Product Features

- Compliant with IEEE Std 802.3cd
- Compliant with 400G-FR4 optical specificatio
- Compliant with QSFP-DD MSA
- Compliant with CMIS4.0 Management interface specifications
- Duplex LC receptacles
- 53.125GBd PAM4x4 un-cooled EA-DFB LD
- 26.5625GBd PAM4x8 electrical connector
- Transmission distance up to 2km
- Single +3.3V power supply
- Commercial operating temperature:0ºC to +70ºC
- RoHS Compliant

Applications

- 400G BASE-FR4 Ethernet
- Coarse wavelength division multiplexing systems

Descriptions

LX9204CDR transceiver is designed for use in 400Gb/s network applications, the maximum transmission distance is 2km. LX9204CDR is a fully integrated optical transceiver modulated using 4-level pulse amplitude modulation (PAM4) format that transmits and receives optical signals with aggregated data rate of 425Gbps over 4 lanes on CWDM wavelength grids each running at 106.25Gbps.They are compliant with the QSFP-DD MSA and 400GBASE-FR4 optical specifications. LX9204CDR are compliant with RoHS.

Ordering Information

Table 1. Ordering Information

Part Number	Transmitter	Output Power (OMA each lane)	Receiver	Sensitivity (OMA each lane)	Reach	Temp	DDM	RoHS
LX9204CDR	CWDM EML	-0.3 ~ +3.7dBm	PIN	< -4.6dBm	2km	0~ 70 ºC	Available	Compliant

Pin Description

Table 2. Pin Description

Pin	Name	Function/Description	Notes
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	
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	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	VccTx	3.3V power supply transmitter	2
30	Vcc1	3.3V power supply	2
31	Init Mode	Initialization mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Output	
38	GND	Ground	1
39	GND	Ground	1
40	Tx6n	Transmitter Inverted Data Input	

41	Tx6p	Transmitter Non-Inverted Data output	
42	GND	Ground	1
43	Tx8n	Transmitter Inverted Data Input	
44	Tx8p	Transmitter Non-Inverted Data output	
45	GND	Ground	1
46	Reserved	For Future Use	3
47	VS1	Module Vendor Specific 1	3
48	VccRx1	3.3V Power Supply	2
49	VS2	Module Vendor Specific 2	3
50	VS3	Module Vendor Specific 3	3
51	GND	Ground	1
52	Rx7p	Receiver Non-Inverted Data Output	
53	Rx7n	Receiver Inverted Data Output	
54	GND	Ground	1
55	Rx5p	Receiver Non-Inverted Data Output	
56	Rx5n	Receiver Inverted Data Output	
57	GND	Ground	1
58	GND	Ground	1
59	Rx6n	Receiver Inverted Data Output	
60	Rx6p	Receiver Non-Inverted Data Output	
61	GND	Ground	1
62	Rx8n	Receiver Inverted Data Output	
63	Rx8p	Receiver Non-Inverted Data Output	
64	GND	Ground	1
65	NC	No Connect	3
66	Reserved	For Future Use	3
67	VccTx1	3.3V power supply	2
68	Vcc2	3.3V power supply	2
69	Reserved	For Future Use	3
70	GND	Ground	1
71	Tx7p	Transmitter Non-Inverted Data Input	
72	Tx7n	Transmitter Inverted Data Output	
73	GND	Ground	1
74	Tx5p	Transmitter Non-Inverted Data Input	
75	Tx5n	Transmitter Inverted Data Output	
76	GND	Ground	1

Notes:

1. QSFP-DD uses common ground (GND) for all signals and supply (power). All are common within the QSFP-DD 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, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. The connector Vcc pins are each rated for a maximum current of 1000mA.

3. All Vendor Specific, Reserved and No Connect pins may be terminated with 50ohms to ground on the host. Pad 65 (No Connect) shall be left unconnected within the module. Vendor specific and reserved pads shall have an

impedance to GND that is greater than 10kohms and less than 100pF.

