Features

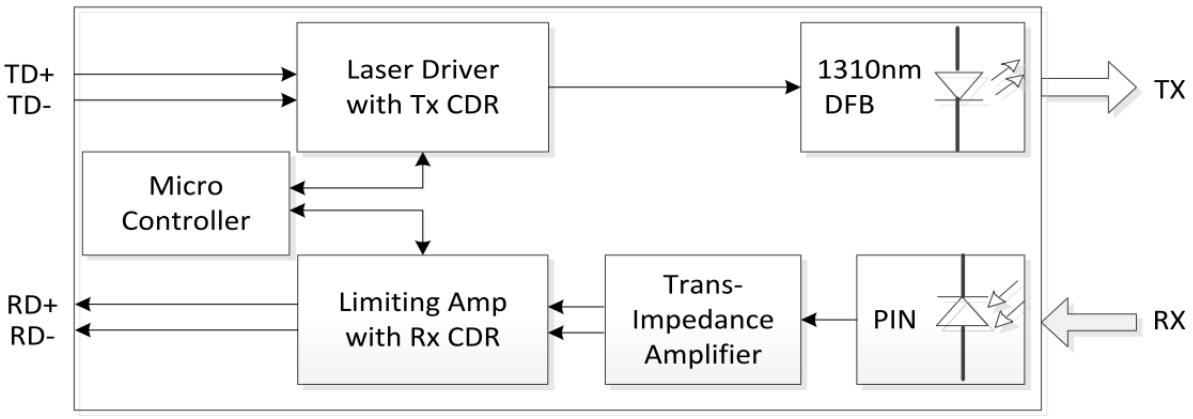
- ✧ Compliant with MSA SFP+ Specification SFF-8402
- ✧ Monitoring Interface Compliant with SFF-8472
- ✧ Single +3.3V Power Supply
- ✧ Hot-Pluggable
- ✧ Built-in dual CDR
- ✧ Support 25.78 Gb/s and 28.05Gb/s Data Links
- ✧ Up to 10Km on 9/125um SMF
- ✧ Very low EMI and excellent ESD protection
- ✧ Operating Case Temperature:0℃~+70℃
- ✧ Power Dissipation < 1.2W
- ✧ RoHS Compliant Products

Applications

- ✧ 25GbE
- ✧ 32GFC
- ✧ Other Optical Links

Description

HSFP28-2321 is SFP28 module for duplex optical data communications support 25.78 Gb/s and 28.05 Gb/s data links. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I2C. It has built-in dual clock and data recovery (CDR).This module is designed for single-mode fiber and operates at a nominal wavelength of 1310nm.The transmitter section uses a high performance 1310nm DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector pre-amplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.



SFP28 LR Module

Specification

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

Parameter	Symbol	Min.	Typical	Max.	Unit
Link Distance with G.652	-	-	-	10	Km
Power Dissipation	-	-	-	1.2	W
Transmitter:					
Transmitter Differential Input Volt*Note1	+/-TX_DAT	180		1600	mV p-p
Input Impedance (Differential)	Zin		100		Ω
Tx_Disable Input Voltage – Low	V_{IL}	-0.3		0.8	V
Tx_Disable Input Voltage – High	V_{IH}	2.0		Vcc+0.3	V
Tx_Fault Output Voltage – Low	V_{OL}	-0.3		0.8	V
Tx_Fault Output Voltage – High	V_{OH}	2.0		Vcc+0.3	V
Receiver:					
Receiver Differential Output Volt*Note1	+/-RX_DAT	370		850	mV p-p
Output Impedance (Differential)	Zout		100		Ω
Rx_LOS Output Voltage- Low	V_{OL}	-0.3		0.8	V
Rx_LOS Output Voltage- High	V_{OH}	2.0		Vcc+0.3	V

Note1: AC coupled.

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

Transmitter:

Parameter	Symbol	Min.	Typical	Max.	Unit
Data Rate	B	-	25.78	-	Gb/s
Centre Wavelength	λc	1295	1310	1325	nm
Output Spectral Width	△λ(-20dB)	-	-	1	nm
Average Output Power*Note1	Po	-7	-	2	dBm
Extinction Ratio*Note2	E.R.	3	-	-	dB
Transmitter Dispersion Penalty	TDP	-		2.7	dB
Output Optical Eye	Compliant to IEEE802.3by				

Receiver:

Parameter	Symbol	Min.	Typical	Max.	Unit
Date Rate	B	-	25.78	-	Gb/s
Operating Wavelength	λ c	1295	-	1325	nm
Average Receiver Power*Note3	P_{avg}	-13.3	-	2	dBm
Receive Sensitivity (OMA)*Note4	RxSEN	-	-	-12	dBm

