

TOSHIBA Photo IC Silicon Epitaxial Planar

# TPS819

- Mobile Phones, PHS, Pagers
- Notebook PCs, PDAs
- Cameras
- Other Equipment Requiring Luminosity Adjustment

The TPS819 is a linear-output photo-IC which incorporates a photodiode and a current amp circuit in a single chip. This photo-IC also incorporates a luminous-efficiency correction filter, so output value is close to luminosity characteristics.

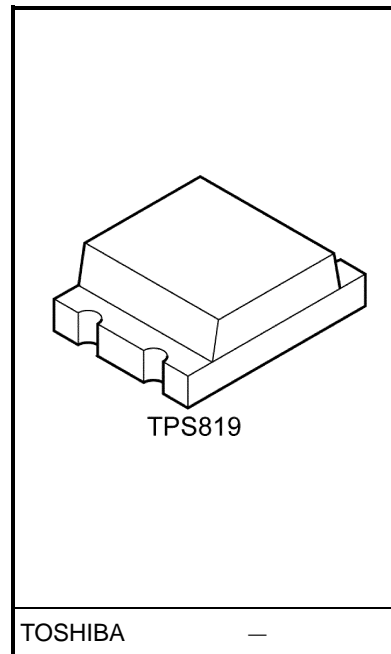
- High sensitivity :  $I_L = 50\sim 100 \mu A$   
@EV = 100 lx  $\lambda_p = 522 \text{ nm LED}$
- Luminous efficiency correction filter mounted on detector  
:  $\lambda_p = 550 \text{ nm (typ.)}$
- Open-emitter output
- Compact and light surface-mount package

## Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	-0.5~7	V
Output voltage	V <sub>OUT</sub>	≤ V <sub>CC</sub>	V
Light current	I <sub>L</sub>	10	mA
Permissible power dissipation	P	70	mW
Operating temperature range	T <sub>opr</sub>	-25~85	°C
Storage temperature range	T <sub>stg</sub>	-40~100	°C
Soldering temperature range (Note 1)	T <sub>sol</sub>	260	°C

Note 1: The reflow time and the recommended temperature profile are shown in the section entitled Handling Precautions.

Unit: mm



Weight: 0.017 g (typ.)

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{CC}$	2.2	—	5.5	V
Lead resistance	$R_L$	510	—	—	$\Omega$

## Electrical and Optical Characteristics (Ta = 25°C)

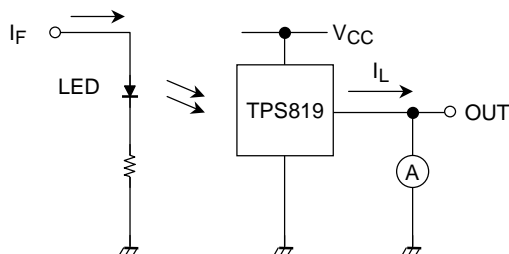
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Supply current	$I_{CC}$	$V_{CC} = 3\text{ V}$ , $E_V = 1000\text{ lx}$ , $R_L = 1\text{ k}\Omega$ (Note 2)	—	2	—	mA
Light current (1)	$I_L (1)$	$V_{CC} = 3\text{ V}$ , $E_V = 10\text{ lx}$ (Note 2, 5)	—	20	—	$\mu\text{A}$
Light current (2)	$I_L (2)$	$V_{CC} = 3\text{ V}$ , $E_V = 100\text{ lx}$ (Note 2, 5)	—	200	—	
Light current (3)	$I_L (3)$	$V_{CC} = 3\text{ V}$ , $\lambda_p = 522\text{ nm}$ , $E_V = 100\text{ lx}$ (Note 3, 5)	50	—	100	
Light current ratio	$\frac{I_L (IR)}{I_L (3)}$ (Note 4, 5)		—	0.03	0.10	
Dark current	$I_{LEAK}$	$V_{CC} = 3.3\text{ V}$ , $E_V = 0$	—	—	0.5	$\mu\text{A}$
Saturation output voltage	$V_o$	$V_{CC} = 3\text{ V}$ , $R_L = 75\text{ k}\Omega$ , $E_V = 100\text{ lx}$ (Note 3)	2.2	2.35	—	V
Peak sensitivity wavelength	$\lambda_p$	—	—	550	—	nm
Switching time	$t_r$	$V_{CC} = 3\text{ V}$ , $R_L = 5\text{ k}\Omega$ , $\lambda_p = 522\text{ nm}$ (Note 6)	—	0.2	—	ms
	$t_f$		—	1	—	
	$t_d$		—	0.3	—	
	$t_s$		—	0.02	—	

