Features

- ✧ Single Mode Bi-directional Transmission
- ✧ SFP Multi-source Package with LC Receptacle
- ✧ Up to 1.25Gb/s Data Links
- ✧ Hot-Pluggable Capability
- ✧ Single +3.3V Power Supply
- ✧ Operating Case Temperature -40℃~+85℃
- ✧ Compliant with Specifications for IEEE802.3Z
- ✧ Compliant with SFP MSA
- ✧ Digital diagnostic monitor interface
- ✧ Compliant with SFF-8472
- ✧ RoHS Compliant Products

Applications

- ✧ Gigabit Ethernet
- ✧ Switch to Switch Interface
- ✧ WDM Application
- ✧ Router/Server Interface
- ✧ Other Optical Links

Electrical Characteristics: (Condition: T_a=T_{OP})

Parameter	Symbol	Min.	Typical	Max.	Unit
Transmitter Differential Input Volt	+/-TX_DAT	200	-	2400	mV p-p
Supply Current	ICC	-	130	300	mA
Tx_Disable Input Voltage – Low	V_{IL}	0	-	0.8	V
Tx_Disable Input Voltage – High	V_{IH}	2.0	-	Vcc	V
Tx_Fault Output Voltage – Low	V_{OL}	0	-	0.8	V
Tx_Fault Output Voltage – High	V_{OH}	2.0	-	Vcc	V
Receiver Differential Output Volt	+/-RX_DAT	600	-	1400	mV p-p
Rx_LOS Output Voltage- Low	V_{OL}	0	-	0.8	V
Rx_LOS Output Voltage- High	V_{OH}	2.0	-	Vcc	V

Optical Characteristics: (Condition: T_a=T_{OP})

Transmitter Section:					
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**
Data Rate	B	-	1250	-	Mb/s
Centre Wavelength	λc	1265	1310	1360	nm
Output Spectral Width	△λ(RMS)	-	-	4	nm
Average Output Power	Po	-9	-	-3	dBm
Extinction Ratio	EXT	9	-	-	dB
Rise time/Fall time(20%-80%)	Tr/Tf	-	-	260	ps
Total jitter	T_J	-	-	0.43	UI
Data Input Voltage-High	V_{IHS}	Vcc-1.16	-	Vcc-0.89	V
Data Input Voltage -Low	V_{ILS}	Vcc-1.82	-	Vcc-1.48	V
Supply Current	ICC	-	70	200	mA
Output Optical Eye	Compliant with IEEE802.3z				
Receiver Section:					
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**
Receive Sensitivity	P_{min}	-	-	-22	dBm
Maximum Input Power	P_{max}	-3	-	-	dBm
LOS De-Assert	LOSD	-	-	-24	dBm
LOS Assert	LOSA	-35	-	-	dBm
LOS Hysteresis	-	0.5	3.0	5.0	dB
Output High Voltage	V_{OH}	Vcc-1.03	-	Vcc-0.89	V
Output Low Voltage	V_{OL}	Vcc-1.82	-	Vcc-1.63	V
Operating Wavelength	λc	1470	1490	1510	nm
Supply Current	ICC	-	60	100	mA

Recommended Operating Environment

Parameter	**Symbol**		**Min.**	**Typical**	**Max.**	**Unit**
Supply Voltage	V_{CC}		+3.0	+3.3	+3.6	V
Operating Temperature	T_{OP}	X=1	0	-	+70	℃
		X=2	-40	-	+85	℃

Timing Characteristics

Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**

TX_DISABLE Assert Time	t_off	-	-	10	usec
TX_DISABLE Negate Time	t_on	-	-	1	msec
Time to initialize include reset of TX_FAULT	t_int	-	-	300	msec
TX_FAULT from fault to assertion	t_fault	-	-	100	usec
TX_DISBEL time to start reset	t_reset	10	-	-	usec
Receiver Loss of Signal Assert Time (off to On)	Ta,RX_LOS	-	-	100	usec
Receiver Loss of Signal Assert Time (on to off)	Td,RX_LOS	-	-	100	usec

