

10G CWDM SFP+ 1270nm-1610nm 40km Industrial DOM Transceiver

CWDM-SFP10G-40-I



Application

- 10GBASE-ER at 10.31Gbps
- 10GBASE-EW at 9.95Gbps
- OBSAI rates 6.144Gb/s, 3.072Gb/s, 1.536Gb/s, 0.768Gb/s
- CPRI rates 10.138Gb/s, 9.830Gb/s, 7.373Gb/s, 6.144Gb/s, 4.915Gb/s, 2.458Gb/s, 1.229Gb/s, 0.614Gb/s
- Other Optical Links

Features

- Operating Data Rate up to 10.31Gbps
- CWDM DFB-LD Transmitter from 1270nm to 1610nm, with step 20nm
- APD Receiver
- Distance up to 40km
- Hot-Pluggable Duplex LC Connector
- Power Dissipation < 1.8W
- Single 3.3V Power Supply and TTL Logic Interface
- Operating Temperature: Industrial: -40°C ~ +85°C

Description

SFP+ transceiver supports up to 40km link lengths over single-mode fiber (SMF) via an LC duplex connector. This transceiver is compliant with SFF-8431 and SFF-8472 MSA standards. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472, to allow access to real-time operating parameters. With these features, this easy to install, hot swappable transceiver is suitable for 10G Ethernet and 10G SONET/SDH applications.

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	85	°C
Maximum Supply Voltage	V _{CC}	-0.5	3.6	V
Operating Relative Humidity	RH		85	%

II. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Output Power	P _{OUT}	1		6	dBm	1
Center Wavelength	λ _C	λ _C - 6.5		λ _C + 6.5	nm	2
Spectral Width (-20dB)	Δλ			1	nm	
Optical Extinction Ratio	ER	3.5			dB	
Side Mode Suppression Ratio	SMSR	30			dB	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter Dispersion Penalty	TDP			2	dB	
Average Launch Power of OFF Transmitter	P _{OFF}			-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
TX Jitter Generation(Peak-to-Peak)	TXj			0.1	UI	
TX Jitter Generation (RMS)	TXj RMS			0.01	UI	
Receiver						
Optical Center Wavelength	λ _C	1260		1620	nm	
Receiver Sensitivity	P _{min}			-21	dBm	3
Maximum Input Power	P _{max}	-9			dBm	
Receiver Reflectance	R _{rf}			-27	dBm	
LOS De-Assert	LOS _D			-27	dBm	
LOS Assert	LOS _A	-37			dBm	
LOS Hysteresis		0.5			dB	

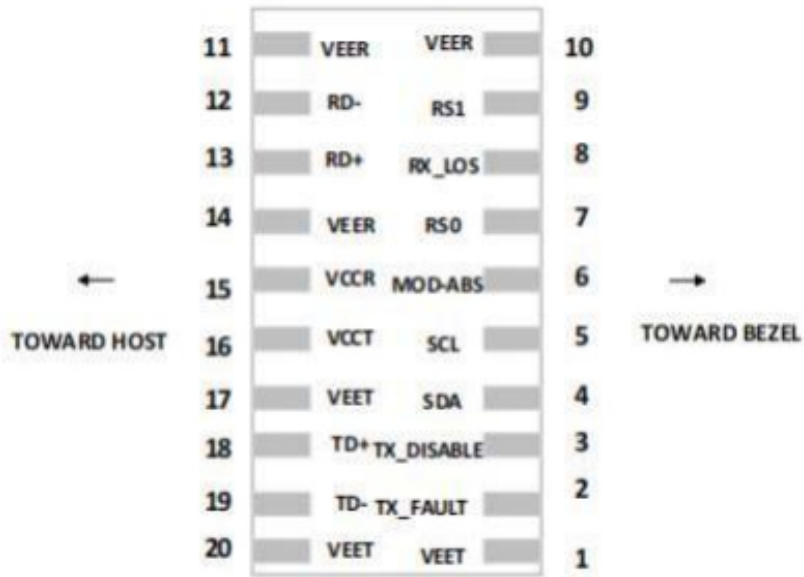
- Notes:
- 1. Output is coupled into a 9/125um SMF.
 - 2. ITU-T G.694.2 CWDM wavelength from 1271nm to 1371nm, each step 20nm.
 - 3. Average received power; BER less than 1E-12 and PRBS 231-1,10.31Gbps, ER=3.5, test pattern.

III. Electrical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter							
CML Inputs (Differential)		V _{in}	150		1200	mVpp	1
Input Differential Impedance		Z _{in}	85	100	115	ohms	2
Tx_Fault	High		2		V _{cc} +0.3	V	3
	Low		0		0.5	V	
Tx_Disable	High		2		V _{cc}	V	
	Low		0		0.8	V	
Receiver							
CML Outputs (Differential)		V _{OUT}	350		700	mVpp	4
Output Differential Impedance		Z _{OUT}	85	100	115	ohms	
RX LOS	High		2		V _{cc} +0.3		3
	Low		0		0.8		
MOD_DEF (0.2)		V _{OH}	2.5			V	5
		V _{OL}	0		0.5	V	

Notes:
1. CML logic, internally AC coupled.