Note 2: CIE standard A light source is used (color temperature = 2856K)

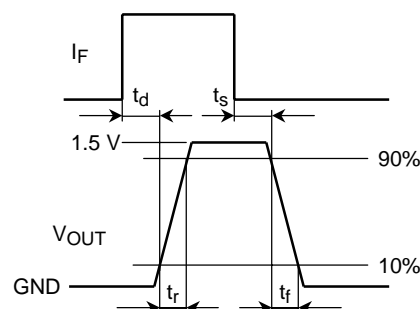
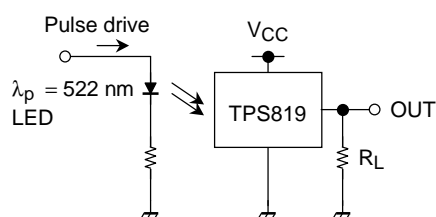
Note 3: Green LED ( $\lambda_p = 522\text{ nm}$ ) is used as light source and set an illuminance meter for 100 lx.  
Light current classification: A Rank: 50~83.5  $\mu\text{A}$ , B Rank: 60~100  $\mu\text{A}$

Note 4: Infrared LED ( $\lambda_p = 870\text{ nm}$ ) is used as light source for  $I_L (IR)$  and light current is set to obtain  $V_{CC} = 3\text{ V}$  and  $E = 0.01\text{ mW/cm}^2$ .

Note 5: Light current measurement circuit



Note 6: Rise time/fall time measurement method




## Package Dimensions

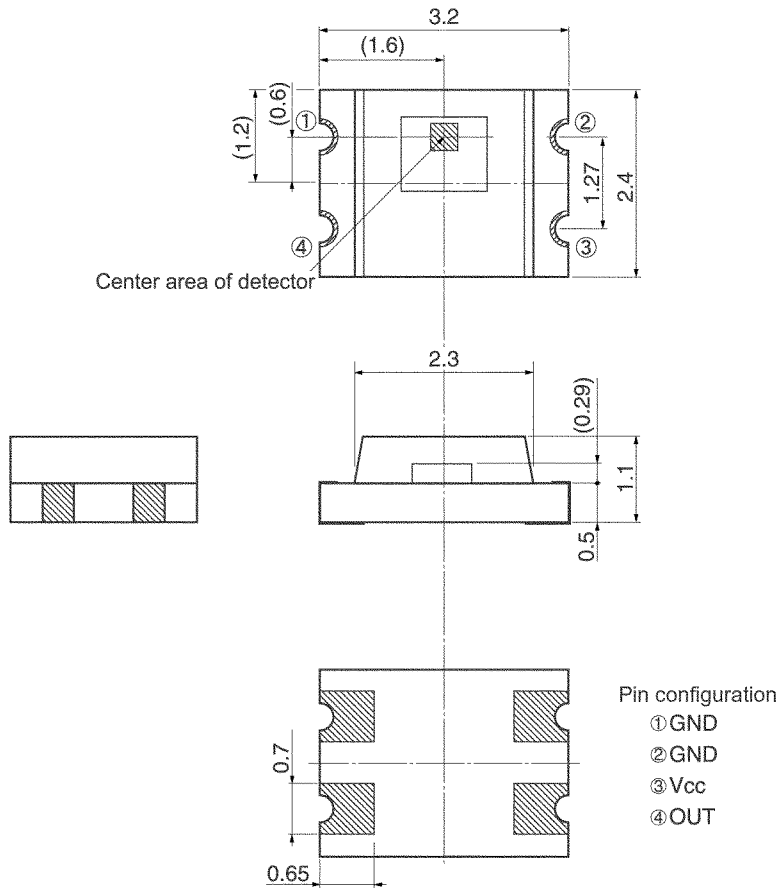
TPS819

Unit: mm

Tolerance:  $\pm 0.2$

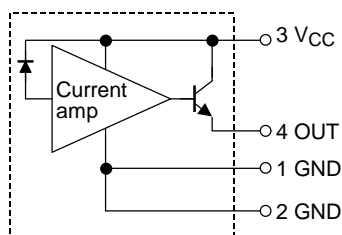
 : Sensitive area

Sensitive area:  $\square 0.35$



Weight: 0.017 g (typ.)

