


# 10G CWDM SFP+ 1350-1450nm 40km Optical Transceiver GCP-xx192-04C

## Features

- ◆ Compliant with SFF-8431,SFF-8432 and IEE802.3ae
- ◆ CWDM DFB transmitter from 1270nm to 1330nm
- ◆ APD photodiode
- ◆ Operating case temperature: 0 to 70 °C
- ◆ Low power consumption
- ◆ Applicable for 40km G652.D SMF connection
- ◆ All-metal housing for superior EMI performance
- ◆ Advanced firmware allow customer system encryption information to be stored in transceiver
- ◆ Cost effective SFP+ solution, enables higher port densities and greater bandwidth
- ◆ RoHS6 compliant (lead free) 



## Applications

- ◆ 10G Ethernet
- ◆ 10G Fibre Channel

## Product description

The Gigalight CWDM SFP+ transceiver is a “Limiting module” designed for 10G Ethernet and 10G Fibre Channel applications. The transceiver consists of two sections: The transmitter section incorporates a DFB laser. And the receiver section consists of a APD 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 rating

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	V <sub>cc</sub>	0	+3.6	V
Storage Temperature	T <sub>c</sub>	-40	+85	°C
Operating Case Temperature	T <sub>c</sub>	0	+70	°C
Relative Humidity	RH	0	85	%
RX Input Average Power	P <sub>max</sub>	-	0	dBm

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

### Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	V <sub>cc</sub>	3.13	3.3	3.47	V
Supply current[1]	I <sub>cc</sub>	-	-	360	mA
Operating Case temperature	T <sub>ca</sub>	-5	-	70	°C
Module Power Dissipation	P <sub>m</sub>	-	-	1.5	W

### Digital Diagnostic Functions

Parameter	Symbol	Min.	Max	Unit	Notes
<b>Accuracy</b>					
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	-7dBm to -20dBm range
Transceiver Supply voltage	DMI_VCC	-0.08	+0.08	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	
<b>Dynamic Range Accuracy</b>					
Transceiver Temperature	DMI_Temp	-5	70	degC	
TX Output optical power	DMI_TX	-5	4	dBm	
RX Input optical power	DMI_RX	-20	-7	dBm	
Transceiver Supply voltage	DMI_VCC	3.0	3.6	V	
Bias current monitor	DMI_Ibias	0	100	mA	

### Optical characteristics

Parameter	Symbol	Unit	Min	Max	Note
<b>Transmitter</b>					
Center wavelength	$\lambda$	nm	( $\lambda - 6.5$ )	( $\lambda + 6.5$ )	5
Side Mode Suppression Ratio	SMSR	dB	30		
Average launched power	Pave	dBm	-4	+2	1
Optical Modulation Amplitude (OMA)	Poma	dBm	-2.5		
Transmitter and dispersion penalty	TDP	dB		3.2	3,4
Average launch power of OFF transmitter	Poff	dBm		-30	
Extinction ratio	ER	dB	3.5		2
Relative Intensity Noise		dB/Hz		-128	
Optical Return Loss Tolerance	RIN	dB	12		
<b>Receiver</b>					
Center wavelength	$\lambda$	nm	1260	1600	
Receive overload	Pave	dBm		-8	
Receive sensitivity	Rsen	dBm		-20	3
Receiver Reflectance	Rrx	dB		-14	
LOS De-Assert	LOSd	dBm		-22	
LOS Assert	LOSa	dBm	-35		
LOS Hysteresis	LOSh	dB	0.5		
<b>Notes:</b>					
1. The optical power is launched into SMF					
2. Measured with a PRBS 2 <sup>31</sup> -1 test pattern@10.3125Gbps					
3. Measured with a PRBS 2 <sup>31</sup> -1 test pattern@10.3125Gbps BER≤10 <sup>-12</sup>					
4. In G.652 and G.655(NDSF)					
5. The available transmitter center wavelengths ( $\lambda$ ) are: 1271nm, 1291nm, 1311nm... and 1451nm as specified in the "Product Selection" section on page 1.					

