

10G CWDM SFP+

1470nm~1610nm 40km

DOM Transceiver

CWDM-SFP10G-40L



Application

- 10GBASE-ER/EW
- 10G FC
- OBSAI rates 6.144 Gb/s, 3.072 Gb/s, 1.536 Gb/s, 0.768Gb/s
- CPRI rates 9.830 Gb/s, 7.373Gb/s, 6.144 Gb/s, 4.915 Gb/s, 2.458 Gb/s, 1.229 Gb/s, 0.614Gb/s
- Other optical links

Features

- Hot-Pluggable SFP+ Footprint
- 8-Wavelengths CWDM EML Transmitter from 1470nm to 1610nm, with step 20nm
- 14dB Power Budget
- Duplex LC connector
- Power Dissipation <1.5W
- Dispersion tolerance 800ps/nm
- Industrial temperature range: -40°C to 85°C
- Commercial temperature range: 0°C to 70°C
- Build-in digital diagnostic functions, including optical power monitoring
- Compliant with SFF-8431 MSA
- Compliant with SFF-8432 MSA

Description

The CWDM-SFP10G-40L series optical transceiver is designed for fiber communications application up to 10G, which fully compliant with the specification of SFP+ MSA SFF-8431.

This module is designed for single mode fiber and operates at a nominal wavelength of CWDM wavelength. There are eight center wavelengths available from 1470nm to 1610nm, with each step 20nm. A guaranteed optical link budget of 14 dB is offered.

The module is with the SFP+ connector to allow hot plug capability. Only single 3.3V power supply is needed. The optical output can be disabled by LVTTTL logic high-level input of TX_DIS. Loss of signal (RX_LOS) output is provided to indicate the loss of an input optical signal of receiver.

This module provides digital diagnostic functions via a 2-wire serial interface as defined by the SFF-8472 specification.

Product Specifications

I. General Specifications

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Module Form Factor	BR	9.95		10.5	Gb/s	1
Number of Lanes	BER			10 ⁻¹²		2
Maximum Aggregate Data Rate	L _{max}		40		KM	

Notes:

1. 10GBASE-ER, 10GBASE-EW, 1200-SM-LL-L 10GFC.
2. Tested with a PRBS 2³¹-1 test pattern.

CWDM Wavelength

18 Wavelengths from 1270nm to 1610nm, each step 20nm.

Band	Nomenclature	Wavelength(nm)		
		Min	Typ.	Max
O-band Original	A	1264	1270	1277.5
	B	1284	1290	1297.5
	C	1304	1310	1317.5
	D	1324	1330	1337.5
	E	1344	1350	1357.5
E-band Extended	F	1364	1370	1377.5
	G	1384	1390	1397.5
	H	1404	1410	1417.5
	I	1424	1430	1437.5
	J	1444	1450	1457.5
S-band Short Wavelength	K	1464	1470	1477.5
	L	1484	1490	1497.5
	M	1504	1510	1517.5
	N	1524	1530	1537.5
C-band Conventional	O	1544	1550	1557.5
L-band Long Wavelength	P	1564	1570	1577.5
	Q	1584	1590	1597.5
	R	1604	1610	1617.5

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit
Maximum Supply Voltage 1	V _{cc}	-0.5		4.0	V
Storage Temperature	T _s	-40		85	°C
Case Operating Temperature	T _c	0		70	°C
	T _c	-40		85	°C
Supply Voltage	V _{cc}	3.13	3.3	3.45	V
Supply Current	I _{cc} (0°C to 70°C)		350	455	mA

III. Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	V _{in}	180		1000	mVpp	1
Input Impedance (Differential)	Z _{in}	85	100	115	ohm	
TX_DISABLE Input Voltage - High		2		V _{cc} +0.3	V	
TX_DISABLE Input Voltage - Low		0		0.8	V	
TX_FAULT Output Voltage - High		2		V _{cc} +0.3	V	
TX_FAULT Output Voltage - Low		0		0.8	V	

Receiver

CML Outputs (Differential)	Vout	350		700	mVpp	1
Output Impedance (Differential)	Zout	85	100	115	ohm	
RX_LOS Output Voltage - High		2		Vcc+0.3	V	
RX_LOS Output Voltage - Low		0		0.8	V	
MOD_DEF (0:2)	VoH	2.5			V	2
	VoL	0		0.5	V	

