FRX 3G

Dual channel
fibre optic receiver

Crystal Vision

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Contents

Revision 1	Added inverted/non-inverted information to RM55	15/05/17

Warning

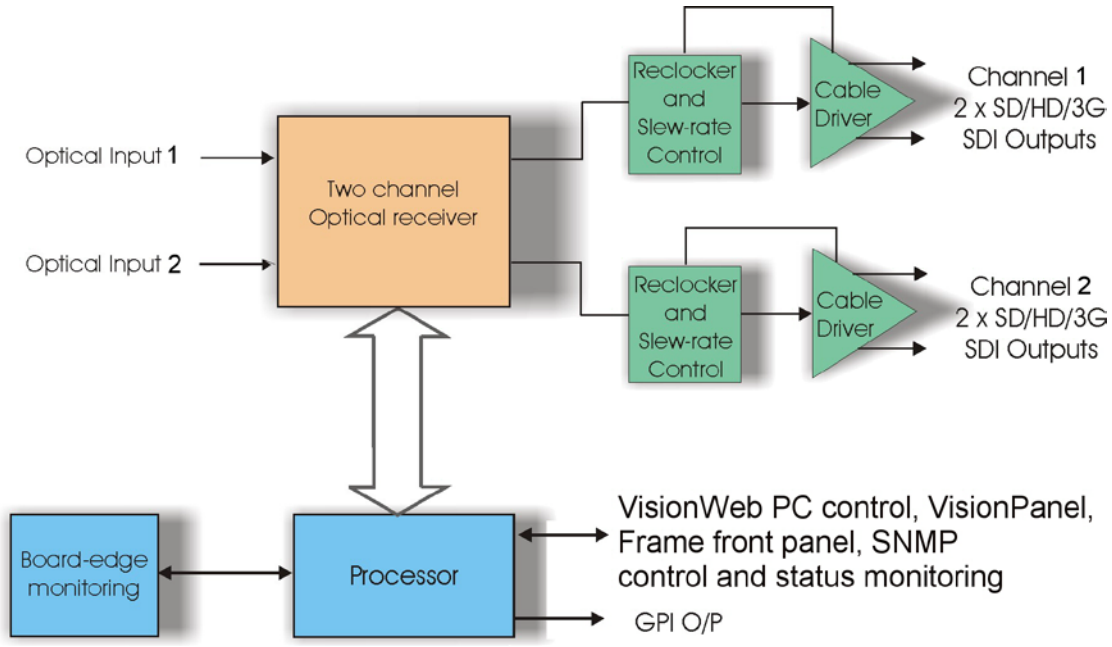
Note: *Caution must be taken when removing the FRX 3G card from the frame when an optical signal is present due to the possible damaging nature of high intensity light to the naked eye.*

Although Crystal Vision optical products contain class 1 devices that have been designed to be safe under all circumstances, you are advised not to look directly into a vacant optical slot.

1 Introduction

The FRX 3G is a two-channel optical serial digital video receiver and distribution amplifier for 3G, High Definition and Standard Definition formats with up to two outputs per channel.

The universal connection system allows a mixture of Crystal Vision modules in the frame. The modules plug in the front and the rear connectors plug in the rear. Depending on frame design, a hinged or removable front panel reveals LED indication of input and PSU status when opened.



FRX 3G two channel optical to SDI receiver

The FRX 3G is from the range of Crystal Vision optical boards which have been designed to fit in all the Crystal Vision range of 2U, 1U frames of issue 2 and above, as well as the issue 3 desk top box. The board may be plugged into any of the PCB slots, the only proviso being where it needs to be placed below a Standard Definition board. The rules governing frame configuration are explained in the installation chapter.

The RM55 single slot rear connector provides two optical inputs and four serial digital outputs with up to 12 modules in 2U of rack space.

