

# GP1S36

## Photointerrupter for Detecting Tilt Direction

### ■ Features

1. Subminiature (4.0×4.2×3.8mm)  
(with built-in super compact ball for detecting tilt direction)
2. 2-phase output type
3. Able to detect the tilt direction of both side ( $\pm 90^\circ$ ) by the position of rolling ball.
4. High reliability due to non-contact structure

### ■ Applications

1. Digital cameras
2. Camcoders

### ■ Absolute Maximum Ratings (Ta=25°C)

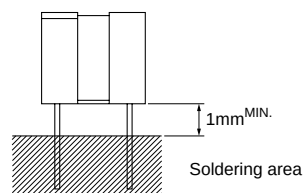
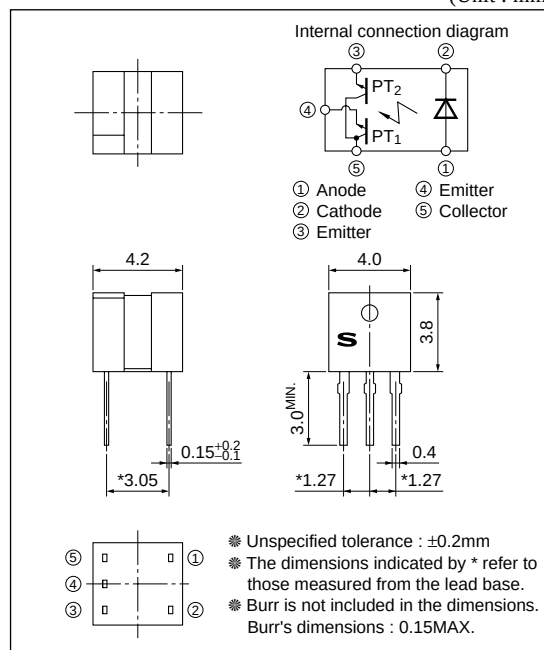
| Parameter | Symbol                      | Rating            | Unit        |
|-----------|-----------------------------|-------------------|-------------|
| Input     | Forward current             | I <sub>F</sub>    | 50          |
|           | Reverse voltage             | V <sub>R</sub>    | 6           |
|           | Power dissipation           | P                 | 75          |
| Output    | Collector-emitter voltage   | V <sub>CE1O</sub> | 35          |
|           |                             | V <sub>CE2O</sub> |             |
|           | Emitter-collector voltage   | V <sub>E1CO</sub> | 6           |
|           |                             | V <sub>E2CO</sub> |             |
|           | Collector current           | I <sub>C</sub>    | 20          |
|           | Collector Power dissipation | P <sub>C</sub>    | 75          |
|           | Total power dissipation     | P <sub>tot</sub>  | 100         |
|           | Operating temperature       | T <sub>opr</sub>  | -25 to +85  |
|           | Storage temperature         | T <sub>stg</sub>  | -40 to +100 |
|           | *1 Soldering temperature 1  | T <sub>sol</sub>  | 260         |
|           | *2 Soldering temperature 2  | T <sub>sol</sub>  | 320         |

\*1 For MAX. 5s

\*2 For MAX. 2s at the position of 0.8mm from the bottom face of resin package by hand soldering.

### ■ Outline Dimensions

(Unit : mm)



■ Electro-optical Characteristics

(Ta=25°C)

| Parameter                      |                                      |           | Symbol               | Conditions                                                           | MIN. | TYP. | MAX. | Unit |
|--------------------------------|--------------------------------------|-----------|----------------------|----------------------------------------------------------------------|------|------|------|------|
| Input                          | Forward voltage                      |           | V <sub>F</sub>       | I <sub>F</sub> =20mA                                                 | —    | 1.2  | 1.4  | V    |
|                                | Reverse current                      |           | I <sub>R</sub>       | V <sub>R</sub> =3V                                                   | —    | —    | 10   | μA   |
| *3 Output                      | Collector dark current               |           | I <sub>CEO</sub>     | V <sub>CE</sub> =20V                                                 | —    | —    | 100  | nA   |
| *3 Coupling<br>Characteristics | Collector current                    |           | I <sub>C</sub>       | V <sub>CE</sub> =5V, I <sub>F</sub> =5mA                             | 60   | —    | 360  | μA   |
|                                | *4 Leak current                      |           | I <sub>LEAK</sub>    | V <sub>CE</sub> =5V, I <sub>F</sub> =5mA                             |      |      | 15   | μA   |
|                                | Response time                        | Rise time | t <sub>r</sub>       | V <sub>CE</sub> =5V, I <sub>C</sub> =100μA<br>R <sub>L</sub> =1 000Ω | —    | 50   | 150  | μs   |
|                                |                                      | Fall time | t <sub>f</sub>       |                                                                      | —    | 50   | 150  | μs   |
|                                | Collector-emitter saturation voltage |           | V <sub>CE(sat)</sub> | I <sub>F</sub> =10mA, I <sub>C</sub> =60μA                           | —    | —    | 0.4  | V    |

\*3 Output and coupling characteristics are common to the both phototransistors.

