PROLABS – EX-SFP-1GE-T-C

1000BASE-T SFP (Small Form Pluggable) Copper Transceiver
3.3V, 1.25GBd Gigabit Ethernet

EX-SFP-1GE-T-C Overview

PROLABS's EX-SFP-1GE-T-C Copper SFP transceivers are based on Gigabit Ethernet IEEE 802.3 standard and 1000BASE-T standard and provide a quick and reliable interface for the Gigabit Ethernet application. The 1000BASE-T physical layer PHY can be accessed via I^2C, allowing access to all PHY setting and features. In addition, they comply with the Small Form Factor Pluggable Multi Sourcing Agreement (MSA) .

Product Features

- Up to 1.25 GBd bi-directional data links
- Compliant with IEEE 802.3z, IEEE 802.3u, IEEE 802.3ab compliant
- Compliant with SFP MSA
- Hot-pluggable SFP footprint
- Support 1000BASE-T full duplex default operating mode
- Support 10/100/1000BASE-T operation in host systems with SGMII interface
- RJ-45 connector
- Auto-sense MDI/MDIX
- Single power supply 3.3V
- Fully RoHS Compliance
- Operating temperature range: 0℃ to 70℃.

Applications

- 1.25 GBd Gigabit Ethernet

Ordering Information

Part Number	***Description***
EX-SFP-1GE-T-C	1000BASE-T SFP Copper RJ-45 Connector 100m Auto Negotiation Version

Host Compatible Selection

Part Number	***Link Indicator on RX_LOS Pin***	***Compatible with 1000BASE-X auto-negotiation***
EX-SFP-1GE-T-CA	NO	YES

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate[1]	*DR*	10		1000	Mb/sec	IEEE 802.3
Cable Length	*CL*			100	m	Category 5 UTP
Bit Error Rate	*BER*			10^{-12}		
Operating Temperature	T_{OP}	0		85	℃	Case temperature
Storage Temperature	T_{STO}	– 40		85	℃	Ambient temperature
Supply Current	I_S		320	375	mA	For electrical power interface
Input Voltage	V_{CC}	3.13	3.3	3.47	V	Referenced to GND. For electrical power interface
Maximum Voltage	V_{MAX}			4	V	For electrical power interface
Surge Current	I_{surge}			30	mA	Hot Plug above steady state current. For electrical power interface

Note 1: 10/100/1000M operation requires the host system to have an SGMII interface with no clock. With a SERDES interface, this transceiver will operate at 1000M only.

High Speed Electrical Interface Host-SFP

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential Input Voltage	V_{INDIFF}	250		1200	mV	Differential peak-peak
Differential Output Voltage	$V_{OUTDIFF}$	350		800	mV	Differential peak-peak
Rise/Fall Time (20% – 80%)	T_{R-F}		175		psec	
Tx Input impedance	Z_{IN}		50		ohm	Single ended
Rx Output impedance	Z_{OUT}		50		ohm	Single ended

