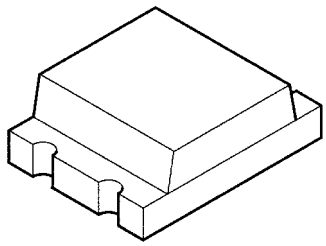
TOSHIBA Photo IC Silicon Epitaxial Planar

TPS850

Mobile Phones, PHS, Pagers
Notebook PCs, PDAs
Video Cameras, Digital Still Cameras
Other Equipment Requiring Luminosity Adjustment



TPS850

TOSHIBA	—

Weight: 0.017 g (typ.)

The TPS850 is a linear-output photo-IC which incorporates a photodiode and a current amp circuit in a single chip. This photo-IC is current output type, so can set up output voltage freely by arbitrary load resistance.

- High sensitivity: I_L = 230 μA
  @E_V = 100 lx (typ.) Using the fluorescent light
- Little fluctuation in light current
  : Width range = x1 to x1.6 (typ. ±25%)
- Output linearity of illuminance is excellent
- Open-emitter output
- Compact and light surface-mount package
- Pb-free

Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	−0.5 to 7	V
Output voltage	V_{OUT}	≦ V_{CC}	V
Light current	I_L	10	mA
Permissible power dissipation	P	70	mW
Operating temperature range	T_{opr}	−30 to 85	°C
Storage temperature range	T_{stg}	−40 to 100	°C
Soldering temperature range (10 s) (Note 1)	T_{sol}	260	°C

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

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	2.2	—	5.5	V

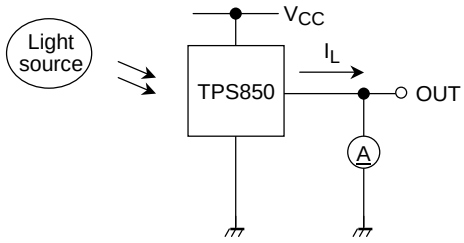
Electrical and Optical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Supply current		I_{CC}	V_{CC} = 3 V, E_V = 1000 lx, R_L = 250 Ω (Note 2)	—	4	—	mA
Light current (1)		I_L (1)	V_{CC} = 3 V, E_V = 100 lx (Note 2, 4)	—	300	—	μA
Light current (2)		I_L (2)	V_{CC} = 3 V, E_V = 10 lx (Note 3, 4)	18	23	30	
Light current (3)		I_L (3)	V_{CC} = 3 V, E_V = 100 lx (Note 3, 4)	180	230	300	
Light current ratio		$\frac{I_L\ (1)}{I_L\ (3)}$		—	1.3	1.7	
Dark current		I_{LEAK}	V_{CC} = 3.3 V, E_V = 0	—	—	0.5	μA
Saturation output voltage		Vo	V_{CC} = 3 V, R_L = 75 kΩ, E_V = 100 lx (Note 3)	2.2	2.35	—	V
Peak sensitivity wavelength		λ_p	—	—	640	—	nm
Switching time	Rise time	t_r	V_{CC} = 3 V, R_L = 5 kΩ, (Note 5)	—	0.2	1	ms
	Fall time	t_f		—	0.35	2	

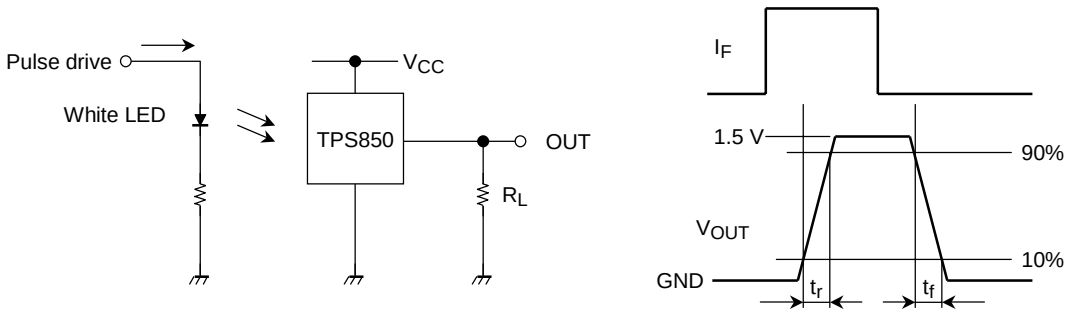
Note 2: CIE standard A light source is used (color temperature = 2856K, approximated incandescence light).

