

# IQ Modular™

## The most comprehensive range of infrastructure for your broadcast or media business

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Snell  
Advanced  
Media



## Introduction

### **IQ Modular**

**SAM's IQ Modular technology is ideally placed to offer the future proof solution that you require. As the HD and UHD digital rollout gathers pace, customers are looking to protect their investments by ensuring they are capable of supporting not only the HD 1.5Gbps standards of today, but future progressive video formats such as 2160p50/59 12Gbps standards.**

By introducing a broader range of 12G/3G/HD/SD products based on the latest audio and video process interfacing technology IQ Modular is ideally placed to offer the future proof solution that you require.

Plus the added choice of multi-channel fiber optic or integrated fiber solutions frees you from the limitations of copper infrastructure and enables you to work with coax and fiber in planning cost effective HD expansion and 3G signal delivery.

Including a host of video processing features such as format conversion, synchronization, agile input switching and metadata handling along with the comprehensive monitoring and control offered by RollCall, IQ provides a reliable, cost-effective base for all infrastructure requirements.

Audio is also comprehensively handled with standard features such as embedding, de-embedding, channel routing, downmixing and delay catered for alongside more advanced multi-channel functions such as Dolby E/D encoding or decoding, stereo to 5.1 surround sound upmixing and loudness control to CALM and EBU-R128 standards.



**Extensive Fiber Solutions for Mixed Connectivity Environments Plus Unrivalled Audio Processing Capabilities**



# Designed to support the most demanding mission critical applications in the media and broadcast industry, and built on more than 20 years of engineering excellence the IQ Modular range from SAM comprises more than 400 modules which boast:

- Fully hot swappable, flexible architecture
- UHD-4K & IP integration
- Advanced audio handling
- Integrated fiber
- Facility wide control, monitoring and QC
- 20 Modules in 4RU with full redundancy, or 16 in 3RU
- Over 250,000 modules in service globally



## Range Overview

Capable of performing a wide range of video and audio processing tasks from synchronization, audio embedding / de-embedding through to high quality format conversion for HD/ SD-SDI signals, or Dolby Encoding / Decoding for audio signals the IQ Modular range offers you an expandable feature set with the versatility to adapt to your changing business demands.

## Cross Compatible Architecture

Available in 1RU, 3RU and 4RU the IQ Modular frames provide excellent product power density and enable complete redundancy from power, to cooling, to communications. IQ Modular enclosures and modules are cross compatible, protecting your investment throughout the life of your media and broadcast infrastructure.

## Built in Intelligence

All card settings are stored on-board the module, so once set up they can be used in any part of the system without further adjustment. SAMs RollMechanic application enables further set-up simplicity through it's use of cloning module settings to multiple modules of the same type in the system.

## 3G Ready

Not yet ready to go 3G but want to protect your investment? No problem all 3G compatible modules are available for the same price as their HD predecessors ensuring a seamless transition to 1080p operations when your schedule demands it.

## Advanced Audio Processing

Audio is comprehensively handled with standard features - such as embedding, de-embedding, channel routing, downmixing and delay – alongside more advanced multi-channel functions such as Dolby E/D encoding or decoding, stereo to 5.1 surround sound upmixing, and loudness.

## Integrated Fiber

In addition to a wide range of high density multi-channel 1080p / 3Gbps fiber modules the IQ Modular range also offers integrated fiber solutions freeing you from the limitations of copper infrastructure and enabling you to work with coax and fiber in planning cost effective HD/UHD expansion and 1080p / 3Gbps signal delivery.





## Advanced Control and Monitoring

Not only does the IQ Modular range include built in control and monitoring as standard, it is also the only modular solution on the market to offer full SNMP control and monitoring compliance on every module, delivering the most advanced control and monitoring solution across your entire media and broadcast workflow.

## Automated QC

Hyperion is a new generation of monitoring and control designed to assist operators monitor content more efficiently and ensure contractual and legal obligations are met. Hyperion's content monitoring aspects of Stillish & Blackish are measuring whether the content is viewable and contains enough motion to be valid. These parameters combined with audiomonitoring and metadata validation provide an automated means of content QC allowing true monitoring by exception.



~ Hyperion QC on screen monitoring display



## Contents

<b>IQ Applications</b>	<b>9</b>
<b>Frames &amp; Hardware</b>	<b>15</b>
IQH4B IQ 4U Modular Enclosure	16
IQH3B IQ 3U Modular Enclosure	18
IQH1A IQ 1U Modular Enclosure	20
IQH1P IQ 1U Passive Modular Enclosure	21
RPAN Router Control Panel	23
RollPod 3U Configurable Control Panel	24
RollPod 1U Configurable Control Panel	26
IQSPI00 Serial Port Interface with RollNet	28
IQGPI00-04 Configurable General Purpose Interface	29
RollUSB RollCall USB Interface Unit	30
<b>Network Management Solutions</b>	<b>31</b>
Control & Monitoring Bringing Peace of Mind to Broadcast Operations	32
RollMap Infrastructure Management System for Broadcast Operations	36
RollSNMP Monitor SNMP Compliant Agents from other Vendors within RollMap	38
RollMIDSRV RollCall Middleware Services - System Logging and Monitoring Services for RollCall	40
RollCall Control Panel - Windows PC Based Configuration and Control	42
RollMechanic RollCall Network Management Tool	43
<b>IP Production</b>	<b>45</b>
IQMIX25/26 3G/HD/SD-SDI Multi-Channel IP Transceiver	46
IQMIX40/41 3G/HD/SD-SDI Multi-Channel IP Transceiver	50
IQMIX10 3G/HD/SD-SDI Multi-Channel IP Transceiver	54
IQEDGE Compact, Powerful, reliable IP Processing Solution	57
IQAMD40 Multi-Channel MADi to IP Interfacing Module	58
IQCAG00 IP Control Aggregation Gateway	60
<b>Intelligent Monitoring</b>	<b>61</b>
Hyperion Bringing Human Intelligence to Automated Broadcast Monitoring	62
IQHIP10 3G/HD/SD-SDI Hyperion Intelligent Processor Module	66
Media Biometrics Tracking Content – The Power Of Media Biometrics	70
IQSAM00 3G/HD/SD-SDI Signal Assurance Module	74
IQLAM00 3G/HD/SD-SDI Logo Assurance Module	78
IQMBG80 8 Channel 3G/HD/SD-SDI Media Biometrics Generator	81
IQQSM00 3G/HD/SD-SDI Quad Split Monitor	83
IQASI82 Dual ASI Transport Stream Monitor and Switch	85
IQDBT105 DVB-T2 & DVB-T Monitoring Receiver	87
<b>SD-HD Conversion</b>	<b>89</b>
IQMCC30 3G/HD/SD-SDI Motion Compensated Frame Rate Converter	90
IQUDC34 3G/HD/SD-SDI Universal Up, Down and Cross Converter	94
IQQMD00 Quad-link-SDI Down Converter for Ultra HD Signals	99
IQDNC30 3G/HD-SDI Down Converter with Frame Synchronizer	101
IQDNC31 Dual Channel 3G/HD-SDI Down Converter with Frame Synchronizer	105
IQDNC32 3G/HD/SD-SDI Down Converter with AES I/O	109
IQDNC33 3G/HD/SD-SDI Dual Down Converter with AES I/O	113
IQDNC34 Dual Channel 3G/HD-SDI Down Converter with Analog Outputs	118
IQUPC30 SDI Upconverter with Frame Synchronizer	122
IQUPC31 Dual Channel SDI Upconverter with Frame Synchronizer	126
IQUPC32 3G/HD/SD-SDI Up Converter with AES I/O	130
IQUPC33 3G/HD/SD-SDI Dual Up Converter with AES I/O	134
IQGBX40 12G Gearbox and Converter for UHD-4K SDI signals	139
IQUDC30 3G/HD/SD-SDI Up, Down and Cross Converter	142
IQUDC31 Dual Channel 3G/HD/SD-SDI Up, Down and Cross Converter	146
IQUDC32 3G/HD/SD-SDI Up, Down and Cross Converter with AES I/O	150
IQUDC33 3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O	154

## Contents

<b>Fiber</b>	<b>159</b>
IQGBE40/80 Ethernet Fiber Converter with 4/8 Port Switch	160
IQOTR32 3G/HD/SD-SDI Flexible Fiber Optic Interfacing Module	163
IQFDA30 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O	167
IQFDA31 Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O	169
IQOTX80-84 3G/HD/SD-SDI Multi-Channel Fiber Transmitter	172
IQORX80 3G/HD/SD-SDI Multi-Channel Fiber Receiver	174
IQOTR40-45 3G/HD/SD-SDI Multi-Channel Fiber Transceiver	176
IQCWM09-16 Fiber Optic Coarse Wave Division Multiplexing Module	179
IQPFS22/24 Dual and Quad 1 x 2 Fiber Optic Splitter Modules	181
IQPFS41-43 Single, Dual and Triple 1 x 4 Fiber Optic Splitter Modules	183
IQPFC21-23 Single, Dual and Triple 2 x 2 Fiber Optic Coupler Modules	185
<b>Synchronizers</b>	<b>187</b>
IQSYN33 3G/HD/SD-SDI Frame Synchronizer with Advanced Audio Processing	188
IQSYN50 3G/HD/SD-SDI Frame Synchronizer	192
IQSYN30 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing	194
IQSYN31 Dual 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing	197
IQSYN11 3G/HD/SD-SDI Dual Channel Frame Synchronizer	201
IQSYN00 SDI Frame Synchronizer with Embedded Audio Processing	204
IQMUX10/12 8 Channel Digital Audio Embedder with Synchronizer	207
IQDMX10/12 SDI Synchronizer and 8 Channel AES De-embedder	210
IQDMX20 Frame Synchronizer with 4 Channel Analog Audio De-embedder	213
<b>Embedded Audio</b>	<b>217</b>
IQMUX33 3G/HD/SD-SDI Embedder and Frame Synchronizer with AES/EBU and Analog Audio Inputs	218
IQMUX30 3G/HD/SD-SDI Embedder for 8 AES/EBU Audio Streams	222
IQMUX31 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams	225
IQMUX32 Dual 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams	228
IQMUX34 3G/HD/SD-SDI Embedder for 8 Analog Audio Channels	232
IQMUX60/61 Universal Audio Embedder	235
IQDMX33 3G/HD/SD-SDI De-embedder and Frame Synchronizer with AES/EBU and Analog Audio Outputs	238
IQDMX30 3G/HD/SD-SDI De-embedder for 8 AES/EBU Audio Streams	242
IQDMX31 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams	245
IQDMX32 Dual 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams	248
IQDMX34 3G/HD/SD-SDI De-embedder for 8 Analog Audio Channels	252
IQBRK30 3G/HD/SD-SDI Re-embedder for 4 AES/EBU Audio Streams	255
<b>Distribution</b>	<b>259</b>
IQSDA41 12G-SDI Re-clocking Distribution Amplifier with RollCall	260
IQSDA42 Multi-channel 12G-SDI Re-clocking Distribution Amplifier with RollCall	261
IQSDA35 Dual Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with selectable outputs	263
IQSDA30 Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall	265
IQSDA32 3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall	267
IQSDA31 Dual Channel 3G/HD/SD-SDI Equalizing Distribution Amplifier	269
IQSDA33 3G/HD/SD-SDI Fan-out Distribution Amplifier	270
IQSDA34 Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with RollCall	271
IQSDA10/11 Reclocking SD-SDI Distribution Amplifier	273
IQVDA00/01 Analog Video Distribution Amplifier with RollCall Control	276
IQVDA02/03 Analog Video Distribution Amplifier	278
IQAES00 Single/Dual Stream AES/EBU Distribution Amplifier	280
IQADA00 Single/Dual Channel Analog Audio Distribution Amplifier	283
IQADA01 Analog Audio Distribution Amplifier - 2 x 7 Outputs	285
<b>Video Processing</b>	<b>287</b>
IQLDK30 3G/HD/SD-SDI Logo Inserter & Keyer	288
IQDLY30 3G/HD/SD-SDI Video Delay Module	291

## Contents

### Audio Processing

IQDBD00/01 HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Decoder	293
IQDBE00-03 HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Encoder	294
IQEAS00 3G/HD/SD-SDI Embedded Audio Shuffler and Processor	298
IQDLY20/21 AES and Analog Audio Delay and Shuffler Module	301

### Analog/Digital Conversion

IQDAVM Video and Audio Monitoring Encoder	304
IQDSEDES Monitoring Encoder and Distribution Amplifier	307
IQAAD00 4 Channel Audio Analog to Digital Converter	308
IQDAA00 4 Channel Digital to Analog Audio Converter	311

### Routing

IQHCO50 3G/HD/SD-SDI Signal Protection Module	313
IQHCO51 3G/HD/SD-SDI Synchronized Signal Protection Module	317
IQASI25 ASI Transport Stream Switch and DA	318
IQDCO SDI Changeover Switch	321
IQACO Analog Video Changeover Switch	324
IQSRT00 HD/SD-SDI 5 x 2 Router	326





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# IQ Applications

An elegant solution to modern day content workflow and control.

## **Addressing your needs:**

SAM offers a range of over 400 IQ modules with different levels of functionality at price points to suit every application:

### **Multi-feature integration**

These modules incorporate many common features on a single card, resulting in the need for a reduced number of cards per installation as well as the benefits of the associated overhead savings.

### **Single function**

Simple to operate, well featured with an excellent cost to performance ratio.

### **Cost sensitive**

Offering basic functionality in either single channel format, or dual channel for space constrained applications.

# Advanced Audio Processing

## Providing multi-channel audio signal processing and manipulation

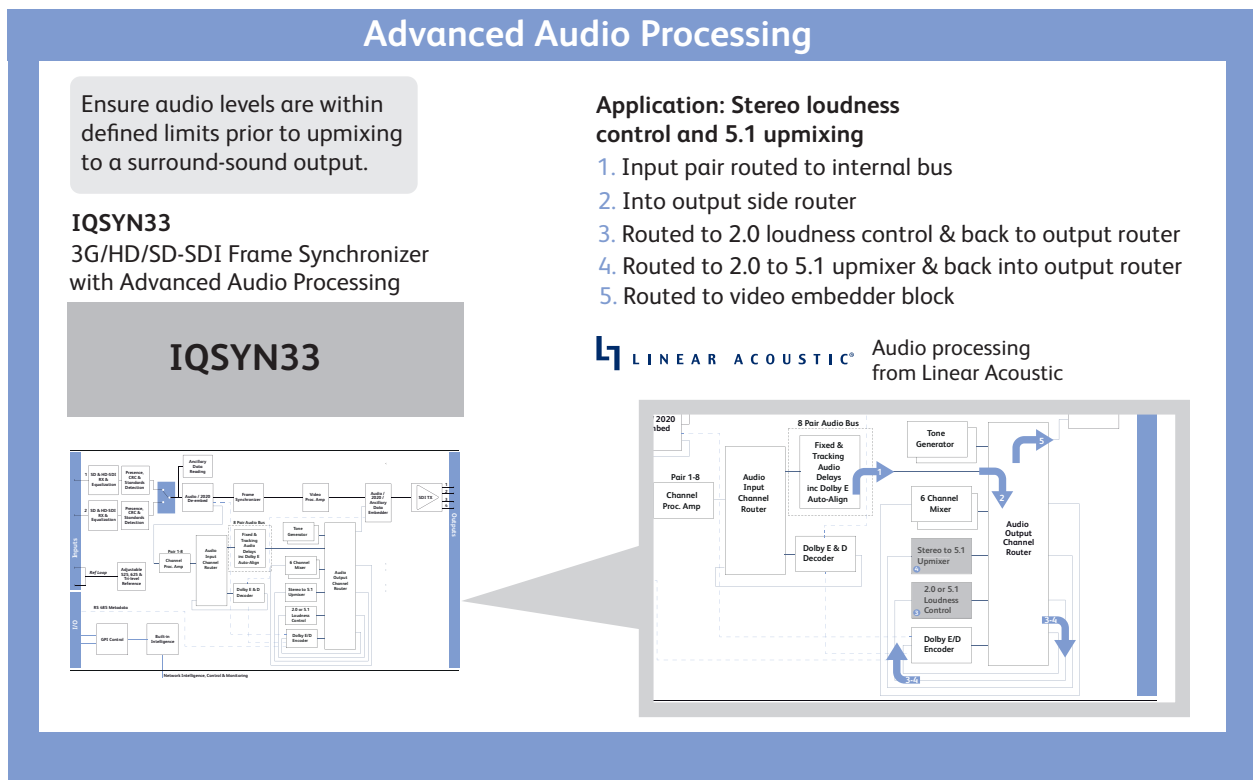
The best HDTV broadcasts combine great picture quality with high resolution audio in order to bring those pictures to life. To this end, providing tools for re-purposing content to maximize its future value and potential is a key focus of the new IQ range of video and audio processing modules.

Based around a set of flexible audio routers, SAM uses proven technology developed by Linear Acoustic, a leader in this field, to enable audio upmixing and loudness control to ensure your HD transmissions contain the best high quality surround-sound at the correct levels.

Variations in loudness between programs and stations is a well known issue. Not only is the problem found during programs – the issue of loud commercials, where volume levels jump during commercial breaks, is a common complaint amongst digital television viewers and can even drive them away from a channel.

The solution is monitoring of channel output, however in today's cost-conscious business environment there is little scope to provide appropriate levels of staffing to monitor and control audio levels manually. There exists a requirement for intelligent technologies that can address the issue as part of a wider scale transmission system.

In addition, there is the question of stereo versus multi-channel sound. Most SD programs contain stereo audio channels and so when upconverting this video content to HD, to provide the best viewing experience, the audio should also be converted (or upmixed) to provide a 5.1 surround sound mix.



In this example we have an embedded feed that has a stereo audio source which we need to ensure remains below our house loudness limit, but we want to transmit in 5.1 surround sound to give our viewers that high quality video and audio experience.

Using the IQSYN33 module, we can route the audio through the unit to the output side router, then round to the stereo loudness block where we can monitor and control the loudness level (loudness values can be monitored and reported over the RollCall network to a Centra monitoring system if required).

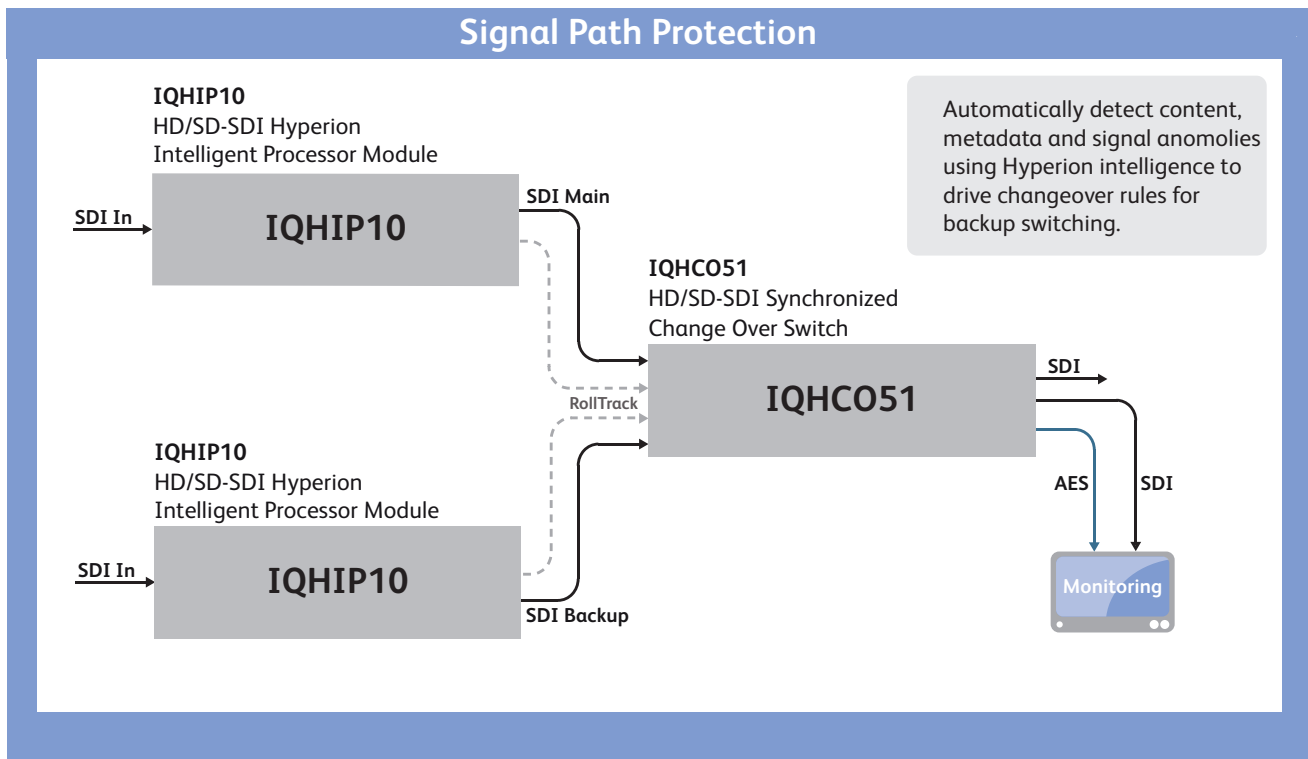
From the loudness block we can route the signal to the upmixing block where it will be detected as a stereo source and upmixed to surround sound 5.1 signals. This output can then be routed to the audio embedders for re-embedding into the video signal.

This is just one example of many applications where the IQSYN33 platform provides an effective solution.



# Signal Protection Solutions

Ensuring your valuable content stays on-air



For a broadcaster or service provider keeping the content on-air regardless of any issues that may occur is of the utmost importance. Both customer satisfaction and revenue can depend on it and in some cases penalty charges may apply if content is offline for more than a certain amount of time. Ensuring that these critical signals are adequately protected becomes a fundamental part of every system design and SAM provides a range of products that not only meet these requirements but can take them to the next level.

This application shows how the IQHIP10 Hyperion content monitoring module can be used in conjunction with the IQHCO51 signal protection module to provide an increased level of signal quality assurance (QA) and an automated changeover trigger via background intelligence from RollTrack messaging.

The IQHCO51 module uses a powerful automated rules engine to monitor both the main and backup inputs for signal integrity. It will perform either an instant or time delayed change over to the back up source should an error or failure occur in the main signal.

This delayed change over feature can be very important for customers who want to ignore glitches and only change over when a serious signal problem occurs. Timings can be independently set for failure and error conditions, meaning that the operator can change instantly on an input loss condition but delay if there are CRC errors, for example.

When combined with the IQHIP10 module much more subtle signal parameters such as video levels and motion, audio level and phase or type, and metadata values such as wide screen signalling, closed caption or timecode can be monitored. The IQHCO51 module can then be triggered by Rolltrack events to enable automated back up control. This function is included within the rules engine and so can run side-by-side with the on-board automated operation or GPI trigger inputs.

The IQHCO51 features a clean switching operation with independent input signal delays. This enables the operator to delay the back up path in order to allow for any extra processing on the main signal.

SDI monitoring outputs are available to either monitor the main path selection, or to check the integrity and suitability of the back up chain.

A cost-effective basic switching version called IQHCO50 is also available for emergency switching applications.

# Flexible Fiber Infrastructure

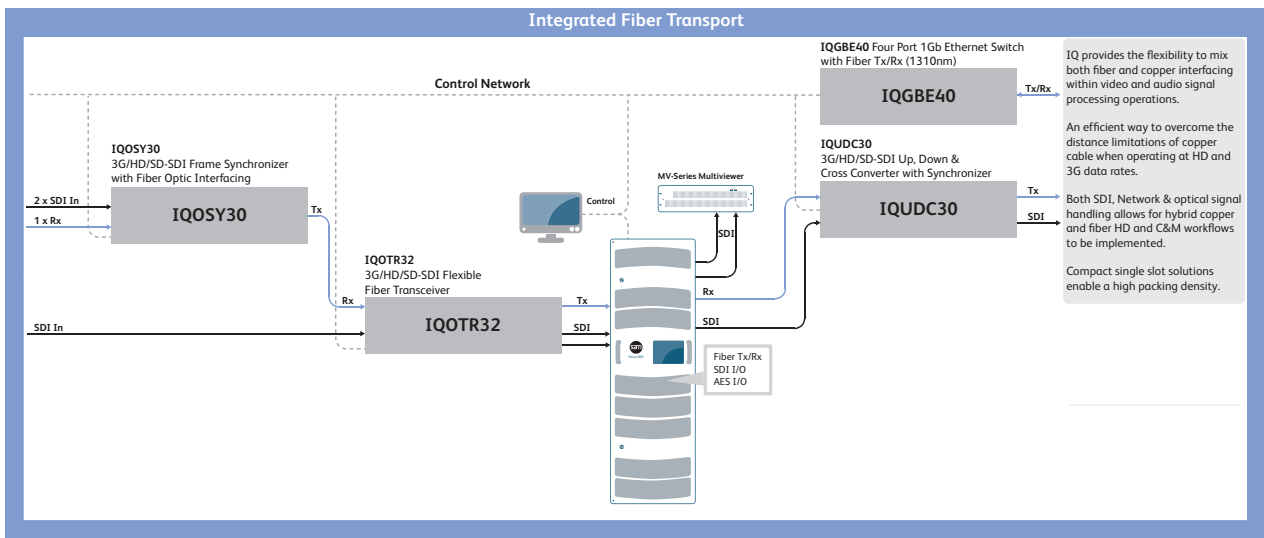
## Ideally suited to multi-format workflows

The first example of this is the IQOSY30 frame synchronizer. Based on the SAMs proven synchronizer technology, this module provides the same video and audio processing feature set with the additional flexibility of fiber inputs and/or outputs.

Intelligent re-profiling of the PCB has allowed this unit to retain its single slot width whilst adding the new fiber interfacing functionality.

Another example is our new flexible fiber optic transceiver - the IQOTR32. Designed to fit around SDI routers, it enables the flexibility to provide either copper or fiber inputs to be switched to both copper and fiber outputs. This means that local signals can be sent over copper, to/from the existing router, whilst more remote areas can be reached or received over the fiber network.

For all these IQ modules, various types of fiber SFP plug-in can be installed in the rear panel to provide fiber transmitting, receiving, or both in order to provide our customers with maximum flexibility.



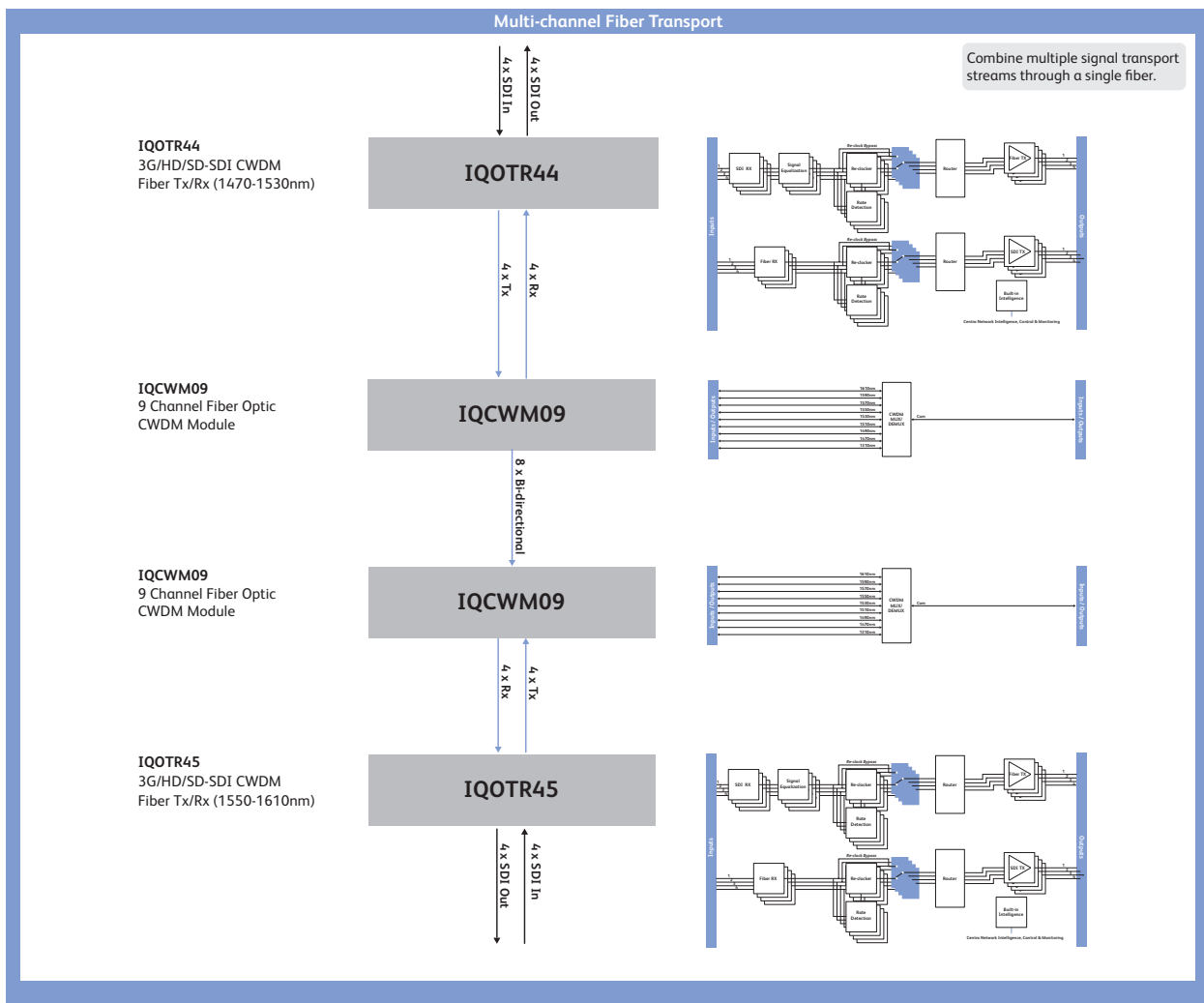
# Multi-Channel Fiber Transport

## Providing Compact and Efficient Signal Distribution

Continuing with the fiber theme, another popular application combines a number of signals into a single fiber for transmission between sites, or between buildings. SAM has a range of new IQ modules that will allow video signals to be converted into CWDM (complex wave division multiplexed) fiber signals that can include up to 16 channels in a single fiber.

Featuring transmitter, receiver and transceiver modules, there will be a number of converter and combiner modules to allow several levels of CWDM functionality from 9, 10 to 16 channels for both single and bi-directional transport of SDI signals.

Alternatively these modules can be fitted with fiber SFP plug-in transmitters of the same wavelength to enable multiple signal transport from a single card (up to 8 SDI streams per module) for applications where HD/3G signals need to move significant distances, for example between floors within a facility.





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## Frames & Hardware

A key requirement for any modular system is the ease with which the desired combination of functions can be achieved. Limitations on how modules can be housed and restrictions on how they can be combined represent unnecessary problems for the system integrator. For this reason, the IQ Modular range has been designed to provide the maximum degree of flexibility and freedom from constraints.

IQH enclosures offer industry leading, high-density delivery of modular solutions. The enclosures are available in three sizes: 1U housing up to four modules, 3U housing up to 16 modules and 4U, designed for IP systems, housing up to 20 modules. Full SNMP control and monitoring of all RollCall enabled modules is included via Ethernet. Dual-redundant power supply options are available without any loss of capacity, and all enclosures feature integral cooling.

A passive 1U enclosure, IQH1P, housing up to 6 modules is also available for cost effective housing of passive fiber optic splitter and combiner modules.

Alongside the enclosures sits a wide range of configurable hardware control panel options including RollPod a fully user configurable control panel ideally suited to IQ Modular control and configuration in operational environments when interfacing to RollCall enabled equipment.

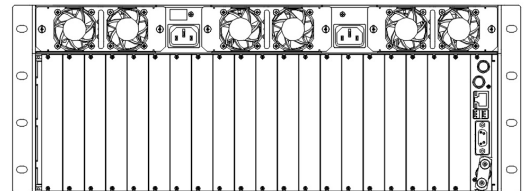
IQH4B enclosures offer industry leading, high-density delivery of modular solutions. With up to 700W of module power available this 4U rack unit enclosure accepts up to 20 modules, has dual redundant PSUs and in service replaceable cooling fans. Analog reference signals can be distributed through the enclosures via 2 connections that can be independently selected by the installed modules. RollCall control and monitoring is included as standard using a Gateway control card that has it's own module style rear connector, thus providing a future proof upgrade path as communication standards evolve. Full SNMP control and monitoring functionality is also available over Ethernet.



### Features

- 20 single or 10 double width modules (or any combination)
- Integrated web browser based RollCall configuration and control
- SNMP Control and Monitoring of ALL RollCall enabled IQ modules as standard
- Dual redundant network architecture over Ethernet and RollNet enables mission critical control applications to function even if a complete network failure occurs
- Plug-in gateway communications card to enable RollCall via RollNet, RS232/485/422 and RollCall over TCP/IP control, with support for upgradeable connectivity to handle future communication standards
- 2 x analog reference signal distribution for dual standard (Bi-Level or Tri-Level), dual video standard (SD or HD), and reference redundancy applications (Note: Only applicable to modules with -B order codes)
- Hot swappable redundant power supplies and in-service replaceable fan units
- Optimum use of rack space – frames do not require any additional ventilation spacing
- Variable fan speed, dependent upon load and ambient temperature
- Full chassis monitoring, including Inlet and Outlet temperature, PSU, fan and module status
- Full CE and UL compliance

### Order codes



#### IQH4B-S-P

Enclosure with Dual Redundant PSU and Ethernet/SNMP Compatible RollCall Gateway Card. 20 module slots.

#### Accessory

#### IQH4B-PSU

Single PSU for use as a cold spare or replacement.

#### Accessory

#### IQH4B-FAN

Dual Fan unit for use as a cold spare or replacement

#### Accessory

#### IQH3B-E-GATEW

Ethernet/SNMP compatible RollCall Gateway card for IQH4B and IQH3B enclosures.

Note: Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Code 'A' or 'B' order codes may be used when installing modules in the IQH4B and IQH3B enclosures. Code 'A' order codes must be used when installing modules in the IQH3A enclosures.

**IQ Modular Chassis Configuration**

Check to AutoRefresh (50sec)

**System Information**

Unit Name: IQH4BIM4-S	RollNet Address: 0x01
Serial Number: 557013880	LogServer Name: LogServerIPDemo
Software Version(s): 5.35.23 [Appllet 4.16.15]	LogServer Address: 0000.01.8E
Ethernet IP Address: 172.19.160.131	IP Bridged To: Unconnected
Ethernet Subnet Mask: 255.255.224.0	SNMP Agent: Disabled
Ethernet Gateway IP: 172.19.160.1	SNMP 1st Trap: 0.0.0.0
Uptime (d:h:m:s): 000.00:34.00	

**Environmental Information**

Left PSU: OK	Temperature In: OK (24)
Right PSU: OK	Temperature Out: OK (28)
Fans: OK Normal	
+7.5 Volt Rail: OK	Module(s): WARN:5 EXTRA MODULE
-7.5 Volt Rail: OK	RollNet Recon: OK

**Frame Status**

Slot	Assigned Name	Module Type	ID#	Status	Slot	Assigned Name	Module Type	ID#	Status
1	01 IQMIX2500	IQMIX2500	793	Extra	11				
2					12				
3	03 IQMIX2500	IQMIX2500	793	Extra	13				
4					14				
5	05 IQMIX2500	IQMIX2500	793	Extra	15				
6					16				
7	07 IQMIX2500	IQMIX2500	793	Extra	17				
8					18				
9	09 IQMIX2500	IQMIX2500	793	Extra	19				
10					20				

IQH4B Http based frame status overview

**Configuration**

Time Sync Configuration: 21:172.19.164.231

SDI Selection: SDI 1 / SDI 2

Information Selected:  Missed Input Status  Wide Output Status  Network Status

**Interface Configuration**

Domain	Current	NEW
ID	101	101

**Card Firmware**

Current: IQMIX2500\_250\_2022-8\_RFC4175\_AUD\_L24\_ANG 0011-82420215.8b

NEW: IQMIX2500\_250\_2022-8\_RFC4175\_AUD\_L24\_ANG

Card must be restarted before changes to firmware will become active

IQH4B RollCall control panel view

### Technical Specification

#### Inputs, Outputs and Controls

##### Inputs/Outputs

RollCall remote control	BNC connector
RS422/485/232 remote control	9-pin D-type connector
RollCall/SNMP over TCP/IP	10/100 baseT Ethernet

##### Preset Controls

Unit address code set switches	2 Hex switches 0 to F
Communications mode switch	Select RS232, RS485 or RS422 interface

#### Additional Controls via RollCall Remote Control System

Full Control via web browser based Java RollCall control panel (available from chassis), any hardware RollCall control surface or standard RollCall Control Panel PC Application.

#### Specifications

Module complement	10 double width or 20 single width (or combinations of both) fitted vertically
Module card dimensions	100mm wide, 340mm long
Module rear panel dimensions	129mm high, 40.4mm (double width) 20mm (single width) wide

#### Power

Input voltage range	100-250 V 50/60 Hz
Input connector	IEC320 C14
Power consumption	1000 VA maximum
Modules power dissipation	700 W /700 LU maximum
Output	+12 V and -7.5 V $\pm$ 5%

Note that all modules have built-in power supply fuses.

#### CE Performance Information

Environment	Commercial and light industrial E2 immunity, controlled EMC E4 emissions
Peak mains inrush current following a 5 second mains interruption	35A @ 230VAC

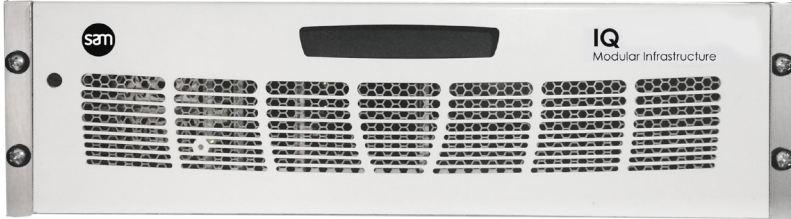
#### Reference

Analog Reference	2 x Analog Reference inputs Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack
Analog Reference Return Loss	SD bi-level > -40 dB to 5.5 MHz HD tri-level > -30 dB to 30 MHz

#### Mechanical

Temperature range	0 to 40° C operating, -20 to +85° storage. A temperature and load sensitive cooling fan is fitted
Humidity range	10 to 85% (non condensing)
Case type	4U rack mounting aluminum case
Dimensions	483mm (445mm behind rack location bracket) x 485mm x 180mm (w, d, h)
Weight	Approximately 13 kg without modules. Approximately 22 kg fully populated

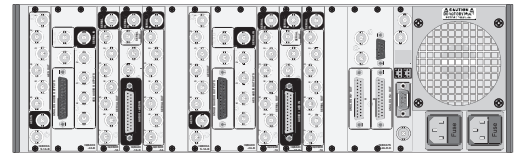
IQH3B enclosures offer industry leading, high-density delivery of modular solutions. The 3U rack unit accepts up to 16 modules, and has dual redundant PSUs and cooling fans. Analog reference signals can be distributed through the enclosures via 2 connections that can be independently selected by the installed modules. RollCall control and monitoring is included as standard using a Gateway control card that has it's own module style rear connector, thus providing a future proof upgrade path as communication standards evolve. Full SNMP control and monitoring functionality is also available over Ethernet.



### Features

- 16 single or 8 double width modules (or any combination)
- Integrated web browser based RollCall configuration and control
- SNMP Control and Monitoring of ALL RollCall enabled IQ modules as standard
- Dual redundant network architecture over Ethernet and RollNet enables mission critical control applications to function even if a complete network failure occurs
- Plug-in gateway communications card to enable RollCall via RollNet, RS232/485/422 and RollCall over TCP/IP control, with support for upgradeable connectivity to handle future communication standards
- 2 x analog reference signal distribution for dual standard (Bi-Level or Tri-Level), dual video standard (SD or HD), and reference redundancy applications (Note: Only applicable to modules with -B order codes)
- Hot swappable redundant power supplies with PSU status reporting through GPIs on the Gateway control card rear panel
- Optimum use of rack space – frames do not require any additional ventilation spacing
- Dual redundant in-service removable fan unit
- Variable fan speed, dependent upon load and ambient temperature
- Full chassis monitoring, including Inlet and Outlet temperature, fan condition and module status
- Full CE and UL compliance

### Order codes



#### IQH3B-S-0

Enclosure with Single PSU and Ethernet/SNMP Compatible RollCall Gateway Card. 16 module slots.

#### IQH3B-S-P

Enclosure with Dual Redundant PSU and Ethernet/SNMP Compatible RollCall Gateway Card. 16 module slots.

#### IQH3B-SQP

100 load unit quiet enclosure with Dual Redundant PSU and Ethernet/SNMP Compatible RollCall Gateway Card. 16 module slots.

#### Accessory

##### IQH3B-PSU

Single PSU as cold spare or upgrade to Dual PSU configuration.

#### Accessory

##### IQH3B-FAN

Dual Fan unit for use as cold spare or replacement

#### Accessory

##### IQH3B-E-GATEW

Ethernet/SNMP compatible RollCall Gateway card for IQH3B enclosures.

Note: Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Code 'A' or 'B' order codes may be used when installing modules in the IQH3B enclosure. Code 'A' order codes must be used when installing modules in the IQH3A enclosures.

**System Information**

Unit Name:	IQH3UM4-S	RollNet Address:	0x01
Serial Number:	A38120075	LogServer Name:	No Active Logger
Software Version(s):	6.07.17 [Applet: 4.0.26 ]	LogServer Address:	Not In Use
Ethernet IP Address:	172.19.81.49	IP Bridged To:	Unconnected
Ethernet Subnet Mask:	255.255.224.0	SNMP Agent:	Disabled
Ethernet Gateway IP:	172.19.71.20	SNMP 1st Trap:	0.0.0.0
Uptime (d:hh:mm):	000:06:39:00		

**Environmental Information**

Left PSU:	Not Used	Temperature In:	OK (30)
Right PSU:	OK	Temperature Out:	OK (26)
Fan:	OK Low	Module(s):	3 EXTRA MODULES
+7.5 Volt Rail:	OK	RollNet Recon:	OK
-7.5 Volt Rail:	OK		

**Frame Status**

Slot	Assigned Name	Module Type	ID#	Status	Slot	Assigned Name	Module Type	ID#	Status
1				--	9				--
2				--	10				--
3				--	11				--
4				--	12				--
5				--	13				--
6	06.IQUAV10	IQUAV10	545	Extra	14	14.IQUDC00	IQUDC00	430	Extra
7	07.IQSYN22	IQSYN22	538	Extra	15				--
8				--	16				--

IQH3B Http based frame status overview

**Video Input Settings**

Input Select	Valid Input Standards
1	1080i23p
2	1080i23p
	1080i24p
	1080i24f
	1080i25i
	1080i25p
	1080i25p
	1080i25i

**CRCE4H Errors**

CRCE4H Errors	Time Since Last Error	Reset Counts
0		Reset Counts

**ARC Errors**

ARC Errors	Time Since Last Error	Reset Counts
0		2:10

IQH3B Web browser based Java RollCall control panel

### Technical Specification

#### Inputs, Outputs and Controls

##### Inputs/Outputs

RollCall remote control	BNC connector
RS422/485/232 remote control	9-pin D-type connector
RollCall/SNMP over TCP/IP	10/100 baseT Ethernet

##### Presets Controls

Unit address code set switches	2 Hex switches 0 to F
Communications mode switch	Select RS232, RS485 or RS422 interface

#### Additional Controls via RollCall Remote

##### Control System

Full Control via web browser based Java RollCall control panel (available from chassis), any hardware RollCall control surface or standard RollCall Control Panel PC Application.

#### Specifications

Module complement	8 double width or 16 single width (or combinations of both) fitted vertically
Module card dimensions	100mm wide, 340mm long
Module rear panel dimensions	129mm high, 40.4mm (double width) 20mm (single width) wide

#### Power

Input voltage range	100-250 V 50/60 Hz
Input connector	IEC320 Fused 4 A(T)
Standby switch	Behind drop-down front panel
Power consumption	300 VA maximum
Modules power dissipation	210 W /165 LU maximum (100LU for IQH3BQ)
Output	+7.5 V and -7.5 V ±5%

Note that all modules have built-in power supply fuses.

#### CE Performance Information

Environment	Commercial and light industrial E2 immunity, controlled EMC E4 emissions
Peak mains inrush current following a 5 second mains interruption	10A

#### Reference

Analog Reference	2 x Analog Reference inputs Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 35 dB to 30 MHz

#### Mechanical

Temperature range	0 to 45° C operating, -20 to +85° storage. A temperature and load sensitive cooling fan is fitted
Humidity range	10 to 85% (non condensing)
Case type	3U rack mounting aluminum case
Dimensions	483mm (445mm behind rack location bracket) x 490mm x 135mm (w, d, h)
Weight	Approximately 8.25 kg without modules. Approximately 15 kg fully populated

### IQH3B Feature Table:

Feature	IQH3B	IQH3BQ
16 module capacity	✓	✓
Hot swappable modules	✓	✓
Dual PSUs	✓	✓
Dual Cooling Fans	✓	✓
Internal reference distribution	✓	✓
Integrated control browser	✓	✓
Hot swappable Gateway Card	✓	✓
Full enclosure monitoring	✓	✓
Module Power capacity	165LU	100LU

#### Note:

Please refer to the IQH3B and respective IQ module Operators Manuals to determine the module power rating limits (PR) for your required configuration. In the IQH3B Enclosure power is quoted in Load Units (LU), which refers to power (in Watts) taken from the positive rail. The IQH3B has 165 Power loading (LU) units available for modules. The Power Ratings of each module should be added together and the total should not exceed 165 loading units. Modules that do not specify a "Power Rating" should use the total power figure (W) as a power rating value.



IQH1A enclosure offers high-density delivery of HD and SD modular solutions. The 1 rack unit enclosure accepts up to four 'A' & now 'B' style modules and is available with hot-swappable dual redundant PSUs for maximum reliability. The enclosure is fitted with RollCall control and monitoring as standard, including full SNMP control and monitoring functionality over Ethernet.



### Features

- 4 single or 2 double width modules (or any combination)
- Capable of accepting all types of IQ Modules including HD-SDI, SD-SDI, AES and analog audio, analog video and fiber optics
- Dual Redundant power supplies (hot swappable) for high system availability
- Optimum use of rack space – frames do not require any additional ventilation spacing
- Plug-in RollCall enabled via gateway card with TCP/IP, RollNet, SNMP and RS232/422 connectivity
- In service replaceable cooling fans
- Chassis monitoring, including Inlet temperature, fan condition and module status
- Full CE and UL compliance

### Order codes



#### IQH1A-S-P

Enclosure with Dual Redundant PSU & Ethernet/SNMP Compatible RollCall Gateway Card. 4 module slots.

#### Accessory

#### IQH1APSU

Single PSU as cold spare or upgrade to Dual PSU configuration.

#### Accessory

#### IQH1A-S-GATEW

Ethernet/SNMP compatible RollCall Gateway card for IQH1A enclosures.

Note: Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Code 'A' or 'B' order codes may be used when installing modules in the IQH3B enclosure. Code 'A' order codes must be used when installing modules in the IQH3A enclosures.

**IQ Modular Chassis Configuration** Control Applet [JRE Download](#)

Check to AutoRefresh (60sec)

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**System Information**

Unit Name: JMR Lower Frame	RollNet Address: 0x08
Serial Number: 6.0T.15 [ Applet: 3.0.3 ]	LogServer Name: LogserverJR
Ethernet IP Address: 172.19.81.46	LogServer Address: 0000:95:00
Ethernet Subnet Mask: 255.255.224.0	IP Bridged To: Unconnected
Ethernet Gateway IP: 172.19.71.20	SNMP Agent: Disabled
Uptime (d:h:m:s): 000 05:20:00	SNMP 1st Trap: 0.0.0.0

---

**Environmental Information**

Left PSU: OK	Temperature In: OK (33)
Right PSU: OK	Temperature Out: OK (33)
Fan: OK:Medium	
+7.5 Volt Rail: OK	Module(s):
-7.5 Volt Rail: OK	RollNet Recon: OK

---

**Frame Status**

Slot	Assigned Name	Module Type	ID#	Status	Slot	Assigned Name	Module Type	ID#	Status
1				--	9	IQSYN21	IQSYN21	397	OK
2	IQMU42	IQMU42	327	OK	10	IQDEC02	IQDEC02	414	OK
3				--	11				--
4	IQBRTB-D	IQBRTB-D	164	OK	12				--
5	IQLOG00	IQLOG00	461	OK	13	IQSDA02	IQSDA02	464	OK
6	IQSDA02	IQSDA02	464	OK	14	IQBRTB-B	IQBRTB-B	164	OK
7				--	15				--
8				--	16	IQSRT10	IQSRT10	392	OK

IQH1A Http based frame status overview

IQH1A Web browser based Java RollCall control panel

# IQH1A

## IQ 1U Modular Enclosure

### Technical Specification

#### Inputs, Outputs and Controls

##### Inputs/Outputs

RollCall remote control	BNC connector
RS422/485/232	
Remote control	9-pin D-type connector
RollCall/SNMP over TCP/IP	10/100 baseT Ethernet

##### Preset Controls

Unit address code set switches	2 Hex switches 0 to F
Communications mode switch	Select RS232, RS485 or RS422 interface

##### Additional Controls via RollCall Remote

##### Control System

Full Control via RollCall Control Panel PC Application.

#### Specifications

Number of Modules that May be Accommodated 1U:	2 double width or 4 single width (or combinations of both) fitted horizontally
Module card dimensions	100 mm wide, 340mm long
Module rear connector	SD - 64 way HD/SD - 55 way Z pack + 6/9 coax inserts
Module rear panel dimensions	129mm wide (-A versions) 40.4mm (double width) 20mm (single width) high

#### CE Performance Information

Environment	Commercial and light industrial E2 immunity, controlled EMC E4 emissions
Peak mains inrush current following a 5 second mains interruption	16A

#### Power (each PSU)

Input voltage range	100 - 250 V 50/60 Hz
Input connector	IEC320 Fused T3.15AH
Input current	2.5 A
Enclosure power consumption	86.25 W maximum ( $\pm 7.5$ V supplies)
Outputs	+7.5 V and -7.5 V $\pm 10\%$ Fan Supply 11 V $\pm 1$ V 0.7 A typical

Note that all modules have built-in power supply fuses.

#### Mechanical

Temperature range	0 to 40° C operating, -30 to +75° storage. Cooling fan is fitted
Humidity range	10 to 85% (non condensing)
Case type	1U rack mounting aluminum case
Dimensions	483mm x 470mm x 44.4mm (w, d, h)
Depth behind rack ears excluding space for leads	450mm
Weight empty	6.45 Kg
Weight including modules	8.25 Kg

# IQH1P

## IQ 1U Passive Modular Enclosure

IQH1P accepts up to 6 single slot passive modules. Designed to offer cost effective mounting of IQ optical fiber modules, the IQH1P provides no power or control, but can be mounted in either direction in a 19" rack.



### Features

- 6 single or 3 double width modules (or combination)
- Full CE and UL compliance

### Order codes

#### IQH1P

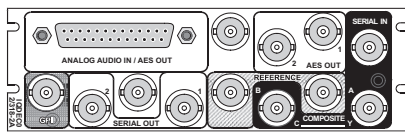
Passive 1U Enclosure with 6 module slots

How do I order the right modules for my enclosure?

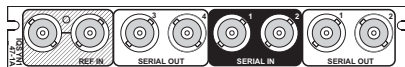
Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Code 'A' or 'B' order codes may be used when installing modules in the IQH3B enclosure however, code 'A' order codes must be used when installing modules in the IQH3A and IQH1A enclosures shown below. Non 'A' order codes relate to all other SAM IQ modular enclosures. Please take time to ensure that the compatible order code is selected to match the chosen enclosure.

### 'B' Style Enclosure

Rear panels with the suffix A or B may be fitted into the 'B' style enclosure as detailed below:



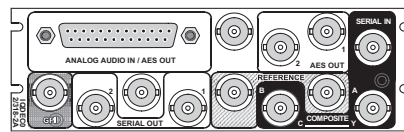
IQDEC0218-2A



IQSYN1047-1B3

### 'A' Style Enclosure

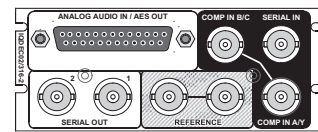
Rear panels with the suffix A may only be fitted into the 'A' style enclosure as detailed below:



IQDEC0218-2A

### All Other Enclosures

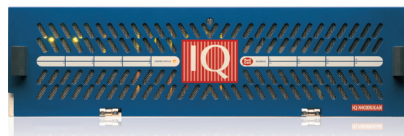
Rear panels without the suffix A may be fitted into all other SAM IQ Modular enclosures as detailed below:



IQDEC0016-2



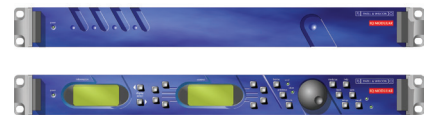
IQH3B-S-0, IQH3B-S-P



IQH3A-S-0, IQH3A-S-P



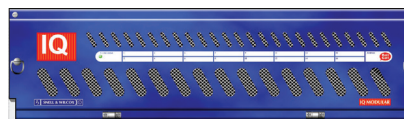
IQH1A-S-P



IQH1S-RC-0, IQH1U-RC-0, IQH1U-RC-AP, Kudos Plus Products



IQH3N-0, IQH3N-P



IQH3A-E-0, IQH3A-E-P, IQH3A-0-0, IQH3A-0-P



IQH3U-RC-0, IQH3U-RC-P

Please contact your local sales office to request a copy of **IQ Modular -1 and -2 Style Rear Panels** document for details of available modules.

The RPAN provides button per source or global x-y control of routers over the RollCall network.

### Features

- Single button per Source
- Single button per Destination (optional)
- Single button per Level (optional)
- 'In-button' LED tally including input signal status
- RollNet high speed connection
- Dual redundant power supply option

### Why should you choose this product?

- Ideal for control of any RollCall compatible router products such as the SAM IQSRT00/10 or IQDMX series
- Triggering of any RollCall command that has a continuous value, for example control of embedded audio shuffling within a module
- Can control any serially interfaced router via an IQSPI00 serial interface module (available separately)



Order Code: RPAN8-1-1



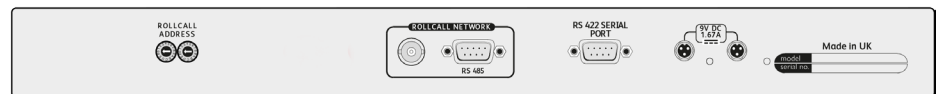
Order Code: RPAN8-1-2



Order Code: RPAN8-8-1



Order Code: RPAN8-8-2



Option - RollPodPSU - RPAN PSU. Upgrade RPAN to dual redundant PSUs, or for use as a cold spare (RPAN is shipped with 1 PSU as standard).

### Technical Specification

#### Features

##### Control Interface

RollNet coax Via BNC connector  
RollCall RS422 Via 9 way D type connector

##### Controls

Hard keys Up to 18

##### Indicators

Hard keys Multi colored (LED illuminated)

#### Specifications

Power Via dual redundant mains operated external adapters  
Input 100-240V AC @ 47 to 63 Hz 1A max  
Output + 9V DC at 1.67 A

Power consumption 5.4VA max  
Temperature range 0° to 40° C operating  
Case type 1U rack mounting steel case  
Dimensions 483 mm x 198 mm x 44.4 mm (w, d, h)  
Weight approximately 1kg

#### Controls via RollCall Remote Control System

Target router(s) configuration  
Hard button LED brightness adjustable  
Power and temperature monitoring

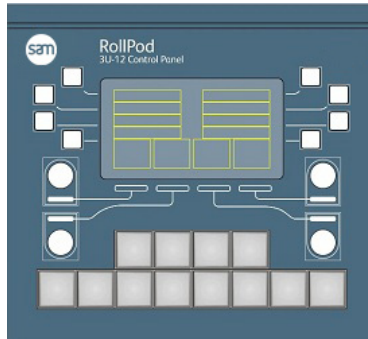
The RollPod is a fully user configurable control panel for interfacing to RollCall enabled equipment. To enable straightforward development of user defined control panels the configuration software tool RollPod Designer enables design and download of user defined configurations to 1U and 3U RollPods, and RollPod code based SAM GPI module (IQGPI00\01).

### Features

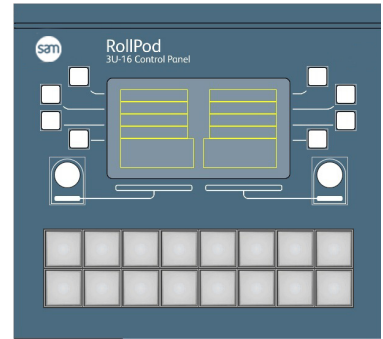
- Programmable control panel for SAM equipment
- Ideally suited to IQ Modular control and configuration in operational environments
- User customisable both locally and through downloaded configuration files
- Alternative custom configured (-C) version also available with enhanced functionality
- Up to 16 assignable push buttons
- Up to 4 shaft encoders
- 8 Soft buttons
- Message and parameter display
- Single control per RollCall function
- In button multi-color LED tally
- User definable 'In-button' labels
- RollCall connection via coaxial cable or Ethernet

### Why should you choose this product?

- Configurable panel to enable control of any function of any unit connected to the RollCall network, for example proc. amp adjustment for video and audio parameters
- Can be supplied pre-configured to meet customers exact control requirements (-C version)
- Compact size enables three panels to be installed in a 19 inch x 3U rack, or single panels to be easily desk mounted



RollPod12 RollPod Configurable Control Panel, 4 shaft encoders and 12 buttons



RollPod16 RollPod Configurable Control Panel, 2 shaft encoders and 16 buttons

The RollPod Designer GUI allows you to browse the RollCall network, select controllable devices then drag and drop the required functionality straight onto the relevant RollPod device from a simple software user interface allowing control of the functions on your SAM Equipment. RollPod Designer is provided with the free RollCall Lite download available from the SAM web-site.



### Order information

*Base Model*

**RollPod3U12E**

RollPod Custom Configurable Control Panel, 4 shaft encoders and 12 buttons.

**RollPod3U16E**

RollPod Custom Configurable Control Panel, 2 shaft encoders and 16 buttons.

*Option*

**RollPodPSU**

RollPod/RPAN PSU, upgrade RollPod to dual redundant PSUs, or for use as a cold spare.

**R-POD3RURACK**

RollPod 3U Mounting Rack. Mounts up to 3 RollPods. Blanking plates included to screen the rack when one or two pods are fitted.

### Technical Specification

**Features**

**Control Interface**

RollNet coaxial Via BNC connector

**Controls**

Soft keys 8  
 Hard keys 12 (RollPod 12), 16 (RollPod 16)  
 Shaft encoders 4 (RollPod 12), 2 (RollPod 16)

**Indicators**

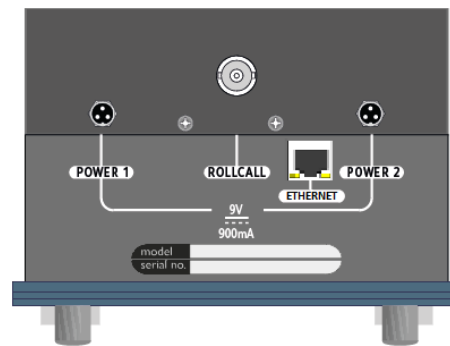
Hard keys Multi colored  
 Soft keys Button with LED indicator  
 Display LCD Bitmap display

**Controls via RollCall Remote Control System**

Full configuration, e.g button assignment, target device setup.  
 LCD display brightness  
 LCD display contrast  
 Hard button LED brightness  
 Soft key LED brightness

**Specifications**

Power Via mains operated external adapter  
 Input 100-240V AC @ 47 to 63 Hz 1A max. Output + 9V DC at 1.67 A  
 Power consumption 7.2 W  
 Temperature range 0° to 40° C operating  
 Case type Special metal case  
 Overall dimensions 140 mm x 130 mm x 70 mm (w,h,d)  
 Hole cutout dimensions 132 mm x 112 mm x 86 mm (w,h,d)  
 Weight 0.94 kg



~ RollPod Configurable Control Panel, including single PSU



The RollPod 1U is a generic control panel for SAM equipment. These panels are ideally suited to the control of products with routing or any other parameter selections and on/off controls. Configurable either using the RollPod Designer software tool, or by SAM directly to the user's required specification the RollPod 1U enables a simple customizable control solution.

### Features

- Generic control panel for SAM equipment
- Ideally suited to IQ Modular control and configuration
- SAM custom configured to user specification
- Up to 40 assignable push buttons
- Dual redundant power supply option
- 'In-button' multi-color LED tally
- User definable 'In-button' labels
- RollCall connection via coaxial cable, Ethernet and/or RS485

### Why should you choose this product?

- Flexible configuration gives the user the ability to use the RollPod 1U for many different applications, for example Router control, emergency switchover, card memory recall, logo on/off, and to control several SAM products simultaneously using a single control panel
- Can be supplied pre-configured to meet customer's exact control requirements (-C version)
- 1U form-factor enables installation directly into a 19" rack or into a control desk. Several RollPods can be used in this way to provide extensive control of products throughout the networks



Order Code: RollPod-1U-8E



Order Code: RollPod-1U-10E



Order Code: RollPod-1U-16E



Order Code: RollPod-1U-18E



Order Code: RollPod-1U-40E

### Order information

#### RollPod1U8E

Customized Operational Configurable Control panel with 8 Hard buttons, Single PSU.

#### RollPod1U10E

Customized Operational Configurable Control panel with 10 Hard buttons, Single PSU.

#### RollPod1U16E

Customized Operational Configurable Control panel with 16 Hard buttons, Single PSU.

#### RollPod1U18E

Customized Operational Configurable Control panel with 18 Hard buttons, Single PSU.

#### RollPod1U40E

Customized Operational Configurable Control panel with 40 Hard buttons, Single PSU.

Option

**RollPod PSU**, upgrade RollPod to dual redundant PSUs, or for use as a cold spare [RollPodPSU].

### Technical Specification

#### Features

##### Control Interface

RollNet coax	Via BNC connector
RollNet RS485	Via 9-way D
RollCall RS422	Via 9 way D

##### Controls

Hard buttons	Up to 40
--------------	----------

##### Indicators

Hard buttons	Multi colored (LED illuminated)
--------------	---------------------------------

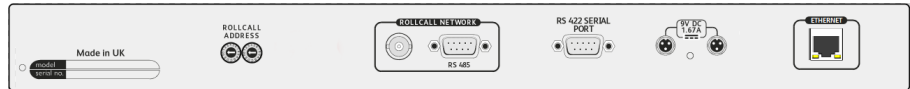
##### Controls via RollCall Remote Control System

Full configuration, e.g button assignment, target device setup. Hard button LED brightness.

Remote monitoring	Temperature and PSU status
-------------------	----------------------------

#### Specifications

Power	Via dual redundant mains operated external adapters Input 100-240 V AC @ 47 to 63 Hz 1 A max Output + 9 V DC at 1.67 A
Power consumption	5.4 W max
Temperature range	0° to 40° C operating
Case type	1U rack mounting steel case
Dimensions	483 mm x 198 mm x 44.4 mm (w,d,h)
Weight	Approximately 2.5 kg



RollPod Rear Panel View

The IQSPI00 provides a programmable serial port interface for external devices and RollCall compatible products.

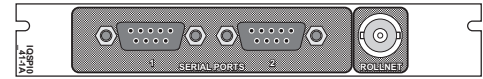
### Features

- Enables control of products on the RollCall network via external serial events
- Interfaces external devices to RollCall i.e. tape machines, routers and disk stores
- Two RS232/RS422 user-configurable ports
- Two further RS422 serial ports
- Multiple actions from one serial message with RollTrack
- External serial events produce RollCall logging messages
- Windows software program for function set-up
- Note: Contact sales office for a list of currently available interfaces to 3rd party equipment

### Why should you choose this module?

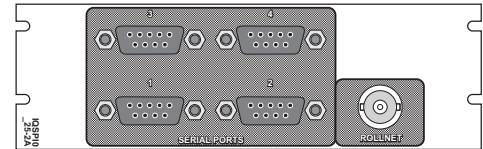
- Enables interfacing to external serial controlled devices
- Provides more flexible control integration either to or from modules in a RollCall network
- External serial panels could control events and commands within a RollCall network
- Can provide multiple actions from one input via the RollTrack mechanism, thus allowing for complex and interrelated functions to occur
- A RollCall based PC application will allow setting up of serial commands to RollCall commands and events

### Order codes



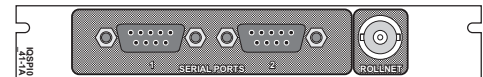
#### IQSPI0041-1A

Serial Port Interface. 2 x D9.  
2 x Serial Ports, 1 x RollNet BNC.



#### IQSPI0025-2A

Serial Port Interface. 4 x D9.  
4 x Serial Ports, 1 x RollNet BNC.



#### IQSPI9900-1A

Custom designed Serial Port Interface. 2 x D9.  
2 x Serial Ports, 1 x RollNet BNC. Contact SAM sales office with requirements

**CSPISOFT** - Pre-written software interfaces for 3rd party equipment

**ROLLDIF** Custom Interface Development - Custom interface design for equipment types not already supported. Contact SAM sales office with requirements

For more details on enclosure types please refer to Frames and Hardware section.

### Technical Specification

#### Inputs and Outputs

##### Serial Ports

Ports 1 and 2	RS232/422 selectable connection via 9 way D-Type
Ports 3 and 4	RS422 connection only via 9 way D-Type

##### Control Interface

RollCall	1 x RollNet Interface via BNC/75 ohm connector Format: 2.5 Mbit/s
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##### Indicators

Data sent	For 4 interfaces
Data received	For 4 interfaces
RS232 mode	RollCall network activity and status

#### Specifications

All ports speed	1200 – 115200 bit/s
-----------------	---------------------

#### Power Consumption

Module power consumption	6 W Max ( A Frames) 5.5 PR (B Frames)
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#### EMC Performance Information

Environment	Commercial and light industrial E2
Peak mains inrush current following a 5 second mains interruption	No mains input
Performance information	No performance degradations or cable length limitations

The IQGPI00/01/03/04 is a configurable control module for external devices and all RollCall compatible products. This module uses the latest SAM intelligent control software developed from the RollPod technology. This will allow the GPI to become a central controller for the most demanding network configuration. GPIs can be assigned to RollCall commands as before, but now with the aid of a PC program (RollPod Designer) the GPI can literally interact with the RollCall network environment, unleashing complex interactivity between external devices and/or other SAM products.

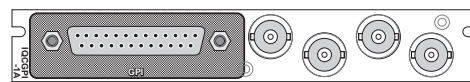
### Features

- Control products on the RollCall Network via external events, or vice-versa.
- 11 off optically isolated I/O interfaces, plus 1 which is non-isolated (IQGPI01, 03, 04).
- Outputs from IQGPI03/4 can switch up to +/-48 V at currents up to +/-1 A
- 23 off GPI non-isolated unbalanced I/O interfaces (IQGPI00)
- Customisable solution allows programming of multiple events from a single trigger
- Outputs may drive Relays or LED's
- Direct connection to the RollCall™ network.
- 200mA 5V Power Supply available on connector

### Why should you choose this module?

- Flexible bridging between RollCall and third party products to provide comprehensive control and tally solutions
- Multiple events to multiple units can be initiated from a single GPI trigger
- External GPI inputs can be configured to trigger multiple RollCall events to multiple units on the RollCall network
- Configuration via the RollPod Designer GUI allows you to browse the RollCall network, select controllable devices then drag and drop the required functionality straight onto the relevant RollPod device from a simple software user interface allowing control of the functions on your SAM Equipment. RollPod Designer is provided with the free RollCall Lite download available from the SAM web-site.

### Order codes



#### IQGPI0015-1A

Configurable General Purpose Interface. 1 x D25. 12 x Unbalanced GPI input or output ports, 1 x RollNet BNC.

#### IQGPI0115-1A

Configurable General Purpose Interface. 1 x D25. 12 x GPI input or output ports (11 Balanced, 1 Unbalanced), 1 x RollNet BNC.

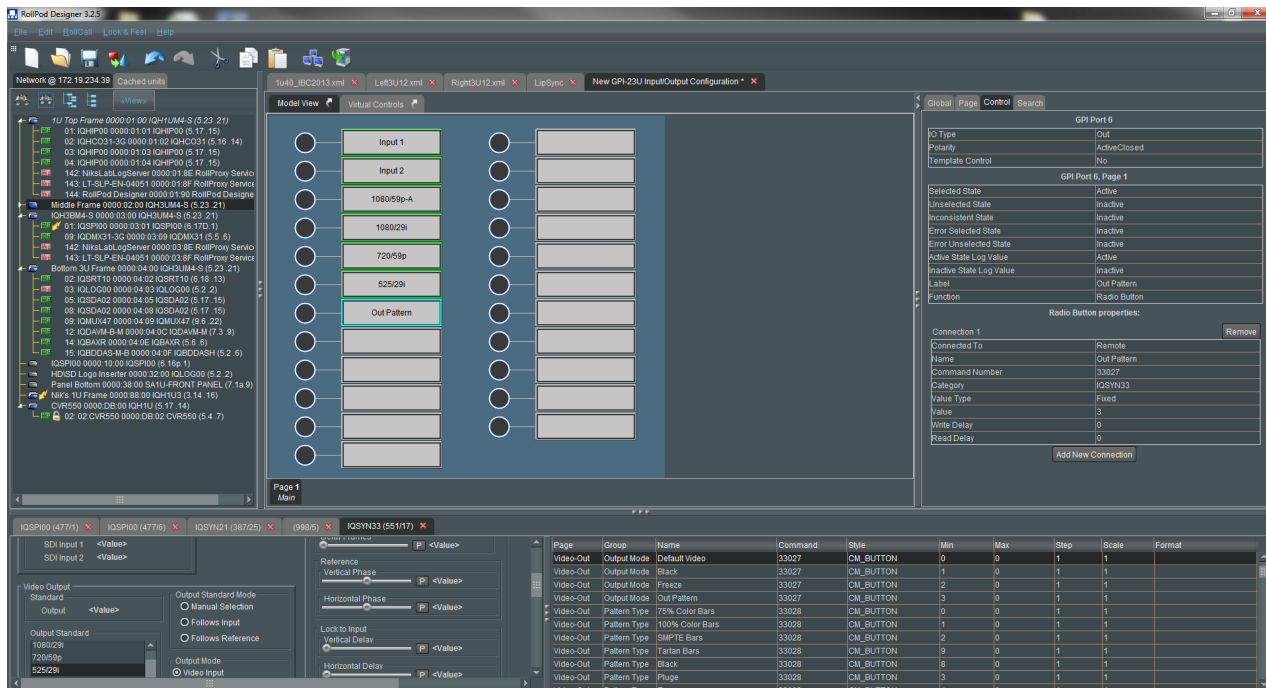
#### IQGPI0315-1A

Configurable General Purpose Interface. 1 x D25. 12 x GPI High Power Output Ports (11 Balanced, 1 Unbalanced), 1 x RollNet BNC.

#### IQGPI0415-1A

Configurable General Purpose Interface. 1 x D25. 12 x GPI High Power Relay Output Ports (11 Balanced, 1 Unbalanced), 1 x RollNet BNC.

For more details on enclosure types please refer to Frames and Hardware section.



### Technical Specification

#### Inputs and Outputs

GPI  
User power supply

#### Indicators

Data received  
PSU overload

#### Additional RollCall Functions

Configure GPI      GPI input triggers RollTrack output(s)  
GPI input triggers RollCall logging messages  
RollTrack input triggers GPI output, plus additional  
RollTrack outputs

#### Specifications

##### Inputs/Outputs

IQGPI00  
Connector/ format      25 way D-type, 12 unbalanced Optically Isolated  
IQGPI01/03/04  
Connector/ format      25 way D-type, 11 balanced Optically Isolated  
Connector/ format      25 way D-type, 1 unbalanced Optically Isolated

##### Input Specification

Voltage limits      -5 V to +30 V  
Logic 1                +2.5 V to +30 V

#### Output Specification

Maximum on current      50 mA (1 A - IQGPI03, IQGPI04)

#### Power Source

Voltage                    5 V ± 0.5 V  
Maximum current        100 mA  
Maximum load            Short-circuit

#### Power Consumption

Module power  
consumption              2.5 W Max (A Frames)  
2.0 PR Max (B frames)  
5 W Max (IQGPI03, IQGPI04)

#### EMC Performance Information

Environment              Commercial and light industrial E2  
Peak mains inrush  
current following a 5  
second mains  
interruption              No mains input  
Performance  
information                No performance degradations or cable length  
limitations

# RollUSB

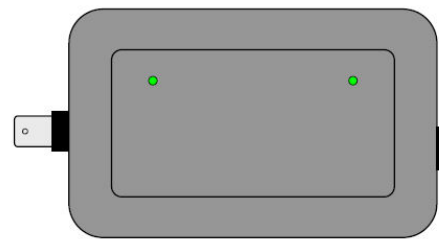
## RollCall USB Interface Unit

RollUSB is a network interface module enabling connection between a PC workstation and the RollNet high-speed 75 ohm co-axial network. The network connection, made with RG-62/u cable via BNC T-connectors supports data rates up to 2.5Mbps. BNC-style 75 ohm terminators must be fitted at either end of a bus.

### Features

- Enables control of SAM products from a PC with RollCall software and RollNet co-axial network
- Supported Operating Systems: Supported Operating Systems: Windows 7 (64-bit, 32-bit), XP, Vista, 2000
- Standard plug and play
- Send and receive RollNet data packets to and from the connected PC
- Operates with either USB 1.1 or 2.0 standard
- LEDs indicate USB status and port activity
- Powered by PC USB port
- Embedded micro-controller provides 128kB of receiver buffering

### Order codes



**RollUSB**  
RollCall USB Interface Unit.

# Network Management Solutions

Today, broadcast systems of any size are inherently complex, with many components, multi-format interconnectivity and sophisticated control requirements. Yet at the same time there are great pressures to reduce costs, leading to centralized multi-channel facilities with reduced headcount and potentially unmanned remote locations. These factors highlight that a robust centralized monitoring and control system is paramount to the successful management of a modern broadcast facility.

## **Rising to the Challenge**

SAM, the leading provider of control and monitoring solutions for over 25 years, has addressed this issue with its RollMap and RollCall suite of products.

RollMap and the successful RollCall product lines bring to the market place the only genuine system wide control AND monitoring solution capable of overseeing the four critical areas of:

- Configuration
- System monitoring
- System control
- Content monitoring





### Get peace of mind with control and monitoring from SAM

Our Control and Monitoring solutions don't just provide comprehensive and efficient control of broadcast systems, but true, end-to-end, monitoring by exception.

When something goes wrong, you need to respond quickly. Our solutions provide for automated failure responses and a simple, drill-down point and click approach, for when operator intervention is required. The exceptionally fast response times afforded by SAM's control and monitoring solutions protect your revenue and maintain your customers viewing experience expectations.

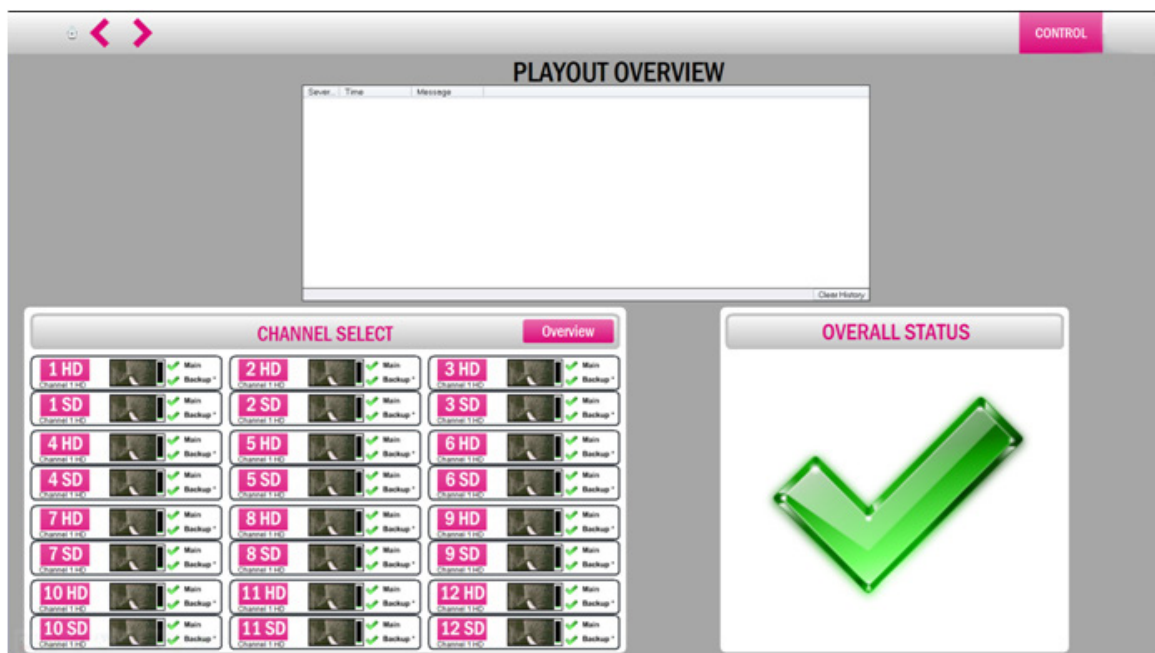
Whether you are a small operation with a single channel, or a multi-national distribution center with 100s of channels, our end-to-end monitoring solutions can interface with any

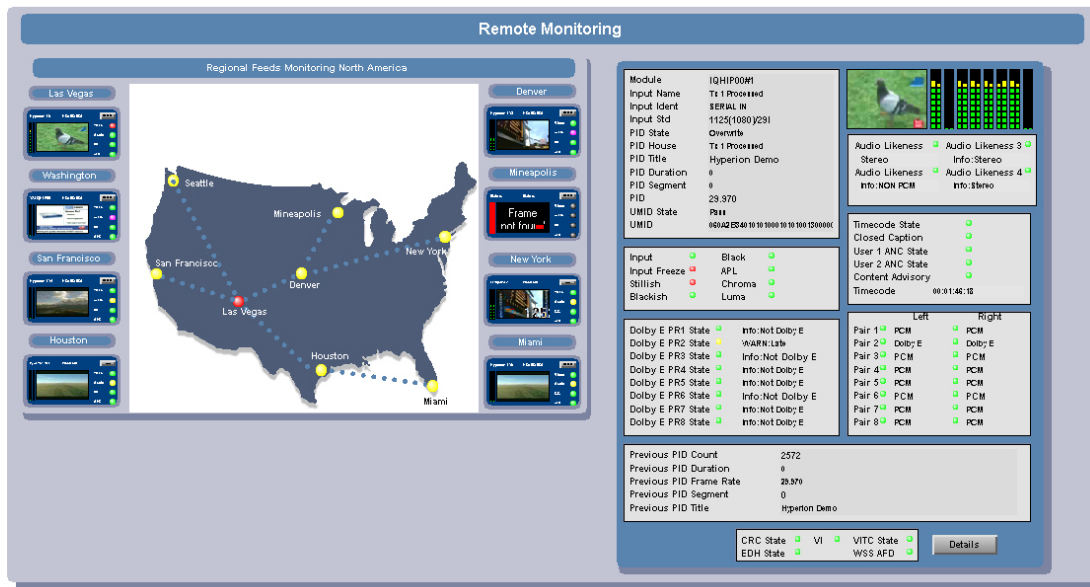
equipment, including third party devices, to ensure you stay on-air even when the unexpected happens.

### RollCall - The heart of SAM's control and monitoring

The RollCall system provides control and monitoring for the SAM product range with the additional capability of monitoring third party equipment via SNMP, serial or GPI interfaces.

The addition of RollMap allows a customizable, graphical representation of systems, for both local facilities and geographically distributed sites. By representing broadcast systems in this way, our customers can centralize their monitoring operations - saving money, whilst at the same time giving them the detailed information they need, to respond to issues quickly as and when they occur.





### Remote system monitoring

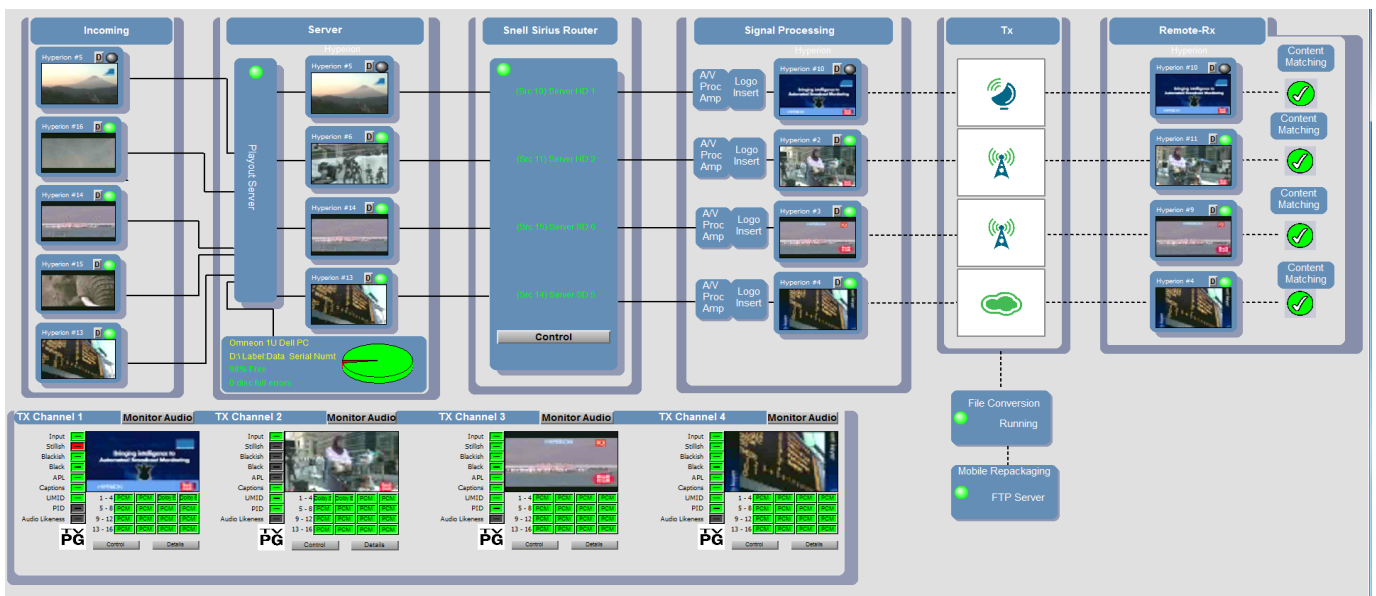
SAM's control and monitoring solutions not only allow systems to be monitored remotely, but with the integration of customized, system specific graphics - the physical system configuration can be represented, giving the operators a comprehensive view of the real world system.

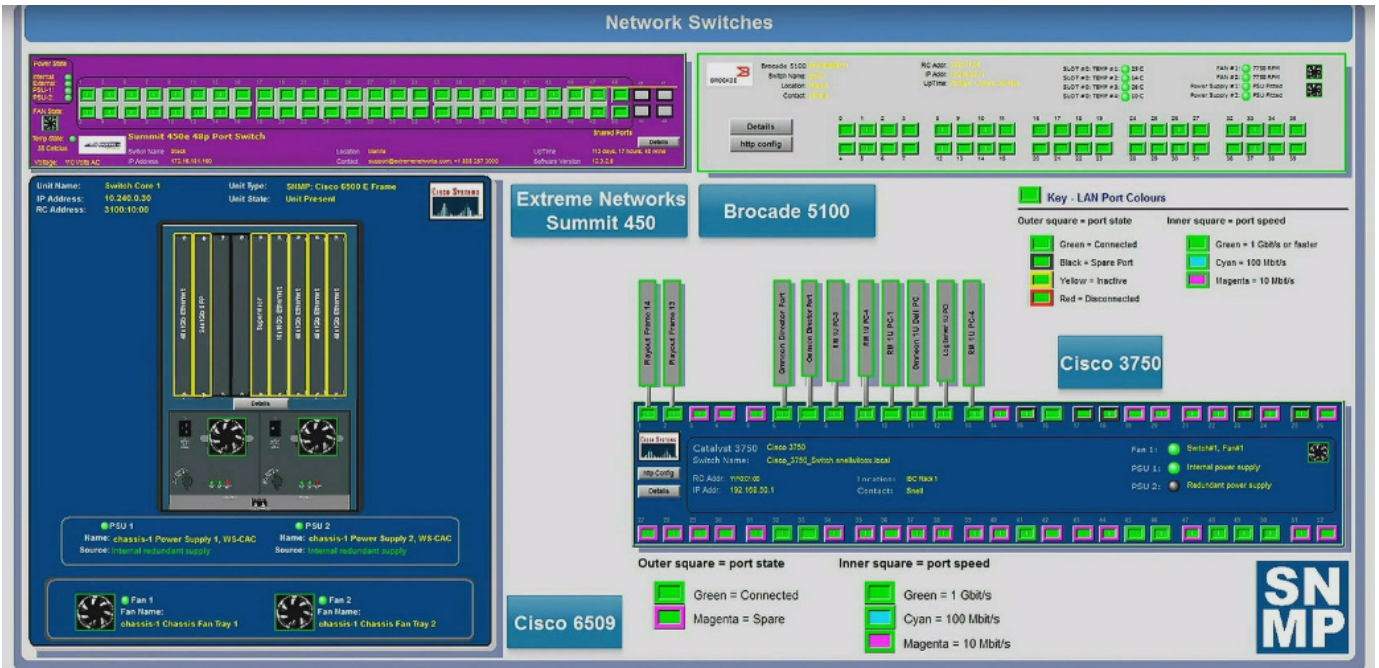
This graphical representation of both the geographic location and the physical equipment installation allows problems to be located quickly and easily.

### Playback content monitoring

Our playout system monitoring analyzes the content of signals throughout the playout infrastructure, not just the signals presence. Bringing human intelligence to automated content monitoring, Hyperion is a valuable component of SAM's monitoring solutions.

Additionally, SAM's monitoring systems are not restricted to monitoring SAM products, but also third party equipment such as video servers, transmitters and IT infrastructure.





### 3rd Party equipment monitoring

SAM's monitoring solutions are not limited to broadcast equipment - or indeed SAM equipment. Making use of a variety of IP protocols, SNMP, RS422 and GPI, we can monitor anything!

### Configuring and monitoring OB trucks

As well as monitoring fixed installations, SAM's Control and Monitoring solutions can provide comprehensive monitoring for mobile operations, such as outside broadcast vehicles.

As with fixed installations, we can drill down to look in detail at particular equipment within the system, identifying issues quickly and effectively.





### Content Monitoring \ Hyperion Ingest

The screenshot displays a comprehensive monitoring dashboard for Hyperion Ingest. Key components include:

- Automation:** A central panel showing system status and configuration for 'Ingest Hyperion #1'.
- Omneon Spectrum:** A detailed view of the 'Omneon Network Manager' showing local time, IP address (192.168.50.70), LAN state (Active), and CPU load (14% CPU loading). It includes tables for 'Omneon Device' and 'Omneon Players'.
- Storage:** A panel showing unit state (Unit Present), network information (Network: Omneon 1U Data PC), IP address (192.168.50.70), LAN state (Active), and up-time.
- Standard Information:** A panel on the left showing 'Incoming vtrst' and a small image of a device.
- Facilities Overview:** A map of the United States with various locations marked, including WAN Link, Sat. Uplink, Sat. Return, DTT Uplink, and IPTV Uplink.
- Event Log:** A table at the bottom showing a history of events with columns for 'S.', 'Time', 'Unit State', 'Input 1 Hyperion Summary', and 'Timecode'. The most recent event is a 'FAIL' at 09:07:10 15:07:53.

### Monitoring of ingest process

When ingesting content, unless you have somebody watching the entire process, how do you know it worked?

Using Hyperion, the material being presented to the ingest process can be monitored automatically, with any issues being reported back, indexed with corresponding timecodes.

### Other Monitoring views and examples

Below are some examples of monitoring various processes within a broadcast chain, showing the flexibility of the Control and Monitoring mechanism, in particular, the customized graphical representation.

The screenshot shows a detailed monitoring interface for a broadcast chain. The top section features a signal flow diagram with the following components:

- Transmitter:** 8x Input 3G SDI to Fiber, 30-Mult Ch Tx (1000000, 1000000), Up to 8 Fiber Output Links, Up to 8 3G SDI Outputs.
- Receiver:** 8x Input 3G Fiber to SDI, 30-Mult Ch Rx (1000000, 1000000), Up to 8 Fiber Input Links, Up to 8 3G SDI Outputs.
- Interconnects:** 16x Fiber Rx to Single Link (Up to 16 Fiber Input Links), Single Link to 16x Fiber Tx (Up to 16 Fiber Output Links), and a Multi-channel Fiber Link.

The bottom section, titled 'Playout Frame 1 Rear', provides a detailed view of 'Rack 1', showing a rack of hardware components with various status indicators and control buttons.

RollMap from SAM is the flagship control and monitoring product in the RollCall range. Its monitoring and control capability is as applicable to equipment monitoring in an outside broadcast truck as it is to centralized management of international play out facilities with locations spanning multiple continents.

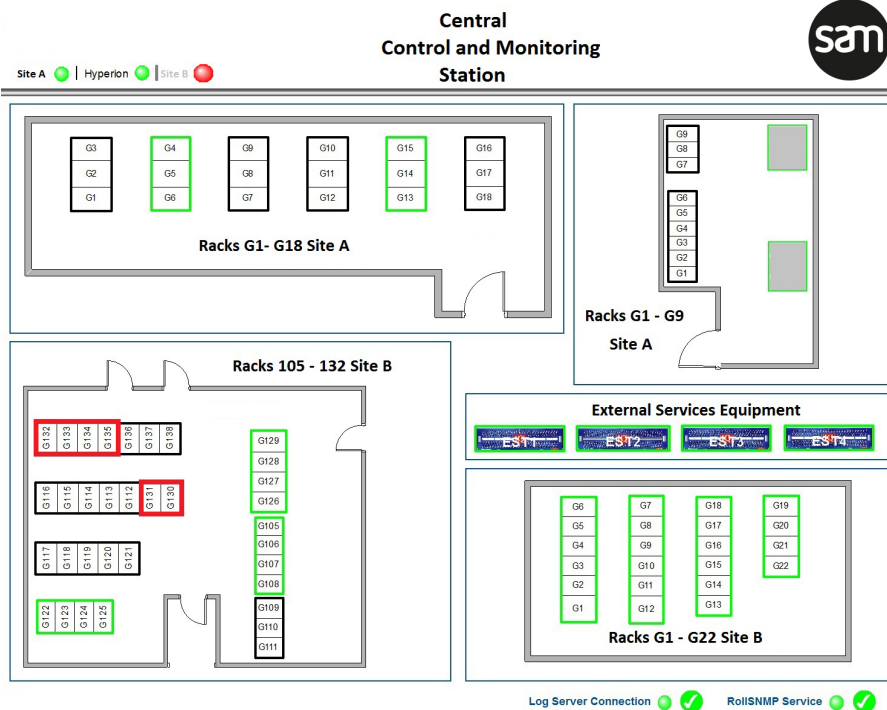
RollMap is a complete management environment for anyone who needs to monitor their infrastructure investment and the assets that they deliver with it. The scale, richness of information, metadata and graphical appearance of the monitoring applications are totally configurable to user requirements. This means that RollMap can be deployed in different roles such as Commercial confidence monitoring, engineering systems management and control room environments, with each deployment tailored to suit the requirements of the operator. When used in conjunction with RollSNMP, true 'end to end' broadcast monitoring systems are possible in a manner tailored to the requirements of broadcast systems management.

### Does this product suit your application?

- Suitable for an integrated monitoring environment tailored to broadcast requirements
- Local or remote site location
- Centralized monitoring and control access to your infrastructure
- Installation of RollCall enabled infrastructure
- Unified alarm reporting for all system elements
- Supports Microsoft Windows 7, Windows XP, Windows Server 2003 and 2008

### Why should you choose this product?

- Streamline overheads required for successful system management
- Achieve superior reliability and uptime through RollMap's effective notification system
- Monitor your system from anywhere with true TCP/IP enabled monitoring and control capability
- Combined with IQ Modular and RollCall enabled products, RollMap and RollSNMP deliver the most powerful Infrastructure solution available



Example of a floorplan/area status overview

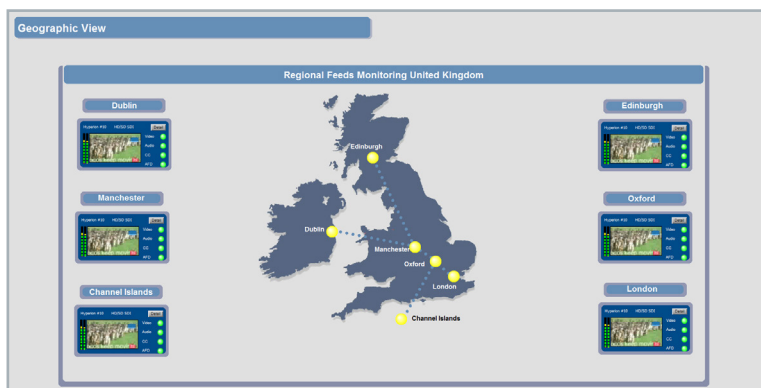
Today, broadcast systems of any size are inherently complex, with many components, multi-format interconnectivity and sophisticated control requirements. Yet at the same time there are great pressures to reduce costs leading to centralized multi-channel facilities with reduced manpower requirements and potentially unmanned remote locations. These factors highlight that a centralized monitoring and control system is paramount to the successful management of a modern broadcast facility.

With RollMap operation is simplicity itself. Utilizing a 'drill down' point and click interface, starting from high level views of a system such as geographical location or floor plan map, the operator can quickly navigate down to the level of functionality required. This makes even low level engineering management of the largest broadcast infrastructure systems available in a few mouse clicks. Configurable Alarm status tabs offer 'at a glance' current status and system histories, and customizable network views compliment the graphical systems to ensure that the latest status information and control access are immediately available for your convenience.

In the event of a system issue occurring, RollMap has a comprehensive alarm notification system that delivers critical alarms and informational updates in a number of ways. These include visual display, email, SNMP Traps, audio file playback and support for command line interfacing and GPI output via the IQGPI modular GPI/O interface range of cards, enabling RollMap to integrate effectively into external systems. A flexible acknowledgement and masking system ensure that spurious alarms are not generated for equipment that is out of service, for instance an incoming lines circuit that is not in use.

In order to expedite deployment of your Infrastructure management system, SAM provide a complete library of graphical monitoring components for RollMap, covering the entire IQ modular product range. This enables signal paths and frame views to be created in very little time by utilizing 'drag and drop' from the network view – simply pick a module, decide whether you want a signal path or a frame view and the correct component appears.

The RollMap component library is regularly updated to include new products and alternate graphical representations.



Example of a regional remote stations overview

## System Requirements

### Recommended system specification for RollMap Server and Client

1920 x 1080 or higher screen resolution  
Quad-core CPU,  
6Gb RAM or higher  
Windows Server 2008

### Minimum system spec for RollMap Client

Dual-core CPU  
4Gb RAM  
Windows 7  
1280 x 1024 or higher screen resolution

## Order Codes

*RollMap is available in three different option packages.*

### ROLLMAP-10

Management of up to 10 RollCall enabled Enclosures, ideal for management of small systems.

Licences included

1 x Schematic Creation License and 2 x Schematic Viewing licenses.

### ROLLMAP-30

Management of up to 30 RollCall enabled Enclosures, for medium sized Infrastructure systems.

Licences included

1 x Schematic Creation License and 5 x Schematic Viewing licenses.

Prerequisites

RollCall Middleware services are required.

Options

RollSNMP is an option with this product.

### ROLLMAP-ENT

RollMap Enterprise Edition offers totally scaleable systems management of unlimited RollCall Enabled Enclosures. RollMap Enterprise edition includes RollCall Middleware Services, RollSNMP and RollMechanic providing the best option for customers that wish to implement an integrated monitoring environment for medium to large Infrastructure systems.

Licences included

2 x Schematic Creation License,  
10 x Schematic Viewing Licences,  
1 x RollCall Middleware Licences,  
1 x RollSNMP Framework License and 1 x RollMechanic Licence.

### ROLLMAP-VL

RollMap Schematic Viewing License - Additional schematic viewing license for existing RollMap customers. Available as a single, 10, 30 and unlimited seat license.



RollSNMP enables monitoring features available within RollMap to be applied to other vendors' SNMP hardware and software products<sup>1</sup>, delivering a complete broadcast centric management environment encompassing video and audio signal paths, hardware enclosure status and fingertip access to control from a single location. Coupled with existing serial and GPI interfaces for legacy equipment, the promise of true 'end to end' monitoring and control systems is a reality with RollMap and RollSNMP.

### Order information

#### ROLLSNMP

SNMP to RollLog translation service.

#### SNMPDEV

Production of a RollSNMP XML script and RollMap monitoring components for an SNMP enabled agent not currently featured in the RollSNMP Library.

#### Licence information

RollSNMP provides one licensed copy of the service application to be run in a system installation. This can monitor up to 100 individual SNMP agents. To monitor more than 100 devices please order multiple ROLLSNMP licenses.

Contact local sales office for information on existing SNMP device configurations.

### Does this product suit your application?

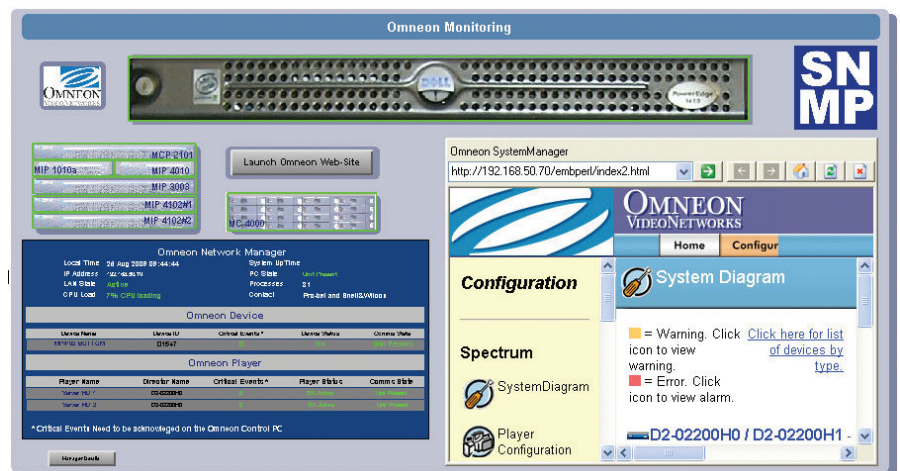
- Requirement for an integrated monitoring environment tailored to broadcast requirements
- User of RollCall enabled infrastructure and RollMap with a requirement to integrate other vendors equipment into the monitoring chain
- Unified alarm reporting for all system elements
- Supports Microsoft Windows 7, Windows XP, Windows Server 2003 and 2008

### Why should you choose this product?

- Integrated RollCall and SNMP monitoring tailored to the broadcast environment
- Configurable to specific customer requirements
- Monitor your system from anywhere with true TCP/IP enabled monitoring and control capability
- Combined with IQ Modular and RollCall enabled products, RollMap and RollSNMP deliver the most powerful Infrastructure solution available



RollSNMP Infrastructure



RollSNMP Server Monitoring

SNMP has been used successfully for some time in the IT domain to manage IP network infrastructures. But the tools that exist for monitoring SNMP hardware (agents) are tailored to this IP network environment and as such do not really suit the monitoring requirements of the broadcaster, where principally, the network is a data and control mechanism rather than the content carrier. The real requirement for today's broadcaster is in monitoring of the signal paths carrying the valuable content assets.

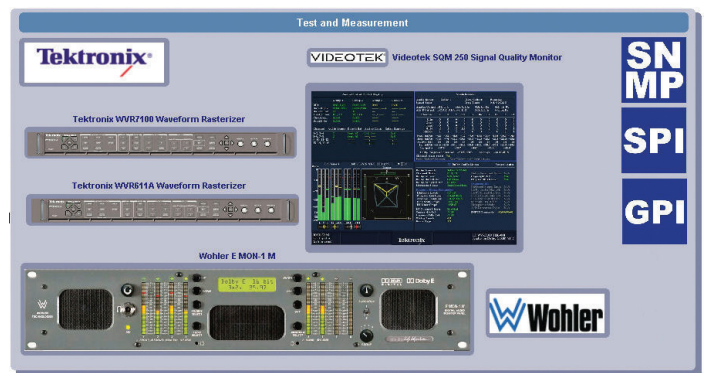
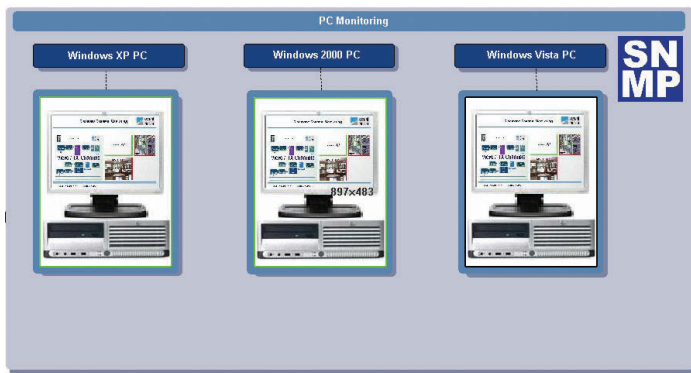
That's not to say that monitoring IP infrastructure is not important, as we move forward to file based content systems and move increasing volumes of metadata between devices, the requirement to monitor all aspects of the broadcast infrastructure chain, be they stream or file based is paramount.

This is where RollSNMP for RollMap comes in. RollMap provides the most powerful Infrastructure Management environment for a broadcast operation. Its ability to enable signal path issue diagnosis by mapping the interconnections between all the elements of your systems, as well as providing layout information mapped to the physical location of infrastructure, delivers benefits that no standard SNMP manager can provide.

The RollSNMP application supports pollable OIDs and traps from SNMP compliant devices and is supplied as a Windows service for Windows 7, Windows XP, Windows server 2003 and 2008. RollSNMP uses industry standard XML for configuration making it straightforward to implement and expand the capabilities of the monitoring system to include new SNMP devices (2). A library of pre-written configurations and RollMap user components for existing SNMP agents is available for purchase. Configurations not catered for in the library can be scripted by the customer using XML, Alternatively SAM can undertake this work on the customers behalf.

<sup>1</sup> Other Vendor equipment requires SNMP support. The level of functionality available in RollMap for other vendor equipment is dependent on the features of their SNMP implementation.

<sup>2</sup> Knowledge of using and configuring SNMP devices and SNMP MIB walking tools is required.



RollSNMP Test and Measurement

## System Requirements

### Recommended system specification for RollSNMP Server

1920 x 1080 or higher screen resolution  
 Quad-core CPU,  
 6Gb RAM or higher  
 Windows Server 2008

### Prerequisites

RollCall Middleware services are required as a minimum to utilize RollSNMP, with RollMap required for graphics support.

The RollCall Middleware services extend the capabilities of a RollCall control system by adding a range of back end services which enable secure TCP/IP access to your Infrastructure, real time and historic logging, remote monitoring and configurable alarming of your SAM infrastructure. This product also provides the core services required for implementing the RollMap and RollSNMP Infrastructure Management systems tools.

RollCall Middleware services include the RollCall control panel application (ROLLCALL) and can be used as a standalone monitoring environment or an enabling platform for the advanced system monitoring applications delivered by RollMap Infrastructure Management System and RollSNMP.

### The Middleware Services feature

- Real time and historic logging of system events - RollCall LogServer provides a real time system status via an IP socket and also writes all events to disk for continuity purposes. Disk logs can be saved by date or timestamp. These disk logs can be utilized offline for trend analysis and system audits.
- TCP/IP connection sharing and security service - IPShare enables PC workstation access to equipment on the RollNet Network via TCP/IP. Access to the IPShare service can be restricted by IP Address or Hostname. IPShare is ideal for delivering Local and Wide area network access to products that do not feature direct Ethernet control capability.
- Real time visual status monitoring - RollView enables a simple 'traffic light' color scheme to indicate system status, with configurable alarm status 'tabs' to help you segment the reporting of your system into logical functions or physical locations. External notification alarms can be delivered from the monitoring application in a number of ways, including email, SMS, SNMP Trap, audio playback of .wav or mp3 files and GPI output via the IQGPI00-04 Modular GPI/O interface card.
- Full RollCall control and monitoring network aggregation using 'RollCall IP Proxy' - TCP/IP connection manager to enable connection and logging from multiple IP enabled RollCall products or discrete RollNet Networks.
- User configurable alarm masking for both unit and individual alarms to prevent the occurrence of false alarms.

The screenshot displays the RollMap - System Alarms application. The interface is divided into several sections:

- Physical Network:** A tree view on the left showing various network components like TVs Manila, IQ\_EN\_01, IQ\_EN\_02, etc., under different locations.
- Main Table:** A large table listing system alarms. The columns are: Address, Unit Name, Local Time, Unit ID, Unit Type, Version, Unit State, Information, CONFIG\_VERS, LOG\_COUNT, Build Number, ENCLOSURE, and CELLSMASKS. The table shows multiple rows of data, including units like IQ\_ENCLOSURE 1, IQMIX42, and IQMIX44-S.
- User Network:** A smaller tree view at the bottom left showing network devices like Cisco Switches, DDM Metadata, and Broadcast SNMP Equipment.
- History:** A table at the bottom right showing a log of events with columns for Unit Name, Unit Type, Unit Address, Time Stamp, Message, Duration, and Timecode.
- Status Bar:** At the bottom, it shows system status like 'Primary control connected (127.0.0.1@2050)', 'Not logged in', and 'Auto Discovery Off'.

