**LQP40-LR4**

**QSFP+40Gb/s LR4 10kmWith DDM**

**PRODUCT FEATURES**

* Supports 41.2 Gb/s aggregate bitrates
* Uncooled 4x10Gb/s transmitter
* Maximum link length of 10km on Single Mode Fiber (SMF)
* Hot-pluggable QSFP+ footprint
* Duplex LC receptacles
* Power dissipation<3.5W
* RoHS-6 compliant and lead-free
* Single 3.3V power supply
* Support Digital Diagnostic Monitor interface
* Case operating temperature

Commercial: 0°C to +70°C

**Compliance**

* QSFP+ MSA.
* IEEE802.3ba
* SFF-8436
* RoHS

**APPLICATIONS**

* 40GBASE-LR4Ethernet

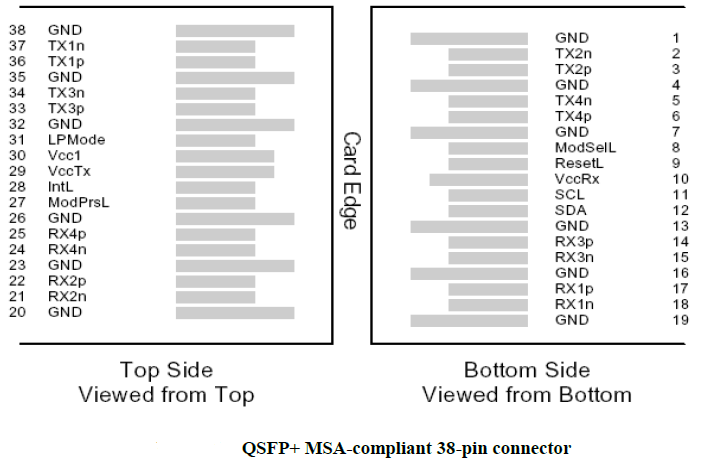
**PRODUCT DESCRIPTION**

LQP40-LR4 QSFP+ transceiver modules are designed for use in 40 Gigabit Ethernet links over single mode fiber. They are compliant with the QSFP+ MSA and IEEE 802.3ba 40GBASE-LR4.Module-level digital diagnostic functions are available via an I2C interface, as specified by the QSFP+ MSA. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

**Ordering information**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Package** | **Product part NO.** | **Data Rate(Gbps)** | **Media** | **Wavelength(nm)** | **TransmissionDistance(km)** | **Temperature Range（℃）** | |
| QSFP+ | LQP40-LR4 | 41.2 | single-mode fiber | 1271nm, 1291nm  1311nm, 1331nm | 10 | 0~70 | Commercial |

1. **Pin Diagram**



1. **Pin Descriptions**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pin** | **Symbol** | **Name/Description** | **Ref.** |
| 1 | GND | Ground | 1 |
| 2 | Tx2n | Transmitter Inverted Data Input |  |
| 3 | Tx2p | Transmitter Non-Inverted Data Input |  |
| 4 | GND | Ground | 1 |
| 5 | Tx4n | Transmitter Inverted Data Input |  |
| 6 | Tx4p | Transmitter Non-Inverted Data Input |  |
| 7 | GND | Ground | 1 |
| 8 | ModSe1L | Module Select |  |
| **Pin** | **Symbol** | **Name/Description** | **Ref.** |
| 9 | ResetL | Module Reset |  |
| 10 | Vcc Rx | +3.3V Power supply receiver |  |
| 11 | SCL | 2-wire serial interface clock |  |
| 12 | SDA | 2-wire serial interface data |  |
| 13 | GND | Ground | 1 |
| 14 | Rx3p | Receiver Non-Inverted Data Output |  |
| 15 | Rx3n | Receiver Inverted Data Output |  |
| 16 | GND | Ground | 1 |
| 17 | Rx1p | Receiver Non-Inverted Data Output |  |
| 18 | Rx1n | Receiver Inverted Data Output |  |
| 19 | GND | Ground | 1 |
| 20 | GND | Ground | 1 |
| 21 | Rx2n | Receiver Inverted Data Output |  |
| 22 | Rx2p | Receiver Non-Inverted Data Output |  |
| 23 | GND | Ground | 1 |
| 24 | Rx4n | Receiver Inverted Data Output |  |
| 25 | Rx4p | Receiver Non-Inverted Data Output |  |
| 26 | GND | Ground | 1 |
| 27 | ModPrSL | Module Present |  |
| 28 | IntL | Interrupt |  |
| 29 | VccTx | +3.3V Power supply transmitter |  |
| 30 | Vcc1 | +3.3V Power Supply |  |
| 31 | LPMode | Low Power Mode |  |
| 32 | GND | Ground | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input |  |
| 34 | Tx3n | Transmitter Inverted Data Input |  |
| 35 | GND | Ground | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input |  |
| 37 | Tx1n | Transmitter Inverted Data Input |  |
| 38 | GND | Ground | 1 |