Notes:

1. After internal AC coupling.
2. Reference the SFF-8472 MSA.

IV. Optical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Notes
Transmitter						
Optical Wavelength	λ	λ_c-6	λ_c	$\lambda_c+7.5$	nm	2
-20dB Spectrum Width	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Output Opt. Pwr: 9/125 SMF	P _{out}	0		+4	dBm	1
Extinction Ratio	ZR	3.5			dB	
Average Launch Power of OFF Transmitter	P _{OFF}			-30	dBm	
Signaling Speed per Lane			10.5		GBd	1
Transmitter Dispersion Penalty	TDP			3.5	dB	
TX Jitter	TXj		Per 802.3ae requirements			
Relative Intensity Noise	RIN			-128	dB/Hz	

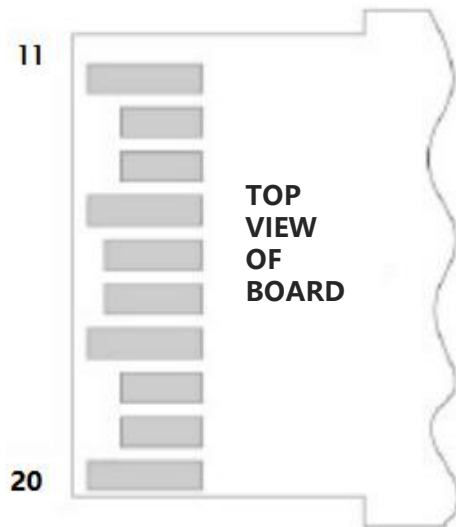
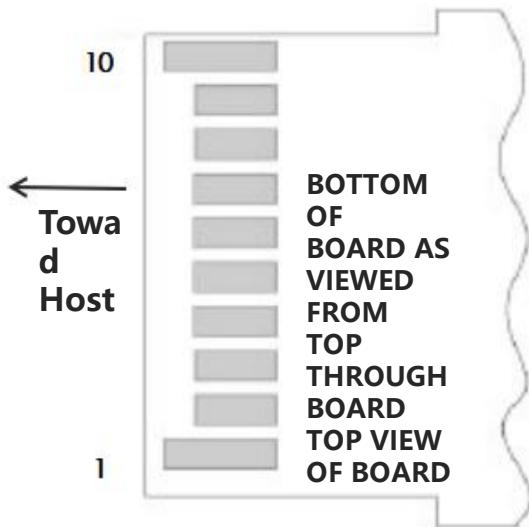
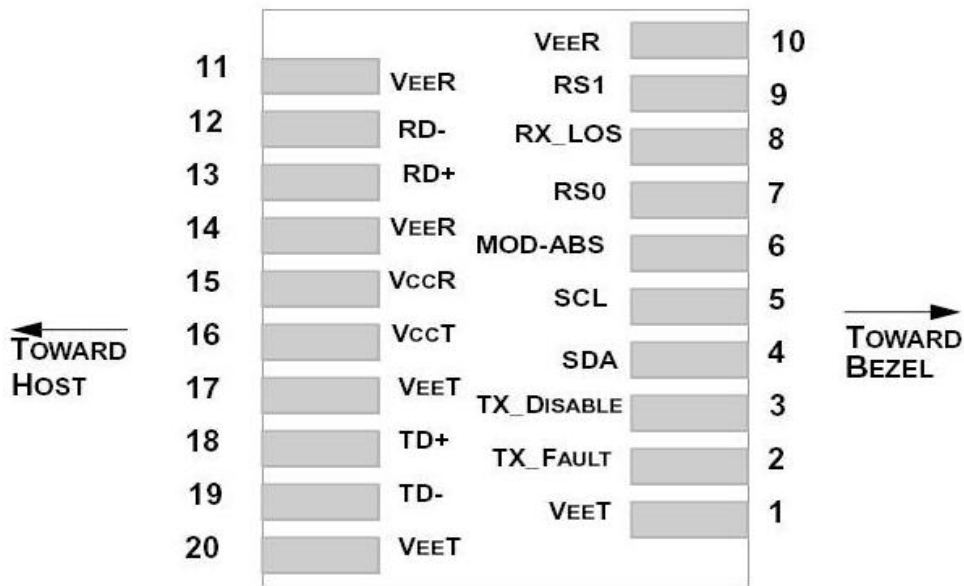
Receiver

