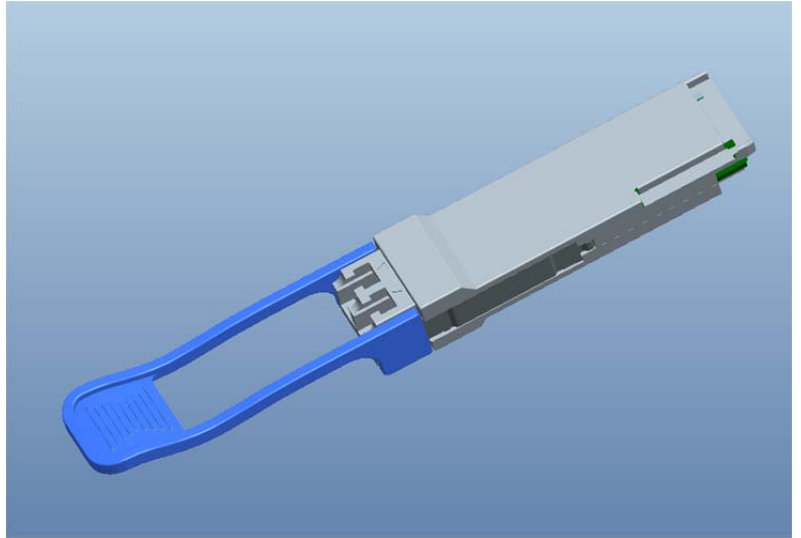


IP-CALK10L31CD

QSFP28 100Gbps LR4 10km DDM Transceiver

PRODUCT FEATURES

- Supports 103.1Gbps and 112Gbps aggregate bit rate
- 4x28Gbps electrical interface
- 4X28Gbps DFB LAN-WDM transmitter and PIN/TIA receiver
- Maximum link length of 10km on Single Mode Fiber
- Hot pluggable QSFP28 footprint
- Duplex LC receptacles
- Single 3.3V power supply
- Maximum power dissipation<4W
- RoHS-6 compliant and lead-free
- I²C management interface
- 0°C to +70°C case operating temperature



