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**OPTICAL**

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**SYSTEMS**

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**DESIGN**

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**OPERATOR MANUAL**

**OSD8600S SERIES**

**DIGITAL 4 CHANNEL VIDEO/DATA/IP**

**FIBER OPTIC MULTIPLEXER**



# OPTICAL SYSTEMS DESIGN

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## 1 TECHNICAL SUMMARY

### 1.1 PRODUCT DESCRIPTION

#### 1.1.1 OVERVIEW

The OSD8600S series is a high-quality digital video, data and IP optical fiber transmission system. The system consists of two OSD8600S transceiver units (OSD8600ST transmitter and OSD8600SR receiver) designed to be used as a pair. They provide forward transmission of four channels of PAL, NTSC or SECAM video, and two full duplex data channels plus one full duplex contact closure channel. The OSD8600S system also optionally transmits/receives 10/100 Base-T Ethernet connections via an RJ45 connector.

The OSD8600ST transmitter has four analog composite video inputs that are converted to digital with 9-bit resolution, two digital data inputs and one contact closure channel. The OSD8600ST can be optionally supplied with 10/100 Base-T Ethernet. The resulting digital signals are multiplexed and transmitted as a digital bit-stream through the fiber utilising an SFP transceiver. The OSD8600ST SFP module also incorporates an optical receiver section that decodes the digital signal transmitted by the OSD8600SR receiver, to provide data and Ethernet signals. The data channels can be RS232 on one channel, RS485 or RS422 on the other channel operating from DC to 400kbps.

The OSD8600SR SFP transceiver incorporates a high performance optical receiver for the incoming digital bit-stream. The received digital signal is then decoded into video and data signals. The OSD8600SR SFP also incorporates a transmitter that outputs a digital optical signal consisting of the return path channels for data and 10/100 Base-T Ethernet. The unit provides a constant analogue composite video and is adjustment free over all link lengths.

The OSD8600ST and OSD8600SR are available in two physical configurations: card and a stand-alone module case. The card versions are designed to fit the 3RU-high 19" OSD370N or OSD350N chassis, which allows multiple OSD card products to be conveniently powered from and located in the one chassis. The module versions are intended for isolated use and require an external power source of +9 to +35V<sub>DC</sub> or 22 to 28V<sub>AC</sub> @ 5VA.

Two fibers are normally employed per SFP, one for each direction of transmission. Single fiber full duplex operation per SFP is possible by employing wavelength division multiplexing (WDM) SFPs. The OSD8600S system can be used with any standard singlemode optical fiber. LC connectors are used on 2-fiber applications while SC is type for single fiber applications. Restricted operation is possible over multimode fiber. Contact OSD for technical advice for this option.

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### 1.1.2 APPLICATIONS

- ▲ CCTV networks
- ▲ Transportation networks
- ▲ Industrial monitoring systems

### 1.1.3 FEATURES AND BENEFITS

- ▲ Uncompressed 9-bit video encoding, giving professional quality transmission.
- ▲ Fiber optic transmission of four video signals on one fiber with one RS232, one RS422/485 data signals and one contact closure.
- ▲ Optional 10/100 Base-T Ethernet bridging through the link.
- ▲ Video bandwidth of 6.5MHz, SNR >63dB
- ▲ Communication utilizing standard 1000Base-X SFP transceivers that can be selected according to specific length or fiber requirements without changing the whole unit.
- ▲ 2-fiber 1310nm or 1-fiber 1310nm/1550nm SFPs available for multimode or singlemode fiber.
- ▲ 2-fiber 850nm SFP available for OM2, OM3, or OM4
- ▲ SFP module(s) sold separately

# OPTICAL SYSTEMS DESIGN

## 1.2 TYPICAL CONFIGURATION

Figure 1 below shows a typical set-up for an OSD8600S pair.

