CRE	Datasheet	No.	DS10-U016
		Initial Date	2023-05-23
OU	OUB8Lxx414	Written Team	R&D Dept.
			GH Zheng

I Preview

PN	OUB8Lxx414
Description	100G QSFP28 ER1 Bi-Di 1305/1309nm 40KM LC DDMI 10~70 °C

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III Revision History

No.	Date	Items	Change Recording	Ver.	Rev.	Customer
1	2023-05-23	All	Initial registration	000	000	Standard
2						
3						
4						
5						
6						

1. Features:

- Supports 100GBASE-ER1-40 BIDI
- Lane signaling rate 106.25Gb/s with PAM4
- Up to 40km transmission on SMF
- EML Laser and APD receiver
- 4x25.78Gb/s with NRZ electrical interface (CAUI-4)
- High speed I/O electrical interface
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with simplex LC connector
- Single +3.3V power supply Voltage
- Maximum 1.3A Power Supply Current
- Support HW TX_DIS and RX_LOS for telecom application
- Maximum power consumption 4.5 W
- Operating case temperature: 0 to +70 ℃
- Compliant to IEEE802.3bm,100G single Lambda MSA
- Compliant to SFF-8636&SFF-8679 standard
- Complies with EU Directive 2015/863/EU

2. Applications

- 100GBASE-ER1-40 BIDI
- Other links

3. Description

The 100G QSFP28 ER1 Bi-Di transceivers are high-performance, cost-effective modules supporting 40KM on SMF. It integrates four electrical data lanes in each direction into transmission over a single LC single fiber optic cable. Each electrical lane operates at NRZ 25 Gbps and conforms to the PAM4 100GE optical interface. All modules satisfy class I laser safety requirements. The transceivers are compatible with 100GBASE-ER1-40 standard of IEEE802.3bm and SFF-8636&SFF-8679 specification.

4. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4	V
Storage Temperature	Ts	-40	+85	℃
Operating Humidity	-	5	85	%

5. Operating Environment

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	Tc	0		+70	℃	
Power Supply Voltage	Vcc	3.135	3.30	3.465	V	
Power supply Current	Icc	-	-	1.3	A	
Power Dissipation	Pm			4.5	W	
Data Rate			106.25		Gbps	
Transmission Distance	TD	-	-	40	KM	SMF

6. Optical and Electrical Characteristics

Optical						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Transmitter						
Centre Wavelength	λc_1	1303.54	1304.58	1305.63	nm	OUB8L9A414
Centre Wavelength	λc_2	1308.09	1309.14	1310.19	nm	OUB8LA9414
Average launch power	P_{out}	1.7		+7.1	dBm	1
Outer Optical Modulation Amplitude	OMA	Max (4.7, 3.3+TDECQ)	-	7.9	dBm	
Transmitter eye closure for PAM4 (TECQ) (max)	TECQ	-	-	3.4	dBm	
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ	-	-	3.9	dBm	
|TDECQ-TECQ| (max)	-			2.7	dB	
Extinction Ratio	ER	5			dB	
Average launch power of OFF transmitter,each lane	P_{off}			-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Receiver						
Centre Wavelength	λc_1	1308.09	1309.14	1310.19	nm	OUB8L9A414
Centre Wavelength	λc_2	1303.54	1304.58	1305.63	nm	OUB8LA9414
Damage threshold	THd	-2.4			dBm	2
Average power at receiver		-16	-	-3.4	dBm	3
Receive power_OMAouter*	POMA	-	-	-2.6	dBm	
Receiver sensitivity_OMAouter	SEN	-	-	Max(-13.8,-	dBm	4

