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Specification

Mini Small Form Factor
Dual Duplex LC Receptacle

Optical Transceivers

10 Gigabit Ethernet

10GBASE-SR



Ordering Information

Model Name	Voltage	Category	Device type	Interface	LOS	Temperature	Distance	Latch Color
TAS-S1NH1-P13	3.3V	With DDMI	850 nm VCSEL	AC / AC Coupling	LVTTL	0°C~+70°C	33m / 82m /300m (OM1/ OM2/OM3)	NO

Features

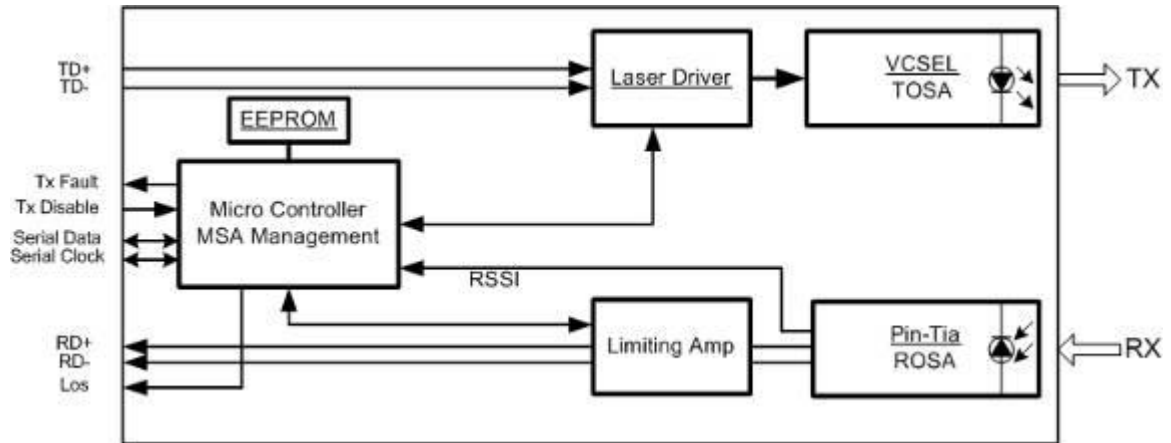
- **Optical interface compliant to IEEE 802.3ae 10GBASE-SR/SW**
- **Compliant with SFP+ MSA**
- **Data Rate 10.3125 Gbps**
- **850nm VCSEL TOSA and PIN ROSA**
- **Maximum link length of 300m on 2000MHz-km MMF**
- **LC duplex receptacle**
- **Low power dissipation (<1600 mW)**
- **All-metal housing for superior EMI performance**
- **Built in digital diagnostic functions**
- **Operating case temperature range: 0 ~ 70°C**
- **RoHS Compliant**

