

# SFP-WA-M 1.25 Gigabit Ethernet-Multi Mode Transceiver

SFP BIDI, Single LC Connector, 1310nm FP LD for Multi Mode Fiber, RoHS Compliant



## Features

- 1310nm FP LD
- Multi Data Rate: from 125M to 1.25Gbps, NRZ
- Single +3.3V Power Supply
- RoHS Compliant and Lead-free
- AC/AC Differential Electrical Interface
- Compliant with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP)
- Single LC Connector
- Compliance with specifications for IEEE-802.3z Gigabit Ethernet at 1.25 Gbps
- Compliance with ANSI specifications for Fibre Channel applications at 1.06 Gbps
- Eye Safety  
Designed to meet Laser Class 1 comply with EN60825-1

## Applications

- Gigabit Ethernet Links
- Fibre Channel Links at 1.06 Gbps
- High Speed Backplane Interconnects

## Description

The SFP-WA-M from AAXEON is the high performance and cost-effective module for serial optical data communication applications specified for multimode of multi-rate from 125M to 1.25 Gb/s. It operates with +3.3V power supply. The module is intended for multimode fiber, operates at a nominal wavelength of Tx: 1310nm / Rx: 1550nm and complies with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP). Each module consists of a transmitter optical subassembly, a receiver optical subassembly and an electrical subassembly. All of them are housed in a metal package and the combination produces a reliable component.

The module is a multimode fiber connector transceiver designed for use in Gigabit Ethernet applications and to provide IEEE-802.3z compliant link for 1.25Gb/s intermediate reach applications. The characteristics are performed in accordance with Telcordia Specification GR-468-CORE.

## EMC

Most equipment utilizing high-speed transceivers will be required to meet the following requirements:

- 1) FCC in the United States
- 2) CENELEC EN55022 (CISPR 22) in Europe

To assist the customer in managing the overall equipment EMC performance, the transceivers have been designed to satisfy FCC class B limits and provide good immunity to radio-frequency electromagnetic fields.

## Eye Safety

The transceivers have been designed to meet Class 1 eye safety and comply with EN 60825-1.

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## Product Information

| Model Number | Operating Voltage & SD Output | Wavelength           | Output Power | Sensitivity | Distance                             |
|--------------|-------------------------------|----------------------|--------------|-------------|--------------------------------------|
| SFP-WA-M     | 3.3V TTL AC/AC                | 1310 nm FP / 1550 nm | -10 ~ -4 dBm | ≤-17 dBm    | 550 m(50/125μm)<br>275 m(62.5/125μm) |

## ABSOLUTE MAX RATINGS

| PARAMETER           | SYMBOL          | MIN | MAX             | UNIT | NOTE |
|---------------------|-----------------|-----|-----------------|------|------|
| Storage Temperature | T <sub>S</sub>  | -40 | 85              | °C   |      |
| Supply Voltage      | V <sub>CC</sub> | 0   | 6               | V    |      |
| Data Input Voltage  | ---             | 0   | V <sub>CC</sub> | V    |      |
| Supply Current      | I <sub>S</sub>  |     | 300             | mA   |      |

## OPERATING CONDITIONS

| PARAMETER                  | SYMBOL          | MIN. | TYP. | MAX. | UNIT | NOTE |
|----------------------------|-----------------|------|------|------|------|------|
| Case Operating Temperature | T <sub>A</sub>  | 0    |      | 70   | °C   |      |
| Supply Voltage             | V <sub>CC</sub> | 3.1  |      | 3.5  | V    |      |
| Data Input Voltage Swing   | V <sub>ID</sub> | 300  |      | 1860 | mV   |      |

