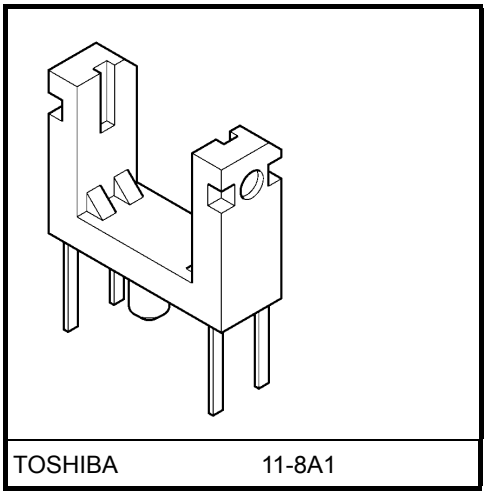
TOSHIBA Photointerrupter Infrared LED + Phototransistor

TLP841

Copiers, Printers and Fax Machines
VCRs and CD Players
Various Position Detection Sensor



TOSHIBA 11-8A1

Weight: 0.1 g (typ.)

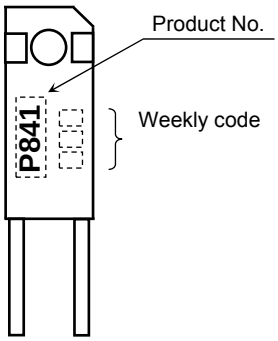
The TLP841 is photointerrupter which consists of a GaAs infrared LED and an Si phototransistor.
With gap width as wide as 5mm, it is a compact package.

- Compact package: 7.5(w)×6.3(h)×2.6(d)mm
- Printed wiring board direct mounting type (with a locating pin)
- Board thickness: 1.6mm or less
- Gap width: 5 mm
- Resolution: Slit width = 0.5 mm
- Current transfer ratio: I_C/I_F = 2.5% (min)
- High response speed: t_r, t_f = 15μs (typ.)
- Material of the package: Polybutylene terephthalate (UL94V-0)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	I_F	30	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℃)	ΔP_C/°C	−1	mW/°C
	Collector current	I_C	50	mA
Operating temperature range		T_{opr}	−30 to 85	°C
Storage temperature range		T_{stg}	−40 to 100	°C
Soldering temperature (5s) (Note 1)		T_{sol}	260	°C

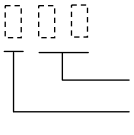
Marking (Note 2)



Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: At least 1.5mm from body

Note 2: Weekly code: (Three digits)



Week of manufacture
(01 for first week of year, continues up to 52 or 53)

Year of manufacture
(One low-order digits of calendar year)

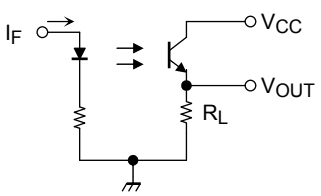
Operating Ranges

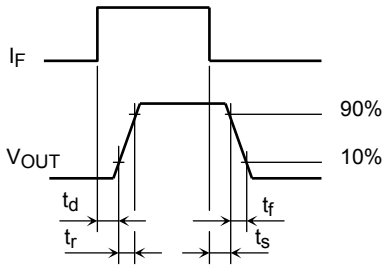
Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	5	24	V
Forward current	I_F	—	—	20	mA
Operating temperature range	T_{opr}	−10	—	75	°C

Optical and Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test conditions	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	I_F = 10 mA	1.00	1.23	1.40	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Peak emission wavelength	λ_P	I_F = 10 mA	—	940	—	nm
Detector	Dark current	I_D (I_{CEO})	V_{CE} = 24 V, I_F = 0	—	—	0.05	μA
	Peak sensitivity wavelength	λ_P	—	—	820	—	nm
Coupled	Current transfer ratio	I_C/I_F	V_{CE} = 2 V, I_F = 10 mA	2.5	—	50	%
	Collector-emitter saturation voltage	$V_{CE\ (sat)}$	I_F = 20 mA, I_C = 0.25 mA	—	0.1	0.4	V
	Rise time	t_r	V_{CE} = 5 V, I_C = 1 mA, R_L = 1 kΩ (Note 3)	—	15	50	μs
	Fall time	t_f		—	15	50	

Note 3 : Switching time measurement circuit and waveform





Precautions

- When removing flux with chemicals after soldering, clean only the leads on the soldering side; do not dip the whole package for cleaning.