Note 3: Fluorescence light is used as light source. However, white LED is substituted in a mass-production process.

Note 4: Light current measurement circuit



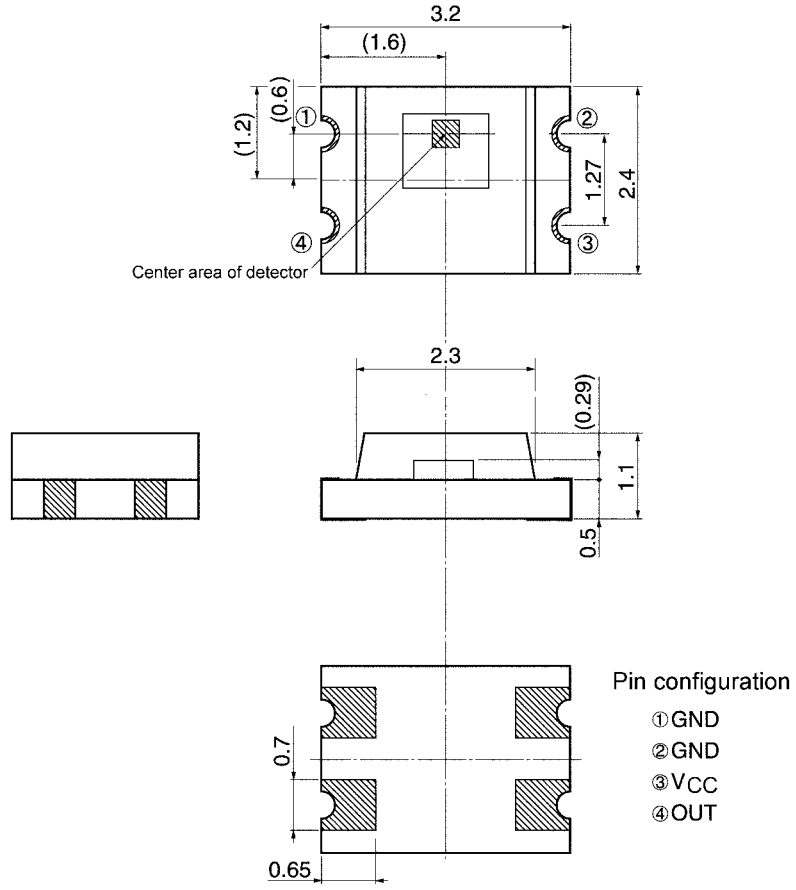
Note 5: Rise time/fall time measurement method



Package Dimensions

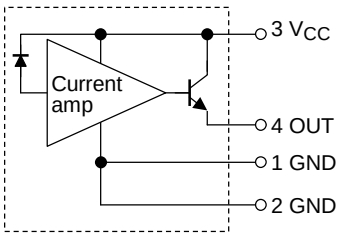
TPS850

Unit: mm



Weight: 0.017 g (typ.)

Block Diagram



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

(1) To avoid moisture absorption by the resin, the product is packed in an aluminum envelope with silica gel.

(2) Since the optical characteristics of the device can be affected during soldering by vaporization resulting from prior absorption of moisture and they should therefore be stored under the following conditions:

Temperature: 5°C to 30°C, Relative humidity: 60% (max), Time: 168 h

(3) Baking is required if the devices have been store unopened for more than six months or if the aluminum envelope has been opened for more than 168 h.

These devices are packed on tapes; hence, please avoid baking at high temperature.

Recommended baking conditions: 60°C for 12 h or longer

Mounting Precautions

(1) Do not apply stress to the resin at high temperature.

