Chipsmall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Specification

Small Form Factor Pluggable

Duplex LC Receptacle – SFP+

Optical Transceivers

10 Gigabit Ethernet

10GBASE-LRM

Ordering Information

TAS－A1NA1－111

| Model Name	Voltage	Category	Device type	Interface	LOS	Temperature	Distance	Latch Color
TAS-A1NA1-111	3.3V	With DDMI	1310 nm FP	AC / AC Coupling	LVTTL	0℃~ +70℃	220m (MM OM1 Fiber)	Coffee

Features

➢ **10Gb/s serial optical interface compliant to IEEE802.3aq 10GBASE-LRM**

➢ **Electrical interface compliant to SFF-8431 specifications for enhanced 8.5 and 10 Gigabit small form factor pluggable module "SFP+"**

➢ **1310nm FP transmitter, PIN photo-detector, Linear receiver module**

➢ **2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface for optical transceivers**

➢ **Operating case temperature: 0 to 70 °C**

➢ **All-metal housing for superior EMI performance**

➢ **Low power consumption**

➢ **Advanced firmware allow customer system encryption information to be stored in transceiver**

➢ **Cost effective SFP+ solution, enables higher port densities and greater bandwidth**

➢ **RoHS Compliant**

Applications

➢ **High-speed storage area networks**

➢ **Computer cluster cross-connect**

➢ **Custom high-speed data pipes**

➢ **220 legacy OM1 MMF transmission**
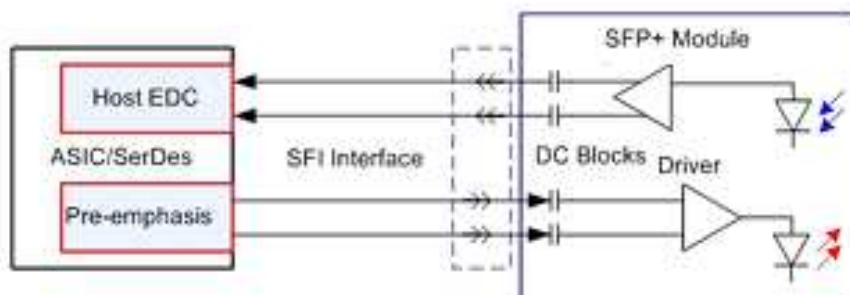
General Description

This 1310 nm FP 10Gigabit SFP+ transceiver is designed to transmit and receive optical data over legacy OM1 multimode fiber up to 220m link.

The SFP+ LRM module electrical interface is compliant to SFI electrical specifications. The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI. SFI typically operates over 200 mm of improved FR4 material or up to about 150mm of standard FR4 with one connector.

The transmitter converts 10Gbit/s serial PECL or CML electrical data into serial optical data compliant with the 10GBASE-LRM standard. An open collector compatible Transmit Disable (Tx_Dis) is provided. A logic "1," or no connection on this pin will disable the laser from transmitting. A logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (Tx_Fault) is provided. TX_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host with a resistor in the range 4.7-10 kΩ. TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor.

The receiver converts 10Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx_LOS signal is intended as a preliminary indication to the system in which the SFP+ is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

