

## Specification

### Small Form Factor

Duplex LC Receptacle – SFF

### Optical Transceivers

STM-1 / OC-3 / 100BASE  
155.52Mbit/s



## Ordering Information

**TSP-FxAA1-D28**

↓  
Temperature  
1: +0 ~ +70°C  
2: -40 ~ +85°C

| Model Name    | Voltage | Category    | Device type | SD/LOS | Temperature | Media                                | Distance |
|---------------|---------|-------------|-------------|--------|-------------|--------------------------------------|----------|
| TSP-F1AA1-D28 | 3.3V    | W/O<br>DDMI | FP / PIN    | LVPECL | +0 ~ +70°C  | Multi-Mode Fiber<br>(50 and 62.5μ m) | 2Km      |
| TSP-F2AA1-D28 |         |             |             |        | -40 ~ +85°C |                                      |          |

## Features

- ROHS Compliant
- Standard Small Form Factor Package – SFF MSA Compliant
- SONET/SDH Standard Compliant
- Fast Ethernet Standard Compliant
- Laser Class 1 Product – IEC / EN 60825-1 Compliant
- Standard Duplex LC Receptacle Optical Interface
- Single + 3.3 V Power Supply
- Differential LVPECL Data Input and Output
- LVPECL Signal Detect
- Low Power Consumption

## Absolute Maximum Ratings

| Parameter                   | Symbol          | Min | Typ | Max             | Unit |
|-----------------------------|-----------------|-----|-----|-----------------|------|
| Storage temperature         | T <sub>S</sub>  | -40 |     | 85              | °C   |
| Supply voltage              | V <sub>CC</sub> | 0   |     | 4               | V    |
| Operating Relative Humidity | RH              | 5   |     | 95              | %    |
| Input voltage               | V <sub>IN</sub> | 0   |     | V <sub>CC</sub> | V    |

### Operating Conditions

| Parameter                                       | Symbol            | Min | Typ | Max | Unit |
|---|-------------------|-----|-----|-----|------|
| Supply Voltage                                  | V <sub>CC</sub>   | 3.1 | 3.3 | 3.5 | V    |
| Operating Case temperature<br>( TSP-F1AA1-D28 ) | Top               | 0   |     | 70  | °C   |
| Operating Case temperature<br>( TSP-F2AA1-D28 ) |                   | -40 |     | 85  |      |
| Current   | I <sub>CC</sub>   | -   | -   | 250 | mA   |
| Soldering Temperature (10sec)                   | T <sub>sold</sub> | -   |     | 260 | °C   |

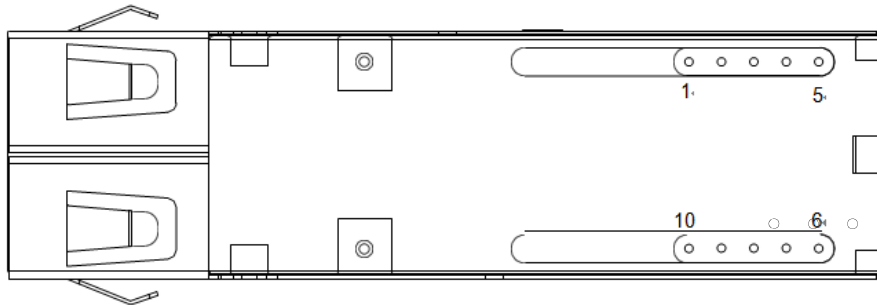
### Transmitter Specifications ( V<sub>CC</sub> = 3.1V ~ 3.5V ; Top = 0°C~70°C / Top = -40 ~ 85°C )

