

1.25Gb/s 1310nm Single-mode SFP Transceiver

PRODUCT FEATURES

- Up to 1.25Gb/s data links
- The FP laser transmitter
- Up to 10km on 9/125µm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- Compliant with SFF-8472
- Operating case temperature

Commercial: 0°C to +70°C

Extended: -10°C to +80°C

Industrial: -40°C to +85°C

APPLICATIONS

- Switch to Switch Interface
- Gigabit Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

PRODUCT DESCRIPTION

Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of four sections: the LD driver, the limiting amplifier, the 1310nm FP laser and the PIN photo-detector. The module data link up to 10KM 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.

I. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault. Not supported.	
3	T _{DIS}	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. Logic 0 indicates normal operation.	5
9	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
10	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	
16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	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	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
3. Should be pulled up with 4.7k - 10kohms 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:

Low (0 – 0.8V): Reduced Bandwidth

(>0.8, < 2.0V): Undefined

High (2.0 – 3.465V): Full Bandwidth

Open: Reduced Bandwidth

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

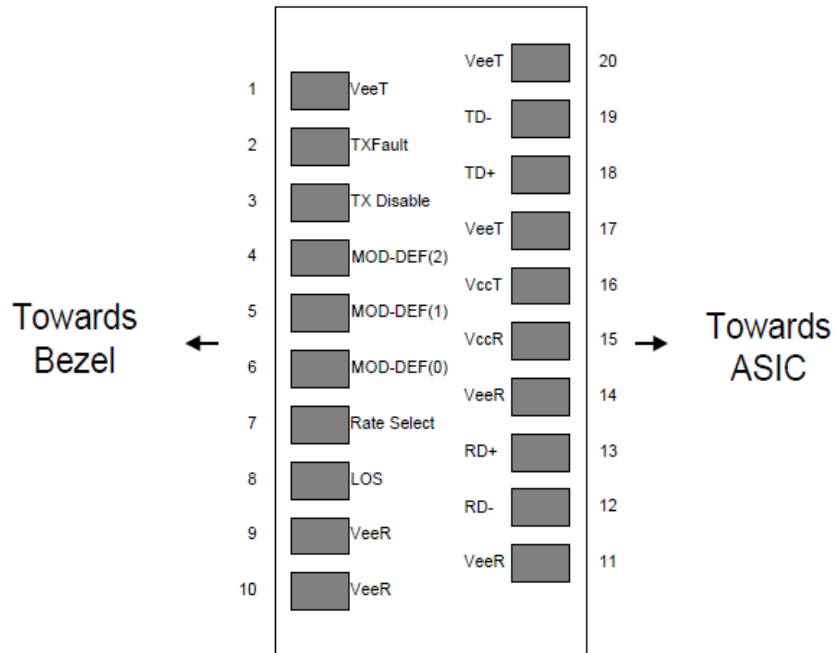


Figure2. Pin out of Connector Block on Host Board

II. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T _s	-40		85	°C	
Storage Ambient Humidity	HA	5		95	%	
Power Supply Voltage	V _{CC}	-0.5		4	V	
Signal Input Voltage		-0.3		V _{CC} +0.3	V	
Receiver Damage Threshold		+3			dBm	
Lead Soldering Temperature/Time	T _{SOLD}			260/10	°C/sec	Note (1)
Lead Soldering Temperature/Time	T _{SOLD}			360/10	°C/sec	Note (2)

Note (1): Suitable for wave soldering.

Note (2): Only for soldering by iron.

III. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note	
Ambient Operating Temperature	TA	0		70	°C		
		-10		80			
		-40		85			
Ambient Humidity	HA	5		70	%	Non-condensing	
Power Supply Voltage	VCC	3.13	3.3	3.47	V		
Power Supply Current	ICC			280	mA		
Power Supply Noise Rejection				100	mVp-p	100Hz to 1MHz	
Data Rate			1250/1250		Mbps	TX Rate/RX Rate	
Transmission Distance				10	KM		
Coupled Fiber	Single mode fiber						9/125um G.652

