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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Product Specification

RoHS-6 Compliant Laserwire™ SFP+ Adapter

FTLX0071D4BNL

PRODUCT FEATURES

- Hot-pluggable SFP+ footprint
- Supports Laserwire™ datarates (1 Gbps to 10.3 Gbps)
- RoHS-6 compliant (lead-free)
- Extended temperature range -5°C to 85°C
- Single 3.3V power supply
- Customizable EEPROM



APPLICATIONS

- Adapts Laserwire™ plug for SFP+ ports

Finisar's FTLX0071D4BNL 10Gb/s Laserwire™ SFP+ Adapters are designed for use in conjunction with Finisar's Laserwire cables (Part Numbers: FCBP110LD1Lxx and FCBC110LD1Lxx). The FTLX0071D4BNL SFP+ Adapter allows a Laserwire cable to be plugged into an SFP+ port. The SFP+ Adapter incorporates a customizable EEPROM. The Adapter is RoHS compliant and lead free per Directive 2002/95/EC¹, and Finisar Application Note AN-2038².

PRODUCT SELECTION

FTLX0071D4BNL

I. Background

Figure 1 illustrates the application of the FTLX0071D4BNL SFP+ Adapter. Pin descriptions for the FTLX0071D4BNL interface to the host board are shown in Section II. Please refer to the FCBP110LD1Lxx Laserwire datasheet for details of the interface between the FTLX0071D4BNL SFP+ Adapter and the Laserwire cable. The Laserwire connector pin-out is also shown in Section II for reference.

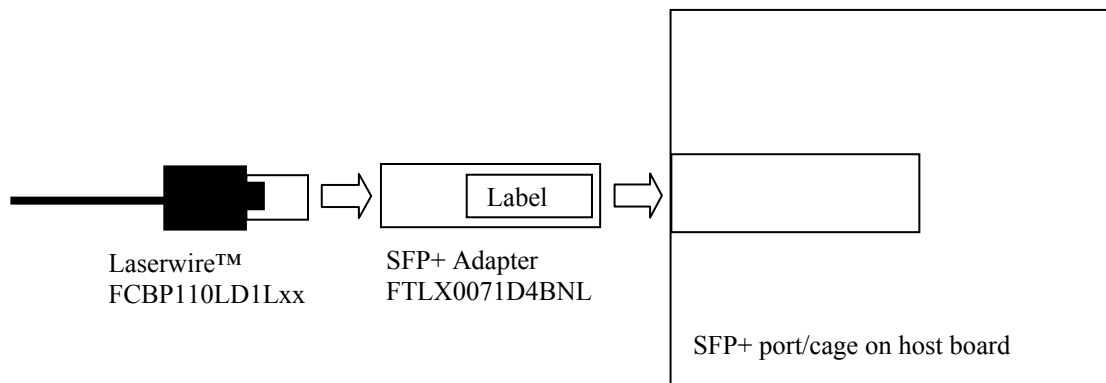


Figure 1. (Top View) From left to right: Laserwire, SFP+ Adapter, SFP+ cage on host board.

Insertion sequence: (1) SFP+ Adapter is plugged into SFP+ port; (2) Laserwire is plugged into Adapter.

Extraction sequence: (1) Depress tab on top of Laserwire plug and extract cable from Adapter; (2) Pull on Adapter bail release lever and extract Adapter from host port.

