10GBASE-LR XENPAK Module SM SC 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.

\*\*XENPAK Modules

\*\*TECHNISCHE\_DATEN

Features
• Up to 10GBd bi-directional data links
• Compliant with IEEE 802.3ae, 10GBASE-LR application
• Compliant with XENPAK MSA
• 1310 nm DFB laser
• PIN Photo-detector
• XAUI electrical interface: 4 lanes at 3.125GBd
• Hot Z-Pluggable
• SC Connectors
• Up to 10km on SMF
• Power Supply: 5V/3.3V/Adaptable Power Supply (APS: 1.2V)
• RoHS Compliance
• Operating temperature range: 0°C to 70°C

Applications
• 10GBd Ethernet

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| Parameter | Symbol | Min. | Max. | Unit | Remarks |
| Storage Ambient Temperature | TS | -40 | 85 | °C |   |
| Supply Voltage (5V) | V5 | 0 | 6 | V |   |
| Supply Voltage (3.3V) | V3 | 0 | 4 | V |   |
| Supply Voltage (APS) | VAPS | 0 | 1.5 | V |   |
| Optical Receiver Input | PIMAX |   | 1.5 | dBm | Average |

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| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remarks |
| Data Rate | DR |   | 10.3125 |   | GBD |   |
| Bit Error Rate | BER |   |   | 10−12 |   |   |
| Total Power Consumption | P |   |   | 3 | W |   |
| Supply Voltage (5V) | VCC5 | 4.75 | 5 | 5.25 | V | Operating Environment |
| Supply Voltage (+3.3V) | VCC3 | 3.14 | 3.3 | 3.47 | V | Operating Environment |
| Supply Voltage (APS) | VCCAPS | 1.152 | 1.2 | 1.248 | V | Operating Environment |
| Supply Current (5V) | ICC5 |   |   | 100 | mA |   |
| Supply Current (+3.3V) | ICC3 |   |   | 300 | mA |   |
| Supply Current (APS) | ICCAPS |   |   | 1000 | mA |   |
| Case Operating Temperature | TC | 0 |   | 70 | °C |   |

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| Parameter | Fiber Type | Distance Range (km) |
| 10.3125GBd | 9/125um SMF | 10 |

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| Parameter | Symbol | Min. | Max. | Unit | Remarks |
| Optical Wavelength | λ | 1290 | 1330 | nm |   |
| Launch Power | POUT | -8.2 | 0.5 | dBm | Average |
| Launch Power in OMA | POUT\_OMA | -5.2 |   | dBm |   |
| Launch Power of OFF Transmitter | POUT\_OFF |   | -30 | dBm | Average |
| Side Mode Suppression Ratio | SMSR | 30 |   | dB |   |
| Spectral Width (RMS) | Δλ |   | 0.6 | nm |   |
| Optical Extinction Ratio | ER | 3.5 |   | dB |   |
| Optical Modulation amplitude | OMA | -5.25 |   | dBm |   |
| Optical Return Loss Tolerance | ORLT |   | 12 | dB |   |
| Relative Intensity Noise | RIN |   | -128 | dB/Hz |   |
| Transmitter Dispersion Penalty | TDP |   | 3.2 | dB |   |
| Eye Mask Definition |   |   |   |   | According to IEEE 802.3ae |

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| Parameter | Symbol | Min. | Max. | Unit | Remarks |
| Center Wavelength Range | λC | 1260 | 1600 | nm |   |
| Optical Input Power | PIN | -14.4 | 0.5 | dBm | Average, Informative |
| Receiver Sensitivity in OMA | PIN\_OMA |   | -12.6 | dBm | Informative |
| Stressed Receiver Sensitivity | PIN\_S |   | -10.3 | dBm |   |
| Receiver Reflectance | TRRX |   | -12 | dB |   |
| Loss of Signal Assert Level | PLOS\_A | -25 |   |   |   |
| Loss of Signal DeAssert Level | PLOS\_D |   | -16 |   |   |
| Loss of Signal Hysteresis | PLOS\_H | 1 |   |   |   |
| Receiver electrical 3dB upper cutoff frequency | FR |   | 12.3 | Ghz |   |

