TOSHIBA PHOTO-INTERRUPTER INFRARED LED + PHOTODARLINGTON TRANSISTOR

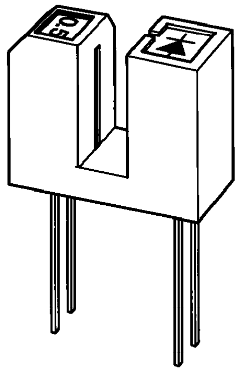
TLP871

VCRS, COMPACT DISC PLAYERS

COPIERS, FAX MACHINES, PRINTERS

VENDING MACHINES, TICKET MACHINES

VARIOUS POSITION DETECTION SENSORS



TOSHIBA 11-12A1

Weight : 0.59 g (typ.)

The TLP871 photo-interrupter combines GaAs infrared LED with a high-sensitivity Si photodarlington transistor.

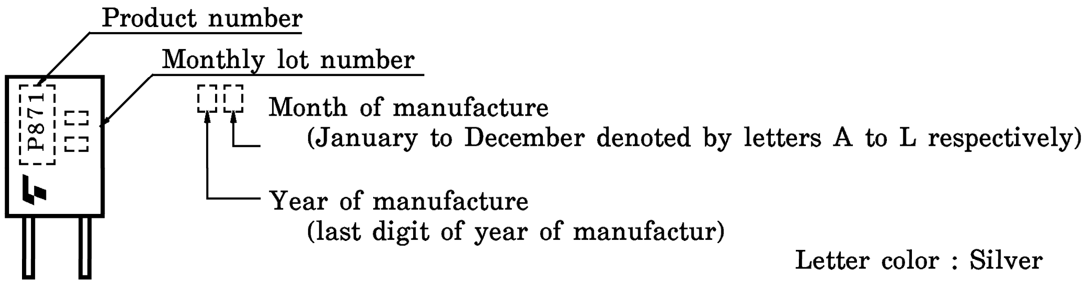
The TLP871 exhibit a high current transfer ratio, can be driven using low input current and is best suited for use in low-power circuit.

- Small package
- TLP871 designed for direct mounting on printed circuit boards.
- Gap : 3 mm
- Resolution : Slit width = 0.5 mm
- High current transfer ratio : I_C / I_F = 50% (min) at I_F = 1 mA
- Detector impermeable to visible light
- Package material : Polycarbonate

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}	30	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	40	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



Letter color : Silver

RECOMMENDED OPERATING CONDITION

CHARACTERISTIC	SYMBOL	Min	Typ.	Max	UNIT
Supply Voltage	V_{CC}	—	5	16	V
Forward Current	I_F	—	—	20	mA
Operating Temperature	T_{opr}	−10	—	70	°C

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
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})	$V_{CE} = 16$ V, $I_F = 0$	—	—	0.25	μA
DETECTOR	Peak Sensitivity Wavelength	λ_P	—	—	870	—	nm
COUPLED	Current Transfer Ratio	I_C / I_F	$V_{CE} = 2$ V, $I_F = 1$ mA	50	—	2000	%
COUPLED	Collector-Emitter Saturation Voltage	$V_{CE\,(sat)}$	$I_F = 2$ mA, $I_C = 0.5$ mA	—	0.75	1	V
COUPLED	Rise Time	t_r	$I_F = 2$ mA, $I_C = 0.5$ mA	—	80	400	μs
COUPLED	Fall Time	t_f		—	70	340	

