

# 622Mb/s SFP 1310nm 40km Optical Transceiver

## Features

- Up to 622Mb/s data links
- 1310nm DFB laser transmitter and PIN photo-detector
- Up to 40km on 9/125µm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS-10 compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Optional operating temperature range:0~+70°C
- Single +3.3V power supply
- Compliant with SFF-8472

## Applications

- Switch to Switch interface
- Fast Ethernet
- Router/Server interface
- Other optical transmission systems

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## Compliance

- SFP MSA
- SFF-8472
- IEEE802.3z
- RoHS

## Description

The SFP-OC12-ER-31 series single-mode transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the DFB laser and the PIN photo-detector. The module data link up to 40km in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

## Absolute Maximum Ratings

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Storage Temperature	TS	-40		+85	°C	
Power Supply Voltage	VCC	-0.3	-	+3.6	V	
Relative Humidity (non-condensation)	RH	5		95	%	
Damage Threshold	THd	5			dBm	

## Recommended Operating Conditions

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Operating Case temperature	Tc	0	-	+70	°C	
3.3V Supply Voltage	VCC	3.135	3.3	3.465	V	
Total Data Rate			622		Mb/s	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			40	km	9/125 um

## Electrical Characteristic

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply current	Icc			260	mA	
Power Consumption	p			0.86	W	
Transmitter						

Single-ended Input Voltage Tolerance	VCC	-0.3		4.0	V	
Differential Input Voltage Swing	Vin,pp	200		2400	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee-0.3		0.8	V	
<b>Receiver</b>						
Differential Output Voltage Swing	Vout,pp	500		900	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	
Data output rise/fall time	Tr/Tf		100		ps	20% to 80%
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	
LOS De-assert Voltage	VlosL	Vee-0.3		0.8	V	

## Optical Characteristic

**Table4-Optical Characteristic**

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
<b>Transmitter</b>						
Center Wavelength	$\lambda C$	1290	1310	1330	nm	
Spectrum Bandwidth(RMS)	$\sigma$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	PAVG	-5		0	dBm	1
Optical Extinction Ratio	ER	8.2			dB	
Transmitter OFF Output Power	POff			-45	dBm	
Transmitter Eye Mask		Compliant with G.957(class 1 laser safety)				
<b>Receiver</b>						
Center Wavelength	$\lambda C$	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-28	dBm	2
Input Saturation Power (overload)	Psat	-8			dBm	
LOS Assert	LOSA	-36			dB	3
LOS De-assert	LOSD			-29	dBm	3
LOS Hysteresis	LOSH	0.5	2	6	dBm	

**Notes:**

[1] Measure at 2<sup>23</sup>-1 NRZ PRBS pattern

[2] Measured with Light source 1310nm, ER=8.2dB; BER = <math>10^{-12}</math> @PRBS=2<sup>23</sup>-1 NRZ

[3] When LOS de-asserted, the RX data+/- output is High-level (fixed).

### Digital Diagnostic Functions

Parameter	Symbols	Min.	Max.	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

### Pin Description

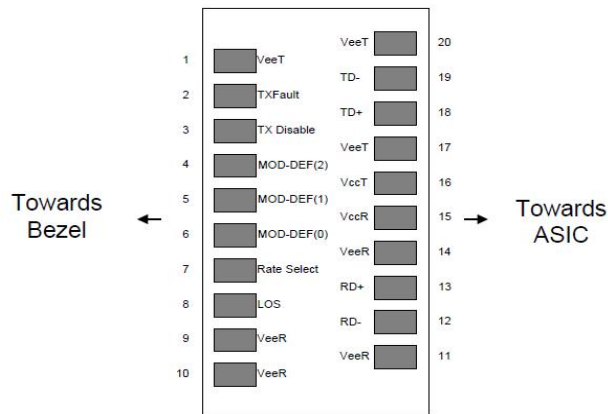


Figure 1 Pin view

### Pin Function Definitions

Pin	Name	Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.Open Drain. Logic "0" indicates normal operation.	
3	TDIS	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3

6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required.	4
8	LOS	Loss of Signal indication. Open Drain. Logic "0" indicates normal operation.	5
9	VEER	Receiver Ground (Common with Transmitter Ground)	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out(CML). AC Coupled	
13	RD+	Receiver Non-inverted DATA out(CML). AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

**Notes:**

[1] Circuit ground is internally isolated from chassis ground.

[2] Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

[3] Should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V. MOD\_DEF (0) pulls line low to indicate module is plugged in.

[4] This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with >30kΩ resistor. The input states are:

1) Low (0 – 0.8V): Reduced Bandwidth

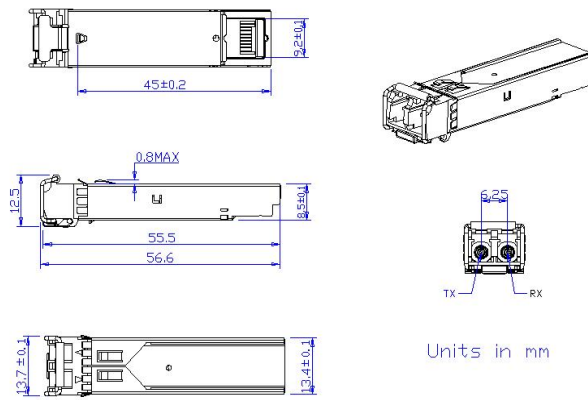
2) (>0.8, <2.0V): Undefined

3) High (2.0 – 3.465V): Full Bandwidth

4) Open: Reduced Bandwidth

[5] LOS is open collector output should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## Mechanical Dimensions



**Figure 2 Mechanical Outline**

## Further Information:

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