GP2Y1010AU0F
Compact Optical Dust Sensor

■ Description

GP2Y1010AU0F is a dust sensor by optical sensing system. An infrared emitting diode (IRED) and an phototransistor are diagonally arranged into this device. It detects the reflected light of dust in air. Especially, it is effective to detect very fine particle like the cigarette smoke. In addition it can distinguish smoke from house dust by pulse pattern of output voltage.

■ Features

1. Compact, thin package (46.0 × 30.0 × 17.6 mm)
2. Low consumption current (Icc: MAX. 20 mA)
3. The presence of dust can be detected by the photometry of only one pulse
4. Enable to distinguish smoke from house dust
5. Lead-free and RoHS directive compliant

■ Compliance

1. Compliant with RoHS directive (2002/95/EC)

■ Applications

1. Detecting of dust in the air.
2. Example: Air purifier, Air conditioner, Air monitor

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■ Internal schematic

![Internal schematic diagram](image)

■ Outline Dimensions

( Unit : mm )

![Outline Dimensions diagram](image)

* Unspecified tolerance : ± 0.3 mm.

The dimensions in parenthesis are shown for reference.

Product mass : approx. 16 g
Marking information

Date code (2 digit)

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repeats in a 10 year cycle

Country of origin

Philippines
■ Absolute Maximum Ratings

<table>
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<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
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<tr>
<td>Supply voltage</td>
<td>V_CC</td>
<td>−0.3 to +7</td>
<td>V</td>
</tr>
<tr>
<td>*1 Input terminal voltage</td>
<td>V_LED</td>
<td>−0.3 to V_CC</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>T_Opr</td>
<td>−10 to +65</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>T_sol</td>
<td>−20 to +80</td>
<td>°C</td>
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</table>

*1 Open drain drive input

■ 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>
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<tbody>
<tr>
<td>Sensitivity</td>
<td>K</td>
<td>*1 *2 *3</td>
<td>0.35</td>
<td>0.5</td>
<td>0.65</td>
<td>V/(0.1mg/m³)</td>
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<tr>
<td>Output voltage at no dust</td>
<td>V_OC</td>
<td>*2 *3</td>
<td>0</td>
<td>0.9</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>Output voltage range</td>
<td>V_OH</td>
<td>*2 *3 RL=4.7kΩ</td>
<td>3.4</td>
<td>–</td>
<td>–</td>
<td>V</td>
</tr>
<tr>
<td>LED terminal current</td>
<td>I_LED</td>
<td>*2 LED terminal voltage = 0</td>
<td>–</td>
<td>10</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td>Consumption current</td>
<td>I_CC</td>
<td>*2 RL=∞</td>
<td>–</td>
<td>11</td>
<td>20</td>
<td>mA</td>
</tr>
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</table>

*1 Sensitivity is specified by the amount of output voltage change when dust density changes by 0.1 mg/m³.
And the dust density for detection is a value of the density of cigarette (MILD SEVEN®) smoke measured
by the digital dust monitor (P-5L2: manufactured by SHIBATA SCIENTIFIC TECHNOLOGY LTD.).
*2 Input condition is shown in Fig. 1
*3 Output sampling timing is shown in Fig. 2

■ Recommended input condition for LED input terminal

<table>
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<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
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<tr>
<td>Pulse Cycle</td>
<td>T</td>
<td>10 ± 1</td>
<td>ms</td>
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<tr>
<td>Pulse Width</td>
<td>P_W</td>
<td>0.32 ± 0.02</td>
<td>ms</td>
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<tr>
<td>Operating Supply voltage</td>
<td>V_CC</td>
<td>5 ± 0.5</td>
<td>V</td>
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</table>
Fig. 1 Input Condition for LED Input Terminal

Fig. 2 Sampling Timing of Output Pulse

Fig. 3 Output Voltage vs. Dust Density

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

1 Connection of case and GND
Case material use conductive resin as cover case {printed model No.} and metal {test terminal side} as bottom cover. The metal case connects with GND in sensor.

2 Cleaning
Please don’t do cleaning, because there is a case that this device is not satisfied with its characteristics by cleaning.

3 Pulse input range
Please subject to recommendation as regard input condition for LED in order to keep reliability.

4 Dust adhesion
There is a case that this product does not detect the dust density correctly, since the dust adhered to the inside of the dust through hole may project into the detecting space which consist of emitter and detector light axis. Please take the structure and mechanism of the equipment into consideration to avoid the influence of adhered dust. And when the dust is adhered, please consider the maintenance such as vacuuming or blowing off the dust by air.
In addition, please pay attention to structure and placing location of the application to avoid any adhesive particle like oil, etc. to gets into the device. If it sticks to optical part, malfunction may occur.

