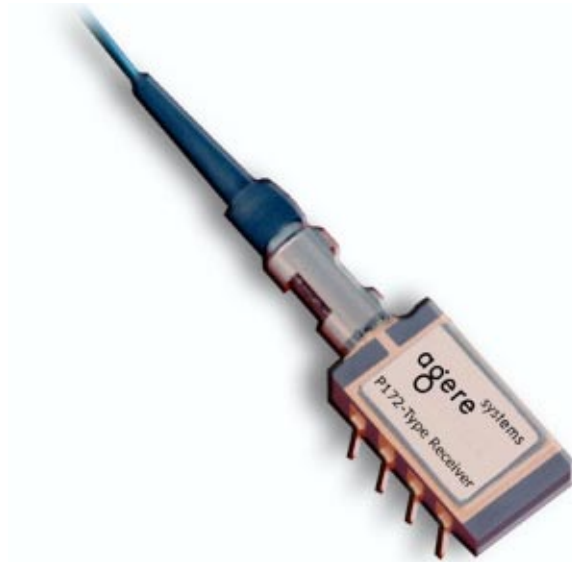


P172-Type Receiver



The P172-Type PIN/Preamp and APD/Preamp receivers are available in a mini-DIL package (top) or a gull-wing package (bottom).

Features

- Low-profile, 8-lead mini-DIL or gull-wing style package:
 - Suitable for SONET/SDH applications
- Metal package:
 - Offers superior shielding for high noise immunity
- Planar structure for high reliability
- Operating wavelength range:
 - 1.25 μm —1.6 μm
- Available in 8 μm core single-mode fiber or 62.5 μm core multimode fiber pigtails
- Wide operating temperature range:
 - APD/PIN, $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$
- Scheduled to be qualified according to *Telcordia Technologies*[™] GR-468-CORE
- Typical sensitivity:
 - APD, -32 dBm
 - PIN, -23 dBm
- Thermistor in APD version

Applications

- Long-reach or metro SONET OC-48 and SDH STM-16, or multirate telecommunications applications
- SONET/SDH receivers and transponders
- Line terminal equipment

Benefits

- Compact size
- Easily board mounted

Description

The P172-type receiver consists of a PIN or APD coupled to a single-mode or multimode fiber pigtail and a linear preamplifier. Both the PIN and APD are rear-illuminated planar diode structures with a low-capacitance active area for maximum responsivity and speed.

This device incorporates the new Laser 2000 manufacturing process from the Optoelectronics Products unit of Agere Systems Inc. Laser 2000 is a low-cost platform that targets high-volume manufacturing and tight product distributions on all optical subassemblies. This platform incorporates an advanced optical design that is produced on Agere Systems' highly automated production lines. The Laser 2000 platform is qualified for central office and uncontrolled environments, and can be used for applications requiring high performance and low cost.

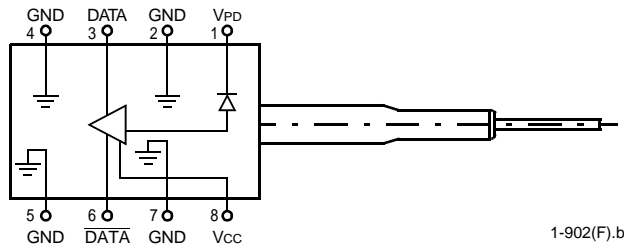


Figure 1. P172P PIN/Preamp Schematic (Top View)

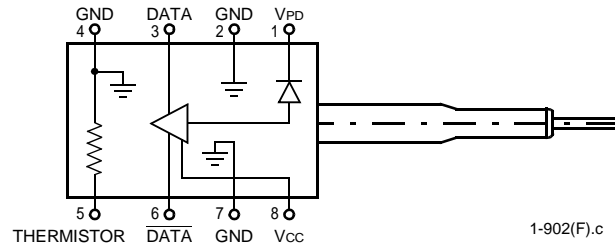


Figure 2. P172A APD/Preamp (Top View)

Table 1. P172-Type PIN/Preamp and APD/Preamp Pin Descriptions

| Pin Number | Description |
|------------|----------------------------------|
| 1 | Photodiode Bias |
| 2 | Case Ground |
| 3 | DATA* |
| 4 | Case Ground |
| 5 | Thermistor/Case Ground† |
| 6 | $\overline{\text{DATA}}\ddagger$ |
| 7 | Case Ground |
| 8 | Vcc |

* Logic high when light is on.