High Speed Electrical Interface Transmission Line-SFP

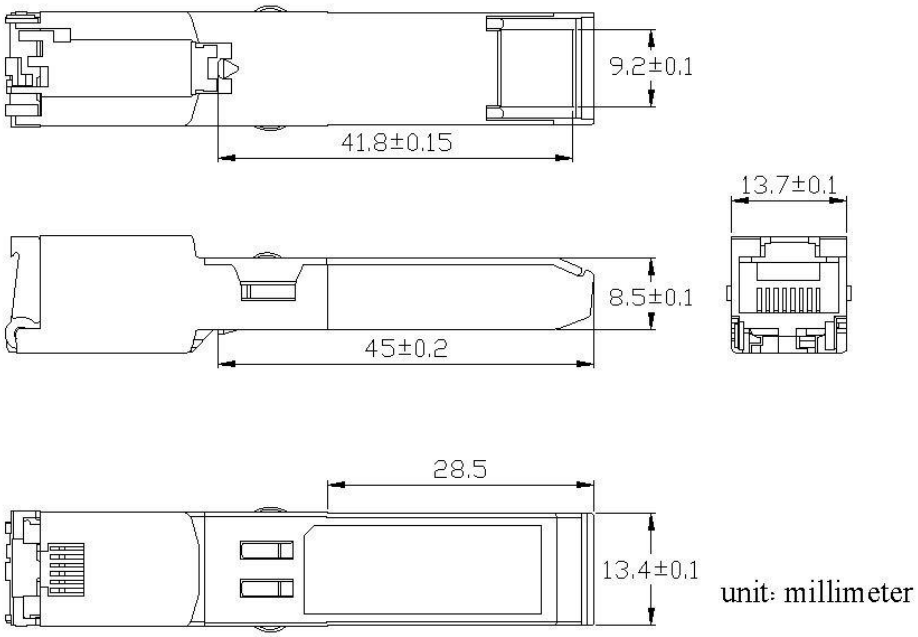
Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Line Frequency	F_L		125		MHz	5-level encoding
Tx Output Impedance – Differential	Z_{OUT_T}		100		Ohm	Note 1
Rx Input Impedance – Differential	Z_{IN_RX}		100		Ohm	Note 1

Note 1: For all frequencies between 1MHz and 125MHz.

Low Speed Electrical Signal

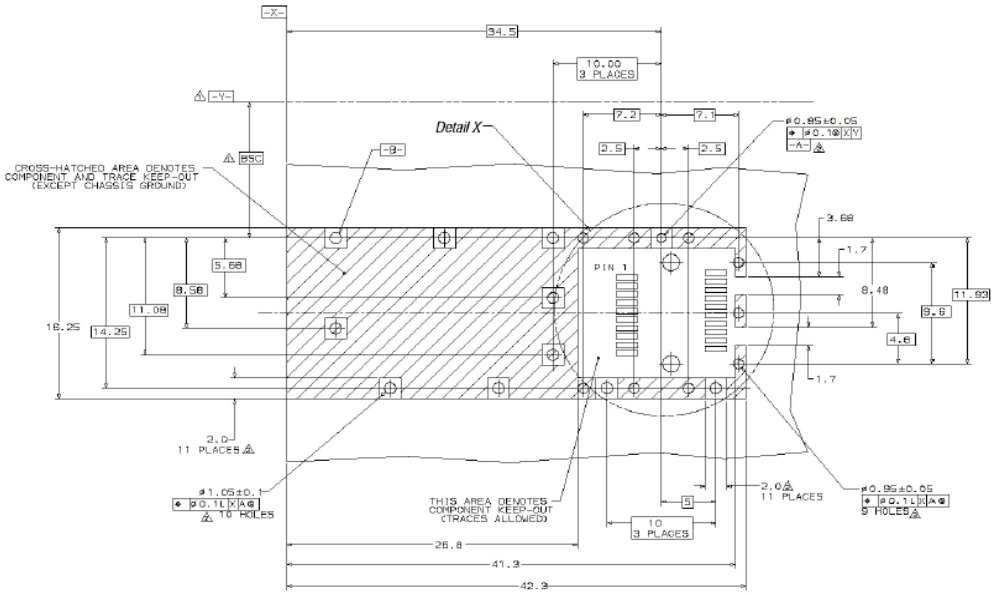
Parameter	Symbol	Min	Typ	Max	Unit	Remarks
SFP Output Low	V_{OL}	0		0.5	V	External 4.7-10k ohm pull-up resistor required
SFP Output High	V_{OH}	Host_V_{CC} – 0.5		Host_V_{CC} + 0.3	V	External 4.7-10k ohm pull-up resistor required
SFP Input Low	V_{IL}	0		0.8	V	External 4.7-10k ohm pull-up resistor required
SFP Input High	V_{IH}	2		V_{CC} + 0.3	V	External 4.7-10k ohm pull-up resistor required

