

QFPQL040400D – QSFP+ Dual Fibre

ITU CWDM / 40km* / 40x Gigabit Ethernet / 40GBASE-ER4

*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

QFPQL040400D is a high performance QSFP+ transceiver module for 40 Gigabit Ethernet data links over a single mode fibre pair. The maximum reach¹ is 40km, with 16.5dB end of life (EOL) power budget. The four transmitters are CWDM DFB (Distributed Feedback) lasers, the four receivers are APD type.

This transceiver module is compliant with the Small Form-factor Pluggable (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 (SFF-8436)
- Hot pluggable QSFP+ footprint
- Serial ID functionality supported according to (SFF-8436)
- Dual LC connector
- 4x CWDM DFB transmitters (1271/1291/1311/1331nm)
- 4x APD receivers
- Up to 11.2Gbps per Lane
- 40km point-to-point transmission on single mode fibre
- Operating temperature range 0°C to 70°C
- Low power dissipation (<3.5W)
- Built in CWDM MUX/DEMUX

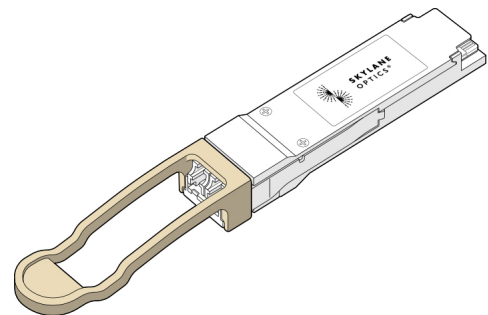


Figure 1. QSFP+ dual fibre (non-binding illustration)

3. Applications

- 40GBASE-ER4
- Infiniband QDR and DDR
- Client-side 40G Telecom connections

4. Optical Interface

P/N	Nominal Wavelength [nm]	Optical Output Power ² [dBm]	Receiver Sensitivity ³ [dBm]	Optical Path Penalty ³ [dB]	Receiver Overload ⁴ [dBm]	Power Budget ² [dB]
QFPQL040400D	1271/1291/1311/1331	3.3 to 10.5	≤ -13.2	≤ 2.6	-1	≥ 16.5

1. Distance is estimated assuming typical optical losses after decent quality fibre deployment; only optical budget value is guaranteed. Links longer than 30km are considered engineered links

2. IEEE 802.3bm-2015, EOL over operating temperature range.

3. BER≤10⁻¹², PRBS 231-1

4. The optical input to the receiver should not exceed this value. Transmitters must never be directly connected to receivers (optical loop back) before ensuring that proper optical attenuation is used

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			1100	mA	
Power Dissipation			3.5	W	

5.2. Transmitter Optical Specifications

Parameter	Min	Typ	Max	Unit	Notes
Data Rate, each Lane		10.3125	11.2	Gbps	
Aggregated Data Rate		41.25		Gbps	5
Average Output Power			10.5	dBm	6
Average Output Power, each Lane	-2.7		4.5		6, 7
Output Power Difference 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	9
Extinction Ratio	5.5			dB	

5. IEEE 802.3bm-2015
6. Output power coupled into a 9/125 µm single-mode fibre
7. Minimum value corresponding to $OMA \geq 0.3\text{dBm}$. Maximum value corresponding to $OMA \leq 5\text{dBm}$

5.3. Receiver Optical Specifications

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		
Receiver Overload	-1			dBm	
Receiver Overload, each Lane	-7			dBm	9
Receiver Sensitivity			-13.2	dBm	
Receiver Sensitivity, each Lane			-19.2	dBm	8, 9
Input Power Difference between any two Lanes			7	dB	

