FRX-VF

Dual channel fibre optic receiver

Crystal Vision

Contents

Warning

Note: *Caution must be taken when removing optical cabling from the rear of 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 any vacant optical outlet.

1 Introduction

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

The FRX-VF is a space-saving 96mm x 325mm module which fits in the standard Vision frames from Crystal Vision.

Optical inputs and video outputs are accessed by using the VR14 rear module.

Status monitoring of optical input presence and received power is by the Vision frame active front panel, remote VisionPanel control panel, SNMP or VisionWeb PC software.
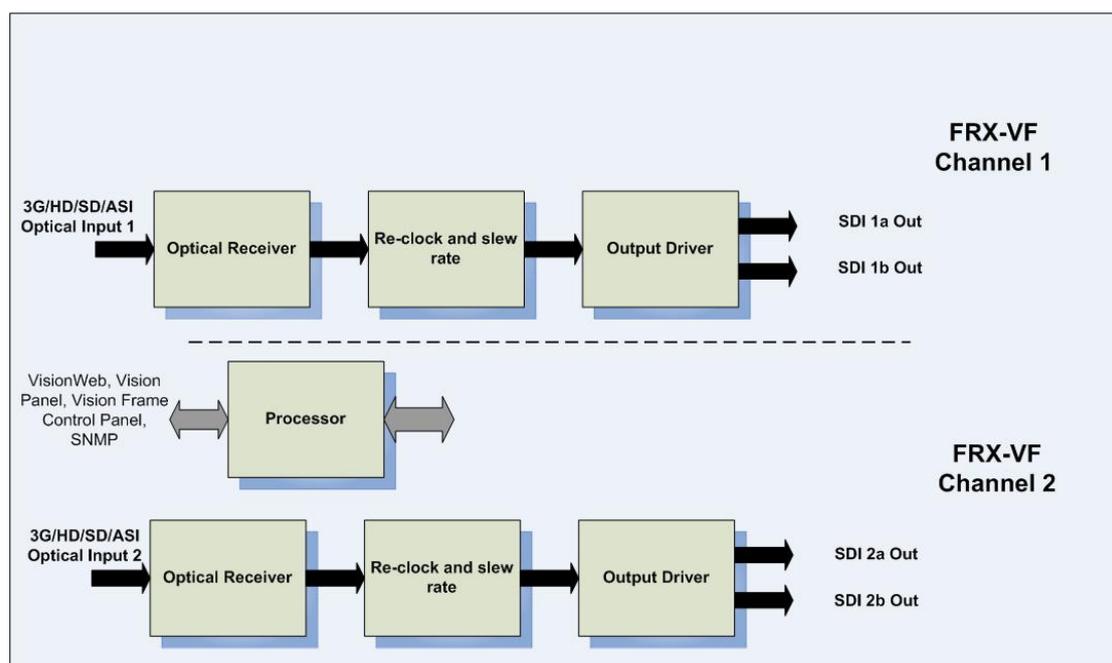
FRX-VF block diagram

The rear connector details may be found in the section *Rear modules and signal I/O*.

The main features are as follows:

- Dual channel, fibre to video output operation

- Two reclocked video outputs per channel

- 270Mb/s to 2.97Gb/s serial digital compliant to SMPTE 259M, SMPTE 292M and SMPTE 424M

- Following video standards supported: 720p 50/59.94/60Hz 1080p 50/59.94Hz, 1080i 50/59.94/60Hz, 1080p 23.98/24/25/29.97/30/50/59.94/60Hz, 1080PsF 23.98/24/25/29.97/30Hz, 2048x1080p 23.98/24/25/29.97/30Hz*, 2048x1080PsF 23.98/24/25/29.97/30Hz* *(*= YUV 4:2:2 10 bit)*

- Remote indications of received power

- DVB-ASI compatible, all outputs positive polarity

- Up to 20 FRX-VF cards in a Vision 3 3U frame

- Less than 100ns delay

- Remote monitoring and control via VisionPanel, VisionWeb control system, SNMP and the frame active panel

