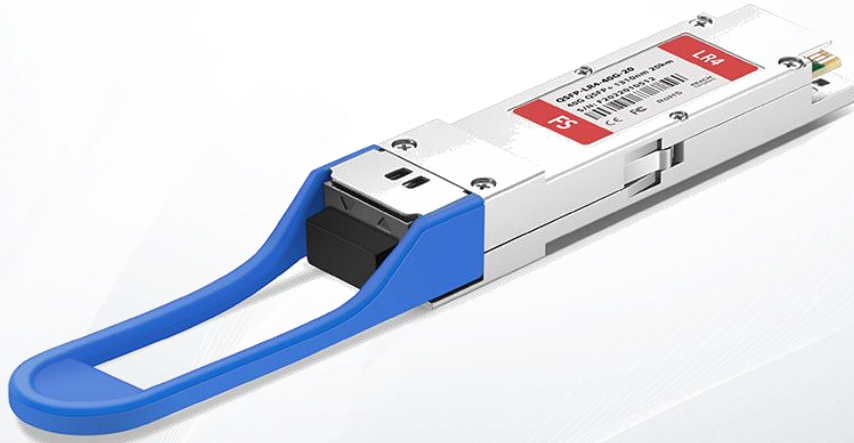


40GBASE-LR4 QSFP+ 1310nm 20km LC DOM Transceiver

QSFP-LR4-40G-20



Application

- 40GBASE-LR4 40G Ethernet

Features

- Hot-pluggable QSFP+ Form Factor
- CWDM DFB Laser and PIN Receiver Array
- Duplex LC Connector
- Max. Power Consumption 3.5W, 1.5W in Low Power Mode
- Commercial Case Temperature Range 0°C to 70°C
- Single 3.3V Power Supply
- Maximum Link Length of 20km on Single Mode Fiber (SMF)
- Maximum Data Rate per Lane: 10.3125Gb/s
- Two Wire Serial (TWS) Interface With Digital Diagnostic Monitoring
- MSA SFF-8436 QSFP+ Revision 4.8 Compliant
- RoHS Compliant
- Class 1 Laser

Description

QSFP+ transceiver modules are designed for use in 40GBASE Ethernet throughput up to 20km over single mode fiber (SMF) using a wavelength of 1310nm via duplex LC connectors. This transceiver is compliant with SFF-8436 QSFP+ MSA and RoHS standards. Digital diagnostics functions are also available via the I2C interface, as specified by the QSFP+ MSA, to allow access to real-time operating parameters. With these features, this easy to install, hot swappable transceiver is suitable to be used in various applications, such as data centers, high-performance computing networks, enterprise core and distribution layer applications.

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Temperature Range	T_S	-40	85	$^{\circ}\text{C}$	
Supply Voltage	V_{CC}	-0.5	3.6	V	
Relative Humidity (Non-Condensing)	RH	5	85	%	
Data Input Voltage Differential	$ V_{DIP}-V_{DIN} $		1.0	V	

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T_{OPR}	0		70	$^{\circ}\text{C}$	
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Maximum Power Dissipation	P_D			3.5	W	
Maximum Power Dissipation, Low Power Mode	P_{DLP}			1.5	W	
Data Rate per Lane	DR		10.3125		Gb/s	
Operating Distance				20	km	

III. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Transmitter						
Wavelength L0	λ_1	1264.5	1271	1277.5	nm	
Wavelength L1	λ_2	1284.5	1291	1297.5	nm	
Wavelength L2	λ_3	1304.5	1311	1317.5	nm	
Wavelength L3	λ_4	1324.5	1331	1337.5	nm	
Side-mode Suppression Ratio	SMSR	30			dB	
Total Average Optical Launch Power	P_{OUT}			8.3	dBm	
Average Launch Power Tx_Off (per Lane)	$P_{OUT-OFF}$			-30	dBm	
Average Optical Launch Power (per Lane)	P_{OUTL}	-4.5		2.3	dBm	
Extinction Ratio	ER	3.5			dB	
Spectral Width	$\Delta\lambda$			1	nm	
Optical Modulation Amplitude (per Lane)	OMA	-4		3.5	dBm	
Transmitter Eye Mask Definition IEEE802.3 Compliance			0.25, 0.4, 0.45, 0.25, 0.28, 0.4		UI	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Receiver						
Wavelength L0	λ_1	1264.5	1271	1277.5	nm	
Wavelength L1	λ_2	1284.5	1291	1297.5	nm	
Wavelength L2	λ_3	1304.5	1311	1317.5	nm	
Wavelength L3	λ_4	1324.5	1331	1337.5	nm	
Receiver Sensitivity (OMA) per Lane				-12.5	dBm	
Damage Threshold For Receiver	$P_{IN, DAMAGE}$	3.3			dBm	
Average Power Input (Each Lane)		-13.7		2.3	dBm	
Receiver Reflectance	RX_R			-26	dB	
LOS Assert	LOS_A	-25			dBm	
LOS De-Assert	LOS_D			-15	dBm	
LOS Hysteresis		0.5			dB	

