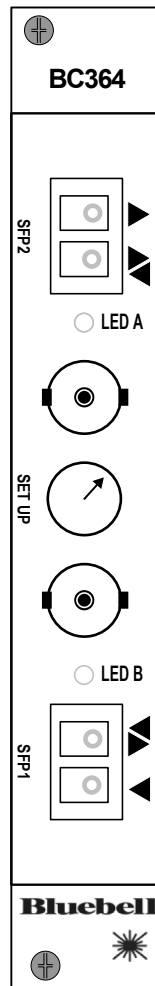


BC364 Multi-format interface



Operation Guide

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Declaration of Conformities

Bluebell Opticom Ltd. hereby declares that the BC364 Fibre Optic Transmission Equipment is in compliance with the essential requirements and other relevant provisions of the following EU directives:

EMI/RFI: 89/336/EEC, EN55022B, EN61000-4-11, EN61000-4-4 (Level 2),
EN61000-4-4FTB, EN61000-4-2, EN61000-4-5
Electrical: EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4
Class 1 Laser Safety Compliant

RoSH and WEEE declaration

Bluebell Opticom Ltd. complies with EU RoSH Directive 2002/95/EC, which restricts the use of substances hazardous to humans and their environment in the manufacture of electrical and electronic equipment.



The “crossed out wheellie bin” symbol on the enclosures and represented above is there to remind users of the obligation of selective collection of waste. This label is applied to various products to indicate that the product is not to be thrown away as unsorted municipal waste. At the end of life, dispose of this product by returning it to the point of sale or to your local municipal collection point for recycling of electric and electronic devices. Customer participation is important to minimize the potential effects on the environment and human health that can result from hazardous substances that may be contained in this product. Please dispose of this product and its packaging in accordance with local and national disposal regulations, including those governing the recovery and recycling of waste electrical and electronic equipment. Contact your local waste administration, waste collection company or dealer.

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Overview

Thank you for purchasing this Bluebell Opticom professional broadcast video product. If you are new to Bluebell products, or to the subject of transmitting video and/or other types of signal over fibre links, please take the time to read through this document before putting the BC364 to use.

Introduction

The BC364 plug-in module belongs to the range of Bluebell Opticom BC Series modular fibre interfaces, designed primarily for Outside Broadcast (OB) and studio applications. The module can support two independent channels, with primary input and output in the form of SFP carriers. These will normally be fitted with fibre-optic cartridges of the user's choice, though compatible cartridges with coaxial or other types of connector may be installed if wished. Each channel also has a second "copper" output in the form of a BNC socket.

The BC364 is a very versatile interface. The SFP carriers are capable of bidirectional operation: when fibre-optic cartridges are fitted, various cartridge combinations - an input and an output, two inputs, or two outputs - may be used. Also, the two channels may be configured in several ways; these two factors allow the module to perform a variety of optical/optical and optical/copper operations often needed in OB and other broadcast situations. Configuration of the BC364 is selected by a front panel hex switch. The module's flexibility is enhanced still further by the interchangeability of SFP cartridge types.

The BC364 is intended for use with SDI video signals (3G, HD or SD), or with ASI video signals, in situations where it is necessary to interface between two fibre-optic systems using different fibre connectors. It can also be used as a "break-out" device, allowing a 3G-SDI video signal to be "tapped-off" from a fibre link between two other locations. If non-fibre optic cartridges are fitted into one of the I/O carriers, the module can act as a fibre-copper converter with a local monitoring point.

Physical formats

BC364 modules fit the Bluebell BC100 or BC160 19" modular rack enclosures. The racks can house fifteen (BC100) or six (BC160) interface modules, and are fitted with dual internal AC power supplies.

Alternatively, modules may be fitted into smaller aluminium chassis; the BC101 and BC102 hold one and two modules respectively and require an external DC power source, while the BC120 holds three modules and has an integral mains PSU.

BC364 modules are fitted with two SFP carriers. These will typically be fitted with dual fibre optic cartridges, but copper interfaces may be fitted alternatively: connectivity options include composite video, SDI, HDMI and DVI.

For fibre optic implementation, singlemode operation will normally be at 1310 nm or 1550 nm; alternative CWDM grid wavelengths are also possible. The optical option is generally specified at the time of order.

Power requirements

Power supply requirements are dictated by the enclosure type used.

BC100 modular rack units:

These may be fitted with either one or two AC mains PSU modules (number specified at time of order). Each module has sufficient capacity to power a fully-loaded rack. The AC connection is via standard IEC cables, DC power distribution inside the rack is via the motherboard. See the Operation Guide supplied with the rack units for more details.

BC160 modular rack units:

These are fitted as standard with dual internal AC mains power supplies, each of sufficient capacity to power a fully-loaded rack. The AC connection is via standard IEC cables, DC power distribution inside the rack is via the motherboard. See the Operation Guide supplied with the rack units for more details.

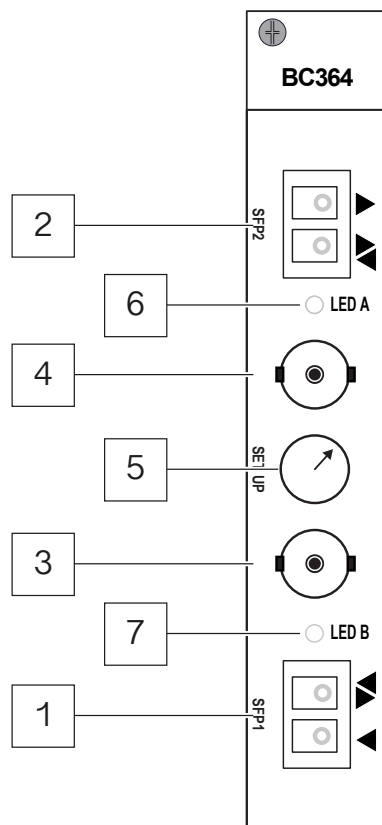
BC101 and BC102 single- and dual-slot chassis:

These are supplied with an external Universal AC adaptor which connects to the chassis via a flying lead terminated in a 4-pin locking XLR connector. Mains is via an IEC connector.

BC120 triple-slot chassis:

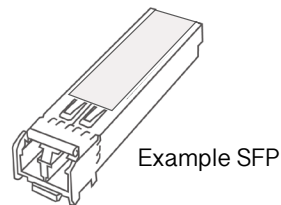
This housing for three plug-in cards is fitted with an internal AC mains supply; mains connection is via a rear IEC connector.

