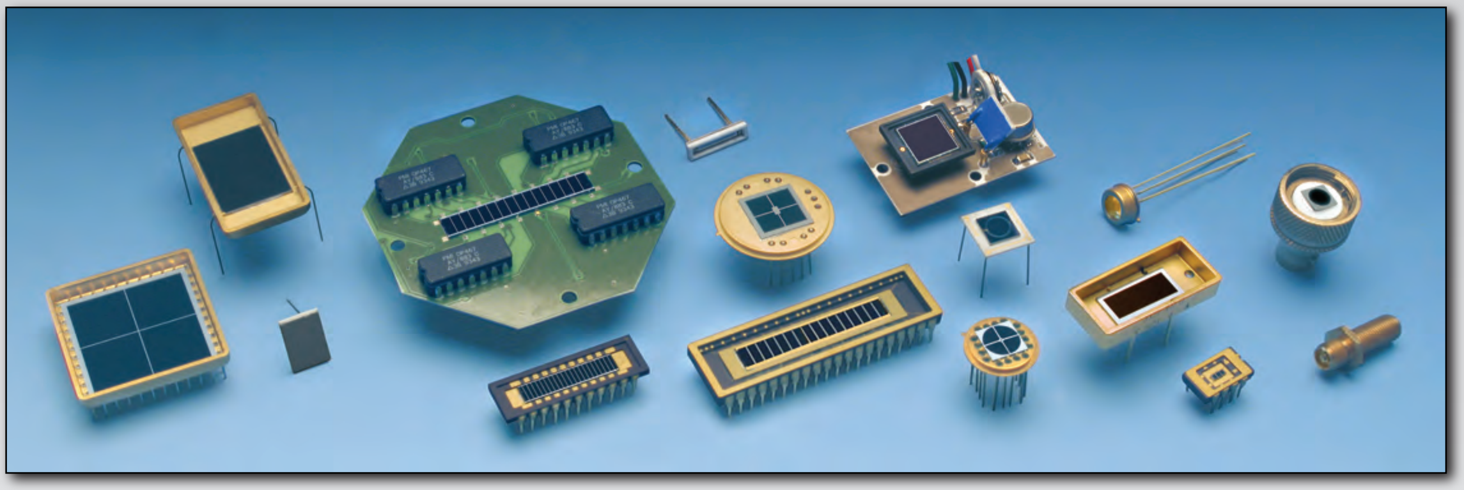
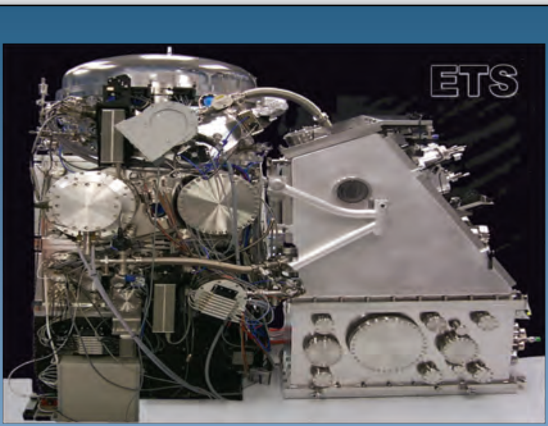
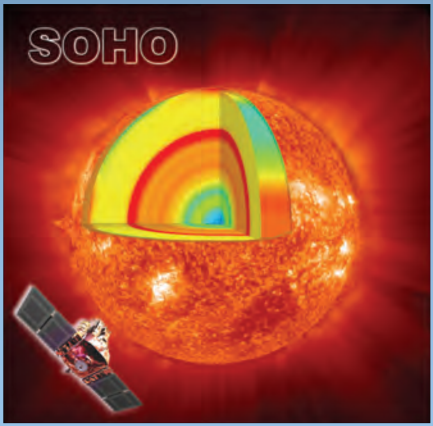
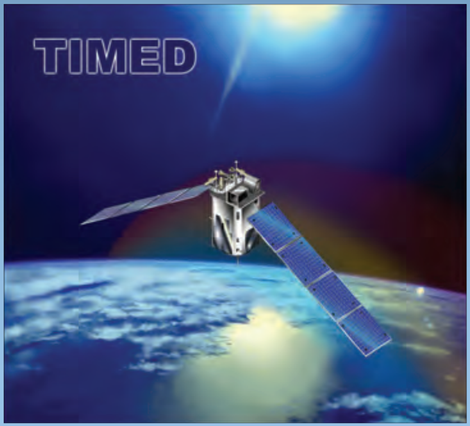
AXUV SERIES









OPTO DIODE CORP.

Advancing UV/EUV Measurement Science

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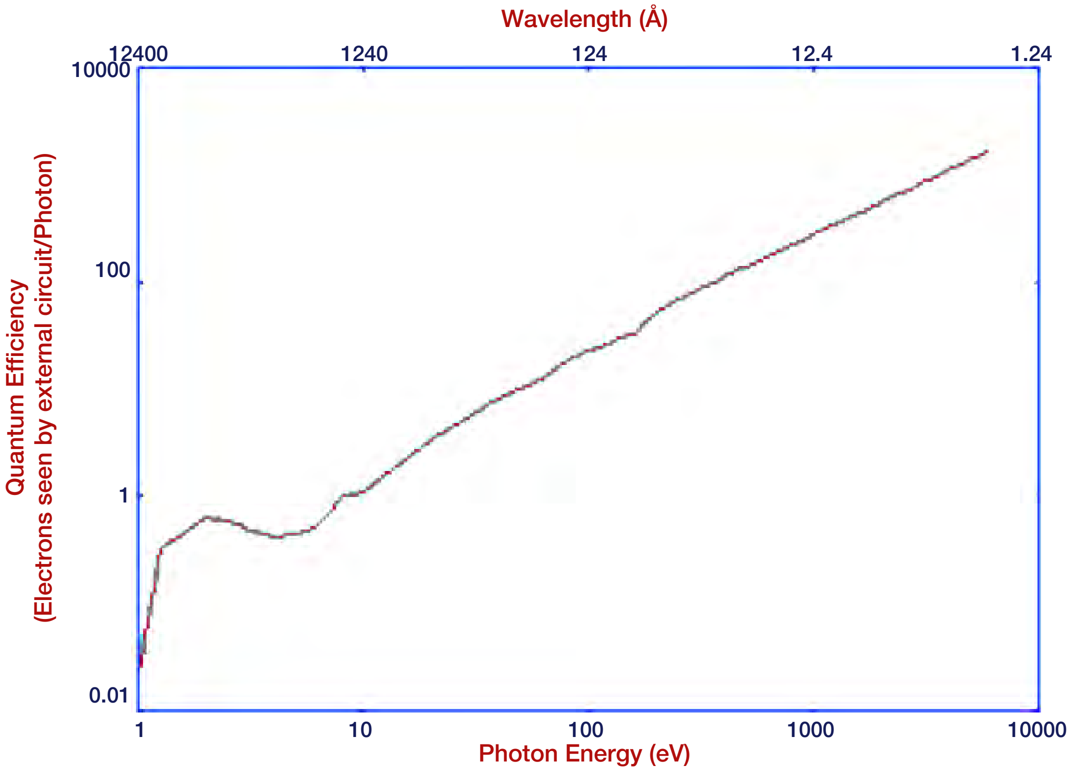
AXUV Operating Principles

When these diodes are exposed to photons of energy greater than 1.12 eV (wavelength less than 1100 nm) electron-hole pairs (carriers) are created. These photogenerated carriers are separated by the p-n junction electric field and a current proportional to the number of electron-hole pairs created flows through an external circuit. For the majority of XUV photons, about 3.7 eV energy is required to generate one electron-hole pair. Thus more than one electron-hole pair is generally created by these photons. This results in device quantum efficiencies (electrons seen by an external circuit per incident photon) much greater than unity, which increase linearly with photon energy.

Two unique properties of the AXUV photodiodes provide previously unattainable stable, high quantum efficiencies for XUV photons. The first property is the absence of a surface dead region i.e. no recombination of photogenerated carriers in the doped n-region or at the silicon-silicon dioxide interface. As absorption depths for the majority of XUV photons are less than 1 micrometer in silicon, the absence of a dead region yields complete collection of the photogenerated carriers by an external circuit resulting in 100% carrier collection efficiency and near theoretical quantum efficiency.

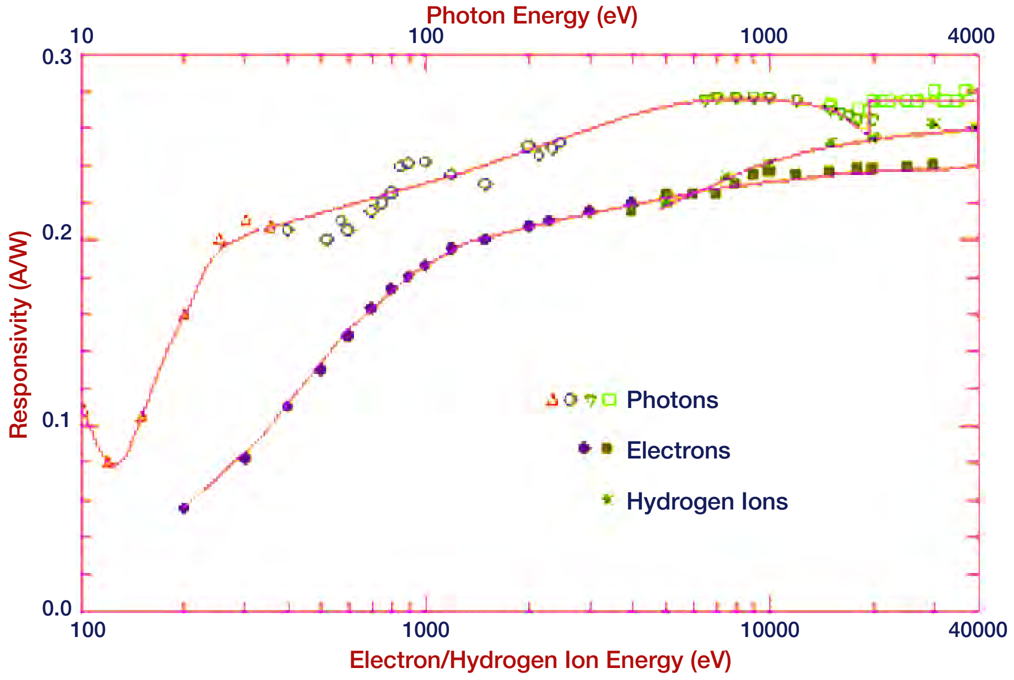
The second unique property of the AXUV diodes is their extremely thin (3 to 7 nm), radiation-hard silicon dioxide junction passivating, protective entrance window. Owing to these two outstanding properties, the quantum efficiency of AXUV diodes can be approximately predicted in most of the XUV region by the theoretical expression Eph/3.7, where Eph is the photon energy in electron-volts. The only quantum efficiency loss is due to the front (3 to 7 nm) silicon dioxide window at wavelengths for which (mainly for 7 to 100 eV photons) oxide absorption and reflection are not negligible.

At wavelengths shorter then about 0.41 nm or longer then about 700 nm, the response of the photodiode will be limited by the "effective silicon thickness" diode. The exact wavelengths where the effect becomes important depends on the effective silicon thickness. Incident light at these wavelengths will transmit through the active collection region of the silicon and responsivity will be reduced from its ideal value. The effective silicon thickness can be measured; due to the absolute nature of the detectors, this thickness can be used to calculate diode responsivity up to energies of 50 keV.

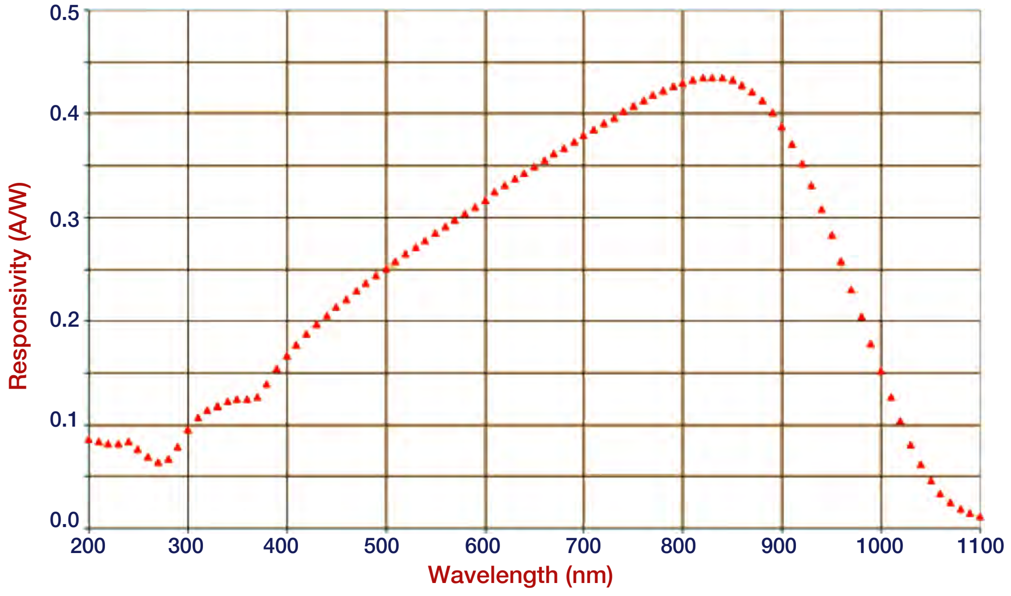


AXUV Series
Absolute UV Silicon Photodiodes

Owing to their extremely thin (3 to 7 nm) entrance window, AXUV diodes exhibit near theoretical response to low energy electrons and hydrogen ions. The following figure shows the responsivity of AXUV photodiodes to photons with 10 to 4000 eV energy and to electrons and hydrogen ions with 100 to 40,000 eV energy.



Typical Responsivity of AXUV photodiodes to photons, electrons & Hydrogen



Typical UV/Visible Responsivity of the AXUV photodiode, 50 µm effective Si thickness

AXUV Photodiode Applications

The AXUV photodiodes have several advantages over the orthodox tube-type XUV detectors. The AXUV photodiodes exhibit very low noise, do not need external voltages for their operation, are insensitive to magnetic fields, cost less to fabricate, have low mass and have large collection area to size ratio making them extremely attractive for use in satellites and deep space probes.

These diodes have been approved as transfer standards in the XUV spectral range because of their ease of use, excellent stability and spatial homogeneity of quantum efficiency, large dynamic range (over eight orders of magnitude), small size, ruggedness, and ultrahigh vacuum compatibility. These diodes are operated in the open face configuration down to Angstrom wavelengths, even in the resence of gases. This feature gives the AXUV diode based spectrometers an important advantage over present XUV spectrometers based on conventional detectors, which need to be used either in vacuum or with a window.

Due to these unique features, AXUV photodiodes have been successfully used in the European SOHO and Coronas-Photon, and American SNOE, SORCE, GOES, TIMED and EOS solar space instrumentation. An AXUV multi-element diode array has been successfully used in a Ring Accelerator Experiment (RACE) at Lawrence Livermore National Laboratory and also by other fusion research laboratories around the world to obtain radiated power vs. length and radius profiles of the plasma. Owing to its fast response speed, the array was found to yield excellent time resolution of power in quasisteady plasma transients.

Small active area AXUV diodes optimized for high response speed were found to be ideal detectors for XUV measurements in a joint US/Russian magnetized target fusion experiment. The performance of the AXUV diodes tested was found to be comparable with that of diamond detectors with orders of magnitude lower cost.

Several quadrant AXUV diodes with central holes and rectangular slit openings have been built specifically for synchrotron beam intensity monitoring and position sensing. Because of its 5 micron physical silicon thickness, the AXUV36 diode can be used in transmission mode for continuous intensity monitoring of the x-ray beam. These devices have proven to be very useful since the unstable nature of synchrotron radiation beam is an important source of experimental error.

AXUV Electron Detectors

Silicon electron detectors (AXUV-series, p-n junction photodiodes) have been developed for detection of electrons and low energy ions. Unlike common photodiodes, these diodes do not have a doped dead-region and have zero surface recombination resulting in near theoretical quantum efficiencies for low energy electrons and ions.

The AXUV photodiode behaviour is characterized by electron gain Ge, which is the number of charges generated per electron incident upon the detector, or responsivity R, the number of charges generated per incident energy ε. The following relation exists between Ge and R for monoenergetic electrons incident upon the detector:-

$$\mathbf{Ge = R \times \varepsilon}$$

Responsivity is proportional to the number of electron hole pairs generated in the AXUV photodiode. As the photodiode is exposed to electrons and ions, electron-hole pairs (carriers) are created; the electric field in the p-n junction separates the charges and drives the current in the external circuit. The silicon electron-hole creation energy is found to be 3.71 eV in silicon [1]. For photons, this value can be used to calculate the ideal responsivity in a lossless system, RA = 1/3.71 electron charge/eV = 0.27 C/J = 0.27 A/W.

Particles incident upon a detector surface have additional loss mechanisms not present for photons. For electrons, these losses are summarized in Equation 1, taken from Reference [1].

$$\mathbf{Rm = RA\ (1 - \Delta DL - \Delta B - \Delta R - \Gamma)}$$

Equation 1: Electron response equation, including terms for responsivity loss.

Rm	Measured responsivity (A/W)
RA	Ideal responsivity (A/W) 0.27 A/W in Si
ΔDL	Fractional losses due to dead layer absorption
ΔB	Fractional losses due to incident electron backscattering
ΔR	Fractional losses due to residual loss effects in photodiode
Γ	Low incident energy enhancement factor from electron-hole generation in dead layer

In the AXUV series photodiodes, dead layer and residual losses are minimised. Residual losses are dominated by recombination of the electron-hole pairs generation in the silicon-silicon oxide interface, which is non-existent in the 100% internal efficiency AXUV photodiodes. Dead layer losses in the 30-70 Â front oxide window are less than 0.1% at ε >2keV, increasing at energies lower than 2keV [1]. This leaves backcattering from the front surface as the dominant loss mechanism at ε > 2keV. As absorption depths for the low energy ions and electrons are less than 1µm in silicon, when losses from the front oxide window and backscattered electrons are subtracted measured data indicates 100% internal carrier collection efficiency and near theoretical gain/responsivity. Measured responsivity data is shown in Figure 1, while Figure 2 shows the same results in terms of electron gain.

