

---

**OPTICAL**

---

**SYSTEMS**

---

**DESIGN**

---

**OPERATOR MANUAL**

**OSD2141A 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	OSD2141A 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	OSD2141A DRAWINGS AND DIMENSIONS .....	10
2.2.3	POWER SUPPLY CONNECTIONS .....	10
2.2.4	FIXED RJ45 COPPER PORT PIN ASSIGNMENTS .....	11
2.2.5	LED INDICATORS .....	11
2.2.6	CONTROLS .....	12
2.2.7	FITTING SFP CONNECTORS .....	13
2.2.8	BASIC CONNECTIONS .....	13
2.3	OSD2141A OPERATION .....	14
2.3.1	SINGLE UNIT CONFIGURATION .....	14
2.3.2	DUAL UNIT CONFIGURATION .....	16
2.4	OSD2141A DEFAULT SETTINGS .....	17
<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: OSD2141A TYPICAL CONFIGURATIONS .....	6
FIGURE 2: OSD2141A CONNECTORS .....	8
FIGURE 3: OSD2141A MOUNTING DIMENSIONS.....	10
FIGURE 4: 2141A POWER SUPPLY CONNECTIONS .....	10
FIGURE 5: FIXED RJ45 ETHERNET CONNECTORS .....	11
FIGURE 6: LED INDICATORS.....	11
FIGURE 7: OSD2141A 3-WAY DIP SWITCH .....	12
FIGURE 8: FITTING/REMOVING SFP CONNECTORS .....	13
FIGURE 9: BASIC CONNECTIONS.....	13
FIGURE 10: LINK LOSS FORWARDING FUNCTION .....	14
FIGURE 11: SINGLE UNIT CONFIGURATION .....	14
FIGURE 12: COPPER CONNECTION LOSS .....	15
FIGURE 13: FIBER CONNECTION LOSS .....	15
FIGURE 14: DUAL UNIT CONFIGURATION .....	16
FIGURE 15: COPPER CONNECTION LOSS .....	17
FIGURE 16: DEFAULT SETTINGS.....	17
TABLE 1: TECHNICAL SPECIFICATIONS .....	7
TABLE 2: DC POWER CONNECTION.....	10
TABLE 3: LED FUNCTION .....	11
TABLE 4: OSD2141A 3-WAY DIP SWITCH SETTINGS .....	12
TABLE 5: SINGLE UNIT CONFIGURATION.....	15
TABLE 6: DUAL UNIT CONFIGURATION.....	16

## 1 TECHNICAL SUMMARY

### 1.1 BRIEF DESCRIPTION

#### 1.1.1 OVERVIEW

The OSD2141A is designed to convert between 1000Base-T copper cabling and 1000Base-Lx 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 OSD2141A 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 OSD2141A 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.

#### 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 IEEE802.3ab 1000Base-T, IEEE802.3z 1000Base-LX standards.
- ▲ Supports network traffic of 1000Mbps.
- ▲ Automatic TP 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> or 24V<sub>AC</sub> supplies
- ▲ Operates over the temperature range of -20 to +75°C

# OPTICAL SYSTEMS DESIGN

## 1.2 TYPICAL CONFIGURATION

Figure 1 below indicates the typical set-up for an OSD2141A system.

