



- Up to 20 km on 9/125µm SMF
- Single +3.3V Power Supply
- Built-in digital diagnostic functions
- Commercial operating temperature range: 0°C to 70°C

Features:

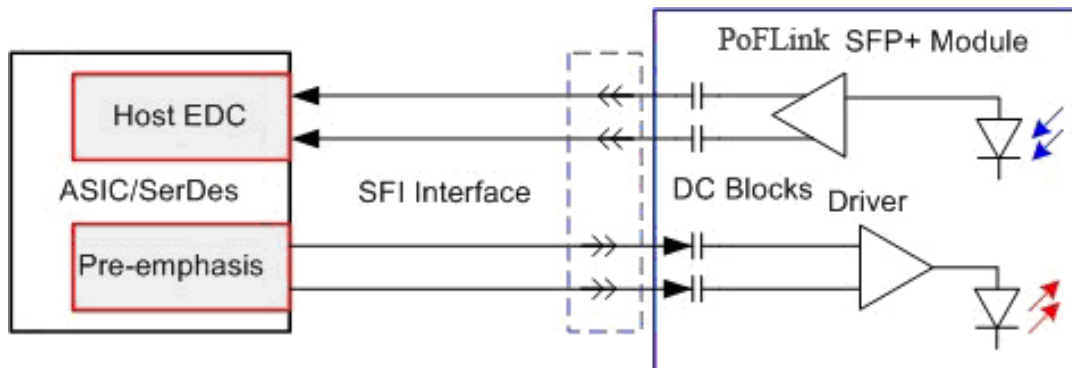
- Supports 9.95 to 10.5Gb/s bit rates
- Hot-Pluggable
- Uncooled 1310nm DFB laser
- Duplex LC connector
- RoHS compliant and Lead Free

Applications:

- 10GBASE-LR/LW 10G Ethernet
- 1200-SM-LL-L 10G Fiber Channel

Description:

POFLink's PLS-10G-LR 10Gb/s SFP+ transceivers are designed for use in 10-Gigabit Ethernet links up to 10km over Single Mode fiber. They are compliant with SFF-84311, SFF-84322 and IEEE 802.3ae 10GBASE-LR/LW3, and 10G Fiber Channel 1200-SM-LL-L4 Digital diagnostics functions are available employs a limiting receiver. Host board designers using an EDC PHY IC should follow via a 2-wire serial interface, as specified in SFF-84725. The PLS-10G-LR is a "limiting module", ie., it employs a limiting receiver. Host board designers using an EDC PHY IC should follow the IC manufacturer's recommended settings for inter-operating the host-board EDC PHY with a limiting receiver SFP+ module.



Absolute Maximum Ratings

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

Recommended Operating Environment:

Parameter	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

Electrical Characteristics (T_{OP} = 0 to 70 °C, VCC = 3.0 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc	3.0	3.30	3.60	V	
Supply Current	Icc		160	280	mA	
Transmitter Section:						
Input differential impedance	R _{in}	90	100	110		
Single ended data input swing	V _{in PP}	180		700	mVp-p	
Transmit Disable Voltage	V _D	Vcc - 1.3		Vcc	V	
Transmit Enable Voltage	V _{EN}	Vee		Vee+ 0.8	V	
Receiver Section:						
Single ended data output	V _{out,pp}	300		850	mv	2,6
Data output rise time	t _r				ps	3
Data output fall time	t _f				ps	3
LOS Fault	V _{losfaul}	Vcc - 0.5		VCC_hos	V	4
LOS Normal	V _{los}	Vee		Vee+0.5	V	4

Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Into 100Ω differential termination.
3. 20 - 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's sequence in the PRBS 9 is an acceptable alternative. SFF-8431 Rev 3.0.
4. 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.
5. See Section 2.8.3 of SFF-8431 Rev 3.0.

