LinkPro™

LPBQLDR1-S50C

QSFP28 100Gb/s DR1 500m DDM

PRODUCT FEATURES

- Supports 53.125G PAM4 baud rate
- 4x25G(OIF CEI-28G-VSR)electrical interface
- Up to 500m distance on single mode fiber, with FEC
- Hot-pluggable QSFP28 footprint
- Duplex LC receptacles
- Single 3.3V power supply
- Maximum power dissipation < 4.5W
- I^2C management interface
- Case operating temperature: 0°C to +70°C

APPLICATIONS

- 100G Ethernet
- Data Center Inter-connect

Compliance

- QSFP28 MSA.
- IEEE802.3cd 100GBASE-DR
- RoHS

Ordering information

Part No.	Bit Rate (GBd)	Laser (nm)	Distance	Fiber Type	DDMI	Connector	Temp
LPBQLDR1-S50C	53.125	1310	500m	SMF	YES	LC	0℃~+70℃

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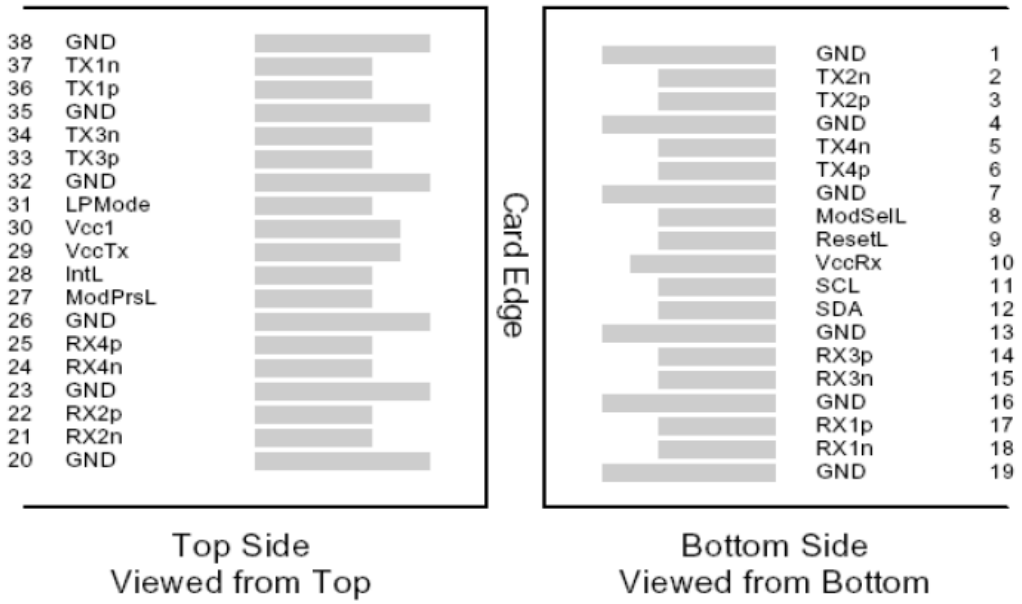
I. Pin Diagram



II. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
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	Vcc Tx	+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

Note1：Circuit ground is internally isolated from chassis ground.

III. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Storage Temperature	T_S	-40		85	ºC	
Storage Ambient Humidity	H_A	5		85	%	
Maximum Supply Voltage	V_{CC}	-0.5		3.6	V	
Receiver Damage Threshold		+5.5			dBm	

IV. General Product Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Case Operating Temperature	Tcase	0	-	70	ºC	
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Transmission Distance	TD	2	-	500	m	1
Electrical Data Rate, eachLane (NRZ)			25.78125		Gb/s	
Optical Data Rate (PAM4)			53. 125		GBd	
Data Rate Accuracy		- 100		100	ppm	
Pre-FEC Bit Error Ratio				2.4 x 10E4		
Post-FEC Bit Error Ratio				1 x 10E12		2
Control Input Voltage High		2		VCC	V	
Control Input Voltage Low		0		0.8	V	

Notes:

1.FEC required to be turned on to support maximum transmission distance.

2.FEC feature is embedded in the module.

V. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Ref.
Transmitter						
Average Output Power	P_{OUT}	-2.9		4	dBm	1
Transmit Output Modulation Amplitude (OMA)	TxOMA	-0.8		4.2	dBm	2
Extinction Ratio	ER	3.5			dB	
Center Wavelength	λ_C	1304.5		1317.5	nm	
Side Mode Suppression Ratio	SMSR	30				
Launch Power in OMAouter minus TDECQ for ER ≥ 5dB		-2.2			dBm	
Launch Power in OMAouter minus TDECQ for ER < 5dB		- 1.9			dBm	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ)	TDECQ			3.4	dB	
TDECQ － 10*log10(Ceq)				3.4	dB	3
RIN15.5 OMA	RIN			- 136	dB/Hz	
Optical Return Loss Tolerance	TOL			15.5	dB	
Transmitter Reflectance	RT			-26	dB	
Transmitter OFF Output Power	P_{Off}			-15	dBm	
Receiver						
Input Optical Wavelength	λ_{IN}	1304.5		1317.5	nm	
Damage Threshold	THd	5			dBm	4
Average Receive Power		-5.9		4	dBm	5
Receive Power (OMAouter)				4.2	dBm	
Receiver Sensitivity (OMAouter)	SEN			Equation (1)	dBm	6
Stressed Receiver Sensitivity (OMAouter)	SRS			- 1.9	dBm	7
Receiver Reflectance	RR			-26	dB	
LOS Assert	LOSA	- 15			dBm	
LOS Deassert	LOSD			-8.9	dBm	
LOS Hysteresis	LOSH	0.5			dB	
*Conditions of Stress Receiver Sensitivity Test (Note 8)						
Stressed Eye Closure for PAM4 (SECQ)			3.4		dB	
SECQ－10*log10(Ceq)				3.4	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 < 1.4dB for an extinction ratio of ≥ 5dB or TDECQ < 1. 1dB for an extinction ratio of < 5dB, the OMAouter (min) must exceed the minimum value specified here.

