

1000BASE DWDM SFP 1528.77nm-1563.86nm 160km DOM Transceiver

DWCxx-SFP1G-ZXC



Applications

- SONET/SDH Networks
- Gigabit Ethernet
- C-Band DWDM Networks
- Fiber Channel

Features

- Compliant with SFF-8472 Rev12.4
- Compliant with SFF-8432 Rev5.2a
- Compliant with SFP+ MSA Rev1.0
- Compliant with IEEE802.3
- DWDM DML Laser Transmitter and APD Photo-Detector
- 100 GHz ITU Channel Spacing with Integrated Wavelength Locker
- Operating Data Rate up to 1.25Gbps
- Hot-Pluggable SFP Footprint Duplex LC Connector Interface
- RoHS Compliant and Lead Free

Description

The 1000BASE DWDM SFP transceiver supports up to 160km link lengths over single-mode fiber (SMF) via an LC duplex connector. Each SFP transceiver module is individually tested to be used on a series of Cisco switches, routers, servers, network interface card (NICs) etc. Featuring low power consumption, the hot swappable 1G SFP transceiver is ideal for Internet Service Provider (ISP) Gigabit Ethernet communication links, Enterprise LAN & SAN Networks, Data Center LAN & SAN Networks and other optical links.

Product Specifications

I. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T _s	-40		85	°C	
Operating Case Temperature	T _{case}	See order Information			°C	
Power Supply Voltage	V _{CC}	-0.5		3.6	V	
Relative Humidity (Non-condensation)	RH	5		95	%	
Damage Threshold	TH _d	0			dBm	

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	T _{OP}	0		70		commercial
		-10		80	°C	extended
		-40		85		industrial
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Data Rate			1250		Mb/s	
Operating Case Temperature	T _{OP}	0		70	°C	commercial

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Control Input Voltage High		2		V _{CC}	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			160	km	9/125um

III. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
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Transmitter

Center Wavelength	λ_c	± 0.1			nm	
Spectral Width	σ	1			nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Output Power	P _{OUT}	1		6	dBm	
Optical Modulation Amplitude	OMA	3		8	dBm	
OFF_Average Power	P _{OFF}	-40			dBm	
Extinction Ratio	ER	9			dB	
Eye Mask Margin		10@25°C 5@0°C&70°C			%	1
Crossing		40	50	60	%	

Receiver

Optical Input Wavelength	λ_c	1270		1610	nm	
Receiver Overload	POL	-10			dBm	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Receiver Sensitivity (Average Power)	BOL			-33	dBm	2
Receiver Sensitivity (OMA)	EOL			-31	dBm	
R _X _LOS Assert	LOS A	-41			dBm	
R _X _LOS De-assert	LOS D			-34	dBm	
R _X _LOS Hysteresis	LOS H	0.5		6	dB	

Notes:

1. EYE Mask Margin test conditions, sample waveform ≥1000 wfms, Hit Ratio 1E-12.
2. Measured with a PRBS 2⁷-1 test pattern @1250Mbps, BER≤1E-12.

IV. Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Consumption	P			1.0	W	
Supply Current	I _{CC}			330	mA	
Transmitter						
Single-ended Input Voltage Tolerance	V _{CC}	-0.3		4.0	V	
Differential Input Voltage Swing	V _{in,pp}	200		2400	mV _{pp}	
Differential Input Impedance	Z _{in}	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	V _{dis}	V _{CC} -1.3		V _{CC}	V	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmit Enable Voltage	V _{en}	V _{ee} -0.3		0.8	V	
Receiver						
Differential Output Voltage Swing	V _{out,pp}	500		900	mV _{pp}	
Differential Output Impedance	Z _{out}	90	100	110	Ohm	
Data Output Rise/Fall Time	Tr/Tf		100		ps	20% to 80%
LOS Assert Voltage	V _{losH}	V _{cc} -1.3		V _{cc}	V	
LOS De-assert Voltage	V _{losL}	V _{ee} -0.3		0.8	V	

