



E-VNG0031PSD

Two-Dimensional Position Sensitive Detector (PSD) Analog Module

The E-VNG0031PSD module features a 2mm diameter active area 2D tetra-lateral extended visible InGaAs position sensitive detector (PSD) with integrated transimpedance amplifiers (TIA) offering industry-first enhanced spectral sensitivity from 400nm to 1700nm. The PSDs are available with two options of 0.5k Ω and 2.2k Ω interelectrode resistance. While quadrant detectors require overlap in all quadrants, the lateral effect PSDs provide positional information of any location within the detector region, independent of beam shape, size, and power distribution. All analog inputs and outputs utilize standard SMA connectors. The housing can accommodate standard UNC for optical and cage mount and any C-Mount threaded camera lenses.

Applications

Two-Dimensional Measurements
Optical Axis Alignment
Free Space Communication
Distance Sensors

Features

SMA Connectors Input/Output
UNC for Cage and Optical Mount
400nm to 1700nm Spectral Range
5MHz Cutoff Frequency
High Position Resolution
Excellent Position Detection Repeatability



Absolute Maximum Ratings at $T_A=23\text{ }^{\circ}\text{C}$

PARAMETER	SYMBOL	MIN	MAX	UNIT
SUPPLY VOLTAGE (V_+ - V_-)	V_S	3.1	5.25	V
REVERSE BIAS	V_R	-	4	V
OPERATING TEMPERATURE	T_{OP}	0	+70	$^{\circ}\text{C}$
STORAGE TEMPERATURE	T_{STG}	-10	+80	$^{\circ}\text{C}$

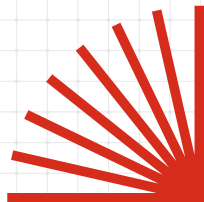
Typical Electro-Optical Specifications at $T_A=23\text{ }^{\circ}\text{C}$

PARAMETER	TEST CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
ACTIVE AREA	-	A.A.	-	3.1	-	mm^2
ACTIVE AREA DIAMETER	-	A.A. $_{\phi}$	-	2	-	mm
SPECTRAL RANGE	Spot Scan	$\Delta\lambda$	400	-	1700	nm
RESPONSIVITY	$\lambda=632\text{nm}$	R_{λ}	0.26	0.29	-	A/W
	$\lambda=1060\text{nm}$	R_{λ}	0.69	0.73	-	A/W
	$\lambda=1550\text{nm}$	R_{λ}	0.9	1.06	-	A/W
CUTON FREQUENCY - 3DB LOWER	$V_R=0\text{V}$	f_c	-	DC	-	Hz
CUTOFF FREQUENCY - 3DB UPPER	$V_R=0\text{V}$	f_c	-	5	-	MHz
OFFSET VOLTAGE DARK STATE	$V_R=0\text{V}$	V_{OS}	-	-50	-	μV
TRANSIMPEDANCE GAIN	-	-	-	5000	-	V/A
POSITION RESOLUTION*	Within 60% of active area diameter, $D_F=10\text{kHz}$, $P_{OPT}=1\mu\text{W}$	ΔR	-	100	-	μm
	Within 60% of active area diameter, $D_F=10\text{kHz}$, $P_{OPT}=100\mu\text{W}$		-	15	-	

Ordering Part Number

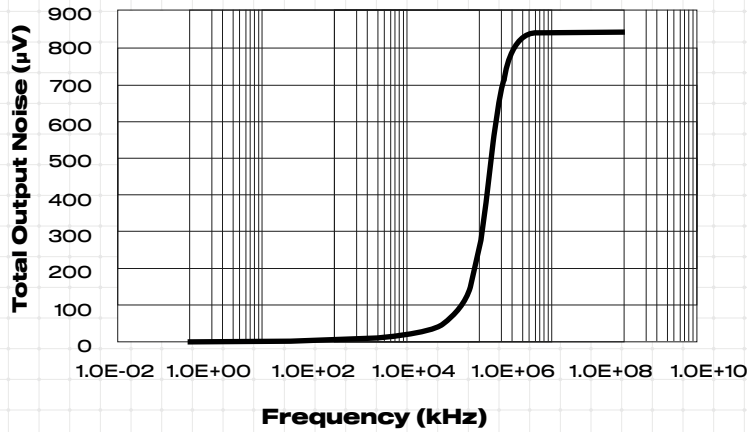
PART NUMBER	PSD INTER-ELECTRODE RESISTANCE TYP [$\text{k}\Omega$]**	PSD PACKAGE TYPE
E-VNG0031PSD-001	2.2	TO-5
E-VNG0031PSD-002	0.5	TO-5
E-VNG0031PSD-003	2.2	Ceramic LCC
E-VNG0031PSD-004	0.5	Ceramic LCC