Transceiver Block Diagram
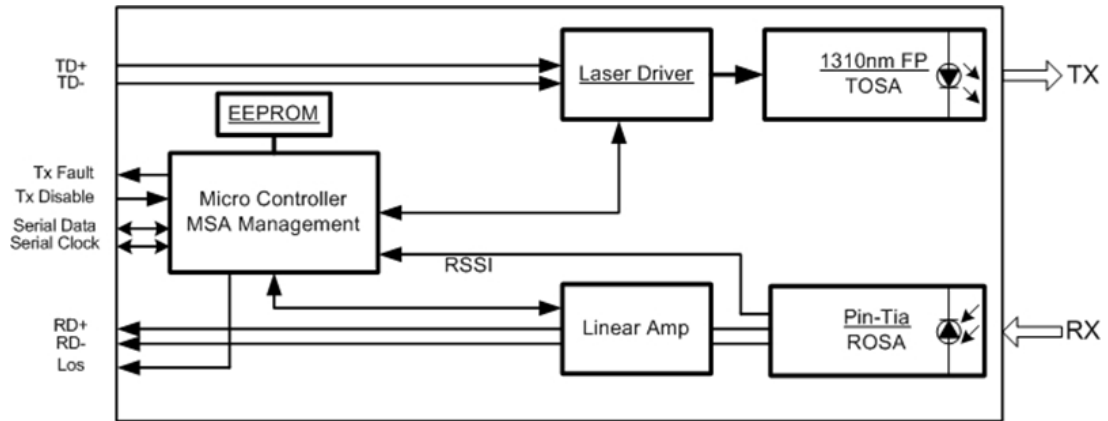
Proposed Applications Schematics
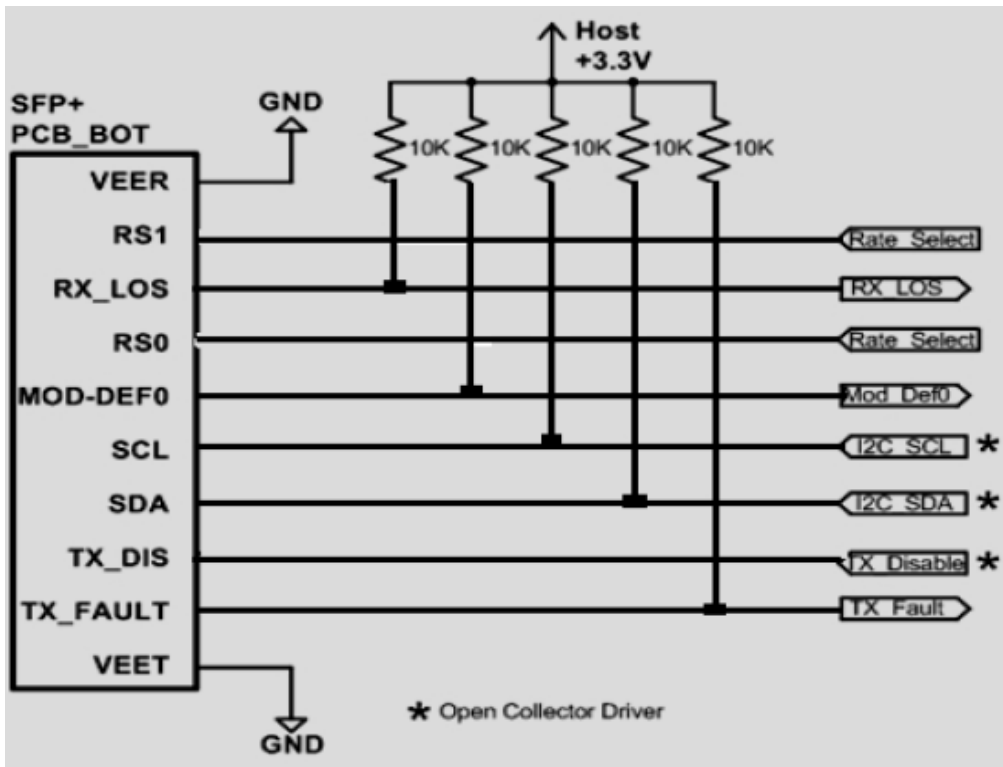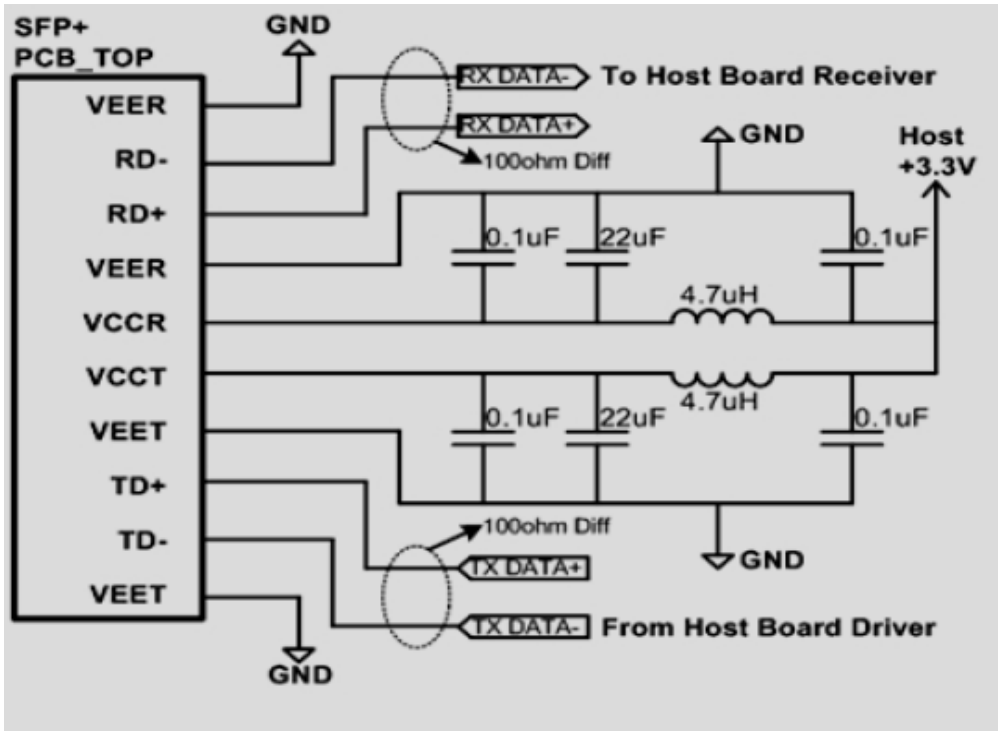
Pin Definition and Descriptions

