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**OPTICAL**

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**SYSTEMS**

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**DESIGN**

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**OPERATOR MANUAL**

**OSD2151 SERIES**

**GIGABIT ETHERNET**

**MEDIA CONVERTER**



# OPTICAL SYSTEMS DESIGN

## INDEX 1

<b>1</b>	<b>TECHNICAL SUMMARY</b> .....	<b>5</b>
1.1	BRIEF DESCRIPTION .....	5
1.1.1	OVERVIEW.....	5
1.1.2	APPLICATIONS.....	5
1.1.3	FEATURES AND BENEFITS.....	5
1.2	TYPICAL CONFIGURATION.....	6
1.3	TECHNICAL SPECIFICATIONS .....	7
1.4	OSD2151 FRONT AND REAR PANELS.....	8
<b>2</b>	<b>INSTALLATION AND OPERATION</b> .....	<b>9</b>
2.1	INTRODUCTION.....	9
2.2	INSTALLATION .....	9
2.2.1	WARNING AND PRECAUTIONS.....	9
2.2.2	OSD2151 DRAWINGS AND DIMENSIONS.....	10
2.2.3	POWER SUPPLY CONNECTIONS .....	11
2.2.4	FIXED RJ45 COPPER PORT PIN ASSIGNMENTS .....	12
2.2.5	LED INDICATORS .....	12
2.2.6	CONTROLS .....	13
2.2.7	FITTING SFP CONNECTORS.....	14
2.2.8	BASIC CONNECTIONS .....	14
2.3	OSD2151 OPERATION.....	15
2.3.1	SINGLE UNIT CONFIGURATION.....	15
<b>3</b>	<b>MAINTENANCE</b> .....	<b>18</b>
3.1	INTRODUCTION .....	18
3.2	EXTERNAL INSPECTION .....	18
3.3	ROUTINE MAINTENANCE.....	18
<b>4</b>	<b>WARRANTY</b> .....	<b>19</b>
4.1	WARRANTY PERIOD.....	19
4.2	REPAIRS.....	19
4.2.1	WARRANTY REPAIRS.....	19
4.2.2	OUT-OF-WARRANTY REPAIRS .....	19
4.2.3	SITE REPAIRS .....	19
4.2.4	EXCLUSIONS .....	19

# OPTICAL SYSTEMS DESIGN

FIGURE 1: OSD2151 TYPICAL CONFIGURATIONS .....	6
FIGURE 2: OSD2151 VERSIONS .....	8
FIGURE 3: OSD2151 DIMENSIONS .....	10
FIGURE 4: CARD POWER SUPPLY CONNECTIONS .....	11
FIGURE 5: MODULE POWER SUPPLY CONNECTIONS .....	11
FIGURE 6: FIXED RJ45 ETHERNET CONNECTORS .....	12
FIGURE 7: LED INDICATORS .....	12
FIGURE 8: OSD2151 3-WAY DIP SWITCH .....	13
FIGURE 9: FITTING/REMOVING SFP CONNECTORS .....	14
FIGURE 10: BASIC CONNECTIONS .....	14
FIGURE 11: LINK LOSS FORWARDING FUNCTION .....	15
FIGURE 12: SINGLE UNIT CONFIGURATION .....	15
FIGURE 13: COPPER CONNECTION LOSS .....	17
FIGURE 14: FIBER CONNECTION LOSS .....	17
TABLE 1: TECHNICAL SPECIFICATIONS .....	7
TABLE 2: CARD POWER SUPPLY PINOUT .....	11
TABLE 3: MODULE POWER CONNECTION .....	11
TABLE 4: LED FUNCTION .....	12
TABLE 5: OSD2151 3-WAY DIP SWITCH SETTINGS .....	13
TABLE 6: CONFIGURATION WITH LLF ENABLED .....	16
TABLE 7: CONFIGURATION WITH LLF DISABLED .....	16

## 1 TECHNICAL SUMMARY

### 1.1 BRIEF DESCRIPTION

#### 1.1.1 OVERVIEW

The OSD2151 is designed to convert between 10/100/1000Base-T copper cabling and 1000Base-Fx fiber cabling with the added feature of Link Loss Forwarding. It has one RJ45 copper port and one SFP port which can be specified by the user for one or two fiber configuration.