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

### Electrical characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Data Rate		0.6	10.3125	11.3	Gbps	
Power Consumption		-	1200	1500	mW	
<b>Transmitter</b>						
Input differential impedance	Rin		100		$\Omega$	1
Differential data input swing	Vin,pp	180		700	mV	
Tx Fault	VoL	-0.3		0.4	V	
Data Dependent Input Jitter	DDJ			0.10	UI	

Data Input Total Jitter	TJ			0.28	UI	
<b>Receiver</b>						
Differential data output swing	Vout,pp	300		850	mV	2
Rx Output Rise and Fall Time	Tr/Tf	28		50	ps	3
Total Jitter	TJ			0.70	UI	
Deterministic Jitter	DJ			0.42	UI	

Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Into 100Ω differential termination.
3. 20 – 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's sequence in the PRBS 9 is an acceptable alternative. SFF-8431 Rev 3.0.

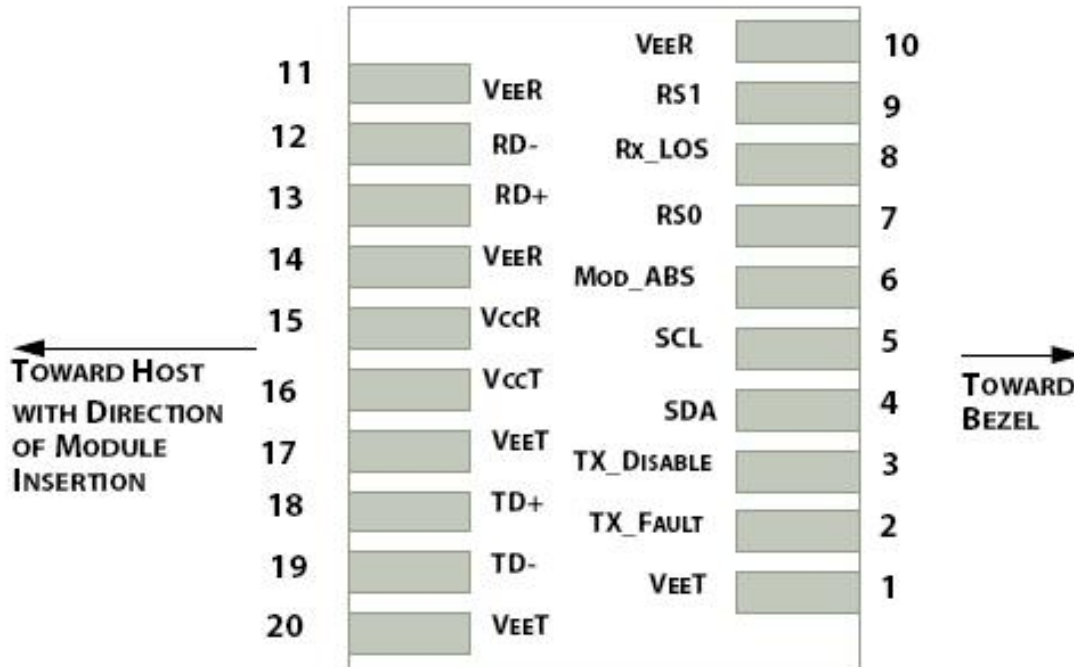


Figure 1: Interface to Host PCB

