Q28QD010C1xx – QSFP28 Dual Fibre

1310nm* / 10km / 100GBASE-LR4 & OTN OTU4

*1310nm LAN-WDM 800GHz

For your product safety, please read the following information carefully before any manipulation of the transceiver:

ESD
This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.

LASER SAFETY
This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.

1. Overview

Q28QD010C1xx is a high performance QSFP28 transceiver module for 100 Gigabit Ethernet and OTN OTU4 data links over a single mode fibre pair. The maximum reach is 10km. The four transmitters are cooled 1310nm LAN-WDM lasers generating four optical 25Gbps output signals, which are multiplexed together at the optical output port. The four receivers are PIN photodiodes which detect (after optical de-multiplexing) 4× 25Gbps optical input signals.

This transceiver module is compliant with the QSFP28 Multisource Agreement (MSA) and hot pluggable. Always contact Skylane Optics® commercial agents for compatibility with different equipment platforms.

2. Features

- QSFP28 Multi-Source Agreement compliant
- Hot pluggable QSFP28 footprint
- Supports 103.125 and 111.810 Gbps Data Rates
- 4× 25.781/27.9525Gbps Serial Electrical Interface (CEI-28G-VSR)
- Dual LC Optical Connector
- 4× cooled 1310nm LAN-WDM Transmitters
- 4× PIN Receivers
- Up to 10km Point-to-Point Transmission on Single Mode Fibre
- Operating temperature range 0°C to 70°C
- Power Dissipation < 3.5W or < 4.5W
- Single +3.3V Power Supply

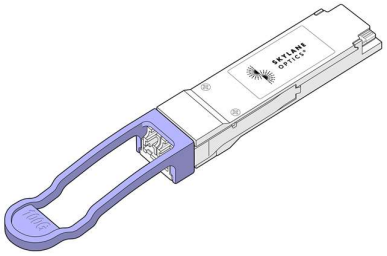

Figure 1. QSFP28 Dual Fibre, pull-tab
(non-binding illustration)

3. Applications

- IEEE 802.3ba 100GBASE-LR4
- ITU-T G.959.1 4I1-9D1F

4. Optical Interface

P/N	Wavelength	Protocol	Optical Output Power[1] [dBm]	Stressed Receiver Sensitivity[2] (OMA) [dBm]	Optical Receiver Overload[3] [dBm]	Link Length[1,4] [km]
Q28QD010C1xx	1310nm LAN-WDM 800GHZ	100GBASE-LR4	1.7 to 10.5	≤ -6.8	4.5	≤ 10
		Protocol	**Optical Output Power[1] [dBm]**	**Receiver Sensitivity[5] [dBm]**	**Optical Receiver Overload[3] [dBm]**	
		G.959.1 4I1-9D1F	3.5 to 10.0	≤ -6.9	4.0	

1. EOL over operating temperature range
2. 25.78Gbps, BER≤ 10^{-12}, PRBS 2^{31}-1, each lane
3. The optical input to each lane of the receiver should not exceed this value. Transmitters must never be directly connected to receivers before ensuring that proper optical attenuation is used
4. Cabled optical fibre as per IEEE 802.3-2012
5. BER≤10^{-12}, ER≥4dB, with FEC. The BER can be significantly higher at the input to the FEC decoder

5. Technical Parameters

5.1. Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit	Notes
Storage temperature	-40		85	°C	
Operating Case Temperature	0		70	°C	
Relative Humidity	0		85	%	Non-Condensing
Power Supply Voltage	3.135	3.3	3.465	V	
Power Supply Current			1.4	A	Q28QD010C10D, Q28QD010C10L
			1.2		Q28QD010C14D
Power Dissipation			4.5	W	Q28QD010C10D, Q28QD010C10L
			3.5		Q28QD010C14D

