Product Specification

100Gb/s 40Km QSFP28 ER1 BIDI Transceiver module

Product Features

- Compliant with IEEE 802.3cu
- Compliant with SFF-8679 MSA hardware specification
- Compliant with SFF-8636
- Compliant with SFF-8661
- EML laser
- APD receiver
- Up to 40km on 9/125um SMF
- 100ohm differential impedance system
- Operating temperature options
  - (Commercial) 0ºC to +70 ºC
- Trouble-free installation and network bring-up
- RoHS Compliant

Applications

- Data Center
- 100 Gigabit Ethernet

The QSFP28 ER1 BIDI transceiver supports single 53.125GBd optical lane. The QSFP28 ER1 BIDI is designed for use up to 106.25Gb/s data rate and up to 40km link length.

Part No.	Specifications									Application
	Package	Data rate	Laser	Optical Power (OMA)	Detector	Sensitivity (OMA)	Temp	Reach	Other	
-	QSFP28	Up to 106.25G	1304.58nm EML	4.7 ~ +7.9dBm	APD	-13.8dBm	0~70℃	40km	DDM	
-	QSFP28	Up to 106.25G	1309.14nm EML	4.7 ~ +7.9dBm	APD	-13.8dBm	0~70℃	40km	DDM	

Pin function definitions

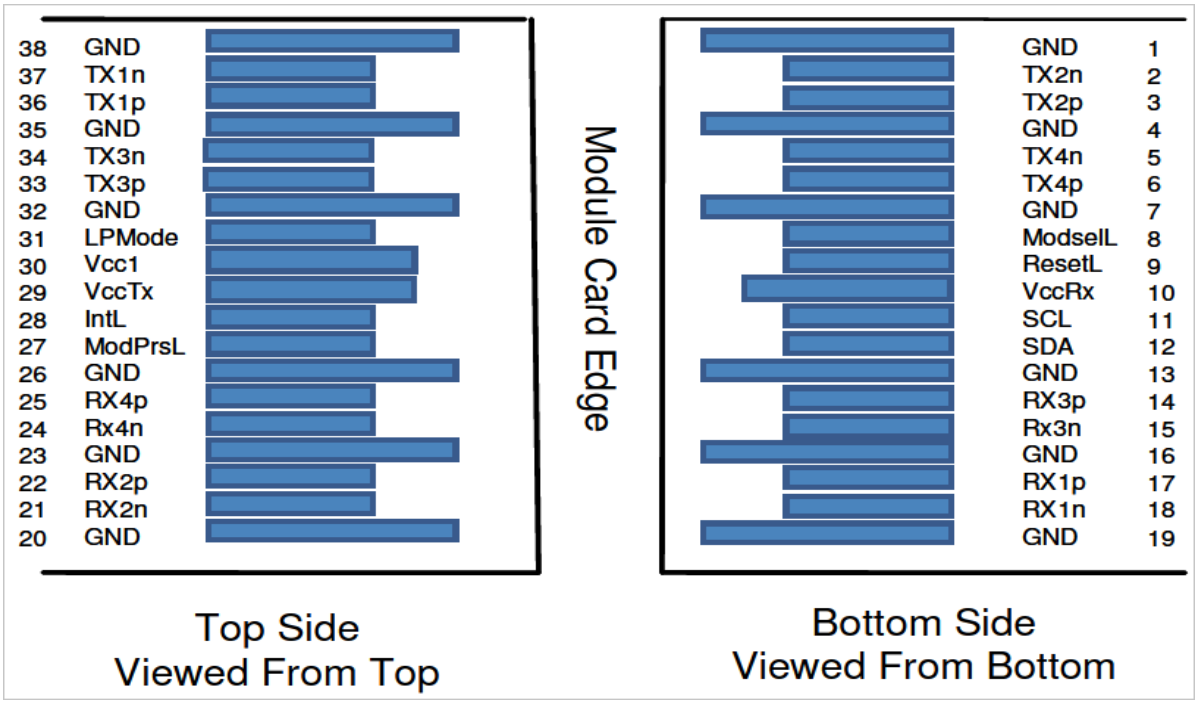

Figure 1.Pin function definitions

Table 1: Transceiver pin descriptions

Pin	Name	Description	Plug Sequence	Notes
1	GND	Ground	1	
2	Tx2n	Transmitter Inverted Data Input	3	
3	Tx2p	Transmitter Non-Inverted Data Input	3	
4	GND	Ground	1	
5	Tx4n	Transmitter Inverted Data Input	3	
6	Tx4p	Transmitter Non-Inverted Data Input	3	
7	GND	Ground	1	
8	ModSelL	Module Select	3	
9	ResetL	Module Reset	3	
10	Vcc Rx	+3.3 V 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	3	
15	Rx3n	Receiver Inverted Data Output	3	
16	GND	Ground	1	
17	Rx1p	Receiver Non-Inverted Data Output	3	
18	Rx1n	Receiver Inverted Data Output	3	
19	GND	Ground	1	
20	GND	Ground	1	

HANGZHOU SOFTEL OPTIC CO., LTD
Add: 708-709 Haiwei Building, No.101 Binkang Road Binjiang District, Hangzhou Zhejiang,China
Tel: +86 571 88989381 Fax: +86 571 88983280
https://www.softel-optic.com/

21	Rx2n	Receiver Inverted Data Output	3	
22	Rx2p	Receiver Non-Inverted Data Output	3	
