



Features

- Compliant with SFF-8431, SFF-8432 and IEE802.3ae
- 10GBASE-ER and 2G/4G/ 8G/10G Fiber Channel applications.
- Suitable for use in 100GHz channel spacing DWDM systems
- Cooled EML transmitter and PIN receiver
- Low Power Dissipation 1.5W Maximum
- Single 3.3V power supply
- Diagnostic Performance Monitoring of module temperature, supply
- RoHS Compliant

Applications

- 10GBASE-ER/EW
- 10G Fiber Channel

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Remarks
Storage Temperature	T_{Str}	-40	85	°C	
Supply Voltage	V_{CC}	-0.5	3.8	V	
Relative Humidity	Rh	0	85	%	

Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units	Remarks
Operating Case temperature	T_{ca}	-5	-	70	°C	
Supply Voltage	V_{CC}	3.13	3.3	3.46	V	
Supply Current	I_{CC}	-	360	450	mA	
Module Power Dissipation	P_m		1.2	1.5	W	

Diagnostics Monitoring

<i>Parameter</i>	<i>Accuracy</i>	<i>Unit</i>	<i>Notes</i>
Temperature	± 3	°C	Over operating temp.
Voltage	± 0.08	V	Full operating range
Bias Current	± 10%	mA	
TX Power	± 3 dB	dBm	
RX Power	± 3 dB	dBm	-3dBm to -12 dBm range

Transmitter Electro-optical Characteristics

$V_{CC} = 3.13\text{ V to } 3.46\text{ V}$, $T_C = -5\text{ }^\circ\text{C to } 70\text{ }^\circ\text{C}$

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Data Rate	Mra	---	10.3	11.3	Gbps	
Average optical Power	Po	-1		+3.0	dBm	
Optical Transmit Power (disabled)	PTX_DIS	---	---	-30	dBm	
Extinction Ratio	ER	8.2	---	---	dB	
Center Wavelength-Start of Life	λ_C	λ_C-25	λ_C	λ_C+25	pm	Note 1
Center Wavelength-End of Life	λ_C	λ_C-100	λ_C	λ_C+100	pm	Note 1
Side-mode Supression Ratio	$SMSR$	30	---	---	dB	
Optical Return Loss Tolerance	Orl	---	---	21	dB	
Relative Intensity Noise	RIN	---	---	-128	dB/Hz	
Spectral Width (-20dB)	$\Delta\lambda_{20}$	---	---	0.3	nm	
Input Differential impedance	Rim	---	100		Ω	
Differential data Input	V_{txDIFF}	120		850	mV	
Transmit Disable Voltage	VD	2.0		$V_{CC}+0.3$	V	
Transmit Enable Voltage	V_{en}	0		+0.8	V	
Transmit Disable Assert Time	V_n	---	---	100	us	

Note: Measured with conformance test signal for BER = 10^{-12} . The stressed sensitivity values in the table are for system level BER measurements which include the effects of CDR circuits. It is recommended that at least 0.4 dB additional margin be allocated if component level measurements are made without the effects of CDR circuits.

