

100GBASE-LX4 300m(MMF)QSFP28 Optical Transceiver with DDM

IP-CALS30B31CU

PRODUCT FEATURES

- QSFP28 MSA compliant
- Supports 103.1 Gb/s aggregate bit rate
- 4x25Gb/s electrical interface
- Up to 0.3km on MMF(OM3)
- Hot-pluggable QSFP28 footprint
- LC duplex connector
- Maximum power consumption 3.5 Watts
- Single 3.3V power supply
- Support Digital Diagnostic Monitor interface
- Case operating temperature: 0°C to 70°C

APPLICATIONS

- 100GBASE-SR4 Ethernet
- Data Center Interconnect

COMPLIANCE

- QSFP28 MSA
- SFF-8636
- IEEE802.3
- RoHS 2.0

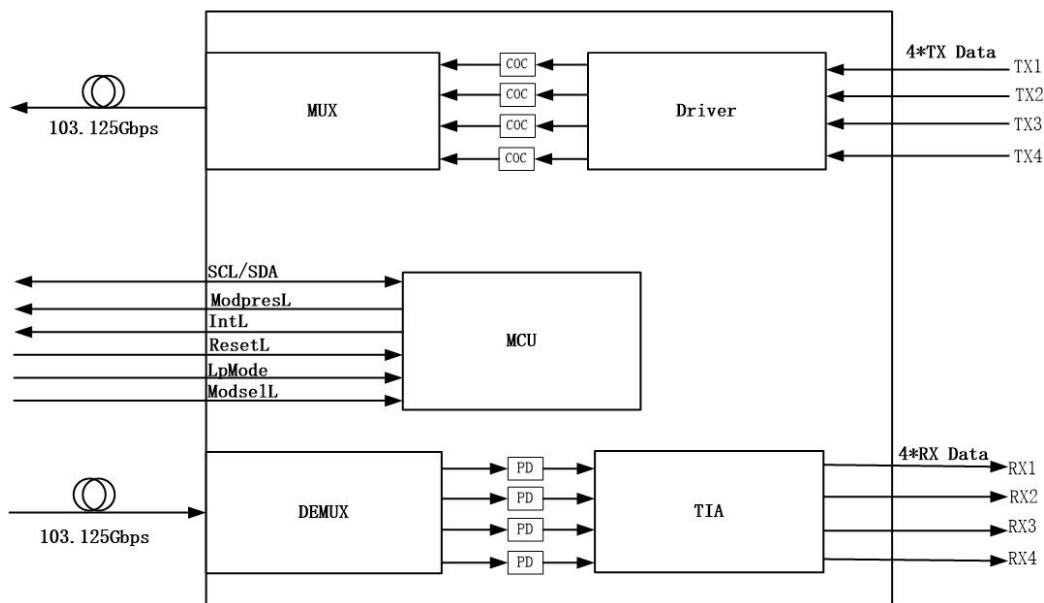
Ordering information

Part Number	Data Rate (Gb/s)	Media	Wavelength(nm)	Operating distance(km)	Temperature (°C)
IP-CALS30B31CU	103.1	MMF	CWDM4	MMF: 0.3@OM3	0 ~ 70
IP-CALS10B31CU	103.1	MMF	CWDM4	MMF: 0.1@OM3	0 ~ 70

