

TOSHIBA PHOTOINTERRUPTER INFRARED LED + PHOTOTRANSISTOR

# TPL1242(C6)

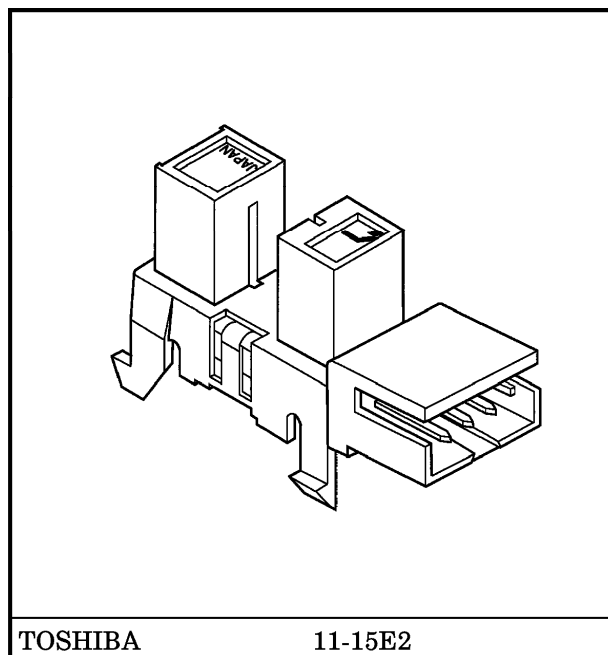
COPIER, PAGE PRINTER, FACSIMILE

FAN-HEATER, AIR CONDITIONER

TERMINAL EQUIPMENT IN BANKING FACILITIES

GAME MACHINE

TLP1242(C6) is a compact photointerrupter with attached connector which uses a high-radiant power GaAs infrared LED and a Si photo-transistor. TLP1242(C6) is a photointerrupter in highly reliable package which eliminates the need for printed circuit board and soldering. It is optimum as a paper carrier location sensor for copiers and page printers. Operating temperature is up to 95°C. Thus the device can be used for high-temperature applications like paper-out sensors or air direction for air conditioner louvers. Open collector outputs are enabled using a phototransistor.



TOSHIBA

11-15E2

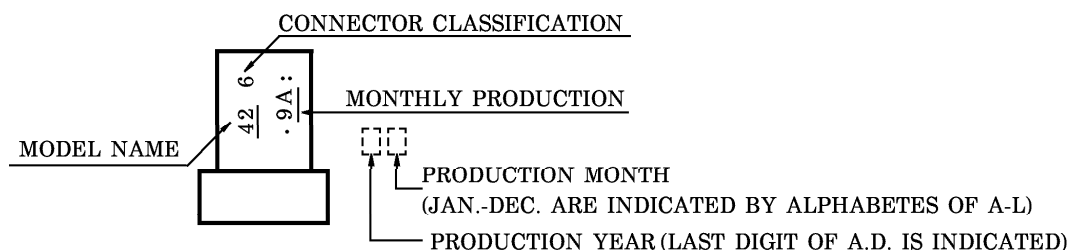
Weight : 1.3 g (Typ.)

- High reliability package (PWBless, Solderingless)
- Small package
- Mountable by one touch (Snap-in mounting type)
- Mountable to boards in 3 kinds of thickness (1.0 mm, 1.2 mm, 1.6 mm)
- Gap : 5 mm
- Resolution : Slit width 0.5 mm
- High temperature operating :  $T_{opr} = 95^{\circ}\text{C}$  (Max.)
- High current transfer ratio :  $I_C / I_F = 5\%$  (Min.)
- Connected to the CT connector (2 mm pitch MT receptacle type, MT crimp receptacle type II) made by AMP (Japan), Ltd.
- Material of the case : Body ..... Polycarbonate (UL94V-2, Black)  
: Connector .. 66 nylon (UL94V-0, White)

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## PRODUCT INDICATION

MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

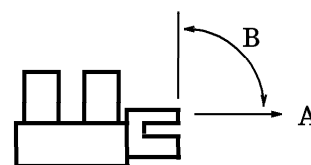
| CHARACTERISTIC  |                              | SYMBOL                        | RATING  | UNIT                  |
|---|------------------------------|-------------------------------|---------|-----------------------|
| Forward Current   |                              | $I_F$                         | 50      | mA                    |
| Forward Current Derating  | ( $T_a > 25^\circ\text{C}$ ) | $\Delta I_F / ^\circ\text{C}$ | -0.33   | mA / $^\circ\text{C}$ |
|   | ( $T_a > 85^\circ\text{C}$ ) |                               | -2      |                       |
| Reverse Voltage   |                              | $V_R$                         | 6       | V                     |
| 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 ( $T_a > 25^\circ\text{C}$ ) |                              | $\Delta P_C / ^\circ\text{C}$ | -1      | mW / $^\circ\text{C}$ |
| Collector Current   |                              | $I_C$                         | 50      | mA                    |
| Operating Temperature Range                                       |                              | $T_{opr}$                     | -30~95  | $^\circ\text{C}$      |
| Storage Temperature Range   |                              | $T_{stg}$                     | -40~100 | $^\circ\text{C}$      |

OPTO-ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

| 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             | $\lambda_P$           | $I_F = 10 \text{ mA}$                       | —    | 940   | —    | nm            |
| DETECTOR       | Dark Current                         | $I_D (I_{CEO})$       | $V_{CE} = 24 \text{ V}, I_F = 0$            | —    | 0.001 | 0.1  | $\mu\text{A}$ |
|                | Peak Sensitivity Wavelength          | $\lambda_P$           |   | —    | 870   | —    | nm            |
| COUPLED        | Current Transfer Ratio               | $I_C / I_F$           | $V_{CE} = 2 \text{ V}, I_F = 10 \text{ mA}$ | 5    | —     | 100  | %             |
|                | Collector-Emitter Saturation Voltage | $V_{CE} (\text{sat})$ | $I_F = 20 \text{ mA}, I_C = 0.5 \text{ mA}$ | —    | 0.1   | 0.35 | V             |
|                | Rise Time                            | $t_r$                 | $V_{CC} = 5 \text{ V}, I_C = 1 \text{ mA},$ | —    | 15    | 50   | $\mu\text{s}$ |
|                | Fall Time                            | $t_f$                 | $R_L = 1 \text{ k}\Omega$                   | —    | 15    | 50   |               |

## TERMINAL STRENGTH (Ta = 25°C)

| CHARACTERISTIC    |      | TEST CONDITION |              | LIMIT                                   |
|-------------------|------|----------------|--------------|---|
| TERMINAL STRENGTH | PULL | DIRECTION      | A            | NO DEFECT OF ELECTRICAL CHARACTERISTICS |
|                   |      | WEIGHT         | 19.6 N       |   |
|                   |      | TIME           | 5 s / ONCE   |   |
|                   | BEND | DIRECTION      | B            |   |
|                   |      | WEIGHT         | 9.8 N        |   |
|                   |      | TIME           | 5 s / THRICE |   |



## MATCHED CONNECTOR

AMP (Japan), Ltd. made CT connector (2 mm pitch MT receptacle type)

| HOUSING-TERMINAL<br>EN BLOCK TYPE | TYPE No. | TERMINAL<br>MATERIAL | AWG SIZE | INSULATION<br>DIAMETER |
|-----------------------------------|----------|----------------------|----------|------------------------|
|                                   | 173977-3 | PHOSPHOR BRONZE      | AWG26~28 | 0.85~1.05 mm           |

AMP (Japan), Ltd. made CT connector (2 mm pitch MT crimp receptacle type II)

| HOUSING  | 179228-3 |                 |                    |          |                        |
|----------|----------|-----------------|--------------------|----------|------------------------|
| TERMINAL | TYPE No. | PRODUCT<br>FORM | MATERIAL           | AWG SIZE | INSULATION<br>DIAMETER |
|          | 179518-1 | LOOSEN          | PHOSPHOR<br>BRONZE | AWG22~26 | 0.93~1.5 mm            |
|          | 179227-1 | LINKED          |                    |          |                        |

For details of the matched connectors, please refer to the connector maker.

## PRECAUTION

1. A visible light cut-off type phototransistor which blocks light with frequencies of 700 nm or less is used.  
However, the device cannot block ambient light with a wave length of 700 nm or more, or sunlight. Install avoiding interference from external light.
2. The environment to install the device should be determined carefully. Oil or chemicals may cause the package to be dissolved or cracked.
3. When installing, avoid to work by holding the connector by hand. Always, install by holding the main body of the device while assuring the metal board is not warped or twisted. The connectors shall be inserted or pulled out at normal temperature.
4. It is recommended to mount this product by inserting from the metal board pressed side.
5. We recommend checking the strength of the mounting on metal board by mounting the device in advance.
6. Do not solder to the pins of the connector block. Use the matched connector.
7. When connecting/disconnecting the connector, hold the matched connector and power line in parallel to the TLP1242 pins. Pushing or pulling diagonally may damage the connector block or degrade the connection.
8. Conversion efficiency drops with time due to current to infrared LED.  
Design the circuit taking the time change in conversion efficiency into consideration.  
Fluctuation of conversion efficiency versus fluctuation of optical output of infrared LED is 1 : 1.

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

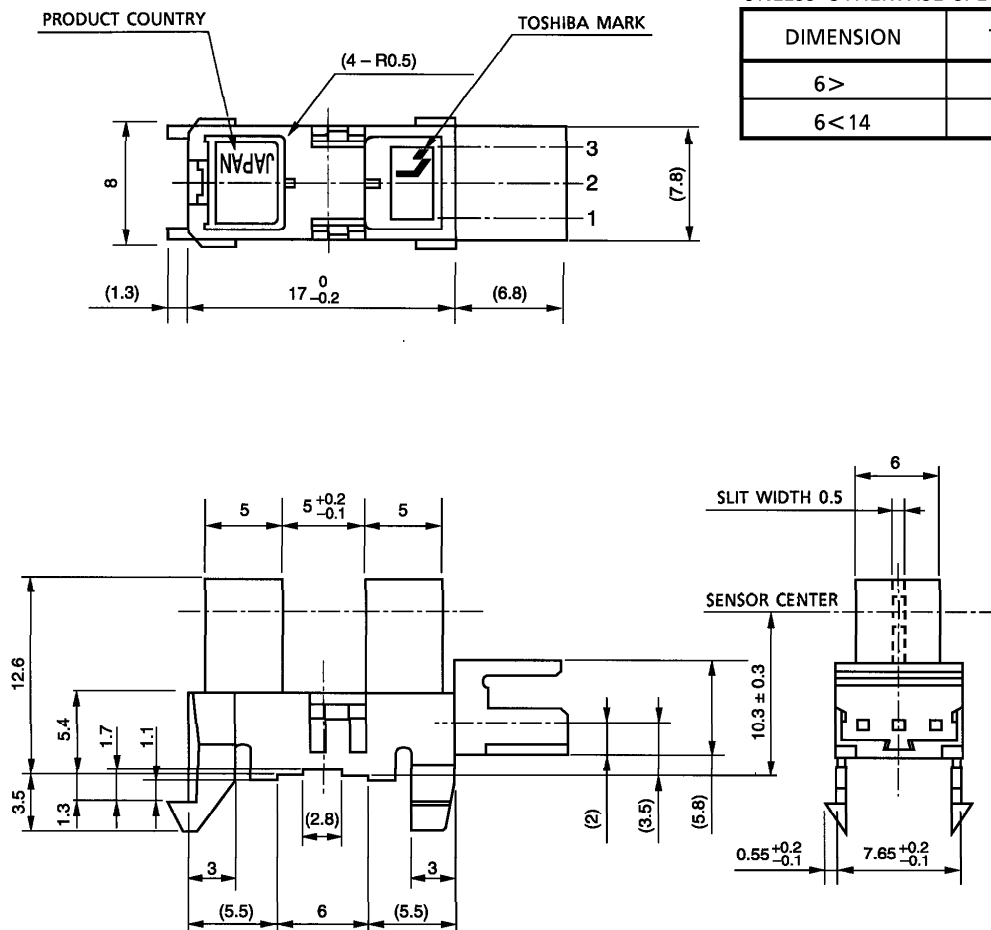
OUTLINE : TOSHIBA 11-15E2

Unit in mm

( ) : REFERENCE VALUE

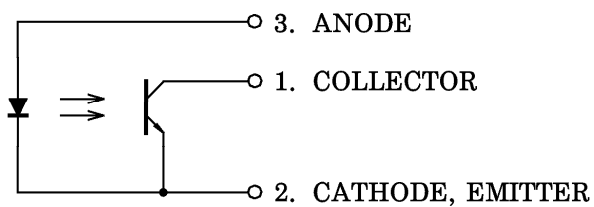
UNLESS OTHERWISE SPECIFIED

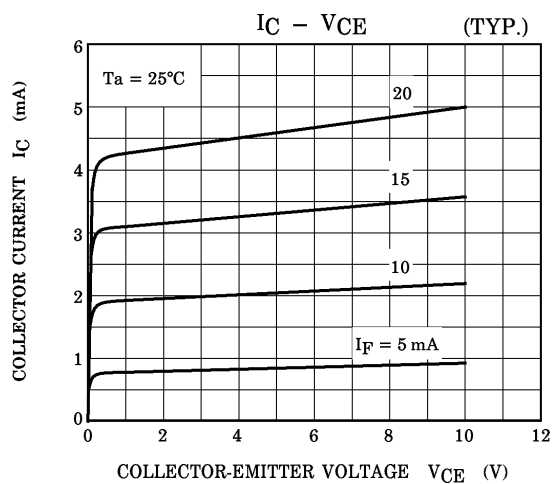
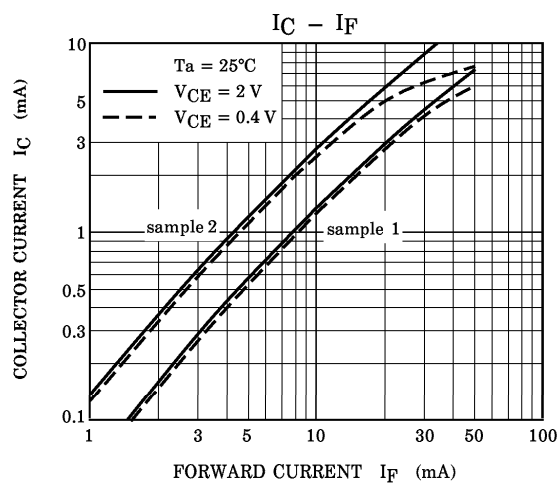
