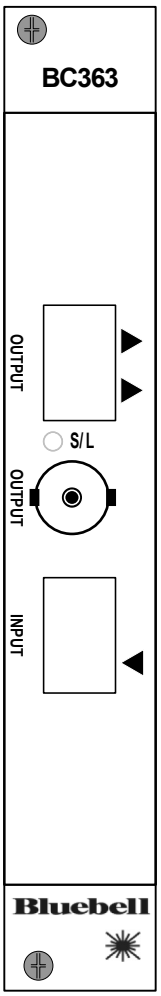
Bluebell

BC363
Multi-format interface



Operation Guide

Ref: BC363-OperationGuide-v1

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Declaration of Conformities

The components of the Bluebell Opticom BC363 Multi-format Interface complies with the essential requirements of the following EU directives, where appropriate:

89/336/EEC, EN55022B, EN61000-4-2, EN61000-4-4 (Level 2), EN61000-4-4FTB, EN61000-4-5, EN61000-4-11, 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 wheelie 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.

Table of Contents

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 BC363 to use.

Introduction

The BC363 plug-in card belongs to the range of the Bluebell Opticom BC Series modular fibre interfaces, designed primarily for Outside Broadcast (OB) and studio applications. The card is unidirectional, with input and primary output both 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. The card has a second output in the form of a BNC socket.

The BC363 is intended for use with SDI video signals (3G-SDI, HD-SDI or SD-SDI), 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 card can act as a fibre-to-copper converter with a local monitoring point.

Physical formats

BC363 cards fit the Bluebell BC100 or BC160 19" modular rack enclosures. The racks can house fifteen (BC100) or six (BC160) interface cards, and are fitted with dual internal AC power supplies.

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

BC363 cards 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.

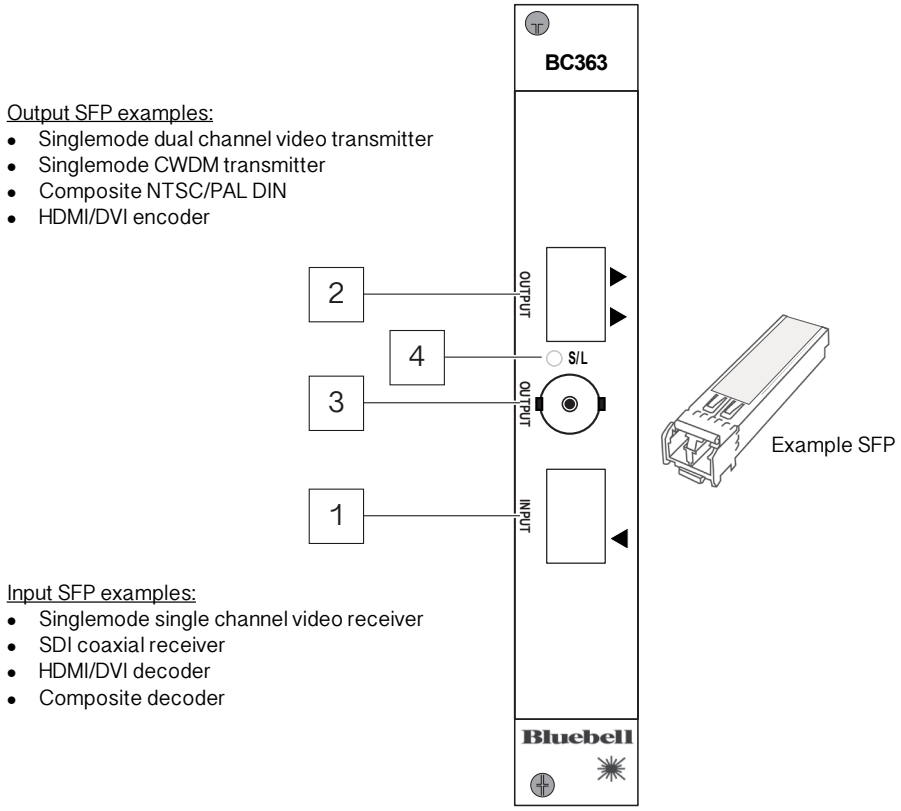
BC100 modular rack units:
These may be fitted with either one or two AC mains PSU modules (number specified at time of order). Each module has sufficient capacity to power a fully-loaded rack. The AC connection is via standard IEC cables, DC power distribution inside the rack is via the motherboard. 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.