23	GND	Ground	1	
24	Rx4n	Receiver Inverted Data Output	3	
25	Rx4p	Receiver Non-Inverted Data Output	3	
26	GND	Ground	1	
27	ModPrsL	Module Present	3	
28	IntL	Interrupt	3	
29	Vcc Tx	+3.3 V Power supply transmitter	2	
30	Vcc1	+3.3 V Power Supply	2	
31	LPMode	Low Power Mode	3	
32	GND	Ground	1	
33	Tx3p	Transmitter Non-Inverted Data Input	3	
34	Tx3n	Transmitter Inverted Data Input	3	
35	GND	Ground	1	
36	Tx1p	Transmitter Non-Inverted Data Input	3	
37	Tx1n	Transmitter Inverted Data Input	3	
38	GND	Ground	1	

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	^{o}C	-40	85
Relative Humidity	RH	%	0	85
Maximum Supply Voltage	Vcc3	V	-0.5	3.6

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	^{o}C	0		70
Power Supply Voltage	Vcc	V	3.14	3.3	3.46
Bit Rate	BR	Gb/s			106.25
Bit Error Ratio	BER				2E-4
Max Supported Link Length	L	Km			40

HANGZHOU SOFTEL OPTIC CO., LTD
Add: 708-709 Haiwei Building, No.101 Binkang Road Binjiang District, Hangzhou Zhejiang,China
Tel: +86 571 88989381 Fax: +86 571 88983280
https://www.softel-optic.com/

Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
Supply Voltage	V_{CC}	V	3.14	3.3	3.46	
Module Power		mW			4500	
Transmitter						
Input Differential Impedance	R_{IN}	Ω	90	100	110	
Differential Data Input	VIN	mVp-p	35		900	
Differential input return loss (min)	RLd	dB	IEEE 802.3ba, Section 83E-5			
Differential to common mode input return loss (min)	RLdc	dB	IEEE 802.3ba, Section 83E-6			
Receiver						
Differential Data Output	VOD	mVp-p			900	
AC common mode output voltage (RMS)		mV			17.5	
Differential output return loss (min)		dB	IEEE 802.3ba, Section 83E-2			
Common to differential mode conversion return loss (min)		dB	IEEE 802.3ba, Section 83E-3			
Output transition time,20% to80%		ps	12			
Vertical eye closure		dB			5.5	

HANGZHOU SOFTEL OPTIC CO., LTD
Add: 708-709 Haiwei Building, No.101 Binkang Road Binjiang District, Hangzhou Zhejiang,China
Tel: +86 571 88989381 Fax: +86 571 88983280
https://www.softel-optic.com/

