TOSHIBA Photointerrupter Infrared LED + Phototransistor

TLP830(F)

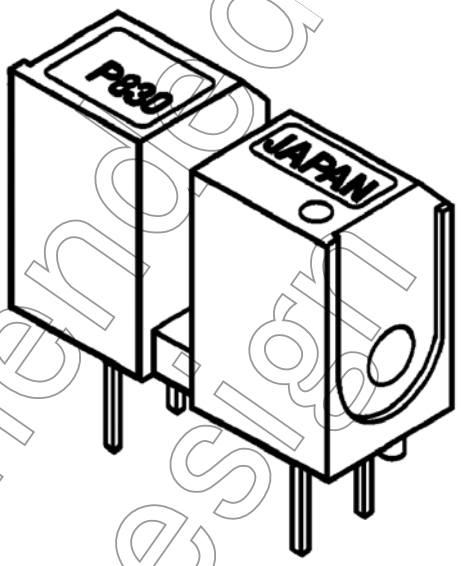
Track "00" Sensor For Floppy Disk Drive

Detection Of Sub−Scanning Quantity By Image Scanner

Various Position Detection Sensor

TLP830(F) is a photointerrupter which uses a high−radiant power GaAs LED and a fast−response Si phototransistor. The device is high resolution with a narrow slit pitch.

- Small package: 7.4 mm (H), 4.5 mm (D)
- Printed wiring board direct mounting type (with a locating pin).
- Board thickness: 1mm or less
- Short lead type enabling automated mounting
- Gap: 2mm
- High resolution: Slit width 0.15mm
- High current transfer ratio: I_C/I_F = 3% (min)
- High temperature operation: T_{opr} = 95°C (max)
- Material of the package:
  Polybutylene terephthalate
  (UL94V−0, black color)
- Detector side is of visible light cut type.



TOSHIBA	11−11C1

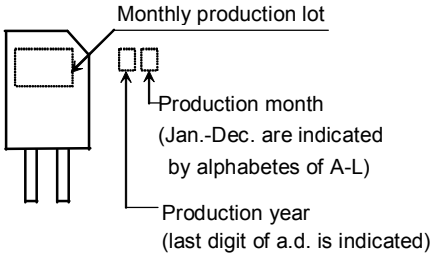
Weight: 0.4 g (typ.)

Absolute 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
		Ta > 85°C		−2	
	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 to 95	°C
Storage temperature range			T_{stg}	−40 to 100	°C
Soldering temperature (5 s)			T_{sol}	260	°C

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).

Product Indication



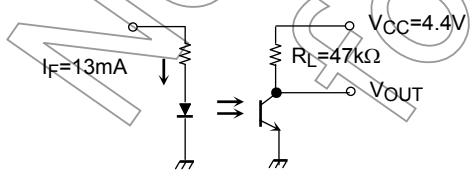
Operating Ranges

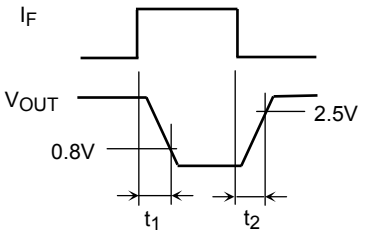
Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	5	24	V
Forward current	I_F	—	—	25	mA
Operating temperature	T_{opr}	−10	—	75	°C

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
	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	V_{CE} = 24 V, I_F = 0	—	—	0.1	μA
	Peak sensitivity wavelength		λ_P	—	—	870	—	nm
Coupled	Current transfer ratio		I_C/I_F	V_{CE} = 2 V, I_F = 10 mA	3	—	20	%
	Collector−emitter saturation voltage		$V_{CE\ (sat)}$	I_F = 20 mA, I_C = 0.3 mA	—	0.1	0.35	V
	Switching times	Rise time	t_r	V_{CC} = 5 V, I_C = 1 mA	—	15	—	μs
		Fall time	t_f	R_L = 1 kΩ	—	15	—	
		Response time (1)	t_1	V_{CC} = 4.4 V, I_C = 13 mA	—	—	80	
		Response time (2)	t_2	R_L = 47 kΩ (Note)	—	—	800	

