

10GBase LR SFP+ Optical Transceivers

PRODUCT FEATURES

- Optical interface compliant with IEEE 802.3ae 10GBASE-LR
- Compliant with SFP+ MSA
- Electrical interface compliant to SFF-8431
- 1310nm DFB TOSA and PIN ROSA
- Maximum link length of 10 km SMF
- Low power dissipation (< 1 W)
- Hot Pluggable LC SFP
- All-metal housing for superior EMI performance
- Built in digital diagnostic monitoring
- Industries operation case temperature: -40°C~+85°C
- RoHS 6 Compliant



APPLICATIONS

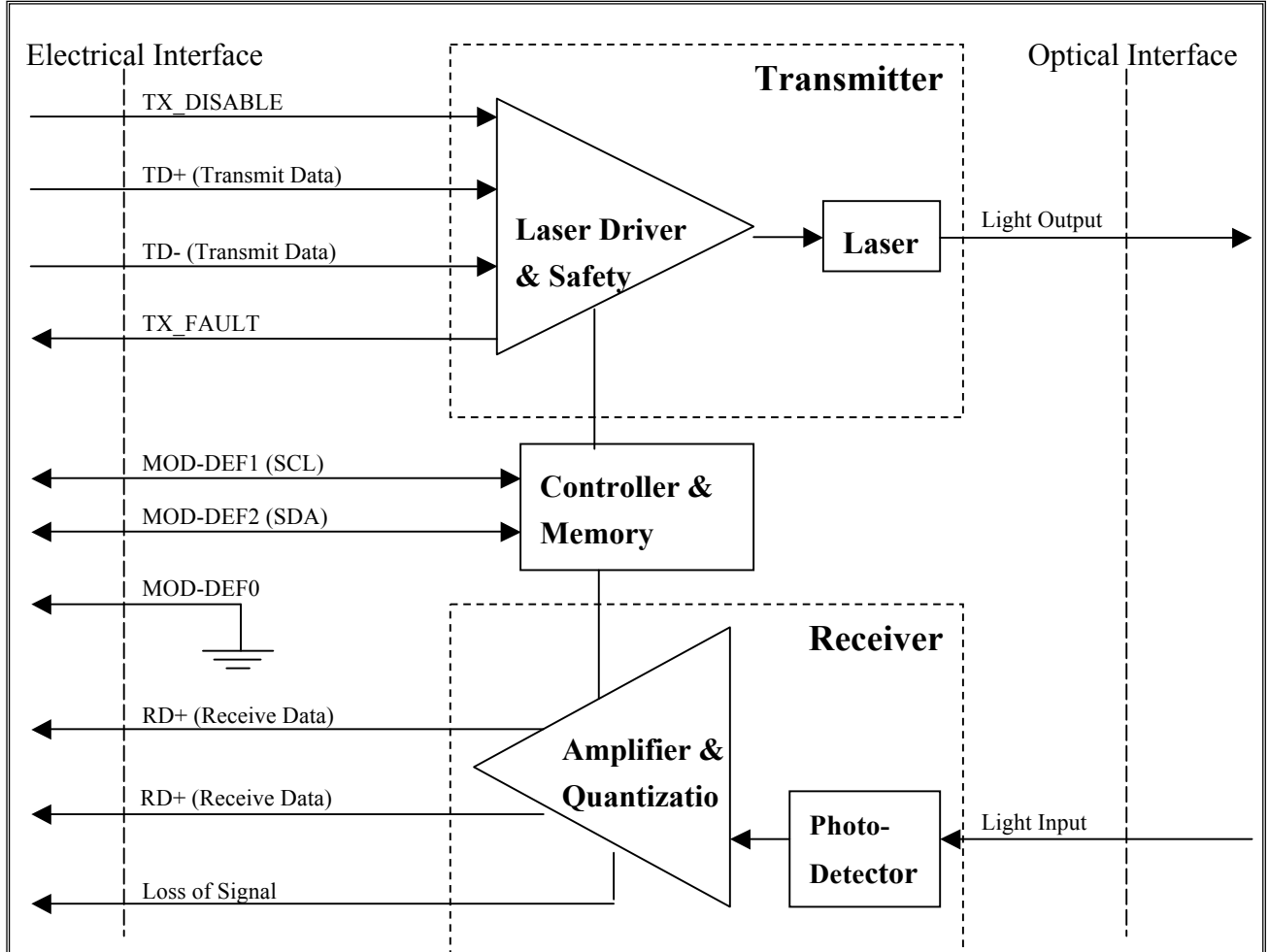
- 10GBASE-LR Ethernet
- 10G Fiber Channel
- High-speed storage area networks
- Computer cluster cross-connect

