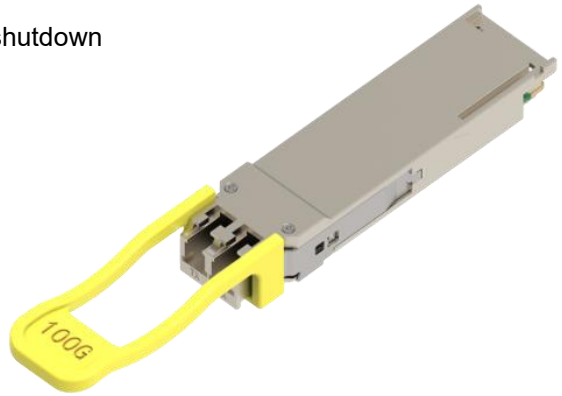
100Gbps QSFP28 BIDI Transceiver, 40KM Reach

Product Features

- QSFP28 MSA package with simplex LC connector
- Compliant to 100G Lamda MSA 100G-ER1 Optical Specifications
- Two Wire Serial Interface with Digital Diagnostic Monitoring
- Support KP4 FEC inside the module and KP4 FEC shutdown
- Lane signaling rate 53.125GBd with PAM4
- High speed I/O electrical interface
- Maximum power consumption 4.5W
- Reaches up to 40km on SMF
- 3.3V power supply voltage
- Compliant to RoHS2.0
- Class 1 Laser
- Operating case temperature range ：

commercial grade: 0~+70℃ , industrial grade: - 40 ~85℃



Applications

- Switch/Router
- 100G BASE Ethernet
- Data center network networking

Description

This transceiver provides 100GBase-BX throughput up to 40km over single-mode fiber (SMF).Use center wavelength 1304nm/1309nm through LC connector.This bidirectional unit must be used with another transceiver or network appliance of complimenting wavelengths. Digital diagnostics functions are also available via the I2C interface, as specified by the QSFP28 MSA, to allow access to real-time operating parameters. With these features, this easy to install, hot swappable transceiver is suitable to be used in various applications, such as 100G Ethernet, data center, and storage area networks applications.

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Table 1 -Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Note
Storage Temperature	TS	-40	85	°C	
Operating Case Temperature	TOP	0	70	°C	
Power Supply Voltage	VCC	-0.5	4	V	
Relative Humidity (non-condensation)	RH	0	85	%	

Recommended Operating Conditions

Table 2 -Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Note
Operating Case Temperature	TOP	0		70	°C	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	

Power Consumption				4.5	W	
Supply Current	Icc			1.3	A	
Aggregate Bit Rate	BRAVE	-	103.125	106.25	Gb/s	
Lane Bit Rate	BRLANE	-	25.78	26.5625	Gb/s	
Transmission Distance	TD			40	KM	Over SMF

Optical Characteristics

Table 3 -Optical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmitter							
Data Rate				103.125	106.25	Gbps	
Data rate variation			-100		+100	ppm	
Lane center wavelength			1304.06	1304.58	1305.1	nm	
			1308.61	1309.14	1309.66	nm	
Launch power	Peach		1.5		7.1	dBm	1，2
Optical modulation amplitude	POMA	For TDECQ <1.4dB	4.5		7.9	dBm	
		For 1.4dB< TDECQ <TDEC Q(max)	3.1+ TDEC Q		7.9		
Transmitter and Dispersion eye closure	TDECQ				3.9	dBm	
Optical Extinction	ER		6			dB	

Ratio							
Side mode Suppression ratio	SMSR		30			dB	
Launch power of OFF Transmitter					-30	dBm	
Relative Intensity Noise	RIN				-136	dB/Hz	
Optical return loss tolerance					15.6	dB	
Transmitter reflectance					-26	dB	4
Receiver							
Data Rate				103.125	106.25	Gbps	
Data rate variation			-100		+100	ppm	
Lane center wavelength			1308.61	1309.14	1309.66	nm	
			1304.06	1304.58	1305.1	nm	
Damage threshold	Rdam		-2.4			dBm	5
Average receiver power	Rpow		-16.2		-3.4	dBm	6
Receiver power(OMA)	Rovl				-2.6	dBm	
Receiver sensitivity (OMA), (max)	SOMA	For TDECQ <1.4dB			-14.0	dBm	@BER2.4 e-4
		For 1.4dB< TDECQ <3.9			-15.4+ TECQ	dBm	
Stressed Sensitivity	SRS				-11.5	dBm	8
Receiver reflectance					-26	dB	
LOSS assert	Optica l		-26		-18	dBm	

	power alarm						
LOSS de-assert					-16	dBm	
Conditions of stressed receiver sensitivity test:							
Stressed eye closure for PAM4 (SECQ),					3.9	dB	8

Notes:

1、As the total average launch power limit has to be met, not all of the lanes can operate at the maximum average launch power ,each lane.

