EMITTERS & DETECTORS

PerkinElmer™
optoelectronics.

A CORPORATE OVERVIEW

PerkinElmer began over 60 years ago with three MIT technological pioneers. Harold (Doc) Edgerton, Kenneth F. Germeshausen and Herbert Grier developed the first stroboscopic techniques for stop motion analysis, providing for the first patent on stroboscopes and the founding of EG&G, Inc. — the initials of the three pioneers.Today, now known as PerkinElmer, Inc., the company is a global, diversified technology company with three distinct business units: Life and Analytical Sciences, Fluid Sciences and Optoelectronics. These business units provide state-of-the-art optoelectronic, mechanical, electromechanical components, instruments and systems, drug discovery, analytical research and genetic disease screening solutions to a broad range of OEM and end-use customers. PerkinElmer products, services, and technical capabilities provide quality solutions to a broad range of applications in worldwide markets including Biomedical, aerospace, automotive, environmental, industrial, medical, photography, security, and many others.

OPTOELECTRONICS OVERVIEW

PerkinElmer Optoelectronics evolved from the company's original operation and was the first business unit to produce commercial products for industry. In fact, many of our lighting products trace their origins to the basic xenon flashlamp designs and various pulse circuit inventions of the company's three founders.

The Optoelectronics strategic business unit consists of three business enterprises: Sensors, Lighting and Imaging. In addition to a vast array of custom and catalogue products, these groups offer custom-engineering services ranging from product definition to full scale production, including contract design and manufacturing of sensors, subassemblies, and systems.

With a broad array of standard products and custom-engineered solutions, we are accelerating the development of new products and applications and enhancing service to our customers.

EMITTERS AND DETECTORS OVERVIEW

For more than three decades, PerkinElmer Optoelectronics has developed and manufactured some of the most reliable emitters and detectors to be found.

Our vast resources — which include a 3,000 sq. ft. Class 100 clean room — have enabled us to provide the highest quality standard and custom optoelectronic devices to meet almost any technological need. These successes have helped us build a worldwide reputation for good value and reliable products. We use the most advanced optoelectronics technology to solve your specific design problems — from prototype design and development through full-scale production. Our quality and reliability assurance programs allow us to meet stringent requirements. The next time you have a design or application challenge, bring it to PerkinElmer Optoelectronics.

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Surface Emitting LEDs

The C30116/F is an InGaAs 1060 nm device offered with a lensed (A) or flat (B) cap in a TO-18 package. CW and pulsed operation are possible. These device types are not suitable for optical fibre coupled applications due to their large emitting areas.

Both types can be qualified to the most stringent military and industrial quality and performance specifications.

Surface Emitting LEDs – 1060 nm

CW or Pulse Operated — **Typical Characteristics @ T = 22ºC**

Type #	Standard Package	Center Wavelength l0 (nm)	Forward Current (CW) I_f (mA)	Output Power (CW) Po (µW)	Forward Current (Pulsed) if pk (A)	Output Power (Pulsed) Po (mW)	Pulse Width tw(µs)	Response Time tr(ns)
C30116	A	1060	50	200	10	20	1	<10
C30116F	B	1060	50	200	10	20	1	<10

Typical Applications

1060 nm–Nd:YAG simulation, including receiver calibration.

High Energy QCW Laser Diodes, 980nm Quasi CW Lasers

These devices have been designed specifically to meet the demanding requirements of laser initiated ordnance (LIO) applications. Product offerings include a 9.0 mm TO-style package and an 8 pin miniDIL pigtailed package equipped with a rear facet monitor photodiode and 100/140 µm optical fibre. The 980 nm laser chip employs advanced epitaxial materials and processing techniques, providing reliable high optical power output capability and significant power retention at elevated temperatures. Alternate package outlines and fibre-optic core diameters may be considered on a custom basis.

Quantum Well Types – 980 nm

Quasi CW Operated — **Typical Characteristics @ T = 22ºC**

Part #	Standard Package	Peak Output Power P_{ko} (W)	Peak Forward Current I_f (A)	Pulse Width tw (ns)	Maximum Duty Factor DF (%)	Response Time tr (ns)	Beam Divergence θ∥ x θ⊥ (deg.)	Fibre Optic Core/ Clad Dia. (µm)
C86118E	R	1.5	2.0	10	10	<1	10 x 35	-
C86155E-10	AA	1.1	2.0	10	10	<1	-	100/140
C86159E-09	AA	2.0	4.0	10	10	<1	-	200/240

Typical Applications

Laser initiated ordnance.

Pulsed Laser Diodes - Specialty Products

These devices range in wavelength from 850 nm to 1300 nm and are produced using Vapor Phase Epitaxial (VPE) and Liquid Phase Epitaxial (LPE) growth techniques. Fibre-optic pigtailed devices employ an advanced fibre alignment process yielding highly stable fibre to laser diode positioning. Alternative packages and fibre-optic core diameters may be supplied on a custom basis.

Double Heterostructure and Quantum Well Types – 850 nm, 1064 nm and 1300 nm

Pulse Operated — **Typical Characteristics @ T = 22ºC**

Part #	Standard Package	Peak Output Power P_{ko} (W)	Peak Forward Current I_f (A)	Pulse Width tw (ns)	Maximum Duty Factor DF (%)	Response Time tr (ns)	Beam Divergence θ∥ x θ⊥ (deg.)	Fibre Optic Core/ Clad Dia. (µm)
C86153E-12	O	850	0.75	5	200	0.1	–	62.5/125
C86119E	F	1064	2.0	4	200	0.1	10 x 40	–
C86120E-10	M	1064	0.4	4	200	0.1	–	100/140

Typical Applications

Fibre-optic instrumentation, YAG laser simulation, range determination and OTDR.

Pulsed Laser Diodes - 850nm PFA Series

This series of devices employs elements from 75 µm wide single sources to three stacks of 400 µm wide elements producing peak optical output power of 5.5 W to 80 W respectively. The laser diode structure is fabricated using an MOCVD epitaxial growth technique. This is a gaseous phase process which provides for very precise control of the crystal layers so that near theoretical device performance can be realized. These laser diodes are designed to provide narrow farfield emission in the plane perpendicular to the junction while maintaining typically 1 W/A slope efficiency. Standard package outlines include "C", "R" and "S". Other package types may be considered upon special request.

Multiple Quantum Well Types – 850 nm

Pulse Operated **Typical Characteristics @ T = 22ºC**

Part #	Preferred Package	Peak Output Power Pko (W)	Peak Forward Current I_f(A)	Pulse Width tw (ns)	Maximum Duty Factor DF (%)	Response Time tr (ns)	Beam Divergence θ∥ x θ⊥(deg.) FWHM	Number of Diode Elements
PFAS1S03	S	5.5	7	50	0.025	<1	12 x 30	1
PFAS1S09	S	17	20	50	0.025	<1	12 x 30	1
PFAS1S12	S	26	30	50	0.025	<1	12 x 30	1
PFAS1S16	S	34	40	50	0.025	<1	12 x 30	1
PFAS2S09	S	34	20	50	0.025	<1	12 x 30	2
PFAS2S12	S	52	30	50	0.025	<1	12 x 30	2
PFAS3S12	S	78	30	50	0.025	<1	12 x 30	3

Typical Applications

Laser range finding, LIDAR and optical fusing.

Pulsed Laser Diodes - 905nm PGA Series

Advanced MOCVD grown multiple quantum well types at 905 nm with strained InGaAs active regions to enhance temperature performance and reliability. Peak output powers range from 5 W to 120 W when operated at a 150 ns pulse width. Significant increases in peak power are attainable at shorter pulse widths. Package options for this series include C, R, S, U and Y packages. Other packages may carry price premiums and/or longer lead times.

Multiple Quantum Well Types – 905 nm

Pulse Operated **Typical Characteristics @T=22˚C**

Part #	Preferred Package	Peak Output Power Pko (W)	Peak Forward Current I_f(A)	Pulse Width tw (ns)	Maximum Duty Factor DF (%)	Response Time tr (ns)	Beam Divergence θ∥ x θ⊥(deg.)	Number of Diode Elements
PGAS1S03	S	5.5	7	150	0.1	<1	10 x 25	1
PGAS1S06	S	12	15	150	0.1	<1	10 x 25	1
PGAS1S09	S	18	22	150	0.1	<1	10 x 25	1
PGAS1S12	S	24	30	150	0.1	<1	10 x 25	1
PGAS1S16	S	33	40	150	0.1	<1	10 x 25	1
PGAS1S24	S	49	60	150	0.1	<1	10 x 25	1
PGAS3S06	S	34	15	150	0.1	<1	10 x 30	3
PGAS3S09	S	50	22	150	0.1	<1	10 x 30	3
PGAS3S12	S	67	30	150	0.1	<1	10 x 30	3
PGAS4S12	S	90	30	150	0.1	<1	10 x 30	4
PGAS4S16	S	120	40	150	0.1	<1	10 x 30	4

Typical Applications

Laser range finding, LIDAR, optical fusing, high speed switching, weapons simulation and laser scanning.

Emitters

Pulsed Laser Diodes - 905nm PGEW Series

This series of laser diodes was specifically designed to address high-volume low-cost requirements in primarily commercial applications. They produce high peak output power and are ideally suited for light duty factor requirements. The laser diode chips employed here are modified versions of our standard advanced multiple quantum well design found in our PGA series. The center wavelength of operation (905 nm) is well-matched to the peak response of Si detectors and complements our low cost APD (C30724 & C30737) series.

Devices are offered in a convenient low-cost plastic encapsulated package. This packaging technique does not yield a hermetic assembly and has limited heat sinking capabilities and therefore, may not be appropriate for applications requiring operation at extreme temperatures and high humidity.

Multiple Quantum Well Types – 905 nm

Pulse Operated — **Typical Characteristics @ T = 22ºC**

Part #	Standard Package	Peak Output Power P_{ko} (W)	Peak Forward Current I_f(A)	Pulse Width tw (ns)	Maximum Duty Factor DF (%)	Beam Divergence θ∥ x θ⊥(deg.)	Number of Diode Elements
PGEW1S03	W	4.5	7	30	0.0075	10 X 25	1
PGEW1S09	W	15	25	30	0.0075	10 X 25	1
PGEW2S09	W	30	25	30	0.0075	10 X 30	2
PGEW3S09	W	45	25	30	0.0075	10 X 30	3

Typical Applications

LIDAR, intrusion alarms, and laser range finding.

Pulsed Laser Diodes - 1550nm PVG Series

MOCVD grown double heterostructure laser diodes at 1550 nm with peak output powers of 4 W, 8 W and 40 W are offered as standard products. The wavelength of these devices is centred at 1550 nm to take advantage of an increase over AlGaAs and InGaAs lasers in the maximum permitted emission levels for eyesafe operation with respect to FDA requirements. Class 1 operation therefore should be possible with relatively high output powers.

Double Heterostructure Types – 1550 nm

Pulse Operated — **Typical Characteristics @ T = 22ºC**

Part #	Standard Package	Peak Output Power P_{ko} (W)	Peak Forward Current I_f(A)	Pulse Width tw (ns)	Maximum Duty Factor DF (%)	Response Time tr (ns)	Beam Divergence θ∥ x θ⊥(deg.)	Number of Diode Elements
PVGR1S06	R	4	20	200	0.1	<1	20 x 40	1
PVGS1S06	S	4	20	200	0.1	<1	20 x 40	1
PVGR2S06	R	8	20	100	0.1	<1	20 x 40	2
PVGS2S06	S	8	20	100	0.1	<1	20 x 40	2
PVGR4S12	R	40	75	50	0.025	<1	20 x 40	4

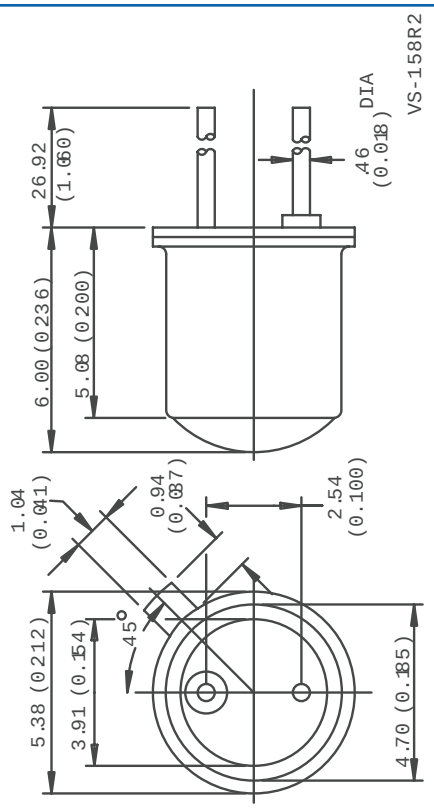
Typical Applications

Eye-safe range finding and weapons simulation.

Package drawings are for reference only.
Not reproduced to actual size. Measurements in mm/inches.

Emitters

A



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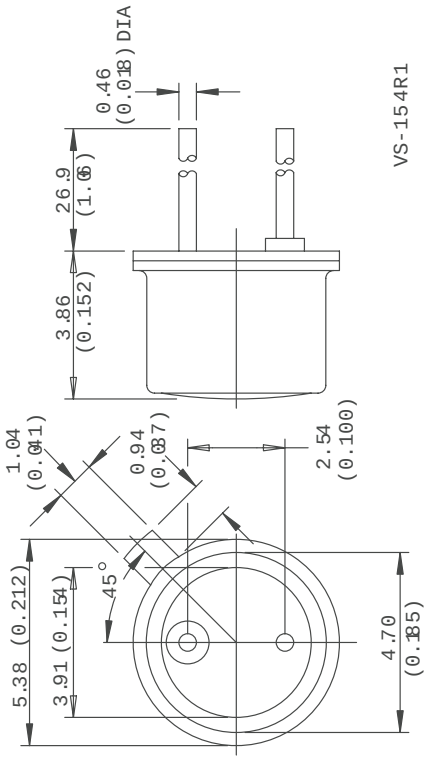

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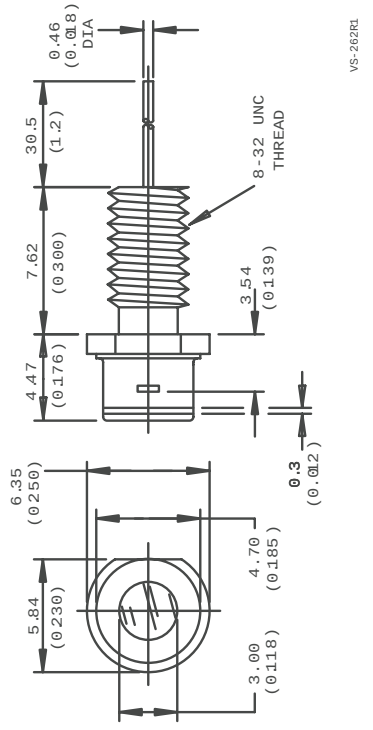

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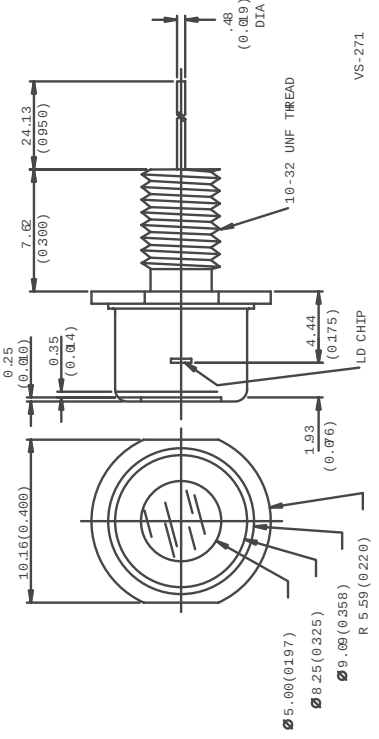

