

The **SFP-25G-MR-LR-ACC** is programmed to be fully compatible and functional with all intended Arista switching devices. This SFP module is based on the 25G Ethernet IEEE 802.3by standard and is designed to be compliant with the SFP28 Multi-source Agreement (MSA). This module is designed for single mode fiber and operates at a nominal wavelength of 1310nm up to 10KM.

Features:

- Up to 28GBd bi-directional data links
- Hot-pluggable SFP28 footprint
- 1310nm DFB laser transmitter
- Duplex LC connector
- Built-in digital diagnostic function
- Up to 10km over single mode fiber
- Single power supply 3.3V
- Operating temperature range
C-Temp: 0°C to 70°C



Compliance:

- IEEE 802.3by
- MSA SFF-8431, SFF-8472
- RoHS Compliant

Applications:

- 25GBASE-LR Ethernet

Warranty:

Lifetime Warranty

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Storage Temperature	T_{STO}	-40		85	°C	Ambient Temperature
Power Supply Voltage	V_{CC}	-0.5		3.6	V	
Relative Humidity	RH	5		95	%	Non-Condensing

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Power Consumption				1.5	W	
Supply Current	I_{CC}			350	mA	

Link Distances

Parameter	Fiber Type	Distance Range (km)
25GBd	9/125 SMF	10km

Optical Characteristics - Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ	1290	1310	1330	nm	
Output Optical Power	P_{TX}	-8.4		3	dBm	Average
Spectral Width (-20 dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	$SMSR$	30			dB	
Extinction Ratio	ER	3.5			dB	
Optical Return Loss Tolerance	ORL			-12	dB	
Transmitter Dispersion Penalty	TDP			3	dB	
Launch Power of OFF Transmitter	P_{OUT_OFF}			-30	dBm	Average
Transmitter Jitter	According to IEEE 802.3ae requirement					

Optical Characteristics - Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_c	1260		1360	nm	
Optical Input Power	P_{IN}	-13.4		2.0	dBm	Average
Receiver Sensitivity	P_{SENS1}			-10.4	dBm	Worst ER: BER<10 ⁻¹²
Receiver Reflectance	TR_{RX}			-12	dB	
LOS Assert	LOS_A	-30			dBm	
LOS De-Assert	LOS_D			-16	dBm	
LOS Hysteresis		0.5			dB	

Electrical Characteristics – Transmitter

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Input differential impedance	R_{in}		100		Ω	Non Condensing
Single ended data input swing	V_{IN_PP}	180		700	mV	
Transmit Disable Voltage	V_D	2		$V_{CC}+0.3$	V	
Transmit Enable Voltage	V_{EN}	V_{EE}		$V_{EE}+0.8$	V	

Electrical Characteristics – Receiver

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Differential data output swing	V_{OUT_PP}	450		1050	mV	
LOS Low Voltage	V_{L_OUT}			0.4	V	
LOS High Voltage	V_{H_OUT}	2.0			V	

Digital Diagnostic Functions

The SFP support the 2-wire serial communication protocol as defined in the SFF 8472. Digital diagnostic information are accessible over the 2-wire interface at the address 0xA2. Digital Diagnostics are internally calibrated by default. A micro controller unit inside the transceiver gathers the monitoring information and reports the status of transceiver.

Transceiver Temperature- Internally measured, represented as a 16 bit signed twos complement value in increments of 1/256 degrees Celsius, Temperature accuracy is better than ± 3 degrees Celsius over specified operating temperature and voltage.

Transceiver Supply Power- Internally measured, represented as a 16 bit unsigned integer with the voltage defined as the full 16 bit value (0 – 65535) with LSB equal to 100 μ Volt, yielding a total range of 0 to +6.55 Volts.

