

### **SFP-10GB-D36-44-40-I-AO**

MSA and TAA Compliant 10GBase-DWDM SFP+ Transceiver (SMF, 1548.51nm to 1542.14nm, 40km, LC, DOM, -40 to 85C)

#### **Features**

- SFF-8432 and SFF-8472 Compliance
- Integrated Tunable MZM transmitter and APD receiver
- Duplex LC Connector
- Single-mode Fiber
- Industrial Temperature -40 to +85 Celsius
- 8 Channels C-band (100GHz spacing)
- Metal with Lower EMI
- Hot Pluggable
- RoHS Compliant and Lead Free
- Excellent ESD Protection



#### **Applications**

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

#### **Product Description**

This MSA Compliant SFP+ transceiver provides 10GBase-DWDM throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1548.51nm to 1542.14nm 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. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

AddOn's transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## 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

## Absolute Maximum Ratings

| Parameter                               | Symbol | Min. | Typ. | Max. | Unit | Notes |
|-----------------------------------------|--------|------|------|------|------|-------|
| Maximum Supply Voltage                  | Vcc    | 0    |      | 3.6  | V    |       |
| Storage Temperature                     | TS     | -40  |      | +85  | °C   |       |
| Operating Case Temperature              | Tc     | -40  |      | +85  | °C   |       |
| Relative Humidity                       | RH     | 5    |      | 85   | %    | 1     |
| Electrical static discharge (HBM Model) | ESD    | 500  |      | 1000 | V    | 2     |
| Receiver Optical Damage Threshold       | RXDmg  |      |      | +3.5 | dBm  | 3     |

### Notes:

1. Non-condensing
2. ESD, per JEDEC JESD22-A114-B
3. This must not be exceeded

## Electrical Characteristics

| Parameter               | Symbol | Min. | Typ. | Max. | Unit | Notes |
|-------------------------|--------|------|------|------|------|-------|
| Power Supply Voltage    | Vcc    | 3.14 | 3.3  | 3.46 | V    |       |
| Power supply current    | Icc    |      |      | 650  | mA   |       |
| Total power dissipation | PD     |      | 1.5  | 2.0  | W    |       |

## Optical Characteristics

| Parameter                                          | Symbol              | Min.                                                  | Typ. | Max.             | Unit     |
|----------------------------------------------------|---------------------|-------------------------------------------------------|------|------------------|----------|
| <b>Transmitter</b>                                 |                     |                                                       |      |                  |          |
| Signaling Rate                                     |                     | 1.0                                                   |      | 11.3             | Gbps     |
| Optical Output Power                               | P <sub>o</sub>      | -1                                                    |      | +3               | dBm      |
| Fiber Dispersion (SMF28 NDSF ITU-T G.652)          |                     | 0                                                     |      | +700             | ps/nm    |
| Extinction Ratio (10.709 Gbps NRZ, Filtered)       | ER                  | 9.0                                                   | 10.0 |                  | dB       |
| Optical Eye Shape & Mask                           |                     | GR-253 & ITU-T G.691/G.959.1 and IEEE 802.3 clause 52 |      |                  |          |
| Eye Mask Margin                                    |                     | 10                                                    |      |                  | %        |
| Spectral Width -20dB (10.709 Gbps NRZ)             |                     |                                                       |      | 0.3              | nm       |
| Optical Frequency Tuning Range (5 bands)           |                     | 192.00 (1561.42)                                      |      | 195.90 (1530.33) | THz (nm) |
| Side-Mode Suppression Ratio                        | SMSR                | 30                                                    | 35   |                  | dB       |
| Optical Frequency Minimum Tuning Grid              |                     | 100                                                   |      |                  | GHz      |
| Optical Centre Wavelength                          | λ <sub>c</sub>      | As per ITU-T 694.1                                    |      |                  | nm       |
| Optical Frequency Accuracy (deviation from centre) |                     | -2.5                                                  |      | +2.5             | GHz      |
| Time to Initialize Cooled Operation                |                     |                                                       | 10   | 90               | Sec      |
| Tuning Speed (Channel to Channel)                  |                     |                                                       |      | 10               | Sec      |
| <b>Receiver (Note 1)</b>                           |                     |                                                       |      |                  |          |
| Receiver Wavelength Range                          |                     | 191.00 (1569.59)                                      |      | 197.00 (1521.79) | THz (nm) |
| Receiver Power                                     |                     | -27                                                   |      | -7               | dBm      |
| Receiver Optical Reflectance                       |                     |                                                       |      | -27              | dB       |
| LOS assert                                         |                     | -35                                                   |      | -30              | dBm      |
| LOS assert/de-assert hysteresis                    |                     | 0.5                                                   |      | 2.0              | dB       |
| Data Rate (Gbps)                                   | BER                 | Maximum Rx Sensitivity (dBm)                          |      |                  |          |
|                                                    |                     | 0km (Ops/nm)                                          |      | 40km (700ps/nm)  |          |
| 1 – 10.7                                           | 1·10 <sup>-12</sup> | -23                                                   |      | -19              |          |
| 11.1 – 11.3                                        | 1·10 <sup>-4</sup>  | -27                                                   |      | -23              |          |

