



Description

General

This QSFP28 transceiver form QuickTreX® is quad small form-factor pluggable module for serial optical data communications such as IEEE 802.3ba 100GBASE-LR4. It is with the QSFP28 38-pin connector to allow hot plug capability. The internally ac coupled high speed serial I/O simplifies interfacing to external circuitry. A serial EEPROM in the transceiver allows the user to access transceiver digital diagnostic monitoring and configuration data via the 2-wire QSFP28 Management Interface.

Transmitter Section

The transmitter consists of four directly modulated uncooled LWDM 4 wavelength 1295.5, 1300, 1304.5, and 1309 nm DFB lasers and four drivers. In addition, this component is also class 1 laser that compliant with International Safety Standard IEC-60825-1:2014. It complies with EN60825-1:2014/A11:2021 and FDA 21 CFR 1040.10 and 1040.11

Receiver Section

The receiver incorporates four InGaAs PIN photodiodes integrated with four trans-impedance preamplifiers (TIA) and four limiting post-amplifier ICs.

QSFP-100G-LR4-S Compatible	
100GBASE-LR4 QSFP28 1310nm 10km	
LC Type with DDM	QT-SM-DXLC-QSFP28-100G-10KM

Features

- Single +3.3V Power Supply
- Compliant with SFF-8665 QSFP28 MSA
- Compliant to IEEE 802.3ba 100GBASE-LR4
- Up to 10km on SMF
- Up to 25Gb/s data rate per wavelength
- Class 1 Laser International Safety Standard IEC-60825-1:2014 Compliant. Complies with EN60825-1:2014/A11:2021 and FDA 21 CFR 1040.10 and 1040.11
- Commercial Operation Temp.: 0 °C to +70 °C
- Duplex LC Connector
- RoHS Compliant

Applications

- 100GBASE-LR4 100G Ethernet Links
- Data Center Switches and Router

Performance Specifications

Absolute Maximum Ratings					
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V _{CC}	-0.5	-	4	V
Signal input Voltage	-	-0.3		V _{CC} +0.3	V
Storage Temperature	T _S	-40	-	85	°C
Relative Humidity(non-condensing)	RH	0	-	85	%

Recommended Operating Conditions and Power Supply Requirements					
Parameter	Symbol	Min	Typ	Max	Units
Operating Case Temperature	T _{OP}	0	-	70	°C
Supply Voltage	V _{CC}	3.135	3.3	3.465	V
Supply Current	I _{CC}	-	-	1150	mA
Power Dissipation	PD	-	-	4	W





Optical and Electrical Characteristics

Transmitter Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Data Rate, Each Lane	B	-	25.78125	-	Gbps
Power Consumption	-	-	-	4	W
Supported Link Length on 9/125 μ m SMF	L	-	10	-	km
Supply Current	I _{CC}	-	-	1150	mA
Data Differential Input Voltage	V _{in, pp}	350	-	-	mV
Data Differential Input impedance	Z _{IN}	-	100	-	Ω
Transmitter Optical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Average Launch Power, each Lane	P _{O, AVG}	-4.3	-	4.5	dBm
Total Average Launch Power	P _{O, Total}			10.5	dBm
Launch Power in OMA, each Lane	P _{O, OMA}	-1.3		4.5	dBm
Center Wavelength	λ_c	1294.53	1295.56	1296.59	nm
		1299.02	1300.05	1301.09	
		1303.54	1304.58	1305.63	
		1308.09	1309.14	1310.19	
Spectral Width (-20dB)	$\Delta\lambda_{(-20dB)}$	-	-	1	nm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Extinction Ratio	ER	4	-	-	dB
Transmitter Eye Mask Definitio(hit ratio $\leq 5E^{-5}$)		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}			%
Average Launch Power of OFF Transmitter, each Lane		-	-	-30	dBm



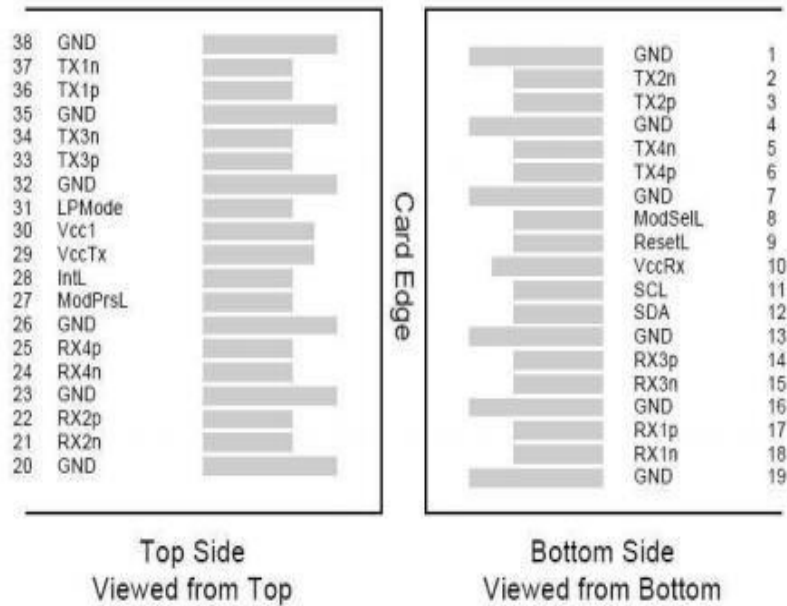
Receiver Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Data Differential Output Voltage	$V_{out, pp}$	-	400	-	mV
Data Differential Output impedance	Z_{OUT}	-	100	-	Ω
Eye width	-	0.57	-	-	UI
Receiver Optical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Damage Threshold	THd	5.5	-	-	dBm
*Average receive power, each Lane	P_{in}	-10.6	-	4.5	dBm
*Receive Power(OMA), each Lane	$P_{S,OMA}$	-8.6	-	4.5	dBm
Center Wavelength	λ_c	1294.53	1295.56	1296.59	nm
		1299.02	1300.05	1301.09	
		1303.54	1304.58	1305.63	
		1308.09	1309.14	1310.19	
Receiver Reflectance	R_R	-	-	-26	dB
Signal Detect-Asserted	P_A	-24	-	-13.6	dBm
Signal Detect-Deasserted	P_D	-	-	-11.6	dBm.
Signal Detect-Hysteresis	P_A-P_D	0.5	-	6	dB