** Inter-electrode resistance is measured between diagonally opposing contacts.

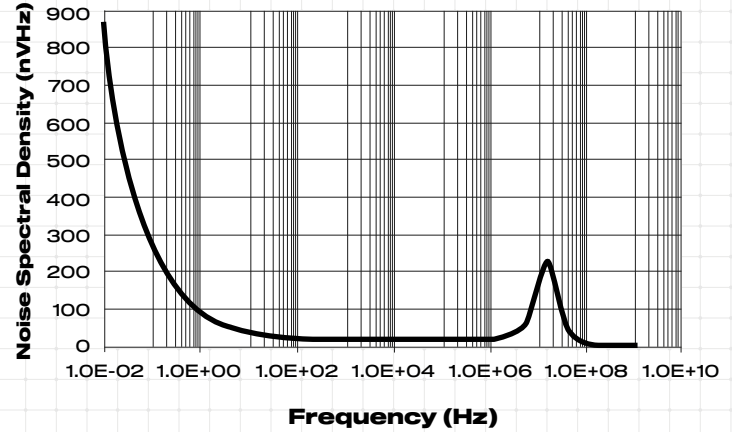




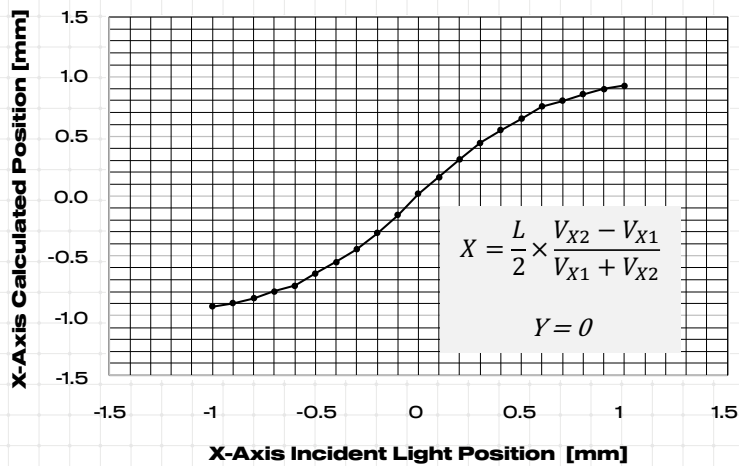
Total Output Noise – TIA Stage



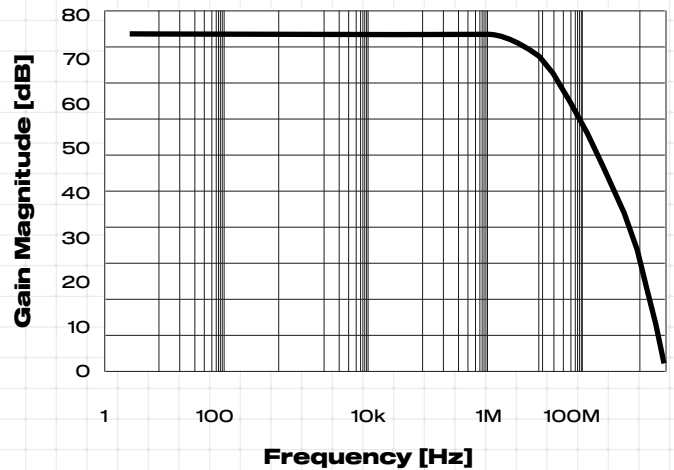
