

PROLABS SFP-10G-T-NC

Overview

The PROLABS SFP-10G-T-NC copper transceiver module is a high performance integrated duplex data link for bi-directional communication over copper cable. It is specifically designed for high speed communication links that require 10 Gigabit Ethernet over Cat 6a/7 cable. This is the first SFP+ transceiver that offers 10 Gb/s communication over this type of media.

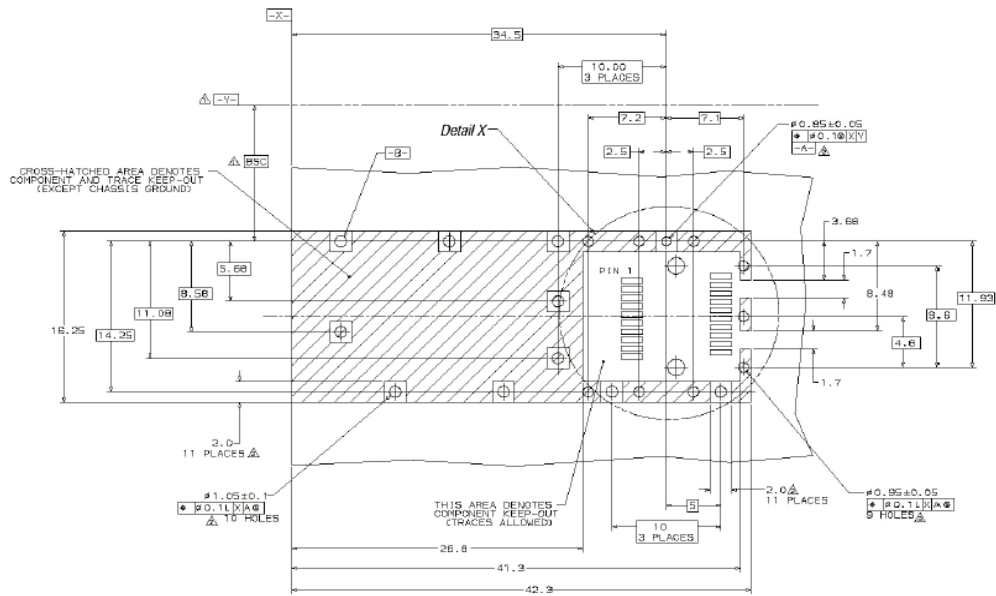
Product Features

- ▶ Supports Links up to 30m using Cat 6a/7 Cable
- ▶ SFF-8431 and SFF-8432 MSA Compliant
- ▶ IEEE 802.3az Compliant
- ▶ Low Power Consumption (2.5W max @ 30m)
- ▶ Fast Retrain EMI Cancellation Algorithm
- ▶ Low EMI Emissions
- ▶ I2C 2 Wire Serial Interface for Serial Id and Phy Registers
- ▶ Auto-negotiates with other 10GBase-T-NC PHYs
- ▶ Automatic Detection and Correction of Wiring and Polarity Swaps
- ▶ Robust Die Cast Housing
- ▶ Bail Latch Style ejector mechanism
- ▶ Unshielded and Shielded cable support

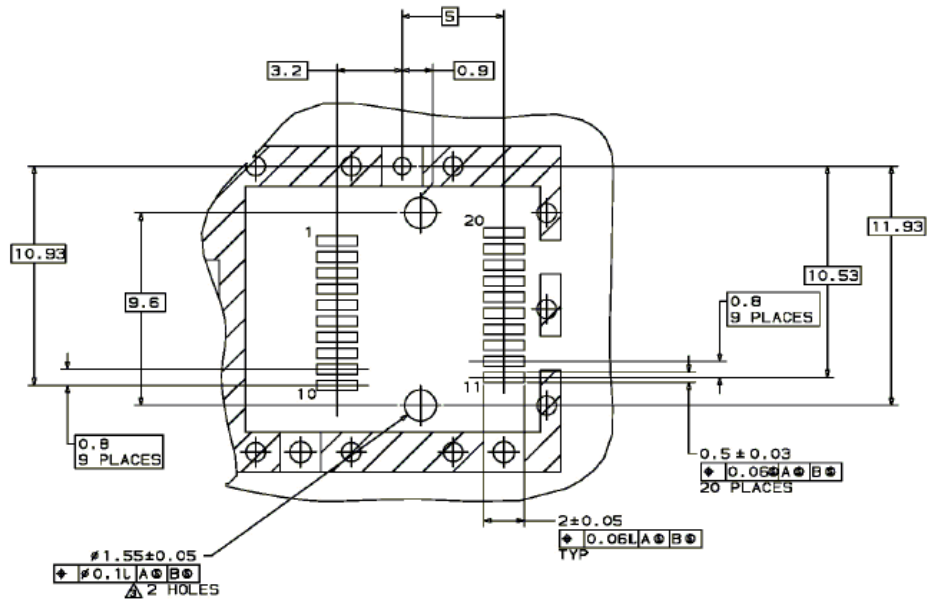
General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Bit Error Rate	BER			10^{-12}		
Operating Temperature	T_{OP}	-5		85	°C	Case temperature
Storage Temperature	T_{STO}	-40		85	°C	Ambient temperature
Operating Humidity	-	5		95	%	Non condensing
Power @30m	I_S		2.3	2.5	W	
Input Voltage	V_{CC}	3	3.3	3.6	V	