BC364 connections



SFP2 examples:

- Singlemode dual channel video transmitter
- Singlemode CWDM transceiver
- Composite NTSC/PAL DIN
- HDMI/DVI encoder



SFP1 examples:

- Singlemode optical transceiver
- SDI coaxial receiver
- HDMI/DVI decoder
- Composite decoder

1. **SFP1** – SFP carrier for signal-pair 1. User's choice of cartridge may be fitted. The arrowheads adjacent to the carrier indicate the transmit and receive connectors when a dual fibre cartridge is fitted. Note that lower optical connector is always “receive” – i.e., an input to the module. The upper connector may be either “transmit” or “receive” depending on the type of SFP fitted, which must match the operational mode selected by the SET UP switch [5] (see below).
2. **SFP2** – SFP carrier for signal-pair 2. Details as [1], except that the upper optical connector is always “transmit”. The lower connector may be either “transmit” or “receive” depending on the type of SFP fitted.
3. Output 1– standard 75 ohm BNC connector for output channel A SDI video, compliant with SMPTE 259/292/297/424 at data rates of between 270 Mb/s and 2.97 Gb/s. Also ASI-compatible.
4. Output 2 – standard 75 ohm BNC connector for output channel B SDI video. All details as [3].
5. **SET UP** – hexadecimal switch to select the module's operational configuration. Switch positions '0' and '8' to 'F' inclusive select an “auto” mode, while positions '1' to '7' select specific fixed configurations. For full details of these, see Operation Guide section “The SET UP switch – BC364 operational configurations”.

6. **LED A** – bi-colour LED for received input signal status. The input signal being monitored depends on the operational configuration selected: the table below summarises the possible signal sources. The LED illuminates green to indicate valid lock state, and red to indicate loss of data lock, reclocking disabled or a non-standard video bitrate. A green/red flashing indication means that SFP 2 cannot be read with the SET UP switch set to '0' (auto-configuration) or '7' (auto-source selection).
7. **LEDB** – bi-colour LED for input signal status; details as [6], except that a green/red flashing indication means that SFP 1 cannot be read with the SET UP switch set to '0' or '7'.

LED signal source table:

	Configuration 1	Configuration 2	Configuration 3	Configuration 4
LED A	SFP 1 Rx2 (upper)	SFP 1 Rx (lower)	SFP 2 Rx (lower)	SFP 1 Rx1 or Rx2
LED B	SFP 1 Rx1 (lower)	SFP 1 Rx (lower)	SFP 1 Rx (lower)	SFP 1 Rx1 or Rx2

The SET UP switch - BC364 operational configurations

Signal flows through the BC364 are determined by:

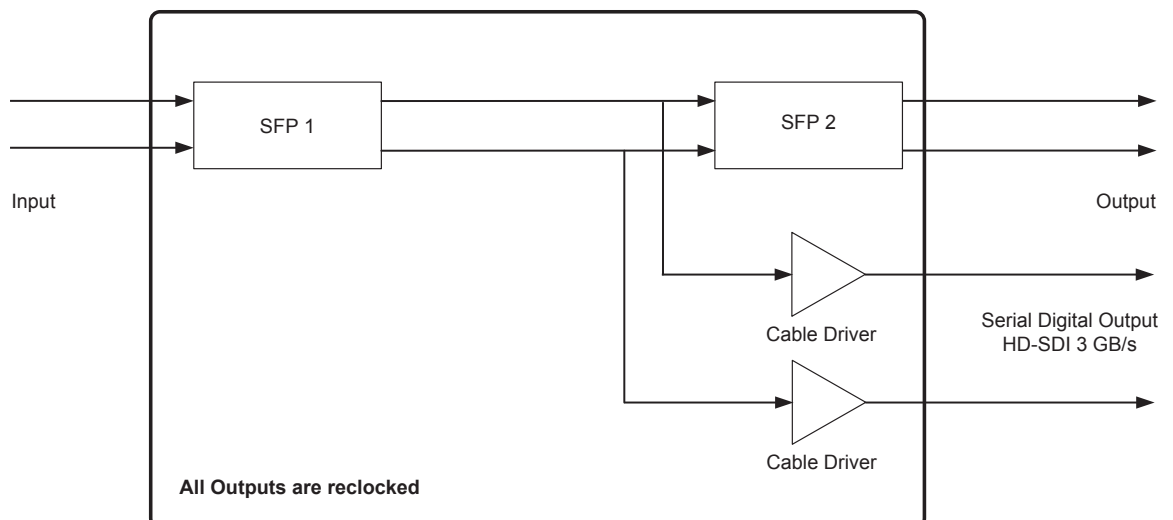
- a) the setting of the front panel **SET UP** switch, and
- b) whether either or both of the cartridges fitted are bidirectional or unidirectional.

There are four primary configurations, 1 to 4, selected by switch positions 1 to 4. Positions 5 to 7 select variations of Configuration 4, but do not alter the fundamental purpose that the module will be used for.

The table below summarises the configurations, and a detailed description of each configuration follows:

SET UP switch position	Config	SFP1	SFP2	Routing	Comments
0	Auto mode	See section "Auto mode"			
1	1	Dual Rx	Dual Tx	SFP 1 Rx1 to SFP 2 Tx1 SFP 1 Rx2 to SFP 2 Tx2	
2	2	Transceiver	Dual Tx	SFP 1 Rx to all outputs	
3	3	Transceiver	Transceiver	SFP 1 Rx to SFP 2 Tx SFP 2 Rx to SFP 1 Tx	
4	4	Dual Rx	Dual Tx	SFP 1 Rx2 to all outputs	
5				SFP 1 Rx1 to all outputs	
6				SFP 1 Rx1 or Rx2 to all outputs	Rx selected externally
7				SFP 1 Rx1 or Rx2 to all outputs	Rx selected by signal level
8 - F	Auto mode	Reserved			

Configuration 1



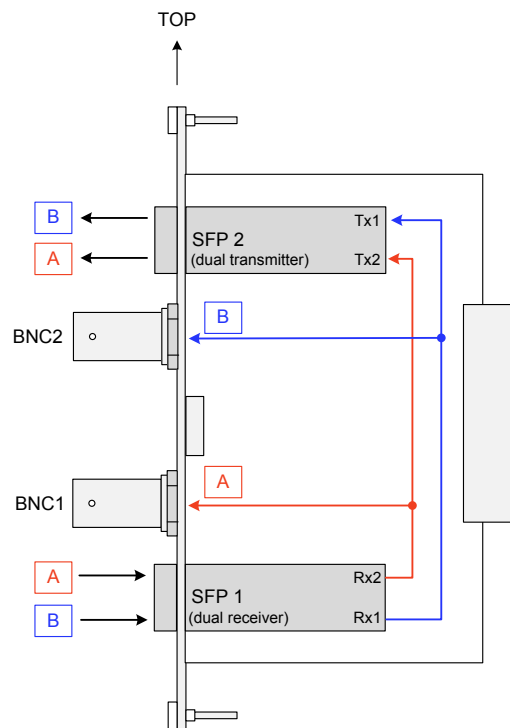
Set the hex switch to '1' to select this configuration.

