OPTICAL
SYSTEMS
DESIGN

OPERATOR MANUAL

OSD8224 SERIES

3G HD/SDI TX/RX

FIBER OPTIC TRANSMISSION SYSTEM

INDEX 1

1 TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD8224 series is a high-quality 4-channel fiber optic serial digital video (SDI) transmission system. The system consists of the OSD8224T transmitter and the OSD8224R receiver, which are designed to be used as a pair to reliably transport either four SDI over four individual fibers using 1310nm or over one fiber using 1510, 1530, 1550, 1570nm wavelengths. The OSD8224 pair is suitable for point to point applications or four 3G HD/SDI transmitters to a single 4-channel receiver using the OSD8220T.

The OSD8224T accepts four 3G HD/SDI video input signals. Each channel has an SDI equalizer to effectively compensate for coaxial cable losses and is optimised for high quality cable such as Belden 1694A cable. This allows flexibility for permanent and temporary installations when the SDI source is some distance away from the unit. The user can disable the equaliser with a toggle switch mounted on the front panel.

Both the OSD8224T and OSD8224R have built-in user bypassable automatic reclocking. The units will lock at 270Mbps, 1.485Gbps and 2.97Gbps. The user can disable the reclocker with a toggle switch mounted on the front panel. This allows the units to operate with other data rates from 19.4Mbps to 2.97Gbps

1.1.2 APPLICATIONS

- Any digital broadcast application such as studio signal routing and temporary OB or studio links
- Remote camera links
- Campus digital video distribution
- Very high performance surveillance networks

1.1.3 FEATURES AND BENEFITS

- Built in user bypassable automatic reclocking at 270Mbps, 1.485Gbps and 2.97Gbps with indication of data rate on each channel
- Operates from 19.4Mbps to 2.97Gbps in non-reclocked mode
- Compatible with SMPTE 310M, 292M, 259M, 297M, 372M and 424M
- Automatic equalisation of up to 350m @ 270Mbps and 70m @ 2.97Gbps of Belden 1694A cable
- Compatable with OSD Network Management System
- Available in 1310nm, 1550nm and all eighteen CWDM wavelengths
- Available with built in CWDM multiplexer for 4-channel single fiber operation
- Capable of operation over more than 50km
- Immune to pathological signals
- Available as a single slot width card which plugs into OSD's standard 19" chassis or as a rugged module suitable for both permanent and temporary throwdown applications.

1.2 TYPICAL CONFIGURATION

Figure 1 below indicates the typical set-ups for an OSD8224 system.

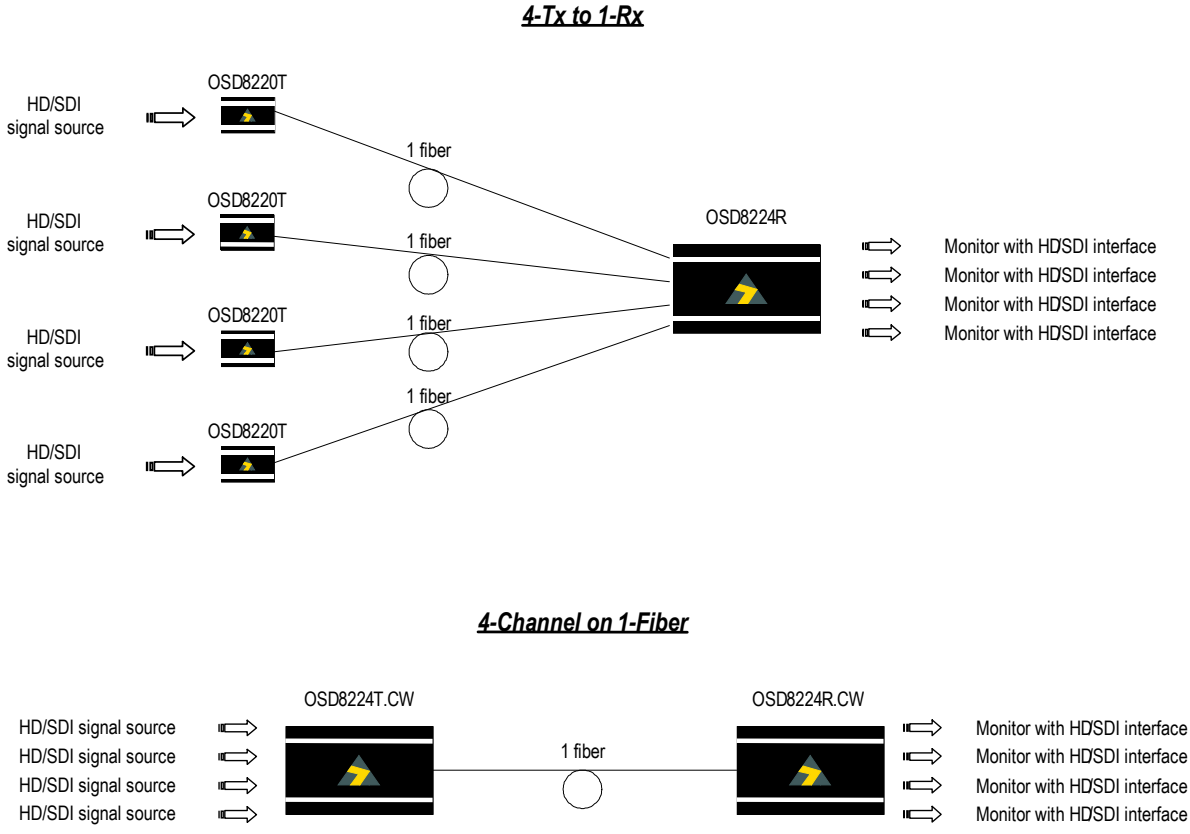

FIGURE 1: OSD8224 TYPICAL CONFIGURATIONS

1.3 TECHNICAL SPECIFICATIONS

Table 1 below provides Technical Specifications for the OSD8224.