Emitters

Package drawings are for reference only.
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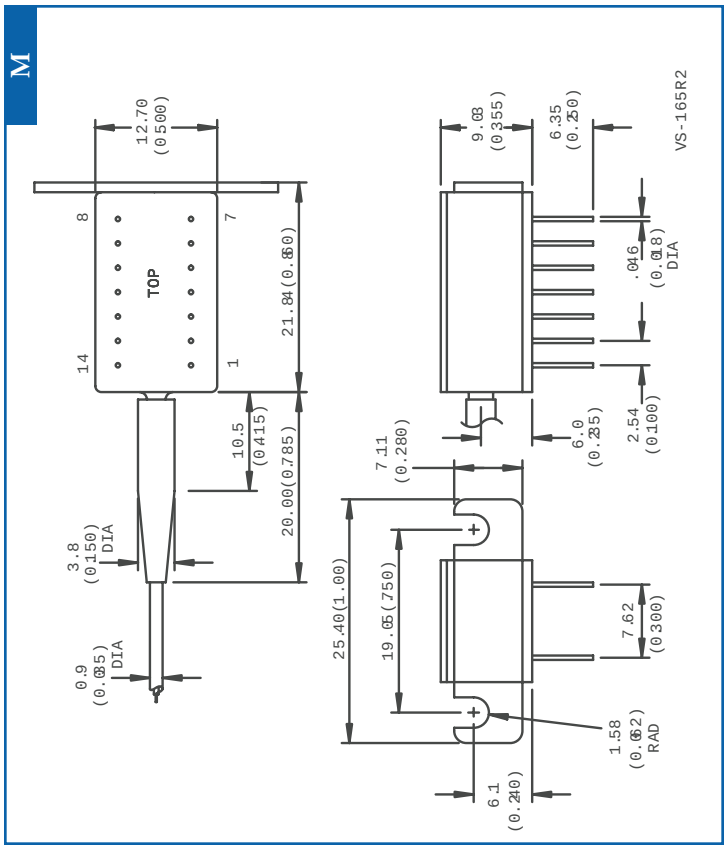

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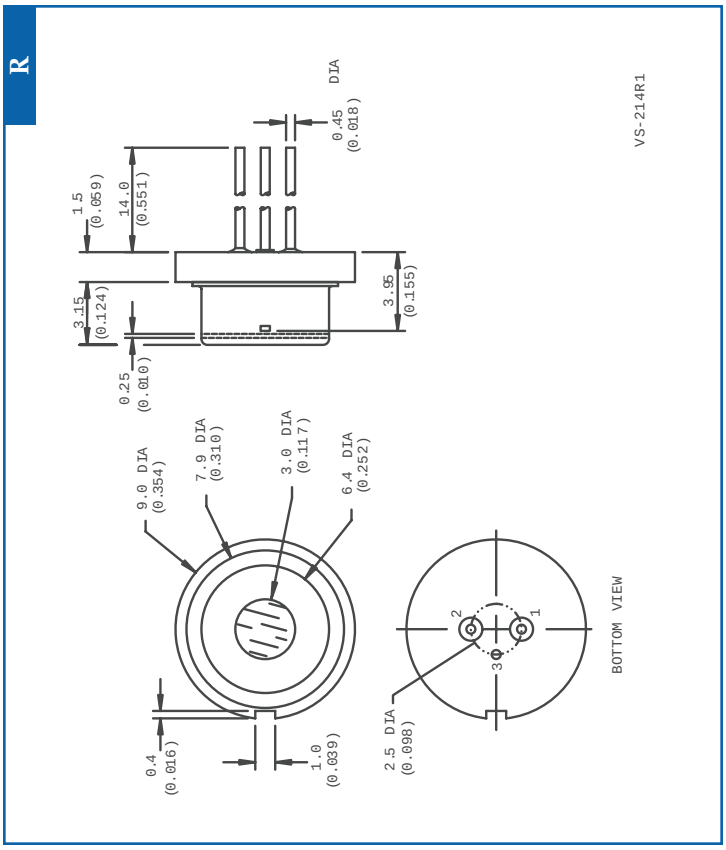

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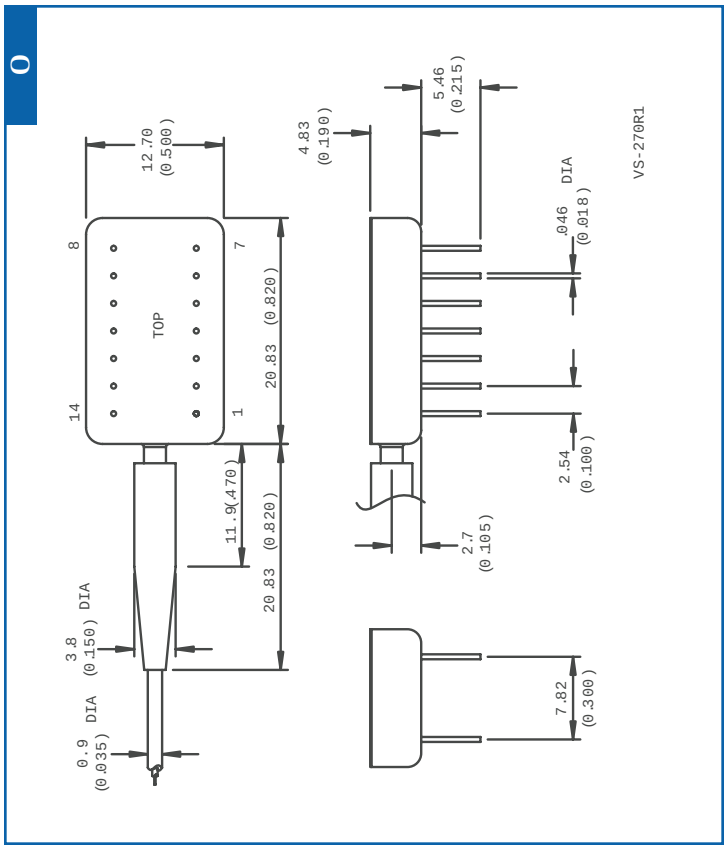

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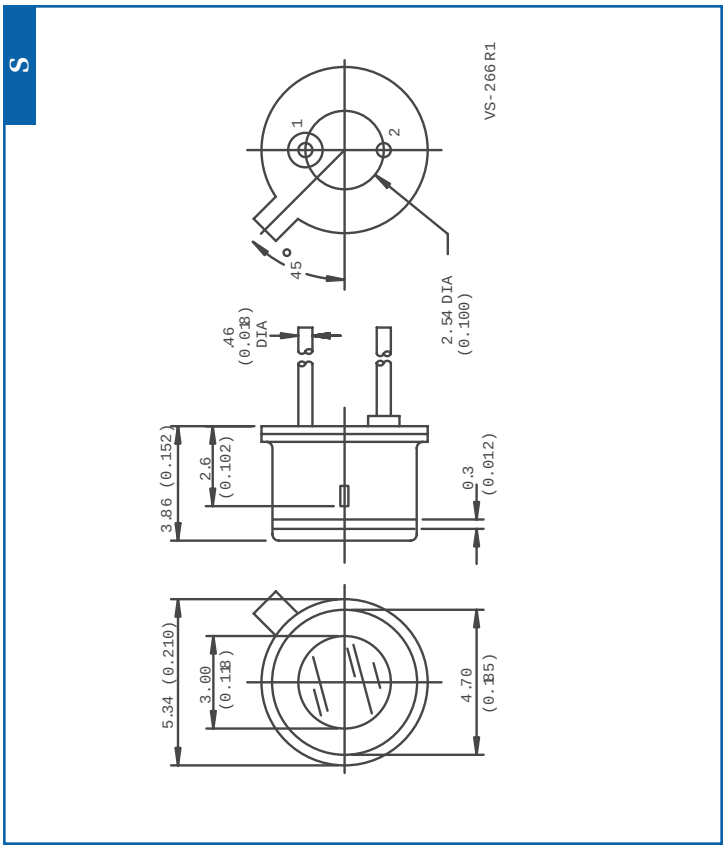

Package drawings are for reference only.
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Emitters

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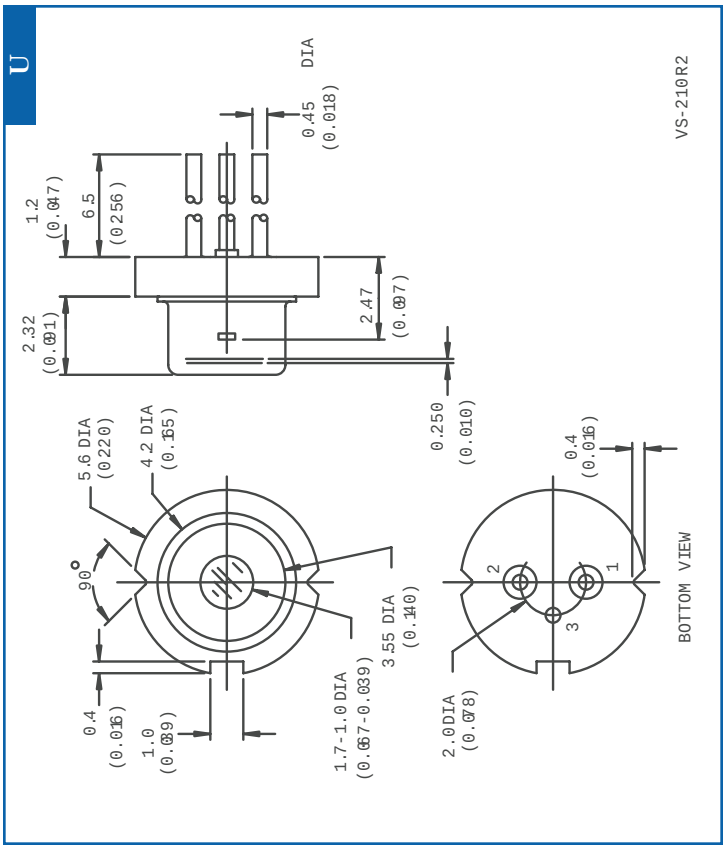

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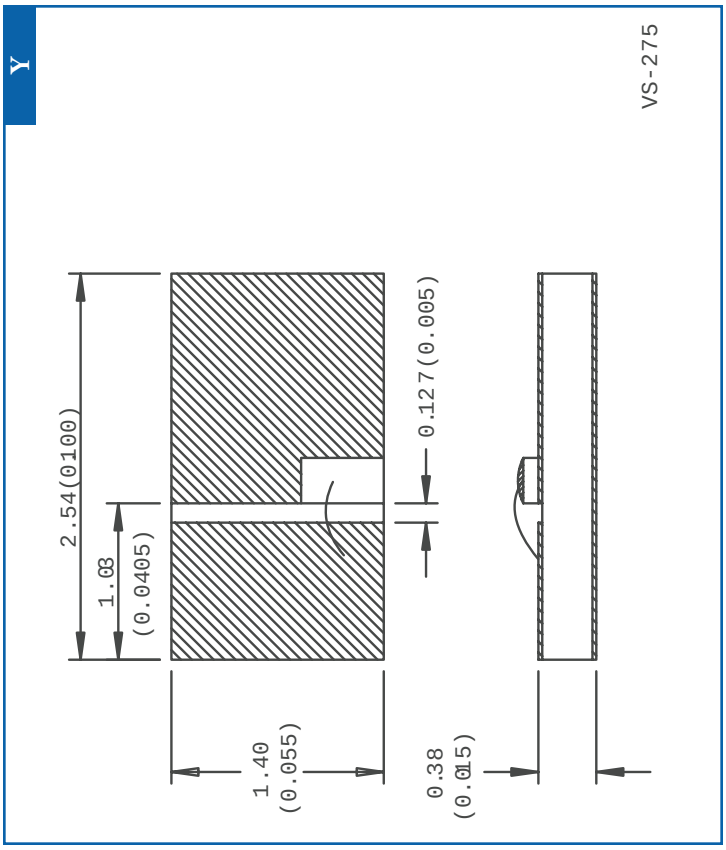

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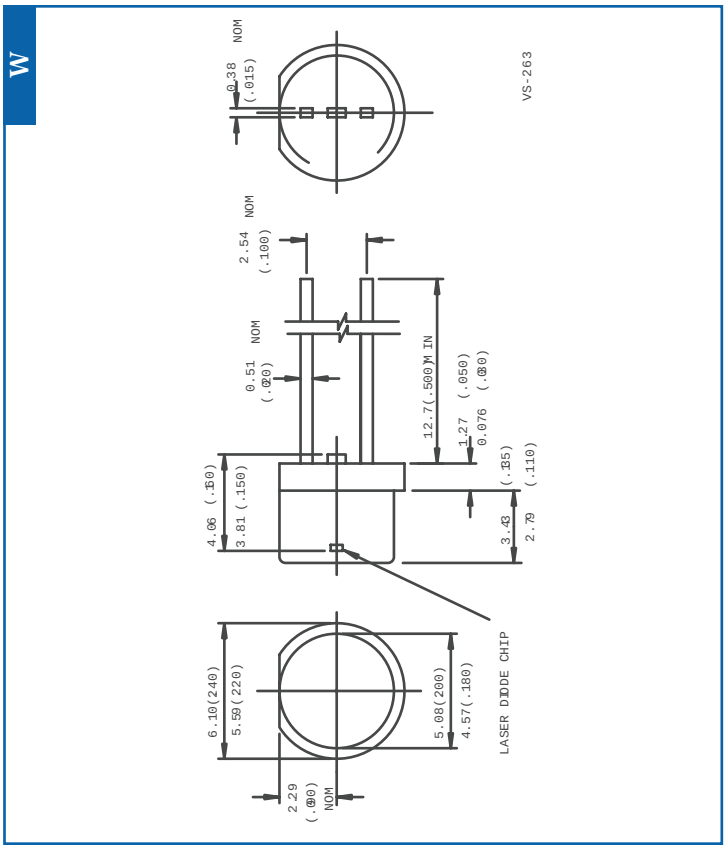

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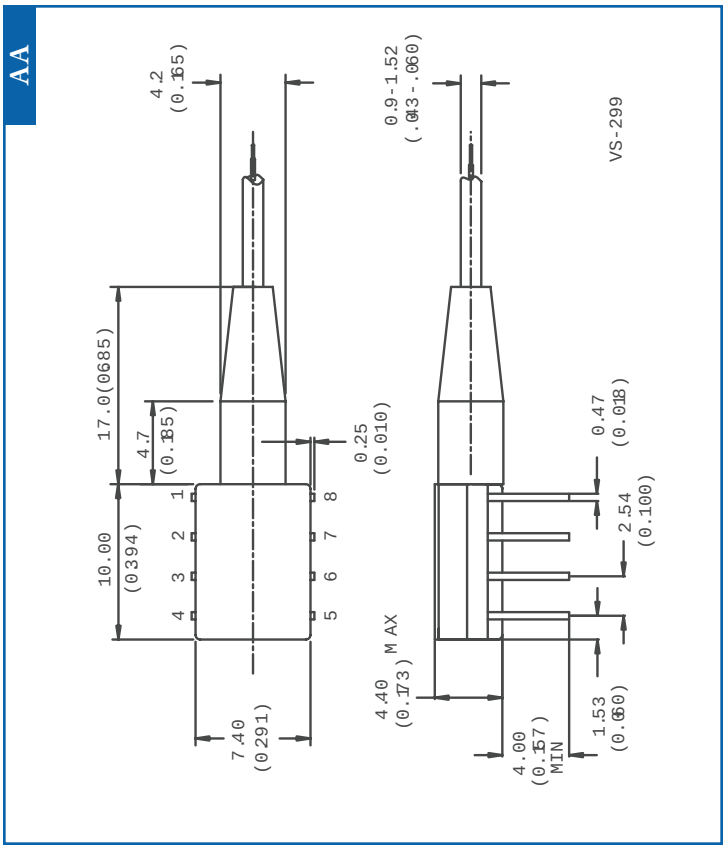


Detectors

Silicon PIN Photodiodes - Window and Fibre-Optic Packages, Fast Response Time – 400 nm to 1100 nm

The C30971 is a high-speed, P-type device designed for fibre-optic and free space applications in the 400 nm to 1100 nm wavelength range.

