

2.5Gb/s SFP Bi-di Transceiver with DDMI

HWTR-48-054778133F

1550nm DFB-LD/APD-TIA, 80Km



Features:

- ✧ SFP Multi-source Package with LC Receptacle
- ✧ Up to 2.5Gb/s Data Links
- ✧ Up to 80km on 9/125μm SMF
- ✧ Single +3.3V Power Supply
- ✧ Hot-Pluggable
- ✧ Compliant with ITU-T G.957
- ✧ Eye Safety Designed to Meet Laser Class1, Compliant with IEC60825
- ✧ Monitoring Interface Compliant with SFF-8472
- ✧ Compliant with Bellcore TA-NWT-000983
- ✧ Operating Case Temperature
Standard(X=1):0°C~+70°C
Industrial(X=2):-40°C~+85°C
- ✧ RoHS Compliant Products



Applications:

- ✧ SDH/SONET
- ✧ WDM Application
- ✧ 2x Fiber Channel
- ✧ Gigabit Ethernet
- ✧ Other Optical Links

Specification:

Electrical and Optical 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		170	350	mA
Tx_Disable Input Voltage – Low	V _{IL}	0		0.8	V
Tx_Disable Input Voltage – High	V _{IH}	2.0		V _{CC}	V
Tx_Fault Output Voltage – Low	V _{OL}	0		0.8	V
Tx_Fault Output Voltage – High	V _{OH}	2.0		V _{CC}	V
Receiver Differential Output Volt	+/-RX_DAT	400		1400	mV p-p
Rx_LOS Output Voltage- Low	V _{OL}	0		0.8	V
Rx_LOS Output Voltage- High	V _{OH}	2.0		V _{CC}	V

Transmitter:

Parameter	Symbol	Min.	Typical	Max.	Unit
Data Rate	B	-	2.5	-	Gb/s
Centre Wavelength	λ _c	1540	1550	1560	nm

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Parameter	Symbol	Min.	Typical	Max.	Unit
Output Spectral Width	$\Delta\lambda(-20\text{dB})$	-	-	1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*Note1	P _o	-2	-	3	dBm
Extinction Ratio*Note2	E.R.	8.2	-	-	dB
Supply Current	ICC	-	100	230	mA
Rise and Fall Time (20~80%)	Tr/Tf	-		0.18	ns
Average Output Power@TX_DISABLE	Po_dis			-45	dBm
Output Optical Eye	Compliant with ITU-T.957				

Receiver:

Parameter	Symbol	Min.	Typical	Max.	Unit
Date Rate	B	-	2.5	-	Gb/s
Receive Sensitivity*Note3	P _{min}	-	-	-28	dBm
Maximum Input Power	P _{max}	-7	-	-	dBm
Signal Detect Threshold-De-Assert	S _D			-30	dBm
Signal Detect Threshold-Assert	S _A	-40			dBm
Hysteresis	-		2.0		dB
Reflection	-	-	-	-27	dB
Optical Path Penalty*Note4	OPP	-	-	2	dB
Supply Current	ICC	-	70	120	mA
Operating Wavelength	λ_c	1470	1490	1510	nm
Alarm Output Interface	LVTTTL				

Note1: Measured with 9/125μm single-mode fiber.

Note2: Filtered, measured with a PRBS 2²³-1 test pattern @2.5Gbps

Note3: Measured with ER=8.2dB, 2²³-1 PRBS data pattern, BER ≤ 1E-12.

Note4: Measured with ER=8.2dB, 2²³-1 PRBS data pattern @2.5Gbps, G.652 SMF, BER ≤ 1E-12.

Absolute Maximum Ratings: (T_C=25°C)

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Operating Temperature	T _{IP}	0	+70	°C
		-40	+85	
Input Voltage	T _{CC}	0	+3.6	V

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Recommended Operating Environment

Parameter		Symbol	Min.	Typical	Max.	Unit
Supply Voltage		V _{CC}	+3.0	+3.3	+3.6	V
Operating Temperature	X=1	T _{OP}	0	-	+70	°C
	X=2		-40	-	+85	