The Indigo frames have been designed to accept any selection of boards from our range of Standard Definition, High Definition, 3G audio and optical products. The high packing density allows up to six modules in 1U, up to 12 modules in 2U and up to two modules in the desk top box.

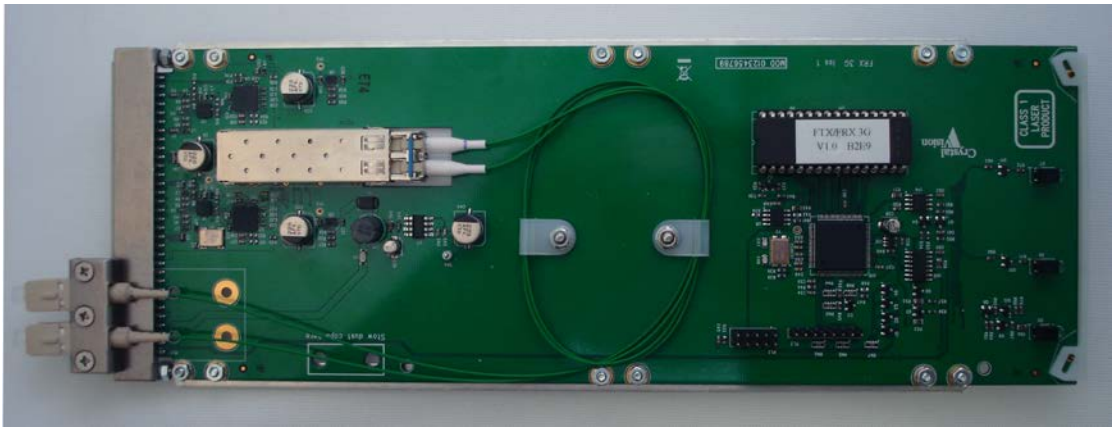
The main features of the FRX 3G are as follows:

- Dual 1-in 2-out optical to 3G, HD and SD receiver and distribution amplifier
- LED optical input presence indication
- Automatic HD/SD slew rate selection and reclocking

FRX 3G

At the heart of the FRX 3G is a two-channel state-of-the-art optical receiver module, each channel consisting of an optical pin diode and signal conditioning circuitry that after reclocking is coupled to a two-output cable driver. The output drive's slew-rate is automatically adjusted to suit the transported format.

Both channels of the FRX 3G optical receiver are completely independent of each other and are under the control of a processor to monitor and report status.



FRX 3G two-channel 3G/HD/SD optical receiver

The FRX 3G is primarily designed for single-mode operation but is capable of receiving video over short distances of multi-mode cable. Although multi-mode operation is not guaranteed, good results have been seen for Standard Definition with over one kilometre of multi-mode cable and HD/3G with over 300 metres of multi-mode cable.

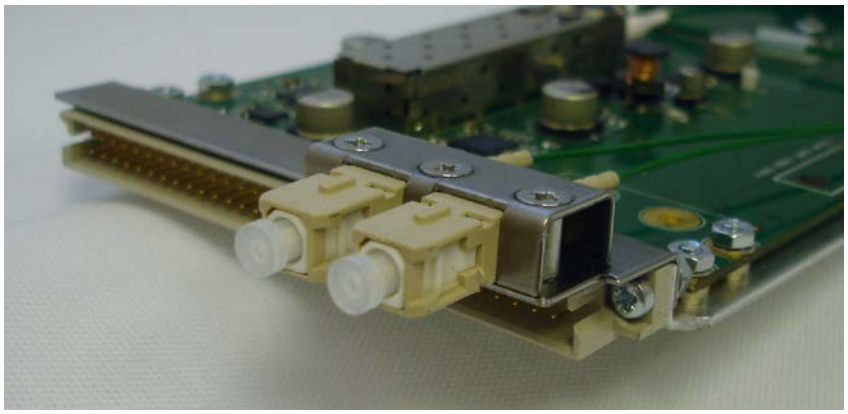
2 Hardware installation

The Crystal Vision optical boards have been designed to work in conjunction with the 2U CoolFlow frames or Indigo 1 and 2 frames of issue 2 or higher, and the issue 3 desk top box. All modules can be plugged in and removed while the frame is powered without damage.

Note: *You can find the issue number of a frame on the inside front.*

2.1 Handling

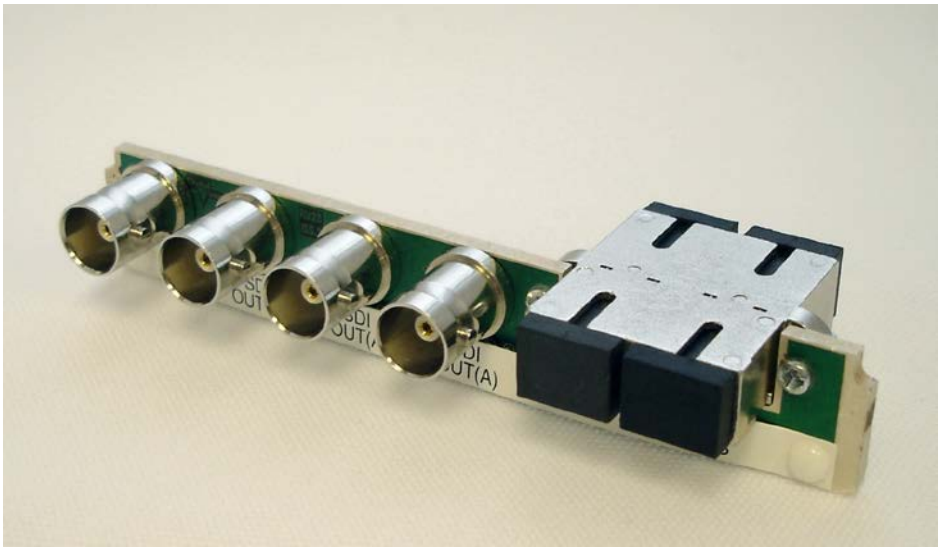
Due to its fragile nature, fibre optic equipment must be handled with care. Sharp blows or snagging the fibre pigtails will fracture the internal glass filament and destroy its light carrying ability. A degraded performance will also result if a build-up of dust and dirt film on the connector ferrules is allowed to occur. It is strongly recommended that the supplied dust caps are in place whenever the receiver card or rear module is de-mounted for any reason.



FRX 3G connectors with the dust caps fitted

When the FRX 3G is fitted in a frame the dust caps can be stored on the board by pushing into the holes provided.

The RM55 rear module is also fitted with dust caps on both sides of the optical connector. The pair of dust caps that are internal to the frame must be removed before the rear module is fitted. The external pair can then be removed when the fibre tails are connected. It is also recommended that dust caps should be re-fitted if the fibre tails are to be removed for any length of time. Should the FRX 3G be removed for any length of time it is recommended that the rear module should also be removed and stored with the dust caps fitted.



RM55 rear module with dust caps fitted to both sides of the optical connector

2.2 Universal rear connectors

When using the RM55 single height rear connector, the 2U frame will house up to 12 modules and dual power supplies, while the 1U Indigo 1 frame will house six modules and a single or dual power supply. The Indigo DT desk top box will house up to two modules.

All frames have hinged front panels giving access to the PSU and all modules. The universal frame wiring system allows any interface range modules to be fitted in any position [(1)] with the use of pluggable rear modules.

[(1)] Due to height restraints, some restrictions apply when mixing optical modules with other Crystal Vision modules.

Loading restrictions

The FRX 3G can be loaded into any compatible frame's slot but due to the extra height of the FRX 3G module it is not possible to place cards from the Crystal Vision Standard Definition or audio range directly above in certain positions. High Definition boards do not share this restriction and can be placed in any slot position.

