
OPTICAL

SYSTEMS

DESIGN

OPERATOR MANUAL

OSD2153P SERIES

GIGABIT ETHERNET

MEDIA CONVERTER

WITH PoE

OPTICAL SYSTEMS DESIGN

OPTICAL SYSTEMS DESIGN

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1 TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD2153P is designed to convert between 10/100/1000Base-T copper cabling and 100/1000Base-X fiber cabling with the added feature of Link Loss Forwarding. It has one RJ45 copper PoE++ (up to 60W) port and one SFP port which can be specified by the user for one or two fiber configuration.

The OSD2153P 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 device.

A major benefit of the OSD2153P 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 OSD2153P module is intended for isolated use and requires an external power source.

1.1.2 APPLICATIONS

- ▲ Any network utilising a mix of copper and fiber
- ▲ Extremely space constrained environments
- ▲ Industrial IP communications
- ▲ Gigabit Ethernet networks

1.1.3 FEATURES AND BENEFITS

- ▲ Complies with IEEE802.3u/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 10/100/1000Base-T, 100Base-Fx or 1000BaseLx/Sx/Zx.
- ▲ Auto MDI/MDIX.
- ▲ Can be used with either singlemode or multimode fiber over a variety of link budgets
- ▲ Supports 10KB jumbo frames
- ▲ Complies with the IEEE802.3af and IEEE802.3at standards
- ▲ Provides up to 60W from PSE.
- ▲ Supports IEEE802.3af/at Alternate A and B cable wiring
- ▲ Available for operation over 1 or 2 fibers.
- ▲ Powered by non-critical 50VDC supplies
- ▲ Operates over the temperature range of -20 to +75°C
- ▲ Advanced features like Link Loss Forwarding to detect the link status of link partners either on the fiber and/or copper port.
- ▲ Interoperates with the OSD2151 card or module
- ▲ SFP sold separately

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1.2 TYPICAL CONFIGURATION

Figure 1 below indicates the typical set-up for an OSD2153P system.

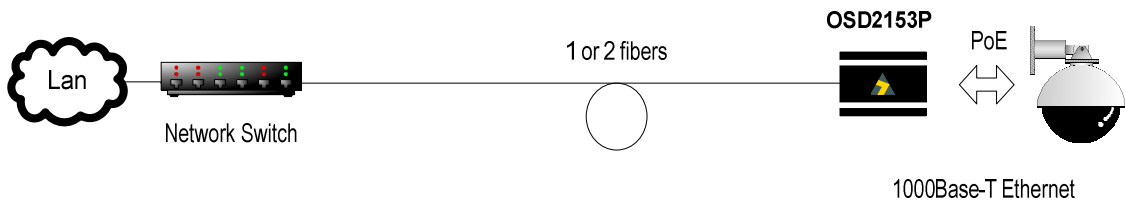


FIGURE 1: OSD2153P TYPICAL CONFIGURATIONS

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1.3 TECHNICAL SPECIFICATIONS

