

**LP-OSFPZX01DX**

**SFP Optical Transceiver module, LC Duplex, 1.25 Gbps 1000BASE-ZX, 1550 nm, Single MODE (9/125 μm), up to 80 Km or Multimode 50/125 μm/62.5/125 μm up to 550 m with DDM**

LPOSFPZX01DX\_SS\_ENB01W

**Features**

- Operation Data-rate of 1.25 Gbps.
- 1550 nm DFB laser and PIN photodetector for 80km transmission.
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle.
- Hot pluggable
- Digital Diagnostic Monitoring: Internal Calibration or External Calibration.
- Compatible with SONET OC-24-LR-1.
- Compatible with RoHS.
- +3.3V single power supply.
- Operating case temperature: Standard : 0 to +70°C Extended : -20 to +85°C.
- 550m transmission with MMF.
- 80 Km transmission with SMF.
- Low EMI and excellent ESD protection.
- Laser safety standard IEC-60825 compliant.

**Applications**

- Gigabit Ethernet.
- Fiber Channel.
- Switch to Switch interface.
- Switched backplane applications.
- Router/Server interface.
- Other optical transmission systems.



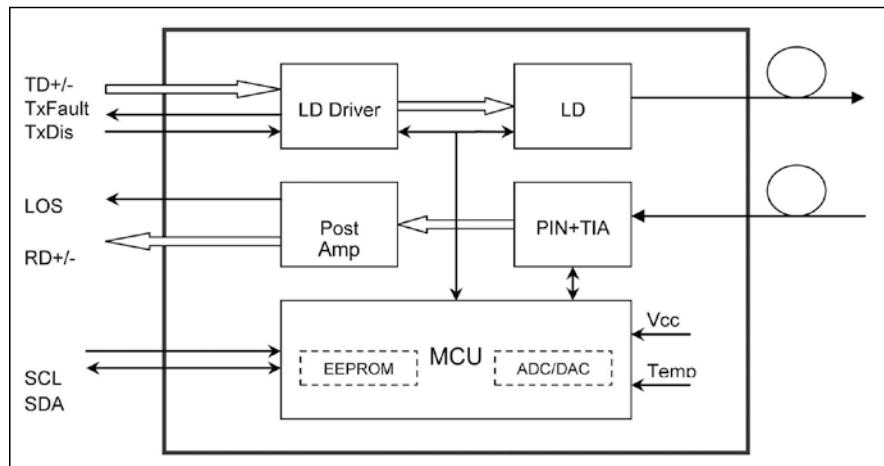
**LP-OSFPZX01DX**  
**SFP Optical Transceiver module, LC Duplex, 1.25 Gbps**  
**1000BASE-ZX, 1550 nm, Single MODE (9/125 μm),**  
**up to 80 Km or Multimode 50/125 μm/62.5/125 μm**  
**up to 550 m with DDM**

The SFP transceiver supports dual data-rate of 1.25 Gbps/1.0625Gbps and from 80km transmission distance with SMF or 550m with MMF.

The transceiver consists of two sections: The transmitter section incorporates a 1550 nm DFB laser. The receiver section consists of a PIN photodiode integrated with a trans-impedance preamplifier (TIA). All modules satisfy class I laser safety requirements. The optical output can be disabled by a TTL logic high-level input of Tx Disable. Tx Fault indicates that degradation of the laser. Loss of signal (LOS) output indicates the loss of an input optical signal of receiver.

The standard serial ID information compatible with SFP MSA and SFF-8472 describes the transceiver’s capabilities, standard interfaces, manufacturer and other information. The host equipment can access this information via the 2-wire serial bus. For more information, please refer to SFP Multi-Source Agreement (MSA).

These modules are compatible with SONET OC-24-LR-1 and come with the DDM (Digital Diagnostic Monitoring) feature included in the functionality.



