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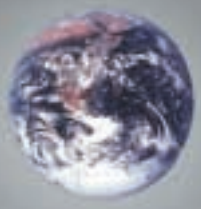


EVERYTHING

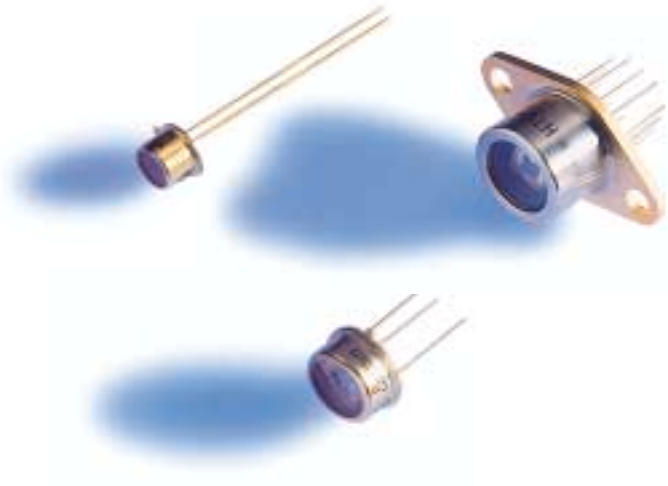
IN A

NEW

LIGHT.

# Large-Area InGaAs Photodiodes

## C30619, C30641, C30642, C30665



## Description

The PerkinElmer family of large-area InGaAs PIN photodiodes provide high responsivity from 800 nm to 1700 nm for applications including optical power meters, fiber optic test equipment, near-IR spectoscopy and instrumentation. All devices are planar passivated and feature low capacitance for extended bandwidth, and high shunt resistance for maximum sensitivity. Typical devices feature <1% non-linearity to optical powers >+13 dBm (20 mW), and uniformity within ±2% across the detector active area. Typical responsivity of 0.2 A/W at 850 nm for our large-area InGaAs devices allows use of a single detector in fiber optic test instrumentation designed to operate at 850, 1300, and 1550 nm.

Devices are available with active areas from 0.5 mm to 3.0 mm in TO-type packages or on thermoelectric coolers for increased sensitivity (see below). Photodiodes can also be mounted on customized ceramic sub-mounts to suit specific application requirements. PerkinElmer Optoelectronics Canada is qualified to ISO-9001 and operates to MIL-Q-9858A and AQAP-1 quality standards. All devices undergo extended life-test and periodic process qualification programs to assure high reliability. In addition, all production devices are sourced from a qualified wafer, screened with a 16 hour, 200°C burn-in at -10V bias (C30619 and C30641) or -5V (C30642 and C30665), and tested to meet responsivity, spectral noise, capacitance, shunt resistance and dark current specifications.

## Features

- 0.5, 1.0, 2.0, and 3.0 mm diameters
- High responsivity from 850 nm to 1550 nm
- High shunt resistance, low dark current
- TE-cooled package options
- Low capacitance for fast response times

## Applications

- Power meters
- Fiber identifiers
- Laser burn-in racks
- Near infrared instrumentation
- F.T.I.R. spectroscopy

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## Package Options

TE-Cooled Devices: Large-area detectors are available mounted on a 1-stage or 2-stage thermoelectric (TE) cooler. Cooling increases shunt resistance (see Figure 2) thereby reducing noise for increased sensitivity. Typical detector temperature is -10°C with a 1-stage TE cooler or -35°C using a 2-stage cooler. A TE-cooler option can be specified by adding the extension -TC (1-stage cooler) or -DTC (2-stage cooler) to the standard part number (see ordering guide). More information is available from the "TC-Series Cooled Photodiodes" datasheet from PerkinElmer Optoelectronics Canada.