TABLE 1: TECHNICAL SPECIFICATIONS

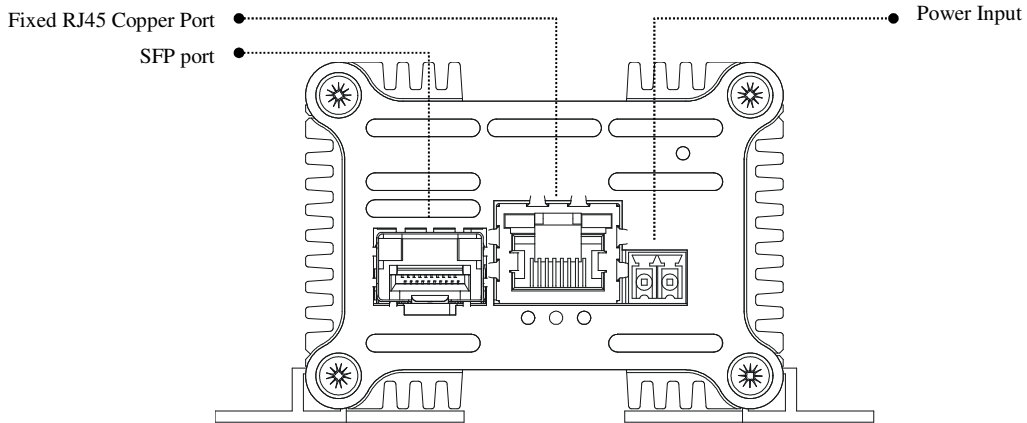
| SPECIFICATION | PERFORMANCE |
|---------------------------|---|
| Electrical Data Interface | IEEE802.3i/802.3u/802.3ab 10/100/1000Base-T Ethernet |
| Electrical Data Rate | 10, 100, 1000Mbps with energy detect, auto negotiate, auto MDIX |
| Jumbo Frame Support | 10KB |
| Optical Data Interface | IEEE802.3z 1000Base-Lx/Sx or IEEE802.3u 100Base-Fx |
| Optical Data Rate | 100Mbps or 1000Mbps |
| Operating Mode | Half or full duplex for 10/100 Full duplex for 1000 Flow control |
| Electrical Data Connector | RJ45 |
| Controls | 1. 100 or 1000Mbps on fiber 2. Link Loss Forwarding: On or off 3. Fault Detection: fiber only or copper and fiber |
| PoE | IEEE802.3af, IEEE802.3at and PoE++ |
| Operating Mode | Alternative A & B (Pins 1/2, 3/6, 4/5, and 7/8) |
| Optical Port Connector | SFP (LC connectors for 2-fiber operation and SC for 1-fiber operation) |
| SFP Options | Short haul, long haul, single fiber operation, etc Please consult OSD datasheet #10210000XX or contact OSD |
| Operating Temperature | -20°C to +75°C |
| Relative Humidity | 0 to 95% non-condensing |
| Power Requirements | +46VDC to +57VDC @ 6W plus up to an extra 60W for PoE operation (attached power device dependant) >52VDC recommended for PoE+ or ≥55VDC for 60W PoE |
| Power Connector | 2 Way 3.5mm Terminal Block on the module |
| Dimensions (mm) | 90W x 58D x 49H |
| Weight | 0.3kg |

1022153P03

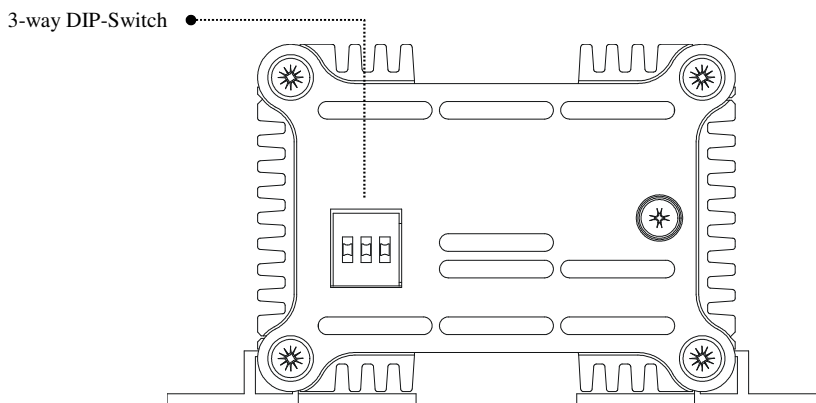
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1.4 OSD2153P FRONT AND REAR PANELS

There is one fixed copper port for 10/100/1000Base-T, one SFP port and a 2-way terminal block power connector 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. On the rear panel is a 3-way DIP switch. Each section will be described further throughout this manual.