This configuration will be useful for wavelength management when using multiple remote cameras. Two BC364 modules can be allocated per two cameras, one module handling the SDI feed from both cameras, the other the reverse video and control from the CCUs. Full details on multi-camera use can be found in the BC364 Data and Applications Note, available at www.bluebellcomms.co.uk/bc364-2.

Configuration 1 requires **SFP 1** to be fitted with a dual receiver cartridge and **SFP 2** with a dual transmitter cartridge. The transmitter wavelengths should differ, allowing the use of a CWDM optical multiplexer such as the Bluebell BC4.

Two separate signals are applied to the two optical ports of **SFP 1**; the two signal paths remain independent within the module, and are transmitted via the two ports of **SFP 2**, typically at different optical wavelengths from the input signals.

Both signals are reclocked, and either may be monitored locally via the BNC outputs (assuming the signal being transported via fibre is of a suitable type, e.g. not RF modulated). Note that in this configuration the upper BNC mirrors the signal transmitted from the upper port of **SFP 2**, and the lower BNC mirrors that transmitted from the lower port of **SFP 2**, as shown below:



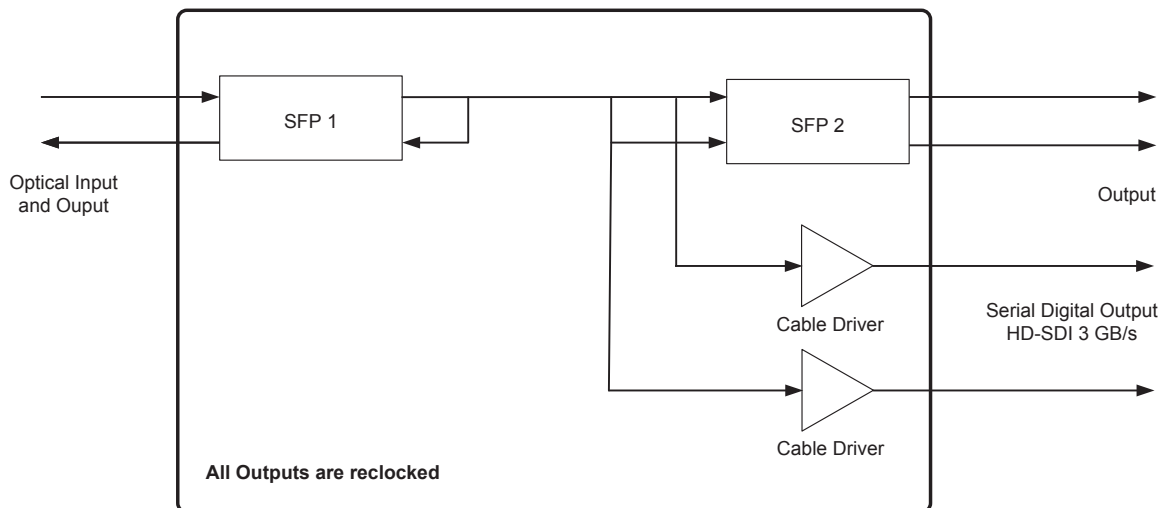
Configuration 1

In Configuration 1, the status LEDs indicate signal lock as follows:

LED	Green	Red
LED A	Valid lock at SFP 1 Rx2	Loss of lock* at SFP 1 Rx2
LED B	Valid lock at SFP 1 Rx1	Loss of lock* at SFP 1 Rx1

* or reclocking disabled, or non-standard video bitrate

Configuration 2

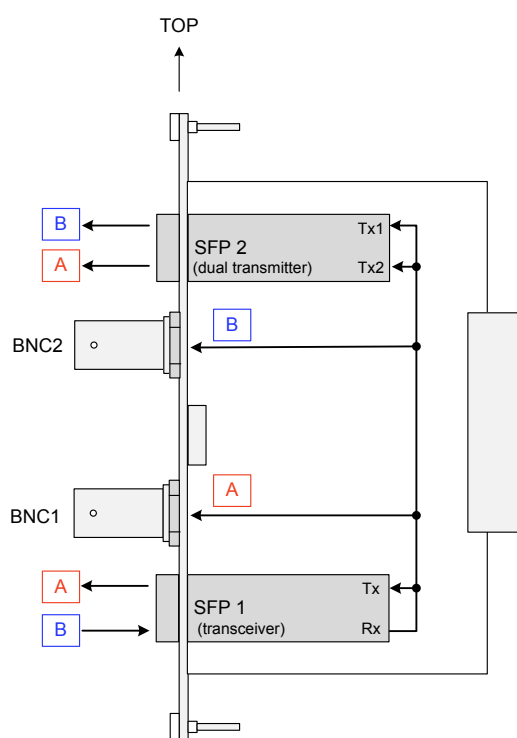


Set the hex switch to '2' to select this configuration.

This configuration may be used as part of a fibre ring to provide local monitoring, and optionally, additional HDMI or optical feeds for local distribution.

Configuration 2 requires **SFP 1** to be fitted with a transceiver cartridge. The module is then connected into the fibre ring, with the signal entering and leaving the transceiver at **SFP 1** (the lower port is the receiver input). Outputs for local monitoring are available at both BNC sockets (assuming the signal being transported via fibre is of a suitable type, e.g., not RF modulated).

If required, an optical dual transmitter cartridge may be fitted to **SFP 2**. The outputs from this will be the same at both ports, and will mirror the "copper" outputs at the BNCs. Alternatively, an HDMI cartridge may be fitted in **SFP 2**, providing a local feed to monitors or other equipment with an HDMI input. All outputs, including the re-transmitted input signal at **SFP 1**, are reclocked.



