40G QSFP+ SR4 Transceiver

Overview

The Wave2Wave 77-Q010S4 is a high-performance QSFP+ SR4 optical transceiver engineered for short-reach, multi-lane data communication and high-density interconnects. It delivers four parallel lanes of 10.3125Gbps for an aggregated bandwidth of 40Gbps, operating at 850nm over OM3 fiber distances up to 300m.

The module features a 38-contact edge connector and a 12-fiber MTP/MPO optical interface. An onboard EEPROM provides real-time monitoring and configuration access through a standard 2-wire QSFP management interface.



Features and Benefits

- Hot-pluggable QSFP+ MSA module with compact MPO interface
- Four 10.3125Gbps lanes supporting up to 300m reach on OM3 fiber
- Integrated 2-wire Digital Diagnostics Monitoring for real-time insights
- Low-power design operating under 1.5W for high-density deployments
- Wide operating case temperature range: 0°C to +70°C

Applications

- High-density datacenter and telecom interconnects
- 40GBASE-SR4 Ethernet
- InfiniBand SDR, DDR, and QDR systems

Absolute Maximum Rating

Parameter	Symbol	Min	Max	Unit
Storage Temperature	TSTG	-40	+85	ºC
Operating Temperature	Top	0	70	
Operating Relative Humidity	RH	5	85	%
3.3V Power Supply Voltage	Vcc	-0.5	+3.6	V

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	ºC
3.3V Supply Voltage	VCC	3.135	3.3	3.465	V
Data Rate			41.25		Gbps
Receiver Differential Data Output Load			100		Ohms
Logic Input Voltage High	Vih	2		Vcc+ 0.3	V
Logic Input Voltage Low	Vil	-0.3		0.8	V
Two Wire Serial Interface Clock Rate			100	400	KHz
Power Supply Noise				50	mVpp
Fiber Length (OM3 2000MHz*Km)		0.5		300	m

Optical Characteristics (Transmitter)					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Center Wavelengths (range)	λc	840		860	nm
RMS Spectral Width	SW			0.45	nm
Average Power per Lane	TXP	-7.6		1	dBm
Transmit OMA per Lane		-5.6		3	dBm
Difference in Power Between any Two Lanes				4	dB
Extinction Ratio		3			dB
TDP per Lane	TDP			3.5	dB
Launch Power in OMA minus TDP per Lane		-6.5			dBm
Optical Return Loss Tolerance				12	dB
Average Launch Power of OFF Transmitter per Lane				-30	dBm
Relative Intensity Noise				-128	dB/Hz
Transmitter Eye Mask Definition (X1,X2,X3,Y1,Y2,Y3)[1]		10%			IEEE802.3ba

NOTES:

1. Hit ratio = $1x10^{-12}$

Optical Characteristics (Receiver)					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Center Wavelengths	λc	840	850	860	nm
Saturation Power		2.4			dBm
Max Input Power		3.4			dBm
Average Power at Receiver Input per Lane		-9.5		2.4	dBm
Receive Power (OMA) per Lane				3	dBm
Peak Power per Lane				4	dBm
Sensitivity OMA per Lane				-11.1	dBm
Stressed Receiver Sensitivity (OMA) per Lane				-8.5	dBm
Receiver Reflectance				-12	dB
Receiver Jitter Tolerance (OMA) per Lane				-5.4	dBm
Rx_LOS Assert	LOSA	-30			dBm
Rx_LOS De-Assert	LOSD			-12	dBm
LOS Hysteresis		0.5			dB
Rx Output Squelch Function			Yes		
Rx LOS in Signal or RSSI			RSSI		
Laser Status in Reset			Close		

Electrical Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Transceiver Power Consumption				1.5	W	
Transceiver Power Supply Current				475	mA	
Maximum Peak Current				900	mA	
Transceiver Power on Initialization Time	Tini			2000	ms	

