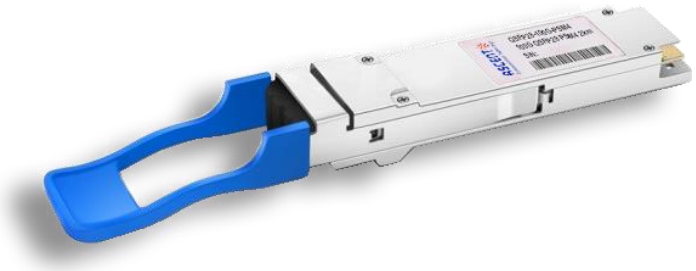
100G QSFP28 PSM4 2km Transceiver

QSFP28 Series



- MPO-12 optical interface
- Maximum link length up to 2km
- Up to 25.78125Gb/s data links per lane
- +3.3 V power supply
- QSFP MSA compliant package
- Hot Pluggable
- High performance single mode DML transmitter
- High sensitivity PIN/TIA optical receiver
- Single Mode operation
- BER < 5E-5@-12.1
- Built-in CDR

Ascent's QSFP28 100G PSM4 transceiver module is designed to meet the requirements of optical fiber interface for 2 km reach over eight single-mode fibers.

QSFP28-100G-PSM4 can be used in Data Centers, High-speed interconnects within and between switches, routers and transport equipment, Server-Server Clusters, Super-computing interconnections and other network applications.

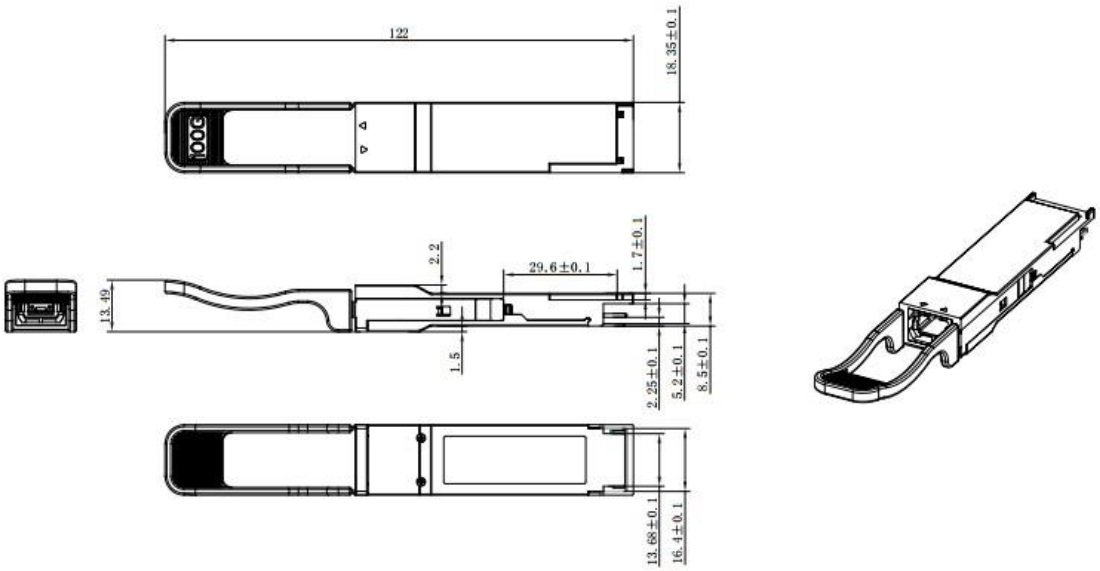
The optical module offers 4 independent transmit and receive channels, each capable of 25 Gbps operation. 4x1310nm DFB transmit and 1310nm 1x4 PD array receive functionality is integrated with a parallel package using MPO connectors.

Mechanical dimensions, connectors and the footprint of this product is QSFP+ specifications compliant. Digital diagnostics functions are available via the I2C interface, as specified by the QSFP28 MSA. The transceiver is RoHS-6 compliant.

