CRE	Datasheet	No.	DS10-Q003A
		Initial Date	2023-02-22
OQ	OQQS3414-8	Written Team	R&D Dept.
			GH Zheng

I Preview

PN	OQQS3414-8
Description	400G QSFP-DD ER8 1310nm-LAN WDM 40KM LC DDMI 0~70 °C

II Contents

1. Features
2. Applications
3. Description
4. Absolute maximum Ratings
5. Operating Environment
6. Optical Characteristics
7. Electrical Specifications
8. Pin Descriptions
9. Digital Diagnostic Functions
10. Mechanical Dimensions
11. Model Ordering Information

III Revision History

No.	Date	Items	Change Recording	Ver.	Rev.	Customer
1	2023-02-22	All	Initial registration	000	000	Standard
2						
3						
4						
5						
6						

1. Features

- QSFP-DD MSA compliant
- Compliant to IEEE 802.3cn 400GBASE-ER8
- Digital diagnostic monitoring support
- Hot pluggable 76 pin electrical interface
- 8 LAN-WDM lanes MUX/DEMUX design
- 53.125 Gbps PAM4 Channel Electrical Serial Interface (400GAUI-8)
- Maximum power consumption 15.4 W
- LC duplex connector
- Supports 425 Gbps bit rate
- Up to 40 km transmission on single mode fiber
- Single 3.3 V power supply
- RoHS 2 compliant
- Operating case temperature: Standard: 0 to +70°C

2. Applications

- 400GBASE-ER8 Ethernet
- Telecom networking
- Data Center Interconnect

3. Description

The OCRECOM's OQQS3414-8 is designed for 40 km optical communication applications, and it is compliant to IEEE 802.3cn for 400GE Ethernet. This module contains 8-lane optical transmitter, 8-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. A block diagram is shown in Figure 1.

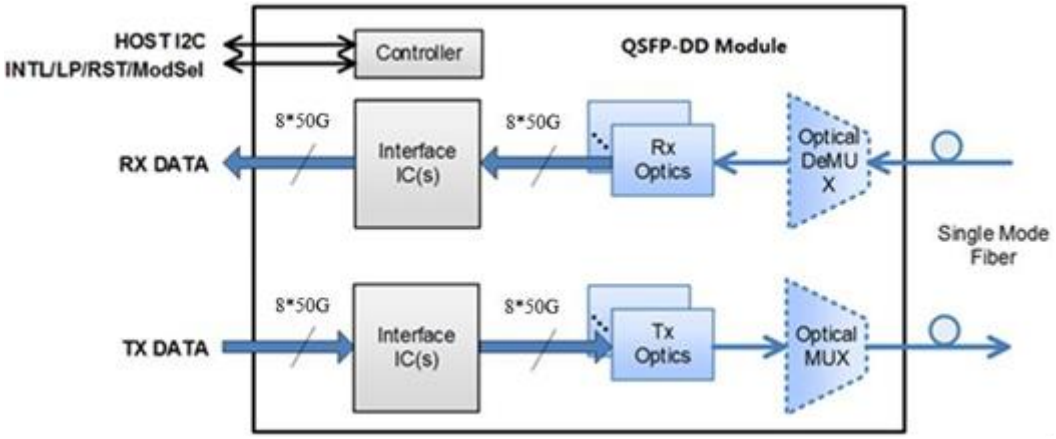


Figure 1 Block Diagram of transceiver

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	Max	Unit	Note
Storage Temperature	TST	-40	85	℃	
Relative Humidity(non-condensing)	RH	0	85	%	
Operating Case Temperature	TOPC	0	70	℃	
Supply Voltage	VCC	-0.5	3.6	V	
Damage Threshold, each Lane	TH_d	-3.4		dBm	

5. Operating Environment

Parameter	Symbol	Min	Typical	Max	Unit	Note
Operating Case Temperature	TOPC	0		70	℃	
Power Supply Voltage	VCC	3.13	3.3	3.47	V	
Supply current	Icc			4.912	A	
Power dissipation		-		15.4	W	
Link Distance with G.652	D			40	km	