  Chemicals remaining on an LED or photo transistor light emitter or receiver, if any, would have a bad influence to the optical characteristics and it may severely lower the conversion efficiency.
- 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.
- The device should be mounted on an unwarped surface.
- 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.

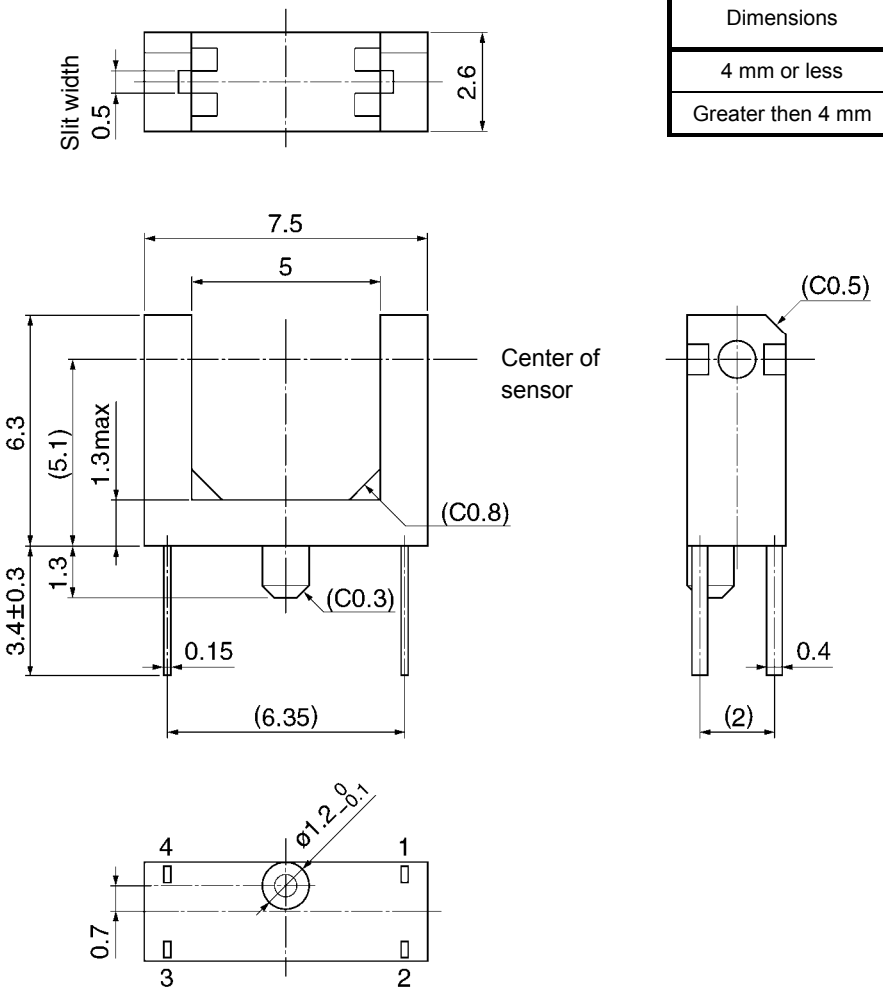
$$\frac{I_C/I_{F\ (t)}}{I_C/I_{F\ (0)}} = \frac{P_{o\ (t)}}{P_{o\ (0)}}$$

Package Dimensions: TOSHIBA 11-8A1

Unit: mm

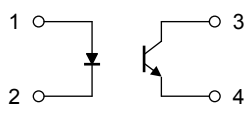
( ): Reference value
Tolerances are listed below unless otherwise specified.

Dimensions	Tolerance
4 mm or less	±0.1
Greater then 4 mm	±0.2



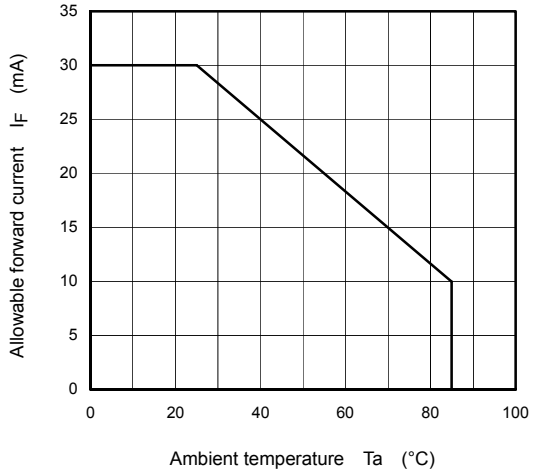
Weight : 0.1g (typ.)

