TOSHIBA PHOTO-INTERRUPTER INFRARED LED + PHOTOTRANSISTOR

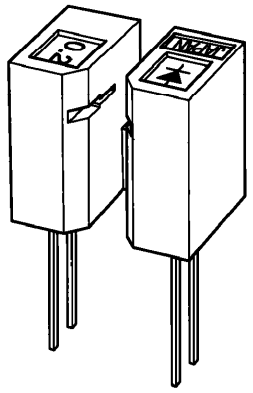
TLP813

IMAGE SCANNERS, HANDHELD COPIERS

COPIERS, FAX MACHINES

PHOTO-ELECTRIC COUNTERS

FOR DETECTING VARIOUS OBJECTS



TOSHIBA 11-11B2

Weight : 0.9 g (typ.)

The TLP813 photo-interrupter combines a GaAs infrared LED with an Si phototransistor, and is designed to be mounted directly on PCB.

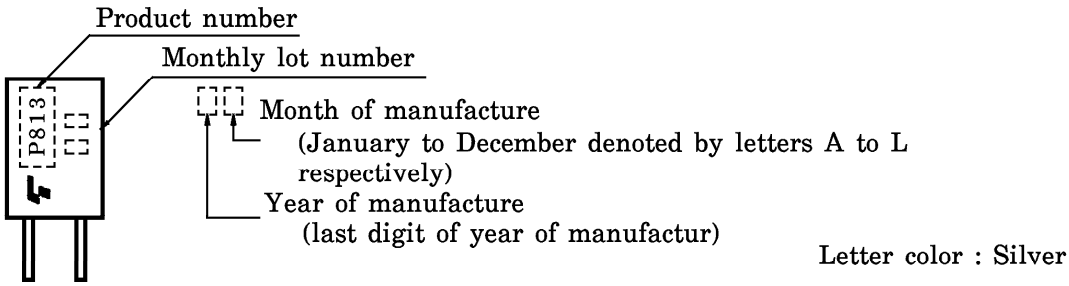
In applications where reference pulses must be acquired from a rotating disk, the detection slit width can be made as narrow as 0.2 mm, enabling a narrow slit pitch to be used so as to obtain a large number of pulses per rotation. Due to its oblong detection slit, this phototransistor is best suited vertical position detection.

- Designed for direct mounting on printed circuit boards (positioning pins included).
- Gap : 2.2 mm
- High resolution : Slit width = 0.2 × 2.0 mm (the oblong slit)
- Current transfer ratio : I_C / I_F = 2.5% (min)
- Detector impermeable to visible light

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating (Ta > 25°C)	ΔI_F / °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)	ΔP_C / °C	−1	mW / °C
	Collector Current	I_C	50	mA
Operating Temperature Range		T_{opr}	−30~85	°C
Storage Temperature Range		T_{stg}	−40~100	°C
Soldering Temperature (5s)		T_{sol}	260	°C

MARKINGS



OPTICAL AND 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
	Reverse Current	I_R	V_R = 5 V	—	—	10	μA
	Peak Emission Wavelength	λ_P	I_F = 20 mA	—	940	—	nm
DETECTOR	Dark Current	I_D (I_{CEO})	V_{CE} = 10 V, I_F = 0	—	—	0.1	μA
	Peak Sensitivity Wavelength	λ_P	—	—	870	—	nm
COUPLED	Current Transfer Ratio	I_C / I_F	V_{CE} = 5 V, I_F = 20 mA	2.5	—	50	%
	Collector-Emitter Saturation Voltage	$V_{CE\ (sat)}$	I_F = 20 mA, I_C = 0.25 mA	—	0.15	0.4	V
	Rise Time	t_r	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω	—	6	—	μs
	Fall Time	t_f		—	6	—	

PRECAUTIONS

The following points must be borne in mind.

1. Clean only the soldered part of the leads. Do not immerse the entire package in the cleaning solvent.
2. 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 chosing a packaging material by refering to the table below.

<Chemicals which should not be used with polycarbonate>

	PHENOMENON	CHEMICALS
A	Staining and slight deterioration	• Nitric acid (diluted), hydrogen peroxide, chlorine
B	Cracking, crazed or swelling	• Acetic acid (70% or more) • Gasoline • Methyl ethyl ketone, ethyl acetate, butyl acetate • Ethyl methacrylate, ethyl ether, MEK • Acetone, m-amino alcohol, carbon tetrachloride • Carbon disulfide, trichloroethylene, cresol • Thinners, oil of turpentine • Triethanolamine, TCP, TBP
C	Melting { } : Used as solvent	• Concentrated sulfuric acid • Benzene • Styrene, acrylonitrile, vinyl acetate • Ethylenediamine, diethylenediamine • {Chloroform, methyl chloride, tetrachloromethane, dioxane, 1, 2-dichloroethane}
D	Decomposition	• Ammonia water • Other alkalis

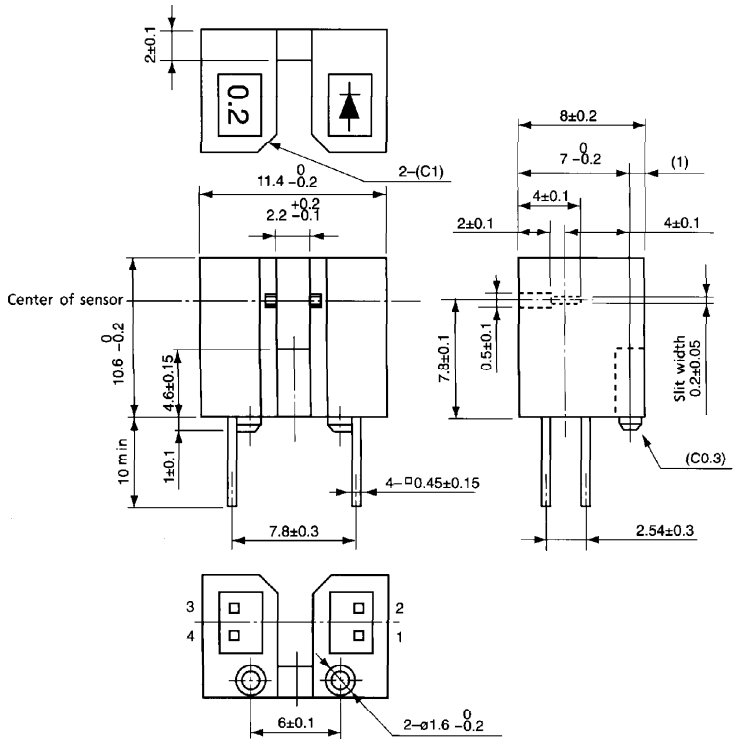
3. Mount the device on a level surface.
4. Conversion efficiency falls over time due to the current which flows in the infrared LED. When designing a circuit, take into account this change in conversion efficiency over time. The ratio of fluctuation in conversion efficiency to fluctuation in infrared 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

11-11B2

Unit : mm

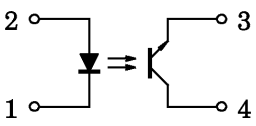


( ) : Reference value

Lead dimensions are indicated with each lead roots.

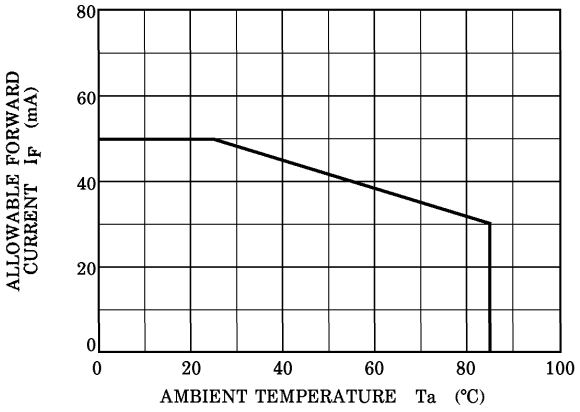
Weight : 0.9 g (typ.)

