

PRODUCT SPECIFICATION

FLSF-C3112-40D

1.25Gb/s Duplex LC, SMF, CWDM DFB, PIN, 40km SFP Transceiver

■ FEATURES:

- ★ Up to 1.25Gb/s Data Links
- ★ Hot-Pluggable SFP footprint
- ★ 18 wavelengths 1270~1610nm CWDM DFB laser transmitter
- ★ Duplex LC connector
- ★ Up to 40 km on 9/125μm SMF
- ★ Single +3.3V Power Supply
- ★ Compliant with SFF-8431 SFF-8432 and IEEE802.3ae
- ★ Operating temperature range: 0°C to 70°C
- ★ RoHS compliant and Lead Free



■ APPLICATIONS:

- ★ 1x Fiber channel
- ★ Gigabit Ethernet
- ★ CWDM Networks
- ★ Other Optical Link

■ DESCRIPTION:

Flowlink FLSF-Cxx12-40D transceiver is a high performance, cost effective module which have a Duplex LC optics interface, standard AC coupled CML for high speed signal and LVTTL control and monitor signals. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472. transceivers are RoHS compliant per Directive 2011/65/EU. The high

performance cooled 1270~1610nm CWDM DFB transmitter and high sensitivity PIN receiver provide superior performance for Ethernet applications at up to 40km links.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T _s	-40		+85	°C
Supply Voltage	V _{CC}	-0.5		3.6	V
Relative Humidity	RH	0		70	%

Electrical Characteristics (T_{OP} = 25°C, V_{CC} = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	V _{CC}	3.14	3.30	3.47	V	
Supply Current	I _{CC}		150	280	mA	
Inrush Current	I _{surge}			I _{CC} +30	mA	
Maximum Power	P _{max}			1	W	
Transmitter Section:						
Input differential impedance	R _{in}	90	100	110	Ω	1
Tx Input Single Ended DC Voltage Tolerance (Ref V _{eeT})	V	-0.3		4	V	
Single ended data input swing	V _{in PP}	250		1200	mVp-p	2
Transmit Disable Voltage	V _D	V _{CC} -1.3		V _{CC}	V	3
Transmit Enable Voltage	V _{EN}	V _{ee}		V _{ee} + 0.8	V	
Transmit Disable Assert Time	T _{dessert}			10	us	
Receiver Section:						
Rx Output Diff Voltage	V _O	300		800	mV	3
Data output rise time	t _r			260	ps	4
Data output fall time	t _f			260	ps	4
LOS Fault	V _{losfault}	V _{CC} -0.5		V _{CC_host}	V	5
LOS Normal	V _{los norm}	V _{ee}		V _{ee} +0.5	V	5
Total Generated Receiver Jitter (peak to peak)	J _{RXP-p}			0.07	UI	
Total Generated Receiver Jitter (rms)	J _{RXRMS}			0.007	UI	

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($T_{OP} = 25^{\circ}C$, $V_{CC} = 3.135$ to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Optical Wavelength-End Of Life	λ_c	λ -6.5		λ +6.5	nm	1
Spectral Width	λ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Output Power	P _{out}	-5		0	dBm	2
Optical Rise/Fall Time	t _r / t _f			260	ps	3
Laser Off Power	P _{off}			-30	dBm	
Extinction Ratio	ER	9			dB	
Transmitter Dispersion Penalty	TDP			3.2	dB	2
Relative Intensity Noise	RIN			-128	dB/Hz	3
Optical Return Loss Tolerance		20			dB	
Eye Mask for Optical Output	Compliant with IEEE802.3 z (class 1 laser safety)					
Receiver Section:						
Optical Input Wavelength	λ_c	1270		1610	nm	
Receiver Overload	P _{ol}	-3			dBm	4,5
RX Sensitivity	Sen			-24	dBm	4,5
Stressed Sensitivity (OMA)	Sen _{ST}				dBm	
RX_LOS Assert	LOS _A	-38			dBm	
RX_LOS Deassert	LOS _D			-25	dBm	
RX_LOS Hysteresis	LOS _H	0.5			dB	
Receiver Reflectance	R _{rx}			-12	dB	
General Specifications:						
Data Rate	BR		1.25		Gb/s	
Bit Error Rate	BER			10 ⁻¹²		
Max. Supported Link Length on 9/125μm SMF @1.25Gb/s	L _{MAX}			40	km	