## Pin Connection



## Handling Precautions

- At power-on in darkness the internal circuit takes about 50 ms to stabilize. During this period the output signal is unstable and may change. Please take this into account.

### Moisture-proof Packing

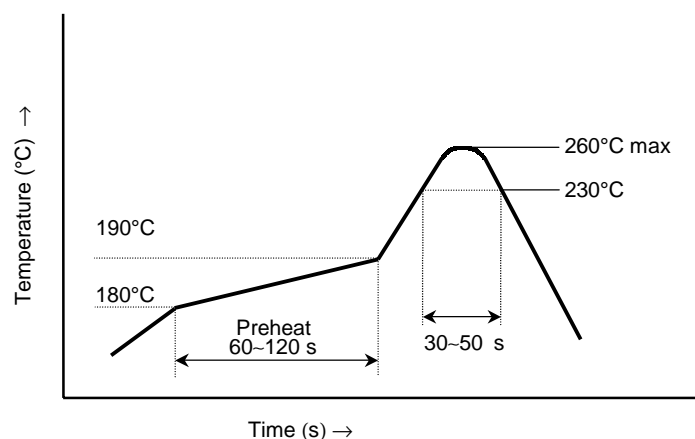
- To avoid moisture absorption by the resin, the product is packed in an aluminum envelope with silica gel.
- The optical characteristics of the devices may be affected by exposure to moisture in the air before soldering and they should therefore be stored after opening the moisture proof bag under the following conditions:  
Temperature: 5°C~30°C, Humidity: 60% (max), Storage time: 168 h (max)
- Please perform baking when the storage time is expired. Expiration date for an unopened moisture proof bag is six month and 168 h for an opened moisture proof bag. This device is a tape packed product; hence, do not bake the product at high temperature:  
Recommended baking condition: Baking Temperature = 60°C, Baking Hours = 12 h or longer

### Mounting Precautions

- Do not apply stress to the resin at high temperature.
- The resin part is easily scratched, so avoid friction with hard materials.
- When installing the assembly board in equipment, ensure that this product does not come into contact with other components.

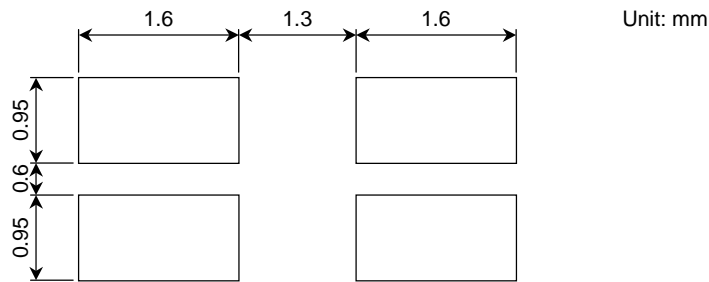
### Mounting Methods

- Reflow soldering
  - Package surface temperature: 260°C (max)
  - Please perform reflow soldering using the following reference temperature profile. Perform reflow soldering no more than twice.



- Please perform the first reflow soldering with reference to the above temperature profile and within 168 h of opening the package.
- Second reflow soldering  
In case of second reflow soldering should be performed within 168 h of the first reflow under the above conditions.  
Storage conditions before the second reflow soldering: 30°C, 60% RH max
- Do not perform flow soldering.
- Make any necessary soldering corrections manually.  
(only once at each soldering point)  
Temperature: 350°C or less  
Time: within 5 s

(2) Recommended soldering pattern



(3) Cleaning conditions

When cleaning is required after soldering

Chemicals: AK225 alcohol

Temperature and time: 50°C × 30 s or : 30°C × 3 min

Ultrasonic cleaning: 300 W or less

**Packing Display**

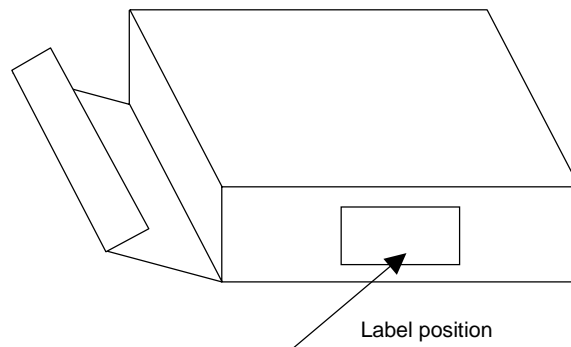
(1) Packing quantity

Reel (minimum packing quantity)	3000 pcs
Carton	5 reels (15000 pcs)

(2) Packing form

To avoid moisture absorption by the resin, the devices are sealed in an aluminum package with silica gel. Buffer materials are enclosed with carton.