Detector and Pre-Amplifier: Large-area InGaAs detectors are also available integrated with a preamplifier and TE-cooler. The HTE-series features large-area InGaAs detectors with a high gain hybrid transimpedence amplifier mounted on a 2-stage TE cooler. TE-cooling maximizes sensitivity and stabilizes op-amp offset and output characteristics. This provides an easy-to-use high sensitivity detector platform optimized for good temperature stability over a wide operating temperature range. More information is available from the HTE-series datasheet. The standard HTE-2642 incorporates a C30642E chip.

## Specifications (at $V_R = V_{OP}$ (typical), 22°C)

| Parameter | C30619 | | | C30641 | | | Units |
|---|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max | |
| Active Diameter | | 0.5 | | | 1.0 | | mm |
| Responsivity At 850 nm | 0.10 | 0.20 | | 0.10 | 0.20 | | A/W |
| At 1300 nm | 0.80 | 0.90 | | 0.80 | 0.90 | | A/W |
| At 1550 nm | 0.85 | 0.95 | | 0.85 | 0.95 | | A/W |
| Shunt Resistance ($V_R$ = 10 mV) [1] | 10 | 250 | | 5 | 50 | | MΩ |
| Dark Current | | 1 | 20 | | 5 | 50 | nA |
| Spectral Noise Current (10 kHz, 1.0 Hz) | | 0.02 | 0.10 | | 0.04 | 0.15 | pA/√Hz |
| Capacitance At $V_R$ = 0V | | 20 | 25 | | 100 | 125 | pF |
| At $V_R = V_{OP}$ | | 8 | 10 | | 40 | 50 | pF |
| Bandwidth (-3 dB, $R_L$ = 50Ω) | | 350 | | | 75 | | MHz |
| Linearity [2] | | > +13 | | | > +13 | | dBm |
| Available package types | | D2, D14 | | | D2, D14 | | - |

## Operating Ratings

| Parameter | C30619 | | | C30641 | | | Units |
|---|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max | |
| Operating Voltage | 0 | 5 | 10 | 0 | 2 | 5 | V |
| Breakdown Voltage | 20 | 80 | | 20 | 80 | | V |
| Maximum Forward Current | | | 10 | | | 10 | mA |
| Maximum Photocurrent | | | 100 | | | 100 | mA |
| Power Dissipation | | | 100 | | | 100 | mW |
| Storage Temperature | -60 | | 125 | -80 | | 125 | °C |
| Operating Temperature | -40 | | 85 | -40 | | 85 | °C |

Note 1. Selected higher shunt resistance devices are available to special order.

Note 2. Maximum optical power level for < ±0.04 dB (±1%) responsivity variation under 1300 nm CW illumination, at $V_R = V_{OP}$ (typ).

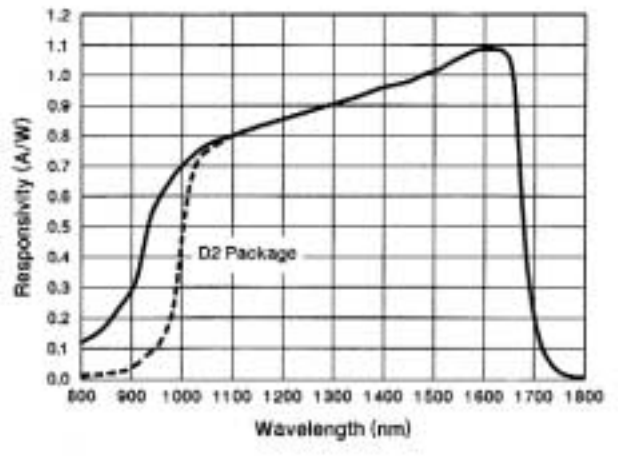


Figure 1. Typical Responsivity vs. Wavelength.

