

C30807EH, C30808EH, C30822EH, C30809EH and C30810EH Types **N-type Silicon PIN Photodetectors**



Overview

The family of N-type silicon PIN photodiodes is designed for use in a wide variety of broad band low light level applications covering the spectral range from below 400 to over 1100 nanometers.

The wide range of photosensitive areas making up this series provides a broad choice in photosensitive areas and in time response characteristics. All the photodiodes are hermetically sealed in TO packages, and is anti-reflection coated to enhance responsivity at 900nm.

These characteristics make the devices highly useful in HeNe and GaAs laser detection systems and in optical demodulation, data transmission, ranging, and high-speed switching applications.

Recognizing that different applications have different performance requirements, Excelitas offers a wide range of customizations of these photodiodes to meet your design challenges. Responsivity and noise screening, custom device testing and packaging are among many of the application specific solutions available.

Key Features

- High responsivity
- Fast response time
- Low operating voltage
- Low capacitance
- Hermetically sealed packages
- RoHS Compliant

Applications

- Laser detection systems
- Photometry
- Data transmission
- Instrumentation
- High speed switching

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Table 1 – Mechanical and Optical Characteristics

| Parameter | Symbol | C30807EH | C30808EH | C30822EH | C30809EH | C30810EH | Unit |
|--|--------|----------|----------|----------|----------|----------|-----------------|
| Shape | | Circular | Circular | Circular | Circular | Circular | |
| Package | | TO-18 | TO-5 | TO-8 | TO-8 | TO-36 | |
| Photosensitive Surface: | | | | | | | |
| Useful area | A | 0.8 | 5 | 20 | 50 | 100 | mm ² |
| Useful diameter | d | 1 | 2.5 | 5 | 8 | 11 | mm |
| Field of View: | | | | | | | |
| Nominal field of view α (see Figure 5) | FoV | 60 | 85 | 94 | 56 | 77 | Degrees |
| Nominal field of view α' (see Figure 5) | | 88 | 129 | 142 | 147 | 138 | |

Table 2 – Electro-Optical Characteristics

Case Temperature $T_a = 22\text{ }^\circ\text{C}$; at the DC reverse operating voltage $V=45\text{V}$, V_{op}

| Parameter | Symbol | C30807EH | | | C30808EH | | | C30822EH | | | Unit |
|--|----------|------------|-------------|------------|------------|--------------|------------|------------|--------------|------------|------------------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| Breakdown Voltage | V_{br} | 100 | | | 100 | | | 100 | | | V |
| Operating Voltage | V_{op} | | 45 | | | 45 | | | 45 | | V |
| Responsivity at 900 nm at 1060 nm | R | 0.5 0.1 | 0.6 0.15 | | 0.5 0.1 | 0.6 0.20 | | 0.5 0.1 | 0.6 0.20 | | A/W |
| Quantum Efficiency at 900 nm at 1060 nm | Q.E. | 70 12 | 83 17 | | 70 12 | 83 23 | | 70 12 | 83 23 | | % |
| Total Dark Current at $V_{op} = 10\text{V}$ at $V_{op} = 45\text{V}$ | I_d | | 2 10 | 1 50 | | 5 30 | 25 150 | | 10 50 | 50 250 | nA |
| Noise Current <small>$f=10\text{kHz}$, $\Delta f=1.0\text{Hz}$</small> | i_n | | 0.06 | 0.42 | | 0.1 | 0.7 | | 0.13 | 0.9 | pA/ $\sqrt{\text{Hz}}$ |
| Capacitance | C_d | | 2.5 | 3 | | 5 | 10 | | 12 | 20 | pF |
| Noise Equivalent Power at 900 nm at 1060 nm <small>$f = 100\text{kHz}$, $\Delta f = 1.0\text{Hz}$</small> | NEP | | 0.1 0.4 | 0.7 2.8 | | 0.17 0.50 | 1.2 3.5 | | 0.22 0.65 | 1.5 4.5 | pW/ $\sqrt{\text{Hz}}$ |
| Rise/Fall Time, $R_L = 50\Omega$, 900nm: | | | | | | | | | | | |
| 10% to 90% points | t_r | | 3 | 5 | | 12 | 20 | | 12 | 20 | ns |
| 90% to 10% points | t_f | | 6 | 10 | | 13 | 20 | | 13 | 20 | |