OSD2153P Front Panel



OSD2153P Rear Panel

FIGURE 2: OSD2153P CONNECTORS

2 INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD2153P 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

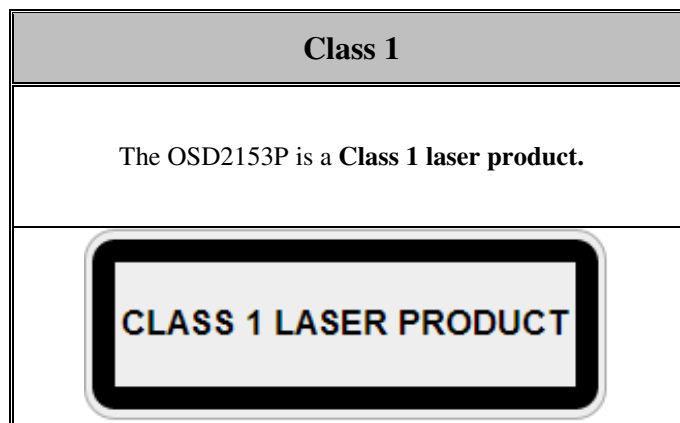
2.2.1 WARNING AND PRECAUTIONS

▲ 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 OSD2153P DRAWINGS AND DIMENSIONS

The standard OSD2153P is designed to be mounted on an even surface and to be secured by means of M4 or smaller screws. All dimensions are in mm. The unit also can be mounted on a standard DIN rail with the OSD2153P DIN Rail bracket.

