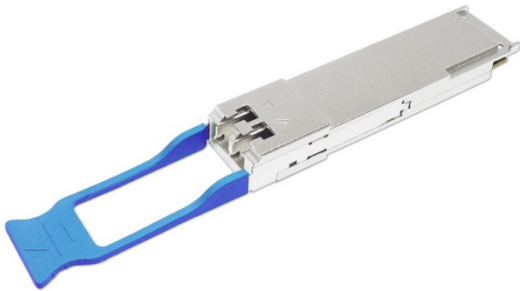




RoHS compliant
CL-QSFP+_LX4
40Gb/s 10km QSFP+ Transceiver
Hot Pluggable, Duplex LC Connector, Single mode

Features



- QSFP+ MSA compliant
- Supports 41.2 Gb/s aggregate bit rate
- 4x10Gb/s electrical interface
- Up to 10km on SMF and 300m on MMF(OM3)
- Hot-pluggable QSFP+ footprint
- LC duplex connector
- Maximum power consumption 3.5 Watts
- Single 3.3V power supply
- Support Digital Diagnostic Monitor interface
- Case operating temperature: -5° C to 70° C

Applications

- 40GBASE-LX4 Ethernet Links
- Infiniband QDR and DDR interconnects
- Client-side 40G datacom connections

Compliance

- QSFP+ MSA
- SFF-8436
- IEEE802.3
- RoHS 2.0

Ordering Information

PART NUMBER	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
CL-QSFP+_LX4	AC/AC	TTL	3.3V	-5°C to 70 °C
CL-QSFP+_LX4i	AC/AC	TTL	3.3V	-40°C to 85 °C

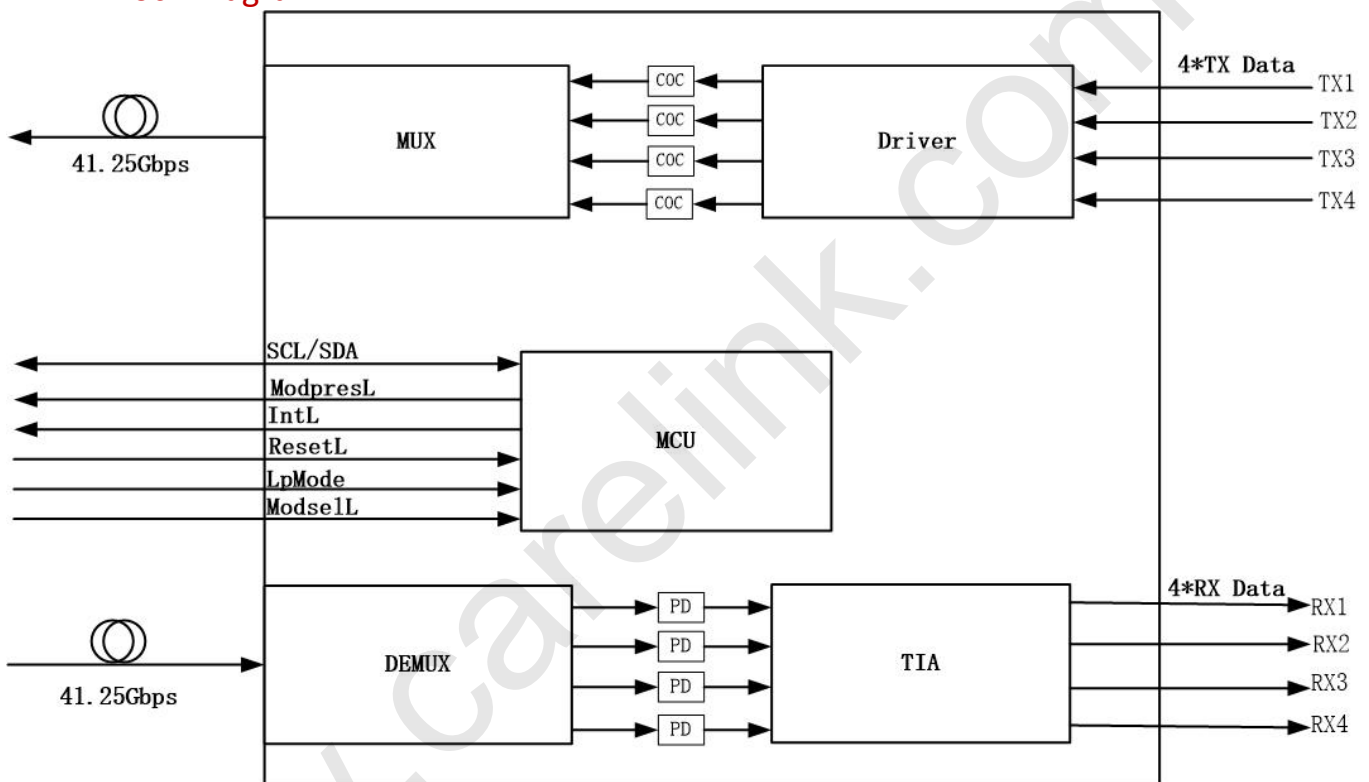


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Description

QSFP+ is designed for 10km on SMF and 0.3km on MMF(OM3) optical communication applications. This module contains 4-lane DFB optical transmitter, 4-lane optical receiver and module management block including 2 wire serial interfaces. The optical signals are multiplexed to a single-mode fiber through an industry standard LC connector.