Noise Spectral Density – TIA Stage



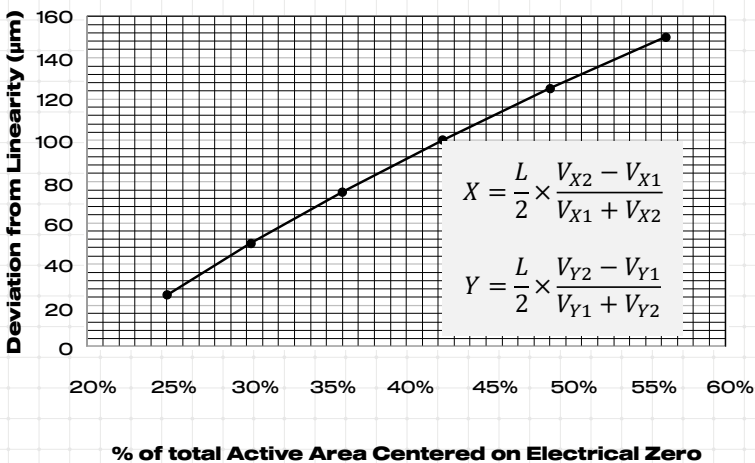
Calculated Incident Light Position



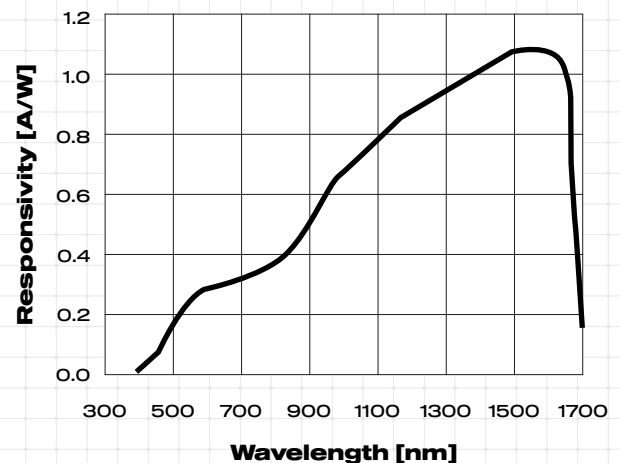
Frequency Response



Deviation From Linearity