6. Optical Characteristics

400GBASE-ER8 Operation (EOL, TOP = 0 to +70℃, VCC = 3.135 to 3.465 Volts)

Transmitter						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Wavelength Assignment	L0	1272.55	1273.54	1274.54	nm	
	L1	1276.89	1277.89	1278.89	nm	
	L2	1281.25	1282.26	1283.27	nm	
	L3	1285.65	1286.66	1287.68	nm	
	L4	1294.53	1295.56	1296.59	nm	
	L5	1299.02	1300.05	1301.09	nm	
	L6	1303.54	1304.58	1305.63	nm	
	L7	1308.09	1309.14	1310.19	nm	
Data Rate, each Lane		26.5625 ± 100 ppm			GBd	
Modulation Format		PAM4				
Side Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P_T			14.6	dBm	

Average Launch Power, each lane	P_{AVG}	-0.6	-	+5.6	dBm	
Optical Modulation Amplitude (OMA)	P_{OMA}	2.4	-	+6.4	dBm	
Transmitter and Dispersion Eye Closure for PAM4, each Lane	TDECQ			3.4	dB	
Extinction Ratio	ER	6			dB	
RIN15 OMA	RIN			-132	dB/Hz	
Optical Return Loss Tolerance	TOL			15	dB	
Transmitter Reflectance	RT			-26	dB	
Average Launch Power OFF Transmitter, each Lane	P_{off}			-30	dBm	

Receiver						
Data Rate, each Lane		26.5625 ± 100 ppm			GBd	
Modulation Format		PAM4				
Damage Threshold	THd	-3.4			dBm	
Average Receive Power, each Lane		-18.6		-4.4	dBm	
Receive Power (OMA), each Lane				-3.6	dBm	
Receiver Sensitivity in OMA, each Lane	SEN			max (-16.1, SECQ-17.5)	dBm	
Receiver Reflectance	R_R			-26	dB	
Difference in Receive Power between any Two Lanes (OMA)	Prx,diff			5.8	dB	
Signal Loss Assert Threshold	LOSA	-30			dBm	
Signal Loss Deassert Threshold	LOSD			-20.6	dBm	
LOS Hysteresis	LOSH	0.5	-	-	dB	

7. Electrical Specifications

Parameter	Test Point	Min	Typical	Max	Units	Notes
Power Consumption				15.4	W	
Supply Current	Icc			4.912	A	
Transmitter (each Lane)						

Signaling Rate, each Lane	TP1	26.5625 ± 100 ppm			GBd	
Differential voltage pk-pk	Vin, pp			880	mV	
Common mode voltage	Vcm	-0.3		2.8	V	
Common mode noise	RMS			17.5	mV	
Differential termination resistance mismatch				10	%	
Transition time	Trise/Tfall	12			ps	20%~80%
Eye width at 10-6 probability	EW6	0.2			UI	
Eye height at at 10-6 probability	EH6	32			mV	
Eye linearity		0.85				
Receiver (each Lane)						
Signaling Rate, each lane	TP4	26.5625 ± 100 ppm			GBd	
Differential voltage pk-pk	Vout, pp			900	mV	
Transition time	Trise/Tfall	9.5			ps	20%~80%
Near-end eye width at 10-6 probability	EW6	0.265			UI	
Near-end eye height at 10-6 probability	EH6	70			mV	
Far-end eye width at 10-6 probability	EW6	0.2			UI	
Far-end eye height at 10-6 probability	EH6	30			mV	
Near-end eye linearity		0.85				

Notes:

400GAUI-8 Electrical Characteristics refers to CEI-56G-VSR-PAM4 of OIF-CEI-04.0.3. DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

8. Pin Descriptions

The electrical pinout of the QSFP-DD module is shown in Figure 2 below.