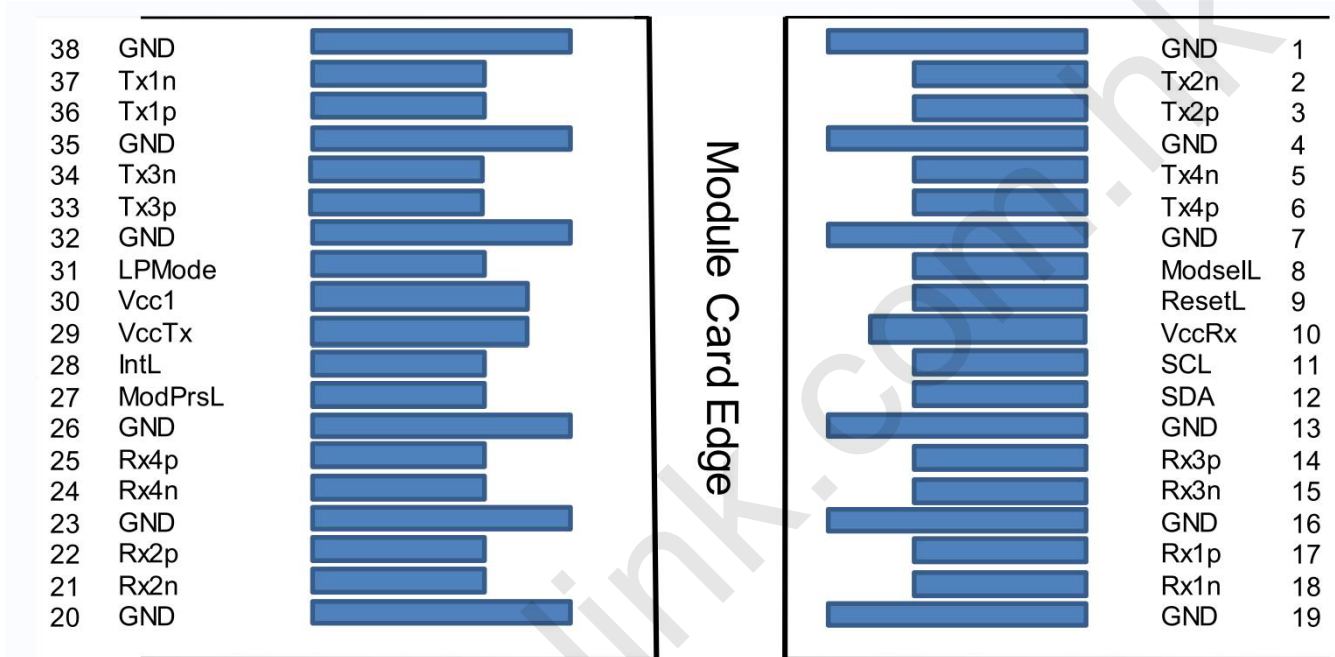
1. Block Diagram





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2. Pin Diagram



3. Pin Descriptions

Pin	Symbol	Name/Description	Notes
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



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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.

4. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Typical	Max	Unit	Note
Maximum Supply Voltage	V _{cc}	0		3.6	V	
Storage Temperature	T _s	-40		85	°C	
Relative Humidity	RH	5		85	%	
Damage threshold, per lane	P _{dam}	4			dBm	



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5. Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Note
Operating Case Temperature	T_{case}	-5		70	°C	
Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Relative Humidity	R_H	5		85	%	
Data Rate (Optical)	DR_O		4*10.3125		Gbps	
Data Rate (Electrical)	DR_E		4*10.3125		Gbps	
Operating Link Distance			SMF:10 MMF:0.3@OM3		km	

6. Electrical Characteristics

40GBASE-LX4 Operation (EOL, TOP = 0 ~ 70°C, V_{CC} = 3.135 to 3.465V)

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Dissipation				3.5	W	
Supply Current	I_{CC}			1.01	A	
Transmitter						
Data Rate, each lane			10.3125		Gbps	
Differential Voltage pk-pk	V_{pp}	300		850	mV	
Input differential impedance	R_{in}		100		Ohm	1
Differential Termination Resistance Mismatch				10	%	
Receiver						
Data Rate, each lane			10.3125		Gbps	
Output differential impedance	R_{out}		100		Ohm	1
Differential Termination Resistance Mismatch				10	%	
Differential output voltage	$V_{out, pp}$	260		850	mV	2

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Into 100Ω differential termination.