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

6 Sensitivity adjustment VR
VR for sensitivity adjustment is set up at shipping from sharp. Please do not touch the VR or Electro-optical characteristics specified on the specification will be invalid.

7 Resolution
Please do not disassemble the device such as removing tapping screw and so on. Even if the device is reassembled, it may not satisfy the specification.

8 Application to fire alarm
Please do not use this device for a fire alarm application. When using this device to application other than air purifying and equipment with air purifying function, please inform us before usage.

9 Noise influence
If the sensor is located close to noise generator (ex. Electric dust collector, etc.), the sensor output may be affected by leaded noise. On top of that noise from power supply line also may affect the sensor output. When designing the system, please consider the effect from noise.

10 Vibration influence
The sensor may change its value under mechanical oscillation. Before usage, please make sure that the device works normally in the application.

11 Incident light influence
There is a case that the sensor output may be affected when outer-light comes through dust through hole on printed side. In order to avoid any influence from outer-light, please locate the printed side of sensor facing to inside of the application.

12 When inside of the sensor is moisturized, this product does not keep its proper function. Please design the application so that moisturization of the sensor does not happen.
• Presence of ODC etc.

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 PBB and PBDE 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).
■ Packing Specification

PACKING METHOD
1. Each tray holds 50 pieces. Packing methods are shown in (A).
2. Each box holds 5 trays. Pads are added to top (B).
3. The box is sealed with packing tape. (C) shows the location of the Model number, Quantity, and Inspection date.
4. Weight is approximately 5.6 kg
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    - Office automation equipment
    - Telecommunication equipment [terminal]
    - Test and measurement equipment
    - Industrial control
    - Audio visual equipment
    - Consumer electronics
  
  (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
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    - Traffic signals
    - Gas leakage sensor breakers
    - Alarm equipment
    - Various safety devices, etc.
  
  (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
    - Space applications
    - Telecommunication equipment [trunk lines]
    - Nuclear power control equipment
    - Medical and other life support equipment (e.g., scuba).

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### 产品及子类

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<tr>
<td>湿湿度传感器</td>
<td>Sensirion/Silicon Labs/MEAS/ST/TI 等公司的 SHT1X/2X/7X 温湿一体系列，HTU20/21D, HTS221, HDC1000/1008 系列，HYT221/271/939，铂电阻/NTC 热电阻/温敏电阻等</td>
</tr>
<tr>
<td>PM2.5 颗粒物传感器</td>
<td>SHARP 公司的 GP2Y1010AU0F/GP2Y1050AU0F/GP2Y1051AU0F 及 GE 公司 SM-PWM-01A 等模块</td>
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<tr>
<td>CO2 二氧化碳传感器</td>
<td>GE 公司 T6613/T6615 二氧化碳模块，SenseAir 公司 K30/S8 模块，ELT 公司 B530 系列等模块</td>
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<tr>
<td>多参数环境传感器模块</td>
<td>MSM-1401/1403/1405/1408/1411/1413/1415/1418 等集温湿度、粉尘颗粒物、二氧化碳和 VOC 空气质量传感器的多参数环境传感器模块</td>
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<tr>
<td>差压传感器</td>
<td>Sensirion / FSL 公司的 SDP600/1000/2000/2108 系列，MPL 系列 MEMS 压力传感器系列</td>
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<tr>
<td>电化学有毒气体传感器</td>
<td>美国高顿公司的 CO2 传感器，H2S 传感器，H2S 气体传感器，O2 传感器，氨气传感器，氯气传感器，有毒气体传感器，电化学气体传感器等</td>
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### 半导体器件

| CPU/MCU/ARM/DSIP 微处理器 | KINETIS 系列处理器（MK60DN512），MSP430 系列，C8051 系列，LPC 系列，STM32 系列，PIC 系列 |
| 数据转换器 | TI/ADI 公司数据转换器全系列产品，典型的如 AD88052, AD600 等 |
| 存储器 | 铸光/HYNIX 公司的 MT29F256/128/64 系列，H5DU 系列，FIFO 系列 |
| PCI-E 接口 | PCI19054/PEX8112/8169/8362/8648, TL16550/552/555/5920/5933 系列 |
| 无线连接 | TI 公司 CC3200/CC2530F256/CC2591/CC2540/CC1101 系列 WIFI 及 ZigBee 无线技术 |
| SIMCOM 公司的 SIM900B/900A/900D/900S 等 GSM/GPRS 通讯模块 |

### 电源芯片

| 电源芯片（可编程） | Micrel 全系列电源芯片，DIALOG 公司 DA9053-3HHA1/FHA1 系列可编程电源，与 FSL 的 IMX515/535/536 系列处理器配套使用 |

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