

# PRODUCT SPECIFICATION

<b>Part No.:</b>	<b>QSFP+ 40G LR4 SMF 20km</b>	
<b>Description:</b>	40G QSFP+ Transceiver, SMF 1271/1291/1311/1331nm 20km	
<b>Release Date</b>	<b>Rev.</b>	<b>Revision Change Description</b>
<b>2017/06/07</b>	<b>A0</b>	New Release
<b>2020/12/28</b>	<b>A1</b>	Template Update

## Features

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- ✧ Transmission data rate up to 11.2Gbps per channel
- ✧ Digital Diagnostics Monitoring Interface
- ✧ Hot-pluggable QSFP+ form factor
- ✧ Aggregate Bandwidth of up to 44.0G
- ✧ 4 Parallel lanes design
- ✧ Commercial operating case temperature range: 0~70°C
- ✧ RoHS-6 Compliant
- ✧ Maximum power consumption 3.5W
- ✧ Single +3.3V power supply
- ✧ Up to 20km transmission on single mode fiber (SMF)
- ✧ Duplex LC Receptacle

## Application

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- ✧ 40GBASE-LR4 40G Ethernet links
- ✧ Infiniband QDR, DDR and SDR
- ✧ Datacenter and Enterprise networking

## Standard

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- ✧ Compliant to IEEE 802.3ba
- ✧ Compliant with QSFP+ MSA
- ✧ Compliant to SFF-8436

## Specification:

### ● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T <sub>s</sub>	-40		+85	°C
Supply Voltage	V <sub>CC,T,R</sub>	-0.5		4	V
Relative Humidity	RH	0		85	%

### ● Recommended Operating Environment:

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	T <sub>c</sub>	0		+70	°C
Supply Voltage	V <sub>CCT,R</sub>	+3.13	3.3	+3.47	V
Supply Current	I <sub>CC</sub>			1000	mA
Power Dissipation	PD			3.5	W

### ● Electrical Characteristics (T<sub>OP</sub> = 0 to 70 °C, V<sub>CC</sub> = 3.13 to 3.47 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Data Rate per Channel		-	10.3125	11.2	Gbps	
Power Consumption		-	2.5	3.5	W	
Supply Current	I <sub>CC</sub>		0.75	1.0	A	
Control I/O Voltage-High	V <sub>IH</sub>	2.0		V <sub>CC</sub>	V	
Control I/O Voltage-Low	V <sub>IL</sub>	0		0.7	V	
Inter-Channel Skew	TSK			150	Ps	
RESETL Duration			10		Us	
RESETL De-assert time				100	ms	
Power On Time				100	ms	
<b>Transmitter</b>						
Single Ended Output Voltage Tolerance		0.3		4	V	1
Common mode Voltage Tolerance		15			mV	
Transmit Input Diff Voltage	V <sub>I</sub>	150		1200	mV	
Transmit Input Diff Impedance	Z <sub>IN</sub>	85	100	115		
Data Dependent Input Jitter	DDJ		0.3		UI	
<b>Receiver</b>						
Single Ended Output Voltage Tolerance		0.3		4	V	
Rx Output Diff Voltage	V <sub>O</sub>	370	600	950	mV	
Rx Output Rise and Fall Voltage	Tr/Tf			35	ps	1
Total Jitter	TJ		0.3		UI	

Note:

1. 20~80%

● Optical Parameters(TOP = 0 to 70 °C, VCC = 3.0 to 3.6 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
<b>Transmitter</b>						
Wavelength Assignment	L0	1264.5	1271	1277.5	nm	
	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
	L3	1324.5	1331	1337.5	nm	
Side-mode Suppression Ratio	SMSR	30	-	-	dB	
Total Average Launch Power	PT	-	-	6	dBm	
Average Launch Power, each Lane		-5	-	2.3	dBm	
Difference in Launch Power between any two Lanes (OMA)		-	-	4	dB	
Optical Modulation Amplitude, each Lane	OMA	-4		+2.5	dBm	
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-4.8	-		dBm	
TDP, each Lane	TDP			2.3	dB	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				
Optical Return Loss Tolerance		-	-	20	dB	
Average Launch Power OFF Transmitter, each Lane	Poff			-30	dBm	
Relative Intensity Noise	Rin			-128	dB/HZ	1
Optical Return Loss Tolerance		-	-	12	dB	
<b>Receiver</b>						
Damage Threshold	THd	3.3			dBm	1
Average Power at Receiver Input, each Lane	R	-15		0	dBm	
Receive Electrical 3 dB upper Cut off Frequency, each Lane				12.3	GHz	
RSSI Accuracy		-2		2	dB	
Receiver Reflectance	Rrx			-26	dB	
Receiver Power (OMA), each Lane		-	-	3.5	dBm	
Receive Electrical 3 dB upper Cutoff Frequency, each Lane				12.3	GHz	
LOS De-Assert	LOS <sub>D</sub>			-15	dBm	
LOS Assert	LOS <sub>A</sub>	-25			dBm	
LOS Hysteresis	LOS <sub>H</sub>	0.5			dB	

