GP2A25J0000F Series

Detecting Distance: 1 to 9mm
*OPIC Output,
Reflective Photointerrupter with Connector

■ Description

GP2A25J0000F Series are OPIC output, reflective photointerrupters with emitter and detector facing the same direction in a molding that provides non-contact sensing. This family of devices uses light modulation to reduce the affects of disturbing light, and the sensor is optimized to work in the selected focal distance. A 3-pin connector is included to allow remote-mount or off-board designs.

■ Features

1. Reflective with OPIC Light Modulated Output
2. Highlights:
   - Includes additional screw fixing holes
   - Position pin to prevent mis-alignment
   - Short focal distance
3. Key Parameters:
   - Detecting distance: 1 to 9mm (White paper)
   - 3 to 7mm (Black paper)
   - Undetecting distance: over 27mm (White paper)
   - Connector: GP2A25J0000F; Tyco Electronics AMP K.K. (PN: 292133-3)
   - GP2A25DJ000F; Tyco Electronics AMP K.K. (PN: 292133-3)
   - GP2A25NJ000F; Tyco Electronics AMP K.K. (PN: 4-292133-3)
4. RoHS directive compliant

■ Agency approvals/Compliance

1. Compliant with RoHS directive

■ Applications

1. General purpose detection of paper presence or motion.
2. Example: PPC, FAX, Printer

* "OPIC" (Optical IC) is a trademark of the SHARP Corporation. An OPIC consists of a light-detecting element and a signal-processing.
**Internal Connection Diagram**

- Reflective object
- Demodulator circuit
- Voltage regulator
- Amp.
- Comparator
- Oscillator circuit
- Sync. detecting circuit

**Outline Dimensions**

(Unit: mm)

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimensions</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP2A25J0000F</td>
<td>VCC, VOUT, GND</td>
<td></td>
</tr>
<tr>
<td>GP2A25DJ000F</td>
<td>VCC, VOUT, GND</td>
<td></td>
</tr>
<tr>
<td>GP2A25NJ00F</td>
<td>VCC, VOUT, GND</td>
<td></td>
</tr>
</tbody>
</table>

- **Dimensions**
  - Product mass: approx. 1.95g
  - Product mass: approx. 2.4g

- **Connector**
  - Connector: 292133-3
  - Connector: 4-SR2
  - Connector: 292133-3

- **Date code**
  - (6.8)
  - Date code

- **Unspecified tolerance**
  - Dimensions less than 6 ±0.2
  - Dimensions 6 or more less than 14 ±0.3
  - Dimensions 14 or more ±0.4

- **Connector terminal plating material**
  - Sn
### Date code (2 digit)

<table>
<thead>
<tr>
<th>Year of production</th>
<th>1st digit</th>
<th>2nd digit</th>
</tr>
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<tbody>
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<td>A.D.</td>
<td>Mark</td>
<td>Month</td>
</tr>
<tr>
<td>2000</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
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<td>2008</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>2009</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
<td>12</td>
</tr>
</tbody>
</table>

repeats in a 10 year cycle

**Country of origin**

Japan
## Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>VCC</td>
<td>−0.5 to +7</td>
<td>V</td>
</tr>
<tr>
<td>Output voltage</td>
<td>VO</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>**1 Output current</td>
<td>IOL</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>**2 Operating temperature</td>
<td>Topr</td>
<td>−10 to +60</td>
<td>℃</td>
</tr>
<tr>
<td>**2 Storage temperature</td>
<td>Tstg</td>
<td>−20 to +80</td>
<td>℃</td>
</tr>
</tbody>
</table>