## ELECTRICAL CHARACTERISTICS

| PARAMETER                                 | SYMBOL            | MIN                   | MAX                   | UNIT | NOTE |
|---|-------------------|-----------------------|-----------------------|------|------|
| <b>Transmitter</b>                        |                   |                       |                       |      |      |
| Transmitter Supply Current                | I <sub>CC</sub> T |                       | 200                   | mA   |      |
| Tx_Disable Input Voltage - Low            | V <sub>IL</sub>   | 0                     | 0.8                   | V    |      |
| Tx_Disable Input Voltage - High           | V <sub>IH</sub>   | 2.0                   | V <sub>CC</sub>       | V    |      |
| Tx_Fault Output Voltage - Low             | V <sub>OL</sub>   | 0                     | 0.8                   | V    |      |
| Tx_Fault Output Voltage - High            | V <sub>OH</sub>   | 2.0                   | V <sub>CC</sub>       | V    |      |
| <b>Receiver</b>                           |                   |                       |                       |      |      |
| Receiver Supply Current                   | I <sub>CC</sub> R |                       | 100                   | mA   |      |
| Receiver Data Output Differential Voltage | V <sub>OD</sub>   | 0.4                   | 1.3                   | V    |      |
| Rx_LOS Output Voltage - Low               | V <sub>OL</sub>   | 0                     | 0.8                   | V    |      |
| Rx_LOS Output Voltage - High              | V <sub>OH</sub>   | 2.0                   | V <sub>CC</sub>       | V    |      |
| MOD_DEF (1) , MOD_DEF (2) - Low           | V <sub>IL</sub>   | -0.6                  | V <sub>CC</sub> × 0.3 | V    |      |
| MOD_DEF (1) , MOD_DEF (2) - High          | V <sub>IH</sub>   | V <sub>CC</sub> × 0.7 | V <sub>CC</sub> + 0.5 | V    |      |

## TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

| PARAMETER                   | SYMBOL         | MIN                            | TYP. | MAX  | UNIT  | NOTE |
|-----------------------------|----------------|--------------------------------|------|------|-------|------|
| Optical Output Power        | P <sub>O</sub> | -10                            |      | -4   | dBm   | 1    |
| Extinction Ratio            | ER             | 9                              |      |      | dB    |      |
| Center Wavelength           | λ <sub>c</sub> | 1270                           |      | 1355 | nm    |      |
| Spectral Width (RMS)        | Δλ             |                                |      | 2.5  | nm    |      |
| RIN                         | RIN            |                                |      | -120 | dB/Hz |      |
| Optical Rise time (20%-80%) | t <sub>r</sub> |                                |      | 260  | ps    | 2    |
| Optical Fall time (20%-80%) | t <sub>f</sub> |                                |      | 260  | ps    | 2    |
| Output Eye                  |                | Compliant with IEEE802.3z/D5.0 |      |      |       |      |

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## RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

| PARAMETER                                      | SYMBOL      | MIN       | TYP. | MAX  | UNIT | NOTE |
|--|-------------|-----------|------|------|------|------|
| Maximum Input Optical Power                    | $P_{max}$   | -3        |      |      | dBm  | 3    |
| Minimum Input Optical Power                    | 1.25Gb/s    |           |      | -17  |      | 3    |
|  | 1.06Gb/s    |           |      | -17  |      | 3    |
|  | 622Mb/s     | $P_{min}$ |      | -17  | dBm  | 4    |
|  | 155Mb/s     |           |      | -17  |      | 4    |
|  | 125Mb/s     |           |      | -17  |      | 3    |
| Operating Wavelength                           | $\lambda$   | 1480      |      | 1580 | nm   |      |
| Optical Return Loss                            | ORL         | 14        |      |      | dB   |      |
| Receiver Electrical 3dB Upper Cutoff Frequency | ---         |           |      | 1500 | MHz  |      |
| LOS of Signal - Asserted                       | $P_A$       | -35       |      |      | dBm  |      |
| LOS of Signal - Deasserted                     | $P_D$       |           |      | -17  | dBm  |      |
| Loss of Signal -Hysterisis                     | $P_D - P_A$ | 0.5       |      |      | dB   |      |

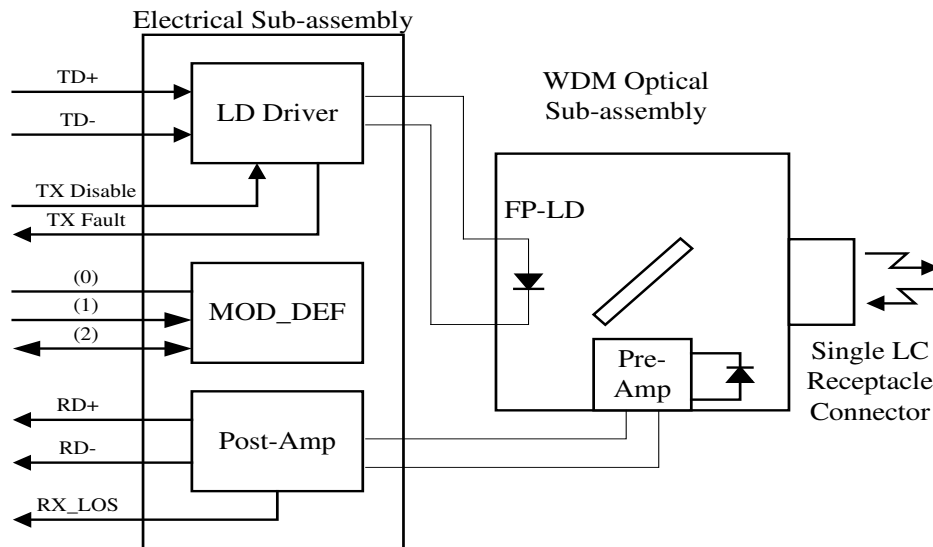
### Notes:

1. Measured average power coupled into 62.5/125 $\mu$ m multimode fiber.
2. These are 20-80% values.
3. Measured with  $2^7-1$  PRBS at BER< $10^{-12}$
4. Measured with  $2^{23}-1$  PRBS at BER< $10^{-10}$

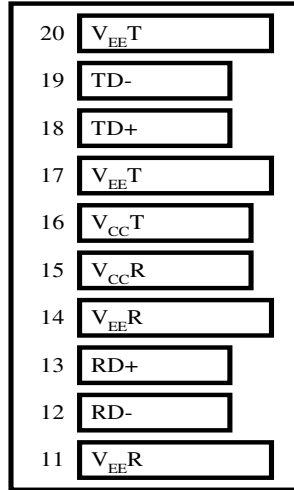
## TIMING CHARACTERISTICS

| PARAMETER                                       | SYMBOL          | MIN | TYP. | MAX | UNIT    | NOTE |
|---|-----------------|-----|------|-----|---------|------|
| TX_DISABLE Assert Time                          | $t_{off}$       |     |      | 10  | $\mu$ s |      |
| TX_DISABLE Negate Time                          | $t_{on}$        |     |      | 1   | ms      |      |
| Time to initialize, include reset of TX_FAULT   | $t_{init}$      |     |      | 300 | ms      |      |
| TX_FAULT from fault to assertion                | $t_{fault}$     |     |      | 100 | $\mu$ s |      |
| TX_DISABLE time to start reset                  | $t_{reset}$     | 10  |      |     | $\mu$ s |      |
| Receiver Loss of Signal Assert Time (off to on) | $t_{A,RX\_LOS}$ |     |      | 100 | $\mu$ s |      |
| Receiver Loss of Signal Assert Time (on to off) | $t_{D,RX\_LOS}$ |     |      | 100 | $\mu$ s |      |