The SFP+ modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP+ host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8083, or stacked connector with equivalent with equivalent electrical performance. Host PCB contact assignment is shown in below Figure and contact definitions are given in the Pin description table. SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by below Figure and the contact sequence order listed in the Pin description below table.
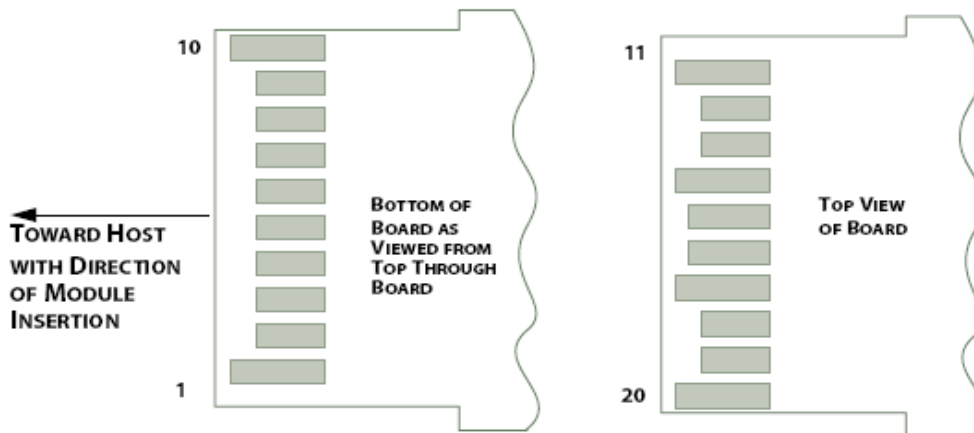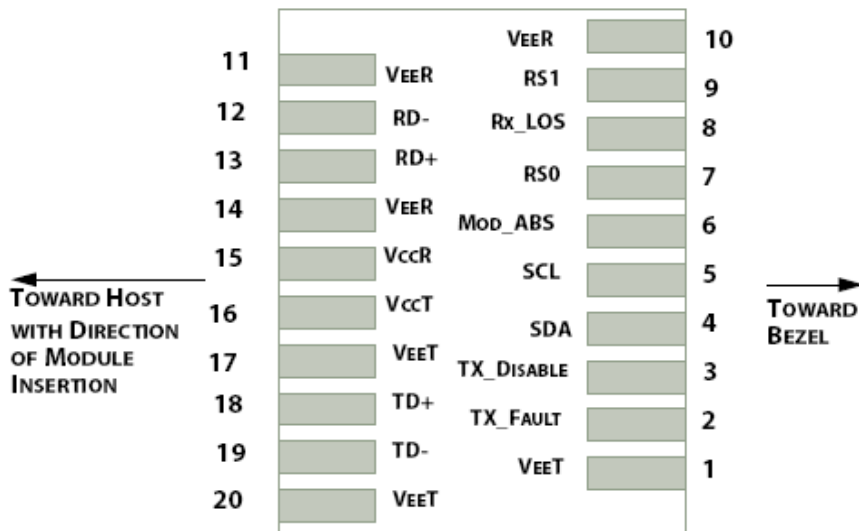
PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_DEF0	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active High	
9	LVTTL-I	RS1	Transmitter Rate Select	
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 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+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