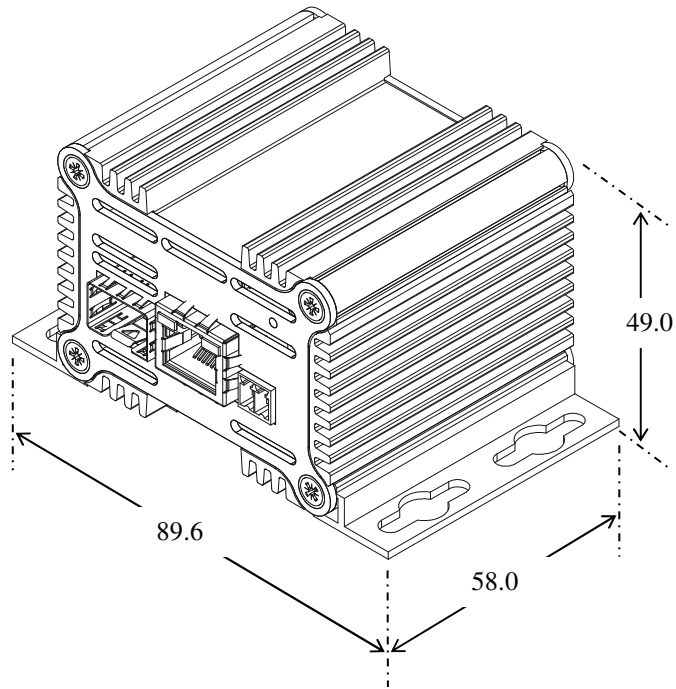


FIGURE 3: OSD2153P DIMENSIONS

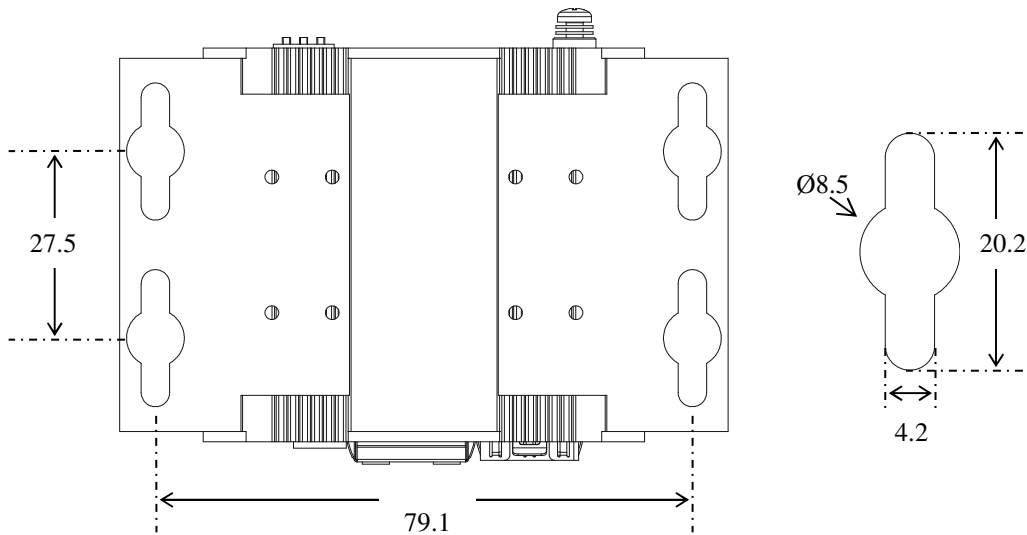


FIGURE 4: OSD2153P MOUNTING DIMENSIONS

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2.2.3 POWER SUPPLY CONNECTIONS

The OSD2153P requires external DC power. The voltage range of the OSD2153P is $+46V_{DC}$ to $+57V_{DC}$ @ 6W. $>52V_{DC}$ is recommended for PoE+ (30W) and $\geq 55V_{DC}$ for PoE++ (60W) operation. Power is connected to the 2-way terminal block located on the front panel as indicated in Table 2.

TABLE 2: POWER CONNECTION

| External Power Pin | Specification |
|--------------------|----------------------------------|
| + | $+46V_{DC}$ to $+57V_{DC}$ @ 6W* |
| - | 0V |

* Plus up to an extra 60W for PoE operation (attached powered device dependent). $>52V_{DC}$ recommended for PoE+ (30W) and $\geq 55V_{DC}$ for PoE++ (60W) operation.

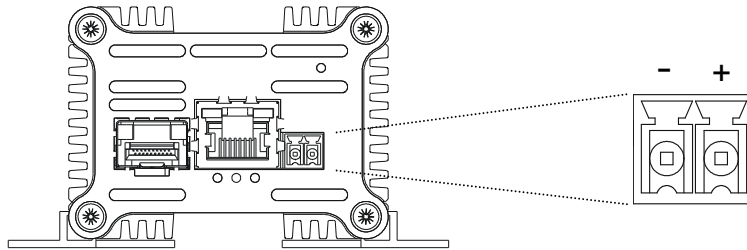


FIGURE 5: MODULE POWER SUPPLY CONNECTIONS

2.2.4 FIXED RJ45 COPPER PORT PIN ASSIGNMENTS

The OSD2153P complies with IEEE802.3af, IEEE802.3at and PoE++, and is capable of supplying up to 60W of PoE. The OSD2153P supports Mode A (i.e. transmitting power over pins 1, 2, 3, & 6) and Mode B (i.e. transmitting power over pins 4, 5, 7, & 8). For PoE++ the OSD2153P transmits power over all 8 pins. Bidirectional data as well as power terminate on all 8 pins.

