40GBASE Bi-Directional QSFP+ 850nm 300m LC DOM Transceiver for MMF

QSFP-BIDI-40G

Application

- 40G Ethernet over Duplex MMF
- Allows Upgrades from 10GBASE-SR without Changing Fiber Plant

Features

- Hot-pluggable QSFP+ Form Factor
- 300m Operation over Duplex OM3 MMF, and 400m over Duplex OM4 MMF
- Supports 41.2 Gb/s Aggregate Bit Rates
- Power Dissipation < 3.5W
- Commercial Case Temperature Range 0°C to 70°C
- Duplex LC Receptacles
- XLPPI Electrical Interface
- Built-in Digital Diagnostic Functions, including Tx/Rx Power Monitoring
- RoHS-6 Compliant

Description

The QSFP-BIDI-40G transceiver modules are designed for use in 40 Gigabit Ethernet links over duplex multimode fiber. They are compliant with the QSFP+ MSA and IEEE 802.3ba XLPPI electrical interface. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP+ MSA. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

Product Specifications

I. General Product Characteristics

Parameter	Value	Unit	Notes
Module Form Factor	QSFP+		
Maximum Aggregate Data Rate	41.2	Gb/s	
Protocols Supported	40G Ethernet		
Electrical Interface and Pin-out	38-pin edge connector		Pin-out as defined by the QSFP+ MSA
Maximum Power Consumption	3.5	Watts	1
Management Interface	Serial, I2C-based, 400 kHz maximum frequency		As defined by the QSFP+ MSA

Notes:

1. Will be <3.5W in link established mode. If the input optical signal is without data, the CDR will keep searching and push the power consumption over the maximum spec.

Data Rate Specifications	Symbol	Min	Typ	Max	Units	Ref.
Bit Error Ratio	BER	0		10^{-12}		1
Link Distance on OM3	d	0		300	Meters	
Link Distance on OM4	d			400	Meters	

Notes:

1. Tested with a PRBS 231-1 test pattern.

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc1, VccTx, VccRx	-0.5		3.6	V	
Storage Temperature	T_S	-40		85	℃	
Case Operating Temperature	T_{OP}	0		70	℃	
Relative Humidity	RH	0		85	%	1
Damage Threshold, per Lane	DT	4			dBm	

Notes:

1. Non-condensing.

III. Electrical Characteristics (T_{OP} = 0 to 70 °C, V_{CC} = 3.1 to 3.47 Volts)

Parameter	Unit	Min	Type	Max	Unit	Ref.
Supply Voltage	VccTx,	Vcc1, 3.1 VccRx		3.47	V	
Supply Current		Icc		0.9	A	1
Link Turn-on Time						
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	120		1200	mVpp	3
Differential Input Threshold			50		mV	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Return Loss			Per IEEEP802.3ba, 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 Coordinates {X1, X2 Y1, Y2}			0.11, 0.31 95, 350		UI mV	5

Parameter	Unit	Min	Type	Max	Unit	Ref.
Receiver (per Lane)						
Single-ended Output Voltage		-0.3		4.0	V	
Differential Data Output Swing	Vout,pp	200		400	mVpp	6, 7
		300		600		
		400		800		
		600		1200		
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.Will be <3.5W in link established mode. If the input optical signal is without data, the CDR will keep searching and push the supply current over the maximum spec.

2. From power-on and end of any fault conditions.

3. After internal AC coupling. Self-biasing 100 differential input.

4. 10 MHz to 11.1 GHz range.

5. Hit ratio = 5 x 10E-5.

6. AC coupled with 100 differential output impedance.

7. Output voltage is settable in 4 discrete steps via I2C.

Ⅳ.Optical Characteristics (T_{OP} = 0 to 70 °C, V_{CC} = 3.1 to 3.47 Volts)

Per-channel optical characteristics vary over the 4 wavelengths. Below are the worst-case

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Lane Center Wavelengths			850 880 910 940		nm	
Spectral Width @ 850nm	SBW			0.53		
Spectral Width @ 880nm, 910nm, 940nm	SBW			0.59	nm	
Total Average Launch Power	P_{OUT}	-1.5		9.0	dBm	2
Average Launch Power per Lane	TXPx	-7.5		3.0	dBm	1,2
Transmit OMA per Lane	TxOMA	-5.5		3	dBm	1
Difference in Launch Power between Any 2 Lanes (OMA)	TxOMA DIFF			4.5	dB	
Launch Power Tx OMA - TDP		-6.6			dBm	
Transmitter and Dispersion Eye Closure @ 850nm	TDEC			3.7	dB	
Transmitter and Dispersion Eye Closure @ 880nm	TDEC			4.0	dB	
Transmitter and Dispersion Eye Closure @ 910nm	TDEC			4.5	dB	
Transmitter and Dispersion Eye Closure @ 940nm	TDEC			5.0	dB	
Optical Extinction Ratio	ER	2.0			dB	
Average Launch Power of OFF Transmitter, Per Lane				-30	dBm	