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>

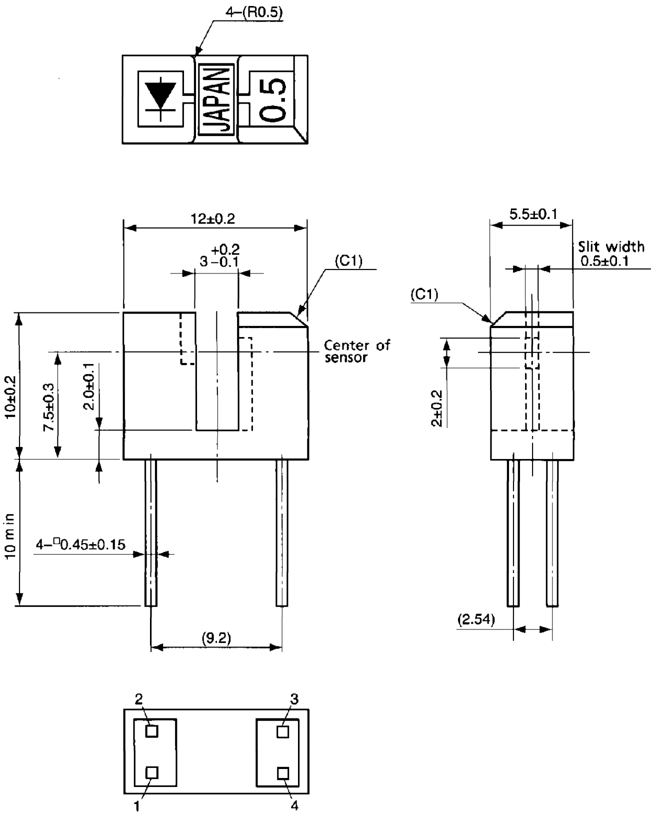
	PHENOMENON	CHEMICALS
A	Staining and slight deterioration	• Nitric acid (diluted), hydrogen peroxide, chlorine
B	Cracking, crazed or swelling	• Acetic acid (70% or more) • Gasoline • Methyl ethyl ketone, ethyl acetate, butyl acetate • Ethyl methacrylate, ethyl ether, MEK • Acetone, m-amino alcohol, carbon 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
11-12A1

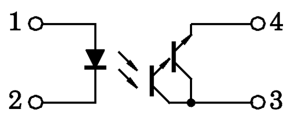
Unit : mm



( ) : Reference value

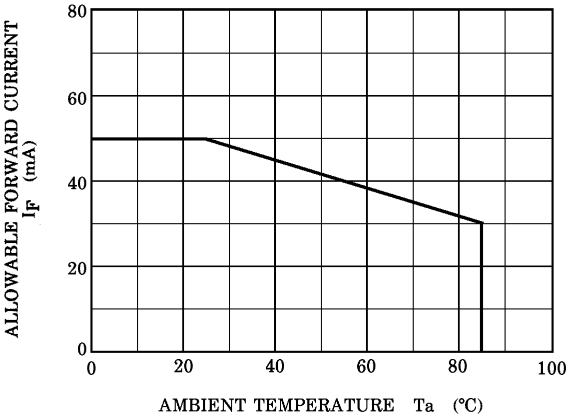
Weight : 0.59 g (typ.)

