# WT112-ER4-D

QSFP28 100Gb/s Single-mode 40km DDM Transceiver / PRODUCT FEATURES

**Part Number**
**WT112-ER4-D**




## 1. Product Overview

### Features

- Support line rates from 111.81 Gb/s;
- Transmission data rate up to 27.95Gbps per channel
- Up to 40kmreach for G.652 SMF with FEC
- LAN WDM DML laser and APD receiver
- High speed I/O electrical interface (CAUI-4);
- I2C interface with integrated Digital Diagnostic monitoring;
- QSFP28 MSA package with duplex LC connector;
- Single +3.3V power supply;
- Maximum power consumption 4.5 W;
- Operating case temperature: 0 to +70 °C;
- Complies with EU Directive 2015/863/EU;

### Applications

- 100G 4WDM-40
- ITU-T G.959.1 OTU4 (4L1-9D1F)
- 100G Datacom& Telecom connections
- 100GBASE-ER4 Ethernet
- DESCRIPTIONS
- WT112-ER4-D is designed for 40km optical communication applications. This module contains 4-lane optical transmitter, 4-lane optical receiver and module management block including 2 wire serial inter-face. The optical signals are multiplexed to a single-mode fiber through an industry standard LC connector.

## 2. Ordering Information

| Package | Part No. | Data Rate(Gbps) | Laser | Fiber Type | Distance(km) | Temp（℃） | Power Dissipation（W） |
|---|---|---|---|---|---|---|---|
| QSFP28 | WT112-ER4-D | 111.81 | LWDM | SMF | 40 | 0~70 | ＜4.5 |

## 3. Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|
| Storage Temperature | TS | -40 | +85 | °C |
| Maximum Supply Voltage | VCC | -0.5 | 3.6 | V |
| Operating Relative Humidity | RH | | 85 | % |

## 4. Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Operating Case Temperature | TC | 0 | | +70 | °C | |
| Power Supply Voltage | VCC | 3.13 | 3.3 | 3.47 | V | |
| Power Supply Current | ICC | | | 1.36 | A | |
| Maximum Power Dissipation | PD | | | 4.5 | W | |
| Aggregate Bit Rate | BRAVE | | 103.125 | 111.81 | Gb/s | |
| Lane Bit Rate | BRLANE | | 25.78125 | 27.9525 | Gb/s | |
| Transmission Distance | TD | | | 40 | km | |
| Coupled fiber | Single mode fiber | Single mode fiber | Single mode fiber | Single mode fiber | Single mode fiber | 9/125um SMF |

## 5. Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Transmitter | Transmitter | Transmitter | Transmitter | Transmitter | Transmitter | Transmitter |
| Signaling Speed per Lane | | | 25.78125 | 27.9525 | Gbps | |
| Lane Wavelengt | L0 | 1294.53 | 1295.56 | 1296.59 | nm | |
| Lane Wavelengt | L1 | 1299.02 | 1300.05 | 1301.09 | nm | |
| Lane Wavelengt | L2 | 1303.54 | 1304.58 | 1305.63 | nm | |
| Lane Wavelengt | L3 | 1308.09 | 1309.14 | 1310.19 | nm | |
| Total Average Launch Power | PT | | | 12.5 | dBm | 1 |
| Average Launch Power per Lane, | Pavg | 0 | | 6.5 | dBm | 1 |
| OMA, each Lane | POMA | 0.5 | | 6.5 | dBm | 1 |
| Difference in launch power between any two lanes(Average and OMA) between any Two Lanes (OMA) | Ptx,diff | | | 3 | dB | |
| Average Output Power (Laser Turn off) | Poff | | | -30 | dBm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Extinction Ratio, 100GE | ER | 4.5 | | | dB | |
| RIN20OMA | RIN | | | -130 | dB/Hz | |
| Optical Return Loss Tolerance | TOL | | | 20 | dB | |
| Transmitter Reflectance | RT | | | -12 | dB | |

