

# 100Gbps 1294 -1310nm 10Km QSFP28 Optical Transceiver Module

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## S-QP1AL4L10-CD

### Features

- Hot Pluggable QSFP28 form factor
- Supports aggregate bit rate up to 103.1Gb/s
- LC Duplex optical interface
- 4x25G/s LAN-WDM transmitter, PIN array detector
- Low power consumption <3.5W
- Applicable for 10km SMF connection
- All-metal housing for superior EMI performance
- IIC management interface
- Single +3.3V power supply
- Operating Temperature:0 to +70°C
- RoHS compliant (lead free)

### Applications

- 100G ethernet
- Other optical links

### Standards

- IEEE 802.3bm
- SFF-8636, SFF-8665, SFF-8679

### Description

Springtek 100GBase-LR4 QSFP28 transceiver is designed to meet the requirements of 100G ethernet links over SMF up to 10km. It is compliant with QSFP28 MSA, IEEE 802.3ba and IEEE 802.3bm. It is cost-effective, low power consumption with a single 3.3V power supply. The module has an aggregate bit rate up to 103.1Gbps by multiplexing of 4 independent LAN-WDM optical lanes, each lane capable of transmitting 25.78125Gb/s over 10km SMF. 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	Vcc	-0.5		4	V
Storage Temperature Range	Ts	-40		85	°C
Relative Humidity - Storage	RH <sub>s</sub>	0		95	%
Relative Humidity - Operating	RH <sub>o</sub>	0		85	%

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### Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Case Operating Temperature Range	Tc	0	-	70	°C
Power Supply Voltage	V <sub>cc</sub>	3.14	3.3	3.47	V
Total Power Consumption	P	-	-	3.5	W
Data Rate	BR	-	25.78125	-	Gbps

### Electrical Characteristics

Transmitter Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Differential Input Voltage Swing	V <sub>IN</sub>	180	-	900	mV
Tx Differential Input Impedence	Z <sub>IN</sub>	-	100	-	Ω
Differential input return loss		Per 100Gbase-LR4			dB
Common mode input return loss		Per 100Gbase-LR4			dB
Receiver Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Differential output Voltage Swing	V <sub>OUT</sub>	300	-	850	mV
Rx Differential Output Impedence	Z <sub>OUT</sub>	-	100	-	Ω
Differential output return loss		Per 100Gbase-LR4			dB
Common mode output return loss		Per 100Gbase-LR4			dB

### Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter Characteristics						
Signaling rate per lane		25.78125			GBd	1
Lane center wavelengths(range)	λ	1294.53	-	1296.59	nm	
		1299.02	-	1301.09		
		1303.54	-	1305.63		
		1308.09	-	1310.19		
Total Average Launch Power	P <sub>out</sub>	-	-	10.5	dBm	
Transmit OMA per Lane	TxOMA	-1.3	-	4.5	dBm	
Average Launch Power per Lane	TXPx	-4.3	-	4.5	dBm	
Extinction Ratio	ER	4	-	-	dB	

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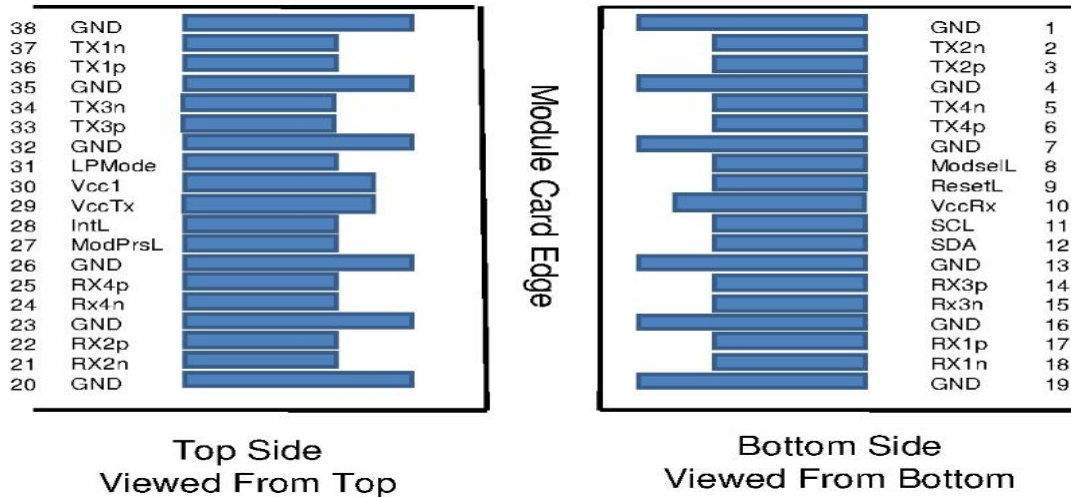
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Sidemode Suppression ratio		SMSR	30	-	-	dB	
Relative Intensity Noise		RIN	-	-	-130	dB/Hz	
Transmitter Reflectance Reflectance			-	-	-12	dB	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}			{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				2
<b>Receiver Characteristics</b>							
Signaling rate per lane			25.78125			GBd	3
Lane center wavelengths(range)		$\lambda$	1294.53	-	1296.59	nm	
			1299.02	-	1301.09		
			1303.54	-	1305.63		
			1308.09	-	1310.19		
Average Receive Power per Lane		RXPx	-10.6	-	4.5	dBm	4
Receiver Sensitivity (OMA) per Lane		Rxsens	-	-	-8.6	dBm	
Receiver Reflectance			-	-	-26	dB	
LOS	Optical De-assert	Pd	-	-	-11.6	dBm	
	Optical Assert	Pa	-24	-	-		
LOS hysteresis			0.5	-	-	dB	
<b>Notes</b>							
1. Transmitter operating at 25.78125Gbps each channel. 2. Hit ratio $5 \times 10^{-5}$ . 3. Receiver operating at 25.78125Gbps each channel. 4. Power value and power accuracy are with all channels on.							