1] H. O. Funsten, D. M. Suszcynsky, S. M. Ritzau, and R. Korde,
"Response of 100% Internal Quantum Efficiency Silicon Photodiodes to 200 eV to 40 keV Electrons."
IEEE Transactions on Nuclear Science, Vol. 44, No. 6, December 1997, 2561-2565

2] Herbert O. Funsten, Stephen M. Ritzau, Ronnie W. Harper, and Raj Korde,
"Response of 100% Internal Carrier Collection Efficiency Silicon Photodiodes to Low-Energy Ions"
IEEE Transactions on Nuclear Science, Vol. 48, No. 6, p. 1785-1789, 2001

3] H. O. Funsten, S. M. Ritzau, R. W. Harper, and R. Korde
"Fundamental limits to detection of low-energy ions using silicon solid-state detectors."
Applied Physics Letters, Vol. 84, No. 18, p. 3552-3554, 2004

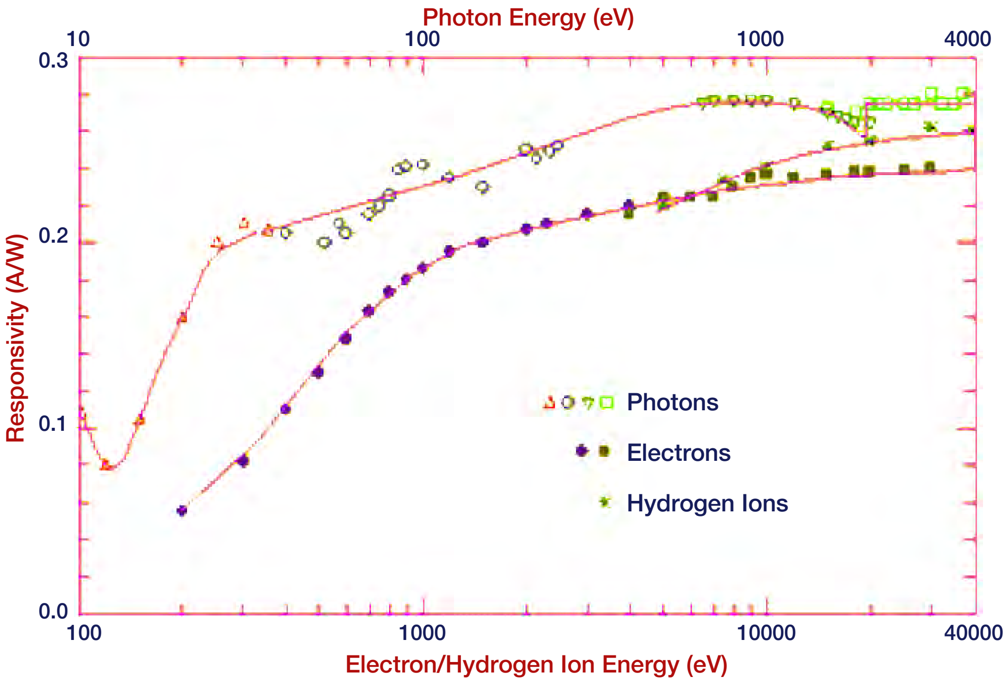


Figure 1: Typical Responsivity of AXUV photodiodes to photons, electrons & Hydrogen

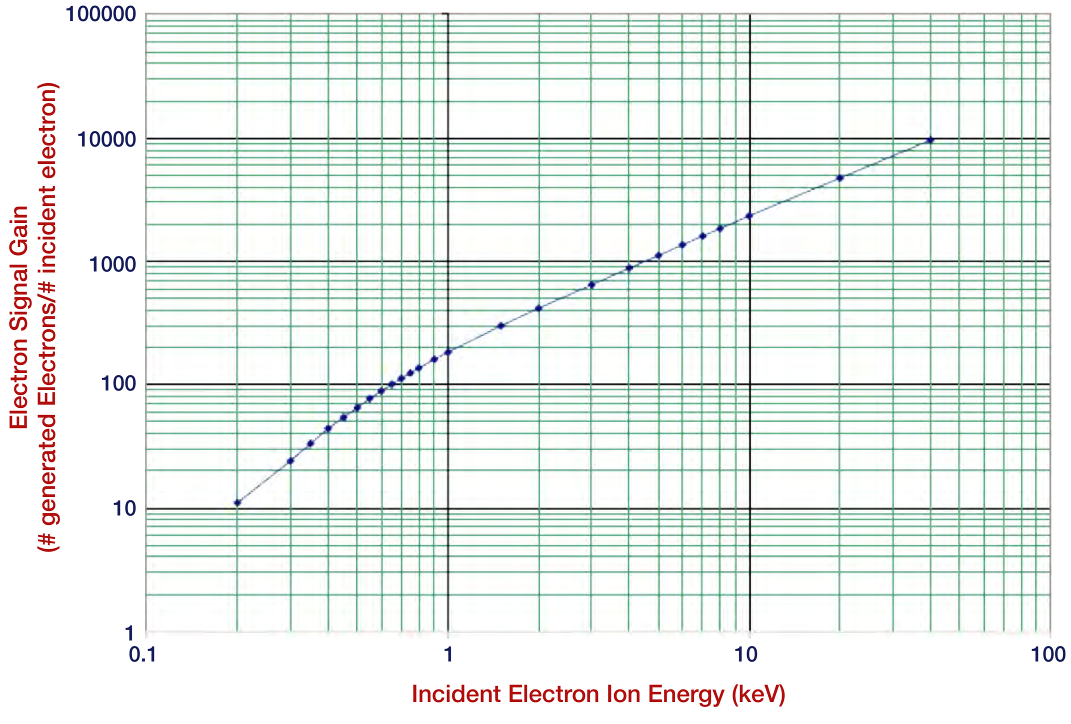


Figure 2 : Electron Gain characteristics of an AXUV photodiode

AXUV Absolute X-ray Detectors

AXUV standard photodiodes have an effective silicon thickness of 30 to 105 microns. Thus, a fraction of photons with energies above 4000 eV will transmit through the active silicon reducing their quantum efficiency from the designed 100% value. As this reduction is solely caused by the limited silicon thickness, the AXUV diodes can also be used as absolute x-ray devices if silicon thickness is known. AXUV100 photodiodes (10mm x 10mm active area) with measured silicon thickness up to 55µm with a measurement uncertainty of ±1.5µm are available as standard products. The AXUV-20HE1 photodiodes have a silicon thickness of 425µm and will have 100% collection of photons up to 10keV. However, because of high noise in these devices, use of the AXUV100 devices with known silicon thickness is recommended. Photodiodes with custom thicknesses can also be manufactured.

Theoretical responsivity as a function of x-ray energy may be obtained once the absorption A(eph) of the silicon layer is known. The absorption may be obtained from public sources such as LBL for photon energies up to 30keV [1] and NIST for photon energies above 30keV [2]. Once the absorption is known, the following formula may be used to calculate the responsivity

$$S(\varepsilon\mathrm{ph}) = Q(\varepsilon\mathrm{ph})/\ \varepsilon ph = \frac{0.98\ A(\varepsilon\mathrm{ph})}{3.65}\ (A/W)$$

The value of 3.65 is an average value for electron-hole pair creation energy (eV) in silicon. The factor .98 accounts for 2% x-ray fluorescence yield in silicon for photons with energy larger than 1838 eV and includes estimates for reabsorption of a fraction of the fluorescent light. Silicon fluorescence yield has been experimentally measured for photons with energy up to 9keV [3].

Calculations included 2% reabsorbance of fluorescent photons.

[1] Center for X-ray Optics, Lawrence Berkeley Laboratory http://www.cxro.lbl.gov/optical_constants/

[2] Physical Laboratory Physical Reference Data, National Institute of Science and Technology
http://physics.nist.gov/PhysRefData/XrayMassCoef/cover.html

[3] J.L. Campbell et. al. "Experimental K-shell fluorescence yield of silicon"
J. Phys. B: At. Mol. Opt Phys., Vol. 31, 4765-4779 (1998).

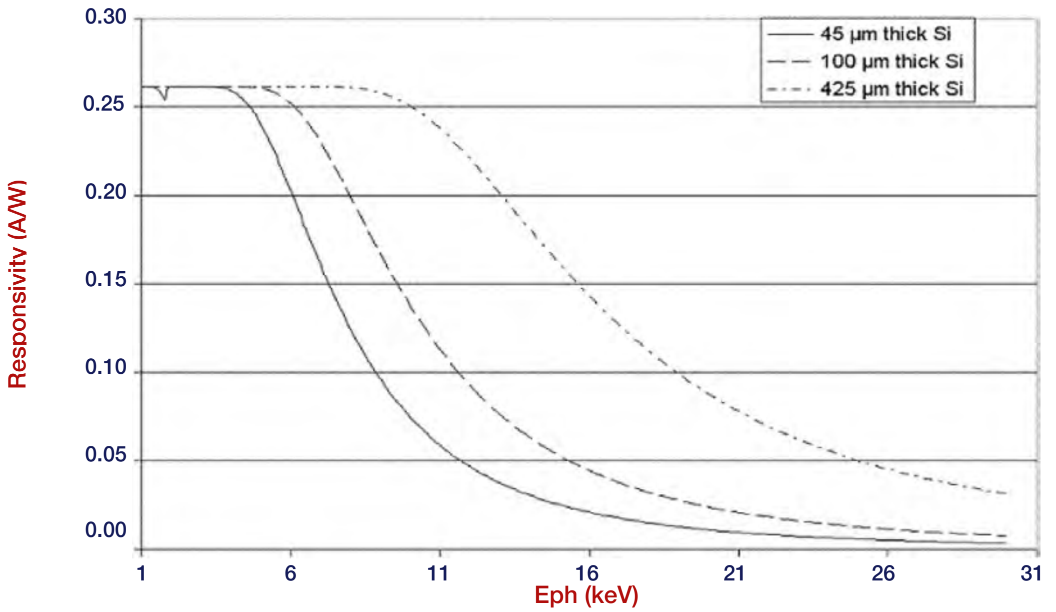


Figure 1: Calculated Responsivity of AXUV photodiodes with 45, 100 and 425µm effective silicon thickness

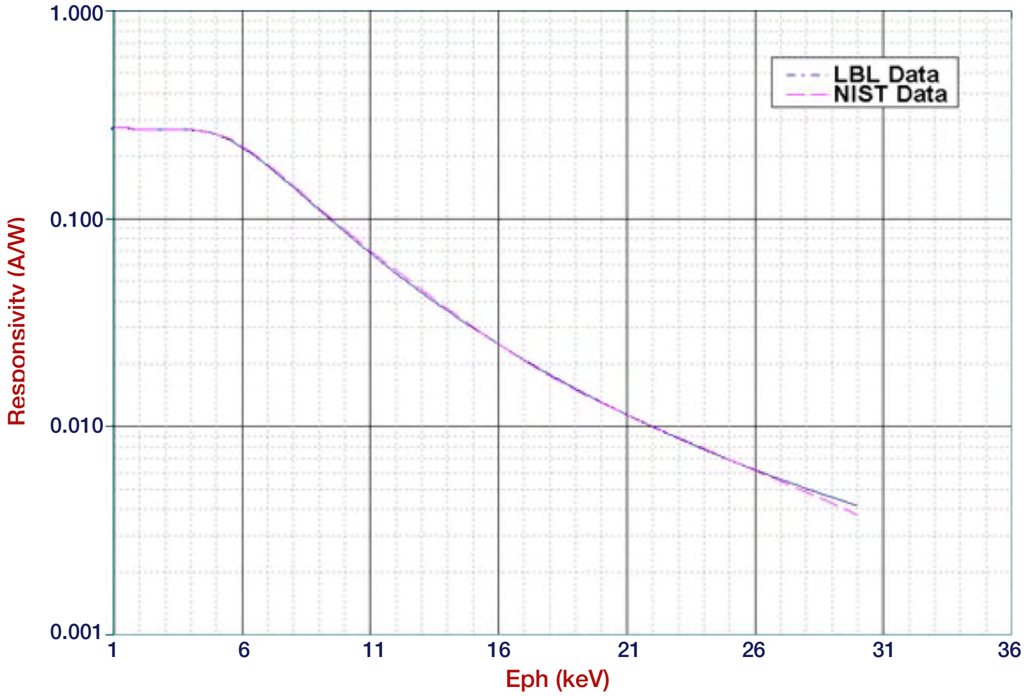


Figure 2: Comparison of Responsivity calculated using both NIST and LBL transmission values for the photoelectric effect, 52 μm effective Si thicknesses.

Figure 3 shows recently obtained data for a AXUV100GX device with 104μm thick silicon. The device was calibrated at PTB and compared against responsivity calculated using the above formula, with ideal results.

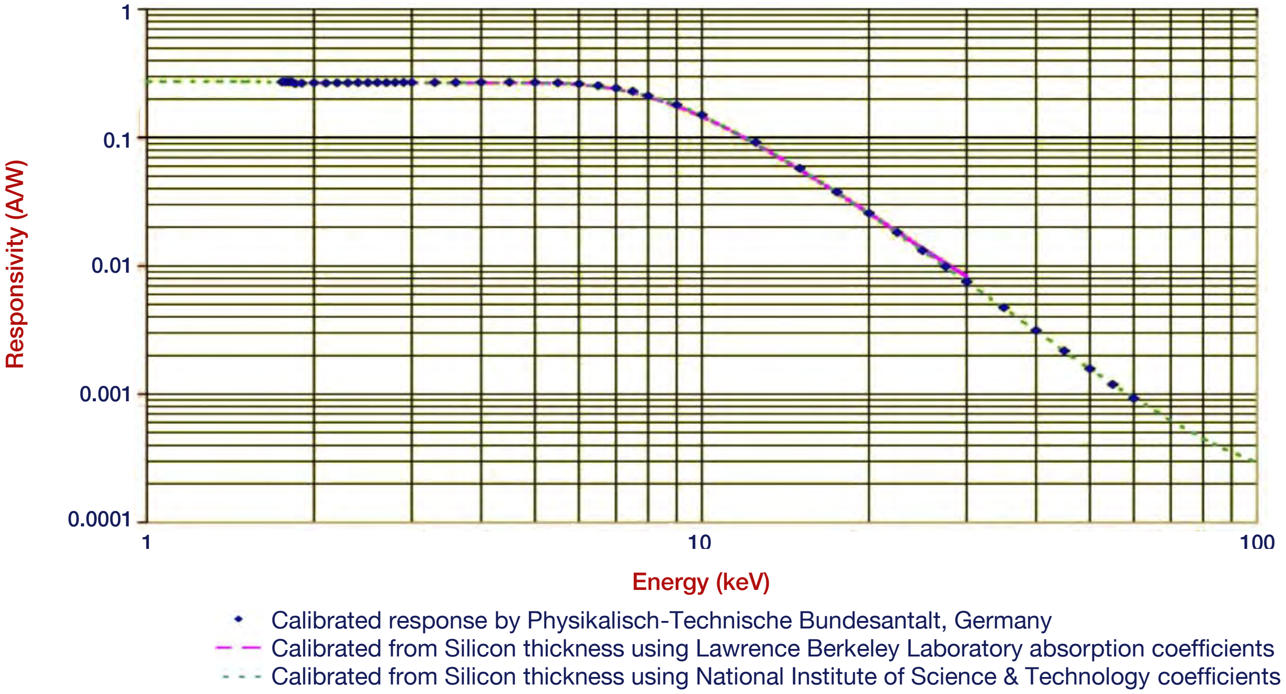


Figure 3: Responsivity of the AXUV100GX photodiode, compared against calculations using both NIST and LBL transmission values, 104μm effective Si thicknesses.

Photodiode Φ5 mm AXUV20HS1

FEATURES

- Circular Active Area
- Ideal for EUV Detection
- High Speed
- Grid Lines 5 Microns, Pitch 100 Microns
- Protective Cover Plate[3]

Electro-Optical Characteristics at 25 °C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	Φ5.01 mm		20		mm^2
Responsivity	(see graph on next page)				A/W
Reverse Breakdown Voltage, V_R	I_R = 1 µA	160			Volts
Capacitance, C	V_R = 0 V		300	900	pF
Rise Time	R_L = 50 Ω, V_R = 150 V			3.5	nsec
Dark Current	V_R = 150 V			100	nA

Thermal Parameters

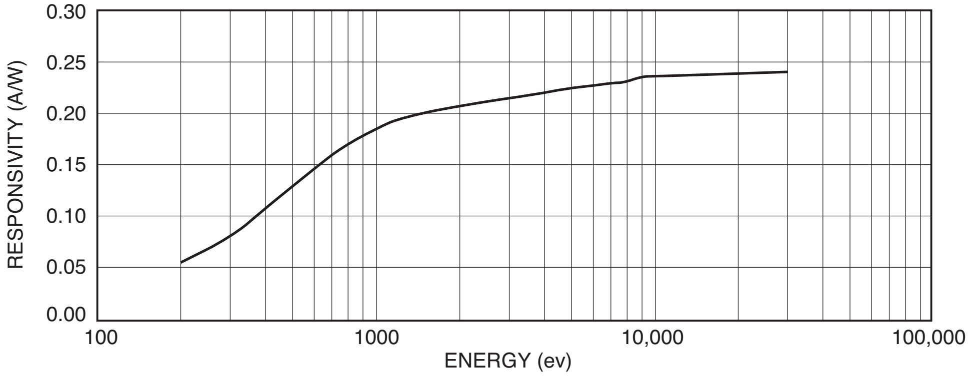
Storage and Operating Temperature Range	Units
Ambient[1]	-10 ° to 40 °C
Nitrogen or Vacuum	-20 °C to 80 °C
Lead Soldering Temperature[2]	260 °C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

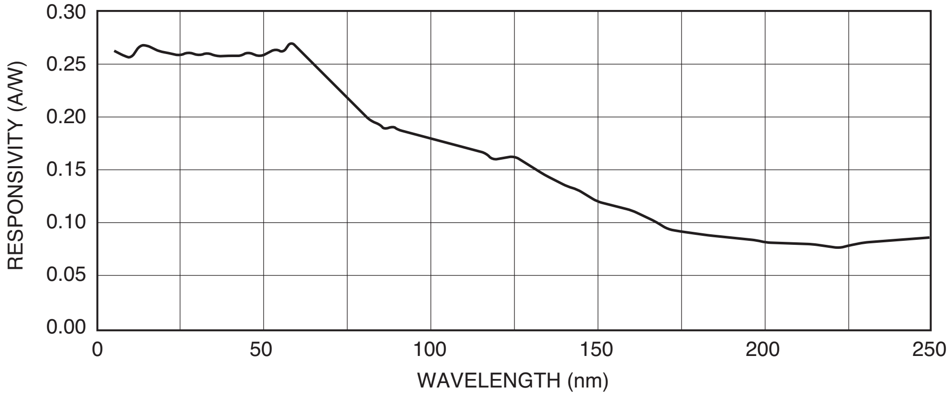
[2] 0.080" from case for 10 seconds.

