

## InGaAs Avalanche Photodiode IAG-Series

### Description

The IAG-series avalanche photodiode is the largest commercially available InGaAs APD with high responsivity and extremely fast rise and fall times throughout the 1000 to 1630 nm wavelength range. The peak responsivity at 1550 nm is ideally suited to eye-safe rangefinding applications, free space optical communications, OTDR and high resolution Optical Coherence Tomography.

The chip is hermetically sealed in a modified TO-46 package or mounted on a ceramic submount.

### Features

- 80, 200 or 350  $\mu\text{m}$  active area
- Bandwidth up to 2.5 GHz
- Over 70% QE from 1000 to 1600 nm
- Low dark current & noise
- Modified TO-46 or ceramic submount
- Fiber-coupled versions available

### Applications

- Rangefinding
- Optical Communication Systems
- Optical Coherence Tomography
- Low-light-level detection



### Generic Characteristics at T= 21°C

	IAG-Series			Units
	Min	Typ	Max	
Wavelength Range	1000		1630	nm
Peak Sensitivity		1550		nm

### Absolute Maximum Ratings

	IAG 080X / IAG 200X				IAG 350X			
	Min	Typ	Max	Units	Min	Typ	Max	Unit
Storage Temperature	-60		125	°C	-60		125	°C
Operating Temperature*	-40		80	°C	-40		80	°C
Max. Reverse Current			1	mA			1	mA
Max. Forward Current	0		10	mA	0		10	mA
Optical Input (10 ns pulse)			200	kW/cm <sup>2</sup>			200	kW/cm <sup>2</sup>
Optical Input (average)			0	dBm			2	dBm
Soldering (for 5 sec.)			200	°C			200	°C

\*Extended operating temperature range possible for special design considerations

### Electrical Characteristics (T<sub>c</sub>= 25°C, λ= 1550 nm)

Parameter	IAG 080X			IAG 200X			IAG 350X			Units
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Active Diameter	78	80	82	200	205	210	350	352	355	µm
Responsivity @ M= 1 1550 nm wavelength	0.85	0.90	1.00	0.85	0.90	0.95	0.90	0.94	1.05	A/W
Dark Current @ M= 10	-	1	15	-	8	50	-	190	250	nA
Operating voltage, V <sub>r</sub> @ M= 10	-	55	70	43	55	75	30	45	60	Volt
Breakdown voltage, V <sub>br</sub> (I <sub>d</sub> = 10 µA)	40	65	80	50	63	83	35	55	70	Volt
Capacitance	0.32	0.35	0.4	-	1.5	2.0	-	4.1	4.6	pF
Temperature coeff. of V <sub>br</sub>	0.05	0.06	0.07	-	0.075	-	-	0.075	-	V/°C
Bandwidth @ M= 5	-	-	-	0.5	1.5	2.0	-	0.6	-	GHz
Bandwidth @ M= 10	2.0	2.5	3.0	1	1.5	2.0	-	0.6	-	GHz
Bandwidth @ M= 20	1.5	2.2	2.5	0.5	1.0	1.5	-	0.6	-	GHz
Excess Noise Factor, F @ M= 10	-	3.2	3.7	-	3.2	3.7	-	3.2	3.7	-
Excess Noise Factor, F @ M= 20	-	5.5	6.0	-	5.5	6.0	-	5.5	6.0	-
Noise Equivalent Power, NEP @ M= 10	-	0.01	0.04	-	0.032	0.10	-	0.12	-	pW/Hz <sup>1/2</sup>

Fig. 1: Spectral Response and Quantum Efficiency (M= 10 @ 1550 nm)

