Preliminary

NEC

25Gbps Transceiver

OD-PPPS21540001

25Gbps SFP Optical Transceiver Module

1. Features

- •Digital diagnostic monitor compatible with SFF-8472
- •1310nm DFB transmitter, PIN photo-detector
- •Up to 10km on Single Mode Fiber (SMF)
- •Transmission data rate up to 25.78Gbit/s
- •LC duplex connector
- •Hot Pluggable Capability
- •Power dissipation <1.5W
- •Compliant With ROHS Standard
- •25Gb/s serial optical interface compliant to IEEE 802.3ae 25GBASE-LR

Applications
25G Ether application(25.78Gb/s)
25G CPRI application(24.33Gb/s)
Other Optical Link

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2.Absolute Maximum Ratings

No	Parameter	Unit	Specification			Remarks
			Min	Typ.	Max	
Ab-1	Storage Temperature (Ta)	deg.C	-40	-	+85	
Ab-2	Supply Voltage (Vcc)	V	0	-	3.6	
Ab-3	Relative Humidity	%	5	-	85	non-condensing
Ab-4	Damage Threshold for Rx	dBm	3	-	-	Input power to Rx

3.Operating Conditions

No	Items	Unit	Min.	Typ.	Max.	Remarks
Oc-1	Data Rate	Gbps	-	25.78	-	+/- 100ppm(CDR ON)
Oc-2	Transmission Cable		SMF (ITU-T G.652)			
Oc-3	Case Temperature (Tc)	°C	-20	-	+85	
Oc-4	Ambient humidity	%	5	-	85	non-condensing
Oc-5	Power supply voltage (Vcc)	V	+3.135	+3.300	+3.465	
Oc-6	Power Consumption	W			1.5	

4.Optical Interface

4.1 Transmitter Section

Item No	Parameter	Symbol	Min.	Typ.	Max.	Units	Remarks
TO-1	Center wavelength range	WL_{tx}	1295	1310	1325	nm	
TO-2	Side Mode Suppression Ratio	SMSR	30			dBN	
TO-3	Average Optical Power	Po_ave	-7	-	+2	dBm	Note 1
TO-4	Optical Modulation Amplitude	Poma	-4			dBm	
TO-5	Average launch power of Tx Disable	Po_dis			-30	dBm	
TO-6	Extinction ratio	ER	3.5	-	-	dB	
TO-7	Transmitter and dispersion penalty	TDP			2.7	dB	@BER=5e-5
TO-8	Optical return loss tolerance	ORL	-	-	12	dB	
TO-9	Transmitter eye mask		{X1,X2,X3,Y1,Y2,Y3} = {0.31, 0.40, 0.45, 0.34, 0.38, 0.40}				Note 2

4.2 Receiver Section

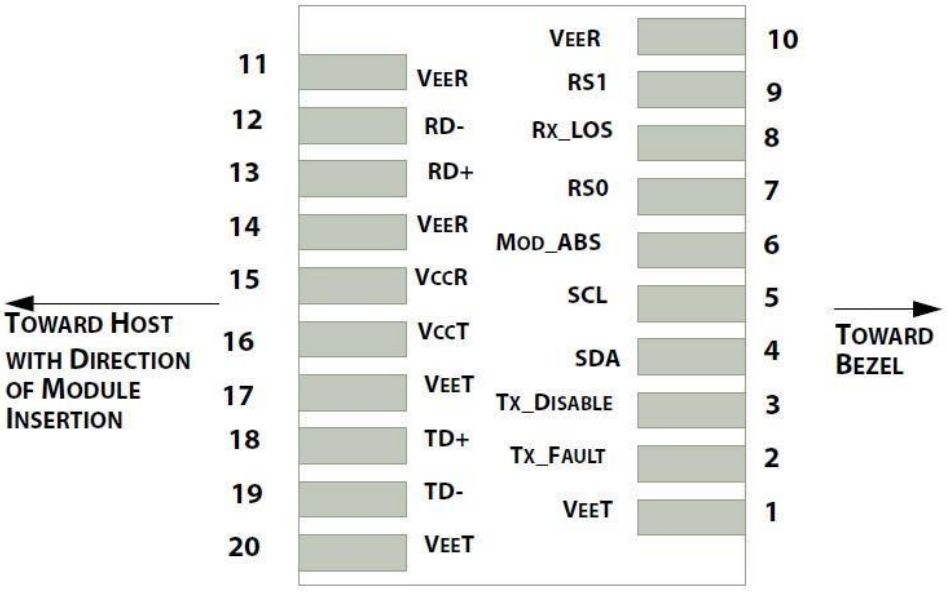
Item No	Parameter	Symbol	Min.	Typ.	Max.	Units	Remarks
RO-1	Center wavelength range	WL_{tx}	1295	1310	1325	nm	
RO-2	Average receive power	Pr_avg	-13.3	-	2	dBm	Note 3
RO-3	Receiver sensitivity (OMA)	Pr_oma	-	-	-11.3	dBm	Note 3
RO-4	Receiver reflectance	RR	-	-	-26	dB	
RO-5	LOS Assert Level	LOSA	-30	-	-	dBm	
RO-6	LOS Deassert Level	LOSD	-	-	-17	dBm	
RO-7	LOS Hysteresis	LOSH	0.5	-	-	dB	

