Fiber Coupled High-Speed InGaAs APD Photodiode

(900 to 1600nm, up to 2.5 GHz)

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Avalanche photodiodes (APDs) offer a better signal-to-noise ratio (SNR) than PIN photodiodes, primarily in low-light or low-signal conditions. Specifically, the SNR advantage of APDs is most significant when:

1. In low-light conditions, APDs provide internal gain (multiplication of photocurrent), boosting weak signals before noise from downstream electronics becomes significant. This leads to improved SNR compared to PIN diodes, which lack internal gain and are limited by amplifier noise at low signal levels.
2. APDs typically have higher capacitance and lower bandwidth than PINs for the same area. When the application doesn't require ultra-high-speed operation, APDs can be beneficial due to the improved SNR from gain.
3. APDs multiply the signal but also introduce excess noise due to the stochastic multiplication process. However, when the dominant noise source is thermal (like preamp noise in a PIN system), the APD's gain outweighs the multiplication noise.

Applications

- Lidar
- RF over Fiber
- Sensor
- Instruments

Features

- High Gain
- Large Bandwidth
- Fast Response
- High Reliability

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	1000		1630	nm
Responsivity (1550nm (M=1))	0.75	0.94		A/W
Input Power	-26		-5	dBm
Conversion Gain (Small Signal)	12000			V/W
Dark Current (M=10)		3		nA
Capacitance		0.35	0.8	pF
Temperature Coefficient		0.075		V/K
Optical Back Reflection	40			dB
Operation Voltage	20	40	50	V
Breakdown Voltage (10 µA)		66		V
Active Area		Ø 80		µm
Operation Bandwidth (NRZ Rate) (M=10)		2.5		GHz
Noise Equivalent Power (NEP) (M=10)		0.04		pW/√Hz
Character (S22)		-7		dB
Group Delay		50		ps
RF Connector (50 om)		SMA		
Operating Temperature	-5		+75	°C
Storage Temperature	-40		+85	°C
Reliability		Telcordia 1209 and 1221		

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

Warning: **The device is extremely ESD-sensitive. Its dark current increases by unprotected handling. It is recommended to be handled under a certified ion fan once the package is removed.**

Rev 07/30/25

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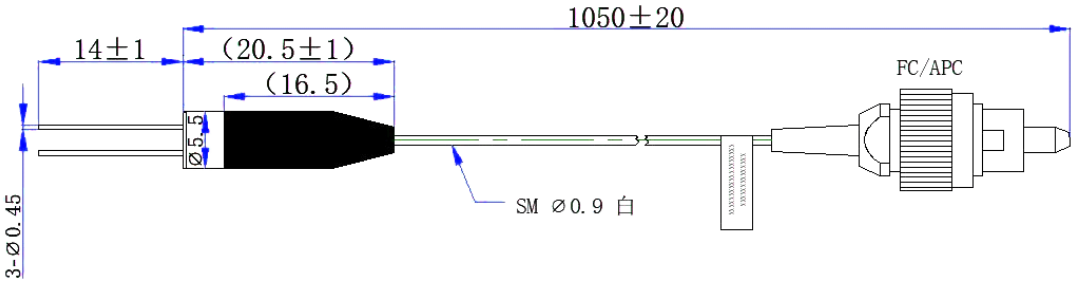
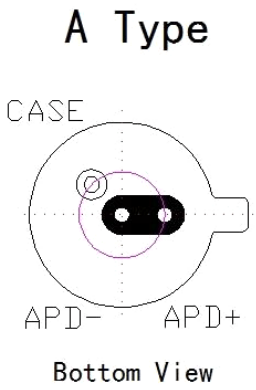
Mechanical Dimensions (mm)

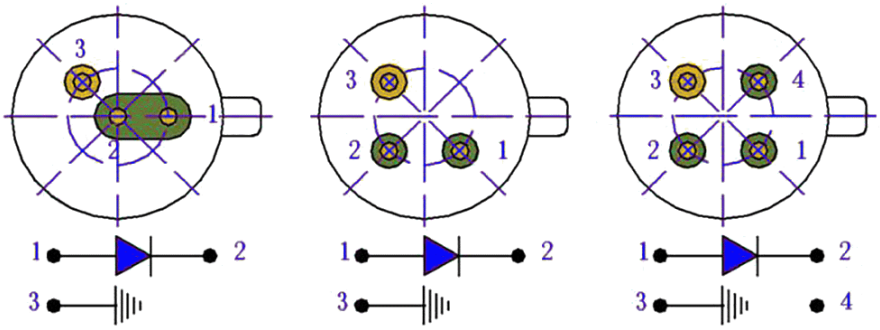




Standard Package for Infrared Band. For other wavelength band, size may vary due to special detector configurations.

