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**OPTICAL**

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**SYSTEMS**

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**DESIGN**

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**OPERATOR MANUAL**

**OSD8327 SERIES**

**HD/SDI AND DATA TX/RX**

**FIBER OPTIC TRANSMISSION SYSTEM**



# OPTICAL SYSTEMS DESIGN

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## 1 TECHNICAL SUMMARY

### 1.1 BRIEF DESCRIPTION

#### 1.1.1 OVERVIEW

The OSD8327 series is a high-quality fiber optic serial digital video (SDI) and data transmission system. The system consists of the OSD8327T transmitter and the OSD8327R receiver, which are designed to be used as a pair to reliably transport SDI and duplex serial data over fiber for long distances using 1310nm, 1510nm and CWDM wavelengths. The OSD8327 pair is suitable for point to point applications.

The OSD8327T accepts one HD/SDI video input signal. It has a SDI equalizer to effectively compensate for coaxial cable losses such as the Belden 1694A cable. This allows flexibility for permanent and temporary installations when 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 OSD8327T and OSD8327R 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. The OSD8327R has HD/SDI received optical power LED indicators on the front panel displaying <0dBm, <-6dBm, <-12dBm, <-18dBm and <-24dBm. The OSD8327T and OSD8327R transmit and receive duplex serial data. Supported data are 2 and 4-wire RS485, TTL, RS422, Manchester, Biphase and RS232 operation from DC to 1Mbps.

#### 1.1.2 APPLICATIONS

- ▲ Any digital broadcast application such as studio signal routing and temporary OB or studio links requiring HD/SDI transmission plus duplex serial data
- ▲ Very high performance surveillance networks

#### 1.1.3 FEATURES AND BENEFITS

- ▲ Basic functionality is that of OSD's well established OSD8327T/OSD8327R HD/SDI link plus the OSD138 multi-protocol serial data link
- ▲ 2 and 4-wire RS485, TTL, RS422, Manchester, Biphase and RS232 operation from DC to 1Mbps
- ▲ Available with built in user bypassable automatic reclocking at 270Mbps, 1.485Gbps and 2.97Gbps
- ▲ 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 140m @ 1.485Gbps and 70m @ 2.97Gbps of Belden 1694A cable
- ▲ Immune to pathological signals
- ▲ Capable of operation over more than 30km
- ▲ Capable of running off any unregulated supply from 10 to 28V<sub>DC</sub>
- ▲ Indication of HD/SDI operating rate

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## 1.2 TYPICAL CONFIGURATION

Figure 1 below indicates the typical set-up for an OSD8327 system.