Note:
1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	VCC	0	3.6	V
Storage Temperature	Ts	-40	85	°C
Operating Case temperature	Tc	0	70	°C
Relative Humidity	RH	5	95	%
RX Input Average Power	Pmax	-	1	dBm

Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameters	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	VCC	3.135	3.3	3.465	V
Power Supply Current	Icc			300	mA
Operating Case temperature	TC	0	25	70	°C

Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Operating Reach, OM1 MMF				220	m	
Transmitter						
Center Wavelength	λt	1260	1310	1355	nm	
RMS spectral width	Pm			4.0	nm	Pf = -2.0 dBm
Average Optical Power	Pavg	-6.5		0.5	dBm	Note1
Optical Modulation Amplitude (OMA)	Poma	-4.5		1.5	dBm	
Transmitter and dispersion penalty (max)	TDP			4.7	dB	Note2
Average launch power of Off transmitter	Poff			-30	dBm	
Extinction Ratio	ER	3.5			dB	
RIN12 OMA (max)	Rin			-128	dB/Hz	
Optical Return Loss Tolerance (min)		20			dB	
Receiver						
Center Wavelength	λr	1260		1355	nm	
Receiver overload (max) in OMA		1.5			dBm	
Stressed Receiver Sensitivity (OMA)	Psens			-6.5	dBm	Note3
Receiver Reflectance (max)				-12	dBm	
Stressed Receiver Sensitivity in OMA (Symetrical)	Psens			-6	dBm	Note3
Los Assert	LosA	-30			dBm	
Los Dessert	LosD			-12	dBm	
Los Hysteresis	LosH	0.5		6	dB	
Receiver power (damage, Max)	Pin	1.5			dBm	

Note:
1. Average optical power shall be measured using the methods specified in TIA/EIA-455-95.
2. Path penalty is intended as the power penalty of the interface between back-to-back and the maximum applied dispersion.
3. Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER =1x 10^{-12} .

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales stuff.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	
RX power monitor absolute error	DMI_RX	-3	3	dB	-1dBm to -14dBm range
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	

Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Data Rate			10.3125		Gbps	
Power Consumption			800	1000	mW	
Transmitter						
Single Ended Output Voltage Tolerance		-0.3		4	V	
C common mode voltage tolerance		15			mV	
Tx Input Diff Voltage	VI	180		700	mV	
Tx Fault	V$_{OL}$	-0.3		0.4	V	At 0.7mA
	V$_{OH}$	2		Vcc		
Data Dependent Input Jitter	DDJ			0.1	UI	
Data Input Total Jitter	TJ			0.28	UI	
Receiver						
Single Ended Output Voltage Tolerance		-0.3		4	V	
Rx Output Diff Voltage	Vo	180		600	mV	
Rx Output Rise and Fall Time	Tr/Tf	30			ps	20% to 80%
Total Jitter	TJ			0.7	UI	
Deterministic Jitter	DJ			0.42	UI	

Control and Status I/O Timing Characteristics

Timing characteristics of control and status I/O are included in Table 9, which is also defined in SFF-8431.