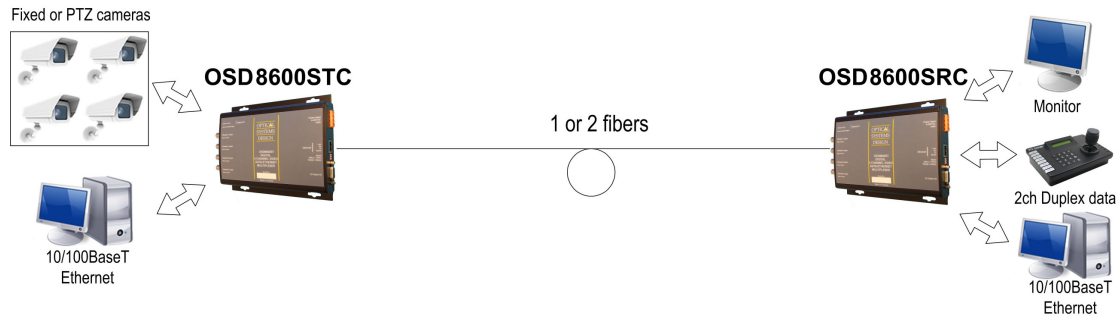


FIGURE 1: TYPICAL CONFIGURATION

## 1.3 PRODUCTS AND OPTIONS

There are various options available for the OSD8600S and SFPs as identified in Table 1 below:

TABLE 1: PRODUCTS AND OPTIONS

ITEM	DESCRIPTION
OSD8600ST/4V.2Dd	4 Channel Video Transmitter Card with 2 Duplex Data and 1 Duplex Contact Closure Channel
OSD8600SR	4 Channel Video Receiver Card with 2 Duplex Data and 1 Duplex Contact Closure Channel
C	Module Version
E	10/100BaseT Ethernet Interface

SFP ITEM	DESCRIPTION
OSDSFP1000Lx	2-fiber 1310nm SFP Plugin Module with LC connectors for up to 20km
OSDSFP1000WLxA	Single fiber SFP Plugin Module with an SC connector for up to 20km (Tx @ 1310nm, RX @ 1550nm)
OSDSFP1000WLxB	Single fiber SFP Plugin Module with an SC connector for up to 20km (Tx @ 1550nm, RX @ 1310nm)
OSDSFP1000Sx	1000Base-Sx 850nm SFP plugin module for 2 multimode fibers, supports up to 500m on OM2 and 860m on OM3

# OPTICAL SYSTEMS DESIGN

## 1.4 TECHNICAL SPECIFICATIONS

TABLE 2: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Input/Output Impedance	75Ω
Input/Output Levels	1.0Vpp nominal
Bandwidth (±0.5dB)	10Hz to 6.5MHz
Signal to Noise Ratio	> 63dB (weighted)
Linearity	<0.7% Differential Phase (DP) <0.7° Differential Gain (DG)
Standard Data Interface	1 x RS232, 1 x RS422/RS485 and 1 x Contact Closure
Standard Data Rates	DC to 400kbps on both data channels DC to >100bps on relay channel
Optional Ethernet Interface	10/100 Base-T via RJ45 connector with system rate of 10Mbps
Data Bit Error Rate	< 1x10 <sup>-9</sup>
Video Connectors	BNC
Standard Data Connector	Female 9 pin D connector
Optical Port	SFP
SFP Options	Short haul, long haul, single fiber operation, etc Please consult OSD datasheets or contact OSD
Optical Connectors	2-fiber = LC, 1-fiber = SC (for full-duplex operation) 1-Fiber = LC (for one-way operation)
Dimensions (mm)	100W x 208D x 25H card 114W x 174D x 32H module – excluding flanges and connectors
Weight	0.2kg (card), 0.7kg (module)
Power Requirements	9 to 35V <sub>DC</sub> or 22 to 28V <sub>AC</sub> @5VA
Operating Temperature	-20 to +75°C
Relative Humidity	0 to 95% non-condensing
Chassis Current Consumption (CCC)	0.40 Amp

1028600S02

# OPTICAL SYSTEMS DESIGN

## 1.5 CONNECTOR PIN ASSIGNMENTS

### 1.5.1 DB9 CONNECTOR

TABLE 3: DB9 FEMALE CONNECTOR PIN ASSIGNMENTS

PIN	DATA CONNECTION	
	Connection Type	Connection Logic
1	Relay Input	To OSD8600S
2	RS232 Input	To OSD8600S
3	RS232 Output	From OSD8600S
4	RS422 Input (+)	To OSD8600S
5	RS422 Output (-) / RS485 (-)	From OSD8600S
6	Relay Output	From OSD8600S
7	Ground	-
8	RS422 Input (-)	To OSD8600S
9	RS422 Output (+) / RS485 (+)	From OSD8600S