Receiver Sensitivity	P_{\min}			-23	dBm	3
Input Overload	P_{\max}	-8			dBm	
Optical Center Wavelength	λ	1260		1620	nm	
Receiver Reflectance	R_{rf}			-12	dB	
LOS De-Assert	LOS_D			-24	dBm	
LOS Assert	LOS_A	-37			dBm	
LOS Hysteresis		1			dB	

Notes:

1. Output power is coupled into a 9/125 μ m SMF.
2. ITU-T G.694.2 CWDM wavelength from 1470nm to 1610nm, each step 20nm.
3. Average received power; BER less than 1E-12 and PRBS 2³¹-1 test pattern.

V. Pin Description



Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	Note 5
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	2-wire Serial Interface Data Line.

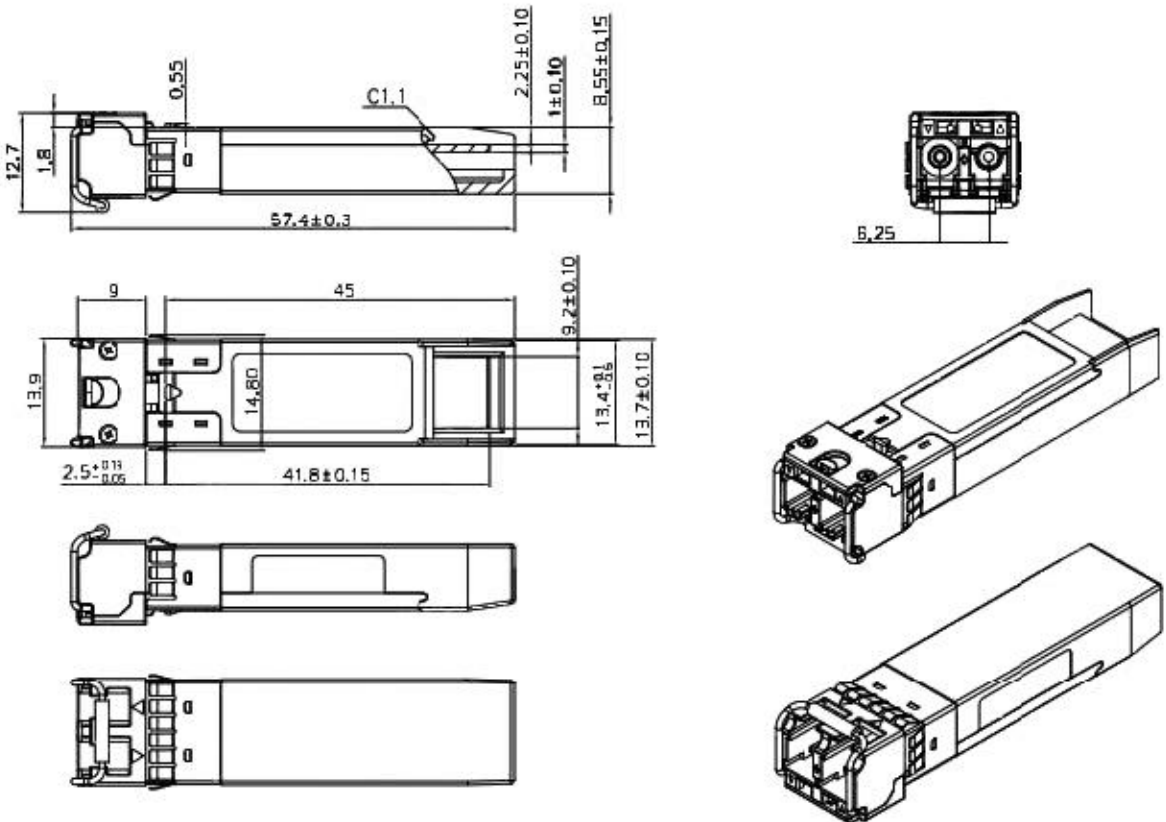
5	SCL	Module Definition 1	3	2-wire Serial Interface Clock.
6	MOD-ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTTL).	3	Rate Select 0, optionally controls SFP+ module receiver. This pin is pulled low to VeeT with a >30K resistor.
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTTL).	1	Rate Select 1, optionally controls SFP+ module transmitter. This pin is pulled low to VeeT with a >30K resistor.
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3V ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3V ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K –10KΩ resistor on the host board. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. 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 4.7K~10 KΩ 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. Module Absent, connected to VeeT or VeeR in the module.
4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K –10 KΩ resistor on host board. 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. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
6. RD-/+ : These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (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 370 and 700 mV differential (185 –350mV single ended) when properly terminated.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±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. VccR and VccT may be internally connected within the SFP+ transceiver module.
8. TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

