
1 Gigabit Long-Wavelength SFP Transceiver

SFP-SX-MM

PRODUCT FEATURES

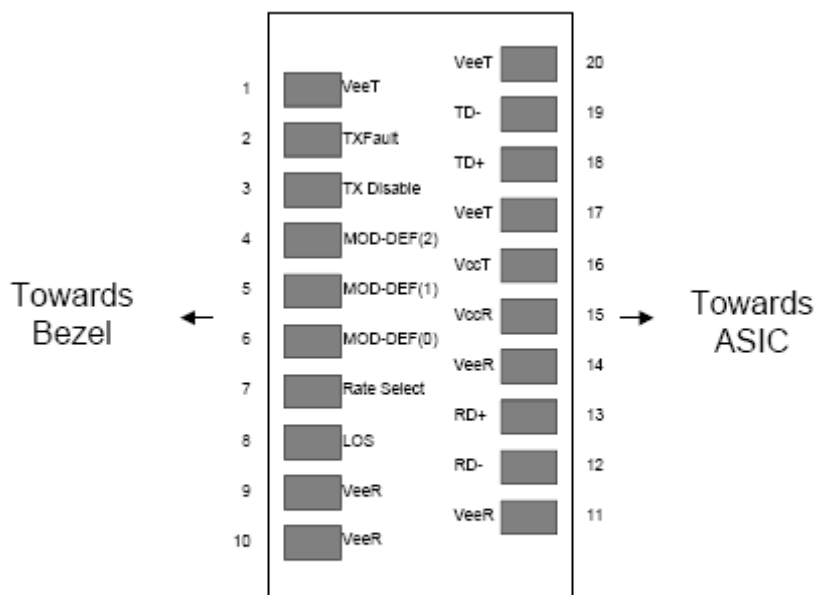
- ◇ • **Up to 1.25Gb/s bi-directional data links**
- ◇ • **Hot-pluggable SFP footprint**
- ◇ • **Built-in digital diagnostic functions**
- ◇ • **850nm VCSEL laser transmitter**
- ◇ • **Duplex LC connector**
- ◇ • **Very low jitter**
- ◇ • **Up to 500m on 50/62.5µm MMF**
- ◇ • **Metal enclosure, for lower EMI**
- ◇ • **Single 3.3V power supply**
- ◇ • **Low power dissipation <700mW typical**

APPLICATIONS

- ◇ • **Gigabit Ethernet**
- ◇ • **Switch to Switch interface**
- ◇ • **Switched backplane applications**
- ◇ • **Router/Server interface**
- ◇ • **Other optical transmission systems**

SFP-SX-MM Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). They simultaneously comply with Gigabit Ethernet as specified in IEEE Std 802.31 and 1x and 2x Fiber Channel as defined in FC-P1 13.03.

Pin Assignment:



Pinout of Connector Block on Host Board

I. Pin Descriptions

Pin	Signal Name	I/O Typ.	Functional Description
1	VeeT		Transmitter Ground
2	TX_FAULT		Transmitter Fault Indication, Logic high, open collector Compatible , 4.7K to 10K Ohm pull up to V _{DD} T on host
3	TX_DISABLE		Transmitter Disable – Module disable on high or open (No Used)
4	MOD_DEF(2)	I/O	Module Definition 2 Two wire serial ID interface SDA, 4.7K to 10K Ohm pull up to V _{DD} T on host
5	MOD_DEF(1)	Input	Module Definition 1 Two wire serial ID interface SCL, 4.7K to 10K Ohm pull up to V _{DD} T on host
6	MOD_DEF(0)	Output	Module Definition 0 TTL Low
7	Rate Select	Input	Select between full or reduced receiver bandwidth The undefined
8	LOS		Receiver Loss of Signal, Logic high, Open collector compatible 4.7K to 10K Ohm pull up to V _{DD} T on host.
9	VeeR		Receiver Ground
10	VeeR		Receiver Ground
11	VeeR		Receiver Ground
12	RD-	Output	Inverse Received Data Out, Differential PECL, at AC couple
13	RD+	Output	Received Data Out, Differential PECL, at AC couple
14	VeeR		Receiver Ground
15	VccR	Input	Receiver Power
16	VccT	Input	Transmitter Power
17	VeeT		Receiver Ground
18	TD+	Input	Transmitter Data In, Differential PECL, AC couple
19	TD-	Input	Inverse Transmitter Data In, Differential PECL, AC couple
20	VeeT		Transmitter Ground

