Femtowatt Photodetectors

Free Space/Fiber Coupled, GHz, 400-2350nm

DATASHEET

BUY NOW

The Agiltron HGDT series of photodetectors have extremely high gain, making them ideal for low-light-level detection applications, such as single photon, spectroscopy and fluorescence measurements. They can detect optical signals in the sub-picowatt to 0.5 nanowatt range, and when used with a chopper and lock-in amplifier to reduce the measurement bandwidth, these photodetectors can achieve sensitivity levels in the femtowatt range. It has a 1-mm-diameter PIN photodetector with TEC cooling. To detect light from 300 to 1050 nm, silicon detector is used. InGaAs PIN photodetector is used to operates from 800 to 1700 nm and strained InGaAs PIN is used for 1600 to 2350nm range detection. Typical responsivity curves for the units can be found in the “Responsivity” section on page 24. The circuitry inside consists of a photodetector followed by an electronic gain stage powered by a battery to reduce interferences. The TEC cooling is powered by an external wall plug power supply. The incredibly high gain and low-noise performance of these photoreceivers was achieved by careful selection and design of the amplifier-resistor pair. A large feedback resistor is used to achieve the high trans-impedance gain values, while an ultra-quiet amplifier keeps noise to a minimum.

The device is powered by a standard 9V and an external low-noise power supply are provided in the shipment. It has a M4 mounting thread at the bottom.

Features

- Femtowatt Sensitivity
- Low Noise
- Fiber Coupled/ Free Space
- Power Supplier Operation
- Battery Operation

Applications

- General Lab Use
- Instruments

Specifications

Parameter		Min	Typical	Max	Unit
Detector Diameter			1		mm
Wavelength	Si	400		1000	nm
	InGaAs	850		1650	
	EX-InGaAs	1600		2350	
Peak Response [1]			1		A/W
Gain	DC/AC Low			2	10^{10}V/A
	AC High			20	
Rise/Fall Time [2]			100		ns
Bandwidth [3]		DC		800	Hz
NEP [1]			23		fW/Hz$^{1/2}$
Output Impedance			100		Ω
Bias Voltage				9	V
Optical Damage Threshold				10	mW
Operating Temperature		0		40	°C
Optical Input		Free Space	FC/PC		
Electric Output (DC Coupled)		Male BNC			
Battery		Internal 9V			

Notes:
[1]. @730nm
[2]. 80/20%
[3]. Defined as the boundary at which the output is 3dB below the normal output