Applications

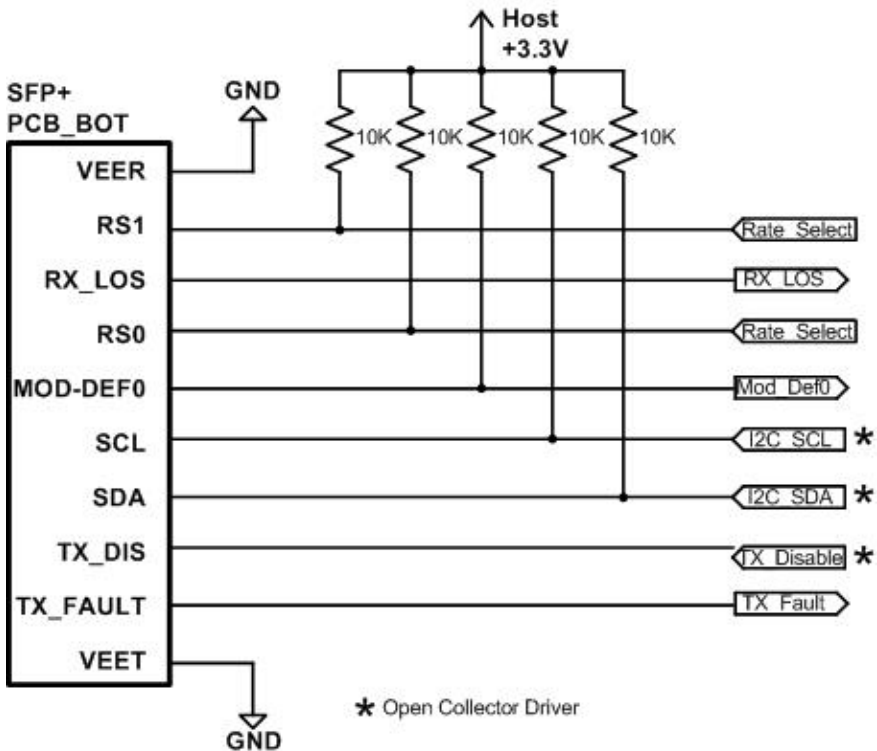
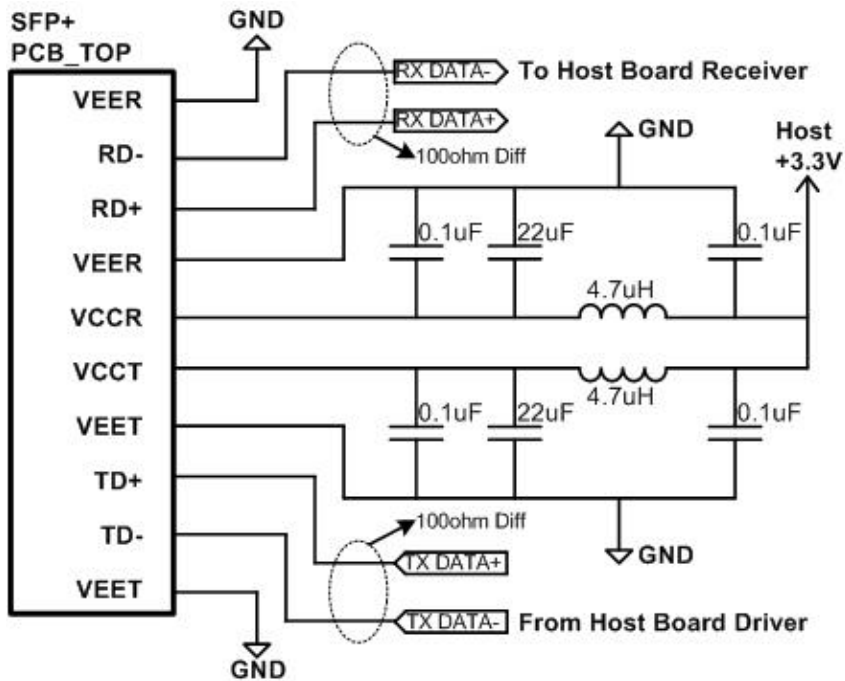
- **10GBASE-SR 10Gigabit Ethernet**
- **High-speed storage area networks**
- **Computer cluster cross-connect**
- **Custom high-speed data pipes**
- **Inter Rack Connection**

Fiber type	Minimum modal bandwidth @ 850 nm (MHz•km)	Operating range (meters)
62.5 μm MMF	160	2 to 26
	200	2 to 33
50 μm MMF	400	2 to 66
	500	2 to 82
	2000	2 to 300

Transceiver Block Diagram



Proposed Applications Schematics



Pin Definition and Descriptions (COM1 & COM2)

PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	3
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	
6		Mod_ABS	Module Absent, connected to VeeT or VeeR in the module	2
7	LVTTL-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	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication	2
9	LVTTL-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 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 are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7k to 10k ohm to a voltage between 3.15V and 3.45V on the host board.
3. Shall be pulled up with 4.7k to 10k ohm to VccT in the module.

Absolute Maximum Ratings

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

Recommended Operating Environment

Parameters	Symbol	Min.	Typical	Max	Unit
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Operating Case Temperature	T_C	0	25	70	°C

Optical Characteristics

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

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λ_t	840	850	860	nm	
RMS spectral width	P_m	-	-	Note 1	nm	
Average Optical Power	P_{avg}	-6.5	-	-1	dBm	
Optical Power OMA	P_{oma}	-	-	Note 1	dBm	
Laser Off Power	P_{off}	-	-	-30	dBm	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter Dispersion Penalty	TDP	-	-	3.9	dB	
Relative Intensity Noise	R_{in}	-	-	-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance		-	-	12	dB	
Receiver						
Center Wavelength	λ_r	840	850	860	nm	
Receiver Sensitivity (OMA)	P_{sens}	-	-	-11.1	dBm	
Stressed Sensitivity (OMA)		-	-	-7.5	dBm	
Los Assert	LosA	-30	-	-	dBm	
Los Dessert	LosD	-	-	-12	dBm	
Los Hysteresis	LosH	0.5	-	-	dB	
Overload	P_{in}	-	-	-1	dBm	
Receiver Reflectance		-	-	-12	dB	

Note:

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

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 staff.

