

### **SFP-10GB-DW59-80-I-AT-OPC**

Adtran® Compatible TAA Compliant 10GBase-DWDM 100GHz SFP+ Transceiver (SMF, 1530.33nm, 80km, LC, DOM, -40 to 85C)

#### **Features**

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Temperature-stabilized EML transmitter and APD receiver
- Single-mode Fiber
- Industrial Temperature -40 to 85 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



#### **Applications:**

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

#### **Product Description**

This Adtran® compliant SFP+ transceiver provides 10GBase-DWDM throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1530.33nm via an LC connector. It can operate at temperatures between -40 and 85C. It is guaranteed to be 100% compatible with the equivalent Adtran® compliant 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. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

## 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>   | -40  |         | +85               | °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    |       |
| Transmitter                          |                                |                  |      |                        |      |       |
| 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    |       |
| Receiver                             |                                |                  |      |                        |      |       |
| 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>2Vor 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