QSFP28 100G DR Single Lambda Transceiver

QSFP28 Series

- IEEE 100GBASE-DR compliant
- 100GE Single Protocol (103.125 Gb/s)
- CAUI-4 compliant - 4x 25.78125 Gb/s
- 100GAUI-4 compliant – 4x 26.5625 Gb/s
- Single cooled 100Gb/s 1310nm EML
- Single PIN PD + low-power TIA
- SFF-8636 management interface

Ascent's QSFP28 100G DR Single Lambda Ethernet module is a transceiver module designed for 500m optical communication applications, and it is compliant with IEEE 802.3cu 100GBASE-DR standard.

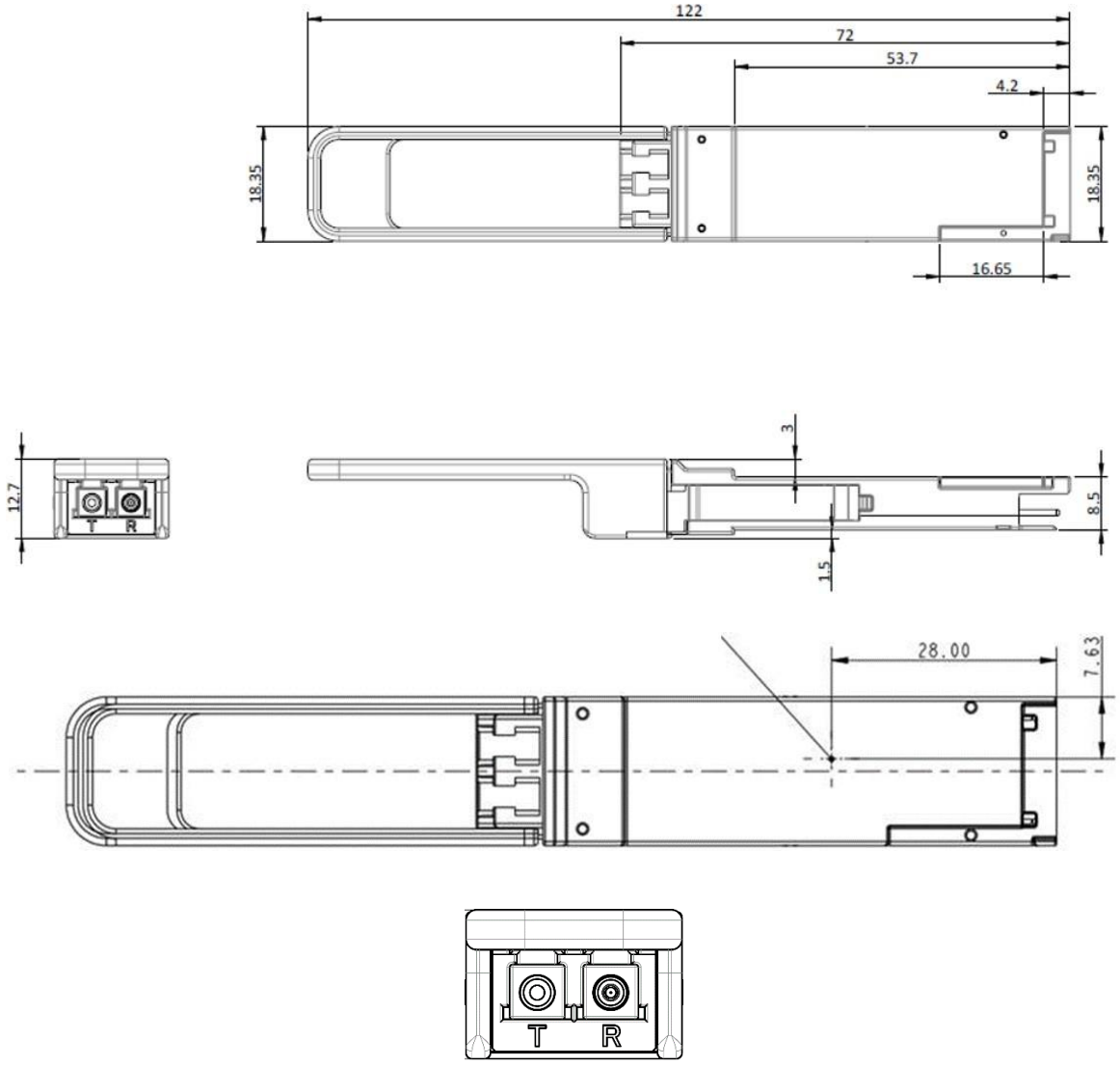
QS28-100G-DR1-05 can be used in Data Centers, High-speed interconnects within and between switches, routers and transport equipment, Server-Server Clusters, Super-computing interconnections and other network applications.

