

1000BASE-LX/LH SFP Module SM LC 10km data range (1310nm) Cisco compatible



## GBIC-, SFP-, XFP-, XENPAK-Transceiver

The tde Small Form Pluggable Optical Transceiver are easy installed for enterprise and telecom applications. The tde SFP modular line provides a fully compatible, highly reliable and volume accessible supply of quality transceiver products with excellent performance for design-in manufacturing and end-user enterprise applications.



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### Technical Data

#### Features

- Operating data rate up to 1.25Gbps
- 1310nm FP LD Transmitter
- Distance up to 10km
- Single 3.3V Power supply and TTL Logic Interface
- Duplex LC Connector Interface
- Hot Pluggable
- Operating Case Temperature Industrial: -40°C~+85°C
- Compliant with MSA SFP Specification
- Digital diagnostic monitor interface Compatible with SFF-8472

#### Applications

- Gigabit Ethernet Switches and Routers
- Fiber Channel Switch Infrastructure
- XDSL Applications
- Metro Edge Switching

#### Regulatory Compliance

| Features                                             | Standard                                                           | Performance                                                                    |
|------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E<br>Method 3015.7                                      | Class 1(>500 V)<br>Isolation with the case                                     |
| Electromagnetic Interference (EMI)                   | FCC Part 15 Class B                                                | Compatible with standards                                                      |
| Laser Eye Safety                                     | FDA 21CFR 1040.10 and<br>1040.11<br>EN60950, EN (IEC)<br>60825-1,2 | Compatible with Class I<br>laser product.<br>Compatible with T üV<br>standards |
| Component Recognition                                | UL and CUL                                                         | UL file E317337                                                                |
| Green Products                                       | RoHS                                                               | RoHS6                                                                          |

#### Absolute Maximum Ratings

| Parameter           | Symbol          | Min. | Max. | Unit |
|---------------------|-----------------|------|------|------|
| Storage Temperature | T <sub>s</sub>  | -40  | +85  | °C   |
| Supply Voltage      | V <sub>CC</sub> | -0.5 | 3.6  | V    |

#### Recommended Operating Conditions

| Parameter                  | Symbol             | Min. | Typ. | Max. | Unit |
|----------------------------|--------------------|------|------|------|------|
| Operating Case Temperature | T <sub>A</sub>     | -40  |      | +85  | °C   |
| Power Supply Voltage       | V <sub>CC</sub>    | 3.15 | 3.3  | 3.45 | V    |
| Power Supply Current       | I <sub>CC</sub>    |      |      | 300  | mA   |
| Surge Current              | I <sub>Surge</sub> |      |      | +30  | mA   |

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Baud Rate

1.25

GBaud

### Performance Specifications - Electrical

| Parameter                       | Symbol           | Min.     | Typ. | Max.                 | Unit   | Notes                                        |
|---------------------------------|------------------|----------|------|----------------------|--------|----------------------------------------------|
| <b>Transmitter</b>              |                  |          |      |                      |        |                                              |
| LVPECL Inputs (Differential)    | V <sub>in</sub>  | 400      |      | 2500                 | mVp    | AC coupled inputs                            |
| Input Impedance (Differential)  | Z <sub>in</sub>  | 85       | 100  | 115                  | ohms   | R <sub>in</sub> > 100 kohms @ DC             |
| Tx_DISABLE Input Voltage - High |                  | 2        |      | 3.45                 | V      |                                              |
| Tx_DISABLE Input Voltage - Low  |                  | 0        |      | 0.8                  | V      |                                              |
| Tx_FAULT Output Voltage - High  |                  | 2        |      | V <sub>cc</sub> +0.3 | V      | I <sub>o</sub> = 400µA; Host V <sub>cc</sub> |
| Tx_FAULT Output Voltage - Low   |                  | 0        |      | 0.5                  | V      | I <sub>o</sub> = -4.0mA                      |
| <b>Receiver</b>                 |                  |          |      |                      |        |                                              |
| LVPECL Outputs (Differential)   | V <sub>out</sub> | 400      | 800  | 1200                 | mVpp   | AC coupled outputs                           |
| Output Impedance (Differential) | Z <sub>out</sub> | 85       | 100  | 115                  | ohms   |                                              |
| Rx_LOS Output Voltage - High    |                  | 2        |      | V <sub>cc</sub> +0.3 | V      | I <sub>o</sub> = 400µA; Host V <sub>cc</sub> |
| Rx_LOS Output Voltage - Low     |                  | 0        |      | 0.8                  | V      | I <sub>o</sub> = -4.0mA                      |
| MOD_DEF ( 0:2 )                 | VoH<br>VoL       | 2.5<br>0 |      | 0.5                  | V<br>V | With Serial ID                               |

### Optical and Electrical Characteristics

| Parameter                     | Symbol                | Min. | Typ. | Max. | Unit |
|-------------------------------|-----------------------|------|------|------|------|
| 9µm Core Diameter SMF         |                       |      |      | 10   | km   |
| Data Rate                     |                       |      | 1.25 |      | Gbps |
| <b>Transmitter</b>            |                       |      |      |      |      |
| Centre Wavelength             | λ <sub>c</sub>        | 1260 | 1310 | 1360 | nm   |
| Spectral Width (RMS)          | σ                     |      |      | 3    | nm   |
| Average Output Power          | P <sub>out</sub>      | -10  |      | -3   | dBm  |
| Extinction Ratio              | EX                    | 9    |      |      | dB   |
| Rise/Fall Time (20% – 80%)    | tr/tf                 |      |      | 1.2  | ns   |
| Total Jitter                  | TJ                    |      |      | 56.5 | ps   |
| Output Optical Eye            | ITU-T G.957 Compliant |      |      |      |      |
| Data Input Swing Differential | V <sub>IN</sub>       | 500  |      | 2000 | mV   |
| Input Differential Impedance  | Z <sub>IN</sub>       | 90   | 100  | 110  | Ω    |

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|                                         |                  |                      |          |
|-----------------------------------------|------------------|----------------------|----------|
| TX Disable - Disable                    | 2.0              | VCC+0.3              | V        |
| - Enable                                | 0                | 0.8                  | V        |
| TX_Fault - Fault                        | 2.0              | VCC+0.3              | V        |
| - Normal                                | 0                | 0.8                  | V        |
| TX_Disable Assert Time t <sub>off</sub> | 10               |                      | us       |
| <b>Receiver</b>                         |                  |                      |          |
| Centre Wavelength                       | $\lambda_c$      | 1100                 | 1600     |
|                                         |                  |                      | nm       |
| Receiver Sensitivity                    | PIN              |                      | -20      |
|                                         |                  |                      | dBm      |
| Output Differential Impedance           | P <sub>IN</sub>  | 90                   | 100      |
|                                         |                  |                      | 110      |
|                                         |                  |                      | $\Omega$ |
| Data Output Swing Differential          | V <sub>OUT</sub> | 370                  | 2000     |
|                                         |                  |                      | mV       |
| Rise/Fall Time                          | Tr/tf            | 2.2                  | ns       |
| LOS De-Assert                           | LOS <sub>D</sub> | -24                  | dBm      |
| LOS Assert                              | LOS <sub>A</sub> | -40                  | dBm      |
| LOS - High                              | 2.0              | V <sub>CC</sub> +0.3 | V        |
| - Low                                   | 0                | 0.8                  | V        |

## Product variants & accessories

| Art.-No.      | Description                                                               |
|---------------|---------------------------------------------------------------------------|
| TDE-GLC-LH-SM | 1000BASE-LX/LH SFP Module SM LC 10km data range (1310nm) Cisco compatible |