LQP40-LR4

QSFP+ 40Gb/s LR4 10km With 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-LR4 Ethernet

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 I^2C interface, as specified by the QSFP+ MSA.

Ordering information

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

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Storage Temperature	T_S	-40		85	ºC	
Storage Ambient Relative Humidity	H_A	0		85	%	
Maximum Supply Voltage	$V_{CC}1$, $V_{CC}T_X$, $V_{CC}R_X$	-0.5		3.6	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		+3.4			dBm	
Lead Soldering Temperature/Time	TSOLD			260/10	ºC/sec	1
Lead Soldering Temperature/Time	TSOLD			360/10	ºC/sec	2

Note:

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

II. 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 Spcifications	Symbol	Min.	Typ.	Max.	Unit	Ref.
Bit Rate per Lane	BR			10313	Mb/s	1
Bit Error Ratiio	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.

III. 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	λC	1264.5 1284.5 1304.5 1324.5	1271 1291 1311 1331	1277.5 1297.5 1317.5 1337.5	nm	
Sidemode Suppression ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			3.5	dB	
Transmitter OFF Output Power	POff			-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 1284.5 1304.5 1324.5	1271 1291 1311 1331	1277.5 1297.5 1317.5 1337.5	nm	
Rx Sensitivity per lane	R_{SENS1}			-11.5	dBm	
Rx Sensitivity(OMA)	R_{SENS2}			-9.6	dBm	
InputSaturation Power (Overload)	PSAT			+3.4	dBm	
Receiver Reflectance	Rfl			-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.

IV. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Supply Voltage	$V_{CC}1$, $V_{CC}T_X$, $V_{CC}R_X$	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	Vin,pp	120		820	mV	
Transmitter Disable Voltage	VDIS	2		V_{CC}	V	3
Transmitter Enable Voltage	VEN	0		0.8	V	
Receiver						
Output different impedance	R_{out}	90	100	110	Ω	2
Single ended data output swing	Vout,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.

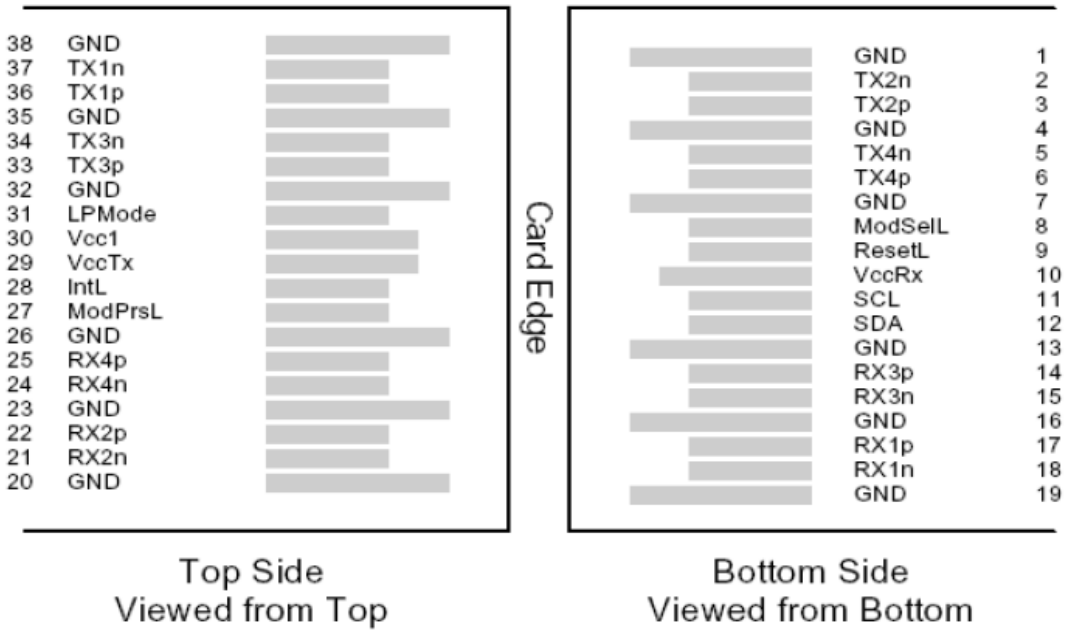
2.Connected directly to TX data input pins. AC coupled thereafter.