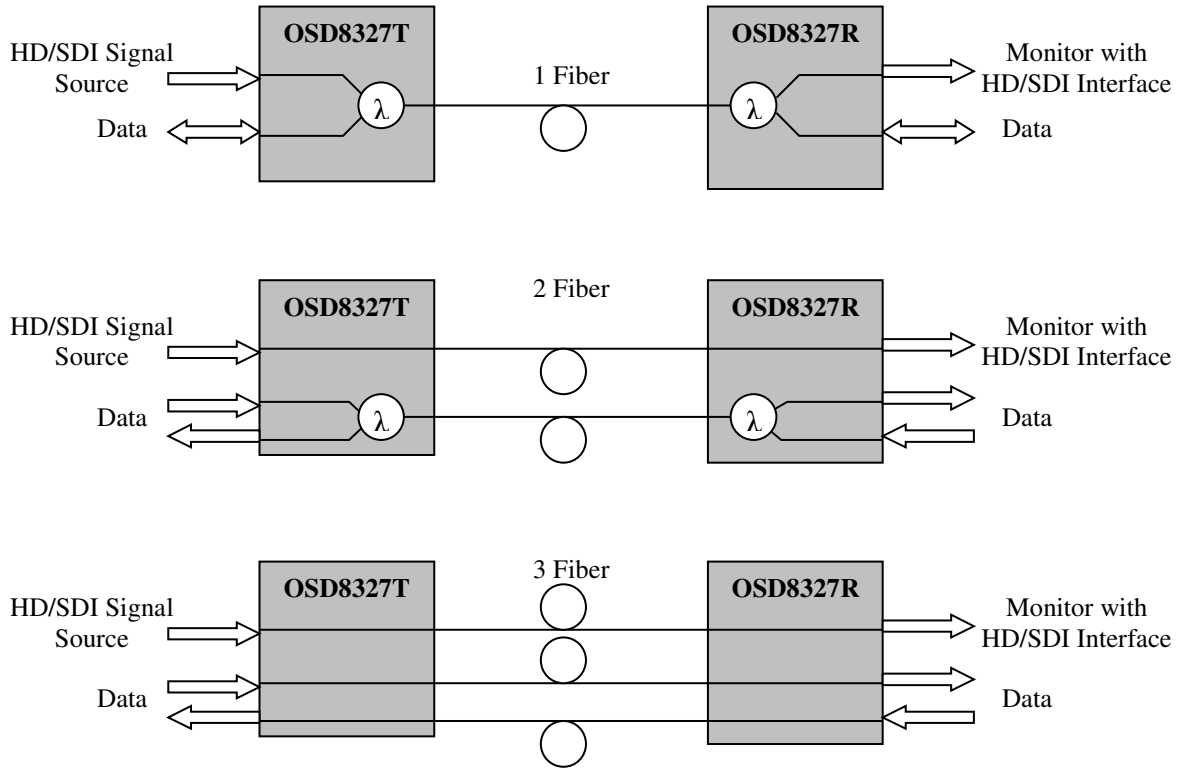


FIGURE 1: OSD8327 TYPICAL CONFIGURATION

# OPTICAL SYSTEMS DESIGN

## 1.3 TECHNICAL SPECIFICATIONS

TABLE 1: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Input/Output Impedance	75Ω
Input/Output Levels	800mVpp nominal
Coax Equalization	350m @ 270Mbps 140m @ 1.485Gbps 70m @ 2.97Gbps
SDI Connectors	BNC Female Sockets
Data Rate	DC to 1Mbps NRZ
Pulse Distortion and Jitter	<±0.3μsec over full dynamic range
Input	User selectable between RS422/RS485 levels, TTL on the + input with – input floating or RS232 levels
User Controls	8-way user adjustable lever switches
HD/SDI Transmitter Wavelength	1310nm ±30nm (1550nm optionally available)
HD/SDI Transmitter Coupled Power	-5 to -0dBm (0dBm and +2dBm are optional)
HD/SDI Receiver Sensitivity	<-20dBm for 1x10 <sup>-9</sup> Bit Error Rate
Data Link Transmitter Wavelength	1310nm ± 30nm or 1510 to 1590nm
Data Link Transmitter Coupled Power	-15 to -12dBm
Data Link Receiver Sensitivity	<-37dBm for 1 x 10 <sup>-9</sup> Bit Error Rate
Standard Optical Link Budget	>15dB at 1310nm (>30km of singlemode fiber)
Optical Connector	ST standard, FC and SC optional
Power Requirements	+10 to 28V <sub>DC</sub>
Electrical Connectors	9 pin male subminiature D connector for power on card 2 way terminal block with screw clamps for power on module 8 way terminal block with screw clamps or data
Dimensions (mm)	100W x 208D x 25H card 105 x 114 x 32 modem case
Weight	0.3kg (card), 0.8kg (modem case)
Operating Temperature	-20°C to +75°C
Relative Humidity	0 to 95% non-condensing

102832702

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 OSD8327T and OSD8327R 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 lightning, and switching transients etc. which may cause damage to the unit. All cable shielding must be grounded at a convenient ground point.