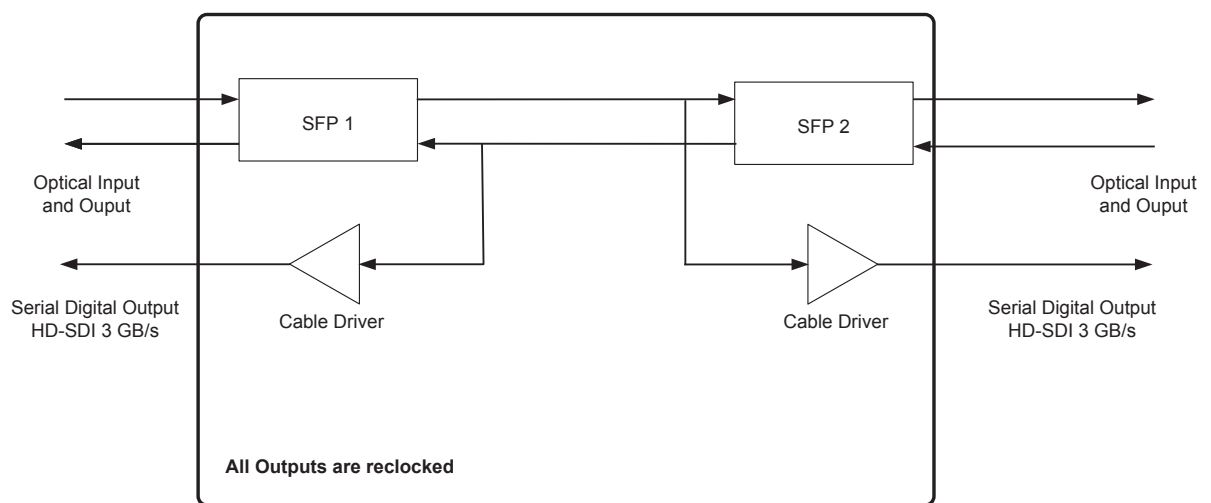
Configuration 2

In Configuration 2, the status LEDs indicate signal lock as follows:

LED	Green	Red
LED A	Valid lock at SFP 1 Rx	Loss of lock* at SFP 1 Rx
LED B	Valid lock at SFP 1 Rx	Loss of lock* at SFP 1 Rx

* or reclocking disabled, or non-standard video bitrate

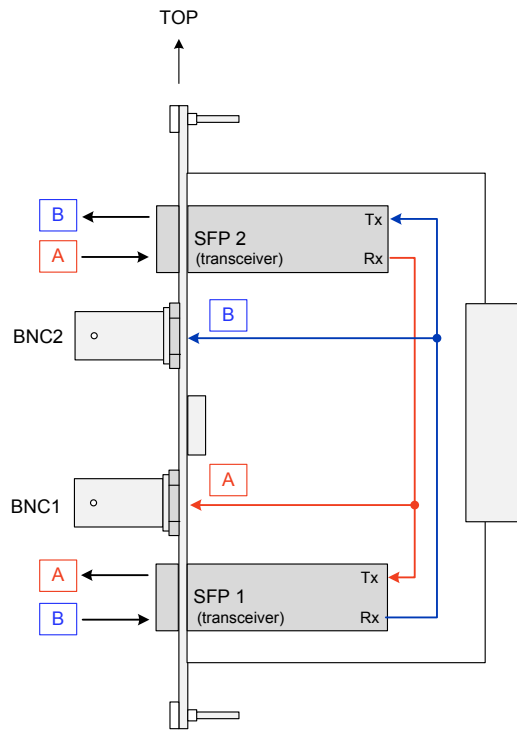
Configuration 3



Set the hex switch to '3' to select this configuration.

This configuration is useful when a duplex fibre ring is in use; the signal on either fibre may be tapped into locally using the BNC outputs, either for monitoring or to feed other equipment.

Both **SFP1** and **SFP 2** should be fitted with transceiver cartridges. The signal at SFP 1's input (the lower optical connector of the pair) will be reclocked and available at SFP 2's output (the upper optical connector of the pair) and the upper BNC connector. A second, symmetrical signal path is available in the opposite direction, as the diagram on the following page shows:



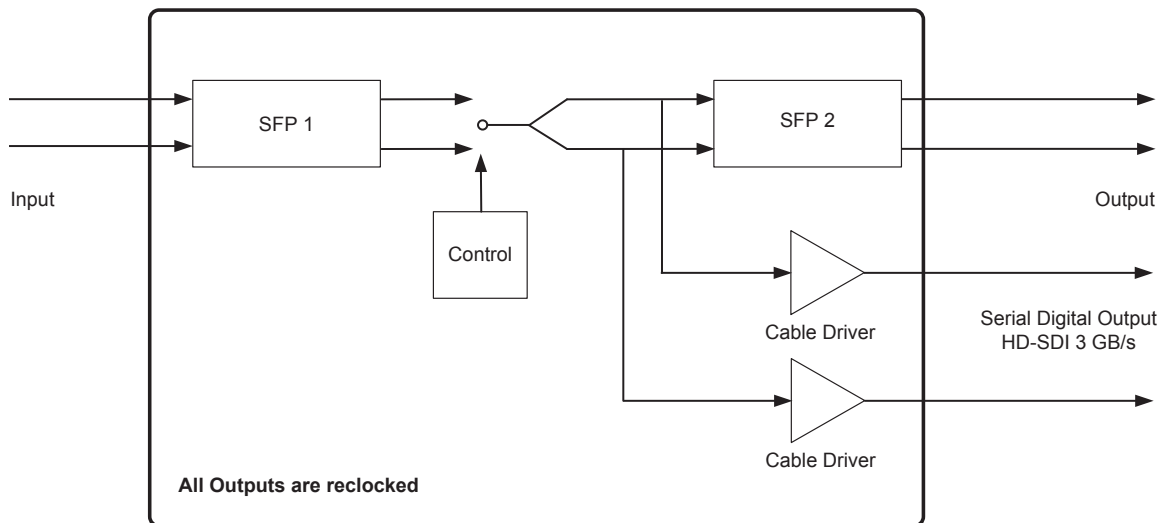
Configuration 3

In Configuration 3, the status LEDs indicate signal lock as follows:

LED	Green	Red
LED A	Valid lock at SFP 2 Rx	Loss of lock* at SFP 2 Rx
LED B	Valid lock at SFP 1 Rx	Loss of lock* at SFP 1 Rx

* or reclocking disabled, or non-standard video bitrate

Configuration 4



Set the hex switch to '4', '5', '6' or '7' to select this configuration. The differences between these settings are discussed on the following page.

This configuration is intended to be used with a dual redundant fibre system. The module accepts primary and secondary SDI signals, and makes one of them available at all outputs for further distribution. SFP 1 is used for the two inputs, and both outputs of SFP2, and both BNC outputs all carry the same signal.