**A Performance specifications:****Table 1 - Absolute Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	Tst	-40	+85	°C
Operating Temperature	Top	0	+70	°C
Supply Voltage	Vcc	0	+3.6	V
Input voltage	Vin	GND	Vcc	
Lead Soldering Temperature & Time		240/10		°C/s

**B Recommended Operating Conditions****Table 2 - Recommended Operating Conditions**

Parameter	Symbol	Min	Typical	Max	Unit	
Operating Case Temperature	Standard	Tc	0		+70	°C
	Extended		-20		+85	°C
Power Supply Voltage	Vcc	3.13	3.47	V		
Power Supply Current	Icc		300	mA		
Data Rate		1.25		Gbps		

**C Optical and Electrical Characteristics****(DFB and PIN, 1550nm, 80km Reach)****Table 3 - Optical and Electrical Characteristics**

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	$\lambda_c$	1480	1550	1580	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	Pout	0		5	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time (20%~80%)	tr/tf			0.26	ns	
Data Input Swing Differential	V <sub>IN</sub>	400		1800	mV	2
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	$\Omega$	
TX Disable	Disable	2.0		V <sub>cc</sub>	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		V <sub>cc</sub>	V	
	Normal	0		0.8	V	

Receiver						
Centre Wavelength	$\lambda_c$	1260		1580	nm	
Receiver Sensitivity				-23	dBm	3
Receiver Overload		-3			dBm	3
LOS De-Assert	LOSD			-24	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		1		4	dB	
Data Output Swing Differential	Vout	370		1800	mV	4
LOS	High	2.0		$V_{cc}$	V	
	Low			0.8	V	

**Notes:**

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 27-1 test pattern @1250 Mbps, BER  $\leq 1 \times 10^{-12}$ .
4. Internally AC-coupled.

**D Timing and Electrical****Table 4 - Timing and Electrical**

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	$\mu$ s
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	$\mu$ s
Tx Disable To Reset	t_reset	10			$\mu$ s
LOS Assert Time	t_loss_on			100	$\mu$ s
LOS De-assert Time	t_loss_off			100	$\mu$ s
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0:2)-High	$V_H$	2		$V_{cc}$	V
MOD_DEF (0:2)-Low	$V_L$			0.8	V