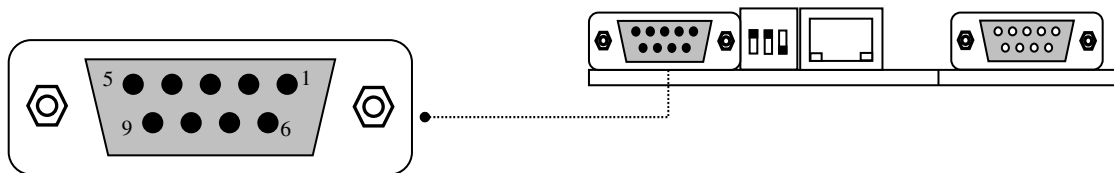


FIGURE 2: DB9 - FEMALE CONNECTOR PIN OUT

**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, try swapping the polarity of the data lines on both ends. Some devices are marked opposite the RS485 standard.

### 1.5.2 RJ45 CONNECTOR (10/100 BASE-T ETHERNET)

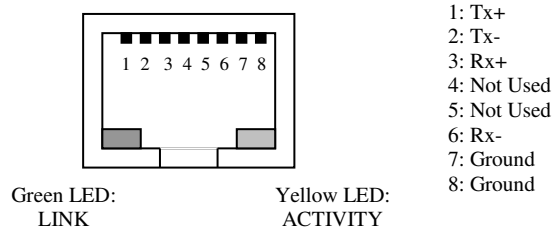


FIGURE 3: 10/100 BASE-T ETHERNET RJ45 CONNECTOR



## 2 INSTALLATION AND OPERATION

### 2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD8600S system 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

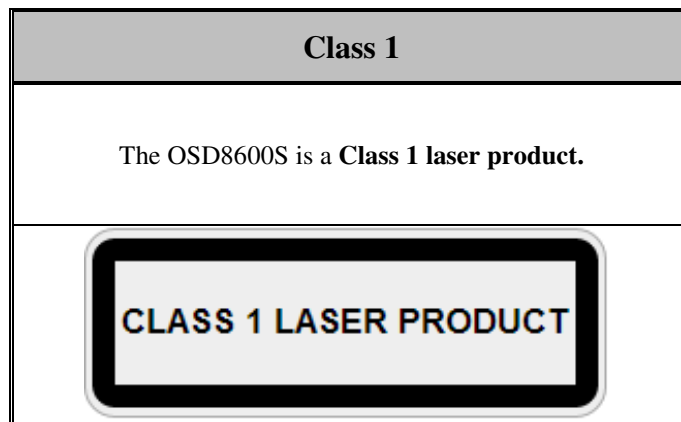
#### 2.2.1 WARNING AND PRECAUTIONS

##### ▲ 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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## 2.2.2 PACKAGING

There are two types of packaging of the OSD8600S, the "Module Case" version, "Card" version" as shown in Figure 4.

