

2.5Gb/s SFP Optical Transceiver with DDMI

HSFP-48-2322S-22F

1310nm DFB-LD/PIN-TIA, 10Km



Features:

- ✧ Multi-Source Package with Duplex LC Connector
- ✧ Up to 2.5Gb/s Data Links
- ✧ Up to 15km on 9/125μm SMF
- ✧ Single +3.3V Power Supply
- ✧ Hot-Pluggable
- ✧ Compliant with Specifications for ITU-T G.957, G.958
- ✧ 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 -40°C~+85°C
- ✧ RoHS Compliant Products



Applications:

- ✧ STM-16
- ✧ Fiber channel
- ✧ Metro/Access Networks
- ✧ 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		160	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	1260	1310	1360	nm
Output Spectral Width	Δλ(-20dB)	-	-	1	nm
Parameter	Symbol	Min.	Typical	Max.	Unit

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Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*Note1	P _o	-5	-	0	dBm
Extinction Ratio*Note2	E.R.	8.2	-	-	dB
Supply Current	ICC	-	100	230	mA
Rise/Fall Time(20%~80%)	tr/tf	-	-	150	ps
Average Output Power@TX_DISABLE	P _{o_dis}			-45	dBm
Output Optical Eye	Compliant with ITU-T G.957				

Receiver:

Parameter	Symbol	Min.	Typical	Max.	Unit
Date Rate	B	-	2.5	-	Gb/s
Receive Sensitivity*Note3	P _{min}	-	-	-18	dBm
Maximum Input Power	P _{max}	0	-	-	dBm
Signal Detect Threshold-De-Assert	S _D			-20	dBm
Signal Detect Threshold-Assert	S _A	-35			dBm
Hysteresis	-		2.0		dB
Return Loss	RL	12	-	-	dB
Supply Current	ICC	-	60	120	mA
Operating Wavelength	λ _c	1100	-	1620	nm
Alarm Output Interface	LVTTL				

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.

Absolute Maximum Ratings: (T_C=25°C)

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Operating Temperature	X=1	0	+70	°C
	X=2	-40	+85	
Input Voltage	T _{CC}	0	+3.6	V

Recommended Operating Environment:

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

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Timing Characteristics

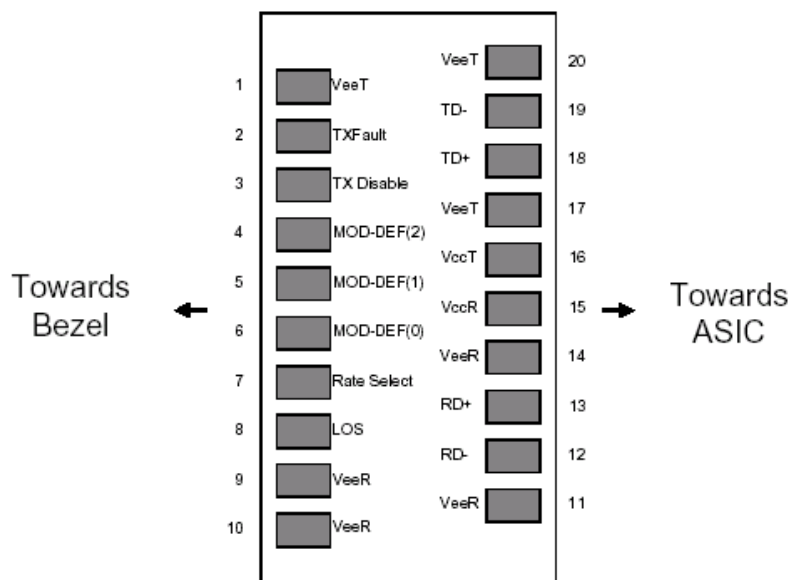
Parameter	Symbol	Min.	Typical	Max.	Unit
TX_DISABLE Assert Time	t_off		3	10	usec
TX_DISABLE Negate Time	t_on		0.5	1	msec
Time to Initialize Include Reset of TX_FAULT	t_int		30	300	msec
TX_FAULT from Fault to Assertion	t_fault		20	100	usec
TX_DISBEL Time to Start Reset	t_reset	10			usec
Receiver Loss of 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

