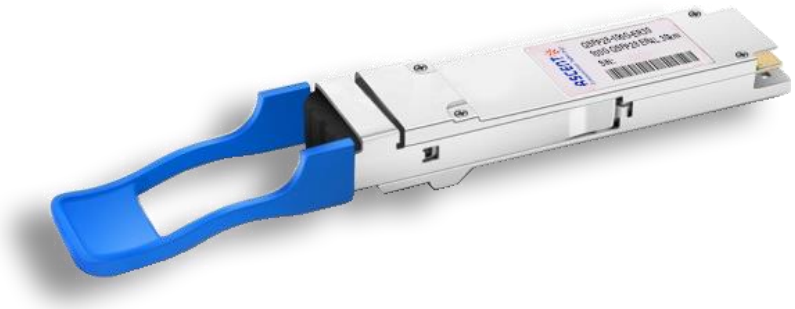
100G QSFP28 ER4 Lite 30 km Transceiver

QSFP28 Series



- Hot-pluggable QSFP28 MSA form factor
- Compliant with 100GBASE-ER4 Lite
- 103.1 Gb/s aggregate data rate
- Up to 30 km reach over SMF
- DDM Interface
- Duplex LC optical receptacle
- Electrically hot-pluggable
- Compliant to IEEE 802.3bm
- Compliant to SFF-8665 and SFF-8679

Ascent's 100G QSFP28 ER4 Lite Optical Transceiver offers service providers, network operators 100 Gigabit Ethernet connectivity options for data center networking, enterprise core aggregation, and service provider transport applications. It integrates receiver and transmitter path on one module.

In the transmit side, four lanes of serial data streams are recovered, retimed, and passed to four laser drivers. The laser drivers control 4-EML with center wavelength of 1296 nm, 1300nm, 1305nm and 1309 nm. The optical signals are multiplexed to a single–mode fiber through an industry standard LC connector.

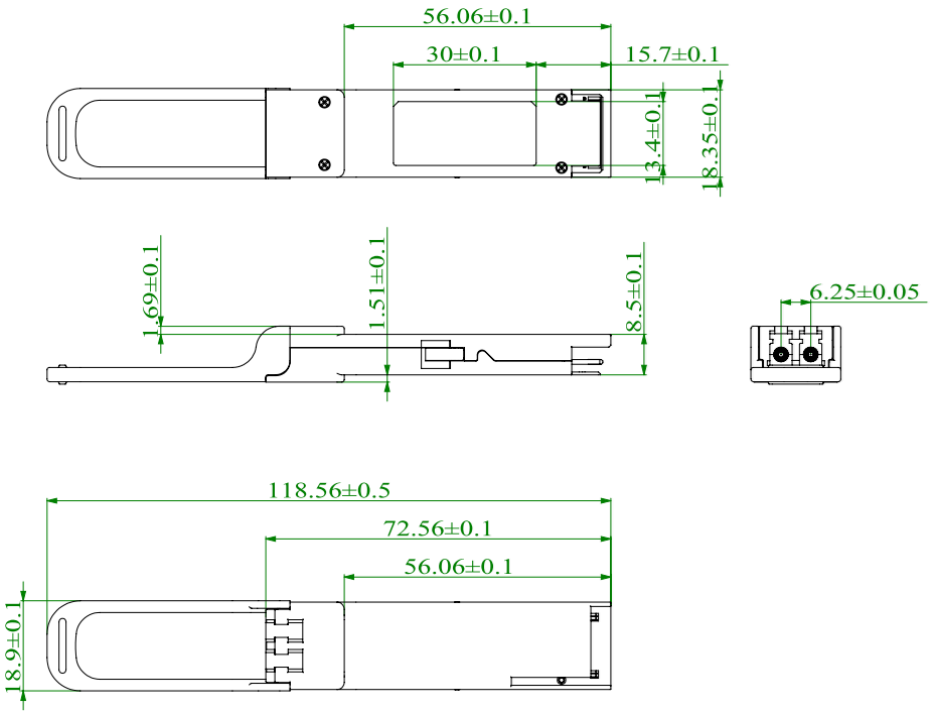
In the receive side, the four lanes of optical data streams are optically de-multiplexed by the integrated optical de-multiplexer. Each data stream is recovered by a APD and trans-impedance amplifier, retimed. This module features a hot-pluggable electrical interface, low power consumption and 2-wire serial interface.

This product is designed with form factor, optical/electrical connections, and digital diagnostic interface according to the QSFP28 Multi-Source Agreement (MSA) and compliant to IEEE 802.3bm.

