QFPQL040410D – QSFP+ Dual Fibre

ITU CWDM / 40km* / 40GBASE-LR4 & OTN OTU3

*As per IEEE 802.3bm, links above 30km are considered to be engineered links and performance cannot be guaranteed

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

QFPQL040410D is a high performance QSFP+ transceiver module for 40 Gigabit Ethernet and OTN OTU3 data links over a single mode fibre pair. The maximum reach is 40km. The four transmitters are CWDM DFB (Distributed Feed Back) lasers generating four optical 10Gbps output signals, which are multiplexed together at the optical output port. The four receivers are Avalanche Photodiodes (APD) which detect (after optical de-multiplexing) 4× 10Gbps optical input signals.

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

2. Features

- QSFP+ Multi-Source Agreement compliant
- Hot pluggable QSFP+ footprint
- Supports 10.3 and 10.8 Gbps Data Rates
- Dual LC Optical Connector
- 4× CWDM DFB Transmitters
- 4× APD Receivers
- Up to 40km Point-to-Point Transmission on Single Mode Fibre
- Operating temperature range 0°C to 70°C
- Power Dissipation < 3.5W
- Single +3.3V Power Supply

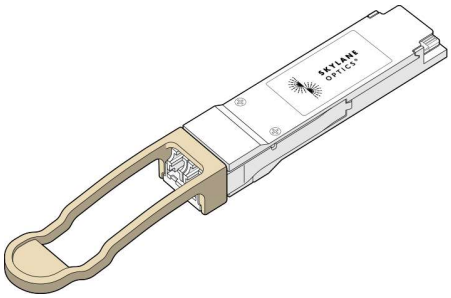

Figure 1. QSFP+ Dual Fibre
(non-binding illustration)

3. Applications

- 40GBASE-ER4
- OTN OTU3 C4L1-2D1

4. Optical Interface

P/N	Nominal Wavelength [nm]	Protocol	Optical Output Power[1] [dBm]	Stressed Receiver Sensitivity[2] (OMA) [dBm]	Optical Receiver Overload[3] [dBm]	Link Length[1,4] [km]
QFPQL040410D	1271/1291/1311/1331	40GBASE-ER4	3.3 to 10.5	≤ -16.8	-4.5	≤ 40
		Protocol	**Optical Output Power[1] [dBm]**	**Receiver Sensitivity[5] [dBm]**	**Optical Receiver Overload[3] [dBm]**	
		G.695 C4L1-2D1	7.6 to 10.5	≤ -18.7	-4.5	

1. EOL over operating temperature range
2. 10.3125Gbps, 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≥5.5dB

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	3.13	3.3	3.47	V	
Power Supply Current			1.06	A	
Power Dissipation			3.5	W	

5.2. Transmitter Optical Specifications

40GBASE-ER4

Parameter	Min	Typ	Max	Unit	Notes
Data Rate, each Lane		10.3125		Gbps	6
Aggregated Data Rate		41.25		Gbps	6
Average Output Power			10.5	dBm	7
Average Output Power, each Lane	-2.7		4.5	dBm	7,8
Launched OMA, each Lane	0.3		5	dBm	7,9
Launched OMA minus TDP, each lane	-0.5			dBm	7
Difference in launched OMA between any two Lanes			4.7	dB	
Centre Wavelength, Optical Lanes 0 to 3	1264.5	1271	1277.5	nm	
	1284.5	1291	1297.5		
	1304.5	1311	1317.5		
	1324.5	1331	1337.5		
Transmitter and Dispersion Penalty (TDP), each Lane			2.6	dB	
Extinction Ratio, each Lane	5.5			dB	

C4L1-2D1

Parameter	Min	Typ	Max	Unit	Notes
Data Rate, each Lane		10.755		Gbps	10
Aggregated Data Rate		43.02		Gbps	10
Average Output Power			10.5	dBm	7
Average Output Power, each Lane	1.6		4.5	dBm	7
Centre Wavelength, Optical Lanes 0 to 3	1264.5	1271	1277.5	nm	
	1284.5	1291	1297.5		
	1304.5	1311	1317.5		
	1324.5	1331	1337.5		
Optical Path Penalty			1.8	dB	
Extinction Ratio, each Lane	5.5			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 <0.8 dB, the minimum OMA must exceed 0.3dBm
10. ITU-T G.695 (07/2018), optical interface C4L1-2D1