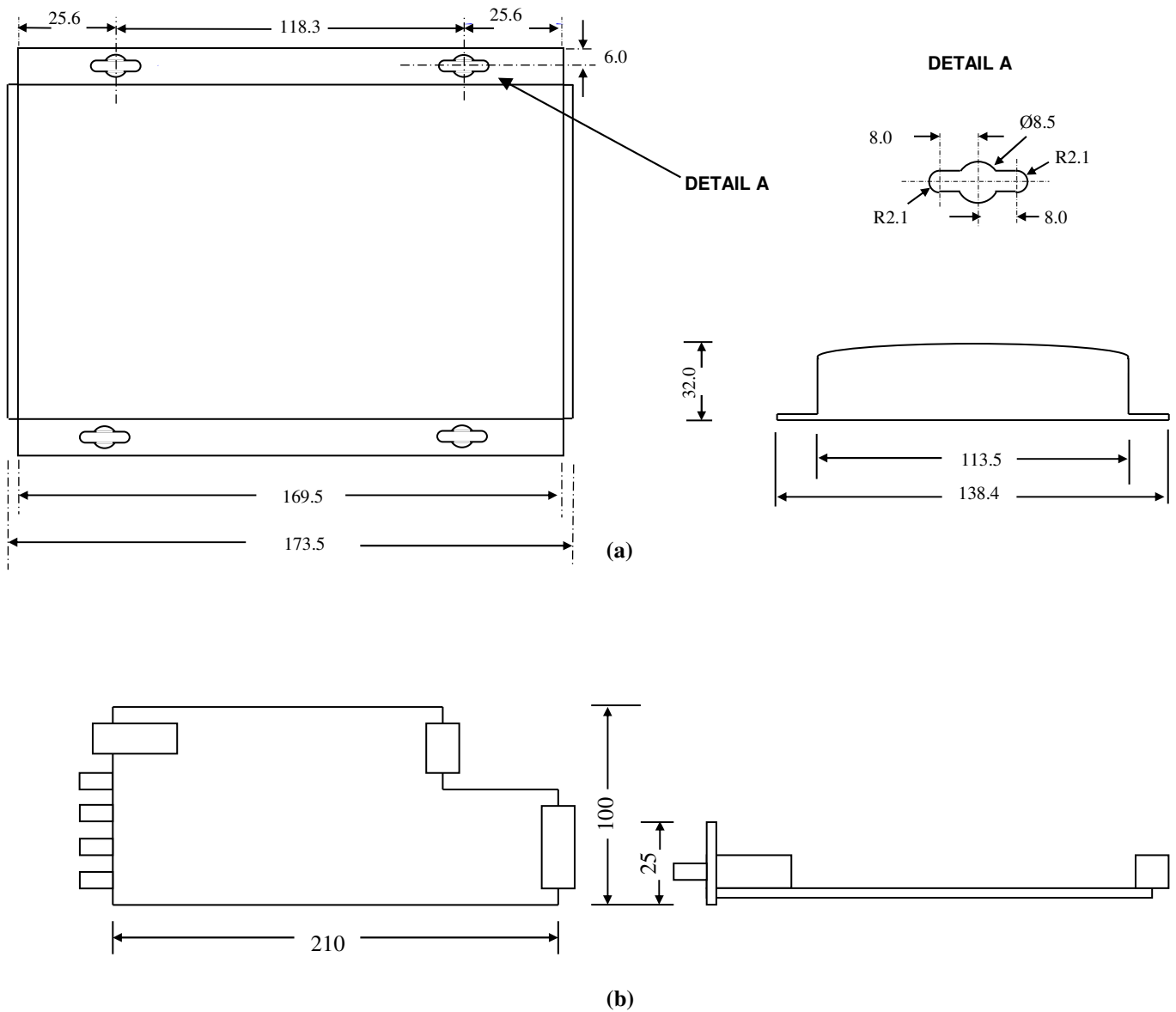


FIGURE 4: OSD8600S DIMENSIONS  
(a) Module Version (b) Card Version

# OPTICAL SYSTEMS DESIGN

## 2.2.3 POWER SUPPLY CONNECTIONS

The OSD8600S card version is powered from the OSD370N or OSD350N chassis. DC power is connected via the DB9 connector. The card version should be fixed into the chassis using the captivated screws. Either card can be plugged in or out of the chassis with power on or off.

TABLE 4: CARD POWER SUPPLY PINOUT

OSD370N or OSD350N Power Pin	Specification
Pin 3	+12V <sub>DC</sub> (±1V) – supplied by OSD921
Pin 6,7	0V

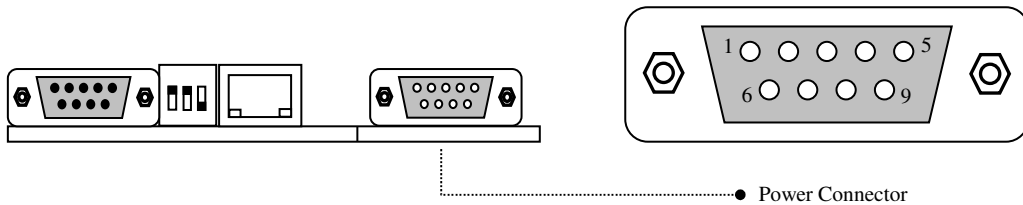


FIGURE 5: CARD POWER SUPPLY PINOUT

The OSD8600S Module requires external 9V<sub>DC</sub> to 35V<sub>DC</sub> or 22V<sub>AC</sub> to 28V<sub>AC</sub> @ 5VA power. This is connected to the power socket located at the back of the case. Power should be connected as indicated in Table 5.