Frame type				
Indigo 4		xxxxxxxx	xxxxxxxx	xxxxxxxx
		Optical module	Optical module	Optical module
		xxxxxxxx	xxxxxxxx	xxxxxxxx
		Optical module	Optical module	Optical module
	Indigo 2	xxxxxxxx	xxxxxxxx	xxxxxxxx
		Optical module	Optical module	Optical module
	Indigo 1	xxxxxxxx	xxxxxxxx	xxxxxxxx
		Optical module	Optical module	Optical module

Optical cards loaded in these slots will not allow Standard Definition or audio cards to be placed in the slot above.

Rear module connections with RM55

RM55 fits in all frames	Description
	**RM55** • 12 modules in 2U, six in 1U and two in desk top box • All frame slots can be used

BNC	I/O assignment
OPTICAL INPUT 1	Optical serial digital video input 1
OPTICAL INPUT 2	Optical serial digital video input 2
SDI OUT1B	Channel 1 3G/HD/SD output (non-inverted)
SDI OUT1A	Channel 1 3G/HD/SD output (inverted)
SDI OUT2B	Channel 2 3G/HD/SD output (non-inverted)
SDI OUT2A	Channel 2 3G/HD/SD output (inverted)

2.3 General purpose interface

The external GPI control lines 'a' to 'f' at the frame remote connectors are provided to allow remote control and/or remote status indication. The FRX 3G has four GPI output lines assigned for status reporting.

GPI Connections

	High (+5V)	Low (less than 0.7V)
'a'	<----------no user connection---------->	
'b'	<----------no user connection---------->	
'c'	<----------no user connection---------->	
'd'	<----------no user connection---------->	
'e'	Input 1 present	Input 1 not present
'f'	Input 2 present	Input 2 not present

GPI lines are fitted with 6k8 ohm pull-up resistors connected to the frames +5V. There is also an output series resistor of 270 ohm.

2U frame GPI Connections

GPI lines 'a' to 'f' of each card connect to two of four rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)

Table shows pin number (Remote number)

Note: *Remote 1 and Remote 3 are 26-way high-density D-Type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case.*

Remote 2 and Remote 4 are 26-way high-density D-Type male plugs and frame ground is pin 6 in each case and +5V @500mA is pin 15 on Remote 2.

The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-4 to approximately 1A.

1U frame GPI connections

GPI lines 'a' to 'f' of each card connect to the two rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
4	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
5	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
6	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)

Table shows pin number (Remote number)

Note: *Remote 1: 26 way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.*

Remote 2: 26-way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15.

The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

Indigo DT desk top box GPI connections

GPI lines 'a' to 'f' of each card connect to the rear remote connector as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)

Table shows pin number (remote number)

Note: *Remote 1: 26 way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.*

Remote 2: 26 way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15.

The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

3 Card edge operation

3.1 Card edge controls

The front edge of the FRX 3G provides power rail monitoring and signal status.

FRX 3G front edge view

LED	Location/colour	Meaning when lit
Input 1 Present	Green	There is an optical input present on input 1.
Input 2 Present	Green	There is an optical input present on input 2.
PSU Ok	Green	Power supply voltage present.

4 Control and status monitoring

4.1 Using the front control panel

On power up, the LEDs of all eight control panel keys will illuminate briefly. Once the panel has completed its power up and configuration sequence the panel will enter its status mode and display the current software version and frame IP address.

'Status' menu showing current software version and IP address

Selecting an FRX 3G

To continue with control panel operation or configuration, press the 'Device' key once. The control panel will display the name of the card that first responds to the polling request together with its location number. The location number consists of the frame number plus the card position in the frame. Rotate the Shaft control to poll through the available cards. Use the F2 soft key to toggle between the card's serial number and issue number with modification level.

'Device' menu showing FRX 3G in slot 1.01

In the example above, the card displayed is located in the first frame in slot number 1.

When the desired card is selected press the ENTER key to access that card's HOME menu.