Pin Connection

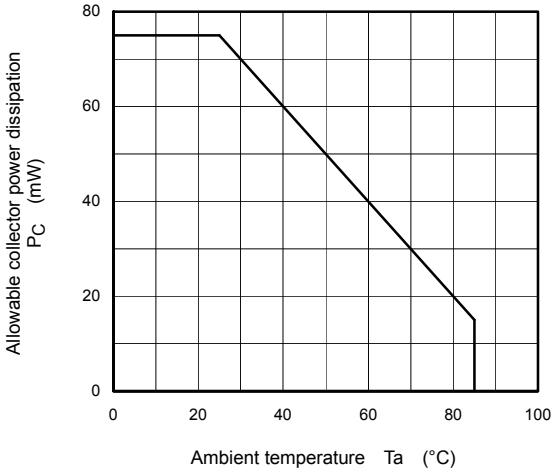


1: Anode
2: Cathode
3: Collector
4: Emitter

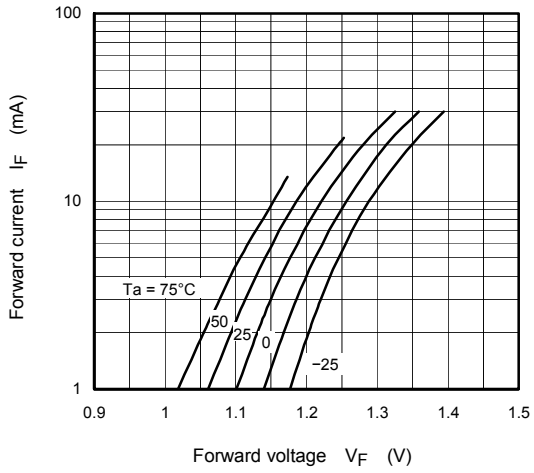
I_F – Ta



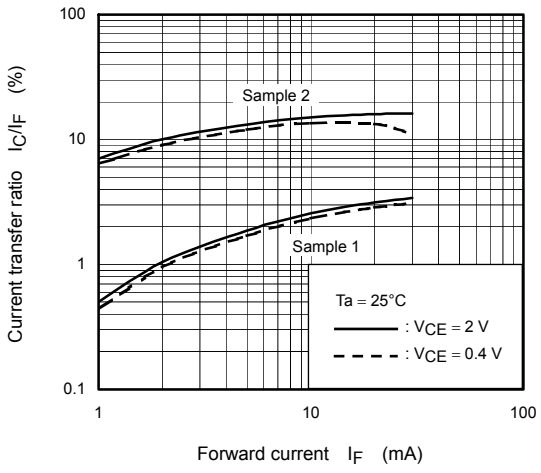
P_C – Ta



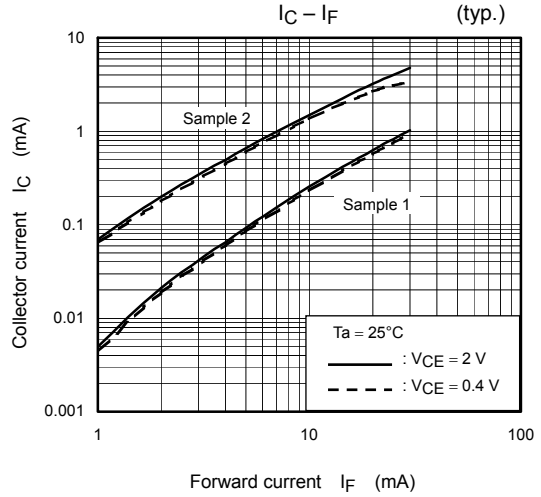
I_F – V_F (typ.)



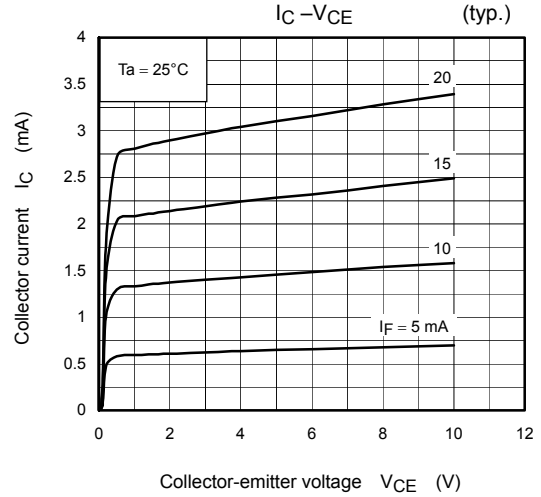
I_C/I_F – I_F (typ.)



