

◆ UN-QSFA0-0031SL10C

100Gbps QSFP28 LR4 10km Optical Transceiver

Product Feature

- Hot pluggable UN-QSFP28 MSA form factor
- Supports 103.1Gb/s aggregate bit rate
- Compliant to IEEE 802.3ba 100GBASE-LR4 Lite
- Up to 10km reach for G.652 SMF
- Single +3.3V power supply
- Transmitter: cooled 4x25Gb/s LR4 DFB TOSA
- Receiver: 4x25Gb/s PIN ROSA
- 4x25G electrical interface (OIF CEI-28G-VSR)
- Maximum power consumption 4.0W
- Duplex LC receptacle
- RoHS-6 compliant
- Operating case temperature
Commercial: 0°C to +70°C



Applications

- 100GBASE-LR4 Ethernet Links
- Infiniband QDR and DDR interconnects
- Datacenter and Enterprise networking

Product Description

This product is a 100Gb/s transceiver module designed for optical communication applications compliant to 100GBASE-LR4 of the IEEE 802.3ba standard. The module converts 4 input channels of 25Gb/s electrical data to 4 channels of LR4 optical signals and then multiplexes them into a single channel for 100Gb/s optical transmission. Reversely on the receiver side, the module demultiplexes a 100Gb/s optical input into 4 channels of LR4 optical signals and then converts them to 4 output channels of electrical data.

The central wavelengths of the 4 LR4 channels are 1271, 1291, 1311 and 1331 nm as members of the LR4 wavelength grid defined in IEEE 802.3ba. The high performance cooled LR4 DFB transmitters and high sensitivity PIN receivers provide superior performance for 100Gigabit Ethernet applications up to 10km links and compliant to optical interface with 100GBASE-LR4 requirements specified in IEEE 802.3ba Clause 88.

The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP+ Multi-Source Agreement (MSA). It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference.

Product Selection

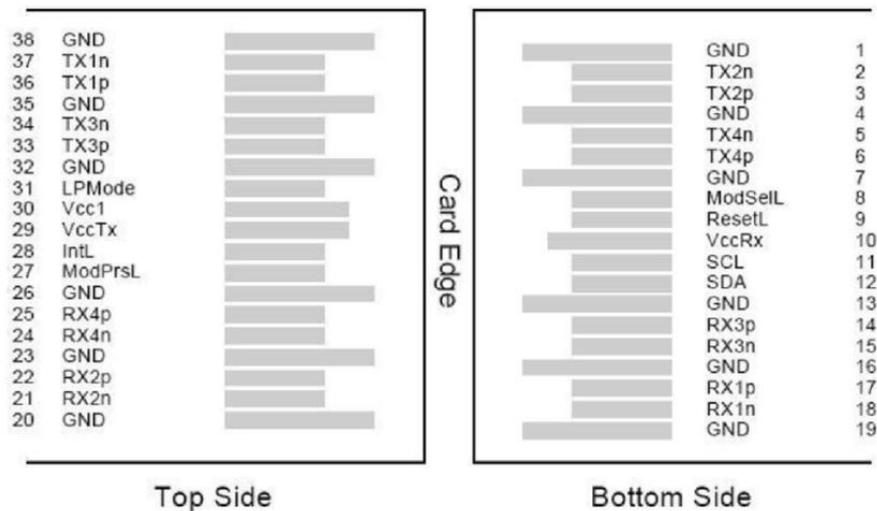
Part Number	Operating Case temperature	DDMI
UN-QSFA0-0031SL10C	Commercial(0~70°C)	Yes

