

SFP-1/10GB-LR-I-OPC

MSA and TAA 1/10GBase-LR SFP+ Dual-Rate Transceiver (SMF, 1310nm, 10km, LC, DOM, -40 to 85C)

Features

- Supports rate selectable 1.25Gbps or 9.83Gbps to 11.3Gbps bit rates
- Complaint with IEEE 802.3.2-2012 10GBASE-LR/LW and 1000BASE-LX
- Compliant with SFF-8431
- Hot-Pluggable SFP+ Footprint
- 1310 DFB Laser Transmitter
- Built in Digital Diagnostic Functions
- Duplex LC Connector
- Up to 10km on SMF
- Power Supply: 3.3V
- Operating Temperature: -40 to 85 Celsius
- RoHS Compliant and Lead-Free



Applications:

- 10GBase-LR Ethernet

Product Description

This MSA compliant SFP+ transceiver provides 1/10GBase-LR throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It can operate at temperatures between -40 and 85C. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	V _{CC}	-0.5		4	V	1
Storage Temperature	T _{stg}	-40		85	°C	
Operating Case Temperature	T _c	-40		85	°C	
Data Rate (RS0 = Low)	DR		1.25		Gbps	2
Data Rate (RS0 = High)	DR	9.83	10.3125	11.3	Gbps	2
Bit Error Rate	BER			10 ⁻¹²		

Notes:

1. For the electrical power interface.
2. IEEE 802.3-2012.

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Module Supply Voltage	V _{CC}	3.14	3.3	3.46	V	
Module Supply Current	I _{CC}		290	380	mA	1
Power Dissipation	P _{DISS}		1.0	1.3	W	
Transmitter						
Input Differential Impedance	R _{IN}		100		Ω	
Differential Data Input Swing	V _{IN,pp}	180		700	mVp-p	
Transmit Disable Voltage	V _D	2		Host_V _{CC}	V	
Transmit Enable Voltage	V _{EN}	V _{EE}		V _{EE} +0.8	V	
Receiver						
Differential Data Output Swing	V _{OUT,pp}	300		850	mVp-p	
Data Output Rise/Fall Time (20-80%)	T _r /T _f	28			ps	
LOS Assert	V _{LOSA}	2		Host_V _{CC}	V	
LOS De-Assert	V _{LOSD}	V _{EE}		V _{EE} +0.5	V	

Notes:

1. For the electrical power interface.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Output Optical Power @1.25Gbps	PTX1	-9.5		-3	dBm	1
Output Optical Power @10.3Gbps	PTX2	-8.2		0.5	dBm	1
Optical Center Wavelength	λ_C	1260		1355	nm	
Optical Modulation Amplitude	OMA	-5.2			dBm	2
Extinction Ratio @1.25Gbps	ER1	9			dB	
Extinction Ratio @10.3Gbps	ER2	3.5			dB	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			3.2	dB	
Launch Power of Off Transmitter	P _{off}			-30	dBm	1
Transmitter Jitter						2
Receiver						
Optical Center Wavelength	λ_C	1260		1600	nm	
Receive Overload	P _{OL}	0.5			dBm	
Receiver Sensitivity @1.25Gbps	R _{X_SEN1}			-19	dBm	3
Receiver Sensitivity @10.3Gbps	R _{X_SEN2}			-14.4	dBm	4
Receiver Reflectance	TR _{RX}			-12	dB	
LOS Assert @1.25Gbps	LOSA	-30			dBm	
LOS Assert @10.3Gbps	LOSA	-30			dBm	
LOS De-Assert @1.25Gbps	LOSD			-17	dBm	
LOS De-Assert @10.3Gbps	LOSD			-17	dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. Average.
2. According to IEEE 802.3ae requirements.
3. Average. Test the resulting value using the minimum ER value within the defined range: BER<10⁻¹² and 2⁷-1 PRBS.
4. Average. Test the resulting value using the minimum ER value within the defined range: BER<10⁻¹² and 2³¹-1 PRBS.