The OSD2151 incorporates Link Loss Forwarding (LLF) function providing fault detection and shut down when a link fails.

The unit will operate on either singlemode or multimode fiber. Operation over at least 500m of multimode fiber or 50km of singlemode fiber is possible by use of the appropriate optical devices.

A major benefit of the OSD2151 is its reliable operation over the -20°C to +75°C temperature range which allows it to be used in environments such as roadside cabinets, mine sites and factories.

The OSD2151 is available in two physical configurations: card or module. 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.

#### 1.1.2 APPLICATIONS

- ▲ Any network utilising a mix of copper and fiber
- ▲ Industrial IP communications
- ▲ Gigabit Ethernet backbone networks

#### 1.1.3 FEATURES AND BENEFITS

- ▲ Complies with IEEE802.3i/802.3u/802.3ab 10/100/1000Base-T, IEEE802.3z 1000Base-Lx/Sx standards.
- ▲ Supports network traffic of 100Mbps or 1000Mbps.
- ▲ Has one fixed 10/100/1000BaseT copper port and one SFP port which can be 10/100/1000BaseT, 100Base-Fx or 1000BaseLx/Sx.
- ▲ Automatic MDI/MDIX setup: no need for crossover cables.
- ▲ Can be used with either singlemode or multimode fiber over a variety of link budgets
- ▲ Advanced features like Link Loss Forwarding to detect the link status of link partners either on the fiber and/or copper port.
- ▲ Available for operation over 1 or 2 fibers.
- ▲ Powered by non critical 12V<sub>DC</sub> supplies
- ▲ Operates over the temperature range of -20 to +75°C

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## 1.2 TYPICAL CONFIGURATION

Figure 1 below indicates the typical set-up for an OSD2151 system.

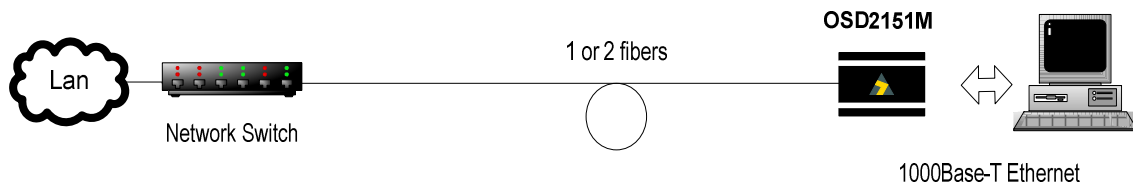


FIGURE 1: OSD2151 TYPICAL CONFIGURATIONS

# OPTICAL SYSTEMS DESIGN

## 1.3 TECHNICAL SPECIFICATIONS

TABLE 1: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Electrical Data Interface	IEEE802.3i/802.3u/802.3ab 10/100/1000Base-T Ethernet
Electrical Data Rate	10, 100, 1000Mbps with energy detect, auto negotiate, auto MDIX
Optical Data Interface	IEEE802.3z 1000Base-Lx/Sx
Optical Data Rate	100Mbps or 1000Mbps
Operating Mode	Half or full duplex for 10/100 Full duplex for 1000 Pause frames for 1000Mbps flow control
Electrical Data Connector	RJ45
Optical connector	SFP
SFP Options	Short haul, long haul, single fiber operation, etc Please consult OSD datasheet #102100002 or contact OSD
User Controls	Three externally accessible switches; 1. 100/1000BASE-X for optical port 2. Link Loss Forwarding Enable/Disable 3. Fault Detection on fiber port or RJ45 port / both
Dimensions (mm)	60W x 94D x 26H (Module) 25W x 169D x 100H (Card)
Weight	0.3kg (Module) 0.2kg (Card)
Power Requirements	+8V <sub>DC</sub> to +35V <sub>DC</sub> or 20 to 28V <sub>AC</sub> @ 3VA
Power Connector	2 Way Terminal Block
Operating Temperature	-20°C to +75°C
Relative Humidity	0 to 95% non-condensing
Cassis Current Consumption	0.25Amp for OSD2151 0.50 Amp for OSD2151R2

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## 1.4 OSD2151 FRONT AND REAR PANELS

There is one fixed copper port for 10/100/1000Base-T and one SFP port on the front panel. The SFP device is sold separately giving the user choice to use either one or two fiber communications with various optical power outputs depending on the distance required. The rear panel consists of a 2-way term-block power connector and a 3-Way DIP switch. Each section will be described further throughout this manual.