GENERAL DESCRIPTION

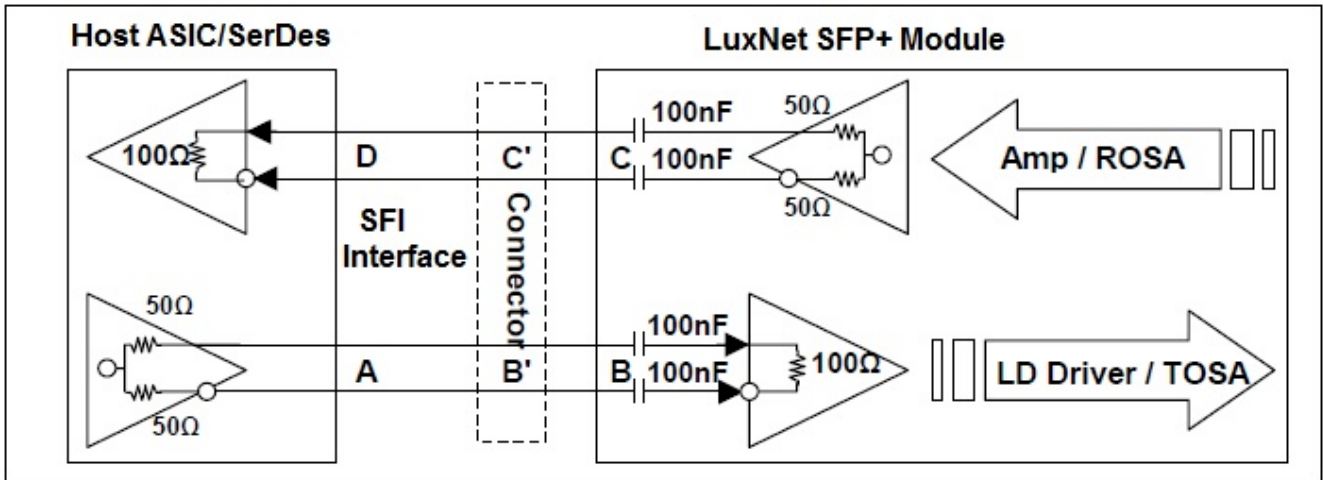
LuxNet's 10GBase LR SFP+ optical transceiver is designed for 10G Ethernet Link, router line card applications, storage, IP network and LAN application operating at 10.3125Gbps with link distance up to 10km SMF. It is fully qualified in accordance with GR-468-CORE reliability standard.

The optical transceiver incorporates a 1310nm wavelength DFB laser transmitter and a PIN/TIA receiver. Digital Diagnostic Monitoring function is also provided to enable full transceiver failure/fault alarm monitoring.