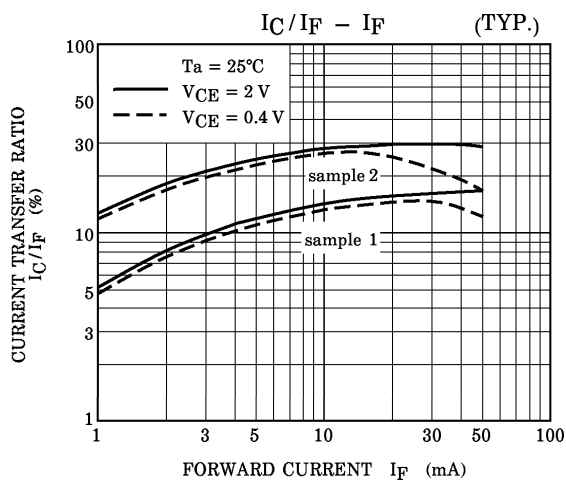
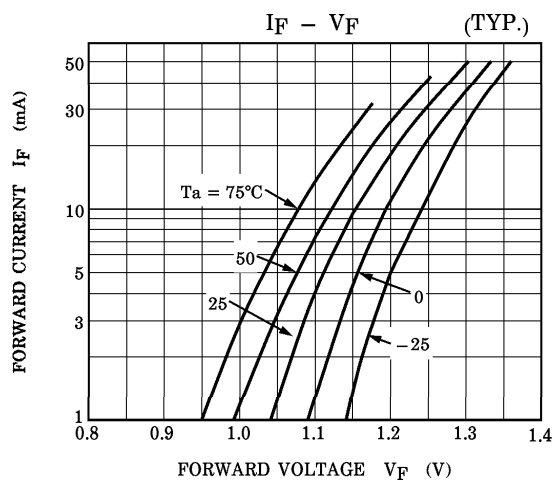
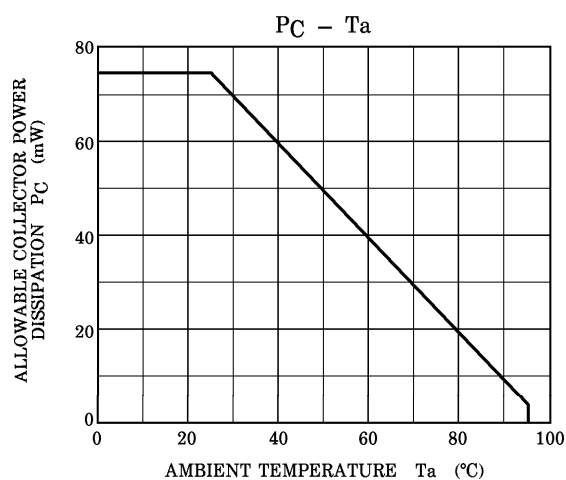
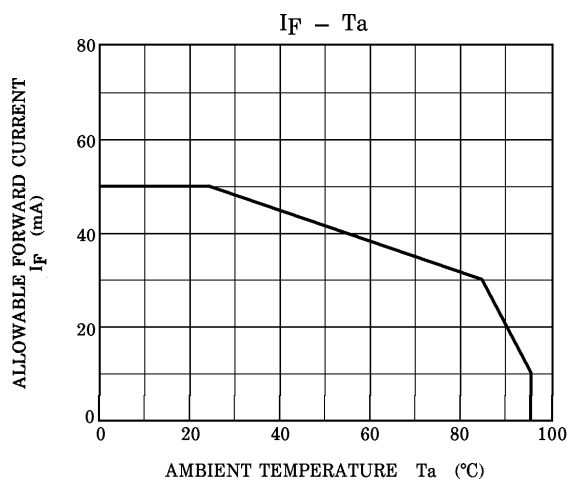
| DIMENSION | TOLERANCE |
|-----------|-----------|
| 6 >       | ± 0.1     |
| 6 < 14    | ± 0.2     |

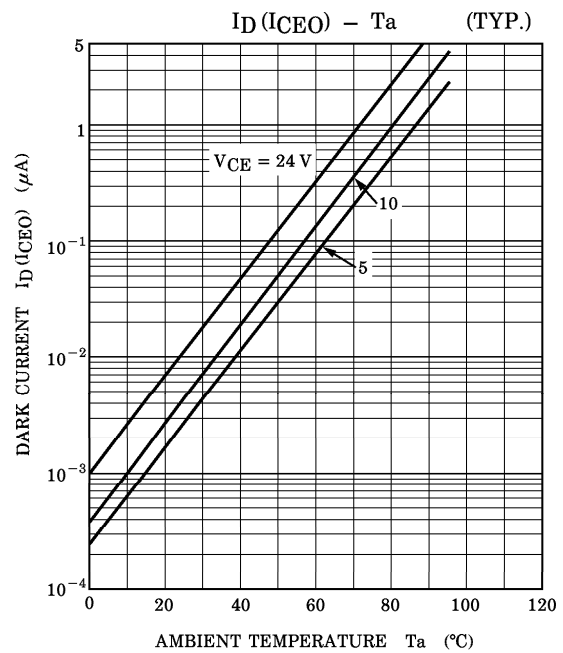
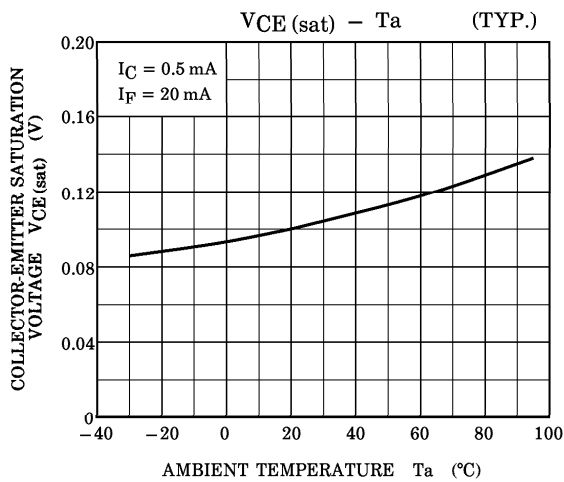
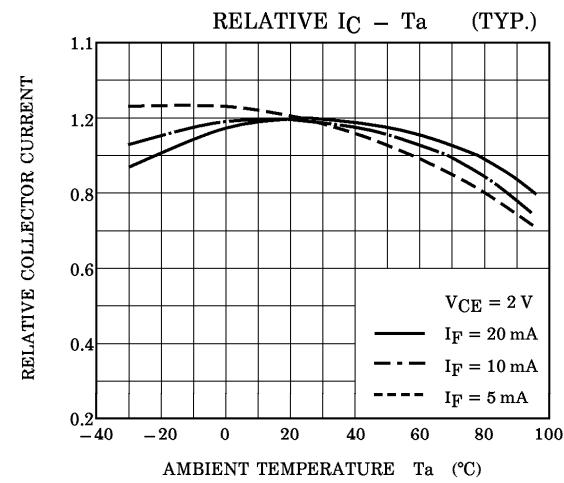


Weight : 1.3 g (Typ.)

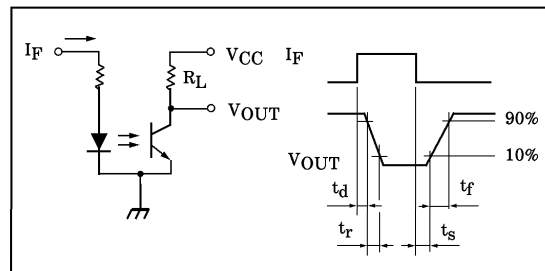
## PIN CONNECTION

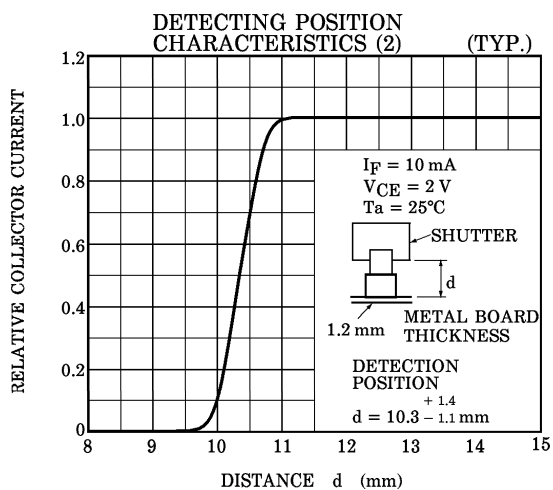
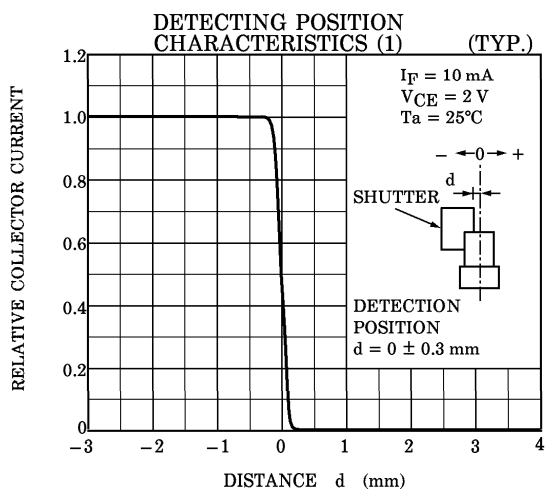
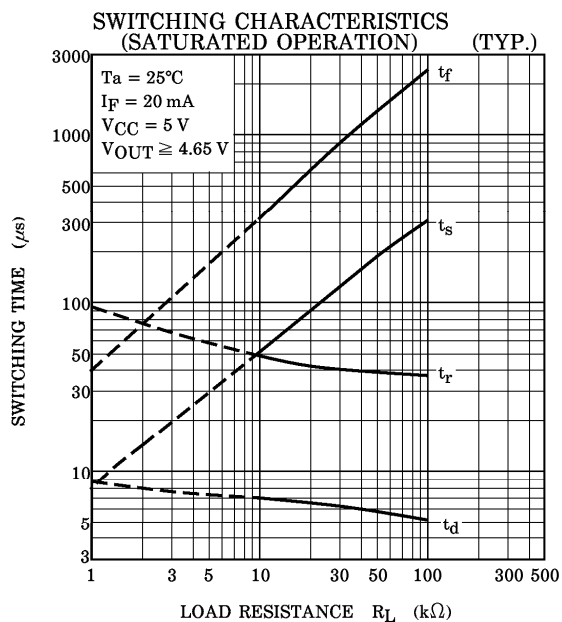
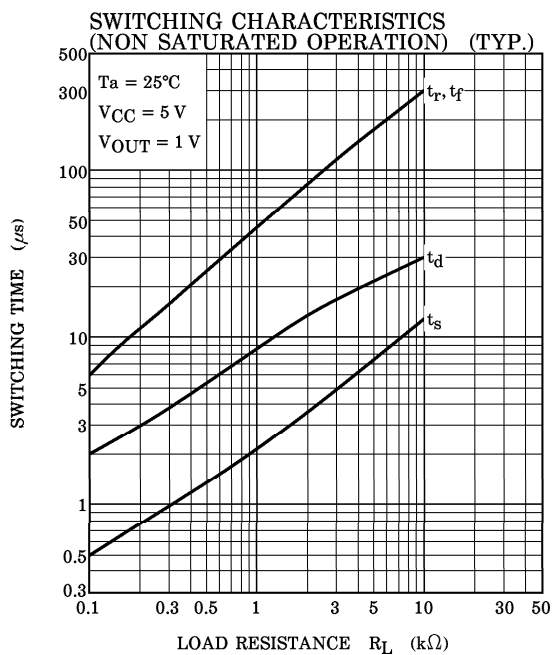






SWITCHING TIME TEST CIRCUIT

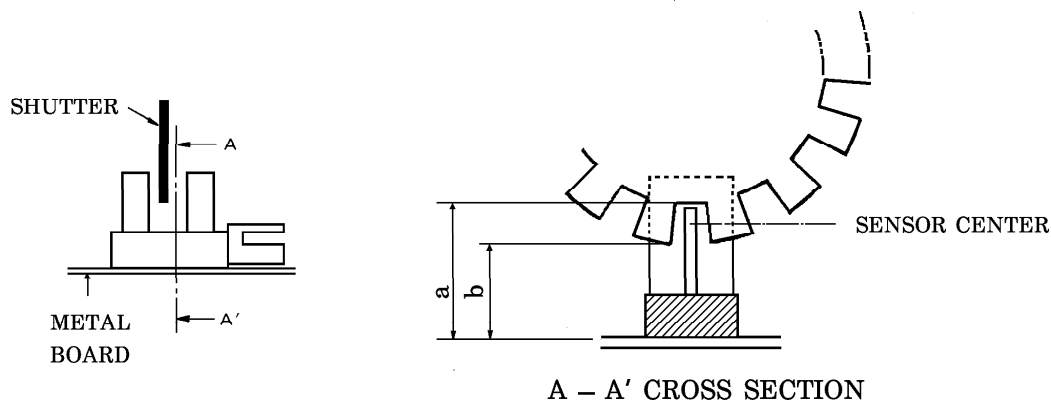




# POSITIONING OF SHUTTER AND DEVICE

To operate correctly, make sure that the shutter and the device are positioned as shown in the figure below.

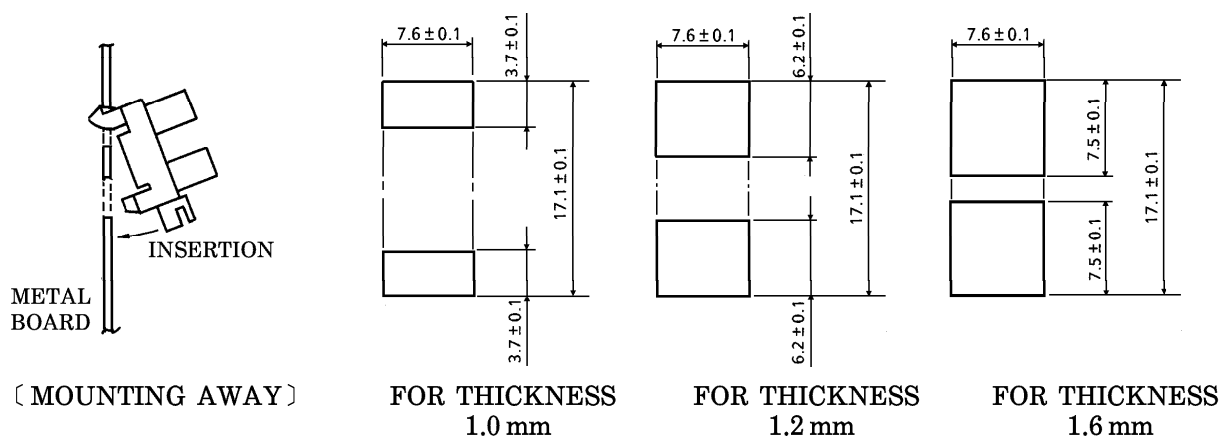
The slit pitch of the shutter must be set wider than the slit width of the device.  
Determine the width taking the switching time into consideration.



Unit : mm

| METAL BOARD THICKNESS | a SIZE    | b SIZE   |
|-----------------------|-----------|----------|
| 1.0                   | 11.9 MIN. | 9.4 MAX. |
| 1.2                   | 11.7 MIN. | 9.2 MAX. |
| 1.6                   | 11.3 MIN. | 8.8 MAX. |

## RECOMMENDED MOUNTING HOLE (Unit : mm)



When mounting on other than metal board as shown above, contact TOSHIBA.