

## 02312QTL-AO

Huawei® 02312QTL Compatible TAA Compliant 100GBase-4WDM-40 QSFP28 Transceiver (SMF, 1295nm to 1309nm, 40km, LC, DOM)

### Features

- QSFP28 MSA compliant
- Single 3.3V Power Supply and Power dissipation < 4.8W
- Supports 103Gbps
- Operating case temperature: 0 to 70C
- Four 25Gbps DFB-based LAN-WDM transmitter
- Up to 20km over SMF
- 4x25G electrical interface
- PIN and TIA array on the receiver side
- I2C interface with integrated Digital Diagnostic Monitoring
- Duplex LC receptacles
- RoHS Compliant and Lead Free



### Applications

- 100GBase Ethernet

### Product Description

This Huawei® QSFP28 transceiver provides 100GBase-CWDM throughput up to 40km over single-mode fiber (SMF) using wavelengths between 1295nm to 1309nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Huawei® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

AddOn's transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## Absolute Maximum Ratings

| Parameter                  | Symbol          | Min. | Max. | Unit |
|----------------------------|-----------------|------|------|------|
| Maximum Supply Voltage     | V <sub>cc</sub> | -0.5 | 3.6  | V    |
| Storage Temperature        | T <sub>S</sub>  | -40  | +85  | °C   |
| Operating Case Temperature | T <sub>c</sub>  | 0    | 70   | °C   |
| Operating Humidity         | RH              | 5    | 85   | %    |

## Electrical Characteristics

| Parameter                              | Test Point       | Min.                     | Typ. | Max.  | Unit  | Notes |
|--|------------------|--------------------------|------|-------|-------|-------|
| Power Supply Voltage                   | V <sub>cc</sub>  | 3.135                    | 3.3  | 3.465 | V     |       |
| Power Dissipation                      | PD               |                          |      | 5     | W     |       |
| Transmitter                            |                  |                          |      |       |       |       |
| Differential data input swing per lane |                  |                          |      | 900   | mVp-p |       |
| Input Impedance (Differential)         | Z <sub>in</sub>  |                          |      | 10    | %     |       |
| Stressed Input Parameters              |                  |                          |      |       |       |       |
| Eye width                              |                  | 0.46                     |      |       | UI    |       |
| Applied pk-pk sinusoidal jitter        |                  | IEEE 802.3bm Table 88-13 |      |       |       |       |
| Eye height                             |                  | 95                       |      |       | mv    |       |
| DC common mode voltage                 |                  | -350                     |      | 2850  | mv    |       |
| Receiver                               |                  |                          |      |       |       |       |
| Differential output amplitude          |                  | 200                      |      | 900   | mVp-p |       |
| Output Impedance (Differential)        | Z <sub>out</sub> |                          |      | 10    | %     |       |
| Eye width                              |                  | 0.57                     |      |       | UI    |       |
| Eye height differential                |                  | 228                      |      |       | mv    |       |
| Vertical eye closure                   |                  |                          |      | 5.5   | dB    |       |