SFP 1 is fitted with a dual receiver cartridge and **SFP 2** with dual transmitter cartridge. The method used to determine which of the two input signals is selected depends on the **SET UP** switch setting, as follows:

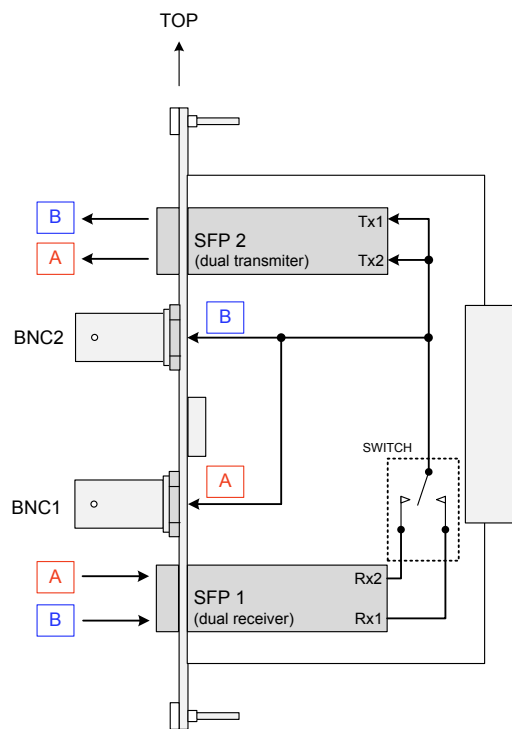
Switch position 4: the selected source is Rx2. The signal at **SFP 1** receiver 2 (the upper optical connector of the pair) is permanently routed to all outputs. Signals at **SFP 1** receiver 1 will be ignored.

Switch position 5: the selected source is Rx1. The signal at **SFP 1** receiver 1 (the lower optical connector of the pair) is permanently routed to all outputs. Signals at **SFP 1** receiver 2 will be ignored.

Switch position 6: external source selection. Use of the signal at either **SFP 1** receiver 1 or receiver 2 is determined by an external DC input, applied to the module through the backplane connector. For applications requiring external control, please contact the Bluebell Sales Office.

If multiple BC364 modules are present in the rack, all modules will switch their sources simultaneously, a very useful fail-over provision.

Switch position 7: Automatic source selection. In this setting, selection of **SFP 1** receiver 1 or receiver 2 is determined by optical signal strength. Default operation is with receiver 2; if the recovered signal level drops below a factory-set threshold, the module switches automatically to the signal at receiver 1 – provided that this signal's level is itself above the threshold. If a usable signal level cannot be recovered from either receiver, receiver 2 is selected as the default.



Configuration 4

In Configuration 4, the status LEDs indicate signal lock as follows:

LED	Green	Red
LEDA	Valid lock at SFP 1 Rx1 or Rx2 (as selected)	Loss of lock* at SFP 1 Rx1 or Rx2 (as selected)
LEDB	Valid lock at SFP 1 Rx1 or Rx2 (as selected)	Loss of lock* at SFP 1 Rx1 or Rx2 (as selected)

* or reclocking disabled, or non-standard video bitrate

Auto mode

Auto mode should be selected by setting the SET UP switch to '0'. Switch positions '8' to 'F' inclusive also select auto mode.

In auto mode, the BC364 module senses the type of SFP cartridge fitted in each carrier, and configures the module as described in Configurations 1, 2 or 3 above. The following table summarises the selections:

SFP 1	SFP 2	Configuration
Dual receiver	Dual transmitter	Configuration 1
Transceiver	Dual transmitter	Configuration 2
Transceiver	Transceiver	Configuration 3

It will be seen from the table at page 8 that both Configurations 1 and 4 require the same pair of SFP cartridges: however, Auto mode will always select Configuration 1 for this cartridge combination. Configuration 4 must be selected 'manually'.

Operation with incorrect SFP cartridges

With Auto mode (hex switch position 0) or automatic source selection (hex switch position 7) selected, the BC364 will default to the routing defined by hex switch position 4 if the cartridges fitted do not match those required by any of Configurations 1, 2 or 3, or, if the SFPs are unreadable. Thus in these cases, the upper optical connector of SFP 1 (receiver 2) will be the active input, and the signal applied here will be available at all outputs.

Note that in hex switch positions 1 to 6 (inclusive) , the signal routing will be as described in the section above (“The SET UP switch - BC364 operational configurations”) irrespective of which SFP type are fitted.

Inadvertent operation with an incorrect SFP cartridge type will not damage the BC364 module.

SDI format compatibility

BC364 interfaces are intended for use with serial digital video (SDI) signals at data rates up to 3 Gb/s. Standards supported are SD-SDI (SMPTE 259M-compliant at 270 Mb/s), HD-SDI (SMPTE 292M-compliant at 1.483 and 1.485 Gb/s) and 3G-SDI (SMPTE 424M-compliant at 2.967 and 2.970 Gb/s). ASI baseband streams at 270 Mb/s are also compatible. Signals at these standards will be detected and the relevant status LED(s) will illuminate green to indicate “locked”. These signals can be re-clocked.

The BC364 will also pass signals at other bit rates, such as MADI at 125 Mb/s and other digital video formats at 143 Mb/s, 177 Mb/s, 360 Mb/s, and 540 Mb/s, but in these cases, the status LED(s) will illuminate red (“not locked”). These signals will not be re-clocked.

BC364 SFP combinations

The BC364 is a format converter whose functionality and application will always be determined by the type of cartridges fitted into the two SFP carriers. While the BC364 will generally be used with fibre optic cartridges, several other types exist and are compatible with the module.

The table below illustrates some possible combinations of input and output formats. When fitting non-optical cartridges, users should first consider the configuration in which the module is to be used (i.e. the SET UP switch setting) as this will determine whether the two cartridges will be single- or dual-channel, transmitters, receivers or transceivers. When this has been decided, use the table to check that the combination of Input and Output SFPs is a compatible one.

