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## **100G QSFP28 ER Optical Transceiver**

**PN: VQ-1CERICS-AA**

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### **Product Overview**

Vitex VQ-1CERICS-AA is designed for 40km optical communication applications over a fiber cable. The QSFP28 transceiver supports 53.125GBd per optical lane, and up to 106.25 Gbps total data rate. The digital diagnostic management (DDM) interface and I2C interface are supported.

### **Features**

- Compliant with 100G-ER1 MSA
- Compliant with SFF-8679 MSA hardware specification
- Compliant with SFF-8636
- Compliant with SFF-8661
- 1310nm EML laser
- APD receiver
- Up to 40km on 9/125um SMF
- 100ohm differential impedance system
- Operating temperature options
  - (Commercial) 0 °C to 70 °C
- Trouble-free installation and network bring-up
- RoHS Compliant

### **Applications**

- Data Center
- 100 Gigabit Ethernet

### **Ordering Information**

| Part Number          | Description                                                         |
|----------------------|---------------------------------------------------------------------|
| <b>VQ-1CERICS-AA</b> | 100G QSFP28 ER1, single lambda, 40km SMF, 1310nm, Duplex-LC, C-temp |

## General Specifications

| Parameter                                           | Symbol | Min  | Typical           | Max    | Unit | Remarks |
|-----------------------------------------------------|--------|------|-------------------|--------|------|---------|
| Storage Temperature                                 | $T_s$  | -40  |                   | +85    | °C   |         |
| Relative Humidity                                   | $R_H$  | 15   |                   | 85     | %    |         |
| Operating Relative Humidity                         | $R_H$  | 15   |                   | 85     | %    |         |
| Supply Voltage (Maximum)                            | VCC    | 0    |                   | 3.6    | V    |         |
| Supply Voltage (Recommended)                        | VCC    | 3.13 | 3.3               | 3.47   |      |         |
| Operating Case Temperature                          | TC     | 0    |                   | 70     | °C   |         |
| Data Rate                                           | BR     |      | 53.125±<br>100ppm |        | GBd  |         |
| Bit Error Rate                                      | BER    |      |                   | 2.4E-4 |      | 1       |
| Supported Link Length on 9/125um SMF,<br>53.125 GBd | L      |      | 40                |        | km   | 2       |

1. Tested with a PRBS31Q test pattern for 53.125 GBd operation.
2. Distances are based on FC-PI-6 Rev. 3.1 and IEEE 802.3 standards, with FEC.

## Optical – Transmitter

| Parameter                                                  | Symbol      | Min         | Typical | Max  | Unit  | Remarks                         |
|------------------------------------------------------------|-------------|-------------|---------|------|-------|---------------------------------|
| Launch Optical Power (Average)                             | $P_o$       | 1.7         |         | 7.1  | dBm   | 1                               |
| Launch Optical Power (OMA)                                 | $P_{oma}$   | 4.7         |         | 7.9  | dBm   | TDECQ < 1.4 dB                  |
|                                                            |             | 3.3 + TDECQ |         | 7.9  | dBm   | 1.4 dB < TDECQ<br>< TDECQ (max) |
| Extinction Ratio                                           | ER          | 5           |         |      | dB    |                                 |
| Center Wavelength Range                                    | $\lambda_c$ | 1307        |         | 1313 | nm    |                                 |
| Transmitter and dispersion penalty eye<br>closure for PAM4 | TDECQ       |             |         | 3.9  | dB    |                                 |
| RIN15.5OMA (max)                                           | RIN         |             |         | -136 | dB/Hz |                                 |
| Optical Return Loss Tolerance                              | ORLT        |             |         | 15   | dB    |                                 |
| Pout@TX-Disable Asserted                                   | $P_{off}$   |             |         | -15  | dBm   |                                 |

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.

## Optical – Receiver

| Parameter                  | Symbol      | Min  | Typical | Max          | Unit | Remarks                |
|----------------------------|-------------|------|---------|--------------|------|------------------------|
| Center Wavelength          | $\lambda_c$ | 1307 |         | 1313         | nm   |                        |
| Receiver Sensitivity (OMA) | RxSENS      |      |         | -13.8        | dBm  | 1; TECQ<br>< 1.4 dB    |
|                            |             |      |         | -15.2 + TECQ | dBm  | 1.4 < TECQ<br>< 3.9 dB |
| Receiver Overload (Pavg)   | POL         | -3   |         |              | dBm  |                        |
| Receiver reflectance       |             |      |         | -26          | dB   |                        |
| LOS De-Assert              | LOSD        |      |         | -16          | dBm  |                        |
| LOS Assert                 | LOSA        | -24  |         |              | dBm  |                        |
| LOS Hysteresis             |             | 0.5  |         |              | dB   |                        |

