

40Gbps 1271~1331nm 40Km QSFP+ Optical Transceiver Module

S-QS40CWL40-CD

Features

- Hot Pluggable QSFP+ form factor
- Supports bit rate up to 10.3125Gb/s per lane
- Duplex LC interface
- Uncooled 4x10Gbps CWDM transmitter, PIN array detector
- Low power consumption <3.5W
- Maximum link length of 40km on Single Mode Fiber (SMF)
- All-metal housing for superior EMI performance
- IIC management interface
- Single +3.3V power supply
- Operating case temperature:0 to 70 °C
- RoHS compliant (lead free)

Applications

- 40G Ethernet
- High speed access

Standards

- Compliant to IEEE 802.3bm
- Compliant to SFF-8436

Description

40GBase-ER4 QSFP+ transceiver is designed to meet the requirements of 40G ethernet links over SMF up to 40km. It is compliant with QSFP+ MSA, IEEE 802.3ba 40GBase-ER4. It is cost-effective, low power consumption with a single 3.3V power supply. It is fabricated with all-metal and compact size housing for superior EMI performance.

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	V _{cc}	-0.5		3.6	V
Storage Temperature Range	T _s	-40		85	°C
Relative Humidity - Storage	RH _s	0		95	%
Relative Humidity - Operating	RH _o	0		85	%

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Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Case Operating Temperature Range	T _c	0	-	70	°C
Power Supply Voltage	V _{cc}	3.14	3.3	3.47	V
Total Power Consumption	P	-	-	3.5	W
Data Rate per Lane	BR	-	10.3125	-	Gbps

Electrical Characteristics

Transmitter Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Unit	Note
Differential Input Voltage Swing	V _{IN}	180	-	700	mV	
Tx Differential Input Impedence	Z _{IN}	-	100	-	Ω	
Differential input return loss		Per IEEE P802.3ba 86A.4.1.1			dB	10MHz to 11.1GHz
Differential to common-mode input return loss		10	-	-	dB	10MHz to 11.1GHz
J2 Jitter Tolerance	J2T	0.17	-	-	UI	Per IEEE P802.3ba 86A.4.1
J9 Jitter Tolerance	J9T	0.29	-	-	UI	
Receiver Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Unit	
Differential output Voltage Swing	V _{OUT}	300	-	850	mV	
Rx Differential Output Impedence	Z _{OUT}	-	100	-	Ω	
Differential output return loss		Per IEEE P802.3ba 86A.4.2.1			dB	10MHz to 11.1GHz
Common mode output return loss		Per IEEE P802.3ba 86A.4.2.2			dB	10MHz to 11.1GHz
Output transition time,20% to 80%		28	-	-	ps	Per IEEE P802.3ba 86A.4.2
J2 Jitter output	J2O	-	-	0.42	UI	
J9 Jitter output	J9O	-	-	0.65	UI	

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter Characteristics						
Laser Type		CWDM DFB				
Data Rate per lane	-	-	10.3125	-	Gb/s	
Lane Center Wavelengths	λ ₀	1264.5		1277.5	nm	
	λ ₁	1284.5		1297.5		
	λ ₂	1304.5		1317.5		
	λ ₃	1324.5		1337.5		
Side-mode suppression ratio	SMSR	30	-	-	dB	
Total average Launch Power	PT	-	-	10.5	dBm	
Average Launch Power, each lane	POUT	-2.7	-	4.5	dBm	