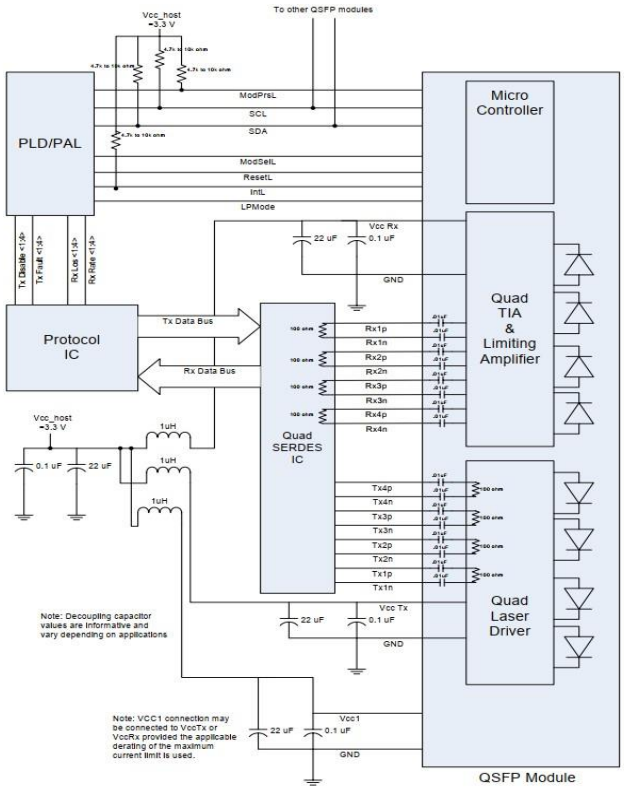
Key Features

- Hot Pluggable QSFP form factor
- Support 25.78125Gb/s per channel and 103.1Gb/s aggregate bit rate
- Power consumption < 3.5W
- 3.3V power supply voltage
- Case Operating Temperature: 0 °C to +70 °C
- Up to reach 2 km on Single-Mode MPO (APC 8-degree) connector receptacle
- 4 channels 1310 nm DFB
- 4 channels PIN photo detector array
- Internal CDR circuits on both receiver and transmitter channels
- RoHS-6 compliance

