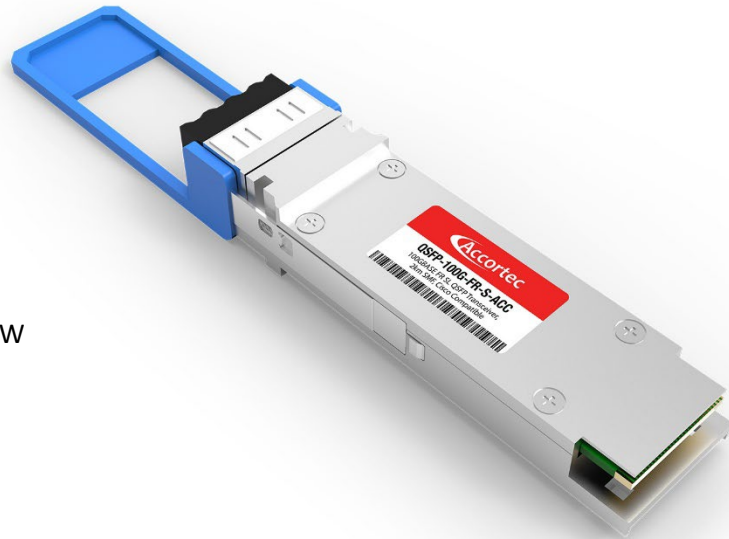


The **QSFP-100G-FR-S-ACC** is programmed to be fully compatible and functional with all intended Cisco switching devices. This QSFP28 optical transceiver is a single lambda optical module. The transceiver converts single optical transmit and receive channels each capable of 50Gb/s into a single PAM4 electrical signal, and then into four NRZ electrical channels at 25Gb/s each. This module is compliant with the QSFP28 MSA standards. This module is designed for singlemode fiber using an LC duplex connection and operates at a nominal wavelength of 1310nm up to 2km.

Features:

- 53.125 Gb/s data rate
- 1310nm EML laser transmitter
- Hot-pluggable QSFP28 footprint
- Built-in digital diagnostic function
- LC duplex connector
- Up to 2km over singlemode fiber
- Maximum power consumption 4.5W
- Operating temperature range
C-Temp: 0°C to 70°C



Compliance:

- QSFP28 MSA SFF-8665
- IEEE 802.3cd
- RoHS Compliant

Applications:

- 100GBASE Ethernet

Warranty:

Lifetime Warranty

General Specifications - Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Storage Temperature	T_{STO}	-40		85	°C	Ambient Temperature
Power Supply Voltage	V_{CC}	-0.3		3.6	V	
Relative Humidity	RH	0		85	%	
Input Voltage	V_{IN}	-0.3		$V_{CC}+3$	V	

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Power Consumption				4.5	W	
Electrical Data Rate	DR_E		25.78		Gbps	Each Lane, NRZ
Optical Data Rate	DR_O		53.125		GBd	PAM4
Data Speed Tolerance	ΔDR	-100		+100	ppm	
Pre-FEC Bit Error Ratio				2.4×10^{-4}		
Post-FEC Bit Error Ratio				1×10^{-12}		
Control Input Voltage High		2		V_{CC}	V	
Control Input Voltage Low		0		0.8	V	
Link Distance	D	0.002		2	Km	Singlemode G.652

Optical Characteristics - Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_C	1304.5	1310	1317.5	nm	
Data Rate			53.125		GBd	
Side-mode Suppression Ratio	$SMSR$	30			dB	Modulated
Average Launch Power	P_{AVG}	-2.4		4	dBm	
Optical Modulation Amplitude	P_{OMA}	-0.2		4.2	dBm	
Launch Power in OMA minus TX and Dispersion Penalty	$OMA-TDP$	-1.6			dBm	
Transmitter and Dispersion Eye Closure for PAM4	$TDECQ$			3.4	dB	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	RIN			-136	dB/Hz	
Optical Return Loss Tolerance	TOL			17.1	dB	
Transmitter Reflectance	RT			-26	dB	
Launch Power of OFF Transmit	P_{OFF}			-15	dBm	Average

