GP1A173LCS5F

Description

GP1A173LCS5F is a standard, low voltage operation, OPIC output, transmissive photointerrupter with opposing emitter and detector in a case, providing non-contact sensing. For this family of devices, the emitter and detector are inserted in a case, and a 3-pin connector is included to allow remote-mount or off-board designs.

Features

1. Transmissive with OPIC output
2. Highlights:
   - Special position hooks compatible with 3 different plate thicknesses (1.0, 1.2, 1.6mm)
   - Snap insertion
   - Enforced electrostatic discharge (ESD)
   - Increased power line noise tolerance
3. Key Parameters:
   - Low operating voltage: 3.0 to 5.5V
   - Gap Width: 5mm
   - Slit Width (detector side): 0.5mm
   - Package: 17 × 12.8 × 8mm (without connector and hooks)
   - Connector: Tyco Electronics JAPAN G.K. (173977-3 and 179228-3)
4. RoHS directive compliant

Agency approvals/Compliance

1. Compliant with RoHS directive (2011/65/EU)

Applications

1. General purpose detection of object presence or motion.
   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

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Internal Connection Diagram

Outline

Drawing No. CY15156i02  Unit: 1/1 mm

Note:
1. Unspecified tolerance shall be followed the list below.
2. Dimensions in parenthesis are shown for reference.
3. Coupling and contact: CT receptacle connector (173977-3 and 179228-3) by Tyco Electronics Japan G.K.
4. Date code
   Y: Year (2013: 3) Last digit of prod. Year
   M: Month (1 through 9, X, Y, Z)
   D: Date (1 through 9, Please refer to a right list other than it.)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 5.0</td>
<td>±0.15</td>
</tr>
<tr>
<td>5.0 or more, less than 15.0</td>
<td>±0.2</td>
</tr>
<tr>
<td>15.0 or more</td>
<td>±0.3</td>
</tr>
</tbody>
</table>

Date

<table>
<thead>
<tr>
<th>Date</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>Date</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
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<td>Code</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>J</td>
<td>K</td>
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<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Code</td>
<td>M</td>
<td>N</td>
<td>O</td>
<td>P</td>
<td>R</td>
</tr>
<tr>
<td>Date</td>
<td>25</td>
<td>26</td>
<td>27</td>
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<td>Code</td>
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<td>T</td>
<td>U</td>
<td>W</td>
<td>X</td>
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<tr>
<td>Date</td>
<td>30</td>
<td>31</td>
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<td></td>
<td></td>
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<tr>
<td>Code</td>
<td>Y</td>
<td>Z</td>
<td></td>
<td></td>
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</table>
### Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Vcc</td>
<td>-0.5 to +6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>Vout</td>
<td>-0.5 to +6</td>
<td>V</td>
<td>Output transistor between collector and emitter</td>
</tr>
<tr>
<td>Output current</td>
<td>I_OH</td>
<td>8</td>
<td>mA</td>
<td>Output transistor collector current *1</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>-30 to +95</td>
<td>°C</td>
<td>The connector should be plugged in/out at normal temperature.</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-40 to +100</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

*1 Fig.1 shows output current vs. ambient temperature.

### Electro-optical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption</td>
<td>I_{CCL}</td>
<td>16.5 MAX</td>
<td>mA</td>
<td>Light beam uninterrupted</td>
</tr>
<tr>
<td>Low level output voltage</td>
<td>V_{OL}</td>
<td>0.35 MAX</td>
<td>V</td>
<td>Light beam uninterrupted</td>
</tr>
<tr>
<td>Current consumption</td>
<td>I_{CCH}</td>
<td>16.5 MAX</td>
<td>mA</td>
<td>Light beam interrupted</td>
</tr>
<tr>
<td>High level output voltage</td>
<td>V_{OH}</td>
<td>V_{cc} × 0.9</td>
<td>V</td>
<td>Light beam interrupted</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>V_{cc}</td>
<td>3.0 to 5.5</td>
<td>V</td>
<td>R_{L} = 10kΩ</td>
</tr>
<tr>
<td>Response characteristics</td>
<td>t_{h}</td>
<td>166 MIN</td>
<td>µs</td>
<td>R_{L} = 4.7kΩ</td>
</tr>
<tr>
<td></td>
<td>t_{L}</td>
<td>166 MIN</td>
<td>µs</td>
<td></td>
</tr>
</tbody>
</table>

### Detection position characteristics

**Horizontal detecting position characteristics**

(d = 3.2 ± 0.3mm)

**Vertical detecting position characteristics**

(d = 3.0 ± 0.3 mm)
Fig.1  Output current vs. ambient temperature
Supplements

- ODS materials
  - This product shall not contain the following materials.
  - Also, the following materials shall not be used in the production process for this product.
  - Materials for ODS: CFCs, Halon, Carbon tetrachloride 1.1.1-Trichloroethane (Methyl chloroform)

- Specified brominated flame retardants
  - Specified brominated flame retardants (PBB and PBDE) are not used in this device at all.

- Compliance with each regulation
  1) The RoHS directive (2011/65/EU)
    - This product complies with the RoHS directive (2011/65/EU).
    - Object substances: mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)
  2) Content of six substances specified in Management Methods for Control of Pollution Caused by Electronic Information Products Regulation (Chinese: 电子信息产品污染控制管理办法).

