100 Gb/s 2km QSFP28 CWDM4 Transceiver

QSFP28 Series

- Hot-pluggable QSFP28 from factor
- Supports 103.1Gb/s aggregate bit rate
- Supports 4X25Gb/s CWDM transmitter and PIN/TIA receiver
- 2km on Single Mode Fiber
- Single 3.3V power supply
- Maximum power dissipation<3.5W
- RoHS-6 compliant and lead-free

Ascent's QSFP28-100G-LP02 transceiver modules are designed for use in 100 Gigabit Ethernet links over single mode fiber. They are compliant with the QSFP28 MSA, CWDM4 MSA, IEEE 802.3ba and IEEE 802.3bm. They are suitable to be used in various applications, such as data centers, high-performance computing networks, enterprise core and distribution layer applications.

The central wavelengths of the 4 CWDM channels are 1271, 1291, 1311 and 1331 nm. It contains a duplex LC connector for the optical interface and a 38-pin connector for the electrical interface. This product converts the 4- channel 25Gb/s electrical input data into CWDM optical signals (light), by a 4-wavelength Distributed Feedback Laser (DFB) TO.

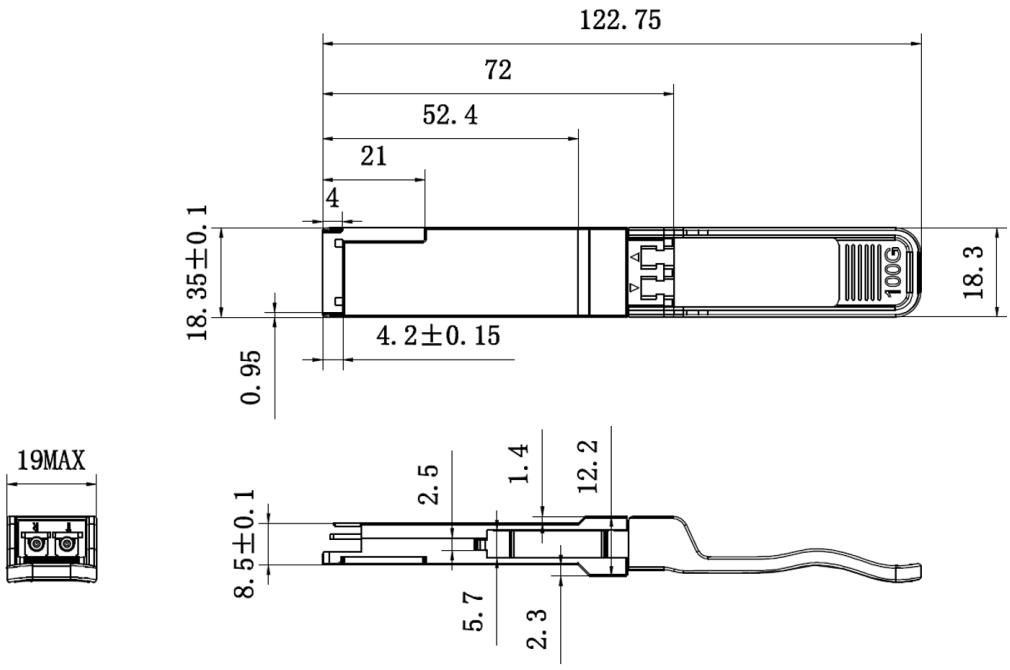
The 4 wavelengths are multiplexed into a single 100Gb/s data, propagating out of the transmitter module via the SMF. The receiver module accepts the 100Gb/s optical signals input, and de-multiplexes it into 4 CWDM 25Gb/s channels. Each wavelength light is collected by a discrete photo diode, and then outputted as electric data after amplified by a TIA.