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7. Optical Characteristics

40GBASE-LX4 Operation (EOL, TOP = 0 ~ 70°C, V_{cc} = 3.135 to 3.465V)

Parameters	Symbol	Min	Typical	max	Unit	Notes
Transmitter						
Signal Speed per Lane	BR	10.3125 ± 100 ppm			Gb/s	
Transmit wavelength	λ	1264.5	1271	1277.5	nm	
		1284.5	1291	1297.5	nm	
		1304.5	1311	1317.5	nm	
		1324.5	1331	1337.5	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power for SMF	P _{total}			8.3	dBm	
Total Average Launch Power for MMF				9.5	dBm	
Average launch power per lane for SMF	P _{out}	-7		2.3	dBm	
Average launch power per lane for MMF		-5.0		3.5	dBm	
Transmit OMA per Lane for SMF	T _{XOMA}	-4.0		3.5	dBm	
Transmit OMA per Lane for MMF		-4.0		4.5	dBm	
Launch power OFF per lane	P _{Off}			-30	dBm	
Transmitter and Dispersion Penalty (TDP), each lane	TDP			2.6	dB	
Extinction Ratio (ER)	ER	3.5			dB	
Transmitter eye mask definition {X1,X2, X3, Y1, Y2, Y3}		{0.23, 0.34, 0.43, 0.27, 0.35, 0.4}				1
Mask margin		10			%	1
Receiver						
Signaling Speed per Lane	BR	10.3125 ± 100 ppm			Gb/s	
Receive wavelength	λ	1264.5	1271	1277.5	nm	
		1284.5	1291	1297.5	nm	
		1304.5	1311	1317.5	nm	
		1324.5	1331	1337.5	nm	
Damage threshold, each lane	P _{max}			3.3	dBm	
Average receive power per lane for SMF		-13.7		2.3	dBm	
Average receive power per lane for MMF		-10.5		3.5	dBm	
Rx Sensitivity (OMA) per lane for SMF	R _{SEN}			-11.5	dBm	
Rx Sensitivity (OMA) per lane for MMF				-10.5	dBm	
Receiver reflectance	R _{fl}			-26	dB	
LOS Assert	LosA	-30			dBm	
LOS De-Assert	LosD			-12.5	dBm	
LOS Hysteresis	LosH	0.5		6	dB	

Note:

1. Hit ratio 5 x 10⁻⁵.



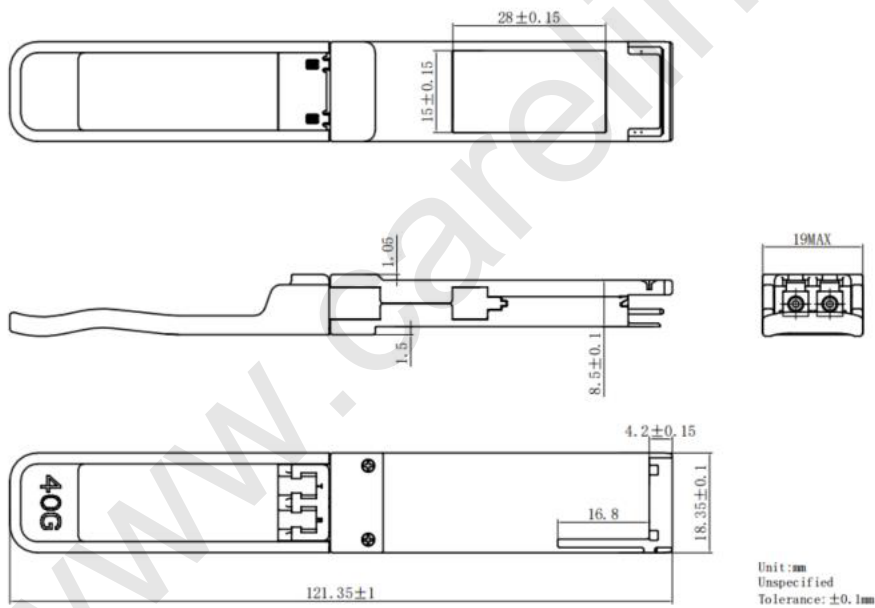
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8. Digital Diagnostic Monitoring Functions

QSFP+ support the I²C-based Diagnostic Monitoring Interface (DMI) defined in document SFF-8436. The host can access real-time performance of transmitter and receiver optical power, temperature, supply voltage and bias current.

Parameter	Accuracy	Unit
Case Temperature	±3	°C
Supply Voltage	±3%	V
Tx Bias Current	±10%	mA
Tx Optical Power	±3	dB
Rx Optical Power	±3	dB

9. Mechanical Specifications





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10.Regulatory Compliance

Feature	Reference	Performance
EMC	EN61000-3	Compatible with standards
Electrostatic Discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, EC/EN 60825-2	Class 1 laser product
Component Recognition	IEC/EN 60950, L 60950	Compatible with standards
RoHS 2.0	2002/95/EC	Compatible with standards

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