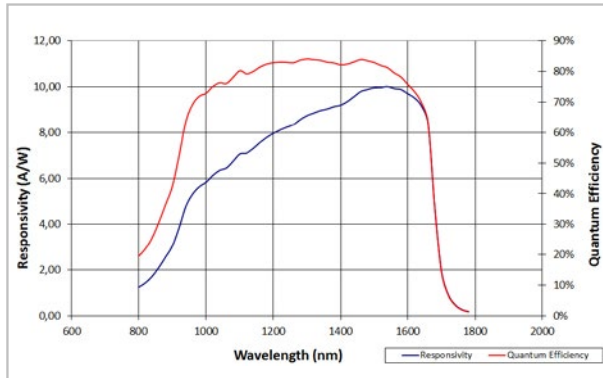


Fig. 2: Responsivity-Voltage Characteristics (25 degrees C)

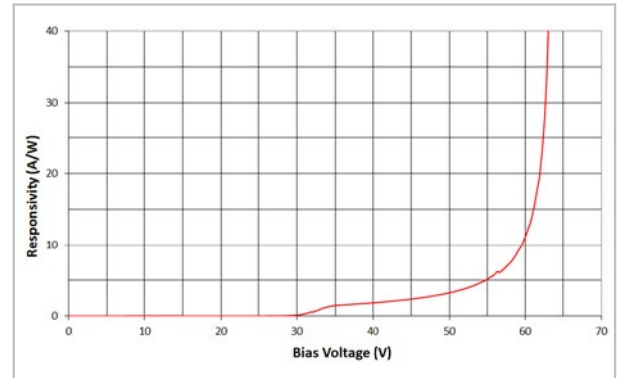


Fig. 3: Typical APD Noise Density as a Function of Gain

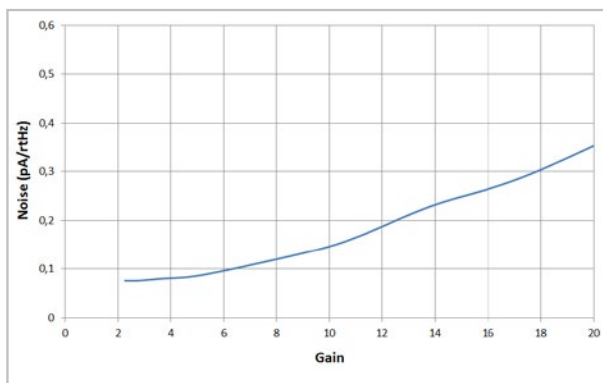


