

TOSHIBA Phototransistor Silicon NPN Epitaxial Planar

# TPS616(F)

Lead(Pb)-Free  
 Floppy Disk Drive  
 VCR  
 Position Detector Of Home Electric Equipment  
 Opto-electronic Switch

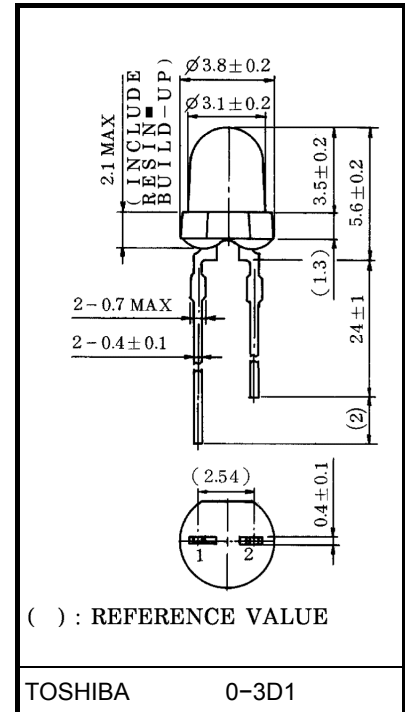
- $\phi 3.1\text{mm}$  epoxy resin package. (black)
- Light current:  $I_L = 10\mu\text{A}$  (min.) at  $E = 0.1\text{mW/cm}^2$
- Half value angle:  $\theta_{1/2} = \pm 30^\circ$  (typ.)
- Protected from external light by black mold packaging.

### Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-emitter voltage	$V_{CEO}$	30	V
Emitter-collector voltage	$V_{ECO}$	5	V
Collector current	$I_C$	20	mA
Collector power dissipation	$P_C$	75	mW
Collector power dissipation derating (Ta > 25°C)	$\Delta P_C/^\circ\text{C}$	-1	mW/°C
Operating temperature range	$T_{opr}$	-30~85	°C
Storage temperature range	$T_{stg}$	-30~100	°C

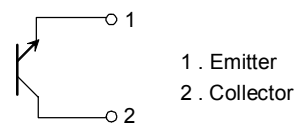
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.  
 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).

Unit in mm



Weight: 0.12g (typ.)

### Pin Connection



## Opto-electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Dark current		$I_D(I_{CEO})$	$V_{CE} = 24V$	—	0.01	0.1	$\mu A$
Light current		$I_L$ (Note 2)	$V_{CE} = 3V, E = 0.1mW / cm^2$ (Note 1)	10	—	75	$\mu A$
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = 5\mu A, E = 0.1mW / cm^2$ (Note 1)	—	0.2	0.4	V
peak sensitivity wavelength		$\lambda_P$	—	—	900	—	nm
Half value angle		$\theta \frac{1}{2}$	—	—	$\pm 30$	—	°
Switching time	Rise time	$t_r$	$V_{CC} = 10V, I_C = 1mA$	—	9	—	$\mu s$
	Fall time	$t_f$	$R_L = 1k\Omega$	—	10	—	

Note 1: Color temperature = 2870K, standard tungsten lamp.