Optical Characteristics - Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_C	1304.5	1310	1317.5	nm	
Damage Threshold	TH_D	5.5			dBm	
Average Receive Power		-6.4		4.5	dBm	
Receive Power in OMA				4.7	dBm	
Stressed Receiver Sensitivity (OMA)	SRS			-2.5	dBm	
LOS Assert	LOS_A	-15			dBm	
LOS De-Assert	LOS_D			-9.4	dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Electrical Characteristics - Transmitter

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Power Consumption				4.5	W	
Supply Current	I_{CC}			1.36	A	
Differential Input Voltage Tolerance	ΔV_{IN}	900			mVpp	Peak-to-Peak
Differential Termination Mismatch	$TP1$			10	%	At 1MHz
Differential Input Return Loss	VIL		CEI-28G-VSR Equation 13-19			dB
Common Mode to Differential Conversion and Differential to Common Mode Conversion	$SDC11$ $SCD11$		CEI-28G-VSR Equation 13-20			dB
Stressed Input Test			CEI-28G-VSR Equation 13.3.11.2.1			

Electrical Characteristics - Receiver

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Differential Output Voltage Tolerance	ΔV_{OUT}			900	mVpp	Peak-to-Peak
Common Mode Voltage	V_{CM}	-350		2850	mV	
Differential Termination Mismatch	$TP4$	-10%		+10%	%	At 1MHz
Differential Output Return Loss	VOL		CEI-28G-VSR Equation 13-19			
Common Mode to Differential Conversion and Differential to Common Mode Conversion	$SDC22$ $SCD22$		CEI-28G-VSR Equation 13-21			
Common Mode Return Loss	$SCC22$			-2	dB	
Transition Time	TT	9.5			ps	20% - 80%
Vertical Eye Closure	VEC			5.5	dB	
Eye Width at 10^{-15} Probability	$EW15$	0.57			UI	
Eye Height at 10^{-15} Probability	$EH15$	228			mV	

Digital Diagnostic Functions

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Max</i>	<i>Unit</i>	<i>Remarks</i>
Temperature Monitor Absolute Error	DMI_Temp	-3	+3	C	Over Temp Range
Supply Voltage Monitor Absolute Error	DMI_VCC	-0.1	+0.1	V	Over Full Range
Channel RX Power Monitor Absolute Error	DMI_RX_Ch	-3	3	dB	
Channel Bias Current Monitor	DMI_Ibias_Ch	-10%	+10%	mA	
Channel TX Power Monitor Absolute Error	DMI_TX_Ch	-3	3	dB	

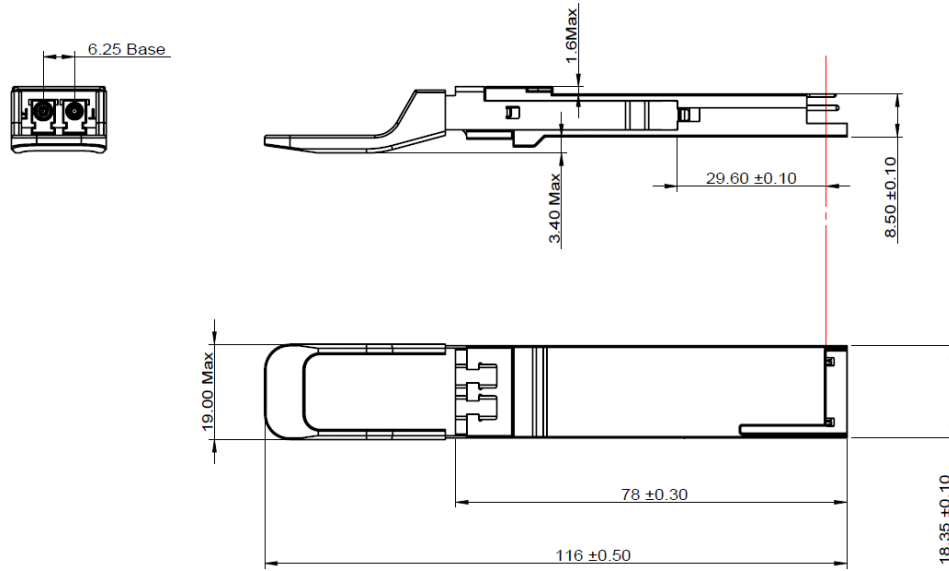
ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

