norwia

Product information catalog

Optical fiber transport

www.norwia.no

giving Value ...

Client list - miniHUB

Norwia is a trusted provider of fiber based equipment for Broadcaster and Telecommunications vendors around the world. The miniHUB has out performed other optical products in the market and now has impressive quality trademarks that can only come after time. The key areas of Optical Quality, Ultimate Flexibility, Easy Setup and Superior OPEX is the four pillars of strength where the miniHUB gives value. A key differentiator with the miniHUB is the technology AutoSFP®. Norwia's unique technology is one of the reason why the miniHUB is so successful.

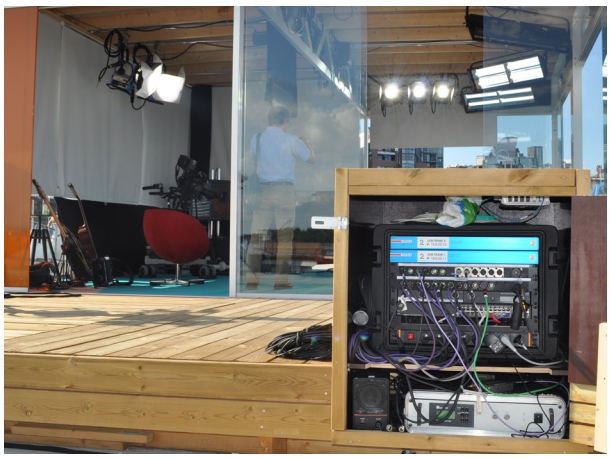
Around the world

MTG	Sweden, Stockholm
TDK 42	Kazakhstan
TV Gybernia	Vorenezh, Russia
BBC	United Kingdom
ITV	United Kingdom
AT&T	USA
KION-TV	Portland, Oregon, USA
WTVT-TV Fox	Tampa, Florida, USA
YLE	Helsinke, Finland
NRK	Oslo, Norway
TV-2	Oslo, Norway
Onside Broadcast (OB)	Stockholm, Sweden
HDR (OB)	Stockholm, Sweden
Aftonbladet (Media)	Stockholm, Sweden
VG TV	Oslo, Norway
Norwegian Government	Oslo, Norway
Norwegian Parliament	Oslo, Norway
SIGE, TVE Teletna	Catania, Italy
SKY TV	London, UK
DR	Denmark
Hawkeye	London, UK
NEP	Finland

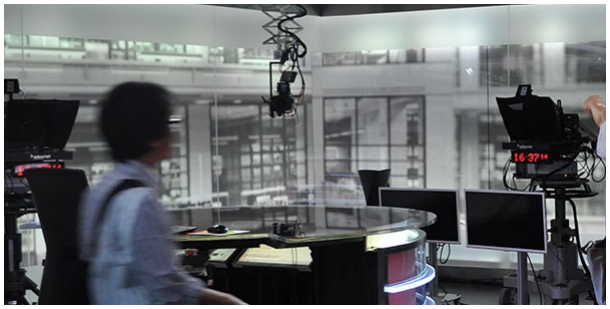
Customer Quote

"Norwia's industry leading levels of support and fiber expertise were fully evident throughout the project. The miniHUB remote production solution is a powerful package that's a real production game-changer. Norwia's solution has already provided us with major benefits and we look forward to exploring how it can continue to enhance the way we make and transport programming," TV-2 Norway.

Roland Gaross- Tennis	Paris France
Friends Arena	Stockholm Sweden
Bjerke Racetrack	Oslo Norway
Bunyodkor Stadium	Tashket Uzbekistan
Parc des Princes Stadium	Paris France
Spartek Stadium	Moscow Russia
TV2 Lorry	Denmark
Siam Parliament	Latvia



Ismaning, Germany	Probe Maintenance
Sälen, Sweden	Vasaloppet ski race
Oslo, Norway	OB Team
United Kingdom, London	ITV signal distribution
Spain	Aragon TV
United Kingdom, London	BBC Radio
Istanbul, Turkey	Grid Telekom
United Kingdom	Arena Broadcast (OB)
Stockholm, Sweden	IEC Sports
Rio 2014 World Cup	BBC News
2016 Olympics	BBC News
2016 Olympics	YLE
DSS	Norway
EPB	Estonia
TVN	Poland
Polsat	Poland



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Optical Quality | Ultimate Flexibility
Easy Setup | Superior OPEX

norwia.no

REV1650

Client list

miniHUB

index

This book belongs to .....

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www.norwia.no

01 miniHUB main brochure

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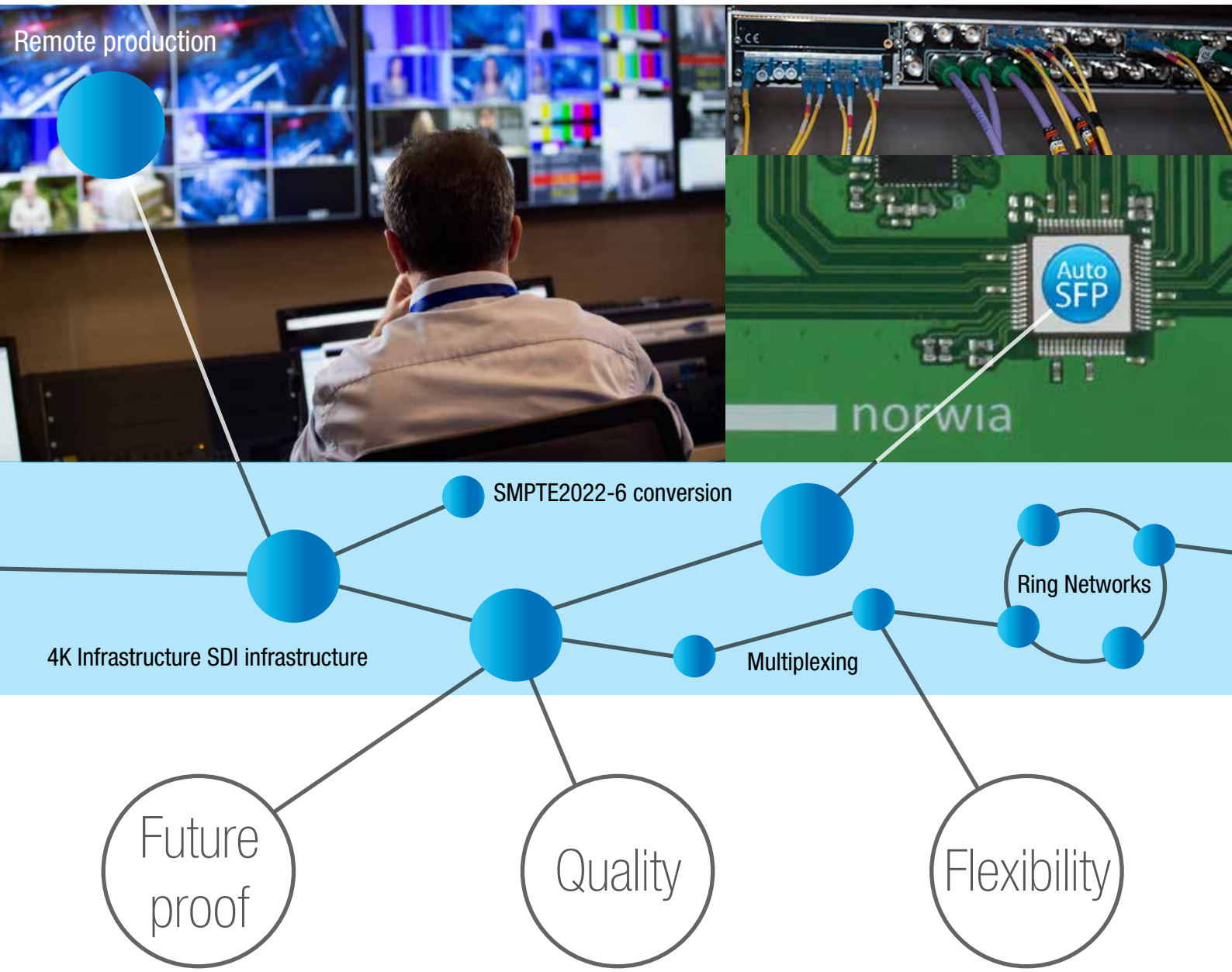
miniHUB

Optical fiber distribution platform



Company & Technology

Norwia has decades of expertise in the broadcast industry and is the inventor of unique AutoSFP technology which advances broadcast and network fibre optic communications. The high quality, flexible multifunctional products improve reliability, provide unsurpassed flexibility while reducing cost.

Sandefjord, Norway is the headquarter for all corporate functions of Norwia. The company is owned by active shareholders.

Manufactured and Developed in Norway to preserve quality and reliability.

Solid growth ensuring stability and longevity.

Superior logistics with on time product delivery and high quality products.

Quality assurance through external certification.

(SMPTE, IEC, ITU, FCC, ATIS)

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miniHUB is a format flexible, application flexible and holds the title “lowest cost of ownership on the market today”.

Engineering excellence designed into the entire miniHUB product line.

Formats supported IP SMPTE 2022-6, 4K/12G-SDI, Dual and Quad Link 4K, 3G-SDI, HD-SDI, SD-SDI, RS422, GPIO, DVB-ASI, MADI, AES Audio, Analogue Video, HDMI input, HDMI output, 1/10 Gbit Ethernet, Intercom AES and Sony Optical /Electrical remote CCU.

compact miniHUB-1RU-2-0

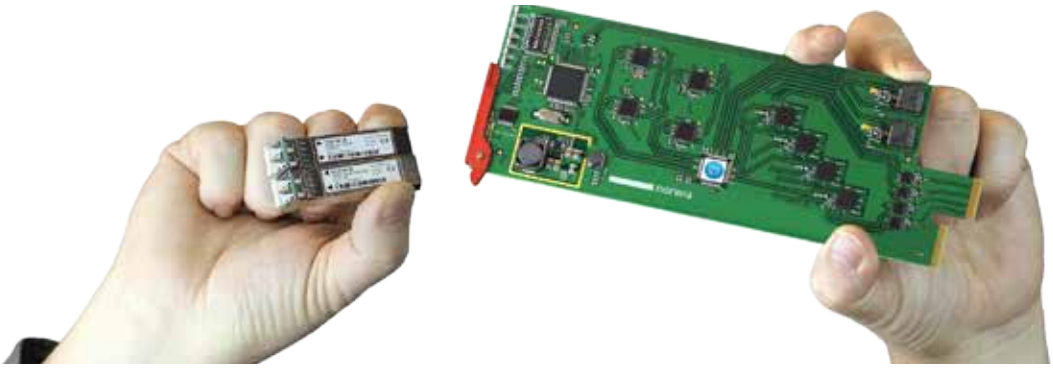
Extreme Temperature versions of the miniHUB are available for abnormal operating conditions including Telecommunications and outdoor use.

AutoSFP® technology is an integrated part of the core phabrix of the miniHUB concept and can only found in Norwia products.

Auto SFP

Optical Technology

Think of the Optical interface card (OC-4B-SDI) as being a one stop optical shop, and by using a simple key (SFP) you can unlock the card to be anyone of the more then 200 combinations that are available to you.



Auto SFP

Insert a dual optical transmitter SFP, then you will have a 2 channel transmission card. Take the same Optical interface card and remove the dual optical transmitter SFP and replace this with a dual channel receiver, then Norwia's AutoSFP® technology will automatically setup the Optical interface card as a dual channel optical receiver.

Norwia makes its so simple and so easy!

One card

\+

Multiple Interfaces

\+

Optical Fiber

\=

THE power of choice with flexibility not seen before in this next generation optical distribution platform.

Mass signal distribution

miniHUB has the best density for 'Frame/Card Based systems" on the market today. Compared to general 2RU system miniHUB can provide 32 reclocked point to point (P to P) 3G-SDI signals.
Compared to Compact based systems you also gain the benefits of having mixed signal formats, easy maintenance and quick replacement of spares. Also adding Norwia's exclusive AutoSFP® technology the customer gains a flexible and easy way of distributing signal where users can change signal direction in the matter of seconds.

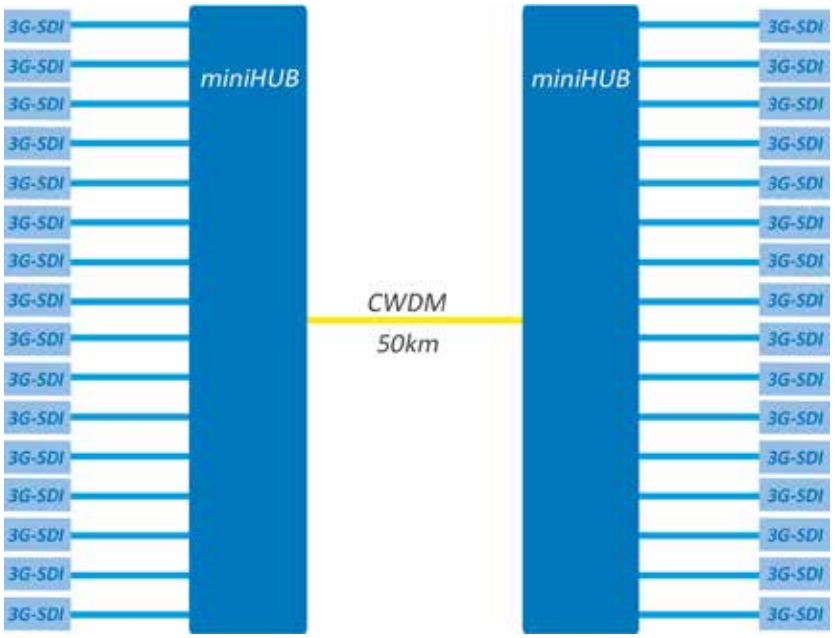
32 SDI in 2RU

P to P or CWDM

CWDM signal distribution

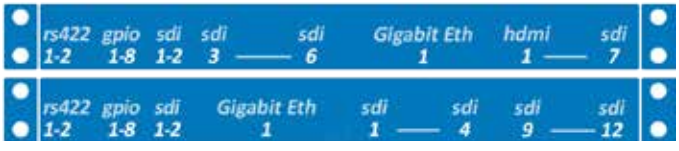
CWDM or Course Wave Division Mulitplexing in the MiniHUB platform can have up to 18 channel but more commonly 16 channels is used within the miniHUB CWDM system. CWDM brings signal density when customers don't have the necessary fiber count or maybe the distance is to large and compared to fiber cost makes CWDM a viable solution. The miniHUB system delivers un-compressed signal 'Bit for bit' quality with virtually zero latency.

16 SDI on 1 Fiber

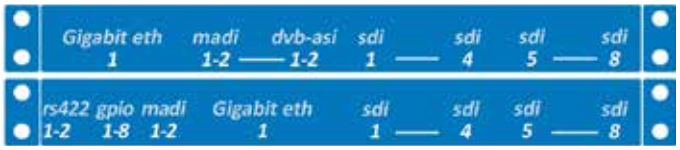


CWDM signal distribution with multiple formats

Norwia's miniHUB Platform can be adapted to perform different signal format without removing the main optical cards. The main optical cards can be removed from the front of the unit for maintenance purposes. Signal configuration can be changed on the fly by changing the SFP types and letting Norwia's AutoSFP® technology take care of the configuration automatically. Below is just a few of the many different configurations that can be achieved so that your investment can be used more frequently or changed later on in your organizations development.



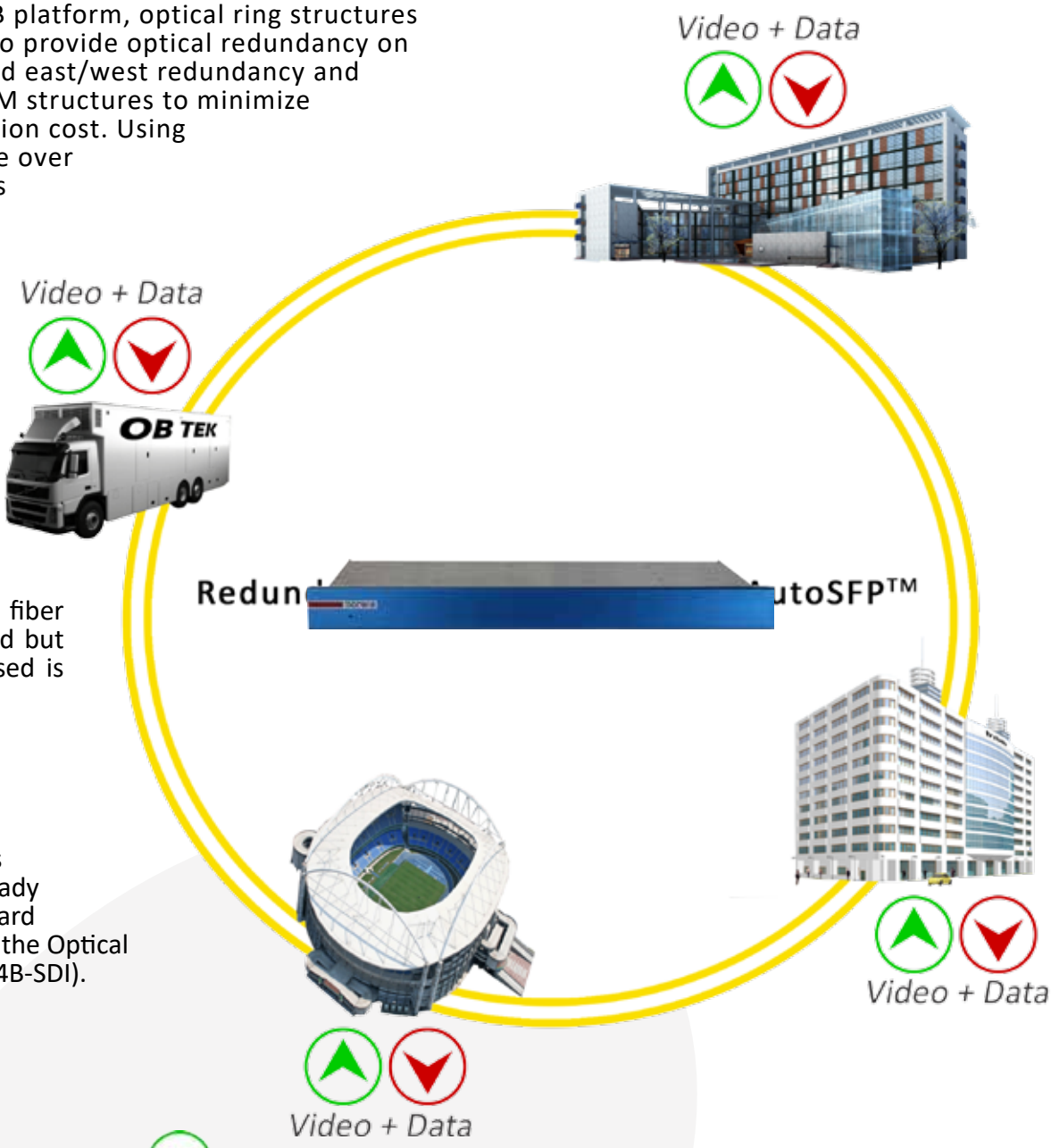
Same card, just change the SFP and let AutoSFP® do the work!



Fiber Rings

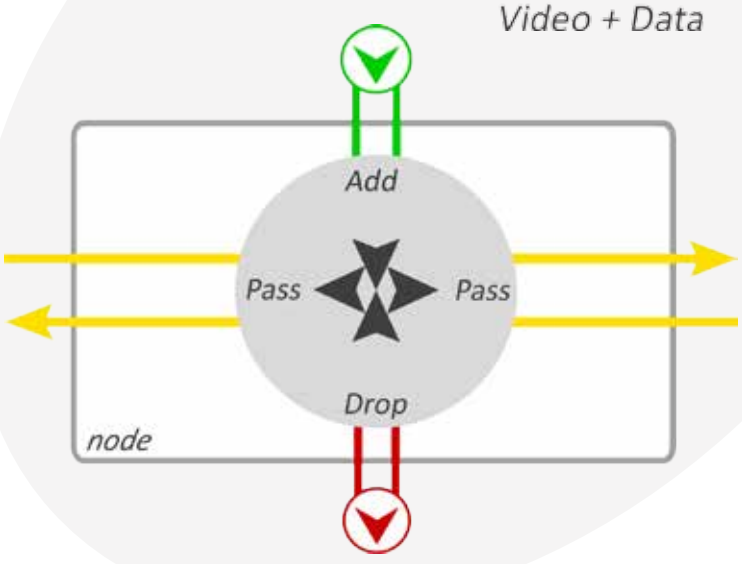
Add, Drop and Pass circuits can be designed and implemented for more complex applications. Metro ring systems, Inter building networks, Stadiums and Outside Broadcast are perfect applications for ring based networks using the Norwia miniHUB platform.

With the miniHUB platform, optical ring structures can be designed to provide optical redundancy on two fiber, so called east/west redundancy and incorporate CWDM structures to minimize fiber and installation cost. Using the optical change over function networks can be easily managed in case of fiber breakage.



Any amount of fiber circuits can be used but most commonly used is a fiber pair.

The Add/Drop/Pass functionality is already built into the standard product offering of the Optical interface card (OC-4B-SDI).

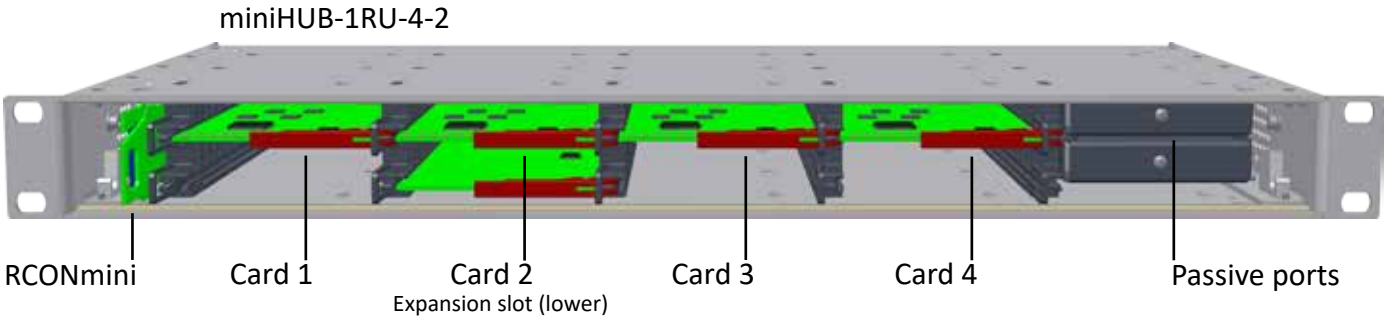


The miniHUB node will allow you to add signals or drop signals coming from another node in the ring. You can also decide to just pass signal through a node if required.

Remote production can be achieved over the same miniHUB optical distribution system.

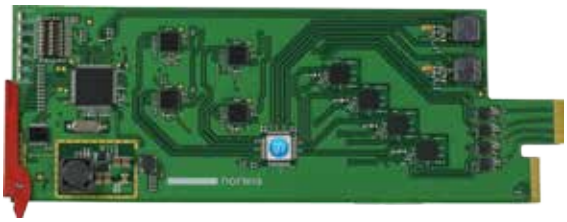
Consult the "Remote Production" brochure.

m i n i H U B



Optical Interface card (OC-4B-SDI)

This is the most versatile card on the market today for fiber optical distribution, from point to point links to optical distribution, optical transponding, add/drop networking, Ethernet, RS422, GPIO's and optical/electrical changeover. This card is a multipurpose tool made for any outside venue broadcaster, fiber network operator or broadcast production station.