Total System Budget	LB	20			dB	
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Note:

- Also specified to meet curves in FC-PI 13.0 Figures 18 and 19, which allow trade-off between wavelengthspectral widths.
- Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
- Unfiltered, 20-80%. Complies with IEEE 802.3 (Gig. E), FC 1x and 2x eye masks when filtered.
- Measured with conformance signals defined in FC-PI 13.0 specifications.
- Measured with PRBS 2^{7-1} at 10^{-12} BER
- Dispersion limited per FC-PI Rev. 13
- Attenuation of 0.25dB/km is used for the link length calculations. Distances are indicative only.

Pleaserefer to the Optical Specifications in Table IV to calculate a more accurate link budget based on specificonditions in your application.

Pin Assignment

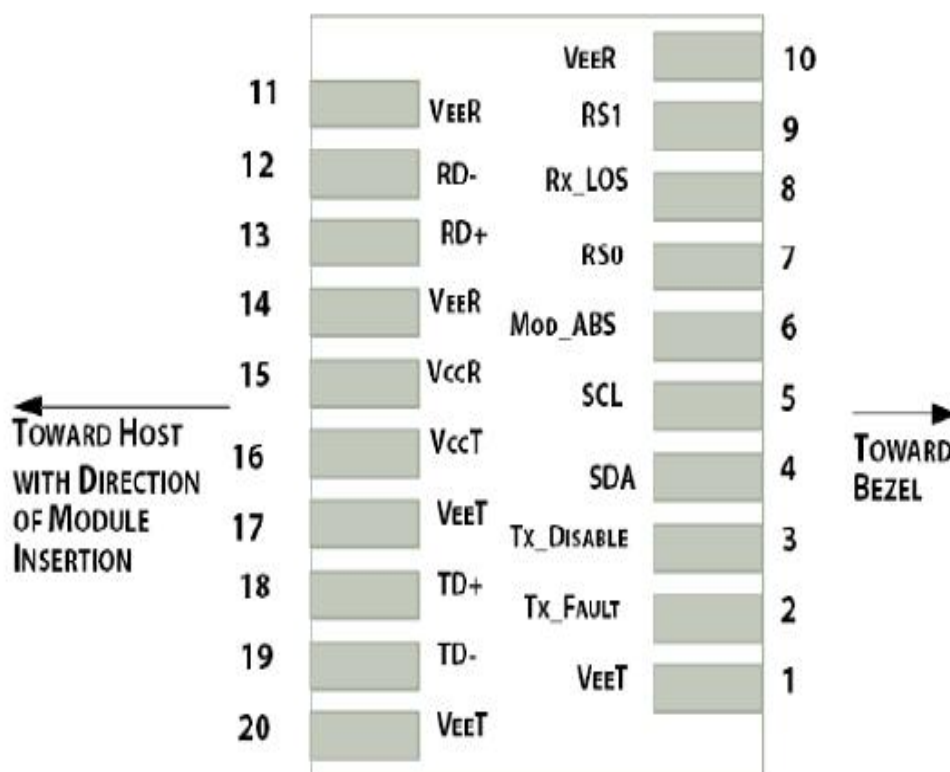


Figure2:Diagram of Host Board Connector Block Pin Numbers and Names

■ Pin Description

Pin No	Name	Function	Notes
1	VeeT	Transmitter Ground	1
2	TX Fault	Transmitter Fault Indication	
3	TX Disable	Transmitter Disable	2
4	MOD-DEF2	Module Definition 2	3
5	MOD-DEF1	Module Definition 1	3
6	MOD-DEF0	Module Definition 0	3
7	RS0	Rate select0, optionally control SFP+ receiver. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	4
8	LOS	Loss of Signal	5
9	RS1	Rate select0, optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	1
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inv. Received Data Out	6
13	RD+	Received Data Out	6
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power	1
16	VccT	Transmitter Power	
17	VeeT	Transmitter Ground	
18	TD+	Transmit Data In	6
19	TD-	Inv. Transmit In	6
20	VeeT	Transmitter Ground	

