

PRODUCT SPECIFICATION



FLXF-1596-40D(I)

10Gb/s Duplex LC, 1550nm EML-PIN 40km SMF XFP Transceiver

■ Features:

- ★ Support multi protocol from 9.95Gb/s to 11.3Gb/s
- ★ Hot-Pluggable
- ★ Cooled EML laser transmitter
- ★ Duplex LC connector
- ★ Transmission distance of 40km over single mode fiber
- ★ Power supply voltages : +3.3V, +5V
- ★ Monitoring Interface Compliant with INF-8077i
- ★ Power dissipation <3W typically
- ★ Industrial /Extended/ Commercial operating temperature range: -40°C to 85°C/-5°C to 85°C/0°C to 70°C Version available
- ★ RoHS compliant and Lead Free



■ Applications:

- ★ 10GBASE-ER/EW Ethernet
- ★ SONET OC-192/SDH STM-64
- ★ 40km 10G FC
- ★ Other Optical Link

■ Description:

Flowlink FLXF-1596-40D(I) 10Gb/s (XFP) Transceiver is a high performance, cost effective module which has a Duplex LC optics interface, Standard AC coupled CML for high speed signal and LVTTTL control and monitor signals. The high performance cooled 1550nm EML transmitter and high sensitivity PIN receiver provide superior performance for SONET/SDH and Ethernet applications up to 40km optical links.

■ Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T _S	-40		+85	°C
Supply Voltage1	V _{CC3}	-0.5		+4	V
Supply Voltage2	V _{CC5}	-0.5		+6	V
Relative Humidity	RH	0		85	%

■ Recommended Operating Environment:

Parameter		Symbol	Min.	Typical	Max.	Unit
Caseoperating Temperature	Industrial	T _C	-40		85	°C
	Extended					
	Commercial		0		70	

■ Electrical Characteristics (T_{OP} = 25°C)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage1	V _{CC}	3.14	3.30	3.47	V	
Supply Voltage2	V _{CC}	4.75	5.0	5.25	V	
Supply Current-V _{CC3}	I _{CC}			700	mA	
Supply Current-V _{CC5}	I _{CC}			700	mA	
Maximum Power	P _{max}			3.0	W	
Transmitter Section:						
Input differential impedance	R _{in}	90	100	110		
Single ended data input swing	V _{in PP}	120		1000	mVp-p	
Transmit Disable Voltage	V _D	V _{CC3} – 1.3		V _{CC3}	V	2
Transmit Enable Voltage	V _{EN}	V _{ee}		V _{ee} + 0.8	V	
Transmit Disable Assert Time	T _{dessert}			10	us	
Receiver Section:						
Single ended data output swing	V _{out,pp}	250		800	mv	3
Data output rise time	t _r			35	ps	4
Data output fall time	t _f			35	ps	4
LOS Fault	V _{losfault}	V _{CC_host} – 0.5		V _{CC_host}	V	5
LOS Normal	V _{los norm}	V _{ee}		V _{ee} +0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6
Deterministic Jitter Contribution	RXΔDJ			51.7	ps	
Total Jitter Contribution	RXΔTJ			122.4	ps	

Note:

1. AC coupled.
2. Or open circuit.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.

■ Optical Parameters($T_{OP} = 25^{\circ}\text{C}$)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λ_c	1530	1550	1570	nm	
Spectral Width(-20dB)	σ			1	nm	
Side mode Suppression ratio	SMSR	30			dB	
Optical Output Power	P _{out}	-3		3	dBm	1
Optical Rise/Fall Time	t _r / t _f			35	ps	2
Extinction Ratio	ER	6			dB	
Eye Mask for Optical Output	Compliant with IEEE802.3ae					
Receiver Section:						
Optical Input Wavelength		1530		1570	nm	
Receiver Overload	P _{ol}	-1			dBm	4
RX Sensitivity	Sen			-15.8	dBm	4
RX_LOS Assert	LOS _A	-30			dBm	
RX_LOS Deassert	LOS _D			-16.5	dBm	
RX_LOS Hysteresis	LOS _H	0.5		5	dB	
General Specifications						
Data Rate	BR	9.95	10.3125	11.3	Gb/s	
Bit Error Rate	BER			10 ⁻¹²		
Max. Supported Link Length on SMF@10.3125G	L _{MAX}		40		km	
Total System Budget	LB	15			dB	

Note

1. The optical power is launched into SMF.
2. 20-80%.
3. Jitter measurements taken using Agilent OMNIBERT 718 in accordance with GR-253.
4. Measured with PRBS 2^{31-1} at 10^{-12} BER