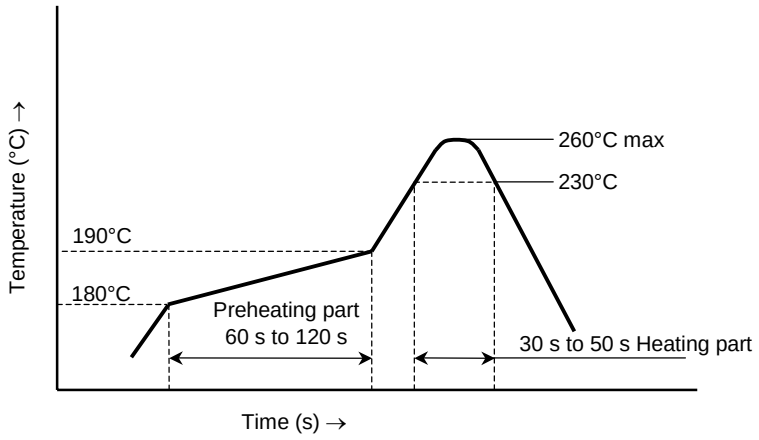
(2) The resin part is easily scratched, so avoid friction with hard materials.

(3) When installing the assembly board in equipment, ensure that this product does not come into contact with other components.

Mounting Methods

(1) 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 within 168 h after opening the package with reference to the above temperature profile.
- Second reflow soldering

  In case of second reflow soldering, it should be performed within 168 h after first reflow under the above conditions.

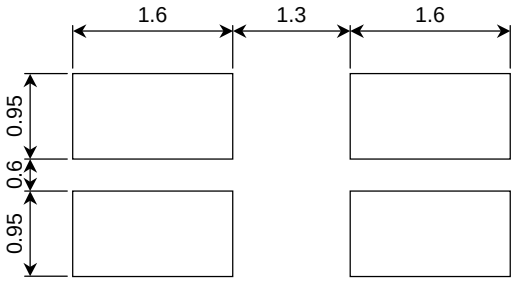
  Storage conditions before second reflow soldering: 30°C, 60% RH or lower
- Do not perform flow soldering.
- Make any necessary soldering correction manually.

  (do not do this more than once for any given pin.)

  Temperature: no more than 350°C (25 W for soldering iron)

  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 mins

Ultrasonic cleaning: 300 W or less

Packing Specification

(1) Packing quantity

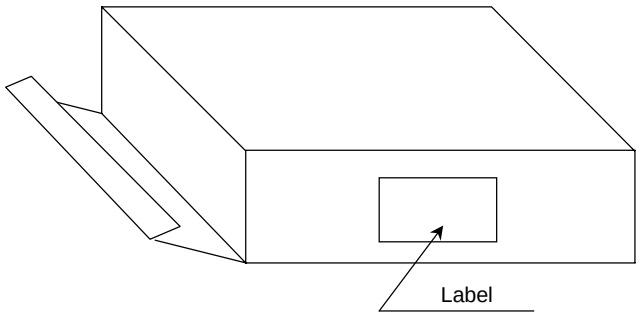
Reel (minimum packing quantity)	3000 devices
Carton	5 reels (15000 devices)

(2) Packing format

An aluminum envelope containing silica gel and reels is deaerated and sealed.

Pack shock-absorbent materials around the aluminum envelopes in the cartons to cushion them.