| Parameter                                 | Symbol                           | Min  | Typ  | Max                  | Unit  |
|---|----------------------------------|------|------|----------------------|-------|
| <b>Optical Characteristics</b>            |                                  |      |      |                      |       |
| Output Optical Power                      | P <sub>O</sub>                   | -20  | --   | -12                  | dBm   |
| Extinction Ratio                          | ER                               | 9    | --   | --                   | dB    |
| Center Wavelength                         | λ                                | 1260 | 1310 | 1360                 | nm    |
| Spectral Width (RMS)                      | σλ                               | --   | --   | 7                    | nm    |
| Rise/Fall time (10-90%)                   | T <sub>r</sub> / T <sub>f</sub>  | --   | --   | 2                    | ns    |
| Relative Intensity Noise                  | RIN                              | --   | --   | -120                 | dB/Hz |
| Output Eye                                | Compliant with IEEE 802.3z       |      |      |                      |       |
| Max. P <sub>out</sub> TX-DISABLE Asserted | P <sub>OFF</sub>                 | --   | --   | -45                  | dBm   |
| <b>Electrical Characteristics</b>         |                                  |      |      |                      |       |
| Transmitter Data Input Voltage - High     | V <sub>IH</sub> -V <sub>CC</sub> | -1.1 | --   | -0.74                | V     |
| Transmitter Data Input Voltage - Low      | V <sub>IL</sub> -V <sub>CC</sub> | -2.0 |      | -1.58                | V     |
| Tx_Disable_Input_High                     | V <sub>DISH</sub>                | 2.0  | --   | V <sub>CC</sub> +0.3 | V     |
| Tx_Disable_Input_Low                      | V <sub>DISL</sub>                | 0    | --   | 0.8                  | V     |

**Receiver Specifications** (  $V_{CC} = 3.1V \sim 3.5V$  ;  $T_{op} = 0^{\circ}C \sim 70^{\circ}C$  /  $T_{op} = -40 \sim 85^{\circ}C$  )

| Parameter   | Symbol            | Min  | Typ | Max   | Unit |
|---|-------------------|------|-----|-------|------|
| <b>Optical Characteristics</b>  |                   |      |     |       |      |
| Optical Input Power-maximum   | $P_{max}$         | -3   | --  | --    | dBm  |
| Receiver Sensitivity<br>( PRBS=2 <sup>23</sup> -1 ; BER ≤ 10 <sup>-10</sup> ) | Sens              | --   | --  | -30   | dBm  |
| Operating Center Wavelength   | $\lambda$         | 1260 | --  | 1610  | nm   |
| Signal Detect – Asserted  | PSA               | --   | --  | -30   | dBm  |
| Signal Detect – De-asserted   | PSD               | -45  | --  | --    | dBm  |
| Signal Detect – Hysteresis  | PSH               | 0.5  |     | 6     | dB   |
| <b>Electrical Characteristics</b>   |                   |      |     |       |      |
| Receiver Data Output Voltage - High   | $V_{OH} - V_{CC}$ | -1.1 | --  | -0.74 | V    |
| Receiver Data Output Voltage - Low  | $V_{OL} - V_{CC}$ | -2.0 | --  | -1.58 | V    |
| Signal Detect Output Voltage - High   | $V_{OH} - V_{CC}$ | -1.1 | --  | -0.74 | V    |
| Signal Detect Output Voltage - Low  | $V_{OL} - V_{CC}$ | -2.0 |     | -1.58 | V    |

