


# 10G SFP+ CWDM 10KM Optical Transceiver GCP-XX192-01T

1270nm~1450nm 19dB link budget

## Features

- ✓ Compliant with SFF-8431, SFF-8432 and IEEE802.3ae
- ✓ CWDM DFB transmitter from 1270nm to 1450nm
- ✓ APD photo-detector
- ✓ Operating case temperature: -40 to 85 °C
- ✓ Low power consumption
- ✓ Applicable for 10km 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
- ✓ RoHS compliant (Lead Free) 

## Applications

- ✓ 10GBASE-LR at 10.3125Gbps
- ✓ Other optical links
- ✓ 10G Ethernet
- ✓ OTU2 at 10.709Gbps

## Product description

Gigalight SFP+LR CWDM Transceiver is a “Limiting module”, designed for 10GBASE-LR, and 2G/4G/8G/10G Fiber- 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	Tc	-40	+85	°C
Operating Case Temperature	Tc	-40	+85	°C
Relative Humidity	RH	5	95	%

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	Vcc	3.13	3.3	3.47	V
Supply current	Icc	-	-	454	mA
Operating Case temperature	Tca	-40	-	85	°C
Module Power Dissipation	Pm	-	-	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	0dBm to -18dBm 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	-40	85	degC	
TX Output optical power	DMI_TX	-3	+3	dBm	
RX Input optical power	DMI_RX	-28	-8	dBm	
Transceiver Supply voltage	DMI_VCC	3.0	3.6	V	
Bias current monitor	DMI_Ibias	0	100	mA	

## Optical characteristics

Parameter	Unit	Values
Operating Reach	m	10000
<b>Transmit</b>		
Center wavelength (range)	nm	1270 -1450
Side Mode Suppression Ratio (min)	dB	30
Launched power		
– maximum	dBm	+3
– minimum	dBm	-2 Notes1
Average launch power of OFF transmitter (max)	dBm	-30
Extinction ratio (min)	dB	3.5 Notes2
RIN12 OMA (max)	dB/Hz	-128
Optical Return Loss Tolerance (min)	dB	12
<b>Receiver</b>		
Center wavelength (range)	nm	1260-1460
Receiver overload (max) in average power1	dBm	-6
Receiver sensitivity (min) in average power1	dBm	-21 Notes3
Receiver Reflectance (max)	dB	-12
Vertical eye closure penalty (min)3	dB	2.2
Stressed eye jitter (min)2	Ulp-p	0.7
Receive electrical 3dB upper cutoff frequency (max)	GHz	12.3
Receiver power (damage, Max)	dBm	-0.5
Notes:		
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≤10-12		
4. In G.652 and G.655(NDSF)		

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	10.709	Gbps	
<b>Transmitter</b>						
Single Ended Output Voltage Tolerance		-0.3	-	4.0	V	
C common mode voltage tolerance		15	-	-	mV	
Tx Input Diff Voltage	VI	180		700	mV	
Tx Fault	VoL	-0.3		0.4	V	At 0.7mA
Data Dependent Input Jitter	DDJ			0.10	UI	
Data Input Total Jitter	TJ			0.28	UI	
<b>Receiver</b>						

Single Ended Output Voltage Tolerance		-0.3	-	4.0	V	
Rx Output Diff Voltage	Vo	300		850	mV	
Rx Output Rise and Fall Time	Tr/Tf	28		50	ps	20% to 80%
Total Jitter	TJ			0.70	UI	
Deterministic Jitter	DJ			0.42	UI	

