

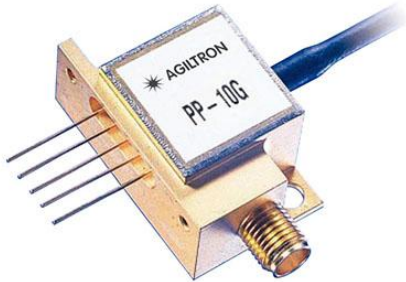
# 12GHz PIN Preamp Detector/Receiver

one stage GaAs HBT preamp



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## Features

- Low Capacitance High Speed InGaAs PIN Detector
- GaAs HBT Preamp IC Chip
- Single Polarity Power Supply
- 11GHz Bandwidth
- Wide Dynamic Range
- Hermetically Sealed.
- Bellcore TR-NWT-000468 Compliant

## Applications

- Long and Short Reach SONET/SDH Systems
- Optically Preamplified Receivers
- Datacom Systems up to 12.5 Gb/s



The PP-10G module consists of a low capacitance photodetector and a low noise GaAs transimpedance amplifier in a hermetic package with a connectorized single-mode fiber pigtail and a 50  $\Omega$  SMA electrical output. HBT is a linear amplifier.

Due to their high sensitivity to electrostatic discharge, warranty coverage applies only to fully metal covered modules the benchtops, which include proper protection. Other versions of the lasers and photodetectors are not covered by any warranty. Please use them with great caution.

## Specifications

| Parameter                                                                | Min                                 | Typical | Max  | Unit     |
|--------------------------------------------------------------------------|-------------------------------------|---------|------|----------|
| NRZ Data Rate                                                            |                                     | 10      |      | Gb/s     |
| Module PIN bias voltage                                                  | 9.5                                 | 11.5    | 13.5 | V        |
| Positive supply                                                          | 7.5                                 | 8       | 8.5  | V        |
| Power dissipation                                                        |                                     | 1       | 1.6  | W        |
| PIN responsivity <sup>[1]</sup>                                          |                                     | 0.88    |      | A/W      |
| PIN responsivity <sup>[5]</sup>                                          |                                     | 0.83    |      | A/W      |
| Responsivity variation with temperature 0°C to 70°C                      |                                     | 5       |      | %        |
| Dark current (25°C)                                                      |                                     |         | 10   | nA       |
| Optical connector loss                                                   |                                     | 0.3     |      | dB       |
| Sensitivity <sup>[2]</sup>                                               | -18                                 | -19     |      | dBm      |
| Optical saturation power (BER < 10 <sup>-9</sup> )                       | 0                                   |         |      | dBm      |
| Average input equivalent noise current density 30kHz - 10GHz             |                                     |         | 16.5 | pA/√Hz   |
| High frequency -3dB corner <sup>[3]</sup>                                |                                     | 11      |      | GHz      |
| Transimpedance gain <sup>[3], [4]</sup>                                  | 400                                 | 500     | 650  | $\Omega$ |
| Trans. gain variation with supply voltage and temperature <sup>[3]</sup> | -15                                 |         | +15  | %        |
| Output return loss <sup>[3]</sup> 100kHz - 8GHz                          | 10                                  |         |      | dB       |
| Operating case temperature                                               | 0                                   |         | 70   | °C       |
| Storage temperature                                                      | -50                                 |         | 70   | °C       |
| SM fiber pigtail connector options                                       | Standard SC-PC, Custom ST-PC, FC-PC |         |      |          |
| Positive supply                                                          |                                     | 9       |      | V        |
| Maximum optical input <sup>[6]</sup>                                     |                                     |         | 10   | dBm      |
| Maximum module PIN bias voltage                                          |                                     |         | 15   | V        |
| Maximum peak module PIN current                                          |                                     |         | 3    | mA       |
| Minimum fiber bend radius                                                | 35                                  |         |      | mm       |

### Notes:

- [1]. Excluding optical connector loss. Optical wavelength is in the 1300nm region and between 1525 - 1575nm.
- [2]. For 10<sup>-10</sup> BER, PRBS 2<sup>23</sup>-1. NRZ @10Gb/s
- [3]. Load impedance is 50 $\Omega$  with a return loss > 20dB, up to 20GHz
- [4]. Excluding PIN responsivity factor and connector loss
- [5]. Excluding optical connector loss. Optical wavelength is in the range 1576 - 1610nm
- [6]. The optical level that causes no damage to the module. Performance specified in this document is not guaranteed at this input power.