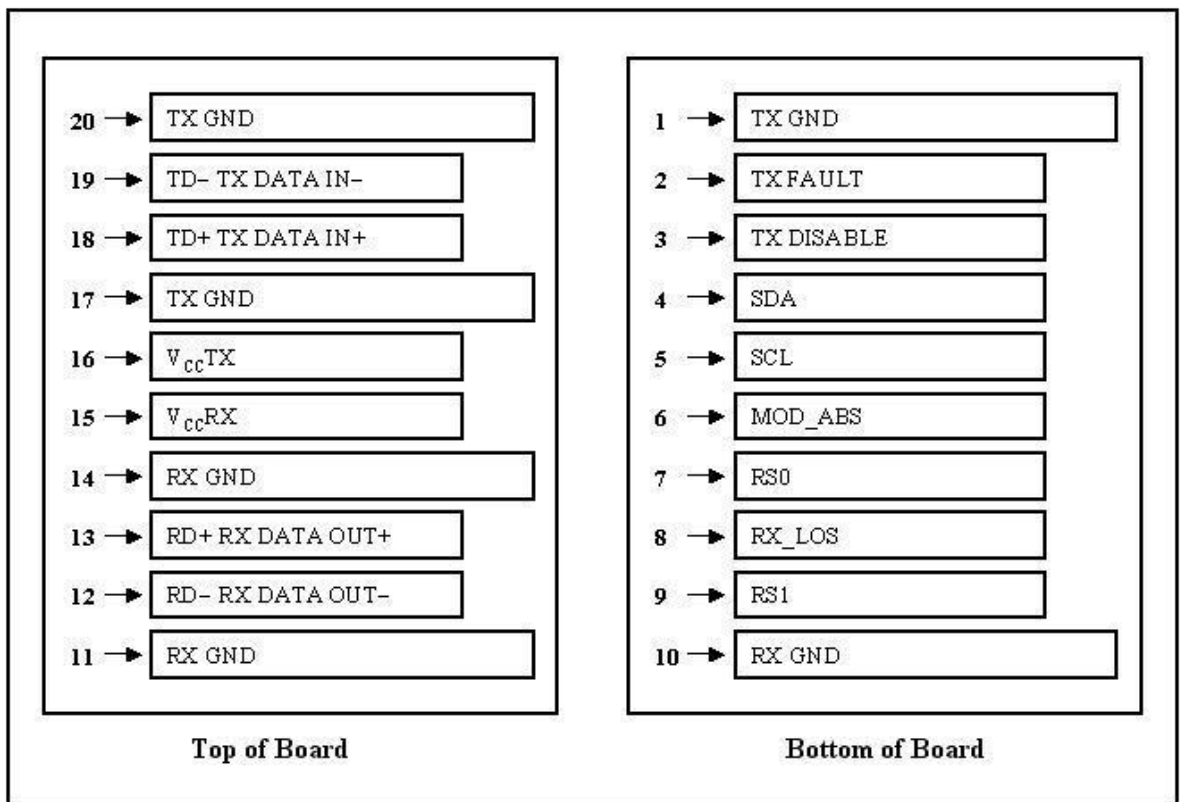
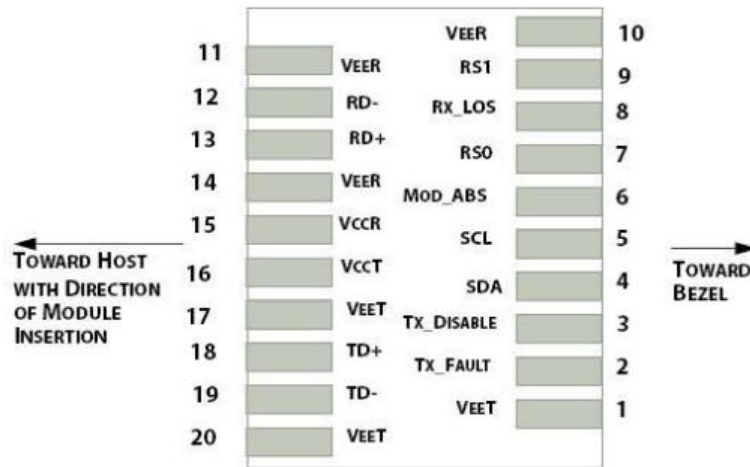
PCB Layout Recommendation