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Optical Eye Mask | {0.25,0.4, 0.45, 0.25, 0.28, 0.4} | {0.25,0.4, 0.45, 0.25, 0.28, 0.4} | {0.25,0.4, 0.45, 0.25, 0.28, 0.4} | {0.25,0.4, 0.45, 0.25, 0.28, 0.4} | % | 2 |
| Receiver | Receiver | Receiver | Receiver | Receiver | Receiver | Receiver |
| Signaling rate, each lane | | | 25.78125 | 27.9525 | Gbps | |
| Center Wavelength Lane 0 | λ0 | 1294.53 | 1295.56 | 1296.59 | nm | |
| Center Wavelength Lane 1 | λ1 | 1299.02 | 1300.05 | 1301.09 | nm | |
| Center Wavelength Lane 2 | λ2 | 1303.54 | 1304.58 | 1305.63 | nm | |
| Center Wavelength Lane 3 | λ3 | 1308.09 | 1309.14 | 1310.19 | nm | |
| Damage threshold , each lane | Pdamage | -6 | | | dBm | |
| Receiver sensitivity （OMA）, each lane (100GbE) （BER = 1x10-12） | SEN | | | -16 | dBm | 3 |
| Receiver sensitivity （OMA）, each lane (OTU4) （BER = 5x10-5） | SEN | | | -18.9 | | 5 |
| Los Assert | LosA | -35 | | | dBm | |
| Los De-assert | LosDA | | | -22 | dBm | |
| Los Hysteresis | LosH | 0.5 | | | dB | |

# 6. Electrical Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Transmitter (Module Input) | Transmitter (Module Input) | Transmitter (Module Input) | Transmitter (Module Input) | Transmitter (Module Input) | Transmitter (Module Input) | Transmitter (Module Input) |
| Data Rate, each lane | | | 25.78125 | 27.9525 | Gbps | |
| Differential Voltage pk-pk | Vpp | | | 900 | mV | 1 |
| Common Mode Voltage | Vcm | -350 | | 2850 | mV | |
| Transition time | Trise/Tfall | 10 | | | ps | 2 |
| Receiver (Module Output) | Receiver (Module Output) | Receiver (Module Output) | Receiver (Module Output) | Receiver (Module Output) | Receiver (Module Output) | Receiver (Module Output) |
| Data Rate, each lane | | | 25.78125 | 27.9525 | Gbps | |
| Common Mode Noise, RMS | Vrms | | | 17.5 | mV | |
| Differential output voltage swing | Vout, pp | | | 900 | mV | |
| Eye width | EW15 | 0.57 | | | UI | |
| Eye height | EH15 | 228 | | | mV | |

| Parameter | Symbol | Min. | Typical | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Differential Termination Resistance Mismatch | | | | 10 | % | 1 |
| Transition time | Trise/Tfall | 12 | | | ps | |

## 7. Digital Diagnostics

| Parameter | Range | Unit | Accuracy | Calibration |
|---|---|---|---|---|
| Temperature | 0 to +70 | °C | ±3°C | Internal / External |
| Voltage | 3.0 to 3.6 | V | ±3% | Internal / External |
| Bias Current | 30 to 100 | mA | ±10% | Internal / External |
| TX Power | -1 to 6.5 | dBm | ±3dB | Internal / External |
| RX Power | -23 to -3.5 | dBm | ±3dB | Internal / External |

## 8. Pin Descriptions

| PIN | Logic | Symbol | Description | Plug Seq. | Notes |
|---|---|---|---|---|---|
| 1 | | GND | Ground | 1 | 1 |
| 2 | CML-I | Tx2n | Transmitter Inverted Data Input | 3 | |
| 3 | CML-I | Tx2p | Transmitter Non-Inverted Data output | 3 | |
| 4 | | GND | Ground | 1 | 1 |
| 5 | CML-I | Tx4n | Transmitter Inverted Data Input | 3 | |
| 6 | CML-I | Tx4p | Transmitter Non-Inverted Data output | 3 | |
| 7 | | GND | Ground | 1 | 1 |
| 8 | LVTLL-I | ModSelL | Module Select | 3 | |
| 9 | LVTLL-I | ResetL | Module Reset | 3 | |
| 10 | | VccRx | + 3.3V Power Supply Receiver | 2 | 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 | 1 |
| 17 | CML-O | Rx1p | Receiver Non-Inverted Data Output | 3 | |