Packages

This photodiode is offered in the standard TO-18 (Q package) with window as well as a TO-18 equipped with a lightpipe (D7). D3 and D4 packages are connectorized to facilitate fiber optic connections. Fibre-optic receiver modules using this photodiode are available on a custom basis.

Si PIN Photodiodes – Window and Fibre-Optic Packages, Fast Response

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp. @ 830nm (A/W)	Dark Current Id (nA)	Spect. Noise Curr. Dens. In(fW/√Hz)	Cap. @ 100 kHz Cd (pF)	Response Time tr (ns)	NEP @ 830 nm (fW/√Hz)	Bias Volt (V)
C30971E	Q	0.5	0.5	10	57	1.6	0.5	113	100
C30971EL	D7	0.25	0.5	10	57	1.6	0.5	113	100
C30971BST	D3	0.5	0.45	10	57	1.6	0.5	126	100
C30971BFC	D4	0.5	0.45	10	57	1.6	0.5	126	100

Typical Applications

Fast laser pulse detection, fibre-optic communications, instrumentation, and high-speed switching.

Silicon PIN Photodiodes - UV Enhanced, Low Noise – 220 nm to 1100 nm

The UV series are high-quality N-type Si PIN photodiodes in hermetically sealed TO packages designed for the 220 nm to 1100 nm wavelength region with enhanced operation in the UV range. These photodiodes are operated in the photovoltaic mode (0-V bias) and encounter very low noise.

Active areas are circular or rectangular and are also available in bi-cell, dual-element and quadrant configurations. The standard devices (BQ) use a quartz window for transmission below 250 nm, with an A/R coating for 250 nm.

Custom devices with an A/R coating for 340 nm may also be offered upon request.

Preamplifier Modules

The HUV series uses these photodiodes in hybrid preamplifier modules.

Si PIN Photodiodes – UV Enhanced

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp. @ 250 nm (A/W)	Resp. @ 900 nm (A/W)	Shunt Resis. Rd (M Ω)	Spect. Noise Curr Dens. In (fW/√Hz)	Cap. @100kHz Cd (pF)	NEP @ 900 nm (fA/√Hz)
UV-040BQ	C1	1	0.12	0.58	2000	3	25	5
UV-100BQ	C1	2.5	0.12	0.58	1000	4	120	7
UV-215BQ	C3	5.4	0.12	0.58	250	8	450	25
UV-245BQ	C1	4.4 x 4.7 (rectang.)	0.12	0.58	375	7	375	20
UV-100BQ DUAL	C1	2.5(circ.)(x2)	0.12	0.58	1000	4	120	7
UV-140BQ-2 [Bi Cell]	B	2.5 x 1.3 (rect.)(x2)	0.12	0.58	1000	4	68	7
UV-140BQ-4 [Quad]	E	1.3 x 1.3 (square)(x4)	0.12	0.58	1000	4	34	7

Typical Applications

UV light meters, visible light meters, photometry, fluorescent light detection, spectroscopy, low-level light sensing, and instrumentation.

Silicon Epitaxial PIN Photodiodes - High Speed – 400 nm to 1100 nm

The C30736 series of high-speed epitaxial silicon PIN photodetectors provide fast response and good quantum efficiency in the spectral range between 400 nm and 1100 nm. These devices are optimized for high-speed, high volume and low cost applications. Standard sizes include 0.25 mm, 0.5mm, 1.0 mm, 1.5 x 1.5 mm and custom sizes can be accomodated depending on volume required. Available in plastic surface mount packages and in chip form.

Silicon Epitaxial PIN Photodiodes

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp. @ 870nm (A/W)	Dark Current @2V Id (nA)	Spect. Noise Curr. Dens. In(fW/√Hz)	Cap. @ 100 kHz Cd (pF)	Response Time tr (ns)	NEP @ 870 nm (fW/√Hz)	Bias Volt (V)
C30736-1	Chip form	0.20	0.55	0.05	6	0.75	0.3	11	2
C30736-2	Chip form	0.50	0.55	0.10	10	1.5	0.5	18	2
C30736-3	Chip form	1.5 x 1.5	0.55	0.50	50	14	0.3	91	2

Silicon PIN Photodiodes - Standard N-Type – 400 nm to 1100 nm

The C308XX series devices are high-quality N-type Si PIN photodiodes in hermetically sealed TO packages designed for the 400 nm to 1100 nm wavelength region.

Si PINs – Standard N-Type

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp. @ 900nm (A/W)	Dark Current Id (nA)	Spect. Noise Curr. Dens. (fA/√Hz)	Cap. @ 100 kHz Cd (pF)	Response Time tr (ns)	NEP @ 900 nm (fW/√Hz)	Bias Volt (V)
C30807E	A	1	0.6	1	18	2.5	3	30	45
C30808E	B	2.5	0.6	3	31	6	5	52	45
C30822E	C	5	0.6	5	40	17	7	67	45
C30809E	C3	8	0.6	7	47	35	10	79	45
C30810E	D	11.4	0.6	30	98	70	12	163	45

Typical Applications

Laser detection systems, photometry, data transmission, instrumentation, and high-speed switching.

Silicon PIN Photodiodes - Large Area, Fast Response Time – 400 nm to 1100 nm

The FFD series devices are high-quality, large-area, high-speed, N-type Si PIN photodiodes in hermetically sealed TO packages designed for the 400 nm to 1100 nm wavelength range. The FND-100Q has a quartz window to enhance UV responsivity.

Preamplifiers

Preamplifier modules incorporating these photodiodes are available on a custom basis.

Si PINs – Large Area, Fast Response

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp. @ 900nm (A/W)	Dark Current Id (nA)	Spect. Noise Curr. Dens. In(fW/√Hz)	Cap. @ 100 kHz Cd (pF)	Response Time tr (ns)	NEP @ 900 nm (fW/√Hz)	Bias Volt (V)
FFD-040B	Y	1	0.58	1	18	1.8	2	31	15
FFD-100	B	2.5	0.58	2	25	8.5	3.5	44	15
FFD-200	C3	5.1	0.58	4	36	30	5	62	15
FND-100Q	B	2.5	0.58	10	60	8.5	2	100	90

Typical Applications

Laser detection systems, fast pulse detection, instrumentation, and high-speed switching.

Detectors

Silicon PIN Photodiodes - Quadrant – 220 nm to 1100 nm

The C30845E series is a high-quality N-type Si PIN quadrant photodiode in hermetically-sealed TO packages designed for the 400 nm to 1100 nm wavelength range.

The photodiode active area is circular with four pie-shaped quadrant sections created from the doping process. There is no "dead" space between the elements. Each quadrant has an isolated signal lead. The specifications are per quadrant element.

The UV and YAG devices are described in their respective device sections.

The spectral range is 400 to 1100 nm, except for the UV type which will respond to at least 220 nm.

Si PIN Photodiodes – Quadrant

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp. @ 900nm (A/W)	Dark Current Id (nA)	Spect. Noise Curr. Dens. (fA/√Hz)	Cap. @ 100 kHz Cd (pF)	Response Time tr (ns)	NEP @ 900 nm (fW/√Hz)	Bias Volt (V)
C30845E	F	8	0.6	7	47	8	6	79	45
YAG-444-4A	G	11.4	0.4 @ 1.06 µm	40	118	9	25	295	180
UV-140BQ-4	E	1.3 x 1.3 (x4)	0.58	—	4	34	<1 µsec	7	0

Typical Applications

Quadrant detectors are used for spot position tracking and measurements in the X and Y directions for either pulsed or cw applications, laser spot tracking, positional measurements, and instrumentation.

Silicon PIN Photodiodes - Near-IR Enhanced (1.064 µm) – 400 nm to 1100 nm

The YAG series are high-quality P-type Si PIN photodiodes in hermetically sealed TO packages. These photodiodes perform well over the 400 nm to 1100 nm wavelength range and use a thicker Si material for enhanced IR responsivity, making them ideal for 1.064 µm detection applications.

A guard ring has been implemented to collect the higher surface leakage current of a P-type detector. This also serves to collect current generated outside the active area, ensuring the current will not contribute to noise. This is advantageous for applications when the entire chip is illuminated or when nuclear particles outside the active area could create noise.

The YAG-444-4A is a quadrant photodiode.

Si PIN Photodiodes – Near-IR Enhanced (1.064 µm)

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp. @ 1060nm (A/W)	Dark Current @2V Id (nA)	Spect. Noise Curr. Dens. (fA/√Hz)	Cap. @ 100 kHz Cd (pF)	Response Time tr (ns)	NEP @ 1060nm (fW/√Hz)	Bias Volt (V)
YAG-100A	B	2.5	0.4	10	62	2.5	15	155	180
YAG-200	C3	5.1	0.4	50	131	6	20	327	180
YAG-444A	G	11.3	0.4	75	162	35	25	406	180
YAG-444-4A [per element]	G	11.4 Quad	0.4	40	118	9	25	295	180

Typical Applications

Laser range finding, laser warning receivers, and missile guidance systems.

Avalanche Photodiodes - Guidelines

When to Use an APD

The use of APDs instead of PIN photodetectors will result in improved sensitivity in many applications. In general, APDs are useful in applications where the noise of the amplifier is high — i.e., much higher than the noise in the PIN photodetector. Thus, although an APD is always noisier than the equivalent PIN, improved signal-to-noise can be achieved in the system for APD gains up to the point where the noise of the APD is comparable to that of the amplifier. For example, when the system bandwidth is high, the amplifier noise is high, and an APD is likely to be useful. On the other hand, in very low bandwidth systems, the noise of the amplifier is likely to be very low, in which case, the APD may not be the best choice. In applications where the background optical power falling on the detector is very high, such as operation of the detector in daylight conditions with little or no filtering, an APD may not be useful, except perhaps at low gain, since the multiplied noise of the background illumination will be very high and may exceed that of the amplifier. These results can be seen from the following equation for the system noise in the unit bandwidth:

1 $$i_n = [\, 2q\, [\, I_{DS} + (\, I_{DB} + P_S R_O\,)\, M^2 F\,]\,]$$

The value of F for a silicon APD is given by the following expression:

2 $$F = K_{eff} M + (1 - K_{eff})(2 - 1/M)$$

Where K_{eff} = Effective ratio of the hole and electron hole ionization coefficients

As the multiplication increases, the relative contribution of the surface current and amplifier is decreased, however, the contribution of the multiplied dark and illuminated currents is increased. Since the signal increases as M, then it can be seen from (1) that the detector contribution to the system noise, omitting the IDS term, is proportional to the square root of the excess noise factor, F.

Temperature Effects in Silicon APDs

There are three main effects of varying the temperature of silicon APDs. The first is the effect on the two components of the dark current, which vary exponentially according to the following expression:

3 $$I(T) = I_o \exp(-qN/kT)$$

Where
N = Activation energy
k = Boltzman's constant
T = Absolute temperature in Kelvin

The activation energy, N, is equal to 0.55 eV for the bulk (multiplied) component of the dark current, while the surface current (unmultiplied) is found to have an activation energy of about 0.7 eV. The second main effect of temperature is the variation of the operating voltage for a fixed value of the gain, which occurs due to variation of the ionization coefficients. For a fixed operating gain, the required voltage increases at higher temperatures, and decreases at lower temperatures. Alternatively, for a fixed operating voltage, the gain decreases at higher temperatures, and increases at lower temperatures. The third effect is quantum efficiency for wavelengths near the band edge of silicon, in particular at 1064 nm. The effect is to decrease quantum efficiency at lower temperatures and conversely, to increase quantum efficiency at higher temperatures. To a first approximation, the quantum efficiency at 1064 nm for most of PerkinElmer's standard APDs, is found to vary about 1.3% ºC over their useful temperature range.

Note: For more information on APDs, please request the APD User's Guide from PerkinElmer Optoelectronics.

Detectors

Silicon Avalanche Photodiodes - Standard Types – 400 nm to 1100 nm

PerkinElmer Si APDs are very reliable, high-quality detectors in hermetically sealed TO packages designed for high speed and responsivity for the 400 nm to 1100 nm wavelength range. A "reach-through" structure provides very low noise performance at high gains. A full range of active areas is available.

Special APDs

In addition to the PerkinElmer standard-type APDs, other APDs tailored for specific applications are available. See specifications in other sections. These include:

- Low-cost APDs (C30724, C30737E) high-volume applications
- NIR Enhanced APDs (C30954 Series) 1.064 µm detection
- Arrays (C30927, C30985) 2x2 el., 25 el. linear
- Radiation Detection (C30626, C30703) large area for scintillator coupling
- C30902BST, BSC, BFC connectorized packages
- Lightpipe Package (C30921E) efficient fibre coupling
- Photon Counting (SPCM series, C30902S, C30902S-TC or DTC) ultra low-noise APDs, and modules

Preamplifiers

C30950 and C30659 devices use some of these APDs in bipolar and FET hybrid preamplifier packages.

Si APDs – Standard Types

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam. (mm)	Resp.@ 900nm (A/W)	Dark Curr. Id (nA)	Spect. Noise Curr. Dens.: In (pA/√Hz)	Cap.@100 kHz Cd (pF)	Resp. Time tr (ns)	NEP @ 900nm (fW/√Hz)	VOP Range Specs. (V)
C30902E	Q	0.5	77 (@830 nm)	15	0.23	1.6	0.5	3.0 (@830 nm)	180 - 250
C30902S	Q	0.5	128 (@ 830 nm)	15	0.11	1.6	0.5	0.86 (@830 nm)	180 - 250
C30817E	B	0.8	75	50	0.5	2	2	7	275 - 425
C30916E	B	1.5	70	100	0.5	3	2	8	275 - 425
C30872E	C3	3	45	100	0.5	10	2	11	275 - 425

Typical Applications

Fluorescence detection, fast and small signal detection, LIDAR, range finding, photon counting, data transmission, instrumentation, adaptive optics, and confocal microscopes.

Silicon Avalanche Photodiode Arrays - Quadrant & Linear – 400 nm to 1100 nm

The Si APD arrays are high-quality detectors in hermetically sealed TO packages designed for high speed and responsivity for the 400 nm to 1100 nm wavelength range.

Element Separation

The arrays are monolithic chip structures with the elements created from the doping process. The quadrant array, C30927, has no "dead space" between the elements. The linear array, C30985, has a high inter-electrode resistance with a 75 µm FWHM dead space between the elements. Packages have a common ground and bias with a separate lead for each element output.

Quadrant APDs

The quadrant APD has 3 versions, each tailored for high response at a particular wavelength:

C30927E-01: 1060 nm C30927E-02: 900 nm C30927E-03: 800 nm

Other Arrays

PerkinElmer Optoelectronics also specializes in making custom linear and monolithic arrays, with and without hybrid preamplifiers.

Si APD Arrays

Typical Characteristics @ T = 22ºC

Part #	# Elem	Standard Package	Photo Sens. Diam.(mm)	Resp.@ 830nm (A/W)	Dark Curr. per El. Id (nA)	Spect.Noise Curr. Dens.per El. In(pA/√Hz)nm	Cap. @ 100 kHz per El. Cd (pF)	Resp. Time tr (ns)	NEP @ 830nm (fW/√Hz)	VOP Range (V)
C30927E-01, 02, 03 (quadrant)	4	L	1.5(total)	62 (@900 nm)	25	0.25	1	3	16(@ 900 nm)	275-425
C30985E (linear)	25	O	0.3 pitch	31	1	0.1	0.5	2	3	250-425

Typical Applications

LIDAR, spectroscopy, particle detection, adaptive optics, and tracking systems.

