# 100G QSFP28 eSR4 Optical Transceiver

# Part Number - VQ-1CSR4CP-EA

**VQ-1CSR4CP-EA** is a high performance QSFP28 transceiver module based on 100G Ethernet IEEE 802.3bm standard. QSFP28 eSR4 offers 4 independent transmit and receive channels, each capable of 25G for an aggregate bandwidth of 100G.

## Features

- Compliant with QSFP28 MSA
- Management interface specifications per SFF-8636
- Single MPO connector receptacle
- 4 channels 850nm VCSEL array
- 4 channels PIN photo detector array
- Up to 103.1Gb/s data rates
- Single +3.3V power supply
- Class 1 laser safety certified
- Commercial operating temperature:0°C to +70oC
- Up to 200m on OM3 MMF and 300m on OM4 MMF
- RoHS6 Compliant

## Applications

- IEEE 802.3bm 100G Base-eSR4
- InfiniBand EDR
- Datacenter: servers, switches, storages and NIC adapters

## Ordering Information

| Part Number | Description |
|---|---|
| **VQ-1CSR4CP-EA** | 100G QSFP28 850nm MPO/MTP connectors, up to 200m/300m on OM3/OM4 MMF |

## Product Overview

Vitex **VQ-1CSR4CP-EA** transceivers are designed for use in 100Gb/s links up to 200m/300m on OM3/OM4 MMF.

## Absolute Maximum Ratings

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Storage Temperature | $T_S$ | -40 | | 85 | °C |
| Relative Humidity | RH | 0 | | 95 | % |
| Supply Voltage | $V_{CC}$ | -0.5 | | 4.0 | V |

## Operating Specifications

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Case Temperature | $T_c$ | 0 | 25 | 70 | °C |
| Power Supply Voltage | $V_{CC}$ | 3.1335 | 3.3 | 3.465 | V |
| Data Rate PER Channel | - | - | 25.78125 | - | Gb/s |
| Module Supply Current | $I_{cc}$ | - | - | 750 | mA |
| Power Dissipation | $P_D$ | - | - | 2.5 | W |

## Electrical – Transmitter

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Input Differential Impedance | $Z_{IN}$ | - | 100 | - | Ω |
| Differential Data Input Swing | $V_{IN, P-P}$ | 180 | - | 900 | $mV_{P-P}$ |

## Electrical – Receiver

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Output Differential Impedance | $Z_O$ | - | 100 | - | Ω |
| Differential Data Output Swing[1] | $V_{OUT, P-P}$ | 300 | - | 850 | $mV_{P-P}$ |
| Transition Time (20% to 80%) | Tr,Tf | 12 | | | ps |

1. Internally AC coupled, but requires a external 100Ω differential load termination

## Optical – Transmitter

| Parameter | Symbol | Min | Typ | Max | Unit | Note |
|---|---|---|---|---|---|---|
| Launch Optical Power | Po | -8.4 | - | +2.4 | dBm | 1 |
| Center Wavelength Range | λc | 840 | 850 | 860 | nm | |
| Extinction Ratio | EX | 2 | - | - | dB | 2 |
| Spectral width (RMS) | Δλ | - | - | 0.6 | nm | |
| Transmitter and Dispersion Penalty | TDP | - | - | 4.3 | dB | |
| Optical Return Loss Tolerance | ORLT | - | - | 12 | dB | |
| Eye Diagram | IEEE Std 802.3bm compatible | | | | | |

**Notes:**
1. The optical power is launched into OM3 MMF.
2. Measured with a PRBS $2^{31}$-1 test pattern @25.78125Gbps.

## Optical- Receiver

| Parameter | Symbol | Min | Typ | Max | Unit | Note |
|---|---|---|---|---|---|---|
| Centre Wavelength | $\lambda_C$ | 840 | 850 | 860 | nm | |
| Average Receiver Sensitivity (Pavg) | S | - | - | -10.3 | dBm | 1 |
| Receiver Overload (Pavg) | $P_{OL}$ | 2.5 | - | - | dBm | |
| Damage Threshold | $P_{OL}$ | 3.4 | - | - | dBm | |
| Optical Reflectance | ORL | - | - | -12 | dB | |
| LOS De-Assert | $LOS_D$ | - | - | -11 | dBm | |
| LOS Assert | $LOS_A$ | -30 | - | - | dBm | |
| LOS Hysteresis | - | 0.5 | - | 5 | dB | |