2 Hardware installation

2.1 Board configuration
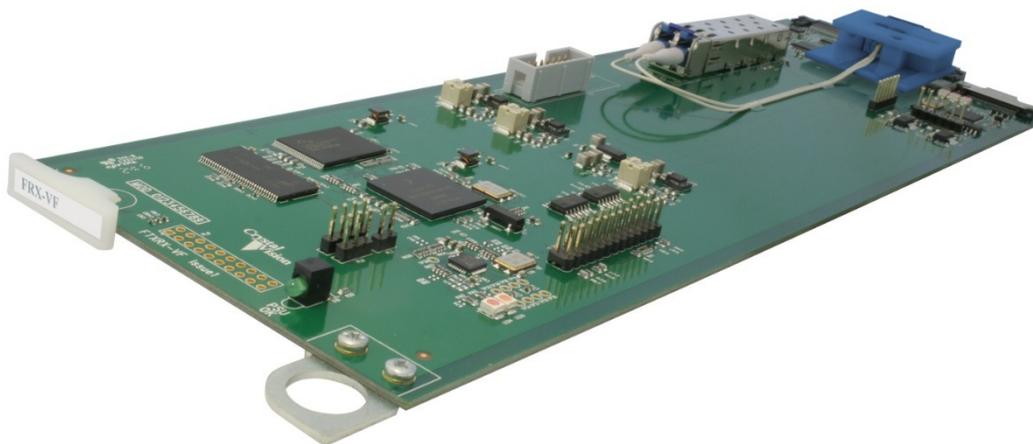
FRX-VF card

Link configuration

The FRX-VF has no user-selectable links. Any links or controls should remain in their factory set positions.

Inserting cards

Cards can be plugged in and out of powered Vision frames without damage. Although no electrical damage should occur if a FRX-VF is plugged into the incorrect frame slot, the optical connectors may be damaged.

See Vision frame User manual for the correct procedure for installing cards and rear modules.

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 dust caps are not replaced whenever the receiver card or rear modules are de-mounted for any reason and 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 replaced whenever the receiver card or rear modules are de-mounted for any reason.

FRX-VF connectors with the dust caps fitted

The dust caps must be removed before fitting the FRX-VF into a frame.

The VR14 rear module is fitted with dust caps on both sides of the optical connector. The pair of dust caps that will be 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-VF 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.
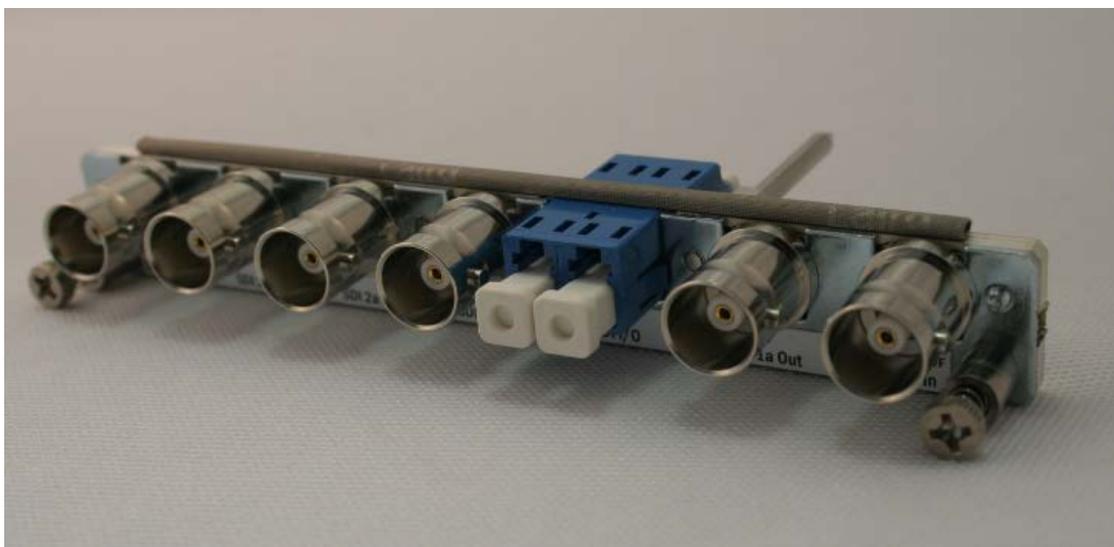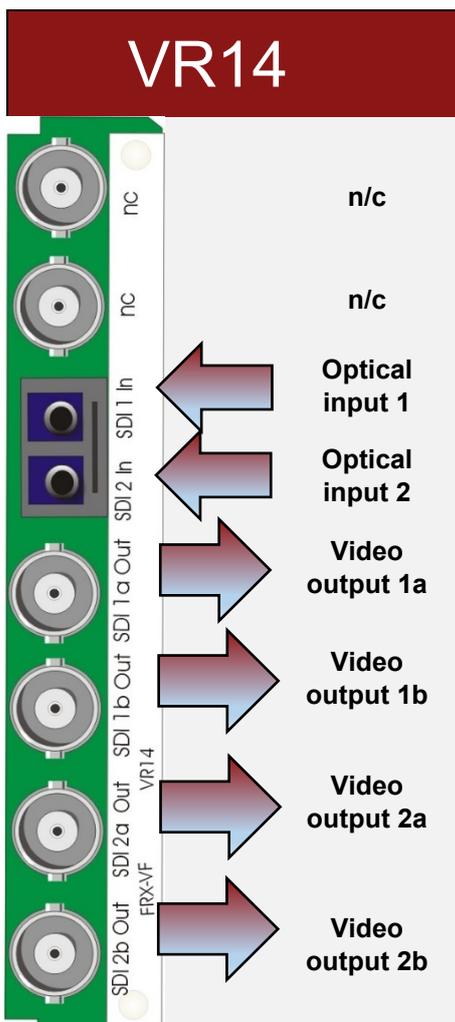