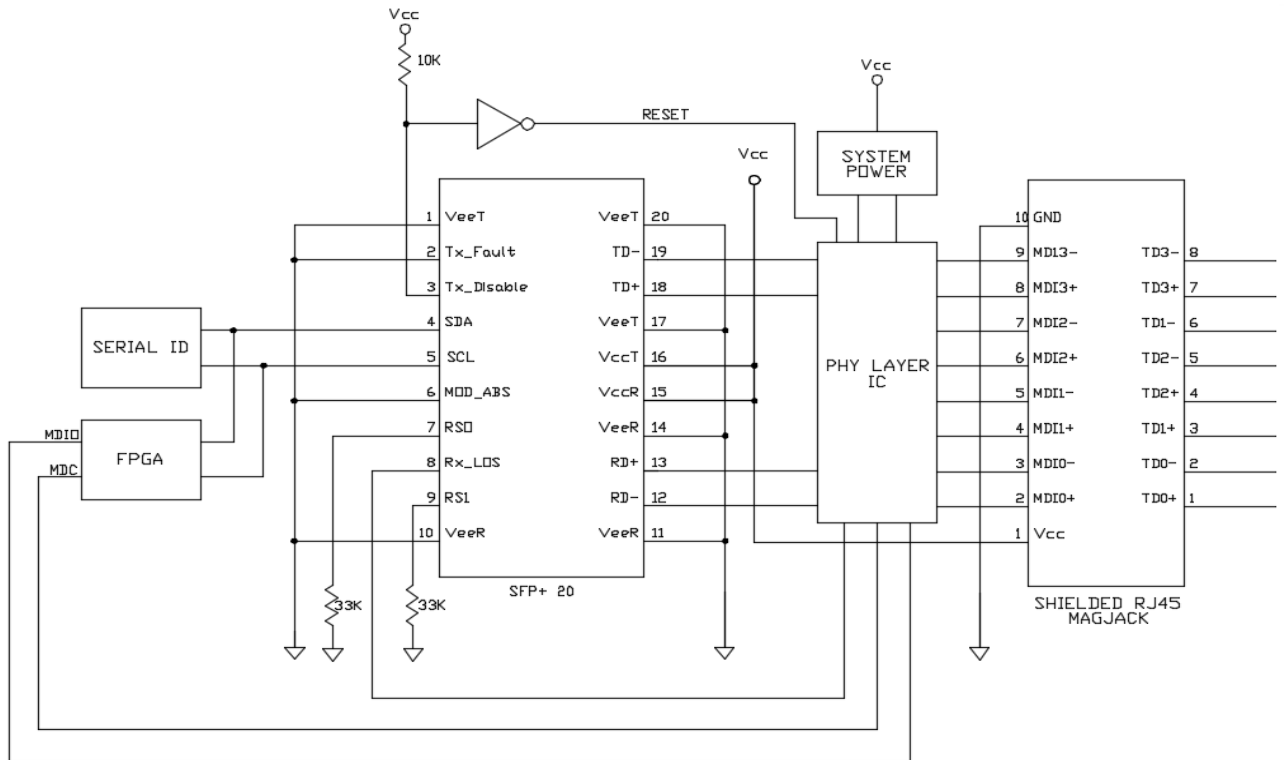
-  Datum and Basic Dimension Established by Customer
-  Rads and Vias are Chassis Ground, 11 Places
-  Through Holes are Unplated