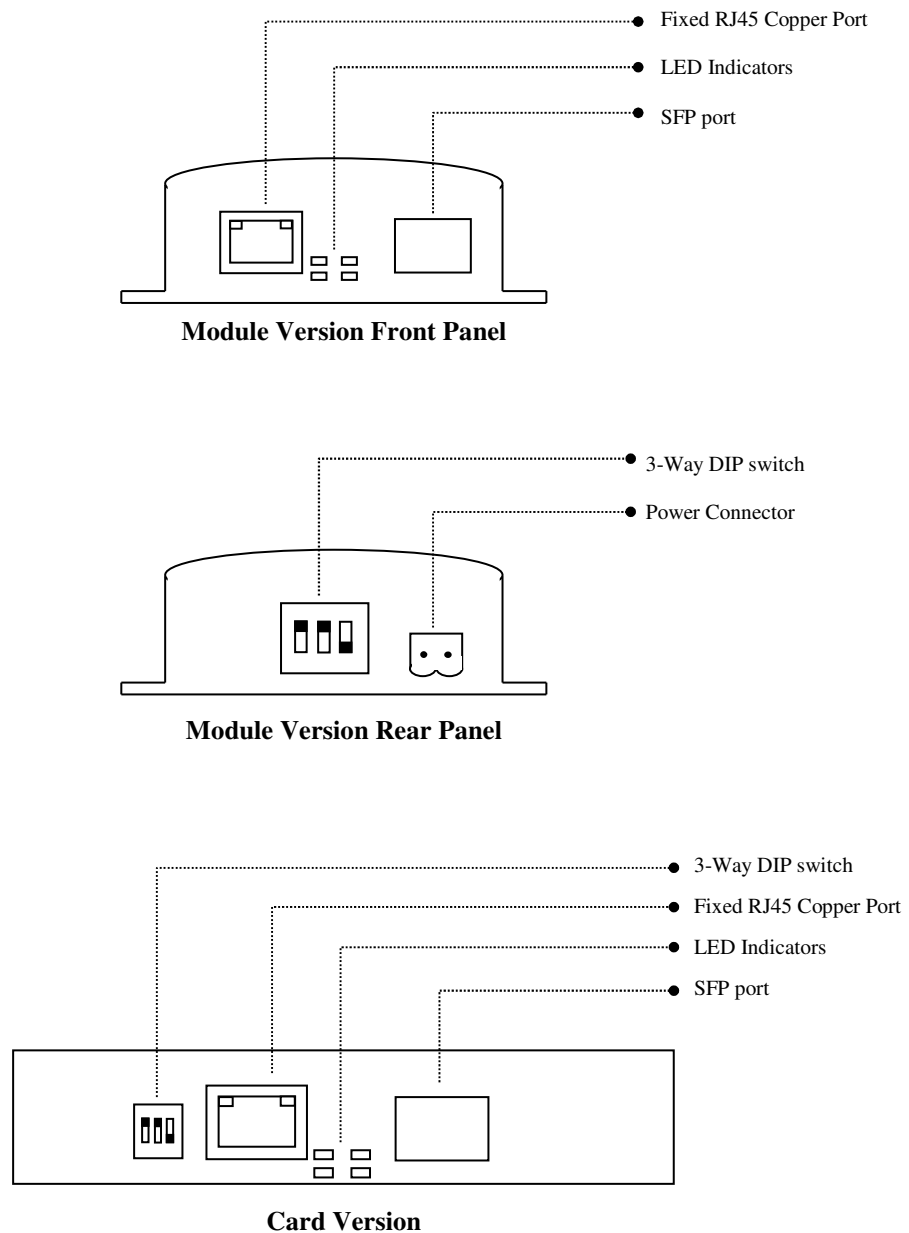


FIGURE 2: OSD2151 VERSIONS



## 2 INSTALLATION AND OPERATION

### 2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD2151 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

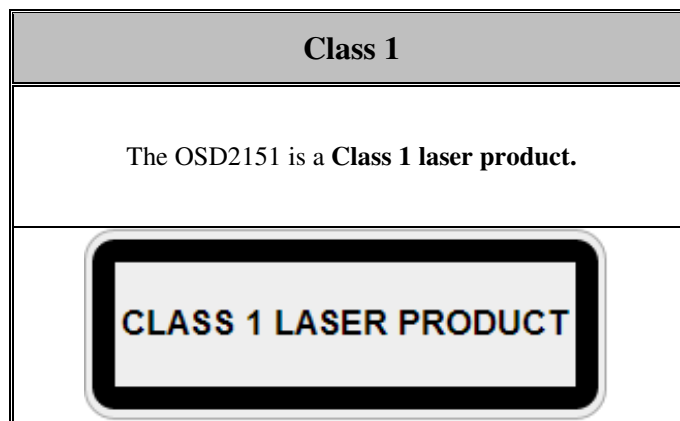
#### 2.2.1 WARNING AND PRECAUTIONS

##### ▲ 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 OSD2151 DRAWINGS AND DIMENSIONS

The OSD2151 is designed to be mounted on an even surface and to be secured by means of M4 or smaller screws. The OSD2151 card versions are designed to be inserted into an OSD370N or OSD350N chassis and secured by means of captivated screws.