VR14 rear module

3 Rear modules and signal I/O

The FRX-VF fibre receiver fits into all Vision rack frames from Crystal Vision and can be plugged in and removed while the frame is powered without damage.

Vision frames all have a hinged front panel that gives access to the PSUs and all cards. The universal frame wiring system allows any of the interface range of cards to be fitted in any position with the use of removable rear modules.

3.1 Rear module connections with VR14

The VR14 single-slot rear module allows up to 20 FRX-VF cards to fit into a Vision 3 frame.

A dual LC/SFP fibre connector provides the optical input for both channels.

BNC connectors provide two 3G/HD/SD reclocked video outputs per channel.

4 Status monitoring

FRX-VF status can be accessed most easily by VisionWeb remote control PC software but also by VisionPanel, the Vision frame's front panel and SNMP. The following screen grabs are from the VisionWeb GUI and are used to identify the various available status indications. The menu tree for VisionWeb, front panel and VisionPanel operation is identical although the appearance and labelling of some controls may vary according to the available space. See the Vision frame and VisionPanel's User Manuals for more details.

4.1 Controlling cards via VisionWeb

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

Accessing the Vision frame homepage with a PC browser via the Ethernet connector of a frame will display a list of the cards fitted. (See Vision frame User Manual for more details.)
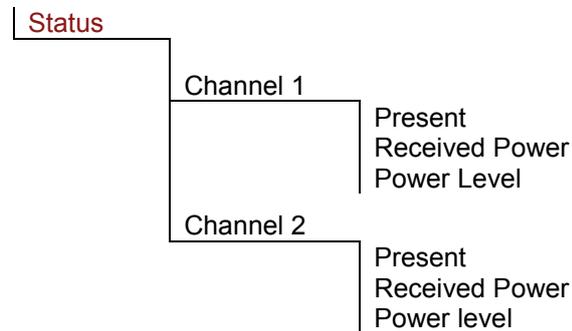

Typical Vision 3 frame homepage

The example above shows a FRX-VF card fitted in slot 1 and other Vision cards in slots 2, 3, 5 and 7. Clicking on the FRX-VF card will bring up the card's Status page, for example:

FRX-VF Status page

4.2 Menu Structure

Operators of a Vision frame active front panel or VisionPanel should use the following tree to access the FRX-VF status:

Status

Channel 1

Present
Received Power
Power Level

Channel 2

Present
Received Power
Power level

Users of VisionWeb need only select the tab shown above in red to access the page containing the set of controls.

4.3 Control Descriptions

The description of controls used in this manual is based on VisionWeb GUI screen grabs. VisionWeb monitoring and control pages are accessed by tabs at the bottom of the page which, when selected, offer controls such as LEDs, check boxes, buttons, sliders and labels.