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 - 10 kohms 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. KY-SFP-SX-MM transceivers operate between OC-3 and OC-48, 1x and 2x Fiber Channel, and Gigabit Ethernet data rates and respective protocols without active control.
KY-SFP-SX-MM transceivers operate at 1x and 2x Fiber Channel, and Gigabit Ethernet data rates and respective protocols without active control.
5. LOS is open collector output. Should be pulled up with 4.7k – 10 k ohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	V _{cc}	-0.5		4.5	V	
Storage Temperature	TS	-40		100	°C	
Case Operating Temperature	TOP	-40		85	°C	
Relative Humidity	RH	0		85	%	1

III. Electrical Characteristics (TOP = -40 to 85°C, VCC = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	V _{cc}	3.00		3.60	V	
Supply Current	I _{cc}		200	300	mA	
Transmitter						
Input differential impedance	R _{in}		100		Ω	2
Single ended data input swing	V _{in,pp}	250		1200	mV	
Transmit Disable Voltage	VD	V _{cc} – 1.3		V _{cc}	V	
Transmit Enable Voltage	VEN	V _{ee}		V _{ee} + 0.8	V	3
Transmit Disable Assert Time				10	us	
Receiver						
Single ended data output swing	V _{out,pp}	300	400	800	mV	4
Data output rise time	t _r		100	175	ps	5
Data output fall time	t _f		100	175	ps	5
LOS Fault	V _{LOS} fault	V _{cc} – 0.5		V _{cc} HOST	V	6
LOS Normal	V _{LOS} norm	V _{ee}		V _{ee} +0.5	V	6
Power Supply Rejection	PSR	100			mV _{pp}	7
Deterministic Jitter Contribution	RX Δ DJ			51.7	ps	8
Total Jitter Contribution	RX Δ TJ			122.4	ps	

Notes:

1. Non condensing.
2. AC coupled.
3. Or open circuit.
4. Into 100 ohm differential termination.
5. 20 – 80 %
6. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
7. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.
8. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and ΔDJ.

IV. Optical Characteristics (TOP = 0 to 70°C, VCC = 3.00 to 3.60 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	POUT	-9.5		-3	dBm	1
Optical Wavelength	λ	760		860	nm	2
Spectral Width	σ			3	nm	2
Optical Modulation Amplitude	OMA	174			μ W	2,3
Optical Rise/Fall Time	tr/ tf		100	160	ps	4
RIN				-120	dB/Hz	
Deterministic Jitter Contribution	TX Δ DJ		20	56.5	ps	5
Total Jitter Contribution	TX Δ TJ		70	119	ps	
Optical Extinction Ratio	ER	9			dB	
Receiver						
Average Rx Sensitivity @ 2.125 Gb/s (2X Fiber Channel)	RSENS1			-21	dBm	6, 7
Average Rx Sensitivity @ 1.25 Gb/s (Gigabit Ethernet)	RSENS2			-22	dBm	6, 7
Average Rx Sensitivity @ 1.06 Gb/s (1X Fiber Channel)	RSENS1			-22	dBm	6, 7
Stressed RX sens. =1.25 Gb/s			-18	-14.5	dBm	
Average Received Power	RxMAX			0	dBm	
Receiver Elec. 3 dB cutoff freq.				1500	MHz	
Optical Center Wavelength	λ_C	760		860	nm	
Return Loss		12			dB	
LOS De-Assert	LOSD		-23	-19	dBm	
LOS Assert	LOSA	-30	-25		dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. Also specified to meet curves in FC-PI 13.0 Figures 18 and 19, which allow trade-off between wavelength, spectral width and OMA.
3. Equivalent extinction ratio specification for Fiber Channel. Allows smaller ER at higher average power.
4. Unfiltered, 20-80%. Complies with IEEE 802.3 (Gig. E), FC 1x and 2x eye masks when filtered.
5. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and Δ DJ.
6. Measured with conformance signals defined in FC-PI 13.0 specifications.
7. Measured with PRBS 27-1 at 10-12 BER

V. Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	Top	0		70	$^{\circ}$ C	

Recommend Application Circuit:

