

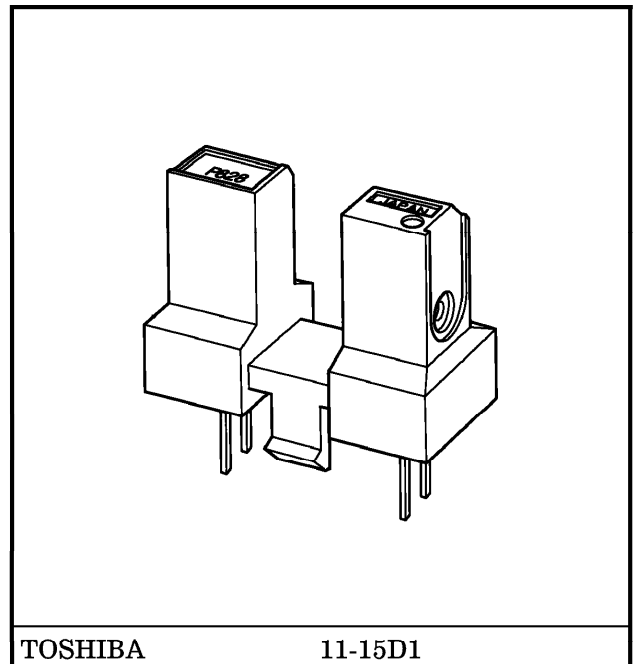
TOSHIBA PHOTO-INTERRUPTER INFRARED LED + PHOTOTRANSISTOR

**TLP828**

MOTOR ROTATION SENSOR FOR OIL-FIRED HEATERS  
 LOUVER LOCATION SENSOR FOR AIR CONDITIONERS  
 PAPER PASS DETECTION FOR TICKET VENDING MACHINES  
 PAPER DETECTOR FOR PRINTERS AND FAX MACHINES

The TLP828 is a photo-interrupter which incorporates a GaAs infrared LED and a fast-response Si phototransistor in a dust-proof package.

- Snap-in mounting type (for 1.6 mm thick PCBs)
- The part of the package which houses the sensor is only dust-proof in the sense that there is no slit in it.
- High current transfer ratio :  $I_C/I_F = 7.5\%$  (min)
- Gap : 5 mm
- Resolution : 1.5 mm
- Package material : Polycarbonate (UL94V-2)
- Detector impermeable to visible light
- Fast response speed :  $t_r, t_f = 15 \mu s$  (typ.)



TOSHIBA

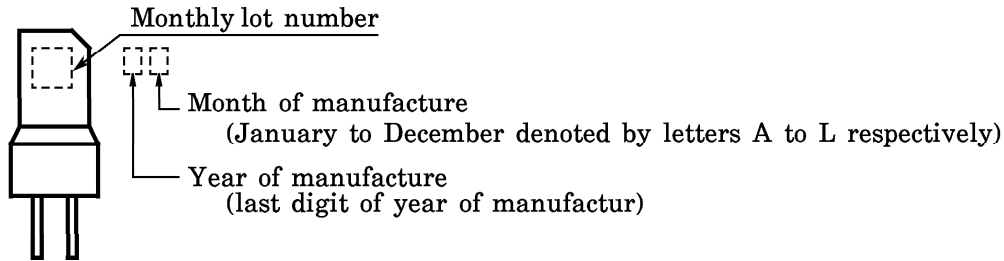
11-15D1

Weight : 0.7 g (typ.)

## MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC              |  | SYMBOL                  | RATING | UNIT    |
|-----------------------------|--|-------------------------|--------|---------|
| LED                         | Forward Current                                  | $I_F$                   | 50     | mA      |
|                             | Forward Current Derating (Ta > 25°C)             | $\Delta I_F / ^\circ C$ | -0.33  | mA / °C |
|                             | Reverse Voltage                                  | $V_R$                   | 5      | V       |
| DETECTOR                    | Collector-Emitter Voltage                        | $V_{CEO}$               | 35     | V       |
|                             | Emitter-Collector Voltage                        | $V_{ECO}$               | 5      | V       |
|                             | Collector Power Dissipation                      | $P_C$                   | 75     | mW      |
|                             | Collector Power Dissipation Derating (Ta > 25°C) | $\Delta P_C / ^\circ C$ | -1     | mW / °C |
|                             | Collector Current                                | $I_C$                   | 50     | mA      |
|                             | Operating Temperature Range                      | $T_{opr}$               | -25~85 | °C      |
| Storage Temperature Range   | $T_{stg}$  | -40~100                 | °C     |         |
| Soldering Temperature (5 s) | $T_{sol}$  | 260                     | °C     |         |