The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP28 Multi-Source Agreement (MSA). The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

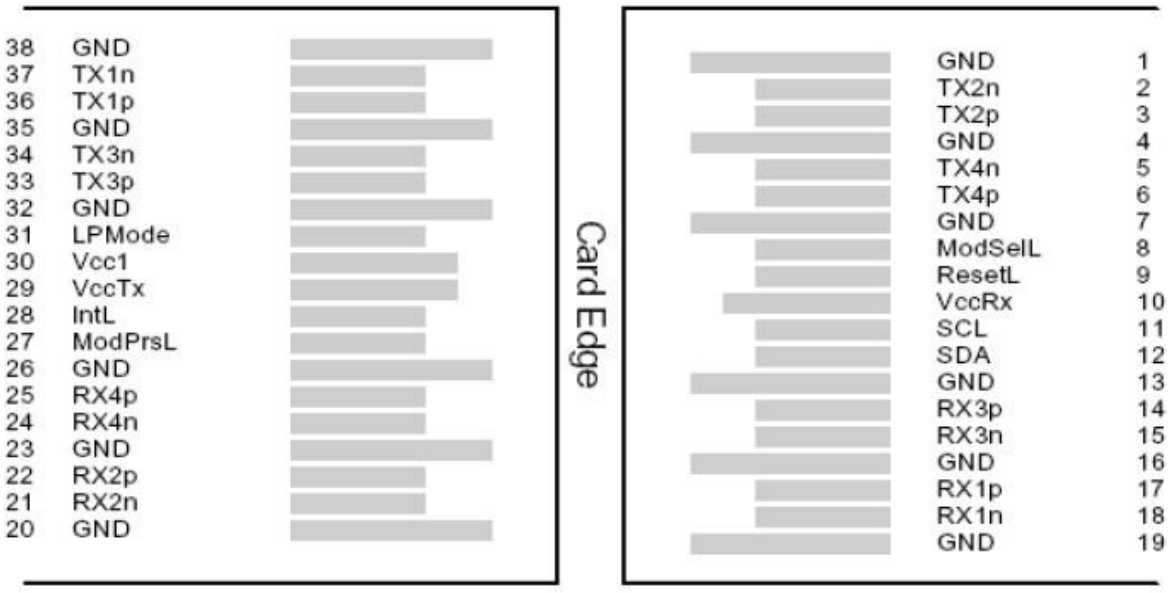
Key Features

- Supports 103.1Gb/s aggregate bit rate
- 4x25Gb/s electrical interface
- 4X25Gb/s CWDM transmitter and PIN/TIA receiver
- Maximum link length of 2km on Single Mode Fiber (SMF)
- Hot-pluggable QSFP28 from factor
- Single 3.3V power supply
- Integrated 4-channel CWDM mux/Demux for duplex LC operation
- Duplex LC receptacles
- Maximum power dissipation<3.5W
- RoHS-6 compliant and lead-free
- I2C management interface
- Commercial operating temperature: 0°C to +70°C

Outline Diagram



Pin Assignment



Top Side
Viewed from Top

Bottom Side
Viewed from Bottom

Pin	Symbol	Name/Description	Note
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSe1L	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	1
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	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrSL	Module Present	

28	IntL	Interrupt	
29	VccTx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power Supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Note:

1. Circuit ground is internally isolated from chassis ground.

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T_s	-40	--	85	°C	
Storage Ambient Relative Humidity	H_A	0	--	85	%	
Maximum Supply Voltage	V_{CC}	-0.5	--	3.6	V	
Lead Soldering Temperature/Time	TSOLD	--	--	260/10	°C /sec	1
Lead Soldering Temperature/Time	TSOLD	--	--	360/10	°C /sec	2

Note:

1. Suitable for wave soldering.
2. Only for soldering by iron.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter(per lane)						
Signaling Speed per Lane			25.78125 ± 100 ppm		Gb/s	1
Center Wavelength	λ_C	--	1264.5 ~ 1277.5 1284.5 ~ 1297.5 1304.5 ~ 1317.5 1324.5 ~ 1337.5	--	nm	
Extinction Ratio	ER	3.5	--	--	dB	
Side Mode Suppression Ratio	SMSR	30	--	--	dB	
Total Average Launch Power	Ptot	--	--	8.5	dBm	
Average Launch Power, Each Lane	Po	-6.5	--	2.5	dBm	
OMA, Each Lane	OMA	-4	--	2.5	dBm	CW,ER >3.5dB
Difference in Launch Power between Any Two Lanes (OMA)				5	dB	
TDP, Each Lane	TDP			3.0	dB	2
Average Launch Power of OFF Transmitter, Each Lane	Poff			-30	dBm	
Transmitter Eye Mask Definition {X1,X2,X3,Y1,Y2,Y3}			{0.31, 0.40, 0.45, 0.34, 0.38, 0.4}			3
Receiver(per lane)						
Signaling Speed per Lane			25.78125 ± 100 ppm		Gb/s	4
Input Optical Wavelength	λ_{IN}		1264.5 ~ 1277.5		nm	