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 -12dBm range
Supply voltage monitor absolute error	DMI_VCC	-0.08	0.08	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.	Typical	Max	Unit	Notes
Data Rate		-	10.3125	-	Gbps	
Power Consumption		-	1200	1600	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	VoL	-0.3		0.4	V	At 0.7mA
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	300		850	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	



Mini Dual 10GbE SFP+ SR Transceiver

PRODUCT NUMBER: TAS-S1NH1-P13

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	10	10G Ethernet Compliance Codes	10G Base SR
04	00	SONET Compliance Codes	Not compliant
05	00	SONET Compliance Codes	Not compliant
06	00	Ethernet Compliance Codes	1000BASE-LX
07	20	Fiber Channel link length	intermediate distance (I)
08	40	Fiber Channel transmitter technology	Shortwave laser w/o OFC (SN)
09	0C	Fiber Channel transmission media	Multimode 62.5um and 50um
10	80	Fiber Channel speed	1200 MBytes/sec
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	08	Link length supported for 50um,OM2	80m (units of 10m)
17	03	Link length supported for 62.5um,OM1	30m (units of 10m)
18	00	Link length supported for copper	N/A (units of 1m)
19	1E	Link length supported for 50um,OM3	300m (units of 10m)
20 ~ 35	46,4F,52,4D,45,52,49,43,41,4F,45,20,20,20,20,20	Vendor Name	FORMERICA OE
36	00	Unallocated	
37 ~ 39	00,00,00	Vendor OUI	Unspecified
40 ~ 55	54,41,53,2D,53,31,4E,48,31,2D,50,31,33,20,20,20	Part Number	TAS-S1NH1-P13
56 ~ 59	00,00,00,00	Vendor Revision number	Unspecified
60 ~ 61	03,52	Laser Wavelength	850nm
62	00	Unallocated	
63		CC_BASE:	Check sum of byte 0 ~ 62
64	00	Options	
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	B0	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	