Electrical Characteristics (Continued)						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Transmitter per Lane						
Differential Data Input Input Voltage Peak to Peak Swing	Vin.pp	190		70	mV	
Differential Input Impedance	Zind	90	100	110	ohm	AC Coupled Inside Module
AC Common-Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Return Loss			Per IEEE P802.3ba, Section 86A.4.1.1		dB	10 MHz to 11.1 GHz
J2 Jitter Tolerance	Jt2	0.17			UI	
J9 Jitter Tolerance	Jt9	0.29			UI	
Eye Mask Coordinates: (X1, X2, Y1, Y2)			0.11, 0.31, 95, 350		UI MV	Hit ratio = $5x10^{-5}$
Transmitter Eye Mask Definition: (X1, X2, X3, Y1, Y2, Y3)			0.23, 0.34, 0.43, 0.27, 0.35, 0.4		UI	Hit ratio = $5x10^{-5}$
Receiver per Lane						
Differential Data Putput Voltage Peak to Peak Swing	Vopp	300		850	mV	
Differential Output Impedance	Zos	90	100	110	Ohms	AC Coupled Inside Module
Differential Output Return Loss			Per IEEE P802.3ba, Section 86A.4.2.1		dB	10 MHz to 11.1 GHz
J2 Output	Jo2			0.42	UI	
J9 Output	Jo9			0.65	UI	
Eye Mask Definition: (X1, X2, X3, Y1, Y2, Y3)			0.29, 0.5, 150, 425		UI mV	10 Hit ratio = $1x10^{-12}$
						20% to

Digital Diagnostic Function					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Temperature DDM Accuracy	DMI_Temp	-3		+3	ºC
Supply Voltage DDM Accuracy	DMI_VCC	-5%		+5%	V
Rx Power DDM Accuracy	DMI_Rx	-3		+3	dB
Bias Current DDM Accuracy	DMI_Ibias	-10%		+10%	mA
Tx Power DDM Accuracy	DMI_Tx	-3		+3	dB

DDM Alarm & Warning Threshold			
Parameter	**Threshold**	**Description**	**Unit**
Low Temperature Warning	0		ºC
High Temperature Warning	70		ºC
Low Voltage Warning	3.15		V
High Voltage Warning	3.45		V
Low Ibias Warning	1		mA
High Ibias Warning	11		mA
Low Tx Power Warning	-7.6		dBm
High Tx Power Warning	+0.5		dBm
Low Rx Power Warning	-9.9		dBm
High Rx Power Warning	2.4		dBm
Low Temperature Alarm	-10		ºC
High Temperature Alarm	80		ºC
Low Voltage Alarm	3.10		V
High Voltage Alarm	3.50		V
Low Ibias Alarm	1		mA
High Ibias Alarm	11		mA
Low Tx Power Alarm	-10.6		dBm
High Tx Power Alarm	+3.5		dBm
Low Rx Power Alarm	-12.9		dBm
High Rx Power Alarm	3.4		dBm