*Measured with a PRBS $2^{31}-1$ test pattern @25.78125 Gbps, BER= 10^{-12} .

Digital Diagnostic Accuracy

Parameter	Typical Value	Note
Transceiver Temperature	$\pm 3^\circ\text{C}$	$T_{OP-min} \sim T_{OP-max}$
Power Supply Voltage	$\pm 3\%$	V_{CC}
TX Bias Current	$\pm 10\%$	
TX Optical Power	$\pm 3\text{dB}$	$P_{O, AVG-min} \sim P_{O, AVG-max}$
RX Optical Power	$\pm 3\text{dB}$	$P_{in-min} \sim P_{in-max}$

QSFP+ Transceiver Electrical Pad Layout



Pinout Table

Pin	Symbol	Name/Description	Ref.
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
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	Tx 1p	Transmitter Non-Inverted Data Input	
37	Tx 1n	Transmitter Inverted Data Output	
38	GND	Ground	1

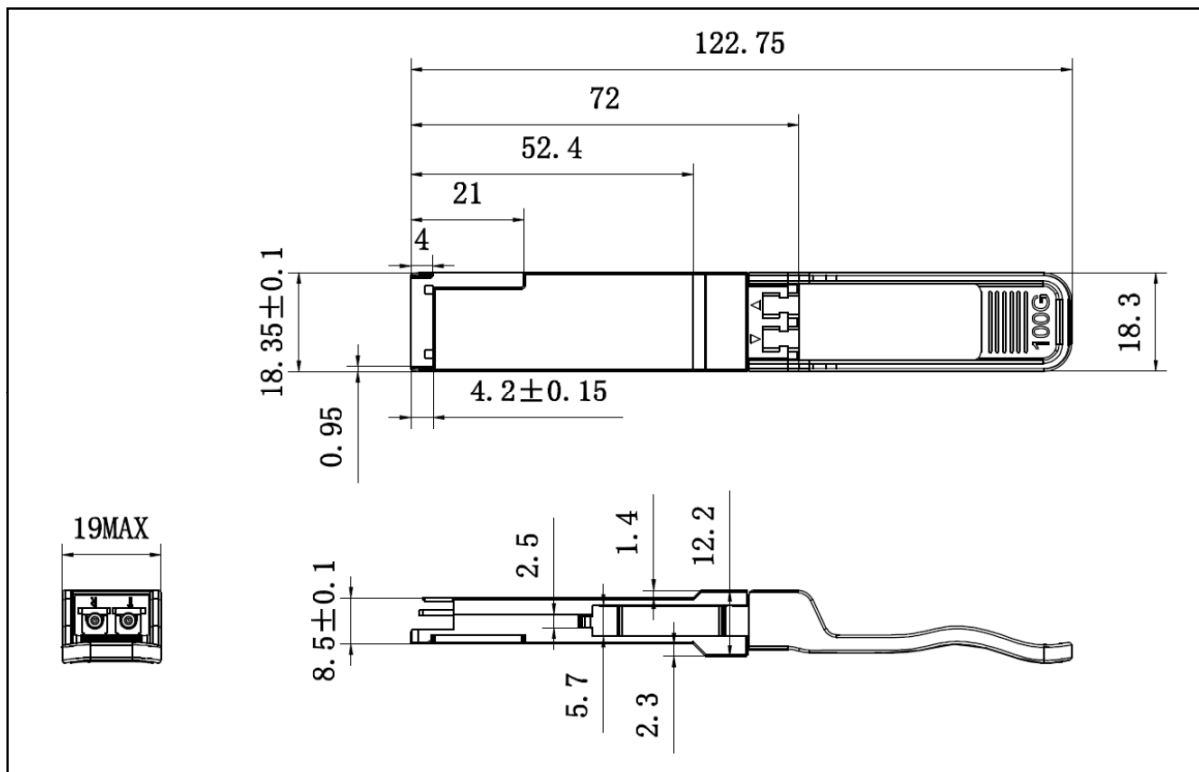
Notes:

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP+ module in any combination.

Package Outline Drawing

LC Type (SQ Series)

DIMENSIONS ARE IN MILLIMETERS (unit:mm)



Eye Safety

The transceiver is a class 1 laser product. It complies with EN60825-1:2014/A11:2021 and FDA 21 CFR 1040.10 and 1040.11. In order to meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.

Caution

All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part is required. Tampering with and modifying the performance of the device will result in voided product warranty.