### Does this Product suit your application?

- Monitor and report events across your system infrastructure including
  - Signal input condition
  - Environmental status
  - Power supply and card health status
- Flexible and configurable external alarm notification capability
- Rapid control and monitoring access via configurable tabs
- Secure access to equipment services by password or IP address guest lists
- Operates through Ethernet/TCP/IP network, RollNet Interface cards (RollPCI or RollUSB)
- Supports Microsoft Windows 7, Windows XP, Windows server 2003 and 2008

### Why should you choose this product?

- Maximize system uptime with centralized monitoring and control
- Intelligent notification and alarming with RollView minimizes staffing requirements by increasing efficiency
- Configurable to specific customer requirements
- Monitor your system from anywhere with true TCP/IP enabled monitoring and control capability
- Middleware services provide the base for RollMap and RollSNMP Network Management Systems

## Order information

### RollCall Middleware Services (ROLLMIDSRV)

RollCall Middleware Services for Windows

### Licence information

*The RollCall Middleware Services suite provides one licensed copy of each service application to be run in a system installation. There is no restriction on the number of copies of the RollCall Control Panel or RollView Monitoring application that are installed per system.*

## System Requirements

### Recommended system specification for RollMIDSRV Server

1920 x 1080 or higher screen resolution  
Quad-core CPU,  
6Gb RAM or higher  
Windows Server 2008

### Minimum system spec for RollMIDSRV

Dual-core CPU  
4Gb RAM  
Windows 7  
1280 x 1024 or higher screen resolution

The RollCall Control Panel is a PC application enabling remote configuration and control functionality for all RollCall enabled Infrastructure. Navigating and controlling your infrastructure is made simple using standard 'Windows Explorer' type operations that any user of Windows is familiar with. Whether you have a small control network or multiple geographically separate and potentially unmanned sites, RollCall Control Panel enables access to your entire infrastructure, anywhere, anytime. Included with RollCall control Panel are key features that ease systems installation and maintenance, such as the ability to access User Manuals for the entire IQ Modular product range at the touch of a button within RollCall. It is also possible to backup individual module configurations and apply software upgrades.

The RollCall Control Panel Package includes 'RollCall IP Proxy' - TCP/IP connection manager to enable concurrent connection to multiple IP enabled RollCall products. Connection to equipment can be achieved by Ethernet/TCP/IP, RollNet or RS422. Control of Non-Ethernet enabled RollCall products will require either IQCRSAD RS232 to 422 converter, or RollPCI / RollUSB to connect to the RollNet Network.

RollCall Control Panel is available free of charge to all users of SAM infrastructure products. It can be ordered on CD and it is also available for download from the Internet.

### Licence information

*There is no restriction on the number of copies installed per system of the RollCall Control Panel Application.*

### Recommended system spec for RollCall Client

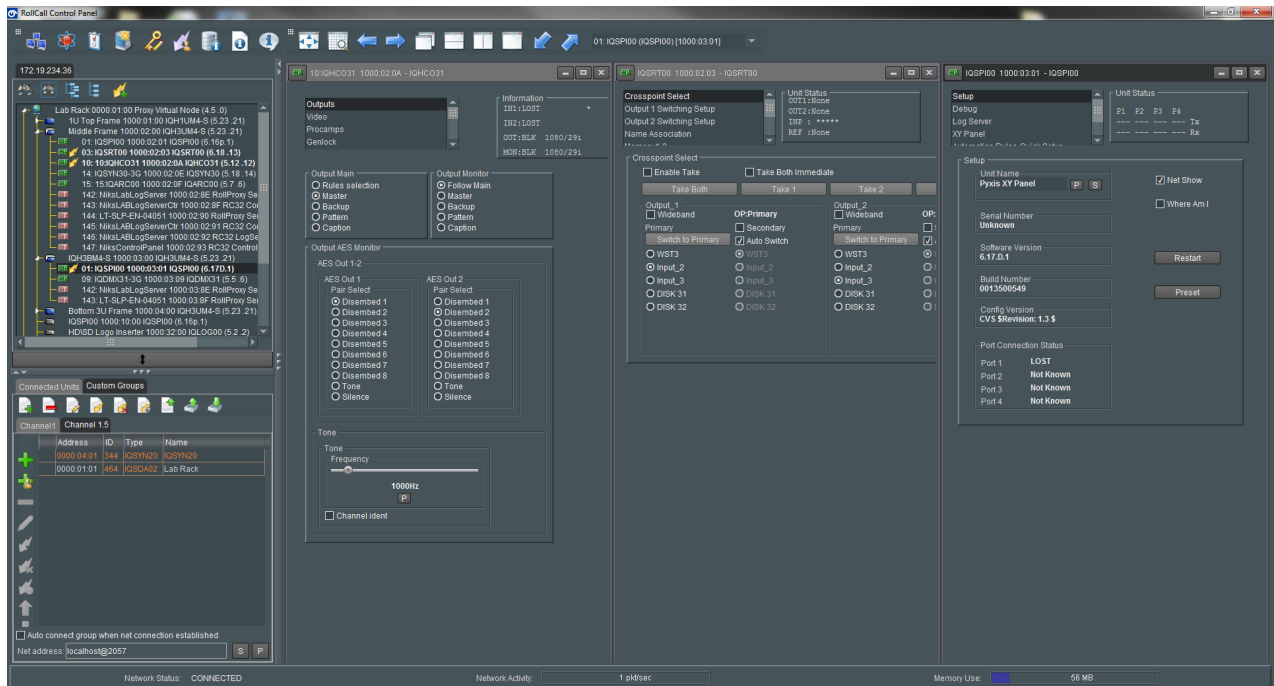
- Dual-core CPU
- 4Gb RAM
- Windows 7
- 1280 x 1024 or higher screen resolution

### Does this Product suit your application?

- Full remote control of RollCall compatible units from single or multiple PC workstations
- Access hardware configuration and control functions via simple GUI
- Fingertip access for all IQ modular product manuals within RollCall
- Multiple units can be controlled simultaneously for efficiency
- Save and restore configurations to entire RollCall systems from a single location
- Operates through Ethernet/TCP/IP network, RollNet Interface cards (RollPCI or RollUSB) or through an RS422 serial port
- Supports Microsoft Windows 7, Windows XP, Windows server 2003 and 2008

### Why should you choose this product?

- Build and integrate your systems with greater efficiency by configuring and controlling from one PC workstation
- Ideal in central operations or engineering location to enable real time control of all RollCall connected systems
- Offers full remote control of all RollCall enabled products from a graphical environment
- Secure access by password or IP address guest lists





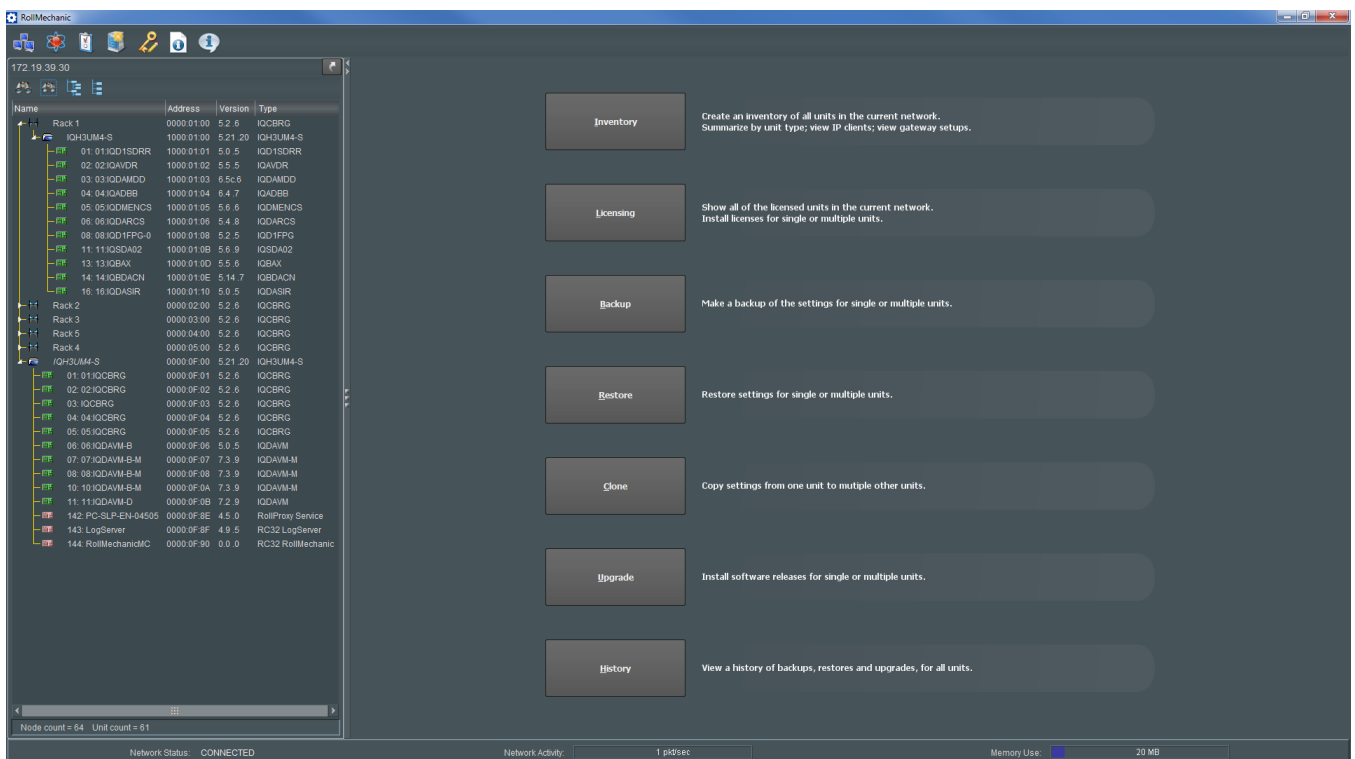
RollMechanic is a software application aimed at reducing the set up times for medium and large system installations and optimizing the maintenance of those systems once operational. Designed as an aid for engineering maintenance and installation personnel, RollMechanic builds on and extends the features of the free RollCall Control Panel by adding powerful automated batch functions. RollMechanic is capable of rapidly cloning a single device's settings to multiple devices on the network reducing the need to adjust each individual device's control parameters. Once your system is operational, RollMechanic can provide a rapid backup and restore facility for multiple stored settings, perform firmware upgrades, install feature licences as well as quickly producing a full system inventory and logging the history of RollMechanic operations.

### Key features

- Backup feature allows settings from an entire system to be rapidly saved thus providing a known snapshot of system configuration at a point in time. Unit back up includes the current settings plus contents of user memories
- Multi-unit restore allows a whole 'mode of operation' to be rapidly recalled for a system or sub-system, for example an OB truck set up, or studio configuration. Can also be used to rollback a facility to a previously known snapshot
- Multiple unit cloning enables unit settings to be copied from one to multiple compatible devices
- Filtered unit cloning enable a selection of parameters to be copied from one unit to multiple compatible devices
- Firmware upgrade allows automated hands-off parallel installation of new features or bug fixes in to multiple devices through the network
- Licence management allows purchased product features to be enabled on multiple devices
- System Inventory reports complete list of units including comprehensive details such as unit serial number and software and hardware versions. Inventory reports are exportable to spreadsheet or text file
- Provides instant access to the relevant product manuals from either an online or local source

### Why should you choose this product?

- Reduces system set-up time and avoids human error by facilitating cloning of one device's settings to many
- Reduces between-job reconfiguration time allowing better utilisation of critical resources such as OB trucks and studios
- Reduces system down-time by ensuring a complete backup of all device parameters is easily available, for example if a card needs to be replaced and brought in to operation
- Saves engineer time while performing important tasks such as upgrading firmware, or auditing installed devices
- Provides audit trail by logging all actions in a history database
- Compatible with SAM's IQ Modular and all SAM RollCall enabled product families



## Order information

**ROLLMECH** - RollMechanic Network Management tool (V2)

### Licence information

Each RollMechanic application licence allows one workstation install for system installations, managing unlimited devices in the system.

### System Requirements

Operating System Requirements  
Windows 32-bit or 64-bit operating system (XP, Server 2003, Server 2008, Windows 7) Java 1.6 or later

### Recommended system spec for RollCall Client

Dual-core CPU  
4Gb RAM  
Windows 7  
1280 x 1024 or higher screen resolution

## IP Production

SAM's IP Routing System offers the most complete, flexible and cost effective solution on the market today with a topology equally suited to both pure IP or hybrid IP/SDI systems.

Many years of design and development work has resulted in a cutting edge solution that:

- Is fully scalable from small to enterprise networks
- Adheres to open IP transport standards as targeted by the AIMS alliance
- Retains existing SDI type operational interfaces and workflows
- Is truly agnostic with respect to COTS IP switches and media formats
- Offers multiple IP interfaces, 10GbE, 25GbE, 40GbE & 100GbE
- Provide SMPTE 2022-7 'hitless' redundancy switching on all stream types
- Integrates with all SAM and third party edge devices

The system seamlessly provides for simultaneous transport and switching of any mix of 'packetized data' streams such as uncompressed 2022-6/-7, TR-04, TR-03, AES67 and compressed VC-2 HQ and TICO standards. This is true for all network speeds form 10GbE to 100GbE...

For Related Modules see:  
IQGBE40/80 in Fiber

The IQMIX25 is a multi-channel video over IP transceiver developed for use within low latency and high bandwidth Ethernet IP networks. Using RTP VSF TR-03, TR-04 and SMPTE 2022-6 encoding and encapsulation schemes, along with either clause 74 or clause 108 FEC, enables the IQMIX25 to encode or decode up to 16 SDI signals and transport them over redundant 25GbE links (IQMIX25 is also upgradeable to support SMPTE 2110).

IQMIX25 provides frame synchronized SDI outputs along with both compressed and uncompressed modes of IP operation. Using SMPTE-2042 (VC2) lightweight compression allows for high quality signal carriage whilst optimising bandwidth requirements, and sending signals uncompressed provides best quality transport although at the expense of bandwidth. Encapsulation of signals in a SMPTE 2022-6 transport stream provides compatibility with other video over IP solutions.

IQMIX25 fully integrates with remote control and monitoring systems to provide easy set up and real-time information on signal presence and status for each channel. It's also fully compatible with SAM's new broadcast centric IP routing and network management solution designed to migrate Broadcasters from a traditional baseband routing and control environment to new Hybrid SDI and IP workflows.

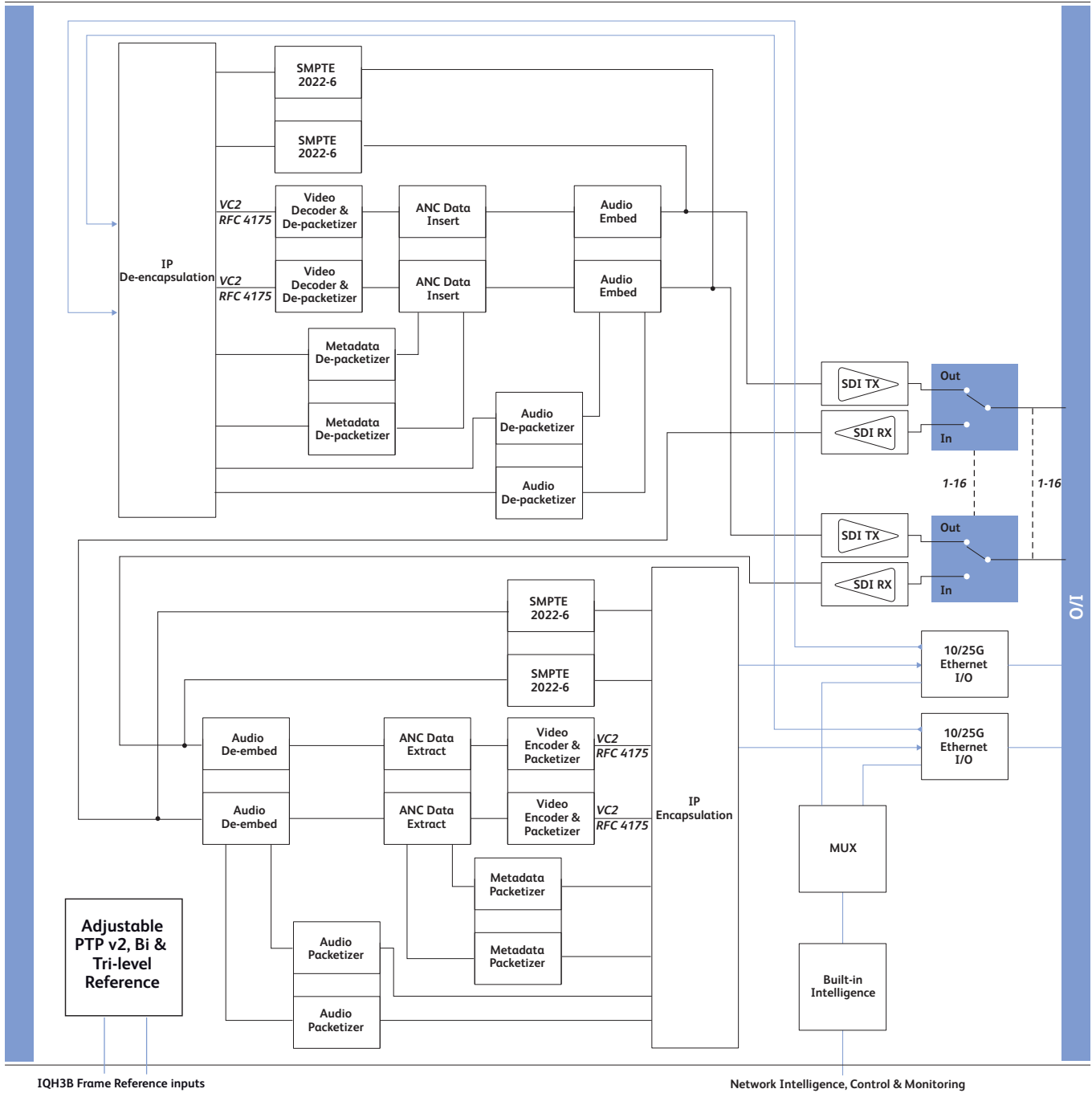
IQMIX26 has the same feature set as IQMIX25 but includes Densi-shield SDI connectors to enable straightforward interfacing with Sirius 800 routers, ideal for SDI router expansion into IP type applications.

## Features

- Handles up to 16 SDI signals over dual 25GbE IP links (dependent on SDI signal format and compressed or uncompressed transport mode)
- Supports configuration of Ethernet links for maximum signal transport using both SFPs or for dual link mode to provide link redundancy as per SMPTE 2022-7, and when operating as a receiver will dynamically adapt to any stream presented to it
- Multiple transport types available for each SDI input including:
  - Compressed IP transport using SMPTE-2042 (VC2) low latency high quality encoding profile
  - Uncompressed video transport using either VSF TR-03 and TR-04 RTP (upgradeable to SMPTE 2110), or SMPTE-2022-6 encapsulation
  - PCM audio using TR-03 & AES67
  - SMPTE-291M metadata support via IETF standard "RTP Payload for Ancillary Data"
- Supports frame synchronized SDI outputs referenced to either IEEE-1588v2 (PTP) network timing (compliant with SMPTE-2059-2) or via the IQH3B frame analog reference bus for black burst / tri-level syncs
- Supports uni-cast as well as IGMPv3 source specific multi-cast, allowing point to point operation or transmission in multi-cast groups, and forward error correction with either clause 74 (Base-R) or clause 108 (RS) FEC
- Low delay mode and Independent H & V offset available for each channel along with up to 2 frames of video delay, and up to 255ms of audio delay
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - 25G Ethernet to IEEE 802.3
- RollCall control and monitoring compatible with standard logging and reporting features

## Why should you choose this module?

- Using a 25GbE transport allows many more signals to be sent over a single fiber thereby reducing the required link count and minimizing dark fiber leasing cost
- Generate signal transport efficiency by running multiple SDI signals over a single Ethernet link and provide the link between existing SDI equipment and future IP network architectures
- Using IGMPv3 source specific multi-cast allows fast configuration of network routes and provides the basis for clean switching at the destination unit
- Full RollCall and SNMP compatibility allows easy integration with SAM's, or third party, network management systems providing an all-inclusive monitoring and control solution



Block Diagram for IQMIX25



### Technical Specification

#### Inputs and Outputs

##### Signal Inputs/Outputs

SDI	16 x bi-directional, see configuration table
Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	HD-BNC/ 75ohm panel jack on standard connector panel
Input cable length	TBC

##### Ethernet Signal

SFP+ Optical	2 x 25G Ethernet
Conforms to	IEEE 802.3by - 25 Gigabit Ethernet over fiber

SFP+ connected cable	2 x 25G Ethernet
Conforms to	IEEE 802.3 - 25 Gigabit Ethernet over twinaxial cables

**Note:** SFP type must be ordered in addition to the module.

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green) Warning (Yellow) Error (Red)

#### Functions

##### Specifications

##### Electrical

Standards supported

##### Power Consumption

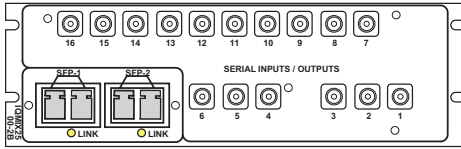
Module Power Consumption  
34.5 PR (B Frames)

### SDI to IP Configurations:

IQMIX25 - 25GbE	Config 1	Config 2	Config 3	Config 4	Config 5
SDI In <> Out	16 > 0	8 <> 8	4 > 4	8 > 0	0 > 8
Codec Support	2022-6 TR-03 TR-04	2022-6 TR-03 TR-04	VC2	VC2	VC2

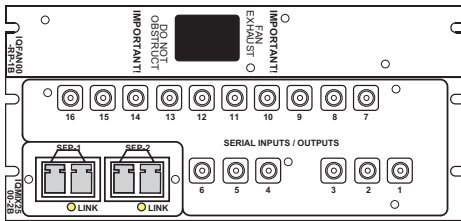
### Ordering Information

#### Order codes for IQH enclosures



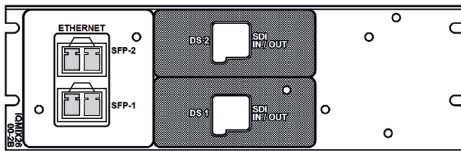
#### IQMIX2500-2B3

3G/HD/SD-SDI Multi-channel IP Transceiver. 16 SDI I/O, 2 25GbE I/O on SFP+ connectors. Suitable for IQH1A and IQH4B frames



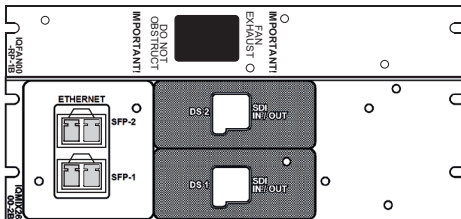
#### IQMIX2501-3B3

3G/HD/SD-SDI Multi-channel IP Transceiver. 16 SDI I/O, 2 25GbE I/O on SFP+ connectors. Includes IQFAN rear panel for additional cooling in IQH3B frame.



#### IQMIX2600-2B3

3G/HD/SD-SDI Multi-channel IP Transceiver using DensiShield connectors. Up to 8 SDI inputs and 8 SDI outputs, 2 x 25GbE I/O on SFP+ connectors. Suitable for use in IQH1A or IQH4B frames.



#### IQMIX2601-3B3

3G/HD/SD-SDI Multi-channel IP Transceiver using DensiShield connectors. Up to 8 SDI inputs and 8 SDI outputs, 2 x 25GbE I/O on SFP+ connectors. Includes IQFAN rear panel for additional cooling in IQH3B frame.

For more details on enclosure types please refer to datasheet IQH3B.

The IQMIX40 is a multi-channel video over IP transceiver developed for use within low latency and high bandwidth Ethernet IP networks. Using RTP VSF TR-03, TR-04 and SMPTE 2022-6 encoding and encapsulation schemes enables the IQMIX40 to encode or decode up to 16 SDI signals and transport them over two 10GbE or 40GbE links (IQMIX40 is also upgradeable to support SMPTE 2110).

IQMIX40 provides frame synchronized SDI outputs and both compressed and uncompressed modes of IP operation. Using SMPTE-2042 (VC2) lightweight compression allows for high quality signal carriage whilst optimizing bandwidth requirements, and sending signals uncompressed provides best quality transport although at the expense of bandwidth. Encapsulation of signals in a SMPTE 2022-6 transport stream provides full compatibility with other video over IP solutions.

IQMIX40 fully integrates with remote control and monitoring systems to provide easy set up and real-time information on signal presence and status for each channel. It's also fully compatible with SAM's new broadcast centric IP routing and network management solution designed to migrate Broadcasters from a traditional baseband routing and control environment to new Hybrid SDI and IP workflows.

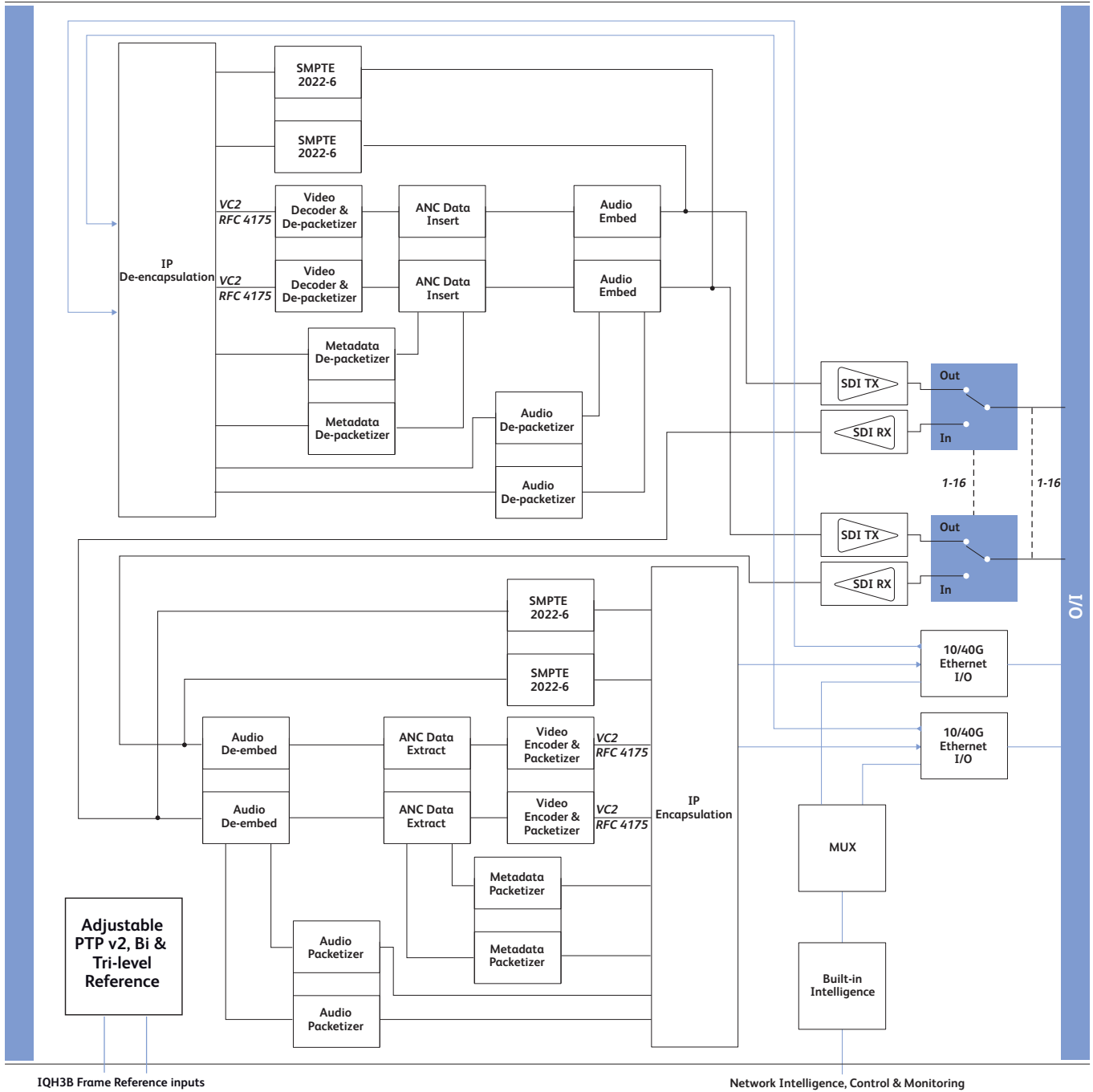
IQMIX41 has the same feature set as IQMIX40 but includes Densi-shield SDI connectors to enable straightforward interfacing with Sirius 800 routers, ideal for SDI router expansion into IP type applications.

## Features

- Handles up to 16 SDI signals over dual 10GbE or dual 40GbE IP links (dependent on Ethernet rate, SDI signal format and compressed or uncompressed transport mode)
- Supports configuration of Ethernet links for maximum signal transport using both SFPs or for dual link mode to provide link redundancy as per SMPTE 2022-7, and when operating as a receiver will dynamically adapt to any stream presented to it
- Multiple transport types available for each SDI input including:
  - Compressed IP transport using SMPTE-2042 (VC2) low latency high quality encoding profile
  - Uncompressed video transport using either VSF TR-03 and TR-04 RTP (upgradeable to SMPTE 2110), or SMPTE-2022-6 encapsulation
  - PCM audio using TR-03 & AES67
  - SMPTE-291M metadata support via IETF standard "RTP Payload for Ancillary Data"
- Supports frame synchronized SDI outputs referenced to either IEEE-1588v2 (PTP) network timing (compliant with SMPTE-2059-2) or via the IQH3B frame analog reference bus for black burst / tri-level syncs
- Low delay mode and Independent H & V offset available for each channel along with up to 2 frames of video delay, and up to 255ms of audio delay
- Supports uni-cast as well as IGMPv3 source specific multi-cast, allowing point to point operation or transmission in multi-cast groups
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - 10G & 40G Ethernet to IEEE 802.3
- RollCall control and monitoring compatible with standard logging and reporting features

## Why should you choose this module?

- Generate signal transport efficiency by running multiple SDI signals over a single Ethernet link and provide the link between existing SDI equipment and future IP network architectures
- Using IGMPv3 source specific multi-cast allows fast configuration of network routes and provides the basis for clean switching at the destination unit
- Full RollCall and SNMP compatibility allows easy integration with SAM's, or third party, network management systems providing an all-inclusive monitoring and control solution



Block Diagram for IQMIX40

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs/Outputs

<b>IQMIX4010-2B3 (SFP+)</b>	SDI	16 x bi-directional, see configuration table
<b>IQMIX4000-2B3 (QSFP)</b>	SDI	4 inputs, 4 outputs, 8 x bi-directional; see configuration table

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	HD-BNC/ 75ohm panel jack on standard connector panel
Input cable length	TBC

##### Ethernet Signal

SFP+ Optical	2 x 10G Ethernet
Conforms to	IEEE 802.3ae - 10 Gigabit Ethernet over fiber 2 x 40G Ethernet IEEE 802.3ba - 40 Gigabit Ethernet over fiber

SFP+ connected cable	2 x 10G Ethernet
Conforms to	IEEE 802.3ak - 10 Gigabit Ethernet over twinaxial cables 2 x 40G Ethernet
Conforms to	IEEE 802.3 - 40 Gigabit Ethernet over twinaxial cables

**Note:** SFP/QSFP type must be ordered in addition to the module.

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green) Warning (Yellow) Error (Red)

#### Functions

##### Specifications

##### Electrical

Standards supported

##### Power Consumption

Module Power Consumption	37.5 PR (B Frames)
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### SDI to IP Configurations:

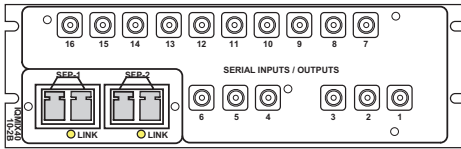
IQMIX40 - 40GbE	Config 1	Config 2	Config 3	Config 4	Config 5	Config 6
SDI In <> Out	12 > 0	8 <> 8	0 > 12	8 > 0	4 <> 4	0 > 8
Codec Support	2022-6 TR-03 TR-04	2022-6 TR-03 TR-04	2022-6 TR-03 TR-04	VC2	VC2	VC2

IQMIX40 - 10GbE	Config 1	Config 2	Config 3	Config 4	Config 5	Config 6
SDI In <> Out	12 > 0	8 <> 8	0 > 12	8 > 0	4 <> 4	0 > 8
Codec Support	2022-6 TR-03 TR-04	2022-6 TR-03 TR-04	2022-6 TR-03 TR-04	VC2	VC2	VC2



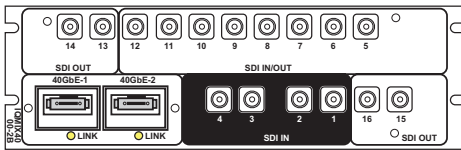
### Ordering Information

#### Order codes for IQH enclosures



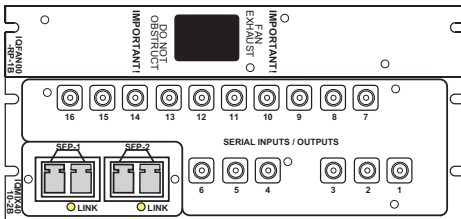
#### IQMIX4010-2B3

3G/HD/SD-SDI Multi-channel IP Transceiver. 16 SDI I/O, 2 10GbE I/O on SFP+ connectors. Suitable for IQH1A and IQH4B frames



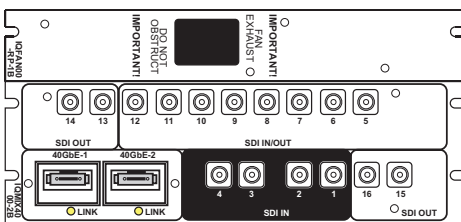
#### IQMIX4000-2B3

3G/HD/SD-SDI Multi-channel IP Transceiver. 8 SDI I/O, 4 SDI inputs, 4 SDI outputs, 2 40GbE I/O on QSFP connectors. Suitable for IQH1A and IQH4B frames



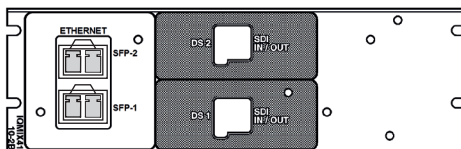
#### IQMIX4011-3B3

3G/HD/SD-SDI Multi-channel IP Transceiver. 16 SDI I/O, 2 10GbE I/O on SFP+ connectors. Includes IQFAN rear panel for additional cooling in IQH3B frame.



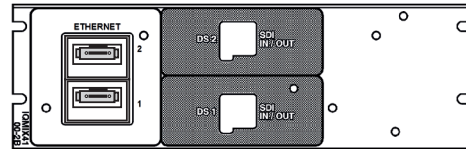
#### IQMIX4001-3B3

3G/HD/SD-SDI Multi-channel IP Transceiver. 8 SDI I/O, 4 SDI inputs, 4 SDI outputs, 2 40GbE I/O on QSFP connectors. Includes IQFAN rear panel for additional cooling in IQH3B frame.



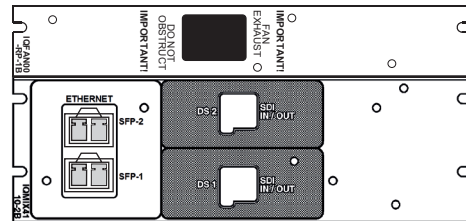
#### IQMIX4110-2B3

3G/HD/SD-SDI Multi-channel IP Transceiver using DensiShield connectors. Up to 4 SDI inputs and 8 SDI outputs, 2 x 10GbE I/O on SFP+ connectors. Suitable for use in IQH1A or IQH4B frames.



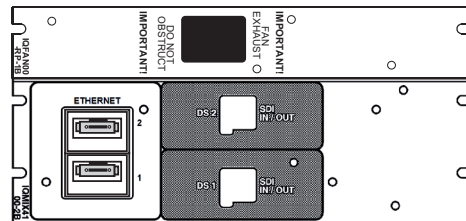
#### IQMIX4100-2B3

3G/HD/SD-SDI Multi-channel IP Transceiver using DensiShield connectors. Up to 4 SDI inputs and 8 SDI outputs, 2 x 40GbE I/O on QSFP connectors. Suitable for use in IQH1A or IQH4B frames.



#### IQMIX4111-3B3

3G/HD/SD-SDI Multi-channel IP Transceiver using DensiShield connectors. Up to 4 SDI inputs and 8 SDI outputs, 2 x 10GbE I/O on SFP+ connectors. Includes IQFAN rear panel for additional cooling in IQH3B frame.



#### IQMIX4101-3B3

3G/HD/SD-SDI Multi-channel IP Transceiver using DensiShield connectors. Up to 4 SDI inputs and 8 SDI outputs, 2 x 40GbE I/O on QSFP connectors. Includes IQFAN rear panel for additional cooling in IQH3B frame.

#### SFP options

- FCS-10GE-SR** - 10GBASE-SR short range SFP for MMF
- FCS-10GE-LR** - 10GBASE-LR long range SFP for SMF
- FCQ-40GE-SR** - 40GBASE-SR short range QSFP for MMF
- FCQ-40GE-LR** - 40GBASE-LR long range QSFP for SMF
- FCQ-40GE-LR4** - 40GBASE-LR4 long range QSFP for SMF

**Note:** Fiber SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to datasheet IQH3B.

The IQMIX10 is SAM's entry level video over IP transceiver developed for use within low latency and high bandwidth Ethernet IP networks. Using RTP VSF TR-03, TR-04 and SMPTE 2022-6 encoding and encapsulation schemes enables the IQMIX10 to encode or decode up to 12 SDI signals (6 in and 6 out) and transport them over redundant 10GbE links (IQMIX10 is also upgradeable to support SMPTE 2110).

IQMIX10 provides frame synchronized SDI outputs along with both compressed and uncompressed modes of operation. Using SMPTE-2042 (VC2) lightweight compression allows for high quality signal carriage whilst optimising bandwidth requirements, and sending signals uncompressed provides best quality transport although at the expense of bandwidth. Encapsulation of signals in a SMPTE 2022-6 transport stream provides compatibility with other video over IP solutions.

IQMIX10 fully integrates with remote control and monitoring systems to provide easy set up and real-time information on signal presence and status for each channel. It's also fully compatible with SAM's new broadcast centric IP routing and network management solution designed to migrate Broadcasters from a traditional baseband routing and control environment to new Hybrid SDI and IP workflows.

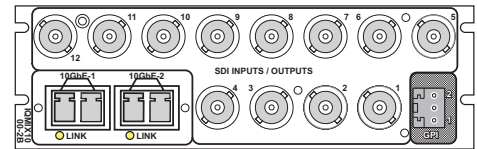
## Features

- Handles up to 12 SDI signals over dual 10GbE IP links (dependent on SDI signal format and compressed or uncompressed transport mode)
- Supports configuration of Ethernet links for maximum signal transport using both SFPs, or for dual link mode to provide link redundancy as per SMPTE 2022-7
- Multiple transport types available for each SDI input including:
  - Compressed IP transport using SMPTE-2042 (VC2) low latency high quality encoding profile
  - Uncompressed video transport using either VSF TR-03 and TR-04 RTP (upgradeable to SMPTE 2110), or SMPTE-2022-6 encapsulation
  - PCM audio using TR-03 & AES67
  - SMPTE-291M metadata support via IETF standard "RTP Payload for Ancillary Data"
- Supports frame synchronized SDI outputs referenced to either IEEE-1588v2 (PTP) network timing (compliant with SMPTE-2059-2) or via the IQH3B frame analog reference bus for black burst / tri-level syncs
- Low delay mode and Independent H & V offset available for each channel along with up to 2 frames of video delay, and up to 255ms of audio delay
- Supports uni-cast as well as IGMPv3 source specific multi-cast, allowing point to point operation or transmission in multi-cast groups
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - 10G Ethernet to IEEE 802.3
- RollCall control and monitoring compatible with standard logging and reporting features

## Why should you choose this module?

- Generate signal transport efficiency by running multiple SDI signals over a single Ethernet link and provide the link between existing SDI equipment and future IP network architectures
- Using IGMPv3 source specific multi-cast allows fast configuration of network routes and provides the basis for clean switching at the destination unit
- Full RollCall and SNMP compatibility allows easy integration with SAM's, or third party, network management systems providing an all-inclusive monitoring and control solution

## Order codes - IQH enclosures



**IQMIX1000-2B3** 3G/HD/SD-SDI Multi-channel IP Transceiver. 12 SDI I/O, 2 10GbE I/O on SFP+ connectors.

For more details on enclosure types please refer to datasheet IQH3B

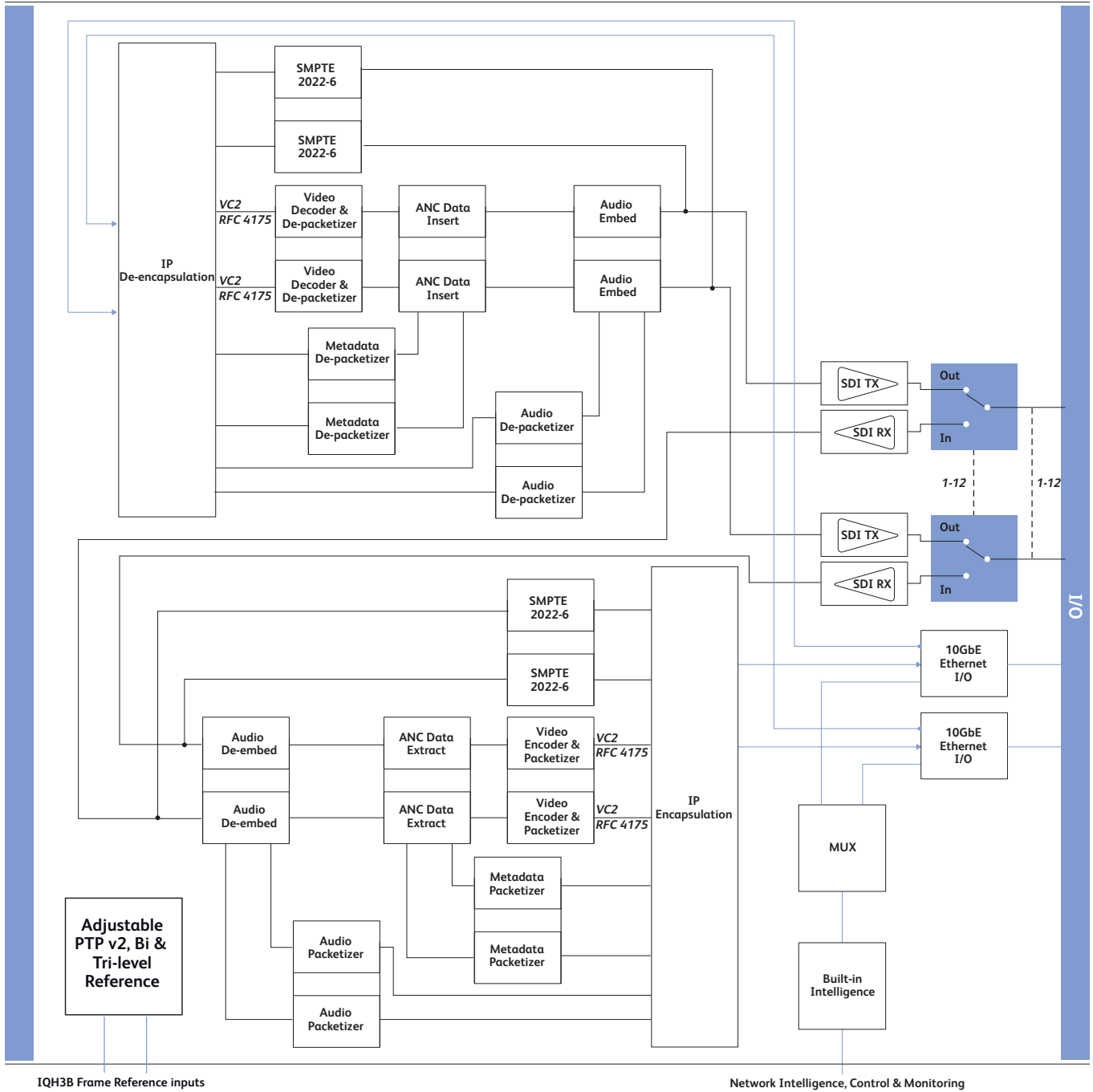
### SFP options

**FCS-10GE-SR** - 10GBASE-SR short range SFP for MMF

**FCS-10GE-LR** - 10GBASE-LR long range SFP for SMF

**FCS-10GE-ER** - 10GBASE-ER extended range SFP for SMF

**Note:** Fiber SFP type must be ordered in addition to the module.



Block Diagram for IQMIX10

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs/Outputs

SDI	12 x bi-directional, see configuration table
Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard connector panel
Input cable length	TBC

##### Ethernet Signal

SFP+ Optical	2 x 10G Ethernet
Conforms to	IEEE 802.3ae - 10 Gigabit Ethernet over fiber

SFP+ connected cable	2 x 10G Ethernet
Conforms to	IEEE 802.3ak - 10 Gigabit Ethernet over twinaxial cables

**Note:** SFP type must be ordered in addition to the module.

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green) Warning (Yellow) Error (Red)

#### Functions

##### Specifications

##### Electrical

Standards supported

##### Power Consumption

Module Power Consumption	
	26.5 W Max (A Frames)
	26.5 PR Max (B Frames)

### SDI to IP Configurations:

IQMIX10 - 10GbE	Config 1	Config 2	Config 3	Config 4	Config 5
SDI In <> Out	6 <> 6	5 <> 5	5 <> 5	4 > 0	0 > 4
Codec Support	2022-6	TR-04	TR-03	VC2	VC2

Meeting the Challenge of processing broadcast signals in an IP environment.

Transitioning a facility from a tried and tested point to point SDI system into a more flexible IP networked operation is a challenge faced by many broadcasters today.

Converting signals to and from an IP workflow is now broadly understood, but how do you continue to perform the common broadcast processing tasks once there?

IQEDGE provides the answer by packaging multiple channels of video and audio processing into a compact 3RU box enabled with either 25 or 40 GbE IP interfaces.

**Applications**

- Handle up to 8 channels of common video and audio processing tasks in an IP networked environment
- Add channel branding, side-bar keying and ensure Dolby handling and loudness requirements are met
- Provide high quality content across multiple regions and services with simulcast format and frame rate conversion processing

**Video Features**

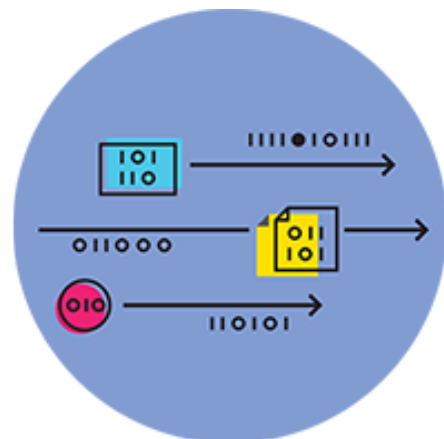
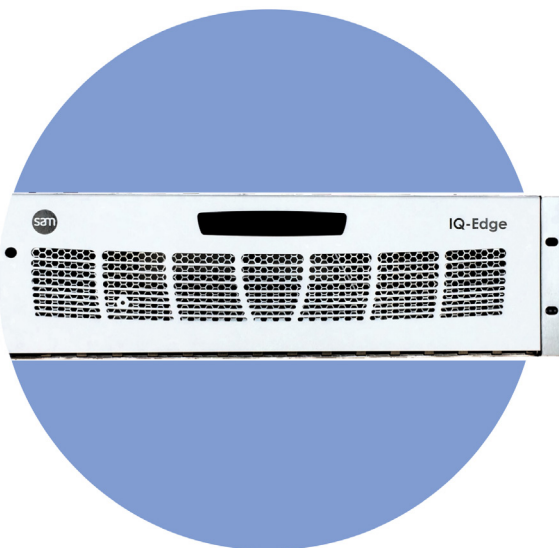
- Gain, offset and hue control, horizontal and vertical picture enhancement, delay, RGB gamut legalization, aspect ratio conversion with preset ARC maps, and including selectable pan, tilt, aspect, size, and output crop adjustments
- High quality up, down and cross conversion including conversion aperture control
- Options for noise reduction (adaptive spatial and recursive), side-bar keying, logo insertion and frame rate conversion

**Audio Features**

- Processing for 16 channels of embedded audio present on each video channel, with audio proc features including: channel routing (shuffling), gain, invert, delay and mixing
- Advanced audio options including loudness processing for 4 channels or 5.1 surround sound, downmixing, upmixing and Dolby E/D encoding and decoding

**Ancillary Features**

- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016), closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- Built in test pattern and audio tone generators along with 19 character scrolling caption generator for signal path testing or keep-alive applications
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems
- Dual 25GbE or 40GbE IP links with Multiple transport types available for including:
  - Compressed IP transport using SMPTE-2042 (VC2) low latency high quality encoding profile
  - Uncompressed video transport using either TR-03, TR-04 RTP (upgradeable to SMPTE 2110) or SMPTE-2022-6 encapsulation
  - PCM audio using TR-03 & AES67
  - SMPTE-291M metadata support via IETF standard “RTP Payload for Ancillary Data”
- Timing and synchronization provided by IEEE-1588v2 (PTP), compliant with SMPTE-2059-2, or via the frame analog reference bus
- Up to 8 processing channels per EDGE option, dual PSUs, cooling fans and control card as standard, plus full chassis monitoring for PSUs, temperature, fans and signal status



The IQAMD40 provides multi-channel MADI to IP interfacing, and has been developed to allow high density audio integration into Ethernet IP networks. Using industry standard AES67 encapsulation and a 10GbE interface enables the IQAMD40 to interface directly with many common audio desks and systems.

IQAMD40 also allows configuration of audio channels for IP streams, and provides stream compatibility by offering packet time adjustment. Two audio tone generators are also available to enable link testing and configuration.

IQAMD40 fully integrates with remote control and monitoring systems to provide easy set up and real-time information on signal presence and status for each channel. It's also fully compatible with SAM's new broadcast centric IP routing and network management solution designed to migrate Broadcasters from a traditional baseband routing and control environment to new Hybrid SDI and IP workflows.

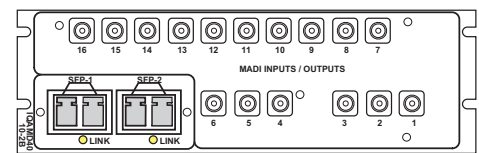
### Features

- Handles up to 16 MADI signals (8 in & 8 out) over dual 10GbE IP links, with the option to provide MADI link redundancy
- Audio delay per IP stream of up to 255ms
- Dual SFP/QSFP to provide link redundancy
- Uncompressed PCM audio transport using AES67
- Timing and synchronization provided by IEEE-1588v2 (PTP), compliant with SMPTE-2059-2 and AES67 profiles
- Supports uni-cast as well as IGMPv3 source specific multi-cast, allowing point to point operation or transmission in multi-cast groups
- Two audio tone generators available for MADI channels, with selectable tone frequencies of 500Hz, 1kHz, 2kHz and 4kHz
- Standards supported:
  - MADI to AES10-2003
  - 10G Ethernet to IEEE 802.3
- Audio channel selection per IP stream from 1-64 channels, plus packet time selection of 125us, 250us, 500us, 1ms and 4ms
- RollCall control and monitoring compatible with standard logging and reporting features

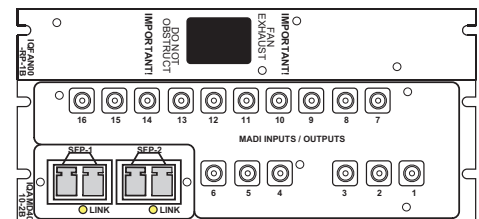
### Why should you choose this module?

- Provides a flexible and cost-effective way to integrate MADI audio devices into Ethernet IP networks for efficient signal transport
- Using IGMPv3 source specific multi-cast allows fast configuration of network routes and provides the basis for clean switching at the destination unit
- Full RollCall and SNMP compatibility allows easy integration with SAM's, or third party, network management systems providing an all-inclusive monitoring and control solution

### Inputs & Outputs - IQH enclosures



**IQAMD4010-2B3** Translates up to 16 MADI streams to IP with 10GbE interface. 8 MADI inputs and 8 MADI outputs, 2 x 10GbE SFP ports. Suitable for IQH1A and IQH4B frames



**IQAMD4011-3B3** Translates up to 16 MADI streams to IP with 10GbE interface. 8 MADI inputs and 8 MADI outputs, 2 x 10GbE SFP ports. Includes IQFAN rear panel for additional cooling in IQH3B frame

For more details on enclosure types please refer to datasheet IQH3B

### SFP options

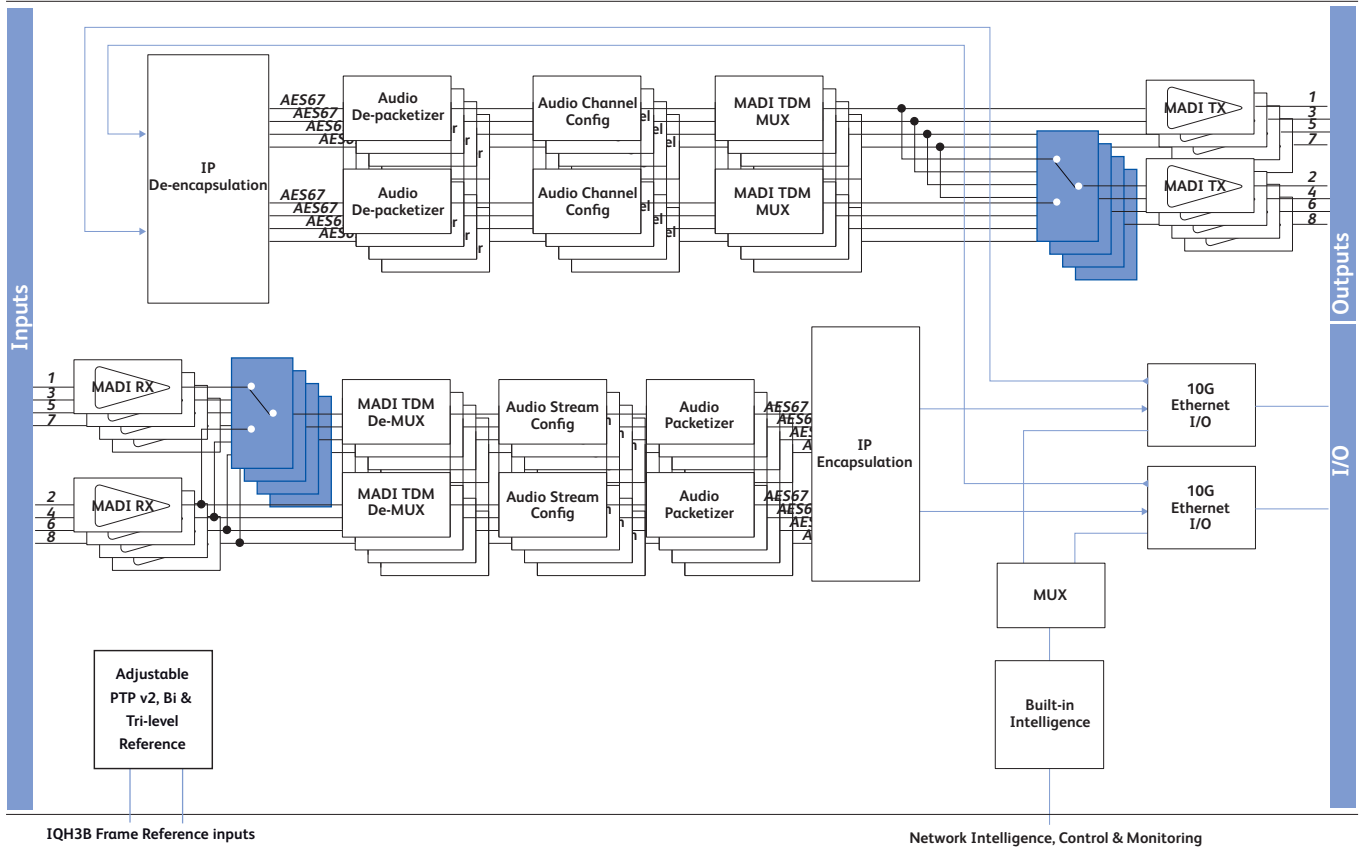
**FCS-10GE-SR** - 10GBASE-SR short range SFP for MMF

**FCS-10GE-LR** - 10GBASE-LR long range SFP for SMF

**FCS-10GE-ER** - 10GBASE-ER extended range SFP for SMF

**Note:** Fiber SFP type must be ordered in addition to the module.





Block Diagram for IQAMD40

The IQCAG00 enables out-of-band remote control of IQ IP interfacing and processing modules via dual 1GbE links. Using the internal comms bus within the IQH3B IQ frame the IQCAG00 allows any IP modules installed in the frame to communicate via dual redundant 1GbE links separate to the IP video transport. This is ideal for networks where independent video and data transport has been mandated, and the dual 1GbE links also provide additional redundancy for control layers (IP modules can also communicate in-band providing further control flexibility). IQCAG00 fully integrates with SAM's RollCall control and monitoring system, including it's new broadcast centric IP routing and network management solution designed to migrate Broadcasters from a traditional baseband routing and control environment to new Hybrid SDI and IP workflows.

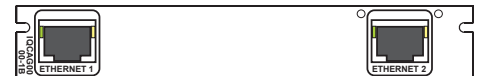
### Features

- Dual 1GbE Ethernet links via RJ45 connectors for remote control interfacing 'out-of-band'
- Aggregates control for any IP interfacing or processing modules within the same IQH3B frame
- RollCall and IP routing control and monitoring compatible with standard logging and reporting features

### Why should you choose this module?

- Provides independent control links with built in redundancy
- Useful for applications requiring control flexibility both in and out of band
- Full integration with SAM's RollCall control and monitoring system, including it's new broadcast centric IP routing and network management solution

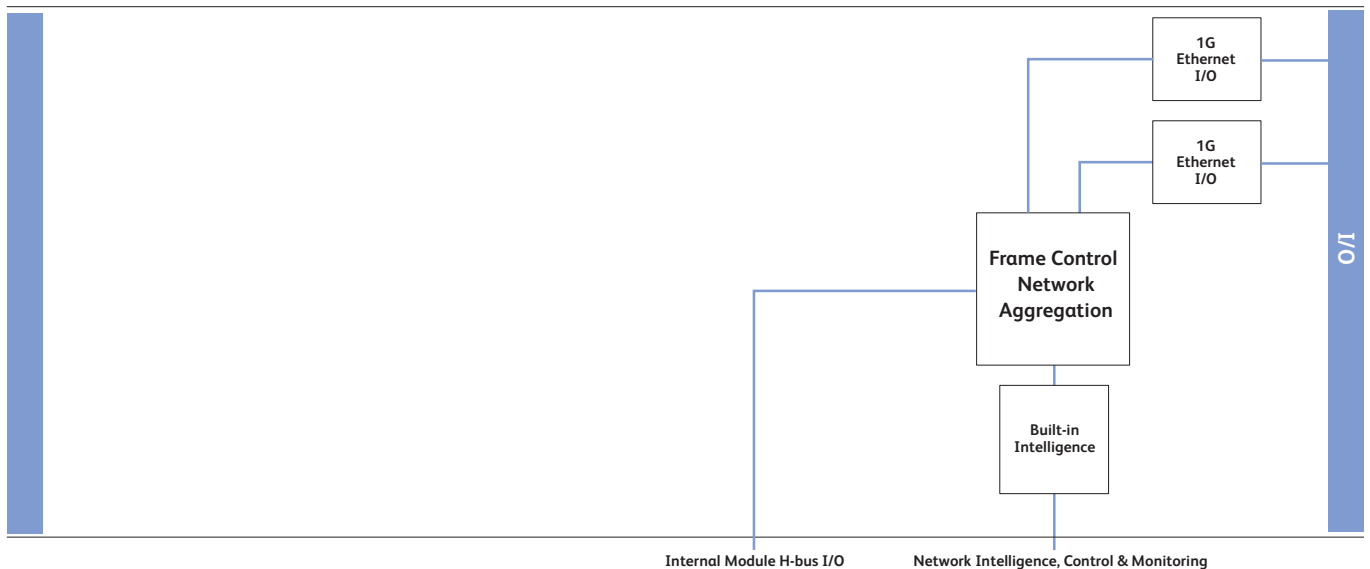
### Inputs & Outputs - IQH enclosures



#### IQCAG0000-1B

IP Control Aggregation Gateway. Two 1G Ethernet I/O RJ45 connectors.

For more details on enclosure types please refer to datasheet IQH3B



Block Diagram for IQCAG00

## Intelligent Monitoring

The best time to identify faults in a system is while they are still potential faults rather than immediate problems. If something does fail, it's best to be able to identify the source and nature of the fault rapidly and easily. This is particularly true in the digital domain, where poor quality can lead rapidly to a complete loss of pictures.

Building on their experience of modern broadcast monitoring requirements SAM has developed Hyperion and Media Biometrics, entirely new ways to monitor the integrity of content that passes through every stage of the broadcast infrastructure. Designed on the belief that opinion-based human intelligence is a more effective way to validate content quality than simply monitoring the technical parameters of a video signal, these technologies provide a set of intuitive processes that enable an in depth analysis of the video and audio data. For the first time, a broadcast monitoring system evaluates the content of a television signal rather than measure the absolute technical properties of the signal carrying that content.

Broadcasters working with Hyperion and Media Biometrics realize more sophisticated multi-channel content monitoring and significant new protections when airing premium, high-value television programs.

Included with Hyperion are additional tools to enable remote monitoring over IP via video thumbnails, time code logging for accurate event tracking and content identification from source to output using UMID metadata.

For Related Modules see:  
IQDAVM in Analog/Digital Conversion

Hyperion represents a new generation of television monitoring and quality control. Its sophisticated capabilities enable far more efficient and cost effective content monitoring than has ever been available to the broadcast industry.

To manage the increasing complexity of their operating environment, broadcasters now rely on automated systems for ingest, playout and scheduling. These systems enable broadcasters to do more with less while operating their plant at greater efficiency.

Unfortunately there is one critical system that has not kept pace with these advances - Quality Control.

Effective quality control in a modern broadcast facility requires intelligent monitoring of a wide range of functions. These include not only the quality of the video images from ingest to transmission, but also other critical issues such as multichannel sound, multiple language racks, accuracy of content scheduling & delivery, and management of metadata including closed captions, subtitles and content advisory ratings.

To check the system-wide accuracy of all these parameters would require a dedicated person to monitor the audio and video quality of each channel at every stage in the broadcast workflow - an expensive proposition that can be justified only for extremely high value content.

And even with dedicated human monitoring, it is still extremely difficult for a single operator to cope with QC of multiple language tracks, multi-channel audio and the ever-increasing amounts of technical and operational metadata that tie automated systems together.

To meet the QC needs of the modern broadcast infrastructure, a more intelligent, intuitive, system-wide monitoring approach is required.

### Limitations of Current QC Monitoring Techniques

Most current QC monitoring systems have two main drawbacks. They are deployed only at the end of the signal flow just before transmission and they are designed primarily to detect the rare absolute technical failure rather than subtle issues which occur more commonly.

These systems are designed to monitor content immediately prior to transmission, so every failure detected has the potential to result in lost revenue for the broadcaster.

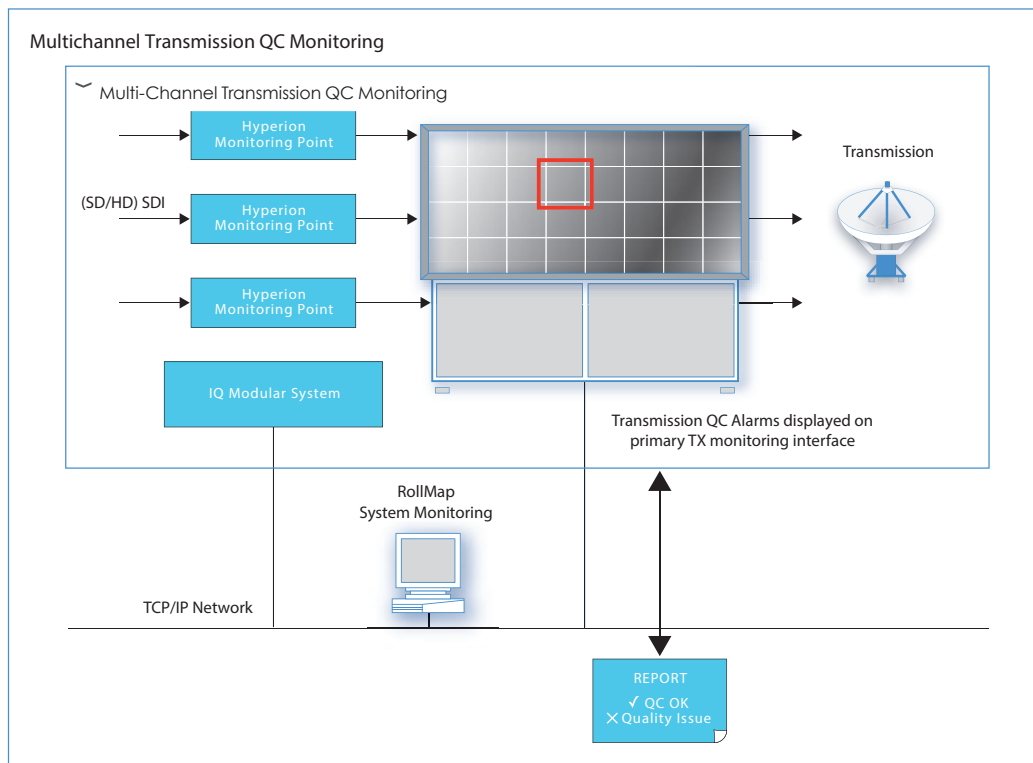
A better solution would be an intelligent system-wide QC process that monitors content quality at every stage of the broadcast workflow, from ingest to transmission. Unfortunately, current systems can make such an implementation economically prohibitive.

At the transmission monitoring site, most quality control systems let an operator monitor multiple channels simultaneously through a combination of software alarms and large displays powered by multi-viewers. These systems focus on detecting absolute presence (or failure) of signals, such as sync loss, no audio or digital freeze.

While the detection of such catastrophic signal loss has proved useful, this type of monitoring is no substitute for the kind of opinion based, subjective evaluation humans can bring to quality assessment. For example, current automated systems might give a "green light" to the multichannel audio associated with picture content regardless of whether the soundtrack is in the correct language or even relevant to the content.

Even with dedicated human monitoring, the sheer amount of information in the multichannel environment can quickly overwhelm the senses. An operator can ensure that program content is being broadcast to air, but may easily fail to catch a subtle error - such as a language requirement - that can result in loss of revenue.

As the potential loss of revenue due to content delivery failure is so high, a better method is needed to monitor and evaluate content quality.



### Hyperion - Automated Intelligence from Ingest to Transmission

To address this important challenge, SAM has developed Hyperion, an entirely new way to monitor the integrity of the content that passes through every stage of the broadcast infrastructure. Designed on the belief that opinion-based human intelligence is a more effective way to validate content quality than the simple monitoring of technical parameters of a video signal, Hyperion provides a set of intuitive processes that mimic the eyes and ears of a human observer. For the first time, a broadcast monitoring system evaluates the content of a television signal rather than measure the absolute technical properties of the signal carrying that content.

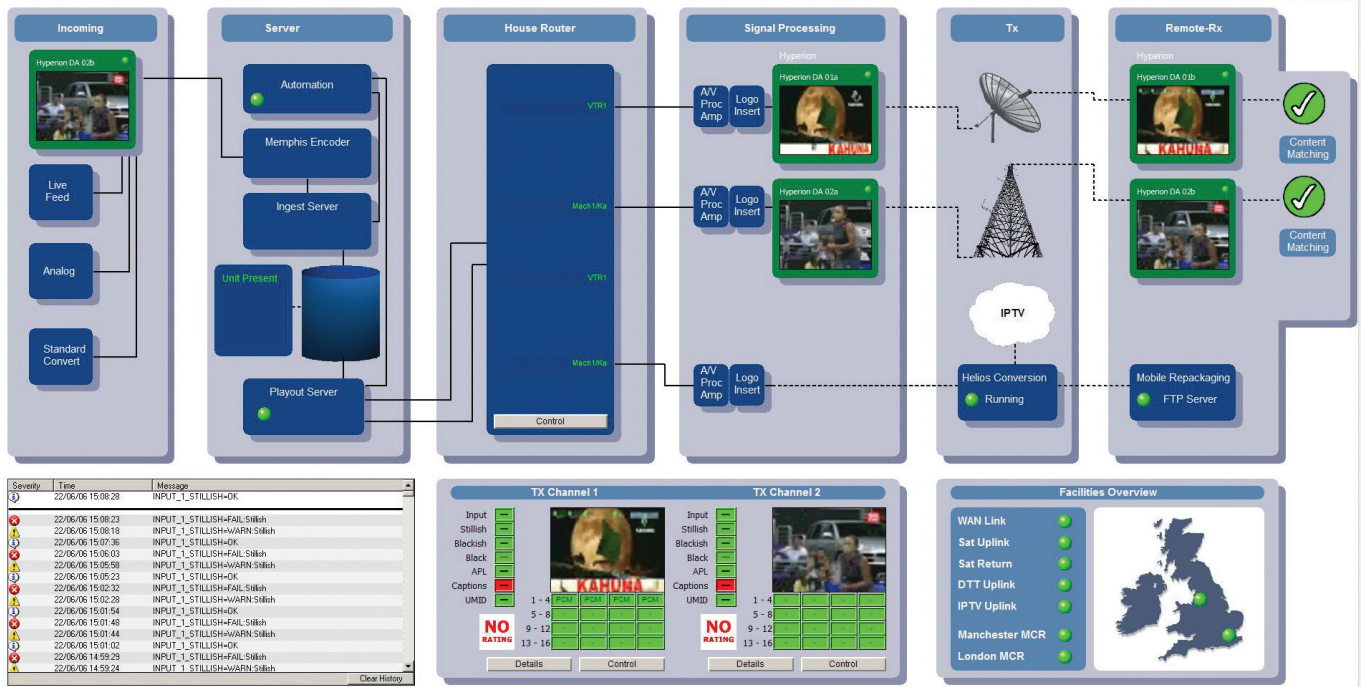
Hyperion is an integral part of a series of SAM products that are positioned at different points in the broadcast workflow. Therefore it can be deployed in a distributed system, making it possible for the first time to monitor content quality through the entire broadcast chain from ingest to transmission. By using the entire broadcast infrastructure to monitor quality, Hyperion can ensure that content failures never go on air.

By elevating the monitoring bar beyond a series of technical check points, the goal of Hyperion is to form an educated "opinion" as to whether content video, audio and metadata is meeting the quality standards to satisfy viewers as well as the contractual requirements necessary to generate revenue for the operator.

Fully programmable, Hyperion "opinions" can be tailored to the exact requirements of each installation. No other monitoring technology has ever even attempted to offer Hyperion's "intelligent" content evaluation.

At its core, Hyperion consists of a variety of detection algorithms that are designed to evaluate what is "normal" in various program types, according to the specifications of each customer installation. These algorithms interpret whether the content lacks value by matching its actual behavior with a pre-set profile of expected behavior.

The factors monitored in each profile, for example, may include the motion content of the video signal, the intensity of color or the amount of darkness. Unlike conventional monitoring systems, Hyperion detection works on "stillish" and not absolutely still pictures, or blackish and not absolutely black pictures. Hyperion assumes that if a picture is largely still then it is probably not valuable and probably not fulfilling its role of generating revenue. These alarms have configurable thresholds so that content does not alarm unnecessarily. Of course Hyperion also contains the technical and metadata monitoring required to validate signal integrity.



Transmission Center Main Payout Monitoring

### Video “Thumbnails” and Metadata Tracking Ensure Schedule Integrity

Also included with Hyperion are tools to enable remote monitoring over IP and content identification from source to output. These tools work in conjunction with automation and scheduling systems to enable signals to be tracked and verified automatically by inserting and reading back SMPTE UMD and program ID metadata. Metadata tracking ensures that the content being broadcast is exactly what the programming schedule says it should be and can report back the total number of frames of each individual piece of content transmitted both locally and from remote locations such as head ends.

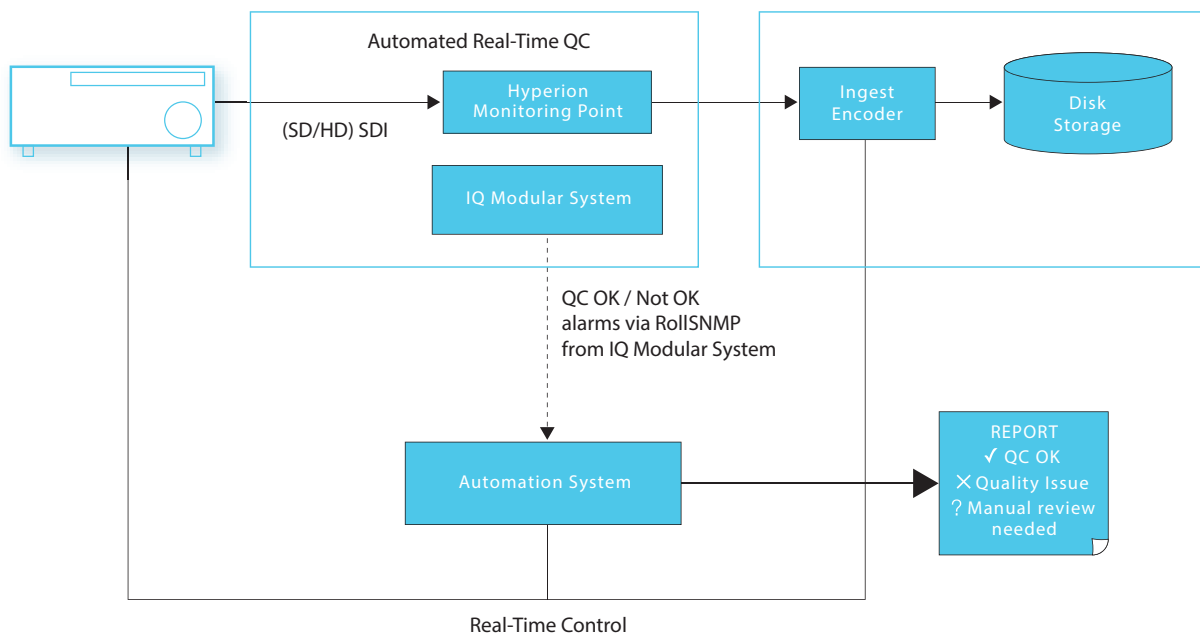
As an additional visual safeguard for remote content identification, delivery of video thumbnail images support the video, audio and metadata alarm information to provide a secondary level of confidence that content is correct at both internal and remote locations through the use of inexpensive IP network bandwidth.

### Multiple Reporting Options

In the event of any problems, Hyperion can notify operators of trouble through a wide choice of alerts. It can operate through the SAM RollMap™ Infrastructure Management System and it can also integrate with a variety of third party multi-viewer systems such as the Barco Hydra and NG Display Wall processors. Also provided as standard is a full SNMP control and monitoring interface for third party integration of Hyperion enabled products.



### Unmanned (Automated) Ingest / QC Application



### Distributed Intelligence

Because Hyperion technology is being integrated into SAM's IQ Modular™ products that process video, audio, metadata and other content, it will automatically be distributed throughout the broadcast plant where these products are installed. By using SAM infrastructure products to distribute Hyperion monitoring points in this way, customers can gain tremendous extra value throughout their operations. For example, Hyperion cards may be deployed into the ingest chain between source and Ingest Encoder to provide automated QC during the ingest process.

### Transition to File-Based Operations

Not only is Hyperion a futuristic platform, it also provides a future-proof transition path for broadcast evolution. For example, it provides a metadata bridge between stream and file technologies, such as MXF, within the broadcast plant. This allows content to be tracked and monitored regardless of whether it exists in a stream or file domain. Over time, Hyperion will be implemented in all new SAM products, whether hardware or software based, thus providing a system-wide content monitoring capability with multiple monitoring points throughout the broadcast signal chain.

Hyperion represents a new generation of television monitoring and quality control. Its sophisticated capabilities enable far more efficient and cost effective content monitoring than has ever been available to the broadcast industry.

The IQHIP10 is an advanced monitoring module with revolutionary Hyperion content QC capability. Hyperion is designed to continuously and automatically monitor signal content providing verification of whether legal and technical obligations are being met and to provide guidance as to whether the content is within the required parameters to be considered as valid. For video factors such as motion level within the content, as well as the amount of darkness and amount of picture color are monitored. Audio factors reported include Dolby D/E or PCM audio presence, likeness and level information such as Silent, Quiet, Loud and Overload.

Picture regions can be monitored to allow for animated logos and on-screen graphics such as News Tickers. Alarm thresholds can all be adjusted allowing profiles to be set by the user for different material types (genres).

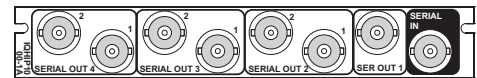
Content may be tracked through the broadcast chain by the insertion and reading of SMPTE UMIDs or Internal House Number, title and duration metadata. This data can be used to track content, verify that the correct content is being transmitted and even frame count the duration of every piece of content to ensure contractual obligations are being met. For ingest applications timecode information can also be interpreted and stamped on any Hyperion alarms to enable efficient location of QC alarms.

For remote content identification, delivery of video thumbnail images and audio level monitoring provide a secondary manual level of confidence that content is correct at both internal and remote locations. All alarms from this product can be integrated into the major Video display wall processors to streamline alarm reporting and reported through RollMap Network Management system or via SNMP to other vendor Control and Monitoring systems.

### Features

- Intelligent 3G/HD/SD-SDI processing module with integrated Hyperion QC monitoring
- Dedicated monitoring outputs with OSD for hyperion audio/video alarms and audio level meter information
- Automated content QC, suited to:
  - Multi-channel playout facilities and complimentary monitoring of high value content
  - Automated ingest processes including timecode logging for accurate location of Hyperion alarms
  - Remote location monitoring such as business continuity sites and unmanned teleport facilities
- Real Time content QC against genre profiles ensure any on air issues are identified with minimal potential impact on revenue, such as scheduling errors or dropped frames on commercial content
- Remote monitoring over TCP/IP via video Thumbnails
- Legal and Technical validation of signal including detection and reporting of closed captions, content advisory rating, XDS Program data
- Automated ingest QC significantly increases throughput efficiency over manual QC processes
- Standards supported:
  - 625/25i, 525/29i
  - 720/50p, 1080/25i
  - 720/59p, 1080/29i
  - 1080/50p, 1080/59p Level A
- Single SFP cage version suitable for fiber optic transmitter and receiver options, DIN or HD-BNC SDI input or outputs, and HDMI output option for local monitoring

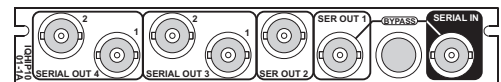
### Inputs & Outputs - IQH3A/1A/3B enclosures



**IQHIP1000-1A3, IQHIP1000-1B3**



**IQHIP1003-1A3, IQHIP1003-1B3**



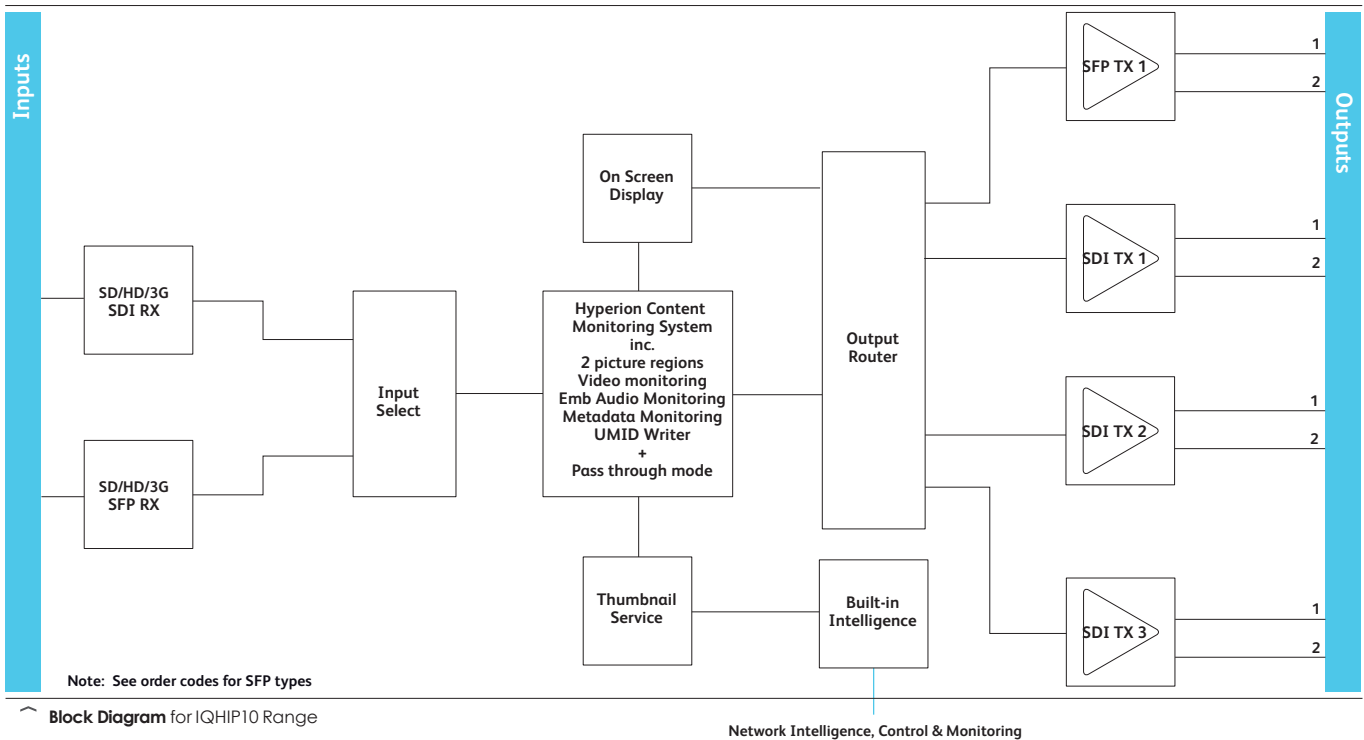
**IQHIP1001-1A3, IQHIP1001-1B3**

For more details on enclosure types please refer to datasheet IQH3B.

### Features cont...

#### Why should you choose this module?

- Sophisticated Hyperion content quality management tools allow true assessment of the value of the signal, not just presence, ideal for unmanned and lowmanning operations
- Reporting of all detected alarms via RollMap Infrastructure Management System or via SNMP to other vendor control and automation systems
- Hyperion alarm data integrates with all major Video display wall processors to streamline alarm reporting in playout facilities
- Fiber optic interfacing allows extended transmission distances for 3Gbps and HD SDI signals
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution



### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Input cable length	TBC

##### Fiber Signal Input

Inputs	1*
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

##### Signal Outputs

Electrical	3Gbit/s SDI, SMPTE 424M 1.5 Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel HD / SD-SDI Outputs x 7 (1 selectable main or monitoring)
Return loss	>-15dB to 1.5GHz, better than -10dB to 3GHz

##### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2*

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green) Warning (Yellow) Error (Red)

##### Functions

Pattern select	Black, 100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse and Bar, Burst
Monitor output select	Main/Monitoring (Output pair selectable)
On Screen Display	On/Off (Output pair selectable)
Video	Video Thumbnails over TCP/IP Motion Level (Stillish) Picture Darkness (Blackish) CRC/EDH Reporting Average Picture Level Luma High/Low Chroma High/Low Chroma/Luma Underflow Video Bit Depth Black Input Status Input Standard Freeze Detect

#### Audio

Audio Presence	Audio Type Detection (PCM, Non-PCM, Dolby E, AC3, MPEG Audio (SMPTE 338M)) Audio Bit Depth Audio Level Metering Audio Silence Audio Quiet Audio Loud Audio Overload Audio Out of Phase (Polarity) Audio Mono/Stereo Detectio
Metadata	SMPTE UMID (Insert, Report and Scrub) Program ID House Number Watermarking (Insert, Report and Scrub) Closed Captions Detection (CEA608, CEA708) Signaling detection (WSS, AFD (inc SMPTE 2016), VI) Content Advisory Rating (XDS, V-chip) ANC Timecode (720p, 1080i) VITC Timecode (525, 625) User Definable ANC Detectors Dolby E Guardband reporting Timecode Logging
On screen display	Picture Region Configuration On/Off Audio Level Meters Audio Presence and Type Content advisory system and rating 2 x 19 character caption generators Timecode display Average picture level
User memories	16 x Save / Recall / Rename

#### Specifications

##### Electrical

Standards supported	1080/50p, 1080/59p, 1080/60p 750(720)/60p, 1125(1080)/30 750(720)/59p, 750(720)/50p, 1125(1080)/29i, 1125(1080)/30p 1125(1080)/29p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/24p 1125(1080)/23p, 525(480)/29i, 625(576)/25i
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##### Power Consumption

IQHIP1000-1A3	12 W max (A frames)
IQHIP1000-1B3	11.5 PR (B frames)
IQHIP1001-1A3	13 W max (A frames)
IQHIP1001-1B3	12.5 PR (B frames)
IQHIP1003-1A3	13 W max (A frames)
IQHIP1003-1B3	12.5 PR (B frames)

### Ordering Information

#### Order codes for IQH3B enclosures

##### **IQHIP1000-1B3**

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 7 SDI main or monitoring OSD outputs.

##### **IQHIP1001-1B3**

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module with power fail relay input bypass. 6 SDI main or monitoring OSD outputs.

##### **IQHIP1003-1B3**

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 1 SDI configurable input or output, 5 SDI main or monitoring OSD outputs. 1 SFP cage

#### Order codes for IQH3A/1A enclosures

##### **IQHIP1000-1A3**

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 7 SDI main or monitoring OSD outputs.

##### **IQHIP1001-1A3**

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module with power fail relay input bypass. 6 SDI main or monitoring OSD outputs.

##### **IQHIP1003-1A3**

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 1 SDI configurable input or output, 5 SDI main or monitoring OSD outputs. 1 SFP cage

For more details on enclosure types please refer to datasheet IQH3B

#### Fiber SFP options

**FC1-13T1** - Single 1310nm Tx

**FC1-13T2** - Dual 1310nm Tx

**FC1-15T1** - Single 1550nm Tx

**FC1-15T2** - Dual 1550nm Tx

**FC1-R1** - Single Rx

**FC1-13TR** - Transceiver 1310nm/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

**FC1-HDMI2** - HDMI Tx with 2m cable

**CWDM Tx** - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.

One of the biggest practical challenges of multi-channel broadcasting is keeping track of all the content. It is clearly economically impractical to have eyeballs on every channel and variants through a major installation like a master control room or a playout center.

The accepted solution is to monitor by exception. Assume everything is working perfectly, and only sound the alarm if something is detected to be at fault. This is a sound principle, and one on which complex plants in other industries work

The challenge with media is that the fault conditions are more subtle than a simple yes or no. Is it the right content? Is the video present but frozen? Is the audio present but silent? All these and many more are issues which need to be monitored, and which it is hard to do automatically.

These issues can be summarized under three broad headings:

- Is this the right content, or has something been routed incorrectly in the network
- Are the audio and video elements travelling along similar path lengths, or has their synchronization slipped
- Is there a change in quality?

While there have been technological solutions to this in the past, they have not been very successful, not least because they take a long time to register errors. Typically such systems can take as long as 90 seconds to lock up, by which time the complaints from viewers will already be flooding in.

There is a need for a new technology which can be used for automated content tracking – what we call **Media Assurance**. The core requirements might be summarized as:

- Both creating and detecting measurements in realtime
- Capable of accurately comparing and confirming content within seconds
- Independent of changes to resolution, framerate, and multiple encodings
- Non-destructive and invisible in operation
- Depending upon metadata which is very small, allowing it to be carried with the signal or over a separate network with effectively no increase in the payload
- Capable of meeting the three key requirements above and being extensible to other functionality as required

This is the background to the decision by SAM to develop a new form of content fingerprinting to meet all of these challenges and aspirations.

### Media Biometrics

Media Biometrics is the name given to a unique signature technology developed by SAM, and now implemented in a number of its products.

The underlying principle is that the algorithms look at the media file – video and audio – in both spatial and temporal planes, the way that a human would perceive it. The resulting signature, because it contains the essence of the picture and sound, is therefore impervious to format, frame rate, aspect ratio and color shift processing.

This is absolutely central to the Media Assurance system: Media Biometrics can match content after any of the processes which typically take place in a delivery system, for instance. An original signal may be up- or down-converted, passed through a color legalizer, and compressed for transmission, but Media Biometrics will still recognize it as the same content.

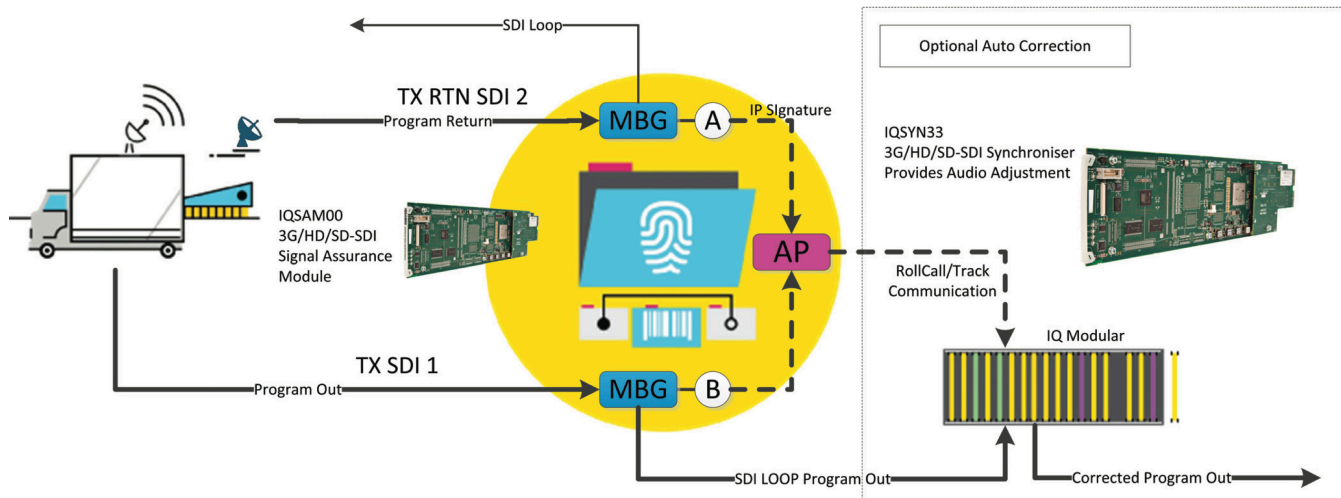
Media Biometrics is also sensitive to small motion in the picture. Earlier attempts at detecting frozen video using signatures failed on some content: a one-to-one news interview, for example, didn't always have enough motion for the system to detect.

Despite this, the amount of data associated with Media Biometrics is tiny. The payload is measured in bytes per frame. A new signature is generated for each video frame, and the data is continuously streamed, meaning that the very small Media Biometrics stream can be handled over the same network, or across a business network associated with the media.

Although many of its uses will be found in video systems, Media Biometrics is also applicable to radio. The audio and video footprints are self-contained, allowing it to detect lip-sync errors. The system works equally well without a video component for broadcasters who also want to use it to track the health of radio channels.







Media Biometrics deployed in a lip sync application for live production

### Architecture

Media Biometrics is not a standalone product or system. It is designed to be embedded into key points of the architecture.

There are two elements to the system. The first is the MBG, or Media Biometric Generator. This, as its name suggests, creates the signature. It can be embedded in anything that generates content.

The SAM Kahuna production switcher, for example, has MBGs on all 64 of its outputs. The Sirius 800 routers have MBGs on each input to the embedded multi-viewer. Other products, which create a significant new version of content, can have embedded MBGs. The output is the reference signature.

The second part of the system is the AP, the Assurance Point. An AP compares the new signature to the reference signature and determines if they are the same. Because of the power of the correlation algorithms built into Media Biometrics, an AP will lock up to the stream of data within two seconds (plus signature-sending network delay), generating accurate reporting from that time.

As will be embedded in content-aware and schedule-aware processes, at critical points in the workflow. Signals may pass through many APs across the content chain. This gives an automated decision-making process which is very quick to respond and resilient to false triggers.

As well as being implemented in SAM products including IQ and ICE, APs can run as software on COTS (commercial off the shelf) hardware. A standard computer will support a large number of AP instances simultaneously.

### Implementation

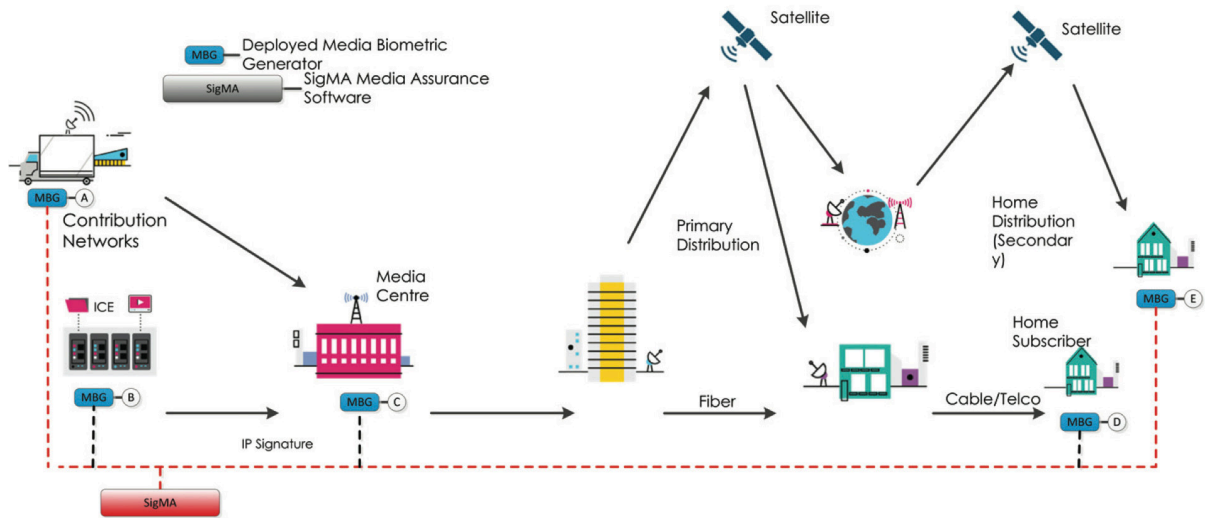
One way in which Media Biometrics can be used is within SAM's control and monitoring architecture. The RollCall system provides control and monitoring for the SAM product range. It also has a library of third party devices which can be monitored via SNMP, serial or GPI interfaces.

The addition of an AP to a RollCall monitoring point allows the health of the content to be checked anywhere downstream. This means the system reacts within seconds to conditions including:

- Absence of video or audio
- Incorrect audio or video
- Lip sync errors
- Audio mapping errors – Media Biometrics currently supports 32 audio channels
- Video still or audio silence
- Media match confirmation that two signals are the same

Where RollCall is used in conjunction with RollMap, to provide a graphical representation of systems, then multiple APs can be used to track the source of a problem.

RollMap is designed to plot and monitor both local facilities and geographically-distributed operations. Media Biometrics fits into this environment, and can identify problems at any location equipped with an AP. It can be used to monitor off-air in a remote site, for example, to ensure that only scheduled content is transmitted.



Media Biometrics deployed as part of a network wide media assurance system

The above example system consists of the following components:

### MBG A

1x IQSAM00 modular card within the OB environment, (1x AP, 2x MBG)

### MBG B

ICE Integrated MBG, Playback, (8x MBG)

### MBG C

1x IQMBG80 modular Card, Master Control Processing, (8x MBG)

### MBG D & E

2x IQMBG80 modular Card, Return feed monitoring, (16x MBG)

The number and type of SigMA Assurance Point (AP) licences is determined by the level of monitoring required at each stage of the workflow.

In this case it is deemed sufficient to provide one standard SigMA licence and one Professional SigMA licence per channel. The Standard AP is used to monitor the signal integrity post IQ Modular processing and the Professional licence prior to transmission for media Match and lip sync errors.

### Roadmap

As currently implemented, Media Biometrics delivers intelligent content checking, this provides a significant advance in systems monitoring, helping broadcasters build resilient delivery systems and get closer to the economic goal of lights-out playback.

The core technology is capable of considerable extension, and SAM has a roadmap for further applications. Some of these will add further to the technical quality assurance portfolio, and some will add new commercial capabilities.

**Quality matching** – with extensions to the core signature generation process, while still staying with a compact payload, it will be practical to develop a metric for signal degradation, based on PSNR (peak signal to noise ratio, the most common error metric to compare image compression quality). With multiple APs, it will be possible to identify any process responsible for significant quality loss.

**Absolute delay** – rather than the relative delay between audio and video which can be measured for lip sync errors, future enhancements will allow the measurement of the absolute delay across the signal paths. Any change in the delay will be an indicator of problems with hardware or routing, which may be a precursor to a complete failure.



**Intelligent diagnostics** – while an operator can identify the source of a problem through the use of multiple APs, in future this could be automated with the system simply reporting to the operator the area of failure.

**Media identification** – due to Media Biometrics' small payload size and powerful correlation algorithms it would be practical to create a complete library of signatures for checking content against. This would have applications in rights management for example.

**Schedule-aware media identification** – taking the same concept a step further, by integrating playlists from automation systems such as Morpheus, Media Biometrics can be used to check that the right content is being transmitted. Checking that the right commercials are transmitted is particularly important where advertising is localized and a single channel may have many sub-regions.

### Conclusion

The attractions of getting a signature from a video stream and using it to check that we have the same stream further down the pipeline are obvious. It is an excellent way to improve quality and to reduce operational costs.

The inescapable fact is that all previous efforts in this field have failed. They take too long to match – 90 seconds is not uncommon – or they cannot cope with some content, or the data payload is too large.

Media Biometrics succeeds in these three areas. Correlation takes around two seconds. The core technology is agnostic to anything that is likely to happen to a signal in the delivery chain, from minimal movement to color correction, from aspect ratio conversion to logo insertion. Finally, the payload is remarkably tiny.

It is implemented as part of a system or network-wide control and monitoring system, providing a service-oriented approach to quality and supervision. It extends the capabilities of monitoring by exception. It is cost-effective, and proven.

Media Biometrics is an important step towards fully automated multi-channel, multi-platform delivery, a step change in the quest for lights out broadcast operations.

For more  
information on  
Media Biometrics  
enabled products  
go to the  
[SAM website](#)

The IQSAM00 provides a fast and efficient way to monitor video and audio confidence and timing at various points within an SDI system. In broadcast systems maintaining the association and timing between video and audio signals to avoid an objectionable viewer experience has always involved a lot of time consuming set up, testing and monitoring by broadcast engineers and staff, but now IQSAM00 can provide the monitoring confidence that everything is correct and remains correct during live operation. It does this by generating and comparing video and audio signatures from the SDI stream and reporting back the delay value and an accuracy confidence, all without the need for potentially intrusive metadata insertion, or watermarking.

IQSAM00 can operate as a purely SDI based module to compare two SDI streams (one 'known good' and one 'measured') in a 'probe' type application, or can transmit and receive fingerprints over IP for comparison with units at different locations within the facility or at a remote site. IQSAM00 can compare the signals quickly and reliably with typical confidence times of sub 5 seconds achieved for common applications and material types. Being fully compatible with SAM's RollMap graphical monitoring software means that signal confidence and delay values from across the system can be shown in a single display graphic providing system timing confidence 'at a glance'. Alternatively native SNMP support enables the IQSAM00 to be integrated with other network management systems used for 'in house' monitoring operations.

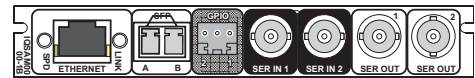
### Features

- Compares two signals for video and audio identity confidence and timing differences with accuracy to 1ms
- Has the flexibility to operate as a local signal probe comparing 2 SDI inputs, or compare local SDI with remote signature information received via IP link using the SAM Media Biometrics technology
- Handles and can check the channel mapping of up to 16 channels of embedded audio present on the incoming SDI stream
- Either input can be routed to either output for signal chain transparency
- Measures both absolute video and audio delays and is robust to format conversion, ARC changes and IP compression
- Generates Media Biometric signatures from each input for analysis by other Media Biometrics enabled units
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - Fiber to SMPTE 297-2006
- SFP cage enables I/O over fiber or additional SDI via HD-BNC
- 16 x user memories, save/recall/rename
- RollTrack delay values created to enable delay correction by other RollTrack enabled units
- RollCall control and monitoring compatible with standard logging and reporting features

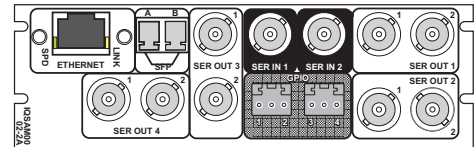
### Why should you choose this module?

- Quickly and reliably detects any video or audio routing and lipsync errors in the system and provides measurements and alerts to work in harmony with Network management systems
- Can be used to measure signals that have undergone format or ARC conversion, or for remote 'off-air' applications where the signal will have been compressed and decoded
- Providing delay values via SAM's RollTrack low level control system allows connected units to automatically adjust any unwanted audio delay errors, ideal for use in remote locations or low-staffing situations
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

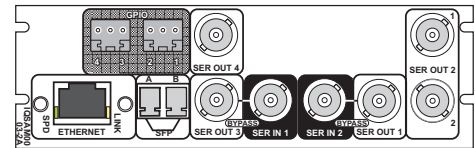
### Inputs & Outputs - IQH3A/1A/3B enclosures



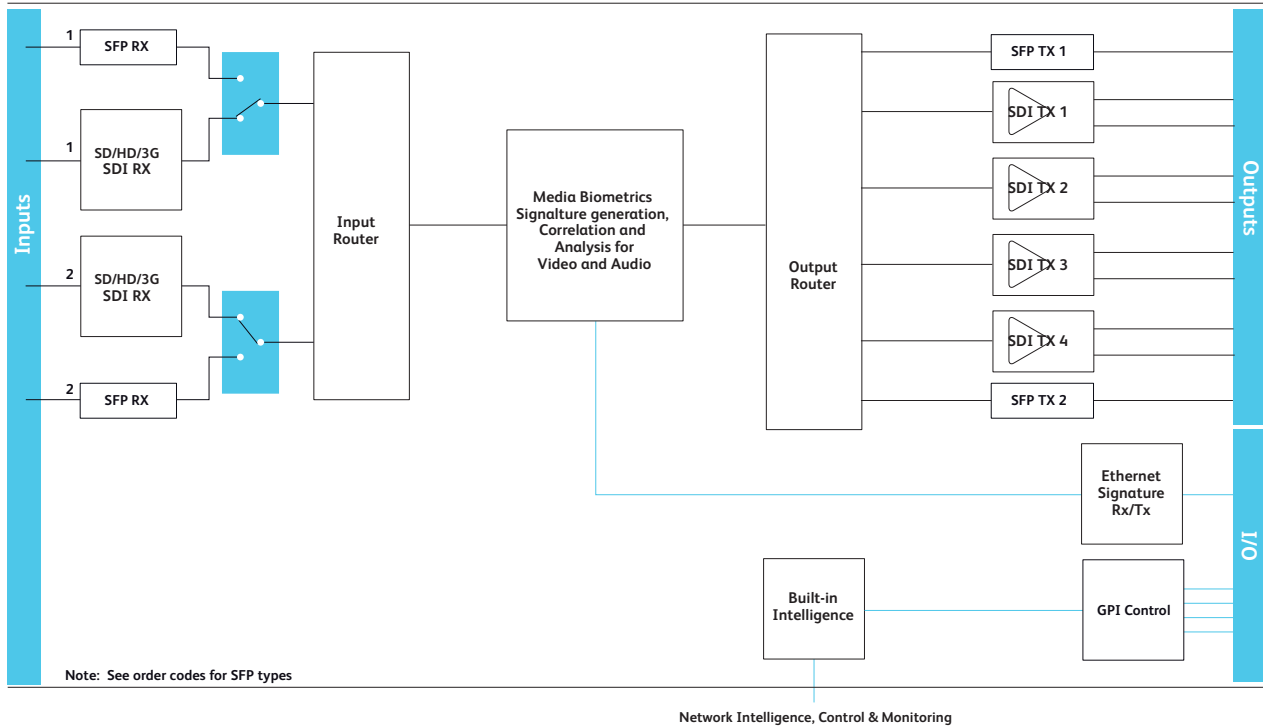
IQSAM0000-1A3, IQSAM0000-1B3



IQSAM0002-2A3, IQSAM0002-2B3



IQSAM0003-2A3, IQSAM0003-2B3



Block Diagram for IQSAM00002-2B3

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

SDI Inputs	2 x
Electrical	3Gbit/s SDI, SMPTE 424M (425M-level A) 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Input cable length	Up to 80m Belden 1694A @ 3Gbps Up to 150m Belden 1694A @ 1.5 Gbps Up to 250m Belden 1694A @ 270 Mbps

#### Fiber Signal Input

Inputs	2 x*
Optical	3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

#### Signal Outputs

SDI Output	Up to 8 pair selectable from input 1, 2
Electrical	3Gbit/s SDI, SMPTE 424M 1.5 Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel HD / SD-SDI Outputs x 7 (1 selectable main or monitoring)
Return loss	>-15dB to 1.5GHz, better than -10dB to 3GHz

#### Fiber Signal Output

Optical	3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2*

\*Note: Optical I/O and control dependant on type of SFP module fitted

### Controls

#### Indicators

Power	OK (Green)
CPU	OK (Flashing)

#### Content Status

Summary	OK (Green) Warning (Yellow) Error (Red)
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#### Functions

Monitor output select	Main/Monitoring (Output pair selectable)
Channel 1/2	Input & Output select
Audio alarm Threshold settings	

#### Detection Range

Detection range offset	0 - 10 seconds
Audio channel names	Channels 1 - 16 user configurable
Audio channel mapping	Channels 1 - 16 for input 1 to 2
User memories	16 x Save / Recall / Rename
Reporting & Logging	Input Loss; Input Line Standard; lipsync confidence, relative video and audio delays, absolute video and audio delays, audio timing alarms, embedded audio state, audio routing state
Information Window	Video Input Status, Audio Input Status,
RollTrack Index	Up to 16 RollTrack destinations
RollTrack Sources	Unused, Input state & Std, Video confidence, video delay, Audio delay (absolute & relative), audio timing warning, GPI/O state
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module

### Technical Specification

**Module Information** "Reports following module information:  
Software version, Serial number, Build number,  
KOS version, Firmware version, PCB version

#### Specifications

##### Electrical

**Standards supported** 1080/50p, 1080/59p, 1080/60p, 750(720)/60p,  
750(720)/59p, 750(720)/50p, 1125(1080)/29i,  
1125(1080)/30p\*, 1125(1080)/29p\*,  
1125(1080)/25i, 1125(1080)/25p\*, 1125(1080)/24p\*,  
1125(1080)/23p\*, 525(480)/29i, 625(576)/25i  
\* Note: Must be the same standard on both  
inputs

#### Power Consumption

Module power consumption 14.5W Max (A frames)  
14 PR (B Frames)

### Ordering Information

#### Order codes for IQH3B enclosures

##### **IQSAM0000-1B3**

3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 2 SDI outputs, 1 SFP interface, 2 GPIs, Ethernet I/O.