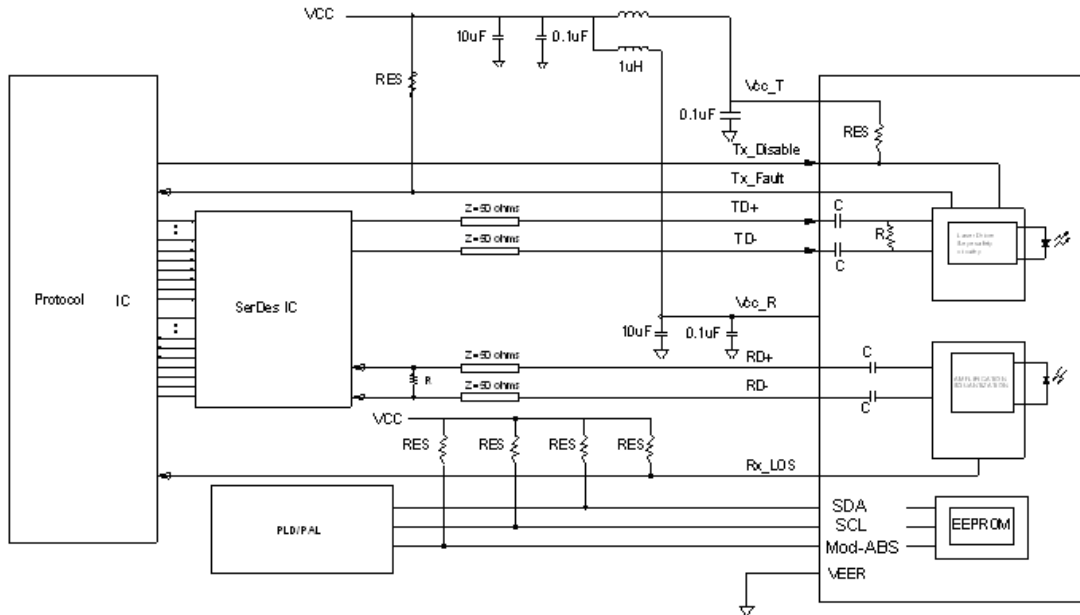
Transceiver TX bias current- Internally measured, represented as a 16 bit unsigned integer with the current defined as the full 16 bit value (0 – 65535) with LSB equal to 2 μ A, yielding a total range of 0 to 131mA. Accuracy is better than $\pm 10\%$ over specified operating temperature and voltage.

Transceiver TX output power- Internally measured, represented as a 16 bit unsigned integer with the power defined as the full 16 bit value (0 – 65535) with LSB equal to 0.1 μ W. Data is assumed to be based on measurement of laser monitor photodiode current. Accuracy is better than ± 3 dB over specified temperature and voltage. Data is not valid when the transmitter is disabled.

Transceiver RX received optical power- Internally measured, represented as a 16 bit unsigned integer with the power defined as the full 16 bit 35 value (0 – 65535) with LSB equal to 0.1 μ W. Accuracy is better than ± 3 dB over specified temperature and voltage.

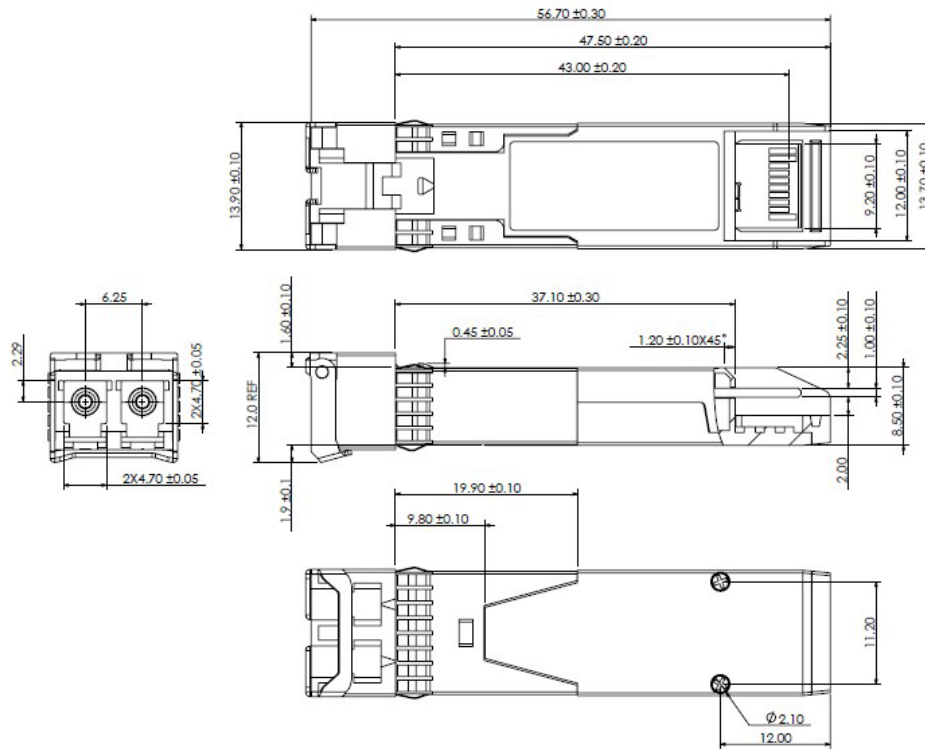
<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Max</i>	<i>Unit</i>
Temperature	DMI_Temp	-3	+3	$^{\circ}$ C
Voltage	DMI_VCC	-3%	+3%	V
Tx Power	DMI_TX	-3	+3	dB
Rx Power	DMI_RX	-3	+3	dB
Bias Current	DMI_Ibias	-10%	+10%	mA

