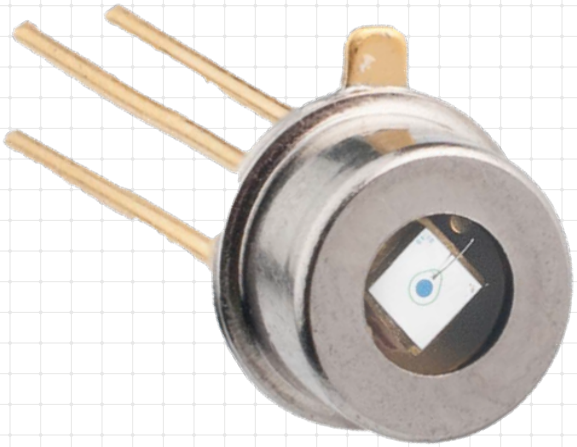
OSI OPTOELECTRONICS

InGaAs Avalanche Photodiode



APX-NG000XAPD

1000 to 1650nm InGaAs Avalanche Photodiode (APD)

The APX-NG000XAPD series are InGaAs Avalanche Photodiodes (APD), which come in various active area diameters of 0.2mm, 0.4mm, and 0.5mm. These APDs operate at reverse bias voltages ranging from 40V to less than 80V, with a typical bias voltage of 55V. They can provide avalanche gains of up to 25. These devices are available in TO-46 metal cans and Surface Mount Technology (SMT) packages. Due to their high gain, low noise, and fast response times, these devices are ideal for use in optical communication receivers, laser range finders, and low-light-level detection systems operating in the near-infrared wavelength range (1000nm to 1650nm).

Applications

Optical Communication

Time of Flight

Low-Light-Level Detection

Features

1000-1650nm Spectral Range

Low Dark Current

Low Capacitance

High Responsivity

High Avalanche Gain up to 25

0.2mm, 0.4mm and 0.5mm Active Area Diameters

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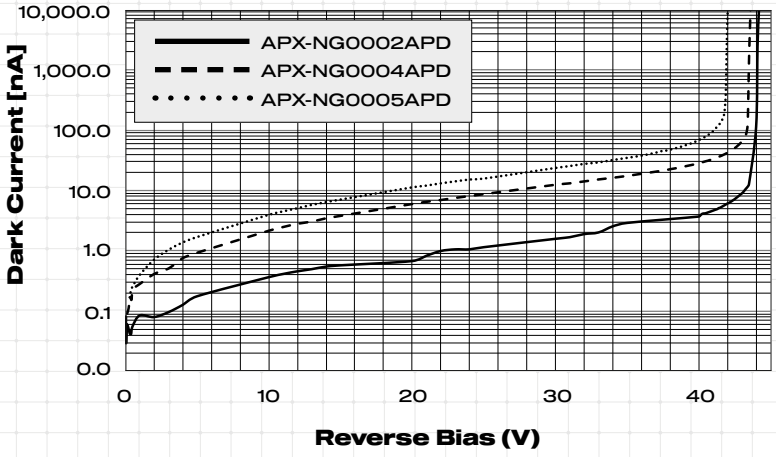
Absolute Maximum Ratings at T_A=23 ºC

PARAMETER	SYMBOL	MIN	MAX	UNIT
OPERATING TEMPERATURE	T_{OP}	-40	+85	ºC
STORAGE TEMPERATURE	T_{STG}	-55	+125	ºC
PACKAGE	TO-46, SMT			

