40GBASE-SR4 QSFP+ 850nm 150m MTP/MPO Transceiver for MMF

QSFP-SR4-40G

Application

- 40GBASE-SR4 40G Ethernet
- Breakout to 4 x 10GBASE-SR Ethernet
- Proprietary interconnections

Features

- Four-channel full-duplex transceiver module
- Hot Pluggable QSFP+ form factor
- Maximum link length of 100m on OM3 Multimode Fiber (MMF) and 150m on OM4 MMF
- Single 1x12 MPO receptacle
- Unretimed XLPPI electrical interface
- Max power dissipation <1.2W
- Reliable VCSEL array technology
- Built-in digital diagnostic functions, including optical power monitoring
- Commercial operating case temperature range: 0° C to 70° C

Description

QSFP+ transceiver modules are designed for use in 40 Gigabit per second links over multimode fiber. They are compliant with the QSFP+ MSA and IEEE 802.3ba 40GBASE-SR4 and breakout to 4 10GBASE-SR. Digital diagnostics functions are available via an I2C interface, including Tx and Rx power monitoring. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

Product Specifications

I.General Specifications

Parameter	Value	Unit	Notes
Module Form Factor	QSFP+		
Number of Lanes	4 Tx and 4 Rx		
Maximum Aggregate Data Rate	42.0	Gb/s	
Maximum Data Rate per Lane	10.5	Gb/s	Higher bit rates may be supported. Please contact FS.
Protocols Supported	Typical applications include 40G Ethernet, Infiniband QDR, SATA/SAS3		This module is not retimed
Electrical Interface and Pin-out	38-pin edge connector		Pin-out as defined by the QSFP+ MSA2
Maximum Power Consumption	1.2	Watts	Varies with output voltage swing and pre-emphasis settings
Management Interface	Serial, I2C-based, 400 kHz maximum frequency		As defined by the QSFP+ MSA2

Data Rate Specifications	Symbol	Min	Typ.	Max	Units	Ref.
Bit Rate per Lane	BR	1062		10500	Mb/sec	1
Bit Error Ratio	BER			10-12		2
Link distance on OM3 MMF	d			100	meters	3
Link distance on OM4 MMF	d			150	meters	3

Notes:

1. Compliant with 40G Ethernet. Compatible with 1/10 Gigabit Ethernet and 1/2/4/8/10G Fibre Channel.
2. Tested with a PRBS 231-1 test pattern.
3. Per 40GBASE-SR4, IEEE 802.3ba.

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Maximum Supply Voltage	Vcc1, VccTx, VccRx	-0.5		3.6	V	
Storage Temperature	Ts	-40		85	° C	
Case Operating Temperature	Top	0		70	° C	
Relative Humidity	RH	0		85	%	1
Damage Threshold, per Lane	DT	3.4			dBm	

Notes:

Non-condensing..

III. Electrical Characteristics (TOP= 0 to 70 ° C, VCC = 3.14 to 3.46 Volts)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Supply Voltage	Vcc1, VccTx, VccRx	3.15		3.45	V	
Supply Current	Icc			350	mA	
Transmit turn-on time				2000	ms	2
Transmitter (per Lane)						
Single ended input voltage tolerance	VinT	-0.3		4.0	V	
Differential data input swing	Vin,pp	180		1200	mVpp	3
Differential input threshold			50		mV	
AC common mode input voltage tolerance (RMS)		15			mV	
Differential input return loss		Per IEEE P802.3ba,Section 86A.4.1.1			dB	4
J2 Jitter Tolerance	Jt2	0.17			UI	
J9 Jitter Tolerance	Jt9	0.29			UI	
Data Dependent Pulse Width Shrinkage	DDPWS	0.07			UI	
Eye mask colordinates {X1, X2 ,Y1, Y2}			0.11, 0.31 95, 350		UI mV	5
Receiver (per Lane)						
Single-ended output voltage		-0.3		4.0	V	
Differential data output swing	Vout,pp	0		800	mVpp	6,7

AC common mode output voltage (RMS)				7.5	mV	
Termination mismatch at 1 MHx				5	%	
Differential output return loss		Per IEEE P802.3ba,Section 86A.4.2.1			dB	4
Common mode output return loss		Per IEEE P802.3ba,Section 86A.4.2.2			dB	4
Output transition time, 20% to 80%		28			ps	
J2 Jitter output	Jo2			0.42	UI	
J9 Jitter output	Jo9			0.65	UI	
Eye mask coordinates #1 {X1, X2, Y1, Y2}		0.29, 0.5 150, 425			UI mV	5
Power Supply Ripple Tolerance	PSR	50			mVpp	

Notes::

1. Maximum total power value is specified across the full temperature and voltage range.
2. 2From power-on and end of any fault conditions.
3. 3After internal AC coupling. Self-biasing 100Ω differential input.
4. 10 MHz to 11.1 GHz range
5. Hit ratio = 5 x 10E-5.
6. AC coupled with 100Ω differential output impedance.
7. Settable in 4 discrete steps via the I2C interface.