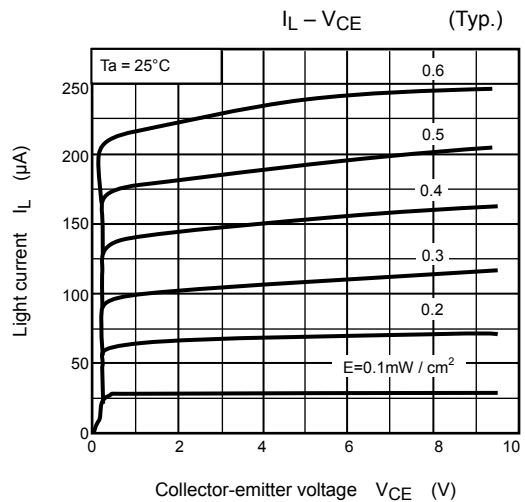
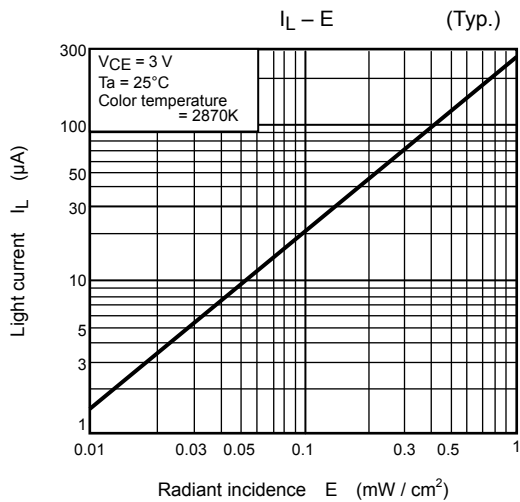
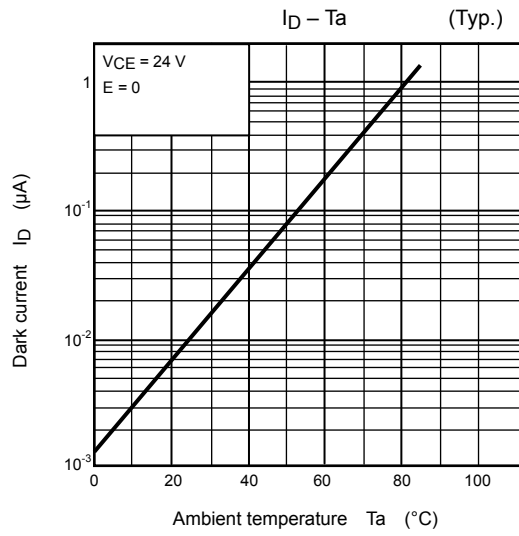
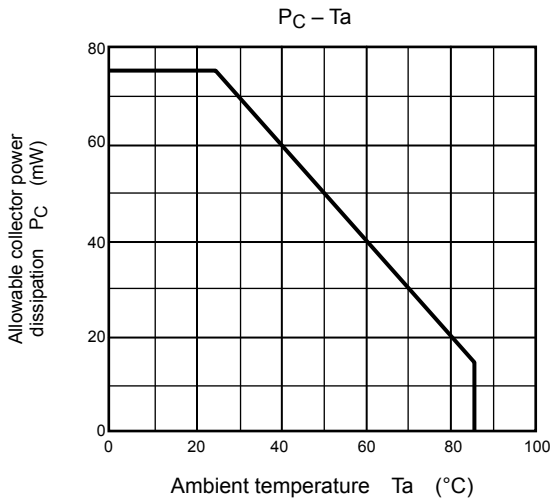
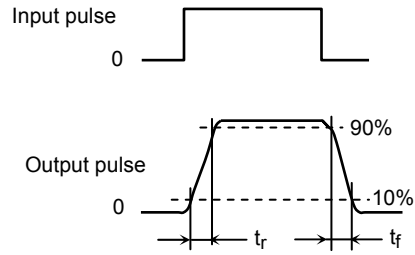
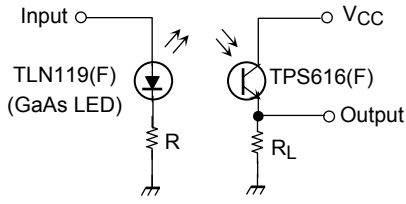
Note 2:  $I_L$  classification A: 10~25 $\mu A$ , B: 17~42.5 $\mu A$ , C: 30~75 $\mu A$ , AB: 10~42.5 $\mu A$ , BC: 17~75 $\mu A$

## Precaution

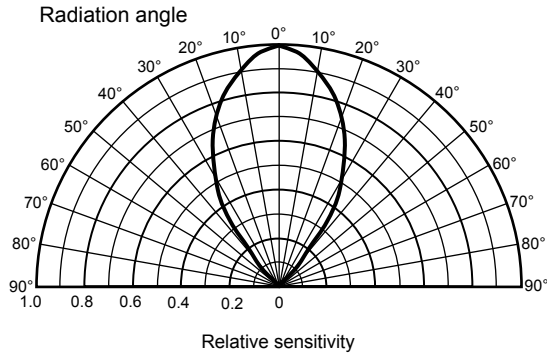
Please be careful of the followings.

- Soldering temperature: 260°C max. Soldering time: 3s max.  
(Soldering portion of lead: Above 1.5mm from the body of the device)
- If the lead is formed, the lead should be formed at a distance of 2mm from the body of the device.  
Soldering shall be performed after lead forming.