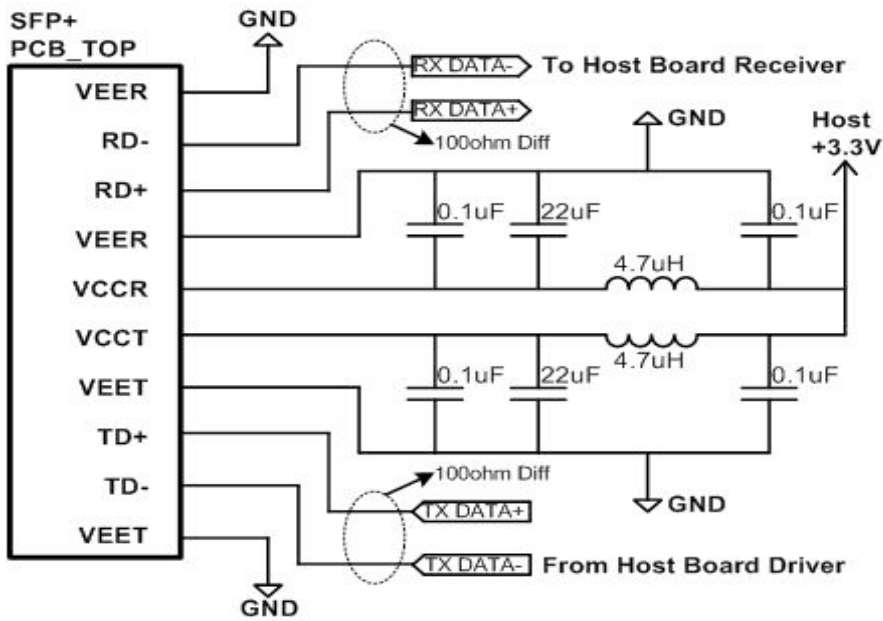
Block Diagram

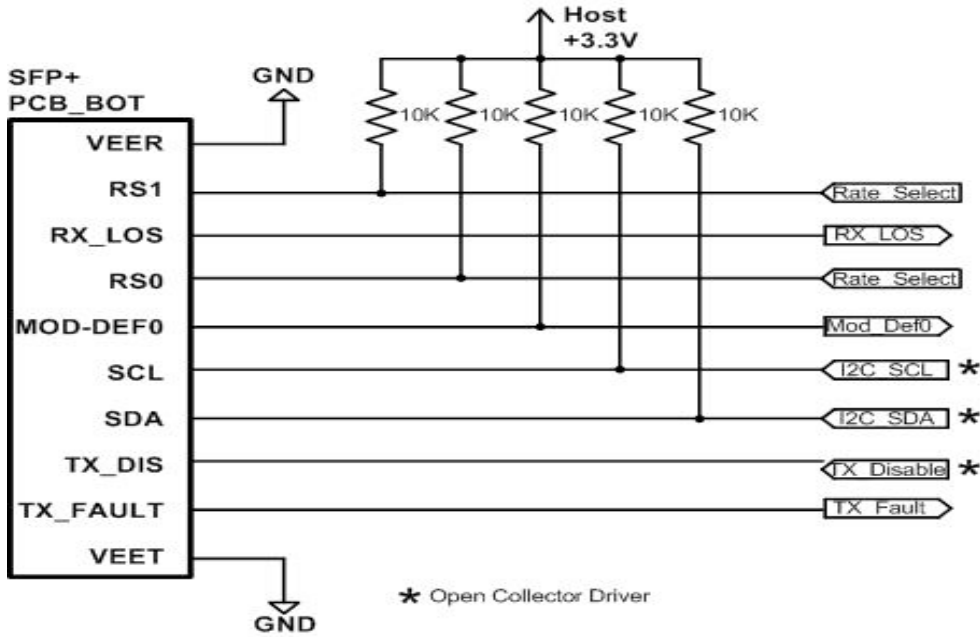


Host Interface Illustration

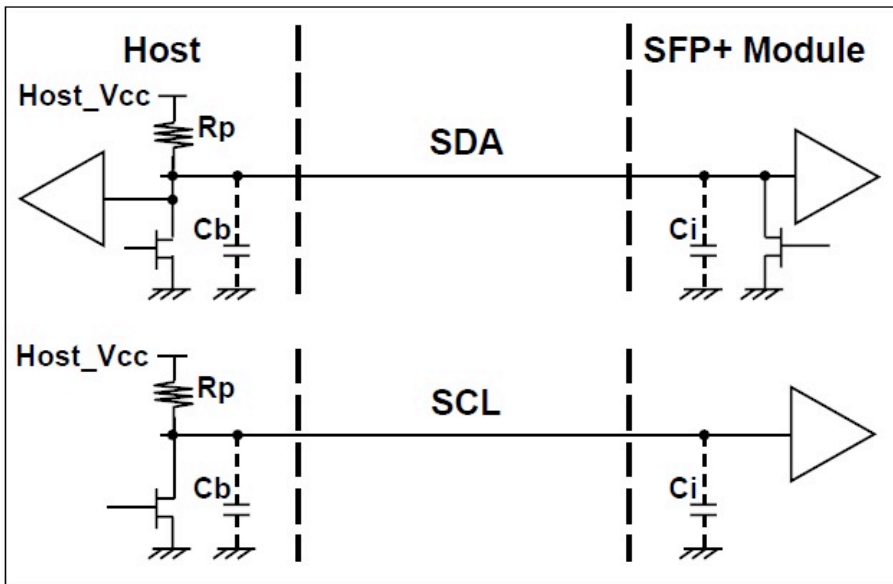


Typical Application Circuit





Two Wire Interface



PERFORMANCE DESCRIPTION

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	T_S	°C	-40	+85
Power Supply Voltage	V_{CC}	V	0	+3.6
Relative Humidity	RH	%	5	95
Optical Receiver Power (Damage)		dBm		4

Recommended Operating Environment and Power Supply Characteristics

Parameter	Symbol	Unit	Min	Typ	Max
Case Operating Temperature Range	T_C	°C	-40	25	+85
Power Supply Voltage	V_{CC}	V	3.135	3.3	3.465
Power Supply Current	I_{CC}	mA			300
Power Consumption		mW		800	1000