- Carton specification

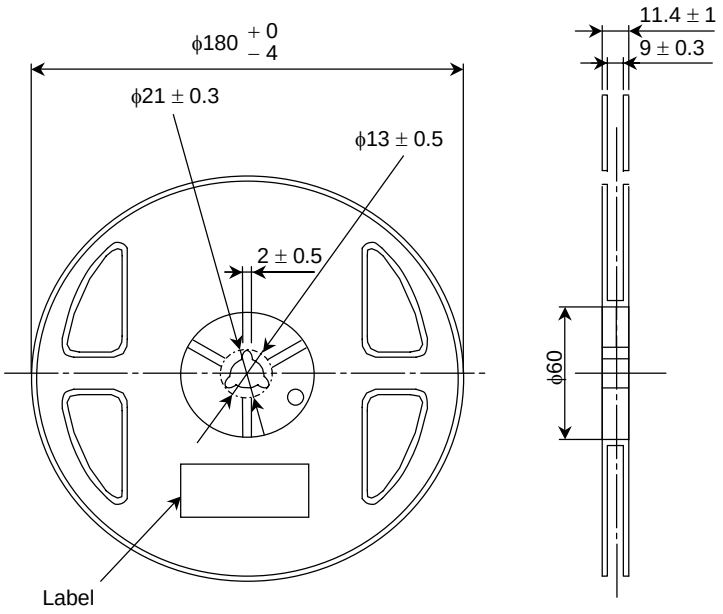


Carton dimensions

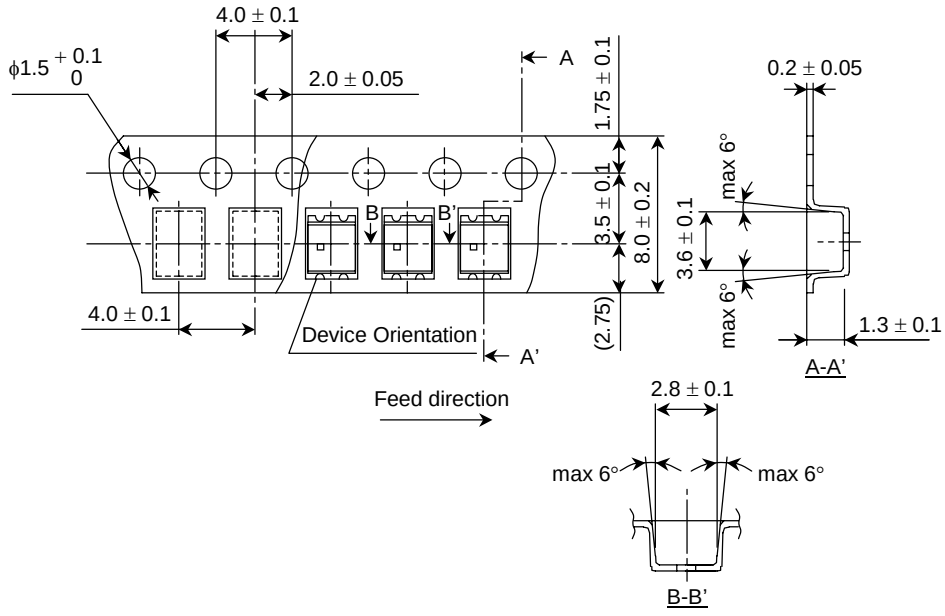
(W) 81 mm × (L) 280 mm × (H) 280 mm

Tape Packing Specifications

(1) Reel dimensions

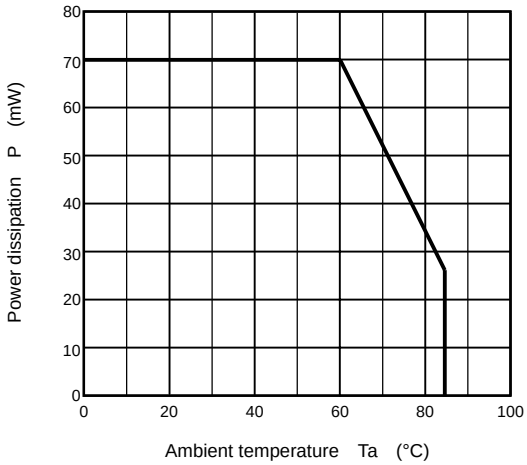


(2) Tape dimensions

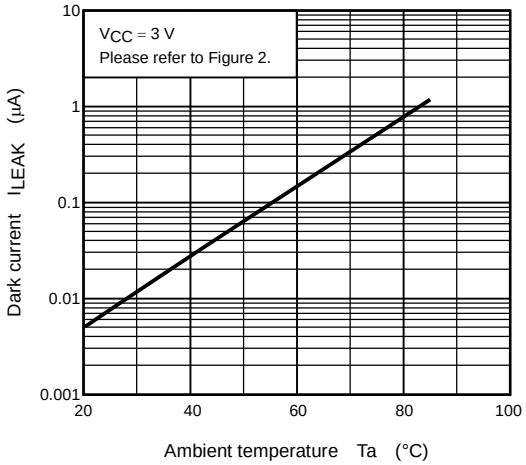