V. Pin Definition

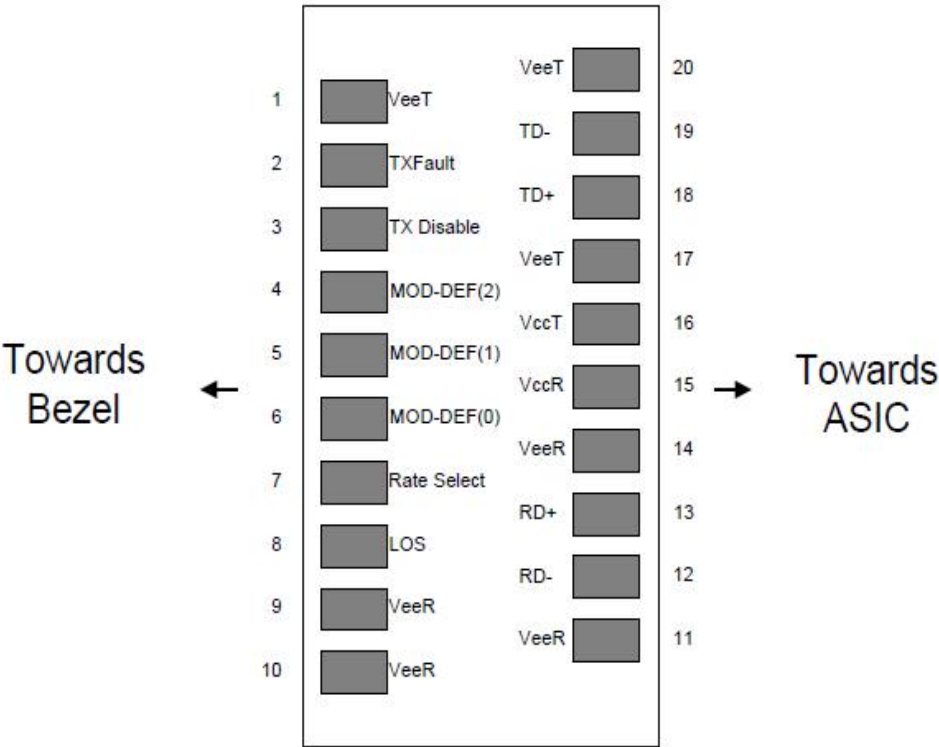


Figure 1. Diagram of Host Board Connector Block Pin Numbers and Names

VI. Pin Description

Pin	Name	Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TX Fault	Transmitter Fault.	
3	TX DIS	Transmitter Disable. Laser Output Disabled on High or Open.	2
4	MOD_DEF(2)	Module Definition 2. Data Line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock Line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the Module.	3
7	Rate Select	No Connection Required.	4
8	LOS	Loss of Signal Indication. Logic 0 Indicates Normal Operation.	5
9	VEER	Receiver Ground (Common with Transmitter Ground)	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA Out. AC Coupled	
13	RD+	Receiver Non-inverted DATA Out. AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1

Pin	Name	Description	Notes
18	TD+	Transmitter Non-inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver 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-10k ohms 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. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates).If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:
 - 1) Low (0 – 0.8V): Reduced Bandwidth
 - 2) (>0.8, < 2.0V): Undefined
 - 3) High (2.0 – 3.465V): Full Bandwidth
 - 4) Open: Reduced Bandwidth
- 5. LOS is open collector output should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

VII. Digital Diagnostic Monitoring Specifications

Parameter	Range	Accuracy	Unit
DDM Accuracy			
Temperature	0 to 70	±3	°C
Voltage	0 to V _{CC}	± 0.1	V
T _X Bias Current	4 to 85	±10%	mA
T _X Output Power	3 to 8	±2	dB
R _X Power	-33 to -10	±2	dB

Parameter	Comments	Unit
DDM Alarm & Warning Threshold		
Temperature High Alarm	80	°C
Temperature Low Alarm	-10	°C
Temperature High Warning	75	°C
Temperature Low Warning	-5	°C
V _{CC} High Alarm	3.63	V
V _{CC} Low Alarm	2.97	V
V _{CC} High Warning	3.46	V
V _{CC} Low Warning	3.13	V
Bias High Alarm	90	mA
Bias Low Alarm	2	mA
Bias High Warning	85	mA
Bias Low Warning	4	mA
T _x Power High Alarm	8	dBm
T _x Power Low Alarm	-2	dBm
T _x Power High Warning	6	dBm
T _x Power Low Warning	0	dBm
R _x Power High Alarm	-8	dBm

Parameter	Comments	Unit
R _x Power Low Alarm	-37	dBm
R _x Power High Warning	-10	dBm
R _x Power Low Warning	-35	dBm

Note:
1. EEPROM write permissions

From(DEC)	To(DEC)	NO. Of Bytes	Type@OEM Password	NVR/VR
2-Wire Serial Address: 1010000x(A0h)				
0	127	128	Read/Write	NVR
128	255	128	Read/Write	NVR
2-Wire Serial Address: 1010000x(A2h)				
0	127	128	Same as MSA	Same as MSA
128	255	128	Read/Write	NVR