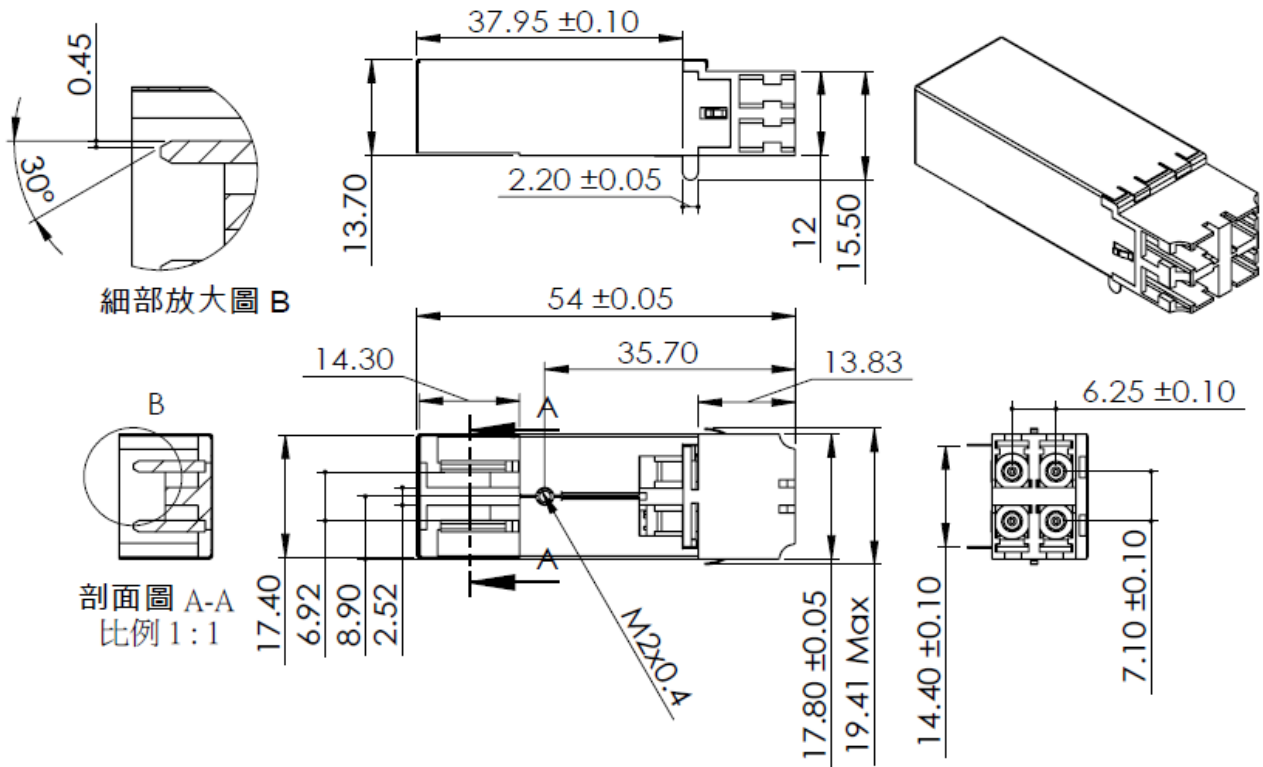
Mini Dual 10GbE SFP+ SR Transceiver

PRODUCT NUMBER: TAS-S1NH1-P13

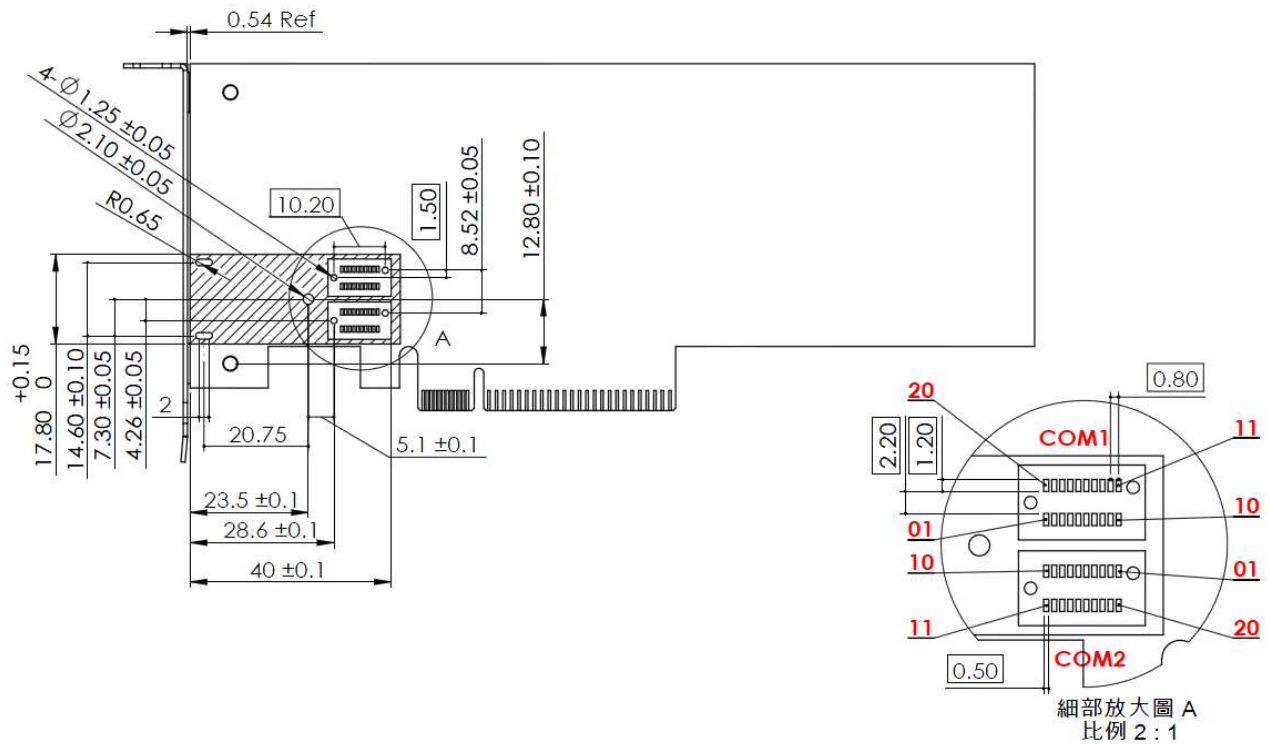
Content in 2-Wire Address A2H

Add	Bytes	Name	Hex	Real Value
00-01	2	Temp High Alarm	4600	70°C
02-03	2	Temp Low Alarm	0000	0°C
04-05	2	Temp High Warning	4400	68°C
06-07	2	Temp Low Warning	0200	2°C
08-09	2	Voltage High Alarm	8CA0	3.6V
10-11	2	Voltage Low Alarm	7530	3.0V
12-13	2	Voltage High Warning	88B8	3.5V
14-15	2	Voltage Low Warning	7918	3.1V
16-17	2	Bias High Alarm	1964	13mA
18-19	2	Bias Low Alarm	01F4	1mA
20-21	2	Bias High Warning	1770	12mA
22-23	2	Bias Low Warning	02EE	1.5mA