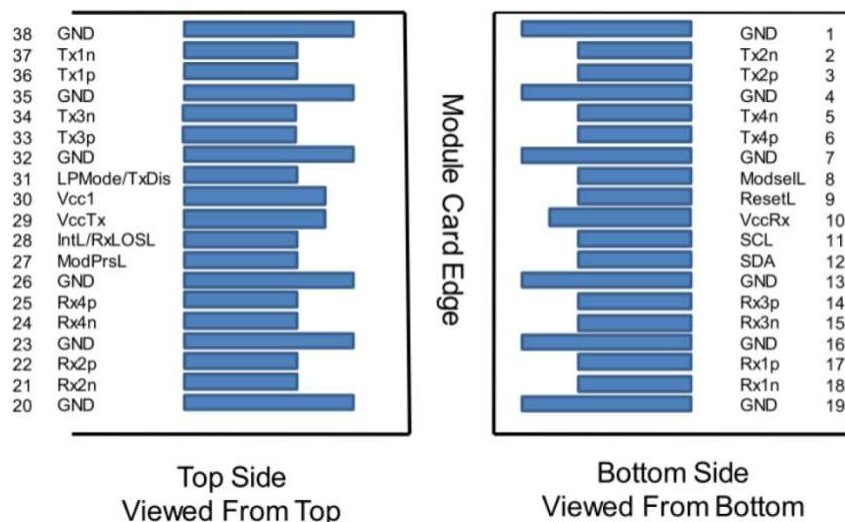
## Electrical – Transmitter

| Parameter                     | Symbol                | Min | Typical | Max  | Unit              |
|-------------------------------|-----------------------|-----|---------|------|-------------------|
| Module Supply Current         | I <sub>cc</sub>       |     |         | 1437 | mA                |
| Power Dissipation             | PD                    |     |         | 4500 | mW                |
| Input Differential Impedance  | Z <sub>IN</sub>       | 90  | 100     | 110  | Ω                 |
| Differential Data Input Swing | V <sub>IN</sub> , P-P | 180 |         | 900  | mV <sub>P-P</sub> |

## Electrical – Receiver

| Parameter                      | Symbol                 | Min | Typical | Max | Unit              |
|--------------------------------|------------------------|-----|---------|-----|-------------------|
| Output Differential Impedance  | Z <sub>o</sub>         | 90  | 100     | 110 | Ω                 |
| Differential Data Output Swing | V <sub>OUT</sub> , P-P | 300 |         | 850 | mV <sub>P-P</sub> |