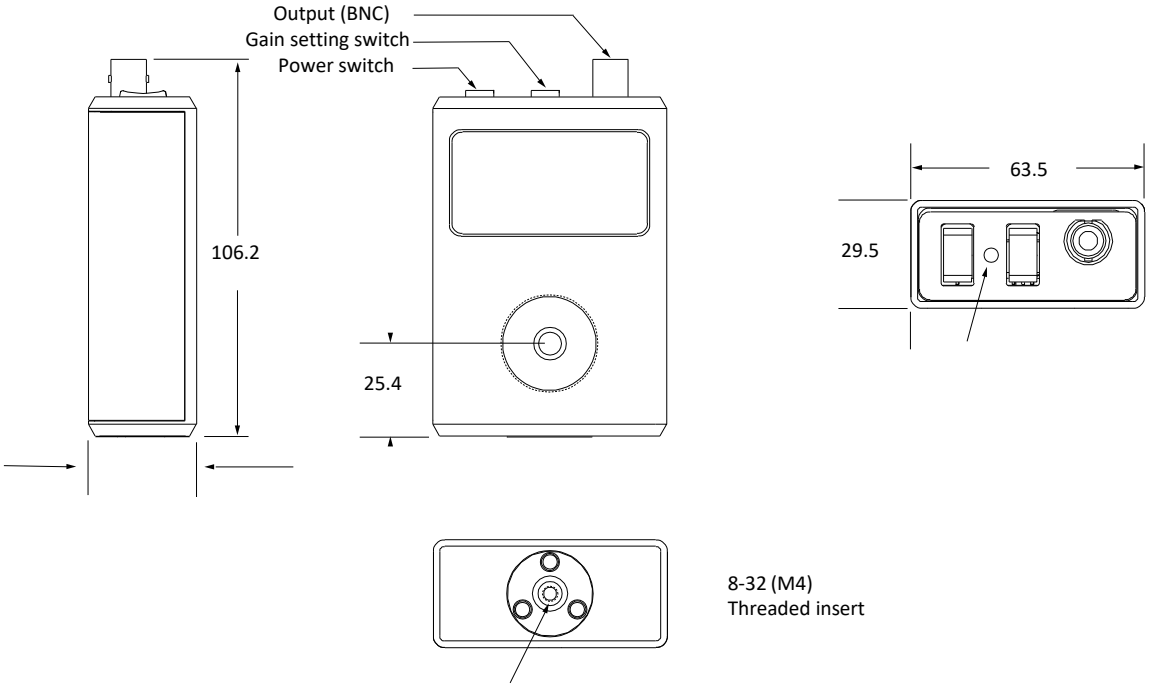
Rev 03/09/24

Femtowatt Photodetectors

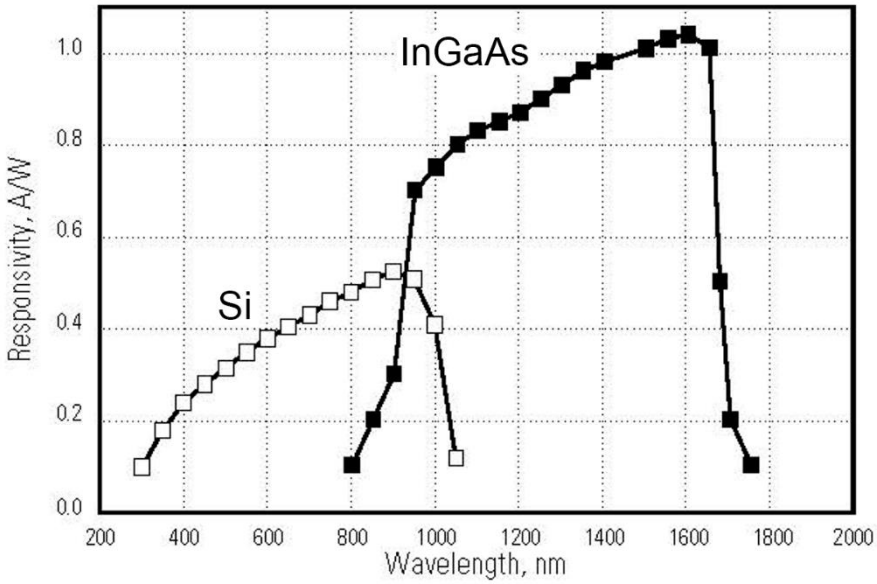
Free Space/Fiber Coupled, GHz, 400-2350nm

DATASHEET

Mechanical Dimensions (mm)



Spectral Response (typical)



Femtowatt Photodetectors

Free Space/Fiber Coupled, GHz, 400-2350nm

DATASHEET

Frequency Response (typical)

Accessories

- Low Noise Wall Pluggable Power Supply

$120

Ordering Information

	☐	☐	☐	☐	1	1 1	☐	1
Prefix	**Type**	**Wavelength**	**Fiber Adaptor**	**Configure**	**Package**		**Cooling**	**Power Supply**
HGDT-	Standard = 1	800-1700nm = 1 400-1000nm = 2 1600-2350nm = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 Bare Fiber = 4	Regular = 1 Special = 0	Regular = 1 Special = 0		Single Stage = 1 Dual Stage = 2 Non = 3	Yes = 1 Non = 2

P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

Femtowatt Photodetectors

Free Space/Fiber Coupled, GHz, 400-2350nm

DATASHEET

Application Notes

Fiber Core Alignment
Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness
Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power
Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.