Pin Descriptions

Pin	Symbol	Name/Description	NOTE
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver 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	Transmitter Ground (Common with Receiver Ground)	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4n	Receiver Inverted Data Output	1
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Transmitter Ground (Common with Receiver Ground)	1
27	ModPrsl	Module Present	
28	GND	Transmitter Ground (Common with Receiver Ground)	
29	Tx2n	Transmitter Inverted Data Input	2
30	Tx2p	Transmitter Non-Inverted Data output	2
31	GND	Transmitter Ground (Common with Receiver Ground)	
32	Tx4n	Transmitter Inverted Data Input	1
33	Tx4p	Transmitter Non-Inverted Data output	
34	GND	Transmitter Ground (Common with Receiver Ground)	
35	ModSell	Module Select	1
36	ResetL	Module Reset	
37	VccRx	3.3V Power Supply Receiver	
38	SCL	2-Wire serial Interface Clock	1

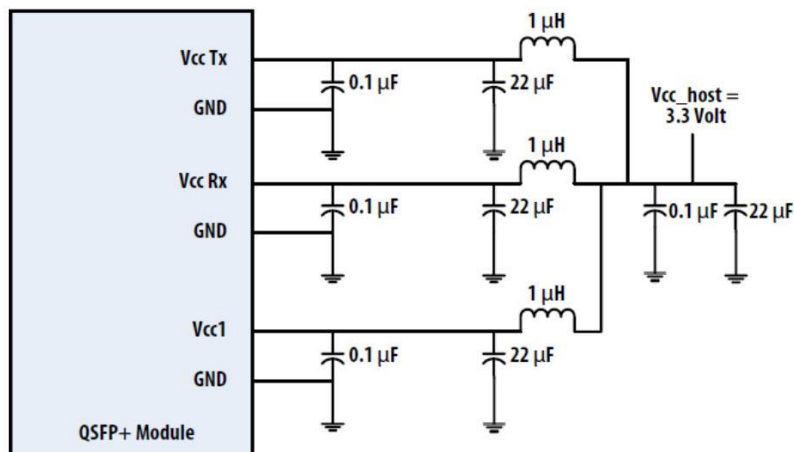
Notes:

1. GND is the symbol for signal and supply (power) common for QSFP28 modules. 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. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 4 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.



Pin-out of Connector Block on Host Board

Recommended Power Supply Filter



Recommended Power Supply Filter

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T _s	-40		+85	°C	
Relative Humidity	RH	0		95	%	
Power Supply Voltage	V _{CC}	-0.5		+3.6	V	
Damage Threshold, each Lane	TH _d	5.5			dBm	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T _c	0		70	°C	
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Data Rate Accuracy		-100		100	ppm	
Control Input Voltage High		2		V _{CC}	V	
Control Input Voltage Low		0		0.8	V	
Data Rate, each Lane	BR		25.78		Gb/s	
Link Distance with G.652	D	0.002		10	km	

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Power Consumption				4	W	
Supply Current	I _{CC}			1.21	A	
Transmitter						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (V _{cm})	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11,SCD11)	TP1			See CEI-28G-VSR	dB	
Stressed Input Test	TP1a					
Receiver						
Differential Voltage, pk-pk	TP4			900	mV	
Common Mode Voltage(V _{cm})	TP4	-350		2850	mV	1

Common Mode Noise,RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	mV	At 1MHz
Differential Return Loss (SDD22)	TP4			See CEI-28G-VSR	dB	
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22,SCD22)	TP4			See CEI-28G-VSR	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	dB	
Eye Width at 10-15 probability (EW15)	TP4	0.57			UI	
Eye Height at 10-15 probability (EH15)	TP4	228			mV	

Notes:

1. Vcm is generated by the host. Specification includes effects of ground offset voltage.
2. From 250MHz to 30GHz.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Lane Wavelength	L0	1264.5	1271	1277.5	nm	
	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
	L3	1324.5	1331	1337.5	nm	
Transmitter						
SMSR	SMSR	30			dB	
Total Average Launch Power	P_T			8.3	dBm	
Average Launch Power, each Lane	P_{AVG}	-4		3.5	dBm	
Optical Modulation Amplitude (OMA), each Lane	P_{OMA}	-7		2.5	dBm	1
Extinction Ratio	ER	3.5			dB	
RIN_{20OMA}	RIN			-130	dB/Hz	
Transmitter Reflectance	R_T			-12	dB	
Receiver						
Damage Threshold, each Lane	THd	3.5			dBm	2