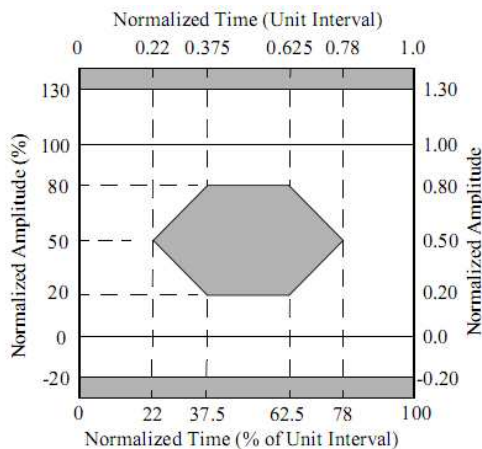
IV. Specification of Transmitter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P _{OUT}	-9		-3	dBm	
Extinction Ratio	ER	9			dB	
Center Wavelength	λ_c	1270	1310	1360	nm	FP Laser
Spectrum Bandwidth(RMS)	σ			3.5	nm	
Transmitter OFF Output Power	P _{Off}			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Optical Rise/Fall Time	t _r /t _f			0.26	ns	Note (1)
Total Jitter	t _j			128	ps	Note (2)
Output Eye Mask	Compliant with IEEE802.3 z (class 1 laser safety)					Note (3)

Note (1): These are unfiltered 20-80% values.

Note (2): Measure at 2⁷-1 NRZ PRBS pattern.

Note (3): Transmitter eye mask definition.



V. Specification of Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	1270	1310	1360	nm	PIN-TIA
Receiver Sensitivity	P_{IN}			-18	dBm	Note (1)
Input Saturation Power (Overload)	P_{SAT}	-3			dBm	
Signal Detect (Assert Power)	P_A			-19	dBm	
Signal Detect (De-Assert Power)	P_D	-38			dBm	Note (2)
Signal Detect Hysteresis	P_A-P_D	0.5	2	6	dB	
Data Output Rise/Fall time	t_r/t_f			0.36	ns	Note (3)

Note (1): Measured with Light source 1310nm, ER=9dB; BER = $<10^{-12}$ @PRBS=2⁷-1 NRZ.

Note (2): When SD De-Assert, the RX-LOS output is High-level (fixed).

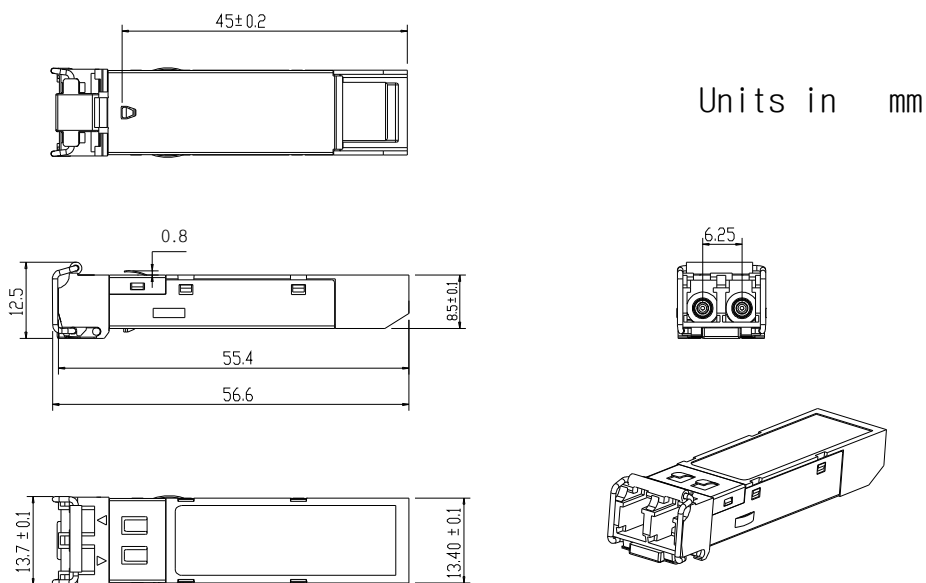
Note (3): These are 20%~80% values.

VI. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Total Supply Current	I_{CC}			A	mA	Note (1)
Transmitter Disable Input-High	V_{DISH}	2		$V_{CC}+0.3$	V	
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Transmitter Fault Input-High	V_{DISL}	2		$V_{CC}+0.3$	V	
Transmitter Fault Input-Low	V_{TXFH}	0		0.8	V	
Receiver						
Total Supply Current	I_{CC}			B	mA	Note (1)
LOSS Output Voltage-High	V_{LOSH}	2		$V_{CC}+0.3$	V	LVTTTL
LOSS Output Voltage-Low	V_{LOSL}	0		0.8	V	

Note (1): A (TX) + B (RX) = 280mA (Not include termination circuit)

VIII. Mechanical Specifications (Unit: mm)



IX. Regulatory Compliance

Feature	Reference	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7 EIA-JESD22-A114	Class 1
Electrostatic Discharge (ESD) to the Simplex Receptacle	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1 IEC/EN 60825-2	Class 1 laser product
Component Recognition	IEC/EN 60950 UL 60950	Compatible with standards
ROHS	2002/95/EC	Compatible with standards

Appendix A. Document Revision

Version No.	Date	Description
1.0	2011-4-26	Preliminary datasheet