**MARKINGS**



**RECOMMENDED OPERATING CONDITIONS**

| CHARACTERISTIC  | SYMBOL   | Min | Typ. | Max | UNIT |
|-----------------|----------|-----|------|-----|------|
| Supply Voltage  | $V_{CC}$ | —   | 5    | 24  | V    |
| Forward Current | $I_F$    | —   | —    | 25  | mA   |

**OPTICAL AND ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

| CHARACTERISTIC |                                      | SYMBOL                 | TEST CONDITION  | Min  | Typ.   | Max      | UNIT          |
|----------------|--------------------------------------|------------------------|---|--|--------|----------|---------------|
| LED            | Forward Voltage                      | $V_F$                  | $I_F = 10 \text{ mA}$                                   | 1.00   | 1.15   | 1.30     | V             |
|                | Reverse Current                      | $I_R$                  | $V_R = 5 \text{ V}$                                     | —  | —      | 10       | $\mu\text{A}$ |
|                | Peak Emission Wavelength             | $\lambda_P$            | $I_F = 20 \text{ mA}$                                   | —  | 940    | —        | nm            |
| DETECTOR       | Dark Current                         | $I_D (I_{CEO})$        | $V_{CE} = 24 \text{ V}, I_F = 0$                        | —  | —      | 0.1      | $\mu\text{A}$ |
|                | Peak Sensitivity Wavelength          | $\lambda_P$            | —   | —  | 870    | —        | nm            |
| COUPLED        | Current Transfer Ratio               | $I_C / I_F$            | $V_{CE} = 5 \text{ V}, I_F = 10 \text{ mA}$             | 7.5  | —      | —        | %             |
|                | Collector-Emitter Saturation Voltage | $V_{CE} (\text{sat})$  | $I_F = 20 \text{ mA}, I_C = 0.75 \text{ mA}$            | —  | 0.15   | 0.35     | V             |
|                | Leakage Current                      | $I_{LEAK}$             | $V_{CE} = 5 \text{ V}, I_F = 50 \text{ mA}$<br>(Note 1) | —  | —      | 10       | $\mu\text{A}$ |
|                | Switching Times                      | Rise Time<br>Fall Time | $t_r$<br>$t_f$  | $V_{CC} = 5 \text{ V}, I_C = 1 \text{ mA},$<br>$R_L = 1 \text{ k}\Omega$ | —<br>— | 15<br>15 | 50<br>50      |

(Note 1) : When the top 5.1 mm of the device is blocked off from light by a shutter.

## PRECAUTIONS

1. Be careful that no solder is attached to the case body.
2. Clean only the soldered part of the leads. Do not immerse the entire package in the cleaning solvent.
3. Mount the device on a level surface.
4. Do not apply solder to the pins of the device's connector. Make sure that the connector is plugged into a recommended connector.
5. Keep the device away from external light. Although the photo-IC is of low optical sensitivity, the device may malfunction if external light with a wavelength of 700 nm or more is allowed to impinge on it.
6. The package is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol and aliphatic hydrocarbons, however, with petrochemicals (such as benzene, toluene and acetone), alkalis, aromatic hydrocarbons, or chloric hydrocarbons, polycarbonate may crack, swell or melt. Please take this into account when choosing a packaging material by referring to the table below.

