

Product Specification

ROHS-6 Compliant
1/2/4/8/10G FC and 1G/10G Ethernet Pluggable SFP+
Electrical Loopback Module

FTLF0078P2BTL

PRODUCT FEATURES

- Hot-pluggable SFP+ footprint
- Serial ID
- Integrated Module Usage Counter
- ROHS-6 Compliant (lead-free)
- Industrial Temperature Range:
-40 °C to +85 °C
- Bit Rates up to 11.3 Gb/sec.



APPLICATIONS

- Loopback testing of 1G/10G Ethernet SFP+ host ports.
- Loopback testing of 1/2/4/8/10G FC host ports.

Finisar's Small Form Factor Pluggable (SFP+) FTLF0078P2BTL Electrical loopback modules provide an effective way of testing the SFP+ ports in the host system by looping back the electrical signal (no optics are included). The units provide basic Serial ID information that attempts to mimic a shortwave Gige /1G/2G FC SFP+ transceiver (FTLF8519-type) 4G FC (FTLF8524-type), 8G FC (FTLF8528-type) and 10Gb/s Ethernet/FC (FTLX8571-type) for manufacturing testing. In addition, the user can query the number of power-up/insertion cycles via the Digital Diagnostics Monitoring Interface in order to ensure optimum module reliability and ascertain device's useful life.

PRODUCT SELECTION

FTLF0078P2BTL

I. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	V _{EET}	Transmitter Ground (Common with Receiver Ground).	
2	T _{FAULT}	Transmitter Fault. Pulled low.	
3	T _{DIS}	Transmitter Disable. Not connected (module has no optical transmitter).	
4	SDA	Module Definition 2. Data line for Serial ID.	1
5	SCL	Module Definition 1. Clock line for Serial ID.	1
6	Mod_ABS	Module Definition 0. Grounded within the module.	1
7	RS0	No connection required.	
8	LOS	Loss of Signal indication. Pulled low.	2
9	RS1	No Connection required.	
10	V _{EER}	Receiver Ground (Common with Transmitter Ground).	
11	V _{EER}	Receiver Ground (Common with Transmitter Ground).	
12	RD-	Receiver Inverted DATA out.	
13	RD+	Receiver Non-inverted DATA out.	
14	V _{EER}	Receiver Ground (Common with Transmitter Ground).	
15	V _{CCR}	Receiver Power Supply.	
16	V _{CCT}	Transmitter Power Supply.	
17	V _{EET}	Transmitter Ground (Common with Receiver Ground).	
18	TD+	Transmitter Non-Inverted DATA in.	
19	TD-	Transmitter Inverted DATA in.	
20	V _{EET}	Transmitter Ground (Common with Receiver Ground).	

Notes:

- Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V.
MOD_DEF(0) pulls line low to indicate module is plugged in.
- LOS is pulled low within the module and therefore will always indicate a received signal.

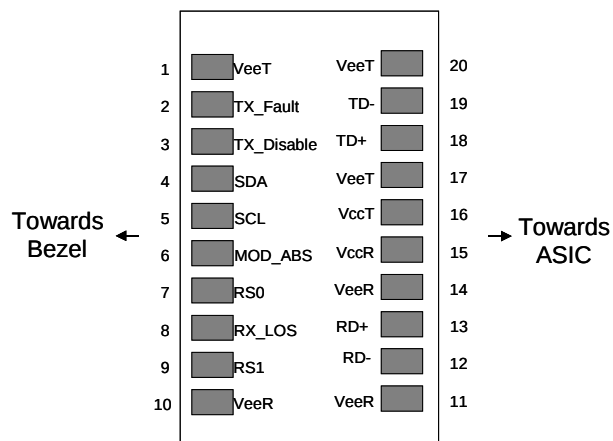


Fig 1.--Diagram of Host Board Connection Pin Names

II. Absolute Maximum Ratings

Finisar SFP+ transceivers have a power supply voltage range of 3.0 V to 3.60V and an extended operating temperature range from -40°C to 85°C.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	V _{CC}	-0.5		4.0	V	
Storage Temperature	T _S	-40		85	°C	
Case Operating Temperature	T _{OP}	-40		85	°C	
Relative Humidity	RH	0		85	%	1
Useful Life - Maximum Insertion/Extraction Cycles	T _{OP}			100		4

