

Amphenol Interconnect Products

SMALL FORM FACTOR PLUGGABLE LC OPTICAL TRANSCEIVER



Amphenol Interconnect Products (AIPC) in Endicott, New York, USA, recognized as the leading manufacturer of Copper and Fiber Optic cable assemblies, now offers the Small Form Factor (SFP) Pluggable LC Optical Transceivers.

Amphenol **555910001** SFP Optical Transceivers are compliant with the SFP Multi-Source Agreement (MSA) specifications. The typical applications for this product are edge to core, Host Bus Adapter (HBA) to switch, and HBA to storage devices links in enterprise networks.

Features:

- SFP Multi-Source Agreement (MSA) Compliant
- SFF-8472 Digital Diagnostics Compliant
- Meets Fibre Channel FC-PI-2 400-M5/6-SN-I Specifications
- Meets IEEE 802.3 Gigabit Ethernet Specifications
- Class 1 Laser complying with 21 CFR 1040.10
- Push to release de-latch mechanism for easy module removal
- Riveted Die-Cast housing for improved ruggedness and EMI shielding
- Hot Pluggable
- RoHS Compliant and Lead Free
- Manufactured in ISO 9001 compliant facility

Amphenol Interconnect Products

Customer Service Department

20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

I. PIN OUT DESCRIPTION

| Pin Number | Signal Name | Description |
|------------|-------------|--|
| 1 | VeeT | Transmitter Ground |
| 2 | TxFault | Transmitter Fault Indicator ¹ HIGH: FAULT LOW: Normal Operation |
| 3 | TxDisable | Transmitter Disable ² HIGH: Disabled LOW: Normal |
| 4 | MOD_DEF(2) | Module Definition 2 Data Line of 2-wire Interface |
| 5 | MOD_DEF(1) | Module Definition 1 Clock Line of 2 wire Interface |
| 6 | MOD_DEF(0) | Module Definition 0 Grounded by Module to indicate that the module is present |
| 7 | Rate Select | N/C ³ |
| 8 | LOS | Loss of Signal ⁴ HIGH: LOS LOW: Normal |
| 9 | VeeR | Receiver Ground |
| 10 | VeeR | Receiver Ground |
| 11 | VeeR | Receiver Ground |
| 12 | RD- | CML Differential Rx Output (-) ⁵ |
| 13 | RD+ | CML Differential Rx Output (+) ⁵ |
| 14 | VeeR | Receiver Ground |
| 15 | VccR | Receiver Power |
| 16 | VccT | Transmitter Power |
| 17 | VeeT | Transmitter Ground |
| 18 | TD+ | CML Differential Tx Input (+) ⁵ |
| 19 | TD- | CML Differential Tx Input (-) ⁵ |
| 20 | VeeT | Transmitter Ground |

1. Open-Drain Buffer Output, requires 4.7kΩ pullup resistor to Vcc_{HOSTBOARD}.
2. Internally connected to VccT using a 4.7kΩ pullup resistor.
3. Rate-Select is NOT supported in this module.
4. Internally connected to VeeR using a 10kΩ pull-down resistor.
5. AC-coupled