Note：

1. Circuit ground is internally isolated from chassis ground.

1. **Absolute Maximum Ratings**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Unit** | **Ref.** |
| Storage Temperature | TS | -40 |  | 85 | ºC |  |
| Storage Ambient Relative Humidity | HA | 0 |  | 85 | % |  |
| Maximum Supply Voltage | VCC1,  VCCTX,  VCCRX | -0.5 |  | 3.6 | V |  |
| Signal Input Voltage |  | -0.3 |  | Vcc+0.3 | V |  |
| Receiver Damage Threshold |  | +3.4 |  |  | dBm |  |
| Lead Soldering Temperature/Time | TSOLD |  |  | 260/10 | ºC/sec | 1 |
| Lead Soldering Temperature/Time | TSOLD |  |  | 360/10 | ºC/sec | 2 |

Note:

1.Suitable for wave soldering.

2. Only for soldering by iron.

1. **General Product Characteristics**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Value** | **Unit** | **Ref.** |
| Module Form Factor | QSFP+ |  |  |
| Number of Lanes | 4 Tx and 4 Rx |  |  |
| Maximum Aggregate Data Rate | 41.2 | Gb/s |  |
| Maximum Data Rate per Lane | 10.3125 | Gb/s | Higher bit rates may be supported. Please contact Inphilight |
| Protocols Supported | Typical applications include 40G Ethernet |  |  |
| Management Interface | Serial,I2c-based,400kHz maximum frequency |  | As defined by the QSFP+ MSA |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Data Rate Spcifications** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Unit** | **Ref.** |
| Bit Rate per Lane | BR |  |  | 10313 | Mb/s | 1 |
| Bit Error Ratiio | BER |  |  | 10-12 |  | 2 |
| Link distance on SMF-28 | d |  |  | 10 | km | 3 |

Notes:

1. Compliant with 40GBASE-LR4 and XLPPI per IEEE 802.3ba. Compatible with 1/10 Gigabit Ethernet and 1/2/4/8/10G Fibre Channel.

2. Tested with a PRBS 231-1 test pattern.

3. Per 40GBASE-LR4, IEEE 802.3ba.

1. **Optical Characteristics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Unit** | **Ref.** |
| **Transmitter** | | | | | | |
| Total Average Launch Power | POUT |  |  | 8.3 | dBm |  |
| Average Output Power per lane | POUT | -7 |  | 2.3 | dBm |  |
| Transmit OMA per Lane | TxOMA | -4.0 |  | 3.5 | dBm | 1 |
| Extinction Ratio | ER | 3.5 |  |  | dB |  |
| Center Wavelength | λC | 1264.5  1284.5  1304.5  1324.5 | 1271  1291  1311  1331 | 1277.5  1297.5  1317.5  1337.5 | nm |  |
| Sidemode Suppression ratio | SMSR | 30 |  |  | dB |  |
| Transmitter and Dispersion Penalty | TDP |  |  | 3.5 | dB |  |
| Transmitter OFF Output Power | POff |  |  | -30 | dBm |  |
| Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3} |  | 0.25,0.4,0.45,0.25,0.28,0.4 | | |  |  |
|  | | | | | | |
| **Receiver** | | | | | | |
| Input Optical Wavelength | λIN | 1264.5  1284.5  1304.5  1324.5 | 1271  1291  1311  1331 | 1277.5  1297.5  1317.5  1337.5 | nm |  |
| Rx Sensitivity per lane | RSENS1 |  |  | -11.5 | dBm |  |
| Rx Sensitivity(OMA) | RSENS2 |  |  | -9.6 | dBm |  |
| InputSaturation Power (Overload) | PSAT |  |  | +3.4 | dBm |  |
| Receiver Reflectance | Rfl |  |  | -12 | dBm |  |
| Loss of Signal Assert | PA | -30 |  |  | dBm |  |
| Loss of Signal De-assert | PD |  |  | -12.5 | dBm |  |
| LOS Hysteresis | PD - PA | 0.5 |  | 6 | dB |  |

Note:

1.Even if TDP is <0.9dB, the OMA min must exceed this value.

1. **Memory Map and Control Registers**

Compatiable with SFF-8436Rev.4.8(QSFP+).