Low-Cost High-Volume Avalanche Photodiodes

The C30724 is a high-quality, low-gain Si APD designed for high-volume applications. This device operates in the region where the APD gain is less sensitive to temperature variations, allowing for easy implementation without temperature compensation, rendering it ideal for applications where the background flux is large.

The C30737E type avalanche photodiode provides high gain, high responsivity between 400 nm and 1000 nm as well as extremely fast rise-and-fall times at all wavelengths and a frequency response useful to 1.2 GHz.

Packaging

Hermetic TO-18, TO-18 with built-in filter, plastic encapsulated, and plastic surface-mount packages are also available.

Si APDs – Low-Cost

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam.(mm)	Resp. @ 900nm (A/W)	Dark Curr. Id (nA)	Spect.NoiseCurr. Dens. In (pA/√Hz)	Cap. @100 kHz Cd (pF)	Resp.Time tr (ns)	NEP@ 900nm M=15 (fW/√Hz)	VOPRange(V) [160 V nominal]
C30724E(TO-18 Pkg)	Q	0.5	9 (@M=15)	25	0.1	1.0	5	11	120 - 200
C30724P(Plastic Pkg)	R	0.5	9 (@M=15)	25	0.1	1.0	5	11	120 - 200
C30737E(TO-18 Pkg)	Q	0.5	47(@ l=800 nm M=100)	20	0.3	2.5	0.3	6.4 (@ 800 nm M=100)	120 - 200

Typical Applications

Laser range finding, collision avoidance, and optical communication systems.

Detectors

TE-Cooled Silicon Avalanche Photodiodes

The C30902S APD is available on a one-stage or two-stage thermo-electric cooler. Cooling the APD reduces the thermal noise for very small signal detection. An integral thermistor can be used for temperature monitoring and cooler control.

Gain Control

An APD breakdown voltage is temperature dependent and decreases with decreasing temperature. If the bias voltage is kept constant, APD gain will increase with decreasing temperature. A room temperature operating voltage is supplied with each unit.

A TE cooler can also be used to maintain a constant APD temperature and thus keep the gain constant. Another method is to use a temperature compensation circuit, described in the preamplifier section.

Performance Improvement

Specifications below for Id, In and NEP are given for 0ºC for the one-stage cooler and for 20ºC for the two-stage cooler. A one-stage cooler will provide about a 3X performance improvement, and a two-stage cooler will provide about a 6X improvement.

Photon Counting

See photon counting section for Geiger-mode specifications.

Si APDs – TE-Cooled

Typical Characteristics @ T = 0ºC for "-TC" and -20ºC for "-DTC"

Part #	Standard Package	PhotoSens. Diam.(mm)	Resp.@ 830nm (A/W)	Dark Curr. Id (nA)	Spect.Noise Curr. Dens. In (pA/√Hz)	Cap. @ 100kHz Cd (pF)	Resp. Time tr (ns)	NEP @ 830nm (fW/√Hz)	APD VOP Range (V)
C30902S-TC [one-stage]	CC	0.5	128	2	0.04	1.6	0.5	0.3	160 -250 [temp.depend.]
C30902S-DTC [two-stage]	CC	0.5	128	1	0.02	1.6	0.5	0.16	160 - 250 [temp.depend.]

Typical Applications

Small signal fluorescence, photon counting, fast or weak signal detection, and adaptive optics.

Fibre Coupled and Lightpipe Silicon Avalanche Photodiodes

The C30902 APD is available in fibre receptacle and lightpipe packages.

Specifications

See specifications for C30902E and C30902S in standard APD section.

Part Numbers and Packages

ST Receptacle: C30902BST (D3 pkg.)

FC Receptacle: C30902BFC (D4 pkg.)

Lightpipe: C30921E (902E chip) (H pkg.)

Lightpipe: C30921S (902S chip) (H pkg.)

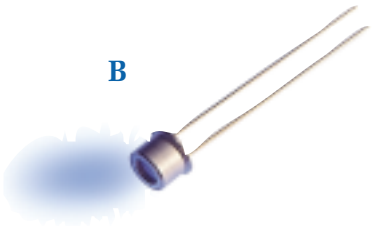
Typical Applications

Fibre-optic data transmission, remote sensing, small signal detection, and OTDR.

Emitters

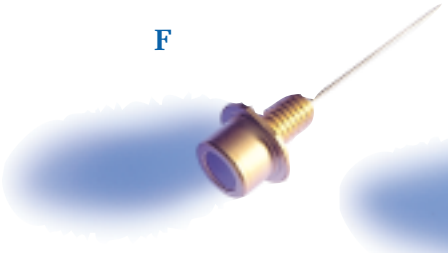
A

B



C

F



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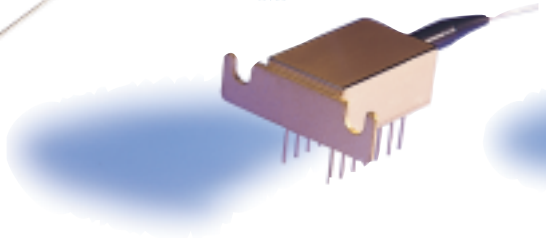

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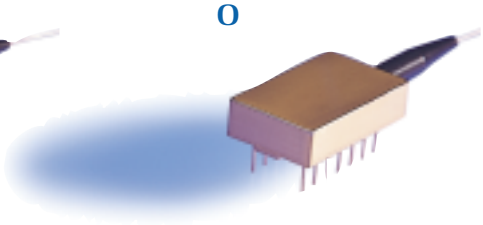
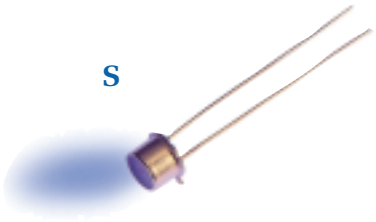


R

S

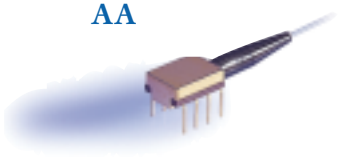


U

W

Y

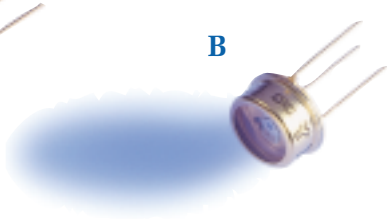
AA



Detectors

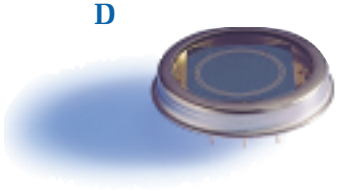
A

B

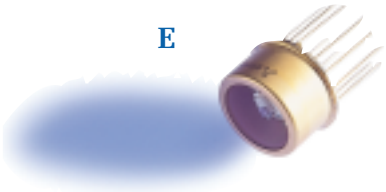


C, C1, C2

D

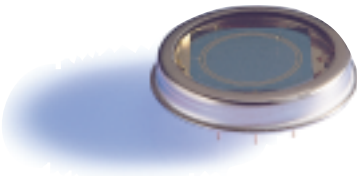


E



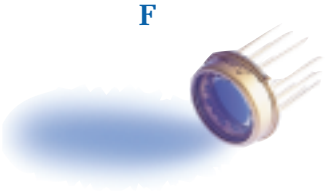
C3

G



L

F



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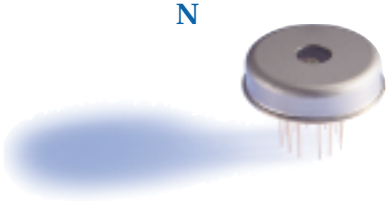
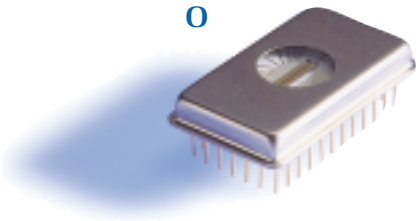
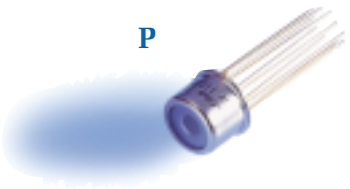


O



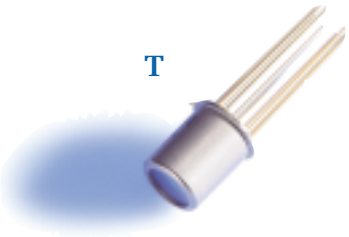
P



Q, Q1, Q2

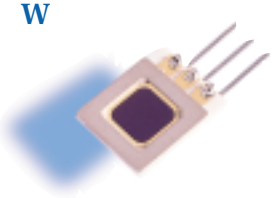
R

T



Detectors

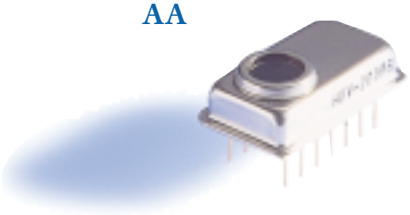
W



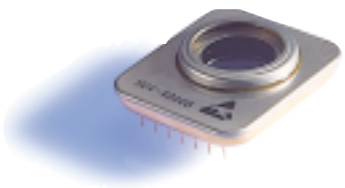
Y

Z

AA

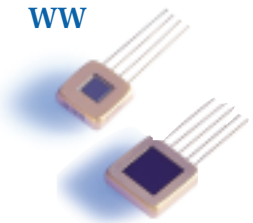


BB



CC

WW



D1

D2

D3, X3

D4, X1

D5, X2

D7

D21

X7

Detectors

Radiation Detection Avalanche Photodiodes

These are large area Si APDs in flatpack packages for either direct detection or easy coupling to scintillator crystals. The C30703 is enhanced for blue wavelength response and has a peak quantum efficiency at ~ 530 nm. The C30626 uses a standard structure and has a peak detection at about 900 nm.

Packages

These APDs are packaged in flatpacks with or without windows or on ceramics. The no-window devices can detect direct radiation of X-rays and electrons at the energies listed, and the windowed packages are best for easy scintillator coupling. Packages are designated as follows:

C30626F: flatpack w/o window (Package WW) C30626G: flatpack w/ window (Package WW)

C30703F: flatpack w/o window (Package WW) C30703G: flatpack w/ window (Package WW)

Radiation Energies Detectable

This is a general guide for the detectable radiation energies. Consult us with your specific application.

Light:	C30626: ~550 nm to 1100 nm	C30703: 400 nm to 1100 nm
X-Rays:	C30626: < 1 keV to 20 keV	C30703: < 1 keV to 20 keV
Electrons:	C30626: ~2 keV to 200 keV	C30703: ~2 keV to 200 keV
Gamma:	Need scintillator crystal.	

Si APDs – Radiation Detection

Typical Characteristics @ T = 22ºC

Part #	Photo Sens. Diam.(mm)	Resp. (A/W)	Dark Curr. Id (nA)	Spect. Noise Curr. Dens. In(pA/√Hz)	Cap.@ 100 kHz Cd (pF)	Resp. Time tr (ns)	NEP @ Peak (fW/√Hz)	VOP Range Specs. (V)
C30626	5 x 5	22(@ 900 nm)	250	0.5	30	5	23(@ 900 nm)	275 - 425
C30703	10 x 10	16(@ 530 nm)	10	0.7	120	5	40(@ 530 nm)	275 - 425

Silicon Avalanche Photodiodes - NIR-Enhanced (1.064 µm) 400 nm to 1100 nm

PerkinElmer NIR-enhanced Si APDs are high-quality photodiodes in hermetic TO packages designed for high-speed and responsivity for the 400 nm to 1100 nm wavelength region. A patented chip process produces 40% quantum efficiencies at 1.064 µm.

Preamplifiers

The C30659 series are hybrid preamplifier modules which can incorporate the C30954, -955 or -956 APD chips.

Si APDs – NIR-Enhanced (1.064 µm)

Typical Characteristics @ T = 22ºC

Part #	Standard Package	PhotoSens. Diam.(mm)	Resp.@1060nm (A/W)	Dark Curr. Id (nA)	Spect. Noise Curr. Dens. In(pA/√Hz)	Cap.@100 kHz Cd (pF)	Resp.Time tr (ns)	NEP @ 1060nm (fW/√Hz)	VOP Specs. Range (V)
C30954E	B	0.8	36	50	0.5	2	2	14	275 - 425
C30955E	B	1.5	34	100	0.5	3	2	15	275 - 425
C30956E	C3	3	25	100	0.5	10	2	20	275 - 425

Typical Applications

LIDAR, laser range finding, fluorescence detection, and fast and small signal detection.

Single Photon Counting Avalanche Photodiodes and Modules – 400 nm to 1100 nm

APDs with very low noise currents can be operated in the Geiger mode, which means the applied bias voltage is above the diode breakdown voltage, V_{BR}. In this mode, any electron event will produce a very large current flow, like a pulse.

After a photo event, a circuit will quench the diode (stop the avalanche process) by temporarily lowering the bias voltage below V_{BR}. The bias is then raised again to the original value to complete the cycle. Single photon events can be detected from minimum count rates allowed by the background count to maximum rates determined by the dead time of the quenching circuit.

Quenching

Quenching circuits can range from a simple passive quench resistive network to the active quench circuit built into the Single Photon Counting Module (SPCM-AQR series). The active quench circuit speeds up the APD discharge, allowing for a faster reset and thus a higher maximum counting rate. A very basic quenching circuit is described in the C30902 data sheet.

Modules

The SPCM is a self-contained unit which requires only 5 volts for complete operation. It outputs a TTL level pulse for each event.

The SPCM-AQ4C is a 4-channel photon counting card, detecting single photons of light over the wavelength range from 400 nm to 1060 nm. Each channel is independent from the others.

The C30902S is a stand-alone APD and is available on one-stage and two-stage TE coolers without circuitry.

Detection Efficiency and Background Count

Detection efficiency, or probability of detection [Pd], is a product of the quantum efficiency and the probability that an electron event will trigger an avalanche. The quantum efficiency is wavelength dependent, and the avalanche probability is bias voltage dependent. While a larger bias will increase the detection efficiency, it will also increase the background count rate. There is a trade-off between detection efficiency and background count rate.

The APDs used in the SPCMs are rigorously selected and achieve >70% Pd for the 180 µm APD . However, the C30902S-TC and DTC units, which are less expensive stand-alone APDs on TE coolers, are tested with a lower bias voltage and thus have a lower guaranteed Pd.

The 0.18 mm SLiK^{TM} APDs have a peak detection efficiency at 700 nm, and the 0.5 mm APDs have a peak detection efficiency at 830 nm.

SPCM Features

- +5V input only
- Two-stage TE Cooler
- Cooler control circuit
- High-voltage bias
- Active quench circuit
- TTL Output
- Gating Function

Options [consult data sheet]

SPCM-AQR-XX-FC: FC fibre receptacle
SPCM-QC-X: jacketed fibre with FC connector.

Single Photon Counting Specifications – Si APDs

Part #	Standard Package	Photo Sens. Diam.(mm)	Detect.Eff.@ Peak:[typ.]	Dark Count Rate (c/s) [r =√(DarkCnt Rt)]	Statistical Dark Count Var.(c/s)	Typ. Count Rate Before Sat.(c/s)	Dead Time (ns)[typ.]	Pulse Width (ns)[typ.into 50W]
SPCM-AQR-12	Z	0.18	70%	< 500	< 22	> 15M	50	30
SPCM-AQR-13	Z	0.18	70%	< 250	< 16	> 15M	50	30
SPCM-AQR-14	Z	0.18	70%	< 100	< 10	> 15M	50	30
SPCM-AQR-15	Z	0.18	70%	< 50	< 7	> 15M	50	30
SPCM-AQR-16*	Z	0.18	70%	<25	< 5	> 15M	50	30
SPCM-AQ4C	CC2	Fibered	60%	< 500	< 22	> 1M	50	30
C30902S	Q	0.475	> 5%	15 kc/s (typ)	122	—	—	—
C30902S-TC (0ºC oper.)	CC	0.475	> 5%	2.5 kc/s (typ)	50	—	—	—
C30902S-DTC (-20ºC oper.)	CC	0.475	> 5%	350 c/s (typ)	19	—	—	—
SPCM-AQ4C	CC2	Fibered	60%	<500	10%	>1M	50	30

*Subject to availability.