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

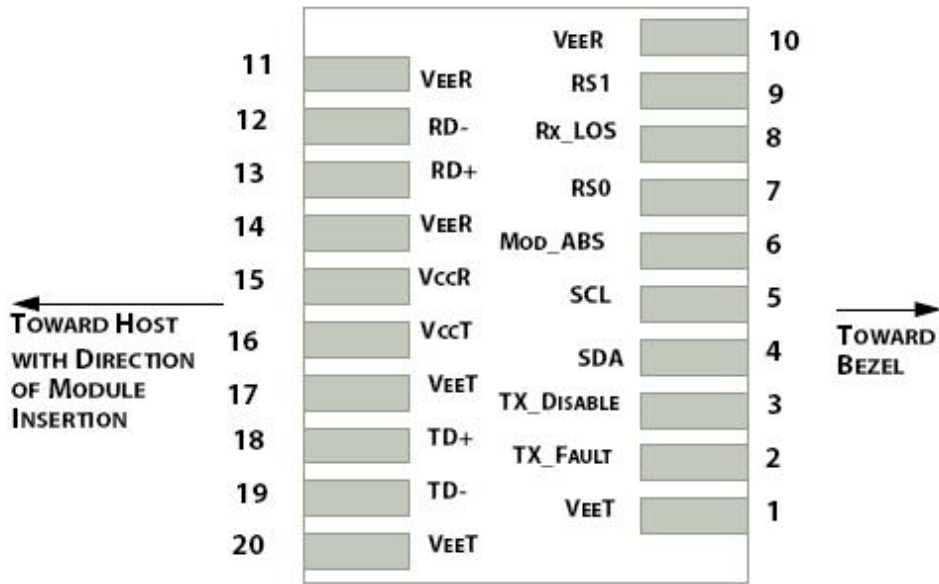


Figure 1: Interface to Host PCB

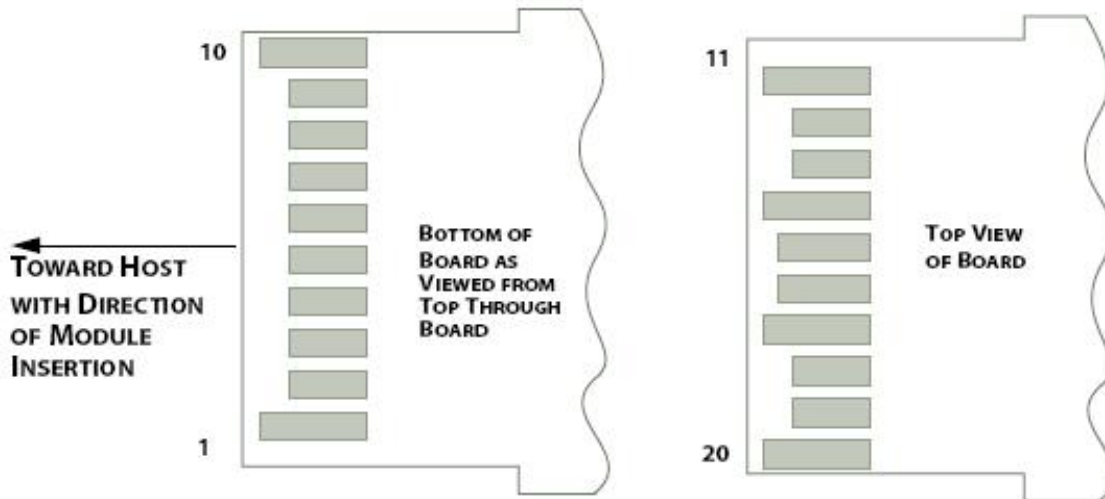


Figure 2: Module Contact Assignment

## 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:

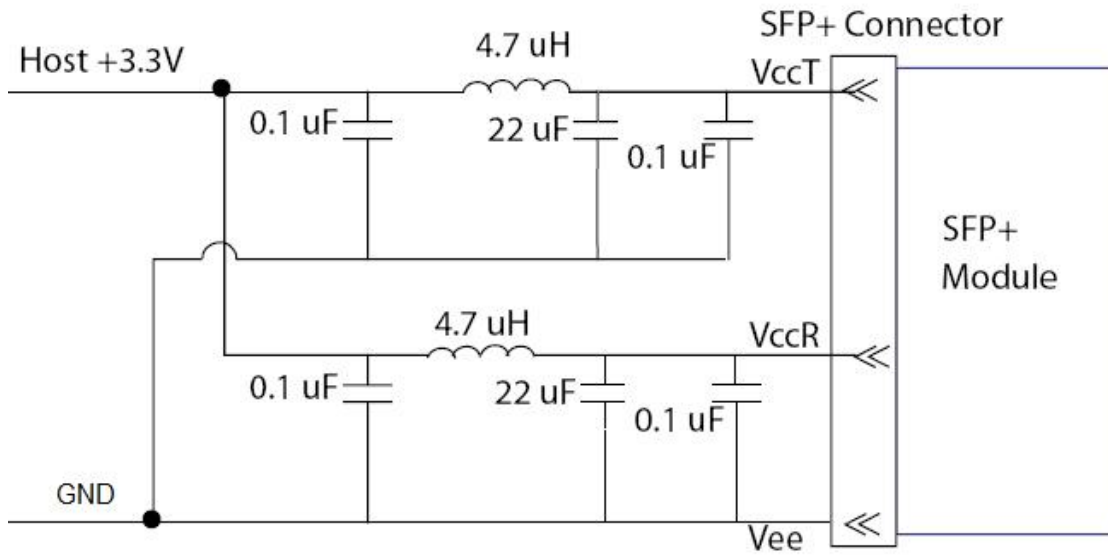
[1] Module circuit ground is isolated from module chassis ground within the module.