Timing Characteristics

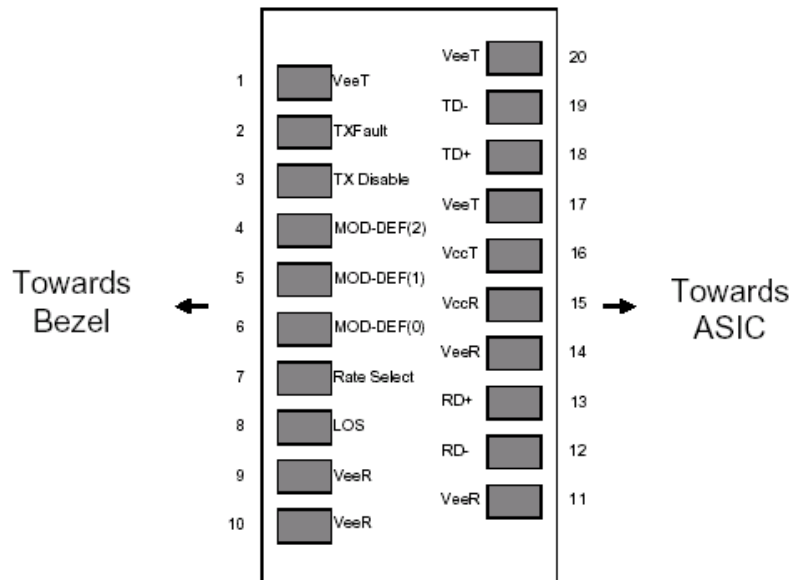
Parameter	Symbol	Min.	Typical	Max.	Unit
TX_DISABLE Assert Time	t _{off}		3	10	usec
TX_DISABLE Negate Time	t _{on}		0.5	1	msec
Time to Initialize Include Reset of TX_FAULT	t _{int}		30	300	msec
TX_FAULT from Fault to Assertion	t _{fault}		20	100	usec
TX_DISBEL Time to Start Reset	t _{reset}	10			usec
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

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

Note: For the latest certification information, please check with Hi-Optel.