Fig. 4: Capacitance vs. Reverse Voltage

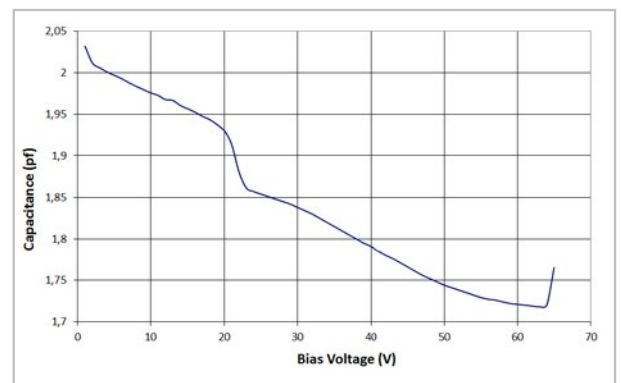
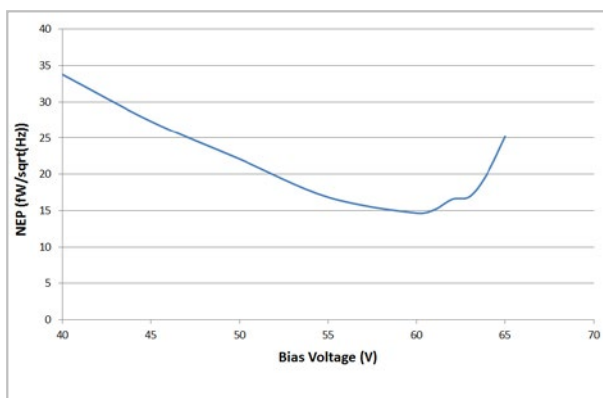
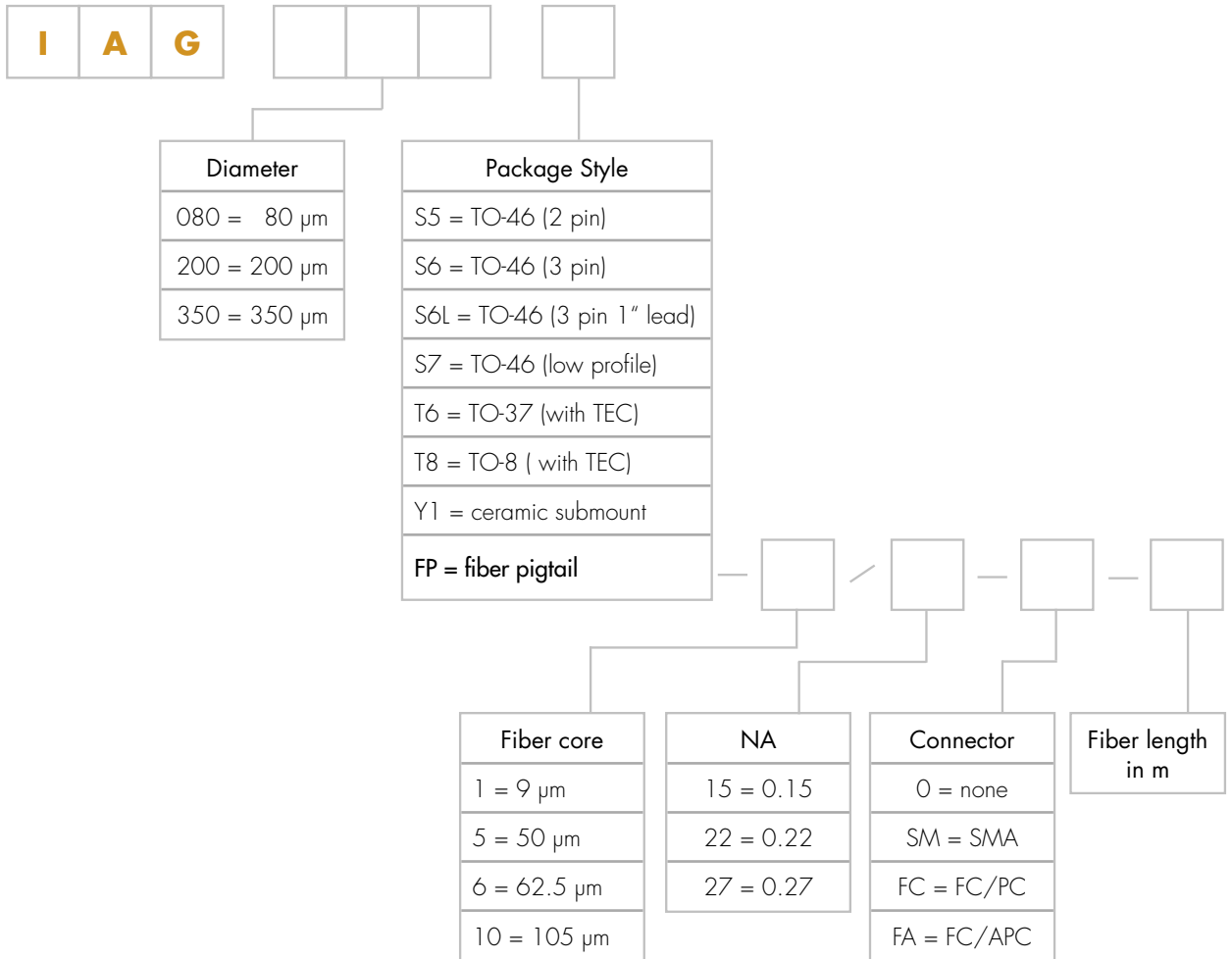


Fig. 5: NEP vs. Bias Voltage



Note: Fig. 3 - Fig. 5 only valid for IAG 200-Series!

