1000BASE-CWDM SFP 1270nm~1610nm 100km DOM Transceiver

CWDM-SFP1G-EZX



Application

- Gigabit Ethernet
- 1XFiber Channel
- CWDM Networks

Features

- Up to 1.25Gb/s Data Links
- Hot-Pluggable
- Duplex LC connector
- Up to 100km on 9/125μm SMF
- 18-Wavelength CWDM 1270n~1610nm Available
- CWDM 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

Description

FS's CWDM-SFP1G-EZX 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 1270nm to 1610nm. 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.

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit
Storage Temperature	T_S	-40		+85	° C
Supply Voltage	V_{CC}	-0.5		4	V
Relative Humidity	RH	0		85	%

II. Recommended Operating Environment

Parameter	Symbol	Min	Typ.	Max	Unit
Case operating Temperature	Tc	0		+70	° C
Supply Voltage	V_{CC}	3.135		3.465	V
Supply Current	Icc			300	mA
Inrush Current	I_{surge}			Icc+30	mA
Maximum Power	P_{max}			1	W

III. Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	NOTE
Transmitter						
Input differential impedance	Rin	90	100	110		
Single ended data input swing	Vin PP	250		1200	mVp-p	

Transmit Disable Voltage	V_D	Vcc – 1.3		Vcc	V	2
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	
Transmit Disable Assert Time	$T_{dessert}$			10	us	
Receiver						
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	$V_{losfault}$	Vcc – 0.5		V_{CC}_host	V	5
LOS Normal	$V_{los\ norm}$	Vee		Vee+0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6

Notes:

1. AC coupled.
2. Or open circuit.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTL. 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.

IV. Optical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit
Transmitter					
Center Wavelength	λc	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		+4	dBm

Optical Rise/Fall Time	t_r / t_f			260	ps
Extinction Ratio	ER	9			dB
Generated Jitter (peak to peak)	J_{TXp-p}			0.07	UI
Generated Jitter (rms)	J_{TXrms}			0.007	UI
Eye Mask for Optical Output	Compliant with IEEE802.3z(class 1 laser safety)				
Receiver					
Optical Input Wavelength	λc	1260		1620	nm
Receiver Overload	P_{ol}	-8			dBm
RX Sensitivity	Sen			-32	dBm
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}		100		km
Total System Budget	LB	32			dB

Notes:

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 2^7 -1at 10^{-12} BER

V. Pin Description

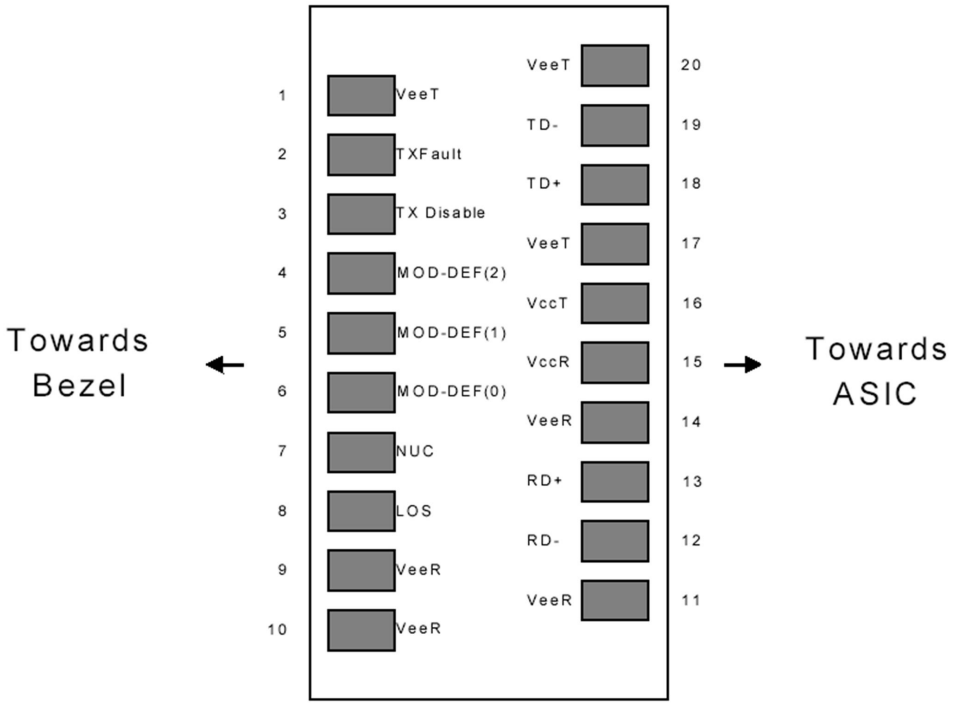


Diagram of Host Board Connector Block Pin Numbers and Names

Pin Num.	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
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