Typical Applications

Small signal fluorescence, spectroscopy, confocal microscopes, adaptive optics, LIDAR photon correlation, drug discovery and high-throughput DNA sequencing.

Detectors

Preamplifier Modules - Guidelines

Preamplifier modules are hybrid devices with a photodiode and a matching amplifier in a compact hermetic TO package. An integral amplifier allows for better ease of use and noise bandwidth performance. 14 pin, DIL, and/or fibred packaged modules are available on a custom basis.

Selecting a Preamp Module

Choose a preamp module based on the following:

- Wavelength: Determines detector type.
- Bandwidth: Determines type of amplifier. A smaller bandwidth means less integrated noise.
- Smallest detector area that can be used.
- Min. Signal Level: Determines suitability of PIN photodiode or APD and signal-to-noise ratio using a particular module. An APD module is generally used when a PIN photodiode module is not sufficient.

Noise: How to Use NEP_{RMS}

Noise Equivalent Power (NEP) is the signal level which will produce a signal-to-noise ratio (SNR) of 1. In this catalogue, it is normalized to a 1 Hz bandwidth for valid comparison of devices, as total noise is bandwidth-dependent. For a known bandwidth (BW), a good estimate of total integrated device noise is:

NEP_{RMS} = NEP (W/√Hz) x %BW Noise sources which will add to this will be signal shot and other electronics.

PerkinElmer Preamplifier Options

See the Detector Finder Guide for a list of preamplifier module options.

PerkinElmer Si APDs are reliable, high-quality detectors in hermetically-sealed TO packages designed for high-speed and responsivity for the 400 nm to 1100 nm wavelength range. A “reach-through” structure is utilized, providing very low noise performance at high gains. A full range of active areas is available.

Silicon PIN Modules - Low Bandwidth - 1 kHz to 50 kHz – 220 nm to 1100 nm

The HUV series uses a UV-enhanced PIN photodiode with a hybrid preamp in a hermetic TO package.

The HUV-1100 uses an external feedback resistor for bandwidth flexibility, while the others have an internal feedback resistor and a fixed bandwidth. The bandwidth values listed for HUV-1100 are for a 200 MΩ feedback resistor.

Windows

The HUV devices have a UV quartz window for transmission down to 185 nm.

Si PIN Modules – Low Bandwidth – 1 kHz to 50 kHz

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam.(mm)	Resp(MV/W) 250nm	Resp(MV/W) 900nm	Spec. Noise Volt Dens.Vn (µV/√Hz)	NEP @900 nm (pW/√Hz)	Bandwidth (kHz)(into 50Ω)	Bias Volt (V)
HUV-1100BQ	P	2.5	24	116	20	0.17	20	0
HUV-2000B	AA	5.4	24	116	2.5	0.02	2	0
HUV-4000B	BB	11.3	24	116	9	0.08	1.3	0

Typical Applications

UV signal detection and photometry instrumentation.

Silicon PIN and Avalanche Photodiodes PreAmplifier Modules
High Bandwidth — 40 MHz to 200 MHz – 400 nm to 1100 nm

These are hybrid preamp modules using a Si PIN photodiode and a Si APD or InGaAs hermetic TO packages.

The C30608E uses a transimpedance FET amp. The C30950E and C30919E use bipolar amps, while the C30659 uses a FET transimpedance amplifier.

Fibre-Optic Receivers

Custom connectorized packages are available upon request.

Temperature Compensation

APD breakdown voltage is temperature dependent and decreases with decreasing temperature. If the bias voltage is kept constant, APD gain will increase with decreasing temperature. The C30919E has a temperature compensation circuit which uses an internal thermistor to automatically adjust the bias voltage for constant responsivity over a wide temperature range. A temperature range of 1.06 µm versions of this is also available.

Si PIN & APD Modules – High Bandwidth

Typical Characteristics @ T = 22ºC

Part #	PIN or APD Used	Standard Package	PhotoSens. Diam.(mm)	Resp @ 900nm (kV/W)	Lin.Volt.Out. Swing(V)50Ω	Spec.NoiseVolt. Dens, Vn (nV/√Hz)	NEP @900 nm (pW/√Hz)	Bandwidth (MHz) [3 dB,into 50Ω]	Phot.Diod. BiasVolt (V)
C30608E	C30971[Si PIN]	P	0.5	32[@ 830nm]	0.7	60	1.8[@ 830nm]	50	12
C30950E	C30817[Si APD]	L	0.8	560	0.7	20	0.036	50	275 - 425
C30919E [temp.compens.]	C30817[Si APD]	N	0.8	1000	0.7	25	0.025	40	275 - 425

Si InGaAs APD Modules – High Bandwidth – 50 MHz to 200 MHz

Typical Characteristics @ T = 22ºC

Part #	APD Chip	Optimum Resp. λ	Standard Package	Photo Sens. Diam.(mm)	Resp.@ λ of APD (kV/W)	Lin.Volt.Out Swing (V) 50Ω	Spec.Noise Volt. Dens. Vn(nV/√Hz)	NEP @ λ of APD (pW/√Hz)	Bandwidth (MHz)[3 dB, into 50Ω]	Phot.Diod Bias Volt (V)
C30659-900-R5B	C30902E[Si APD]	900	L	0.5	400	0.7	15	40	200	180-260
C30659-900-R8A	C30817E[Si APD]	900	L	0.8	3000	0.7	35	12	50	275-435
C30659-1060-R8B	C30954E[Si APD]	1060	L	0.8	200	0.7	20	100	200	275-425
C30659-1060-3A	C30956E[Si APD]	1060	L	3	280	0.7	25	90	50	275-425
C30659-1550-R08B	C30645E[InGaAs APD]	1550	L	0.08	90	0.7	20	220	200	40-70
C30659-1550-R2A	C30662E[InGaAs APD]	1550	L	0.2	340	0.7	45	130	50	40-70

Typical Applications

Range finding, instrumentation and laser signal detection.

Note:

Bandwidths up to 1.2 GHz are available for both PINs and APDs on a custom device basis.

Detectors

Indium Gallium Arsenide PIN Photodiodes - Fibre-Optic & Window Packages – 900 nm to 1700 nm

These are high-quality InGaAs PIN photodiodes in hermetically sealed TO, and fibre receptacle, and ceramic packages designed for the 900 nm to 1700 nm wavelength region. Bare die form is also available in volume application on a custom basis.

InGaAs PINs – Small Area/Fibre-Optic

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam.(µm)	Resp.(A/W) 1300nm	Resp.(A/W) 1550nm	DarkCurr Id(nA)	Spect.Noise Curr.Dens. In (pA/√Hz)	Cap@100kHz Cd (pF)	Bandwidth (GHz)[into50Ω]	NEP@1550nm (pW/√Hz)	BiasVolt (V)
C30616E CER	D1 ceramic	50	0.86	0.95	0.5	<0.02	0.35	>3.5	<0.02	5
C30637E CER	D1 ceramic	75	0.86	0.95	0.8	<0.02	0.4	3.5	<0.02	5
C30617E CER	D1 ceramic	100	0.86	0.95	1.0	<0.02	0.55	3.5	<0.02	5
C30617B	D21 ball lens	100	0.80	0.90	1.0	<0.02	0.8	3.5	<0.02	5
C30617BFC ST,SC	D3,D4,D5recept.	100	0.75	0.85	1.0	<0.02	0.8	3.5	<0.02	5
C30618E CER	D1 ceramic	350	0.86	0.95	2.0	0.02	4.0	0.8	0.02	5
C30618G	D2 window	350	0.86	0.95	2.0	0.02	4.0	0.8	0.02	5
C30618G	D2 window	350	0.86	0.95	2.0	0.02	4.0	0.8	0.02	5
C30618BFC ST-SC	D3,D4,D5recept.	350	0.75	0.85	2.0	0.02	4.0	0.8	0.02	5

Typical Small Area Device Applications

Telecommunications,data transmission, instrumentation, and high-speed switching.

Typical Large Area Device Applications

Power meters, fibre-optic test and measurement, instrumentation, and eyesafe laser communications.

Indium Gallium Arsenide PIN Photodiodes Fibre-Optic & Window Packages – 900 nm Window Packages – 900 to 1700 nm

Devices with built-in TE cooler and/or amplifiers can be available on a custom basis. Detector chips on ceramic carriers and on thermoelectric cooler TO-8 are also available on a custom basis.

Large-Area InGaAs PINs

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam.(mm)	Resp.(A/W) 850 nm	Resp.(A/W) 1300 nm	Resp.(A/W) 1550 nm	DarkCurr Id(nA)	NEP@1300nm (pW/√Hz)	Cap@100kHz Cd (pF)	Bandwidth (GHz)[into50Ω]	Max Power for 0.15 dB Liniarity [dBm]	BiasVolt (V)
C30619G	Q1	0.5	0.2	0.86	0.95	5	< 0.1	8	350	>+13	5
C30641G	Q2	1.0	0.2	0.86	0.95	5	< 0.1	40	75	>+13	2
C30642G	B	2.0	0.2	0.86	0.95	10	0.1	350	20	+11	0
C30665G	B	3.0	0.2	0.86	0.95	25	0.2	1000	3.0	+11	0
C30723G	C	5.0	0.2	0.86	0.95	30	0.3	2500	2.5	+11	0

Indium Gallium Arsenide Avalanche Photodiodes - Fibre-Optic & Window Packages – 900 nm to 1700 nm

These are high-quality InGaAs avalanche photodiodes (APDs) in hermetically sealed TO and fibre-optic packages designed for the 900 to 1700 nm wavelength range. These APD's are available on a one-stage or two-stage thermoelectric coolers on a custom basis. Cooling the APD reduces the thermal noise for very small signal detection. An integral thermistor can be used for temperature monitoring and cooler control.

Preamplifiers

The C30645 and C30662E are available in hybrid amplifier packages. See section under C30659 series.

InGaAs APDs

Typical Characteristics @ T = 22ºC

Part #	Standard Package	Photo Sens. Diam.(µm)	Resp.(A/W) 1300nm	Resp.(A/W) 1550nm	DarkCurr Id(nA)	Spect.Noise Curr.Dens. In (pA/√Hz)	Cap@100kHz Cd (pF)	Bandwidth (GHz)[into50Ω]	NEP@1550nm (pW/√Hz)	BiasVolt (V)
C30733E CER	DI ceramic	30	8.4	9.4	5	<0.1	0.25	3	0.01	40 to 90
C30644E CER	D1 ceramic	50	8.4	9.4	6	0.15	0.8	2	0.03	40 to 90
C30644E	D2 window	50	8.4	9.4	6	0.15	1.0	2	0.03	40 to 90
C30645E CER	D1 ceramic	80	8.4	9.4	10	0.25	1.0	1.0	0.13	40 to 90
C30645E	D2 window	80	8.4	9.4	10	0.25	1.2	1.0	0.13	40 to 90
C30662E CER	D1 ceramic	200	8.4	9.4	200	1.4	2.5	0.2	0.15	40 to 90
C30662E	D2 window	200	8.4	9.4	200	1.4	2.5	0.2	0.15	40 to 90

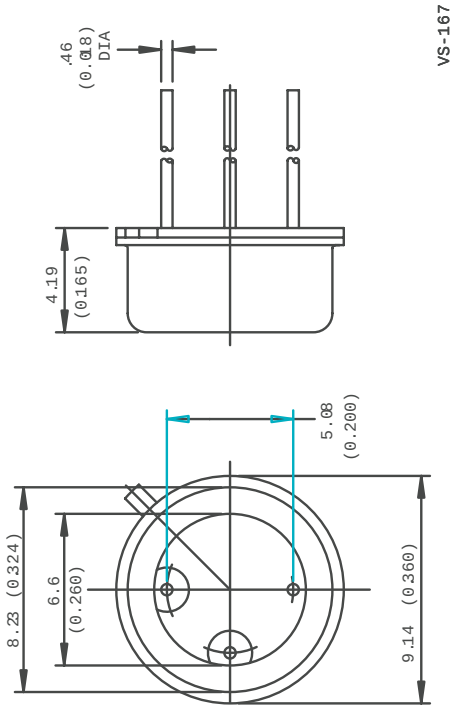
Typical Applications

Telecommunications, data transmission, eyesafe laser range finding, OTDR, fibre-optic test and measurement.

Detectors

Package drawings are for reference only.
Not reproduced to actual size. Measurements in mm/inches.

B



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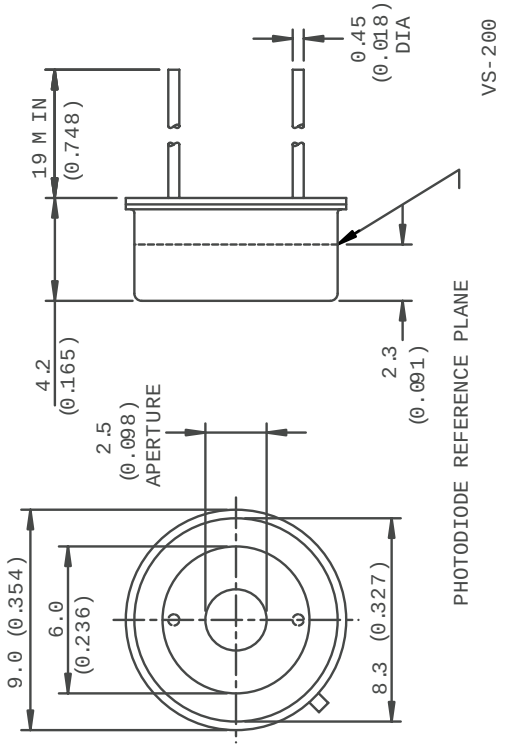

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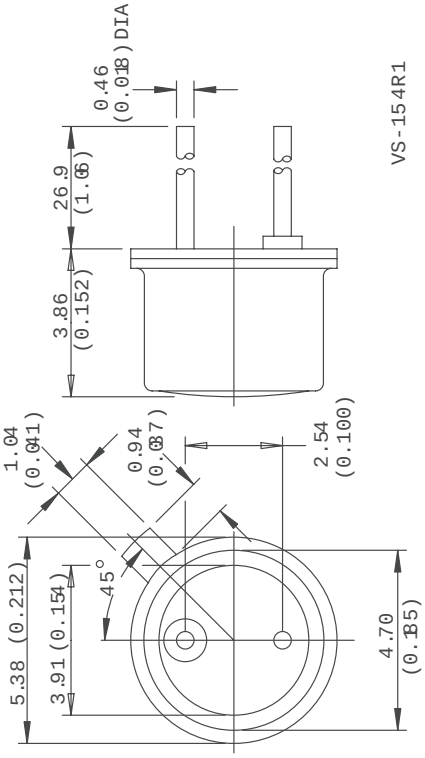

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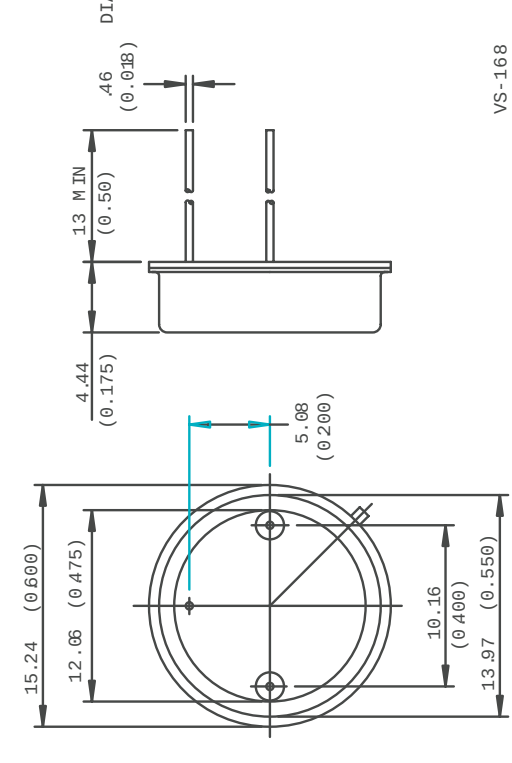