		OUTPUT							
		Optical Transmitter SM/MM	Optical Transmitter SM 1550 nm	Optical Transmitter CWDM	Composite Encoder	3G/HD/SD-SDI/ASI Transmitter	HDMI 1.4 Encoder	DVI 1.0 Encoder	MADI Encoder
INPUT	Optical Receiver SM/MM	3G, HD-SDI, SD-SDI, ASI, MADI	3G, HD-SDI, SD-SDI, ASI, MADI	3G, HD-SDI, SD-SDI, ASI, MADI	SD-SDI only	3G, HD-SDI, SD-SDI, ASI only	3G, HD-SDI, SD-SDI only	3G, HD-SDI, SD-SDI only	MADI only
	Composite Decoder	SD-SDI	SD-SDI	SD-SDI	SD-SDI	SD-SDI	SD-SDI	SD-SDI	
	3G/HD/SD-SDI/ASI Receiver	3G, HD-SDI, SD-SDI, ASI	3G, HD-SDI, SD-SDI, ASI	3G, HD-SDI, SD-SDI, ASI	SD-SDI only	3G, HD-SDI, SD-SDI, ASI	3G, HD-SDI, SD-SDI only	3G, HD-SDI, SD-SDI only	
	HDMI Decoder	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	SD-SDI only	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	
	DVI Decoder	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	SD-SDI only	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	3G, HD-SDI, SD-SDI	
	MADI Decoder	MADI	MADI	MADI					MADI

The table cells at the intersections of inputs and outputs indicate the format of the “native” internal signal. Both SFPs must be capable of handling the internal signal. Where the word ‘only’ is used, the output SFP can only accept a subset of the possible input signals.

Some of the non-optical SFP combinations shown above will clearly not be realisable with certain of the BC364’s operational configurations, particularly where there is a conflict between a configuration’s requirement for a transceiver SFP and the unidirectional nature of some formats. Single channel SFPs may be used, but the user must check the signal flow diagram for the intended configuration to see the effect of the missing channel. It should be noted that as a general rule, single channel transmitters use port Tx1 and single channel receivers use port Rx1.

In all cases, BC364 output signals are simply buffered and optionally re-clocked versions of an input signal. The module does not convert any signal types but just re-generates them for output, and will pass on any embedded audio that the SFPs can carry.

Please see also the tables of available cartridge types at page 21.

Other setup options

BC364 modules have five movable, internal PCB jumpers (“links”), LK1 to LK5, whose positions modify the interface’s operation. There are no other user adjustments. The links are all set on 3-pin headers: a jumper is positioned either on pins 1 and 2 or 2 and 3 of the header.

LK1 and LK5 control the SDI signal reclocking in each of the module’s two output channels, though their input source varies with the module’s operational configuration, as set on the **SET UP** switch. Reclocking is enabled as the factory default. The following table defines the signals in Output Channel A and Output Channel B for each configuration:

	Output Channel A (ref LK1)	Output Channel B (ref LK5)
Configuration 1	Input signal at SFP 1 Rx2	Input signal at SFP 1 Rx1
Configuration 2	Input signal at SFP 1 Rx	Input signal at SFP 1 Rx
Configuration 3	Input signal at SFP 2 Rx	Input signal at SFP 1 Rx
Configuration 4	Input signal at SFP 1 Rx1 or Rx2*	Input signal at SFP 1 Rx1 or Rx2*

* In Configuration 4, the SFP 1 receiver in use is determined by the SET UP switch setting. LK1 controls reclocking of the A outputs, and LK5 the B outputs. See the Configuration 4 block diagram at page 14.

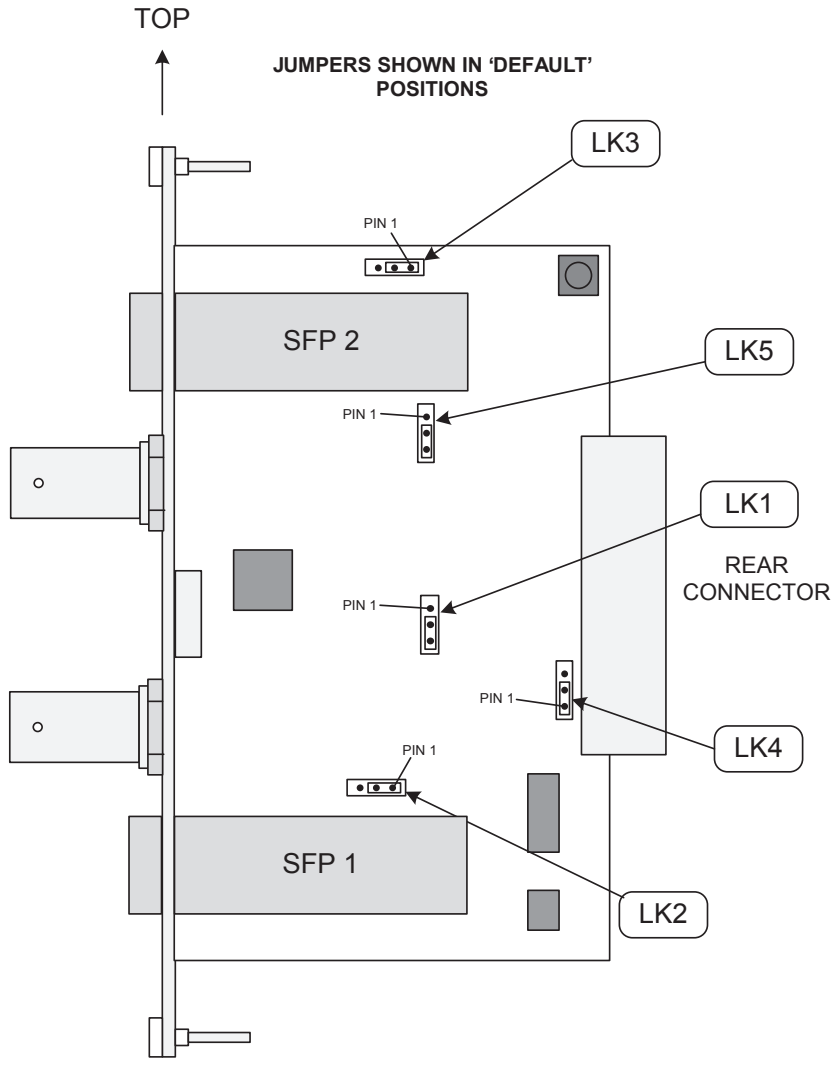
LK2 and LK3 should be set according to whether either or both of the SFPs fitted are MSA (the default setting) or non-MSA type.

LK4 is for factory use only. In its default setting, the module’s control EEPROM is write-protected.

The table below summarises the jumper settings. Factory default settings are shown in ***Bold italics***.