II. Pin Descriptions

Pin	Symbol	Name/Description (per SFF-8431)	Laserwire-Adapter Interface	Adapter-SFP+ Port Interface	Note
1	V _{EET}	Transmitter Ground	Connected to Laserwire VEE	Pass through	1
2	T _{FAULT}	Transmitter Fault	NC	Pulled low in adapter	2
3	T _{DIS}	Transmitter Disable	NC	NC	3
4	SDA	2-wire Serial Interface Data line	NC	Connected to adapter EEPROM	4
5	SCL	2-wire Serial Interface Clock	NC	Connected to adapter EEPROM	4
6	MOD_ABS	Module Absent	NC	Pulled low in adapter	5
7	RS0	Rate Select 0	NC	NC	
8	RX_LOS	Receiver Loss of signal (active high)	Connected to Laserwire Fault output pin 6	Pass through	2
9	RS1	Rate Select 1		NC	
10	V _{EEER}	Receiver Ground	Connected to Laserwire VEE	Pass through	1
11	V _{EEER}	Receiver Ground	Connected to Laserwire VEE	Pass through	1
12	RX-	Receiver Inverted DATA out	DC Coupled to Laserwire RX- pin 11	Pass through	
13	RX+	Receiver Non-inverted DATA out	DC Coupled to Laserwire RX+ pin 10	Pass through	
14	V _{EEER}	Receiver Ground	Connected to Laserwire VEE	Pass through	1
15	V _{CCR}	Receiver Power Supply (+3.3V ± 5%)	Connected to Laserwire VCC pin 5	Pass through	
16	V _{CCT}	Transmitter Power Supply (+3.3V ± 5%)	Connected to Laserwire VCC pin 5	Pass through	
17	V _{EET}	Transmitter Ground	Connected to Laserwire VEE	Pass through	1
18	TX+	Transmitter Non-Inverted DATA in	DC Coupled to Laserwire TX+ pin 3	Pass through	
19	TX-	Transmitter Inverted DATA in	DC Coupled to Laserwire TX- pin 2	Pass through	
20	V _{EET}	Transmitter Ground	Connected to Laserwire VEE	Pass through	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Open collector output. Should be pulled up with 4.7k - 10 kΩ on host to VccHost
3. Open collector input pin. Should be pulled up with 4.7k - 10 kΩ on module to VccT
4. See 2-wire electrical specifications in SFF-8431 section 4.2
5. Should be pulled up with 4.7k - 10 kΩ on host to VccHost

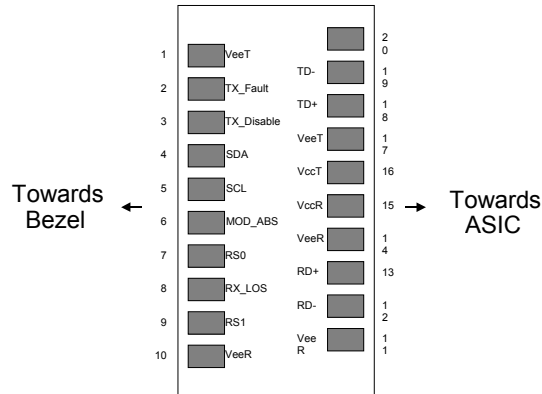


Figure 1. Diagram of Host Board Connector Block Pin Numbers and Names, for pin-out reference. Details of host-board connector specifications can be found in SFF-8431³. Or refer to Finisar SFP+ datasheet (e.g., FTLX8571D3BCL)

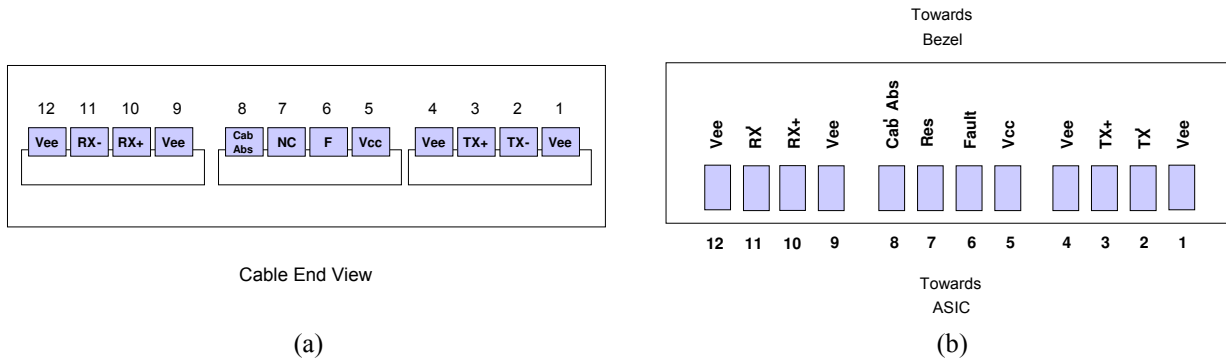


Figure 2. Pinout : (a) Laserwire cable plug end view, (b) Adapter pin-out (Laserwire port endview).

