

NXQD-1314-S2D

QSFP-DD 400GBASE-FR4 CWDM4 2km Singlemode

Features

- QSFP-DD Form Factor
- 400 Gb/s bitrate
- Up to 2 km over Singlemode
- LC connector
- CWDM4, EML laser, PIN photodiode
- Up to 10W power consumption
- +0/+70°C temperature range
- Built in digital diagnostic monitoring



Applications

- 400GBase Ethernet
- Access and Enterprise

Optical specifications



Optical budget : 4 dB

Transmitter & Receiver optical Specifications

Parameter	Min	Max	Unit
Tx Power	-3.3	3.5	dBm
Rx Sensitivity	-7.3	3.5	dBm

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	0		70	°C	
Relative Humidity	RH	5		89	%	
Supply Voltage	Vcc	-0.5		3.6	V	
Signaling Rate Per Lane			53.125 ± 100ppm		Gbd	PAM4
Operating Distance		2		2000	m	

Electrical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		Vcc	3.135	3.3	3.465	V	
Instantaneous Peak Current at Hot Plug		Icc_IP			4000	mA	
Sustained Peak Current at Hot Plug		Icc_SP			3300	mA	
Maximum Power Dissipation		PD			10	W	
Maximum Power Dissipation (Low-Power Mode)		PD _{LP}			1.5	W	
2-Wire Serial Interface Clock Rate					400	kHz	
Module Sinusoidal Power Supply Noise Tolerance 1kHz - 1MHz (Pk-Pk)					66	mVp-p	
Rx Differential Data Output Load				100		Ω	
Transmitter							
Differential Pk-Pk Input Voltage Tolerance (TP1a)			750			mV	
Pk-Pk AC Common-Mode Voltage Tolerance	Low-Frequency (VCMLF)				32	mV	
	Full-Band (VCMFB)				80		
Effective Return Loss		ERL	8.5			dB	
Differential Termination Mismatch					10	%	
Single-Ended Voltage Tolerance Range			-0.4		3.3	V	
DC Common-Mode Voltage Tolerance			-0.35		2.85	V	
Differential-Mode to Common-Mode Return Loss		RLcd	802.3ck 120G-2			dB	
Receiver							
Pk-Pk AC Common-Mode Voltage	Low-Frequency (VCMLF)				32	mV	
	Full-Band (VCMFB)				80		
Differential Pk-Pk Output Voltage	Short-Mode				600	mV	
	Long-Mode				845		

Eye Height	EH	15			mV	
Vertical Eye Closure	VEC			12	dB	
Effective Return Loss	ERL	8.5			dB	
Differential Termination Mismatch				10	%	
Transition Time		8.5			ps	
DC Common-Mode Voltage Tolerance		-0.35		2.85	V	
Common-Mode to Differential-Mode Return Loss	RLDc	802.3ck 120G-1			dB	
Low-Speed Signal						
Module Output SCL and SDA	VOL	0		0.4	V	
Module Input SCL and SDA	VIL	-0.3		Vcc*0.3	V	
	VIH	Vcc*0.7		Vcc+0.5	V	
LPMode/TxDis, ResetL, and ModSelL	VIL	-0.3		0.8	V	
	VIH	2		Vcc+0.3	V	
IntL/RxLOS	VOL	0		0.4	V	
	VOH	Vcc-0.5		Vcc+0.3	V	

Optical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter							
Center Wavelength	λ_C		1264.5	1271	1277.5	nm	
			1284.5	1291	1297.5		
			1304.5	1311	1317.5		
			1324.5	1331	1337.5		
Side-Mode Suppression Ratio	SMSR		30			dB	
Average Launch Power Per Lane	AOP _L		-3.2		4.4	dBm	1
Outer Optical Modulation Amplitude (OMA _{outer}) Per Lane	T _{OMA}				3.7	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}) Per Lane	TDECQ<1.4dB	T _{OMA}	-0.2				
	1.4≤TDECQ≤3.4dB		-1.6+TDECQ				
Difference in Launch Power Between Any Two Lanes (OMA _{outer})	DP				3.9	dB	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ) Per Lane	TDECQ				3.4	dB	
Transmitter Eye Closure for PAM4 (TECQ)	TECQ				3.4	dB	
TDECQ - TECQ					2.5	dB	
Over/Under-Shoot					22	%	
Transmitter Power Excursion					1.8	dBm	