TABLE 1: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Number of Channels	4
Input/Output Impedance	75Ω
Input/Output Levels	800mVpp nominal
Coax Equalization	350m @ 270Mbps 140m @ 1.485Gbps 70m @ 2.97Gps
SDI Connectors	BNC female sockets
Power Connector	4 way terminal block on module, DB9 on card
Number of Fibers	4 for standard unit, 1 for CWDM unit
Fiber Type	Singlemode is standard
Transmitter Wavelength	1310nm ±30nm (1550nm and all 18 CWDM wavelengths are optionally available). Standard 4-Channel CWDM module operates on 1510, 1530, 1550 and 1570nm)
Transmitter Coupled Power	-5 to -0dBm (0dBm and +2dBm are optional)
Receiver Operating Wavelength	1200 to 1600nm
Receiver Sensitivity	<-18dBm for $1x10^{-9}$ Bit Error Rate
Optical Link Budget and distances	>13dB at 1310nm (>30km of singlemode fiber) >20dB at 1550nm with +2dBm laser (>60km on singlemode fiber)
Receiver Saturation	>0dBm
Optical Connector	LC Standard. FC and ST are optional for the 1-fiber CWDM unit
Power Requirements	+5 to $20V_{DC}$ @ 4VA
Dimensions of 4-fiber Module (mm)	114W x 105D x 32H
Weight of 4-fiber Module	350g
Dimensions of 1-fiber Module (mm)	114W x 174D x 32H
Weight of 1-fiber Module	500g
Dimensions of Card (mm)	25W x 208D x 100H
Operating Temperature	-20°C to +65°C
Relative Humidity	0 to 95% non-condensing
Chassis Current Consumption (CCC)	0.3 Amp

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NOTES:

*Other combinations of laser types and optical levels, receiver types and sensitivity levels are possible. Contact OSD for details.

2 INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD8224T and OSD8224R successfully. It should be studied carefully if damage to the equipment or poor results are to be avoided.

This equipment has been fully tested prior to dispatch and is ready for immediate operation. However it is advisable to check for external transportation damage before operation. If damage is evident, return the unit with the packaging to your supplier immediately.

2.2 INSTALLATION

2.2.1 CABLING

Shielded cables should be used on all cabling to provide protection from external electrical events such as lighting, and switching transients etc. which may cause damage to the unit. All cable shielding must be grounded at a convenient ground point.

2.2.2 WARNING AND PRECAUTIONS

▲ **ELECTROMAGNETIC COMPATIBILITY**

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

▲ **OPTICAL OUTPUT OPERATION**

WARNING: **Laser Safety:** Class 1 Laser Product per IEC/EN 60825-1:20011 standard.

