UN-QSFA0-E031SL40C

QSFP28 100G ER4 40KM Optical Transceiver

Product Feature

- Compliant with QSFP28 Standard: SFF-8665 Revision 1.9, SFF-8636 Revision 2.6
- Compliant with 100G 4WDM-40 MSA technical specification rev 1.0
- High speed I/O electrical interface (CAUI-4) compliant with IEEE 802.3bm
- Single 3.3V Supply Voltage
- Maximum power consumption 4.5W
- 0-70 ºC Case Operating Temperature
- DML laser and APD Receiver
- QSFP28 MSA package with duplex LC connector
- Two Wire Serial Interface with Digital Diagnostic Monitoring
- Complies with EU Directive 2011/65/EU (RoHS compliant)
- Class 1 Laser

Applications

- Data Center Interconnect
- 100G Ethernet

Product Selection

Part Number	Operating Case temperature	DDMI
UN-QSFA0-E031SL40C	Commercial(0~70℃)	Yes

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	TS	-40	_	+85	ºC	
Supply Voltage	VCC	-0.5	_	3.6	V	
Relative Humidity (non-condensing)	RH	5	_	95	%	
Data Input Voltage – Differential	IVDIP- VDINI	_	_	1.0	V	
Control Input Voltage	VI	-0.3	_	Vcc+0.5	V	
Control Output Current	IO	-20	_	20	mA	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T_{OPR}	0	_	70	ºC	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Instantaneous peak current at hot plug	ICC_IP	_	_	1800	mA	
Sustained peak current at hot plug	ICC_SP	_	_	1485	mA	
Maximum Power Dissipation	PD	_	_	4.5	W	
Maximum Power Dissipation, Low Power Mode	PDLP	_	_	1.5	W	
Aggregate Bit Rate	ABR	_	103.125	_	Gb/s	
Data Rate per Lane	DRL	_	25.78	_	Gb/s	
Control Input Voltage High	VIH	VCC*0.7	_	VCC+0.3	V	
Control Input Voltage Low	VIL	-0.3	_	VCC*0.3	V	
Two Wire Serial Interface Clock Rate	_	_	_	400	kHz	
Power Supply Noise Tolerance	_	_	_	66	mVpp	10 Hz - 10 MHz
Rx Differential Data Output Load	_	_	100	_	ohms	
Operating Distance	_	2	_	40,000	m	With FEC

Transmitter Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength L0	L0	1294.53	1295.56	1296.59	nm	
Wavelength L1	L1	1299.02	1300.05	1301.09	nm	
Wavelength L2	L2	1303.54	1304.58	1305.63	nm	
Wavelength L3	L3	1308.09	1309.14	1310.19	nm	
Side-mode suppression ratio	SMSR	30			dB	
Total Average Optical Launch Power	POUT	-	-	12.5	dBm	
Average Launch Power Tx_Off (Each Lane)	POUT_ OFF	-	-	-30	dBm	
Average Optical Launch Power (Each Lane)	POUTL	-2.5	-	6.5	dBm	
Extinction Ratio	ER	4	-	-	dB	
Optical Modulation Amplitude (OMA), (Each Lane)	OMA	0.5	-	6.5	dBm	
Launch Power in OMA minus TDP (Each Lane)	OMA-TDP	-0.5	-	-	dBm	
Difference in launch power between any two lanes (Average and OMA)	DT_OMA	-	-	4	dB	
Transmitter and Dispersion Penalty (Each Lane)	TDP	-	-	3	dB	
Optical Return Loss Tolerance	ORLT	20	-	-	dB	
Transmitter Eye Mask Definition	-	{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				
Transmitter Reflectance	TR	-	-	-26	dB	

Receiver Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Wavelength L0	L0	1294.53	1295.56	1296.59	nm	
Wavelength L1	L1	1299.02	1300.05	1301.09	nm	
Wavelength L2	L2	1303.54	1304.58	1305.63	nm	
Wavelength L3	L3	1308.09	1309.14	1310.19	nm	
Receiver sensitivity (OMA), each lane at 5 x 10^{-5} BER		-	-	-18.5	dBm	
Stressed receiver sensitivity (OMA), each lane	-	-	-	-16	dBm	
Stressed Receiver Sensitivity Test Conditions:						
Stressed Eye J2 Jitter (Each Lane)	-	-	0.33	-	UI	
Stressed Eye J4 Jitter (Each Lane)	-	-	0.48	-	UI	
Vertical Eye Closure Penalty	-	-	2.5	-	dB	
SRS eye mask definition { X1, X2, X3, Y1, Y2, Y3}		{0.39, 0.5, 0.5, 0.39, 0.39, 0.4}				
Damage threshold, each lane	Pin, damage	-2.5	-	-	dBm	
Average Receive Power (Each Lane)	-	-20.5	-	-3.5	dBm	
Receive Power in OMA (Each Lane), Overload	OMA	-	-	-3.5	dBm	
Receiver Reflectance	RXR	-	-	-26	dB	