PIN CONNECTION

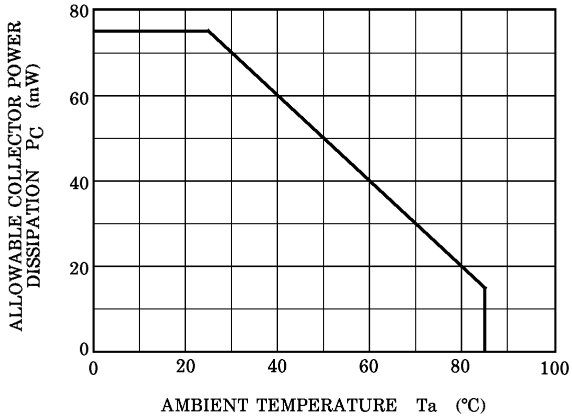


1. Anode
2. Cathode
3. Collector
4. Emitter

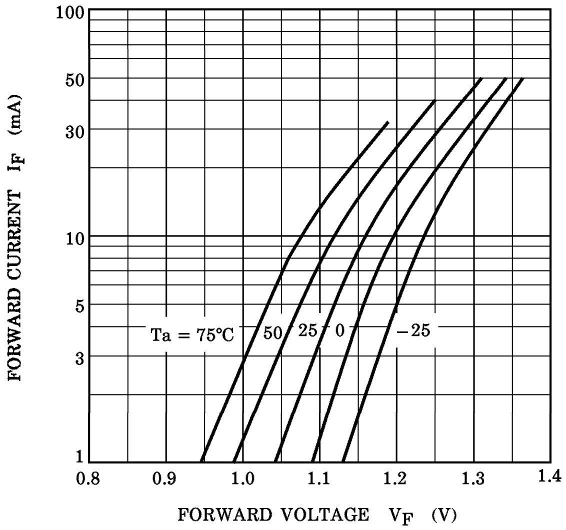
I_F – Ta



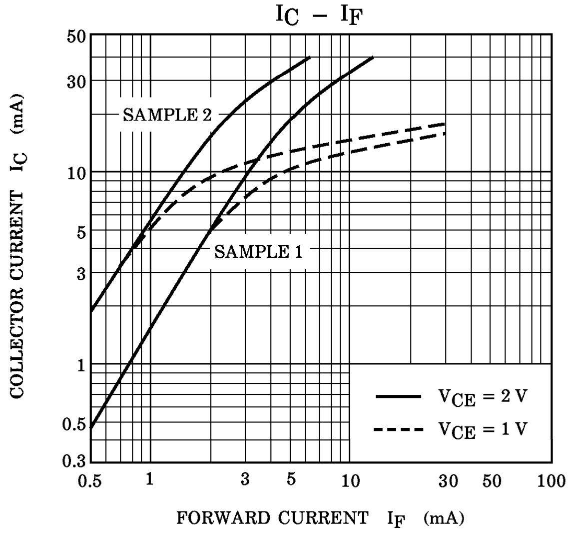
P_C – Ta



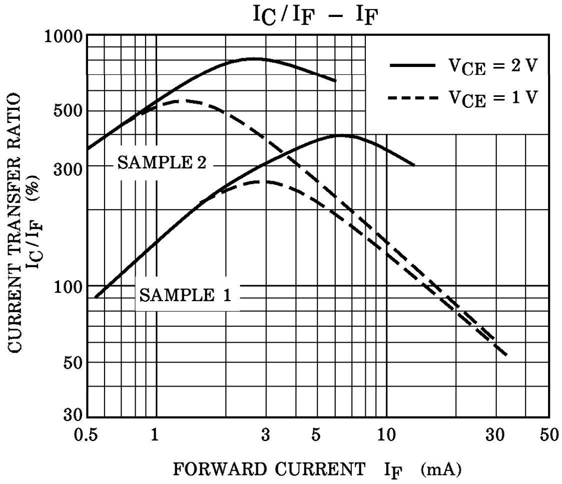
I_F – V_F (typ.)