### Pin Definitions



## 100Gbps 1294 -1310nm 10Km QSFP28 Optical Transceiver Module

### S-QP1AL4L10-CD

Pin	Symbol	Name/Description	Notes
1	GND	Ground.	
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground.	
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground.	
8	ModSelL	Module Select.	
9	ResetL	Module Reset.	
10	VccRx	3.3V Power Supply Receiver.	1
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.	
17	Rx1p	Receiver Non-Inverted Data Output.	
18	Rx1n	Receiver Inverted Data Output.	
19	GND	Ground.	
20	GND	Ground.	
21	Rx2n	Receiver Inverted Data Output.	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground.	
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground.	
27	ModPrsl	Module Present	
28	IntL	Interrupt	
29	VccTx	3.3V power supply.	1
30	Vcc1	3.3V power supply.	1
31	LPMODE	Low Power Mode	

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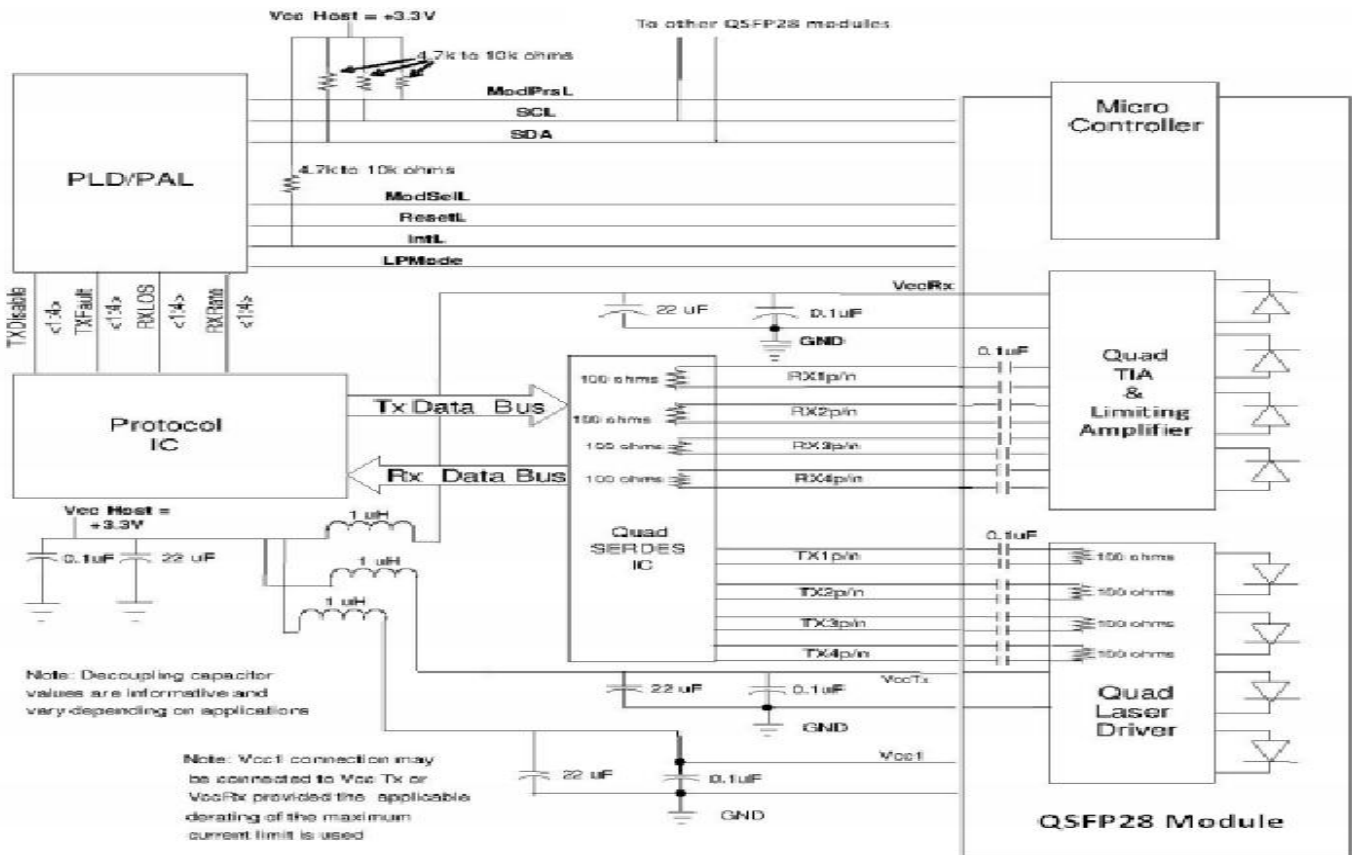
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32	GND	Ground.	
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground.	
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground.	