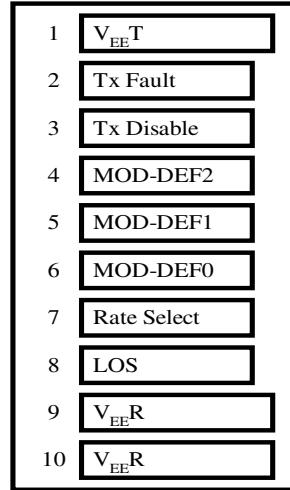
## BLOCK DIAGRAM OF TRANSCEIVER



## PIN OUT DIAGRAM OF TRANSCEIVER



Top of Board

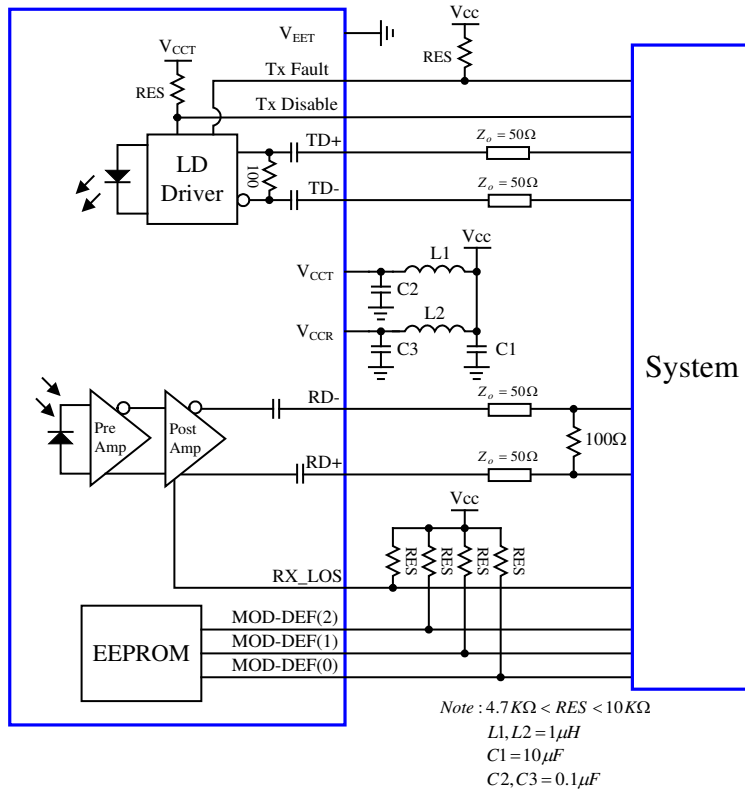


Bottom of Board (As Viewed through Top of Board)

## PIN OUT TABLE

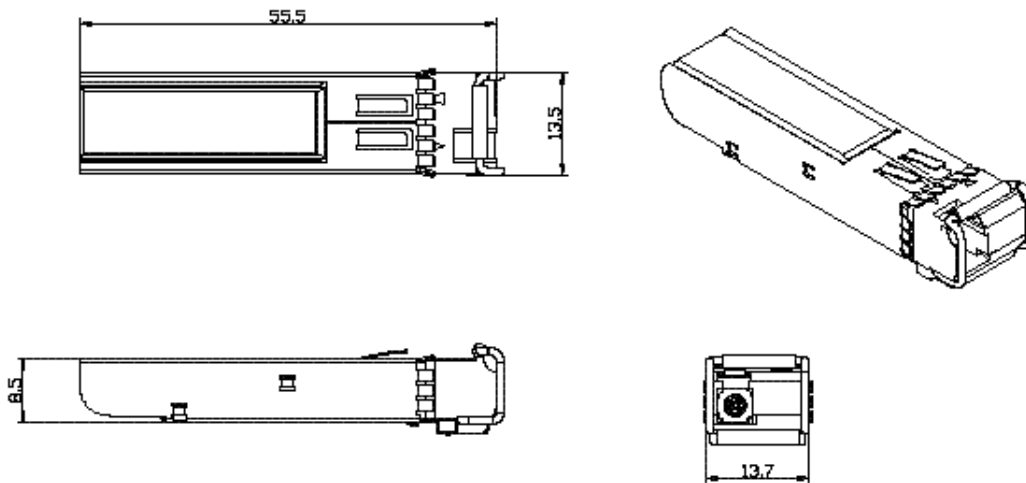
| Pin | Symbol      | Functional Description                                |
|-----|-------------|---|
| 1   | VeeT        | Transmitter Ground                                    |
| 2   | TX Fault    | Transmitter Fault Indication                          |
| 3   | TX Disable  | Transmitter Disable – Module disables on high or open |
| 4   | MOD-DEF(2)  | Module Definition 2 – Two wire serial ID interface    |
| 5   | MOD-DEF(1)  | Module Definition 1 – Two wire serial ID interface    |
| 6   | MOD-DEF(0)  | Module Definition 0 – Grounded in module              |
| 7   | Rate Select | Not Connected   |
| 8   | LOS         | Loss of Signal  |
| 9   | VeeR        | Receiver Ground                                       |
| 10  | VeeR        | Receiver Ground                                       |
| 11  | VeeR        | Receiver Ground                                       |
| 12  | RD-         | Inverse Received Data Out                             |
| 13  | RD+         | Received Data Out                                     |
| 14  | VeeR        | Receiver Ground                                       |
| 15  | VccR        | Receiver Power  |
| 16  | VccT        | Transmitter Power                                     |
| 17  | VeeT        | Transmitter Ground                                    |
| 18  | TD+         | Transmitter Data In                                   |
| 19  | TD-         | Inverse Transmitter Data In                           |
| 20  | VeeT        | Transmitter Ground                                    |

## RECOMMENDED CIRCUIT SCHEMATIC



## MECHANICAL DIMENSIONS

Units in mm



All dimensions are  $\pm 0.2\text{mm}$  unless otherwise specified.