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Table 2 (continued) – Electro-Optical Characteristics

 Case Temperature $T_a = 22\text{ }^\circ\text{C}$; at the DC reverse operating voltage $V=45\text{V}$, V_{op}

| Parameter | Symbol | C30809EH | | | C30810EH | | | Unit |
|--|----------------|------------|-------------|------------|------------|-------------|-------------|--------|
| | | Min | Typ | Max | Min | Typ | Max | |
| Breakdown Voltage | V_{br} | 100 | | | 100 | | | V |
| Operating Voltage | V_{op} | | 45 | | | 45 | | V |
| Responsivity at 900 nm at 1060 nm | R | 0.5 0.1 | 0.6 0.20 | | 0.5 0.1 | 0.6 0.20 | | A/W |
| Quantum Efficiency at 900 nm at 1060 nm | Q.E. | 70 12 | 83 23 | | 70 12 | 83 23 | | % |
| Total Dark Current at $V_{op} = 10\text{V}$ at $V_{op} = 45\text{V}$ | I_d | | 25 70 | 130 350 | | 83 300 | 400 1500 | nA |
| Noise Current <small>$f=10\text{kHz}$, $\Delta f=1.0\text{Hz}$</small> | i_n | | 0.15 | 1.1 | | 0.3 | 2.1 | pA/√Hz |
| Capacitance | C_d | | 25 | 45 | | 45 | 90 | pF |
| Noise Equivalent Power at 900 nm at 1060 nm <small>$f = 100\text{kHz}$, $\Delta f = 1.0\text{Hz}$</small> | NEP | | 0.2 0.75 | 1.6 5.5 | | 0.45 1.5 | 3.6 11 | pW/√Hz |
| Rise/Fall Time, $R_L = 50\Omega$: 10% to 90% points 90% to 10% points | t_r t_f | | 12 13 | 20 20 | | 15 20 | 25 30 | ns |

Table 3–Absolute – Maximum Ratings, Limiting Values

| Parameter | Symbol | Minimum | Maximum | Unit | Remarks/Conditions |
|---|-----------|---------|----------|--------------------|--|
| Reverse Bias Voltage | | | 100 | V | |
| Photocurrent Density : average value peak value | J_p | | 5 20 | mA/mm ² | Continuous operation, at $T_a = 22\text{ }^\circ\text{C}$ |
| Forward Current: average value peak value | I_F | | 10 20 | mA | Continuous operation, at $T_a = 22\text{ }^\circ\text{C}$ (For 1 second duration, non-repetitive) |
| Storage Temperature | T_{stg} | -60 | 100 | $^\circ\text{C}$ | |
| Operating Temperature | T_o | -40 | 80 | $^\circ\text{C}$ | |
| Soldering | | | 200 | $^\circ\text{C}$ | 5 seconds, leads only |

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Figure 1 – Typical Spectral Responsivity Characteristics