(3) Packing quantity: 3000/reel

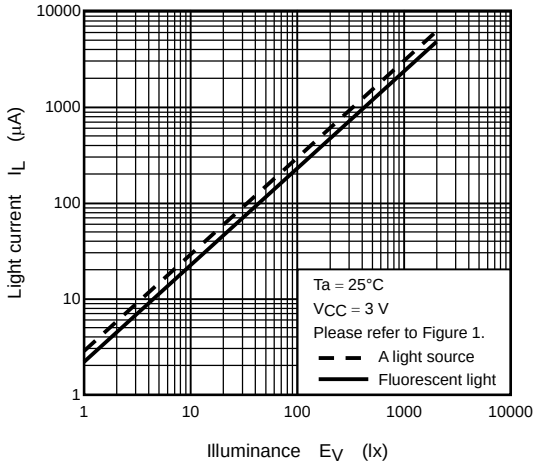
P – Ta



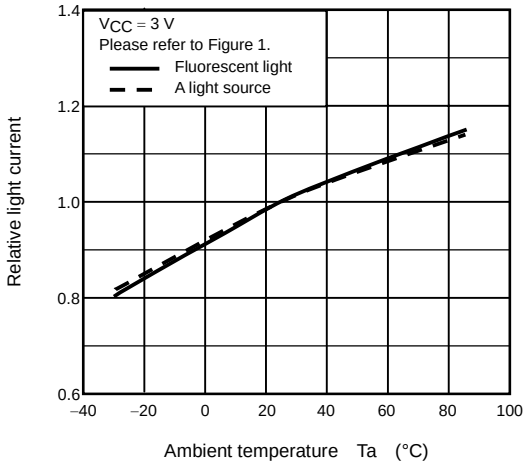
I_{LEAK} – Ta (typ.)



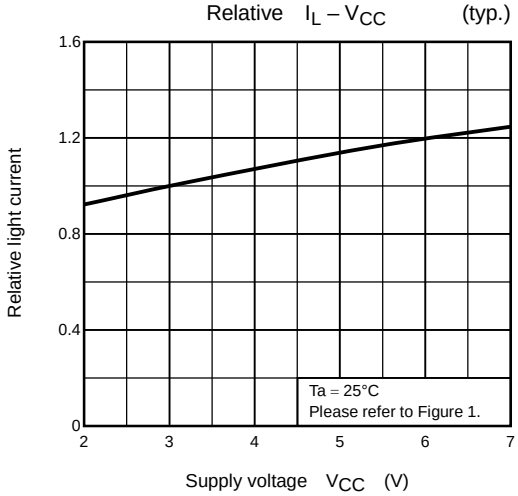
I_L – E_V (typ.)



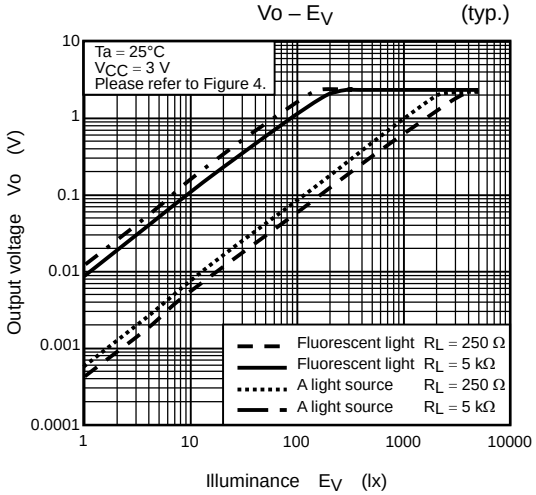
Relative I_L – Ta (typ.)



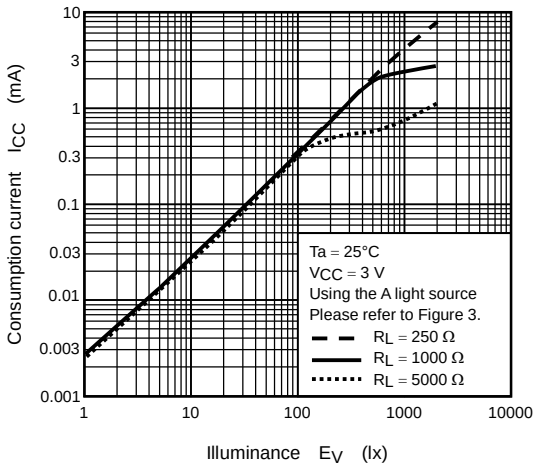
Relative I_L – V_{CC} (typ.)



