

## SFP-10GBASE-LR-20-EX-AO

Extreme Networks® Compatible TAA 10GBase-LR SFP+ Transceiver (SMF, 1310nm, 20km, LC, DOM)

### Features

- Compliant with IEEE802.3ae 10GBASE-LR/LW
- 1310nm DFB-LD Transmitter
- Compliant with MSA SFP+ Specification SFF-8431
- Single 3.3V Power Supply and TTL Logic Interface
- Duplex LC Connector
- Distance up to 20km
- Hot-Pluggable
- Commercial Temperature 0 to 70 Celsius
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS compliant and Lead Free



### Applications

- 1x Fibre Channel
- 1000Base-LX/10GBASE-LR Ethernet
- Access and Enterprise

### Product Description

This Extreme Networks® SFP+ transceiver provides 10GBase-LR throughput up to 20km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Extreme Networks® 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.

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."



## Absolute Maximum Ratings

| Parameter                  | Symbol           | Min. | Typ.    | Max.              | Unit | Notes |
|----------------------------|------------------|------|---------|-------------------|------|-------|
| Maximum Supply Voltage     | V <sub>CC</sub>  | -0.5 |         | 4                 | V    | 1     |
| Storage Temperature        | T <sub>stg</sub> | -40  |         | 85                | °C   |       |
| Operating Case Temperature | T <sub>c</sub>   | 0    |         | 70                | °C   |       |
| Relative Humidity          | RH               | 0    |         | 85                | %    |       |
| Data Rate                  | DR               | 9.83 | 10.3125 | 11.3              | Gb/s | 2     |
| Bit Error Rate             | BER              |      |         | 10 <sup>-12</sup> |      |       |

## Notes:

1. For electrical interface
2. IEEE 802.3ae

## Electrical Characteristics

| Parameter                            | Symbol                         | Min.            | Typ. | Max.                 | Unit | Notes |
|--------------------------------------|--------------------------------|-----------------|------|----------------------|------|-------|
| Module Supply Voltage                | V <sub>CC</sub>                | 3.14            | 3.3  | 3.46                 | V    |       |
| Module Supply Current                | I <sub>CC</sub>                |                 | 200  | 310                  | mA   |       |
| Power Dissipation                    | PD                             |                 | 0.65 | 1.0                  | W    |       |
| Transmitter                          |                                |                 |      |                      |      |       |
| Input Differential Impedance         | R <sub>IN</sub>                |                 | 100  |                      | Ω    |       |
| Differential Data Input Swing        | V <sub>IN</sub> PP             | 180             |      | 700                  | mV   |       |
| Transmit Disable Voltage             | V <sub>D</sub>                 | 2               |      | V <sub>CC</sub>      | V    |       |
| Transmit Enable Voltage              | V <sub>EN</sub>                | V <sub>EE</sub> |      | V <sub>EE</sub> +0.8 | V    |       |
| Receiver                             |                                |                 |      |                      |      |       |
| Differential Data Output Swing       | V <sub>OUT</sub> PP            | 300             |      | 850                  | mV   |       |
| Data Output Rise/Fall Time (20%-80%) | t <sub>r</sub> /t <sub>f</sub> | 28              |      |                      | ps   |       |
| LOS Assert                           | V <sub>LOS</sub> A             | 2               |      | V <sub>CC</sub> HOST | V    |       |
| LOS De-Assert                        | V <sub>LOS</sub> D             | V <sub>EE</sub> |      | V <sub>EE</sub> +0.5 | V    |       |

## Optical Characteristics

| Parameter                       | Symbol               | Min.  | Typ. | Max.  | Unit  | Notes |
|---------------------------------|----------------------|-------|------|-------|-------|-------|
| Transmitter                     |                      |       |      |       |       |       |
| Output Optical Power            | P <sub>TX</sub>      | -8.2  |      | 0.5   | dBm   | 1     |
| Optical Center Wavelength       | $\lambda_c$          | 1260  |      | 1355  | nm    |       |
| Optical Modulation Amplitude    | OMA                  | -5.2  |      |       | dBm   | 2     |
| Extinction Ratio                | ER                   | 3.5   | 5.5  |       | dB    |       |
| Spectral Width(-20dB)           | $\Delta\lambda$      |       |      | 1     | 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>OUT_OFF</sub> |       |      | -30   | dBm   | 1     |
| Transmitter Jitter              |                      |       |      |       |       | 2     |
| Receiver                        |                      |       |      |       |       |       |
| Optical Center Wavelength       | $\lambda_c$          | 1260  |      | 1600  | nm    |       |
| Average Receive Power           | P <sub>RX</sub>      | -14.4 |      | 0.5   | dBm   |       |
| Receiver Sensitivity @10.3Gb/s  | R <sub>X_SEN</sub>   |       |      | -14.4 | dBm   | 3     |
| Receiver Reflectance            | TR <sub>RX</sub>     |       |      | -12   | dB    |       |
| LOS Assert                      | LOS <sub>A</sub>     | -30   |      |       | dBm   |       |
| LOS De-Assert                   | LOS <sub>D</sub>     |       |      | -17   | dBm   |       |
| LOS Hysteresis                  | LOS <sub>H</sub>     | 0.5   |      |       | dB    |       |