III. Electrical Characteristics (T_{OP} = -40 to 85 °C, V_{CC} = 3.0 to 3.60 Volts)

Testing Methodology per SFF-8431. Rev 2.2

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	V _{CC}	3.0		3.60	V	
Supply Current	I _{CC}			150	mA	
Transmitter						
Input differential impedance	R _{in}		100		Ω	
Single ended data input swing	V _{in,pp}	150		800	mV	
Receiver						
Single ended data output swing	V _{out,pp}	200		400	mV	2
Jitter (Total, DDj, PWS,Uj)	T _j	Per SFF-8431 Rev 2.2				
Data output rise time	t _r	28		60	ps	2
Data output fall time	t _f	28		60	ps	2
LOS Normal	V _{LOS norm}	V _{ee}		V _{ee} +0.8	V	3

Notes:

1. Non condensing.
2. Into 100 ohms differential termination.
3. LOS is pulled low internally, and will therefore always indicate a received signal.
4. A digital power cycle counter can be found at memory location 254 (MSB)-255(LSB) at device address A2.
See section IV

IV. Serial Communications Protocol

Finisar SFP+ transceivers support the 2-wire serial communication protocol as defined in the SFF-8472. It is very closely related to the E²PROM defined in the GBIC standard, with the same electrical specifications.

The standard SFP+ serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, Finisar SFP+ transceivers provide an enhanced digital diagnostic monitoring interface, 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. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

SFF-8472 defines a 256-byte memory map in E²PROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The Insertion Cycle Counter is placed in this area, with Byte 120 containing the MSB, Byte 121 the LSB. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement. The complete interface is described in Finisar Application Note AN-2030: "Digital Diagnostics Monitoring Interface for SFP Optical Transceivers".

The FTLF0078P2BTL contains an additional feature called a power cycle counter. This value is a 2-byte number between 0 and 65535. This counter is located at memory address 254 (MSB) and 255 (LSB) on device address A2. This counter will be automatically incremented every time the transceiver is power cycled. The transceiver can not tell the difference between hot swap insertion and system power up. The counter will maximize at 65535 and will not roll over. The transceiver will not take any action due to the value of this counter. This is only provided as an indicator to the cycle age of the transceiver for the user.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E²PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. For more information, please see the SFF-8472 documentation and Finisar Application Note AN-2030.

V. Mechanical Specifications

Finisar SFP+ modules are compatible with the SFF-8432 specification for improved pluggable form factor, and shown here for reference purposes only.

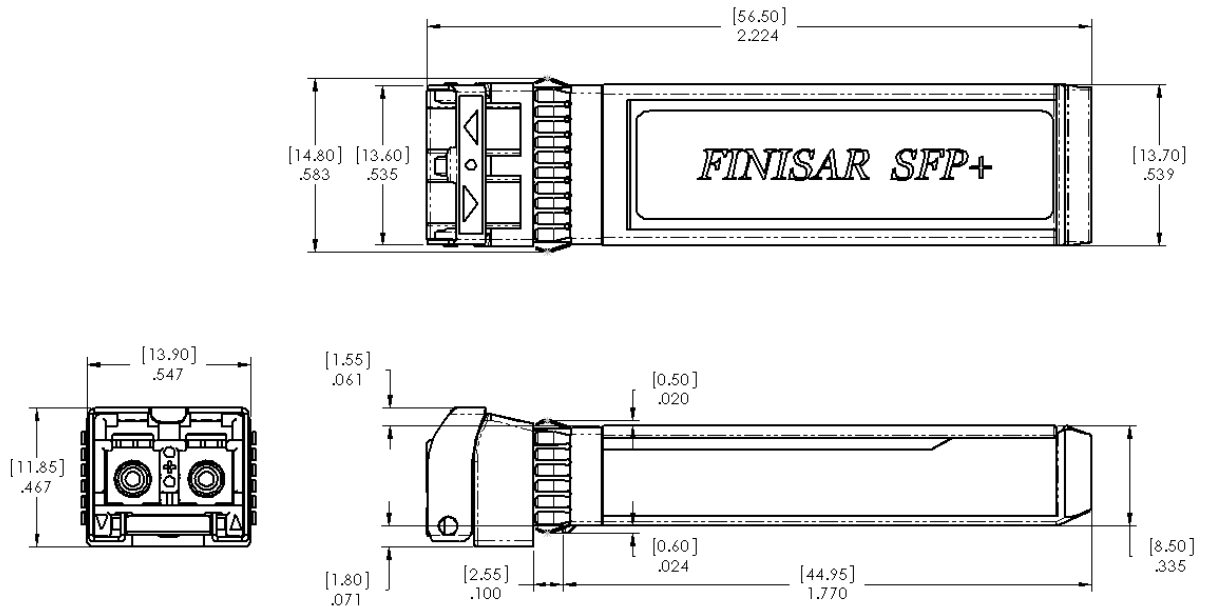


Figure 3. SFP+Mechanical Dimensions.