Average Launch Power of Off Transmitter Per Lane		Toff			-16	dBm	
Extinction Ratio Per Lane		ER	3.5			dB	
Transmitter Transition Time					17	ps	
RIN _{17.1} OMA		RIN			-136	dB/Hz	
Optical Return Loss Tolerance		ORL			17.1	dB	
Transmitter Reflectance		TR			-26	dB	
Receiver							
Center Wavelength		λ_C	1264.5	1271	1277.5	nm	
			1284.5	1291	1297.5		
			1304.5	1311	1317.5		
			1324.5	1331	1337.5		
Damage Threshold Per Lane		AOP _D	5.4			dBm	
Average Receive Power Per Lane		AOP _R	-7.2		4.4	dBm	2
Receive Power (OMAouter) Per Lane		OMA _R			3.7	dBm	
Difference in Receive Power Between Any Two Lanes (OMAouter)		DR			4.1	dB	
Receiver Reflectance		RR			-26	dB	
Receiver Sensitivity (OMAouter) Per Lane	TECQ<1.4dB	SOMA			-4.6	dBm	
	1.4≤TECQ≤3.4dB				-6+TECQ		
Stressed Receiver Sensitivity (OMAouter) Per Lane		SRS			-2.6	dBm	3
Stressed Eye Closure for PAM4 (SECQ)				3.4		dB	
OMAouter of Each Aggressor Lane				1.4		dBm	

Notes:

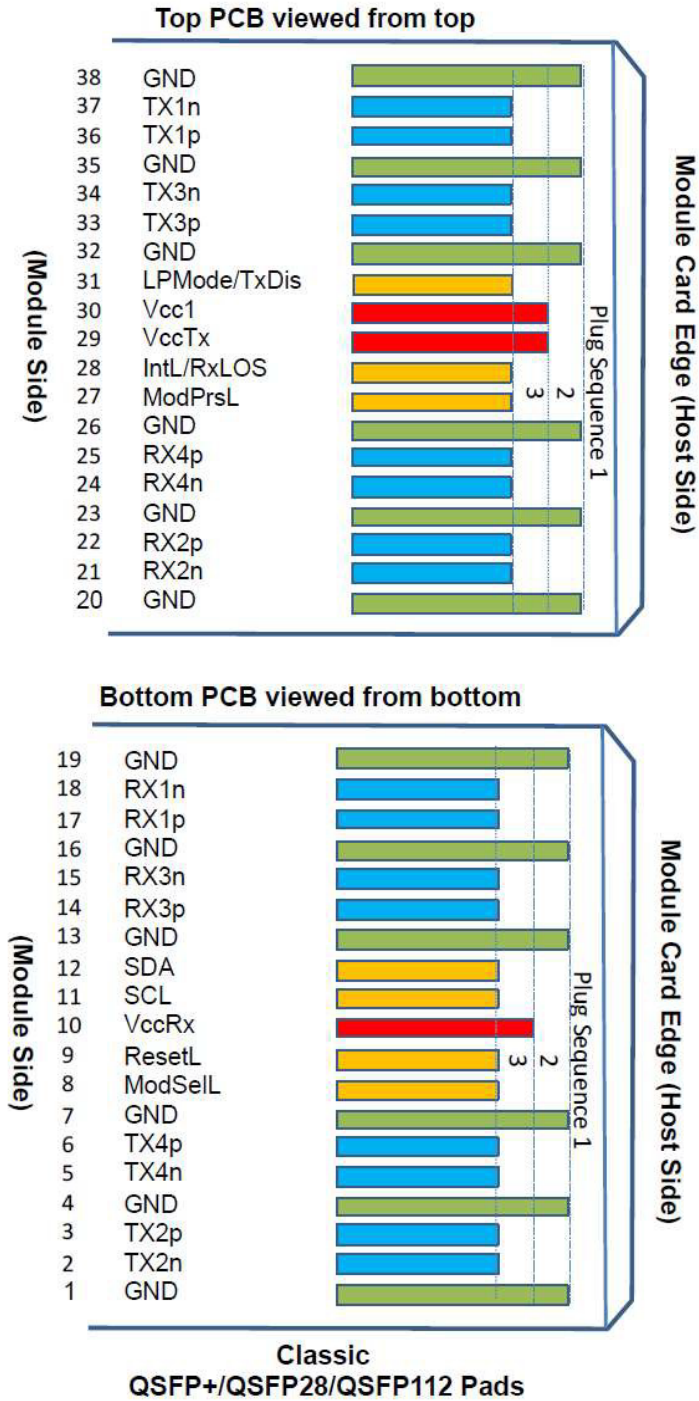
1. Average launch power, per lane (minimum), is informative and not the principal indicator of signal strength.
2. Average receive power, per lane (minimum), is informative and not the principal indicator of signal strength.
3. Measured with conformance test signal at TP3 for the BER=2.4x10⁻⁴.