5.2. Transmitter Optical Specifications

100GBASE-LR4

Parameter	Min	Typ	Max	Unit	Notes
Data Rate, each Lane		25.781		Gbps	6
Aggregated Data Rate		103.125		Gbps	6
Average Output Power			10.5	dBm	7
Average Output Power, each Lane	-4.3		4.5	dBm	7,8
Launched OMA, each Lane	-1.3		4.5	dBm	7,9
Launched OMA minus TDP, each lane	-2.3			dBm	7
Difference in launched OMA between any two Lanes			5	dB	
Centre Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm	
	1299.02	1300.05	1301.09		
	1303.54	1304.58	1305.63		
	1308.09	1309.14	1310.19		
Transmitter and Dispersion Penalty (TDP), each Lane			2.2	dB	
Extinction Ratio, each Lane	4			dB	

4I1-9D1F

Parameter	Min	Typ	Max	Unit	Notes
Data Rate, each Lane		27.952		Gbps	10
Aggregated Data Rate		111.810		Gbps	10
Average Output Power			10	dBm	7
Average Output Power, each Lane	-2.5		4	dBm	7
Output Power Difference between any two Lanes			5	dB	
Centre Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm	
	1299.02	1300.05	1301.09		
	1303.54	1304.58	1305.63		
	1308.09	1309.14	1310.19		
Optical Path Penalty			1.5	dB	
Extinction Ratio, each Lane	4			dB	

6. IEEE 802.3ba-2012
7. Output power coupled into a 9/125 µm single mode fibre
8. Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance
9. Even if the TDP is <1 dB, the minimum OMA must exceed -1.3dBm
10. ITU-T G.959.1 (02/12), optical interface 4I1-9D1F

5.3. Receiver Optical Specifications

100GBASE-LR4					
Parameter	**Min**	**Typ**	**Max**	**Unit**	**Notes**
Operating Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm	
	1299.02	1300.05	1301.09		
	1303.54	1304.58	1305.63		
	1308.09	1309.14	1310.19		
Average Receive Power, each Lane	-10.6		4.5	dBm	11
Receiver Sensitivity (OMA), each Lane			-8.6	dBm	12
Stressed Receiver Sensitivity (OMA), each Lane			-6.8	dBm	13
Difference in receive power between any two lanes (OMA)			5.5	dB	
4I1-9D1F					
Parameter	**Min**	**Typ**	**Max**	**Unit**	**Notes**
Operating Wavelength, Optical Lanes 0 to 3	1294.53	1295.56	1296.59	nm	
	1299.02	1300.05	1301.09		
	1303.54	1304.58	1305.63		
	1308.09	1309.14	1310.19		
Average Receive Power, each Lane	-6.9		4	dBm	14
Receiver Sensitivity, each Lane	-8.4			dBm	14
Input Power Difference between any two Lanes			5.5	dB	

11. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance
12. Receiver sensitivity (OMA), each lane (max) is informative
13. 25.78Gbps, BER≤10^{-12}, PRBS 2^{31}-1
14. 27.95Gbps, BER≤10^{-12}, ER≥4dB, with FEC. The BER can be significantly higher at the input to the FEC decoder