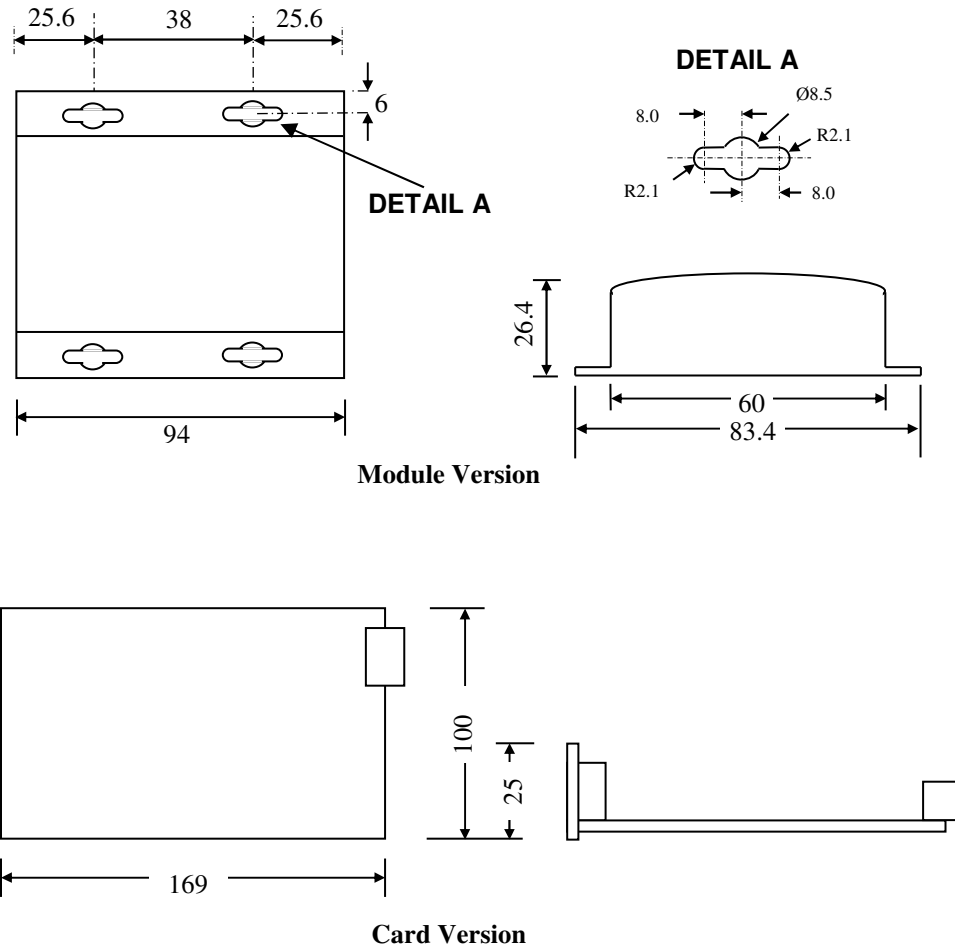


FIGURE 3: OSD2151 DIMENSIONS

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## 2.2.3 POWER SUPPLY CONNECTIONS

The OSD2151 card version is powered from the OSD370N or OSD350N chassis. DC power in the OSD2151 card version is connected via a DB9 connector. The card version of the OSD2151 should be fixed into the OSD370N (or OSD350N) chassis using the captivated screws. The card can be plugged in or out of the chassis with power on or off.