The Optical interface card can be configured in seconds for new applications by Norwia's unique AutoSFP® functionality, which makes this an uniquely innovative product.

Over 200 combination in one card that are easily adaptable out in the field makes the miniHUB's optical interface card a truly remarkable product that gives value day in and day out!

AutoSFP® technology from Norwia is integrated into the optical interface card hardware, Software and our range of SFP's. This combination provides a very powerful platform for system design. It also give an intuitive and *EASY* automatic way of setting the unit up for a particular operation. This innovation provides immense cost saving to users and is unique to Norwia.

Card Locking system

Click & Go card locking is a secure and sure way of knowing that your signal path will not be interrupted by cards accidently slipping during transportation or coming loose over time. The "Click" sound is heard once the card is securely positioned.

Web and data interface (RCONmini)

RCONmini is the web and data interface for the miniHUB system.

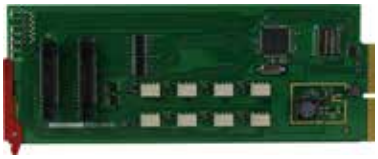
RCONmini comes free with the miniHUB frame and provides a robust control and monitoring platform independent of the OC-4B-SDI operations. Software upgrades are also free.

SNMP

The miniHUB platform is SNMP enabled via the RCONmini. SNMP comes as a integrated function in all miniHUB frames and is also available for users that have existing systems. A simple no cost upgrade is available on RCONmini.

Expansion Slot

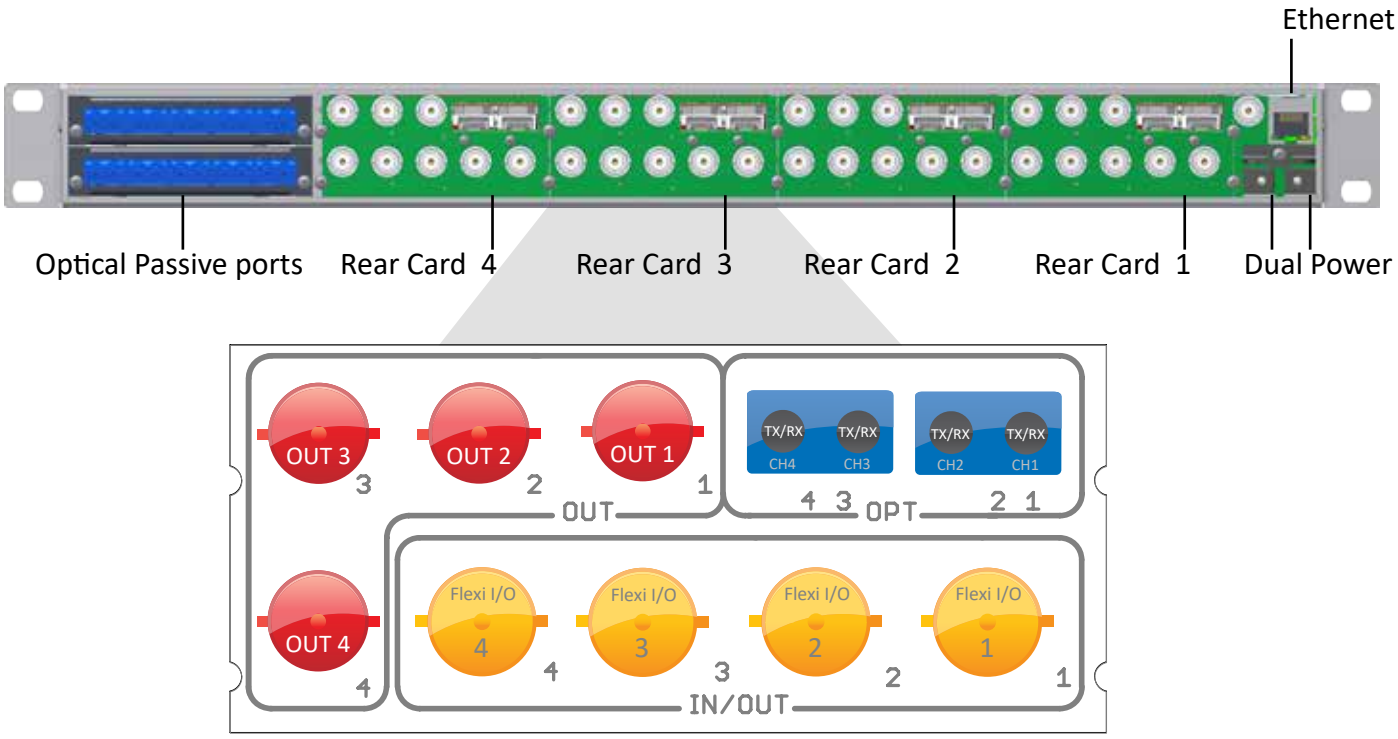
miniHUB has one slot for special applications. This slot is located under Card 2 in the miniHUB-1RU-4-2 subrack and when using the EX-8B-422 provides 2 x RS422 and 8 GPI's or 8 GPO's to the optical interface cards (OC-4B-SDI) in the upper card slot one. The expansion slot is an unique way of interfacing signals onto a fiber connections.



The EX-8B-422 card can be also optioned for TCIP transfer through the RCONmini for GPIO connections.

Optical Changeover

The Optical changeover card comes in three choices, 2x1, 2x2 and a 2x1 with optical signal level detection.
The changover card can be used for redundancy in CWDM systems or for protecting fiber circuits in a by-pass mode.



Optical passive modules

The miniHUB 1RU-4-2 Frame has options for 2 additional optical passive modules that extend the possibilities of the platform by giving the user the ability of adding multiple 4 channel CWDM filters or 2, 8 channel CWDM modules or an 18 channel filter.

Other passive optical products can be inserted to give even more flexibility to the miniHUB platform, these include WDM and Optical splitters.

Change your point to point Norwia fiber system into a CWDM system by adding CWDM SFP's and a CWDM multiplexer while keeping the rest of your investment. 4 & 8/16/18 channel systems available.

Addition to the product line is Norwia's Ultra low loss CWDM multiplexer. The Ultra low loss multiplexer is perfect for extended distance application or high loss fiber circuits.

Norwia provides a full suite of multiplexers including 18 channel version and multi-mode version for specialized applications.

Power Supplies

A robust power supply solution has been designed into the miniHUB system to give ultimate flexibility, stability and reliability to critical fiber networks.

All miniHUB systems include a single external supply with the option of a second supply. One supply is enough for a fully populated frame to operate while still running at 70% of its capacity.

Two supply inputs are accessible from the rear of the unit with each input totally independent in case of short circuit. A large range of +12Vdc to +24Vdc is allowed so users can choose their own power plan. This could be a DC battery supply or a common plant DC supply.

Optional a rackmountable frame is avialable for the external supplies.

Also supplied is a cable retention bracket to make sure the power cable is not disconnected during operation accidently and LED power indication from the front of the miniHUB subrack.

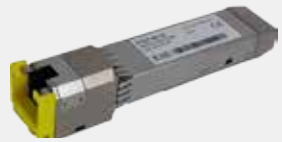
S F P O p t i o n s

Norwia has a wide range of SFP's that have undergone extensive selection and testing procedures. Norwia SFP's are selected for their performance and price level to give the best possible solution for your critical applications. All Norwia SFP's have AutoSFP® technology built in.

All Norwia SFP'S have passed a rigorous quality control process that includes measurement and documentation procedures to ensure quality standards that are at the highest possible levels.

HDMI INPUT **NV30-HDMI-IN**
HDMI OUTPUT **NV30-HDMI-OUT**
Application: HDMI Input SFP for encoding onto optical fiber for distribution via a fiber circuit. The HDMI output SFP can be used for Monitoring via a cost effective high definition PC monitor for proof monitoring or sending HDMI formatted signals via a fiber circuit.

ANALOG VIDEO INPUT **NV03-COMP-2-IN**
ANALOG VIDEO OUTPUT **NV03-COMP-2-OUT**
Application: The Dual SD-SDI to analog composite video convertor for delivering analog output from a fiber circuit. Dual Analog composite video to SD-SDI video convertor for distribution over a fiber circuit. Analog Standards include NTSC M, NTSC J, NTSC 4.43, PAL B/G/H/I/D, PAL M, PAL N, PAL 60.



GIGABIT ETHERNET **ND12-GBE1000**
Application: Gigabit ethernet distribution over optical fiber. Paired with an optical transceiver distribution can be over one fiber using the BiDi SFP or two separate fibers using a tranceiver.

MADI OPTICAL **ND01-T1300-R30-MM**
Application: Conversion between multimode optical MADI sources to incorporate into the correct level matching in readiness for inclusion into a Single mode fiber system or frequency shifting to a CWDM system.

BiDi OPTICAL **ND12-T1310-R20-BiDi**
Application: Built in WDM filter allows for Gigabit ethernet distribution over 1 fiber. Paired with ND12-T1550-R20-BiDi for WDM operation.

DUAL OPTICAL RECEIVER **NV30-R20-R20**
Application: Dual optical receive SFP for receiver two channel from a point to point or CWDM system. (CWDM requires CWDM TX SFP's and Multiplexers) Also available in a single channel version.

DUAL OPTICAL TRANSMITTER **NV30-T1310-T1310-10**
Application: Dual TX SFP for point to point optical systems. Also available in a single channel version.

OPTICAL TRANSCEIVER **NV30-T1310-R20-10**
Application: Two channel SFP including TX and RX optical function in one SFP package. Good when you need bi-directional distribution.

CWDM DUAL OPTICAL TRANSMITTER **NV30-CXXXX-CXXXX-40**
Application: Dual CWDM TX SFP for CWDM based optical systems. Can be used for point to point systems. Choose from 9 different pairs of frequencies.

CWDM TRANSCEIVER **NV30-CXXXX-R20**
Application: CWDM TX/RX SFP for CWDM based optical systems. Can be used for point to point systems. Choose from 18 different frequencies.

OTHER SPECIALIZED SFP's
Norwia also provide specialized SFP's on a project application basis, call for more information. IP SMPTE2022-6, RS422, GPO's & GPI's are also available for interface onto Optical distribution via the EX-8B-422 card.

Optical Passive Options

Norwia's point to point system can be upgraded by just replacing the transmitter SFP's to CWDM SFP's plus the appropriate multiplexer. This has not been seen in the optical distribution market before!
The ease of use and flexible format features make the miniHUB platform the best choice for all advanced installations.

Simplify with easier cable installation	Multiple uncompressed signals on 1 fiber	Using fiber reduces production cost

WDM 2 CHANNEL **WDM-2-1310-1550-1**

Application: Combines two signals onto one fiber and double the usability of your fiber system. The WDM 2 channel is provided in 1 filter package, but also is available in 2 and 3 filters per package.

CWDM 4 CHANNEL **CWDM-4E-1550-1610**

Application: Combines 4 channels onto one fiber for smaller multiplexed applications.All CWDM filters are supplied in matched pairs. The 4 channel CWDM filter can be expanded by the Express port to 12 channels via a 8 channel filter.

CWDM 8 CHANNEL **CWDM-8E-1470-1610**

Application: Combines 8 channels onto one fiber with ability to expand to 16 channels via the Express port. This module can also be use to combine 8 optical signals onto one fiber with the addition of the 1310 Express port for a legacy fiber systems. This module can also be provided in a Multimode version as well. All CWDM filters are supplied in matched pairs.

CWDM 16 CHANNEL **CWDM-8E-1470-1610**
CWDM-8E-1270-1410

Application: Combines 16 optical signals onto one fiber with two modules via the express port.

CWDM 8 CHANNEL ULTRA LOW LOSS **CWDM-8ULE-1470-1610**

Application: Combines 8 optical signals onto one fiber. This multiplexer is a high quality low loss filter and used when extra reach is required. This module can also be use to combine 8 optical signals onto one fiber with the addition of a 1310 Express port for a legacy fiber systems.

CWDM 16 CHANNEL ULTRA LOW LOSS **CWDM-8ULE-1470-1610**
CWDM-8ULE-1270-1410

Application: Combines 16 optical signals onto one fiber with two modules via the express port when extra reach is required.

CWDM 18 CHANNEL **CWDM-18-1270-1610**

Application: Combines 18 optical signals onto one fiber for maximum channel count for CWDM systems.

OPTICAL SPLITTER (2 WAY & 4 WAY) **OS-2-50-3 & OS-4-25-2**

Application: Split your optical signal in two direction with the OS-2-50-3, Package include 3 x 2 way splitters or split your optical signal in four direction with the OS-4-25-2, Package includes 2 x 4 way splitters.

FIBER PATCH CABLES

Application: High quality class C2 fiber patch cable kits for CWDM systems that conforms to IEC 61655-1 classification.

Norwia's CWDM solution is the most cost effective frame based system on the market today. This coupled with quality and next generation technology, makes the miniHUB system a best of breed product that is used world wide.

Frame & Power

Norwia's frame and power options are designed to suit the needs of today's broadcasters and telecommunication operators.
Flexibility was also a factor in the design of the frame and power system for the miniHUB and delivers a professional solution for mission critical applications.
All frames can be powered redundantly and independently to allow for fault proof operation and easy change out. Multiple solutions are possible from battery to 3rd party solutions and the miniHUB's own robust solution.

Frame options

miniHUB **miniHUB-1RU-4-2**

This miniHUB Frame can mount 4 optical interface cards (OC-4B-SDI), 2 passive modules plus 1 expansion slot card solution. Dual power inputs that delivery a wide range of +12 to +24V dc on each input. Frame includes RCONmini for control, upgrades and SNMP functions.

miniHUB extended temperature **miniHUB-1RU-4-2**

This miniHUB Frame is the Extended temperature range product. All point to point applications are guaranteed at -40 to +65 Deg C. 4 optical interface cards (OC-4B-SDI), 2 passive modules plus 1 expansion slot card solution. Dual power inputs that delivery a wide range of +12 to +24V dc on each input. Frame includes RCONmini for control, upgrades and SNMP functions. Anti-corrosion protection is included for extreme environments and conforms to ATIS-0600010.01.2008 temperature specifications.

miniHUB compact + 8ch CWDM miniHUB compact **miniHUB-1RU-2-0**

miniHUB compact is designed and built for 're-engineered' applications. Pelicase and non-rack mountable cases are ideal for the miniHUB compact. A maximum of 2 x optical interface cards (OC-4B-SDI) are allowed and includes the RCONmini for control, upgrades and SNMP functions. 8ch CWDM version now avialable.

miniHUB passive **miniHUB-1RU-0-10**

The passive rack mount unit is designed for mounting a large amount of WDM/CWDM and 2/4 way splitters in to a compact space. A maximum of 10 passive slots are available.

Frames

	OC-4B-SDI Cards	Passive Slots	Expansion Slots
miniHUB-1RU-4-2	4	2	1
compact miniHUB-1RU-2-0	2	0	1
miniHUB-1RU-0-10	0	10	0

compact miniHUB-1RU-2-0

miniHUB-1RU-4-2

miniHUB-1RU-0-10

Power options

Power External **24 volt**

Professional grade 24V dc power supply for use with the miniHUB optical distribution platform. 100,000 hrs MTBF and certified to all relevant specifications. 90-264V ac with 60W capacity.

Power Subrack **1 RU**

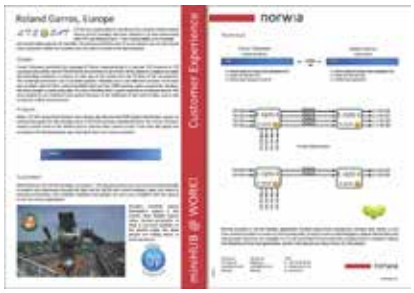
1 RU power supply frame for the 10653 24volt power supplies. A maximum of 6 supply can be mounted in a sturdy frame that includes mechanisms for DC and AC power cable clamping. Power supply LED are readable from the front of the frame via optical means.

Other Power Option

The miniHUB frame has standard 24volt inputs that are redundant. Because of this design there are a wide range of 3rd party external options at every level available for the users of miniHUB. Enquire with Norwia sales for options.

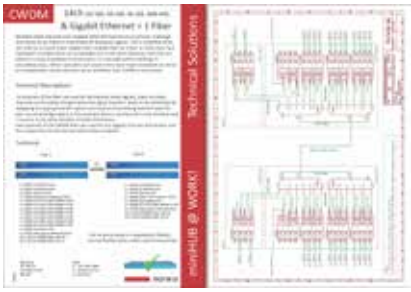
Technical Data Sheets

A comprehensive selection of technical data sheets for SFP, Optical interface card, expansion slots cards, Multiplexers and power options can be found on the Norwia website.



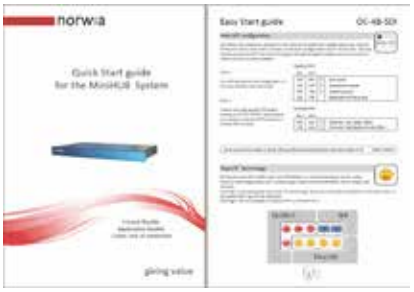
Customer Experience Documents

Customer Experience (CE Documents) documents are written from the customers point of view. Read how miniHUB has given huge benefits to all of its users and why the miniHUB is the most preferred optical distribution system in the world.



Technical Solution Documents

Technical Solution (TS Documents) documents include a technical layout of the miniHUB optical distribution system in a particular configuration that solve some of todays challenges.

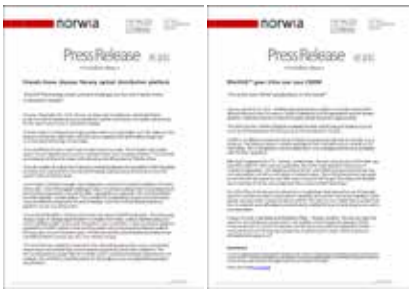


Easy Start guide

New users that require a quick start introduction into the Norwia optical distribution system should read this for the most important information. The *EASY* setup of the miniHUB is due to Norwia's new technology called AutoSFP™.

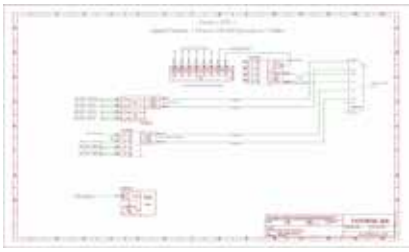
Remote production brochure

miniHUB opens up some exciting possibilities into the full remote production over fiber optics. This proven technology is already in use today and gives enormous benefits to broadcasters.



Press Releases

Success stories and product development news can be found on Norwia' website. Read about the innovative miniHUB platform and how users are solving their challenges with modern infrastructures.



Solution Architects

Norwia has many years of experience with Optical fiber distribution systems. Contact us today and we will show you how to solve your challenges with the innovative miniHUB platform.

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Contact us

Norwia or one of our distribution network dealers can help you via email or phone on how we can solve the challenges that you are fronted with today. Click the 'Buy Now' tab on Norwia's website.

AutoSFP

Norwia holds unique core technologies such as AutoSFP® which is incorporated into the next generation miniHUB optical distribution platform.

miniHUB is a Format flexible, Application flexible and holds the title "lowest cost of ownership on the market today"

Visit www.norwia.no for more information on the miniHUB optical distribution system, representative around the world, news on new product releases, product data sheets, customers stories and technical solutions.

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REV15612

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miniHUB Technical specifications

miniHUB is a 1 rack unit frame that will hold up to 4 cards and 2 passive optical devices.

The miniHUB frame is supplied with RCONmini (Frame Controller) which provides all external data control and referencing to the cards within. 1 power module is included in the frame purchase and there are facilities for a second supply to be connected if redundancy is an issue.

miniHUB is constructed of high quality material that will withstand rigorous environments. Features such as “Click & Go” card locking system is standard and provides operational continuity in harsh conditions.

Frame Specifications

Model No:	miniHUB-1RU-4-2
Frame power input range	+12 VDC to +24 VDC
Connector type:	DC-Jack 5.5/2.1mm
Power connectors on frame:	2
Mixed supplies allowed:	Yes, diode split input
Dimensions of frame:	483 x 44 x 255 mm (19”, 1RU)
Card slots - active:	4
Passive optical slots:	2
Expansion slots:	1
Operating temperature	0 deg Celcius to +45 deg Celcius
Relative humidity	<90% (non-condensing)
Door release mechanism	Push to release and push to close
Door removal	Yes, hinged for normal use

Power supply

Model No:	10653
AC input:	100-240 VAC, 1.5A, 50-60Hz
Output voltage:	+24VDC, 2.5A MAX
Maximum wattage:	60 W
Input connector:	IEC 60320 C14
Power LED indicator:	Yes
Dimensions:	110 x 62 x 32 mm (L/W/H)
MTBF	100,000 hours
Certification:	UL, CE and CB

Control

Model No:	RCONmini
Connector type:	RJ45
Connector Indicator:	Yes, 10/100Mbit & Link
Control language:	html
SNMP enabled:	Yes

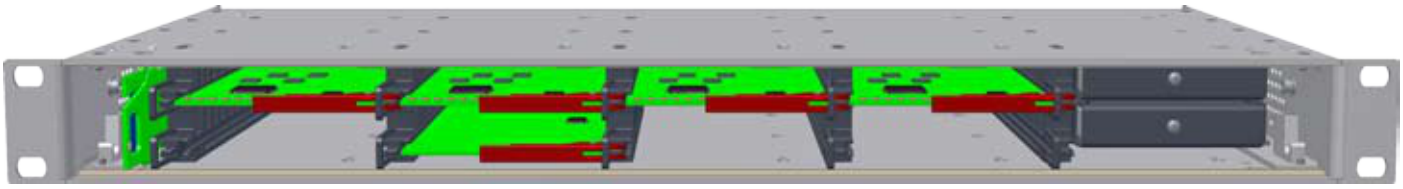
Sync

Connector type:	75 ohm BNC
Signal Type:	Black and Burst / Tri-level
Distributed in frame:	Yes

Cooling

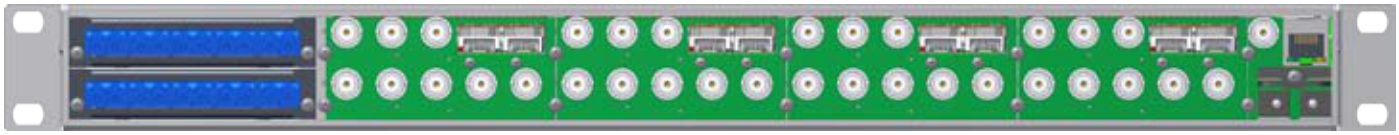
Fans:	3 x Processor controlled
Size:	30 x 30 x 10 mm (W/H/D)
Control:	Temperature sense with speed control

Front



RCONmini | Card 1 | Card 2 Expansion slot (lower) | Card 3 | Card 4 | Passive ports

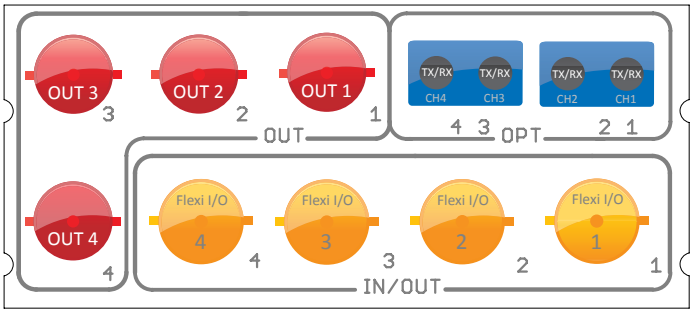
Rear



Passive ports | Rear card 4 | Rear card 3 | Rear card 2 | Rear card 1 | Sync & Control Dual Power

OC-4B-SDI back panel

Model No:	OC-4B-SDI-B1
SFP slots	2
SFP type	Norwia OEM type, (see SFP type list)
BNC (Standard O/P)	4 x 75 ohm output
BNC (Flexi-IO)	4 x 75 ohm (input or output)
Input/Output specifications	(See OC-4B-SDI Technical specification)



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REV1223

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OC-4B-SDI Technical specifications

The OC-4B-SDI is the most flexible Optical video distribution product on the market today.