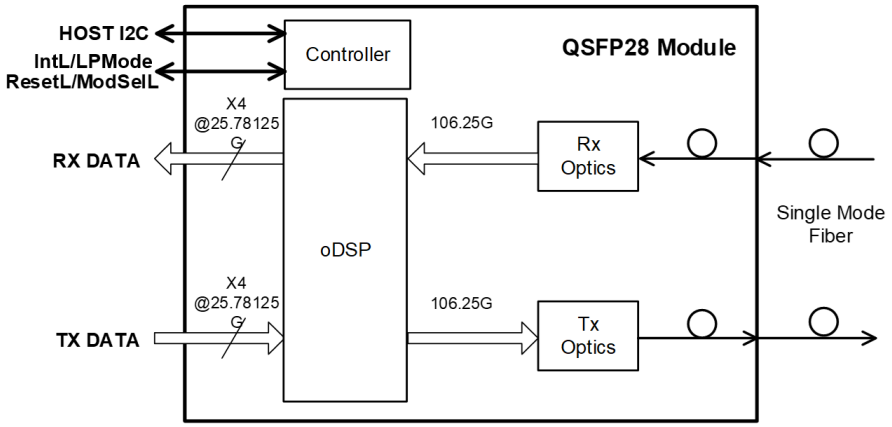
Key Features

- Supports 100GBASE (103.1Gb/s) aggregate
- Lane bit rate 25.78 Gb/s 100GE
- Up to 30km transmission on SMF
- LAN WDM EML laser and APD receiver
- High speed I/O electrical interface (CAUI-4)
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with duplex LC connector
- Single +3.3V power supply
- Maximum power consumption 5 W
- Operating case temperature: 0 to +70 °C
- Compliant to IEEE 802.3bm
- Compliant to SFF-8665 and SFF-8679
- Complies with EU Directive 2015/863/EU

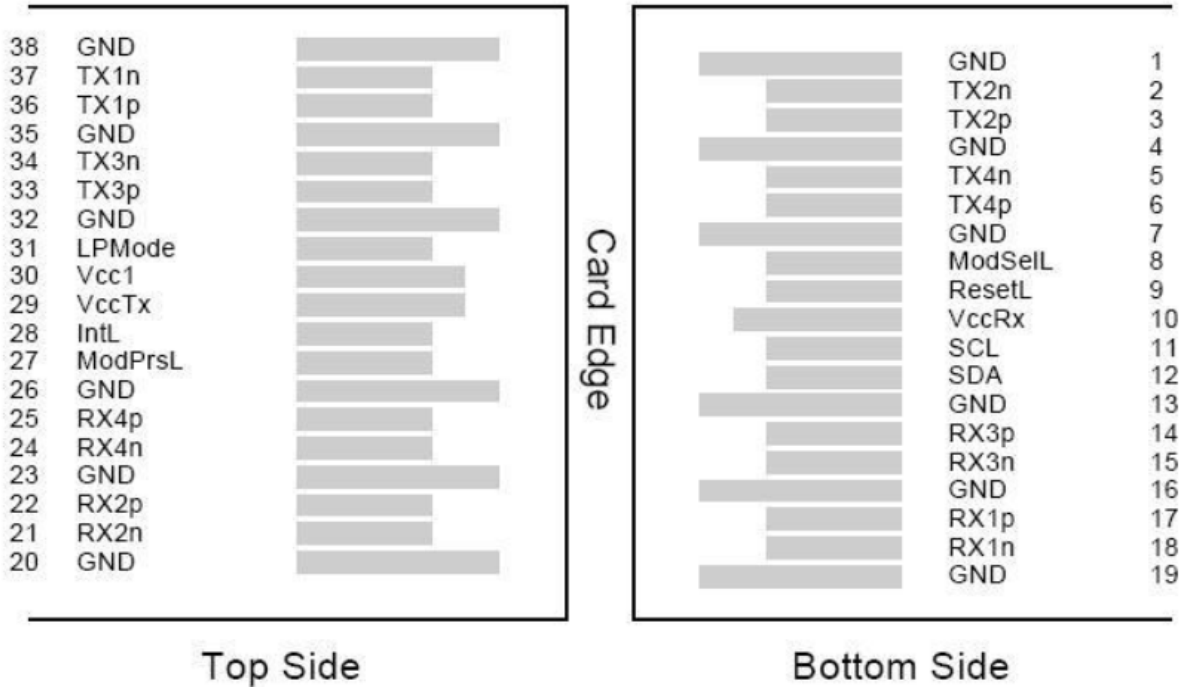
Outline Diagram



Host-Transceiver Block Diagram



Pin Assignment



Pin out of Connector Block on Host Board

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.	Typ.	Max.	Unit	Note
Storage Temperature	T_S	-40	-	+85	°C	
Supply Voltage	V_{CC}	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Case Temperature	T_C	0	-	+70	°C	
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Power Supply Current	I_{CC}	-	-	1.5	A	
Maximum Power Dissipation	P_D	-	-	5	W	
Aggregate Bit Rate	BR_{AVE}	-	103.125	-	Gb/s	
Lane Bit Rate	BR_{LANE}	-	25.78	-	Gb/s	
Transmission Distance	TD	-	-	30	km	Over SMF

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	~~λ_3~~	1308.09	1309.14	1310.19	nm	
Total Launch Power, 100GE	P_{ALL}	-	-	12.5	dBm	1
Average Launch Power per Lane, 100GE	P_{TX_LANE}	-2.5	-	6.5	dBm	1
OMA per Lane, 100GE	OMA	0.5	-	6.5	dBm	1
Average Output Power (Laser Turn off)	$P_{OUT-OFF}$	-	-	-30	dBm	
Difference in launch power between lanes	$P_{TX\_DELTA\_LANE}$	-	-	4	dB	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio, 100GE	ER	4.5	-	-	dB	
Launch Power in OMA Minus TDP, per Lane	OMA - TDP	-0.5	-	-	dBm	
Transmitter and Dispersion Penalty	TDP	-	-	3	dB	2
Optical Eye Mask, 100GE	Compliant with 4WDM-40 MSA {0.25, 0.4, 0.45, 0.25, 0.28, 0.4}					2
Receiver						
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	

Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Damage Threshold	P_{damage}	-2.5	-	-	dBm	
Average Rx Power per Lane, 100GE	P_{RX_LANE}	-20.5		-3.5	dBm	3
OMA Sensitivity per Lane, 100GE	P_{OMA_LANE}	-	-	-18.5	dBm	3
Los Assert	LosA	-40			dBm	
Los De-Assert	LosDA			-22	dBm	
Los Hystersis	LosH	0.5		5	dB	

Notes:

1. The optical power is launched into SMF
2. Measured with a PRBS 2^{31}-1 test pattern @ 25.78125 Gb/s, Hit ratio ≤ 5E-5.
3. Measured with a PRBS 2^{31}-1 test pattern @ 25.78125 Gb/s, BER ≤ 5E-5.

Electrical Characteristics

High-Speed Signal: Compliant to CAUI-4 (IEEE 802.3bm)

Low-Speed Signal: Compliant to QSFP-8679.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter (Module Input)						
Differential Data Input Amplitude	$V_{IN,P-P}$	85	-	900	mVpp	
Differential Termination Mismatch		-	-	10	%	
LPMode, Reset and ModSelL, V in Low	V_{IL}	-0.3	-	0.8	V	
LPMode, Reset and ModSelL, V in High	V_{IH}	2.0	-	VCC+0.3	V	
Receiver (Module Output)						
Differential Data Output Amplitude	$V_{OUT,P-P}$	200	-	900	mVpp	
Differential Termination Mismatch		-	-	10	%	
Transition time, 20% to 80%	Tr Tf	12	-	-	ps	
ModPrsL and IntL, V Out Low	VOL	0	-	0.4	V	
ModPrsL and IntL, V Out High	V_{OH}	VCC-0.5	-	VCC+0.3	V	

Digital Diagnostic

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to VCC	0.1	V	Internal
Tx Bias Current Per Lane	0 to 100	10%	mA	Internal
Tx Output Power Per Lane	-2.5 to 6.5	±3	dBm	Internal
Rx Power (Each Lane)	-20.5 to -3.5	±3	dBm	Internal

Ordering Information

Product Name	Product Description
QSFP28-100G-ER30	QSFP28 Plug-in, 100GBASE-ERL, Single Channel 1310nm, 30km Optical Transceiver, LC, DOM

Contact Information

Ascent Communication Technology Ltd

AUSTRALIA
140 William Street, Melbourne
Victoria 3000, AUSTRALIA
Phone: +61-3-8691 2902

CHINA
Unit 1933, 600 Luban Road
200023, Shanghai CHINA
Phone: +86-21-60232616

EUROPE
Pfarrer-Bensheimer-Strasse 7a
55129 Mainz, GERMANY
Phone: +49 (0) 6136 926 3246

HONG KONG SAR
Unit 9, 12th Floor, Wing Tuck Commercial Centre
177 Wing Lok Street, Sheung Wan, HONG KONG
Phone: +852-2851 4722

USA
2710 Thomes Ave
Cheyenne, WY 82001, USA
Phone: +1-203 816 5188

VIETNAM
15 /F TTC Building, Duy Tan Street
Cau Giay Dist., Hanoi, VIETNAM
Phone: +84 243 795 5917

WEB: www.ascentcomtec.com

EMAIL: sales@ascentcomtec.com

Ver. ACT_QSFP28-100G-ER30_Datasheet_V1b_Nov_2020