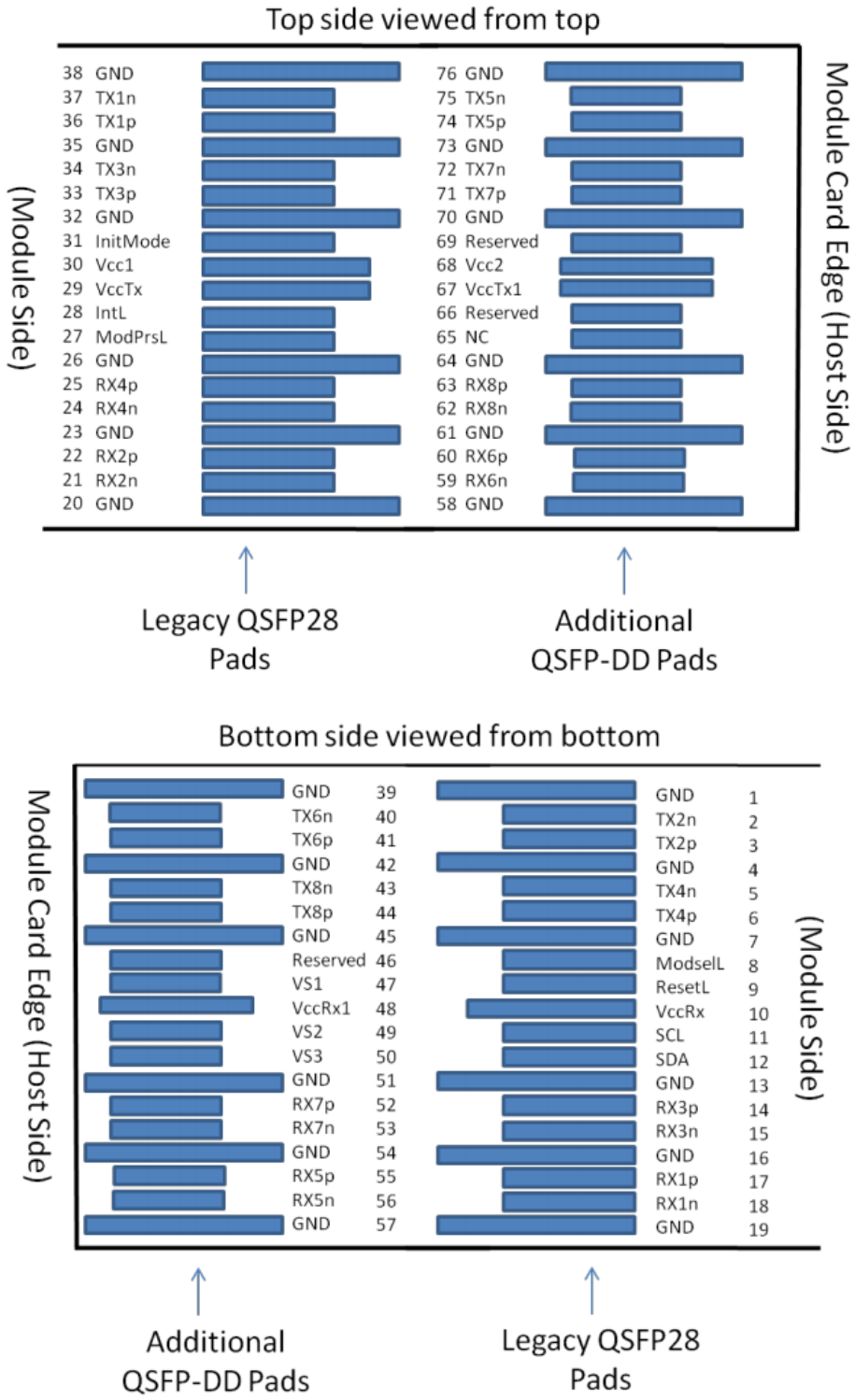

Figure 1. QSFP-DD pad assignment

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Table 3. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	T_S	-40	85	°C
Relative Humidity	RH	15	85	%
Supply Voltage	V_{CC}	-0.5	4.0	V

Recommended Operating Conditions

Table 4. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T_C	0	25	70	°C
Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Data Rate PER Channel	-	-	53.125	-	GBd
Modulation format			PAM4		