Pin Assignment

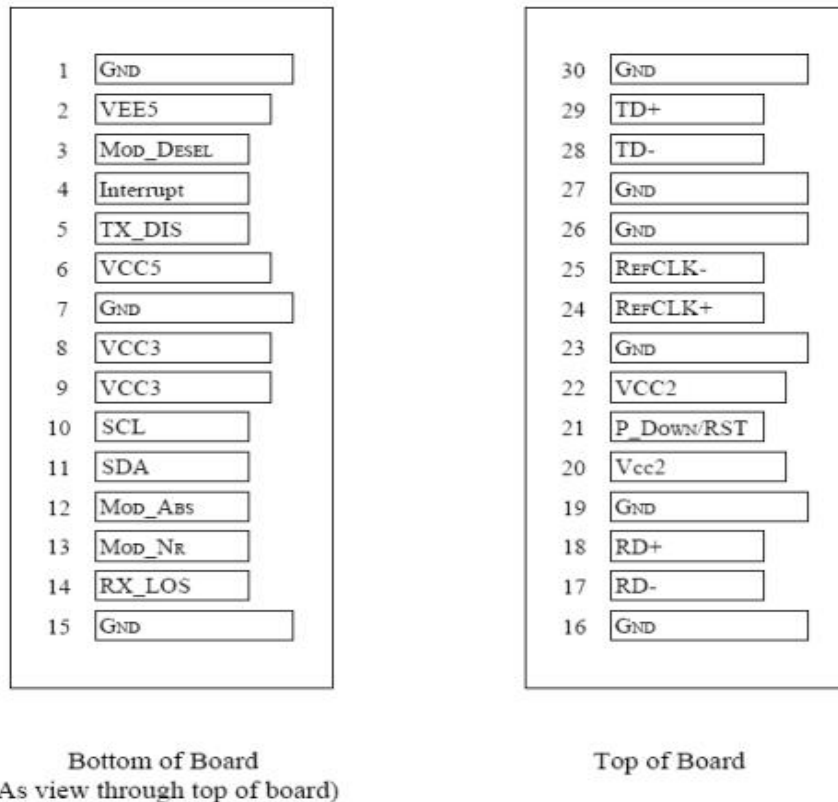


Diagram of Host Board Connector Block Pin Numbers and Names

Pin Description

Pin No	Name	Function Plug Seq	Notes
1	GND	Module Ground	1
2	VEE5	Optional -5.2 Power Supply – Not required	
3	Mod-Desel	Module De-select; When held low allows the module to,respond to 2-wire serial interface commands	
4	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6	VCC5	+5 Power Supply	
7	GND	Module Ground	1
8	VCC3	+3.3V Power Supply	
9	VCC3	+3.3V Power Supply	
10	SCL	Serial 2-wire interface clock	2
11	SDA	Serial 2-wire interface data line	2
12	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	Mod_NR	Module Not Ready;	2
14	RX_LOS	Receiver Loss of Signal indicator	2

15	GND	Module Ground	1
16	GND	Module Ground	1
17	RD-	Receiver Inverted Data Output. CML-O	
18	RD+	Receiver Non-Inverted Data Output. CML-O	
19	GND	Module Ground	1
20	VCC2	+1.8V Power Supply (Not required).	3
21	P_DOWN/RST	Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode. LVTTL-I Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle. LVTTL-I	
22	VCC2	+1.8V Power Supply (Not required)	
23	GND	Module Ground	1
24	REFCLK+	Reference Clock (Not required)	3
25	REFCLK-	Reference Clock (Not required)	3
26	GND	Module Ground	1
27	GND	Module Ground	1
28	TD-	Transmitter Inverted Data Input. CML-I	
29	TD+	Transmitter Non-Inverted Data Input. CML-I	
30	GND	Module Ground	1

Notes:

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Open collector, Should be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.6V on the host board.
3. The pins are open within module.

■ XFP Module EEPROM Information and Management

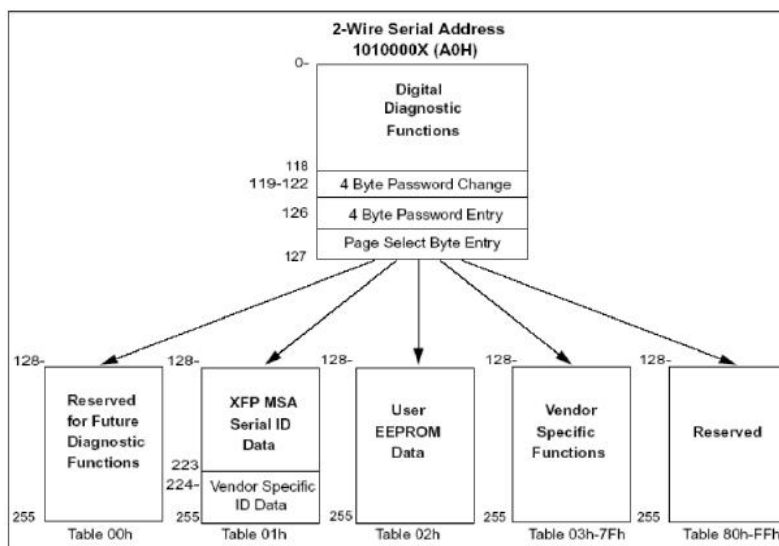
The Glight's XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- ★ Transceiver temperature
- ★ Laser bias current
- ★ Transmitted optical power
- ★ Received optical power
- ★ Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP transceiver. The serial data signal (SDA pin) 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. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)