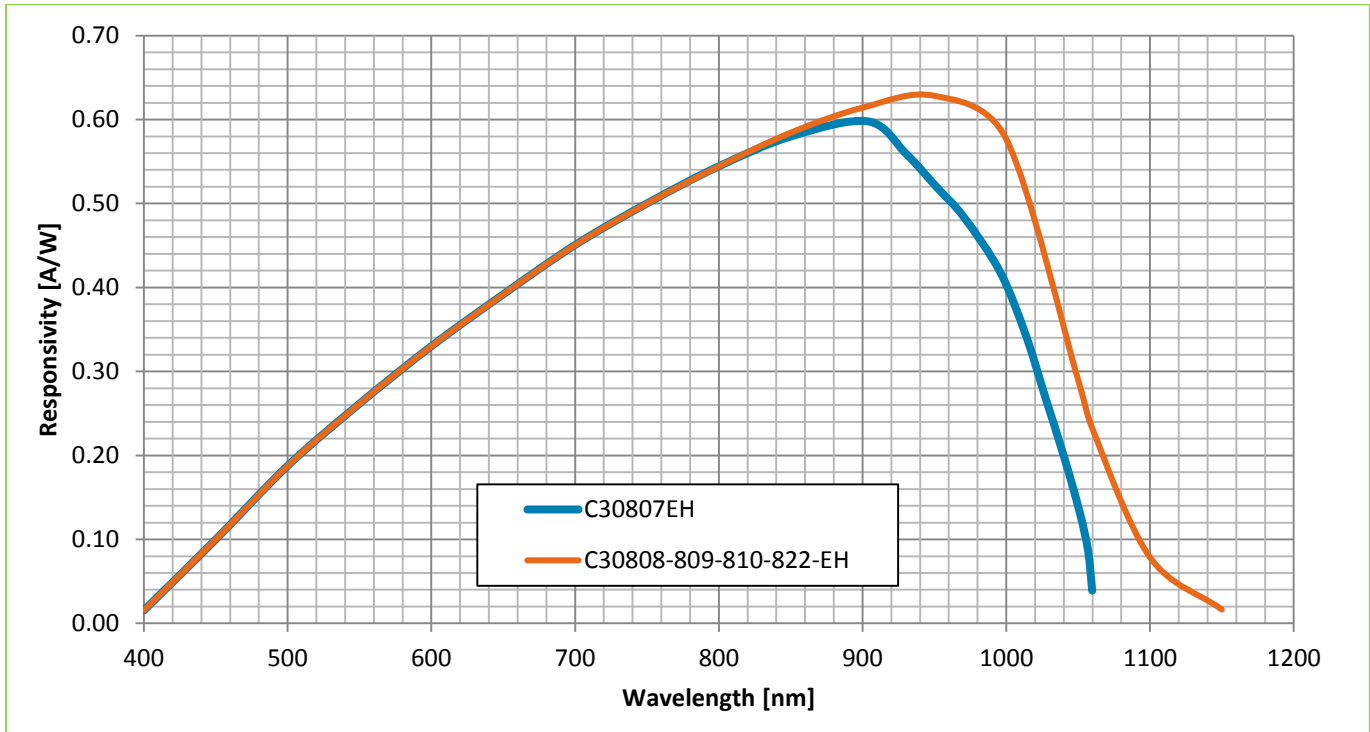
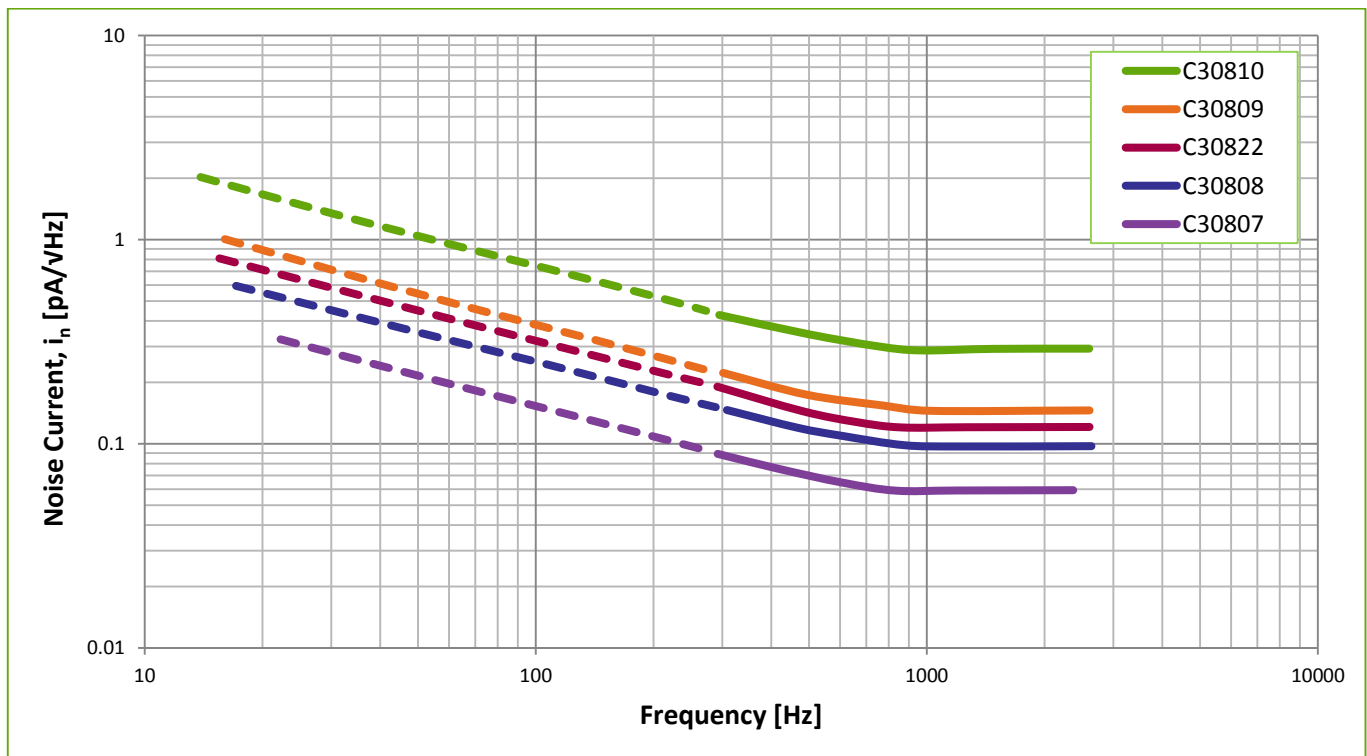
