

## 400Gb/s QSFP112 SR4 100m Optical Transceiver

### Features

- Hot-pluggable QSFP112 form factor
- Maximum link length of 100m on OM4 fiber with FEC
- +3.3V single power supply
- Power dissipation <9W
- Operating case temp Commercial: 0°C to +70 °C
- MPO-12 APC connector
- RoHS compliant

### Applications

- 400GBASE-SR4 per IEEE 802.3db
- 400GAUI-4

## Absolute Maximum Ratings

**Table1-Absolute Maximum Ratings**

| Parameter                               | Symbols          | Min. | Max.                 | Unit | Notes |
|-----------------------------------------|------------------|------|----------------------|------|-------|
| Storage Temperature                     | T <sub>S</sub>   | -40  | 85                   | °C   |       |
| Control Input Voltage                   | V <sub>I</sub>   | -0.3 | V <sub>CC</sub> +0.5 | V    | 1     |
| Power Supply Voltage                    | V <sub>CC3</sub> | -0.5 | 3.6                  | V    |       |
| Relative Humidity<br>(non-condensation) | RH               | 5    | 85                   | %    | 1     |

Note1:

[1] No condensation

## Recommended Operating Conditions

**Table2-Recommended Operating Conditions**

| Parameter                  | Symbols         | Min.  | Typical | Max.  | Unit | Notes |
|----------------------------|-----------------|-------|---------|-------|------|-------|
| Operating Case Temperature | T <sub>C</sub>  | 0     |         | +70   | °C   |       |
| Power Supply Voltage       | V <sub>CC</sub> | 3.135 | 3.3     | 3.465 | V    |       |
| Power Dissipation          | P <sub>d</sub>  | -     | -       | 9     | W    | PAM4  |

## Electrical Characteristic

**Table3-Electrical Characteristic**

| Parameter                                  | Symbol                  | Min.             | Typical | Max. | Unit | Notes |
|--------------------------------------------|-------------------------|------------------|---------|------|------|-------|
| <b>Transmitter</b>                         |                         |                  |         |      |      |       |
| Signaling Rate per Lane                    | SR                      | 53.125 ± 100 ppm |         |      | Gbd  |       |
| Modulation format                          | -                       | PAM4             |         |      |      |       |
| Differential pk-pk input Voltage tolerance | V <sub>in,pp,diff</sub> | 750              | -       | -    | mV   |       |
| Differential termination mismatchal        | -                       | -                | -       | 10   | %    |       |
| Single-ended voltage tolerance range       | -                       | -0.4             | -       | 3.3  | V    |       |
| DC common mode voltage                     | -                       | -350             | -       | 2850 | mV   |       |
| <b>Receiver (each Lane)</b>                |                         |                  |         |      |      |       |
| Signaling Rate per Lane                    | SR                      | 53.125 ± 100 ppm |         |      | Gbd  |       |
| Modulation format                          | -                       | PAM4             |         |      | -    |       |
| Differential output Voltage (Long mode)    | -                       | -                | -       | 845  | mV   |       |
| Differential output Voltage (Short mode)   | -                       | -                | -       | 600  | mV   |       |
| Near-end Eye height, differential          | -                       | 70               | -       | -    | mV   |       |
| Far-end Eye height, differential           | -                       | 30               | -       | -    | mV   |       |
| Far end pre-cursor ratio                   | -                       | -4.5             | -       | 2.5  | %    |       |
| Differential Termination Mismatch          | -                       | -                | -       | 10   | %    |       |

|                                   |   |      |   |      |    |  |
|-----------------------------------|---|------|---|------|----|--|
| Transition Time (min, 20% to 80%) | - | 9.5  |   |      | %  |  |
| DC common mode Voltage            | - | -350 | - | 2850 | mV |  |

