OP-1GT-1
1000Base-T Copper SFP Module, RJ45 100m

Features

- Up to 1.25Gb/s bi-directional data links

- Hot-pluggable SFP footprint

- Extended case temperature range (0°C to +70°C)

- Fully metallic enclosure for low EMI

- Low power dissipation (1.05 W typical)

- Compact RJ-45 connector assembly

- Access to physical layer IC via 2-wire serial bus

- 1000 BASE-T operation in host systems with SERDES interface

Applications

- Gigabit Ethernet over Cat 5 cable

Description

OPTIENT Copper Small Form Pluggable (SFP)transceivers is high performance, cost effective module compliant with the Gigabit Ethernet and 1000BASE-T standards as specified in IEEE 802. 3-2002 and IEEE 802.3ab, which supporting 1000Mbps data- rate up to 100 meters reach over unshielded twisted-pair category 5 cable. The module supports 1000Mbps full duplex data-links with 5-level Pulse Amplitude Modulation (PAM) signals. All four pairs in the cable are used with symbol rate at 250Mbps on each pair. The module provides standard serial ID information compliant with SFP MSA, which can be accessed with address of A0h via the 2wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2wire serial bus at address ACh.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	85	℃
Supply Voltage	Vcc	-0.5	4	V
Operating Humidity	RH	5	95	﹪
Operating Temperature	Tso	0	70	℃

+3.3V Volt Electrical Power Interface

+3.3V volt Electrical Power Interface						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Supply Current	Is		320	375	mA	1.2W max power over full range of

					voltage and temperature. See caution note below
Input Voltage	Vcc	3.13	3.3	3.47	V	Referenced to GND
Maximum Voltage	Vmax			4	V	

Low-speed signals, electronic characteristics

Low-Speed Signals, Electronic Characteristics					
Parameter	Symbol	Min	Max	Units	Notes/Conditions
SFP Output LOW	VOL	0	0.5	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Output HIGH	VOH	host_Vcc - 0.5	host_Vcc + 0.3	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Input LOW	VIL	0	0.8	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
SFP Input HIGH	VIH	2	Vcc + 0.3	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector

High-speed electrical interface, transmission line-SFP

High-Speed Electrical Interface Transmission Line-SFP						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3u
Tx Output Impedance	Zout,TX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz
Rx Input Impedance	Zin,RX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz

High-speed electrical interface, host-SFP

High-Speed Electrical Interface, Host-SFP						
Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Single ended data input swing	Vinsing	250		1200	mV	Single ended
Single ended data output swing	Voutsing	350		800	mV	Single ended
Rise/Fall Time	Tr,Tf		175		psec	20%-80%
Tx Input Impedance	Zin		50		Ohm	Single ended
Rx Output Impedance	Zout		50		Ohm	Single ended

General specifications

General

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Data Rate	BR	10		1000	Mb/sec	IEEE802.3u
Cable Length	L			100	m	Category 5 UTP. BER <10^{-12}

Notes:

1. Clock tolerance is +/- 50 ppm

2. By default, the GE-FB-PXRC is a full duplex device in preferred master mode

3. Automatic crossover detection is enabled. External crossover cable is not required
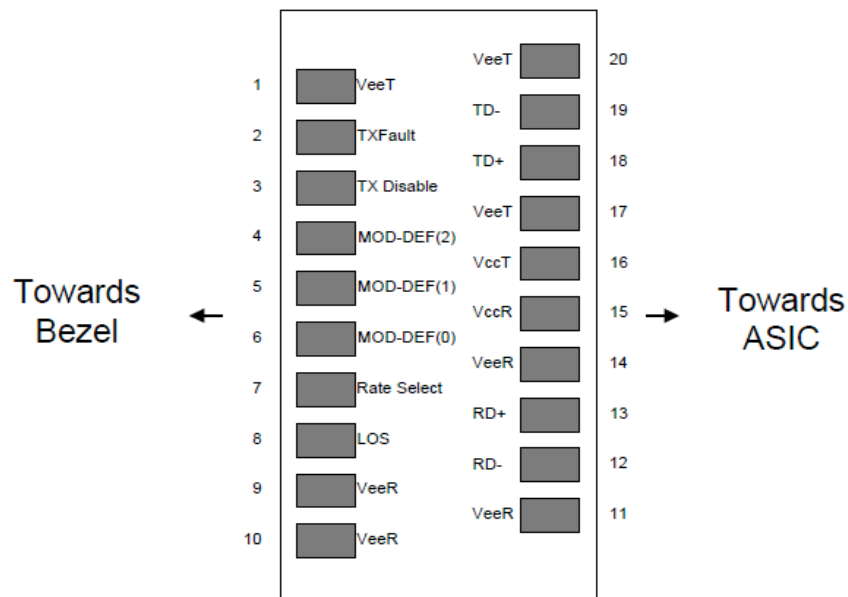
Pin Definitions