5.3. Receiver Optical Specifications

40GBASE-ER4					
Parameter	**Min**	**Typ**	**Max**	**Unit**	**Notes**
Operating Wavelength, Optical Lanes 0 to 3	1264.5	1271	1277.5	nm	
	1284.5	1291	1297.5		
	1304.5	1311	1317.5		
	1324.5	1331	1337.5		
Average Receive Power, each Lane	-21.2		-4.5	dBm	11
Receive Power (OMA), each Lane			-4	dBm	
Receiver Sensitivity (OMA), each Lane			-19	dBm	12
Stressed Receiver Sensitivity (OMA), each Lane			-16.8	dBm	13
Difference in receive power between any two lanes (OMA)			7	dB	
C4L1-2D1					
Parameter	**Min**	**Typ**	**Max**	**Unit**	**Notes**
Operating Wavelength, Optical Lanes 0 to 3	1264.5	1271	1277.5	nm	
	1284.5	1291	1297.5		
	1304.5	1311	1317.5		
	1324.5	1331	1337.5		
Average Receive Power, each Lane	-16.9		-4.5	dBm	14
Equivalent Receiver Sensitivity, each Lane	-18.7			dBm	14

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. 10.3125Gbps, BER≤10^{-12}, PRBS 2^{31}-1
14. 10.755Gbps, BER≤10^{-12}, ER≥5.5dB

6. Electrical Connector

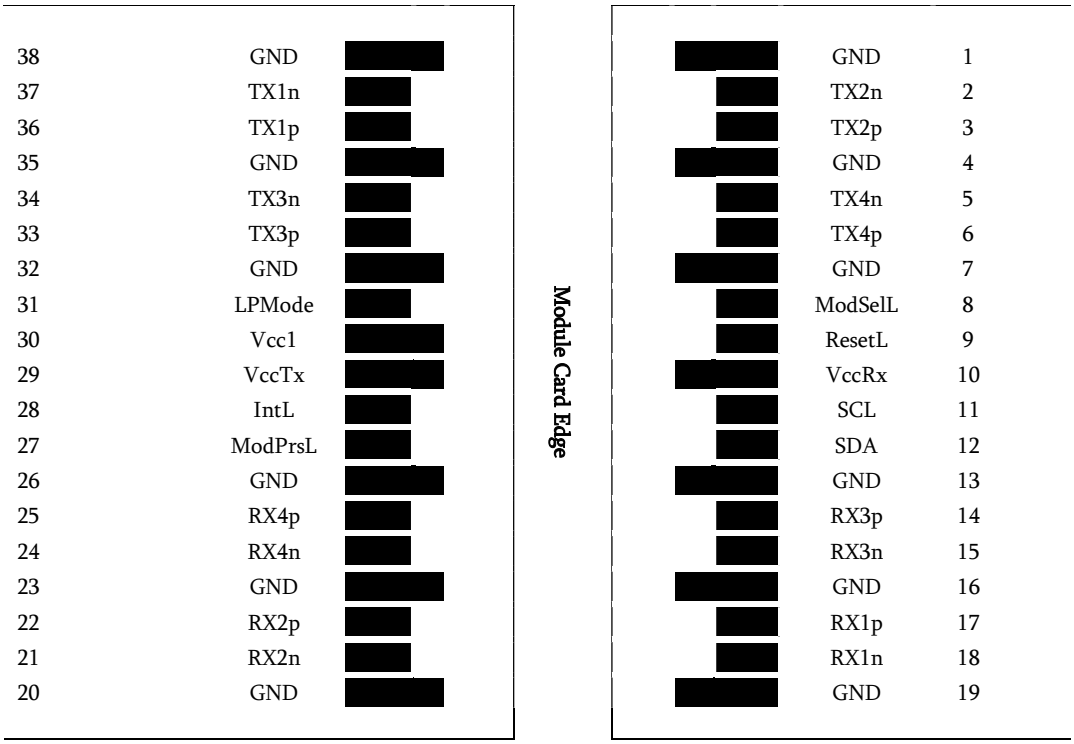

Figure 2. QSFP+ Module Pad Layout

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)