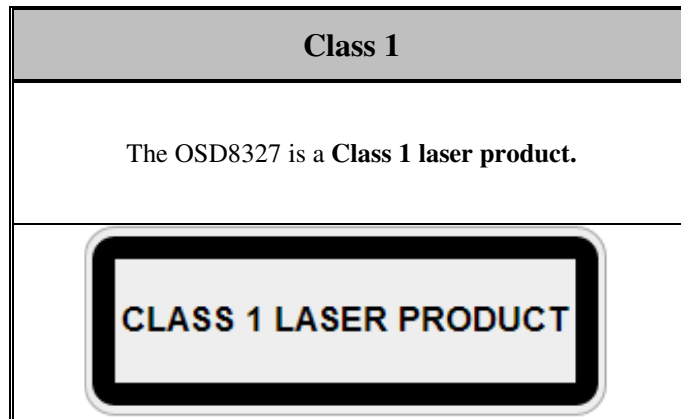
#### 2.2.2 WARNING AND PRECAUTIONS

##### ▲ 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.



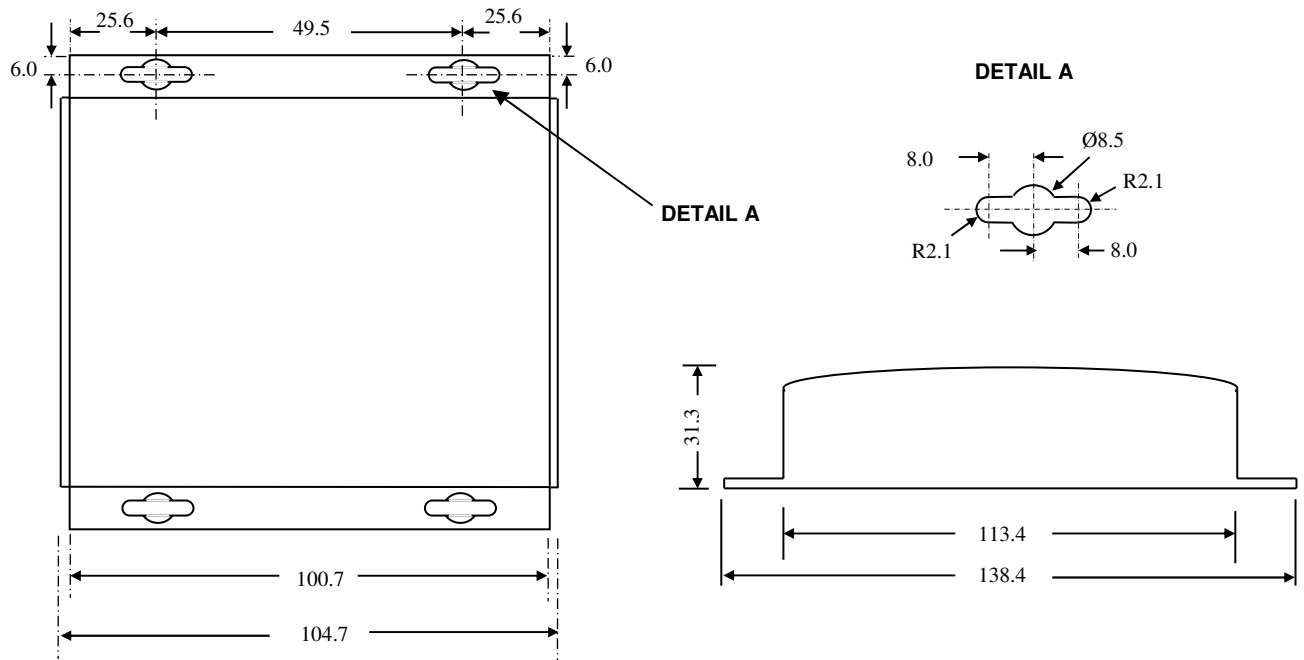
### PRECAUTIONS

- ▲ 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.

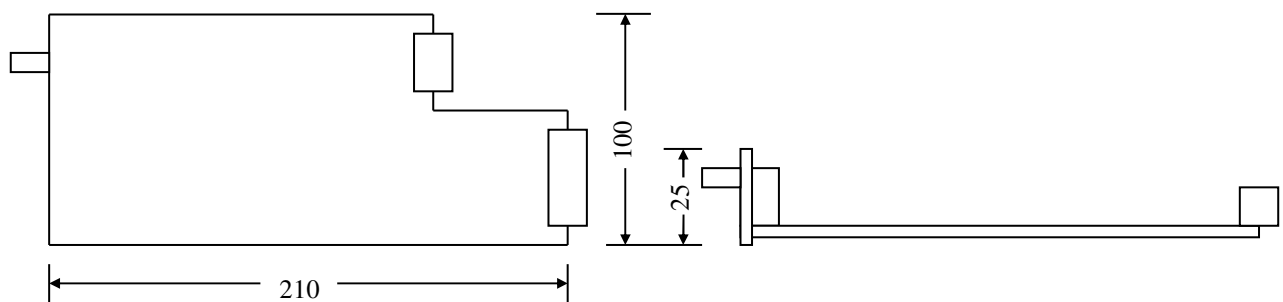
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## 2.2.3 OSD8327 DRAWINGS AND DIMENSIONS

The OSD8327T and OSD8327R are designed to be mounted on an even surface and to be secured by means of M4 or smaller screws. The OSD8327T and OSD8327R card versions are designed to be inserted into a chassis and secured by means of captivated screws.



