40G-QSFP-LR4

40GBASE-LR4 10km QSFP+ Optical Transceiver with DDM

PRODUCT FEATURES

40G-QSFP-LR4

- QSFP+ MSA compliant
- 4x10Gb/s electrical interface
- Supports 41.2Gb/s aggregate bit rate
- Up to 10km transmission on single mode fiber
- LC duplex connector
- Hot-pluggable QSFP+ footprint
- 4-lane DFB and 4-lane PIN
- Commercial case temperature: 0 ℃o 70℃
- Single 3.3V power supply
- Maximum power consumption 3.5 Watts
- RoHS compliant

APPLICATIONS

- 40GBASE-LR4 Ethernet
- Data Center Interconnect

COMPLIANCE

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

Ordering information

Part Number	Data Rate (Gb/s)	Media	Wavelength(nm)	Operating distance(km)	Temperature(℃)
40G-QSFP-LR4	41.2	SMF	CWDM	10	0~70

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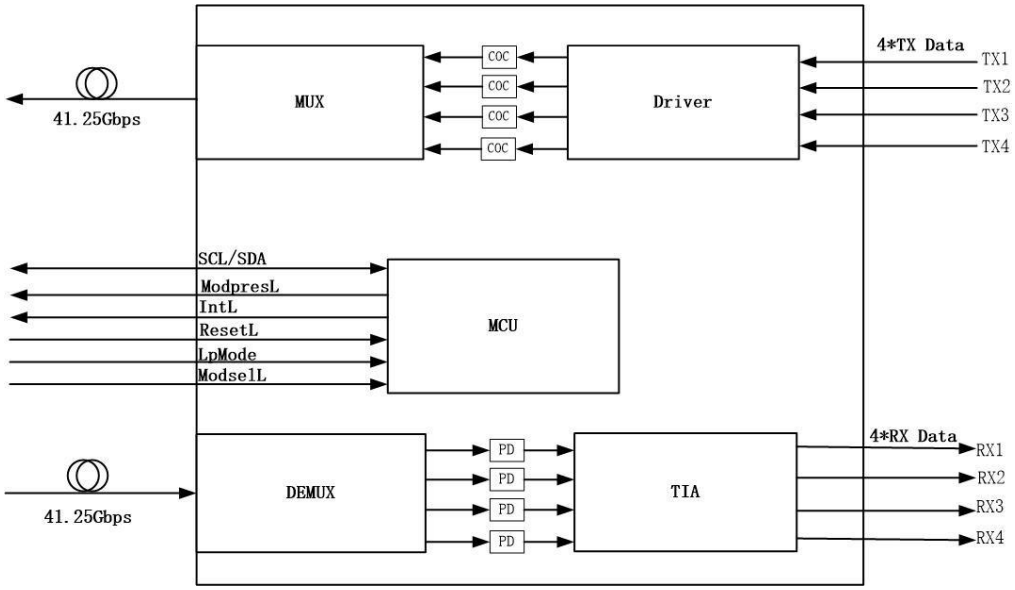
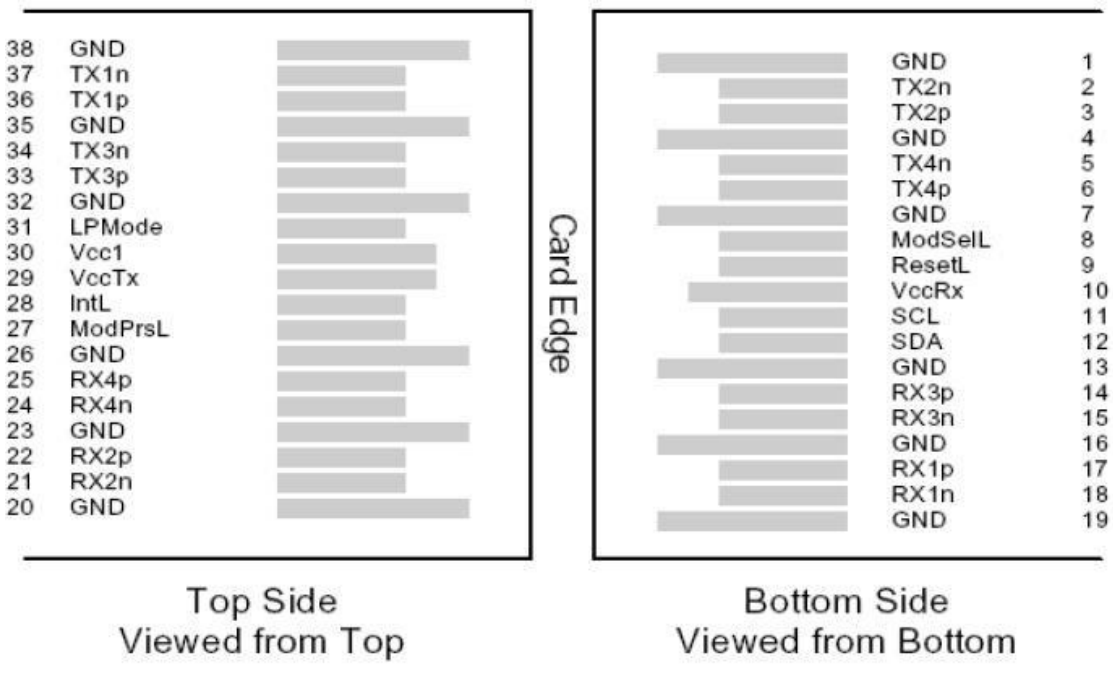
PRODUCT DESCRIPTION