Class 1
The OSD8224 is a **Class 1 laser product.**

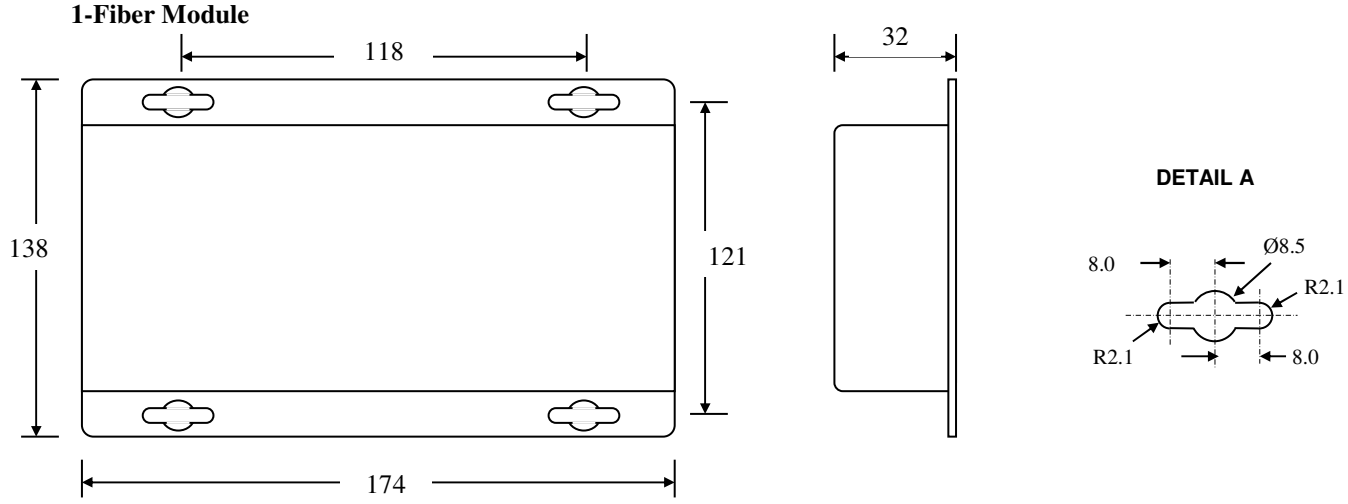

PRECAUTIONS

- ▲ All service personnel should be provided training as to the hazards of direct viewing of laser radiation and of the precautionary measures during servicing of equipment
- ▲ Areas where laser products are installed should be restricted in access to trained service personnel only and appropriate warning signs posted in the work area.
- ▲ All laser apertures should be covered by protective covers when not connected to optical fibers. Never leave outputs uncovered.
- ▲ Laser equipment should be positioned above or below eye level where possible. Apertures should be positioned away from personnel.
- ▲ Protective eyewear should be worn in the vicinity of laser equipment.

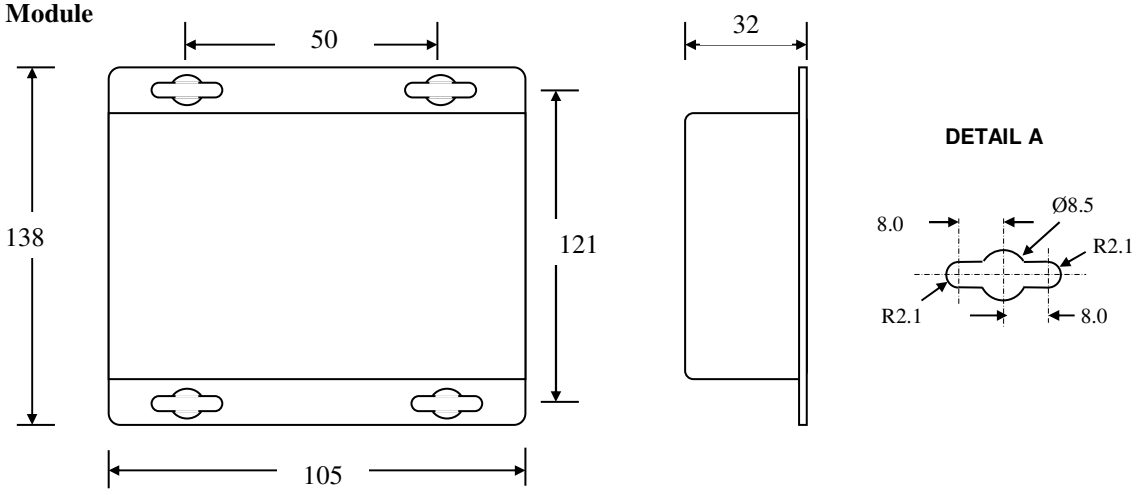
2.2.3 OSD8224 DRAWINGS AND DIMENSIONS

The OSD8224 module versions are designed to be mounted on an even surface and to be secured by means of M4 or smaller screws. The OSD8224 card versions are designed to be inserted into a chassis and secured by means of captivated screws.

1-Fiber Module



4-Fiber Module



Card Version

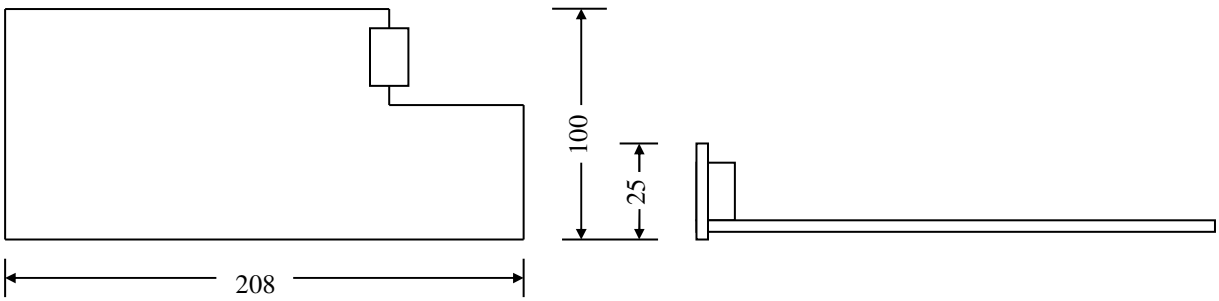


FIGURE 2: OSD8224 MOUNTING DIMENSIONS

2.2.4 POWER SUPPLY CONNECTIONS

The OSD8224T and OSD8224R requires external DC power. The voltage range is +5 to 20V_{DC}. For module versions, power should be connected to the power socket located on the rear panel of the units and applied as indicated below. For card versions, power is supplied via the DB9 connector from the OSD350N or OSD370N chassis.