**1 Sink current refer to Fig.5.
**2 The connector should be plugged in/out at normal temperature.

## Electro-optical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>VCC</td>
<td>−</td>
<td>4.75</td>
<td>−</td>
<td>5.25</td>
<td>V</td>
</tr>
<tr>
<td>Current dissipation (I)</td>
<td>ICC</td>
<td>Smoothing value VCC=5V, R1=∞</td>
<td>−</td>
<td>−</td>
<td>30</td>
<td>mA</td>
</tr>
<tr>
<td>**3 Current dissipation (II)</td>
<td>ICCP</td>
<td>Pulse peak value VCC=5V</td>
<td>−</td>
<td>−</td>
<td>150</td>
<td>mA</td>
</tr>
<tr>
<td>Low level output voltage</td>
<td>VIL</td>
<td>VCC=5V, IOL=16mA, at detecting time</td>
<td>−</td>
<td>−</td>
<td>0.4</td>
<td>V</td>
</tr>
<tr>
<td>High level output voltage</td>
<td>VIL</td>
<td>VCC=5V, RIL=1kΩ, at non detecting time</td>
<td>4.5</td>
<td>−</td>
<td>−</td>
<td>V</td>
</tr>
<tr>
<td>**4 Non detection distance</td>
<td>LHL</td>
<td>KODAK Gray Cards, VCC=5V</td>
<td>−</td>
<td>−</td>
<td>27</td>
<td>mm</td>
</tr>
<tr>
<td>**4 Detection distance</td>
<td>L0</td>
<td>KODAK Gray Cards, VCC=5V</td>
<td>−</td>
<td>−</td>
<td>9</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td>L1</td>
<td>KODAK Gray Cards, VCC=5V</td>
<td>−</td>
<td>−</td>
<td>7</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>Black paper, VCC=5V</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>mm</td>
</tr>
<tr>
<td>**5 Response time</td>
<td>tPLH</td>
<td>VCC=5V</td>
<td>−</td>
<td>−</td>
<td>1</td>
<td>ms</td>
</tr>
<tr>
<td></td>
<td>tPHL</td>
<td>VCC=5V</td>
<td>−</td>
<td>−</td>
<td>1</td>
<td>ms</td>
</tr>
<tr>
<td>**6 Acceptable illuminance</td>
<td>Ev1</td>
<td>−</td>
<td>3000</td>
<td>−</td>
<td>−</td>
<td>lx</td>
</tr>
<tr>
<td></td>
<td>Ev2</td>
<td>−</td>
<td>1500</td>
<td>−</td>
<td>−</td>
<td>lx</td>
</tr>
</tbody>
</table>

**3 Refer to Fig.1.
**4 Refer to Fig.2.
**5 Refer to Fig.3.
**6 Refer to Fig.4.

Reflective object
- Black paper (black) : Standard reflective object (provided by SHARP Corporation)
- KODAK Gray Cards (use the white side reflects about 90%) : Standard reflective object (provided by SHARP Corporation)
- PPC paper : Standard reflective object (provided by SHARP Corporation)
Fig.1 Test Condition for Peak Pulse Value $I_{CCP}$

![Circuit Diagram]

$V_{CC}=5V$

$R=1\Omega$

$V_{O}$

$V_{OH}$

$V_{OL}$

$t_{W}$

$t_{P}$

$I_{CCP}=V/1\Omega$

$t_{W}(TYP.)=130\mu s$

$t_{P}(TYP.)=8\mu s$

Fig.2 Test Condition for Detecting Distance Characteristics

![Graph]

Output $V_O$

Detecting distance $L$

Detection surface

Reflective object

Fig.3 Test Circuit for Response Time

![Circuit Diagram]

$V_{CC}=5V$

$R=1k\Omega$

$V_O$

$V_{OH}$

$V_{OL}$

$t_{PHL}$

$t_{PLH}$

With reflective object

Without reflective object

Fig.4 Test Condition for External Disturbing Light Illuminance

![Graph]

$E_{V1}$: At non-detecting

Light source A

Emission/detection surface

$EV_2$: At detecting

Light source A

Emission/detection surface

PPC paper

Illuminance shall be that on the emission/detection surface.

Output shall not go from "H" to "L".

Illuminance shall be that on the reflective object.

Output shall not go from "L" to "H".