Note: t_1, t_2 test condition





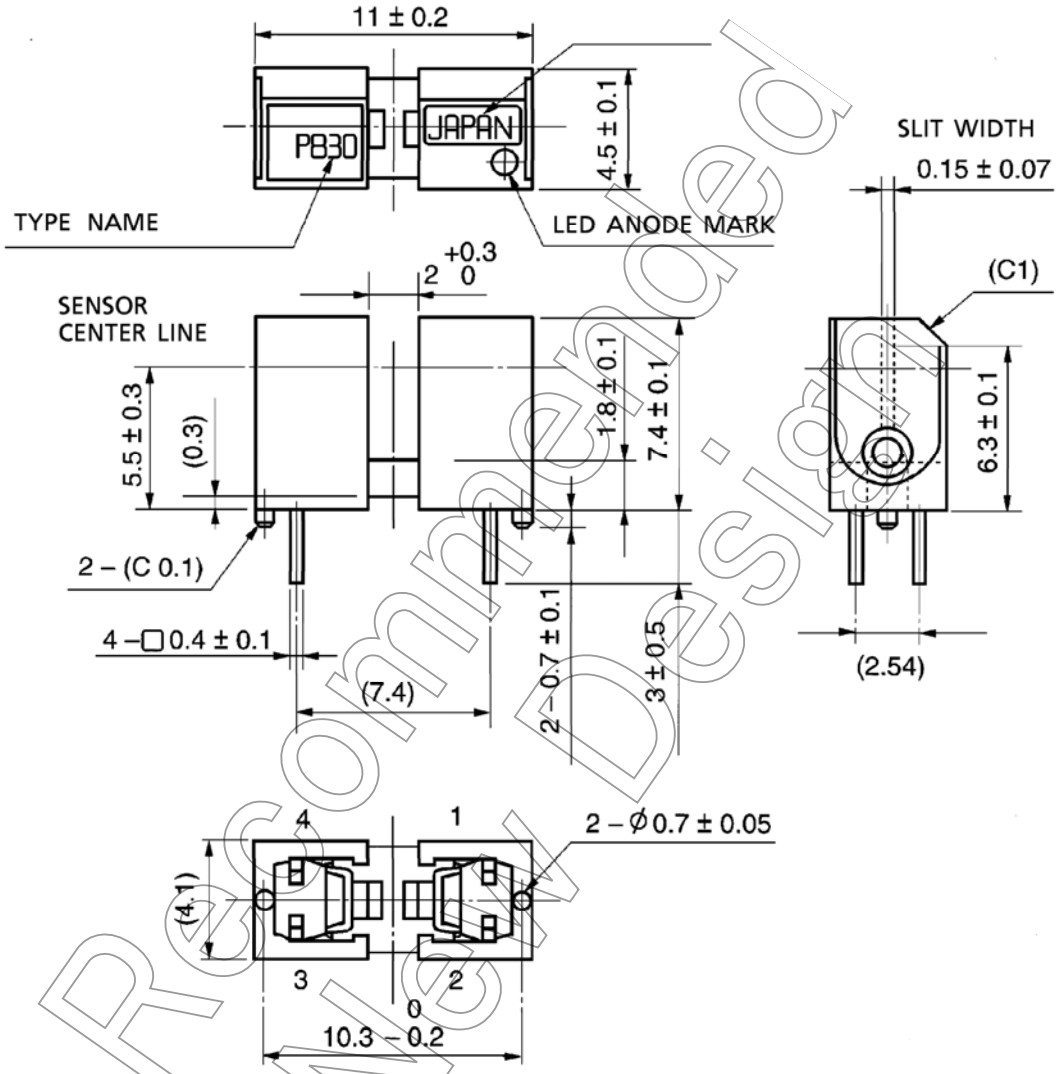
Precaution

1. If the chemical are used for cleaning, the soldered surface only shall be cleaned with chemicals avoiding the whole cleaning of the package.
2. The container is made of polybutylene terephthalate. Oil or chemicals may cause melting or cracks. Check the environment carefully before installing.
3. Shall be mounted on an unwarped surface.
4. A visible light cut–off type photo transistor which blocks light with frequencies of 700nm or above is used. However, the device cannot block ambient light with a wavelength of 700nm or more or sunlight. Install avoiding the disturbance light.
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.

