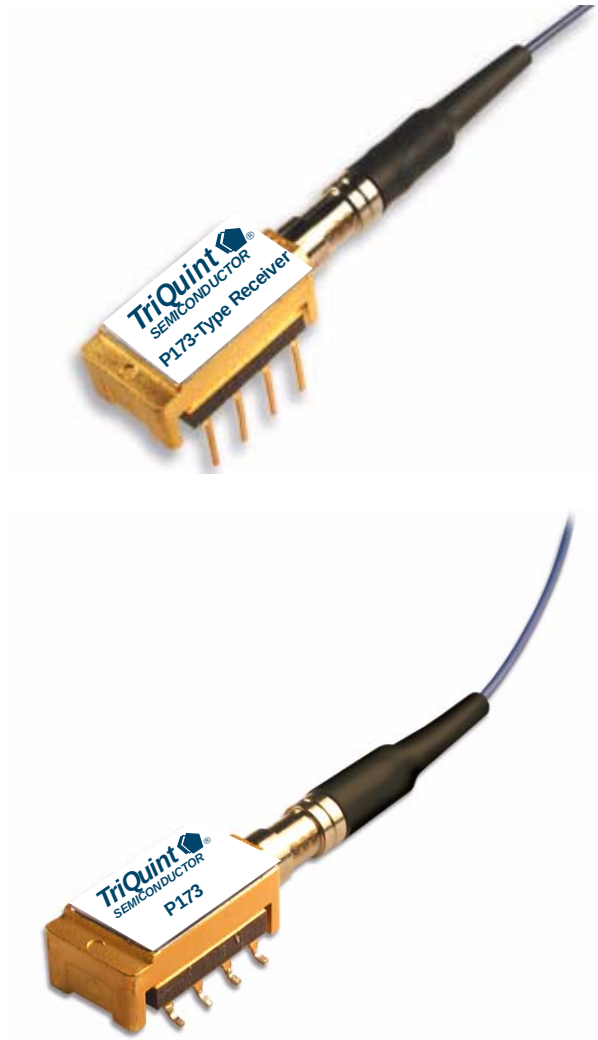
TriQuint OPTOELECTRONICS, INC.

Advance Data Sheet
July 2003

P173P OC-48/STM-16 MiniDIL PIN Receiver with Improved Sensitivity



The P173-Type PIN/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 to 1.6 µm
- Wide operating temperature range:
  — –40 °C to +85 °C
- Scheduled to be qualified according to *Telcordia Technologies* ™ GR-468-CORE
- Single 3.3 V or 5 V power supply
- Typical sensitivity: –25.5 dBm
- Typical overload: +1 dBm
- Built-in thermistor

Applications

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

Benefits

- Compact size
- Easily board mounted

Description

The P173-type receiver consists of an PIN coupled to a single-mode fiber pigtail and a linear preamplifier. The PIN is a rear-illuminated planar diode structure 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 TriQuint Semiconductor. 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 TriQuint's 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.

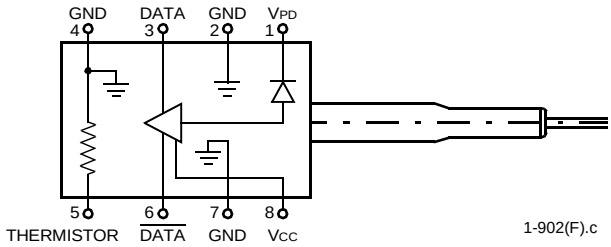


Figure 1. P173P PIN/Preamp (Top View)

Table 1. P173-Type PIN/Preamp Pin Descriptions

Pin Number	Description
1	Photodiode Bias
2	Case Ground
3	DATA*
4	Case Ground
5	Thermistor
6	$\overline{\text{DATA}}$‡
7	Case Ground
8	V_{CC}

* Logic high when light is on.
‡ 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	V_{CC}	–0.5	6.0	V
Optical Input Power	P_{IN}	—	8	dBm
Operating Case Temperature Range	T_C	–40	85	°C
Storage Temperature Range	T_{stg}	–40	85	°C
Lead Soldering Temperature	—	—	250	°C
Lead Soldering Time	—	—	10	s

Electrostatic Discharge

CAUTION: This device is susceptible to damage as a result of electrostatic discharge. Take proper precautions during both handling and testing. Follow guidelines such as *EIA*® Standard *EIA*-625.

TriQuint Semiconductor employs a human-body model (HBM) for ESD-susceptibility testing and protection-design evaluation. ESD voltage thresholds are dependent on the critical parameters used to define the model. A standard HBM (resistance = 1.5 kΩ, capacitance = 100 pF) is widely used and can be used for comparison purposes.