IV. Optical Characteristics (TOP = 0 to 70 ℃, VCC = 3.14 to 3.46 V)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Transmitter (per Lane)						
Signaling Speed per Lane			10.5		GBd	1
Center wavelengths		840		860	nm	
RMS Spectral Width	SW			0.65	nm	
Average Launch Power per Lane	TXPx	-7.6		-1.0	dBm	
Transmit OMA per Lane	TxOMA	-5.6		3.0	dBm	2
Difference in Power between any two lanes (OMA)	DPx			4.0	dB	
Peak Power per Lane	PPx			4.0	dB	
Launch Power (OMA) minus TDP per Lane	P-TDP	-6.5			dBm	
TDP per Lane	TDP			3.5	dBm	
Optical Extinction Ratio	ER	3.0			dB	
Optical Return Loss Tolerance	ORL			12	dB	
Encircled Flux	FLX		> 86% at 19 um < 30% at 4.5 um		dBm	
Average launch power of OFF transmitter, per lane				-30	dBm	
Relative Intensity Tolerance	RIN			-128	dB/H	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}			(0.25, 0.4, 0.45, 0.25, 0.28, 0.4)			

Receiver (per Lane)

Signaling Speed per Lane			10.5		GBd	3
Center wavelengths		840		860	nm	
Damage Threshold	DT	3.4			dBm	
Receive Power (OMA) per Lane	RxOMA			3.0	dBm	
Average Receive Power per Lane	RXPx	-9.9		2.4	dBm	
Stressed Receiver Sensitivity (OMA) per Lane	SRS			-5.4	dBm	
Peak Power, per lane	PPx			4	dBm	
Receiver Reflectance	Rfl			-12	dB	
Vertical eye closure penalty, per lane				1.9	dB	
Stressed eye J2 jitter, per Lane				0.3	UI	
Stressed eye J9 jitter, per Lane				0.47	UI	
OMA of each aggressor lane				-0.4	dBm	
Rx jitter tolerance: Jitter frequency and p-p amplitude		(75, 5) (375,1)			kHz, UI kHz, UI	
LOS De-Assert	LOSD			TBD	dBm	
LOS Assert	LOSA	TBD			dBm	
LOS Hysteresis			1		dB	

Notes:

1.Transmitter consists of 4 lasers operating at a maximum rate of 10.5Gb/s each.

2.Even if TDP is <0.9dB, the OMA min must exceed this value.

3.Receiver consists of 4 photodetectors operating at a maximum rate of 10.5Gb/s each.