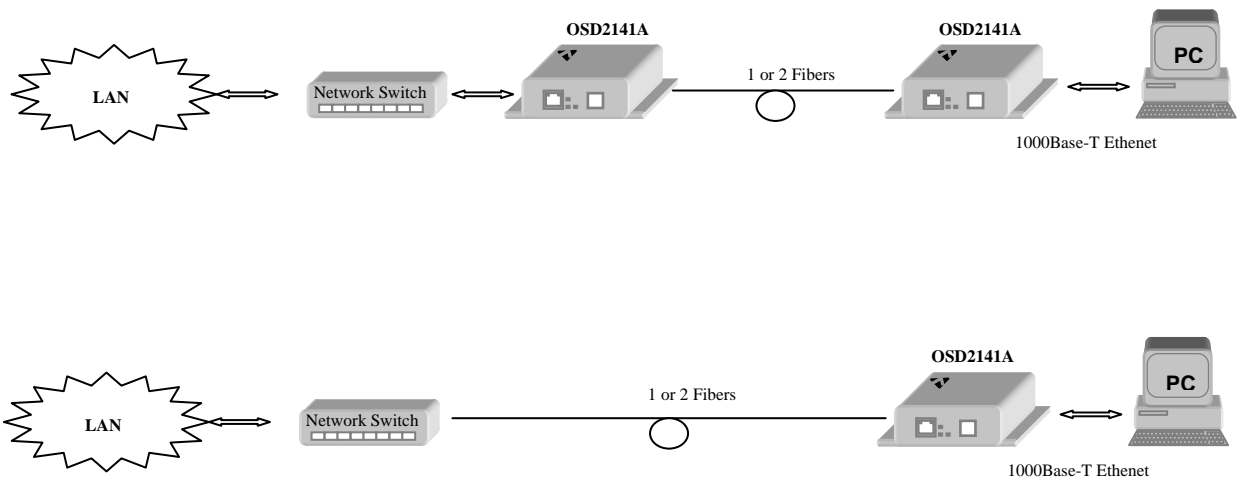


FIGURE 1: OSD2141A TYPICAL CONFIGURATIONS

# OPTICAL SYSTEMS DESIGN

## 1.3 TECHNICAL SPECIFICATIONS

TABLE 1: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Electrical Data Interface	IEEE802.3ab Base-T Ethernet
Electrical Data Rate	1000Mbps
Electrical Data Connector	RJ45
Optical Data Interface	IEEE802.3z 1000Base-Lx
Optical Data Rate	1000Mbps
Operating Mode	Pause frames for 1000Mbps flow control
Optical connector	SFP
User Controls	Three externally accessible switches; 1. Auto-Negotiation Enable/Disable to work either as single unit or as a pair 2. Link Loss Forwarding Enable/Disable 3. Fault Detection on fiber port or RJ45 port / both
Indicators	1x Power 1x Copper Link, blink indicates activity 1x Auto Negotiation Enabled/Disable 1x LLF Enabled/Disabled 1x Fiber Rx – Link/No Link
Dimensions (mm)	60W x 94D x 26H
Weight	0.3kg (module)
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	0.3Amp

1022214108

# OPTICAL SYSTEMS DESIGN

## 1.4 OSD2141A FRONT AND REAR PANELS

There is one fixed copper port for 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 terminal block power connector and a 3-Way DIP switch. Each section will be described further throughout this manual.