† Thermistor in APD version; case ground in PIN version

‡ Logic low when light is on.

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter | Symbol | Min | Max | Unit |
|-----------------------------------|--------|------|-----|------|
| Positive Supply Voltage | Vcc | -0.5 | 4.0 | V |
| Optical Input Power: | | | | |
| APD | PIN | — | 0 | dBm |
| PIN | PIN | — | 8.0 | dBm |
| Operating Case Temperature Range: | | | | |
| APD/PIN | Tc | -40 | 85 | °C |
| Storage Temperature Range | Tstg | -40 | 85 | °C |
| Lead Soldering Temperature | — | — | 250 | °C |
| Lead Soldering Time | — | — | 10 | s |

Electrical Characteristics

Minimum and maximum values specified over operating case temperature range and end of life (EOL), and typical values are for 25 °C and beginning of life (BOL), unless otherwise specified

Table 2. Electrical Characteristic

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|-------------------|------|-----|------|-------|
| dc Power Supply Voltages: | | | | | |
| Positive Supply | V _{CC} | 3.15 | 3.3 | 3.45 | V |
| APD Operating Bias Voltage | V _{OP} | 45 | — | 70 | V |
| APD Operating Voltage Temperature Coefficient | — | 0.07 | — | 0.14 | V/°C |
| PIN Operating Bias Voltage | V _{OP} | 3.0 | 5.0 | 15 | V |
| dc Power Supply Currents: | | | | | |
| Positive Supply | I _{CC} | — | 55 | 101 | mA |
| APD Bias Supply at V _{OP} | I _{APD} | — | — | 4 | mA |
| PIN Bias Supply at V _{OP} | I _{PIN} | — | — | 4 | mA |
| dc Power Dissipation | P _{DISS} | — | 200 | 350 | mW |
| Small Signal (<10 μA) Transimpedance | T _z | 1.7 | 2.5 | 3.1 | kΩ |
| Input Noise Current (100 kHz—2 GHz) | N _{rms} | — | 322 | 466 | nArms |
| Output Return Loss (130 MHz—5 GHz) | S ₂₂ | — | -15 | -9 | dB |
| 3 dB Bandwidth | f _c | 1.7 | 2.0 | — | GHz |
| Thermistor resistance at 25 °C* | R _{TH} | 9.5 | 10 | 10.5 | kΩ |

* The resistance of the thermistor is inversely proportional to the temperature. The temperature can be calculated from the resistance value using the Steinhart-Hart equation: $1/T = A + B \ln(R) + C \ln(R)^3$; where A, B, and C are constants: $A = 1.0267 \times 10^{-3}$, $B = 2.565 \times 10^{-4}$, $C = 4.5421 \times 10^{-8}$.

Optical Characteristics

Minimum and maximum values specified over operating case temperature range and end of life (EOL), and typical values are for 25 °C and beginning of life (BOL), unless otherwise specified.

