

Specification

Small Form Factor Pluggable

Duplex LC Receptacle – SFP+

Optical Transceivers


10 Gigabit Ethernet

8G Fiber Channel



Ordering Information

TAS-A1TH1-P11

| Model Name | Voltage | Category | Device type | Interface | LOS | Temperature | Distance | Latch Color |
|---------------|---------|-----------|--------------|------------------|-------|-------------|-------------------------------|---|
| TAS-A1TH1-P11 | 3.3V | With DDMI | 850 nm VCSEL | AC / AC Coupling | LVTTL | 0°C~+70°C | 33m / 82m /300m (OM1/OM2/OM3) | Black  |

Features

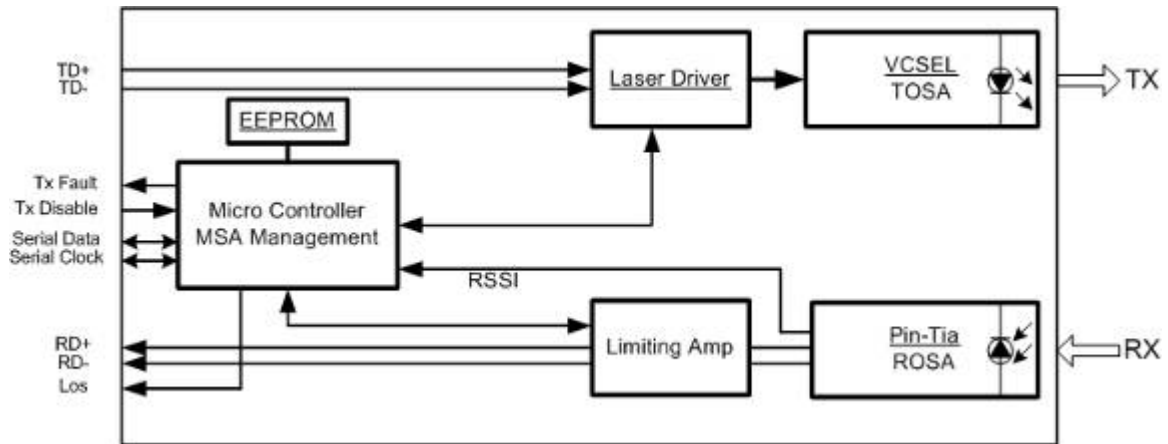
- Optical interface compliant to IEEE 802.3ae 10GBASE-SR/SW
- 850nm VCSEL TOSA and PIN ROSA
- Maximum link length of 300m on 2000MHz-km MMF
- LC duplex receptacle
- Low power dissipation (<800 mW)
- Hot Pluggable
- All-metal housing for superior EMI performance
- Built in digital diagnostic functions
- Operating case temperature range: 0 ~ 70°C
- RoHS Compliant
- Electrical Interface Compliant to SFF-8431 Specifications for Enhanced 8.5 And 10 Gigabit Small Form Factor Pluggable Module “SFP+”
- Fibre Channel Physical Interface-4 Specification (FC-PI-4 Rev. 8.00)”.
American National. Standard for Information Systems, May 21, 2008.