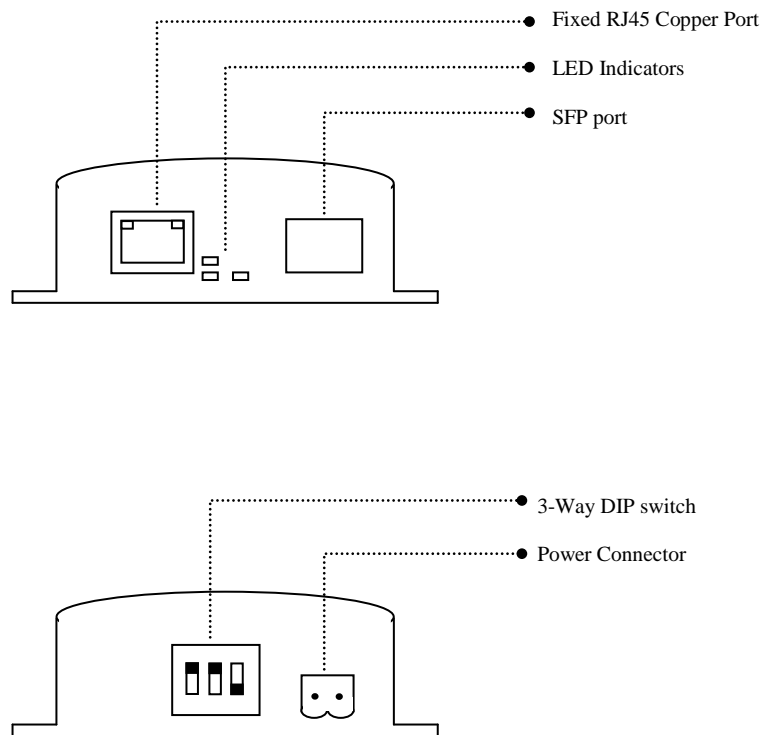


FIGURE 2: OSD2141A CONNECTORS



## 2 INSTALLATION AND OPERATION

### 2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD2141A 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

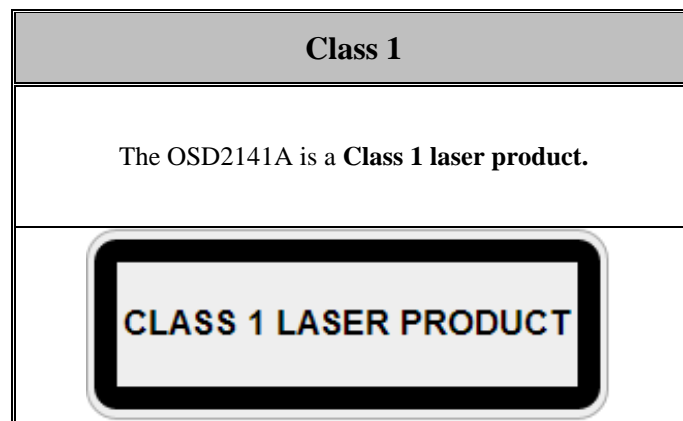
#### 2.2.1 WARNING AND PRECAUTIONS

##### ▲ 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.

# OPTICAL SYSTEMS DESIGN

## 2.2.2 OSD2141A DRAWINGS AND DIMENSIONS

The OSD2141A is designed to be mounted on an even surface and to be secured by means of M4 or smaller screws.

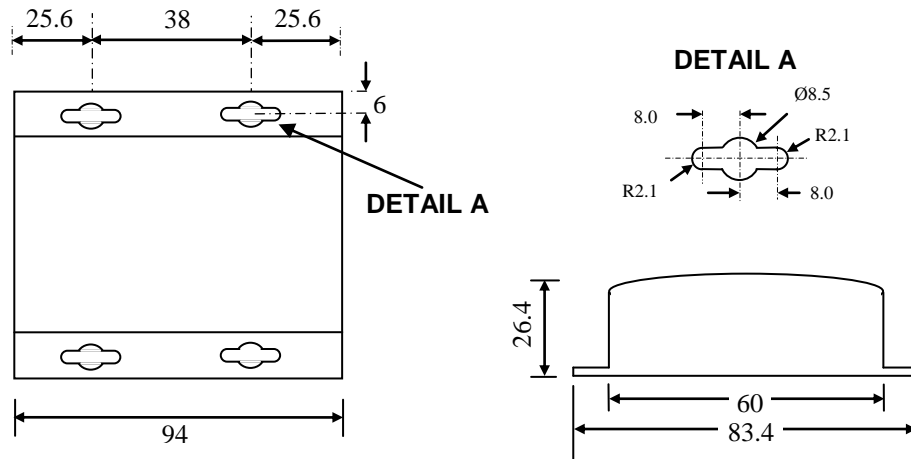


FIGURE 3: OSD2141A MOUNTING DIMENSIONS

## 2.2.3 POWER SUPPLY CONNECTIONS

The OSD2141A module requires external DC or AC power. The voltage range of the OSD2141A is  $+8V_{DC}$  to  $+35V_{DC}$  or  $20$  to  $28V_{AC}$  with maximum current output of 300mA. Power should be connected to the power socket located at the back of the case as indicated in Table 2.

TABLE 2: DC POWER CONNECTION

External Power Pin	Specification
Pin 1	$+8$ to $+35V_{DC}$ or $20$ to $28V_{AC}$ @ $3VA$
Pin 2	Ground – $0V$

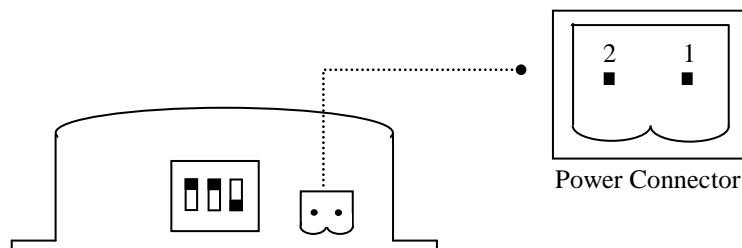


FIGURE 4: 2141A POWER SUPPLY CONNECTIONS

# OPTICAL SYSTEMS DESIGN

## 2.2.4 FIXED RJ45 COPPER PORT PIN ASSIGNMENTS

Figure 5 shows the pin configuration for the fixed RJ45 copper port.