V. Pin Description

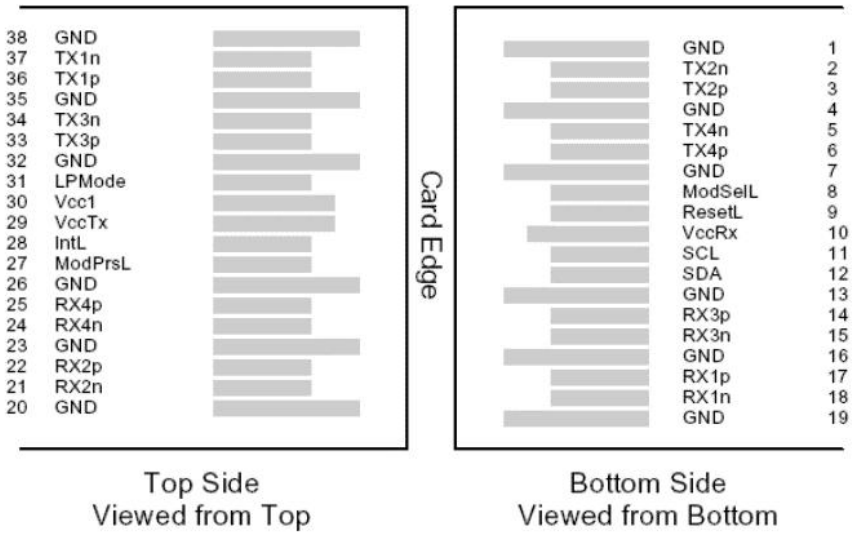


Figure 1 – QSFP+ MSA-compliant 38-pin connector

Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	

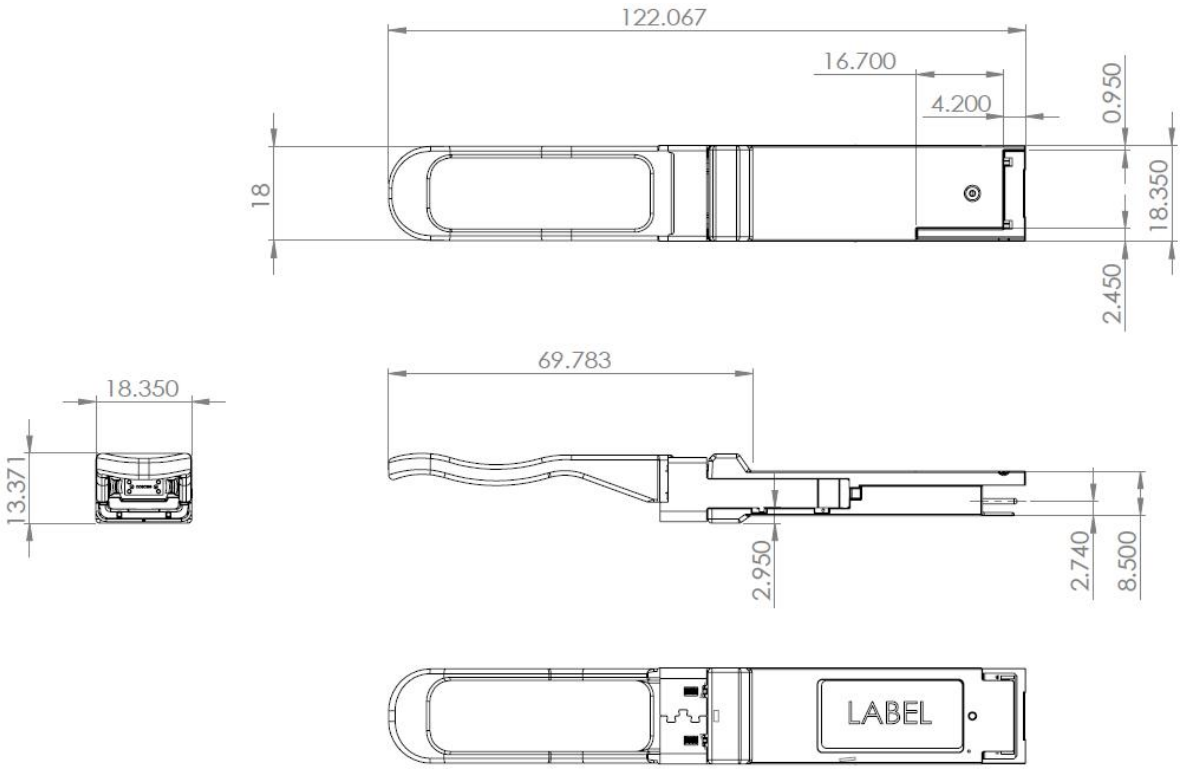
10	Vcc Rx	+3.3 V Power supply receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3 V Power supply transmitter	
30	Vcc1	+3.3 V Power Supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1

34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Note:

Circuit ground is internally isolated from chassis ground.

VI. Mechanical Specifications



Test Center

FS.COM transceivers are tested to ensure connectivity and compatibility in our test center before shipped out. FS.COM test center is supported by a variety of mainstream original brand switches and groups of professional staff, helping our customers make the most efficient use of our products in their systems, network designs and deployments.

The original switches could be found nowhere but at FS.COM test center, eg: Juniper MX960 & EX 4300 series, Cisco Nexus 9396PX & Cisco ASR 9000 Series, HP 5900 Series & HP 5406R ZL2 V3(J9996A), Arista 7050S-64, Brocade ICX7750-26Q & ICX6610-48, Avaya VSP 7000 MDA 2, etc.

Cisco ASR 9000 Series(A9K-MPA-1X40GE)


ARISTA 7050S-64(DCS-7050S-64)

Juniper MX960


Brocade ICX 7750-26Q

Extreme Networks X670V VIM-40G4X

Mellanox M3601Q


Dell N4032F

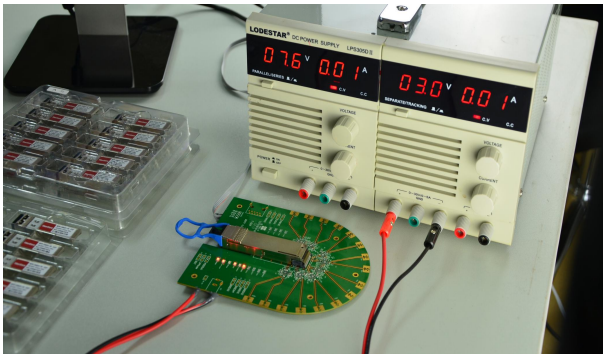
HP 5406R ZL2 V3(J9996A)

AVAYA 7024XLS(7002QQ-MDA)

Test Assured Program

FS.COM truly understands the value of compatibility and interoperability to each optics. Every module FS.COM provides must run through programming and an extensive series of platform diagnostic tests to prove its performance and compatibility. In our test center, we care of every detail from staff to facilities—professionally trained staff, advanced test facilities and comprehensive original-brand switches, to ensure our customers to receive the optics with superior quality.

Our smart data system allows effective product management and quality control according to the unique serial number, properly tracking the order, shipment and every part.



Our in-house coding facility programs all of our parts to standard OEM specs for compatibility on all major vendors and systems such as Cisco, Juniper, Brocade, HP, Dell, Arista and so on.

With a comprehensive line of original-brand switches, we can recreate an environment and test each optics in practical application to ensure quality and distance.

The last test assured step to ensure our products to be shipped with perfect package.

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-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

Notes:

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.

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