##### **IQSAM0002-2B3**

3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 8 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

##### **IQSAM0003-2B3**

3G/HD/SD-SDI Signal Assurance Module with dual relay input bypass. 2 SDI inputs, 5 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

#### Order codes for IQH3A/1A enclosures

##### **IQSAM0000-1A3**

3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 2 SDI outputs, 1 SFP interface, 2 GPIs, Ethernet I/O.

##### **IQSAM0002-2A3**

3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 8 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

##### **IQSAM0003-2A3**

3G/HD/SD-SDI Signal Assurance Module with dual relay input bypass. 2 SDI inputs, 5 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

For more details on enclosure types please refer to datasheet IQH3B.

#### Fiber SFP options

**FC1-13T1** - Single 1310nm Tx

**FC1-13T2** - Dual 1310nm Tx

**FC1-15T1** - Single 1550nm Tx

**FC1-15T2** - Dual 1550nm Tx

**FC1-R1** - Single Rx

**FC1-13TR** - Transceiver 1310nm/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

**FC1-HDMI2** - HDMI Tx with 2m cable

**FC1-HDMIR** - HDMI Rx with 2m cable

**CWDM Tx** - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.



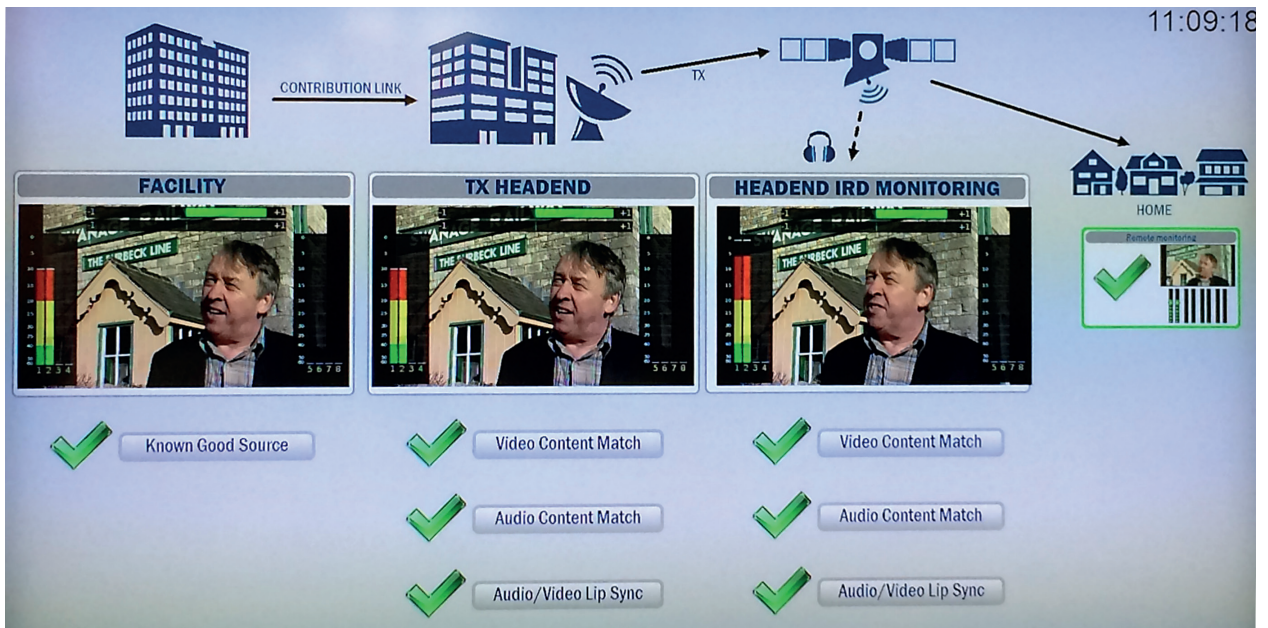
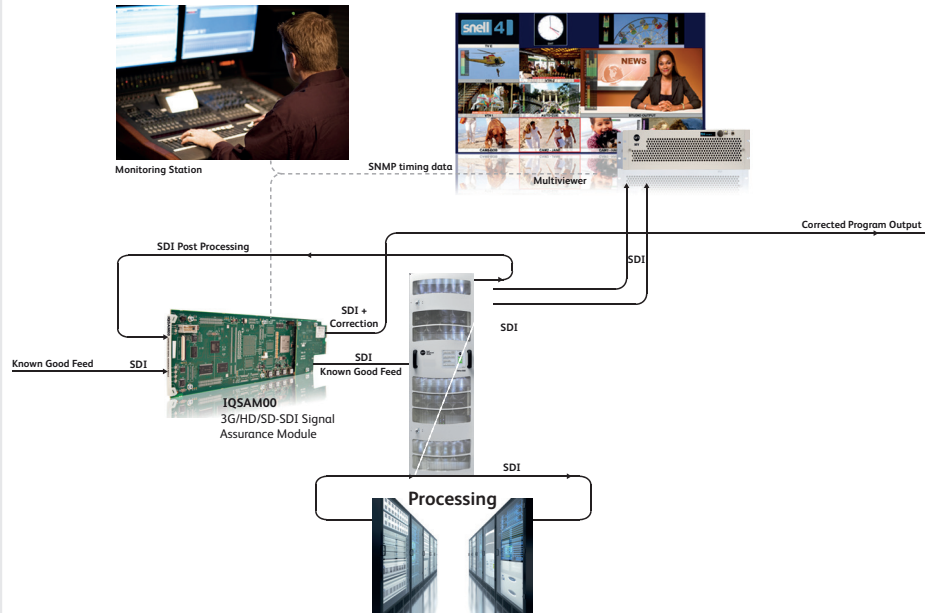
### IQSAM00 Applications

This example shows an efficient way to monitor and correct video and audio timing where a known good signal is being wrapped around a router for additional processing such as down conversion or logo insertion.

IQSAM00 provides a fast and efficient way to monitor video and audio timing at various points within an SDI system. It does this by generating and comparing video and audio signatures from the SDI stream and reporting back the delay value and an accuracy confidence, all without the need for potentially intrusive metadata insertion, or watermarking.

Accurate to 1ms and a less than 5 second timing detection window enables IQSAM00 to send timing and confidence values to any network management or monitoring system via SNMP, or direct to any SAM RollCall enabled products.

Any timing issues can also be corrected by the IQSAM00 via it's built in audio correction option to provide delay adjustment.



The IQLAM00 provides a fast and efficient way to monitor channel branding by detecting an on air logo and comparing it with a stored logo signature file. Multiple logo files can be stored on the card and loaded via triggers from the automation system as required to provide confidence that the channel branding is correct. Similarly the IQLAM00 can feed back it's logging and reporting information for the automation systems 'as run log' enabling any anomalies to be captured for later analysis. It does this by generating and comparing region specific video signatures from the SDI stream and its stored logo signature file then reporting back the detection confidence value and an alarm should there be a mismatch.

Being fully compatible with both SAM's RollMap graphical monitoring software means that logo detection confidence values and alarms from across the system can be shown in a single display graphic providing confidence 'at a glance'.

Alternatively native SNMP support enables the IQLAM00 to be integrated with other network management or automation systems.

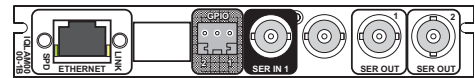
### Features

- Detects the presence of logos in 3G/HD/SD-SDI video streams with reference to a stored 'target' logo signature
- Can report presence or absence of target logo using the RollCall control and monitoring system, or via SNMP
- Multiple Logos can be downloaded to the card simply via RollCall, and stored for recall during playout
- Either input can be routed to either output for signal chain transparency
- Generates Media Biometric signatures from each input for analysis by other Media Biometrics enabled units
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - Fiber to SMPTE 297-2006
- SFP cage enables I/O over fiber or additional SDI via HD-BNC
- 16 x user and logo memories, save/recall/rename
- RollTrack triggers for logo presence and absence created to enable action by other RollTrack enabled units
- Rollcall control and monitoring compatible with standard logging and reporting features

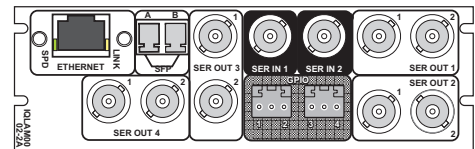
### Why should you choose this module?

- Provides confidence that channel branding remains correct during live operations
- Full RollCall and SNMP compatibility allows easy integration with Snell, or third party, network management systems providing an all-inclusive monitoring and control solution

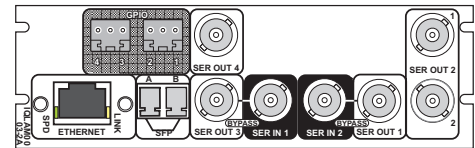
### Inputs & Outputs - IQH3A/1A/3B enclosures



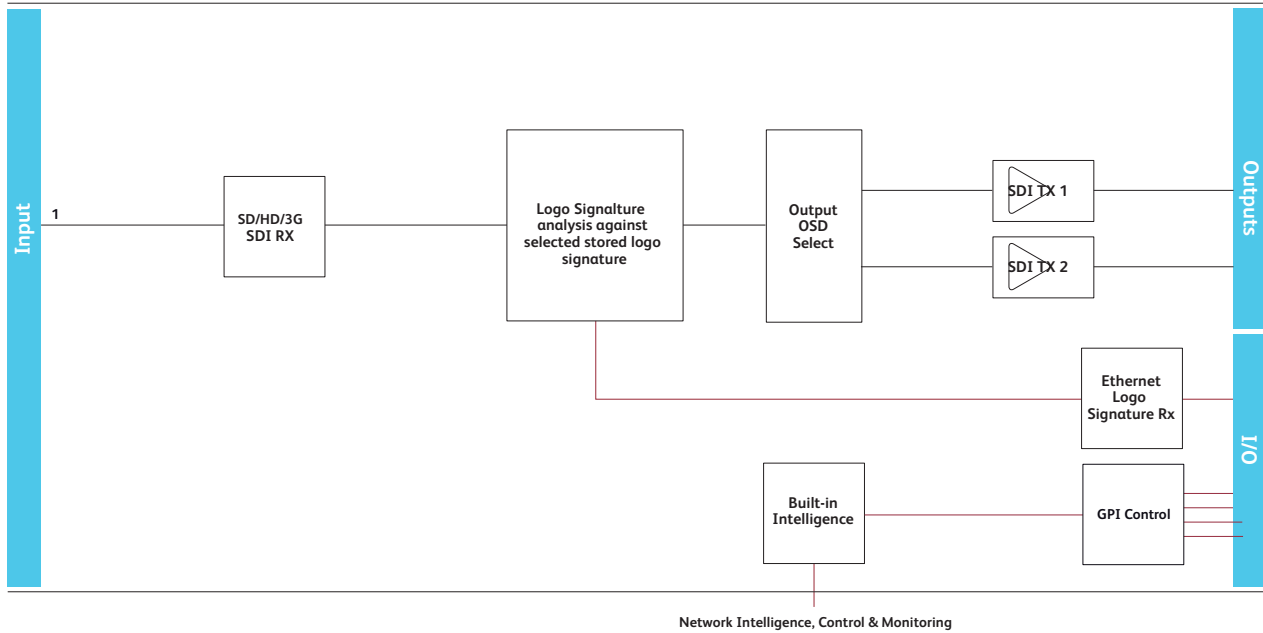
IQLAM0000-1A3, IQLAM0000-1B3



IQLAM0002-2A3, IQLAM0002-2B3



IQLAM0003-2A3, IQLAM0003-2B3



Block Diagram for IQLAM0002-2B3

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

SDI Inputs	2 x
Electrical	3Gbit/s SDI, SMPTE 424M (425M-level A) 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard Snell connector panel
Input cable length	Up to 80m Belden 1694A @ 3Gbps Up to 150m Belden 1694A @ 1.5 Gbps Up to 250m Belden 1694A @ 270 Mbps

##### Fiber Signal Input

Inputs	2 x*
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

##### Signal Outputs

SDI Output	Up to 8 pair selectable from input 1, 2
Electrical	3Gbit/s SDI, SMPTE 424M 1.5 Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard Snell connector panel HD / SD-SDI Outputs x 7 (1 selectable main or monitoring)
Return loss	>-15dB to 1.5GHz, better than -10dB to 3GHz

##### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2*

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green)      Warning (Yellow) Error (Red)

##### Functions

Monitor output select	Main/Monitoring (Output pair selectable)
Channel 1/2	Input & Output select
Logo detection window size?	
Logo detection position	X-Y adjust?
Logo detection	Enable/Disable
User memories	16 x Save / Recall / Rename
Logo memories	16 x Save / Recall / Rename
Reporting & Logging	Input Loss; Input Line Standard; Logo detected, detection confidence
Information Window	Video Input Status, Audio Input Status,
RollTrack Index	Up to 16 RollTrack destinations
RollTrack Sources	Unused, Input state & Std, Logo confidence, logo detected, GPI/O state
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

### Technical Specification

#### Specifications

##### Electrical

Standards supported 1080/50p, 1080/59p, 1080/60p, 750(720)/60p, 750(720)/59p, 750(720)/50p, 1125(1080)/29i, 1125(1080)/30p\*, 1125(1080)/29p\*, 1125(1080)/25i, 1125(1080)/25p\*, 1125(1080)/24p\*, 1125(1080)/23p\*, 525(480)/29i, 625(576)/25i  
 \* Note: Must be the same standard on both inputs

##### Power Consumption

Module power consumption 14.5W Max (A frames)  
 14 PR (B Frames)

### Ordering Information

#### Order codes for IQH3B enclosures

##### IQLAM0000-1B3

3G/HD/SD-SDI Logo Assurance Module. 2 SDI inputs, 2 SDI outputs, 1 SFP interface, 2 GPIs, Ethernet I/O.

##### IQLAM0002-2B3

3G/HD/SD-SDI Logo Assurance Module. 2 SDI inputs, 8 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

##### IQLAM0003-2B3

3G/HD/SD-SDI Logo Assurance Module with dual relay input bypass. 2 SDI inputs, 5 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O .

#### Order codes for IQH3A/1A enclosures

##### IQLAM0000-1A3

3G/HD/SD-SDI Logo Assurance Module. 2 SDI inputs, 2 SDI outputs, 1 SFP interface, 2 GPIs, Ethernet I/O.

##### IQLAM0002-2A3

3G/HD/SD-SDI Logo Assurance Module. 2 SDI inputs, 8 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

##### IQLAM0003-2A3

3G/HD/SD-SDI Logo Assurance Module with dual relay input bypass. 2 SDI inputs, 5 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O .

For more details on enclosure types please refer to datasheet IQH3B.

#### Fiber SFP options

**FC1-13T1** - Single 1310nm Tx

**FC1-13T2** - Dual 1310nm Tx

**FC1-15T1** - Single 1550nm Tx

**FC1-15T2** - Dual 1550nm Tx

**FC1-R1** - Single Rx

**FC1-13TR** - Transceiver 1310nm/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

**FC1-HDMI2** - HDMI Tx with 2m cable

**FC1-HDMIR** - HDMI Rx with 2m cable

**CWDM Tx** - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.

The IQMBG80 generates media biometrics signatures containing vital video and audio information from up to 8 independent SDI inputs and transmits them over an Ethernet IP link.

SAM Media Biometrics takes the 'fingerprinting' concept a step further by using advanced techniques to both identify media and discover content errors regardless of the content and, in most cases, the processing that has been applied to the content.

IQMBG80 Media Biometrics generators are designed to provide a low barrier to entry for customers wishing to integrate the system into their existing workflows. Handling up to 8 SDI inputs in a space efficient single width modular form factor allows media biometrics signatures to be cost-effectively transmitted to either a Media Biometrics SigMA based system, or a downstream IQSAM00 module for analysis and error reporting.

### Features

- Generates Media Biometric signatures from up to 8 SDI inputs and transmits them over IP link for analysis by other Media Biometrics enabled units
- Signatures contain video data and 16 channels of audio data, transmitted frame by frame
- Dedicated IP streaming output connection
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - Ethernet IP to IEEE 802.3
- RollCall control and monitoring compatible with standard logging and reporting features

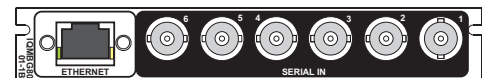
### Why should you choose this module?

- SAM's media biometrics technology quickly and easily detects any media errors in the system and provides measurements and alerts to work in harmony with Network management systems
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

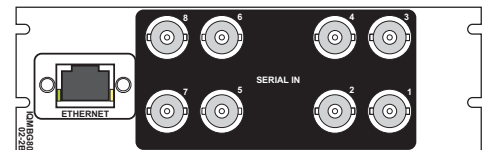
### Inputs & Outputs - IQH3A/1A/3B enclosures



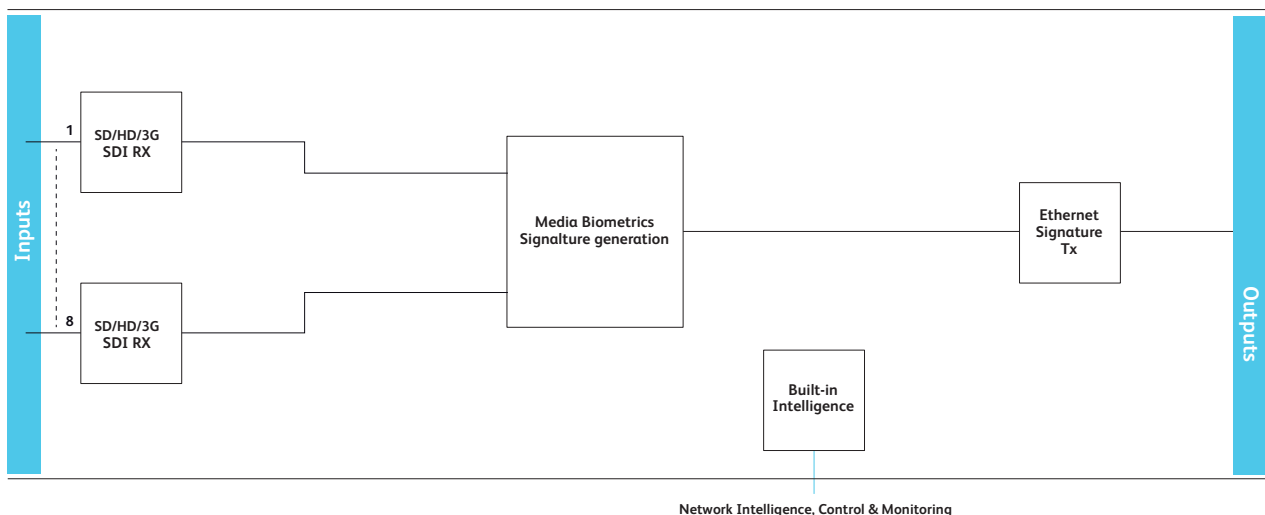
**IQMBG8000-1A3, IQMBG8000-1B3**



**IQMBG8001-1A3, IQMBG8001-1B3**



**IQMBG8002-2A3, IQMBG8002-2B3**



Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

SDI Inputs	8 x
Electrical	3Gbit/s SDI, SMPTE 424M (425M-level A) 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	HD-BNC/BNC 75ohm panel jack on standard SAM connector panel
Input cable length	Up to 80m Belden 1694A @ 3Gbps Up to 150m Belden 1694A @ 1.5 Gbps Up to 250m Belden 1694A @ 270 Mbps

##### Signal Outputs

Ethernet Output	Up to 8 media biometric signatures
Electrical	10/100 baseT Ethernet to IEEE 802.3
Connector / format	RJ-45 panel jack on standard SAM connector panel

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green) Warning (Yellow) Error (Red)
Link	Link Up (Green)
Rate	10Mbps (Yellow), 100Mbps (Green)

##### Functions

Reporting & Logging	Input Loss; Input Line Standard;
Information Window	Video Input Status,
RollTrack Index	Up to 16 RollTrack destinations
RollTrack Sources	Unused, Input state & Std
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

##### Electrical

Standards supported	1080/50p, 1080/59p, 1080/60p, 750(720)/60p, 750(720)/59p, 750(720)/50p, 1125(1080)/29i, 1125(1080)/30p*, 1125(1080)/29p*, 1125(1080)/25i, 1125(1080)/25p*, 1125(1080)/24p*, 1125(1080)/23p*, 525(480)/29i, 625(576)/25i
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##### Power Consumption

Module power consumption	13.5 W Max (A frames) 13.5 PR (B Frames)
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### Ordering Information

#### Order codes for IQH3B enclosures

##### IQMBG8000-1B3

3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (HD-BNC), Ethernet Output.

##### IQMBG8001-1B3

3G/HD/SD-SDI Media Biometrics Generator. 6 SDI inputs (BNC), Ethernet Output.

##### IQMBG8002-2B3

3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (BNC), Ethernet Output.

#### Order codes for IQH3A/1A enclosures

##### IQMBG8000-1A3

3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (HD-BNC), Ethernet Output.

##### IQMBG8001-1A3

3G/HD/SD-SDI Media Biometrics Generator. 6 SDI inputs (BNC), Ethernet Output.

##### IQMBG8002-2A3

3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (BNC), Ethernet Output.

For more details on enclosure types please refer to datasheet IQH3B



The IQQSM00 provides both SDI and HDMI monitoring outputs for up to four HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI inputs. Generated in a quad split format at resolutions up to 1920x1080 it enables convenient source monitoring on a single display with the option of feeding the SDI output into a router for remote monitoring applications. With inputs capable of handling a mix of formats and frame rates, the IQQSM00 comes in a space efficient modular package with the added benefit of user definable on-screen captions for easy image identification.

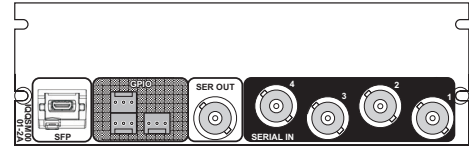
### Features

- Easy to use, quad-split multi-viewer
- Output - Support for HDMI at resolutions up to 1920 x 1080, and SDI
- Genlock reference to provide phase aligned output
- 32 user definable memories for storing and recalling image identifiers etc.
- Standard quad-split display using equal image sizes, with single image zoom function
- Controllable borders and image identification via user definable caption, 1 per image
- Standards supported:
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
- Rear panel connection via micro HDMI interface with adapter cables for standard HDMI connection
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

- Enables convenient local monitoring up to four video signals in a quad split view on a single monitor
- Duplicate SDI output allows the quad split signal to be routed to other areas for remote monitoring applications

### Order codes



#### IQQSM0001-2B3, IQQSM0001-2A3

3G/HD/SD-SDI Quad Split Monitor. 4 SDI inputs, 1 SDI output, Up to 2 outputs via SFP, 6 GPIs, reference inputs via IQH3B frame reference\*.

#### SFP options:

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

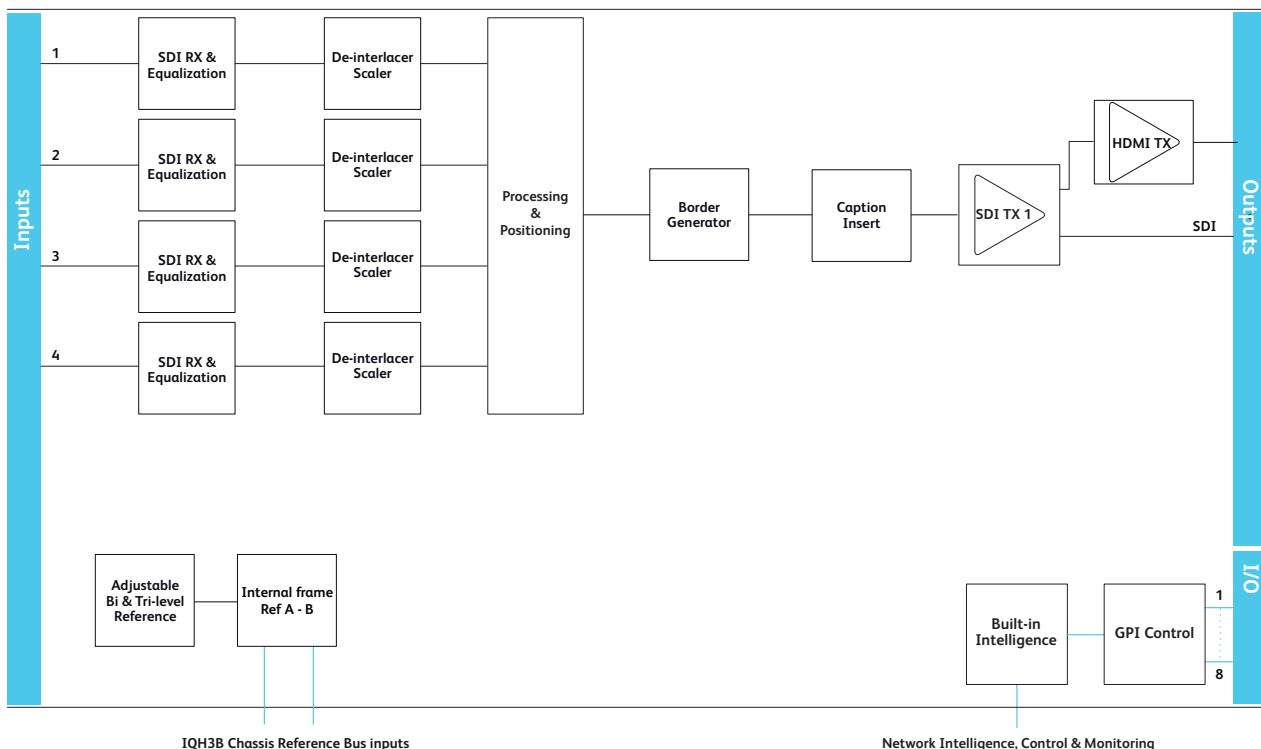
**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDMI2** - HDMI Tx with 2m cable

Note: SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to Frames and Hardware section.

\*Note: Frame reference only available with -B rear panels and IQH3B frame.



Block Diagram for IQQSM0001-2B3

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

SDI Inputs	4 x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 140m Belden 1694A @ 1.5 Gbit/s Up to 350m Belden 1694A @ 270 Mbit/s

##### Signal Outputs

SDI Output	x 1
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##### Fiber Signal Output

Outputs	x 2
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Status	OK (Green), Warning (Yellow), Error (Red)
Input 1-4	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Loss (Red)
Reference	OK (Green – tri-level), OK (Yellow – bi-level), Loss (Red)

##### Video Controls

Input 1 - 4 Configuration	1, 2
Input status	Present, Loss, Unknown, Data Rate
Logging	
Optical Logging	
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused Input 1 - 4 Present Input 1 - 4 Rate Unknown Input 1 - 4 Error Input 1 - 4 Loss Input 1 - 4 3G Input 1 - 4 HD Input 1 - 4 SD

##### Other Controls

User memories	Name, save and recall 32 user memories
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#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

#### Optical Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

#### Power Consumption

Module Power Consumption (inc. HDMI SFP)	25.5 PR (B Frames) 28 W (A Frames)
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The IQASI82 monitors two ASI streams simultaneously for errors automatically switching from main and backup inputs depending on error criteria. Alarm management flexibility is provided by user defined criticality of alarms from TS Loss to PID monitoring and basic ETSI TR 101290 alarms.

External GPI I/O, RS232 and Relay ports can also control functionality, allowing upstream triggering and or automated control via a third party system.

IQASI82 can be used in conjunction with RollCall Network management system for advanced alarm monitoring and control.

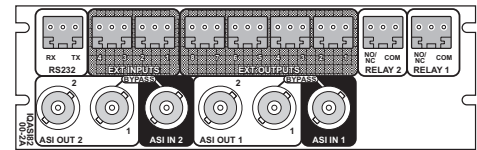
### Features

- Simultaneously monitors two MPEG-2 DVB ASI Transport Streams (TS)
- Compliant with ETSI TR101290 specification and ATSC TS streams packet, burst and byte modes
- Multiple switching methods, including near-seamless (between co-timed Identical streams) and non-seamless switching, Manual or Automatic
- Transport stream monitoring and user selectable alarms, including:
  - Catastrophic failures such as no TS, loss of synchronisation or low signal level
  - User defined maximum and minimum data rates for each Transport Stream
  - Monitoring PIDs from a customer specified list up to a maximum of 64 (32 per input)
- Alarm monitoring and logging via RollCall interface or SNMP
- Relay Bypass for signal path protection
- RollCall control and monitoring compatible

### Why should you choose this module?

- Each ASI Transport stream is independently monitored with MPEG-2, DVB and ATSC standards supported
- Near-seamless switching minimises disruption to the output stream by maintaining TS synchronisation when switching between sources
- Programmable TR101290 monitoring to match each transmission system specification
- 12 Configurable GPI ports (4 inputs, 8 Outputs), 2 relays and RS232 control provide flexible external interfacing options
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

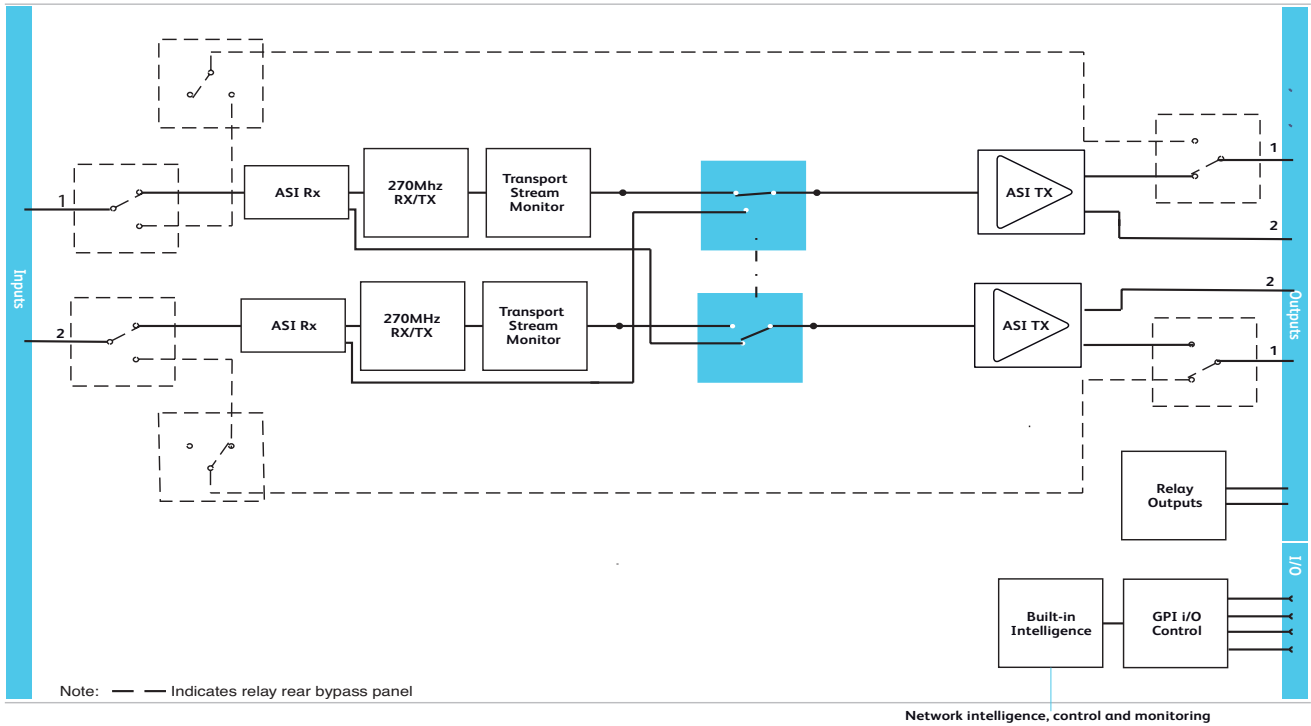
### Order codes



### IQASI8200-2A, IQASI8200-2B

ASI Transport Stream Monitor and Switch. 2 ASI inputs, 4 ASI outputs, 12 GPIs, RS232 port, and 2 relay ports.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQASI8200-2A

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

ASI 1	ASI (270 Mbit/s)
ASI 2	ASI (270 Mbit/s)
Standards	DVB-ASI, EN50083-9
Electrical	Transformer coupled 75R 800mV p-p

#### Signal Outputs

Serial data	4 ASI (270 MBit/s)
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#### Control Interface

GPI	4
Electrical	Opto-isolated with an internal 5V pull-up through 470R, active low 8mA
Connector / Format	Standard SAM screw terminal
GPO	8
Electrical	Darlington driver with 0V common, max sink current 500mA switching up to 50V
Connector / Format	Standard SAM screw terminal

#### Indicators

Power	OK	(Green)
CPU	OK	(Green flashing)
Input Status	OK	(Green)
	Fail	(Red)
Remote	Green	Lit = selected
Local	Red	Lit = selected
Output source	Yellow	Lit = selected

### RollCall Features

Status	Input and Output alarm statuses
Primary Config	ASI switch configuration
PID List	PID management
Alarm Outputs	Enable / disable
User memories	None
Logging	Input Status
	Input Alarms
	Output Alarms
	Output Status
	Misc
RollTrack Controls	On/off, Index, Source, Address, Command, Status, Sending
Setup	Versions, reset defaults, restart

### Specifications

Electrical	ASI transport stream
Connector / Format	BNC
	Standard SAM screw terminal

### Power Consumption

Module power consumption	6.5 W max (A frames)
	6.5 PR (B frames)

The IQDBT105 provides continuous off air terrestrial reception of DVB-T and DVB-T2 RF signals, to be used as part of a re-broadcast transmitter system, for example, or for direct monitoring of a transmitter. The IQDBT105 is able to monitor input RF modulation parameters, including Modulation Error Ratio, and also compare the input with a template of modulation parameters stored within the unit to provide an alarm on error conditions.

IQDBT105 can be used in conjunction with RollCall network management system for advanced alarm monitoring and control.

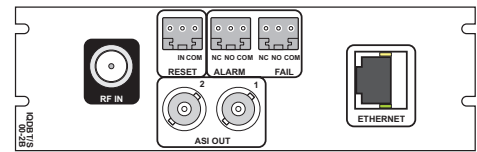
### Features

- Receives DVB-T2 RF signals and converts to DVB-ASI output
- Monitors input level, Modulation Error Rate (MER) and lock status to ensure quality of service is maintained
- Able to monitor RF modulation parameters and compare with pre-defined templates to provide alarms on error conditions
- Seven fixed and eight programmable modulation parameter templates available
- Template parameters include: The FFT in use, Guard Interval, Constellation of PLP and L1 modulation, LDPC ratio of PLP and PAPR reduction in use
- Transport Stream Monitoring is included to monitor PAT conformance and PID presence against a user defined list of expected PIDs
- Excellent adjacent channel performance (+10dB), useful for difficult RF environments such as transmitter sites
- Receiver tuning and MER monitoring available via the RollCall Network Management system, with full access to templates and transport stream monitoring via on-board SNMP interface

### Why should you choose this module?

- Ideal as an off-air receiver to provide DVB-T and T2 RF monitoring
- Provides output monitoring for DVB-T or DVB-T2 transmitter sites to check signal parameters and quality
- User defined PID matching allows transport streams to be monitored for payload and content problems
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

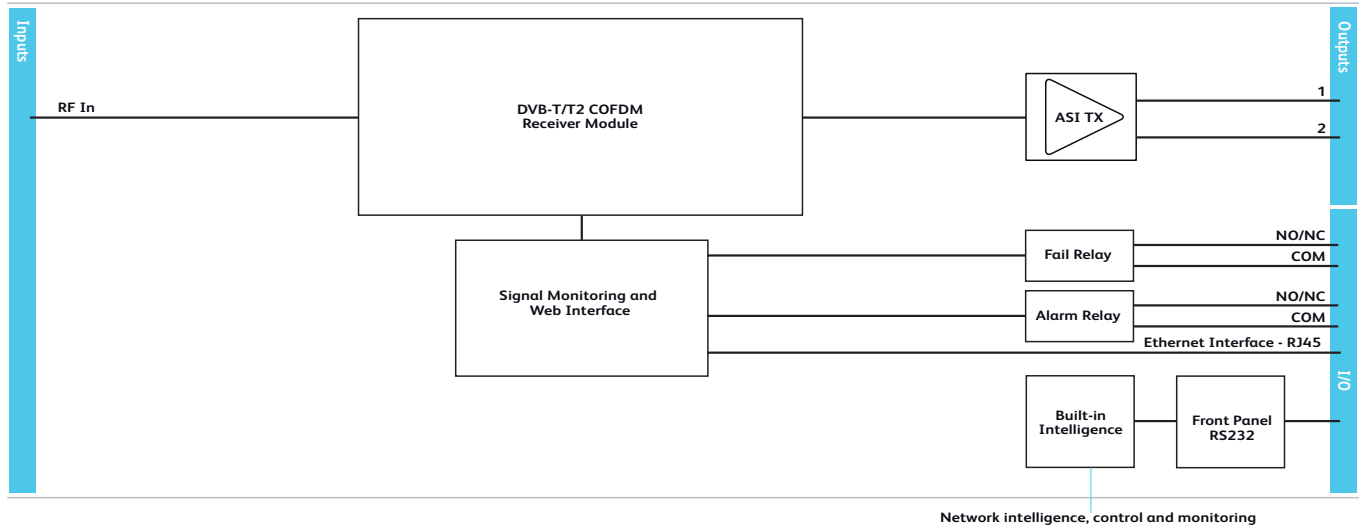
### Order codes



#### IQDBT10500-2B

DVB-T2 Terrestrial Receiver. 1 RF input, 2 ASI outputs.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDBT10500-2B

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

RF	DVB-T2 (Single PLP (mode A) and multi PLP (mode B) to EN 302 755) DVB-T (EN 300 744)
Return loss	6dB typical
Tuning range	178MHz to 858MHz
Input level	-20dBm to -80dBm
Tuning step	125kHz 7MHz channel, 166.7kHz 8MHz channel
Connector	F-type

#### DVB-T2 Features

##### Modulation

Guard interval	1/4, 19/128, 1/8, 1/32, 1/128, 19/256, 1/16
Code rate	1/2, 2/3, 3/4, 5/6, 7/8, 3/5, 4/5
Modulation	QPSK, 16QAM, 64QAM, 256QAM
FFT	1k, 2k, 4k, 8k, 16k, 32k
Modulation status (tested with template)	Selected PLP, Pilot pattern, Constellation, Guard interval, FFT, FEC, Rotation, PAPR, Extended carrier, L1 post signalling, No of T2 frames/superframe, Time interleaving blocks/frame, No of data symbols/T2 frame, FEC blocks/interleaving frame, FEC block length
Modulation status	PLP's present
Modulation ident	Cell ident, T2 system ident, network ident

#### Measurement and Alarms

Measured parameters	Input level (dBm), MER (dB), Lock status, Frequency (kHz), Frequency offset, Frequency error (kHz), TS bit rate, Pre LDPC BER, Pre BCH BER, LDPC error ratio, LDPC instantaneous iterations, LDPC error total/period, LDPC samples/period, LDPC mean error rate, Tuner temperature (°C)
Alarm parameters	TS sync loss, PAT repetition, PID presence against user defined list (up to 6 PIDs checked), Tuned, Alarm relay (summary), RF input level (upper and lower) RF input level, MER (lower), Frequency error (upper and lower), T2 template error, LDPC mean error (upper), LDPC warning (upper), LDPC interation (upper), Pre LDPC BER (lower), Pre BCH BER (lower), TS bit rate (upper and lower), Receiver lock, Tuner temperature (upper and lower)

#### DVB-T Features

##### Modulation

Guard interval	1/4, 1/8, 1/16, 1/32
Code rate	1/2, 2/3, 3/4, 5/6, 7/8
Modulation	QPSK, 16QAM, 64QAM
FFT	2k, 8k
Modulation status	Constellation, COFDM mode, Guard interval, Hierarchy, HP FEC, LP FEC

#### Measurement and Alarms

Measured parameters	Input level (dBm), MER (dB), Lock status, Frequency (kHz), Frequency offset, Frequency error (kHz), TS bit rate, BER pre viterbi, BER post viterbi, UCE, UCE total, Tuner temperature (°C)
Alarm parameters	TS sync loss, PAT repetition, PID presence against user, defined list (up to 6 PIDs checked), Tuned, Alarm relay (summary), RF input level, MER (lower), Frequency error (upper and lower), TS bit rate (upper and lower), BER pre viterbi, BER post viterbi, Receiver lock, Tuner temperature (upper and lower)

#### Signal Outputs

Serial data	2 ASI (270 MBit/s)
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#### Power Consumption

Module power consumption	4.5 PR (IQH3B Frame)
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## SD-HD Conversion

The SAM range of 3G/HD/SD-SDI converters offers top quality performance at every professional level. From compact motion compensated frame rate converters, through format converters that include both analog and digital video and audio interfacing to just a straight down converter, IQ has a module to suit all applications.

For an extremely compact solution with performance and features that you would normally expect from a much larger product, the IQUDC31 offers market-leading value.

Now introducing a new UHD-4K gearbox and converter module able to integrate HD content with Quad-link or single link 4K workflows, or vice-versa.

The IQMCC30 provides multi-rate frame-rate and format conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion compensated image processing the IQMCC30 delivers high quality conversion in a compact and affordable modular form-factor ideal for broadcasters, news agencies, and content providers needing to deliver premium content to domestic and international audiences.

IQMCC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, side-bar keying and logo insertion, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

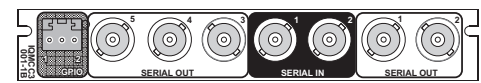
## Features

- Motion compensated SD/HD/3G frame rate conversion
- High quality up, down and cross conversion including conversion aperture control and clean cut mode
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection, and filmic field detection optimizes 3:2, 2:2 picture cadences
- Aspect ratio conversion including preset ARC maps relative to conversion modes, 32 ARC user memories, pan, tilt, size, and output crop adjustments
- Aspect ratio control (signaling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, luma clipper, horizontal and vertical picture enhancement, and adjustable RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/SMPTE2031 WST captions, and VITC or SMPTE12M timecode translation with output line adjustment (VITC)
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and logo insertion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay (including tracking audio delay which seamlessly tracks the video delay) and eight internal tone generators
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories, 2 GPI/O ports, in-built test pattern generator and 19 character scrolling caption generator
- RollCall control and monitoring compatible with standard logging and reporting features, plus RollTrack triggers available for detected module states including: Input loss and reference loss

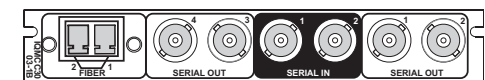
## Why should you choose this module?

- Ideal for international program distribution, TV and video production and content repurposing for internet, TV and Blu-ray distribution
- Low cost and high density broadcast quality conversion solution, helping to re-define the economics of Broadcast infrastructure
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

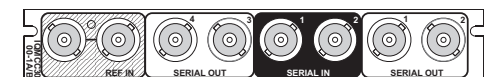
## Inputs & Outputs - IQH3B enclosures



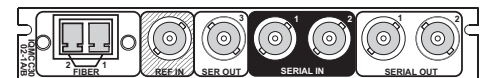
**IQMCC3001-1B3**



**IQMCC3003-1B3**

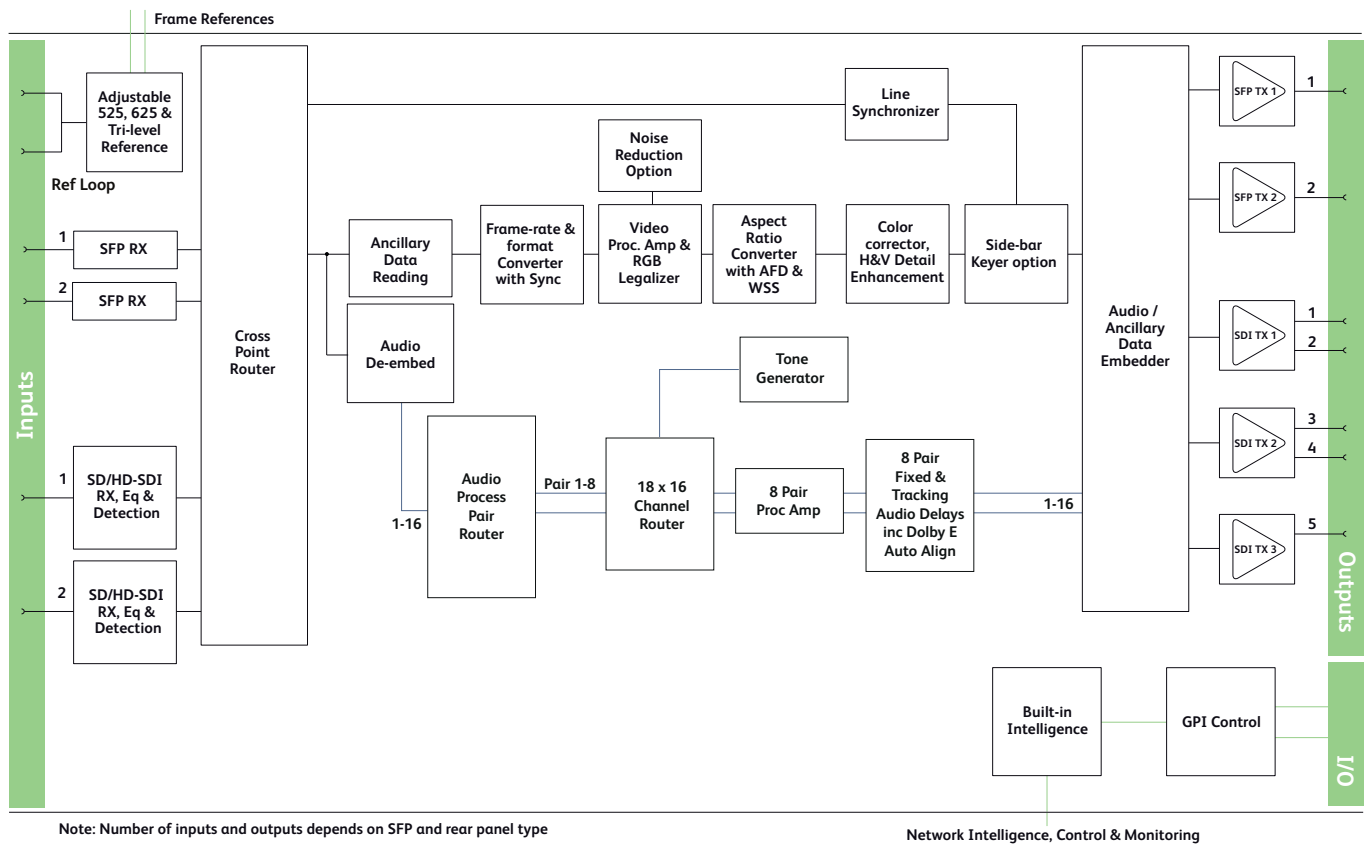


**IQMCC3000-1B3**



**IQMCC3002-1B3**

For more details on enclosure types please refer to datasheet IQH3B.



### Block Diagram for IQMCC30 Range

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s

Input Standard (auto detect)  
 525, 625, 720 50/59.94p,  
 1080 50/59.94i,  
 1080 50/59.94p (Levels A and B),  
 720/1080 23/24/25/29p,  
 1080 23/24/25/29psf

Analog Reference 1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

#### Fiber Signal Input

Inputs Up to 2  
 Optical 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

#### Video Signal Outputs

SDI Outputs up to 5  
 Output standard 525, 625, 720 50/59.94p,  
 1080 50/59.94i,  
 1080 50/59.94p (Levels A and B),  
 720/1080 23/24/25/29p,  
 1080 23/24/25/29psf

#### Fiber Signal Output

Optical 3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Conforms to SMPTE 297-2006  
 Outputs Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

#### Control Interface

GPI 2 x Closing contact I/O interface (ST) (rear panel dependant)

## Technical Specification cont...

## Conversion Functions

Modes	SD/HD/3Gb/s Motion Compensated Standards Conversion Up, down, and cross conversion
Conversion processing	Aspect ratio conversion synchronization Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Manual zoom	Zoom +/- 20%
Metadata	Closed caption CE608 <> CE708 Timecode conversions Teletext subtitles WST/RDD8/SMPTE 2031 conversion

## Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

## Embedded Audio Routing

Processed pair 1-8	Disembled 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

## Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

## Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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## Tone

Frequency	100Hz to 10kHz in 100Hz steps
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## Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	700 mV, 721 mV, 735 mV, 746 mV, Off
Genlock	Reference lock, Input lock (same format), Follow input (same frame rate), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

## Proc amp

Master Gain	-6 dB to +6 dB (0) in 0.1 dB steps
Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

## Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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## Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

## Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
RollTrack Sources	Input Present Ch 1, Input Loss Ch 1, Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

## Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

**Optical Outputs (Tx) 1310 (1550) nm Tx**

Wavelength	1310 (1550) nm
Spectral width (FWHM)	>1.5 (>1) nm (typ)
Output power	-2 (4) dBm Typical ( $\pm 3$ dBm)
Extinction ratio	>7.5:1 (typ)
Transmission distance	Up to 30 (50) Km max

**Optical Rx**

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

**Power Consumption**

Module Power Consumption with Fiber	17.5PR Max
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**Ordering Information****Order codes for IQH3B enclosures****IQMCCC3000-1B3**

Motion Compensated Frame Rate Converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

**IQMCC3001-1B3**

Motion Compensated Frame Rate Converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

**IQMCC3002-1B3**

Motion Compensated Frame Rate Converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

**IQMCC3003-1B3**

Motion Compensated Frame Rate Converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B

**Software Options**

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**Fiber SFP options**

**FC1-13T1** - Single 1310nm Tx

**FC1-13T2** - Dual 1310nm Tx

**FC1-15T1** - Single 1550nm Tx

**FC1-15T2** - Dual 1550nm Tx

**FC1-R1** - Single Rx

**FC1-R2** - Dual Rx

**FC1-13TR** - Transceiver 1310nm/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

**FC1-HDMI2** - HDMI Tx with 2m cable

**CWDM Tx** - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.

Having both analog and digital interfacing along with multi-rate format conversion for 3G/HD/SD-SDI digital video signals gives the IQUDC34 a high level of flexibility and ability to handle a wide range of interfacing applications. Whether its decoding composite signals and embedding the associated analog audio, or receiving HD-SDI and de-embedding to AES, or analog audio for monitoring IQUDC34 can adapt, and using high quality motion adaptive de-interlacing and flexible scaling technology ensures that the conversion performance is first class.

IQUDC34 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

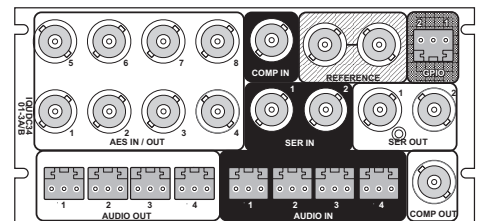
### Features

- Wide range of I/O including SDI, CVBS, AES audio, analog audio and integrated Fiber support via SFP module
- High quality up, down and cross conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying, logo insertion and linear or motion compensated frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, two pairs of balanced analog audio inputs and outputs all available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

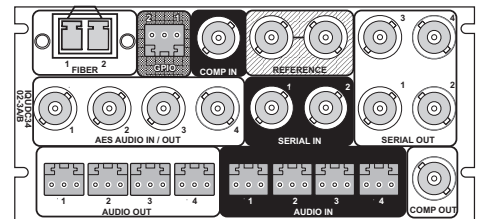
### Why should you choose this module?

- It's ability to work with a wide range of analog and digital inputs along with with high quality video conversion and frame synchronization makes the IQUDC34 an ideal interfacing module for mixed analog and digital systems
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

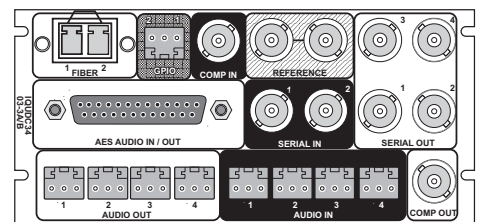
### Inputs & Outputs - IQH3A/1A/3B enclosures



### IQUDC3401-3A3, IQUDC3401-3B3



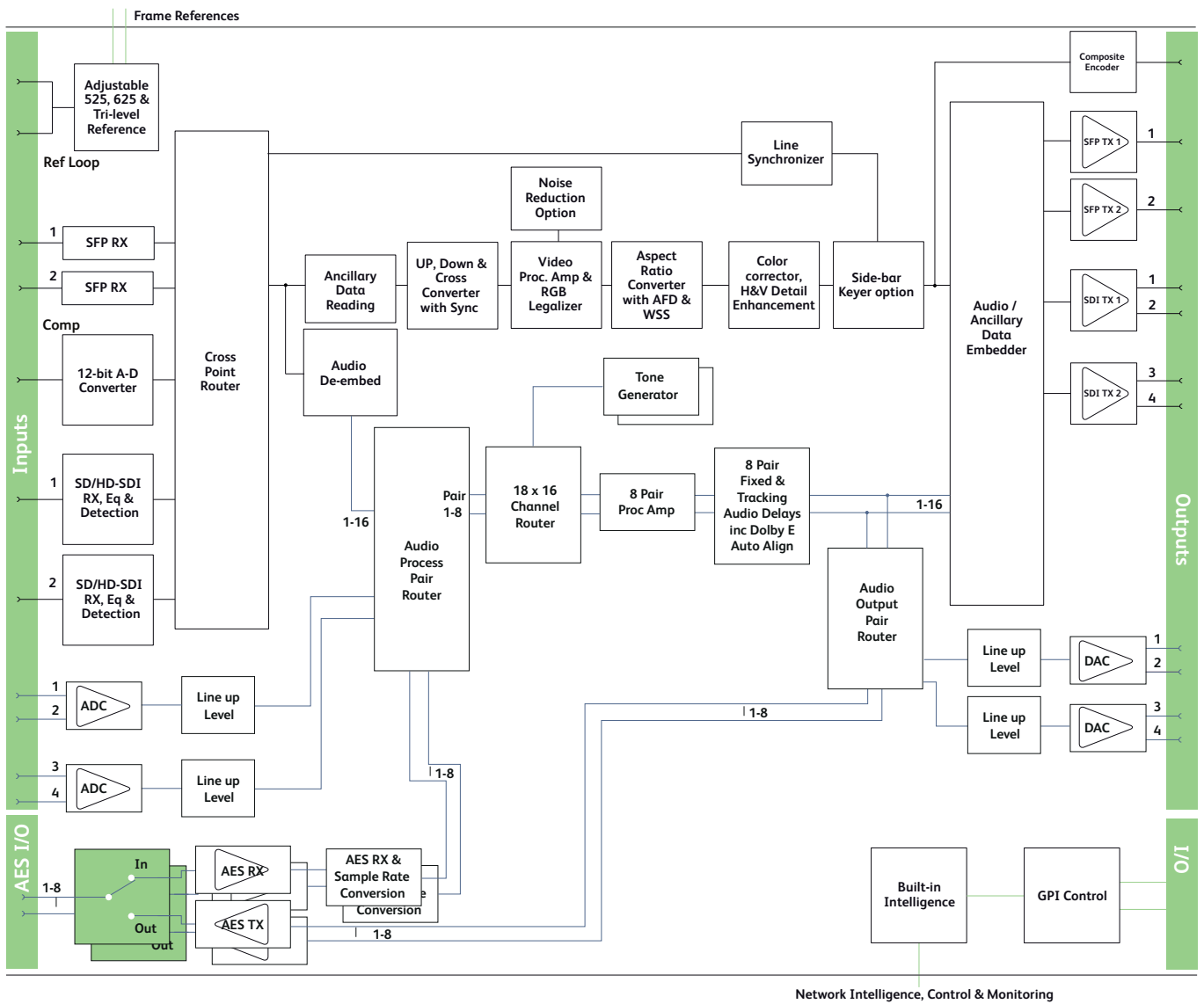
### IQUDC3402-3A3, IQUDC3402-3B3



### IQUDC3403-3A3, IQUDC3403-3B3

For more details on enclosure types please refer to datasheet IQH3B.





Block Diagram for IQUDC34 Range

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

- SDI Inputs: 2x
- Input Cable Length: Up to 80m Belden 1694A @ 3 Gbit/s  
Up to 120m Belden 1694A @ 1.5 Gbit/s  
100m typical (with output set to 1080p rates),  
Belden 1694A @ 270 Mbit/s
- Input Standard (auto detect): 625(576)/25i, 525(480)/29i  
720 50/59p/1080 50/59i  
1080 50/59p level A/B  
1080 25/29psf
- Analog Video inputs: 1 x Composite: PAL, NTSC, NTSC-J, PAL-M, PAL-N,  
N4.4, SECAM with 12-bit resolution
- Analog Reference: 1 x Analog Reference with passive loop-through  
Black (HD tri-level and SD bi-level) and Black  
Burst (SD bi-level)  
SD bi-level – RS170A  
HD Tri-level – SMPTE 240M, 274M

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✓	✓	✓	✓	✗	✗	✗	✗
	50	720P	✓	✓	✓	✓	✗	✗	✗	✗
		1080P	✓	✓	✓	✓	✗	✗	✗	✗
Input	29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓
		1080i	✗	✗	✗	✗	✓	✓	✓	✓
	59.94	720P	✗	✗	✗	✗	✓	✓	✓	✓
		1080P	✗	✗	✗	✗	✓	✓	✓	✓

Format Conversion I/O Grid

### Technical Specification cont...

#### Fiber Signal Input

Inputs	Up to 2*
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format Standard	LC singlemode SMPTE 297-2006

#### Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B
Analog Video Outputs	1 x Composite; PAL, NTSC, NTSC-J, PAL-M, PAL-N with 12-bit resolution

#### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2*

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

#### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	8 Unbalanced (BNC) 8 Balanced (25D Type)
Balanced analog audio inputs	4 channels (Screw terminal connectors (ST))
Balanced analog audio outputs	4 channels (ST)

#### Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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#### Conversion Functions

Modes	Up, down, and cross conversion
Conversion processing	Aspect ratio conversion synchronization Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

#### Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
Embedded audio	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat Enable/Blank

#### Analog Audio

Output Level adjustment	+12 dB to +24 dB (+18)
Input Headroom	+12 dB to +24 dB (+18)

#### Audio Routing

Processed pair 1-8	Disembled 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence
Analog 1-2	Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

#### Dolby-E

Dolby-E Auto	
Alignment	+/- 10 line offset in 1 line steps

#### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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#### Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
Note:	Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations

### Technical Specification cont...

Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, CVBS, Fiber 1 & 2), Input Loss (1&2, CVBS, Fiber 1 & 2), Reference OK & Loss
Information Window Factory Default	Video Input Status, Reference Status Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot, Licensed options

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

### Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

### Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

### Analog Audio Input (Balanced)

Connector/Format	Screw Terminals (ST)
Analog Input Impedance	10 k Ohms
Frequency Response	20 Hz to 20 kHz (+/- 0.1 dB)
Distortion (THD+N)	Better than -97 dB at -1 dBFS / 1 kHz
Headroom	Adjustable +12 dBu to +24 dBu in 1dB steps

### Analog Audio Outputs (Balanced)

Connector/Format	Screw Terminals (ST)
Frequency Response	20 Hz to 20 kHz (+/- 0.1 dB)
Output Level	Adjustable +12 dBu to +24 dBu in 1dB steps
Output Impedance	~25 Ohms
THD+N	Better than -97 dB at +23 dBu / 1 kHz

### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

### Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

### Power Consumption

Module Power Consumption with Fiber	
	21.5W (A frames)
	21.5PR (B Frames)

## Ordering Information

### Order codes for IQH3B enclosures

**IQUDC3401-3B3**

Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, External & Frame reference inputs, 2 SDI outputs, 1 composite output, 8 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI

**IQUDC3402-3B3**

Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, External & Frame reference inputs, 4 SDI outputs, 1 composite output, 4 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

**IQUDC3403-3B3**

Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, External & Frame reference inputs, 4 SDI outputs, 1 composite output, 8 balanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

### Order codes for IQH3A/1A enclosures

**IQUDC3401-3A3**

Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, reference loop, 2 SDI outputs, 1 composite output, 8 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI

**IQUDC3402-3A3**

Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, reference loop, 4 SDI outputs, 1 composite output, 4 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

**IQUDC3403-3A3**

Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, reference loop, 4 SDI outputs, 1 composite output, 8 balanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**IQOPTM-MC** - Software option to upgrade with motion compensated frame rate conversion

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

**Fiber CWDM Tx** - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQQMD00 provides conversion for Quad-link Ultra HD SDI inputs to SDI outputs in 1080p, 1080i, 720p or SD formats. This allows Ultra High Definition signals to be integrated into existing HD/SD-SDI workflows and monitored on standard 1920 x 1080 displays removing the need for expensive Ultra HD specific equipment and monitors. Drawing on SAMs's extensive experience in conversion technology the IQQMD00 uses high quality scaling and filtering technology to downconvert and align the quad-link input to provide a clean and sharp HD/SD output, ideal for monitoring and other signal distribution applications.

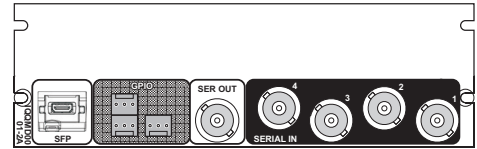
### Features

- Custom scaling and filtering to provide seamless reconstruction of a quad-link UHD input for HD single link applications
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - 4K-UHD Quad Link to both Quadrant based and SMPTE 2036 pixel interleave
- SFP cage enables output over HDMI, fiber or additional SDI via HD-BNC
- User definable caption generator for image identification
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible
- Input loss detection – default output of black

### Why should you choose this module?

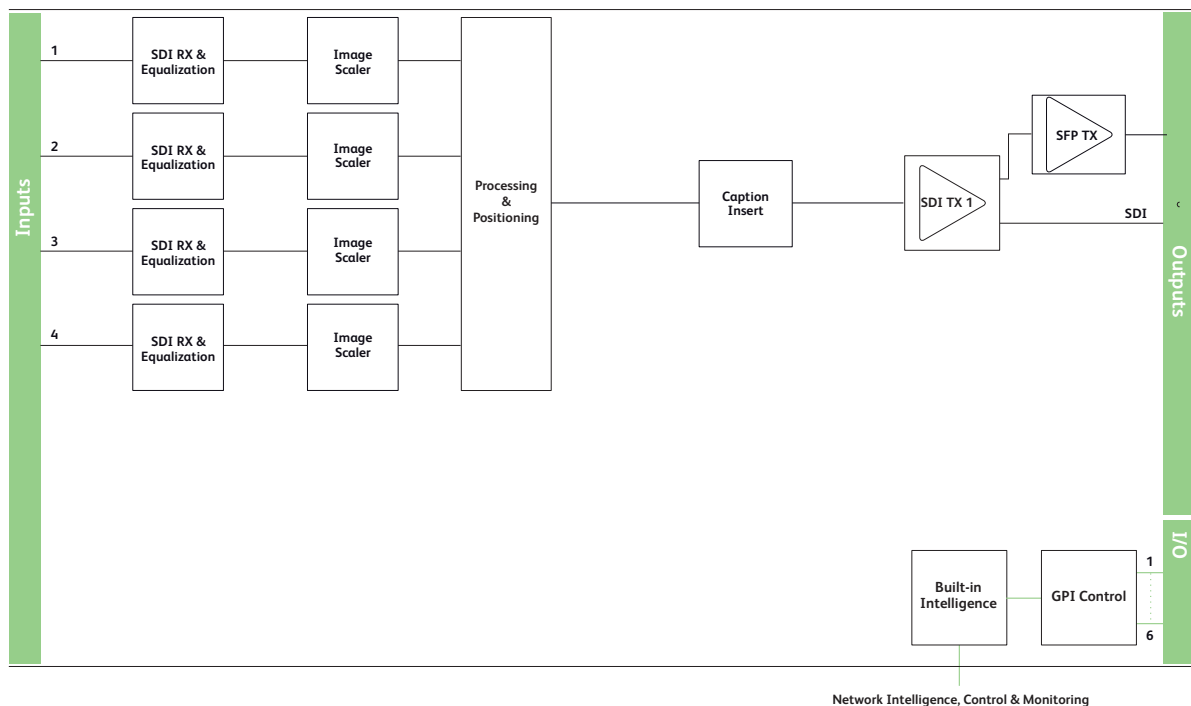
- Down convert Ultra HD signals to 1080p, 720p, 1080i, 625/525 formats for monitoring on standard displays, or for routing into a standard HD/SD workflow
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Inputs & Outputs



#### IQQMD0000-2B3, IQQMD0001-2A3

For more details on enclosure types please refer to datasheet IQH3B.



### Ordering Information

#### Order codes for IQH3B enclosures

##### **IQQMD0000-2B3**

3G/HD/SD-SDI Quad-link Monitoring downconverter. 4 SDI inputs, 1 SDI output, up to 2 SFP outputs, 6 GPIs.

#### Order codes for IQH3A/1A enclosures

##### **IQQMD0001-2A3**

3G/HD/SD-SDI Quad-link Monitoring downconverter. 4 SDI inputs, 1 SDI output, up to 2 SFP outputs, 6 GPIs.

For more details on enclosure types please refer to datasheet IQH3B

#### Fiber SFP options

**FC1-13T1** - Single 1310nm Tx

**FC1-13T2** - Dual 1310nm Tx

**FC1-15T1** - Single 1550nm Tx

**FC1-15T2** - Dual 1550nm Tx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDMI2** - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.



The IQDNC30 provides multi-rate down conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC30 is a broadcast quality conversion module able to handle applications such as downconversion to maintain SD output feeds.

IQDNC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

### Features

- High quality down conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying, logo insertion and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

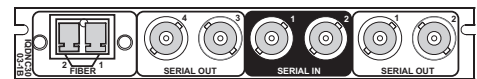
### Why should you choose this module?

- High quality down conversion and frame synchronization allows multi-format working and provides integration with existing SD workflows
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

### Inputs & Outputs - IQH3B enclosures

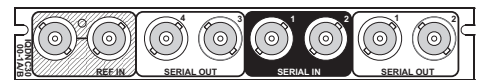


IQDNC3001-1B3

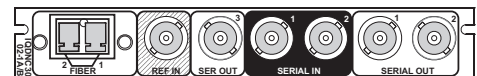


IQDNC3003-1B3

### Inputs & Outputs - IQH3A/1A/3B enclosures

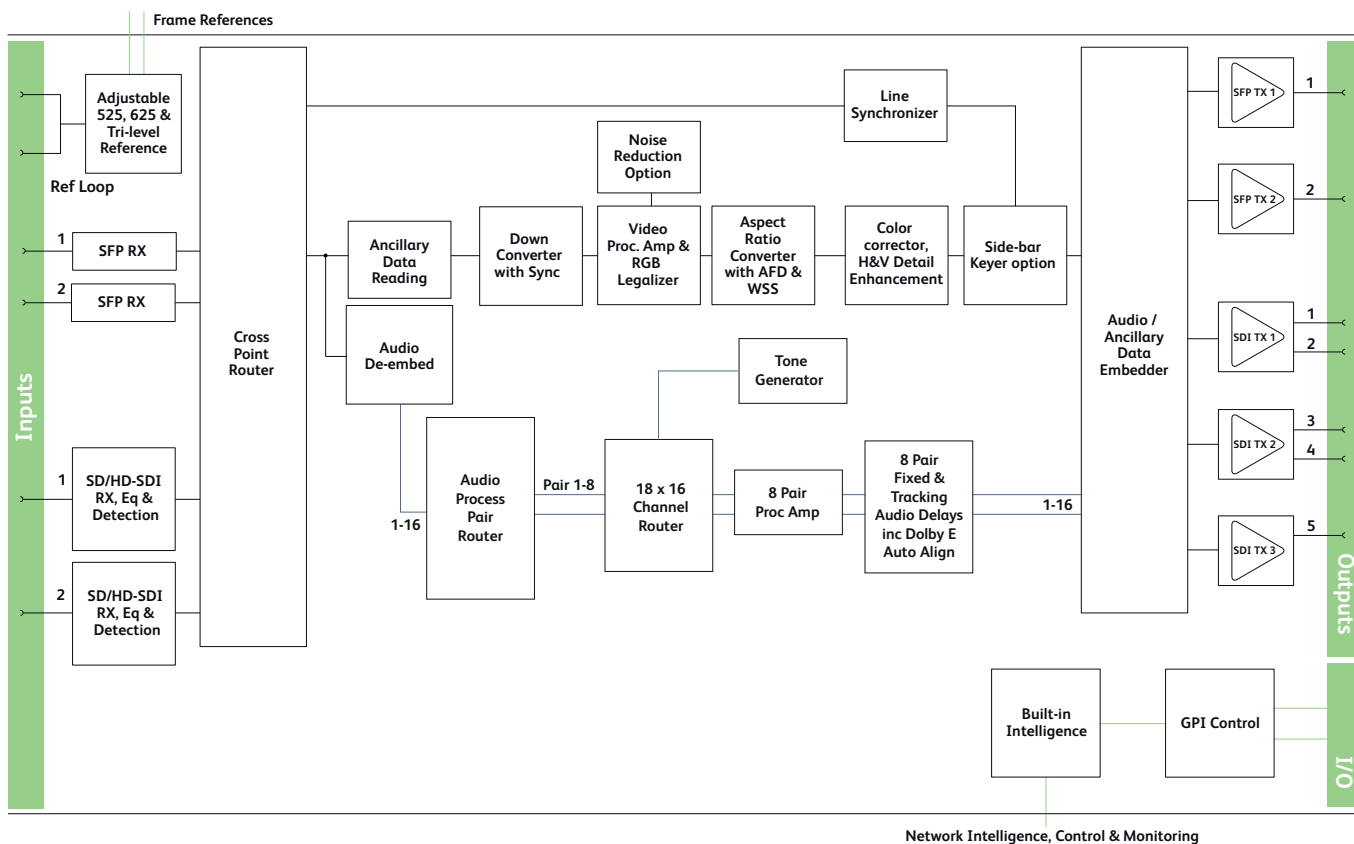


IQDNC3000-1A3, IQDNC3000-1B3



IQDNC3002-1A3, IQDNC3002-1B3

For more details on enclosure types please refer to datasheet IQH3B.



Block Diagram for IQDNC30 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

- SDI Inputs: 2x
- Input Cable Length: Up to 80m Belden 1694A @ 3 Gbit/s, Up to 120m Belden 1694A @ 1.5 Gbit/s, 100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
- Input Standard (auto detect): 625(576)/25i, 525(480)/29i, 720 50/59p, 1080 50/59i, 1080 50/59p level A/B, 1080 25/29psf
- Analog Reference: 1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level), SD bi-level – RS170A, HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

- Inputs: Up to 2
- Optical: 3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
- Connector / Format Standard: LC singlemode, SMPTE 297-2006

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✗	✗	✗	✗	✗	✗	✗
		1080i	✓	✗	✗	✗	✗	✗	✗	✗
	50	720P	✓	✗	✗	✗	✗	✗	✗	✗
		1080P	✓	✗	✗	✗	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✓	✗	✗	✗
		1080i	✗	✗	✗	✗	✓	✗	✗	✗
59.94	720P	✗	✗	✗	✗	✓	✗	✗	✗	
	1080P	✗	✗	✗	✗	✓	✗	✗	✗	

Format Conversion I/O Grid

## Technical Specification cont...

**Video Signal Outputs**

SDI Outputs up to 5  
Output standard 625(576)/25i, 525(480)/29i

**Fiber Signal Output**

Optical 270 Mbit/s SD-SDI  
Connector / Format LC singlemode  
Conforms to SMPTE 297-2006  
Outputs Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

**Control Interface**

GPI 2 x Closing contact I/O interface (ST) (rear panel dependant)

**Conversion Functions**

Modes Down conversion  
Aspect ratio conversion synchronization  
Conversion processing Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response  
Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns  
Aspect ratio conversion (manual or auto) AFD (SMPTE 2016), VI (RP186), WSS (L23)  
SD input format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9  
SD output format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9  
Metadata Closed caption CE608 <> CE708  
Timecode conversions  
Teletext subtitles WST/RDD8 conversion

**Audio Functions**

Embedded audio 16-channel embedded audio processing  
PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature  
Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat

Embedded audio Enable/Blank

**Embedded Audio Routing**

Processed pair 1-8 Disembed 1-8  
Output Channels 1-16 Processed pair 1-8, Tone, Silence

**Processed Audio Control**

Invert Phase Channels 1-16  
Pair 1 to 8 Gain L/R +18 dB to -18 dB in 0.1 dB steps  
Pair 1-8 Manual Delay -40 to +200 ms in 1 ms steps  
Global Manual Delay -40 to +200 ms in 1 ms steps

**Dolby-E**

Dolby-E Auto  
Alignment +/- 10 line offset in 1 line steps

**Tone**

Frequency 100Hz to 10kHz in 100Hz steps

**Processing Functions**

Ancillary Data Pass/Strip  
Freeze On/Off  
Legalizer On/Off  
Genlock Reference lock, Input lock (same format), Free run  
Pattern Off, Black, Ramp, Bars  
Caption On/Off, Scrolling  
Edit Caption 19 characters available

Proc amp  
Black Level: +100 to -100 mV (0) in 0.8 mV steps  
Contrast: -6 dB to +6 dB (0) in 0.2 dB steps  
Saturation: -6 dB to +6 dB (0) in 0.2 dB steps  
Y Gamma: 0.4 to 1.7 (1) in 0.1 steps  
YC Offset: -20 to 20 (0) in 2 Luma pixel steps  
Note: Defaults shown in brackets

**Enhancement**

Nonlinear Enhancer  
Frequency Band Selection: Low, Med, High  
Four preset enhancement modes: Low, Med, High, Super  
Manual enhancement mode with H Gain and H Noise rejection levels

**Conversion Aperture**

Vertical  
Frequency Band Selection: Low, Med, High  
Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2  
Horizontal  
Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2  
Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

**Other Controls**

GPI input Low/High Select  
Black, Freeze, Pattern, User Memories 1-16  
GPI Output Source Black, Freeze, Pattern  
User Memories 16 x Save, Recall, Rename  
Memory Naming User configurable naming of memories 1 – 16  
RollTrack Index Up to 50 RollTrack destinations  
Optical Logging\* Tx Laser Bias High Warning  
Tx Power Low Warning  
Tx Power High Warning  
Laser Wavelength Input 1 (2) Rx Power High Warning  
Input 1 (2) Rx Power Low Warning  
Input 1 (2) Rx Power Measurement  
RollTrack Sources Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss  
Information Window Video Input Status, Reference Status  
Factory Default Resets all module settings to factory specified default values and clears memories  
Default Settings Resets all module settings to factory specified defaults but does not clear memories  
Module Information Reports following module information:  
Software version, Serial number, Rear Panel ID, Frame Slot

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Embedded audio handling  
 HD - 24-bit synchronous 48 kHz to SMPTE 299M,  
 SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

### Power Consumption

Module Power Consumption with Fiber	13W (A frames) 13PR (B frames)
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## Ordering Information

### Order codes for IQH3B enclosures

#### IQDNC3000-1B3

Down converter . 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

#### IQDNC3001-1B3

Down converter . 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

#### IQDNC3002-1B3

Down converter . 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

#### IQDNC3003-1B3

Down converter . 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

### Order codes for IQH3A/1A enclosures

#### IQDNC3000-1A3

Down converter . 2 SDI inputs, reference loop, 4 SDI outputs

#### IQDNC3002-1A3

Down converter . 2 SDI inputs, reference input, 3 SDI outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**IQOPTM-UDC** - Software option for upgrade to up, down and cross conversion

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQDNC31 provides two channels of multi-rate down conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC31 is a broadcast quality conversion module ideal for space constrained applications requiring downconversion to maintain SD output feeds.

IQDNC31 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

### Features

- High quality down conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying, logo insertion and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features

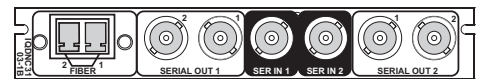
### Why should you choose this module?

- With it's ability to provide two independent channels of down conversion, coupled with audio processing and metadata handling, IQDNC31 allows space efficient multi-format working in a cost effective package
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

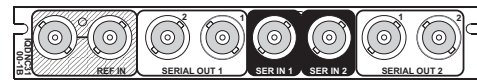
### Inputs & Outputs - IQH3B enclosures



IQDNC3101-1B3



IQDNC3103-1B3

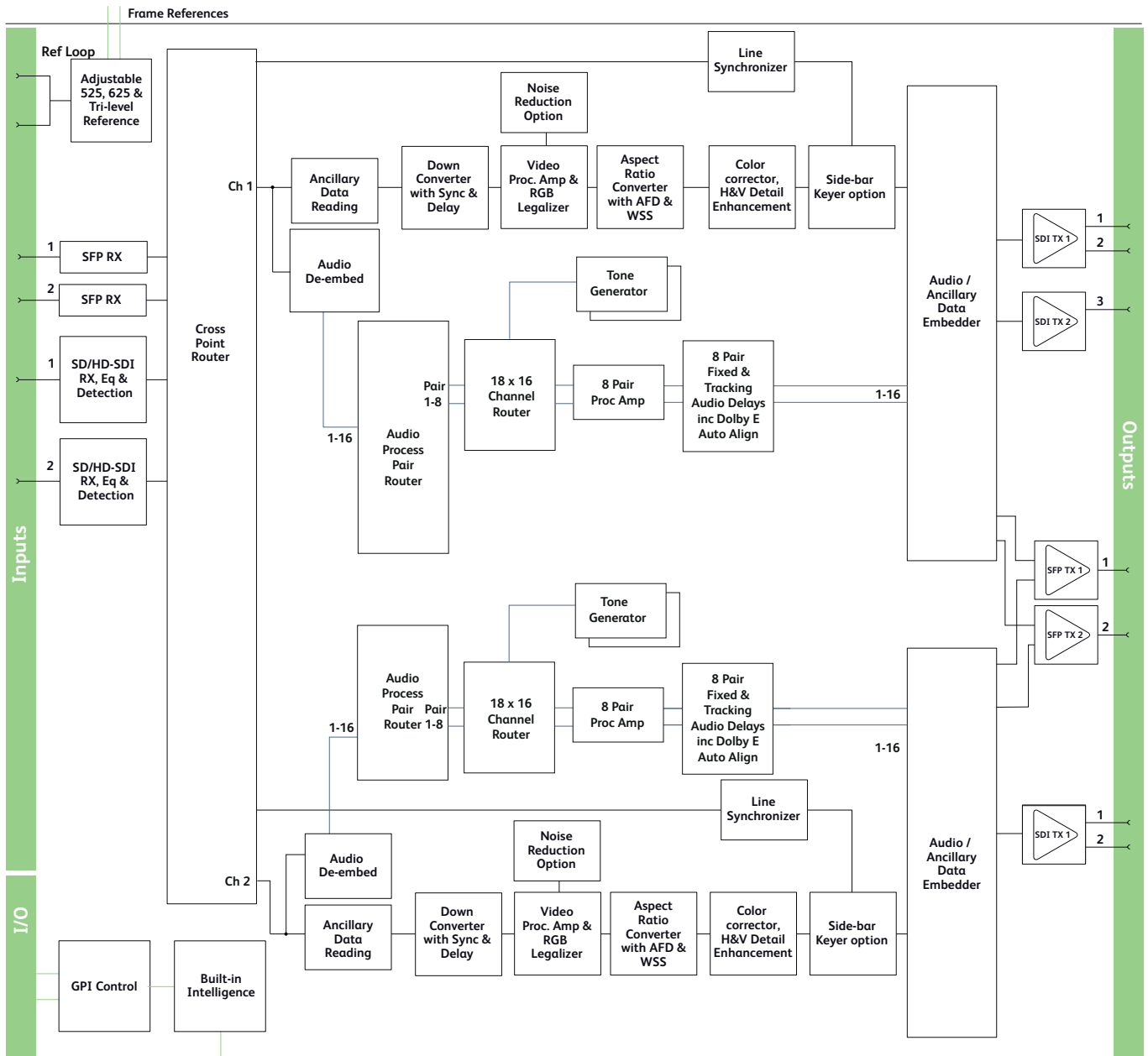


IQDNC3100-1B3



IQDNC3102-1B3

For more details on enclosure types please refer to datasheet IQH3B.



Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

Block Diagram for IQDNC31 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s

##### Input Standard (auto detect)

625(576)/25i, 525(480)/29i  
 720 50/59p/1080 50/59i  
 1080 50/59p level A/B  
 1080 25/29psf

##### Analog Reference

1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

Map of input to output standards		Output							
		25 576i	25 1080i	50 720P	50 1080P	29.97 480i	29.97 1080i	59.94 720P	59.94 1080P
Input	25	576i	✓	×	×	×	×	×	×
		1080i	✓	×	×	×	×	×	×
	50	720P	✓	×	×	×	×	×	×
		1080P	✓	×	×	×	×	×	×
29.97	480i	×	×	×	×	✓	×	×	
	1080i	×	×	×	×	✓	×	×	
59.94	720P	×	×	×	×	✓	×	×	
	1080P	×	×	×	×	✓	×	×	

Format Conversion I/O Grid



## Technical Specification cont...

### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

### Video Signal Outputs

SDI Outputs	up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i

### Fiber Signal Output

Optical	270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

### Control Interface

GPI	2x Closing contact I/O interface (ST) (rear panel dependant)
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### Conversion Functions (per channel)

Modes	Down conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

### Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

### Embedded Audio Routing

Processed pair 1-8	Disembled 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

### Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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### Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

#### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Embedded audio handling

HD - 24-bit synchronous 48 kHz to SMPTE 299M,  
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Power Consumption

Module Power Consumption with Fiber  
16PR (B frames)

### Ordering Information

#### Order codes for IQH3B enclosures

##### IQDNC3100-1B3

Dual channel down converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

##### IQDNC3101-1B3

Dual channel down converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

##### IQDNC3102-1B3

Dual channel down converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

##### IQDNC3103-1B3

Dual channel down converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B

#### Software Options

**IQOPTM-2NR** - Software option to add noise reduction on both processing channels

**IQOPTM-2SBK** - Software option to add side-bar keying on both processing channels

**IQOPTM-2LOG** - Software option to add Logo insertion

**IQOPTM-2UDC** - Software option for upgrade to up, down and cross conversion for both processing channels

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

#### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQDNC32 provides down conversion and AES embedding and de-embedding for 3G/HD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC32 is a broadcast quality conversion module able to handle a wide variety of common applications such as downconversion to maintain SD output feeds.

IQDNC32 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

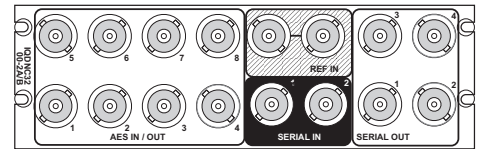
### Features

- High quality down conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signalling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying, logo insertion and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

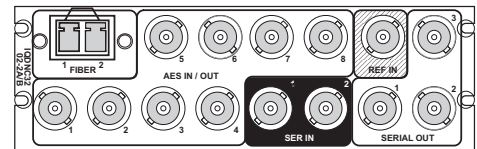
### Why should you choose this module?

- High quality down conversion and frame synchronization allows multi-format working and provides integration with existing SD workflows
- Comprehensive audio I/O and processing allows complete control over audio signals for embedding and de-embedding, and where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

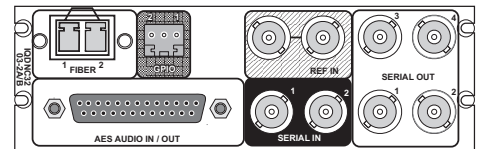
### Inputs & Outputs - IQH3A/1A/3B enclosures



IQDNC3200-2A3, IQDNC3200-2B3

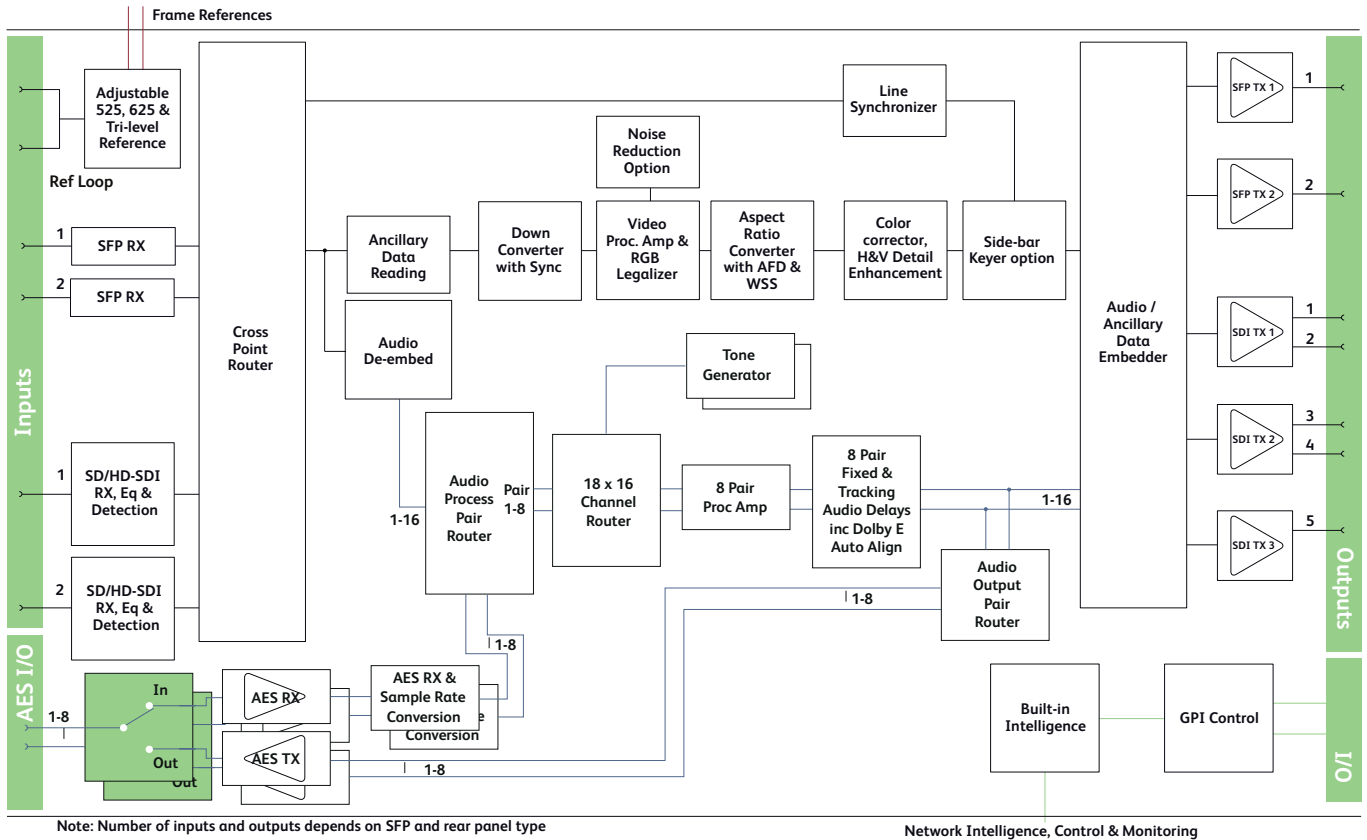


IQDNC3202-2A3, IQDNC3202-2B3



IQDNC3203-2A3, IQDNC3203-2B3

For more details on enclosure types please refer to datasheet IQH3B.



Block Diagram for IQDNC32 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s

##### Input Standard (auto detect)

625(576)/25i, 525(480)/29i  
 720 50/59p/1080 50/59i  
 1080 50/59p level A/B  
 1080 25/29psf

##### Analog Reference

1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

Inputs Up to 2  
 Optical 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

##### Video Signal Outputs

SDI Outputs up to 4  
 Output standard 625(576)/25i, 525(480)/29i  
 720 50/59p, 1080 50/59i  
 1080 50/59p level A/B

##### Fiber Signal Output

Optical 3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Conforms to SMPTE 297-2006  
 Outputs Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	×	×	×	×	×	×	×
		1080i	✓	×	×	×	×	×	×	×
	50	720P	✓	×	×	×	×	×	×	×
		1080P	✓	×	×	×	×	×	×	×
	29.97	480i	×	×	×	×	✓	×	×	×
		1080i	×	×	×	×	✓	×	×	×
	59.94	720P	×	×	×	×	✓	×	×	×
		1080P	×	×	×	×	✓	×	×	×

Format Conversion I/O Grid

## Technical Specification cont...

### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	8 Unbalanced (BNC) 8 Balanced (25D Type)
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### Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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### Conversion Functions

Modes	down conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPT 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

### Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat Enable/Blank
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Embedded audio

### Audio Routing

Processed pair 1-8	Disembled 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

### Dolby-E

Dolby-E Auto	
Alignment	+/- 10 line offset in 1 line steps

### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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### Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps

YC Offset:	-20 to 20 (0) in 2 Luma pixel steps Note: Defaults shown in brackets
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### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

**Digital Audio Input (Balanced)**

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

**Digital Audio Output (Unbalanced)**

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

**Digital Audio Output (Balanced)**

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

**Optical 1310 nm Tx**

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

**Optical 1550 nm Tx**

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

**Optical Rx**

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

**Power Consumption**

Module Power Consumption with Fiber	13W (A frames) 13PR (B frames)
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## Ordering Information

### Order codes for IQH3B enclosures

**IQDNC3200-2B3**

Down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 unbalanced AES inputs or outputs

**IQDNC3202-2B3**

Down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

**IQDNC3203-2B3**

Down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

### Order codes for IQH3A/1A enclosures

**IQDNC3200-2A3**

Down converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 unbalanced AES inputs or outputs

**IQDNC3202-2A3**

Down converter with AES I/O. 2 SDI inputs, reference input, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

**IQDNC3203-2A3**

Down converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

**IQOPTM-UDC** - Software option for upgrade to up, down and cross conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.



The IQDNC33 provides two channels of down conversion and AES embedding and de-embedding for 3G/HD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC33 is a broadcast quality conversion module able to handle a wide variety of common applications such as downconversion to maintain SD output feeds.

IQDNC33 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, shared between the video channels, plus audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

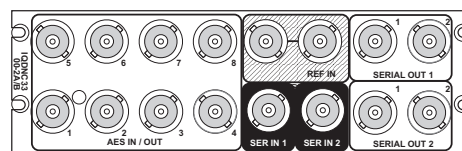
### Features

- High quality down conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or SMPTE12M timecode translation
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying, logo insertion and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

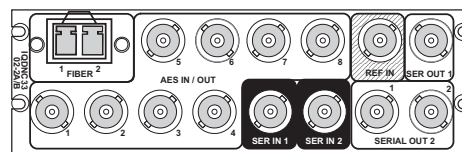
### Why should you choose this module?

- With it's ability to provide two independent channels of down conversion, AES audio interfacing and metadata handling, IQDNC33 allows efficient multi-format working in a compact and cost effective package
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

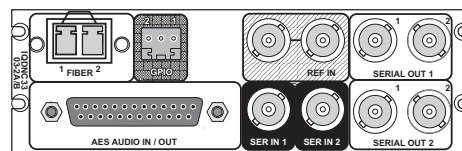
### Inputs & Outputs - IQH3A/1A/3B enclosures



IQDNC3300-2A3, IQDNC3300-2B3

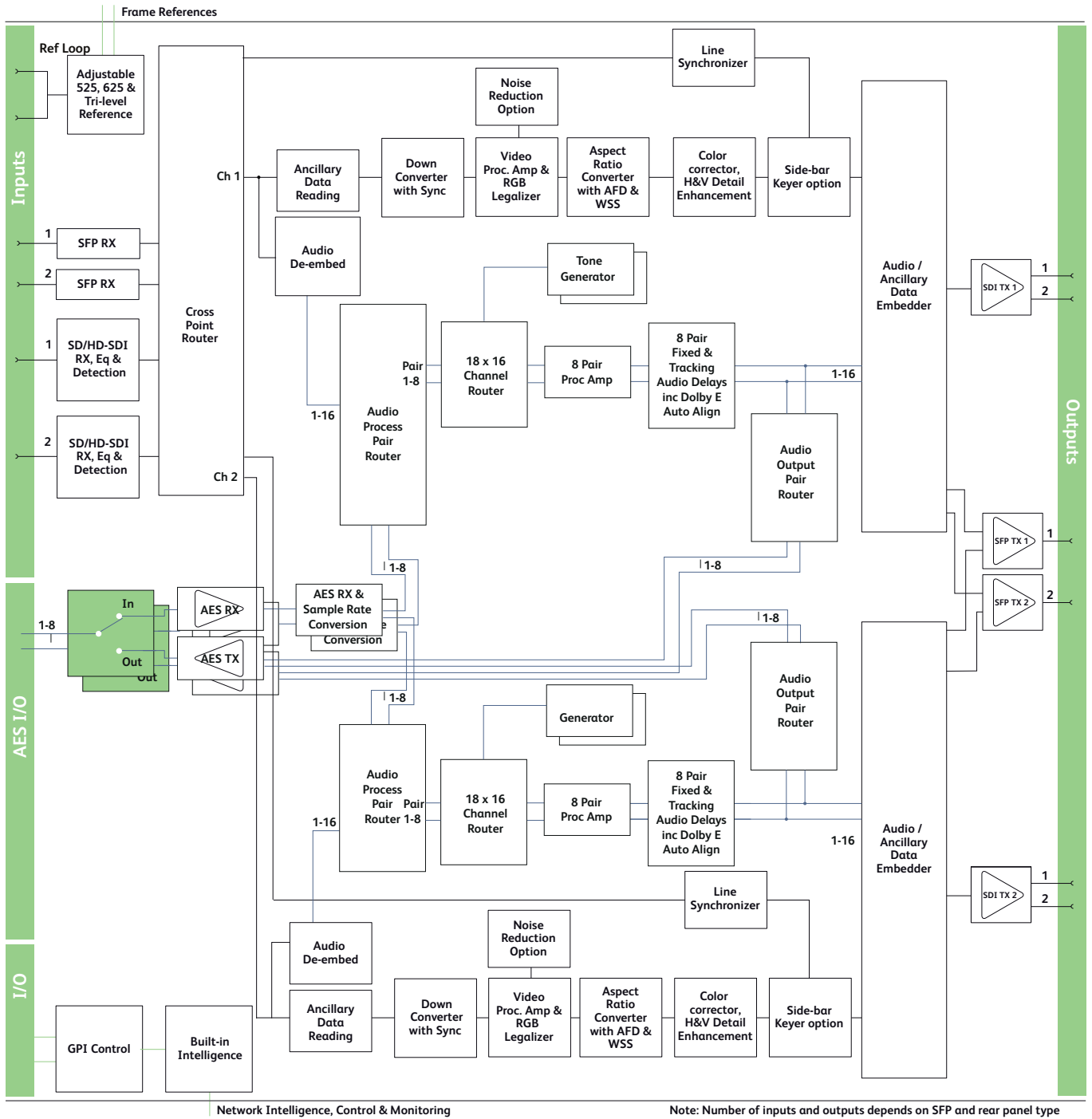


IQDNC3302-2A3, IQDNC3302-2B3



IQDNC3303-2A3, IQDNC3303-2B3

For more details on enclosure types please refer to datasheet IQH3B.



Block Diagram for IQDNC33 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 120m Belden 1694A @ 1.5 Gbit/s 100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	625(576)/25i, 525(480)/29i 720 50/59p/1080 50/59i 1080 50/59p level A/B 1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

##### Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B

##### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

##### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	8 Unbalanced (BNC) 8 Balanced (25D Type)
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##### Control Interface

GPI	2x Closing contact I/O interface (ST) (rear panel dependant)
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##### Conversion Functions (per channel)

Modes	Down conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✓	×	×	×	×	×	×
		1080i	✓	×	×	×	×	×	×
	50	720P	✓	×	×	×	×	×	×
		1080P	✓	×	×	×	×	×	×
	29.97	480i	×	×	×	×	✓	×	×
		1080i	×	×	×	×	✓	×	×
	59.94	720P	×	×	×	×	✓	×	×
		1080P	×	×	×	×	✓	×	×

↪ Format Conversion I/O Grid

##### Metadata

Closed caption CE608 <> CE708  
Timecode conversions  
Teletext subtitles WST/RDD8 conversion

##### Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

##### Audio Routing

Processed pair 1-8	Disembled 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

##### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

##### Dolby-E

Dolby-E Auto	
Alignment	+/- 10 line offset in 1 line steps

##### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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##### Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

### Technical Specification cont...

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
Note: Defaults shown in brackets	

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

#### Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

#### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

#### Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

#### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

#### Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

#### Power Consumption

Module Power Consumption with Fiber	18W (A frames) 18PR (B frames)
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## Ordering Information

### Order codes for IQH3B enclosures

**IQDNC3300-2B3**

Dual down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

**IQDNC3302-2B3**

Dual down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

**IQDNC3303-2B3**

Dual down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

### Order codes for IQH3A/1A enclosures

**IQDNC3300-2A3**

Dual down converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

**IQDNC3302-2A3**

Dual down converter with AES I/O. 2 SDI inputs, reference input, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

**IQDNC3303-2A3**

Dual down converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-2NR** - Software option to add noise reduction on both channels

**IQOPTM-2SBK** - Software option to add side-bar keying on both channels

**IQOPTM-2LOG** - Software option to add Logo insertion

**IQOPTM-2LC** - Software option to upgrade with linear frame rate conversion on both channels

**IQOPTM-UDC** - Software option for upgrade to up, down and cross conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQDNC34 provides two channels of multi-rate down conversion for 3Gbps SDI, and HD-SDI digital video signals along with both composite and analog audio outputs suitable for monitoring applications where space is of the essence.

IQDNC34 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls with audio monitoring outputs selectable from either video channel. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

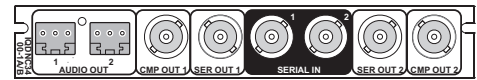
### Features

- High quality down conversion for SDI video inputs with composite 12-bit encoded and analog audio monitoring outputs
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signalling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion and side-bar keying
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Integrated SFP module supports Fiber or HD-BNC I/O, and HDMI output
- 16 x user memories
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

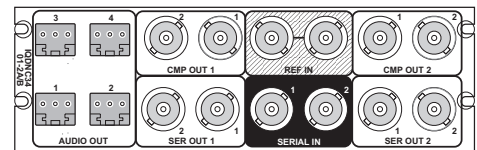
### Why should you choose this module?

- Including composite video and analog audio outputs along with the SDI and embedded audio outputs enables the IQDNC34 to downconvert HD Signals for the main signal chain, and provide a monitoring output for built-in QC
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

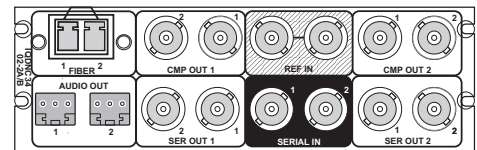
### Inputs & Outputs - IQH3A/1A/3B enclosures



IQDNC3400-1A3, IQDNC3400-1B3



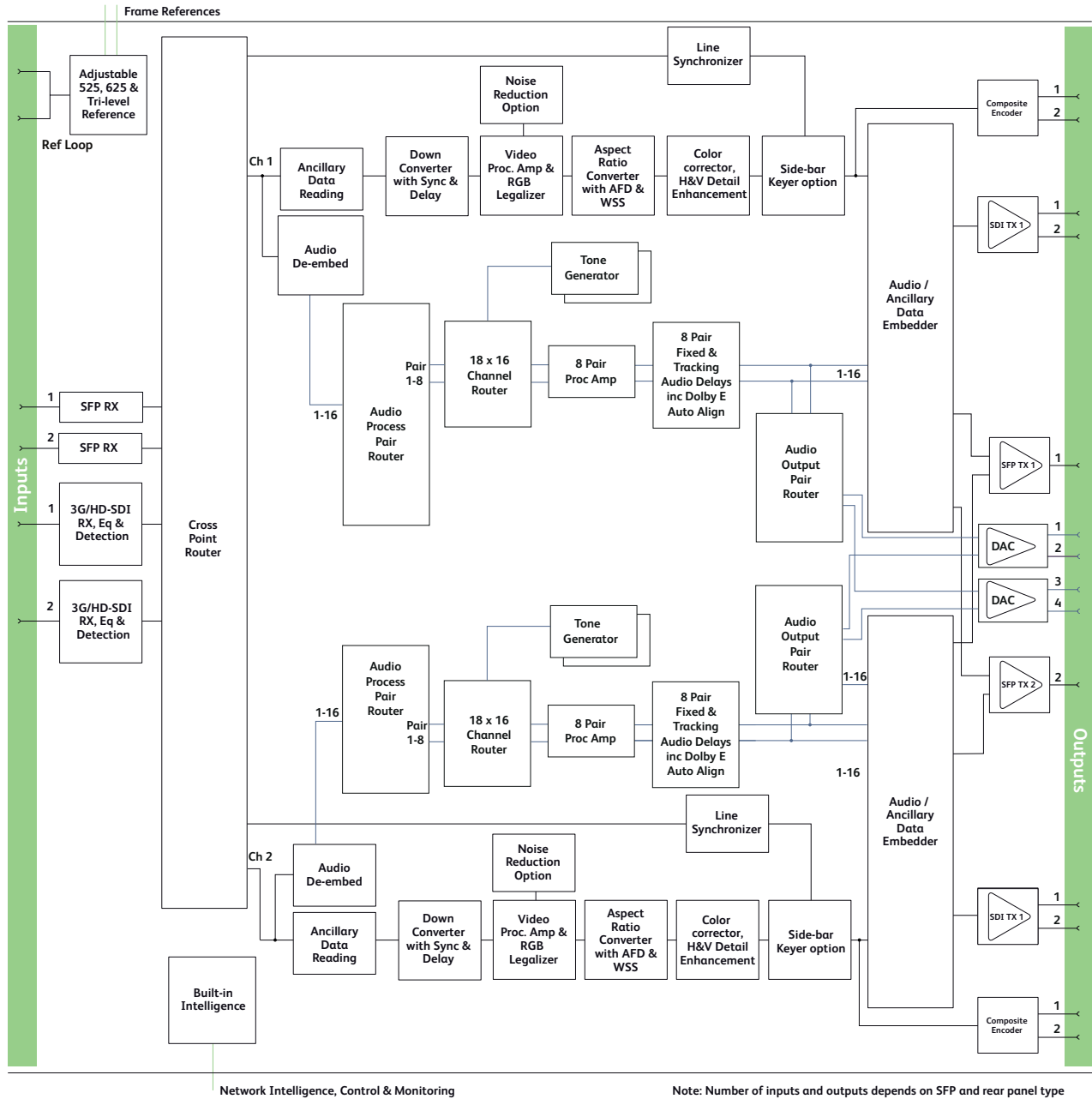
IQDNC3401-2A3, IQDNC3401-2B3



IQDNC3402-2A3, IQDNC3402-2B3

For more details on enclosure types please refer to datasheet IQH3B.





Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

Block Diagram for IQDNC34 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

- SDI Inputs: 2x
- Input Cable Length: Up to 80m Belden 1694A @ 3 Gbit/s  
Up to 120m Belden 1694A @ 1.5 Gbit/s  
100m typical (with output set to 1080p rates),  
Belden 1694A @ 270 Mbit/s
- Input Standard (auto detect): 625(576)/25i, 525(480)/29i  
720 50/59p/1080 50/59i  
1080 50/59p level A/B  
1080 25/29psf
- Analog Reference: 1 x Analog Reference with passive loop-through  
Black (HD tri-level and SD bi-level) and Black  
Burst (SD bi-level)  
SD bi-level – RS170A  
HD Tri-level – SMPTE 240M, 274M

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✓	×	×	×	×	×	×
		1080i	✓	×	×	×	×	×	×
	50	720P	✓	×	×	×	×	×	×
		1080P	✓	×	×	×	×	×	×
	29.97	480i	×	×	×	×	✓	×	×
		1080i	×	×	×	×	✓	×	×
	59.94	720P	×	×	×	×	✓	×	×
		1080P	×	×	×	×	✓	×	×

Format Conversion I/O Grid

### Technical Specification cont...

#### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format Standard	LC singlemode SMPTE 297-2006

#### Video Signal Outputs

SDI Outputs	Up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i
Composite Outputs	Up to 2 per channel
Output standard	625(576)/25i, 525(480)/29i

#### Audio Signal Outputs

Analog Audio Outputs	Up to 4 channels (selectable from either video channel)
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#### Fiber Signal Output

Optical	270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

**\*Note:** Optical I/O and control dependant on type of SFP module fitted

#### Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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#### Conversion Functions (per channel)

Modes	Down conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

#### Audio Functions

Analog audio	Four channels (two pairs) of analog outputs, separately assignable to any processing channel
Headroom	+24 dBu, balanced connection
Level adjustment	+12 dB to +24 dB (+18)

#### Analog Audio Routing

Output Pair1-2	Select from configured embedded audio output pairs (Ch1: 1-8, Ch2: 1-8)
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#### Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

#### Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

#### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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#### Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement

### Technical Specification cont...

RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot
<b>Specifications</b>	
Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

<b>Optical 1310 nm Tx</b>	
Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

<b>Optical Rx</b>	
Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

#### Embedded audio handling

HD - 24-bit synchronous 48 kHz to SMPTE 299M,  
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Power Consumption

Module Power Consumption	
	15.5 W Max (A Frames)
	14.5 PR (B Frames)
Module Power Consumption with Fiber	
	16.5 W Max (A Frames)
	15.5 PR (B Frames)

### Order codes for IQH3B enclosures

#### IQDNC3400-1B3

Dual channel down converter with analog I/O. 2 SDI inputs, reference inputs from enclosure, 1 SDI outputs per channel, 1 composite output per channel, 2 analog audio outputs

#### IQDNC3401-2B3

Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop & enclosure reference inputs, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs

#### IQDNC3402-2B3

Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop & enclosure reference inputs, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs, single SFP cage

### Order codes for IQH3A/1A enclosures

#### IQDNC3400-1A3

Dual channel down converter with analog I/O. 2 SDI inputs, 1 SDI outputs per channel, 1 composite output per channel, 2 analog audio outputs

#### IQDNC3401-2A3

Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs

#### IQDNC3402-2A3

Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-2NR** - Software option to add noise reduction

**IQOPTM-2SBK** - Software option to add side-bar keying

**IQOPTM-2LOG** - Software option to add Logo insertion

**IQOPTM-2UDC** - Software option for upgrade to up, down and cross conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQUPC30 provides multi-rate up conversion for SD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC30 is a broadcast quality conversion module able to handle applications such as upconversion for SD content repurposing on HD channels.

