**GP2D02**

**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**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>$V_{CC}$</td>
<td>- 0.3 to + 10</td>
<td>V</td>
</tr>
<tr>
<td>Input terminal voltage</td>
<td>$V_{in}$</td>
<td>- 0.3 to + 3</td>
<td>V</td>
</tr>
<tr>
<td>Output terminal voltage</td>
<td>$BV_O$</td>
<td>- 0.3 to + 10</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>$T_{opr}$</td>
<td>- 10 to + 60</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{ag}$</td>
<td>- 40 to + 70</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 Open drain operation input

**Outline Dimensions**

(Unit: mm)

![Diagram of GP2D02](image)

**Block Diagram**

- Signal processing circuit
- LED drive circuit
- Control circuit
- Reflective object

**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

**Operating Supply Voltage**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CC}$</td>
<td>4.4 to 7</td>
<td>V</td>
</tr>
</tbody>
</table>

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## Electro-optical Characteristics

(Ta=25°C, Vcc=5V)

<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\text{OH}</td>
<td>Output voltage at High</td>
<td>L = 20cm</td>
<td>V\text{CC} - 0.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>V\text{OL}</td>
<td>Output voltage at Low</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\text{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\text{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\text{vin}</td>
<td>Vin = 0V</td>
<td>-</td>
<td>-</td>
<td>170</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>280</td>
<td>μA</td>
<td></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

![Test Circuit Diagram](image)

2. Vin input signal for measurement
**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%)
**Test Method for Sensing Range Characteristics**

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

**Test Method for Anti External Disturbing Light Characteristics**

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

**Fig. 2 Detection Distance vs. Sensing Range**

Detection distance $L$ (cm)

Sensing range $X$ (mm)

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

**Fig. 3 Detection Distance vs. Illuminance**

Detection distance $L$ (cm)

Illuminance (lx)

- 50cm
- 30cm
- 15cm

0 5000 10000 15000 20000 25000 30000

0 10 20 30 40 50 60 70 80 90 100

50cm
30cm
15cm
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- Consumer electronics

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