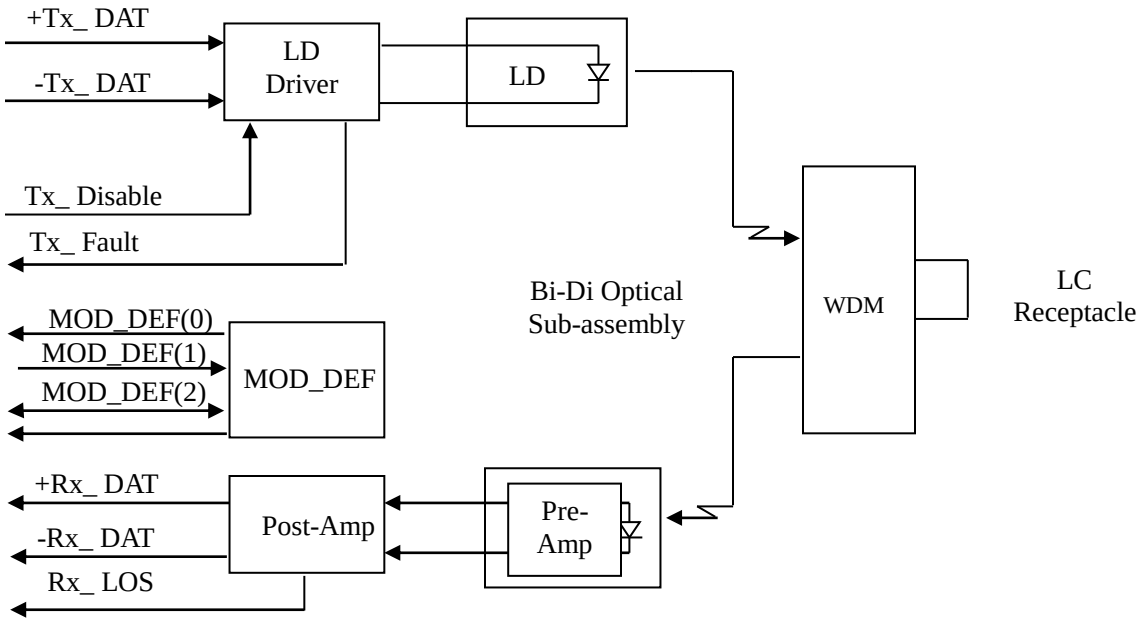
Digital Diagnostic Monitor Characteristics

Parameter	**Max.**	**Unit**
Tx Output Power Accuracy	±3.0	dB
Rx Input Power Accuracy	±3.0	dB
Laser Bias Current Accuracy	±1 0	%
Transceiver Internal Temperature Accuracy	±3.0	° C
Transceiver Internal Supply Voltage Accuracy	±0.1	V

