

**OSD151**

**SYNCHRONOUS/ASYNCHRONOUS FIBER**

**OPTIC RS422/TTL MODEM**

# OPTICAL SYSTEMS DESIGN

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## 1. TECHNICAL SUMMARY

### 1.1 BRIEF DESCRIPTION

#### 1.1.1 OVERVIEW

The OSD151 is a small high performance fiber optic modem capable of linking equipment employing RS422 communications over two kilometres of commonly available fiber optic cable.

A pair of OSD151 short haul RS422 modems and a duplex fiber optic cable form a link that is a direct replacement for twisted pair extension cables. This link provides an effective way of extending cables from building to building while providing EMI/RFI protection, data security, reduced data error rates, and elimination of ground loops.

The OSD151 supports full duplex synchronous data rates of between 1kbps and 2.5Mbps. The OSD151 can also operate asynchronously (ie data only, no clock) from DC to 200kbps. A user accessible toggle switch selects asynchronous or synchronous mode. In either case, no controls are transmitted through the link.

The OSD151 is also available for singlemode fiber. This version is designated the OSD151L and operates at a wavelength of 1300nm.

#### 1.1.2 APPLICATIONS

- ▲ Long distance synchronous RS422 links.
- ▲ Secure communications.
- ▲ Hazardous environment.
- ▲ Factory automation.

#### 1.1.3 FEATURES AND BENEFITS

- ▲ TTL or RS422 operation.
- ▲ Extends link lengths to 3km.
- ▲ Small size, low cost, robust and reliable.
- ▲ Full duplex, asynchronous operation from DC to 200kbps or synchronous operation to 2.5Mbps.
- ▲ EMI/RFI resistant metal enclosure.
- ▲ More secure than copper cables.
- ▲ Power provided via a D connector or by an external source.
- ▲ Complete end to end isolation.

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## 1.2 TYPICAL CONFIGURATION

Below in FIGURE 1 is a typical set-up for two OSD151's that may be used together.

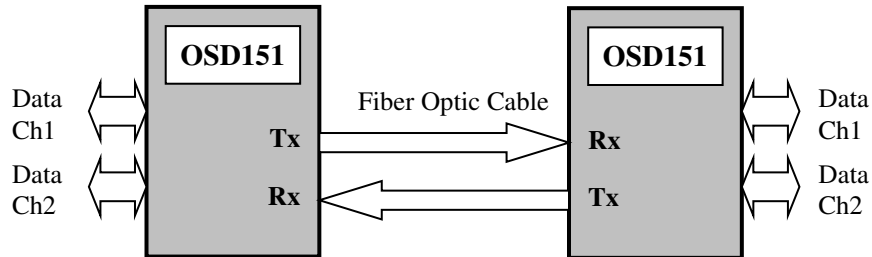


FIGURE 1: TYPICAL CONFIGURATION

It should be noted that the unit can operate in either synchronous or asynchronous mode and that the mode is user selected via a switch on the OSD151.

## 1.3 PRODUCTS AND OPTIONS

There are various options available for the OSD151. These options are identified in TABLE 1 below:

TABLE 1: PRODUCTS AND OPTIONS

ITEM	DESCRIPTION
OSD151	SYNCHRONOUS/ASYNCHRONOUS RS422/TTL MODEM
OPTION L	SINGLEMODE OPTION FOR THE ABOVE
OSD151PP	PLUG PACK FOR THE OSD151

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## 1.4 TECHNICAL SPECIFICATION

TABLE 2 below lists the Technical Specifications for the OSD151.

TABLE 2: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Data rate	DC to 200kbps in asynchronous mode 1kbps to 2.5Mbps in synchronous mode
Pulse Distortion and Jitter	< ± 100ns over the full dynamic range for synchronous transmission < ± 500ns over the full dynamic range for asynchronous transmission
Input	RS422 Levels
Output	RS422 Levels
Controls	Synchronous/Asynchronous selection
Optical Wavelength	850nm nominal (1310nm for OSD151L)
Optical Transmit Power	> -18 to 16dBm into 62.5/125multimode fiber > -20 to -16dBm into singlemode fiber (OSD151L only)
Receiver Sensitivity (for a BER of $1 \times 10^{-9}$ )	> - 35dBm
Optical Loss Budget	> 17dB at 850nm (>5km of multimode fiber) > 15dB at 1310nm (>25km of singlemode fiber)
Receiver Saturation	> - 16dBm
Electrical Connector	25 Pin D connector (female) for power and data
Optical Connector	ST
Power Connector	1.3mm socket on side of case
Operating Temperature	-20 to + 75°C
Relative Humidity	0 to 95% non-condensing
Power	8V to 14V DC at less than 200mA via D connector or power socket
Weight	120g
Dimensions(mm)	15H X 54W X 93D

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## 1.5 PIN ASSIGNMENTS

TABLE 3 identifies the pin assignments of the 25 Pin D Connector on the OSD151.