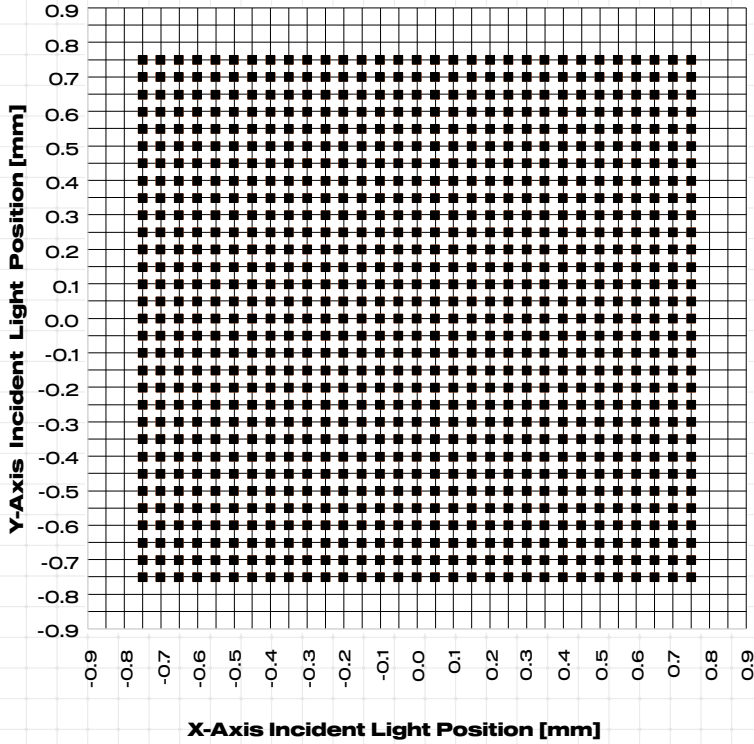


Typical Spectral Response

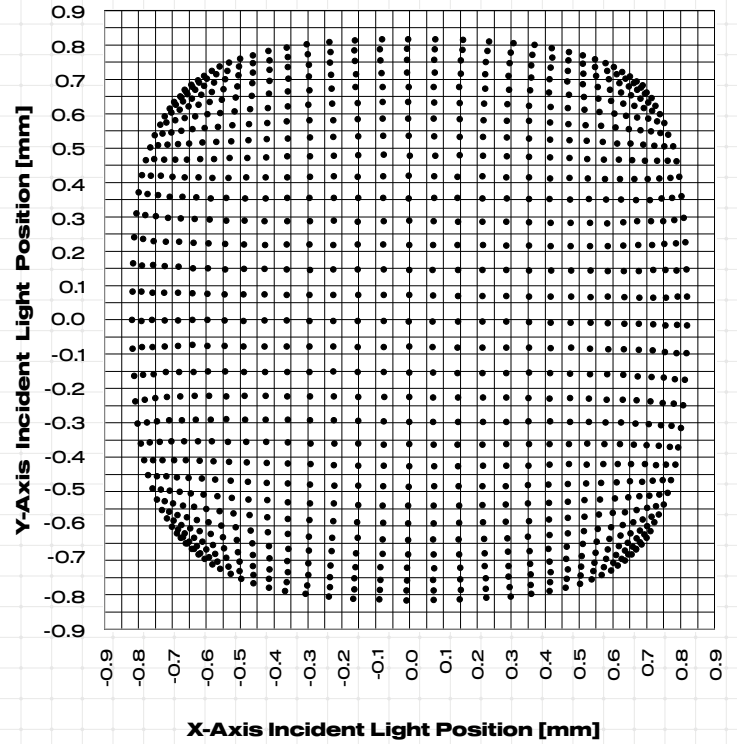




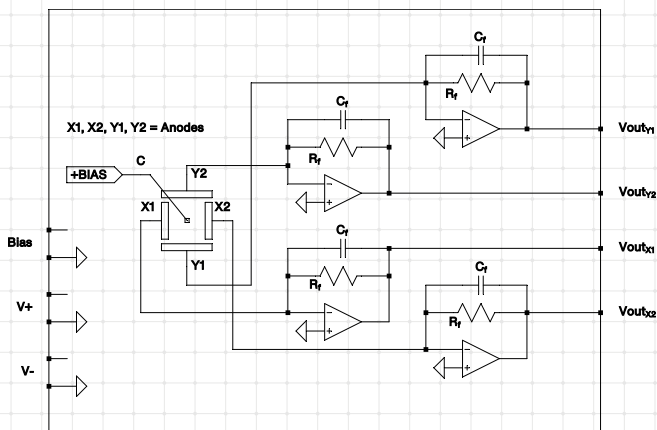
Laser Scan X/Y 0.75mm, 0.05mm Step



X/Y Calculated Positions (Equations -1 & 2)