24-25	2	TX Power High Alarm	2710	0dBm
26-27	2	TX Power Low Alarm	0630	-8dBm
28-29	2	TX Power High Warning	22D0	-0.5dBm
30-31	2	TX Power Low Warning	06F2	-7.5dBm
32-33	2	RX Power High Alarm	2710	0dBm
34-35	2	RX Power Low Alarm	0232	-12.5dBm
36-37	2	RX Power High Warning	22D0	-0.5dBm
38-39	2	RX Power Low Warning	0276	-12.01dBm
40-55	16	Reserved	00	-
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		-

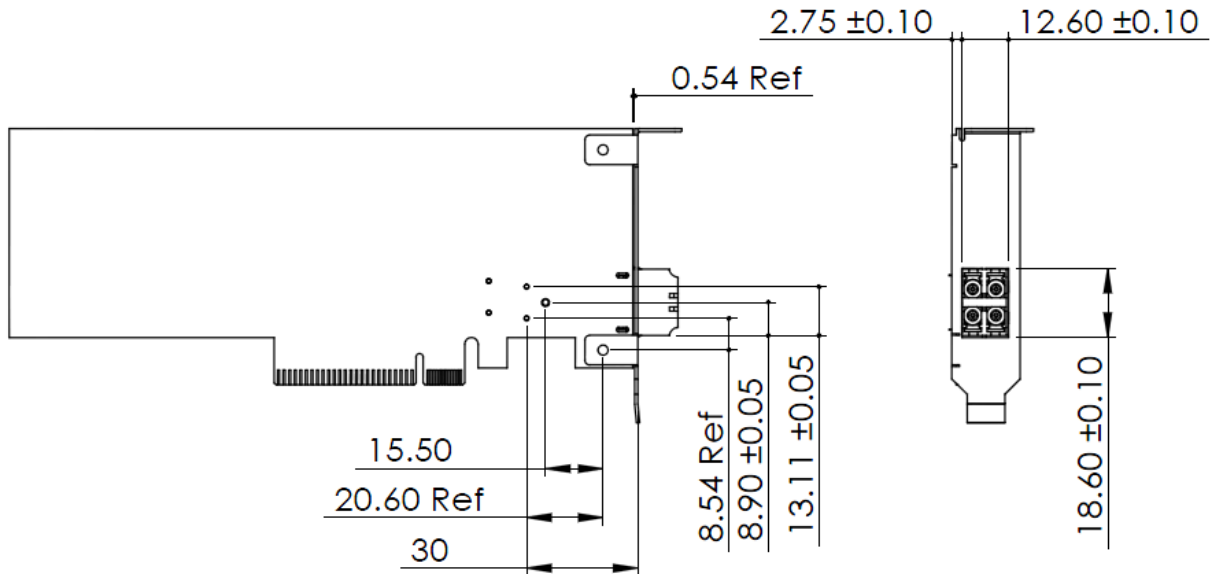
Mechanical (mm)



RECOMMENDED PCB LAYOUT (mm)



RECEPTACLE TO BWZEL (mm)



ESD

This transceiver is specified as ESD threshold 2kV 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 26, 2001)