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

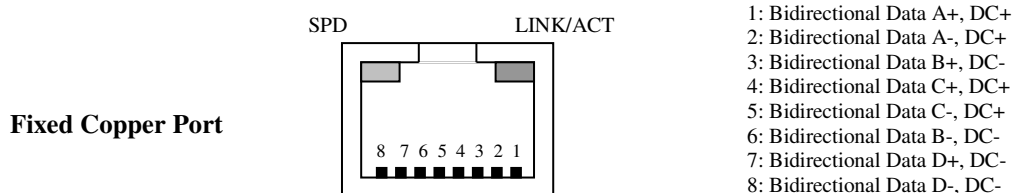


FIGURE 6: FIXED RJ45 ETHERNET CONNECTORS

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2.2.5 LED INDICATORS

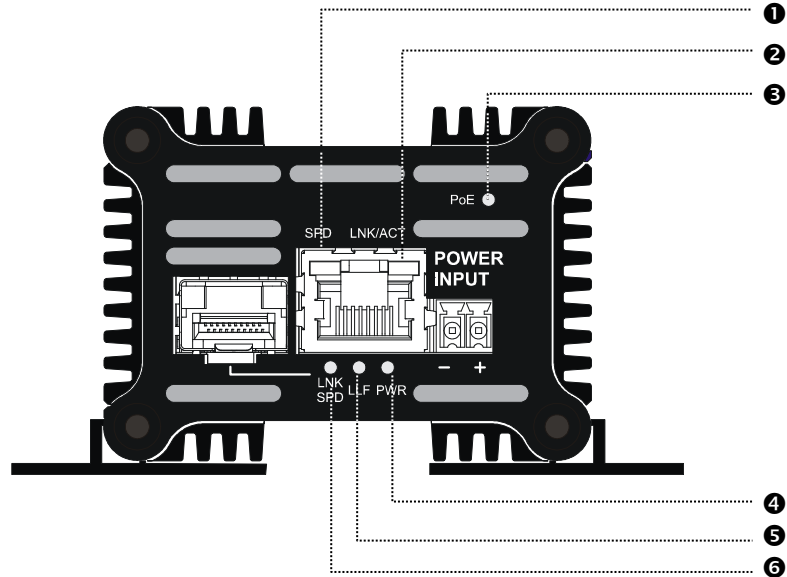


FIGURE 7: LED INDICATORS

TABLE 3: LED FUNCTION

| No | FUNCTION | | | | |
|----|-----------|--|-----------------|-------------------------------|-------------------------|
| | Indicator | On | LED Colour | Off | Blinking |
| ① | SPD | Copper Speed: 10/100Mbps 1Gbps | Yellow Green | N/A | - |
| ② | LNK/ACT | Copper Link Activity | Amber | No Copper Link | Activity ⁽¹⁾ |
| ③ | PoE | PoE Enable | Green | No PoE | - |
| ④ | PWR | Power On | Green | Power Off | - |
| ⑤ | LLF | Link Loss Forwarding Enabled | Green | Link Loss Forwarding Disabled | - |
| ⑥ | LNK SPD | Fiber Speed: 100Mbps: 3 Times/Sec 1Gbps: 6 Times/Sec | Green | No Optical Link | Activity ⁽¹⁾ |

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

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2.2.6 CONTROLS

The OSD2153P has a 3-way DIP switch to control a number of functions. Figure 8 outlines the function of each switch. For correct operation, set the required switch settings before powering the unit.

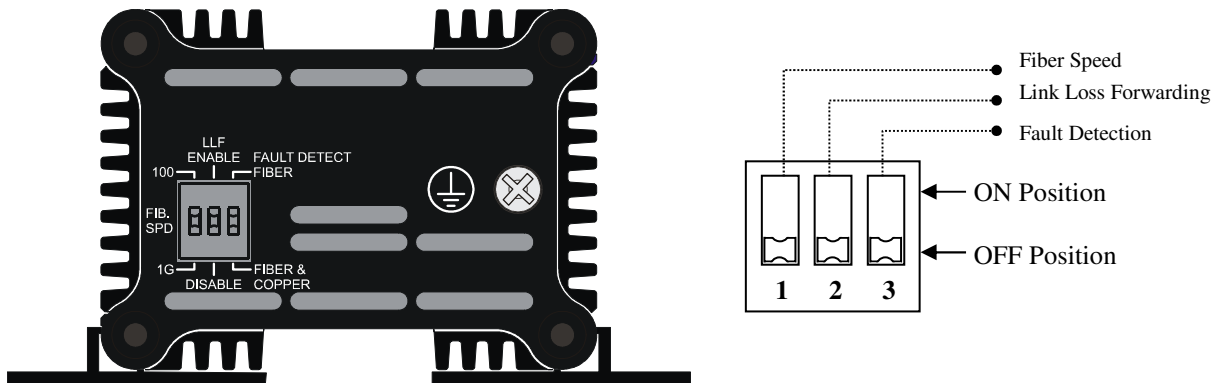


FIGURE 8: OSD2153P 3-WAY DIP SWITCH

TABLE 4: OSD2153P 3-WAY DIP SWITCH SETTINGS

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

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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.

