

## Q2D21080C00F000

MSA 100GBase-DWDM PAM4 QSFP28 Transceiver C-Band Channel DW21 100GHz (SMF, 1560.61nm, 80km w/EDFA/DCM, LC, DOM)

### Product Description

This MSA Compliant QSFP28 transceiver provides 100GBase-DWDM throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1560.61nm via an LC connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. 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:

- SFF-8665 Compliance
- 100GHz DWDM ITU Grid
- Duplex LC Connector
- Commercial Temperature 20 to 70 Celsius
- Hot Pluggable
- Single-mode Fiber
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications:

- 100GBase Ethernet
- Access, Metro 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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## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

## Wavelength Guide (100GHz ITU-T Channel)

| Channel # | Frequency (GHz) | Wavelength (nm) | Frequency (GHz) | Wavelength (nm) |
|-----------|-----------------|-----------------|-----------------|-----------------|
|           | L0              |                 | L1              |                 |
| 16        | 191600          | 1564.68         | 191650          | 1564.27         |
| 17        | 191700          | 1563.86         | 191750          | 1563.45         |
| 18        | 191800          | 1563.05         | 191850          | 1562.64         |
| 19        | 191900          | 1562.23         | 191950          | 1561.83         |
| 20        | 192000          | 1561.42         | 192050          | 1561.01         |
| 21        | 192100          | 1560.61         | 192150          | 1560.2          |
| 22        | 192200          | 1559.79         | 192250          | 1559.39         |
| 23        | 192300          | 1558.98         | 192350          | 1558.58         |
| 24        | 192400          | 1558.17         | 192450          | 1557.77         |
| 25        | 192500          | 1557.36         | 192550          | 1556.96         |
| 26        | 192600          | 1556.56         | 192650          | 1556.15         |
| 27        | 192700          | 1555.75         | 192750          | 1555.34         |
| 28        | 192800          | 1554.94         | 192850          | 1554.54         |
| 29        | 192900          | 1554.13         | 192950          | 1553.73         |
| 30        | 193000          | 1553.33         | 193050          | 1552.93         |
| 31        | 193100          | 1552.52         | 193150          | 1552.12         |
| 32        | 193200          | 1551.72         | 193250          | 1551.32         |
| 33        | 193300          | 1550.92         | 193350          | 1550.52         |
| 34        | 193400          | 1550.12         | 193450          | 1549.72         |
| 35        | 193500          | 1549.32         | 193550          | 1548.91         |
| 36        | 193600          | 1548.52         | 193650          | 1548.11         |
| 37        | 193700          | 1547.72         | 193750          | 1547.32         |
| 38        | 193800          | 1546.92         | 193850          | 1546.52         |
| 39        | 193900          | 1546.12         | 193950          | 1545.72         |
| 40        | 194000          | 1545.32         | 194050          | 1544.92         |
| 41        | 194100          | 1544.53         | 194150          | 1544.13         |
| 42        | 194200          | 1543.73         | 194250          | 1543.33         |
| 43        | 194300          | 1542.94         | 194350          | 1542.54         |
| 44        | 194400          | 1542.14         | 194450          | 1541.75         |
| 45        | 194500          | 1541.35         | 194550          | 1540.95         |
| 46        | 194600          | 1540.56         | 194650          | 1540.16         |
| 47        | 194700          | 1539.77         | 194750          | 1539.37         |
| 48        | 194800          | 1538.98         | 194850          | 1538.58         |

|    |        |         |        |         |
|----|--------|---------|--------|---------|
| 49 | 194900 | 1538.19 | 194950 | 1537.79 |
| 50 | 195000 | 1537.4  | 195050 | 1537    |
| 51 | 195100 | 1536.61 | 195150 | 1536.22 |
| 52 | 195200 | 1535.82 | 195250 | 1535.43 |
| 53 | 195300 | 1535.04 | 195350 | 1534.64 |
| 54 | 195400 | 1534.25 | 195450 | 1533.86 |
| 55 | 195500 | 1533.47 | 195550 | 1533.07 |
| 56 | 195600 | 1532.68 | 195650 | 1532.29 |
| 57 | 195700 | 1531.9  | 195750 | 1531.51 |
| 58 | 195800 | 1531.12 | 195850 | 1530.72 |
| 59 | 195900 | 1530.33 | 195950 | 1529.94 |
| 60 | 196000 | 1529.55 | 196050 | 1529.16 |
| 61 | 196100 | 1528.77 | 196150 | 1528.38 |

