

## Features:

- ☞ Supports 25.78125Gb/s serial optical interface
- ☞ Up to 10km transmission on SMF
- ☞ Un-cooled DFB laser and PIN receiver
- ☞ Hot-pluggable SFP28 footprint
- ☞ Built-in digital diagnostic functions
- ☞ Single +3.3V power supply
- ☞ Power consumption less than 1.3 W
- ☞ Operating case temperature: -40~+85°C
- ☞ Internal CDR on both transmitter and receiver channel
- ☞ Support CDR bypass
- ☞ SFP28 MSA package with simplex LC connector, Bi-directional

## Applications:

- ☞ 25GBASE-BX 25G Ethernet
- ☞ 25.78125 Gb/s single lane 100GE LR4
- ☞ Other optical links

## Specification:

### ● Electrical and Optical Characteristics: (Condition: $T_a=T_{OP}$ )

Parameter	Symbol	Min	Typ	Max	Unit
Differential Data Input Amplitude	VIN,P-P	180	-	1200	mVpp
Input Differential Impedance	ZIN	90	100	110	$\Omega$
Transmitter Fault Output-High	VOH	2.0	-	VCC	V
Transmitter Fault Output-Low	VOL	0	-	0.8	V
Transmitter Disable Voltage- High	VIH	2.0	-	VCC	V
Transmitter Disable Voltage- low	VIL	0	-	0.8	V
Differential output voltage swing	VOUT,P-P	300	-	850	mVpp
Output Differential Impedance	ZOUT	90	100	110	$\Omega$
LOS Output Voltage-High	VLOSH	2.0	-	VCC	V
LOS Output Voltage-Low	VLOSL	-	-	0.8	V

● **Timing and Electrical**

Parameter	Symbol	Min	Typ	Max	Unit
Tx Disable Negate Time	t_on	-	-	1	ms
Tx Disable Assert Time	t_off	-	-	10	μs
Time To Initialize, including Reset of Tx Fault	t_init	-	-	300	ms
Tx Fault Assert Time	t_fault	-	-	100	μs
Tx Fault To Reset	t_reset	10	-	-	μs
LOS Assert Time	t_loss_on	-	-	100	μs
LOS De-assert Time	t_loss_off	-	-	100	μs
Rate-Select Change Time	t_ratesel	-	-	10	μs
Serial ID Clock Rate	f_serial_clock	-	100	400	KHZ
SDA, SCL, MOD_ABS High Level	VH	2.0	-	VCC	V
SDA, SCL, MOD_ABS Low Level	VL	-	-	0.8	V

● **Characteristics of Transmitter**

<b>Transmitter :</b>						
Parameter	Symbol	Min.	Typical	Max.	Unit	
Data Rate	B	-	25.78	-	Gb/s	
Centre Wavelength	TM-PEEDG-143x	λc	1260	1270	1280	nm
	TM-PEEGD-143x		1320	1330	1340	
Output Spectral Width	Δλ	-	-	1	nm	
Side-mode Suppression Ratio	SMSR	30	-	-	dB	
Average Output Power	P <sub>o</sub>	-5	-	+2	dBm	
Extinction Ratio	EXT	3.5	-	-	dB	
Data Input Voltage-High	V <sub>IHS</sub>	V <sub>cc</sub> -1.16	-	V <sub>cc</sub> -0.89	V	
Data Input Voltage -Low	V <sub>ILS</sub>	V <sub>cc</sub> -1.82	-	V <sub>cc</sub> -1.48	V	
Supply Current	I <sub>CC</sub>	-	80	180	mA	
Output Optical Eye	Compliant with IEEE802.3by					
<b>Receiver :</b>						
Parameter	Symbol	Min.	Typical	Max.	Unit	
Operating Wavelength	TM-PEEDG-143x	λc	1310	1330	1350	nm
	TM-PEEGD-143x		1250	1270	1290	
Receive Sensitivity	P <sub>min</sub>	-	-	-13	dBm	
Hysteresis	-	-	3.0	-	dBm	
Maximum Input Power	P <sub>MAX</sub>	-3	-	-	dBm	

Signal Detection-Deserted	SD <sub>LOW</sub>	-45	-	-	dBm
Signal Detection-Asserted	SD <sub>HIGH</sub>	-	-	-25	dBm
Output High Voltage	V <sub>OH</sub>	V <sub>cc</sub> -1.03	-	V <sub>cc</sub> -0.89	V
Output Low Voltage	V <sub>OL</sub>	V <sub>cc</sub> -1.82	-	V <sub>cc</sub> -1.63	V
Supply Current	I <sub>CC</sub>	-	80	180	mA