Data rate		Gbps		10.3125	

Electrical Characteristics

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Electrical Characteristics						
Transmitter Differential Input Voltage	V_{IN}	mV _{pp}	180		800	
Receiver Differential Output Voltage	V_O	mV _{pp}	300		850	
Loss of Signal (LOS)	V_{OH}	V	2		V_{CC}	
	V_{OL}		Vee		Vee+0.8	
Transmitter Disable (TX-Disable)	V_{IH}	V	2		V_{CC}	
	V_{IL}		Vee		Vee+0.8	
Rx Output Rise and Fall Time	T_r/T_f	ps	30			20% to 80%

Note1. Trade-offs are available between spectral width, center wavelength and minimum OMA, as shown in table 1 & 2.

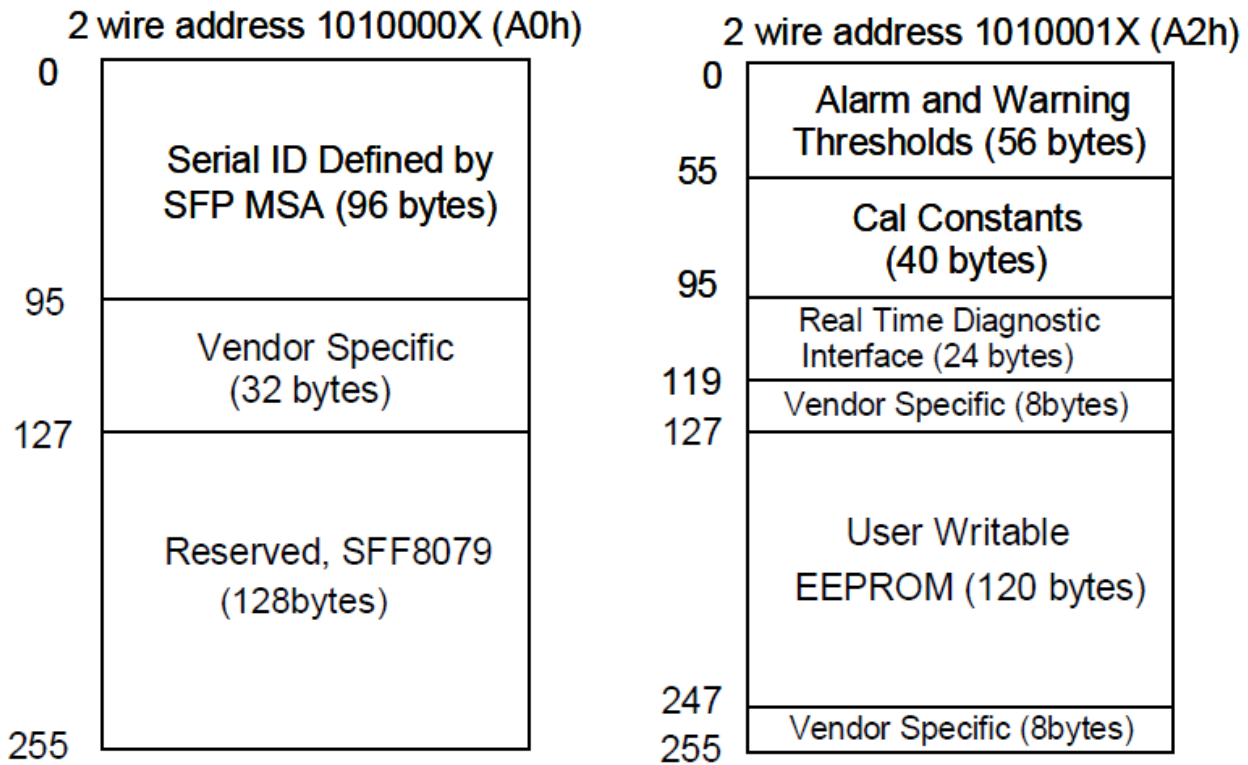
Note2. LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.