**Notes:**
1. Measured with PRBS $2^{31}$-1 test pattern, 25.78125Gb/s, BER<$5E^{-5}$.

## EEPROM Serial ID Memory Contents

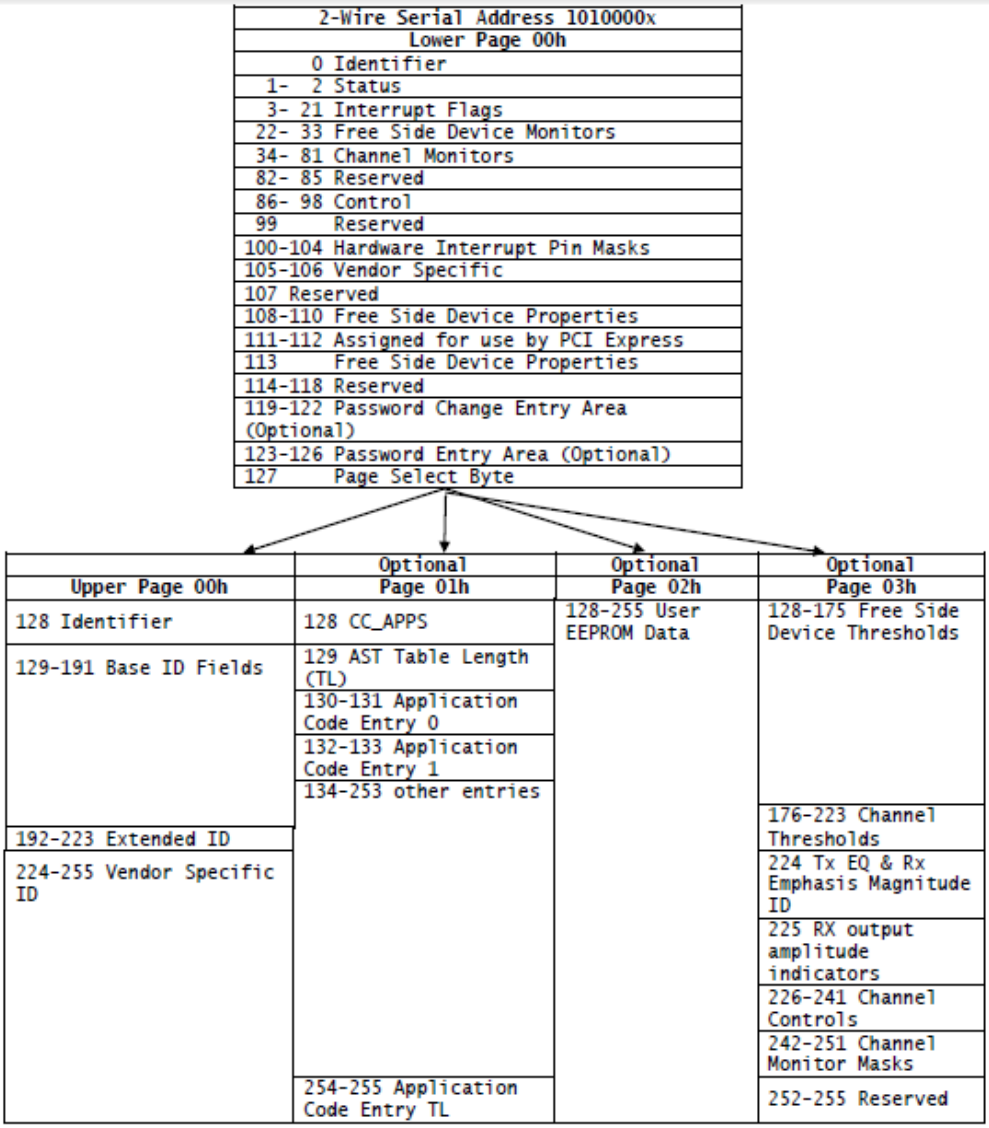



FIGURE 6-1 COMMON MEMORY MAP

The QSFP28 SMA defines the operation of the QSFP28 2-wire serial interface which is used for serial ID, digital diagnostics, and certain control functions. The 2-wire serial interface is mandatory for all QSFP28 modules. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented.