(a) Module Version



(b) Card Version

FIGURE 2: OSD8327 MOUNTING DIMENSIONS



# OPTICAL SYSTEMS DESIGN

## 2.2.4 POWER SUPPLY CONNECTIONS

The OSD8327T and OSD8327R require external DC power. The voltage range is +10 to 28V<sub>DC</sub>. Power should be connected to the power socket located on the front panel of the units and applied as indicated below;

TABLE 2: OSD8327 DC POWER CONNECTION

External Power Pin	Specification
Pin 1	Ground or 0V
Pin 2	+10 to 28V <sub>DC</sub>

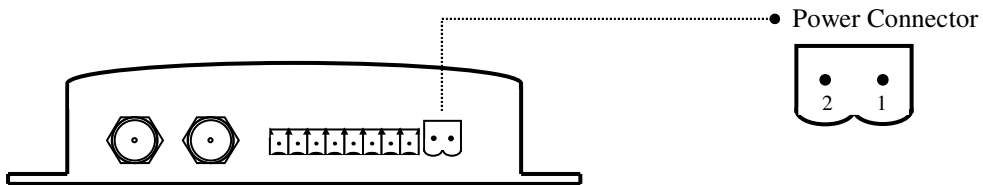


FIGURE 3: OSD8327 POWER SUPPLY CONNECTIONS

## 2.2.5 HD/SDI CONNECTIONS

The HD/SDI video-input signal (eg. from camera) is connected to the HD/SDI input BNC connector on the OSD8327T. The OSD8327T also has two HD/SDI input monitor outputs. *Note: The OSD8327T card version has only one monitor output.*

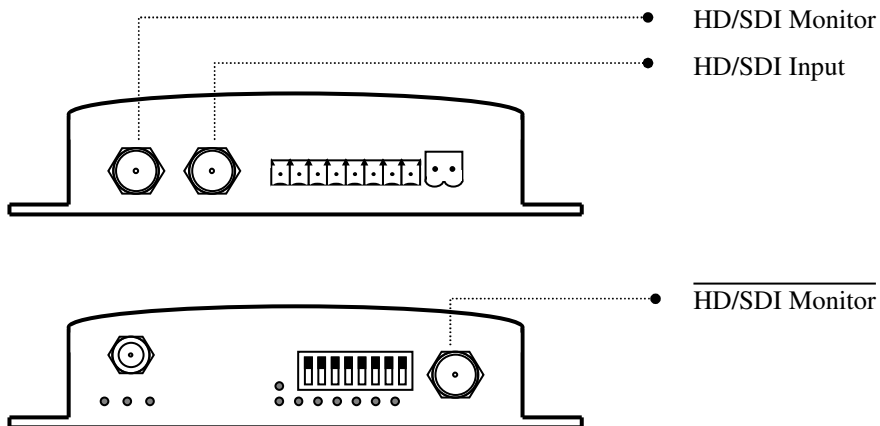


FIGURE 4: OSD8327T VIDEO CONNECTIONS

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The OSD8327R has two HD/SDI BNC output connectors. *Note: Figure 5 drawing shows the module version. The card version is identical except the power connector being a DB9.*

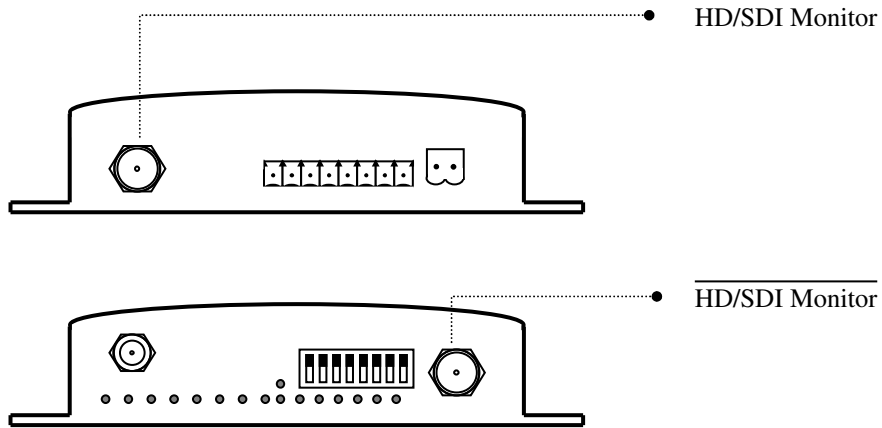


FIGURE 5: OSD8327R VIDEO CONNECTIONS

### 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.

# OPTICAL SYSTEMS DESIGN

## 2.2.7 DATA CONNECTIONS

Data signals are connected to the 8-way terminal block connector as set out in Table 3

