

NXQ28-SWD4-M1D

QSFP28-BIDI-100GBASE-SR SWDM4 100m

Features

- QSFP28 Form Factor
- 100 Gb/s bitrate
- Up to 100 m over Multimode
- LC connector
- SWDM4, VCSEL laser, PIN photodiode
- Up to 3,5W power consumption
- +0/+70°C temperature range
- Built in digital diagnostic monitoring



Applications

- 100GBase Ethernet
- Access and Enterprise

Optical specifications



Optical budget : 4 dB

Transmitter & Receiver optical Specifications

Parameter	Min	Max	Unit
Tx Power	-5.5	-3	dBm
Rx Sensitivity	-9.5	3.4	dBm

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Maximum Supply Voltage	V _{cc}	-0.5		3.6	V	
Storage Temperature	TS	-40		85	°C	
Case Operating Temperature	TOP	0		70	°C	1
Relative Humidity	RH	15		85	%	2
Receiver Damage Threshold, per Lane	PR _{dmg}	3.8			dBm	

Notes:

1. Temporary excursions case operating temperature of -5 to -75 °C not exceeding 72 hours.
2. Non-condensing.

Electrical Characteristics

Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			1.5	A	
Module total power	P			3.5	W	1
Transmitter						
Signaling rate per lane		25.78125 ± 100ppm			Gb/s	
Differential pk-pk input voltage tolerance	Vin,pp,diff			900	mV	
Single-ended voltage tolerance	Vin,pp	-0.35		+3.3	V	
Module stress input test	Per Section 83E.3.4.1, IEEE 802.3bm					
Receiver						
Signaling rate per lane		25.78125 ± 100ppm			Gb/s	
Differential data output swing	Vout,pp	100		400	mVpp	2
		300		600		
		400	600	800		
		600		1200		
Eye width		0.57			UI	
Eye height, differential		228			mV	
Vertical eye closure	VEC	5.5			dB	
Transition time (20% to 80%)	tr, tf	12			ps	

Notes:

1. Maximum total power value is specified across the full temperature and voltage range.
2. Output voltage is settable in 4 discrete ranges via I2C. Default range is Range 2 (400 – 800 mV).

Optical Characteristics

Parameter	Symbol	λ1	λ2	λ3	λ4	Unit	Notes
Transmitter							
Signaling Speed per Lane			25.78125 ± 100ppm			Gb/s	1
Lane center wavelengths (range)	λ	850	880	910	940	nm	
RMS Spectral Width	SW	0.59	0.59	0.59	0.59	nm	
Tx _{OMA} min at max TDEC		-3	-3	-3	-2.9	dBm	
TDEC (OM3)	TDEC	3.3	3.5	3.7	4.2	dB	
Tx _{OMA} - TDEC	P-TDEC	-6.3	-6.5	-6.7	-7.1	dBm	
Tx _{OMA} min	TxOMA	-5.5	-5.5	-5.5	-5.5	dBm	
Relative Intensity Noise	RIN		-130			dB/Hz	2
Optical Extinction Ratio	ER	2	2	2	2	dB	
Optical Return Loss Tolerance	ORL		12			dB	
Average launch power of OFF transmitter, per lane			-30			dBm	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}			{0.3,0.38,0.45,0.35,0.41,0.5}				3
Receiver							
Signaling Speed per Lane			25.78125 ± 100ppm			GBd	4
Lane center wavelengths (range)	λ	850	880	910	940	nm	
Damage Threshold	DT	3.8	3.8	3.8	3.8	dBm	
Average Receive Power per Lane (min)	RXPmin	-9.5	-9.4	-9.4	-9.4	dBm	
Average Receive Power per Lane (max)	RXPmax	3.4	3.4	3.4	3.4	dBm	
Receiver Reflectance (max)	Rfl		-12			dB	
Stressed Receiver Sensitivity (OMA) per Lane	SRS	-5.2	-5.2	-5.2	-5.2	dBm	5
Back to Back Receiver Sensitivity (OMA) per Lane	RxSens	-8.2	-8.4	-8.6	-8.8	dBm	6
Stressed Conditions:							
Stressed eye closure	SEC	3.3	3.5	3.7	4.2	dB	
Stressed eye J2 jitter	J2		0.39			UI	
Stressed eye J4 jitter	J4		0.53			UI	
Stressed Receiver Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}			{0.28,0.5,0.5,0.33,0.33,0.4}				7
LOS De-Assert (max)	LOSD		-11			dBm	8
LOS Assert (min)	LOSA		-30			dBm	8
LOS Hysteresis			0.5			dB	

Notes:

1. Transmitter consists of 4 lasers and a 4:1 optical multiplexer.
2. Informative, link controlled by TDEC
3. Hit Ratio 1.5×10^{-3} hits/sample.
4. Receiver consists of a 1:4 optical de-multiplexer and 4 photodetectors.
5. 5×10^{-5} BER (pre-FEC).
6. Unstressed receiver sensitivity is information and assumes 5×10^{-5} BER (pre-FEC).
7. Hit Ratio 5×10^{-5} hits/sample.
8. DC values.