Jumper	Setting	Issue 2 PCBs
LK1	Pins 1, 2 linked	Ch A signal path reclocking disabled*
	Pins 2, 3 linked	<i>Ch A signal path reclocking enabled</i>
LK2	Pins 1, 2 linked	<i>When SFP 1 is data type (MSA)</i>
	Pins 2, 3 linked	When SFP 1 is video type (non-MSA)
LK3	Pins 1, 2 linked	<i>When SFP 2 is data type (MSA)</i>
	Pins 2, 3 linked	When SFP 2 is video type (non-MSA)
LK4	Pins 1, 2 linked	<i>(or no link) - EEPROM protected</i>
	Pins 2, 3 linked	For factory use only
LK5	Pins 1, 2 linked	Ch B signal path reclocking disabled*
	Pins 2, 3 linked	<i>Ch B signal path reclocking enabled</i>

* When reclocking is disabled, the relevant status LED will permanently display red, indicating “not locked”.



BC364 – PCB layout
SIMPLIFIED VIEW - ONLY PRIMARY
COMPONENTS SHOWN

The diagram above shows the locations of the PCB jumpers. Note that on the PCB itself, Pin 1 of each jumper is indicated by a bevelled corner on the silkscreen outline around the header, and a square solder pad on the rear of the module.

External monitoring

All modules in the Bluebell modular range can report their status to the rack in which they are housed. The rack's LEDs (two per module) will confirm correct operation (or otherwise), and if the optional SNMP/Ethernet interface module is fitted, remote monitoring is available.

BC100/160 Frame Panel LEDs:

- Ch A: green = output channel A locked.
red = loss of lock of output channel A, or reclocking disabled, or non-standard video bitrate.
red/green flashing = unable to read **SFP 2**.
- Ch B: green = output channel B locked.
red = loss of lock of output channel B, or reclocking disabled, or non-standard video bitrate.
red/green flashing = unable to read **SFP 1**.

Monitoring via webpages:

"Overview" webpage:

- CHA LED: green = output channel A locked.
red = loss of lock of output channel A, or reclocking disabled, or non-standard video bitrate.
red/green blinking = unable to read **SFP 2**.
- CHB LED: green = output channel B locked.
red = loss of lock of output channel B, or reclocking disabled, or non-standard video bitrate.
red/green blinking = unable to read **SFP 1**.

"Frame Information" webpage:

SFP 1 is reported as "SFP 1", **SFP 2** is reported as "SFP 2".

Monitoring via SNMP:

CHA Sig: good = equivalent to the Ch A Frame LED showing green
fail = equivalent to the Ch A Frame LED showing red

CHB Sig: good = equivalent to the Ch B Frame LED showing green
fail = equivalent to the Ch B Frame LED showing red

SFP 1 is reported as "sfp...". **SFP 2** is reported as "sfp2...".

Note: if traps are enabled, a flashing LED will cause regular unwanted traps. This can be avoided by setting the hex switch to one of the fixed modes (positions 1 through 6) or by ensuring that valid SFPs are fitted to the card.

Appendix

Specifications - BC364

Monitoring Output	
Connectors	2 x 75 ohm BNC per IEC 60169-8 Amendment 2
Standards supported*	SMPTE 424M, SMPTE 292M, SMPTE 259M, SMPTE 297M, DVB-ASI
Return loss	> 15 dB @ 1.485 Gb/s
DC Offset	0 ±0.5 V
Jitter	<0.15 UI line equalised
Signal level	800 mV ±10%
Format	Reclocked; may be bypassed via internal jumper
Other Output & Input	
Physical	SFP Module
Connector	SFP Module dependent**
Signal detection	Bicolour LED (green = lock, red = no lock/reclocking disabled/non-standard video bitrate)
Conformities	
EMI/RFI	Complies with 89/336/EEC
Electrical	Complies with EN 61000-6-1, EN61000-6-2
Laser Safety	Class 1 laser safety compliant
RoHS	Complies with Directive 2002/95/EC
Physical	
Depth	86 mm (inc. connectors)
Width	20 mm (4HP)
Height	129 mm (3RU)
Weight	100 g
Operating Temp	-30°C to +70°C
Power	3.7 W

* The “Standards supported” are those that can be reclocked and for which the status LEDs will give a “locked” indication. Other non-standard signals are also permitted.

** Unit functionality is defined by the SFP modules fitted. See diagram at page 16 for currently available combinations.

SFP Options

The BC364's functionality is largely dependent on which type SFP cartridge is fitted to each of the two carriers (**SFP 1** and **SFP 2**). Your BC364 card will normally be supplied with the cartridges that were specified at the time of ordering already factory-fitted.

The tables below list some of the compatible SFP cartridges available at the time of printing; others may become available over time. The applications to which the BC364 may be put can be changed at any time by fitting a different cartridge in either or both the **SFP 1** and **SFP 2** carriers. Please contact the Bluebell Sales Department with any specific requirements.

SFP 1		
SFP Part Ref.	MSA?	Description
Single/Dual Channel receivers:		
VRS/S/SFP	Non-MSA	Singlemode single channel video wideband receiver
VR/S/SFP	Non-MSA	Singlemode dual channel video wideband receiver
VR/S/SFP/APD	Non-MSA	Singlemode dual channel video wideband APD receiver
Transceivers - standard wavelengths:		
DTR/M/SFP	MSA	Multimode dual fibre transmitter 850 nm; wideband receiver
DTR/S/SFP	MSA	Singlemode dual fibre 40 km transmitter 1310 nm; wideband receiver
SDI Coaxial DIN 1.0/2.3:		
BB30CSRT-LN	Non-MSA	SDI Coaxial Transceiver, long reach, DIN
BB30CS2R-LN	Non-MSA	SDI Coaxial Dual Receiver, long reach, DIN
BB30CSRT-LNR	Non-MSA	SDI Coaxial Transceiver, long reach, reclocked, DIN
BB30CS2R-LNR	Non-MSA	SDI Coaxial Dual Receiver, long reach, reclocked, DIN
SDI Coaxial HD-BNC:		
BB30HDRT-LN	Non-MSA	SDI Coaxial Transceiver, long reach, HD-BNC
BB30HDRT-LNR	Non-MSA	SDI Coaxial Transceiver, long reach, reclocked, HD-BNC
BB30HD2R-LNR	Non-MSA	SDI Coaxial Dual Receiver, long reach, reclocked, HD-BNC
Composite NTSC/PAL DIN:		
BB30CSRT-AN	Non-MSA	COMPOSITE CODEC Coaxial Transceiver, DIN
BB30CS2R-AN	Non-MSA	COMPOSITE CODEC Coaxial Dual Receiver, DIN
Composite NTSC/PAL HD-BNC:		
BB30HDRT-AN	Non-MSA	COMPOSITE CODEC Coaxial Transceiver, HD-BNC
BB30HD2R-AN	Non-MSA	COMPOSITE CODEC Coaxial Dual Receiver, HD-BNC
HDMI/DVI:		
BB34TD1R-SN	Non-MSA	HDMI/DVI to SDI Receiver, Type D with retention clip
MADI:		
BB06HD2R-MN-MADI	Non-MSA	MADI emSFPTM Coaxial Dual Receiver Medium reach, HD-BNC
BB06HDRT-MN-MADI	Non-MSA	MADI emSFPTM Coaxial Transceiver Medium reach, HD-BNC

