# TSQM4-NAAJA1 Optical Transceiver

Multi-mode 100G QSFP28 SR4 Transceiver, With Diagnostic Monitoring

## Features

- 4 channels full-duplex Transceiver
- Transmission data rate 25.78125Gbps per channel
- 4 channels 850nm VCSEL array
- 4 channels PIN photo detector array
- Hot-pluggable QSFP28 form factor
- Low power consumption < 2.5W
- Single 1X12 MPO connector receptacle
- Hot-pluggable electrical interface
- Operating case temperature: 0°C ~+70°C/-20°C ~+85°C/-40°C ~+85°C
- RoHS6 compliant (lead free)

## Applications

- IEEE 802.3bm 100GBASE SR4

## Description

The TSQM4-NAAJA1 module is a highly integrated 4x25G transceiver focused on reach, bandwidth, density and cost for high port-count 100G systems, and client-side 100G interfaces. Each lane can operate at 25Gbps up to 70m using OM3 fiber or 100m using OM4 fiber. These modules are designed to operate over multimode fiber systems using a nominal wavelength of 850nm. The electrical interface uses a 38-contact edge type connector. The optical interface uses a 12-fiber MPO connector.

## Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

| Parameters | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|
| Power Supply Voltage | VCC | -0.5 | +3.6 | V |
| Storage Temperature | Tc | -40 | +85 | °C |
| Relative Humidity | RH | 0 | 85 | % |



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## Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

| Parameter | Symbol | Min | Typical | Max | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage | VCC | 3.15 | 3.30 | 3.45 | V |
| Operating Case Temperature | Tca | 0 | - | 70 | °C |
| | Tca | -20 | - | 85 | °C |
| | Tca | -40 | - | 85 | °C |

## Electrical Characteristics

| Parameter | Symbol | Min. | Typical | Max | Unit | Ref. |
|---|---|---|---|---|---|---|
| **Transmitter** | | | | | | |
| Input differential impedance | Rin | - | 100 | - | Ω | - |
| Differential Input Voltage swing, per lane | Vin | 300 | - | 1100 | mV | - |
| Input Logic Level High | VIH | 2.0 | - | VCC+0.3 | V | - |
| Input Logic Level Low | VIL | Vee | - | Vee+0.8 | V | - |
| **Receiver** | | | | | | |
| Output differential impedance | Rout | - | 100 | - | Ω | - |
| Differential Output Swing, per lane | Vout | 500 | - | 800 | mV | - |
| Output Logic Level High | VOH | 2.0 | - | VCC+0.3 | V | - |
| Output Logic Level Low | VOL | 0 | - | +0.4 | V | - |

## Transmitter Specifications – Optical

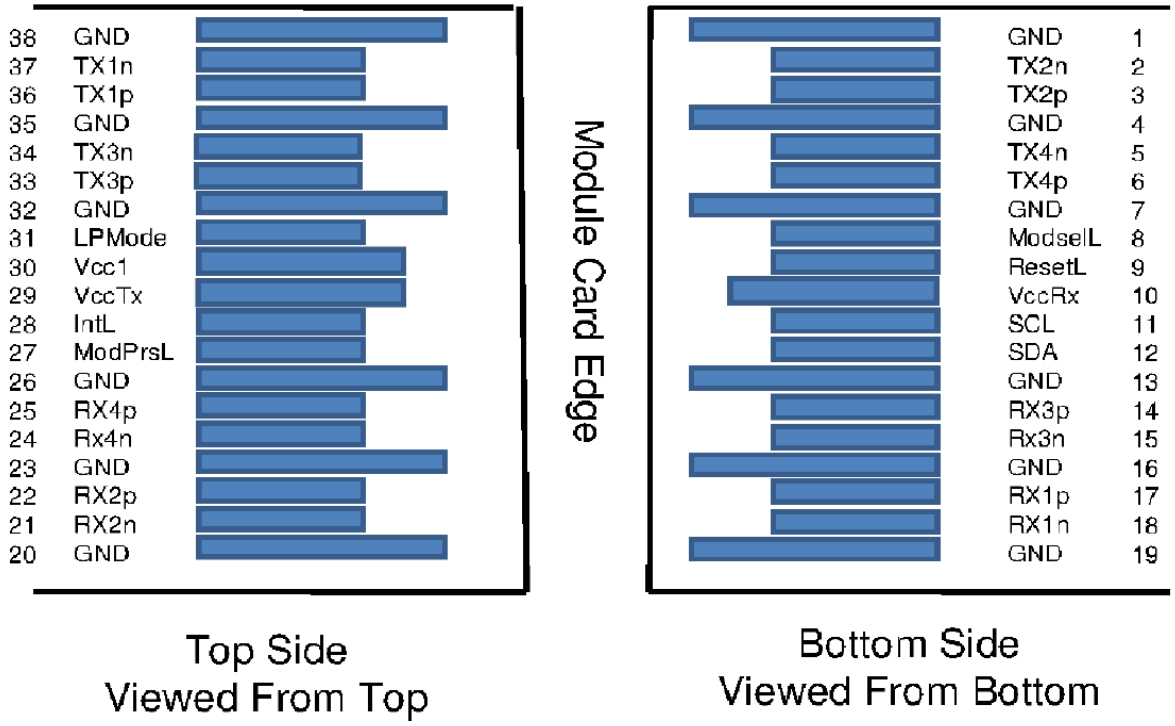
| Parameter | Symbol | Min | Typical | Max | Unit | - |
|---|---|---|---|---|---|---|
| Signaling Speed per Lane | - | 25.78125 ± 100ppm | | | Gb/s | -- |
| Center Wavelength | λ | 840 | 850 | 860 | nm | |
| RMS spectral width | Δλ | - | - | 0.6 | nm | - |
| Average Launch Power per Lane | Po | -6 | - | 2.4 | dBm | - |
| Transmit OMA per Lane | OMA | -6.4 | - | 3 | dBm | - |
| Launch Power [OMA] minus TDEC per Lane | P-TDEC | -7.3 | - | - | dBm | - |
| Extinction Ratio | ER | 3 | - | - | dB | - |
| Optical Return Loss Tolerance | ORL | - | - | 12 | dB | - |
| Average launch power of OFF transmitter, each lane | - | - | - | -30 | dBm | - |