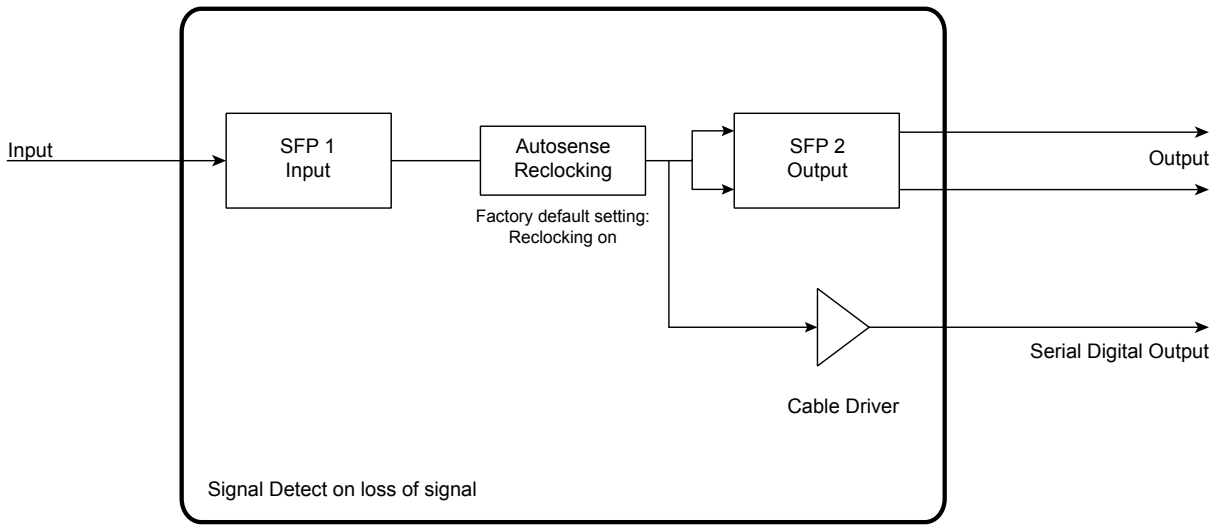
BC120 triple-slot chassis:
This housing for three plug-in cards is fitted with an internal AC mains supply; mains connection is via a rear IEC connector.

BC363 connections



1. **INPUT** – SFP carrier for user's choice of cartridge. When a dual fibre cartridge is fitted, the input signal should be applied to the lower optical connector.
2. **OUTPUT** – SFP carrier for user's choice of cartridge. When a dual fibre cartridge is fitted, both optical connectors are active unless it is a transceiver, in which case only the upper fibre port is active.
3. **OUTPUT** – standard 75 ohm BNC connector for 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. **S/L** ('signal loss') – bi-colour LED; illuminates red to indicate loss of data lock and green to indicate valid lock state.

System block diagram



BC363

The BC363 receives an incoming SDI or ASI signal at the **INPUT** SFP cartridge; this will typically be via a single fibre-optic cable, but alternative SFP cartridges are available to allow HDMI, DVI, etc., connectivity. After reclocking, the video signal is available for onward distribution at both **OUTPUT** connectors. Again, an optical cartridge will typically be fitted in the SFP carrier, though other connectivity options are available. The received and reclocked signal is always available at the BNC connector.

SDI format compatibility

BC363 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 **S/L** LED will illuminate green to indicate "locked". These signals can be re-clocked.

The BC363 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 **S/L** LED will illuminate red ("not locked"). These signals will not be re-clocked.

BC363 SFP combinations

		OUTPUT SFP2							
		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 SFP1	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 BC363 is a format converter whose functionality and application will always be determined by the type of cartridges fitted into the **INPUT** and **OUTPUT** SFP carriers. The input signal will always be available at the BNC **OUTPUT** connector regardless of the types of cartridge fitted.