TABLE 2: CARD POWER SUPPLY PINOUT

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

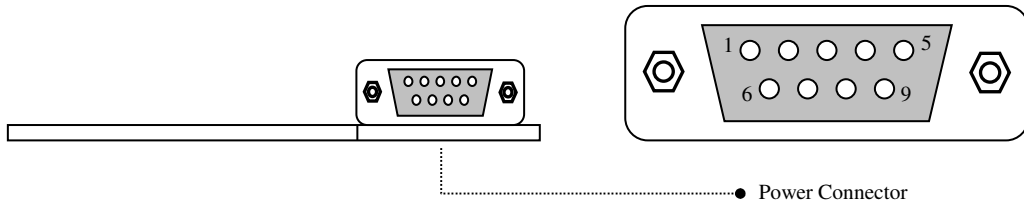


FIGURE 4: CARD POWER SUPPLY CONNECTIONS

The OSD2151 module requires external DC or AC power. The voltage range of the OSD2151 is +8V<sub>DC</sub> to +35V<sub>DC</sub> or 20 to 28V<sub>AC</sub> @ 3VA. Power should be connected to the power socket located at the back of the case as indicated in Table 3.

TABLE 3: MODULE POWER CONNECTION

External Power Pin	Specification
Pin 1	+8 to +35V <sub>DC</sub> or 20 to 28V <sub>AC</sub> @ 3VA
Pin 2	Ground – 0V

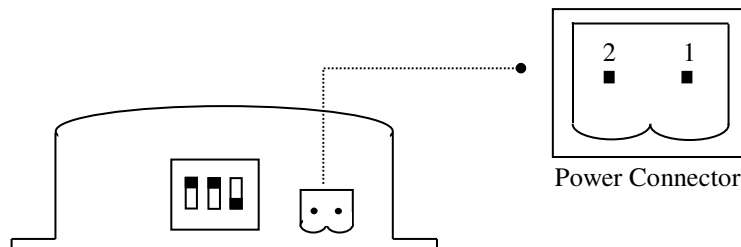


FIGURE 5: MODULE POWER SUPPLY CONNECTIONS

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## 2.2.4 FIXED RJ45 COPPER PORT PIN ASSIGNMENTS

Figure 6 shows the pin configuration for the fixed RJ45 copper port.

