**LQP100-CWDM4**

**QSFP28 100Gb/s CWDM4 2km DDM**

**PRODUCT FEATURES**

* Supports 103.1Gb/s aggregate bit rate
* 4x25Gb/s electrical interface
* 4X25Gb/s CWDM transmitter and PIN/TIA receiver
* Maximum link length of 2km on Single Mode Fiber (SMF)
* Hot-pluggable QSFP28 from factor
* Single 3.3V power supply
* Integrated 4-channel CWDM mux/Demux

for duplex LC operation

* Duplex LC receptacles
* Maximum power dissipation<3.5W
* RoHS-6 compliant and lead-free
* I2C management interface
* Case operating temperature

Commercial: 0°C to +70°C

**APPLICATIONS**

**Compliance**

* QSFP28 MSA.
* IEEE802.3bm
* SFF-8665
* RoHS
* 100 Gigabit Ethernet

**PRODUCT DESCRIPTION**

LQP100-CWDM4 QSFP28 transceiver modules are designed for use in 100 Gigabit Ethernet links over multimode fiber. They are compliant with the QSFP28 MSA,CWDM4 MSA and IEEE 802.3bm.Digital diagnostic functions are available via an I2C interface, as specified by the QSFP28 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（℃）** |
| QSFP28 | LQP100-CWDM4 | 4X25 | Single-mode fiber | 1271nm1291nm1311nm1331nm | 2 | 0~70 | Commercial |

1. **Pin Diagram**

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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 |  |
| 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 |  |
| **Pin**  | **Symbol**  | **Name/Description**  | **Ref.**  |
| 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  | VCC | -0.5 |  | 3.6 | V  |  |
| 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. **Optical Characteristics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter**  | **Symbol**  | **Min.**  | **Typ.**  | **Max.**  | **Unit**  | **Ref.** |
| **Transmitter(per lane)** |
| Signaling Speed per Lane |  | 25.78125 ± 100 ppm | Gb/s | 1 |
| Center Wavelength | λC | -- | 1264.5 – 1277.51284.5 – 1297.51304.5 – 1317.51324.5 – 1337.5 | -- | nm |  |
| Extinction ratio | ER | 3.5 | -- | -- | dB |  |
| Side Mode Suppression Ratio | SMSR | 30 | -- | -- | dB |  |
| Total average launch power | Ptot | -- | -- | 8.5 | dBm |  |
| Average launch power, each lane | Po | -6.5 | -- | 2.5 | dBm |  |
| OMA, each lane | OMA | -4 | -- | 2.5 | dBm | CW,ER>3.5dB |
| Difference in launch power between anytwo lanes (OMA) |  |  |  | 5 | dB |  |
| TDP, each lane | TDP |  |  | 3.0 | dB | 2 |
| Average launch power of OFF transmitter, each lane | Poff |  |  | -30 | dBm |  |
| Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3} |  | {0.31, 0.40, 0.45, 0.34, 0.38, 0.4} |  | 3 |
|  |
| **Receiver(per lane)** |
| Signaling Speed per Lane |  | 25.78125 ± 100 ppm | Gb/s | 4 |
| Input Optical Wavelength | λIN |  | 1264.5 – 1277.51284.5 – 1297.51304.5 – 1317.51324.5 – 1337.5 |  | nm |  |
|  |  |  |  |  |  |  |
| Damage threshold |  | 3.5 |  |  | dBm |  |
| Receiver Power (OMA), each Lane |  | 2.5 |  |  | dBm |  |
| Rx Sensitivity(OMA) per lane | RSENS |  |  | -10 | dBm | 5 |
| Stressed receiver sensitivity (OMA), each lane | SRS |  |  | -7.3 | dBm | 6 |
| **Conditions of stressed receiver sensitivity test:** |
| Vertical eye closure penalty, each lane | VECP | 1.9 |  | dB |  |  |
| Stressed eye J2 jitter, each lane | J2 | 0.33 |  | UI |  |  |
| Stressed eye J4 jitter, each lane | J4 | 0.48 |  | UI |  |  |
| SRS eye mask definition {X1, X2, X3, Y1, Y2, Y3} |  | {0.39, 0.50, 0.50, 0.39, 0.39, 0.4} |  |  |
| Loss of Signal Assert | PA | -24 |  | -13.6 | dBm |  |
| Loss of Signal De-assert | PD |  |  | -11.6 | dBm |  |
| LOS Hysteresis | PD - PA | 0.5 |  | 6 | dB |  |