[3] Shipped with temporary cover to protect the photodiode array and wire bonds.
Review the Application Note, “Handling Precautions for AXUV, SXUV, and UVG Detectors”, prior to removing cover.

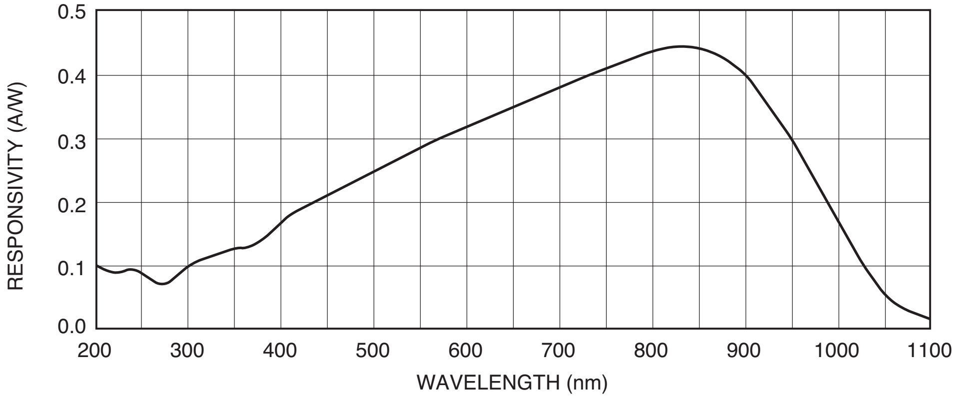
Typical Electron Response



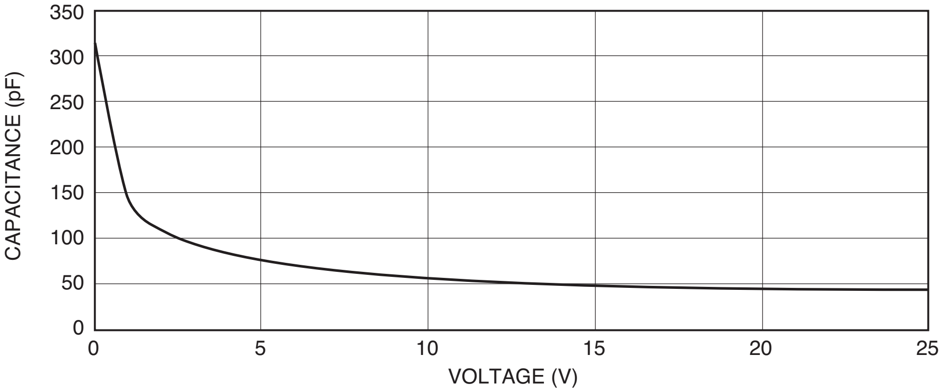
Typical EUV-UV Photon Response



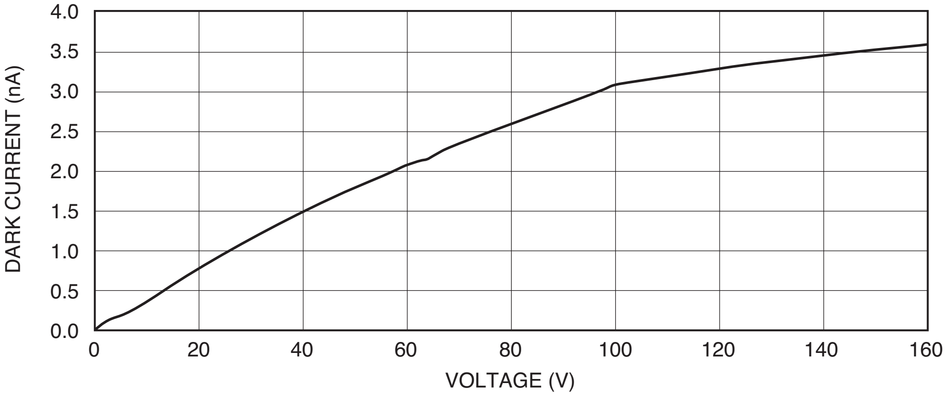
Typical UV-VIS-NIR Photon Responsivity



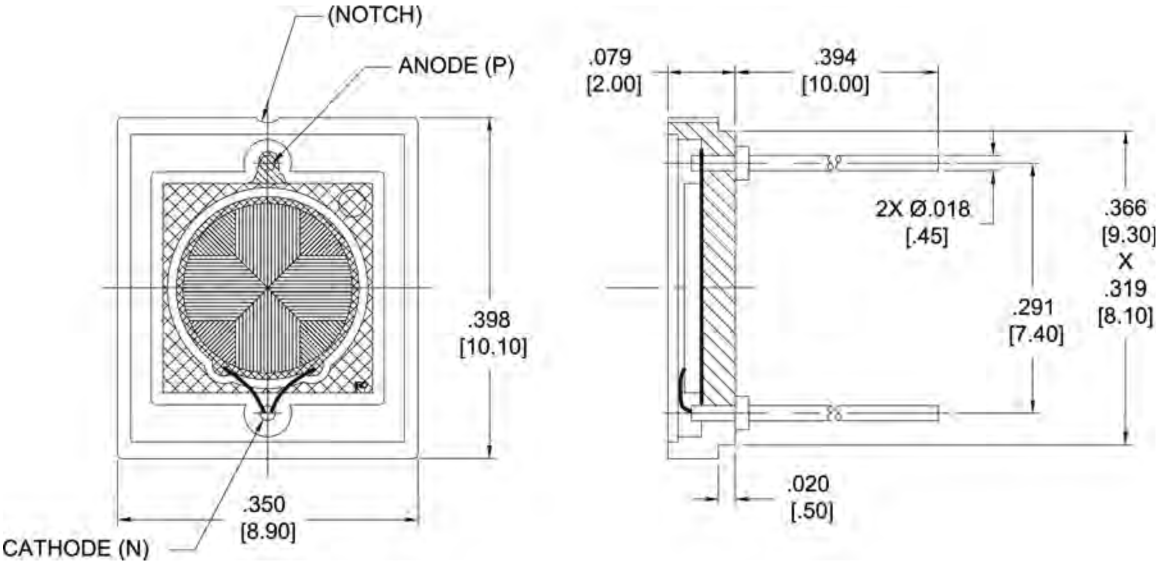
Capacitance vs. Voltage



Dark Current vs. Voltage



Package Information

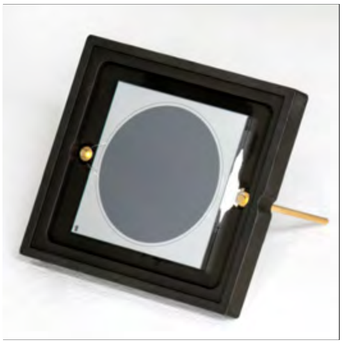


Specifications are subject to change without prior notice.

Dimensions are in inch [metric] units

Photodiode Φ9 mm

AXUV63HS1



FEATURES

- Circular Active Area
- Ideal for Electron Detection
- High Speed
- Protective Cover Plate[3]

Electro-Optical Characteristics at 25°C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	9 mm		63		mm^2
Responsivity	(see graphs on next page)				A/W
Reverse Breakdown Voltage, V_R	I_R = 1 µA	160			Volts
Capacitance, C	V_R = 0 V		700	2000	pF
Rise Time	R_L = 50 Ω, V_R = 150 V			10	nsec
Dark Current	V_R = 150 V			100	nA

Thermal Parameters

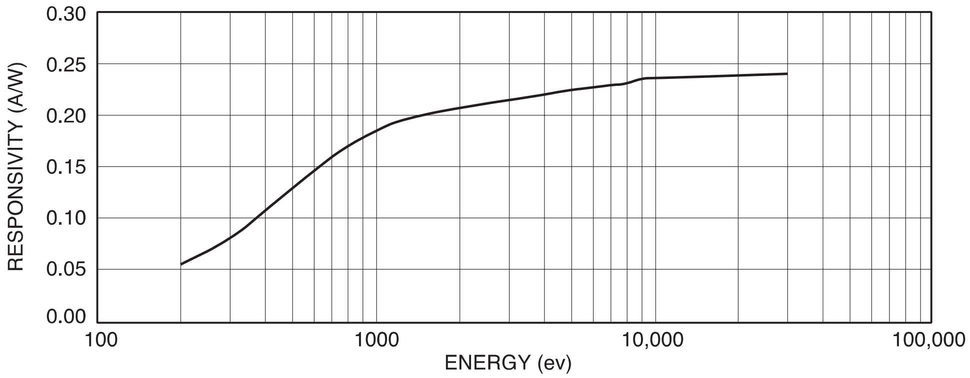
Storage and Operating Temperature Range	Units
Ambient[1]	-10°C to 40°C
Nitrogen or Vacuum	-20°C to 80°C
Lead Soldering Temperature[2]	260°C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

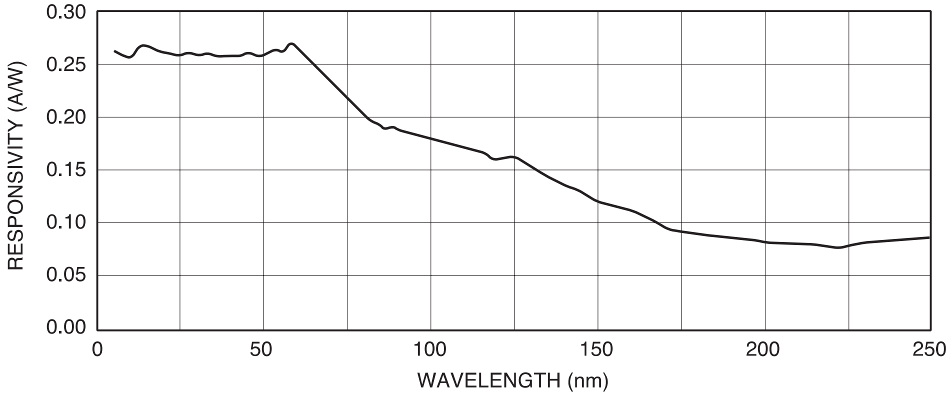
[2] 0.080" from case for 10 seconds.

[3] Shipped with temporary cover to protect the photodiode array and wire bonds.
Review the Application Note, “Handling Precautions for AXUV, SXUV, and UVG Detectors”, prior to removing cover.

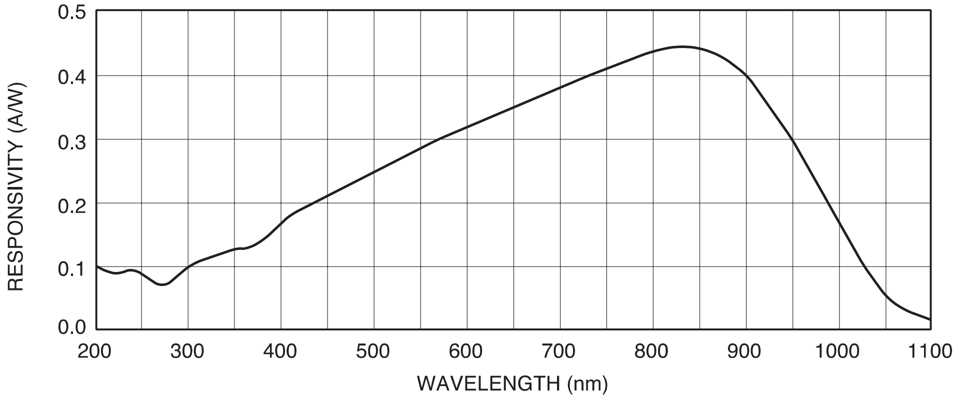
Typical Electron Response



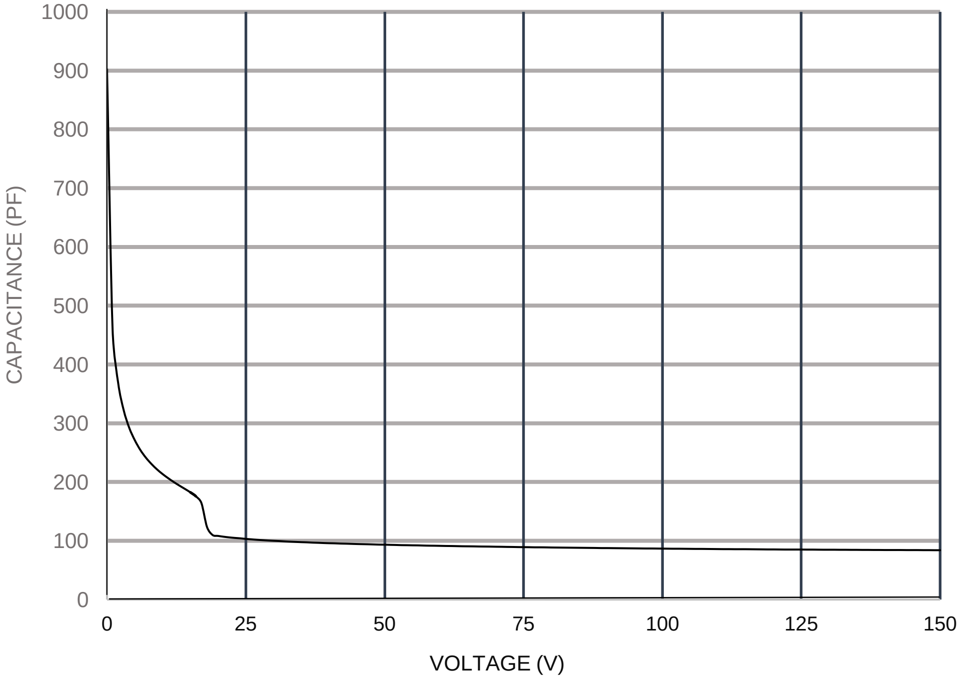
Typical EUV-UV Photon Response



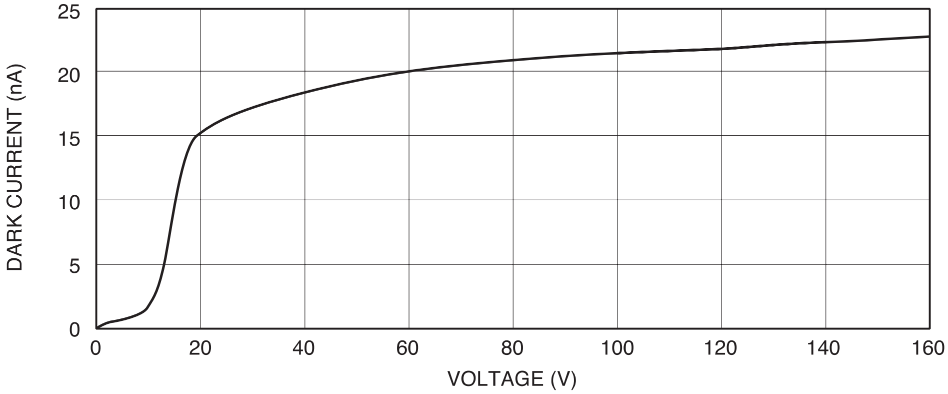
Typical UV-VIS-NIR Photon Responsivity



Capacitance vs. Voltage



Dark Current vs. Voltage



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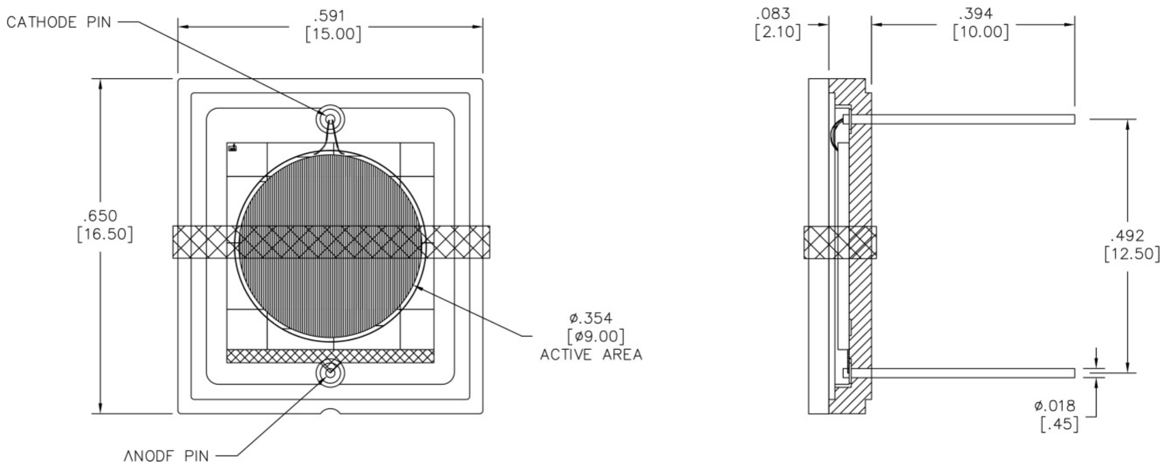
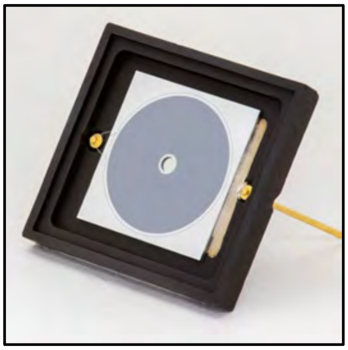


Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Photodiode 63 mm^2 AXUV63HS1-CH



FEATURES

- Circular Active Area
- Ideal for Electron Detection
- High Speed
- Hole in Center of Detector

Electro-Optical Characteristics at 25°C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	Φ9 mm		63		mm^2
Responsivity	(see graphs on next page)				A/W
Reverse Breakdown Voltage, V_R	I_R = 1 µA	160			Volts
Capacitance, C	V_R = 0 V		1	10	nF
Capacitance, C	V_R = 150 V		85		pF
Rise Time	V_R = 150 V, R_L = 50 Ω			9	nsec
Dark Current	V_R = 150 V			100	nA

Thermal Parameters

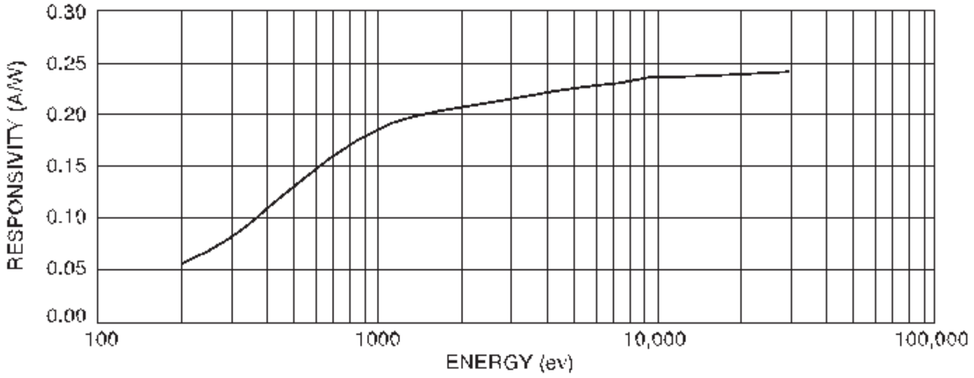
Storage and Operating Temperature Range	Units
Ambient[1]	-10°C to 40°C
Nitrogen or Vacuum	-20°C to 80°C
Lead Soldering Temperature[2]	260°C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

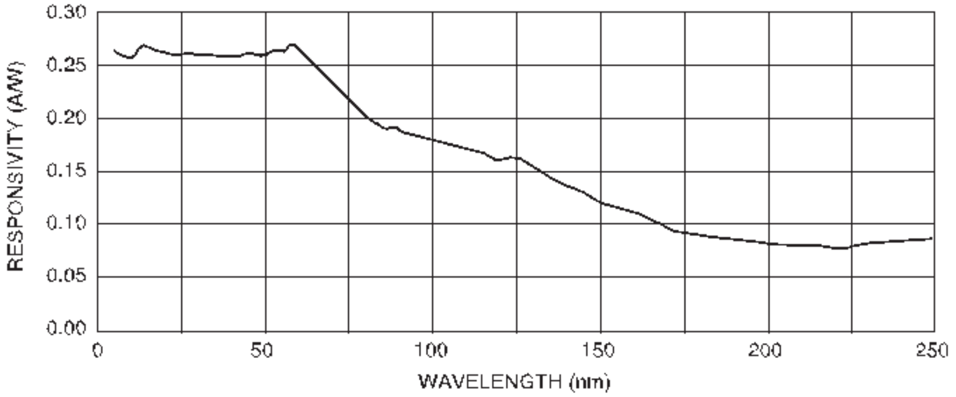
[2] 0.080" from case for 10 seconds.