Optical Characteristics *(Tc=0˚C to 70˚C and Vcc= 3.14 to 3.46)*

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter						
Launch Optical Power(Average)	Po	1.7	-	7.1	dBm	1
Launch Optical Power(OMA)	Poma	4.7	-	7.9	dBm	TDECQ < 1.4 dB
OMA minus TDECQ	OMA-TD ECQ	3.3 + TDECQ		7.9	dBm	1.4 dB < TDECQ< TDECQ (max)
Extinction Ratio	ER	5	-	-	dB	-
Center Wavelength Range	λc	1303.54	1304.58	1305.63	nm	-
Center Wavelength Range	λc	1308.09	1309.14	1310.19	nm	-
Transmitter and dispersion penalty eye closure for PAM4	TDECQ	-	-	3.9	dB	-
RIN15.5OMA (max)	RIN	-	-	-136	dB/Hz	
Optical Return Loss Tolerance	ORLT	-	-	15	dB	
Pout @TX-Disable Asserted	Poff	-	-	-15	dBm	
Receiver						
Center Wavelength Range	λc	1308.09	1309.14	1310.19	nm	-
Center Wavelength Range	λc	1303.54	1304.58	1305.63	nm	-
Receiver Sensitivity (OMA)	RxSENS	-	-	-13.8	dBm	2；TECQ < 1.4 dB
Average receive power				-15.2 + TECQ		1.4 < TECQ < 3.9 dB
Receive power(OMAouter)		-3	-	-	dBm	-
Receiver reflectance			-	-26	dB	-
LOS De-Assert	LOSD	-	-	-14	dBm	-
LOS Assert	LOSA	-20	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	

Note:

1.Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.

2.Measured with PRBS31Q test pattern, 53.125GBd, BER<2.4E-4.

HANGZHOU SOFTEL OPTIC CO., LTD
Add: 708-709 Haiwei Building, No.101 Binkang Road Binjiang District, Hangzhou Zhejiang,China
Tel: +86 571 88989381 Fax: +86 571 88983280
https://www.softel-optic.com/

