



## XFD21040100DL2R

Huawei® Compatible 10GBase-DWDM XFP Transceiver C-Band 100GHz (SMF, 1560.61nm, 40km, LC, DOM)

### Product Description

This Huawei® Compatible XFP transceiver provides 10GBase-DWDM throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1560.61nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Huawei® 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:

- INF-8077i Compliance
- Temperature-stabilized EML transmitter and PIN 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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### 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 (THz) | Center Wavelength (nm) |
|-----------|-----------------|------------------------|
| 17        | 191.7           | 1563.86                |
| 18        | 191.8           | 1563.05                |
| 19        | 191.9           | 1562.23                |
| 20        | 192.0           | 1561.42                |
| 21        | 192.1           | 1560.61                |
| 22        | 192.2           | 1559.79                |
| 23        | 192.3           | 1558.98                |
| 24        | 192.4           | 1558.17                |
| 25        | 192.5           | 1557.36                |
| 26        | 192.6           | 1556.55                |
| 27        | 192.7           | 1555.75                |
| 28        | 192.8           | 1554.94                |
| 29        | 192.9           | 1554.13                |
| 30        | 193.0           | 1553.33                |
| 31        | 193.1           | 1552.52                |
| 32        | 193.2           | 1551.72                |
| 33        | 193.3           | 1550.92                |
| 34        | 193.4           | 1550.12                |
| 35        | 193.5           | 1549.32                |
| 36        | 193.6           | 1548.51                |
| 37        | 193.7           | 1547.72                |
| 38        | 193.8           | 1546.92                |
| 39        | 193.9           | 1546.12                |
| 40        | 194.0           | 1545.32                |
| 41        | 194.1           | 1544.53                |
| 42        | 194.2           | 1543.73                |
| 43        | 194.3           | 1542.94                |
| 44        | 194.4           | 1542.14                |

|    |       |         |
|----|-------|---------|
| 45 | 194.5 | 1541.35 |
| 46 | 194.6 | 1540.56 |
| 47 | 194.7 | 1539.77 |
| 48 | 194.8 | 1538.98 |
| 49 | 194.9 | 1538.19 |
| 50 | 195.0 | 1537.40 |
| 51 | 195.1 | 1536.61 |
| 52 | 195.2 | 1535.82 |
| 53 | 195.3 | 1535.04 |
| 54 | 195.4 | 1534.25 |
| 55 | 195.5 | 1533.47 |
| 56 | 195.6 | 1532.68 |
| 57 | 195.7 | 1531.90 |
| 58 | 195.8 | 1531.12 |
| 59 | 195.9 | 1530.33 |
| 60 | 196.0 | 1529.55 |
| 61 | 196.1 | 1528.77 |

#### Absolute Maximum Ratings

| Parameter                  | Symbol | Min. | Max. | Unit |
|----------------------------|--------|------|------|------|
| Maximum Supply Voltage     | Vcc3   | -0.5 | 4.0  | V    |
|                            | Vcc5   | -0.5 | 6.0  | V    |
| Storage Temperature        | TS     | -40  | 85   | °C   |
| Operating Case Temperature | TO     | 0    | 70   | °C   |
| Relative Humidity          | RH     | 5    | 95   | %    |
| Data Rate                  |        | 9.95 | 11.3 | Gb/s |

## Electrical Characteristics

| Parameter                        | Symbol   | Min.        | Typ. | Max.        | Unit     | Notes |
|----------------------------------|----------|-------------|------|-------------|----------|-------|
| Power Supply Voltage             | Vcc3     | 3.135       | 3.3  | 3.465       | V        |       |
|                                  | Vcc5     | 4.75        | 5.00 | 5.25        | V        |       |
| Power Supply Current             | Icc3     |             |      | 750         | mA       |       |
|                                  | Icc5     |             |      | 500         |          |       |
| Power Dissipation                | Pd       |             |      | 3500        | mW       |       |
| Transmitter                      |          |             |      |             |          |       |
| Differential data input swing    | Vin,pp   | 120         |      | 1000        | mVp-p    |       |
| Input differential impedance     | Zin      |             | 100  |             | $\Omega$ |       |
| TX_Disable, P_Down/RST           | VIH      | 2.0         |      | Vcc3+0.3    | V        |       |
|                                  | VIL      | -0.3        |      | 0.8         | V        |       |
| Transmit Disable Assert Time     |          |             |      | 10          | us       |       |
| Receiver                         |          |             |      |             |          |       |
| Differential data output swing   | Vout, pp | 340         |      | 850         | mVp-p    | 1     |
| Output differential impedance    | Zo       |             | 100  |             | $\Omega$ |       |
| Data Output Rise Time, Fall Time | tr, tf   | 24          |      |             | ps       | 2     |
| Rx_LOS, Mod-NR, Interrupt        | VOH      | VccHost-0.5 |      | VccHost+0.3 | V        | 3     |
|                                  | VOL      | 0           |      | 0.4         | V        | 3     |