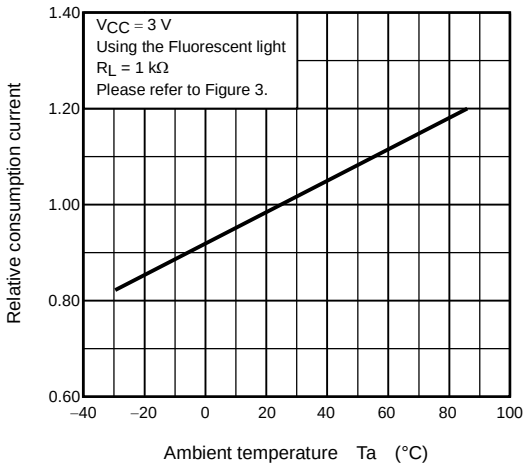
Vo – E_V (typ.)



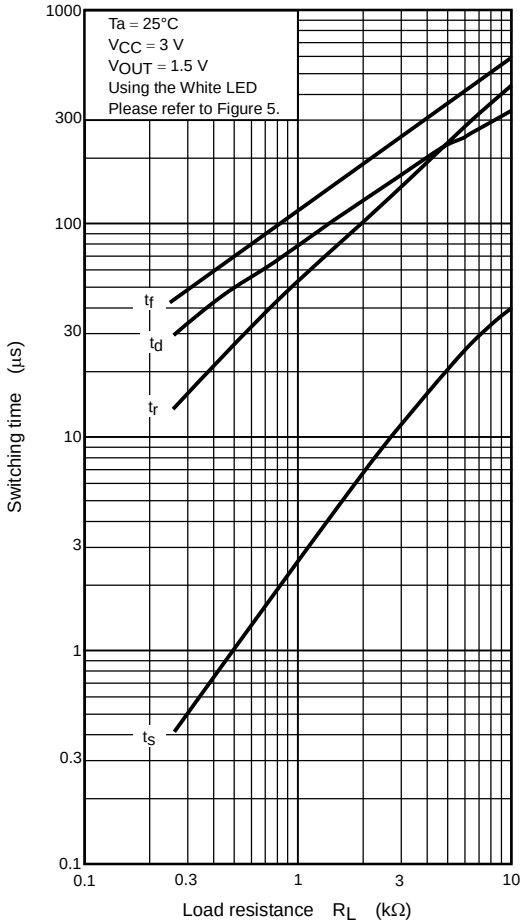
I_{CC} – E_V (typ.)



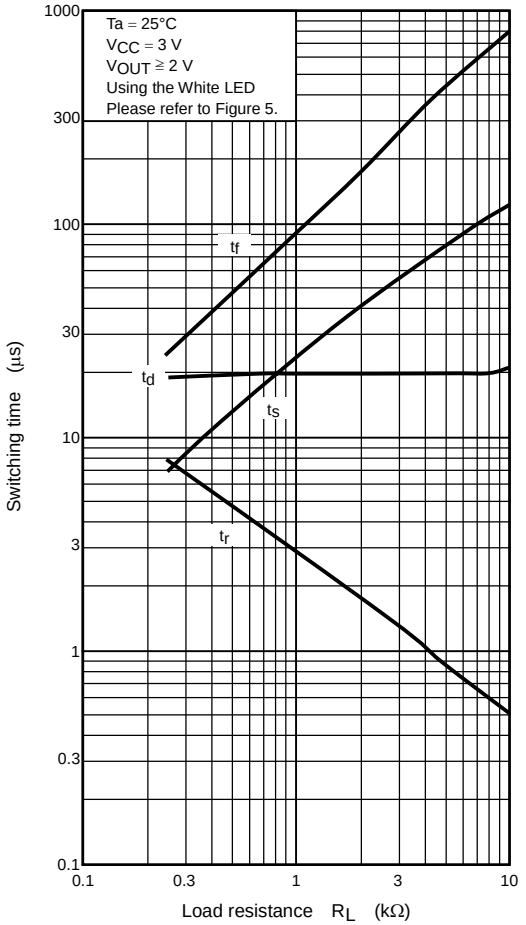
Relative I_{CC} – Ta (typ.)