Fiber SFP

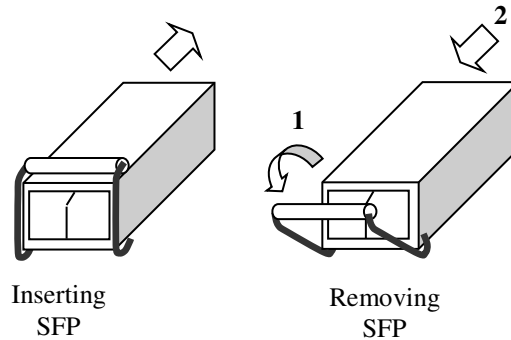


FIGURE 9: FITTING/REMOVING SFP CONNECTORS

2.2.8 BASIC CONNECTIONS

Figure 10 shows basic user connections to the OSD2153P.

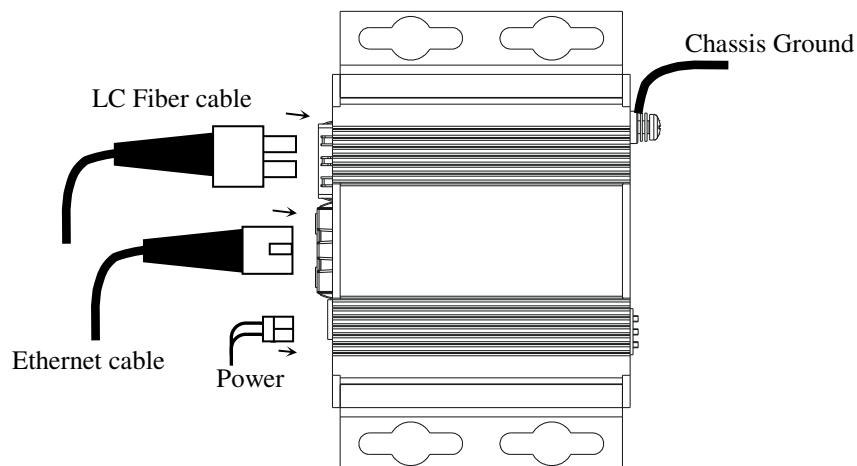


FIGURE 10: BASIC CONNECTIONS

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2.3 OSD2153P OPERATION

This section outlines the OSD2153P connections and switch settings. Read this section carefully for trouble free set up and operation.

There are two possible configurations for the OSD2153P namely Single Unit Configuration and Dual Unit configuration.

Figure 11 is a flow chart of the OSD2153P Link Loss Forwarding (LLF) function and operation.

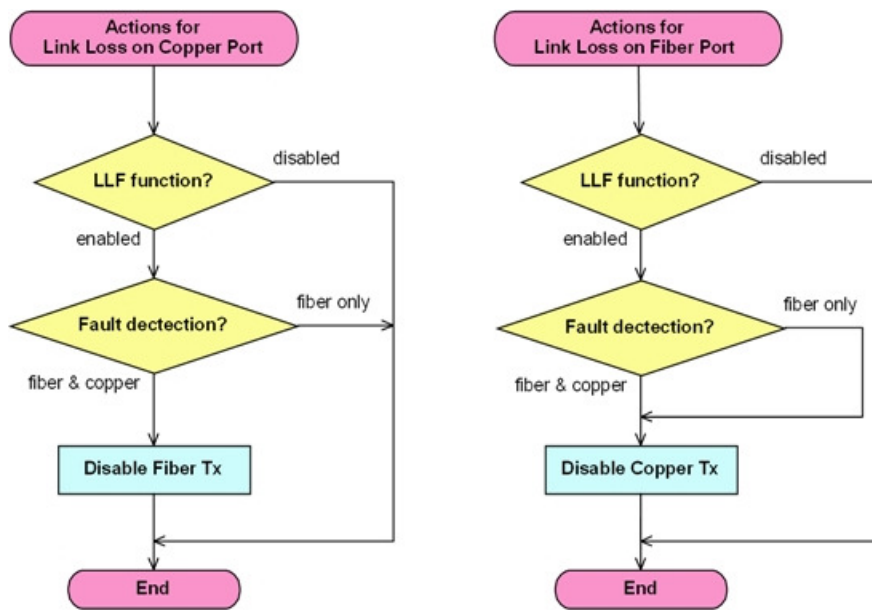


FIGURE 11: LINK LOSS FORWARDING FUNCTION

2.3.1 SINGLE UNIT CONFIGURATION

The single unit configuration enables the user to connect the OSD2153P 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.

