

# PRODUCT SPECIFICATION

|                     |                                               |                                    |
|---------------------|-----------------------------------------------|------------------------------------|
| <b>Part No.:</b>    | <b>AC-SP-3G25-40&amp;AC-SP-3G25-40F (工业级)</b> |                                    |
| <b>Description:</b> | 25G SFP28 Transceiver, SMF 1310nm 40km        |                                    |
| <b>Release Date</b> | <b>Rev.</b>                                   | <b>Revision Change Description</b> |
| <b>2017/06/07</b>   | <b>A0</b>                                     | New Release                        |
| <b>2020/12/28</b>   | <b>A1</b>                                     | Template Update                    |

## Features

- ✧ Operating data rate up to 25.78Gbps
- ✧ Up to 40km transmission distance
- ✧ High sensitivity APD photodiode and TIA
- ✧ Rate Adaptation
- ✧ LC single connector
- ✧ Hot pluggable 20pin connector
- ✧ Low power consumption <1.5 W
- ✧ Single +3.3V $\pm$ 5% power supply
- ✧ Compliant with SFF-8472& IEEE 802.3cc
- ✧ Fully RoHS Compliant
- ✧ Operating temperature range:
  - Commercial: 0°C to +70°C
  - Industrial: -40°C to +85°C

## Application

- ✧ 25GE BASE-ER Ethernet
- ✧ CPRI Option 10/eCPRI

## Standard

- ✧ Compliant with MSA SFP+ specification(SFF-8431)
- ✧ Compliant with SFF-8472
- ✧ Compliant to IEEE 802.3ae

## Specification

| Absolute Maximum Ratings         |                 |      |         |                    |      |
|----------------------------------|-----------------|------|---------|--------------------|------|
| Parameter                        | Symbol          | Min  | Max     | Unit               |      |
| Storage Temperature Range        | TS              | -40  | 85      | °C                 |      |
| Relative Humidity                | RH              | 0    | 85      | %                  |      |
| Recommended Operating Conditions |                 |      |         |                    |      |
| Parameter                        | Symbol          | Min  | Typical | Max                | Unit |
| Power Supply Voltage             | V <sub>CC</sub> | 3.14 | 3.3     | 3.46               | V    |
| Bit Rate                         | BR              |      | 25.78   |                    | Gb/s |
| Bit Error Ratio                  | BER             |      |         | 5*10 <sup>-5</sup> |      |
| Max Supported Link Length        | L               |      |         | 40                 | Km   |

## Electric Ports Definition

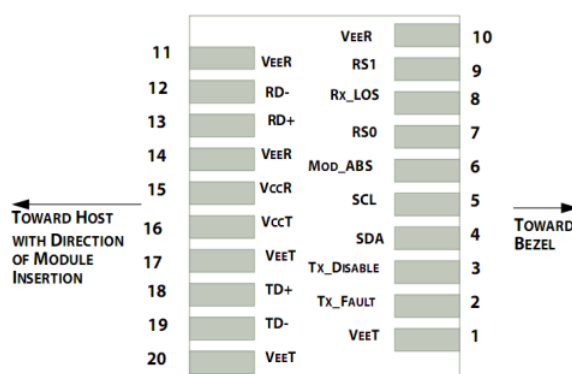
| Transmitter                      |                    |                 |         |                      |       |       |
|----------------------------------|--------------------|-----------------|---------|----------------------|-------|-------|
| Parameter                        | Symbol             | Min             | Typical | Max                  | Unit  | Notes |
| Input Differential Impedance     | R <sub>IN</sub>    |                 | 100     |                      | Ω     |       |
| Single-ended Data Input Swing    | V <sub>IN</sub>    | 90              |         | 450                  | mVp-p |       |
| Transmit Disable Voltage         | V <sub>DIS</sub>   | 2               |         | V <sub>CCHOST</sub>  | V     |       |
| Transmit Enable Voltage          | V <sub>EN</sub>    | V <sub>EE</sub> |         | V <sub>EE</sub> +0.8 | V     |       |
| Transmit Fault Assert Voltage    | V <sub>FA</sub>    | 2               |         | V <sub>CCHOST</sub>  | V     |       |
| Transmit Fault De-Assert Voltage | V <sub>FDA</sub>   | V <sub>EE</sub> |         | V <sub>EE</sub> +0.4 | V     |       |
| Receiver                         |                    |                 |         |                      |       |       |
| Parameter                        | Symbol             | Min             | Typical | Max                  | Unit  | Notes |
| Single-ended Data Output Swing   | V <sub>OD</sub>    | 200             |         | 450                  | mVp-p |       |
| LOS Fault                        | V <sub>LOSFT</sub> | 2               |         | V <sub>CCHOST</sub>  | V     |       |
| LOS Normal                       | V <sub>LOSNR</sub> | V <sub>EE</sub> |         | V <sub>EE</sub> +0.4 | V     |       |