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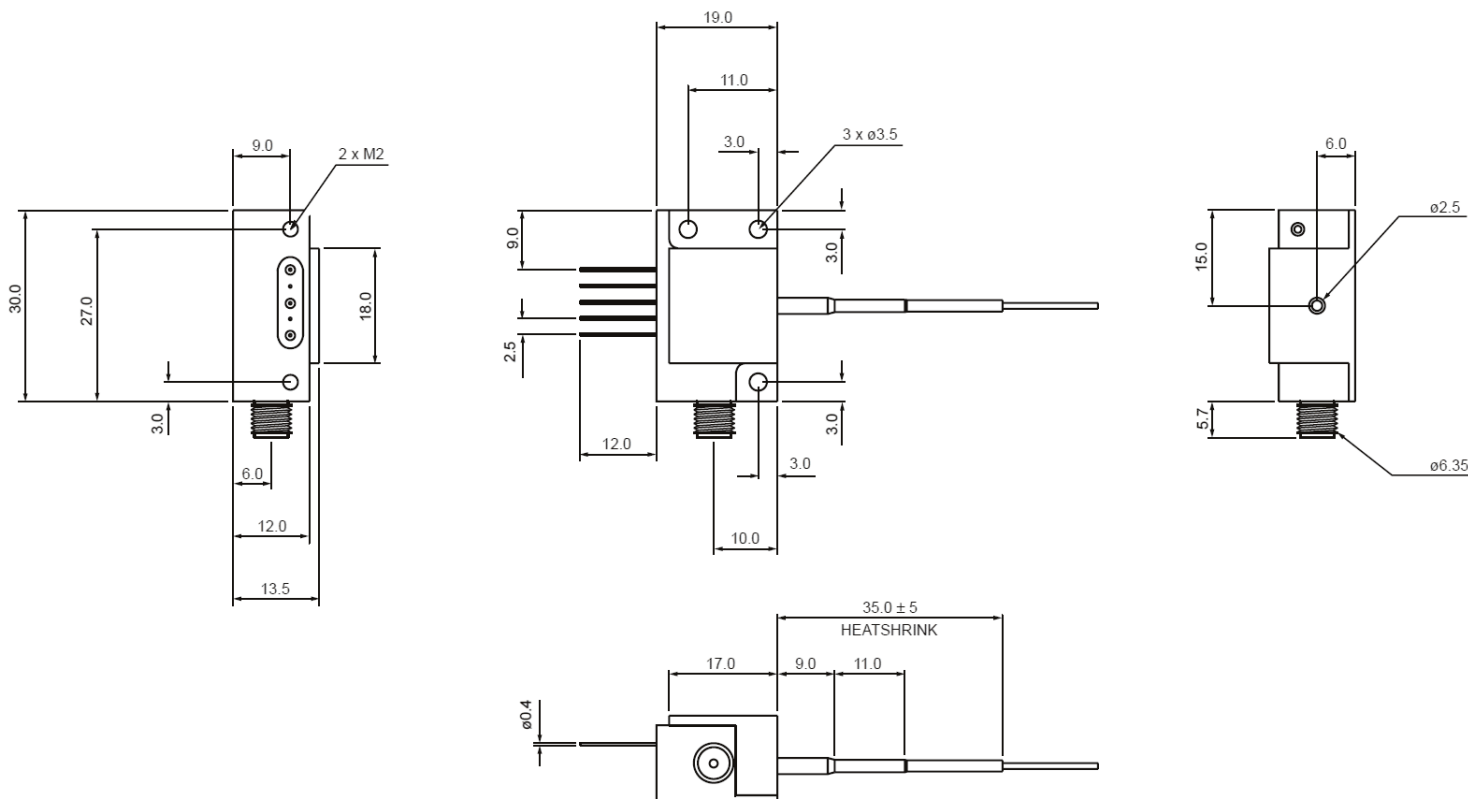
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## Dimensions (mm)