- Carton appearance

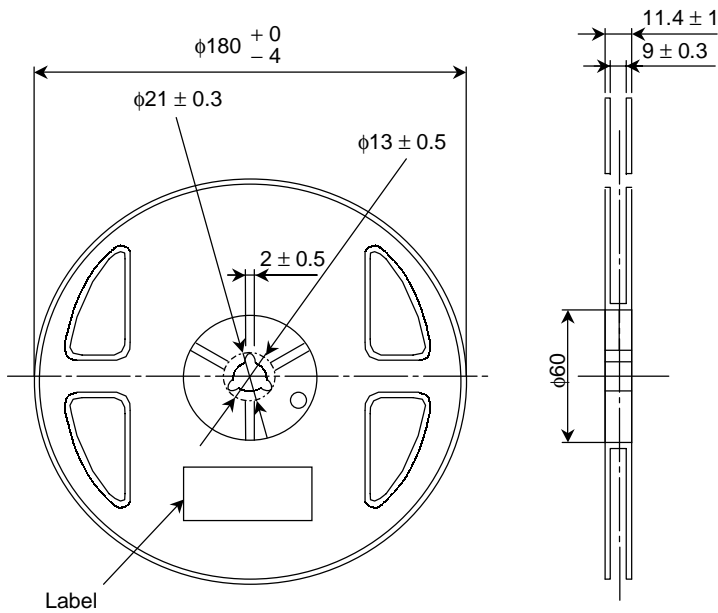


Carton dimensions

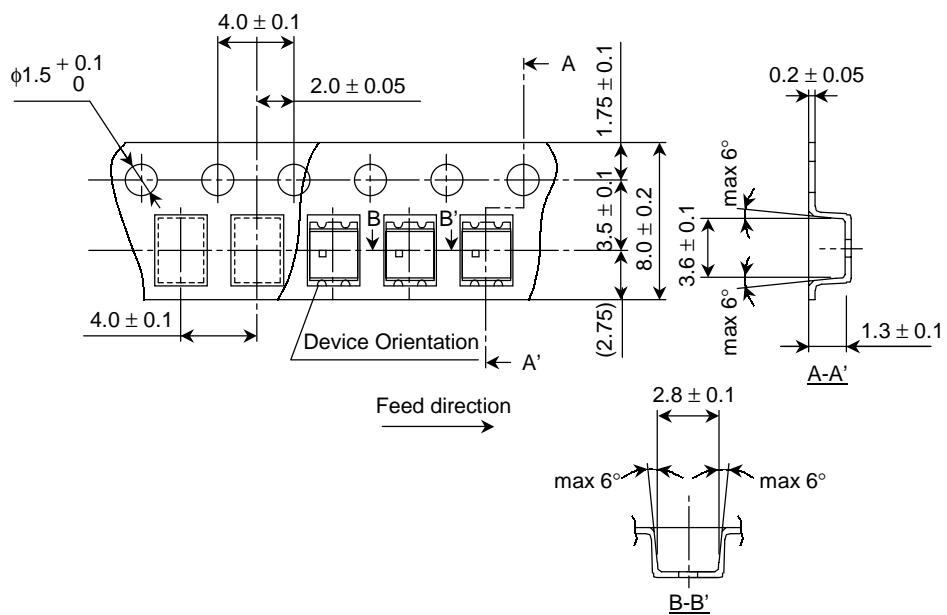
(W) 81 mm × (L) 280 mm (H) 280 mm

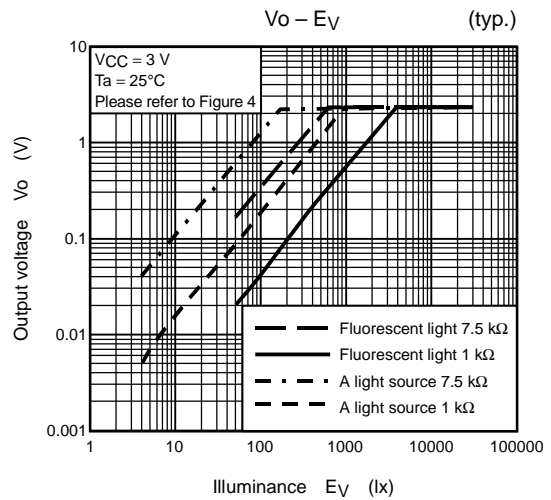