Dimensions



ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

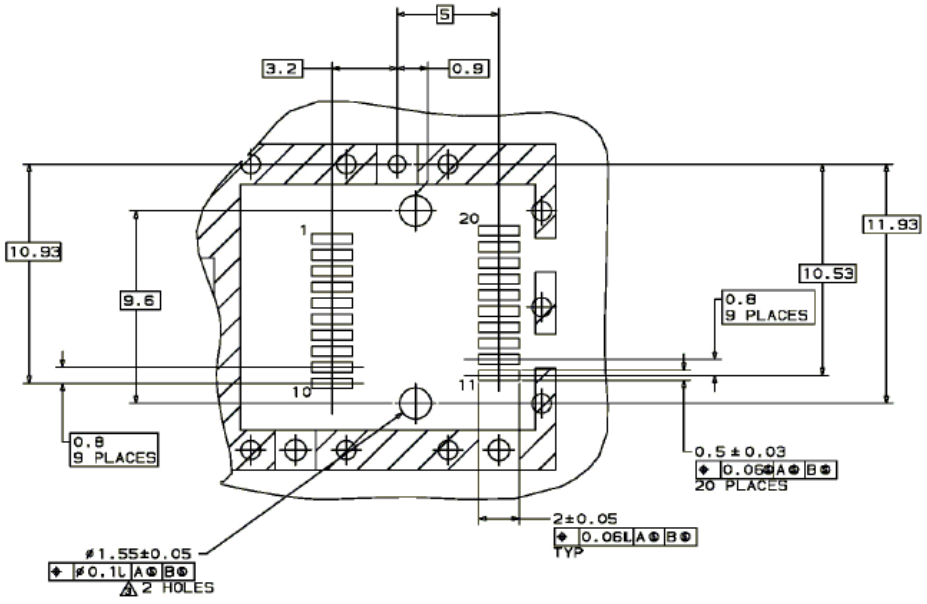
PCB Layout Recommendation



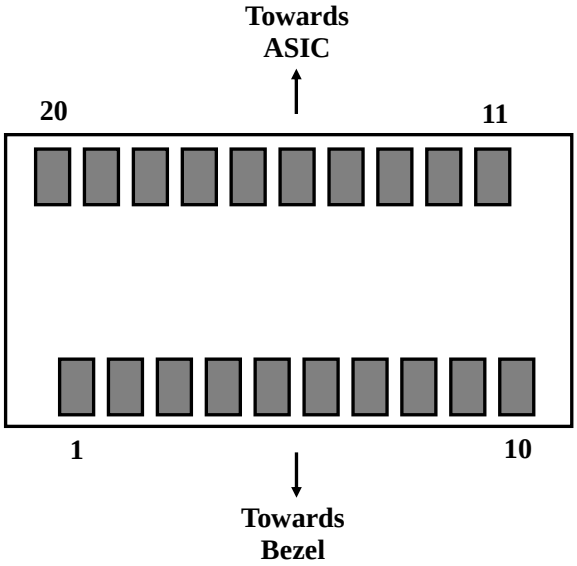
Datum and Basic Dimension Established by Customer

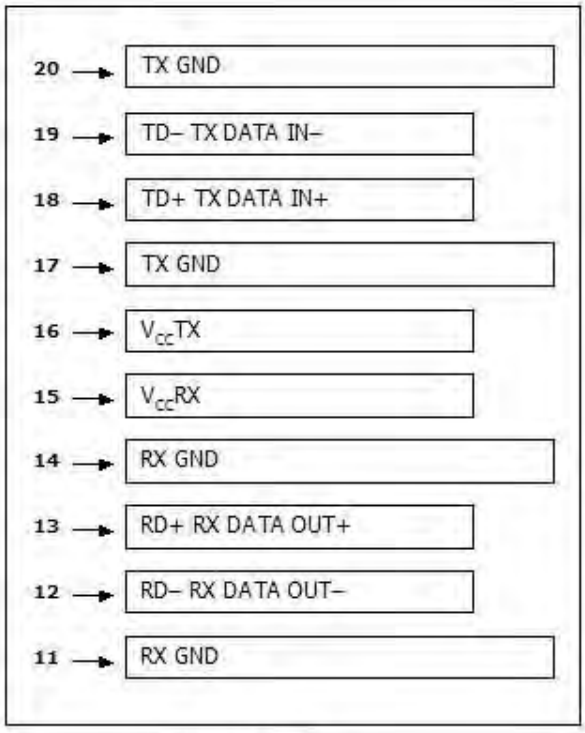
Pads and Vias are Chassis Ground, 11 Places