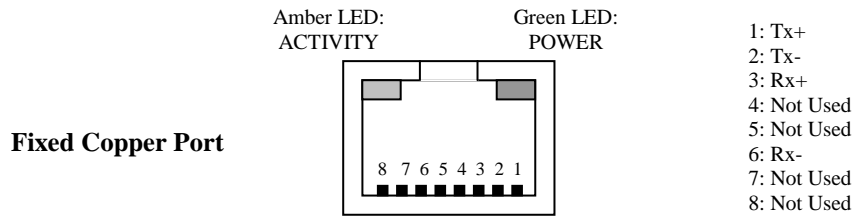


FIGURE 5: FIXED RJ45 ETHERNET CONNECTORS

## 2.2.5 LED INDICATORS

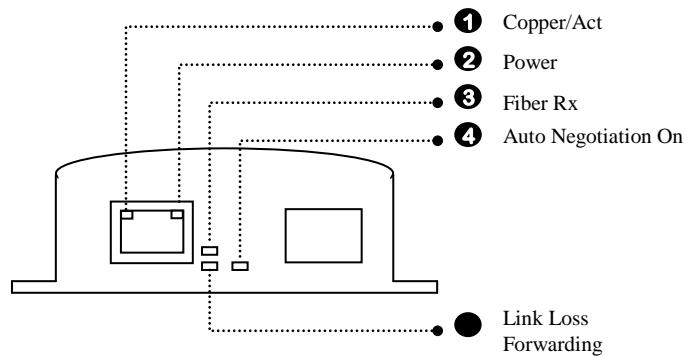


FIGURE 6: LED INDICATORS

TABLE 3: LED FUNCTION

No	Function		
	On	Off	Blinking
1	Copper Link OK	No Copper Link	Activity <sup>(1)</sup>
2	Power On	Power Off	-
3	Fiber Link OK	No Fiber Link	-
4	Auto Negotiation Enabled	Auto Negotiation Disabled	-
5	Link Loss Forwarding Enabled	Link Loss Forwarding Disabled	-

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

# OPTICAL SYSTEMS DESIGN

## 2.2.6 CONTROLS

The OSD2141A has a 3-way DIP switch to control a number of functions. Table 4 outlines the function of each switch.

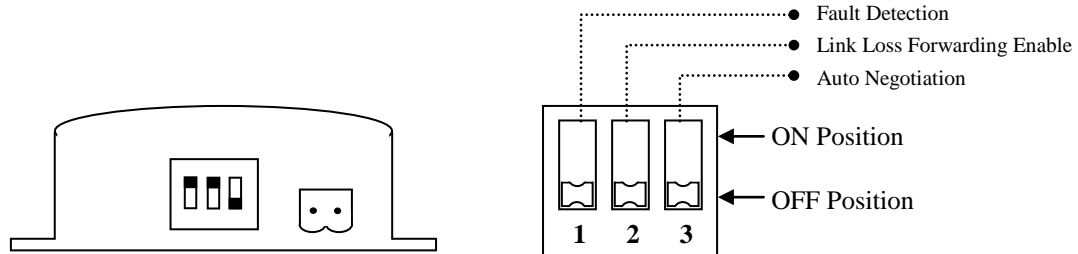


FIGURE 7: OSD2141A 3-WAY DIP SWITCH

TABLE 4: OSD2141A 3-WAY DIP SWITCH SETTINGS

SWITCH NUMBER	DESCRIPTION	SWITCH POSITION	FUNCTION	COMMENT
1	Fault Detection	OFF	LLF for copper and fiber	Set switch before power up
		ON	LLF for fiber only	
2	Link Loss Forwarding	OFF	Disable	Set when link is established
		ON	Enable	
3	Auto Negotiation	OFF	Disable	Set switch before power up
		ON	Enable	