TABLE 2: OSD8224 DC POWER CONNECTION

External Power Pin	Specification
Pin 1	Ground or 0V
Pin 2	+5 to 20V_{DC}

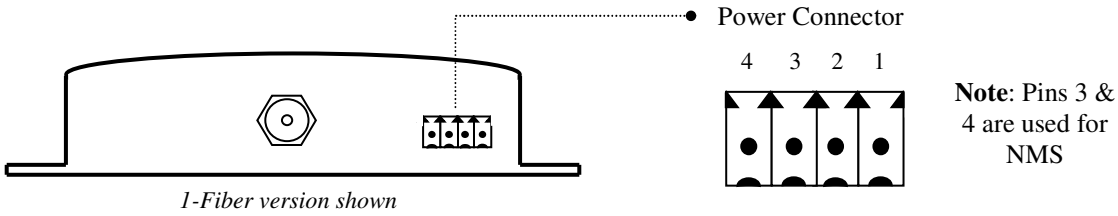


FIGURE 3: OSD8224 POWER SUPPLY CONNECTIONS

2.2.5 3G HD/SDI CONNECTIONS

The 3G HD/SDI video-input signals (eg. from camera) is connected to the 3G HD/SDI BNC input connectors on the OSD8224T. *Note: Card Version Shown.*

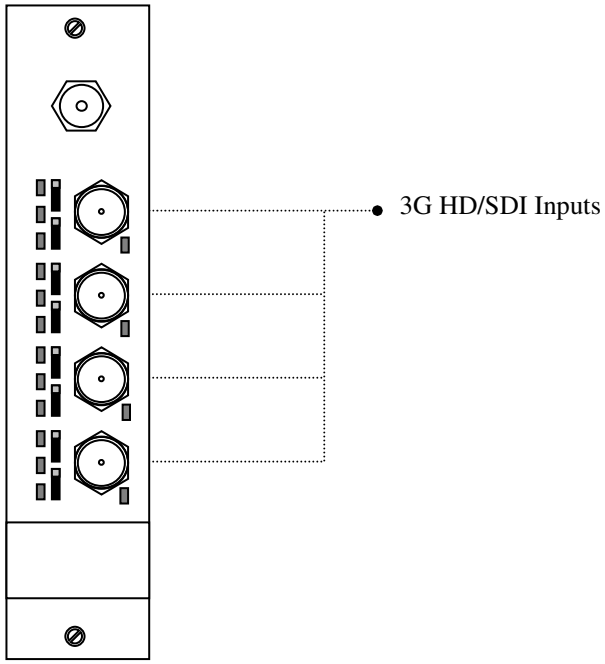


FIGURE 4: OSD8224T VIDEO CONNECTIONS

The 3G HD/SDI output signal (eg. to monitor equipment) is connected from the 3G HD/SDI BNC output connectors on the OSD8224R. *Note: Card Version Shown.*

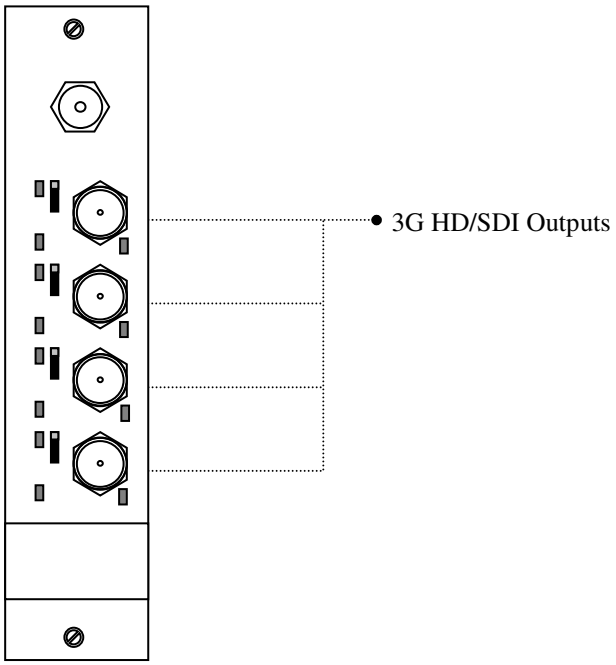


FIGURE 5: OSD8224R VIDEO CONNECTIONS

2.2.6 OPTICAL CONNECTIONS

The optical fiber cable must be terminated with the appropriate optical connector. Before connection, inspect the ends of the connectors to ensure that no dust or dirt is present as it could contaminate the modem connector and result in poor performance. If it is necessary to clean the cable connectors, use isopropyl alcohol and lint free tissue to remove contamination.

2.3 OSD8224 OPERATION

2.3.1 SWITCH SETTINGS

The OSD8224T has Automatic Equalizer and Reclocker switches located on the front panel. The OSD8224R has only the Reclocker switch. The default setting upon shipment is in the "on" position.
Note: Card Version Shown.

TABLE 3: OSD8224T SWITCH SETTINGS

OSD8224T

SWITCH	STATE	POSITION	FUNCTION	DEFAULT
EQ	OFF	DOWN	Automatic Equalizer Off	
	ON	UP	Automatic Equalizer On	default*
RCLK	OFF	DOWN	Reclocker Bypassed	
	ON	UP	Reclocker Enabled	default*