VI. PCB Layout and Bezel Recommendations

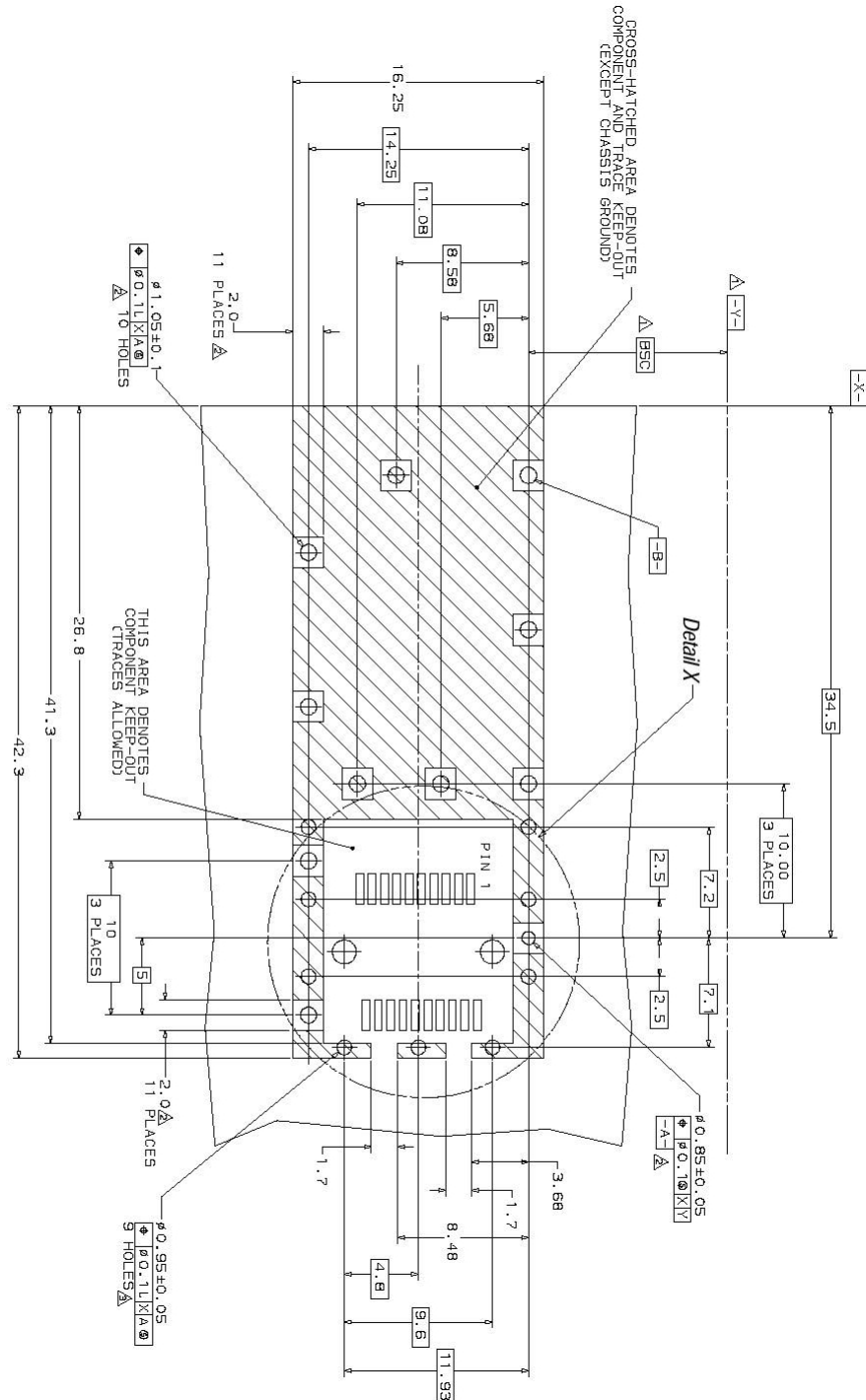


Figure 4.

