

# ON1109

## Photo Interrupter

For contactless SW, object detection

### Outline

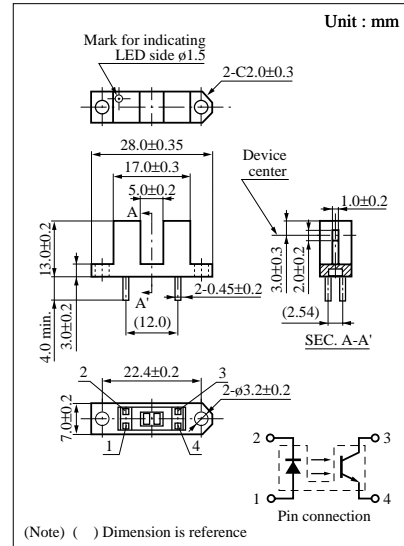
ON1109 is a photocoupler in which a high efficiency GaAs infrared light emitting diode is used as the light emitting element, and a high sensitivity phototransistor is used as the light detecting element. The two elements are arranged so as to face each other, and objects passing between them are detected.

### Features

- Highly precise position detection : 0.7 mm
- Fast response :  $t_r, t_f = 6 \mu s$  (typ.)
- Small output current variation against change in temperature
- Deep and wide gap between emitting and detecting elements

### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

|                              | Parameter                     | Symbol     | Ratings     | Unit       |
|------------------------------|-------------------------------|------------|-------------|------------|
| Input (Light emitting diode) | Reverse voltage (DC)          | $V_R$      | 3           | V          |
|                              | Forward current (DC)          | $I_F$      | 50          | mA         |
|                              | Power dissipation             | $P_D^{*1}$ | 75          | mW         |
| Output (Photo transistor)    | Collector current             | $I_C$      | 20          | mA         |
|                              | Collector to emitter voltage  | $V_{CEO}$  | 30          | V          |
|                              | Emitter to collector voltage  | $V_{ECO}$  | 5           | V          |
|                              | Collector power dissipation   | $P_C^{*2}$ | 100         | mW         |
| Temperature                  | Operating ambient temperature | $T_{opr}$  | -25 to +85  | $^\circ C$ |
|                              | Storage temperature           | $T_{stg}$  | -30 to +100 | $^\circ C$ |



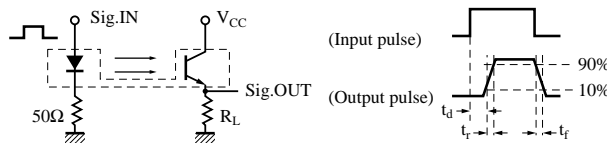
\*1 Input power derating ratio is 1.0 mW/ $^\circ C$  at  $T_a \geq 25^\circ C$ .

\*2 Output power derating ratio is 1.34 mW/ $^\circ C$  at  $T_a \geq 25^\circ C$ .

### Electrical Characteristics ( $T_a = 25^\circ C$ )

|                          | Parameter                               | Symbol        | Conditions                                 | min | typ | max | Unit    |
|--------------------------|-----------------------------------------|---------------|--------------------------------------------|-----|-----|-----|---------|
| Input characteristics    | Forward voltage (DC)                    | $V_F$         | $I_F = 50mA$                               |     | 1.2 | 1.5 | V       |
|                          | Reverse current (DC)                    | $I_R$         | $V_R = 3V$                                 |     |     | 10  | $\mu A$ |
| Output characteristics   | Collector cutoff current                | $I_{CEO}$     | $V_{CE} = 10V$                             |     |     | 200 | nA      |
|                          | Collector to emitter capacitance        | $C_C$         | $V_{CE} = 10V, f = 1MHz$                   |     | 5   |     | pF      |
| Transfer characteristics | Collector current                       | $I_C$         | $V_{CE} = 10V, I_F = 20mA$                 | 0.3 |     |     | mA      |
|                          | Response time                           | $t_r, t_f^*$  | $V_{CC} = 10V, I_C = 1mA, R_L = 100\Omega$ |     | 6   |     | $\mu s$ |
|                          | Collector to emitter saturation voltage | $V_{CE(sat)}$ | $I_F = 50mA, I_C = 0.1mA$                  |     |     | 0.3 | V       |

\* 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)

