



## SFP13002FE0DJ31

D-Link® DEM-211 Compatible 100Base-FX SFP Transceiver (MMF, 1310nm, 2km, LC, DOM)

### Product Description

This D-Link® DEM-211 compatible SFP transceiver provides 100Base-FX throughput up to 2km over multi-mode fiber (MMF) using a wavelength of 1310nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent D-Link® 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-8074 and SFF-8472 Compliance
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Multi-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications:

- 100Base 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 |
|----------------------------|------------------|------|---------|------|------|
| Maximum Supply Voltage     | V <sub>CC</sub>  | -0.5 |         | 3.6  | V    |
| Storage Temperature        | T <sub>stg</sub> | -40  |         | 85   | °C   |
| Operating Case Temperature | T <sub>c</sub>   | 0    |         | 70   | °C   |
| Operating Humidity         | RH               |      |         | 95   | %    |
| Receiver Power             | R <sub>MAX</sub> |      |         | -12  | dBm  |
| Data Rate                  |                  |      | 100/155 |      | Mbps |
| 50µm Core Diameter MMF     | L                |      | 2       |      | km   |

## Electrical Characteristics

| Parameter                     |         | Symbol           | Min. | Typ. | Max.                 | Unit  | Notes |
|-------------------------------|---------|------------------|------|------|----------------------|-------|-------|
| Power Supply Voltage          |         | V <sub>CC</sub>  | 3.15 | 3.30 | 3.45                 | V     |       |
| Power Supply Current          |         | I <sub>CC</sub>  |      |      | 300                  | mA    |       |
| Transmitter                   |         |                  |      |      |                      |       |       |
| LVPECL Differential Inputs    |         | V <sub>IN</sub>  | 400  |      | 2000                 | mVp-p | 1     |
| Input Differential Impedance  |         | Z <sub>IN</sub>  | 85   | 100  | 120                  | Ω     | 2     |
| Tx_Disable                    | Disable |                  | 2    |      | V <sub>CC</sub>      | V     |       |
|                               | Enable  |                  | 0    |      | 0.8                  | V     |       |
| Tx_Fault                      | Fault   |                  | 2    |      | V <sub>CC</sub> +0.3 | V     |       |
|                               | Normal  |                  | 0    |      | 0.5                  | V     |       |
| Receiver                      |         |                  |      |      |                      |       |       |
| LVPECL Differential Outputs   |         | V <sub>OUT</sub> | 400  |      | 2000                 | mVp-p | 1     |
| Output Differential Impedance |         | Z <sub>IN</sub>  | 85   | 100  | 120                  | Ω     |       |
| Tx_Disable Assert Time        |         | T <sub>off</sub> |      |      | 10                   | us    |       |
| Rx_LOS                        | LOS     |                  | 2    |      | V <sub>CC</sub> +0.3 | V     |       |
|                               | Normal  |                  | 0    |      | 0.8                  | V     |       |
| MOD_DEF (0.2)                 |         | V <sub>OH</sub>  | 2.5  |      |                      | V     | 3     |
|                               |         | V <sub>OL</sub>  | 0    |      | 0.8                  | V     | 3     |

## Notes:

1. AC Coupled.
2. R<sub>IN</sub>> 100kΩ @ DC.
3. With Serial ID.

## Optical Characteristics

| Parameter                  | Symbol | Min.                  | Typ. | Max. | Unit | Notes |
|----------------------------|--------|-----------------------|------|------|------|-------|
| Transmitter                |        |                       |      |      |      |       |
| Average Output Power       | POUT   | -19                   |      | -14  | dBm  | 1     |
| Optical Extinction Ratio   | ER     | 10                    |      |      | dB   | 2     |
| Optical Wavelength         | Tλ     | 1260                  | 1310 | 1360 | nm   |       |
| Spectral Width (RMS)       | Δλ     |                       |      | 4    | nm   |       |
| Total Jitter               | TJ     |                       |      | 1    | ns   | 2     |
| Tx_Disable Asserted Time   | T_off  |                       |      | 10   | us   |       |
| POUT @ Tx_Disable Asserted | POUT   |                       |      | -45  | dBm  |       |
| Rise/Fall Time (20-80%)    | Tr/Tf  |                       |      | 2    | ns   |       |
| Output Optical Eye         |        | IUT-T G.957 Compliant |      |      |      |       |
| Receiver                   |        |                       |      |      |      |       |
| Receiver Sensitivity       | Pmin   |                       |      | -31  | dBm  | 3     |
| Receiver Overload          | Pmax   | -12                   |      |      | dBm  |       |
| Optical Center Wavelength  | λC     | 1260                  |      | 1600 | nm   |       |
| Return Loss                |        | 14                    |      |      | dB   |       |

