

LQP50-ER

QSFP28 50Gb/s ER 40km DDM Transceiver

PRODUCT FEATURES

- Supports 50GBASE-ER
- Lane signaling rate 26.5625 Gb/s with PAM4
- Up to 40km transmission on SMF
- 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 4.5 W
- Operating case temperature: 0 to +70 °C
- Compliant to IEEE 802.3cn v0.1
- Compliant to SFF-8636 and SFF-8679
- Complies with EU Directive 2015/863/EU

APPLICATIONS

- 50GBASE-ER

Ordering Information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
LQP50-ER	53.125Gbps	1310nm	SMF	40km	LC	0~70C	Y

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T _s	-40	-	+85	°C	
Supply Voltage	V _{CC}	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-5	-	+85	%	

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
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}	-	-	1.3	A	
Maximum Power Dissipation	P _D	-	-	4.5	W	
Data Rate(optical)	DR _o	-	53.125	-	Gb/s	
Data Rate(Electrical)	DR _e	-	26.5625	-	Gb/s	
Transmission Distance	TD		-	40	km	Over SMF

III. Optical and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	CW	1304.5	1311	1317.5	nm	
Side-mode Suppression ratio	SMSR	30			dB	
Average Launch Power	P _{TX}	0.4	-	6.63	dBm	Note 1
Outer Optical Modulation Amplitude	OMA	3.4	-	7.4	dBm	Note 2
Launch power in OMA minus TDECQ(min)	OMA-TDECQ	2	-	-	dB	Note 3
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ	-	-	3.2	dBm	
Average Output Power (Laser Turn off)	P _{0UT-OFF}	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	6	-	-	dB	
Receiver						
Center Wavelength	CW	1304.5	1311	1317.5	nm	
Damage threshold	P _{damage}	-2.37	-	-	dBm	Note 4

Average Rx Power	P_{RX}	-17.6	-	-3.37	dBm	Note 5
Receive power (OMAouter) (max)	P_{oma}	-	-	-2.6	dBm	
Receiver sensitivity _OMA	$SEN_{_OMA}$	-	-	-15.1	dBm	@BER 2.4E-4
Stressed receiver sensitivity (OMAouter) (max)	SRS	-	-	-13.3	dBm	@BER 2.4E-4
Conditions of stressed receiver sensitivity test						
Stressed eye closure for PAM4 (SECQ)	SECQ	-	-	3.2	dB	
SECQ – 10log10(Ceq)f (max)		-	-	3.2	dB	

Notes:

1. Average launch power(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 < 1dB, the OMA (min) must exceed this value.
3. TDECQ is the Transmitter and Dispersion eye closure for PAM4.
4. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.
5. Average received power(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.

IV. Electrical Characteristics

High-Speed Signal: Compliant to CAUI-4 (IEEE 802.3bm Annex 83E)

Low-Speed Signal: Compliant to SFF-8679.

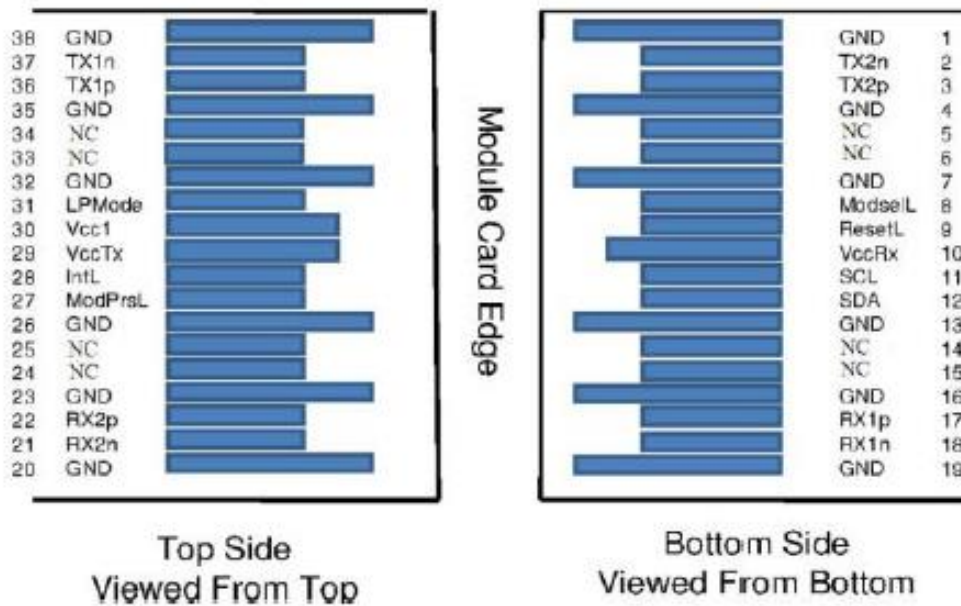
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)						
Input Differential Impedance	R_{in}	-	100	-	Ohm	
Differential Data Input Amplitude	$V_{IN,P-P}$	80	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10%		
DC common-mode input voltage		-0.3	-	2.8	V	
Transition time(20%~80%)	$T_r T_f$	10	-	-	ps	
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	-	$V_{CC}+0.3$	V	
Receiver (Module Output)						
Output Differential Impedance	R_{out}	-	100	-	Ohm	
Differential Data Output Amplitude	$V_{OUT,P-P}$	-	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
Transition time, 20% to 80%	$T_r T_f$	12	-		ps	
ModPrsL and IntL, V out low	V_{OL}	0	-	0.4	V	
ModPrsL and IntL, V out high	V_{OH}	$V_{CC}-0.5$	-	$V_{CC}+0.3$	V	

V. Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal

Parameter	Range	Accuracy	Unit	Calibration
Voltage	0 to Vcc	0.1	V	Internal
Tx Bias Current	0 to 100	10%	mA	Internal
Tx Output Power	0.4 to 6.63	±3	dB	Internal
Rx Input Power	-17.6 to -3.37	±3	dB	Internal

VI. Pin Diagram



VII. Pin Definitions

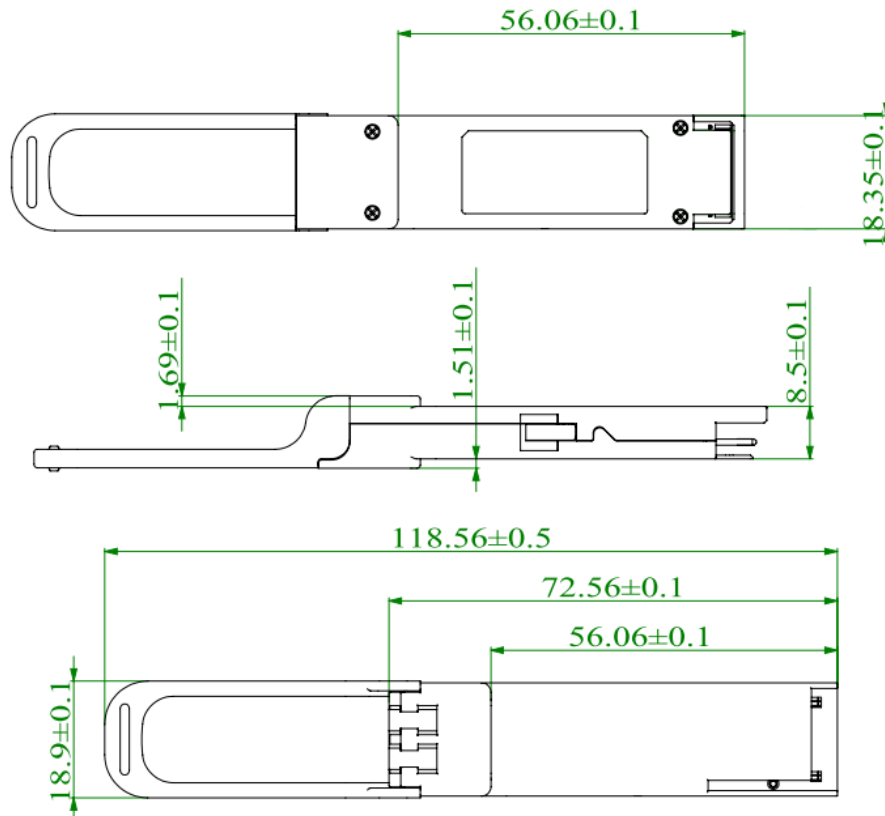
PIN	Logic	Symbol	Description	Plug Seq.	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5		NC		3	
6		NC		3	
7		GND	Ground	1	1
8	LVTLL-I	ModSelL	Module Select	3	
9	LVTLL-I	ResetL	Module Reset	3	
10		VccRx	+ 3.3V Power Supply Receiver	2	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	3	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	3	
13		GND	Ground	1	
14		NC		3	

15		NC		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		NC		3	
25		NC		3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL	Interrupt	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTL-I	LPMODE	Low Power Mode	3	
32		GND	Ground	1	1
33		NC		3	
34		NC		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 QSFP28 module. 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 supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1000 mA.

VIII. Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	June 24, 2020	Preliminary datasheet