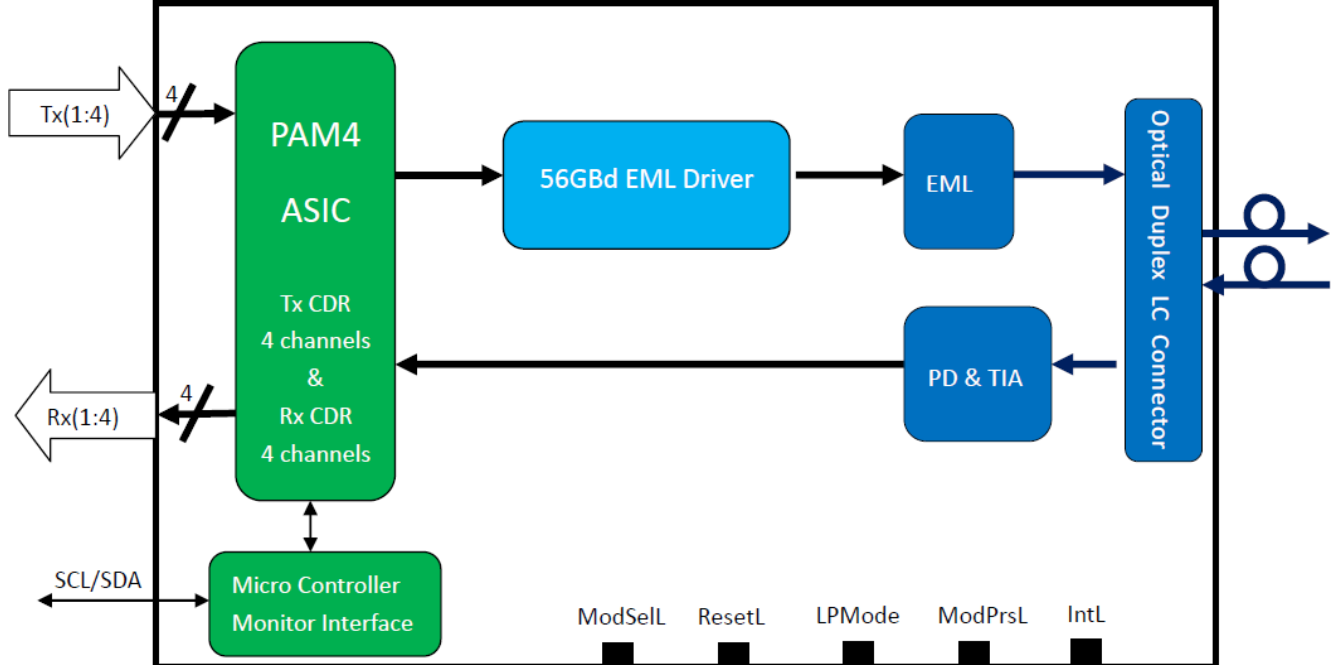
This is a Class 1 Laser Product according to IEC 60825-1:2014. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2014).