PIN CONNECTION

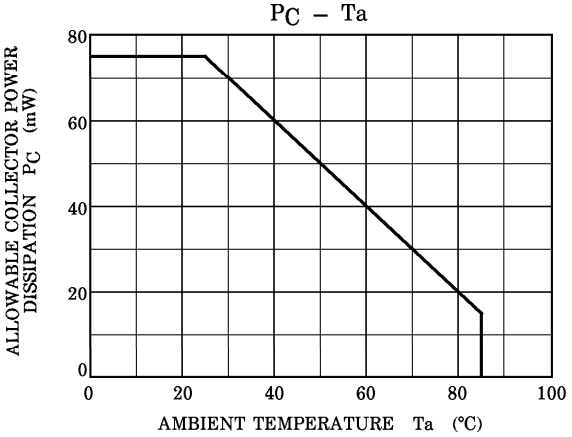


1. Cathode
2. Anode
3. Emitter
4. Collector

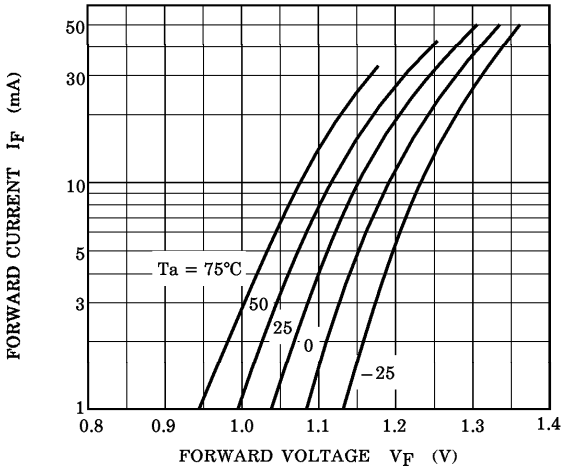
I_F – Ta



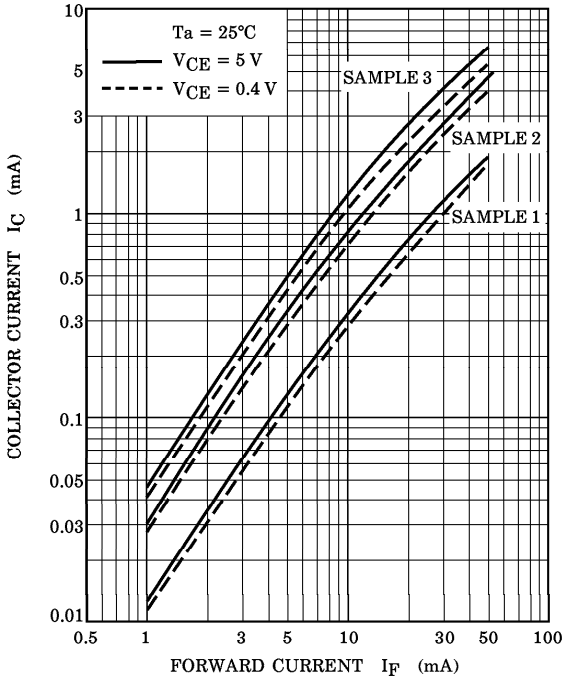
P_C – Ta



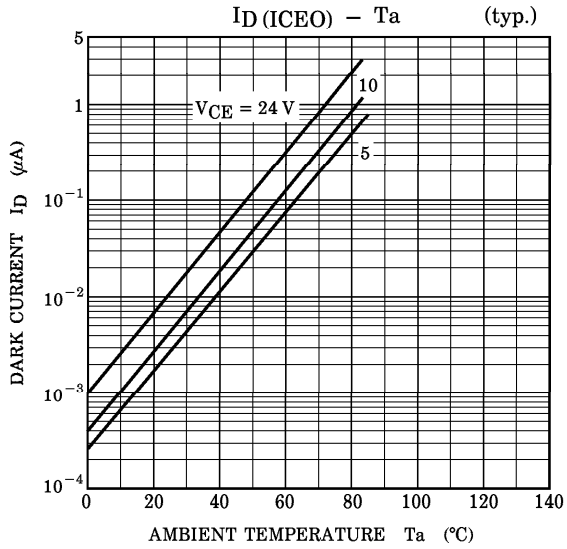
I_F – V_F (typ.)



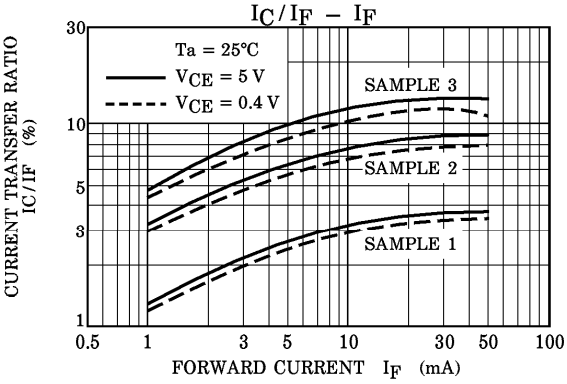
I_C – I_F



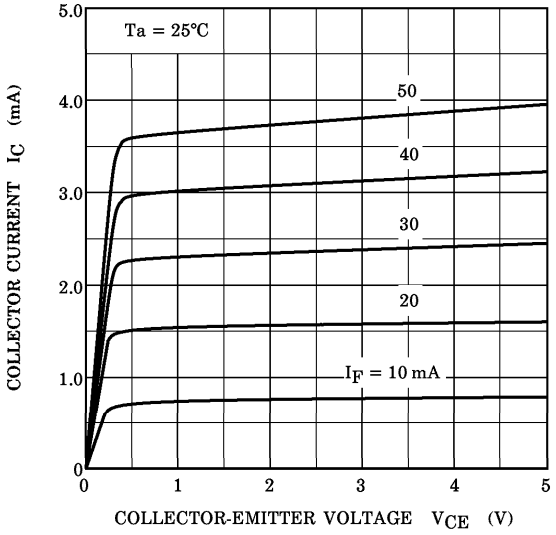
I_D (ICEO) – Ta (typ.)



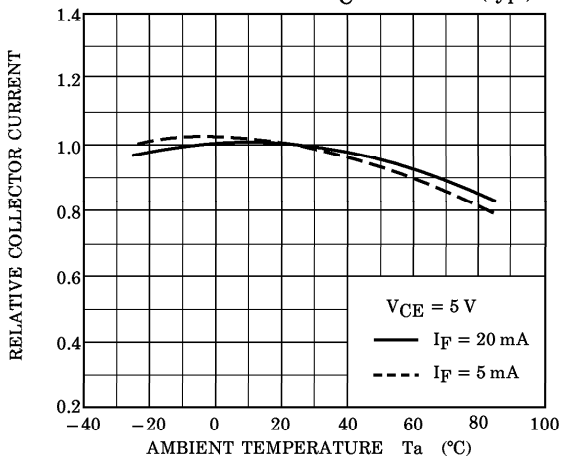
I_C / I_F – I_F



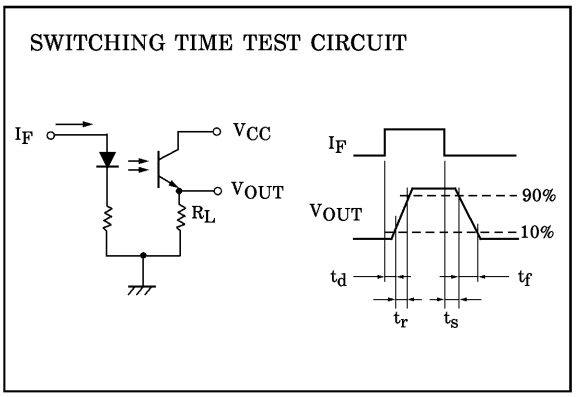
$I_C - V_{CE}$ (typ.)



