# OSP2488-8503DxR

2.5Gb/s SFP Optical Transceiver Module, Multi-Mode, 850nm, 300m Reach

## Features


- Supports up to 2.67Gbps bit rates
- Compliant with SFP MSA standard
- Compliant with SFF-8472
- 850nm VCSEL laser transmitter and PIN photo-detector
- Up to 300m on 50/125μm MMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- +3.3V power supply
- Support Digital Diagnostic Monitoring interface
- ROHS compliant and Lead Free
- Operating Temperature: Standard 0~70ºC Extended -10~85ºC Industrial -40~85ºC

## Applications

- SDH STM-16 and SONET OC-48 system
- CPRI rates 2.4576Gb/s, and 1.2288Gb/s
- 2X Fiber Channel
- Other optical transmission systems

## Description

Optcore's OSP2488-8503DxR is a high performance small form factor pluggable SFP module for 2.5Gb/s serial optical data communications such as SDH STM-16 I-16 / SONET OC-48 SR-1 / 2x Fibre Channel application. This SFP transceiver module provides 300m transmission distance over multimode fiber at a nominal wavelength of 850nm. The transmitter section incorporates a 850nm VCSEL laser that is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses a high-speed InGaAs PIN photodiode (PD) and trans-impedance preamplifier. The 2.5Gb/s SFP module series is fully compliant with SFP Multi-Sourcing Agreement (MSA) and SFF-8472. For further information, please see SFP MSA and SFF-8472 standard.

Additionally, the STM-16/OC48 SR SFP module also features digital diagnostic interface per SFF-8472, which provides real-time monitoring of the transceiver temperature, supply voltage, laser bias current, laser average output power and received optical power. These parameters are internally calibrated by default.

There are three versions of the series 2.5Gbps SFP 850nm optical transceiver modules for different applications. The Standard grade (0~70ºC) is for commonly commercial application, the Extended grade (-10~85ºC) is for Extended temperature application, and the Industrial grade (-40~85ºC) is made with robust and reliable components to meet the needs of Industrial Ethernet application under harsh environmental conditions.

## Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit | Notes |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Maximum Supply Voltage | Vcc | -0.5 | 4.0 | V | |
| Storage Temperature | $T_S$ | -40 | 85 | °C | |
| Operating Humidity | RH | 5 | 85 | % | |

## Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Power Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | |
| Power Supply Current | Icc | | | 300 | mA | |
| Operating Case Temperature | Tc | 0 | | 70 | °C | Standard |
| | | -10 | | 85 | °C | Extended |
| | | -40 | | 85 | °C | Industrial |
| Data Rate | DR | | 2.5 | 2.67 | Gbps | |
| Transmission Distance | | | | 300 | m | 50/125μm MMF |

## Optical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| ***Transmitter*** | | | | | | |
| Center Wavelength | $\lambda_C$ | 830 | 850 | 860 | nm | |
| Average Output Power | $P_{out}$ | -10 | | -3 | dBm | 1 |
| Spectral Width (RMS) | σ | | | 0.85 | nm | |
| Extinction Ratio | ER | 8.2 | | | dB | 1 |
| Optical Rise/Fall Time | Tr-Tf | | | 0.18 | ns | 2 |
| Output Optical Eye | Compliant with ITU G.957 (class 1 laser safety) | | | | | |
| ***Receiver*** | | | | | | |
| Center Wavelength | $\lambda_C$ | 770 | - | 860 | nm | |
| Receiver Sensitivity | | | | -18 | dBm | 3 |
| Receiver Overload | | -3 | | | dBm | 3 |
| LOS De-Assert | LOSD | | | -19 | dBm | |
| LOS Assert | LOSA | -35 | | | dBm | |
| LOS Hysteresis | | 0.5 | 2 | 6 | dB | |

**Note :**

1. Measured at 2.5Gbps with PRBS $2^{23}$– 1 NRZ test pattern.
2. Unfiltered, measured with a PRBS $2^{23}$-1 test pattern @2.5Gbps
3. Measured at 2.5Gbps with PRBS $2^{23}$– 1 NRZ test pattern for BER < $1x10^{-10}$