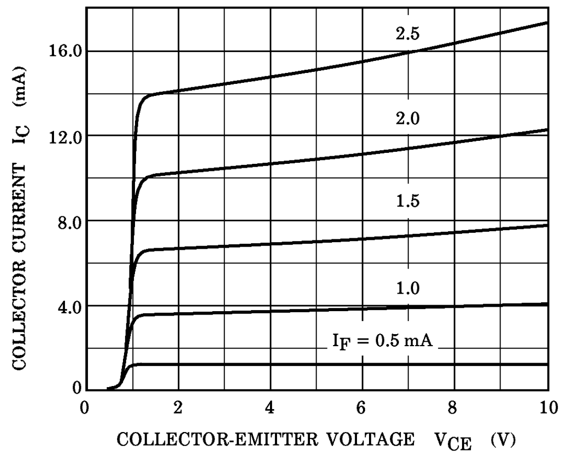
I_C – I_F



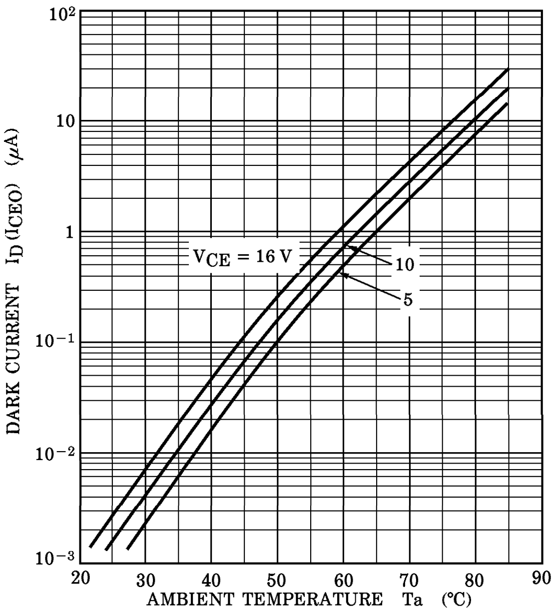
I_C/I_F – I_F

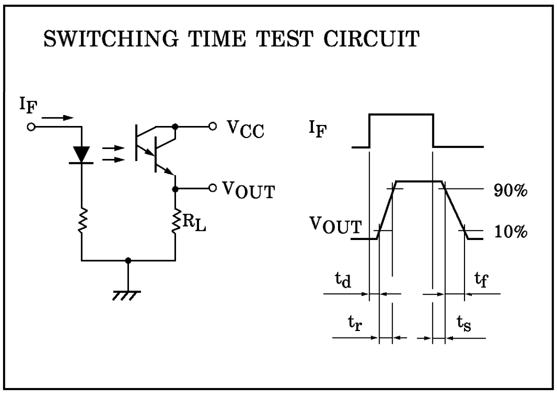


I_C – V_{CE} (typ.)

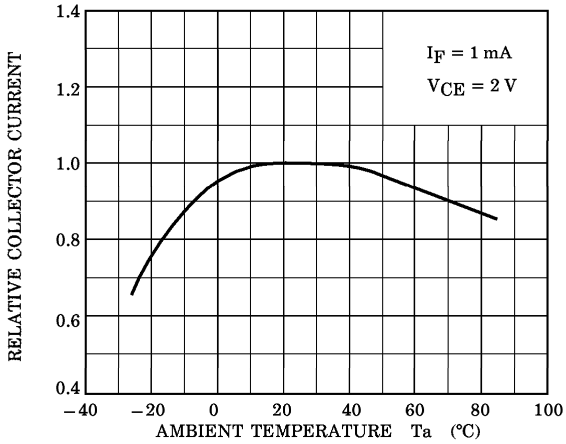


I_D (I_{CEO}) – Ta (typ.)

