



## S2D23010250F000

MSA 25GBase-DWDM SFP28 Transceiver C-Band 100GHz (SMF, 1558.98nm, 10km, LC, DOM)

### Product Description

This MSA Compliant SFP28 transceiver provides 25GBase-DWDM throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1558.98nm 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-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications:

- 25GBase-LR 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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### Wavelength Guide (100GHz ITU Channels)

| Channel | Wavelength (nm) | Frequency (THZ) | Channel | Wavelength (nm) | Frequency (THZ) |
|---------|-----------------|-----------------|---------|-----------------|-----------------|
| 15      | 1565.50         | 191.5           | 39      | 1546.12         | 193.9           |
| 16      | 1564.68         | 191.6           | 40      | 1545.32         | 194.0           |
| 17      | 1563.86         | 191.7           | 41      | 1544.53         | 194.1           |
| 18      | 1563.05         | 191.8           | 42      | 1543.73         | 194.2           |
| 19      | 1562.23         | 191.9           | 43      | 1542.94         | 194.3           |
| 20      | 1561.42         | 192.0           | 44      | 1542.14         | 194.4           |
| 21      | 1560.61         | 192.1           | 45      | 1541.35         | 194.5           |
| 22      | 1559.79         | 192.2           | 46      | 1540.56         | 194.6           |
| 23      | 1558.98         | 192.3           | 47      | 1539.77         | 194.7           |
| 24      | 1558.17         | 192.4           | 48      | 1538.98         | 194.8           |
| 25      | 1557.36         | 192.5           | 49      | 1538.19         | 194.9           |
| 26      | 1556.55         | 192.6           | 50      | 1537.40         | 195.0           |
| 27      | 1555.75         | 192.7           | 51      | 1536.61         | 195.1           |
| 28      | 1554.94         | 192.8           | 52      | 1535.82         | 195.2           |
| 29      | 1554.13         | 192.9           | 53      | 1535.04         | 195.3           |
| 30      | 1553.33         | 193.0           | 54      | 1534.25         | 195.4           |
| 31      | 1552.52         | 193.1           | 55      | 1533.47         | 195.5           |
| 32      | 1551.72         | 193.2           | 56      | 1532.68         | 195.6           |
| 33      | 1550.92         | 193.3           | 57      | 1531.90         | 195.7           |
| 34      | 1550.12         | 193.4           | 58      | 1531.12         | 195.8           |
| 35      | 1549.32         | 193.5           | 59      | 1530.33         | 195.9           |
| 36      | 1548.51         | 193.6           | 60      | 1529.55         | 196.0           |
| 37      | 1547.72         | 193.7           | 61      | 1528.77         | 196.1           |
| 38      | 1546.92         | 193.8           |         |                 |                 |

### Absolute Maximum Ratings

| Parameter                  | Symbol | Min. | Typ.  | Max. | Unit | Notes |
|----------------------------|--------|------|-------|------|------|-------|
| Maximum 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   | %    |       |
| Data Rate                  | BR     |      | 25.78 |      | Gbps |       |

## Electrical Characteristics

| Parameter                     |         | Symbol           | Min. | Typ. | Max.                 | Unit  | Notes |
|-------------------------------|---------|------------------|------|------|----------------------|-------|-------|
| Power Supply Voltage          |         | V <sub>cc</sub>  | 3.15 | 3.3  | 3.45                 | V     |       |
| Power Supply Current          |         | I <sub>cc</sub>  |      |      | 606                  | mA    |       |
| Transmitter                   |         |                  |      |      |                      |       |       |
| Differential CML Inputs       |         | V <sub>in</sub>  | 40   |      | 1000                 | mVp-p | 1     |
| Differential Input Impedance  |         | Z <sub>in</sub>  |      | 100  |                      | Ω     | 2     |
| Tx_Dis                        | Disable |                  | 2    |      | V <sub>cc</sub> +0.3 | V     |       |
|                               | Enable  |                  | 0    |      | 0.8                  |       |       |
| Tx-Fault                      | Fault   |                  | 2    |      | V <sub>cc</sub> +0.3 | V     |       |
|                               | Normal  |                  | 0    |      | 0.8                  |       |       |
| Receiver                      |         |                  |      |      |                      |       |       |
| Differential CML Outputs      |         | V <sub>out</sub> | 450  |      | 1050                 | mVp-p | 3     |
| Differential Output Impedance |         | Z <sub>out</sub> | 85   | 100  | 115                  | Ω     |       |
| RXD_LOS                       | LOS     |                  | 2    |      | V <sub>cc</sub> +0.3 | V     |       |
|                               | Normal  |                  | 0    |      | 0.8                  |       |       |

### Notes:

1. AC coupled input. CML logic. Internally AC coupled.
2. R<sub>IN</sub>>100kΩ @ DC.
3. AC coupled output. CML logic. Internally AC coupled.