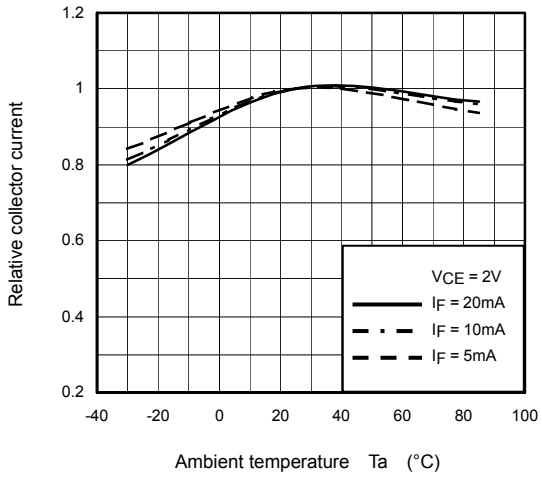
I_C – I_F (typ.)



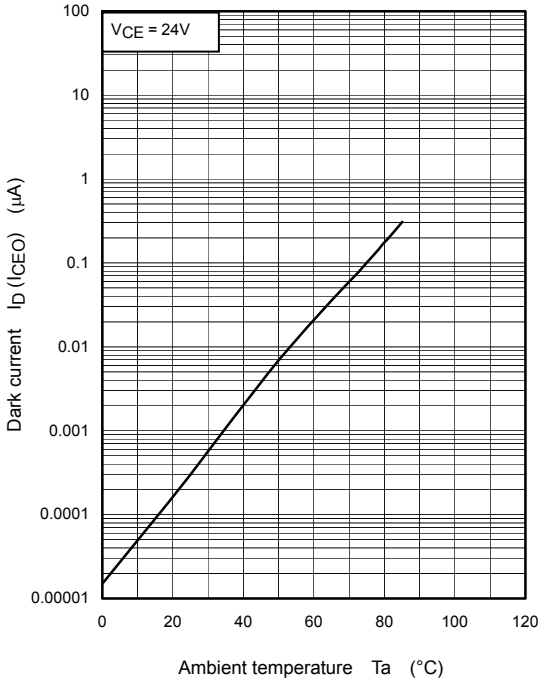
I_C –V_{CE} (typ.)



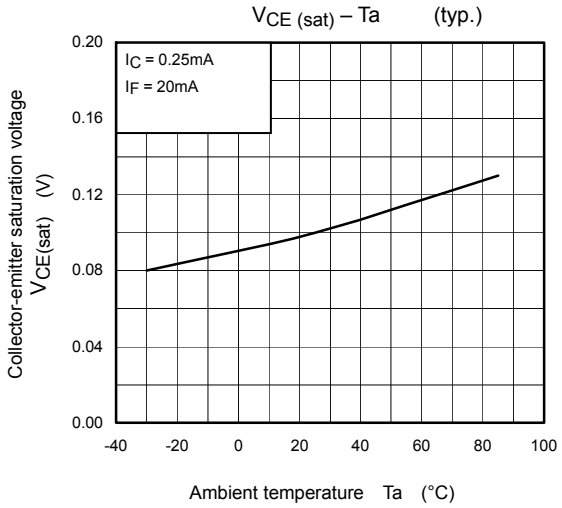
Relative I_C – Ta (typ.)



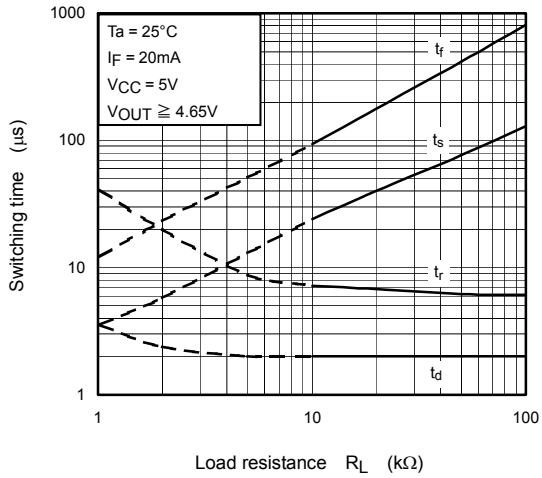
I_D (I_{CEO}) – Ta (typ.)