TABLE 3: DATA CONNECTOR PIN ASSIGNMENTS

8 WAY DATA TERMINAL BLOCK	FUNCTION
1	GROUND
2	RS232 OUTPUT
3	RS232 INPUT
4	RS422 OUTPUT - / RS485 (4W OUTPUT -)
5	RS422 OUTPUT + / RS485 (4W OUTPUT +)
6	GROUND
7	RS422 INPUT - / RS485 (2W I/O, 4W INPUT -)
8	RS422 INPUT + / RS485 (2W I/O, 4W INPUT +)

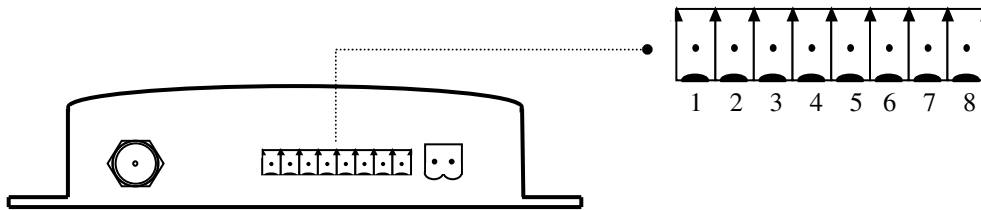


FIGURE 6: DATA CONNECTOR PIN ASSIGNMENTS

**RS485 2-Wire** half duplex is used to connect several devices to the same bus when only one unit transmits data at a time. All units are normally in high impedance receive mode waiting for data. When transmission of data is requested, the device waits for a protocol specific turn-around time delay before transmitting after which it returns to receive mode.

**RS485 4-Wire** full duplex is used for master/slave arrangement. Devices are polled and respond faster with no turn-around time delay required between request/response. The receiver is always enabled allowing the devices to receive data even while responding to a request.

**Note:** If a link doesn't seem to be working correctly (no communication or just one way communication), try swapping the polarity of the data lines on both ends. Some devices are marked opposite the RS485 standard.

# OPTICAL SYSTEMS DESIGN

## 2.3 OSD8327 SWITCH OPERATION

The OSD8327 has an 8-way switch for control of data functions and video functions. These will be described in two sections, namely HD/SDI video control and data control.

### 2.3.1 HD/SDI VIDEO SWITCH SETTINGS

The OSD8327T has an Automatic Equalizer (SW8) and Reclocker (SW7) switch located on the front panel. The OSD8327R has only the Reclocker switch (SW8). The default setting is “on” position.