IV. Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
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Transmitter (Module Input)

Single Ended Input Voltage	V_{IN}	-0.3		4	V	
Differential Data Input Swing	$V_{IN,P-P}$	150		1000	mVpp	
AC Common Mode Input Voltage (RMS)		15			mV	

Receiver (Module Output)

Single Ended Output Voltage	V_{OUT}	-0.3		4	V	
Differential Data Output Swing	$V_{OUT,P-P}$	200		1000	mVpp	
AC Common Mode Output Voltage (RMS)				7.5	mV	
Output Transition Time, 20% to 80%		28			ps	

V. Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	± 3	$^{\circ}\text{C}$	Internal
Voltage	0 to V_{CC}	0.1	V	Internal
Tx Bias Current (Each Lane)	0 to 80	10%	mA	Internal
Tx Output Power	-3.5 to 2.3	± 3	dB	Internal
Rx Power (Each Lane)	-13 to 2.3	± 3	dB	Internal

VI. Pin Function Definitions

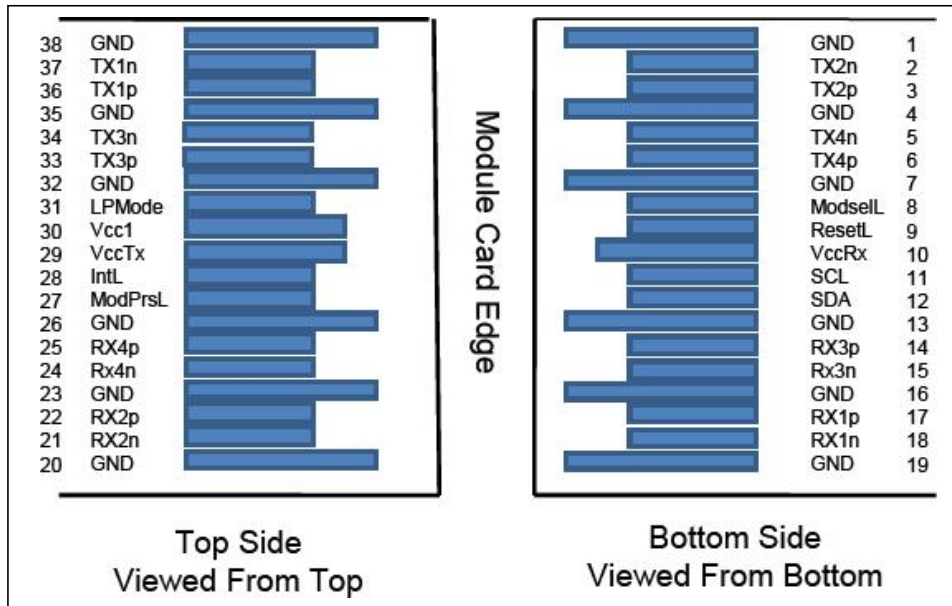


Figure 1 - QSFP+ Module Pad Layout

VII. Transceiver Pin Descriptions

Pin	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModSelL	Module Select	3	

Pin	Logic	Symbol	Description	Plug Sequence	Notes
9	LVTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply Receiver	2	2
11	LVC MOS-I/O	SCL	2-wire Serial Interface Clock	3	
12	LVC MOS-I/O	SDA	2-wire Serial Interface Data	3	
13		GND	Ground	1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1

Pin	Logic	Symbol	Description	Plug Sequence	Notes
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL	Interrupt	3	
29		VccTx	+3.3V Power Supply Transmitter	2	2
30		Vcc1	+3.3V Power Supply	2	2
31	LVTTL-I	LPMODE	Low Power Mode	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1

Note1: GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

Note2: Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently.