VI. Pin Descriptions



V. Pin Definitions

Pin	Name	Function	Plug Seq.	Notes
1	V _{ee} T	Transmitter Ground	1	5
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable	3	2. Module disables on high or open
4	SDA	Transmitter Disable	3	3. 2 wire serial ID interface
5	SCL	Module Definition 2	3	3. 2 wire serial ID interface
6	MOD-ABS	Module Definition 1	3	3
7	RS0	RX Rate Select (LVTTTL)	3	Rate Select 0, optionally controls SFP+ module receiver. This pin is pulled low to VeeT with a >30K resistor.
8	LOS	Loss of Signal	3	4

Pin	Name	Function	Plug Seq.	Notes
9	RS1	TX Rate Select (LVTTL)	1	Rate Select 1, optionally controls SFP+ module transmitter. This pin is pulled low to VeeT with a >30K resistor.
10	V _{ee} R	Receiver Ground	1	
11	V _{ee} R	Receiver Ground	1	5
12	RD-	Inv. Received Data Out	3	6
13	RD+	Received Data Out	3	6
14	V _{ee} R	Receiver Ground	1	5
15	V _{cc} R	Receiver Power	2	7. 3.3V ± 5%
16	V _{cc} T	Transmitter Power	2	7. 3.3V ± 5%
17	V _{ee} T	Transmitter Ground	1	5
18	TD+	Transmit Data In	3	8
19	TD-	Inv. Transmit Data In	3	8
20	V _{ee} T	Transmitter Ground	1	5

Notes:

- 1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K– 10K resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
- 2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10K resistor. Its states are:Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined;High (2.0 – 3.465V): Transmitter Disabled
Open: Transmitter Disabled.
- 3. Modulation Absent, connected to VEET or VEER in the module.

Notes:

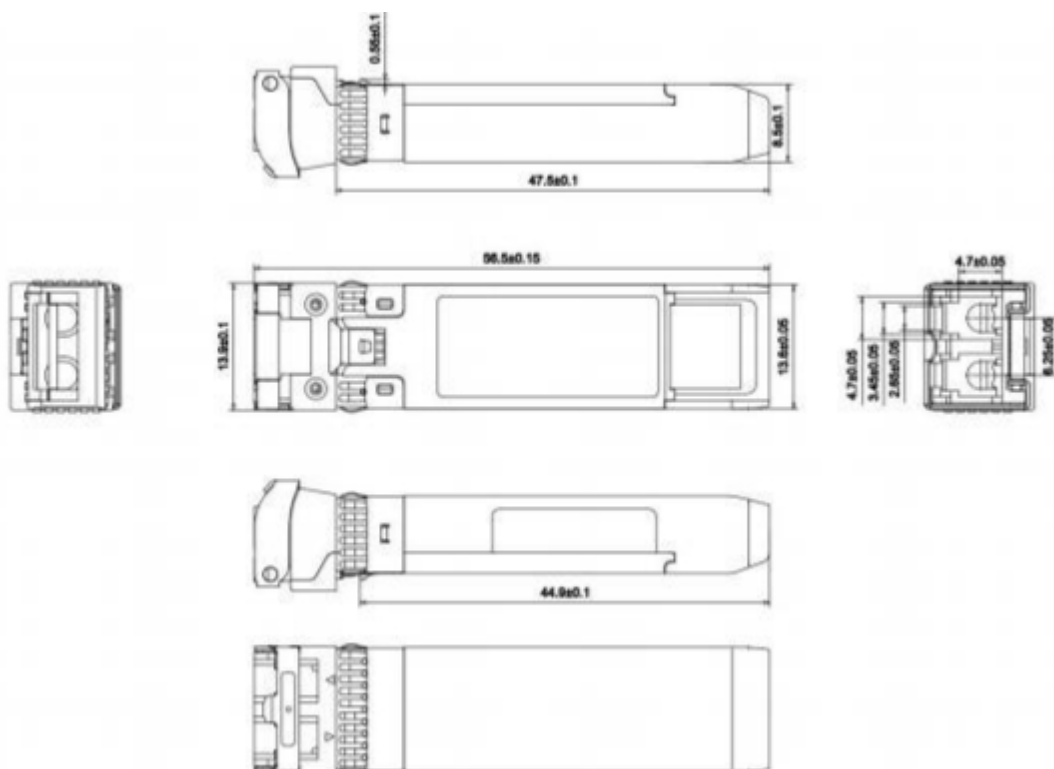
4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10K resistor. Pull up voltage between 2.0V and V_{ccT} , $R+0.3V$. When high, this output indicates the received optical power is below the worst-case receiver Sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to $<0.8V$.