The FRX 3G home menu

Rotate the shaft control to scroll through the menu structure and press ENTER to select the sub-menus. Press HOME at any time to return to the home menu.

FRX 3G Status sub-menu

Press ENTER to select the Status menu or SCROLL to display other sub-menus. See description of menu structure below for list of sub-menus.

Control Panel keys overview

The functions assigned to the control panel keys are:

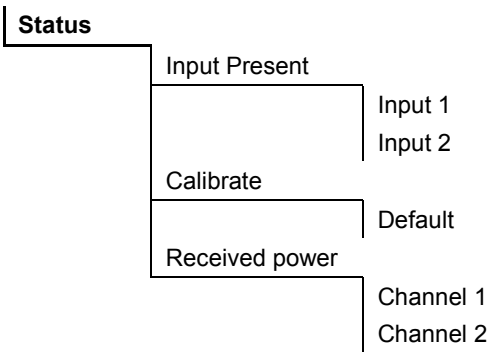
- **DEVICE** – enters 'device' menu to select a card or show available cards.
- **ASTERISK** (*) – selects 'network configuration' menu.
- **F1 to F4** – soft keys not currently used by FRX 3G.
- **HOME** – returns to top of the menu structure.
- **ENTER** – accept current selection.
- **Up arrow** – used to move up through the menu structure.
- **Rotary control** – shaft encoder used to select sub-menus or variable data.

Updating the display

The values displayed on an active front panel are only updated when an adjustment is made and when changing menu level. If changes occur using card edge controls or other remote control, the text displayed on the active front panel will not be updated immediately. If necessary, use the upward arrow to leave and then re-enter a menu to update the display.

Menu Structure

The basic menu tree for front panel access and VisionWeb is identical and consists of the following menus and sub-menus:



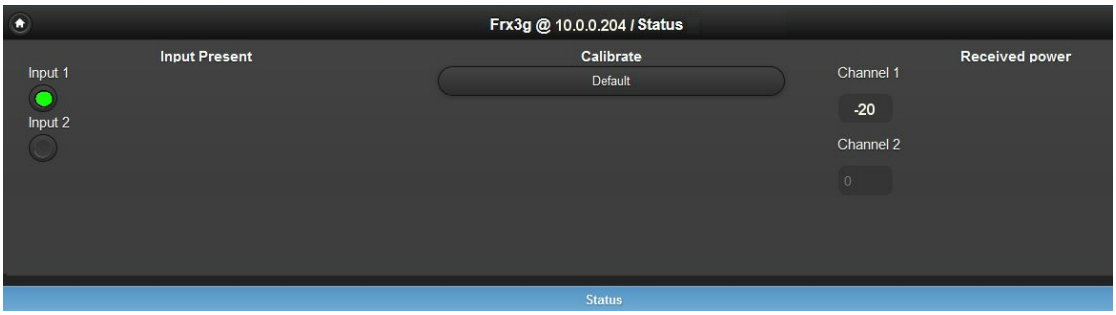
4.2 Controlling cards via VisionWeb

Crystal Vision cards use an XML file to create a control database that is used by the Indigo frame front panel controller, VisionPanel and VisionWeb software. VisionWeb web browser software offers a full range of controls with slider controls etc.

Accessing the Indigo Home page with a PC browser via the Ethernet connector of an Ethernet-enabled frame will display a list of the cards fitted (see Frame Manual for more details).