TABLE 5: POWER CONNECTION

OSD8600S Version	Specification	Power	Network Management	Connection
Card	12V <sub>DC</sub>	Supplied by OSD370N or OSD350N Chassis	DB9	DB9
Module	9V <sub>DC</sub> to 35V <sub>DC</sub>	Pin 1: V <sub>DC</sub> or V <sub>AC</sub>	Pin 3: Not Used	4 way terminal Connector
	-	Pin 2: 0V	Pin 4: Not Used	

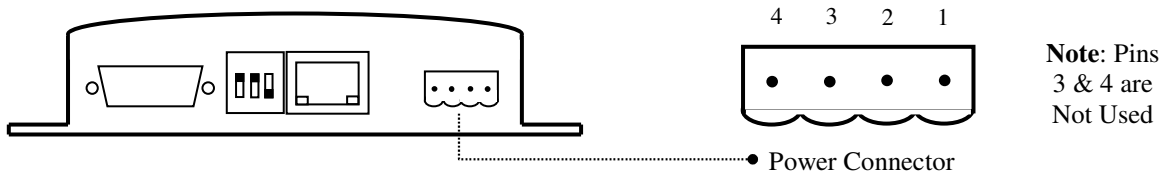


FIGURE 6: OSD8600S MODULE CASE VERSION POWER SUPPLY CONNECTION

**NOTE:**

1. The OSD8600S card version should be fixed into the OSD370N or OSD350N chassis using the captivated screws
2. The cards can be plugged in or out of the chassis with power on or off.

# OPTICAL SYSTEMS DESIGN

## 2.2.4 VIDEO CONNECTIONS

The OSD8600S provides transmission of up to 4 video channels. The video-input signal (eg. from camera) is connected to the video input BNC connectors on the OSD8600S transmitter. The video output signal (eg. to monitor) is connected from the corresponding video channel output BNC connectors on the OSD8600S receiver. Video channel allocation is shown on the product label.

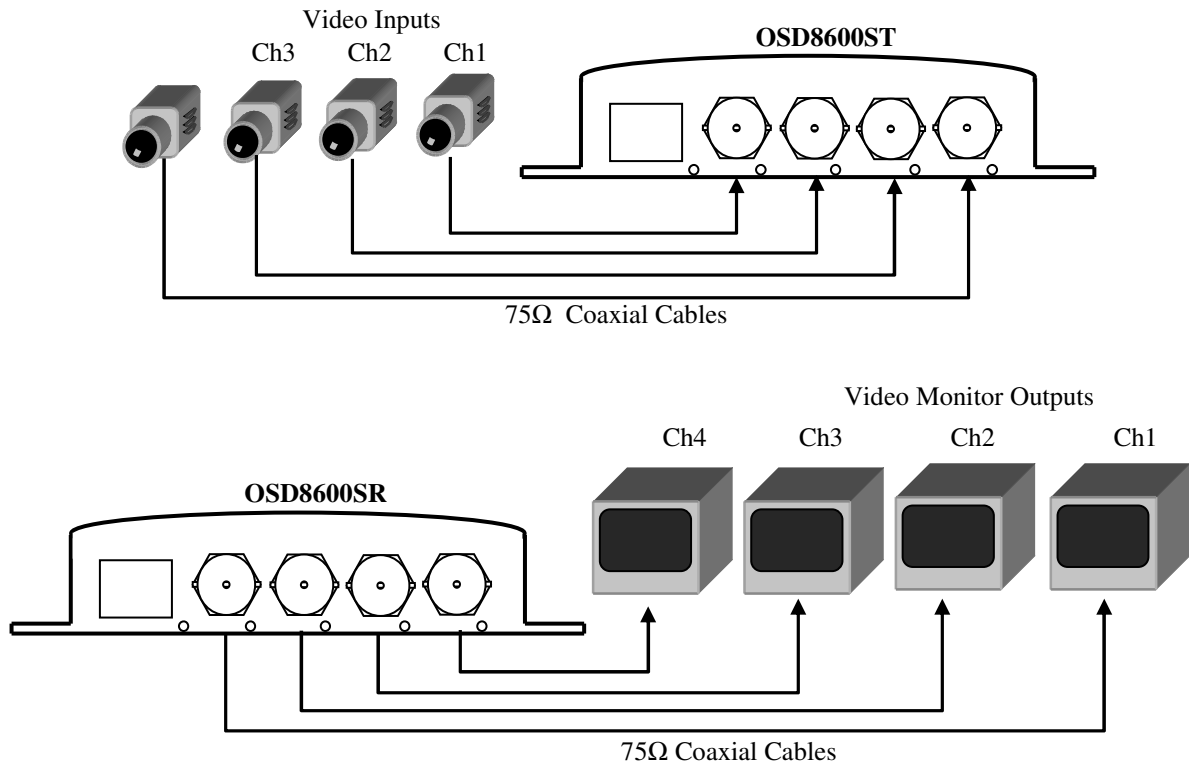


FIGURE 7: VIDEO CONNECTIONS

## 2.2.5 DATA CONNECTIONS

The two data channels are connected via the DB9 connector as set out in Table 3 and Figure 2.