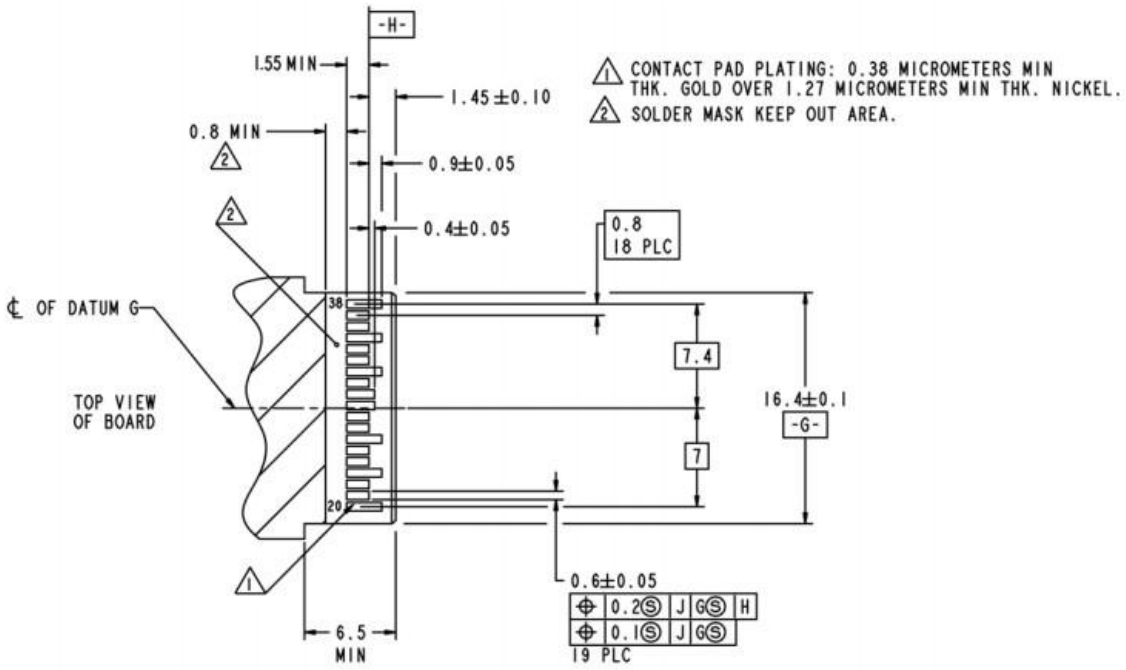
Outline Diagram

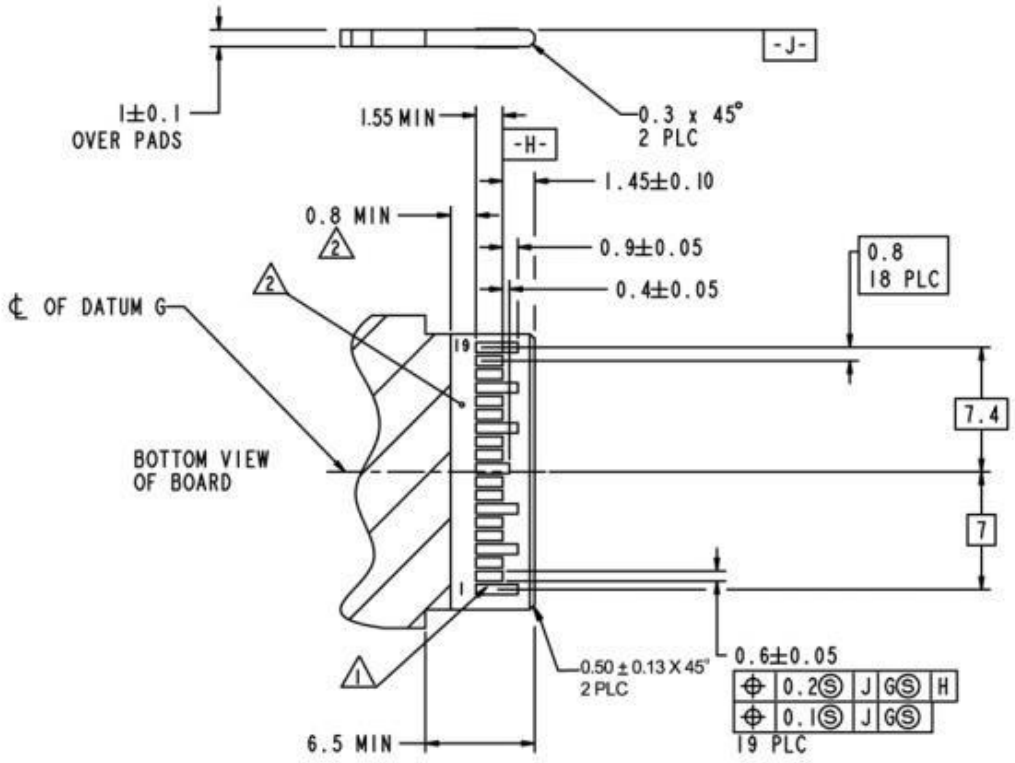


Electrical Interface



Recommended PCB Layout

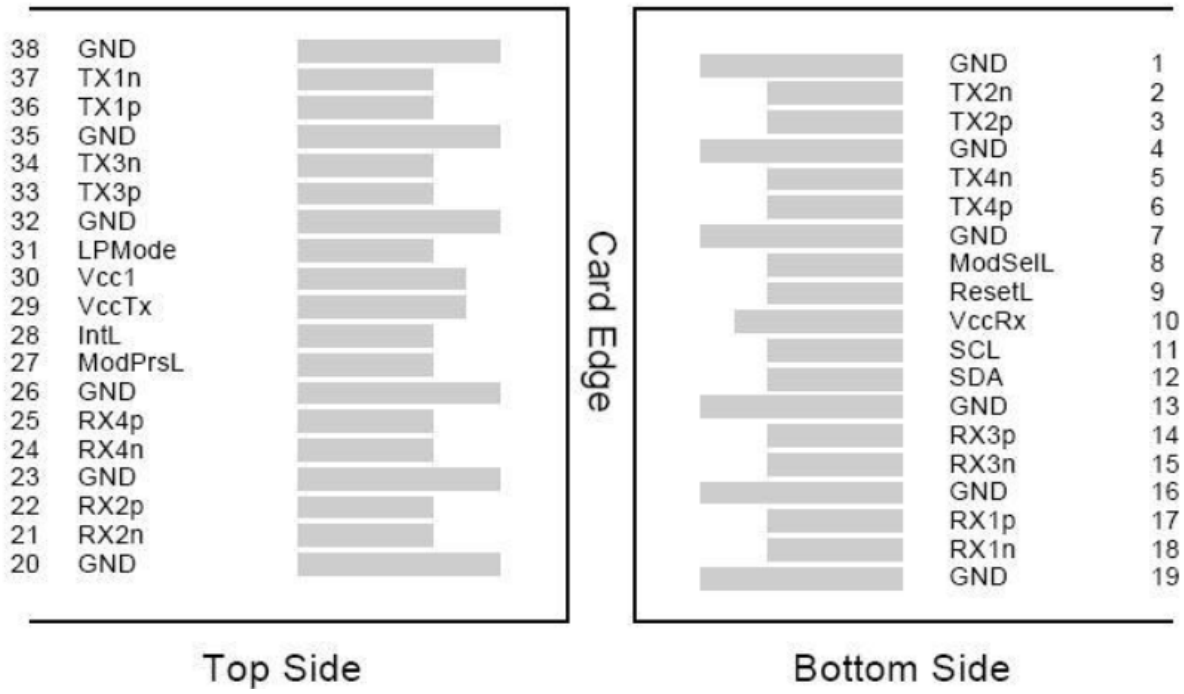




Digital Diagnostics

Parameter	Symbol	Spec	Units	Condition/Notes
Temperature	Te	±3	°C	
Voltage	Vcc	±5 %	V	
IBias	BIAS	±10 %	mA	
Rx power	Rx-pwr	±2	dBm	
Tx power	Tx-pwr	±2	dBm	