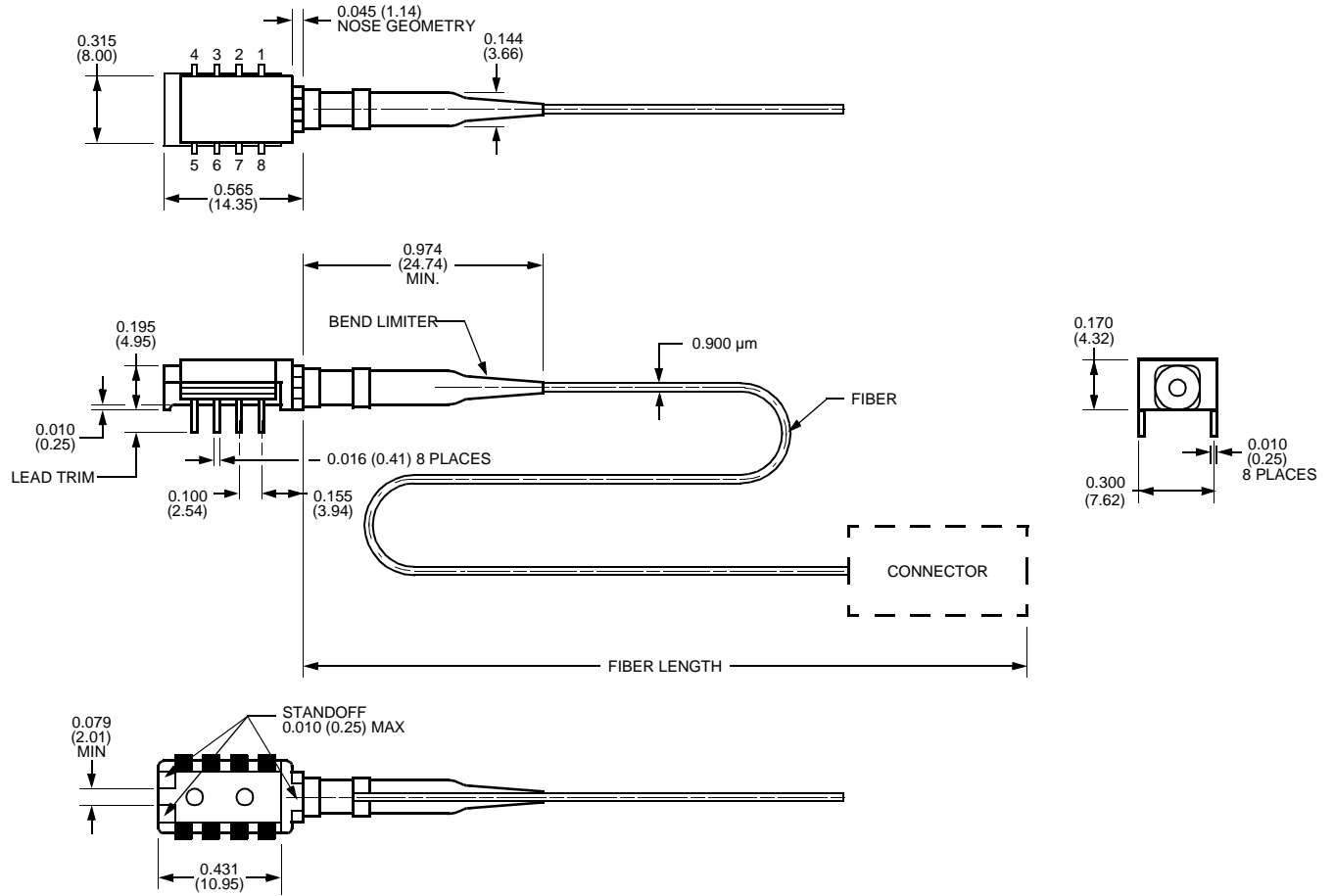
Table 3. Optical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit |
|--|-------------------|------|-------|-----|---------------|
| Optical Wavelength for Rated Sensitivity | λ | 1.25 | — | 1.6 | μm |
| Responsivity (at 1310 nm, $V_{\text{BIAS}} = V_{\text{OP}}$): | R | | | | |
| APD at -30 dBm, 25 °C | | 9.0 | — | — | A/W |
| APD at -30 dBm, -40 °C to +85 °C | | 8.6 | — | — | A/W |
| PIN at -20 dBm, 25 °C | | 0.81 | — | — | A/W |
| PIN at -20 dBm, -40 °C to +85 °C | | 0.70 | — | — | A/W |
| Sensitivity (2.5 Gbits/s, $2^{23} - 1$ PRBS, 1×10^{-10} BER, 1310 nm, 8.2 dB Extinction Ratio, $V_{\text{BIAS}} = V_{\text{OP}}$): | P_{RMIN} | | | | |
| APD Version: | | | | | |
| At 25 °C | | — | -32.5 | -31 | dBm |
| At -40 °C to +85 °C | | — | -31.5 | -30 | dBm |
| PIN Version: | | | | | |
| At 25 °C | | — | -23 | -22 | dBm |
| At -40 °C to +85 °C | | — | -22 | -21 | dBm |
| Overload (2.5 Gbits/s, $2^{23} - 1$ PRBS, 1×10^{-10} BER, 1550 nm, 8.2 dB Extinction Ratio, $V_{\text{BIAS}} = V_{\text{OP}}$): | P_{RMAX} | | | | |
| APD Version | | -6 | -3 | — | dBm |
| PIN Version | | 0 | 1 | — | dBm |
| Optical Return Loss: | | | | | |
| Single-mode Fiber | — | — | — | -27 | dB |
| Multimode Fiber | — | — | — | -14 | dB |

Outline Diagrams

P172-Type Through-Hole Package

Dimensions are in inches and (millimeters).