		1284.5 ~ 1297.5 1304.5 ~ 1317.5 1324.5 ~ 1337.5			
Damage Threshold		3.5		dBm	
Receiver Power (OMA), Each Lane		2.5		dBm	
Rx Sensitivity(OMA) per Lane	R_{SENS}		-10	dBm	5
Stressed Receiver Sensitivity (OMA), Each Lane	SRS		-7.3	dBm	6
Conditions of stressed receiver sensitivity test					
Vertical Eye Closure Penalty, Each Lane	VECP	1.9		dB	
Stressed Eye J2 Jitter, Each Lane	J2	0.33		UI	
Stressed Eye J4 Jitter, Each Lane	J4	0.48		UI	
SRS Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}		{0.39, 0.50, 0.50, 0.39, 0.39, 0.4}			
Loss of Signal Assert	P_A	-24	-13.6	dBm	
Loss of Signal De-assert	P_D		-11.6	dBm	
LOS Hysteresis	P_D - P_A	0.5	6	dB	

Note:

1. Transmitter consists of 4 lasers operating at 25.78 Gb/s each.
2. TDP value does not include MPI penalty.
3. Hit ratio of $5x10^{-5}$, per IEEE.
4. Receiver consists of 4 photodetectors operating at 25.78 Gb/s each.
5. Sensitivity is specified at $5x10^{-5}$ BER.
6. Measured with CWDM4 MSA2 conformance test signal at TP3 for $5x10^{-5}$ BER.

Electrical Interface Characteristics

Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Note**
Supply Voltage	V_{CC}	3.135		3.465	V	
Supply Current	I_{CC}			1.12	A	
Module Total Power	P			3.5	W	1
Transmitter						
Signaling Rate per Lane			25.78125±100ppm		Gb/s	
Differential Data Input Swing per Lane	V_{in}, pp	900			mV	
Differential Input Return Loss(min)	RLd(f)		9.5-0.37f, 0.01≤f<8 4.75-7.4log10(f/14), 8≤f<19		dB	
Differential to Common Mode Input Return Loss(min)	RLdc(f)		22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19		dB	
Differential Termination				10	%	

Mismatch						
Eye Width			0.46		UI	
Applied Pk-Pk Sinusoidal Jitter			Per IEEE802.3bm Table 88-13		--	
Eye Height			95		mV	
Receiver						
Signaling Rate per Lane			25.78125±100ppm		Gb/s	
Differential Data Output Wwing	V_{out}, pp	100		400	mVpp	2
		300		600		
		400	600	800		
		600		1200		
Eye Width		0.57			UI	
Vertical Eye Closure	VEC			5.5	dB	
Differential Output Return Loss (min)	RLd(f)	9.5-0.37f, 0.01≤f<8 4.75-7.4log$_{10}$(f/14), 8≤f<19			dB	
Common to Differential Mode Conversion Return Loss (min)	RLdc(f)	22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19			dB	
Differential Termination Mismatch				10	%	

Note:

1. Maximum total power value is specified across the full temperature and voltage range.
2. Output voltage is settable in 4 discrete range via I2C.Default range is Range 2 (400 – 800mV).

Digital Diagnostic Functions

Ascent's QSFP28-100G-LP02 supports transceivers support the I2C-based diagnostics interface specified by the QSFP28 MSA Transceiver temperature.

Ordering Information

Product Name	Product Description
QSFP28-100G-LP02	QSFP+ Plug-in, 100Gbps, 2 km, 4 CWDM wavelength (1271, 1291, 1311, 1331nm) on single-mode fiber, LC Connector

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Specifications and product availability are subject to change without notice.

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