Note

1. 12dB Reflection

Notes:

1. The maximum transmitter average optical power of 1.5 dBm is well within the guardband of receiver overload specifications of commercially available 10GBASE-LR SFP+ transceivers offered by InnoLight and other vendors.
2. Even if the TDP < 1 dB, the OMA min must exceed the minimum value specified here.
3. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.

### Pin Definition

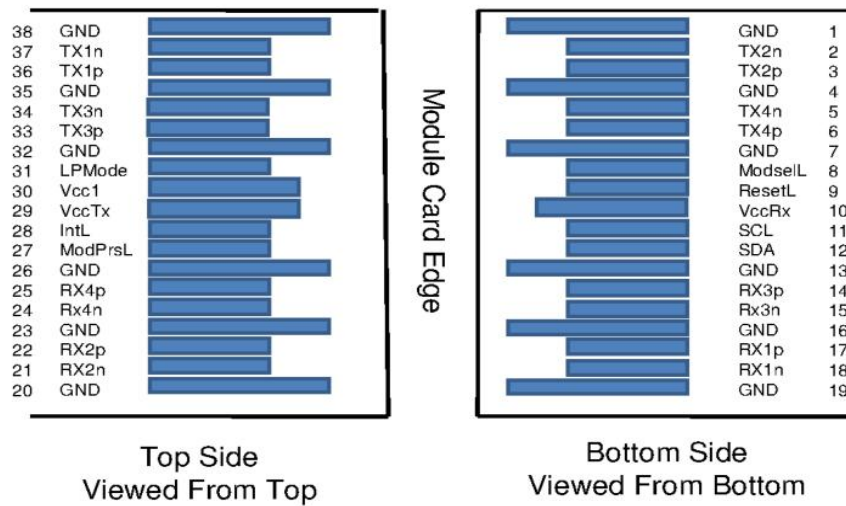


Figure1 QSFP MSA-compliant 38-pin connector

Pin	Symbol	Name/Description	Notes
1	GND	Transmitter Ground (Common with Receiver 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	2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	
14	RX3P	Transmitter Inverted Data Input	
15	RX3N	Transmitter Non-Inverted Data Input	
16	GND	Ground	1
17	RX1P	Transmitter Inverted Data Input	
18	RX1N	Transmitter Non-Inverted Data Input	
19	GND	Ground	1
20	GND	Ground	1
21	RX2N	Transmitter Inverted Data Input	
22	RX2P	Transmitter Non-Inverted Data Input	
23	GND	Ground	1
24	RX4N	Transmitter Inverted Data Input	1
25	RX4P	Transmitter Non-Inverted Data Input	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3 V Power supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	TX3P	Transmitter Inverted Data Input	
34	TX3N	Transmitter Non-Inverted Data Input	
35	GND	Ground	1
36	TX1P	Transmitter Inverted Data Input	
37	TX1N	Transmitter Non-Inverted Data Input	
38	GND	Ground	1

