The K12729-010K is a two-color detector in a compact ceramic package, covering a wide spectral response range. Like the current K11908-010K, it incorporates two InGaAs PIN photodiodes with different spectral response, along the same optical axis. It features low noise and low dark current and supports reflow soldering.

### Features

- Wide spectral response range
- Compact, low noise, low dark current
- Supports reflow soldering

### Structure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window material</td>
<td>-</td>
<td>-</td>
<td>Borosilicate glass</td>
</tr>
<tr>
<td>Package</td>
<td>-</td>
<td>-</td>
<td>Ceramic</td>
</tr>
<tr>
<td>Photosensitive area</td>
<td>-</td>
<td>InGaAs ($\lambda_c$=1.7 μm)</td>
<td>2.4 × 2.4 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ($\lambda_c$=2.55 μm)</td>
<td>$\phi$1.0</td>
</tr>
</tbody>
</table>

### Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>$V_{R \text{ max}}$</td>
<td>InGaAs ($\lambda_c$=1.7 μm), $T_a$=25 °C</td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ($\lambda_c$=2.55 μm), $T_a$=25 °C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>$T_{\text{op}}$</td>
<td>No condensation$^*$</td>
<td>-20 to +70</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{\text{stg}}$</td>
<td>No condensation$^*$</td>
<td>-20 to +85</td>
<td>°C</td>
</tr>
</tbody>
</table>

$^*$: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability. Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.
# Electrical and optical characteristics (Ta=25 °C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral response range</td>
<td>( \lambda )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m))</td>
<td>-</td>
<td>0.9 to 1.7</td>
<td>-</td>
<td>( \mu m )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m))</td>
<td>-</td>
<td>1.7 to 2.55</td>
<td>-</td>
<td>( \mu m )</td>
</tr>
<tr>
<td>Peak sensitivity wavelength</td>
<td>( \lambda_p )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m))</td>
<td>-</td>
<td>1.55</td>
<td>-</td>
<td>( \mu m )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m))</td>
<td>-</td>
<td>2.1</td>
<td>-</td>
<td>( \mu m )</td>
</tr>
<tr>
<td>Photosensitivity</td>
<td>( S )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m), \lambda=\lambda_p)</td>
<td>0.85</td>
<td>0.95</td>
<td>-</td>
<td>A/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m), \lambda=\lambda_p)</td>
<td>0.7</td>
<td>1.0</td>
<td>-</td>
<td>A/W</td>
</tr>
<tr>
<td>Dark current</td>
<td>( I_d )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m), V_R=10 \ \text{mV})</td>
<td>-</td>
<td>1</td>
<td>10</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m), V_R=10 \ \text{mV})</td>
<td>-</td>
<td>0.7</td>
<td>3.5</td>
<td>( \mu A )</td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>( f_c )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m), -3 \ \text{dB}\ V_R=0 \ \text{V}, R_L=50 \ \Omega)</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m), -3 \ \text{dB}\ V_R=0 \ \text{V}, R_L=50 \ \Omega)</td>
<td>2</td>
<td>6</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>( C_t )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m), V_R=0 \ \text{V}, f=1 \ \text{MHz})</td>
<td>-</td>
<td>1.5</td>
<td>2.5</td>
<td>nF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m), V_R=0 \ \text{V}, f=1 \ \text{MHz})</td>
<td>-</td>
<td>0.5</td>
<td>1</td>
<td>nF</td>
</tr>
<tr>
<td>Shunt resistance</td>
<td>( R_{sh} )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m), V_R=10 \ \text{mV})</td>
<td>1</td>
<td>10</td>
<td>-</td>
<td>M( \Omega )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m), V_R=10 \ \text{mV})</td>
<td>2.8</td>
<td>14</td>
<td>-</td>
<td>k( \Omega )</td>
</tr>
<tr>
<td>Detectivity</td>
<td>( D^* )</td>
<td>InGaAs ((\lambda_c=1.7 \ \mu m), \lambda=\lambda_p)</td>
<td>( 1 \times 10^{12} )</td>
<td>( 5 \times 10^{12} )</td>
<td>-</td>
<td>cm-Hz(^{1/2})/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>InGaAs ((\lambda_c=2.55 \ \mu m), \lambda=\lambda_p)</td>
<td>( 2 \times 10^{10} )</td>
<td>( 7 \times 10^{10} )</td>
<td>-</td>
<td>cm-Hz(^{1/2})/W</td>
</tr>
</tbody>
</table>