The OC-4B-SDI is a 1 card solution for all your Optical distribution needs. This include Optical video links, Optical signal distribution, Add/Drop/Pass Optical video distribution and Ethernet links.

It has the capacity for 4 channels that can be built up as the customer needs greater capacity. OC-4B-SDI has high quality specification with innovative features such as Flexi I/O™ technology and Auto SFP configuration.

Optical ports

Number of ports:	Up to 4 (2 per SFP)
Direction:	Depends on SFP, See Optical and SFP guide
Optical performance:	See Optical and SFP guide
Connector type:	LC/PC according to SMPTE-297M-2006
Fiber Type:	Single mode 9/125um
Maximum reflected power:	14dB
Connector return loss:	≥26 dB
Transmitter light source:	F-P and DFB lasers with WDM and CWDM options. See Optical and SFP guide
Receiver detector:	Medium or high sensitivity. See Optical and SFP guide
CWDM channel grid:	20nm

Electrical inputs

Number of inputs:	4 Flexi I/O™
Data rate:	19.4 Mbps - 2970 Mbps
Cable equalization:	Up to 100m of Belden 1694A @ 2.97Gbps Up to 150m of Belden 1694A @1.485Gbps Up to 300m of Belden 1694A @270Mbps *
Connector type:	BNC
Impedance:	75 ohms
Signal level:	800mV p-p nominal
Return loss:	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]

* for mixed signal environments, recommended cable length on 270Mbps should follow HD standard.

Electrical outputs

Number of outputs:	4 (8 including Flexi I/O™)
Signal polarity:	All outputs non-inverting
Connector type:	BNC
Impedance:	75 ohm
Signal level:	800mV p-p ±10%
Return loss:	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]
Reclocking:	270Mbps, 1.483/1.485Gbps, 2.966/2.970Gbps, Automatic bypass for other rates
Alignment jitter:	≤ 0.2UI
Timing jitter:	≤ 1.0UI, ≤ 0.2UI @ 270Mbps

General

Operating voltage:	+12Vdc to +24Vdc/ 10W max
Working Temperature:	0 to +45°C
Card weight:	70 grams (OC-4B-SDI)
Rear connector weight:	65 grams (OC-4B-SDI-B1)

Supported standards

SMPTE:	292M-2008, 259M-2008, 297M-2006, 305M-2005, 310M-2004, 424M-2006
DVB-ASI:	EN50083-9
ITU:	ITU-T G.694.2 for CWDM applications
SFP-MSA	SFF-8074i, SFF-8472 (DDMI)

Control interface

Control	AUTO SFP configuration with RCONmini for remote status and setup. See RCONmini user manual

LED indication

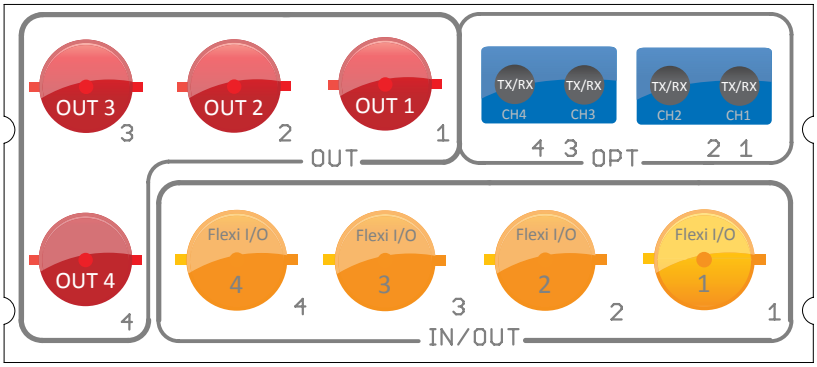
Front mounted leds to indicate SFP type, and confirmation of input presence and lock.

DIP sx

DIP sx selection for Distribution or Link mode

OC-4B-SDI back panel

Model No:	OC-4B-SDI-B1
SFP slots	2
SFP type	Norwia approved only, see Optical and SFP guide
BNC (Standard O/P)	4 x 75 ohm output
BNC (Flexi-IO)	4 x 75 ohm (input or output)



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REV1135

02 Optical Changeover card

OX-2O-2X1-D / OX-2O-2X2

Automatic Protection Switch for all types of optical signals with optional power detection

Data Sheet

Description

The OX-2O-2x1/ OX-2O-2x2 modules are an Optical Fiber Protection switch with 2x1 or 2x2 switching architecture.

It can be user for fiber redundancy switching, optical switching in fiber networks or protection switching in optical ring networks.

The module can be controlled with external GPI control, or from the miniHUB WEB control interface (RCONmini). In addition it can also perform switching based on power supply failure.

The OX-2O-2X1-D version has an additional optical power sense on both inputs. The user can decide which optical trigger level (dBm) to activate the switch. It will then automatically protect the fiber connection.

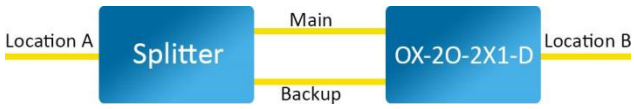
Features

- Available in 2x1 and 2x2 versions
- GPI control available
- Large Optical detection range, 0dBm to -30dBm (-D verion)
- LEDs show selected input status and input signal presence (-D version)
- Automatic Protection Switching based on optical input power (-D version)
- Switching based on power failure
- Low optical insertion loss of typically < 2dB
- Use together with OS-2-50 to split fiber circuit into 2 fibers

Part Number Options

Part Number	Temperature *)
OX-2O-2X1	0°C to +45°C
OX-2O-2X1-D	0°C to +45°C
OX-2O-2X2	0°C to +45°C

*) Rated temperature for the complete miniHUB.



Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

General Operating Conditions

Parameter	
Control	10 way DIP switch, GPI, WEB or Automatic(-D version)
LEDs	Card status, selected input. Optical input presence (-D version)
Operating modes	Latching and Non-Latching
Number of inputs	2
Number of outputs	1 or 2
Connectors	LC/UPC

Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Switch versions	2x1 or 2x2			
Operating Wavelenth	1270 – 1610			nm
Insertion Loss				dB
OX-2O-2X1		0.8	1.1	dB
OX-2O-2X1-D		1.4	2.1	dB
OX-2O-2X2		0.8	1.1	dB
Max input power			27	dBm
Input power sensor detection range (-D version)	-30		0	dBm
Input power sensor directivity (-D version)	25	30		dB
Return loss	45			dB
PDL		0.05	0.1	dB
Connector	LC/PC			
Transmitting circuit fiber	Single Mode (9/125µm)			

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OC-2B-NRC

Optical Transponder Card for Video

Data Sheet

Description

The OC-2B-NRC module is an optical transponder card for video signal formats. This module is typically used when optical signals needs to be converted into CWDM, such as SMPTE-304 camera signals. It has a limited functionality over OC-4B-SDI, but enables a more economical solution to the miniHUB system.

The module can be controlled from the miniHUB WEB control interface (RCONmini).

Features

- Available with 18 CWDM wavelengths
- LEDs show input signal presence
- RCONmini WEB & SNMP control interface
- Optical Power Monitoring
- Backplane compatible to OC-4B-SDI

Part Number Options

Part Number	Temperature *)
OC-2B-NRC	0°C to +45°C
OC-2B-NRC/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

General Operating Conditions

Parameter	
Control	10 way DIP switch, GPI, WEB
LEDs	Card status, Loss of Signal.
Operating modes	- 1310nm or CWDM depending on selected SFP type - Dual RX to Dual TX (CWDM) - RX/TX to RX/TX (CWDM)
Number of active channels	2
Number of SFP slots	2
Number of active BNC's	0

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Compatible SFP types	Any Norwia video type SFP			

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Compatible SFP types	Any Norwia video type SFP			

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OC-2T-10G

10Gbit/s Ethernet Optical CWDM Transponder

Data Sheet

Description

The OC-2T-10G module is an optical 10Gbit/s Ethernet CWDM transponder. This module is typically connected to a 10Gig Ethernet switch with 1310nm interface. It enables the miniHUB system to transport 10Gig Ethernet over its CWDM architecture.

It can also be used for refreshing long distance 10Gig Ethernet signals with reclocking and possible wavelength swaping.

The module can be controlled from the miniHUB WEB control interface (RCONmini).

Features

- Available with 18 CWDM wavelegths
- LEDs show input signal presence
- RCONmini WEB & SNMP control interface
- Optical Power Monitoring
- 10Gbps Reclocking
- Backplane compatible to OC-4B-SDI
- 80km optical SFP's and DWDM available on request

Part Number Options

Part Number	Temperature *)
OC-2T-10G / 1270nm	0°C to +45°C
OC-2T-10G / 1290nm	0°C to +45°C
OC-2T-10G / 1310nm	0°C to +45°C
OC-2T-10G / 1330nm	0°C to +45°C
OC-2T-10G / 1350nm	0°C to +45°C
OC-2T-10G / 1370nm	0°C to +45°C
OC-2T-10G / 1390nm	0°C to +45°C
OC-2T-10G / 1410nm	0°C to +45°C
OC-2T-10G / 1430nm	0°C to +45°C
OC-2T-10G / 1450nm	0°C to +45°C
OC-2T-10G / 1470nm	0°C to +45°C
OC-2T-10G / 1490nm	0°C to +45°C
OC-2T-10G / 1510nm	0°C to +45°C
OC-2T-10G / 1530nm	0°C to +45°C
OC-2T-10G / 1550nm	0°C to +45°C
OC-2T-10G / 1570nm	0°C to +45°C
OC-2T-10G / 1590nm	0°C to +45°C
OC-2T-10G / 1610nm	0°C to +45°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

General Operating Conditions

Parameter	
Control	10 way DIP switch, GPI, WEB or Automatic(-D version)
LEDs	Card status, Loss of Signal.
Operating modes	Reclocking 1310nm or CWDM
Number of inputs	2 optical
Number of outputs	2 optical (1x 1310nm and 1x CWDM)
Connectors	LC/UPC

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm)			
Light source	DFB laser			
Optical output power	0		+4	dBm
Optical center wavelength (λ = 1270nm to 1610nm)	λ-6.0nm	λ	λ+7.5nm	nm
Spectral width (-20dB)			1	nm

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm)			
Receiver technology	PIN (APD receivers are available on request)			
Optical receiving window	1270		1610	nm
Optical input overload power	-8			dBm
Optical receiver sensitivity (BER=10^{-12}, $TX_{EXT} \geq 9dB$)			-23	dBm

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OC-2T-ETH

1Gbit/s Ethernet or MADI Optical Transponder

Data Sheet

Description

The OC-2T-ETH module is a SFP transponder card for SFP transceivers types only. This module is typically used for Ethernet Media convertion or as a MADI Multimode to Single mode transponder. It also enables convertion into CWDM. It has a limited functionality over OC-4B-SDI, but enables a more economical solution to the miniHUB system.

The module can be controlled from the miniHUB WEB control interface (RCONmini).

Features

- Available with 18 CWDM wavelengths
- LEDs show input signal presence
- RCONmini WEB & SNMP control interface
- Optical Power Monitoring
- Backplane compatible to OC-4B-SDI

Part Number Options

Part Number	Temperature *)
OC-2T-ETH	0°C to +45°C
OC-2T-ETH/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

General Operating Conditions

Parameter	
Control	10 way DIP switch, GPI, WEB
LEDs	Card status, Loss of Signal.
Operating modes	- 1310nm or CWDM depending on selected SFP type - For Gigabith Ethernet convertion: Use: ND12-GBE1000 in combination with any ND12-# optical SFP - For MADI Multimode to Signle mode: Use: ND01-T1300-R30-MM in combination with any NV30-# tranceivers or ND12-C# tranceivers - For general transponder functionality: Use: any transceiver RX/TX to RX/TX (CWDM)
Number of active channels	2
Number of SFP slots	2
Number of active BNC's	0

Tranceiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Compatible SFP types	Any Norwia transceiver type SFP			

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03 SFP’s miniHUB

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NV30-R17-R17

Dual Channel Optical Receiver with AutoSFP™ functionality for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-R17-R17 is a Small Form Factor Pluggable (SFP) LC dual channel optical receiver. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- PIN receiver technology
- Typical Link lengths at 2.97Gbps:
  - Up to 30km @ 9µm SMF (limited by laser)
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Pb-free and RoHS compliant

Part Number Options

Part Number	Temperature *)
NV30-R17-R17	-5°C to +55°C

*) Rated temperature for the complete miniHUB unit.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.8	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	-5		+70	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation			1000	mW
Data rate	50		3000	Mbps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm)			
Receiver technology	PIN			
Optical input overload power	-3			dBm
Optical receiver sensitivity @ 3Gbps (3G-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-19	-17	dBm
Optical receiver sensitivity @ 1.5Gbps (HD-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-19	-17	dBm
Optical receiving window	1260		1620	nm

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NV30-T1310-T1310-05 (/E)

Dual Channel Optical Transmitter with AutoSFP™ functionality for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-T1310-T1310-05 is a Small Form Factor Pluggable (SFP) LC dual channel optical transmitter. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range. It is also available with two temperature ranges, standard and extended.

Part Number Options

Part Number	Temperature *)
NV30-T1310-T1310-05	-5°C to +55°C
NV30-T1310-T1310-05/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- 1310nm Fabry-Perot laser
- Typical Link lengths at 2.97Gbps:
  - 0.5 to 250m @ 50µm MMF
  - 0.5 to 250m @ 62.5µm MMF
  - 0.5 to 10km @ 9µm SMF
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.8	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:				
• NV30-T1310-T1310-05	-5		+70	°C
• NV30-T1310-T1310-05/E	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation			1100	mW
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Light source	Fabry-Perot laser			
Optical output power	-6	-2	-0	dBm
Optical extinction ratio	5			dB
Optical center wavelength	1290	1310	1330	nm
Spectral line width		1.5	3	nm
Optical rise/fall time (20-80%)		115	135	ps

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NV30-R20-R20 (/E)

Dual Channel Optical Receiver with AutoSFP™ functionality for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-R20-R20 is a Small Form Factor Pluggable (SFP) LC dual channel optical receiver. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range. It is also available with two temperature ranges, standard and extended.

Part Number Options

Part Number	Temperature *)
NV30-R20-R20	-5°C to +55°C
NV30-R20-R20/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB unit.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- PIN receiver technology
- Typical Link lengths at 2.97Gbps:
  - 0.5 to 250m @ 50µm MMF
  - 0.5 to 250m @ 62.5µm MMF
  - 0.5 to 65km @ 9µm SMF (limited by laser)
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.8	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:				
• NV30-R20-R20	-5		+70	°C
• NV30-R20-R20/E	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation		600	700	mW
Data rate	50		3000	Mbps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power			0	dBm
Optical receiver sensitivity @ 3Gbps (3G-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-24	-20	dBm
Optical receiver sensitivity @ 1.5Gbps (HD-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-25	-24	dBm
Optical receiving window	1260		1620	nm

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NV30-T1310-T1310-10 (/E)

Dual Channel Optical Transmitter with AutoSFP™ functionality for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-T1310-T1310-10 is a Small Form Factor Pluggable (SFP) LC dual channel optical transmitter. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range. It is also available with two temperature ranges, standard and extended.

Part Number Options

Part Number	Temperature *)
NV30-T1310-T1310-10	-5°C to +55°C
NV30-T1310-T1310-10/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- 1310nm Fabry-Perot laser
- Typical Link lengths at 2.97Gbps:
  - 0.5 to 250m @ 50µm MMF
  - 0.5 to 250m @ 62.5µm MMF
  - 0.5 to 20km @ 9µm SMF
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.8	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:				
• NV30-T1310-T1310-10	-5		+70	°C
• NV30-T1310-T1310-10/E	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation			1100	mW
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Light source	Fabry-Perot laser			
Optical output power	-5	-2.5	-0	dBm
Optical extinction ratio	7			dB
Optical center wavelength	1280	1310	1340	nm
Spectral line width		1.5	3	nm
Optical rise/fall time (20-80%)		115	135	ps

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NV30-T1310-R20-10 (/E)

Optical Transceiver with AutoSFP™ functionality for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-T1310-R20-10 is a Small Form Factor Pluggable (SFP) LC dual channel optical transceiver. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range. It is also available with two temperature ranges, standard and extended.

Part Number Options

Part Number	Temperature *)
NV30-T1310-R20-10	-5°C to +55°C
NV30-T1310-R20-10/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- 1310nm Fabry-Perot laser
- Typical Link lengths at 2.97Gbps:
  - 0.5 to 250m @ 50µm MMF
  - 0.5 to 250m @ 62.5µm MMF
  - 0.5 to 20km @ 9µm SMF
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.8	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:				
• NV30-T1310-T1310-10	-5		+70	°C
• NV30-T1310-T1310-10/E	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation			1100	mW
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Light source	Fabry-Perot laser			
Optical output power	-5	-2.5	-0	dBm
Optical extinction ratio	7			dB
Optical center wavelength	1280	1310	1340	nm
Spectral line width		1.5	3	nm
Optical rise/fall time (20-80%)		115	135	ps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power			0	dBm
Optical receiver sensitivity @ 3Gbps (3G-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-24	-20	dBm
Optical receiver sensitivity @ 1.5Gbps (HD-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-25	-24	dBm
Optical receiving window	1260		1620	nm

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NV30-C1xxx-C1xxx-40

Dual Channel Optical CWDM Transmitter for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-C1xxx-C1xxx-40 is a Small Form Factor Pluggable (SFP) LC dual channel optical transmitter. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. It contains two independant DFB CWDM lasers providing error-free transmissions with more than 50km of fiber. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range

Part Number Options

Part Number	Laser wavelength (nm)	Temperature *)
NV30-C1270-C1290-40	1270/1290	0°C to +40°C
NV30-C1310-C1330-40	1310/1330	0°C to +40°C
NV30-C1350-C1370-40	1350/1370	0°C to +40°C
NV30-C1390-C1410-40	1390/1410	0°C to +40°C
NV30-C1430-C1450-40	1430/1450	0°C to +40°C
NV30-C1470-C1490-40	1470/1490	0°C to +40°C
NV30-C1510-C1530-40	1510/1530	0°C to +40°C
NV30-C1550-C1570-40	1550/1570	0°C to +40°C
NV30-C1590-C1610-40	1590/1610	0°C to +40°C

*) Rated temperature for the complete miniHUB.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- Available wavelengths: 1270nm to 1610nm, with 20nm channel spacing
- DFB laser
- Typical Link lengths at 2.97Gbps:
  - 0.5 to 250m @ 50µm MMF
  - 0.5 to 250m @ 62.5µm MMF
  - 0.5 to 50km @ 9µm SMF
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Case operating temperature:	-20	+80	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+70	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation		650	1000	mW
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125μm), Multi Mode compatible			
Light source	DFB laser			
Optical output power	0	+2	+5	dBm
Optical extinction ratio	7.5			dB
Optical center wavelength ($\lambda = 1270\text{nm to } 1610\text{nm}$)	λ-5.5nm	λ	λ+7.5nm	nm
Spectral width (-20dB)		0.2	1	nm
Optical rise/fall time (20-80%)		130	180	ps

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NV30-C1xxx-C1xxx-50

Dual Channel Optical CWDM Transmitter for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-C1xxx-C1xxx-50 is a Small Form Factor Pluggable (SFP) LC dual channel optical transmitter. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. It contains two independant DFB CWDM lasers providing error-free transmissions with more than 50km of fiber. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range

Part Number Options

Part Number	Laser wavelength (nm)	Temperature *)
NV30-C1270-C1290-50	1270/1290	0°C to +40°C
NV30-C1310-C1330-50	1310/1330	0°C to +40°C
NV30-C1350-C1370-50	1350/1370	0°C to +40°C
NV30-C1390-C1410-50	1390/1410	0°C to +40°C
NV30-C1430-C1450-50	1430/1450	0°C to +40°C
NV30-C1470-C1490-50	1470/1490	0°C to +40°C
NV30-C1510-C1530-50	1510/1530	0°C to +40°C
NV30-C1550-C1570-50	1550/1570	0°C to +40°C
NV30-C1590-C1610-50	1590/1610	0°C to +40°C

*) Rated temperature for the complete miniHUB.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- Available wavelengths: 1270nm to 1610nm, with 20nm channel spacing
- DFB laser
- Typical Link lengths at 2.97Gbps:
  - 0.5 to 250m @ 50µm MMF
  - 0.5 to 250m @ 62.5µm MMF
  - 0.5 to 50km @ 9µm SMF
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Case operating temperature:	-20	+80	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+70	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation		650	1000	mW
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125μm), Multi Mode compatible			
Light source	DFB laser			
Optical output power	0	+1	+3	dBm
Optical extinction ratio	5	7.5		dB
Optical center wavelength (λ = 1270nm to 1610nm)	λ-6nm	λ	λ+7.5nm	nm
Spectral width (-20dB)			1	nm
Optical rise/fall time (20-80%)		105	180	ps

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NV30-C1xxx0-R20-40

Optical CWDM Transceiver with AutoSFP™ functionality for SMPTE 297-2006 Video applications

Data Sheet

Description

The NV30-C1xxx-R20-40 is a Small Form Factor Pluggable (SFP) LC dual channel optical transceiver. The unit is specially designed to meet SMPTE 297-2006 and to give robust performance when SDI pathological signals are present. DVB-ASI and all SD-, HD- and 3G-SDI signal formats are supported. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range. It is also available with two temperature ranges, standard and extended.

Features

- AutoSFP™ enabled functionality
- Compliant to SMPTE 297-2006
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- 1310nm Fabry-Perot laser
- Typical Link lengths at 2.97Gbps:
  - 0.5 to 250m @ 50µm MMF
  - 0.5 to 250m @ 62.5µm MMF
  - 0.5 to 60km @ 9µm SMF
- Non-MSA Video compliant pinning
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant

Part Number Options

Part Number	Laser wavelength (nm)	Temperature *)
NV30-C1270-R20-40	1270	-5°C to +55°C
NV30-C1290-R20-40	1290	-5°C to +55°C
NV30-C1310-R20-40	1310	-5°C to +55°C
NV30-C1330-R20-40	1330	-5°C to +55°C
NV30-C1350-R20-40	1350	-5°C to +55°C
NV30-C1370-R20-40	1370	-5°C to +55°C
NV30-C1390-R20-40	1390	-5°C to +55°C
NV30-C1410-R20-40	1410	-5°C to +55°C
NV30-C1430-R20-40	1430	-5°C to +55°C
NV30-C1450-R20-40	1450	-5°C to +55°C
NV30-C1470-R20-40	1470	-5°C to +55°C
NV30-C1490-R20-40	1490	-5°C to +55°C
NV30-C1510-R20-40	1510	-5°C to +55°C
NV30-C1530-R20-40	1530	-5°C to +55°C
NV30-C1550-R20-40	1550	-5°C to +55°C
NV30-C1570-R20-40	1570	-5°C to +55°C
NV30-C1590-R20-40	1590	-5°C to +55°C
NV30-C1610-R20-40	1610	-5°C to +55°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.8	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature: • NV30-C1xxx-R20-40	-5		+70	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation			1100	mW
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125μm), Multi Mode compatible			
Light source	DFB laser			
Optical output power	0	+2	+5	dBm
Optical extinction ratio	7.5			dB
Optical center wavelength (λ = 1270nm to 1610nm)	λ-5.5nm	λ	λ+7.5nm	nm
Spectral width (-20dB)		0.2	1	nm
Optical rise/fall time (20-80%)		130	180	ps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125μm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power			0	dBm
Optical receiver sensitivity @ 3Gbps (3G-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-24	-20	dBm
Optical receiver sensitivity @ 1.5Gbps (HD-SDI Checkfield, BER = 10^{-12}, $TX_{EXT} \geq 7dB$)		-25	-24	dBm
Optical receiving window	1260		1620	nm

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ND12-GBE1000 (/E)

Electrical 1000BASE-T Transceiver with AutoSFP™ functionality for Gigabit Ethernet (1.25Gbps)

Data Sheet

Description

The ND12-GBE1000 is a Small Form Factor Pluggable (SFP) 1000BASE-T electrical transceiver. The unit is specially designed to work in a pair with the ND12-T1310-R18-10 to function as a 1000BASE-T/LX Gigabit Ethernet optical media converter. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

The unit offer full-duplex throughput of 1000 Mbps by transporting data over shielded twisted pair category 5 cables with 5-level PAM signals. The module performs the SerDes functions and link speed auto-negotiation needed for optical media conversion.