\*4 Characteristics except leak current is measured at  $\theta=0^\circ$ ,  $\phi=0^\circ$ .

Leak current is the output current of transistor when  $\theta=\pm 90^\circ$ ,  $\phi=0^\circ$  and  $I_C=OFF$ .

■ Detecting Angle Characteristics

| $\theta$        | $-90^\circ$ | $\leftrightarrow$ | $-75^\circ$ | $\leftrightarrow$ | $-15^\circ$ | $\leftrightarrow$ | $+15^\circ$ | $\leftrightarrow$ | $+75^\circ$ | $\leftrightarrow$ | $+90^\circ$ |
|-----------------|-------------|-------------------|-------------|-------------------|-------------|-------------------|-------------|-------------------|-------------|-------------------|-------------|
| I <sub>C1</sub> | ON          |                   |             |                   |             |                   |             | *5                | OFF         |                   |             |
| I <sub>C2</sub> | OFF         |                   |             | *5                | ON          |                   |             |                   |             |                   |             |

※ Conditions :  $I_F=5\text{mA}$ ,  $V_{CC}=5\text{V}$ ,  $\phi=\pm 5^\circ$

\*5 Indefinite

$I_{C1}$  : Output current of phototransistors PT1

$I_{C2}$  : Output current of phototransistors PT2

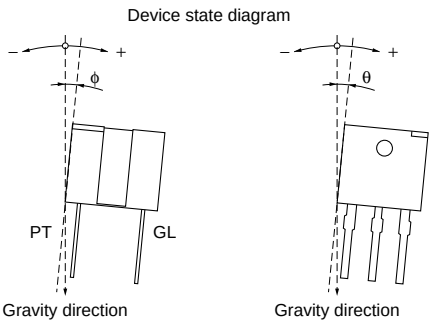
$\theta$  : Device condition : Refer to the figure

$\phi$  : Device condition : Refer to the figure

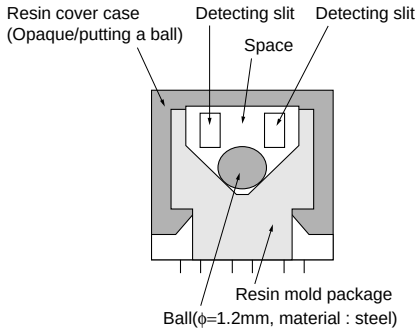
ON : Output current of phototransistors :  $60\mu\text{A}$  or more

OFF : Output current of phototransistors :  $15\mu\text{A}$  or less

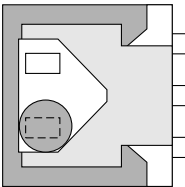
※ Output current of ON/OFF is output when device is at a standstill