3.Or open circuit.

4.Into 100Ωdifferential termination.

5.LossOf Signal is LVTTL. Logic “0”indicates normal operation; logic “1” indicates no signal detected.

V. Pin Diagram



QSFP+ MSA-compliant 38-pin connector

VI. Pin Descriptions

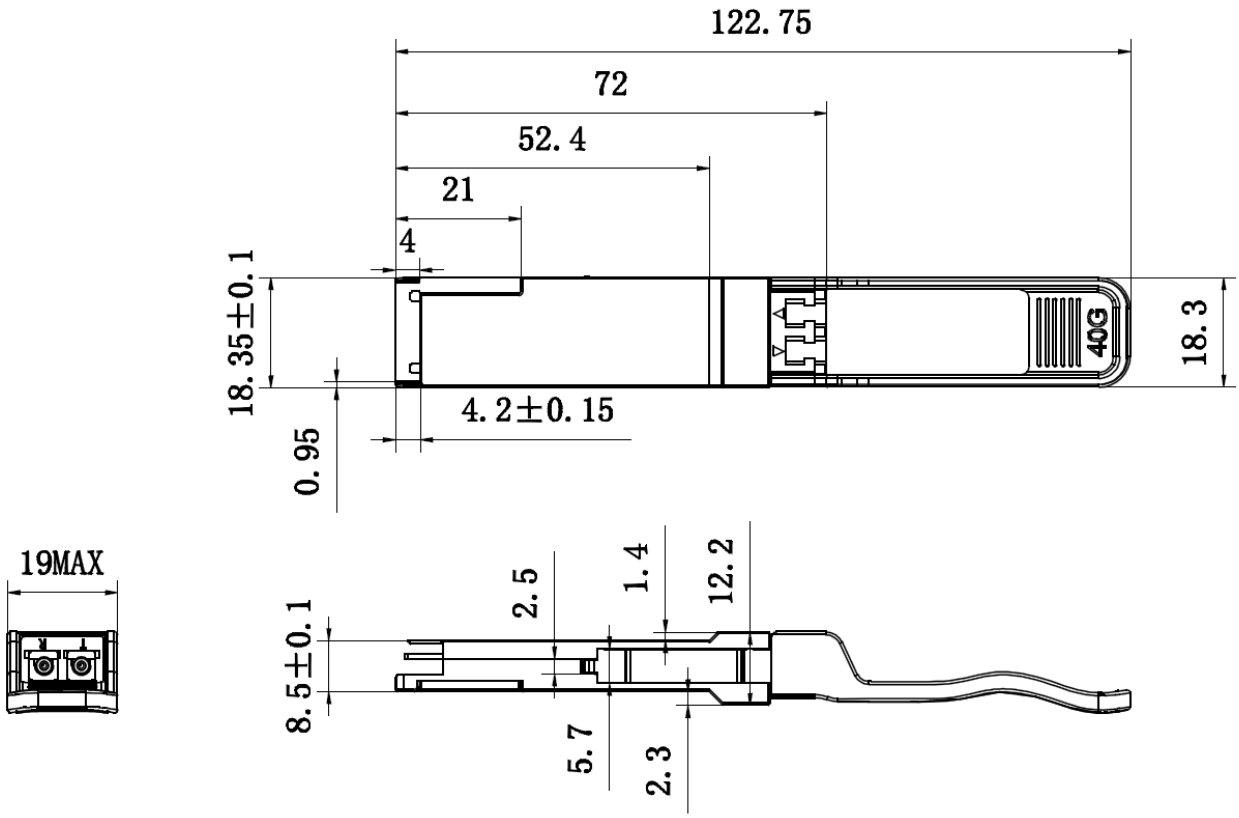
Pin	Symbol	Name/Description	Ref.
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSe1L	Module Select	
9	ResetL	Module Reset	

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.

VII. Mechanical Specifications(Unit: mm)



Revision History

Version No.	Date	Description
1.0	June 24, 2020	Preliminary datasheet