## Receiver Specifications – Optical

| Parameter | Symbol | Min | Typical | Max | Unit | - |
|---|---|---|---|---|---|---|
| Bit Rate per Channel | DR | 25.78125 ± 100ppm | | | Gb/s | - |
| Center Wavelength | λ | 840 | 850 | 860 | nm | - |
| Damage Threshold | DT | 3.4 | - | - | dBm | - |
| Average receive power, each lane | RXPOW | -10.3 | - | 2.4 | dbm | - |

**Note:**
[1] BER=5E-5; PRBS 2^31-1@25.78125Gbps.

## Qsfp28 Transceiver Electrical Pad Layout




## Pin Definition

| Pin | Symbol | Name/Description |
|---|---|---|
| 1 | GND | Ground |
| 2 | Tx2n | Transmitter Inverted Data Input |
| 3 | Tx2p | Transmitter Non-Inverted Data Input |
| 4 | GND | Ground |
| 5 | Tx4n | Transmitter Inverted Data Input |
| 6 | Tx4p | Transmitter Non-Inverted Data Input |
| 7 | GND | Ground |
| 8 | ModSelL | Module Select |
| 9 | ResetL | Module Reset |

| | | |
|---|---|---|
| 10 | VCC Rx | +3.3 V Power supply receiver |
| 11 | SCL | 2-wire serial interface clock |
| 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 |
| 17 | Rx1p | Receiver Non-Inverted Data Output |
| 18 | Rx1n | Receiver Inverted Data Output |
| 19 | GND | Ground |
| 20 | GND | Ground |
| 21 | Rx2n | Receiver Inverted Data Output |
| 22 | Rx2p | Receiver Non-Inverted Data Output |
| 23 | GND | Ground |
| 24 | Rx4n | Receiver Inverted Data Output |
| 25 | Rx4p | Receiver Non-Inverted Data Output |
| 26 | GND | Ground |
| 27 | ModPrsL | Module Present |
| 28 | IntL | Interrupt |
| 29 | VCC Tx | +3.3 V Power supply transmitter |
| 30 | VCC 1 | +3.3 V Power Supply |
| 31 | LPMode | Low Power Mode |
| 32 | GND | Ground |
| 33 | Tx3p | Transmitter Non-Inverted Data Input |
| 34 | Tx3n | Transmitter Inverted Data Input |
| 35 | GND | Ground |
| 36 | Tx1p | Transmitter Non-Inverted Data Input |
| 37 | Tx1n | Transmitter Inverted Data Input |
| 38 | GND | Ground |



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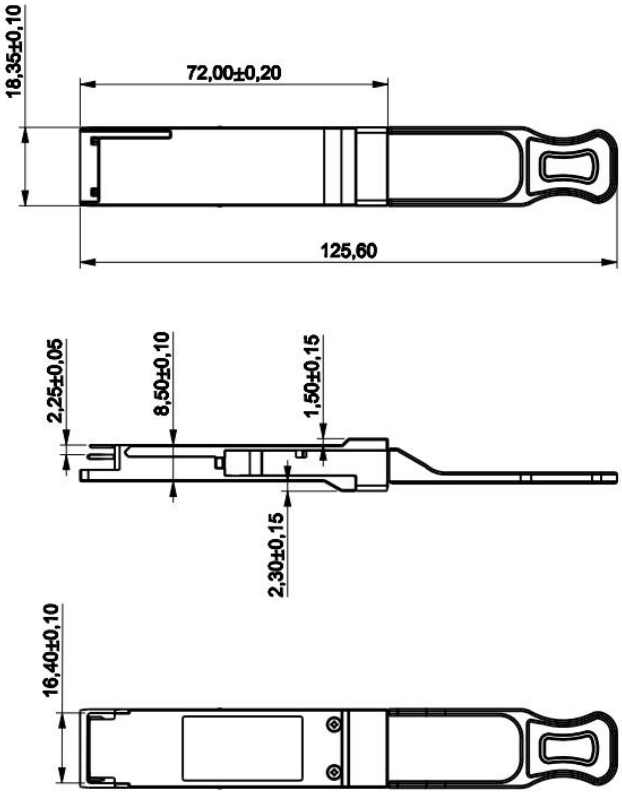
## Mechanical




Unit：mm

## Ordering Information

| Part Number | Product Description |
|---|---|
| TSQM4-NAAJA1C | 100G QSFP28 SR4 OM3 MMF and 100m on OM4 MMF 0°C ~ +70°C |
| TSQM4-NAAJA1E | 100G QSFP28 SR4 OM3 MMF and 100m on OM4 MMF -20°C ~ +85°C |
| TSQM4-NAAJA1T | 100G QSFP28 SR4 OM3 MMF and 100m on OM4 MMF -40°C ~ +85°C |

## References

1. SFF-8636 Specification for QSFP28.
2. Ethernet 100GBASE-SR4 IEEE802.3bm

## Important Notice

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