# OPTICAL SYSTEMS DESIGN

## 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.

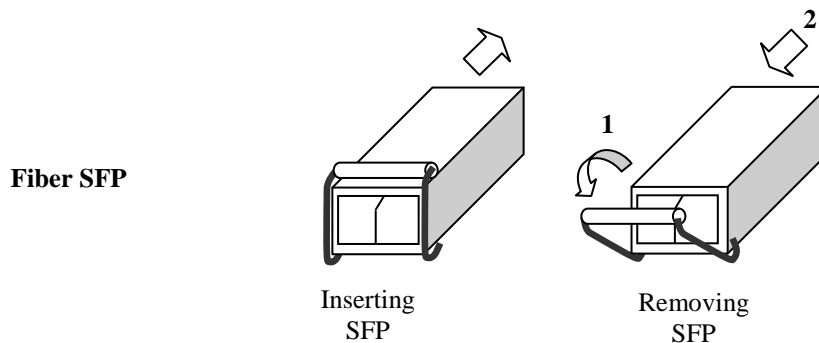


FIGURE 8: FITTING/REMOVING SFP CONNECTORS

## 2.2.8 BASIC CONNECTIONS

Figure 9 shows basic user connections to the OSD2141A

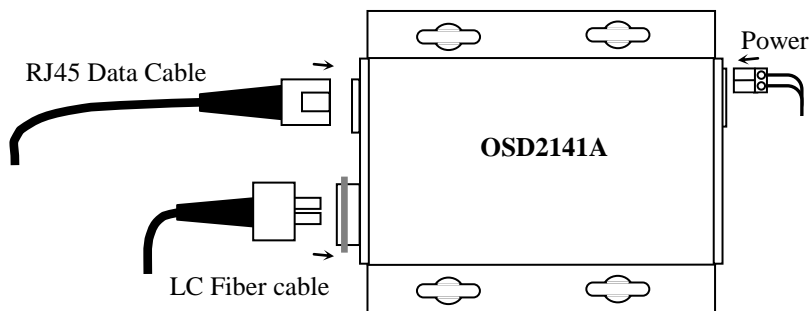


FIGURE 9: BASIC CONNECTIONS

# OPTICAL SYSTEMS DESIGN

## 2.3 OSD2141A OPERATION

This section outlines the OSD2141A connections and switch settings. Read this section carefully for trouble free set up and operation.

There are two possible configurations for the OSD2141A namely Single Unit Configuration and Dual Unit configuration.

Figure 10 is a flow chart of the OSD2141A Link Loss Forwarding (LLF) function and operation.

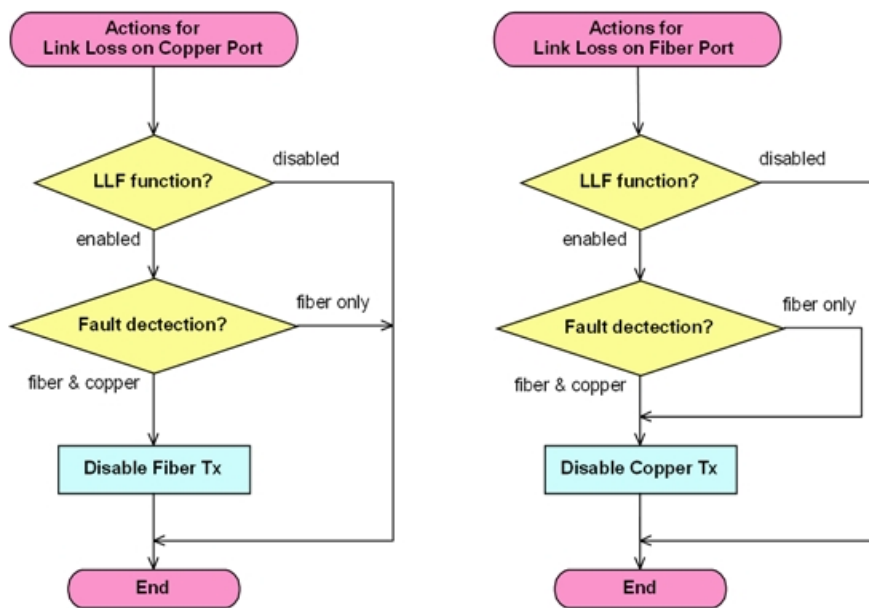


FIGURE 10: LINK LOSS FORWARDING FUNCTION

### 2.3.1 SINGLE UNIT CONFIGURATION

The single unit configuration enables the user to connect the OSD2141A 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.