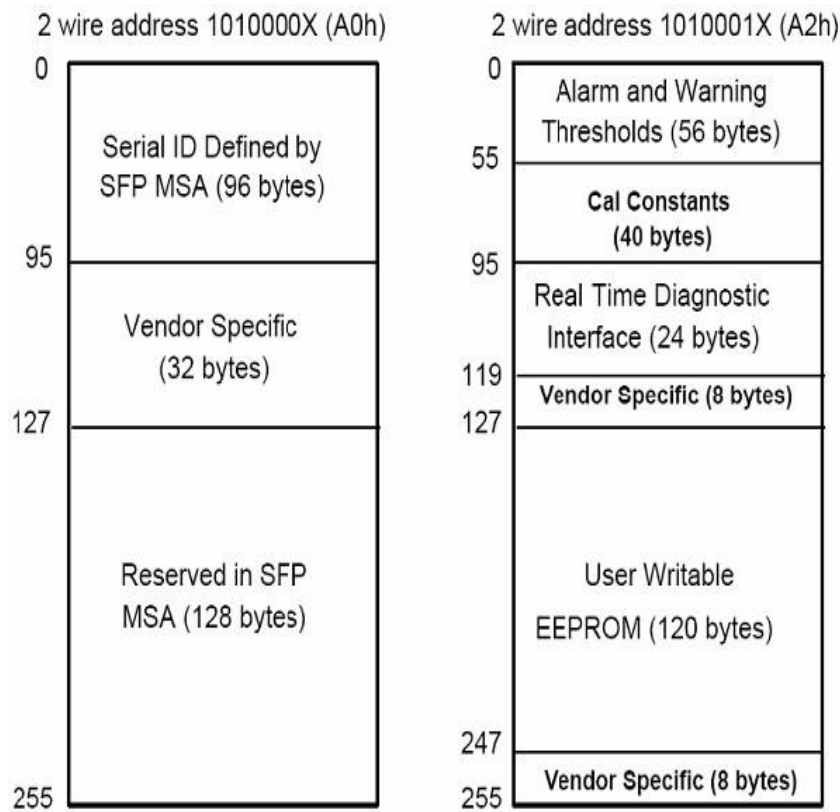
Notes:

1. The module ground pins shall be isolated from the module case.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.
3. This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP-8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I²C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification is at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, “Digital Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

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



■ EEPROM Serial ID Memory Contents (A0h)

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	Gigabit Ethernet 1000Base-ZX and Fiber Channel
11	1	Encoding	NRZ (03h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13	1	Reserved	(0000h)
14	1	Length(9um,km)	Link length supported for 9/125um fiber, units of km
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name:
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "GL-xxxxx" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-61	2	Wavelength	Laser wavelength
62	1	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented(001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	Manufacturing date code
92	1	Diagnostic Type	Diagnostics
93	1	Enhanced Options	Diagnostics
94	1	SFF-8472	Diagnostics
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	Vendor specific data, read only
128-255	128	Reserved	Reserved for SFF-8079

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	±3.0	%	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