VI. 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)

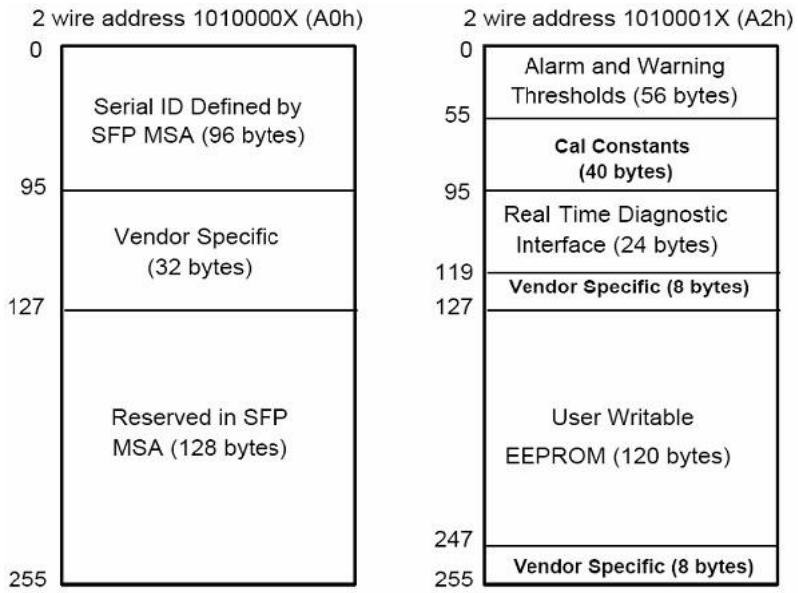


Table 2. EEPROM Serial ID Memory Contents (A0h)

Data Address	Length(Byte)	Name ofLength	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: FS
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: “CWDM-SFP1G-EZX” (ASCII)
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	FS’s 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	FS specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

VII. Digital Diagnostic Monitor Characteristics

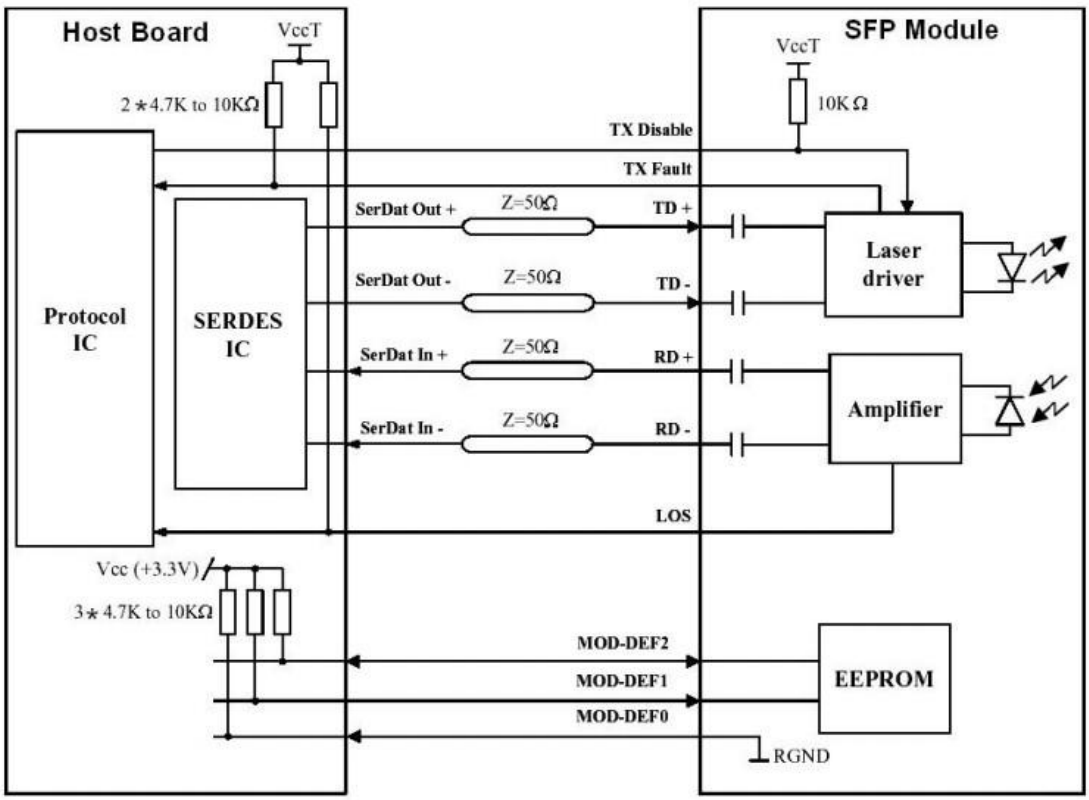
Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	° C
98-99	VCC3 Internal Supply Voltage	±5.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dBm
104-105	Rx Input Power	±3.0	dBm