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

Outline: TOSHIBA

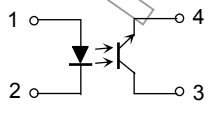
Unit: mm



( ) : REFERENCE VALUE SHIFT

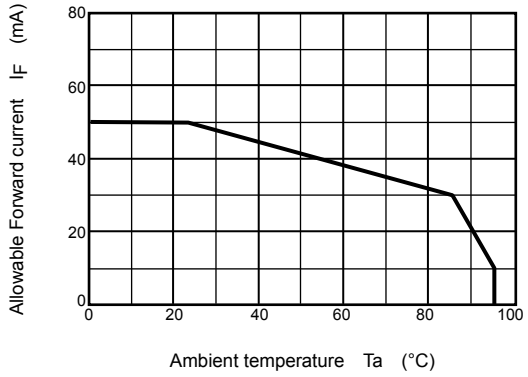
Weight: 0.4 g (typ.)

Pin Connections

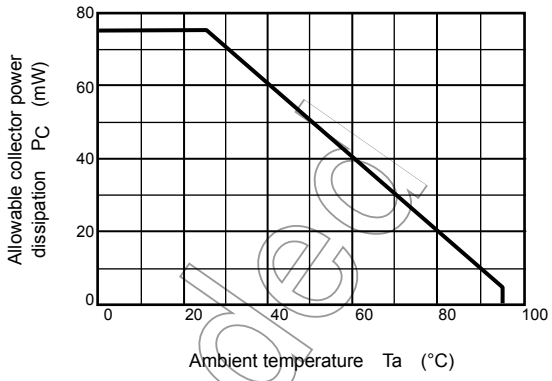


1. Anode
2. Cathode
3. Collector
4. Emitter

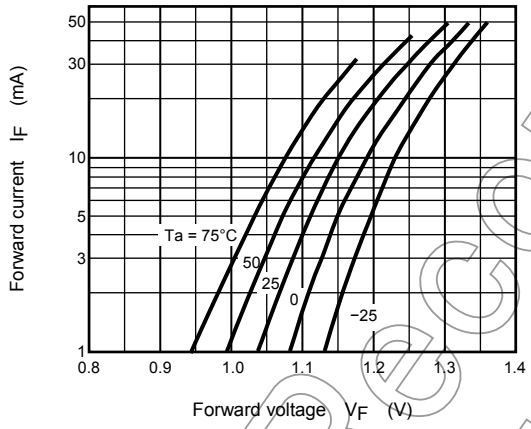
I_F – Ta



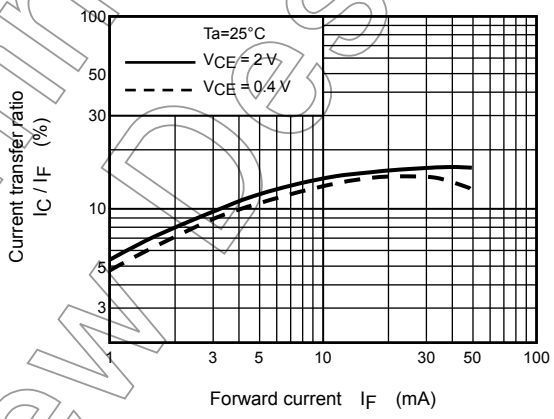
P_C – Ta



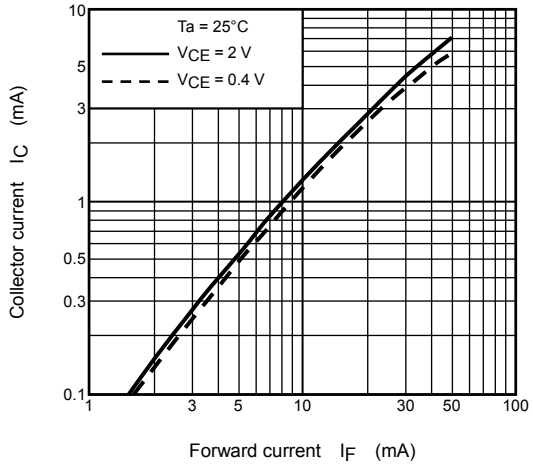
I_F – V_F (typ.)