### Notes:

1. Internally AC coupled, but requires an external 100 $\Omega$  differential termination.
2. 20-80%.
3. Loss of Signal is an open collector output. Should be pulled up with a 4.7k $\Omega$ -10k $\Omega$  resistor on the host board.

## Optical Characteristics

| Parameter                    | Symbol            | Min.    | Typ. | Max.    | Unit | Notes |
|------------------------------|-------------------|---------|------|---------|------|-------|
| Transmitter                  |                   |         |      |         |      |       |
| Launch Average Optical Power | Po                | -1      |      | +4      | dBm  | 1     |
| Center Wavelength Range      | $\lambda_c$       | 1528.77 |      | 1563.86 | nm   |       |
| Center Wavelength Spacing    |                   |         | 100  |         | GHz  |       |
| Center Wavelength Tolerance  | $\Delta\lambda_c$ | -100    |      | 100     | pm   |       |
| Extinction Ratio             | ER                | 9       |      |         | dB   | 2     |
| Spectral Width (-20dB)       | $\Delta\lambda$   |         |      | 0.3     | nm   |       |
| Side Mode Suppression Ratio  | SMSR              | 30      |      |         | dB   |       |

|                                   |                                          |      |  |       |     |   |
|-----------------------------------|------------------------------------------|------|--|-------|-----|---|
| Average Optical Power (Laser Off) | Poff                                     |      |  | -30   | dBm | 1 |
| Eye Diagram                       | ITU-T G.691 SDH STM-64 L-64.2 compatible |      |  |       |     | 2 |
| Receiver                          |                                          |      |  |       |     |   |
| Center Wavelength                 | λc                                       | 1528 |  | 1565  | nm  |   |
| Receiver Sensitivity @ 9.953Gb/s  | S                                        |      |  | -24.0 | dBm | 3 |
| Receiver Sensitivity @ 11.1 Gb/s  | S                                        |      |  | -15   | dBm | 4 |
| Receiver overload (Pavg)          | POL                                      | -1   |  |       | dBm | 3 |
| Path Penalty @1600ps @9.953Gb/s   | PP1                                      |      |  | 2     | dB  | 3 |
| Path Penalty @1600ps @11.1 Gb/s   | PP2                                      |      |  | 3     | dB  | 4 |
| Optical Return Loss               | ORL                                      | 27   |  |       | dB  |   |
| LOS De-Assert                     | LOSD                                     |      |  | -27   | dBm |   |
| LOS Assert                        | LOSA                                     | -38  |  |       | dBm |   |
| LOS Hysteresis                    |                                          | 0.5  |  |       | dB  |   |

**Notes:**

1. Measured with worst ER; 1550nm; PRBS 2<sup>31</sup>-1 test pattern @ 9.953 Gb/s, BER<10<sup>-12</sup>.
2. Measured with worst ER; 1550nm; PRBS 2<sup>31</sup>-1 test pattern @ 11.1 Gb/s, BER<10<sup>-12</sup>.