2、Average launch power, each lane(min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value can not be compliant: however, a value above this does not ensure compliance.

3、Transmitter reflectance is defined looking into the transmitter.

4、The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.

5、Average receiver 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.

6、Measured with conformance test signal at TP3 for the BER specified in 《100G-FR and 100G-LR1 Technical Specifications Rev 2.0》

7、These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

Electrical Characteristics

The following electrical characteristics are defined over the recommended operating environment

Table 4 -Electrical Characteristics

Transmitter (Module Input)						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Notes**
Input Differential Impedance	Rin	-	100	-	Ohm	
Differential Data Input Amplitude	VIN,P-P	80	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
DC common-mode input voltage		-0.3	-	2.8	V	
Transition time(20%~80%)	Tr Tf	10	-	-	ps	
LPMode, Reset and ModSelL / Tx dis	VIL	-0.3	-	0.8	V	
LPMode, Reset and ModSelL / Tx dis	VIH	2.0	-	VCC+0.3	V	
Receiver (Module Output)						
Output Differential Impedance	Rout	-	100	-	Ohm	
Differential Data Output Amplitude	VOUT,P-P	-	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
Transition time, 20% to 80%	Tr Tf	12	-		ps	
ModPrsL and IntL/ Rx los	VOL	0	-	0.4	V	
ModPrsL and IntL/ Rx los	VOH	VCC-0.5	-	VCC+0.3	V	

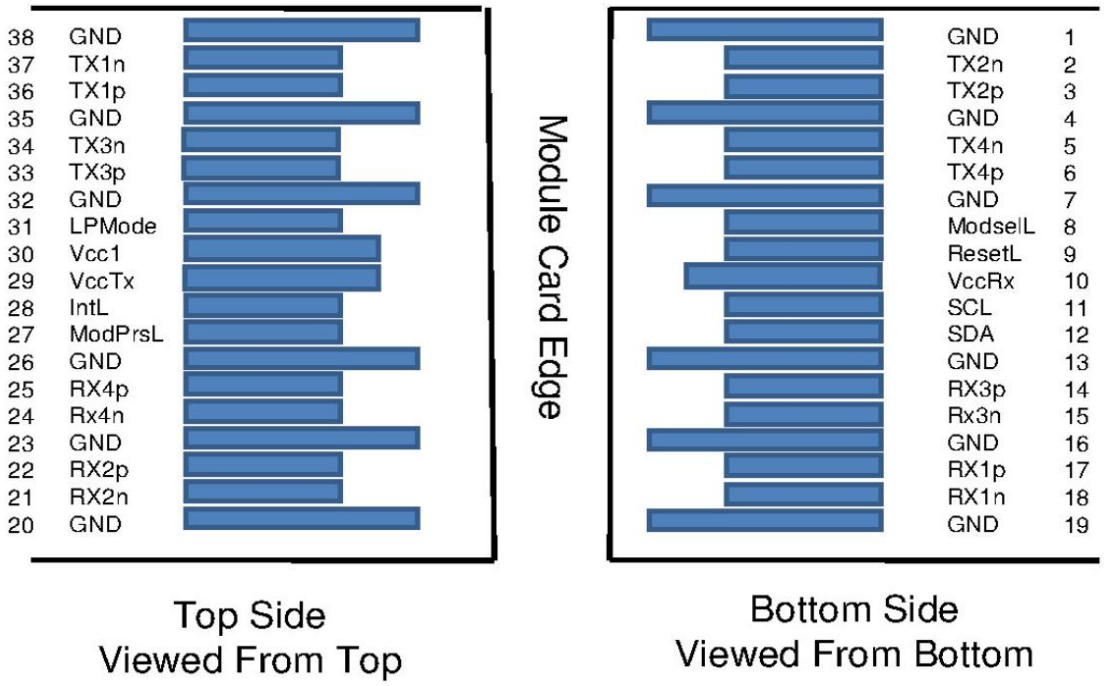
Digital Diagnostics

Table 6-Digital Diagnostics

Parameter	Symbol	Min	Max	Unit	Note
Temperature Monitor Absolute Error	DMI_Temp	-3	3	°C	Cover full operating temperature range
Supply Voltage Monitor Absolute Error	DMI _VCC	-0.1	0.1	V	Cover full operating temperature range
Channel RX Power Monitor Absolute Error	DMI_RX_Ch	-3	3	dB	
Channel Bias Current Monitor	DMI_Ibias_Ch	-10%	10%		
Channel TX Power Monitor Absolute Error	DMI_TX_Ch	-3	3	dB	

Edge connector and pinout description

The electrical pinout of the QSFP28 module is shown in Figure 1 below.



PIN	Symbol	Name/Description	Note
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Ground	1
8	ModSelL	Module Select	3
9	ResetL	Module Reset	4
10	VccRx	+3.3V Power Supply Receiver	2
11	SCL	2-Wire Serial Interface Clock	3
12	SDA	2-Wire Serial Interface Data	3
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	

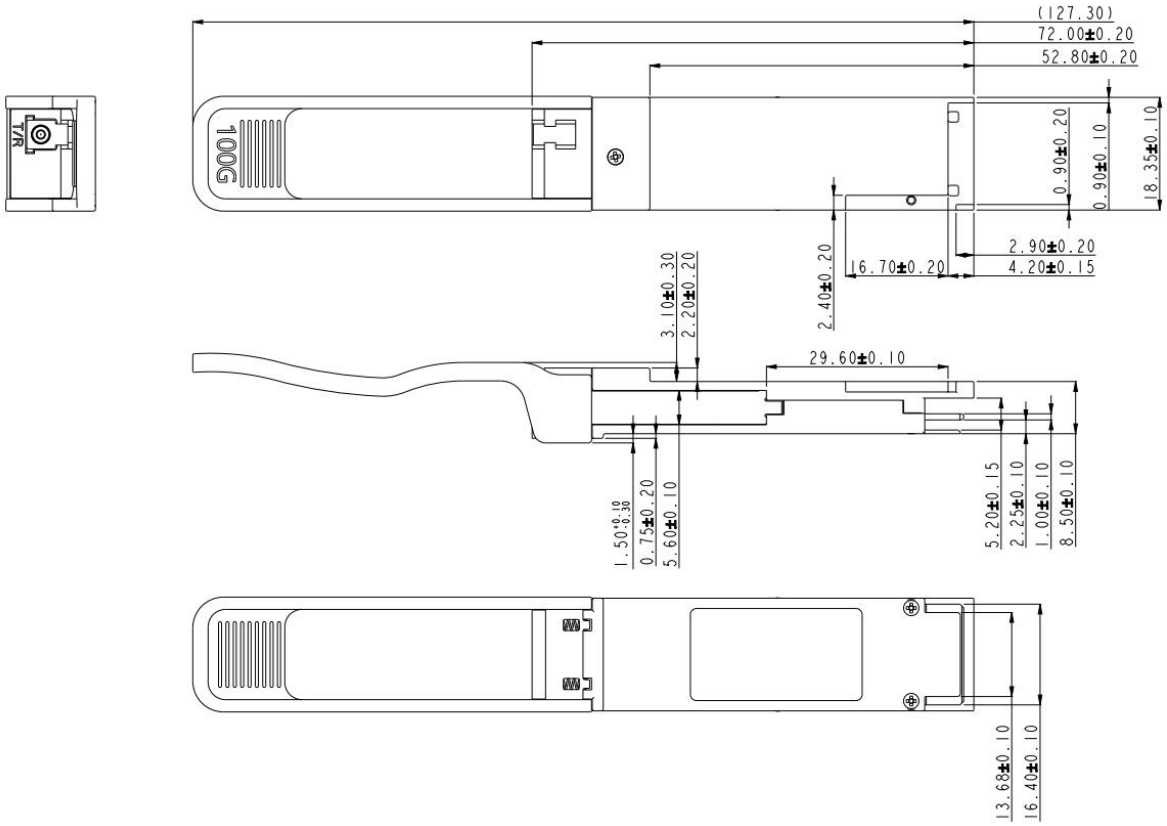
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	5
29	VccTx	+3.3 V Power Supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMode	Low Power Mode	5
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data output	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data output	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Notes:

1. GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 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. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power suppliers and shall be applied concurrently. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.
3. Timing for SCL, SDA and ModSelL shall comply with the common management interface document SFF-8636 and SFF-8679.
4. The QSFP28 module must support hardware reset operation.

5. Two Multi-Purpose PIN for supporting Tx_DIS and Rx_LOS function in the 100G QSFP28 module.The IIC interface must function normally when the QSFP28 module is in the LP mode.

Mechanical Dimension



Order Information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	DDM
HC-Q28-B49L-40D/ HC-Q28-B94L-40D	106.25Gbps	EML	SMF	40KM	Simplex LC	Y
Temp	Commercial grade: 0~+70℃ ,Industrial grade: - 40 ~85℃					