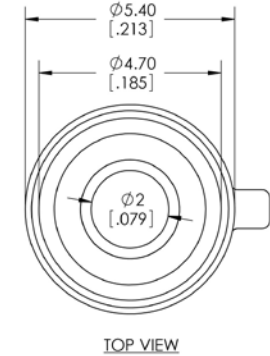
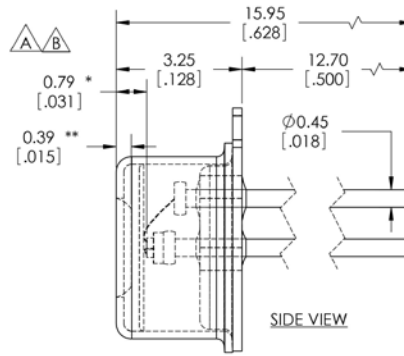
Product Number Designations



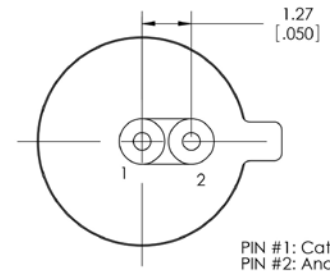
Note: other fibers and connectors are available on request.

Package Drawings

Package S5 TO-46 (2 pin)

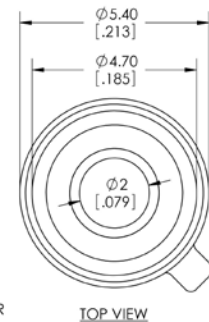
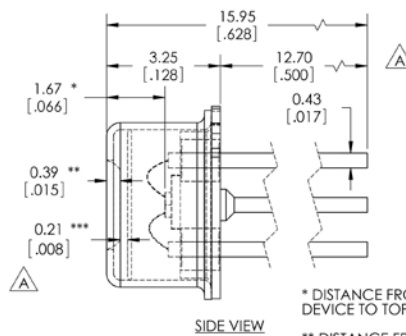
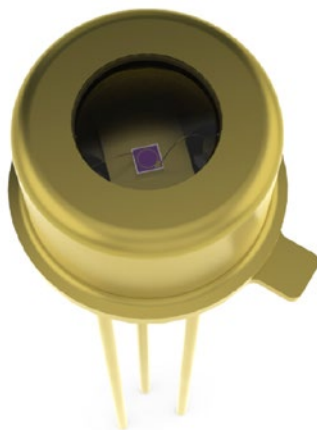


\* DISTANCE FROM TOP OF DEVICE TO TOP OF DETECTOR  
 \*\* DISTANCE FROM TOP OF DEVICE TO TOP OF WINDOW

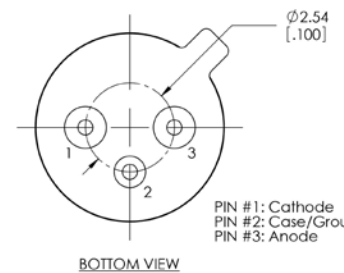


PIN #1: Cathode  
 PIN #2: Anode

Package S6 TO-46 (3 pin)



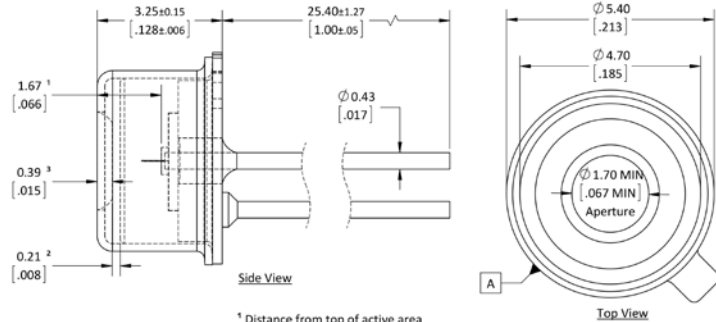
\* DISTANCE FROM TOP OF DEVICE TO TOP OF DETECTOR  
 \*\* DISTANCE FROM TOP OF DEVICE TO TOP OF WINDOW  
 \*\*\* WINDOW THICKNESS