SFP 2		
SFP Part Ref.	MSA?	Description
Single/Dual Channel transmitters - standard wavelengths:		
VT/S/SFP/13	Non-MSA	Singlemode single channel video transmitter 1310 nm
VT/S/SFP/13/13	Non-MSA	Singlemode dual channel video transmitter 1310/1310 nm
VT/S/SFP/13/15	Non-MSA	Singlemode dual channel video transmitter 1310/1550 nm
VT/S/SFP/13/15/WDM	Non-MSA	Singlemode dual channel video single fibre transmitter 1310/1550 nm. Fitted with internal WDM MUX.
Dual channel transmitters - CWDM wavelengths:		
VT/S/SFP/CWDM/27/29	Non-MSA	Singlemode dual channel video CWDM transmitter 1270/1290 nm
VT/S/SFP/CWDM/31/33	Non-MSA	Singlemode dual channel video CWDM transmitter 1310/1330 nm
VT/S/SFP/CWDM/35/37	Non-MSA	Singlemode dual channel video CWDM transmitter 1350/1370 nm
VT/S/SFP/CWDM/39/41	Non-MSA	Singlemode dual channel video CWDM transmitter 1390/1410 nm
VT/S/SFP/CWDM/47/49	Non-MSA	Singlemode dual channel video CWDM transmitter 1470/1490 nm
VT/S/SFP/CWDM/51/53	Non-MSA	Singlemode dual channel video CWDM transmitter 1510/1530 nm
VT/S/SFP/CWDM/55/57	Non-MSA	Singlemode dual channel video CWDM transmitter 1550/1570 nm
VT/S/SFP/CWDM/59/61	Non-MSA	Singlemode dual channel video CWDM transmitter 1590/1610 nm
Transceivers - standard wavelengths:		
DTR/M/SFP	MSA	Multimode dual fibre transmitter 850 nm; wideband receiver
DTR/S/SFP	MSA	Singlemode dual fibre 40 km transmitter 1310 nm; wideband receiver
Transceivers - CWDM wavelengths:		
DTR/S/SFP/CWDM/27	MSA	Singlemode CWDM transmitter 1270 nm; wideband receiver
DTR/S/SFP/CWDM/29	MSA	Singlemode CWDM transmitter 1290 nm; wideband receiver
DTR/S/SFP/CWDM/31	MSA	Singlemode CWDM transmitter 1310 nm; wideband receiver
DTR/S/SFP/CWDM/33	MSA	Singlemode CWDM transmitter 1330 nm; wideband receiver
DTR/S/SFP/CWDM/35	MSA	Singlemode CWDM transmitter 1350 nm; wideband receiver
DTR/S/SFP/CWDM/37	MSA	Singlemode CWDM transmitter 1370 nm; wideband receiver
DTR/S/SFP/CWDM/39	MSA	Singlemode CWDM transmitter 1390 nm; wideband receiver
DTR/S/SFP/CWDM/41	MSA	Singlemode CWDM transmitter 1410 nm; wideband receiver
DTR/S/SFP/CWDM/47	MSA	Singlemode CWDM transmitter 1470 nm; wideband receiver
DTR/S/SFP/CWDM/49	MSA	Singlemode CWDM transmitter 1490 nm; wideband receiver
DTR/S/SFP/CWDM/51	MSA	Singlemode CWDM transmitter 1510 nm; wideband receiver
DTR/S/SFP/CWDM/53	MSA	Singlemode CWDM transmitter 1530 nm; wideband receiver
DTR/S/SFP/CWDM/55	MSA	Singlemode CWDM transmitter 1550 nm; wideband receiver
DTR/S/SFP/CWDM/57	MSA	Singlemode CWDM transmitter 1570 nm; wideband receiver
DTR/S/SFP/CWDM/59	MSA	Singlemode CWDM transmitter 1590 nm; wideband receiver
DTR/S/SFP/CWDM/61	MSA	Singlemode CWDM transmitter 1610 nm; wideband receiver
SDI coaxial DIN 1.0/2.3:		
BB30CS2T-LN	Non-MSA	SDI Coaxial Dual Transmitter, long reach, DIN
BB30CSRT-LN	Non-MSA	SDI Coaxial Transceiver, long reach, DIN
BB30CS2T-LNR	Non-MSA	SDI Coaxial Dual Transmitter, long reach, reclocked, DIN
BB30CSRT-LNR	Non-MSA	SDI Coaxial Transceiver, long reach, reclocked, DIN

SFP 2		
SFP Part Ref.	MSA?	Description
SDI coaxial HD-BNC:		
BB30HD2T-LN	Non-MSA	SDI Coaxial Dual Transmitter, long reach, HD-BNC
BB30HDRT-LN	Non-MSA	SDI Coaxial Transceiver, long reach, HD-BNC
BB30HD2T-LNR	Non-MSA	SDI Coaxial Dual Transmitter, long reach, reclocked, HD-BNC
BB30HDRT-LNR	Non-MSA	SDI Coaxial Transceiver, long reach, reclocked, HD-BNC
Composite NTSC/PAL DIN:		
BB30CS2T-AN	Non-MSA	COMPOSITE CODEC Coaxial Dual Transmitter, DIN
BB30CSRT-AN	Non-MSA	COMPOSITE CODEC Coaxial Transceiver, DIN
Composite NTSC/PAL HD-BNC:		
BB30HD2T-AN	Non-MSA	COMPOSITE CODEC Coaxial Dual Transmitter, HD-BNC
BB30HDRT-AN	Non-MSA	COMPOSITE CODEC Coaxial Transceiver, HD-BNC
HDMI/DVI:		
BB34TD1T-SN	Non-MSA	SDI to HDMI/DVI Transmitter, Type D with retention clip
MADI:		
BB06HD2T-MN-MADI	Non-MSA	MADI emSFPTM Coaxial Dual Transmitter, medium reach, HD-BNC
BB06HDRT-MN-MADI	Non-MSA	MADI emSFPTM Coaxial Transceiver, medium reach, HD-BNC