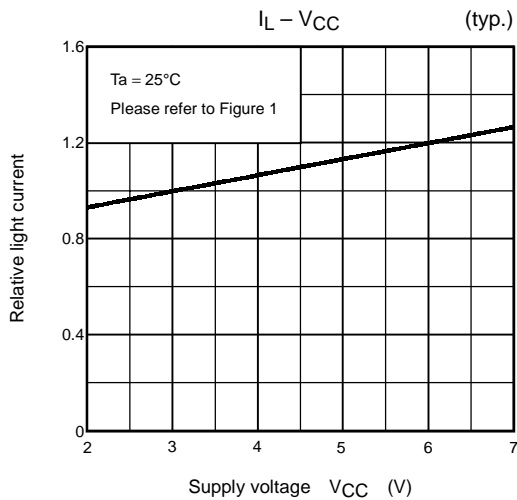
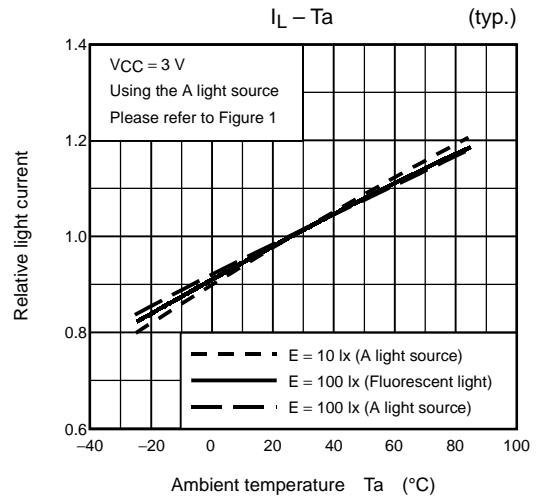
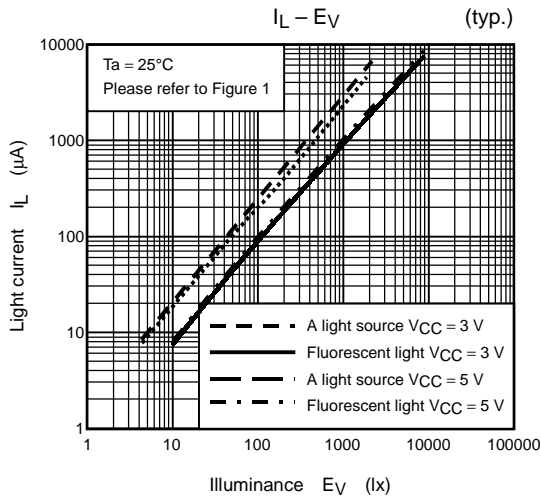
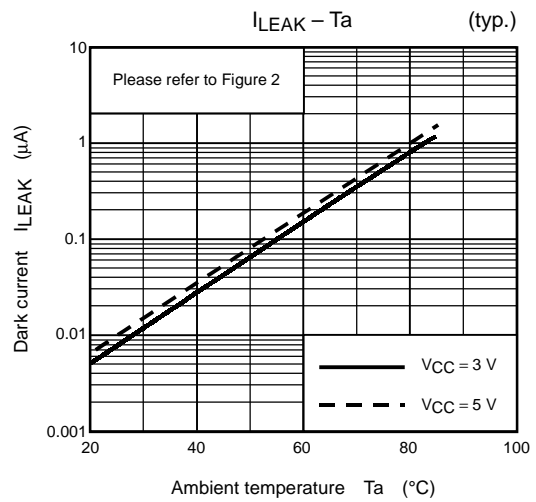
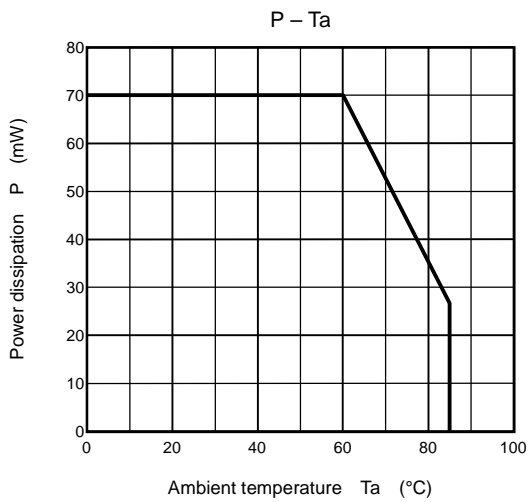
## Tape Packing Specifications