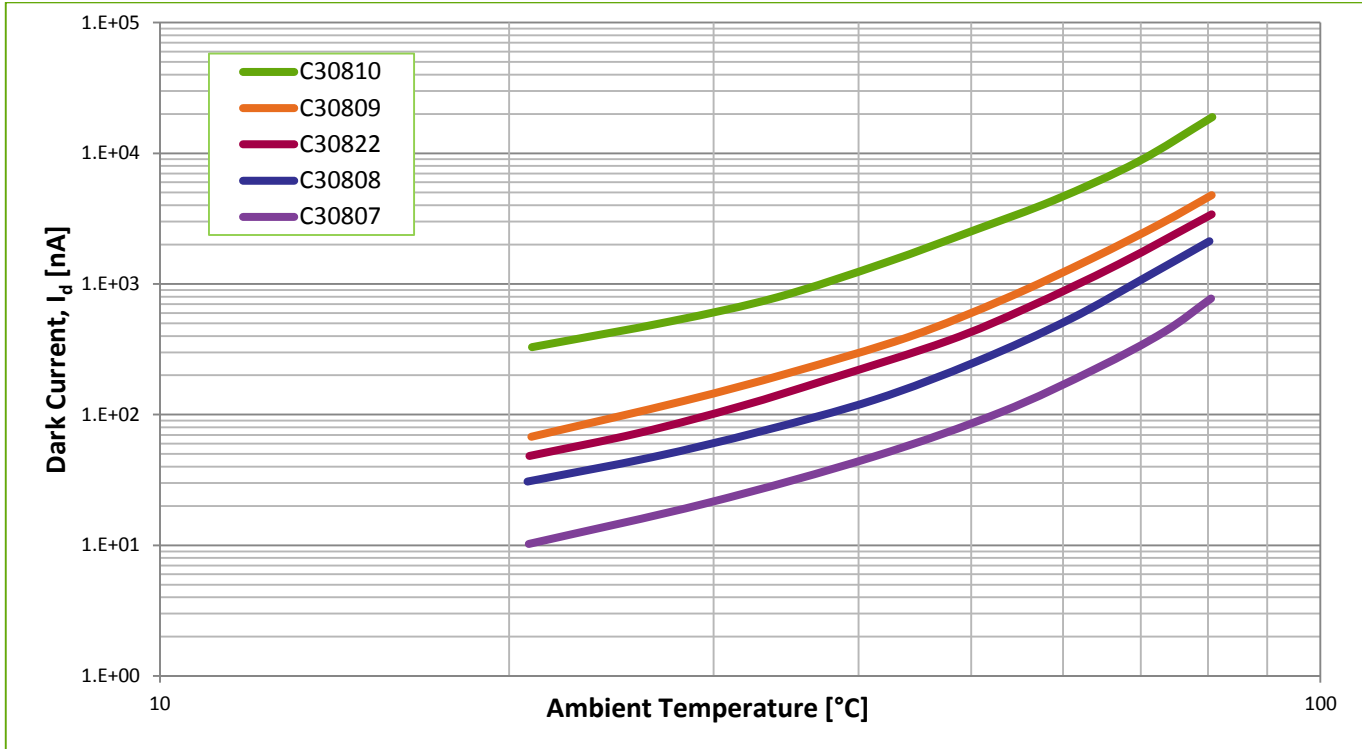


