TOSHIBA PHOTO-INTERRUPTER INFRARED LED + PHOTOTRANSISTOR

TLP836

STILL CAMERAS

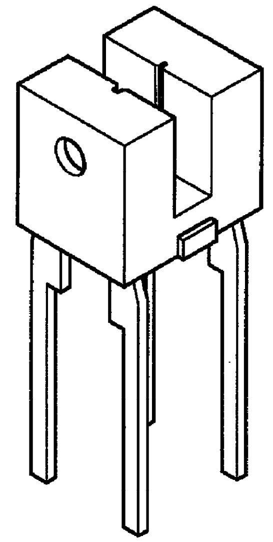
VIDEO CAMERAS

FLOPPY DISK DRIVES

SMALL-SIZED COPIERS, PRINTERS AND FAX MACHINES FOR PERSONAL USE

The TLP836 photo-interrupter consists of a GaAs infrared LED and an Si phototransistor.
Slit width is narrow and is high resolution.

- Very small package
- Designed for direct mounting on printed circuit boards.
- Gap : 1 mm
- High resolution
  Slit width : 0.15 mm (infrared LED)
  0.1 mm (phototransistor)



TOSHIBA 11-4G2

Weight : 0.09 g (typ.)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
LED	Forward Current Derating (Ta > 25°C)	ΔI_F / °C	−0.67	mA / °C
LED	Reverse Voltage	V_R	5	V
DETECTOR	Collector-Emitter Voltage	V_{CEO}	35	V
DETECTOR	Emitter-Collector Voltage	V_{ECO}	5	V
DETECTOR	Collector Power Dissipation	P_C	75	mW
DETECTOR	Collector Power Dissipation Derating (Ta > 25°C)	ΔP_C / °C	−1	mW / °C
DETECTOR	Collector Current	I_C	20	mA
Operating Temperature Range		T_{opr}	−25~85	°C
Storage Temperature Range		T_{stg}	−40~100	°C
Soldering Temperature (5 s) (Note 1)		T_{sol}	260	°C

(Note 1) : Soldering is carried out 1.5 mm from the resin which comprises the underside of the package.

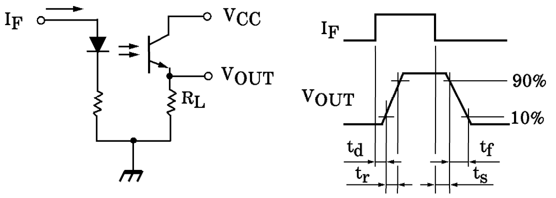
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	Min	Typ.	Max	UNIT
Supply Voltage	V_{CC}	—	—	24	V
Forward Current	I_F	—	—	20	mA

OPTO-ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC		SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
LED	Forward Voltage		V_F	I_F = 10 mA	1.00	1.15	1.30	V
LED	Reverse Current		I_R	V_R = 5 V	—	—	10	μA
LED	Peak Emission Wavelength		λ_P	I_F = 10 mA	—	940	—	nm
DETECTOR	Dark Current		I_D (I_{CEO})	V_{CE} = 24 V	—	—	0.1	μA
DETECTOR	Peak Sensitivity Wavelength		λ_P	—	—	800	—	nm
COUPLED	Current Transfer Ratio		I_C / I_F	V_{CE} = 5 V, I_F = 10 mA	0.27	1.2	—	%
COUPLED	Collector-Emitter Saturation Voltage		$V_{CE\ (sat)}$	I_F = 20 mA, I_C = 27 μA	—	—	0.4	V
COUPLED	Switching Time	Rise Time	t_r	V_{CC} = 5 V, I_C = 2 mA	—	4	—	μs
COUPLED	Switching Time	Fall Time	t_f	R_L = 100 Ω (Note 2)	—	5	—	μs

(Note 2) : Switching time measurement circuit and waveform



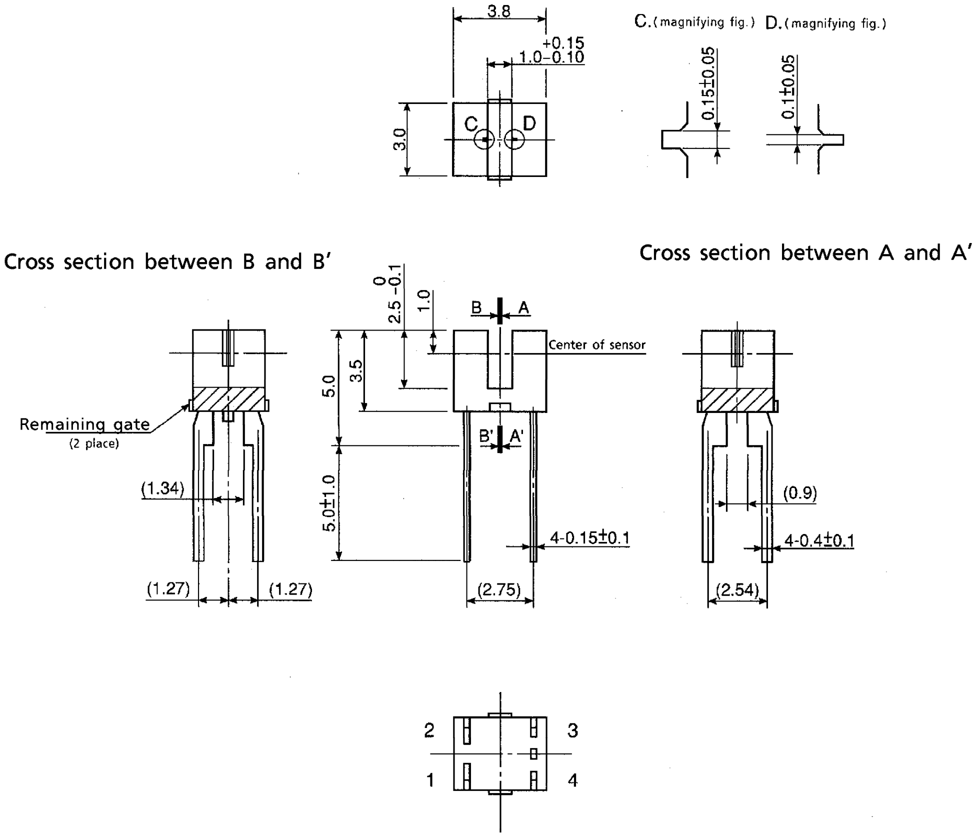
PRECAUTIONS

1. When removing flux with chemicals after soldering, clean only the soldered part of the leads. Do not immerse the entire package in the cleaning solvent. Chemical residue on the LED emitter or the phototransistor inside the photo-IC case may adversely affect the optical characteristics of the device and may drastically reduce the threshold input current.
2. Care must 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. Mount the device on a level surface.
4. The package should not be subjected to stress, since this may result in package deformation or have other deleterious effects.
5. 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.

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

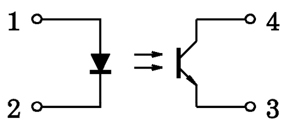
PACKAGE DIMENSIONS : TOSHIBA 11-4G2

Unit : mm
Tolerance : ±0.2 mm unless otherwise specified
Values in parentheses ( ) are for reference.
The remaining gate should be 0.2 mm or less.

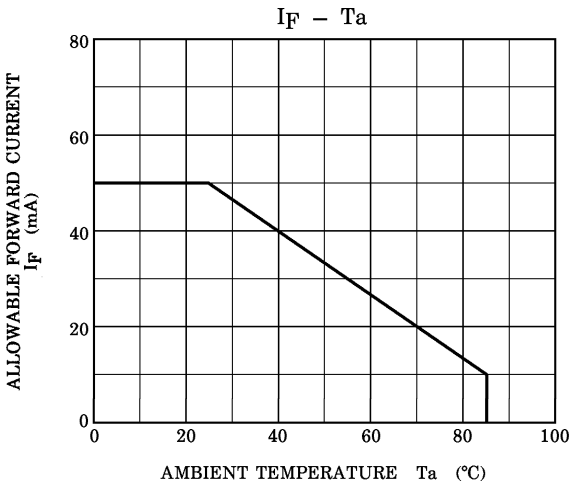


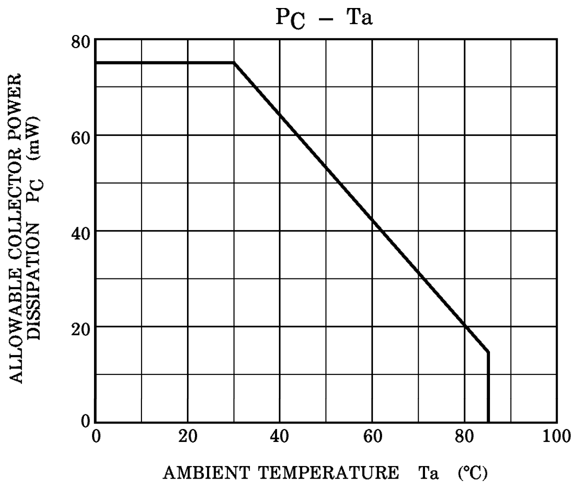
Weight : 0.09 g (typ.)