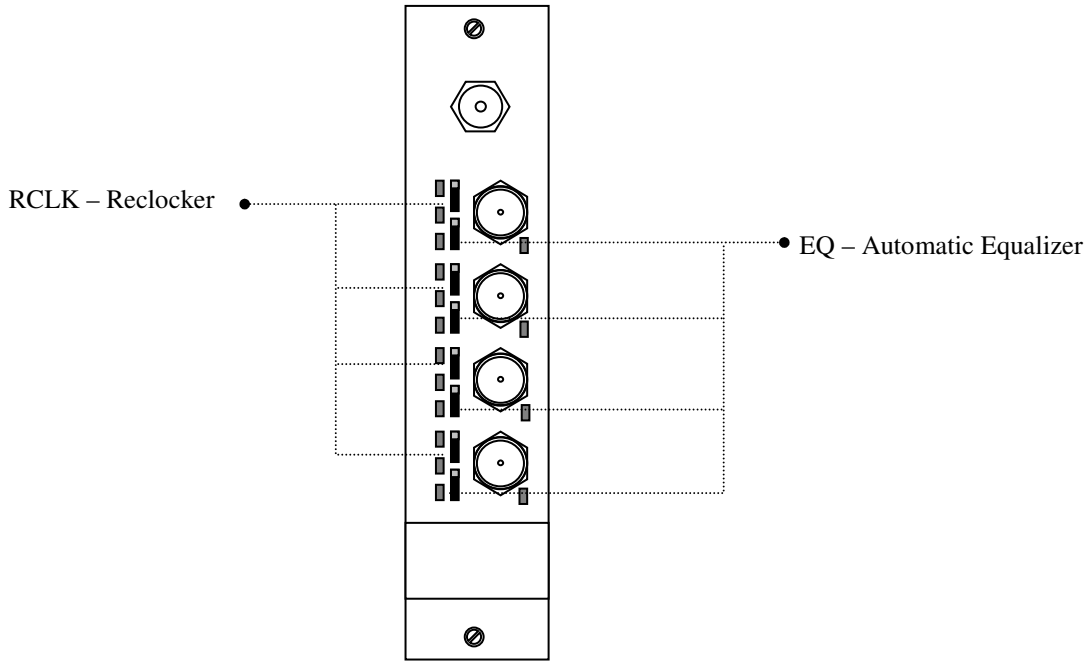


FIGURE 6: OSD8224T SWITCH SETTINGS

TABLE 4: OSD8224R SWITCH SETTINGS

OSD8224R

SWITCH	STATE	POSITION	FUNCTION	DEFAULT
RCLK	OFF	DOWN	Reclocker Bypassed	
	ON	UP	Reclocker Enabled	default*