### Notes:

1. Average
2. According to IEEE 802.3ae requirement.
3. Test the resulting value using the minimum ER value within the defined range; BER<10<sup>-12</sup>; 2<sup>31</sup>-1 PRBS.

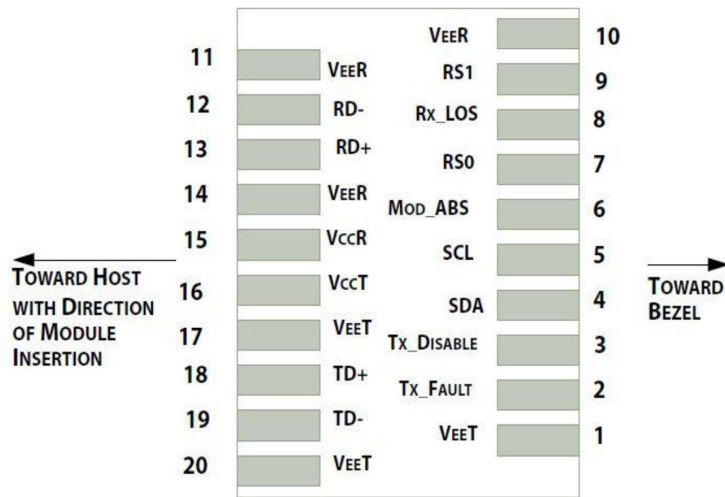
## Pin Descriptions

| Pin | Symbol     | Name/Descriptions                                                         | Ref. |
|-----|------------|---------------------------------------------------------------------------|------|
| 1   | VeeT       | Transmitter Ground.                                                       | 1    |
| 2   | Tx_Fault   | Transmitter Fault. LVTTTL-O. "High" indicates a fault condition.          | 2    |
| 3   | Tx_Disable | Transmitter Disable. LVTTTL-I. "High" or "open" disables the transmitter. | 3    |
| 4   | SDA        | 2-Wire Serial Interface Data. LVCMOS-I/O. MOD-DEF2.                       | 4    |
| 5   | SCL        | 2-Wire Serial Interface Clock. LVCMOS-I/O. MOD-DEF1.                      | 4    |
| 6   | MOD_ABS    | Module Absent (Output). Connected to VeeT or VeeR in the module.          | 5    |
| 7   | RS0        | N/A.                                                                      | 6    |
| 8   | Rx_LOS     | Receiver Loss of Signal. LVTTTL-O.                                        | 2    |
| 9   | RS1        | N/A.                                                                      | 6    |
| 10  | VeeR       | Receiver Ground.                                                          | 1    |
| 11  | VeeR       | Receiver Ground.                                                          | 1    |
| 12  | RD-        | Inverse Received Data Out. CML-O.                                         |      |
| 13  | RD+        | Received Data Out. CML-O.                                                 |      |
| 14  | VeeR       | Receiver Ground.                                                          |      |
| 15  | VccR       | +3.3V Receiver Power.                                                     |      |
| 16  | VccT       | +3.3V Transmitter Power.                                                  |      |
| 17  | VeeT       | Transmitter Ground.                                                       | 1    |
| 18  | TD+        | Transmitter Data In. CML-I.                                               |      |
| 19  | TD-        | Inverse Transmitter Data In. CML-I.                                       |      |
| 20  | VeeT       | Transmitter Ground.                                                       | 1    |