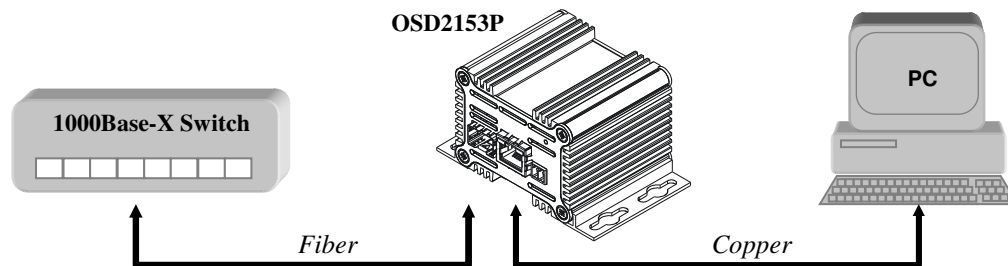


FIGURE 12: SINGLE UNIT CONFIGURATION

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The following tables outline the recommended switch settings for the OSD2153P. Any changes in switch settings require power up to take effect.

TABLE 5: CONFIGURATION WITH LLF ENABLED

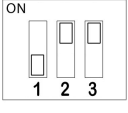
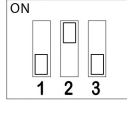
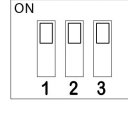
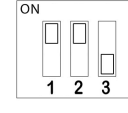
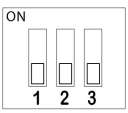
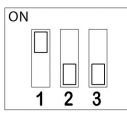
| Configurations | | Case1 | Case2 | Case3 | Case4 |
|-------------------------|-------------------------|---|---|--|---|
| Switch Setting | |  |  |  |  |
| Configurations | | 1. LLF detects fiber & copper 2. LLF is enabled 3. Fiber port is 100BASE-X | 1. LLF detects fiber & copper 2. LLF is enabled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

TABLE 6: CONFIGURATION WITH LLF DISABLED

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

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Examples

Figure 13 is an example of a copper connection loss. The OSD2153P 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.

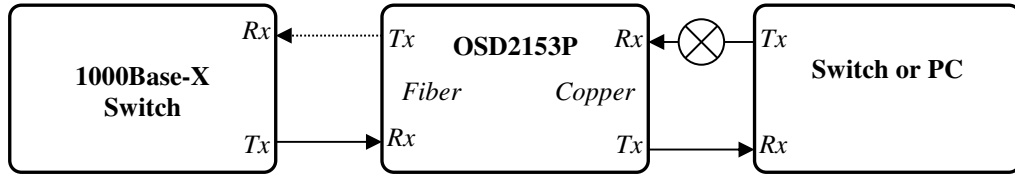


FIGURE 13: COPPER CONNECTION LOSS

Figure 14 is an example of a fiber connection loss. If the OSD2153P does not receive a valid optical signal from the switch, transmission to copper port will be disabled.

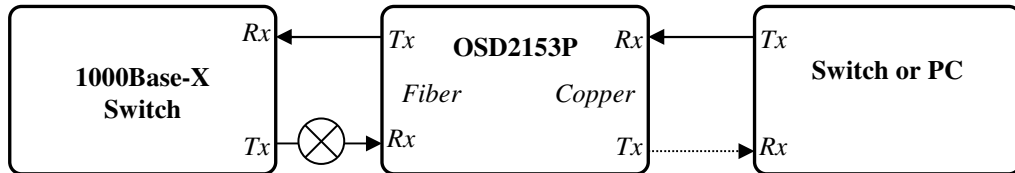


FIGURE 14: FIBER CONNECTION LOSS

3 MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD2153P 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 OSD2153P 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 OSD2153P.

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

Web Site: www.osd.com.au

OPTICAL

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DESIGN

PTY LTD

A.B.N. 83 003 020 504

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