Typical Indigo home page

The example above shows a FRX 3G card fitted in slot 1 and the frame's power supply and status monitor in slots 13 and 14. Clicking on the FRX 3G card will bring up the card's home page:



FRX 3G Status Page

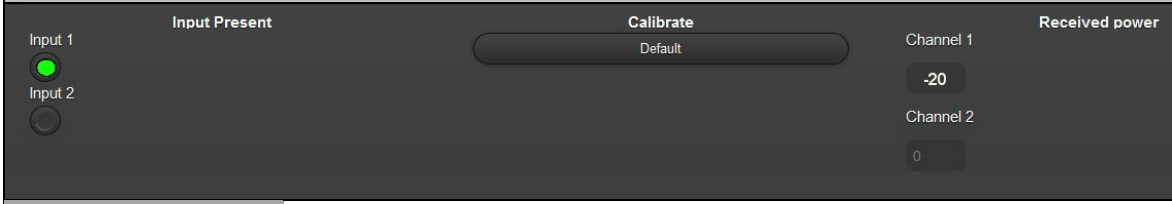
5 Control Descriptions

The controls of FRX 3G are accessible from the front panel, VisionWeb software, VisionPanel remote panels or SNMP. The description of controls used in this manual is based on VisionWeb GUI screen grabs but the path to locate controls via the front panel follows the same logic. VisionWeb GUI controls are accessed by menus at the bottom of the page which, when selected, may offer sub-menus containing a number of controls. Some controls are simulated LEDs that are used to show status, others are check boxes, buttons or sliders which change various settings.

FRX 3G only has a single menu **STATUS** for input and laser status monitoring.

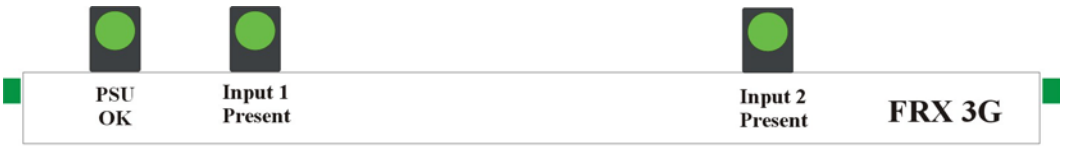
The menu is shown with a screen grab and description of each control's function.

5.1 Status Menu

<table>
<tr><th colspan="2">Status</th></tr>
<tr><td colspan="2">Display presence of incoming video signal and laser status.</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td>Input Present</td><td>On when Channel 1 or Channel 2 optical input is present with a satisfactory received level, typically > -20dBm.</td></tr>
<tr><td>Default</td><td>This button currently has no function.</td></tr>
<tr><td>Received power</td><td>Displays received optical power in dBm in the range -25 to 0dBm in 1dBm steps. The following formula can be used to convert microwatts to dBm: dBm = 10 log (microwatts/1000)</td></tr>
</table>

6 Troubleshooting

The front edge of the FRX 3G card provides power rail monitoring, slew rate selection and signal status.



Basic fault finding guide

The Power OK LEDs are not illuminated

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information.

Check that the card is seated correctly in the frame.

There is no video output

Check that valid video input is present and that any cabling is intact.

Optical inputs are present but no video output

Check that the optical signal contains valid serial digital video.

The video output is low quality

Check that the maximum cable length has not been exceeded for both the optical input and video outputs.

Check that the optical connectors have not become contaminated.

Check that the received power is sufficient.

Resetting the card

If required, the card may be reset by simply removing the frame power and re-applying it after a few seconds or by removing the card from the frame and then re-inserting it.

It is safe to re-insert the card whilst the frame is powered

7 Specification

General

Dimensions	100mm x 266mm module with DIN 41612 connector
Weight	200g
Power consumption	3.5 W

Inputs

Optical wavelength	1260-1620nm, 1300nm nominal
Connector type	SC
Input level maximum	-1dBm
Input level minimum	Typical -20dBm (-18 dBm 2.97Gbps Pathological)
Fibre	Single-mode with multi-mode pigtail

Outputs

Number	Two channels with two outputs per channel
Video	3G, HD or SD SDI 270Mb/s to 2.97Gb/s serial digital compliant to SMPTE 259M and SMPTE 424M

Status monitoring

LED display	Front of card edge visual monitoring with LED indicators to indicate:
	PSU rails within limits, optical input present
GPI output	Input present Channel 1 and Channel 2