**E Diagnostics**

**Table 5 – Diagnostics Specification**

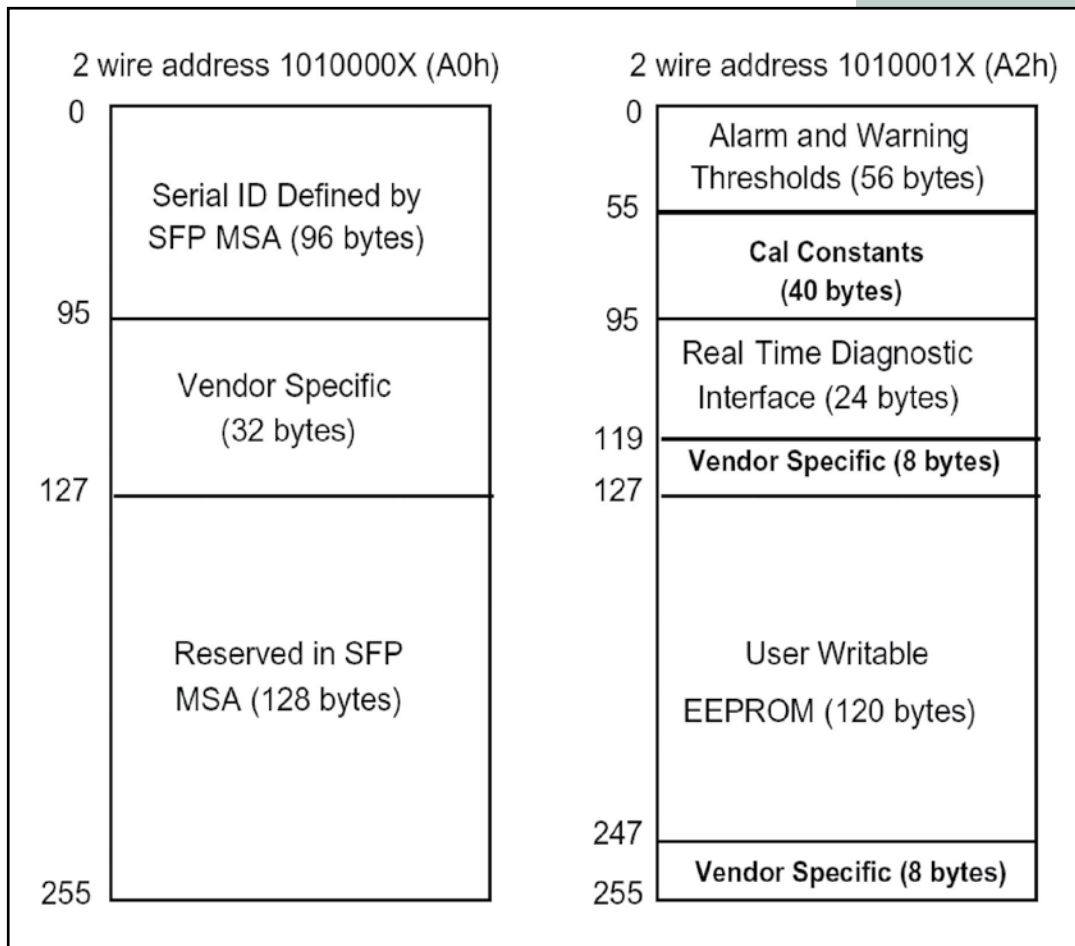
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
	-20 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	0 to +5	dBm	±3dB	Internal / External
RX Power	-23 to -3	dBm	±3dB	Internal / External

**F Digital Diagnostic Memory Map**

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

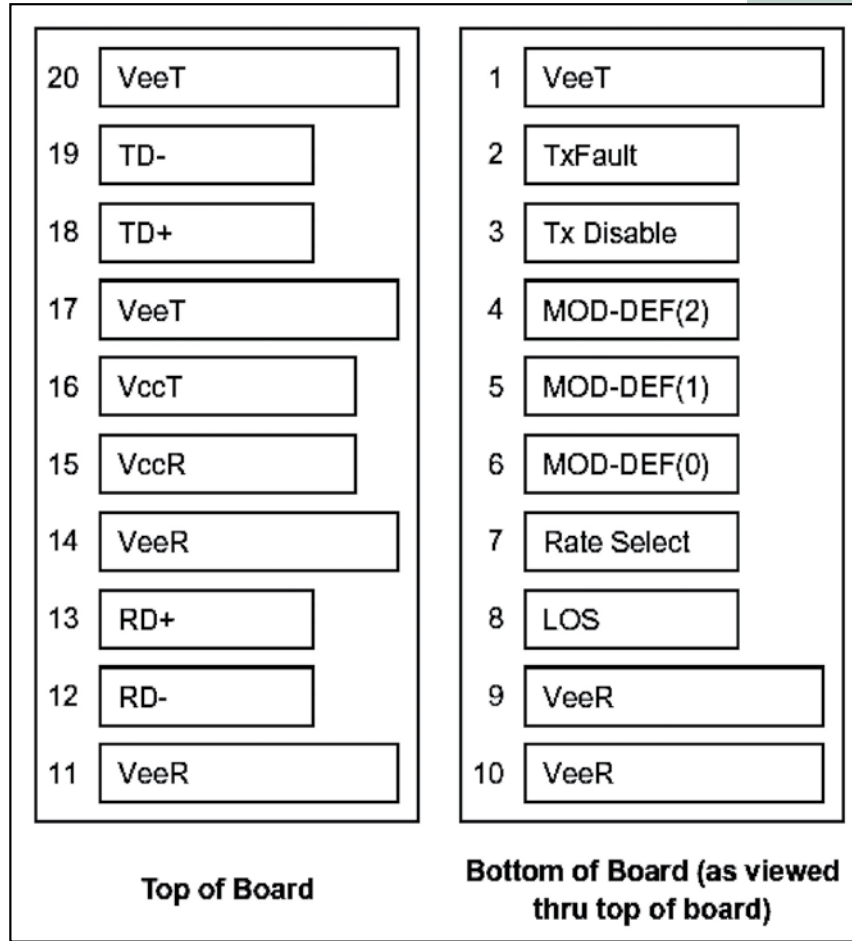
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