Shipped with temporary cover to protect the photodiode array and wire bonds.
Review the Application Note, “Handling Precautions for AXUV, SXUV, and UVG Detectors”, prior to removing cover.

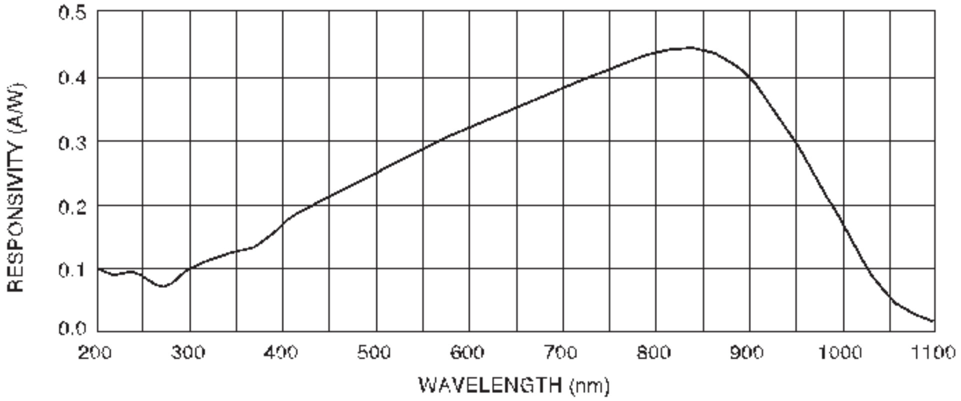
Typical Electron Response



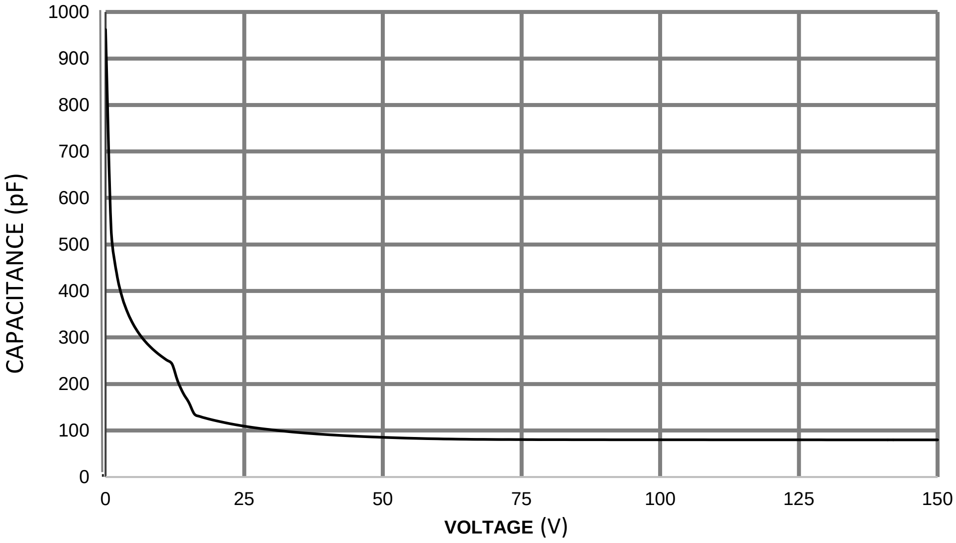
Typical EUV-UV Photon Response



Typical UV-VIS-NIR Photon Responsivity



Capacitance vs. Voltage



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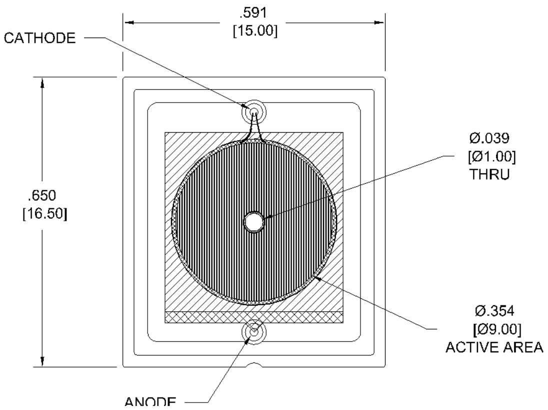
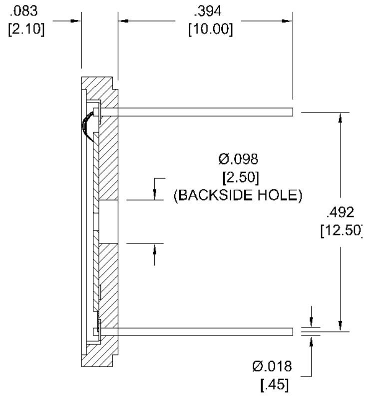
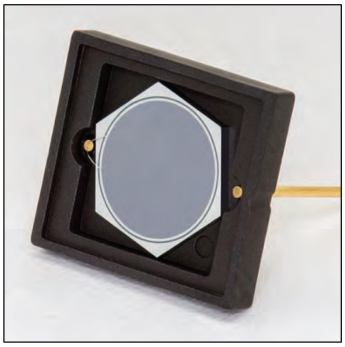




Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Photodiode Φ5 mm **AXUV20A**



FEATURES

- Circular Active Area
- Ideal for Electron Detection
- Protective Cover Plate[3]

Electro-Optical Characteristics at 25 °C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	Φ5.5 mm		23		mm^2
Responsivity	(see graphs on next page)				A/W
Shunt Resistance	$V_f = \pm 10$ mV	100			MOhm
Reverse Breakdown Voltage, V_R	$I_R = 1$ μA	5	10		Volts
Capacitance, C	$V_R = 10$ V		500	1500	pF
Rise Time	$V_R = 0$ V, $R_L = 50\ \Omega$		2		usec

Thermal Parameters

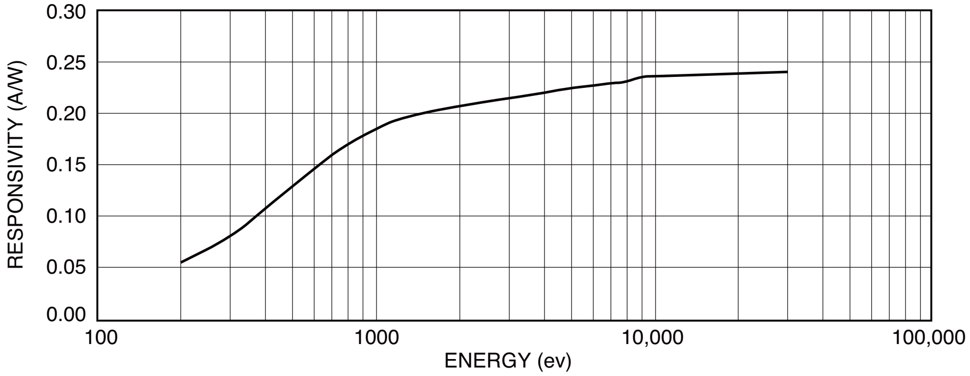
Storage and Operating Temperature Range	Units
Ambient[1]	-10 ° to 40 °C
Nitrogen or Vacuum	-20 °C to 80 °C
Lead Soldering Temperature[2]	260 °C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

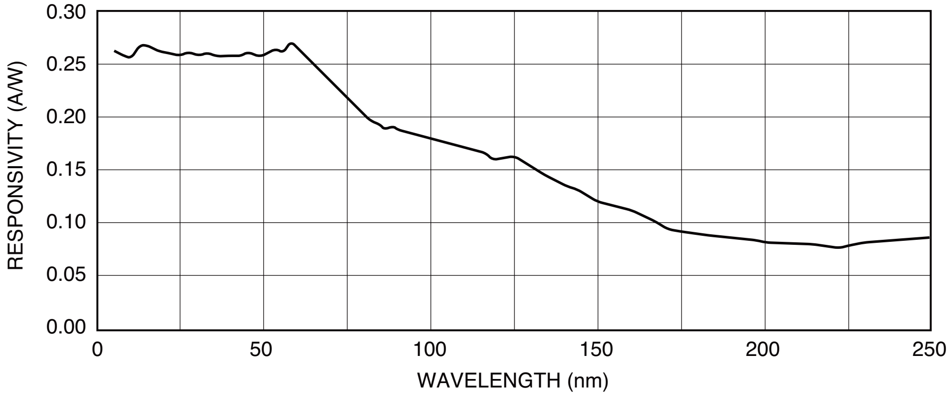
[2] 0.080" from case for 10 seconds.

[3] Shipped with temporary cover to protect the photodiode array and wire bonds.
Review the Application Note, “Handling Precautions for AXUV, SXUV, and UVG Detectors”, prior to removing cover.

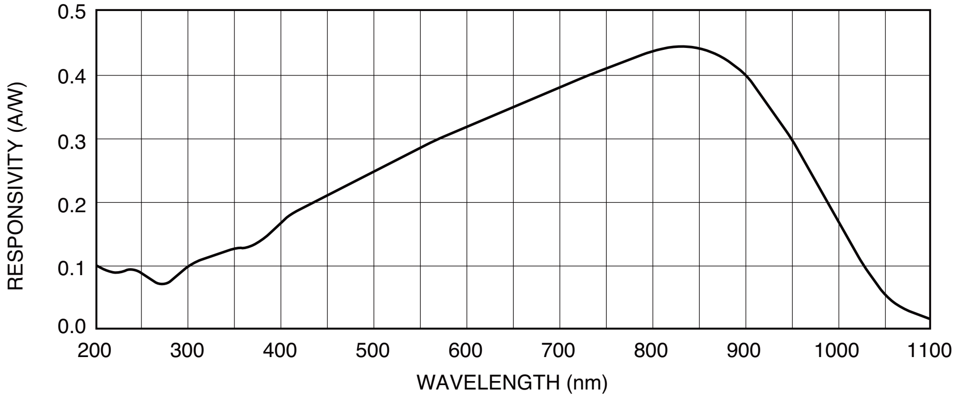
Typical Electron Response



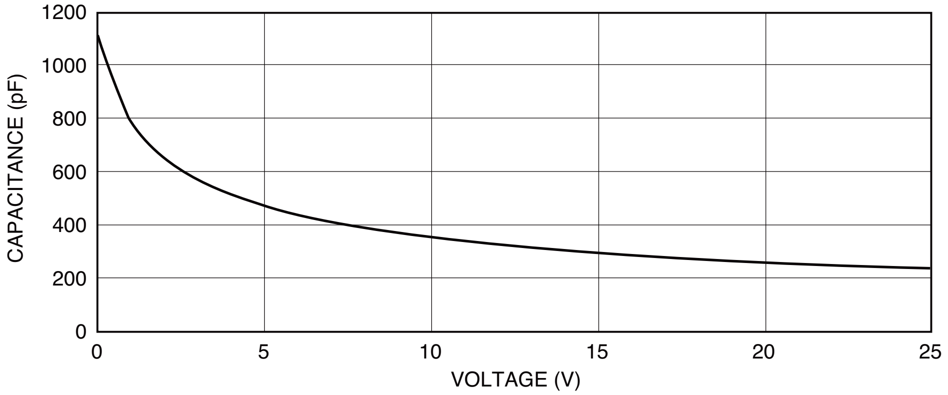
Typical EUV-UV Photon Response



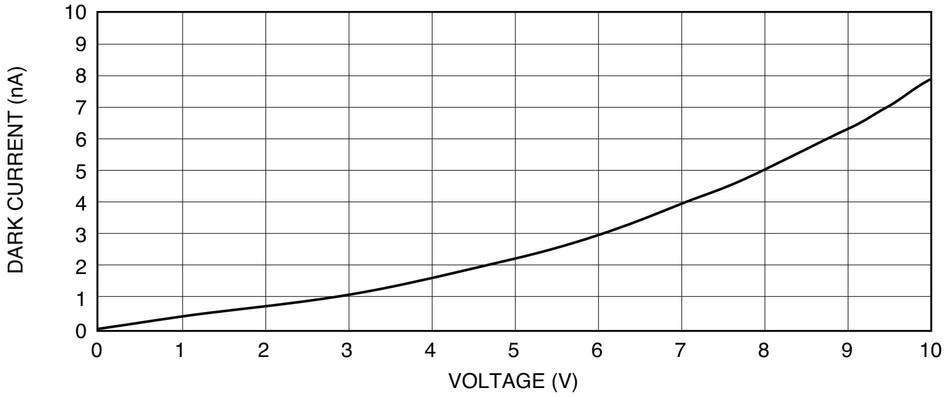
Typical UV-VIS-NIR Photon Responsivity



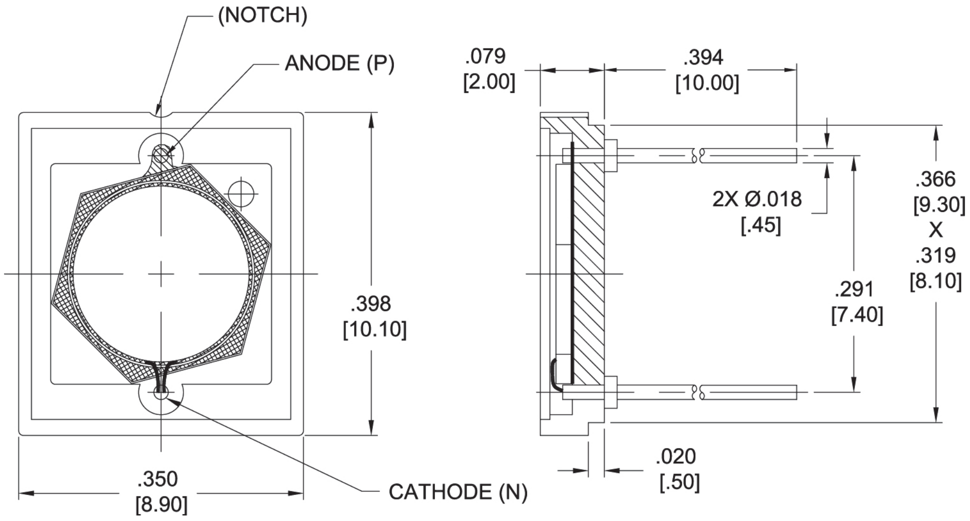
Capacitance vs. Voltage



Dark Current vs. Voltage



Package Information

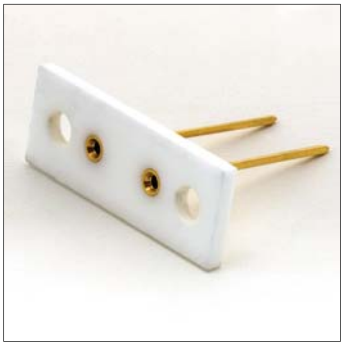


Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Photodiode Socket

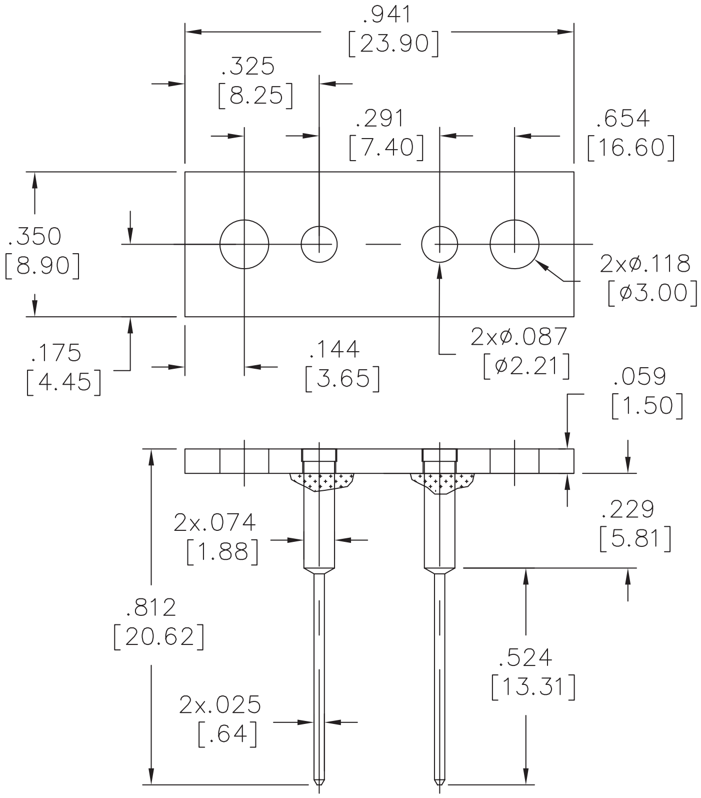
AXUV20ACS



FEATURES

- Ceramic Socket for Devices to Eliminate Soldering to Leads
- For Use with AXUV20A, AXUV20HS1, SXUV20HS1 and UVG20S Photodiodes with 7.4 mm Lead Spacing
- Low Outgassing Materials for Vacuum Compatibility

Package Information



Dimensions are in inch [metric] units.