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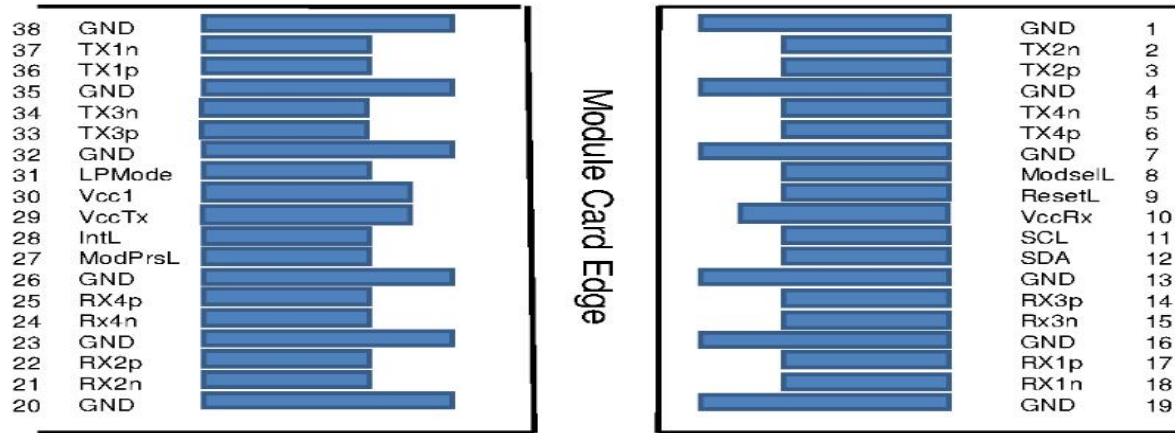
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Optical Modulation Amplitude, each lane	OMA	-0.3	-	5	dBm	
Difference in launch power between any two lanes (OMA)	Ptx,diff	-	-	4.7	dB	
Launch Power in OMA minus TDP, each lane		-0.5	-	-	dBm	
Extinction Ratio	ER	4.5	-	-	dB	
Transmitter dispersion penalty	TDP	-	-	2.6	dB	
Average Launch Power of OFF transmitter, each lane	POFF	-	-	-30	dBm	
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	
Optical return loss tolerance		-	-	20	dB	
Transmitter Reflectance		-	-	-12	dB	
Transmitter eye mask definition		Compliant to IEEE802.3ba				
Receiver Characteristics						
Receiver Type		PIN				
Data Rate per lane		-	10.3125	-	Gb/s	
Lane Center Wavelengths	λ_0	1264.5		1277.5	nm	
	λ_1	1284.5		1297.5		
	λ_2	1304.5		1317.5		
	λ_3	1324.5		1337.5		
Average receive power, each lane	P _{IN1}	-19	-	-4.5	dBm	
Damage Threshold	DT	3.3	-	-	dBm	
Receiver Power (OMA), each lane (max)		-	-	-4.0	dBm	
Difference in receive power between any two lanes(OMA)(max)		-	-	7.5	dB	
Receiver Sensitivity (OMA), each lane (max)	Sen ₁	-	-	-19	dBm	1
Stressed Receiver Sensitivity (OMA), each lane (max)	Sen ₁	-	-	-16.8	dBm	
Receiver 3dB electrical upper cutoff frequency, each lane		-	-	12.3	GHz	
Receiver Reflectance	RFL	-	-	-26	dB	
LOS Assert	LOSA	-30	-	-	dBm	
LOS De-Assert	LOSD	-	-	-23	dBm	
LOS Hysteresis	LOSH	0.5	-	-	dB	
Notes						
1. BER=1E-12, measured with PRBS31@10.3125Gbps						

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Pin Definitions



Top Side
Viewed From Top

Bottom Side
Viewed From Bottom

Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	+3.3V Power Supply Receiver	2
11	SCL	2-Wire Serial Interface Clock	
12	SDA	2-Wire Serial Interface Data	
13	GND	Ground	
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	1

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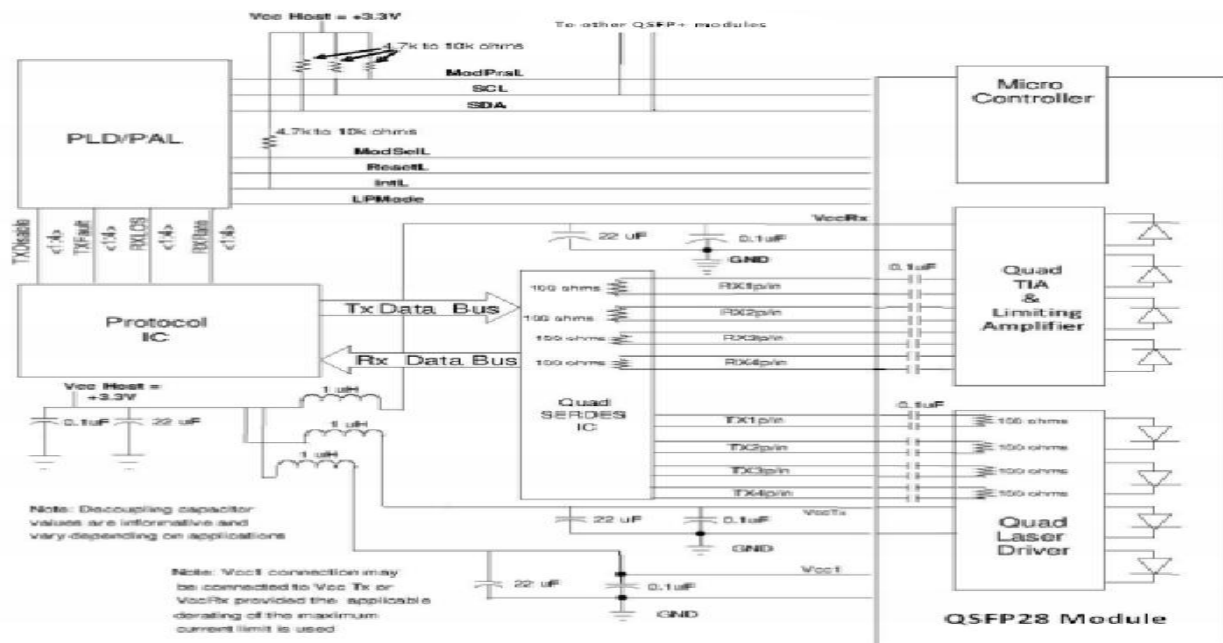
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25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	VccTx	+3.3 V Power Supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMODE	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Output	
38	GND	Ground	1