## Diagnostic Monitor Specifications

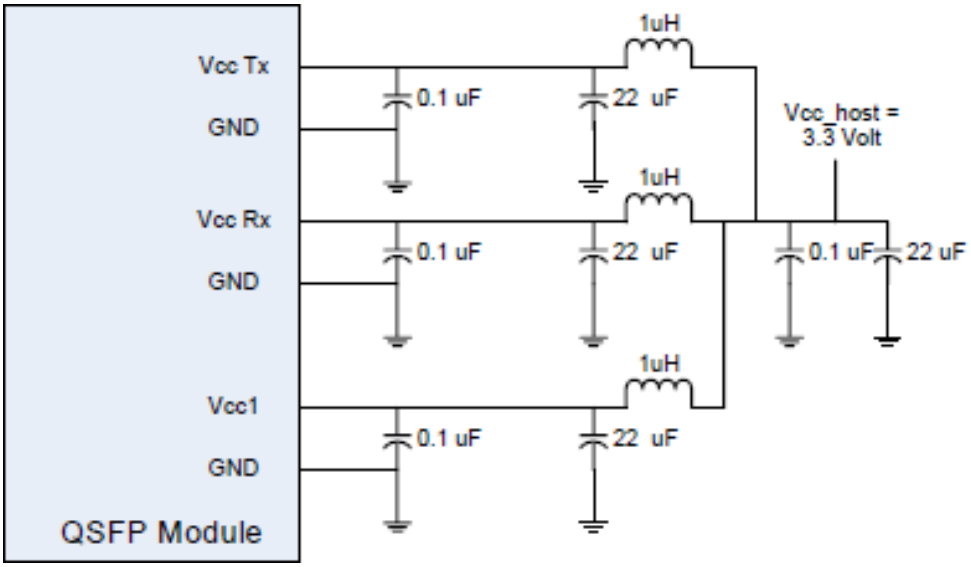
The digital diagnostic monitoring interface also defines memory map in EEPROM, for detail EEPROM information, please refer to the related document of SFF-8636. The monitoring specification of this product is described in Table below.

**Diagnostic Monitor Specifications**

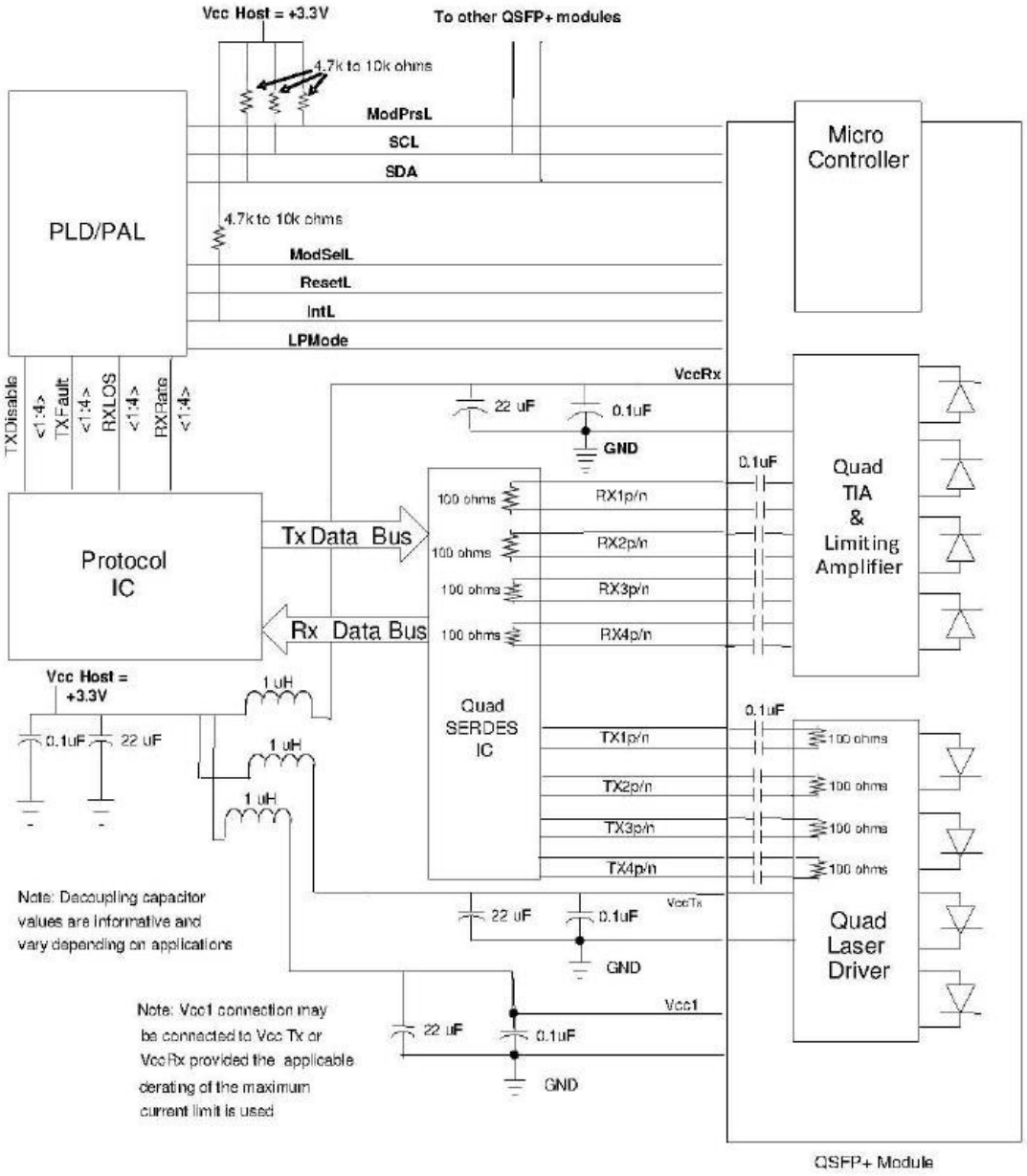
| Parameter | Range | Accuracy | Calibration |
|---|---|---|---|
| Temperature | -10 to +80°C | ±3°C | Internal |