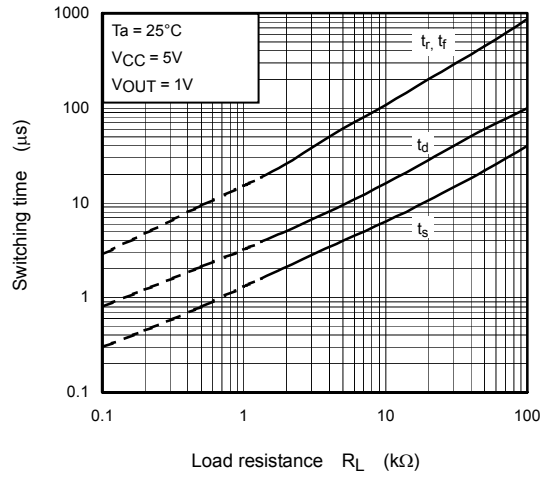
$V_{CE\ (sat)}$ – Ta (typ.)

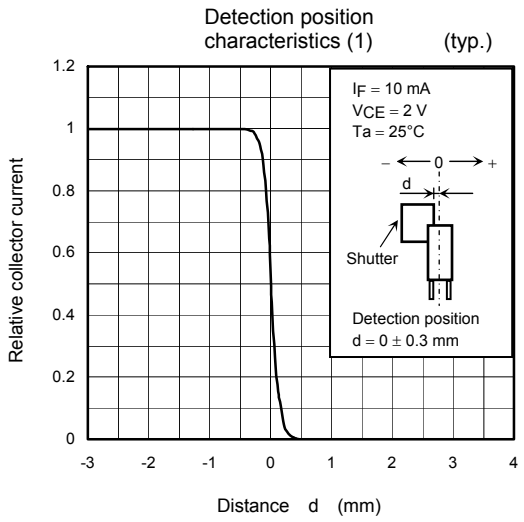


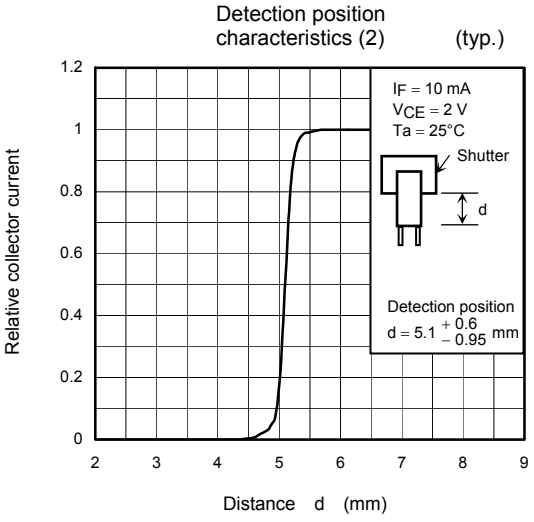
Switching characteristics (saturated operation) (typ.)



Switching characteristics (non saturated operation) (typ.)

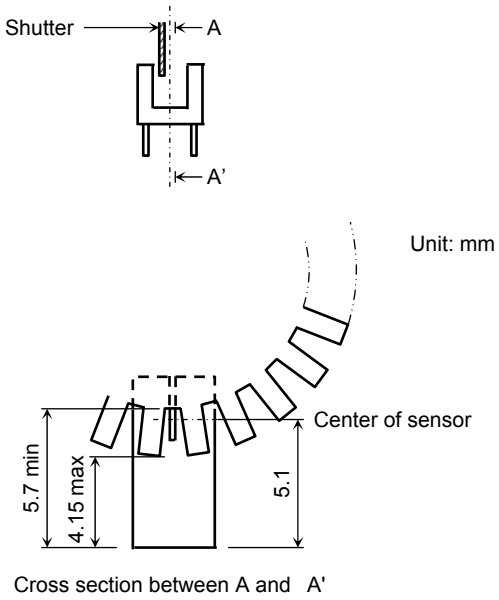






Relative Positioning of Shutter and Device

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.



Cross section between A and A'

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