This module incorporates one channel optical signal, on 1310nm center wavelength. The transmitter path incorporates an EML Driver integrated in the DSP and a cooled EML together. On the receiver path, the input optical signal is coupled to a Pin photodiode detector. can convert 4-channel 25.78125Gbit/s electrical data to 1-channel 106.25Gbit/s optical signals. It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. The module offers very high functionality and feature integration, accessible via a two-wire serial interface.

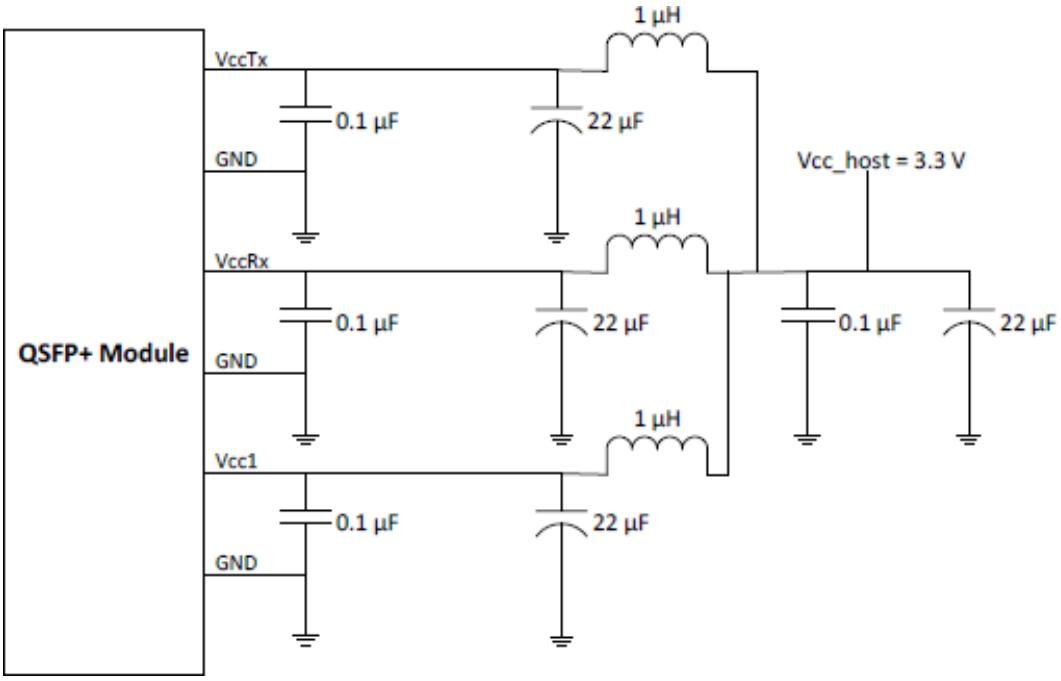
Key Features

- IEEE 100GBASE-DR compliant
- 100GE Single Protocol (103.125 Gb/s)
- CAUI-4 compliant - 4x 25.78125 Gb/s
- 100GAUI-4 compliant – 4x 26.5625 Gb/s
- RS-FEC(544,514) FEC coder/decoder function
- < 3.5 W MAX
- 0 to 70°C
- Single cooled 100Gb/s 1310nm EML
- Single PIN PD + low-power TIA
- SFF-8636 management interface