Transceiver Electrical Characteristics

Table 5. Transceiver Electrical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Module Supply Current	Icc	-	-	3.8	A	-
Power Dissipation	P_D	-	-	12	W	-
Transmitter						
Input Differential Impedance	Z_{IN}	-	100	-	Ω	-
Differential Data Input Swing	$V_{IN, P-P}$	180	-	900	mV_{P-P}	-
Transition Time (20% to 80%)	Tr,Tf			34	ps	
Receiver						
Output Differential Impedance	Z_O	-	100	-	Ω	-
Differential Data Output Swing	$V_{OUT, P-P}$	300	-	850	mV_{P-P}	1

Notes:
1. Internally AC coupled, but requires a external 100Ω differential load termination.

Transmitter Optical Characteristics

Table 6. Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Lane wavelengths	λc	1264.5	-	1277.7	nm	1
		1284.5	-	1297.5		-
		1304.5	-	1317.5		-
		1324.5	-	1337.5		-
Side-mode suppression ratio	SMSR	30	-	-	dB	-
Total average launch power	P_T	-	-	9.3	dBm	-
Average launch power, each lane	P	-3.3	-	3.5	dBm	-
Outer Optical Modulation Amplitude, each lane	OMAouter	-0.3	-	3.7	dBm	-
Difference in launch power between any two lanes(OMAouter)	-	-	-	4	dB	-
Transmitter and dispersion penalty eye closure for PAM4, each lane	TDECQ	-	-	3.4	dB	-
Extinction Ratio	ER	3.5	-	-	dB	-
Average launch power of OFF transmitter	P_{off}	-	-	-30	dBm	-
Optical Return Loss Tolerance	ORLT	-	-	17.1	dB	-
Transmitter reflectance	-	-	-	-26	dB	-

Notes:
1. The typical wavelengths compliant with 1310nm CWDM wavelength grids.

Receiver Optical Characteristics

Table 7. Receiver Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Center Wavelength	λc	-	1310	-	nm	-
Average Receiver Power, each lane	P	-7.3	-	3.5	dBm	
Receiver Overload (Average Power)	P_{OL}	3.5	-	-	dBm	
Damage Threshold(Average Power)	P_{TH}	4.5	-	-	dBm	
Receive power, each lane (OMA outer)	OMA	-	-	3.7	dBm	-
Receiver Sensitivity each lane (OMA outer)				-4.6	dBm	1
Optical Reflectance	ORL	-	-	-26	dB	-
LOS De-Assert	LOS_D	-	-	-10	dBm	-
LOS Assert	LOS_A	-16	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

Notes:
1. Measured with PRBS31Q test pattern, 53.125GBd, PAM4, BER<2.4E^{-4}.