Diagram of Connector Block Pins on Host Board

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note1
3	TX DISABLE	Transmitter Disable	3	Note2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note3
6	MOD_DEF(0)	TTL Low	3	Note3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RX-	Inv. Received Data Out	3	Note 5
13	RX+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	

17	V$_{EET}$	Transmitter Ground	1	
18	TX+	Transmit Data In	3	Note 6
19	TX-	Inv. Transmit Data In	3	Note 6
20	V$_{EET}$	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is not supported and is always connected to ground.

2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a

  4.7 ¨C 10 K resistor. Its states are:

  Low (0 to 0.8V):   Transmitter on

  (>0.8, < 2.0V):   Undefined

  High (2.0 to 3.465V):   Transmitter Disabled

  Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a   4.7K to 10K resistor on the host

  board. The pull-up voltage shall be VccT or VccR

  Mod-Def 0 is grounded by the module to indicate that the module is present

  Mod-Def 1 is the clock line of two wire serial interface for serial ID

  Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V

  and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be

  pulled to less than 0.8V.

5) RD-/+: These are the differential receiver outputs. They are AC-coupled, differential lines with 100 differential

  termination inside the module.

6) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential

  termination inside the module.

Mechanical Diagram
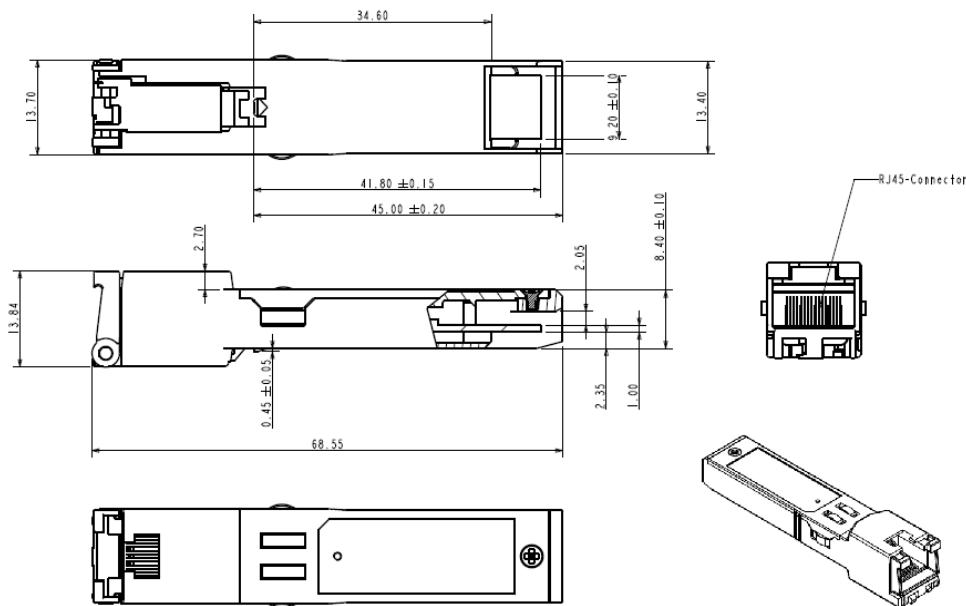
Ordering Information

Part Number	Description
OP-1GT-1	1000Mbps only, Copper SFP RJ45 100m