IQUPC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

### Features

- High quality up conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

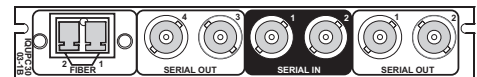
### Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

### Inputs & Outputs - IQH3B enclosures

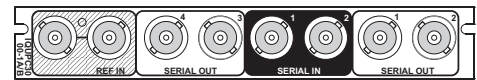


IQUPC3001-1B3

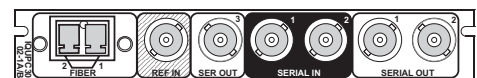


IQUPC3003-1B3

### Inputs & Outputs - IQH3A/1A/3B enclosures

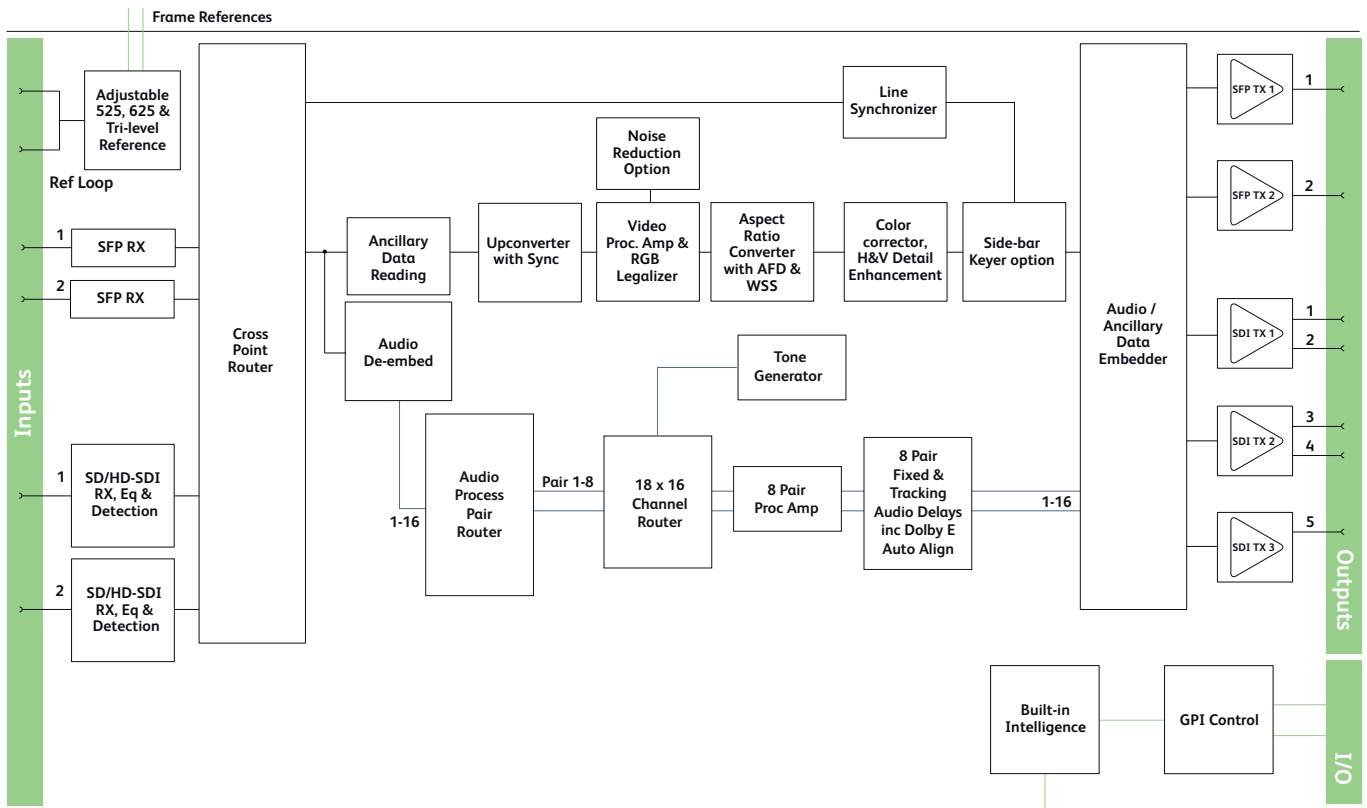


IQUPC3000-1A3, IQUPC3000-1B3



IQUPC3002-1A3, IQUPC3002-1B3

For more details on enclosure types please refer to datasheet IQH3B.



Note: Number of inputs and outputs depends on SFP and rear panel type

Network Intelligence, Control & Monitoring

### Block Diagram for IQUPC30 Range

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s  
 Input Standard (auto detect) 625(576)/25i, 525(480)/29i  
 Analog Reference 1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

#### Fiber Signal Input

Inputs Up to 2  
 Optical 270 Mbit/s SD-SDI  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓	
	1080i	✗	✗	✗	✗	✗	✗	✗	✗	
59.94	720P	✗	✗	✗	✗	✗	✗	✗	✗	
	1080P	✗	✗	✗	✗	✗	✗	✗	✗	

Format Conversion I/O Grid

### Technical Specification cont...

#### Video Signal Outputs

SDI Outputs	up to 5
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B

#### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

#### Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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#### Conversion Functions

Modes	Up conversion
Conversion processing	Aspect ratio conversion synchronization Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <-> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

#### Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

#### Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

#### Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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#### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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#### Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

##### GPI input Low/High Select

GPI Output Source	Black, Freeze, Pattern, User Memories 1-16
User Memories	Black, Freeze, Pattern
Memory Naming	16 x Save, Recall, Rename User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot



### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

#### Power Consumption

Module Power Consumption with Fiber	
	13W (A frames)
	13PR (B frames)

### Ordering Information

#### Order codes for IQH3B enclosures

##### IQUPC3000-1B3

Upconverter . 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

##### IQUPC3001-1B3

Upconverter . 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

##### IQUPC3002-1B3

Upconverter . 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

##### IQUPC3003-1B3

Upconverter . 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

#### Order codes for IQH3A/1A enclosures

##### IQUPC3000-1A3

Upconverter . 2 SDI inputs, reference loop, 4 SDI outputs

##### IQUPC3002-1A3

Upconverter . 2 SDI inputs, reference input, 3 SDI outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B

#### Software Options

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**IQOPTM-UDC** - Software option for upgrade to up, down and cross conversion

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

#### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQUPC31 provides two channels of multi-rate up conversion for SD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC31 is a broadcast quality conversion module ideal for space constrained installations, or for applications requiring simultaneous HD and SD output feeds.

IQUPC31 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion and side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

### Features

- High quality up conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signalling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss/freeze and reference loss

### Why should you choose this module?

- With its ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion and metadata handling, IQUPC31 allows fully flexible multi-format working in a compact and cost effective package
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

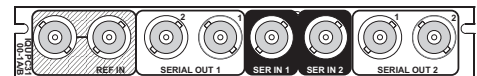
### Inputs & Outputs - IQH3B enclosures



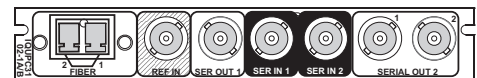
IQUPC3101-1B3



IQUPC3103-1B3

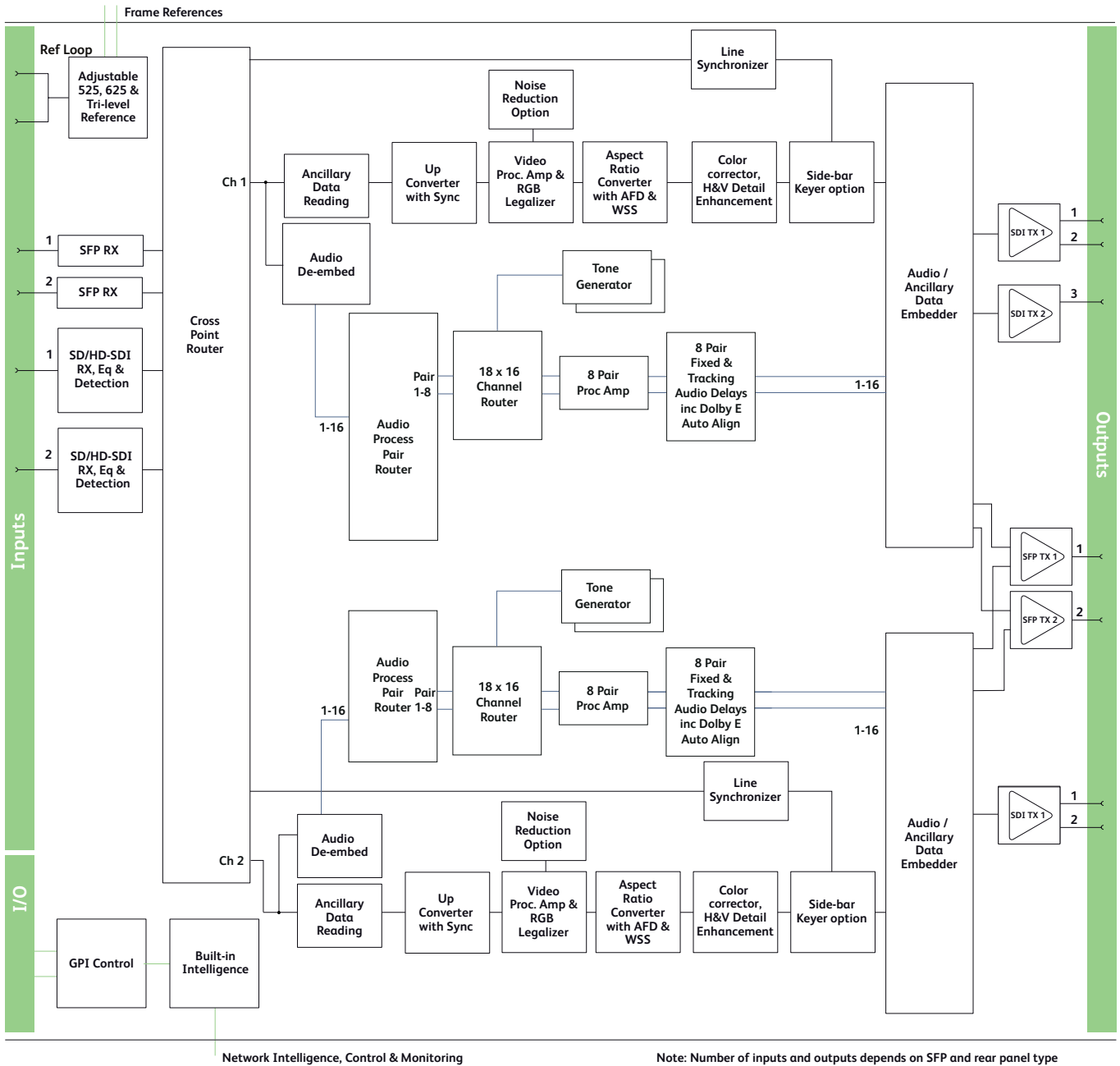


IQUPC3100-1B3



IQUPC3102-1B3

For more details on enclosure types please refer to datasheet IQH3B.



Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

### Block Diagram for IQUPC31 Range

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s

Input Standard (auto detect)

625(576)/25i, 525(480)/29i

Analog Reference 1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓	
	1080i	✗	✗	✗	✗	✗	✗	✗	✗	
59.94	720P	✗	✗	✗	✗	✗	✗	✗	✗	
	1080P	✗	✗	✗	✗	✗	✗	✗	✗	

Format Conversion I/O Grid

### Technical Specification cont...

#### Fiber Signal Input

Inputs	Up to 2
Optical	270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

#### Video Signal Outputs

SDI Outputs	up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B

#### Fiber Signal Output

Optical	3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

\*Note: Optical I/O and control dependant on type of SFP module fitted

#### Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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#### Conversion Functions (per channel)

Modes	Up conversion
Conversion processing	Aspect ratio conversion synchronization Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9

#### Metadata

Closed caption CE608 <> CE708  
Timecode conversions  
Teletext subtitles WST/RDD8 conversion

#### Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
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#### Embedded audio

Enable/Blank

#### Embedded Audio Routing

Processed pair 1-8	Disembled 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

#### Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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#### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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#### Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps

Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

#### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

#### Embedded audio handling

HD - 24-bit synchronous 48 kHz to SMPTE 299M,  
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Power Consumption

Module Power Consumption with Fiber 16PR (B frames)

### Ordering Information

#### Order codes for IQH3B enclosures

##### **IQUPC3100-1B3**

Dual channel up converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

##### **IQUPC3101-1B3**

Dual channel up converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

##### **IQUPC3102-1B3**

Dual channel up converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

##### **IQUPC3103-1B3**

Dual channel up converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B.

#### Software Options

**IQOPTM-2NR** - Software option to add noise reduction on both processing channels

**IQOPTM-2SBK** - Software option to add side-bar keying on both processing channels

**IQOPTM-2LOG** - Software option to add Logo insertion

**IQOPTM-2UDC** - Software option for upgrade to up, down and cross conversion for both processing channels

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

#### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQUPC32 provides up conversion and AES embedding and de-embedding for HD/SD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC32 is a broadcast quality conversion module able to handle a wide variety of common applications such as upconversion for SD content repurposing on HD channels.

IQUPC32 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

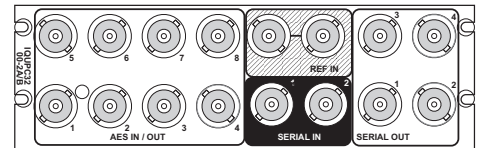
### Features

- High quality up conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signalling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

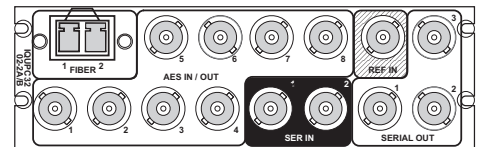
### Why should you choose this module?

- High quality up conversion and frame synchronization allows multi-format working and provides integration with HD workflows
- Comprehensive audio I/O and processing allows complete control over audio signals for embedding and de-embedding, and where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

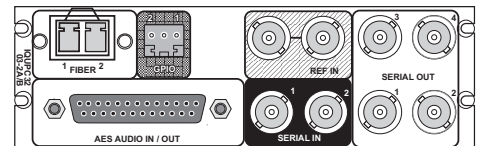
### Inputs & Outputs - IQH3A/1A/3B enclosures



**IQUPC3200-2A3, IQUPC3200-2B3**



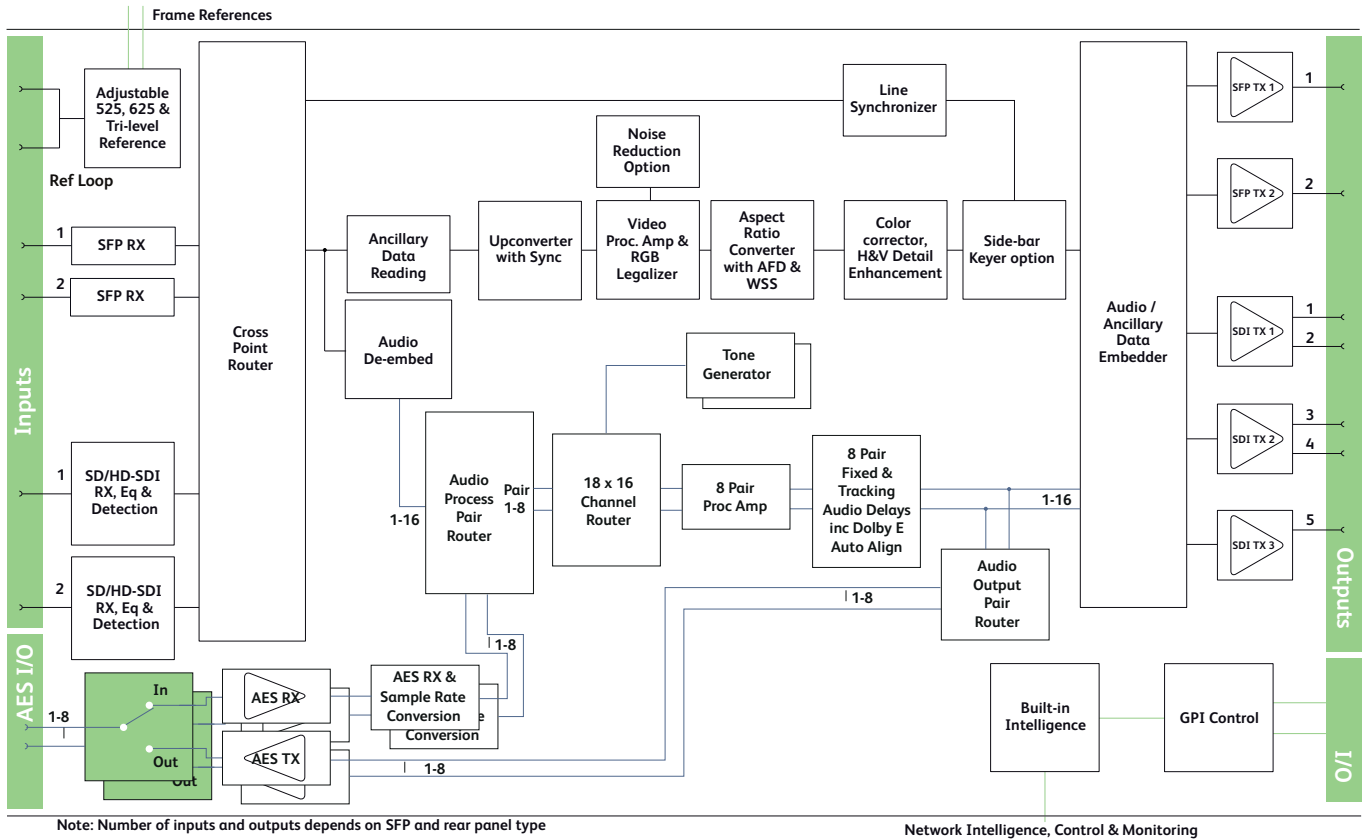
**IQUPC3202-2A3, IQUPC3202-2B3**



**IQUPC3203-2A3, IQUPC3203-2B3**

For more details on enclosure types please refer to datasheet IQH3B.





Block Diagram for IQUPC32 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s

##### Input Standard (auto detect)

625(576)/25i, 525(480)/29i  
 720 50/59p, 1080 50/59i  
 1080 50/59p level A/B  
 1080 25/29psf

##### Analog Reference

1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

Inputs Up to 2  
 Optical 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

##### Video Signal Outputs

SDI Outputs up to 4  
 Output standard 625(576)/25i, 525(480)/29i  
 720 50/59p, 1080 50/59i  
 1080 50/59p level A/B

##### Fiber Signal Output

Optical 3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Conforms to SMPTE 297-2006  
 Outputs Up to 2

**\*Note:** Optical I/O and control dependant on type  
 of SFP module fitted

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
59.94	720P	✗	✗	✗	✗	✗	✗	✗	✗	
	1080P	✗	✗	✗	✗	✗	✗	✗	✗	

Format Conversion I/O Grid

### Technical Specification cont...

#### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)  
 8 Unbalanced (BNC)  
 8 Balanced (25D Type)

#### Control Interface

GPI 2 x Closing contact I/O interface (ST) (rear panel dependant)

#### Conversion Functions

Modes Up conversion  
 Aspect ratio conversion synchronization  
 Conversion processing Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response  
 Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns  
 Aspect ratio conversion AFD (SMPTE 2016), VI (RP186), WSS (L23)  
 (manual or auto)  
 SD input format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9  
 SD output format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9  
 Metadata Closed caption CE608 <> CE708  
 Timecode conversions  
 Teletext subtitles WST/RDD8 conversion

#### Audio Functions

Embedded audio 16-channel embedded audio processing  
 PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature  
 Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat  
 Embedded audio Enable/Blank

#### Audio Routing

Processed pair 1-8 Disembled 1-8, AES 1-8, Analog 1-2  
 Embedded Output Channels 1-16  
 Processed pair 1-8, Tone, Silence  
 AES 1-8 Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase Channels 1-16  
 Pair 1 to 8 Gain L/R +18 dB to -18 dB in 0.1 dB steps  
 Pair 1-8 Manual Delay -40 to +200 ms in 1 ms steps  
 Global Manual Delay -40 to +200 ms in 1 ms steps

#### Dolby-E

Dolby-E Auto  
 Alignment +/- 10 line offset in 1 line steps

#### Tone

Frequency 100Hz to 10kHz in 100Hz steps

#### Processing Functions

Ancillary Data Pass/Strip  
 Freeze On/Off  
 Legalizer On/Off  
 Genlock Reference lock (Ext, Int A, Int B), Input lock (same format), Free run  
 Memories 16 user memories  
 Pattern Off, Black, Ramp, Bars  
 Caption On/Off, Scrolling  
 Edit Caption 19 characters available

#### Proc amp

Black Level: +100 to -100 mV (0) in 0.8 mV steps  
 Contrast: -6 dB to +6 dB (0) in 0.2 dB steps  
 Saturation: -6 dB to +6 dB (0) in 0.2 dB steps  
 Y Gamma: 0.4 to 1.7 (1) in 0.1 steps  
 YC Offset: -20 to 20 (0) in 2 Luma pixel steps  
 Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer Frequency Band Selection: Low, Med, High  
 Four preset enhancement modes: Low, Med, High, Super  
 Manual enhancement mode with H Gain and H Noise rejection levels

#### Conversion Aperture

Vertical Frequency Band Selection: Low, Med, High  
 Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2  
 Horizontal Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2  
 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select Black, Freeze, Pattern, User Memories 1-16  
 GPI Output Source Black, Freeze, Pattern  
 User Memories 16 x Save, Recall, Rename  
 Memory Naming User configurable naming of memories 1 – 16  
 RollTrack Index Up to 50 RollTrack destinations  
 Optical Logging\* Tx Laser Bias High Warning  
 Tx Power Low Warning  
 Tx Power High Warning  
 Laser Wavelength Input 1 (2) Rx Power High Warning  
 Input 1 (2) Rx Power Low Warning  
 Input 1 (2) Rx Power Measurement  
 RollTrack Sources Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss  
 Video Input Status, Reference Status  
 Information Window Resets all module settings to factory specified default values and clears memories  
 Factory Default Resets all module settings to factory specified defaults but does not clear memories  
 Default Settings Reports following module information:  
 Module Information Software version, Serial number, Rear Panel ID, Frame Slot

#### Specifications

Electrical 3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C  
 Connector / Format BNC/ 75ohm panel jack on standard IQ connector panel  
 Return loss >-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)  
 Output Jitter SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)  
 Reference Source External – HD Tri-Level / SD Bi-level / Input Video syncs  
 Electrical Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M and 274M  
 Connector / Format BNC/75 ohm panel jack on standard IQ connector panel  
 Embedded audio handling HD - 24-bit synchronous 48 kHz to SMPTE 299M,  
 SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

### Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

### Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

### Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

### Power Consumption

Module Power Consumption with Fiber	
	13W (A frames)
	13PR (B frames)

## Ordering Information

### Order codes for IQH3B enclosures

#### IQUPC3200-2B3

Up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 unbalanced AES inputs or outputs

#### IQUPC3202-2B3

Up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### IQUPC3203-2B3

Up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

### Order codes for IQH3A/1A enclosures

#### IQUPC3200-2A3

Up converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 unbalanced AES inputs or outputs

#### IQUPC3202-2A3

Up converter with AES I/O. 2 SDI inputs, reference input, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### IQUPC3203-2A3

Up converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

**IQOPTM-UDC** - Software option for upgrade to up, down and cross conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQUPC33 provides two channels of up conversion and AES embedding and de-embedding for 3G/HD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC33 is a broadcast quality conversion module ideal for space constrained installations, or for applications requiring simultaneous HD and SD output feeds.

IQUPC33 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, shared between the video channels, plus audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

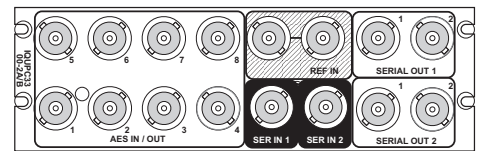
### Features

- High quality up conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or SMPTE12M timecode translation
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

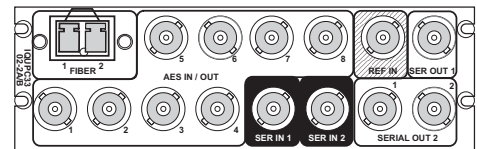
### Why should you choose this module?

- With it's ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion, AES audio interfacing and metadata handling IQUPC33 allows efficient multi-format working in a compact and cost effective package
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

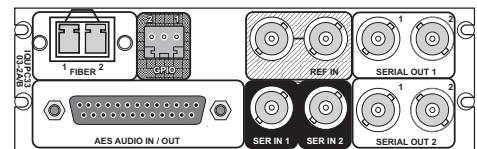
### Inputs & Outputs - IQH3A/1A/3B enclosures



IQUPC3300-2A3, IQUPC3300-2B3

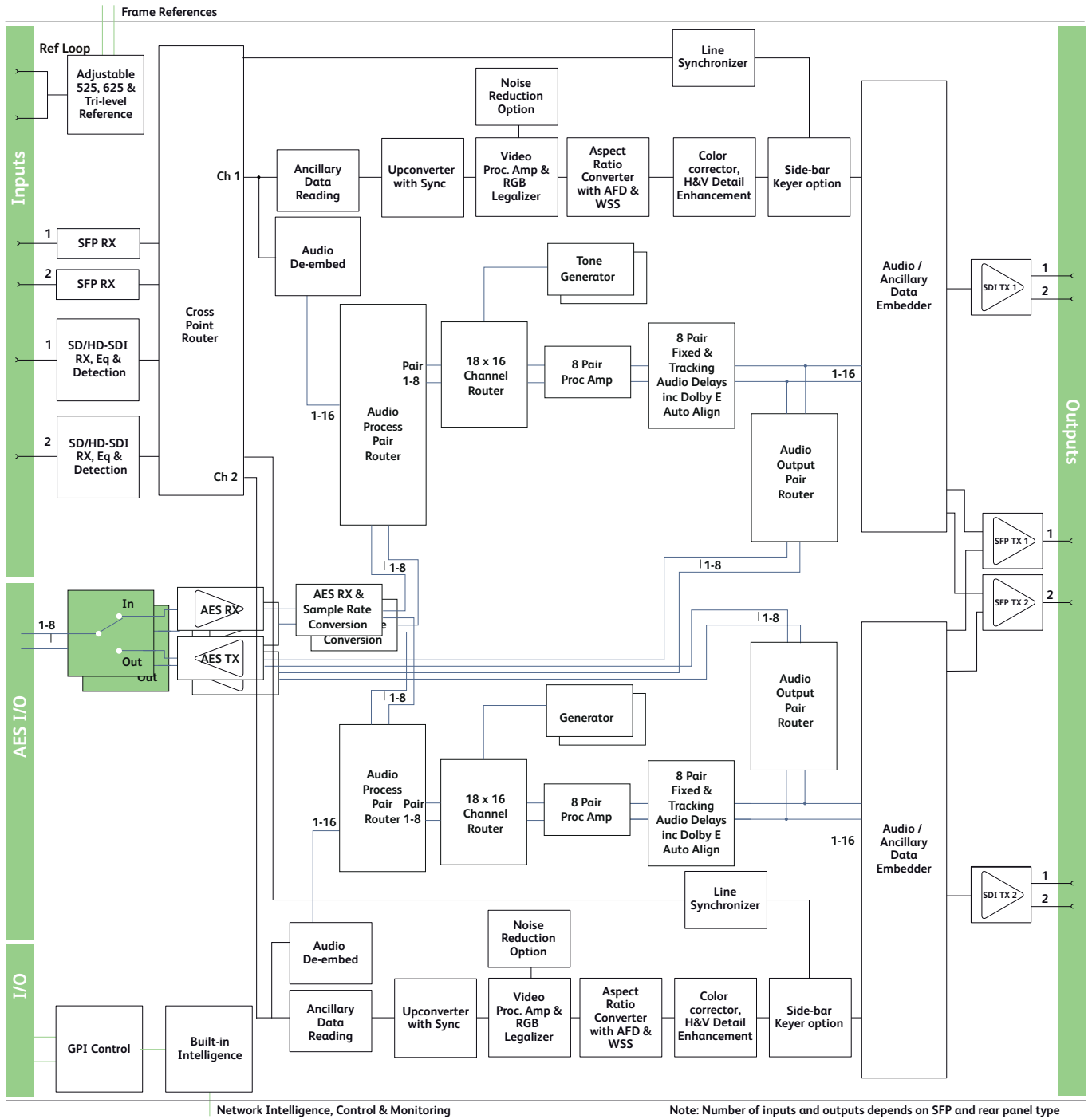


IQUPC3302-2A3, IQUPC3302-2B3



IQUPC3303-2A3, IQUPC3303-2B3

For more details on enclosure types please refer to datasheet IQH3B.



Block Diagram for IQUPC33 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 120m Belden 1694A @ 1.5 Gbit/s 100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	625(576)/25i, 525(480)/29i 720 50/59p/1080 50/59i 1080 50/59p level A/B 1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format Standard	LC singlemode SMPTE 297-2006

##### Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B

##### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format Conforms to Outputs	LC singlemode SMPTE 297-2006 Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

##### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	8 Unbalanced (BNC) 8 Balanced (25D Type)
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##### Control Interface

GPI	2x Closing contact I/O interface (ST) (rear panel dependant)
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##### Conversion Functions (per channel)

Modes	Up conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	59.94	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗

^ Format Conversion I/O Grid

SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <-> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

##### Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat Enable/Blank
Embedded audio	Enable/Blank

##### Audio Routing

Processed pair 1-8	Disembled 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

##### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

##### Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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##### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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### Technical Specification cont...

#### Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

#### Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

#### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

#### Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

#### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

#### Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

#### Power Consumption

Module Power Consumption with Fiber	18W (A frames) 18PR (B frames)
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## Ordering Information

### Order codes for IQH3B enclosures

#### **IQUPC3300-2B3**

Dual up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

#### **IQUPC3302-2B3**

Dual up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### **IQUPC3303-2B3**

Dual up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

### Order codes for IQH3A/1A enclosures

#### **IQUPC3300-2A3**

Dual up converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

#### **IQUPC3302-2A3**

Dual up converter with AES I/O. 2 SDI inputs, reference input, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### **IQUPC3303-2A3**

Dual up converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-2NR** - Software option to add noise reduction on both channels

**IQOPTM-2SBK** - Software option to add side-bar keying on both channels

**IQOPTM-2LOG** - Software option to add Logo insertion

**IQOPTM-2LC** - Software option to upgrade with linear frame rate conversion on both channels

**IQOPTM-UDC** - Software option for upgrade to up, down and cross conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQGBX40 provides interfacing between quad-link and 12G single link UHD-4K signals, and format conversion between SD or HD SDI signals and UHD-1 4K in either quad-link 3G or single link 12G standards. IQGBX40 uses high quality conversion technology allowing SD or HD signals to be upconverted and re-assembled seamlessly for broadcast applications, or alternatively UHD-4K production to be down converted for use on mainstream HD channels. Handling both quad-link and 12G I/O means that the IQGBX40 can gearbox quad-link UHD signals to or from a single link transport thereby saving on cabling overhead and avoiding potential timing issues.

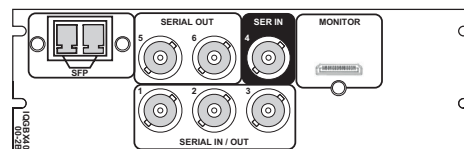
### Features

- Interfacing between quad-link and 12G single link UHD-1 4K signals with two dedicated 12G outputs available
- Selectable up, down and cross conversion for UHD-4K (single or quad link SQ or 2SI modes)/HD/SD-SDI inputs with input format detection
- SDI input and output crosspoint routing for link swapping in quad link applications
- Integrated Fiber I/O support via SFP module to ST297M 2015, data rates up to 12Gbps supported
- User variable static aspect ratio conversion with 40 programmable display memories – fixed selection (9 presets), including pan, tilt and zoom functions with pixel accurate control
- Aspect ratio control using SMPTE 2016 AFD signalling (reading and writing)
- Automatic color space conversion – ITU 601, ITU 709 (SMPTE-274)
- 16-channel embedded audio with SDI link selection, and delay to match the video signal
- Input Loss Detection – Cut to Black or Pattern
- Test pattern generator selectable between 100% bars and black
- Remote Status Monitoring – Input standard, Reference Status and CRC error checking
- 16 user memories

### Why should you choose this module?

- Translate quad-link 4K signals into single link 12G workflows and handle repurposing of 4K content for HD applications
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

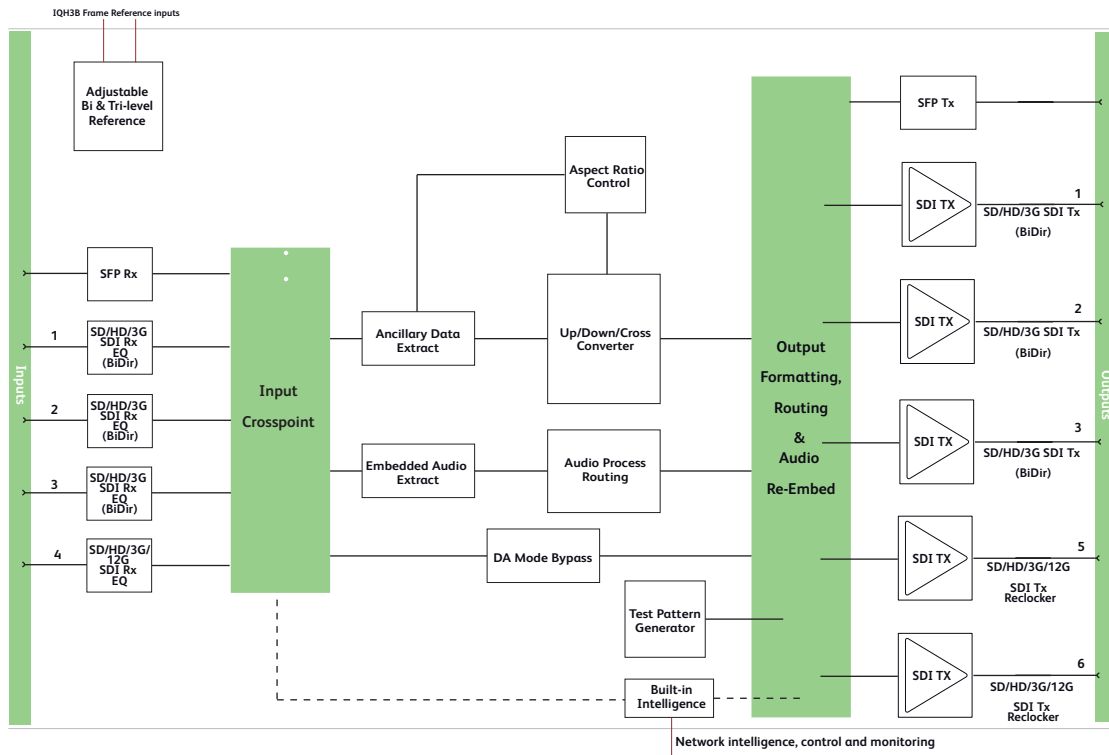
### Order Codes - IQH3B enclosures



#### IQGBX4000-2B4

UHD-1 4K/3G/HD/SD Gearbox and Converter. 1 12G SDI input, 3 3G/HD/SD SDI bi-directional connections, 2 12G SDI outputs, analog reference connection via IQH3B frame, SFP transceiver

For more details on enclosure types please refer to datasheet IQH3B.



Block Diagram for IQGBX40

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs/Outputs

SDI Input	1 (12G/3G/1.5G/270M)
SDI bi-directional inputs/outputs	3 (3G/1.5G/270M)
Input Cable Length	Up to 40m Belden 1694A @ 12 Gbit/s Up to 80m Belden 1694A @ 3 Gbit/s Up to 180m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	SD - 525, 625, HD - 720 50/59.94/60p, HD - 1080 25/29/30i, 3G - 1080/2160 (quad) 50/59.94/60p (A & B) 12G - 2160 50/59.94/60p (2SI) BNC 4 only
Analog Reference	1 x Analog Reference Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) selectable from IQH3B frame reference connections

#### Fiber Signal Input

Input	1
Optical	12Gbit/s UHD-SDI, 3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

#### Video Signal Outputs

SDI Outputs	5 (3 x 3G/1.5G/270M, 2 x 12G/3G/1.5G/270M)
Output standard	SD - 525, 625, HD - 720 50/59.94/60p, HD - 1080 25/29/30i, 3G - 1080/2160 (quad) 50/59.94/60p (A & B) 12G - 2160 50/59.94/60p (2SI) - BNC 5 & 6 only

#### Fiber Signal Output

Output	1
Optical	12Gbit/s UHD-SDI, 3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006

### Technical Specification cont...

#### Controls

##### Conversion Functions

Quad Link Type	SQ Div, 2SI
Modes	Distribution Amp - 1 in, 2 out Quad-link to 12G UHD gearbox Up, down, and cross conversion Test pattern generator
I/O Port Mapping	Input 1 - 4 selectable to link 1 - 4
Output standard select	525, 625, 720 50/59.94/60p, 1080 25/29/30i, 1080/2160 (quad) 50/59.94/60p (A & B), 2160 50/59.94/60p (2SI)
Signalling type	WSS (ETSI or AFD), VI (SMPTE or AFD), SMPTE 2016
Preset selections	Full Frame, Box 16:9 top > 16:9, 4:3 box 14:9 top > 16:9, Box 16:9 > 16:9, Box 4:3 > 4:3, 4:3 > box 16:9, 16:9 > box 4:3, 4:3 box 14:9 > 16:9, 16:9 box 14:9 > 4:3
Manual ARC control	Size, Aspect, Pan, Tilt
Crop and Scale	Left, Right, Top and Bottom
32 Display Memories	Save Recall, Rename

##### Audio Functions

Embedded audio	16-channel embedded audio passed with delay to match the video processing
Audio Source	Link 1-4
Group/Channel active	Group 1-4
Embed audio	On/Off

##### Other Controls

Genlock	Link 1-4, Frame ref A/B, Free run
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
Pattern	Off, Black, 100% Bars

Video Logging	Type, State, Standard
Audio Logging	Link 1-4 pair 1-8 state
Information Window	Link Input Status, Video Output status, Input status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version & build, Serial number

##### Specifications

Electrical	12Gbit/s SDI, SMPTE 2082M, 3Gbit/s SDI, SMPTE 425M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

##### Power Consumption

Module Power Consumption	27PR (B frames)
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The IQUDC30 provides multi-rate format conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC30 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

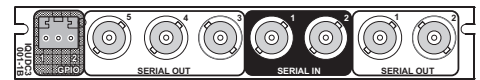
### Features

- High quality up, down and cross conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

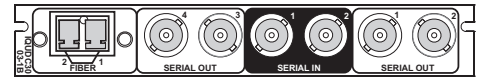
### Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

### Inputs & Outputs - IQH3B enclosures

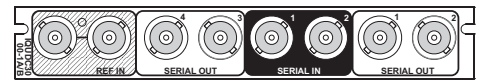


IQUDC3001-1B3

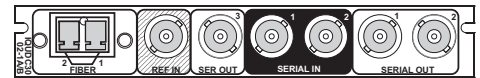


IQUDC3003-1B3

### Inputs & Outputs - IQH3A/1A/3B enclosures



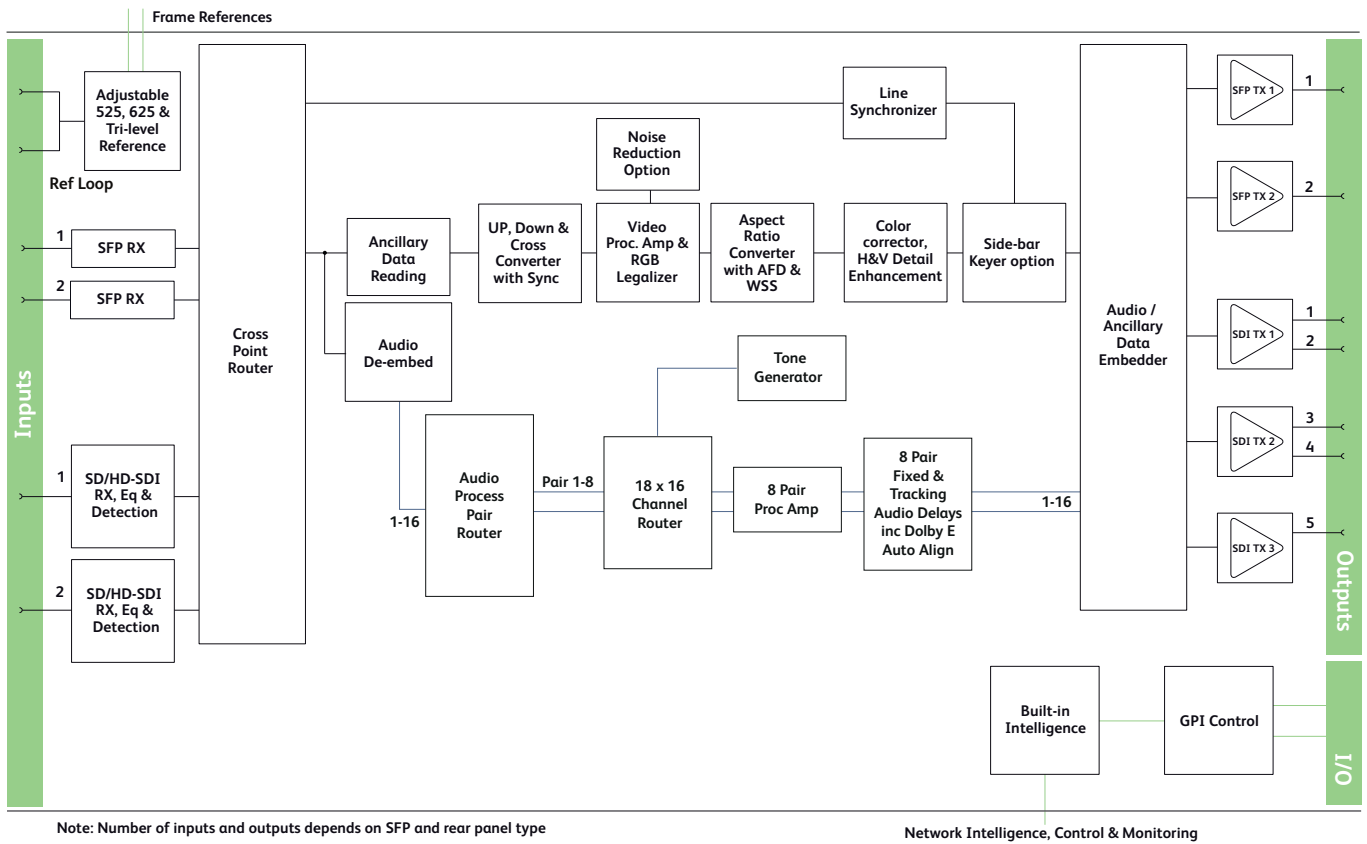
IQUDC3000-1A3, IQUDC3000-1B3



IQUDC3002-1A3, IQUDC3002-1B3

For more details on enclosure types please refer to datasheet IQH3B.





Block Diagram for IQUDC30 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s  
 Input Standard (auto detect)  
 625(576)/25i, 525(480)/29i  
 720 50/59p/1080 50/59i  
 1080 50/59p level A/B  
 1080 25/29psf  
 Analog Reference 1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

Inputs Up to 2  
 Optical 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✓	✓	✓	✓	✗	✗	✗	✗
	50	720P	✓	✓	✓	✓	✗	✗	✗	✗
		1080P	✓	✓	✓	✓	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓	
	1080i	✗	✗	✗	✗	✓	✓	✓	✓	
59.94	720P	✗	✗	✗	✗	✓	✓	✓	✓	
	1080P	✗	✗	✗	✗	✓	✓	✓	✓	

Format Conversion I/O Grid

### Technical Specification cont...

#### Video Signal Outputs

SDI Outputs	up to 5
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B

#### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

#### Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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#### Conversion Functions

Modes	Up, down, and cross conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Auto zoom	On/Off
Manual zoom	Zoom +/- 20%
Metadata	Closed caption CE608 <> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

#### Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

#### Embedded Audio Routing

Processed pair 1-8	Disembled 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

#### Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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#### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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#### Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Follow input (same frame rate), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

### Power Consumption

Module Power Consumption with Fiber	
	13W (A frames)
	13PR (B frames)

## Ordering Information

### Order codes for IQH3B enclosures

#### IQUDC3000-1B3

Up, down and cross converter . 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

#### IQUDC3001-1B3

Up, down and cross converter . 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

#### IQUDC3002-1B3

Up, down and cross converter . 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

#### IQUDC3003-1B3

Up, down and cross converter . 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

### Order codes for IQH3A/1A enclosures

#### IQUDC3000-1A3

Up, down and cross converter . 2 SDI inputs, reference loop, 4 SDI outputs

#### IQUDC3002-1A3

Up, down and cross converter . 2 SDI inputs, reference input, 3 SDI outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

### Fiber SFP options

**FC1-13T1** - Single 1310nm Tx

**FC1-13T2** - Dual 1310nm Tx

**FC1-15T1** - Single 1550nm Tx

**FC1-15T2** - Dual 1550nm Tx

**FC1-R1** - Single Rx

**FC1-R2** - Dual Rx

**FC1-13TR** - Transceiver 1310nm/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

**FC1-HDMI2** - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.

The IQUDC31 provides two channels of multi-rate format conversion for 3G/HD/SD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC31 is a broadcast quality conversion module ideal for space constrained installations, or for applications requiring simultaneous HD and SD output feeds.

IQUDC31 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

### Features

- High quality up, down and cross conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

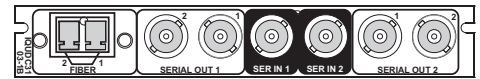
### Why should you choose this module?

- With its ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion and metadata handling, IQUDC31 allows fully flexible multi-format working in a compact and cost effective package
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

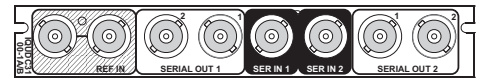
### Inputs & Outputs - IQH3B enclosures



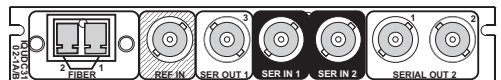
IQUDC3101-1B3



IQUDC3103-1B3

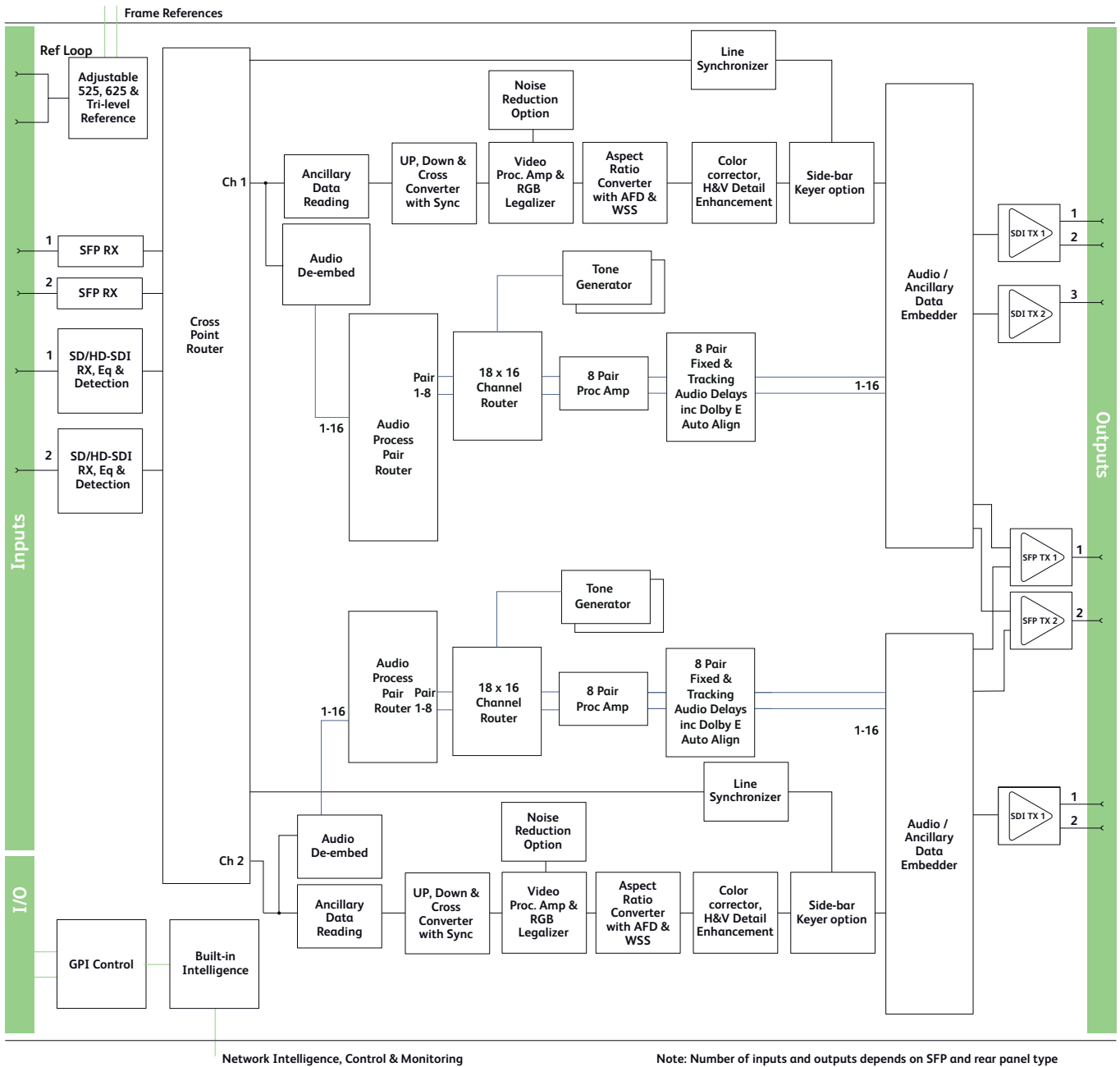


IQUDC3100-1B3



IQUDC3102-1B3

For more details on enclosure types please refer to datasheet IQH3B.



Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

### Block Diagram for IQUDC31 Range

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s

#### Input Standard (auto detect)

625(576)/25i, 525(480)/29i  
 720 50/59p, 1080 50/59i  
 1080 50/59p level A/B  
 1080 25/29psf

#### Analog Reference

1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✓	✓	✓	✓	✗	✗	✗	✗
	50	720P	✓	✓	✓	✓	✗	✗	✗	✗
		1080P	✓	✓	✓	✓	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓	
	1080i	✗	✗	✗	✗	✓	✓	✓	✓	
59.94	720P	✗	✗	✗	✗	✓	✓	✓	✓	
	1080P	✗	✗	✗	✗	✓	✓	✓	✓	

Format Conversion I/O Grid

### Technical Specification cont...

#### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format Standard	LC singlemode SMPTE 297-2006

#### Video Signal Outputs

SDI Outputs	up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B

#### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

#### Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)
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#### Conversion Functions (per channel)

Modes	Up, down, and cross conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <-> CE708 Timecode conversions Teletext subtitles WST/RDD8 conversion

#### Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

#### Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

#### Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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#### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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#### Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

#### Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot



### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

#### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

#### Embedded audio handling

HD - 24-bit synchronous 48 kHz to SMPTE 299M,  
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Power Consumption

Module Power Consumption with Fiber  
16PR (B frames)

### Ordering Information

#### Order codes for IQH3B enclosures

##### IQUDC3100-1B3

Dual channel up, down and cross converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

##### IQUDC3101-1B3

Dual channel up, down and cross converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

##### IQUDC3102-1B3

Dual channel up, down and cross converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

##### IQUDC3103-1B3

Dual channel up, down and cross converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B

#### Software Options

**IQOPTM-2NR** - Software option to add noise reduction on both processing channels

**IQOPTM-2SBK** - Software option to add side-bar keying on both processing channels

**IQOPTM-LOG** - Software option to add Logo insertion on both channels

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

#### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQUDC32 provides multi-rate format conversion and AES embedding and de-embedding for 3G/HD/SD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC32 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC32 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

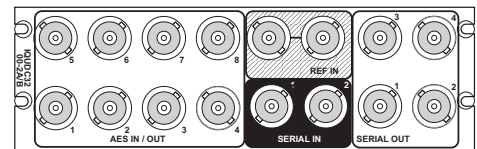
### Features

- High quality up, down and cross conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports

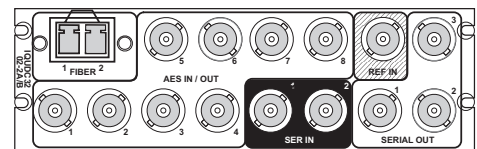
### Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio I/O and processing allows complete control over audio signals for embedding and de-embedding, and where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

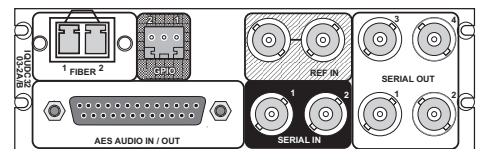
### Inputs & Outputs - IQH3A/1A/3B enclosures



IQUDC3200-2A3, IQUDC3200-2B3

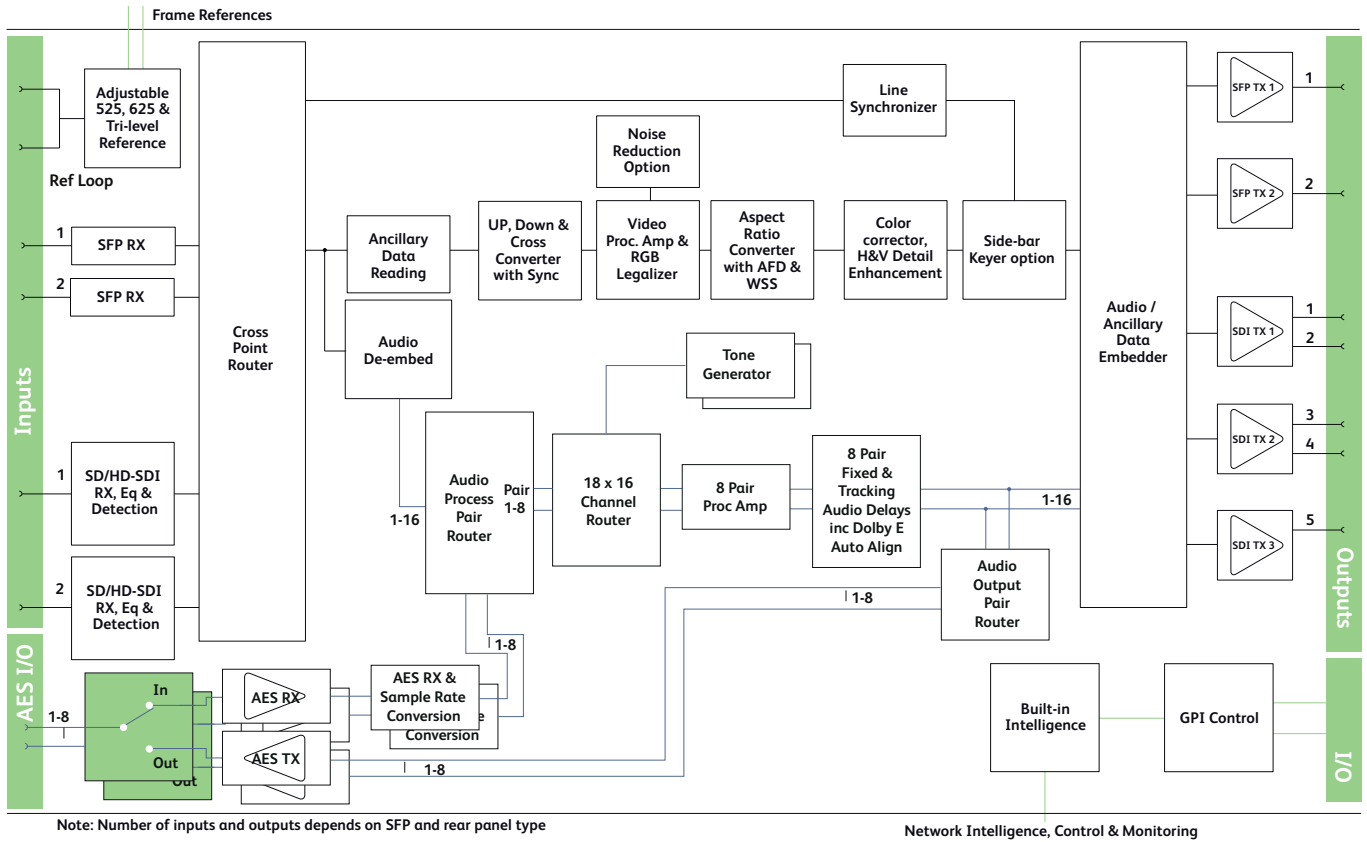


IQUDC3202-2A3, IQUDC3202-2B3



IQUDC3203-2A3, IQUDC3203-2B3

For more details on enclosure types please refer to datasheet IQH3B.



Block Diagram for IQUDC32 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs 2x  
 Input Cable Length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 120m Belden 1694A @ 1.5 Gbit/s  
 100m typical (with output set to 1080p rates),  
 Belden 1694A @ 270 Mbit/s  
 Input Standard (auto detect)

625(576)/25i, 525(480)/29i  
 720 50/59p/1080 50/59i  
 1080 50/59p level A/B  
 1080 25/29psf

##### Analog Reference

1 x Analog Reference with passive loop-through  
 Black (HD tri-level and SD bi-level) and Black  
 Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

Inputs Up to 2  
 Optical 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

##### Video Signal Outputs

SDI Outputs up to 4  
 Output standard 625(576)/25i, 525(480)/29i  
 720 50/59p, 1080 50/59i  
 1080 50/59p level A/B

##### Fiber Signal Output

Optical 3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s  
 SD-SDI  
 Connector / Format LC singlemode  
 Conforms to SMPTE 297-2006  
 Outputs Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✓	✓	✓	✓	✗	✗	✗	✗
	50	720P	✓	✓	✓	✓	✗	✗	✗	✗
		1080P	✓	✓	✓	✓	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓	
	1080i	✗	✗	✗	✗	✓	✓	✓	✓	
59.94	720P	✗	✗	✗	✗	✓	✓	✓	✓	
	1080P	✗	✗	✗	✗	✓	✓	✓	✓	

Format Conversion I/O Grid

### Technical Specification cont...

#### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)  
 8 Unbalanced (BNC)  
 8 Balanced (25D Type)

#### Control Interface

GPI 2x Closing contact I/O interface (ST) (rear panel dependant)

#### Conversion Functions

Modes Up, down, and cross conversion  
 Aspect ratio conversion synchronization  
 Conversion processing Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response  
 Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns  
 Aspect ratio conversion (manual or auto) AFD (SMPTE 2016), VI (RP186), WSS (L23)  
 SD input format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9  
 SD output format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9  
 Metadata Closed caption CE608 <> CE708  
 Timecode conversions  
 Teletext subtitles WST/RDD8 conversion

#### Audio Functions

Embedded audio 16-channel embedded audio processing  
 PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature  
 Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat  
 Embedded audio Enable/Blank

#### Audio Routing

Processed pair 1-8 Disembled 1-8, AES 1-8, Analog 1-2  
 Embedded Output Channels 1-16  
 Processed pair 1-8, Tone, Silence  
 AES 1-8 Processed pair 1-8, Tone, Silence

#### Processed Audio Control

Invert Phase Channels 1-16  
 Pair 1 to 8 Gain L/R +18 dB to -18 dB in 0.1 dB steps  
 Pair 1-8 Manual Delay -40 to +200 ms in 1 ms steps  
 Global Manual Delay -40 to +200 ms in 1 ms steps

#### Dolby-E

Dolby-E Auto  
 Alignment +/- 10 line offset in 1 line steps

#### Tone

Frequency 100Hz to 10kHz in 100Hz steps

#### Processing Functions

Ancillary Data Pass/Strip  
 Freeze On/Off  
 Legalizer On/Off  
 Genlock Reference lock (Ext, Int A, Int B), Input lock (same format), Free run  
 Memories 16 user memories  
 Pattern Off, Black, Ramp, Bars  
 Caption On/Off, Scrolling  
 Edit Caption 19 characters available

#### Proc amp

Black Level: +100 to -100 mV (0) in 0.8 mV steps  
 Contrast: -6 dB to +6 dB (0) in 0.2 dB steps  
 Saturation: -6 dB to +6 dB (0) in 0.2 dB steps  
 Y Gamma: 0.4 to 1.7 (1) in 0.1 steps  
 YC Offset: -20 to 20 (0) in 2 Luma pixel steps  
 Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer Frequency Band Selection: Low, Med, High  
 Four preset enhancement modes: Low, Med, High, Super  
 Manual enhancement mode with H Gain and H Noise rejection levels

#### Conversion Aperture

Vertical Frequency Band Selection: Low, Med, High  
 Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2  
 Horizontal Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2  
 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select  
 Black, Freeze, Pattern, User Memories 1-16  
 GPI Output Source Black, Freeze, Pattern  
 User Memories 16 x Save, Recall, Rename  
 Memory Naming User configurable naming of memories 1 – 16  
 RollTrack Index Up to 50 RollTrack destinations  
 Optical Logging\* Tx Laser Bias High Warning  
 Tx Power Low Warning  
 Tx Power High Warning  
 Laser Wavelength Input 1 (2) Rx Power High Warning  
 Input 1 (2) Rx Power Low Warning  
 Input 1 (2) Rx Power Measurement  
 RollTrack Sources Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss  
 Information Window Video Input Status, Reference Status  
 Factory Default Resets all module settings to factory specified default values and clears memories  
 Default Settings Resets all module settings to factory specified defaults but does not clear memories  
 Module Information Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

#### Specifications

Electrical 3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C  
 Connector / Format BNC/ 75ohm panel jack on standard IQ connector panel  
 Return loss >-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)  
 Output Jitter SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)  
 Reference Source External – HD Tri-Level / SD Bi-level / Input Video syncs  
 Electrical Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)  
 SD bi-level – RS170A  
 HD Tr-level – SMPTE 240M and 274M  
 Connector / Format BNC/75 ohm panel jack on standard IQ connector panel  
 Embedded audio handling HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

### Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

### Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

### Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

### Power Consumption

Module Power Consumption with Fiber	
	13W (A frames)
	13PR (B frames)

## Ordering Information

### Order codes for IQH3B enclosures

#### IQUDC3200-2B3

Up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 unbalanced AES inputs or outputs

#### IQUDC3202-2B3

Up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### IQUDC3203-2B3

Up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

### Order codes for IQH3A/1A enclosures

#### IQUDC3200-2A3

Up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 unbalanced AES inputs or outputs

#### IQUDC3202-2A3

Up, down and cross converter with AES I/O. 2 SDI inputs, reference input, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### IQUDC3203-2A3

Up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-NR** - Software option to add noise reduction

**IQOPTM-SBK** - Software option to add side-bar keying

**IQOPTM-LOG** - Software option to add Logo insertion

**IQOPTM-LC** - Software option to upgrade with Linear frame rate conversion

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

The IQUDC33 provides two channels of multi-rate format conversion and AES embedding and de-embedding for 3G/HD/SD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC33 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC33 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, shared between the video channels, plus audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, logo insertion, side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

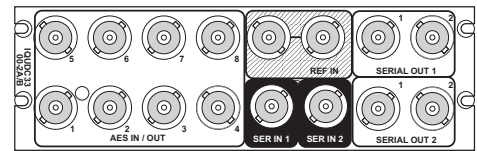
### Features

- High quality up, down and cross conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or SMPTE12M timecode translation
- Additional processing options including; noise reduction (adaptive spatial and recursive), logo insertion, side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including; channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

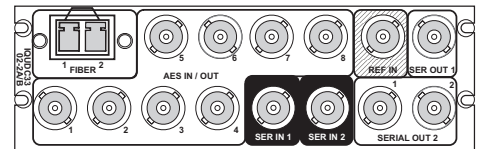
### Why should you choose this module?

- With it's ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion, AES audio interfacing and metadata handling, IQUDC33 allows efficient multi-format working in a compact and cost effective package
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

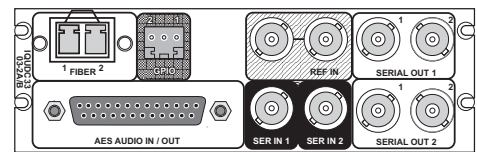
### Inputs & Outputs - IQH3A/1A/3B enclosures



IQUDC3300-2A3, IQUDC3300-2B3



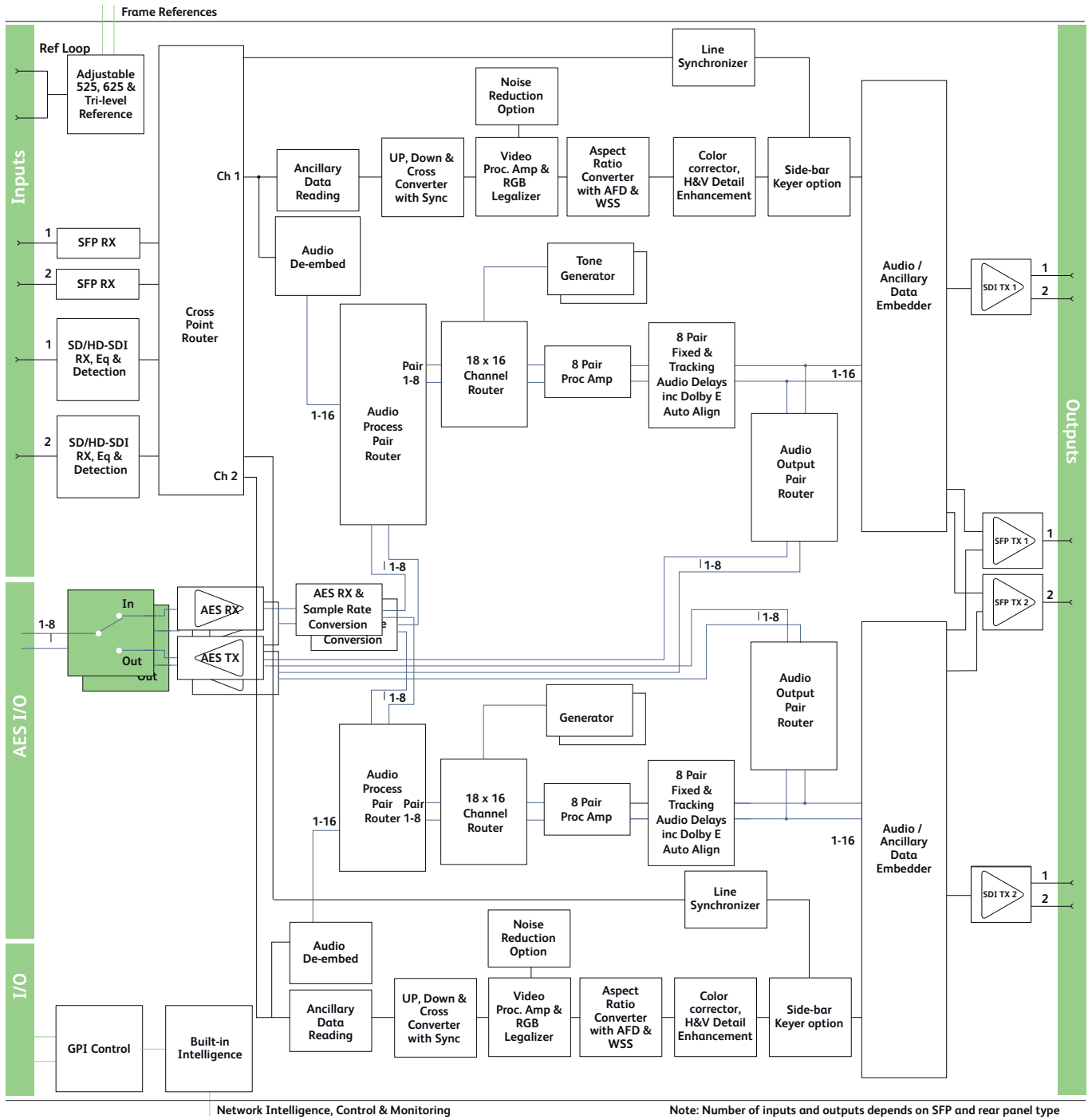
IQUDC3302-2A3, IQUDC3302-2B3



IQUDC3303-2A3, IQUDC3303-2B3

For more details on enclosure types please refer to datasheet IQH3B.





Block Diagram for IQUDC33 Range

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 120m Belden 1694A @ 1.5 Gbit/s 100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	625(576)/25i, 525(480)/29i 720 50/59p/1080 50/59i 1080 50/59p level A/B 1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M

##### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format Standard	LC singlemode SMPTE 297-2006

##### Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i 720 50/59p, 1080 50/59i 1080 50/59p level A/B

##### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

**\*Note: Optical I/O and control dependant on type of SFP module fitted**

##### Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	8 Unbalanced (BNC) 8 Balanced (25D Type)
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##### Control Interface

GPI	2x Closing contact I/O interface (ST) (rear panel dependant)
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##### Conversion Functions (per channel)

Modes	Up, down, and cross conversion Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)

Map of input to output standards		Output								
		25		50		29.97		59.94		
		576i	1080i	720P	1080P	480i	1080i	720P	1080P	
Input	25	576i	✓	✓	✓	✓	✗	✗	✗	✗
		1080i	✓	✓	✓	✓	✗	✗	✗	✗
	50	720P	✓	✓	✓	✓	✗	✗	✗	✗
		1080P	✓	✓	✓	✓	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✓	✓	✓	✓
		1080i	✗	✗	✗	✗	✓	✓	✓	✓
59.94	720P	✗	✗	✗	✗	✓	✓	✓	✓	
	1080P	✗	✗	✗	✗	✓	✓	✓	✓	

^ Format Conversion I/O Grid

SD input format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9

SD output format Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9

Metadata Closed caption CE608 <> CE708  
Timecode conversions  
Teletext subtitles WST/RDD8 conversion

##### Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat Enable/Blank
Embedded audio	Enable/Blank

##### Audio Routing

Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
AES 1-8	Processed pair 1-8, Tone, Silence Processed pair 1-8, Tone, Silence

##### Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

##### Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps
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##### Tone

Frequency	100Hz to 10kHz in 100Hz steps
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### Technical Specification cont...

#### Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available
Proc amp	
Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps Note: Defaults shown in brackets

#### Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise rejection levels
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#### Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

#### Other Controls

GPI input Low/High Select	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100kHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

#### Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

#### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

#### Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

#### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

#### Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

#### Power Consumption

Module Power Consumption with Fiber	
	18W (A frames)
	18PR (B frames)

## Ordering Information

### Order codes for IQH3B enclosures

#### **IQUDC3300-2B3**

Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

#### **IQUDC3302-2B3**

Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### **IQUDC3303-2B3**

Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

### Order codes for IQH3A/1A enclosures

#### **IQUDC3300-2A3**

Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

#### **IQUDC3302-2A3**

Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference input, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

#### **IQUDC3303-2A3**

Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

### Software Options

**IQOPTM-2NR** - Software option to add noise reduction on both channels

**IQOPTM-2SBK** - Software option to add side-bar keying on both channels

**IQOPTM-2LOG** - Software option to add Logo insertion on both channels

**IQOPTM-2LC** - Software option to upgrade with linear frame rate conversion on both channels

### SFP options

**FC1-13T1** - Single 1310nm fiber Tx

**FC1-13T2** - Dual 1310nm fiber Tx

**FC1-15T1** - Single 1550nm fiber Tx

**FC1-15T2** - Dual 1550nm fiber Tx

**FC1-R1** - Single fiber Rx

**FC1-R2** - Dual fiber Rx

**FC1-13TR** - Fiber transceiver 1310nmTx/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

**Note:** SFP type must be ordered in addition to the module.

# Fiber

The high data rates associated with serial digital links impose their own constraints on the length of cable runs within a facility. Those members of the IQ Modular range that rely on SDI connections have inputs and outputs designed to allow the maximum length of copper cable without signal degradation. However, all copper cabling has its limitations, particularly on large sites, at high data rates or in areas susceptible to electromagnetic interference.

The solution for these most demanding circumstances is fiber optic interfacing. Compared with copper, fiber optic cabling offers secure communications over greatly increased distances with complete immunity from electromagnetic interference and ground loop problems.

The IQ Modular range has both stand-alone and integrated fiber units for single mode transmitter and receiver modules. All are designed for use with SDI signals at 3Gbit/s, 1.5Gbit/s HD and 270 Mbit/s SD data rates, signals are reclocked as standard.

For Related Modules see:  
SD-HD Conversion Section  
Synchronizers Section

The IQGBE40/80 is a range of Gigabit Fiber Media Converter modules with either a 4 or 8 port Ethernet switch occupying either a single or double slot in an IQ modular frame. The RJ45 copper ports are triple speed auto negotiating enabling connectivity to 10, 100 or 1000Base Ethernet devices using standard CAT5 or CAT6 cable assemblies. The fiber interface utilizes an SFP (Small Form factor Pluggable) fiber module receptacle cage compliant with the SFP MSA (Multi Source Agreement). It accepts a single 1000Base SFP Fiber Transceiver with 1310nm singlemode laser transmitter and medium sensitivity receiver. A copper SFP option is also available to make the unit a 4 or 8 port electrical switch if required.

The IQGBE40/80 may be used for direct links to other fiber enabled Ethernet devices or used as part of a system using WDM or CWDM techniques to transport multiple serial digital data streams over a single optical cable.

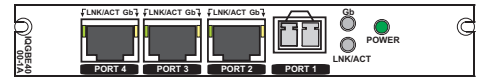
### Features

- 4 or 8 port Ethernet switch including fiber optic I/O
- 10, 100 or 1000 Base Ethernet operation
- Low and high power 1310 nm output wavelengths available, plus copper RJ45 SFP option
- Conforms to IEEE 802.3 wired Ethernet and fibre channel FC-PI-2 Rev. 10.0 standards
- Provides typical fiber link distances of 10 to 55km
- Easily integrates into a CWDM system by using the 'express' channel of the IQCWM10 fiber combiner module
- Front and rear of card power and port status LEDs
- SFP status monitoring via RollCall

### Why should you choose this module?

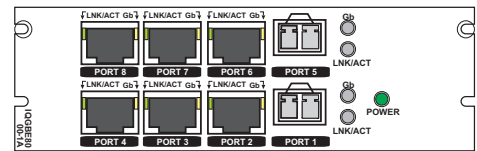
- Adds network based devices into fiber links between facilities or sites
- Include RollCall or other network data into existing video fiber links, when partnering with IQCWM10
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQGBE4000-1A, IQGBE4000-1B**

Ethernet fiber converter with 4 port switch. 3 copper Ethernet I/O, 1 Optical I/O.



#### **IQGBE8000-2A, IQGBE8000-2B**

Ethernet fiber converter with 8 port switch. 6 copper Ethernet I/O, 2 Optical I/O.

### SFP options

**FC1-10KGB-13T** - 1310nm SFP Transceiver, 10km typical on 9/125µm SMF

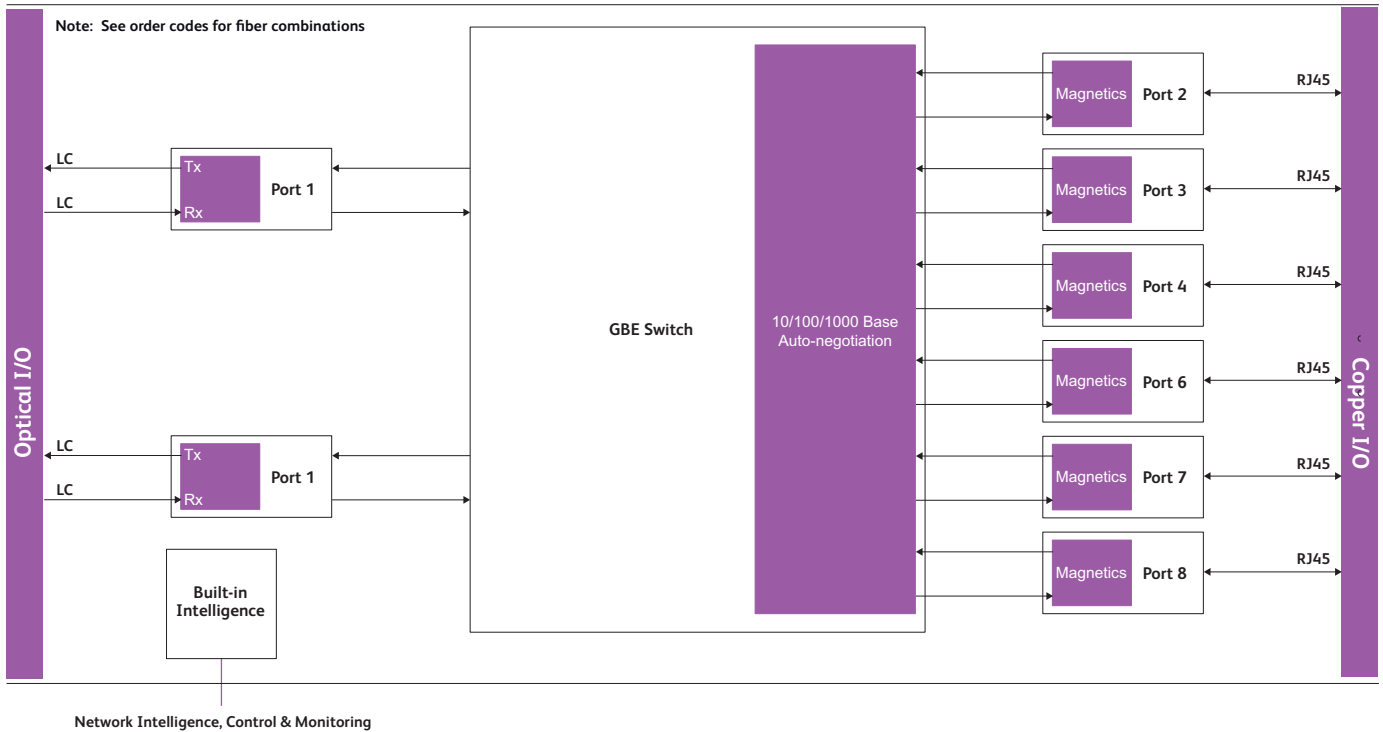
**FC1-40KGB-13T** - 1310nm SFP Transceiver, 55km typical on 9/125µm SMF

**FC1-GBE-CT5** - Copper Ethernet RJ-45 SFP Transceiver

**Note:** SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to Frames and Hardware section.





Block Diagram for IQGBE8000-2A

## Technical Specification

### Inputs and Outputs

#### Signal Inputs and Outputs

Electrical Ethernet	3 (4 with copper SFP) IQGBE40 6 (up to 8 with copper SFPs) IQGBE80
Connector / format	RJ-45, CAT 5, 6, 7 Electrical Interfaces LC singlemode Optical Interfaces
Conforms to	IEEE 802.3 Electrical Interfaces FC-PI-2 Rev. 10.0 Optical Interfaces
Cable length	Up to 100m for 1000Base-T (Electrical Interfaces) Up to 55 km 1000Base-X, depending on SFP and cable (Optical Interfaces)

### Controls

#### Indicators

Indicators	
Power	OK (Green)
CPU	OK (Green flashing)
Per Channel:	
Link	Link Up (Green)
Rate	10Mbps (Yellow), 100Mbps (Green), 1000Mbps (Blue)

### RollCall Functions

Port Status	Link, Speed, and Connector type
Information Window	Port Status
Logging:	Port Logging, Name, Link Status, Speed SFP Logging, Type, Status, Connector, Vendor, Vendor Part Number, Serial Number, Rx Power State, Rx Power, Tx Power State, Tx Power, Wavelength, Laser Bias, Laser Bias State
RollTrack Index	Up to 16 RollTrack destinations
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused, Link Down, Link Up, Speed None/10Mbps/100Mbps/1Gbps, SFP 1/2 Not Fitted, SFP 1/2 Fitted, SFP 1/2 Signal LOST/OK, SFP 1/2 RX Pwr FAIL/OK, SFP 1/2 TX Pwr FAIL/OK, SFP 1/2 TX Bias FAIL/OK
Factory Default	Resets all module settings to factory specified default values
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version, Uptime, Rear ID, Rear Status, Power Usage

### Technical Specification

#### Specifications

##### 1310 nm Standard Haul Transceiver (FGAN FC1-10KGB-13T)

**Tx**

Wavelength	1310 nm
Spectral width (FWHM)	3 nm
Output power	-9.5 dBm (min), -3 dBm max
Extinction ratio	9:1 (min)
Transmission distance	10 km* (at 0.55db/km loss, dispersion limited per FC-PI-2 Rev.10)

\*actual transmission distances depend on type of fiber, data rate and receiver sensitivity as well as other system components.

**Rx**

Average Rx Sensitivity	-19 dBm (max)
Optical Center Wavelength	1265nm – 1600nm
LOS De Asser	-19 dBm
LOS Assert	-30 dBm
LOS Hysteresis	0.5 dB

##### 1310 nm Long Haul Transceiver (FGAN FC1-40KGB-13T)

**Tx**

Wavelength	1310 nm
Spectral width (FWHM)	1 nm
Output power	0 dBm (min), +5 dBm max
Extinction ratio	9:1 (min)
Transmission distance	up to 55 km* (at 0.4db/km loss, dispersion limited per FC-PI Rev.13)

\*actual transmission distances depend on type of fiber, data rate and receiver sensitivity as well as other system components.

**Rx**

Average Rx Sensitivity	-22 dBm (max)
Optical Center Wavelength	1270nm – 1600nm
LOS De Asser	-23 dBm
LOS Assert	-25 dBm
LOS Hysteresis	0.5 dB

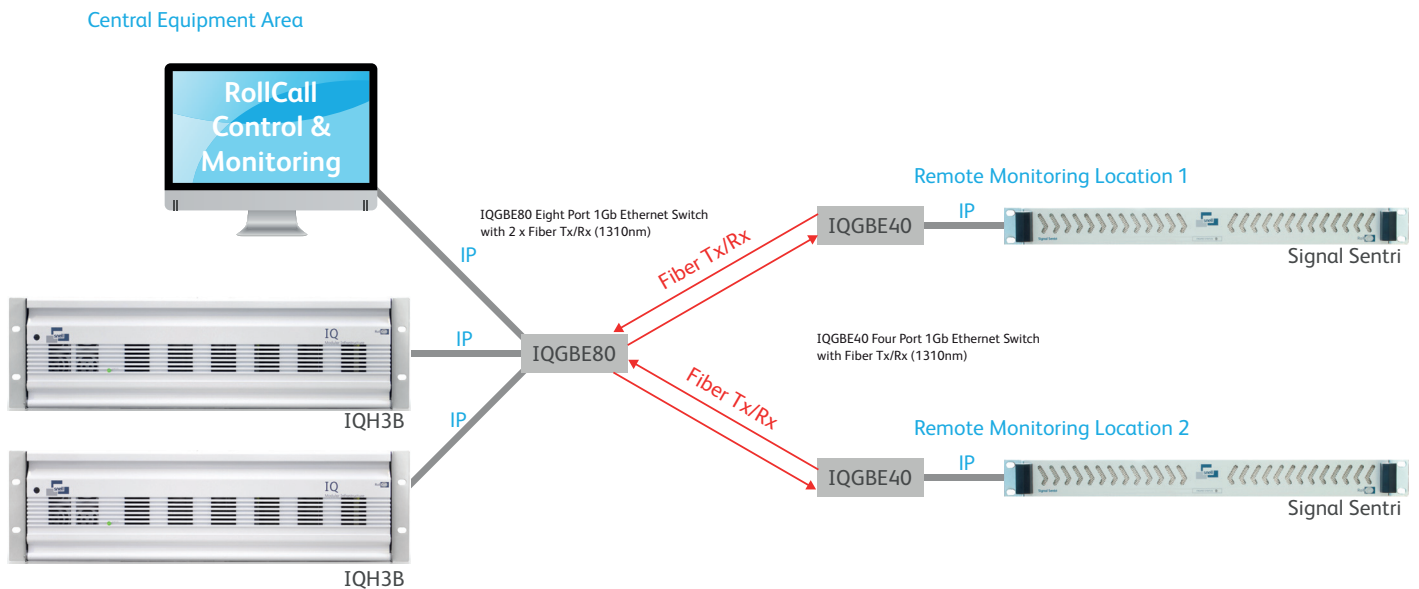
##### Copper Interface Transceiver (FGAN FC1-GBE-CTS)

Standard IEEE 802.3 interface  
Only operates at 1000Base-T

##### Power Consumption

Module power consumption	IQGBE40 - 4W Max
	IQGBE80 - 6.3W Max

### Example Application - Using IQGBE to link communications between central and remote locations:



The IQOTR32 is a user configurable fiber optic transceiver for bi-directional conversion of 3Gbps, HD and SD-SDI signals to 1310nm optical signals. Ideal for mixed coax and fiber workflows, the IQOTR32 allows the user to configure the inputs and outputs to match their infrastructure needs.

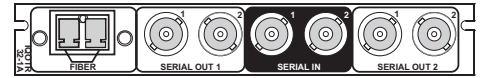
### Features

- Single mode fiber optic receiver and transmitter for 3G/HD/SD-SDI signals
- Independent input selection for each channel, or all outputs follow input mode
- User selectable 3G/HD/SD-SDI outputs for fiber or coax inputs in accordance with SMPTE424M, SMPTE292M and SMPTE259M
- Input wavelength range 1260-1620 nm, output wavelength of 1310 nm
- 2 x GPI/O control interface

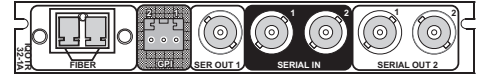
### Why should you choose this module?

- Ideal for applications that require mixed coax and fiber interfacing, to integrate an existing router into a new 3G/HD operation for example
- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- 2 x GPI control interface allows external control of input selection or status reporting
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all-inclusive monitoring and control solution

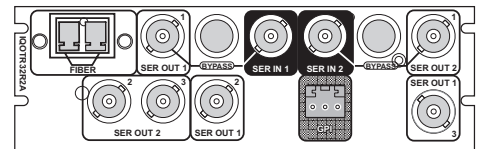
### Inputs & Outputs - IQH3A/1A/3B enclosures



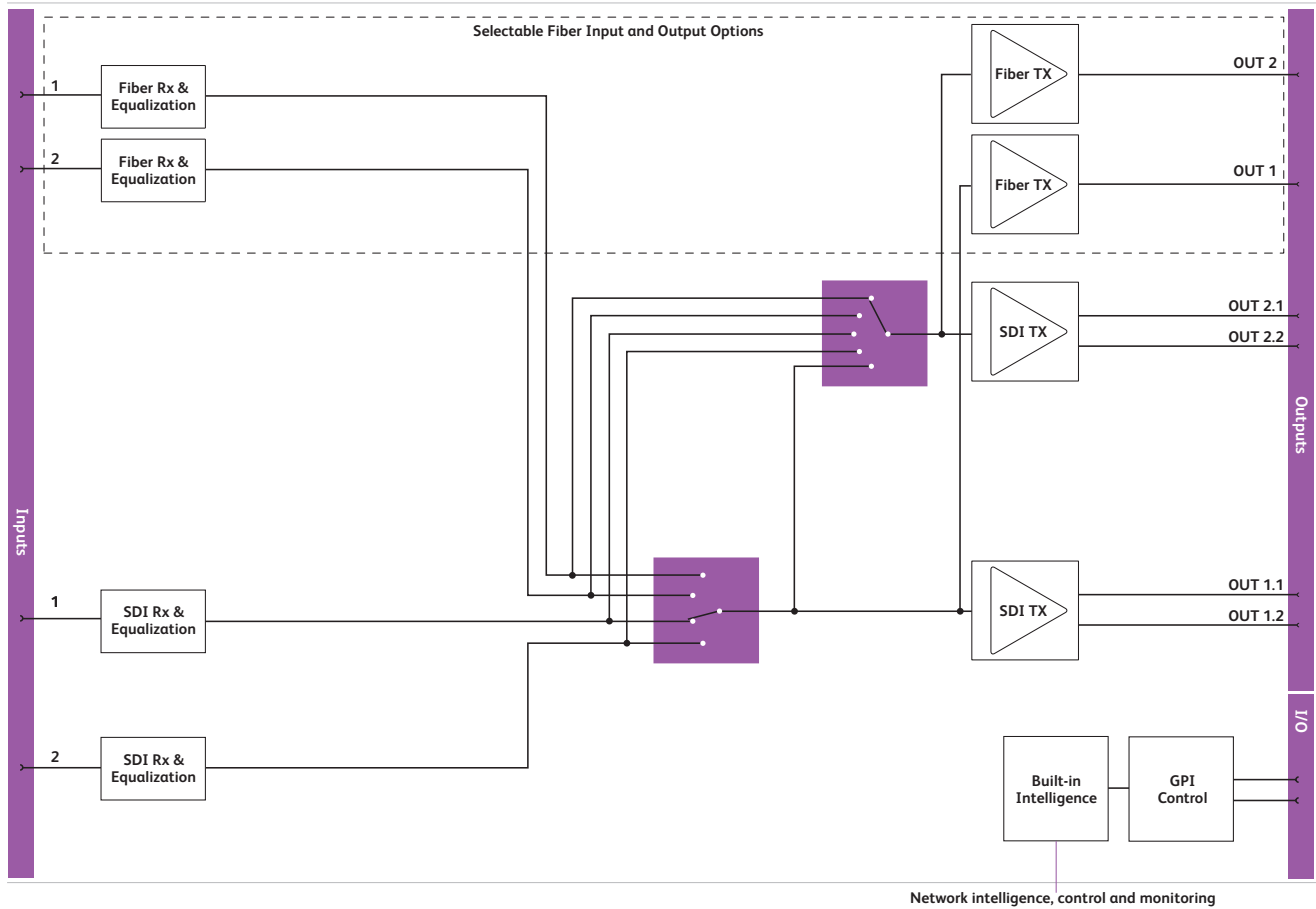
**IQOTR3299-1B3, IQOTR3299-1A3**



**IQOTR32991B3G, IQOTR32991A3G**



**IQOTR32992B3R, IQOTR32992A3R**



Block Diagram for IQOTR3299-1B3

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Electrical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	BNC/ 75 ohm panel jack
Conforms to:	SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)
Inputs	2
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s (40m with relay rear version) Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s (40m with relay rear version) Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s

##### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

##### Signal Outputs

Electrical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	BNC/ 75 ohm panel jack
Outputs	2 x 2 selectable reclocked
Conforms to:	SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

##### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)
Outputs	Up to 2, selectable per Channel

##### Control Interface

GPI I/O	2 x closing contact via screw terminal connector (ST)
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## Technical Specification cont...

**Controls****Indicators**

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Rx 1	OK (Green)

**Controls****Video Controls**

Output 1 Select	Serial 1, Serial 2, RX1, RX2
Output 2 Select	Serial 1, Serial 2, RX1, RX2, Follow Output 1 Selection
Laser Disable	On/Off

**Other Controls**

User Memories	16 x Save, Recall, Rename
GPI Inputs	Memory recall 1 to 16, Memory toggle
GPI Outputs	Input Present or Loss for SDI 1, 2, Fiber 1, 2
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status
RollTrack Index	Up to 70 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Output Rate/Std (1&2), Out 1 Selects (In1 & 2 & Rx1 & Rx2), Out 2 Selects (In1 & 2 & Rx1 & Rx2), Fiber Rx Power OK (1&2), Fiber Rx Power Fail (1&2), Fiber Tx Power OK (1&2), Fiber Tx Power Fail (1&2), Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2)
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

**Specifications**

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

**Optical 1310 nm Tx**

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Optical Return Loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

**Optical Rx**

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

**Video Standards**

1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
750(720)/50p, 750(720)/59p,
1125(1080)/25i, 1125(1080)/29i
625(576)/25i, 525(480)/29i

**Power Consumption**

Module Power Consumption	8.8W Max (A Frames) 8.5 PR (B Frames) 9W (PR) Max with relay bypass
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## Ordering Information

### Order codes for IQH3B enclosures

**IQOTR32992B3R**

Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with relay input bypass. 2 x 3GHD/SD-SDI inputs, 6 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

**IQOTR3299-1B3**

Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI. 2 x 3GHD/SD-SDI inputs, 4 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

**IQOTR32991B3G**

Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with GPIs. 2 x 3GHD/SD-SDI inputs, 3 x 3G/HD/SD-SDI outputs, 2 x GPI, single fiber cage but no SFP fitted.

### Fiber SFP options

**FC1-13T1** - Single 1310nm Tx

**FC1-13T2** - Dual 1310nm Tx

**FC1-15T1** - Single 1550nm Tx

**FC1-15T2** - Dual 1550nm Tx

**FC1-R1** - Single Rx

**FC1-R2** - Dual Rx

**FC1-13TR** - Transceiver 1310nm/Rx

**FC1-HDBT2** - HD-BNC Dual Tx

**FC1-HDBR2** - HD-BNC Dual Rx

**FC1-HDMI2** - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.

### Order codes for IQH3A/1A enclosures

**IQOTR32992A3R**

Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with relay input bypass. 2 x 3GHD/SD-SDI inputs, 6 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

**IQOTR3299-1A3**

Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI. 2 x 3GHD/SD-SDI inputs, 4 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

**IQOTR32991A3G**

Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with GPIs. 2 x 3GHD/SD-SDI inputs, 3 x 3G/HD/SD-SDI outputs, 2 x GPI, single fiber cage but no SFP fitted.

For more details on enclosure types please refer to datasheet IQH3B.



The IQFDA30 provides a HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI input with both SDI and Fiber optic outputs in a single width package. Its 80m 3G, 170m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications. Fiber signals can also be received and distributed as SDI depending on the chosen SFP device type.

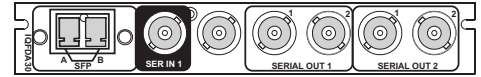
### Features

- Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 170m at 1.5 Gbit/s and 300m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
  - SMPTE 297-2006
- 1310 nm, 1550 nm and CWDM Output wavelengths available
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

- The IQFDA30 is an extremely space efficient hybrid distribution amplifier for mixed fiber and copper workflows
- Useful for critical installation thanks to outstanding input equalization capability

### Order codes



#### IQFDA3000-1A3, IQFDA3000-1B3

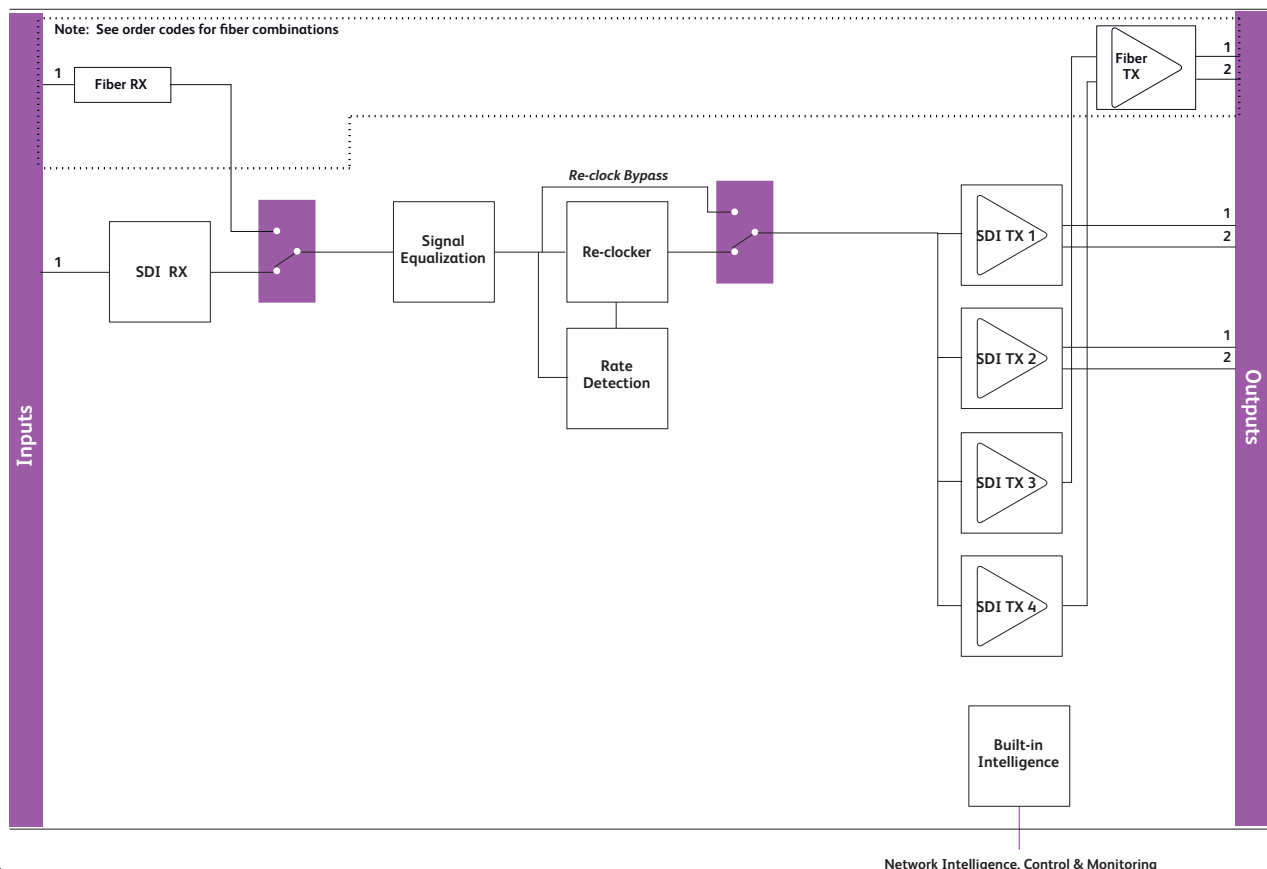
3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O. 1 SDI input, 1 optical input or 2 optical outputs, 4 SDI outputs.

#### Fiber SFP options

- FC1-13T1** with single fiber transmitter (1310nm)
- FC1-13T2** with dual fiber transmitter (1310nm)
- FC1-15T1** with single fiber transmitter (1550nm)
- FC1-15T2** with dual fiber transmitter (1550nm)
- FC1-R1** with single fiber receiver
- FC1-13TR** with single fiber transceiver (1310nm)

**Note: Fiber SFP type must be ordered in addition to the module.**

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQFDA30-1A3

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Input

SDI input	1 x
Input cable length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 170m Belden 1694A @ 1.5 Gbit/s Up to 300m Belden 1694A @ 270 Mbit/s

##### Fiber Signal Input

Inputs	1 x
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

##### Signal Outputs

SDI outputs	up to 4
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##### Fiber Signal Output

Outputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
SFP A	Selected (Green)

##### RollCall Functions

##### Video Controls

Input 1 Format Select	SDI, Rx
Laser Disable	On/Off
Input 1 select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off), Output
Input status	Present, Loss/Unknown, Data Rate

##### Other Controls

User memories	Name, save and recall 16 user memories
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status
Logging	Input 1 Type Input 1 Data Rate Input 1 Present Input 1 Error Input 1 Loss
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 Rx Power High Warning Input 1 Rx Power Low Warning Input 1 Rx Power Measurement
RollTrack Index	Up to 16 RollTrack destinations
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending

##### RollTrack Sources

Unused, Input Present, Input Loss, Input Rate, Fiber Rx Power OK, Fiber Rx Power Fail, Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2), Fiber Tx Bias Low (1&2)

##### Factory Default

Resets all module settings to factory specified default values and clears memories

##### Default Settings

Resets all module settings to factory specified defaults but does not clear memories

##### Restart

Software restart of the module

##### Module Information

\*Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

##### Electrical

3Gbit/s SDI, SMPTE 424M  
1.5Gbit/s HD-SDI, SMPTE 292M

##### Connector / format

270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI  
BNC/ 75ohm panel jack on standard SAM connector panel

##### Return loss

>-15dB (270Mbit/s, 1.5Gbit/s)

##### Output jitter

>-10dB (3Gbit/s)  
SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)  
3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

##### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Optical Return Loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

##### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

##### Power Consumption

Module power consumption	4.5 W Max (A Frames) 4.5 PR Max (B Frames)
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The IQFDA31 provides dual HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI inputs with both SDI and Fiber optic outputs in a single width package. Flexible routing of inputs to outputs allows the module to operate as single or dual channel mixing fiber and copper I/O. Input signal loss detection enables switching from a main to back-up feed automatically, providing emergency changeover functionality. Its 80m 3G, 170m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications.

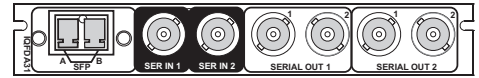
### Features

- Dual channel Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Flexible selection of inputs allows single or dual channel operation
- Input signal monitoring allows auto-changeover functionality to provide emergency switching
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 170m at 1.5 Gbit/s and 300m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
  - SMPTE 297-2006
- 1310 nm, 1550 nm and CWDM Output wavelengths available
- RollCall monitoring allows all signal paths to be managed
- Extremely compact – up to 32 channels in 3RU - for use where space is at a premium

### Why should you choose this module?

- The IQFDA31 is an extremely space efficient hybrid distribution amplifier for mixed fiber and copper workflows
- Useful for critical installation thanks to outstanding input equalization capability
- Can be used for current HD/SD systems that will later upgrade to 1080p50/60 operations

### Order codes



#### IQFDA3100-1A3, IQFDA3100-1B3

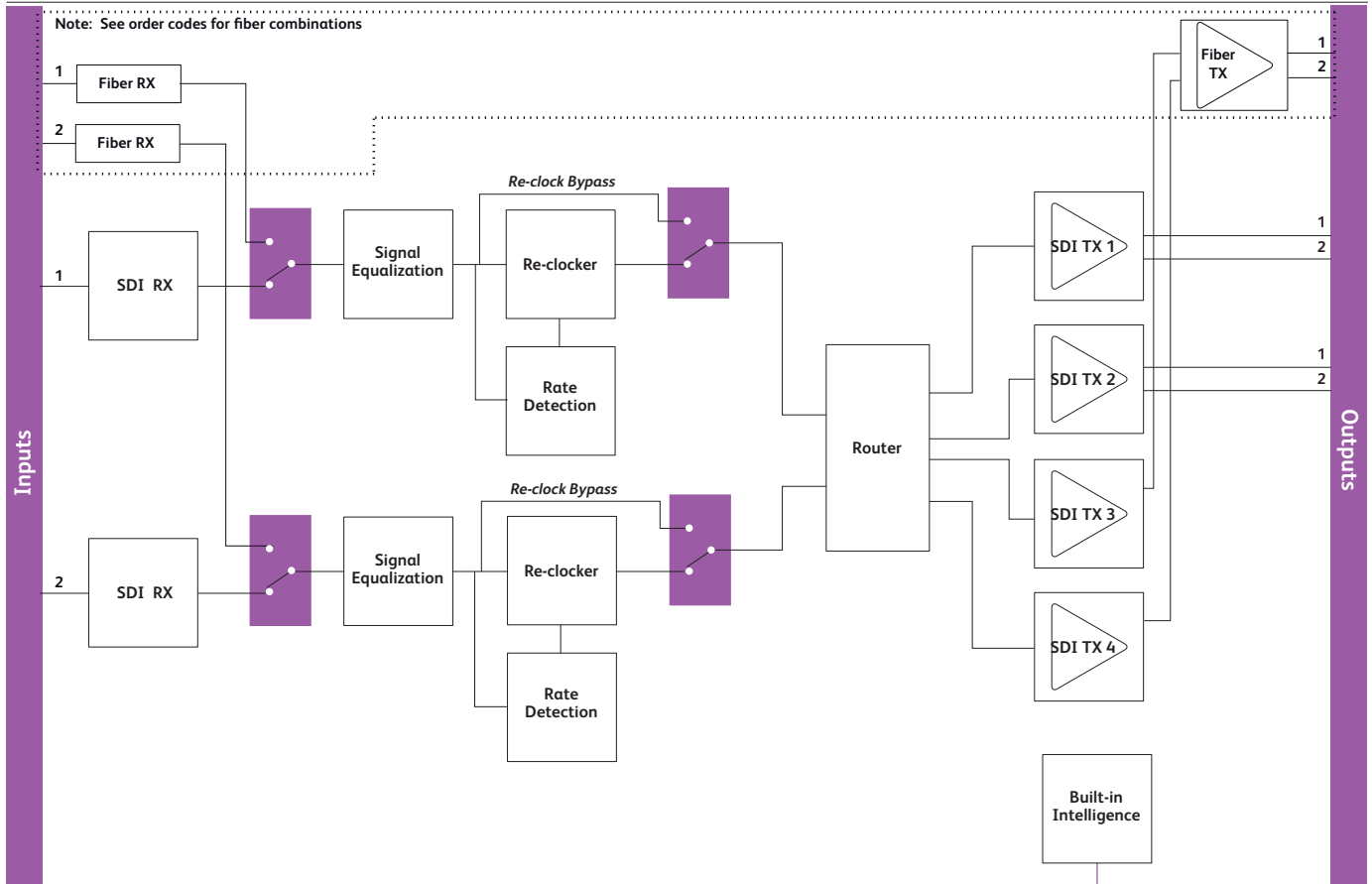
Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O. 2 SDI inputs, 2 Optical input/outputs, 4 SDI outputs selectable per input.