## Electrical Characteristics ($T_{OP(C)}$ = 0 to 70°C, $T_{OP(I)}$ =-40 to 85°C,$V_{CC}$ = 3.13 to 3.47 V)

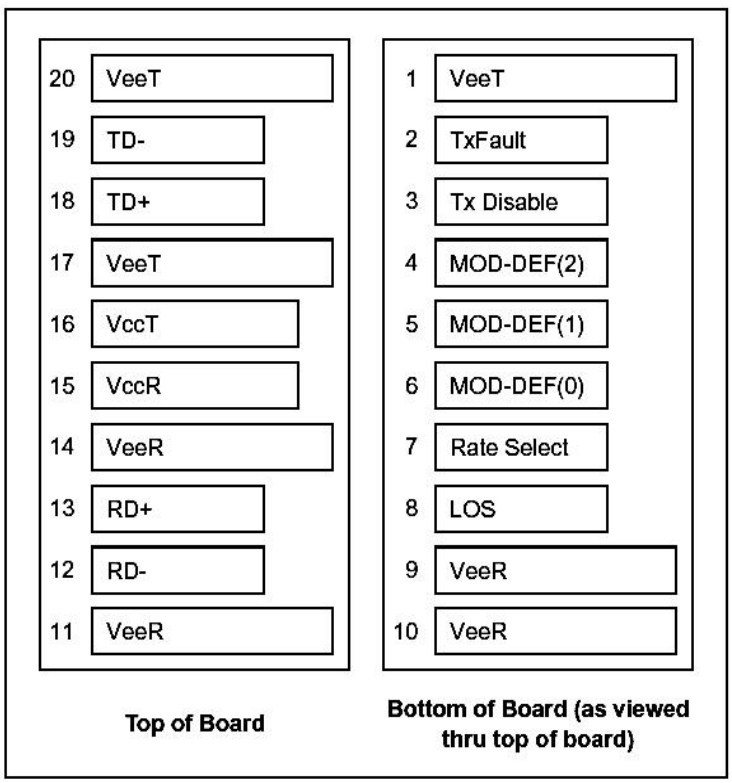
| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| ***Transmitter*** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Differential data input swing | VIN,PP | 200 | | 2400 | mVpp | 1 |
| Tx Disable Input-High | VIH | 2.0 | | Vcc+0.3 | V | |
| Tx Disable Input-Low | VIL | 0 | | 0.8 | V | |
| Tx Fault Output-High | VOH | 2.0 | | Vcc+0.3 | V | 2 |
| Tx Fault Output-Low | VOL | 0 | | 0.8 | V | 2 |
| Input differential impedance | Rin | | 100 | | Ω | |
| ***Receiver*** | | | | | | |
| Differential data output swing | Vout,pp | 400 | | 1000 | mVpp | 3 |
| Rx LOS Output-High | VROH | 2.0 | | Vcc+0.3 | V | 2 |
| Rx LOS Output-Low | VROL | 0 | | 0.8 | V | 2 |

**Notes:**

1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.
2. Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.
3. RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

## Pin Definitions




## Pin Descriptions

| Pin | Signal Name | Description | Plug Seq. | Notes |
|---|---|---|---|---|
| 1 | $V_{EET}$ | Transmitter Ground | 1 | |
| 2 | TX FAULT | Transmitter Fault Indication | 3 | Note 1 |
| 3 | TX DISABLE | Transmitter Disable | 3 | Note 2 |
| 4 | MOD_DEF(2) | SDA Serial Data Signal | 3 | Note 3 |

| | | | | |
|---|---|---|---|---|
| 5 | MOD_DEF(1) | SCL Serial Clock Signal | 3 | Note 3 |
| 6 | MOD_DEF(0) | Model present indication | 3 | Note 3 |
| 7 | Rate Select | Not Connected | 3 | |
| 8 | LOS | Loss of Signal | 3 | Note 4 |
| 9 | $V_{EER}$ | Receiver ground | 1 | |
| 10 | $V_{EER}$ | Receiver ground | 1 | |
| 11 | $V_{EER}$ | Receiver ground | 1 | |
| 12 | RD- | Inverse Received Data Out | 3 | Note 5 |
| 13 | RD+ | Received Data Out | 3 | Note 5 |
| 14 | $V_{EER}$ | Receiver ground | 1 | |
| 15 | $V_{CCR}$ | Receiver Power Supply | 2 | |
| 16 | $V_{CCT}$ | Transmitter Power Supply | 2 | |
| 17 | $V_{EET}$ | Transmitter Ground | 1 | |
| 18 | TD+ | Transmit Data In | 3 | Note 6 |
| 19 | TD- | Inv. Transmit Data In | 3 | Note 6 |
| 20 | $V_{EET}$ | Transmitter Ground | 1 | |

**Notes:**

1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2. TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:

   Low (0 to 0.8V): Transmitter on (>0.8V, < 2.0V): Undefined

   High (2.0 to 3.465V): Transmitter Disabled Open:Transmitter Disabled
3. Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