TABLE 3: PIN ASSIGNMENTS

PIN	NAME	FUNCTION
1	Protective ground pin	Connected to case.
2	Transmit data +	Modem accepts data.
3	Transmit data -	Modem accepts data.
4	Receive data +	Modem outputs data.
5	Receive data -	Modem outputs data.
6	Not used	
7	Signal ground	0V ground.
8	Not used	
9	Power	+12V DC Power input.
10	Transmit clock -	Modem accepts clock.
11	Transmit clock +	Modem accepts clock.
12	Receive clock +	Modem outputs clock.
13	Receive clock -	Modem outputs clock.

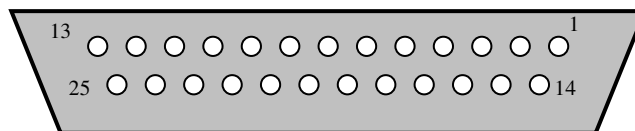


FIGURE 2: D CONNECTOR PINOUT CONFIGURATION

## 2. INSTALLATION AND OPERATION

### 2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD151 successfully. This information 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 prior to operation. If damage is detectable, return the unit and the packaging to the supplier.

### 2.2 INSTALLATION

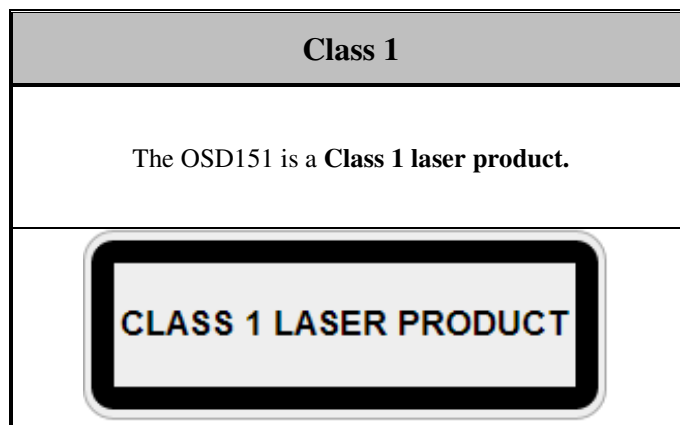
#### 2.2.1 WARNING AND PRECAUTIONS

##### 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 60825-1:2014 standard.



- ▲ 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

The case of the OSD151 is made from metal, and is designed to be placed on a bench or to be mounted directly on the host equipment's 25 Pin D Connector. FIGURE 3 below, provides the outside dimensions of the OSD151.