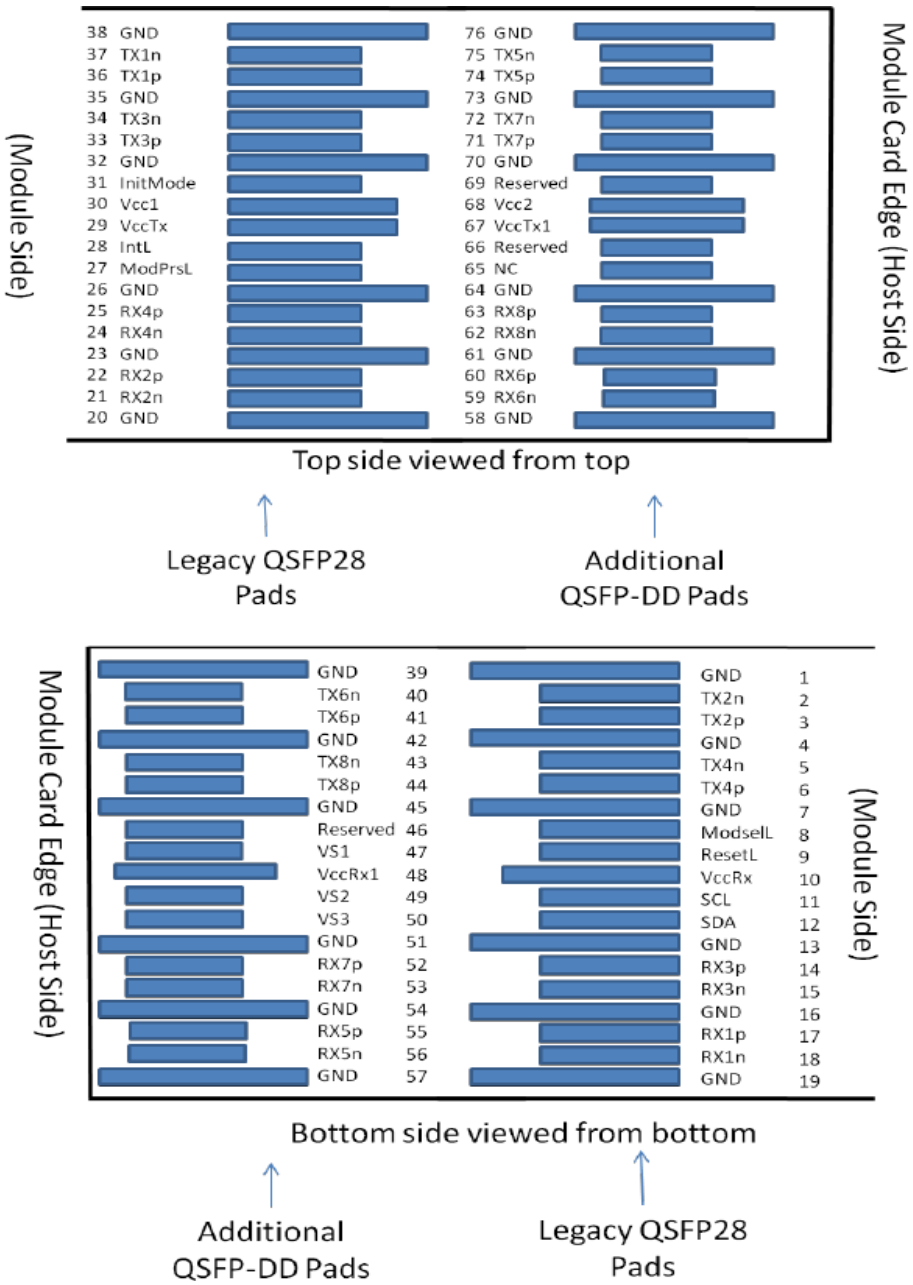


Figure 2 MSA Compliant Connector

PIN	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Ground	1B	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3B	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3B	
4		GND	Ground	1B	1

