

1.25Gb/s CWDM SFP_Duplex LC, 1271~1611nm 120km DFB& PIN

Features:

Up to 1.25Gb/s Data Links
 Hot-Pluggable
 Duplex LC connector
 32dB optical link budget
 18-Wavelength CWDM 1271~1611nm DFB laser transmitter
 Single +3.3V Power Supply
 Monitoring Interface Compliant with SFF-8472
 Low power dissipation <1W typically
 Operating temperature range: 0°C to 70°C
 RoHS compliant and Lead Free

Applications:

Gigabit Ethernet
 1×Fiber Channel
 CWDM Networks

Description:

This CWDM Transceiver products provide optical networking equipment manufacturers with a timely and cost effective tool in supporting the unceasing demand for higher bandwidth equipment build-outs in the enterprise access and metropolitan area networks. There are 18 center wavelengths available from 1271nm to 1611nm. The 20nm channel spacing allows for un-cooled laser operation, a high yield manufacturing process, and lower cost Mux/Demux technology, thus providing a complete cost effective solution for various data and telecom applications.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T _s	-40		+85	°C
Supply Voltage	V _{cc}	-0.5		4	V
Relative Humidity	RH	0		85	%

Recommended Operating Environment

Parameter	Symbol	Min.	Typical	Max.	Unit
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Case operating Temperature	T _c	0		+70	°C
Supply Voltage	V _{CC}	3.135		3.465	V
Supply Current	I _{CC}			300	mA
Inrush Current	I _{surge}			I _{CC} +30	mA
Maximum Power	P _{max}			1	W

Electrical Characteristics(TOP =T_c, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Input differential impedance	R _{in}	90	100	110	Ω	1
Single ended data input swing	V _{in PP}	250		1200	mVp-p	
Transmit Disable Voltage	V _D	V _{CC} – 1.3		V _{CC}	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}	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
Power Supply Rejection	PSR	100			mVpp	6

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.

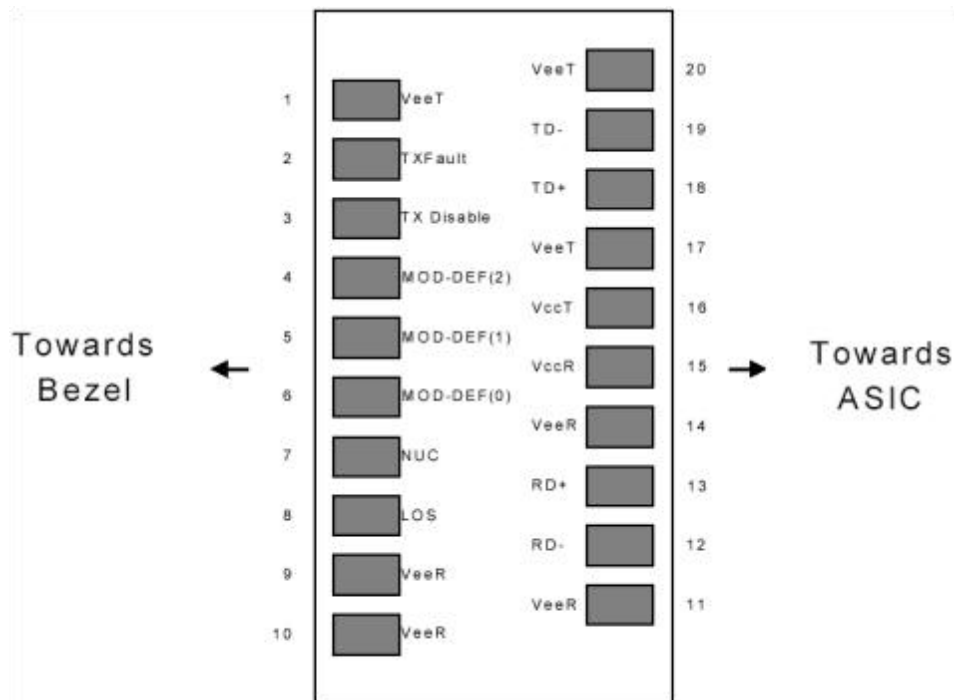
Optical Parameters(TOP =T_c, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λ _c	λ-6.5	λ	λ+6.5	nm	
Spectral Width	σ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Output Power	P _{out}	0		+5	dBm	1
Optical Rise/Fall Time	t _r / t _f			260	ps	2
Extinction Ratio	ER	9			dB	
Generated Jitter (peak to peak)	J _{TXp-p}		0.1		UI	
Generated Jitter (rms)	J _{TXrms}		0.01		UI	

Eye Mask for Optical Output	Compliant with IEEE802.3z(class 1 laser safety)					
Receiver Section:						
Optical Input Wavelength	λ_c	1260		1620	nm	
Receiver Overload	P_{ol}	-7			dBm	
RX Sensitivity	Sen			-32	dBm	3
RX_LOS Assert	LOS _A	-45			dBm	
RX_LOS De-assert	LOS _D			-33	dBm	
RX_LOS Hysteresis	LOS _H	0.5			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}		120		km	
Total System Budget	LB	32			dB	

Note:

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. Unfiltered, 20-80%. Complies with IEEE 802.3 (Gig. E), FC 1x and 2x eye masks when filtered.
3. Measured with PRBS 2²³-1 @1.25G ,BER $\leq 1 \times 10^{-12}$.