Dimensions

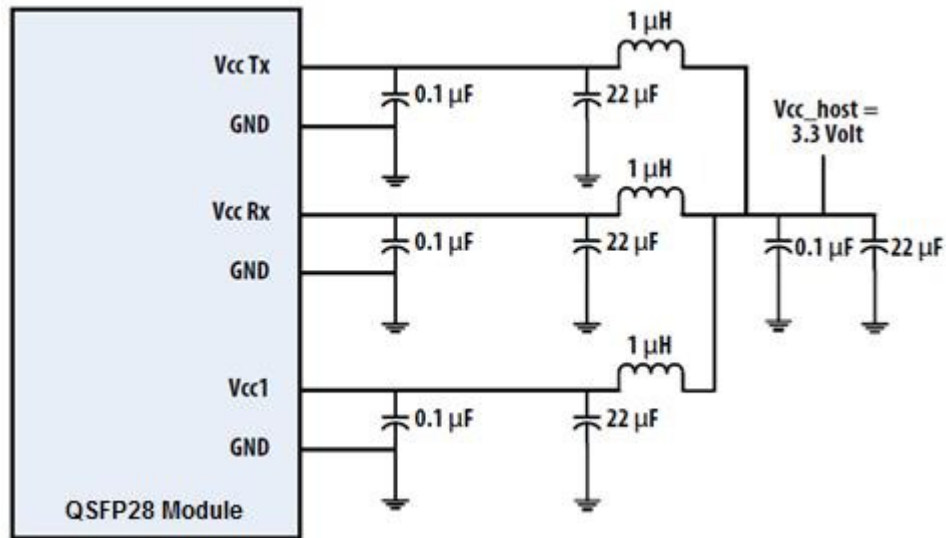


ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED UNIT: mm

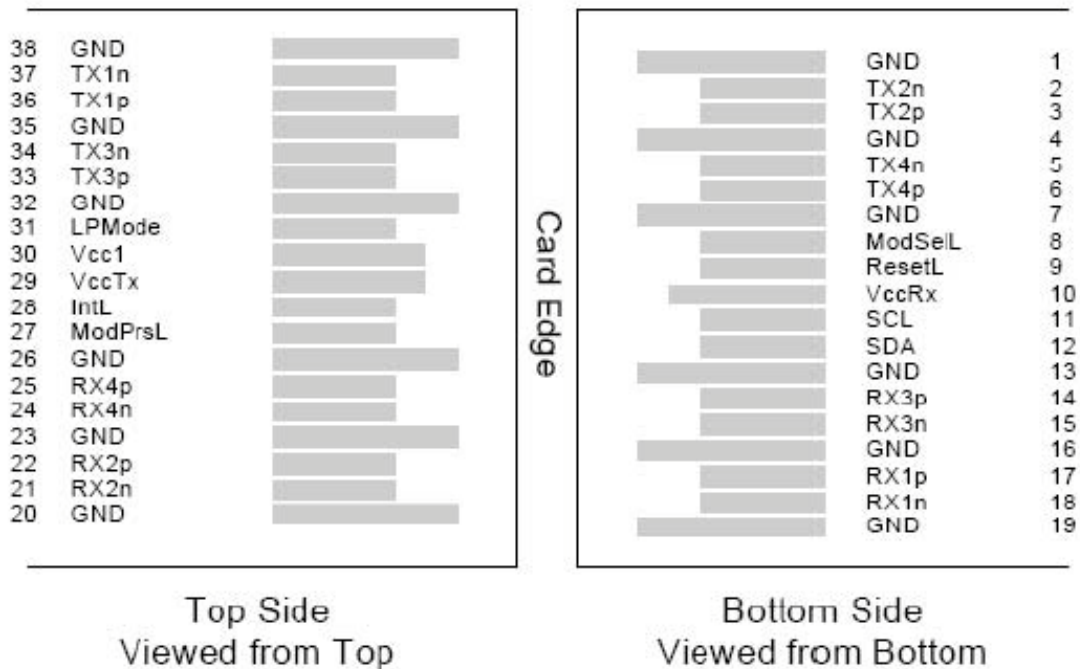
Transceiver Block Diagram



Recommended Power Supply Filter



Electrical Pad Layout



Pin Assignment

<i>PIN #</i>	<i>Symbol</i>	<i>Description</i>	<i>Remarks</i>
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	Vcc RX	+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	Vcc TX	+3.3V Power Supply transmitter	
30	Vcc1	+3.3V 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	

References

1. IEEE standard 802.3bm. IEEE Standard Department.
2. QSFP28 4X PLUGGABLE TRANSCEIVER – SFF-8665