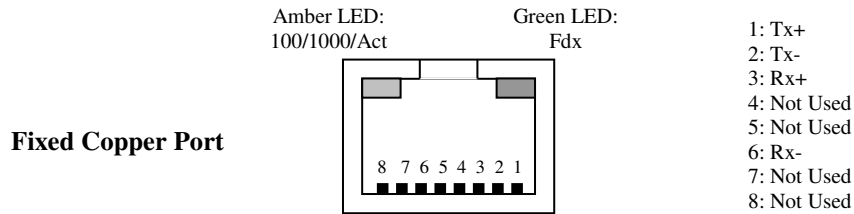


FIGURE 6: FIXED RJ45 ETHERNET CONNECTORS

## 2.2.5 LED INDICATORS

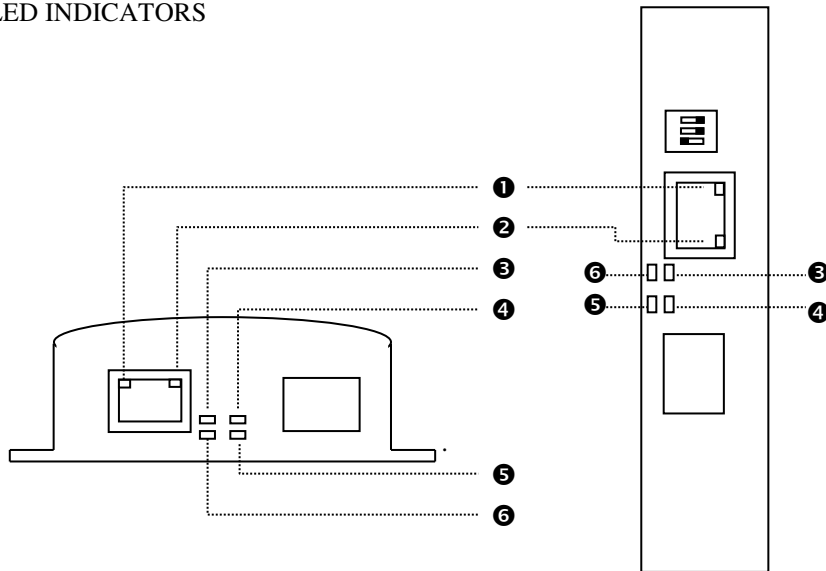


FIGURE 7: LED INDICATORS

TABLE 4: LED FUNCTION

No	Function		
	On	Off	Blinking
①	Copper Link Amber: 10Mbps Bi-colour: 100Mbps Green: 1Gbps	No Copper Link	Activity <sup>(1)</sup>
②	Full Duplex on Copper Port	Half Duplex on Copper Port	-
③	Power On	Power Off	-
④	Fiber Speed: 100Mbps	Fiber Speed: 1Gbps	-
⑤	Fiber Link	No Fiber Link	Activity <sup>(1)</sup>
⑥	Link Loss Forwarding Enabled	Link Loss Forwarding Disabled	-

Note: (1) Activity indicates traffic for both copper and fiber port.

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## 2.2.6 CONTROLS

The OSD2151 has a 3-way DIP switch to control a number of functions. Table 5 outlines the function of each switch. For correct operation, set the required switch settings before powering the unit.

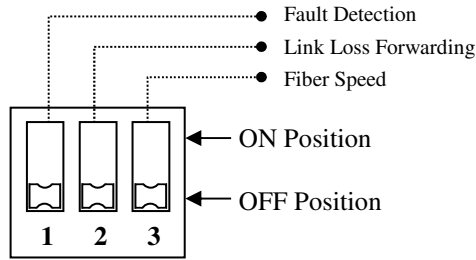


FIGURE 8: OSD2151 3-WAY DIP SWITCH

TABLE 5: OSD2151 3-WAY DIP SWITCH SETTINGS

SWITCH NUMBER	DESCRIPTION	SWITCH POSITION	FUNCTION
1	Fault Detection	OFF	Detect LLF for copper and fiber loss
		ON	Detect LLF for fiber loss only
2	Link Loss Forwarding	OFF	Disable
		ON	Enable
3	Optical Port Speed	OFF	1000BASE-X
		ON	100BASE-FX

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### 2.2.7 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.

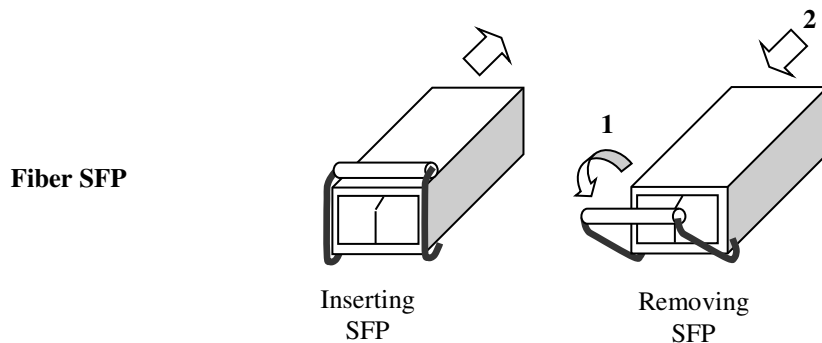


FIGURE 9: FITTING/REMOVING SFP CONNECTORS

### 2.2.8 BASIC CONNECTIONS

Figure 10 shows basic user connections to the OSD2151 Module version.