Note :

1.Transmitter consists of 4 lasers operating at 25.78Gb/s each.

2.TDP value does not include MPI penalty.

3. Hit ratio of 5x10-5, per IEEE.

4. Receiver consists of 4 photodetectors operating at 25.78Gb/s each.

5.Sensitivity is specified at 5x10-5 BER.

6.Measured with CWDM4 MSA2 conformance test signal at TP3 for 5x10-5 BER.

1. **Digital Diagnostic Functions**

LQP100-CWDM4 QSFP28 transceivers support the I2C-based diagnostics interface specified by the QSFP28 MSA.

1. **Electrical Interface Characteristics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Unit** | **Ref.** |
| Supply Voltage | VCC | 3.135 |  | 3.465 | V |  |
| Supply Current | ICC |  |  | 1.12 | A |  |
| Module total power | P |  |  | 3.5 | W | 1 |
| **Transmitter** |
| Signaling rate per lane |  | 25.78125±100ppm | Gb/s |  |
| Differential data input swing per lane | Vin,pp | 900 |  |  | mV |  |
| Differential input return loss(min) | RLd(f) | 9.5 – 0.37f, 0.01≤f<84.75-7.4log10(f/14), 8≤f<19 | dB |  |
| Differential to common mode input return loss(min) | RLdc(f) | 22-20(f/25.78), 0.01≤f<12.8915-6(f/25.78), 12.89≤f<19 | dB |  |
| Differential termination mismatch |  |  |  | 10 | % |  |
| Eye width |  |  | 0.46 |  | UI |  |
| Applied pk-pk sinusoidal Jitter |  | Per IEEE802.3bm Table 88-13 |  |  |
| Eye height |  |  | 95 |  | mV |  |
| **Receiver**  |
| Signaling rate per lane |  | 25.78125±100ppm | Gb/s |  |
| Differential data output swing | Vout,pp | 100 |  | 400 | mVpp | 2 |
| 300 |  | 600 |
| 400 | 600 | 800 |
| 600 |  | 1200 |
| Eye width |  | 0.57 |  |  | UI |  |
| Vertical eye closure | VEC |  |  | 5.5 | dB |  |
| Differential output return loss (min)  | RLd(f)  | 9.5 – 0.37f, 0.01≤f<84.75 – 7.4log10(f/14), 8 ≤f<19 | dB |  |
| Common to differential mode conversion return loss (min)  | RLdc(f) | 22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19  | dB |  |
| Differential termination mismatch  |  |  |  | 10 | % |  |

Note :

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

2.Output voltage is settable in 4 discrete range via I2C.Default range is Range 2 ( 400 – 800mV ).

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

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**LQP100-CWDM4**

1. **Regulatory Compliance**

|  |  |
| --- | --- |
| **Item** | **Standard** |
| Electromagnetic Interference (EMI) | FCC Part 15 Class BEN55022 Class B (CISPR 22B) VCCI Class B |
| Electrostatic Discharge to the Electrical Pins (ESD) | MIL-STD-883E Method 3015.7 |
| Electrostatic Discharge to the Receptacle (ESD) | IEC 61000-4-2 |
| RoHS | 2011/65/EU |
| Laser Eye Safety | FDA 21CFR 1040.10 and 1040.11 |
| Component Recognition | UL and TUV |

**Revision History**

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