It is also available with two temperature ranges, standard and extended.

Part Number Options

Part Number	Temperature *)
ND12-GBE1000	-5°C to +55°C
ND12-GBE1000/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB unit.

Features

- AutoSFP™ enabled functionality
- Compliant to IEEE 802.3:2005
- RJ45 with built in transformer
- Link lengths up to 100m per IEEE802.3
- Auto-negotiation per IEEE 802.3:2005 clause 28 (twisted pair) and clause 37 (1000BASE-X)
- Compliant to MSA-SFP pinning specification
- SFF-8472 diagnostic features
- Hot-pluggable
- Pb-free and RoHS compliant
- Available with extended temperature

SGMII

The ND12-GBE1000 supports the Serial Gigabit Media Independent Interface (SGMII). This enables the SFP to handle 10/100/1000BASE-T links while maintaining a 1.25Gbps serial speed on the optical signaling side. The connected host unit must support the SGMII interface to automatically utilize the module 10/100/1000BASE-T functionality. If the host does not support the SGMII, bit rate settings must be performed from the OC-4B-SDI motherboard.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	-0.5	3.6	V
Control input voltage	-0.5	Vcc	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:				
• ND12-GBE1000	-5		+70	°C
• ND12-GBE1000/E	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.46	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supply current			350	mA
Power dissipation			1100	mW
Data rate	10		1250	Mbps

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ND12-T1310-R18-10 (/E)

Optical Transceiver with AutoSFP™ functionality for Gigabit Ethernet (1.25Gbps)

Data Sheet

Description

The ND12-T1310-R18-10 is a Small Form Factor Pluggable (SFP) LC optical transceiver. The unit is specially designed to work in a pair with the ND12-GBE1000 to function as a 1000BASE-T/LX Gigabit Ethernet optical media converter. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range. It is also available with two temperature ranges, standard and extended.

Part Number Options

Part Number	Temperature *)
ND12-T1310-R18-10	-5°C to +55°C
ND12-T1310-R18-10/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB unit.

Features

- AutoSFP™ enabled functionality
- Compliant to IEEE 802.3Z Gigabit Ethernet (1,25Gbps) 1000BASE-LX
- 1310nm Fabry-Perot laser
- Typical Link lengths at 1.25Gbps:
  - 0.5 to 550m @ 50µm MMF
  - 0.5 to 550m @ 62.5µm MMF
  - 0.5 to 10km @ 9µm SMF
- Compliant to MSA-SFP specification
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	-0.5	3.8	V
Control input voltage	-0.5	Vcc+0.5	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:				
• ND12-T1310-R18-10	-10		+70	°C
• ND12-T1310-R18-10/E	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supply current		200	240	mA
Power dissipation		660	830	mW
Data rate			1250	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Light source	Fabry-Perot laser			
Optical output power	-9.5		-3	dBm
Optical extinction ratio	9			dB
TX optical eye mask margin (using filer defined in IEEE 802.3 section 38.6.5)	0	30		%
Optical center wavelength	1270	1310	1355	nm
Optical rise/fall time (20-80%)			260	ps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power			-3	dBm
Optical receiver sensitivity (BER = 10^{-12}, $TX_{EXT} \geq 9dB$)		-19	-18	dBm
Optical receiving window	1270		1355	nm

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ND12-C1xxx-R25-40

Optical CWDM Transceiver with AutoSFP™ functionality for Gigabit Ethernet (1.25Gbps)

Data Sheet

Description

The ND12-C1xxx-R25-40 is a Small Form Factor Pluggable (SFP) LC optical transceiver. The unit is specially designed to work in a pair with the ND12-GBE1000 to function as a 1000BASE-T/ZX Gigabit Ethernet optical media converter. It contains one optical receiver and one DFB CWDM laser providing error-free transmissions with more than 80km of fiber.

The ND12-C1xxx-R25-40 is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

Part Number Options

Part Number	Laser wavelength (nm)	Temperature *)
ND12-C1470-R25-40	1470	0°C to +40°C
ND12-C1490-R25-40	1490	0°C to +40°C
ND12-C1510-R25-40	1510 [1)]	0°C to +40°C
ND12-C1530-R25-40	1530 [1)]	0°C to +40°C
ND12-C1550-R25-40	1550	0°C to +40°C
ND12-C1570-R25-40	1570	0°C to +40°C
ND12-C1590-R25-40	1590	0°C to +40°C
ND12-C1610-R25-40	1610	0°C to +40°C

*) Rated temperature for the complete miniHUB.
1) Unit with best delivery time

Wavelengths 1270nm to 1450nm are also available on request.

Features

- AutoSFP™ enabled functionality
- Compliant to IEEE 802.3ah Gigabit Ethernet (1,25Gbps) 1000BASE-ZX
- Available wavelengths: 1270nm to 1610nm, with 20nm channel spacing
- DFB laser
- Typical Link lengths at 1.25Gbps:
  - 0.5 to 80km @ 9µm SMF
- Compliant to MSA-SFP specification
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+70	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.15	3.3	3.45	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supply current			300	mA
Power dissipation			1000	mW
Data rate		1.063 / 1250	1250	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm)			
Light source	DFB laser			
Optical output power	0	+2	+5	dBm
Optical extinction ratio (filtered)	8.2			dB
Optical center wavelength (λ = 1270nm to 1610nm)	λ-6.0nm	λ	λ+7.5nm	nm
Spectral width (-20dB)			1	nm
Optical rise/fall time (20-80%)			260	ps
TX optical eye mask (filered, measured w/ PRBS 2^{-7}-1)	Compliant with IEEE 802.3ah-2004			

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical receiving window	1270		1610	nm
Optical input overload power	-3			dBm
Optical receiver sensitivity (BER=10^{-12}, $TX_{EXT} \geq$ 9dB)		-28	-25	dBm

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ND12-T1xx0-R20-BiDi (/E)

Optical Transceiver with WDM BiDi and AutoSFP™ functionality for Gigabit Ethernet (1.25Gbps)

Data Sheet

Description

The ND12-T1xx0-R20-BiDi is a Small Form Factor Pluggable (SFP) LC optical transceiver. The unit is specially designed to work in a pair with the ND12-GBE1000 to function as a 1000BASE-T/LX Gigabit Ethernet optical media converter. It is designed with a built-in WDM filter (BiDi) and is available with 1310nm and 1550nm laser. The ND12-T1310-R20-BiDi and ND12-T1550-R20-BiDi must be used in pairs with TX=1310nm / RX=1550nm and TX=1550nm / RX=1310nm.

The ND12-T1xx0-R20-BiDi is made with AutoSFP™ enabled functionality to fit the miniHUB product range. It is also available with two temperature ranges, standard and extended.

Part Number Options

Part Number	Temperature *)
ND12-T1310-R20-BiDi	-5°C to +55°C
ND12-T1550-R20-BiDi	-5°C to +55°C
ND12-T1310-R20-BiDi/E	-40°C to +65°C
ND12-T1550-R20-BiDi/E	-40°C to +65°C

*) Rated temperature for the complete miniHUB unit.

Features

- AutoSFP™ enabled functionality
- Built-in WDM filter (BiDi)
- Compliant to IEEE 802.3Z Gigabit Ethernet (1,25Gbps) 1000BASE-LX
- Laser types:
  - 1310nm: Fabry-Perot laser
  - 1550nm: DFB laser
- Typical Link lengths at 1.25Gbps:
  - 0.5 to 20km @ 9µm SMF
- Compliant to MSA-SFP specification
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant
- Available with extended temperature

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	-0.5	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:				
• ND12-T1xx0-R20-BiDi	-5		+70	°C
• ND12-T1xx0-R20-BiDi /E	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.15	3.3	3.45	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supply current			300	mA
Power dissipation			1035	mW
Data rate			1250	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm)			
Light source	1) = 1310nm Fabry-Perot laser, 2) = 1550nm DFB laser			
Optical output power *1), 2)	-8		-3	dBm
Optical extinction ratio *1), 2)	8			dB
Optical center wavelength *1)	1260	1310	1360	nm
Spectral line width (RMS) *1)			4	nm
Optical center wavelength *2)	1480	1550	1580	nm
Spectral width (-20dB) *2)			1	nm
Optical rise/fall time (20-80%)			260	ps
TX optical eye mask (filered, measured with PRBS 2^{-7}-1)	Compliant with IEEE 802.3z *1) Compliant with IEEE 802.3ah-2004 *2)			

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm)			
Receiver technology	PIN			
Receiver center wavelengths	1) = 1310nm, 2) = 1550nm			
Optical input overload power *1), 2)	-3			dBm
Optical receiver sensitivity ($BER=10^{-12}$, $TX_{EXT} \geq 9dB$) *1), 2)		-22	-20	dBm
Optical receiving window *1)	1260	1310	1360	nm
Optical receiving window *2)	1500	1550	1580	nm

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ND01-T1300-R30-MM

Optical Transceiver with AutoSFP™ functionality for MADI Multi Mode

Data Sheet

Description

The ND01-T1300-R30-MM is a Small Form Factor Pluggable (SFP) LC optical transceiver. The unit is specially designed to work in a pair with the ND12-Cxxxx-R25-40 to function as a MADI Multi Mode to Single Mode CWDM transponder. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

Part Number Options

Part Number	Temperature *)
ND01-T1300-R30-MM	-40°C to +65°C

*) Rated temperature for the complete miniHUB unit.

Features

- AutoSFP™ enabled functionality
- Compliant to the MADI multimode standard
- Operates with 62.5/125 µm and 50/125 µm multimode fiber
- 1300nm LED laser
- Compliant to MSA-SFP specification
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	-0.5	3.63	V
Control input voltage	-0.5	Vcc+0.5	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature: • ND12-T1310-R18-10	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.47	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supply current		200	240	mA
Power dissipation		660	830	mW
Data rate			1250	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Multimode 50/125µm and 62.5/125µm			
Light source	1300nm InGaAsP LED			
Optical output power	-19	-15.7	-14	dBm
Optical center wavelength	1270	1308	1380	nm
Optical rise/fall time (20-80%)			3	ns

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power			-14	dBm
Optical receiver sensitivity (BER = 10^{-12}, $TX_{EXT} \geq 9dB$)		-31	-30	dBm
Optical receiving window	1270		1380	nm

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NV03-COMP-2-IN

Composite to SD-SDI Decoder for PAL/NTSC with AutoSFP™ functionality

Data Sheet

Description

The NV03-COMP-2-IN is a Small Form Factor Pluggable (SFP) Composite to SD-SDI Decoder. The unit is specially designed to convert PAL/NTSC analog video signals into SD-SDI. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

The unit offers 2 independent 10-bit video decoders enabling systems with mixed analog and digital signal support.

When using the NV03-COMP-2-IN with miniHUB, full legacy support for PAL/NTSC will be accieved. Later upgrade to digital SDI video is already in place by just unplugging this module.

Features

- AutoSFP™ enabled functionality
- SMPTE-259M-C compliant
- Supported standards:
  - NTSC M, NTSC J, NTSC 4.43
  - PAL B/G/H/I/D, PAL M, PAL N, PAL 60
- 10 bit video decoders
- 4x signal oversampling (54MHz)
- HD-BNC connectors (75ohm)
- Hot-pluggable
- Pb-free and RoHS compliant

Part Number Options

Part Number	Temperature *)
NV03-COMP-2-IN	0°C to +40°C

*) Rated temperature for the complete miniHUB unit.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Case operating temperature:	0	+65	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature	0		+65	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.46	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation		1027	1478	mW
Serial Data rate		270		Mbps

Analog Video Input Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of inputs (# of converters)		2		
Connector type		HD-BNC (Amphenol)		
Connector impedance		75 ohm		
Output resolution		10		bits
Sampling frequency		54		MHz
Video Luminance Bandwidth		5.5		MHz
Video Chrominance Bandwidth		1		MHz
Luminance Nonlinearity		1.0		%
Differential Gain		1.0		%
Differential Phase		1.0		°
Signal to Noise Ratio		59		dB

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NV03-COMP-2-OUT

SD-SDI to Composite Encoder for PAL/NTSC with AutoSFP™ functionality

Data Sheet

Description

The NV03-COMP-2-OUT is a Small Form Factor Pluggable (SFP) SD-SDI to Composite Encoder. The unit is specially designed to convert SD-SDI signals into PAL/NTSC analog video. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

The unit offers 2 independent 10-bit video encoders enabling systems with mixed analog and digital signal support.

When using the NV03-COMP-2-OUT with miniHUB, full legacy support for PAL/NTSC will be accieved. Later upgrade to digital SDI video is already in place by just unplugging this module.

Features

- AutoSFP™ enabled functionality
- SMPTE-259M-C compliant
- Supported standards:
  - NTSC M, NTSC J, NTSC 4.43
  - PAL B/G/H/I/D, PAL M, PAL N, PAL 60
- 10 bit video encoders
- 16x signal oversampling (216MHz)
- HD-BNC connectors (75ohm)
- Hot-pluggable
- Pb-free and RoHS compliant

Part Number Options

Part Number	Temperature *)
NV03-COMP-2-OUT	0°C to +40°C

*) Rated temperature for the complete miniHUB unit.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Case operating temperature:	0	+65	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+65	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.14	3.3	3.46	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation		934	1226	mW
Serial Data rate		270		Mbps

Analog Video Output Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of outputs (# of converters)	2			
Connector type	HD-BNC (Amphenol)			
Connector impedance	75 ohm			
Output resolution		10		bits
Sampling frequency		216		MHz
Luminance Nonlinearity		±0.5		%
Differential Gain		0.5		%
Differential Phase		0.5		°
Signal to Noise Ratio (Luma Ramp)		58		dB
Signal to Noise Ratio (Flat field, full bandwidth)		75		dB

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NV30-HDMI-OUT

SD-/HD-/3G-SDI to HDMI Converter with no scaling artifacts and AutoSFP™ functionality

Data Sheet

Description

The NV30-HDMI-OUT is a Small Form Factor Pluggable (SFP) SDI to HDMI converter. The unit is specially designed to convert SD-SDI, HD-SDI and 3G-SDI signals into an HDMI output with no scaling artifacts. It is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

The unit offers embedding of audio. Up to 8 channels of audio is supported and embedded in the HDMI signal.

Part Number Options

Part Number	Temperature *)
NV30-HDMI-OUT	-5°C to +55°C
ADAPTER CABLE HDMI/D-HDMI/J	

*) Rated temperature for the complete miniHUB unit.

Features

- AutoSFP™ enabled functionality
- Compliant to:
  - SMPTE-424M
  - SMPTE-292M
  - SMPTE-259M-C compliant
  - SMPTE 425A (Mapping 1)
  - SMPTE 425B (372M Mapping)
- Supported standards:
  - 525/625 (50/ 59.94/60 Hz)
  - 720p/1080i (50/ 59.94/60 Hz)
  - 1080p (23.98/24/25/29.97/30/50/ 59.94/60 Hz)
- Up to 8 channels of audio embedding
- HDMI 1.4 type D connector
- HDMI type D plug with locking mechanism available
- Hot-pluggable
- Pb-free and RoHS compliant

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Case operating temperature:	-20	+80	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	-20		+80	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.13	3.3	3.46	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Power dissipation		1032	1326	mW
Serial Data rate	270	270/1485/2970	2970	Mbps

HDMI Output Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of outputs (# of converters)	1			
Connector type	HDMI 1.4 type D			
TMDS output clock frequency	20		150	MHz
TMDS Output Clock Duty Cycle	48		52	%
TMDS Differential Swing	800	1000	1200	mV
TMDS Rise/Fall Time	75	175		ps
Maximum Output current	55			mA
Output Voltage	4.8	5.05	5.3	V
Output resolution (Full RGB range)			24	bit

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04 Optical Multiplexers & Spliters

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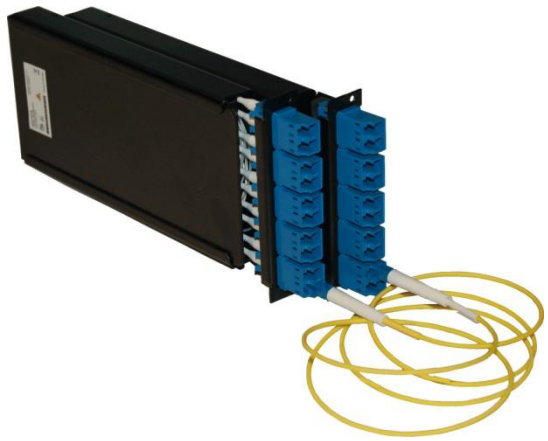
CWDM-8E-1xxx-1xxx

8 and 16 Channel CWDM Filter/Mux with Express port for Video and Data applications

Data Sheet



Description

The CWDM-8E-1xxx-1xxx are passive CWDM MUX/DMUX filters that fit with the miniHUB frame.

Each CWDM filter has 10 ports, 8 ports for accepting the CWDM wavelengths and a common port that combines the 8 channels for feeding to and from your fiber network. These filters also have an EXPRESS port which allows these units to be cascaded into a larger 16 channel CWDM system.

These filters use the LC/PC fiber connectors that are preferred by SMPTE

With two of these filters you can obtain a 16 channel CWDM system in a 1 rack unit miniHUB frame, that's compact.

These filters are shipped in pairs of one MUX and one DMUX.

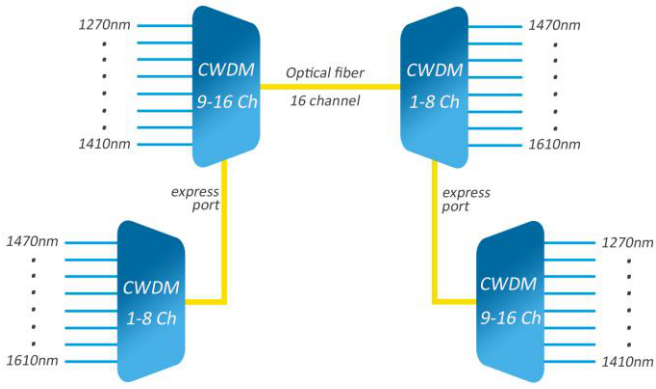
Features

- Up to 16 channels per fiber
- Easy upgrade from 8 to 16 channels
- Express port can be used for +1 channel communication (1310nm or 1550nm)
- Compliant to SMPTE 297-2006
- Compliant to ITU-T G.694.2
- High isolation allowing bi-directional traffic
- LC/UPC connector

Part Number Options

Part Number	Channel wavelengths (nm)	Temperature *)
CWDM-8E-1270-1410	1270 ~ 1410	0°C to +40°C
CWDM-8E-1470-1610	1470 ~ 1610	0°C to +40°C

*) Rated temperature for the complete miniHUB.



Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+70	°C
Relative Humidity (non-condensing)	5		90	%

Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of Channels	8 + Common + Express (16 when using 2 filters with express connection)			
Operating Center Wavelenth				
CWDM-8E-1270-1410:	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410			nm
CWDM-8E-1470-1610:	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610			nm
Channel Spacing	20			nm
Insertion Loss			2.7	dB
Express Port Insertion Loss			2.7	dB
Channel Ripple			0.3	dB
Isolation, Adjacent Channel	30			dB
Isolation, Non-Adjacent Channel	40			dB
Polarization Dependant Loss			0.2	dB
Polarization Mode Dispersion			0.2	ps
Connector	LC/UPC			
Transmitting circuit fiber	Single Mode (9/125µm) of type SMF-28e			

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CWDM-8M[E]-1xxx-1xxx

8 and 16 Channel Multi Mode CWDM Filter/Mux for Video and Data applications

Data Sheet

Description

The CWDM-8M[E]-1xxx-1xxx and are Multi Mode passive CWDM MUX/DMUX filters that fit with the miniHUB frame.

Each CWDM filter has 8 ports for accepting the CWDM wavelengths and a common port that combines the 8 channels for feeding to and from your fiber network. The CWDM-8ME-1270-1410 filter also has an EXPRESS port which allows these units to be cascaded into a larger 16 channel CWDM system.

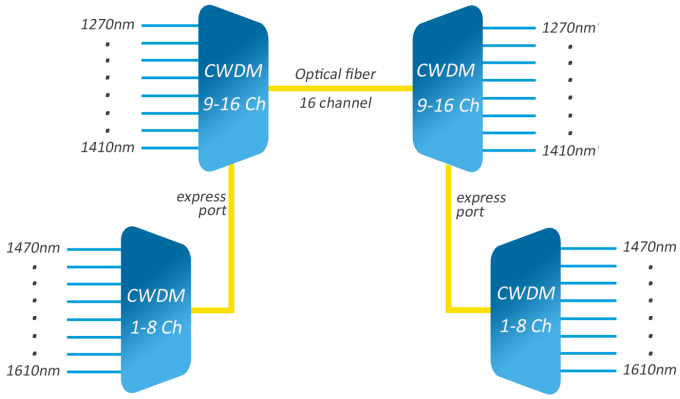
These filters use the LC/PC fiber connectors that are preferred by SMPTE

With two of these filters you can obtain a 16 channel CWDM system in a 1 rack unit miniHUB frame, that's compact.

These filters are shipped in pairs of one MUX and one DMUX.

Features

- Accepts Multi Mode fiber
- Up to 16 channels per fiber
- Easy upgrade from 8 to 16 channels
- Compliant to SMPTE 297-2006
- Compliant to ITU-T G.694.2
- High isolation allowing bi-directional traffic
- LC/PC Multi Mode connector



Part Number Options

Part Number	Channel wavelengths (nm)	Temperature *)
CWDM-8ME-1270-1410	1270 ~ 1410	0°C to +40°C
CWDM-8M-1470-1610	1470 ~ 1610	0°C to +40°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+70	°C
Relative Humidity (non-condensing)	5		90	%

Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of Channels	8 (16 when using 2 filters with express connection)			
Operating Center Wavelenth				
CWDM-8ME-1270-1410:	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, EXP			nm
CWDM-8M-1470-1610:	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610			nm
Channel Spacing	20			nm
Insertion Loss			3.2	dB
Express Port Insertion Loss				dB
Isolation, Adjacent Channel	30			dB
Isolation, Non-Adjacent Channel	40			dB
Connector	LC/PC Multi Mode			
Transmitting circuit fiber	Multi Mode (50/125µm)			

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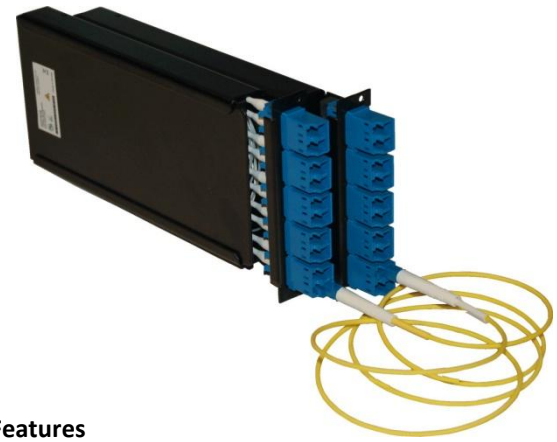
CWDM-8ULE-1xxx-1xxx

Ultra Low Loss 8 and 16 Channel CWDM Filter/Mux with Express port for Video and Data applications

Data Sheet



Description

The CWDM-8ULE-1xxx-1xxx are Ultra Low Loss passive CWDM MUX/DMUX filters that fit with the miniHUB frame.