Pin Descriptions

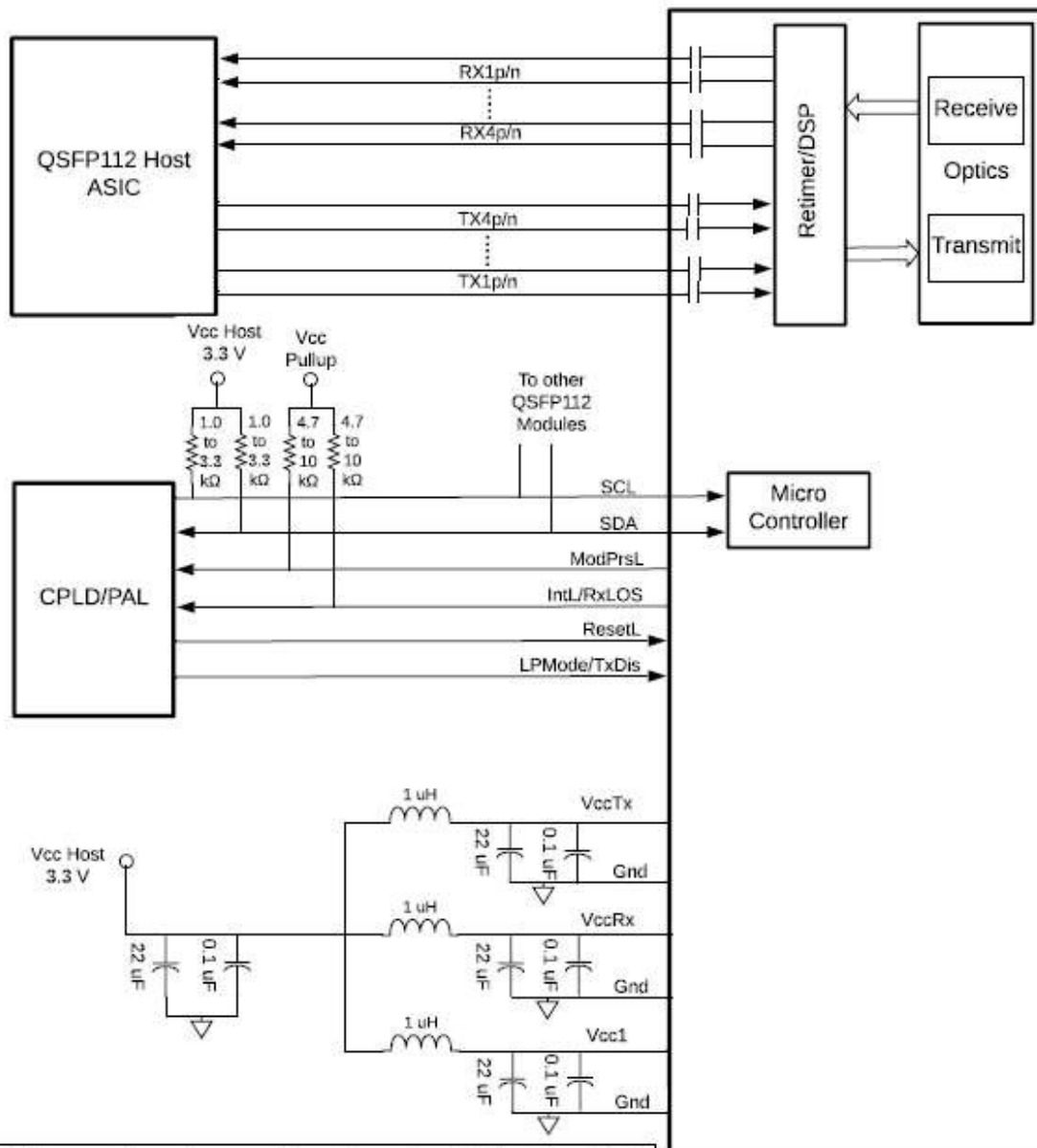
Pin	Symbol	Logic	Name/Description	Notes
1	GND		Module Ground.	1
2	Tx2-	CML-I	Transmitter Inverted Data Input.	
3	Tx2+	CML-I	Transmitter Non-Inverted Data Input.	
4	GND		Module Ground.	1
5	Tx4-	CML-I	Transmitter Inverted Data Input.	
6	Tx4+	CML-I	Transmitter Non-Inverted Data Input.	
7	GND		Module Ground.	1
8	ModSelL	LVTTL-I	Module Select.	
9	ResetL	LVTTL-I	Module Reset.	
10	VccRx		+3.3V Receiver Power Supply.	2
11	SCL	LVC MOS-I/O	2-Wire Serial Interface Clock.	
12	SDA	LVC MOS-I/O	2-Wire Serial Interface Data.	
13	GND		Module Ground.	1
14	Rx3+	CML-O	Receiver Non-Inverted Data Output.	
15	Rx3-	CML-O	Receiver Inverted Data Output.	
16	GND		Module Ground.	1
17	Rx1+	CML-O	Receiver Non-Inverted Data Output.	
18	Rx1-	CML-O	Receiver Inverted Data Output.	
19	GND		Module Ground.	1
20	GND		Module Ground.	1
21	Rx2-	CML-O	Receiver Inverted Data Output.	
22	Rx2+	CML-O	Receiver Non-Inverted Data Output.	
23	GND		Module Ground.	1
24	Rx4-	CML-O	Receiver Inverted Data Output.	