The table above illustrates the possible combinations of input and output formats. Cartridges supporting any of the formats listed vertically may be fitted to the **INPUT** SFP carrier, and similarly, any of those listed horizontally to the **OUTPUT** carrier. 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** SFP signals.

The signals sent to the **OUTPUT** SFP and **OUTPUT** BNC are simply buffered and optionally re-clocked versions of the signal at the **INPUT** SFP. The card does not convert any signal types but just re-generates them for the **OUTPUT** SFP, and will pass on any embedded audio that the **INPUT** and **OUTPUT** SFPs can carry.

Please see also the tables of available cartridge types at "SFP Options" on page 13.

Configuration and setup options

BC363 cards have movable, internal PCB jumpers ("links"), whose positions modify the interface's operation. There are no other user adjustments.

There are two different versions of BC363 PCB: **Issue 1** and **Issue 2**.

On **Issue 1** cards, only one of the SFPs can be monitored at a time, and this selection is made by the links LK2 and LK3. The SFP that is NOT to be monitored should not have a jumper fitted to its associated link (LK2 for the **INPUT** SFP and LK3 for the **OUTPUT** SFP).

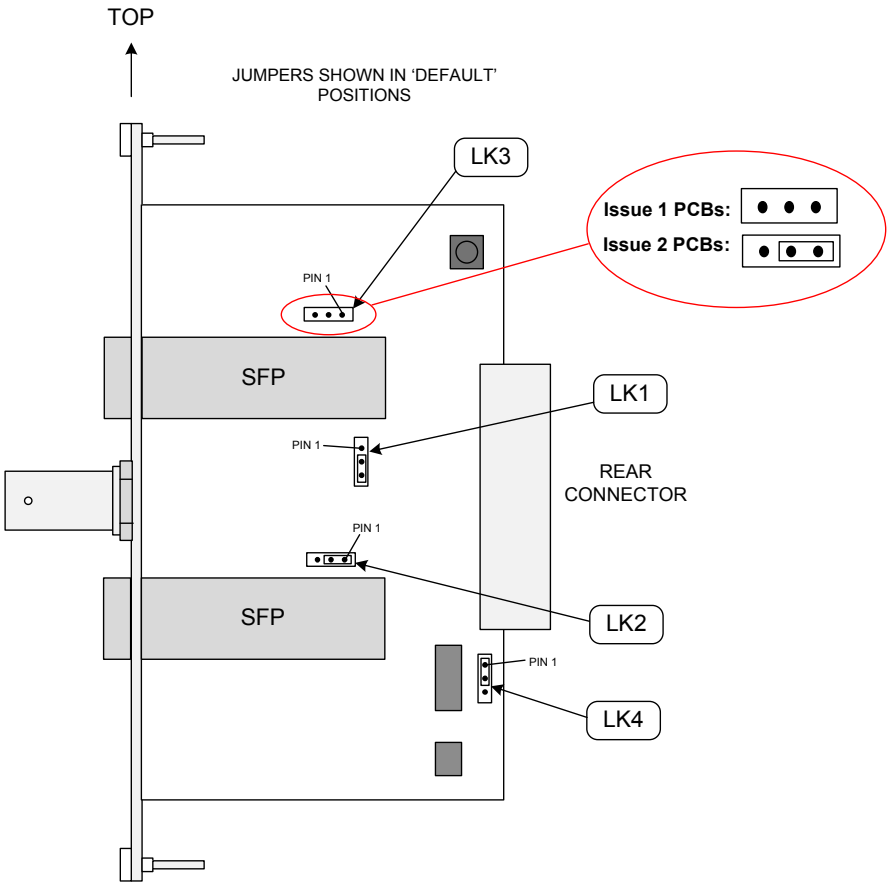
The SFP that is to be monitored should have a jumper fitted to its associated link, according to the SFP type as indicated in the table below. If jumpers are fitted to both links (appropriate to the type of SFP), then whether one or neither of the SFPs is reported correctly will depend on the particular SFPs fitted. The default is that the input SFP will be monitored and so LK3 will be set unlinked at the factory.

Issue 2 cards are able to read both SFPs separately, so both links LK2 and LK3 should have a jumper fitted to select the type of SFP as indicated in the table below.