● **Absolute Maximum Ratings: (T<sub>C</sub>=25°C)**

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>ST</sub>	-40	+85	°C
Operating Temperature	T <sub>IP</sub>	0(-40)	+70(+85)	°C
Input Voltage	T <sub>CC</sub>	0	+5	V

● **Recommended Operating Environment:**

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	V <sub>CC</sub>	+3.0	+3.3	+3.6	V
Operating Temperature	T <sub>OP</sub>	0	-	+70	°C

● **Timing Characteristics:**

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_DISABLE Assert Time	t <sub>off</sub>		3	10	usec
TX_DISABLE Negate Time	t <sub>on</sub>		0.5	1	msec
Time to Initialize Include Reset of TX_FAULT	t <sub>int</sub>		30	300	msec
TX_FAULT from Fault to Assertion	t <sub>fault</sub>		20	100	usec
TX_DISABLE Time to Start Reset	t <sub>reset</sub>	10			usec
Receiver Loss of Signal Assert Time (Off to On)	T <sub>A,RX_LOS</sub>			100	usec
Receiver Loss of Signal Assert Time (On to Off)	T <sub>d,RX_LOS</sub>			100	usec

● **Serial ID Memory Contents:**

Data Address	Length (Byte)	Name of Length	Description and Contents
<b>Base ID Fields</b>			
0	1	Identifier	Type of Serial transceiver (03h=SFP28)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	Gigabit Ethernet 1000Base-SX & Fiber Channel
11	1	Encoding	8B10B (01h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP28 vendor name
36	1	Reserved	
37-39	3	Vendor OUI	SFP28 transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
<b>Extended ID Fields</b>			
64-65	2	Option	Indicates which optical SFP28 signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
<b>Vendor Specific ID Fields</b>			
96-127	32	Readable	specific date, read only

● **Digital Diagnostic Monitoring Functions**

2-wire serial bus address 1010001X (A2h) is used to access measurement of transceiver temperature, internally measured supply voltage, TX bias current, TX optical output power and RX optical input

power which are shown in table 1. Each diagnostic parameter has a corresponding high alarm, low alarm, high warning and low warning threshold which are shown in table 2.