Electron Detection 100 mm^2 AXUV100G

FEATURES

- Large Detection Area
- Protective Cover Plate[3]
- Vacuum Compatible

APPLICATIONS

- Electron Detection
- X-ray Detection

Electro-Optical Characteristics at 25 °C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	10 mm x 10 mm		100		mm^2
Responsivity	(see graph on next page)	0.07	0.08	0.09	A/W
Shunt Resistance, Rsh	V = ± 10 mV	20			M-ohm
Capacitance, C	V_R = 0 V		5	15	nF
Rise Time	V_R = 0 V, R_L = 50 Ω			10	usec

Thermal Parameters

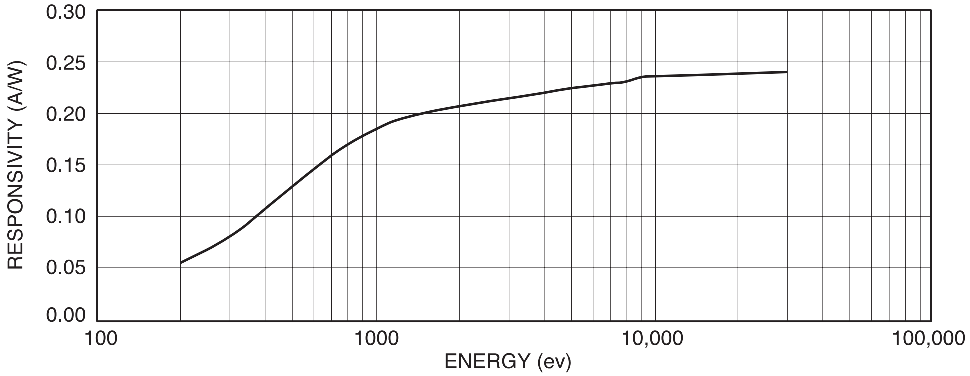
Storage and Operating Temperature Range	Units
Ambient[1]	-10 ° to 40 °C
Nitrogen or Vacuum	-20 °C to 80 °C
Lead Soldering Temperature[2]	260 °C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

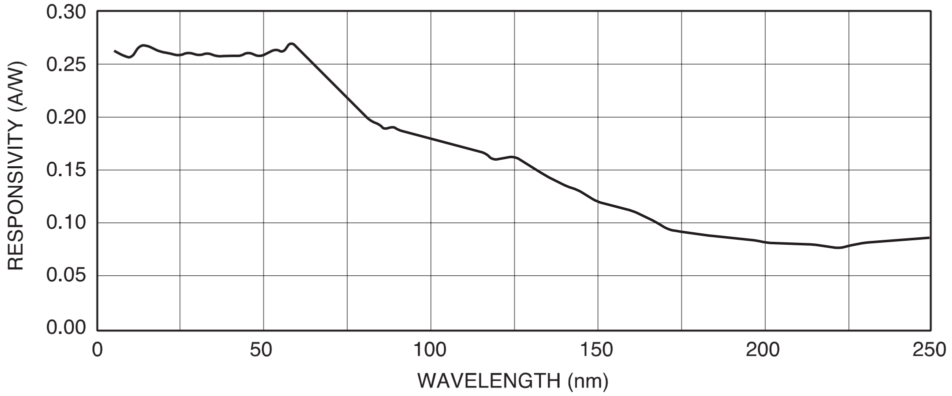
[2] 0.080" from case for 10 seconds.

[3] Shipped with temporary cover to protect the photodiode array and wire bonds.
Review the Application Note, “Handling Precautions for AXUV, SXUV, and UVG Detectors”, prior to removing cover.

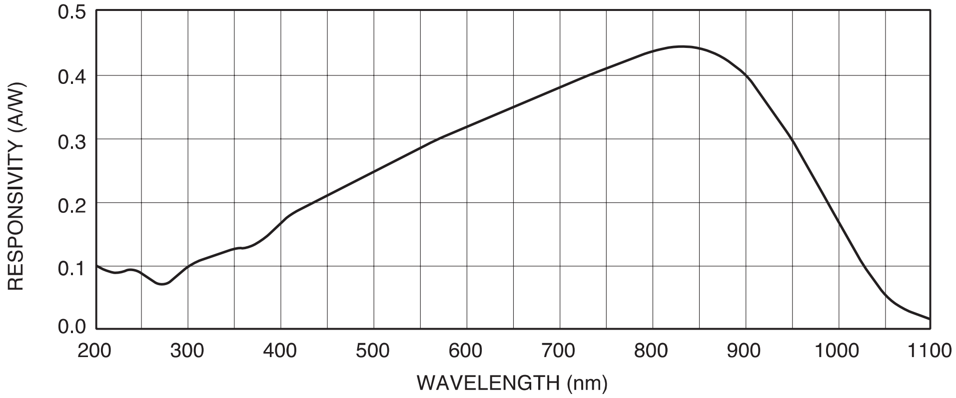
Typical Electron Response



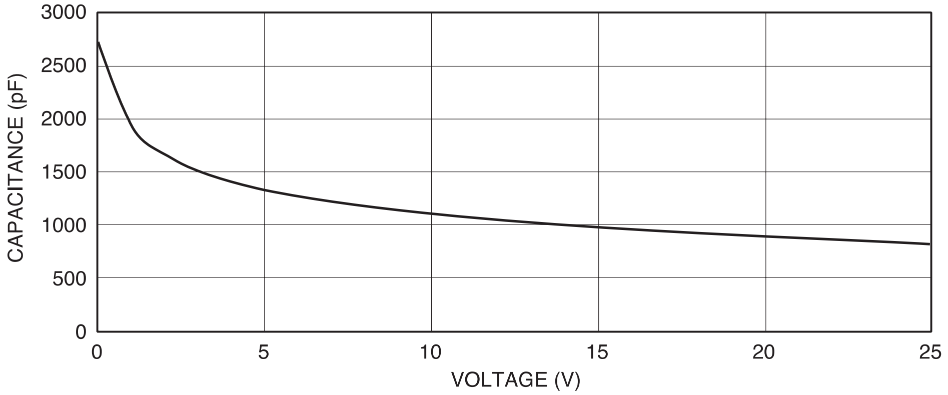
Typical EUV-UV Photon Response



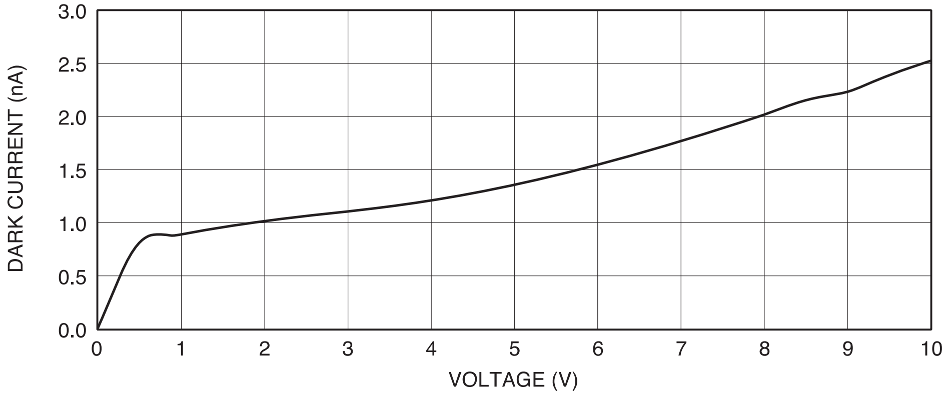
Typical UV-VIS-NIR Photon Responsivity



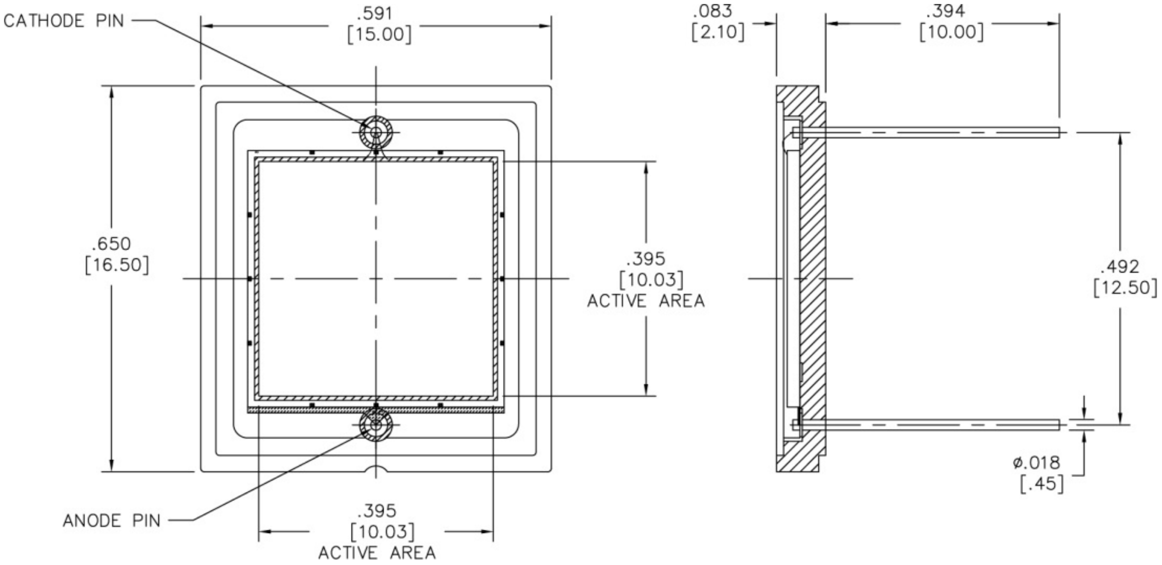
Capacitance vs. Voltage



Dark Current vs. Voltage



Package Information

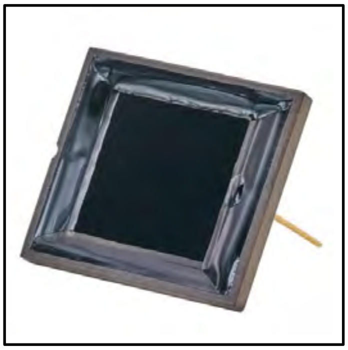


Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Photodiode 100 mm^2 with Integrated Thin Film Filter

AXUV100TF030



FEATURES

- 100 mm^2 Square Active Area
- Responsivity @ 3 nm 0.16 A/W
- 200 nm titanium & 50 nm carbon filter
- Detection Range 1 nm to 12 nm
- Shipped with Protective Cover

Electro-Optical Characteristics at 25°C

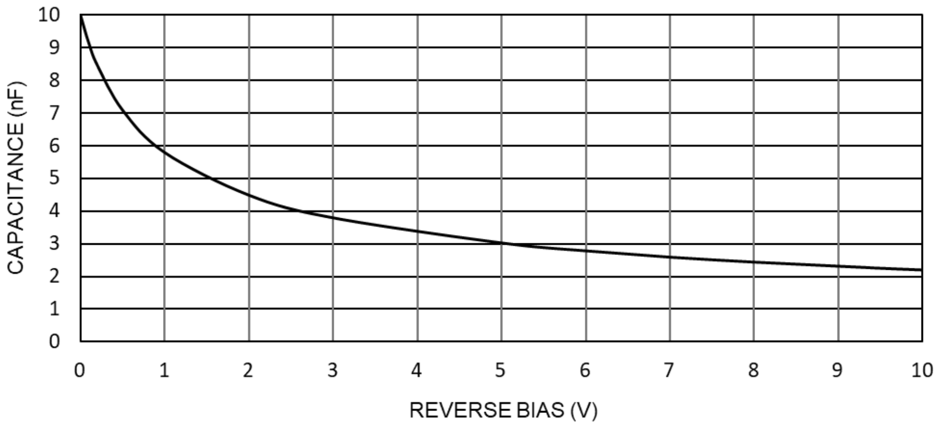
Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	10 mm x 10 mm		100		mm^2
Responsivity	(see graph on next page)		0.16		A/W
Shunt Resistance, Rsh	@ ±10 mV	20			Ohms
Capacitance, C	V_R = 0 V		10	44	nF

Thermal Parameters

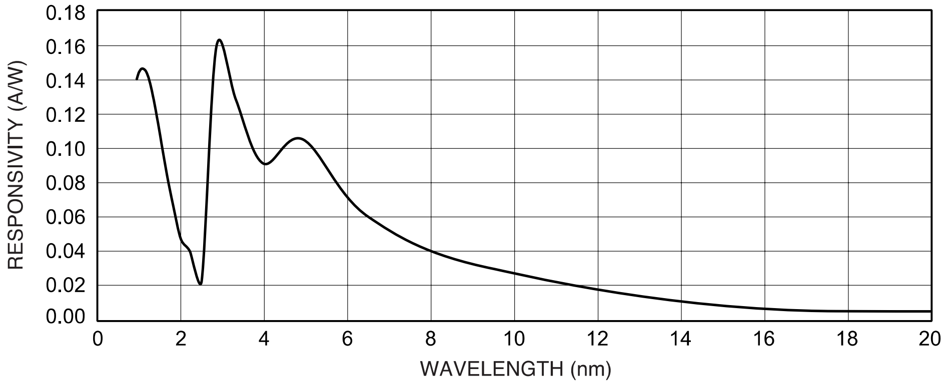
Storage and Operating Temperature Range	Units
Ambient	–10° to 40°C
Nitrogen or Vacuum	–20 to 80°C
Lead Soldering Temperature*	260°C

*0.080" from case for 10 seconds.

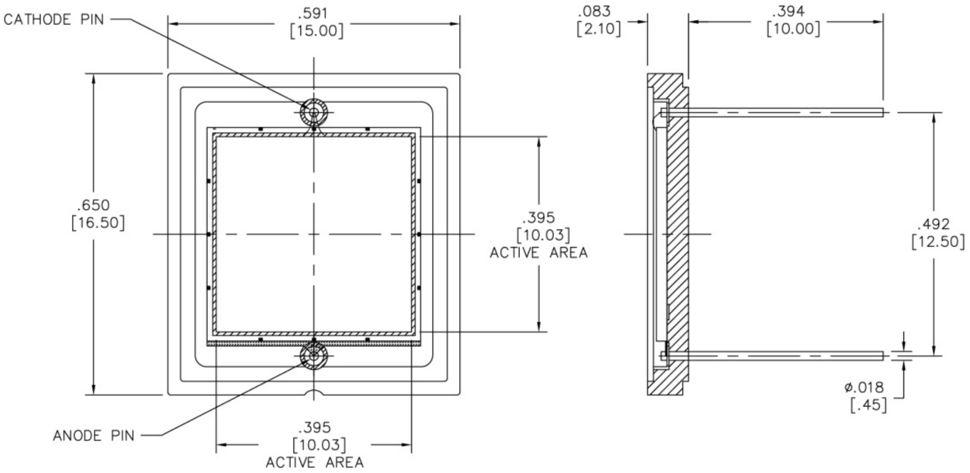
Capacitance vs. Bias Voltage



Typical Responsivity at 25°C



Package Information



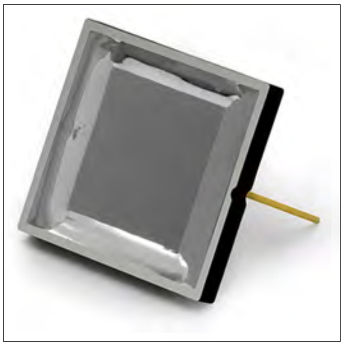
Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

From Deep UV to Mid-IR
OPTO DIODE
An ITW Company

Photodiode 100 mm² with Integrated Thin Film Filter

AXUV100TF400



FEATURES

- 100 mm² Square Active Area
- Responsivity @ 40 nm 0.15 A/W
- 150 nm Al filter
- Detection Range 18 nm to 80 nm
- Shipped with Protective Cover

Electro-Optical Characteristics at 25°C

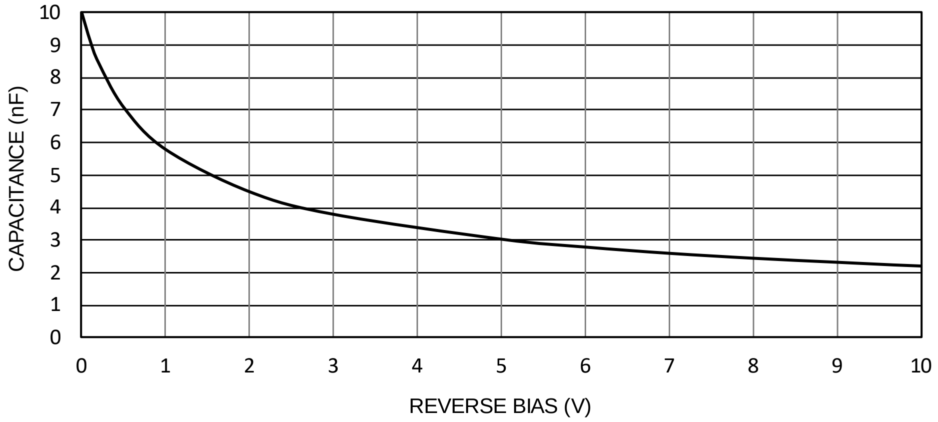
Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	10 mm x 10 mm		100		mm^2
Responsivity	(see graph on next page)		0.15		A/W
Shunt Resistance, Rsh	@ ±10 mV	20			Ohms
Reverse Breakdown Voltage, V_R	$1_R = 1$ µA	5	10		Volts
Capacitance, C	$V_R = 0$ V		10	44	nF

Thermal Parameters

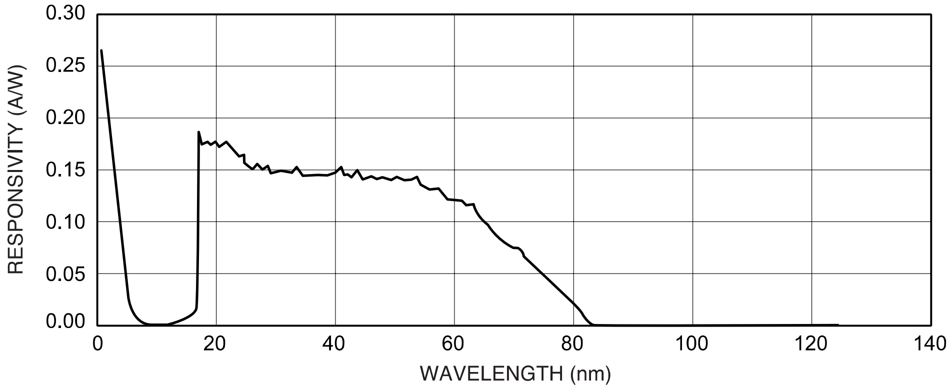
Storage and Operating Temperature Range	Units
Ambient	–10° to 40°C
Nitrogen or Vacuum	–20 to 80°C
Lead Soldering Temperature*	260°C

*0.080" from case for 10 seconds.