Functional Characteristics (Electrical)

Electrical Specification High Speed Signal (compliant with IEEE 802.3 CAUI-4)

Receiver (Module Output)						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Notes**
AC common-mode output Voltage (RMS)		-	-	17.5	mV	
Differential output Voltage		-	-	900	mV	
Eye width		0.57	-	-	UI	
Eye height differential		228	-	-	mV	
Vertical eye closure		-	-	5.5	dB	
Differential Termination Mismatch		-	-	10	%	
Transition Time (min, 20% to 80%)		12	-	-	ps	
DC common mode Voltage		-350	-	2850	mV	
Transmitter (Module Input)						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Notes**
Differential pk-pk input Voltage tolerance		900	-	-	mV	
Differential termination mismatch		-	-	10	%	
Single-ended voltage tolerance range		-0.4	-	3.3	V	
DC common mode Voltage		-350	-	2850	mV	

Electrical Specification Low Speed Signal (compliant with SFF-8679 Rev 1.8)

Parameter	**Symbol**	**Min.**	**Max.**	**Unit**	**Condition**
Module output SCL and SDA	V_{OL}	0	0.4	V	
	V_{OH}	Vcc-0.5	Vcc+0.3	V	
Module Input SCL and SDA	V_{IL}	-0.3	V_{CC}*0.3	V	
	V_{IH}	V_{CC}*0.7	V_{CC}+0.5	V	
LPMode/TxDis, ResetL and ModSelL	V_{IL}	-0.3	0.8	V	
	V_{IH}	2	V_{CC}+0.3	V	
ModPrsL and IntL/RxLOSL	V_{OL}	0	0.4	V	
	V_{OH}	V_{CC}-0.5	V_{CC}+0.3	V	