Pin Assignment



Pin out of Connector Block on Host Board

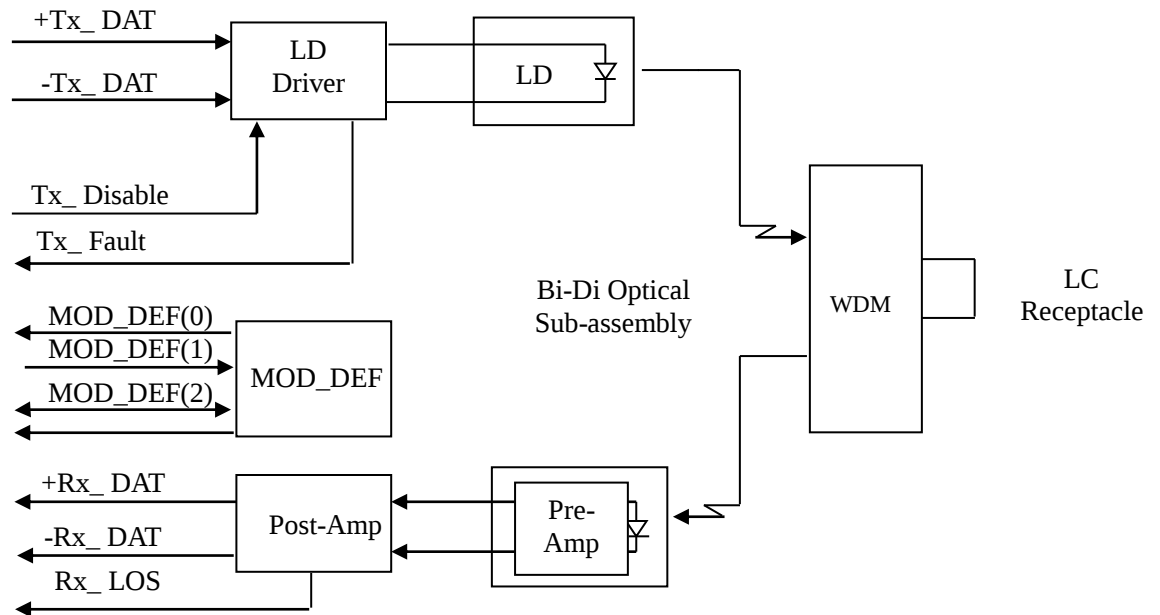
Pin Description

Pin	Symbol	Name/Description	Ref
1	VEET	Transmitter Ground(Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.Low normal operation,High Fault indication	
3	TDIS	Transmitter Disable.Laser output disabled on high or open	2
4	MOD_DEF(2)	Module Definition 2.Data line for Serial ID	3
5	MOD_DEF(1)	Module Definition 1.Clock line for Serial ID	3
6	MOD_DEF(0)	Module Definition 0.Grounded within the moudle	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication.Logic 0 indicates normal operation.	4
9	VEER	Receiver Ground(Common with Transmitter Ground)	1
10	VEER	Receiver Ground(Common with Transmitter Ground)	1
11	VEER	Receiver Ground(Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out.AC Coupled	
13	RD+	Receiver Non-inverted DATA out.AC Coupled	
14	VEER	Receiver Ground(Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground(Common with Receiver Ground)	1
18	TD+	Transmitter Non-inverted DATA in.AC Coupled	
19	TD-	Transmitter Inverted DATA in.AC Coupled	
20	VEET	Transmitter Ground(Common with Receiver Ground)	1

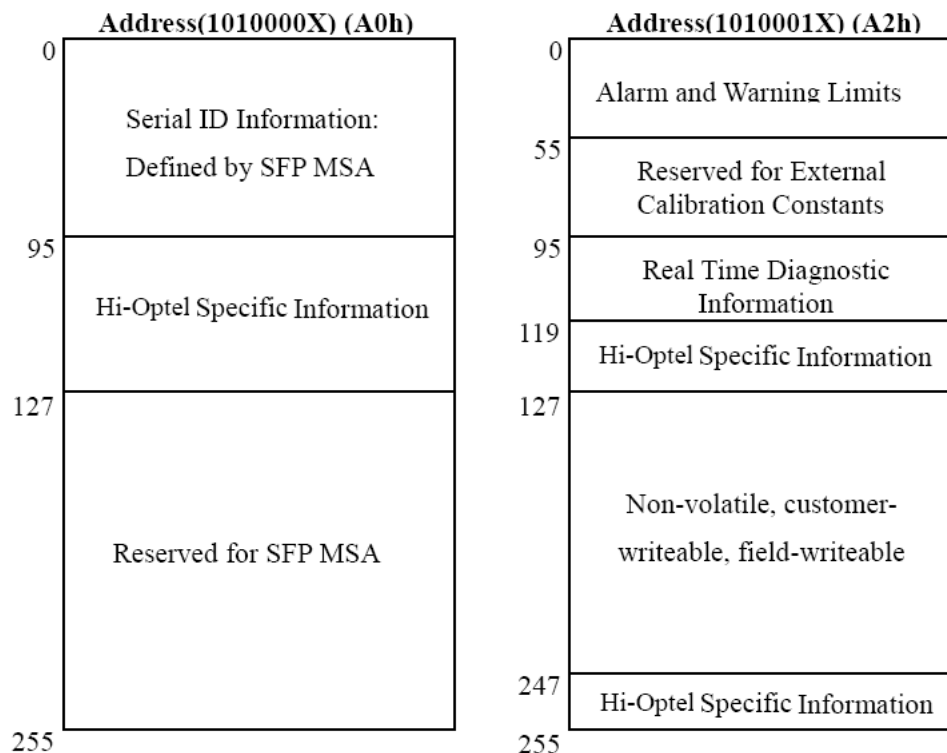
Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Block Diagram of Transceiver