Each CWDM filter has 10 ports, 8 ports for accepting the CWDM wavelengths and a common port that combines the 8 channels for feeding to and from your fiber network. These filters also have an EXPRESS port which allows these units to be cascaded into a larger 16 channel CWDM system.

These filters use the LC/PC fiber connectors that are preferred by SMPTE

With two of these filters you can obtain a 16 channel CWDM system in a 1 rack unit miniHUB frame, that's compact.

These filters are shipped in pairs of one MUX and one DMUX.

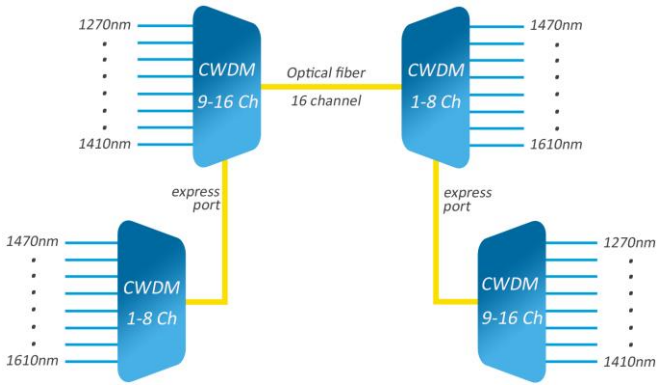
Part Number Options

Part Number	Channel wavelengths (nm)	Temperature *)
CWDM-8ULE-1270-1410	1270 ~ 1410	0°C to +40°C
CWDM-8ULE-1470-1610	1470 ~ 1610	0°C to +40°C

*) Rated temperature for the complete miniHUB.

Features

- Ultra Low Loss performance with max 2.6dB loss end to end on an 8 channel system
- Ultra Low Loss performance with max 4.9dB loss end to end on a 16 channel system
- Up to 16 channels per fiber
- Easy upgrade from 8 to 16 channels
- Express port can be used for +1 channel communication (1310nm or 1550nm)
- Compliant to SMPTE 297-2006
- Compliant to ITU-T G.694.2
- High isolation allowing bi-directional traffic
- LC/UPC connector



Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	-10		+65	°C
Relative Humidity (non-condensing)	5		90	%

Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of Channels	8 + Common + Express (16 when using 2 filters with express connection)			
Operating Center Wavelenth				
CWDM-8ULE-1270-1410:	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410			nm
CWDM-8ULE-1470-1610:	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610			nm
Channel Spacing	20			nm
Insertion Loss, CWDM Pass Channels (including connector loss)				nm
CWDM-8ULE-1270-1410:			1.8	dB
CWDM-8ULE-1470-1610:			1.3	dB
Insertion Loss, Express Port (including connector loss)				nm
CWDM-8ULE-1270-1410:			1.8	dB
CWDM-8ULE-1470-1610:			1.3	dB
Channel Ripple			0.5	dB
Isolation, Adjacent Channel	30			dB
Isolation, Non-Adjacent Channel	45			dB
Isolation, Express Port	15			dB
Polarization Dependant Loss			0.2	dB
Polarization Mode Dispersion			0.2	ps
Directivity	50			dB
Return Loss	45			dB
Connector	LC/UPC			
Transmitting circuit fiber	Single Mode (9/125µm) of type SMF-28e			

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CWDM-18-1270-1610

18 Channel CWDM Filter/Mux for Video and Data applications

Data Sheet

Description

The CWDM-18-1270-1610 is a passive CWDM MUX / DMUX filter that fit with the miniHUB frame.

Each CWDM filter has 19 ports, 18 ports for accepting the CWDM wavelengths and a common port that combines the 18 channels for feeding to and from your fiber network.

These filters use the LC/PC fiber connectors that are preferred by SMPTE

These filters are shipped in pairs of one MUX and one DMUX.

Features

- Low Loss performance with max 6.2dB loss end to end for all the 18 channels
- Up to 18 channels per fiber
- Compliant to SMPTE 297-2006
- Compliant to ITU-T G.694.2
- High isolation allowing bi-directional traffic
- LC/UPC connector

Part Number Options

Part Number	Channel wavelengths (nm)	Temperature *)
CWDM-18-1270-1610	1270 ~ 1610	0°C to +40°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature	0		+70	°C
Relative Humidity (non-condensing)	5		90	%

Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of Channels	18 + Common			
Operating Center Wavelenth	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610			nm
Channel Spacing	20			nm
Insertion Loss (including connectors)			3.1	dB
Channel Ripple			0.5	dB
Isolation, Adjacent Channel	30			dB
Isolation, Non-Adjacent Channel	40			dB
Directivity	50			dB
Polarization Dependant Loss			0.2	dB
Polarization Mode Dispersion			0.1	ps
Return Loss	45			dB
Connector	LC/UPC			
Transmitting circuit fiber	Single Mode (9/125µm) of type SMF-28e			

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DWDM-40-x-CH20-CH59

40 Channel DWDM Filter/Mux for Video and Data applications

Data Sheet

Description

The DWDM-40-x-CH20-CH59 is a passive DWDM MUX / DMUX filter mounted in a 1RU frame for use with the miniHUB system.

Each DWDM filter has 41 ports, 40 ports for accepting the DWDM wavelengths and a common port that combines the 40 channels for feeding to and from your fiber network.

These filters use the LC/PC fiber connectors that are preferred by SMPTE

These filters should be used in pairs of one MUX and one DMUX. DWDM-40-A-CH20-CH59 is the multiplexer and DWDM-40-B-CH20-CH59 is the demultiplexer.

Features

- Up to 40 channels per fiber
- Compliant to SMPTE 297-2006
- Compliant to ITU-T G.694.1
- High isolation allowing bi-directional traffic
- LC/UPC connector

Part Number Options

Part Number	Channel	Temperature *)
DWDM-40-A-CH20-CH59 DWDM-40-B-CH20-CH59	CH20 ~ CH59 CH20 ~ CH59	0°C to +40°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature	0		+70	°C
Relative Humidity (non-condensing)	5		90	%

Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of Channels	40 + Common			
Operating Center Wavelenth	1520 to 1568 (CH20-CH59)			nm
Channel Spacing		100		GHz
Insertion Loss (including connectors)			6	dB
Channel Ripple			0.5	dB
Isolation, Adjacent Channel	30			dB
Isolation, Non-Adjacent Channel	45			dB
Directivity	50			dB
Polarization Dependant Loss			0.25	dB
Polarization Mode Dispersion			0.15	ps
Return Loss	45			dB
Connector		LC/UPC		
Transmitting circuit fiber	Single Mode (9/125µm) of type SMF-28e			

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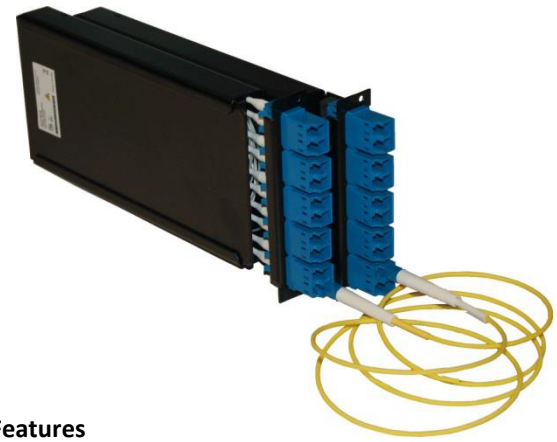
OS-x-xx-x

2 and 4 way Optical Splitters for Video and Data distribution applications

Data Sheet



Description

The OS-x-xx-x are passive optical splitters that fit into the miniHUB frame system. These are mainly used for passive optical signal distribution and fiber redundancy applications.

You can install 2 packages into the miniHUB-2RU-4-2 or 10 packages into the miniHUB-2RU-0-10 passive frame.

The units are available with 1:2 or 1:4 split ratio.

The OS-2-xx-3 packages include 3 x 2 way splitters, and the OS-4-25-2 package includes 2 x 4 way splitters. The OS-2-50-1 is also available with 1 x 2 way splitter.

These filters use the LC/PC fiber connectors that are preferred by SMPTE

Part Number Options

Part Number	Split ratio	Temperature *)
OS-2-50-1	50/50	-40°C to +65°C
OS-2-50-3	50/50	-40°C to +65°C
OS-2-60-3	60/40	-40°C to +65°C
OS-2-70-3	70/30	-40°C to +65°C
OS-2-80-3	80/20	-40°C to +65°C
OS-2-90-3	90/10	-40°C to +65°C
OS-2-50-70-90-3	50/50 70/30 90/10	-40°C to +65°C
OS-4-25-2	25/25/25/25	-40°C to +65°C

*) Rated temperature for the complete miniHUB.

Features

- 1:2 and 1:4 split ratios
- Low insertion loss
- Fits Single Channel, WDM and CWDM applications
- High density with up to 3 splitters per package
- Compliant to SMPTE 297-2006
- Allows bi-directional traffic
- LC/UPC connector

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	-40		+85	°C
Relative Humidity (non-condensing)	5		90	%

Optical Characteristics

Parameter		Minimum	Typical	Maximum	Unit
Split ratio		1:2 and 1:4			
Operating Wavelenth		1260 - 1620			nm
Insertion Loss					dB
OS-2-90-3:	3x 1:2 – 90/10			11.1 / 0.7	dB
OS-2-80-3:	3x 1:2 – 80/20			7.8 / 1.25	dB
OS-2-70-3:	3x 1:2 – 70/30			5.9 / 2.05	dB
OS-2-60-3:	3x 1:2 – 60/40			4.6 / 2.75	dB
OS-2-50-1:	1x 1:2 – 50/50			3.6	dB
OS-2-50-3:	3x 1:2 – 50/50			3.6	dB
OS-2-50-70-90-3:	3x 1:2 – 1x 50/50			3.6 / 3.6	dB
	+ 1x 70/30			5.9 / 2.05	dB
	+ 1x 90/10			11.1 / 0.7	dB
OS-4-25-2:	1:4 – 25/25/25/25			8.0	dB
Directivity		50			dB
Connector		LC/UPC			
Transmitting circuit fiber		Single Mode (9/125µm)			

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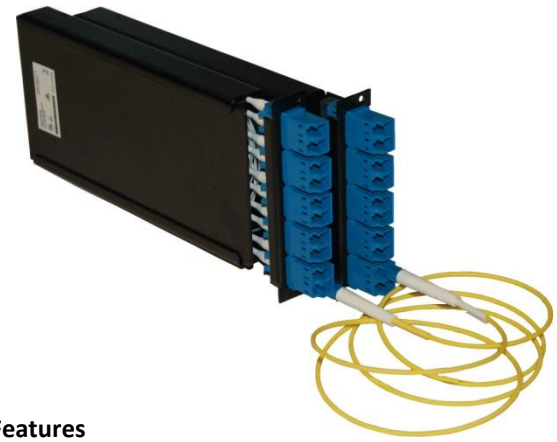
WDM-2-1310-1550-x

2 channel WDM Filter/Mux package for Video and Data applications

Data Sheet



Description

The WDM-2-1310-1550-x are passive 2 channel WDM MUX/DMUX filters that fit with the miniHUB frame system.

You can install 2 packages into the miniHUB-2RU-4-2 or 10 packages into the miniHUB-2RU-0-10 passive frame.

Each WDM filter has 3 ports, 2 ports for accepting the WDM wavelengths and a common port that combines the 2 channels for feeding to and from your fiber network. The WDM uses 1310nm + 1550nm, and any standard F-P and DFP lasers with those wavelengths can be used.

These filters are available with 1, 2 or 3 WDM units per package.

These filters use the LC/PC fiber connectors that are preferred by SMPTE

Features

- 2 channels per fiber
- Compatible to any F-P or DFB laser of correct wavelength
- Wide bandwidth with high adjacent channel isolation
- High density with up to 3 filters per package
- Compliant to SMPTE 297-2006
- Compliant to ITU-T G.694.2
- Allows bi-directional traffic
- LC/UPC connector

Part Number Options

Part Number	WDM units per package	Temperature *)
WDM-1310-1550-1	1	-5°C to +55°C
WDM-1310-1550-2	2	-5°C to +55°C
WDM-1310-1550-3	3	-5°C to +55°C

*) Rated temperature for the complete miniHUB.

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+70	°C
Relative Humidity (non-condensing)	5		90	%

Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Number of Channels	2 + Common			
Operating Center Wavelenth	1310, 1550			nm
Optical pass band	1260-1360 / 1460-1620			nm
Insertion Loss (including connectors)			1.5	dB
Isolation, Adjacent Channel	30			dB
Connector	LC/UPC			
Transmitting circuit fiber	Single Mode (9/125µm)			

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05 Hubbox - small optics

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HubBox HB-DMB-4AA

3G-/HD-/SD-SDI Dual stereo analogue audio de-embedder

Data Sheet

Description

The HubBox 3G-HD-SD dual stereo analogue audio de-embedder extracts two balanced stereo analogue audio pairs from any group in the ancillary data space of an SDI signal and provides broadcast quality analogue audio outputs. Audio conversion employs high quality 24-bit DACs. Adjustable full scale output levels meet all international standards. Units can be cascaded to enable de-embedding from all four available groups (16 audio channels). The unit automatically detects whether the SDI input is 3G, HD or 270Mb/s SD SDI. There is automatic input cable equalisation and two re-clocked SDI outputs are provided.

The HubBox is perfect for using with the miniHUB system where one or two signals are required remotely.

Features

- Automatic 3G, HD, or SD SDI standard detection
- Extracts two balanced analogue audio stereo pairs from any group
- High quality 24 bit audio DAC
- Adjustable full scale output levels to meet all international standards
- LEDs show group status and input signal presence
- Automatic input cable equalisation
- 2 re-clocked SDI outputs
- Locking connector for power supply
- Optional XLR breakout cable

Part Number Options

Part Number	Temperature
HB-DMB-4AA	0°C to +40°C

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	80	%

General Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating temperature	0		+40	°C
Supply voltage (Vcc)	6		12	V
Power consumption			5	W

General Operating Conditions (continued)

Parameter	
Dimensions	63.5mm x 84mm x 30mm (excluding connectors)
Weight	200g
Control	6 way DIP switch
LEDs	Power, input presence and audio group status

Electrical Video Characteristics

Parameter	
Supported standards: SMPTE	299M and 272M-C 259M-C (270Mbps), 625i 50, 525i 59.94 292M (1.485 & 1.435Gbps) • 1080i 60/59.94/50 • 1080p/psf 30/29.97/25/24/23.98 • 720p 60/59.94/50/30/29.97/25/24/23.98 424M & 425-AB (2.97 & 2.967), 1080p 50/59.94/60
Number of inputs	1
Number of outputs	2
Typical input cable length equalization	Up to 100m of Belden 1694A @ 2.97Gbps Up to 160m of Belden 1694A @1.485Gbps Up to 200m of Belden 1694A @270Mbps
Output signal level	800mVp-p ±10%
Jitter	<0.2UI p-p
Connectors	BNC
Impedance	75ohm
Return loss	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]

Electrical Audio Characteristics

Parameter	
Inputs	Balanced analogue audio, 2 stereo pairs
Connector	Female 15pin D-SUB (optional XLR breakout cable)
Output impedance	<50 Ohm
Output level	Adjustable 0dBFS = +12 to +26dBu
Maximum level	+24dBu with 10kOhm load
Quantisation	24 bit

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HubBox HB-EMB-4AA

3G-/HD-/SD-SDI Dual stereo analogue audio embedder

Data Sheet

Description

The HubBox 3G-HD-SD analogue audio embedder inserts two balanced stereo analogue audio pairs into any group in the ancillary data space of an SDI signal.

The unit automatically detects whether the SDI input is 3G, HD or 270Mb/s SD SDI. Audio conversion employs high quality 24-bit DACs. Adjustable full scale input levels meet all international standards. There is automatic input cable equalisation and two re-clocked SDI outputs are provided.

Units can be cascaded to enable embedding into all four available groups. The HubBox is perfect for using with the miniHUB system where one or two signals are required remotely.

Features

- Automatic 3G, HD, or SD SDI standard detection
- Insert two balanced analogue audio stereo pairs from any group
- Replaces or adds to existing audio
- High quality 24 bit audio ADC
- Adjustable full scale output levels to meet all international standards
- LEDs show group status and input signal presence
- Automatic input cable equalisation
- 2 re-clocked SDI outputs
- Locking connector for power supply
- Optional XLR breakout cable

Part Number Options

Part Number	Temperature
HB-EMB-4AA	0°C to +40°C

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	80	%

General Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating temperature	0		+40	°C
Supply voltage (Vcc)	6		12	V
Power consumtion			5	W

General Operating Conditions (continued)

Parameter	
Dimensions	63.5mm x 84mm x 30mm (excluding connectors)
Weight	175g
Control	6 way DIP switch
LEDs	Power, input presence and audio group status

Electrical Video Characteristics

Parameter	
Supported standards: SMPTE	299M and 272M-C 259M-C (270Mbps), 625i 50, 525i 59.94 292M (1.485 & 1.435Gbps) • 1080i 60/59.94/50 • 1080p/psf 30/29.97/25/24/23.98 • 720p 60/59.94/50/30/29.97/25/24/23.98 424M & 425-AB (2.97 & 2.967), 1080p 50/59.94/60
Number of inputs	1
Number of outputs	2
Typical input cable length equalization	Up to 100m of Belden 1694A @ 2.97Gbps Up to 160m of Belden 1694A @1.485Gbps Up to 200m of Belden 1694A @270Mbps
Output signal level	800mVp-p ±10%
Jitter	<0.2UI p-p
Connectors	BNC
Impedance	75ohm
Return loss	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]

Electrical Audio Characteristics

Parameter	
Inputs	Balanced analogue audio, 2 stereo pairs
Connector	Female 15pin D-SUB (optional XLR breakout cable)
Impedance	>20kOhm
Input level	Adjustable 0dBFS = +12 to +26dBu
Maximum level	+24dBu
Quantisation	24 bit
Noise floor	<-90dB (A weighted)
Distortion	<0.002% (20Hz-20kHz)
Frequency response	±0.2dB (20Hz-20kHz)
Crosstalk	<-90dB (20Hz-20kHz)

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HubBox HB-R20

Single Channel 3G-/HD-/SD-SDI Optical Receiver for SMPTE 297-2006 Video applications

Data Sheet

Description

Single Optical Fiber to SDI converter supports 3G-/HD-/SD-SDI and DVB/ASI. Support data rates from 50Mbps to 3Gbps.

It is housed in an extremely compact and rugged aluminium case ideally suited to both studio and portable applications.

The HubBox is perfect for using with the miniHUB system where one or two signals are required remotely.

Part Number Options

Part Number	Temperature
HB-R20	0°C to +40°C

Features

- Multi-rate reclocking with automatic rate detection and automatic bypass for non SDI data rates
- LEDs display power and SDI lock status
- Locking DC jack
- Optical output on LC/PC connector
- Provides reclocked SDI outputs
- PIN receiver technology
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- Use in conjunction with another HB-T1310 or the miniHUB system for a complete fibre transmit/receive system

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	80	%

General Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating temperature	0		+40	°C
Supply voltage (Vcc)	6		12	V
Dimensions	63.5mm x 84mm x 30mm (excluding connectors)			
Weight	145g			

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supported standards:				
• SMPTE	292M-2008, 259M-2008, 297M-2006, 424M-2006			
• DVBASI	EN50083-9			
• Laser safety	Class 1 21CFR and IEC60825-1			
Number of outputs	1			
Output signal level	800mVp-p ±10%			
Connectors	BNC			
Impedance	75ohm			
Return loss	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]			
LED Indicators	Power and SDI lock			
Data rate	50		3000	Mbps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power	-3			dBm
Optical receiver sensitivity @ 3Gbps (3G-SDI Checkfield, BER = 10^{-12}, TX_{EXT} ≥ 7dB)		-19	-17	dBm
Optical receiver sensitivity @ 1.5Gbps (HD-SDI Checkfield, BER = 10^{-12}, TX_{EXT} ≥ 7dB)		-19	-17	dBm
Optical receiving window	1260		1620	nm

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HubBox HB-R20-R20

Dual Channel 3G-/HD-/SD-SDI Optical Receiver for SMPTE 297-2006 Video applications

Data Sheet

Description

Dual Optical Fiber to SDI converter supports 3G-/HD-/SD-SDI and DVB/ASI. Support data rates from 50Mbps to 3Gbps.

It is housed in an extremely compact and rugged aluminium case ideally suited to both studio and portable applications.

The HubBox is perfect for using with the miniHUB system where one or two signals are required remotely.

Part Number Options

Part Number	Temperature
HB-R20-R20	0°C to +40°C

Features

- Multi-rate reclocking with automatic rate detection and automatic bypass for non SDI data rates
- LEDs display power and SDI lock status
- Locking DC jack
- Optical output on LC/PC connector
- Provides reclocked SDI outputs
- PIN receiver technology
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- Use in conjunction with another HB-T1310-T1310 or the miniHUB system for a complete fibre transmit / receive system

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	80	%

General Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating temperature	0		+40	°C
Supply voltage (Vcc)	6		12	V
Dimensions	63.5mm x 84mm x 30mm (excluding connectors)			
Weight	145g			

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supported standards:				
• SMPTE	292M-2008, 259M-2008, 297M-2006, 424M-2006			
• DVBASI	EN50083-9			
• Laser safety	Class 1 21CFR and IEC60825-1			
Number of outputs	2			
Output signal level	800mVp-p ±10%			
Connectors	BNC			
Impedance	75ohm			
Return loss	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]			
LED Indicators	Power and SDI lock			
Data rate	50		3000	Mbps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power	-3			dBm
Optical receiver sensitivity @ 3Gbps (3G-SDI Checkfield, BER = 10^{-12}, TX_{EXT} ≥ 7dB)		-19	-17	dBm
Optical receiver sensitivity @ 1.5Gbps (HD-SDI Checkfield, BER = 10^{-12}, TX_{EXT} ≥ 7dB)		-19	-17	dBm
Optical receiving window	1260		1620	nm

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norwia

HubBox HB-T1310

Single Channel 3G-/HD-/SD-SDI Optical Transmitter for SMPTE 297-2006 Video applications

Data Sheet

Description

Single SDI to Optical Fiber converter supports 3G-/HD-/SD-SDI and DVB/ASI. Support data rates from 50Mbps to 3Gbps.

It is housed in an extremely compact and rugged aluminium case ideally suited to both studio and portable applications.

The HubBox is perfect for using with the miniHUB system where one or two signals are required remotely.