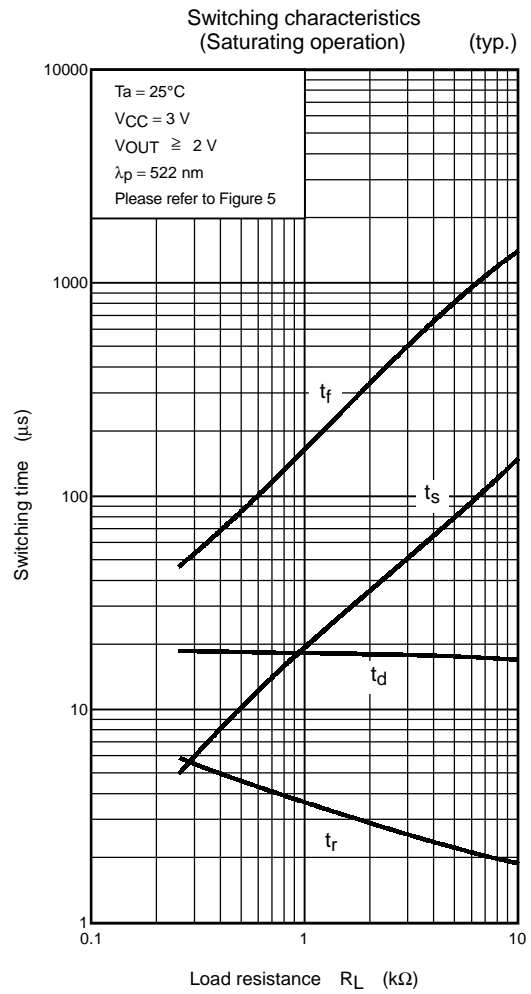
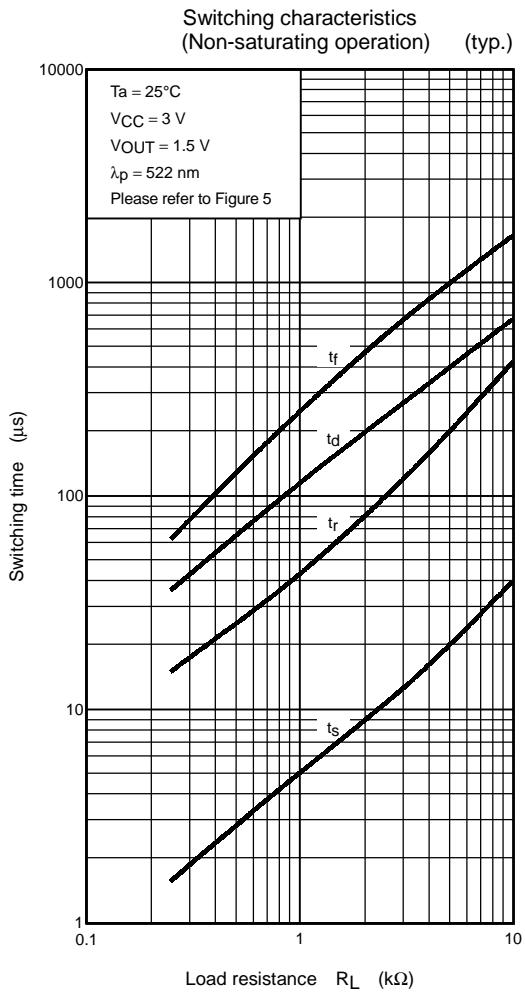
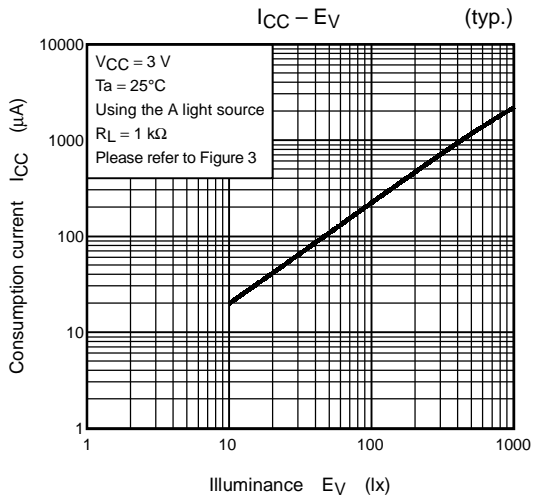
(1) Reel dimensions