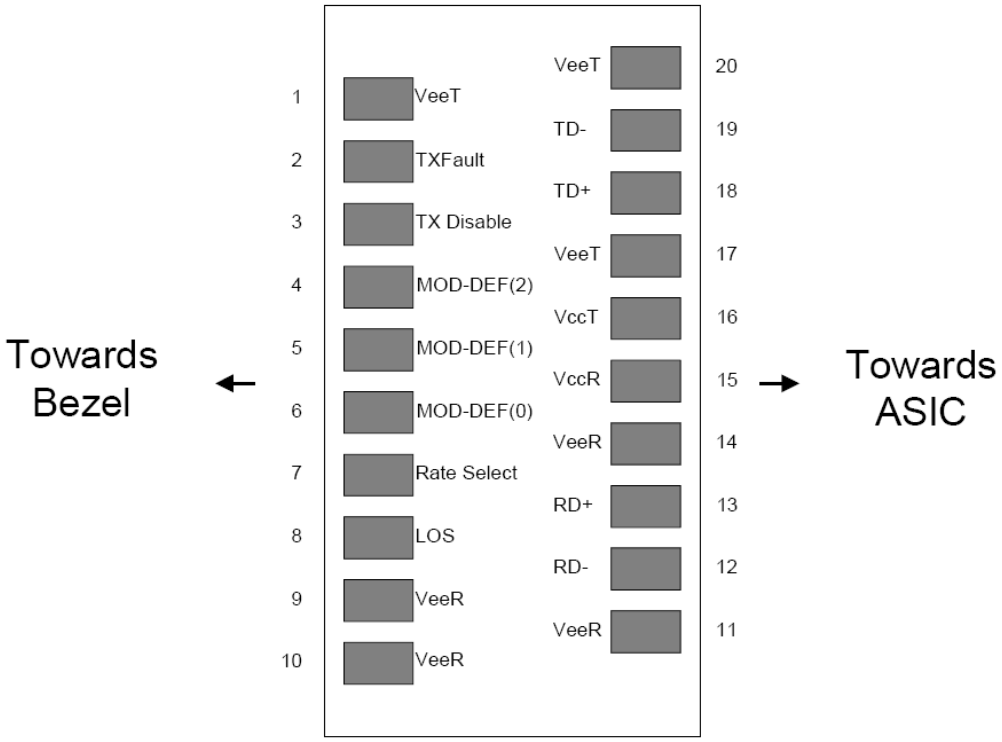
Regulatory Compliance

Feature	**Standard**	**Performance**
Electrostatic Discharge(ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>500 V)
Electrostatic Discharge(ESD) To the Duplex Receptacle	IEC61000-4-2	Class 2(>4000V)
Electromagnetic Interference (EMI)	FCC Part 15 Class B	Compatible with standards
Immunity	IEC61000-4-3	Compatible with standards
Laser eye safety	FDA21CFR1040.10and1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class I laser product
Component Recognition	UL and CE	Compatible with standards
ROHS	ROHS6	Compatible with standards

Block Diagram of Transceiver



Pin Assignment



Pin Description

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	T_{FAULT}	Transmitter Fault Indication	3	Note1
3	T_{DIS}	Transmitter Disable	3	Note2, Module disables on high or open
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note3, 2 wire serial ID interface
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note3, 2 wire serial ID interface
6	MOD_DEF(0)	TTL Low	3	Note3, Grounded in Module
7	Rate Select	Select between full or reduced receiver bandwidth	3	NO connection required, Low or Open-reduced bandwidth, High-full bandwidth
8	LOS	Loss of Signal indication, Logic 0 indicate normal operation	3	Note 5
9	V_{EER}	Receiver ground	1	Note 6
10	V_{EER}	Receiver ground	1	Note 6
11	V_{EER}	Receiver ground	1	Note 6
12	RX_	Receiver Data Bar, Differential PECL, ac coupled	3	Note 7
13	RX+	Receiver Data, Differential PECL, ac coupled	3	Note 7
14	V_{EER}	Receiver ground	1	Note 6
15	V_{CCR}	Receiver Power Supply	2	3.3V±5%,Note 8
16	V_{CCT}	Transmitter Power Supply	2	3.3V±5%,Note 8
17	V_{EET}	Transmitter Ground	1	Note 6
18	TX+	Receiver Data, Differential PECL, ac coupled	3	Note 9
19	TX-	Receiver Data Bar, Differential PECL, ac coupled	3	Note 9
20	V_{EET}	Transmitter Ground	1	Note 6

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10K resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 ¨C 10 K resistor. Its states are:

Low (0 to 0.8V): Transmitter on

(>0.8, < 2.0V): Undefined

High (2.0 to 3.465V): Transmitter Disabled

Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K to 10K resistor on the host board. The pull-up voltage shall be VccT or VccR