Applications

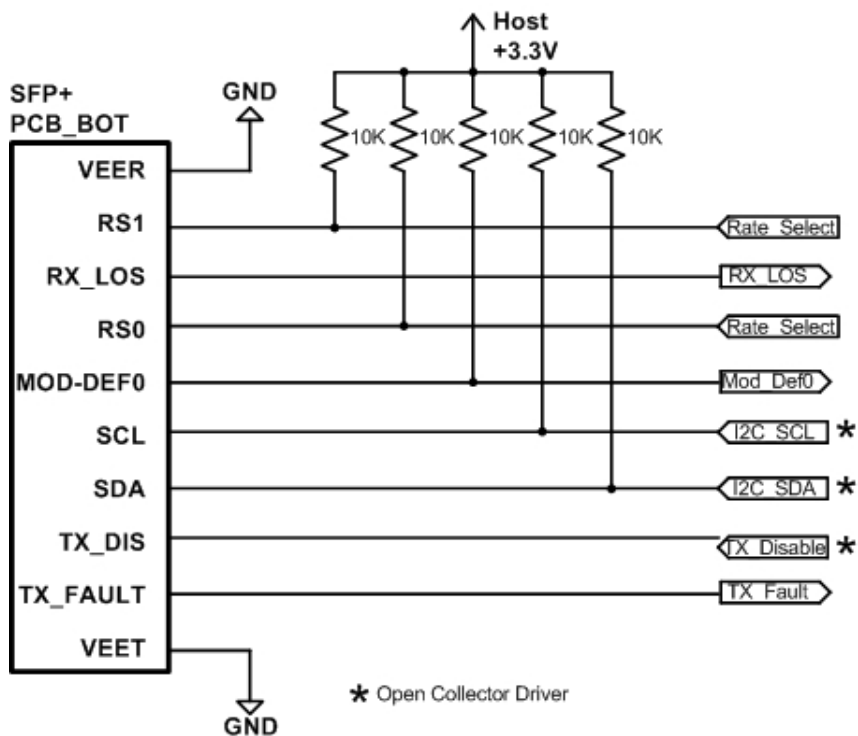
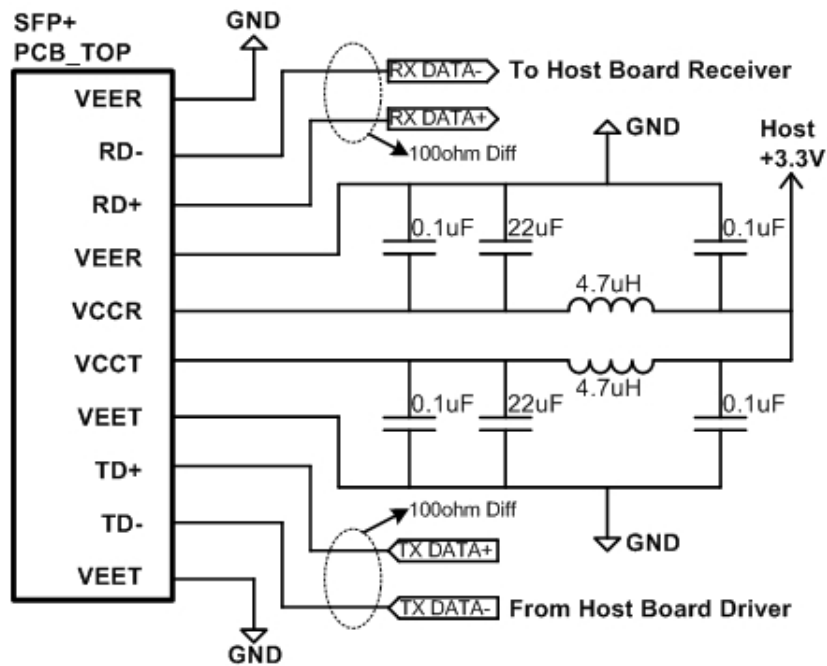
- High-speed storage area networks
- Computer cluster cross-connect
- Custom high-speed data pipes
- Inter Rack Connection
- Multi-Rate 8.5/10.312 Gb/s Fibre Channel

| Fiber type | Minimum modal bandwidth @ 850 nm (MHz•km) | Operating range (meters) |
|-------------|---|--------------------------|
| 62.5 μm MMF | 160 | 2 to 26 |
| | 200 | 2 to 33 |
| 50 μm MMF | 400 | 2 to 66 |
| | 500 | 2 to 82 |
| | 2000 | 2 to 300 |

