



## SFP-10GB-DW60-80-FT-SKY

Fortinet® Compatible 10GBase-DWDM SFP+ Transceiver C-Band 100GHz (SMF, 1529.55nm, 80km, LC, DOM)

### Product Description

This Fortinet® compatible SFP+ transceiver provides 10GBase-DWDM throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1529.55nm via an LC connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Fortinet®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows 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
- Temperature-stabilized EML transmitter and APD receiver
- 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:

- 10x Gigabit Ethernet over DWDM
- Access, Metro and Enterprise
- 8x/10x Fibre Channel

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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-T Channel)

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

|    |       |         |
|----|-------|---------|
| 19 | 191.9 | 1562.23 |
| 18 | 191.8 | 1563.05 |
| 17 | 191.7 | 1563.86 |

### Absolute Maximum Ratings

| Parameter                  | Symbol           | Min. | Typ.    | Max.              | Unit | Notes |
|----------------------------|------------------|------|---------|-------------------|------|-------|
| Maximum Supply Voltage     | V <sub>cc</sub>  | 0.5  |         | 4.0               | V    |       |
| Storage Temperature        | T <sub>stg</sub> | -40  |         | +85               | °C   | 1     |
| Operating Case Temperature | T <sub>c</sub>   | 0    |         | 70                | °C   |       |
| Data Rate                  | BR               | 1.2  | 10.3125 | 11.3              | Gbps | 2     |
| Bit Error Rate             | BER              |      |         | 10 <sup>-12</sup> |      |       |
| Supply Current             | I <sub>cc</sub>  |      | 450     | 500               | mA   | 3     |

### Notes:

1. Ambient temperature.
2. IEEE 802.3ae.
3. For electrical power interface.

### Electrical Characteristics V<sub>cc</sub>=3.4 to 3.46V, T<sub>c</sub>

| Parameter                            | Symbol                         | Min.             | Typ. | Max.                   | Unit | Notes |
|--------------------------------------|--------------------------------|------------------|------|------------------------|------|-------|
| Input Voltage                        | V <sub>cc</sub>                | 3.14             | 3.3  | 3.46                   | V    |       |
| Power Consumption                    | P <sub>D</sub>                 |                  |      | 1.5                    | W    |       |
| <b>Transmitter</b>                   |                                |                  |      |                        |      |       |
| Differential Input Impedance         | Z <sub>IN</sub>                |                  | 100  |                        | Ω    |       |
| Differential Data Input Swing        | V <sub>IN,pp</sub>             | 300              |      | 850                    | mV   |       |
| Transmit Enable voltage              | V <sub>D</sub>                 | 2                |      | V <sub>cc</sub>        | V    |       |
| Transmit Enable voltage              | V <sub>EN</sub>                | V <sub>eeT</sub> |      | V <sub>eeT</sub> + 0.8 | V    |       |
| <b>Receiver</b>                      |                                |                  |      |                        |      |       |
| Differential Data Output Swing       | V <sub>OUT_pp</sub>            | 300              |      | 850                    | mV   |       |
| Data Output Rise/Fall Time (20%-80%) | T <sub>r</sub> /T <sub>f</sub> | 28               |      |                        | ps   |       |
| LOS Asserted                         | LOSA                           | 2                |      | Host_V <sub>cc</sub>   | V    |       |
| LOS De-Asserted                      | LOSD                           | V <sub>eeR</sub> |      | V <sub>eeR</sub> + 0.5 | V    |       |