| | | | |
|---|---|---|---|
| Voltage | 2.9 to 3.6V | ±3% | Internal |
| Bias Current | 2 to 14mA | ±10% | Internal |
| TX Power | -9.4 to +3.4dBm | ±2dB | Internal |
| RX Power | -11 to +3.4dBm | ±2dB | Internal |

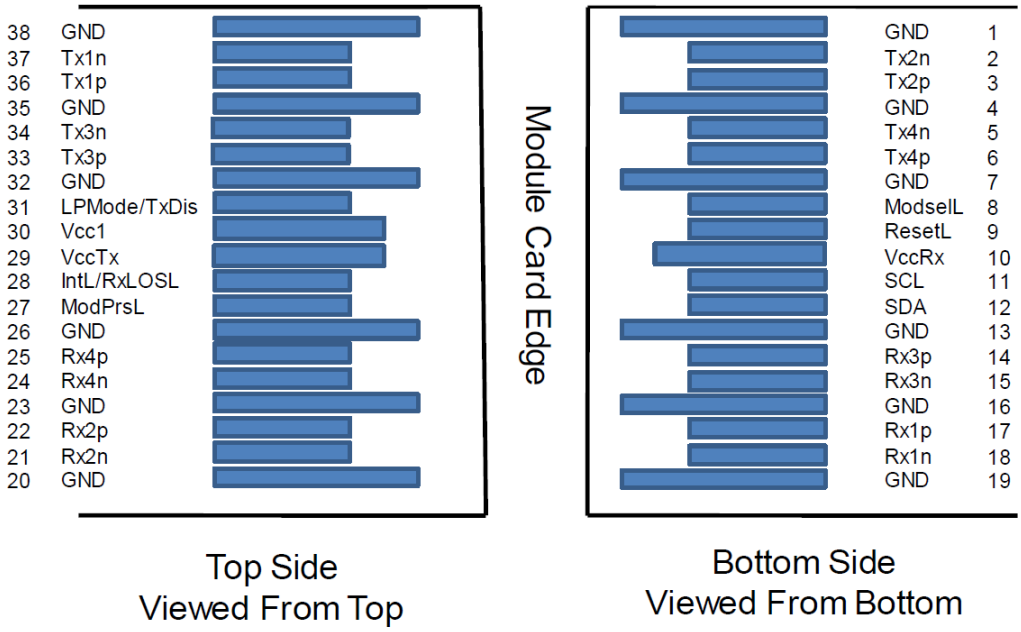
## Recommended Host Board Power Supply Filter Network