Part Number Options

Part Number	Temperature
HB-T1310	0°C to +40°C

Features

- Multi-rate reclocking with automatic rate detection and automatic bypass for non SDI data rates
- Automatic Cable Equalisation
- LEDs display power and SDI lock status
- Locking DC jack
- Optical output on LC/PC connector
- Provides reclocked loop-through SDI output
- Delivered with 1310nm Fabry-Perot laser
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- Use in conjunction with HB-R20 or the miniHUB system for a complete fibre transmit/receive system

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	80	%

General Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating temperature	0		+40	°C
Supply voltage (Vcc)	6		12	V
Dimensions	63.5mm x 84mm x 30mm (excluding connectors)			
Weight	145g			

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supported standards:				
• SMPTE	292M-2008, 259M-2008, 297M-2006, 424M-2006			
• DVBASI	EN50083-9			
• Laser safety	Class 1 21CFR and IEC60825-1			
Number of inputs	1			
Number of outputs	1 active loop through			
Typical input cable length equalization	Up to 140m of Belden 1694A @ 2.97Gbps Up to 200m of Belden 1694A @1.485Gbps Up to 400m of Belden 1694A @270Mbps			
Output signal level	800mVp-p ±10%			
Connectors	BNC			
Impedance	75ohm			
Return loss	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]			
LED Indicators	Power and SDI lock			
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Light source	Fabry-Perot laser			
Optical output power	-6	-2	0	dBm
Optical extinction ratio	5			dB
Optical center wavelength	1290	1310	1330	nm
Spectral line width		1.5	3	nm
Optical rise/fall time (20-80%)		115	135	ps

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HubBox HB-T1310-T1310

Dual Channel 3G-/HD-/SD-SDI Optical Transmitter for SMPTE 297-2006 Video applications

Data Sheet

Description

Dual SDI to Optical Fiber converter supports 3G-/HD-/SD-SDI and DVB/ASI. Support data rates from 50Mbps to 3Gbps.

It is housed in an extremely compact and rugged aluminium case ideally suited to both studio and portable applications.

The HubBox is perfect for using with the miniHUB system where one or two signals are required remotely.

Part Number Options

Part Number	Temperature
HB-T1310-T1310	0°C to +40°C

Features

- Multi-rate reclocking with automatic rate detection and automatic bypass for non SDI data rates
- Automatic Cable Equalisation
- LEDs display power and SDI lock status
- Locking DC jack
- Optical output on LC/PC connector
- Provides reclocked loop-through SDI output
- Delivered with 1310nm Fabry-Perot laser
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- Use in conjunction with HB-R20-R20 or the miniHUB system for a complete fibre transmit/receive system

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	80	%

General Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating temperature	0		+40	°C
Supply voltage (Vcc)	6		12	V
Dimensions	63.5mm x 84mm x 30mm (excluding connectors)			
Weight	145g			

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supported standards:				
• SMPTE	292M-2008, 259M-2008, 297M-2006, 424M-2006			
• DVBASI	EN50083-9			
• Laser safety	Class 1 21CFR and IEC60825-1			
Number of inputs	2			
Number of outputs	2 active loop through			
Typical input cable length equalization	Up to 140m of Belden 1694A @ 2.97Gbps Up to 200m of Belden 1694A @1.485Gbps Up to 400m of Belden 1694A @270Mbps			
Output signal level	800mVp-p ±10%			
Connectors	BNC			
Impedance	75ohm			
Return loss	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]			
LED Indicators	Power and SDI lock			
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Light source	Fabry-Perot laser			
Optical output power	-6	-2	0	dBm
Optical extinction ratio	5			dB
Optical center wavelength	1290	1310	1330	nm
Spectral line width		1.5	3	nm
Optical rise/fall time (20-80%)		115	135	ps

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HubBox HB-T1310-R20

3G-/HD-/SD-SDI Optical Transceiver for SMPTE 297-2006 Video applications

Data Sheet

Description

1 channel of SDI to Optical and 1 channel of Optical to SDI conversion. For 3G-/HD-/SD-SDI and DVB/ASI. Supports data rates from 50Mbps to 3Gbps.

It is housed in an extremely compact and rugged aluminium case ideally suited to both studio and portable applications.

The HubBox is perfect for using with the miniHUB system where one or two signals are required remotely.

Part Number Options

Part Number	Temperature
HB-T1310-R20	0°C to +40°C

Features

- Multi-rate reclocking with automatic rate detection and automatic bypass for non SDI data rates
- Automatic Cable Equalisation
- LEDs display power and SDI lock status
- Locking DC jack
- Optical output on LC/PC connector
- Provides reclocked loop-through SDI output
- Delivered with 1310nm Fabry-Perot laser
- Excellent performance with SDI-Checkfield test signal at SD-, HD- and 3G-SDI
- Use in conjunction with another HB-T1310-R20 or the miniHUB system for a complete fibre transmit/receive system

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	80	%

General Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating temperature	0		+40	°C
Supply voltage (Vcc)	6		12	V
Dimensions	63.5mm x 84mm x 30mm (excluding connectors)			
Weight	145g			

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supported standards:				
• SMPTE	292M-2008, 259M-2008, 297M-2006, 424M-2006			
• DVBASI	EN50083-9			
• Laser safety	Class 1 21CFR and IEC60825-1			
Number of inputs	1			
Number of outputs	1 + 1 active loop through			
Typical input cable length equalization	Up to 140m of Belden 1694A @ 2.97Gbps Up to 200m of Belden 1694A @1.485Gbps Up to 400m of Belden 1694A @270Mbps			
Output signal level	800mVp-p ±10%			
Connectors	BNC			
Impedance	75ohm			
Return loss	≥15 dB [5-1485 MHz], ≥10dB [1485-2970MHz]			
LED Indicators	Power and SDI lock			
Data rate	50		3000	Mbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Light source	Fabry-Perot laser			
Optical output power	-6	-2	0	dBm
Optical extinction ratio	5			dB
Optical center wavelength	1290	1310	1330	nm
Spectral line width		1.5	3	nm
Optical rise/fall time (20-80%)		115	135	ps

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125µm), Multi Mode compatible			
Receiver technology	PIN			
Optical input overload power	-3			dBm
Optical receiver sensitivity @ 3Gbps (3G-SDI Checkfield, BER = 10^{-12}, TX_{EXT} ≥ 7dB)		-19	-17	dBm
Optical receiver sensitivity @ 1.5Gbps (HD-SDI Checkfield, BER = 10^{-12}, TX_{EXT} ≥ 7dB)		-19	-17	dBm
Optical receiving window	1260		1620	nm

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06 MADIson - MADI audio

norwia

MADISON-1260-xx

16+16 Channel Analogue Audio MADI-Interface to Fiber

Data Sheet

Description

The Norwia Madison 1260 is a 1RU, 16 inputs and 16 outputs Analogue Audio MADI encoder/decoder to fiber.

The Madison combines state of the art signal conversion with highly reliable clock and MADI processing. As usual the unit is simple to operate, easy to expand and, of course, an awesome sounding conversion system.

Madison has a built in Fiber transceiver for short and long distances over a Multi Mode or Single Mode fiber, and can be connected to the miniHUB fiber distribution platform for CWDM multiplexing.

The analogue outputs and inputs are balanced pair cabling and are externally feed though D25 connections. This allow for easy addition of premade XLR panels.

Part Number

Part Number	Description
MADISON-1260-MM	1RU Analogue Audio (16in/out) to MADI convertor with Multimode optical TX/RX and dual supplies.
MADISON-1260-SM	1RU Analogue Audio (16in/out) to MADI convertor with Singlemode optical TX/RX and dual supplies.

Features

- 16 AD and 16 DA convertors in 1RU
- Multi Mode or Single Mode fiber interface
- Superb sounding convertors with a sophisticated analogue section on 36 V audio rails
- +24 dBu professional output level
- Best price/performance level
- Up to 64 I/O's on 1 MADI port (4 units)
- Latency-neutral MADI chaining
- Dual Power supplies are standard

Applications

- Stadium audio transport
- Mass audio transport
- Remote production audio
- Ring Structure audio

Specifications:

Convertor and Connections	
Resolution	24 Bit
Sample Rates	44.1, 48, 88.2, 96, 176.4, 192 kHz
Varispeed	±12.5% in 56 CH mode, -12,5% in 64 CH mode
Reference Levels/Inputs	24dBu max, selectable 22dBu, 18dBu, 15dBu
Reference Levels/Outputs	24dBu max, selectable 22dBu, 18dBu, 15dBu
Clock	Internal clock circuitry from SPL, Wordclock or MADI
Expanability	4 units via MADI chain for 64 channels
Wordclock Input	75 ohms, terminated impedance
Wordclock Level	Input: TTL/CMOS5/CMOS3; Output: 3.3Vtt
MADI Channels	44,1 & 48kHz: 56/64ch
MADI Channels	2x 44,1 & 48K: 28/32ch
MADI Channels	4x 44,1 & 48K: 14/16ch
MADI Formats	2x 44,1 & 48K, 4x 44,1 & 48kHz: SMUX/HighSpeed
Audio Inputs	16 analog, balanced inputs, DB25/Tascam MADI optical digital input (up to 64 channels)
Audio Outputs	16 analog, balanced outputs, DB25/Tascam MADI optical digital output (up to 64 channels)

Rear Connections
2 IEC power connector on Norwia/SPL units
USB Type A socket (no audio, firmware updates only)
Wordclock input via BNC socket with Termination switch
Wordclock output via BNC socket with Termination switch
MADI optical input, Type SC with SM fiber connection 8/125u. (MM avaialble and CWDM possible with miniHUB)
MADI optical output, Type SC with SM fiber connection 8/125u. (MM avaialble and CWDM possible with miniHUB)
2 x DB25 8-channel analog inputs (Tascam)
2 x DB25 8-channel analog outputs (Tascam)

Power Supply x 2	Switchmode, 90-264 V AC, 50/60 Hz, 35W max.
Thermal Units	65 BTU/h typ., 110 BTU/h max.
Dimensions (HxWxD, mm)	44 x 482 x 260 (without sockets D=240)
Dimensions (HxWxD, inch)	1,7 x 19 x 10,2 (without sockets D=9,4)
Weight kg	3,17
Weight lbs	6,99
Note: 0dBu = 0,775 V. Technical specifications subject to change without notice.	

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07 SMPTE camera media convertors

norwia

miniHUB and SMC series

Remote production & OB production

Remote production with miniHUB and SMC (SMPTE Media Convertors)

Today Norwia can provide a full optical solution from end to end for transporting camera based SMPTE signals for the following area's;

- Camera to OB Truck
- Camera to Studio for long distance remote production

Norwia have introduced the SMC series product line to enable multiple branded camera to be adapted from SMPTE 304M to a more standadized connector (LC) for multiplexing of remote signals back to the OB Truck or back to a fixed location, i.e. Studio.

Norwia covers the following brands Sony, Hitachi, Ikegami and Grass Valley. For model information please refer to the technical data sheets for more information.

Features

- Single camera per unit and Dual camera units
- Switchable for Sony, Hitachi and Ikegami via rotary switch and a separate unit for Grass Valley
- LC optical connectors (2) for Single Unit, (4) for dual units
- LED for link status
- 300VA, 600VA version is available on request for driving large box lens
- Can be rack mounted into a chassis for two SMC-CAM-P-LC
- Ideally suited for miniHUB optical transport for multiplexing multiple camera through 1 fiber
- Rugadized construction
- Multiplexing solution available with miniHUB

SMC-CCU-LC / SMC-CAM-LC

The SMC (SMPTE Media Convertor) system from Norwia has been designed to allow SD-SDI and HD-SDI broadcast cameras fitted with Standard SMPTE 304M hybrid connectors to be deployed using ordinary single mode optical fiber.

This system allows the user to replace the fiber/copper hybrid cable between the camera and the CCU with standard fiber cable. The SMC system is perfect for Stadiums, Arenas and Concert Halls that have preinstalled fiber networks.

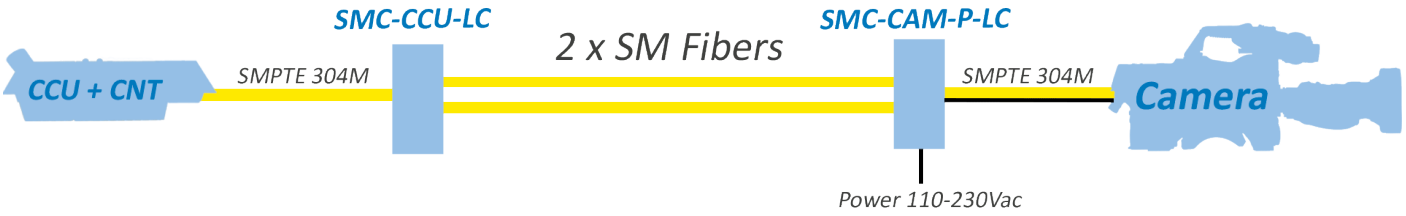
Both ends of this system are enclosed in a compact, lightweight, ruggedized aluminum enclosure.

The SMC-CCU-LC IS also available in Grass Valley camara formats.
SMC-CCU-GV-LC

SMC-CAM-P-LC

The single SMC (SMPTE Media Convertor) system from Norwia has been designed to provide power insertion to broadcast cameras fitted with Standard SMPTE 304M hybrid connectors, thus allowing them to be remotely powered over the hybrid cable. Power can be inserted and transferred to the remote camera which can be up to 300m away. When combined with the SMC-CCU, cameras can be remotely deployed using the ordinary single mode optical fiber network that may exist within a stadium, campus or metro area.

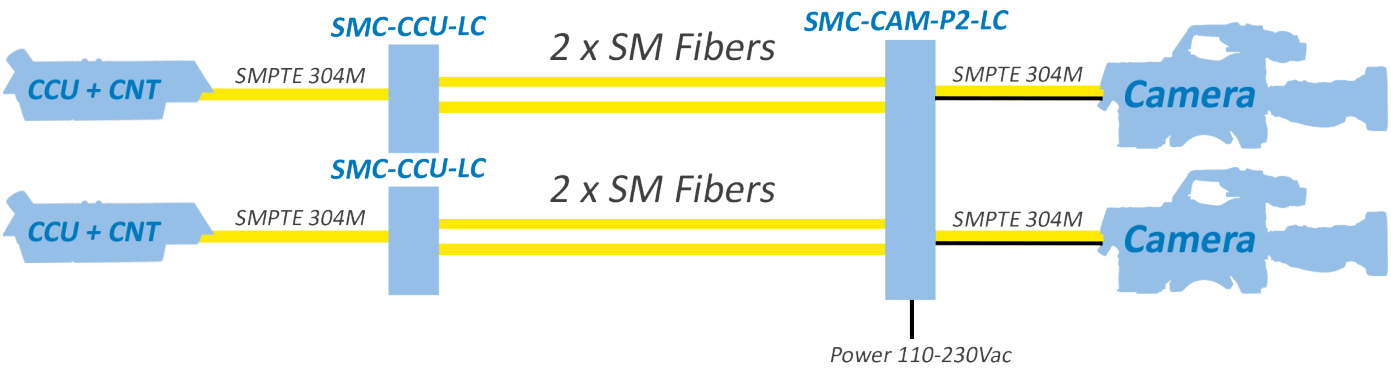
SMC-CAM-P-LC is provided in a compact footprint for the most cost-effective solutions. A rotary switch determines the camera type (Sony,Hitachi & Ikegami). A separate units is available for Grass Valley cameras. (SMC-CAM-GV-P-LC)



SMC-CAM-P2-LC

The dual SMC (SMPTE Media Convertor) system from Norwia has been designed to provide power insertion to broadcast cameras fitted with Standard SMPTE 304M hybrid connectors, thus allowing them to be remotely powered over the hybrid cable. Power can be inserted and transferred to the remote camera which can be up to 300m away. When combined with the SMC-CCU, cameras can be remotely deployed using the ordinary single mode optical fiber network that may exist within a stadium, campus or metro area.

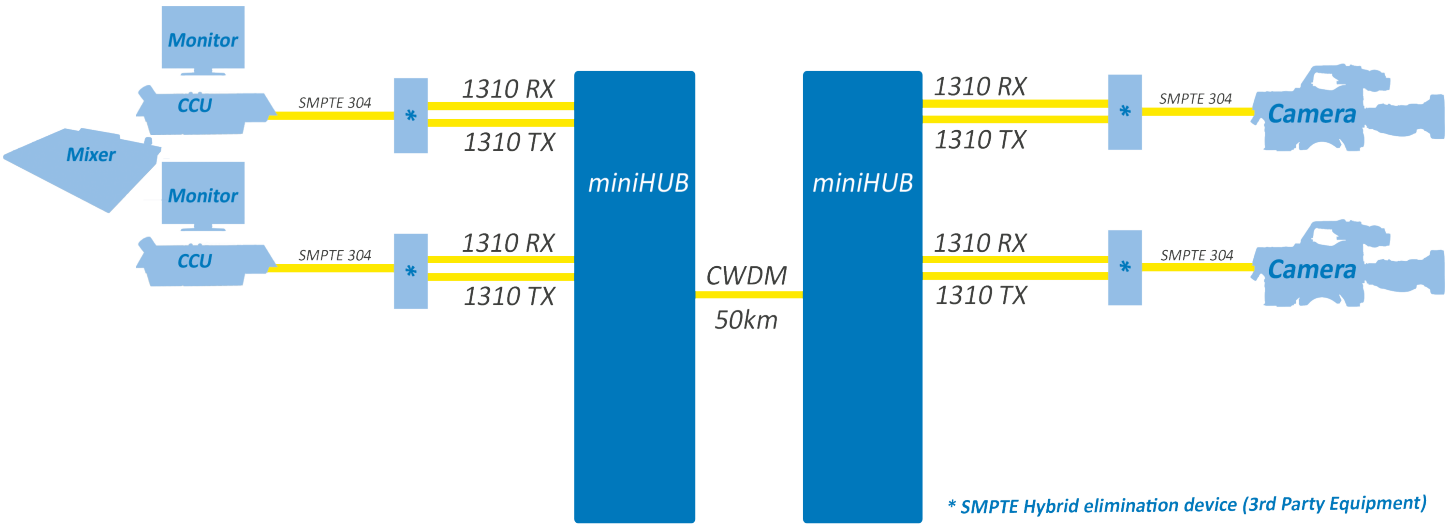
SMC-CAM-P2-LC is provided in a compact footprint for the most cost-effective solutions. A rotary switch determines the camera type (Sony,Hitachi & Ikegami). A separate units is available for Grass Valley cameras. (SMC-CAM-GV-P2-LC)



Remote production with Norwia

Norwia provides an unique remote production package in which the core fiber structure is built around the miniHUB optical fiber distribution solution.
Depending on the peripheral equipment being the camera and CCU package, Norwia can provide an optical multiplexed solution that can grow with a selection of signal formats in addition to the multiplexed protocol from the camera to base station.
One of the benefits of using the miniHUB optical fiber distribution system is the extended distance that can be achieved, which is the best in market today.

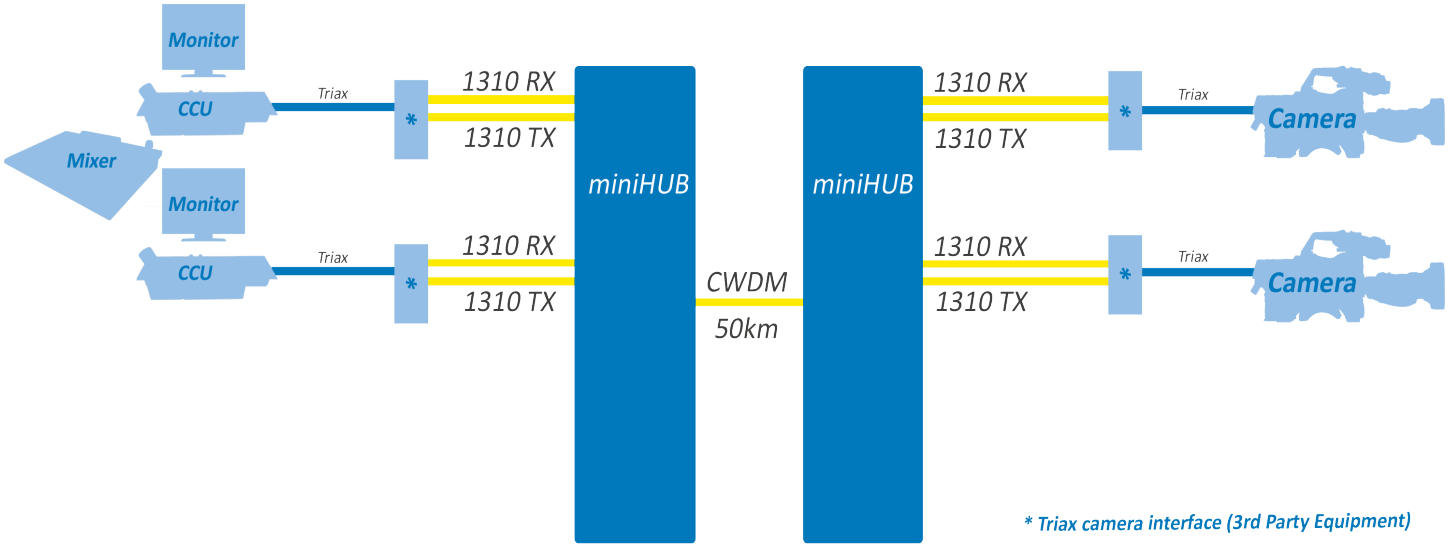
Optical camera system with Norwia's SMC product range



Optical camera based systems need to have conversion between SMPTE Optical connector to LC type optical connector and provide a power up sequence to enable the base station and camera communicate. Power is supplied from the SMPTE optical connector through the SMPTE Hybrid elimination device that powers the camera locally. This is the same for the CCU end of the camera chain.

Depending on the nature of the SMPTE Hybrid elimination system, either passive or active a maximum of 8 cameras can be operated on 1 fiber. This gives virtually zero latency operational qualities compared to other compressed IP remote solutions.

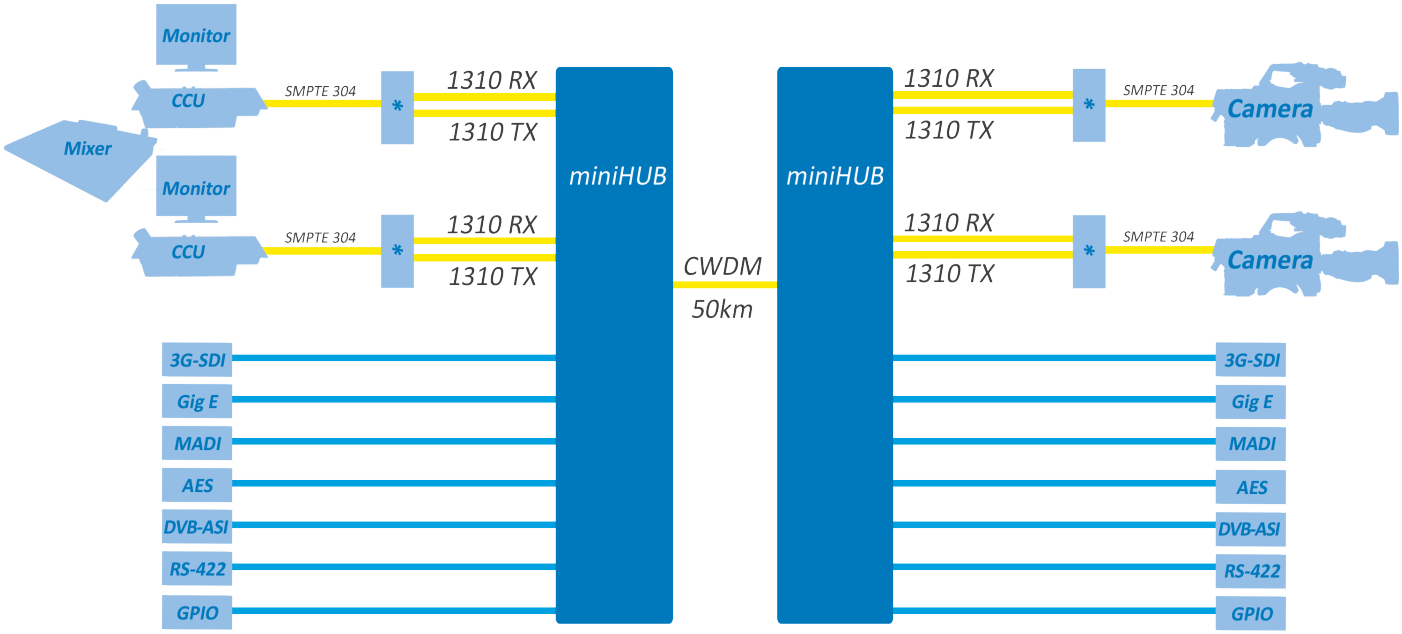
Optical camera system with TRIAX/Optical systems



Add on Triax/Optical based systems are also good for bridging older camera systems for optical distribution networks. These type of systems can be directly mounted to the camera and eliminate the Triax part of the system.