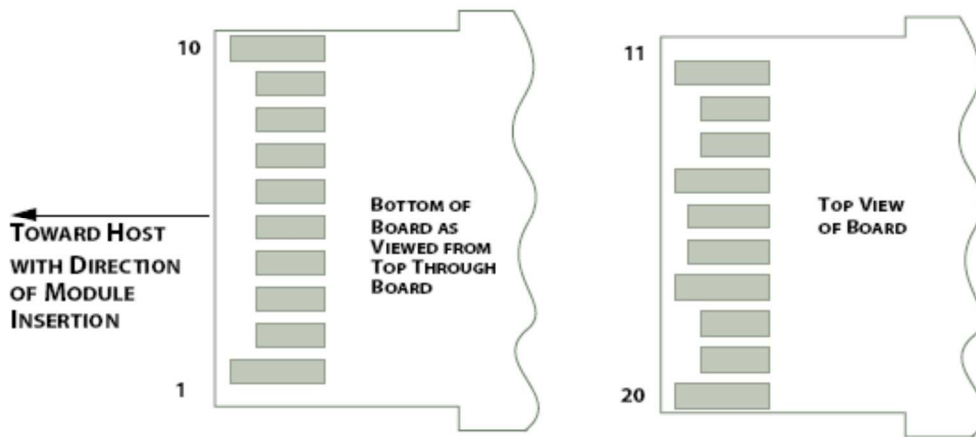
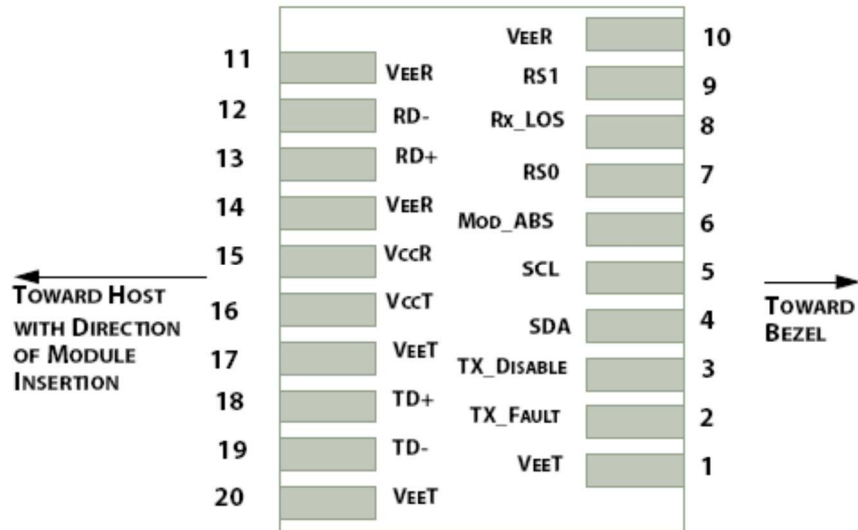
Transceiver Block Diagram



Proposed Applications Schematics



Pin Definition and Descriptions



| PIN | Logic | Symbol | Name / Description | Note |
|-----|-----------|----------|---|------|
| 1 | | VeeT | Module Transmitter Ground | 1 |
| 2 | LVTTL-O | TX_Fault | Module Transmitter Fault | 2 |
| 3 | LVTTL-I | TX_Dis | Transmitter Disable; Turns off transmitter laser output | 3 |
| 4 | LVTTL-I/O | SDA | 2-Wire Serial Interface Data Line | |
| 5 | LVTTL-I | SCL | 2-Wire Serial Interface Clock | |
| 6 | | Mod_ABS | Module Absent, connected to VeeT or VeeR in the module | 2 |
| 7 | LVTTL-I | RS0 | Rate Select 0, optionally controls SFP+ module receiver. When high input signaling rate > 4.25 GBd and when low input signal rate \leq 4.25 GBd. | |
| 8 | LVTTL-O | RX_LOS | Receiver Loss of Signal Indication | 2 |
| 9 | LVTTL-I | RS1 | Rate Select 1, optionally controls SFP+ module transmitter. When high input signaling rate > 4.25 GBd and when low input signal rate \leq 4.25 GBd. | |
| 10 | | VeeR | Module Receiver Ground | 1 |
| 11 | | VeeR | Module Receiver Ground | 1 |
| 12 | CML-O | RD- | Receiver Inverted Data Output | |
| 13 | CML-O | RD+ | Receiver Data Output | |
| 14 | | VeeR | Module Receiver Ground | 1 |
| 15 | | VccR | Module Receiver 3.3 V Supply | |
| 16 | | VccT | Module Transmitter 3.3 V Supply | |
| 17 | | VeeT | Module Transmitter Ground | 1 |
| 18 | CML-I | TD+ | Transmitter Non-Inverted Data Input | |
| 19 | CML-I | TD- | Transmitter Inverted Data Input | |
| 20 | | VeeT | Module Transmitter Ground | 1 |

Note:

1. Module ground pins are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7k to 10k ohm to a voltage between 3.15V and 3.45V on the host board.
3. Shall be pulled up with 4.7k to 10k ohm to VccT in the module.

Absolute Maximum Ratings

| Parameters | Symbol | Min. | Max. | Unit |
|---------------------------------|----------|------|------|------|
| Power Supply Voltage | V_{CC} | 0 | 3.6 | V |
| Storage Temperature | T_s | -40 | 85 | °C |
| Relative Humidity | RH | 5 | 95 | % |
| Optical Receiver Power (Damage) | | - | 4 | dBm |

Recommended Operating Environment

| Parameters | Symbol | Min. | Typical | Max | Unit |
|----------------------------|----------|-------|---------|-------|------|
| Power Supply Voltage | V_{CC} | 3.135 | 3.3 | 3.465 | V |
| Operating Case Temperature | T_{op} | 0 | 25 | 70 | °C |

Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter | Symbol | Min. | Typical | Max | Unit | Notes |
|---|-------------|------|---------|--------|-------|-----------------|
| Transmitter | | | | | | |
| Center Wavelength | λ_t | 840 | 850 | 860 | nm | |
| RMS spectral width | Pm | | | Note 1 | nm | |
| Average Optical Power @10Gb/s | Pavg | -6.5 | | -1 | dBm | |
| Average Optical Power @8.5Gb/s | Pavg | -8.2 | | -2 | dBm | |
| Optical Power OMA | Poma | | | Note 1 | dBm | |
| Laser Off Power | Poff | | | -30 | dBm | |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Transmitter Dispersion Penalty @10Gb/s | TDP | | | 3.9 | dB | |
| Transmitter Dispersion Penalty @8.5Gb/s | TDP | | | 4.2 | dB | |
| Relative Intensity Noise | Rin | | | -128 | dB/Hz | 12dB reflection |
| Optical Return Loss Tolerance | | | | 12 | dB | |
| Receiver | | | | | | |
| Center Wavelength | λ_r | 840 | 850 | 860 | nm | |
| Receiver Sensitivity (OMA) @10Gb/s | Psens | | | -11.1 | dBm | |
| Receiver Sensitivity (OMA) @8.5Gb/s | Psens | | | -11.2 | dBm | |
| Los Assert | LosA | -30 | | | dBm | |
| Los Dessert | LosD | | | -12 | dBm | |
| Los Hysteresis | LosH | 0.5 | | | dB | |
| Overload | Pin | | | -1 | dBm | |
| Receiver Reflectance | | | | -12 | dB | |

Note:

1. Trade-offs are available between spectral width, center wavelength and minimum OMA, as shown in follow table.

| Center Wavelength (nm) | RMS Spectral width (nm) | | | | | | | | |
|------------------------|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Up to 0.05 | 0.05 to 0.1 | 0.1 to 0.15 | 0.15 to 0.2 | 0.2 to 0.25 | 0.25 to 0.3 | 0.3 to 0.35 | 0.35 to 0.4 | 0.4 to 0.45 |
| 840 to 842 | -4.2 | -4.2 | -4.1 | -4.1 | -3.9 | -3.8 | -3.5 | -3.2 | -2.8 |
| 842 to 844 | -4.2 | -4.2 | -4.2 | -4.1 | -3.9 | -3.8 | -3.6 | -3.3 | -2.9 |
| 844 to 846 | -4.2 | -4.2 | -4.2 | -4.1 | -4.0 | -3.8 | -3.6 | -3.3 | -2.9 |
| 846 to 848 | -4.3 | -4.2 | -4.2 | -4.1 | -4.0 | -3.8 | -3.6 | -3.3 | -2.9 |
| 848 to 850 | -4.3 | -4.2 | -4.2 | -4.1 | -4.0 | -3.8 | -3.6 | -3.3 | -3.0 |
| 850 to 852 | -4.3 | -4.2 | -4.2 | -4.1 | -4.0 | -3.8 | -3.6 | -3.4 | -3.0 |
| 852 to 854 | -4.3 | -4.2 | -4.2 | -4.1 | -4.0 | -3.9 | -3.7 | -3.4 | -3.1 |
| 854 to 856 | -4.3 | -4.3 | -4.2 | -4.1 | -4.0 | -3.9 | -3.7 | -3.4 | -3.1 |
| 856 to 858 | -4.3 | -4.3 | -4.2 | -4.1 | -4.0 | -3.9 | -3.7 | -3.5 | -3.1 |
| 858 to 860 | -4.3 | -4.3 | -4.2 | -4.2 | -4.1 | -3.9 | -3.7 | -3.5 | -3.2 |

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

| Parameter | Symbol | Min. | Max | Unit | Notes |
|---------------------------------------|-----------|-------|------|------|-----------------------|
| Temperature monitor absolute error | DMI_Temp | -3 | 3 | degC | Over operating temp |
| Laser power monitor absolute error | DMI_TX | -3 | 3 | dB | |
| RX power monitor absolute error | DMI_RX | -3 | 3 | dB | -1dBm to -12dBm range |
| Supply voltage monitor absolute error | DMI_VCC | -0.08 | 0.08 | V | Full operating range |
| Bias current monitor | DMI_Ibias | -10% | 10% | mA | |

Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

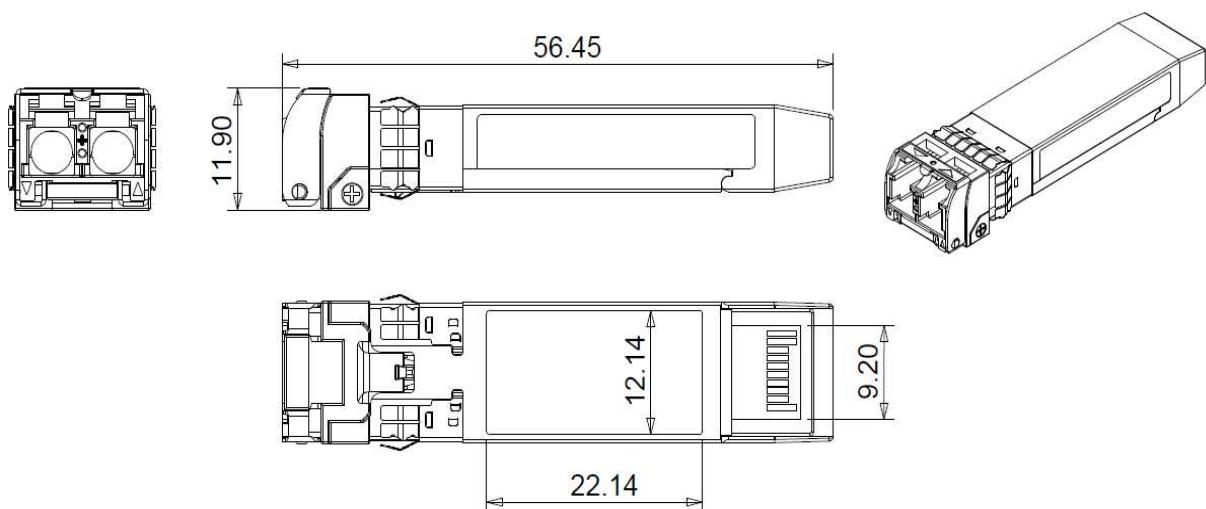
| Parameter | Symbol | Min. | Typical | Max | Unit | Notes |
|---------------------------------------|--------|------|---------|---------|------|------------|
| Data Rate | | 8.5 | | 10.3125 | Gbps | |
| Power Consumption | | | 600 | 800 | mW | |
| Transmitter | | | | | | |
| Single Ended Output Voltage Tolerance | | -0.3 | | 4 | V | |
| C common mode voltage tolerance | | 15 | | | mV | |
| Tx Input Diff Voltage | VI | 180 | | 700 | mV | |
| Tx Fault | VoL | -0.3 | | 0.4 | V | At 0.7mA |
| Data Dependent Input Jitter | DDJ | | | 0.1 | UI | |
| Data Input Total Jitter | TJ | | | 0.28 | UI | |
| Receiver | | | | | | |
| Single Ended Output Voltage Tolerance | | -0.3 | | 4 | V | |
| Rx Output Diff Voltage | Vo | 300 | | 850 | mV | |
| Rx Output Rise and Fall Time | Tr/Tf | 30 | | | ps | 20% to 80% |
| Total Jitter | TJ | | | 0.7 | UI | |
| Deterministic Jitter | DJ | | | 0.42 | UI | |

Control And Status I/O Timing Characteristics

Timing characteristics of control and status I/O are included in Table 9, which is also defined in SFF-8431.

| Parameter | Symbol | Min | Max | Unit | Condition |
|---|---------------------------|-----|-----|------|--|
| TX Disable Assert Time | t _{off} | | 10 | μs | Time from rising edge of TX Disable to when the optical output falls below 10% of nominal |
| TX Disable Negate Time | t _{on} | | 1 | ms | Time from falling edge of TX Disable to when the modulated optical output rises above 90% of nominal |
| Time to initialize, including reset of TX_Fault | t _{init} | | 300 | ms | From power on or negation of TX Fault using TX Disable |
| TX Fault Assert Time | t _{fault} | | 100 | μs | Time from fault to TX fault on. |
| TX Disable to reset | t _{reset} | 10 | | μs | Time TX Disable must be held high to reset TX_fault |
| LOS Assert Time | t _{loss_on} | | 100 | μs | Time from LOS state to RX LOS assert |
| LOS Deassert Time | t _{loss_off} | | 100 | μs | Time from non-LOS state to RX LOS deassert |
| Rate-Select Change Time | t _{ratesel} | | 10 | μs | Time from rising or falling edge of Rate Select input until receiver bandwidth is in conformance with appropriate specification. |
| Serial ID Clock Rate | f _{serial_clock} | | 100 | kHz | |

Mechanical (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.

LASER Safety

This is a Class 1 Laser Product according to IEC / EN 60825-1: 2014 (Third Edition). This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007)

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