5	CML-I	Tx4n	Transmitter Inverted Data Input	3B	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3B	
7		GND	Ground	1B	1
8	LVTTL-I	ModSelL	Module Select	3B	
9	LVTTL-I	ResetL	Module Reset	3B	
10		VccRx	+3.3V Power Supply Receiver	2B	2
11	LVCMOS-I/O	SCL	2-wire serial interface clock	3B	
12	LVCMOS-I/O	SDA	2-wire serial interface data	3B	
13		GND	Ground	1B	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3B	
15	CML-O	Rx3n	Receiver Inverted Data Output	3B	
16		GND	Ground	1B	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3B	
18	CML-O	Rx1n	Receiver Inverted Data Output	3B	
19		GND	Ground	1B	1
20		GND	Ground	1B	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3B	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3B	
23		GND	Ground	1B	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3B	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3B	
26		GND	Ground	1B	1
27	LVTTL-O	ModPrsL	Module Present	3B	
28	LVTTL-O	IntL	Interrupt	3B	
29		VccTx	+3.3V Power supply transmitter	2B	2
30		Vcc1	+3.3V Power supply	2B	2
31	LVTTL-I	InitMode	Initialization mode; In legacy QSFP applications, the InitMode pad is called LPMODE	3B	
32		GND	Ground	1B	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3B	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3B	

35		GND	Ground	1B	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3B	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3B	
38		GND	Ground	1B	1
39		GND	Ground	1A	1
40	CML-I	Tx6n	Transmitter Inverted Data Input	3A	
41	CML-I	Tx6p	Transmitter Non-Inverted Data Input	3A	
42		GND	Ground	1A	1
43	CML-I	Tx8n	Transmitter Inverted Data Input	3A	
44	CML-I	Tx8p	Transmitter Non-Inverted Data Input	3A	
45		GND	Ground	1A	1
46		Reserved	For future use	3A	3
47		VS1	Module Vendor Specific 1	3A	3
48		VccRx1	3.3V Power Supply	2A	2
49		VS2	Module Vendor Specific 2	3A	3
50		VS3	Module Vendor Specific 3	3A	3
51		GND	Ground	1A	1
52	CML-O	Rx7p	Receiver Non-Inverted Data Output	3A	
53	CML-O	Rx7n	Receiver Inverted Data Output	3A	
54		GND	Ground	1A	1
55	CML-O	Rx5p	Receiver Non-Inverted Data Output	3A	
56	CML-O	Rx5n	Receiver Inverted Data Output	3A	
57		GND	Ground	1A	1
58		GND	Ground	1A	1
59	CML-O	Rx6n	Receiver Inverted Data Output	3A	
60	CML-O	Rx6p	Receiver Non-Inverted Data Output	3A	
61		GND	Ground	1A	1
62	CML-O	Rx8n	Receiver Inverted Data Output	3A	
63	CML-O	Rx8p	Receiver Non-Inverted Data Output	3A	
64		GND	Ground	1A	1
65		NC	No Connect	3A	3
66		Reserved	For future use	3A	3
67		VccTx1	3.3V Power Supply	2A	2
68		Vcc2	3.3V Power Supply	2A	2

69		Reserved	For Future Use	3A	3
70		GND	Ground	1A	1
71	CML-I	Tx7p	Transmitter Non-Inverted Data Input	3A	
72	CML-I	Tx7n	Transmitter Inverted Data Input	3A	
73		GND	Ground	1A	1
74	CML-I	Tx5p	Transmitter Non-Inverted Data Input	3A	
75	CML-I	Tx5n	Transmitter Inverted Data Input	3A	
76		GND	Ground	1A	1

Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP-DD 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.

2. VccRx, Vcc1 and VccTx, VccRx1, Vcc2 and VccTx1 are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 3 below. VccRx, Vcc1 and VccTx, VccRx1, Vcc2 and VccTx1 may be internally connected within the module in any combination. The connector pins are each rated for a maximum current of 1000mA.