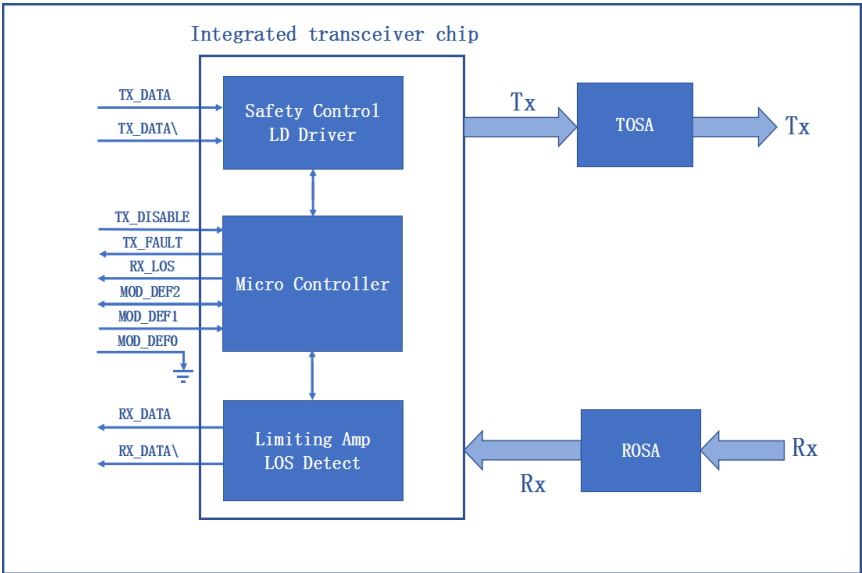
## Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to Host\_Vcc.
3. This input is internally biased high with a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccT.
4. 2-Wire Serial Interface Clock and Data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that, on the host board, requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to the Host\_Vcc.
6. Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 12.1. Rx Rate Select is set at Bit 3, Byte 110, and Address A2h, and Tx Rate Select is set at Bit 3, Byte 118, and Address A2h.  
**Note:** Writing a "1" selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.

Electrical Pin-out Details



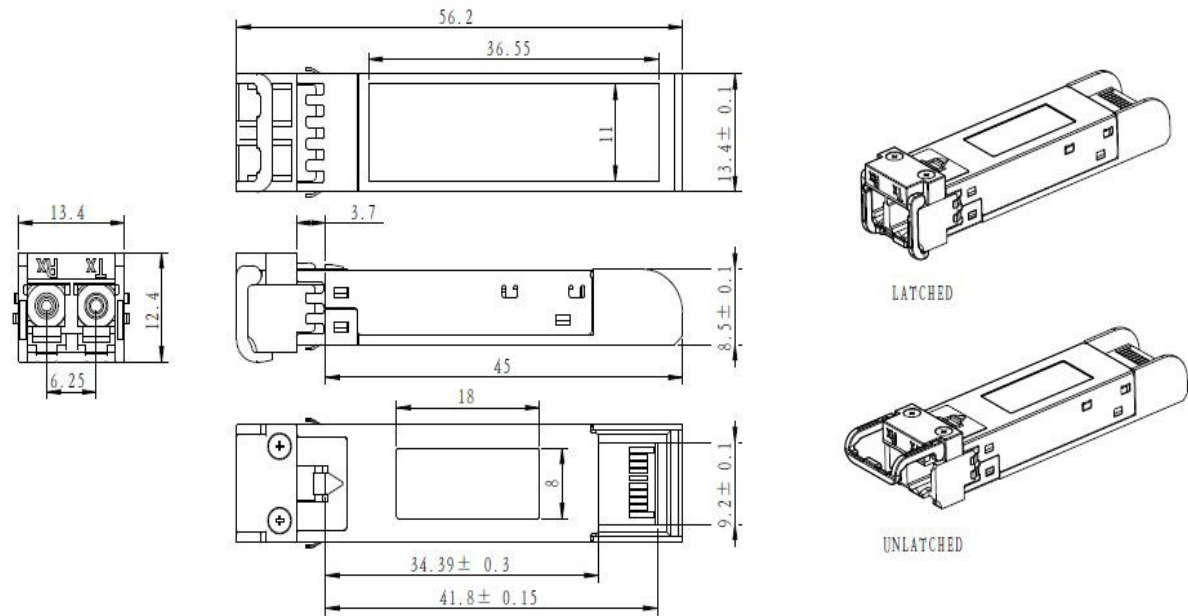
Block Diagram



Mechanical Specifications

ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED

UNIT: mm



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)   |
| 55                                      | 55                                        |
| Cal Constants (40 bytes)                | 95                                        |
| 95                                      | Real Time Diagnostic Interface (24 bytes) |
| 119                                     | 119                                       |
| Vendor Specific (32 bytes)              | Vendor Specific (8 bytes)                 |
| 127                                     | 127                                       |
| Reserved, SFF8079 (128 bytes)           | User Writable EEPROM (120 bytes)          |
| 247                                     | 247                                       |
| 255                                     | 255                                       |
|                                         | Vendor Specific (8 bytes)                 |

## 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 ingrained 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.



## U.S. Headquarters

Email: [sales@addonnetworks.com](mailto:sales@addonnetworks.com)

Telephone: +1 877.292.1701

Fax: 949.266.9273

## Europe Headquarters

Email: [salesupportemea@addonnetworks.com](mailto:salesupportemea@addonnetworks.com)

Telephone: +44 1285 842070