FluxLight
OPTICAL TRANSCEIVERS

Datasheet

# JNP-QSFP-40G-LR4-FL

40G, QSFP+, Duplex LC, 40GBASE-LR4, CWDM, SMF, 10km, COM

## Quick Spec

| | |
|---|---|
| **Rate Category:** | 40G |
| **Form Factor:** | QSFP+ |
| **Interface Type:** | 40GBASE-LR4 |
| **Standard/Protocol:** | IEEE 802.3ba 40GBASE-LR4 |
| **TX Wavelength:** | 1271/1291/1311/1331nm (CWDM) |
| **RX Wavelength:** | 1271/1291/1311/1331nm (CWDM) |
| **Cable Type:** | SMF |
| **Reach:** | 10km (SMF) |
| **DDM:** | Supported |
| **Connector Type:** | Duplex LC (UPC) |
| **Power Consumption:** | 3.5W max |
| **Operating Temperature:** | 0°C to +70°C (COM) |



## Overview

The FluxLight JNP-QSFP-40G-LR4-FL is a 40G QSFP+ optical transceiver for 40 Gigabit Ethernet links up to 10 km over duplex single-mode fiber. It converts four 10.3125 Gb/s electrical lanes into four CWDM optical signals at 1271, 1291, 1311 and 1331 nm (ITU-T G.694.2), multiplexes them onto a single fiber for transmission, and demultiplexes the four wavelengths on the receive side. The module uses a four-lane DFB laser transmitter and a four-lane PIN photodiode receiver behind a duplex LC connector. Compliant with the QSFP+ MSA, SFF-8436 digital diagnostic monitoring (DDM/DOM), IEEE 802.3ba 40GBASE-LR4 and Class 1 laser safety standards.

## Features

- Hot-pluggable QSFP+ footprint with duplex LC receptacle
- Compliant with IEEE 802.3ba 40GBASE-LR4
- 4 × 10.3125 Gb/s electrical interface; 41.25 Gb/s aggregate
- Four CWDM lanes at 1271, 1291, 1311 and 1331 nm; 4-lane DFB transmitter and 4-lane PIN receiver
- Up to 10 km over G.652 single-mode fiber
- Average launch power −7 to +2.3 dBm per lane; receiver sensitivity −11.5 dBm (OMA) per lane
- Real-time Digital Diagnostic Monitoring (DDM/DOM) per SFF-8436
- Single +3.3V power supply, power dissipation ≤ 3.5 W
- Operating case temperature: 0°C to +70°C (COM)
- QSFP+ MSA compliant, RoHS-6 compliant, and Class 1 laser eye safety certified (IEC/EN 60825-1)
- 100% compatible with and programmed for the target OEM platform
- Backed by a FluxLight lifetime warranty

## Applications

- 40 Gigabit Ethernet over duplex single-mode fiber up to 10 km
- Switch/router uplinks, campus and inter-building links
- Data center interconnect

## Absolute Maximum Rating

The operation in excess of any absolute maximum ratings might cause permanent damage to this module.

| Parameter | Symbol | Min | Max | Unit | Notes |
|---|---|---|---|---|---|
| Storage Temperature | TS | -40 | 85 | °C | |
| Operating Case Temperature | TOP | 0 | 70 | °C | |
| Power Supply Voltage | VCC | 0 | 3.6 | V | |
| Relative Humidity | RH | 5 | 85 | % | Non-condensing |

## Recommended Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit |
|---|---|---|---|---|---|
| Operating Case Temperature | TOP | 0 | | 70 | °C |
| Supply Voltage | VCC | 3.15 | 3.3 | 3.45 | V |
| Data Rate (Each Lane) | DR | | 10.3125 | | Gb/s |
| Power Consumption | PC | | | 3.5 | W |
| Supply Current | ICC | | | 1.1 | A |
| Link Distance with G.652 SMF | D | | | 10 | km |