| Optical transmitter Characteristic |                  |      |         |      |      |       |
|------------------------------------|------------------|------|---------|------|------|-------|
| Parameter                          | Symbol           | Min  | Typical | Max  | Unit | Notes |
| Center Wavelength                  | λ                | 1290 |         | 1330 | nm   |       |
| Side-mode Suppression Ratio        | SMSR             | 30   |         |      | dB   |       |
| Average Optical Power              | P <sub>avg</sub> | -3   |         | 6.0  | dBm  |       |
| Optical Modulation Amplitude       | TxOMA            | 0    |         |      | dBm  |       |
| Transmitter and Dispersion Penalty | TDP              |      |         | 2.7  | dB   |       |

| Average Launch Power of OFF Transmitter | $P_{off}$ |      |         | -20  | dBm  |       |
|-----------------------------------------|-----------|------|---------|------|------|-------|
| Extinction Ratio                        | ER        | 4    |         |      | dB   |       |
| Optical Return Loss Tolerance           |           |      |         | 20   | dB   |       |
| Transmitter Reflectance                 |           |      |         | -26  | dB   |       |
| Optical receiver Characteristics        |           |      |         |      |      |       |
| Parameter                               | Symbol    | Min  | Typical | Max  | Unit | Notes |
| Center Wavelength                       | $\lambda$ | 1290 |         | 1330 | nm   |       |
| Damage Threshold                        |           | -3   |         |      | dBm  |       |
| Receive Power Overload                  |           |      |         | -5   | dBm  |       |
| Receiver Reflectance                    |           |      |         | -26  | dB   |       |
| Receiver Sensitivity (OMA)              | $S_{OMA}$ |      |         | -19  | dBm  | Note1 |
| LOS Assert                              | $LOS_A$   | -30  |         |      | dBm  |       |
| LOS De-Assert                           | $LOS_D$   |      |         | -21  | dBm  |       |

Note1: Measured at 25.78125Gb/s, ER>4dBm, PRBS 231-1 and BER better than or equal to 5E-5;