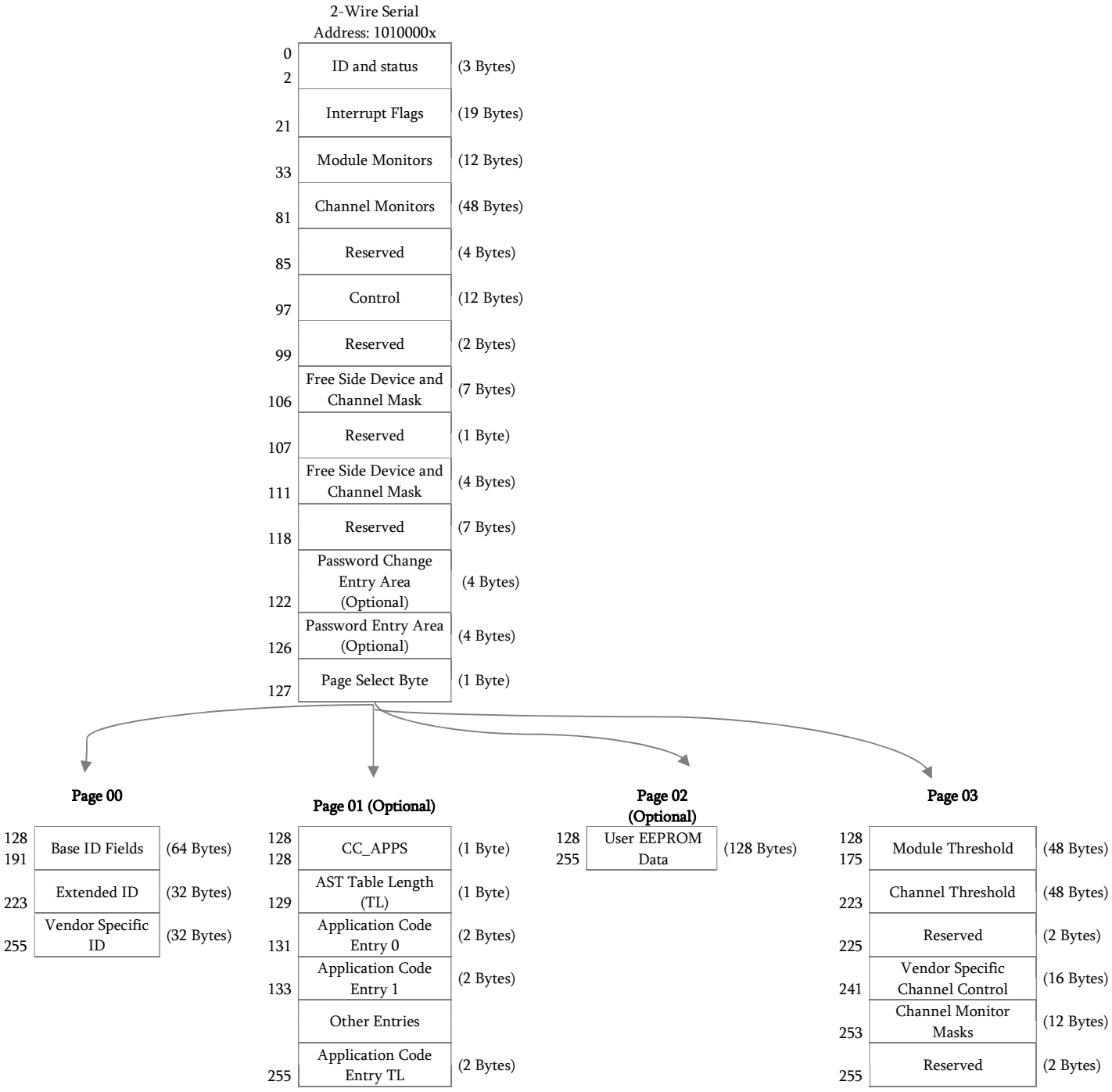

Figure 3. QSFP+ Memory Map

9. Ordering Information

Part Number	Description
QFPQL040410D	QSFP+ ER4, Tx (CWDM DFB), Rx (PIN), maximum distance 40km on SMF, 40GBASE-ER4 & OTN OTU3, dual LC connector, 0°C to 70°C, DDM

10. Document Revision Information

Revision	Description
A	Initial release

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