APPLICATIONS

- 100GBASE-LR4 100G Ethernet
- OTN OTU4 411-9D1F

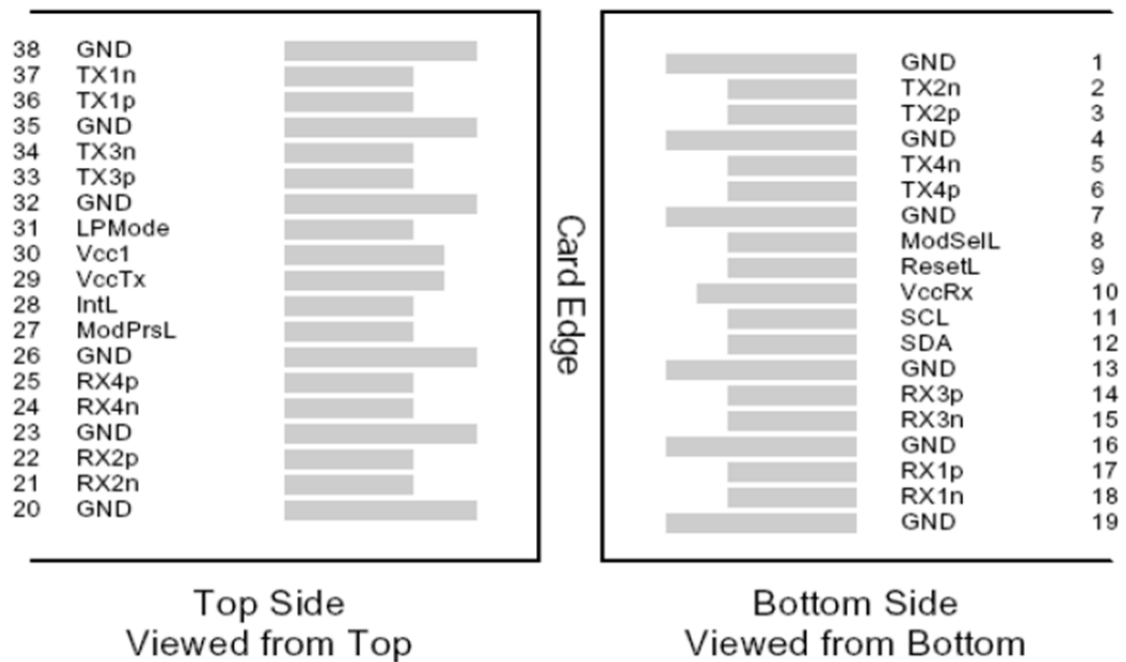
COMPLIANCE

- QSFP28 MSA SFF-8665
- IEEE802.3ba 100GBASE-LR4
- ROHS

● Ordering Information

Package	Product part NO.	Description
QSFP28	IP-CALK10L31CD	4X28Gbps, Single-mode fiber, 10Km, 0-70℃

I. Pin Diagram



QSFP28 38pin connector (SFF 8679)

II. Pin Descriptions

Pin	Symbol	Name/Description	Note
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	

Pin	Symbol	Name/Description	Note
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

Note :

1. Circuit ground is internally isolated from chassis ground.

III. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Storage Temperature	T _S	-40		85	°C	
Storage Ambient Humidity	H _A	5		95	%	
Case Operation Temperature	°C	0		70	°C	
Maximum Supply Voltage	V _{CC}	-0.5		4.0	V	
Signal Input Voltage		-0.3		V _{CC} +0.3	V	
Receiver Damage Threshold		+5.5			dBm	

IV. Optical Characteristics

OTU4 4I1-9D1F Operation

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Transmitter						
Signaling Speed per Channel		27.9525±20ppm			Gbps	
Total Average Output Power	P _{OUT}			10	dBm	
Average Output Power, each lane		-0.6		4	dBm	
Extinction Ratio	ER	4			dB	
Center Wavelength	λ _c	1294.53 ~ 1296.59 1299.02 ~ 1301.09 1303.54 ~ 1305.63 1308.09 ~ 1310.19			nm	
Spectral Width				1	nm	
Transmitter OFF Output Power	P _{Off}			-30	dBm	
Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3}		{0.25,0.4,0.45,0.25,0.28,0.4}				Hit ratio 5x10 ⁻⁵
Receiver						
Input Optical Wavelength	λ _{IN}	1294.53 ~ 1296.59 1299.02 ~ 1301.09 1303.54 ~ 1305.63 1308.09 ~ 1310.19			nm	
Average receive power, each lane		-6.9		4		BER = 10–6
Receive power, each lane (OMA)		-8.6		4.5	dBm	BER = 10–6
Receiver Reflectance	R _{fl}			-26	dBm	
Loss of Signal Assert	P _A	-24		-13.6	dBm	
Loss of Signal De-assert	P _D			-11.6	dBm	
LOS Hysteresis	P _D - P _A	0.5		6	dB	

100GBASE-LR4 Operation

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Transmitter						
Total Average Output Power	P _{OUT}			10.5	dBm	
Average Output Power, each lane		-4.3		4.5	dBm	
Optical Modulation Amplitude (OMA), each lane		-1.3		4.5	dBm	
Extinction Ratio	ER	4			dB	
Center Wavelength	λ _c	1294.53 ~ 1296.59 1299.02 ~ 1301.09 1303.54 ~ 1305.63			nm	

		1308.09 ~ 1310.19				
Spectral Width				1	nm	
Transmitter OFF Output Power	POff			-30	dBm	
Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3}		{0.25,0.4,0.45,0.25,0.28,0.4}				Hit ratio 5x10 ⁻⁵
Receiver						
Input Optical Wavelength	λ_{IN}	1294.53 ~ 1296.59 1299.02 ~ 1301.09 1303.54 ~ 1305.63 1308.09 ~ 1310.19			nm	
Average receive power, each lane		-10.6		4.5		BER = 10–12
Receive power, each lane (OMA)		-8.6		4.5	dBm	BER = 10–12
Receiver Reflectance	Rfl			-26	dBm	
Loss of Signal Assert	P _A	-24		-13.6	dBm	
Loss of Signal De-assert	P _D			-11.6	dBm	
LOS Hysteresis	P _D - P _A	0.5		6	dB	