# OPTICAL SYSTEMS DESIGN

## 2.2.6 CONTACT CLOSURE CONNECTIONS

The OSD8600S has one contact closure channel. The contact closure input (Pin 1 on the DB9 connector) is driven high. To operate the contact closure, the input should be switched to ground (see Figure 8).

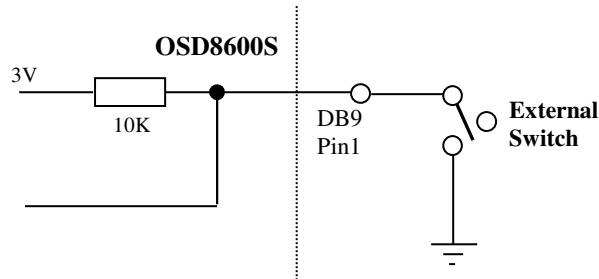


FIGURE 8: CONTACT CLOSURE INPUT

The contact closure output (Pin 6 on the DB9 connector) is to be connected to the relay coil. Maximum ratings the OSD8600S can drive is 1.5A @ 24V<sub>(max)</sub>.

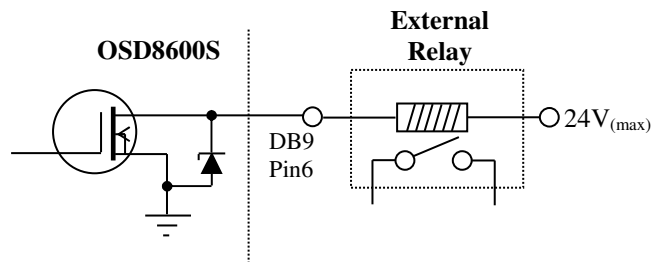


FIGURE 9: CONTACT CLOSURE OUTPUT

# OPTICAL SYSTEMS DESIGN

## 2.2.7 SWITCH SETTINGS

The OSD8600S has a user configurable switch on the side. The switch is used for setting data protocols. The possible configuration of the switch settings is shown in Table 6.

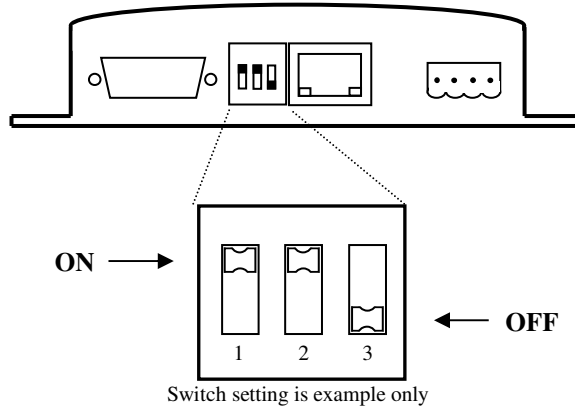


FIGURE 10: SWITCH SETTINGS DIAGRAM

SWITCH	STATE	POSITION	FUNCTION
SW1(T1)	OFF	DOWN	RS422
	ON	UP	RS485
SW2(T2)	OFF	DOWN	4-Wire Operation
	ON	UP	2-Wire Operation
SW3(T3)	OFF	DOWN	Not Used
	ON	UP	Not Used

TABLE 6: OSD8600S SWITCH SETTINGS

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## 2.3 SFP OPTICAL PORT CONNECTIONS

Care should be taken when inserting/removing the SFP connectors from SFP ports 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 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.