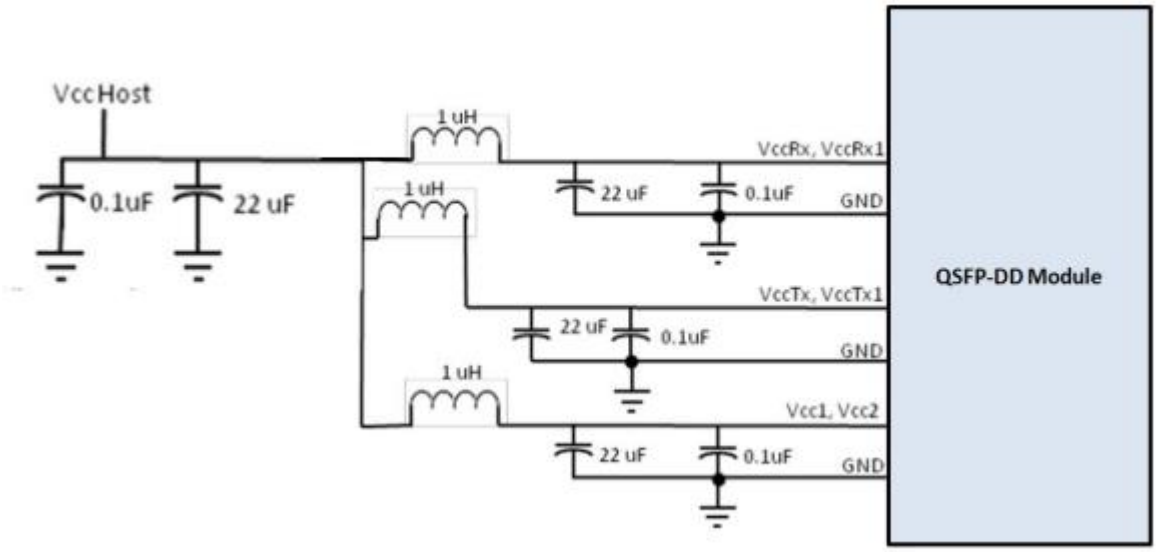


Figure 3 Power supply Filter

3. Reserved or for future use or Vendor's specification.

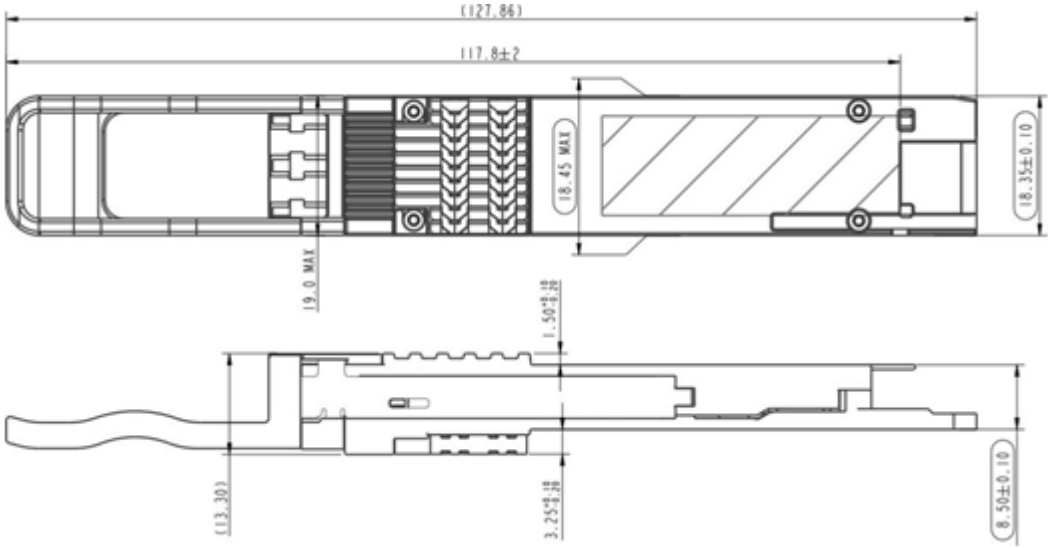
9. Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Symbol	Min	Max	Unit	Notes

Temperature monitor absolute error	DMI_Temp	-3	+3	degC	Over operating temp
Supply voltage monitor absolute error	DMI _VCC	-0.1	0.1	V	Full operating range
Channel RX power monitor absolute error	DMI_RX	-3	3	dB	Per channel
Channel Bias current monitor	DMI_Ibias	-10%	10%	mA	Per channel
Channel TX power monitor absolute error	DMI_TX	-3	3	dB	Per channel

10. Mechanical Dimensions



ESD

This transceiver is specified as ESD threshold 1KV for high speed data pins and 2KV for all others electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:2014. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007)

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

11. Module Ordering information

PN	Description
OQQS3414-8	400G QSFP-DD ER8 1310nm-LAN WDM 40KM LC DDMI 0~70 °C