Norwia's solution brings together ready made technology and develops the fiber backbone in a flexible user package. The benefits are enormous for anyone wanting a remote production facility and easily gain by using the miniHUB optical distribution system from Norwia.

Camera systems including expansion possibility with miniHUB



** SMPTE Hybrid elimination device (3rd Party Equipment)*

The miniHUB optical distribution system can easily be expanded to include other signal formats or additional signal formats that the camera system in not carrying. This means you can include Ethernet data services, HDMI Multiviewer signals and extra SDI video signals when needed.

Benefits of miniHUB for Remote event production

The miniHUB can be adapted easily for each event depending on the individual needs. This makes the miniHUB the most flexible and cost effective system on the market today. Listed below are some of the benefits that Norwia customers have enjoyed.

- Easy setup with Norwia's AutoSFP™ technology
- Multi-purpose single card solution, less spares and less inventory cost
- Superior quality and extreme temperature system that are used by leading Broadcasters and Telecommunication providers.
- Convertible system that can be used as a Camera transport system one week then a high density video distribution next week. Increasing return on investment significantly.
- Zero latency production

There are many different types of camera configuration in general and Norwia will have a solution available. Just consult with Norwia and we will design a system to your specification that will give you all the benefits that a Norwia solution can give.

Norwia systems are used in live product everyday and users rely heavily on the optical fiber knowledge of Norwia. Over 15 years of experience is accumulated in the miniHUB optical distribution system to give our users the latest next generation optical system available.

Discover an easy way for Optical fiber distribution.

A u t o S F P

Norwia holds unique core technologies such as AutoSFP™ which is incorporated into the next generation miniHUB optical distribution platform.

miniHUB is a Format flexible, Application flexible and holds the title “lowest cost of ownership on the market today”

Visit www.norwia.no for more information on the miniHUB optical distribution system, representative around the world, news on new product releases, product data sheets, customers stories and technical solutions.

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REV1638

8

08 IP Networks, SMPTE 2022-6 & 10G Switch

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IP conversion

miniHUB

Integrating SMPTE 2022-6 and SDI

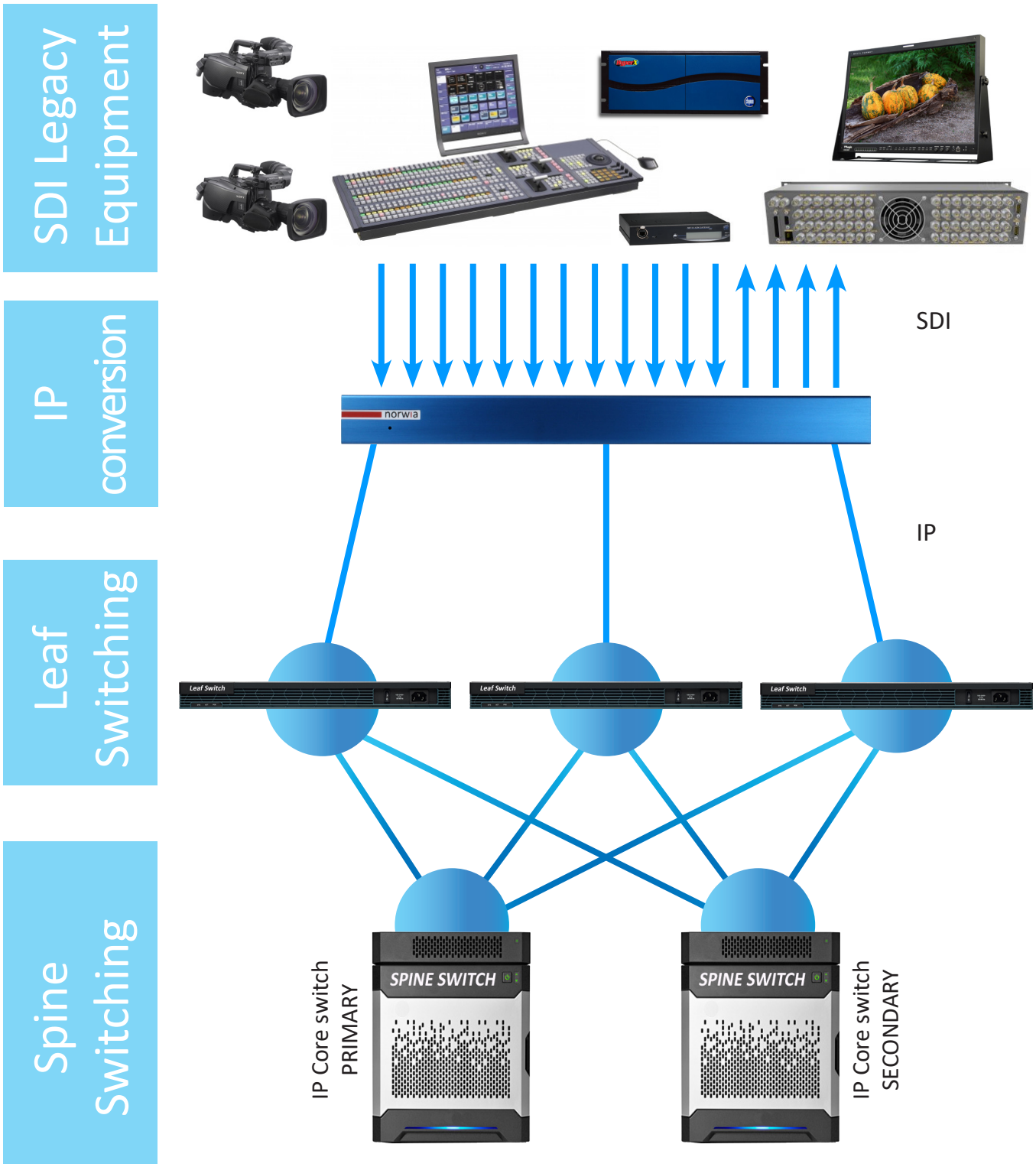
Solutions for distribution and contribution of SMPTE 2022-6
while integrating existing SDI equipment

IP GATEWAY

If you were lucky enough to be using the miniHUB optical transport platform you can now make a simple upgrade into the IP world, if not your still in luck and can choose miniHUB optical distribution transport platform and start your migration into the IP world in an orderly fashion.

IP conversion from Norwia can take your legacy equipment into the future while you build your IP islands and make the transition as painless as possible.

Norwia can provide the conversion between your SDI world and your new venture into IP, whist connecting your IP domain back to your SDI equipment.



Typical approach for IP Media networks using Spine and Leaf Topology

SDI to SMPTE 2022-6 / SMPTE 2026-6 Conversion

By using the miniHUB optical transport platform and the flexible OC-4B-SDI card the user can choose between converting 1, 2, 3 or 4 channels of SDI to SMPTE 2022-6 conversion to point to point 10Gbit Optical Ethernet service. Up to 2 channels can be transported down each fiber pair.

SDI → SMPTE 2022-6

1ch SDI to 10Gbit Optical SMPTE 2022-6

2ch SDI to 10Gbit Optical SMPTE 2022-6

3ch SDI to 10Gbit Optical SMPTE 2022-6

4ch SDI to 10Gbit Optical SMPTE 2022-6

11586 SDI host to SMPTE 2022-6 host (Encoder) 1CH
11588 SDI host to SMPTE 2022-6 host (Encoder) 2CH
10561 OC-4B-SDI, 4 Channel configurable card with AutoSFP

Encoding solutions with the OC-4B-SDI

SMPTE 2022-6 → SDI

1ch 10Gbit Optical SMPTE 2022-6 to SDI

2ch 10Gbit Optical SMPTE 2022-6 to SDI

3ch 10Gbit Optical SMPTE 2022-6 to SDI

4ch 10Gbit Optical SMPTE 2022-6 to SDI

11585 SMPTE 2022-6 Optical TX/RX to SDI host (Decoder) 1CH
11587 SMPTE 2022-6 Optical TX/RX to SDI host (Decoder) 2CH
10561 OC-4B-SDI, 4 Channel configurable card with AutoSFP

Decoding solutions with the OC-4B-SDI

Norwia's flexibility allows you to change and reconfigure with any complex GUI. Norwia also has combination Encoding and decoding on the same card with SDI and SMPTE 2022-6. Any one of the combinations on this page is easily configured with appropriate SMPTE 2022-6 SFP from Norwia.

SDI & SMPTE 2022-6 combinations

1ch 10Gbit Optical SMPTE 2022-6 to SDI
1ch SDI to 10Gbit Optical SMPTE 2022-6

2ch 10Gbit Optical SMPTE 2022-6 to SDI
2ch SDI to 10Gbit Optical SMPTE 2022-6

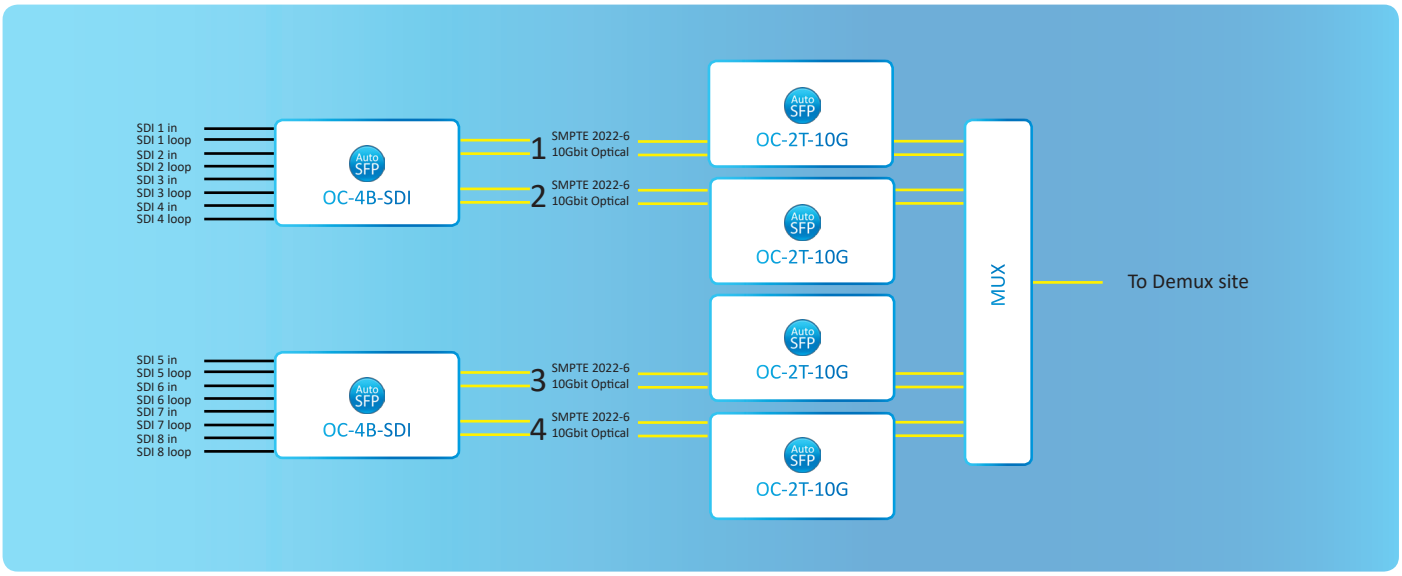
1ch 10Gbit Optical SMPTE 2022-6 to SDI
2ch SDI to 10Gbit Optical SMPTE 2022-6

2ch 10Gbit Optical SMPTE 2022-6 to SDI
1ch SDI to 10Gbit Optical SMPTE 2022-6

Mixed encoding and decoding solutions with the OC-4B-SDI

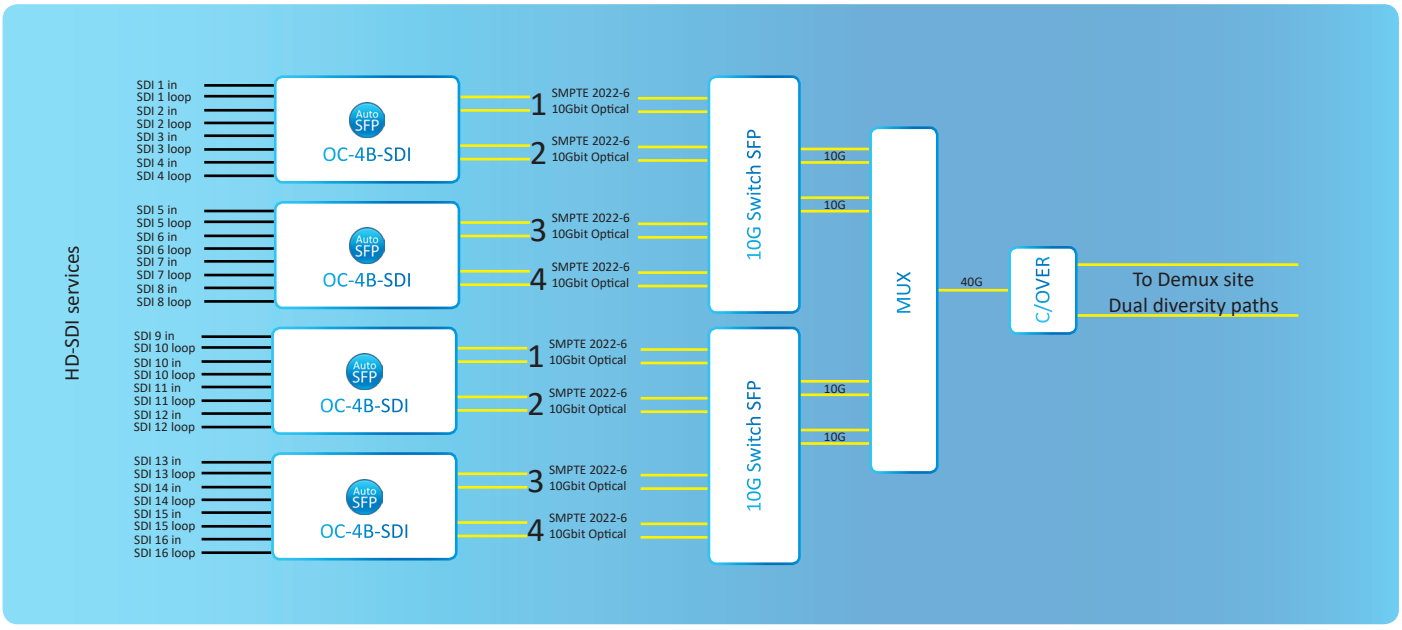
Multiplexing with SMPTE 2022-6

miniHUB can be used to multiplex SMPTE 2022-6 in a single transport stream via optical fiber. After encapsulation from SDI on SMPTE 2022-6. The Norwia miniHUB can frequency shift from a single frequency to a CWDM or DWDM frequency for greater channel capacity.



SDI to SMPTE 2022-6 conversion with wavelength swap to CWDM for Multiplexing

The miniHUB IP conversion solution fills the gap between SDI production to IP production. The miniHUB system is ultra compact with 16 channels of SDI to SMPTE 2022-6 conversion or a mixture of demux/encoding based on the customers needs. The miniHUB uses their unique AutoSFP™ technology that gives ultimate flexibility when reconfiguring for encoding or decoding of SMPTE 2022-6.



SDI to SMPTE 2022-6 conversion with multiplexing in the IP domain

miniHUB 1RU-4-2 Frame

miniHUB Compact 1RU-2-0 Frame

Features

ST 2022-6 (HBRMT), ST-424, ST-292 and ST-259 compliant
10GBASE SFP+ (10GE) compliant, 10GBASE-LR compliant, SFF-8431 SFP+ Electrical MSA compliant
HD-BNC(75Ω) or LC Fiber connectors
Supports video SD-SDI, HD-SDI, 3G-SDI
Supports DVB-ASI at 270Mb/s
Available in dual or single configuration
AIMS, ASPEN, NMOS ready
Resolves interoperability between multiple formats/standards
Supports ST-2022, AIMS TR-03, AES67 and ASPEN
Encoding & Decoding of compressed signals such as JPEG-2000, VC-2* and Tico*

OC-4B-SDI, SMPTE 2022-6 IP Gateway

IP host products

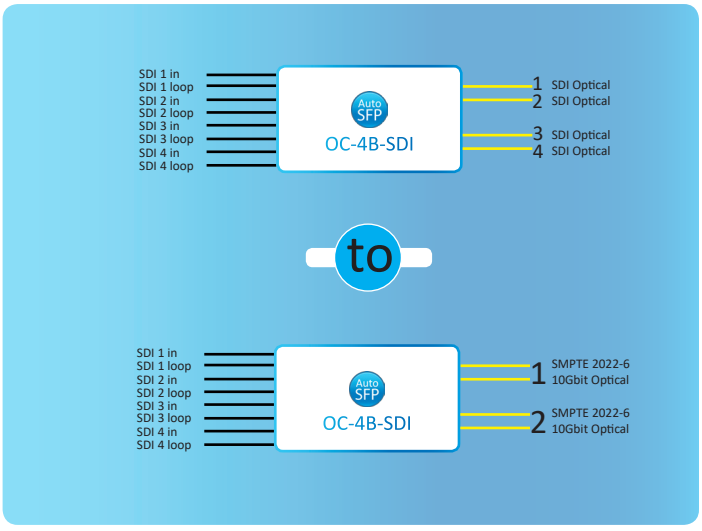
Norwia has a range of SFP based products for direct SDI connection to an IP host. These product can be adapted directly to COTS IP switches. Encoding and de-coding devices are available in single and dual channel variety.

11589	SDI (HD-SDI) to SMPTE 2026-6 host (Decoder) 1CH
11590	SMPTE 2022-6 host to SDI (HD-SDI) (Encoder) 1CH
11591	SDI (HD-SDI) to SMPTE 2026-6 host (Decoder) 2CH
11592	SMPTE 2022-6 host to SDI (HD-SDI) (Encoder) 2CH

COTS IP Switch

Your benefits using miniHUB

Wheather your ready to invest in a totally new equipment plant or your making a step into the IP island with your exisiting SDI equipment base, miniHUB is the solution for you.
Example,



The upgrade path between SDI to optical and SDI to SMPTE 2022-6 optical is very simple with the miniHUB.

What changes is just the SFP!

What stays the same,

- The miniHUB Frame
- RCONmin controller card
- The Flexible OC-4B-SDI card
- ... your investment!

miniHUB is the most flexible otical platform on the market today and last 6 years!

A u t o S F P

Norwia holds unique core technologies such as AutoSFP™ which is incorporated into the next generation miniHUB optical distribution platform.

miniHUB is a Format flexible, Application flexible and holds the title “lowest cost of ownership on the market today”

Visit www.norwia.no for more information on the miniHUB optical distribution system, representative around the world, news on new product releases, product data sheets, customers stories and technical solutions.

Your local representative:

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REV1650

SMPTE 2022-6

IP Gateway for SDI

Data Sheet

Noriwa's OC-4B-SDI with 4ch SDI to SMPTE 2022-6 optical conversion

Descriptions,

The Norwia ST 2022-6 encoders and decoders are a family of modules designed to encapsulate an SDI signal with 2022-6 or decapsulate
a 2022-6 stream to an uncompressed SDI signal. The ST 2022-6 (SDI on host) has a 10GE (10GBase-LX) port to be used directly with 10GE video switches and routers. The ST 2022-6 emSFP (10GE on host) has a 10GE (10GBase-X) host
connection which can be used inside IP routers and switches. The IP host sfp's can be used directly in the miniHUB system by using the OC-4B-SDI multifuncitonal module.

Benefits

- Can be used in exiting miniHUB Systems
- High flexibility with ST 2022-6 HBRMT capability in a small SFP+ form factor
- Design a cost effective system by adding ST 2022-6 functionality as you grow with the miniHUB system

Models,

11585	SMPTE 2022-6 Optical TX/RX to SDI host (Decoder) 1CH
11586	SDI host to SMPTE 2022-6 host (Encoder) 1CH
11587	SMPTE 2022-6 Optical TX/RX to SDI host (Decoder) 2CH
11588	SDI host to SMPTE 2022-6 host (Encoder) 2CH
11589	SDI (HD-SDI) to SMPTE 2026-6 host (Decoder) 1CH
11590	SMPTE 2022-6 host to SDI (HD-SDI) (Encoder) 1CH
11591	SDI (HD-SDI) to SMPTE 2026-6 host (Decoder) 2CH
11592	SMPTE 2022-6 host to SDI (HD-SDI) (Encoder) 2CH

Features

- ST 2022-6 (HBRMT), ST-424, ST-292 and ST-259 compliant
- 10GBASE SFP+ (10GE) compliant, 10GBASE-LR compliant, SFF-8431 SFP+ Electrical MSA compliant
- HD-BNC (75Ω) or LC Fiber connectors
- Supports video SD-SDI, HD-SDI, 3G-SDI
- Available in dual or single configuration

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norwia

Highlights

10 Gigabit Ethernet Connection

10 Gigabit Ethernet ensures that high-bandwidth demand, such as data replication and backup, video on demand application and 10G server connection, can be fulfilled easily

Layer 3 Lite Functions

Wired speed inter-VLAN routing helps by reducing the pressure of routers and backbone networks, improving the overall network efficiency

Save Energy, Save Money

D-Link Green technology conserves energy by powering down unused ports, saving you money while reducing your carbon footprint

Norwia part numbers:

11356 - D-LINK DXS-1210-10TS 8+2 PORT 10GBPS LEVEL-3 SWITCH
11357 - D-LINK DXS-1210-12TC 8+4 PORT 10GBPS LEVEL-3 SWITCH

DXS-1210-10TS/12TC

10 Gigabit Ethernet Smart Managed Switch

Features

Green Technology

- Power saving via the following features:
  - Link Status detection
  - LED Shut-Off
  - Port Shut-Off
  - System Hibernation

Security Features

- Access Control List
- IP-MAC-Port Binding
- Clientless MAC/Web access control
- D-Link Safeguard Engine
- Port Security
- ARP Spoofing Prevention

Intuitive Management

- D-Link Network Assistant Utility or Web-based GUI
- Built-in SNMP MIB for remote NMS (D-View 6.0)
- CLI through Telnet

Advanced Features

- Auto Surveillance VLAN
- Loopback Detection
- Cable Diagnostics
- Static Route[1]
- LLDP/LLDP-MED
- Auto Voice VLAN

D-Link's DXS-1210 Series 10 Gigabit Ethernet Smart Managed Switches are a cost effective 10 GbE switch series capable of servicing a range of network needs in any business. Supporting 10GBASE-T/SFP+ combo ports, they provide connection flexibility across a network allowing easier network integration. With high performance and low latency the DXS-1210-10TS/12TC can fulfil the needs for virtualisation, cloud services and server-to-server applications making it perfect for SMB customers.