#### Absolute Maximum Ratings

| Parameter             | Symbol            | Min. | Typical | Max.                 | Unit |
|-----------------------|-------------------|------|---------|----------------------|------|
| Signal Input Voltage  | V <sub>in</sub>   | -0.5 |         | V <sub>cc</sub> +0.5 | V    |
| Power Supply Voltage  | V <sub>cc</sub>   | -0.5 |         | 3.6                  | °C   |
| Storage Temperature   | T <sub>S</sub>    | 5    |         | 85                   | °C   |
| Operating Temperature | T <sub>case</sub> | 20   |         | 70                   | °C   |

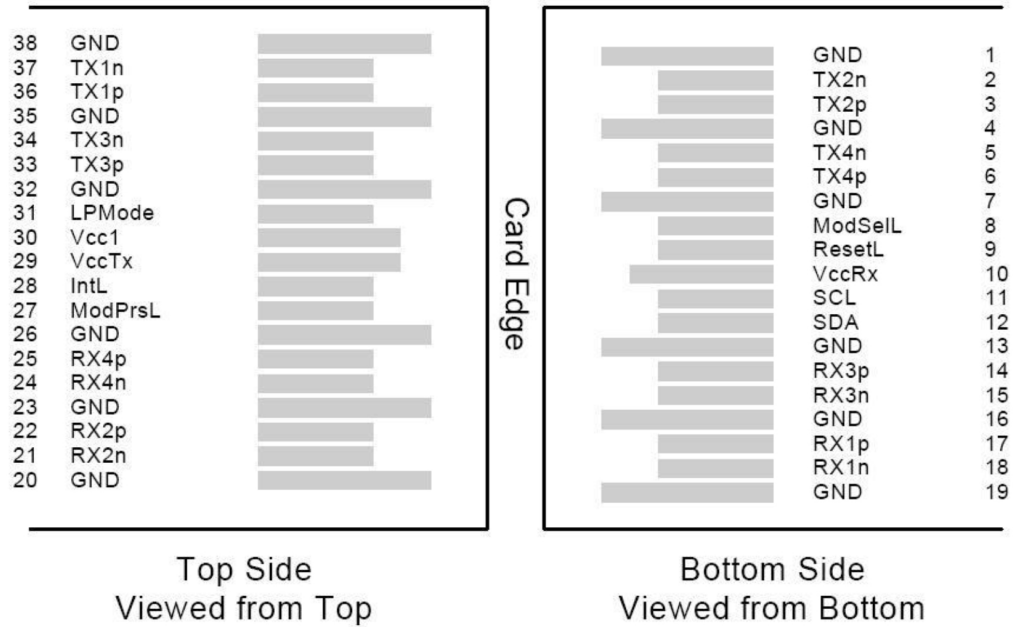
#### Electrical Characteristics

| Parameter            | Symbol          | Min.  | Typ. | Max.  | Unit | Notes |
|----------------------|-----------------|-------|------|-------|------|-------|
| Power Supply Voltage | V <sub>cc</sub> | 3.135 | 3.3  | 3.465 | V    |       |
| Power Dissipation    | P <sub>D</sub>  |       | 4    | 5     | W    |       |

Optical Characteristics

| Parameter                   | Symbol          | Min. | Typ.      | Max. | Unit | Notes |
|-----------------------------|-----------------|------|-----------|------|------|-------|
| Transmitter                 |                 |      |           |      |      |       |
| Optical Wavelength          | $\lambda_C$     | 1480 | $\lambda$ | 1580 | nm   |       |
| Channel Spacing             | $\Delta f$      |      | 100       |      | GHz  |       |
| Optical Extinction Ratio    | ER              |      | 6         |      | dB   |       |
| Side-Mode Suppression Ratio | SMSR            | 30   |           |      | dB   |       |
| Spectral Width              | $\Delta\lambda$ |      | +/-25     | 1    | GHz  |       |
| Optical Transmit Power      | Pout/lane       | -11  | -10       | -8   | dBm  |       |
| Receiver                    |                 |      |           |      |      |       |
| Optical Wavelength          | $\lambda_C$     | 1480 |           | 1580 | nm   |       |
| Receiver Max. Sensitivity   | Pmin            | -3   | -2.5      | -2   | dBm  |       |
| Damage Threshold            | Pmax            | 10   |           |      | dBm  |       |
| Optical Return Loss         | ORL             |      |           | 20   | dBm  |       |
| LOS Hysteresis              | LOSH            |      | 1.0       |      | dB   |       |
| LOS Assert                  | LOSA            | -10  |           |      | dBm  |       |
| LOS De-Assert               | LOSD            |      |           | -3   | dBm  |       |