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	5.25	V
PIN Operating Bias Voltage	V_{PD}	3	5	15	V
dc Power Supply Currents:					
Positive Supply (at V_{CC} = 3.3 V)	$I_{CC3.3}$	—	45	60	mA
Positive Supply (at V_{CC} = 5 V)	I_{CC5}	—	60	80	mA
PIN Bias Supply at V_{OP}	I_{APD}	—	—	4	mA
dc Power Dissipation (at V_{CC} = 3.3 V)	$P_{DISS3.3}$	—	150	200	mW
dc Power Dissipation (at V_{CC} = 5 V)	P_{DISS5}	—	300	420	mW
Single-ended, Small Signal (<10 µA) Transimpedance	T_z	—	4	—	kΩ
TIA Input Noise Current (100 kHz—2 GHz)	N_{rms}	—	130	—	nArms
Output Return Loss (130 MHz—5 GHz)	S_{22}	—	–15	–9	dB
3 dB Bandwidth[1]	f_C	1.8	2.5	—	GHz
Thermistor resistance[2]	R_{TH}	9.5	10	10.5	kΩ

1. Measured relative to 60 MHz at -20 dBm optical power .

2. Measured at 25 ^{o}C. The resistance of the thermistor is inversely proportional to the temperature. The temperature T_k in degree-Kelvin can be calculated from the resistance value using the Steinhart-Hart equation: $1/T_k = A + B\ln(R_{TH}) + C[\ln(R_{TH})]^3$, where R_{TH} is the resistance and A, B, and C are constants: A = +1.0267 x 10^{-3} ; B = +2.565 x 10^{-4} ; C = -4.5421 x 10^{-8}. The temperature in degree-Celsius is $T_c = T_k$ - 273.15

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

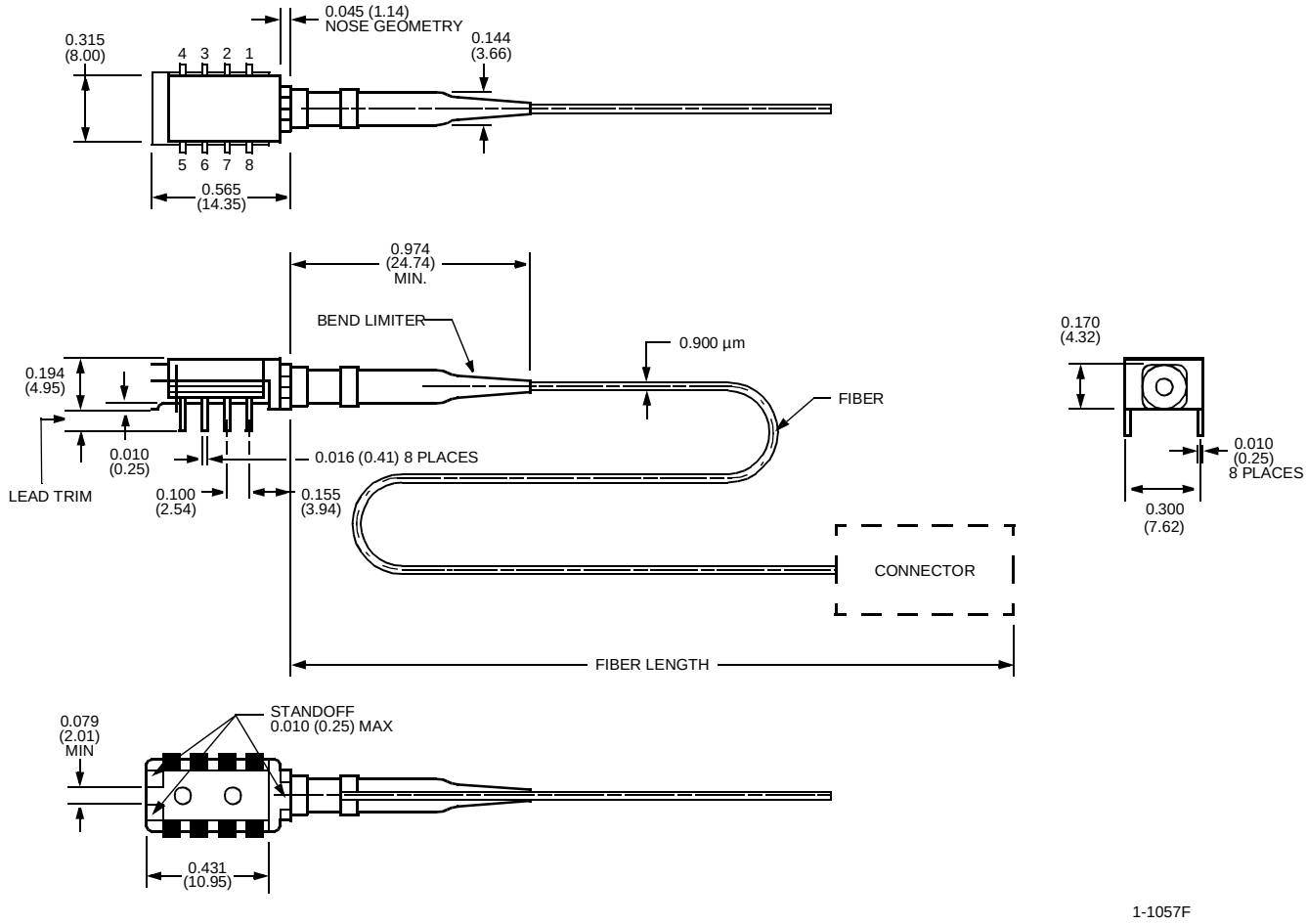
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Optical Wavelength	At Rated Sensitivity	λ	1250	—	1610	nm
Responsivity [1]	1310 nm, -30 dBm, 25 °C	R	0.75	—	—	A/W
Sensitivity [1]	1310 nm, 2.5 Gb/s, 2^{23} – 1 PRBS, $1x10^{-10}$ BER, 10 dB Extinction Ratio:	P_{RMIN}				
	At 25 °C		—	–25.5	–24	dBm
	At –40 °C to +85 °C		—	–25.0	–23	dBm
Overload [1]	1550 nm, 2.5 Gb/s, 2^{23} – 1 PRBS, $1x10^{-10}$ BER, 10 dB Extinction Ratio	P_{RMAX}	0	+1	—	dBm
Optical Return Loss	Optical Return Loss	ORL	—	—	–27	dB