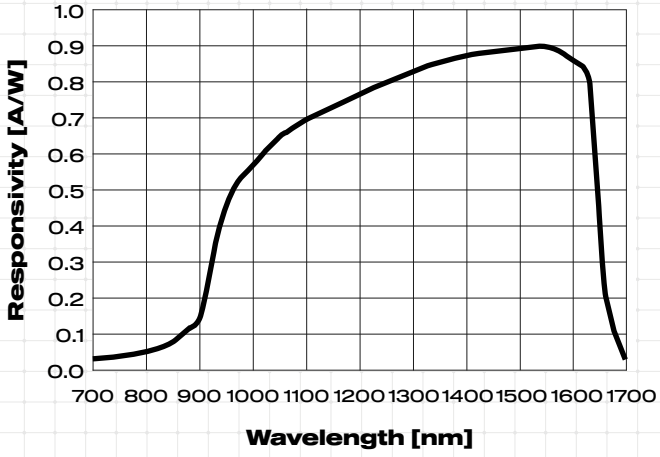
Typical Electro-Optical Specifications at T_A=23 ºC

PARAMETER	TEST CONDITIONS		APX-NG0002APD			APX-NG0004APD			APX-NG0005APD			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
ACTIVE AREA	-	A.A.	-	0.03	-	-	0.13	-	-	0.2	-	mm^2
ACTIVE DIAMETER	-	$A.A._{ø}$	-	200	-	-	400	-	-	500	-	µm
SPECTRAL RANGE	-	Δλ	950	-	1650	950	-	1650	950	-	1650	nm
PEAK WAVELENGTH	-	λ_{Peak}	-	1550	-	-	1550	-	-	1550	-	nm
RESPONSIVITY	λ=1550nm, M=1	R_λ	-	0.95	-	-	0.95	-	-	0.95	-	A/W
	λ=1550nm, M=10	R_λ	-	9.5	-	-	9.5	-	-	9.5	-	A/W
GAIN	λ=1550nm	M	-	10	30	-	10	30	-	10	30	-
BREAKDOWN VOLTAGE	I_R=100µA	V_{BR}	35	40	60	35	40	60	35	40	60	V
OPERATING VOLTAGE	M=10	V_{OP}	-	$0.92xV_{BR}$	-	-	$0.92xV_{BR}$	-	-	$0.92xV_{BR}$	-	V
CAPACITANCE	M=10	C_j	-	2	-	-	5	-	-	9	-	pF
DARK CURRENT	M=10	I_D	-	20	50	-	80	200	-	120	300	nA
TEMP. COEFFICIENT OF BREAKDOWN VOLTAGE	-40ºC to +85ºC	Γ	-	0.12	0.15	-	0.12	0.15	-	0.12	0.15	V/ºC
RISE TIME	M=10, R_L=50Ω, λ=1550nm	T_R	-	-	0.4	-	-	0.8	-	-	1	ns

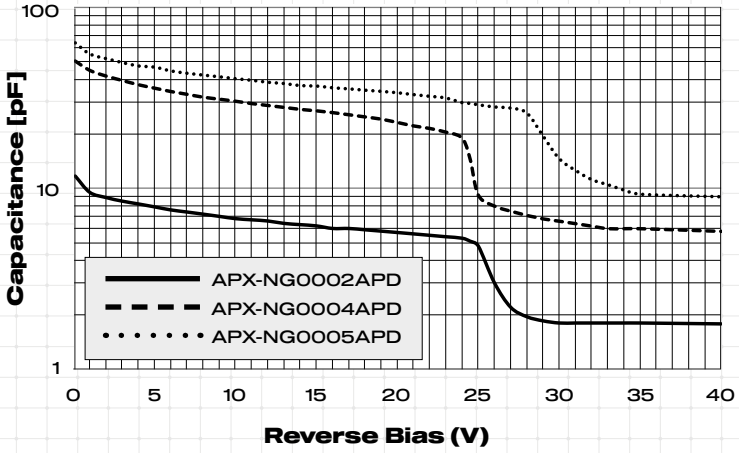
Typical Dark Current vs. Reverse Voltage