6. Electrical Connector

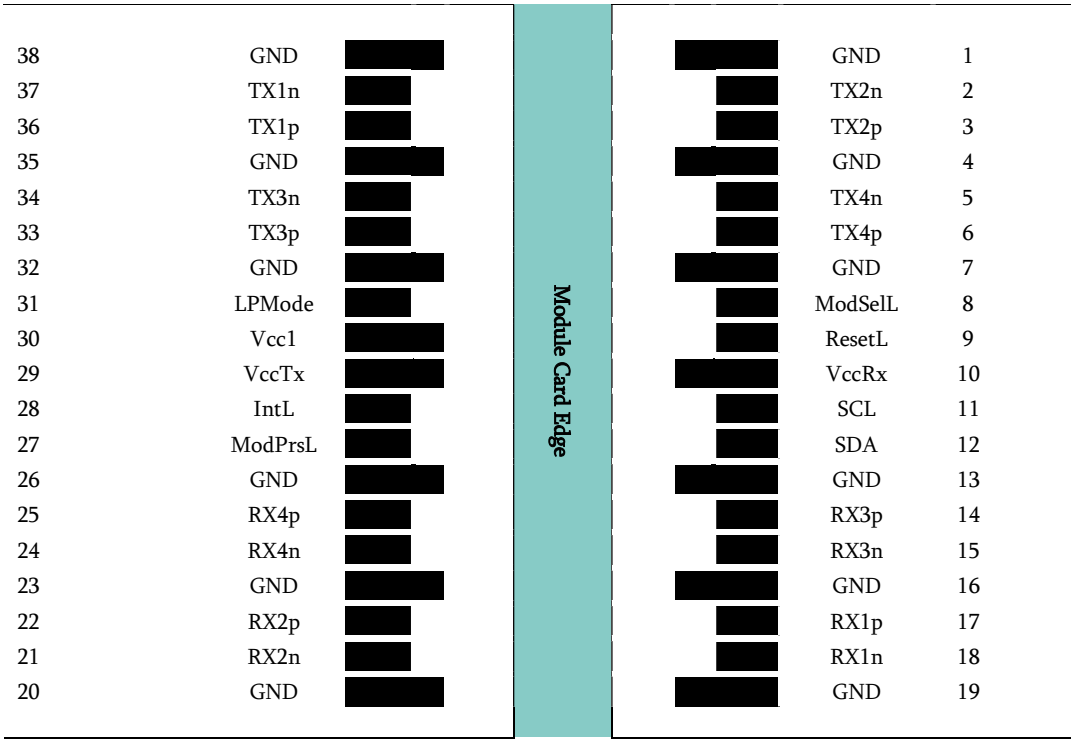

Figure 2. QSFP28 Module Pad Layout

7. Pin Function Definition

Pin	Symbol	Description	Pin	Symbol	Description
1	GND	Ground	20	GND	Ground
2	TX2n	Transmitter Inverted Data Input	21	RX2n	Receiver Inverted Data Output
3	TX2p	Transmitter Non-Inverted Data Input	22	RX2p	Receiver Non-Inverted Data Output
4	GND	Ground	23	GND	Ground
5	TX4n	Transmitter Inverted Data Input	24	RX4n	Receiver Inverted Data Output
6	TX4p	Transmitter Non-Inverted Data Input	25	RX4p	Receiver Non-Inverted Data Output
7	GND	Ground	26	GND	Ground
8	ModSelL	Module Select	27	ModPrsL	Module Present
9	ResetL	Module Reset	28	IntL	Interrupt
10	VccRx	+3.3V Power Supply Receiver	29	VccTx	+3.3V Power supply transmitter
11	SCL	2-wire serial interface clock	30	Vcc1	+3.3V Power supply
12	SDA	2-wire serial interface data	31	LPMode	Low Power Mode
13	GND	Ground	32	GND	Ground
14	RX3p	Receiver Non-Inverted Data Output	33	TX3p	Transmitter Non-Inverted Data Input
15	RX3n	Receiver Inverted Data Output	34	TX3n	Transmitter Inverted Data Input
16	GND	Ground	35	GND	Ground
17	RX1p	Receiver Non-Inverted Data Output	36	TX1p	Transmitter Non-Inverted Data Input
18	RX1n	Receiver Inverted Data Output	37	TX1n	Transmitter Inverted Data Input
19	GND	Ground	38	GND	Ground

8. EEPROM

QSFP+ MSA (SFF-8436)