Optical Characteristics

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
OPTICAL TRANSMITTER						
Average Launch Power	P _o	dBm	-8.2		0.5	
Center wavelength	λ _c	nm	1260		1355	
Side Mode Suppression Ratio	SMSR	dB	30			
Extinction ratio	EE _R	dB	3.5			
Transmitter and dispersion penalty(max)	TTDP	Db			3.2	
Optical power OMA	P _{OMA}	dBm	-5.2			
Average launch power of OFF transmitted	P _{off}	dBm			-30	
RIN ₁₂ OMA	RIN	dB/Hz			-128	
Optical Return Loss Tolerance		dB	12			
Output eye	Compliant with IEEE802.3ae eye mask					
OPTICAL RECEIVER						
Center wavelength	λ _c	nm	1260		1360	
Average receiver overload (BER=10 ⁻¹²)	P _{max}	dBm	0.5			
Receiver Reflectance	R _{rx}	dB			-12	
Receiver Sensitivity in OMA		dBm			-12.6	
Stressed Sensitivity in OMA		dBm			-10.3	
LOS	Assert	LOS _A	dBm	-30		
	Deassert	LOS _D	dBm			-17
LOS Hysteresis	LOS _H	dB	0.5		5	

Digital Diagnostic Function

< Memory Map >



< EEPROM Serial ID Memory Contents >

Accessing Serial ID Memory uses the 2 wire address 1010000X (A0H). Memory Contents of Serial ID are shown in Table as below.

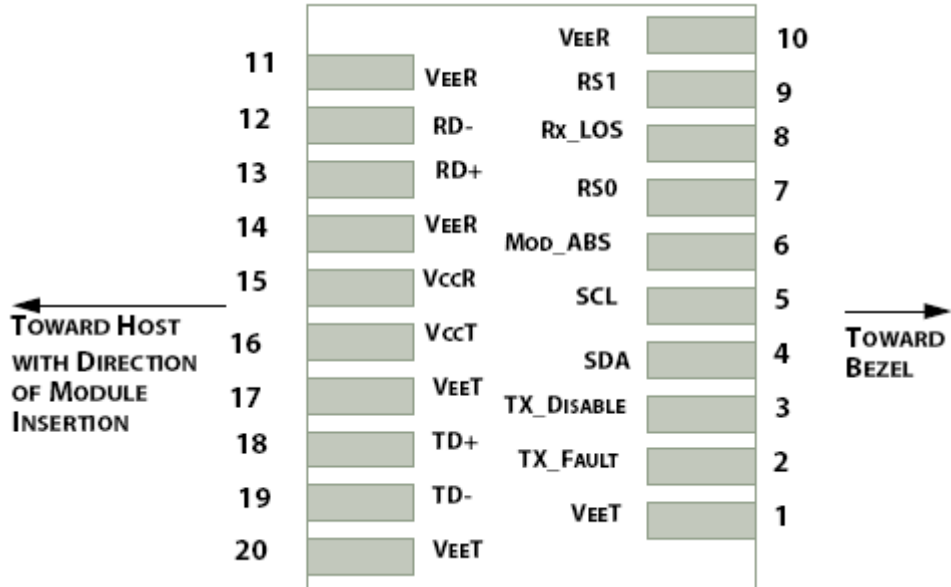
< Serial ID Memory Contents >

Data Address	Size (Bytes)	Name of Field	Contents(Hex)	Description
BASE ID FIELDS				
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	GBIC/SFP function is defined by two-wire interface ID only
2	1	Connector	07	LC Connector