### Notes:

1. For electrical power interface.

## Optical Characteristics

| Parameter                        | Symbol           | Min           | Typ.      | Max           | Unit  | Notes |
|----------------------------------|------------------|---------------|-----------|---------------|-------|-------|
| Transmitter                      |                  |               |           |               |       |       |
| Optical Power                    | PTX              | 0             |           | 4             | dBm   | 1     |
| Optical Wavelength               | $\lambda$        | $\lambda-0.1$ | $\lambda$ | $\lambda+0.1$ | nm    | 2     |
| Extinction Ratio                 | ER               | 9             |           |               | dB    |       |
| Spectral Width (-20dB)           | $\Delta\lambda$  |               |           | 0.6           | nm    |       |
| Side Mode Suppression Ratio      | SMSR             | 30            |           |               | dB    |       |
| Relative Intensity Noise         | RIN              |               |           | -128          | dB/Hz |       |
| Transmitter Dispersion Penalty   | TDP              |               |           | 3.2           | dB    |       |
| Launch Power of OFF Transmitter  | P <sub>off</sub> |               |           | -30           | dBm   | 1     |
| Receiver                         |                  |               |           |               |       |       |
| Optical Center Wavelength        | $\lambda_c$      | 1260          |           | 1620          | nm    |       |
| Average Receive Power            | P <sub>RX</sub>  | -24           |           | -7            | dBm   |       |
| Receiver Sensitivity @ 10.3 Gbps | PX_SEN           |               |           | -24           | dBm   | 3     |
| Receiver Reflectance             | TR <sub>RX</sub> |               |           | -27           | dB    |       |
| LOS Assert                       | LOSA             | -35           |           |               | dB    |       |
| LOS De-assert                    | LOSD             |               |           | -27           | dB    |       |
| LOS Hysteresis                   | LOSH             | 0.5           |           |               | dB    |       |

### Notes:

1. Average.
2.  $\lambda$  = specified ITU Grid wavelength.
3. Measured with PRBS 2<sup>31</sup>-1 test mode, BER<10<sup>-12</sup>.

## Pin Descriptions

| Pin | Symbol     | Name/Descriptions                                                | Ref. |
|-----|------------|------------------------------------------------------------------|------|
| 1   | VeeT       | Transmitter Ground (Common with Receiver Ground).                | 1    |
| 2   | TX_Fault   | Transmitter Fault.                                               |      |
| 3   | TX_Disable | Transmitter Disable. Laser output disabled on “high” or “open.”  | 2    |
| 4   | SDA        | 2-Wire Serial Interface Data.                                    | 3    |
| 5   | SCL        | 2-Wire Serial Interface Clock.                                   | 3    |
| 6   | MOD_ABS    | Module Absent. Grounded within the module.                       | 3    |
| 7   | RS0        | Rate Select 0. Not used.                                         |      |
| 8   | LOS        | Loss of Signal indication. “Logic 0” indicates normal operation. | 4    |
| 9   | RS1        | Rate Select 1. Not used.                                         | 1    |
| 10  | VeeR       | Receiver Ground (Common with Transmitter Ground).                | 1    |
| 11  | VeeR       | Receiver Ground (Common with Transmitter Ground).                | 1    |
| 12  | RD-        | Receiver Inverted Data out. AC Coupled.                          |      |
| 13  | RD+        | Receiver Non-inverted DATA out. AC Coupled.                      |      |
| 14  | VeeR       | Receiver Ground (Common with Transmitter Ground).                | 1    |
| 15  | VccR       | Receiver Power Supply.                                           |      |
| 16  | VccT       | Transmitter Power Supply.                                        |      |
| 17  | VeeT       | Transmitter Ground (Common with Receiver Ground).                | 1    |
| 18  | TD+        | Transmitter Non-Inverted Data In. AC Coupled.                    |      |
| 19  | TD-        | Transmitter Inverted Data In. AC Coupled.                        |      |
| 20  | VeeT       | Transmitter Ground (Common with Receiver Ground).                | 1    |

### Notes:

1. Circuit ground is isolated form chassis ground.
2. Disable TDIS>2V or open. Enable TDIS<0.8V.
3. Should be pulled up with 4.7kΩ-10KΩ on host board to a voltage between 2V and 3.46V.
4. LOS is open collector output.

## Typical eye Diagram



## Block Diagram



## Electrical Pad Layout



Top of Board



Bottom of Board



## Mechanical Specifications

Module Weight: 16.5g

Dust Cap Weight: 0.95g



All Dimensions are ±0.2mm unless otherwise specified

# 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.