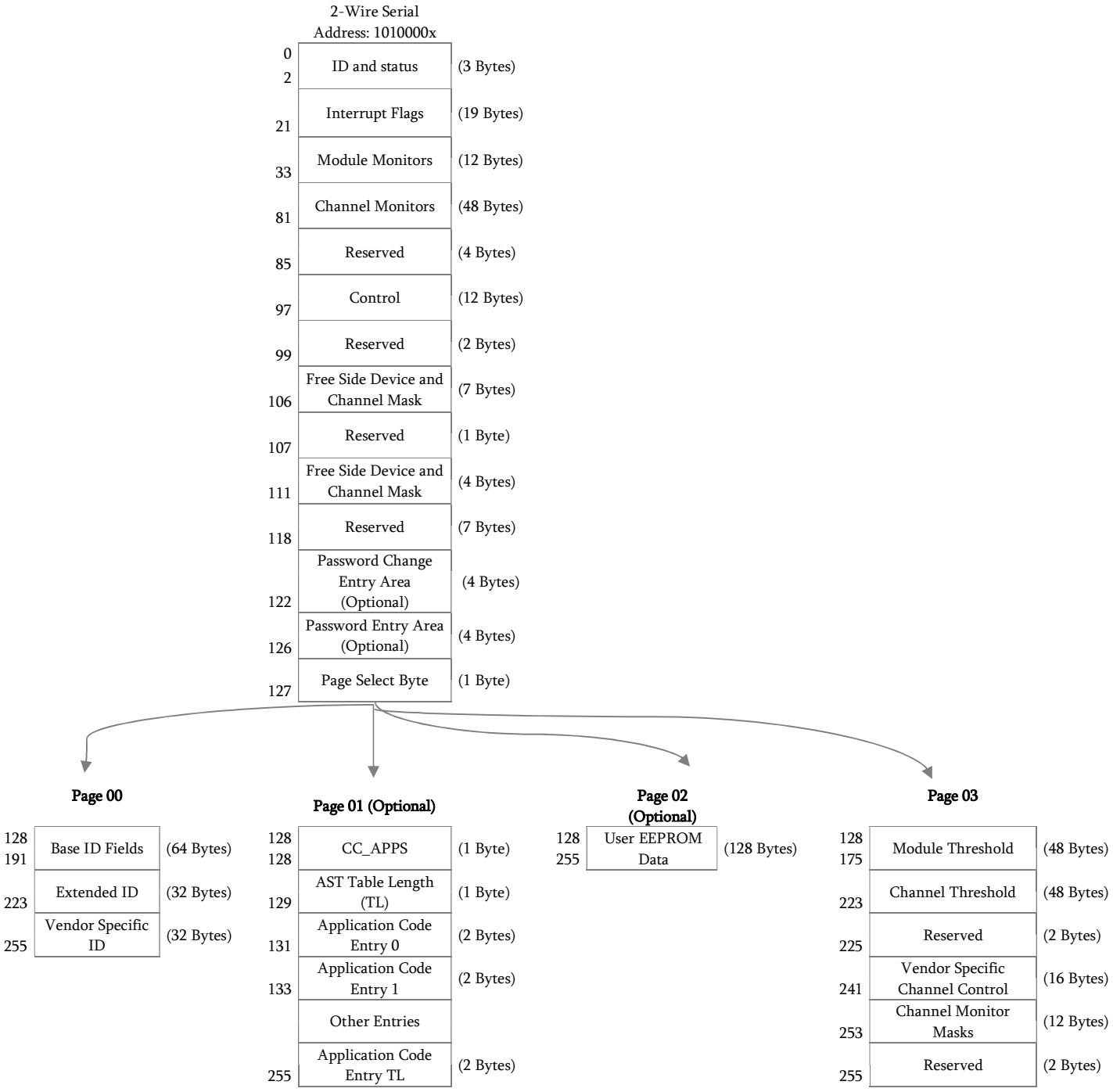

Figure 3. QSFP28 Memory Map

9. Ordering Information

Part Number	Description
Q28QD010C10D	QSFP28 LR4, 1310nm LAN-WDM, Tx (1310 LAN-WDM), Rx (PIN), maximum distance 10km on SMF, 100GBASE-LR4 & OTN OTU4, **4.5W**, dual LC connector, pull-tab, 0°C to 70°C, DDM
Q28QD010C10L	QSFP28 LR4, 1310nm LAN-WDM, Tx (1310 LAN-WDM), Rx (PIN), maximum distance 10km on SMF, 100GBASE-LR4 & OTN OTU4, **4.5W**, dual LC connector, bail latch, 0°C to 70°C, DDM
Q28QD010C14D	QSFP28 LR4, 1310nm LAN-WDM, Tx (1310 LAN-WDM), Rx (PIN), maximum distance 10km on SMF, 100GBASE-LR4 & OTN OTU4, **3.5W**, dual LC connector, bail latch, 0°C to 70°C, DDM

10. Document Revision Information

Revision	Description
A	Initial release
B	References to optical power budget removed. Typo corrected
C	OTU4 optical specification updated
D	Bail latch variant added
E	Low power consumption variant added

Skylane Optics® supplies a broad range of optical transceivers. Our engineers work closely with our customers to find the best solutions for every application. We are committed to provide high quality products and services to our customers.

For questions on this product please contact:
support@skylaneoptics.com