III. Absolute Maximum Ratings

Exceeding the limits below may damage the transceiver module permanently.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		4.0	V	
Storage Temperature	T _S	-40		85	°C	
Relative Humidity	RH	0		85	%	1

1. Non-condensing.

IV. Electrical Characteristics (TOP = -5 to 85°C, VCC = 3.14 to 3.46 Volts)

Electrical characteristics assume a Laserwire cable is inserted into the Adapter port.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.14		3.46	V	
Supply Current	Icc		150	200	mA	
Transmitter (to Laserwire)						
Differential data input swing	V _{in,pp}	180		800	mV	1
Receiver (from Laserwire)						
Differential data output swing	V _{out,pp}	450	700	850	mV	2
Power Supply Ripple Tolerance	PSR	33			mVpp	4

Notes:

1. AC coupled internally. See Figure 2 of Laserwire (P/N FCBP110LD1Lxx) Datasheet for input eye mask requirements. Self-biasing 100Ω differential input.
2. AC Coupled with 100Ω differential output impedance. See Figure 3 of Laserwire (P/N FCBP110LD1Lxx) Datasheet for output eye mask.
3. All transceiver specifications are guaranteed with the given power supply sinusoidal modulation up to specified amplitude over a range of 10 Hz to 10 MHz applied through the power supply filtering network shown in Figure 6. See SFF-8431 Rev 2.2 (SFP+) specification section D.17.3 Power Supply Tolerance Testing for the test methodology but with the module replaced by a 15Ω load for amplitude calibration.

V. Environmental Specifications

The FTLX0071D4BNL SFP+ Adapter has an operating temperature range from -5°C to +85°C case temperature. Note that the Laserwire™ cable has an operating temperature range of 0°C to +60°C.

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T _{op}	-5		85	°C	
Storage Temperature	T _{sto}	-40		85	°C	

VI. Regulatory Compliance

These products are certified by TÜV and CSA to meet the Class 1 eye safety requirements of EN (IEC) 60825 and the electrical safety requirements of EN (IEC) 60950. Copies of certificates are available at Finisar Corporation upon request.

VII. Mechanical Specifications

Finisar’s Laserwire SFP+ Adapters are compatible with the dimensions defined by the SFP+ Mechanical Specifications in SFF-8432⁴, with the exception of the port design to accommodate the Laserwire plug.