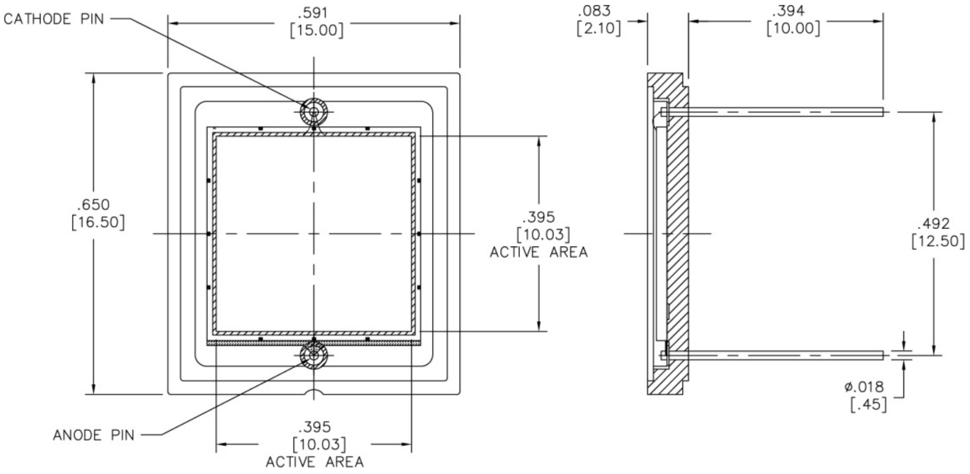
Capacitance vs. Reverse Bias



Typical Responsivity at 25°C



Package Information



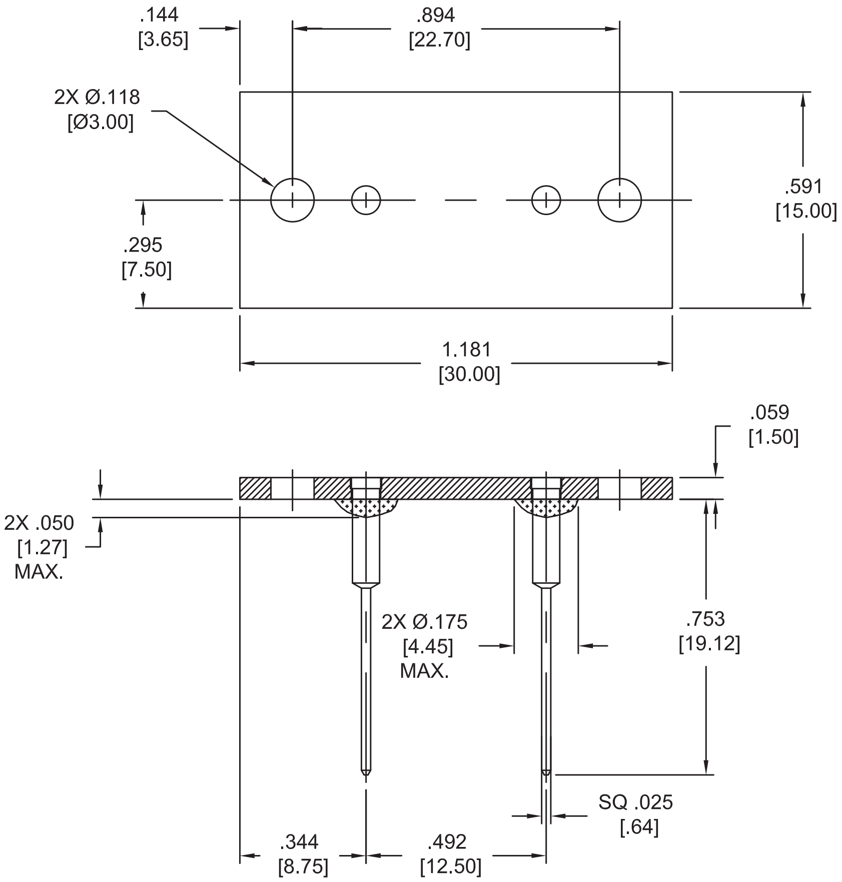
Dimensions are in inch [metric] units.

Photodiode Socket AXUV100CS

FEATURES

- Ceramic Socket for Devices to Eliminate Soldering to Leads
- For Use with Any 2 Pin Photodiode with 12.5 mm Lead Spacing
- Low Outgassing Materials for Vacuum Compatibility

Package Information

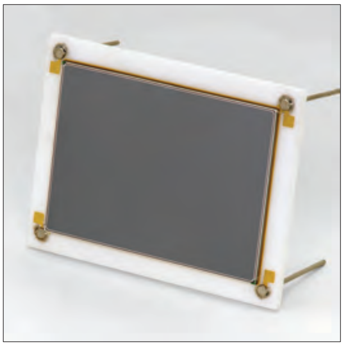


Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Electron Detection 331 mm^2

AXUV300C



FEATURES

- Rectangle Active Area
- Large Detection Area
- 2 Anode and Cathode Pins
- Ideal for Electron Detection
- No Window for Extended Response to Below 200 nm

Electro-Optical Characteristics at 25°C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	21.56 mm x 15.36 mm		331		mm^2
Responsivity	(see graphs on next page)				
Conductive Current, I_C	V_f = 0.8 V	1			mA
Breakdown Voltage, V_R	I_R = 1 μA	5	25		Volts
Capacitance, C	V_R = 10 V		25	40	nF
Response Time, tr	RL = 50 Ω, V_R = 0 V		15		usec
Shunt Resistance	@ ± 10 mV	5			MOhms

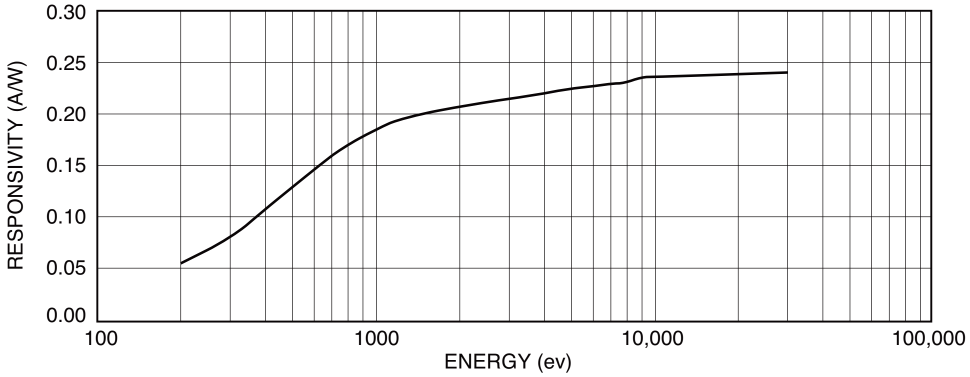
Thermal Parameters

Storage and Operating Temperature Range	Units
Ambient[1]	-10° to 40°C
Nitrogen or Vacuum	-20°C to 80°C
Lead Soldering Temperature[2]	260°C

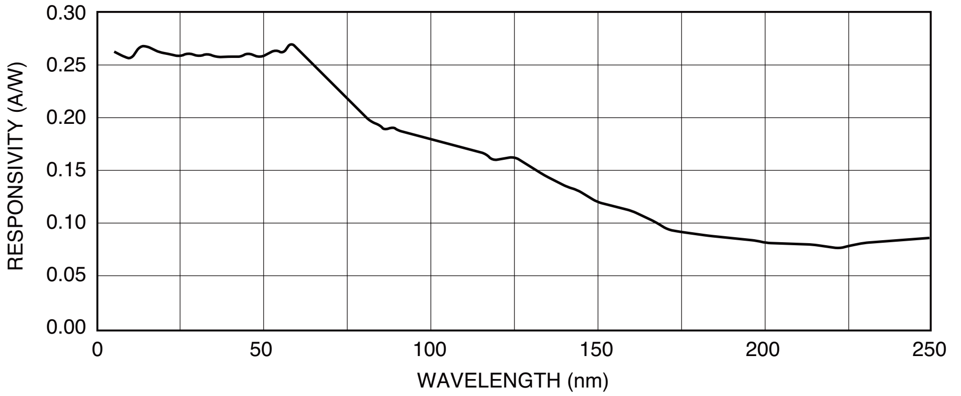
[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

[2] 0.080" from case for 10 seconds.

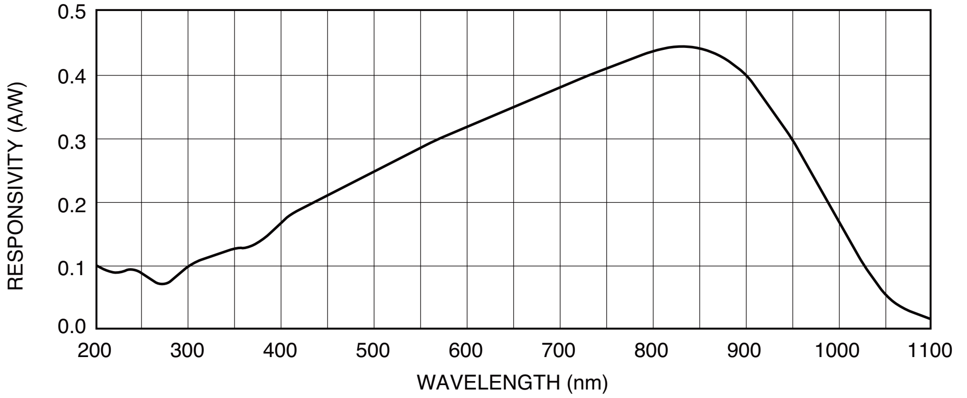
Typical Electron Response



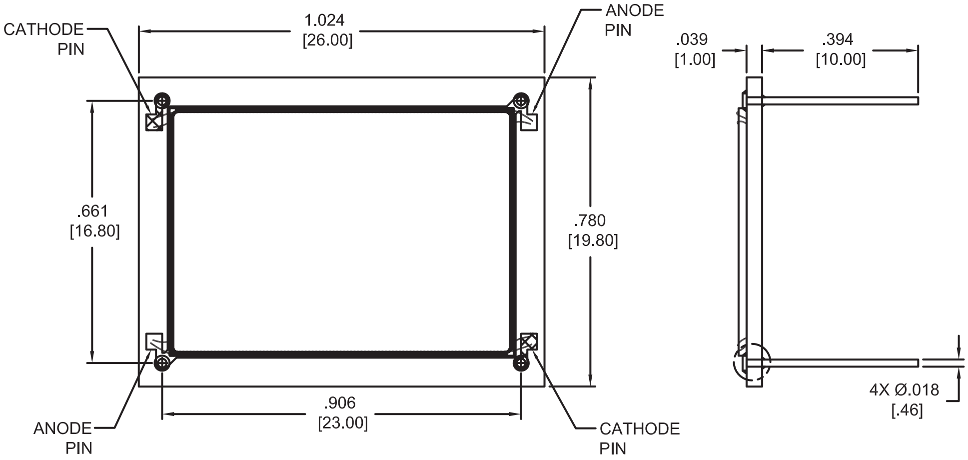
Typical EUV-UV Photon Response



Typical UV-VIS-NIR Photon Responsivity



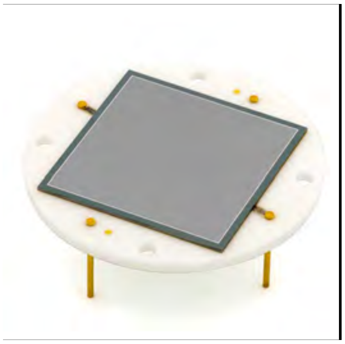
Package Information



Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Electron Detection 576 mm^2 AXUV576C



FEATURES

- Square Active Area
- Round 4-Pin Package
- Ideal for Electron Detection

Electro-Optical Characteristics at 25 °C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	24.01 mm x 24.01 mm		576.5		mm^2
Responsivity	(see graphs on next page)				
Shunt Resistance, Rsh	V = ±10 mV	5	50		MΩ
Capacitance, C	$V_R = 0$ V		5	15	nF
Rise Time, tr	$V_R = 10$ V, $R_L = 50\ \Omega$			50	usec

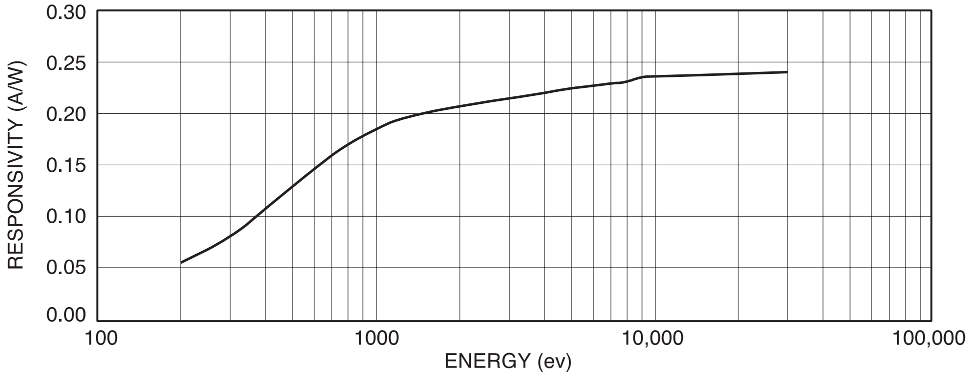
Thermal Parameters

Storage and Operating Temperature Range	Units
Ambient[1]	-10° to 40°C
Nitrogen or Vacuum	-20°C to 80°C
Lead Soldering Temperature[2]	260°C

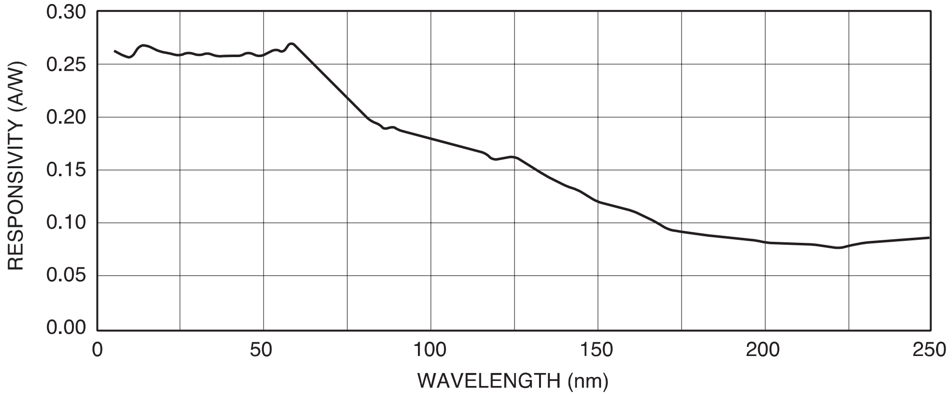
[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

[2] 0.080" from case for 10 seconds.