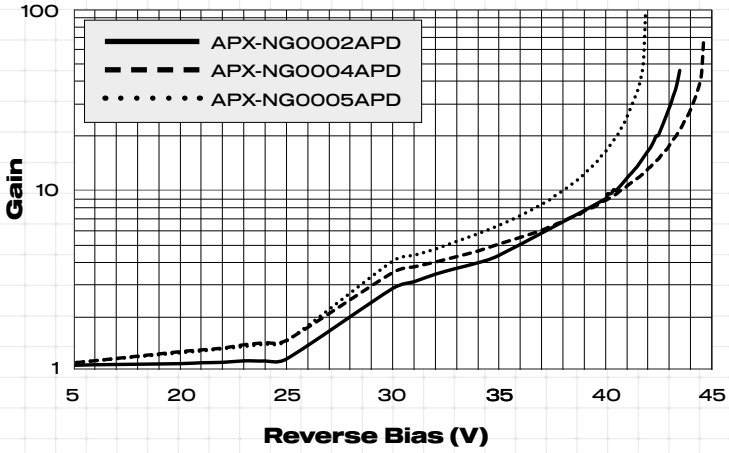
Typical Spectral Response at M=1



Typical Capacitance vs. Reverse Voltage



Typical Gain vs. Reverse Voltage at 1550nm

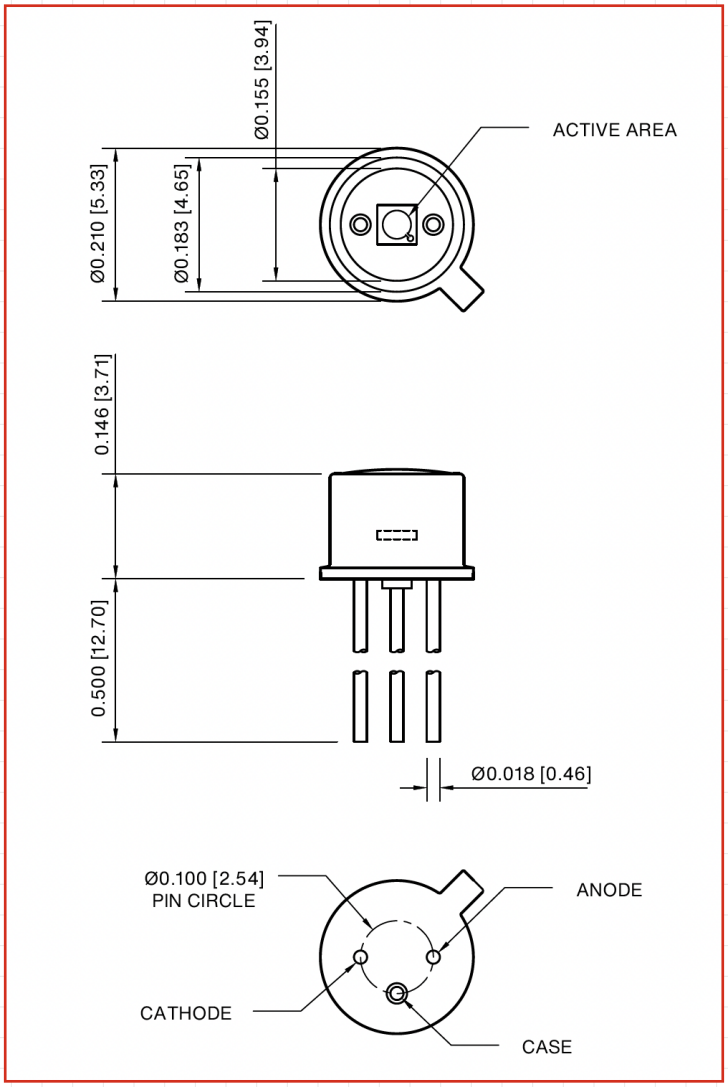


Mechanical Specification

Units are in inches [mm]

Note: Lead soldering temperature (1/16 inches from case) 260ºC for 3 sec.

*This drawing represents a TO-46 package speficiation. Surface Mount Technology (SMT) variants may also be available.



General Care and Handling Instructions

PHOTODIODES:
HANDLING AND STORAGE

- Handle Photodiodes gently to prevent damage.
- Avoid exposing Photodiodes to temperatures exceeding the storage temperature rating of the device.
- Maintain a non-condensing environment for optimum performance and lifetime.