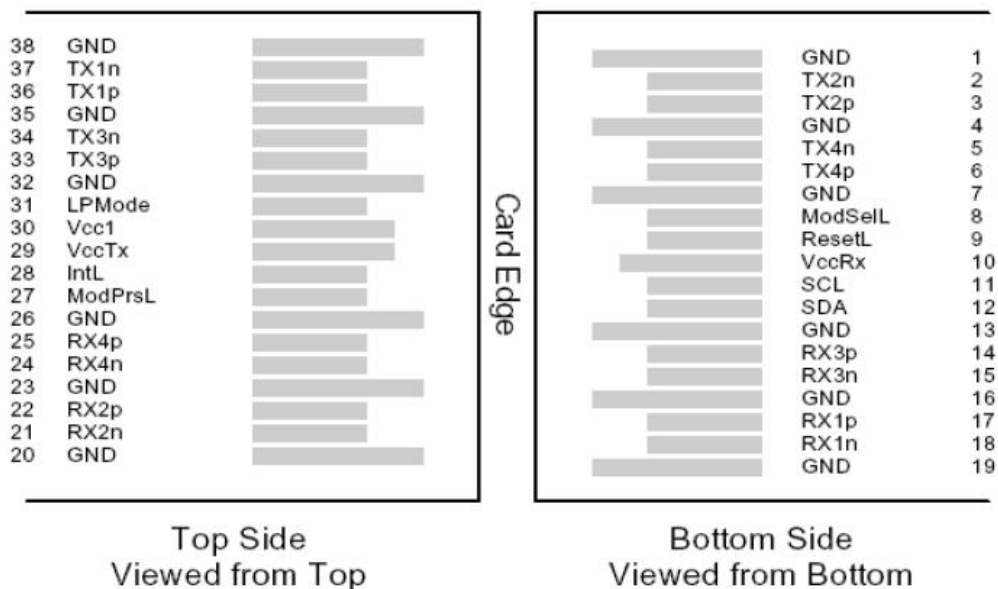
PRODUCT DESCRIPTION

IP-CALS10B31CU is designed for 100m on MMF(OM3) optical communication applications and IP-CALS30B31CU can transmit up to 300m on MMF(OM3). Both of them contain 4-lane DFB optical transmitter, 4-lane optical receiver and module management block including 2 wire serial interfaces. The optical signals are multiplexed to a single-mode fiber through an industry standard LC connector.

1. Block Diagram



2. Pin Diagram



QSFP28 38pin connector (SFF 8665)

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3. Pin Descriptions

Pin	Symbol	Name/Description	Notes
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	ModSelL	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

Notes:

1. Circuit ground is internally isolated from chassis ground.

4. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Maximum Supply Voltage	V _{CC}	0		3.6	V	
Storage Temperature	T _s	-40		85	°C	
Operating Case Temperature	T _{case}	-5		75	°C	

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Relative Humidity	RH	5		85	%	
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5. Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	T _{case}	0		70	°C	
Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Relative Humidity	R _H	5		85	%	
Data Rate (optical)	DR _O		4*25.78125		Gbps	
Data Rate (Electrical)	DR _E		4*25.78125		Gbps	
Operating Link Distance			MMF:0.1@ OM3		km	IP-CALS10B31CU
			MMF:0.3@ OM3			IP-CALS30B31CU

6. Electrical Characteristics

100GBASE-LX4 Operation (EOL, TOP = 0 ~ 70 °C, V_{CC} = 3.135 to 3.465V)

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Dissipation				3.5	W	
Supply Current	I _{CC}			1.01	A	
Transmitter						
Data Rate, each lane			25.78125		Gbps	
Differential Voltage pk-pk	V _{pp}	300		850	mV	
Input differential impedance	R _{in}		100		Ohm	1
Differential Termination Resistance Mismatch				10	%	
Receiver						
Data Rate, each lane			25.78125		Gbps	
Output differential impedance	R _{out}		100		Ohm	1
Differential Termination Resistance Mismatch				10	%	
Differential output voltage	V _{out, pp}	260		850	mV	2

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Into 100Ω differential termination.

7. Optical Characteristics

100GBASE-LX4 Operation (EOL, TOP = 0 ~ 70 °C, V_{CC} = 3.135 to 3.465V)

Parameters	Symbol	Min	Typical	max	Unit	Notes
Transmitter						
Signal Speed per Lane	BR	25.78125 ± 100 ppm			Gb/s	
Transmit wavelength	λ	1264.5	1271	1277.5	nm	
		1284.5	1291	1297.5	nm	
		1304.5	1311	1317.5	nm	
		1324.5	1331	1337.5	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power for MMF				9.5	dBm	
Average launch power per lane for MMF		-5.0		3.5	dBm	
Transmit OMA per Lane for MMF		-4.0		3.5	dBm	

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Launch power OFF per lane	P _{Off}			-30	dBm	
Transmitter and Dispersion Penalty (TDP), each lane	TDP			4.3	dB	
Extinction Ratio (ER)	ER	3.5			dB	
RIN20 OMA	RIN			-128	dB/Hz	
Transmitter eye mask definition {X1,X2, X3, Y1, Y2, Y3}	{0.3, 0.38, 0.45, 0.35, 0.41, 0.5}					1
Mask margin		5			%	1
Receiver						
Signaling Speed per Lane	BR	25.78125 ± 100 ppm			Gb/s	
Receive wavelength	λ	1264.5	1271	1277.5	nm	
		1284.5	1291	1297.5	nm	
		1304.5	1311	1317.5	nm	
		1324.5	1331	1337.5	nm	
Damage threshold, each lane	P _{max}			4.5	dBm	
Average receive power per lane for MMF		-8.6		3.5	dBm	
Rx Sensitivity (OMA) per lane for MMF	R _{SEN}			-8.6	dBm	
Receiver reflectance	R _{fl}			-26	dB	
LOS Assert	LosA	-30			dBm	
LOS De-Assert	LosD			-12.5	dBm	
LOS Hysteresis	LosH	0.5		6	dB	

