

LQP40-LR4

QSFP+40Gb/s LR4 10kmWith DDM

PRODUCT FEATURES

- Supports 41.2 Gb/s aggregate bitrates
- Uncooled 4x10Gb/s transmitter
- Maximum link length of 10km on Single Mode Fiber (SMF)
- Hot-pluggable QSFP+ footprint
- Duplex LC receptacles
- Power dissipation<3.5W
- RoHS-6 compliant and lead-free
- Single 3.3V power supply
- Support Digital Diagnostic Monitor interface
- Case operating temperature

Commercial: 0°C to +70°C



APPLICATIONS

- 40GBASE-LR4Ethernet

Compliance

- QSFP+ MSA.
- IEEE802.3ba
- SFF-8436
- RoHS

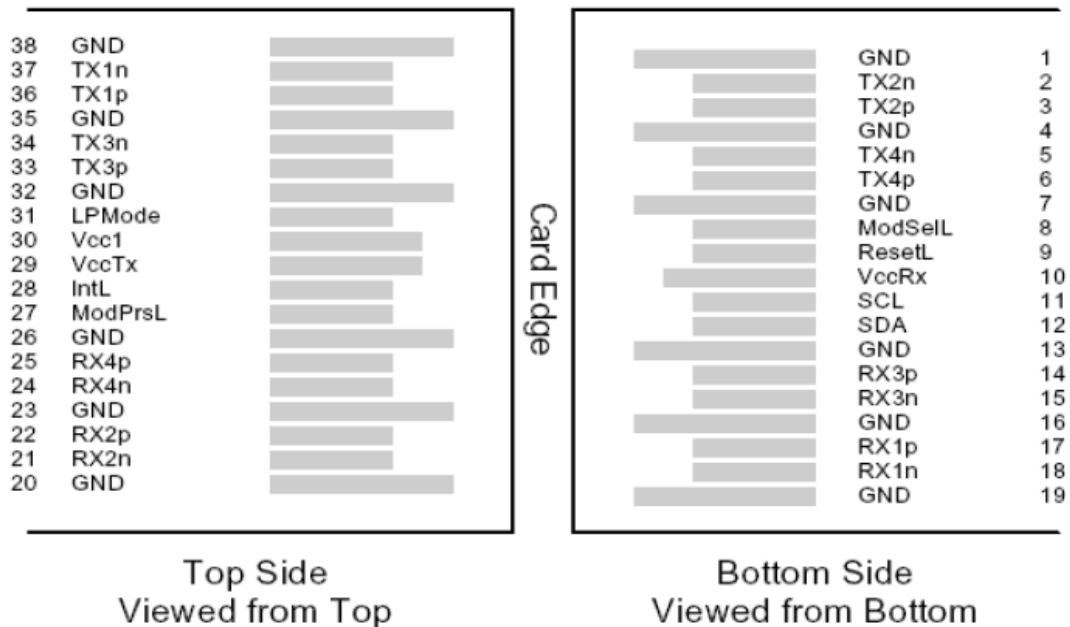
PRODUCT DESCRIPTION

LQP40-LR4 QSFP+ transceiver modules are designed for use in 40 Gigabit Ethernet links over single mode fiber. They are compliant with the QSFP+ MSA and IEEE 802.3ba 40GBASE-LR4. Module-level digital diagnostic 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.

Ordering information

Package	Product part NO.	Data Rate(Gbps)	Media	Wavelength(nm)	Transmission Distance(km)	Temperature Range (°C)	
QSFP+	LQP40-LR4	41.2	single-mode fiber	1271nm, 1291nm 1311nm, 1331nm	10	0~70	Commercial

I. Pin Diagram



QSFP+ MSA-compliant 38-pin connector

II. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
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	ModSe1L	Module Select	
Pin	Symbol	Name/Description	Ref.
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V 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	VccTx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V 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

Note:

1. Circuit ground is internally isolated from chassis ground.

III. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Storage Temperature	T _s	-40		85	°C	
Storage Ambient Relative Humidity	H _A	0		85	%	
Maximum Supply Voltage	V _{cc1} , V _{ccTx} , V _{ccRx}	-0.5		3.6	V	
Signal Input Voltage		-0.3		V _{cc} +0.3	V	
Receiver Damage Threshold		+3.4			dBm	
Lead Soldering Temperature/Time	TSOLD			260/10	°C/sec	1
Lead Soldering Temperature/Time	TSOLD			360/10	°C/sec	2

Note:

1. Suitable for wave soldering.
2. Only for soldering by iron.

IV. General Product Characteristics

Parameter	Value	Unit	Ref.
Module Form Factor	QSFP+		
Number of Lanes	4 Tx and 4 Rx		
Maximum Aggregate Data Rate	41.2	Gb/s	
Maximum Data Rate per Lane	10.3125	Gb/s	Higher bit rates may be supported. Please contact Lightrend
Protocols Supported	Typical applications include 40G Ethernet		
Management Interface	Serial, I2c-based, 400kHz maximum frequency		As defined by the QSFP+ MSA

Data Rate Specifications	Symbol	Min.	Typ.	Max.	Unit	Ref.
Bit Rate per Lane	BR			10313	Mb/s	1
Bit Error Ratio	BER			10 ⁻¹²		2
Link distance on SMF-28	d			10	km	3

Notes:

1. Compliant with 40GBASE-LR4 and XLPPI per IEEE 802.3ba. 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-LR4, IEEE 802.3ba.

V. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Transmitter						
Total Average Launch Power	P_{OUT}			8.3	dBm	
Average Output Power per lane	P_{OUT}	-7		2.3	dBm	
Transmit OMA per Lane	$TxOMA$	-4.0		3.5	dBm	1
Extinction Ratio	ER	3.5			dB	
Center Wavelength	λ_C	1264.5	1271	1277.5	nm	
		1284.5	1291	1297.5		
		1304.5	1311	1317.5		
		1324.5	1331	1337.5		
Sidemode Suppression ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			3.5	dB	
Transmitter OFF Output Power	P_{Off}			-30	dBm	
Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3}		0.25,0.4,0.45,0.25,0.28,0.4				

Receiver						
Input Optical Wavelength	λ_{IN}	1264.5	1271	1277.5	nm	
		1284.5	1291	1297.5		
		1304.5	1311	1317.5		

		1324.5	1331	1337.5		
Rx Sensitivity per lane	R _{SENS1}			-11.5	dBm	
Rx Sensitivity(OMA)	R _{SENS2}			-9.6	dBm	
Input Saturation Power (Overload)	PSAT			+3.4	dBm	
Receiver Reflectance	R _{fl}			-12	dBm	
Loss of Signal Assert	P _A	-30			dBm	
Loss of Signal De-assert	P _D			-12.5	dBm	
LOS Hysteresis	P _D - P _A	0.5		6	dB	

Note:

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

VI. Memory Map and Control Registers

Compatible with SFF-8436 Rev. 4.8 (QSFP+).