Energy Saving

Incorporating D-Link Green technology, the switch is capable of power-saving without sacrificing operational performance or functionality. The switches feature built-in smart fans; internal heat sensors that monitor and detect temperature changes and react accordingly by utilising different fan speeds for different temperatures. At lower temperatures, the fans will run slower, reducing the switch's power consumption and noise. Link status drastically reduces power consumption by automatically toggling ports without a link to sleep mode. The DXS-1210-10TS/12TC takes the approach to green IT one step further by incorporating a special chipset with advanced silicon technology for efficient use of energy.

Extensive Management and Layer 2 Features

Equipped with a complete line-up of L2 features, the DXS-1210-10TS/12TC includes port mirroring, Spanning Tree Protocol and Link Aggregation Control Protocol (LACP). Network maintenance features include loopback detection and cable diagnostics. Loopback detection is used to detect loops created by a specific port and automatically shut down the affected port. The cable diagnostic feature, designed primarily for administrators and customer service representatives, can rapidly discover errors and determine the cable quality, allowing the switch to manage itself for you.

QoS, Bandwidth Control

The DXS-1210-10TS/12TC supports Auto Surveillance VLAN (ASV), and Auto Voice VLAN, which are best suited for VoIP and video surveillance deployments. Auto Surveillance VLAN is a new, industry-leading technology that the DXS-1210-10TS/12TC 10 Gigabit Ethernet Smart Managed Switch provides. This technology consolidates data and surveillance video transmission through a single unit thus sparing businesses the expense of dedicated hardware and facilities. ASV also ensures the quality of real-time video for monitoring and control without compromising the transmission of conventional network data. The Auto Voice VLAN technology enhances the VoIP service by automatically placing voice traffic from an IP phone to an assigned VLAN. With higher priority and individual VLAN, these features guarantee the quality and security of VoIP traffic. Furthermore, the DSCP markings on Ethernet packets enable different levels of service to be assigned to network traffic. As a result, these voice and video packets take precedence over other packets. In addition, with bandwidth control, network administrators can reserve bandwidth for important functions that require a larger amount or have high priority.

Secure your Network

D-Link's innovative Safeguard Engine™ protects the switches against traffic flooding caused by malicious attacks. The DXS-1210-10TS/12TC supports 802.1X port based and host based authentication, allowing the network to be authenticated through external RADIUS servers. In addition, the Access Control List (ACL) feature enhances network security and helps to protect the internal IT network. The DXS-1210-10TS/12TC includes ARP spoofing prevention, which protects from attacks on the network that may allow an intruder to sniff data frames, modify traffic, or bring traffic to a halt altogether by sending fake ARP messages. To prevent ARP spoofing attacks, the switch uses packet control ACLs to block invalid packets that contain fake ARP messages. For added security, the DHCP server screening feature blocks rogue DHCP server packets from user ports to prevent unauthorised IP assignment.

Versatile Management

The DXS-1210-10TS/12TC provides a D-Link Network Assistant Utility that simplifies the configuration for devices supporting D-Link Discovery Protocol. The D-Link network assistant utility easily allows customers to discover multiple D-Link Smart Switches within the same L2 network segment. With this utility, users do not need to change the IP address of their PC. It also simplifies the initial setup of the switches. Switches within the same L2 network segment that are connected to the user's PC are displayed on screen for instant access. This allows extensive switch configuration and basic setup of discovered devices, including password changes and firmware upgrades. The DXS-1210-10TS/12TC also supports D-View 6.0 and Command Line Interface (CLI) through Telnet. D-View 6.0 is a network management system that allows for the central management of critical network characteristics such as availability, reliability, resilience, and security.

Seamless Integration

The DXS-1210-10TS/12TC comes with Ethernet copper ports capable of connecting using standard CAT6 twisted-pair cables for 10GBASE-T. The DXS-1210-10TS has 8 10GBASE-T ports and 2 SFP+ ports while the DXS-1210-12TC has an additional 2 10GBASE-T/SFP+ combo port design. This means they provide a more flexible solution for upstream or downstream server connections, making network administration easy.

D-Link Assist
Rapid Response Support

If the worst should happen to your network you need the very best support and fast. Downtime costs your business money. D-Link Assist maximises your uptime by solving technical problems quickly and effectively. Our highly trained technicians are on standby around the clock, ensuring that award-winning support is only a phone call away.

With a choice of three affordable service offerings covering all D-Link business products, you can select the package that suits you best:

D-Link Assist Gold - for comprehensive 24-hour support

D-Link Assist Gold is perfect for mission-critical environments where maximum uptime is a high priority. It guarantees four hour around-the-clock response. Cover applies 24/7 for every day of the year including holidays.

D-Link Assist Silver - for prompt same-day assistance

D-Link Assist Silver is designed for 'high availability' businesses that require rapid response within regular working hours. It provides a four hour response service Monday to Friday from 8am to 5pm, excluding holidays.

D-Link Assist Bronze - for guaranteed response on the next business day

D-Link Assist Bronze is a highly cost-effective support solution for less critical environments. Response is guaranteed within eight business hours Monday to Friday from 8am to 5pm, excluding holidays.

D-Link Assist can be purchased together with any D-Link business product. So whether you're buying switching, wireless, storage, security or IP Surveillance equipment from D-Link, your peace of mind is guaranteed. D-Link Assist also offers installation and configuration services to get your new hardware working quickly and correctly.

D-Link
Building Networks for People

DXS-1210-10TS/12TC
10 Gigabit Ethernet Smart Managed Switch

Technical Specifications

General		
Model	• DXS-1210-10TS	• DXS-1210-12TC
Interfaces	• 8-port 10GBASE-T • 2-port SFP+	• 8-port 10GBASE-T • 2-port SFP+ • 2-port 10GBASE-T/SFP+ combo design
Port Standard & Functions	• IEEE 802.3u 100BASE-TX Fast Ethernet • IEEE 802.3ab 1000BASE-T Gigabit Ethernet • IEEE 802.3az compliance • IEEE 802.3an 10GBASE-T 10GbE over copper • IEEE 802.3ae 10GbE over fiber • IEEE 802.3z 1000BASE-X • Auto MDI/MDIX support for 1000/10GBASE-T	
Network Cables for 10GBASE-T	• CAT-6 (30 m max) • CAT-6A or CAT-7(100 m max)	
Media Interface Exchange	• Auto MDI/MDIX adjustment for all twisted-pair ports	
Performance		
Switching Capacity	• 200 Gbps	• 240 Gbps
Maximum Packet Forwarding Rate	• 148.8 Mpps	• 178.56 Mpps
Transmission Method	• Store-and-forward	
MAC Address Table	• Up to 16 ,000 entries per device	
Physical/Environmental		
AC Input	• 100 to 240 VAC	
Maximum Power Consumption	• 68.67 watts	• 90.81 watts
Standby Power Consumption	• 31.59 watts	• 42.65 watts
Operating Temperature	• -5 to 50 ° C (23 to 122 ° F)	
Storage Temperature	• -40 to 70 ° C (-40 to 158 ° F)	
Operating Humidity	• 0 % to 95 % non-condensing	
Storage Humidity	• 0 % to 95 % non-condensing	
Dimensions (L x W x H)	• 440 x 210 x 44 mm (17.36 x 8.26 x 1.73 inches)	
Weight	• 3.1 kg	• 3.15 kg
Diagnostic LEDs	• Link/Activity/Speed (Per 10GBASE-T port) • Link/Activity/Speed (Per 10G SFP+ port) • Power/Fan (Per device)	
Certifications	• CE • FCC • C-Ticket • VCCI • BSMI • CCC	
Safety	• cUL • CB • CE • CCC • BSMI	

D-Link
Building Networks for People

DXS-1210-10TS/12TC
10 Gigabit Ethernet Smart Managed Switch

Software

L2 Features	• MAC Address Table
	  • Up to 16K entries
	• Static MAC Addresses
	  • 1K
	• IGMP Snooping
	  • IGMP v1/v2/v3 Snooping
	  • Supports 384 IGMP groups
	  • Supports at least 128 static multicast addresses
	  • Per VLAN IGMP Snooping
	  • Support host-based fast leave
	• MLD Snooping
	  • MLD v1/v2 Snooping
	  • Support 384 groups
	  • Support 128 static multicast addresses
	  • Support host-based fast leave
	• LLDP
	• LLDP-MED
		• Spanning Tree Protocol
		  • 802.1D STP
		  • 802.1w RSTP
		  • 802.1s MSTP
		• Flow Control
		  • 802.3x Flow Control
		  • HOL Blocking Prevention
		• Port Mirroring
		  • One-to-One
		  • Many-to-One
		  • Supports Mirroring for Tx/Rx/Both
		• 802.3ad Link Aggregation:
		  • Maximum of 8 groups/8 ports per group
		• Jumbo Frame
		  • Up to 9KB
		• Loopback Detection
		• ERPS (Ethernet Ring Protection Switching) [1]

VLAN	• 802.1Q VLAN • Port-based VLAN • 4K VLAN Groups • Configurable VID • 1~4094	• Voice VLAN[1] • Auto Surveillance VLAN[1] • GVRP[1] • Asymmetric VLAN

Quality of Service (QoS)	• CoS based on
	  • 802.1p Priority Queues
	  • DSCP
	  • ToS
	  • IPv6 Traffic Class
	  • TCP/UDP port
	  • VLAN ID
	  • MAC Address
	  • Ether Type
	  • IP Address
	  • Protocol Type
	  • IPv6 Flow Label
		• 802.1p Priority Queue
		• 8 queues per port
		• Queue Handling
		  • Strict
		  • Weighted Round Robin (WRR)
		  • Deficit Round Robin (DRR)
		  • Weighted Deficit Round Robin (WDRR)
		• Bandwidth Control
		  • Port-based (Ingress/Egress, min. granularity 64 Kbps)
		  • iSCSI Awareness[1]

L3 Features	• IP Interface
	  • Supports 16 IPv4/v6 interfaces
	• ARP
	  • 768 Static ARP
	• Default Route[1]
		• IPv6 Neighbor Discovery (ND)
		• Static Route[1]
		  • Max. 32 IPv4 entries
		  • Max. 32 IPv6 entries

Access Control List (ACL)	• Max. 50 access list
	• Max. 256 ACL rules
	• Max. 50 VLAN access map[1]
	• ACL based on
	  • 802.1p priority
	  • VLAN[1]
	  • MAC address
	  • Ether type
		• IP address
		• DSCP
		• Protocol type
		• TCP/UDP port number
		• IPv6 Traffic Class
		• IPv6 flow label

Security	• Broadcast/Multicast/Unicast Storm Control
	• D-Link Safeguard Engine
	• DHCP Server Screening
	• IP-MAC-Port Binding
	  • DHCP Snooping[1]
	  • IP Source Guard[1]
	  • Dynamic ARP Inspection[1]
	  • IPv6 Snooping[1]
	  • IPv6 Source Guard[1]
	  • DHCPv6 Guard[1]
	  • IPv6 ND Inspection[1]
	  • IPv6 Route Advertisement (RA) Guard[1]
		• Traffic Segmentation
		• SSH[1]
		  • Support v1/ v2
		  • Support IPv4/ IPv6
		• SSL
		  • Support v1/v2/v3
		  • Support IPv4/IPv6
		• ARP Spoofing Prevention[1]
		  • Max. 127 entries
		• DoS Attack Prevention
		• Port Security
		  • Supports up to 6656 MAC addresses per port
		• Duplicate Address Detection

OAM	• Cable Diagnostics	

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DXS-1210-10TS/12TC
10 Gigabit Ethernet Smart Managed Switch

AAA	• Web-based Access Control (WAC)[1]
	  • Support local/RADIUS database
	  • Support Port-based access control
	  • Support Host-based access control
	  • Support Dynamic VLAN Assignment
	  • Identity-driven Policy (VLAN/ACL/QoS) Assignment
	• 802.1X Authentication[1]
	  • Support Dynamic VLAN Assignment
	  • Identity-driven Policy (VLAN/ACL/QoS) Assignment
	  • Supports local/RADIUS database
	  • Supports Port-based access control
	  • Supports Host-based access control
	  • Supports EAP, OTP, TLS, TTLS, PEAP
		• Support IPv4/IPv6 RADIUS Server[1]
		• Support IPv4/IPv6 TACACS+[1]
		• Guest VLAN[1]
		• Compound Authentication[1]
		• Authentication for management access
		• Authentication Database Failover[1]
		• MAC-based Access Control (MAC)[1]
		  • Support local/RADIUS database
		  • Support Port-based access control
		  • Support Host-based access control
		  • Support Dynamic VLAN Assignment
		  • Identity-driven Policy (VLAN/ACL/QoS) Assignment

Management	• Web-based GUI • D-Link Network Assistant Utility • Compact CLI • Telnet Server • TFTP Client • Configurable MDI/MDIX • SNMP • Supports v1/v2c/v3 • SNMP Trap • Smart Wizard • LLDP • LLDP-MED • DHCP Relay[1]	• System Log • BootP/DHCP Client • SNTP[1] • ICMP v6 • IPv4/v6 Dual Stack • DHCP Auto Configuration[1] • RMON v1/v2[1] • Trusted Host • Dual Images • Dual Configurations[1] • DNS Client[1] • Debug command
Green V3.0 Technology	• Power Saving by: • LED Shutoff	• System Hibernation • Port Shutoff
MIB/RFC Standards	• RFC 783 TFTP • RFC 951 BootP/DHCP Client • RFC 1157 SNMP v1, v2, v3 • RFC 1213 MIB II • RFC 1215 MIB Traps Convention • RFC 1350 TFTP • RFC 1493 Bridge MIB • RFC 1769 SNTP • RFC 1542 BootP/DHCP Client • RFC 1901 SNMP v1, v2, v3 • RFC 1907 SNMP v2 MIB • RFC 1908 SNMP v1, v2, v3 • RFC 2131 BootP/DHCP Client • RFC 2138 RADIUS Authentication[1] • RFC 2139 RADIUS Authentication • RFC 2233 Interface Group MIB	• RFC-2246 SSL • RFC 2475 • RFC 2570 SNMP v1, v2, v3 • RFC 2575 SNMP v1, v2, v3 • RFC 2598 CoS • RFC 2618 RADIUS Authentication[1] • RFC 2819 RMON v1 • RFC 2865 RADIUS Authentication • RFC 3164 System Log • RFC 3195 System Log • RFC 3411-17 SNMP • D-Link Private MIB • LLDP MIB • Zone Defense MIB • 2233 Interface Group MIB

Optional 10 Gigabit Ethernet SFP+ Direct Attach Cables	
DEM-CB100S	10GbE SFP+ to SFP+ 1 m Direct Attach Cable
DEM-CB300S	10GbE SFP+ to SFP+ 3 m Direct Attach Cable
Optional Gigabit Ethernet SFP transceivers	
DEM-310GT	1000BASE-LX Single-Mode, 10KM
DEM-311GT	1000BASE-SX Multi-mode, 550M
DEM-314GT	1000BASE-LHX Single-mode, 50KM
Optional 10 Gigabit Ethernet SFP+ transceivers	
DEM-431XT	10GBASE-SR Multi-Mode, OM1:33M/OM2:82M/OM3:300M (w/o DDM)
DEM-432XT	10GBASE-LR Single-Mode, 10KM (w/o DDM)
DEM-432XT-DD	10GBASE-LR Single-Mode, 10KM (with DDM)

[1] This feature will be supported in a future firmware release

For more information: www.dlink.com

Updated February 2015

D-Link®
Building Networks for People

norwia

ND99-C1xxx-R24-80

Optical CWDM Transceiver with AutoSFP™ functionality for 10 Gigabit Ethernet (10Gbps)

Data Sheet

Description

The ND99-C1xxx-R24-80 is a Small Form Factor Pluggable (SFP+) LC optical transceiver. The unit is specially designed to meet the 10GBASE-ZR 10Gbps Ethernet specification. It contains one APD optical receiver and one cooled EML CWDM laser providing error-free transmissions with up to 80km of fiber.

The ND99-C1xxx-R24-80 is made with AutoSFP™ enabled functionality to fit the miniHUB product range.

Part Number Options

Part Number	Laser wavelength	Temperature *)
ND99-C1470-R24-80	1470nm	0°C to +40°C
ND99-C1490-R24-80	1490nm	0°C to +40°C
ND99-C1510-R24-80	1510nm	0°C to +40°C
ND99-C1530-R24-80	1530nm	0°C to +40°C
ND99-C1550-R24-80	1550nm	0°C to +40°C
ND99-C1570-R24-80	1570nm	0°C to +40°C
ND99-C1590-R24-80	1590nm	0°C to +40°C
ND99-C1610-R24-80	1610nm	0°C to +40°C

*) Rated temperature for the complete miniHUB.

Features

- AutoSFP™ enabled functionality
- Compliant to SFF-8431,SFF-8432 and IEEE 802.3ae 10Gigabit Ethernet, 10GBASE-ZR
- Available wavelengths: 1470nm to 1610nm, with 20nm channel spacing
- Cooled EML laser
- Typical Link lengths at 10Gbps:

  Up to 80km @ 9µm SMF
- Compliant to SFP+ specification
- SFF-8472 diagnostic features
- Hot-pluggable
- Class 1 21CFR and IEC60825-1 laser safety compliant
- Pb-free and RoHS compliant

Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which functional performance is not intended, device reliability is not implied, and damage to the device may occur.

Parameter	Minimum	Maximum	Unit
Storage temperature (non-operating)	-40	+85	°C
Relative Humidity (non-condensing)	5	95	%
Supply voltage (Vcc)	0	3.6	V

Recommended Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Case operating temperature:	0		+70	°C
Relative Humidity (non-condensing)	5		90	%
Supply voltage (Vcc)	3.15	3.3	3.45	V

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Supply current		420	610	mA
Power dissipation		1.4	2	W
Data rate	-	10.3125	11.1	Gbps

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125μm)			
Light source	Cooled EML laser			
Optical output power	0		+3	dBm
Optical extinction ratio (filtered)	8.2			dB
Optical center wavelength (λ = 1270nm to 1610nm)	λ-6.0nm	λ	λ+7.5nm	nm
Spectral width (-20dB)			0.3	nm
Dispersion penalty(1450ps/nm)			2	dB
Relative Intensity Noise			-128	dB/Hz
TX optical eye mask (filered, measured w/ PRBS 2^{-7}-1)	Compliant with IEEE 802.3ah-2004			

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Transmitting circuit fiber	Single Mode (9/125μm)			
Receiver technology	APD			
Optical receiving window	1470		1610	nm
Optical input overload power	-7			dBm
Path penalty at 1450ps/nm @10.3125Gbps			3	dB
Optical receiver sensitivity (BER=10^{-12}, 10.3125Gbps)			-24	dBm

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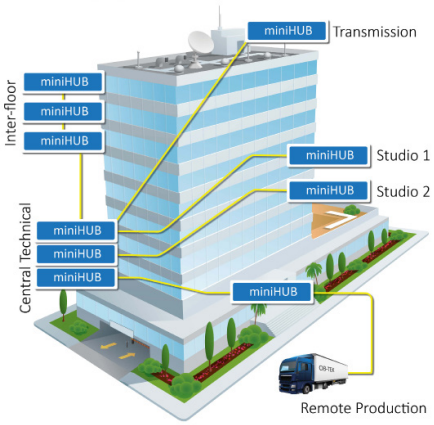
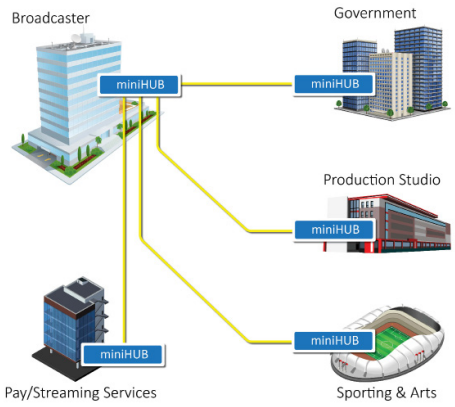
Fiber Optic Transport

Broadcasters

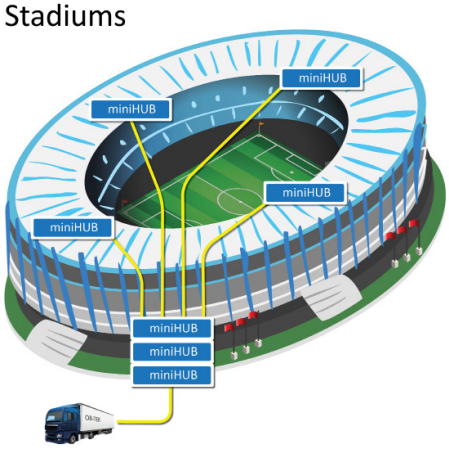


Metropolitan

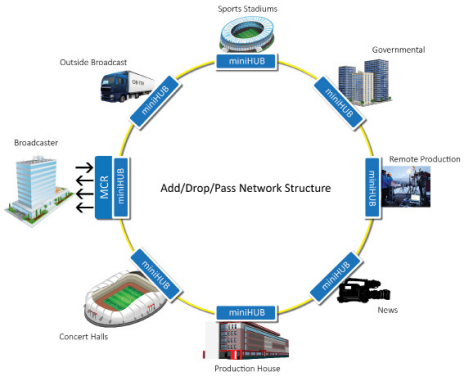


Sporting

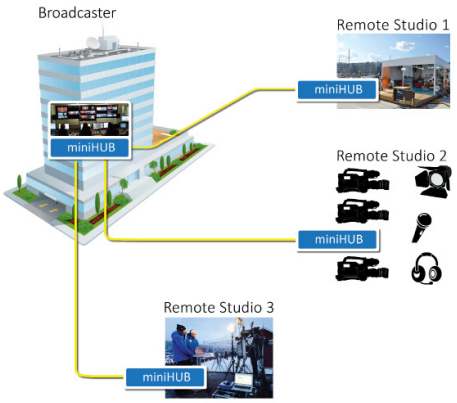
Stadiums



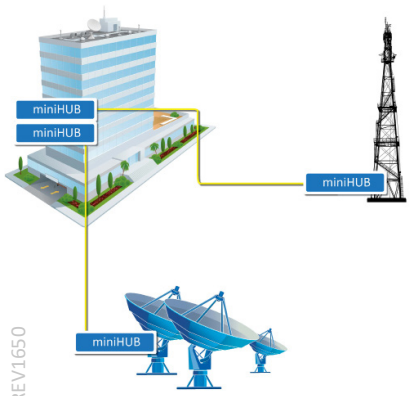
Ring Networks



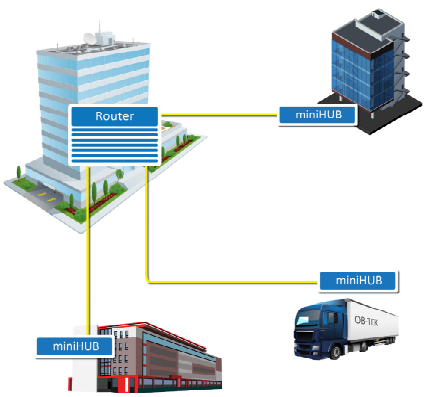
Remote Production



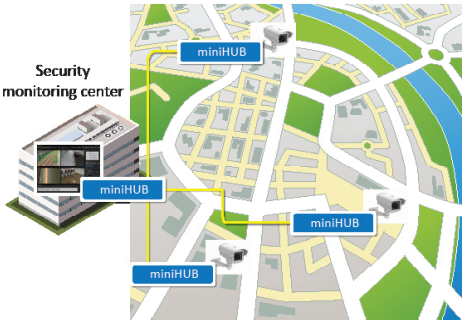
Transmission



Router connection



Security - High End



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