Link Budget

Parameter	Symbol	Min	Typ	Max	Units	Notes
Bit Rate (all wavelengths combined)	BR		103.10		Gb/s	
Bit Error Rate	BER			5×10^{-5}		1
Insertion Loss	IL			1.8	dB	2
Maximum Supported Distances						
Fiber Type						
OM3 MMF	Lmax1			75	m	3
OM4 MMF	Lmax2			100	m	3
OM5 MMF	Lmax3			150	m	3

Notes:

1. Tested with a $2^{31} - 1$ PRBS at 25.78125 Gb/s
2. 850 nm channel can tolerate 1.9 dB insertion loss
3. Specified at 103.1Gb/s. Requires RS-FEC on the host to support maximum distance.

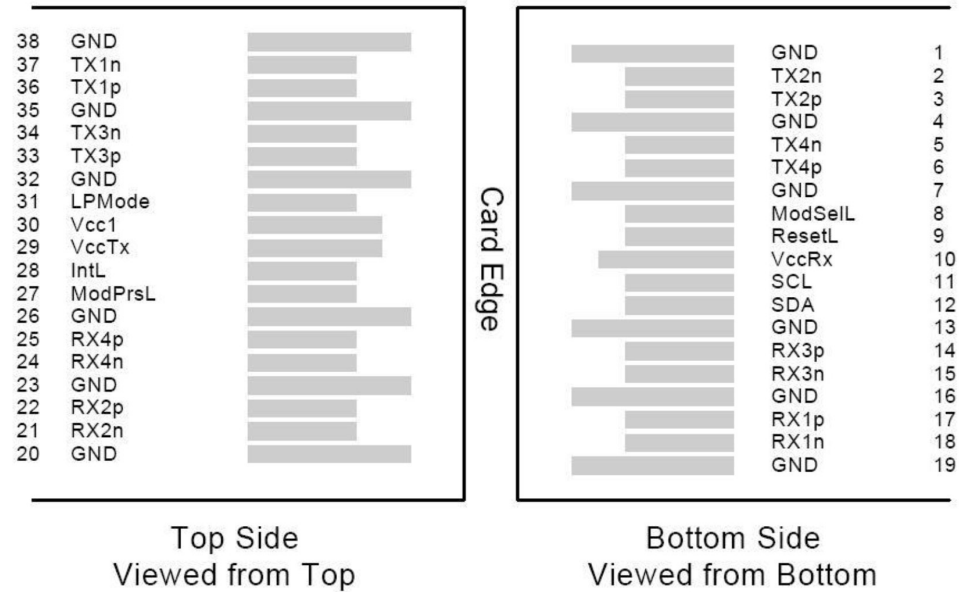
Pin Descriptions

Pin	Logic	Symbol	Name/Descriptions	Ref.
1		GND	Module Ground	1
2	CML-I	Tx2-	Transmitter inverted data input	
3	CML-I	Tx2+	Transmitter non-inverted data input	
4		GND	Module Ground	1
5	CML-I	Tx4-	Transmitter inverted data input	
6	CML-I	Tx4+	Transmitter non-inverted data input	
7		GND	Module Ground	1
8	LVTTL-I	MODSEIL	Module Select	2
9	LVTTL-I	ResetL	Module Reset	2
10		VCCR _x	+3.3v Receiver Power Supply	
11	LVC _{MOS} -I	SCL	2-wire Serial interface clock	2
12	LVC _{MOS} -I/O	SDA	2-wire Serial interface data	2
13		GND	Module Ground	1
14	CML-O	RX3+	Receiver non-inverted data output	
15	CML-O	RX3-	Receiver inverted data output	
16		GND	Module Ground	1
17	CML-O	RX1+	Receiver non-inverted data output	
18	CML-O	RX1-	Receiver inverted data output	
19		GND	Module Ground	1
20		GND	Module Ground	1
21	CML-O	RX2-	Receiver inverted data output	
22	CML-O	RX2+	Receiver non-inverted data output	
23		GND	Module Ground	1
24	CML-O	RX4-	Receiver inverted data output	
25	CML-O	RX4+	Receiver non-inverted data output	
26		GND	Module Ground	1
27	LVTTL-O	ModPrsL	Module Present, internal pulled down to GND	
28	LVTTL-O	IntL	Interrupt output should be pulled up on host board	2
29		VCCT _x	+3.3v Transmitter Power Supply	
30		VCC1	+3.3v Power Supply	
31	LVTTL-I	LPMode	Low Power Mode	2
32		GND	Module Ground	1
33	CML-I	Tx3+	Transmitter non-inverted data input	
34	CML-I	Tx3-	Transmitter inverted data input	
35		GND	Module Ground	1
36	CML-I	Tx1+	Transmitter non-inverted data input	
37	CML-I	Tx1-	Transmitter inverted data input	
38		GND	Module Ground	1

Notes:

- 1. Module circuit ground is isolated from module chassis ground with in the module.
- 2. Open collector; should be pulled up with 4.7k-10k ohms on host board to a voltage between 3.15V and 3.6V.

Electrical Pin-out Details



Mechanical Specifications