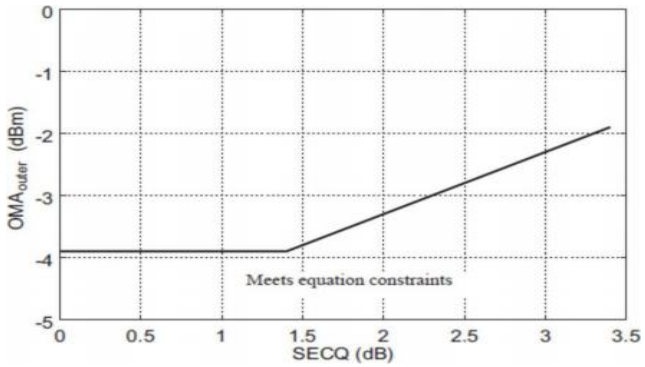
3. Ceq is a coefficient defined in IEEE Std 802.3-2018 clause 121.8.5.3 which accounts for reference equalizer noise

enhancement.

4. Average receive 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.

5.The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.

6. Receiver sensitivity (OMAouter) (max) is informative and is defined for a transmitter with a value of SECQ up to 3.4 dB. It should meet Equation (1)



7.Measured with conformance test signal at TP3 for the BER equal to 2.4x 10-4.

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

VI. Electrical Interface Characteristics

Parameter	Symbol	Min.	Type	Max.	Unit	Ref.
Power Consumption				4.5	W	
Supply Current	Icc			1.36	A	
Transmitter per lan						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1	SeeCEI-28G-VSR Equation13- 19			dB	
Common Mode to Differential Conversion and Differential to Common Mode Conversion (SDC11,SCD11)	TP1	SeeCEI-28G-VSR Equation13- 20			dB	
Stressed Input Test	TP1a	See CEI- 28G-VSR Section 13.3				
Receiver per lan						
Differential Voltage, pk-pk	TP4			900	mV	

Common Mode Voltage (Vcm)	TP4	-350		2850	mV	1
Common Mode Noise, RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1MHz
Differential Return Loss (SDD22)	TP4	See CEI- 28G-VSR Equation13-19			dB	
Common Mode to Differential Conversion and Differential to Common Mode Conversion (SDC22,SCD22)	TP4	See CEI- 28G-VSR Equation13-21			dB	
Common Mode Return Loss (SCC22)	TP4			-2	dB	2
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5.5	B	
Eye Width at 10- 15 probability (EW15)	TP4	0.57			UI	
Eye Height at 10- 15 probability(EH15)	TP4	228			V	

NOTE:

1.Vcm is generated by the host. Specification includes effects of ground offset voltage

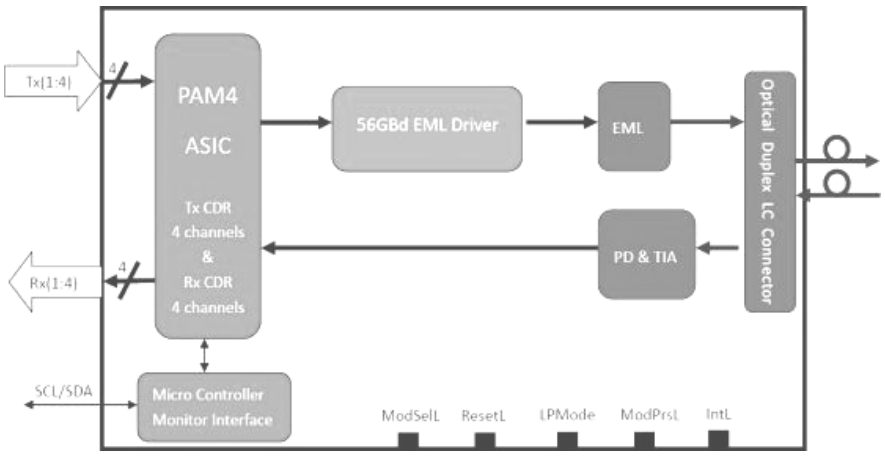
2. From 250MHz to 30GHz.

VII. Digital Diagnostic Monitoring Information

Parameter	Unit	Accuracy	Ref.
Case Temperature	℃	±3	Over operating temp. range
Supply Voltage	V	±0.1	Over full operating range
Tx Bias Current	mA	±10%	-
Tx Optical Power	dB	±3	1
Rx Optical Power	dB	±3	1

Note1:Due to measurement different single mode fibers, there could additional ±1 dB fluctuation, or a ±3 dB total accuracy.

VIII.Transceiver Block Diagram



IX. Mechanical Specifications (Unit: mm)

compatible with SFF-8661.