Pin Definitions

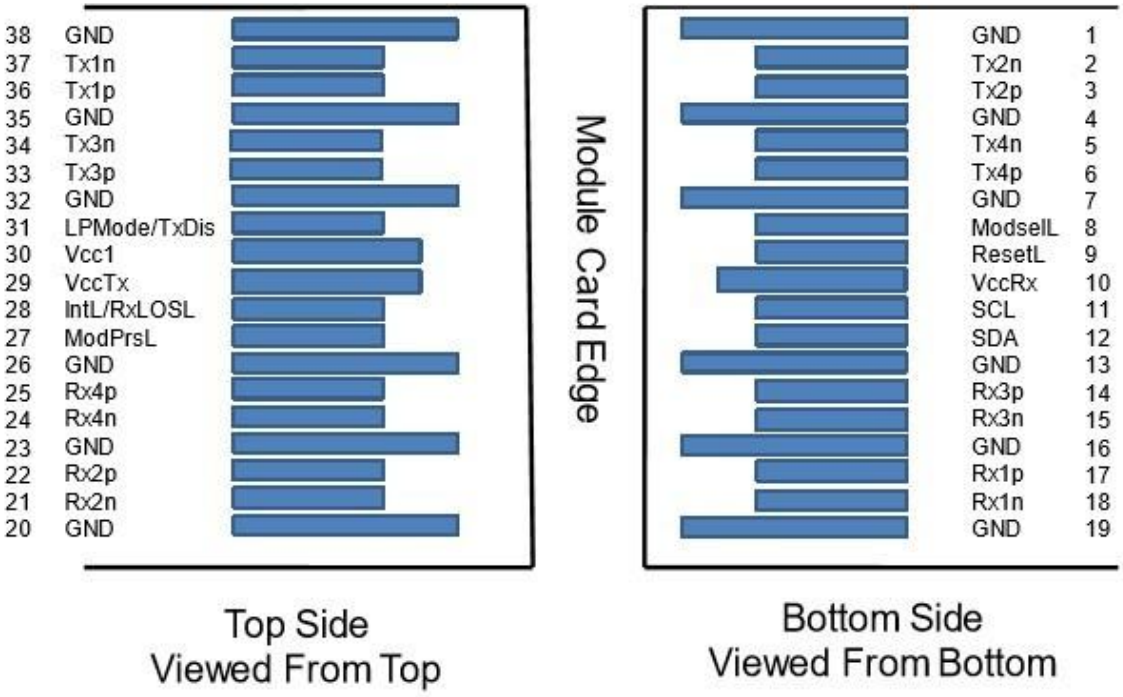


Figure 1 – Pin definitions of the module high speed inputs/outputs

Module Pin Definitions

Pin	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModselL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply Receiver	2	2
11	LVCMOS-I/O	SCL	2-wire serial interface clock	3	
12	LVCMOS-I/O	SDA	2-wire serial interface data	3	
13		GND	Ground	1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL/RxLOSL	Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636). Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).	3	
29		Vcc Tx	+3.3V Power supply transmitter	2	2
30		Vcc1	+3.3V Power supply	2	2

31	LVTTL-I	LPMode/TxDis	Low Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636).	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1

Note 1: GND is the symbol for signal and supply (power) common for the module. All are common within the module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

Note 2: VccRx, Vcc1 and VccTx are applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1 A.

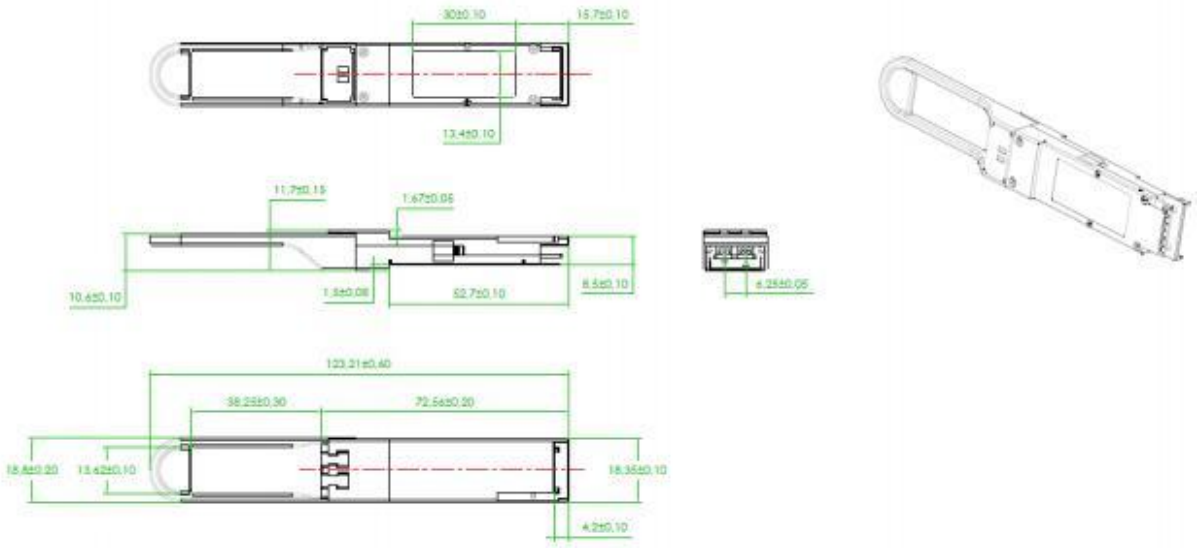
Timing for Squelch & Disable

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Rx Squelch Assert Time	ton_Rxsq			80	μs	
Rx Squelch Deassert Time	toff_Rxsq			80	μs	
Tx Squelch Assert Time	ton_Txsq			400	ms	
Tx Squelch Deassert Time	toff_Txsq			400	ms	
Tx Disable Assert Time	ton_txdis			100	ms	
Tx Disable Deassert Time	toff_txdis			400	ms	
Rx Output Disable Assert Time	ton_rxdis			100	ms	
Rx Output Disable Deassert Time	toff_rxdis			100	ms	
Squelch Disable Assert Time	ton_sqdis			100	ms	
Squelch Disable Deassert Time	toff_sqdis			100	ms	

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	ºC	Internal
Voltage	0 to VCC	0.1	V	Internal
Tx Bias Current (Each Lane)	0 to 100	10%	mA	Internal
Tx Output Power (Each Lane)	-2.5 to 6.5	±3	dB	Internal
Rx Power (Each Lane)	-20.5 to -3.5	±3	dB	Internal

Mechanical Diagram



Revision History

Revision	Initiated	Reviewed	Approved	DCN	Release Date
Version1.0	Zhangchengxing	pengyanhui	Liubin	New Released.	July 10, 2021