Optical Parameters(T_{OP} = 0 to70 °C, V_{CC} = 3.00 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λ_t	1260	1310	1355	nm	
Side Mode Suppression Ratio	SMRS	30	-	-	dB	
Average Optical Power	P _{avg}	-8.2	-	0.5	dBm	
Optical Power OMA	P _{oma}	-5.2	-	-	dBm	
Optical Power OMA-TDP	P _{oma-TDP}	-6.2	-	-	dBm	
Laser Off Power	P _{off}	-	-	-30	dBm	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter Dispersion Penalty	TDP	-	-	3.2	dB	
Relative Intensity Noise	R _{in}	-	-	-128	dB/Hz	12dB reflectio
Optical Return Loss Tolerance		-	-	12	dB	
Receiver Section:						
Center Wavelength	λ_r	1260	1310	1355	nm	
Receiver Sensitivity in Average	Sen	-14.4			dBm	1
Receiver Sensitivity (OMA)	Sen-oma	-	-	-12.6	dBm	2
Stressed Sensitivity (OMA)		-	-	-10.3	dBm	2
Vertical eye closure penalty		2.2	-	-	dB	3
Los Assert	LosA	-30	-	-	dBm	
Los Dessert	LosD	-	-	-12	dBm	
Los Hysteresis	LosH	0.5	-	-	dB	
Overload	Pin	-	-	0.5	dBm	1
Receiver Reflectance		-	-	-12	dB	
Stressed eye jitter		0.3	-	-	Ulp-p	2
Receive electrical 3dB upper cutoff frequency		-	-	12.3	GHz	
Receiver power (damage)		-	-	1.5	dBm	

Notes:

1. Average optical power shall be measured using the methods specified in TIA/EIA-455-95.
2. Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER = 1×10^{-12} .
3. Vertical eye closure penalty and stressed eye jitter are the test conditions for measuring stressed receiver sensitivity. They are not the required characteristic of the receiver.
4. Power budget is defined as the different between the Rx sensitivity and the Tx output power of the interface.
5. Path penalty is intended as the power penalty of the interface between back-to-back and the maximum applied dispersion.

Timing Characteristics:

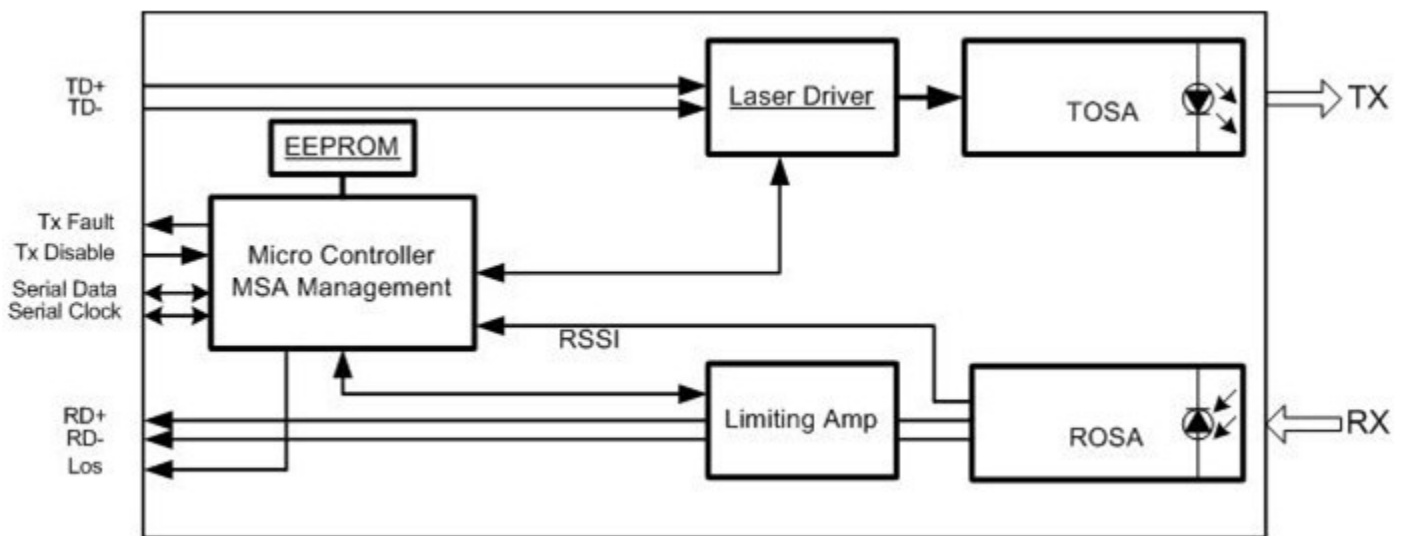
Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			10	us
TX_Disable Negate Time	t_on			1	ms
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms
TX_FAULT from Fault to Assertion	t_fault			100	us
TX_Disable Time to Start Reset	t_reset	10			us
Receiver Loss of Signal Assert Time	T _A ,RX_LOS			100	us
Receiver Loss of Signal Deassert Time	T _d ,RX_LOS			100	us
Rate-Select Chage Time	t_ratesel			10	us
Serial ID Clock Time	t_serial-			100	kHz