1. V_{CC} = 3.3 V, V_{PD} = 5 V, OSNR > 40 dB, using a Maxim 3265 limiting amp.

Outline Diagrams

P173-Type Through-Hole Package

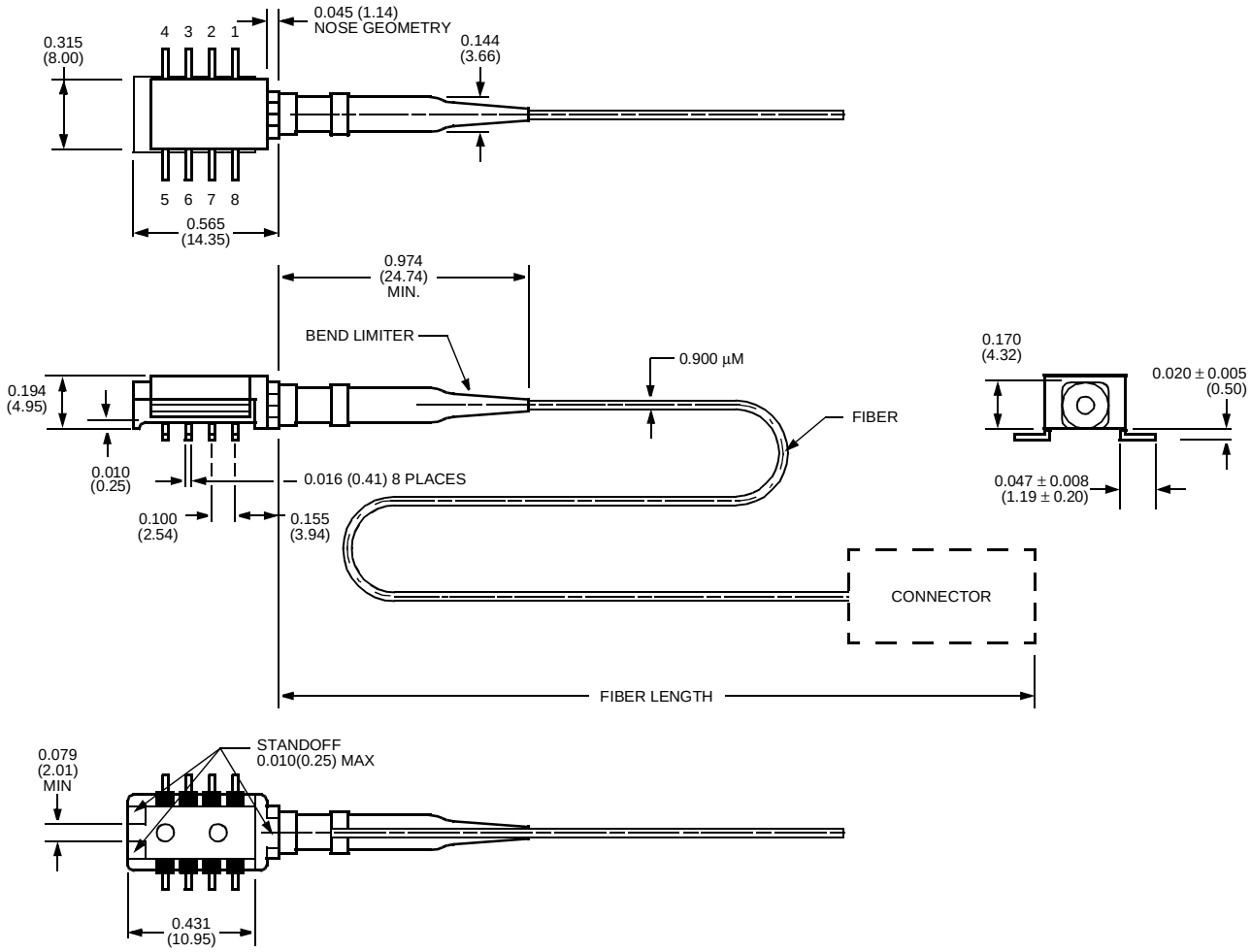
Dimensions are in inches and (millimeters).