## Optical Characteristics

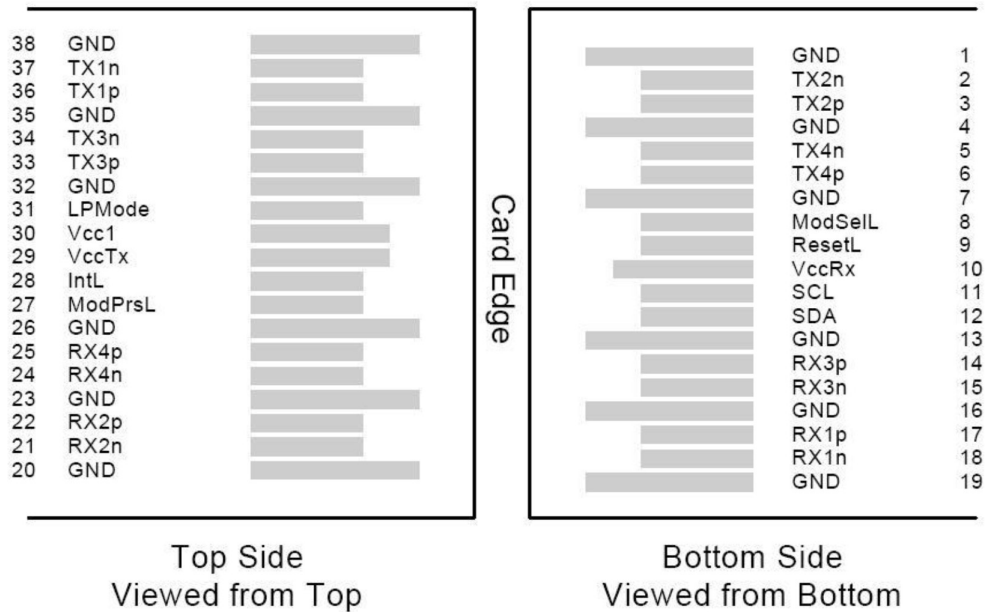
| Parameter  | Symbol         | Min.                               | Typ.    | Max.    | Unit | Notes |
|--|----------------|------------------------------------|---------|---------|------|-------|
| Transmitter  |                |                                    |         |         |      |       |
| Signaling Speed per Lane                                 | BRAVE          |                                    | 25.78   |         | Gbps |       |
| Data Rate Variation                                      |                | -100                               |         | +100    | ppm  |       |
| Lane_0 Center Wavelength                                 | $\lambda_{C0}$ | 1294.53                            | 1295.56 | 1296.59 | nm   |       |
| Lane_1 Center Wavelength                                 | $\lambda_{C1}$ | 1299.02                            | 1300.05 | 1301.09 | nm   |       |
| Lane_2 Center Wavelength                                 | $\lambda_{C2}$ | 1303.54                            | 1304.58 | 1305.63 | nm   |       |
| Lane_3 Center Wavelength                                 | $\lambda_{C3}$ | 1308.09                            | 1309.14 | 1310.19 | nm   |       |
| Total Average Output Power                               | Po             |                                    |         | 12.5    | dBm  |       |
| Average Launch Power per Lane                            | Peach          | -2.5                               |         | 6.5     | dBm  | 1     |
| Average launch power of OFF transmitter per lane         |                |                                    |         | -30     | dBm  |       |
| Side-mode suppression ratio                              | SMSRmin        | 30                                 |         |         | dB   |       |
| Optical modulation amplitude                             | Poma           | 0.5                                |         | 6.5     | dBm  | 2     |
| Difference in launch power between any two lanes (OMA)   |                |                                    |         | 4       | dB   |       |
| Optical Return Loss Tolerance                            |                | 20                                 |         |         | dB   |       |
| Transmitter reflectance                                  |                |                                    |         | -26     |      | 3     |
| Extinction Ratio   | ER             | 4.5                                |         |         | dB   | 4     |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} |                | {0.31, 0.4, 0.45, 0.34, 0.38, 0.4} |         |         |      | 4     |
| Receiver   |                |                                    |         |         |      |       |
| Signaling Speed per Lane                                 | BRAVE          |                                    | 25.78   |         | Gbps |       |
| Data Rate Variation                                      |                | -100                               |         | +100    | ppm  |       |
| Damage threshold per Lane                                | Rdam           | -2.5                               |         |         | dBm  |       |
| Lane_0 Center Wavelength                                 | $\lambda_{C0}$ | 1294.53                            | 1295.56 | 1296.59 | nm   |       |
| Lane_1 Center Wavelength                                 | $\lambda_{C1}$ | 1299.02                            | 1300.05 | 1301.09 | nm   |       |
| Lane_2 Center Wavelength                                 | $\lambda_{C2}$ | 1303.54                            | 1304.58 | 1305.63 | nm   |       |
| Lane_3 Center Wavelength                                 | $\lambda_{C3}$ | 1308.09                            | 1309.14 | 1310.19 | nm   |       |
| Average Receive Power per Lane                           | Rxpow          | -20.5                              |         | -3.5    | dBm  | 5     |
| Receive Sensitivity in OMA per Lane                      | Rxsens         |                                    |         | -18.5   | dBm  | 6     |
| Stressed Receiver Sensitivity (OMA) per Lane             | RXSRS          |                                    |         | -16     | dBm  | 7     |
| Optical Return Loss                                      | ORL            |                                    |         | -26     | dB   |       |
| LOS Assert   | LOSA           | -30                                |         |         | dBm  |       |
| LOS De-Assert  | LOSD           |                                    |         | -20     | dBm  |       |
| LOS Hysteresis   |                | 0.5                                |         |         | dB   |       |
| Conditions of Receiver Sensitivity Test (Note 8)         |                |                                    |         |         |      |       |
| Vertical Eye Closure Penalty                             | VECP           |                                    | 2.5     |         | dB   |       |
| Stressed Eye J2 Jitter                                   |                |                                    | 0.33    |         | UI   |       |