PIN #1: Cathode  
 PIN #2: Case/Ground  
 PIN #3: Anode

Package Drawings

Package S6L TO-46 (3 pin 1" lead)

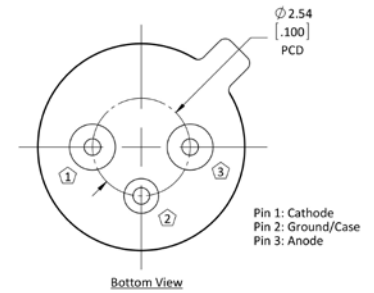


Note:  
Active area concentric to Datum A within 50µm.

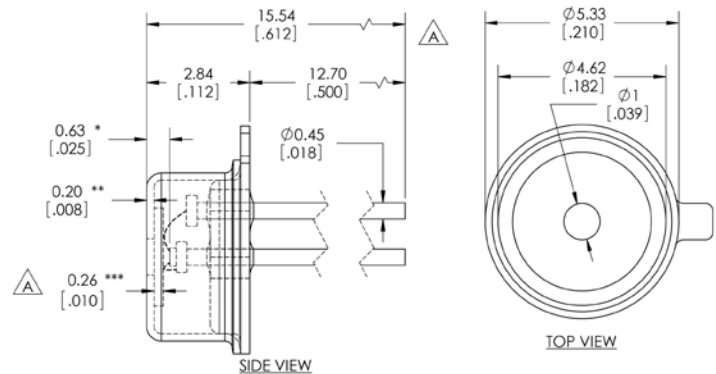
¹ Distance from top of active area to top of device.

² Window thickness.

³ Distance from top of device to top of window.



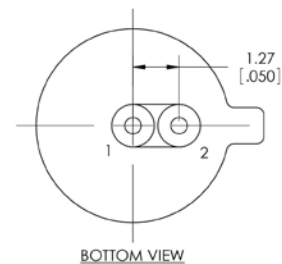
Package S7 TO-46 (low profile)



\* DISTANCE FROM TOP OF DEVICE TO TOP OF ACTIVE AREA

\*\* DISTANCE FROM TOP OF DEVICE TO TOP OF WINDOW

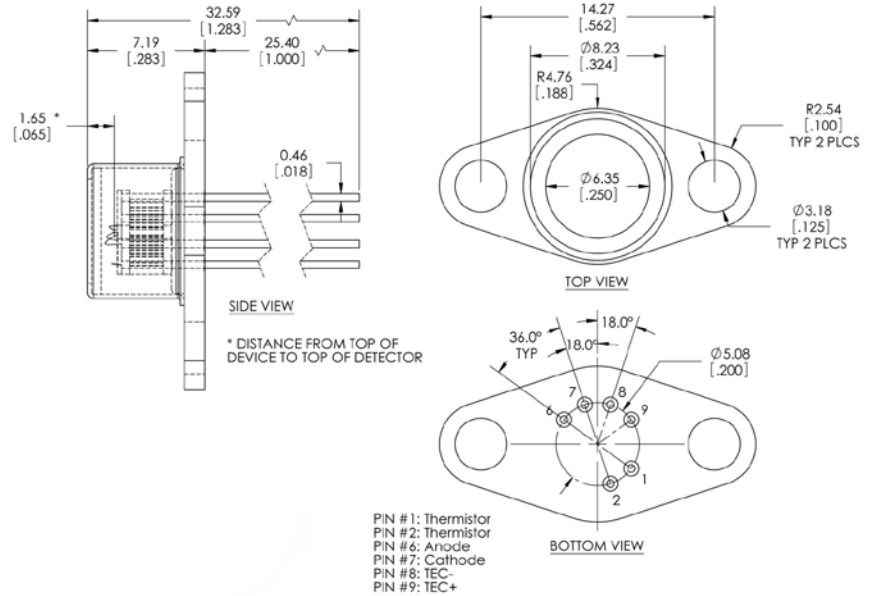
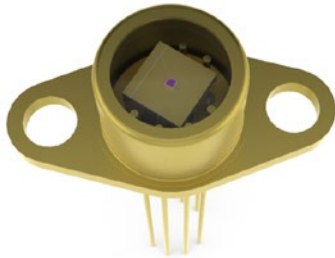
\*\*\* WINDOW THICKNESS



