



## Q28QD080C05FZWL

RAD® Compatible 100GBase-ZR4 QSFP28 Transceiver (SMF, 1295nm to 1309nm, 80km, LC, DOM)

### Product Description

This Rad® QSFP28 transceiver provides 100GBase-ZR4 throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1295nm to 1309nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Rad® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Skylane's transceivers are RoHS compliant and lead-free.

### Features:

- Compliant with IEEE 802.3ba, ITU-T G.959
- Single 3.3V Power Supply
- Compliant with 4x28G (CEI-28G-VSR)
- Transmitter: cooled 4x25Gbps LAN WDM EML TOSA
- Receiver: 4x25Gbps SOA+PIN ROSA
- Maximum Power Consumption of 5.5W
- Hot-pluggable QSFP28 MSA form factor
- 4x25G Electrical Interface
- Single-mode Fiber
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- RoHS Compliant and Lead Free



### Applications:

- 100GBase Ethernet
- Access and Enterprise

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*For your product safety, please read the following information carefully before any manipulation of the transceiver:*



#### ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 / JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



#### LASER SAFETY

This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

*The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.*

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## Absolute Maximum Ratings

| Parameter                           | Symbol | Min. | Typ.     | Max. | Unit |
|-------------------------------------|--------|------|----------|------|------|
| Supply Voltage                      | Vcc    | -0.5 |          | 3.6  | V    |
| Storage Temperature                 | Tstg   | -40  |          | 85   | °C   |
| Operating Case Temperature          | Tc     | 0    |          | 70   | °C   |
| Relative Humidity                   | RH     | 5    |          | 85   | %    |
| Rx Damage Threshold Per Lane        | THd    | 5.5  |          |      | dBm  |
| Data Rate                           | DR     |      | 25.78125 |      | Gbps |
| Link Distance with G.652 (With FEC) | D1     |      |          | 80   | km   |

## Electrical Characteristics

| Parameter                      | Symbol      | Min.    | Typ. | Max.     | Unit | Notes |
|--------------------------------|-------------|---------|------|----------|------|-------|
| Supply Voltage                 | Vcc         | 3.135   | 3.3  | 3.465    | V    |       |
| Supply Current                 | Icc         |         |      | 1.66     | A    |       |
| Power Consumption              |             |         |      | 5.5      | W    |       |
| Transmitter                    |             |         |      |          |      |       |
| Input Differential Impedance   | RIN         |         | 100  |          | Ω    | 1     |
| Differential Data Input Swing  | VIN,pp      | 180     |      | 1000     | mV   |       |
| Transmit Disable Voltage       | VD          | Vcc-1.3 |      | Vcc      | V    |       |
| Transmit Enable Voltage        | VEN         | Vee     |      | Vee+0.8  | V    | 2     |
| Receiver                       |             |         |      |          |      |       |
| Differential Data Output Swing | VOUT,pp     | 300     |      | 850      | mV   | 3     |
| LOS Fault                      | VLOS Fault  | Vcc-1.3 |      | Host_Vcc | V    | 4     |
| LOS Normal                     | VLOS Normal | Vee     |      | Vee+0.8  | V    | 4     |

### Notes:

1. Connected directly to the Tx data input pins. AC coupled thereafter.
2. Optional for Tx disable.
3. Into 100Ω differential termination.
4. Loss of Signal is LVTTTL. “Logic 0” indicates normal operation. “Logic 1” indicates no signal detected.
5. Tested under recommended operating conditions, unless otherwise noted.