40G-QSFP-LR4 is designed for 10km 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



2. Pin Diagram



QSFP+ MSA-compliant 38-pin connector

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
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

Notes:
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	Notes
Maximum Supply Voltage	Vcc	0		3.6	V	
Storage Temperature	Ts	-40		85	℃	
Operating Case Temperature	T_{case}	-5		75	℃	
Relative Humidity	RH	5		85	%	
Damage threshold, per lane	P_{dam}	3.4			dBm	

5. Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	Tcase	0		70	℃	
Supply Voltage	VCC	3.135	3.3	3.465	V	
Relative Humidity	R_H	5		85	%	
Power Dissipation	P_D			3.5	W	
Data Rate (optical)	DR_O		4*10.3125		Gbps	
Data Rate (Electrical)	DR_E		4*10.3125		Gbps	
Operating Link Distance	L_D			10	km	

6. Electrical Characteristics

40GBASE-LR4 Operation (EOL, TOP = 0 ~70 ℃,V_{CC} = 3.135 to 3.465 V）

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Dissipation				3.5	W	
Supply Current	Icc			1.1	A	1
Transmitter						
Data Rate, each lane			10.3125		Gbps	2
Differential Voltage pk-pk	Vpp			900	mV	
Input differential impedance	Rin		100		Ohm	
Differential Termination Resistance Mismatch				10	%	3
Receiver						
Data Rate, each lane			10.3125		Gbps	2
Output differential impedance	Rout		100		Ohm	
Differential Termination Resistance Mismatch				10	%	3
Differential output voltage	Vout, pp			900	mV	

Notes：
1. Steady state；
2. For 40GBASE-LR4 application；
3. At 1 MHz.