■ Digital Diagnostic Monitor Characteristics

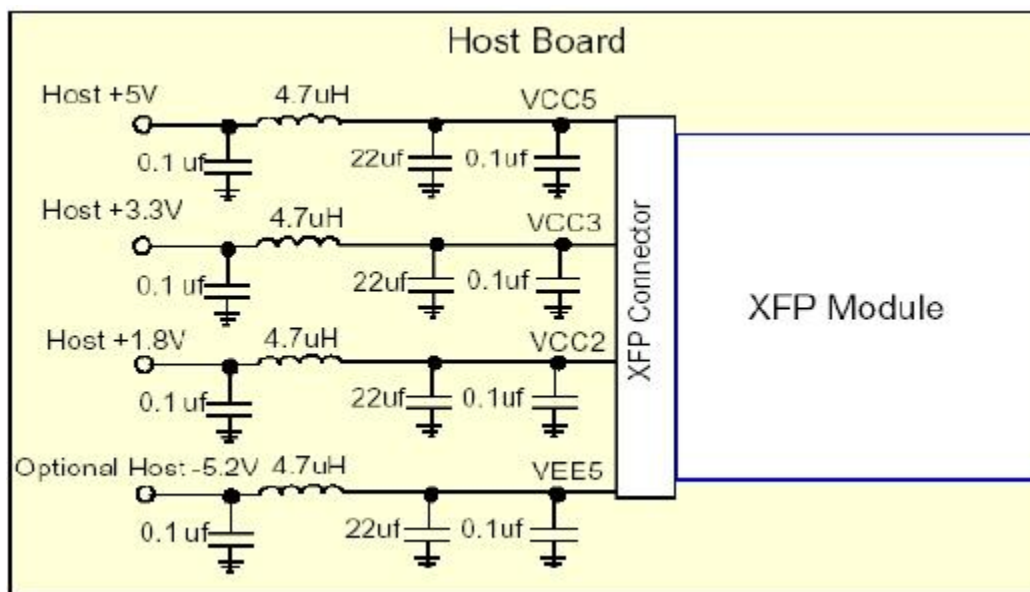
Data Address	Parameter	Accuracy	Unit	Calibration
96-97	Transceiver Internal Temperature	±3.0	°C	internal
98-99	VCC3 Internal Supply Voltage	±5.0	%	internal
100-101	Laser Bias Current	±10	%	internal
102-103	Tx Output Power	±3.0	dBm	internal
104-105	Rx Input Power	±3.0	dBm	internal

■ Regulatory Compliance

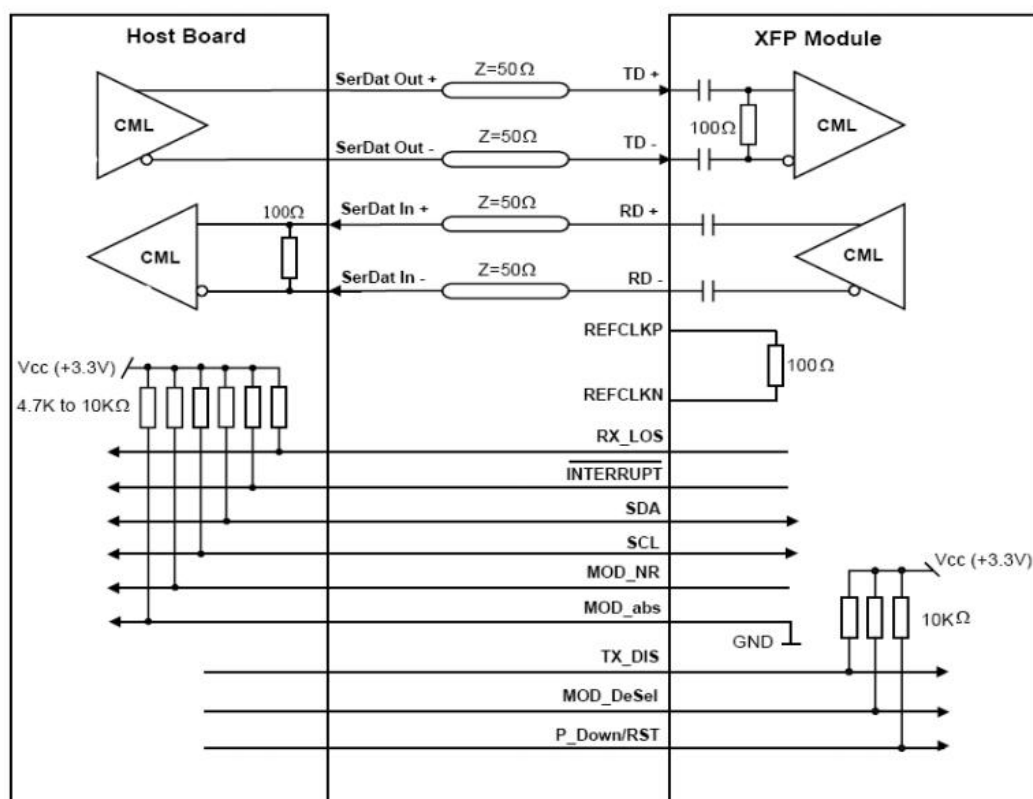
The transceiver complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