■ Supplement



<90°rotation>



<Viewing from detecting side>

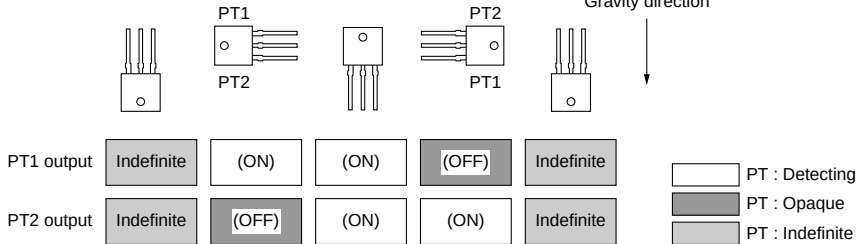


**Fig.1 Forward Current vs. Ambient Temperature**

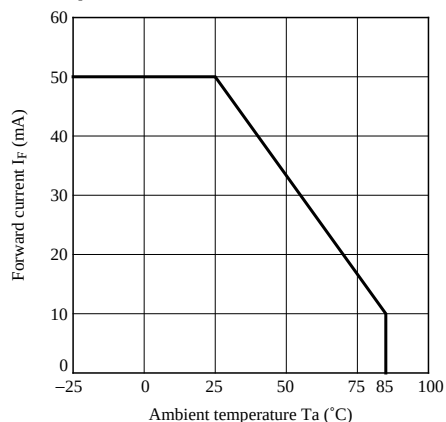


**Fig.2 Power Dissipation vs. Ambient Temperature**

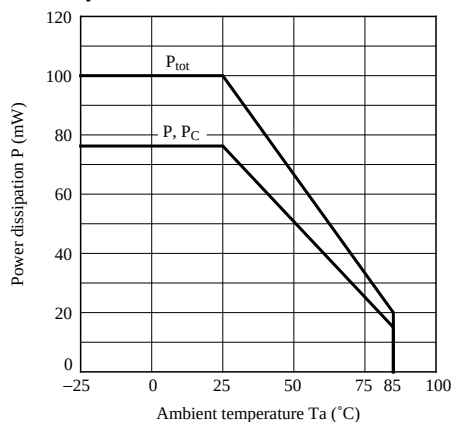


**Fig.3 Forward Current vs. Forward Voltage**

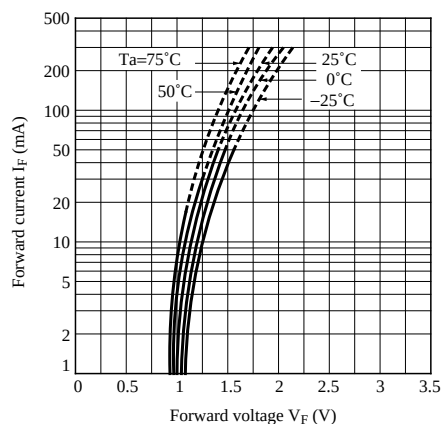


**Fig.4 Collector Current vs. Forward Current**

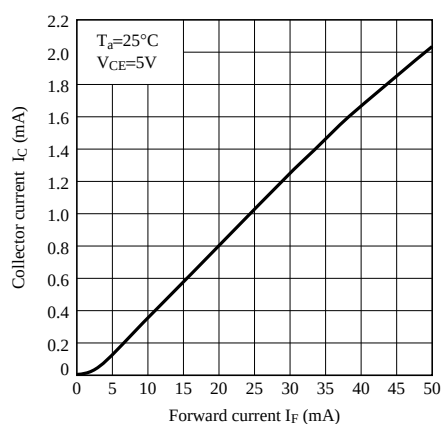


**Fig.5 Collector Current vs. Collector-emitter Voltage**

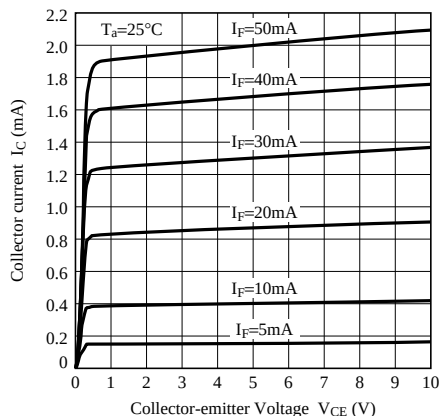


**Fig.6 Relative Collector Current vs. Ambient Temperature**

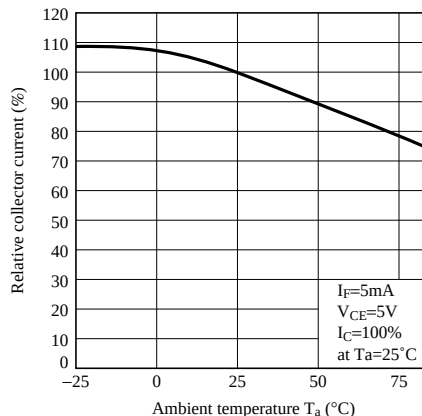
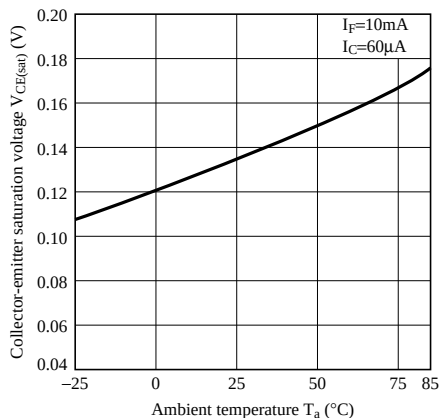
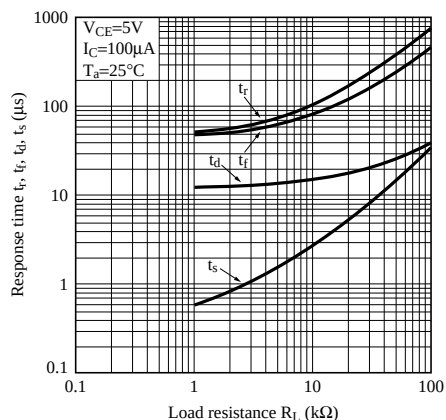
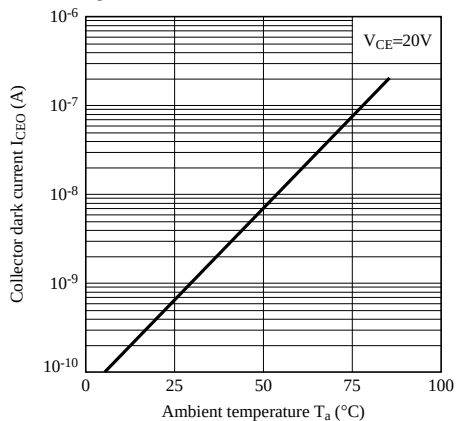
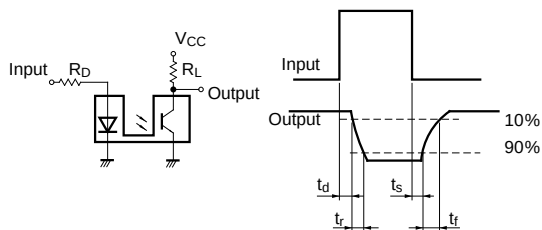


**Fig.7 Collector-emitter Saturation Voltage vs. Ambient Temperature**

**Fig.8 Response Time vs. Load Resistance**

**Fig.9 Collector Dark Current vs. Ambient Temperature**

**Fig.10 Test Circuit for Response Time**


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