Stressed Receive Sensitivity (OMA)	$RxSEN_S$	-	-	-9.5	dBm
Maximum Input Power	P_{max}	2.0	-	-	dBm
Signal Detect Threshold-De-Assert	S_D	-	-	-17	dBm
Signal Detect Threshold-Assert	S_A	-30	-	-	dBm
Hysteresis	-	0.5	-	-	dB
Optical Return Loss	ORL	-	-	-26	dB

Note1: Measured with 9/125μm single-mode fiber.
Note2: Measured with a PRBS 2^31-1 test pattern @25.78Gb/s
Note3: Only for reference, per IEEE802.3CC.
Note4: Measured with ER=3.5dB, 2^31-1 PRBS data pattern, BER less than 5E-5@25GB and less than 1E-6@32G FC.

Absolute Maximum Ratings: (T_C=25℃)

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_{ST}	-40	+85	℃
Operating Temperature	T_{IP}	0	+70	℃
Input Voltage	T_{CC}	0	+4.0	V
Operating Relative Humidity	RH	5	95	%

Note: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Environment:

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	V_{CC}	+3.135	+3.3	+3.465	V
Operating Temperature	T_{OP}	0	-	+70	℃

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

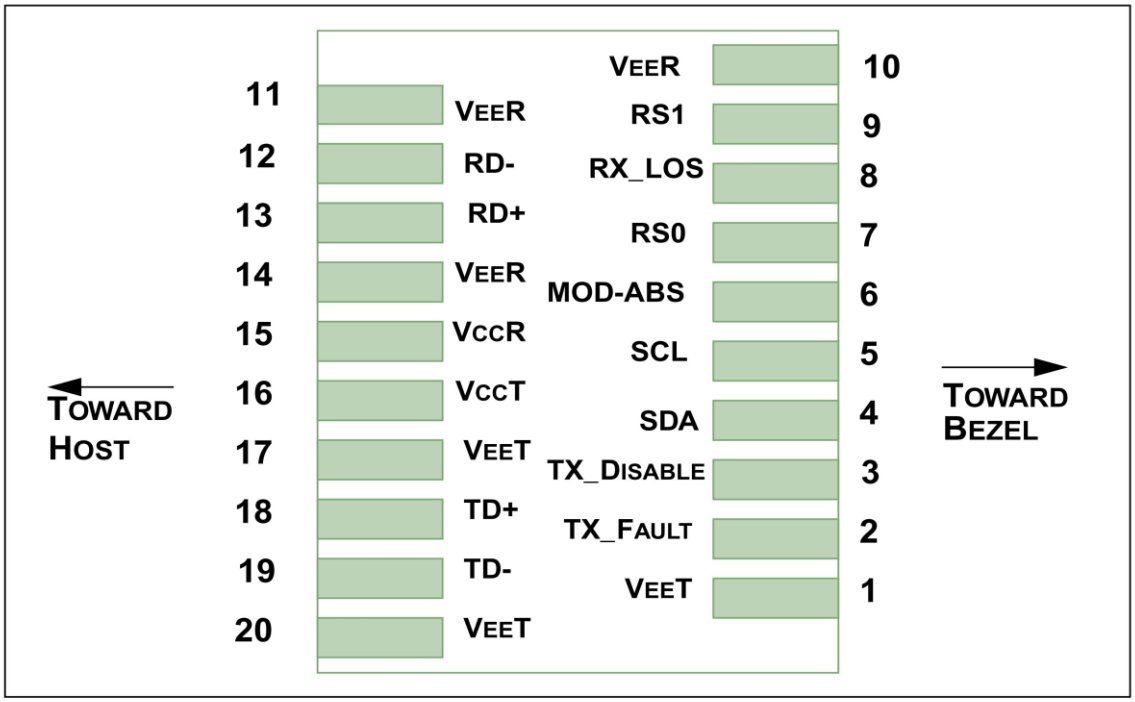


Figure 1 Host PCB SFP+ Pad Pinout Top View