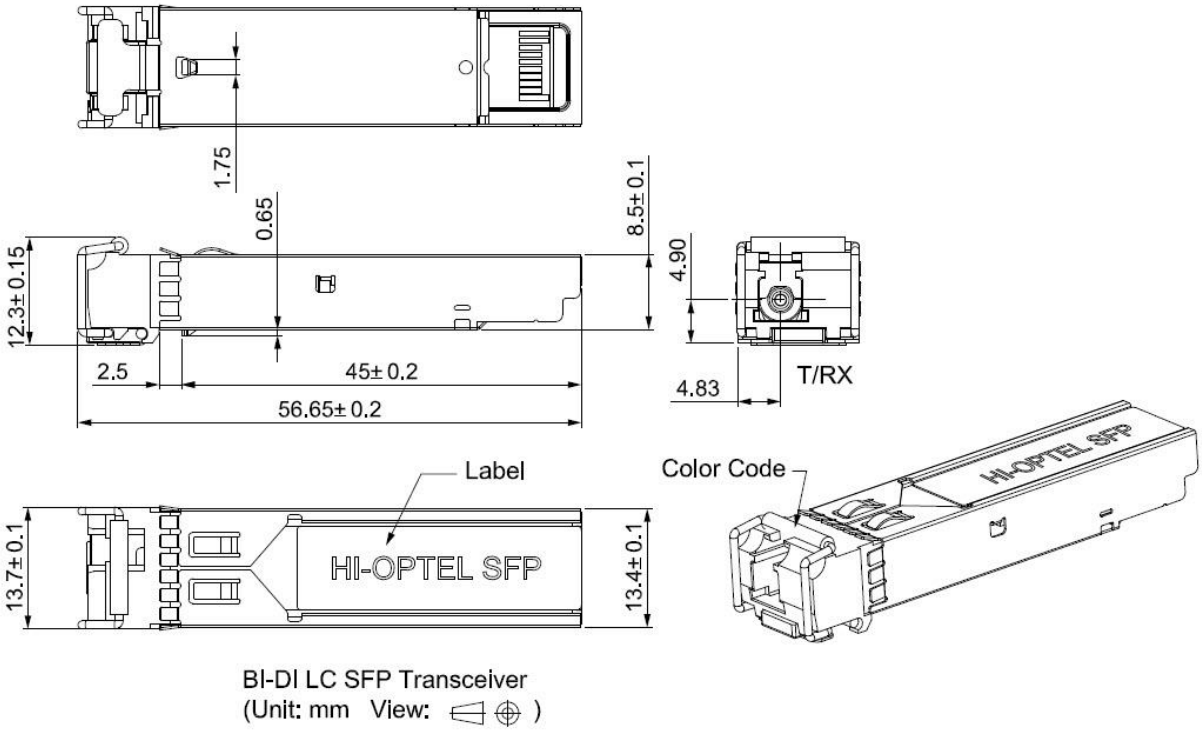
Mod-Def 0 is grounded by the module to indicate that the module is present