Outline Diagrams (continued)

P173-Type Gull-Wing Package

Dimensions are in inches and (millimeters).



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Qualification Information

The P173-type receiver is scheduled to complete the following qualification tests and meet the intent of *Telcordia Technologies* GR-468-CORE.

Table 4. P173-Type Qualification Information

Test	Reference	Conditions	Sample Size	Pass/Fail Criteria
Mechanical Shock	MIL-STD-883 Method 2002	Condition B 5 times/axis 500 G, 1 ms	11	Change in receiver sensitivity: 1 dB
Vibration	MIL-STD-883 Method 2007	Condition A 20 G, 20 Hz—2000 Hz 4 min./cycle 4 cycles/axis	11	Change in receiver sensitivity: 1 dB
Thermal Shock	MIL-STD-883 Method 1011	0° C to 100 °C, 20 cycles	Reference to P172	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	—
Fiber Pull	—	1 kg; 3 times; 5 s	Reference to P172	Change in receiver sensitivity: 1 dB
Accelerating Aging (HTOB)	MIL-STD-883 Method 1005	85 °C under bias, 2000 hours	Reference to P172	Change in receiver sensitivity: 1 dB
Low-temperature Storage	—	–40 °C storage 2000 hours	Reference to P172	Change in receiver sensitivity: 1 dB
High-temperature Storage	—	85 °C storage 2000 hours	11	Change in receiver sensitivity: 1 dB
Temperature Cycling	*Telcordia Technologies* GR-468-CORE, Section 5.20	–40 °C to +85 °C, 100 cycles	11	Change in receiver sensitivity: 1 dB
Damp Heat	MIL-STD-883 Method 103	85 °C/85% RH 1000 hours	Reference to P172	Change in receiver sensitivity: 1 dB
Cyclic Moisture Resistance	*Telcordia Technologies* GR-468-CORE, Section 5.23	—	Reference to P172	Change in receiver sensitivity: 1 dB
ESD Threshold	*Telcordia Technologies* GR-468-CORE, Section 5.22	Human Body Model	6	Threshold minimum 500 V
Internal Moisture	MIL-STD-883 Method 1018	5000 ppm water vapor	Reference to P172	Change in receiver sensitivity: 1 dB
Flammability	UL94	V0	Reference to P172	—

Ordering Information

Table 5. P173-Type Receiver Ordering Information

Product Code	Detector Type	Connector type	Lead type	Fiber type
P173PBCA	PIN	SC/PC	Through Hole	SMF
P173PBCF	PIN	FC/PC	Through Hole	SMF
P173PBCJ	PIN	MU	Through Hole	SMF
P173PBCJJ	PIN	MU-J	Through Hole	SMF
P173PBCS	PIN	LC	Through Hole	SMF
P173PCCA	PIN	SC/PC	Gull Wing	SMF
P173PCCF	PIN	FC/PC	Gull Wing	SMF
P173PCCJ	PIN	MU	Gull Wing	SMF
P173PCCJJ	PIN	MU-J	Gull Wing	SMF
P173PCCS	PIN	LC	Gull Wing	SMF

Table 6. Related Product Information

Product Code	Description
P172	2.5 Gb/s miniDIL Receiver
R485	2.5 Gb/s Receiver with Clock Recovery
R480	2.5 Gb/s Receiver with CML Data Output

Additional Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

Web: www.triquint.com **Tel: (503) 615-9000**

E-mail: info_opto@tqs.com **Fax: (503) 615-8902**

For technical questions and additional information on specific applications:

E-mail: info_opto@tqs.com