[2].should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.

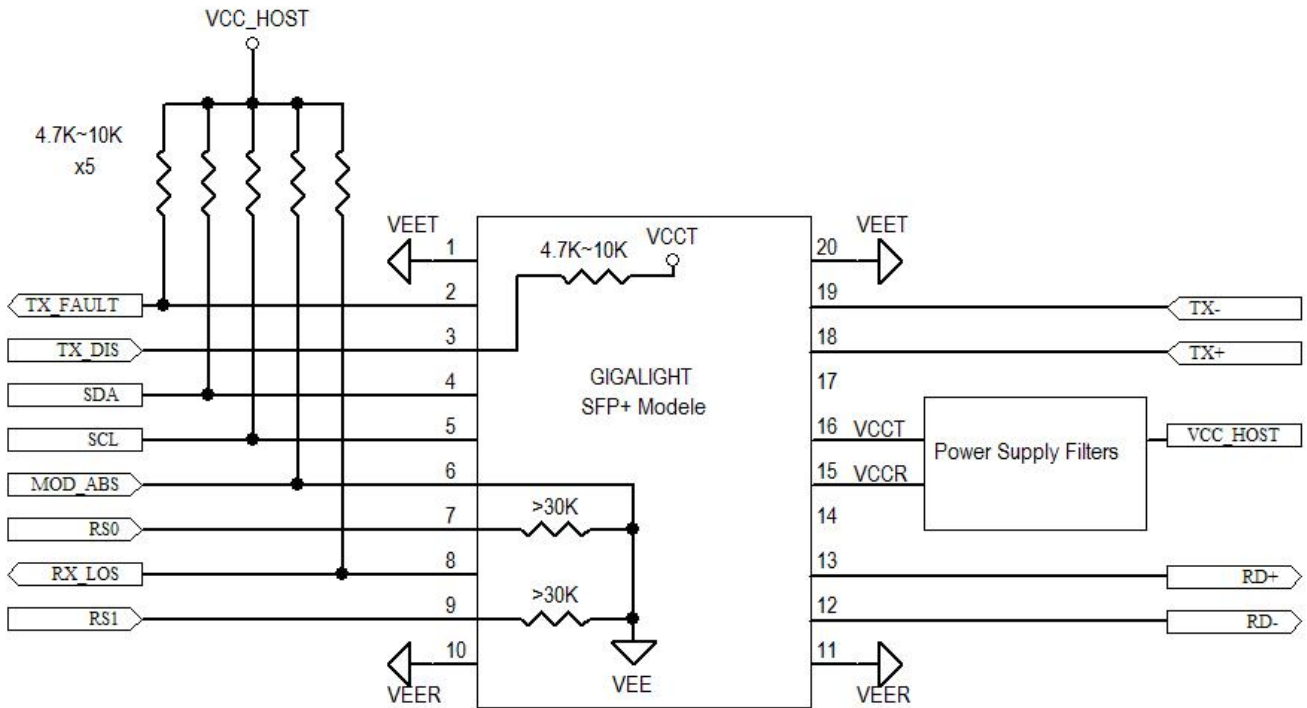
[3]Tx\_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.

[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.