Amphenol Interconnect Products

Customer Service Department

20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

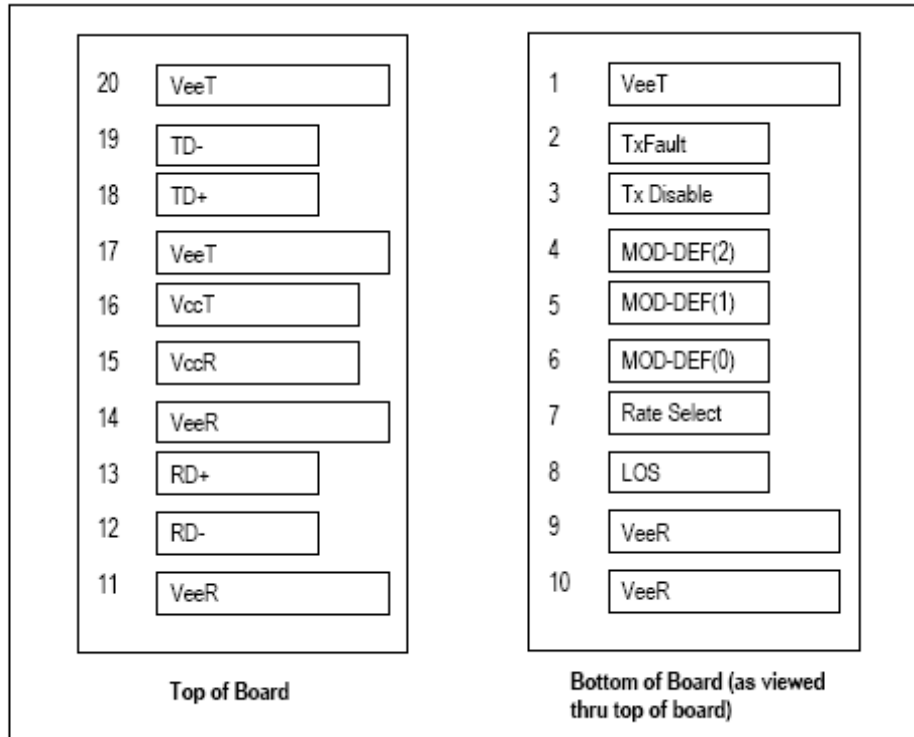


Figure 1: SFP Transceiver Electrical Pad Layout

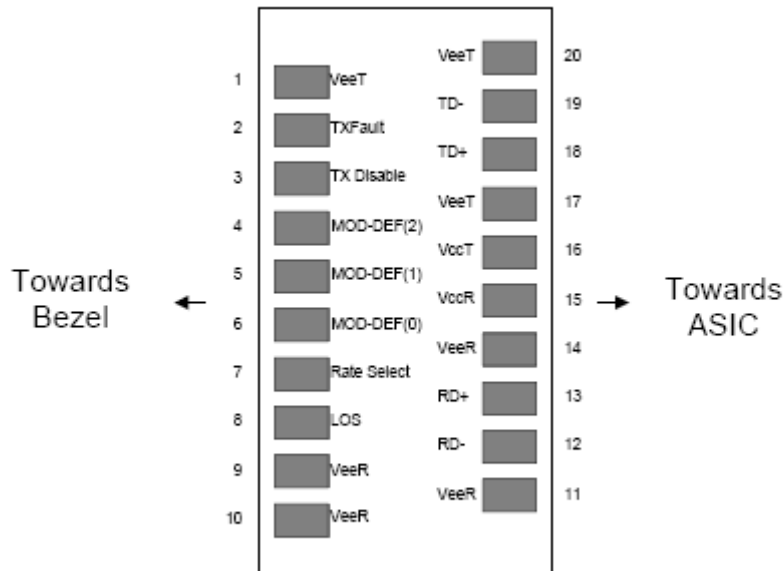


Figure 2: Diagram of Host Board Connector Block Pin Number and Names

Amphenol Interconnect Products

Customer Service Department

20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

II. ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Min | Typ. | Max | Unit |
|----------------------------|----------------|-----|------|-----|------|
| Maximum Supply Voltage | VccR, VccT | | | 4.0 | V |
| Storage Temperature | T _S | -40 | | 85 | °C |
| Case Operating Temperature | T _A | -10 | | 85 | °C |
| Relative Humidity | RH | 0 | | 85 | % |

III. ELECTRICAL CHARACTERISTICS (T_A = -10 to 85 °C, VccT = 3.0 to 3.6V)

| Parameter | Symbol | Min | Typ | Max | Unit | |
|-----------------------------------|----------------------|------|-----|----------|-------------------|---|
| Supply Voltage | VccR, VccT | 3.0 | | 3.6 | V | |
| Supply Current | Icc | | 150 | 220 | mA | |
| Data Rate | DR | 1.0 | | 4.25 | Gbps | |
| Transmitter | | | | | | |
| Differential Input Impedance | | | 100 | | Ω | |
| Differential Input Voltage Swing | V _{DIFF} | 500 | | 2400 | mV _{p-p} | |
| Transmit Disable Voltage | V _{DISABLE} | 2 | | VccT | V | |
| Transmit Enable Voltage | V _{ENABLE} | VeeT | | VeeT+0.8 | V | |
| Receiver | | | | | | |
| Differential Output Voltage Swing | V _{DIFF} | 600 | | 1200 | mV _{p-p} | 1 |
| Data Output Rise Time | t _R | | | 120 | ps | 2 |
| Data Output Fall Time | t _F | | | 120 | ps | 2 |
| LOS Fault | | 2 | | VccR | V | |
| LOS Normal | | VeeR | | VeeR+0.8 | V | |
| Total Jitter @ 1.0625Gbps | TJ | | | 0.21 | UI | 3 |
| Total Jitter @ 2.125Gbps | TJ | | | 0.26 | UI | 3 |
| Total Jitter @ 4.25Gbps | TJ | | | 0.26 | UI | 3 |

1. Differential Output Swing ~ 750mV when terminating with a 100Ω differential load.
2. Measured at 20-80%
3. Measured using a PRBS 2¹⁵ – 1 pattern, discrete high speed/low-jitter source.