\*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

## Pin Definition and Instructions for Use

### Pin 1 PIN Bias

A DC voltage, between 9.5V and 13.5V, to reverse bias the PIN. This voltage should be present BEFORE the Positive Supply (pin 3) is applied to prevent the possibility of forward biasing the PIN (which will damage the device). Power down sequence is: pin 3, then pin 1.

This pin should be decoupled externally to minimize conducted noise from the power rails.

### Pin 2, 4, 5 Ground

Ground all pins for optimum performance.

### Pin 3 Positive Supply

DC voltage between 7.5 and 8.5V provides power to the pre-amplifier IC. This pin should be decoupled externally to minimize conducted noise from the power rails. The source should be capable of supplying up to 150 mA.

### SMA Electrical Output

Device output is via the SMA connector and should be delivered into a 50Ω load.

There is a DC offset of approximately 3V on this pin, so most applications will require that the output is AC coupled.

| Pin # | Symbol   | Function          |
|-------|----------|-------------------|
| 1     | PIN Bias | PIN Bias          |
| 2     | GND      | Case Ground       |
| 3     | DC       | Positive Supply   |
| 4     | GND      | Case ground       |
| 5     | GND      | Case ground       |
| SMA   | SMA      | Electrical Output |

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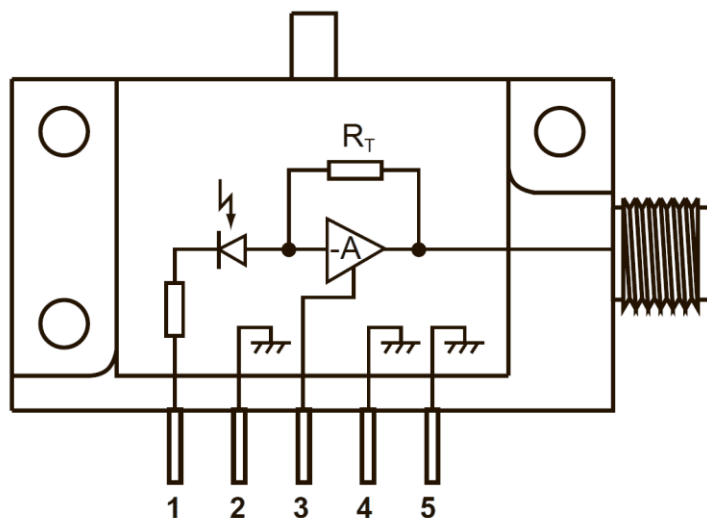
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## Receiver Schematic



## Typical Frequency Response (S21)



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### Ordering Information (Part Number)

|        | 1                  | 1                | 12         | 1               | 1                     | 11            | <input type="checkbox"/>               |
|--------|--------------------|------------------|------------|-----------------|-----------------------|---------------|----------------------------------------|
| Prefix | Detector Type      | Wavelength Range | Bandwidth  | Amplification   | Module*               | Configuration | Connector <sup>[1]</sup>               |
| AFDT-  | PIN = 1<br>APD = 2 | 1200-1600nm = 1  | 12GHz = 12 | Single Stage= 1 | Device = 1<br>Yes = 2 | Standard = 11 | FC/PC = 2<br>FC/APC = 3<br>Special = 0 |

\* Module contains driver and power supply.

[1]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

### Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5  $\mu$ m.

Maximum power = 30 mW.



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## Caution Electrostatic Sensitivity



- Never touch laser diode and the module using hands
- Always use protections when handle a photodiode
- Recommend mounting the laser diode using an ionic gun and ESD finger cots



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