## Recommended Application Interface Block Diagram



## Electrical Connector Layout




## Electrical Pin Definition

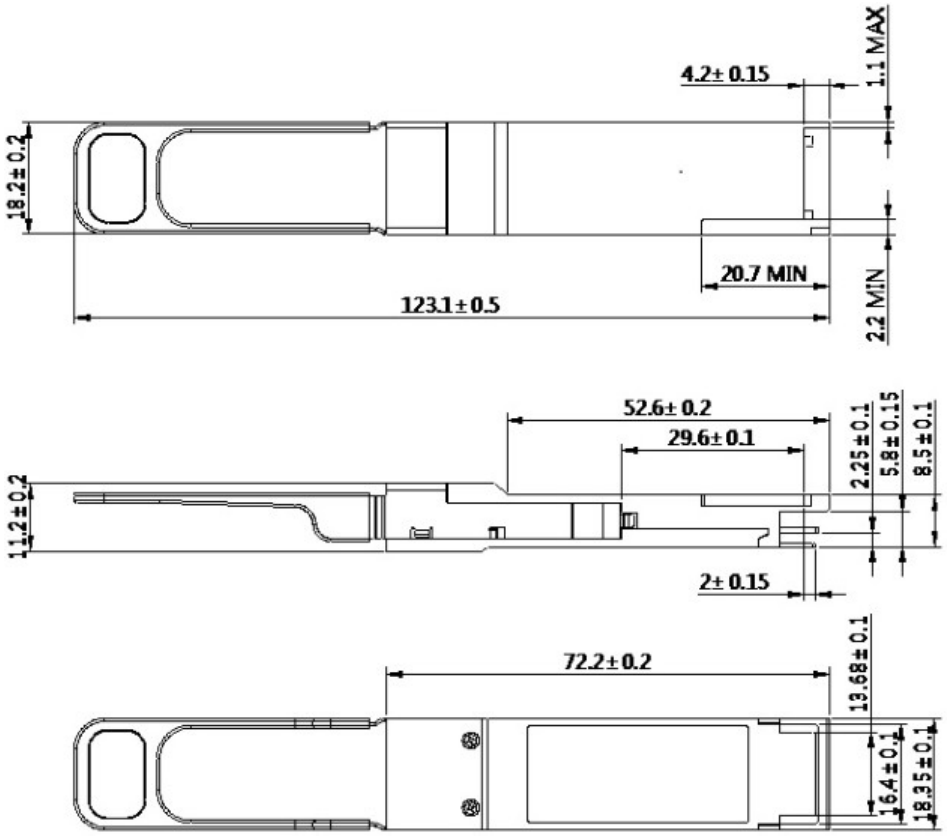
| Pin | Symbol | Description | Unit |
|---|---|---|---|
| 1 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 2 | Tx2- | Transmitter Inverted Data Input | |
| 3 | Tx2+ | Transmitter Non-Inverted Data Input | |
| 4 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 5 | Tx4- | Transmitter Inverted Data Input | |
| 6 | Tx4+ | Transmitter Non-Inverted Data Input | |
| 7 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 8 | ModSelL | Module Select | 2 |
| 9 | ResetL | Module Reset | 2 |
| 10 | VccRx | 3.3V Power Supply Receiver | |
| 11 | SCL | 2-Wire serial Interface Clock | 2 |
| 12 | SDA | 2-Wire serial Interface Data | 2 |
| 13 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 14 | Rx3+ | Receiver Non-Inverted Data Output | |
| 15 | Rx3- | Receiver Inverted Data Output | |
| 16 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 17 | Rx1+ | Receiver Non-Inverted Data Output | |
| 18 | Rx1- | Receiver Inverted Data Output | |
| 19 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |

| | | | |
|---|---|---|---|
| 20 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 21 | Rx2- | Receiver Inverted Data Output | |
| 22 | Rx2+ | Receiver Non-Inverted Data Output | |
| 23 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 24 | Rx4- | Receiver Inverted Data Output | 1 |
| 25 | Rx4+ | Receiver Non-Inverted Data Output | |
| 26 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 27 | ModPrsl | Module Present | |
| 28 | IntL | Interrupt | 2 |
| 29 | VccTx | 3.3V power supply transmitter | |
| 30 | Vcc1 | 3.3V power supply | |
| 31 | LPMode | Low Power Mode | 2 |
| 32 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 33 | Tx3+ | Transmitter Non-Inverted Data Input | |
| 34 | Tx3- | Transmitter Inverted Data Input | |
| 35 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |
| 36 | Tx1+ | Transmitter Non-Inverted Data Input | |
| 37 | Tx1- | Transmitter Inverted Data Input | |
| 38 | GND | Transmitter Ground (Common with Receiver Ground) | 1 |

**Notes:**

1. The module signal grounds are isolated from the module case.
2. This is open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost

## Mechanical specifications




## Revision History

| Date | Rev | Description |
|---|---|---|
| 10/6/2020 | 1.0 | Initial Release |
| 7/2/2021 | 1.1 | Mechanical update and sheet format change |

## Contact Information

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