GP1S173LCS2F

**Description**

GP1S173LCS2F is a standard, phototransistor 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 phototransistor output
2. Highlights :
   - Special position hooks compatible with 3 different plate thicknesses (1.0, 1.2, 1.6mm)
   - Snap insertion
3. Key Parameters :
   - 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 (2002/95/EC)

**Applications**

1. General purpose detection of object presence or motion.
   Example : PPC, FAX, Printer
Internal Connection Diagram

Outline

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 (2012 : 2) Number of the end of the Christian era
   M : Month (1-9, X, Y, Z)
   D : Date (1-9, Please refer to a right list other than it.)

<table>
<thead>
<tr>
<th>Date</th>
<th>Code</th>
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<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
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<td>Code</td>
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<td>Date</td>
<td>Code</td>
<td>25</td>
<td>26</td>
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<td>29</td>
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<tr>
<td>Date</td>
<td>Code</td>
<td>30</td>
<td>31</td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
</table>

Dimension | Tolerance
---|---
less than 5.0 | ±0.15
5.0 or more less than 15.0 | ±0.2
15.0 or more | ±0.3

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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 (2012 : 2) Number of the end of the Christian era
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Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>*1 Forward current</td>
<td>IF</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>*1, 2 Peak forward current</td>
<td>IFM</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>Reverse voltage</td>
<td>VR</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>P</td>
<td>75</td>
<td>mW</td>
</tr>
<tr>
<td>Collector-emitter voltage</td>
<td>VCEO</td>
<td>35</td>
<td>V</td>
</tr>
<tr>
<td>Emitter-collector voltage</td>
<td>VECO</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>IC</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td>*1 Collector power dissipation</td>
<td>Pc</td>
<td>75</td>
<td>mW</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>-30 to +95</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1, 2, 3.
*2 Pulse width ≤ 100μs, Duty ratio : 0.01
*3 Connector attachment and release shall be done 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>Input Forward voltage</td>
<td>VF</td>
<td>IF=20mA</td>
<td>-</td>
<td>1.2</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Peak forward voltage</td>
<td>VFm</td>
<td>IFm=0.5A</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>V</td>
</tr>
<tr>
<td>Reverse voltage</td>
<td>IR</td>
<td>VR=3V</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>μA</td>
</tr>
<tr>
<td>Collector current</td>
<td>IC</td>
<td>VCE=20V</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>VCE(sat)</td>
<td>IF=40mA, IC=0.5mA</td>
<td>0.5</td>
<td>-</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td>Collector current</td>
<td>IC</td>
<td>VCE=5V, IF=20mA</td>
<td>0.5</td>
<td>-</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td>Collector current</td>
<td>IC</td>
<td>VCE=5V, IF=20mA</td>
<td>0.5</td>
<td>-</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>VCE(sat)</td>
<td>IF=40mA, IC=0.5mA</td>
<td>0.5</td>
<td>-</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td>Response time (Rise)</td>
<td>tr</td>
<td>VCE=2V, IC=2mA</td>
<td>-</td>
<td>3</td>
<td>15</td>
<td>μs</td>
</tr>
<tr>
<td>Response time (Fall)</td>
<td>tf</td>
<td>Rl=100Ω</td>
<td>-</td>
<td>4</td>
<td>20</td>
<td>μs</td>
</tr>
</tbody>
</table>

(Test circuit for response time)

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Sheet No.: OP13014EN
Fig. 1  Forward current vs. ambient temperature

![Graph of forward current vs. ambient temperature]

Fig. 2  Collector power dissipation vs. ambient temperature

![Graph of collector power dissipation vs. ambient temperature]

Fig. 3  Peak forward current vs. duty ratio

Pulse width ≦ 100us  Ta=25℃

![Graph of peak forward current vs. duty ratio]
■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: CFC₃, 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.

- Country of origin: Philippine or China

- Product mass: Approx. 1.0g

- Compliance with each regulation
  1) The RoHS directive(2002/95/EC)
     This product complies with the RoHS directive(2002/95/EC).
     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).

<table>
<thead>
<tr>
<th>Category</th>
<th>Toxic and hazardous substances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lead (Pb)</td>
</tr>
<tr>
<td>Photointerrupter</td>
<td>✓</td>
</tr>
</tbody>
</table>

✓: indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006 standard.
Notes

● Circuit design
   In circuit designing, make allowance for the degradation of the light emitting diode output that results from long continuous operation. (50% degradation/5 years)

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

   ![Diagram of opaque board installation]

   In case opaque board is the material with 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 (940nm) 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 be 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.
Recommended Installation Hole drawing

(Drawing No. CY14033i06)

*1 We recommend to fix GP1S173LCS2F 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**

<table>
<thead>
<tr>
<th>Thickness of plate for 1.6mm</th>
<th>Thickness of plate for 1.2mm</th>
<th>Thickness of plate for 1.0mm</th>
</tr>
</thead>
</table>

**Irregular mounting protection type**

<table>
<thead>
<tr>
<th>Thickness of plate for 1.6mm</th>
<th>Thickness of plate for 1.2mm</th>
<th>Thickness of plate for 1.0mm</th>
</tr>
</thead>
</table>
**Parts**

This product uses the following parts.

- **Light detector (Quantity : 1)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Material</th>
<th>Maximum sensitivity wavelength (nm)</th>
<th>Sensitivity wavelength (nm)</th>
<th>Response time (μs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phototransistor</td>
<td>Silicon</td>
<td>930</td>
<td>400 to 1200</td>
<td>3</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>940</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

  ![Diagram of packaging components](Image)

<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 phase 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
      --- Consumer electronics
  
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      --- Traffic signals
      --- Gas leakage sensor breakers
      --- Alarm equipment
      --- Various safety devices, etc.
  
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