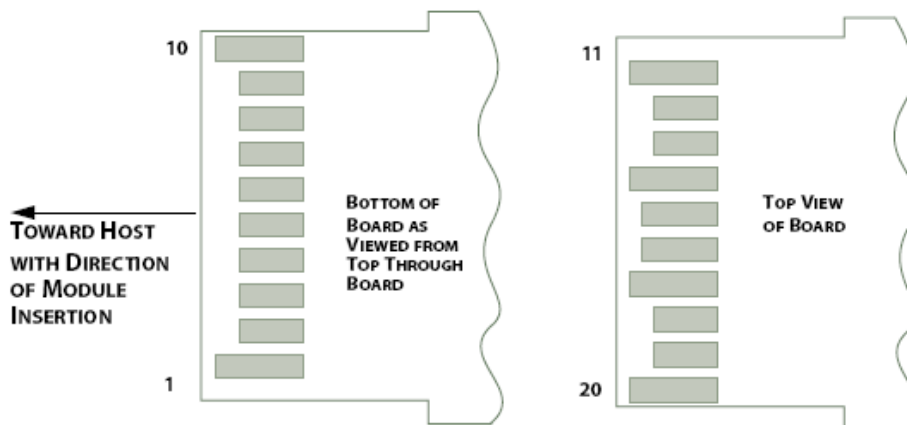
3-10	8	Transceiver	20 00 00 00 00 00 00 00	10GBASE-LR
11	1	Encoding	06	64B/66B
12	1	BR-Normal	67	10.3Gbps
13	1	Rate Identifier	00	unspecified
14	1	Length (SMF)-km	0A	10 km
15	1	Length (E-50um)	64	10 km
16	1	Length(50um)	00	Not support MMF
17	1	Length(62.5um)	00	Not support MMF
18	1	Length (Copper)	00	Not support MMF
19	1	Length(OM3)	00	Not support MMF
20-35	16	Vendor name		
36	1	Channel Spacing	00	
37-39	3	Vendor OUI	00 00 00	
40-55	16	Vendor PN		
56-59	4	Vendor rev	xx xx xx xx	
60-61	2	Wavelength	05 1E	1310nm
62	1	DWDM Wavelength	00	Reserved
63	1	CC Base	xx	Check add. 0 to 62
64-65	2	Options	00 1A	TxDisable, TxFault, LOS implemented
66	1	BR,max	00	
67	1	BR,min	00	
68-83	16	Vendor SN	xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	
84-91	8	Data code	xxxxxxxxxxxxxxxx	
92	1	Diagnostic Monitoring Type	68	Internal cal., Average power
93	1	Enhanced Options	B0	Alarm/Warning flags, Soft TxFault, Soft RxLOS implemented
94	1	SFF-8472 Compliance	06	Rev. 11.3
95	1	CC_EXT	xx	Check add. 64 to 94

96-127	32	Vendor Specific		Vendor Specific EEPROM
128-255	128	Reserved	00	

Module Electrical Pin Definition



Interface to Host PCB



Module Contact Assignment

Pin Definition Table

Pin	Logic	Symbol	Name/Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTTL-I	TX_Disable	Transmitter Disable; Turns of transmitter laser output	3
4	LVTTTL-I/O	SDA	2-wire Serial Interface Data Line (Same as MOD-DEF2 in the INF-8074i)	
5	LVTTTL-I/O	SCL	2-wire Serial Interface Clock (Same as MOD-DEF1 in the INF-8074i)	
6		Mod_ABS	Module Absent, connected to VeeT or VeeR in the module	2
7	LVTTTL-I	RS0	Rate Select 0, optionally controls SFP+ module receiver. When high input signaling rate > 4.25 GBd and when low input signal rate \leq 4.25 GBd.	
8	LVTTTL-O	Rx_LOS	Receiver Loss of Signal Indication	2
9	LVTTTL-I	RS1	Rate Select 1, optionally controls SFP+ module transmitter. When high input signaling rate > 4.25 GBd and when low input signal rate \leq 4.25 GBd.	
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Receiver Non-Inverted Data Output	
19	CML-I	TD-	Receiver Inverted Data Output	
20		VeeT	Module Transmitter Ground	1