VIII. Mechanical Dimensions

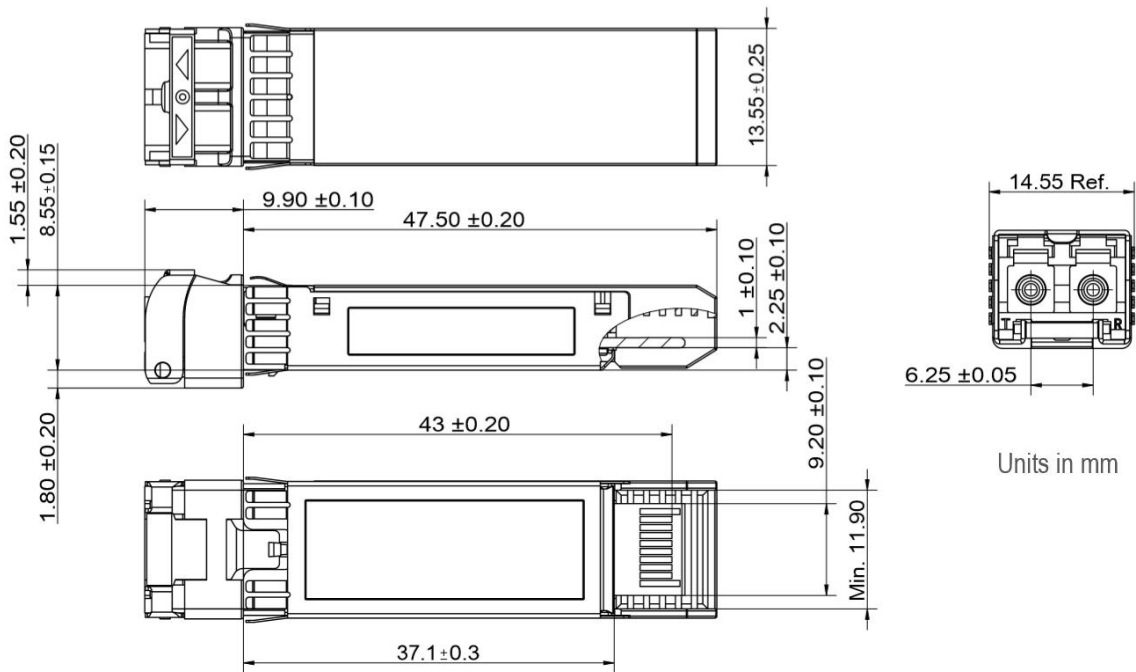


Figure 2. Mechanical Dimensions

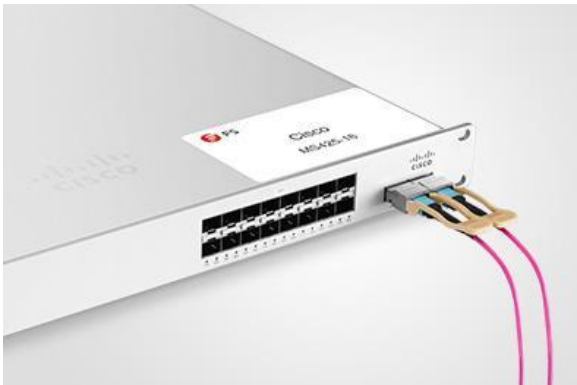
Test Center

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



Force@tm S60-44T

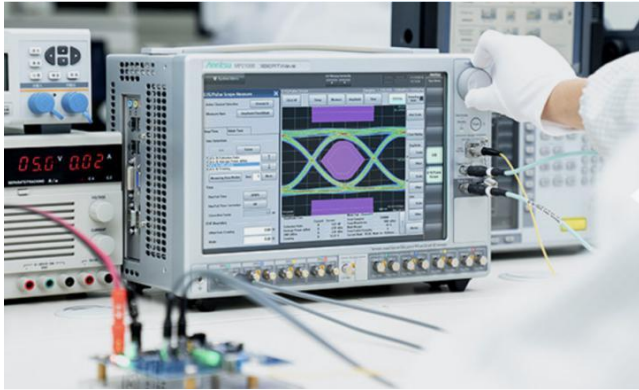


HUAWEI S6720-30L-HI-24S

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 Signal Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator to ensure 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 changes in temperature on the thermal shock chamber to ensure reliability and stability of the transceivers.

- Commercial: 0 °C to 70 °C
- Extended: -5 °C to 85 °C
- Industrial: -40 °C to 85 °C



3. Transfer Rate and Protocol Testing

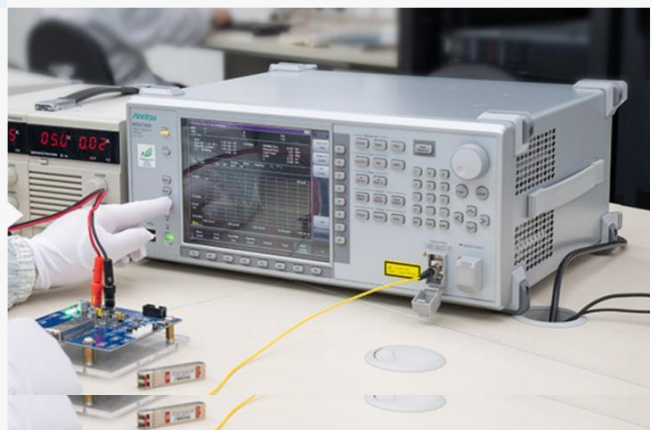
Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- Ethernet
- Fibre 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
DWDM-SFP1G-ZX	1000BASE DWDM SFP 1528.77nm-1563.86nm Transceiver, Duplex LC, 40km over SMF
DWDM-SFP1G-ZX	1000BASE DWDM SFP 1528.77nm-1563.86nm Transceiver, Duplex LC, 80km over SMF
DWDM-SFP1G-EZX	1000BASE DWDM SFP 1528.77nm-1563.86nm Transceiver, Duplex LC, 100km over SMF
DWCxx-SFP1G-120	1000BASE DWDM SFP 1528.77nm-1563.86nm Transceiver, Duplex LC, 120km over SMF