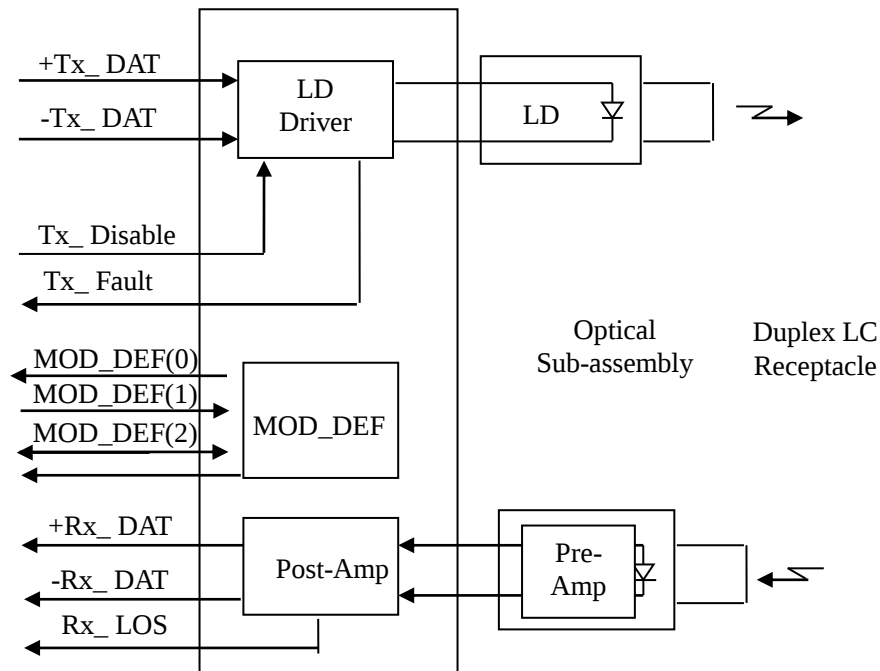
Pin Description

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

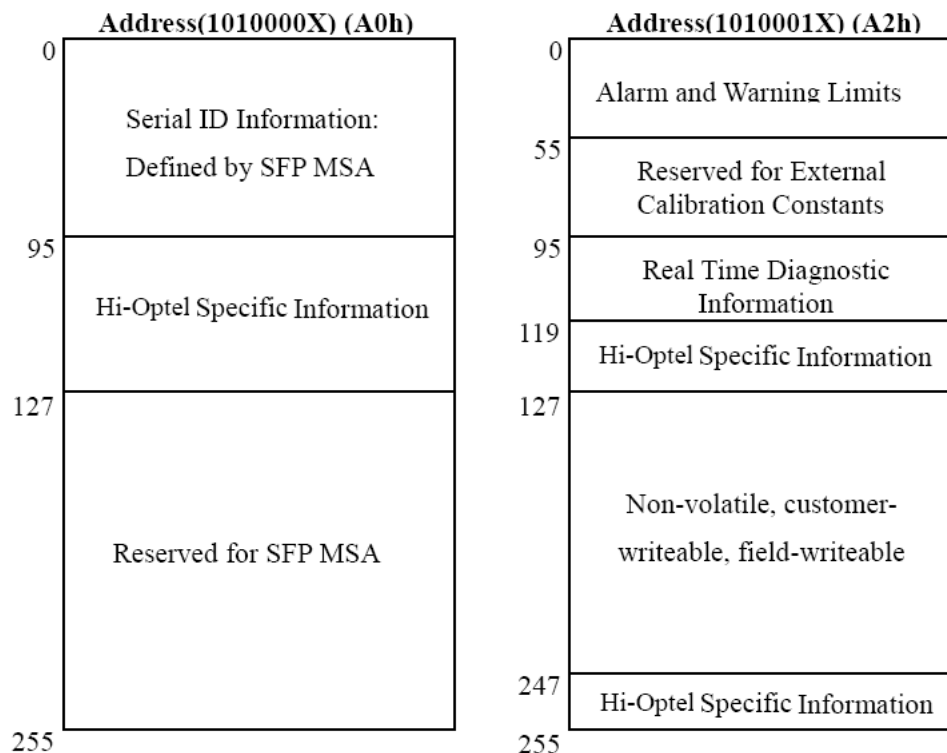
Notes:

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

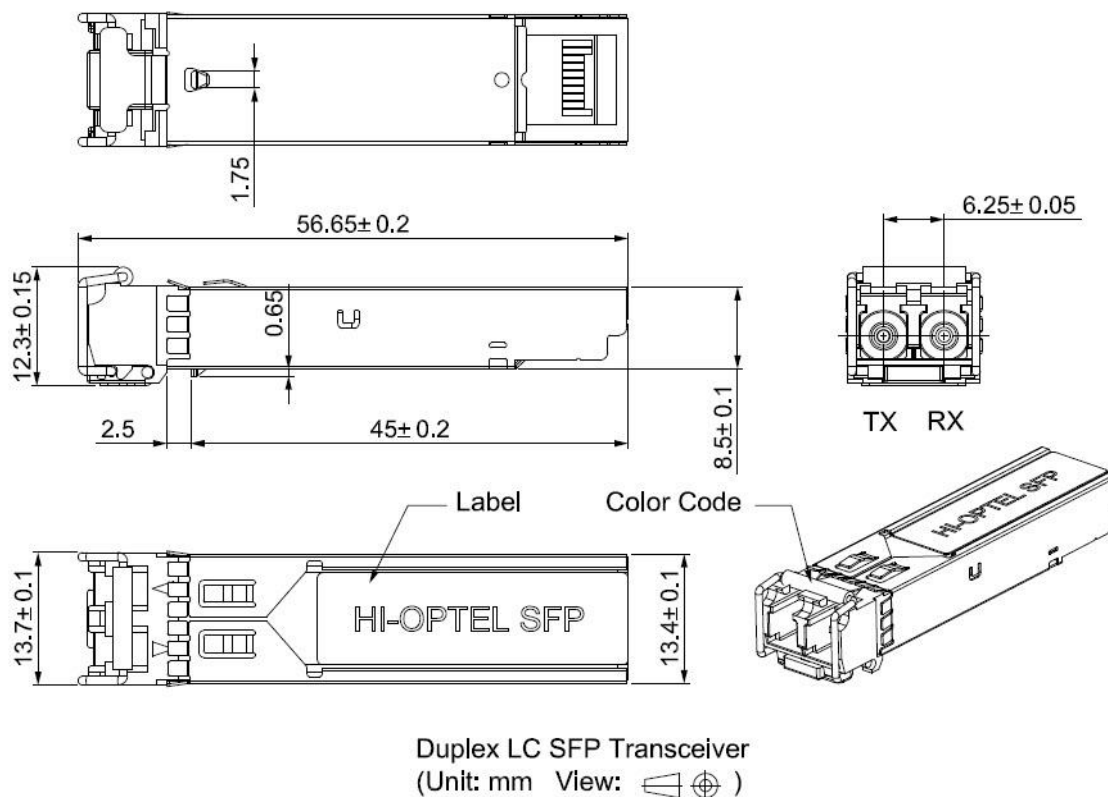
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Mechanical Dimensions:



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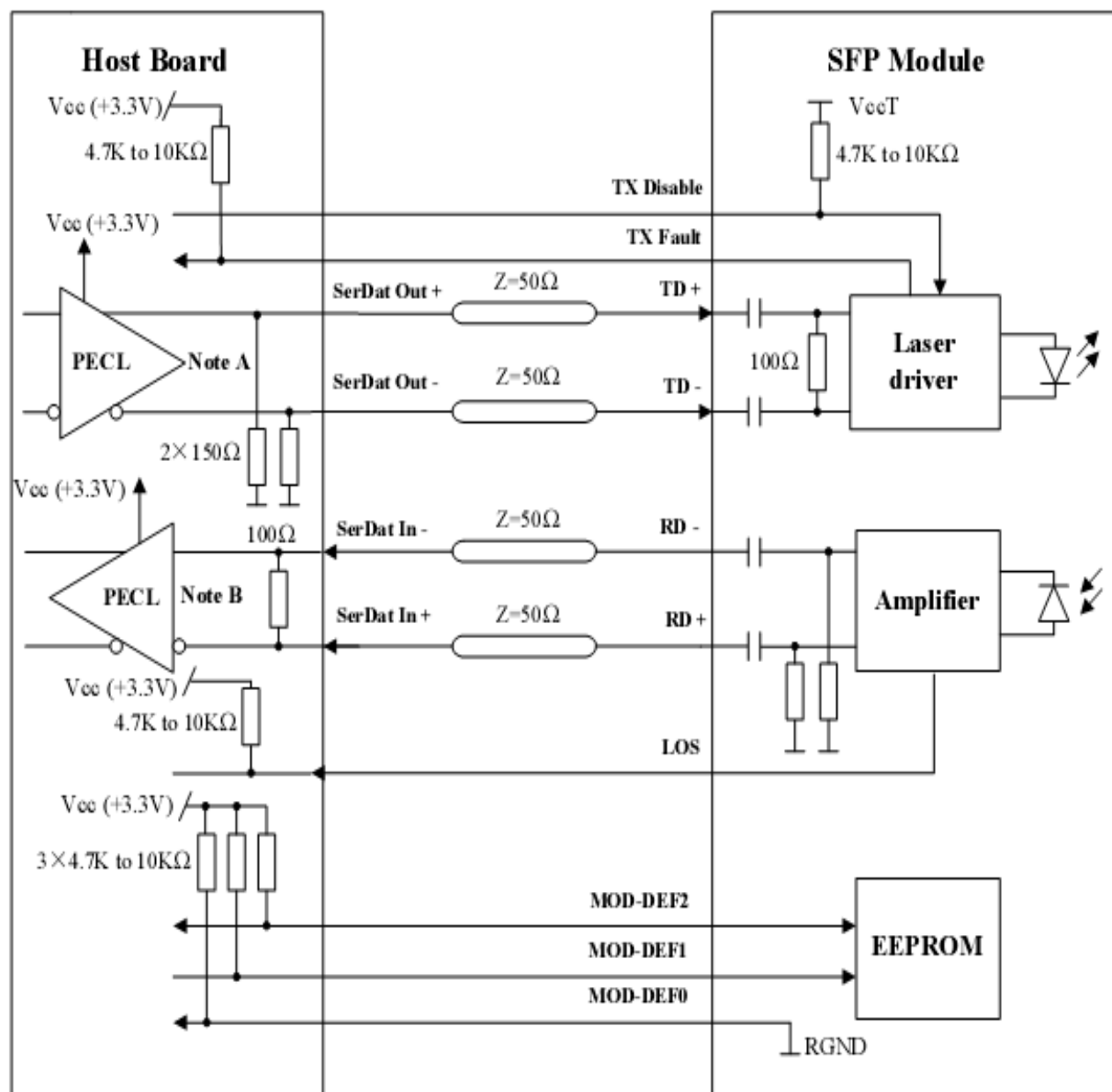
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Recommended Circuit:



Note A: Circuit assumes open emitter output

Note B: Circuit assumes high impedance internal bias @Vcc-1.3V

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Ordering Information:

HSFP-□□-□□□□□□-□□F

Data Rate

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

3:1310nm
5:1550nm
8:850nm

LD/PD Type

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

Application

1:Fiber Channel
2:Others

DDMI

1:Without DDMI
2:With DDMI

Fiber Type

S:SM
M:MM

Operation Temperature

1:0 ~ +70 °C
2:-40 ~ +85 °C

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