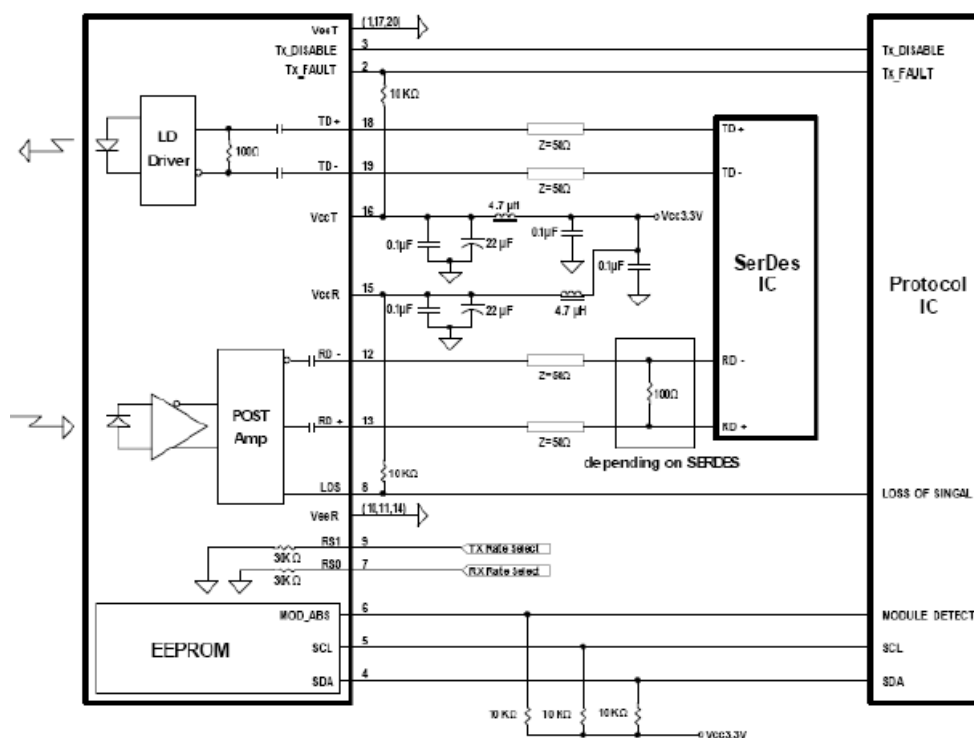
## Pin Descriptions



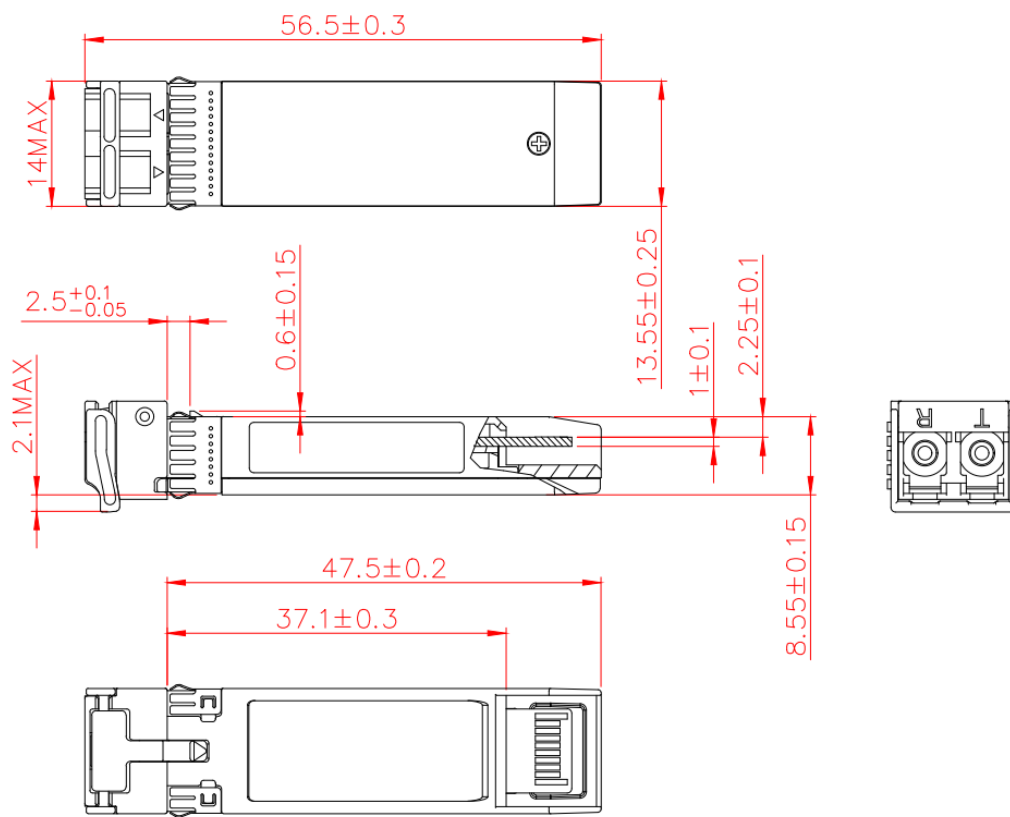
| Pin     | Symbol     | Name                           | Description                                                                                                         |
|---------|------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------|
| 1,17,20 | VeeT       | Transmitter Signal Ground      | Connected to signal ground on the host board.                                                                       |
| 2       | TX Fault   | Transmitter Fault Out (OC)     | Module transmitter fault output.                                                                                    |
| 3       | TX Disable | Transmitter Disable In (LVTTL) | Module transmitter disable control.                                                                                 |
| 4       | SDA        | Module Definition Identifiers  | Serial ID with SFF 8472 Diagnostics<br>Module Definition pins should be pulled up to Host Vcc with 10 kΩ resistors. |
| 5       | SCL        |                                |                                                                                                                     |
| 6       | MOD-ABS    |                                |                                                                                                                     |
| 7       | RS0        | Receiver Rate Select (LVTTL)   | Rate select 0(Rx):Low=CDR Bypass ;                                                                                  |