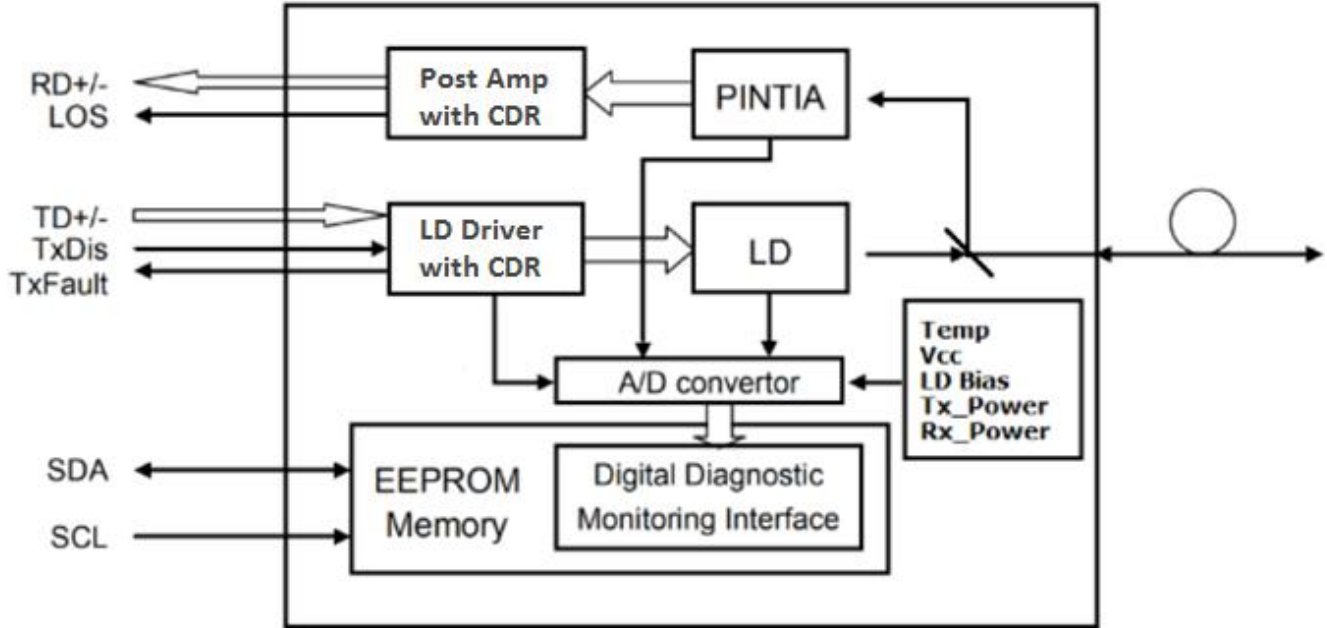
Table 1. Diagnostic Parameters

Diagnostic Parameter	Range		LSB	Accuracy	Address	Note
	Min	Max				
Transceiver Temperature (Temp)	-50[°C]	+80[°C]	1/256[°C]	±3[°C]	96-97	A 16bit signed two's complement value
Supply Voltage (Voltage)	+3.0[V]	+3.6[V]	100[ $\mu$ V]	±3[%]	98-99	A 16bit unsigned integer
TX Bias Current (Bias)	3[mA]	95[mA]	2.0[ $\mu$ A]	±10[%]	100-101	A 16bit unsigned integer
TX Optical Output Power (TX Power)	-5[dBm]	+2[dBm]	0.1[ $\mu$ W]	±3 [dB]	102-103	A 16bit unsigned integer
RX Optical Input Power (RX Power)	-13[dBm]	+0[dBm]	0.1[ $\mu$ W]	±3 [dB]	104-105	A 16bit unsigned integer

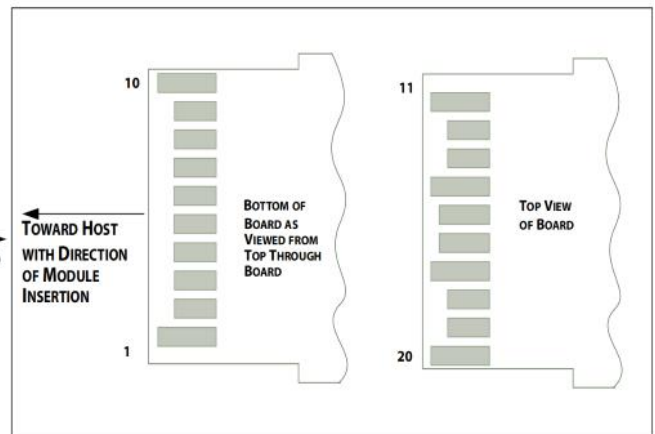
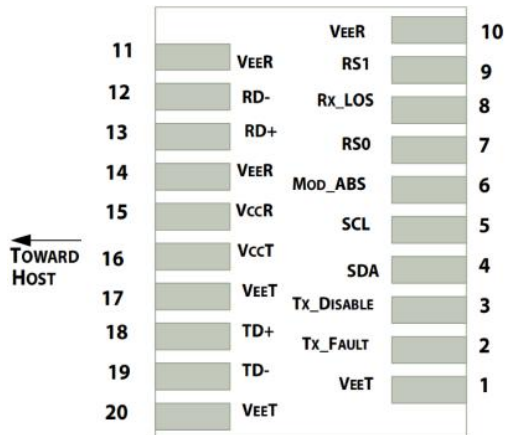
Table 2. Alarm and Warning Thresholds

Parameter	Warning		Alarm		Unit
	Low	High	Low	High	
Transceiver Temperature (Temp)	-40	+80	-50	+90	°C
Supply Voltage (Voltage)	+3.13	+3.47	+3.0	+3.6	V
TX Bias Current (Bias)	5	85	3	95	mA
TX Optical Output Power (TX Power)	-5	+2	-6	+3	dBm
RX Optical Input Power (RX Power)	-13	-3	-14	-2	dBm