## Pin Descriptions

| Pin | Logic     | Symbol     | Name/Descriptions                                                                                                                                                                                                                                                                                 | Ref. |
|-----|-----------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1   |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 2   |           | Vee5       | Optional -5.2v Power Supply (not required)                                                                                                                                                                                                                                                        |      |
| 3   | LVTTL-I   | MOD_DESEL  | Module De-select; When Held low allows the module to respond to 2-wire serial interface.                                                                                                                                                                                                          |      |
| 4   | LVTTL-O   | INTERRUPT  | Interrupt; Indicates presence of an important condition which can be read via the 2-wire serial interface.                                                                                                                                                                                        | 2    |
| 5   | LVTTL-I   | TX_DIS     | Transmitter Disable; Turns off transmitter laser output                                                                                                                                                                                                                                           |      |
| 6   |           | VCC5       | +5V Power Supply                                                                                                                                                                                                                                                                                  |      |
| 7   |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 8   |           | VCC3       | +3.3V Power Supply                                                                                                                                                                                                                                                                                |      |
| 9   |           | VCC3       | +3.3V Power Supply                                                                                                                                                                                                                                                                                |      |
| 10  | LVTTL-I/O | SCL        | 2-Wire Serial Interface Clock.                                                                                                                                                                                                                                                                    | 2    |
| 11  | LVTTL-I/O | SDA        | 2-Wire Serial Interface Data Line.                                                                                                                                                                                                                                                                | 2    |
| 12  | LVTTL-O   | MOD_Abs    | Indicates Module is not present. Grounded in the Module.                                                                                                                                                                                                                                          | 2    |
| 13  | LVTTL-O   | MOD_NR     | Module Not Ready; Indicating Module Operational Fault.                                                                                                                                                                                                                                            | 2    |
| 14  | LVTTL-O   | RX_LOS     | Receiver Loss of Signal Indicator                                                                                                                                                                                                                                                                 | 2    |
| 15  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 16  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 17  | CML-O     | RD-        | Receiver Inverted Data Output                                                                                                                                                                                                                                                                     |      |
| 18  | CML-O     | RD+        | Receiver Non-Inverted Data Output.                                                                                                                                                                                                                                                                |      |
| 19  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 20  |           | VCC2       | +1.8V Power Supply (Not required).                                                                                                                                                                                                                                                                |      |
| 21  | LVTTL-I   | P_DOWN/RST | Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode.<br>Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle. |      |
| 22  |           | VCC2       | +1.8V Power Supply (Not required)                                                                                                                                                                                                                                                                 |      |
| 23  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 24  | PECL-I    | REFCLK+    | Reference Clock Non-Inverted Input, AC coupled on the host board- not required.                                                                                                                                                                                                                   | 3    |
| 25  |           | REFCLK-    | Reference Clock Inverted Input, AC coupled on the host board-Not Required                                                                                                                                                                                                                         | 3    |
| 26  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 27  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |
| 28  | CML-I     | TD-        | Transmitter Inverted Data Input.                                                                                                                                                                                                                                                                  |      |
| 29  | CML-I     | TD+        | Transmitter Non-Inverted Data Input.                                                                                                                                                                                                                                                              |      |
| 30  |           | GND        | Module Ground                                                                                                                                                                                                                                                                                     | 1    |

**Notes:**

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7KΩ to 10KΩ to a voltage between 3.15V and 3.45V on the host board.
3. Reference Clock is not required. If present, it will be ignored.



Pin-out of connector Block on Host board

# OSNR Characteristics

| Bit Rate (Gbps)    | Dispersion (ps/nm) | OSNR (dB) | Receiver Sensitivity (dBm) | BER    |
|--------------------|--------------------|-----------|----------------------------|--------|
| 9.95/10.3          | 0                  | >30       | -24 ~-7                    | 10E-12 |
|                    |                    | >25       | -18 ~-7                    |        |
|                    | 1200               | >30       | -23 ~-7                    |        |
|                    |                    | >27       | -18 ~-7                    |        |
|                    | 1600               | >30       | -22 ~-7                    |        |
|                    |                    | >28       | -18 ~-7                    |        |
| 10.7/11.1 with FEC | 0                  | >30       | -26 ~-7                    | 10E-4  |
|                    |                    | >16       | -18 ~-7                    |        |
|                    | 1200               | >30       | -25 ~-7                    |        |
|                    |                    | >18       | -18 ~-7                    |        |
|                    | 1600               | >30       | -22 ~-7                    |        |
|                    |                    | >20       | -18 ~-7                    |        |

# Recommended Application Interface Block Diagram



Recommended Host Board Power Supply Filter Network



Management Interface



**Mechanical Specifications**

Small Form Factor Pluggable (XFP) transceivers are compatible with the dimensions defined by the XFP Multi-Sourcing Agreement (MSA).



# 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.