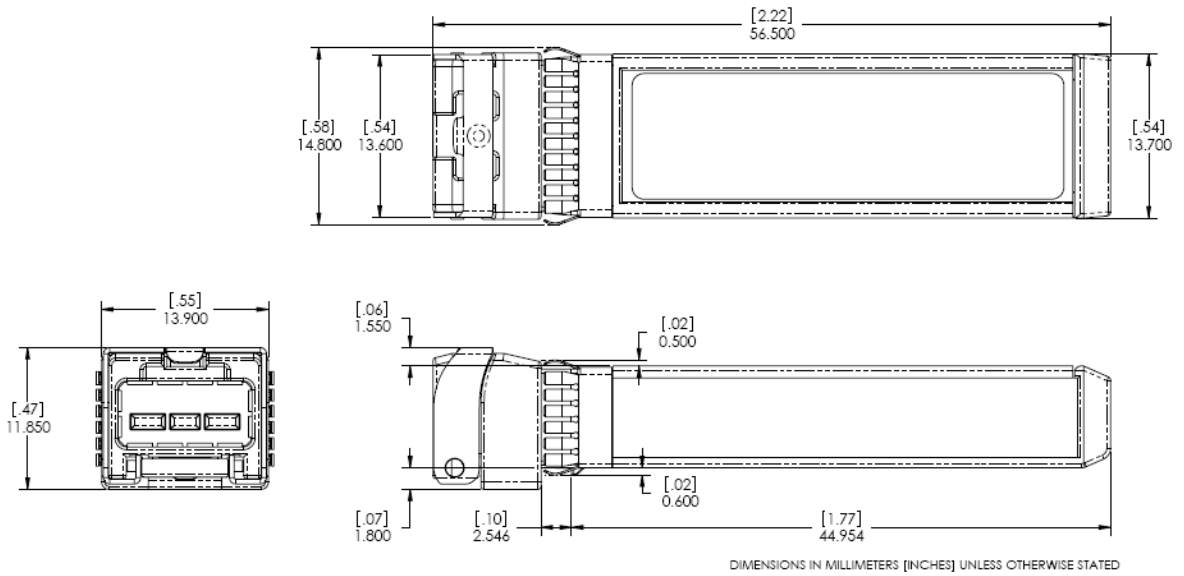


Figure 3. FTLX0071D4BNL Mechanical Dimensions.