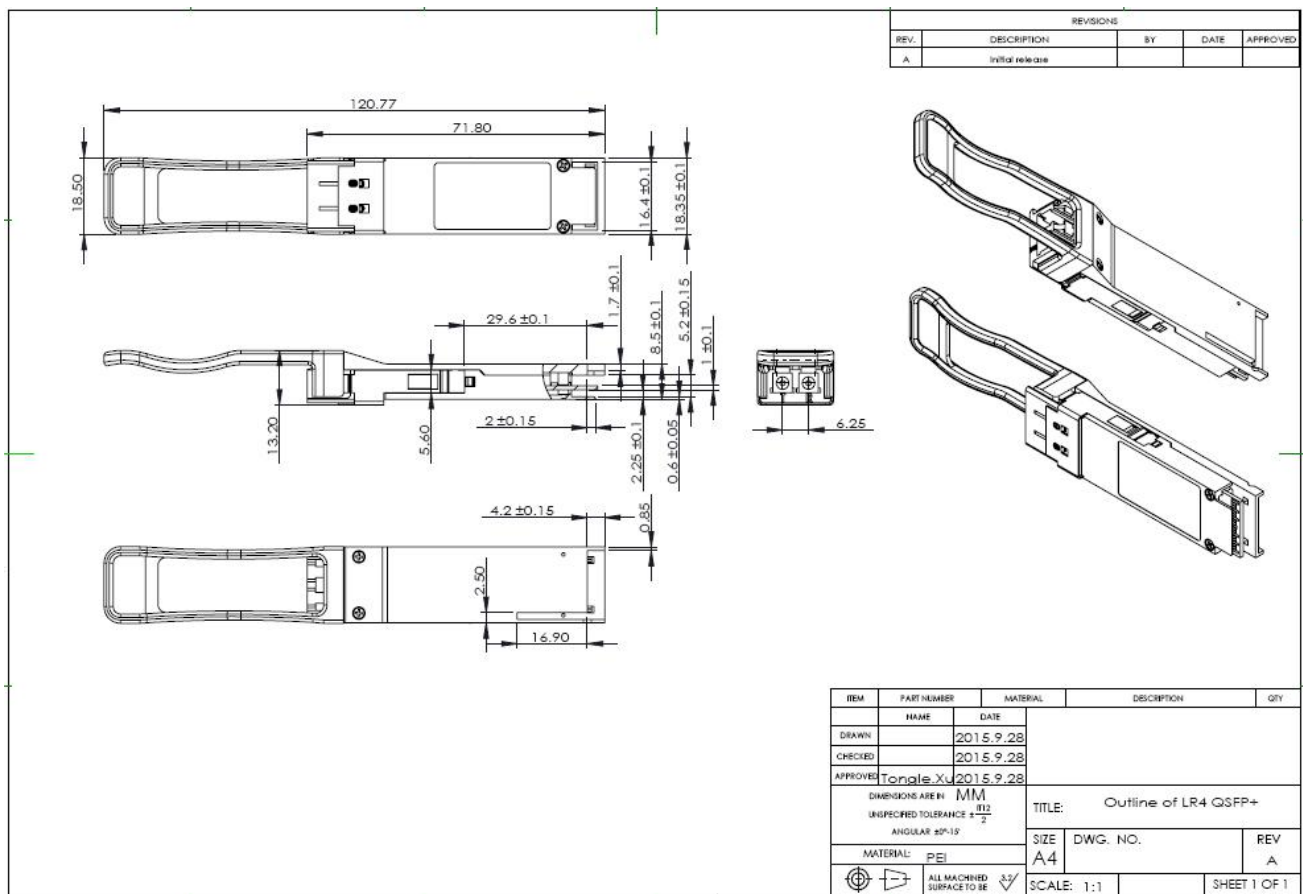
**Table 1: QSFP Module PIN Definition**

**Notes:**

1. GND is the symbol for signal and supply (power) common for QSFP+ modules. 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.
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 3 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP+ transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

# Package Outline

Dimensions are in millimeters. All dimensions are  $\pm 0.2\text{mm}$  unless otherwise specified. (Unit: mm)



# Regulatory Compliance

Feature	Test	Method
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000Vfor other pins.)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2(>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Comply with standard
Immunity	IEC61000-4-3	Comply with standard
Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compatible with Class I laser Product

## Ordering information

Part. No	Specifications								
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (°C)	Reach (km)	DDM
QSFP+ 40G LR4 SMF 20km	QSFP+	41.25G, 10.31G Per channel	DFB 1271/ 1291/ 1311/ 1331	-5~2.3	PIN	<-15	0~70	20	Y