Mod-Def 1 is the clock line of two wire serial interface for serial ID

Mod-Def 2 is the data line of two wire serial interface for serial ID

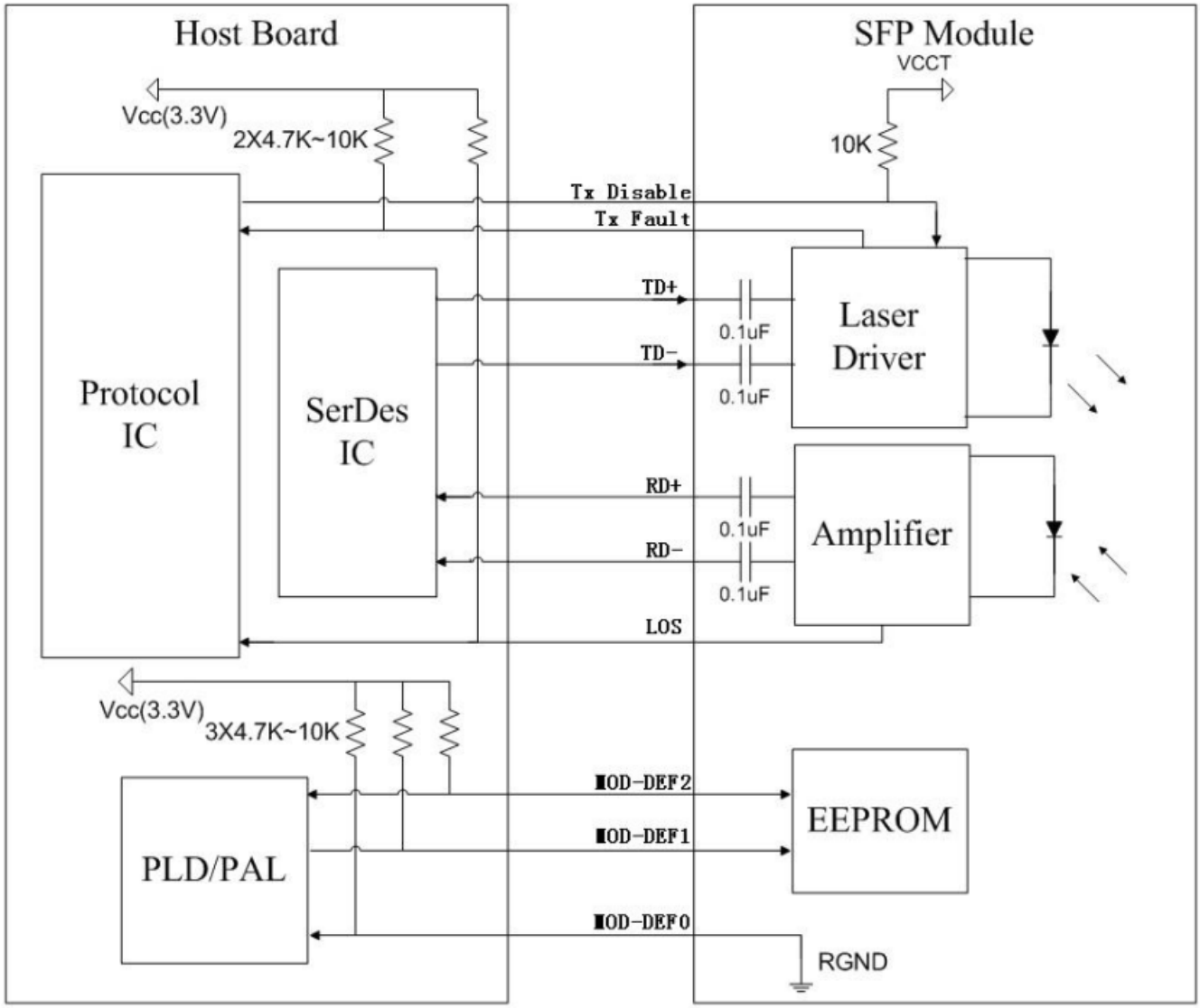
4) This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30k resistor. The input states are:
Low (0 to 0.8V): Reduced Bandwidth
(>0.8, < 2.0V): Undefined
High (2.0 to 3.465V): Full Bandwidth
Open: Reduced Bandwidth
5) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K to 10K resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to <0.8V.
6) VeeR and VeeT may be internally connected within the SFP module.
7) RD-/+: These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 2000 mV differential (185 to 1000 mV single ended) when properly terminated.
8) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300 mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than1 Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
9) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500 to 2400 mV (250 to 1200 mV single-ended), though it is recommended that values between 500 and 1200 mV differential (250 to 600 mV single-ended) be used for best EMI performance.

Mechanical Dimensions (Unit: mm)



BI-DI LC SFP Transceiver
(Unit: mm View:)

Recommended Circuit



Ordering Information:

HWTR-□□-□□□□□□□□□□F

Data Rate
01:52Mb/s
02:100Mb/s
03:155Mb/s
12:622Mb/s
24:1.25Gb/s
48:2.5Gb/s
L1:0.5~5Mb/s
L2:DC~0.5Mb/s

Transmission Distance
0:Ultra-Long Reach
1:Long Reach
2:Intermediate Reach
3:Short Reach

Wavelength(nm)
35:1310Tx/1550Rx
53:1550Tx/1310Rx
33:1310Tx/1310Rx
45:1490Tx/1550Rx
54:1550Tx/1490Rx
17:1510Tx/1570Rx
71:1570Tx/1510Rx
34:1310Tx/1490Rx
43:1490Tx/1310Rx

LD/PD Type
1:FP-LD/PIN-TIA
2:DFB-LD/PIN-TIA
5:DFB-LD/APD
6:DFB-LD with Isolator/PIN-TIA
7:DFB-LD with Isolator/APD

Fiber Type
Blank:SM
M:MM

Data/SD Interface
1:Data-TTL,SD-TTL
2:Data-PECL,SD-PECL
3:Data-PECL,SD-TTL

Operation Voltage
3:+3.3V
5:+5V

Operation Temperature
1:0 ~ +70 °C
2:-40 ~ +85 °C

Package Type
1:1X9 SC
3:2X5 SFF
4:SFP SC
5:SFP with DDMI SC
6:GBIC
7:SFP LC
8:SFP with DDMI LC

Connector
1:SC/PC
2:ST/PC
3:FC/PC
4:Pigtail with SC/PC
5:Pigtail with ST/PC
6:Pigtail with FC/PC
7:LC/PC
8:Pigtail with LC/PC
9:SC/APC