## Optical Characteristics

**Table4-Optical Characteristics**

| Parameter                                                                   | Symbols | Min. | Typical | Max. | Unit | Notes |
|-----------------------------------------------------------------------------|---------|------|---------|------|------|-------|
| <b>Transmitter</b>                                                          |         |      |         |      |      |       |
| Center wavelength                                                           | CW      | 844  | 850     | 863  | nm   |       |
| RMS Spectral Width                                                          | SW      | -    | -       | 0.6  | dBm  |       |
| Average Launch Power per Lane                                               | AOP     | -4.6 | -       | 4.0  | dBm  | 1     |
| Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (min) | TxOMA   | -2.6 | -       | 3.5  | dBm  |       |
| Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), each lane          | TDECQ   | -    | -       | 4.4  | dB   |       |
| Average Launch Power of OFF Transmitter, each lane                          | TOFF    | -    | -       | -30  | dBm  |       |
| Extinction Ratio, each lane                                                 | ER      | 2.5  | -       | -    | dB   |       |
| Optical Return Loss Tolerance                                               | ORL     | -    | -       | 12   | dB   |       |
| Transmitter Reflectance                                                     | TR      | -    | -       | -26  | dBm  | 2     |
| <b>Receiver</b>                                                             |         |      |         |      |      |       |
| Wavelength                                                                  | W       | 842  | -       | 865  | nm   |       |
| Damage Threshold, average optical power, each lane                          | DT      | 5    | -       | -    | dBm  |       |
| Average Receive Power, each lane                                            | RxPx    | -6.3 | -       | 4    | dBm  |       |
| Receive Power (OMA) per Lane                                                | RxOMA   | -    | -       | 3.5  | dBm  |       |
| Receiver Reflectance                                                        | Rfl     | -    | -       | -26  | dB   |       |
| Receiver Sensitivity (OMA <sub>outer</sub> ), each lane                     | SOMA    | -4.4 | -       | -    | dBm  | 3     |

**Notes:**

[1] Minimum value is informative only and not the principal indicator of signal strength.

[2] Transmitter reflectance is defined looking into the transmitter.

[3] Receiver sensitivity (OMA<sub>outer</sub>), each lane (max) is informative and is defined for a transmitter with

TDECQ ≤ 1.8 dB

## Pin Function Definitions

**Table5-Pin Function Definitions**

| Pin | Symbol   | Description                         | Notes |
|-----|----------|-------------------------------------|-------|
| 1   | GND      | Ground                              | 1     |
| 2   | TX2n     | Transmitter Inverted Data Input     |       |
| 3   | TX2p     | Transmitter Non-Inverted Data Input |       |
| 4   | GND      | Ground                              | 1     |
| 5   | TX4n     | Transmitter Inverted Data Input     |       |
| 6   | TX4p     | Transmitter Non-Inverted Data Input |       |
| 7   | GND      | Ground                              | 1     |
| 8   | ModeSelL | Module Select                       |       |
| 9   | ResetL   | Module Reset                        |       |
| 10  | Vcc Rx   | +3.3V Power Supply Receiver         |       |
| 11  | SCL      | 2-wire serial interface clock       |       |
| 12  | SDA      | 2-wire serial interface data        |       |
| 13  | GND      | Ground                              | 1     |
| 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       |       |
| 25  | Rx4p     | Receiver Non-Inverted Data Output   |       |
| 26  | GND      | Ground                              | 1     |
| 27  | ModPrsL  | Module Present                      |       |
| 28  | IntL     | Interrupt                           |       |
| 29  | Vcc Tx   | +3.3V Power supply transmitter      |       |
| 30  | Vcc1     | +3.3V Power supply                  |       |
| 31  | LPMode   | Low Power Mode                      |       |
| 32  | GND      | Ground                              | 1     |
| 33  | Tx3p     | Transmitter Non-Inverted Data Input |       |
| 34  | Tx3n     | Transmitter Inverted Data Input     |       |
| 35  | GND      | Ground                              | 1     |
| 36  | Tx1p     | Transmitter Non-Inverted Data Input |       |

|    |      |                                 |   |
|----|------|---------------------------------|---|
| 37 | Tx1n | Transmitter Inverted Data Input |   |
| 38 | GND  | Ground                          | 1 |

Note:

[1] Circuit ground is internally isolated from chassis ground.