Recommended Circuit



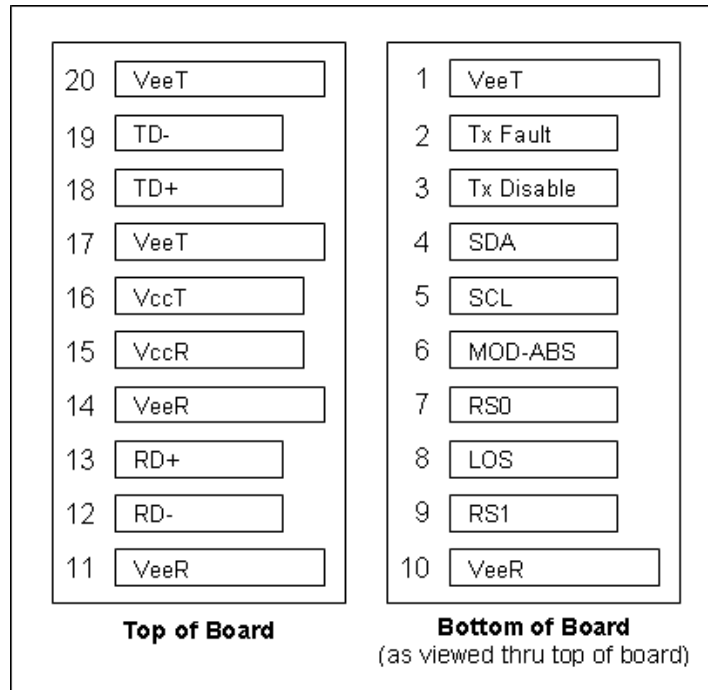
NOTE: 4.7K ohms<RES<10K ohms

Dimensions



ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED UNIT: mm

Electrical Pad Layout



Pin Assignment

PIN #	Symbol	Description	Remarks
1	VEET	Transmitter ground (common with receiver ground)	
2	TFAULT	Transmitter Fault	Note 1
3	TDIS	Transmitter Disable. Laser output disable on high or open	Note 2, Module disables on high or open
4	SDA	Data line for serial ID	
5	SCL	Clock line for serial ID	
6	MOD_ABS	Module Absent, connected to VeeT or VeeR	Note 3
7	RS0	No Connection required	Rate Select 0. Note 9
8	LOS	Loss of Signal indication	Note 4
9	RS1	SFP TX Rate Select, Optional	Rate Select 1, Note 9
10	VeeR	Receiver Ground	Note 5
11	VeeR	Receiver Ground	Note 5
12	RD-	Receiver Inverted DATA out. AC coupled	Note 6
13	RD+	Receiver Non-inverted DATA out. AC coupled	Note 6
14	VEER	Receiver ground	Note 5
15	VCCR	Receiver power supply	Not3 7, 3.3V 5%
16	VCCT	Transmitter power supply	Not3 7, 3.3V 5%
17	VEET	Transmitter ground	Note 5
18	TD+	Transmitter Non-inverted DATA out. AC coupled	Note 8
19	TD-	Transmitter Inverted DATA out. AC coupled	Note 8
20	VEET	Transmitter ground	Note 5

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10K Ω resistor on the host board. Pull up voltage between 2.0V and VccT +0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7–10 K Ω resistor. Its states are:

Low (-0.3–0.8V): Transmitter on (>0.8, < 2.0V): Undefined

High (2.0–VccT+0.3V): Transmitter Disabled Open: Transmitter Disabled

3. Mod-ABS shall be pulled up with a 4.7K–10K Ω resistor on the host board. The pull -up voltage shall VccT or VccR.

4. LOS (Loss of Signal) is an open collector/ drain output, which should be pulled up with a 4.7K–10K Ω resistor. Pull up voltage between 2.0V and VccR+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

5. VeeR and VeeT may be internally connected within the SFP module.

6. RD-/+ : These are the differential receiver outputs. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V 5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage.

When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.

8. TD-/+ : These are the differential transmitter inputs. They are AC -coupled, differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

9. Internally pulled down per SFF-8431 Rev 4.1.

References

1. IEEE standard 802.3by. IEEE Standard Department
2. Digital Diagnostics Monitoring Interface for Optical Transceivers – SFF-8472.