Recommended Host Board Power Supply Filter Network

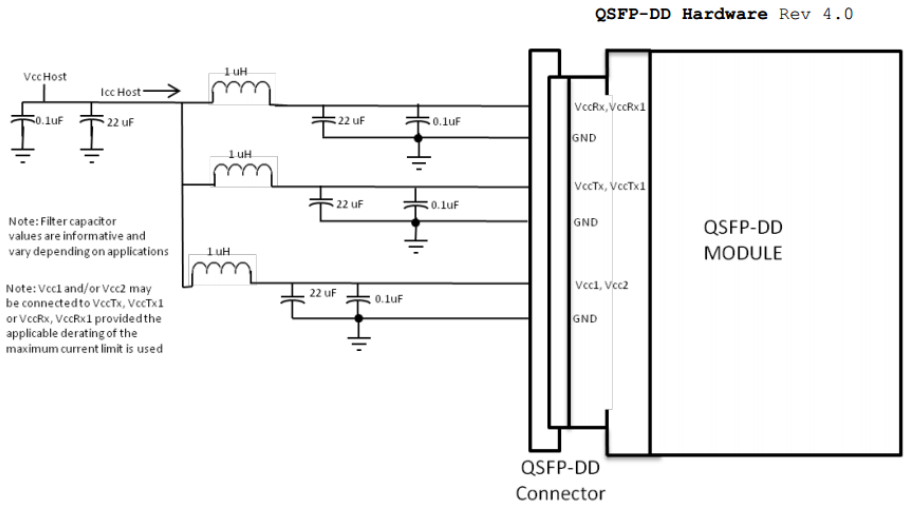

Figure 2. Recommended Host Board Power Supply Filter Network

Mechanical specifications

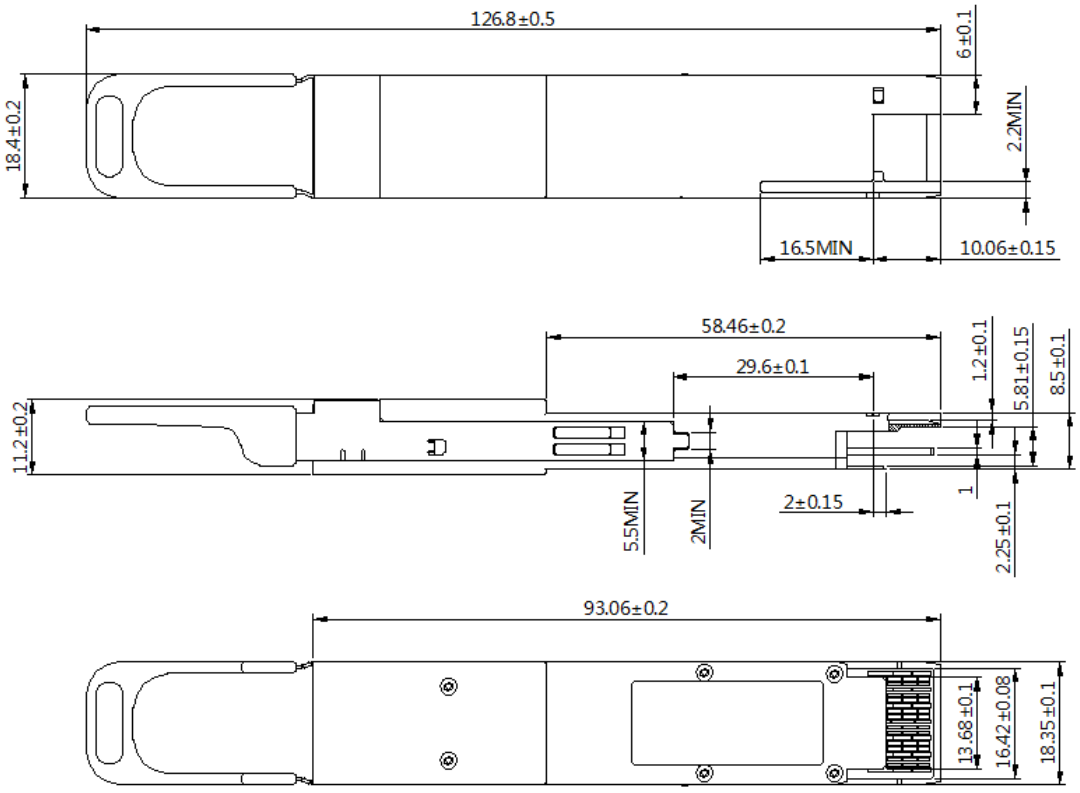

Figure 3. Outline Drawing

RoHS Compliance

RoHS Certificate Number: BST13080782Y-1RC-4, compliance with the council RoHS directive-2011/65/EU.

Revision History

Date	Rev	Description	Modified By
08/22/2019	V1.0	Initial Release	Hui Yang
09/11/2020	V1.1	Update for new rules demand of Linktel	Hui Yang

For More Information

Linktel Technologies Co., Ltd

info@linkteltech.com

www.linkteltech.com

Linktel USA

1601 McCarthy Blvd #9, Milpitas, CA 95035, USA

Tel: +1 408 807 0482

Email: linktelus@linkteltech.com

jimli@linkteltech.com

Linktel International (Except USA)

E12, No. 52 Liufang Road, East-Lake Hi-tech Development Zone, Wuhan, China

Tel: +86 27 8792 9207

Email: ailsagong@linkteltech.com

Linktel China

E12, No. 52 Liufang Road, East-Lake Hi-tech Development Zone, Wuhan, China

Tel: +86 27 8792 9213

Email: lifan@linkteltech.com