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Relative Intensity Noise	RIN			-128	dB/Hz	3
Optical Return Loss Tolerance		12			dB	
Transmitter Eye Mask Definition {X1, X2 X3, Y1, Y2, Y3}			0.23, 0.34, 0.43, 0.27, 0.35,0.4			
Receiver						
Lane Center Wavelengths			850 880 910 940		nm	
Average Receive Power per Lane	RXPx	-9.0		3.0	dBm	1,4
Receive Power (OMA) per Lane	RxOMA			3	dBm	1
Receiver Sensitivity (OMA) per Lane	Rxsens			-9.1	dBm	1,5
Stressed Receiver Sensitivity (OMA) Per Lane @ 850nm	SRS			-5.7	dBm	1
Stressed Receiver Sensitivity (OMA) per Lane @ 880nm, 910nm, 940nm	SRS			-4.4	dBm	1
Return Loss	RL			12	dB	
LOS De-Assert	LOS_D			-13	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. This value varies among the 4 channels. The value shown is for the worst-casechannel.
2. Minimum value is informative.
3. Maximum value is informative. TDP guarantees Tx performance
4. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss.
5. Maximum value is informative based on a theoretical perfect unstressed optical source

V.Memory Map and Control Registers

Compatible with SFF-8636 (QSFP+).

VI. Environmental Specifications

The QSFP-BIDI-40G transceivers have an operating temperature range from 0°C to +70°C case temperature.

Parameter	Unit	Min	Type	Max	Unit	Ref.
Case Operating Temperature	Top	0		70	°C	
Storage Temperature	Tsto	-40		85	°C	0

VII. Regulatory Compliance

The QSFP-BIDI-40G transceivers are RoHS-6 compliant. Copies of certificates are available at FS.COM upon request. The QSFP-BIDI-40G transceiver modules are Class 1 laser eye safety compliant per IEC 60825-1.

VIII. Mechanical Specifications

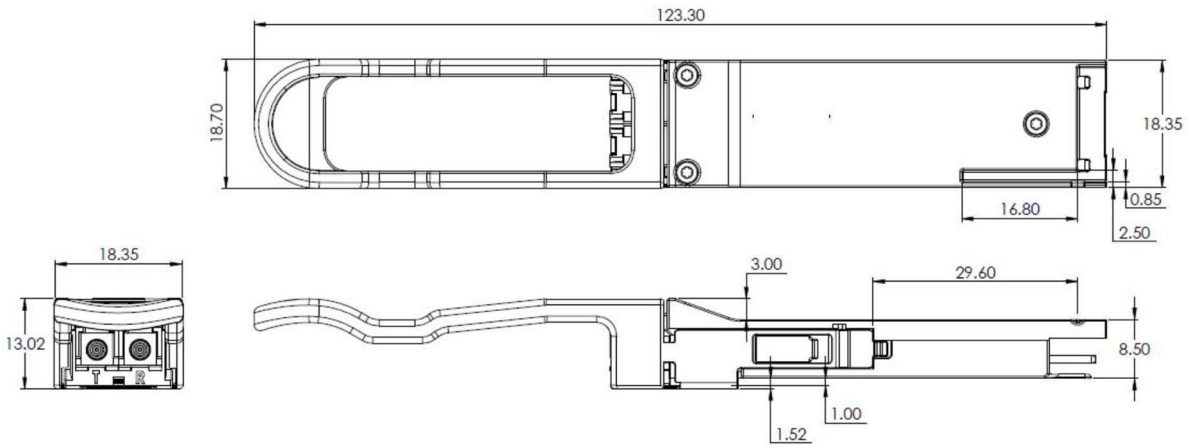


Figure1. QSFP-BIDI-40G mechanical drawing

The QSFP-BIDI-40G mechanical specifications are compliant to the QSFP+ MSA transceiver module specifications..