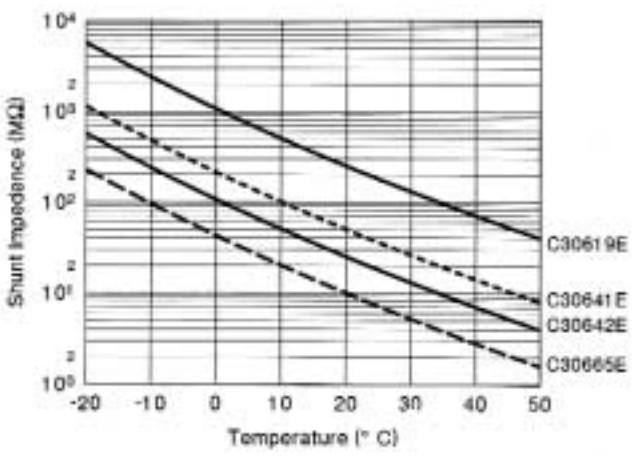


Figure 2. Typical Shunt Resistance as a Function of Temperature.

## Specifications (at $V_R = V_{OP}$ (typical), 22°C)

| Parameter | C30642 | | | C30665 | | | Units |
|---|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max | |
| Active Diameter | | 2.0 | | | 3.0 | | mm |
| Responsivity At 850 nm | 0.10 | 0.20 | | 0.10 | 0.20 | | A/W |
| At 1300 nm | 0.80 | 0.90 | | 0.80 | 0.90 | | A/W |
| At 1550 nm | 0.85 | 0.95 | | 0.85 | 0.95 | | A/W |
| Shunt Resistance ($V_R$ = 10 mV) [1] | 2 | 25 | | 1 | 10 | | MΩ |
| Dark Current | | 10[3] | | | 25[3] | | nA |
| Spectral Noise Current (10 kHz, 1.0 Hz) | | 0.03 | 0.15 | | 0.04 | 0.20 | pA/√Hz |
| Capacitance At $V_R$ = 0V | | 300 | 500 | | 1000 | 1250 | pF |
| At $V_R$ = 2.0V (typical) | | 150 | | | 400 | | pF |
| Bandwidth (-3 dB, $R_L$ = 50Ω) | | 20 | | | 3.0 | | MHz |
| Linearity [2] | | +11 | | | +11 | | dBm |
| Available package types | | D15 | | | D15 | | - |

## Operating Ratings

| Parameter | C30642 | | | C30665 | | | Units |
|---|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max | |
| Operating Voltage | | 0 | 5 | | 0 | 5 | V |
| Breakdown Voltage | 15 | 50 | | 10 | 50 | | V |
| Maximum Forward Current | | | 10 | | | 10 | mA |
| Maximum Photocurrent | | | 100 | | | 100 | mA |
| Power Dissipation | | | 250 | | | 250 | mW |
| Storage Temperature | -60 | | 125 | -80 | | 125 | °C |
| Operating Temperature | -40 | | 85 | -40 | | 85 | °C |

Note 1. Selected higher shunt resistance devices are available to special order.

Note 2. Maximum optical power level for < ±0.04 dB (±1%) responsivity variation under 1300 nm CW illumination, at $V_R = V_{OP}$ (typ).

Note 3. At $V_R$ = 2.0V

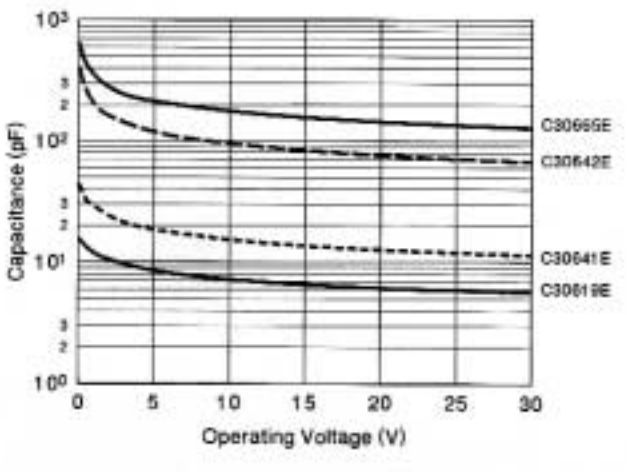


Figure 3. Typical Capacitance vs. Operating Voltage.

