

2.5Gb/s SFP 1310nm 40km Optical Transceiver

Features

- Up to 2.5Gbps data-rate
- 1310nm DFB laser transmitter and PIN photo-detector
- Up to 40km on 9/125 μ m SMF
- Hot-pluggable
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS-10 compliant and lead-free
- Operating temperature range:0~+70°C
- Support Digital Diagnostic Monitoring interface
- Single +3.3V power supply

Applications

- Gigabit Ethernet
 - 1xFiber/2xFiber channel
- Application
- Switch to Switch Interface
 - Router/Server Interface
 - Other Optical Links

Compliance

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

Description

The SFP-OC48-ER-31 series multi-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

Table1-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	RH	
Damage Threshold	THd	5			dBm	

Recommended Operating Conditions

Table2-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			2.5		Gbps	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			40	km	9/125 μm

Electrical Characteristic

Table3-Electrical Characteristic

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply current	Icc			280	mA	
Power Consumption	p			0.95	W	
Optical Transmitter Characteristics						

Single-ended Input Voltage Tolerance	VCC	-0.3		4.0	V	
Differential Input Voltage Swing	V _{in,pp}	200		2400	mV _{pp}	
Differential Input Impedance	Z _{in}	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	V _{dis}	V _{cc} -1.3		V _{cc}	V	
Transmit Enable Voltage	V _{en}	V _{ee} -0.3		0.8	V	
Optical Receiver Characteristics						
Differential Output Voltage Swing	V _{out,pp}	500		900	mV _{pp}	
Differential Output Impedance	Z _{out}	90	100	110	Ohm	
Data output rise/fall time	T _r /T _f		100		ps	20% to 80%
LOS Assert Voltage	V _{losH}	V _{cc} -1.3		V _{cc}	V	
LOS De-assert Voltage	V _{losL}	V _{ee} -0.3		0.8	V	

Optical Characteristics

Table4-Optical Characteristics

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Optical Transmitter Characteristics						
Center Wavelength	λ C	1290	1310	1330	nm	
Spectrum Bandwidth(RMS)	σ			1	nm	
Average Optical Power	PAVG	-2		3	dBm	1
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	8.2			dB	
Transmitter OFF Output Power	Poff			-45	dBm	
Transmitter Eye Mask Definition	Compliant with G.957(class 1 laser safety)					
Optical Receiver Characteristics						
Center Wavelength	λ C	1270		1610	nm	
Sensitivity (Average Power)	Sen.			-19	dBm	2
Input Saturation Power(overload)	Psat	0			dBm	
LOS Assert	LOSA	-36			dBm	3
LOS De-assert	LOSD			-20	dBm	3
LOS Hysteresis	LOSH	0.5	2	6	dB	

Notes:

[1]Measure at 2²³-1 NRZ PRBS pattern.

[2] Measured with Light source 1310nm, ER=8.2dB; BER = $\leq 10^{-12}$ @ PRBS=2²³-1 NRZ

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

Pin Description

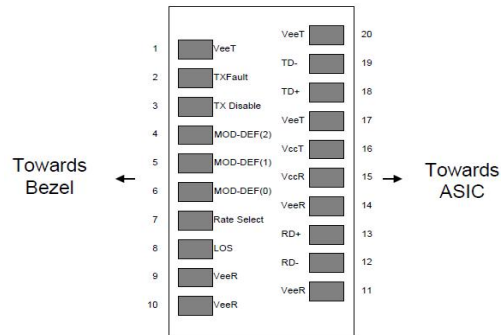


Figure 1 Pin view

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.

Digital Diagnostic Functions

Table6-Digital Diagnostic Functions

Parameter	Symbols	Min.	Max.	Unit	Notes
Temperature monitor	DMI _ Temp	-3	3	degC	Over operating temp
Supply voltage monitor	DMI _ VCC	-0.15	0.15	V	Full operating range
RX power monitor	DMI _ RX	-3	3	dB	
Bias current monitor	DMI _ bias	-10%	10%	mA	
TX power monitor	DMI _ TX	-3	3	dB	

Mechanical Dimensions

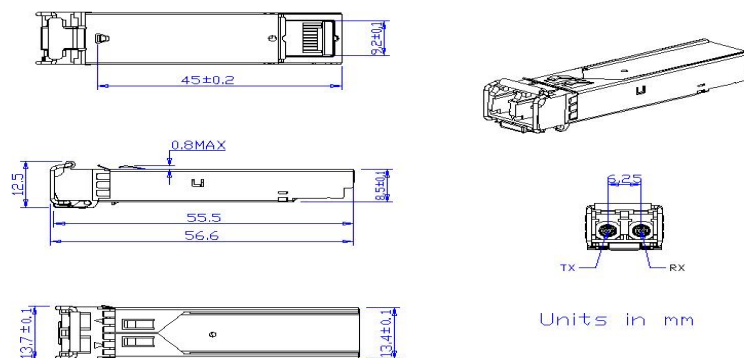


Figure 2 Mechanical Outline

Precautions

a . This device 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.

b. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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