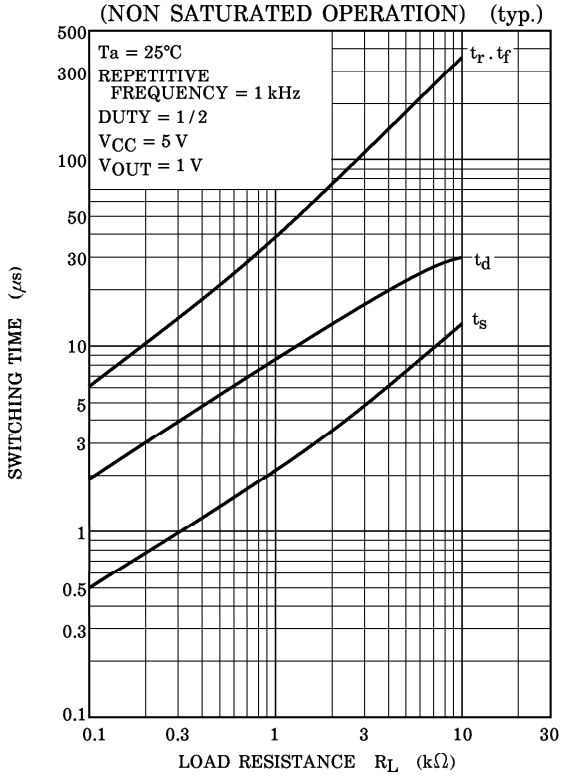
RELATIVE I_C – Ta (typ.)



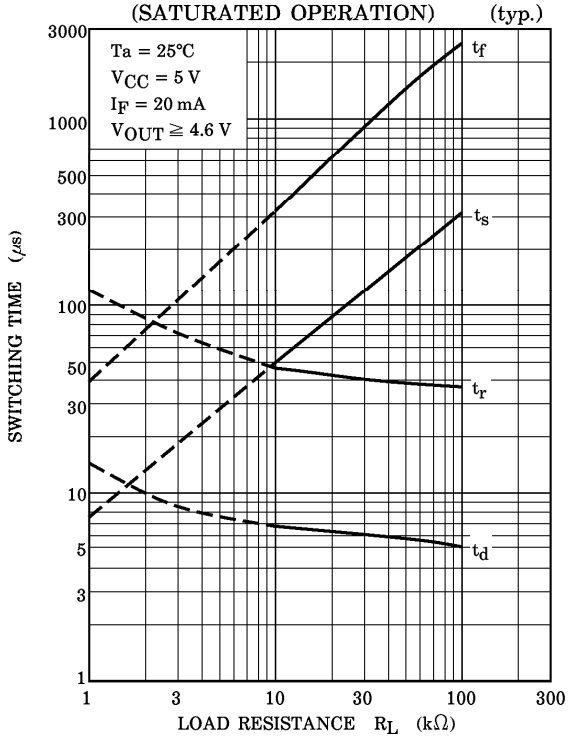
SWITCHING TIME TEST CIRCUIT



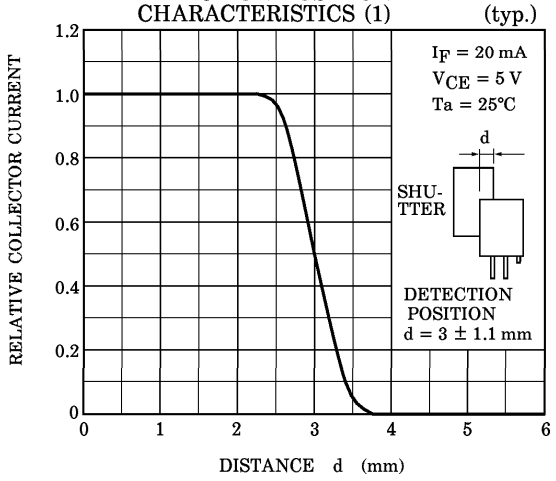
SWITCHING CHARACTERISTICS (NON SATURATED OPERATION) (typ.)