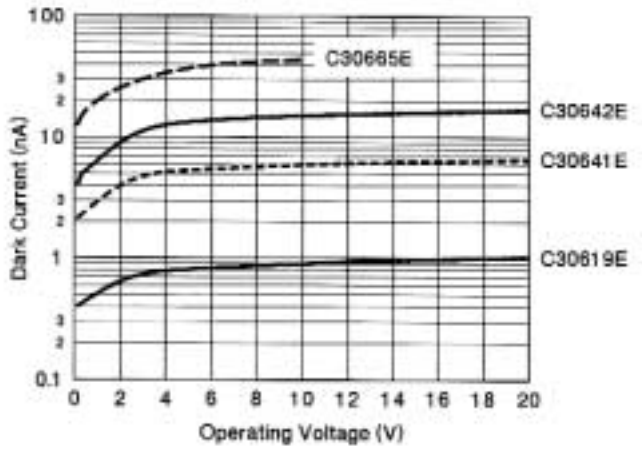


Figure 4. Typical Dark Current vs. Operating Voltage.

| Wavelength (nm) | Temperature Coefficient[1] (%/°C) | |
|---|---|---|
| 850 | -0.121 | |
| 1060 | 0.039 | |
| 1300 | 0.012 | |
| 1550 | 0.009 | |
| 1650 | 0.085 | (20°C to 85°C) |
| | 1.287 | (-40°C to 20°C) |

**Note1:** Measured from -40°C to +85°C except 1650nm, as indicated.

Figure 5. Typical Responsivity Temperature Coefficients.

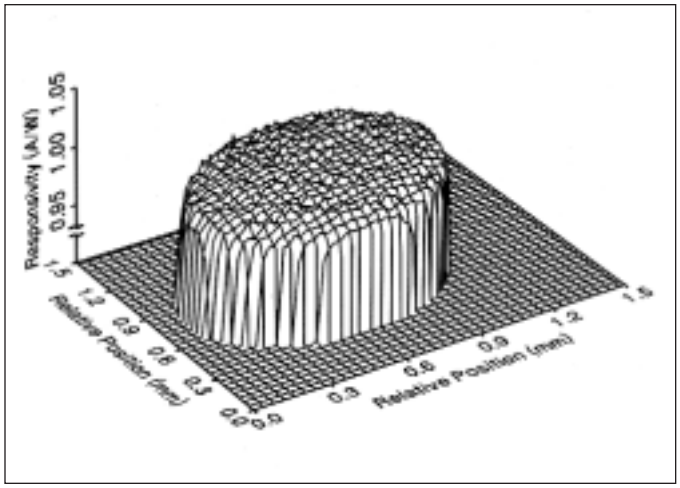


Figure 6. Typical Responsivity Scan of a 1mm Photodiode.

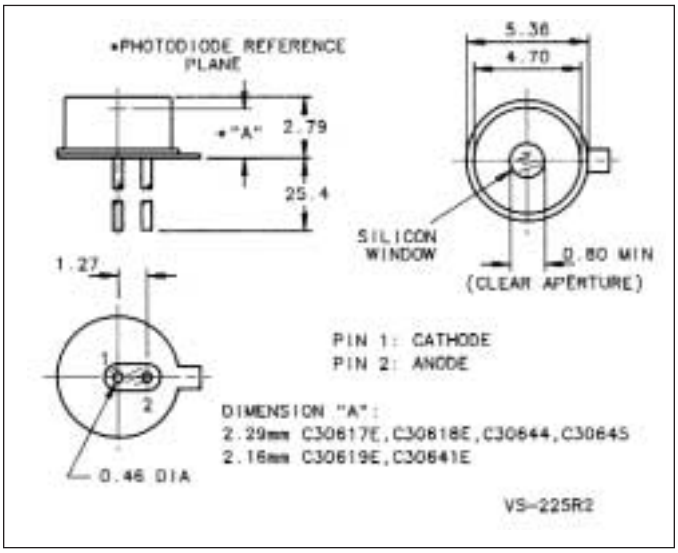


Figure 7. Package D2: TO-18 Low Profile with Silicon Window. To special order.

