PRODUCT SPECIFICATION

Part No.:	**QSFP28-100G-FR**	
Description:	100G QSFP28 PAM4 Single Lambda FR1 SMF 2km LC	
Release Date	**Rev.**	**Revision Change Description**
2015/06/07	A0	New Release
2020/12/28	A1	Template Update

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Features

- ✧ Compliant with IEEE 802.3bm electrical specifications (Clause 83E, CAUI-4)
- ✧ Supports both FEC and non-FEC modes on the host side
- ✧ Supports 100 Gbps data rate
- ✧ Up to 2km reach over SMF
- ✧ Typical power consumption: 3W
- ✧ Hot-pluggable QSFP28 form factor
- ✧ Duplex LC connector
- ✧ Operating case temperature range: 0 to 70°C
- ✧ RoHS-6 compliant (lead-free)

Application

- ✧ 100GBASE-FR1 Ethernet links
- ✧ High-density 100G data center interconnects (DCI)
- ✧ HPC Interconnects
- ✧ Proprietary Interconnections

Standard

- ✧ CEI-28G-VSR
- ✧ QSFP28 MSA
- ✧ SFF-8636

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	-	-40	85	ºC
3.3V Power Supply Voltage	-	-0.5	3.6	V
Data Input Voltage- Single Ended	-	-0.5	-	Vcc+0.5
Control Input Voltage	-	-0.5	3.6	V
Relative Humidity	-	5	85	%
Rx Optical Damage Threshold / Lane	-	5	-	dBm

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Case Operating Temperature	-	0	-	70	ºC
Power Supply Voltage	-	3.135	3.3	3.465	V
Date Rate per Channel (4*25G NRZ)	-	-	25.78125	-	Gbps
Date Rate per Channel (2*50G PAM4)	-	-	53.125	-	Gbps
Bit Error Ratio (BER) with FEC on Bit	-	-	10^{-12}	-	-
Error Ratio (BER) without FEC	-	-	-	$2.4x10^{-4}$	-
Control Input Voltage High	-	2	-	Vcc+0.3	V
Control Input Voltage Low	-	-0.3	-	0.8	V
Two Wire Serial (TWS) Interface Clock Rate	-	-	-	1	MHz
Differential Data Input / Output Load	-	-	100	-	Ohms
SM Fiber Length (DR1):	-	2	-	500	m
SM Fiber Length (FR1):	-	2	-	2000	m

Optical transmitter Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	λ	1304.5	-	1317.5	nm	-
Side-Mode Suppression Ratio	SMSR	30	-	-	dB	-
Average launch power, each lane	LOP	-2.9	-	4	dBm	-
Output Optical Modulation Amplitude, per Lane	OMA	-0.8	-	4.2	dBm	-
Transmitter and dispersion eye closure (TDECQ), each lane	TDECQ	-	-	3.4	dB	-
Extinction ratio	ER	3.5	-	-	dB	-

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Optical receiver Characteristics

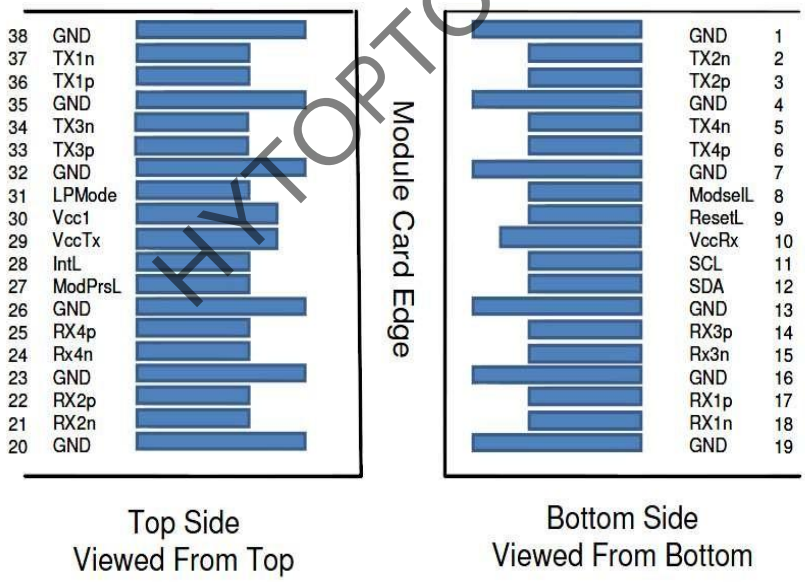
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	λ	1304.5	-	1317.5	nm	-
Damage Threshold	-	5.5	-	-	dBm	-
Average receive power	-	-6.4	-	4.5	dBm	-
Receive power (OMAouter)	-	-	-	4.7	dBm	-
Receiver Reflectance	-	-	-	-26	dB	-
Receiver sensitivity (OMAouter)	-	-	-	Equation	dBm	1
Stressed receiver sensitivity (OMAouter)	-	-	-	-12.5	dBm	2
Conditions of stressed receiver	-	-	-	-	-	-
sensitivity test:	-	-	-	-	-	-
Stressed eye closure for PAM4 (SECQ), lane under test	-	-	3.4	-	dB	-
OMAouter of each aggressor lane	-	-	-	3.4	dBm	-