   Mod-Def 0 is grounded by the module to indicate that the module is present

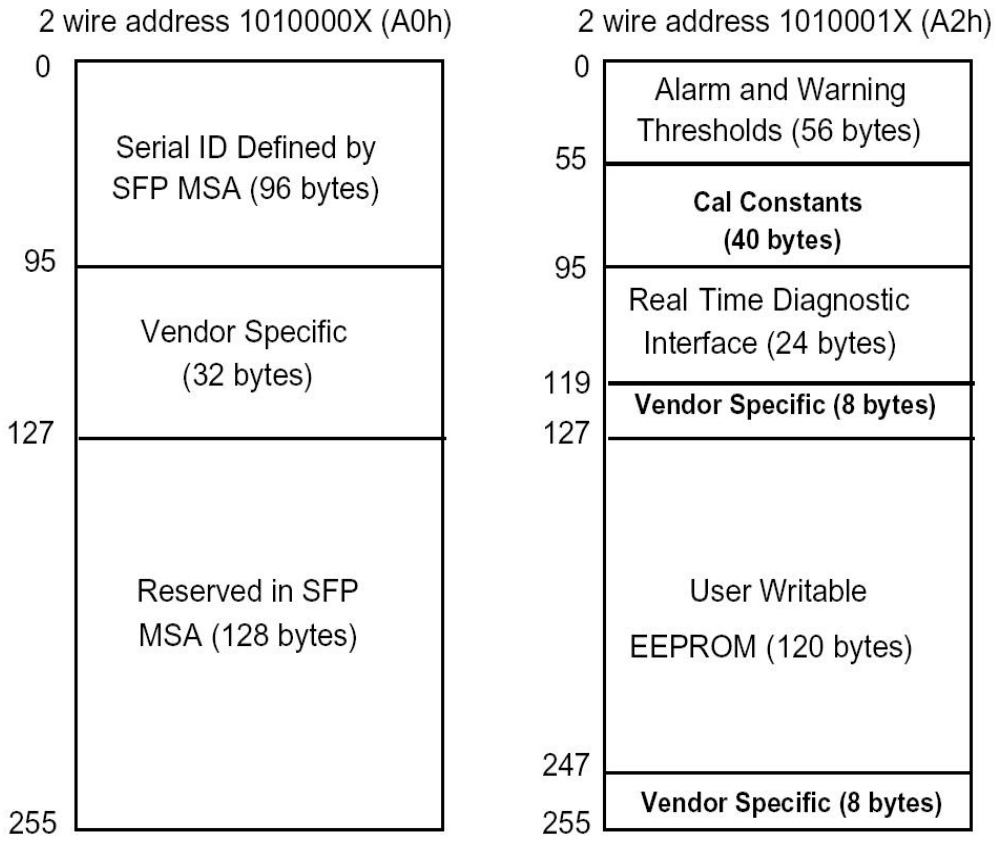
   Mod-Def 1 is the clock line of two wire serial interface for serial ID

   Mod-Def 2 is the data line of two wire serial interface for serial ID
4. LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
5. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
6. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