### Notes:

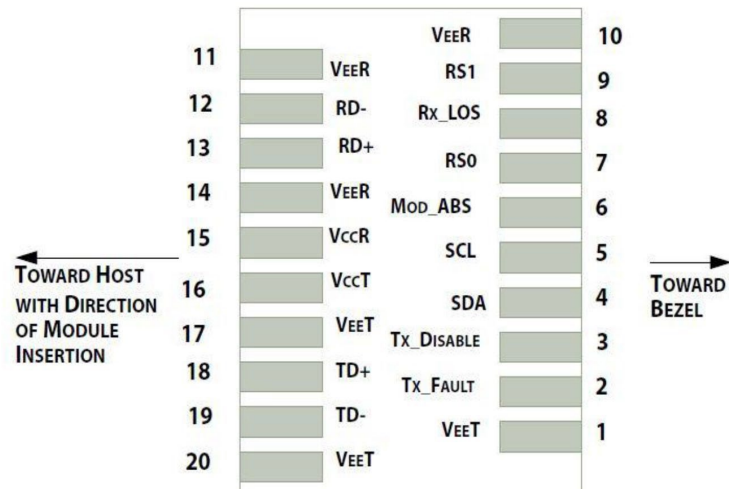
1. Output power is measured by coupling into a 50/125mm multi-mode fiber.
2. Filtered. Measured with a PRBS  $2^{23}-1$  test pattern @155Mbps.
3. Minimum average optical power is measured at BER less than  $1E^{-12}$  with  $2^{23}-1$  PRBS and ER=9dB.

## Pin Descriptions

| Pin | Symbol     | Name/Description                                                          | Note |
|-----|------------|---------------------------------------------------------------------------|------|
| 1   | VeeT       | Transmitter Ground. Common with Receiver Ground.                          | 1    |
| 2   | Tx_Fault   | Transmitter Fault. LVTTTL-O.                                              | 2    |
| 3   | Tx_Disable | Transmitter Disable. Laser output disabled on "high" or "open." LVTTT-I.  | 3    |
| 4   | SDA        | 2-Wire Serial Interface Data (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O. |      |
| 5   | SCL        | 2-Wire Serial Interface Clock (Same as MOD-DEF2 in INF-8074i). LVTTTL-I.  |      |
| 6   | MOD_ABS    | Module Absent. Connect to VeeT or VeeR in the module.                     | 4    |
| 7   | RS0        | Rate Select 0. Not Used.                                                  | 5    |
| 8   | LOS        | Loss of Signal indication. Logic 0 indicates normal operation. LVTTTL-O.  | 2    |
| 9   | RS1        | Rate Select 1. Not Used.                                                  | 5    |
| 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. CML-O.                            |      |
| 13  | RD+        | Receiver Non-Inverted Data Out. AC Coupled. CML-O.                        |      |
| 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. CML-I.                      |      |
| 19  | TD-        | Transmitter Inverted Data In. AC Coupled. CML-O.                          |      |
| 20  | VeeT       | Transmitter Ground. Common with Receiver Ground.                          | 1    |

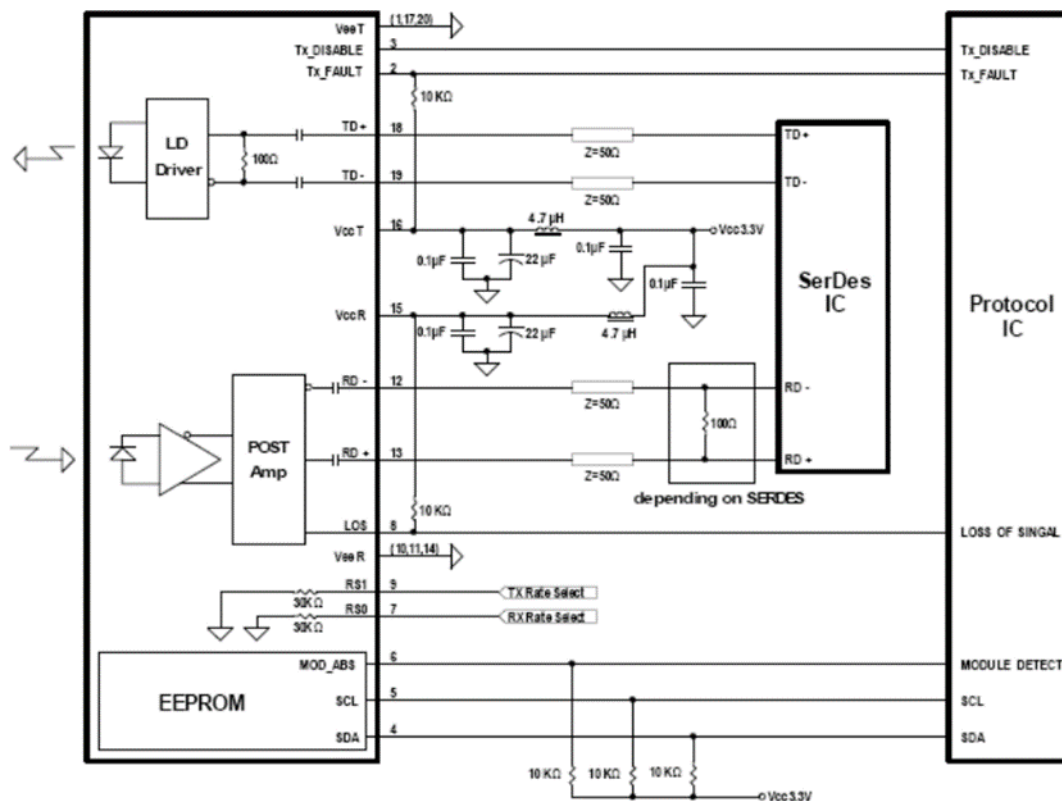
## Notes:

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Host\_Vcc with a resistor in the range 4.7kΩ-10kΩ. Pull-ups can be connected to one or several power supplies; however, the host board design shall ensure that no module contact has a voltage exceeding the module VccT/R+0.5V.
3. Tx\_Disable is an input contact with a 4.7kΩ-10kΩ pull-up resistor to the VccT inside the module.
4. MOD\_ABS is connected to the VeeT or VeeR in the SFP+ module. The host may pull the contact up to the Host\_Vcc with a resistor in the range from 4.7kΩ-10kΩ. MOD\_ABS is asserted "high" when the SFP+ module is physically absent from a host slot.
5. Internally pulled down per SFF-8431.



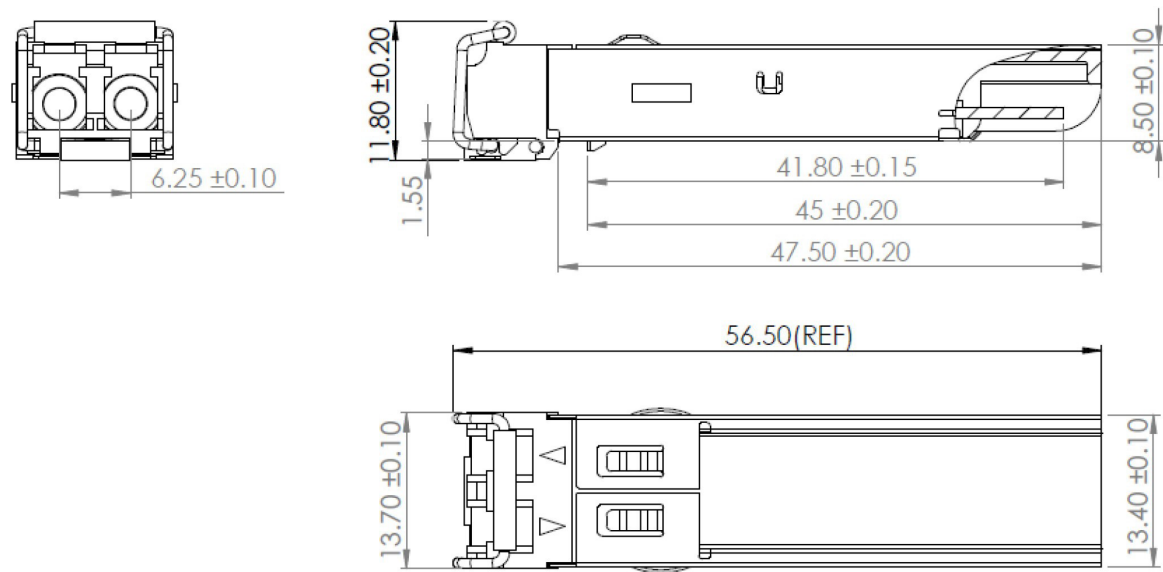
Pin-Out of Connector Block on the Host Board

### Recommended Circuit Schematic



**Mechanical Specifications**

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



**EEPROM Information**

EEPROM memory map-specific data field description is as below:

| 2 wire address 1010000X (A0h)           | 2 wire address 1010001X (A2h)             |
|-----------------------------------------|-------------------------------------------|
| 0                                       | 0                                         |
| Serial ID Defined by SFP MSA (96 bytes) | Alarm and Warning Thresholds (56 bytes)   |
| 95                                      | 55                                        |
| Vendor Specific (32 bytes)              | Cal Constants (40 bytes)                  |
| 127                                     | 95                                        |
| Reserved, SFF8079 (128 bytes)           | Real Time Diagnostic Interface (24 bytes) |
|                                         | 119                                       |
|                                         | 127                                       |
|                                         | Vendor Specific (8 bytes)                 |
|                                         | User Writable EEPROM (120 bytes)          |
|                                         | 247                                       |
| 255                                     | 255                                       |
|                                         | Vendor Specific (8 bytes)                 |

# 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.