|          |      |                                    |                                                                            |
|----------|------|------------------------------------|----------------------------------------------------------------------------|
| 9        | RS1  | Transmitter Rate Select (LVTTTL)   | High=CDR Select<br>Rate select 1(Tx):Low=CDR Bypass ;<br>High=CDR Select   |
| 8        | LOS  | Loss of Signal Out (OC)            | Receiver loss of signal.                                                   |
| 10,11,14 | VeeR | Receiver Signal Ground             | Connected to signal ground on the host board.                              |
| 12       | RD-  | Receiver Negative DATA Out (CML)   | Receiver inverted data output, internally AC coupled and terminated        |
| 13       | RD+  | Receiver Positive DATA Out (CML)   | Receiver non-inverted data output, internally AC coupled and terminated.   |
| 15       | VccR | Receiver Power Supply              | Receiver Power 3.3V Supply.                                                |
| 16       | VccT | Transmitter Power Supply           | Transmitter Power 3.3V Supply.                                             |
| 18       | TD+  | Transmitter Positive DATA In (CML) | Transmitter non-inverted data input, internally AC coupled and terminated. |
| 19       | TD-  | Transmitter Negative DATA In (CML) | Transmitter inverted data Input, internally AC coupled and terminated.     |

## Recommended Interface Circuit



## Package Outline



## Digital Diagnostics Functions

As defined by the SFF-8472, The SFP28 transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 0x00h to the maximum address of the memory. For more detailed information, including memory map definitions, please refer the SFF-8472 documentation.

## Digital Diagnostic Monitor Accuracy

The following characteristics are defined over recommended operating conditions

| Parameter                                      | Accuracy | Unit  |
|------------------------------------------------|----------|-------|
| Internally measured transceiver temperature    | +/-3     | deg.C |
| Internally measured transceiver supply voltage | +/-3     | %     |
| Measured Tx bias current                       | +/-10    | %     |
| Measured Tx output power                       | +/-3     | dB    |
| Measured Rx received average optical power     | +/-3     | dB    |

## Ordering information

| Part. No       | Specifications |                |            |             |     |              |              |               |     |
|----------------|----------------|----------------|------------|-------------|-----|--------------|--------------|---------------|-----|
|                | Pack           | Rate<br>(Gbps) | Tx<br>(nm) | Po<br>(dBm) | RX  | Sen<br>(dBm) | Temp<br>(°C) | Reach<br>(km) | DDM |
| AC-SP-3G25-40  | SFP28          | 25             | DML        | -3~6        | APD | -19          | 0~70         | 40            | Y   |
| AC-SP-3G25-40F | SFP28          | 25             | DML        | -3~6        | APD | -19          | -40~85       | 40            | Y   |