

TOSHIBA PHOTO-INTERRUPTER INFRARED LED + PHOTOTRANSISTOR

# TLP1241(C5)

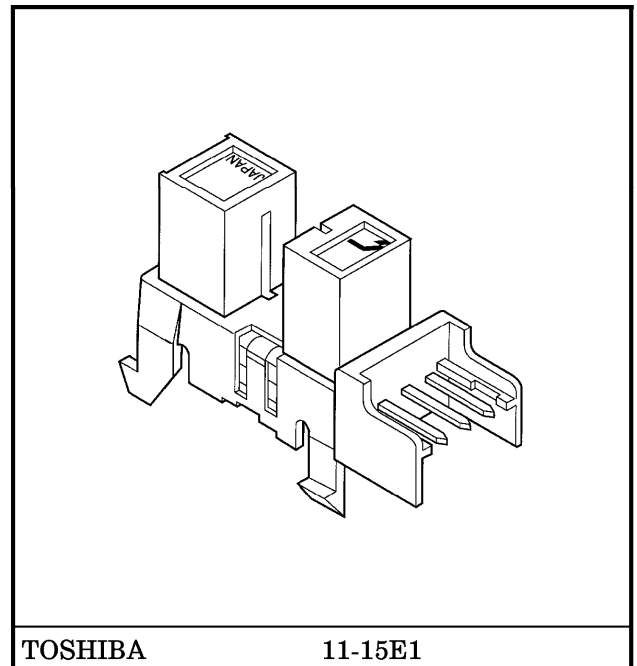
COPIERS, PRINTERS, FAX MACHINES

FANHEATERS, AIR-CONDITIONERS

BANK ATMS

GAME MACHINES

The TLP1241 (C5) is a compact photo-interrupter which has a built-in connector and which uses a high-radiant-intensity GaAs infrared LED and an Si phototransistor. The TLP1241 (C5) is housed in a highly reliable package which eliminates the need for a printed circuit board or for soldering. It is ideal as a paper carrier location sensor for copiers and printers. The device can operate at temperatures of up to 95°C. Thus the device can be used in high-temperature applications such as a paper-out sensor or in the detection of air flow direction for air-conditioner louvers. Open-collector output can be enabled using the phototransistor.



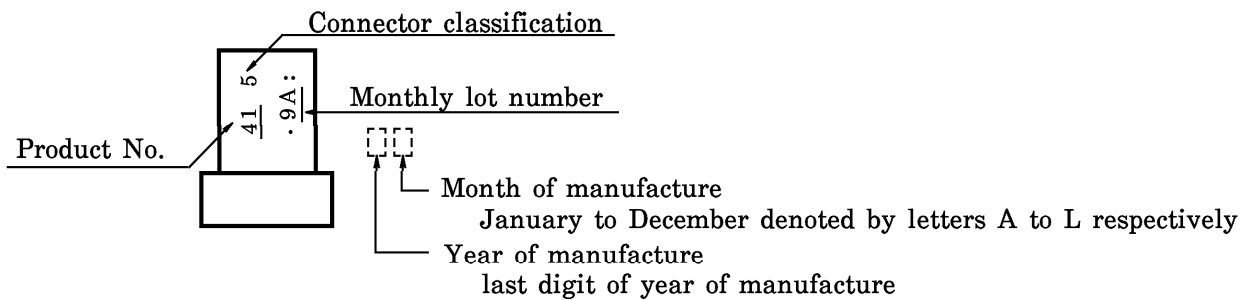
TOSHIBA

11-15E1

Weight : 1.4 g (typ.)

- Highly reliable package (device need not be attached to a PCB)
- Small package
- Snap-in installation
- Three board thicknesses supported : 1.0 mm, 1.2 mm and 1.6 mm
- Gap : 5 mm
- Resolution : Slit width = 0.5 mm
- High-temperature operation :  $T_{opr} = 95^{\circ}\text{C}$  (max)
- High current transfer ratio :  $I_C / I_F = 5\%$  (min)
- CT connector (2-mm pitch, MT receptacle type) made by Tyco Electronics AMP, Ltd.
- Package material : Polycarbonate (UL94V-2, black)
- Connector material : Polybutylene terephthalate (UL94V-0, white)

## MARKING

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

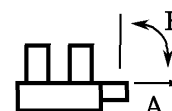
CHARACTERISTIC		SYMBOL	RATING	UNIT
Forward Current		$I_F$	50	mA
Forward Current Derating	( $T_a > 25^\circ\text{C}$ )	$\Delta I_F / ^\circ\text{C}$	-0.33	mA / $^\circ\text{C}$
	( $T_a > 85^\circ\text{C}$ )		-2	
Reverse Voltage		$V_R$	6	V
Collector-Emitter Voltage		$V_{CEO}$	35	V
Emitter-Collector Voltage		$V_{ECO}$	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	$^\circ\text{C}$

OPTICAL AND 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	$V_{CE(sat)}$	$I_F = 20\text{ mA}, I_C = 0.5\text{ mA}$	—	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	

## PIN STRENGTH (Ta = 25°C)

CHARACTERISTIC	TEST CONDITIONS		LIMIT
Pulling	Direction	A	No defect in electrical characteristics
	Weight	19.6 N	
	Time	5 s / once	
Bending	Direction	B	
	Weight	9.8 N	
	Time	5 s / three times	



## CT CONNECTOR

CT connector manufactured by Tyco Electronics AMP

Housing-Terminal En Block Type	Model Number	Terminal Material	AWG Size	External Diameter of Insulation Coating
	173977-3	Phosphor bronze	AWG26~28	0.85~1.05 mm

For more of connector characteristics, please contact the relevant connector manufacturer.

Note that the device cannot be connected to a MT crimp receptacle type connector housing.

## PRECAUTIONS

1. 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.
2. Care must be taken in relation to the environment in which the device is to be installed. Oil or chemicals may cause the package to melt or crack.
3. When attaching the device to the metal board, always hold the body of the device. Do not hold it by the connector. Ensure that the board is flat, and not warped or twisted. Attach the device to a metal board at room temperature.
4. Toshiba recommend attaching the device to the smoother side of the board.
5. Toshiba recommend testing the attachment strength beforehand by actually attaching a device to the board.
6. Do not apply solder to the pins of the device's connector. Make sure that the connector is plugged into the CT connector.
7. When inserting or removing the CT connector, always grasp it and its cable firmly and either plug it straight into or pull it straight out of the device's connector. If the CT connector is inserted or removed at an angle, both the device's connector and the CT connector may get damaged, resulting in an unreliable connection.
8. Conversion efficiency falls over time due to the current which flows in the infrared LED. 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.