Amphenol Interconnect Products

Customer Service Department

20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

IV. TX OPTICAL CHARACTERISTICS (T_A = -10 to 85 °C, V_{ccT} = 3.0 to 3.6V)

| Parameter | Symbol | Min | Typ | Max | Unit | Ref |
|---|---------------------------------|------|-----|------|---------|-----|
| Wavelength | λ | 830 | | 860 | nm | |
| Average Optical Output Power | P _{out} | -9.0 | | | dBm | |
| Optical Modulation Amplitude @ 1.0625Gbps | OMA | 156 | | | μ W | |
| Optical Modulation Amplitude @ 2.125Gbps | OMA | 196 | | | μ W | |
| Optical Modulation Amplitude @ 4.25Gbps | OMA | 247 | | | μ W | |
| Optical Rise/Fall Time @ 4.25Gbps | t _R , t _F | | | 90 | Ps | 1 |
| P _{out} TxDisable=HIGH | P _{DISABLE} | | | -35 | dBm | |
| Total Jitter @ 1.0625Gbps | TJ | | | 0.21 | UI | 2 |
| Total Jitter @ 2.125Gbps | TJ | | | 0.26 | UI | 2 |
| Total Jitter @ 4.25Gbps | TJ | | | 0.26 | UI | 2 |

1. Measured using unfiltered eye at 20-80%.
2. Measured using PRBS 2¹⁵ - 1 pattern into high-speed OE converter.

Amphenol Interconnect Products

Customer Service Department

20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

V. RX OPTICAL CHARACTERISTICS ($T_A = -10$ to 85°C , $V_{eeR} = 3.0$ to 3.6V)

| Parameter | Symbol | Min | Typ | Max | Unit | Ref |
|--|----------------|-----|-----|-----|---------------|-----|
| Average Receive Power, max | P_{MAX} | | | 0 | dBm | |
| Receiver Sensitivity @ 1.0625Gbps | OMA | 31 | | | μW | |
| Receiver Sensitivity @ 2.125Gbps | OMA | 49 | | | μW | |
| Receiver Sensitivity @ 4.25Gbps | OMA | 61 | | | μW | |
| Receiver Stressed Sensitivity @ 1.0625Gbps | OMA | 55 | | | μW | 1 |
| Receiver Stressed Sensitivity @ 2.125Gbps | OMA | 96 | | | μW | 1 |
| Receiver Stressed Sensitivity @ 4.25Gbps | OMA | 138 | | | μW | 1 |
| LOS Threshold | LOS_{THRESH} | | -20 | | dBm | |
| LOS Hysteresis | | | 0.5 | | dB | |

1. Measured using a low-pass filter, connected to a bias-tee, driving a discrete VCSEL source to create required DJ and ISI.