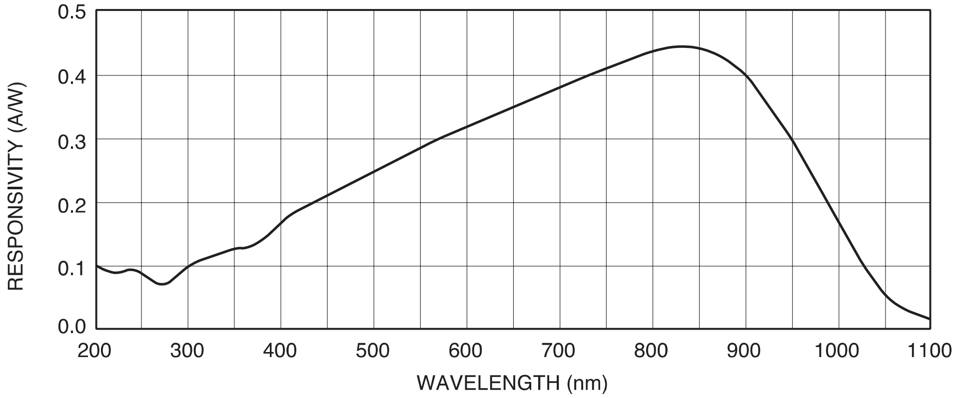
Typical Electron Response



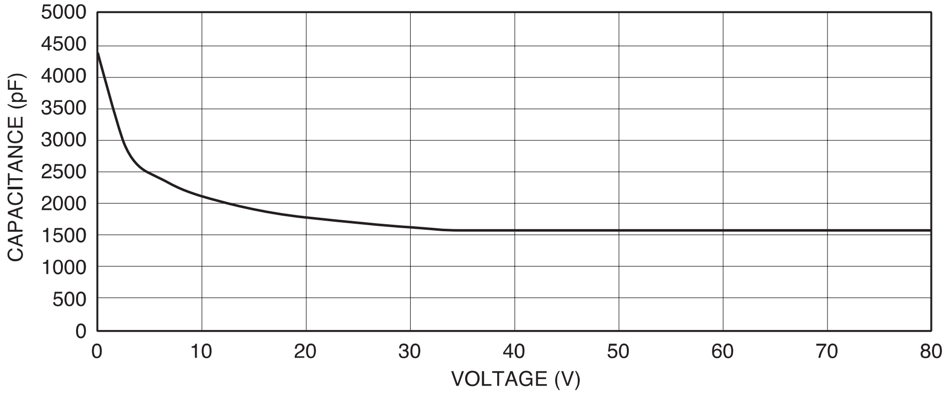
Typical EUV-UV Photon Response



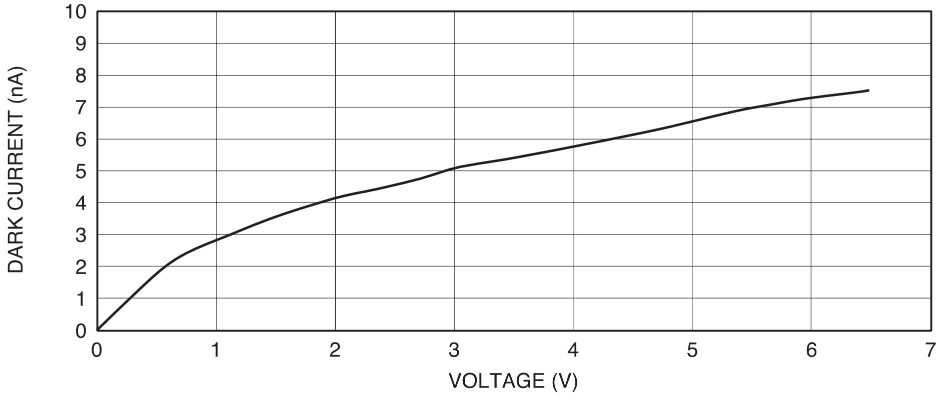
Typical UV-VIS-NIR Photon Responsivity



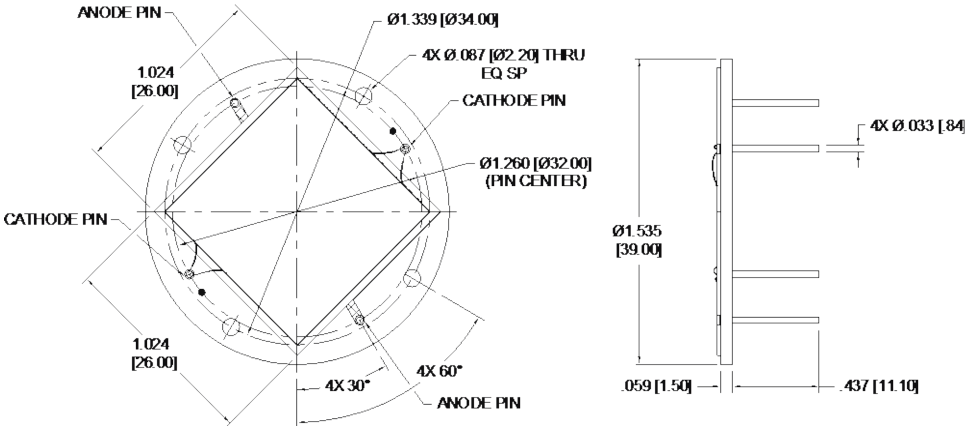
Capacitance vs. Voltage



Dark Current vs. Voltage



Package Information

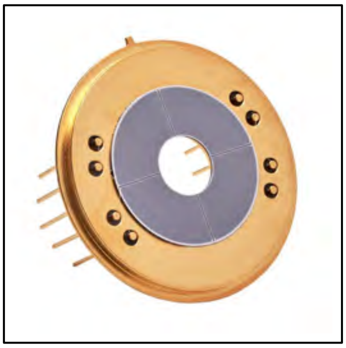


Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Quad Electron Detector 146 mm^2

AXUVPS7



FEATURES

- Ideal for Electron Detection
- Circular Active Area

Electro-Optical Characteristics at 25°C (Per Element)

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area (per element)			36.5		mm^2
Responsivity	(see graphs on next page)	0.07	0.08	0.09	A/W
Shunt Resistance, RsH	V_R = ± 10 mV	10			MOhm
Capacitance, C	V_R = 0 V		2	6	nF
Rise Time	V_R = 2 V, R_L = 50 Ω			2	usec

Thermal Parameters

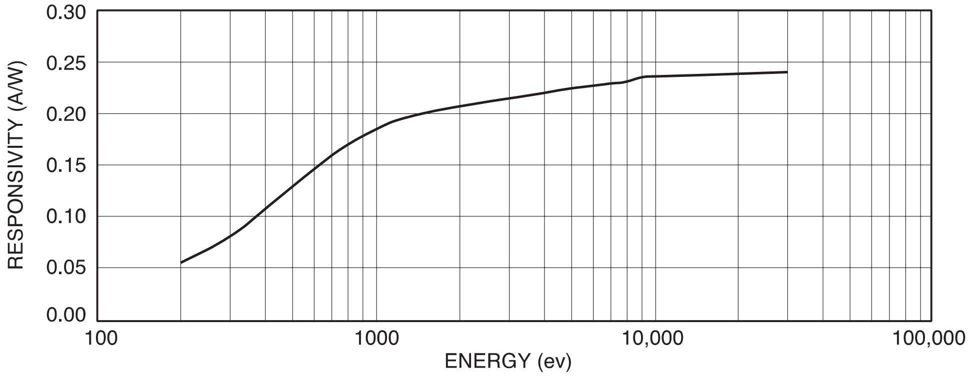
Storage and Operating Temperature Range	Units
Ambient[1]	-10°C to 40°C
Nitrogen or Vacuum	-20°C to 80°C
Lead Soldering Temperature[2]	260°C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

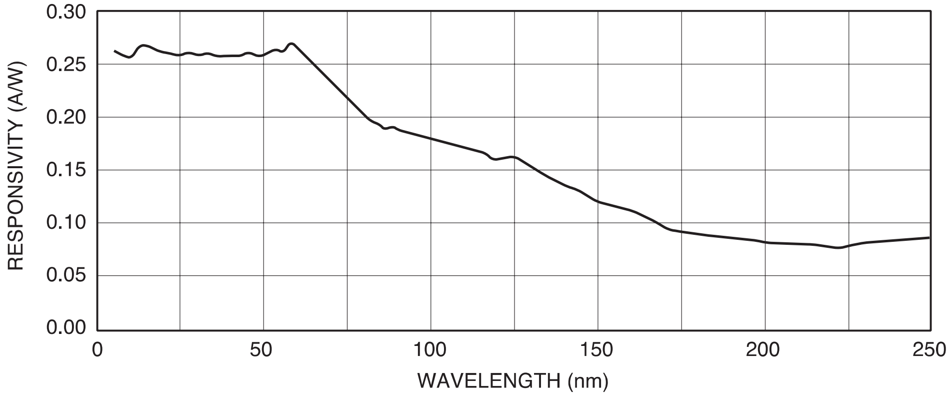
[2] 0.080" from case for 10 seconds.

Shipped with temporary cover to protect photodiode and wire bond.
Review Opto Diode, “Handling Precautions for IRD Detectors”, prior to removing cover.

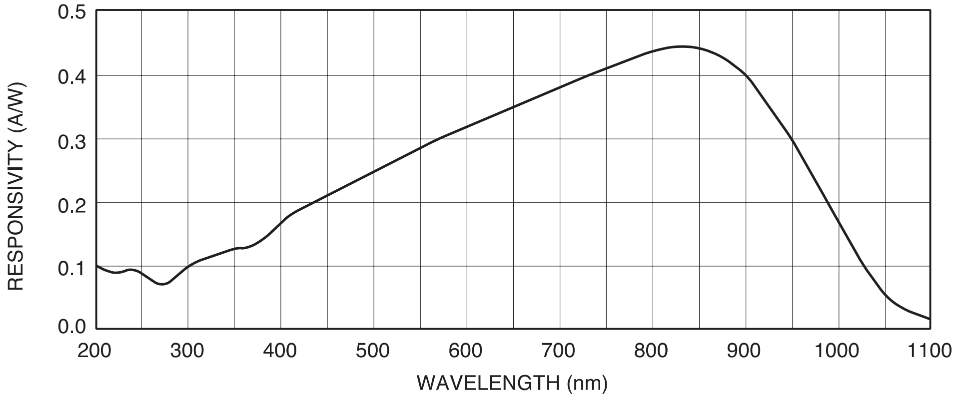
Typical Electron Response



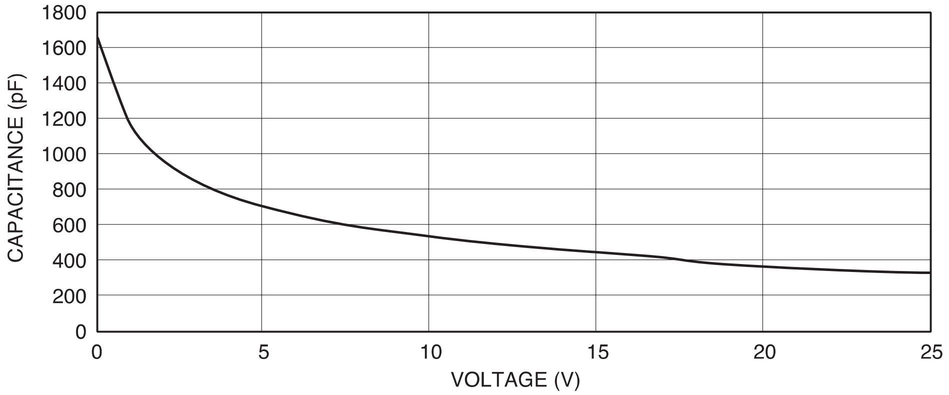
Typical EUV-UV Photon Response



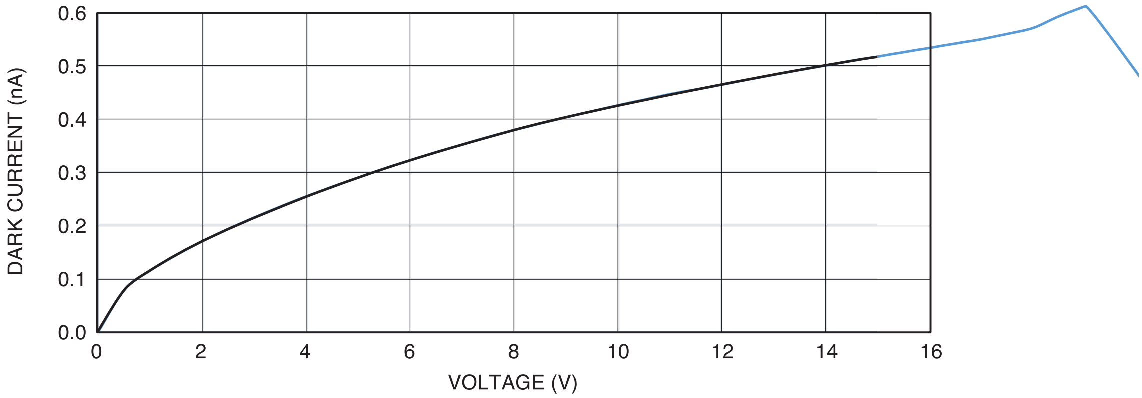
Typical UV-VIS-NIR Photon Responsivity



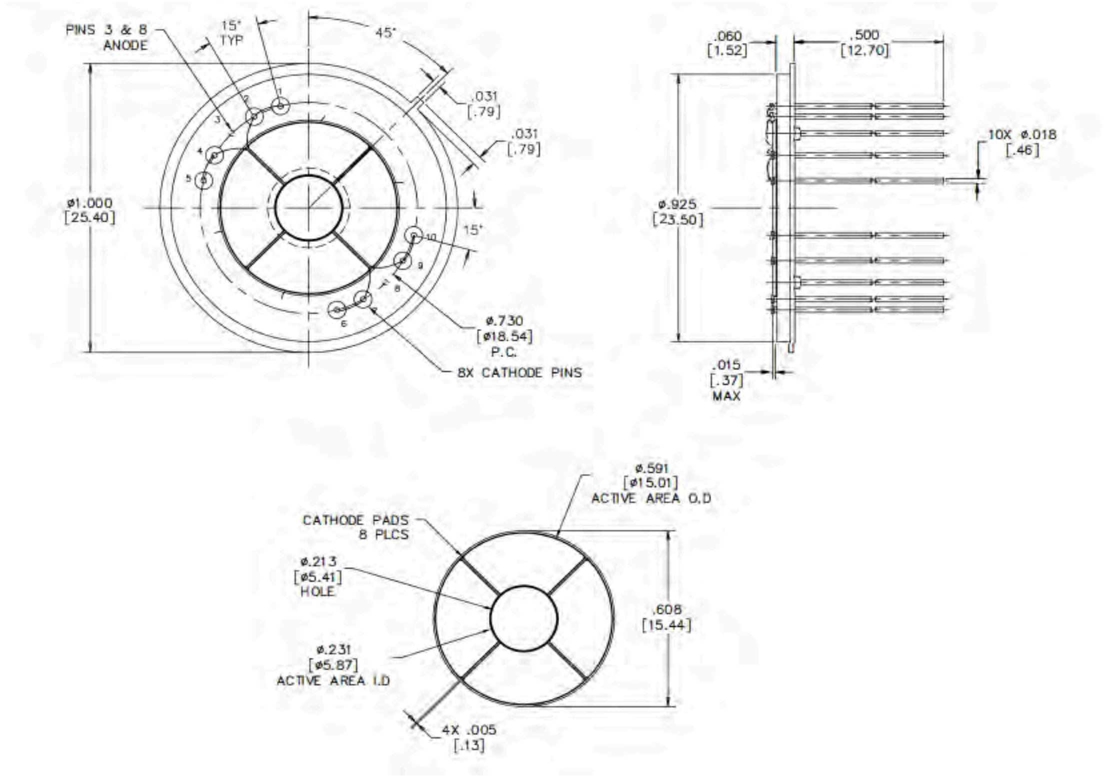
Capacitance vs. Voltage



Dark Current vs. Voltage



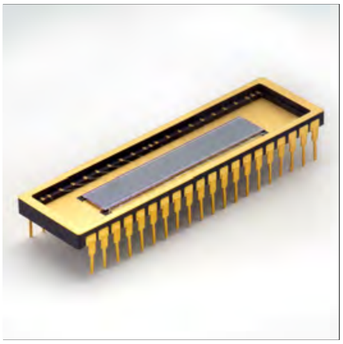
Package Information



Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

Photodiode 16 Element AXUV16ELG



FEATURES

- 40 Pin Dual-In-Line Package
- Ideal for Electron Detection
- Protective Cover Plate[3]

Electro-Optical Characteristics at 25 °C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	2 mm x 5 mm		10		mm^2
Responsivity	(see graphs on next page)				A/W
Reverse Breakdown Voltage, V_R	I_R = 1 µA		25		Volts
Capacitance, C	V_R = 0 V		700	2000	pF
Rise Time	V_R = 0 V		500		nsec
Shunt Resistance (per element)	V_f = ± 10 mV	100			MOhms

Thermal Parameters

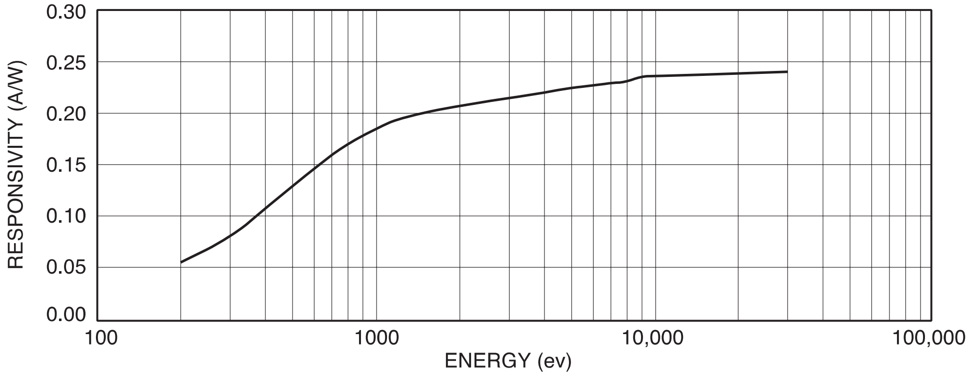
Storage and Operating Temperature Range	Units
Ambient[1]	-10°C to 40°C
Nitrogen or Vacuum	-20°C to 80°C
Lead Soldering Temperature[2]	260°C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

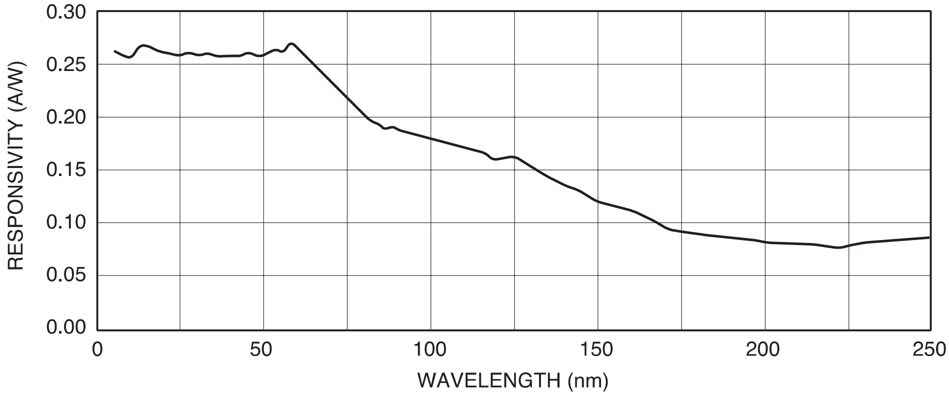
[2] 0.080" from case for 10 seconds.

[3] Shipped with temporary cover to protect the photodiode array and wire bonds.
Review the Application Note, “Handling Precautions for AXUV, SXUV, and UVG Detectors”, prior to removing cover.