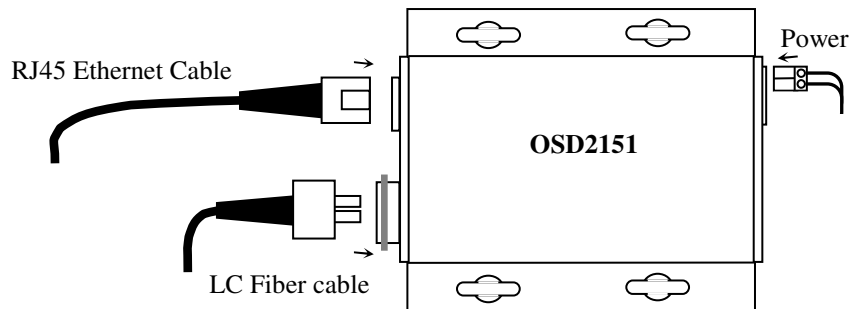


FIGURE 10: BASIC CONNECTIONS

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## 2.3 OSD2151 OPERATION

This section outlines the OSD2151 connections and switch settings. Read this section carefully for trouble free set up and operation.

There are two possible configurations for the OSD2151 namely Single Unit Configuration and Dual Unit configuration.

Figure 11 is a flow chart of the OSD2151 Link Loss Forwarding (LLF) function and operation.

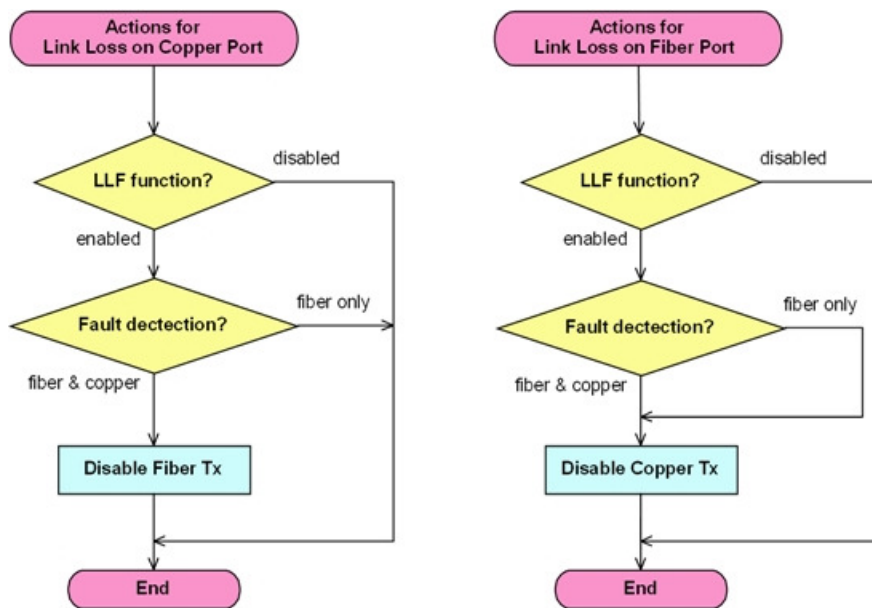


FIGURE 11: LINK LOSS FORWARDING FUNCTION

### 2.3.1 SINGLE UNIT CONFIGURATION

The single unit configuration enables the user to connect the OSD2151 to any 1000Base-X switch via the fiber port. The fixed RJ45 copper port can be connected to a switch or PC using standard CAT5 or higher cable.

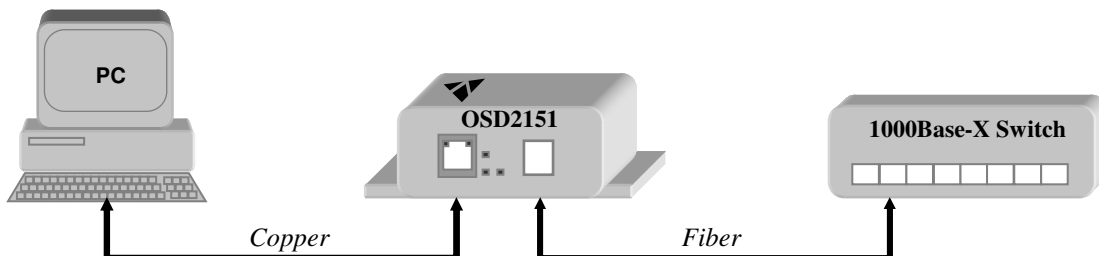


FIGURE 12: SINGLE UNIT CONFIGURATION

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The following tables outline the recommended switch settings for the OSD2151. Any changes in switch settings require power up to take effect.