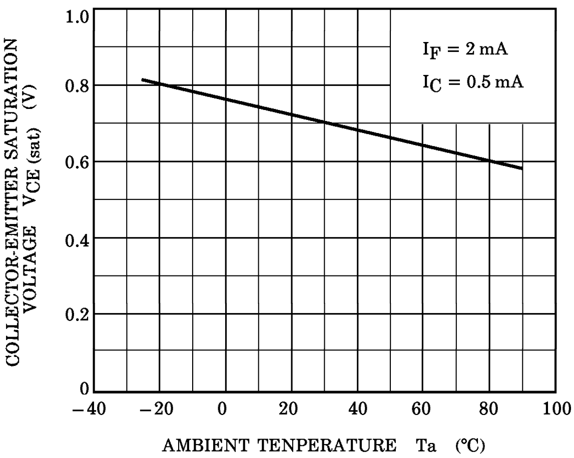




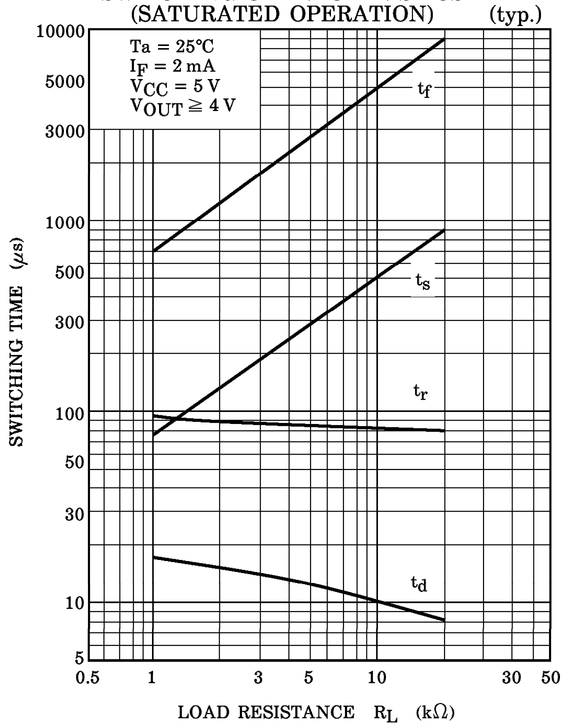
RERATIVE I_C – Ta (typ.)

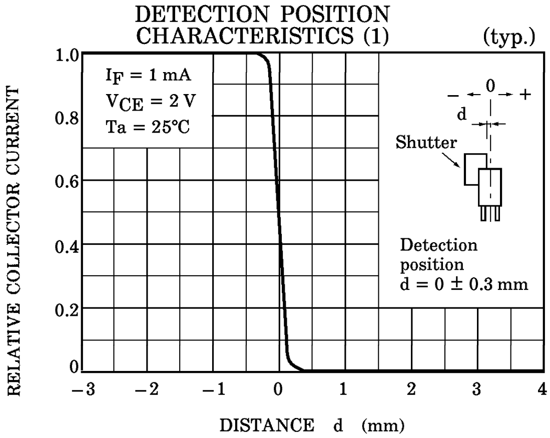


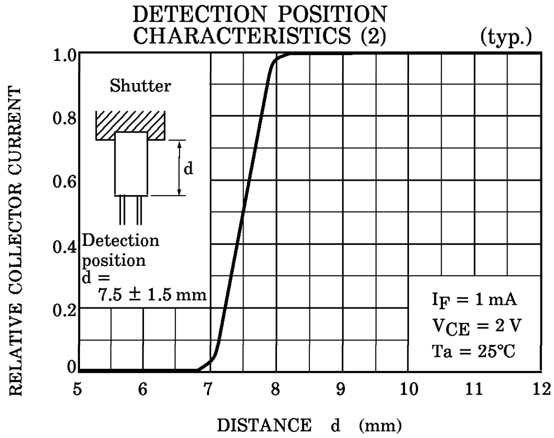
$V_{CE\,(sat)}$ – Ta (typ.)



SWITCHING CHARACTERISTICS (SATURATED OPERATION) (typ.)

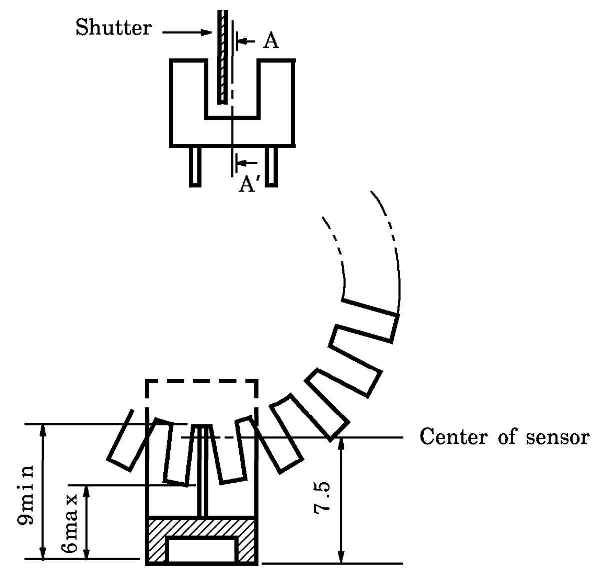






RELATIVE POSITIONING OF SHUTTER AND DEVICE

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.



Unit in mm

Cross section between A and A′

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