| PIN | Logic | Symbol | Description | Plug Seq. | Notes |
|---|---|---|---|---|---|
| 18 | CML-O | Rx1n | Receiver Inverted Data Output | 3 | |
| 19 | | GND | Ground | 1 | 1 |
| 20 | | GND | Ground | 1 | 1 |
| 21 | CML-O | Rx2n | Receiver Inverted Data Output | 3 | |
| 22 | CML-O | Rx2p | Receiver Non-Inverted Data Output | 3 | |
| 23 | | GND | Ground | 1 | 1 |
| 24 | CML-O | Rx4n | Receiver Inverted Data Output | 3 | 1 |
| 25 | CML-O | Rx4p | Receiver Non-Inverted Data Output | 3 | |
| 26 | | GND | Ground | 1 | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present | 3 | |
| 28 | LVTTL-O | IntL/Rx_LOS | Interrupt/Rx_LOS | 3 | |
| 29 | | VccTx | +3.3 V Power Supply transmitter | 2 | 2 |
| 30 | | Vcc1 | +3.3 V Power Supply | 2 | 2 |
| 31 | LVTTL-I | LPMode/TxDIS | Low Power Mode/Tx_Disable | 3 | |
| 32 | | GND | Ground | 1 | 1 |
| 33 | CML-I | Tx3p | Transmitter Non-Inverted Data Input | 3 | |
| 34 | CML-I | Tx3n | Transmitter Inverted Data Output | 3 | |
| 35 | | GND | Ground | 1 | 1 |
| 36 | CML-I | Tx1p | Transmitter Non-Inverted Data Input | 3 | |
| 37 | CML-I | Tx1n | Transmitter Inverted Data Output | 3 | |
| 38 | | GND | Ground | 1 | 1 |

# 9. Revision History

| Version No. | Date | Description |
|---|---|---|
| 1.0 | June 6 2024 | Preliminary datasheet |