TABLE 4: OSD8327T SWITCH SETTINGS

#### OSD8327T

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*

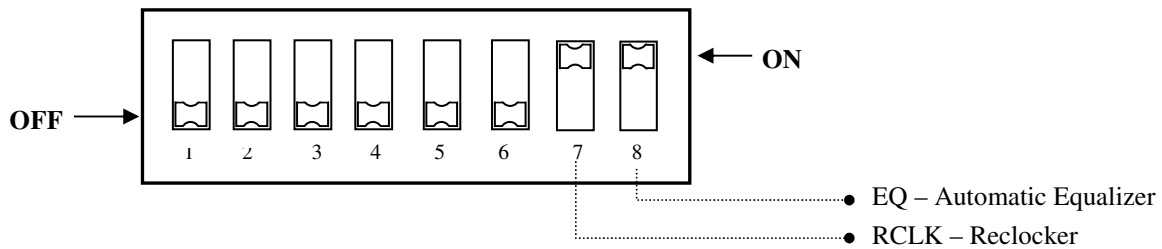


FIGURE 7: OSD8327T SWITCH SETTINGS

TABLE 5: OSD8327R SWITCH SETTINGS

#### OSD8327R

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

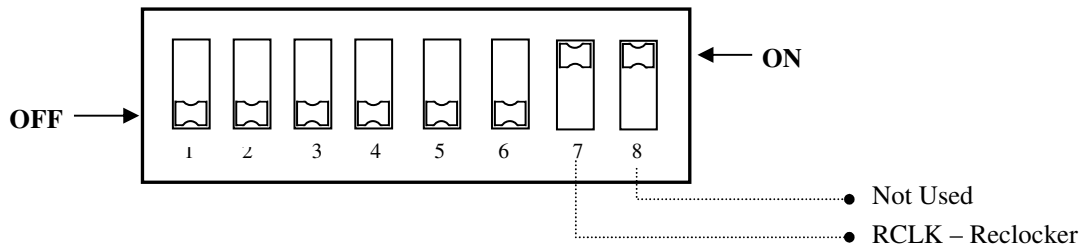


FIGURE 8: OSD8327R SWITCH SETTINGS

# OPTICAL SYSTEMS DESIGN

## 2.3.2 DATA SWITCH SETTINGS

Six (SW1 to SW6) of the 8-way control switches are used for data control. The 8-way switch is located at the front of OSD8327 modem.

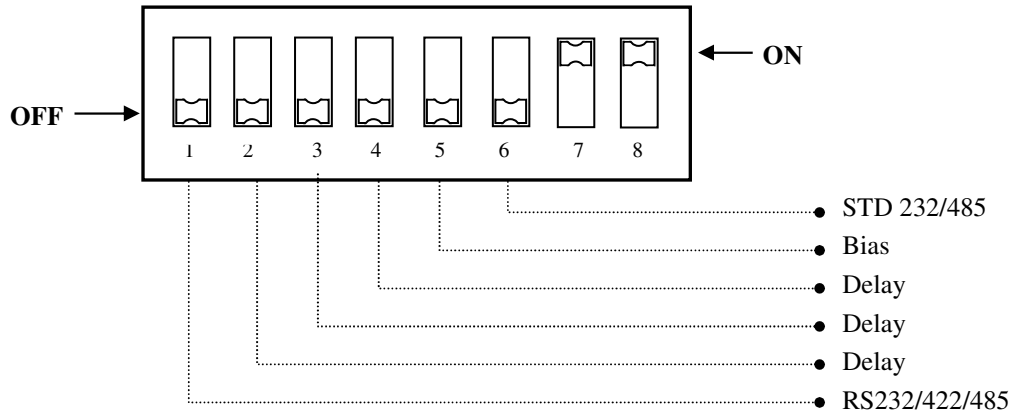


FIGURE 9: DATA MODE SWITCH SETTINGS

TABLE 6: DATA MODE SWITCH SETTINGS

SWITCH	STATE	FUNCTION
SW1	OFF	RS232/RS422
	ON	2 WIRE AND 4 WIRE RS485
SW5	OFF	NO BIAS RS485
	ON	BIAS RS485
SW6	OFF	RS232/RS422 OR 4 WIRE RS485
	ON	INVERSE RS232 OR 2WIRE RS485

Switches SW2, SW3 and SW4 are used for setting RS485 turnaround time.

TABLE 7: RS485 TURNAROUND TIME SWITCH SETTINGS

SW2	SW3	SW4	RS485 TURNAROUND TIME
ON	ON	ON	10us
ON	ON	OFF	30us
ON	OFF	ON	100us
ON	OFF	OFF	300us
OFF	ON	ON	1ms
OFF	ON	OFF	3ms
OFF	OFF	ON	10ms
OFF	OFF	OFF	30ms

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## 2.4 LED INDICATOR OPERATION