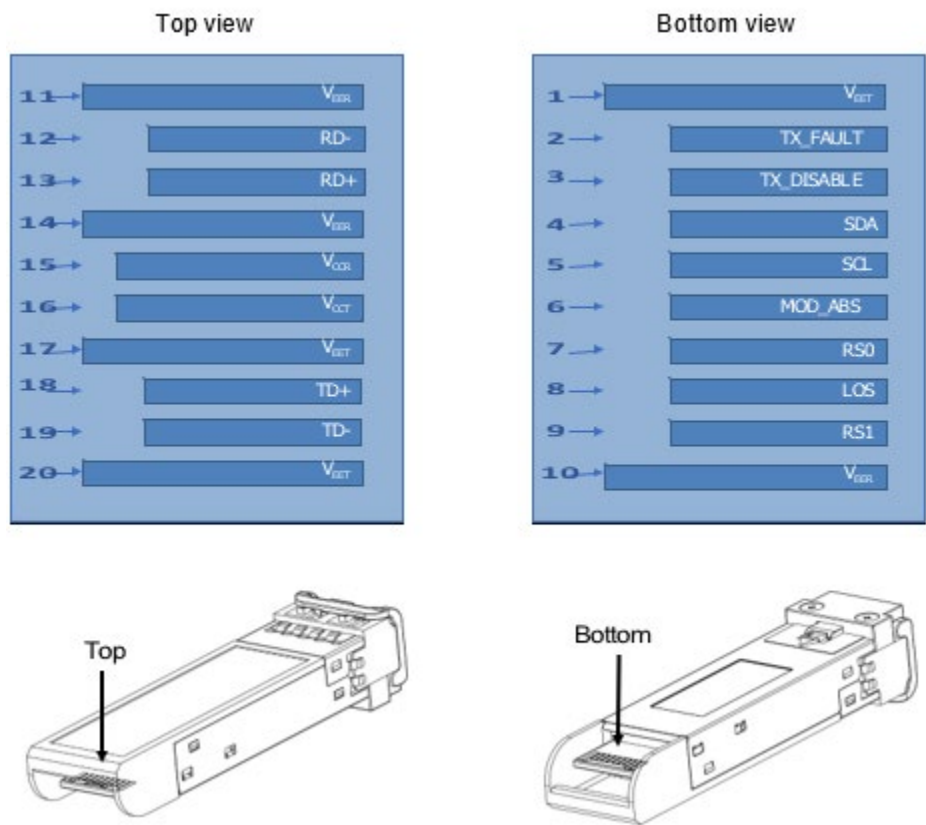
Pin Descriptions

Pin	Symbol	Name/Description	Notes
1	VeeT	Transmitter Ground (Common with Receiver Ground).	1
2	Tx_Fault	Transmitter Fault.	2
3	Tx_Disable	Transmitter Disable. Laser output disables on “high” or “open.”	3
4	SDA	2-Wire Serial Interface Data.	4
5	SCL	2-Wire Serial Interface Clock.	4
6	MOD_ABS	Module Absent. Grounded within the module.	4
7	RS0	Module Rate Selection: “Open” or “Low” Level = 1.25Gbps rate (low bandwidth). “High” Level = 9.95-10.31Gbps rate (high bandwidth).	
8	LOS	Loss of Signal Indication. “Logic 0” indicates normal operation.	5
9	RS1	No Connection Required.	1
10	VeeR	Receiver Ground (Common with Transmitter Ground).	1
11	VeeR	Receiver Ground (Common with Transmitter Ground).	1
12	RD-	Inverse Receiver Data Out. AC Coupled.	
13	RD+	Received 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 Data In. AC Coupled.	
19	TD-	Inverse Transmitter Data In. AC Coupled.	
20	VeeT	Transmitter Ground (Common with Receiver Ground).	1