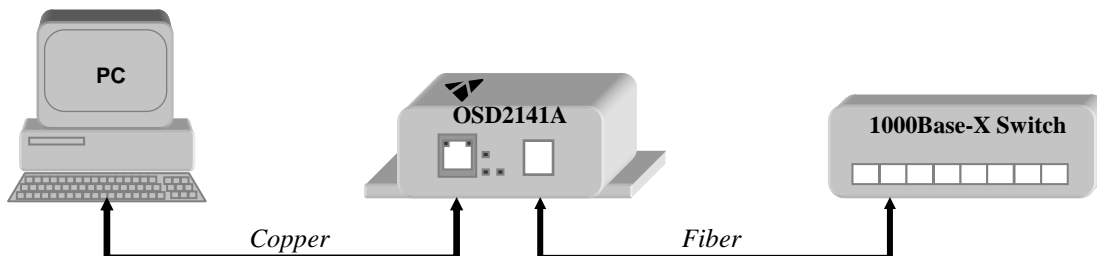
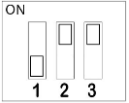
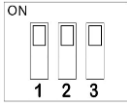


FIGURE 11: SINGLE UNIT CONFIGURATION

# OPTICAL SYSTEMS DESIGN

The following table (Table 5) outlines the recommended switch settings when the OSD2141A is used in single unit configurations. Note that Auto Negotiation (AN) should be enabled for single unit configurations.

TABLE 5: SINGLE UNIT CONFIGURATION

LLF TYPE		Copper and Fiber	Fiber Only
Switch Setting			
Configuration		Fault detect – fiber & copper LLF – enabled AN – enabled	Fault detect – fiber only LLF – enabled AN – enabled
Fiber link loss	Response Action	Disables Transmission of copper port	Disables Transmission of copper port
	Restore Steps	1. Fix link fault 2. Wait for link to be re-established	1. Fix link fault 2. Wait for link to be re-established
Copper link loss	Response Action	Disable Transmission of fiber port	NULL
	Restore steps	1. Fix link fault 2. Wait for link to be re-established	1. Fix link fault 2. Wait for link to be re-established

### Examples

Figure 12 is an example of a copper connection loss. The OSD2141A 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.

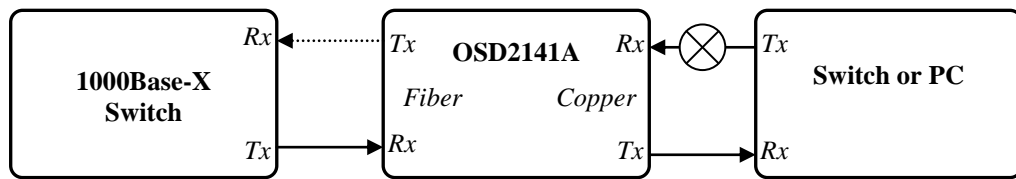


FIGURE 12: COPPER CONNECTION LOSS

Figure 13 is an example of a fiber connection loss. If the OSD2141A does not receive a valid optical signal from the switch, transmission to copper port will be disabled.

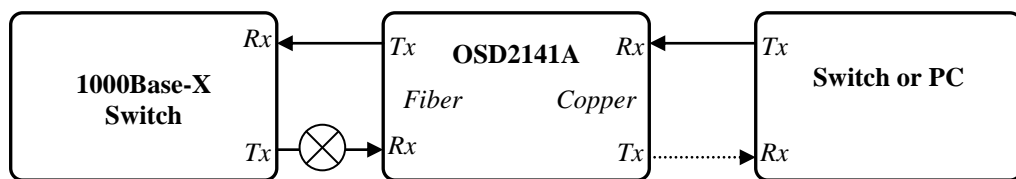


FIGURE 13: FIBER CONNECTION LOSS

# OPTICAL SYSTEMS DESIGN

## 2.3.2 DUAL UNIT CONFIGURATION

The dual unit configuration enables the user to connect the two OSD2141A units with a fiber connection. Both single fiber and two fiber types can be employed depending on the SFP type fitted. Either side of the OSD2141A copper connections (RJ45) can be connected to a switch and/or PC using standard CAT5 or higher cable.