Digital Diagnostic Monitor Characteristics

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
Temperature monitor absolute error	DMI_Temp	-3	3	degC
Laser power monitor absolute error	DMI_TX	-3	3	dB
RX power monitor absolute error	DMI_RX	-3	3	dB
Supply voltage monitor absolute error	DMI_VCC	-0.08	0.08	V
Bias current monitor absolute error	DMI_Ibias	-10%	10%	mA

Block Diagram of Transceiver:



Pin Assignment:

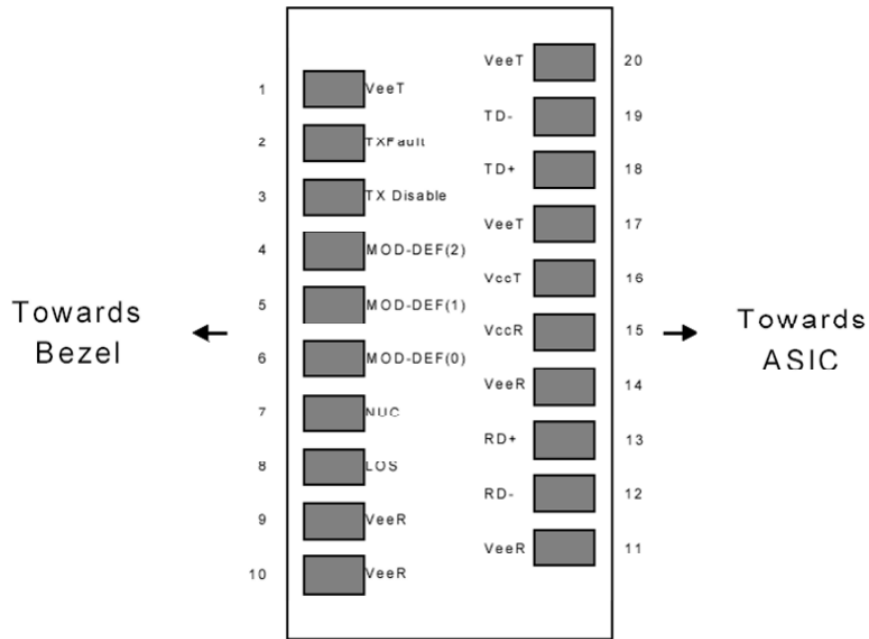
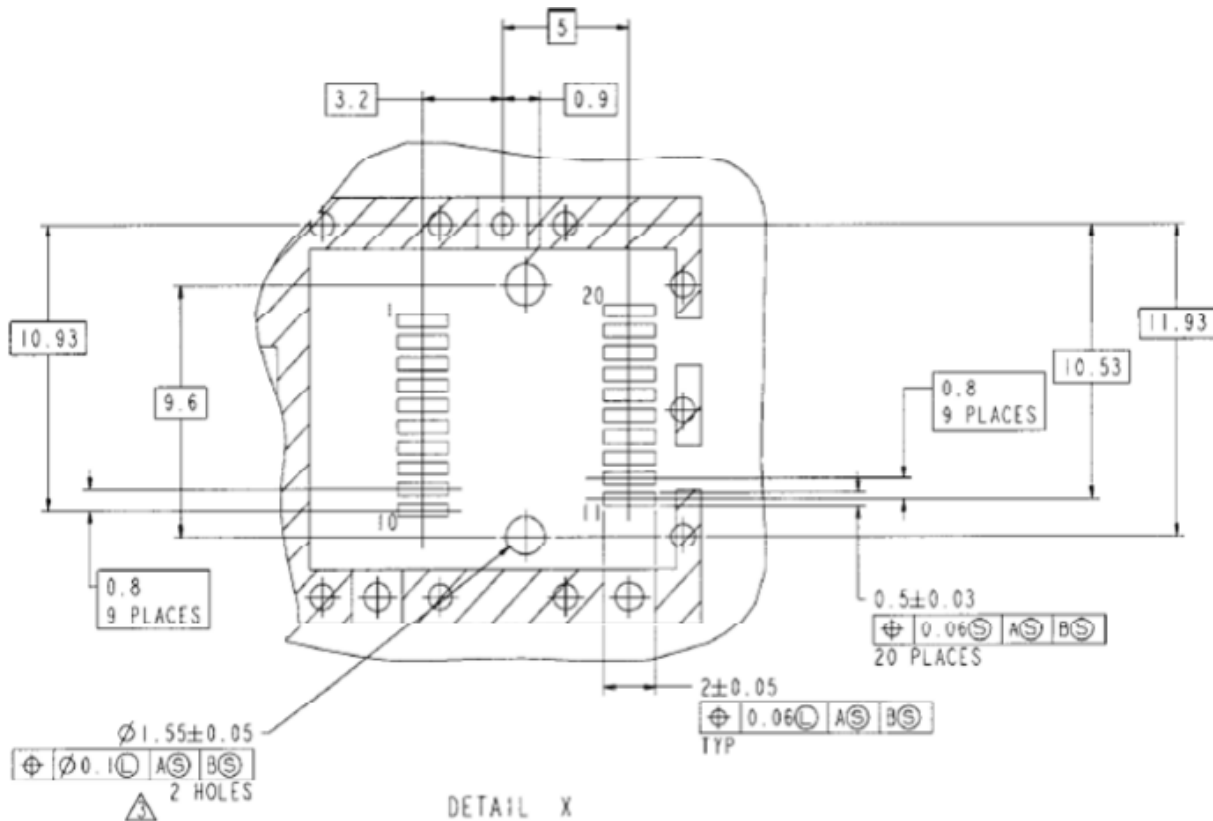
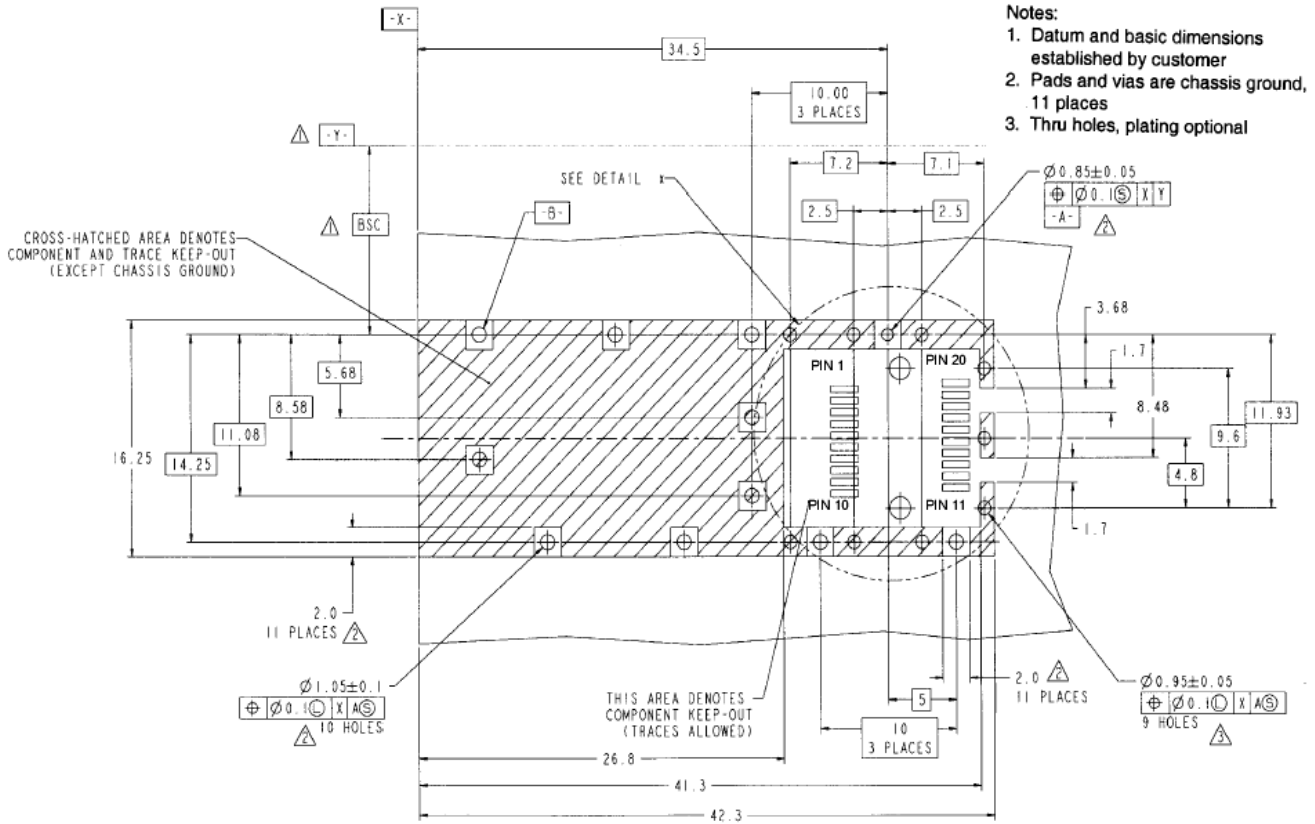