Note1: Module ground pins are isolated from the module case and chassis ground within the module.

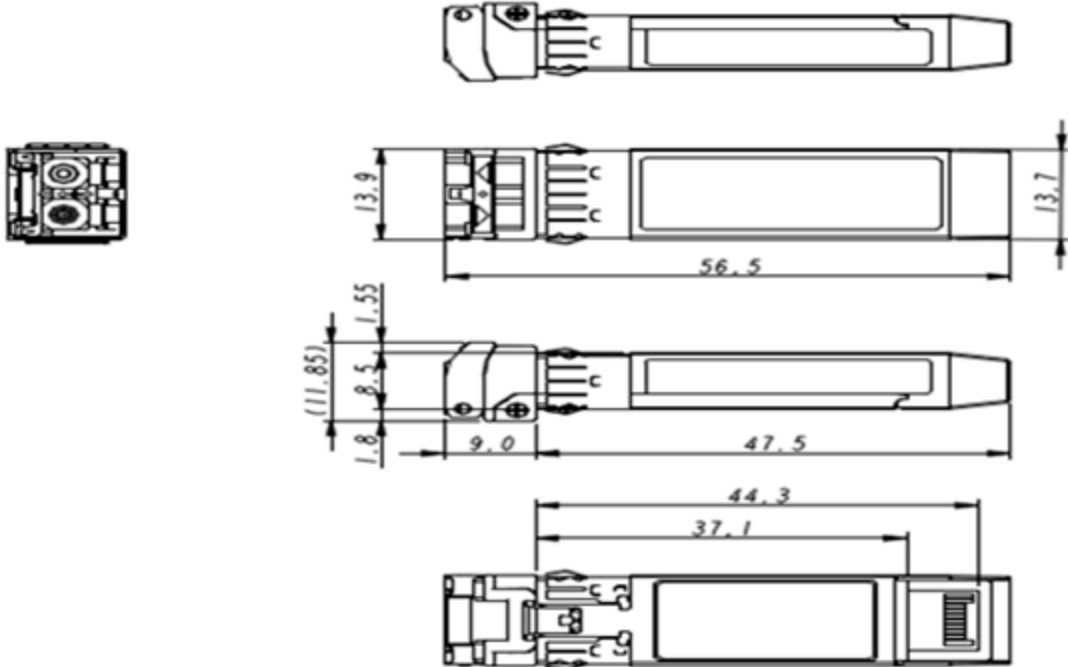
Note2: Shall be pulled up with 4.7k to 10k ohm to a voltage between 3.15V and 3.45V on the host board.

Note3: Shall be pulled up with 4.7k to 10k ohm to VccT in the module.

Mechanical Dimensions

Comply with SFF-8432 rev. 5.0, the improved Pluggable form factor specification.

Bail latch color is Blue



Regulatory Compliance

Feature	Test Method	Performance
Laser Eye Safety	FDA 21 CFR 1040.10 and 1040.11 IEC 60825-1: 1994+ A11: 1996+ A2: 2001 IEC 60825-2: 2004 + A1: 2006 EN 60825-1:1994+A1:2002+A2:2001 EN 60825-2: 2004	Compliant with Class 1 laser product
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.4 Human Body Model	Class 1 (>1.5kV)
Electrostatic Discharge (ESD) Immunity	IEC 61000-4-2: 2001	Class 2 (>4.0kV)
Electromagnetic Interference (EMI)	FCC Part 15 Subpart J Class B CISPR22:1997+A1:2000+A2:2002, Class B EN55022:1998+A1:2000+A2:2003, Class B	Compliant with standards