**Recommended Interface**

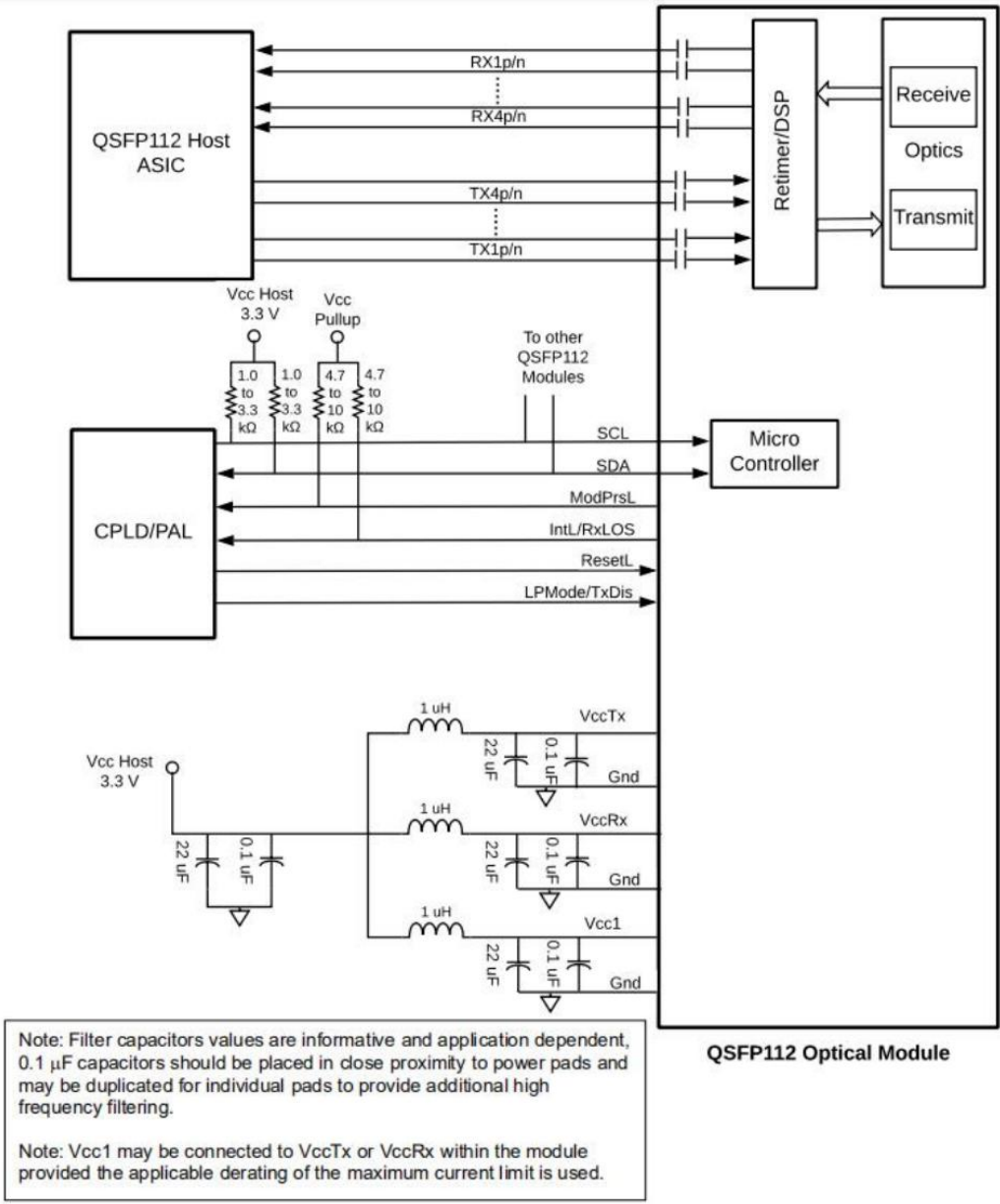


Figure 1 Recommended Interface Circuit

## Pin arrangement

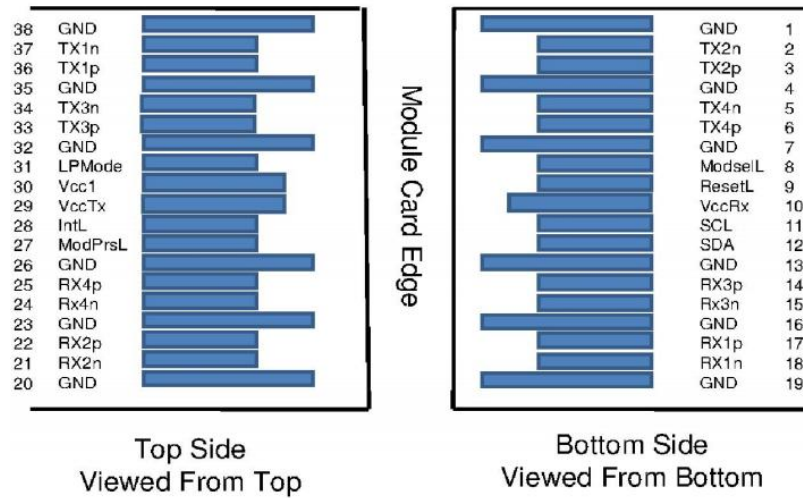


Figure 2 Pin View

## Memory Map

Compatible with CMIS rev 5.2.