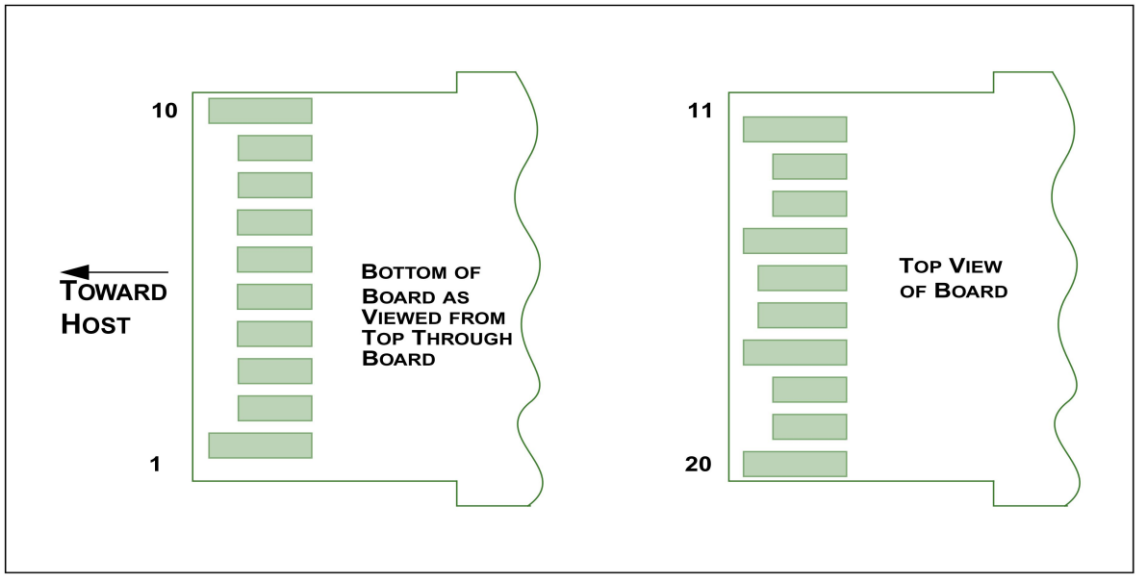


Figure 2 SFP+ Module PCB Pinout

Pin Description

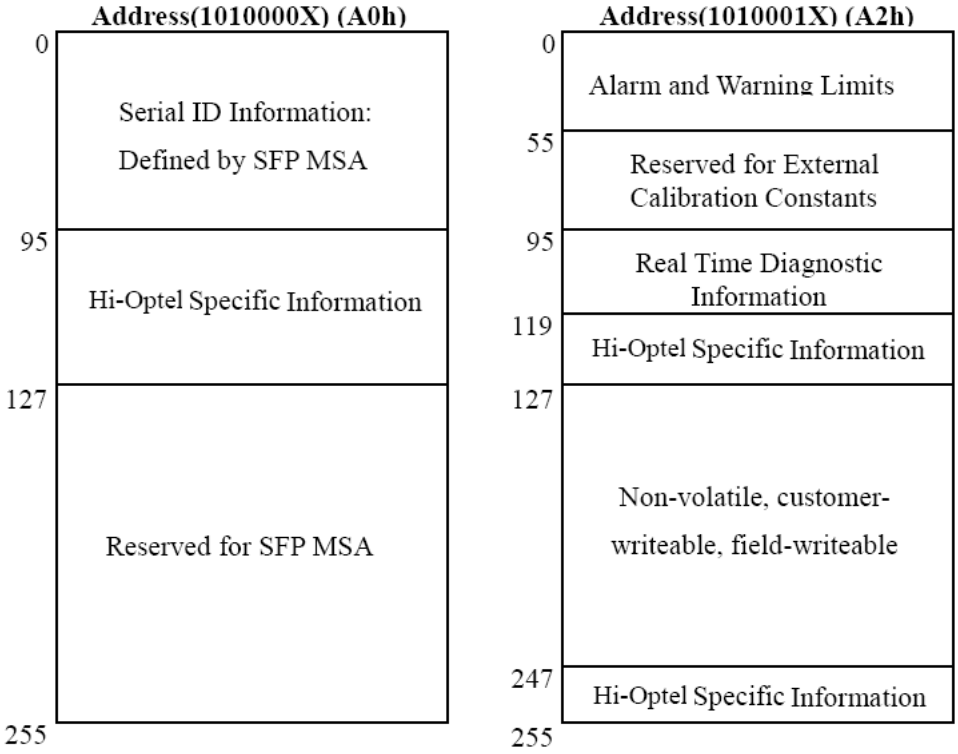
Pin	Symbol	Name/Description	Ref
1	VeeT	Transmitter Ground(Common with Receiver Ground)	1
2	Tx Fault	Transmitter Fault. Low normal operation, High Fault indication	
3	Tx Disable	Transmitter Disable. Laser output disabled on high or open	2
4	SDA	Module Definition 2.Data line for Serial ID	3
5	SCL	Module Definition 1.Clock line for Serial ID	3
6	MOD-ABS	Module Definition 0.Grounded within the module	
7	RS0	Rate Select 0, optionally controls SFP28 module receiver. LVTTL Logic.	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	4
9	RS1	Rate Select 1, optionally controls SFP28 module transmitter. LVTTL Logic.	5
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. VeeR and VeeT may be internally connected within the SFP28 module.
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.
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.
5. Pulled low to VeeR or VeeT with a >30K resistor within the SFP28 module.