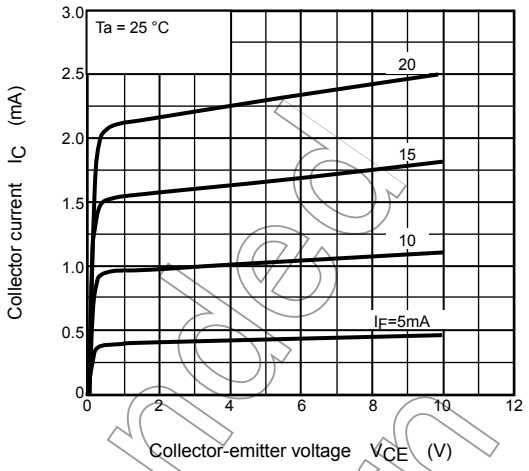
I_C / I_F – I_F (typ.)



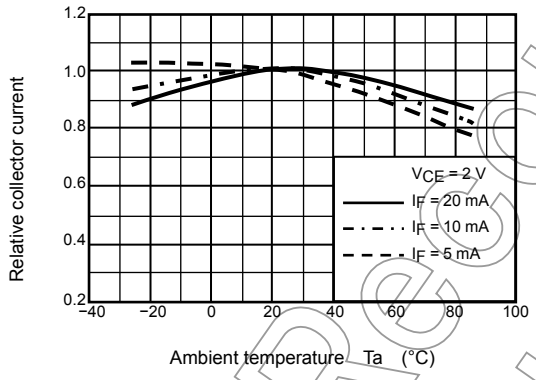
$I_C - I_F$ (typ.)



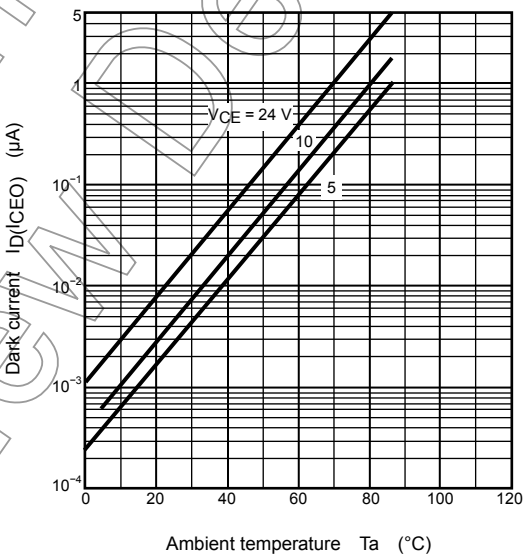
$I_C - V_{CE}$ (typ.)



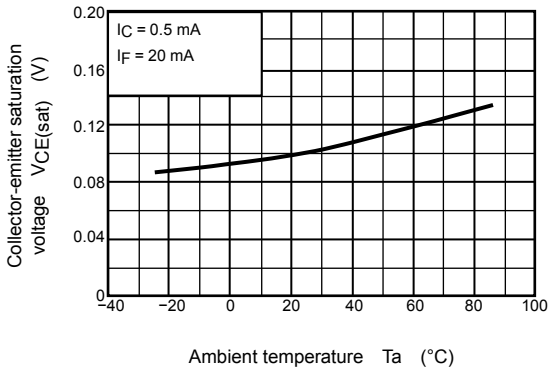
Relative I_C – Ta (typ.)



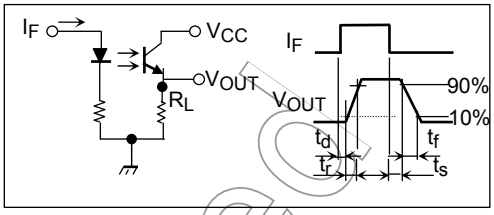
$I_D(I_{CEO})$ – Ta (typ.)



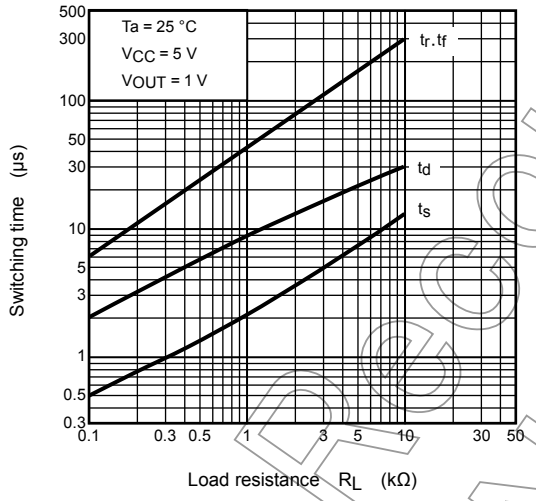
$V_{CE(sat)}$ – Ta (TYP.)