<Chemicals which should not be used with polycarbonate>

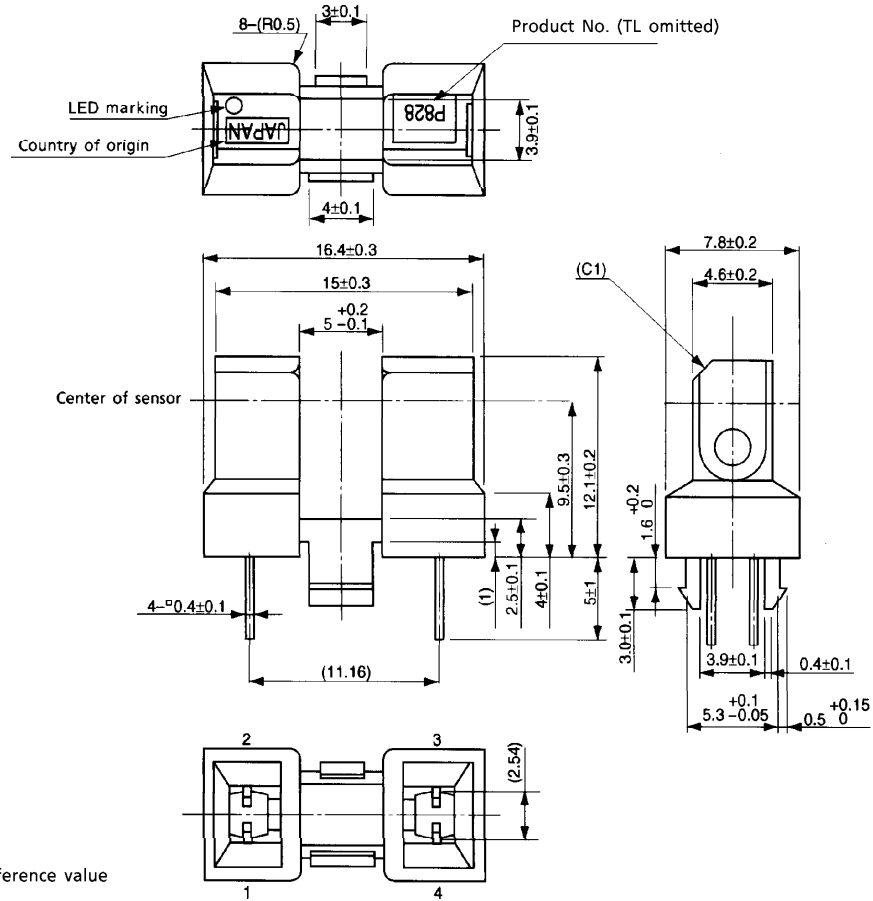
|   | PHENOMENON                        | CHEMICALS   |
|---|-----------------------------------|---|
| A | Staining and slight deterioration | <ul style="list-style-type: none"> <li>• Nitric acid (diluted), hydrogen peroxide, chlorine</li> </ul>  |
| B | Cracking, crazed or swelling      | <ul style="list-style-type: none"> <li>• Acetic acid (70% or more)</li> <li>• Gasoline</li> <li>• Methyl ethyl ketone, ethyl acetate, butyl acetate</li> <li>• Ethyl methacrylate, ethyl ether, MEK</li> <li>• Acetone, m-amino alcohol, carbon tetrachloride</li> <li>• Carbon disulfide, trichloroethylene, cresol</li> <li>• Thinners, oil of turpentine</li> <li>• Triethanolamine, TCP, TBP</li> </ul> |
| C | Melting<br>{ } : Used as solvent  | <ul style="list-style-type: none"> <li>• Concentrated sulfuric acid</li> <li>• Benzene</li> <li>• Styrene, acrylonitrile, vinyl acetate</li> <li>• Ethylenediamine, diethylenediamine</li> <li>• {Chloroform, methyl chloride, tetrachloromethane, dioxane, }<br/>1, 2-dichloroethane</li> </ul>  |
| D | Decomposition                     | <ul style="list-style-type: none"> <li>• Ammonia water</li> <li>• Other alkalis</li> </ul>  |

7. When designing a circuit, take into account this change in conversion efficiency over time. The ratio of fluctuation in conversion efficiency to fluctuation in infrared LED optical output is 1:1.

$$\frac{I_C / I_F(t)}{I_C / I_F(0)} = \frac{P_O(t)}{P_O(0)}$$

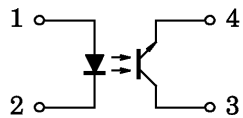
PACKAGE DIMENSIONS  
11-15D1

Unit : mm



Weight : 0.7 g (typ.)