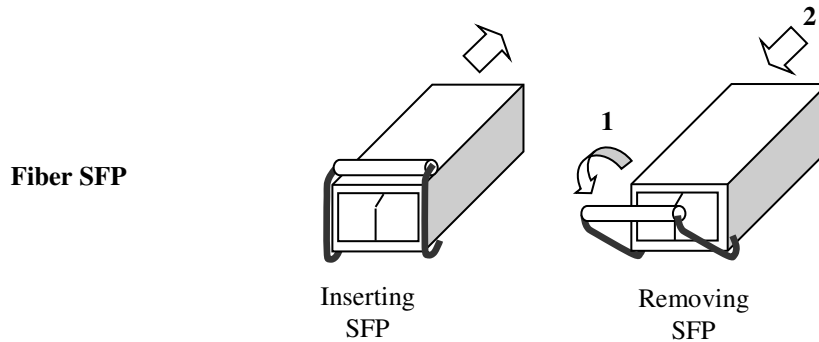


FIGURE 11: FITTING/REMOVING SFP CONNECTORS

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.

## 2.4 OSD8600S OPERATION

When using the OSD8600S for the first time, check that the unit is in good condition with no visible damage.

If a card version is used, insert it in an appropriate slot on the OSD chassis and check that the indicators illuminate accordingly on power up. If a module version is used connect the unit to an appropriate power source and check that the indicators illuminate accordingly on power up.

To connect video signals, connect BNC terminated coaxial cables ( $75 \Omega$  - RG59) from the camera to the unit. Note that when a video signal is connected that the corresponding channel LED will illuminate Amber to indicate that a video signal is present.

Finally, plug in the SFP(s) and optical connectors of the optical cable. If the remote OSD8600SR is connected, the "Optical Rx OK" LED will change from Red to Green.

Plug the digital signal source into the DB9 connector on the rear of the module. Ensure that the correct signals are connected to the correct pins of Data Input/Output connector as specified in Table 3.

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## 2.4.1 INDICATORS

There are three types of LED indicators on the OSD8600S; Optical Rx OK, Video Present and Ethernet.

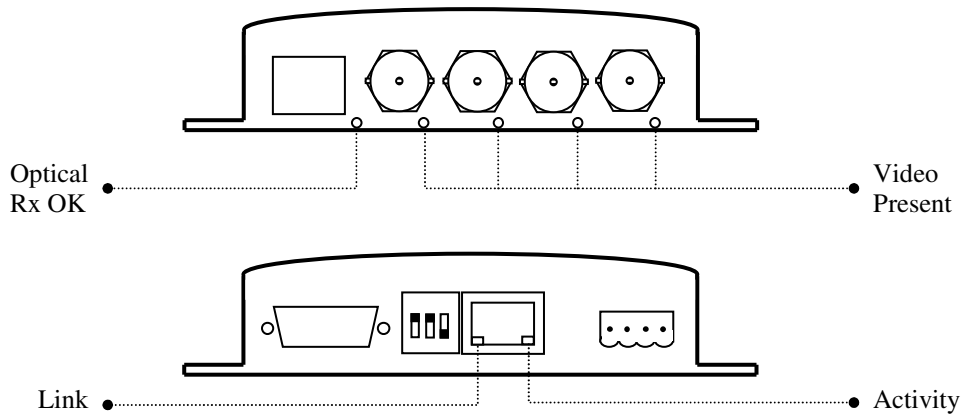


FIGURE 12: LED INDICATORS

### Optical Rx OK Indicators

STATUS/COLOUR	FUNCTION
Off	No Power
Red	No optical link established
Green	Link/Sync established

### Video Present Indicators (x 4)

STATUS/COLOUR	FUNCTION
Off	No Video Signal Present
Amber	Video Signal Present

### Ethernet Indicators

LINK	SPEED (AMBER)	FUNCTION
Off	On	100Mb/s operation. Link Idle
Green Blinks	On	100Mb/s operation. Tx/Rx activity
Orange On	On	100Mb/s connection without auto-negotiation. Link Idle
Orange Blinks	On	100Mb/s connection without auto-negotiation. Rx activity
Orange-Green Alternating	On	100Mb/s connection without auto-negotiation. Tx/Rx activity
Orange On	Off	10Mb/s operation. Link Idle
Orange Blinks	Off	10Mb/s operation. Tx/Rx activity

TABLE 7: OSD8600S INDICATORS



## 3 MAINTENANCE

### 3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD8600S 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 sensitive and 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 data signals are connected to the modem correctly and that the distant OSD8600S 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 OSD8600S.

## 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 repair labels is evident.



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