Table 6: CONFIGURATION WITH LLF ENABLED

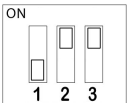
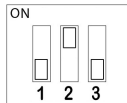
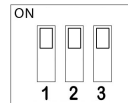
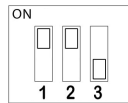


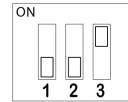
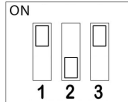
Configurations		Case1	Case2	Case3	Case4
<b>Switch Setting</b>					
<b>Configurations</b>		1. LLF detects fiber & copper 2. LLF is enabled 3. Fiber port is 100BASE-FX	1. LLF detects fiber & copper 2. LLF is enabled 3. Fiber port is 1000BASE-X	1. LLF detects fiber only 2. LLF is enabled 3. Fiber port is 100BASE-FX	1. LLF detects fiber only 2. LLF is enabled 3. Fiber port is 1000BASE-X
<b>Fiber link loss</b>	<b>Response Action</b>	Disable Tx of copper port		Disable Tx of copper port	
	<b>Restore Sequence</b>	1. Fix fault and reconnect 2. Wait for link to be reestablished		1. Fix fault and reconnect 2. Wait for link to be reestablished	
<b>Copper link loss</b>	<b>Response Action</b>	Disable Tx of fiber port		NULL	
	<b>Restore Sequence</b>	1. Fix fault and reconnect 2. Wait for link to be reestablished		NULL	

TABLE 7: CONFIGURATION WITH LLF DISABLED

Configurations		Case1		Case2	
<b>Switch status</b>					
<b>Configurations of SIP switch</b>		1. Invalid 2. LLF is disabled 3. Fiber port is 1000BASE-X	1. Invalid 2. LLF is disabled 3. Fiber port is 1000BASE-X	1. Invalid 2. LLF is disabled 3. Fiber port is 100BASE-FX	1. Invalid 2. LLF is disabled 3. Fiber port is 100BASE-FX
<b>Fiber link loss</b>	<b>Response Action</b>	NULL		NULL	
	<b>Restore Sequence</b>	NULL		NULL	
<b>Copper link loss</b>	<b>Response Action</b>	NULL		NULL	
	<b>Restore Sequence</b>	NULL		NULL	



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## Examples

Figure 13 is an example of a copper connection loss. The OSD2151 will detect that there is no copper connection received and then disable the transmission to the fiber port. The 1000Base-X switch will thus be notified that there has been a copper link loss.

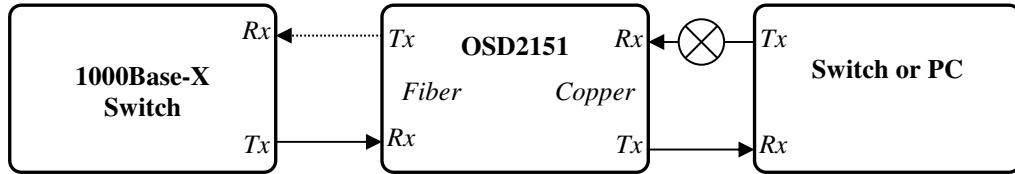


FIGURE 13: COPPER CONNECTION LOSS

Figure 14 is an example of a fiber connection loss. If the OSD2151 does not receive a valid optical signal from the switch, transmission to copper port will be disabled.

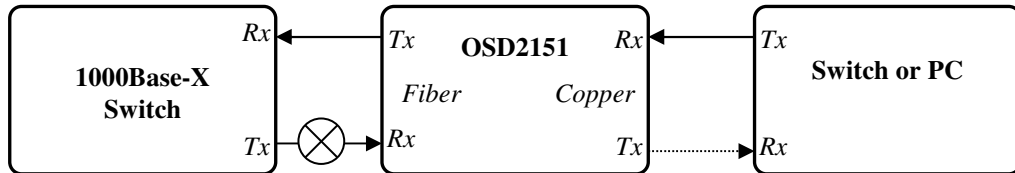


FIGURE 14: FIBER CONNECTION LOSS

## 3 MAINTENANCE

### 3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD2151 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 Ethernet cables are connected to the modem correctly and that the distant OSD2151 modem has been connected correctly to any external equipment.
- ▲ Inspect the optical connectors (for fiber SFP option) for any contamination and clean using isopropyl alcohol and a lint free tissue if any contamination is detected.

### 3.3 ROUTINE MAINTENANCE

- ▲ There is no routine maintenance required with the OSD2151.

## 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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