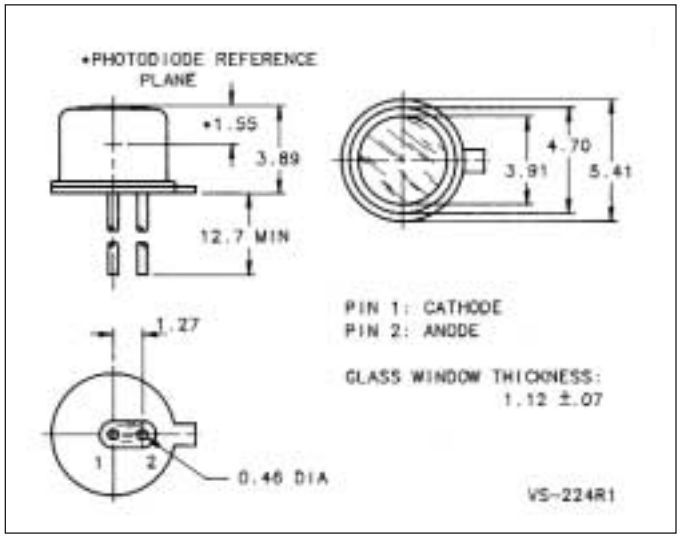


Figure 8. Package D-14: TO-18 with Glass Window.

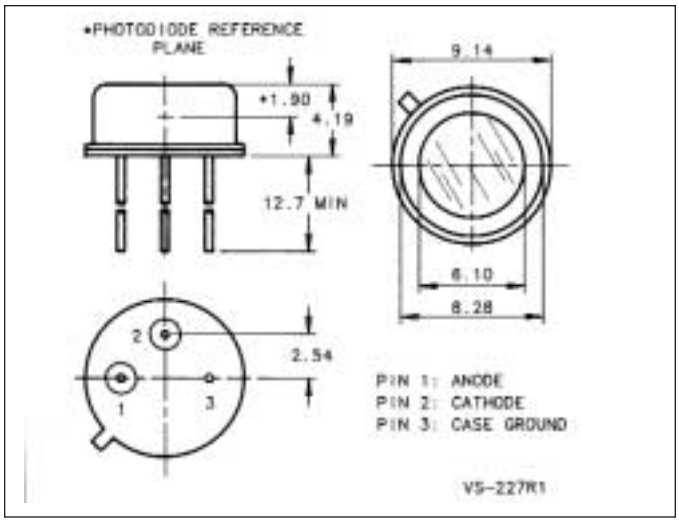


Figure 9. Package D15: TO-5 with Glass Window.

## Ordering Guide

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- TE-Cooler Option:
- Window Option:
- Chip Type:

| | |
|---|---|
| TC: | 1-stage TE cooler |
| DTC: | 2-stage TE cooler (Not yet available for C30665) |
| E: | Silicon |
| G: | Glass (See below for availability) |
| 619: | 0.5mm diameter |
| 641: | 1.0mm diameter |
| 642: | 2.0mm diameter |
| 665: | 3.0mm diameter |

## Device Package Availability

| Window Option | Window Type | Package Type C30619 | C30641 | C30642 | C30665 |
|---|---|---|---|---|---|
| E | Silicon | D2[1] | D2[1] | - | - |
| G | Glass | D14 | D14 | D15 | D15 |

Note 1: Special Order

For more information e-mail us at opto@perkinelmer.com or visit our web site at www.perkinelmer.com/opto

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All values are nominal; specifications subject to change without notice.