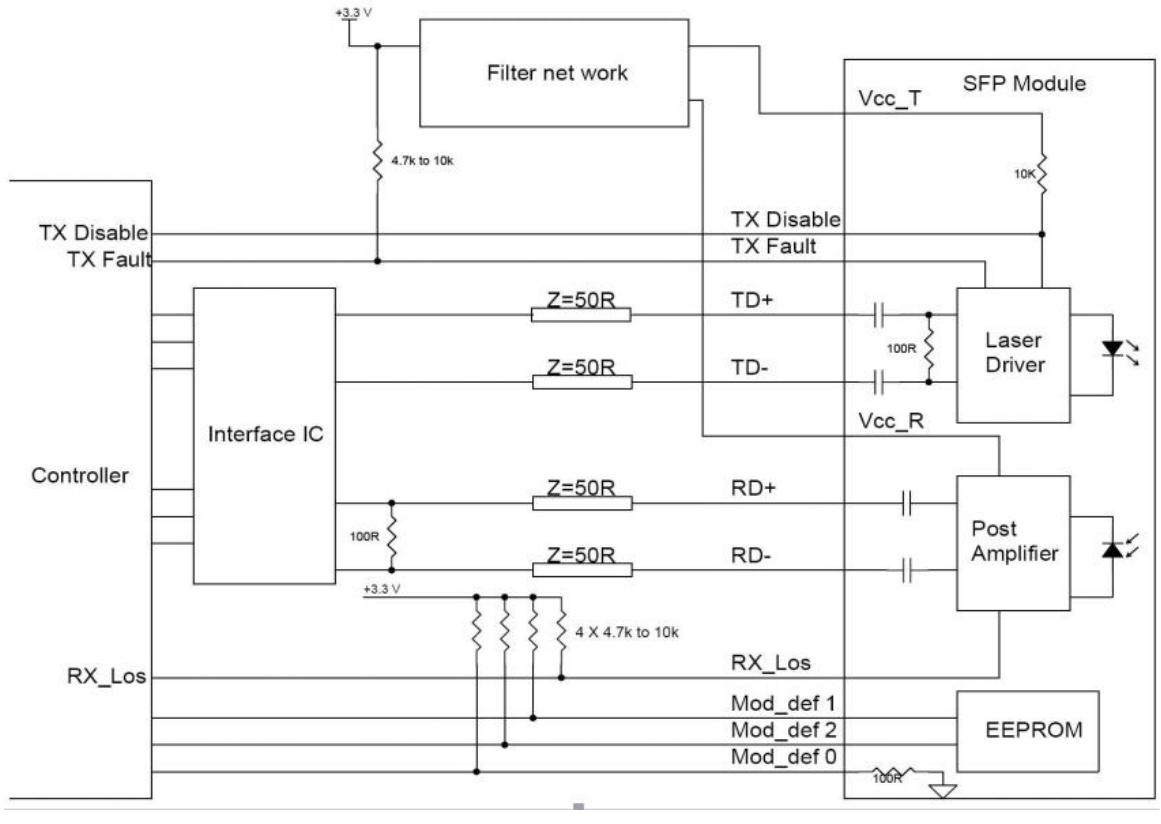
## Digital Diagnostic Functions

The OC-48/STM-16 SR SFP transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

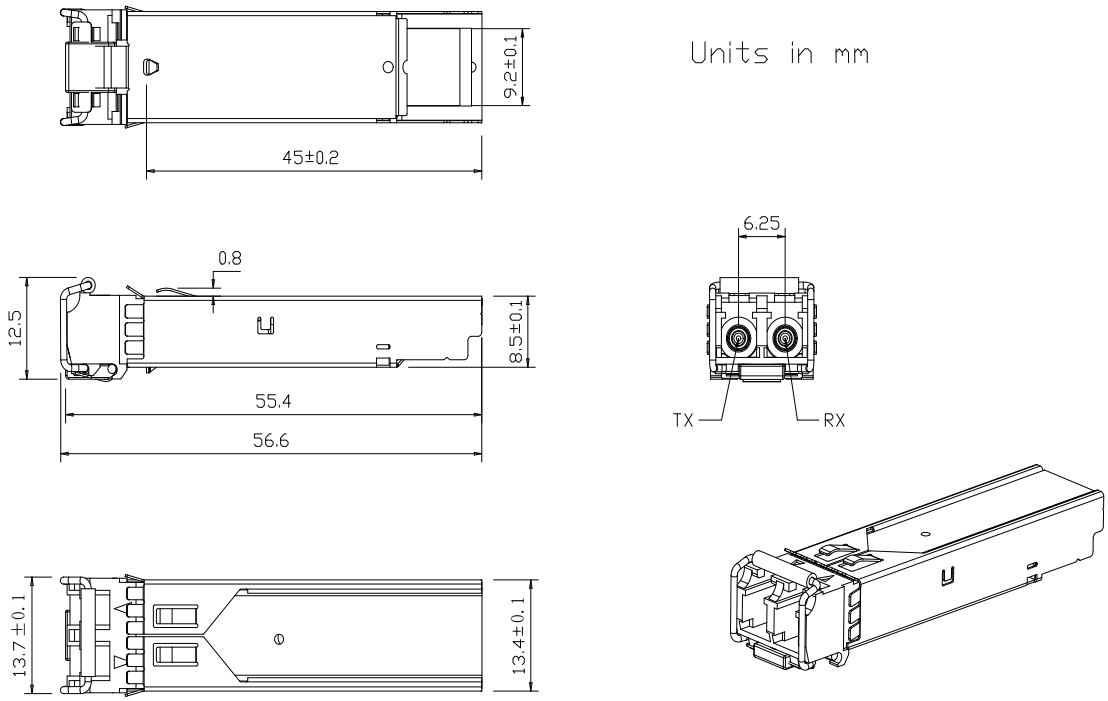
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.




**Recommended Interface Circuit**



## Mechanical Dimensions




## Ordering information

| Part number | Description |
|---|---|
| OSP2488-8503DCR | 2.5Gb/s SFP Transceiver, MMF, 850nm, 300m, LC, DDM, 0ºC~+70ºC |
| OSP2488-8503DER | 2.5Gb/s SFP Extended Transceiver, MMF, 850nm, 300m, LC, DDM, -10ºC~+85ºC |
| OSP2488-8503DTR | 2.5Gb/s SFP Industrial Transceiver, MMF, 850nm, 300m, LC, DDM,-40ºC~+85ºC |

## Warnings

***Process plug***

The transceiver optics is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles.It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.

***Handling Precautions***

The transceiver optics is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

***Laser Safety***

The transceiver optics is a Class 1 laser product per international standard IEC 60825-1. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

For more product information, visit us on the web at www.optcore.net