Figure 2 – Typical Noise Current as a function of Frequency, $T_a=22^\circ\text{C}$, $V_{op}=45\text{V}$



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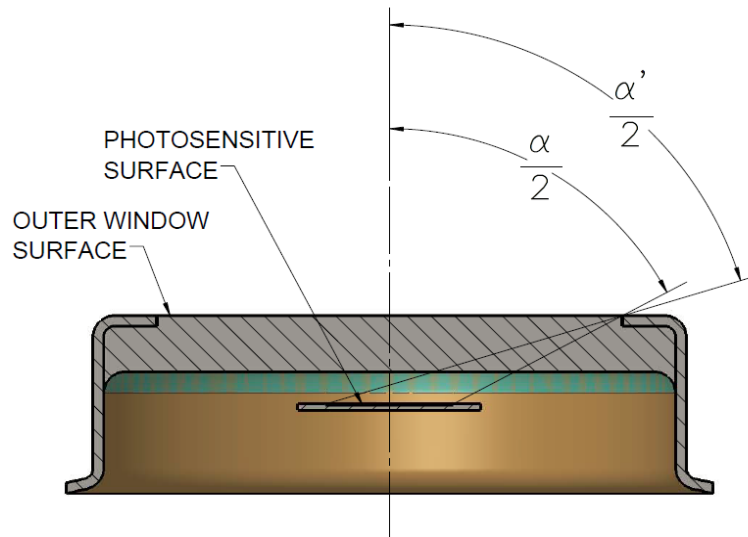
Figure 3 – Typical Dark Current as a function of Ambient Temperature, $V_{op} = 45V$



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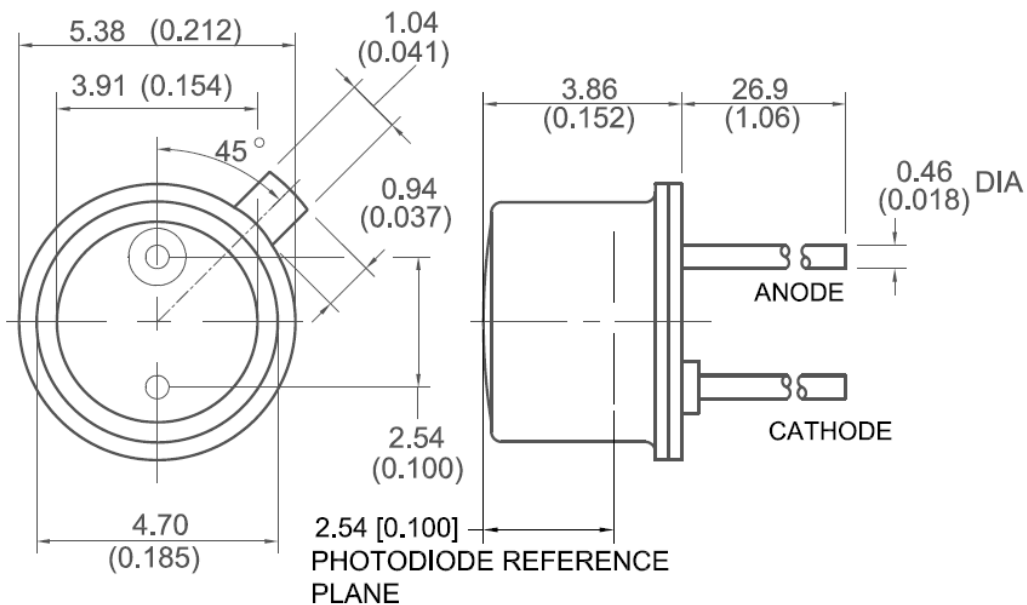
Figure 4 – Approximate Field of View

For incident radiation at angles $\leq \alpha/2$, the photosensitive surface is totally illuminated.
 For incident radiation at angles $> \alpha/2$, but $\leq \alpha'/2$, the photosensitive surface is partially illuminated



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Figure 5 – Package Dimension of C30807EH, mm (inches), for reference only.