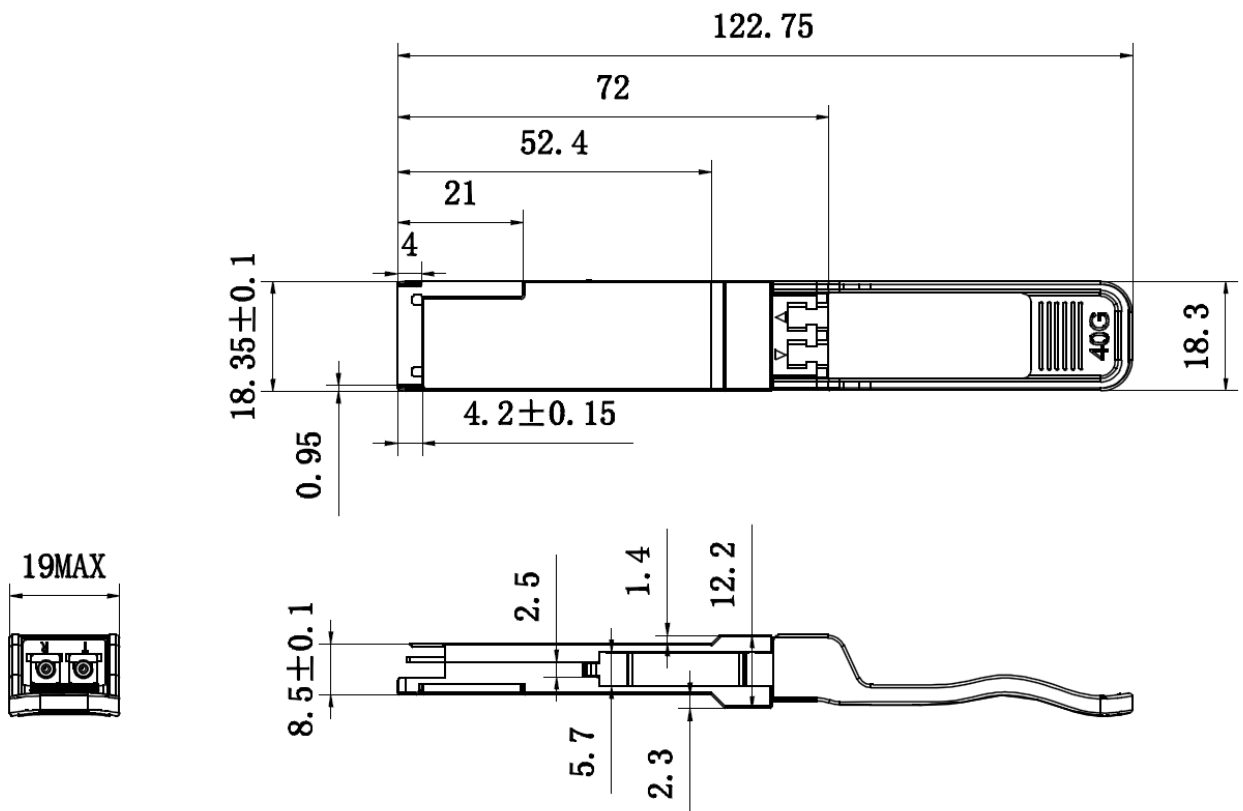
VII. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Supply Voltage	V _{CC1} , V _{CCTx} , V _{CCRx}	3.15		3.45	V	
Supply Current	I _{CC}			1000	mA	
Transmitter						
Input different impedance	R _{in}	90	100	110	Ω	2
Single ended data input swing	V _{in,pp}	120		820	mV	
Transmitter Disable Voltage	V _{DIS}	2		V _{CC}	V	3
Transmitter Enable Voltage	V _{EN}	0		0.8	V	
Receiver						
Output different impedance	R _{out}	90	100	110	Ω	2
Single ended data output swing	V _{out,pp}	340		850	mV	4
LOS Asserted	V _{LOSA}	2		V _{CCHOST}	V	5
LOS De-asserted	V _{LOSD}	0		0.8	V	5
Power Supply Rejection	PSR	50			mVpp	

Note :

1. Maximum total power value is specified across the full temperature and voltage range.
2. Connected directly to TX data input pins. AC coupled thereafter.
3. Or open circuit.
4. Into 100Ω differential termination.
5. Loss Of Signal is LVTTTL. Logic “0” indicates normal operation; logic “1” indicates no signal detected.

VIII. Mechanical Specifications (Unit: mm)



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IX. Regulatory Compliance

LQP40-LR4 transceiver are RoHS-6 Compliant.

LQP40-LR4 transceiver modules are Class 1 laser eye safety compliant per IEC 60825-1, which means that they are eye safe under normal “unaided” viewing conditions. Laser radiation may be hazardous if viewed with magnifying optics.

Revision History

Version No.	Date	Description
1.0	June 24, 2019	Preliminary datasheet