Transmissive Photosensors (Photo Interrupters)

CNZ1111, CNZ1112 (ON1111, ON1112)

Photo Interrupters

For contactless SW, object detection

■ Overview

CNZ1111 and CNZ1112 are a photocoupler in which a high efficiency GaAs infrared light emitting diode is used as the light emitting element, and a high sensitivity phototransistor is used as the light detecting element. The two elements are arranged so as to face each other, and objects passing between them are detected.

■ Features

- Highly precise position detection : 0.3 mm
- Wide gap between emitting and detecting elements, suitable for thick plate detection
- Fast response : t_r, t_f = 6 µs (typ.)
- Small output current variation against change in temperature

■ Absolute Maximum Ratings (Ta = 25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input (Light emitting diode)</td>
<td>V_R</td>
<td>3</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>I_F</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>P_D</td>
<td>75</td>
<td>mW</td>
</tr>
<tr>
<td>Output (Photo transistor)</td>
<td>I_C</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>V_CEO</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>V_ECO</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>P_C</td>
<td>100</td>
<td>mW</td>
</tr>
<tr>
<td>Temperature</td>
<td>T_opr</td>
<td>–25 to +85</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>T_stg</td>
<td>–30 to +100</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 Input power derating ratio is 1.0 mW/°C at Ta ≥ 25°C.

*2 Output power derating ratio is 1.33 mW/°C at Ta ≥ 25°C.

(Note) ( ) Dimension is reference

CNZ1111, CNZ1112

Unit : mm

Mark for indicating LED side

Device center

Pin connection

Note) The part numbers in the parenthesis show conventional part number.
### Electrical Characteristics (Ta = 25°C)

<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 characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage (DC)</td>
<td>V_F</td>
<td>I_F = 50mA</td>
<td>1.2</td>
<td>1.5</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Reverse current (DC)</td>
<td>I_R</td>
<td>V_R = 3V</td>
<td></td>
<td></td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td>Output characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector cutoff current</td>
<td>I_CEO</td>
<td>V_CE = 10V</td>
<td></td>
<td></td>
<td>200</td>
<td>nA</td>
</tr>
<tr>
<td>Collector to emitter capacitance</td>
<td>C_C</td>
<td>V_CE = 10V, f = 1MHz</td>
<td></td>
<td></td>
<td>5</td>
<td>pF</td>
</tr>
<tr>
<td>Collector current</td>
<td>I_C</td>
<td>V_CE = 10V, I_F = 20mA</td>
<td>0.3</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Response time</td>
<td>t_r, t_f</td>
<td>V_CC = 10V, I_C = 1mA, R_L = 100Ω</td>
<td></td>
<td>6</td>
<td></td>
<td>µs</td>
</tr>
<tr>
<td>Collector to emitter saturation voltage</td>
<td>V_CE(sat)</td>
<td>I_F = 50mA, I_C = 0.1mA</td>
<td></td>
<td>0.3</td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>

* Switching time measurement circuit

- t_d: Delay time
- t_r: Rise time (Time required for the collector current to increase from 10% to 90% of its final value)
- t_f: Fall time (Time required for the collector current to decrease from 90% to 10% of its initial value)

![Diagrams](image-url)
Caution for Safety

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