Data Field Descriptions

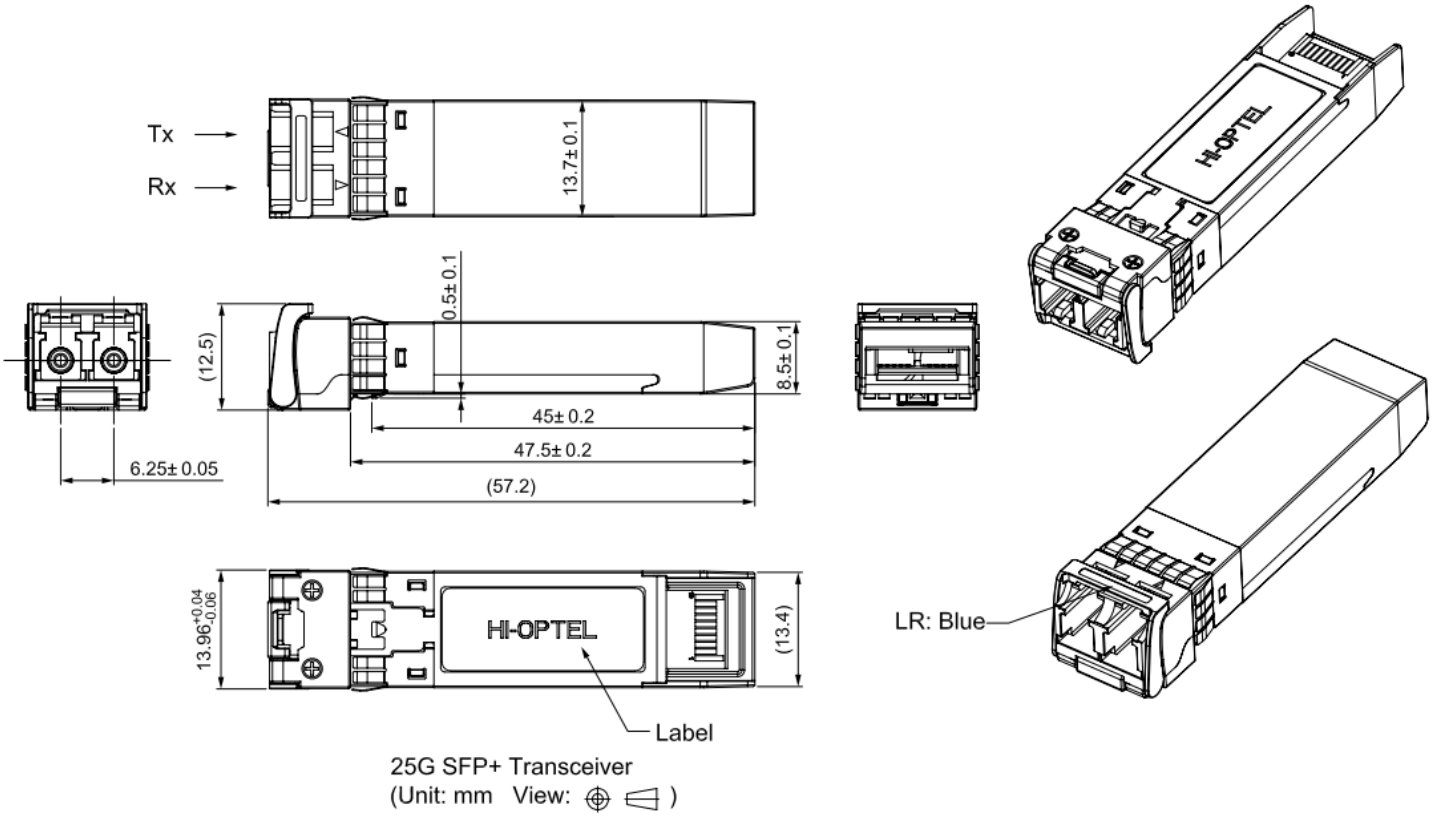
The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented.
The digital diagnostic memory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 12.2.



Digital Diagnostic Monitor Characteristics

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

Mechanical Dimensions:



25G SFP+ Transceiver
(Unit: mm View:)