Sheet No.: D3-A04901FEN
Fig. 5 Low Level Output Current vs. Ambient Temperature

Fig. 6 Low Level Output Voltage vs. Ambient Temperature

Fig. 7 Low Level Output Voltage vs. Low Level Output Current

Fig. 8 Dissipation Current (Smoothing Value) vs. Ambient Temperature

Remarks: Please be aware that all data in the graph are just for reference and not for guarantee.
Design Considerations

● Design guide

1) $V_O$ terminal: Open collector output
   This product operates the light emitter by pulse drive. Please supply the stable supply voltage in order to prevent error operation by pulse current.
   Please use this device after connecting a capacitor between $V_O$ and GND for prevention of line noise.
2) Prevention of detection error
   Please be careful that you need to keep the direct inverter light away from the photo detecting surface since the device will not operate correctly in such case.
   In addition, we recommend to make sure the operation test in the actual application.
3) Plugging in/out
   The connector should be plugged in/out at normal temperature.

This product is not designed against irradiation and incorporates non-coherent IRED.

● Parts

This product is assembled using the below parts.

• Photodetector (Q'ty : 1) [Using a silicon photodiode as light detecting portion, and a bipolar IC as signal processing circuit]

<table>
<thead>
<tr>
<th>Category</th>
<th>Maximum Sensitivity wavelength (nm)</th>
<th>Sensitivity wavelength (nm)</th>
<th>Response time (μs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photodiode</td>
<td>900</td>
<td>700 to 1,200</td>
<td>400</td>
</tr>
</tbody>
</table>

• Photo emitter (Q'ty : 1)

<table>
<thead>
<tr>
<th>Category</th>
<th>Material</th>
<th>Maximum light emitting wavelength (nm)</th>
<th>I/O Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrared emitting diode (non-coherent)</td>
<td>Gallium arsenide (GaAs)</td>
<td>950</td>
<td>0.3</td>
</tr>
</tbody>
</table>

• Material

<table>
<thead>
<tr>
<th>Case</th>
<th>Lens</th>
<th>Bottom cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP2A25J0000F</td>
<td>Black polyphenylene</td>
<td>Polycarbonate resin (Black) (UL94 V-2)</td>
</tr>
<tr>
<td>GP2A25DJ000J</td>
<td>Sulfide resin (UL94 V-0)</td>
<td>Polycarbonate resin (Black) (UL94 V-2)</td>
</tr>
<tr>
<td>GP2A25NJJ00F</td>
<td>Sulfide resin (UL94 V-0)</td>
<td>Polycarbonate resin (Black) (UL94 V-2)</td>
</tr>
<tr>
<td>GP2A25NJJ000F*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The IR-90 filter (Fuji Photo Film Co., Ltd.) is inserted between case and detector side lens.

• Others

Laser generator is not used.
Manufacturing Guidelines

● Cleaning instructions
  Polycarbonate resin is used as the material of the lens surface. So this product shall not be cleaned by cleaning solvent absolutely. Dust and stain shall clean by air blow, or shall clean by soft cloth.

● Presence of ODC
  This product shall not contain the following materials.
  And they are not used in the production process for this product.
  Regulation substances: CFCs, Halon, Carbon tetrachloride, 1,1,1-Trichloroethane (Methylchloroform)

  Specific brominated flame retardants such as the PBBOs and PBBs are not used in this product at all.

  This product shall not contain the following materials banned in the RoHS Directive (2002/95/EC).
  • Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).
■ Package specification

● Case package

Package materials
   Anti-static plastic bag : Polyethylene
   Moltopren : Urethane
   Packing case : Corrugated fiberboard

Package method
   100 pcs of products shall be packaged in a plastic bag. Ends shall be sealed by stapler. The bottom of the packing case is covered with moltopren, and 2 plastic bags shall be put into the packing case. Moltopren should be located after all products are settled (1 packing contains 200 pcs).

Packing composition
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    --- Telecommunication equipment [terminal]
    --- Test and measurement equipment
    --- Industrial control
    --- Audio visual equipment
    --- Consumer electronics
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    --- Traffic signals
    --- Gas leakage sensor breakers
    --- Alarm equipment
    --- Various safety devices, etc.
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