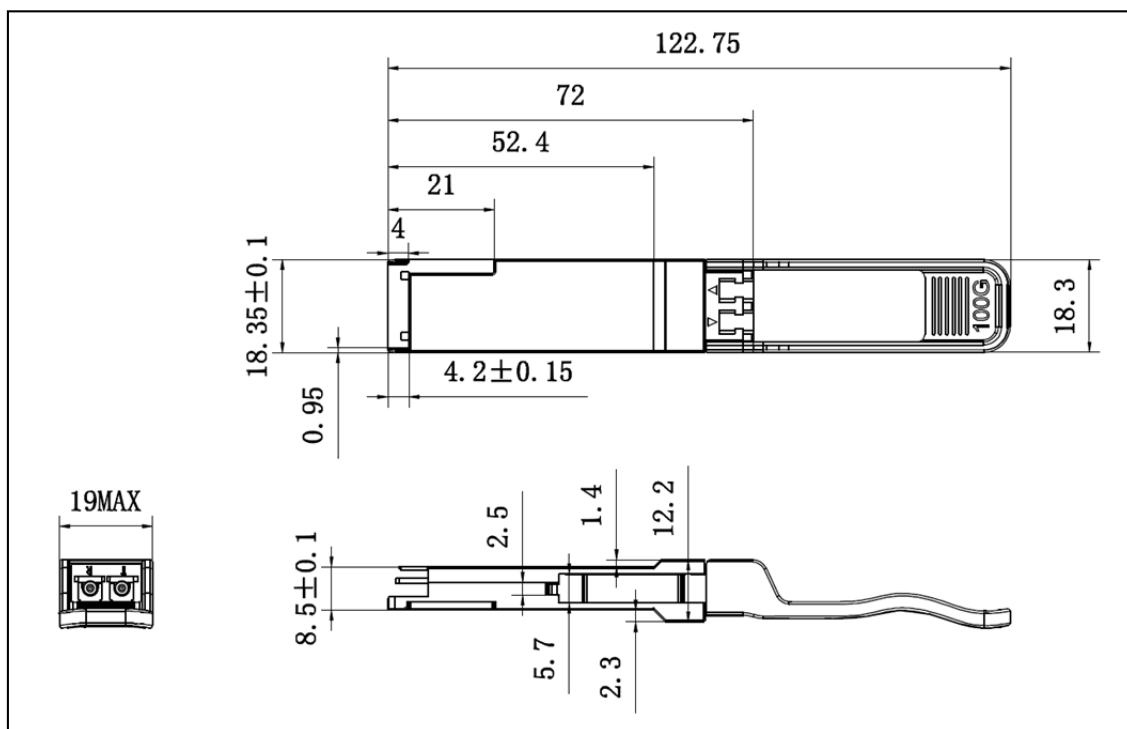
V. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage	V _{CC}	3.135		3.465	V	
Supply Current	I _{CC}			1.15	A	
Module total power	P			4	W	
Transmitter						
Signaling rate per lane		25.78		27.95	Gbps	
Differential pk-pk input voltage	V _{in,pp,diff}	350			mV	
Differential input Resistance	R _{tin}		100		Ohm	
Receiver						
Signaling rate per lane		25.78		27.95	Gbps	
Differential data output swing	V _{out,pp}		400		mVpp	
Eye width		0.57			UI	
Differential output Resistance			100		ohm	

VI. Digital Diagnostic Functions

IP-CALK10L31CD transceivers support the I2C-based diagnostics interface specified by the SFF8636.

VII. Mechanical Specifications(Unit: mm)



VIII.Contact Information

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Revision History

Version No.	Date	Description
1.0	September 2, 2020	Preliminary datasheet