## Spectral response

![Spectral response graph](image)

\( \text{Typ. Ta}=25 \ ^\circ \text{C} \)

## Spectral transmittance of window material

![Spectral transmittance graph](image)

\( \text{Typ. Ta}=25 \ ^\circ \text{C} \)
Two-color detector

Temperature characteristics of sensitivity

![Temperature characteristics of sensitivity graph](image1.png)

Dark current vs. reverse voltage

![Dark current vs. reverse voltage graph](image2.png)

Terminal capacitance vs. reverse voltage

![Terminal capacitance vs. reverse voltage graph](image3.png)

Shunt resistance vs. element temperature

![Shunt resistance vs. element temperature graph](image4.png)
- **Dimensional outline (unit: mm)**

  - **Index mark**
    - 6.6 ± 0.2
  - **Window**
    - 2.4 ± 1.5
  - **Photosensitive area**
    - InGaAs (λ=1.7 μm)
    - 6.6 ± 0.2, 2.4 ± 0.1

  - **Photosensitive area**
    - InGaAs (λ=2.5 μm)
    - 8.0 ± 0.1, 2.4 ± 0.3

- **Recommended land mark pattern (unit: mm)**

  - **Center position accuracy of photosensitive area**
    - -0.3 ≤ X ≤ +0.3
    - -0.3 ≤ Y ≤ +0.3

  - **Photosensitive area**
    - InGaAs (λ=1.7 μm)
    - 2.0 ± 0.2
    - 2.0 ± 0.2
    - 2.0 ± 0.2

  - **Anode**
    - InGaAs (λ=1.7 μm)
    - 2.0 ± 0.2
    - 2.0 ± 0.2

  - **Cathode**
    - InGaAs (λ=2.55 μm)
    - 2.0 ± 0.2
    - 2.0 ± 0.2

  - **Anode**
    - InGaAs (λ=2.55 μm)
    - 2.0 ± 0.2
    - 2.0 ± 0.2

  - **Center position accuracy of photosensitive area**
    - -0.3 ≤ X ≤ +0.3
    - -0.3 ≤ Y ≤ +0.3

  - **Recommended land mark pattern**
    - Unit: mm
    - Dimensions:
      - 2.5, 3.3, 2.5
      - 8.0, 0.8
      - 2.4, 2.4, 3.3, 2.5
      - 2.0, 2.0, 2.0, 2.0

  - **Markings**
    - ①, ⑦, ⑧, ⑨

  - **Dimensions (unit: mm)**
    - 2.0 ± 0.2, 2.0 ± 0.2
    - 2.0 ± 0.2

  - **Marks**
    - ①, ②, ③, ④

  - **Dimensions (unit: mm)**
    - 0.7 ± 0.1, 0.7 ± 0.1
    - 2.4 ± 0.3

  - **Marks**
    - ①, ②, ③, ④

  - **Dimensions (unit: mm)**
    - 6.6 ± 0.2, 2.4 ± 1.5

  - **Marks**
    - ①, ②, ③, ④

  - **Dimensions (unit: mm)**
    - 2.4 ± 0.3

  - **Marks**
    - ①, ②, ③, ④
Two-color detector K12729-010K

Measured example of temperature profile with our hot-air reflow oven for product testing

- After unpacking, store the device in an environment at a temperature range of 5 to 30 °C and a humidity of 60% or less, and perform reflow soldering within 4 weeks.
- The thermal stress applied to the device during reflow soldering varies depending on the circuit board and the reflow oven that is used.
- When setting the reflow conditions, verify that the reliability of the device is not compromised by the reflow soldering process.

Related information

www.hamamatsu.com/sp/ssp/doc_en.html

- Precautions
- Disclaimer
- Safety consideration
- Metal, ceramic, plastic package products

- Technical information
- Infrared detectors

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