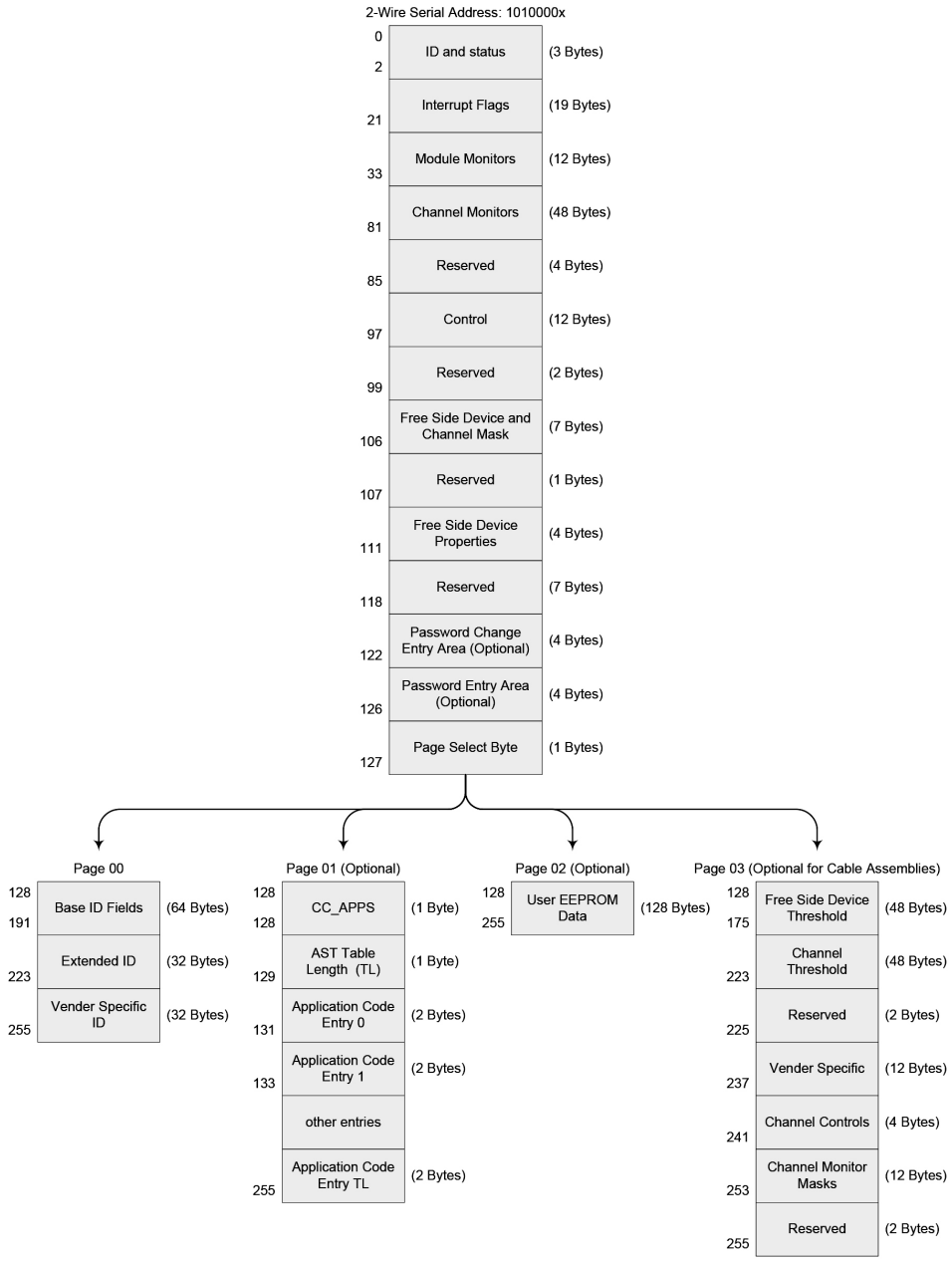
	_OMA			15.2+TECQ)		
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-26			dBm	
LOS Hysteresis		0.5			dB	
Electrical						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Transmitter						
Input Differential Impedance	Rin	-	100	-	Ohm	
Differential Data Input Amplitude	VIN,P-P	80	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
DC common-mode input voltage		-0.3	-	2.8	V	
Transition time(20%~80%)	Tr Tf	10	-	-	ps	
LPMode, Reset and ModSelL / Tx dis	VIL	-0.3	-	0.8	V	
LPMode, Reset and ModSelL / Tx dis	VIH	2.0	-	V_{CC}+0.3	V	
Receiver						
Output Differential Impedance	Rout	-	100	-	Ohm	
Differential Data Output Amplitude	VOUT,P-P	-		900	mVpp	
Differential termination mismatch (max)	D-mismatch	-		10	%	
Transition time, 20% to 80%	Tr Tf	12			ps	
ModPrsL and IntL/ Rx los	VOL	0		0.4	V	
ModPrsL and IntL/ Rx los	VOH	V_{CC}-0.5		VCC+0.3	V	

1. The optical power is launched into SMF.
2. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.
3. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
4. Measured with conformance test signal at TP3 using the test pattern PRBS31Q or scrambled idle for stressed receiver sensitivity for the BER=2.4x10^{-4}.

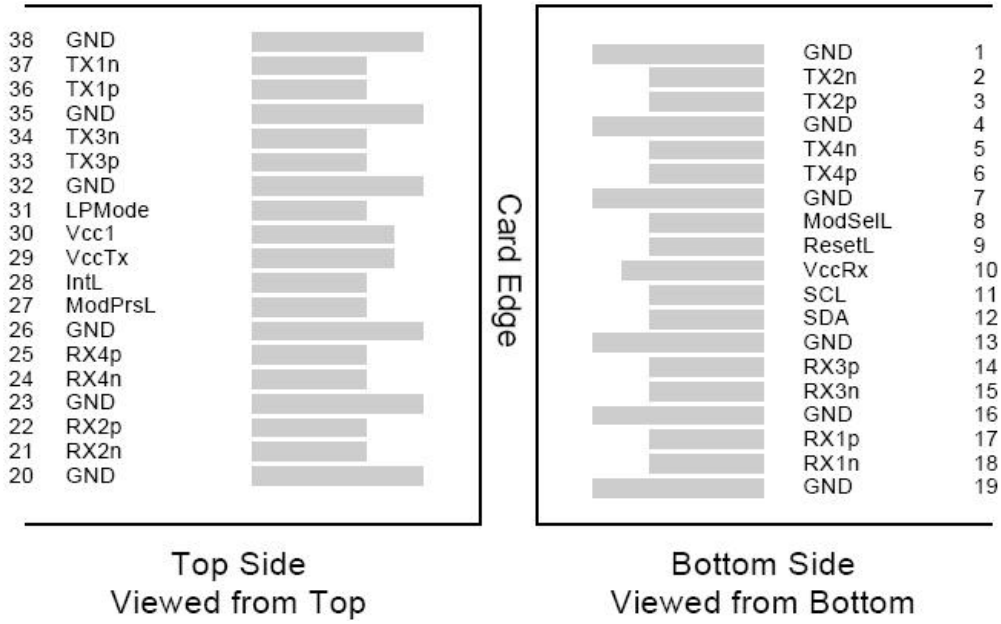
7. Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The digital diagnostic memory map specific data field defines as following.


2-Wire Serial Address: 1010000x
0
2
ID and status
(3 Bytes)
21
Interrupt Flags
(19 Bytes)
33
Module Monitors
(12 Bytes)
81
Channel Monitors
(48 Bytes)
85
Reserved
(4 Bytes)
97
Control
(12 Bytes)
99
Reserved
(2 Bytes)
106
Free Side Device and Channel Mask
(7 Bytes)
107
Reserved
(1 Bytes)
111
Free Side Device Properties
(4 Bytes)
118
Reserved
(7 Bytes)
122
Password Change Entry Area (Optional)
(4 Bytes)
126
Password Entry Area (Optional)
(4 Bytes)
127
Page Select Byte
(1 Bytes)
Page 00
128
191
Base ID Fields
(64 Bytes)
223
Extended ID
(32 Bytes)
255
Vender Specific ID
(32 Bytes)
Page 01 (Optional)
128
128
CC_APPS
(1 Byte)
129
AST Table Length (TL)
(1 Byte)
131
Application Code Entry 0
(2 Bytes)
133
Application Code Entry 1
(2 Bytes)
other entries
255
Application Code Entry TL
(2 Bytes)
Page 02 (Optional)
128
255
User EEPROM Data
(128 Bytes)
Page 03 (Optional for Cable Assemblies)
128
175
Free Side Device Threshold
(48 Bytes)
223
Channel Threshold
(48 Bytes)
225
Reserved
(2 Bytes)
237
Vender Specific
(12 Bytes)
241
Channel Controls
(4 Bytes)
253
Channel Monitor Masks
(12 Bytes)
255
Reserved
(2 Bytes)

8. Pin Descriptions



PIN	Logic	Symbol	Name/Description	Plug Seq.	Note
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	3	
7		GND	Ground	1	1
8	LVTLL-I	ModSelL	Module Select	3	
9	LVTLL-I	ResetL	Module Reset	3	
10		VccRx	+ 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	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1

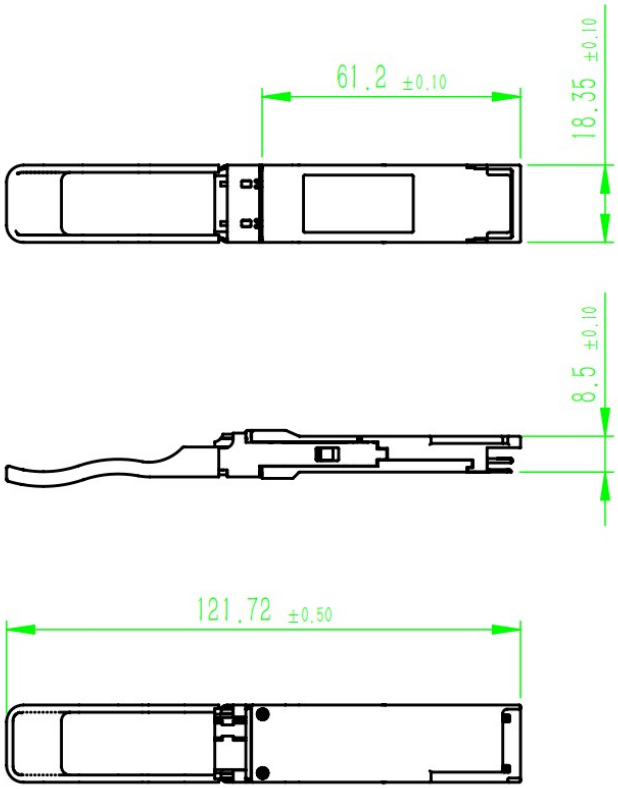
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	1
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	Interrupt	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTL-I	LPMode	Low Power Mode	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Output	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Output	3	
38		GND	Ground	1	1

Notes:

1. GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP 28module 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 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.

9. Mechanical Dimensions



10. Module Ordering information

PN	Description
OUB8L9A414	100G QSFP28 ER1 Bi-Di Tx1305/Rx1309nm 40KM LC DDMI 10~70 °C
OUB8LA9414	100G QSFP28 ER1 Bi-Di Tx1309/Rx1305nm 40KM LC DDMI 10~70 °C