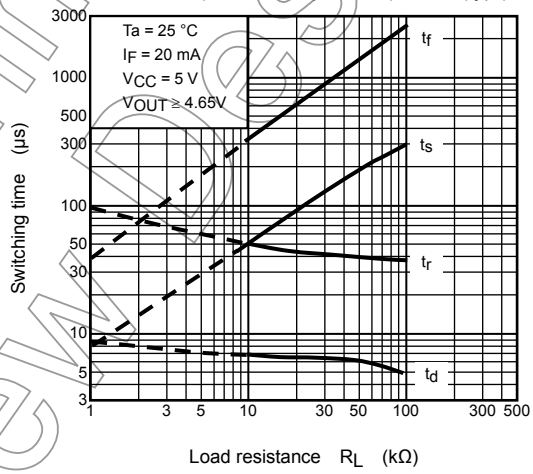
Switching time test circuit



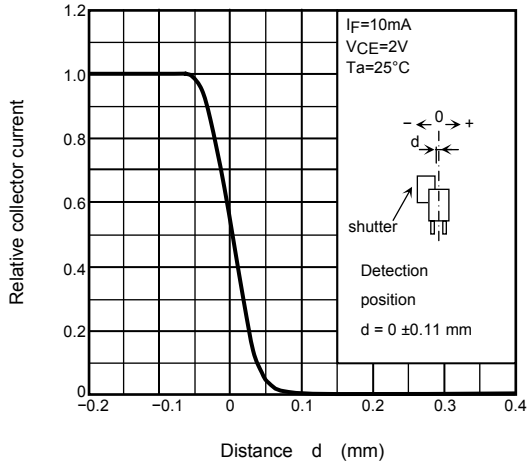
Switching characteristics (non saturated operation) (typ.)



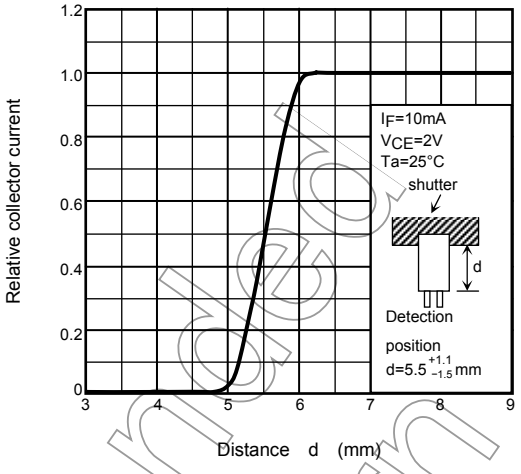
Switching characteristics (saturated operation) (typ.)



Detecting position characteristics(1) (typ.)

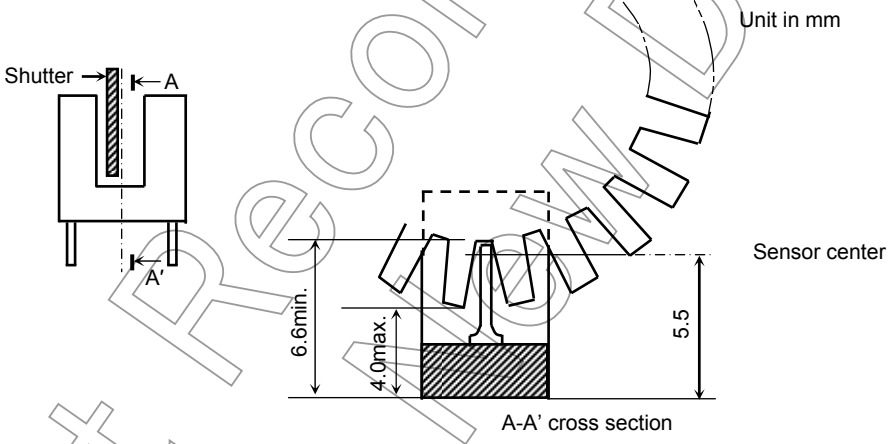


Detecting position characteristics(2) (typ.)



Positioning Of Shutter And Device

To operate correctly, make sure that the shutter and the device are positioned as shown in the figure below.
The shit pitch of the shutter must be set wider than the slit width of the device.
Determine the width taking the switching time into consideration.



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