VIII. Digital Diagnostic Monitor Characteristics

The CWDM-SFP1G-EZX complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

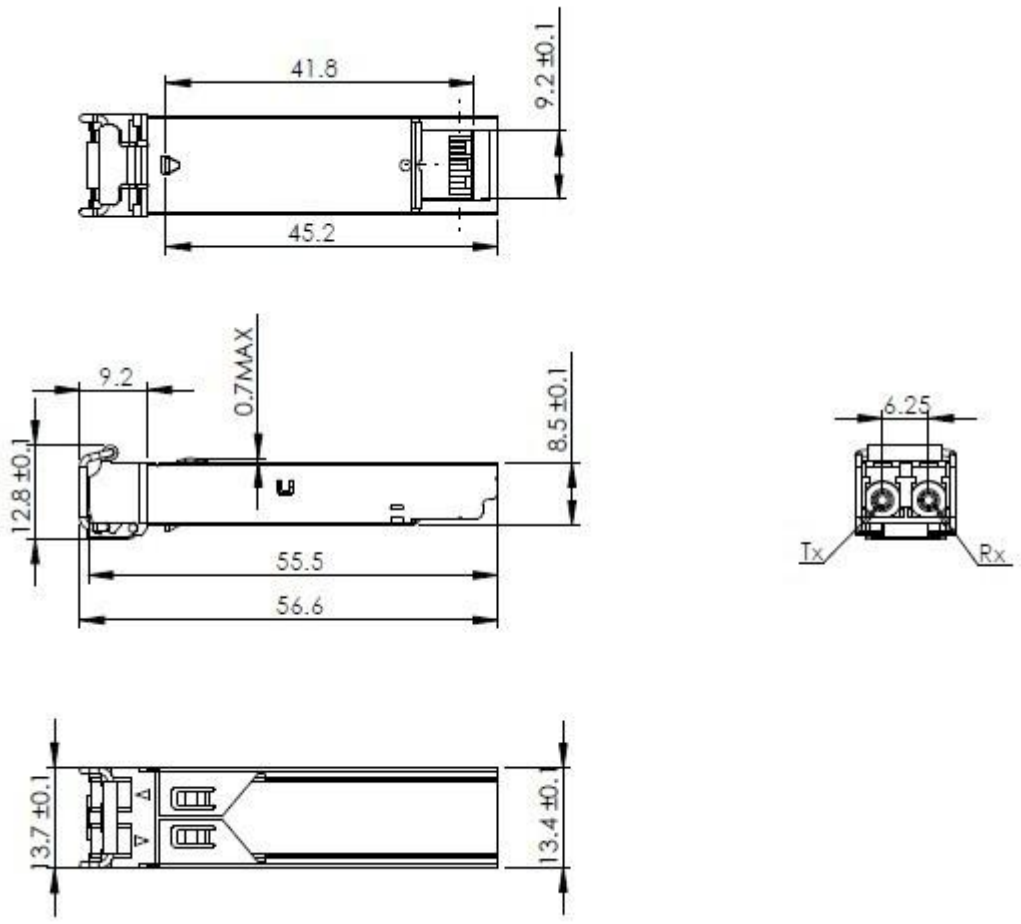
Electrostatic Discharge(ESD) to the Electrical Pins	MIL-STD-883EMethod 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD)to the Duplex LC Receptacle	IEC 61000-4-2GR-1089-CORE	Compatible with standards
ElectromagneticInterference (EMI)	FCC Part 15 Class BEN55022 Class B (CISPR 22B)VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laserproduct.

IX. Recommended Circuit



SFP Host Recommended Circuit

X. Mechanical Specifications



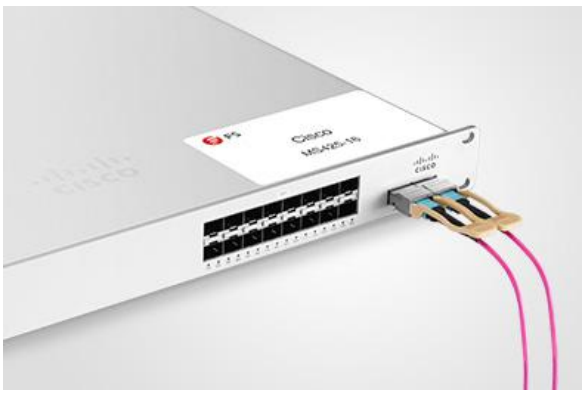
Test Center

I. Compatibility Testing

Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.