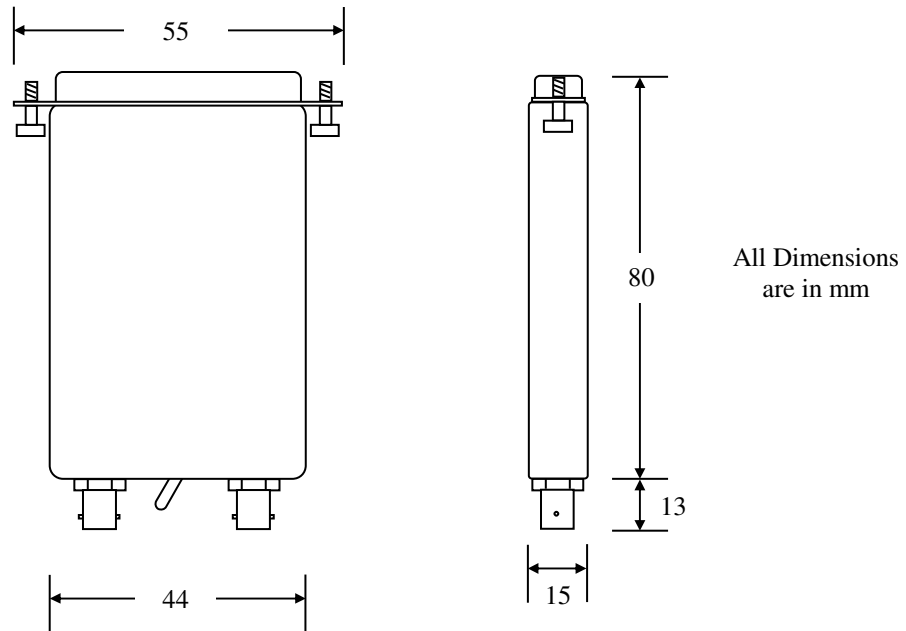


FIGURE 3: DIMENSIONS

## 2.2.3 POWER SUPPLY CONNECTIONS

The OSD151 is powered by +8 to 14V<sub>DC</sub> which may be supplied to the unit via Pin 9 of the 25 Pin D connector or via the included 1.3mm power socket mounted on the side of the unit. The internal pin is the positive connection and the outer connection is Ground (see Figure 4).

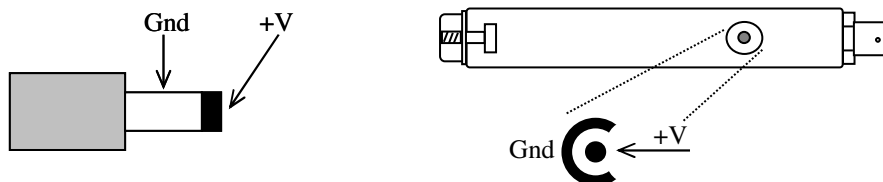


FIGURE 4: POWER SOCKET CONNECTION DIAGRAM



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## 2.2.4 OTHER CONNECTIONS

The RS422 signal is connected to or from external equipment by the 25 pin D connector. Ensure that the incoming clock and data signals are correctly phased. The clock should go logically low at the halfway point of the data bit.

Likewise ensure that the receiving equipment can accept the phasing of the clock and data signals output from the OSD151 which has the clock going logically high about 15ns to 20ns before the data bit. Refer to Figure 5 for more details.

+12V DC power is fed to the unit via pin 9 of this connector or via the power socket.

Each optical fiber must be terminated by an ST type optical connector. Before connection, inspect the end 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 a lint free tissue to remove contamination.

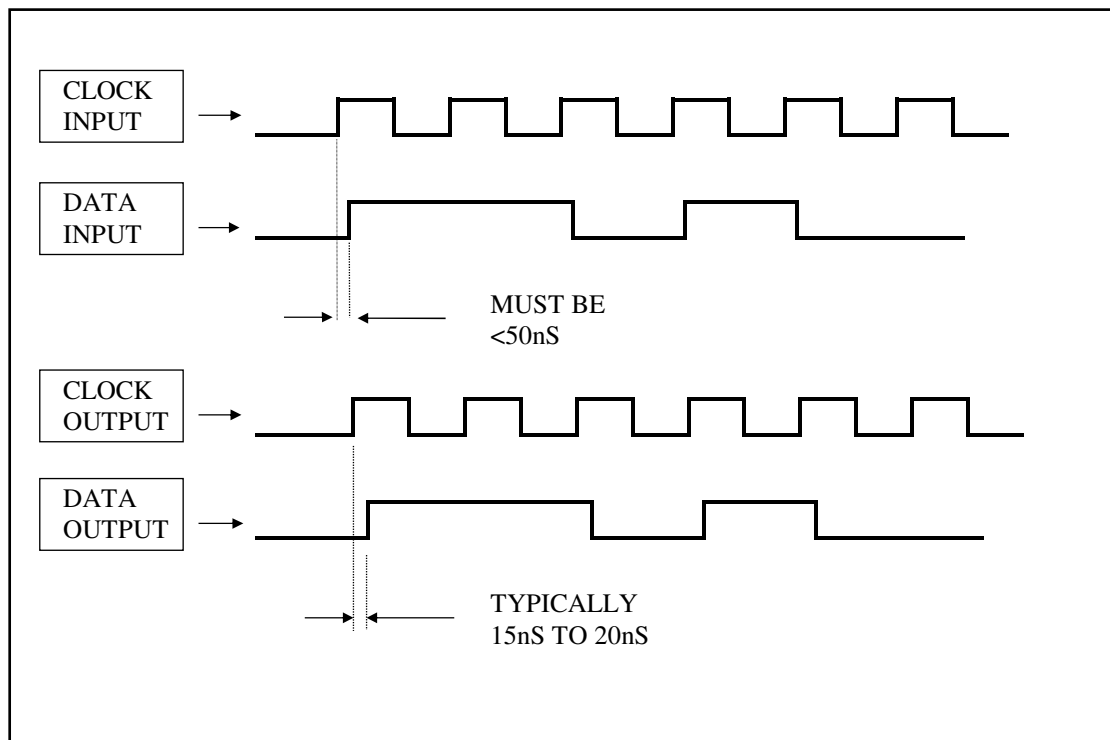


FIGURE 5: TIMING DIAGRAM

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## 2.3 OPERATION

### 2.3.1 BLOCK DIAGRAM

Below in Figure 6 is a simple block diagram of the OSD151.