## Optical Characteristics

| Parameter                                |        | Symbol      | Min.    | Typ.    | Max.    | Unit | Notes |
|------------------------------------------|--------|-------------|---------|---------|---------|------|-------|
| Transmitter                              |        |             |         |         |         |      |       |
| Center Wavelength                        | Lane 0 | $\lambda_0$ | 1294.53 | 1295.56 | 1296.59 | nm   |       |
|                                          | Lane 1 | $\lambda_1$ | 1299.02 | 1300.05 | 1301.09 | nm   |       |
|                                          | Lane 2 | $\lambda_2$ | 1301.54 | 1304.58 | 1305.63 | nm   |       |
|                                          | Lane 3 | $\lambda_3$ | 1308.09 | 1309.14 | 1310.19 | nm   |       |
| Total Launch Power (100GE)               |        | Pavg        | 7       |         | 12.5    | dBm  | 1     |
| Average Launch Power Per Lane (100GE)    |        | PLane       | 1       |         | 6.5     | dBm  | 1     |
| Difference in Launch Power Between Lanes |        | PΔ          |         |         | 3       | dB   |       |
| Average Laser Output Power (Laser Off)   |        | Poff        |         |         | -30     | dBm  |       |
| Side-Mode Suppression Ratio              |        | SMSR        | 30      |         |         | dB   |       |
| Extinction Ratio (100GE & OTU4)          |        | ER          | 6       |         |         | dB   |       |
| Receiver                                 |        |             |         |         |         |      |       |
| Center Wavelength                        | Lane 0 | $\lambda_0$ | 1294.53 | 1295.56 | 1296.59 | nm   |       |
|                                          | Lane 1 | $\lambda_1$ | 1299.02 | 1300.05 | 1301.09 | nm   |       |
|                                          | Lane 2 | $\lambda_2$ | 1301.54 | 1304.58 | 1305.63 | nm   |       |
|                                          | Lane 3 | $\lambda_3$ | 1308.09 | 1309.14 | 1310.19 | nm   |       |
| Damage Threshold                         |        | PDAM        |         |         | 5.5     | dBm  |       |
| Average Rx Power Per Lane                |        | PRX_Lane    | -28     |         | 4.5     | dBm  |       |
| Receiver Sensitivity Per Lane (OMA)      |        |             |         |         | -26.4   | dBm  | 2     |
| LOS Assert                               |        | LOSA        | -40     |         |         | dBm  |       |
| LOS De-Assert                            |        | LOSD        |         |         | -29     | dBm  |       |
| LOS Hysteresis                           |        | LOSH        | 0.5     |         |         | dB   |       |

### Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS  $2^{31}-1$  test pattern @25.78125Gbps,  $BER \leq 5E^{-5}$ .

## Pin Descriptions

| Pin | Logic       | Symbol       | Name/Description                                                                          | Notes |
|-----|-------------|--------------|-------------------------------------------------------------------------------------------|-------|
| 1   |             | GND          | Module Ground.                                                                            | 1     |
| 2   | CML-I       | Tx2-         | Transmitter Inverted Data Input.                                                          |       |
| 3   | CML-I       | Tx2+         | Transmitter Non-Inverted Data Input.                                                      |       |
| 4   |             | GND          | Module Ground.                                                                            | 1     |
| 5   | CML-I       | Tx4-         | Transmitter Inverted Data Input.                                                          |       |
| 6   | CML-I       | Tx4+         | Transmitter Non-Inverted Data Input.                                                      |       |
| 7   |             | GND          | Module Ground.                                                                            | 1     |
| 8   | LVTTL-I     | ModSelL      | Module Select.                                                                            |       |
| 9   | LVTTL-I     | ResetL       | Module Reset.                                                                             |       |
| 10  |             | VccRx        | +3.3V Receiver Power Supply.                                                              | 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          | Module Ground.                                                                            | 1     |
| 14  | CML-O       | Rx3+         | Receiver Non-Inverted Data Output.                                                        |       |
| 15  | CML-O       | Rx3-         | Receiver Inverted Data Output.                                                            |       |
| 16  |             | GND          | Module Ground.                                                                            | 1     |
| 17  | CML-O       | Rx1+         | Receiver Non-Inverted Data Output.                                                        |       |
| 18  | CML-O       | Rx1-         | Receiver Inverted Data Output.                                                            |       |
| 19  |             | GND          | Module Ground.                                                                            | 1     |
| 20  |             | GND          | Module Ground.                                                                            | 1     |
| 21  | CML-O       | Rx2-         | Receiver Inverted Data Output.                                                            |       |
| 22  | CML-O       | Rx2+         | Receiver Non-Inverted Data Output.                                                        |       |
| 23  |             | GND          | Module Ground.                                                                            | 1     |
| 24  | CML-O       | Rx4-         | Receiver Inverted Data Output.                                                            |       |
| 25  | CML-O       | Rx4+         | Receiver Non-Inverted Data Output.                                                        |       |
| 26  |             | GND          | Module Ground.                                                                            | 1     |
| 27  | LVTTL-O     | ModPrsL      | Module Present.                                                                           |       |
| 28  | LVTTL-O     | IntL/RxLOSL  | Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).     |       |
| 29  |             | VccTx        | +3.3V Transmitter Power Supply.                                                           | 2     |
| 30  |             | Vcc1         | +3.3V Power Supply.                                                                       | 2     |
| 31  | LVTTL-I     | LPMode/TxDis | Low-Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636). |       |
| 32  |             | GND          | Module Ground.                                                                            | 1     |
| 33  | CML-I       | Tx3+         | Transmitter Non-Inverted Data Input.                                                      |       |
| 34  | CML-I       | Tx3-         | Transmitter Inverted Data Input.                                                          |       |