## Electrical Connector Layout



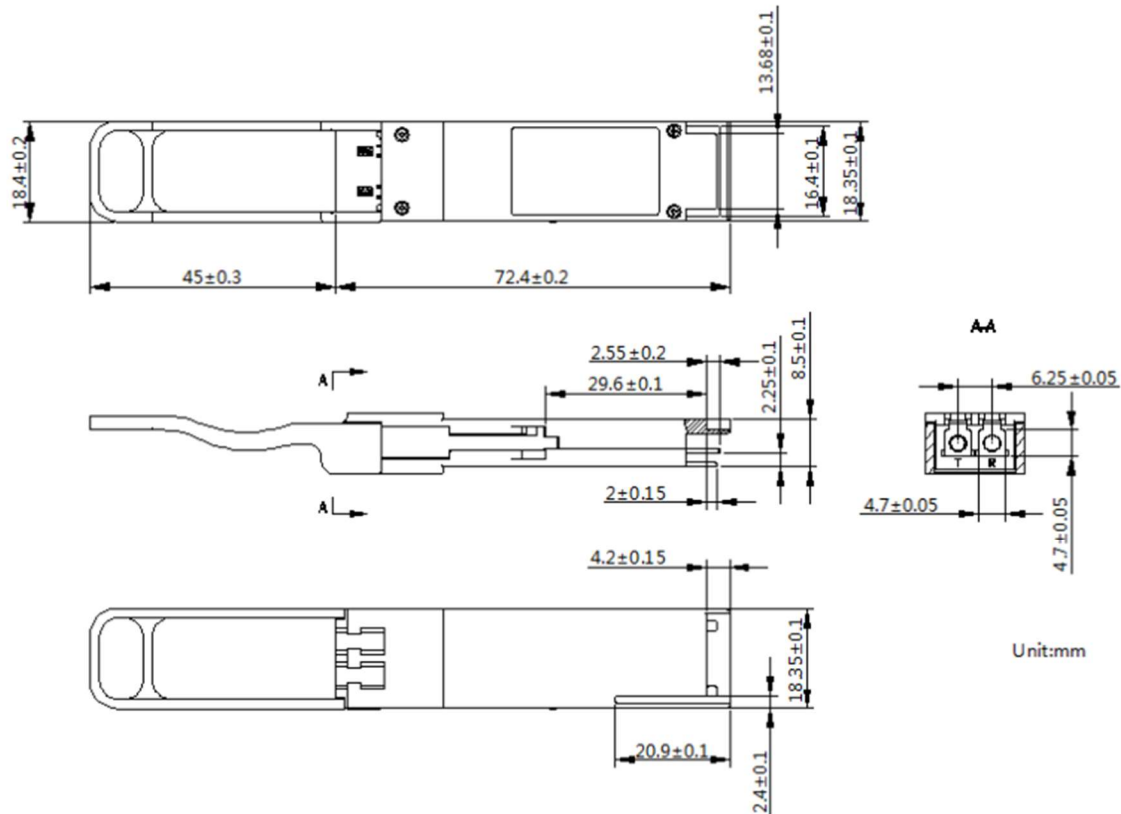
## Electrical Pin Definition

| PIN # | Logic | Symbol | Description                          | Remarks |
|-------|-------|--------|--------------------------------------|---------|
| 1     |       | GND    | Ground                               | 1       |
| 2     | CML-I | Tx2n   | Transmitter Inverted Data Input      |         |
| 3     | CML-I | Tx2p   | Transmitter Non-Inverted Data Output |         |
| 4     |       | GND    | Ground                               | 1       |
| 5     | CML-I | Tx4n   | Transmitter Inverted Data Input      |         |
| 6     | CML-I | Tx4p   | Transmitter Non-Inverted Data Output |         |
| 7     |       | GND    | Ground                               | 1       |

|    |             |              |                                     |   |
|----|-------------|--------------|-------------------------------------|---|
| 8  | LVTLL-I     | ModSelL      | Module Select                       |   |
| 9  | LVTLL-I     | ResetL       | Module Reset                        |   |
| 10 |             | VccRx        | +3.3V Power Supply Receiver         | 2 |
| 11 | LVC MOS-I/O | SCL          | 2-Wire Serial Interface Clock       |   |
| 12 | LVC MOS-I/O | SDA          | 2-Wire Serial Interface Data        |   |
| 13 |             | GND          | Ground                              | 1 |
| 14 | CML-O       | Rx3p         | Receiver Non-Inverted Data Output   |   |
| 15 | CML-O       | Rx3n         | Receiver Inverted Data Output       |   |
| 16 |             | GND          | Ground                              | 1 |
| 17 | CML-O       | Rx1p         | Receiver Non-Inverted Data Output   |   |
| 18 | CML-O       | Rx1n         | Receiver Inverted Data Output       |   |
| 19 |             | GND          | Ground                              | 1 |
| 20 |             | GND          | Ground                              | 1 |
| 21 | CML-O       | Rx2n         | Receiver Inverted Data Output       |   |
| 22 | CML-O       | Rx2p         | Receiver Non-Inverted Data Output   |   |
| 23 |             | GND          | Ground                              | 1 |
| 24 | CML-O       | Rx2n         | Receiver Inverted Data Output       | 1 |
| 25 | CML-O       | Rx4p         | Receiver Non-Inverted Data Output   |   |
| 26 |             | GND          | Ground                              | 1 |
| 27 | LVTLL-O     | ModPrsL      | Module Present                      |   |
| 28 | LVTLL-O     | IntL/Rx_LOS  | Interrupt/Rx_LOS                    |   |
| 29 |             | VccTx        | +3.3V Power Supply Transmitter      | 2 |
| 30 |             | VccI         | +3.3V Power Supply                  | 2 |
| 31 | LVTLL-I     | LPMode/TxDIS | Low Power Mode/Tx_Disable           |   |
| 32 |             | GND          | Ground                              | 1 |
| 33 | CML-I       | Tx3p         | Transmitter Non-Inverted Data Input |   |
| 34 | CML-I       | Tx3n         | Transmitter Inverted Data Output    |   |
| 35 |             | GND          | Ground                              | 1 |
| 36 | CML-I       | Tx1p         | Transmitter Non-Inverted Data Input |   |
| 37 | CML-I       | Tx1n         | Transmitter Inverted Data Output    |   |
| 38 |             | GND          | Ground                              | 1 |

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module, and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, VccI and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1A.

## Mechanical Dimension



## Revision History

| Date       | Rev | Description             |
|------------|-----|-------------------------|
| 10/1/2021  | 1.0 | Release version         |
| 02/11/2025 | 2.0 | New branding guidelines |

## For more information

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