Notes:

1. Hit ratio 5×10^{-5} .

8. Digital Diagnostic Monitoring Functions

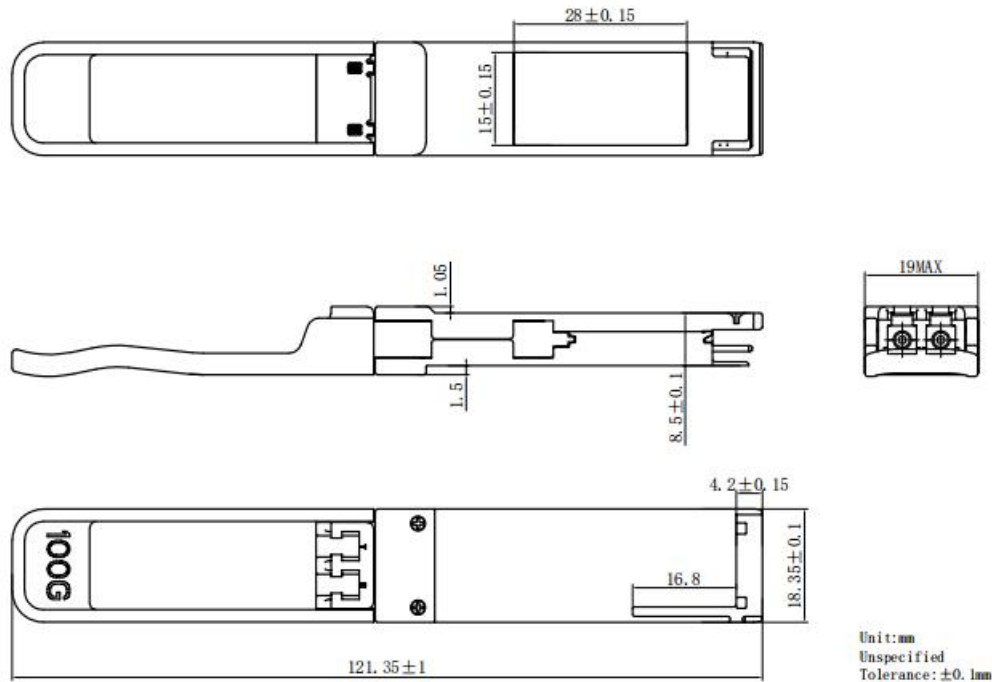
IP-CALS30B31CU and IP-CALS10B31CU support the I²C-based Diagnostic Monitoring Interface (DMI) defined in document SFF-8636. The host can access real-time performance of transmitter and receiver optical power, temperature, supply voltage and bias current.

Parameter	Accuracy	Unit
Case Temperature	±3	°C
Supply Voltage	±3%	V
Tx Bias Current	±10%	mA
Tx Optical Power	±3	dB
Rx Optical Power	±3	dB

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9. Mechanical Specifications



IP-CALS30B31CU

10. Regulatory Compliance

Feature	Reference	Performance
EMC	EN61000-3	Compatible with standards
Electrostatic Discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, EC/EN 60825-2	Class 1 laser product
Component Recognition	IEC/EN 60950, L 60950	Compatible with standards
RoHS 2.0	2002/95/EC	Compatible with standards

11. Contact Information

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12. Revision History

Version No.	Date	Description
1.0	Jun. 24, 2019	Preliminary datasheet
1.1	May. 26, 2021	Add IP-CALS30B31CU
1.2	Oct. 8,2021	Update contact Information
1.3	Feb.14,2022	Update part number
1.4	Jul.8,2022	Update mechanical specifications
1.5	Sep. 30, 2022	Update part number, contact Information and optical characteristics
1.6	Jun. 24, 2024	Add part number IP-CALS10B31CU and corresponding contact Information, updata optical characteristics and the company address