C30739ECERH Series

Large Area Silicon Avalanche Photodiodes – Short Wavelength Enhanced

Exceldas’ C30739ECERH Large Area Silicon Avalanche Photodiodes (APDs) are intended for use in a wide variety of broadband low light level applications covering the spectral range from below 400 nm to over 700 nm.

The devices are designed to have enhanced short wavelength responsivity with quantum efficiency typically exceeding 75% at 430 nm. In addition, the large area APD is optimized for low noise and low capacitance (60 pF). Operation at an avalanche gain of up to $M = 400$ at 430 nm is feasible with a special high gain version.

The standard ceramic carrier package allows for easy handling and coupling to scintillating crystals such as LSO and BGO. Combined with the superior short wavelength responsivity, it makes this APD ideal in demanding high-volume applications such as Positron Emission Tomography (PET).

While the devices are warranted over the entire specification, customers are welcome to discuss their custom requirements; Excelitas is pleased to accommodate special design, packaging or testing needs.

Key Features

- Large Area silicon APD
- Short Wavelength enhanced responsivity
- High quantum efficiency (75%) at short wavelength (430 nm)
- Easy coupling to scintillating crystals
- Non-magnetic package
- Custom packaging available
- Excellent timing resolution
- RoHS compliant

Applications

- Molecular imaging (PET)
- Nuclear medicine
- Fluorescence detection
- High energy physics
- Safety radiation detection
- Optical tomography
- Environmental monitoring
Table 1. Package and Chip Dimensions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Measurement</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package Size</td>
<td>8.50 x 8.00 x 1.55</td>
<td>mm</td>
</tr>
<tr>
<td>Chip size</td>
<td>6.5 x 6.5</td>
<td>mm</td>
</tr>
<tr>
<td>Active area</td>
<td>5.6 x 5.6</td>
<td>mm</td>
</tr>
</tbody>
</table>

Table 2. Electrical Characteristics, at $T_A = 22 \, ^\circ\text{C}$; at typical operating voltage-$V_b$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>C30739ECERH (standard version)</th>
<th>C30739ECERH-1 (low gain version)</th>
<th>C30739ECERH-2 (high gain version)</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_b$</td>
<td>Operating Voltage</td>
<td>Min 400 Typ 475 Max 475</td>
<td>Min 390 Typ 475 Max 475</td>
<td>Min 400 Typ 475 Max 475</td>
<td>V</td>
<td>defines relation of operating voltage $V_b$ to breakdown voltage $V_{bd}$</td>
</tr>
<tr>
<td>dV</td>
<td>$dV = V_{br} - V_b$</td>
<td>Min 25 Typ - Max 40</td>
<td>Min - Typ - Max 10</td>
<td>Min - Typ - Max -</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Gain at $V_b$</td>
<td>Min 100 Typ 150 Max -</td>
<td>Min 30 Typ 50 Max -</td>
<td>Min 200 Typ 250 Max -</td>
<td>%</td>
<td>at 430 nm</td>
</tr>
<tr>
<td>Q.E.</td>
<td>Quantum Efficiency</td>
<td>Min 60 Typ 75 Max -</td>
<td>Min 60 Typ 75 Max -</td>
<td>Min 60 Typ 75 Max -</td>
<td>%</td>
<td>at 430 nm</td>
</tr>
<tr>
<td>R</td>
<td>Responsivity</td>
<td>Min - Typ 39 Max -</td>
<td>Min - Typ 13 Max -</td>
<td>Min - Typ 65 Max -</td>
<td>A/W</td>
<td>at 430 nm and Typical Gain M</td>
</tr>
<tr>
<td>C_J</td>
<td>Capacitance</td>
<td>Min - Typ 60 Max -</td>
<td>Min - Typ 60 Max -</td>
<td>Min - Typ 60 Max -</td>
<td>pF</td>
<td>at $V_b$</td>
</tr>
<tr>
<td>t_R</td>
<td>Rise Time</td>
<td>Min - Typ 2 Max -</td>
<td>Min - Typ 2 Max -</td>
<td>Min - Typ 2 Max -</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>I_D</td>
<td>Dark Current</td>
<td>Min - Typ 3 Max -</td>
<td>Min - Typ 3 Max -</td>
<td>Min - Typ 3 Max -</td>
<td>nA</td>
<td>at $V_b$</td>
</tr>
<tr>
<td>I_N</td>
<td>Noise Current</td>
<td>Min - Typ 0.4 Max -</td>
<td>Min - Typ 0.4 Max -</td>
<td>Min - Typ 0.5 Max -</td>
<td>pA/V Hz</td>
<td>at $V_b$</td>
</tr>
</tbody>
</table>

Table 3. Maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0</td>
<td>-</td>
<td>50</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20</td>
<td>-</td>
<td>70</td>
<td>°C</td>
</tr>
<tr>
<td>Maximum Humidity (non-condensing)</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>%</td>
</tr>
</tbody>
</table>
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Large Area Short Wavelength Enhanced Silicon Avalanche Photodiodes

Figure 1
Capacitance vs. operating voltage

Figure 2
Quantum Efficiency vs. Wavelength

Figure 3
Spectral Response vs. Wavelength
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Electrical properties: **C30739ECERH-2** (Ta=25°C)

![Graph showing electrical properties vs. bias voltage](image)

**Figure 4**
Electrical properties vs. bias voltage

![Package Dimensions in mm](image)

**Figure 5**
Package Dimensions in mm

RoHS Compliance

The C30739ECERH Si APD is designed and built to be fully compliant with the European Union Directive 2002/95EEC – Restriction of the use of certain Hazardous Substances in Electrical and Electronic equipment.
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Warranty

A standard 12-month warranty following shipment applies.

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.

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 3,000 employees in North America, Europe and Asia, serving customers across the world.