Parameter	Symbol	Min	Max	Unit	Condition
TX Disable Assert Time	t_off		10	µs	Time from rising edge of TX Disable to when the optical output falls below 10% of nominal
TX Disable Negate Time	t_on		1	ms	Time from falling edge of TX Disable to when the modulated optical output rises above 90% of nominal
Time to initialize, including reset of TX_Fault	t_init		300	ms	From power on or negation of TX Fault using TX Disable
TX Fault Assert Time	t_fault		100	µs	Time from fault to TX fault on.
TX Disable to reset	t_reset	10		µs	Time TX Disable must be held high to reset TX_fault
LOS Assert Time	t_loss_on		100	µs	Time from LOS state to RX LOS assert
LOS Deassert Time	t_loss_off		100	µs	Time from non-LOS state to RX LOS deassert
Rate-Select Change Time	t_ratesel		10	µs	Time from rising or falling edge of Rate Select input until receiver bandwidth is in conformance with appropriate specification.
Serial ID Clock Rate	f_serial_clock		100	kHz	

Content in 2-Wire Address A0H

| Address	HEX	Name of Field	Description
00	03	Identifier	SFP
01	04	Extended Identifier	SFP
02	07	Connector type	LC
03	40	10G Ethernet Compliance Codes	10G Base-LRM
04	00	SONET Compliance Codes	Not compliant
05	00	SONET Compliance Codes	Not compliant
06	00	Ethernet Compliance Codes	Not compliant
07	00	Fiber Channel link length	Not compliant
08	00	Fiber Channel transmitter technology	Not compliant
09	00	Fiber Channel transmission media	Not compliant
10	00	Fiber Channel speed	Not compliant
11	06	Encoding codes:	64B/66B
12	67	Nominal Bit Rate (units of 100Mbps)	10.3Gbps
13	00	Rate identifier	Unspecified
14	00	Link length supported for 9um fiber	N/A (units of km)
15	00	Link length supported for 9um fiber	N/A (units of 100m)
16	16	Link length supported for 50um,OM2	220m (units of 10m)
17	16	Link length supported for 62.5um,OM1	220m (units of 10m)
18	00	Link length supported for copper	N/A (units of 1m)
19	00	Link length supported for 50um,OM3	N/A (units of 10m)
20 ~ 35	46,4F,52,4D,45,52,49,43, 41,4F,45,20,20,20,20,20	Vendor Name	FORMERICAOE
36	00	Unallocated	
37 ~ 39	00,00,00	Vendor IEEE company ID	Unspecified
40 ~ 55	54,41,53,2D,41,31,4E,41, 31,2D,31,31,31,20,20,20	Part Number	TAS-A1NA1-111
56 ~ 59	00,00,00,00	Vendor Revision number	Unspecified
60 ~ 61	05,1E	Laser Wavelength	1310nm
62	00	Unallocated	
63		CC_BASE:	Check sum of byte 0 ~ 62
64	00	Options	Not compliant
65	1A	Options	TX-DIS, TX_FAULT, RX-LOS
66	00	Bit Rate, max.	Unspecified
67	00	Bit Rate, min.	Unspecified
68 ~ 83	Serial Number	Serial Number	
84 ~ 89	yy/mm/dd	Date Code	
90 ~ 91	20,20	Vendor specific lot code	Unspecified
92	68	Diagnostic Monitoring Type	Internal calibration
93	F0	Enhanced Options (soft)	Alarm/Warning flags, Soft TxDisable, Soft TxFault, Soft RxLOS implemented
94	03	SFF-8472 Compliance	Rev10.2
95		CC_EXT	Check sum of byte 64 ~ 94
96~127		Vendor specific	