### 2.4.1 OSD8327T INDICATORS

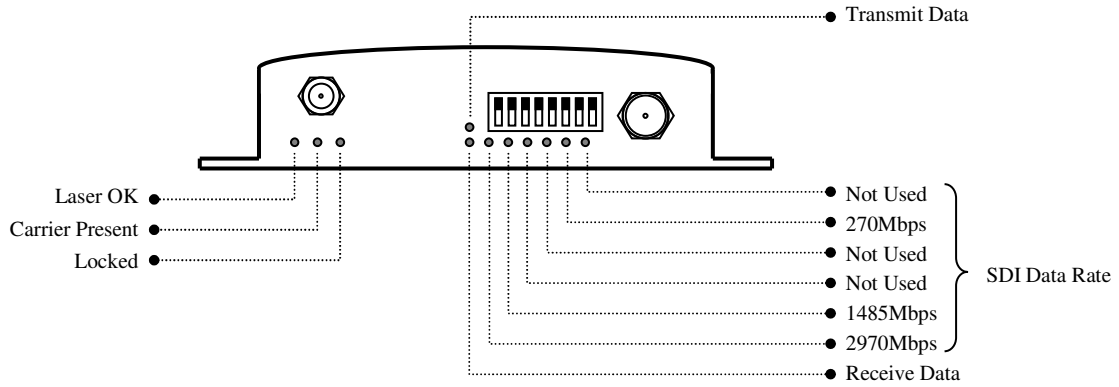


FIGURE 10: OSD8327T LED INDICATORS

TABLE 8: OSD8327T LED INDICATORS

INDICATOR	COLOUR	FUNCTION
<b>Laser</b>	Red	Faulty Laser
	Green	Laser OK
<b>Carrier Present</b>	Off	SDI source is off or unplugged
	Green	Carrier Detected
<b>Locked</b>	Off	Reclocker not locked or reclocker in bypass mode.
	Green	Reclocker is locked
<b>Transmit Data</b>	Off	No data transmission
	Amber	Data transmission
<b>Receive Data</b>	Off	No data received
	Amber	Data received

SDI DATA LOCKED RATE (Mbps)	2970	1485	-	-	270	-
<b>GREEN</b>	On	On	-	-	On	-
<b>BLINKING</b>	Optical Transceiver Error					

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## 2.4.2 OSD8327R INDICATORS

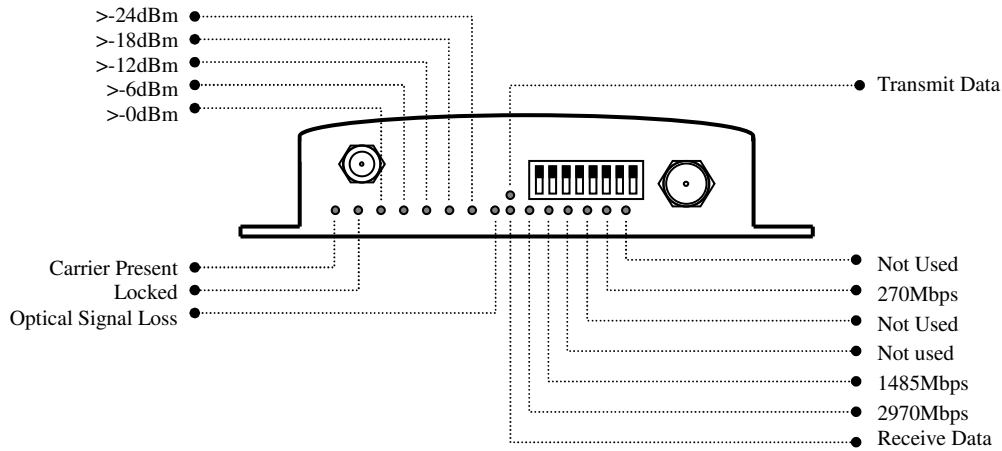


FIGURE 11: OSD8327R LED INDICATORS

TABLE 9: OSD8327R FRONT PANEL INDICATOR FUNCTIONS

INDICATOR	COLOUR	FUNCTION
Carrier Present	Off	SDI source is unplugged
	Green	Carrier Detected
Locked	Off	Reclocker not locked or reclocker in bypass mode.
	Green	Reclocker is locked
Optical Signal Loss	Red	No optical signal
	Off	Optical Power above -27dBm
0dBm	Green	Optical Power above 0dBm
-6dBm	Green	Optical Power above -6dBm
-12dBm	Green	Optical Power above -12dBm
-18dBm	Green	Optical Power above -18dBm
-24dBm	Green	Optical Power above -24dBm
Transmit Data	Off	No data transmission
	Amber	Data transmission
Receive Data	Off	No data received
	Amber	Data received

SDI DATA LOCKED RATE (Mbps)	2970	1485	-	-	270	-
GREEN	On	On	-	-	On	-
BLINKING	Transmit Error					

## 3 MAINTENANCE

### 3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD8327T and OSD8327R 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 and data signals are connected to the modem correctly and that the distant OSD8327T or OSD8327R 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 OSD8327T and OSD8327R.



## 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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