1. **Electrical Interface Characteristics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Unit** | **Ref.** |
| Supply Voltage | VCC1,  VCCTX,  VCCRX | 3.15 |  | 3.45 | V |  |
| Supply Current | ICC |  |  | 1000 | mA |  |
| **Transmitter** | | | | | | |
| Input different impedance | Rin | 90 | 100 | 110 | Ω | 2 |
| Single ended data input swing | Vin,pp | 120 |  | 820 | mV |  |
| Transmitter Disable Voltage | VDIS | 2 |  | VCC | V | 3 |
| Transmitter Enable Voltage | VEN | 0 |  | 0.8 | V |  |
| **Receiver** | | | | | | |
| Output different impedance | Rout | 90 | 100 | 110 | Ω | 2 |
| Single ended data output swing | Vout,pp | 340 |  | 850 | mV | 4 |
| LOS Asserted | VLOSA | 2 |  | VCCHOST | V | 5 |
| LOS De-asserted | VLOSD | 0 |  | 0.8 | V | 5 |
| Power Supply Rejection | PSR | 50 |  |  | mVpp |  |

Note :

1.Maximum total power value is specified across the full temperature and voltage range.

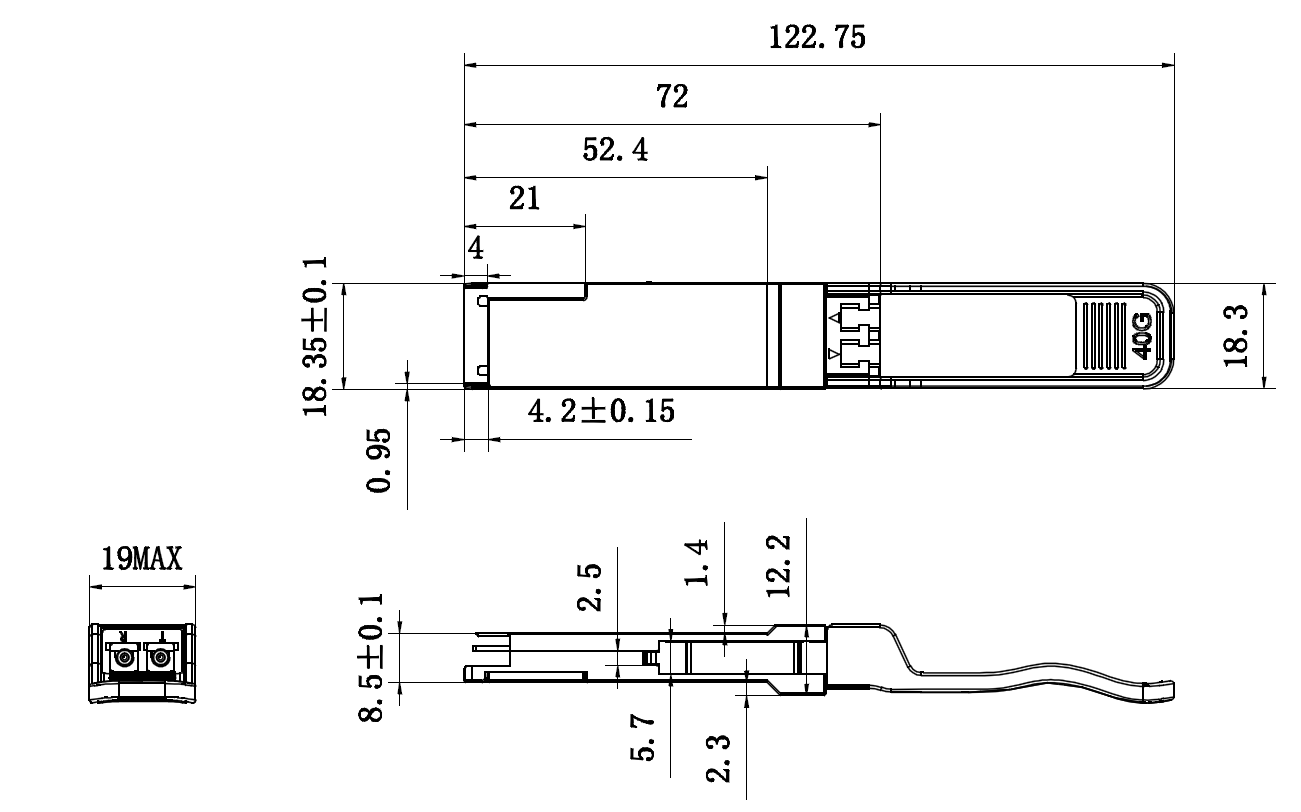
2.Connected directly to TX data input pins. AC coupled thereafter.

3.Or open circuit.

4.Into 100Ωdifferential termination.

5.LossOf Signal is LVTTL. Logic “0”indicates normal operation; logic “1” indicates no signal detected.

1. **Mechanical Specifications**(Unit: mm)



**LQP40-LR4**

1. **Regulatory Compliance**

LQP40-LR4transceiverare RoHS-6 Compliant.

LQP40-LR4transceiver modules are Class 1 laser eye safety compliant per IEC 60825-1, which means that they are eye safe under normal “unaided” viewing conditions. Laser radiation may be hazardous if viewed with magnifying optics.

**Revision History**

|  |  |  |
| --- | --- | --- |
| **Version No.** | **Date** | **Description** |
| 1.0 | June 24, 2019 | Preliminary datasheet |