The table below summarises the jumper settings for both Issues of card. Factory default settings are shown in **Bold**.

Jumper	Setting	Issue 1 PCBs	Issue 2 PCBs
LK1	Pins 1, 2 linked	Reclocking disabled*	Reclocking disabled*
	Pins 2, 3 linked	**Reclocking enabled**	**Reclocking enabled**
LK2	Pins 1, 2 linked	**When INPUT SFP is data type (MSA)**	**When INPUT SFP is data type (MSA)**
	Pins 2, 3 linked	When INPUT SFP is video type (non-MSA)	When INPUT SFP is video type (non-MSA)
	No link fitted	Disable INPUT SFP monitoring	n/a
LK3	Pins 1, 2 linked	When OUTPUT SFP is data type (MSA)	**When OUTPUT SFP is data type (MSA)**
	Pins 2, 3 linked	When OUTPUT SFP is video type (non-MSA)	When OUTPUT SFP is video type (non-MSA)
	No link fitted	**Disable OUTPUT SFP monitoring**	n/a
LK4	Pins 1, 2 linked	**(or no link) - EEPROM protected**	**(or no link) - EEPROM protected**
	Pins 2, 3 linked	For factory use only	For factory use only

* When Reclocking is disabled, the **S/L** LED will permanently display red, indicating "not locked".



BC363 – PCB layout

SIMPLIFIED VIEW - ONLY PRIMARY COMPONENTS SHOWN

The diagrams above show 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 card.

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 = locked to signal at **INPUT** SFP connector
  red = loss of lock of input signal, or locking disabled, or non-standard video bitrate.

- Ch B: always off (no reporting on Ch B).

Monitoring via webpages:

"Overview" webpage:

- CH A LED: green = locked to signal from **INPUT** SFP
  red = input signal not locked, or locking disabled, or non-standard video bitrate.

- CH B LED: green = always (no errors reported on Ch B).

"*Frame Information*" webpage:

On cards with Issue 1 PCBs, the SFP selected by LK2 or LK3 is reported as "SFP 1". Nothing will be reported as "SFP 2".

On cards with Issue 2 PCBs, the **INPUT** SFP is reported as "SFP 1". The **OUTPUT** SFP is reported as "SFP 2".

Monitoring via SNMP:

- CH A Sig: good = locked to input signal.
  fail = input signal not locked, or locking disabled, or non-standard video bitrate.

- CH B Sig: good = always (no errors reported on Ch B).

On cards with Issue 1 PCBs, the SFP selected by LK2 or LK3 is reported as "sfp...". Nothing will be reported as "sfp2..."

On cards with Issue 2 PCBs, the **INPUT** SFP is reported as "sfp...". The **OUTPUT** SFP is reported as "sfp2...".

Appendix

Specifications - BC363

Monitoring Output	
Connector	1 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)
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	87 mm (inc. connectors)
Width	20 mm (4HP)
Height	129 mm (3RU)
Weight	100 g
Operating Temp	-30°C to +70°C
Power	2.0 W

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

** Unit functionality is defined by the SFP modules fitted. See diagram on page 8 for currently available combinations.

SFP Options

The BC363's functionality is entirely dependent on which type SFP cartridge is fitted to each of the two carriers (**INPUT** and **OUTPUT**). Your BC363 card will be fitted with the SFP cartridges that were specified at the time of ordering.

The tables below list some of the compatible SFP cartridges available at the time of printing; others may become available over time. The application to which the BC363 may be put can be changed at any time by fitting different cartridge in either or both the **INPUT** and **OUTPUT** carriers. Please contact the Bluebell Sales Department with any specific requirements.

INPUT SFPs		
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

OUTPUT SFPs		
SFP Part Ref.	**MSA?**	**Description**
Single/Dual Channel transmitters - standard wavelengths:		
VTS/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

OUTPUT SFPs		
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
BB30CS2T-LNR	Non-MSA	SDI Coaxial Dual Transmitter, long reach, reclocked, HD-BNC
BB30CSRT-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

NOTE: When a transceiver cartridge is fitted to the **OUTPUT** SFP carrier, only one transmission channel is available: this will always be the upper port of the pair.