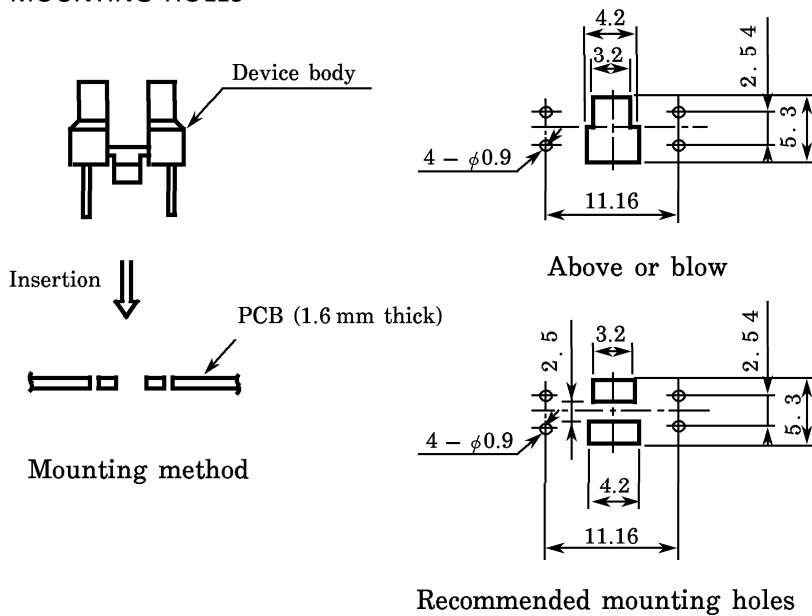
PIN CONNECTION



1. Anode
2. Cathode
3. Collector
4. Emitter

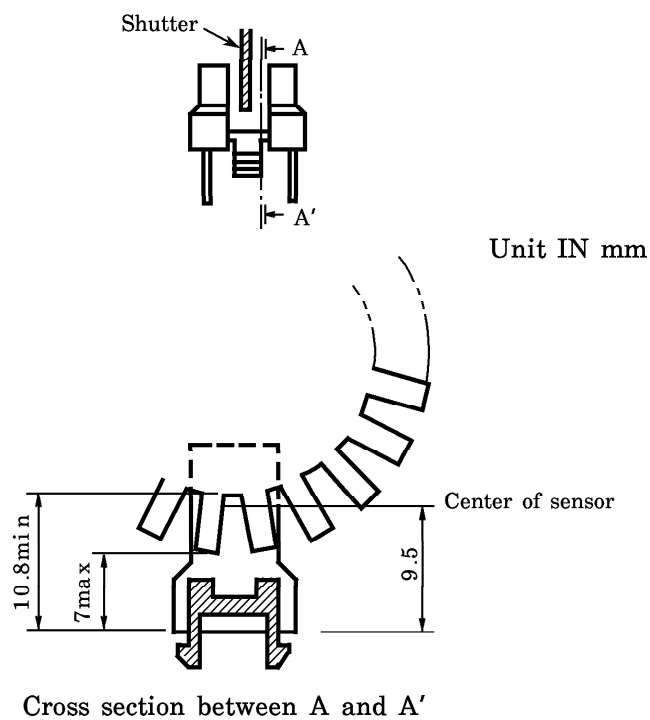
RECOMMENDED MOUNTING HOLES

Unit : mm



RELATIVE POSITIONING OF SHUTTER AND DEVICE

For normal operation position the shutter and the device as shown in the figure below. By considering the device's detection direction characteristic and switching time, determine the shutter slit width and pitch.



**RESTRICTIONS ON PRODUCT USE**

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