Receiver Electro-optical Characteristics

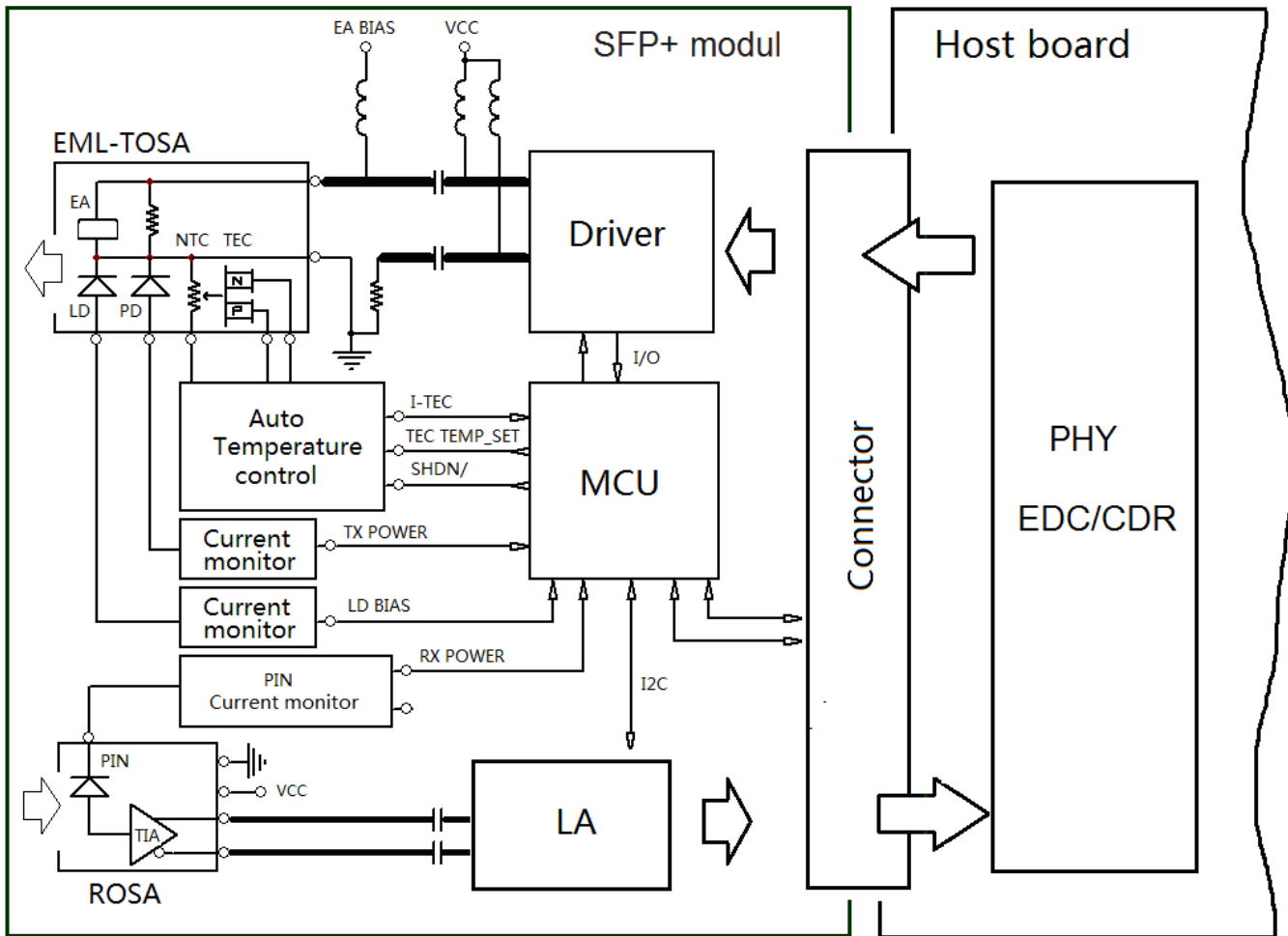
V_{cc} = 3.13 V to 3.46 V, T_c = -5 °C to 70 °C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Data Rate	<i>Mra</i>	---	10.3	11.3	Gbps	
Receiver Sensitivity in 10.3Gbps (OMA)	<i>Rsen1</i>	---	---	-14.1	dBm	
Stressed receiver sensitivity in 10.3Gbps(OMA)	<i>Rsens2</i>	---	---	-11.3	dBm	
Average receiver Power	<i>Pavg</i>	-15.8	---	-1.0	dBm	
Input Operating Wavelength	λ	1260	---	1600	nm	
Reflectance	<i>Rrx</i>	---	---	-26	dB	
LOS Asserted	<i>LOS_A</i>	-28	---	---	dBm	
LOS De-Asserted	<i>LOS_D</i>	---	---	-19	dBm	
LOS Hysteresis	<i>LOS_H</i>	0.5	---	---	dB	
Differential Output Swing	<i>Vout P-P</i>	350	---	850	mV	
Rise/Fall Time	<i>Tr/Tf</i>	24	---	---	ps	
Loss of Signal-Asserted	<i>VOH</i>	2	---	V _{cc} 3+0.3-	V	
Loss of Signal-Negated	<i>VOL</i>	0	---	+0.4	V	

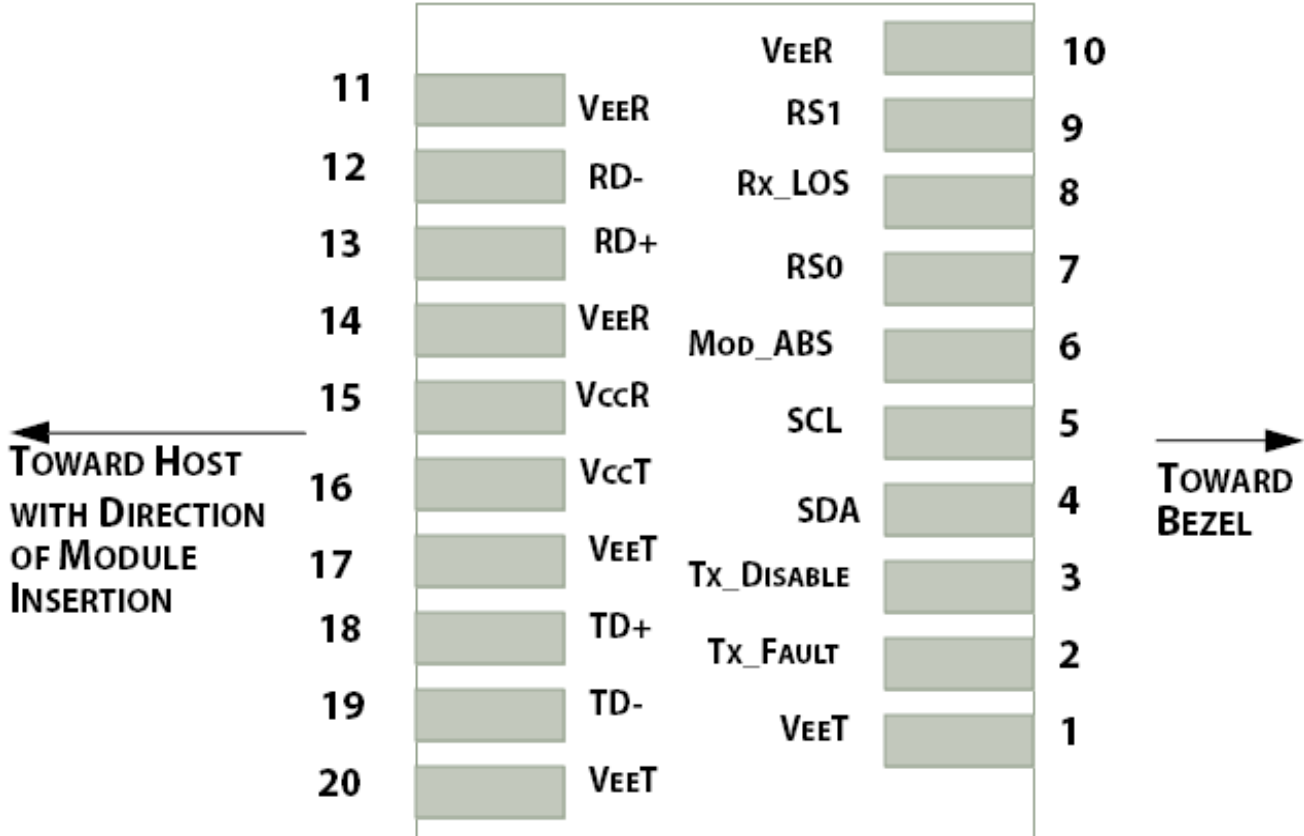
C-band λ_c Wavelength Guide

<i>Channels</i>	<i>Frequency</i>	<i>Wavelength</i>	<i>Channels</i>	<i>Frequency</i>	<i>Wavelength</i>	<i>Channels</i>	<i>Frequency</i>	<i>Wavelength</i>
18	191.8	1563.05	33	193.3	1550.92	48	194.8	1538.98
19	191.9	1562.23	34	193.4	1550.12	49	194.9	1538.19
20	192.0	1561.42	35	193.5	1549.32	50	195.0	1537.40
21	192.1	1560.61	36	193.6	1548.51	51	195.1	1536.61
22	192.2	1559.79	37	193.7	1547.72	52	195.2	1535.82
23	192.3	1558.98	38	193.8	1546.92	53	195.3	1535.04
24	192.4	1558.17	39	193.9	1546.12	54	195.4	1534.25
25	192.5	1557.36	40	194.0	1545.32	55	195.5	1533.47
26	192.6	1556.55	41	194.1	1544.53	56	195.6	1532.68
27	192.7	1555.75	42	194.2	1543.73	57	195.7	1531.9
28	192.8	1554.94	43	194.3	1542.94	58	195.8	1531.12
29	192.9	1554.13	44	194.4	1542.14	59	195.9	1530.33
30	193.0	1553.33	45	194.5	1541.35	60	196.0	1529.55
31	193.1	1552.52	46	194.6	1540.56	61	196.1	1528.77
32	193.2	1551.72	47	194.7	1539.77			

Block Diagram of Transceiver



Pin Assignment



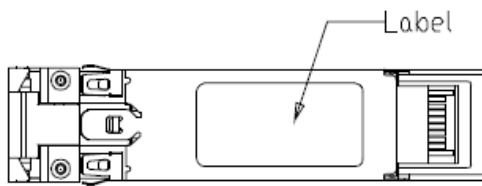
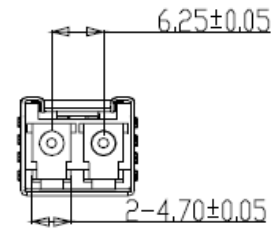
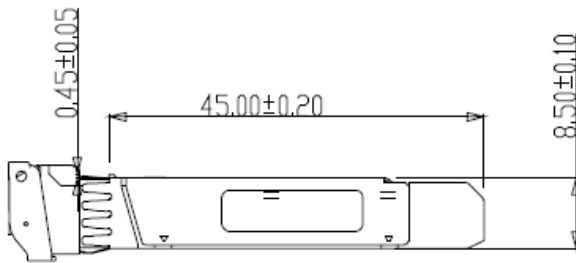
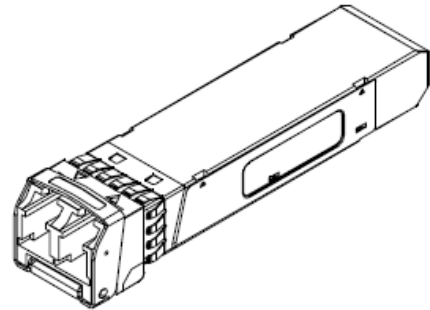
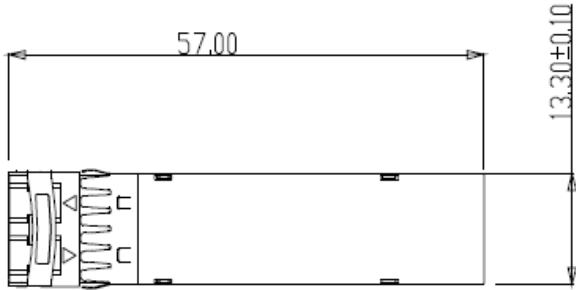
Pin Descriptions

Pin	Symbol	Name/Description	Notes
1	VEET	Transmitter Ground	1
2	Tx_FAULT	Transmitter Fault	2
3	Tx_DIS	Transmitter Disable. Laser output disabled on high or open	3
4	SDA	2-wire Serial Interface Data Line	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation	2
9	RS1	Rate Select 1	5
10	VEER	Receiver Ground	1
11	VEER	Receiver Ground	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver DATA out. AC Coupled	
14	VEER	Receiver Ground	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground	1
18	TD+	Transmitter DATA in. AC Coupled	
19	TD-	Transmitter Inverted DATA in. AC Coupled	
20	VEET	Transmitter Ground	1

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.
4. Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
5. RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

Dimensions



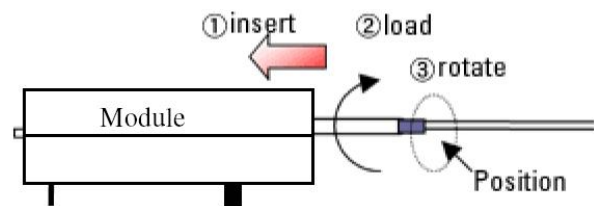
Optical Receptacle Cleaning Recommendations :

All fiber stubs inside the receptacle portions were cleaned before shipment. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using a NTT international Cletop® stick type and HFE7100 cleaning fluid. Before the mating of patch-cord, the fiber end should be cleaned up by using Cletop® cleaning cassette.

Cleaning of patch-cord



Cleaning of fiber stub



1. Insert
Ensure that stick is held straight when inserting into sleeve.
2. Load
Apply sufficient pressure (approx 600-700g) to ensure ferrule a little depressed in sleeve.
3. Rotate
Rotate stick clockwise 4-5 times, while ensuring direct contact with ferrule end-face is maintained.

*Notice: Number of possible wipes:
Maintenance (repair) ~1 use / piece
Equipment construction: 4 uses / piece (max.)*

Note: The pictures were extracted from NTT-ME website. And the Cletop® is a trademark registered by NTT-ME

Ordering Information

OP	6	C	-	S	10	-	13	-	C	M	
		↑			↑			↑			↑
Product Code:	Data Rate:	Type:	Reach:	Wavelength:	Operating Temperature:	Additional Feature:					
5=GBIC; 6=SFP-LC; 7=XFP; 8=XENPAK; 9=X2; A=SFP+; C=QSFP; F=CFP; P=SFP-SC; Q=SFP-MTRJ	A=155Mb/s; B=622Mb/s; C=1.25Gb/s; D=2.125Gb/s; E=2.5Gb/s; F=4.25Gb/s; G=3.1Gb/s; J=2.97G; P=6.144G; Q=7.37G; H=8.5Gb/s; K=10Gb/s; T=1/10Gb/s; L=11.09Gb/s; R=20Gb/s; S=40Gb/s; M=100Base-X SGMII; N=100/1000Base-X SGMII;	S=Single-mode; M=Multi-mode; W=BWDM; C=CWDM; D=DWDM; T=Copper-T (RJ-45) E=GEPON ONU; F=GEPON OLT; G=GPON ONU; H=GPON OLT	Normal: X1=Under 150m; X3=300m; X5=550m; O2=2km, 10=10km; 70=70km; A0=100km; C0=120km CWDM: 20=20dB; 24=24dB; 28=28dB	Normal: 85=850nm; 13=1310nm; 15=1550nm; 00=Copper T (RJ-45) CWDM: 27=1270nm; 47=1470nm; 61=1610nm BWDM: B3=Tx1310/Rx1550; B5=Tx1550/Rx1310; B4=Tx1310/Rx1490; B9=Tx1490/Rx1310; 51=Tx1510/Rx1570; 57=Tx1570/Rx1510; 27=Tx1270/Rx1330; 33=Tx1330/Rx1270; B2=Tx1270/Rx1577; B7=Tx1577/Rx1270 T2=2TX1310nm; T3=TX1310nm; T5=TX1550nm DWDM: 17=Channel 17 34= Channel 34 00=Channel 17~61 Tunable	C=Commercial Purpose (0~70°C); I= Industrial Purpose (Extended Range)	M=Digital Optical Monitoring (DOM) (RX_LOS for Copper TX); F=with Fiber Stub; I=with Isolator; S=Customized Style					

Model Number	Part Number	Distance	Input/Output	Voltage	Temperature
SFP+-DWDM-40	OPAK-D40-xx-CF	40 km	AC/AC	3.3V	-5°C to 70 °C

Note: All information contained in this document is subject to change without notice.