#### Fiber SFP options

- FC1-13T1** with single fiber transmitter (1310nm)
- FC1-13T2** with dual fiber transmitter (1310nm)
- FC1-15T1** with single fiber transmitter (1550nm)
- FC1-15T2** with dual fiber transmitter (1550nm)
- FC1-R1** with single fiber receiver
- FC1-13TR** with single fiber transceiver (1310nm)

**Note: Fiber SFP type must be ordered in addition to the module.**

For more details on enclosure types please refer to Frames and Hardware section.



Network Intelligence, Control & Monitoring

Block Diagram for IQFDA3100-1A3

## Technical Specification

### Inputs and Outputs

#### Signal Input

SDI inputs	2 x
Input cable length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 170m Belden 1694A @ 1.5 Gbit/s
	Up to 300m Belden 1694A @ 270 Mbit/s

Note: When using mixed HD and SD inputs it is recommended that cable lengths do not exceed the HD specification of 140m.

#### Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

### Signal Outputs

SDI outputs up to 12, Group selectable per input

#### Fiber Signal Output

Outputs	Up to 2, selectable per Channel
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

### Control Interface

GPI	Up to 2 x GPI (I/O configurable)
Electrical	TTL compatible, active low driven
Connector / format	BNC/75 ohm panel jack on standard SAM connector panel

### Technical Specification

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
Input 2	OK (Green), Bypass (Orange), Loss (Red)
SFP A	Selected (Green)
SFP B	Selected (Green)

##### RollCall Functions

##### Video Controls

Input 1 Format Select	SDI, Rx
Input 2 Format Select	SDI, Rx
Output 1 Select	Serial 1, Serial 2
Output 2 Select	Serial 1, Serial 2
Output 3 Select	Serial 1, Serial 2
Output 4 Select	Serial 1, Serial 2
Laser Disable	On/Off
Input 1 (2) select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off), Output
Input status	Present, Loss/Unknown, Data Rate

##### Other Controls

User memories	Name, save and recall 16 user memories
Memory Naming	User configurable naming of memories 1 – 16
GPI input	Activates on contact closure: - select config 1 or 2
GPI output	Produces an output for: Config 1 selected, Config 2 selected, Input 1 error, Input 2 error
Information Window	Video Input Status
Logging	Input 1 (2) Type Input 1 (2) Data Rate Input 1 (2) Present Input 1 (2) Error Input 1 (2) Loss
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Index	Up to 16 RollTrack destinations
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2) , Output Rate/Std (1&2), Out 1 Selects (In1 & 2 & Rx1 & Rx2), Out 2 Selects (In1 & 2 & Rx1 & Rx2), Fiber Rx Power OK (1&2), Fiber Rx Power Fail (1&2), Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2), Fiber Tx Bias Low (1&2)
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI BNC/ 75ohm panel jack on standard SAM connector panel
Connector / format	
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

##### Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Optical Return Loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

##### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

##### Power Consumption

Module power consumption	4.5 W Max (A Frames) 4.5 PR Max (B Frames)
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The IQOTX80-84 range converts eight 3G/HD/SD-SDI signals into single mode fiber optic signals. The unit is available in single or dual width versions with either HDBNC or BNC connectors with a range of fiber wavelength transmitters suitable for CWDM applications.

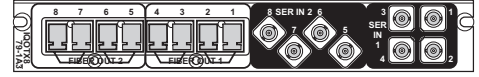
### Features

- Multi-channel Single mode fiber optic Transmitter for 3G/HD/SD-SDI signals
- Output wavelengths from 1270nm to 1610nm suitable for CWDM applications
- Reclocking for 3 Gbit/s, 1.5 Gbit/s HD-SDI and 270 Mbit/s SDI signals, or asynchronous operation for other frequencies (input range 50 Mbit/s to 3 Gbit/s)

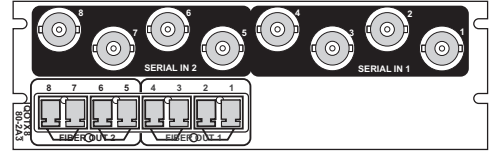
### Why should you choose this module?

- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



IQOTX8079-1A3 - HD-BNC & LC/PC Connectors



IQOTX8080-2A3 BNC & LC/PC Connectors

**IQOTX8079-1A3, IQOTX8080-2A3, IQOTX8079-1B3, IQOTX8080-2B3** 3G/HD/SD-SDI multi-channel fiber transmitter. 8 x 3G/HD/SD-SDI inputs, 8 x 1310nm optical outputs.

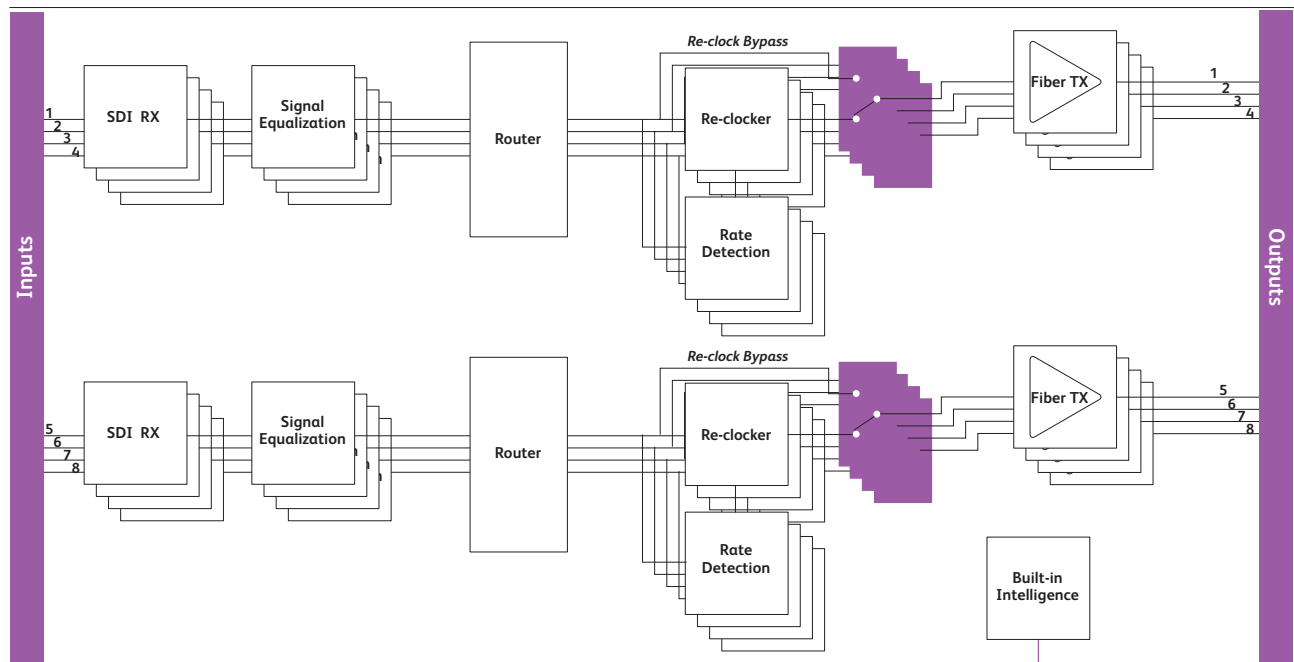
**IQOTX8179-1A3, IQOTX8180-2A3, IQOTX8179-1B3, IQOTX8180-2B3** As IQOTX80 but fitted with 1550nm optical transmitters.

**IQOTX8279-1A3, IQOTX8280-2A3, IQOTX8279-1B3, IQOTX8280-2B3** As IQOTX80 but fitted with 1270-1410nm CWDM optical transmitters.

**IQOTX8379-1A3, IQOTX8380-2A3, IQOTX8379-1B3, IQOTX8380-2B3** As IQOTX80 but fitted with 1470-1610nm CWDM optical transmitters.

**IQOTX8479-1A3, IQOTX8480-2A3, IQOTX8479-1B3, IQOTX8480-2B3** 3G/HD/SD-SDI multi-channel fiber transmitter. 8 x 3G/HD/SD-SDI inputs, 4 x 1310nm and 4 x 1550nm optical outputs.

For more details on enclosure types please refer to Frames and Hardware section.



### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

SDI Inputs	8 x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 140m Belden 1694A @ 1.5 Gbit/s Inputs 1-3, up to 350m Belden 1694A @ 270 Mbit/s Inputs 4-8, up to 160m Belden 1694A @ 270 Mbit/s

##### Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

Outputs	x 8
---------	-----

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1-8	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Bypass (Rate color flashing), Loss (Red)

##### Video Controls

Input 1 - 8 rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1-4 select	Input 1 - 4
Output 5-8 select	Input 5 - 8
Laser Disable	On/Off/Input Error
Input 1 - 4 Configuration	1, 2
Input 5 - 8 Configuration	1, 2
Configuration Rules	Primary Input OK Primary Input Error Secondary Input Error
Mode	Use Config 1 Use Config 2 Use Rules
Delay for Rules Actions	OK Timer 0 - 5s Error Timer 0 - 5s

Input status	Present, Loss, Unknown, Data Rate
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Logging	Input 1 - 8 Identifier Input 1 - 8 Name Input 1 - 8 Type Input 1 - 8 Data Rate Input 1 - 8 Present Input 1 - 8 Error Input 1 - 8 Loss
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Optical Logging	Output 1 - 8 Tx Laser Bias High Warning Output 1 - 8 Tx Laser Bias Current Output 1 - 8 Tx Power Low Warning Output 1 - 8 Tx Power High Warning Output 1 - 8 Tx Power Output 1 - 8 Wavelength Output 1 - 8 SFP State
-----------------	--

RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
--------------------	--

RollTrack Sources	Unused Input 1 - 8 Present Input 1 - 8 Rate Unknown Input 1 - 8 Error Input 1 - 8 Loss Input 1 - 8 3G Input 1 - 8 HD Input 1 - 8 SD Output 1 - 8 Tx Laser Bias High/Low Warning,
-------------------	--

#### Other Controls

User memories	Name, save and recall 16 user memories
---------------	--

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI BNC/ 75ohm panel jack on standard SAM connector panel
Connector / format	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Return loss	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Output jitter	

#### Optical Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s
Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

#### CWDM

Wavelength	1270 - 1610 nm
Spectral width (FWHM)	1 nm
Output power	5 to 0 dBm (2.5 dBm Typ)
Rise and Fall Time	130 ps @ 3Gbit/s 175 ps @ 1.5Gbit/s 300 ps @ 270Mbit/s
Extinction ratio	>9 dB

#### Power Consumption

Module Power Consumption	9.5W Max (A Frames) 8 PR (B Frames)
--------------------------	--



The IQORX80 converts eight single mode fiber optic signals to 3G/HD/SD-SDI signals. The unit is available in single or dual width versions with either DIN1.0/2.3, HDBNC or BNC connectors with a wide band receiver suitable for CWDM applications.

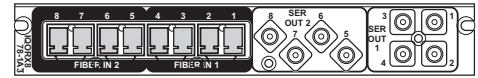
### Features

- Multi-channel Single mode fiber optic receiver for 3G/HD/SD-SDI signals
- Input wavelengths from 1260nm to 1620nm suitable for CWDM applications

### Why should you choose this module?

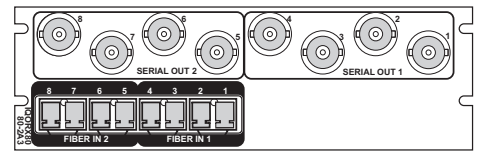
- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### IQORX8079-1A3, IQORX8079-1B3

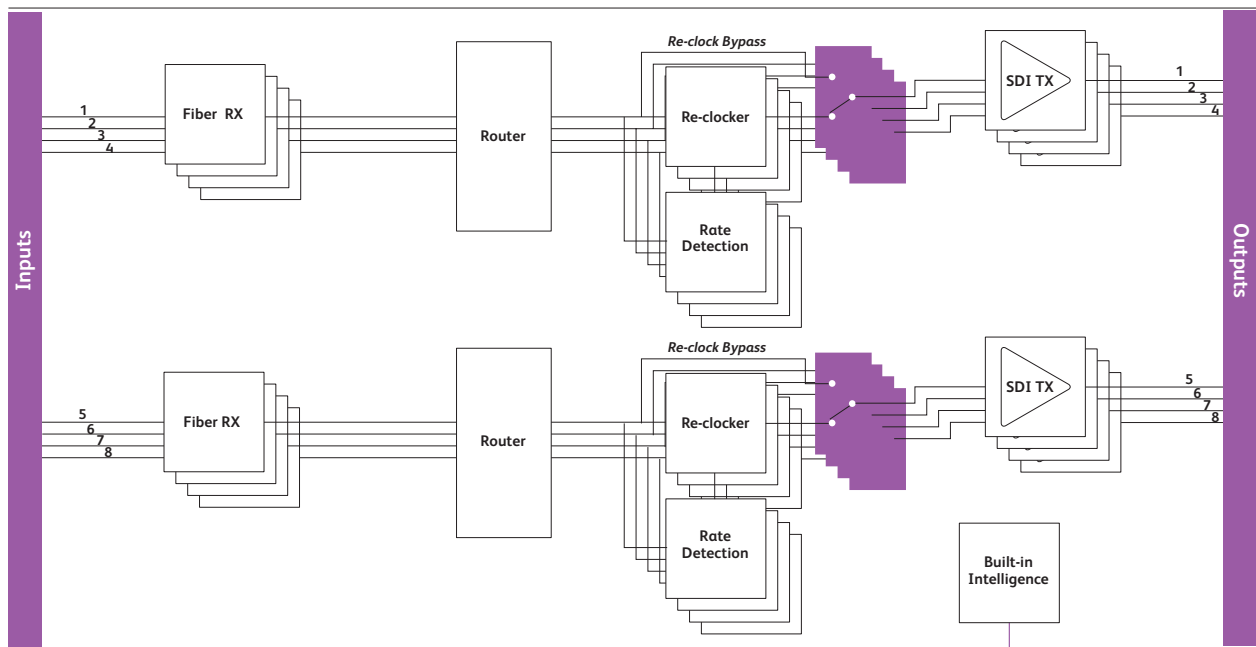
3G/HD/SD-SDI multi-channel fiber receiver. 8 x optical inputs, 8 x 3G/HD/SD-SDI outputs (HD-BNC).



#### IQORX8080-2A3, IQORX8080-2B3

3G/HD/SD-SDI multi-channel fiber receiver. 8 x optical inputs, 8 x 3G/HD/SD-SDI outputs (BNC).

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQORX8080-2A3

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Fiber Signal Input

Inputs	Up to 8
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

##### Signal Outputs

SDI Outputs	x 8
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##### Controls

Indicators	
Power	OK (Green)
CPU	OK (Green flashing)
Input 1-8	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Bypass (Rate color flashing), Loss (Red)

##### Video Controls

Input 1 - 8 rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1-4 select	Input 1 - 4
Output 5-8 select	Input 5 - 8
Output Mute	On/Off
Output Mute on I/P Error	On/Off
Input 1 - 4 Configuration	1, 2
Input 5 - 8 Configuration	1, 2
Configuration Rules	Primary Input OK Primary Input Error Secondary Input Error
Mode	Use Config 1 Use Config 2 Use Rules
Delay for Rules Actions	OK Timer 0 - 5s Error Timer 0 - 5s

Input status	Present, Loss, Unknown, Data Rate
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Logging	Input 1 - 8 Identifier Input 1 - 8 Name Input 1 - 8 Type Input 1 - 8 Data Rate Input 1 - 8 Present Input 1 - 8 Error Input 1 - 8 Loss
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Optical Logging	Input 1 - 8 Rx Power High Warning Input 1 - 8 Rx Power Low Warning Input 1 - 8 Rx Power Measurement Input SFP 1-8 State
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RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
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RollTrack Sources	Unused Input 1 - 8 Present Input 1 - 8 Rate Unknown Input 1 - 8 Error Input 1 - 8 Loss Input 1 - 8 3G Input 1 - 8 HD Input 1 - 8 SD Input 1 - 8 Rx Power High Warning, Input 1 - 8 Rx Power Low Warning,
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##### Other Controls

User memories	Name, save and recall 16 user memories
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##### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

##### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Optical return loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

##### Power Consumption

Module Power Consumption	9.5W Max (A Frames) 7.5 PR (B Frames)
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The IQOTR40-45 range provides bi-directional conversion of four 3G/HD/SD-SDI signals to/from single mode fiber optic signals. The unit is available in single or dual width versions with either HDBNC or BNC connectors with a range of fiber wavelength transmitters suitable for CWDM applications.

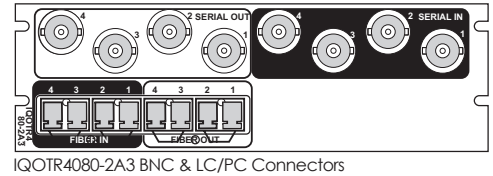
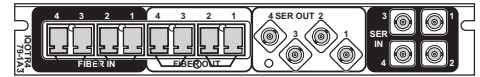
### Features

- Multi-channel Single mode fiber optic receiver for 3G/HD/SD-SDI signals
- Input wavelengths from 1260nm to 1620nm suitable for CWDM applications
- Multi-channel Single mode fiber optic Transmitter for 3G/HD/SD-SDI signals
- Output wavelengths from 1270nm to 1610nm suitable for CWDM applications
- Reclocking for 3 Gbit/s, 1.5 Gbit/s HD-SDI and 270 Mbit/s SDI signals, or asynchronous operation for other frequencies (input range 50 Mbit/s to 3 Gbit/s)

### Why should you choose this module?

- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



**IQOTR4079-1A3, IQOTR4080-2A3, IQOTR4079-1B3, IQOTR4080-2B3** 3G/HD/SD-SDI multi-channel fiber transceiver. 4 x 3G/HD/SD-SDI inputs, 4 x 1310nm optical outputs.

**IQOTR4179-1A3, IQOTR4180-2A3, IQOTR4179-1B3, IQOTR4180-2B3** As IQOTR40 but fitted with 1550nm optical transmitters.

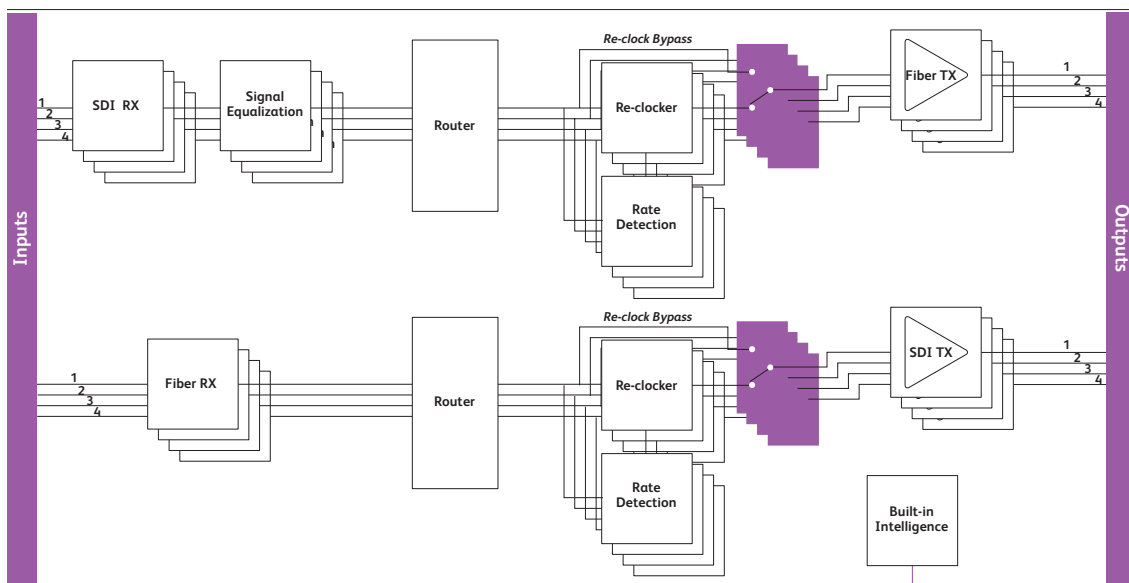
**IQOTR4279-1A3, IQOTR4280-2A3, IQOTR4279-1B3, IQOTR4280-2B3** As IQOTR40 but fitted with 1270-1330nm CWDM optical transmitters.

**IQOTR4379-1A3, IQOTR4380-2A3, IQOTR4379-1B3, IQOTR4380-2B3** As IQOTR40 but fitted with 1350-1410nm CWDM optical transmitters.

**IQOTR4479-1A3, IQOTR4480-2A3, IQOTR4479-1B3, IQOTR4480-2B3** As IQOTR40 but fitted with 1470-1530nm CWDM optical transmitters.

**IQOTR4579-1A3, IQOTR4580-2A3, IQOTR4579-1B3, IQOTR4580-2B3** As IQOTR40 but fitted with 1550-1610nm CWDM optical transmitters.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQOTR4080-2A3

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

SDI Inputs	4 x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 140m Belden 1694A @ 1.5 Gbit/s Inputs 1-3, up to 350m Belden 1694A @ 270 Mbit/s Inputs 4-8, up to 160m Belden 1694A @ 270 Mbit/s

##### Signal Outputs

SDI Outputs	x 4
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##### Fiber Signal Input

Inputs	Up to 4
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI

Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

##### Fiber Signal Output

Outputs	x 4
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI

Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006 SMPTE 424M (HD level A/B) SMPTE 292M (HD) SMPTE 259M-C (SD)

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1-8	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Bypass (Rate color flashing), Loss (Red)

##### Video Controls

Input 1 - 8 rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1-4 select	Input 1 - 4
Output 5-8 select	Input 5 - 8
Laser Disable (Tx)	On/Off/Input Error
Output Mute (Rx)	On/Off
Output Mute on I/P Error (Rx)	On/Off
Input 1 - 4 Configuration	1, 2
Input 5 - 8 Configuration	1, 2
Configuration Rules	Primary Input OK Primary Input Error Secondary Input Error
Mode	Use Config 1 Use Config 2 Use Rules
Delay for Rules Actions	OK Timer 0 - 5s Error Timer 0 - 5s

Input status	Present, Loss, Unknown, Data Rate
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Logging	Input 1 - 8 Identifier Input 1 - 8 Name Input 1 - 8 Type Input 1 - 8 Data Rate Input 1 - 8 Present Input 1 - 8 Error Input 1 - 8 Loss
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#### Optical Logging

Output 1 - 8 Tx Laser Bias High Warning	
Output 1 - 8 Tx Laser Bias Current	
Output 1 - 8 Tx Power Low Warning	
Output 1 - 8 Tx Power High Warning	
Output 1 - 8 Tx Power	
Output 1 - 8 Tx Wavelength	
Input 1 - 8 Rx Power High Warning	
Input 1 - 8 Rx Power Low Warning	
Input 1 - 8 Rx Power Measurement	
Input/Output 1 - 8 SFP State	
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused
Input 1 - 8 Present	
Input 1 - 8 Rate Unknown	
Input 1 - 8 Error	
Input 1 - 8 Loss	
Input 1 - 8 3G	
Input 1 - 8 HD	
Input 1 - 8 SD	
Output 1 - 8 Tx Laser Bias High/Low Warning	
Input 1 - 8 Rx Power High Warning	
Input 1 - 8 Rx Power Low Warning	

#### Other Controls

User memories	Name, save and recall 16 user memories
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#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

#### Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Optical return loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

#### Optical Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s
Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Rise and Fall Time	135 ps @ 3Gbit/s 270 ps @ 1.5Gbit/s 1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

**Technical Specification cont...****CWDM**

Wavelength	1270 - 1610 nm
Spectral width (FWHM)	1 nm
Output power	5 to 0 dBm (2.5 dBm Typ)
Rise and Fall Time	130 ps @ 3Gbit/s 175 ps @ 1.5Gbit/s 300 ps @ 270Mbit/s
Extinction ratio	>9 dB
Link distance	Up to 30 Km @ 270Mbit/s Up to 21 Km @ 1.5Gbit/s Up to 10 Km @ 3Gbit/s

**Power Consumption**

Module Power Consumption	9.5W Max (A Frames) 8 PR (B Frames)
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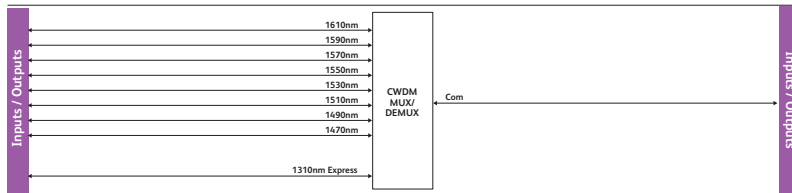
The IQCWM09, IQCWM10 and IQCWM16 are optical Coarse Wave Division Multiplexer/Demultiplexer modules. Occupying just a single slot of an IQ modular frame, the CWDM optical blocks themselves are completely passive devices and there are no other active components on the fully assembled modules. Both types are intended for use with the IQOTX80, IQORX80 and IQOTR40 series Fiber Optical Conversion modules. Connection to all ports are made at the rear of the modules using standard LC receptacles.

The IQCWM09 features 10 bi-directional optical paths (9 dedicated wavelengths + Common). The wavelength range for eight of the nine channels extends from 1470nm to 1610nm with 20nm separation between each. The wavelength for the ninth channel (often referred to as the 'Express Channel') is 1310nm.

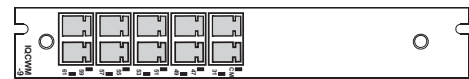
The IQCWM10 has the same features as the IQCWM09 plus an 'Express Port' that includes an Optical Circulator for implementing bi-directional full duplex data transmission (e.g. Ethernet) using a single (1310nm) optical path.

The IQCWM16 features 17 bi-directional optical paths (16 dedicated wavelengths + Common). The 16 dedicated wavelength paths are split into two groups which are separated from the 'Common' port by an optical splitting filter.

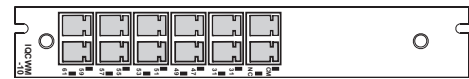
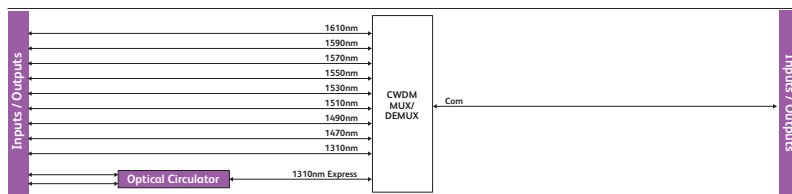
Wavelengths for the first group of eight channels extends from 1610nm to 1470nm and 1410nm to 1270nm for the second group.



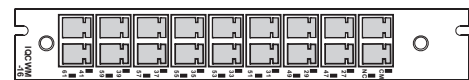
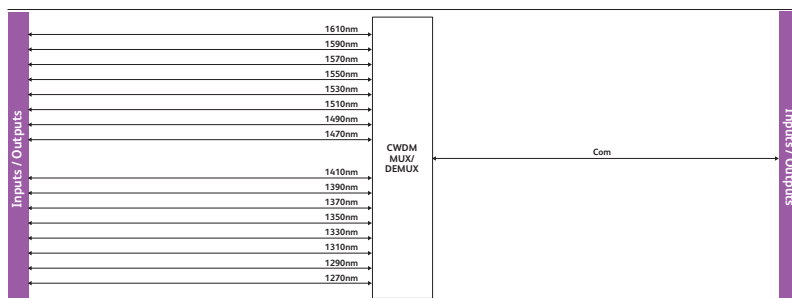
### Order codes



**IQCWM0900-1A** 10 port Fiber CWDM module. 10 bi-directional fiber connections (LC/PC), Common plus 1310, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm optical wavelengths, plus 1310nm express channel.



**IQCWM1000-1A** 11 port Fiber CWDM module. 11 bi-directional fiber connections (LC/PC), 1310nm Optical circulator Channel, Common, 1310, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm optical wavelengths.



**IQCWM1600-1A** 17 port Fiber CWDM module. 17 bi-directional fiber connections (LC/PC), Common plus 1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm optical wavelengths.

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs / Outputs

##### IQCWM09 Optical

1 x Common  
 1 x 1310 nm Express  
 1 x 1470 nm  
 1 x 1490 nm  
 1 x 1510 nm  
 1 x 1530 nm  
 1 x 1550 nm  
 1 x 1570 nm  
 1 x 1590 nm  
 1 x 1610 nm

##### IQCWM10 Optical

1 x Common  
 1 x Optical Circulator  
 1 x 1310 nm  
 1 x 1470 nm  
 1 x 1490 nm  
 1 x 1510 nm  
 1 x 1530 nm  
 1 x 1550 nm  
 1 x 1570 nm  
 1 x 1590 nm  
 1 x 1610 nm

##### IQCWM16 Optical

1 x Common  
 1 x 1270 nm  
 1 x 1290 nm  
 1 x 1310 nm  
 1 x 1330 nm  
 1 x 1350 nm  
 1 x 1370 nm  
 1 x 1390 nm  
 1 x 1410 nm  
 1 x 1470 nm  
 1 x 1490 nm  
 1 x 1510 nm  
 1 x 1530 nm  
 1 x 1550 nm  
 1 x 1570 nm  
 1 x 1590 nm  
 1 x 1610 nm

Connector / format LC singlemode

#### Controls

Card Edge Controls  
 NONE

Card Edge Indicators  
 NONE

#### Specifications

##### IQCWM9/10

Connector Type LC  
 Insertion Loss: < 2.6dB  
 Channel Spacing: 20nm  
 Pass band @ 0.5dB >=13nm  
 Isolation: > 30dB  
 Directivity: > 50dB  
 Return Loss: > 45dB

##### IQCWM16

Connector Type LC  
 Insertion Loss: < 5dB  
 Channel Spacing: 20nm  
 Pass band @ 0.5dB >=14nm  
 Isolation: > 30dB  
 Directivity: > 50dB  
 Return Loss: > 45dB

#### Power Consumption

Module power consumption No power requirement as passive module design

Note: This module can only be installed in IQH3A, IQH3B, IQH1A or IQH1P enclosures. As the card is fitted from the rear of the enclosure at least 435 mm clearance is required behind the enclosure installation.



IQPFS22 and IQPFS24 provide optical 1 x 2 splitting, with either two or four channels per module respectively. The IQ Passive Fiber modules complement the existing range of fiber optic modules and are designed to function alongside the electrical / fiber converters and CWDM functions available. These optical blocks are completely passive devices and there are no other active components present on these modules.

### Features

- Wideband fiber connections (LC/PC), 1260nm-1650nm
- Single common fiber connection (LC/PC) carries all CWDM wavelengths
- Protocol transparent; can be used for network or video applications
- Will distribute DVB-ASI and other wide-band signals
- Supports all data rates for Ethernet (i.e. 10/100/1000/10GBASE) or video (i.e.1080p, HD and SD)
- Can be located anywhere as passive operation requires no power

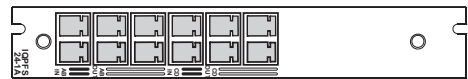
### Why should you choose this module?

- Ideal for distributing fiber signals to multiple locations

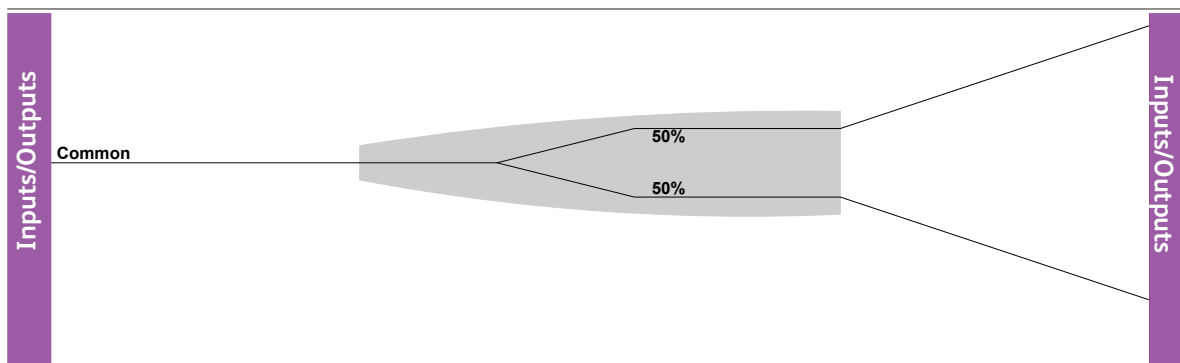
### Order codes



**IQPFS22-1A** Dual 1x2 Fiber Optic Splitter module. Each splitter contains 3 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the two split ports



**IQPFS24-1A** Quad 1x2 Fiber Optic Splitter module. Each splitter contains 3 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the two split ports.



Example of IQPFS22/24 fiber splitter

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs / Outputs

IQPFS22 Optical	6 x 1260nm-1650nm
IQPFS24 Optical	12 x 1260nm-1650nm

Connector / format LC singlemode

#### Controls

Card Edge Controls  
NONE

Card Edge Indicators  
NONE

#### Specifications

Connector Type	LC
Insertion Loss:	< 4.7dB
Return Loss:	> 55dB

#### Power Consumption

Module power consumption No power requirement as passive module design

Note: This module can only be installed in IQH3B/3A/1A/1P enclosures. As the card is fitted from the rear of the enclosure at least 435 mm clearance is required behind the enclosure installation.

IQPFS41, IQPFS42 and IQPFS43 provide optical 1 x 4 splitting, with either one, two or three channels per module respectively.

The IQ Passive Fiber modules complement the existing range of fiber optic modules and are designed to function alongside the electrical / fiber converters and CWDM functions available.

These optical blocks are completely passive devices and there are no other active components present on these modules.

### Features

- Wideband fiber connections (LC/PC), 1260nm-1650nm
- Single common fiber connection (LC/PC) carries all CWDM wavelengths
- Protocol transparent; can be used for network or video applications
- Will distribute DVB-ASI and other wide-band signals
- Supports all data rates for Ethernet (i.e. 10/100/1000/10GBASE) or video (i.e. 1080p, HD and SD)
- Can be located anywhere as passive operation requires no power

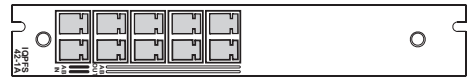
### Why should you choose this module?

- Ideal for distributing fiber signals to multiple locations

### Order codes



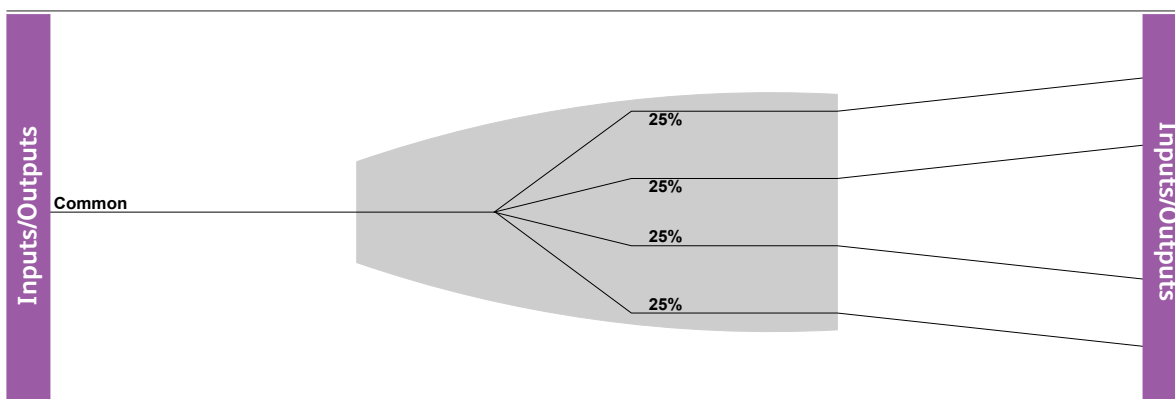
**IQPFS41-1A** Single 1x4 Fiber Optic Splitter module. Each splitter contains 5 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the four split ports.



**IQPFS42-1A** Dual 1x4 Fiber Optic Splitter module. Each splitter contains 5 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the four split ports.



**IQPFS43-1A** Triple 1x4 Fiber Optic Splitter module. Each splitter contains 5 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the four split ports.



^ Example of IQPFS41/42/43 fiber splitter

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs / Outputs

IQPFS41 Optical	5 x 1260nm-1650nm
IQPFS42 Optical	10 x 1260nm-1650nm
IQPFS43 Optical	15 x 1260nm-1650nm
Connector / format	LC singlemode

#### Controls

Card Edge Controls  
NONE

Card Edge Indicators  
NONE

#### Specifications

Connector Type	LC
Insertion Loss:	< 8dB
Return Loss:	> 55dB

#### Power Consumption

Module power consumption  
No power requirement as passive module design

Note: This module can only be installed in IQH3B/3A/1A/1P enclosures. As the card is fitted from the rear of the enclosure at least 435 mm clearance is required behind the enclosure installation.

IQPFC21, IQPFC22 and IQPFC23 provide 2 x 2 optical coupling, with either one, two or three channels per module respectively.

The IQ Passive Fiber modules complement the existing range of fiber optic modules and are designed to function alongside the electrical / fiber converters and CWDM functions available.

These optical blocks are completely passive devices and there are no other active components present on these modules.

### Features

- Wideband fiber connections (LC/PC), 1260nm-1620nm
- Single common fiber connection (LC/PC) carries all CWDM wavelengths
- Protocol transparent; can be used for network or video applications
- Will distribute DVB-ASI and other wide-band signals
- Supports all data rates for Ethernet (i.e. 10/100/1000/10GBASE) or video (i.e. 1080p, HD and SD)
- Can be located anywhere as passive operation requires no power

### Why should you choose this module?

- Ideal for distributing fiber signals between multiple locations

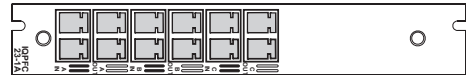
### Order codes



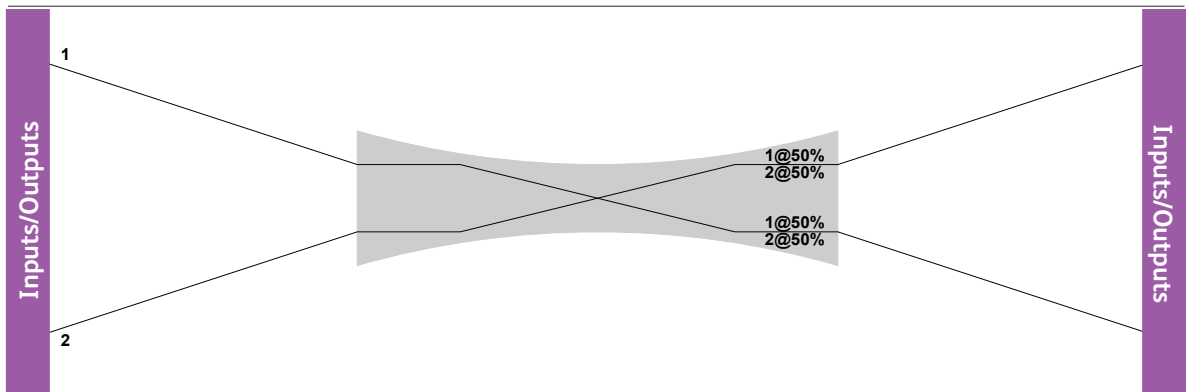
**IQPFC21-1A** Single 2x2 Fiber Optic coupler module. Each coupler contains 4 wideband (1260-1620nm) bi-directional fiber connections (LC/PC). Two ports either side of the coupler



**IQPFC22-1A** Dual 2x2 Fiber Optic coupler module. Each coupler contains 4 wideband (1260-1620nm) bi-directional fiber connections (LC/PC). Two ports either side of the coupler.



**IQPFC23-1A** Triple 2x2 Fiber Optic coupler module. Each coupler contains 4 wideband (1260-1620nm) bi-directional fiber connections (LC/PC). Two ports either side of the coupler.



^ Example of IQPFC21/22/23 fiber coupler

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs / Outputs

IQPFC21 Optical	4 x 1260nm-1620nm
IQPFC22 Optical	8 x 1260nm-1620nm
IQPFC24 Optical	12 x 1260nm-1620nm
Connector / format	LC singlemode

#### Controls

##### Card Edge Controls

NONE

Card Edge Indicators

NONE

#### Specifications

Connector Type	LC
Insertion Loss:	< 4.7dB
Return Loss:	> 55dB

#### Power Consumption

Module power consumption	No power requirement as passive module design
--------------------------	---

Note: This module can only be installed in IQH3B/3A/1A/1P enclosures. As the card is fitted from the rear of the enclosure at least 435 mm clearance is required behind the enclosure installation.

# Synchronizers

Facilities using externally-sourced contributions will have to ensure these are accurately synchronized, since such sources are not usually locked to the local reference and can therefore be unstable. IQ Modular synchronizers enable incoming signals to be accurately genlocked - easily and cost effectively.

Using broadcast quality 10-bit data paths throughout, the range offers a choice of SD/HD/3G-SDI frame synchronizers with embedded audio passing, processing and channel shuffling capability. Synchronizers with audio embedding capability are also available making an ideal incoming lines solution for SDI and AES signals.

For Related Modules see:  
SD-HD Conversion Section  
IQMUX33 in Embedded Audio  
IQDMX33 in Embedded Audio



The IQSYN33 provides frame synchronization for SD, HD and 3Gbps digital video signals. Capable of handling 2 SDI inputs with auto-change over capability and referencing to a SD bi-level or HD tri-level reference, the IQSYN33 also includes audio processing features such as audio channel routing, mixing, delay and level adjustment.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

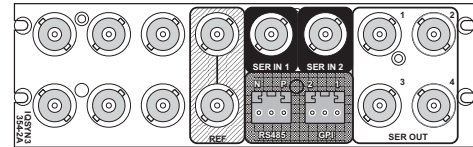
### Features

- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection, ancillary data blanking and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Dual SDI inputs with auto switching on pre-defined input errors
- Video proc. features include: gain, offset, hue, horizontal picture enhancement and RGB gamut legalization
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- In-built test pattern generator and 2 x 16 character caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

### Why should you choose this module?

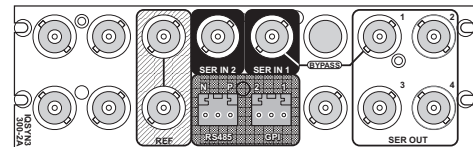
- Frame synchronization and advanced audio processing provides a powerful solution for embedded workflows
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQSYN3354-2A3, IQSYN3354-2B3**

HD/SD-SDI Frame synchronizer with advanced audio processing. 2 SDI inputs, reference loop, 4 SDI outputs, 2 GPI/Os



#### **IQSYN3300-2A3, IQSYN3300-2B3**

HD/SD-SDI Frame synchronizer with advanced audio processing. 2 SDI inputs, reference loop, 4 SDI outputs, 2 GPI/Os, relay input bypass

### Hardware and Software Options

**IQOPTA-DBD** Hardware option to add a single Dolby E/D decoder

**IQOPTA-DBE-D** Hardware option to add a single Dolby D encoder

**IQOPTA-DBE-E** Hardware option to add a single Dolby E encoder

**IQOPTA-LOUD51** Software option to add Linear Accoustic AeroMax 5.1 loudness processing

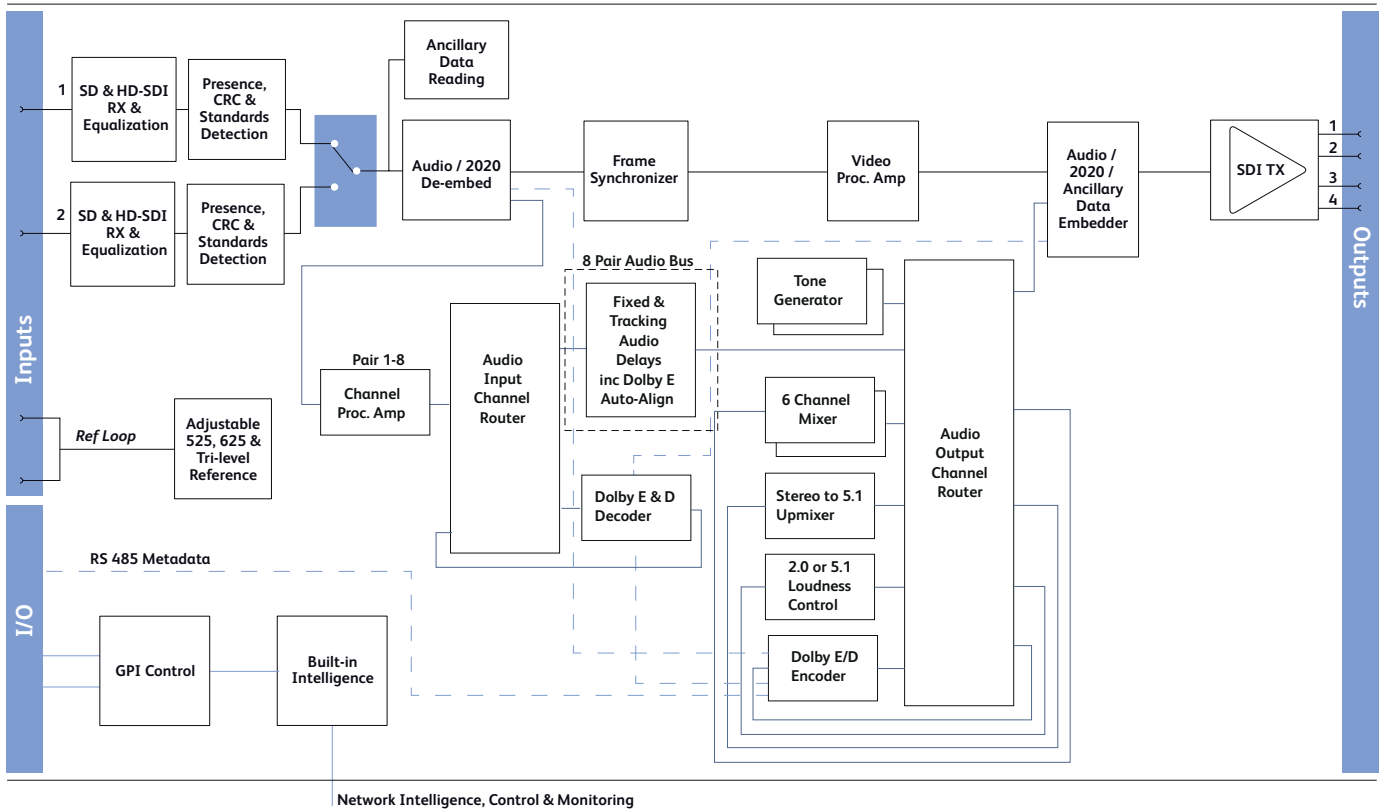
**IQOPTA-LOUDA2** Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

**IQOPTA-LOUDB2** Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

**IQOPTA-UPMIX** Software option to add Linear Accoustic UPMAX stereo to 5.1 upmixing

**IQOPTA-CC** Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.



Block Diagram for IQSYN3354-2A3

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 180m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M

#### Video Signal Outputs

SDI Outputs	x 4
Control Interface	
GPI	2 x Closing contact I/O interface (ST)

### Controls

#### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	$\pm 1$ H in pixel clock steps
Genlock V-Phase	$\pm 1$ F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 26 frames @ 1080 59p 0 – 21 frames @ 1080 50p 0 – 26 frames @ 1080 29i 0 – 21 frames @ 1080 25i 0 – 54 frames @ 720 59p 0 – 44 frames @ 720 50p 0 – 147 frames @ 525 29i 0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

#### Video Controls

Input Select	Input 1, Input 2
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Default Video Output Type	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Plug, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Mode	Input, Black, Freeze, Pattern
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	$\pm 200$ mV in steps of 1 mV
Hue Adjust	$\pm 180^\circ$ in steps of $1^\circ$
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position

#### Audio Controls

##### Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity	
Inv	On/Off

### Technical Specification cont...

Channel 1 – 16 Gain +12 dB to -80 dB in 0.1 dB steps  
 Pair 1 – 8 Stereo Link channel pairs

#### Audio Out - Embedded

Group 1 -4 Enable On/Off  
 Audio Out-embed Pairs 1-8  
 Channel 1 – 16 Mute On/Off  
 Channel 1 – 16 Gain +12 dB to -80 dB in 0.1 dB steps  
 Pair 1 – 8 Stereo Link channel pairs

#### Audio Routing

Input routing Bus 1-8 Disembed 1-8, Dolby Decoder 1-5\*  
 Output routing embed 1-8 Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix\*/Loudness\*, Dolby Encoder 1-5\*

\* indicates optional feature

#### Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video On/Off  
 Bulk Manual Delay -520ms to +2s in 0.17ms steps  
 Coarse Manual Pair Delay ±1.995s in 1ms steps  
 Fine Manual Delay ±5ms in 0.02ms steps  
 Fast or smooth delay limit 5ms to 80ms  
 Silence Detect -2dBFS to -128dBFS in steps of 1dB  
 Signal Overload Detect -1dBFS to -127dBFS in steps of 1dB  
 Warning Timer 1 to 20 seconds in steps of 1 second  
 Tone Frequency 1-8 100Hz to 16kHz in 100Hz steps

#### Dolby Decoder

Decoder Source Disembed 1-8  
 Detection Mode Auto, dolby E, Dolby D, Mute  
 AES Channel Select Channel 1, 2  
 PCM Latency Single Frame, Minimum  
 Dolby D listening mode Full, EX, 3 Stereo, Phantom, Stereo, Mono  
 Dolby D Dynamic Range Line, RF, Bypass  
 Metadata Program 1, 2  
 Input Metadata RS-485, SMPTE 2020

#### Dolby Encoder

Encoder Source Bus 1-8, Upmix\*/Loudness\*, Silence  
 Metadata Source Prog 1-8, Internal  
 Internal Metadata control Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)  
 Mode Encode, Pass through  
 Bit Depth Dolby D - 32 bit, 16 bit  
 Dolby E - 20 bit, 16 bit  
 SRC Enable, Disable  
 Stream Number 0-6

#### Audio Mixers

Mixer Select 1-4, Downmix 1 -2  
 Source select Bus 1-8, Silence, Tones 1-8  
 Source Gain 12dB to -80dB in 0.1dB steps  
 Mixer 1-4 invert On/Off  
 Mixer 1-4, Downmix 1-2 Mute On/Off  
 Downmix Configuration LoRo, 4 level selections

#### Other Controls

GPI input High/Low Select Input 1-2, Black, Freeze, Pattern, User Memories 1-16,  
 High/Low  
 GPI Level Invert High/Low  
 GPI Output Source Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16  
 RS-485 Port Output Dolby decoder, Output SMPTE 2020 Disembed, Input  
 SMPTE 2020 embedder Dolby decoder, RS-485 Port, SMPTE 2020 Disembed  
 User Memories Save/Recall/Rename  
 Memory Naming User configurable naming of Memories 1 – 16  
 Information Window Video Input Status, Audio Input Status, EDH/CRC & ANC Status  
 EDH/CRC Reset Resets all EDH/CRC counts  
 RollTrack Index Allows up to 70 destinations  
 RollTrack Sources Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing  
 Factory Default Resets all module settings to factory specified default values and clears memories  
 Default Settings Resets all module settings to factory specified defaults but does not clear user memories  
 Restart Software reset of module  
 Module Information Reports: Product Name  
 Software version, Serial number, Build number, KOS version, PCB version, Licensed Options  
 Input Names 19 Character editable name

### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Power Consumption

Module Power Consumption	19W Max (A Frames) 18 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

The IQSYN50 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 32-channel embedded audio handling. Including 2 SDI inputs, agile synchronization and audio firewall features means the IQSYN50 is ideal for general incoming line applications. A video proc. amp provides complete control over the video levels and RGB gamut legalization, along with tracking audio delay to avoid disturbance around synchronizer wrap points.

### Features

- 3G/HD/SD-SDI synchronizer with additional video delay up to 30 frames and auto change-over on signal loss conditions
- Agile, router switching tolerant synchronizer operation with precision genlock adjustment allowing you to time any SDI signal to pixel accuracy with greater tolerance to mis-timed upstream SDI switching (up to +/- 10 lines adjustable), ensuring disturbance free picture output
- Firewall for video and processed PCM audio to provide a continuous uninterrupted output
- Reference input capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal chassis reference bus
- Connectivity: 2 SDI inputs, up to 4 SDI outputs, reference input, 8 x GPI/O, relay bypass version with input 1 bypassed to output 1 on power loss or card removal
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE 292M/274M/296M
  - SD-SDI to SMPTE 259M-C
  - Fiber to SMPTE 297-2006C
- Able to pass all ancillary data with independent HANC and VANC blanking control (VANC blanking is input line selectable)
- Card Edge LED status indicators and input loss detection – default output of black/pattern/freeze/mute, and input SDI CRC, EDH and ANC data checking and reporting
- Video proc. amp controls including video gain, offset, hue, RGB gamut legalization and Y/C picture position adjustment
- Processing for up to 32 channels (at 3G-SDI) of embedded audio present on the incoming SDI stream to remove audio disturbance around the synchronizer wrap and drop points, and provide tracking audio delay
- Any group of embedded audio may be passed unchanged, processed or blanked, and handles Dolby E and PCM audio present in the same group
- In-built test pattern generator, 2 caption generators and audio tone generator
- 16 x user memories, save/recall/rename, and up to 8 GPI/O ports
- Full RollCall and SNMP compatibility, with up to 70 RollTrack destinations and triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

### Options

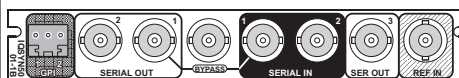
- Single mode fiber optic transmitter and receiver options -including SFP HDMI output version to provide a built-in local monitoring output - rear option

### Order codes



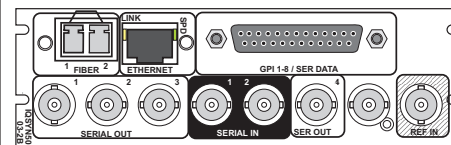
#### IQSYN5000-1B3

3G/HD/SD-SDI Synchronizer. 2 inputs, 4 outputs, External and internal frame reference selection, 2 GPI/Os.



#### IQSYN5001-1B3

3G/HD/SD-SDI Synchronizer with relay input bypass. 2 inputs, 4 outputs, External and internal frame reference selection, 2 GPI/Os.



#### IQSYN5003-2B3

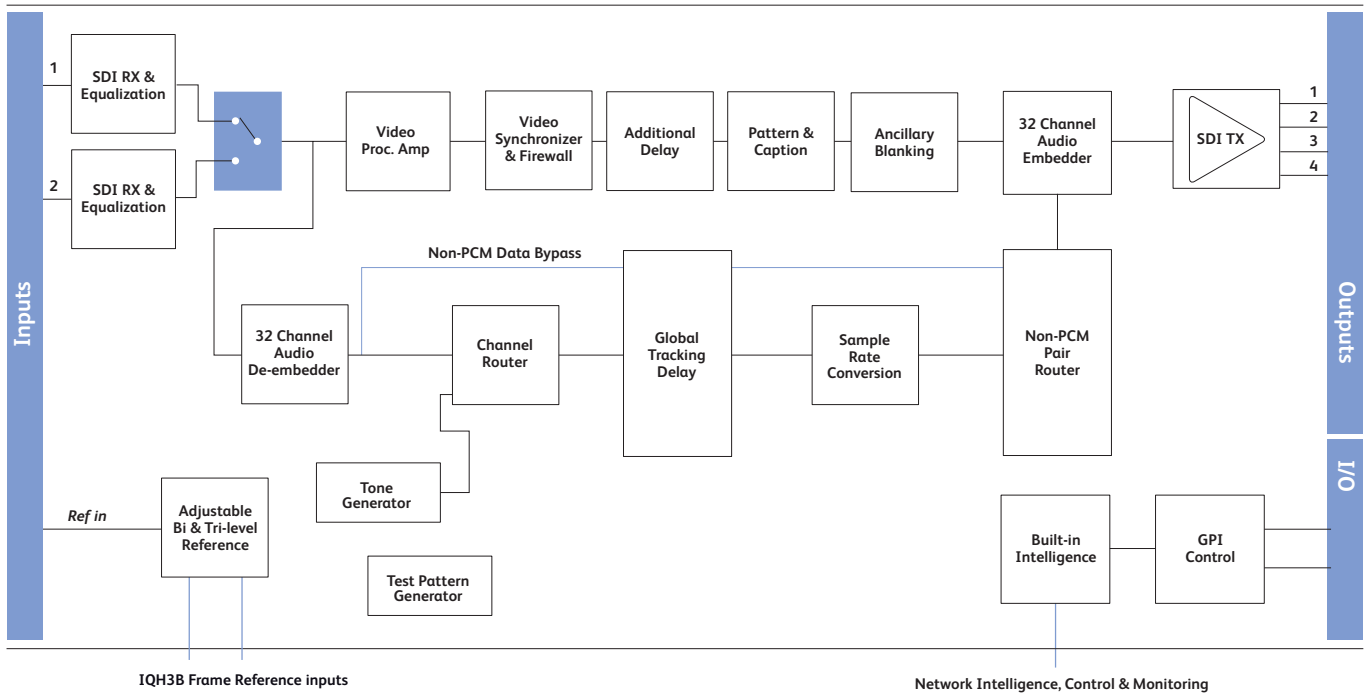
3G/HD/SD-SDI Synchronizer. 2 inputs, 4 outputs, External and internal frame reference selection, Fiber SFP Tx/Rx, Media biometric Ethernet port, 8 GPI/Os.

### Fiber SFP options

- FC1-13T1** - Single 1310nm Tx
- FC1-13T2** - Dual 1310nm Tx
- FC1-15T1** - Single 1550nm Tx
- FC1-15T2** - Dual 1550nm Tx
- FC1-R1** - Single Rx
- FC1-R2** - Dual Rx
- FC1-13TR** - Transceiver 1310nm/Rx
- FC1-HDBT2** - HD-BNC Dual Tx
- FC1-HDBR2** - HD-BNC Dual Rx
- FC1-HDMI2** - HDMI Tx with 2m cable
- CWDM Tx - Wavelengths available on request

**Note:** Fiber SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to Frames & Hardware section



Block Diagram for IQSYN5000-1B3

The IQSYN30 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio processing. Including 2 SDI inputs with clean-switching functionality, agile synchronization and flexible audio processing features the IQSYN30 is ideal for general incoming line applications. A video proc. amp provides complete control over the video levels, and audio processing features include Dolby E auto-alignment, audio delay, gain, invert and channel level routing.

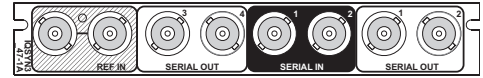
### Features

- 3G/HD/SD-SDI synchronizer with up to 9 frames of video delay
- Processing for 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Loop-through reference capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal IQH3B chassis reference bus
- Precision genlock adjustment allowing you to time any SDI signal accurately
- Agile, router switching tolerant synchronizer operation
- Firewall for video and processed PCM audio to provide a continuous uninterrupted output
- Audio proc-amp features including channel level (Sub-frame) routing, adjustable delay, independent gain, invert and mute control
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Can be used as a video delay, up to 9 frames
- Video proc. amp controls including video gain, offset and hue
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Agile video synchronization provides greater tolerance to mis-timed upstream SDI switching (up to +/- 5 lines), ensuring disturbance free picture output
- Flexible handling of input loss – pass through or switch to black/patterns/freeze - and integrated video/audio controls make the IQSYN30 an ideal processor for incoming lines applications
- Dual inputs allow main and redundant feeds to terminate in a single synchronizer
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### IQSYN3047-1A3

3G/HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 inputs, 4 outputs, loop-through reference.

#### IQSYN3047-1B3

HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 inputs, 4 outputs, External loop-through and internal frame reference selection



#### IQSYN3000-1A3

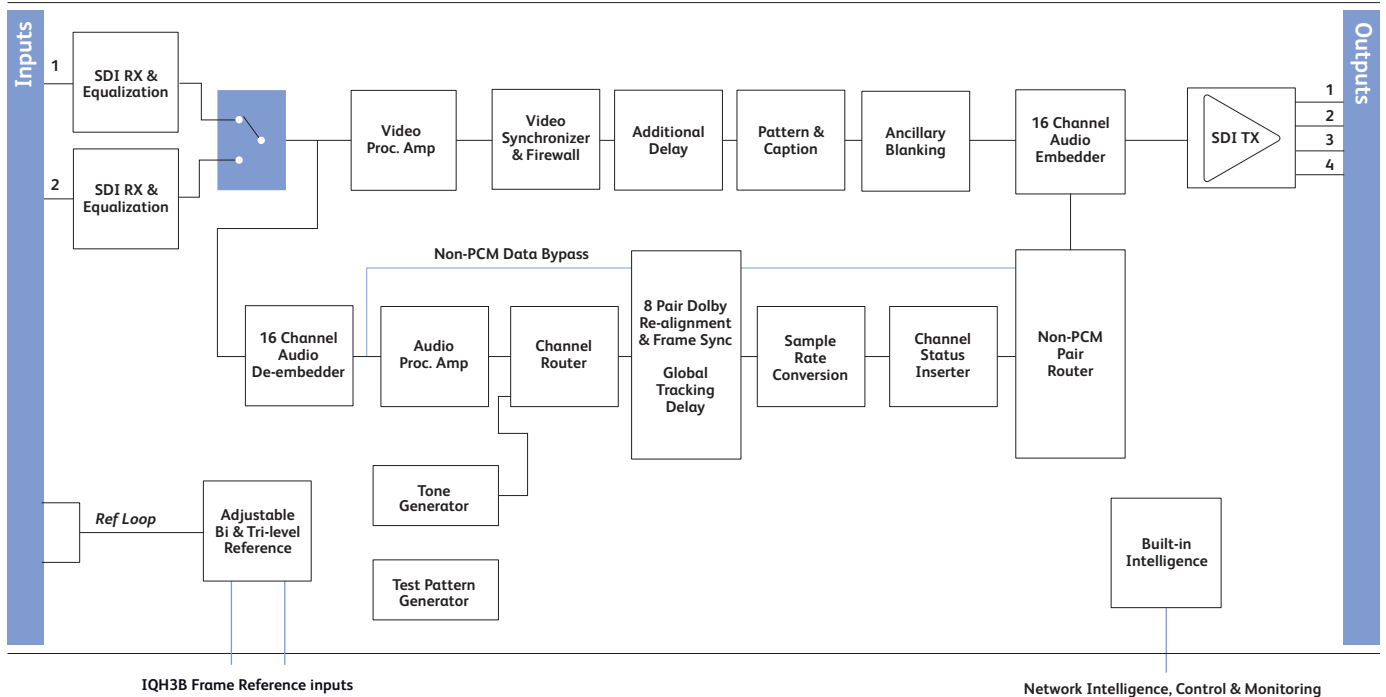
3G/HD/SD-SDI Synchronizer with Embedded Audio Processing and relay input bypass. 2 inputs, 4 outputs, loop-through reference.

#### IQSYN3000-1B3

HD/SD-SDI Synchronizer with Embedded Audio Processing and relay input bypass. 2 inputs, 4 outputs, External loop-through and internal frame reference selection

For more details on enclosure types please refer to Frames and Hardware section.





Block Diagram for IQSYN3047-1A3

## Technical Specification

### Inputs & Outputs

#### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M

#### Signal Outputs

SDI Outputs	x 4
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### Controls

#### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

#### Controls

##### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 9 F

### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

### Technical Specification cont...

#### Audio Controls

##### Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	De-embed 1-16, Tone, Silence
Pair 1 to 8 Source R	De-Embed 1-16, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

##### Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
Variable Audio Delay Control Source	Internal, Manual

#### Dolby-E

Dolby-E Auto Alignment	On/Off
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#### Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

#### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

#### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Audio Delay (1&2), Input Present (1&2), Input Loss (1&2), Input Select (1&2), Output Rate/Std, Output Freeze, Output Unfreeze, Output Pattern On, Output Pattern Off, Output Black On, Output Black Off, Output Caption On, Output Caption Off, Inp1 Embedded Audio (Pairs 1-8) PCM, Inp1 Embedded Audio (Pairs 1-8) Non-PCM, Inp1 Embedded Audio (Pairs 1-8) Loss, Inp1 Embedded Audio (Pairs 1-8) V Bit, Reference OK & Loss, Inp2 Embedded Audio (Pairs 1-8) PCM, Inp2 Embedded Audio (Pairs 1-8) Non-PCM, Inp2 Embedded Audio (Pairs 1-8) Loss, Inp2 Embedded Audio (Pairs 1-8) V Bit.
Information Window	Video Input Status, Audio Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories

Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Minimum Delay (Reference lock or free run)	SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us
Typical delay (Input lock)	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Synchronizer Hysteresis Window	5 µs
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us
<b>Power Consumption</b>	
Module Power Consumption	8.5W Max (A Frames) 8.5 PR (B Frames)

The IQSYN31 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio processing. Enabling powerful processing features with a space efficient two channels per card the IQSYN31 is ideal for incoming line applications where space is at a premium. A video proc. amp provides complete control over the video levels, and audio processing features include Dolby E auto-alignment, audio delay, gain, invert and channel level routing.

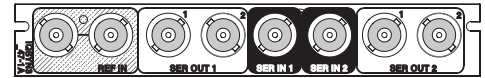
### Features

- Dual channel 3G/HD/SD-SDI synchronizer with up to 3 frames of video delay per channel
- Processing for 16 channels of embedded audio present on each incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Loop-through reference capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal IQH3B chassis reference bus
- Precision genlock adjustment allowing you to time any SDI signal accurately
- Agile, router switching tolerant synchronizer operation
- Firewall for video and processed PCM audio to provide a continuous uninterrupted output
- Audio proc-amp features including channel level (Sub-frame) routing, adjustable delay, independent gain, invert and mute control
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Can be used as a video delay, up to 3 frames per channel
- Video proc. amp controls including video gain, offset and hue
- In-built test pattern and tone generators for each channel
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Compact multi-channel synchronizer for lines in applications where space is at a premium, in OB environments for example
- Agile video synchronization provides greater tolerance to mis-timed upstream SDI switching (up to +/- 5 lines), ensuring disturbance free picture output
- Advanced embedded audio processing features, such as Dolby E synchronization, provide ideal solutions for today's complex system requirements
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution
- Available as an SD/HD version with simple software upgrade path to 3G, providing a cost effective future proof solution

### Order codes



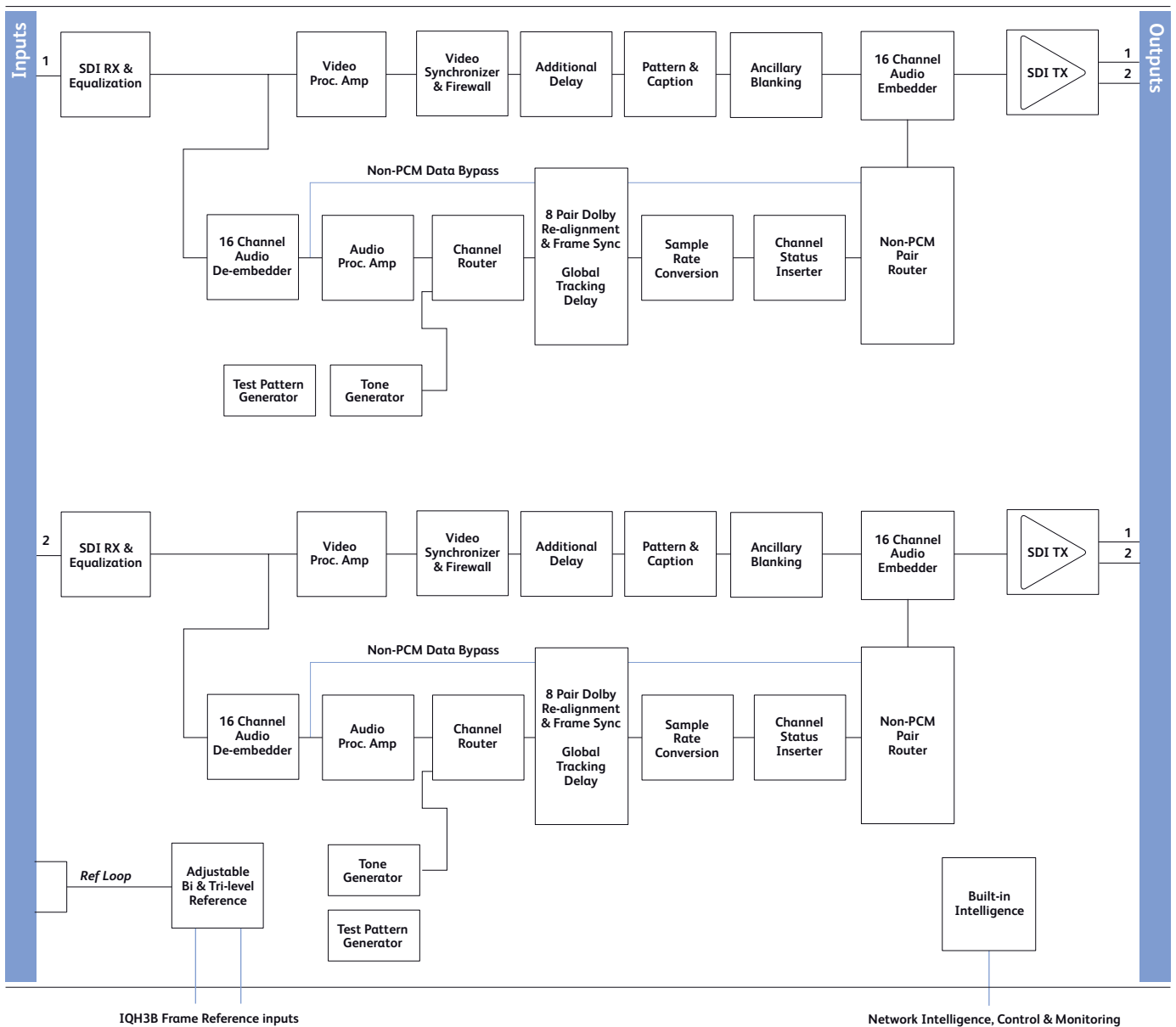
#### **IQSYN3147-1A3**

Dual channel 3G/HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 outputs per input, reference loop-through.

#### **IQSYN3147-1B3**

Dual channel 3G/HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 outputs per input, external loop-through and internal frame reference selection.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQSYN3147-1A3

### Technical Specification

#### Inputs & Outputs

##### Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 200m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M

##### Signal Outputs

SDI Outputs x 2 per Channel

##### Controls

##### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

### Technical Specification cont...

#### Controls

##### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 3 F

##### Video Controls (per Channel)

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
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##### Default Video Output

Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data, including audio)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

##### Audio Controls (per Channel)

Embedder Assignment	
Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

##### Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
Variable Audio Delay Control Source	Internal, Manual, RollTrack (14 to 17)

#### Dolby-E

<b>Dolby-E Auto Alignment</b>	On/Off
Tone	
Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

#### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

#### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Audio Delay (1&2), Input Present (1&2), Input Loss (1&2), Input Select (1&2), Output Rate/Std (1&2), Output Freeze(1&2), Output Unfreeze(1&2), Output Pattern On(1&2), Output Pattern Off(1&2), Output Black On(1&2), Output Black Off(1&2), Output Caption On(1&2), Output Caption Off(1&2), Inp1 Embedded Audio (Pairs 1-8) PCM, Inp1 Embedded Audio (Pairs 1-8) Non-PCM, Inp1 Embedded Audio (Pairs 1-8) Loss, Inp1 Embedded Audio (Pairs 1-8) V Bit, Reference OK & Loss, Inp2 Embedded Audio (Pairs 1-8) PCM, Inp2 Embedded Audio (Pairs 1-8) Non-PCM, Inp2 Embedded Audio (Pairs 1-8) Loss, Inp2 Embedded Audio (Pairs 1-8) V Bit.
Information Window	Video Input Status, Audio Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bilevel/ Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 35 dB to 30 MHz

#### Video Standards

1125(1080)/50p (A & B), 1125(1080)/59p (A & B)  
750(720)/50p, 750(720)/59p,  
1125(1080)/25i, 1125(1080)/29i  
625(576)/25i, 525(480)/29i

#### Minimum Delay (Reference lock or free run)

SD: 67us  
HD: 28us  
3G-A: 15us  
3G-B: 25us

#### Typical delay (Input lock)

SD: 70us  
HD: 38us  
3G-A: 19us  
3G-B: 40us

#### Synchronizer Hysteresis Window

5  $\mu$ s

#### Embedded audio handling

HD - 24-bit synchronous  
48 kHz to SMPTE 299M  
SD - 20-bit synchronous  
48 kHz to SMPTE 272M-A

#### Embedded Audio Delay

Minimum (PCM) 2 ms  
Maximum (non-PCM)  
SD: 67us  
HD: 28us  
3G-A: 15us  
3G-B: 25us

#### Power Consumption

Module Power Consumption  
11W Max (A Frames)  
10.5 PR (B Frames)

The IQSYN11 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s. Includes dual channel independent SDI input processing functionality and agile synchronization. A video proc amp provides complete control over the video levels. The IQSYN11 is a space efficient low cost solution that includes core functionality.

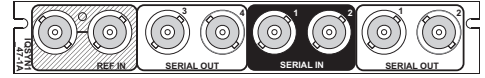
### Features

- Dual channel 3G/HD/SD-SDI synchronizer providing two independent video path processing on one card with up to 3 frames of video delay per channel
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Loop-through reference capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal IQH3B chassis reference bus
- Select either external input reference direct or from internal IQH3B chassis reference bus
- Precision genlock adjustment allowing you to time any SDI signal accurately
- Agile, router switching tolerant synchronizer operation
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Edit function for static/animated caption overlay on Video output
- Can be used as a video delay, up to 3 frames per channel
- Video proc. amp controls including video gain, offset and hue, including Y/C picture position adjustment
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Agile video synchronization provides greater tolerance to mis-timed upstream SDI switching (up to +/- 5 lines), ensuring disturbance free picture output
- Dual channel, flexible handling of input loss – pass through or switch to black/patterns/freeze - and integrated video controls make the IQSYN11 an ideal synchronizer for incoming lines applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQSYN1147-1A3**

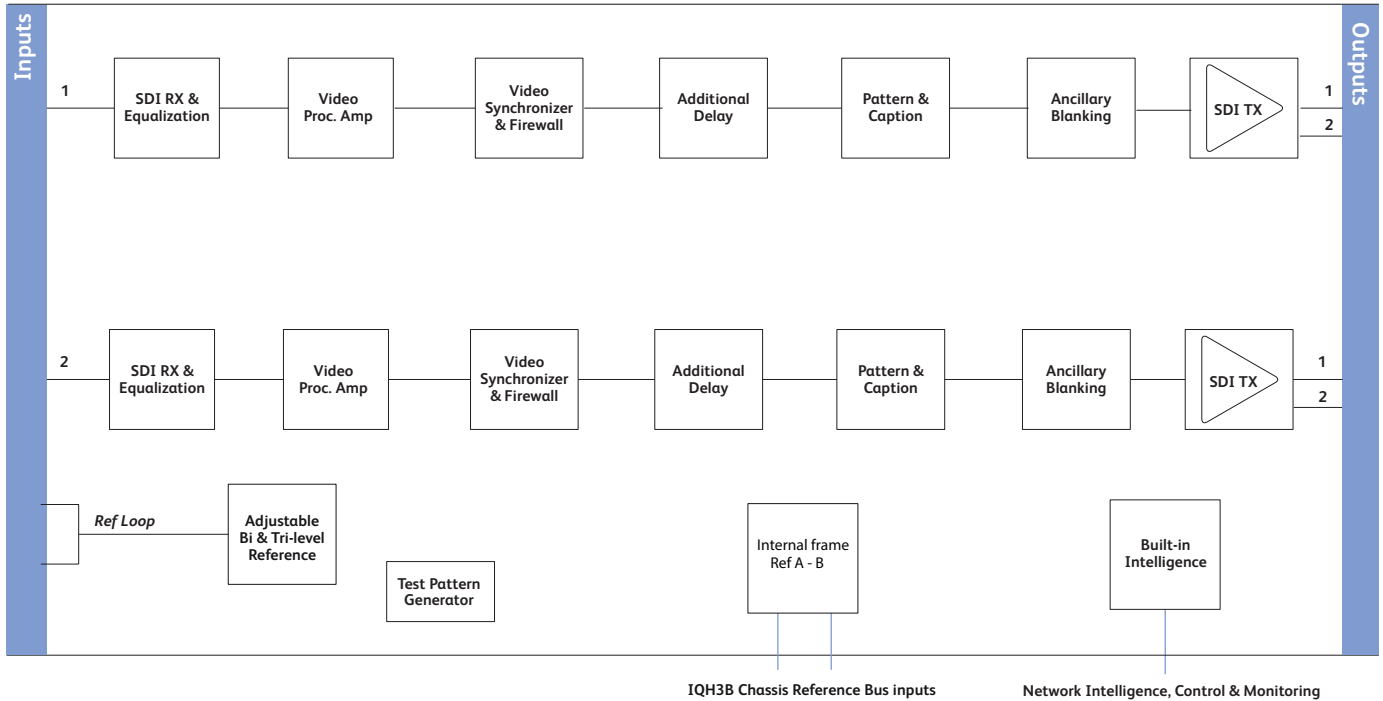
3G/HD/SD-SDI Synchronizer. 2 inputs, 4 outputs, reference loop-through.

#### **IQSYN1147-1B3**

3G/HD/SD-SDI Synchronizer. 2 inputs, 4 outputs, external loop-through and internal frame reference selection

For more details on enclosure types please refer to Frames / enclosures section.





Block Diagram for IQSYN1147-1A

## Technical Specification

### Inputs & Outputs

#### Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 200m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M

#### Signal Outputs

SDI Outputs	x 2 per Channel
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### Controls

#### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

### Controls

#### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 3 F
Reference select mode	Module input reference or IQH3B Reference A or B

#### Video Controls (per channel)

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
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#### Default Video Output

Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i

#### Input Select

Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21, 22, 283, 284 in 525)

#### HANC Data

ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB

### Technical Specification cont...

Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available
Animated Caption	Slow,medium,fast
HANC Data	Blank HANC Removes all HANC data. Note this includes removal of embedded audio
VANC Data	Blank VANC
Other Controls	
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status, Reference Statu
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Minimum Delay (Reference lock or free run)	SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us
Typical delay (Input lock)	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Synchronizer Hysteresis Window	5 µs
<b>Power Consumption</b>	
Module Power	
Consumption	8.5W Max (A Frames) 8.5 PR (B Frames)

A powerful SDI video synchronizer with advanced embedded audio handling and gamut legalizer. Video and audio proc. amp capability makes this module ideal for SD lines-in applications. All audio manipulation is at the channel-level suiting discreet surround and multi-lingual use. Its firewall capability ensures continuous audio and video output even when the input signal fails. A dual SDI input allows this synchronizer to take signals from either of two paths. This can be used for handling main and redundant feeds, or it can be used with a composite decoder such as the IQDEC02 to provide analog and digital alternative inputs.

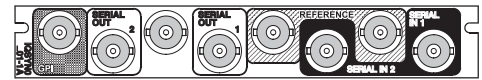
## Features

- SDI synchronizer with tracking audio delay
- Sophisticated color Gamut legalizer
- Separate Cb and CbCr gain adjustment
- Separate Cb and Cr offset adjustment
- Hue adjustment
- Firewall for video and processed PCM audio to provide a continuous output
- Transparent to Dolby E / non-PCM audio
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and processes audio for re-insertion at 20 bits
- Eight channel audio processor with channel level manipulation
- Channel level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Video proc. amp (gain, saturation, black level)
- Audio proc. amp and delay
- Flexible audio delay including common fixed delay and tracking delay
- Tracking audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Second input allows split operation, with video taken from one input and embedded audio from the other
- Up to 3 frames of video delay in delay mode
- RollCall control and monitoring compatible

## Why should you choose this module?

- For all general SDI synchronization tasks including embedded audio handling
- An ideal lines input processor with full control of audio and video parameters, including proc. amp and delays
- To ensure the signal remains within the confines of the RGB gamut space a sophisticated legalizer operates on both luminance and chrominance to give the closest legal color under all conditions
- Allows an SDI router to provide split audio and video operation by taking video from one input and embedded audio from the other

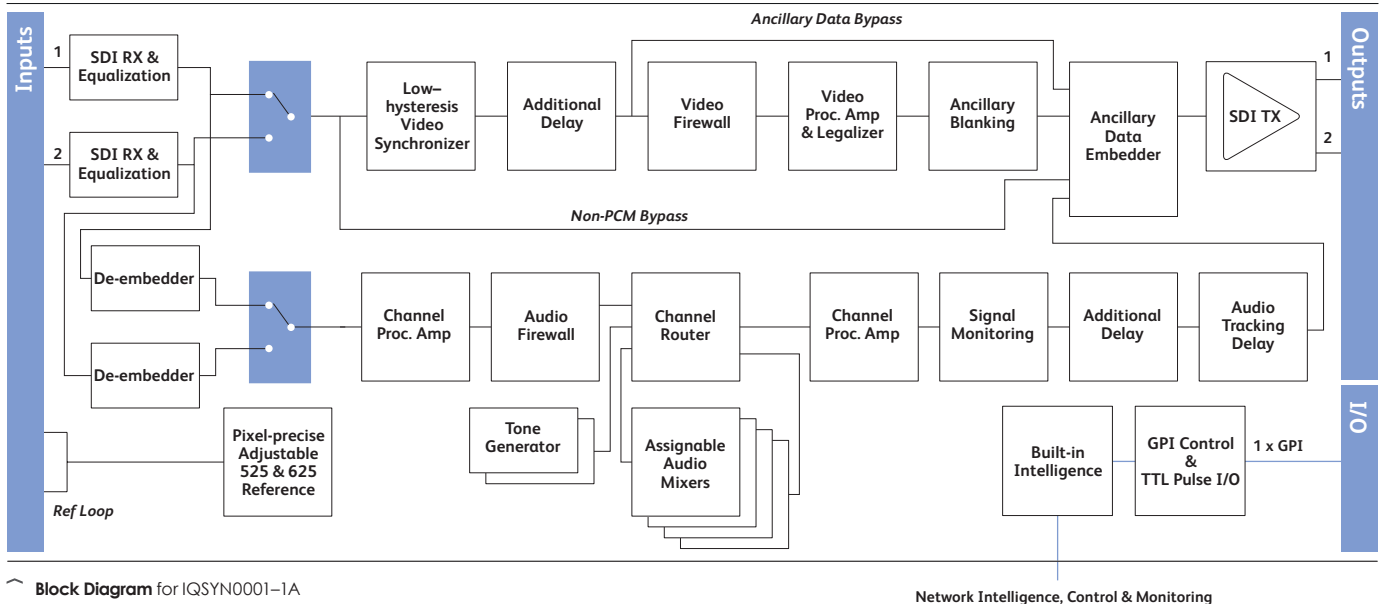
## Order codes



### IQSYN0001-1A

SDI frame synchronizer with embedded audio processing. 2 SDI inputs, 2 SDI outputs, analog reference loop-through.

For more details on enclosure types please refer to Frames and Hardware Section.



### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Digital video Standards	Up to 2 x SDI (BNC) SMPTE 259M-C-1997, SMPTE 272M-A-1994
Video reference	Composite video (BNC)

##### Signal Outputs

Digital video Standards	SDI x 2 SMPTE 259M-C-1997, SMPTE 272M-A-1994
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##### Control Interface

GPI	1 x Closing contact I/O interface
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#### Card Edge and RollCall Controls

##### Card Edge Controls

NONE

##### Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow (Unused input not at current operating standard)

##### Reference loss

CPU running / power	One green LED, flashing = OK
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#### RollCall Functions

##### Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input side control proc. – audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded channels. ±18 dB in 0.1 dB steps
Channel routing	Output channels routed from SDI 8 embedded channels from any group, test tone and silence
Output side control proc. – gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. ±18 dB in 0.1 dB steps
Lock	Control to select the clock source from the output side of the synchronizer – Video, Input 1, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

##### Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

### Technical Specification cont...

#### Video Controls

Select primary input	1/2
RGB legalizer	On/ Off
Black level	±100 mV in 0.8 mV steps
Hue adjust	±180°
Cb gain offset	±1 dB in 0.1dB steps
Cb offset	±50 mV in 1 mV steps
Cr offset	±50 mV in 1 mV steps
Y min/max clipper value	-50 mV to +50 mV and 635 mV to 765 mV in 1 mV steps
C min/max clipper value	±300 mV to ±398 mV in 1 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 µs in 37 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video horizontal delay	+1 Line in 37 ns steps
Video vertical delay	+1 Frame in 1 line steps
Video delay frames	0 to +2 frames

#### Other Controls

Pass vertical data	On / Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns initial settings to default
Pattern select	100% Bars / 75% Bars / Multiburst / Black / Animated Bars / Pulse + Bar Name, clear, save and read 8 user memories
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze/ run through
Default audio output	Silence
Caption output	On / Off
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function / polarity

#### Reporting \* also Logged

EDH (for selected input)	*EDH Error / *Error-Time / *EDH Error-Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC Error / ANC Error-Seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only

#### RollTrack Input

Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed
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#### RollTrack Output

Delay	Current video/audio delay
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence]
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625 Input 1: Input Present, Input Missing, Standard 525, Standard 625 Input 2: Input Present, Input Missing, Standard 525, Standard 625 GPI 1 Low, High, Inactive
Embedded audio state	De-embed 1-8 Lost/Present

#### Specifications

Video internal processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than -15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 Vp-p ± 3 dB
Minimum delay	6 µs
Synchronize hysteresis window	0.5 - 1 µs
Delay (synchronize mode)	Sync delay +0, 1 or 2 Frames
Delay (delay mode)	6 µs - 3 Frames +5.5 µs

#### Power Consumption

Module power consumption	7 W max (A Frames) 6 PR (B Frames)
--------------------------	---------------------------------------

A powerful SDI video synchronizer with 4 x AES/EBU stream embedder and advanced embedded audio handling. Ideal as a general digital ingest module where any digital audio source signal can be catered for, even combinations of embedded and external digital audio. All audio manipulation is at the channel-level suiting discreet surround and multi-lingual use. Its firewall capability ensures errors or interruptions in the input signal are not passed through to the output. In addition to its tracking audio delay, it also has a bulk audio delay feature. To complete the delay flexibility, it has a built-in video delay that can be used to adjust to match external audio processing delays, such as that from a Dolby E encoder. A dual SDI input allows the unit to take signals from either of two paths. This can be used for handling main and redundant feeds, or it can be used with a composite decoder such as the IQDEC02 to provide analog and digital alternative inputs. The second input also allows split operation, with video taken from one input and embedded audio from the other.

As a further function, this module can be used to provide separate audio and video routing in an embedded SDI environment. In this way, two levels of a SDI router feed separately the video and audio to a single destination. In this case however, the normal mode of operation can be supplemented by a small AES router allowing a few destinations at a time to have a mix capability between multiple audio sources.

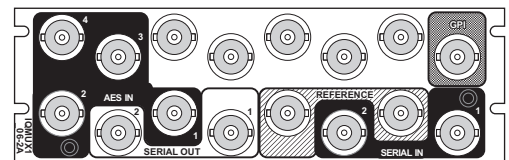
## Features

- SDI synchronizer with tracking audio delay
- Combine AES and embedded source channels
- Handles 4 AES streams or any eight embedded input channels to total eight output channels
- Handles up to 24 bit embedded audio present on the incoming SDI stream or AES inputs, and embeds/de-embeds to 20 bits
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Firewall for video and processed PCM audio to provide a continuous output
- Variable audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Video proc. amp (gain, saturation, black level)
- Up to 3 frames of video delay
- RollCall control and monitoring compatible

## Why should you choose this module?

- Provides a complete synchronizing solution for SDI video and 4 streams of AES audio
- Allows the use of mixed AES and embedded audio where both must be accommodated or combinations may be required
- A complete AV solution for incoming lines with firewall, proc. amp, audio shuffling and delay

## Order codes



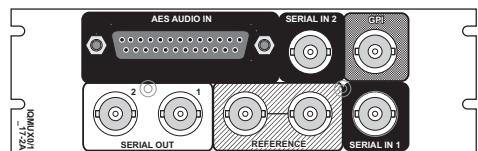
### IQMUX1006-2A

SDI and 8 channel AES embedder synchronizer with extended video delay. Unbalanced AES connection. 2 SDI inputs, 4 AES inputs, 2 SDI outputs, analog reference loop-through, 1 GPI.



### IQMUX1215-1A

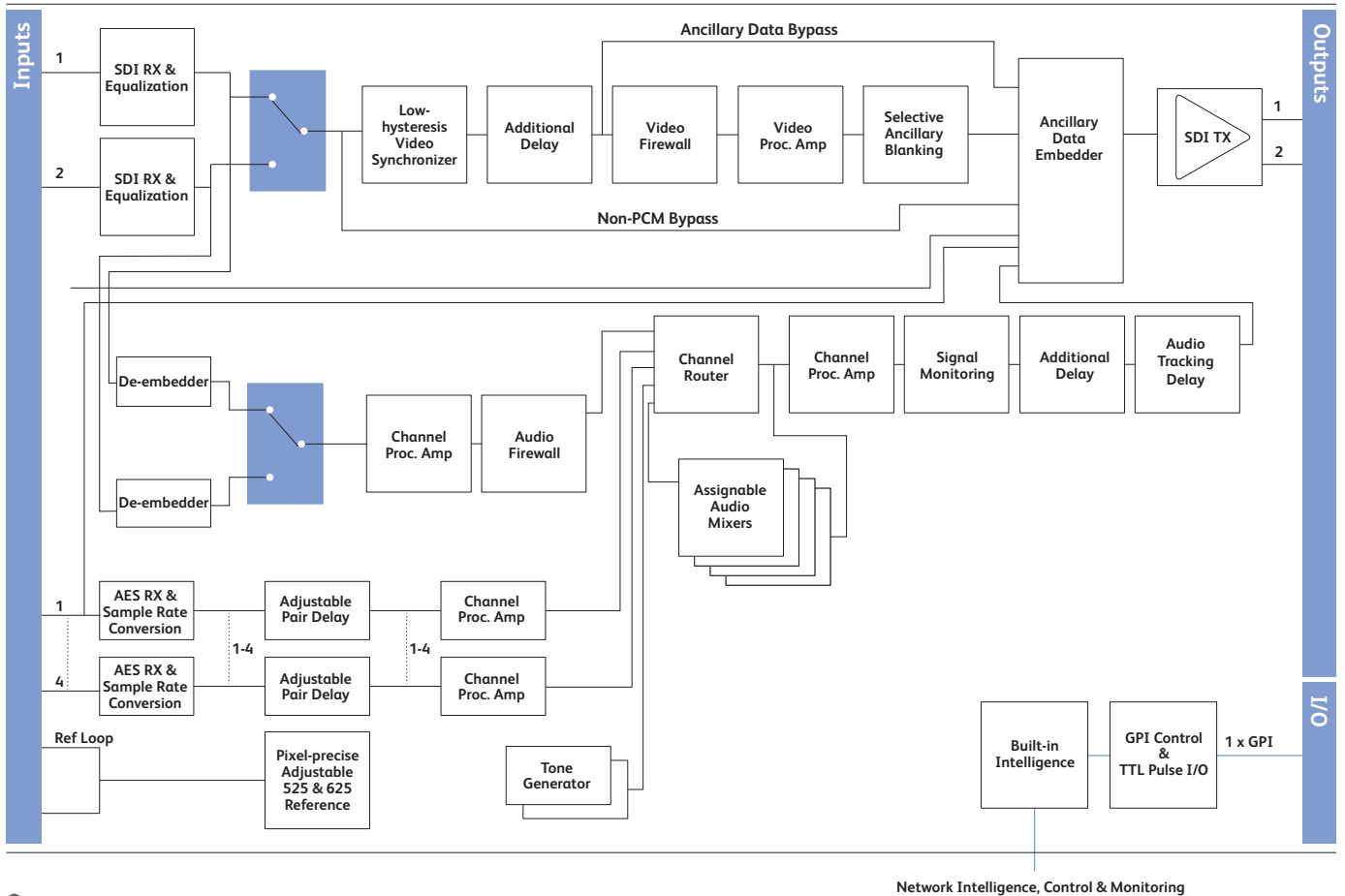
SDI and 8 channel AES embedder synchronizer with extended video delay. Balanced AES connection. 1 SDI input, 4 AES inputs, 2 SDI outputs, analog reference.



### IQMUX1217-2A

SDI and 8 channel AES embedder synchronizer with extended video delay. Balanced AES connection. 2 SDI inputs, 4 AES inputs, 2 SDI outputs, analog reference loop-through, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware Section.



Block Diagram for IQMUX1006-2A

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

Digital video	2 x SDI (BNC)
Video reference	Composite video (BNC)
Unbalanced digital audio	4 x AES/EBU (BNC)
Balanced digital audio	4 x AES/EBU (25Way D-Type)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3-1992

#### Signal Outputs

Digital video	SDI x 2
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994

#### Control Interface

GPI	1 x Closing contact I/O interface (BNC, Double Width only)
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### Card Edge and RollCall Controls

#### Card Edge Controls

NONE

#### Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard
AES input present	1 x LED per pair

#### Reference Loss

CPU running / power One green LED, flashing = OK

### RollCall Functions

#### Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
External input audio delay	Up to 1.5s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded and input channels. +18 dB to -18 dB in 0.1 dB steps
Channel routing	Output channels routed from AES pairs 1 to 4, test tone and silence, SDI 8 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. +18 dB to -18 dB in 0.1 dB steps
Lock	control to select the clock source from the output side of the synchronizer - Video, AES reference, Input 1, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 10 kHz in 100 Hz steps



## Technical Specification

### Tone Setup

Frequency	100 Hz to 10 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

### Video Controls

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 µs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video delay	+0 to +2 frames

### Other Controls

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze/ run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function/ polarity

### Reporting (\* also Logged)

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio Data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only

### RollTrack Input

Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed
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### RollTrack Output

Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Std 525, Std 625 Input 1: Input Present, Input Missing, Std 525, Std 625 Input 2: Input Present, Input Missing, Std 525, Std 625
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence
Embedded audio state	Pair present
External AES audio state	Pair present

### Specifications

#### Video internal

Processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p ± 3 dB
Minimum delay	6 µs
Synchronize hysteresis window	0.5 - 1 µs
Delay (synchronize mode)	Sync delay + 0, 1 or 2 Frames
Delay (delay mode)	6 µs - 3 Frames + 5.5 µs
THD+N	<-117 dB @ 700 Hz (24 bits) AES to AES

#### Digital Audio Input (Balanced)

Connector / format	25 W D
Sample frequency	25 – 55 kHz, 48 kHz for Ref
Input cable length	>150 m of AES3 cable
Impedance	110 Ohms

#### Digital Audio Input (Unbalanced)

Connector / format	BNC
Sample frequency	25 – 55 kHz, 48 kHz for Ref
Input cable length	>500 m of RG59 cable
Impedance	75 Ohms
Output sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode Digital Audio Output (Balanced)

#### Power Consumption

Module power consumption	9 W max (A Frames) 8 PR (B Frames)
--------------------------	---------------------------------------

A powerful SDI video synchronizer with 4 x AES/EBU stream de-embedder and advanced embedded audio handling. All audio manipulation is at the channel-level suiting discreet surround and multi-lingual use. In addition to its tracking audio delay, it also has a bulk audio delay feature. To complete the delay flexibility, it has a built-in video delay that can be used to adjust to match external audio processing such as that from a Dolby E encoder. Its firewall capability ensures continuous audio and video output even when the input signal fails. A dual SDI input allows this synchronizer to take signals from either of two paths thus allowing split operation, with video taken from one input and embedded audio from the other.

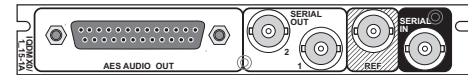
### Features

- SDI synchronizer and 8 channel AES de-embedder
- Can de-embed AES/EBU, AC3 and Dolby E digital audio data
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and de-embeds / embeds to 20 bits
- Flexible audio delay including common fixed delay and tracking delay
- A further audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Firewall for video and processed PCM audio to provide a continuous output
- Transparent to Dolby E / non-PCM audio
- Eight channel audio processor with channel level manipulation
- Channel level (Sub-frame) routing
- 4 off 4 channel audio mixers
- Video proc. amp (gain, saturation, black level)
- Video test pattern generator, 2 channel audio tone generator
- Up to 3 frames of video delay in delay mode
- RollCall control and monitoring compatible

### Why should you choose this module?

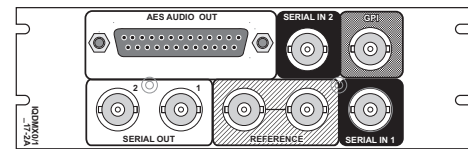
- This module provides a comprehensive solution for taking asynchronous SDI input feeds and providing AES audio alongside synchronous video
- Superb for a lines input role, with proc. amps on both audio and video signals
- Can be used as a general video synchronizer with audio monitoring
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs

### Order codes



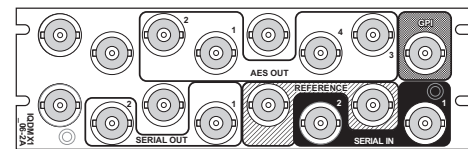
#### IQDMX1215-1A

SDI and 8 channel AES de-embedder synchronizer with extended video delay. Balanced AES connection. 1 SDI input, 4 AES outputs, 2 SDI outputs, analog reference.



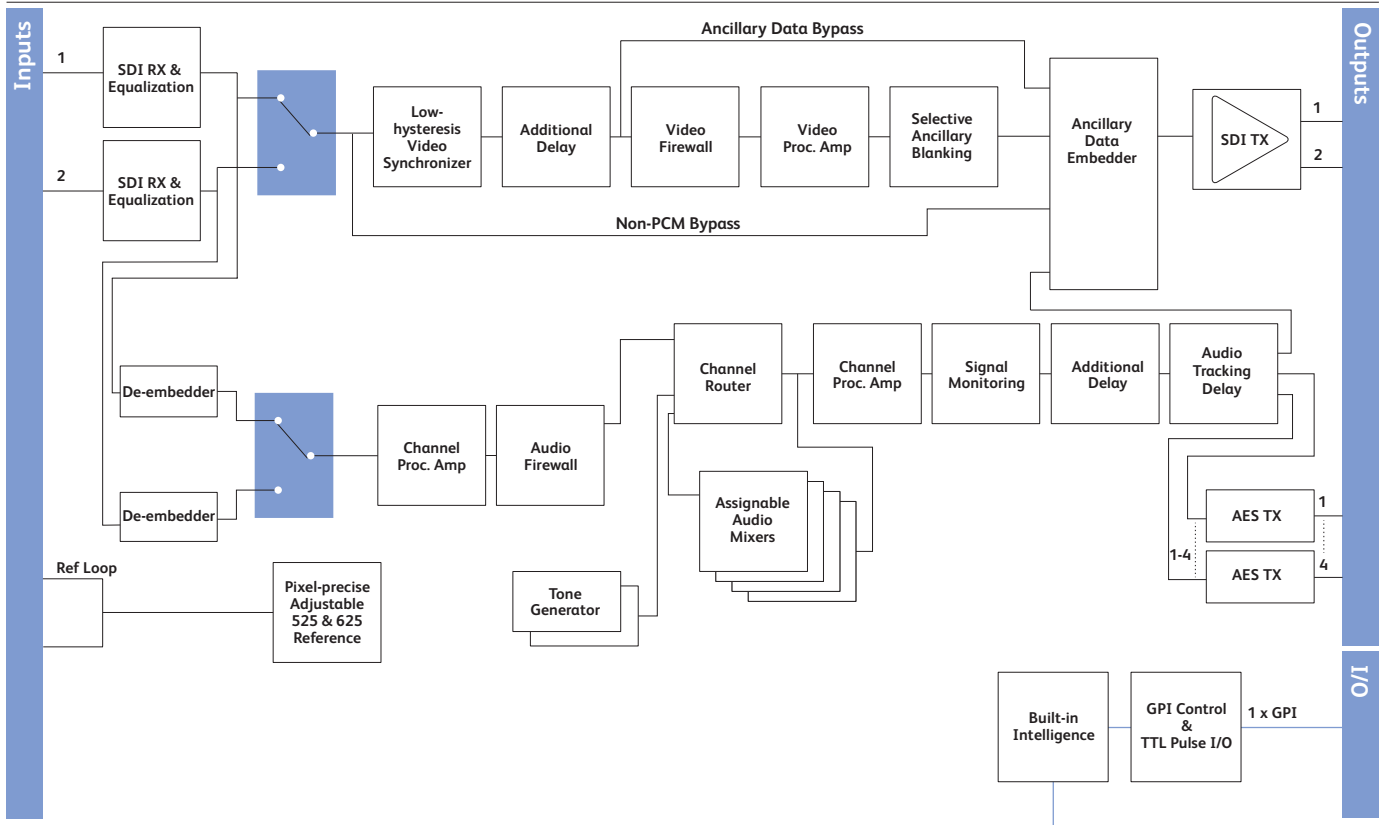
#### IQDMX1217-2A

SDI and 8 channel AES de-embedder synchronizer with extended video delay. Balanced AES connection. 2 SDI inputs, 4 AES outputs, 2 SDI outputs, analog reference loop-through, 1 GPI.



#### IQDMX1006-2A

SDI and 8 channel AES de-embedder synchronizer with extended video delay. Unbalanced AES connection. 2 SDI inputs, 4 AES outputs, 2 SDI outputs, analog reference loop-through, 1 GPI.



Block Diagram for IQDMX1006-2A

Network Intelligence, Control & Monitoring

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

Digital video	2 x SDI (BNC)
Video reference	Composite video (BNC)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994

#### Signal Outputs

Digital video	SDI x 2
Unbalanced digital audio	4 x AES/EBU (BNC)
Balanced digital audio	4 x AES/EBU (25Way D-Type)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3-1992

#### Control Interface

GPI	1 x Closing contact I/O interface (BNC)
-----	---

### Card Edge and RollCall Controls

#### Card Edge Controls

NONE

#### Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard

#### Reference Loss

CPU running / power	One green LED, flashing = OK
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### RollCall Functions

#### Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded audio. +18 dB to -18 dB in 0.1 dB steps.
Channel routing	Output channels routed from test tone, silence or SDI 8 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded and AES output channels. +18 dB to -18 dB in 0.1 dB steps
Lock	Control to select the clock source from the output side of the synchronizer - Video, Input 1, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 10 kHz in 100 Hz steps

#### Tone Setup

Frequency	100 Hz to 10 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

### Video Controls

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 µs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video horizontal delay	+1 Line in 37 ns steps
Video vertical delay	+1 Frame in 1 line steps
Video delay frames	0 to +2 frames

### Other Controls

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze / run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function / polarity

### Reporting (\* also Logged)

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only
RollTrack Input Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed
RollTrack Output Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625 Input 1: Input Present, Input Missing, Standard 525, Standard 625 Input 2: Input Present, Input Missing, Standard 525, Standard 625 GPI 1 Low, High, Inactive
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence
Embedded audio state	De-embed 1-8 Lost/Present

### Specifications

Video internal processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p ±3 dB
Minimum delay	6 µs
Synchronize hysteresis window	0.5 - 1 µs
Delay (synchronize mode)	Sync delay + 0, 1 or 2 Frames
Delay	6 µs - 3 Frames + 5.5 µs
THD+ N	<-117 dB @ 700 Hz (24 bits) AES to AES

### Digital Audio Output (Balanced)

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

### Digital Audio Output (Unbalanced)

Connector / format	BNC
Level	1 V p-p typical into 75 Ohms

### Power Consumption

Module power consumption	9 W max (A Frames) 8 PR (B Frames)
--------------------------	---------------------------------------

The IQDMX20 is a synchronizer/de-embedder with analog audio outputs. This module provides a more enhanced product featuring audio and video synchronization in addition to de-embedding.

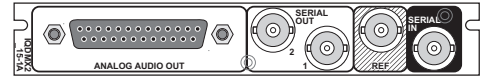
### Features

- SDI synchronizer and 4 channel analog audio de-embedder
- Flexible audio delay including common fixed delay and tracking delay
- A further audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Firewall for video and processed PCM audio to provide a continuous output
- Transparent to Dolby E / non-PCM audio
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and embeds/de-embeds to 20 bits
- Eight channel audio processor with channel level manipulation
- Channel level (Sub-frame) routing
- 4 off 4 channel audio mixers
- Video proc. amp (gain, saturation, black level)
- Video test pattern generator, 2 channel audio tone generator
- Up to 3 frames of video delay in delay mode
- RollCall control and monitoring compatible

### Why should you choose this module?

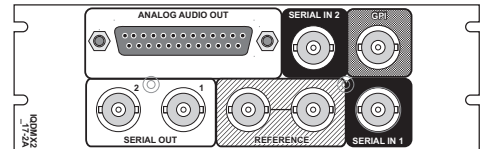
- This module provides a comprehensive solution for taking asynchronous SDI input feeds and providing analog audio alongside synchronous video
- Superb for a lines input role, with proc. amps on both audio and video signals

### Order codes



#### IQDMX2015-1A

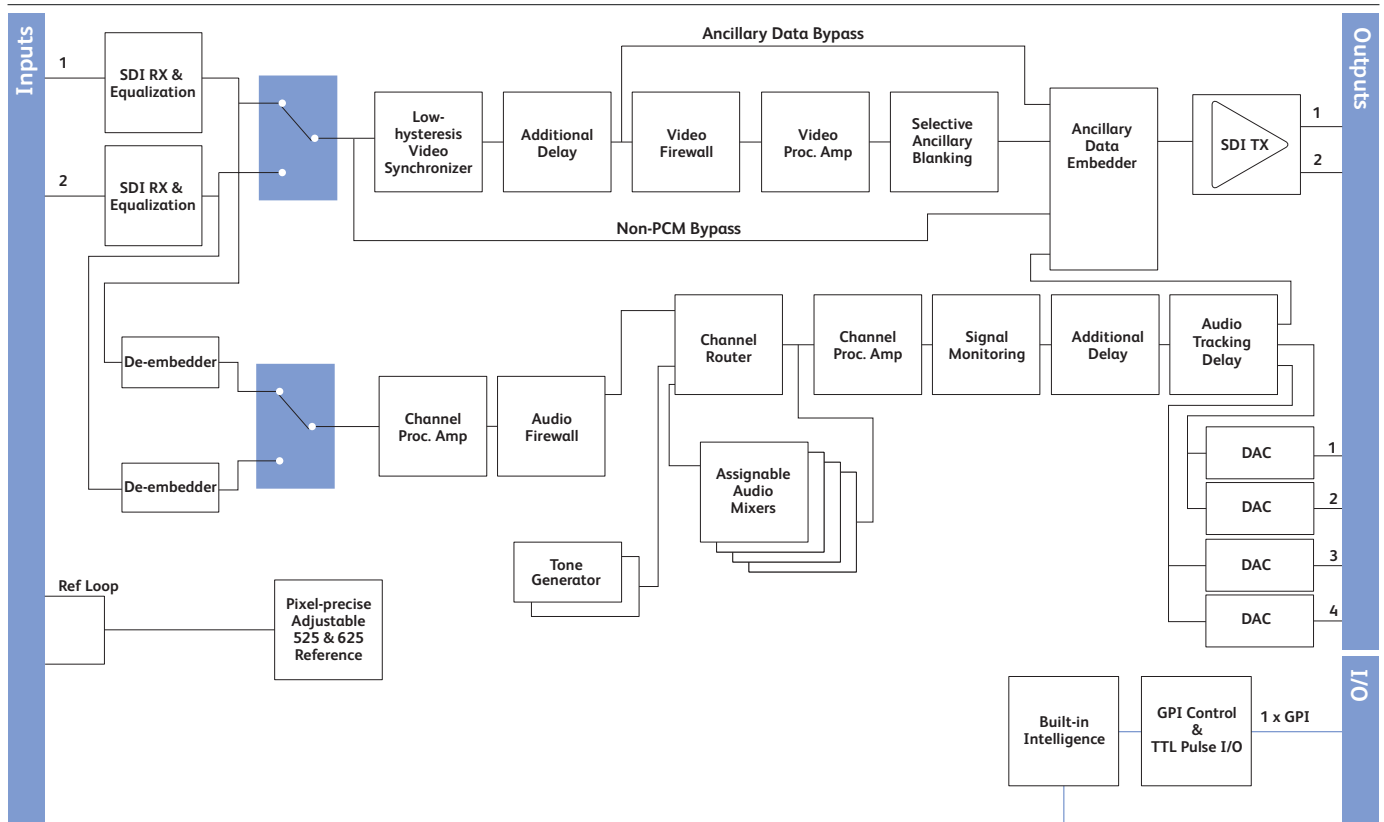
SDI and 4 channel analog audio de-embedder with synchronizer and extended video delay. Balanced analog audio connection. 1 SDI input, 4 analog outputs, 2 SDI outputs, analog reference.



#### IQDMX2017-2A

SDI and 4 channel analog audio de-embedder with synchronizer and extended video delay. Balanced analog audio connection. 2 SDI inputs, 4 analog outputs, 2 SDI outputs, analog reference, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware Section.



Block Diagram for IQDMX2017-2A

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Digital video	2 x SDI (BNC) (1 x SDI – single width versions)
Video reference	Composite video (BNC)

##### Signal Outputs

Digital video	SDI x 2
Balanced analog audio	4 channels (25 Way D-Type)

##### Control Interface

GPI	1 x Closing contact I/O interface (BNC)
-----	---

#### Card Edge and RollCall Controls

##### Card Edge Controls

NONE

##### Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard

##### Reference Loss

CPU running / power	One green LED, flashing = OK
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#### RollCall Functions

##### Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set line up level	+20 to –20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded audio. +18 dB to –18 dB in 0.1 dB steps
Channel routing	Output channels routed from test tone, silence or SDI 8 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded and AES output channels. +18 dB to –18 dB in 0.1 dB steps
Lock	Control to select the clock source from the output side of the synchronizer – Video, selected Input, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 15 kHz in 100 Hz steps
<b>Tone Setup</b>	
Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

#### Video Controls

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 μs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video horizontal delay	+1 Line in 37 ns steps
Video vertical delay	+1 Frame in 1 line steps
Video delay frames	0 to +2 frames

#### Other Controls

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 & 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze/ run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function/ polarity

#### Reporting (\* also Logged)

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only

#### RollTrack Input

Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed
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#### RollTrack Output

Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625 Input 1: Input Present, Input Missing, Standard 525, Standard 625 Input 2: Input Present, Input Missing, Standard 525, Standard 625
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence
Embedded audio state	Pair present

**Technical Specification cont...****Specifications****Video internal**

Processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV $\pm$ 5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p $\pm$ 3 dB
Minimum delay	6 $\mu$ s
Synchronize hysteresis window	0.5 - 1 $\mu$ s
Delay (synchronize mode)	Sync delay + 0, 1 or 2 Frames
Delay (delay mode)	6 $\mu$ s - 3 Frames + 5.5 $\mu$ s
THD+N	<-117 dB @ 700 Hz (24 bits) AES to AES

**Analog Audio Outputs**

Output impedance	~25 Ohms
THD+N	-92 dB @ 23 dBu typical at 1 kHz
Conversion	Min 20-bit – 105 dB dynamic range
Sampling	48 kHz Synchronous to D1 video stream

**Power Consumption**

Module power consumption	9.5 W (A Frames) 8 PR (B Frames)
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## Embedded Audio

Many operations require audio information to be combined with its corresponding video information into a single signal. Many other operations and equipment require that they be kept separate. IQ Modular offers an extensive choice of embedders and de-embedders for use with SDI signals.

The range of embedded audio modules encompasses different numbers of input channels, is capable of dealing with existing audio, and offers the choice of AES/EBU digital or analog audio formats. The IQMUX33 and IQDMX33 modules can even handle a combination of AES/EBU and analog signals, and provide frame synchronization.

For Related Modules see:  
IQDBD00/01 in Audio Processing  
IQDBE00-03 in Audio Processing  
IQUPC32 in SD-HD Conversion  
IQUPC33 in SD-HD Conversion  
IQUDC32 in SD-HD Conversion  
IQUDC33 in SD-HD Conversion  
IQDNC32 in SD-HD Conversion  
IQDNC33 in SD-HD Conversion  
IQUDC34 in SD-HD Conversion

The IQMUX33 provides 16 channel AES and analog audio embedding for 3Gbps SDI, HD-SDI or SD-SDI signals. Ideal for lines in applications features include a frame synchronizer capable of locking to a SD bi-level or HD-tri-level reference and up to 8 AES and 4 analog audio inputs for discreet audio handling. Audio processing features include gain, invert, delay, mixing and channel level routing.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

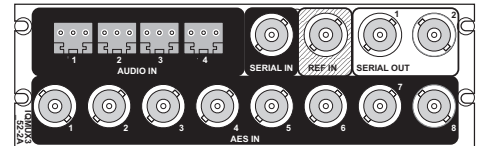
### Features

- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection , ancillary data blanking and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Embed analog and unbalanced AES audio onto 3G/HD/SD-SDI video streams with channel-level control (24-bit HD, 20-bit SD embedded resolution)
- Video proc. features include: gain, offset and hue
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- In-built test pattern generator and 2 x 16 character caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

### Why should you choose this module?

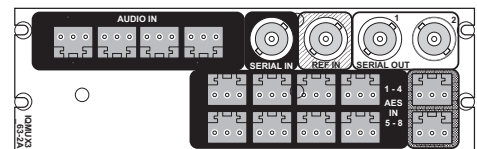
- Frame synchronization and flexible embedding provides the ideal solution applications where separate video and audio signals need to be combined for embedded workflows
- Comprehensive audio processing functions allow complete control over external and embedded audio signals for applications where audio manipulation is essential
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQMUX3352-2A3, IQMUX3352-2B3**

3G/HD/SD-SDI 16 channel AES and analog audio embedder with synchronizer . 1 SDI input, reference input, 8 unbalanced AES inputs, 4 analog audio inputs, 2 SDI outputs



#### **IQMUX3363-2A3, IQMUX3363-2B3**

3G/HD/SD-SDI 16 channel AES and analog audio embedder with synchronizer . 1 SDI input, reference input, 8 balanced AES inputs, 4 analog audio inputs, 2 SDI outputs

### Hardware and Software Options

**IQOPTA-DBD** Hardware option to add a single Dolby E/D decoder

**IQOPTA-DBE-D** Hardware option to add a single Dolby D encoder

**IQOPTA-DBE-E** Hardware option to add a single Dolby E encoder

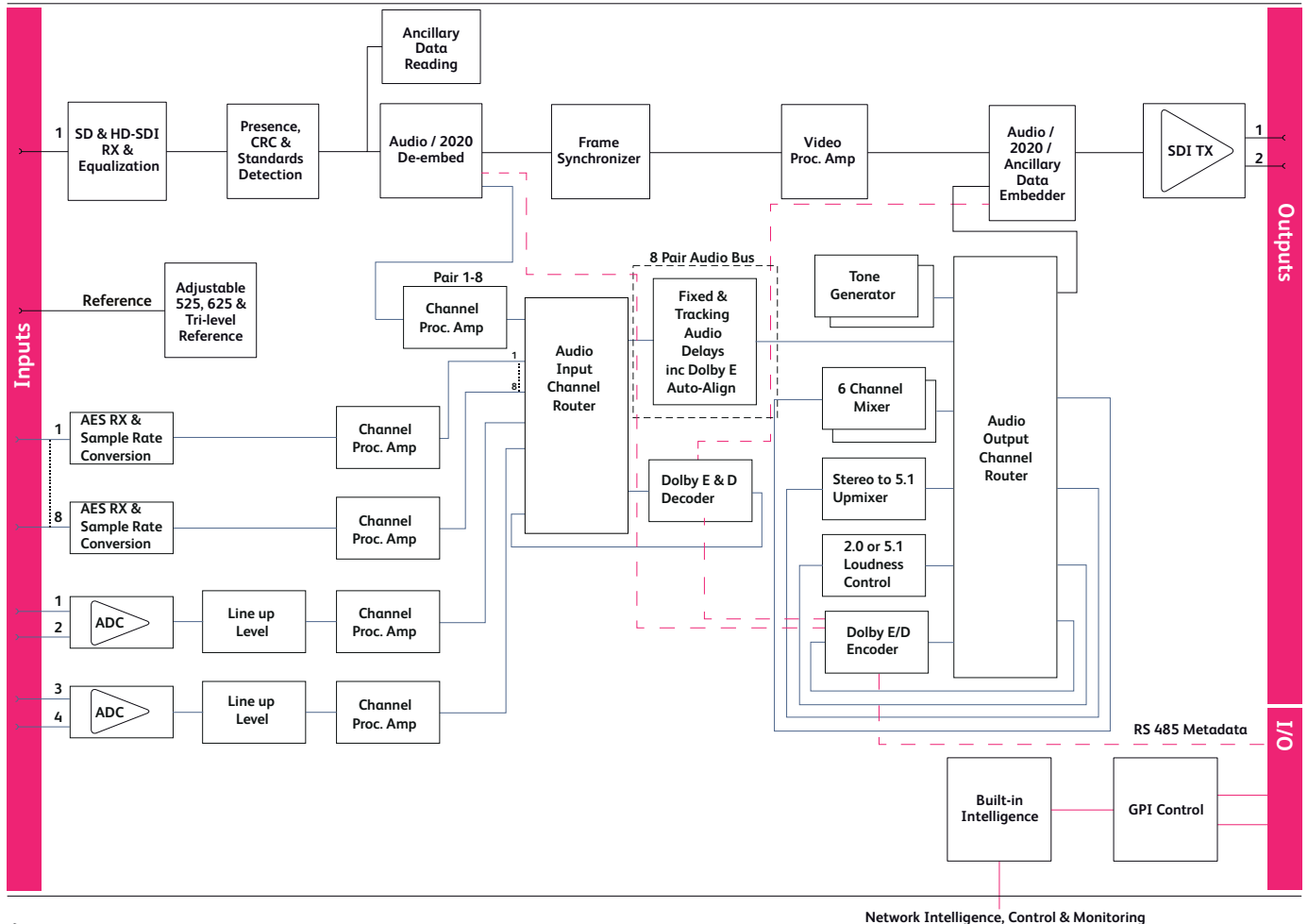
**IQOPTA-LOUD51** Software option to add Linear Accoustic AeroMax 5.1 loudness processing

**IQOPTA-LOUDA2** Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

**IQOPTA-LOUDB2** Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

**IQOPTA-UPMIX** Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

For more details on enclosure types please refer to Frames & Hardware section.



Block Diagram for IQMUX3363-2A3

Network Intelligence, Control & Monitoring

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

SDI Input	1x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 180m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference input Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M

#### Video Signal Outputs

SDI Outputs	x 2
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#### Audio Signal Inputs

AES/EBU, AC3, Dolby E Audio	8 Unbalanced (BNC), or 8 Balanced (Screw terminal connectors (ST))
Balanced analog audio inputs	4 channels (Screw terminal connectors (ST))

### Controls

#### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 26 frames @ 1080 59p 0 – 21 frames @ 1080 50p 0 – 26 frames @ 1080 29i 0 – 21 frames @ 1080 25i 0 – 54 frames @ 720 59p 0 – 44 frames @ 720 50p 0 – 147 frames @ 525 29i 0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

#### Video Controls

Default Video Output Type	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Mode	Input, Black, Freeze, Pattern
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB

### Technical Specification cont...

Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position

#### Audio Controls

Audio In - Embedded	
Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

#### Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

#### Audio In - AES

Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
AES 1 – 8 Stereo	Link channel pairs

#### Audio In - Analog

Channel 1 – 4 Mute	On/Off
Channel 1 – 4 Polarity Inv	On/Off
Channel 1 – 4 Gain	+12 dB to -80 dB in 0.1 dB steps
Analog 1 – 2 Stereo	Link Channel Pairs

#### Audio Routing

Input routing Bus 1-8	Disembed 1-8, AES input 1-8, Analog 1-2, Dolby Decoder 1-5*
Output routing embed 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

\* indicates optional feature

#### Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps
Analog input Headroom	4dB to 24dB in 1dB steps
Analog input Line Up Level	-20dBu to 20dBu in 1dB steps (with 4dB Headroom setting)

#### Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

#### Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	Program Descriptor, Dialog Norm, Audio Production information, Extended BSII, BSII, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LfRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

#### Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	On/Off
Downmix Configuration	LoRo, 4 level selections

#### Other Controls

GPI input High/Low Select	Input 1-2, Black, Freeze, Pattern, User Memories 1-16,
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, AES Audio (Pairs 1-8) PCM, Data, Dolby E, Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module

## Technical Specification cont...

Module Information	Reports: Product Name Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name
<b>Specifications</b>	
Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

**Digital Audio Input (Unbalanced)**

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Output Sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

**Digital Audio Input (Balanced)**

Connector/Format	ST
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Output Sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

**Analog Audio Input (Balanced)**

Analog Input Impedance	10 k ohms
Frequency Response	20 Hz to 20 kHz ( 0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ -1 dBFS
Dynamic range	> 106 dB
Audio delay	Equal to video delay + adjustable offset

**Power Consumption**

Module Power Consumption	20.W Max (A Frames) 18.5 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

The IQMUX30 provides 16 channel digital audio embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal as a general digital ingest module where any digital audio source signal can be catered for, even combinations of embedded and external digital audio.

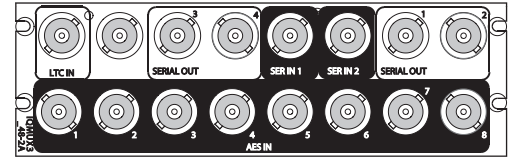
### Features

- 16 channel 3G/HD/SD-SDI embedder capable of embedding asynchronous or synchronous AES inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE 292M/274M/296M
  - SD-SDI to SMPTE 259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Independent HANC and VANC blanking control
- LTC Timecode Insertion and embedded Timecode handling, with the ability to output via the caption mechanism for monitoring
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Transparent to all ancillary data inc. VANC metadata
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and up to 4 active HD/SD-SDI outputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Ideal as a general embedder for stereo, multichannel or Dolby E AES audio applications
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQMUX3048-2A3, IQMUX3048-2B3**

3G/HD/SD-SDI 16 channel AES Embedder.  
4 SDI outputs, 8 Unbalanced AES inputs

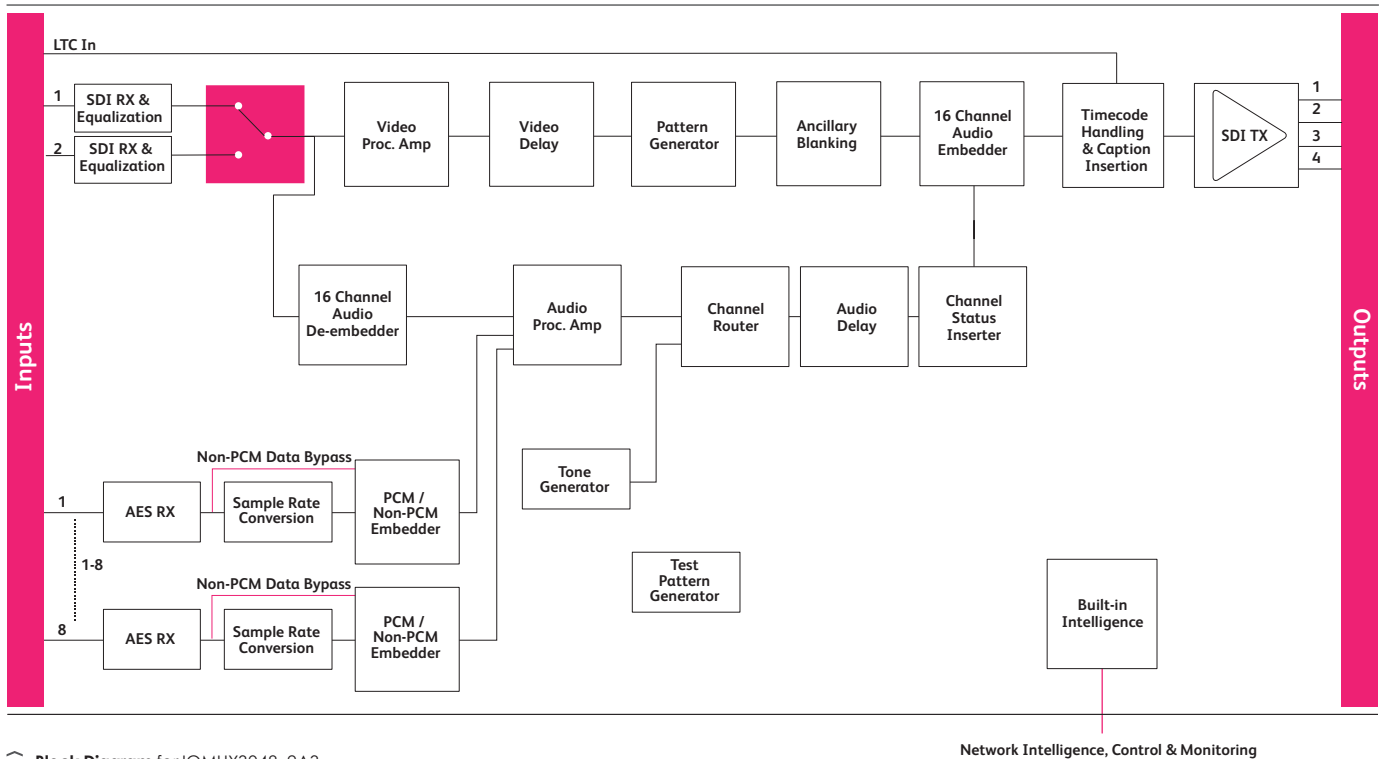


#### **IQMUX3049-1A3, IQMUX3049-1B3**

3G/HD/SD-SDI 16 channel AES Embedder.  
2 SDI outputs, 8 Balanced AES inputs

For more details on enclosure types please refer to Frames and Hardware section.





## Technical Specification

### Inputs and Outputs

#### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
Input 2 Cable Length	Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	8 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	8 x AES/EBU, AC3, Dolby E (25 Way D-Type)

#### Signal Outputs

SDI Outputs x 2 (4)

### Controls

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type	Pattern, Freeze, Black

#### Default Video Output Standard

Last Known Good,  
1125(1080)/50P (A & B),  
1125(1080)/59P (A & B),  
1125(1080)/29i, 1125(1080)/25i,  
750(720)/59P, 750(720)/50P,  
525(480)/29i, 625(576)/25i

#### Input Select

Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)

#### Picture Position

Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

## Technical Specification cont...

**Audio Controls****Embedder Assignment**

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

**Processed Audio Delay Control**

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

**Dolby-E**

Dolby-E Auto Alignment	On/Off
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**Tone**

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

**Audio Monitoring**

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

**Other Controls**

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, AES (Pairs 1-8) PCM, AES (Pairs 1-8) Data, AES (Pairs 1-8) DolbyE, AES (Pairs 1-8) V bit, AES (Pairs 1-8) Loss, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

**Specifications**

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)

Output Jitter	>-10dB (3Gbit/s) SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

**Digital Audio Input (Balanced)**

Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

**Digital Audio Input (Unbalanced)**

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked

**LTC Input Format**

According to	SMPTE-12M 2008c
Frame Rate	23.94, 24, 25, 29.97, 30, 50, 59.98 and 60 fps
Level	0.4V to 5V p-p for unbalanced and 0.2V to 5V p-p for balanced

**LTC Port Unbalanced**

Input Connector Type	BNC
Input Impedance	75 Ohms
Input Signal Range	0.4 V p-p to 5 V p-p

**LTC Port Balanced**

Input Connector Type	Differential via 2 pins of 25 pin D-Sub female AES AUDIO/LTC IN (and GND pin)
Input Impedance	10K Ohms
Input Signal Range	0.2 V p-p to 5 V p-p

**Power Consumption**

Module Power Consumption	9W Max (A Frames) 8 PR (B Frames)
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The IQMUX31 provides 8 channel digital audio embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal as a small scale digital ingest module where any digital audio source signal can be catered for, even combinations of embedded and external digital audio.

### Features

- 8 channel 3G/HD/SD-SDI embedder capable of embedding asynchronous or synchronous AES inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE 292M/274M/296M
  - SD-SDI to SMPTE 259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Transparent to all ancillary data inc. VANC metadata
- Input loss detection – input pass through or black/pattern/freeze
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and 2 active HD/SD-SDI outputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Ideal as a general embedder for stereo, multichannel or Dolby E AES audio applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution
- Available as an SD/HD version with simple software upgrade path to 3G, providing a cost effective future proof solution

### Order codes



#### **IQMUX3147-1A3, IQMUX3147-1B3**

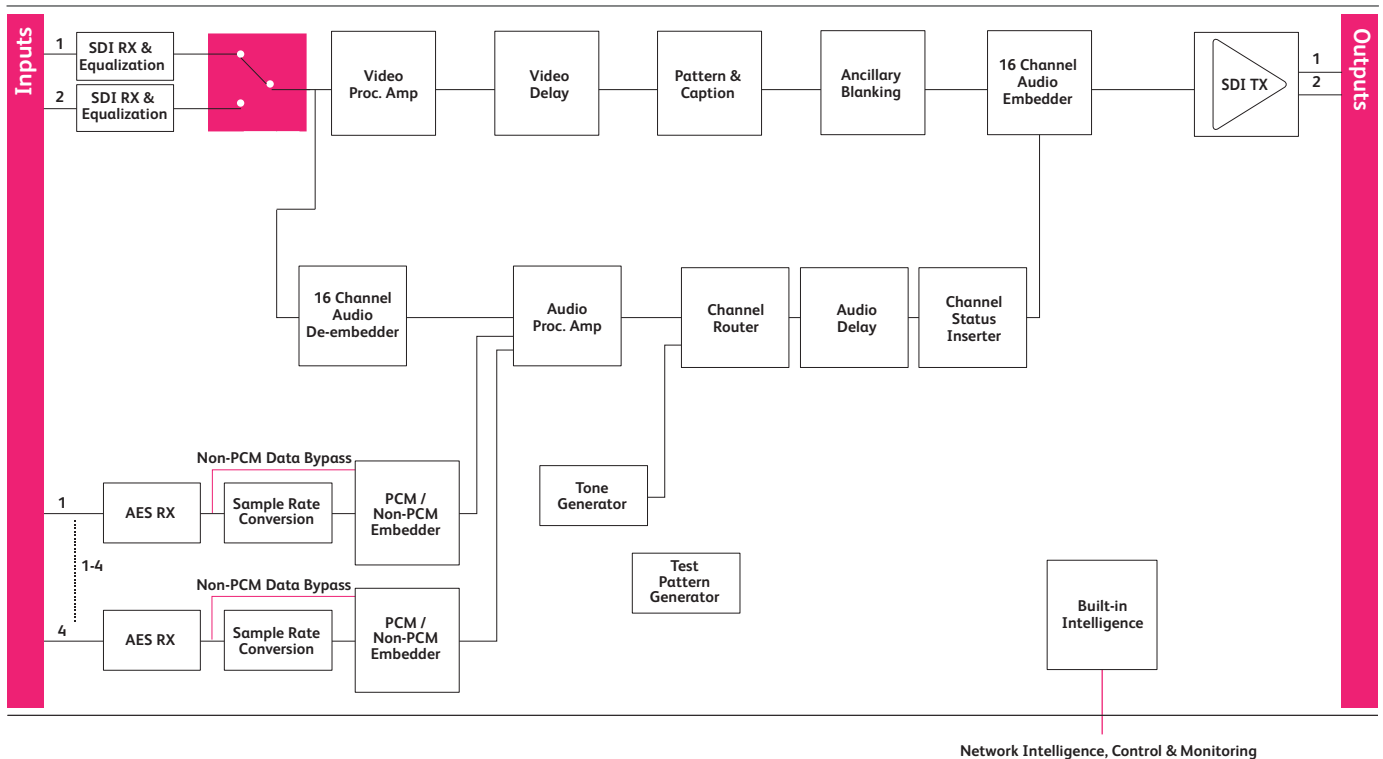
3G/HD/SD-SDI 8 channel AES Embedder.  
2 SDI outputs, 4 Unbalanced AES inputs



#### **IQMUX3149-1A3, IQMUX3149-1B3**

3G/HD/SD-SDI 8 channel AES Embedder.  
2 SDI outputs, 4 Balanced AES inputs

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQMUX3149-1A3

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

#### Signal Outputs

SDI Outputs x 2

### Controls

#### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

### Controls

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)

### Technical Specification cont...

Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available
<b>Audio Controls</b>	
<b>Embedder Assignment</b>	
Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off
<b>Processed Audio Delay Control</b>	
Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
<b>Dolby-E</b>	
Dolby-E Auto Alignment	On/Off
<b>Tone</b>	
Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
<b>Audio Monitoring</b>	
Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
<b>Other Controls</b>	
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, AES (Pairs 1-4) PCM, AES (Pairs 1-4) Data, AES (Pairs 1-4) DolbyE, AES (Pairs 1-4) V bit, AES (Pairs 1-4) Loss, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss Information Window Video
Factory Default	Input Status, Audio Input Status Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
<b>Video Standards</b>	
Typical Video Delay	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us
<b>Digital Audio Input (Balanced)</b>	
Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M
<b>Digital Audio Input (Unbalanced)</b>	
Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked
<b>Power Consumption</b>	
Module Power Consumption	9W Max (A Frames) 8 PR (B Frames)

The IQMUX32 is a dual 8 channel digital audio embedder for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set.

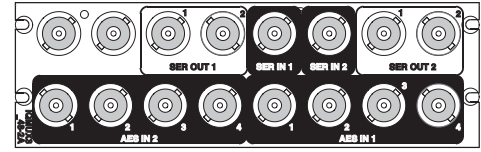
## Features

- Dual 8 channel 3G/HD/SD-SDI embedder capable of embedding asynchronous or synchronous AES inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on each SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 3 frames of video delay and 2 seconds of audio delay per channel
- Video controls including video gain and offset
- In-built test pattern and tone generators for each channel
- Up to 2 active HD/SD-SDI outputs per channel
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

## Why should I choose this module?

- Compact multi-channel embedder for AES audio applications where space is at a premium, in OB environments for example
- Comprehensive AV solution for incoming lines with audio firewall, proc. amp, shuffling, and delay
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

## Order codes



### **IQMUX3248-2A3, IQMUX3248-2B3**

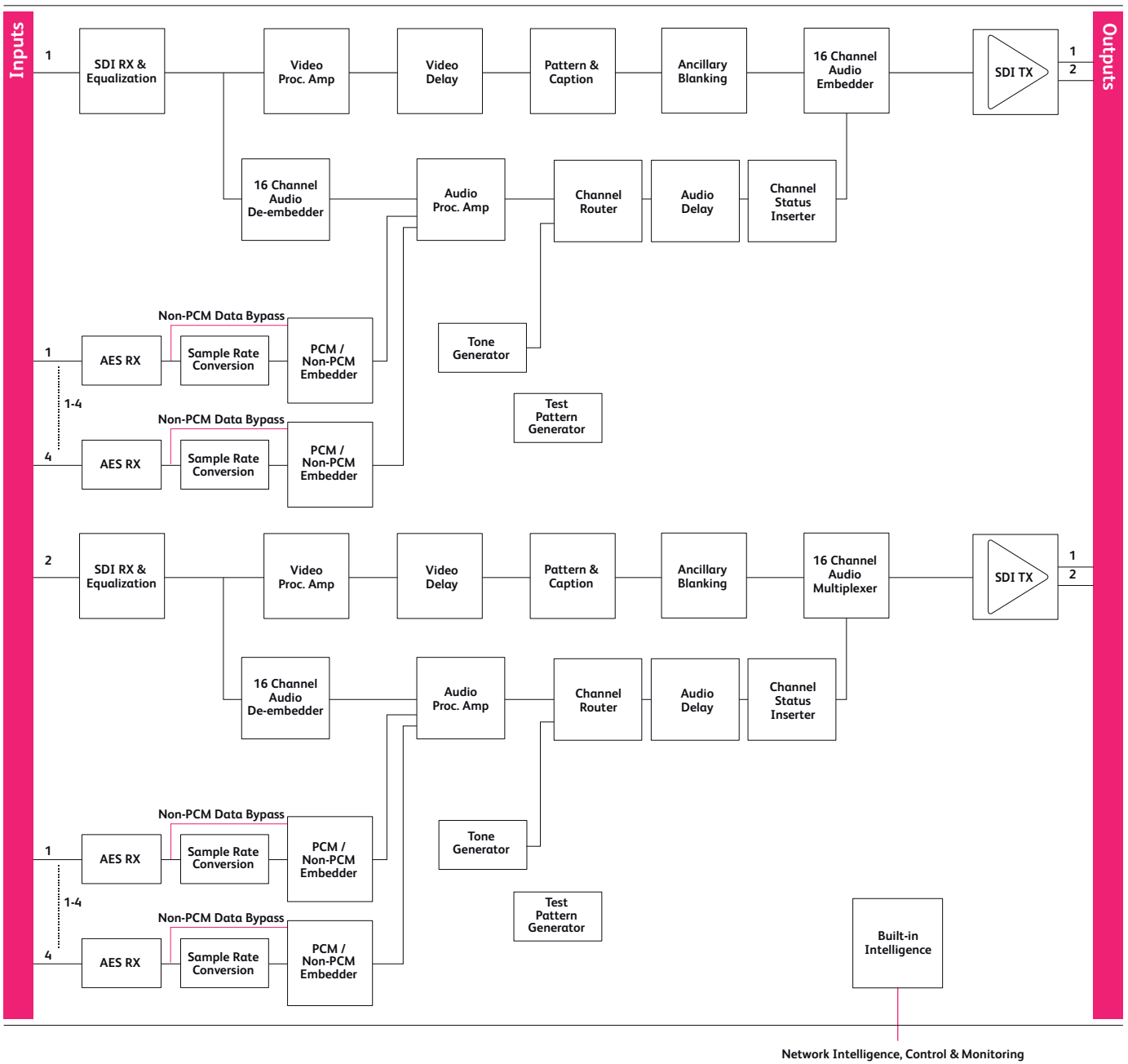
3G/HD/SD-SDI Dual 8 channel AES Embedder. 2 SDI outputs per input, 4 Unbalanced AES inputs per channel.



### **IQMUX3249-1A3, IQMUX3249-1B3**

3G/HD/SD-SDI Dual 8 channel AES Embedder. 1 SDI output per input, 4 Balanced AES inputs per channel.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQMUX3248-2A3



## Technical Specification

### Inputs & Outputs

#### Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 200m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

#### Signal Outputs

SDI Outputs	x 2 per Channel
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### Controls

#### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

### Controls

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good,
Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 3 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)

Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

### Audio Controls

#### Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

#### Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

### Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Input Present (1&2), Input Loss (1&2), Output525 (1&2), Output 625 (1&2), Output 720p (1&2), Output 1080i (1&2), Output 1080p (1&2), Output Freeze (1&2), Output Unfreeze (1&2), Output Pattern on (1&2), Output pattern off (1&2), Output Caption on (1&2), Output Caption off (1&2), AES (Pairs 1-4) PCM (1&2), AES (Pairs 1-4) Data (1&2), AES (Pairs 1-4) DolbyE (1&2), AES (Pairs 1-4) V bit (1&2), AES (Pairs 1-4) Loss (1&2), Disemb (Pairs 1-8) PCM (1&2), Disemb (Pairs 1-8) Data (1&2), Disemb (Pairs 1-8) DolbyE (1&2), Disemb (Pairs 1-8) V bit (1&2), Disemb (Pairs 1-8) Loss (1&2)
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	“Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

## Technical Specification cont...

## Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

**Digital Audio Input (Balanced)**

Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms

**Digital Audio Input (Unbalanced)**

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3-1992, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked

**Power Consumption**

Module Power Consumption	11W Max (A Frames) 10 PR (B Frames)
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The IQMUX34 provides 8 channel analog audio embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal as a general analog audio ingest module for incorporating local audio feeds.

### Features

- 8 channel 3G/HD/SD-SDI embedder for analog audio inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Features include independent gain, invert, mute controls, channel level (Sub-frame) routing, and adjustable delay for selected audio channels
- Embedding continues on loss of SDI input (silence)
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- Up to 9 frames of video delay and 2 seconds of audio delay
- Video controls including video gain, offset, HANC and VANC blanking control
- Input loss detection – default output of black/pattern
- Transparent to all ancillary data inc. VANC metadata
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- Rollcall control and monitoring compatible

### Why should you choose this module?

- Ideal as a general embedder for analog audio applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

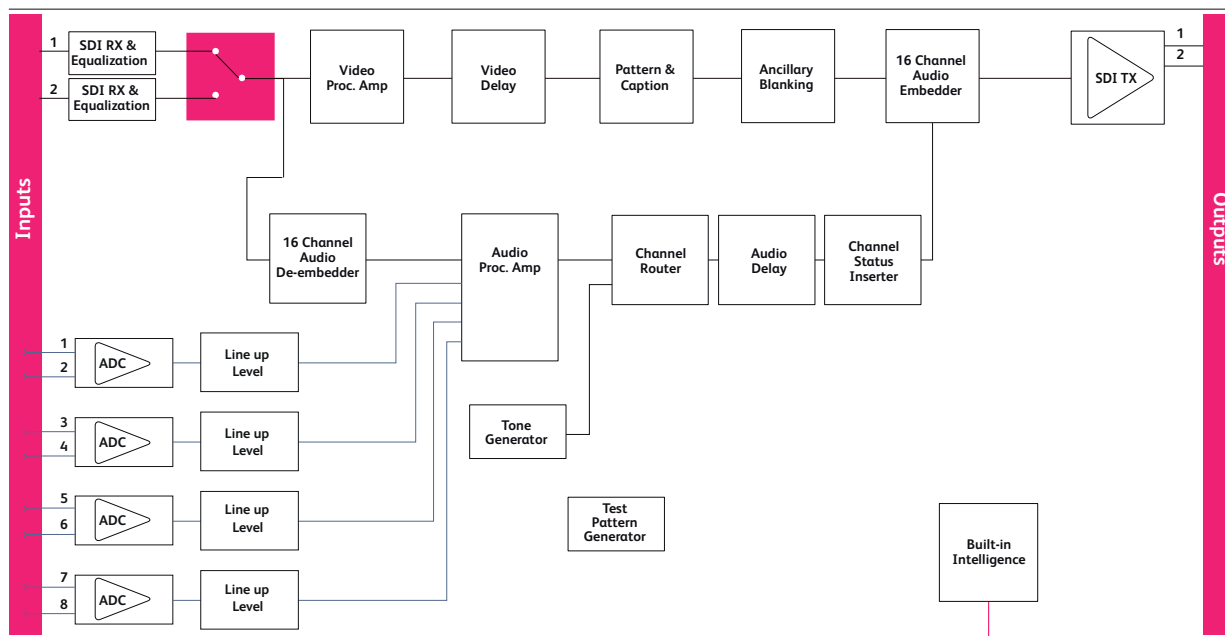
### Order codes



#### IQMUX3449-1A3, IQMUX3449-1B3

3G/HD/SD-SDI 8 channel Analog Audio Embedder. 2 SDI outputs, 8 Balanced analog audio inputs

For more details on enclosure types please refer to datasheet IQH3B.



Block Diagram for IQMUX3449-1B3

Network Intelligence, Control & Monitoring

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s

#### Audio Signal Inputs

Balanced analog audio inputs	8 channels (25 Way D-Type)
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#### Signal Outputs

SDI Outputs	x 2
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### Controls

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Video Select	Input 1, Input 2
Audio Select	Video Input 1, Video Input 2, Follow Video
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

### Audio Controls

#### Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L	Dis-embed 1_1 to 8_2, Analog 1 to 8, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Analog 1 to 8, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

#### Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

#### Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

#### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

#### Audio Setup Controls

Analog Headroom Level	+12 dBu to +24dBu
Note:	Headroom level specified at 0 dBFS line up level

#### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

## Technical Specification cont...

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

### Analog Audio Input (Balanced)

Analog Input Impedance	40 k ohms
Distortion (THD+N)	-100dB @ +24dBu 800Hz
Frequency Response	20Hz-20KHz +0.05dB
Dynamic range	114 dB typical

### Power Consumption

Module Power	9 W (A Frames)
Consumption	9 PR (B Frames)

The IQMUX60/61 is a flexible 4-channel analog and AES audio embedder with advanced embedded audio handling. When used with a composite decoder such as the IQDEC02 it provides a powerful analog video and audio ingest solution. The built in audio firewall capability ensures errors or interruptions in the input signal are not passed through to the output. A dual SDI input allows the unit to take signals from either of two paths. The second input also allows split operation, with video taken from one input and embedded audio from the other.

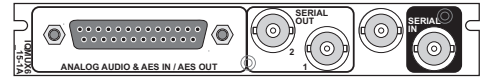
### Features

- Combine external analog, AES and embedded audio source channels
- Handles 4 analog audio channels, 4 AES audio channels, or any eight embedded input channels to total eight output channels
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and embeds/de-embeds to 20 bits
- Firewall for processed PCM audio to provide a continuous output
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Variable audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Up to 3 frames of video delay
- Video proc. amp (gain, saturation, black level)
- RollCall control and monitoring compatible

### Why should you choose this module?

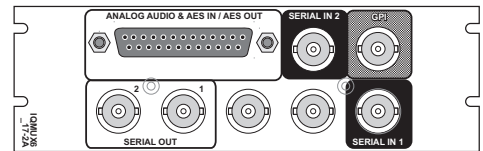
- Allows the use of mixed analog, AES and embedded audio where all must be accommodated or combinations may be required
- When used with the IQDEC02 decoder provides a complete analog AV solution for incoming lines with firewall, proc. amp, audio shuffling and delay

### Order codes



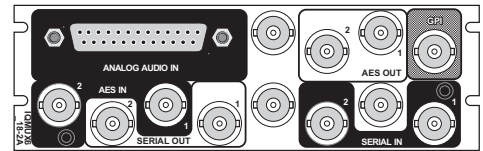
#### IQMUX6115-1A

Universal audio embedder. Balanced audio connection. 1 SDI input, 4 analog audio inputs, 2 AES/EBU inputs, 2 SDI outputs, 2 AES/EBU outputs.



#### IQMUX6117-2A

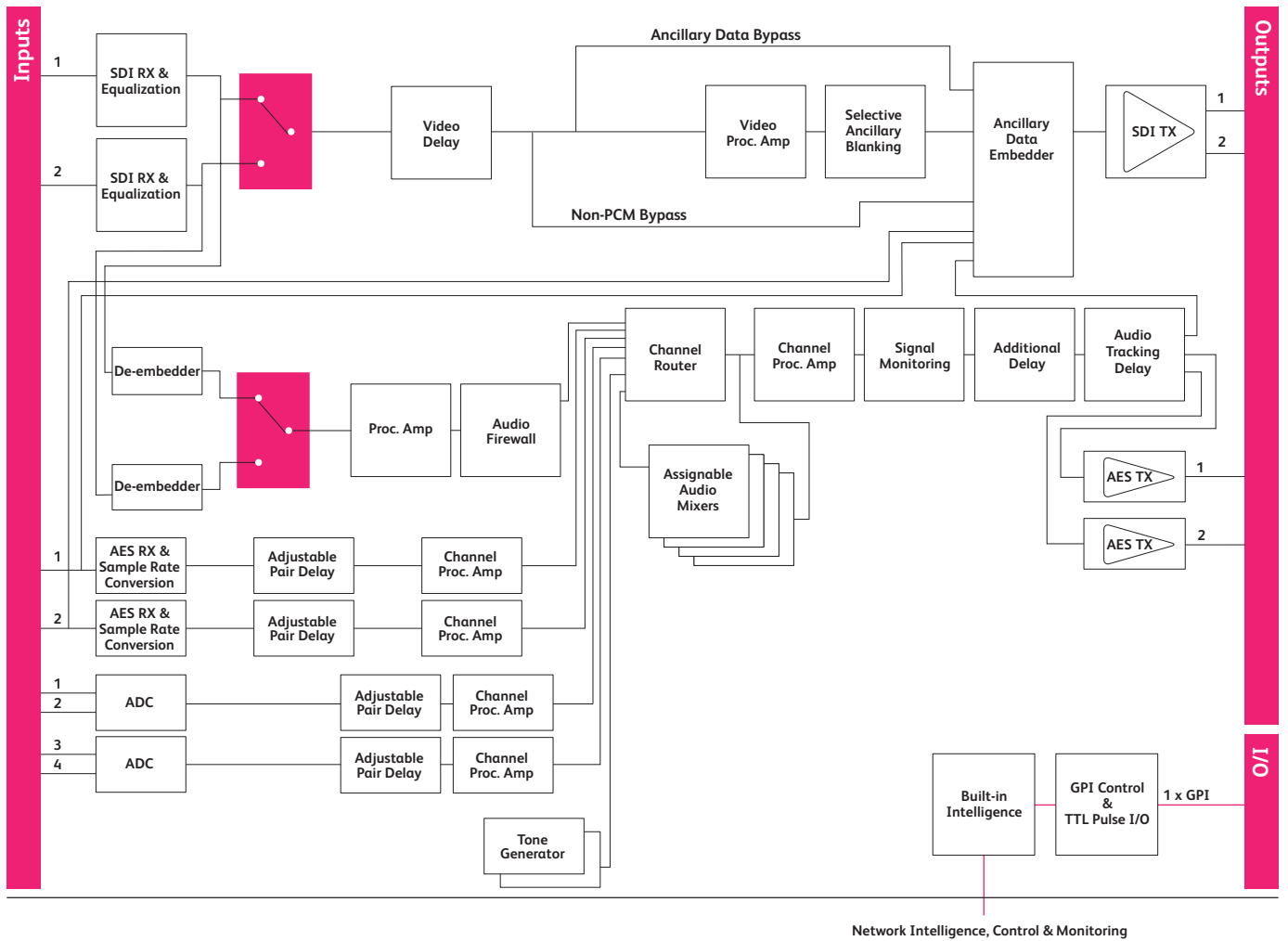
Universal audio embedder. Balanced audio connection. 2 SDI inputs, 4 analog audio inputs, 2 AES/EBU inputs, 2 SDI outputs, 2 AES/EBU outputs, 1 GPI.



#### IQMUX6018-2A

Universal audio embedder. 2 SDI inputs, 4 balanced analog audio inputs, 2 unbalanced AES/EBU inputs, 2 SDI outputs, 2 unbalanced AES/EBU outputs, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware Section.



Block Diagram for IQMUX6115-1A

## Technical Specification

### Inputs and Outputs

#### Video Signal Inputs

Digital video	2 x SDI (BNC)
Analog audio	4 Channels (2 Stereo Pairs) (25 Way D-Type)
Unbalanced digital audio	2 x AES/EBU (BNC)
Balanced digital audio	2 x AES/EBU (25 Way D-Type)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3 - 1992

#### Signal Outputs

Digital video	SDI x 2
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994
Unbalanced digital audio	2 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	2 x AES/EBU, AC3, Dolby E (25 Way D-Type)

#### Control Interface

GPI	1 x Closing contact I/O interface (BNC, Double Width only)
-----	--

### Card Edge and RollCall Controls

#### Card Edge Controls

NONE

#### Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard
AES input present	1 x LED per pair
CPU running / power	One green LED, flashing = OK

#### RollCall Functions

##### Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set line up level	+20 to -20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
External input audio delay	Up to 1.5s additional delay in 1 ms steps
Input side control proc.	
-audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded and input channels. +18 dB to -18 dB in 0.1 dB steps



## Technical Specification cont...

Channel routing	Output channels routed from AES pairs 1 and 2, analog pairs 1 and 2, test tone and silence, SDI 8 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. +18 dB to -18 dB in 0.1 dB steps
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

**Tone Setup**

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

**Video Controls**

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock H phase	±32 µs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video delay	+0 to +2 frames

**Other Controls**

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze / run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function/polarity

**Reporting (\* also Logged)**

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI

Audio silence, high level, low level, overflow	For processed audio channels only
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**RollTrack Input**

Delay	Audio delay – Fixed, RollTrack + fixed
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**RollTrack Output**

Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625
	Input 1: Input Present, Input Missing, Standard 525, Standard 625
	Input 2: Input Present, Input Missing, Standard 525, Standard 625
Embedded audio state	Pair present
External audio state	Pair present

**Specifications**

Video internal processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Minimum delay	6 µs
Delay	6 µs - 3 Frames + 5.5 µs

**Analog Audio Input (Balanced)**

Analog input impedance	10 k ohms
Frequency response	20 Hz to 20 kHz (±0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ -1 dBFS
Dynamic range	>106 dB
Audio delay	Equal to video delay + adjustable offset

**Digital Audio Input (Balanced)**

Connector / format	25 W D
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>150 m of AES3 cable
Impedance	110 Ohms

**Digital Audio Input (Unbalanced)**

Connector / format	BNC
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>500 m of RG59 cable
Impedance	75 Ohms
Output sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

**Digital Audio Output (Balanced)**

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

**Digital Audio Output (Unbalanced)**

Connector / format	BNC
Level	1 V p-p typical into 75 Ohms

**Power Consumption**

Module power consumption	9 W max (A Frames) - 8 PR (B Frames)
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The IQDMX33 provides 16 channel digital audio de-embedding for 3Gbps SDI, HD-SDI or SD-SDI signals. Audio outputs are available as AES or analog formats selectable from any of the 16 embedded audio channels. Audio processing features include gain, invert and channel level routing.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

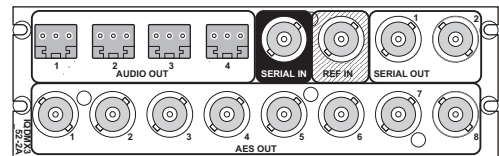
### Features

- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection, ancillary data blanking and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- De-embed analog and AES audio from 3G/HD/SD-SDI video streams with channel-level control
- Video proc. features include: gain, offset and hue
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- In-built test pattern generator and 2 x 16 character caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

### Why should you choose this module?

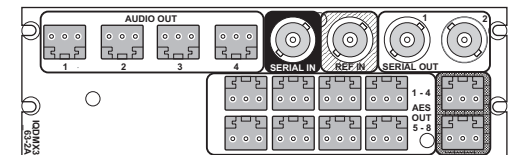
- Frame synchronization and flexible de-embedding provides the ideal solution for incoming lines applications where video and audio are required to be separate through the plant
- Comprehensive audio processing functions allow complete control over external and embedded audio signals for applications where audio manipulation is essential
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQDMX3352-2A3, IQDMX3352-2B3**

3G/HD/SD-SDI 16 channel AES and analog audio de-embedder with synchronizer. 1 SDI input, reference input, 8 unbalanced AES outputs, 4 analog audio outputs, 2 SDI outputs



#### **IQDMX3363-2A3, IQDMX3363-2B3**

3G/HD/SD-SDI 16 channel AES and analog audio de-embedder with synchronizer. 1 SDI input, reference input, 8 balanced AES outputs, 4 analog audio outputs, 2 SDI outputs

### Hardware and Software Options

**IQOPTA-DBD** Hardware option to add a single Dolby E/D decoder

**IQOPTA-DBE-D** Hardware option to add a single Dolby D encoder

**IQOPTA-DBE-E** Hardware option to add a single Dolby E encoder

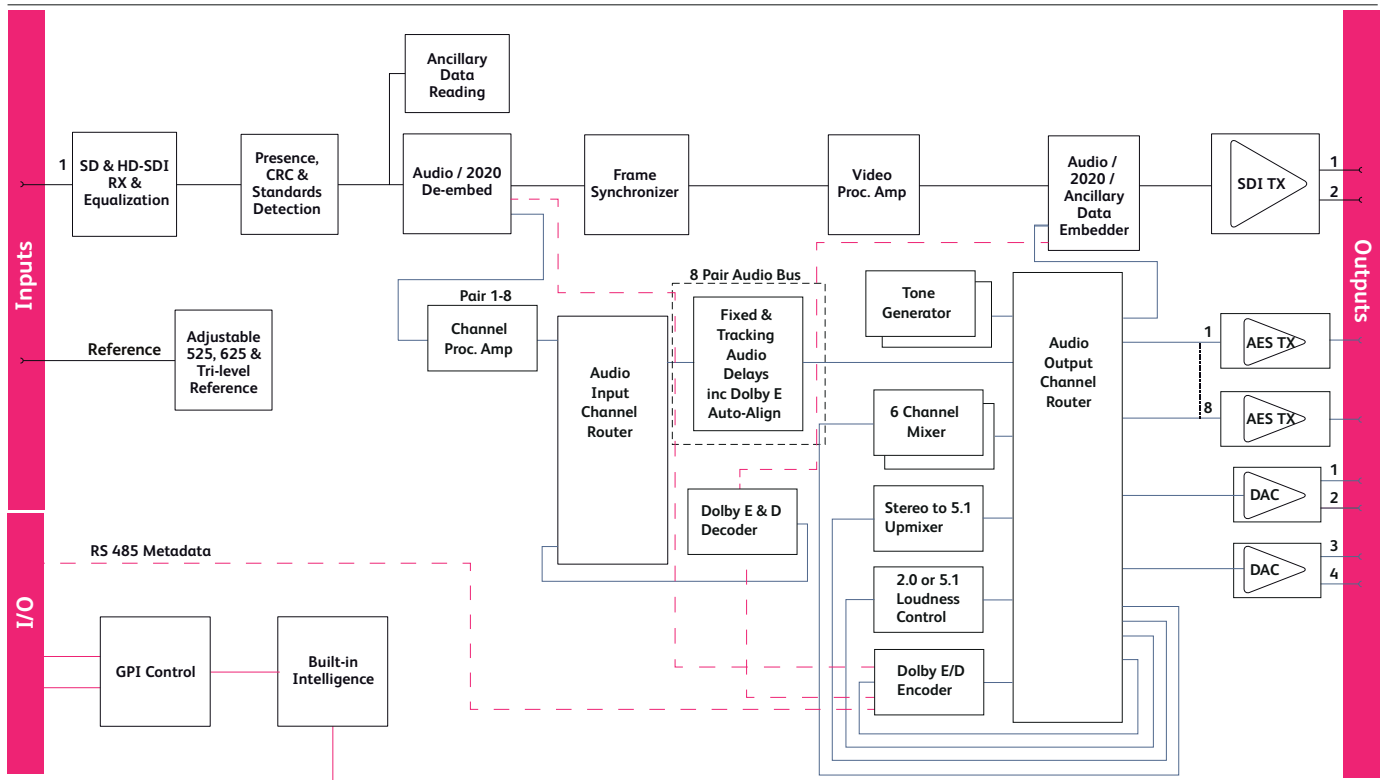
**IQOPTA-LOUD51** Software option to add Linear Accoustic AeroMax 5.1 loudness processing

**IQOPTA-LOUDA2** Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

**IQOPTA-LOUDB2** Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

**IQOPTA-UPMIX** Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

For more details on enclosure types please refer to Frames & Hardware section.



Block Diagram for IQDMX3363-2A3 Network Intelligence, Control & Monitoring

## Technical Specification

### Inputs & Outputs

#### Video Signal Inputs

SDI Input	1x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 180m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference input Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M

#### Video Signal Outputs

SDI Outputs	x 2
Audio Signal Outputs	
AES/EBU, AC3, Dolby E Audio	8 Unbalanced (BNC), or 8 Balanced (Screw terminal connectors (ST))
Balanced analog audio Outputs	4 channels (Screw terminal connectors (ST))

### Controls

#### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video Delay Frames	0 – 26 frames @ 1080 59p 0 – 21 frames @ 1080 50p 0 – 26 frames @ 1080 29i 0 – 21 frames @ 1080 25i 0 – 54 frames @ 720 59p 0 – 44 frames @ 720 50p 0 – 147 frames @ 525 29i 0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

#### Video Controls

Default Video Output Type	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Plug, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Mode	Input, Black, Freeze, Pattern
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position

### Technical Specification cont...

#### Audio Controls

##### Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

##### Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

##### Audio Out - Analog

Channel 1 – 4 Mute	On/Off
Channel 1 – 4 Gain	+12 dB to -80 dB in 0.1 dB steps
Analog 1 – 2 Stereo	Link Channel Pairs

##### Audio Routing

Input routing Bus 1-8	Disembed 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
Output routing AES 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
Output routing Analog 1-2	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

\* indicates optional feature

##### Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps
Analog output Headroom	4dB to 24dB in 1dB steps
Analog output Line Up Level	-20dBu to 20dBu in 1dB steps (with 4dB Headroom setting)

#### Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	On/Off
Downmix Configuration	LoRo, 4 level selections

#### Other Controls

GPI input High/Low Select	Input 1-2, Black, Freeze, Pattern, User Memories 1-16,
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, AES Audio (Pairs 1-8) PCM, Data, Dolby E, Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A
Connector / Format	HD Tri-level – SMPTE 240M, 274M and 296M BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

#### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3-1992, SMPTE 272M A-1994, SMPTE 299M

#### Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

#### Analog Audio Outputs

Output Level	Adjustable +12 dBu to +24 dBu
Output Impedance	~25 Ohms
THD+N	-97 dB at 18 dBu, typical at 1 kHz
Conversion	32-bit sampling @ 48kHz – 107 dB dynamic range typical

#### Power Consumption

Module Power Consumption	22.5 W Max (A Frames) 21 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

The IQDMX30 provides 16 channel digital audio de-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include gain, invert and channel level routing, whilst a video proc. amp is also included in the feature set.

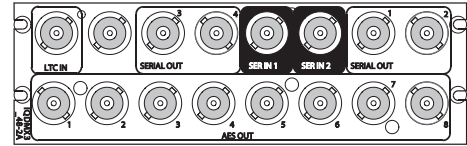
### Features

- 16 channel 3G/HD/SD-SDI de-embedder with 8 balanced or unbalanced AES outputs
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert, mute controls and adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group with detection and reporting
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- LTC Timecode Insertion and embedded Timecode handling, with the ability to output via the caption mechanism for monitoring
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Ideal as a general de-embedder for AES audio applications
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQDMX3048-2A3, IQDMX3048-2B3**

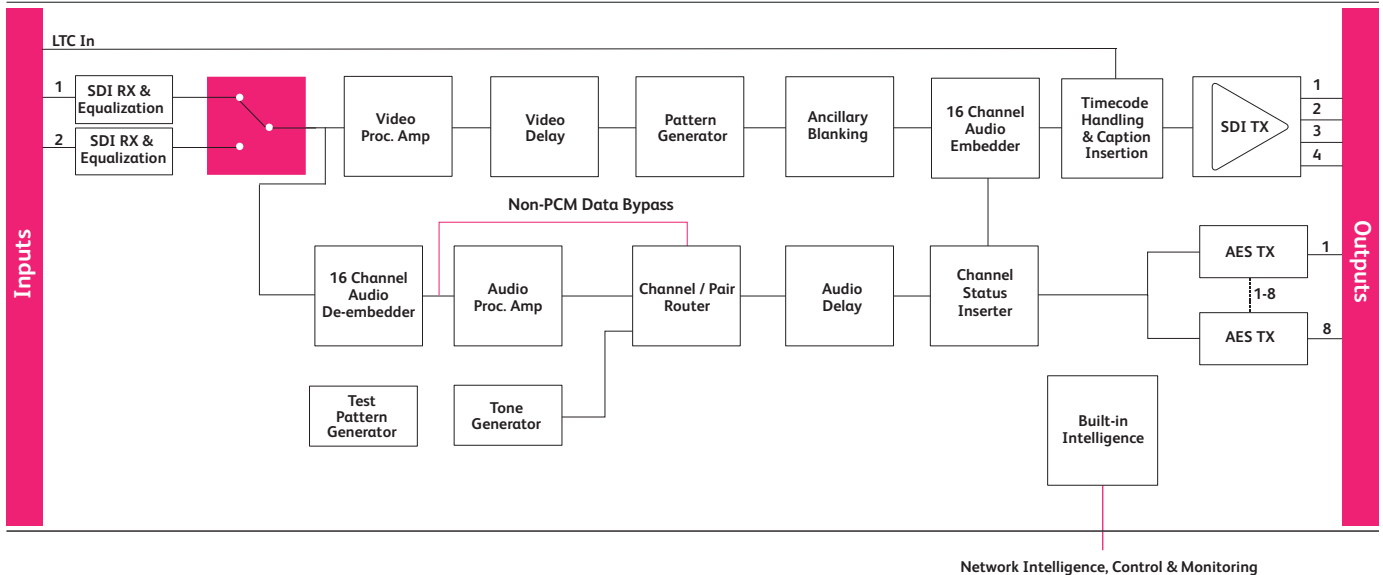
3G/HD/SD-SDI 16 channel AES De-embedder. 4 SDI outputs, 8 Unbalanced AES outputs



#### **IQDMX3049-1A3, IQDMX3049-1B3**

3G/HD/SD-SDI 16 channel AES De-embedder. 2 SDI outputs, 8 Balanced AES outputs

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDMX3048-2A3

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s

#### Signal Outputs

SDI Outputs	x 2 (4)
Unbalanced digital audio	8 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	8 x AES/EBU, AC3, Dolby E (2.5 Way D-Type)

### Controls

#### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

### Controls

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
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#### Default Video Output Type.

Pattern, Freeze, Black

#### Default Video Output Standard

Last Known Good,  
1125(1080)/50P (A & B),  
1125(1080)/59P (A & B),  
1125(1080)/29i, 1125(1080)/25i,  
750(720)/59P, 750(720)/50P,  
525(480)/29i, 625(576)/25i

#### Input Select

Input 1, Input 2

#### Manual Freeze

On/Off

#### Freeze

Field/Frame

#### Video Delay Frames

0 - 9 F

#### VANC Data

Blank VANC

#### SD VANC Data

Line blanking (6 controls)

#### ProcAmp Enable

On/Off

#### Black Level

±100 mV in steps of 0.8 mV

#### Hue Adjust

±180° in steps of 1°

#### Master Video Gain

±6 dB in steps of 0.1 dB

#### Y-Gain

±6 dB in steps of 0.1 dB

#### Cb/Cr Gain

±6 dB in steps of 0.1 dB

#### Y/C Timing

±8 pixels in 2 pixel steps (SD)

#### Picture Position

±16 pixels in 2 pixel steps (HD/3G)

±16 pixels in 2 pixel steps (SD)

±16 pixels in 2 pixel steps (HD/3G)

#### Pattern On

On/Off

#### Pattern Select

75% Color Bars, Black

#### Caption On

On/Off

#### Edit Caption

19 characters available



## Technical Specification cont...

### Audio Controls

#### Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

#### AES Assignment

AES 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 8 Stereo	Link channel pairs
AES 1 to 8 Polarity L/R	On/Off
AES 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 8 Non-PCM	On/Off

#### Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

#### Dolby-E

#### Dolby-E Auto

Alignment	On/Off
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#### Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

#### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

#### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI BNC/ 75ohm panel jack on standard IQconnector panel
Connector / Format	BNC/ 75ohm panel jack on standard IQconnector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling.	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

#### Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

#### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M

#### LTC Input Format

According to	SMPTE-12M 2008c
Frame Rate	23.94, 24, 25, 29.97, 30, 50, 59.98 and 60 fps
Level	0.4V to 5V p-p for unbalanced and 0.2V to 5V p-p for balanced

#### LTC Port Unbalanced

Input Connector Type	BNC
Input Impedance	75 Ohms
Input Signal Range	0.4 V p-p to 5 V p-p

#### LTC Port Balanced

Input Connector Type	Differential via 2 pins of 25 pin D-Sub female AES AUDIO/LTC IN (and GND pin)
Input Impedance	10K Ohms
Input Signal Range	0.2 V p-p to 5 V p-p

#### Power Consumption

Module Power Consumption	9.5W Max (A Frames) 8.5 PR (B Frames)
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The IQDMX31 provides 8 channel digital audio de-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include gain, invert, delay and channel level routing, whilst a video proc. amp is also included in the feature set.

### Features

- 8 channel 3G/HD/SD-SDI de-embedder with 4 balanced or unbalanced AES outputs
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert, mute controls and adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group with detection and reporting
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and 2 active HD/SD-SDI outputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Ideal as a general de-embedder for AES audio applications
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQDMX3147-1A3, IQDMX3147-1B3**

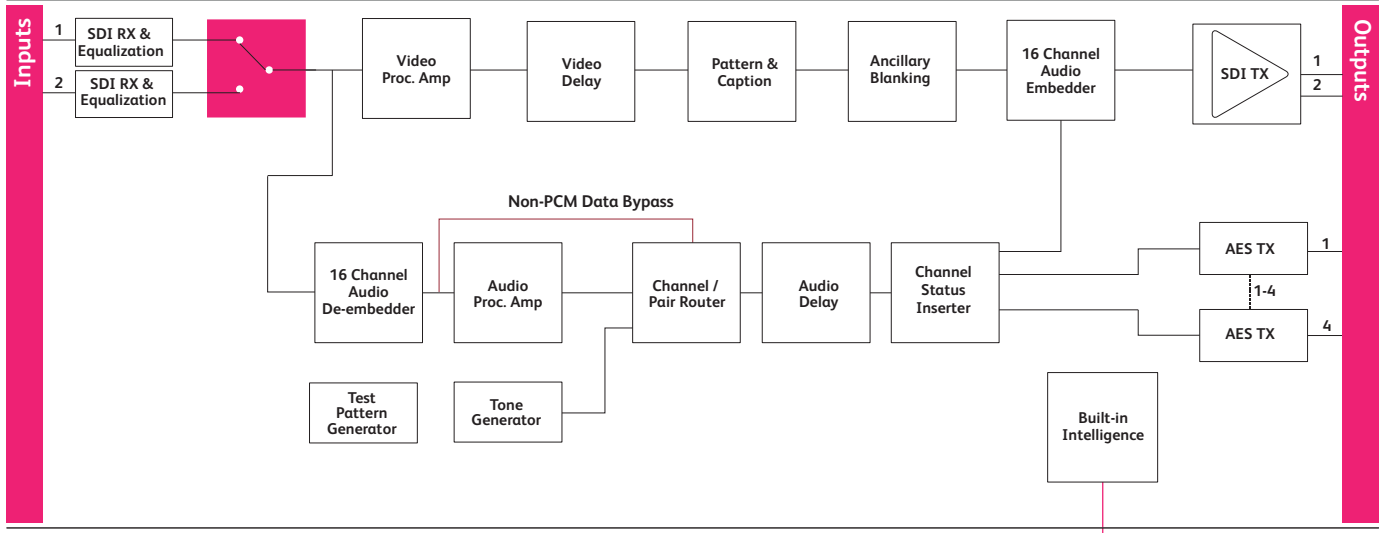
3G/HD/SD-SDI 8 channel AES De-embedder. 2 outputs, 4 Unbalanced AES outputs.



#### **IQDMX3149-1A3, IQDMX3149-1B3**

3G/HD/SD-SDI 8 channel AES De-embedder. 2 outputs, 4 Balanced AES outputs.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDMX3149-1A3

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs & Outputs

##### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s

##### Signal Outputs

SDI Outputs	x 2
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

#### Controls

##### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

#### Controls

##### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type .	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

### Technical Specification cont...

#### Audio Controls

##### Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

##### AES Assignment

AES 1 to 4 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Stereo	Link channel pairs
AES 1 to 4 Polarity L/R	On/Off
AES 1 to 4 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 4 Non-PCM	On/Off
Processed Audio Delay Control	
Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

##### Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

##### Dolby-E

Dolby-E Auto Alignment	On/Off
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##### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

##### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories

##### Default Settings

Resets all module settings to factory specified defaults but does not clear memories

##### Restart

Software restart of the module

##### Module Information

"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

##### Electrical

3Gbit/s SDI, SMPTE 424M  
1.5Gbit/s HD-SDI, SMPTE 292M  
270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI

##### Connector / Format

BNC/ 75ohm panel jack on standard IQ connector panel

##### Return loss

>-15dB (270Mbit/s, 1.5Gbit/s)  
>-10dB (3Gbit/s)

##### Output Jitter

SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)  
3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

##### Video Standards

1125(1080)/50p (A & B), 1125(1080)/59p (A & B)  
750(720)/50p, 750(720)/59p,  
1125(1080)/25i, 1125(1080)/29i  
625(576)/25i, 525(480)/29i

##### Typical Video Delay

SD: 70us  
HD: 38us  
3G-A: 19us  
3G-B: 40us

##### Embedded audio handling.

HD - 24-bit synchronous  
48 kHz to SMPTE 299M  
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

##### Embedded Audio Delay

Minimum (PCM) 2 ms  
Maximum (non-PCM)  
SD: 67us  
HD: 28us  
3G-A: 15us  
3G-B: 25us

##### Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

##### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M

##### Power Consumption

Module Power Consumption	9.5W Max (A Frames) 8.5 PR (B Frames)
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The IQDMX32 is a dual 8 channel digital audio de-embedder for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SDSDI 270 Mbit/s signals. Audio processing features include gain, invert, delay and channel level routing, whilst a video proc. amp is also included in the feature set.

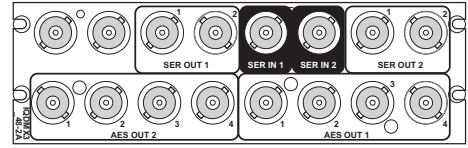
### Features

- Dual 8 channel 3G/HD/SD-SDI de-embedder with 4 balanced or unbalanced AES outputs per channel
- Handles up to 16 channels of embedded audio present on each SDI input
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 3 frames of video delay and 2 seconds of audio delay per channel
- Video controls including video gain and offset
- In-built test pattern and tone generators for each channel
- Up to 2 active HD/SD-SDI outputs per channel
- 16 x user memories per channel, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Compact multi-channel de-embedder for AES audio applications where space is at a premium, in OB environments for example
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQDMX3248-2A3, IQDMX3248-2B3**

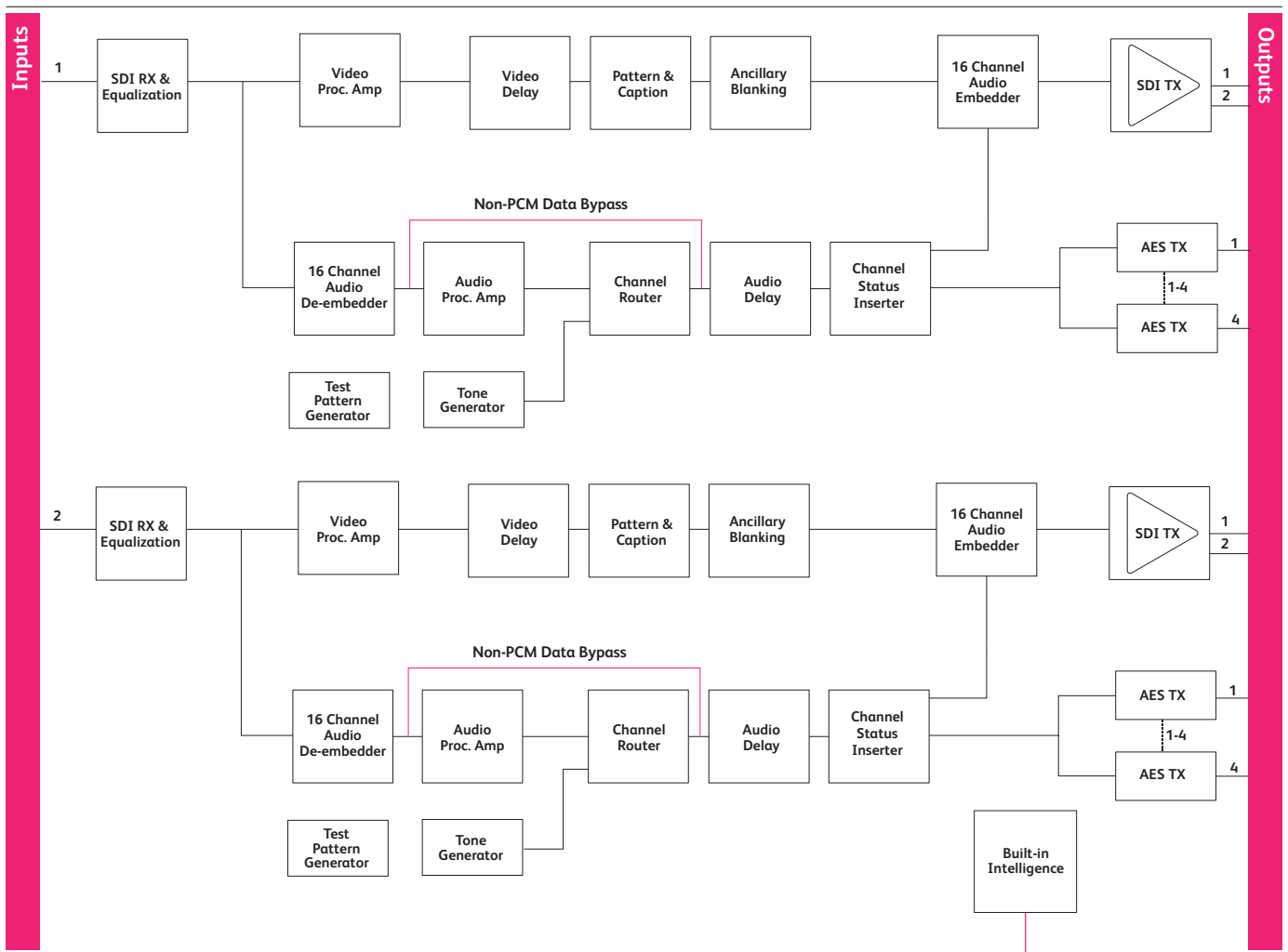
3G/HD/SD-SDI Dual 8 channel AES De-embedder. 2 outputs per input, 4 Unbalanced AES outputs per input.



#### **IQDMX3249-1A3, IQDMX3249-1B3**

3G/HD/SD-SDI Dual 8 channel AES De-embedder. 1 output per input, 4 Balanced AES outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDMX3248-2A3

Network Intelligence, Control & Monitoring

## Technical Specification

### Inputs & Outputs

#### Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 200m Belden 1694A @ 270 Mbit/s

#### Signal Outputs

SDI Outputs	x 2 per Channel
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

### Controls

#### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)

Input 1  
Input 2

OK (Green)  
OK (Green)

### Controls

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
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## Technical Specification cont...

Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good,
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 3 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

**Audio Controls****Embedder Assignment**

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

**AES Assignment**

AES 1 to 4 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Stereo	Link channel pairs
AES 1 to 4 Polarity L/R	On/Off
AES 1 to 4 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 4 Non-PCM	On/Off

**Processed Audio Delay Control**

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

**Tone**

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

**Audio Monitoring**

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

**Other Controls**

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Input Present (1&2), Input1 Select, (1&2) Input2 Select (1&2), Input Loss (1&2), Output525 (1&2), Output 625 (1&2), Output 720p (1&2), Output 1080i (1&2), Output 1080p (1&2), Output Freeze (1&2), Output Unfreeze (1&2), Output Pattern on (1&2), Output pattern off (1&2), Output Caption on (1&2), Output Caption off (1&2), Disemb (Pairs 1-8) PCM (1&2), Disemb (Pairs 1-8) Data (1&2), Disemb (Pairs 1-8) DolbyE (1&2), Disemb (Pairs 1-8) V bit (1&2), Disemb (Pairs 1-8) Loss (1&2)
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version



### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling.	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us
<b>Digital Audio Output (Balanced)</b>	
Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M
<b>Digital Audio Output (Unbalanced)</b>	
Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M
<b>Power Consumption</b>	
Module Power Consumption	12W Max (A Frames) 11 PR (B Frames)

The IQDMX34 provides 8 channel analog audio de-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include gain, invert and channel level routing, whilst a video proc. amp is also included in the feature set.

### Features

- 3G/HD/SD-SDI de-embedder with 8 balanced analog outputs selectable from any of the 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Features include independent gain, invert, mute controls, channel level (Sub-frame) routing, and adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- Up to 9 frames of video delay and 2 seconds of audio delay
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Ideal as a general de-embedder for analog audio monitoring applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

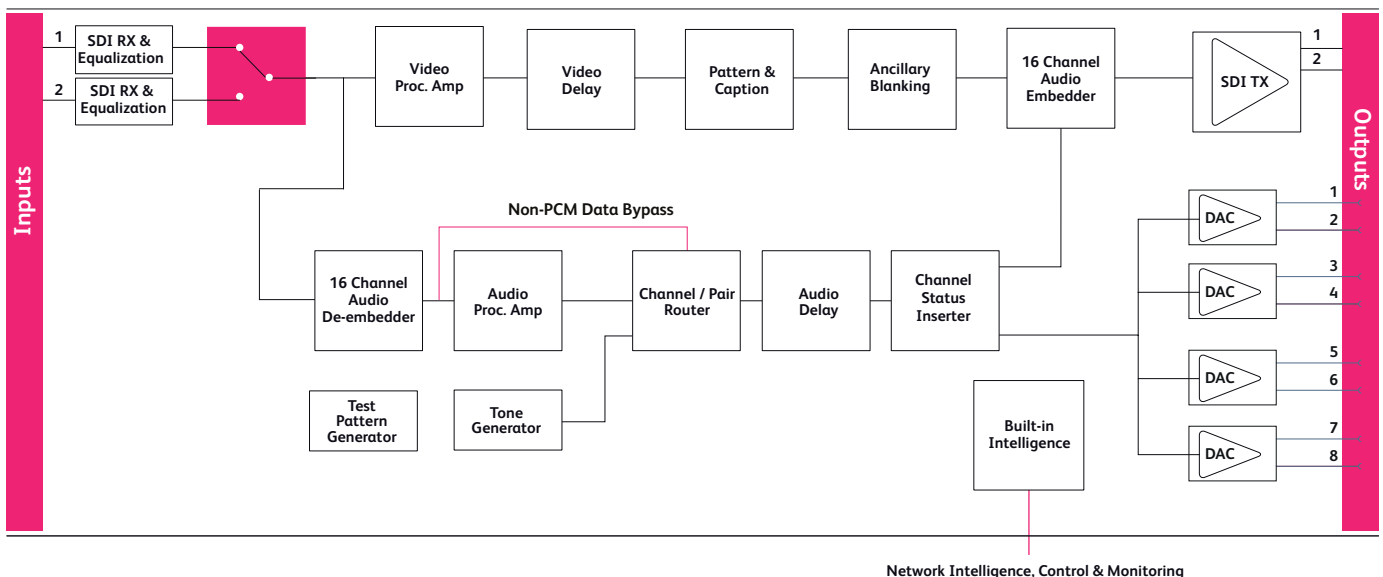
### Order codes



#### **IQDMX3449-1A3, IQDMX3449-1B3**

3G/HD/SD-SDI 8 channel Analog Audio De-embedder. 2 SDI outputs, 8 Balanced Analog outputs

For more details on enclosure types please refer to datasheet IQH3B.



Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s

##### Signal Outputs

SDI Outputs	x 2
Audio Signal Outputs	
Balanced analog audio Outputs	8 channels (25 Way D-Type)

#### Controls

##### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

##### Controls

Video Controls	
Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Video Select	Input 1, Input 2
Audio Select	Video Input 1, Video Input 2, Follow Video
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

#### Audio Controls

##### Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

##### Analog Output Assignment

Channel 1 to 8 Source	Dis-embed 1_1 to 8_2, Tone, Silence
Channel 1 to 8 Stereo	Link channel pairs
Channel 1 to 8 Polarity	On/Off
Channel 1 to 8 Gain	+12 dB to -72 dB in 0.1 dB steps

##### Audio Setup Controls

Analog Output Level	+12 dBU to +24dBU
Note: Output level specified at 0 dBFS line up level	

##### Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

##### Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

##### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

##### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

### Technical Specification cont...

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQconnector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling.	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

#### Analog Audio Outputs

Output Level	Adjustable +12 dBu to +24 dBu
Output Impedance	~25 Ohms
Dynamic Range	114 dB typical
THD+N	-93dB @ +23dBu 800Hz typical
Frequency Response	20Hz-20KHz +0.05dB
Conversion	24-bit sampling @ 48kHz

#### Power Consumption

Module Power	9.5W (A Frames)
Consumption	9.5PR (B Frames)

The IQBRK30 provides 8 channel digital audio de-embedding and re-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Able to select any of the 16 embedded channels, audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal for breaking out embedded audio to AES only devices for processing then re ingesting the resulting feeds back into the SDI domain.

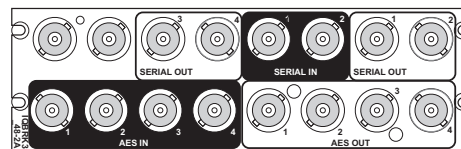
### Features

- 8 channel 3G/HD/SD-SDI re-embedder capable of embedding and de-embedding up to 4 AES signals
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Transparent to all ancillary data inc. VANC metadata
- Input loss detection – default output of black/pattern/freeze
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and up to 4 active HD/SD-SDI outputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Ideal as a re-embedder for stereo, multichannel or Dolby E AES audio applications
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### **IQBRK3048-2A3, IQBRK3048-2B3**

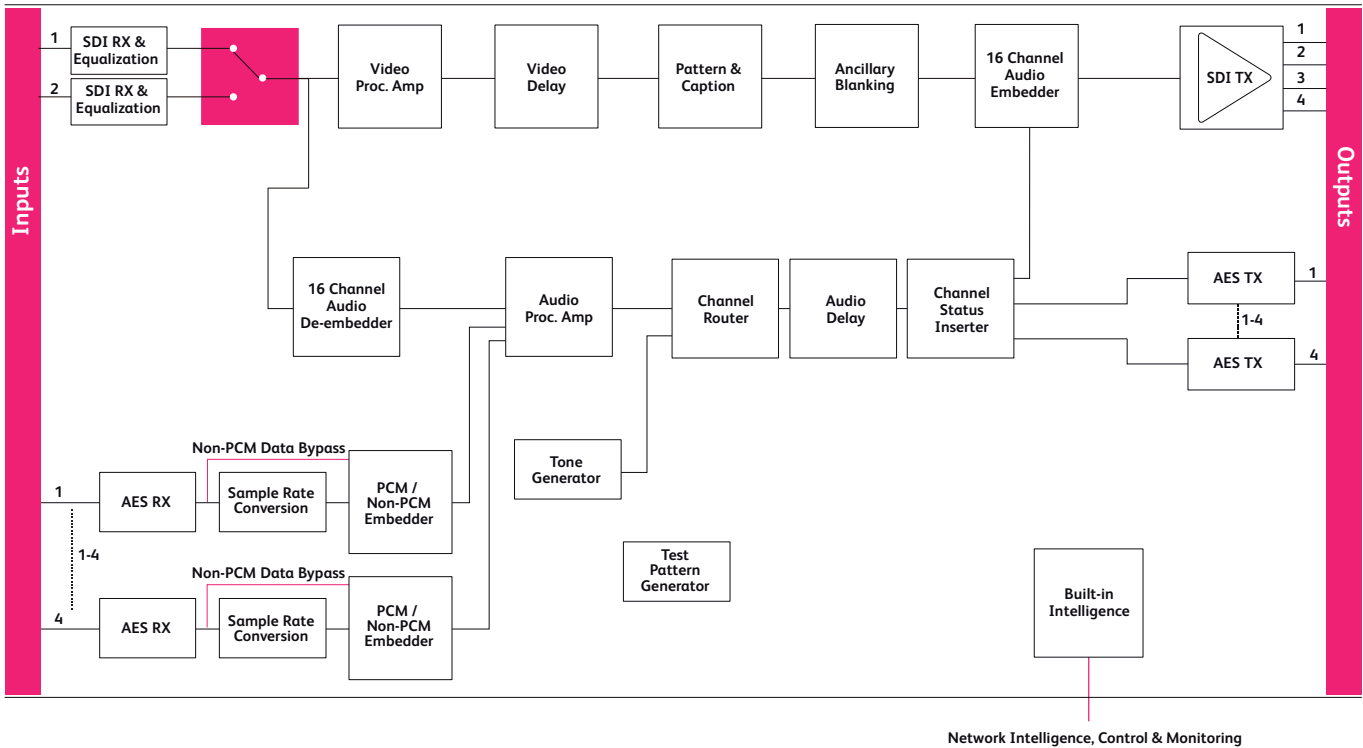
3G/HD/SD-SDI 16 channel AES Re-embedder. 4 SDI outputs, 4 Unbalanced AES inputs, 4 Unbalanced AES outputs



#### **IQBRK3049-1A3, IQBRK3049-1B3**

3G/HD/SD-SDI 16 channel AES Re-embedder. 2 SDI outputs, 4 Balanced AES inputs, 4 Balanced AES outputs

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQBRK3048-2A3

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	8 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	8 x AES/EBU, AC3, Dolby E (25 Way D-Type)

#### Signal Outputs

SDI Outputs	x 2 (4)
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

### Controls

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
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Default Video Output Type .

Default Video Output Standard	Pattern, Freeze, Black
Video Select	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Audio Select	Input 1, Input 2
Manual Freeze	Video Input 1, Video Input 2, Follow Video
Freeze	On/Off
Video Delay Frames	Field/Frame
VANC Data	0 - 9 F
SD VANC Data	Blank VANC
ProcAmp Enable	Line blanking (6 controls)
Black Level	On/Off
Hue Adjust	±100 mV in steps of 0.8 mV
Master Video Gain	±180° in steps of 1°
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

### Technical Specification cont...

#### Audio Controls

##### Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off
AES Assignment	
AES 1 to 4 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Stereo	Link channel pairs
AES 1 to 4 Polarity L/R	On/Off
AES 1 to 4 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 4 Non-PCM	On/Off
Processed Audio Delay Control	
Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

#### Dolby-E

##### Dolby-E Auto

Alignment	On/Off
Tone	
Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring	
Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

#### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, AES (Pairs 1-8) PCM, AES (Pairs 1-8) Data, AES (Pairs 1-8) DolbyE, AES (Pairs 1-8) V bit, AES (Pairs 1-8) Loss, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

#### Digital Audio Input (Balanced)

Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

#### Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked

#### Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

#### Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M

#### Power Consumption

Module Power	
Consumption	8.5 W Max (A Frames) 8.5 PR (B Frames)



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## Distribution

Even within comparatively simple systems, a single video feed will often need to be supplied to a number of different functions. IQ Modular offers a comprehensive series of analog and digital video distribution amplifiers, offering a range of functions and up to 19 outputs from a single input signal.

Digital versions can now operate at 12Gbit/s rates for UHD signal handling, 3Gbit/s rates for 1080p applications as well as 1.5 Gbit/s HD-SDI, 270 Mbit/s SDI or MPEG-ASI. They can be specified with a reclocking capability to minimize jitter in the ongoing picture. They also feature input equalization to allow the use of long cable runs.

Separate audio signals, whether analog or digital, form a significant element of most facilities' systems. The IQ Modular range provides a choice of audio distribution amplifiers suitable for use with either the AES/EBU digital format or with analog signals.

For Related Modules see:  
IQHIP10 in Intelligent Monitoring  
IQFDA30 in Fiber  
IQFDA31 in Fiber  
IQOTX80-84 in Fiber  
IQORX80 in Fiber  
IQOTR40-45 in Fiber

The IQSDA41 is a single or dual channel SDI distribution amplifier for UHD-1 12Gbit/s, HD 3 Gbit/s, 1.5 Gbit/s or SD 270 Mbit/s signals providing up to 9 equalized and re-clocked outputs of the input in a single width package. Its 60m 12G, 80m 3G, 180m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications.

### Features

- Intelligent UHD-1 12Gbit/s, HD 3 Gbit/s or 1.5 Gbit/s and SD-SDI re-clocking distribution amplifier
- Configurable as 1 input to 9 outputs, or 2 inputs with 4 outputs per input
- Equalizes up to 60m at 12Gbit/s, 80m at 3 Gbit/s, 180m at 1.5 Gbit/s and more than 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 12G UHD-1 to SMPTE 2082
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

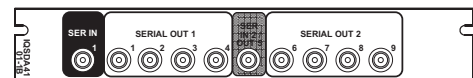
- Space efficient design with 9 outputs of the input in single width, allowing 16 modules in 3RU or 4 in 1RU
- Useful for critical installation thanks to outstanding input equalization capability
- Operation at SMPTE 2082 12Gbit/s data rates allows future proof system design
- Built in Fiber option allows increased receive and transmit distances for long reach applications

### Order codes



#### IQSDA4100-1B4

12G/3G/HD/SD-SDI Re-clocking Distribution Amplifier. 1 input, 7 outputs or 2 inputs 3 outputs per input, 2 optical inputs or 2 optical outputs.



#### IQSDA4101-1B4

12G/3G/HD/SD-SDI Re-clocking Distribution Amplifier. 1 input, 9 outputs or 2 inputs 4 outputs per input

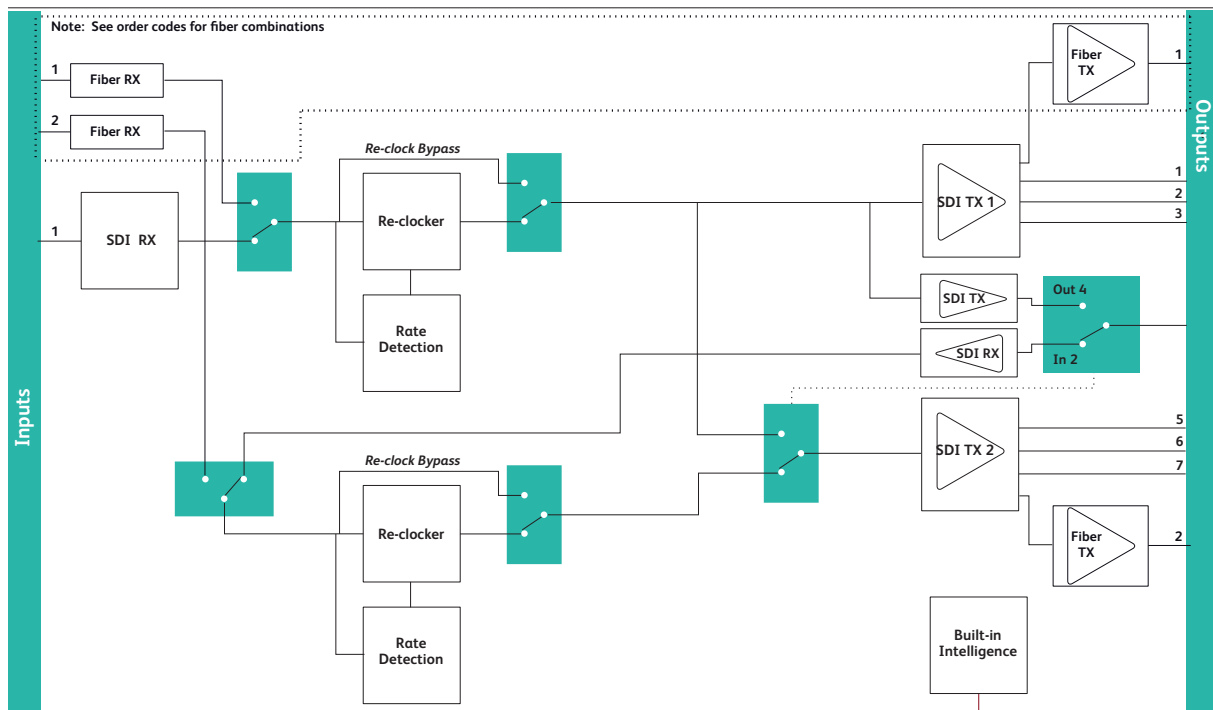
#### SFP Options:

FC1-13TR-12G Fiber transceiver 1 x 12G Rx, 1 x 12G Tx (1310nm)

FC1-13T2-12G Fiber transceiver 2 x 12G Tx (1310nm)

FC1-13R2-12G Fiber transceiver 2 x 12G Rx

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQSDA4100-1B4

Network Intelligence, Control & Monitoring

The IQSDA42 is a configurable single, dual or quad channel SDI distribution amplifier for UHD-1 12Gbit/s, HD 3 Gbit/s, 1.5 Gbit/s or SD 270 Mbit/s signals providing up to 19 equalized and re-clocked outputs of the input in a single width package. Its 60m 12G, 80m 3G, 180m HD input equalization performance coupled with excellent packing density make it ideal for signal dense distribution applications.

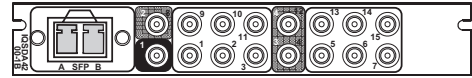
### Features

- Intelligent UHD-1 12Gbit/s, HD 3 Gbit/s or 1.5 Gbit/s and SD-SDI re-clocking distribution amplifier
- Configurable as 1 input to 19 outputs, or 2 inputs with 9 outputs per input, or 4 inputs with 4 outputs per input
- Equalizes up to 60m at 12Gbit/s, 80m at 3 Gbit/s, 180m at 1.5 Gbit/s and more than 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 12G UHD-1 to SMPTE 2082
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

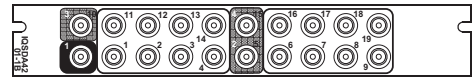
- Extremely space efficient and flexible design with up to 19 outputs of a single input, or 4 channels of signal distribution in a single width solution
- Operation at SMPTE 2082 12Gbit/s data rates allows future proof system design
- Built in Fiber option allows increased receive and transmit distances for long reach applications

### Order codes



#### **IQSDA4200-1B4**

Multi-channel 12G/3G/HD/SD-SDI Re-clocking Distribution Amplifier. 1 input, 15 outputs, 2 inputs 7 outputs per input or 4 inputs 3 outputs per input. 1 optical input and 1 optical output.



#### **IQSDA4201-1B4**

Multi-channel 12G/3G/HD/SD-SDI Re-clocking Distribution Amplifier. 1 input, 19 outputs, 2 inputs 9 outputs per input or 4 inputs 4 outputs per input.

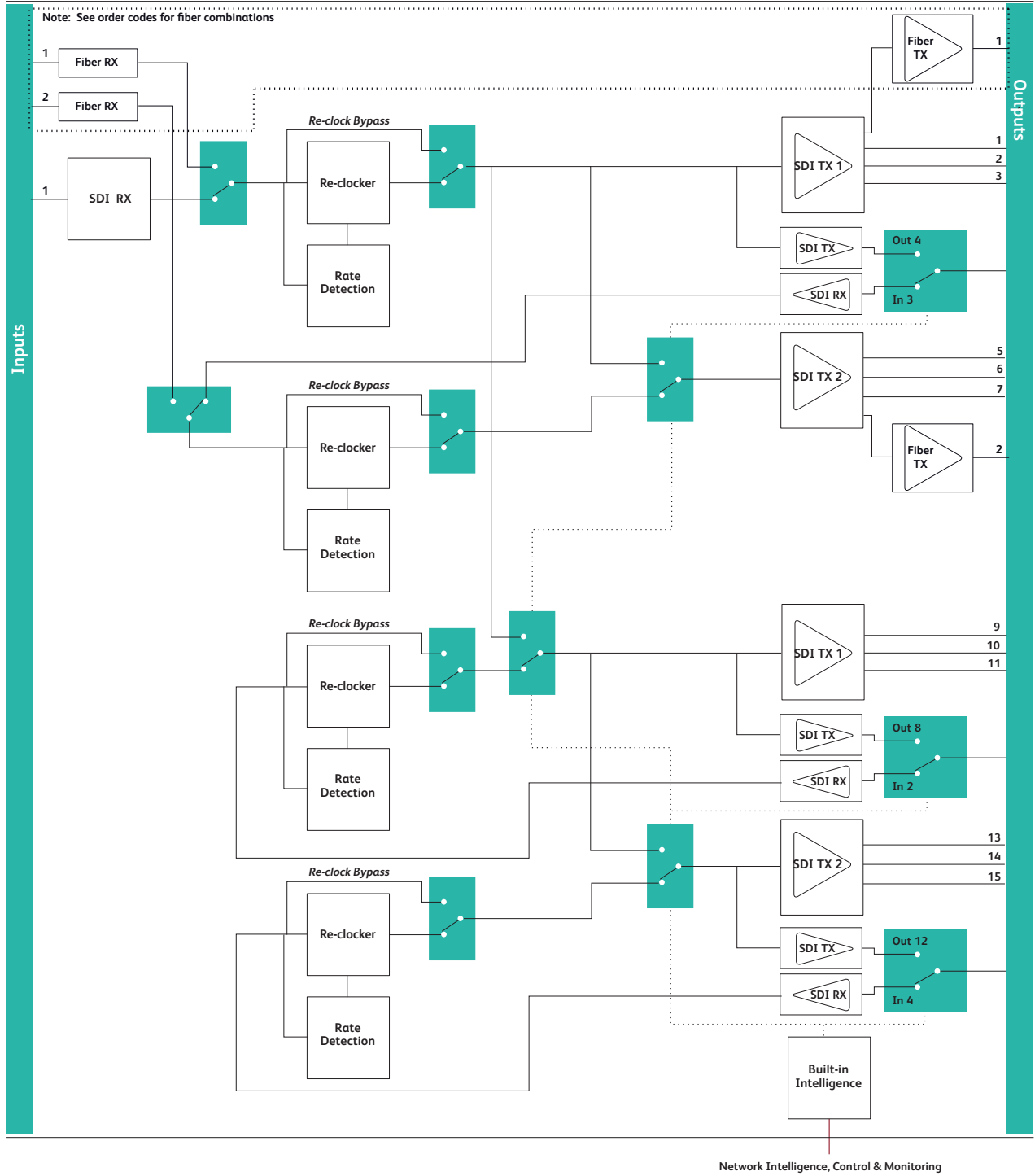
#### **SFP Options:**

FC1-13TR-12G Fiber transceiver 1 x 12G Rx, 1 x 12G Tx (1310nm)

FC1-13T2-12G Fiber transceiver 2 x 12G Tx (1310nm)

FC1-13R2-12G Fiber transceiver 2 x 12G Rx

For more details on enclosure types please refer to Frames and Hardware section.



The IQSDA35 provides dual channel distribution for HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals with flexible routing of inputs to outputs. Input signal loss detection enables switching from a main to back-up feed automatically, providing emergency changeover functionality. Flexible output selection enables the IQSDA35 to be used either as a single channel DA with 12 outputs, or in dual channel mode with 6 outputs per input. An HD/SD-SDI version is available for HD/SD only applications, with an option to upgrade firmware for 3Gbps operation when required.

### Features

- Single or dual channel 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Flexible selection of inputs allows single or dual channel operation
- Input signal monitoring allows auto-changeover functionality to provide emergency switching
- Equalizes up to 70m at 3 Gbit/s, 140m at 1.5 Gbit/s and 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
- Emergency input bypass option enables the SDI input signal to be passed through to SDI output 1 in the event of frame power failure or module removal
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

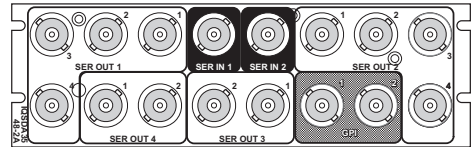
- Outputs can be grouped for selection from either input allowing flexibility for expansion or changes in distribution requirements
- Input loss detection enables automatic switching between inputs to provide emergency back-up changeover functionality
- Can be used for current HD/SD systems that will later upgrade to 1080p50/60 workflows
- Emergency input to output bypass option allows added protection for critical signal paths or 24/7 operations

### Order codes



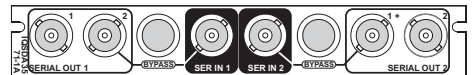
#### **IQSDA3547-1A3, IQSDA3547-1B3**

Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs. 2 inputs, 6 outputs selectable per input.



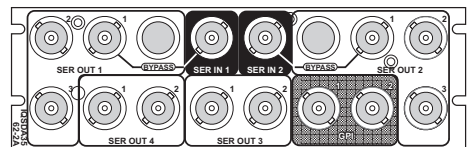
#### **IQSDA3548-2A3, IQSDA3548-2B3**

Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs. 2 inputs, 12 outputs selectable per input.



#### **IQSDA3571-1A3, IQSDA3571-1B3**

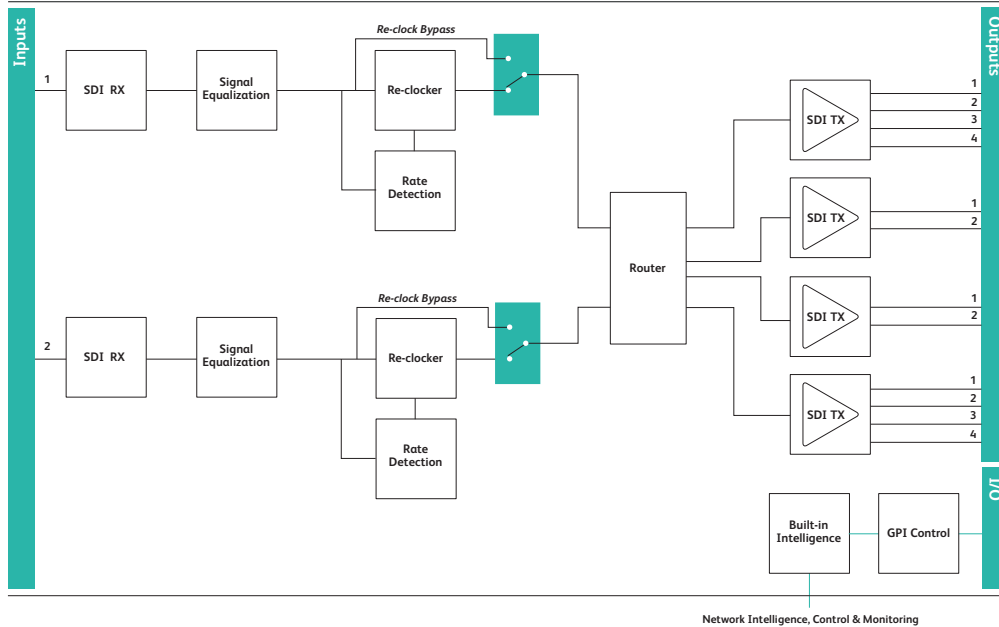
Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs and relay bypass. 2 inputs, 4 outputs selectable per input.



#### **IQSDA3562-2A3, IQSDA3562-2B3**

Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs and relay bypass. 2 inputs, 10 outputs selectable per input.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQSDA3548-2A3

## Technical Specification

### Inputs and Outputs

#### Signal Input

SDI input	2 x
Input cable length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 140m Belden 1694A @ 1.5 Gbit/s Up to 350m Belden 1694A @ 270 Mbit/s

Note: When using mixed HD and SD inputs it is recommended that cable lengths do not exceed the HD specification of 140m.

#### Signal Outputs

SDI outputs	x 12 Group selectable per input
ASI Compatible Outputs	IQSDA3547-1A/B - Serial Out 1/1, Serial out 2/1, 2/2 IQSDA3548-2A/B - Serial out 1/1, 1/4, Serial out 2/1, 2/2, Serial out 3/1, Serial out 4/2 IQSDA3557-1A/B - Serial out 2/1 IQSDA3562-2A/B - Serial out 1/4, Serial out 2/2, Serial out 3/1, Serial out 4/2

#### Control Interface

GPI	Up to 2 x GPI (I/O configurable)
Electrical	TTL compatible, active low driven
Connector / format	BNC/75 ohm panel jack on standard SAM connector panel

### Controls

#### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
Input 2	OK (Green), Bypass (Orange), Loss (Red)

#### RollCall Functions

Input 1 (2) rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1 select	Input 1, 2
Output 2 select	Input 1, 2
Output 3 select	Input 1, 2
Output 4 select	Input 1, 2
Input status	Present, Loss, Unknown, Data Rate

### Logging

Input 1 (2) Type	
Input 1 (2) Data Rate	
Input 1 (2) Present	
Input 1 (2) Error	
Input 1 (2) Loss	
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Unused Input 1 (2) Present Input 1 (2) Rate Unknown Input 1 (2) Error Input 1 (2) Loss Input 1 (2) 3G Input 1 (2) HD Input 1 (2) SD

### Other Controls

GPI input	Activates on contact closure: - select config 1 or 2
GPI output	Produces an output for: Config 1 selected, Config 2 selected, Input 1 error, Input 2 error
User memories	Name, save and recall 16 user memories

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

### Power Consumption

Module power consumption	4 W max (A Frames) 4 PR (B Frames) 5W (PR) max
with relay rear	



The IQSDA30 provides dual inputs with 3 outputs per input for distribution of HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals in a single width package. Its 80m 3G, 180m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications. For HD/SD only applications a HD/SD-SDI version is available, with an option to upgrade firmware for 3Gbps operation when required.

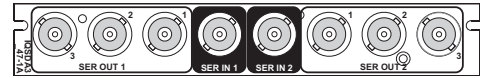
### Features

- Dual channel Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 180m at 1.5 Gbit/s and more than 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
- RollCall monitoring allows all signal paths to be managed
- Extremely compact – up to 32 channels in 3RU - for use where space is at a premium

### Why should you choose this module?

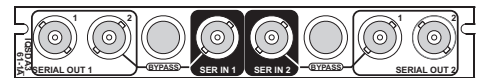
- The IQSDA30 is extremely space efficient providing an incredible density of HD/SD-SDI outputs and distribution channels at 32 per rack unit and 10.6 per rack unit respectively
- Useful for critical installation thanks to outstanding input equalization capability
- Can be used for current HD/SD systems that will later upgrade to 1080p50/60 workflows

### Order codes



#### **IQSDA3047-1A3, IQSDA3047-1B3**

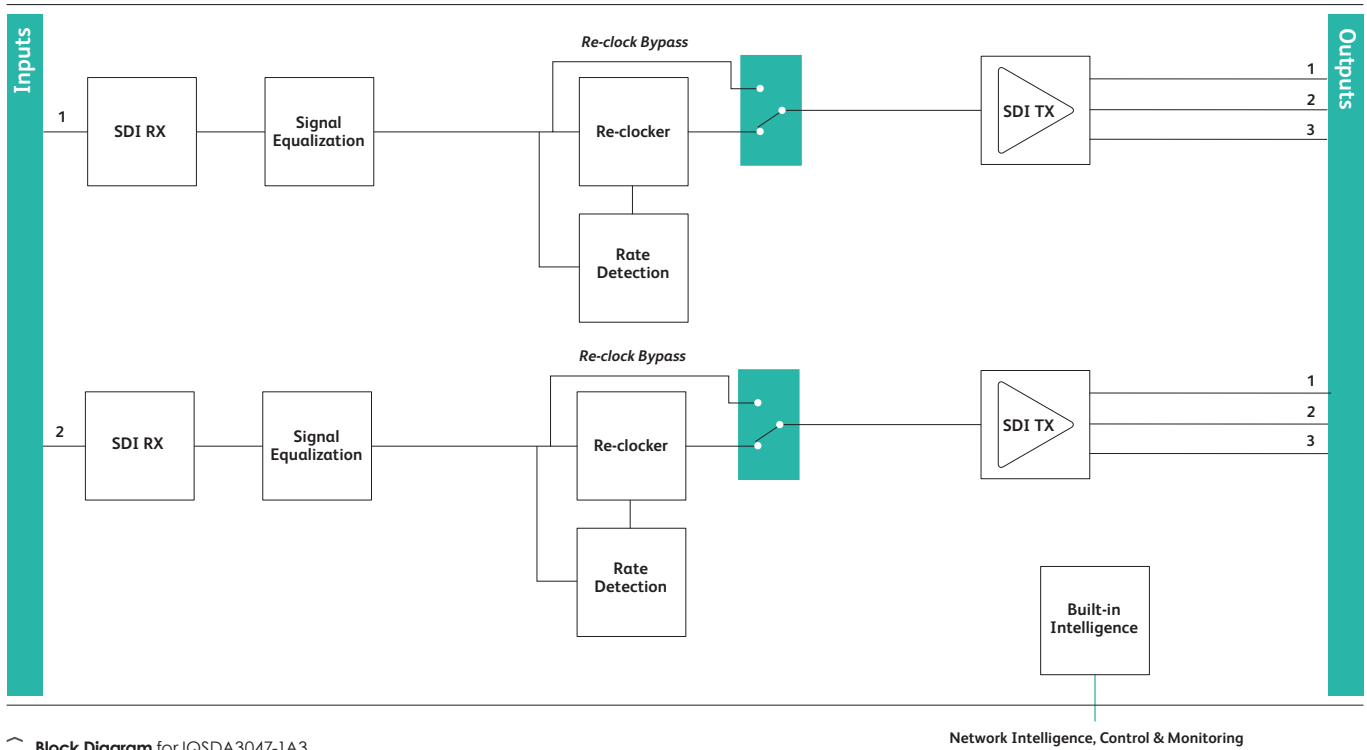
Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier. 2 inputs, 3 outputs per input.



#### **IQSDA3061-1A3, IQSDA3061-1B3**

Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with relay input bypass. 2 inputs, 2 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQSDA3047-1A3

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Input

SDI inputs 2 x  
 Input cable length Up to 80m Belden 1694A @ 3 Gbit/s  
 Up to 180m Belden 1694A @ 1.5 Gbit/s  
 >350m Belden 1694A @ 270 Mbit/s

##### Signal Outputs

SDI outputs x 3 per input

#### Controls

##### Indicators

Power OK (Green)  
 CPU OK (Green flashing)  
 Input 1 OK (Green), Bypass (Orange), Loss (Red)  
 Input 2 OK (Green), Bypass (Orange), Loss (Red)

##### RollCall Functions

Input 1 (2) select Auto, 3G, HD, SD, DVB-ASI, Bypass (re-clocking off)  
 Input status Present, Loss/Unknown, Data Rate  
 Logging Input 1 (2) Type  
 Input 1 (2) Data Rate  
 Input 1 (2) Present  
 Input 1 (2) Error  
 Input 1 (2) Loss

##### RollTrack controls

On/Off, Index, Source, Address, Command, Status, Sending

##### RollTrack outputs

Unused  
 Input 1 (2) Present  
 Input 1 (2) Rate Unknown  
 Input 1 (2) Loss  
 Input 1(2) 3G  
 Input 1(2) HD  
 Input 1(2) SD

##### Other Controls

User memories Name, save and recall 16 user memories

#### Specifications

##### Electrical

3Gbit/s SDI, SMPTE 424M  
 1.5Gbit/s HD-SDI, SMPTE 292M  
 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI  
 Connector / format BNC/ 75ohm panel jack on standard SAM connector panel  
 Return loss >-15dB (270Mbit/s, 1.5Gbit/s)  
 >-10dB (3Gbit/s)  
 Output jitter SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)  
 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

##### Power Consumption

Module power consumption 3 W Max (A frames)  
 4 W Max with relay rear (A frames)  
 3 PR Max (B Frames)  
 3 PR Max with relay rear (B frames)

The IQSDA32 is a distribution amplifier for HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals providing 7 equalized and re-clocked outputs of the input in a single width package. Its 80m 3G, 180m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications. For HD/SD only applications a HD/SD-SDI version is available, with an option to upgrade firmware for 3Gbps operation when required.

### Features

- Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 180m at 1.5 Gbit/s and more than 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
- Emergency input bypass option enables the SDI input signal to be passed through to SDI output 2 in the event of frame power failure or module removal
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

- Space efficient design with 7 outputs of the input in single width, allowing 16 modules in 3RU or 4 in 1RU
- Useful for critical installation thanks to outstanding input equalization capability
- Operation at SMPTE 424M data rates allows future proof system design
- Emergency input to output bypass option allows added protection for critical signal paths or 24/7 operations

### Order codes

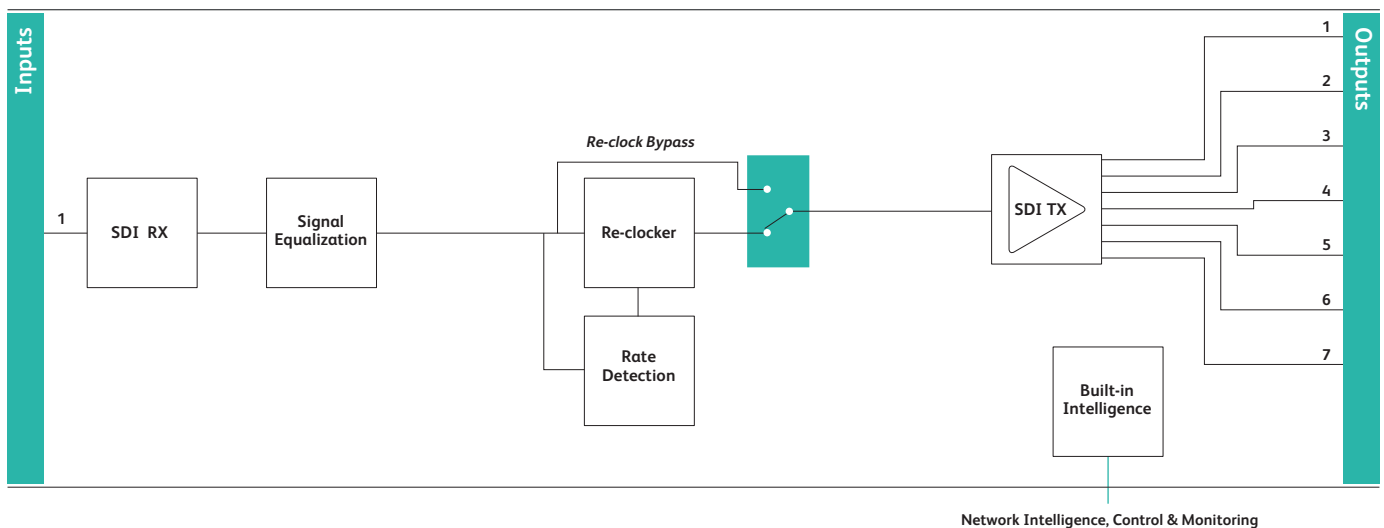


**IQSDA3247-1A3, IQSDA3247-1B3**  
3G/HD/SD-SDI Re-clocking Distribution Amplifier. 1 input, 7 outputs.



**IQSDA3261-1A3, IQSDA3261-1B3**  
3G/HD/SD-SDI Re-clocking Distribution Amplifier with Relay Bypass. 1 input, 6 outputs.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQSDA3247-1A3

### Technical Specification

#### Inputs and Outputs

##### Signal Input

SDI input	1 x
Input cable length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 180m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s

##### Signal Outputs

SDI outputs	x 7 (1, 3, 5, 7 DVB-ASI compatible)
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#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input	OK (Green), Bypass (Orange), Loss (Red)

##### RollCall Functions

Input select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off)
Input status	Present, Loss/Unknown, Data Rate
Logging	Input Type Input Data Rate Input Present Input Error Input Loss
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Unused Input Present Input Rate Unknown Input Loss Input 3G Input HD Input SD

##### Other Controls

User memories	Name, save and recall 16 user memories
---------------	--

#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

##### Power Consumption

Module power consumption	3 W max (A Frames) 3 PR (B Frames)
With Relay Rear	3.5W max

The IQSDA31 provides dual inputs with 3 outputs per input for distribution of HD-SDI 3 Gbit/s and 1.5 Gbit/s or 270 Mbit/s SD-SDI signals in a single width package.

### Features

- Dual channel 3G-HD, HD-SDI, SD-SDI and wide-band distribution amplifier
- Equalizes SDI signals from 270 Mbit/s up to 3 Gbit/s
- Extremely compact – up to 32 channels in 3RU - for use where space is at a premium

### Why should you choose this module?

- The IQSDA31 is extremely space efficient providing an incredible density of HD/SD-SDI outputs and distribution channels at 32 per rack unit and 10.6 per rack unit respectively
- Suitable for local fan out distribution applications

### Order codes



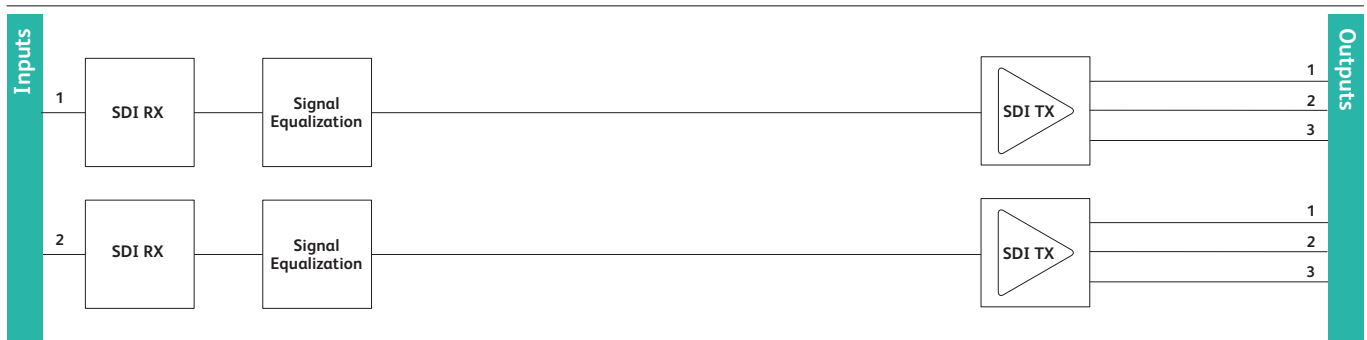
#### **IQSDA3147-1A3, IQSDA3147-1B3**

Dual Channel 3G/HD/SD-SDI Equalizing Distribution Amplifier. 2 inputs, 3 outputs per input.



#### **IQSDA3161-1A3, IQSDA3161-1B3**

Dual Channel 3G/HD/SD-SDI Equalizing Distribution Amplifier with relay input bypass. 2 inputs, 2 outputs per input.



Block Diagram for IQSDA3147-1A3

### Technical Specification

#### Inputs and Outputs

##### Signal Input

SDI inputs 2 x  
 Input cable length Up to 250m Belden 1694A @ 270 Mbit/s  
 Up to 100m Belden 1694A @ 1.5 Gbit/s  
 Recommended for local fan out distribution only at 3 Gbit/s

Signal Outputs  
 SDI outputs x 3 per input

##### Controls

##### Indicators

Power OK (Green)

##### Card Edge Controls

Slew rate switch SD/HD

##### Roll/Call Functions

N/A

#### Specifications

Electrical 1.5Gbit/s HD-SDI, SMPTE 292M  
 270 Mbit/s SDI, SMPTE 259M-C

Connector / format BNC/ 75ohm panel jack on standard SAM connector panel

Return loss >-15dB (270Mbit/s, 1.5Gbit/s)  
 >-10dB (3Gbit/s)

Power Consumption  
 Module power consumption 3 W Max (A frames)  
 4 W Max with relay rear (A frames)  
 3 PR Max (B Frames)  
 3 PR Max with relay rear (B frames)

The IQSDA33 is a fan-out distribution amplifier for HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals providing 7 equalized outputs of the input in a single width package.

### Features

- 3G-HD, HD-SDI, SD-SDI and wide-band distribution amplifier
- Equalizes SDI signals from 270 Mbit/s up to 3 Gbit/s

### Why should you choose this module?

- Space efficient design with 7 outputs of the input in single width, allowing 16 modules in 3RU or 4 in 1RU
- Suitable for local fan out distribution applications

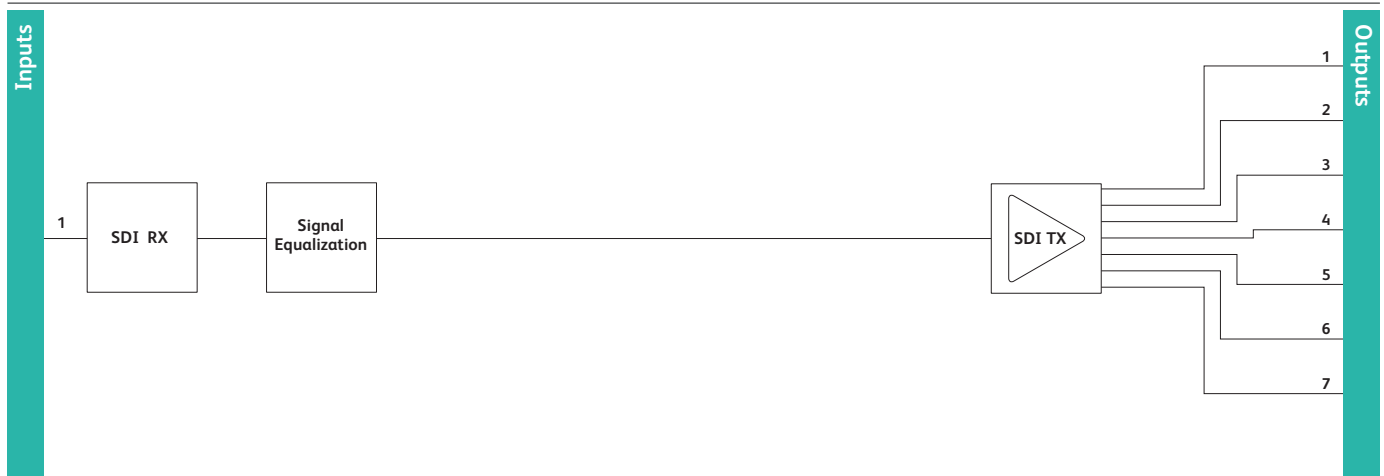
### Order codes



#### **IQSDA3347-1A3, IQSDA3347-1B3**

HD/SD-SDI Fan-out Distribution Amplifier.  
1 input, 7 outputs.

For more details on enclosure types please refer to Frames and Hardware section.



^ Block Diagram for IQSDA3347-1A3

## Technical Specification

### Inputs and Outputs

#### Signal Input

HD / SD-SDI input	1 x
Input cable length	Up to 250m Belden 1694A @ 270 Mbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Recommended for local fan out distribution only at 3 Gbit/s

#### Signal Outputs

HD / SD-SDI outputs	x 7
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### Controls

#### Indicators

Power	OK (Green)
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#### Card Edge Controls

Slew rate switch	SD/HD
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#### RollCall Functions

N/A

### Specifications

Electrical	1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)

### Power Consumption

Module power consumption	3 W Max (A Frames) 3 PR (B Frames)
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The IQSDA34 provides three inputs with 4 outputs per input for distribution of 1080p 3 Gbit/s SDI, HD-SDI 1.5 Gbit/s or 270 Mbit/s SD-SDI signals in a double width package. Its 70m 3G, 140m HD-SDI input equalization performance and non re-clocking distribution of wide-band signals makes it ideal for all current distribution applications.

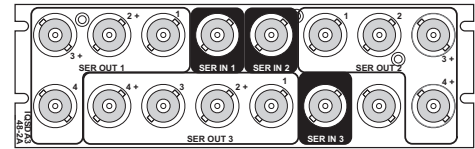
### Features

- Triple channel Intelligent 3G-SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Equalizes up to 70m at 3 Gbit/s, 140m at 1.5 Gbit/s and 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 1080p SDI to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
- Switchable option to connect channels together producing 1 input to 12 outputs, or 2 inputs with 8 and 4 outputs respectively
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

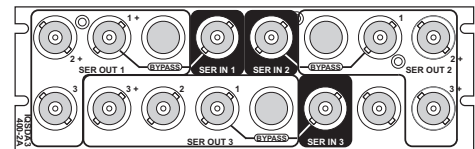
- The IQSDA34 is extremely space efficient providing 4 outputs per input and a density of 24 channels in 3U
- Operation at SMPTE 424M data rates allows future proof system design
- Flexible output switching allows the module to adapt should distribution requirements change

### Order codes



#### IQSDA3448-2A3, IQSDA3448-2B3

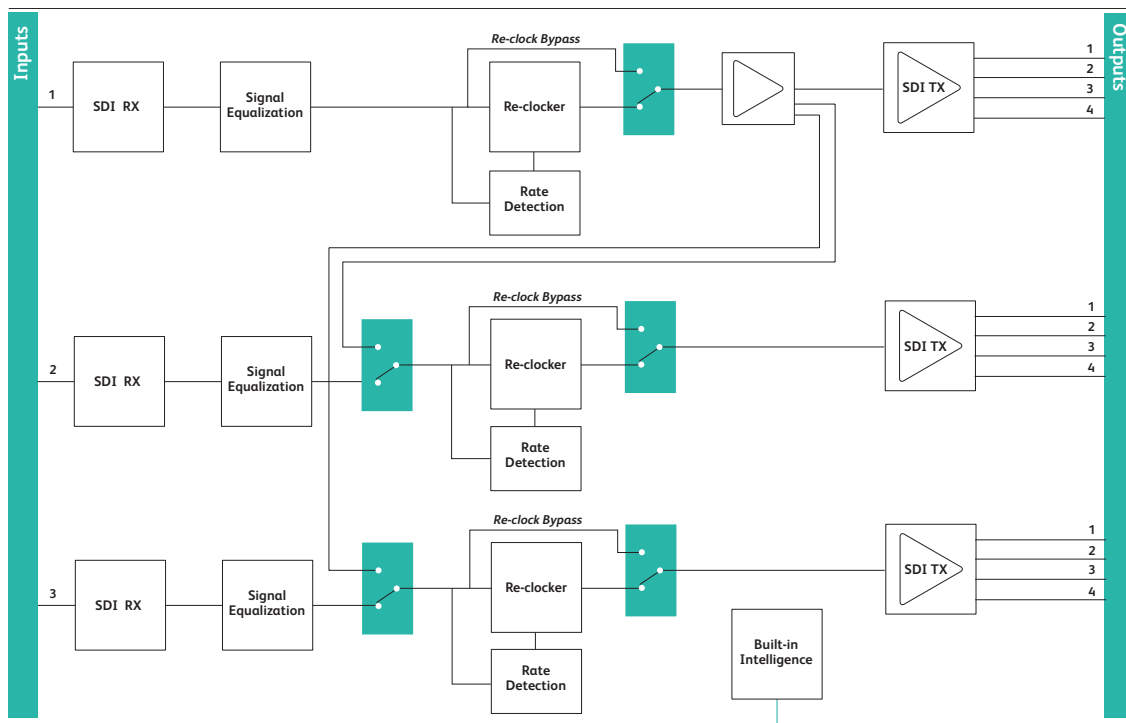
Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier. 3 inputs, 4 outputs per input.



#### IQSDA3400-2A3, IQSDA3400-2B3

Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with relay input bypass. 3 inputs, 3 outputs per input.

For more details on enclosure types please refer to Frames and Hardware Section.



Block Diagram for IQSDA3448-2A3

Network Intelligence, Control & Monitoring



### Technical Specification

#### Inputs and Outputs

##### Signal Input

SDI input	3 x
Input cable length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 140m Belden 1694A @ 1.5 Gbit/s Up to 350m Belden 1694A @ 270 Mbit/s

**Note: When using mixed HD and SD inputs it is recommended that cable lengths do not exceed the HD specification of 140m.**

##### Signal Outputs

SDI outputs	x 4 per input
ASI Compatible Outputs	IQSDA3448-2A/B - Serial out 1/2, 1/3, Serial out 2/3, 2/4, Serial out 3/2, 3/4 IQSDA3400-2A/B - Serial out 1/1, 1/2, Serial out 2/2, 2/3, Serial out 3/3

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
Input 2	OK (Green), Bypass (Orange), Loss (Red)
Input 3	OK (Green), Bypass (Orange), Loss (Red)

##### RollCall Functions

Input 1 (2) select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off)
Input status	Present, Loss/Unknown, Data Rate
Logging	Input 1 (2, 3) Type Input 1 (2, 3) Data Rate Input 1 (2, 3) Present Input 1 (2, 3) Error Input 1 (2, 3) Loss
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Unused Input 1 (2, 3) Present Input 1 (2, 3) Rate Unknown Input 1 (2, 3) Loss Input 1 (2, 3) 3G Input 1 (2, 3) HD Input 1 (2, 3) SD

#### Other Controls

User memories	Name, save and recall 16 user memories
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#### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

#### Power Consumption

Module power consumption:	
IQSDA3448-2A3	5W Max (A frames)
IQSDA3448-2B3	5 PR Max (B Frames)
IQSDA3400-2A3	6W Max (A frames)
IQSDA3400-2B3	5 PR Max (B Frames)

The IQSDA10/11 provides up to fifteen re-clocked equalized outputs operating with 270 Mbit/s SDI signals, or seven non-inverting outputs suitable for 270 Mbit/s DVB-ASI signals. Dual channel version available with three outputs per input.

### Features

- Performs equalization and re-clocking of serial 4:2:2 and DVB-ASI signals
- Provides up to 15 buffered outputs for SDI signals and 7 for DVB-ASI signals
- Input equalizer and re-clocking allows for use as a line receiver/distribution amplifier
- Input signal loss indicator
- Single and dual channel versions available
- RollCall remote control and monitoring

### Why should you choose this module?

- Re-clocking distribution amplifier ensures there are no jitter problems in the system
- Dual channel version ideal for monitoring or space constrained applications
- Input equalization ensure maximum cable lengths can be used
- Can be used in either serial 4:2:2 or DVB-ASI systems
- Fan-out can be either 7 or 15, depending on the chosen module version
- RollCall remote control and monitoring

### Order codes



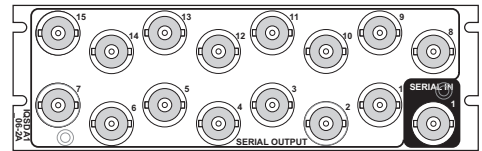
#### **IQSDA1001-1A**

Reclocking SDI/DVB-ASI DA with RollCall control and monitoring. 1 SDI/DVB-ASI input, 7 SDI/DVB-ASI outputs.



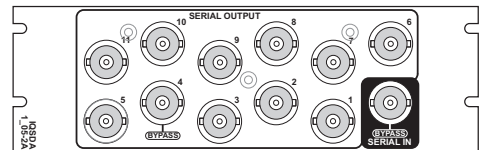
#### **IQSDA1101-1A**

Reclocking SDI DA with RollCall control and monitoring. 2 SDI/DVB-ASI inputs, 3 SDI/DVB-ASI outputs per input.



#### **IQSDA1006-2A**

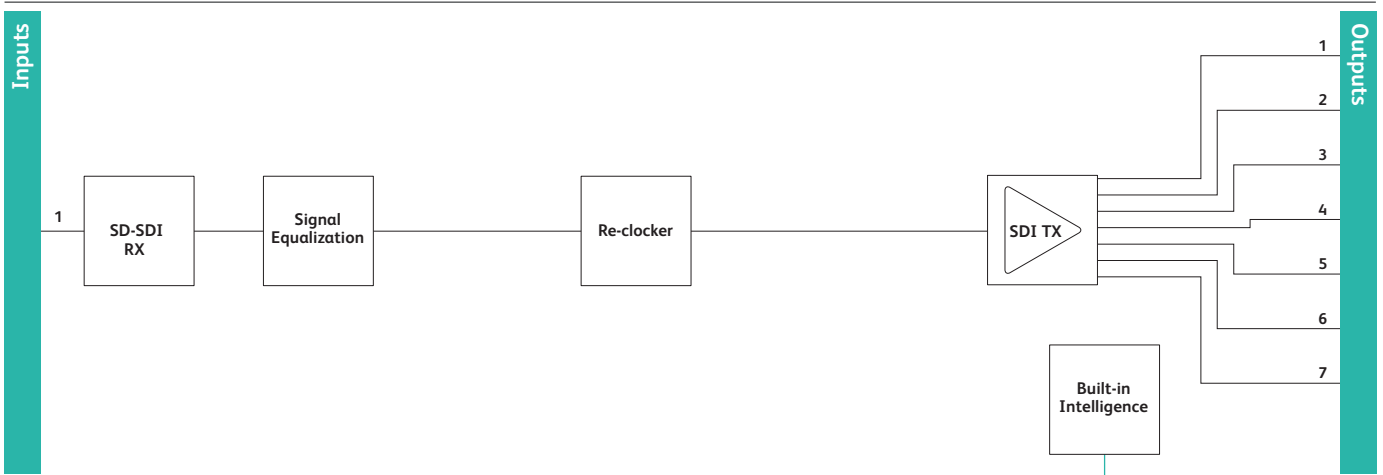
Reclocking SDI DA with RollCall control and monitoring. 1 SDI input, 15 SDI outputs (outputs 1-7 DVB-ASI compatible).



#### **IQSDA1005-2A**

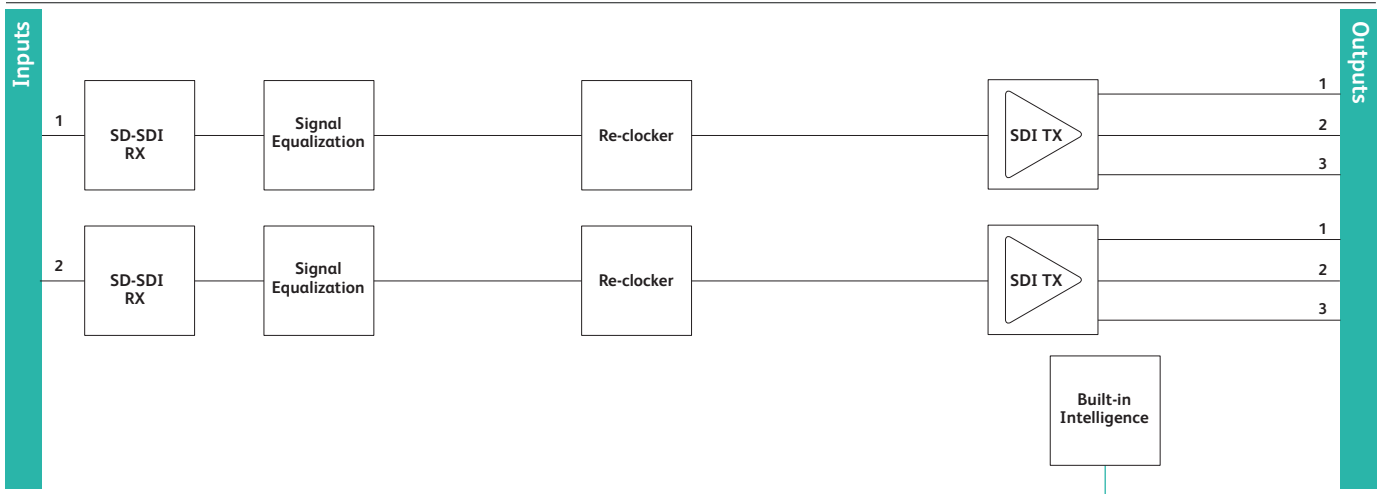
Reclocking SDI DA with RollCall control and monitoring. 1 SDI input, 10 SDI outputs, relay bypass for input to output 4.

For more details on enclosure types please refer to Frames and Hardware Section.



^ Block Diagram for IQSDA1001-1A

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^ Block Diagram for IQSDA1101-1A

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Standards	SMPTE 259M-C-1997, DVB-ASI
Connector / format	BNC/75ohm panel jack on standard SAM connector panel

##### Signal Outputs

Serial digital	IQSDA1001-1A: 7 SDI/DVB-ASI, IQSDA1006-2A: 15 SDI (1-7 DVB-ASI compatible), IQSDA1005-2A: 11 SDI (1-5 DVB-ASI compatible), relay bypass on output 4, IQSDA1000-1: 5 SDI/DVB-ASI, IQSDA1002-2: 11 SDI (1-5 DVB-ASI compatible), IQSDA1101-1A: 3 SDI/DVB-ASI per input
Standards	SMPTE 259M-C-1997, DVB-ASI
Connector / format	BNC/75ohm panel jack on standard SAM connector panel

Note: Do not cascade more than 5 modules when using relay bypass rear panel version.

#### Card Edge and RollCall Controls

##### Functions Available via RollCall Only

Input status	Present, Loss
Logging	Input status
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs (1-16)	Unused Input OK Input Lost

##### Indicators

Status	OK (Green), Warning (Yellow), Error (Red)
--------	---

##### Specifications

Input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	220 m (up to 150m combined input and output cable length, relay bypass version)
Output return loss	Better than 15 dB to 270 MHz
Insertion delay	20 ns nominal
SDI output level	800 mV nominal

##### Power Consumption

Module power consumption	IQSDA10 - 3.5 W (A Frames) 3 PR (B Frames) IQSDA10 relay bypass - 4.25 W (PR)
	IQSDA11 - 4 W (A Frames) IQSDA11 -4 PR (B Frames)

The IQVDA00 provides up to 14 equalized analog video outputs. Features include; adjustable gain and equalization, and full remote control and status reporting.

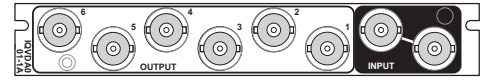
### Features

- Up to 14 high quality outputs
- Balanced loop-through input
- Terminating input option on single width rear panel allows extra output
- 35 MHz bandwidth
- Adjustable gain and equalization
- Equalization for RG59U/Belden 8263 or PSF1/2/Belden 8281 (link selectable)
- Full RollCall remote control and signal identification
- Sync and burst level warnings
- Automatic gain control (AGC) with respect to sync height
- Automatic equalization (ACC) with respect to burst height

### Why should you choose this module?

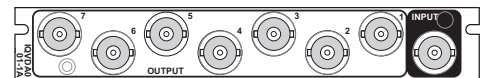
- Ideal distribution amplifier where input cable configuration is likely to change, such as OB trucks
- Remote control of gain and equalization
- Equalization for 3 different cable types, up to 300 meters for Belden 1694A
- Automatic gain and equalization control mode available
- Sync and burst level warnings provided for low level signals
- 35 MHz bandwidth allows it to be used with HDTV component signals
- Differential input for excellent common mode rejection

### Order codes



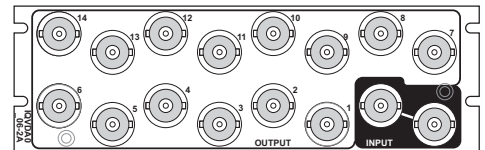
#### IQVDA0001-1A

Analog Video DA with RollCall. Loop-through input, 6 outputs.



#### IQVDA0101-1A

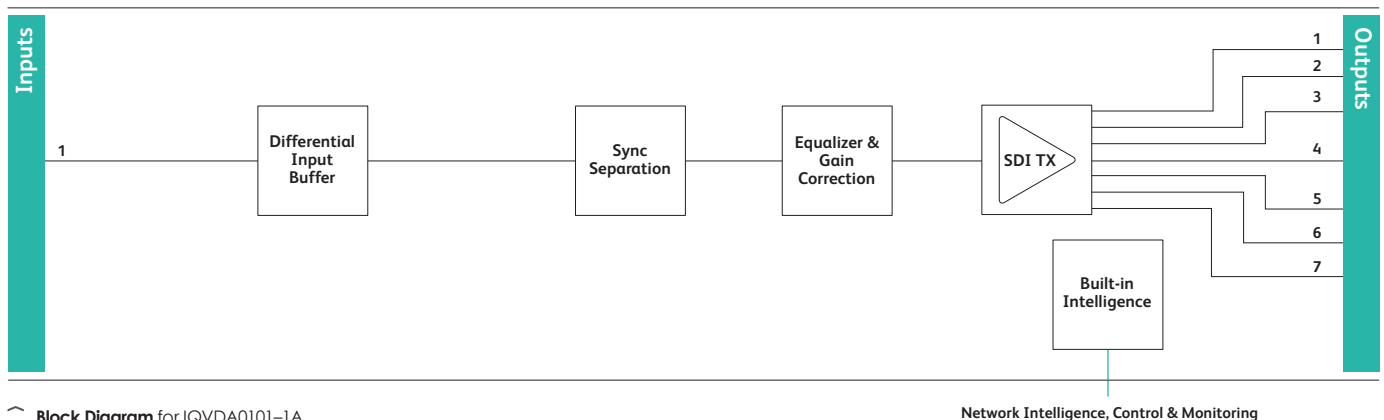
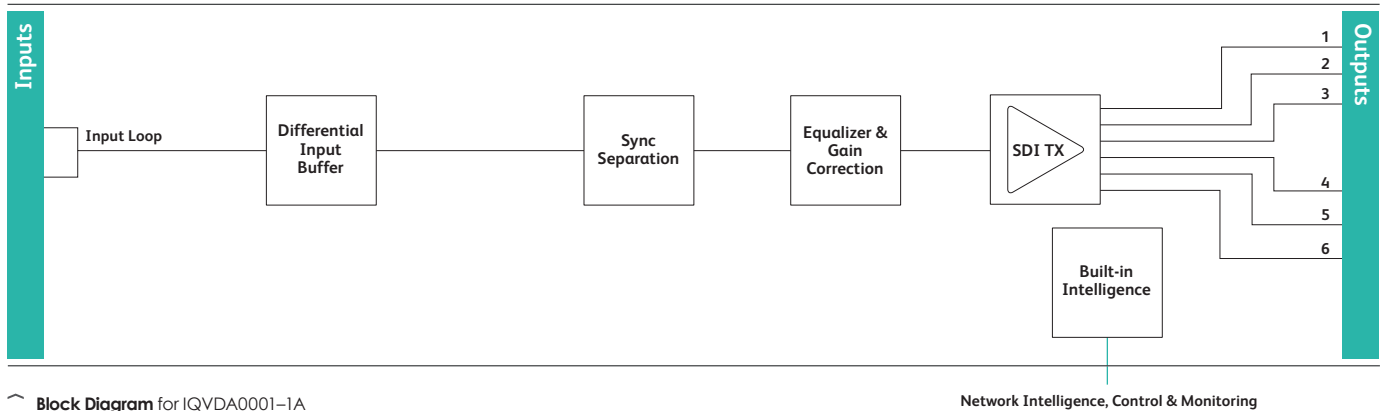
Analog Video DA with RollCall. Terminating input, 7 outputs.



#### IQVDA0006-2A

Analog Video DA with RollCall. Loop-through input, 14 outputs.

For more details on enclosure types please refer to Frames and Hardware section.



### Technical Specification

#### Inputs and Outputs

##### Signal Input

Video 1 Balanced loop-through (terminating input option for single width rear panel)

##### Signal Outputs

Video Up to 14 Unbalanced Outputs

#### Controls

Controls via RollCall

Gain  $\pm 4$  dB in steps of 0.05 dB

#### Typical Equalizer Performance

##### Belden 1694A

0-300 m +0.1 dB to 10 MHz  
0-300 m +0.2 dB to 30 MHz

##### Belden 8281 (PSF1/2)

0-300 m +0.1 dB to 10 MHz  
0-300 m +0.1 dB; -0.4 dB to 30 MHz

##### Belden 1855A

0-200 m +0.1 dB to 10 MHz  
200-300 m +0.1 dB; -1.5 dB to 10 MHz

##### RG59B/U

0-100 m +0.1 dB to 15 MHz  
100-300 m +0.1 dB; -1.5 dB to 15 MHz

##### NK 0.6/2.8

0-150 m +0.1 dB to 15 MHz  
0-150 m +0.1 dB; -0.5 dB to 30 MHz  
AGC [On/Off] - All recognized SD Sources  
ACC [On/Off] - Composite Sources Only  
Signal identification Line standard - PAL, NTSC, 625 MONO, 525 MONO, 1080p24, 1080i50, 1080i60, 720p50, 720p60, 720p25, 720p30, UNKNOWN

##### Selectable clamp

Signal level Off, On (Back Porch) and Sync tip  
Logging Sync and Burst amplitude  $\pm 10\%$   
Signal Level Warning, Line Standard, Burst level warning

#### Indicators

Power OK  
CPU OK  
Status OK (Green), Warning (Yellow), Error (Red)

#### Specifications

##### Frequency Response (Without equalization)

10 kHz - 10 MHz  $\pm 0.1$  dB  
10 MHz - 30 MHz  $\pm 0.2$  dB  
35 MHz  $< -1$  dB

##### Differential gain

Unity Gain - Better than 0.2%

##### Differential phase

Unity Gain - Better than 0.2°

##### Signal/noise ratio

10 kHz - 7 MHz - Better than -66 dB (Unweighted)

##### Linearity

Better than 0.1%

##### 50 Hz filt K50Hz

Better than 0.1%

##### Output D.C.

$< 90$  mV

##### Output return loss

Better than 40 dB to 5.5 MHz, 35 dB to 30 MHz

##### Maximum output level

2.4 V pk to pk @ 30 MHz into 75 ohms

##### Insertion delay

20 ns

##### Y C gain/ delay inequality

$< 1\%$ ,  $< 1$  ns

##### K2T, KPB

Better than 0.1%

##### Max. input level

+6 dB

##### CMRR

Better than 60 dB at 50 Hz, 40 dB 50 Hz to 8 MHz

##### Input return loss (powered)

Better than 40 dB to 5.5 MHz, 35 dB to 30 MHz

##### Input return loss (un powered)

Better than 33 dB to 30 MHz

##### Input impedance

$> 22$  k ohms

##### Headroom

+6 dB

##### Output impedance

75 ohms  $\pm 1\%$

##### Gain

Unity  $\pm 1\%$  as supplied

##### Clamp rejection

8 dB typical at 50 Hz

#### Power Consumption

##### Module power consumption

3W Max (A Frames)  
2 PR (B Frames)

#### Mechanical

Complies with Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2002/95/EC).

#### EMC Performance Information

Environment Commercial and light industrial E2

##### Peak mains inrush current

following a 5 second

##### mains interruption

No mains input

##### Performance information

Immunity to conducted common-mode RF interference (EN 55103 2 immunity phenomenon 16); Interference is just visible on critical picture material when a video input or output is subjected to modulated RF at a level of 3 V

The IQVDA02/03 provide up to 14 equalized analog video outputs.

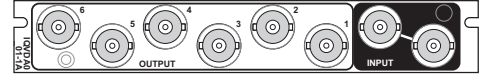
### Features

- Up to 14 high quality outputs
- Balanced loop-through input
- Terminating input option allows extra output
- 35 MHz bandwidth
- Equalizer, better than  $\pm 0.1$  dB to 15 MHz with 100 m RG59 cable

### Why should you choose this module?

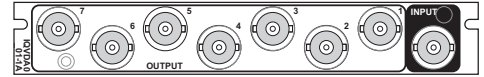
- Ideal budget distribution amplifier for analog video applications
- Maintenance of video quality ensured by the 35 MHz frequency response
- Equalizer ensures the flat response ( $\pm 0.1$  dB) to 15 MHz necessary for quality distribution

### Order codes



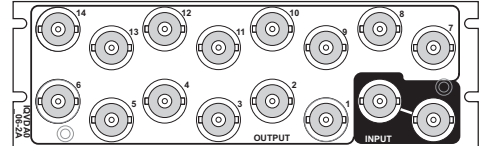
#### IQVDA0201-1A

Analog Video DA. Loop-through input, 6 outputs.



#### IQVDA0301-1A

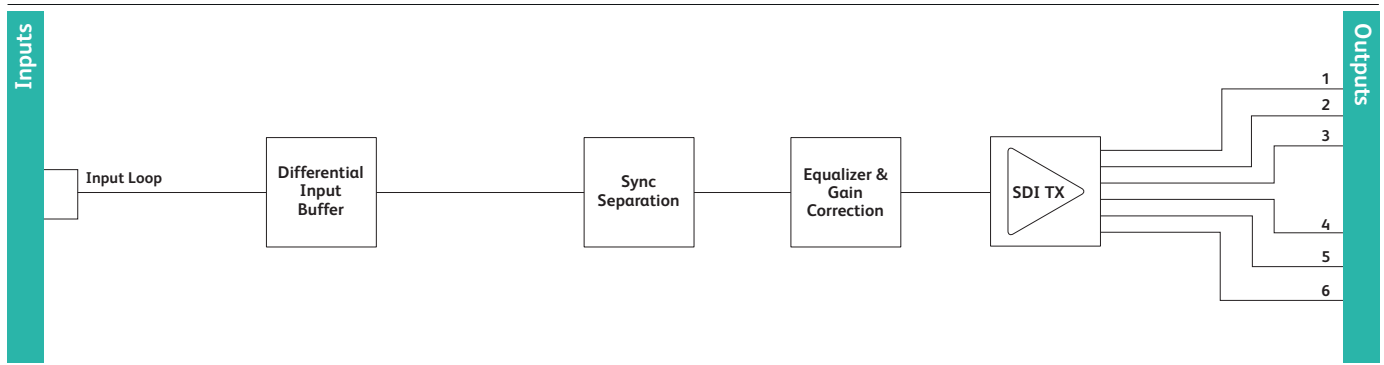
Analog Video DA. Terminating input, 7 outputs.



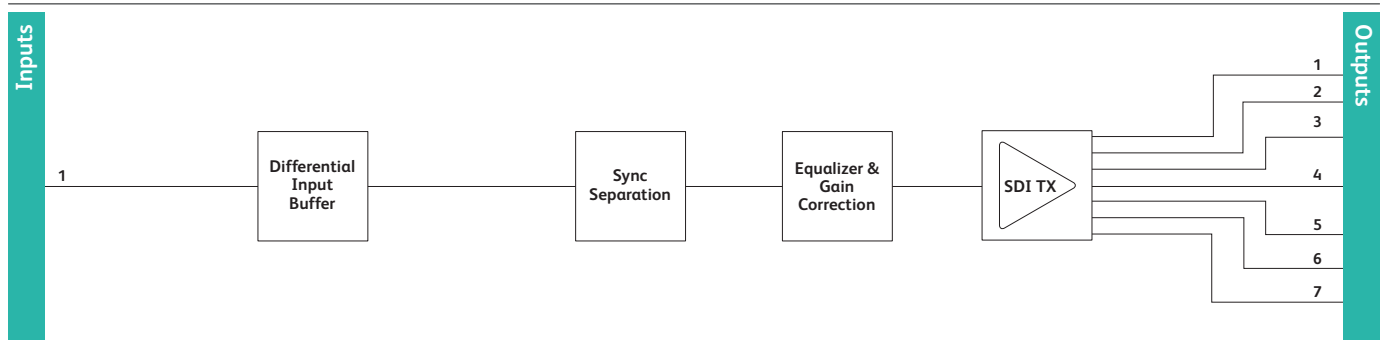
#### IQVDA0206-2A

Analog Video DA. Loop-through input, 14 outputs.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQVDA0201-1A



Block Diagram for IQVDA0301-1A



### Technical Specification

#### Inputs and Outputs

##### Signal Input

Video 1 Balanced loop-through (terminating input option)

##### Signal Outputs

Video Up to 14 Unbalanced Outputs

#### Card Edge and RollCall controls

##### Control Ranges

Gain +6 dB to -4 dB typical  
 Equalization Equalizes up to 100 m of RG59 to 15 MHz  $\pm 0.1$  dB

##### Indicators

Power OK  
 Sync detect OK (Green)

#### Specifications

Frequency response 0-100 m RG59U (or equivalent)  
 15 MHz  $\pm 0.1$  dB  
 typ. -0.33 dB at 20 MHz  
 typ. -3 dB at 36 MHz  
 Differential gain Better than 0.1%  
 Differential phase Better than 0.1°  
 Signal/noise ratio Better than 75 dB rms. (unified weighting filter)  
 50 Hz tilt K50 Hz Better than 0.5%  
 Output D.C.  $\pm 45$  mV max.  $\pm 10$  mV typical  
 Insertion delay 17 ns  
 Max. input level +6 dB  
 CMRR Better than 55 dB at 50 Hz  
 Better than 45 dB at 250 Hz  
 Input return loss Better than 50 dB at LF  
 Better than 40 dB at 5 MHz  
 Better than 36 dB at 10 MHz  
 Headroom +6 dB  
 Output impedance 75 ohms  $\pm 1\%$   
 Output isolation Better than 38 dB to 5 MHz  
 Better than 36 dB to 10 MHz  
 Output return loss Better than 36 dB to 5 MHz  
 Better than 33 dB at 10 MHz  
 Gain Unity  $\pm 1\%$  as supplied

#### Power Consumption

Module power consumption 3 W Max (A Frames)  
 2 PR (B Frames)

The IQAES00 digital audio distribution amplifier can receive digital audio from up to 500 m of RG59B cable for unbalanced inputs, or up to 150 m of AES approved cable for balanced inputs. The unit can be configured to provide up to 10 re-clocked outputs for a single input or up to 5 outputs per input for 2 inputs. Digital audio sample rates of 32, 44.1, 48 and 96 kHz can be automatically detected, however any input sample rates between 32 and 96 kHz may be applied.

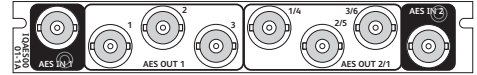
### Features

- Can receive digital audio from up to 150 m of AES cable (balanced inputs) or 500 m of RG59B or equivalent cable (unbalanced inputs)
- Automatic detection of 32, 44.1, 48 and 96 kHz sample rates
- Configurable for 1 input to 10 re-clocked outputs, or 2 inputs to 5 re-clocked outputs per input (dependant on rear panel type)
- Balanced and unbalanced I/O available simultaneously
- Channel status monitoring
- RollCall reporting of input lock, Non-PCM audio and PCM audio, sampling frequency (32, 44.1, 48, 96 kHz and unknown), consumer mode, channel mode, channel status – CRC error and byte 1

### Why should you choose this module?

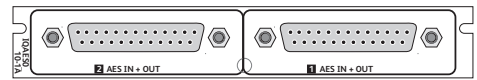
- High quality distribution amplifiers for AES/EBU digital audio
- Operates with all normal professional sampling rates, 32, 44.1, 48 and 96 kHz
- Simultaneous balanced and unbalanced output configuration enables use as an AES format conversion module
- Status monitoring and input lock reporting through RollCall remote control, provides error checking

### Order codes



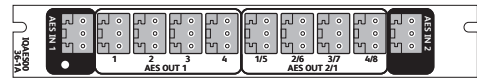
#### **IQAES0001-1A**

Single/Dual stream AES DA. Unbalanced AES. Configurable for 1 input to 6 outputs or 2 inputs to 3 outputs per input.



#### **IQAES0010-1A**

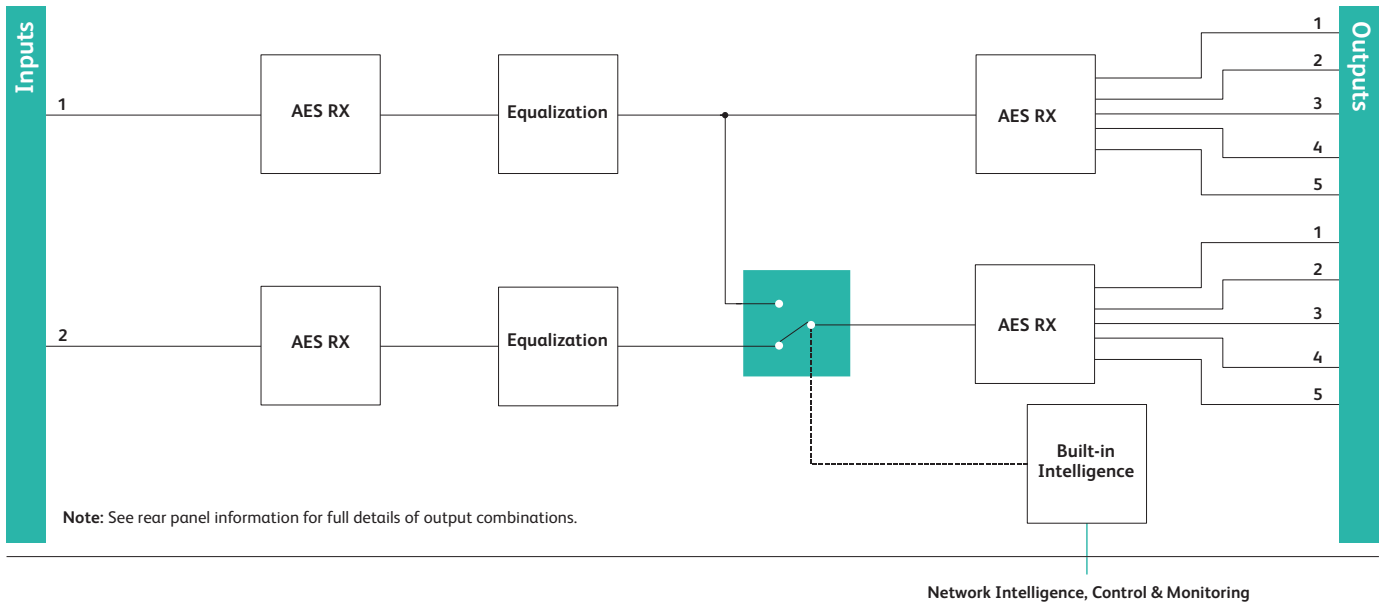
Single/Dual stream AES DA. Balanced D-type AES audio connections. Configurable for 1 input to 10 outputs or 2 inputs to 5 outputs per input.



#### **IQAES0036-1A**

Single/Dual stream AES DA. Balanced screwterminal AES audio connections. Configurable for 1 input to 8 outputs or 2 inputs to 4 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQAES0010-1A

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

Digital audio input	1/2 x AES/EBU
Standards (balanced)	AES3-1992
Standards (unbalanced)	AES3-1992, SPDIF, SMPTE 276M

#### Signal Outputs

Digital audio	AES/EBU, up to 10
	Note: See rear panel details for output options
Standards (balanced)	AES3-1992
Standards (unbalanced)	AES3-1992, SPDIF, SMPTE 276M

### Card Edge and RollCall Controls

Card Edge Controls (also available via RollCall)

#### Indicators

Power up or CPU fault	Good = Off/Fault = Red
CPU running but input 1 not detected (both inputs or input 1 when in single channel mode)	Input detected = Off/Not Detected = Yellow
CPU running but input 2 not detected (both inputs or input 1 when in single channel mode)	Input detected = Off/Not detected = Yellow
Normal operation with input detected (either input or input 1 when in single channel mode)	Input not detected = Off/Input detected = Green

### Functions available via RollCall only

Input mode	Single/Dual
PCM/non-PCM	PCM/non-PCM decision masks
Restart unit	

### Reporting (\* also Logged)

Input 1 lock detect	*No input present
Input 2 lock detect	*No input present
Input 1 channel status monitor	*Display's Channel Status information (Byte 1 bits 0-3)

Input 2 channel status monitor

\*Display's Channel Status information (Byte 1 bits 0-3)

Input 1 channel status warning  
Input 2 channel status warning  
Channel mode

CRC error (broken framing) – Pro mode only

CRC error (broken framing) – Pro mode only  
[unknown; 2-channel; 1-channel; primary/secondary; stereo] – Pro mode only

Input 1 sample rate  
Input 2 sample rate  
Input 1 type  
Input 2 type  
RollTrack controls

\*Unknown, 32, 44.1, 48, 96 kHz detection

\*Unknown, 32, 44.1, 48, 96 kHz detection

\*PCM, \*Non-PCM

\*PCM, \*Non-PCM

On/Off, Index, Source, Address, Command, Status, Sending

RollTrack outputs (0-15)

Unused

Input 1 missing  
Input 1 OK  
Input 1 CS Mode  
Input 1 PCM  
Input 1 non-PCM  
Input 1 SR Unknown  
Input 1 32k, 44.1k, 48k, 96k  
Input 2 missing  
Input 2 OK  
Input 2 CS Mode  
Input 2 PCM  
Input 2 non-PCM  
Input 2 SR Unknown  
Input 2 32k, 44.1k, 48k, 96k

**Technical Specification cont...****Specifications**

Input impedance	Balanced 110 ohm Unbalanced 75 ohm
Sampling frequency range	32 – 96 kHz
Cable length	Balanced, >150 m of AES3 Cable Unbalanced, up to 500 m of RG59 or Equivalent
Output impedance	Balanced 110 ohm Unbalanced 75 ohm
Output signal level	Balanced 3 V pk to pk min Unbalanced 1 V $\pm$ 0.1 V pk to pk

**Performance**

Group delay	@ 48 kHz TBD
Jitter rejection	0.006 UI
Re-clocking	Yes

**Power Consumption**

Module power consumption	3W Max (A Frames) 2.5 PR (B frames)
--------------------------	--

The IQADA00 provides dual analog inputs with up to five outputs per input, or a single analog input with up to ten outputs.

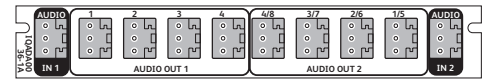
### Features

- Configurable for 1 input to 10 outputs, or 2 inputs to 5 outputs per input (dependant on rear panel type)
- Very low THD+N
- Output gain remotely adjustable from +24 dB to -24 dB with fine control
- +24 dBu headroom

### Why should you choose this module?

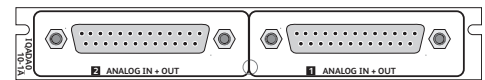
- Ideal stereo distribution amplifier for large analog audio applications
- Maintenance of audio quality ensured by very low THD+N and 24 dBu input headroom
- Up to 10 balanced transformerless outputs

### Order codes



#### IQADA0036-1A

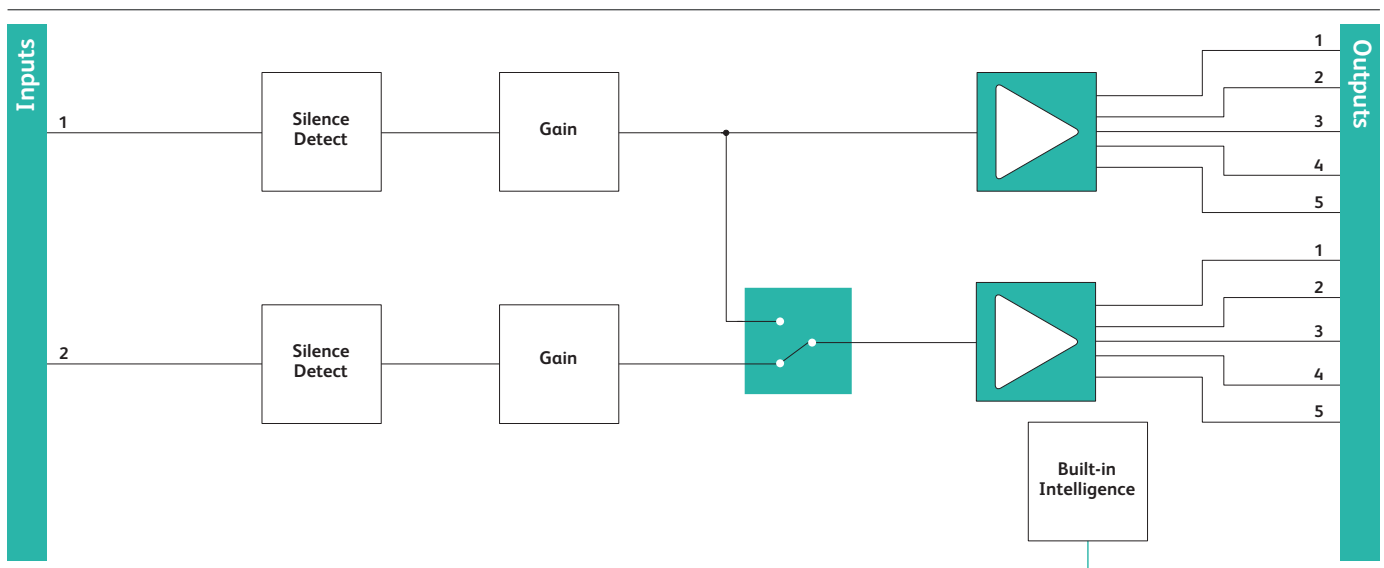
Single/Dual Channel Analog DA. Balanced Screw-terminal Audio Connections. Configurable for 1 input to 8 outputs or 2 inputs to 4 outputs per input.



#### IQADA0010-1A

Single/Dual Channel Analog DA. Balanced D-type Audio Connections. Configurable for 1 input to 10 outputs or 2 inputs to 5 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQADA0010-1A

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Analog 2 channels balanced via screw-terminal or D-type connector

##### Signal Outputs

Analog 4 (5) per input channel balanced via screw-terminal (or D-type connector)  
 Note: Configurable for 1 input to 8 (10) output operation

#### Card Edge and RollCall Controls

##### Indicators

Power up or CPU fault	Good = Off/Fault = Red
CPU running but input 1 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not Detected = Yellow
CPU running but input 2 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not detected = Yellow
Normal operation with input detected (either input or primary input when in single channel mode)	Input not detected = Off/Input detected = Green

##### Controls

Mode	Single, Dual channel
Fine gain adjustment	±0.5 dB additional to the coarse gain level, separately adjustable for each input

##### Functions Available via RollCall

Gain (separate L and R)	+24 dB to -24 dB in 0.5 dB steps
Silence detect	Level adjustable, - 15 to -25 dBu in 1 dB steps
Warning timer	1 to 60s (for silence detection)

##### Reporting (\* also Logged)

Silence detected	*Silence Detected (L and R)
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack	Unused Input 1 Present Input 1 Silent Input 2 Present Input 2 Silent Input 2 Silent

#### Specifications

Analog input / output level	Headroom set to: +24 dBu (17.5 V pk to pk) Gain at Unity
Analog input impedance	10 k Ohms (600 Ohm Option)
Analog output impedance	Balanced <50 ohms
Total harmonic distortion + noise	<-86 dBu (0.005%) at 700 Hz, 24 dBu input and 0 dB gain
Noise floor	<-90 dBu 0 dB gain (20 Hz to 20 kHz)
Gain accuracy	<±0.2 dB @ 0 dB
Gain error (channel 1 to channel 2)	<±0.2 dB @ 0 dB
Common mode rejection	<-60 dB (20 Hz to 20 kHz)
Frequency response	+0.1 dBu to -0.3 dBu (20 Hz to 20 kHz with reference to 1 kHz)
Channel 1 to 2 cross talk	<-90 dB
Headroom (in and out)	24 dBu

#### Power Consumption

Module power consumption	6.5 W (A Frames) 3.5 Pr (B Frames)
--------------------------	---------------------------------------

The IQADA01 provides dual analog inputs with up to seven outputs per input, or a single analog input with up to 14 outputs.

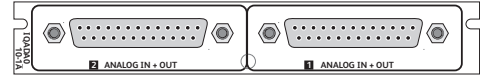
### Features

- Configurable for 1 input to 14 outputs, or 2 inputs to 7 outputs per input
- Very low THD+N
- Output gain remotely adjustable from +24 dB to -24 dB with fine control
- +24 dBu headroom

### Why should you choose this module?

- Ideal stereo distribution amplifier for large analog audio applications
- Maintenance of audio quality ensured by very low THD+N and 24 dBu input headroom
- Up to 14 balanced transformerless outputs

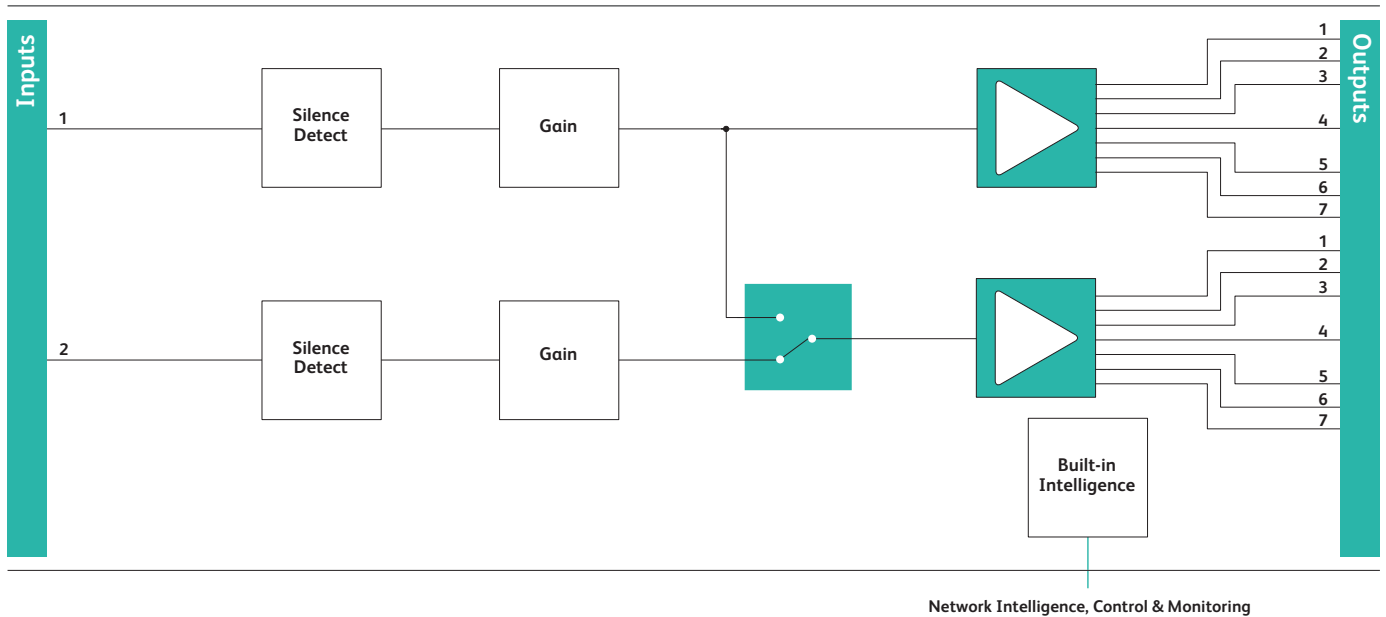
### Order codes



#### IQADA0110-1A

Single/Dual Channel Analog DA. Balanced D-type Audio Connections. Configurable for 1 input to 14 outputs or 2 inputs to 7 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQADA0110-1A



### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Analog 2 channels balanced via 25 way D-type connector

##### Signal Outputs

Analog 7 per input channel balanced via 25 way D-type connector  
 Note: Configurable for 1 input to 14 output operation

#### Card Edge and RollCall Controls

##### Indicators

Power up or CPU fault	Good = Off/Fault = Red
CPU running but input 1 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not Detected = Yellow
CPU running but input 2 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not detected = Yellow
Normal operation with input detected (either input or primary input when in single channel mode)	Input not detected = Off/Input detected = Green

##### Controls

Mode	Single, Dual channel
Fine gain adjustment	±0.5 dB additional to the coarse gain level, separately adjustable for each input

#### Functions Available via RollCall

Gain (separate L and R)	+24 dB to -24 dB in 0.5 dB steps
Silence detect	Level adjustable, - 15 to -25 dBu in 1 dB steps
Warning timer	1 to 60s (for silence detection)

#### Reporting (\* also Logged)

Silence detected	*Silence Detected (L and R)
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack	Unused Input 1 Present Input 1 Silent Input 2 Present Input 2 Silent

#### Specifications

##### Analog input/output

level	Headroom set to: +24 dBu (17.5 V pk to pk) Gain at Unity
Analog input Impedance	10 k Ohms (600 Ohm Option)
analog output Impedance	Balanced <50 ohms
Total harmonic distortion + noise	<-94 dBu (0.002%) at 700 Hz, 24 dBu input and 0 dB gain
Gain accuracy	<±0.2 dB @ 0 dB
gain error (channel 1 to channel 2)	<±0.2 dB @ 0 dB
Common mode rejection	<-70 dB (20 Hz to 20 kHz)
Frequency response	±0.1 dB(20 Hz to 20 kHz with reference to 1 kHz)
Channel 1 to 2 cross talk	<-110 dB at 1 kHz
Headroom (in and out)	24 dBu (Note: a maximum of 3 outputs can be driven at 24 dBu when using 600 Ohm terminations)

#### Power Consumption

Module power consumption	6.5 W Max (A Frames) 4.5 PR (B Frames)
--------------------------	---

## Video Processing

The IQ range generally includes a host of common video processing functions available on many modules, however for channel branding, keying and video delay applications there are a series of dedicated modules.

In order to enable images or logos to be added prior to transmission the range includes a 3G Keyer and logo inserter card with up to 6 key layers available and animated logo support. Logo operation can be controlled via RollCall template, GPI or RollTrack triggers, and logos can be efficiently downloaded over Ethernet via PC application and stored in non-volatile memory.

An extended video delay module allows delays of up to 13 seconds to be added to HD-SDI feeds, ideal for virtual studio applications.

For Related Modules see:

SD-HD Conversion Section - Logo insertion, Side Bar Keying, Noise reduction

IQSYN33 in Synchronizers

The IQLDK30 provides a simple and straightforward linear or luma keying along with logo, clock and text crawl insertion abilities for 3G/HD/SD-SDI signals. The unit is capable of adding up to 6 x animated or static 10-bit color logos, or any combination of logos into the SDI stream at any point within 4:2:2 boundaries of the active picture. Keyer and Logo control is via RollCall template, GPI and RollTrack triggers or SNMP, allowing the IQLDK30 to easily interface with external systems. Logos can be efficiently downloaded over TCP/IP network via a standard web-browser interface on dedicated 32Gb microSD storage, and provides the ability to have up to 64 logos loaded in non-volatile memory ready for immediate keying.

The unit provides a dedicated program output along with selectable preview/program outputs which include a clean feed option. Being transparent to ancillary data allows the IQLDK30 to pass any embedded audio or metadata and this combined with a short signal delay makes the module suitable for all operational environments.

### Features- Keyer

- Linear and Luma keyer with full level of opacity and mix controls
- 2 x Background, Fill, and Key Inputs
- Dedicated Program output, and two independently selectable Auxiliary outputs, showing preview, program, program pre-fade, Background 1&2 (clean feed), Fill, Key, Processed Key, Squeeze Back and pattern (black,color bars) signals
- Cut to Black , Cut to Program and Fade to Black or on Program Output controls available with adjustable duration
- Self-key capability using fill input to provide key signal
- Key opacity control (0-50%)

### Features-Logo inserter

- 6 internal key layers for static or animated logos providing start, stop, pause and loop actions
- Each Layer offers independent transition timers and mix, fade, take and combined fade/take options with smooth control of Transparency, fade in /out time. Including controls for background color and object position on per layer basis.
- 32GB onboard logo storage support, with dedicated large 500MB active video memory for long animated sequences
- User defined logos can be loaded over TCP/IP network with direct support for PNG based files
- Video and alpha-channel processing at 10 bits to 4:2:2:4 resolution

### General

- 32 x user memories and 32 x display memories e.g Logo position and Keyer settings
- Maintains valid output with background input fail, with option of switching to pattern Fill input source or loaded logo pattern via recalling a display memory
- Ancillary data can be passed from the Background inputs, Fill inputs or blanked
- Local Ethernet port for direct control and Logo upload via standard web-browser including RollCall and SNMP for remote C&M
- 8 x GPIO ports configured for control or Tally output (logo & key on/off) with keyer and logo control(Cut In/Out, smooth Fade Up/Down and memories (user & display actions) via GPIO interface

### Why should you choose this module?

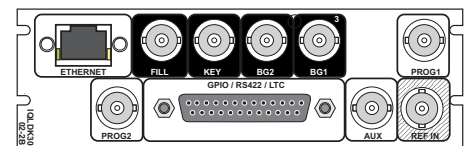
- Adds multiple static 3G,HD or SD sized, full 10-bit, color logos at any point in the active picture region of the SDI stream (within 4:2:2 boundaries)
- Linear and luma key modes provide keying for a variety of sources
- Control of logo position, fade/cut, available from external or RollCall interfaces to enable maximum operational flexibility
- Display memory store/recall available for rapid changes between program logos and Keyer settings
- Selectable clean feed (Background) output for editing and archive purposes

### Order codes



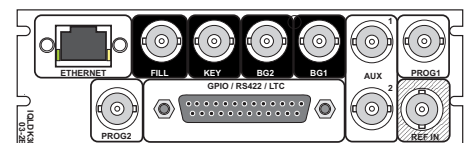
#### IQLDK3000-1B3

3G/HD/SD-SDI Logo inserter and keyer. 2 Background, 1 Fill and 1 Key inputs, 1 Program and 1 Auxiliary output and Ethernet to card.



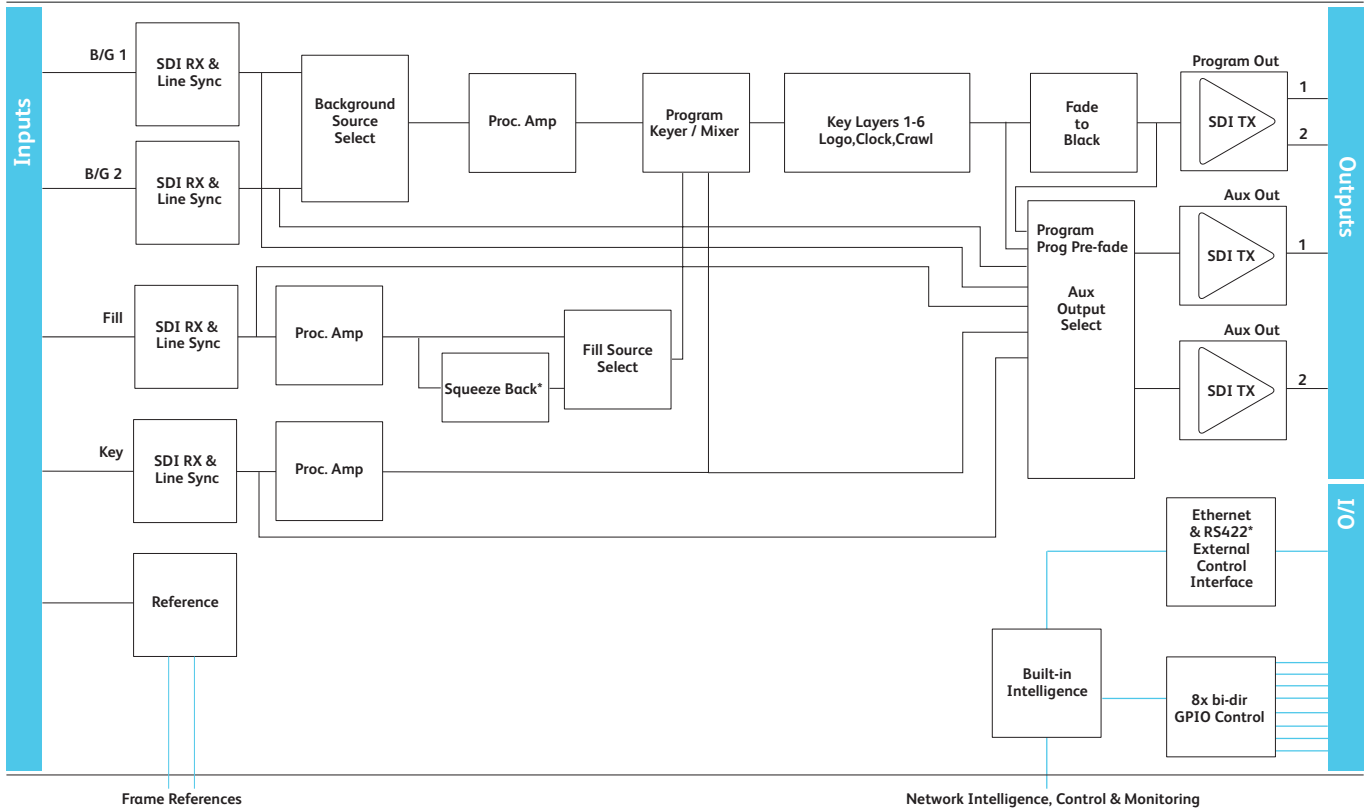
#### IQLDK3002-2B3

3G/HD/SD-SDI Logo inserter and keyer. 2 Background, 1 Fill and 1 Key inputs, 2 Program and 1 Auxiliary outputs, relay bypass for Background 1 input to Program output 1, 8 GPIO and Ethernet to card.



#### IQLDK3003-2B3

3G/HD/SD-SDI Logo inserter and keyer. 2 Background, 1 Fill and 1 Key inputs, 2 Program and 2 Auxiliary outputs, 8 GPIO and Ethernet to card.



Block Diagram for IQLDK30

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

Serial digital Inputs	4 x 3G/HD/SD Serial Digital
Background (1)	1 x BNC Terminated in 75 Ohms
Background (2)	1 x BNC Terminated in 75 Ohms
key	1 x BNC Terminated in 75 Ohms
Fill	1 x BNC Terminated in 75 Ohms

#### Electrical

3Gbit/s SDI, SMPTE 424M  
1.5Gbit/s HD-SDI, SMPTE 292M  
270 Mbit/s SDI, SMPTE 259M-C

#### Connector / format

BNC/75 ohm panel jack on standard SAM connector panel

#### Input cable length

Up to 80m Belden 1694A @ 3Gbps  
Up to 150m Belden 1694A @ 1.5 Gbps  
Up to 250m Belden 1694A @ 270 Mbps

#### Return loss

>15 dB 100K to 1.5 GHz

#### Analog reference (ref)

1 x BNC Terminated in 75 Ohms  
HD Tri-sync / SD Bi-sync, SMPTE 274M, RS170A

#### Signal Outputs

Serial digital Outputs	4 x 3G/HD/SD Serial Digital
Program 1,2	2 x SDI Program
Auxiliary 1, 2	2 x SDI Monitoring (independently selectable) preview, program, program pre-fade, Background 1&2 (clean feed), Fill, Key, Processed Key, pattern (black,color bars) signals and Squeeze Back* option

#### Electrical

3Gbit/s SDI, SMPTE 424M (425M-level A)  
1.5 Gbit/s HD-SDI, SMPTE 292M/296M  
270 Mbit/s SDI, SMPTE 259M-C

#### Connector / format

BNC/75 ohm panel jack on standard SAM connector panel

#### Return loss

>15 dB 100K to 1.5 GHz

#### Control Interface

GPIO	8 x bi-dir GPIO Format: TTL/Open drain ports Connector: 25 way D-Type connector
------	---

#### Ethernet

1 x Ethernet Interface  
Format: 10/100Mbit/s  
Connector: RJ45 ethernet jack on standard SAM connector panel

#### Important Information

Please note that in order to support the IQLDK30 module and provide the ability to download Logos it is essential to have an ethernet connection to the unit or transfer logos to the onboard microSD card via an SD card reader.

#### Card Edge and RollCall Controls

##### Indicators

Power +	OK (Green), No Power(Off).
Power -	OK (Green), No Power(Off).
CPU OK	OK (Flashing Green), No Power(Off).
Input OK	OK (Green), Timing or Std Error(Flashing Green), No Input (Off)
Ref OK	OK (Green), Std Error (Flashing Green), No Input(Off)
Status ERROR	Active (Red), BG Input Loss or Standard Error
Status WARN	Active (Yellow), BG Input Timing Error
Status OK	Active (Green), Unit Operating Correctly

#### Module Power Consumption

IQLDK3000-1B3	7.5 W Max (A Frames) & 7.5 PR (B Frames)
IQLDK3003-2B3	7.5 W Max (A Frames) & 7.5 PR (B Frames)
Relay Bypass Version IQLDK3002-2B3	8.5 W Max (A Frames) & 8.5 PR (B Frames)

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The IQDLY30 module provides extended video delay in 3G/HD/SD-SDI systems for applications such as adding profanity delay or matching delays in virtual studios. IQDLY30 provides up to 6.5s of 3G-SDI delay, 13s of HD-SDI delay and 37s of SD-SDI delay and transparently passes all associated ancillary data including embedded audio and metadata.

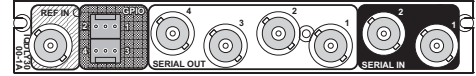
### Features

- Delay 3G/HD/SD-SDI video signals by up to:
  - 6.5s for 3G-SDI
  - 13s for HD-SDI
  - 37s for SD-SDI
- Delay control in frames, lines and pixels, with optional frame synchronizer
- Passes entire video stream including embedded audio and ancillary data
- Embedded audio, and ancillary data is delayed to match the video
- Input loss detection – default output of black or freeze
- 4 GPIOs, each configurable as a general purpose input or output
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Provides flexible delay adjustment for multi-format SDI signals
- May be used to match long system delays elsewhere such as: Profanity delays, Virtual studio graphics, MPEG encoders/decoders, Audio processing, Multi-channel audio compression, Signal re-entry on master control inputs, HD radio links
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

### Order codes



#### IQDLY3000-1A3

3G/HD/SD-SDI Video Delay Module, 2 SDI inputs, 4 SDI outputs, 4 GPIs, Ref input (with Synchronizer option).

#### IQDLY3000-1B3

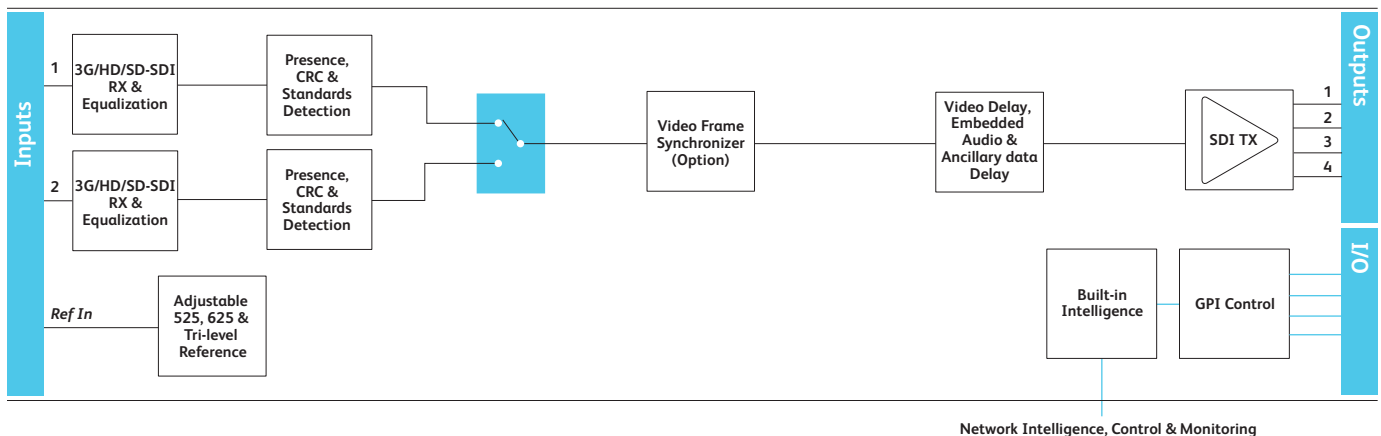
3G/HD/SD-SDI Video Delay Module, 2 SDI inputs, 4 SDI outputs, 4 GPIs, External & Frame reference inputs (with Synchronizer option).

### Software Options

#### IQOPTK-SYN

Frame synchronizer option for IQDLY30

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDLY30

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 100m Belden 1694A @ 3 Gbit/s Up to 190m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference input Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M

#### Signal Outputs

SDI Outputs	x 4
Control Interface	
GPI	4 x Closing contact I/O interface (ST)

### Controls

#### Indicators

Power	OK (Green)	
CPU	OK (Green flashing)	
Status	OK (Green), Warning (Yellow), (Red)	Error
Input 1-2	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Loss (Red)	
Reference	OK (Green – tri-level), OK (Yellow – bi-level), Loss (Red)	

### Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1H in pixel clock steps
Genlock V-Phase	± 1F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Bulk Delay	
1125(1080)/50P (level A)	0 - 342 Frames, 6.84 sec
1125(1080)/59P (level A)	0 - 400 Frames, 6.67 sec
1125(1080)/25i	0 - 343 Frames, 13.72 sec
1125(1080)/29i	0 - 401 Frames, 13.38 sec
750(720)/50P	0 - 680 Frames, 13.60 sec
750(720)/59P	0 - 838 Frames, 13.98 sec
525(480)/29i	0 - 1112 Frames, 37.10 sec
625(576)/25i	0 - 933 Frames, 37.32 sec

Video Standards	1125(1080)/50P (level A), 1125(1080)/59P (level A), 1125(1080)/25i, 1125(1080)/29i, 750(720)/50P, 750(720)/59P, 525(480)/29i, 625(576)/25i
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### Default Video Output

Type	Freeze, Black
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### Default Video Output

Standard	Last Known Good, 1125(1080)/50P (level A), 1125(1080)/59P (level A), 1125(1080)/25i, 1125(1080)/29i, 750(720)/50P, 750(720)/59P, 525(480)/29i, 625(576)/25i
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### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status, Reference (Genlock) Info, Reference Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories.
Default Settings	Resets all module settings to factory specified defaults but does not clear memories.
Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware versions, PCB versions

### Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz) 3G-SDI 2.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 30 dB to 30 MHz

### Synchronizer

Minimum delay	2us (to 7us, dependent upon hysteresis state)
Synchroniser hysteresis window	5us
Embedded Audio Delay	Same delay as for the video data
Ancillary Data Delay	Same delay as for the video data

### Power Consumption

Module Power Consumption	17.5 W Max (A Frames) 15 PR (B Frames)
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# Audio Processing

IQ Modular audio processing modules provide a wide range of functions to meet the diverse requirements of the digital facility.

Whilst many of the video based IQ range also offer a wide range of audio processing features built-in, dedicated IQ audio processing modules also provide a broad range of functions including Dolby E/D processing, synchronization, routing, embedded audio processing, and sample rate conversion.

All modules can be controlled by the SAM RollCall or RollMap control and monitoring systems and, where appropriate, support RollTrack to ensure accurate synchronization of audio to its associated video signal.

Since RollTrack operates through the internal RollCall remote control network, this powerful function has no need for further external connections.

For Related Modules see:  
Embedded Audio Section  
IQUDC34 in SD-HD Conversion

The IQDBD00 provides an integrated Dolby E/D decoding and re-embedding solution for HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. As well as providing embedding or de-embedding for up to 16 PCM audio channels, eight AES/EBU streams, it can de-embed and decode Dolby E data to output as AES or re-embed into the video stream. Dolby E features include automatic Dolby E/D alignment with the video signal, and metadata decoding and output to RS485. PCM audio processing features include tracking audio delay, gain, phase invert, mixing, Dolby E/D pair routing and separate channel level routing. Video features include proc. amp controls and up to 12 frames of delay.

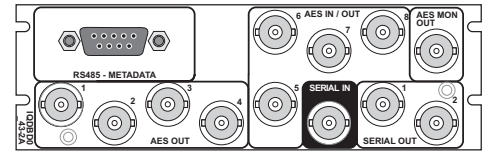
### Features

- Embed unbalanced or balanced AES audio onto HD/SD-SDI video streams with channel level control
- De-embed existing audio channels and output them to unbalanced or balanced AES
- Decode Dolby E or D compressed audio and either output to AES or re-embed into the HD/SD-SDI stream
- Associated Dolby E metadata is output in RS485 format
- Standards supported:
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Channel-level control allows up to 16 individual embedded audio channels to be swapped-over or swapped out
- 4 off 4 channel assignable audio mixers
- Audio proc. amp and delay
- Audio delay channels include selectable fixed delay and tracking delays selectable for any pair
- Tracking audio delay which seamlessly tracks the video delay or external RollTrack inputs
- Dolby E support – pair routing and automatic realignment and synchronization to the video frame boundary
- Any group of embedded audio may be passed unchanged if not selected for processing
- Video delay feature, up to 12 frames
- Video controls including video gain and offset
- 16 x user memories
- Independent horizontal and vertical ancillary data blanking
- Input SDI, CRC, EDH and ANC data checking and reporting
- In-built test pattern generator
- Input loss detection – input pass through or black/pattern/freeze
- Naming of audio output channels for easy identification

### Why should you choose this module?

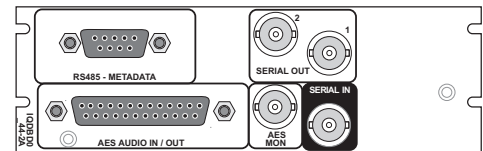
- Powerful audio processing module to decode Dolby E audio signals for content and level monitoring
- Metadata output allows downstream Dolby Encoders to repurpose the audio signals correctly
- Adjustable video delay to match Dolby E decoder delay
- Advanced Dolby E alignment functions enable accurate timing to be maintained throughout the signal path
- Suitable for synchronous or asynchronous embedding and de-embedding applications using AES audio
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation

### Order codes



#### IQDBD0043-2A

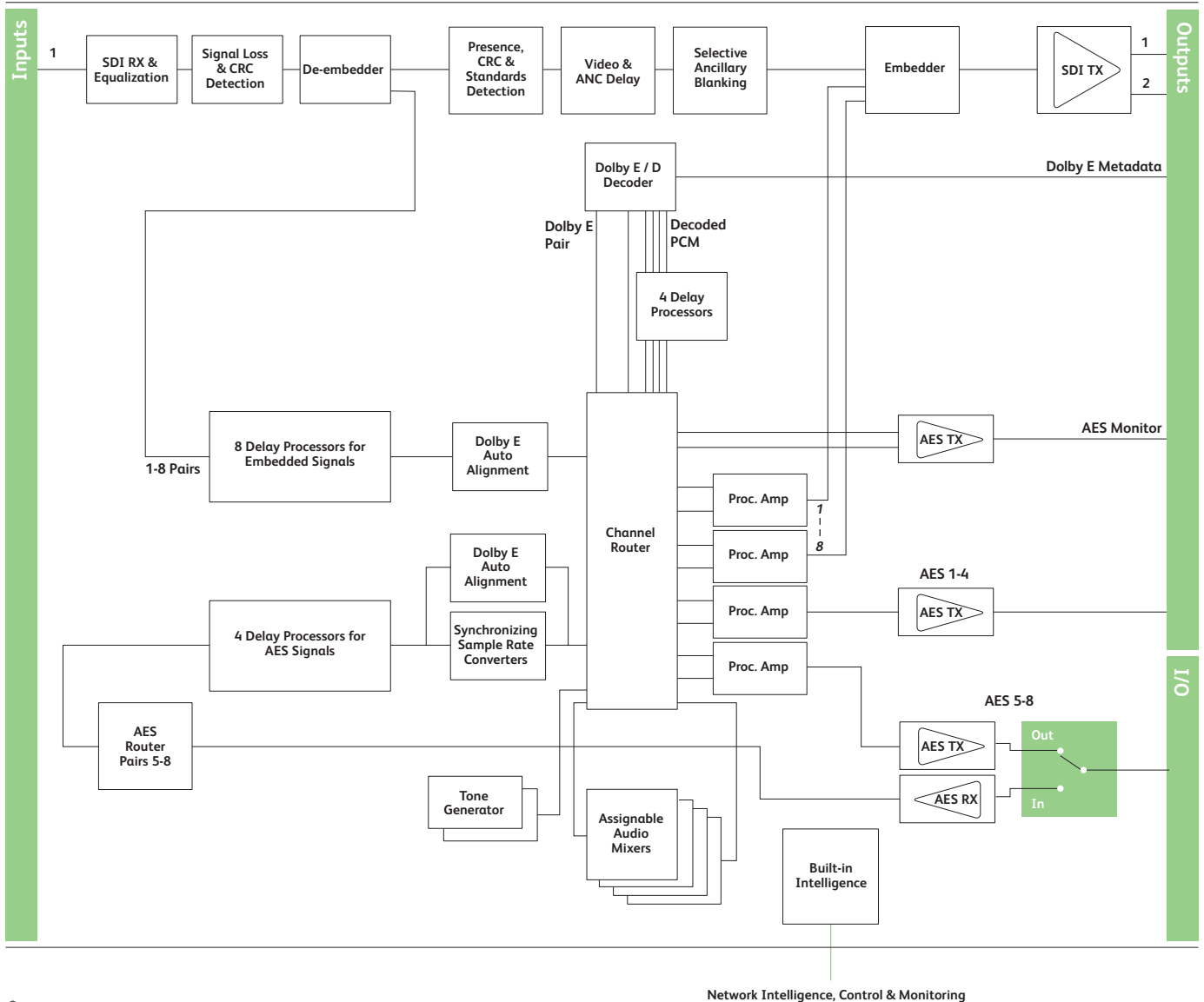
HD/SD-SDI 16 Channel de-embedder with Dolby E decoder. 2 HD/SD-SDI outputs, 4 AES/EBU unbalanced outputs, 4 AES/EBU unbalanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata output.



#### IQDBD0144-2A

HD/SD-SDI 16 Channel de-embedder with Dolby E decoder. 2 HD/SD-SDI outputs, 4 AES/EBU balanced outputs, 4 AES/EBU balanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata output.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDBD0043-2A

Network Intelligence, Control & Monitoring

## Technical Specification

### Inputs and Outputs

#### Video Signal Inputs

Digital video	1 x Serial Digital Input
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M, SMPTE 299M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75 ohm panel jack on standard SAM connector panel
Input cable length	Up to 140 m Belden 1694A @ 1.5 Gbit/s Up to 350 m Belden 1694A @ 270 Mbit/s
Return loss	>-15 dB

#### Video Signal Outputs

Digital video	2 x Serial Digital Outputs
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75 ohm panel jack on standard SAM connector panel

### Audio Signal Inputs/Outputs

Unbalanced AES/EBU	
AES audio I/O	
(software selectable)	4 Unbalanced
AES audio outputs	4 Unbalanced
AES audio monitor output	1 Unbalanced
Connector / format	BNC/ 75 ohm panel jack
Balanced AES/EBU	
AES audio I/O	
(software selectable)	4 Balanced
AES audio outputs	4 Balanced
Connector / format	25 Way D-Type / 110 ohm panel mounted
AES audio monitor output	1 Unbalanced
Connector / format	BNC/ 75 ohm panel jack
RS422 Metadata	
Connector	9 Way D-Type panel mounted

## Technical Specification cont...

### Controls

#### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
FPGA	OK (Orange flashing)
Status	OK (Green), Warning (Orange), Error (Red)
Lock	OK (Green)
SDI error	Error (Red)

#### RollCall Features

Audio Controls	
Embedded audio types	PCM (to AES3)/Data (SMPTE 337M inc. Dolby E)/Mixed (Passes any channel status information present)
Channel routing	Output channels routed from Dolby E decoder, AES inputs 5 to 8, SDI 16 embedded channels from any group, test tone and silence
Embedder priority	Normal distribution/Audio Prioritized
Embedded group	Pass/Blank/Embed

#### Channel Status Handling and Checking

Dolby E auto line selection	Define Dolby E embed line for each video standard
Dolby E decoder routing	Channels routed from AES inputs 5 to 8, SDI 16 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. +12 dB to -66 dB in 0.1 dB steps

#### Channel 1 Delay sources

Coarse manual delay 1 and 2	Up to +2 s in 0.25 ms steps, common to any selected pairs.
Fine manual delay 1 and 2	Up to ±0.25 ms in 5 µs steps, common to any selected pairs
Dolby E delay (alignment)	Auto/Manual
Variable audio delay control source	Up to 0.5 s from RollTrack + Video Delay

#### Channel 2 Delay sources

Coarse manual delay 1 and 2	Up to +2 s in 0.25 ms steps, common to any selected pairs
Fine manual delay 1 and 2	Up to +0.25 ms in 5 µs steps, common to any selected pairs
Dolby E delay (alignment)	Auto/Manual
Variable audio delay control source	Up to 0.5 s from RollTrack + Video Delay
Tone Setup	
Frequency	1 kHz, 2 kHz, 4 kHz, mute @ -20 dBFS or -18 dBFS

### Video Controls

Output standard	Select, Follow Input
Standards list	Select video standards for automatic follow
Black level	±200 mV in steps of 1 mV
Master video gain	±6 dB in steps of 0.1 dB.
Y gain	±6 dB in steps of 0.1 dB.
Cb/Cr gain	±6 dB in steps of 0.1 dB.
Pattern select	Black, 100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse & Bar, Burst
Blank ancillary data	Blank All, Blank HANC, Pass All, Pass when Output Standard equals Input Standard
VBI line blank	Individual lines for each video standard
Manual freeze	On/Off
Freeze	Field/Frame
Video channel control	Y On/Off, C On/Off
Default video output	Pattern / freeze/ black / run through

#### Metadata Controls

TBA

### Other Controls

User memories	16 x Save / Recall / Rename
Input / output names	User configurable naming of the input and output AES/EBU, embedded audio and mixer channels

### RollCall Features

Logging	Video Status Embedded Audio Status O/P Audio Status O/P Audio Level Status O/P Dolby E Status AES Input Status AES Output Status Embedded audio output status, level and type (pairs 1-8) Embedded Dolby E output timing status (pairs 1-8) Misc
RollTrack controls	Source, Address, Command, Status, Sending
RollTrack sources	Unused, Video Delay, Input Present, Input Loss, Output Freeze, Output Unfreeze, Embedded Audio (Pairs 1-8) AES Audio (Pairs 5-8)

## Technical Specification cont...

## Specifications

**Video Standards**

750(720)/59p, 750(720)/50p,  
1125(1080)/29i, 1125(1080)/25i  
525(480)/29i, 625(576)/25i

Horizontal Timing	0 to 1 output line in steps of 1 pixel
Delay adjustment	Horizontal and Vertical timing
Vertical timing	0 to 1 output frame in steps of 1 line
Minimum delay	HD – 15 $\mu$ s SD – 42 $\mu$ s
Video delay	HD - 1120 pixels to 11 Frames + 820 pixels SD - 570 pixels to 11 Frames + 420 pixels
Internal audio processing	32 channels @ 24-bit
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Audio resolution	Inputs: 32 kHz/ 44.1 kHz/48 kHz synchronous or asynchronous to video stream. Outputs: 48kHz synchronous to the video stream. Up to 24-bit, (20 MSBs embedded in SD-SDI stream)
Audio delay	Minimum: 0.75 ms for data signals and embedded input pairs; 3 ms for AES pairs Maximum 2.5 s

**Power Consumption**

Module power consumption	18.5 W Max (A frames) 17 PR (B Frames)
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The IQDBE00 provides an integrated Dolby E/D encoding and re-embedding solution for HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. As well as providing embedding or de-embedding for up to 16 PCM audio channels, eight AES/EBU streams, it can de-embed multi-channel PCM audio and encode as Dolby E/D data to output as AES or re-embed into the video stream. Additional Dolby features include automatic Dolby E alignment with the video signal, and metadata input from RS485 to steer the encoder. Other audio processing features include PCM tracking audio delay, gain, phase invert, mixing, channel level routing and Dolby E pair routing. Video features include proc. amp controls and up to 12 frames of delay.

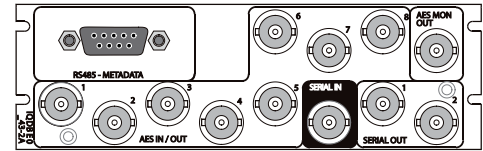
### Features

- Encode multi-channel audio to Dolby E/D compressed audio and either output to AES or re-embed into the HD/SD-SDI stream
- Associated Dolby metadata can be accommodated via RS485 input
- Embed unbalanced or balanced AES audio onto HD/SD-SDI video streams with channel-level control
- De-embed existing audio channels and output them to unbalanced or balanced AES
- Standards supported:
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Channel-level control allows up to 16 individual embedded audio channels to be swapped-over or swapped out
- 4 off 4 channel assignable audio mixers
- Audio proc. amp and delay
- Audio delay channels include selectable fixed delay and tracking delays selectable for any pair
- Tracking audio delay which seamlessly tracks the video delay or external RollTrack inputs
- Dolby E support – pair routing and automatic re-alignment and synchronization to the video frame boundary
- Any group of embedded audio may be passed unchanged if not selected for processing
- Video delay feature, up to 12 frames
- Video controls including video gain and offset
- 16 x user memories
- Independent horizontal and vertical ancillary data blanking
- Input SDI, CRC, EDH and ANC data checking and reporting
- In-built test pattern generator
- Input loss detection – input pass through or black/pattern/freeze
- Naming of audio output channels for easy identification

### Why should you choose this module?

- Powerful audio processing module to encode multi-channel audio into Dolby E/D for distribution throughout the broadcast facility or final transmission
- Metadata input allows the encoder to repurpose any previously coded audio signals correctly
- Adjustable video delay to match Dolby E/D encoder delay
- Advanced Dolby E alignment functions enable accurate timing to be maintained throughout the signal path
- Suitable for synchronous or asynchronous embedding and de-embedding applications using AES audio
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation

### Order codes

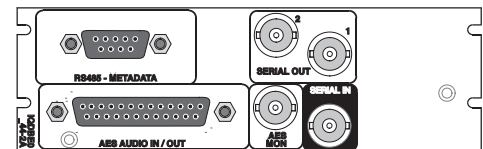


#### IQDBE0043-2A

HD/SD-SDI 16 Channel de-embedder with Dolby E encoder. 2 HD/SD-SDI outputs, 8 AES/EBU unbalanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.

#### IQDBE0243-2A

HD/SD-SDI 16 Channel de-embedder with Dolby D encoder. 2 HD/SD-SDI outputs, 8 AES/EBU unbalanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.



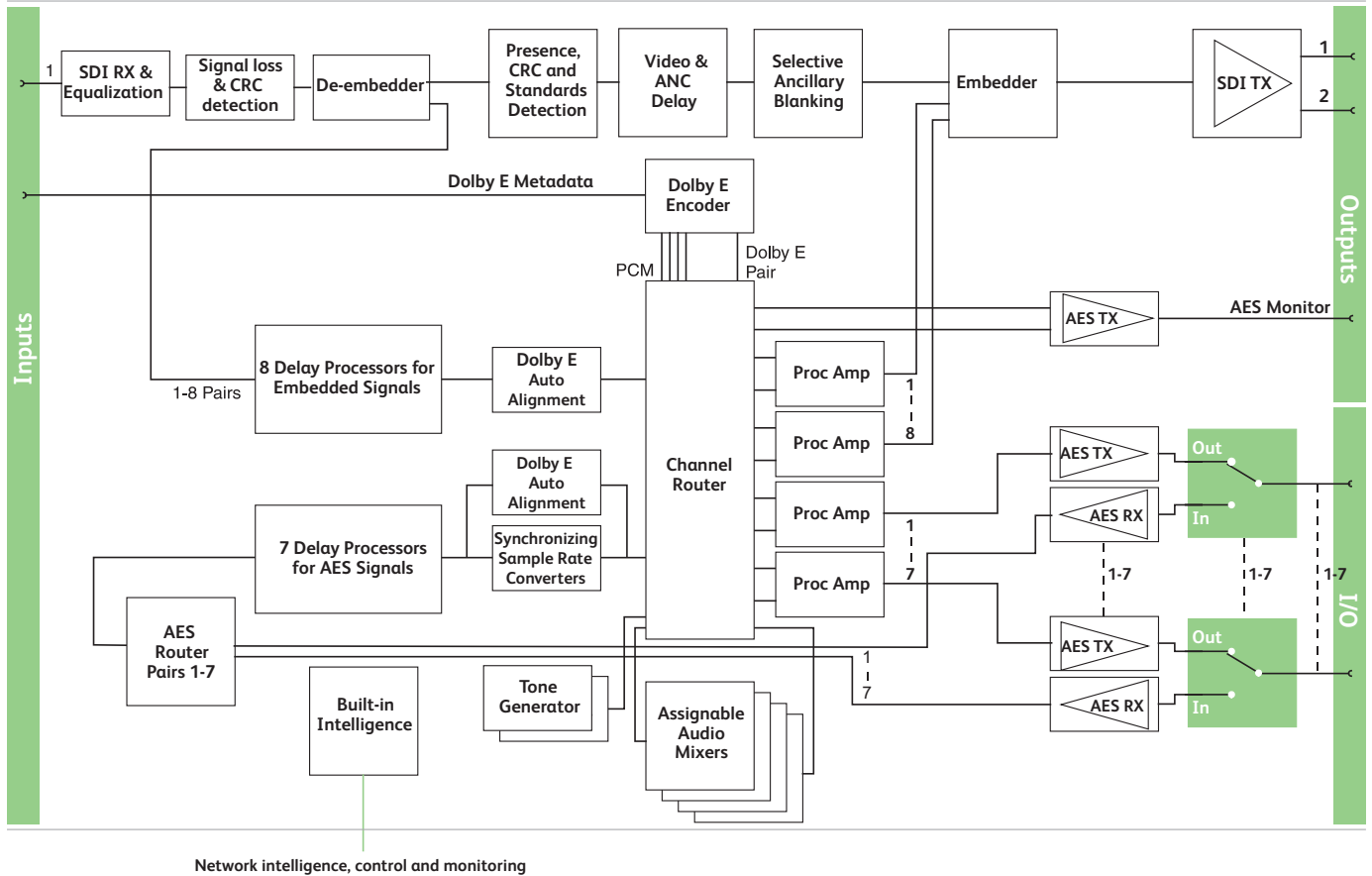
#### IQDBE0144-2A

HD/SD-SDI 16 Channel de-embedder with Dolby E encoder. 2 HD/SD-SDI outputs, 8 AES/EBU balanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.

#### IQDBE0344-2A

HD/SD-SDI 16 Channel de-embedder with Dolby D encoder. 2 HD/SD-SDI outputs, 8 AES/EBU balanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.

For more details on enclosure types please refer to Frames and Hardware Section.



Block Diagram for IQDBE0043-2A

### Technical Specification

#### Inputs & Outputs

##### Video Signal Inputs

Digital Video	1 x Serial Digital Input
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M, SMPTE 299M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75 ohm panel jack on standard S&W connector panel
Input Cable Length	Up to 140 m Belden 1694A @ 1.5 Gbit/s Up to 350 m Belden 1694A @ 270 Mbit/s
Return loss	> -15 dB

##### Video Signal Outputs

Digital Video	2 x Serial Digital Outputs
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75 ohm panel jack on standard S&W connector panel

##### Audio Signal Inputs/Outputs

Unbalanced AES/EBU	4 Unbalanced
AES Audio I/O (software selectable)	4 Unbalanced
AES Audio Outputs	4 Unbalanced
AES Audio Monitor Output	1 Unbalanced
Connector / Format	BNC/ 75 ohm panel jack
Balanced AES/EBU	4 Balanced
AES Audio I/O (software selectable)	4 Balanced
AES Audio Outputs	4 Balanced
Connector / Format	25 Way D-Type / 110 ohm panel mounted
AES Audio Monitor	

Output	1 Unbalanced
Connector / Format	BNC/ 75 ohm panel jack
RS422 Metadata	
Connector	9 Way D-Type panel mounted

#### Controls

##### Indicators

Power	OK (Green)
CPU	OK (Green flashing)
FPGA	OK (Orange flashing)
Status	OK (Green) Warning (Orange) Error (Red)
Lock	OK (Green)
SDI Error	Error (Red)
RollCall Features	
Audio Controls	
Embedded Audio Types	PCM (to AES3)/ Data (SMPTE 337M inc. Dolby E)/ Mixed (Passes any channel status information present)
Channel routing	Output channels routed from Dolby E encoder, AES inputs 1 to 7, SDI 16 embedded channels from any group, test tone and silence
Embedder Priority	Normal distribution/Audio Prioritized
Embedded Group	Pass/Blank/Embed



## Technical Specification cont...

Channel Status handling and checking	
Dolby E Auto Line selection	
Define Dolby embed line for each video standard	
Dolby Encoder routing	channels routed from AES inputs 1 to 7, SDI 16 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, & Polarity control over embedded output channels. +12 dB to 66 dB in 0.1 dB steps
Channel 1 Delay sources	
Coarse Manual delay 1 & 2	Up to +2 s in 0.25 ms steps, common to any selected pairs.
Fine Manual delay 1 & 2	Up to ±0.25 ms in 5 µs steps, common to any selected pairs.
Dolby delay (alignment) Auto/Manual	
Variable audio delay control source	Up to 0.5 s from RollTrack + Video Delay
Channel 2 Delay sources	
Coarse Manual delay 1 & 2	Up to +2 s in 0.25 ms steps, common to any selected pairs.
Fine Manual delay 1 & 2	Up to +0.25 ms in 5 µs steps, common to any selected pairs.
Dolby E delay (alignment) Auto/Manual	
Variable audio delay control source	Up to 0.5 s from RollTrack + Video Delay
<b>Tone Setup:</b>	
Frequency	1 kHz, 2 kHz, 4 kHz, mute @ -20 dBFS or -18 dBFS
Video Controls	
Output Standard	Select, Follow Input
Standards List	Select video standards for automatic follow
Black Level	±200 mV in steps of 1 mV
Master Video Gain	±6 dB in steps of 0.1 dB.
Y Gain	±6 dB in steps of 0.1 dB.
Cb/Cr Gain	±6 dB in steps of 0.1 dB.
Pattern Select	Black, 100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse & Bar, Burst
Blank Ancillary Data	Blank All, Blank HANC, Pass All, Pass when Output Standard equals Input Standard
VBI Line Blank	Individual lines for each video standard
Manual Freeze	On/Off
Freeze	Field/Frame
Video Channel Control	Y On/Off, C On/Off
Default Video Output	Pattern / freeze/ black / run through
<b>Metadata Controls</b>	
Metadata Source	Internal/External
Reversion Mode	Last used (Valid)/Internal
<b>Metadata Program</b>	
Select	1-8
Dialog Norm	-31 dB to -1 dB
User Presets	Definable 1-4
Program Configuration	Selectable standard presets
Stereo Downmix mode	LIRt, LoRo
Extended Metadata settings	BS11 & BS12
Program Description	User definable 2 x 19 Character
<b>Other Controls</b>	
User Memories	16 x Save / Recall / Rename
Input/Output Names	User configurable naming of the input and output AES/EBU, embedded audio and mixer channels

**RollCall Features**

Logging	Video Status Embedded Audio Status O/P Audio Status O/P Audio Level Status O/P Dolby E Status AES Input Status AES Output Status Embedded audio output status, level & type (pairs 1-8) Embedded Dolby E output timing status (pairs 1-8) Dolby Encoder Status Misc
RollTrack Controls	Source, Address, Command, Status, Sending.
RollTrack Sources	Unused, Video Delay, Input Present, Input Loss, Output Freeze, Output Unfreeze, Embedded Audio (Pairs 1-8) AES Audio (Pairs 1-7)

**Specifications****Video Standards**

750(720)/59p, 750(720)/50p,  
1125(1080)/29i, 1125(1080)/25i  
525(480)/29i, 625(576)/25i

Horizontal Timing	0 to 1 output line in steps of 1 pixel.
Delay Adjustment	Horizontal and Vertical timing
Vertical Timing	0 to 1 output frame in steps of 1 line.
Minimum Delay	HD - 15 µs SD - 42 µs
Video Delay	HD - 1120 pixels to 11 Frames + 820 pixels SD - 570 pixels to 11 Frames + 420 pixels

## Internal audio processing

32 channels @ 24-bit

Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Audio Resolution	Inputs: 32 kHz/ 44.1 kHz/48 kHz synchronous or asynchronous to video stream. Outputs: 48kHz synchronous to the video stream. Up to 24 bit, (20 MSBs embedded in SD-SDI stream).
Audio Delay	Minimum: 0.75 ms for data signals and embedded input pairs; 3 ms for AES pairs Maximum 2.5 s

**Power Consumption**

Module Power Consumption	18.5 W Max(A Frames) 17 PR (B Frames)
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The IQEAS00 provides embedded audio channel shuffling or HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio processing. Including 2 SDI inputs with input format detection the IQEAS00 also has a video proc. amp providing complete control over the video levels, and audio processing features including Dolby E auto-alignment, audio delay, gain, and invert.

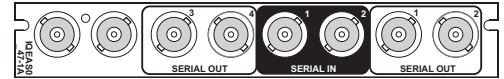
### Features

- 3G/HD/SD-SDI multi-format working with processing for 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Audio proc-amp features including channel level (Sub-frame) routing, adjustable delay, independent gain, invert and mute control
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Can be used as a video delay, up to 9 frames
- Video proc. amp controls including video gain, offset and hue
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

### Why should you choose this module?

- Cost effective module for shuffling incoming audio feeds to align with in-house channel mapping and provide everyday processing functions
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

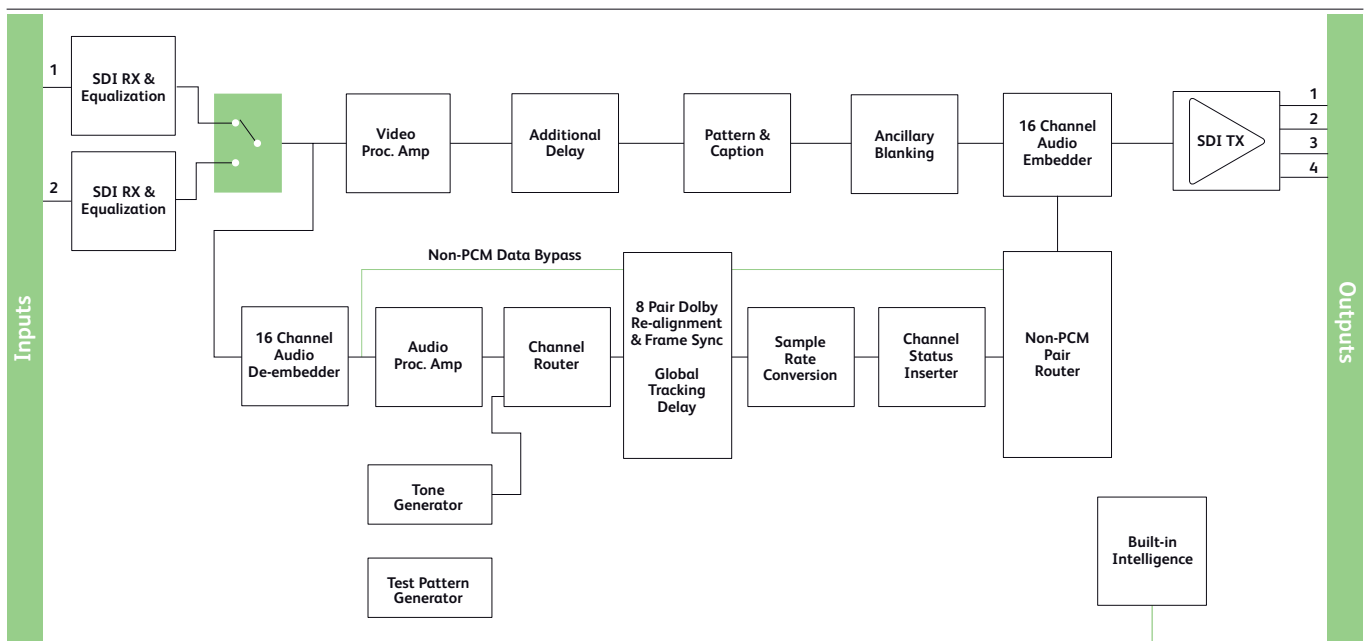
### Order codes



#### **IQEAS0047-1A3, IQEAS0047-1B3**

3G/HD/SD-SDI Embedded Audio shuffler and Processor. 2 inputs, 4 outputs

For more details on enclosure types please refer to Frames and Hardware section.



## Technical Specification

### Inputs & Outputs

#### Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s Up to 160m Belden 1694A @ 1.5 Gbit/s >350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s Up to 100m Belden 1694A @ 1.5 Gbit/s Up to 100m Belden 1694A @ 270 Mbit/s

#### Signal Outputs

SDI Outputs	x 4
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### Controls

#### Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green) Warning (Yellow) Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

#### Controls

Video Delay	
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 9 F

#### Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Video Select	Input 1, Input 2
Audio Select	Video Input 1, Video Input 2, Follow Video
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

### Audio Controls

Embedder Assignment	
Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	De-embed 1-16, Tone, Silence
Pair 1 to 8 Source R	De-Embed 1-16, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

### Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
Variable Audio Delay	
Control Source	Internal, Manual

### Dolby-E

Dolby-E Auto Alignment	On/Off
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### Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

### Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

### Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Audio Delay (1&2), Input Present (1&2), Input Loss (1&2), Input Select (1&2), Output Rate/Std, Output Freeze, Output Unfreeze, Output Pattern On, Output Pattern Off, Output Black On, Output Black Off, Output Caption On, Output Caption Off, Inp1 Embedded Audio (Pairs 1-8) PCM, Inp1 Embedded Audio (Pairs 1-8) Loss, Inp1 Embedded Audio (Pairs 1-8) V Bit, Inp2 Embedded Audio (Pairs 1-8) PCM, Inp2 Embedded Audio (Pairs 1-8) Non-PCM, Inp2 Embedded Audio (Pairs 1-8) Loss, Inp2 Embedded Audio (Pairs 1-8) V Bit.
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module

## Technical Specification cont...

Module Information Reports following module information:  
Software version, Serial number, Build number,  
KOS version, Firmware version, PCB version

**Specifications**

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical delay (Input lock)	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us
<b>Power Consumption</b>	
Module Power Consumption	8.5W Max (A Frames) 8.5 PR (B Frames)

The IQDLY20/21 provides two channels of analog audio and four channels of AES audio with up to 3 seconds of preset delay, and 0.5 seconds of tracking audio delay. The availability of both analog and AES inputs and outputs also enables it to be used as a two-channel audio ADC and DAC.

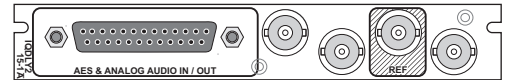
### Features

- 4 x balanced or unbalanced AES paths
- Synchronizes AES inputs
- Proc. amp control of audio channels
- Flexible preset and tracking delay
- Channel-level shuffling
- 4 off assignable 4 input mixers
- References to video or AES signals
- Professional standard 48kHz operation, sample rate converts non-48kHz signals
- Firewall for processed PCM audio to provide a continuous output regardless of input
- Passes non-PCM AES signals including Dolby E
- Pair-level Dolby E routing

### Why should you choose this module?

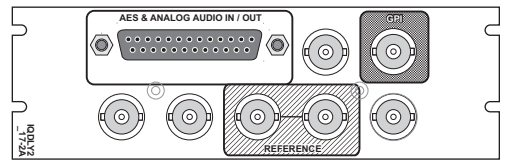
- A complete AES solution in one module for all common 48kHz audio signal tasks
- Firewall function makes this an ideal first unit in a signal chain
- Channel-level manipulation and mixing allows detailed control of audio material
- Tracking capability allows the audio to follow a video synchronizer

### Order codes



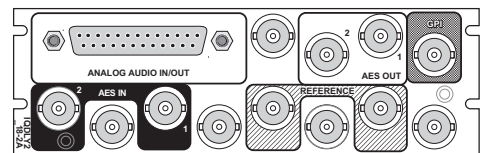
#### IQDLY2115-1A

AES and Analog Audio Delay. Balanced Audio connection via 25 way D type. 2 Analog inputs, 2 AES inputs, 2 Analog outputs, 2 AES outputs.



#### IQDLY2117-2A

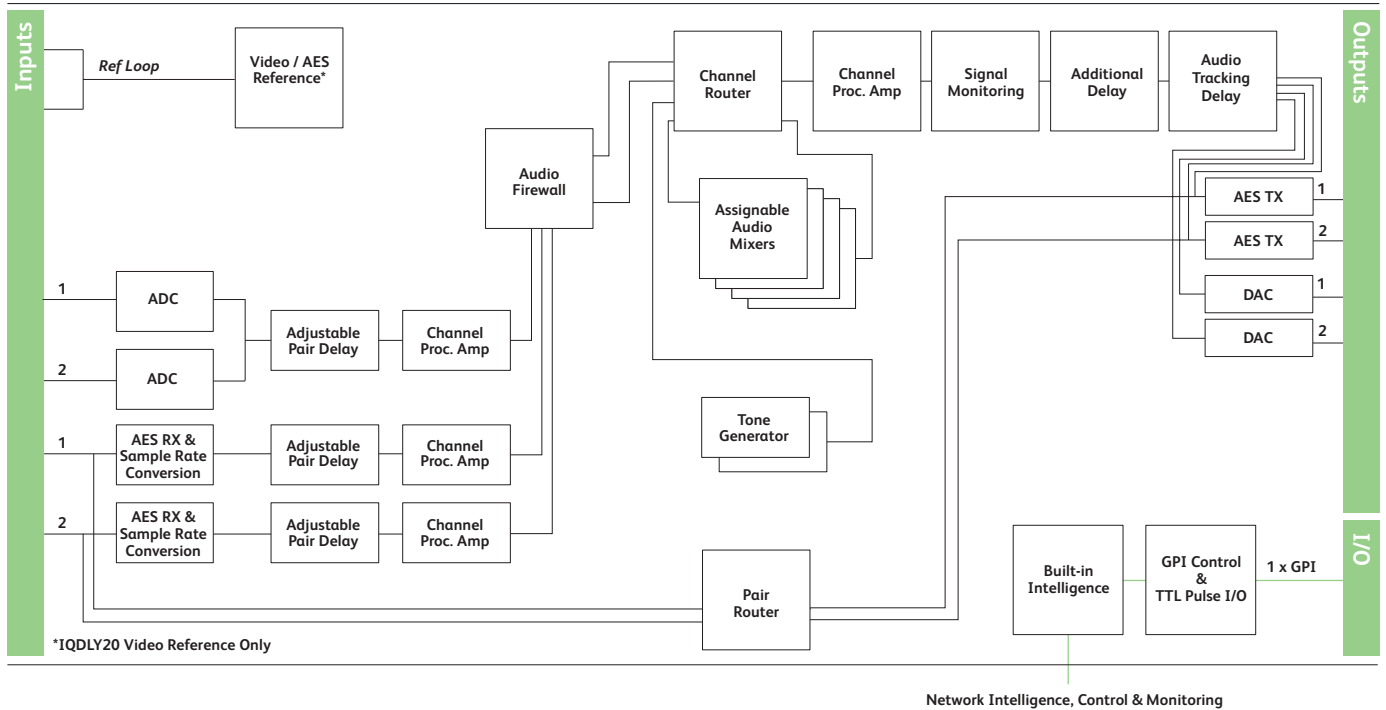
AES and Analog Audio Delay. Balanced Audio connection via 25 way D type. 2 Analog inputs, 2 AES inputs, 2 Analog outputs, 2 AES outputs and 1 x GPI.



#### IQDLY2018-2A

AES and Analog Audio Delay. Balanced Audio connection via 25 way D type, Unbalanced AES connection via BNC. 2 Analog inputs, 2 AES inputs, 2 Analog outputs, 2 AES outputs and 1 x GPI.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDLY2117-2A

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

Unbalanced digital audio	2 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	2 x AES/EBU, AC3, Dolby E (25 Way D-Type)
Analog	2 Channels (1 Stereo Pair)
Reference	IQDLY21: Composite video / AES/EBU (BNC) IQDLY20: Composite video (BNC)

#### Signal Outputs

Unbalanced digital audio	2 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	2 x AES/EBU, AC3, Dolby E (25 Way D-Type)
Analog	2 Channels (1 Stereo Pair)

#### Control Interface

GPI	1 x Closing contact I/O interface (BNC)
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### Card Edge and RollCall Controls

#### Card Edge Controls

NONE

Card Edge Indicators	
AES input present	1 x LED per pair Reference Present
CPU running / power	One green LED, flashing = OK

### RollCall Functions

#### Audio Controls

Set line up level	+20 to -20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input audio delay	Up to 1.5s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control input channels. +18 dB to -18 dB in 0.1 dB steps
Channel routing	Output channels routed from Analog inputs 1-2, AES pairs 1 to 4, test tone and silence
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over output channels. +18 dB to -18 dB in 0.1 dB steps
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

### Technical Specification

#### Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

#### Other Controls

User memories	Name, clear, save and read 8 user memories
Default audio output	Silence
GPI/O set-up	May be attached to any memory function/ polarity

#### Reporting (\* also Logged)

Audio silence, high level, low level, overflow	For processed audio channels only
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#### Audio Delay Setup

Delay	Audio delay - Fixed, RollTrack + fixed, GPI + Fixed
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#### RollTrack Output

Delay	Current audio delay
Reference state	Present, Error, Loss
External audio state	Pair present
AES 1-2	Loss, Present
GPI	Low, High, Inactive

#### Specifications

Noise floor	Better than -100 dBFs (20 Hz to 20 kHz)
Channel amplitude matching	Better than $\pm 0.15$ dBu
Output level accuracy	Better than $\pm 0.2$ dBu
Flatness	Better than +0.1 dBu to -0.3 dBu (20 Hz to 20 kHz with reference to 1 kHz)

#### Digital Audio Input (Balanced)

Connector / format	25 W D
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>150 m of AES3 cable
Impedance	110 Ohms

#### Digital Audio Input (Unbalanced)

Connector / format	BNC
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>500 m of RG59 cable
Impedance	75 Ohms
Output sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

#### Digital Audio Output (Balanced)

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

#### Digital Audio Output (Unbalanced)

Connector / format	BNC
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#### Analog to Digital Audio

Analog input impedance	10 k Ohms
Frequency response	20 Hz to 20 kHz (+/- 0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ -1 dBFS
Dynamic range	>106 dB
Audio delay	Equal to video delay + adjustable offset

#### Digital to Analog Audio

Analog output impedance	50 Ohms
Frequency response	20 Hz to 20 kHz (+/- 0.1 dB)
Distortion (THD+N)	Better than -92 dB at 23 dBu, 1kHz@ -1 dBFS
Dynamic range	>106 dB

#### Power Consumption

Module power consumption	9 W Max (A Frames) 8 PR (B Frames)
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## Analog/Digital Conversion

IQ Modular offers a range of both video and audio conversion modules to provide the optimum balance of price to performance for all system requirements.

For Related Modules see:

IQUDC34 in SD-HD Conversion

IQDLY20/21 in Audio Processing

IQDNC34 in SD-HD Conversion

The IQDAVM accepts a serial 4:2:2 input to provide up to four equalized and re-clocked outputs, three monitoring composite outputs and four embedded audio analog outputs. On-screen audio 'confidence' displays of four embedded audio channels are provided on the -M version.

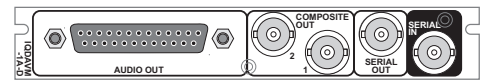
### Features

- Up to four re-clocked serial 4:2:2 outputs
- Three monitoring composite PAL/NTSC/PAL-N outputs
- Four analog audio outputs or 2 stereo pairs
- Balanced audio output level adjustable +12 dBu to +24 dBu for 0 dB FS input (-D version)
- Unbalanced audio output level adjustable 1 Volt pk-pk to 4.5 Volts pk-pk into >50 k ohm, for 0 dB FS input (-B version)
- Audio selection from any embedded channel pair
- 20-bit digital-to-analog audio conversion, -95 dB THD+N typical (Full Scale)
- Audio polarity invert
- Embedded audio presence indication
- On screen display of audio level and status (-M versions only)
- Non-audio ancillary data presence indication
- EDH error detection and reporting
- Test signal generator (Color Bars/Black and -20 dBFS Tone/Silence)
- Automatic 525/625 line detection and no valid signal indication
- Card edge and RollCall remote control

### Why should you choose this module?

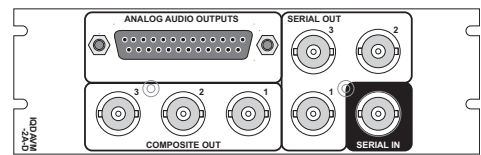
- The on-screen monitoring function of the four audio channels is via familiar bar-graph displays. By using a combination of color bands and text a large amount of information may be conveniently viewed via the composite video monitoring output
- Balanced audio output level adjustable +12 dBu to +24 dBu for 0 dB FS input (-D version)
- Unbalanced audio output level adjustable 1 Volt pk-pk to 5 Volts pk-pk in to 1 k ohm, for 0 dB FS input (-B version)
- 20-bit digital-to-analog conversion, -95 dB THD+N typical (Full Scale)

### Order codes



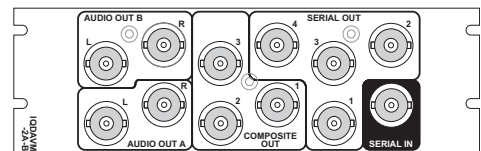
#### **IQDAVM-1A-D-M**

Audio and Video Monitoring Encoder with on-screen display. Balanced Audio.



#### **IQDAVM-2A-D-M**

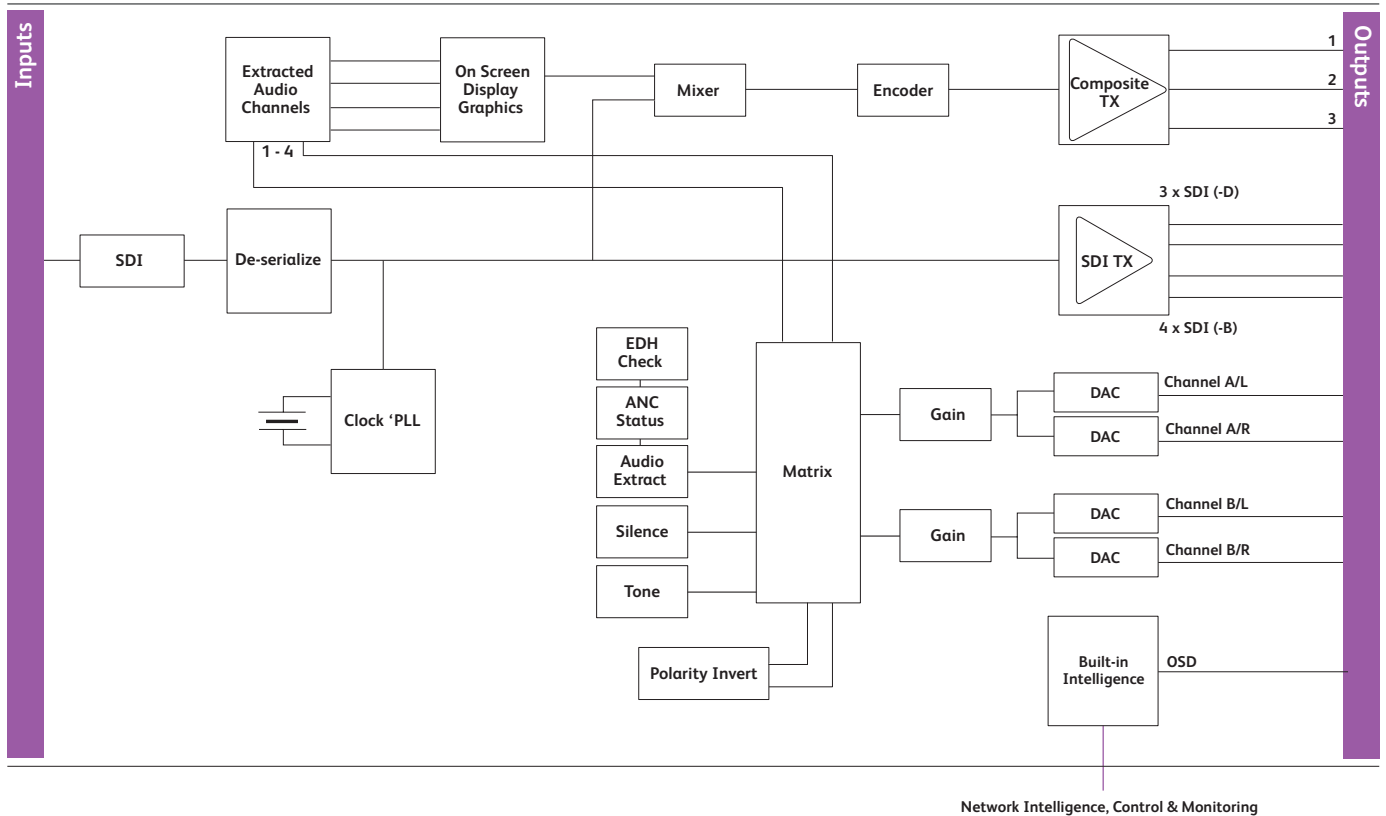
Audio and Video Monitoring Encoder with on-screen display. Balanced Audio.



#### **IQDAVM-2A-B**

Audio and Video Monitoring Encoder. Unbalanced Audio.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQDAVM-1A-D-M

## Technical Specification

### Inputs and Outputs

#### Signal Inputs

Serial digital 1 x SDI via BNC connector  
Standards SMPTE 259M-C-1997  
SMPTE 272M-A-1994

#### Signal Outputs

Serial digital 4 (-B version) 3 (-D version) x SDI via BNC connectors  
Standards SMPTE 259M-C-1997  
SMPTE 272M-A-1994  
Composite video 3 at standard level via BNC connectors  
Standards PAL/NTSC/PAL-N  
Analog audio 2 Stereo pairs Balanced via 25 way (-D version, broadcast level) or unbalanced via BNC (-B versions, low level)

### Technical Specification cont...

#### Card Edge and RollCall Controls

##### Card Edge Controls (also available via RollCall)

OSD audio monitoring	On/Off (-M versions only)
OSD text	On/Off (-M versions only)
Pattern	Color Bars Pattern On, off
Standard	Line standard = 625: PAL/PAL-N Line standard = 525: NTSC
Pedestal	On/Off (NTSC Only)
Local	Local/Remote Control
EDH reset	Resets error flags
Audio channel select	Any Embedded Channel Pair

##### Indicators

Power	O.K.
Input	Loss
Audio presence	On selected pairs
EDH	Present; Error-Minute: Error-Hour

##### Functions Available via RollCall Only

Headroom (-D)	Adjustable from +12 to +24 dB
Level (-B)	Adjustable from 1.0 V to 4.5 V pk-pk
Analog output gain A/B	Adjustable $\pm 6$ dB in 0.2 dB steps

##### Display Information

Default pattern selection	Color Bars or black (Default used on input loss)
Default audio selection	Tone or silence (Default used on extraction fail or input loss)
Polarity	Invert polarity of extracted audio pair
Logging	Input Loss; Input Line Standard; EDH error. Presence of extracted audio, low-level audio and silence
Standard detection	Auto 525/625 line rate detection
Audio gain control	Independent for each output pair
Chroma bandwidth	1.6 MHz or 2 MHz
Pedestal	On, off (NTSC only)
Non-audio HANC data	Presence indication

##### Specifications

SDI input return loss	Better than -15 dB at 270 MHz
Input cable length	>200 m of PSF1/2
SDI output return loss	Better than -15 dB at 270 MHz
Composite video output	1 V pk-pk into 75 ohm (EBU Bars)
Internal processing	8-bit composite encoding with 9-bit oversampled DAC's

#### Video Signal

Luminance frequency response	0 – 4 MHz +0.1 dB, -0.5 dB
Chrominance frequency response	1.6 MHz or 2 MHz (selectable) – 6 dB
Video signal/noise ratio	Better than -68 dB (weighted – flat field) Better than -62 dB (weighted – ramp)
Differential phase	<2°
Differential gain	<1 %
Processing delay	Approx. 2 $\mu$ s

#### Audio Signal

THD+N at 24 dBu	Better than -80 dB (0 dBFS, 1 kHz)
Linear freq. response	+0.1 dB, -0.3 dB (20 Hz to 20 kHz w.r.t. 1kHz)
Conversion	20-bit
Sampling	48 kHz Synchronous to D1 video stream
Dynamic range	Better than 100 dB (Balanced)
Output level (balanced)	Better than 98 dB (Unbalanced)
Output level (unbalanced)	Level Adjustable +12 dBu to +24 dBu, $\pm 5\%$ Adjustable 1 V pk-pk to 4.5 V pk-pk into >50 k ohm, for 0 dB FS input, $\pm 5\%$
Output impedance (balanced)	25 ohm Nominal
Output impedance (unbalanced)	75 ohm Nominal

#### Power Consumption

Module power consumption	8.5 W max (A frames) (balanced versions) 6.5 PR (B frames) (balanced versions) 8.5 W max (A Frames) (unbalanced versions) 6.5 PR (B Frames) (unbalanced versions)
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The IQDSDES provides up to six re-clocked and equalized serial 4:2:2 outputs, and up to five outputs for monitoring of composite video.

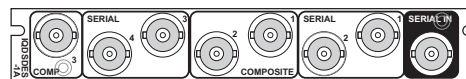
### Features

- Single channel SDI re-clocker and encoder
- Up to 6 re-clocked serial component outputs
- Up to 5 composite PAL/NTSC/NTSC-J/PAL-N/N4.43/PAL-M outputs
- EDH error detection and reporting
- Test signal generation (color bars)
- Black, Bars or Muted output in event of input loss
- Automatic 525/625 line detection and no valid signal indication
- Sends RollTrack commands for input loss or error
- Full RollCall remote control and card edge control

### Why should you choose this module?

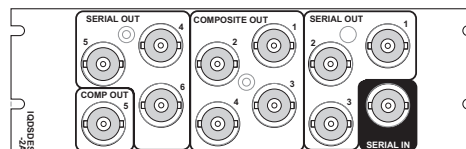
- Re-clocking DA ensures there are no jitter problems in the system
- Composite analog outputs to enable the digital video to be viewed on conventional monitors
- Full EDH capability enables diagnosis of failures
- Simple indication, black or no output, of problems with SDI data

### Order codes



#### IQDSDES-1A

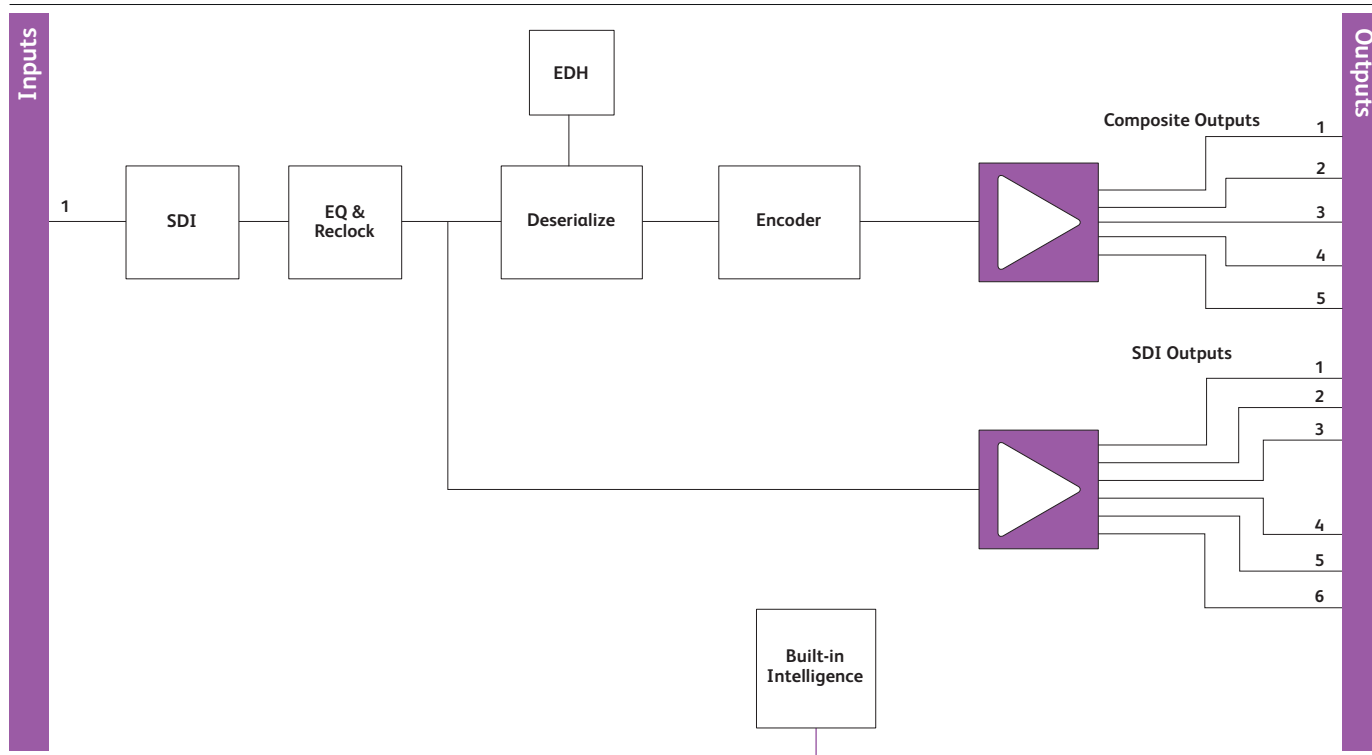
Monitoring Encoder PAL/NTSC.  
3 x composite and 4 x SDI outputs.



#### IQDSDES-2A

Monitoring Encoder PAL/NTSC.  
5 x composite and 6 x SDI outputs.

For more details on enclosure types please refer to Frames and Hardware Section.



Network Intelligence, Control & Monitoring

Block Diagram for IQDSDES-2A

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Serial digital Standards	1 x SDI Via BNC Connector SMPTE 259M-C-1997
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##### Signal Outputs

Serial digital Standards	Up to 6 x SDI via BNC Connectors SMPTE 259M-C-1997
Composite video Standards	Up to 5 composite encoded via BNC Connectors PAL/NTSC//NTSC-J/PAL-M/PAL-N/N4.43

#### Card Edge and RollCall Controls

##### Indicators

Power OK	+ve and -ve supplies
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##### Input Loss

EDH	Present; Error-Minute: Error-Hour
-----	-----------------------------------

#### Card Edge Controls (also available via RollCall)

Pattern enable	Enables pattern on output
EDH reset	Resets EDH Flags

#### Functions Available via RollCall™ Only

Logging	Input Loss; Input Line Standard; [EDH error]
RollTrack	Input Loss or Input error
Default output	Color bars, black or mute
Force standard	PAL / NTSC / NTSC-J / PAL-M / PAL-N / N4.43
VBI pass	Passes vertical interval lines
Chroma bandwidth	1.6 MHz or 2 MHz (default = 1.6 MHz)

#### Specifications

Input return loss	Better than 15dB to 270 MHz
Serial output return loss	Better than 15dB to 270 MHz
Y frequency response	0-4 MHz + 0.1dB, -0.4dB
U and V frequency response	1.6 MHz or 2 MHz (selectable) – 6 dB
Differential gain	Better than 1%
Differential phase	Better than 2°
Composite output return loss	Better than 36 dB to 5.5 MHz
Signal / noise ratio	Better than – 68 dB (weighted – flat field) Better than –62 dB (weighted – ramp)
2T pulse-shape k-rating	Better than 1%
Processing delay	~2.25 μs
Output D.C	<50 mV

#### Power Consumption

Module power consumption	8 W Max (A Frames) 6 PR (B Frames)
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#### EMC Performance Information

Environment	Commercial and light industrial E2
Peak mains inrush current following a 5 second mains interruption	No mains input
Performance information	Immunity to conducted common-mode RF interference (EN 55103-2 immunity phenomenon I6): When the serial input is subjected to modulated RF interference at a level of 3 V, up to 20 mV pk-pk of interference may be present at the composite outputs

The IQAAD00 converts two analog stereo pairs, or four analog mono channels into two AES/EBU digital audio streams. Each analog input is sampled at 48 kHz with 24-bit resolution. Sampling can be free-running, locked to a reference video signal or 48KHz AES/EBU digital audio stream. Video standard is automatically determined. The IQAAD00 also provides proc. amp control, channel routing and mixing, up to 0.5s of tracking audio delay and additional fixed delay of up to 3s adjustable in 1 ms steps.

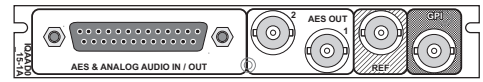
### Features

- Converts four analog audio channels into two AES/EBU digital audio streams
- Firewall for processed PCM audio to provide a continuous output
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Variable audio delay of up to 0.5s which seamlessly tracks an external video delay via RollTrack / GPI inputs
- Audio proc. amp (gain, mute, polarity)
- RollCall control and monitoring compatible

### Why should you choose this module?

- Converts four analog audio channels into two AES/EBU digital audio streams, useful in multi-lingual systems
- Will lock to video and AES/EBU digital audio references
- Balanced or unbalanced output configurations enables use in all environments
- A comprehensive audio conversion solution with firewall, proc. amp, audio shuffling and delay

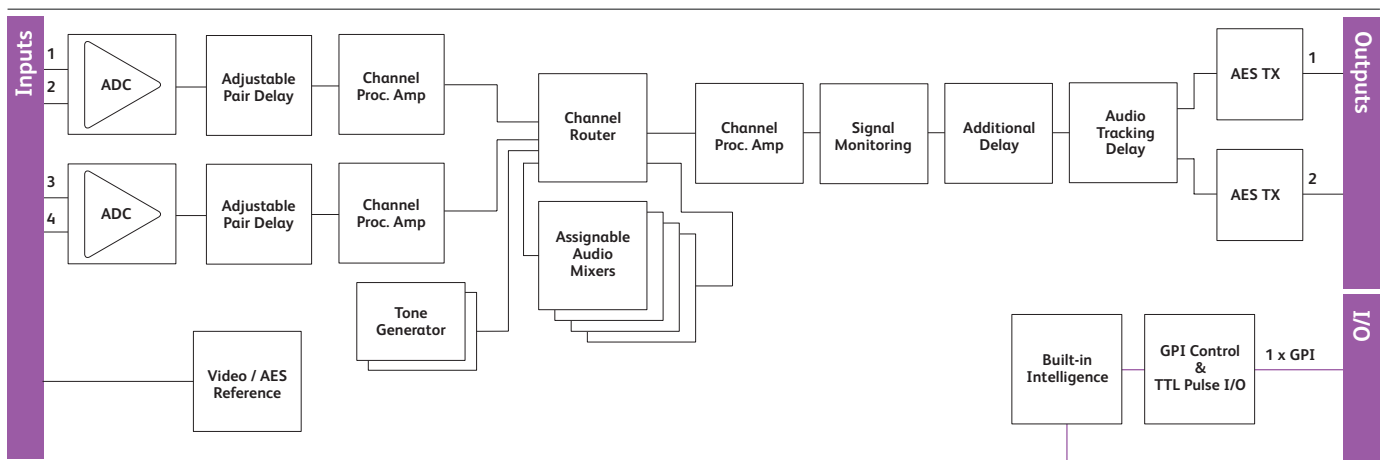
### Order codes



#### IQAAD0015-1A

Analog Audio ADC. 4 balanced analog audio inputs, 2 balanced and unbalanced AES/EBU outputs, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQAAD0015-1A

Network Intelligence, Control & Monitoring



### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Analog audio	4 Channels (2 Stereo Pairs)
Video / AES reference	Composite video / AES/EBU (BNC)

##### Signal Outputs

Unbalanced digital audio	2 x AES/EBU (BNC)
Balanced digital audio Standards	2 x AES/EBU (25 Way D-Type) AES3 - 1992

##### Control Interface

GPI	1 x Closing contact I/O interface (BNC)
-----	---

#### Card Edge and RollCall Controls

##### Card Edge Controls

NONE

##### Card Edge Indicators

Reference Present	
CPU running / Power	One green LED, flashing = OK

##### RollCall Functions

##### Audio Controls

Set line up level	+20 to -20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High/low levels, silence, overload, time delay
Audio input delay	Up to 1.5s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over input channels. +18 dB to -18 dB in 0.1 dB steps
Channel routing	Output channels routed from analog pairs 1 and 2, test tone and silence
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over output channels. +18 dB to -18 dB in 0.1 dB steps
Global delay offset	Up to +1.5 s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5 s from RollTrack + GPI
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

#### Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5 s interruption every 2 s

#### Other Controls

Preset unit	Returns settings to factory defaults
User memories	Name, clear, save and read 8 user memories
GPI/O set-up	May be attached to any memory function/polarity
Reference select	Free Run, AES/EBU or Video PAL/NTSC

#### Reporting (\* also Logged)

Audio silence, high level, low level, overflow	For processed audio channels only
No reference	*No reference present
Reference error	AES reference sample rate not 48 kHz

#### RollTrack Input

Delay	RollTrack + fixed
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#### RollTrack Output

Delay	Current audio delay
Reference state	Ref Lost, Ref Present, Ref error [error: AES reference sample rate not 48 kHz]
GPI	High, Low, Inactive

#### Specifications

##### Analog Audio Input (Balanced)

Analog input impedance	10 k ohms
Frequency response	20 Hz to 20 kHz ( $\pm 0.1$ dB)
Distortion (THD+N)	Better than -95 dB, 1kHz@ -1 dBFS
Dynamic range	>106 dB
Max input level	+24 dBu

##### Digital Audio Output (Balanced)

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

##### Digital Audio Output (Unbalanced)

Connector / format	BNC
Level	1 V p-p typical into 75 Ohms

#### Reference

Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p $\pm 3$ dB
Analog reference input Standard	48 kHz AES/EBU, 625/525 line

#### Power Consumption

Module power consumption	6.5 W max (A Frames) 5 PR (B Frames)
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The IQDAA00 converts two AES/EBU digital audio streams into two analog stereo pairs, or four analog mono channels. The AES streams are converted to analog with 24-bit resolution, and the IQDAA00 also provides proc. amp control, channel routing and mixing, up to 0.5s of tracking audio delay and additional fixed delay of up to 3s adjustable in 1 ms steps.

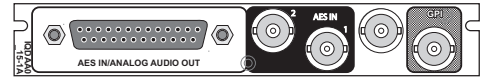
### Features

- Converts two AES/EBU digital audio streams into four analog audio channels
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Variable audio delay of up to 0.5s which seamlessly tracks an external video delay via RollTrack / GPI input
- Audio proc. amp (gain, mute, polarity)
- RollCall control and monitoring compatible

### Why should you choose this module?

- Converts two AES/EBU digital audio streams into four analog audio channels, useful for monitoring multi-lingual systems
- Balanced or unbalanced input configurations enables use in all environments
- A comprehensive audio conversion solution with proc. amp, audio shuffling and delay

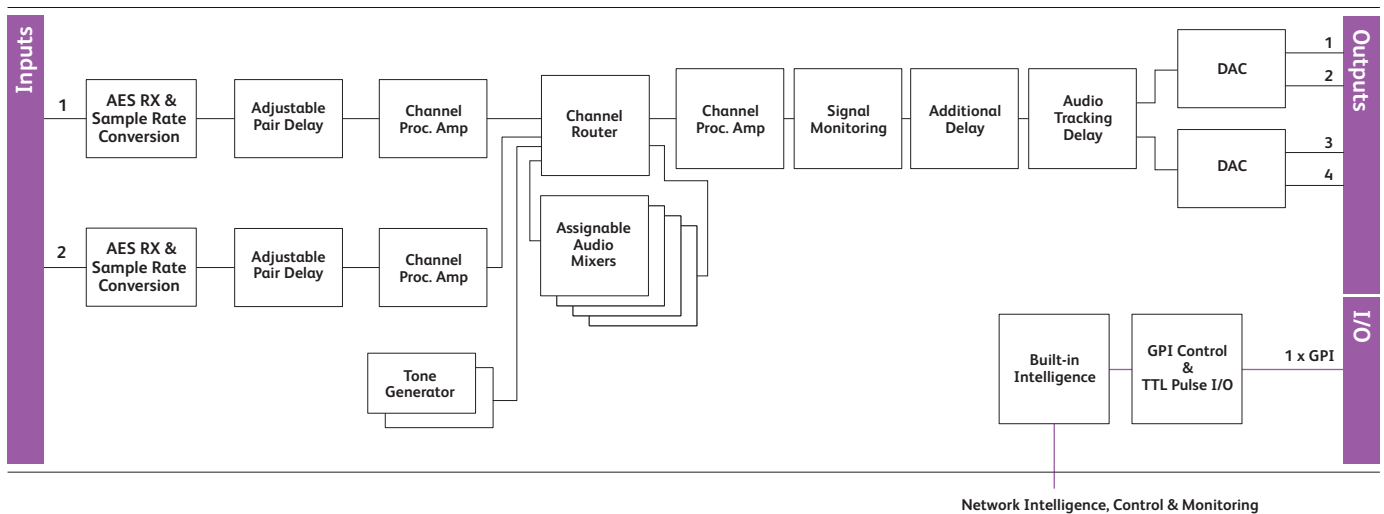
### Order codes



#### IQDAA0015-1A

Analog Audio DAC. 2 unbalanced/balanced AES/EBU inputs, 4 balanced analog audio outputs, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware section.



^ Block Diagram for IQDAA0015-1A

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Unbalanced digital audio	2 x AES/EBU (BNC)
Balanced digital audio Standards	2 x AES/EBU (25 Way D-Type) AES3 - 1992

##### Signal Outputs

Analog audio	4 Channels (2 Stereo Pairs) (25Way D-Type)
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##### Control Interface

GPI	1 x Closing contact I/O interface
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#### Card Edge and RollCall Controls

##### Card Edge Controls

NONE

##### Card Edge Indicators

Input present	1 x LED per pair
CPU running / power	One green LED, flashing = OK

##### RollCall Functions

##### Audio Controls

Set line up level	+20 to -20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High/low levels, silence, overload, time delay
Audio input delay	Up to 1.5 s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over input channels. +18 dB to -18 dB in 0.1 dB steps
Channel routing	Output channels routed from AES pairs 1 and 2, test tone and silence
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over output channels. +18 dB to -18 dB in 0.1 dB steps
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

##### Tone Setup

Frequency	00 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

##### Other Controls

Preset unit	Returns settings to factory defaults
User memories	Name, clear, save and read 8 user memories
GPI/O set-up	May be attached to any memory function/ polarity

#### Reporting (\* also Logged)

Audio silence, high level, low level, overflow	For processed audio channel only
Input AES audio state	Pair present

##### RollTrack Input

Delay	RollTrack + fixed
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##### RollTrack Output

Delay	Current audio delay
Audio state	PCM, Non-PCM, LOST
GPI	High, Low, Inactive

#### Specifications

##### Digital Audio Input (Balanced)

Connector / format	25 W D
Sample frequency	25 - 96 kHz
Input cable length	>150 m of AES3 cable
Impedance	110 Ω

##### Digital Audio Input (Unbalanced)

Connector / format	BNC
Sample frequency	25 - 96 kHz
Input cable length	>500 m of RG59 cable
Impedance	75 Ω

##### Analog Audio Outputs

Output impedance	~25 Ohms
THD+N	-92 dB @ 23 dBu typical, at 1 kHz
Conversion	24-bit - Min 105 dB dynamic range
Sampling	48 kHz

##### Power Consumption

Module power consumption	8.5 W max (A Frames) 6.5 PR (B Frames)
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# Routing

The IQ Modular range has the capability to switch between multiple sources in HD or SD SDI and AES audio. Functions include up to 5x2 crosspoint routing, intelligent change-over switching and GPI remote control.

Control can be via card edge, a 1U active front panel, a PC running RollCall or RollMap network management software or a third party automation system. In addition they can be controlled from the RPAN or RollPod 1U router control panels.

For Related Modules see:

IQSDA35 in Distribution

IQOTR32 in Fiber

IQDLY00 in Audio Processing

The IQHCO50 provides back up protection for SDI signal paths using video and audio input error monitoring, resulting in automatic change-over to a back up feed on error state detection. A powerful rules engine is available to provide logical conditions for auto-switching, whilst GPI inputs and card edge control can force the unit to switch independent of signal state. Features include three selectable inputs and a dedicated TPG input, along side monitoring of the unselected inputs for video and audio signal confidence.

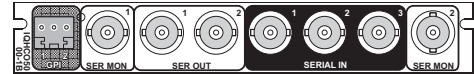
### Features

- 3Gbps SDI, HD-SDI, SD-SDI and DVB-ASI operation
- Auto change-over from either input on pre-defined error conditions with user definable change-over delay
- Input signal monitoring including SDI lock, EDH/CRC error, Freeze detection, Black detection, embedded audio loss and standard mismatch
- Input loss detection – default output of black/pattern, tone/mute
- Connectivity: 3 SDI inputs, up to 4 SDI outputs (2 main and 2 monitoring) and up to 8 x GPI/O
- Video controls including video gain, offset, hue and RGB legalization, with optional color correction
- Up to 32 channel embedded audio support and Dolby E compatibility
- Independent HANC and VANC blanking control per output
- Card Edge Control for input switch & LED status indicators
- Selectable SDI monitoring outputs enable either input to be monitored independent of the main signal selection
- In-built test pattern generator and audio tone generator assignable per input for testing purposes and provision for a dedicated routable TPG fourth input
- 16 x user memories, save/recall/rename
- Input signal relay bypass versions available (options for either basic input 1 to output 1, or follow input select bypass)
- RollCall monitoring allows all signal paths to be managed

### Why should you choose this module?

- Ideal for multi-format workflows where signal redundancy is an essential requirement
- Flexible control interfacing including fully automatic, RollCall, card edge and GPI operation
- RollCall integration ensures real time alarm reporting of potential failure conditions to SAM monitoring systems, and SNMP compatibility allows easy integration with third party network management systems providing an all inclusive monitoring and control solution

### Order codes



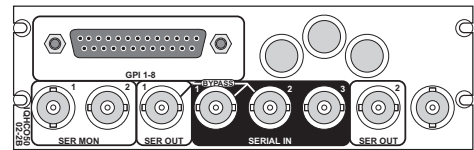
#### **IQHCO5000-1A3, IQHCO5000-1B3**

3G/HD/SD-SDI signal protection module. 3 inputs, 2 main outputs, 2 monitoring outputs, 2 GPI/O



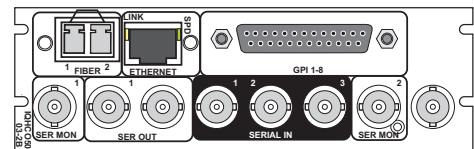
#### **IQHCO5001-1A3, IQHCO5001-1B3**

3G/HD/SD-SDI signal protection module with relay bypass. 3 inputs, 1 main output, 2 monitoring outputs, 2 GPI/O



#### **IQHCO5002-2A3, IQHCO5002-2B3**

3G/HD/SD-SDI signal protection module with input follow relay bypass. 3 inputs, 2 main outputs, 2 monitoring outputs, 8 GPI/O



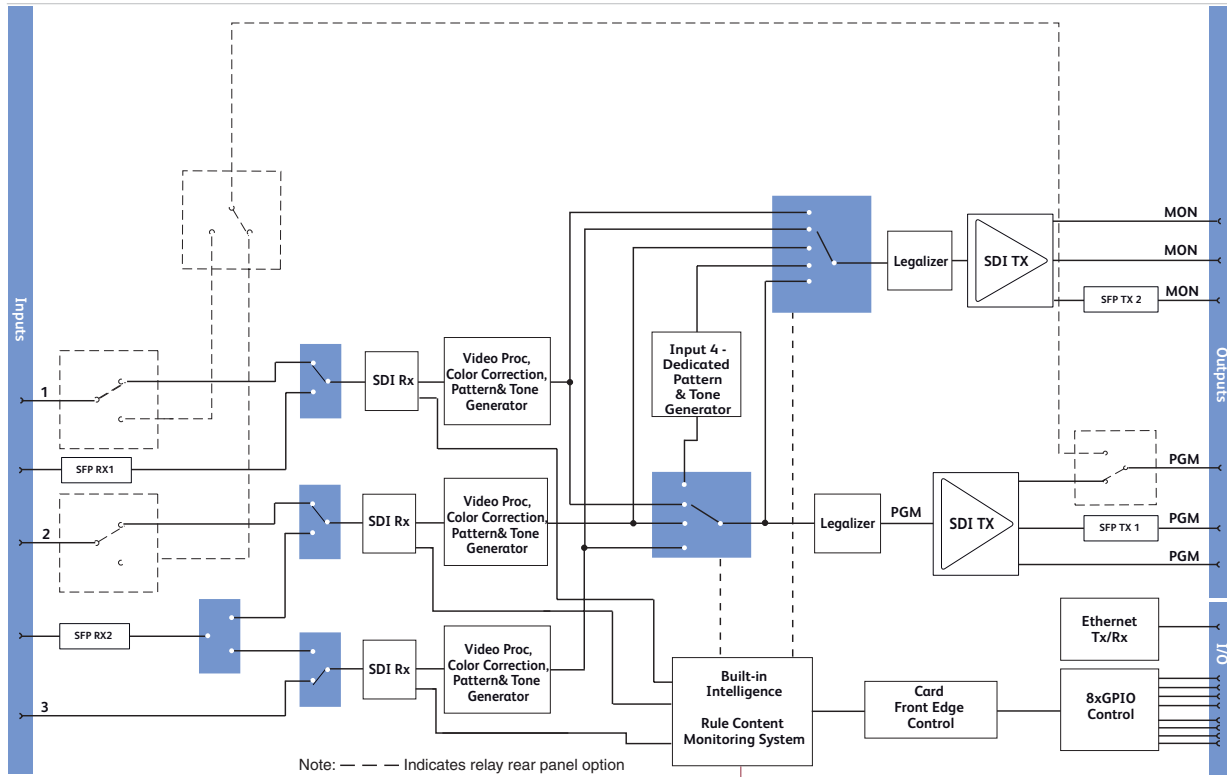
#### **IQHCO5003-2A3, IQHCO5003-2B3**

3G/HD/SD-SDI signal protection module. 3 inputs, 2 main outputs, 2 monitoring outputs, 8 GPI/O, Fiber SFP, Ethernet

### Software Options

**IQOPH5-CC** Software option to add color correction

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQHCO50 range

Network intelligence, control and monitoring

## Technical Specification

### Inputs and Outputs

#### Video Standards Supported

1125(1080)/50p (A & B), 1125(1080)/59p (A & B), 1125(1080)/60p (A & B), 1125(1080)/25p, 1125(1080)/24p, 750(720)/50p, 750(720)/59p, 750(720)/60p, 750(720)/30p, 750(720)/23p, 750(720)/24p, 750(720)/25p, 750(720)/29p, (1035)/29i, (1035)/30i, 1125(1080)/25i, 1125(1080)/29i, 1125(1080)/23p, 1125(1080)/23sF, 1125(1080)/24sF, 625(576)/25i, 525(480)/29i /DVb-ASI, EN50083-9

#### Signal Inputs

Primary switch 3x SDI via BNC connectors  
 Input 1 Cable Length Up to 70m Belden 1694A @ 3 Gbit/s  
 Up to 160m Belden 1694A @ 1.5 Gbit/s  
 >350m Belden 1694A @ 270 Mbit/s  
 Input 2 Cable Length Up to 60m Belden 1694A @ 3 Gbit/s  
 Up to 100m Belden 1694A @ 1.5 Gbit/s  
 Up to 100m Belden 1694A @ 270 Mbit/s  
 Input 3 Cable Length Up to 40m Belden 1694A @ 3 Gbit/s  
 Up to 100m Belden 1694A @ 1.5 Gbit/s  
 Up to 100m Belden 1694A @ 270 Mbit/s

#### Fiber Signal Input

Inputs Up to 2  
 Optical 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI, ASI (270 Mbit/s)  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

#### Signal Outputs

Primary switch 2 x SDI via BNC connector  
 Monitoring switch 2 x SDI via BNC connector

#### Fiber Signal Output

Outputs Up to 2  
 Optical 3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI, ASI (270 Mbit/s)  
 Connector / Format LC singlemode  
 Standard SMPTE 297-2006

#### Control Interface

GPI I/O 8x closing contact via BNC  
 Card Edge Controls External switch for manual and remote mode  
 Input 1-3 manual override select push buttons

#### Controls

##### Indicators

Power OK (Green)  
 CPU Running (Green flashing)  
 FPGA running OK (Green flashing)  
 Status OK (Green), Warning (Yellow), Error (Red)  
 Input 1 OK (Green), Fail (Red)  
 Input 2 OK (Green), Fail (Red)  
 Input 3 OK (Green), Fail (Red)

#### RollCall Controls

Default Video Output Type Input, Mute, TPG (Pattern, Captions, Tone), Black  
 Default Video Output Standard Last Known Good, 1125(1080)/50P, 1125(1080)/59P, 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i, Mute, Pattern  
 Main Output switch Rules selection, Primary, Secondary, FailSafe, ,Input 4 (Pattern, Caption, Tones)  
 Monitor Output switch Follow Main, Rules selection, Primary, Secondary, FailSafe, Input 4 (Pattern, Caption, Tones)  
 Switch rules Logical combinations of warnings, GPI and RollTrack triggers

### Technical Specification

#### Change-over Parameters

No SDI Lock, Standard mismatch, CRC (EDH) Error, Video freeze, Video black, Embedded audio loss, embedded audio quiet, audio overload, pair type detection (Dolby E, Data, PCM)

#### Switch delay

Video 0s to 600s (Reversion) and 0fr to 16384fr (Trigger Condition)

#### GPI/O program

##### Pattern Select

##### Edit Caption

Audio 0 to 16384 from Trigger Condition (fr)  
Audio type 0 to 16384 from Trigger Condition (fr)  
TALLY any input state or warning or set as trigger  
Color Bars, Black

19 characters available, size and position adjustment

#### Reporting & Logging

Input Loss; Input Line Standard; EDH error; Audio & data presence, change over status, main video output

#### PCM Tone Setup

##### Frequency L/R

##### Channel Ident

100Hz to 10kHz in 100Hz steps  
On/Off

#### Audio Monitoring

##### Low audio level Detect

##### Signal Overload Detect

0 to -80dB in steps of 1dB  
0 to -80dB in steps of 1dB

#### Other Controls

##### User Memories

##### Memory Naming

##### Information Window

16 x Save, Recall, Rename  
User configurable naming of memories 1 – 16  
Video Input and output Status, Audio Input Status, Rules status, Network status

##### RollTrack Index

##### RollTrack Sources

Up to 70 RollTrack destinations  
Unused, Main output selection, Backup output selection, Input Std

##### Factory Default

Resets all module settings to factory specified default values and clears memories

##### Default Settings

Resets all module settings to factory specified defaults but does not clear memories

##### Restart

Software restart of the module

##### Module Information

"Reports following module information:  
Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

##### Electrical

3Gbit/s SDI, SMPTE 424M, 1.5Gbit/s HD-SDI, SMPTE 292M, 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI

##### Connector / Format

BNC/ 75ohm panel jack on standard IQ connector panel

##### Return loss

>-15dB (270Mbit/s, 1.5Gbit/s)  
>-10dB (3Gbit/s)

##### Output Jitter

>DVB-ASI, EN50083-9  
SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)  
3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)  
DVB-ASI, EN50083-9

##### GPI I/O (x8) Characteristics

Closing Contact Type with Internal Source  
Input Threshold Voltage 1 V typical

#### Optical 1310 nm Tx

##### Wavelength

1310 nm

##### Spectral width (FWHM)

>1.5 nm (typ)

##### Output power

0 to -5 dBm typical (-2 dBm typical)

##### Rise and Fall Time

135 ps @ 3Gbit/s  
270 ps @ 1.5Gbit/s  
1.5 ns @ 270Mbit/s

##### Extinction ratio

>7.5:1 (typ)

##### Optical Return Loss

-27 dB

##### Link distance

Up to 30 Km @ 270Mbit/s  
Up to 21 Km @ 1.5Gbit/s  
Up to 10 Km @ 3Gbit/s

#### Optical Rx

Input wavelength range Min. 1260 nm, Max. 1620 nm

##### Input Sensitivity

-21 dBm

##### Optical power input range

>  
-0 dBm, < -20 dBm

##### Link distance

Up to 30 Km @ 270Mbit/s  
Up to 21 Km @ 1.5Gbit/s  
Up to 10 Km @ 3Gbit/s

#### Module Power Consumption

IQHCO5000-1A/B3, 11.5 W Max (A Frames)  
11 PR Max (B Frames)

IQHCO5003-2A/B3, 11.5 W Max (A Frames)  
11 PR Max (B Frames)

##### Relay Rear Versions

IQHC05001-1A/B3 12.25 W Max (A Frames)  
11 PR Max (B Frames)

IQHCO5002-2A/B3 12.8 W Max (A Frames)  
11 PR Max (B Frames)



The IQHCO51 provides back up protection for SDI signal paths with a clean switching feature. IQHCO51 uses video and audio input error monitoring to drive an automatic change-over to a back up feed on error state detection. A powerful rules engine is available to provide logical conditions for auto-switching, whilst GPI inputs and card edge control can force the unit to switch independent of signal state. Features include three selectable inputs and a dedicated TPG input, along with monitoring of the unselected inputs for video and audio signal confidence.

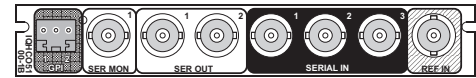
### Features

- 3Gbps SDI, HD-SDI, SD-SDI and DVB-ASI operation with a synchronizer per input and RGB legalization
- Auto change-over from either input on pre-defined error conditions with user definable change-over delay
- Connectivity: 3 SDI inputs, analog reference input, up to 4 SDI outputs (2 main and 2 monitoring) and up to 8 x GPI/O
- Input signal monitoring including SDI lock, EDH/CRC error, Freeze detection, Black detection, embedded audio loss and standard mismatch
- Agile, router switching tolerant synchronizer operation with genlock adjustment allowing you to time any SDI signal to pixel accuracy with greater tolerance to mis-timed upstream SDI switching (up to +/- 10 lines), ensuring disturbance free picture output
- Video controls including video gain, offset, hue and RGB legalization, with optional color correction. Audio proc-amp features including channel level (Sub-frame) routing, independent gain, invert and mute control with audio V Fade on input loss
- Up to 32 channel embedded audio support and Dolby E compatibility
- Input loss detection – default output of black/pattern, tone/mute
- Independent HANC and VANC blanking control per output
- Card Edge Control for input switch & LED status indicators
- Selectable SDI monitoring outputs enable either input to be monitored independent of the main signal selection
- In-built test pattern generator and audio tone generator assignable per input for testing purposes and provision for a dedicated routable TPG fourth input
- 16 x user memories, save/recall/rename
- Input signal relay bypass versions available (options for either basic input 1 to output 1, or follow input select bypass)
- RollCall monitoring allows all signal paths to be managed, and Media Biometrics Signature generation on progame output provides full integration with Sigma media assurance systems

### Why should you choose this module?

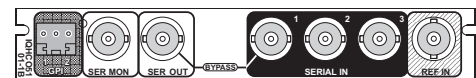
- Ideal for multi-format workflows where transparent signal redundancy is an essential requirement
- Flexible control interfacing including fully automatic, RollCall, card edge and GPI operation
- RollCall integration ensures real time alarm reporting of potential failure conditions and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all inclusive monitoring and control solution

### Order codes



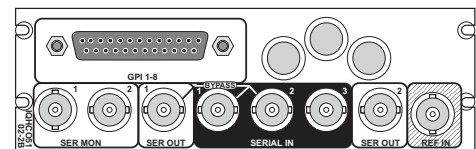
#### **IQHCO5100-1A3, IQHCO51000-1B3**

3G/HD/SD-SDI synchronized signal protection module. 3 inputs, ref input, 2 main outputs, 2 monitoring outputs, 2 GPI/O



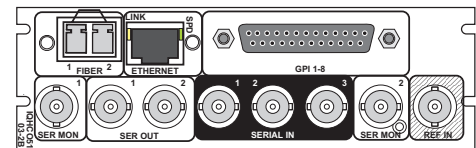
#### **IQHCO5101-1A3, IQHCO5101-1B3**

3G/HD/SD-SDI signal protection module with relay bypass. 3 inputs, ref input, 1 main output, 2 monitoring outputs, 2 GPI/O



#### **IQHCO5102-2A3, IQHCO5102-2B3**

3G/HD/SD-SDI signal protection module with input follow relay bypass. 3 inputs, ref input, 2 main outputs, 2 monitoring outputs, 8 GPI/O



#### **IQHCO5103-2A3, IQHCO5103-2B3**

3G/HD/SD-SDI signal protection module. 3 inputs, ref input, 2 main outputs, 2 monitoring outputs, 8 GPI/O, Fiber SFP, Ethernet

For more details on enclosure types please refer to Frames and Hardware section.

### Hardware & Software Options

**IQOPH5-CC** Software option to add color correction

#### SFP options:

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

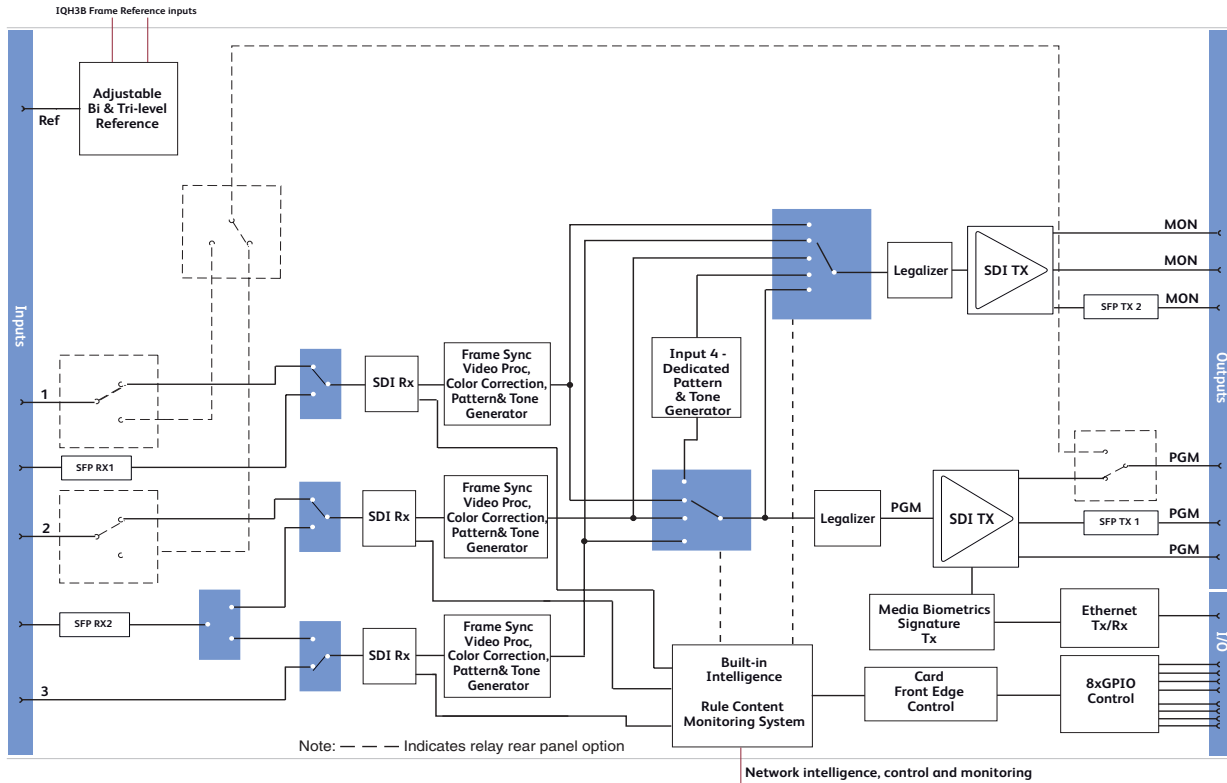
FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

CWDM & high sensitivity options available on request

Note: SFP type must be ordered in addition to the module.



Block Diagram for IQHCO51 range

## Technical Specification

### Inputs and Outputs

#### Video Standards Supported

1125(1080)/50p (A & B), 1125(1080)/59p (A & B), 1125(1080)/60p (A & B), 1125(1080)/25p, 1125(1080)/24p, 750(720)/50p, 750(720)/59p, 750(720)/60p, 750(720)/30p, 750(720)/23p, 750(720)/24p, 750(720)/25p, 750(720)/29p, (1035)/29i, (1035)/30i, 1125(1080)/25i, 1125(1080)/29i, 1125(1080)/23p, 1125(1080)/23sF, 1125(1080)/24sF, 625(576)/25i, 525(480)/29i /DVb-ASI, EN50083-9

#### Signal Inputs

Primary switch: 3x SDI via BNC connectors  
 Input 1 Cable Length: Up to 70m Belden 1694A @ 3 Gbit/s, Up to 160m Belden 1694A @ 1.5 Gbit/s, >350m Belden 1694A @ 270 Mbit/s  
 Input 2 Cable Length: Up to 60m Belden 1694A @ 3 Gbit/s, Up to 100m Belden 1694A @ 1.5 Gbit/s, Up to 100m Belden 1694A @ 270 Mbit/s  
 Input 3 Cable Length: Up to 40m Belden 1694A @ 3 Gbit/s, Up to 100m Belden 1694A @ 1.5 Gbit/s, Up to 100m Belden 1694A @ 270 Mbit/s  
 Analog Reference: 1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level), SD bi-level – RS170A, HD Tri-level – SMPTE 240M, 274M and 296M

#### Fiber Signal Input

Inputs: Up to 2  
 Optical 3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI, ASI (270 Mbit/s)  
 Connector / Format Standard: LC singlemode, SMPTE 297-2006

#### Signal Outputs

Primary switch: 2 x SDI via BNC connector  
 Monitoring switch: 2 x SDI via BNC connector

#### Fiber Signal Output

Outputs: Up to 2  
 Optical 3 Gbit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI, ASI (270 Mbit/s)  
 Connector / Format Standard: LC singlemode, SMPTE 297-2006

#### Control Interface

GPI I/O: 8x closing contact via BNC  
 Card Edge Controls: External switch for manual and remote mode, Input 1-3 manual override select push buttons

#### Controls

##### Indicators

Power: O.K. (Green)  
 CPU: Running (Green flashing)  
 FPGA running: OK (Green flashing)  
 Status: OK (Green), Warning (Yellow), Error (Red)  
 Input 1: OK (Green), Fail (Red)  
 Input 2: OK (Green), Fail (Red)  
 Input 3: OK (Green), Fail (Red)  
 Rx 1: OK (Green), Fail (Red)  
 Rx 2: OK (Green), Fail (Red)

##### RollCall Controls

Default Video Output Type: Input, Mute, TPG (Pattern, Captions, Tone), Black  
 Default Video Output Standard: Last Known Good, 1125(1080)/50p, 1125(1080)/59p, 1125(1080)/29i, 1125(1080)/25i, 750(720)/59p, 750(720)/50p, 525(480)/29i, 625(576)/25i, Mute, Pattern  
 Main Output switch: Rules selection, Primary, Secondary, FailSafe, ,Input 4 (Pattern, Caption, Tones)  
 Monitor Output switch: Follow Main, Rules selection, Primary, Secondary, FailSafe, ,Input 4 (Pattern, Caption, Tones)  
 Switch rules: Logical combinations of warnings, GPI and RollTrack triggers

### Technical Specification

#### Change-over Parameters

No SDI Lock, Standard mismatch, CRC (EDH) Error, Video freeze, Video black, Embedded audio loss, embedded audio quiet, audio overload, pair type detection (Dolby E, Data, PCM)

#### Switch delay

Video 0s to 600s (Reversion) and 0fr to 16384fr (Trigger Condition)  
Audio 0 to 16384 from Trigger Condition (fr)  
Audio type 0 to 16384 from Trigger Condition (fr)  
TALLY any input state or warning or set as trigger

#### GPI/O program

##### Pattern Select

##### Edit Caption

Color Bars, Black  
19 characters available, size and position adjustment

#### Reporting & Logging

Input Loss; Input Line Standard; EDH error; Audio & data presence, change over status, main video output

#### PCM Tone Setup

##### Frequency L/R

##### Channel Ident

##### Audio Monitoring

##### Low level Detect

##### Signal Overload Detect

100Hz to 10kHz in 100Hz steps  
On/Off

0 to -80dB in steps of 1dB  
0 to -80dB in steps of 1dB

#### Other Controls

##### User Memories

##### Memory Naming

##### Information Window

16 x Save, Recall, Rename  
User configurable naming of memories 1 – 16  
Video Input and output Status, Audio Input Status, Rules status, Network status

##### RollTrack Index

##### RollTrack Sources

Up to 70 RollTrack destinations  
Unused, Main output selection, Backup output selection, Input Std

##### Factory Default

##### Default Settings

##### Restart

##### Module Information

Resets all module settings to factory specified default values and clears memories  
Resets all module settings to factory specified defaults but does not clear memories  
Software restart of the module  
"Reports following module information:  
Software version, Serial number, Build number, KOS version, Firmware version, PCB version

#### Specifications

##### Electrical

3Gbit/s SDI, SMPTE 424M, 1.5Gbit/s HD-SDI, SMPTE 292M, 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI

##### Connector / Format

BNC/ 75ohm panel jack on standard IQ connector panel

##### Return loss

>-15dB (270Mbit/s, 1.5Gbit/s)  
>-10dB (3Gbit/s)

##### Output Jitter

>?? DVB-ASI, EN50083-9  
SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)  
3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)  
DVB-ASI, EN50083-9

##### GPI I/O (x8) Characteristics

Closing Contact Type with Internal Source  
Input Threshold Voltage 1 V typical

#### Module Power Consumption

IQHCO5100-1A 14.5 W Max (A Frames)

IQHCO5100-1B3 14.5 PR Max (B Frames)

IQHCO5103-2A 16.5 W Max (A Frames)

IQHCO5103-2B3 16.5 PR Max (B Frames)

##### Relay Rear Versions

IQHC05101-1A 15.5 W Max (A Frames)

IQHC05101-1B3 15.5 PR Max (B Frames)

IQHCO5102-2A 16.5 W Max (A Frames)

IQHCO5102-2B3 16 PR Max (B Frames)

The IQASI25 is a cost effective ASI-switched Distribution Amplifier that continuously monitors two MPEG-2 DVB ASI transport streams (TS) and routes the preferred input to the 5 identical outputs. It monitors various critical parameters within the transport stream and their status will effect switching and alarms. It is compliant to the ETSI TR 101290 specification for Digital Video Broadcasting and supports both DVB and ATSC transport streams in Packet, Byte & Burst modes. Automatic operation is configurable by the user and the switch may also be externally controlled via the RollCall control and monitoring system or external GPI's.

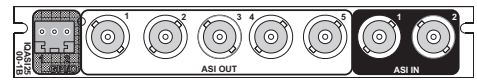
### Features

- Monitors two ASI inputs for loss of carrier signal, loss of TS sync and loss of PAT with automatic input switching on error
- Designed to minimise switching and prevent unnecessary disruption of the TS.
- Remains on an input until that input fails. If the alternate input has also failed, no switch occurs.
- If both inputs return to a good state, the switch remains static on the selected input
- Manual switch to force the module to Input 1 or 2
- 2 configurable GPIO ports (2 in or 2 out or one of each)
- LED indicators to show if Input 1 absent, input 2 absent and if outputs are derived from input 1 or input 2
- RollCall control and monitoring compatible

### Why should you choose this module?

- Cost effective ASI switched distribution amplifier able to automatically switch on critical error detection
- Flexible automatic or manual control for application specific scenarios
- Full RollCall compatibility allows easy integration with SAM network management systems providing an all-inclusive monitoring and control solution

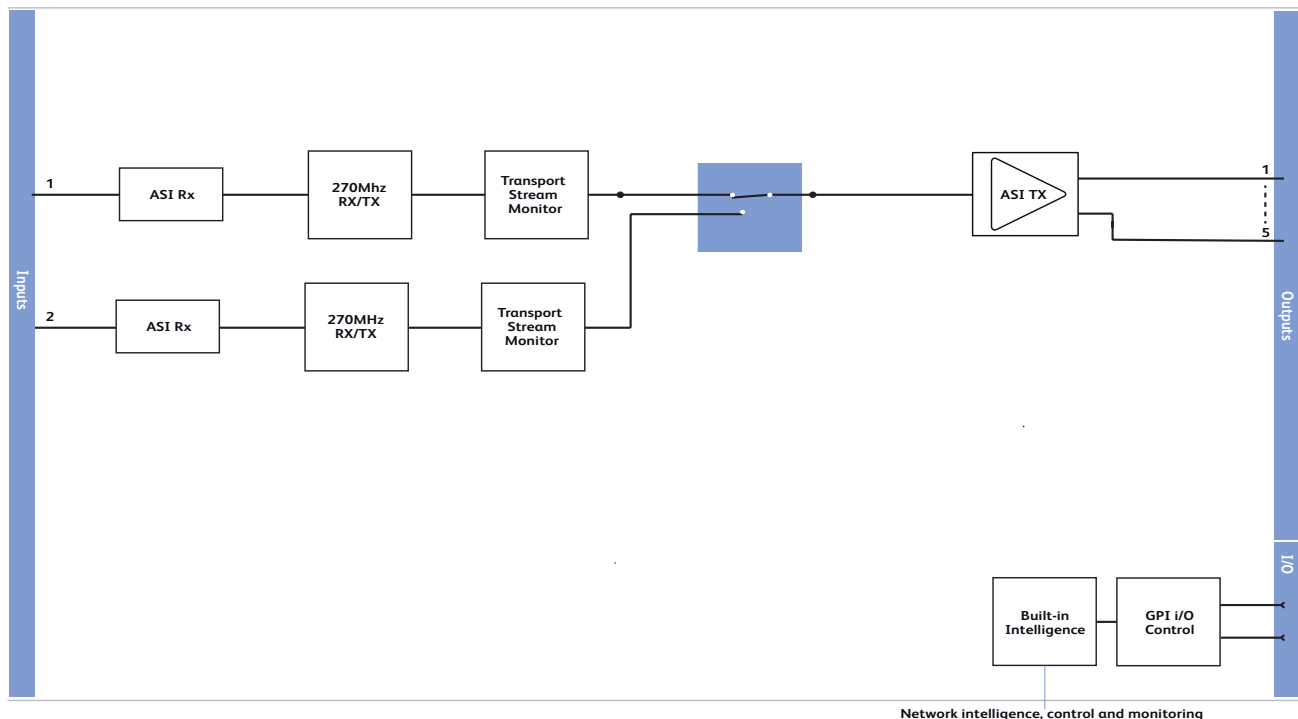
### Order codes



#### IQASI2500-1B

ASI Transport Stream Switch & DA. 2 ASI inputs, 5 ASI outputs, 2 GPI/Os.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQASI2500-1B

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

ASI 1	ASI (270 Mbit/s)
ASI 2	ASI (270 Mbit/s)
Standards	DVB-ASI, EN50083-9
Electrical	Transformer coupled 75R 800mV p-p
Input Cable Length	100m (Image 1000HD)

##### Signal Outputs

Serial data	5 ASI (270 MBit/s)
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##### Control Interface

GPI	2 (shared connector)
Connector / Format	Standard SAM screw terminal
GPI	Opto input 2.2K $\Omega$ to +5V, (1.6mA to ground)
GPO	Relay rated 1A @ 30V DC switching to ground

##### Indicators

Power	OK	(Green)
CPU	OK	(Green flashing)
Input Status	OK	(Green)
	Fail	(Red)
Auto	Green	Lit = selected
Output source 1	Yellow	Lit = selected
Output source 2	Yellow	Lit = selected

#### RollCall Features

Status	Input and Output alarm statuses
Input	Input select: Auto, forced our GPI based
GPIO	GPIO configuration
User memories	16 User configurable
Logging	Input Status
	Input Alarms
RollTrack Controls	Output Status
	Misc
Setup	On/off, Index, Source, Address, Command, Status, Sending
	Versions, reset defaults, restart

#### Specifications

Electrical	ASI transport stream
Connector / Format	BNC
	Standard SAM screw terminal

#### Power Consumption

Module power consumption	4.5 W max (A frames)
	4.5 PR (B frames)

The IQDCO is a passive changeover switch with SDI video presence detection.

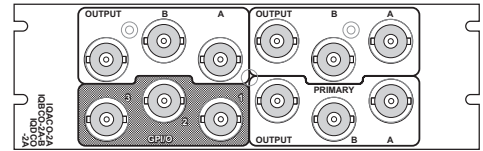
### Features

- Passive SDI changeover switch
- Detection of carrier, SDI lock, line standard, EDH and embedded audio /data presence
- Automatic switch over on programmable condition(s)
- Continuity (A input) maintained with power loss or module removal
- Three programmable GPI/O's for control or tally
- Programmable switch over time delay
- RollCall remote and card edge control
- RollCall fault logging
- Can be linked to trigger other changeover modules via RollTrack

### Why should you choose this module?

- Ideal for conditions where switch over needs to be fully programmable. For example, carrier loss, the absence of embedded audio or any logical combination of conditions may trigger switchover
- Continuity (A input) maintained with power loss or module removal
- Three programmable GPI/O's for control or tally
- Programmable switch over time delay

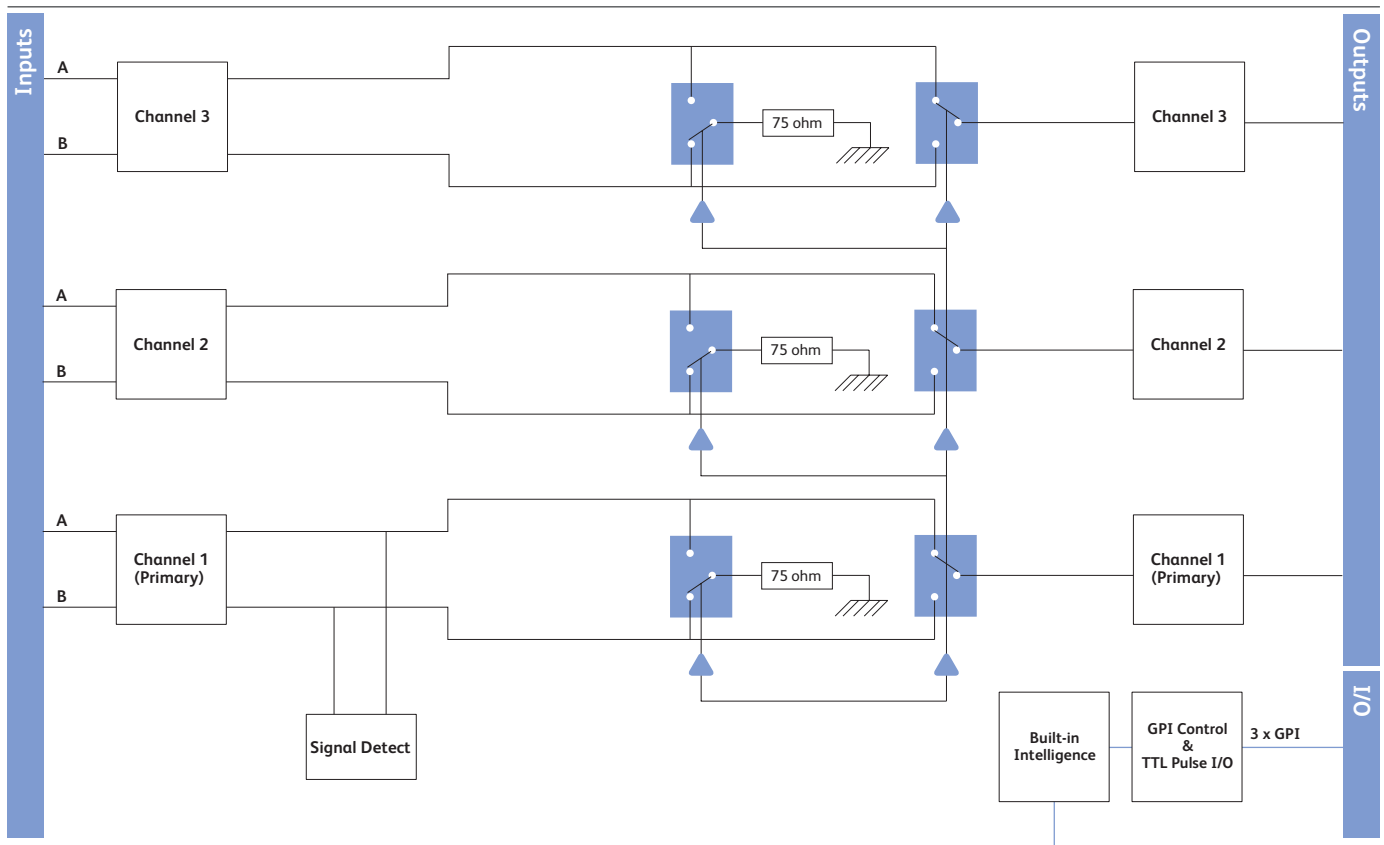
### Order codes



### IQDCO-2A

SDI Video changeover switch.  
1 primary, 2 secondary switches.

For more details on enclosure types please refer to Frames and Hardware Section.



Network Intelligence, Control & Monitoring

Block Diagram for IQDCO-2A

**Technical Specification**

**Inputs and Outputs**

**Signal Inputs**

Primary switch	2 x SDI via BNC connectors
Standards	SMPTE 259M-C-1997
Secondary switch	2 per channel (2 channels) via BNC

**Signal Outputs**

Primary switch	1 x SDI via BNC connector
Standards	SMPTE 259M-C-1997
Secondary switch	1 per channel (2 channels) via BNC
GPI I/O	3 x closing contact via BNC

**Card Edge and RollCall Controls**

**Card Edge Controls (also available via RollCall)**

Switch mode	Manual / Auto
Manual switch	A / B
EDH Reset	Resets error flags (both inputs)
Local	Selects default mode (cancels any RollCall programmed conditions)

**Indicators**

Power OK	
Input Loss A	
Input Loss B	
Audio presence A	At least one channel of embedded audio detected
Audio presence B	At least one channel of embedded audio detected
EDH A	Present; Error-Minute: Error-Hour
EDH B	Present; Error-Minute: Error-Hour
Functions Available via RollCall Only	
Switch rules	Any logical combination of warnings and GPI triggers
GPI/O program	TALLY any input state or warning or set as trigger
Switch delay	0 to 10 s from trigger condition(s)
Reporting and logging	Input Loss; Input Line Standard; EDH error; Audio and data presence

**Specifications**

**Signal Inputs**

Primary SDI (x 2)	
Input return loss	Better than 15 dB to 270 MHz (Output terminated)
Maximum cable length	>100 m PSF1/2 or equivalent Cable length is defined as input cable length + output cable length.
Secondary (2 Channels)	
Input return loss	Better than -38 dB @ 5 MHz Note that the secondary switches are not guaranteed to work with 270 Mbit SDI signals, but may do so in some installations

**Signal Outputs (Passive)**

Primary	
Output return loss	Better than 15 dB to 270 MHz (Inputs A and B terminated)

**Secondary (2 Channels)**

Output return loss	Better than -38 dB @ 5 MHz
GPI I/O (x 3)	
characteristics	Closing Contact Type Output Sink Current 100 mA Input Source Current 1 mA typical Input Threshold Voltage 1 V typical

**Power Consumption**

Module power consumption	4 W Max (A frames) 3.5 PR (B Frames)
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The IQACO is a passive changeover switch with composite video presence detection. Both inputs are monitored for sync presence, sync amplitude and line standard. The condition for switch over may be programmed to be sync loss or video standard change.

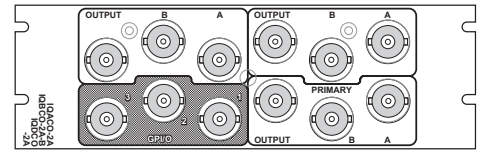
### Features

- Passive composite / pulse changeover switch
- Automatic switch over on programmable condition(s)
- Detection of sync presence, sync amplitude and line standard
- Continuity (A input) maintained with power loss or module removal
- Three programmable GPI/O's for control or tally
- Programmable switch over time delay
- RollCall remote and card edge control
- RollCall fault logging

### Why should you choose this module?

- Switch over on programmable condition(s) for fully automatic operation
- Fault detection triggers the unit to switch over to the alternative input and creates an alarm trigger to flag the problem
- All fault or warning conditions can be reported and logged over RollCall

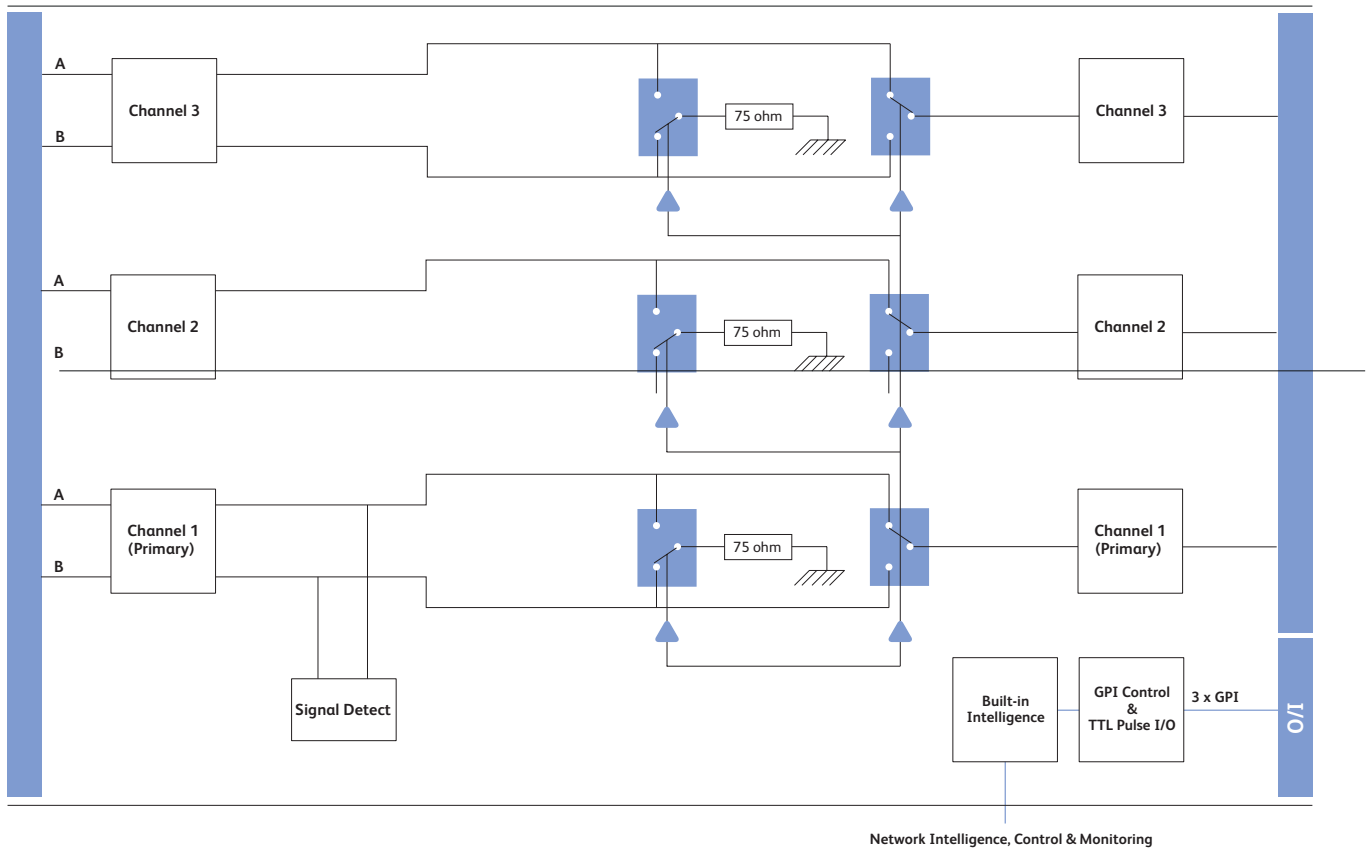
### Order codes



#### IQACO-2A

Analog Video Changeover Switch.  
1 primary, 2 secondary switches.

For more details on enclosure types please refer to Frames and Hardware Section.



Block Diagram for IQACO-2A

Network Intelligence, Control & Monitoring

### Technical Specification

#### Inputs and Outputs

##### Signal Inputs

Primary analog	2 per channel (1 channel) Composite/Black Burst video via BNC
Secondary analog	2 per channel (2 channels) For low data rate signals via BNC

##### Signal Outputs

Primary analog	1 per channel (1 channel) via BNC
Secondary analog	1 per channel (2 channels) via BNC
GPI I/O	3 x closing contact via BNC

#### Card Edge and RollCall Controls

##### Card Edge Controls (also available via RollCall)

Switch mode	Manual / Auto
Manual switch	A / B
Local	Selects default mode (cancels any RollCall programmed conditions)

##### Indicators

Power	OK
Input loss A	
Input loss B	
Input standard A	525/625
Input standard B	525/625
Low sync A	
Low sync B	
Functions Available via RollCall Only	
Switch condition	Any logical combination of warnings and GPI triggers
GPI/O program	Tally any input state or warning or set as trigger
Switch delay	0 to 10s from trigger condition(s)
Reporting and logging	Input Loss; Input Line Standard; Low Sync Level

##### Specifications

Analog input level	Standard levels $\pm 6$ dB
Input return loss (primary)	Better than 35 dB to 6 MHz (Output terminated)

Input return loss (secondary)	Better than 35 dB to 5 MHz (Output terminated)
Output return loss (primary)	Better than 35 dB to 6 MHz (Inputs A and B terminated)
Output return loss (secondary)	Better than 35 dB to 5 MHz (Inputs A and B terminated)
GPI I/O characteristics	Closing Contact Type Output Sink Current 100 mA Input Source Current 1 mA typical Input Threshold Voltage 1 V typical

##### Power Consumption

Module power consumption	1 W Max (A Frames) 1 PR (B Frames)
--------------------------	---------------------------------------

The IQSRT00 is a five input router/switcher for HD-SDI 1.5 Gbit/s, SD-SDI/DVB-ASI 270 Mbit/s and wide-band signals. This module provides a mixed HD/SD solution and includes both a bonus input and a bonus output when compared with the common 4 x 1 specification. Dual outputs and using just one slot in a 3RU enclosure mean that very powerful routing solutions can be built in a very compact space. Ideal as a comprehensive local HD/SD router, a range of RPAN control panels are available for easy construction of comprehensive control environments.

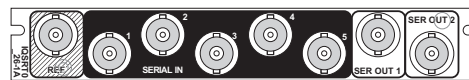
## Features

- HD/SD-SDI router with SMPTE RP168 switching when timed to an external reference
- Standards supported:
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
- Choice of SD bi-level or HD tri-level reference switching
- Can be used to select between inputs of different standards
- Handles HD-SDI or SD-SDI/ASI sources with re-clocking
- Handles other wide-band signals without re-clocking
- Comprehensive button per cross-point, or multi-destination control from RPAN router control panel
- Optional RS-422 control with separate IQSPI00 module

## Why should you choose this module?

- Very high density HD/SD-SDI routing, with over 53 cross-points per rack unit
- Second output for preview, monitoring, redundant path feeds and other purposes
- Will work with the RPAN control panels for simple network-connected routing installations
- HD and SD capable for mixed operation or to provide a future upgrade path
- Can be combined with other IQ Modular routers for mixed-format multi-level routing
- Can be used with HD and SD inputs simultaneously, with one output feeding HD and the other SD, ideal for wrapping around up and down converters

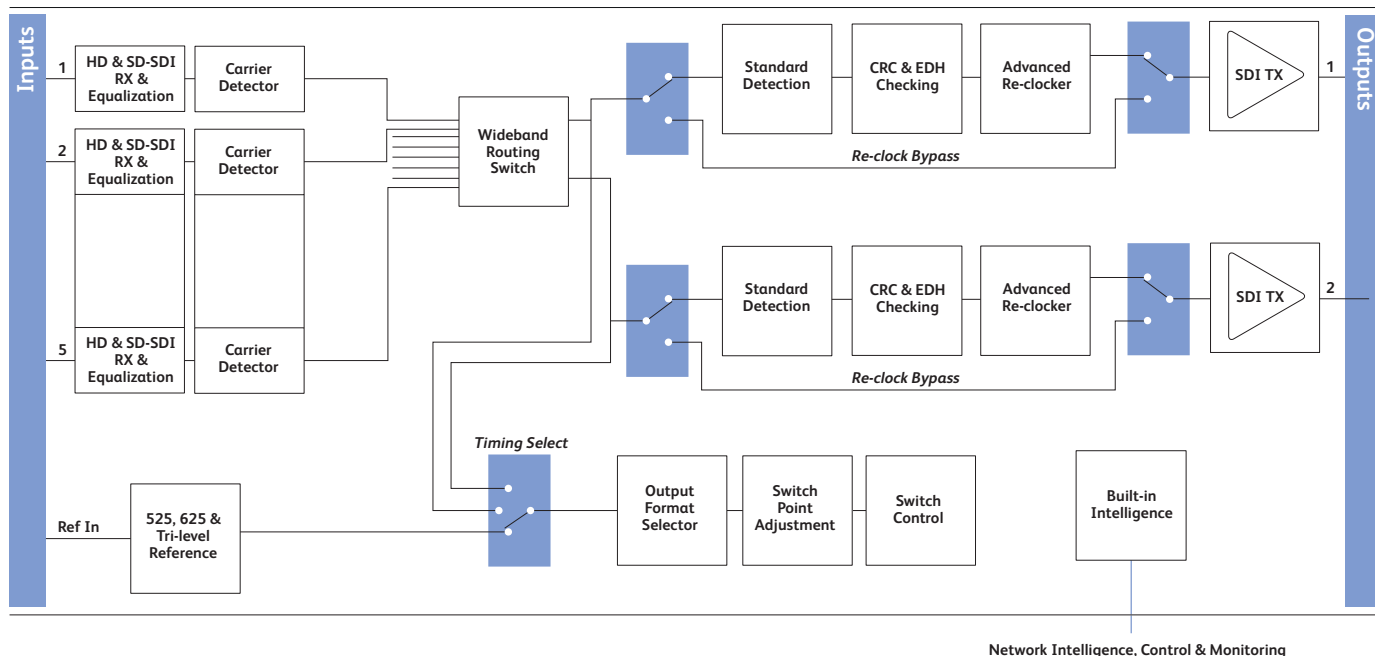
## Order codes



### **IQSRT0026-1A**

HD/SD-SDI 5 x 2 Router. 2 HD/SD-SDI outputs.

For more details on enclosure types please refer to Frames and Hardware section.



Block Diagram for IQSRT0026-1A

## Technical Specification

### Inputs and Outputs

#### Signal Input

Inputs	5 x Serial Digital Input(s)
Electrical	1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C/DVB-ASI
Input cable length	Up to 140m Belden 1694A @ 1.5 Gbit/s Up to 350m Belden 1694A @ 270 Mbit/s
Analog reference	1 x Analog Reference to SMPTE240/ 274M and RS170A
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB

#### Signal Outputs

Outputs	2 x Serial Digital Outputs
Electrical	1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C/DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB

### Controls

#### Indicators

Power	OK
CPU	OK
Status	OK (Green), Warning (Yellow), Error (Red)

#### RollCall Features

Router control	Switching control of input to output channels
Router configuration	Displays current router channel allocation

Channel renaming  
User memories  
Logging

RollTrack controls

RollTrack outputs

### Specifications

#### Inputs

Reference source

#### Power Consumption

Module power consumption

Labelling of all input and output channels  
16 x Save / Recall / Rename  
Input Status (1-5)  
CRC/EDH Error  
Input Standard  
Ref Status  
Output 1/2 standard  
On/Off, Index, Source, Address, Command, Status, Sending  
Input present - 1 to 5  
Output 1 Tallies  
Output 2 Tallies  
Reference OK  
Input Loss - 1 to 5  
Unused

External – HD Tri-Level / SD Bi-level / Output Video syncs

9W Max (A Frames) 8.5 PR (B Frames)

## Index

Control & Monitoring Bringing Peace of Mind to Broadcast Operations	32
Hyperion Bringing Human Intelligence to Automated Broadcast Monitoring	62
IQAAD00 4 Channel Audio Analog to Digital Converter	313
IQACO Analog Video Changeover Switch	328
IQADA00 Single/Dual Channel Analog Audio Distribution Amplifier	283
IQADA01 Analog Audio Distribution Amplifier - 2 x 7 Outputs	285
IQAES00 Single/Dual Stream AES/EBU Distribution Amplifier	280
IQAMD40 Multi-Channel MADI to IP Interfacing Module	58
IQASI25 ASI Transport Stream Switch and DA	324
IQASI82 Dual ASI Transport Stream Monitor and Switch	85
IQBRK30 3G/HD/SD-SDI Re-embedder for 4 AES/EBU Audio Streams	255
IQCAG00 IP Control Aggregation Gateway	60
IQCWM09-16 Fiber Optic Coarse Wave Division Multiplexing Module	179
IQDAA00 4 Channel Digital to Analog Audio Converter	315
IQDAVM Video and Audio Monitoring Encoder	308
IQDBD00/01 HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Decoder	294
IQDBE00-03 HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Encoder	298
IQDBT105 DVB-T2 & DVB-T Monitoring Receiver	87
IQDCO SDI Changeover Switch	326
IQDLY20/21 AES and Analog Audio Delay and Shuffler Module	304
IQDLY30 3G/HD/SD-SDI Video Delay Module	291
IQDMX10/12 SDI Synchronizer and 8 Channel AES De-embedder	210
IQDMX20 Frame Synchronizer with 4 Channel Analog Audio De-embedder	213
IQDMX30 3G/HD/SD-SDI De-embedder for 8 AES/EBU Audio Streams	242
IQDMX31 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams	245
IQDMX32 Dual 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams	248
IQDMX33 3G/HD/SD-SDI De-embedder and Frame Synchronizer with AES/EBU and Analog Audio Outputs	238
IQDMX34 3G/HD/SD-SDI De-embedder for 8 Analog Audio Channels	252
IQDNC30 3G/HD-SDI Down Converter with Frame Synchronizer	101
IQDNC31 Dual Channel 3G/HD-SDI Down Converter with Frame Synchronizer	105
IQDNC32 3G/HD/SD-SDI Down Converter with AES I/O	109
IQDNC33 3G/HD/SD-SDI Dual Down Converter with AES I/O	113
IQDNC34 Dual Channel 3G/HD-SDI Down Converter with Analog Outputs	118
IQDSDES Monitoring Encoder and Distribution Amplifier	311
IQEAS00 3G/HD/SD-SDI Embedded Audio Shuffler and Processor	301
IQEDGE Compact, Powerful, reliable IP Processing Solution	57
IQFDA30 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O	167
IQFDA31 Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O	169
IQGBE40/80 Ethernet Fiber Converter with 4/8 Port Switch	160
IQGBX40 12G Gearbox and Converter for UHD-4K SDI signals	139
IQGPI00-04 Configurable General Purpose Interface	29
IQH1A IQ 1U Modular Enclosure	20
IQH1P IQ 1U Passive Modular Enclosure	21
IQH3B IQ 3U Modular Enclosure	18
IQH4B IQ 4U Modular Enclosure	16
IQHCO50 3G/HD/SD-SDI Signal Protection Module	318
IQHCO51 3G/HD/SD-SDI Synchronized Signal Protection Module	321
IQHIP10 3G/HD/SD-SDI Hyperion Intelligent Processor Module	66
QLAM00 3G/HD/SD-SDI Logo Assurance Module	78

QLDK30 3G/HD/SD-SDI Logo Inserter & Keyer	288
IQMBG80 8 Channel 3G/HD/SD-SDI Media Biometrics Generator	81
IQMCC30 3G/HD/SD-SDI Motion Compensated Frame Rate Converter	90
IQMIX10 3G/HD/SD-SDI Multi-Channel IP Transceiver	54
IQMIX25/26 3G/HD/SD-SDI Multi-Channel IP Transceiver	46
IQMIX40/41 3G/HD/SD-SDI Multi-Channel IP Transceiver	50
IQMUX10/12 8 Channel Digital Audio Embedder with Synchronizer	207
IQMUX30 3G/HD/SD-SDI Embedder for 8 AES/EBU Audio Streams	222
IQMUX31 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams	225
IQMUX32 Dual 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams	228
IQMUX33 3G/HD/SD-SDI Embedder and Frame Synchronizer with AES/EBU and Analog Audio Inputs	218
IQMUX34 3G/HD/SD-SDI Embedder for 8 Analog Audio Channels	232
IQMUX60/61 Universal Audio Embedder	235
IQORX80 3G/HD/SD-SDI Multi-Channel Fiber Receiver	174
IQOTR32 3G/HD/SD-SDI Flexible Fiber Optic Interfacing Module	163
IQOTR40-45 3G/HD/SD-SDI Multi-Channel Fiber Transceiver	176
IQOTX80-84 3G/HD/SD-SDI Multi-Channel Fiber Transmitter	172
IQPFC21-23 Single, Dual and Triple 2 x 2 Fiber Optic Coupler Modules	185
IQPFS22/24 Dual and Quad 1 x 2 Fiber Optic Splitter Modules	181
IQPFS41-43 Single, Dual and Triple 1 x 4 Fiber Optic Splitter Modules	183
IQQMD00 Quad-link-SDI Down Converter for Ultra HD Signals	99
IQQSM00 3G/HD/SD-SDI Quad Split Monitor	83
IQSAM00 3G/HD/SD-SDI Signal Assurance Module	74
IQSDA10/11 Reclocking SD-SDI Distribution Amplifier	273
IQSDA30 Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall	265
IQSDA31 Dual Channel 3G/HD/SD-SDI Equalizing Distribution Amplifier	269
IQSDA32 3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall	267
IQSDA33 3G/HD/SD-SDI Fan-out Distribution Amplifier	270
IQSDA34 Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with RollCall	271
IQSDA35 Dual Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with selectable outputs	263
IQSDA41 12G-SDI Re-clocking Distribution Amplifier with RollCall	260
IQSDA42 Multi-channel 12G-SDI Re-clocking Distribution Amplifier with RollCall	261
IQSPI00 Serial Port Interface with RollNet	28
IQSRT00 HD/SD-SDI 5 x 2 Router	330
IQSYN00 SDI Frame Synchronizer with Embedded Audio Processing	204
IQSYN11 3G/HD/SD-SDI Dual Channel Frame Synchronizer	201
IQSYN30 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing	194
IQSYN31 Dual 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing	197
IQSYN33 3G/HD/SD-SDI Frame Synchronizer with Advanced Audio Processing	188
IQSYN50 3G/HD/SD-SDI Frame Synchronizer	192
IQUDC30 3G/HD/SD-SDI Up, Down and Cross Converter	142
IQUDC31 Dual Channel 3G/HD/SD-SDI Up, Down and Cross Converter	146
IQUDC32 3G/HD/SD-SDI Up, Down and Cross Converter with AES I/O	150
IQUDC33 3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O	154
IQUDC34 3G/HD/SD-SDI Universal Up, Down and Cross Converter	94
IQUPC30 SDI Upconverter with Frame Synchronizer	122
IQUPC31 Dual Channel SDI Upconverter with Frame Synchronizer	126
IQUPC32 3G/HD/SD-SDI Up Converter with AES I/O	130
IQUPC33 3G/HD/SD-SDI Dual Up Converter with AES I/O	134
IQVDA00/01 Analog Video Distribution Amplifier with RollCall Control	276
IQVDA02/03 Analog Video Distribution Amplifier	278

Media Biometrics Tracking Content – The Power Of Media Biometrics	70
RollCall Control Panel - Windows PC Based Configuration and Control	42
RollMap Infrastructure Management System for Broadcast Operations	36
RollMechanic RollCall Network Management Tool	43
RollMIDSRV RollCall Middleware Services - System Logging and Monitoring Services for RollCall	40
RollPod 1U Configurable Control Panel	26
RollPod 3U Configurable Control Panel	24
RollSNMP Monitor SNMP Compliant Agents from other Vendors within RollMap	38
RollUSB RollCall USB Interface Unit	30
RPAN Router Control Panel	23



# SAM offers high quality, technologically advanced yet cost effective solutions

## IQ Modular

### Modular for IP Infrastructure

SAM's IP solution is developed for use within low latency and high bandwidth IP networks and uses both SMPTE 2110 including 2022-6/7 uncompressed encoding and encapsulation schemes, along with SMPTE-2042 (VC2) lightweight compression for high quality signal carriage whilst optimising bandwidth.

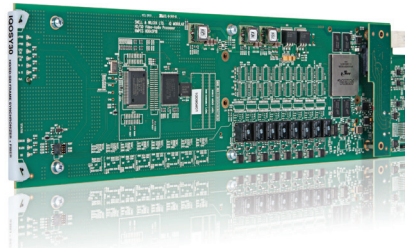
It supports configuration of IP links for maximum signal transport using dual SFPs, or dual link mode to provide link redundancy as per SMPTE 2022-7.

IGMPv3 source specific multi-cast is also fully supported allowing fast configuration of network routes to deliver clean switching at the destination unit.

Timing and synchronization is handled by IEEE-1588v2 (PTP) and is compliant with SMPTE-2059-2 to ensure that all streams are accurately tracked and both break before make or make before break IP switching is selectable by the user on a destination by destination basis.

Fully integrated with the SAM IP or hybrid control system, and SAM's intelligent control and monitoring solutions mean these cards can form an integral part of your broadcast and media system.

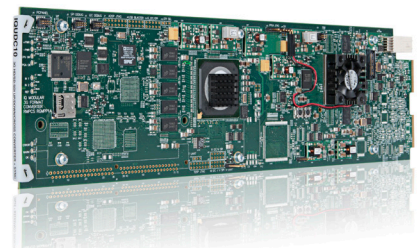
SAM's Modular IP conversion support is based on our IQMIX cards which form the cornerstone of the SAM IP Solution. Available with IP interface speeds of 10GbE, 25GbE and 40GbE these cards convert up to 16 simultaneous IP streams to, or from, SDI with embedded audio and metadata support.



### Intelligent monitoring

Building on their experience of modern broadcast monitoring requirements SAM has developed Hyperion and Media Biometrics, entirely new ways to monitor the integrity of content that passes through every stage of the broadcast infrastructure. Designed on the belief that opinion-based human intelligence is a more effective way to validate content quality than simply monitoring the technical parameters of a video signal, Hyperion and Media Biometrics provides a set of intuitive processes that enable an in depth analysis of the video and audio data.

- They evaluate the content of a television signal as well as measuring the absolute technical properties of the signal carrying that content.
- They enable more sophisticated multi-channel content monitoring and significant new protections when airing premium, high-value television programs. Included with Hyperion are additional tools including
- Remote monitoring over IP via low bit rate video thumbnails
- Timecode logging for accurate event tracking
- Content identification from source to output using UMID metadata. In addition all IQ modules with RollCall capability contain standard monitoring parameters to aid total system monitoring.



### Signal path protection

IQ signal protection modules employ dual synchronizers to enable re-timing of input signals and provides clean switch to/from backup feed.

Key benefits include;

- Rules based change-over with detection on both video and embedded audio parameters
- Change-over externally controllable via GPI and RollTrack messages from other modules, including Hyperion content analyzers
- Main, backup or follow selections for monitor outputs provide flexibility and enables preview of backup channel
- Full 16 channel audio passing around the synchronizers, delayed to match the video
- Auto PCM and Dolby detect to remove SRCs as required