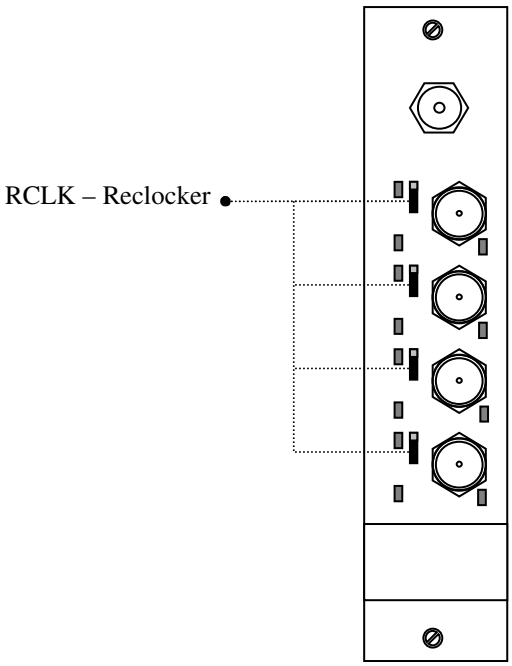


FIGURE 7: OSD8224R SWITCH SETTINGS

2.3.2 OSD8224T AND OSD8224R INDICATORS

OSD8224T

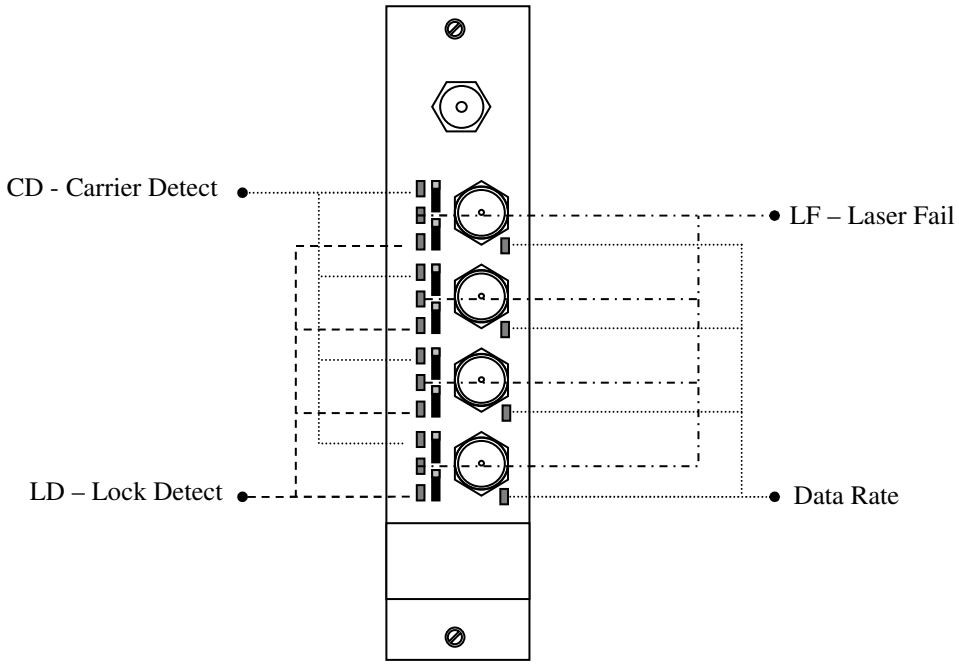


FIGURE 8: OSD8224T LED INDICATORS

TABLE 5: OSD8224T LED INDICATORS

LABEL	INDICATOR	COLOUR	FUNCTION
CD	**Carrier Detect**	Red	SDI source is off or unplugged
		Green	Carrier Detected
LD	**Lock Detect**	Off	Reclocker not locked or reclocker in bypass mode.
		Green	Reclocker is locked
LF	**Laser**	Red (Blink)	Faulty Laser / No SFP
		Off	Laser OK / SFP fitted
Rate	**Data Rate**	Slow (1 blink/sec)	SD Input
		Med (2 blinks/sec)	HD Input
		Fast (3 blinks/sec)	3G Input

OSD8224R

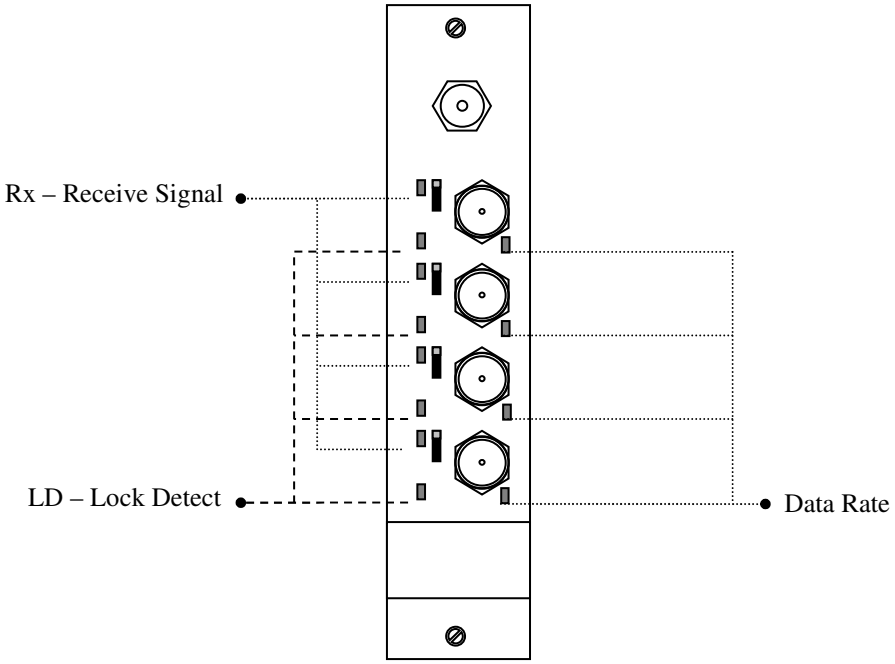


FIGURE 9: OSD8224R LED INDICATORS

TABLE 6: OSD8224R FRONT PANEL INDICATOR FUNCTION

LABEL	INDICATOR	COLOUR	FUNCTION
LD	**Lock Detect**	Off	Reclocker not locked or reclocker in bypass mode.
		Green	Reclocker is locked
RX	**Receive Signal**	Red	No optical signal
		Blinking (R/G)	SFP not installed or engaged properly
		Green	Optical signal present
Rate	**Data Rate**	Slow (1 blink/sec)	SD Signal
		Med (2 blinks/Sec)	HD Signal
		Fast (3 blinks/sec)	3G Signal

2.3.3 NETWORK MANAGEMENT SYSTEM (NMS)

The OSD8224 can be optionally fitted/enabled with the OSD Network Management System (NMS). The NMS allows the user control of various parameters of each node within the network. Any video and/or data channels from any node can be monitored at the receiver. The OSD NMS is designed to be implemented in an SNMP (Simple Network Management Protocol) or Web Browser Based environment, in order to remotely check running status or to configure an OSD optical modem product.

The OSD8224R NMS version is designed to be used in conjunction with the OSD8020 NMS concentrator card which in turn utilizes either the OSD350N or OSD370N chassis. For detailed NMS operation refer to the OSD8020 user manual. The NMS connections are via the DB9 connector. The module version utilizes pins 3 and 4 of the power connector for NMS operation.

TABLE 7: OSD8224 NMS CONNECTION

External Power Pin	Specification
Pin 3	NMS +
Pin 4	NMS -

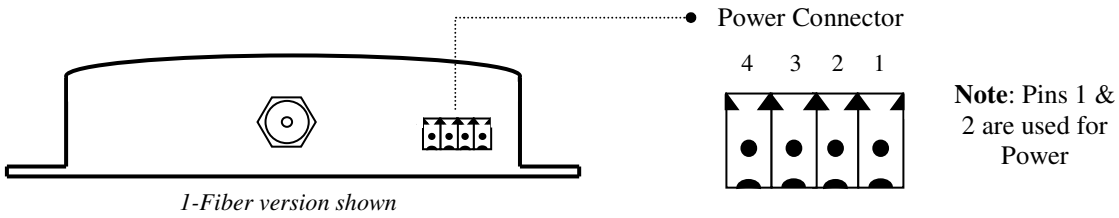


FIGURE 10: OSD8224 NMS CONNECTIONS

2.3.4 OSD8224 VARIANTS

There are 3 versions of both the OSD8224T and the OSD8224R: 1-Fiber Version, 4-Fiber Version, Card.