## Optical Characteristics

| Parameter                               | Symbol           | Min.    | Typ. | Max.    | Unit | Notes |
|-----------------------------------------|------------------|---------|------|---------|------|-------|
| <b>Transmitter</b>                      |                  |         |      |         |      |       |
| Wavelength                              | $\lambda$        | 1528.77 |      | 1565.50 | nm   |       |
| Center Wavelength Spacing               |                  |         | 100  |         | GHz  |       |
|                                         |                  |         | 0.8  |         | nm   |       |
| Side Mode Suppression Ratio             | SMSR             | 30      |      |         | dB   |       |
| Average Output Power                    | P <sub>out</sub> | -3      |      | 2       | dBm  | 1     |
| Extinction Ratio                        | ER               | 3       |      |         | dB   |       |
| <b>Receiver</b>                         |                  |         |      |         |      |       |
| Receiver Sensitivity @25.78Gbps         | P <sub>min</sub> |         |      | -10     | dBm  | 2     |
| Receiver Overload                       | P <sub>max</sub> | 2       |      |         | dBm  |       |
| LOS De-Assert                           | LOSD             |         |      | -17     | dBm  |       |
| LOS Assert                              | LOSA             | -30     |      |         | dBm  |       |
| LOS Hysteresis                          | H <sub>y</sub>   | 0.5     |      |         | dB   |       |
| Optical Signal to Noise Ratio Tolerance | OSNR             | 33      |      |         | dB   |       |

### Notes:

1. Output is coupled into a 9/125μm single-mode fiber.
2. Minimum average optical power measured at the BER less than  $5E^{-5}$ . The measure pattern is PRBS  $2^{31}-1$ .

## Pin Descriptions

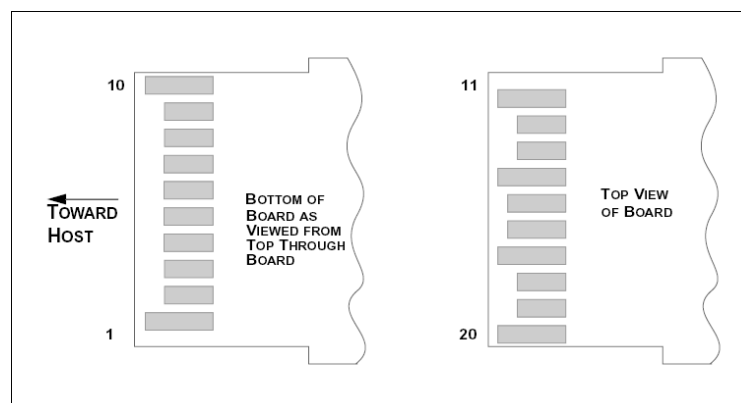
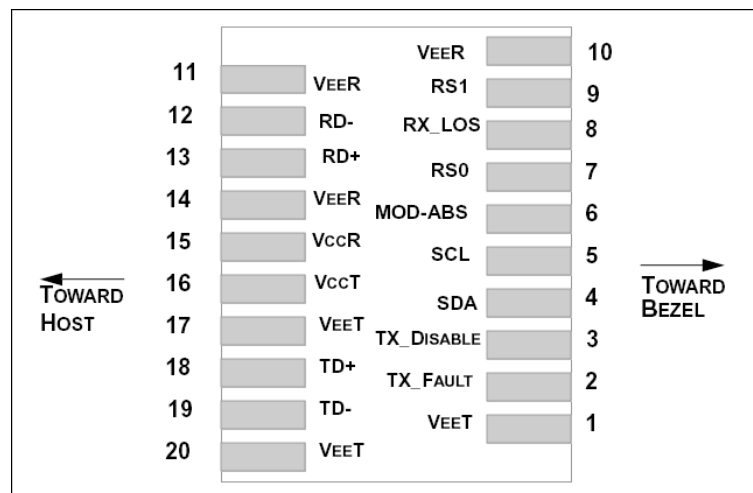
| Pin | Symbol     | Name/Descriptions                                         | Plug Sequence | Ref. |
|-----|------------|-----------------------------------------------------------|---------------|------|
| 1   | VeeT       | Transmitter Ground.                                       | 1             | 5    |
| 2   | TX_Fault   | Transmitter Fault Indication.                             | 3             | 1    |
| 3   | TX Disable | Transmitter Disable. Module disables on "high" or "open." | 3             | 2    |
| 4   | SDA        | Module Definition 2. 2-Wire Serial Interface Data.        | 3             | 3    |
| 5   | SCL        | Module Definition 1. 2-Wire Serial Interface Clock.       | 3             | 3    |
| 6   | MOD-ABS    | Module Definition 0.                                      | 3             | 3    |
| 7   | RS0        | RX Rate Select (LVTTTL).                                  | 3             | 9    |
| 8   | RX_LOS     | Loss of Signal.                                           | 3             | 4    |
| 9   | RS1        | TX Rate Select (LVTTTL).                                  | 1             | 9    |
| 10  | VeeR       | Receiver Ground.                                          | 1             | 5    |
| 11  | VeeR       | Receiver Ground.                                          | 1             | 5    |
| 12  | RD-        | Inverted Received Data Out.                               | 3             | 6    |
| 13  | RD+        | Received Data Out.                                        | 3             | 7    |
| 14  | VeeR       | Receiver Ground.                                          | 1             | 5    |
| 15  | VccR       | Receiver Power. $3.3 \pm 5\%$ .                           | 2             | 7    |
| 16  | VccT       | Transmitter Power. $3.3 \pm 5\%$ .                        | 2             | 7    |
| 17  | VeeT       | Transmitter Ground.                                       | 1             | 5    |
| 18  | TD+        | Transmit Data In.                                         | 3             | 8    |
| 19  | TD-        | Inverted Transmit Data In.                                | 3             | 8    |
| 20  | VeeT       | Transmitter Ground.                                       | 1             | 5    |