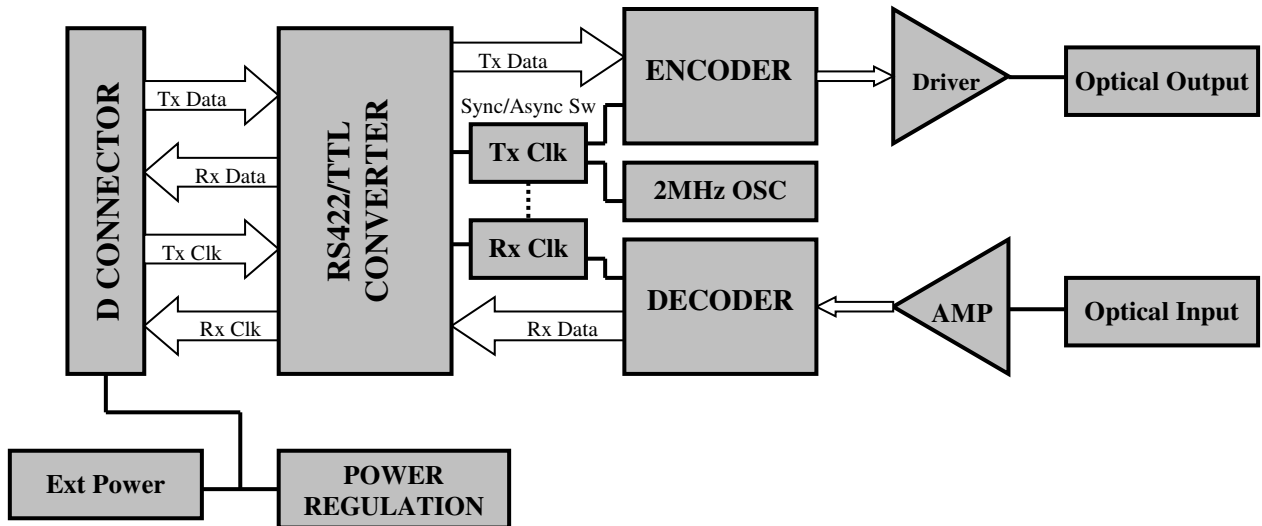


FIGURE 6: BLOCK DIAGRAM

### 2.3.2 CONTROLS

The OSD151 has just one control: a toggle switch located between the optical connectors which selects either synchronous or asynchronous operation.

## 3. MAINTENANCE

### 3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD151 modem. 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:

- ▲ Ensure that the correct power source (ie +12V DC) is connected to pin 9 of the D connector or to the power socket.
- ▲ Ensure that the RS422 signal is connected to the modem correctly and that the distant OSD151 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.
- ▲ Ensure that the toggle switch is set for the correct mode of operation.
- ▲ If synchronous operation is selected check that the system is generating correctly phased clock signals and that it accepts the phasing of received clock signals with respect to the received data signal. Refer to FIGURE 5 for the correct phasing.
- ▲ Check that any external termination resistors are connected if the system configuration requires them in.

### 3.3 ROUTINE MAINTENANCE

There is no routine maintenance required with the OSD151.

## 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 ALL REPAIRS

Optical Systems Design reserves the right to repair or replace faulty modules/units. Please obtain a "Return Material Authorisation" number form and number before returning goods. Goods must be returned to Optical Systems Design, Warriewood or its nominated authorised representative, for all repairs in adequate packing material.

#### 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.

## 4.3 EXCLUSIONS

This warranty does not apply to defects caused by unauthorised modifications, misuse, abuse or transport damage to the equipment. All modifications to OSD's standard product will need written authorisation and will be charged at normal repair rates. All modifications are to be carried out by OSD Technicians. Warranty will lapse if unauthorised removal and/or tampering with serial number and/or repair labels occurs.