DIMENSIONS ARE mm (inches)
 AND ARE FOR REFERENCE ONLY
 VS-154R2

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Figure 6 – Package Dimension of C30808EH, mm (inches), for reference

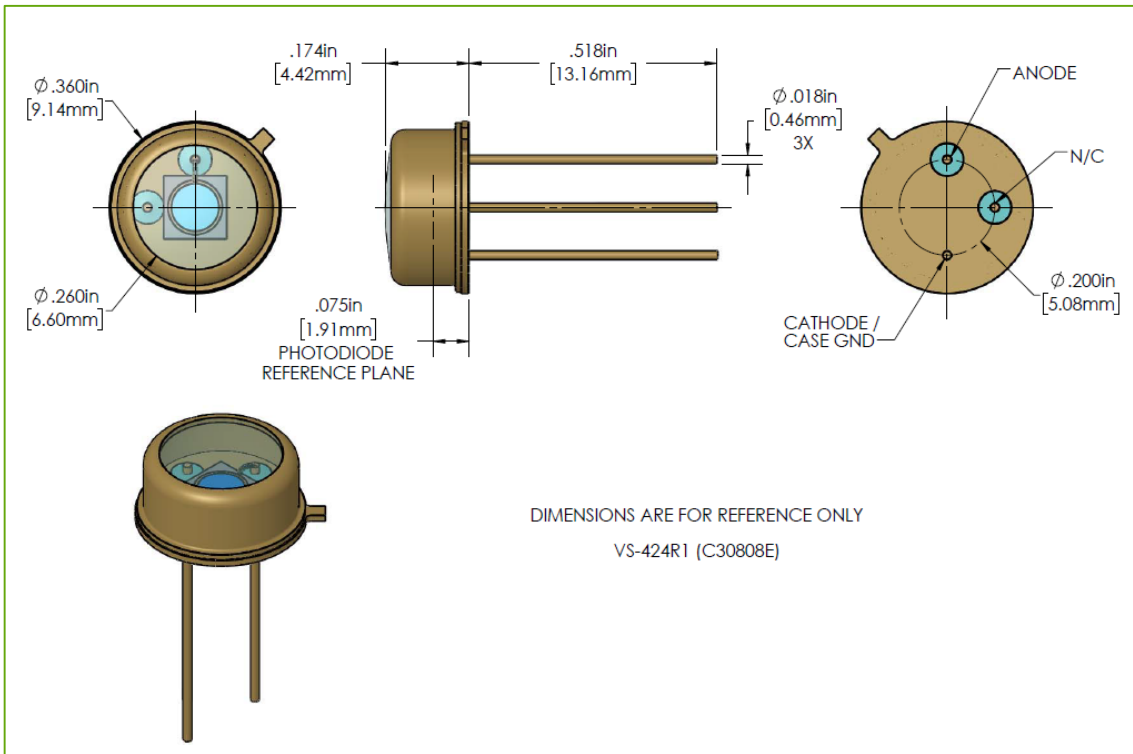
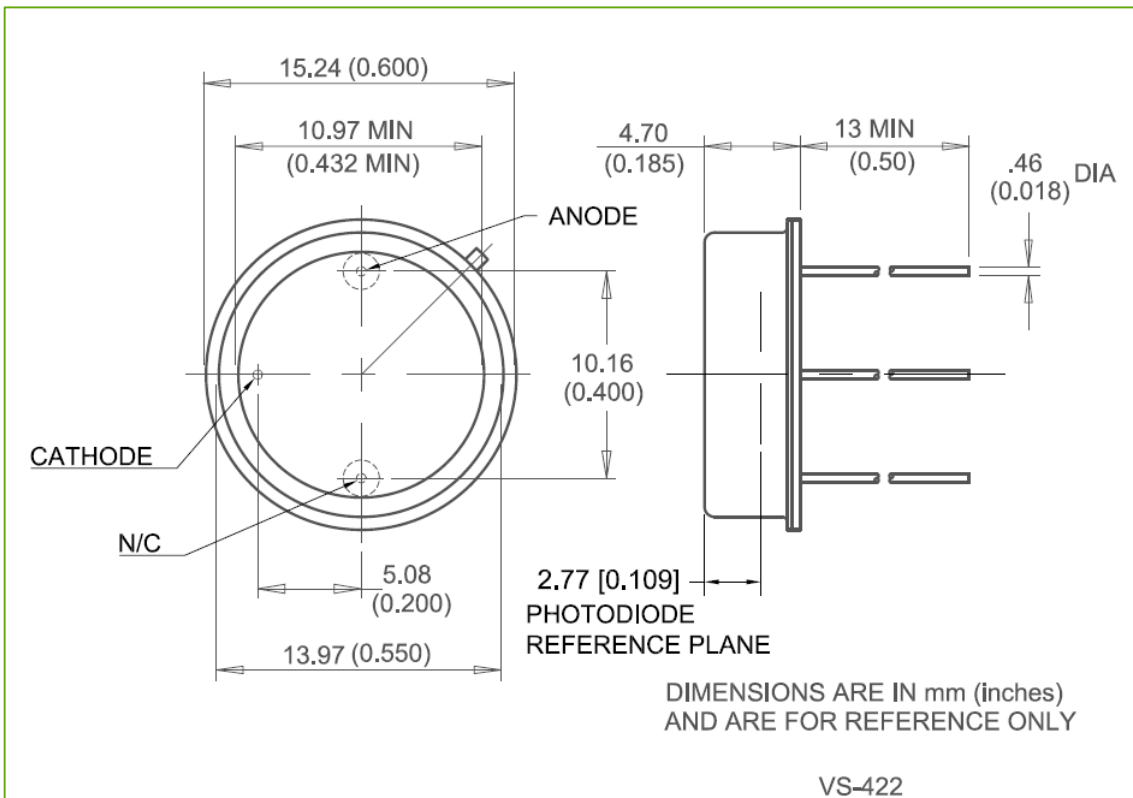