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Detectors

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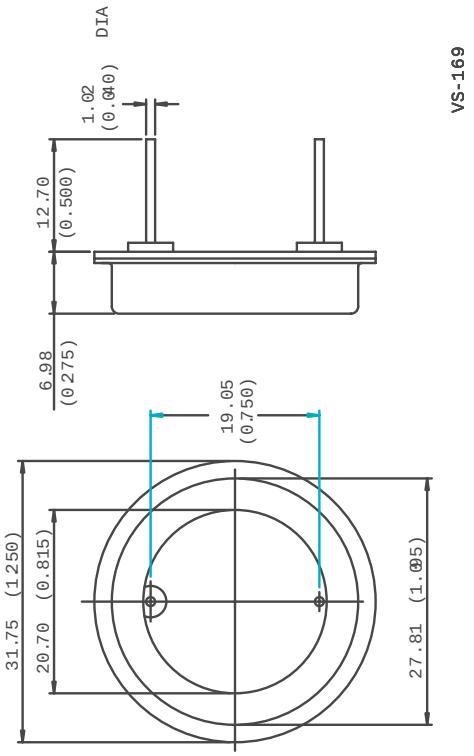

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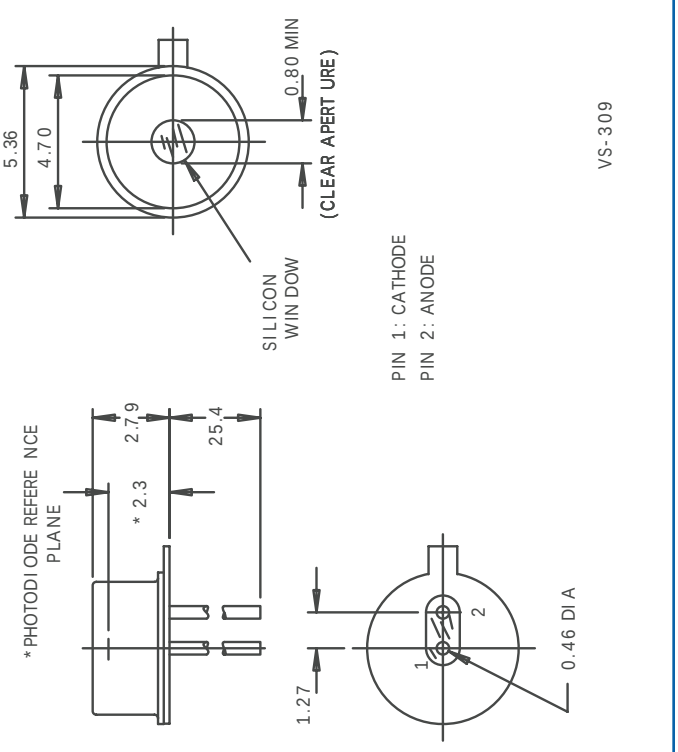

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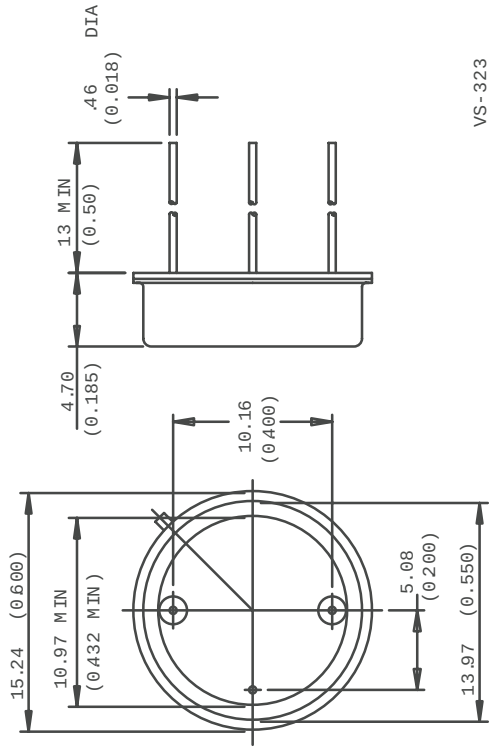

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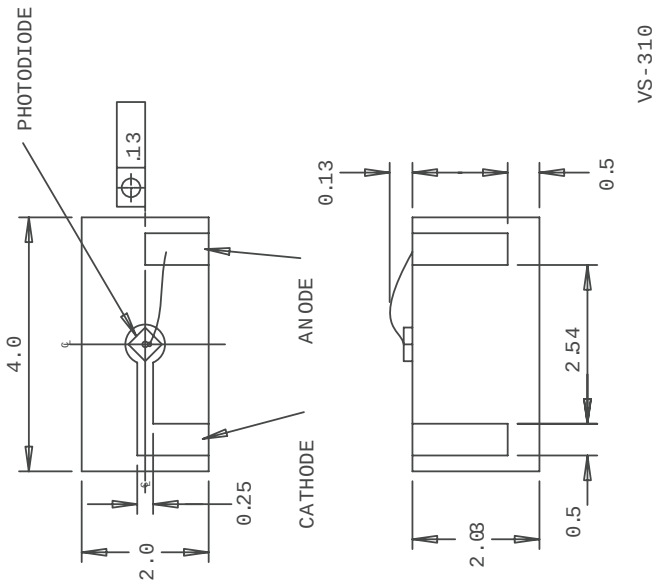

Detectors

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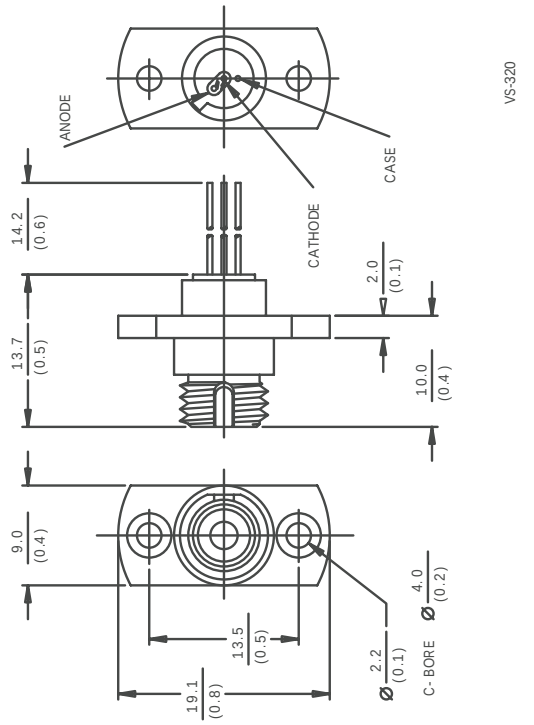

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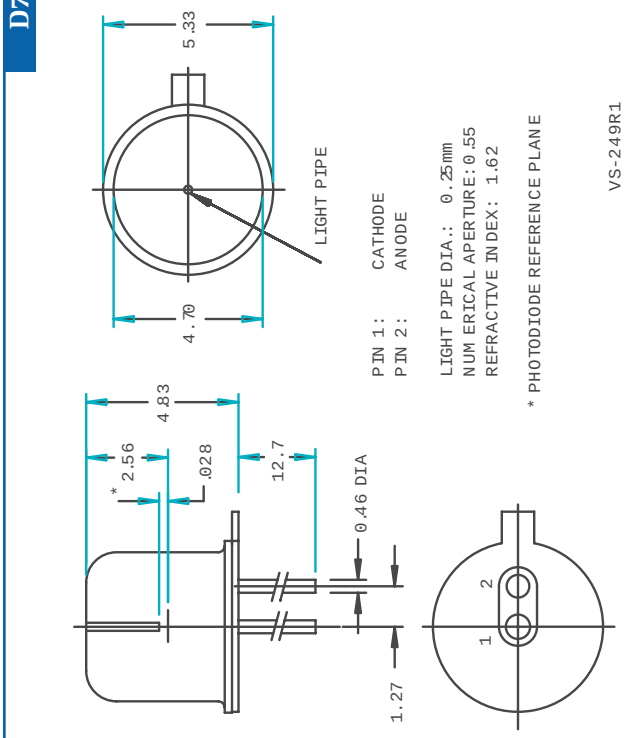

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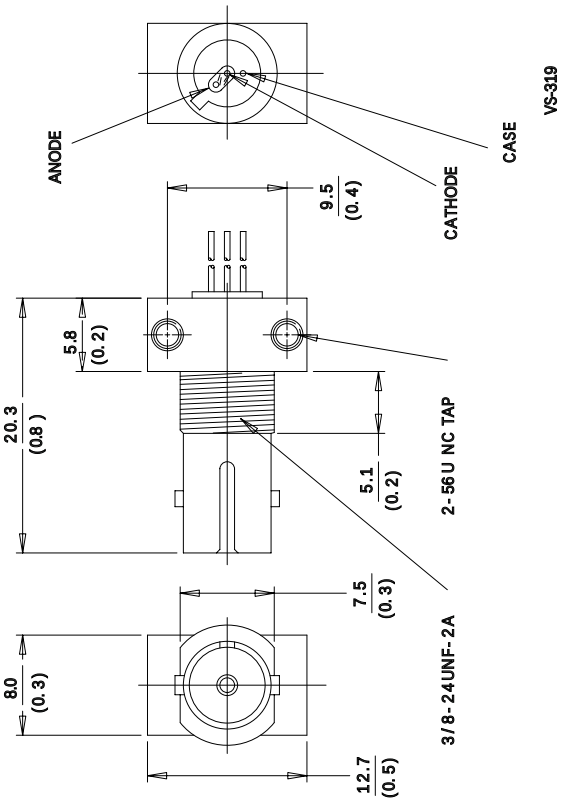

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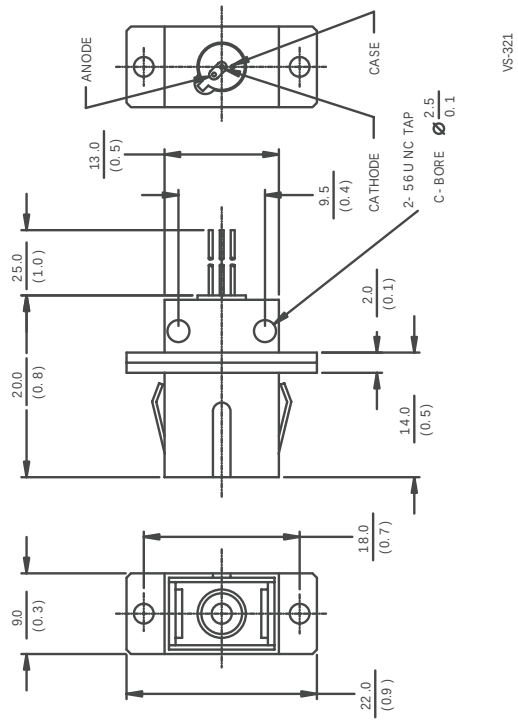

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Detectors

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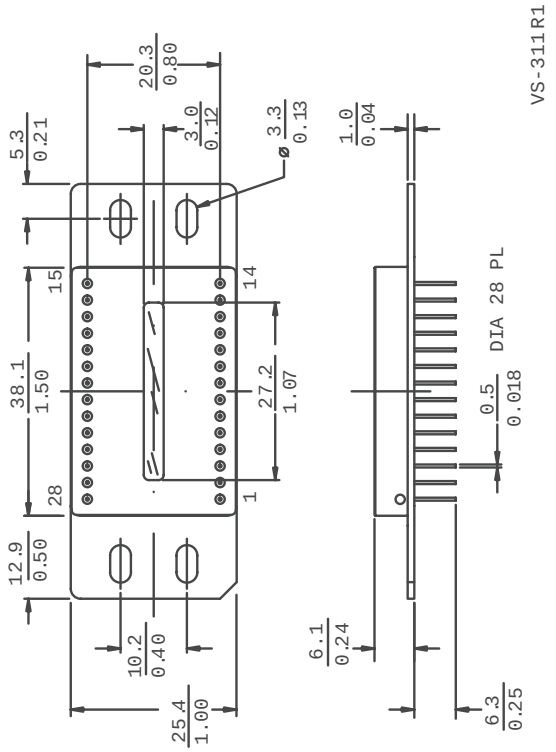

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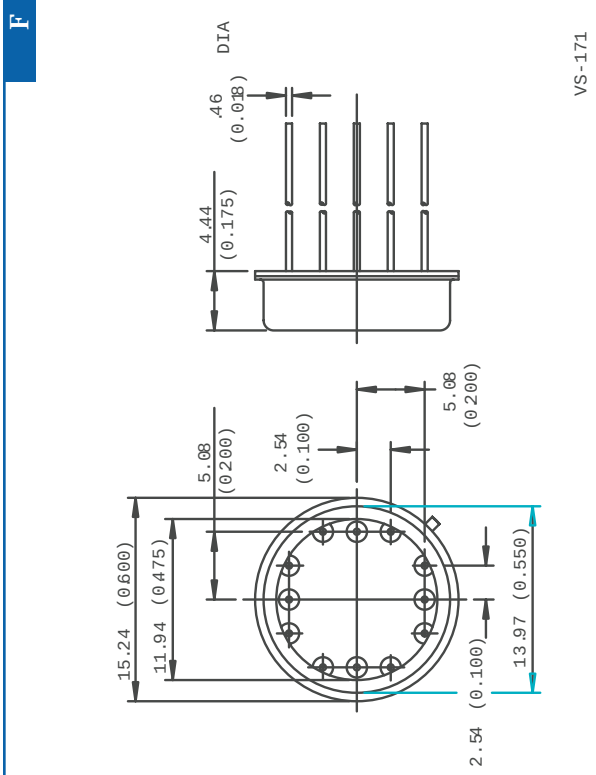

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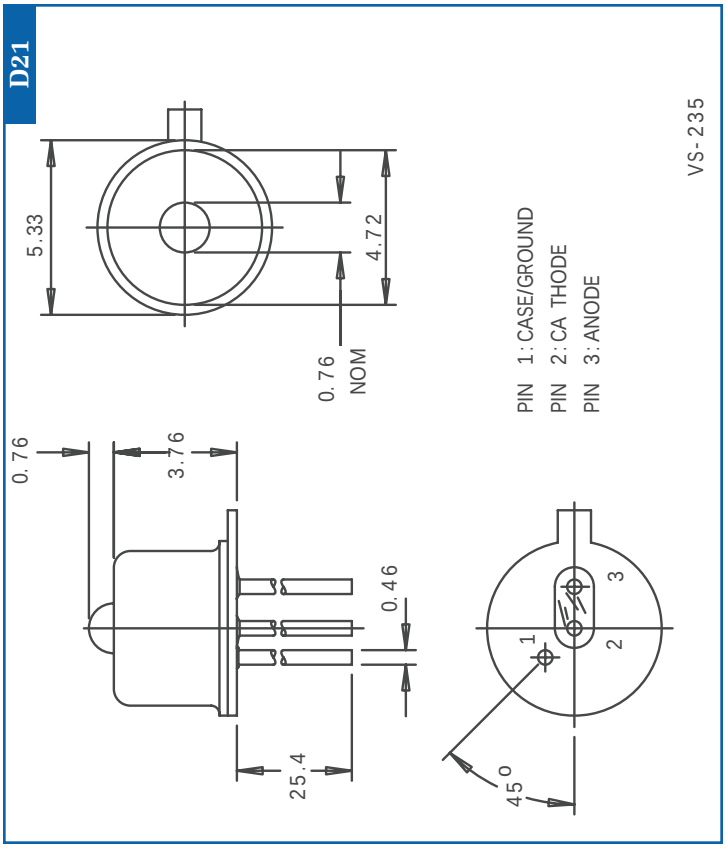