## Optical Interface Arrangement

The optical port is a male MP0 connector receptacle, with fiber lane assignments as shown in Figure 3

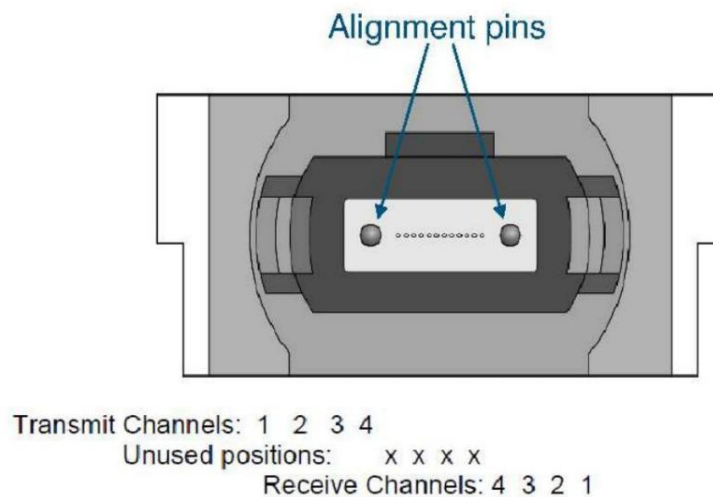


Figure 3 Transceiver Block Diagram

## Mechanical

400G SR4 QSFP112 transceivers are compatible with QSFP112 MSA Specification Rev1.0 for pluggable form factor module.

Unit mm

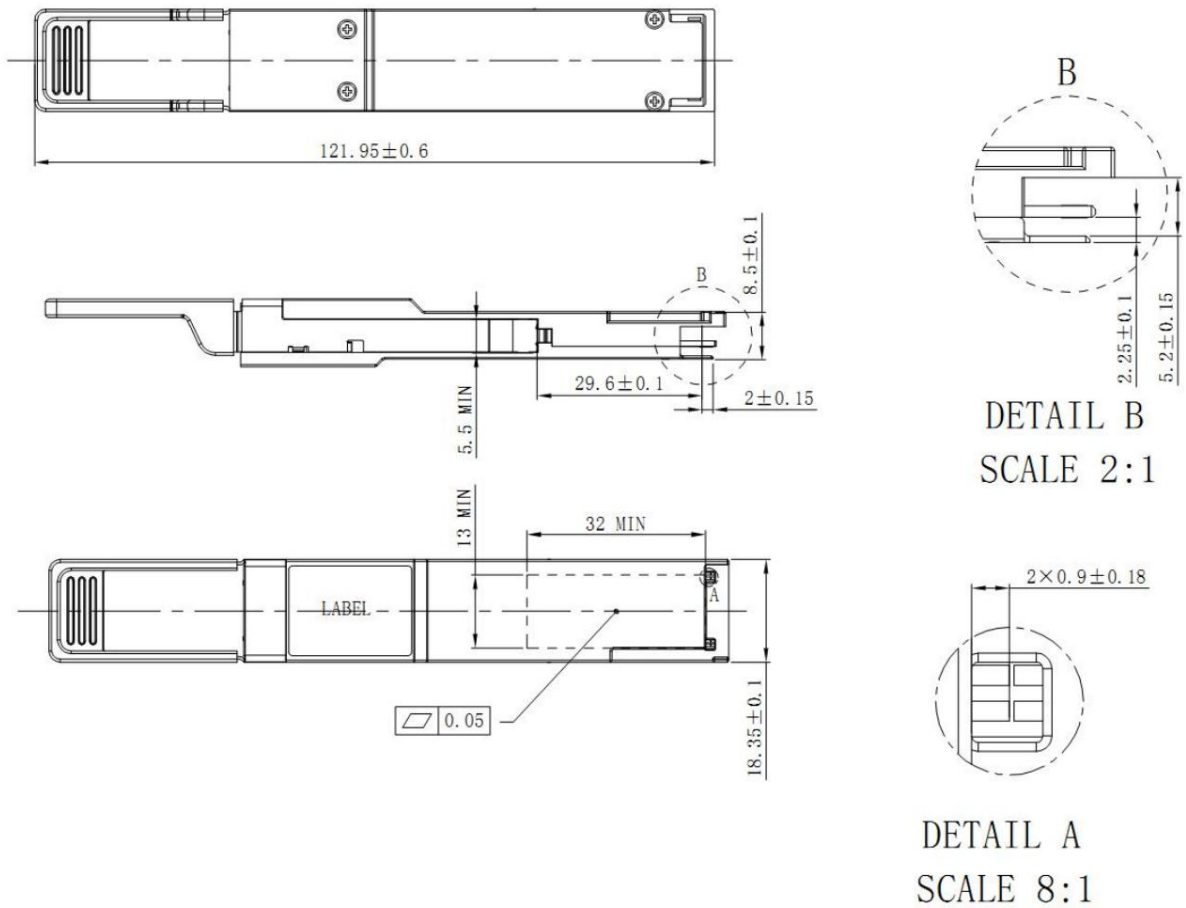


Figure 4 Mechanical Diagram