VI. Mechanical Specifications



Unremarked tolerances ±0.2mm

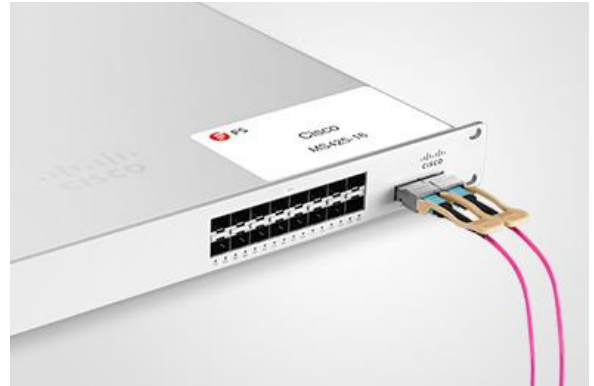
Test Center

I. Compatibility Testing

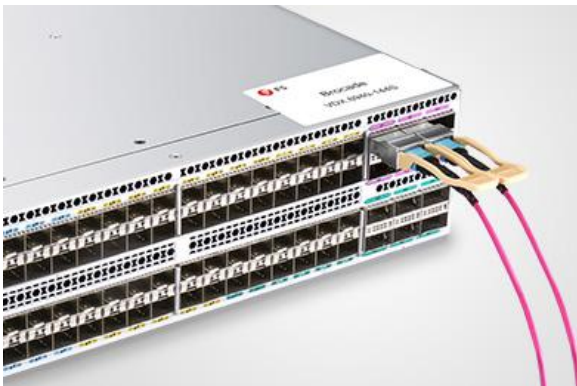
Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.



Cisco Catalyst C9500-24Y4C



Cisco MS425-16



Brocade VDX 6940-144S



Dell EMC Networking Z9100-ON



Force¹⁰ S60-44T

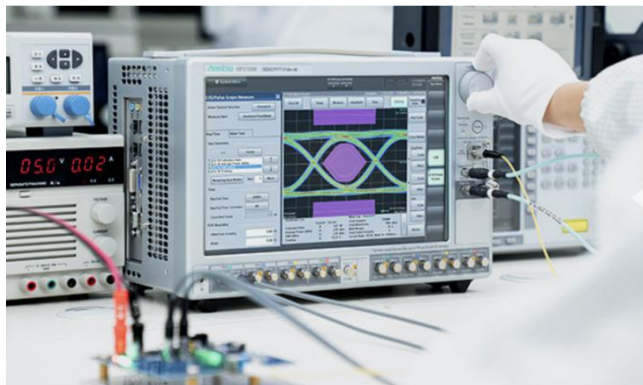


HUAWEI S6720-30L-HI-24S

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°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 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