**Notes:**

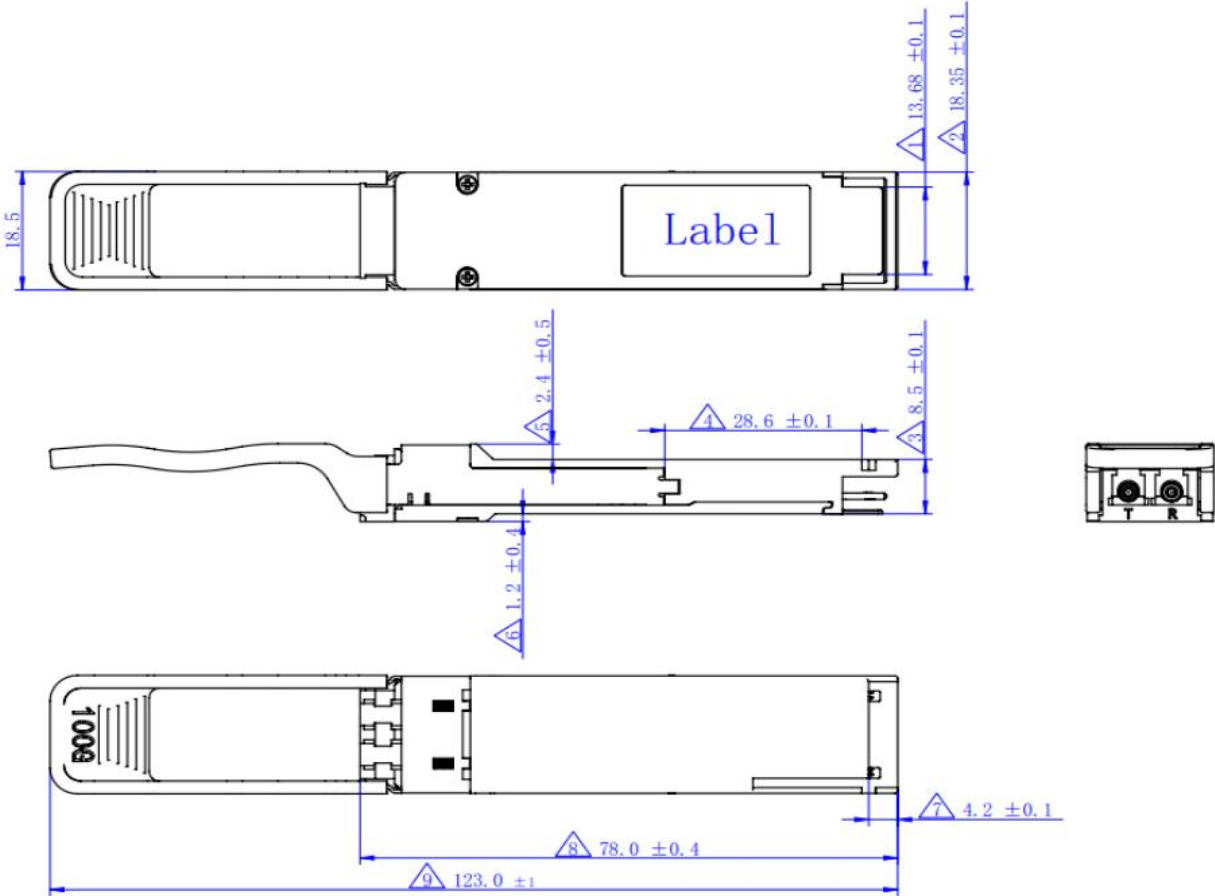
1. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

## Recommended Interface Circuit



# 100Gbps 1294 -1310nm 10Km QSFP28 Optical Transceiver Module S-QP1AL4L10-CD

## Mechanical Dimensions



## Ordering information

Part Number	Product Description
S-QP1AL4L10-CD	QSFP28, 100Gbps, 1294 -1310 nm, SM, LC, 10km, 0°C~+70°C, With DDM, COB style