Pin Assignment**Figure1:Diagram of Host Board Connector Block Pin Numbers and Names**

Pin Function Definitions

Pin NO.	Name	Function	Plug Seq	Notes
1	VeeT	Transmitter Ground	1	1
2	TX Fault	Transmitter Fault Indication	3	
3	TX Disable	Transmitter Disable	3	2
4	MOD-DEF2	Module Definition	2	3
5	MOD-DEF1	Module Definition 1	3	3
6	MOD-DEF0	Module Definition 0	3	3
7	Rate Select	Not Connected	3	4
8	LOS	Loss of Signal	3	5
9	VeeR	Receiver Ground	1	1
10	VeeR	Receiver Ground	1	1
11	VeeR	Receiver Ground	1	1
12	RD-	Inv. Received Data Out	3	6
13	RD+	Received Data Out	3	6
14	VeeR	Receiver Ground	3	1
15	VccR	Receiver Power	2	1
16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	6
19	TD-	Inv. Transmit In	3	6
20	VeeT	Transmitter Ground	1	

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10 kohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.
4. Rate select is not used
5. LOS is open collector output. Should be pulled up with 4.7k — 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. AC Coupled

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.

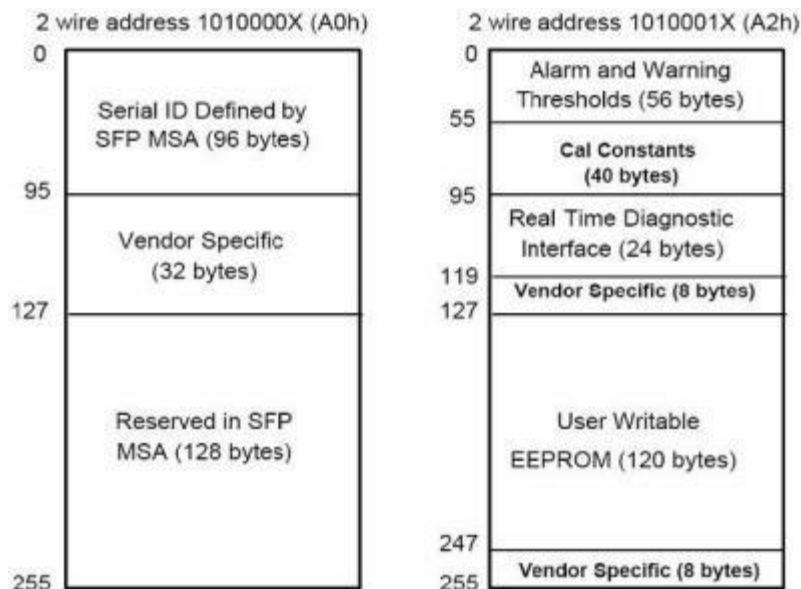
The memory is mapped in Table 1.

Detailed ID information (A0h) is listed in Table 2.

And the DDM specification 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)

**Table 2 - 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	
11	1	Encoding	NRZ(03h)
12	1	BR, Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
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
56-59	4	Vendor rev	Revision level for part number
60-62	3	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
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	Specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