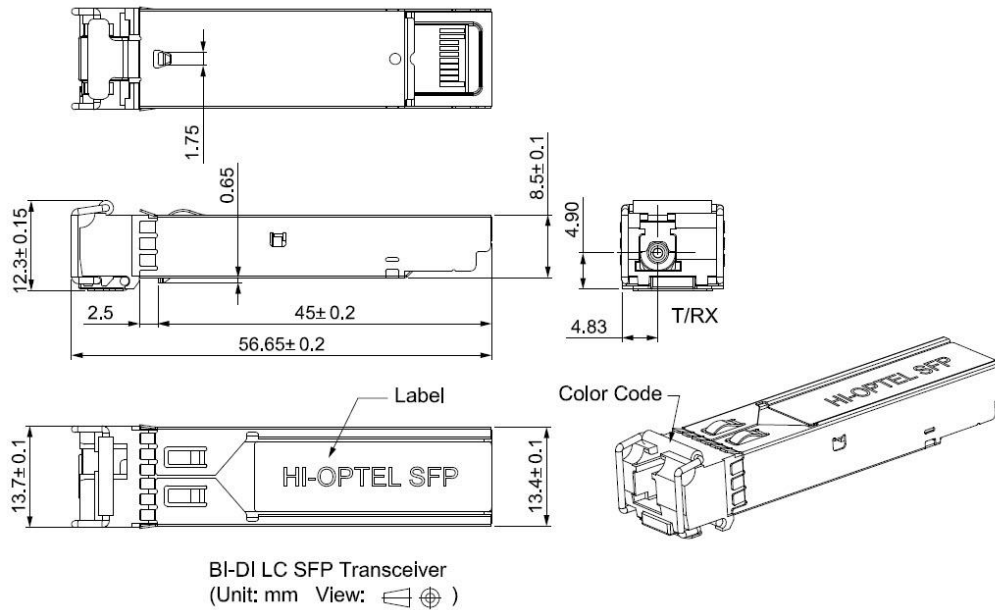
Data Field Descriptions



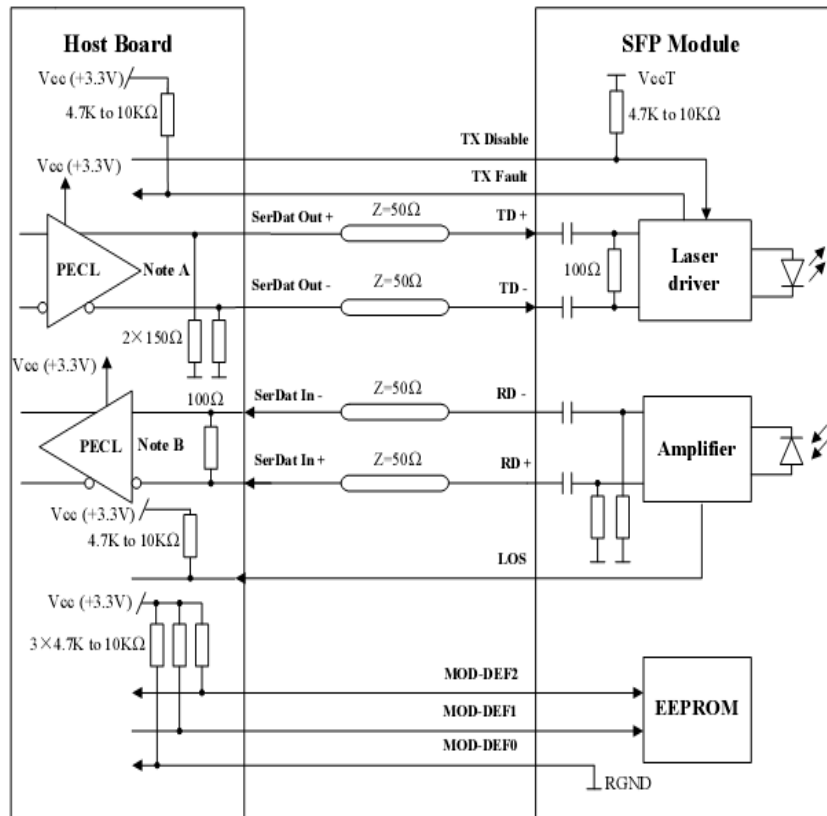
Digital Diagnostic Monitor Characteristics

A2h address	Parameter	Calibration	Accuracy	Unit
96-97	Temperature	Internal	+/- 3	°C
98-99	Vcc	Internal	+/- 3%	V
100-101	Tx bias	Internal	+/- 10%	mA
102-103	Tx power	Internal	+/- 3	dB
104-105	Rx Power	Internal	+/- 3	dB

Mechanical Dimensions:



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
60:3.125Gb/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
75:1470Tx/1550Rx
57:1550Tx/1470Rx
97:1490Tx/1570Rx
79:1570Tx/1490Rx
19:1510Tx/1590Rx
91:1590Tx/1510Rx
31:1530Tx/1610Rx
13:1610Tx/1530Rx
59:1350Tx/1490Rx
95:1490Tx/1350Rx

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
4:+3.3V & +5V
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

0:Other
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