1-Fiber Version – 4 x 3G HD/SDI inputs multiplexed onto one fiber

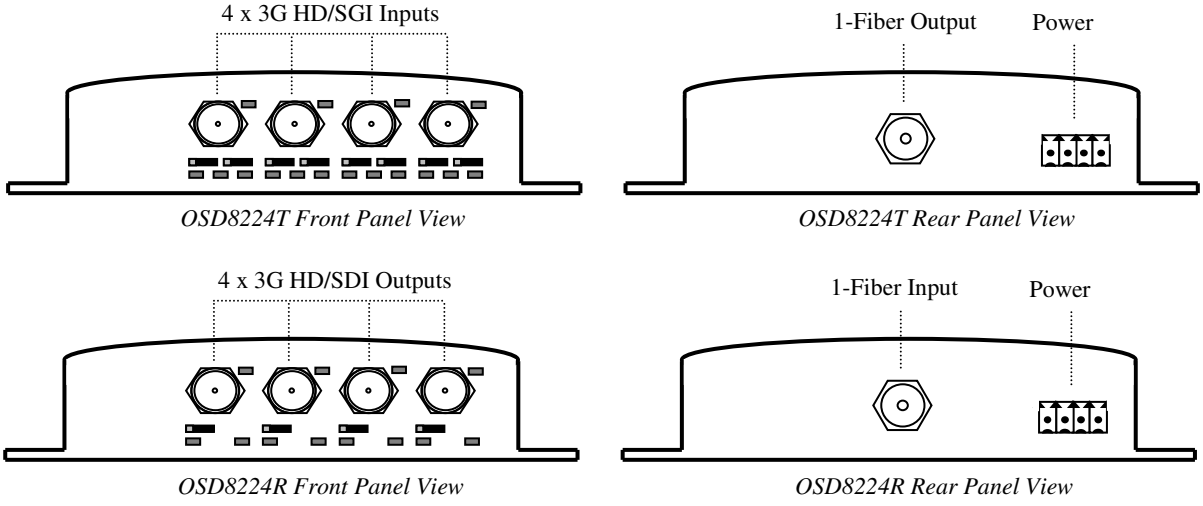


FIGURE 11: 1-FIBER VERSION

4-Fiber Version – 4 x SD/HD/3G inputs, 4 SFP Fiber outputs

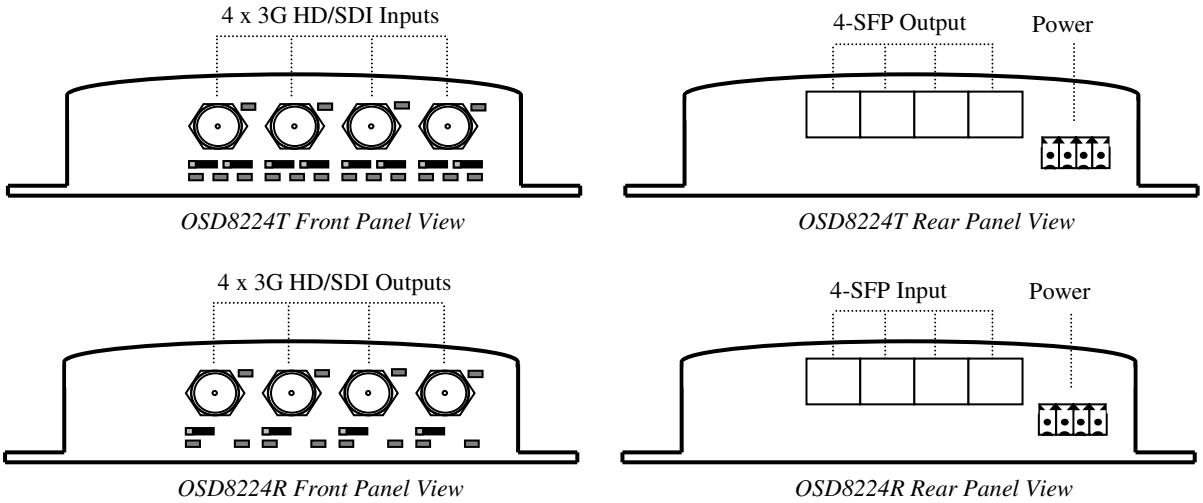
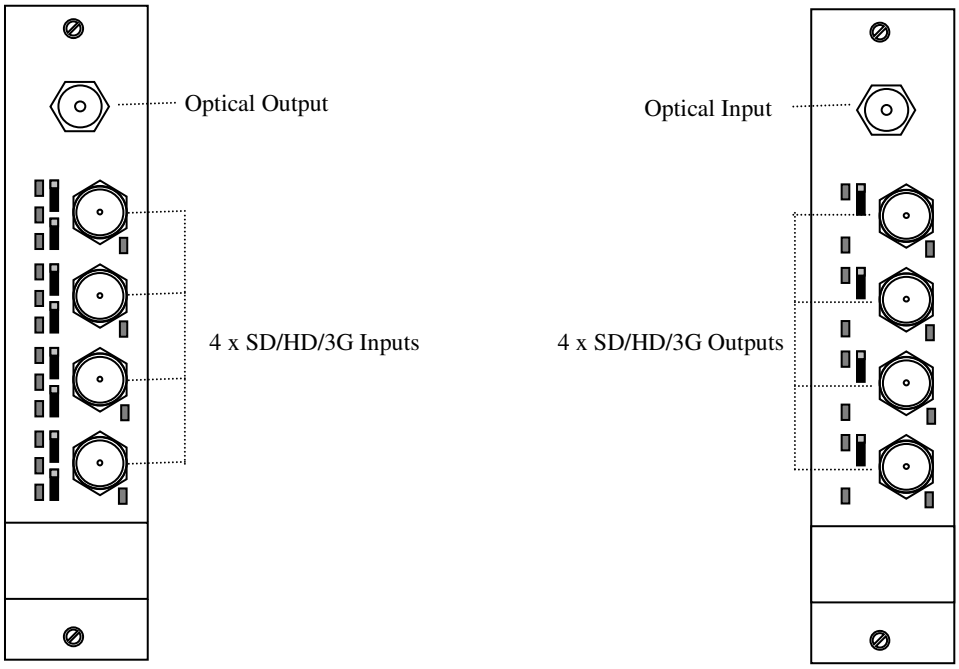