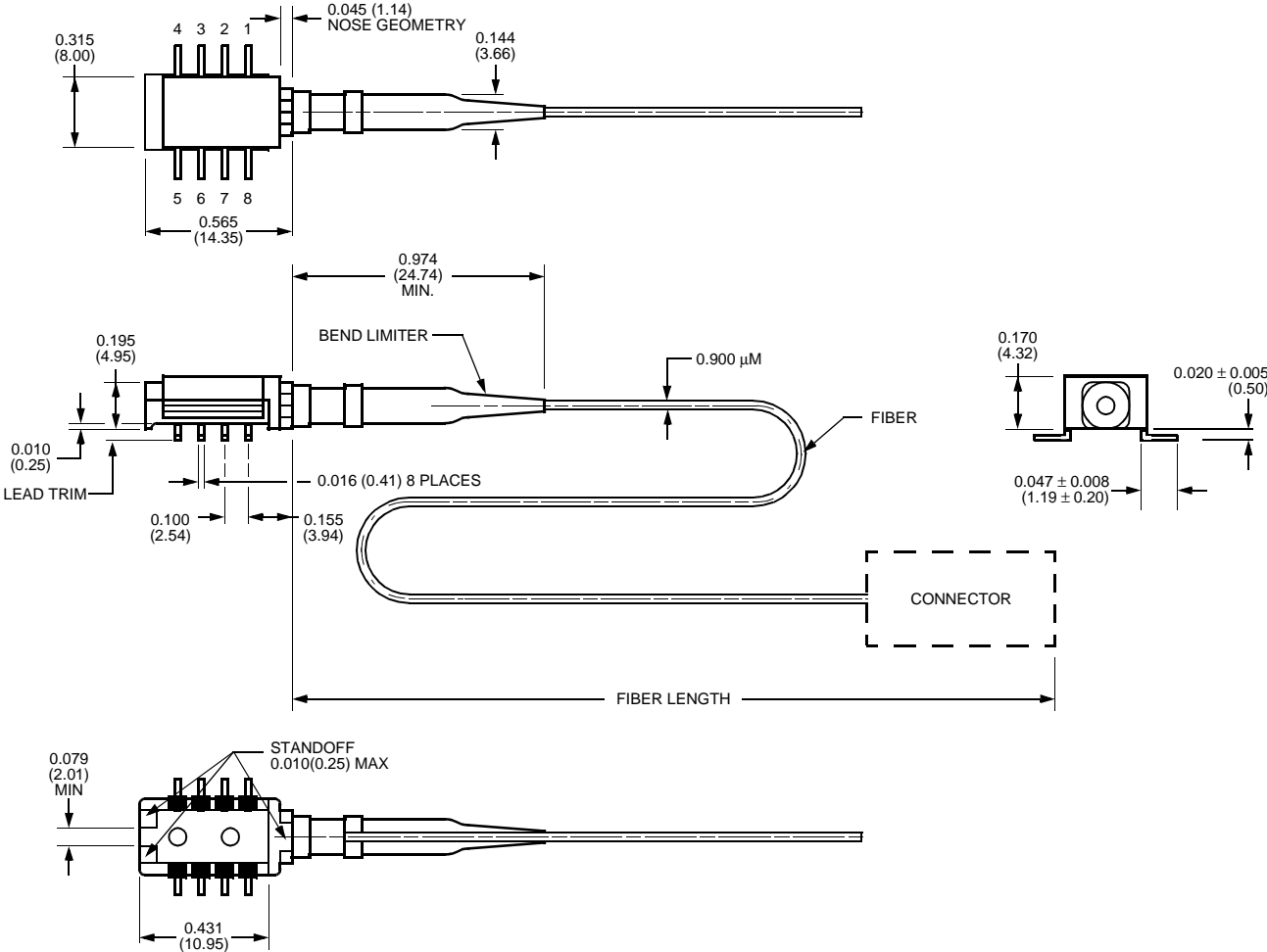
1-1057F

P172-Type Receiver

Outline Diagrams (continued)

P172-Type Gull-Wing Package

Dimensions are in inches and (millimeters).



1-1057F.a

Qualification Information

The P172-type receiver is scheduled to complete the following qualification tests and meet the intent of *Telcordia Technologies* GR-468-CORE.