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

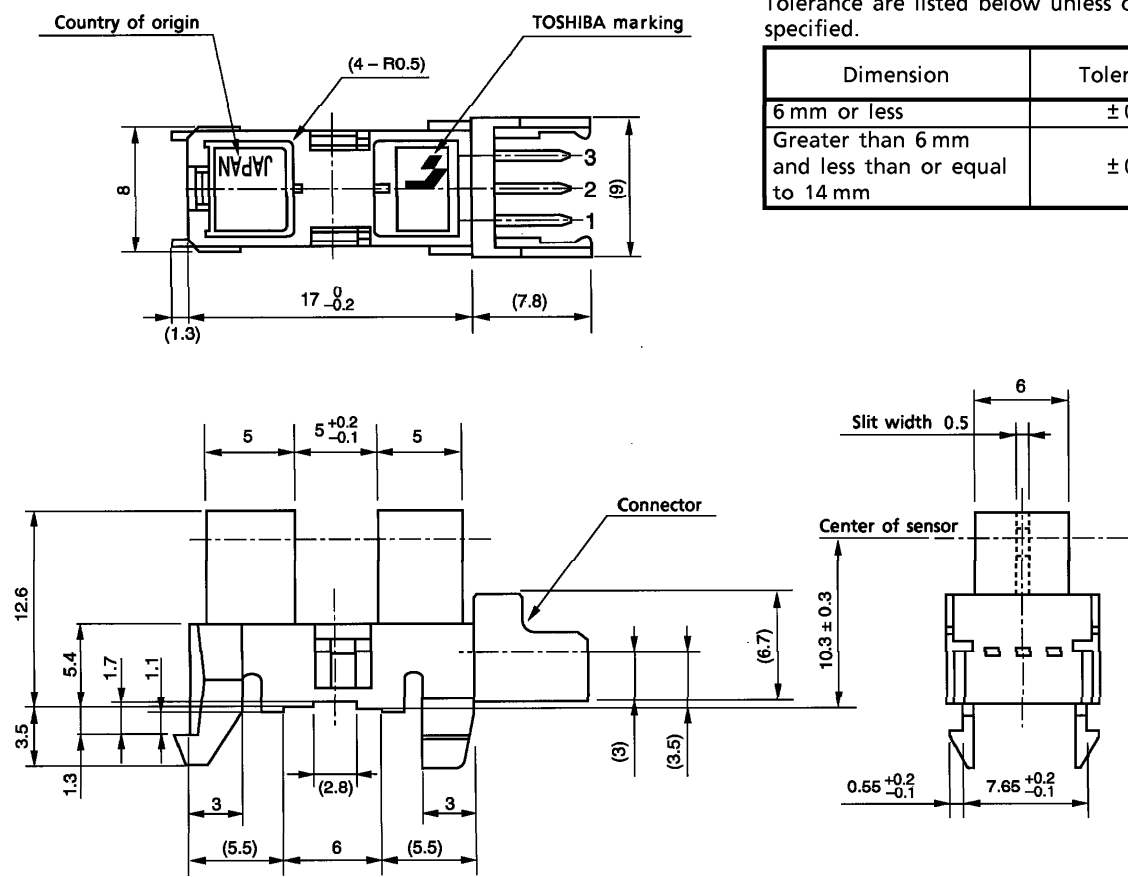
PACKAGE DIMENTIONS : TOSHIBA 11-15E1

Unit in mm

( ) : Reference value

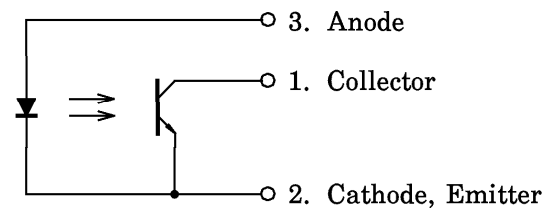
Tolerance are listed below unless otherwise specified.

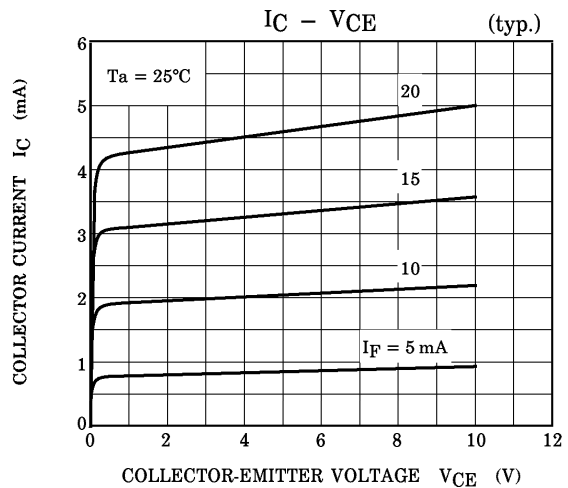
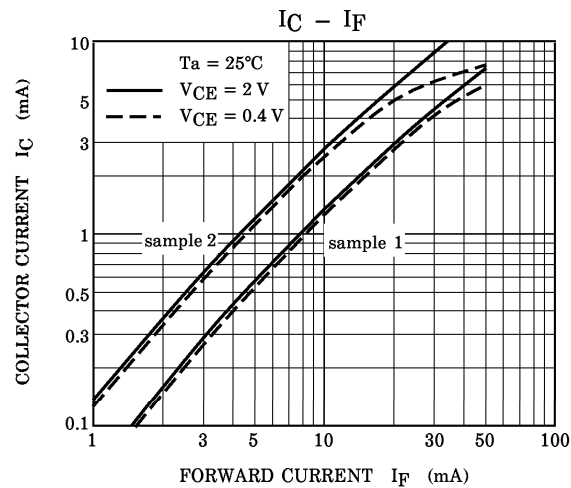
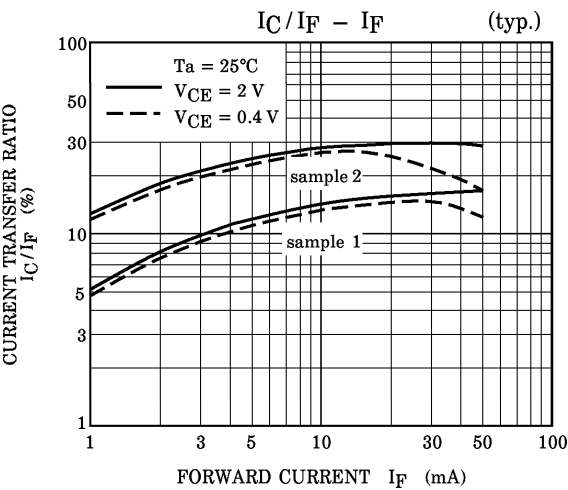
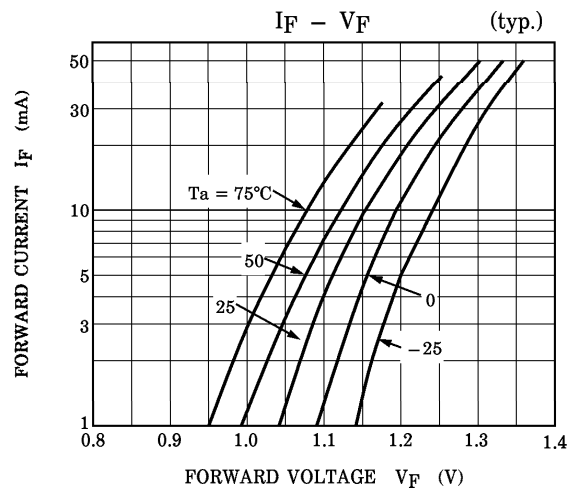
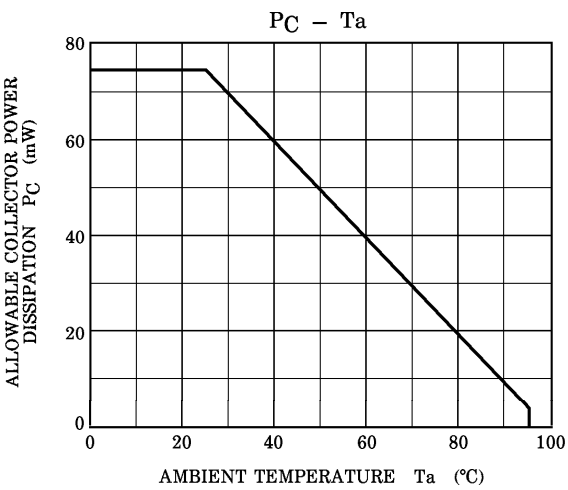
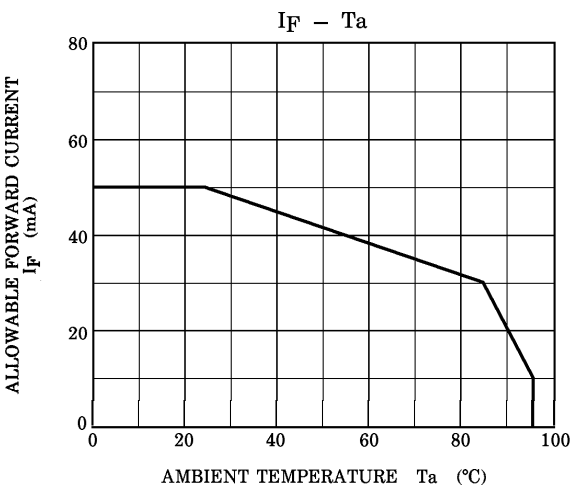
Dimension	Tolerance
6 mm or less	± 0.1
Greater than 6 mm and less than or equal to 14 mm	± 0.2

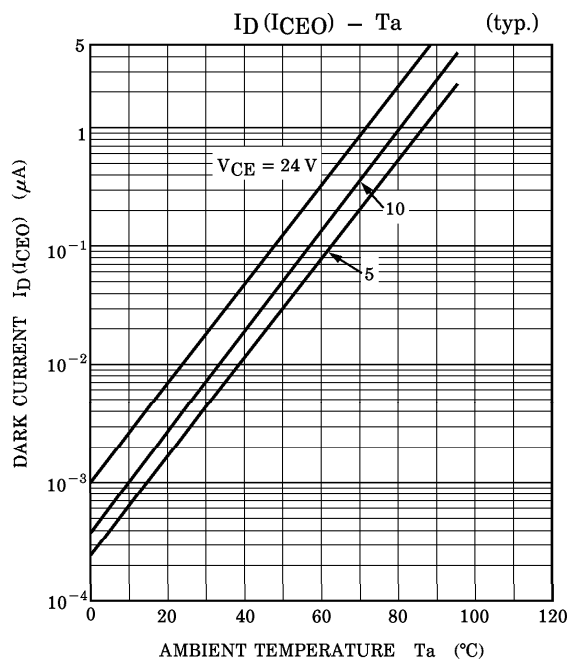
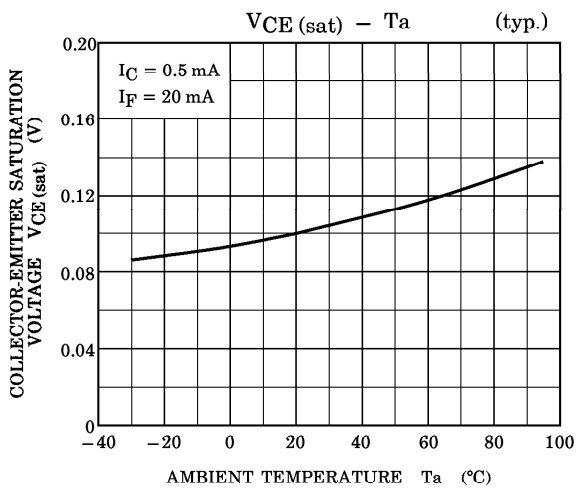
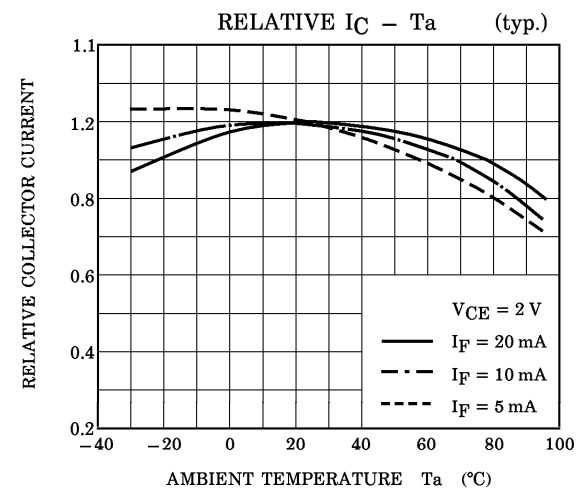


Weight : 1.4 g (typ.)