Content in 2-Wire Address A2H

Add	Bytes	Name	Hex	Real Value
00-01	2	Temp High Alarm	5F00	95℃
02-03	2	Temp Low Alarm	E700	-25℃
04-05	2	Temp High Warning	5A00	90℃
06-07	2	Temp Low Warning	EC00	-20℃
08-09	2	Voltage High Alarm	9470	3.8V
10-11	2	Voltage Low Alarm	6D60	2.8V
12-13	2	Voltage High Warning	9088	3.7V
14-15	2	Voltage Low Warning	7148	2.9V
16-17	2	Bias High Alarm	AFC8	90mA
18-19	2	Bias Low Alarm	03E8	2mA
20-21	A	Bias High Warning	9C40	80mA
22-23	2	Bias Low Warning	05DC	3mA
24-25	2	TX Power High Alarm	3E1C	2dBm
26-27	2	TX Power Low Alarm	0640	-8dBm
28-29	2	TX Power High Warning	3138	1dBm
30-31	2	TX Power Low Warning	07D0	-7dBm
32-33	2	RX Power High Alarm	3138	1dBm
34-35	2	RX Power Low Alarm	0064	-20dBm
36-37	2	RX Power High Warning	2710	0dBm
38-39	2	RX Power Low Warning	007E	-19dBm
40-55	16	Reserved	FF	-
56-59	4	RX_PWR(4)	00000000	0
60-63	4	RX_PWR(3)	00000000	0
64-67	4	RX_PWR(2)	00000000	0
68-71	4	RX_PWR(1)	3F800000	1
72-75	4	RX_PWR(0)	00000000	0
76-77	2	TX_I(Slope)	0100	1
78-79	2	TX_I(Offset)	0000	0
80-81	2	TX_PWR(Slope)	0100	1
82-83	2	TX_PWR(Offset)	0000	0
84-85	2	T(Slope)	0100	1
86-87	2	T(Offset)	0000	0
88-89	2	V(Slope)	0100	1
90-91	2	V(Offset)	0000	0
92-94	3	Reserved	00	-
95	1	Checksum		-

Mechanical

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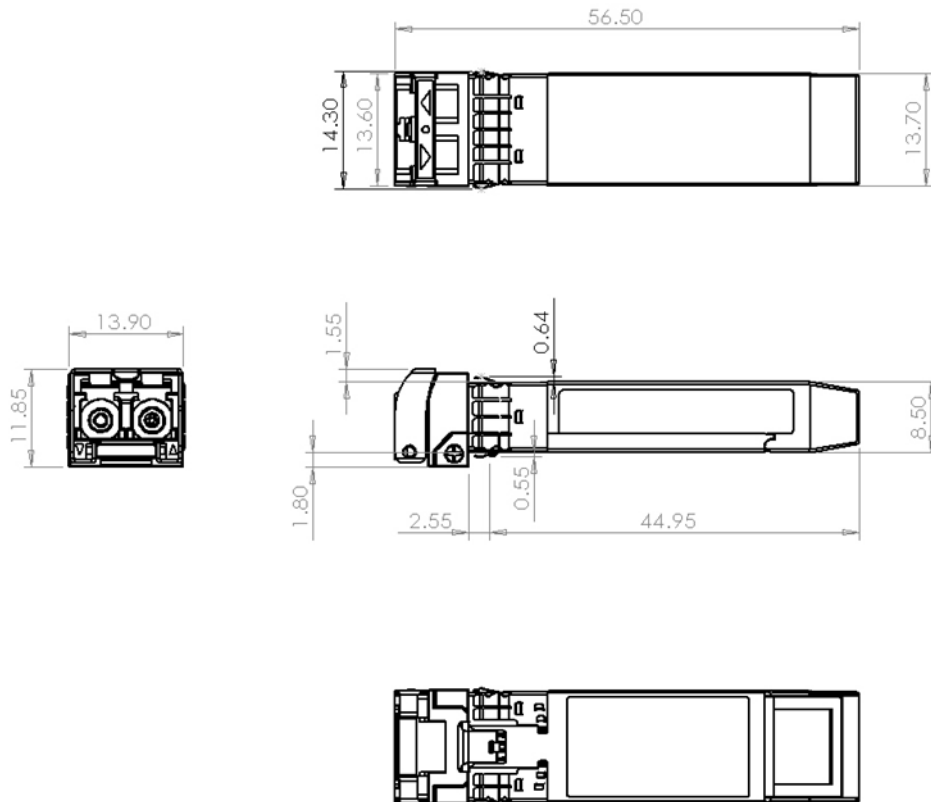
ESD

This transceiver is specified as ESD threshold 1kV for all electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

LASER Safety

This is a Class 1 Laser Product according to IEC 60825-1:1993:+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 24, 2007)