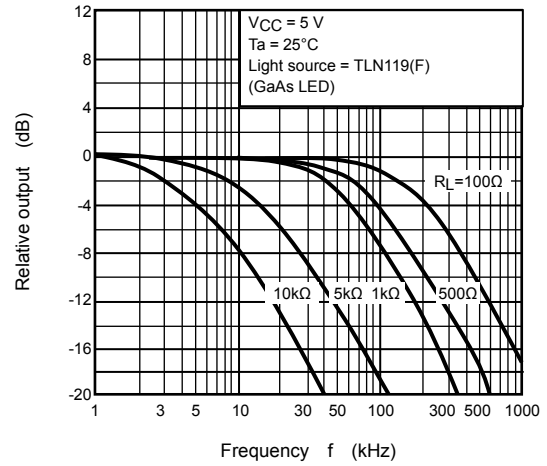
Fig.1 Switching time test circuit



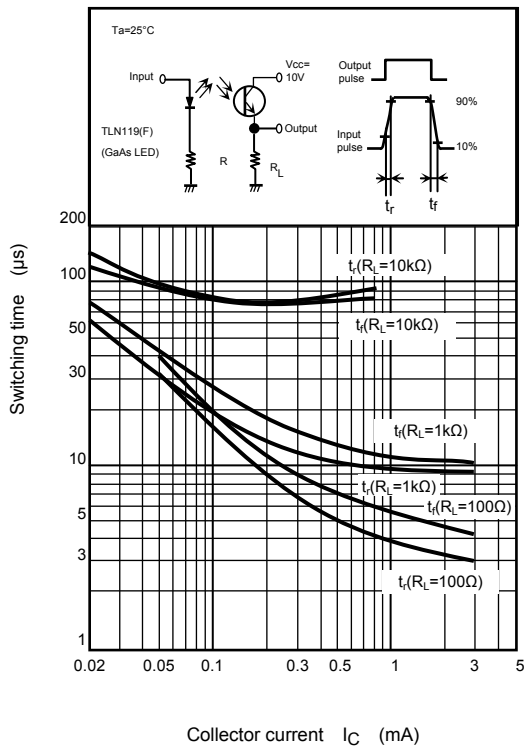
Directional Sensitivity Characteristic (Typ.)  
(Ta = 25°C)



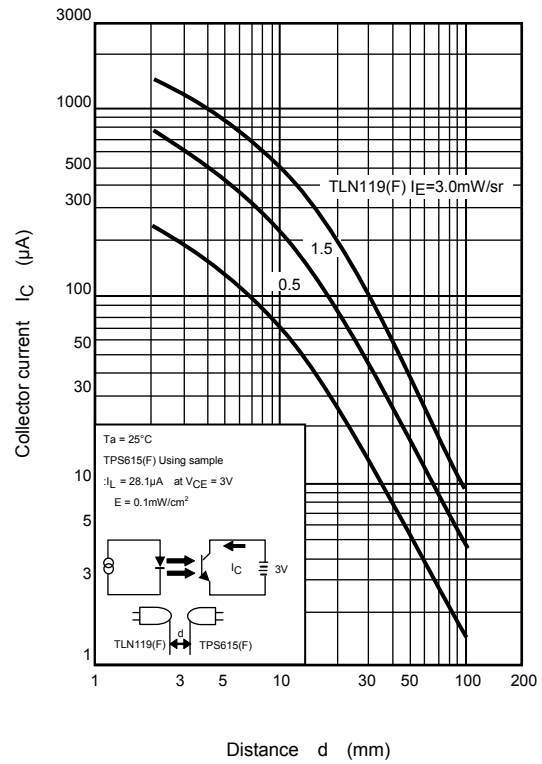
Frequency Characteristics (Typ.)

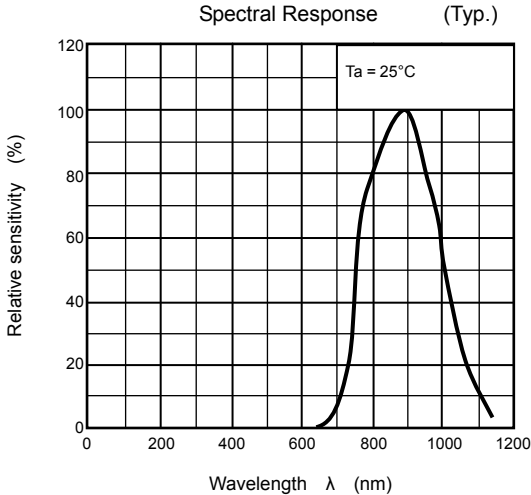


Switching characteristics (Typ.)



Coupling Characteristics With TLN119(F)





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