25	Rx4+	CML-O	Receiver Non-Inverted Data Output.	
26	GND		Module Ground.	1
27	ModPrsL	LVTTL- O	Module Present.	
28	IntL/RxLOS	LVTTL- O	Interrupt/Optional RxLOS.	
29	VccTx		+3.3V Transmitter Power Supply.	2
30	Vcc1		+3.3V Power Supply.	2
31	LPMoDe/TxDis	LVTTL- I	Low-Power Mode/Optional Tx_Disable.	
32	GND		Module Ground.	1
33	Tx1+	CML-I	Transmitter Non-Inverted Data Input.	
34	Tx1-	CML-I	Transmitter Inverted Data Input.	
35	GND		Module Ground.	1

36	Tx1+	CML-I	Transmitter Non-Inverted Data Input.	
37	Tx1-	CML-I	Transmitter Inverted Data Input.	
38	GND		Module Ground.	1

Pin-Out Details



Recommended Host Board Schematic



Note: Filter capacitors values are informative and application dependent, 0.1 μF capacitors should be placed in close proximity to power pads and may be duplicated for individual pads to provide additional high frequency filtering.

Note: Vcc1 may be connected to VccTx or VccRx within the module provided the applicable derating of the maximum current limit is used.

QSFP112 Optical Module

Mechanical Specifications