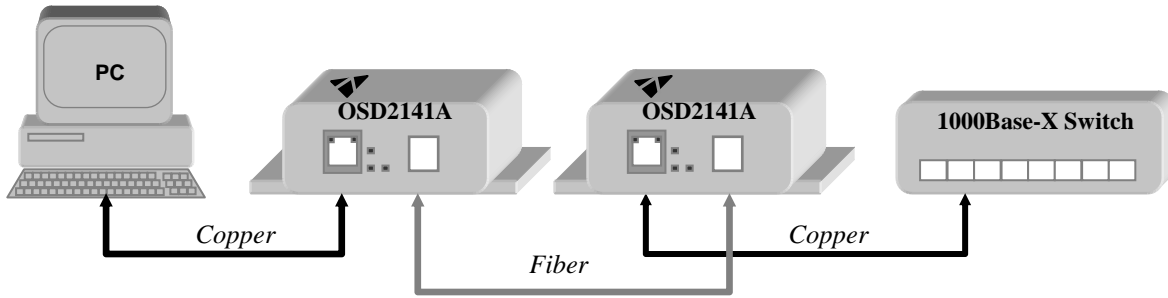


FIGURE 14: DUAL UNIT CONFIGURATION

The following table (Table 6) outlines the recommended switch settings when the OSD2141A is used in dual unit configurations. Auto Negotiation (AN) should be disabled for dual unit configurations.

TABLE 6: DUAL UNIT CONFIGURATION

Configurations		Case1	Case2	Case3
<b>Switch Status</b>				
<b>Configuration</b>		Fault detect – fiber & copper (no1,2) LLF – enabled AN – disabled	Fault detect – fiber only (no1,2) LLF – enabled AN – disabled	Fault detect – fiber & copper(no1) – fiber only (no2) LLF – enabled AN – disabled
<b>Fiber Link Loss</b>	<b>Response Action</b>	Disable Tx of copper port	Disable Tx of copper port	Disable Tx of copper port
	<b>Restore Steps</b>	1.Fix link fault 2.Disable LLF on either unit 3.Wait for link to be reestablished 4.Enable LLF again	1.Fix link fault 2.Wait for links to be reestablished	1.Fix link fault 2.Wait for link to be reestablished
<b>Copper Link Loss</b>	<b>Response Action</b>	Disable Tx of fiber port	NULL	unit-no1 – Disable Tx of fiber port unit-no2 – NULL
	<b>Restore Steps</b>	1.Fix link fault 2.Disable LLF on either unit 3.Wait for link to be reestablished 4.Enable LLF again	1.Fix link fault 2.Wait for link to be reestablished	1.Fix link fault 2.Wait for link to be reestablished
<b>Comment</b>		Only in Case1, a locked logic circle will occur once a link loss arises. Even if the link loss has been fixed, links between the two units will not be re-established. Disabling LLF switch will break this locked logic circle and re-establish the links.		



# OPTICAL SYSTEMS DESIGN

## Examples

Figure 15 is an example of a copper connection loss on a dual unit configuration. The OSD2141A 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.

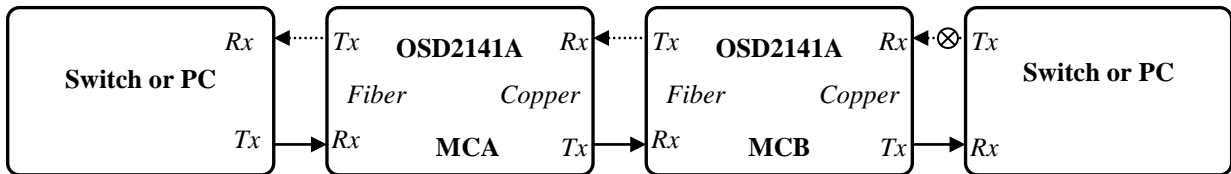


FIGURE 15: COPPER CONNECTION LOSS

## 2.4 OSD2141A DEFAULT SETTINGS

The default settings at time of shipment is as follows;

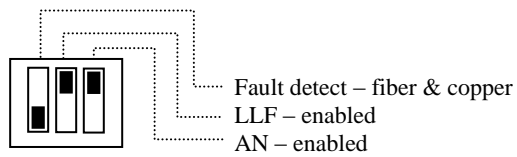


FIGURE 16: DEFAULT SETTINGS

## 3 MAINTENANCE

### 3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD2141A 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 OSD2141A 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 OSD2141A.

## 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.

---

Optical Systems Design Pty. Ltd.

7/1 Vuko Pl. Warriewood 2102

P.O. Box 891 Mona Vale

N.S.W. Australia 2103

Telephone: +61 2 9913 8540

Facsimile: +61 2 9913 8735

Email: [sales@osd.com.au](mailto:sales@osd.com.au)

Web Site: [www.osd.com.au](http://www.osd.com.au)

---

---

OPTICAL

---

SYSTEMS

---

DESIGN

---

PTY LTD

A.B.N. 83 003 020 504

# OPTICAL SYSTEMS DESIGN

Printed in Australia