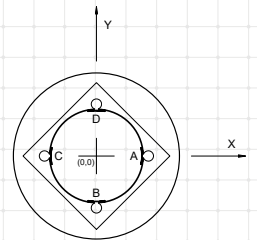
Block Diagram



Equations

Equation-1
$$X = \frac{L}{2} \times \frac{V_{X2} - V_{X1}}{V_{X1} + V_{X2}}$$

Equation-2
$$Y = \frac{L}{2} \times \frac{V_{Y2} - V_{Y1}}{V_{Y1} + V_{Y2}}$$

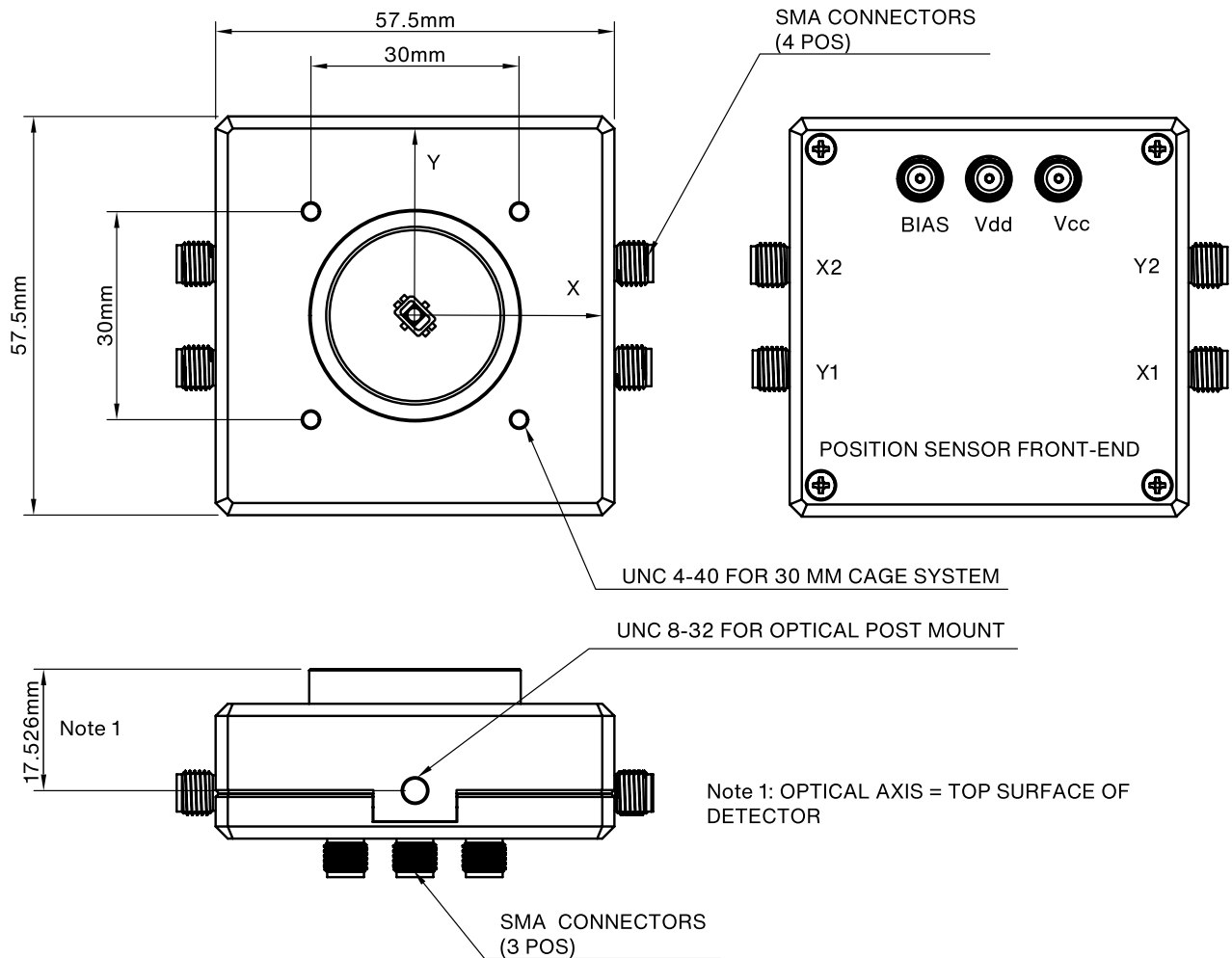


X,Y: Position (mm) of light spot centroid with respect to the geometrical center of the active area.

L: 2mm (APX-VNG0031PSD-00X)

Mechanical Specification

Units are in inches [mm]





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.

OPTOCOUPERS 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

Information in this data sheet is believed to be correct and reliable. However, no responsibility is assumed for possible inaccuracies or omission. Specifications are subject to change without notice.

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