|  |  |                                   |  |    |  |
|--|--|-----------------------------------|--|----|--|
| Stressed Eye J4 Jitter                           |  | 0.48                              |  | UI |  |
| SRS Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} |  | {0.39, 0.5, 0.5, 0.39, 0.39, 0.4} |  |    |  |

#### Notes:

1. 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.
2. Even if the TDP < 1.0dB, the OMA (min) must exceed this value.
3. Transmitter reflectance is defined looking into the transmitter.
4. Eye mask hit ratio is 5E-5.
5. Average launch 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.
6. Receiver sensitivity (OMA), each lane (max) at 5E-5 BER is a normative specification.
7. Measured with conformance test signal at TP3 for BER =  $5 \times 10^{-5}$ .
8. Vertical eye closure penalty, stressed eye J2 Jitter, stressed eye J4 Jitter, and SRS eye mask definition are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

#### Electrical Pin-out Details



## Pin Descriptions

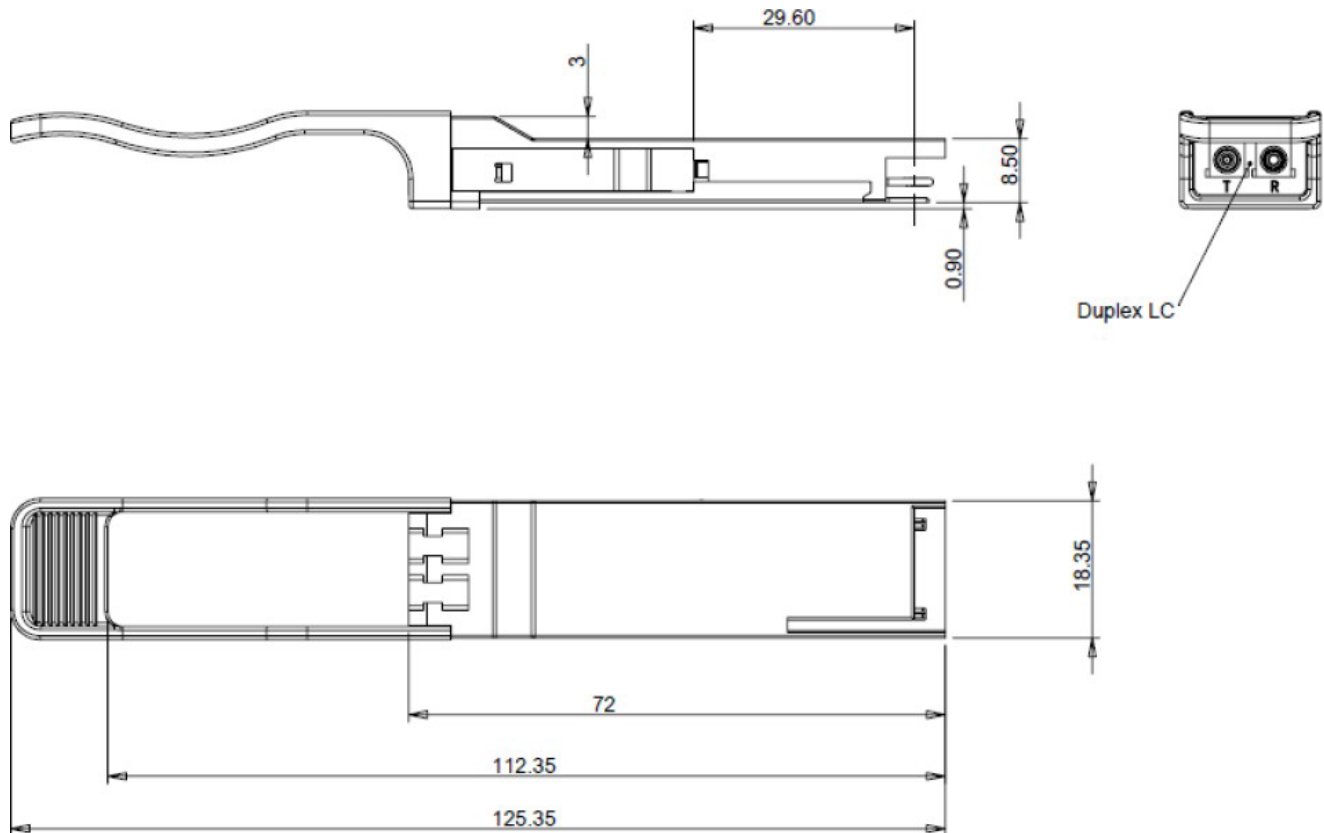
| Pin | Symbol  | Name/Descriptions                    | Ref. |
|-----|---------|--------------------------------------|------|
| 1   | GND     | Ground                               | 1    |
| 2   | Tx2n    | Transmitter Inverted Data Input      |      |
| 3   | Tx2p    | Transmitter Non-Inverted Data output |      |
| 4   | GND     | Ground                               | 1    |
| 5   | Tx4n    | Transmitter Inverted Data Input      |      |
| 6   | Tx4p    | Transmitter Non-Inverted Data output |      |
| 7   | GND     | Ground                               | 1    |
| 8   | ModSelL | Module Select                        |      |
