GP2D02 Compact, High Sensitive Distance Measuring Sensor

**Features**

1. Impervious to color and reflectivity of reflective object
2. High precision distance measurement output for direct connection to microcomputer
3. Low dissipation current at OFF-state (dissipation current at OFF-state: TYP. 3 µA)
4. Capable of changing of distance measuring range through change the optical portion (lens)

**Applications**

1. Sanitary sensors
2. Human body sensors for consumer products such as electric fans and air conditioners
3. Garage sensors

   * PSD: Position Sensitive Detector

**Absolute Maximum Ratings** *(Ta=25°C, VCC=5V)*

<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>-0.3 to +10</td>
<td>V</td>
</tr>
<tr>
<td>*Input terminal voltage</td>
<td>Vin</td>
<td>-0.3 to +3</td>
<td>V</td>
</tr>
<tr>
<td>Output terminal voltage</td>
<td>BV0</td>
<td>-0.3 to +10</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>T_off</td>
<td>10 to +60</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>T_storage</td>
<td>40 to +70</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 Open drain operation input

**Operating Supply Voltage**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCC</td>
<td>4.4 to 7</td>
<td>V</td>
</tr>
</tbody>
</table>

*In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that occur in equipment using any of SHARP's devices, shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest version of the device specification sheets before using any SHARP's device.*
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>Distance measuring range</td>
<td>ΔL</td>
<td>*1</td>
<td>10</td>
<td></td>
<td>80</td>
<td>cm</td>
</tr>
<tr>
<td>Output terminal voltage</td>
<td>V_{OH}</td>
<td>Output voltage at High L= 20cm</td>
<td>VCC - 0.3</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>V_{OL}</td>
<td>Output voltage at Low *1</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
<td>V</td>
</tr>
<tr>
<td>Distance characteristics of output</td>
<td>D</td>
<td>L = 80cm, *1</td>
<td>-</td>
<td>75</td>
<td>-</td>
<td>DEC</td>
</tr>
<tr>
<td></td>
<td>ΔD</td>
<td>Output change at L=80 cm to 20 cm, *1</td>
<td>48</td>
<td>58</td>
<td>68</td>
<td>DEC</td>
</tr>
<tr>
<td>Dissipation current at operating</td>
<td>I_{CC}</td>
<td>L= 20cm, *1, *2</td>
<td>-</td>
<td>22</td>
<td>35</td>
<td>mA</td>
</tr>
<tr>
<td>Dissipation current at OFF-state</td>
<td>I_{off}</td>
<td>L = 20cm, *1</td>
<td>-</td>
<td>3</td>
<td>8</td>
<td>μA</td>
</tr>
<tr>
<td>Vin terminal current</td>
<td>I_{vin}</td>
<td>Vin = 0V</td>
<td>-</td>
<td>170</td>
<td>280</td>
<td>μA</td>
</tr>
</tbody>
</table>

Note) L : Distance to reflective object
DEC : Decimalized value of sensor output (8-bit serial)
*1 Reflective object : White paper (reflectivity : 90%)
*2 Average dissipation current value during distance measuring operation when detecting of input signal, Vin as shown in the timing chart
*3 Vin terminal : Open drain drive input.
Conditions : Vin terminal current at Vin OFF-state : -1 μA
Vin terminal current at Vin ON-state : 0.3V

Test Circuit

1. Test circuit

![Diagram of test circuit]

2. Vin input signal for measurement

![Timing chart]
**Fig. 1 Distance Measuring Output vs. Distance to Reflective Object**

White paper: KODAK made gray chart R-27, white surface (reflectivity: 90%)

Gray paper: KODAK made gray chart R-27, gray surface (reflectivity: 18%)
Fig. 2 Detection Distance vs. Sensing Range

Test Method for Sensing Range Characteristics

Reflective object
White paper
(reflectivity : 90%)
Detecting portion
Emitting portion
Sensor

Sensing distance : 80 cm
Sensing distance : 50 cm
Sensing distance : 20 cm

Fig. 3 Detection Distance vs. Illuminance

Test Method for Anti External Disturbing Light Characteristics

Reflective object
KODAK made white paper
(reflectivity : 90%)
Illuminance meter
Sensor
Sunlight

Sensing distance : 80 cm
Sensing distance : 50 cm
Sensing distance : 20 cm