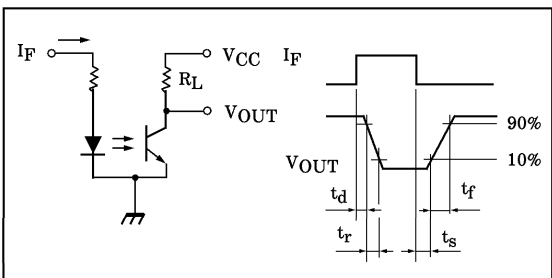
PIN CONNECTION

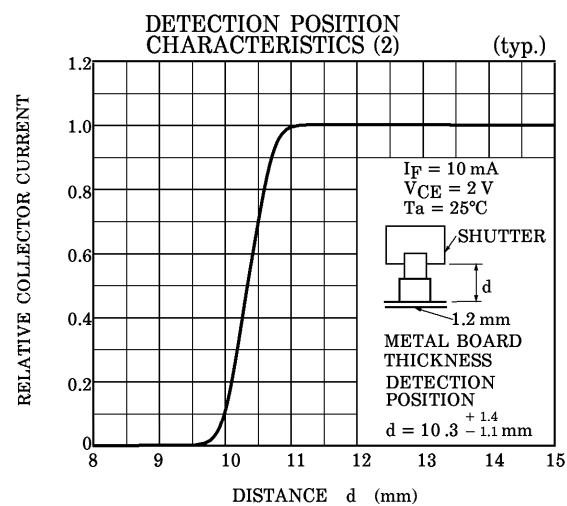
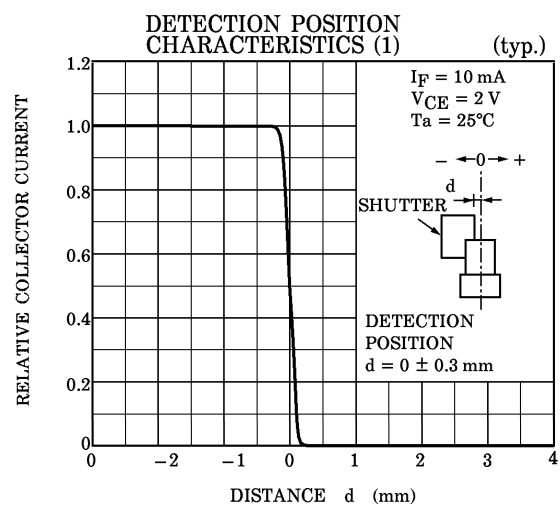
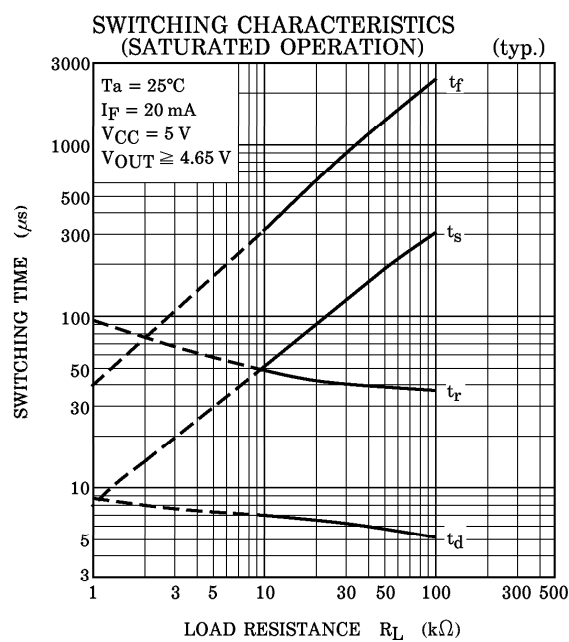
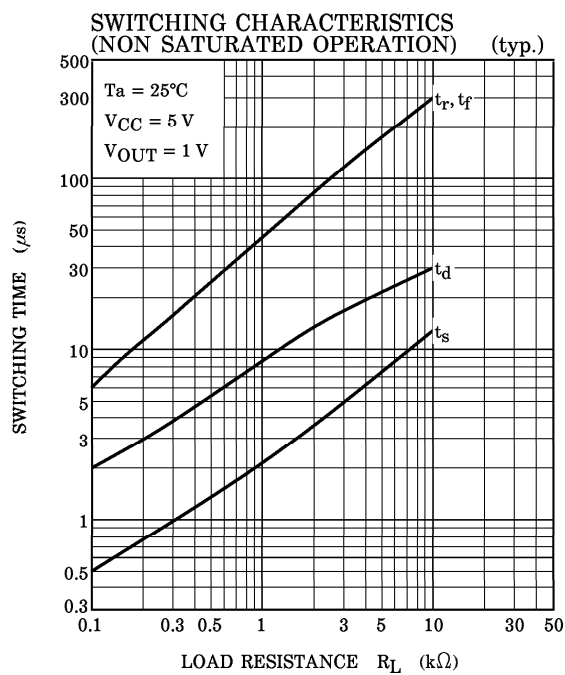