### Notes:

1. Measured with minimum ER; PRBS 2<sup>31</sup>-1; over specified wavelength range; OSNR >30 dB; with external clock and data recovery (CDR) board

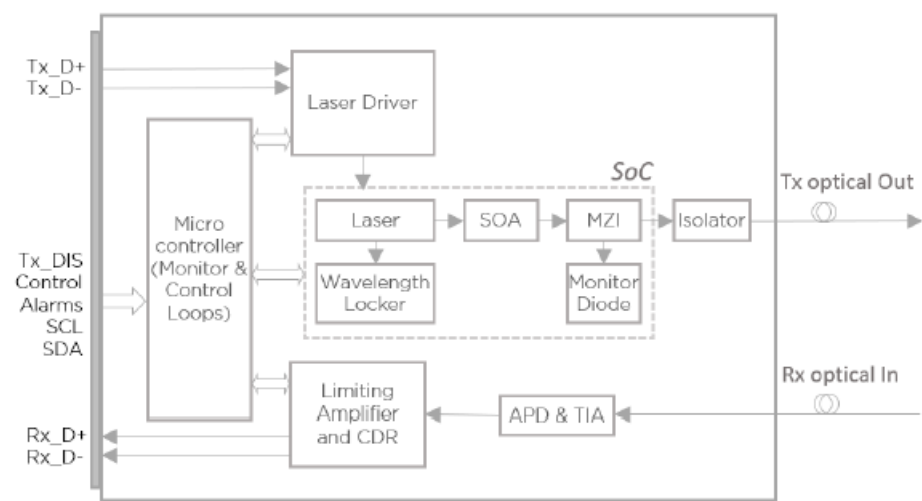
OSNR Characteristics

| Data Rate (Gbps) | BER                 | Dispersion (ps/nm) | RX Power Range (dBm) |     | OSNR (dB) | Notes |
|------------------|---------------------|--------------------|----------------------|-----|-----------|-------|
|                  |                     |                    | Min                  | Max |           |       |
| 1 – 10.7         | 1·10 <sup>-12</sup> | 0                  | -18                  | -7  | 25        | 1     |
| 1 – 10.7         | 1·10 <sup>-12</sup> | 0 to 700 ps/nm     | -18                  | -7  | 28        | 1     |
| 11.1 – 11.3      | 1·10 <sup>-4</sup>  | 0                  | -18                  | -7  | 18        | 1     |
| 11.1 – 11.3      | 1·10 <sup>-4</sup>  | 0 to 700 ps/nm     | -18                  | -7  | 21        | 1     |

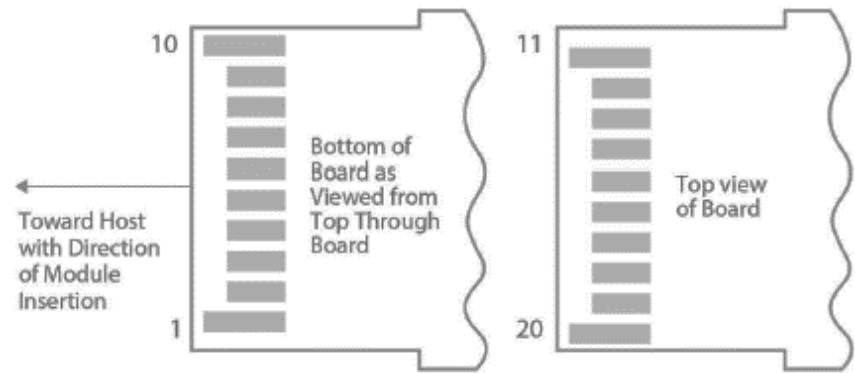
Notes:

- 1. Measured with fixed RxDTV; 0.55nm 3dB filter BW; OSNR resolution 0.2 nm; PRBS 2<sup>31</sup>-1; with external clock and data recovery (CDR) board

Block Diagram



Electrical Pin-out Details



## Pin Descriptions

| Pin | Logic     | Symbol     | Name/Descriptions                                    | Notes |
|-----|-----------|------------|------------------------------------------------------|-------|
| 1   |           | VeeT       | Module Transmitter Ground                            | 1     |
| 2   | LVTTL-O   | TX Fault   | Module Transmitter Fault                             | 2     |
| 3   | LVTTL-I   | TX Disable | Transmitter Disable. Turns off laser output          | 3     |
| 4   | LVTTL-I/O | SDA        | 2-wire Serial interface Data line                    |       |
| 5   | LVTTL-I/O | SCL        | 2-wire Serial Interface Clock                        |       |
| 6   |           | Mod ABS    | Module absent, connect to VeeT or VeeR in the module |       |
| 7   | LVTTL-I   | RS0        | Unused                                               |       |
| 8   | LVTTL-O   | Rx LOS     | Receiver Loss of Signal Indication                   | 2     |
| 9   | LVTTL-I   | RSI        | Unused                                               |       |
| 10  |           | VeeR       | Module Receiver Ground                               | 1     |
| 11  |           | VeeR       | Module Receiver Ground                               | 1     |
| 12  | CML-O     | RD-        | Receiver Inverted Data Output                        |       |
| 13  | CML-O     | RD+        | Receiver Non-Inverted Data Output                    | 1     |
| 14  |           | VeeR       | Module Receiver Ground                               |       |
| 15  |           | VccR       | Module Receiver 3.3V Supply                          |       |
| 16  |           | VccT       | Module Transmitter 3.3V Supply                       |       |
| 17  |           | VeeT       | Module Transmitter Ground                            | 1     |
| 18  | CML-I     | TD+        | Transmitter Non-Inverted Data Input                  |       |
| 19  | CML-I     | TD-        | Transmitter Inverted Data Input                      |       |
| 20  |           | VeeT       | Module Transmitter Ground                            | 1     |

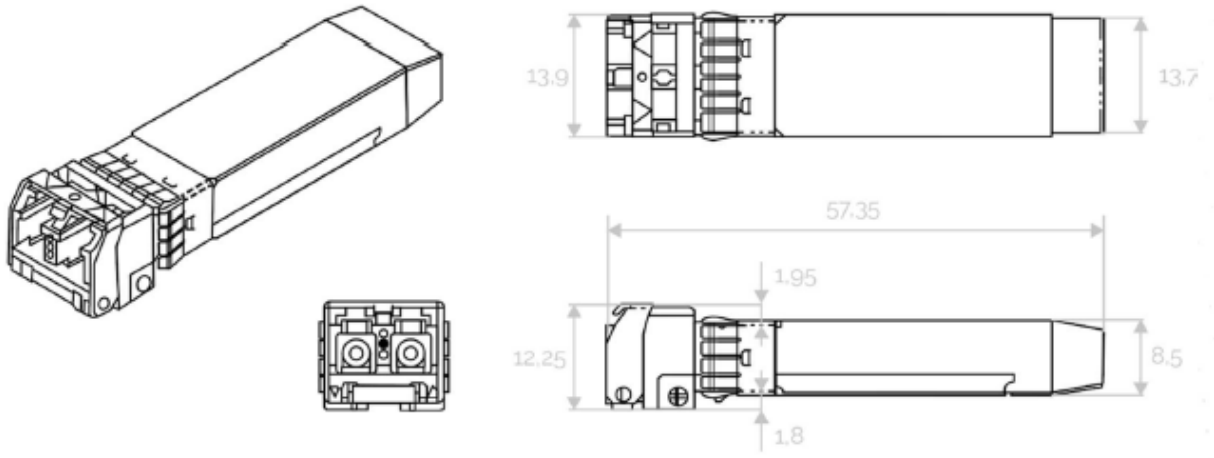
### Notes:

1. The module signal ground pins, VeeR and VeeT, are isolated from the module chassis ground.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7-10 kohms to power supply voltage between 3.3V and 3.5V on the host board.
3. TX\_Disable is an input contact with a 4.7-10 kohm pull-up to VccT inside the module.

### Mechanical Specifications

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

W 13.9mm x L 56.5mm x H 11.85mm



**About AddOn Networks**

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is engrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.

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