Pin Assignment



Pin	Symbol	Name/Description	Note
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver 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	Transmitter Ground (Common with Receiver Ground)	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	

23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4n	Receiver Inverted Data Output	1
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Transmitter Ground (Common with Receiver Ground)	1
27	ModPrsl	Module Present	
28	IntL	Interrupt	
29	VccTx	3.3V power supply transmitter	2
30	Vcc1	3.3V power supply	2
31	LPMode	Low Power Mode, not connect	
32	GND	Transmitter Ground (Common with Receiver Ground)	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Transmitter Ground (Common with Receiver Ground)	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Output	
38	GND	Transmitter Ground (Common with Receiver 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 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP+ transceiver module in any combination. The connector pins are each rated for a maximum current of 500 mA.

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature	T_S	-40	+95	°C	
Operating Case Temperature (Commercial)	T_O	0	+70	°C	
Relative Humidity - Storage	RH_S	0	95	%	
Relative Humidity - Operating	RH_O	0	85	%	
Supply Voltage	V_{CC}	-0.3	3.6	V	

Operating conditions

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Operating Case Temperature	Tcase	0	-	+70	°C	
DC Supply Voltage	V_{CC}	3.135	-	3.465	V	
Module Supply Current	I_{IN}	-	-	1000	mA	

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Differential Data input Swing	Vin	180	-	900	mV	
Tx Differential Input Impendence	Zin	90	100	110	Ω	
Tx Differential Output Impendence	Zout	45	50	55	Ω	
ResetL Disable Voltage	Vr	2.0	-	V_{CC}+0.3	V	
ResetL Enable Voltage	VrEN	0	-	0.8	V	
ModSelL Disable Voltage	Vm	2.0	-	Vcc+0.3	V	
ModSelL Enable Voltage	VmEN	0	-	0.8	V	
Receiver						
Differential Data Output Swing	V_{OUT}	180	-	900	mV	
Rx Differential Output Impendence	Z_{OUT}	90	100	110	Ω	
IntL Assert Voltage	VInt	V_{CC}-0.5	-	V_{CC}+0.3	V	
IntL De-assert Voltage	VDInt	0	-	+0.4	V	

Optical Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Signal Rate each Lane	25.78125 ppm ± 100ppm				Gbps	
Lane Wavelength	L0	1295	1310	1325	nm	
	L1	1295	1310	1325	nm	
	L2	1295	1310	1325	nm	
	L3	1295	1310	1325	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power each Lane	P_{avg}	-9.4		2.0	dBm	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Optical Modulation Amplitude each Lane	OMA			2.2	dBm	1
Transmitter and Dispersion Penalty each Lane	TDP			2.9	dB	
Eye Mask Coordinates: X1, X2, X3, Y1, Y2, Y3	{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}					2
Average Launch Power of OFF Transmitter each Lane				-30	dBm	
Extinction Ratio	ER	3.5			dB	
Spectral Width (20 dB)				1	nm	
Transmitter Reflectance				-12	dB	
Optical Return Loss Tolerance				20	dB	
Receiver						
Signal Speed per Lane	25.78125 ppm ± 100 ppm				Gbps	
Lane Wavelength	L0	1295	1310	1325	nm	
	L1	1295	1310	1325	nm	
	L2	1295	1310	1325	nm	
	L3	1295	1310	1325	nm	
Damage Threshold each Lane	THd			3.0	dBm	3
Average Receive Power each Lane		-12.66		2.0	dBm	
Receiver Reflectance				-26	dB	
Sensitivity OMA each Lane [1]	Sen			-12.1	dBm	4
Stressed Receiver Sensitivity (OMA), each Lane				-8.8	dBm	
LOS Assert	LOSA		-18			
LOS De-Assert	LOSD		-16			
LOS Hysteresis	LOSH	0.5		3		
Vertical Eye Closure Penalty	VECP	1.9			dB	5
Stressed Eye J2 Jitter	J2		0.27		UI	
Stressed Eye J4 Jitter	J4		0.39		UI	

Notes:

1. Even if the TDP < 1 dB, the OMA min must exceed the minimum value specified here.
2. Hit ratio of 5E-5, per IEEE.
3. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.
4. Measured with conformance test signal at receiver input for BER = 5E-5 BER.
5. Vertical eye closure penalty and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver

Ordering Information

Product Name	Product Description
QSFP28-100G-PSM4	QSFP28 Plug-in, 100GBASE-PSM4, SMF, 4 Channels 1310nm Optical Transceiver, 2km, MTP/MPO, DOM

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