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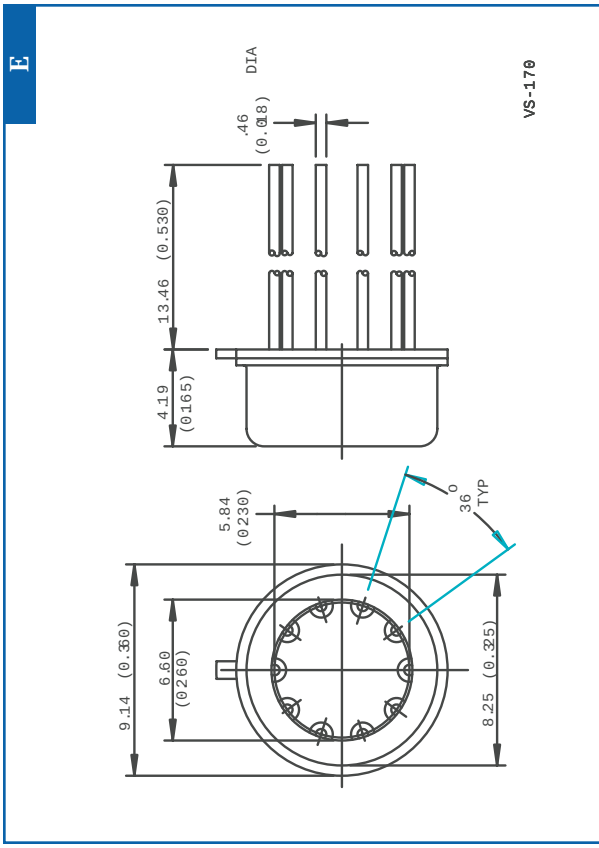

Detectors

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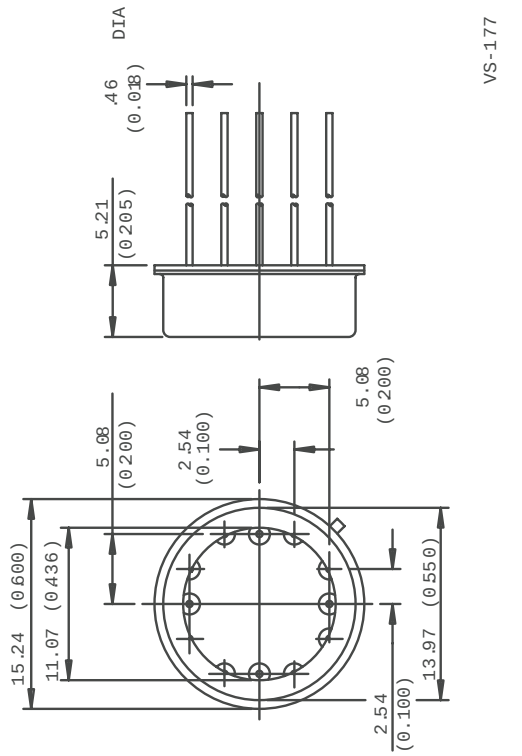

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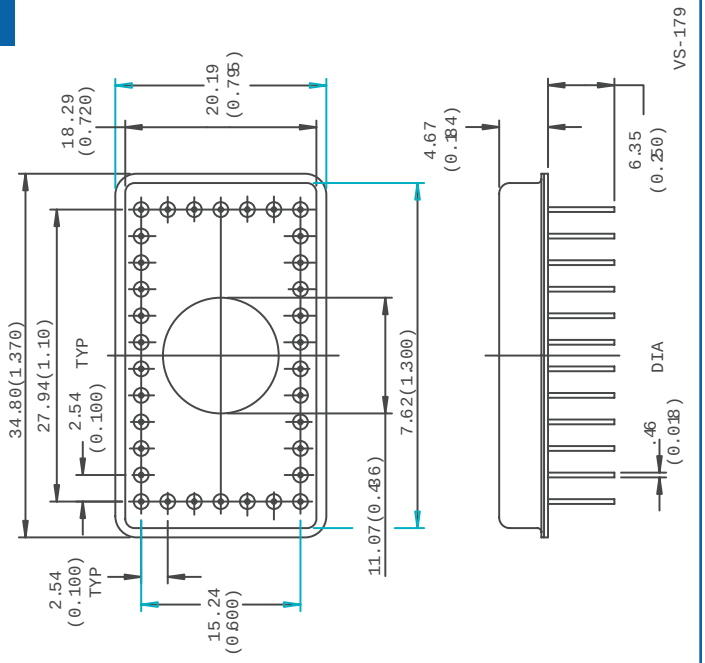

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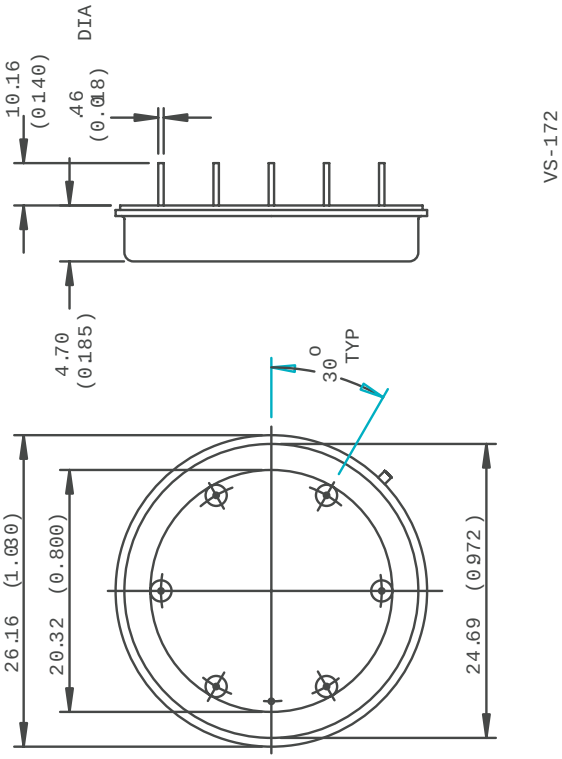

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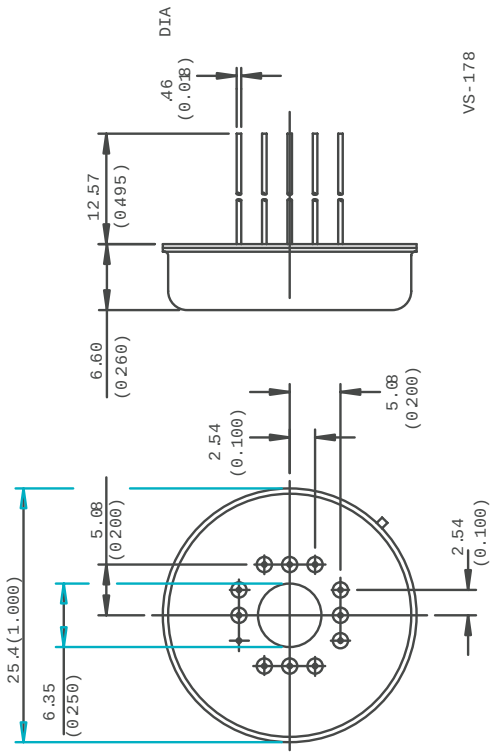

Package drawings are for reference only.
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Detectors

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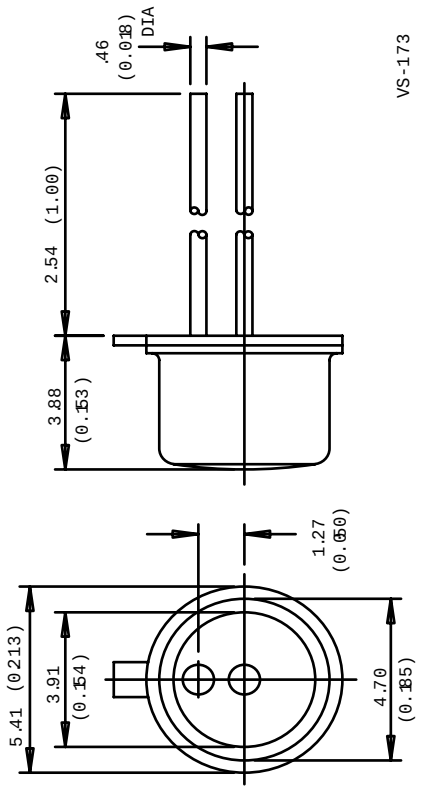

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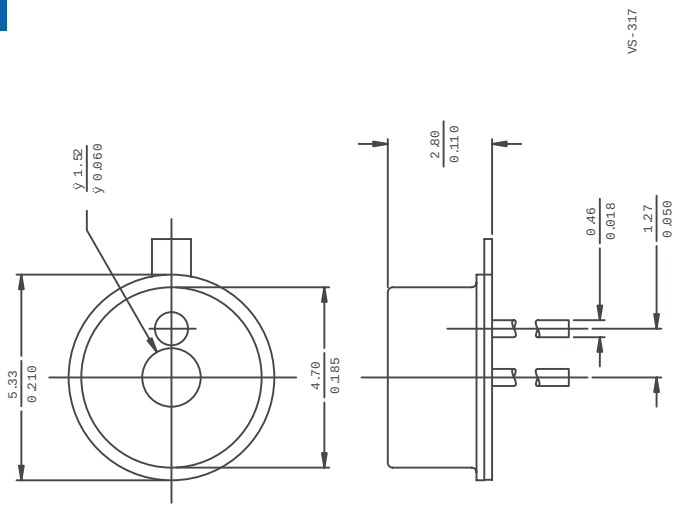

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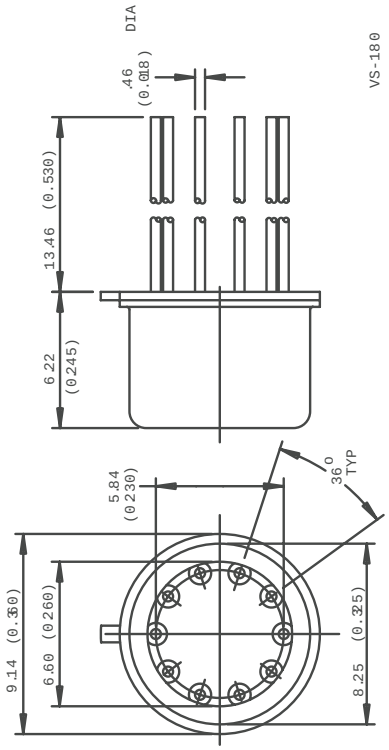

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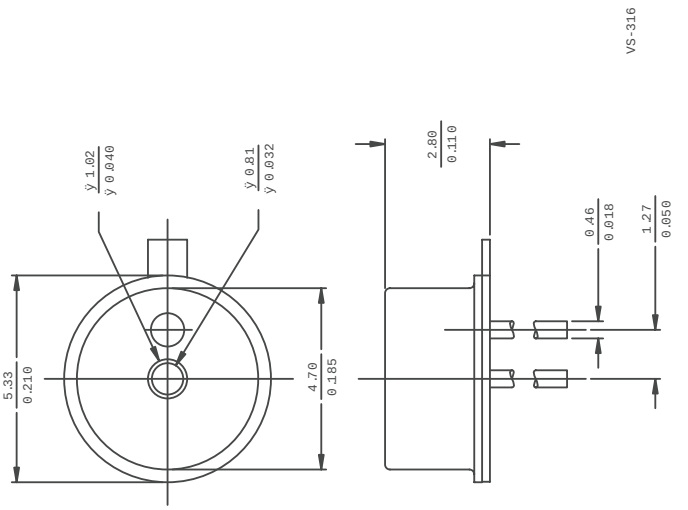

Detectors

Package drawings are for reference only.
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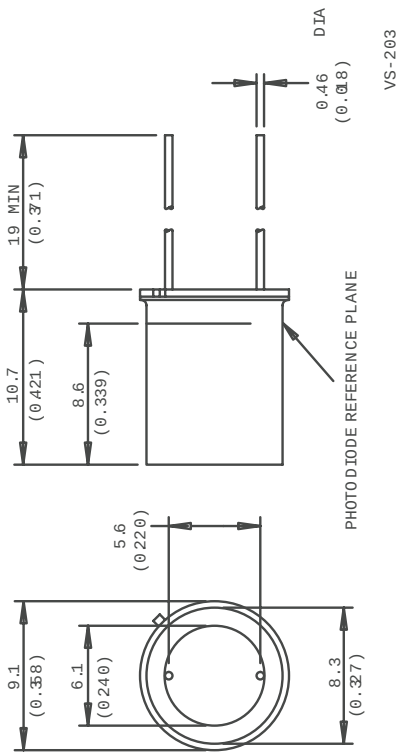

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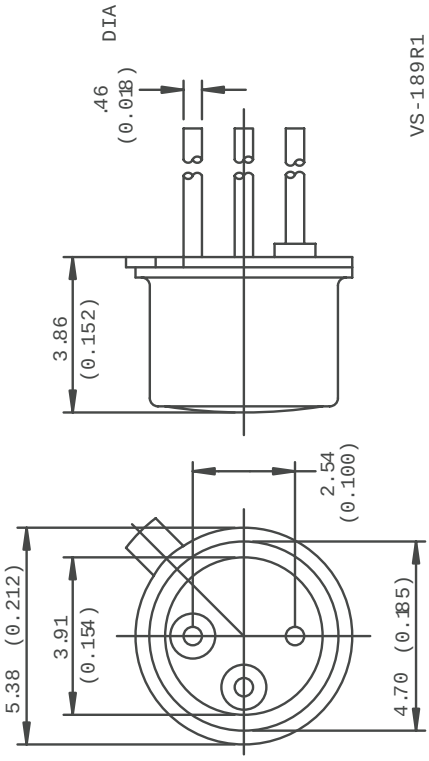

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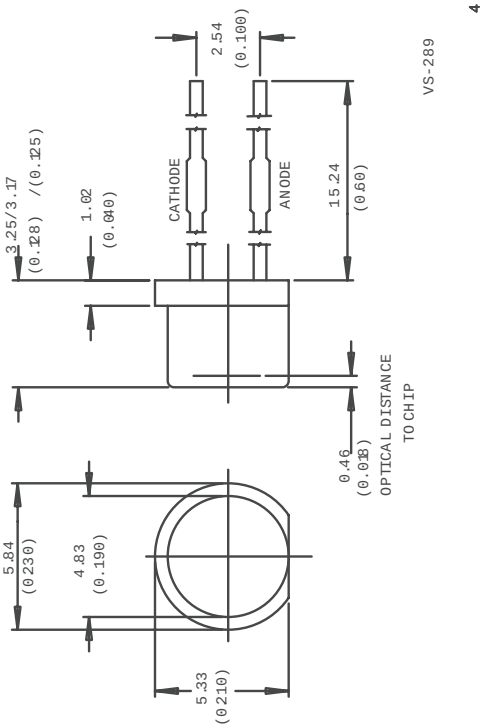