7. OpticalCharacteristics

40GBASE-LR4 Operation（EOL, TOP = 0 ~70 ℃,V_{CC} = 3.135 to 3.465 V）

Parameters	Symbol	Min	Typical	max	Unit	Notes
Transmitter						
Signal Speed per Lane	BR	10.3125 ± 100 ppm			Gb/s	
Transmit wavelength	λ0	1264.5	1271	1277.5	nm	
	λ1	1284.5	1291	1297.5	nm	
	λ2	1304.5	1311	1317.5	nm	
	λ3	1324.5	1331	1337.5	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P_{total}			8.3	dBm	
Average launch power, each lane	P_{out}	-7		2.3	dBm	
Difference in launch power between any two lanes (Average and OMA)				6.5	dB	
Launch power OFF per lane				-40	dBm	
Transmitter and Dispersion Penalty (TDP), each lane	TDP			2.6	dB	
Transmitter OFF Output Power	P_{Off}			-30	dBm	
Optical Modulation Amplitude minus TDP, each lane		-4.8			dBm	
Extinction Ratio (ER)	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}					1
Mask margin		15			%	1
Receiver						
Signaling Speed per Lane	BR	10.3125 ± 100 ppm			Gb/s	
Receive wavelength	λ0	1264.5	1271	1277.5	nm	
	λ1	1284.5	1291	1297.5	nm	
	λ2	1304.5	1311	1317.5	nm	
	λ3	1324.5	1331	1337.5	nm	
Damage threshold, each lane	Pmax			3.4	dBm	
Average receive power, each lane		-		-11.5	dBm	
Receive power, each lane (OMA)		-		-9.6	dBm	2
Receiver reflectance				-26	dB	
LOS Assert		-30			dBm	
LOS De-Assert				-12.5	dBm	
LOS Hysteresis		0.5		6	dB	

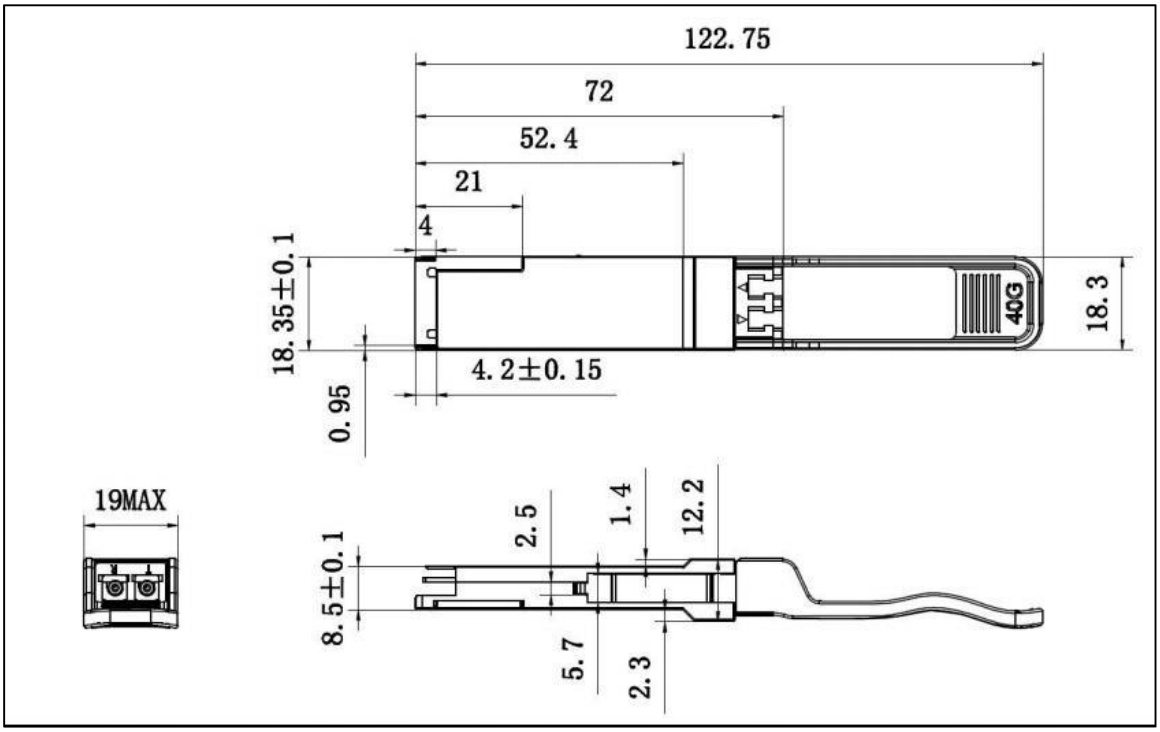
Notes:
1. Hit ratio 5 × 10−5.
2. Sensitivity is specified at BER@1E-12.

8. Digital Diagnostic Monitoring Functions

40G-QSFP-LR4 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	℃
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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