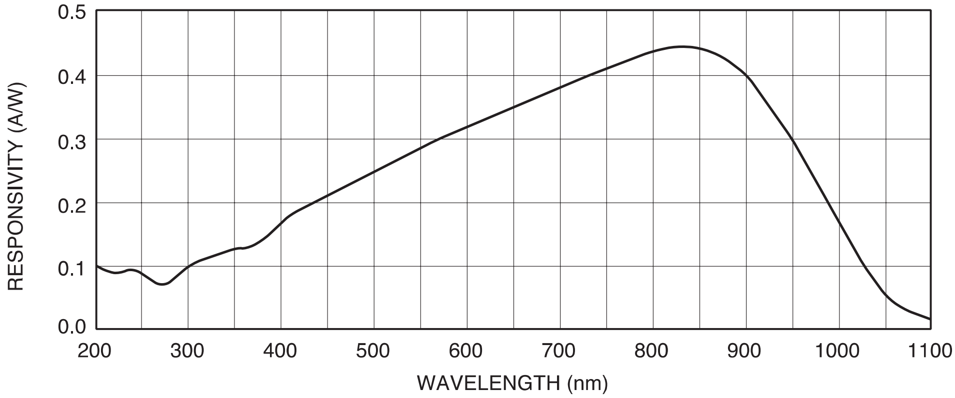
Typical Electron Response



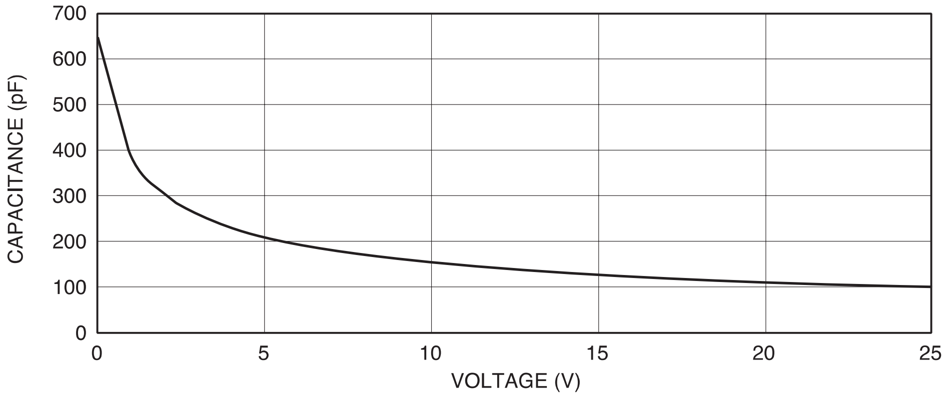
Typical EUV-UV Photon Response



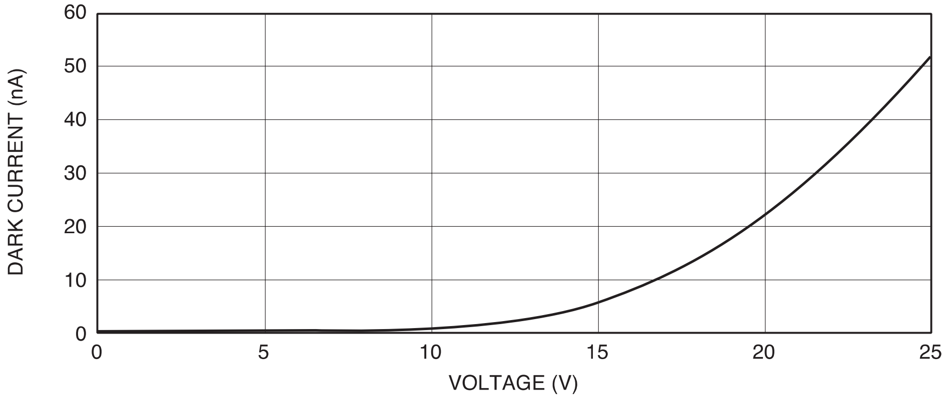
Typical UV-VIS-NIR Photon Responsivity



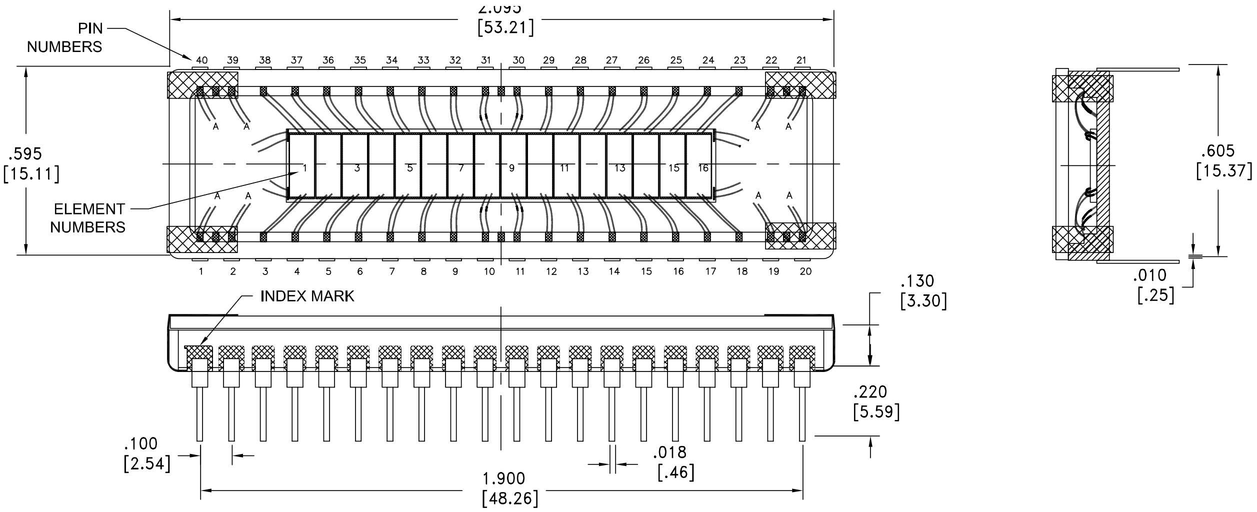
Capacitance vs. Voltage



Dark Current vs. Voltage



Package Information



Dimensions are in inch [metric] units.

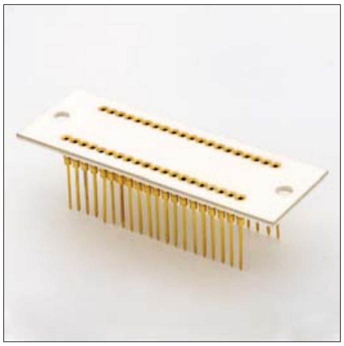
Pin Description

Pins	Connection	Pins	Connection
1, 2, 19, 20	Common Anode	11, 30	Cathode Element 9
21, 22, 39, 40	Common Anode	12, 29	Cathode Element 10
3, 38	Cathode Element 1	13, 28	Cathode Element 11
4, 37	Cathode Element 2	14, 27	Cathode Element 12
5, 36	Cathode Element 3	15, 26	Cathode Element 13
6, 35	Cathode Element 4	16, 25	Cathode Element 14
7, 35	Cathode Element 5	17, 24	Cathode Element 15
8, 33	Cathode Element 6	18, 23	Cathode Element 16
9, 32	Cathode Element 7		

Specifications are subject to change without prior notice.

Photodiode Socket

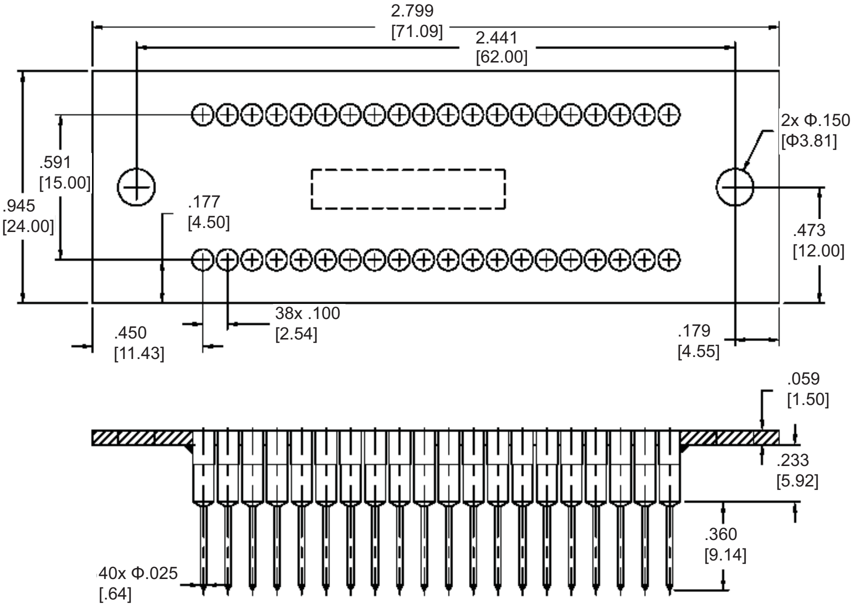
AXUV16ELCS



FEATURES

- Ceramic Socket for Devices to Eliminate Soldering to Leads
- For Use with AXUV16ELG Photodiode with 2.54 mm Lead Spacing
- Low Outgassing Materials for Vacuum Compatibility

Package Information



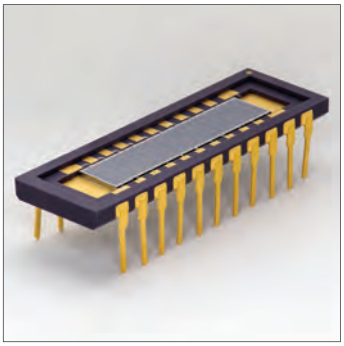
Dimensions are in inch [metric] units.

Specifications are subject to change without prior notice.

From Deep UV to Mid-IR
OPTO DIODE
An ITW Company

Photodiode 20 Element

AXUV20ELG



FEATURES

- 22 Pin Dual-In-Line Package
- Ideal for Electron Detection
- Protective Cover Plate[3]

Electro-Optical Characteristics at 25 °C

Parameters	Test Conditions	Min	Typ	Max	Units
Active Area	0.75 mm x 4.1 mm		3		mm^2
Responsivity	(see graphs on next page)				A/W
Reverse Breakdown Voltage, V_R	$I_R = 1$ μA	20	25		Volts
Capacitance, C	$V_R = 0$ V			1	nF
Rise Time	$V_R = 0$ V			200	nsec
Shunt Resistance (per element)	$V_f = \pm 10$ mV	100			MOhms

Thermal Parameters

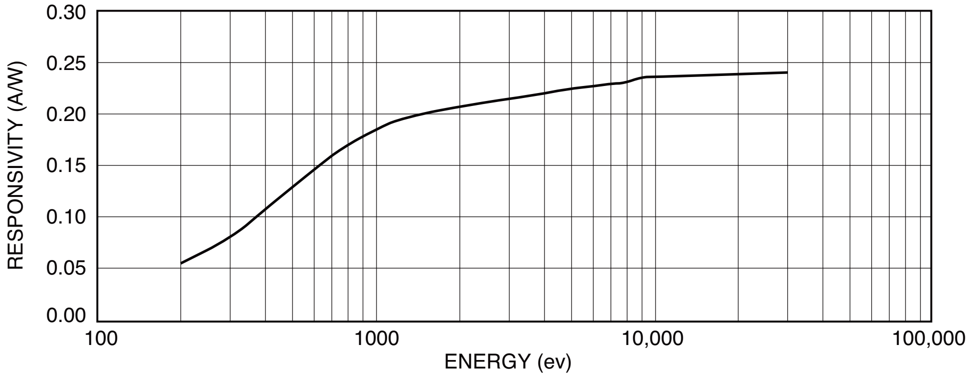
Storage and Operating Temperature Range	Units
Ambient[1]	-10°C to 40°C
Nitrogen or Vacuum	-20°C to 80°C
Lead Soldering Temperature[2]	260°C

[1] Temperatures exceeding these parameters may create oxide growth on the active area.
Over time responsivity to low energy radiation and wavelengths below 150 nm will be compromised.

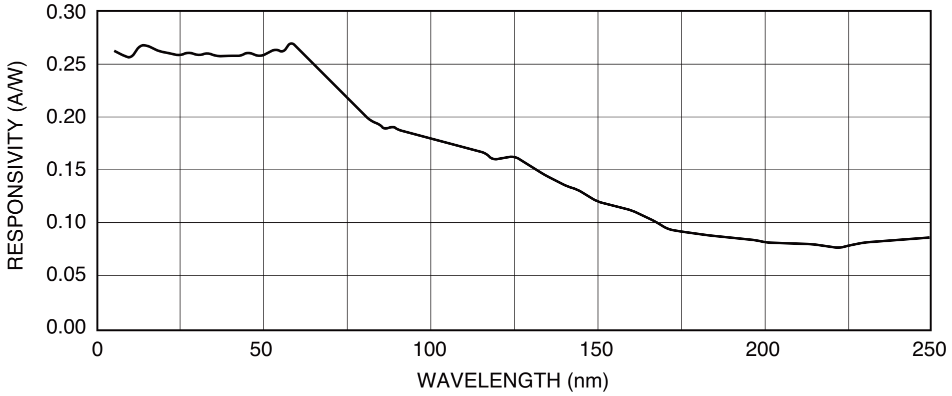
[2] 0.080" from case for 10 seconds.

[3] Shipped with temporary cover to protect the photodiode array and wire bonds.
Review the Application Note, “Handling Precautions for AXUV, SXUV, and UVG Detectors”, prior to removing cover.

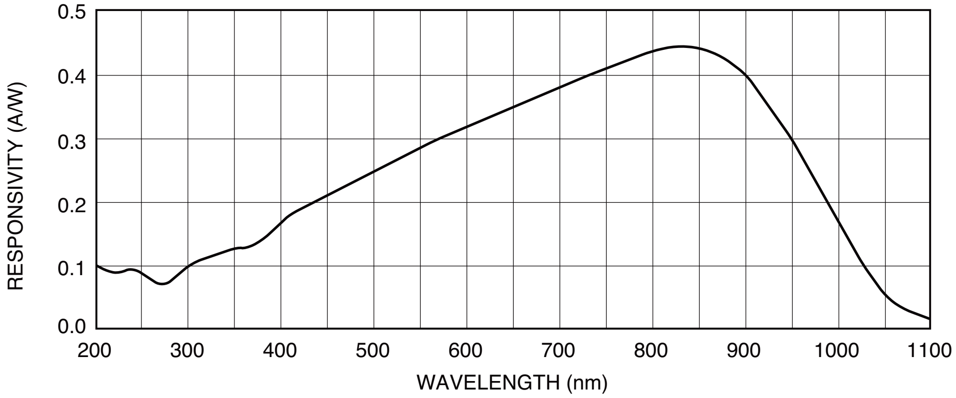
Typical Electron Response



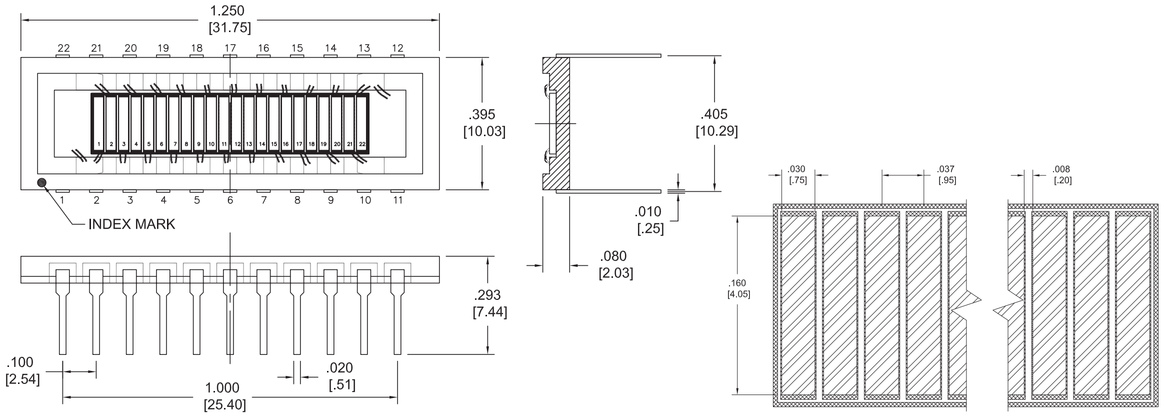
Typical EUV-UV Photon Response



Typical UV-VIS-NIR Photon Responsivity



Package Information



Dimensions are in inch [metric] units.

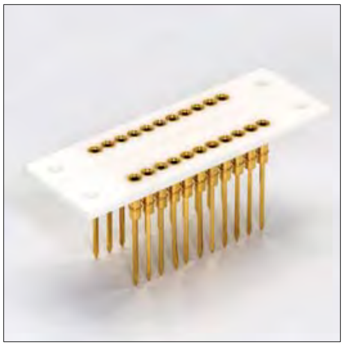
Pin Description

Pins	Connection	Pins	Connection
1, 12	Common Anode	13	Cathode Element 20
n/a	Cathode Element 1	14	Cathode Element 18
2	Cathode Element 3	15	Cathode Element 16
3	Cathode Element 5	16	Cathode Element 14
4	Cathode Element 7	17	Cathode Element 12
5	Cathode Element 9	18	Cathode Element 10
6	Cathode Element 11	19	Cathode Element 8
7	Cathode Element 13	20	Cathode Element 6
8	Cathode Element 15	21	Cathode Element 4
9	Cathode Element 17	22	Cathode Element 2
10	Cathode Element 19	n/a	Cathode Element 22
11	Cathode Element 21		

Specifications are subject to change without prior notice.

Photodiode Socket

AXUV20ELCS



FEATURES

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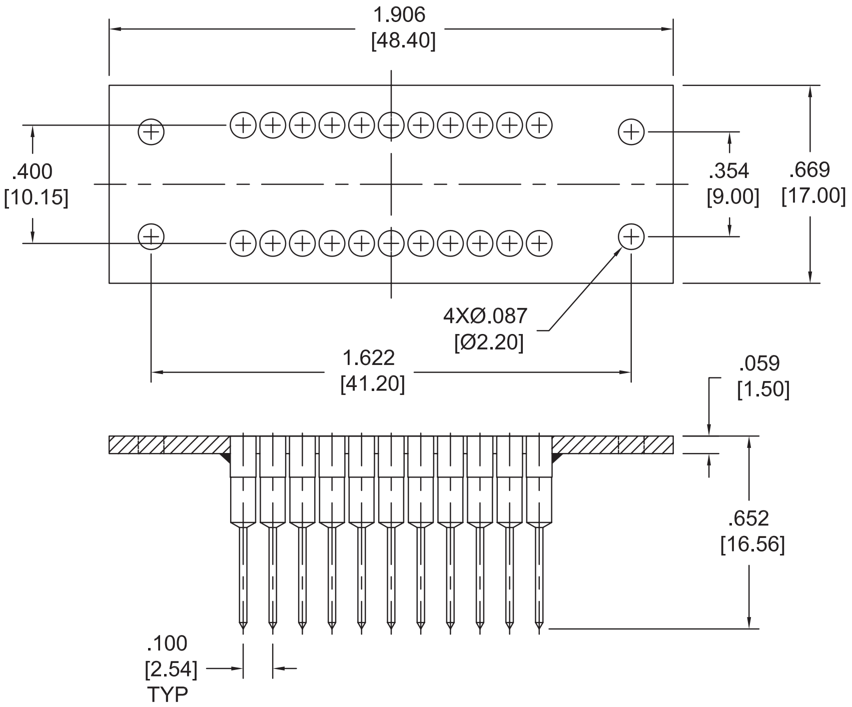
Package Information



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