Notes:

1.Equation: RS = max (-3.9,SECQ – 5.3) dBm, Where RS = Receiver Sensitivity
2.Measured with conformance test signal at TP3 for the BER = 2.4x10-4.

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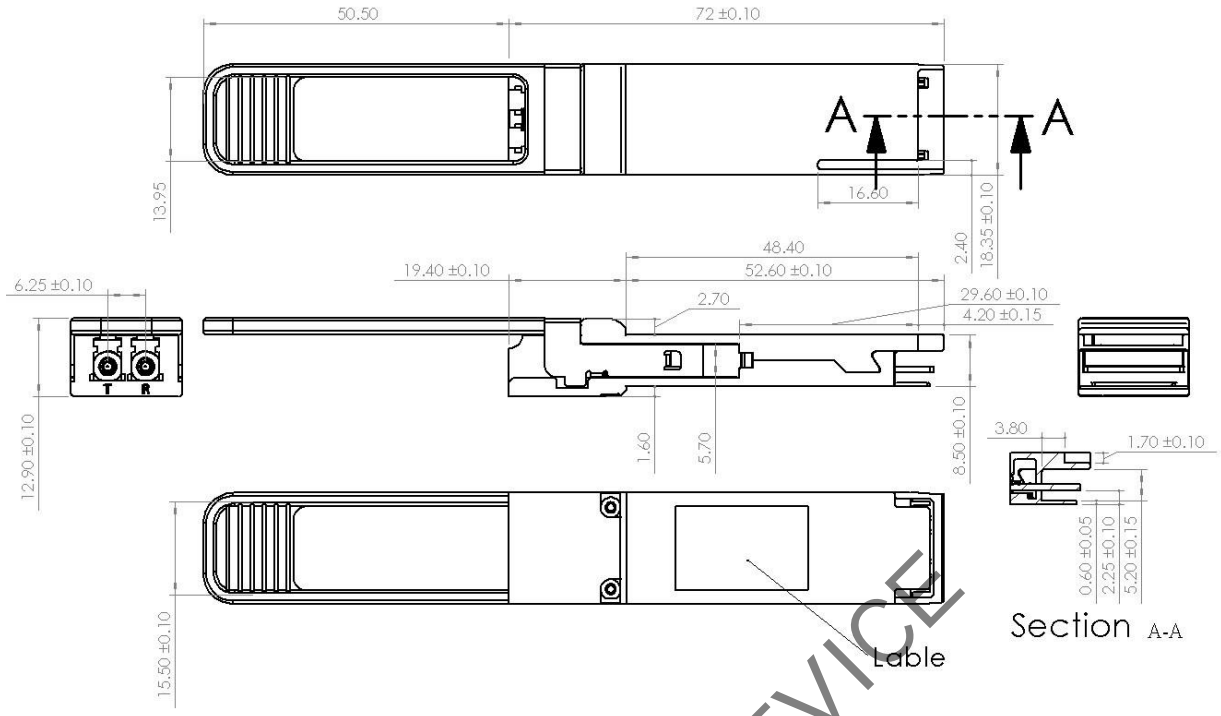
Pin Definition



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	
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	+3.3 V Power Supply transmitter	
30	Vcc1	+3.3 V Power Supply	
31	LPMode	Low Power Mode	
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	

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Package Outline



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Regulatory Compliance

Feature	Test	Method
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000Vfor other pins.)
Electrostatic Discharge (ESD) Immunity	IEC61000-4-2	Class 2(>4.0kV)
Electromagnetic Interference (EMI)	CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1	Comply with standard
Immunity	IEC61000-4-3	Comply with standard
Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2	Compatible with Class I laser Product

Ordering Information

Part. No	Specifications								
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (℃)	Reach (KM)	DDM
QSFP28-100G-FR	QSFP28	100GbE (53.125 GBd)	1310nm EML	-2.9~4	Pin	<-5.3	0~70	2	Y