Note 1. Measured with a PRBS 231-1 test pattern @25.78Gbps
Note 2. IEEE802.3cc mask and filter Hit Ratio meet the standard of 5E-5 under margin.
Note 3. Measured with Light source 1310nm,ER=4dB,BER <5E-5@PRBS=2^{31}-1,NRZ

5.Electrical Interface

Transmitter Section:						
TX Disable Input Voltage Low	VDisH	0	-	0.8	V	
TX Disable Input Voltage High	VDisH	2.0	-	VCCHOST	V	
Transmit Fault Output Low	VFaultL	0	-	0.8	V	
Transmit Fault Output High	VFaultH	2.0	-	VCCHOST	V	
Differential Input Voltage Swing	Vin,pp	190		700	mVpp	
Receiver Section:						
Rx Output Diff Impedance	Zin	90	100	110	Ω	
Rx Output Diff Voltage	Vo	300		900	mV	
Receiver Loss of Signal Output Voltage-Low	VLosL	0	-	0.8	V	
Receiver Loss of Signal Output Voltage-High	VLosH	2.0	-	VCC	V	

6.Pin Configuration



Pin	Logic	Name	Function	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	3
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	4
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	4
6		MOD_DEF0	Module Definition, Grounded in the module	4
7	LVTTL-I	RS0	Not Connected	5
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	6
9	LVTTL-I	RS1	Not Connected	5
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	
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

Note1.Circuit ground is internally isolated from chassis ground.
Note2.TFAULT is an open collector/drain output, which should be pulled up with a 4.7k– 10kOhms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc+0.3V.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
Note3.Laser output disabled on TDIS>2.0V or open, enabled on TDIS<0.8V.
Note4.Should be pulled up with 4.7kΩ-10kΩ host board to a voltage between 2.0V and 3.6V.MOD_ABS pulls line low to indicate module is plugged in.
Note5.Internally pulled down per SFF-8431 Rev4.1.
Note6.LOS is open collector output. It should be pulled up with 4.7kΩ–10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation, logic 1 indicates loss of signal.

7.Memory map and EEPROM information

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, “Digital Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