VIII. EEPROM Table (Address A0h)

Byte Addr	Hex	LSB	Bit Size	Name	Description	Value	Hex Value
0	00	0	8	Identifier	Type of serial transceiver	SFP+	3
1	01	0	8	Ext_Identifier	Extended identifier of type of serial transceiver	GBIC/SFP function is defined by serial ID only	4
2	02	0	8	Connector	Code for connector type	Unspecified	0
3	03	0	1	Transceiver - 1X Copper Passive	Infiniband Compliance Codes	FALSE	0
3	03	1	1	Transceiver - 1X Copper Active	Infiniband Compliance Codes	FALSE	0
3	03	2	1	Transceiver - 1X LX	Infiniband Compliance Codes	FALSE	0
3	03	3	1	Transceiver - 1X SX	Infiniband Compliance Codes	TRUE	1
3	03	4	1	Transceiver - 10G Base-SR	10G Ethernet Compliance Codes	TRUE	1
3	03	5	1	Transceiver - 10G Base-LR	10G Ethernet Compliance Codes	FALSE	0
3	03	6	1	Transceiver - 10G Base-LRM	10G Ethernet Compliance Codes	FALSE	0
3	03	7	1	Unallocated	Unallocated	TRUE	1
4	04	0	1	OC 48 short reach	SONET Compliance Codes	FALSE	0
4	04	1	1	OC 48 intermediate reach	SONET Compliance Codes	FALSE	0
4	04	2	1	OC 48 long reach	SONET Compliance Codes	FALSE	0
4	04	3	1	SONET reach specifier bit 2	SONET Compliance Codes	FALSE	0
4	04	4	1	SONET reach specifier bit 1	SONET Compliance Codes	FALSE	0
4	04	5	1	OC 192 short reach	SONET Compliance Codes	FALSE	0
4	04	6	1	ESCON SMF, 1310nm Laser	ESCON Compliance Codes	FALSE	0
4	04	7	1	ESCON MMF, 1310nm LED	ESCON Compliance Codes	FALSE	0
5	05	0	1	OC 3, short reach	SONET Compliance Codes	FALSE	0
5	05	1	1	OC 3, single mode inter.reach	SONET Compliance Codes	FALSE	0
5	05	2	1	OC 3, single mode long reach	SONET Compliance Codes	FALSE	0
5	05	3	1	Reserved	Reserved		
5	05	4	1	OC 12, short reach	SONET Compliance Codes	FALSE	0
5	05	5	1	OC 12, single mode inter.reach	SONET Compliance Codes	FALSE	0
5	05	6	1	OC 12, single mode long reach	SONET Compliance Codes	FALSE	0
5	05	7	1	Reserved	Reserved		
6	06	0	1	1000BASE-SX	Ethernet Compliance Codes	TRUE	1
6	06	1	1	1000BASE-LX	Ethernet Compliance Codes	FALSE	0
6	06	2	1	1000BASE-CX	Ethernet Compliance Codes	FALSE	0
6	06	3	1	1000BASE-T	Ethernet Compliance Codes	FALSE	0
6	06	4	1	100BASE-LX/LX10	Ethernet Compliance Codes	FALSE	0
6	06	5	1	100BASE-FX	Ethernet Compliance Codes	FALSE	0
6	06	6	1	BASE-BX10	Ethernet Compliance Codes	FALSE	0
6	06	7	1	BASE-PX	Ethernet Compliance Codes	FALSE	0
7	07	0	1	Electrical inter-enclosure	Fibre Channel transmitter technology	FALSE	0
7	07	1	1	Longwave laser	Fibre Channel transmitter technology	FALSE	0
7	07	2	1	Reserved	Reserved		
7	07	3	1	Medium distance (M)	Fibre Channel link length	FALSE	0
7	07	4	1	Long distance (L)	Fibre Channel link length	FALSE	0
7	07	5	1	Intermediate distance (I)	Fibre Channel link length	FALSE	0
7	07	6	1	Short distance (S)	Fibre Channel link length	TRUE	1
7	07	7	1	Very long distance (V)	Fibre Channel link length	FALSE	0
8	08	0	1	Reserved	Reserved		
8	08	1	1	Copper FC-BaseT	Fibre Channel transmitter technology	FALSE	0
8	08	2	1	Copper Passive	Fibre Channel transmitter technology	FALSE	0
8	08	3	1	Copper Active	Fibre Channel transmitter technology	FALSE	0
8	08	4	1	Longwave Laser (LL)	Fibre Channel transmitter technology	FALSE	0
8	08	5	1	Shortwave Laser with OFC (SL)	Fibre Channel transmitter technology	FALSE	0
8	08	6	1	Shortwave Laser w/o OFC (SN)	Fibre Channel transmitter technology	TRUE	1
8	08	7	1	Electrical inter-enclosure	Fibre Channel transmitter technology	FALSE	0
9	09	0	1	Single mode (SM)	Fibre Channel transmission media	FALSE	0
9	09	1	1	Reserved	Reserved		
9	09	2	1	Multimode, 50um (M5)	Fibre Channel transmission media	TRUE	1
9	09	3	1	Multimode, 62.5um (M6)	Fibre Channel transmission media	TRUE	1
9	09	4	1	Video Coax (TV)	Fibre Channel transmission media	FALSE	0
9	09	5	1	Miniature Coax (MI)	Fibre Channel transmission media	FALSE	0
9	09	6	1	Twisted Pair (TP)	Fibre Channel transmission media	FALSE	0
9	09	7	1	Twin Axial Pair (TW)	Fibre Channel transmission media	FALSE	0