Through Holes are Unplated

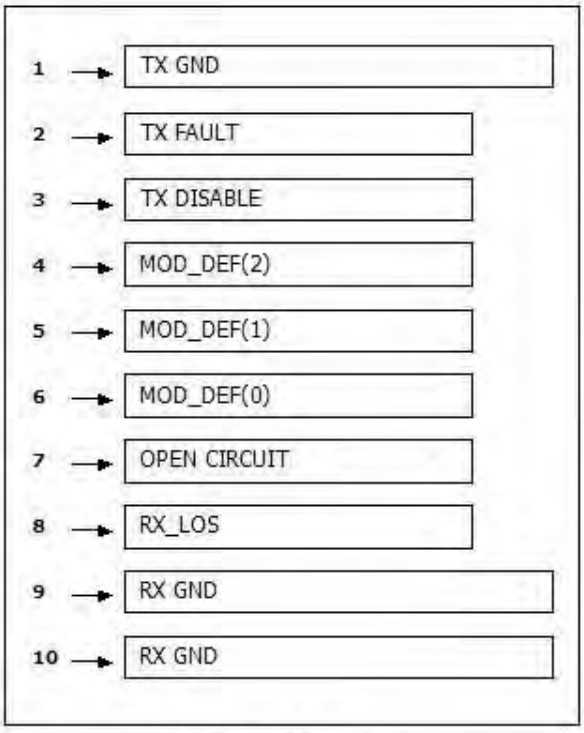


Electrical Pad Layout





Top of Board



Bottom of Board

Pin Assignment

PIN #	Symbol	Description	Remarks
1	V_{EET}	Transmitter ground (common with receiver ground)	Circuit ground is connected to chassis ground
2	T_{FAULT}	Transmitter Fault. Not supported	
3	T_{DIS}	Transmitter Disable. PHY disabled on high or open	Disabled: T_{DIS}>2V or open
			Enabled: T_{DIS}<0.8V
4	MOD_DEF (2)	Module Definition 2. Data line for serial ID	Should Be pulled up with 4.7k – 10k ohm on host board to a voltage between 2V and 3.6V
5	MOD_DEF (1)	Module Definition 1. Clock line for serial ID	
6	MOD_DEF (0)	Module Definition 0. Grounded within the module	
7	Rate Select	No connection required	
8	LOS	Loss of Signal	Not supported on EX-SFP-1GE-T-CA
9	V_{EER}	Receiver ground (common with transmitter ground)	Circuit ground is connected to chassis ground
10	V_{EER}	Receiver ground (common with transmitter ground)	
11	V_{EER}	Receiver ground (common with transmitter ground)	
12	RD–	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	V_{EER}	Receiver ground (common with transmitter ground)	Circuit ground is connected to chassis ground
15	V_{CCR}	Receiver power supply	
16	V_{CCT}	Transmitter power supply	
17	V_{EET}	Transmitter ground (common with receiver ground)	Circuit ground is connected to chassis ground
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	
19	TD–	Transmitter Inverted DATA in. AC coupled	
20	V_{EET}	Transmitter ground (common with receiver ground)	Circuit ground is connected to chassis ground

References

1. IEEE standard 802.3. IEEE Standard Department, 2002.
2. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.
3. Marvell Corporation – Alaska Ultra 88E1111 Integrated 10/100/1000 Gigabit Ethernet Transceiver.