Electrical Pad Layout



Block Diagram



Memory Map

Data Address	Field Size	Field Name	Field Description	Field Value	Value Description
BASE ID FIELDS					
0	1	Identifier	Type of transceiver	3	SFP TRANSCEIVER
1	1	Ext. Identifier	Extended identifier of type of serial transceiver	4	WITH SERIAL ID
2	1	Connector	Code for connector type	22	RJ45 Connector
03-Oct	8	Transceiver	Code for electronic or optical compatibility	00,00,00,nn 00,00,00,00	10G Base-T is Undefined in SFF- 8472
11	1	Encoding	Code for serial encoding algorithm	0	UNSPECIFIED
12	1	BR, Nominal	Nominal signaling rate, units of 100Mbps/sec	64	10Gb Bit Rate
13	1	Rate Identifier	Type of rate select functionality	0	UNSPECIFIED
14	1	Length (SMF, km)	Link length supported for single mode fiber, units of km	0	NA
15	1	Length (SMF)	Link length supported for single mode fiber, units of 100m	0	NA
16	1	Length (50mm)	Link length supported for 50mm OM2 fiber, units of 10m	0	NA
17	1	Length (62.5mm)	Link length supported for 62.5mm OM1 fiber, units of 10m	0	NA
18	1	Length (cable)	Link length supported for copper or direct attach cable, units of m	1E	30
19	1	Length (OM3)	Link length supported for 50mm OM3 fiber, units of 10m	0	RESERVED
20-35	16	Vendor name	SFP vendor name (ASCII)	TBD	Compatibility dependent
36	1	Transceiver	Code for electronic or optical compatibility	1	UNALLOCATED
37-39	3	Vendor OUI	SFP transceiver vendor IEEE company ID	00,00,00	Prolabs OUI
40-55	16	Vendor PN	Part number provided by SFP transceiver vendor (ASCII)	TBD	Compatibility dependent
56-59	4	Vendor rev	Revision level for part number provided by vendor (ASCII)	2D,20,33,32	56: Part Rev "4" 57: Reserved 58: FPGA FW "3" 59: Phy FW "2"
60-61	2	Wavelength	Laser wavelength (Passive/Active Cable Specification Compliance)	00,00	RESERVED
62	1	Unallocated		0	RESERVED
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)	VARIABLES	
EXTENDED ID FIELDS					
64-65	2	Options	Indicates which optional SFP signals are implemented	00,00	
66	1	BR, max	Upper bit rate margin, units of %	0	
67	1	BR, min	Lower bit rate margin, units of %	0	
68-83	16	Vendor SN	Serial number provided by vendor (ASCII)	VARIABLES	(ASCII)
84-91	8	Date code	Vendor's manufacturing date code	VARIABLES	YY-MM-DD-LOT#

92	1	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any)	0	None included
93	1	Enhanced Options	Indicates which optional enhanced features are implemented (if any)	0	None included
94	1	SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with	0	None included
95	1	CC_EXT	Check code for the Extended ID Fields (addr. 64 to 94)	VARIABLES	
VENDOR SPECIFIC ID FIELDS					
96-127	32	Vendor Specific	Vendor Specific EEPROM		
128-255	128	Reserved	Reserved		

Pin Assignment

PIN #	Symbol	Description	Remarks
1	V _{EET}	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground
2	T _{FAULT}	Transmitter Fault.	
3	T _{DIS}	Transmitter Disable. Laser output disable on high or open	Disabled: T _{DIS} >2V or open Enabled: T _{DIS} <0.8V
4	SDA	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	SCL	Clock line for serial ID	
6	MOD_ABS	Module Absent. Grounded within the module	
7	RS0	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	LOS is open collector output
9	RS1	No connection required	
10	V _{EER}	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis 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 isolated from 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 802.3ae. IEEE Standard Department, 2005.
2. Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable Module "SFP+" – SFF-8431
3. Digital Diagnostics Monitoring Interface for Optical Transceivers – SFF-8472.