Pin-Out Definition

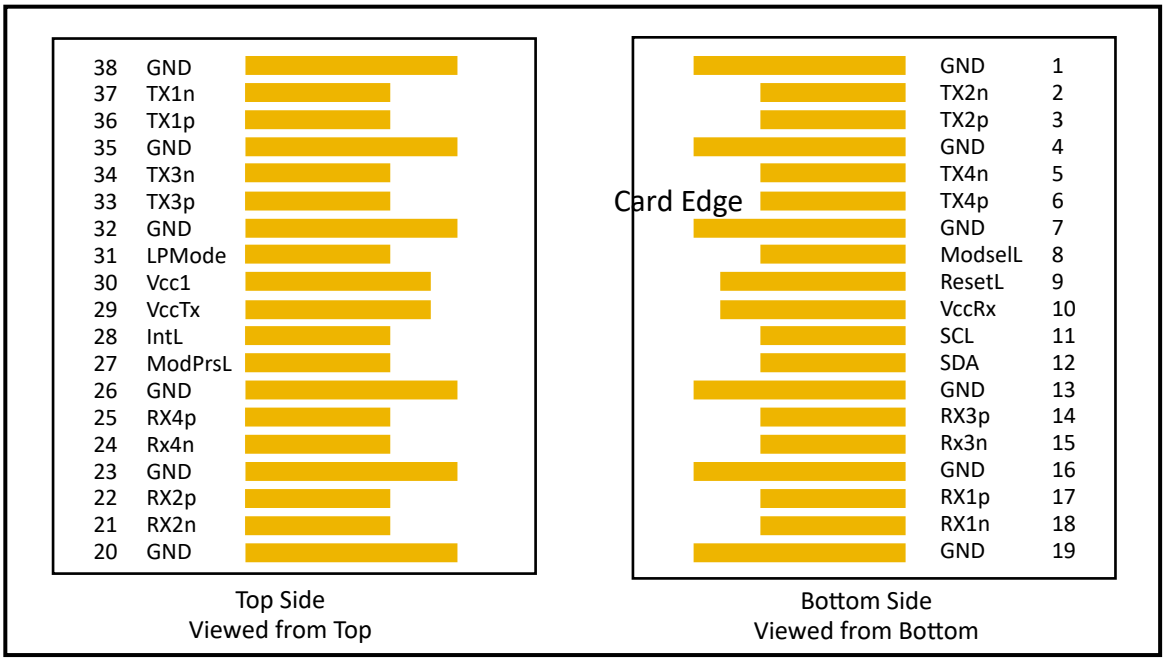


Figure 1. QSFP+ MSA-compliant 38-pin connector

Pin Description			
Pin	**Name**	**Description**	**Notes**
1	GND	Module Ground	Note 1
2	Tx2n	Transmitter inverted data input	
3	Tx2p	Transmitter non-inverted data input	
4	GND	Module Ground	Note 1
5	Tx4n	Transmitter inverted data input	
6	Tx4p	Transmitter non-inverted data input	
7	GND	Module Ground	
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	+3.3V Power Supply Receiver	Note 2
11	SCL	2-Wire serial interface clock	
12	SDA	2-Wire serial interface data	
13	GND	Module Ground	
14	Rx3p	Receiver non-inverted data output	
15	Rx3n	Receiver inverted data output	
16	GND	Module Ground	Note 1
17	Rx1p	Receiver non-inverted data output	
18	Rx1n	Receiver inverted data output	Note 1
19	GND	Module Ground	Note 1
20	GND	Module Ground	
21	Rx2n	Receiver inverted data output	
22	Rx2p	Receiver non-inverted data output	
23	GND	Module Ground	
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Module Ground	Note 1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	VccTx	+3.3V Power Supply Transmitter	Note 2
30	Vcc1	+3.3V Power Supply	Note 2
31	LPMode	Low Power Mode	
32	GND	Module Ground	Note 1
33	Tx3p	Transmitter non-inverted data output	
34	Tx3n	Transmitter inverted data output	
35	GND	Module Ground	Note 1
36	Tx1p	Transmitter non-inverted data input	
37	Tx1n	Transmitter inverted data input	
38	GND	Module Ground	Note 1

NOTES:

1. GND is the symbol for signal and supply (power) common for the QSFP+ module. All the 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.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 7. Vcc Rx Vcc1 and VccTx may be internally connected within the QSFP+ module in any combination. The connector pins are each rated for a maximum current of 500 mA.

Optical Interface

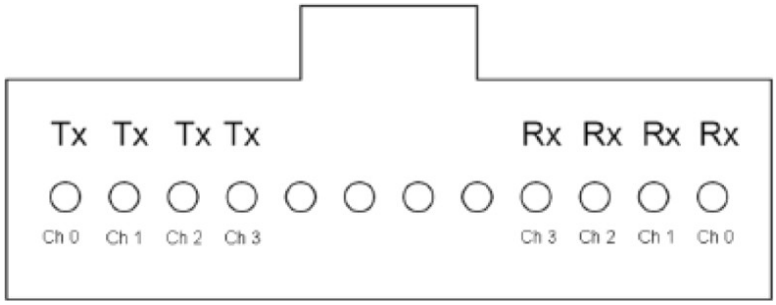


Figure 2. Optical lane assignment (front view of MPO receptacle)

The 4 transmit and 4 receive optical lanes of the SR4 transceiver take the ordered positions as depicted in 12-fiber MPO channel assignment picture shown in Figure 2.

Standards Compliance

- IEEE 802.3ba 40GBASE-SR4
- SFF-8436 QSFP Specification
- Infiniband QDR Specification
- RoHS-6

1017 El Camino Real, Unit 448 Redwood City CA 94063 | info@wave2wave.io | +1 (866) 473-2701 | wave2wave.io
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