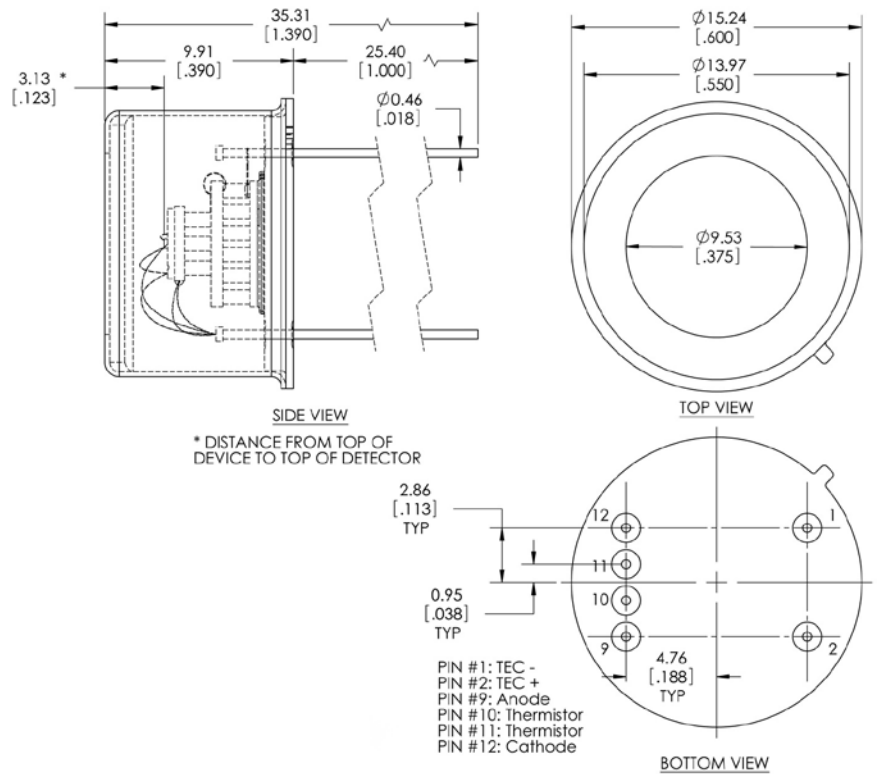
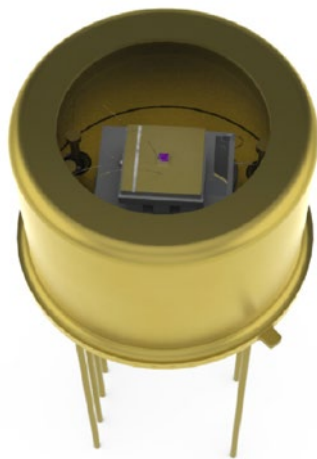
PIN #1: Cathode  
PIN #2: Anode

Package Drawings

Package T6 TO-37 (with TEC)



Package T8 TO-8 (with TEC)





## Product Changes

LASER COMPONENTS reserves the right to make changes to the product(s) or information contained herein without notice. No liability is assumed as a result of their use or application.

## Ordering Information

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Custom designed products are available on request.