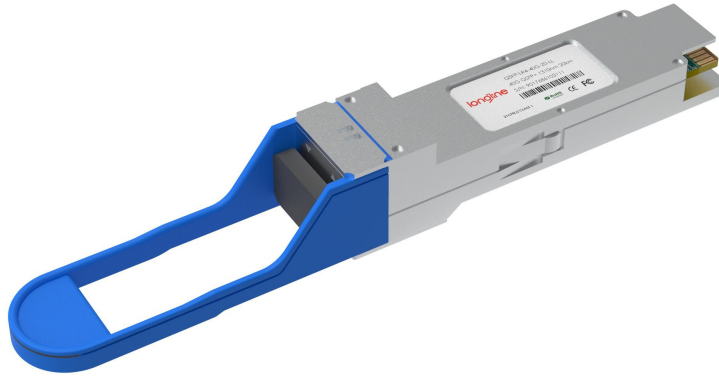


40GBASE-LR4 QSFP+ 1310nm 20km LC DOM Transceiver

QSFP-LR4-40G-20-LL



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	°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	°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

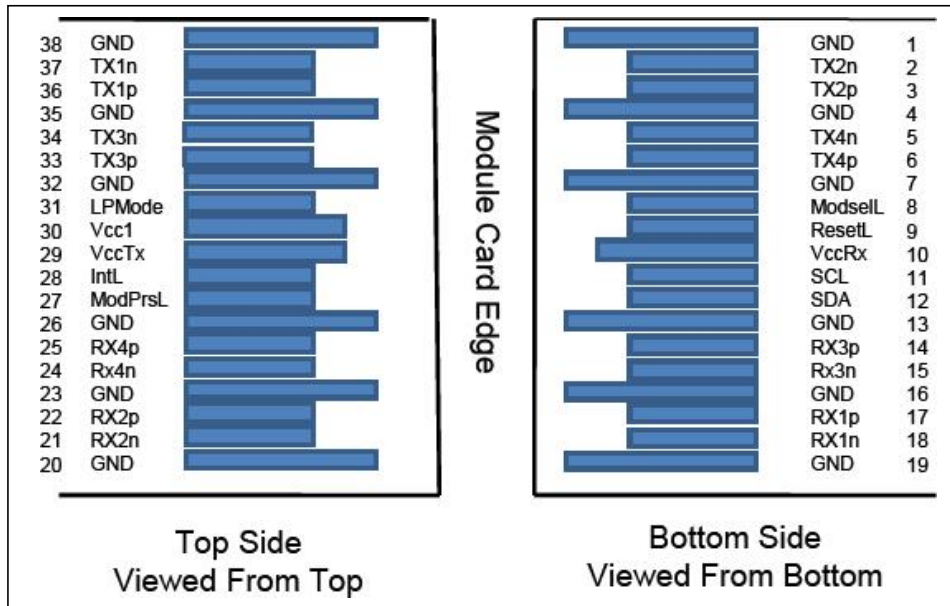


Figure 1 - QSFP+ Module Pad Layout

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.

VIII. Diagram Mechanical Drawing

The mechanical specifications are compliant to the QSFP+ MSA transceiver module specifications.