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 VccTx may be internally connected within the QSFP+ transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

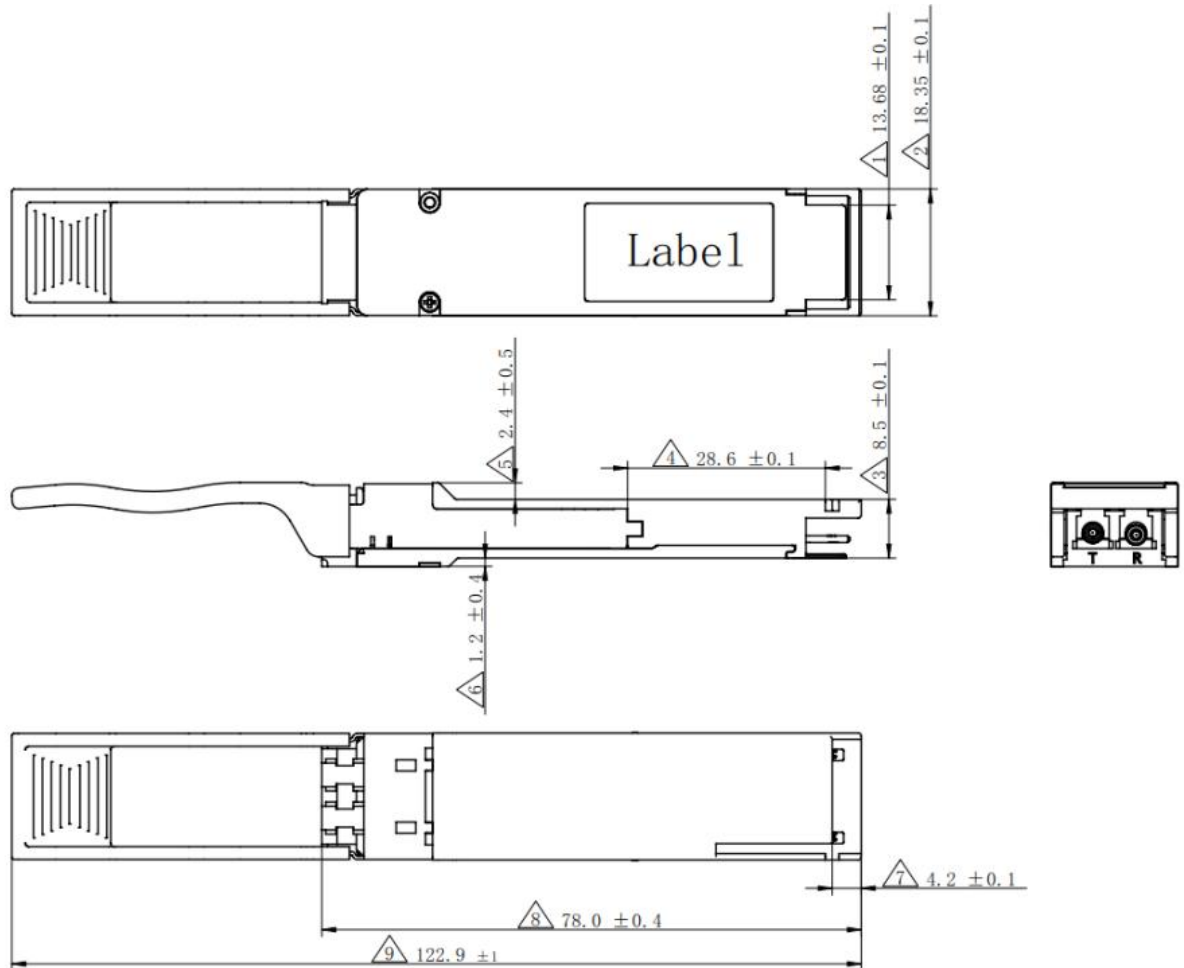
Recommended Interface Circuit



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Mechanical Dimensions



Ordering information

Part Number	Product Description
S-QS40CWL40-CD	QSFP+, 40Gbps, 1271~1331nm, SM, LC, 40km, 0°C ~ +70°C, With DDM