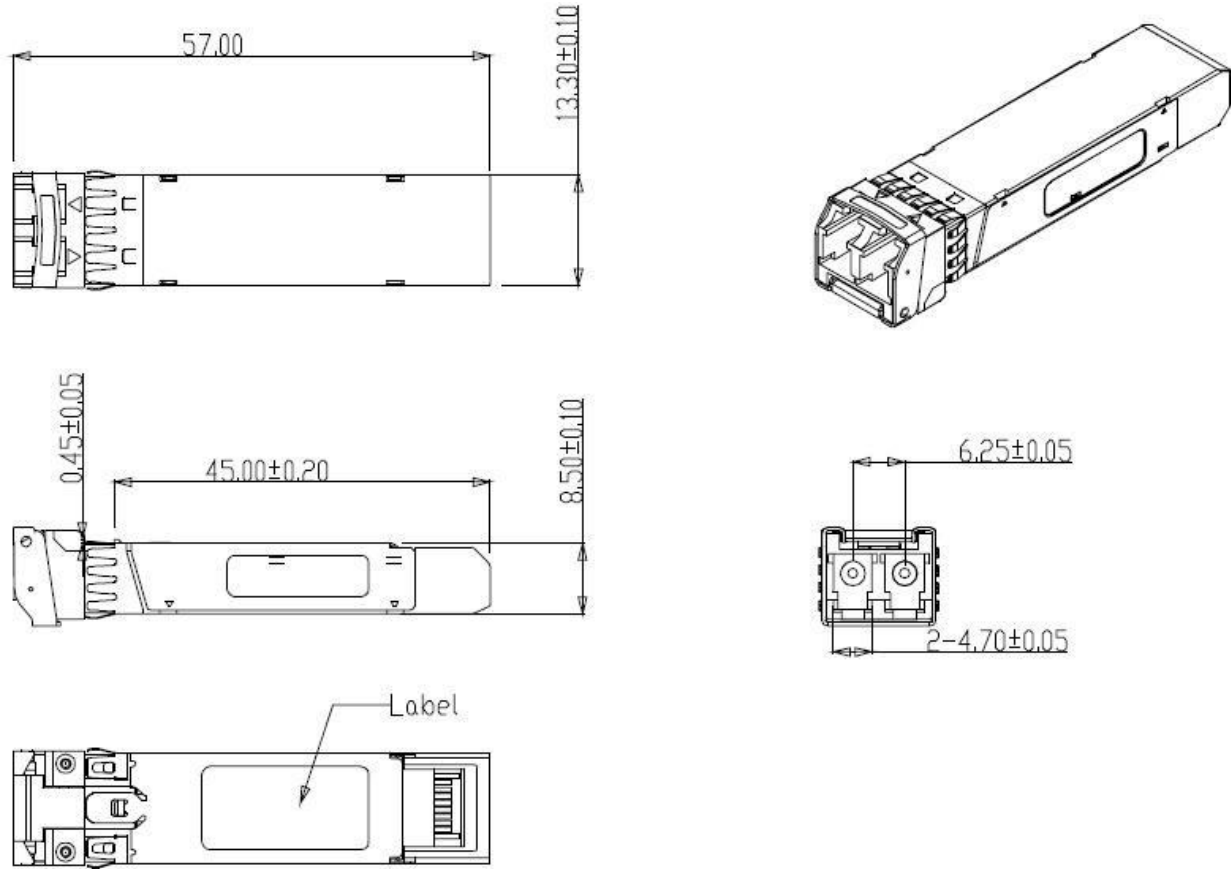
[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.



**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	Standard
Laser Eye Safety	IEC/EN 60825-1:2014
FCC	47CFR FCC Part 15 Subpart B (Class B) ANSI C63.4:2014
RoHS	2011/65/EU and 2015/863/EU
CE EMC	EN55032 EN55035

### CAUTION:

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

## Ordering information

Part Number	Product Description
GCP-27192-01T	10Gbps,1270nm SFP+LR 10km, -40°C ~ +85°C
GCP-29192-01T	10Gbps,1290nm SFP+LR 10km, -40°C ~ +85°C
...	...
GCP-45192-01T	10Gbps,1450nm SFP+LR 10km, -40°C ~ +85°C

## 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

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## Revision History

Revision	Date	Description
V0	21-May-2019	Advance Release.