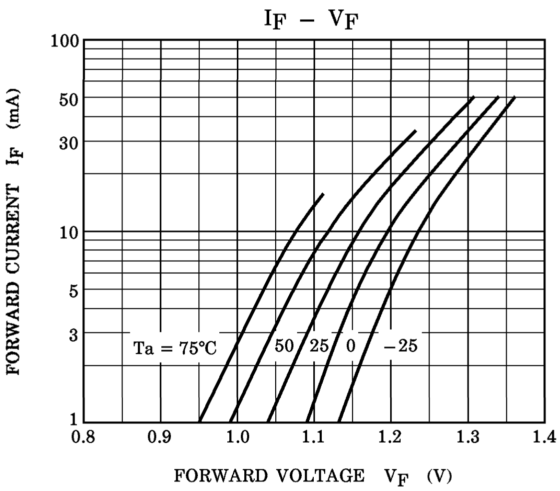
PIN CONNECTION

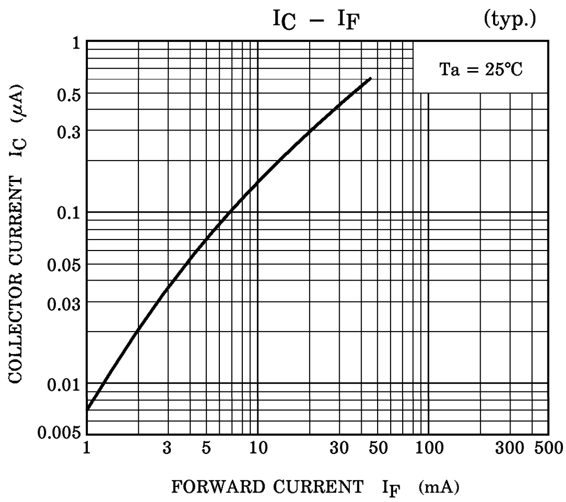


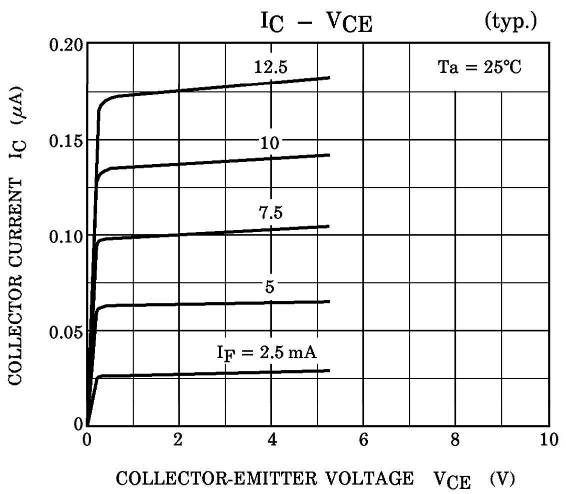
1. Anode
2. Cathode
3. Emitter
4. Collector


IF – Ta
ALLOWABLE FORWARD CURRENT IF (mA)
AMBIENT TEMPERATURE Ta (°C)

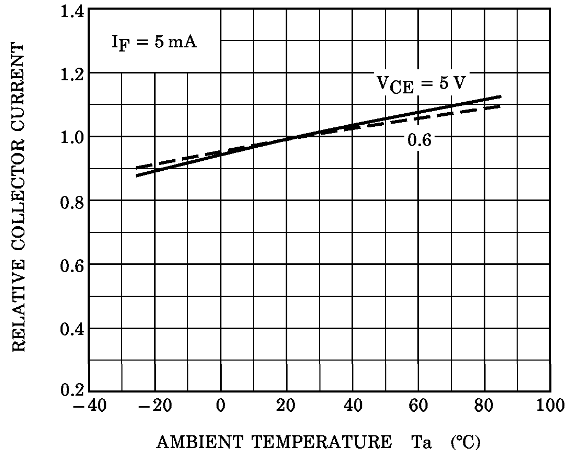

PC – Ta
ALLOWABLE COLLECTOR POWER DISSIPATION PC (mW)
AMBIENT TEMPERATURE Ta (°C)


IF – VF
FORWARD CURRENT IF (mA)
Ta = 75°C
50
25
0
−25
FORWARD VOLTAGE VF (V)

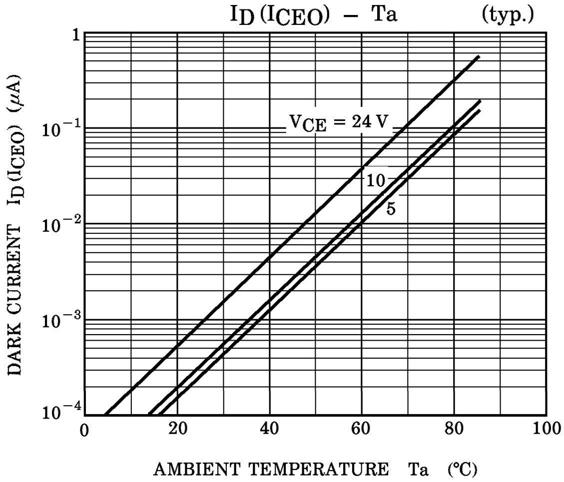

IC – IF (typ.)
Ta = 25°C
COLLECTOR CURRENT IC (μA)
FORWARD CURRENT IF (mA)


IC – VCE (typ.)
Ta = 25°C
12.5
10
7.5
5
IF = 2.5 mA
COLLECTOR CURRENT IC (μA)
COLLECTOR-EMITTER VOLTAGE VCE (V)

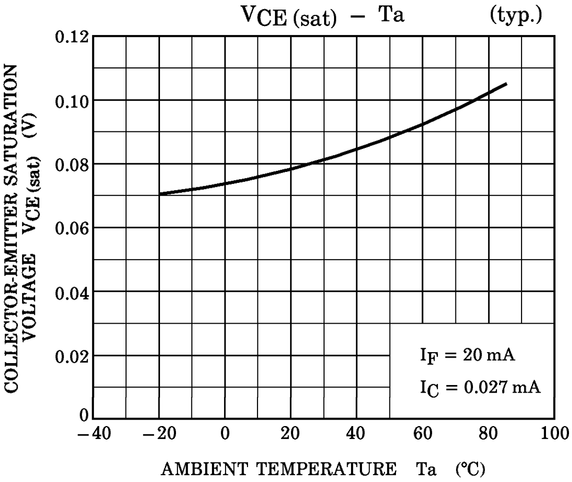
RELATIVE I_C – Ta (typ.)



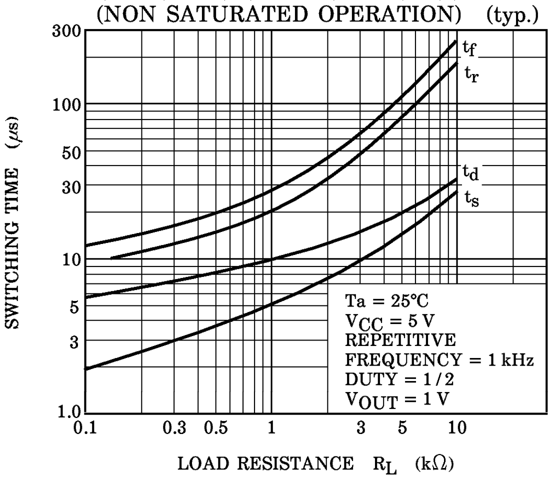
I_D (I_{CEO}) – Ta (typ.)



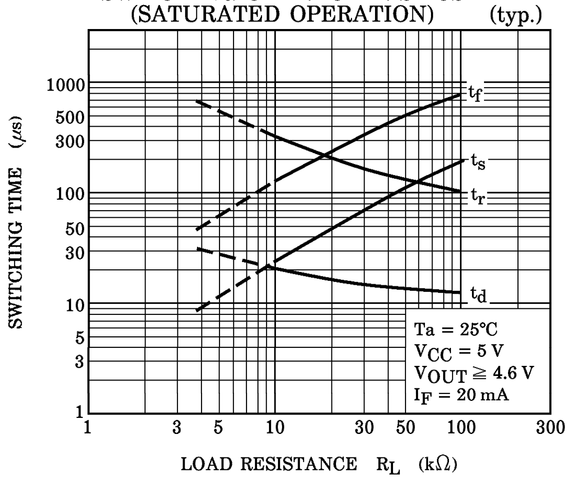
$V_{CE\,(sat)}$ – Ta (typ.)