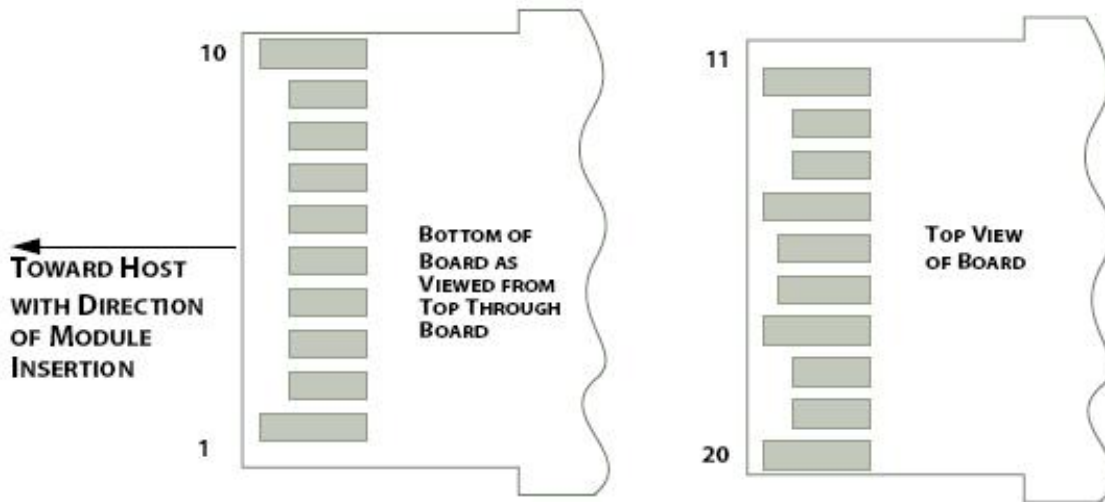


Figure 2: Module Contact Assignment

### Pin definition

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

18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

**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.

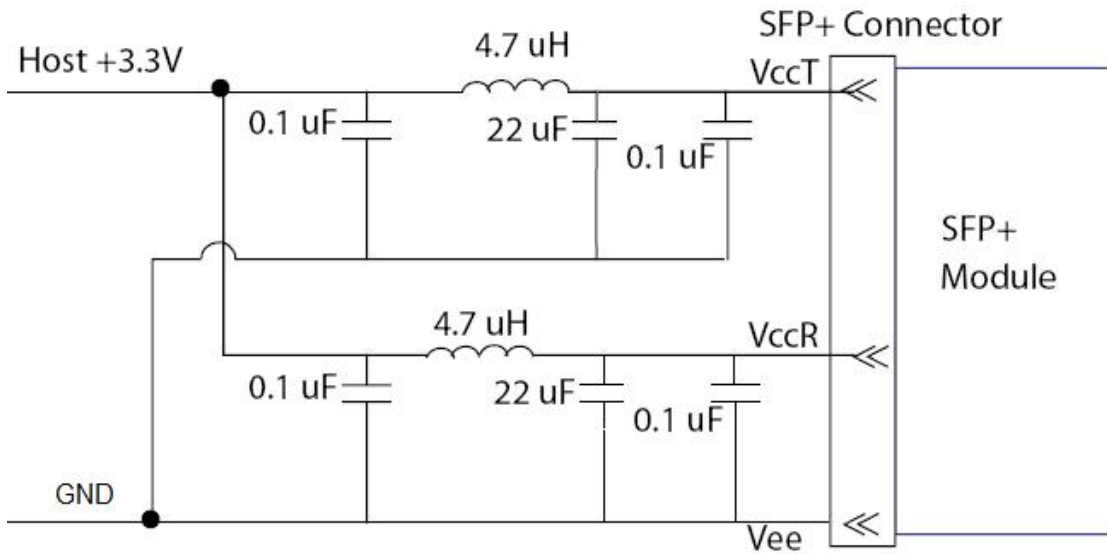


Figure3. Host Board Power Supply Filters Circuit

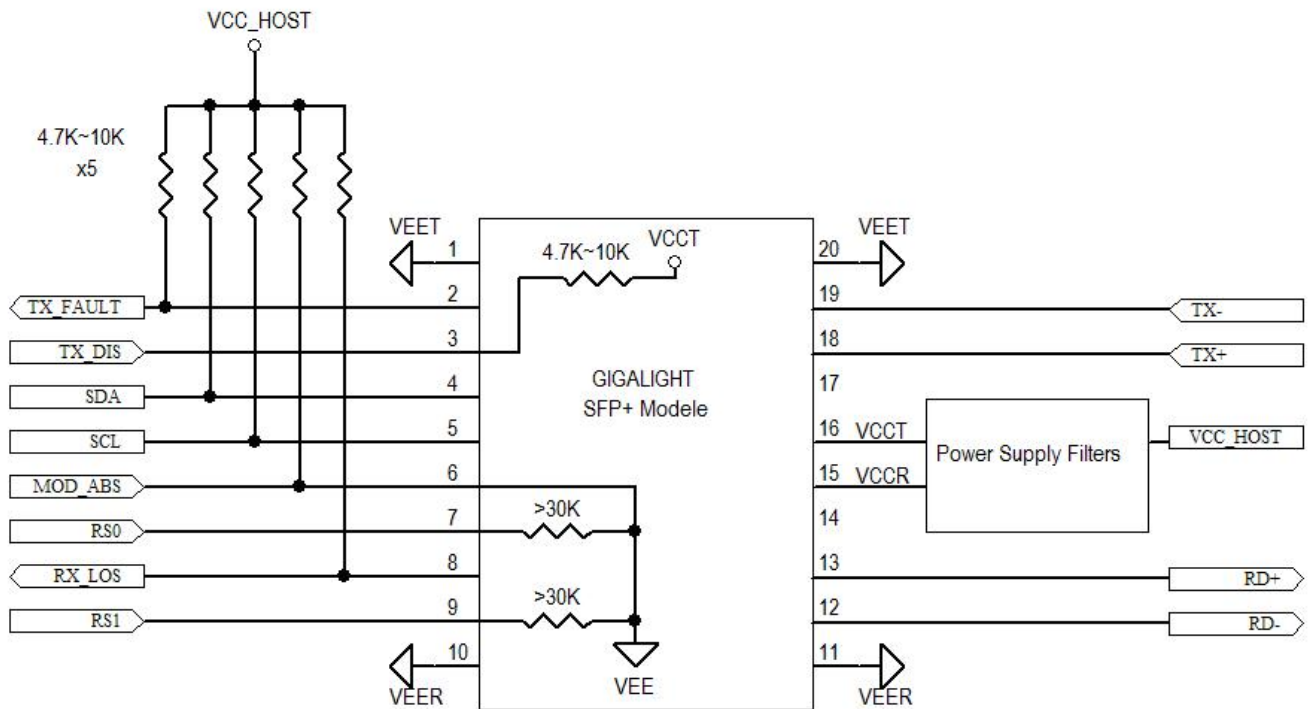
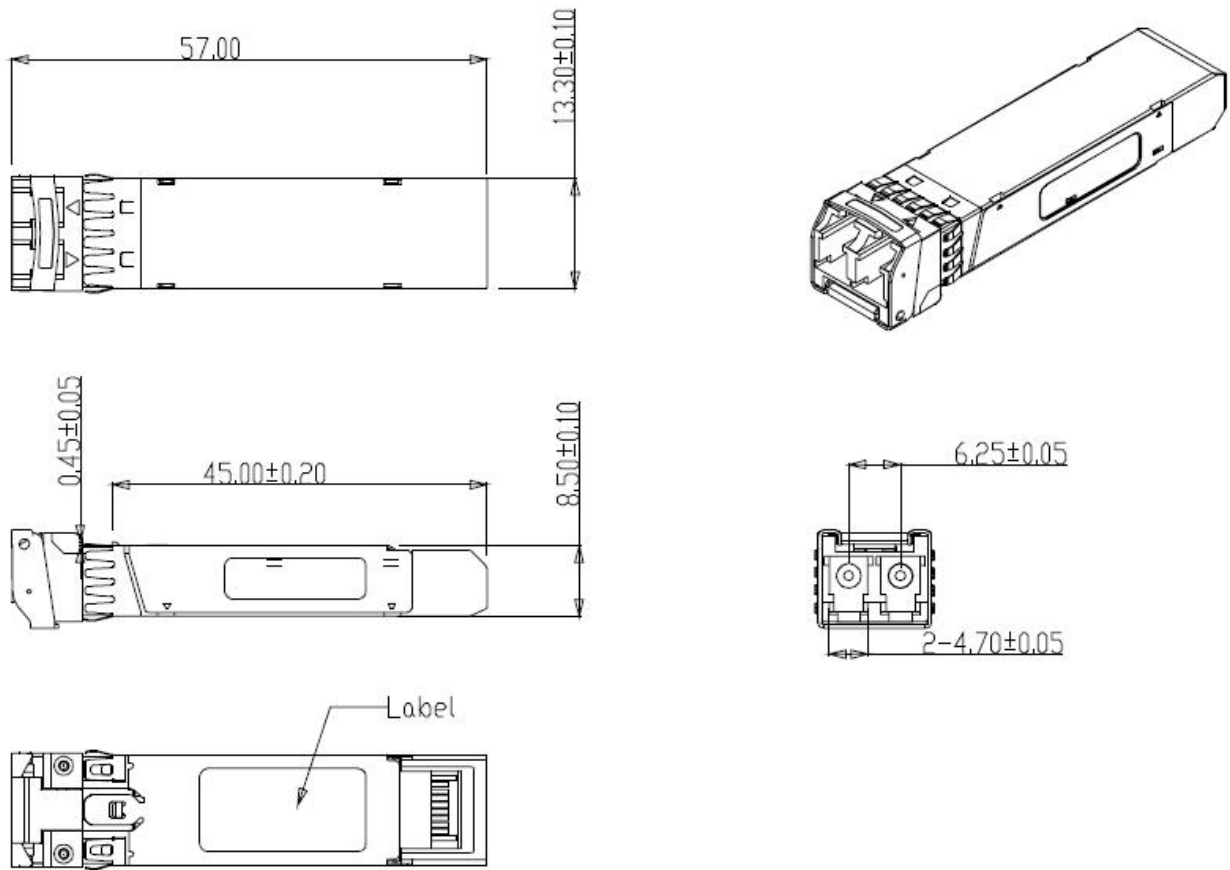