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

PD PIN Assignments



Type A Type B Type C

Optical and Electrical Characteristics (Tc=25°C)

Parameter	Symbol	Min	Typical	Max	Unit	Test condition
Operating Wavelength	λ	1100	-	1650	nm	
Reverser Breakdown Voltage	Vbr	40	-	50	V	Id =10μA, φe=0μW
Responsivity	R	0.70	0.75	-	A/W	λ=1310nm, φe=1μw, M=1
Multiplication factor	M	10	-	-	-	Vr=Vbr-3V, λ=1310nm, φe=1uW
Dark Current	Id	-	-	10	nA	VR=Vbr-3, φe=0μW
Capacitance	C	-	-	0.5	pF	Vr=Vbr-3, f=1MHz
Bandwidth	BW	2.0	-	-	GHz	VR=Vbr-3, RL=50Ω, λ=1550nm
Optical Return Loss	RL	40			dB	λ=1310nm

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Typical Response @ 1550nm

Ordering Information

	G	☐☐	☐	☐☐	☐	☐	☐
Prefix	**Wavelength**	**Frequency**	**Amplifier**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**
FCAD-	900 - 1620 = G Special = 0	2.5GHz = 02	No = 1 Yes = 2	SMF-28 = 01 Special - Choose Below	900µm Tube = 3 Bare fiber = 1 Special = 0	1m = 3 0.5m = 2 0.25m = 1 1.5 m = 5 Special = 0	FC/APC = 3 FC/PC = 2 Non = N SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 LC/APC = A LC/UPC = U Special = 0

Fiber Type Selection Table:

01	**SMF-28**	34	**PM1550**	71	**MM 50/125µm**
02		35	**PM1950**	72	**MM 62.5µm**
03		36	**PM1310**	73	
04		37		74	
05	**SM1950**	38		75	
06		39		76	
07		40			
08		41	**PM980**		
09	**SM980**	42			
10	**Hi1060**	43			
11		44			
12		45			
13		46			

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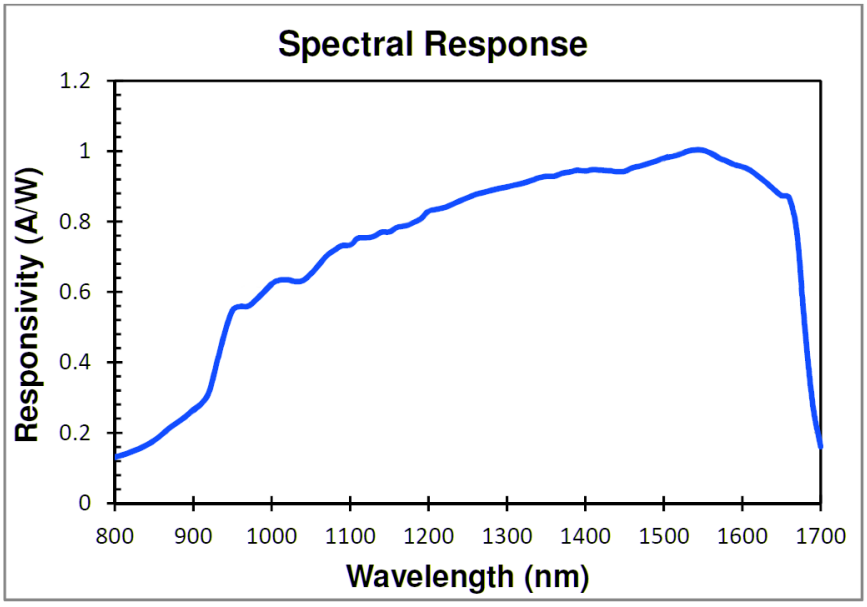
Spectral Response



Amplifier Mounted Option

Low-Noise Optical Detector Amplifier

DETA-11A221111
$165

https://agiltron.com/product/precision-optical-detector-amplifier/

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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.

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