## 10. Pin Assignment

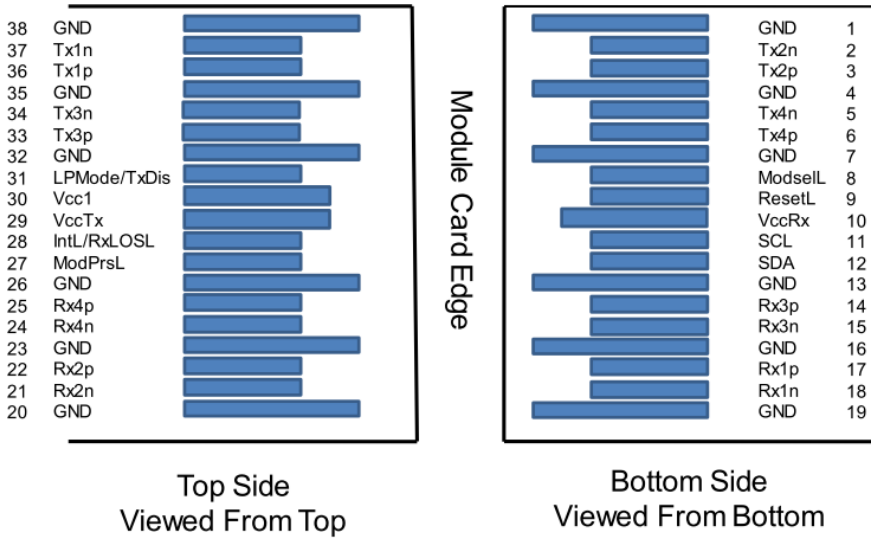
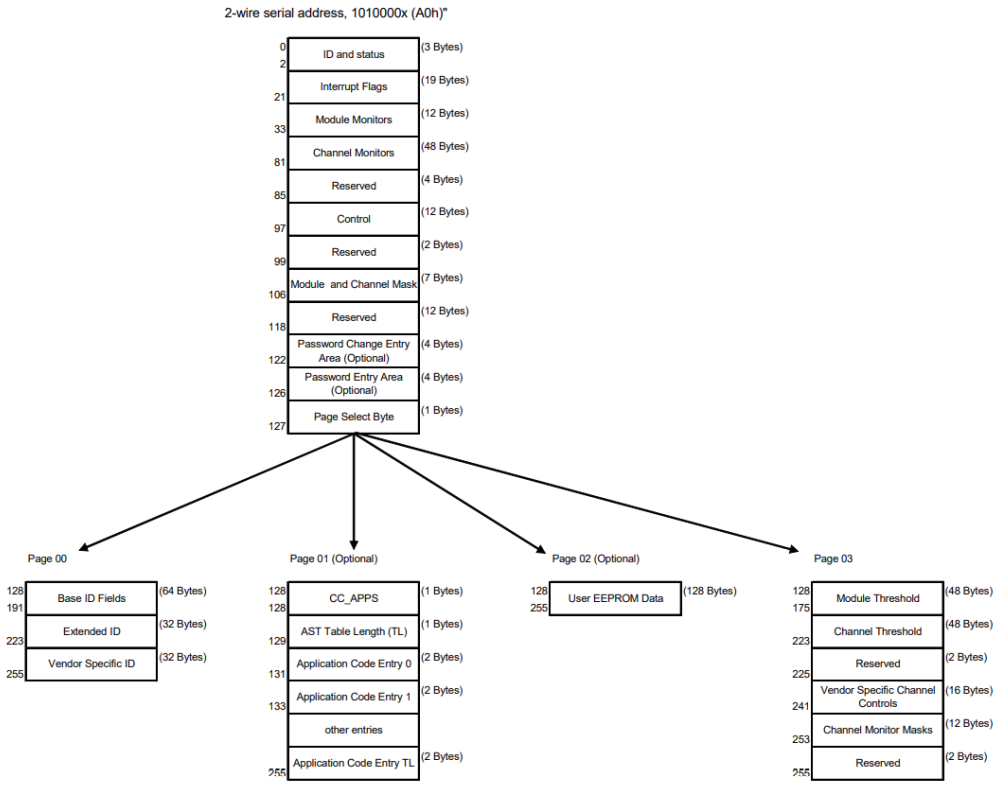
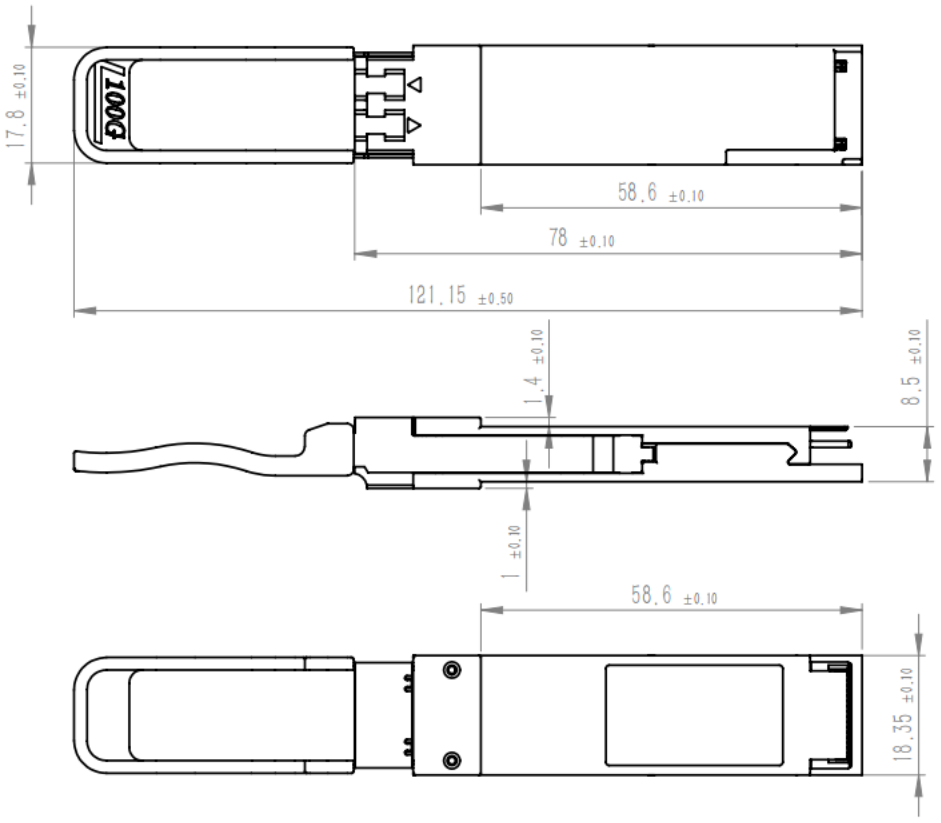



FIGURE 5-1 MODULE PAD LAYOUT

## 11. Digital Diagnostics Memory Map



## 12. Mechanical Specifications




## 13. Revision History

| Version | Date | Description | Prepared by |
|---|---|---|---|
| V6 | 2025 | Unified WincoTek datasheet format | WincoTek |
| V6.1 | 2026-10-23 | Engineering and format review | WincoTek |