**G Pin Definitions**

**Pin Diagram**



**H Pin Descriptions**

Pin	Signal Name	Description	Plug Seq.	Notes
1	VEET	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)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V <sub>EER</sub>	Receiver ground	1	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	

## H Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V <sub>EET</sub>	Transmitter Ground	1	

**Notes:**

Plug Seq.: Pin engagement sequence during hot plugging.

**1)** TX Fault is an open collector output, which should be pulled up with a 4.7 k~10 kΩ 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 4.7 k~10 kΩ 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 4.7 k~10 kΩ 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

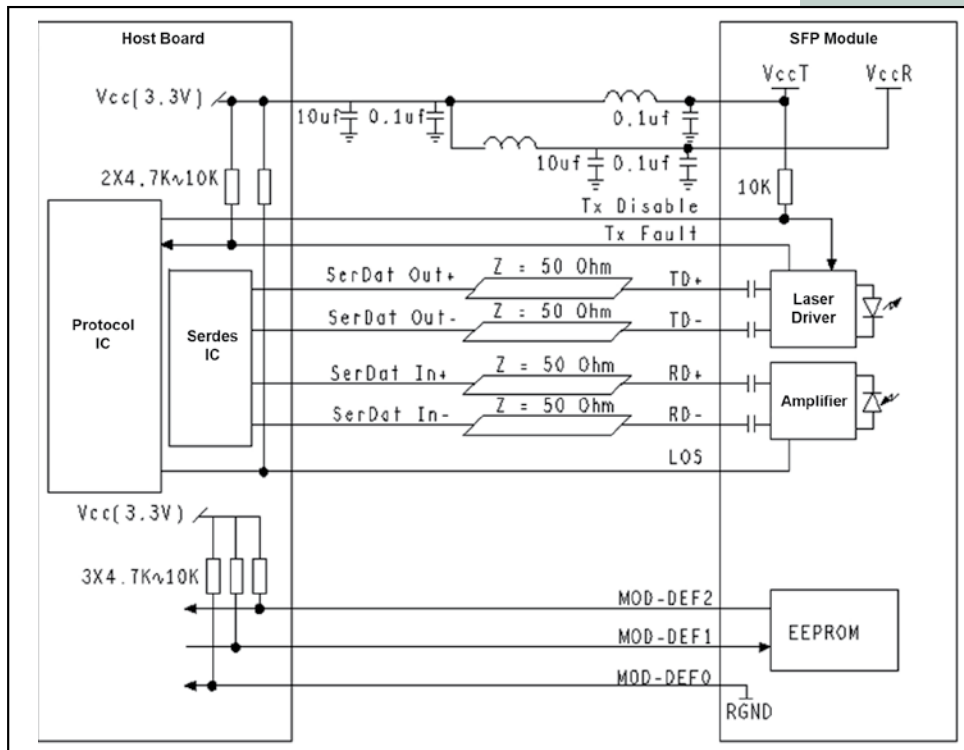
Mod-Def 2 is the data line of two wire serial interface for serial ID