The FRX-VF has only a single status page:

Status		
Display presence and power of optical input signal.		
Channel 1		**Channel 2**	
Present		Present	
⬤		⬤	
Received power		Received power	
-3		-20	
Power level		Power level	
Good		Too low	
Present	On if an optical input is detected.	
Received power	Displays received optical power in dBm in the range -25 to 0dBm in 1dBm steps.	
Power Level	Displays one of the following depending on the received power level: 'OVERLOAD', 'HIGH', 'GOOD', 'LOW', 'TOO LOW'. 'OVERLOAD' or 'HIGH' may cause the receiver to saturate with poor or no video output. In extreme cases the receiver may even be damaged – consider using an optical attenuator or a longer fibre cable. 'TOO LOW' or 'LOW' may be the result of dirty optical connectors – if in doubt, clean. Excessive fibre cable runs will also cause these warnings. Although transmission distances in excess of 10km are possible with single-mode fibre, this distance is dependent on minimal attenuation from junctions etc. Multi-mode fibre installations can expect considerably shorter transmission distances. Single-mode fibre, or any single-mode components should never be used downstream of multi-mode fibre.	

5 Troubleshooting

5.1 Card edge monitoring

The green LED on the front edge of the card provides power rail monitoring. The red LED, if fitted, currently has no function.

FRX-VF front edge

5.2 Basic fault finding guide

WARNING: *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 any vacant optical outlet. As the visible spectrum is well below the wavelengths used by the FRX-VF there is no point looking into the end of a cable to see if there is a signal.*

- **Power OK LED not illuminated:** Check that the frame PSU is functioning – refer to the Vision frame manual for detailed information.

- **Optical input power level 'Low' or 'Too Low':** Check that the optical connectors have not become contaminated with dust etc. The maximum distance that can be achieved depends on fibre quality and the number of splices/connectors. Distances in excess or 10km may be possible with single-mode fibre at 3Gb/s but the maximum achievable distance with multi-mode fibre is considerably less, possibly only a few hundred metres. Single-mode fibre, or any single-mode components should never be used downstream of multi-mode fibre.

- **Optical input power 'High' or 'Overload':** Consider using an optical attenuator or a longer fibre cable run (single-mode fibre, typically attenuates the signal by about

0.5dB per km for 1310nm sources). The receiver could be saturated (poor video output) or, in extreme cases, damaged if the received optical power is too high. Check that the combination of maximum output power of the transmitting device and fibre attenuation is not greater than the maximum permissible receiving level (-3dBm). **Note**: *Users of FTX-VF should be aware that the maximum output power of the SFP laser module is 0dBm, and +5dBm for the CWDM module. These levels may necessitate additional attenuation when used in conjunction with the FRX-VF.*

- **Poor video signal at receiving end:** Check that the received optical power input is 'GOOD'.

- **The card no longer responds to front panel control:** Check that the card is seated correctly and that the Power OK LED is lit. Check if the control panel can control another card in the same rack. If necessary reset the card.

- **Resetting the card:** If required, the card may be reset by removing the card from the rack and then re-inserting it. It is safe to re-insert the card whilst the rack is powered. Any previous configuration will be retained.

6 Specification

General

Dimensions	96mm x 325mm module with connector.
Weight	200g.
Power consumption	FRX-VF 4 Watts.

Inputs

Optical	One wideband diode receiver per channel, meets the SMPTE 297-2006 short-haul specification.
Optical wavelength:	1260-1620nm, 1300nm nominal.
Connector:	Dual LC/SFP.
Input level:	>-20dBm <-3dBm.
Fibre:	Single or Multimode.
Video	Supported formats: SDI 525i/59.94Hz, 625i/50Hz. 720p 50/59.94/60Hz 1080p 50/59.94Hz, 1080i 50/59.94/60Hz, 1080p 23.98/24/25/29.97/30/50/59.94/60Hz, 1080PsF 23.98/24/25/29.97/30Hz, 2048x1080p 23.98/24/25/29.97/30Hz*, 2048x1080PsF 23.98/24/25/29.97/30Hz* *(*= YUV 4:2:2 10 bit).*
Video Standards	3G, HD or SD SDI 270Mb/s to 2.97Gb/s serial digital compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A.

Outputs

Number and type:	Video - Two 3G/HD/SD video inputs, one per channel, compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A.

Rear Module I/O

VR14	Two BNC video outputs per channel. One dual LC/SFP fibre-optic connector.

Delays

Delay through board	Less than 100nS.

Monitoring and Control

Remote:	Monitor from Vision frame front panel, VisionPanel remote panel and VisionWeb Control which is available via the web server on the frame and allows operation using a standard web browser on a computer, tablet or phone. Complimentary SNMP monitoring via frame CPU and Ethernet connection.