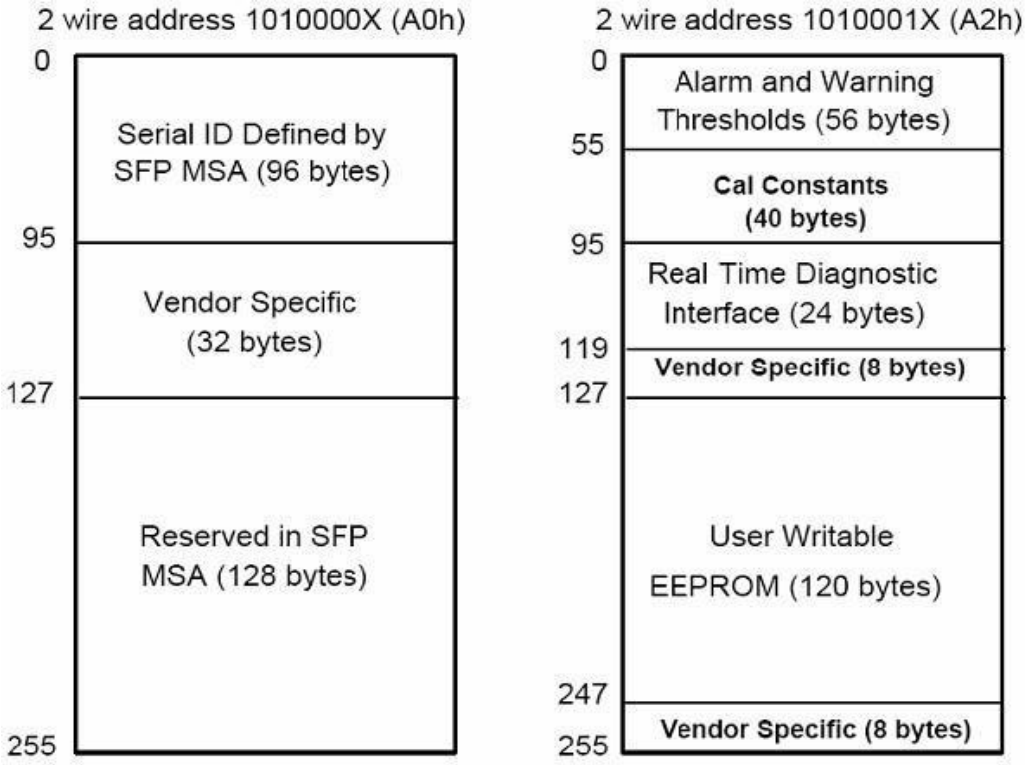


Figure 9-1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

Digital Diagnostic Monitor Characteristics

Data Address	Parameter	Accuracy	Unit
96-97	Temperature monitor absolute error	±3.0	°C
98-99	Laser power monitor absolute error	±3.0	%
100-101	RX power monitor absolute error	±10	%
102-103	Supply voltage monitor absolute error	±3.0	dB
104-105	Bias current monitor	±3.0	dB