8. Corresponding to $OMA \leq -17\text{dBm}$
9. $BER \leq 10^{-12}$, PRBS $2^{31}-1$



6. Electrical Connector

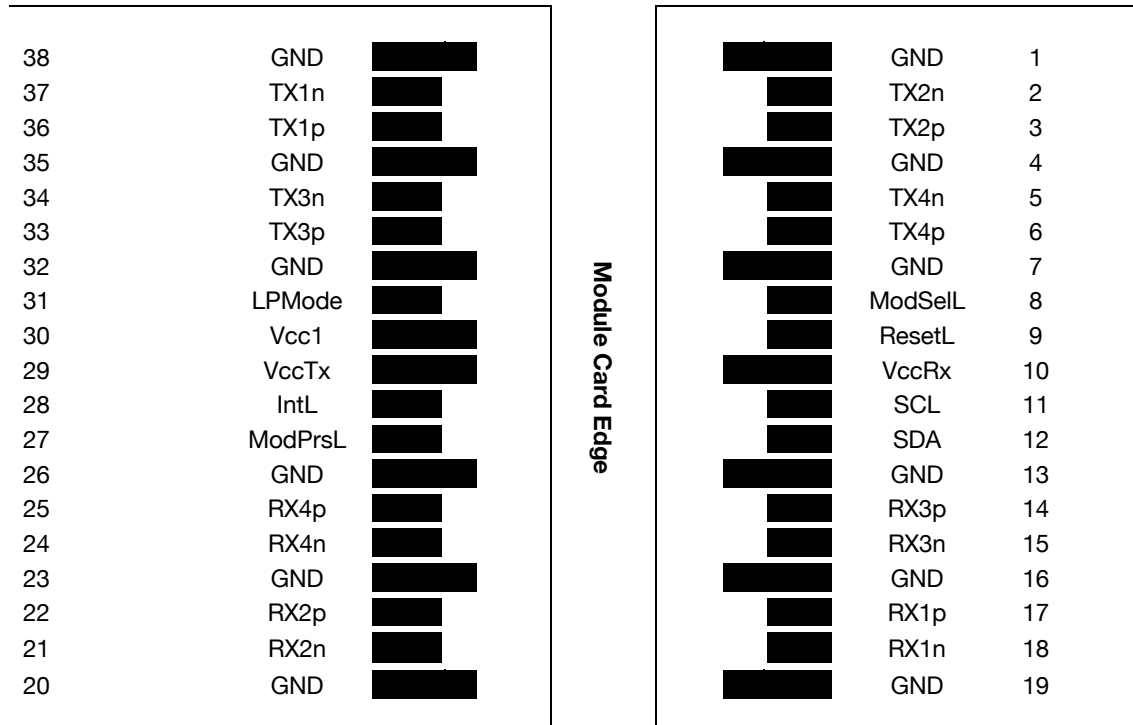


Figure 2. QSFP+ Module Pad Layout

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)

2-Wire Serial
Address :
1010000x

0	ID and status	(3 Bytes)
2		
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 Byte)
111	Free Side Device and Channel Mask	(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 Byte)

Page 00

Page 01 (Optional)

Page 02 (Optional)

Page 03

128	Base ID Fields	(64 Bytes)
191		
223	Extended ID	(32 Bytes)
255	Vendor Specific ID	(32 Bytes)

128	CC_APPS	(1 Byte)
128	AST Table Length (TL)	(1 Byte)
129	Application Code Entry 0	(2 Bytes)
131	Application Code Entry 1	(2 Bytes)
133	Other Entries	
255	Application Code Entry TL	(2 Bytes)

128	User EEPROM Data	(128 Bytes)
255		

128	Module Threshold	(48 Bytes)
175		
223	Channel Threshold	(48 Bytes)
225	Reserved	(2 Bytes)
241	Vendor Specific Channel Control	(16 Bytes)
253	Channel Monitor Masks	(12 Bytes)
255	Reserved	(2 Bytes)

Figure 3. QSFP+ Memory Map

9. Ordering Information

Part Number	Description
QFPQL040400D	QSFP+ ER4 CWDM, Tx (DFB) , Rx (APD), maximum distance 40km, power budget 16.5dB, 40x Gigabit Ethernet & Infiniband QDR, LC connector, 0°C to 70°C, DDM

10. Document Revision Information

Revision	Description
A	Initial release
B	Power budget changed to 18.5dB
C	Power budget changed to 16.5dB

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

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Quality**

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