## Optical Characteristics

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Average Output Power, each lane | POUT | -7 | | 2.3 | dBm | |
| Launch Power in OMA minus TDP, each lane | | -4.8 | | | dBm | |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Total Average Launch Power | PT | | | 8.3 | dBm | |
| Center Wavelength, Lane 0 | λ0 | 1264.5 | 1271 | 1277.5 | nm | |
| Center Wavelength, Lane 1 | λ1 | 1284.5 | 1291 | 1297.5 | nm | |
| Center Wavelength, Lane 2 | λ2 | 1304.5 | 1311 | 1317.5 | nm | |
| Center Wavelength, Lane 3 | λ3 | 1324.5 | 1331 | 1337.5 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Transmitter and Dispersion Penalty, each lane | TDP | | | 2.6 | dB | |
| Difference in Launch Power between any two lanes (OMA) | | | | 6.5 | dB | |
| Optical Return Loss Tolerance | ORLT | | | 20 | dB | Per IEEE 802.3ba 40GBASE-LR4 |
| Transmitter Reflectance | | | | -12 | dB | |
| **Receiver** | | | | | | |
| Average Receive Power, each lane | Pin | -13.7 | | 2.3 | dBm | |
| Receiver Sensitivity (OMA), each lane | Sen | | | -11.5 | dBm | |
| Receive Power, each lane (OMA) | | | | 3.5 | dBm | |
| Receiver Damage Threshold, per Lane | PRdmg | 3.3 | | | dBm | |
| Center Wavelength (Lanes 0–3) | λ | 1264.5 | | 1337.5 | nm | |
| Receiver Reflectance | RFL | | | -26 | dB | |
| LOS Assert | LOSA | -30 | | | dBm | |
| LOS De-Assert | LOSD | | | -12.5 | dBm | |
| LOS Hysteresis | LOSH | 0.5 | | 6 | dB | |

## Digital Diagnostic Functions

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

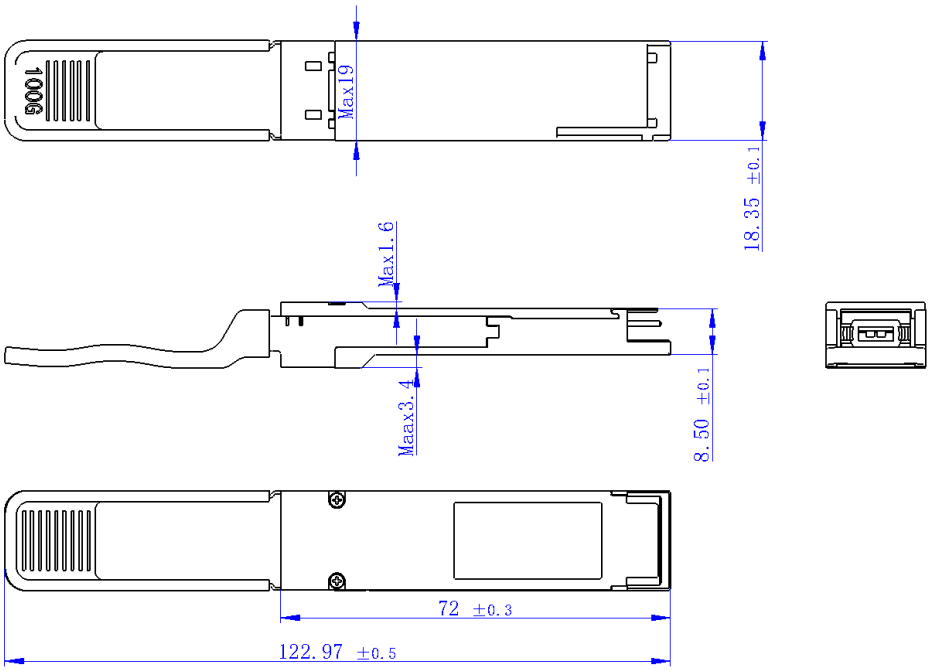
| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Temperature monitor absolute error | DMI_Temp | -3 | 3 | °C |
| Supply voltage monitor absolute error | DMI_VCC | -0.1 | 0.1 | V |
| Channel RX power monitor absolute error | DMI_RX_Ch | -3 | 3 | dB |

Digital Diagnostic Functions (Continued)