### Notes:

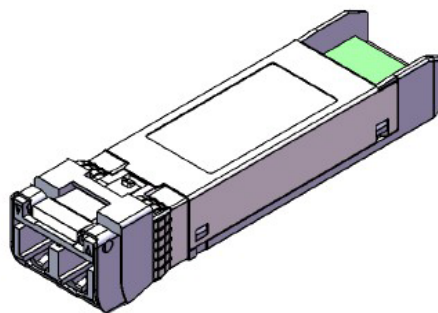
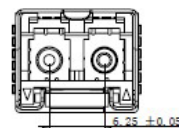
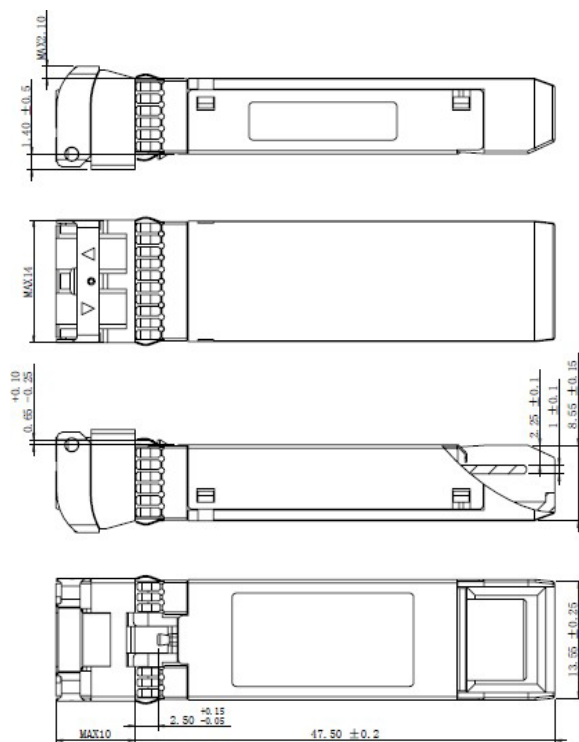
1. Tx\_Fault is an open collector/drain output which should be pulled up with a 4.7kΩ to 10kΩ resistor on the host board. Pull-up voltage is between 2.4V and  $V_{ccT}/R+0.3V$ . When "high," the output indicates a laser fault of some kind. "Low" indicates normal operation. In the "low" state, the output will be pulled to <0.4V..
2. Tx\_Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7kΩ–10kΩ resistor. Its states are:
  - Low (-0.3 – 0.8V): Transmitter On.
  - (>0.8, < 2.0V): Undefined.
  - High (2.0 –  $V_{ccT}/R+0.3V$ ): Transmitter Disabled.
  - Open: Transmitter Disabled.
3. Module Absent. Connected to the VeeT or VeeR in the module.
4. LOS (Loss of Signal) is an open collector/drain output which should be pulled up with a 4.7kΩ to 10kΩ resistor. Pull-up is voltage between 2.4V and  $V_{ccT}/R+0.3V$ . When "high," this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). "Low" indicates normal operation. In the "low" state, the output will be pulled to <0.4V.

5. VeeR and VeeT may be internally connected within the SFP28 module.
6. RD-/+: these are the differential receiver outputs. They are AC coupled 100 (differential) lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 225mV-525mV single-ended when properly terminated.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP+ connector pin. Maximum supply current is 606mA. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP28 input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot-plugging of the SFP28 transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
8. TD-/+: these are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential terminations inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 20mV-500mV single-ended, though it is recommended the values between 90mV-900mV single-ended be used for best EMI performance.
9. This pin has an internal 30k pull down to ground. This pin will not affect module performance.

### Transceiver Pad layout



## Mechanical Specifications



Unremarked tolerances  $\pm 0.2\text{mm}$

# 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.