IX. Pin Description

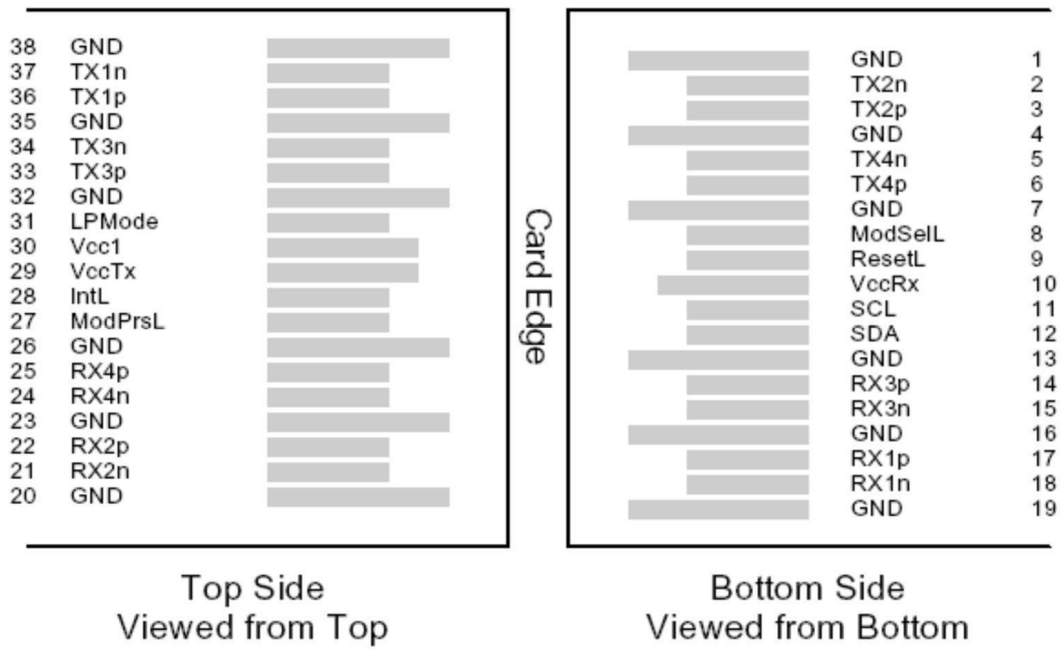


Figure2. QSFP+ MSA-compliant 38-pin connector

Pin	6BSymbol	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	

Pin	6BSymbol	Name/Description	Notes
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
33	Tx3p	Transmitter Non-Inverted Data Input	
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

Notes:

1. Circuit ground is internally isolated from chassis ground.

References:

1. SFF-8436 – Specification for QSFP+ Copper and Optical Transceiver, Rev 4.8, October 2013.

2. SFF-8636 – Common Management Interface, Rev 2.7, January,2016.

3.IEEE 802.3ba – Annex 86A "Parallel Physical Interface (nPPI) for 40GBASE-SR4 and 40GBASE-LR4 (XLPPI) and 100GBASE-SR10 (CPPI)"

4.Directive 2011/65/EU of the European Council Parliament and of the Council, "on the restriction of the use of certain hazardous substances in electrical and electronic equipment," June 8, 2011, which supercedes the previous RoHS Directive 2002/95/EC.

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

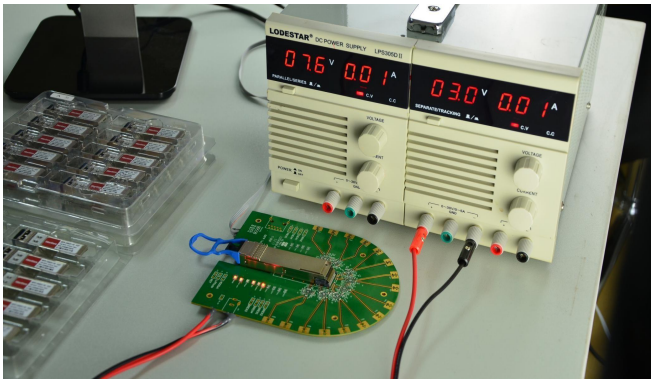
HP 5406R ZL2 V3(J9996A)

AVAYA 7024XLS(7002QQ-MDA)

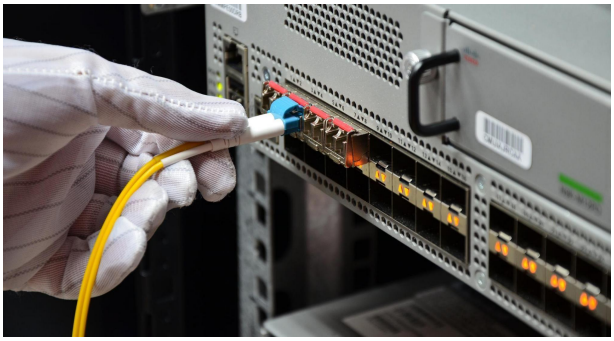
Test Assured Program

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-BIDI-40G	40GBASE-BIDI QSFP+ 850nm 300m LC Transceiver for SMF
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

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.

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