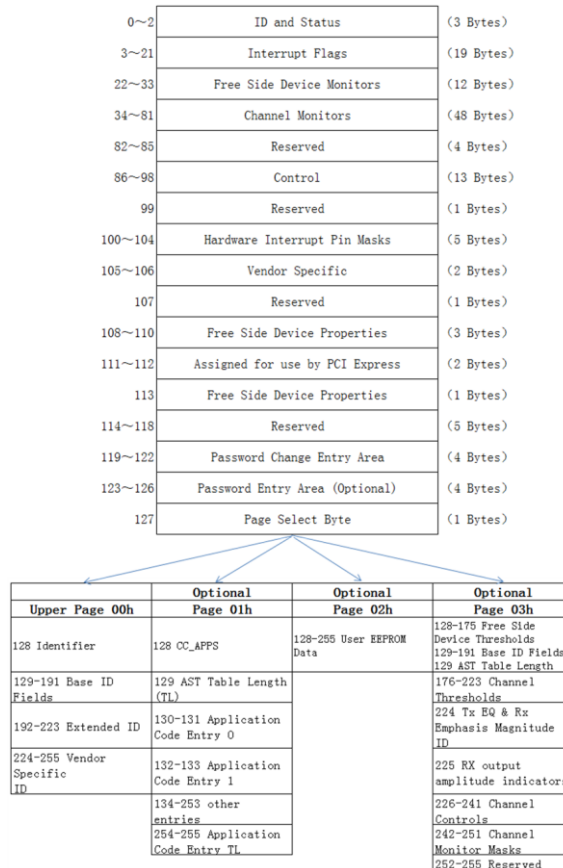
Average Receive Power, each Lane		-11.5		2.5	dBm	
Receive Power (OMA), each Lane				2.5	dBm	
Receiver Sensitivity (OMA), each Lane	SEN			-10	dBm	
Stressed Receiver Sensitivity (OMA), each Lane				-9.6	dB	3
Receiver Reflectance	R _R			-26	dB	
LOS De-assert	LOSD			-12	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. Even if the TDP < 1 dB, the OMA min must exceed the minimum value specified here.
2. 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.
3. Measured with conformance test signal at receiver input for BER = 5E-5.

EEPROM Information

EEPROM memory map specific data field description is as below:

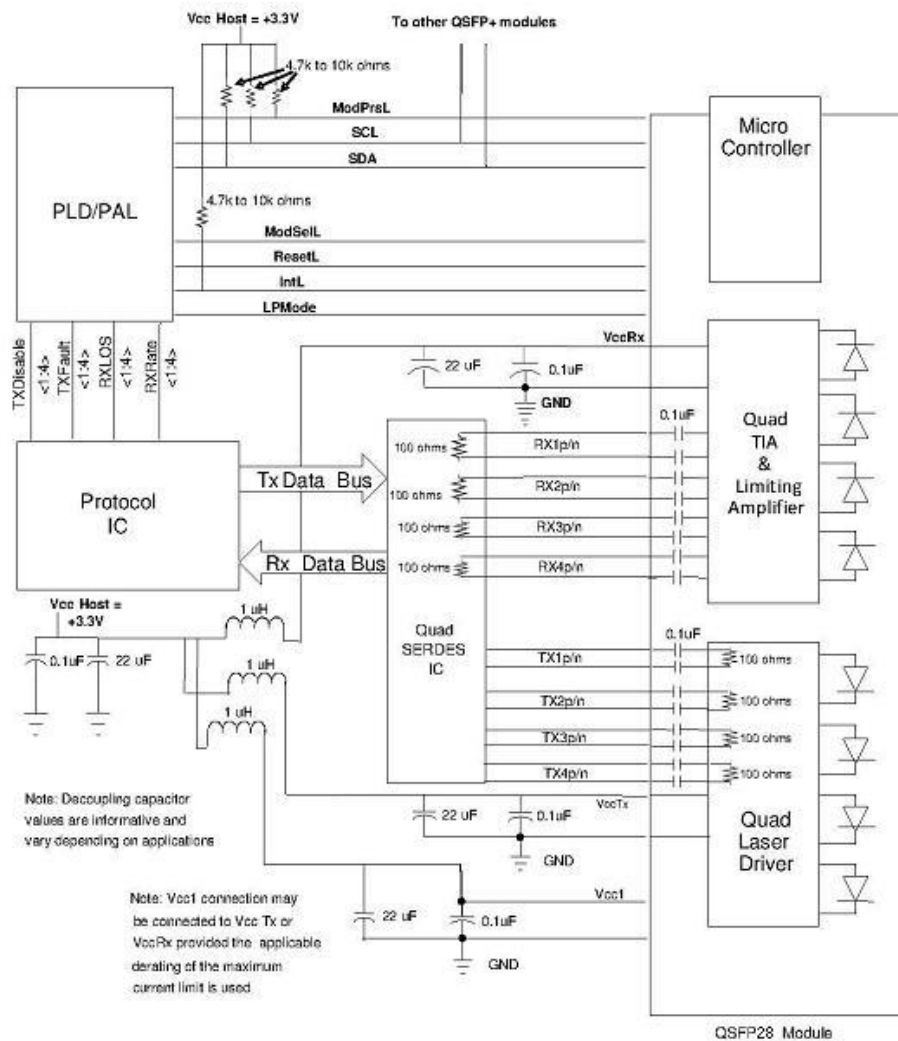


Digital Diagnostic Monitoring Interface

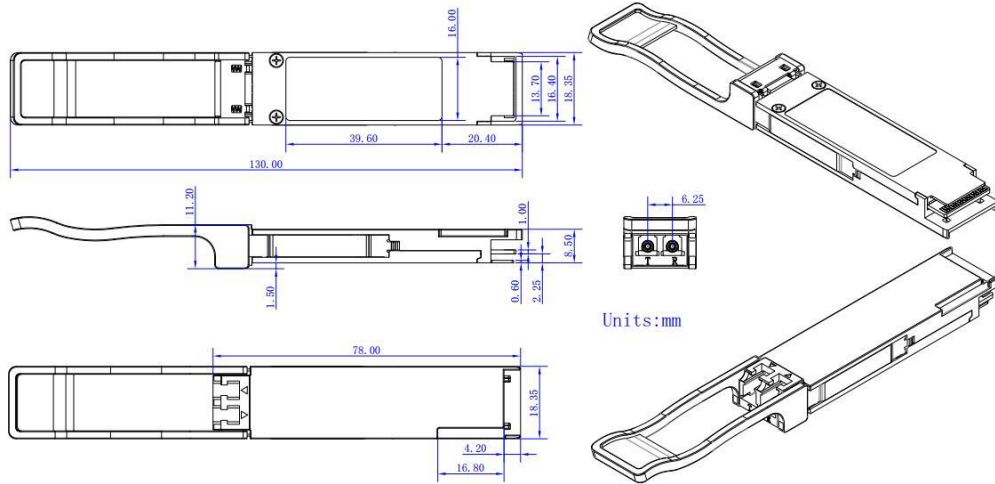
Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

Parameter	Range	Accuracy	Calibration
Temperature	0 to +70°C (C)	±3°C	Internal
Voltage	3.13 to 3.47V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	-5 to +4dBm	±3dBm	Internal
RX Power	-11 to +3dBm	±3dBm	Internal

Recommend Circuit Schematic



Mechanical Specifications



Revision History

Revision	Initiated	Reviewed	Approved	DCN	Release Date
Version1.0	Zhangchengxing	Fanny	Liubin	New Released.	July 28, 2017
Version1.1	Liusong	Fanny	Liubin	Updated document structure	Dec 10,2021