|    |       |      |                                  |   |
|----|-------|------|----------------------------------|---|
| 35 |       | GND  | Module Ground.                   | 1 |
| 36 | CML-I | Tx1+ | Transmitter Non-Inverted Data.   |   |
| 37 | CML-I | Tx1- | Transmitter Inverted Data Input. |   |
| 38 |       | GND  | Module Ground.                   | 1 |

#### Notes:

1. GND is the symbol for signal and supply (power) common for the module. All are common within the 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, Vcc1, and VccTx are applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1A.

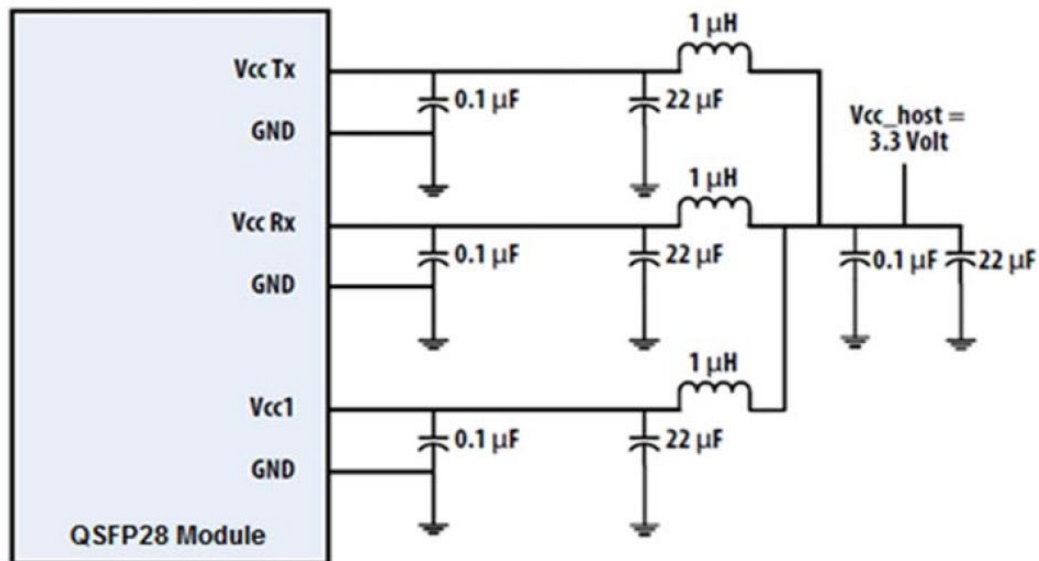
#### Electrical Pin-Out Details



## Functional Diagram



## Recommended Power Supply Filter



Mechanical Specifications



# About Skylane Optics

Skylane is a leading provider of transceivers for optical communication.

We offer an extensive portfolio for the enterprise, access, datacenter and metropolitan fiber optical market as well as for smart home applications and home networks.

We cover the European, South American and North American market with a strong partner network and have offices in Belgium, Brazil, Sweden and USA.

Our offerings are characterized by high quality and performance. In combination with our strong technical support, we enable our customers to build cost optimized network solutions.

We offer an extensive range of high-quality products including transceivers (Optical and copper), Active Optical Cable (AOC), Direct Attach Cable (DAC), Mux/Demux, Coding Box.