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|   | Parameter | Symbol | Min. | Typ. | Max. | Unit | Remarks |
| A. 1.2V COMS I/O DC Characteristics (PRTAD; LASI; RESET; TX\_ON/OFF) | External Pull-Up Resistor For Open Drain | RPU | 10 |   | 22 | kΩ |   |
|   | Output High Voltage | VOH | 1 |   |   | V |   |
|   | Output Low Voltage | VOL |   |   | 0.15 | V |   |
|   | Input High Voltage | VIH | 0.84 |   | 1.2 | V |   |
|   | Input Low Voltage | VIL |   |   | 0.36 | V |   |
|   | Input Pull-Down Current | IPD | 20 |   | 120 | uA | VIN=1.2V |
| B. XAUI I/O DC Charateristics (TXLANE[0..3]; RXLANE[0..3]) | Differential Input Amplitude (pk–pk) | VIN\_XAUI | 200 |   | 2500 | mV | AC Coupled |
|   | Differential Output Amplitude (pk–pk) | VOUT\_XAUI | 800 |   | 1600 | mV | AC Coupled |
| C. MDIO I/O DC Charateristics (MDIO; MDC) | Output Low Voltage | VOL |   |   | 0.2 | V | IOL=100uA |
|   | Output Low Current | IOL |   |   | 4 | mA |   |
|   | Input High Voltage | VIH | 0.84 |   | 1.2 | V |   |
|   | Input Low Voltage | VIL |   |   | 0.36 | V |   |
|   | Pull-Up Supply Voltage | VPU | 1.152 | 1.2 | 1.248 | V |   |
|   | Input Capacitance | CIN |   |   | 10 | pF |   |
|   | Load Capacitance | CLOAD |   |   | 470 | pF |   |
|   | External Pull-Up Resistance | RPU | 200 |   |   | Ω |   |

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|   | Parameter | Symbol | Min. | Typ. | Max. | Unit | Remarks |
| A. XAUI Input AC Characteristics (TXLANE[0..3]) | Baud Rate | BRXAUI\_IN |   | 3.125 |   | GBd |   |
|   | Baud Rate Tolerance | BRTOL\_XAUI | -100 |   | 100 | ppm |   |
|   | Differential Input Impedance | ZIN\_XAUI | 80 | 100 | 120 | Ω |   |
|   | Differential Return Loss | RLIN | 10 |   |   | dB | 100 MHz to 2.5 GHz |
|   | Input Differential Skew | TIN\_SKEW |   |   | 75 | ps | Crossing Point |
|   | Jitter Amplitude Tolerance | JXAUI\_TO |   |   | 0.65 | UIPP | IEEE 802.3ae |
| B. XAUI Output AC Charateristics (RXLANE[0..3]) | Baud Rate | BRXAUI\_OUT |   | 3.125 |   | GBd |   |
|   | Baud Rate Variation | BRXAUI\_VAR | -100 |   | 100 | ppm |   |
|   | XAUI Eye Mask (far-end) | TOUT\_SKEW |   |   |   |   | According to IEEE 802.3ae |
|   | Output Differential Skew |   |   |   | 15 | ps |   |
|   | Output Differential Impedance | ZOUT\_XAUI | 80 | 100 | 120 | Ω  | DC |
|   | Differential Output Return Loss | RLOUT  | 10 |   |   | dB | 100 MHz to 2.5 GHz |
|   | Total Jitter | TJXAUI |   |   | 0.35 | UI | Near-end No pre-equalization 1 UI=320 ps |
|   | Deterministic Jitter | DJXAUI |   |   | 0.17 | UI | Near-end No pre-equalization 1 UI=320 ps |
| C. Power-On Reset Charateristics | Power-On Reset and TX\_ONOFF Charateristics |   |   |   |   |   | According to XENPAK MSA Issue |
| D. MDIO I/O AC Charateristics (MDIO; MDC) | MDIO Data Hold Time | THOLD | 10 |   |   | ns |   |
|   | MDIO Data Setup Time | TSU | 10 |   |   | ns |   |
|   | Delay from MDC Rising Edge to MDIO Data Change | TDELAY |   |   | 300 | ns |   |
|   | MDC Clock Rate | fMAX |   |   | 2.5 | MHz |   |

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| Parameter | Symbol | Min. | Max. | Unit |
| Temperature Monitor | TMON | -5 | +5 | °C |
| Laser Bias Monitor | IMON | -10 | 10 | % |
| TX Power Monitor | PTX | -3 | +3 | dBm |
| RX Power Monitor | PRX | -3 | +3 | dBm |