Electrical Pin-out Details



## Pin Descriptions

| Pin | Logic        | Symbol  | Name/Descriptions                    | Plug Sequence | Ref. |
|-----|--------------|---------|--------------------------------------|---------------|------|
| 1   |              | GND     | Ground                               | 1             | 1    |
| 2   | CML-I        | Tx2n    | Transmitter Inverted Data Input      | 3             |      |
| 3   | CML-I        | Tx2p    | Transmitter Non-Inverted Data output | 3             |      |
| 4   |              | GND     | Ground                               | 1             | 1    |
| 5   | CML-I        | Tx4n    | Transmitter Inverted Data Input      | 3             |      |
| 6   | CML-I        | Tx4p    | Transmitter Non-Inverted Data output | 3             |      |
| 7   |              | GND     | Ground                               | 1             | 1    |
| 8   | LVTTL-I      | ModSelL | Module Select                        | 3             |      |
| 9   | LVTTL-I      | ResetL  | Module Reset                         | 3             |      |
| 10  |              | VccRx   | +3.3V Power Supply Receiver          | 2             | 2    |
| 11  | LVC MOS- I/O | SCL     | 2-Wire Serial Interface Clock        | 3             |      |
| 12  | LVC MOS- I/O | SDA     | 2-Wire Serial Interface Data         | 3             |      |
| 13  |              | GND     | Ground                               | 1             | 1    |
| 14  | CML-O        | Rx3p    | Receiver Non-Inverted Data output    | 3             |      |
| 15  | CML-O        | Rx3n    | Receiver Inverted Data output        | 3             |      |
| 16  |              | GND     | Ground                               | 1             | 1    |
| 17  | CML-O        | Rx1p    | Receiver Non-Inverted Data output    | 3             |      |
| 18  | CML-O        | Rx1n    | Receiver Inverted Data output        | 3             |      |
| 19  |              | GND     | Ground                               | 1             | 1    |
| 20  |              | GND     | Ground                               | 1             | 1    |
| 21  | CML-O        | Rx2n    | Receiver Inverted Data output        | 3             |      |
| 22  | CML-O        | Rx2p    | Receiver Non-Inverted Data output    | 3             |      |
| 23  |              | GND     | Ground                               | 1             | 1    |
| 24  | CML-O        | Rx4n    | Receiver Inverted Data output        | 3             |      |
| 25  | CML-O        | Rx4p    | Receiver Non-Inverted Data output    | 3             |      |
| 26  |              | GND     | Ground                               | 1             | 1    |
| 27  | LVTTL-O      | ModPrsL | Module Present                       | 3             |      |
| 28  | LVTTL-O      | IntL    | Interrupt                            | 3             |      |
| 29  |              | VccTx   | +3.3V Power Supply Transmitter       | 2             | 2    |
| 30  |              | VccI    | +3.3V Power Supply                   | 2             | 2    |
| 31  | LVTTL-I      | LPMODE  | Low Power Mode                       | 3             |      |
| 32  |              | GND     | Ground                               | 1             | 1    |
| 33  | CML-I        | Tx3p    | Transmitter Non-Inverted Data input  | 3             |      |
| 34  | CML-I        | Tx3n    | Transmitter Inverted Data Input      | 3             |      |
| 35  |              | GND     | Ground                               | 1             | 1    |
| 36  | CML-I        | Tx1p    | Transmitter Non-Inverted Data input  | 3             |      |
| 37  | CML-I        | Tx1n    | Transmitter Inverted Data Input      | 3             |      |
| 38  |              | GND     | Ground                               | 1             | 1    |

**Notes:**

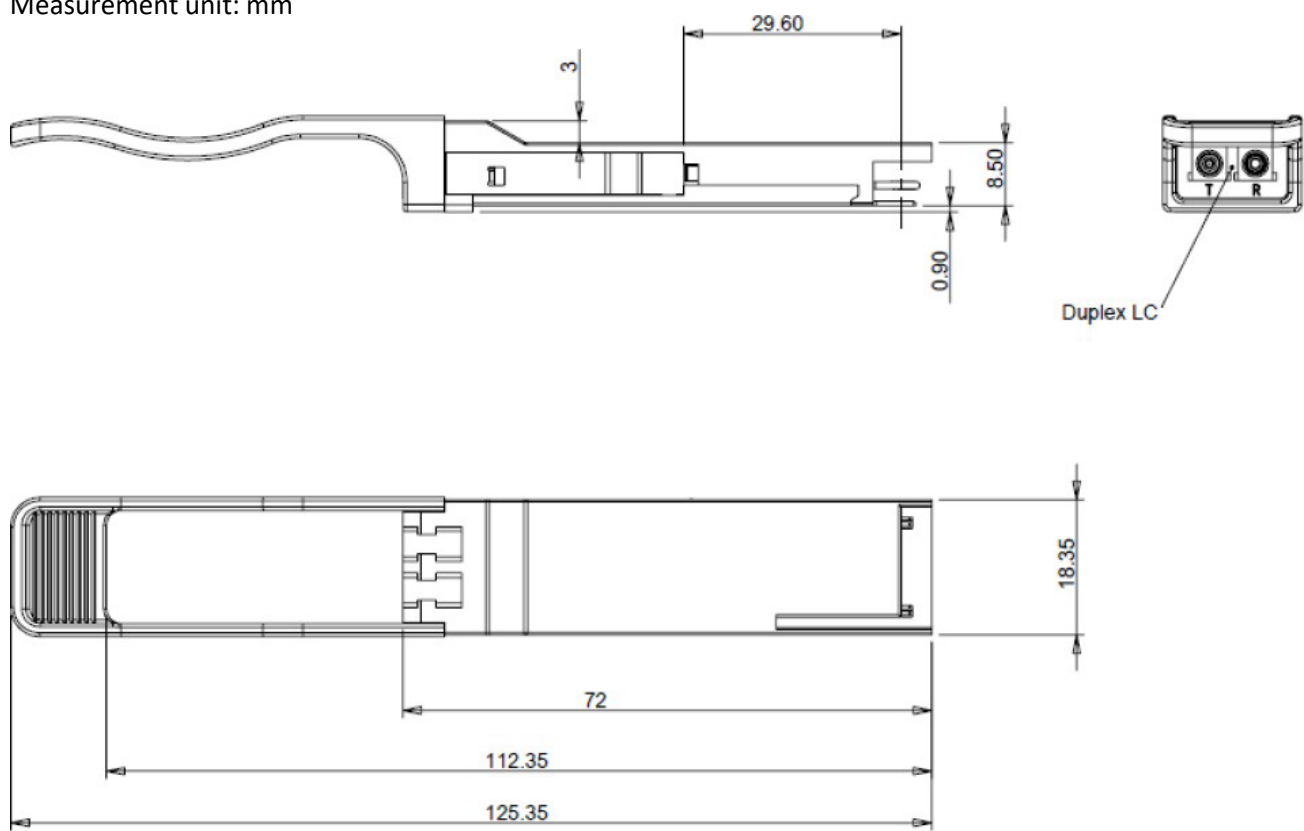
1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, Vcc1 and VccTx are the 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 Table 6. Recommended host board power supply filtering is shown in Figures 3 and 4. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP28 Module in any combination. The connector pins are each rated for a maximum current of 500Ma.

**DOM Specifications**

| Parameter                                      | Min. | Typ. | Max. | Unit |
|------------------------------------------------|------|------|------|------|
| Receive Power Monitor Accuracy                 | -2   |      | 2    | dB   |
| Transmit Power Monitor                         | -2   |      | 2    | dB   |
| Laser Bias Current Monitor Accuracy            | -10  |      | 10   | %    |
| Transceiver Temperature Monitor Accuracy       | -5   |      | 5    | °C   |
| Internally Measured Transceiver Supply Voltage |      |      | 3    | %    |

**Mechanical Specifications**

Measurement unit: mm



# 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.