8.Recommended interface circuit

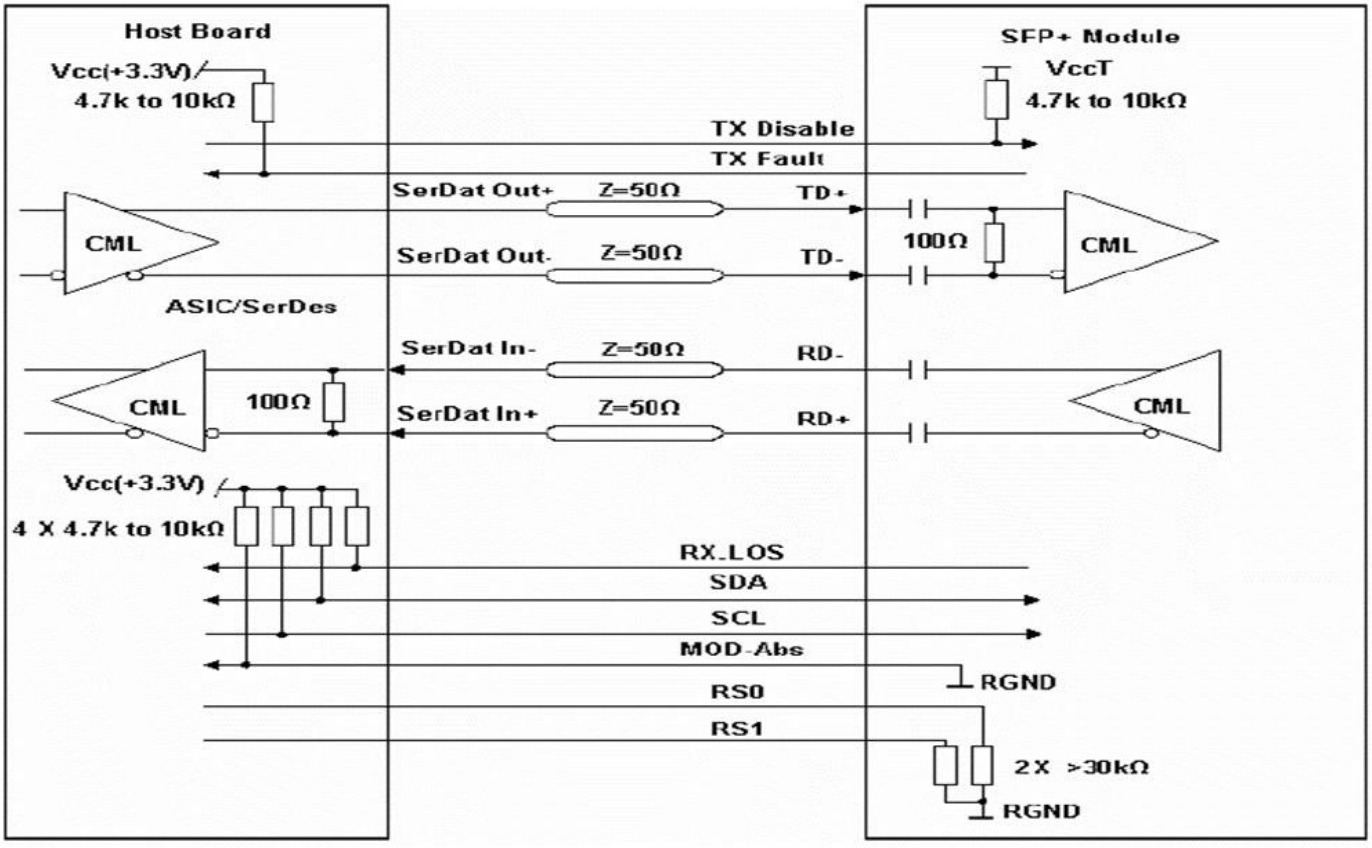


Figure 8-1. Recommended Interface Circuit

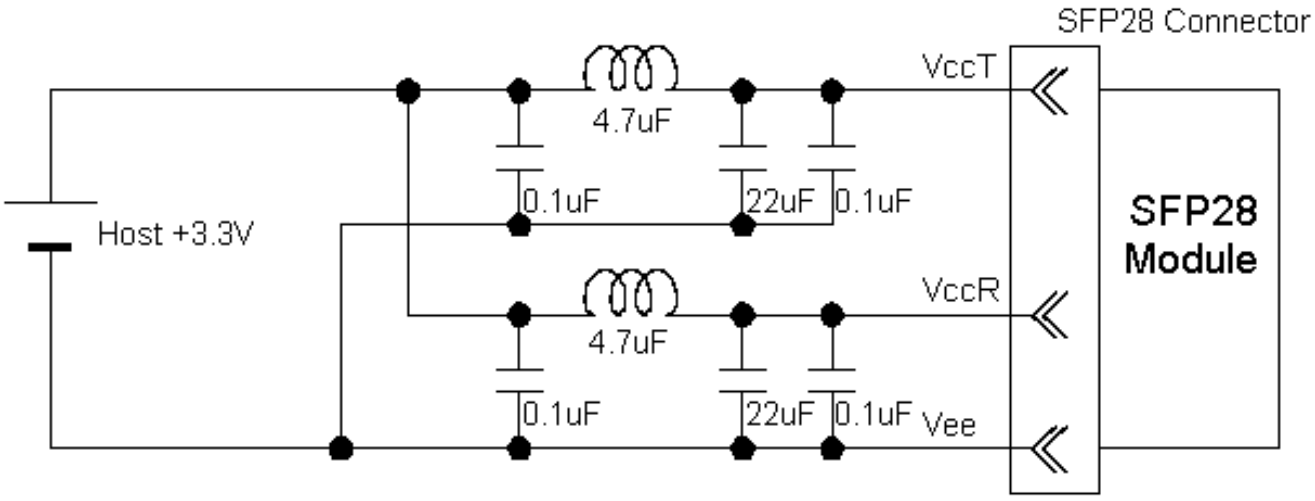


Figure 8-2. Recommended Host Board Supply Filtering Network

9.Label

Label size : T.B.D.
Line 1 : NEC Logo
Line 2 : Part Number
Line 3 : Year, Month of Manufacture and 6-digit Serial Number
Line 4 : Country of Manufacture
Right side : 2D Barcode (Part Number, Year and Month of manufacture, and Serial Number)

10.Ordering Information

Part Number	Fiber Optical Connector	Tx wavelength	Case Temperature
OD-PPPS21540001	LC	1310nm	-20 to 85deg.C

11.Mechanical Dimensions

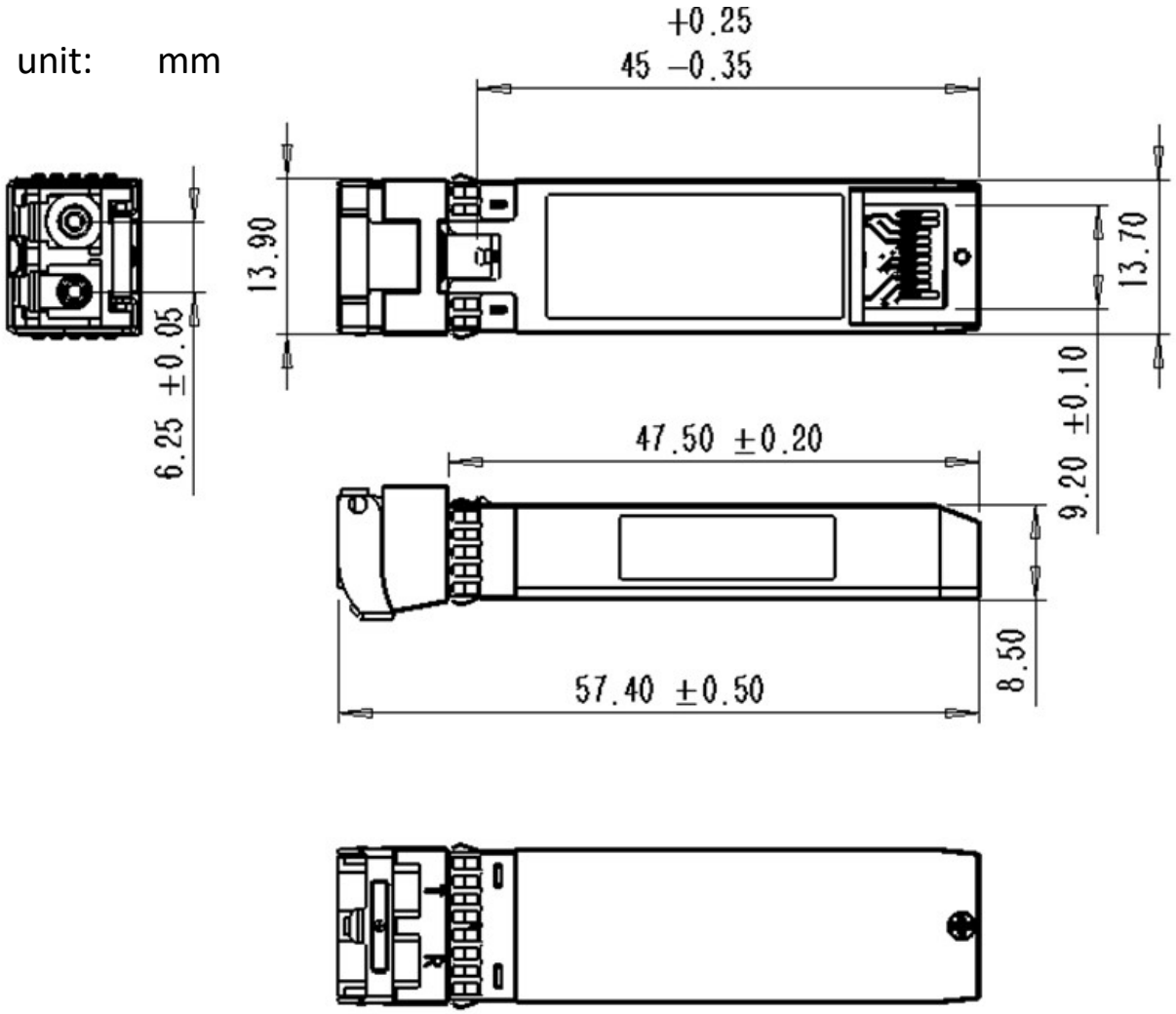


Figure 11-1. Transceiver Outline

- Revision history -

Revision	Date	Contents
P1	19th May 2025	Preliminary Datasheet

Areas of caution in the handling of laser diode products.

● This product complies with IEC 60825-1:2014, IEC 60825-1:2007 and 21 CFR 1040.10, which correspond to the category “Class 1 Laser Product” under IEC regulation and “Class I Laser product” under FDA regulation.

●During operations, the laser diode discharges red beams and infrared beams invisible to the eye. Since it is very hazardous if these beams directly, or bypassing through a lens, get in one’s eyes, please try to avoid this.

● Take proper Electrostatic-discharge (ESD) precautions while handling the device. The device is sensitive to ESD.

● May cause of damage if drop or subject to shock. This product includes optical parts.

●Caution-use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Areas of caution in handling GaAs.

There are some products in our catalogue that use GaAs. Please strictly adhere to the caution items appearing below, in order to prevent dangerous situations.

○Do not put the product in your mouth.

○Do not turn the product into a vaporous or powdered form through burning, grinding or chemical processing.

○When disposing of the product, follow related laws, and your company’s internal waste control regulations.

Areas of caution in handling optical fiber products.

●Be careful not to pierce your skins as the tips of optical fibers are extremely sharp. Especially you must attention in case of hazardous if they pierce one’s eyes.

● Do not apply extreme stress to optical fiber, or it may cause deterioration of characteristics or disconnection. The force of pull should be less than 200gf, and a radius for bending should be larger than R30 mm

● Do not hold only optical fiber or module package, because extreme stress is easy to apply to the optical fiber edge of the module

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Specific level: Aeronautical equipment, aerospace equipment, submarine relay equipment, nuclear control system, and medical equipment, devices or systems for life support.

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