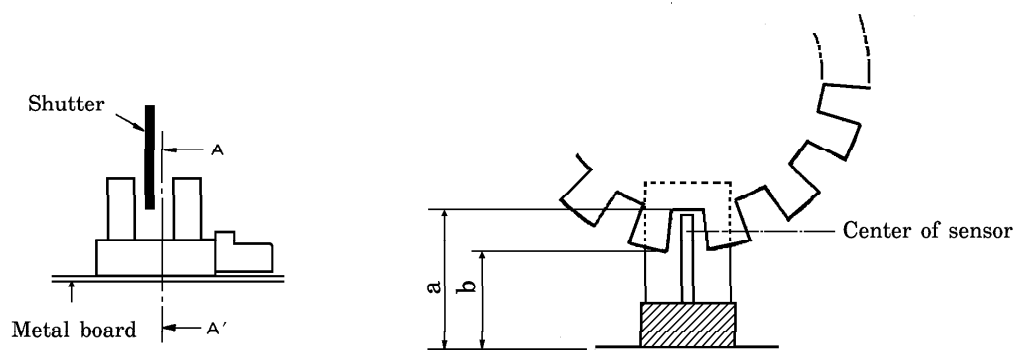
SWITCHING TIME TEST CIRCUIT





## 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.



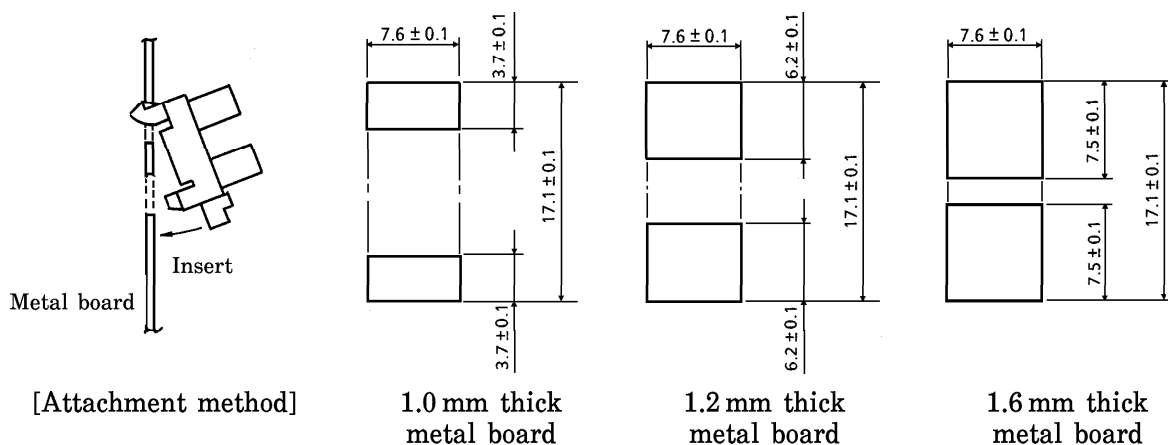
Cross section between A and A'

Unit : mm

Thickness of Metal Board	a Dimension	b Dimension
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 SIZE OF CONNECTION HOLES

(Unit : mm)



For instruction on how to attach the device to a metal board of a type other than the ones shown above, please contact your local Toshiba sales office.