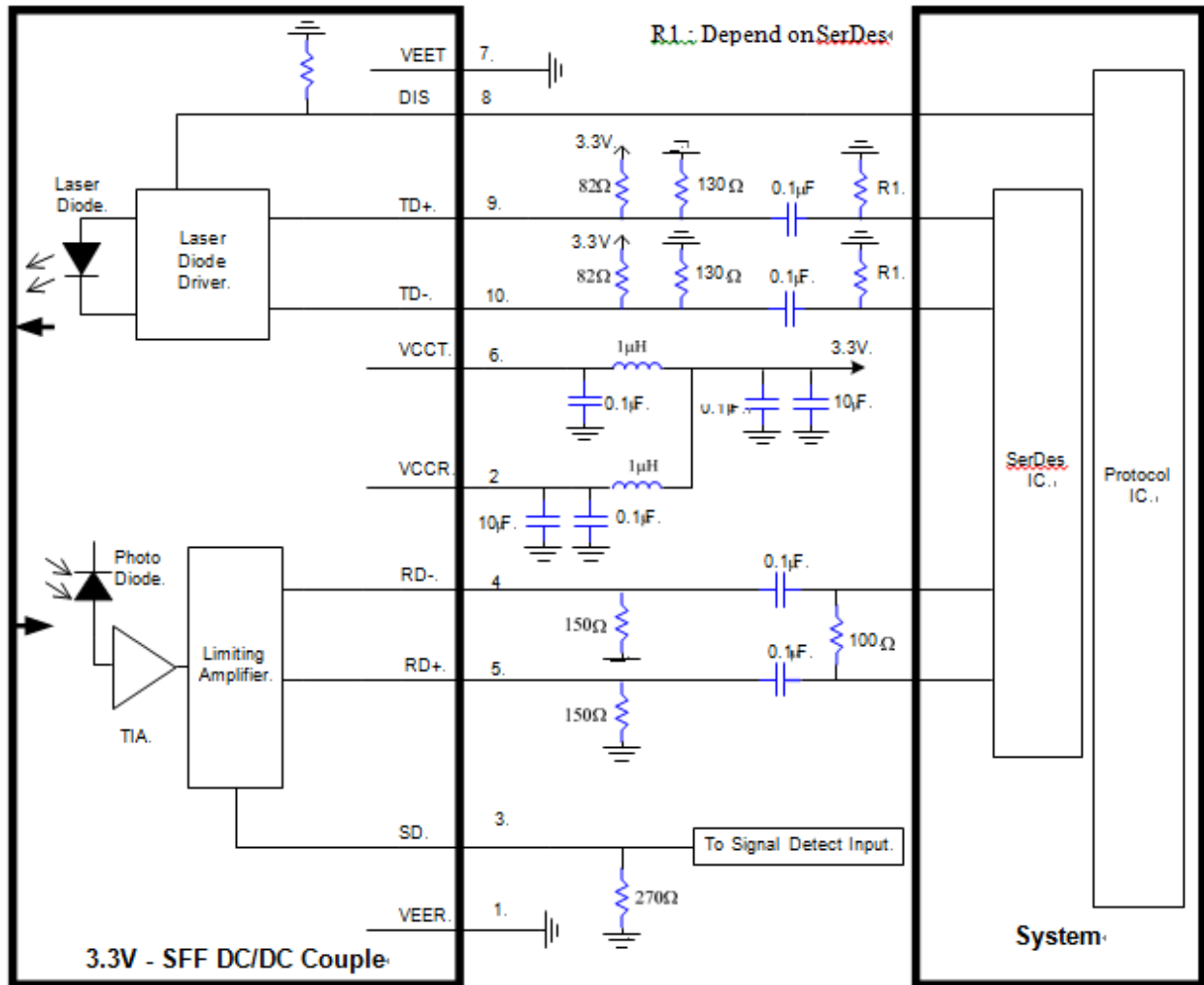
Pin Definition and Descriptions



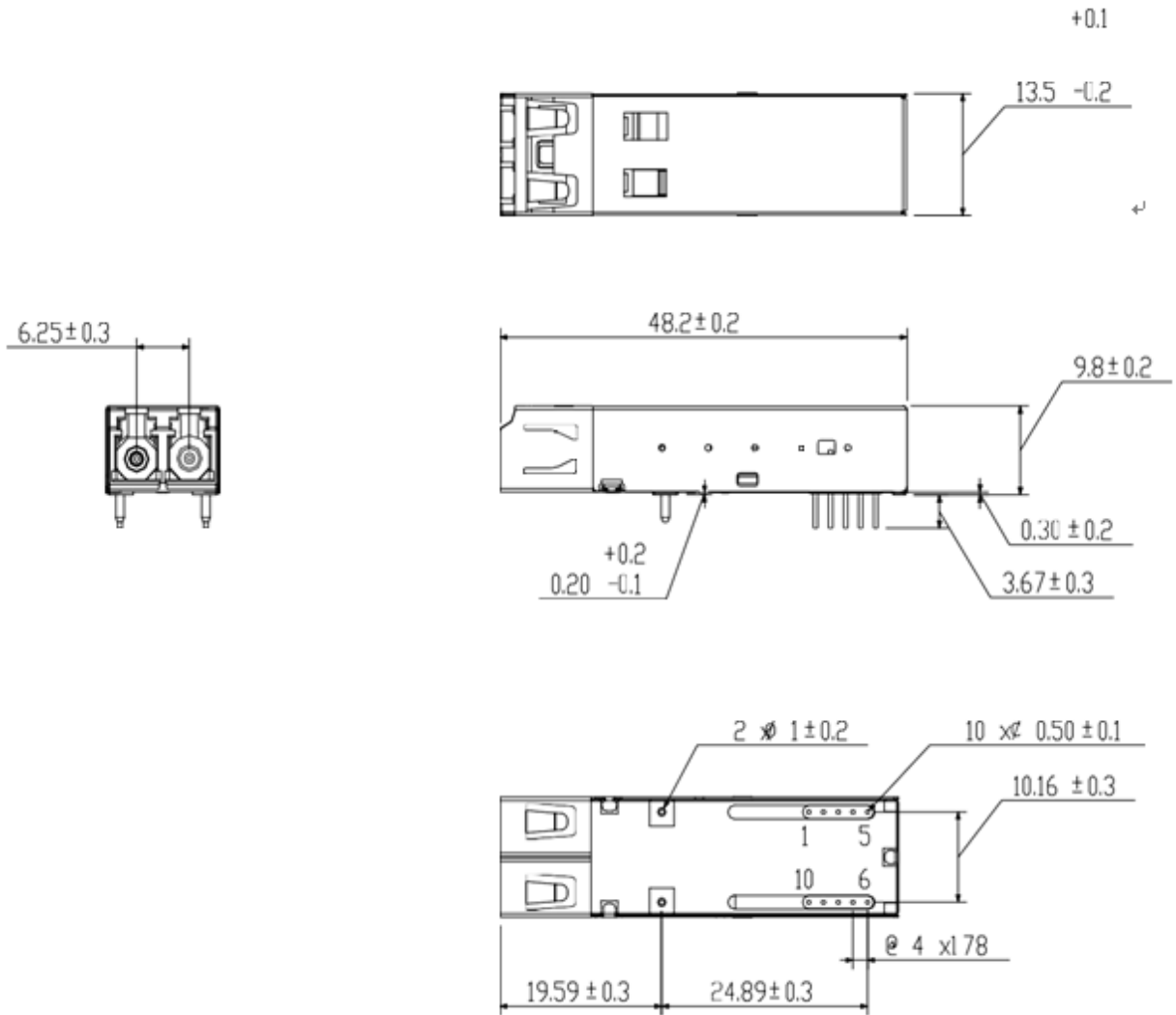
Bottom View

| Pin | Name | Input / Output Level | Description  | Ref. |
|-----|------|----------------------|--|------|
| 1   | VEER | Input                | Receiver ground  |      |
| 2   | VCCR | Input                | Receiver power supply  |      |
| 3   | SD   | Output/LVPECL        | Receiver signal detect. High signal indicates optical signal is present at receiver input. |      |
| 4   | RD-  | Output/LVPECL        | Inverted receiver data output  |      |
| 5   | RD+  | Output/LVPECL        | Non-inverted receiver data output  |      |
| 6   | VCCT | Input                | Transmitter power supply   |      |
| 7   | VEET | Input                | Transmitter ground   |      |
| 8   | DIS  | Input/LVTTL          | Transmitter Disable Control  |      |
| 9   | TD+  | Input/LVPECL         | Transmitter non-inverted data input  |      |
| 10  | TD-  | Input/LVPECL         | Transmitter inverted data input  |      |

Recommended Circuit Diagram



Mechanical Outlines ( Unit : mm)



## ESD

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

## Contact Information

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