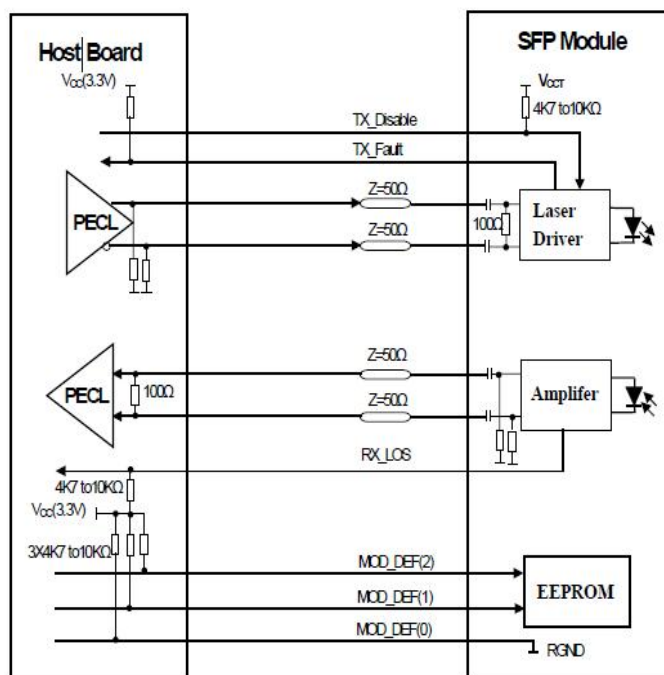
The transceiver complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

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 laserproduct.

References

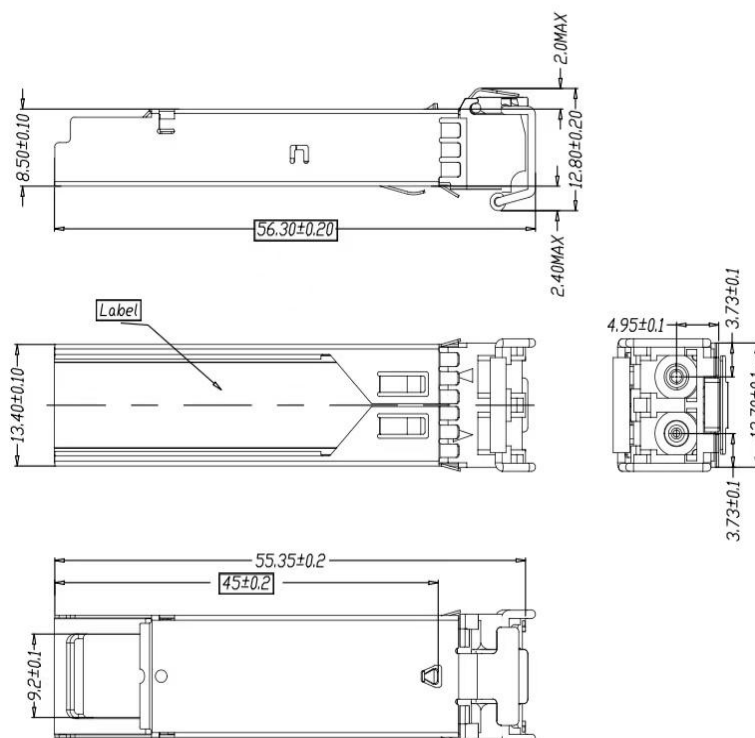
- IEEE Std 802.3, 2002 Edition, Clause 38, PMD Type 1000BASE-LX.IEEE Standards Department, 2002.
- “Fibre Channel Physical and Signaling Interface (FC-PH, FC-PH2, FC-PH3)”.American National Standard for Information Systems.
- “Fibre Channel Draft Physical Interface Specification (FC-PI 13.0)”. American National Standard for Information Systems.
- Small Form-factor Pluggable (SFP) Transceiver Multi-source Agreement (MSA) September 14, 2000.

■ Recommended Circuit:



Recommended Host Board Power Supply Circuit

■ Mechanical Dimensions



Mechanical Drawing

■ Order Information

XX of Part Number (GLSF-Cxx12-40D)	Central Wavelength(nm) C band
27	1270
29	1290
31	1310
33	1330
35	1350
37	1370
39	1390
41	1410
43	1430
45	1450
47	1470
49	1490
51	1510
53	1530
55	1550
57	1570
59	1590
61	1610

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