△ Datum and Basic Dimension Established by Customer

2 Rads and Vias are Chassis Ground, 11 Places

3 Through Holes are Unplated

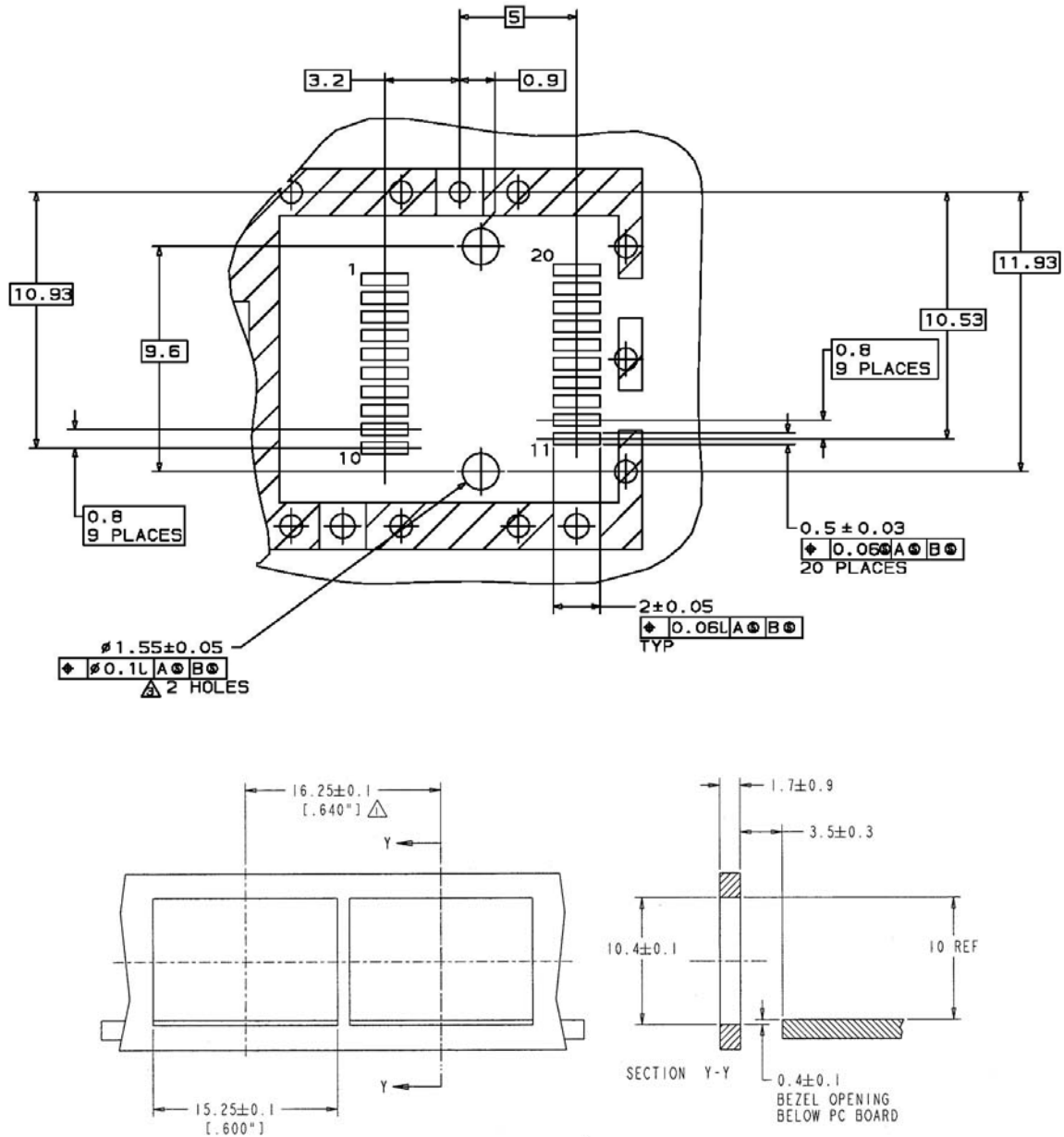


Figure 5.

VII. References

1. “Specifications for Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable Module ‘SFP+ ’”, SFF Document Number SFF-8431, Revision 2.2.
2. “Improved Pluggable Formfactor”, SFF Document Number SFF-8432, Revision 4.2, April 18, 2007.
3. IEEE Std 802.3ae, Clause 52, PMD Type 10GBASE-SR. IEEE Standards Department.
4. “Digital Diagnostics Monitoring Interface for Optical Transceivers”. SFF Document Number SFF-8472, Revision 10.3, December 1, 2007.
5. Directive 2002/95/EC of the European Council Parliament and of the Council, “on the restriction of the use of certain hazardous substances in electrical and electronic equipment”. January 27, 2003.
6. “Application Note AN-2038: Finisar Implementation Of RoHS Compliant Transceivers”, Finisar Corporation, January 21, 2005.

VIII. For More Information

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