Typical Application Circuit

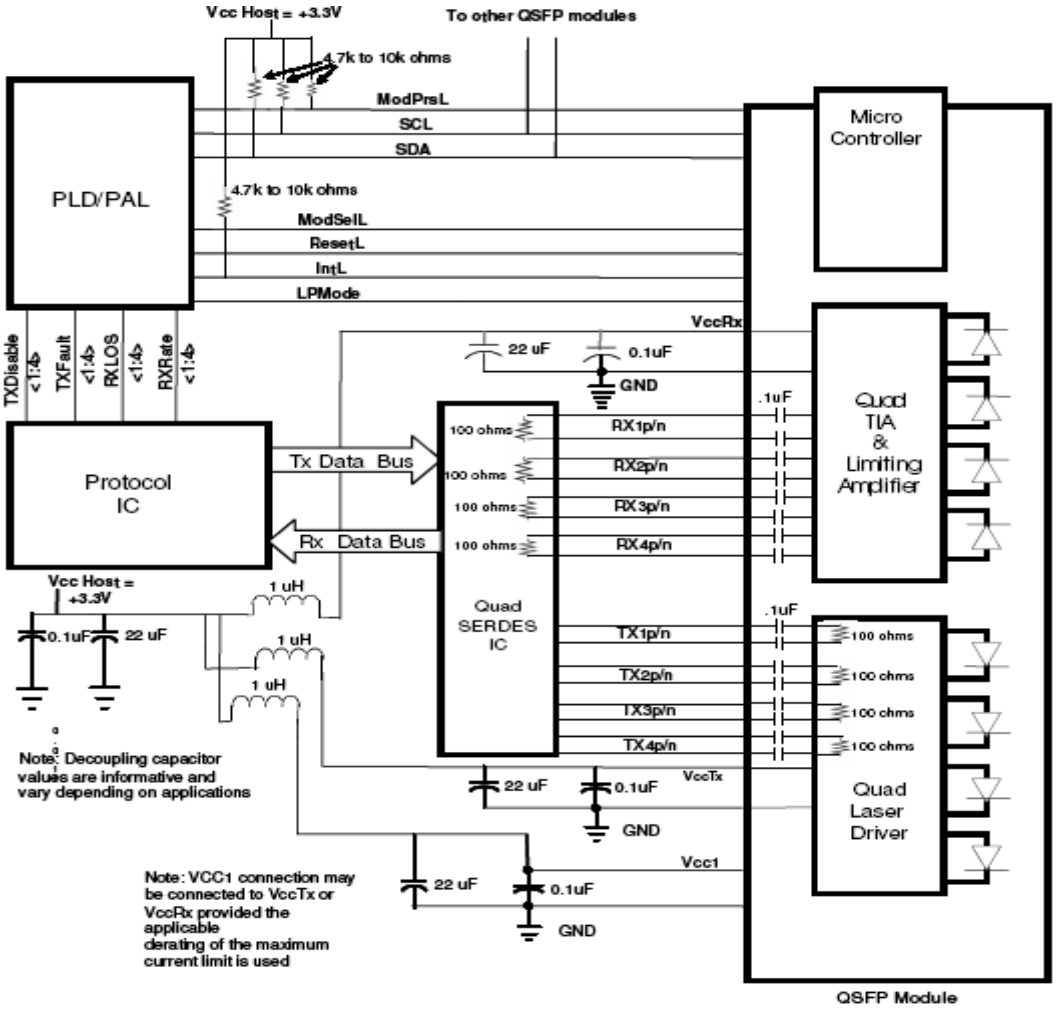

Figure 2. Typical application circuit

Mechanical Dimensions

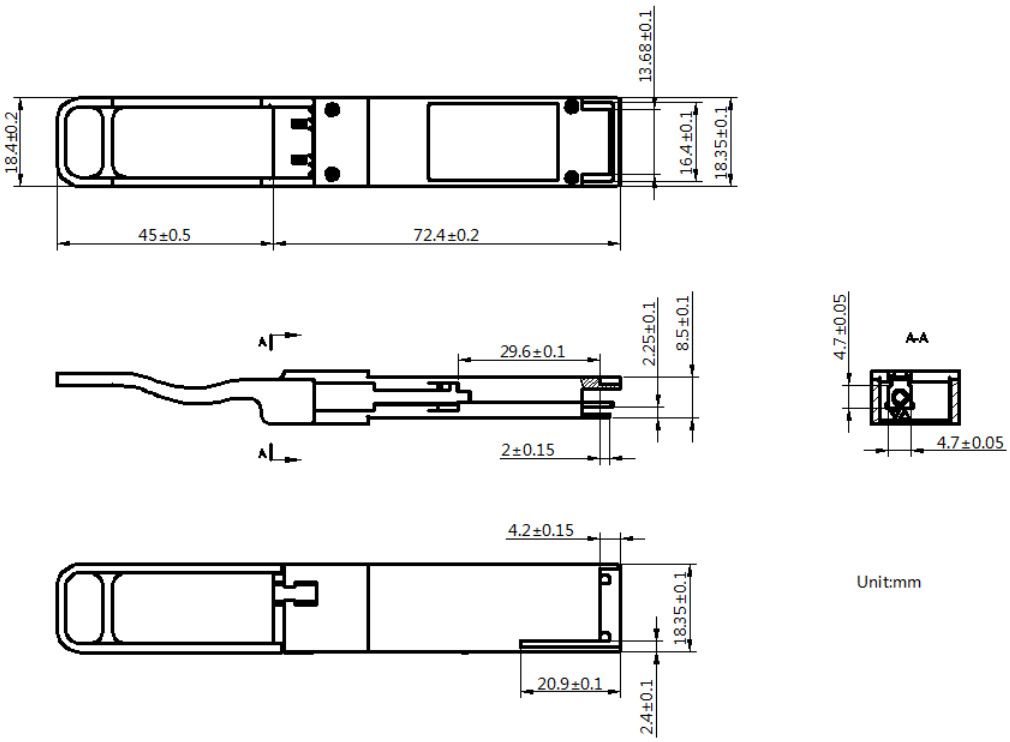

Figure 3. Module Mechanical Dimensions

Digital Diagnostics Functions

As defined by the SFF-8665 Specification for QSFP28 Copper and Optical Transceiver,Our QSFP28 transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host.