■ Recommended circuit

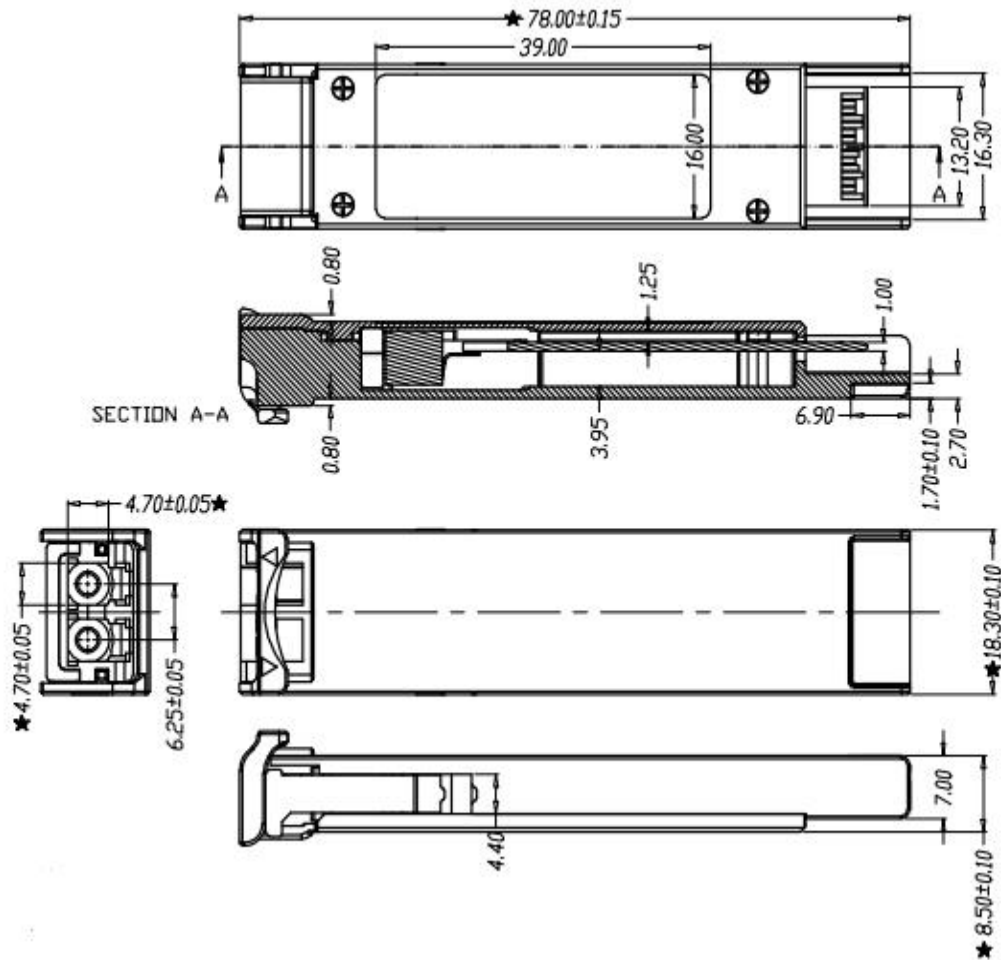


Recommended Host Board Power Supply Circuit



SFP Host Recommended Circuit

■ Mechanical Dimensions



Mechanical Drawing

Flowlink Technology Co., Ltd.

No:201, Building 7, Lian Jian Industrial Park, Hua Rong Road, Da Lang Street, Long Hua District, Shenzhen.

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