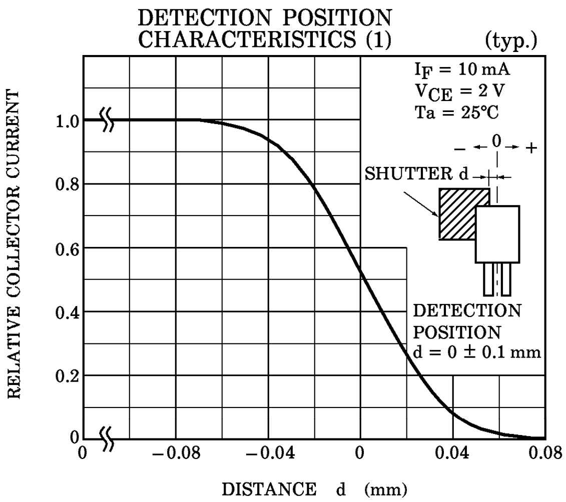


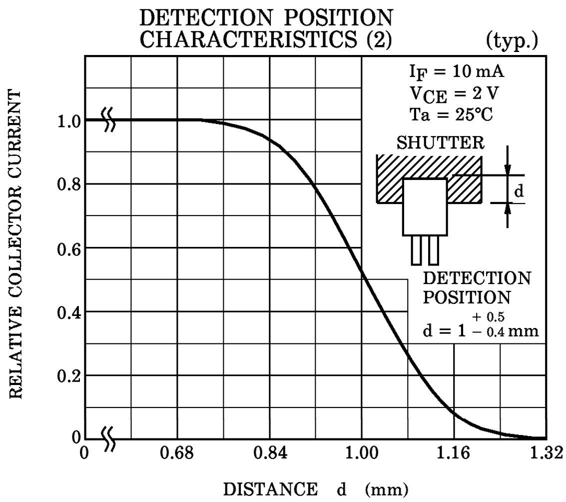
SWITCHING CHARACTERISTICS (NON SATURATED OPERATION) (typ.)



SWITCHING CHARACTERISTICS (SATURATED OPERATION) (typ.)

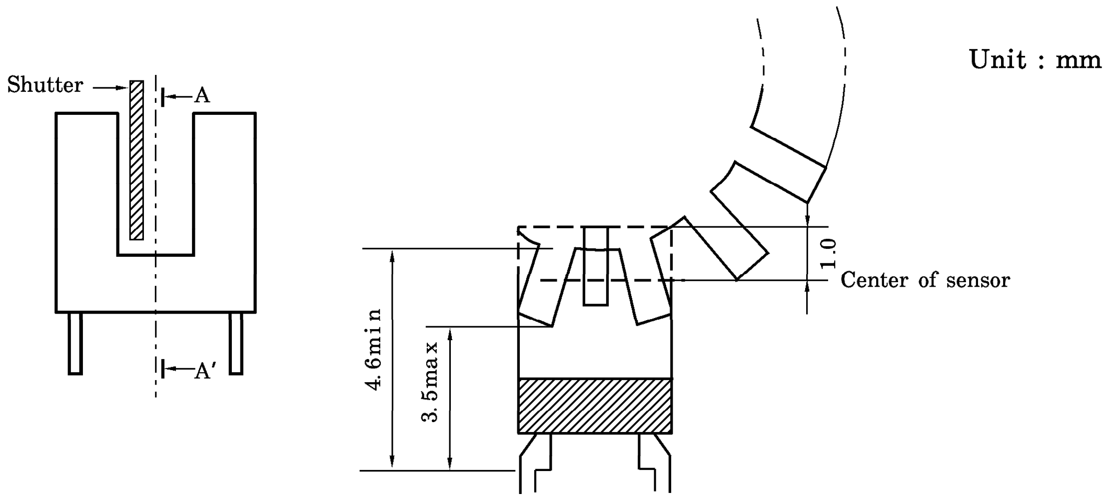






RELATIVE POSITIONING OF SHUTTER AND DEVICE

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.



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