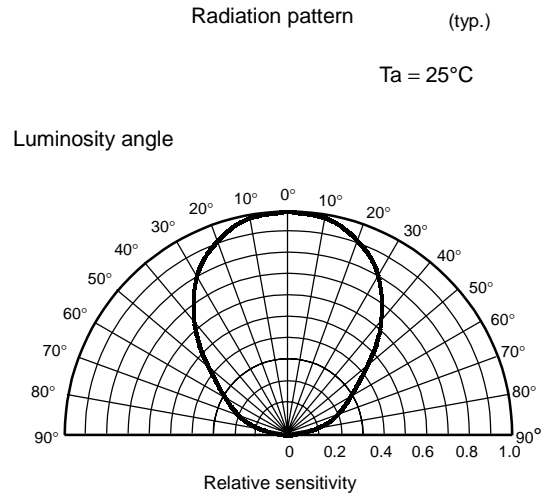
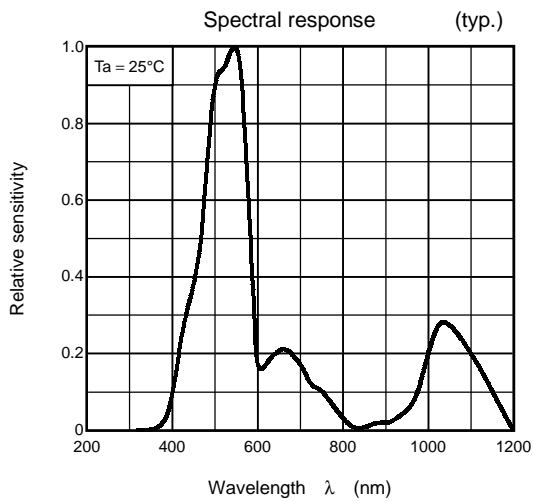


(2) Tape dimensions









**Measurement Circuits**

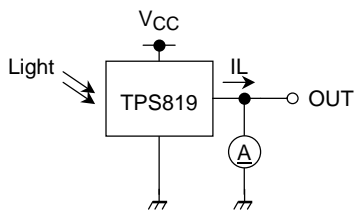


Figure 1 Light current measurement circuit

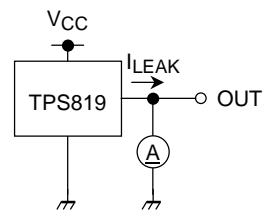


Figure 2 Dark current measurement circuit

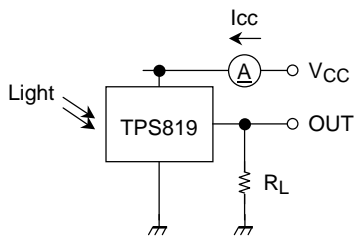


Figure 3 Consumption current measurement circuit

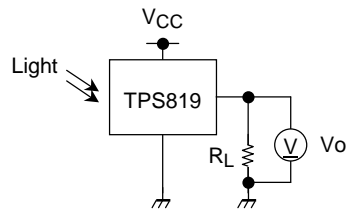


Figure 4 Output voltage measurement circuit

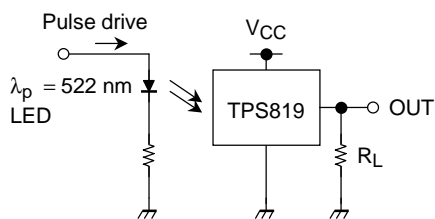


Figure 5 Switching measurement circuit

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