Digital Diagnostic Monitor Characteristics

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

Regulatory Compliance

This 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

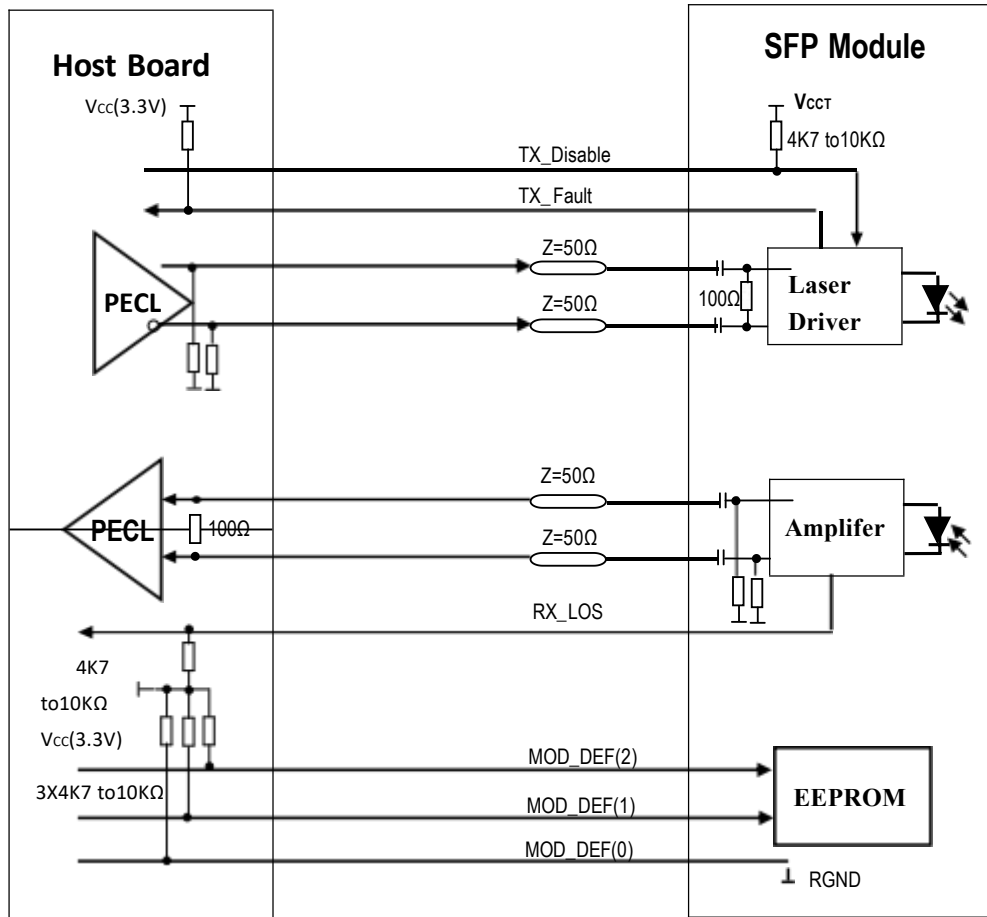


Figure 2. SFP Host Recommended Circuit

Mechanical Dimensions

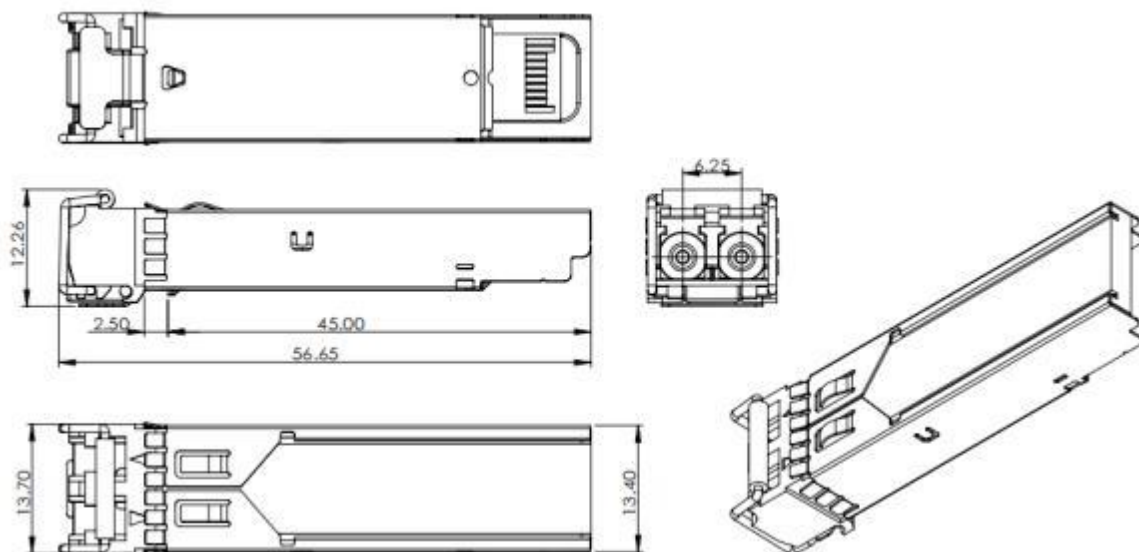


Figure 3. Mechanical Drawing

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Order Information

Data Rate	Central wavelength	Optical Link budget	Recommend Distance
1.25Gbps	1271nm	32dB	80km
1.25Gbps	1291nm	32dB	80km
1.25Gbps	1311nm	32dB	80km
1.25Gbps	1331nm	32dB	80km
1.25Gbps	1351nm	32dB	80km
1.25Gbps	1371nm	32dB	80km
1.25Gbps	1391nm	32dB	80km
1.25Gbps	1411nm	32dB	80km
1.25Gbps	1431nm	32dB	80km
1.25Gbps	1451nm	32dB	80km
1.25Gbps	1471nm	32dB	120km
1.25Gbps	1491nm	32dB	120km
1.25Gbps	1511nm	32dB	120km
1.25Gbps	1531nm	32dB	120km
1.25Gbps	1551nm	32dB	120km
1.25Gbps	1571nm	32dB	120km
1.25Gbps	1591nm	32dB	120km
1.25Gbps	1611nm	32dB	120km