5. V_{eeR} and V_{eeT} may be internally connected within the SFP module.

6. RD-/+: These are the differential receiver outputs. They are AC coupled 100 differential Lines which should be terminated with 100 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 400 and 2000mV differential (200– 1000mV single ended) when properly terminated.

7. V_{ccR} and V_{ccT} are the receiver and transmitter power supplies. They are defined as $3.3V \pm 5\%$ at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. V_{ccR} and V_{ccT} may be internally connected within the SFP transceiver module.

8. TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential terminations inside the module.

VI. Mechanical Dimensions

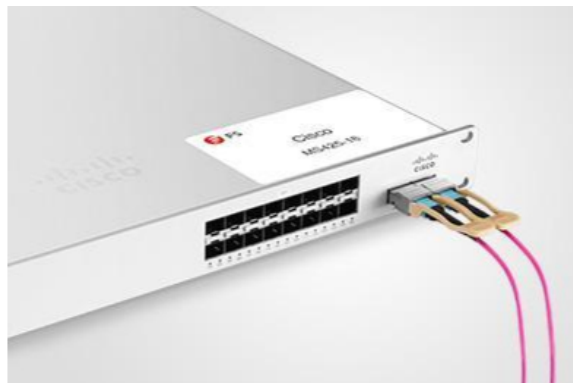
Test Center

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

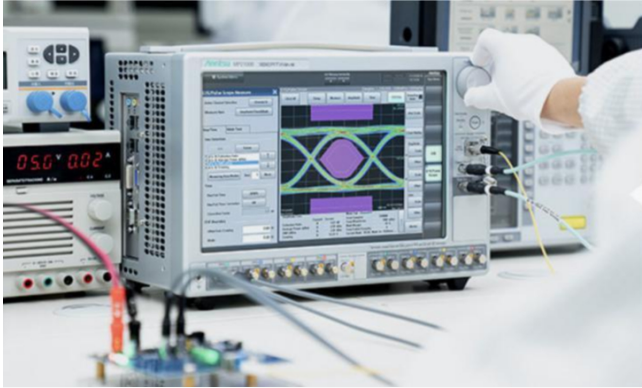


HUAWEI S6720-30L-HI-24S

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

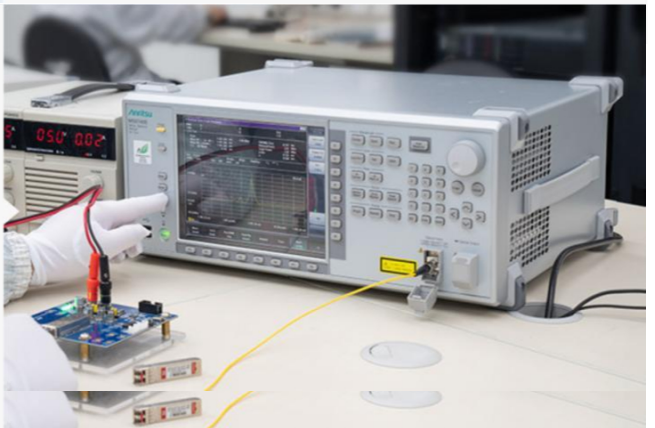
Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- 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
CWDM-SFP10G-80L	10G CWDM SFP+ Transceiver, 1470nm-1610nm, Duplex LC, 80km over SMF
CWDM-SFP10G-40L	10G CWDM SFP+ Transceiver, 1270nm-1590nm, Duplex LC, 40km over SMF
CWDM-SFP10G-10M	10G CWDM SFP+ Transceiver, 1270nm-1590nm, Duplex LC, 10km over SMF
CWDM-SFP10G-20SP	10G CWDM SFP+ Transceiver, 1270nm-1590nm, Duplex LC, 20km over SMF
CWDM-SFP10G-10SP	10G CWDM SFP+ Transceiver, 1270nm-1590nm, Duplex LC, 10km over SMF
CWDM-SFP10G-40S	10G CWDM SFP+ Transceiver, 1270nm-1590nm, Duplex LC, 40km over SMF
CWDM-SFP10G-20S	10G CWDM SFP+ Transceiver, 1270nm-1590nm, Duplex LC, 20km over SMF
CWDM-SFP10G-20L	10G CWDM SFP+ Transceiver, 1270nm-1610nm, Duplex LC, 20km over SMF
CWDM-SFP10G-80-I	10G CWDM SFP+ Transceiver, 1470nm-1610nm, Duplex LC, 80km over SMF, Industrial
CWDM-SFP10G-40-I	10G CWDM SFP+ Transceiver, 1270nm-1610nm, Duplex LC, 40km over SMF, Industrial
CW31-10GSFP-10-I	10G CWDM SFP+ Transceiver, 1270nm-1570nm, Duplex LC, 10km over SMF, Industrial