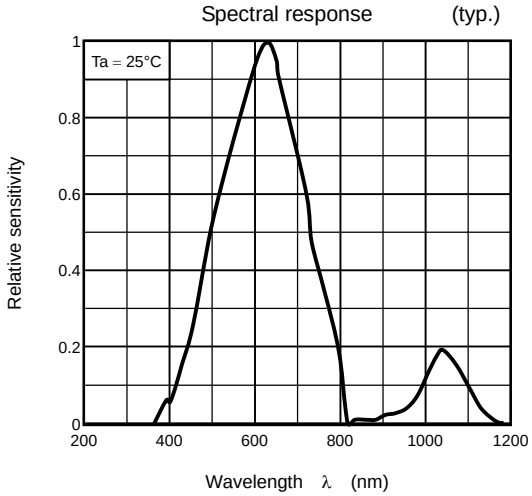


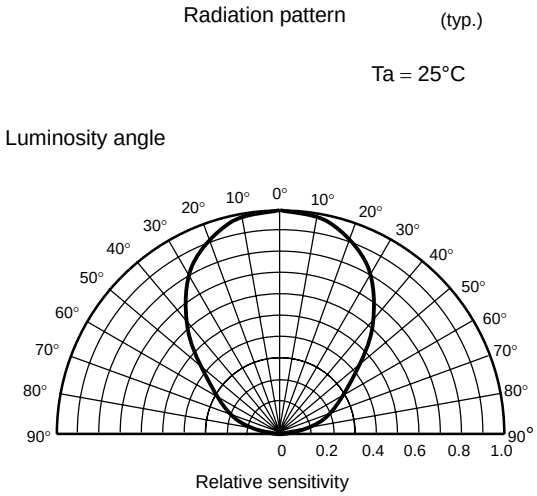
Switching characteristics
(Non-saturating operation) (typ.)



Switching characteristics
(Saturating operation) (typ.)







Measurement Circuits

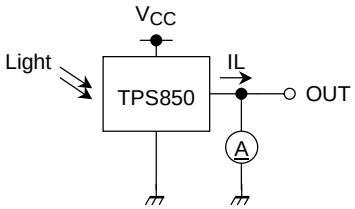


Figure 1 Light current measurement circuit

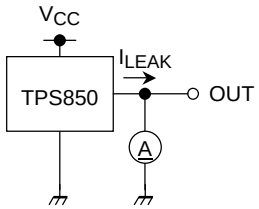


Figure 2 Dark current measurement circuit

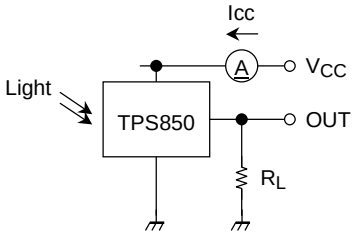


Figure 3 Consumption current measurement circuit

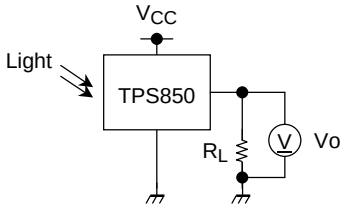


Figure 4 Output voltage measurement circuit

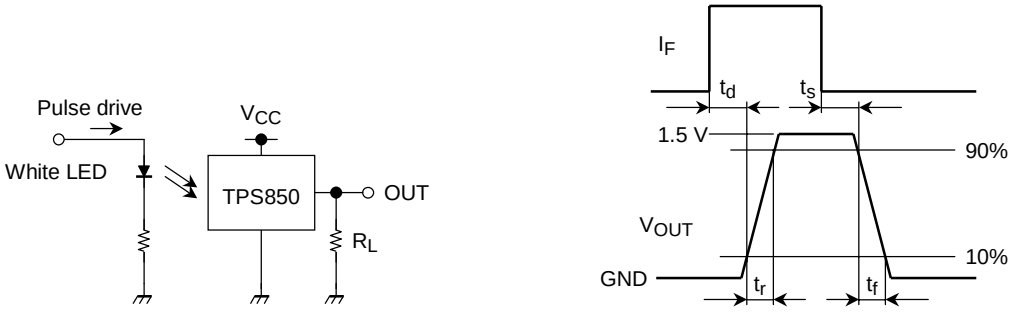


Figure 5 Switching measurement circuit and waveform

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