Finisar

Product Specification RoHS-6 Compliant

LaserwireTM 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 LaserwireTM 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 _{EER}	Receiver Ground	Connected to Laserwire VEE	Pass through	1
11	V _{EER}	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 _{EER}	Receiver Ground	Connected to Laserwire VEE	Pass through	1
15	V _{CCR}	Receiver Power Supply $(+3.3V \pm 5\%)$	Connected to Laserwire VCC pin 5	Pass through	
16	V _{CCT}	Transmitter Power Supply $(+3.3V \pm 5\%)$	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 $4.7k 10 k\Omega$ on host to VccHost
- 3. Open collector input pin. Should be pulled up with 4.7k 10 k Ω 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 $k\Omega$ 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	Тур	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		4.0	V	
Storage Temperature	Ts	-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	Тур	Max	Unit	Ref.
Supply Voltage	Vcc	3.14		3.46	V	
Supply Current	Icc		150	200	mA	
Transmitter (to Laserwire)						
Differential data input swing	Vin,pp	180		800	mV	1
Receiver (from Laserwire)						
Differential data output swing	Vout,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 LaserwireTM cable has an operating temperature range of 0°C to +60°C.

Parameter	Symbol	Min	Тур	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			Bit				Hex
Addr	Hex	LSB		Name	Description	Value	Value
0	00	0	8	Identifier	Type of serial transciever	SFP+	3
-					Extended identifier of type of serial	GBIC/SFP function is defined	
1	01	0	8	Ext Identifier	transceiver	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 0	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			Bit				Hex
Addr	Hex	LSB	Size	Name	Description	Value	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
					Link length 62.5µm/OM1 fiber, units of		
17	11	0	8	Length (62.5µm, OM1)	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
		-	-	ga. (************************************		-	
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
00					RATE SELECT implemented, per SFP	INCOL	v
65	41	5	1	Options-RATE SELECT	MSA	FALSE	0
65	41	6	2	RESERVED	RESERVED	ITALOL	v
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
	40	0	0			0	0
					Address change required see section		
92	5C	2	1	Diagnostic Monitoring Type	above, "addressing modes"	FALSE	0
92	50	2	1		Received power measurement type; 0 =	FALSE	0
92	5C	3	1	Diagnostic Monitoring Type		FALSE	0
92		4	1	Diagnostic Monitoring Type	OMA, 1 = Average Power Externally calibrated	FALSE	0
92 92	5C 5C	4 5		Diagnostic Monitoring Type		TRUE	0
92	50	5	1	Diagnostic Monitoring Type	Internally calibrated	TRUE	1
					Divital dia mandria na arite dana incertante d		
					Digital diagnostic monitoring implemented		
		•			(described in this document). Must be '1'		
92	5C	6	1	Diagnostic Monitoring Type	for compliance with this document	1	1
_		_	1		implementations. Must be '0' for		
92	5C	7	1	Diagnostic Monitoring Type	compilance with this document.	0	0
93	5D	0	1	RESERVED	RESERVED		
93	5D	1	1	Enhanced Options	Rate Select control implemented	FALSE	0
-			4	Enhanced Options	Application Select control implemented	FALSE	0
93	5D	2	1				
93	5D	2	-	· ·	Optional Soft RATE_SELECT control and		
93 93	5D 5D	3	1	Enhanced Options	monitoring implemented	FALSE	0
93	5D	3	1	Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring		
		_			monitoring implemented Optional Soft RX_LOS monitoring implemented	FALSE	0
93 93	5D 5D	3	1	Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring	FALSE	0
93	5D	3	1	Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring implemented		
93 93	5D 5D	3	1	Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring	FALSE	0
93 93	5D 5D	3	1	Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring implemented	FALSE	0
93 93 93	5D 5D 5D	3 4 5	1 1 1	Enhanced Options Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring implemented Optional Soft TX_DISABLE control and	FALSE FALSE	0
93 93 93	5D 5D 5D	3 4 5	1 1 1	Enhanced Options Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring implemented Optional Soft TX_DISABLE control and	FALSE FALSE	0
93 93 93 93	5D 5D 5D	3 4 5 6	1 1 1	Enhanced Options Enhanced Options Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring implemented Optional Soft TX_DISABLE control and monitoring implemented	FALSE FALSE	0
93 93 93	5D 5D 5D	3 4 5	1 1 1	Enhanced Options Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring implemented Optional Soft TX_DISABLE control and monitoring implemented Optional Alarm/Warning flags implemented for all monitoring duputities	FALSE FALSE FALSE	0 0 0
93 93 93 93	5D 5D 5D	3 4 5 6	1 1 1	Enhanced Options Enhanced Options Enhanced Options Enhanced Options	monitoring implemented Optional Soft RX_LOS monitoring implemented Optional Soft TX_FAULT monitoring implemented Optional Soft TX_DISABLE control and monitoring implemented Optional Soft TX_DISABLE control and monitoring implemented Optional Alarm/Warning flags	FALSE FALSE FALSE	0 0 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

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