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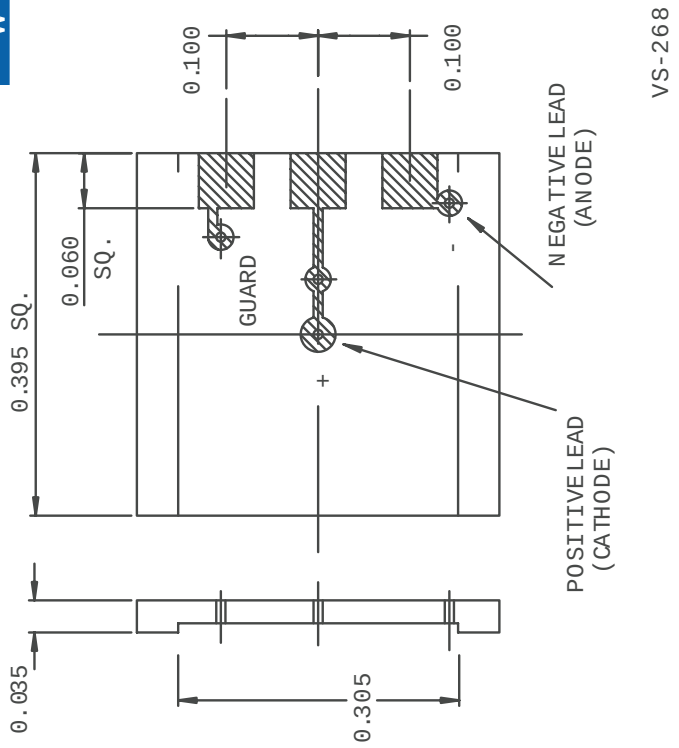

Package drawings are for reference only.
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Detectors

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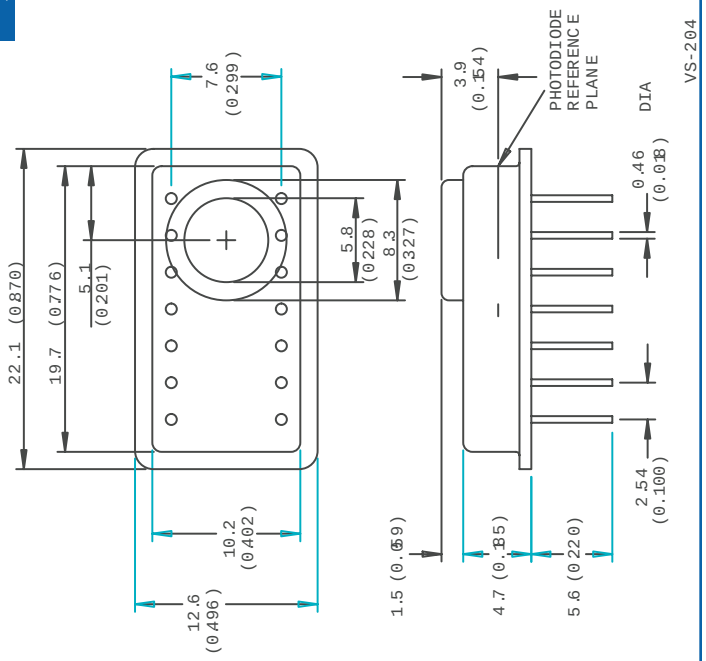

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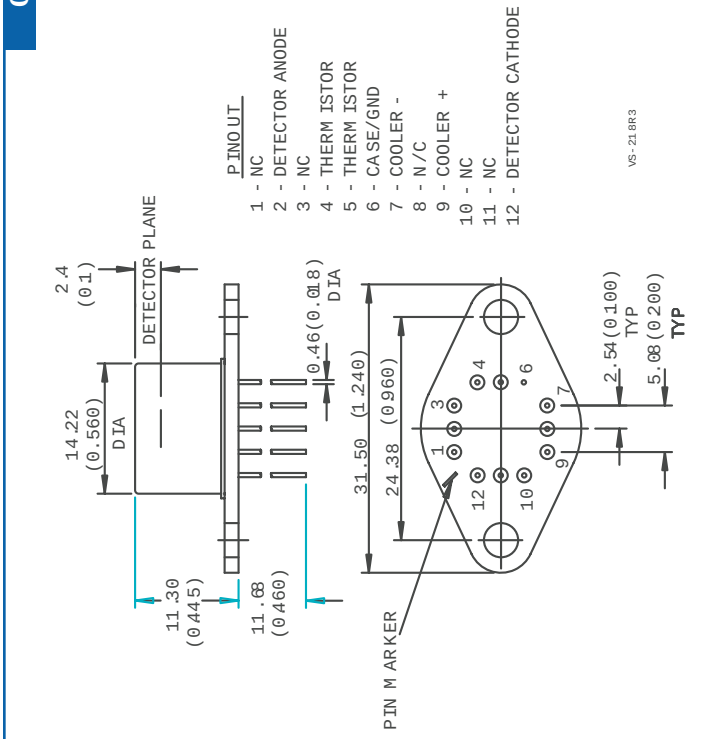

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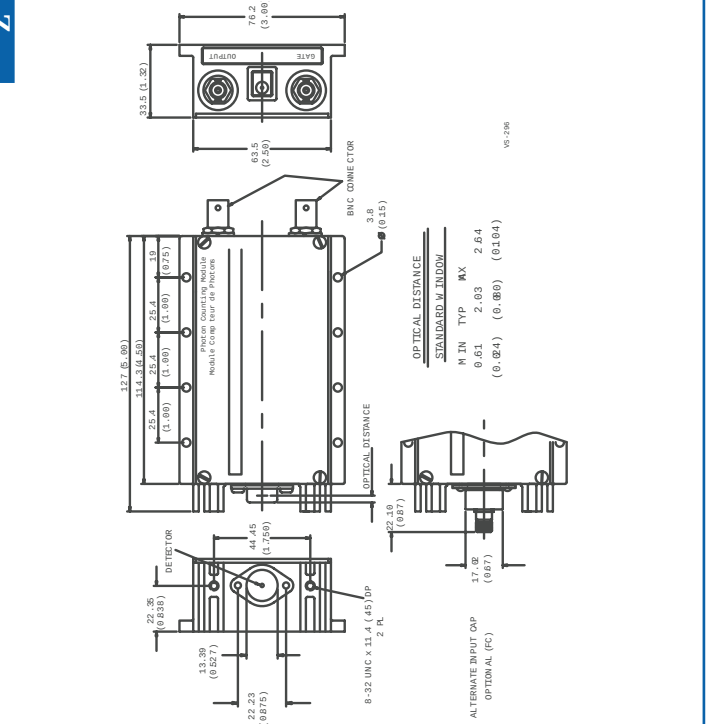

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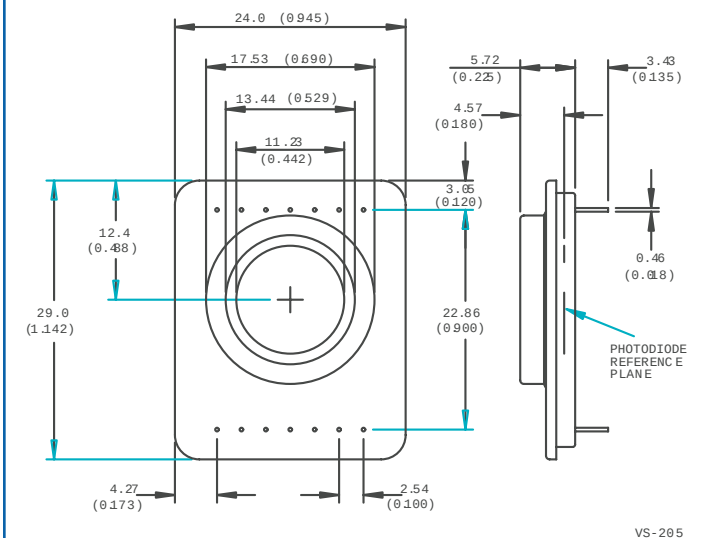

Detectors

Package drawings are for reference only.
Not reproduced to actual size. Measurements in mm/inches.

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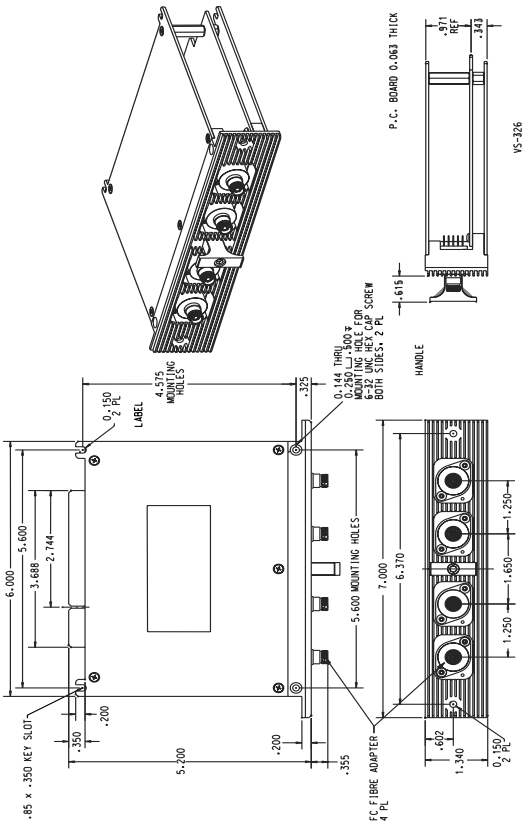

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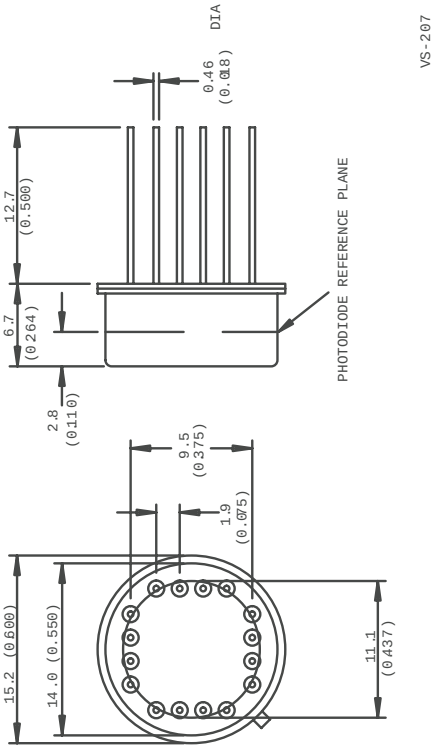

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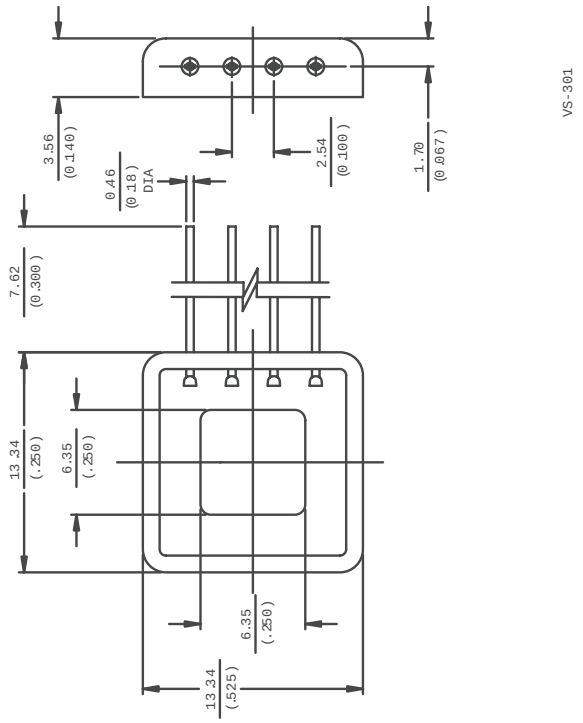


DATA

PerkinElmer Optoelectronics

PerkinElmer's excellence in R&D is reflected in our broad range of products manufactured at our state-of-the-art research and manufacturing facility using the latest growth techniques including VPE and MOCVD systems. Applications include industrial, medical, scientific instrumentation, test equipment, laser range finding, OTDR, optical target designation and tracking, weapons fire simulation, fibre-optic communications, and high-volume commercial applications.

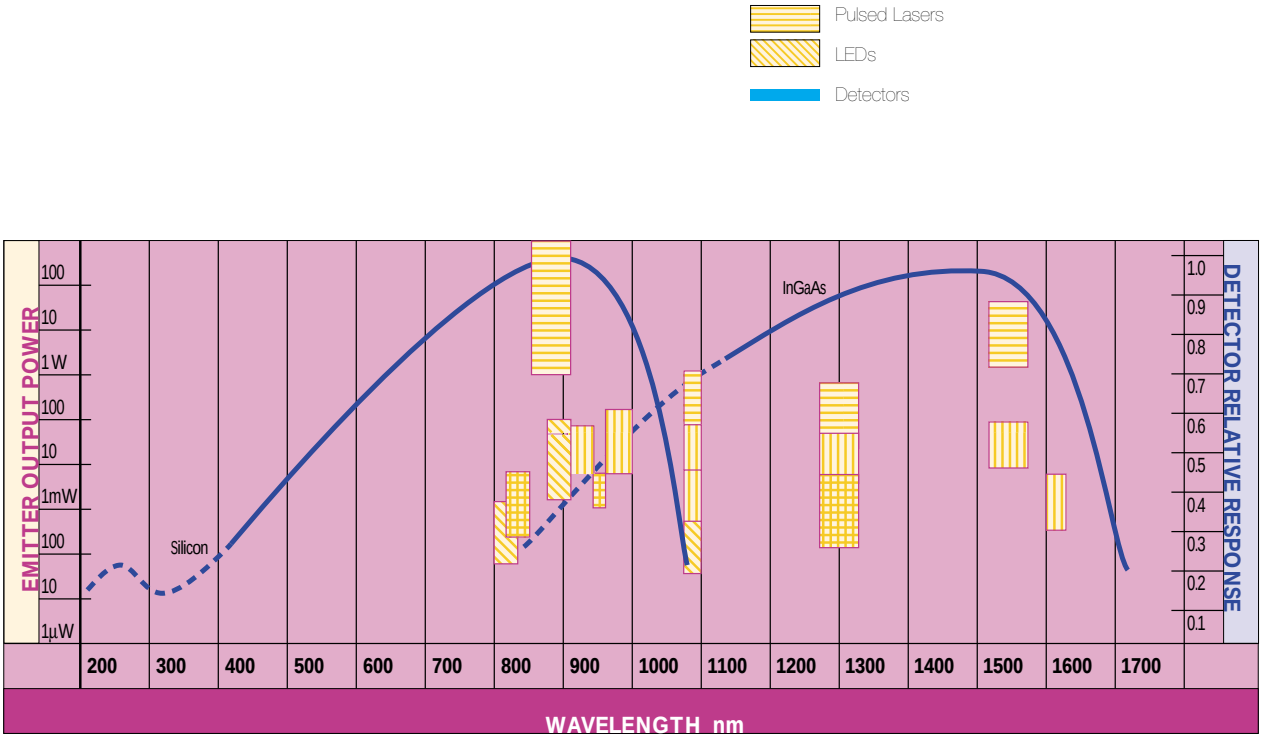
Products

Emitter products include GaAs, AlGaAs, InGaAs and InGaAsP quantum-well and MQW, strained-layer CW and pulsed injection lasers, super luminescent diodes (SLDs) and laser emitting diodes (LEDs).

Detector products include silicon and InGaAs PIN photodetectors, avalanche photodiodes, arrays, hybrid receiver modules, photon-counting modules, cooled detectors, and fibred and connectorized modules for fibre optics. The PerkinElmer standard product line is complemented by custom design and manufacturing capabilities. Contact us for details at Opto@PerkinElmer.com

Quality

PerkinElmer Optoelectronics' mission is to provide high quality products and services which exceed all customer expectations. PerkinElmer is registered to ISO-9001-94 and ISO-14001 with established Statistical Process Control (SPC) and Total Quality Management (TQM) programs to ensure that device quality and reliability are maintained. Devices can be qualified according to the requirements of AQAP-1, MIL-Q-9858A, and Telcordia GR-468-CORE (for fibre-optic products). A Quality and Reliability Assurance (Q&RA) manual is available for customer review.



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PerkinElmer optoelectronics

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