● **Block Diagram of Transceiver:**



**Pin Assignment:**



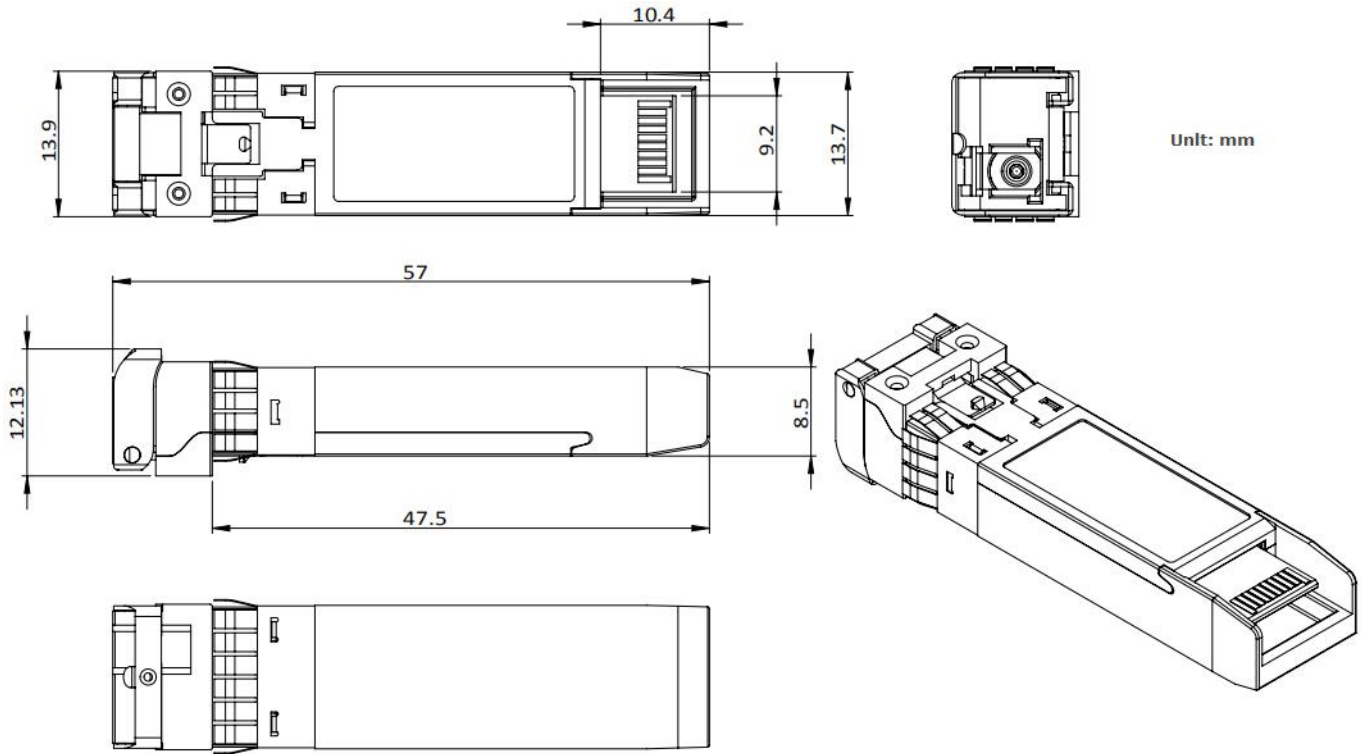
● **Pin Description:**

Pin	Symbol	Name/Description	Notes
1	VEET	Module Transmitter Ground	
2	Tx_Fault	Module Transmitter Fault	1
3	Tx_Disable	Transmitter Disable, Turns off transmitter laser output	2
4	SDA	2 wire serial interface data input/output (SDA)	1
5	SCL	2 wire serial interface clock input (SCL)	1
6	MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	1
7	RS0	Receiver Rate Select	
8	Rx_LOS	Loss of Signal indication, Logic 0 indicates normal operation	3
9	RS1	Transmitter Rate Select, Not Used for this product	
10	VEER	Module Receiver Ground	
11	VEER	Module Receiver Ground	
12	RD-	Receiver Inverted Data Output, AC Coupled	4
13	RD+	Receiver Non-Inverted Data Output, AC Coupled	4
14	VEER	Module Receiver Ground	
15	VCCR	Module Receiver 3.3 V Supply	
16	VCCT	Module Transmitter 3.3 V Supply	
17	VEET	Module Transmitter Ground	
18	TD+	Transmitter Non-Inverted Data Input, AC Coupled	5
19	TD-	Transmitter Inverted Data Input, AC Coupled	5
20	VEET	Module Transmitter Ground	

● **Ordering information:**

Part Number	Package	Rate	Fiber type	Distance	Wavelength (nm)	Temperature (°C)
TM-PEEDG-143E	SFP28	25.78Gbps	SMF	10km	T1270R1330	0/+70
TM-PEEGD-143E	SFP28	25.78Gbps	SMF	10km	T1330R1270	0/+70
TM-PEEDG-143I	SFP28	25.78Gbps	SMF	10km	T1270R1330	-40/+85
TM-PEEGD-143I	SFP28	25.78Gbps	SMF	10km	T1330R1270	-40/+85

● **Mechanical Dimensions:**





● Recommended Circuit:

