

Features

- Compliant with SFF-8431, SFF-8432 and IEEE802.3ae
- 10GBAS-ER, and 2G/4G/ 8G/10G Fiber Channel applications.
- Suitable for use in 100GHz channel spacing DWDM systems
- Cooled EML transmitter and PIN receiver
- link length up to 40km
- Low Power Dissipation 1.5W Maximum
- link length up to 40km
- Single 3.3V power supply
- Diagnostic Performance Monitoring of module temperature, supply Voltages, laser bias current, transmit optical power, receive optical power.
- RoHS6 compliant and Lead Free
- Operating case temperature: -5°C ~ 70°C



Applications

- 10G Ethernet (with/without FEC)
- 10G Fiber Channel (with/without FEC)

Description

This SFP+ER DWDM Transceiver is a "Limiting module", designed for 10G Ethernet-ER, and 2G/4G/ 8G/10G Fiber- Channel applications.

The transceiver consists of two sections: The transmitter section incorporates a cooled EML laser. And the receiver section consists of a PIN photodiode integrated with a TIA. All modules satisfy class I laser safety requirements. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage

Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Units
Supply Voltage	Vcc	-0.5	3.8	V
Storage Temperature	Tst	-40	85	°C
Relative Humidity	Rh	0	85	%

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Supply Voltage	Vcc	3.13	3.3	3.46	V
Supply current	Icc	-	360	450	mA
Operating Case temperature	Tca	-5	-	70	°C
Module Power Dissipation	Pm	-	1.2	1.5	W

Digital Diagnostic Functions

	Symbol	Min.	Max	Unit	Notes
Accuracy					
Transceiver Temperature	DMI_Temp	-3	+3	degC	Over operating temp
TX Output optical power	DMI_TX	-3	+3	dB	
RX Input optical power	DMI_RX	-3	+3	dB	-3dBm to -12dBm range
Transceiver Supply voltage	DMI_VCC	-0.08	+0.08	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	
Dynamic Range Accuracy					
Transceiver Temperature	DMI_Temp	-5	70	degC	
TX Output optical power	DMI_TX	-1	+2	dBm	
RX Input optical power	DMI_RX	-18	0	dBm	
Transceiver Supply voltage	DMI_VCC	3.0	3.6	V	
Bias current monitor	DMI_Ibias	0	100	mA	

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Center Wavelength-Start of Life	λ_c	$\lambda_c - 25$	λ_c	$\lambda_c + 25$	nm	1
Center Wavelength-End of life	λ_c	$\lambda_c - 100$	λ_c	$\lambda_c + 100$	nm	1
Spectral Width (-20dB)	$\Delta\lambda_{20}$	-	-	0.3	nm	
Average Optical Power	Po	-1	-	+3	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Optical Transmit Power (disabled)	PTX_DISABLE	-	-	-30	dBm	
Extinction Ratio	ER	8.2	-	-	dB	
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	
Optical Return Loss Tolerance	Orl	-	-	21	dB	
Receiver						
Input Operating Wavelength	λ	1260	-	1600	nm	
Average receive power	Pavg	-15.8	-	-1.0	dBm	
Receiver sensitivity in 10.3Gbps(OMA)	Rsen1	-	-	-14.1	dBm	
Stressed receiver sensitivity in 10.3Gbps(OMA)	Rsen2	-	-	-11.3	dBm	
Reflectance	Rrx	-	-	-26	dB	
LOS Asserted	Lsa	-28	-	-	dBm	
LOS De-Asserted	Lda	-	-	-19	dBm	
LOS Hysteresis	Lh	0.5	-	-	dB	

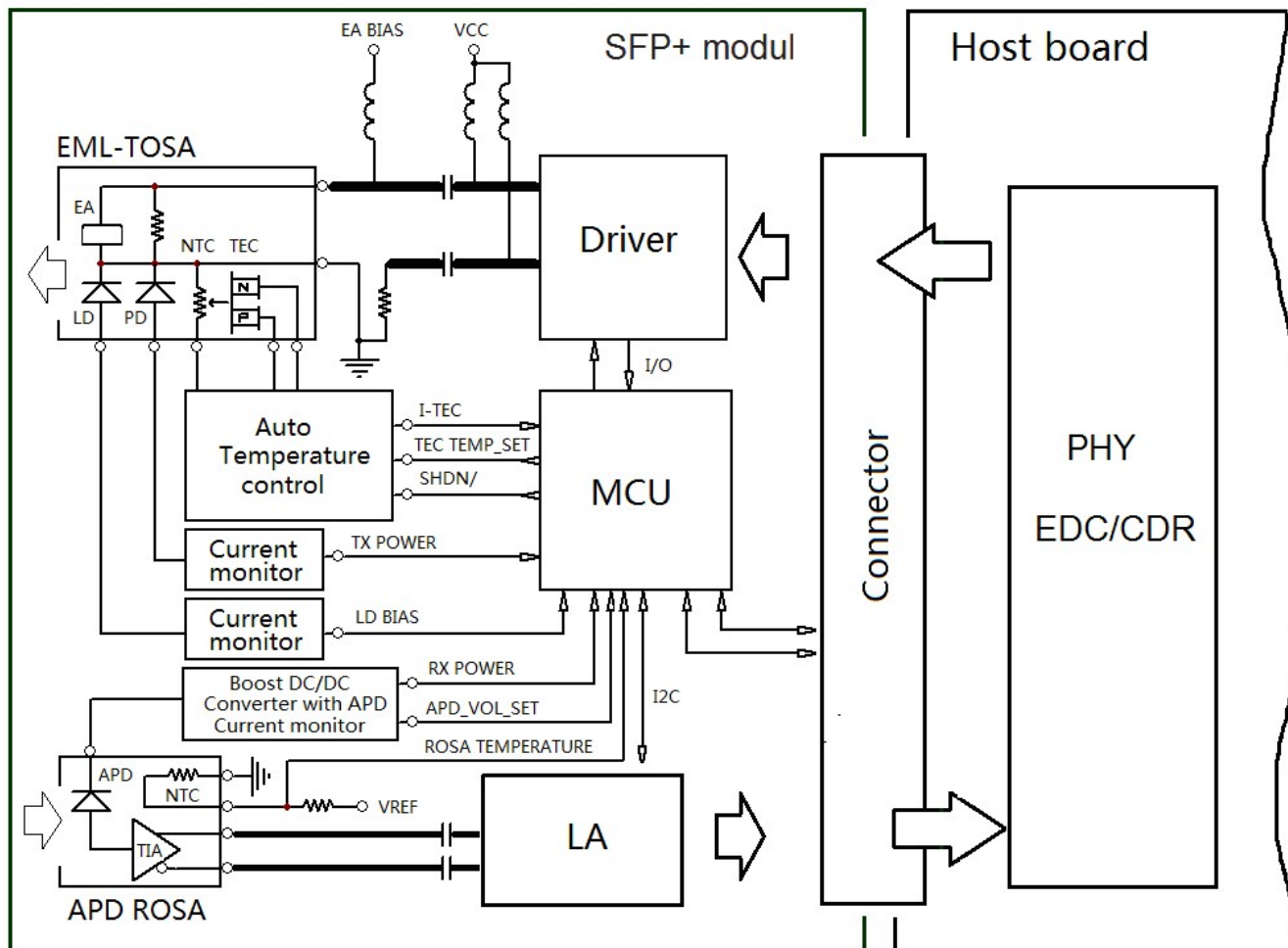
Notes:

1. 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

Electronical Characteristics

<i>Parameter</i>	<i>Symbol</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Units</i>	<i>Note</i>
Transmitter						
Data Rate	Mra	-	10.3	11.3	Gbps	
Input differential impedance	Rim	-	100	-	Ω	
Differential data Input	VtxDIFF	120	-	850	mV	
Transmit Disable Voltage	VD	2.0	-	Vcc3+0.3	V	
Transmit Enable Voltage	Ven	0	-	+0.8	V	
Transmit Disable Assert Time	Vn	-	-	100	us	
Receiver						
Data Rate	Mra	-	10.3	11.3	Gbps	
Differential Output Swing	Vout P-P	350	-	850	mV	
Rise/Fall Time	Tr / Tf	24	-	-	ps	
Loss of Signal –Asserted	VOH	2	-	Vcc3+0.3-	V	
Loss of Signal –Negated	VOL	0	-	+0.4	V	

Module Block Diagram



Gigalight 2011 --HHC

C-band λ c Wavelength Guide

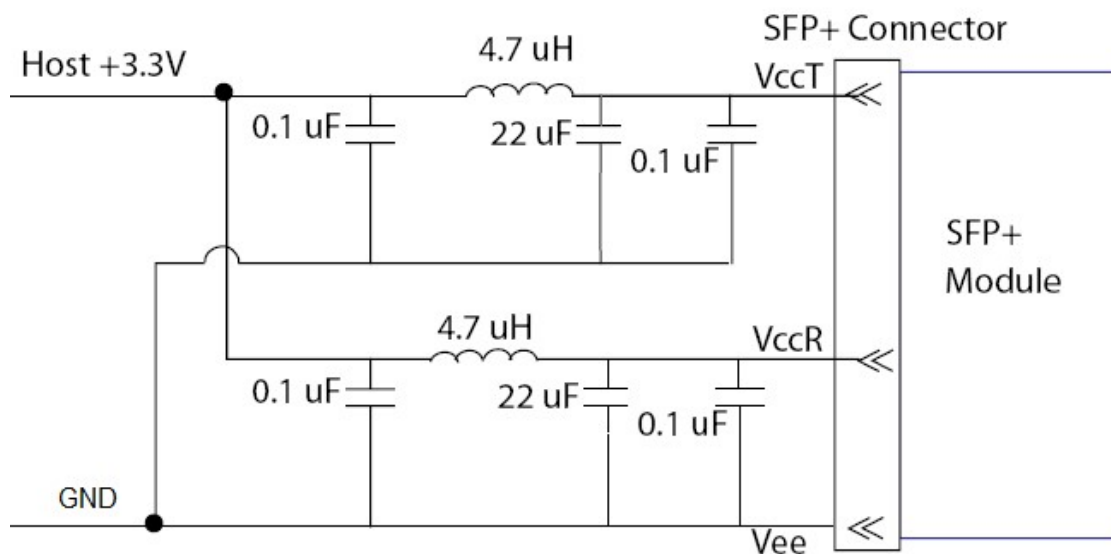
<i>ITU Channel product code</i>	<i>Frequency (THz)</i>	<i>Wavelength.</i>	<i>ITU Channel product code</i>	<i>Frequency (THz)</i>	<i>Wavelength</i>
17	191.7	1563.86	40	194.0	1545.32
18	191.8	1563.05	41	194.1	1544.53
19	191.9	1562.23	42	194.2	1543.73
20	192.0	1561.42	43	194.3	1542.94
21	192.1	1560.61	44	194.4	1542.14
22	192.2	1559.79	45	194.5	1541.35
23	192.3	1558.98	46	194.6	1540.56
24	192.4	1558.17	47	194.7	1539.77
25	192.5	1557.36	48	194.8	1538.98
26	192.6	1556.55	49	194.9	1538.19
27	192.7	1555.75	50	195.0	1537.40
28	192.8	1554.94	51	195.1	1536.61
29	192.9	1554.13	52	195.2	1535.82
30	193.0	1553.33	53	195.3	1535.04
31	193.1	1552.52	54	195.4	1534.25
32	193.2	1551.72	55	195.5	1533.47
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.51	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61	196.1	1528.77
39	193.9	1546.12			

Pin Assignment

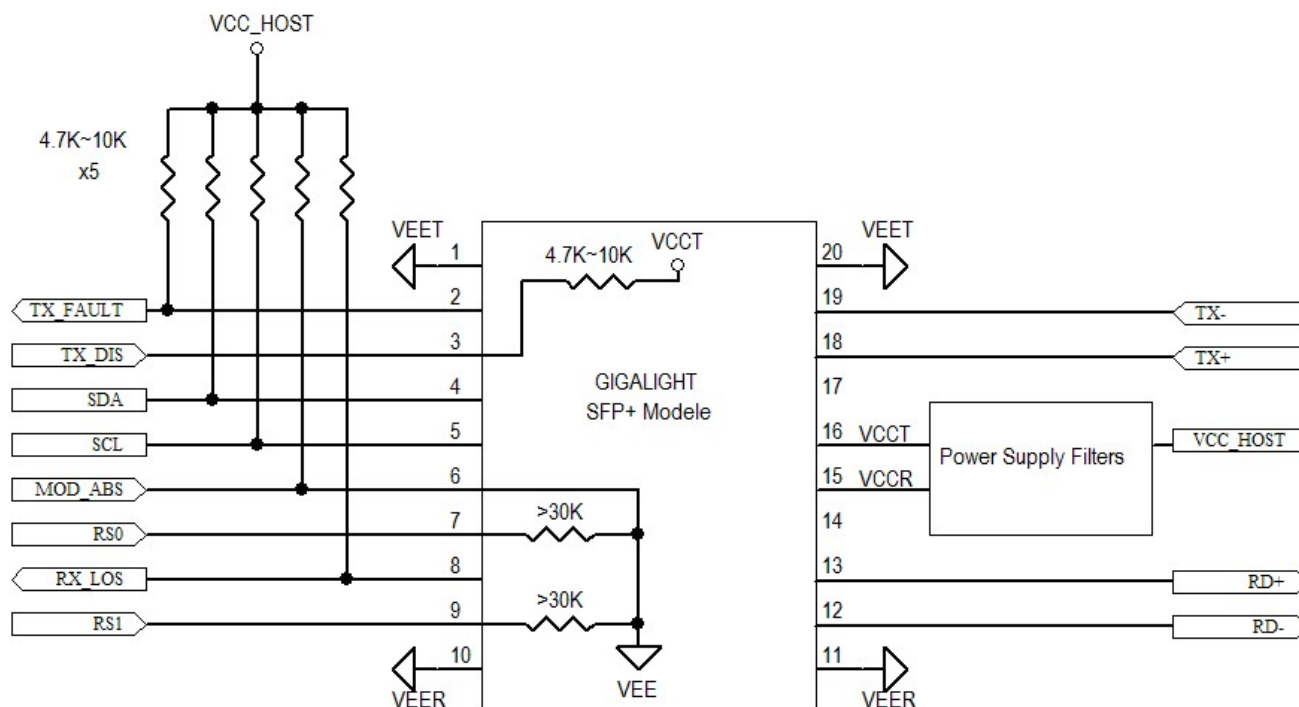
Pin	Symbol	Function/Description	Notes
1	VEET	Transmitter Ground	1
2	Tx_FAULT	Transmitter Fault	2
3	Tx_DIS	Transmitter Disable. Laser output disabled on high or open	3
4	SDA	2-wire Serial Interface Data Line	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Absent. Grounded within the module	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.

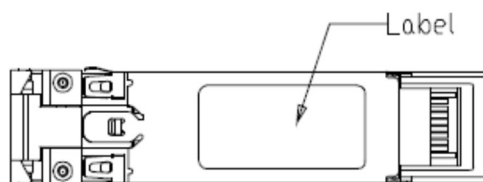
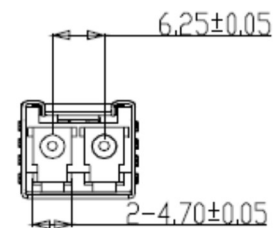
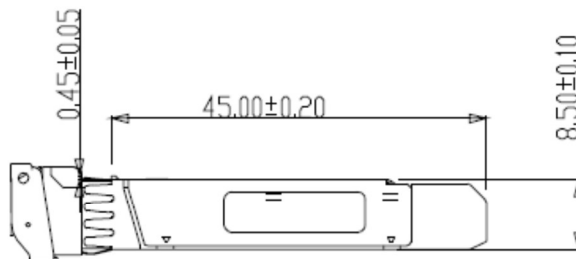
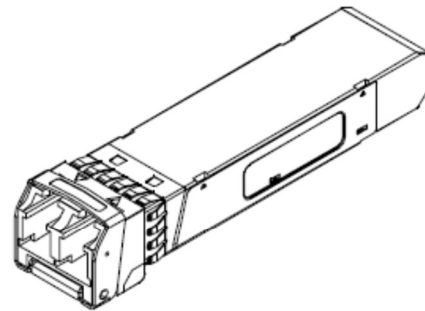
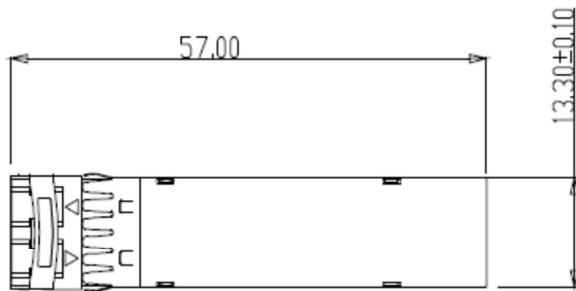


Host Board Powr Supply Filters Circuit



Host-Module Interface

Dimensions



Mechanical Specifications

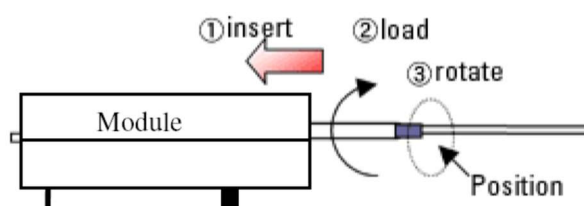
Optical Receptacle Cleaning Recommendations :

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

<i>Model Number</i>	<i>Part Number</i>	<i>Reach</i>	<i>Wavelength</i>	<i>Voltage</i>	<i>Temperature</i>
SFP+-DWDM-xx-ER	OPAK-D40-xx-CF	40 km	xx = ITU Grid 17~61	3.3V	-5°C to 70 °C

Modification History

<i>Revision</i>	<i>Date</i>	<i>Description</i>
A1	Jul. 2024	Initial Release

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