Marking Styles for the Names and Contents of the Hazardous Substances

<table>
<thead>
<tr>
<th>Category</th>
<th>Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lead (Pb)</td>
</tr>
<tr>
<td></td>
<td>Mercury (Hg)</td>
</tr>
<tr>
<td></td>
<td>Cadmium (Cd)</td>
</tr>
<tr>
<td></td>
<td>Hexavalent chromium (Cr⁶⁺)</td>
</tr>
<tr>
<td></td>
<td>Polybrominated biphenyls (PBB)</td>
</tr>
<tr>
<td></td>
<td>Polybrominated diphenyl ethers (PBDE)</td>
</tr>
<tr>
<td>photointerrupter</td>
<td>〇</td>
</tr>
</tbody>
</table>

This table is prepared in accordance with the provisions of SJ/T 11364.

〇: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572

- Product mass: Approx. 1.0g
- Country of origin: China
Notes

- Truth Table (In case of external addition pull-up resistance to Vout terminal)

<table>
<thead>
<tr>
<th>Light beam</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interrupted</td>
<td>High</td>
</tr>
<tr>
<td>Uninterrupted</td>
<td>Low</td>
</tr>
</tbody>
</table>

- Power supply line
  In order to stabilize power supply line, connect a by-pass capacitor of more than 0.01μF between Vcc and GND near the device.

- Opaque board
  Opaque board shall be installed at place 4mm or more from the top of elements.
  (Example)

  ![Opaque board diagram]

  In case opaque board is the material with an low light blocking effect, There is a possibility of malfunctioning because the light of LED transmits the opaque board. When you design the opaque board, please note transmittance of infrared rays wave length (950nm) and the thickness of the opaque board. And, please adjust the amount of transmitted light to 0.1% or less.

- Cleaning
  Please don't carry out immersion cleaning or ultrasonic cleaning to avoid keeping solvent inside case of this device.

- Washing material
  Dust and stain shall clean by air blow, or shall clean by soft cloth soaked in washing materials.
  And washing material to clean shall be used the below materials only.
  - Ethyl alcohol
  - Methyl alcohol
  - Isopropyl alcohol

- Connector connection
  For the electrical connection to the connector terminal, please certainly use the connector specified in this specifications.
  Please avoid the connection by the soldering or welding which may damage the main body of the device, and also avoid the contact by the clip and so on which may cause the malfunction by the contact failure.
  Please avoid the use condition that it always occurs he vibration in the spot where the connector fits in by the resonance of the sensor and the harness.
  It may cause the malfunction of the contact failure.

- Put-in and pull-out of connector
  The connection other than to the correct connection direction, forcing-into, and the pulling-out diagonally (if being not put-in and pulled-out straight) may deform or break the connector terminal and/or housing, which may cause the unusable state of the device.

- Interference light
  Because the upper, bottom and “Date Code” side are not covered by outer case, please do not use this device under ambient light circumstances including infrared component.
Recommended Installation Hole drawing

(Drawing No. CY15335i06)

Unit : 1/1mm

*1 We recommend to fix GP1A173LCS3F at punching side on the fixing plate (metal plate).
*2 Please decide the final dimensions at your side after confirmation by the actual applications. Because mounting efficiency and mounted stabilization are dependent on mounting plate corner-R and punched state.
*3 Tolerance shall be ±0.1mm
*4 Please don’t hold connector area but sensor area when fitting in or putting out on the metal plate.

Normal mounting type

Irregular mounting protection type
This product uses the below parts.

- Light detector (Quantity: 1)
  (Using a silicon photodiode as light detecting portion, and a bipolar IC as signal processing circuit.)

<table>
<thead>
<tr>
<th>Type</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>400 to 1200</td>
<td>10</td>
</tr>
</tbody>
</table>

- Light emitter (Quantity: 1)

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

- Material

<table>
<thead>
<tr>
<th>Case</th>
<th>Lead flame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black polycarbonate resin (UL 94V-0)</td>
<td>Copper Alloy (With plating)</td>
</tr>
</tbody>
</table>

- Others
  This product shall not be radiation flux proof.
  The laser oscillator is not equipped on this product.
  The terminals are covered with Tin Plating (more than 99.99%).
Packing specification

- Package

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Packing case</td>
<td>Corrugated cardboard</td>
<td>1/1000</td>
</tr>
<tr>
<td>2</td>
<td>Pad</td>
<td>Corrugated cardboard</td>
<td>6/1000</td>
</tr>
<tr>
<td>3</td>
<td>Tray</td>
<td>Polystyrene</td>
<td>1/200</td>
</tr>
<tr>
<td>4</td>
<td>Kraft tape</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- Packing method
  1) 5 products are put in 1 pocket. The longer direction of the product is arranged in the arbitrary direction. 200 products are put in the tray. <Fig.1>
  2) The pads are attached at the top and the bottom of the trays and also inserted between the trays. <Fig.2>
  3) Seal packing case with Kraft tape. <Fig.3>
  4) Indication items
    The contents of the carton indication conforms to EIAJ C-3 and the following items are indicated.
    - Model No., Internal production control name, Quantity, Packing date, Corporate name, Country of origin <Fig.3>
    - (1000pcs. / packing case)
    - (Approximately 2.26kg / packing mass)
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      --- Office automation equipment
      --- Telecommunication equipment [terminal]
      --- Test and measurement equipment
      --- Industrial control
      --- Audio visual equipment
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      --- Traffic signals
      --- Gas leakage sensor breakers
      --- Alarm equipment
      --- Various safety devices, etc.
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      --- Telecommunication equipment [trunk lines]
      --- Nuclear power control equipment
      --- Medical and other life support equipment (e.g., scuba).

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