| 9   | ResetL  | Module Reset                         |      |
| 10  | VccRx   | +3.3V Power Supply Receiver          | 2    |
| 11  | SCL     | 2-Wire Serial Interface Clock        | 1    |
| 12  | SDA     | 2-Wire Serial Interface Data         |      |
| 13  | GND     | Ground                               |      |
| 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        | 1    |
| 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       | 2    |
| 30  | VccI    | +3.3V Power Supply                   | 2    |
| 31  | LPMODE  | Low Power Mode                       |      |
| 32  | GND     | Ground                               | 1    |
| 33  | Tx3p    | Transmitter Non-Inverted Data input  |      |
| 34  | Tx3n    | Transmitter Inverted Data output     |      |
| 35  | GND     | Ground                               | 1    |
| 36  | Tx1p    | Transmitter Non-Inverted Data input  |      |
| 37  | Tx1n    | Transmitter Inverted Data output     |      |
| 38  | GND     | Ground                               | 1    |

**Notes:**

1. GND is the symbol for signal and supply (power) common for QSPF28 modules. All are common within the QSPF28 module and all module voltages are referenced to this potential unless otherwise noted. Connected these directly to the host board signal common ground plane.
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. VccRx, Vcc1 and VccTx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

**Mechanical Specifications**

Measurement unit: mm



## About AddOn Networks

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is ingrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.



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