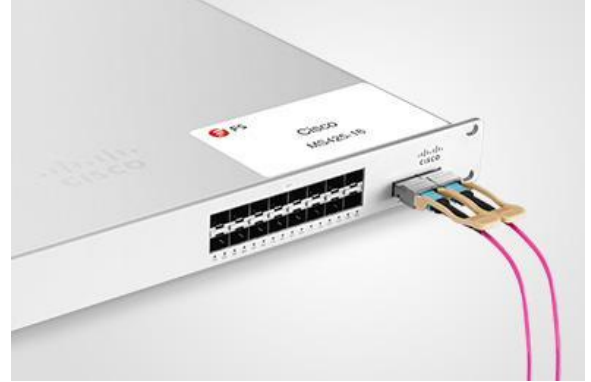
Test Center

I. Compatibility Testing

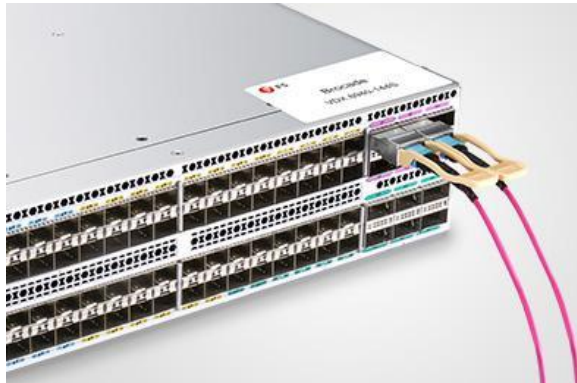
Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.



Cisco Catalyst C9500-24Y4C



Cisco MS425-16



Brocade VDX 6940-144S



Dell EMC Networking Z9100-ON



Force@tm S60-44T

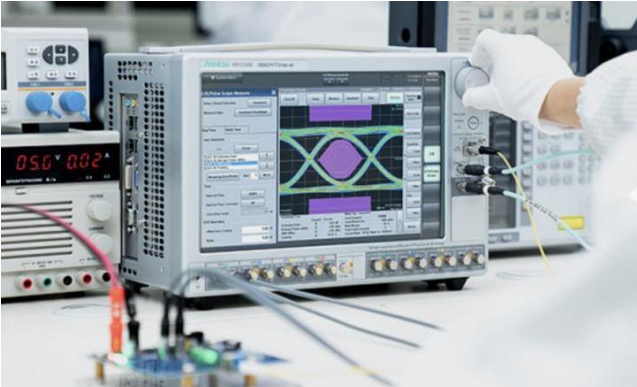


HUAWEI S6720-30L-HI-24S

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.

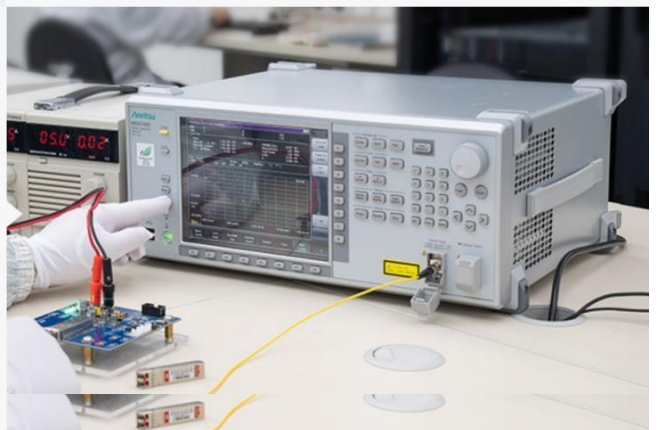
- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI



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
QSFP-SR4-40G	40GBASE-SR4 QSFP+ 850nm 150m MTP/MPO Transceiver for MMF
QSFP-CSR4-40G	40GBASE-CSR4 QSFP+ 850nm 400m MTP/MPO Transceiver for MMF
QSFP-PIR4-40G	40GBASE-PLRL4 QSFP+ 1310nm 1.4km MTP/MPO Transceiver for SMF
QSFP-LX4-40G	40GBASE-UNIV QSFP+ 1310nm 2km LC Transceiver for SMF&MMF
QSFP-IR4-40G	40GBASE-LR4L QSFP+ 1310nm 2km LC Transceiver for SMF
QSFP-LR4-40G	40GBASE-LR4 and OTU3 QSFP+ 1310nm 10km LC Transceiver for SMF
QSFP-LR4-40G-20	40GBASE-LR4 QSFP+ 1310nm 20km LC Transceiver for SMF
QSFP-PLR4-40G	40GBASE-PLR4 QSFP+ 1310nm 10km MTP/MPO Transceiver for SMF
QSFP-ER4-40G	40GBASE-ER4 and OTU3 QSFP+ 1310nm 40km LC Transceiver for SMF
QSFP-BD-40G	40GBASE-SR Bi-Directional QSFP LC Duplex Transceiver for MMF

Note:

40G QSFP+ 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.



 <https://www.fs.com>



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