RJ45 Connector

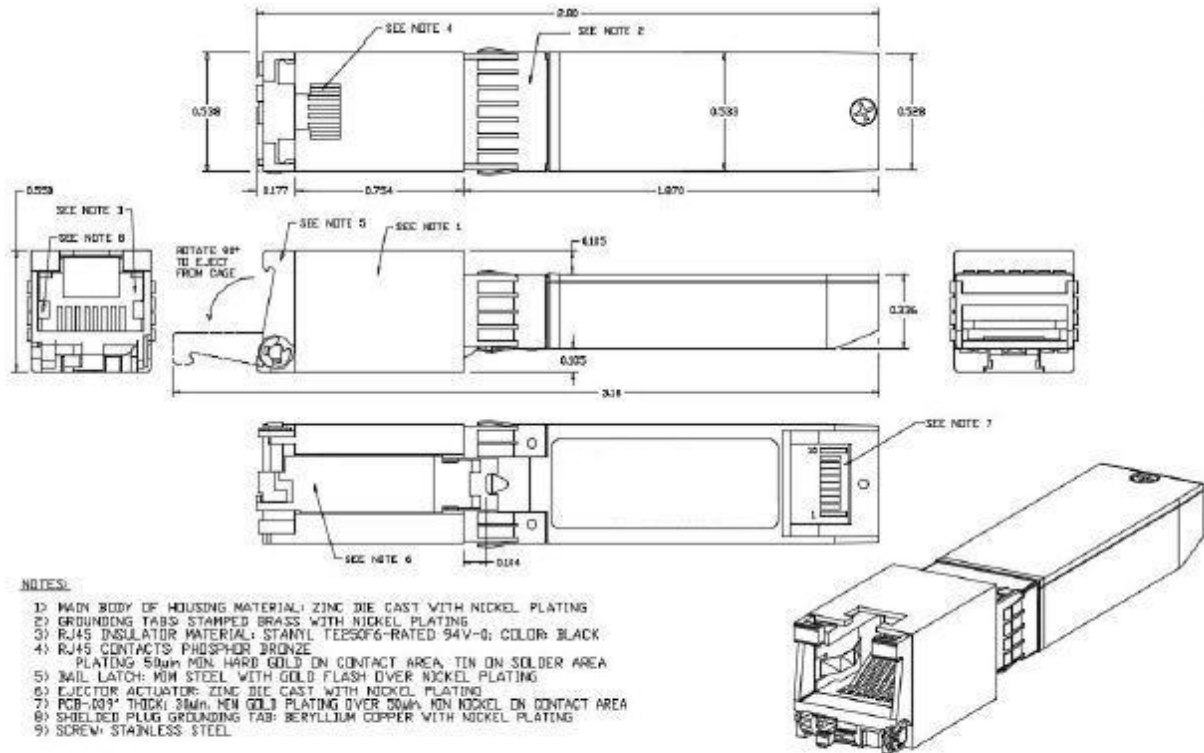
RJ45 connector shall support shielded and unshielded cables. Also, the connector is mechanically robust enough and designed to prevent loss of link, when the cable is positioned or moves in different angles. The connector shall pass the “wiggle” RJ45 connector operational stress test. During the test, after the cable is plugged in, the cable is moved in circle to cover all 360 deg in the vertical plane, while the data traffic is on. There shall be no link or data loss.

Latch Requirements

The SFP transceiver latch should be mechanically robust and designed to prevent unintentional unlatching during insertion or extraction of the transceiver cable. The transceiver is designed with a “Bail type ejector latch mechanism” that allows the SFP module to be easily released from the cage, when the adjacent SFP ports in both rows are also populated and regardless of whether the SFP module is placed in the lower or upper row. The latch shall also pass the “wiggle” RJ45 connector stress test.

Measurement	Minimum	Maximum	Units	Comments
SFP transceiver insertion	N/A	18	Newtons	Measure without the force from any cage kick out springs. Module to be inserted into nominal cage.
SFP transceiver extraction	N/A	12.5	Newtons	Measure without the force from any cage kick out springs. Module to be inserted into nominal cage.
SFP transceiver retention	90	170	Newtons	No functional damage to module below 90N..
Insertion/removal cycles, SFP transceiver	50	N/A	Cycles	No functional damage to module, cage or connector

Dimensions



Safe Usage Advice

The 10G BASE-T SFP+ consumes more power than a standard SFP+ and so ProLabs recommends filling no more than 30% of the switch's allotted ports.

ProLabs recommends, where possible, leaving the adjacent port empty when using a 10G BASE-T SFP+

The SFP+ 10G BASE-T can get hot to the touch due to the higher power consumption. This will not damage the SFP+ or SFP+ Port but care should be taken when handling a part when it is removed from a switch after time in operation.