Byte Addr	Hex	LSB	Bit Size	Name	Description	Value	Hex Value
10	0A	0	1	100 Mbytes/sec	Fibre Channel speed	FALSE	0
10	0A	1	1	RESERVED	RESERVED		
10	0A	2	1	200 Mbytes/sec	Fibre Channel speed	FALSE	0
10	0A	3	1	RESERVED	RESERVED		
10	0A	4	1	400 Mbytes/sec	Fibre Channel speed	FALSE	0
10	0A	5	1	RESERVED	RESERVED		
10	0A	6	1	800 Mbytes/sec	Fibre Channel speed	FALSE	0
10	0A	7	1	1200 Mbytes/sec	Fibre Channel speed	TRUE	1
11	0B	0	8	Encoding	Code for serial encoding algorithm	64B/66B	6
12	0C	0	8	BR, Nominal	Nominal bit rate, units of 100 Mbits/sec	103	67
13	0D	0	8	Rate Identifier	Rate selection functionality	Unspecified	0
14	0E	0	8	Length (9µm) - km	Link length 9µm fiber, units of km	0	0
15	0F	0	8	Length (9µm)	Link length 9µm fiber, units of 100m	0	0
16	10	0	8	Length (50µm, OM2)	Link length 50µm/OM2 fiber, units of 10m	8	8
17	11	0	8	Length (62.5µm, OM1)	Link length 62.5µm/OM1 fiber, units of 10m	3	3
18	12	0	8	Length (Copper)	Link length copper, units of meters	0	0
19	13	0	8	Length (50µm, OM3)	Link length 50µm/OM3 fiber, units of 10m	3	3
...							
64	40	0	1	Options_Rx output	Limiting = False, Linear = True	FALSE	0
64	40	1	1	Options_Power class	Class 1 = False, Class 2 = True	FALSE	0
...							
65	41	1	1	Options-Rx_LOS	Rx_LOS implemented, per SFP MSA	TRUE	1
65	41	2	1	Options-Rx_LOS	Rx_LOS implemented, signal inverted	FALSE	0
65	41	3	1	Options-Tx_FAULT	Tx_FAULT signal implemented	FALSE	0
65	41	4	1	Options-Tx_DISABLE	Tx_DISABLE implemented	FALSE	0
65	41	5	1	Options-RATE_SELECT	RATE_SELECT implemented, per SFP MSA	FALSE	0
65	41	6	2	RESERVED	RESERVED		
66	42	0	8	BR, max	Upper bit rate margin, units of %	0	0
67	43	0	8	BR, min	Lower bit rate margin, units of %	0	0
...							
92	5C	2	1	Diagnostic Monitoring Type	Address change required see section above, "addressing modes"	FALSE	0
92	5C	3	1	Diagnostic Monitoring Type	Received power measurement type; 0 = OMA, 1 = Average Power	FALSE	0
92	5C	4	1	Diagnostic Monitoring Type	Externally calibrated	FALSE	0
92	5C	5	1	Diagnostic Monitoring Type	Internally calibrated	TRUE	1
92	5C	6	1	Diagnostic Monitoring Type	Digital diagnostic monitoring implemented (described in this document). Must be '1' for compliance with this document	1	1
92	5C	7	1	Diagnostic Monitoring Type	implementations. Must be '0' for compliance with this document.	0	0
93	5D	0	1	RESERVED	RESERVED		
93	5D	1	1	Enhanced Options	Rate Select control implemented	FALSE	0
93	5D	2	1	Enhanced Options	Application Select control implemented	FALSE	0
93	5D	3	1	Enhanced Options	Optional Soft RATE_SELECT control and monitoring implemented	FALSE	0
93	5D	4	1	Enhanced Options	Optional Soft RX_LOS monitoring implemented	FALSE	0
93	5D	5	1	Enhanced Options	Optional Soft TX_FAULT monitoring implemented	FALSE	0
93	5D	6	1	Enhanced Options	Optional Soft TX_DISABLE control and monitoring implemented	FALSE	0
93	5D	7	1	Enhanced Options	Optional Alarm/Warning flags implemented for all monitored quantities	FALSE	0
94	5E	0	8	SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with	Not Included	0
...							

IX. References

1. 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.
2. “Application Note AN-2038: Finisar Implementation Of RoHS Compliant Transceivers”, Finisar Corporation, January 21, 2005.
3. “Specifications for Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable Module ‘SFP+ ’”, SFF Document Number SFF-8431, Revision 2.0, April 26, 2007.
4. “Improved Pluggable Formfactor”, SFF Document Number SFF-8432, Revision 4.2, April 18, 2007.

X. For More Information

Finisar Corporation
1389 Moffett Park Drive
Sunnyvale, CA 94089-1133
Tel. 1-408-548-1000
Fax 1-408-541-6138
sales@finisar.com
www.finisar.com