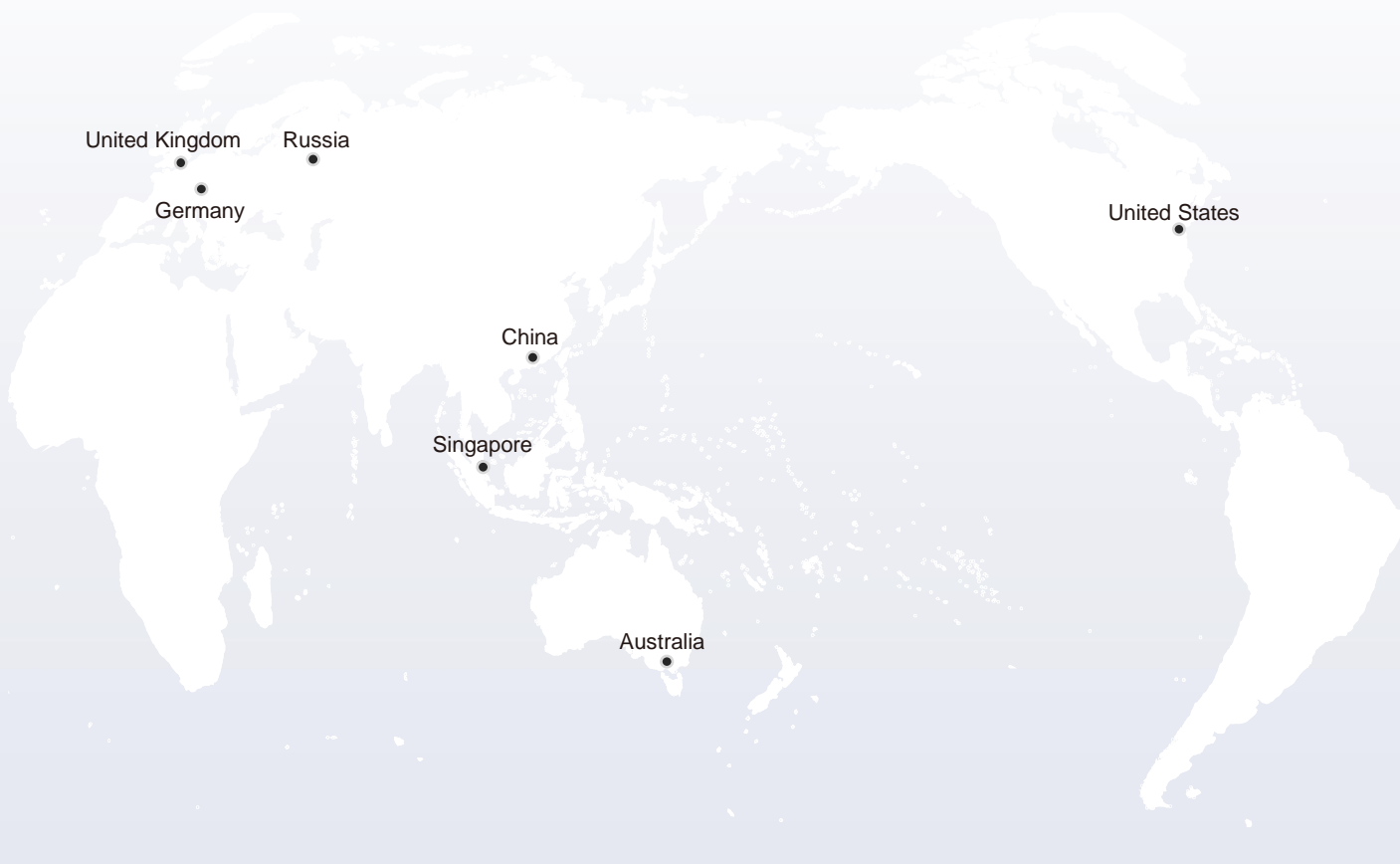


Order Information

Part Number	Description
CWDM-SFP10G-20SP	SFP+, 10GBase-LR, CWDM 1270nm-1330nm, SMF, 20km, LC, DOM
CWDM-SFP10G-20L	SFP+, 10GBase-LR, CWDM 1350nm-1610nm, SMF, 20km, LC, DOM
CWDM-SFP10G-40S	SFP+, 10GBase-ER, CWDM 1270nm-1450nm, SMF, 40km, LC, DOM
CWDM-SFP10G-40L	SFP+, 10GBase-ER, CWDM 1470nm-1610nm, SMF, 40km, LC, DOM
CWDM-SFP10G-80L	SFP+, 10GBase-ZR, CWDM 1470nm-1610nm, SMF, 80km, LC, DOM

Note:

1.10G 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.



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