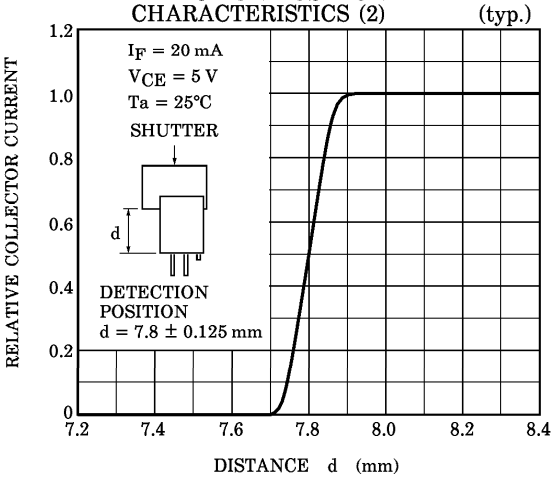
SWITCHING CHARACTERISTICS (SATURATED OPERATION) (typ.)



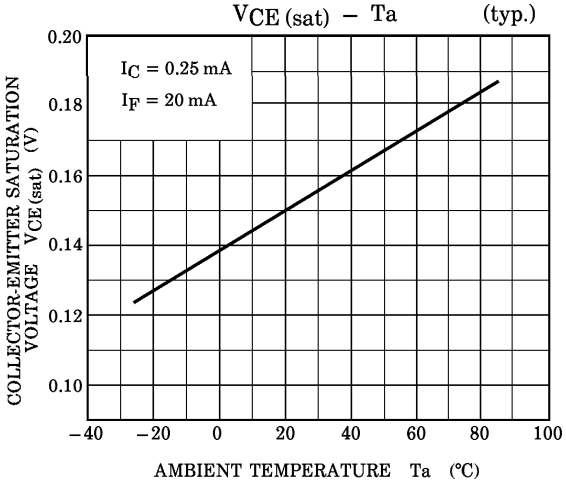
DETECTION POSITION CHARACTERISTICS (1) (typ.)



DETECTION POSITION CHARACTERISTICS (2) (typ.)



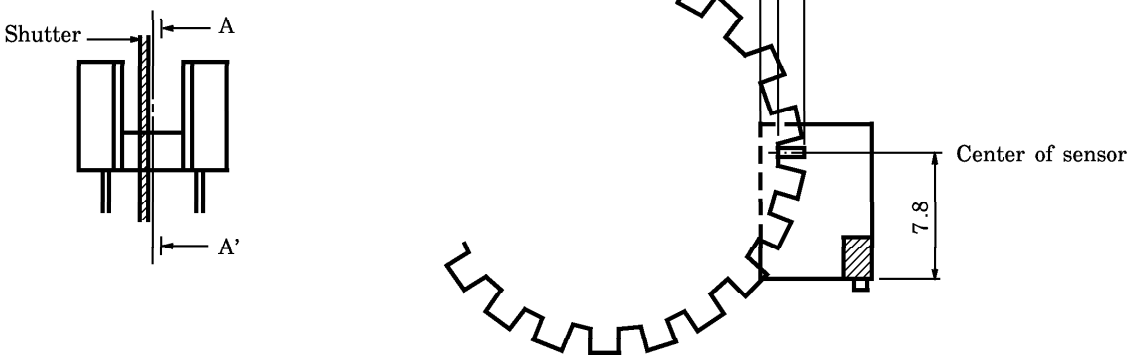
$V_{CE\,(sat)}$ – Ta (typ.)



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.

Unit in mm



Cross section between A and A′

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