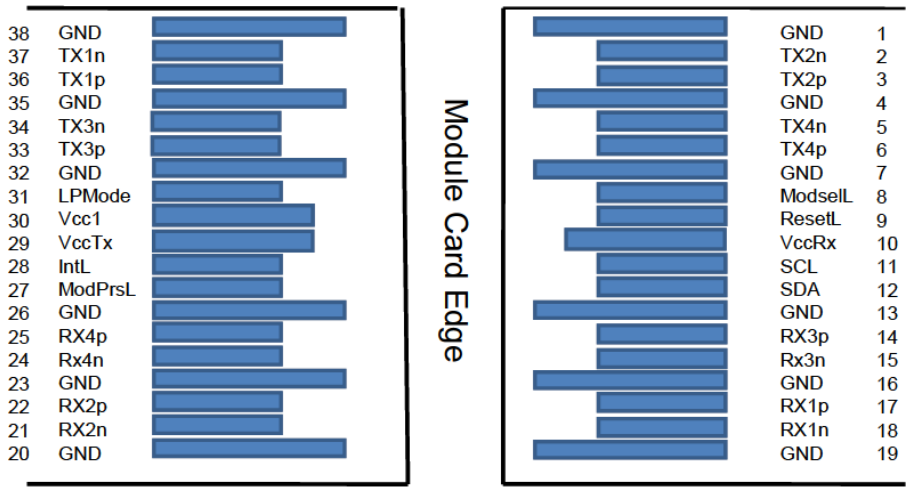
Mechanical Dimensions



Host Board Power Supply Filtering



Pin Assignment



Top Side
Viewed From Top

Bottom Side
Viewed From Bottom

Pin	Logic	Symbol	Name/Description	Plug Sequence	Note
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	

Pin	Logic	Symbol	Name/Description	Plug Sequence	Note
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	3	
7		GND	Ground	1	1
8	LVTTL-I	ModSelL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		VccRx	3.3V Power Supply Receiver	2	2
11	LVCMOS-I/O	SCL	2-Wire serial Interface Clock	3	
12	LVCMOS-I/O	SDA	2-Wire serial Interface Data	3	
13		GND	Ground	1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsl	Module Present	3	
28	LVTTL-O	IntL	Interrupt	3	
29		VccTx	3.3V power supply transmitter	2	2
30		Vcc1	3.3V power supply	2	2
31	LVTTL-I	LPMode	Low Power Mode	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Output	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Output	3	
38		GND	Ground	1	1

Notes:

1. GND is the symbol for signal and supply (power) common for the module. All are common within the the 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 shall be applied concurrently. Requirements defined for the host side of the Host Edge Card connector are listed in above table. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the module in any combination. The connector pins are each rated for a maximum current of 1000 mA.

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{CC}	0	-	+3.6	V	3.3
Storage Temperature		-40	-	+85	°C	
Optical Receiver Input		-		+5.0	dBm	Average

Operating Environment

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Power Supply Voltage Noise Tolerance	PSNR	-	-	66	mV	10 Hz – 10 MHz
MaximumPower Consumption		-	-	3.5	W	Target
Power Supply Current		-	-	1010.1	mA	Steady state
Operating Case Temperature	T_C	0	25	70	°C	

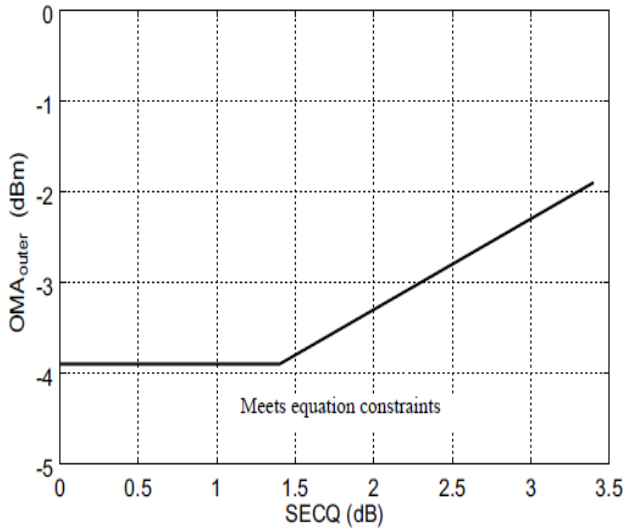
Optical Characteristics

Parameter	Min.	Typ.	Max	Unit	Note
Transmitter					
PAM4 Signaling Rate	53.125 ± 100 ppm			GBd	
Lane Wavelengths	1304.5 - 1317.5			nm	
Side-Mode Suppression Ratio (SMSR)	30			dB	
Average Launch Power (Max)			4	dBm	
Average Launch Power (Min)	-2.9			dBm	1
Outer Optical Modulation Amplitude (OMAouter) (Max)	-0.8		4.2	dBm	2
Outer Optical Modulation Amplitude (OMAouter) (Min)				dBm	2
Launch Power in OMAouter Minus TDECQ ER≥5dB2 (Min)	-2.2			dBm	
Launch Power in OMAouter Minus TDECQ ER<5dB2 (Min)	-1.9			dBm	
Transmitter and Dispersion Penalty Eye Closure for PAM4 (TDECQ), (Max)			3.4	dB	
TDECQ – 10*Log10(Ceq) (Max)			3.4	dB	4
Average Launch Power of OFF Transmitter (Max)			-15	dBm	
Extinction Ratio (Min)	3.5			dB	
Optical Return Loss Tolerance (Max)			15.5	dB	
Transmitter Reflectance (Max)			-26	dB	3
Transmitter Transition Time (Max)			17	ps	
RIN15.5 OMA (Max)			-136	dB/Hz	
Receiver					
PAM4 Signaling Rate	53.125 ± 100 ppm			GBd	
Lane Wavelengths	1304.5 - 1317.5			nm	
Damage Threshold (Min)	5			dBm	5
Average Receive Power (Max)			4	dBm	

Parameter	Min.	Typ.	Max	Unit	Note
Average Receive Power (Min)	-5.9			dBm	6
Receive Power (OMAouter) (Max)			4.2	dBm	
Receiver Reflectance (Max)			-26	dB	
Receiver Sensitivity (OMAouter) (Max)			−3.9, $SECQ$−5.	dBm	7
Stressed Receiver Sensitivity (OMAouter) (Max)			-1.9		8
Conditions of Stressed Receiver Sensitivity Test					9
Stressed Eye Closure for PAM4 (SECQ)			3.4	dB	
SECQ – 10*Log10(Ceq) (Max)			3.4	dB	10

Notes:

1. Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
2. Even if the TDECQ < 1.4 dB for an extinction ratio of ≥ 5 dB or TDECQ < 1.1dB for an extinction ratio of < 5 dB, the OMAouter (min) must exceed this value.
3. Transmitter reflectance is defined looking into the transmitter.
4. Ceq is a coefficient defined in IEEE Std 802.3-2018 clause 121.8.5.3 which accounts for reference equalizer noise enhancement.
5. The receiver shall be able to tolerate, without damage, continuous exposure to an optical signal having this average power level.
6. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
7. Receiver sensitivity (OMAouter), (max) is informative and is defined for a transmitter with a value of SECQ up to 3.4 dB.
8. Measured with conformance test signal at TP3 (see IEEE Std 802.3cd clause 140.7.10) for the BER specified in IEEE Std 802.3cd clause 140.1.1.
9. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.
10. Ceq is a coefficient defined in IEEE Std 802.3-2018 clause 121.8.5.3 which accounts for reference equalizer noise enhancement.



RX_LOS Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Receiver Loss of Signal Indicator Assert Level	RX_LOS	-30	-	-7.5	dBm	Average power
Receiver Loss of Signal Indicator De-assert Level	RX_LOS	-	-	-7	dBm	Average power

Electrical Characteristics

Parameter	Min.	Typ.	Max.	Unit	Note
Transmitter (each lane)					
Differential Pk-Pk Input Voltage Tolerance (Min)	900	-	-	mV	at TP1a
Differential Termination Mismatch	-	-	10	%	at TP1
Single-Ended Input Voltage Tolerance Range	-0.4 to 3.3	-	-	V	at TP1a
DC Common Mode Voltage	-350	-	2850	mV	at TP1
Receiver (Each Lane, at TP4)					
AC Common-Mode Output Voltage (RMS)	-	-	17.5	mV	
Differential Output Voltage	-	-	900	mV	
Eye Width	0.57	-	-	UI	
Eye Height, Differential	228	-	-	mV	
Vertical Eye Closure	-	-	5.5	dB	
Differential Termination Mismatch	-	-	10	%	
Transition Time (20% to 80%)	12	-	-	ps	
DC Common Mode Voltage	-350	-	2850	mV	

Notes: Electrical Rx output is squelched for loss of optical input signal.

Ordering Information

Product Name	Product Description
Q28-100G-DR1-05	QSFP28 Plug-in, 100GBASE-DR, Single Lambda 1310nm, SMF 500m Optical Transceiver, LC, DOM

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