Figure4. Host-Module Interface



**Figure5. Mechanical Specifications**

### Regulatory Compliance

GIGALIGHT SFP+ transceiver is designed to be Class I Laser safety compliant and is certified per the following standards:

Feature	Agency	Standard	Certificate / Comments
Laser Safety	FDA	CDRH 21 CFR 1040 annd Laser Notice No. 50	1120292-000
Product Safety	UL	UL and CUL EN60950-2:2007	E347511
Environmental protection	SGS	RoHS Directive 2002/95/EC	GZ1001008918/CHEM
EMC	WALTEK	EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003	WT10093759-D-E-E



**Ordering information**

Part Number	Product Description
GCP-xx192-04C	CWDM SFP+, 11.3Gb/s, 1350-1450nm with 20nm Spacing, 40km, SMF, Duplex LC xx=35-45

**References**

1. "Specifications for Enhanced Small Form Factor Pluggable Module SFP+", SFF-8431, Rev 4.1, July 6, 2009.
2. "Improved Pluggable Formfactor", SFF-8432, Rev 4.2, Apr 18, 2007
3. IEEE802.3ae – 2002
4. "Diagnostic Monitoring Interface for Optical Transceivers" SFF-8472, Rev 10.3, Dec 1, 2007

**Important Notice**

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by GIGALIGHT before they become applicable to any particular order or contract. In accordance with the GIGALIGHT policy of continuous improvement specifications may change without notice.

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