CLEANING

- Gently clean the glass (borosilicate or quartz window) using a 50/50 mixture of Methanol and isopropyl alcohol and a soft, optical-grade pad.

SPECIAL CONSIDERATIONS FOR PLASTIC OR EPOXY ENCAPSULATED PHOTODIODES

- Protect from intense light sources such as direct sunlight.
- Avoid exposure to harsh chemicals like THINNERS, ACETONE, and TRICHLOROETHYLENE.
- Cleaning with a 50/50 mixture of Methanol and isopropyl alcohol (IPA) is recommended. Cleaning in an ultrasonic bath is generally not recommended.

CDS PHOTOCELLS:
HANDLING AND STORAGE

- Handle CdS Photocells gently to prevent damage.
- Avoid exposing CdS Photocells to temperatures exceeding the storage temperature rating of the device.
- Maintain a non-condensing environment for optimum performance and lifetime.

CLEANING

- Gently clean the glass or plastic covering using a 50/50
- mixture of Methanol and isopropyl alcohol and a soft, optical-grade pad.

SPECIAL CONSIDERATIONS

- DO NOT use Vapor Phase Soldering or Reflow Soldering for CdS components.

OPTOCOUPLERS AND LEDS:
HANDLING AND STORAGE

- Handle Optocouplers and LEDs gently to prevent damage.
- Avoid exposing the devices to temperatures exceeding the storage temperature rating of the device.
- Maintain a non-condensing environment for optimum performance and lifetime.

CLEANING

- For plastic molded devices, cleaning with a 50/50 mixture of Methanol and isopropyl alcohol is recommended. Cleaning in an ultrasonic bath is generally not recommended.

SPECIAL CONSIDERATIONS

- Avoid exposing plastic molded devices or epoxy glob top devices to harsh chemicals like THINNERS, ACETONE, and TRICHLOROETHYLENE.

ELECTROSTATIC DISCHARGE (ESD) SENSITIVITY:

- All devices are considered ESD-sensitive. They are shipped in ESD protective packaging. When unpacking and using these products, anti-ESD precautions should be observed.

LEAD TRIMMING AND BENDING:

- Standard lead trimming after soldering is an acceptable practice; however, do not attempt to bend or modify the leads incorrectly, as it can damage the glass feed-through or the plastic encapsulant.

SOLDERING INSTRUCTIONS:

- Use a soldering iron with a tip temperature of 300°C max.
- Consult with your preferred solder manufacturer to determine a solder alloy and flux combination, as well as the reflow profile appropriate for your application.

GENERAL PRECAUTIONS FOR ALL DEVICES

1. **MOISTURE PREVENTION:**
   Ensure devices are stored in a dry environment to prevent moisture ingress, which can cause damage during soldering. Refer to J-STD-20 for guidance on proper baking procedures to prevent moisture related damage.
2. **LEAD SPLAYING:**
   If required, carefully splay the leads of the devices according to the specific application needs. Be cautious when splaying leads, as improper techniques may damage the device. Consult technical support or device datasheets for guidance on lead splaying.
3. **MECHANICAL STRESS:**
   Handle devices with care throughout the installation process to prevent damage.
4. **CIRCUIT PROTECTION AND LAYOUT:**
   Optimize the circuit design and layout to ensure proper functioning and prevent damage to the devices. Include appropriate protection measures like ESD protection diodes, current-limiting resistors, and voltage regulation.
5. **AFTER-SALE SUPPORT:**
   For troubleshooting and device-specific inquiries, please consult with our technical support team. They can offer valuable guidance and suggestions on handling, operation, and application-related questions. To reach them, please contact the Advanced Photonix Applications group at Techsupport@advancedphotonix.com.

Legal Disclaimer

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RoHS COMPLIANT

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CLEANING

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OPTOCOUPLERS AND LEDS:
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