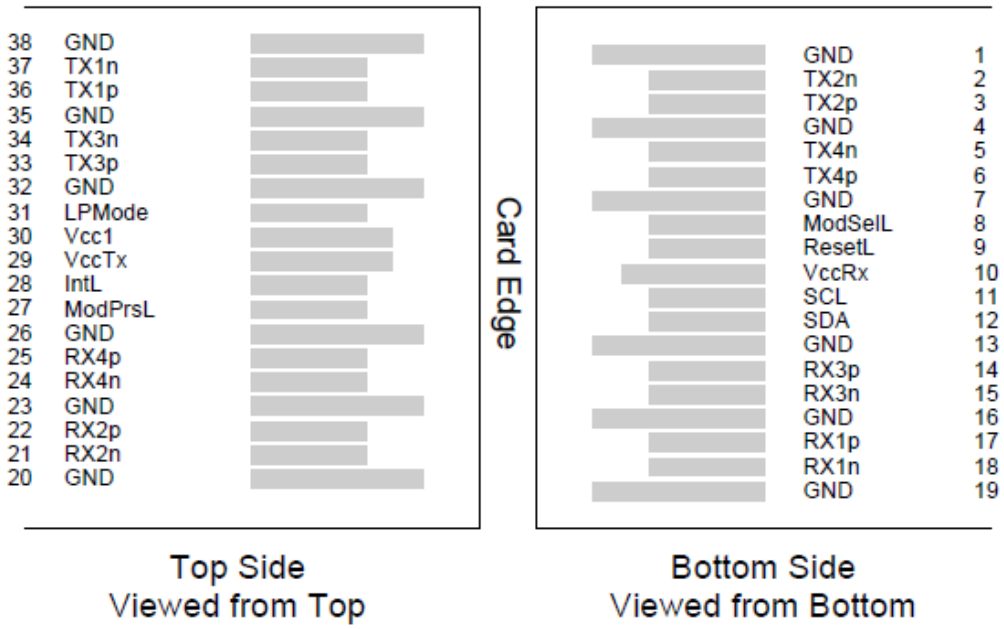
| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Channel bias current monitor absolute error | DMI_Ibias_Ch | -10% | 10% | mA |
| Channel TX power monitor absolute error | DMI_TX_Ch | -3 | 3 | dB |

## Mechanical Dimensions

Units: mm



## Pin Assignment and Description




| Pin | Logic | Symbol | Description | Plug Sequence |
|---|---|---|---|---|
| 1 | | GND | Ground | 1 |
| 2 | CML-I | Tx2n | Transmitter Inverted Data Input | 3 |
| 3 | CML-I | Tx2p | Transmitter Non-Inverted Data Input | 3 |
| 4 | | GND | Ground | 1 |
| 5 | CML-I | Tx4n | Transmitter Inverted Data Input | 3 |
| 6 | CML-I | Tx4p | Transmitter Non-Inverted Data Input | 3 |
| 7 | | GND | Ground | 1 |
| 8 | LVTTL-I | ModSelL | Module Select | 3 |
| 9 | LVTTL-I | ResetL | Module Reset | 3 |
| 10 | | VccRx | +3.3V Power Supply Receiver | 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 |
| 17 | CML-O | Rx1p | Receiver Non-Inverted Data Output | 3 |
| 18 | CML-O | Rx1n | Receiver Inverted Data Output | 3 |
| 19 | | GND | Ground | 1 |

Pin Assignment and Description (Continued)

| Pin | Logic | Symbol | Description | Plug Sequence |
|---|---|---|---|---|
| 20 | | GND | Ground | 1 |
| 21 | CML-O | Rx2n | Receiver Inverted Data Output | 3 |
| 22 | CML-O | Rx2p | Receiver Non-Inverted Data Output | 3 |
| 23 | | GND | Ground | 1 |
| 24 | CML-O | Rx4n | Receiver Inverted Data Output | 3 |
| 25 | CML-O | Rx4p | Receiver Non-Inverted Data Output | 3 |
| 26 | | GND | Ground | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present | 3 |
| 28 | LVTTL-O | IntL | Interrupt | 3 |
| 29 | | VccTx | +3.3V Power Supply Transmitter | 2 |
| 30 | | Vcc1 | +3.3V Power Supply | 2 |
| 31 | LVTTL-I | LPMode | Low Power Mode | 3 |
| 32 | | GND | Ground | 1 |
| 33 | CML-I | Tx3p | Transmitter Non-Inverted Data Input | 3 |
| 34 | CML-I | Tx3n | Transmitter Inverted Data Input | 3 |
| 35 | | GND | Ground | 1 |
| 36 | CML-I | Tx1p | Transmitter Non-Inverted Data Input | 3 |
| 37 | CML-I | Tx1n | Transmitter Inverted Data Input | 3 |
| 38 | | GND | Ground | 1 |

## ESD

This transceiver is specified as an ESD threshold of 1kV for the high-speed data pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 / JESD22-A114-A (Human Body Model). 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 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).