FIGURE 12: 4-FIBER VERSION

Card Version – 4 x 3G HD/SDI inputs multiplexed onto one fiber



OSD8224T Front Panel View *OSD8224R Front Panel View*

FIGURE 13: CARD VERSION

2.3.5 FITTING SFP CONNECTORS

Care should be taken when inserting/removing the SFP connectors from the SFP port as SFP modules are Electrostatic (ES) sensitive and Electrostatic Discharge (ESD) precautions should be taken when installing. Ensure that the SFP is fully engaged and latched into position.

Inserting SFP – Ensure that the SFP lever is in the locked position and insert into appropriate SFP port. Gently push the SFP until it locks into place. Remove plastic/rubber dust cap and fit appropriate fiber cable.

Removing SFP – Remove fiber connector. Pull the SFP lever down to unlock SFP from housing. Using the lever, gently pull the SFP out.

Fiber SFP

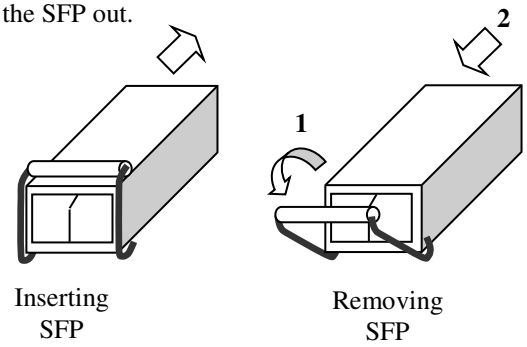


FIGURE 14: FITTING/REMOVING SFP CONNECTORS

3 MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD8224 modems. Please take note of the following:

- Personnel without appropriate training should not attempt any maintenance except that outlined below.
- If further maintenance is attempted you are warned that every care should be taken to ensure that internal measurements made while the equipment is operational are taken carefully as some components within the unit are expensive and may be damaged by failure of any portion of their support circuitry.
- Some components within the unit are Electrostatic (ES) sensitive and Electrostatic Discharge (ESD) precautions should be taken when performing maintenance upon the unit.

3.2 EXTERNAL INSPECTION

Visually check for the following:

- Check that the correct power source is connected to the power socket.
- Check that the HD/SDI signals are connected to the modem correctly and that the distant modem has been terminated correctly to any external equipment.
- Inspect the optical connectors for any contamination and clean using isopropyl alcohol and a lint free tissue if any contamination is detected.
- Check that any external termination resistors are connected if the system configuration requires them.

3.3 ROUTINE MAINTENANCE

- There is no routine maintenance required with the OSD8224.

4 WARRANTY

Thank you for purchasing equipment designed, manufactured and serviced by Optical Systems Design (OSD). OSD warrants that at the time of shipment, its products are free from defects in material and workmanship and conforms to specifications. Our Warranty conditions are outlined below:

4.1 WARRANTY PERIOD

For warranty period, please call your local OSD distributor.

4.2 REPAIRS

Optical Systems Design reserves the right to repair or replace faulty modules/units. Please obtain a "Return Material Authorisation" (RMA) form and number before returning goods.
Goods must be returned in adequate packing material to Optical Systems Design, Warriewood or its nominated authorised representative, for all repairs.

4.2.1 WARRANTY REPAIRS

Return shipments to OSD shall be at customer's expense and freight back to the customer will be at OSD expense.

4.2.2 OUT-OF-WARRANTY REPAIRS

OSD reserves the right to repair or replace any faulty goods. Freight costs and insurance for both journeys are met by the user. All equipment repaired by OSD will have a 3-Month Warranty from the date of dispatch.

4.2.3 SITE REPAIRS

By agreement site repairs may be undertaken for which out of pocket, hotel and travel expenses will be charged.

4.2.4 EXCLUSIONS

This warranty does not apply to defects caused by unauthorized modifications, misuse, abuse or transport damage to the equipment. All modifications to OSD's standard product will need written authorization and will be charged at normal repair rates. All modifications are to be carried out by OSD Technicians. Warranty is void if unauthorized removal and/or tampering with serial number and/or labels is evident.

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