Diagram of Host Board Connector Block Pin Numbers and Names



10G SFP+ Transceiver LR 10km (PLS-10G-LR)
 Hot Pluggable, Duplex LC, +3.3V 1310nm DFB-LD



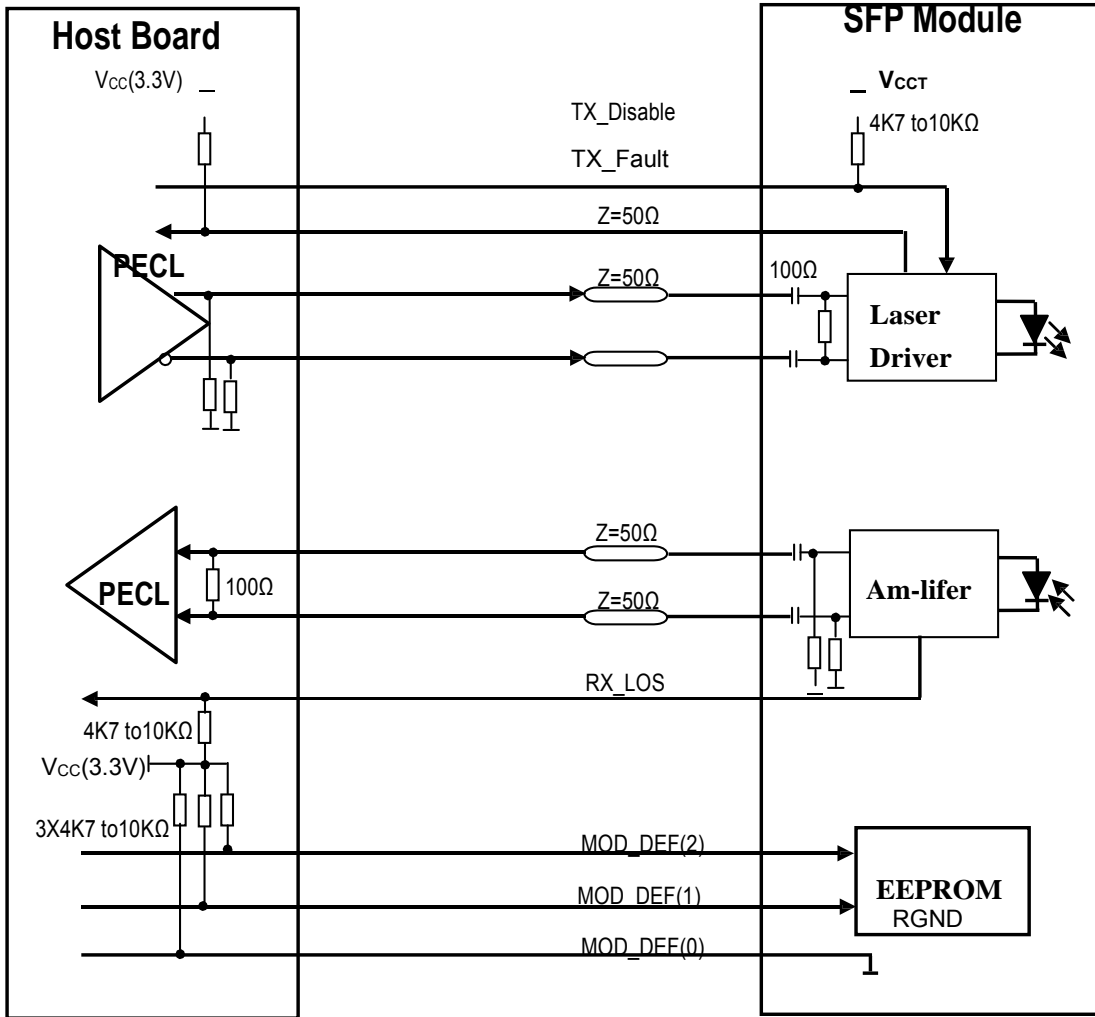
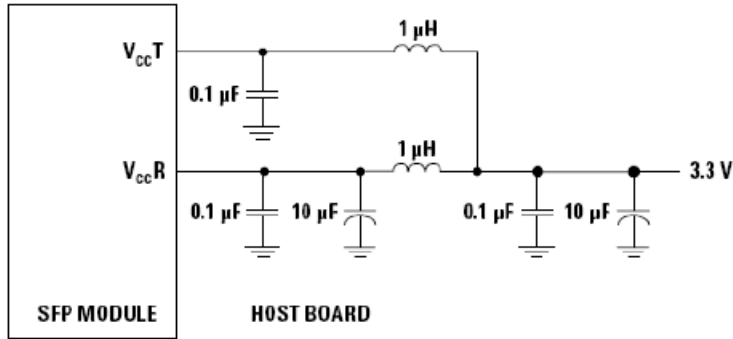
SFP Host Board Mechanical Layout(Cont)

PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_DEF0	Module Definition, Grounded in the module	
7	LVTTTL-I	RS0	Receiver Rate Select	
8	LVTTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTTL-I	RS1	Transmitter Rate Select (not used)	
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 (not used)	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 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

Notes:

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.

Recommended Circuit:



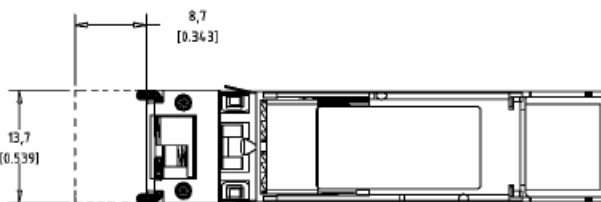
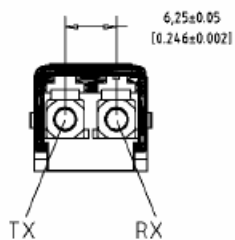
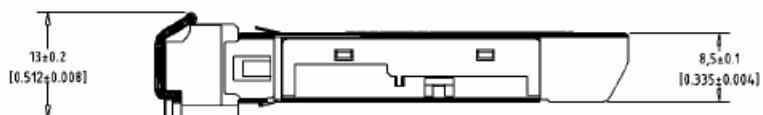
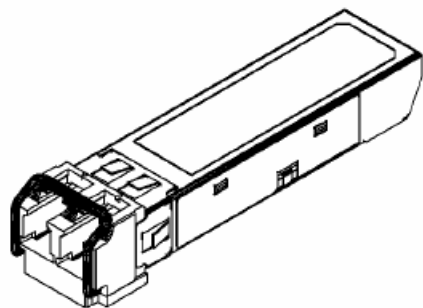
Serial ID Memory Contents:

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	10GBASE-LR
11	1	Encoding	64B66B
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13	1	Reserved	(0000h)
14	1	Length(9um,km)	Link length supported for 9/125um fiber, units of km
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name:
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "PLS-xx-xx" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-61	2	Wavelength	Laser wavelength
62	1	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah =LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	Manufacturing date code
92	1	Diagnostic Type	Diagnostics
93	1	Enhanced	Diagnostics
94	1	SFF-8472	Diagnostics
95	1	CCEX	Check code for the extended ID Fields(addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	Vendor specific date, read only

Diagnostics Memory Contents(A2h):

Data Address	Length (Byte)	Name of Length	Description and Contents
Diagnostic and control/status fields			
0-39	40	A/W Thresholds	Diagnostic Flag Alarm and Warning Thresholds
40-55	16	Unallocated	
56-91	16	Ext Cal Constants	Diagnostic calibration constants for optional External Calibration
92-94	3	Unallocated	
95	1	CC_DMI	Check code for Base Diagnostic Fields (addresses 0 to 94)
96-105	10	Diagnostics	Diagnostic Monitor Data (internally or externally calibrated)
106-109	4	Unallocated	
110	1	Status/Control	Optional Status and Control Bits
111	1	Reserved	Reserved for SFF-8079
112-113	2	Alarm Flags	Diagnostic Alarm Flag Status Bits
114-115	2	Unallocated	
116-117	2	Warning Flags	Diagnostic Warning Flag Status Bits
118-119	2	Ext status/Control	Extended module control and status bytes
General use fields			
120-127	8	Vendor Specific	Vendor specific memory addresses
128-247	120	User EEPROM	User writable non-volatile memory
248-255	8	Vendor Control	Vendor specific control addresses

Mechanical Dimensions:



Mechanical Drawing