Table 4. P172Type Qualification Information

| Test | Reference | Conditions | Sample Size | Pass/Fail Criteria |
|--------------------------------|--|---|------------------------------------|--|
| Mechanical Shock and Vibration | <i>Telcordia Technologies</i> GR-468-CORE, Section 8.3.2 | 500 g, 0.5 ms Condition A, 20 g, 20 Hz to 2000 Hz, 4 min./cycle, 4 cycles | 11 | 10% Responsivity Change After Completion of Both Tests |
| Thermal Shock | MIL-STD-883 Method 1011 | 0°C to 100 °C, 20 cycles | 11 | Physical Attributes and Leak Check |
| Lead Integrity | MIL-STD-883 Method 2004 | Condition A | To Be Provided by the Supplier | — |
| Solderability | MIL-STD-883 Method 2003 | — | To Be Provided by the Supplier | — |
| Low Temperature Storage | — | –40 °C storage 2000 hours | 11 | 10% Responsivity Change After Completion of Test |
| High Temperature Storage | — | 85°C storage 2000 hours | 11 | 10% Responsivity Change After Completion of Test |
| Temperature Cycling | <i>Telcordia Technologies</i> GR-468-CORE, Section 5.20 | –40 °C to +85 °C, 500 cycles | 11 | 10% Responsivity Change After Completion of Test |
| Damp Heat | MIL-STD-883 Method 103 | 85 °C/85% RH 1000 hours | 11 | 10% Responsivity Change After Completion of Test |
| Cyclic Moisture Resistance | <i>Telcordia Technologies</i> GR-468-CORE, Section 5.23 | — | 11 | 10% Responsivity Change After Completion of Test |
| ESD Threshold | <i>Telcordia Technologies</i> GR-468-CORE, Section 5.22 | — | 6 | <i>Telcordia</i> Requirement |
| Internal Moisture | MIL-STD-883 Method 1018 | — | 11 Pieces After Thermal Shock Test | Max 5000 ppm Water Vapor After Other Test Cells |

Ordering Information

Table 5. P172-Type Receiver Ordering Information

| Product Code | Detector Type | Connector type | Lead type | Fiber type | Comcode |
|--------------|---------------|----------------|--------------|------------|-----------|
| P172ABCA | APD | SC/PC | Through Hole | SMF | 108566076 |
| P172ABCF | APD | FC/PC | Through Hole | SMF | 108566084 |
| P172ABCS | APD | LC | Through Hole | SMF | TBD |
| P172ABCJ | APD | MU | Through Hole | SMF | TBD |
| P172ACCA | APD | SC/PC | Gull Wing | SMF | 109122325 |
| P172ACCF | APD | FC/PC | Gull Wing | SMF | TBD |
| P172ACCS | APD | LC | Gull Wing | SMF | TBD |
| P172ACCJ | APD | MU | Gull Wing | SMF | TBD |
| P172PBCA | PIN | SC/PC | Through Hole | SMF | 108566100 |
| P172PBCF | PIN | FC/PC | Through Hole | SMF | 108566118 |
| P172PBCS | PIN | LC | Through Hole | SMF | TBD |
| P172PBCJ | PIN | MU | Through Hole | SMF | TBD |
| P172PCCA | PIN | SC/PC | Gull Wing | SMF | TBD |
| P172PCCF | PIN | FC/PC | Gull Wing | SMF | TBD |
| P172PCCS | PIN | LC | Gull Wing | SMF | TBD |
| P172PCCJ | PIN | MU | Gull Wing | SMF | TBD |
| P172PBAA | PIN | SC/PC | Through Hole | MMF | TBD |
| P172PBAF | PIN | FC/PC | Through Hole | MMF | 109113274 |
| P172PBAS | PIN | LC | Through Hole | MMF | TBD |
| P172PBAJ | PIN | MU | Through Hole | MMF | TBD |
| P172PCAA | PIN | SC/PC | Gull Wing | MMF | TBD |
| P172PCAF | PIN | FC/PC | Gull Wing | MMF | TBD |
| P172PCAS | PIN | LC | Gull Wing | MMF | TBD |
| P172PCAJ | PIN | MU | Gull Wing | MMF | TBD |

Table 6. Related Product Information

| Product Code | Description | Document Number |
|--------------|---|-----------------|
| R485 | 2.5 Gbits/s Receiver with Clock Recovery | DS01-005OPTO |
| R480 | 2.5 Gbits/s Receiver with CML Data Output | DS01-011OPTO |

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