Amphenol Interconnect Products

Customer Service Department

20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

VI. DIGITAL DIAGNOSTICS

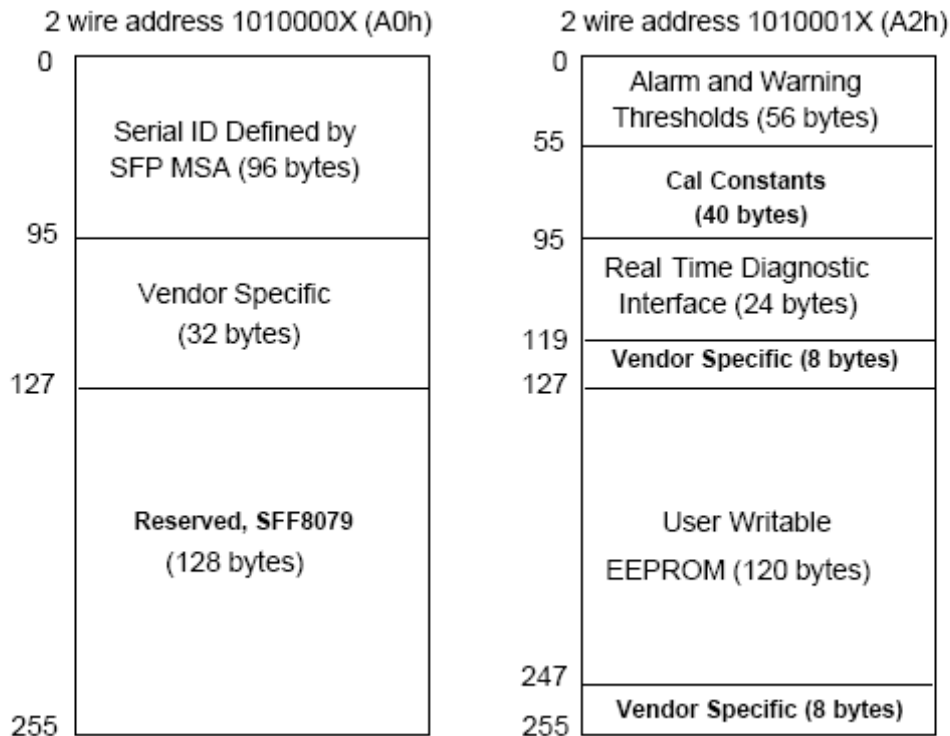
Amphenol **555910001** SFP Optical Transceivers support the SFF-8472 Digital Diagnostics standard.

Enhanced Digital Monitoring Parameters are also available* :

| Parameter | Real-Time Monitoring | Alarms & Warning Flags | Calibration/Units |
|-------------|----------------------|------------------------|--------------------|
| Temperature | • | • | External / °C |
| VCC | • | • | External / Volts |
| Tx Bias | • | • | External / Amperes |
| Tx Power | • | • | External / Watts |
| Rx Power | • | • | External / Watts |

*supported on 553250002

The memory map as defined in the SFP MSA supports two addressable pages 1010000X (A0h) and 1010001X (A2h) over the 2-wire serial bus. The general information content shown, for more specific address content please refer to the Digital Diagnostics application note.



Amphenol Interconnect Products

Customer Service Department

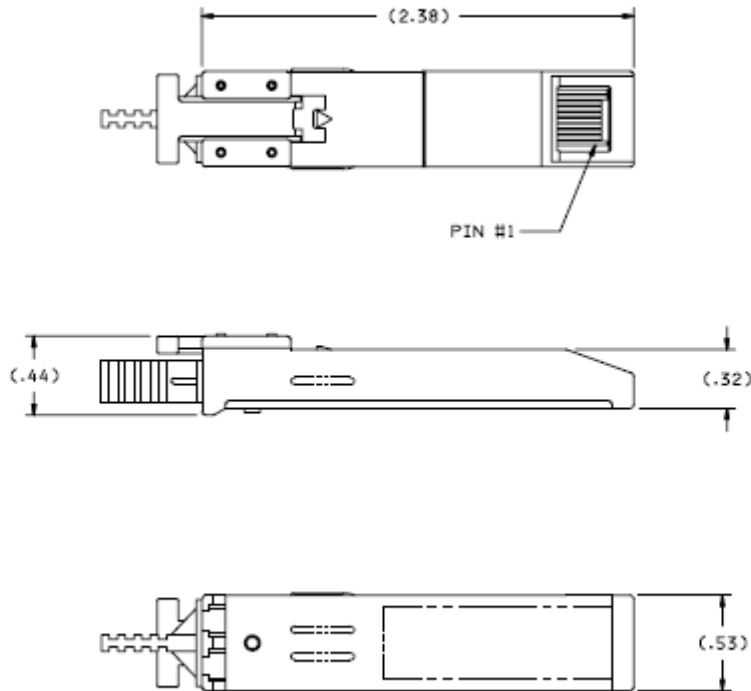
20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

VII. MECHANICAL SPECIFICATIONS



555910001

Amphenol Interconnect Products

Customer Service Department
20 Valley Street, Endicott, New York 13760
Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206

Amphenol Interconnect Products

VIII. ORDERING INFORMATION

5 5 5 9 1 0 0 0 x

|

x: 1 STANDARD DIAGNOSTICS

x: 2 ENHANCED DIGITAL DIAGNOSTICS

Amphenol Interconnect Products

Customer Service Department

20 Valley Street, Endicott, New York 13760

Phone (888) ASK-AIPC • Fax (607) 786-4311 • <http://www.amphenol-aipc.com>

AIPC 0206