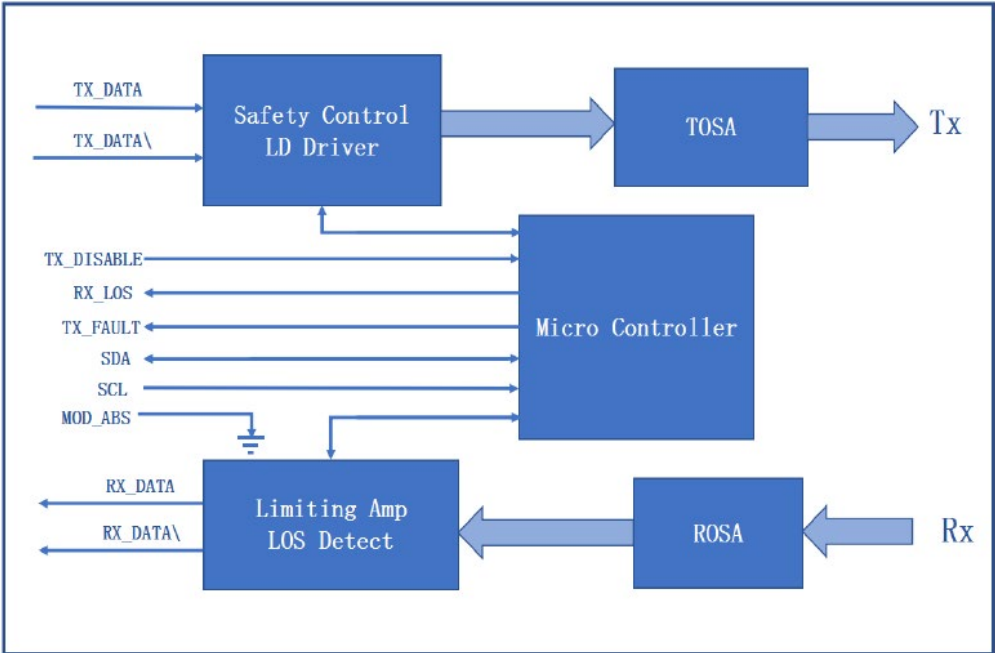
Notes:

1. The circuit ground is isolated from the chassis ground.
2. Tx_Fault is the open collector output and should be pulled up with 4.7k Ω to 10k Ω on the host board to a voltage between 2V and Vcc+0.3V.
3. Disabled: T_{DIS}>2V or open. Enabled: T_{DIS}<0.8V.
4. Should be pulled up with 4.7k Ω to 10k Ω on the host board to a voltage between 2V and Vcc+0.3V.
5. LOS is an open collector output and should be pulled up with 4.7k Ω to 10k Ω on the host board to a voltage between 2V and Vcc+0.3V. “Logic 0” indicates normal operation. “Logic 1” indicates that the receiver signal is lost.

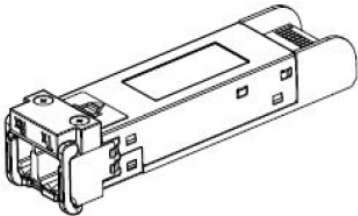
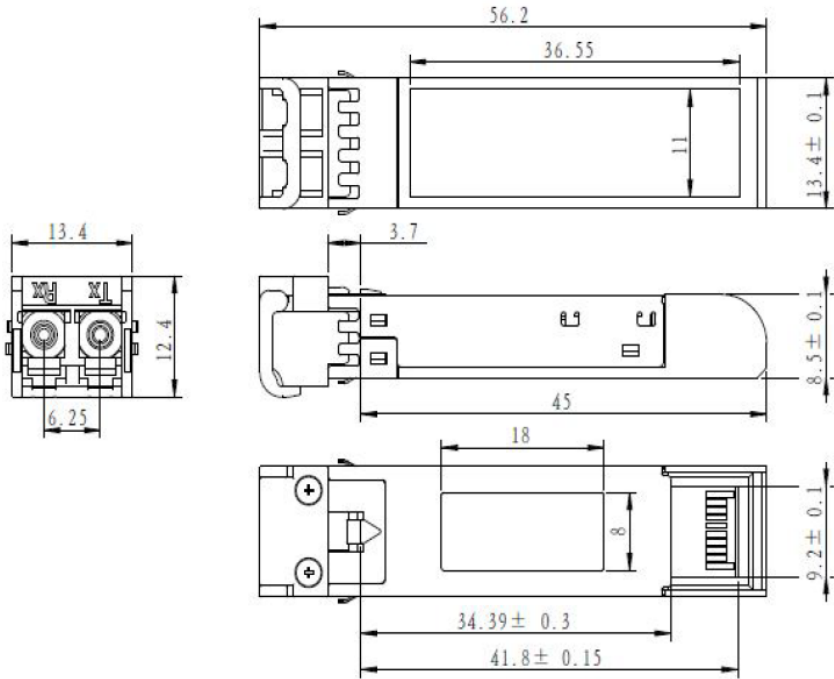
Electrical Pin-Out Details



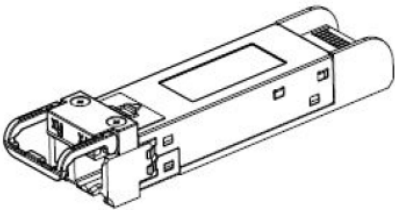
Block Diagram



Mechanical Specifications



LATCHED



UNLATCHED