

**SFP MODULE :****SFP 1.25G SFP SM TX: 1310nm, RX:1550nm FP 20KM LC (double port LC) with DDM****Compatible: CISCO, ALCATEL, HP, HUAWEI, etc...****TSS-G35-20 LC/HC/AL 1.25G SFP SM WDM Tx1310/Rx1550 FP 20KM LC with DDM****Product Features**

- Up to 1.25Gb/s dual data links
- Hot-pluggable SFP footprint
- **1310nm** FP laser transmitter
- Duplex LC connector
- Up to 20km on 9/125µm SMF
- Metal enclosure for lower EMI
- Single +3.3V power supply
- Low power dissipation <700mW
- Commercial operating temperature range: 0°C to +70°C

**Applications**

- 1.25Gb/s 1000Base-LX Ethernet
- 1.06 Gb/s Fibre Channel

**General**

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 802.3 and 1x Fibre Channel as defined in FC-PI-2 Rev. 10.0 .They are RoHS compliant and lead-free.

## I. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground)	1
2	TX Fault	Transmitter Fault.	
3	TX Disable	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	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	4
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. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. 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:

- Circuit ground is internally isolated from chassis ground.
- Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable <0.8V.
- 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.
- LOS is LVTTTL 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.

## II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		+4.0	V	
Storage Temperature	TS	-40		+100	°C	
Case Operating Temperature	TOP	0		+70	°C	
Relative Humidity	RH	0		85	%	1

## III. Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.00		3.60	V	
Supply Current	Icc		180	300	mA	
<b>Transmitter</b>						
Input differential impedance	Rin		100		Ω	2
Single ended data input swing	Vin, pp	250		1200	mV	
Transmit Disable Voltage	VD	Vcc – 1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	

Transmit Disable Assert Time		10	us			
<b>Receiver</b>						
Single ended data output swing	Vout, pp	300	400	800	mV	3
Data output rise time	tr			300	ps	4
Data output fall time	tf			300	ps	4
LOS Fault	VLOS fault	Vcc – 0.5		VccHOST	V	5
LOS Normal	VLOS norm	Vee		Vee+0.5	V	5
Deterministic Jitter Contribution	RXΔDJ			80	ps	6
Total Jitter Contribution	RXΔTJ			122.4	ps	

**Notes:**

1. Non condensing.
2. AC coupled.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. 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=25°C, Vcc=3.3 Volts)**

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
<b>Transmitter</b>						
Output Opt. Power	PO	-9	-	-3	dBm	1
Optical Wavelength	λ	1275	1310	1350	nm	
Spectral Width	σ	-	-	3	nm	
Optical Rise/Fall Time	tr/tf	-	170	260	ps	2
Deterministic Jitter Contribution	TXΔDJ	-	-	0.07	UI	3
Total Jitter Contribution	TXΔTJ	-	-	0.007	UI	
Optical Extinction Ratio	ER	9	-	-	dB	
<b>Receiver</b>						
Average Rx Sensitivity	RSENS	-	-	-24	dBm	4
Maximum Received Power	RXMAX	0	-	-	dBm	
Optical Center Wavelength	λC	1270	-	1600	nm	
LOS De-Assert	LOSD	-	-	-25	dBm	
LOS Assert	LOSA	-36	-	-	dBm	
LOS Hysteresis		0.5	-	-	dB	

**Notes:**

1. Class 1 Laser Safety.
2. Unfiltered, 20-80%.
3. Measured with DJ-free data input signal .In actual application, output DJ will be the sum of input DJ and ΔDJ.
4. Measured with PRBS 2<sup>7</sup>-1 at 10<sup>-12</sup> BER .

**V. General Specifications**

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Data Rate	BR	-	-	1250	Mb/sec	1

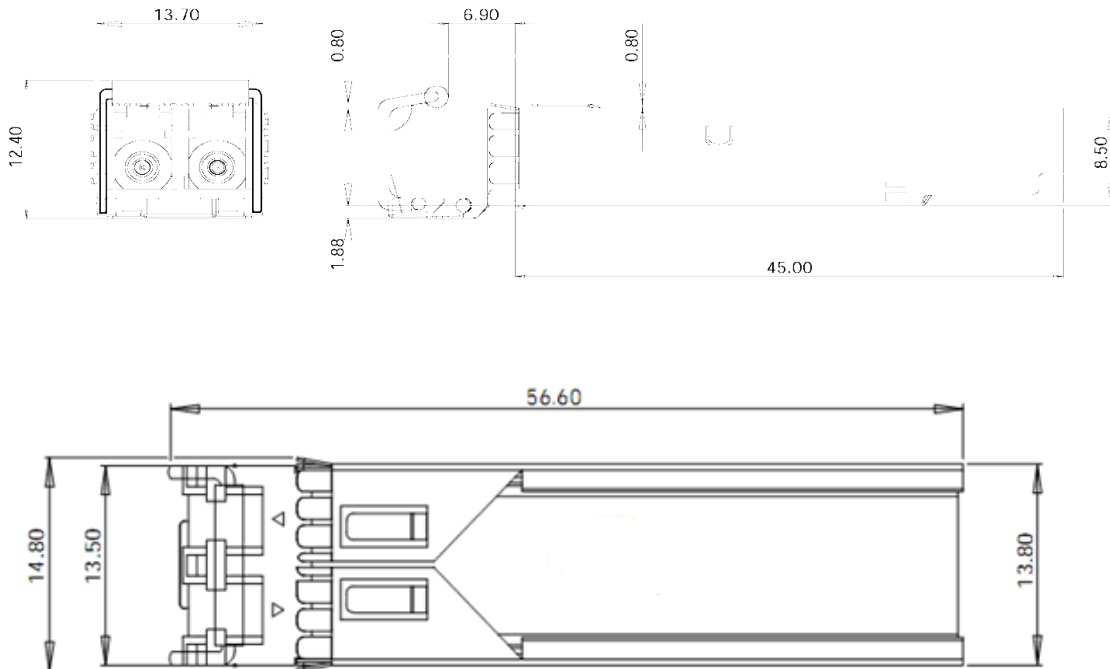
Bit Error Rate	BER	-	-	$10^{-12}$	2
Max. Supported Link Length on 9/125µm SMF @ Gigabit Ethernet	LMAX	-	-	20	km 3,4

**Notes:**

1. Gigabit Ethernet and 1x Fibre Channel compliant.
2. Tested with a PRBS 2<sup>7</sup>-1 data pattern.
3. Dispersion limited per FC-PI-2 Rev. 10.
4. Attenuation of 0.55 dB/km is used for the link length calculations. Please refer to the Optical Specifications in Table IV to calculate a more accurate link budget based on specific conditions in your application.

**VI. Mechanical Specifications**

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



**1.25G 1310 20KM**