Cisco Catalyst C9500-24Y4C



Cisco MS425-16



Brocade VDX 6940-144S



Dell EMC Networking Z9100-ON



Force⑩tm S60-44T

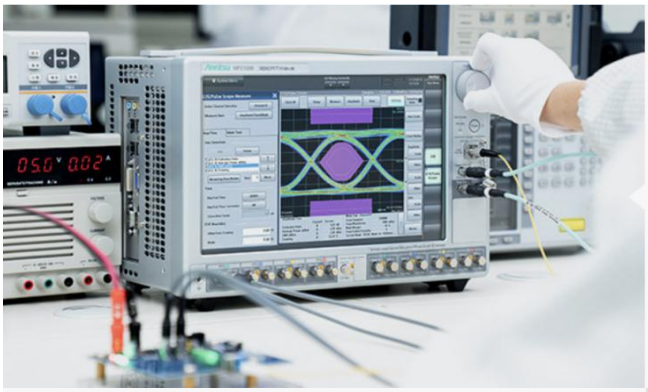


HUAWEI S6720-30L-HI-24S

Above is part of our test bed network equipment. For more information, please click the Test Bed PDF. It will be updated in real time as we expand our portfolio.

II. Performance Testing

Each fiber optical transceiver has been fully tested in FS Assured Program equipped with world's most advanced analytical equipment to ensure that our transceivers work perfectly on your device.



1. TX/RX Single Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator the input and output signal quality.

- Eye Pattern Measurements: Jitter, Mask Margin, etc
- Average Output Power
- OMA
- Extinction Ratio
- Receiver Sensitivity
- BER Curve

2. Reliability and Stability Testing

Subject the transceivers to dramatic in temperature on the thermal shock chamber to ensure reliability and stability of the transceivers.

- Commercial: 0℃ to 70℃
- Extended: -5℃ to 85℃
- Industrial: -40℃ to 85℃





3. Transfer Rate and Protocol Testing

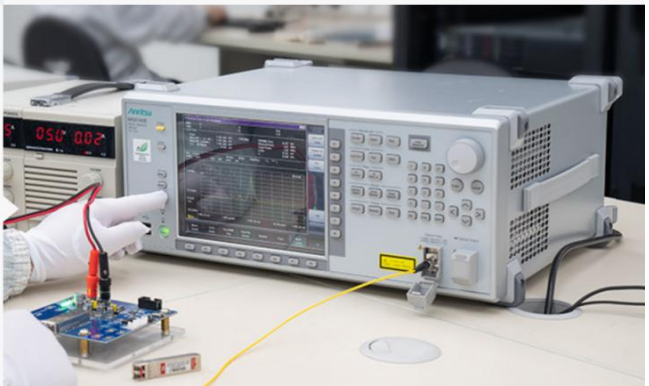
Test the actual transfer data rate and the transmission ability under different protocols with Networks Master Pro.

- Ethernet
- Fiber Channel
- SDH/SONET
- CPRI

4. Optical Spectrum Evaluation

Evaluate various important parameters with the Optical Spectrum Analyzer to meet the industry standards.

- Center Wavelength, Level
- OSNR
- SMSR
- Spectrum Width



Order Information

Part Number	Description
CWDM-SFP1G-ZX	SFP,1000BASE-CWDM, 1270nm~1610nm, SMF, 80km, LC, DOM
CWDM-SFP1G-ZX	SFP,1000BASE-CWDM, 1270nm~1610nm, SMF, 40km, LC, DOM
CWDM-SFP1G-ZX	SFP,1000BASE-CWDM, 1270nm~1610nm, SMF, 20km, LC, DOM
CWDM-SFP1G-EZX	SFP,1000BASE-CWDM, 1270nm~1610nm, SMF, 100km, LC, DOM
CWDM-SFP1G-EZX	SFP,1000BASE-CWDM, 1270nm~1610nm, SMF, 120km, LC, DOM

Note:

1000BASE-CWDM SFP transceiver module is individually tested on corresponding equipment such as Cisco, Arista, Juniper, Dell, Brocade and other brands, and passes the monitoring of FS.COM intelligent quality control system.