Figure 7 – Package Dimension of C30809EH, mm (inches), for reference only



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Figure 8 – Package Dimension of C30822EH, mm (inches), for reference only

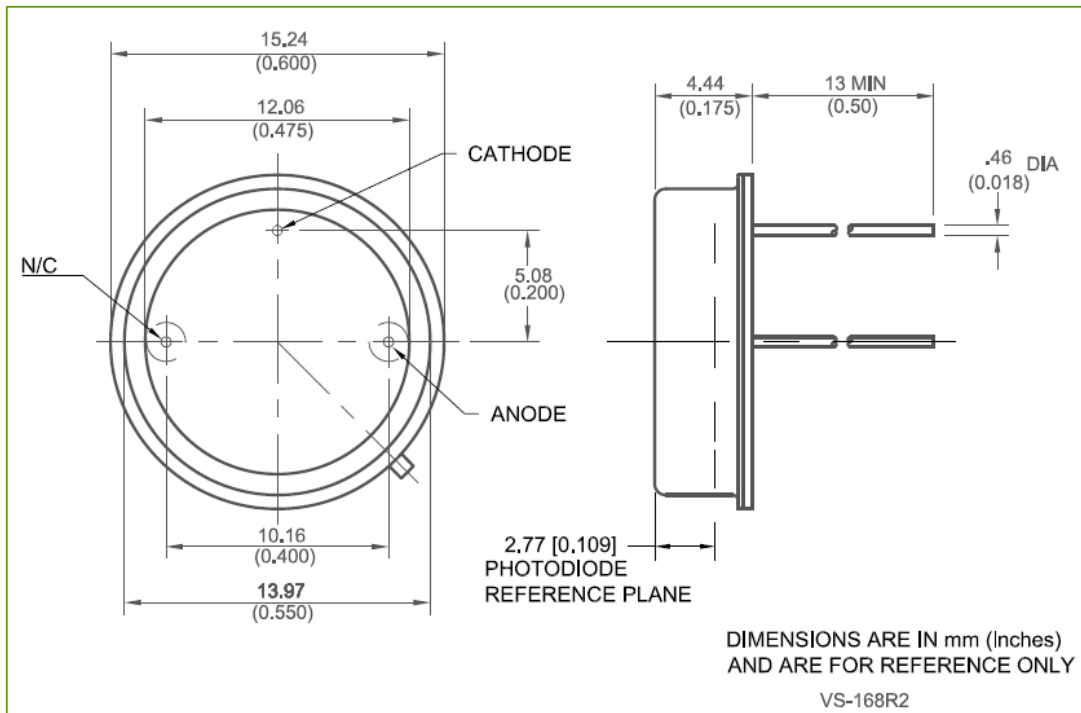
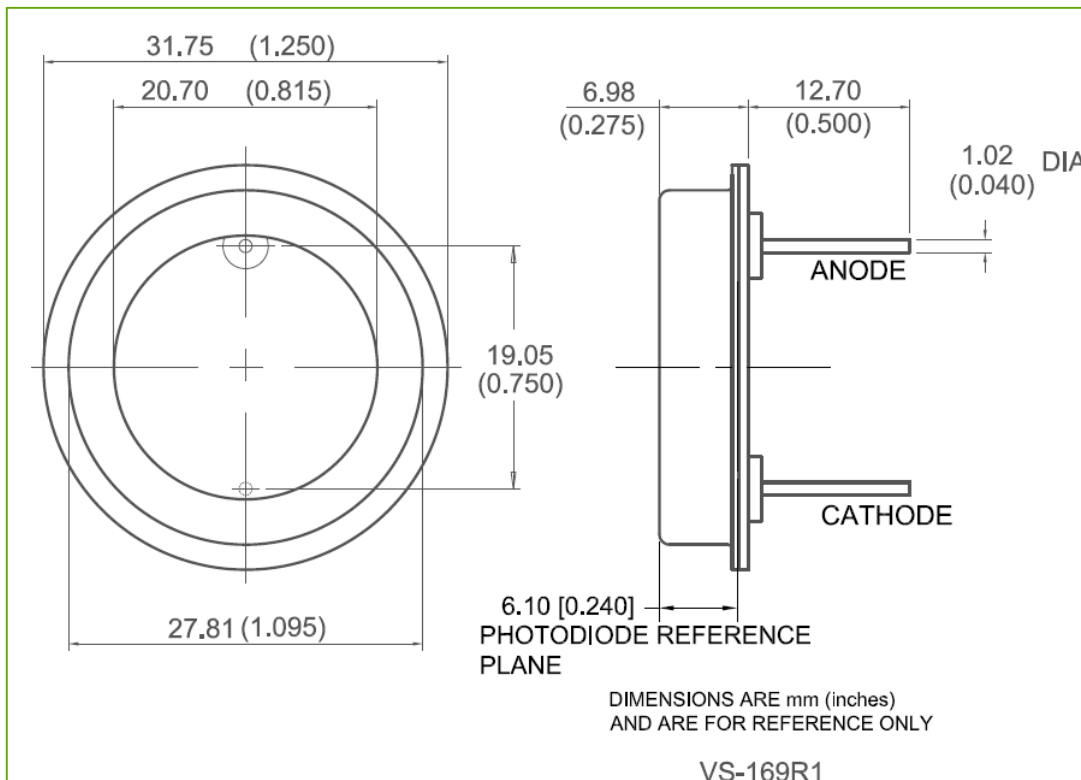


Figure 9 – Package Dimension of C30810EH, mm (inches), for reference only



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RoHS Compliance

The C30807EH, C30808EH, C30822EH, C30809EH, and C30810EH Type PIN Photodetectors are designed and built to be fully compliant with the European Union Directive 2011/65/EU – Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic equipment.



Warranty

A standard 12-month warranty following shipment applies. Any warranty is null and void if the photodiode window has been opened.

About Excelitas Technologies

Excelitas Technologies is a global technology leader focused on delivering innovative, customized solutions to meet the lighting, detection and other high-performance technology needs of OEM customers.

Excelitas has a long and rich history of serving our OEM customer base with optoelectronic sensors and modules for more than 45 years beginning with PerkinElmer, EG&G, and RCA. The constant throughout has been our innovation and commitment to delivering the highest quality solutions to our customers worldwide.

From analytical instrumentation to clinical diagnostics, medical, industrial, safety and security, and aerospace and defense applications, Excelitas Technologies is committed to enabling our customers' success in their specialty end-markets. Excelitas Technologies has approximately 5,000 employees in North America, Europe and Asia, serving customers across the world.

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