**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.

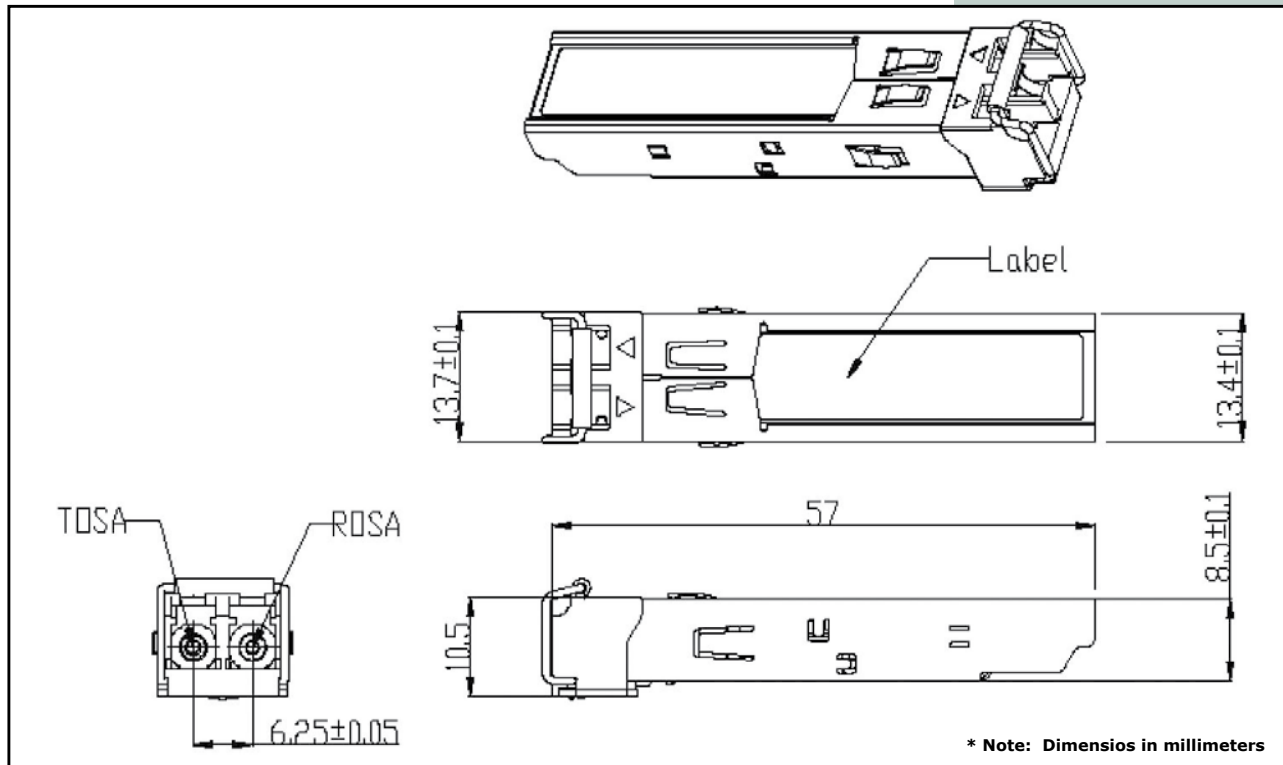
**5)** RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

**6)** TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

## I Recommended Interface Circuit



**J Mechanical Dimensions**



**K How to Order**

<b>LP-OSFPZX01D</b>	SFP Optical Transceiver module, LC Duplex, 1.25 Gbps 1000BASE-ZX, 1550 nm, Single MODE (9/125 μm), up to 80 Km or Multimode 50/125 μm/62.5/125 μm up to 550 m With DDM Standard Temperature range: 0 °C to + 70 °C
<b>LP-OSFPZX01DE</b>	SFP Optical Transceiver module, LC Duplex, 1.25 Gbps 1000BASE-ZX, 1550 nm, Single MODE (9/125 μm), up to 80 Km or Multimode 50/125 μm/62.5/125 μm up to 550 m. With DDM Extended Temperature range: -20 °C to + 85 °C