TOSHIBA Photo-IC Silicon Epitaxial Planar

TPS855(F)

Lead(Pb)-Free

Luminosity Adjustment for TV Screens, CRT Monitors and Liquid-crystal Display Monitors
Other Equipment Requiring Luminosity Adjustment

The TPS855(F) 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 = 280 μA (typ.)
  @E_V = 100 lx Using the fluorescent light
- Little fluctuation in light current
  : 1.67 times width (±25% typ.)
- Excellent illumination output linearity
- Open-emitter output
- Side-view package
- Environmentally friendly silicon used as chip material instead of CdS
  Suitable as a substitute for CdS-based products

Absolute 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	150	mW
Operating temperature range	T_{opr}	−25 to 85	°C
Storage temperature range	T_{stg}	−40 to 100	°C
Soldering temperature range (5s) (Note 1)	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).

Note 1: Solder under the lead stopper.

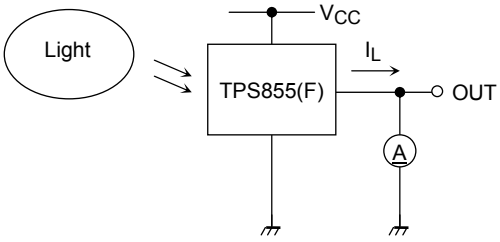
Electrical and Optical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Supply voltage		V_{CC}	—	2.7	—	5.5	V
Supply current		I_{CC}	V_{CC} = 5 V, E_V = 1000 lx R_L = 250 Ω (Note 2)	—	4.5	—	mA
Light current (1)		I_L (1)	V_{CC} = 5 V, E_V = 100 lx (Note 2), (Note 4)	—	365	—	μA
Light current (2)		I_L (2)	V_{CC} = 5 V, E_V = 10 lx (Note 3), (Note 4)	21	28	35	μA
Light current (3)		I_L (3)	V_{CC} = 5 V, E_V = 100 lx (Note 3), (Note 4)	210	280	350	μA
Light current ratio		$\frac{I_L\ (1)}{I_L\ (3)}$	—	—	1.3	1.7	
Dark current		I_{LEAK}	V_{CC} = 5.5 V, E_V = 0	—	—	0.5	μA
Saturation output voltage		V_O	V_{CC} = 5 V, R_L = 75 kΩ, E_V = 100 lx (Note 3)	4.2	4.35	—	V
Peak sensitivity wavelength		λp	—	—	640	—	nm
Switching time	Rise time	t_r	V_{CC} = 5 V, R_L = 5 kΩ (Note 5)	—	0.2	—	ms
	Fall time	t_f		—	0.6	—	

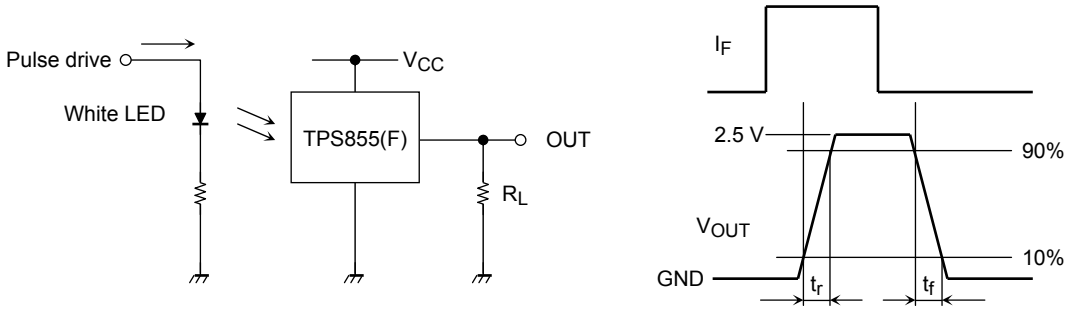
Note 2: CIE standard A light source is used (color temperature = 2856K, approximaterd incandescence light)

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

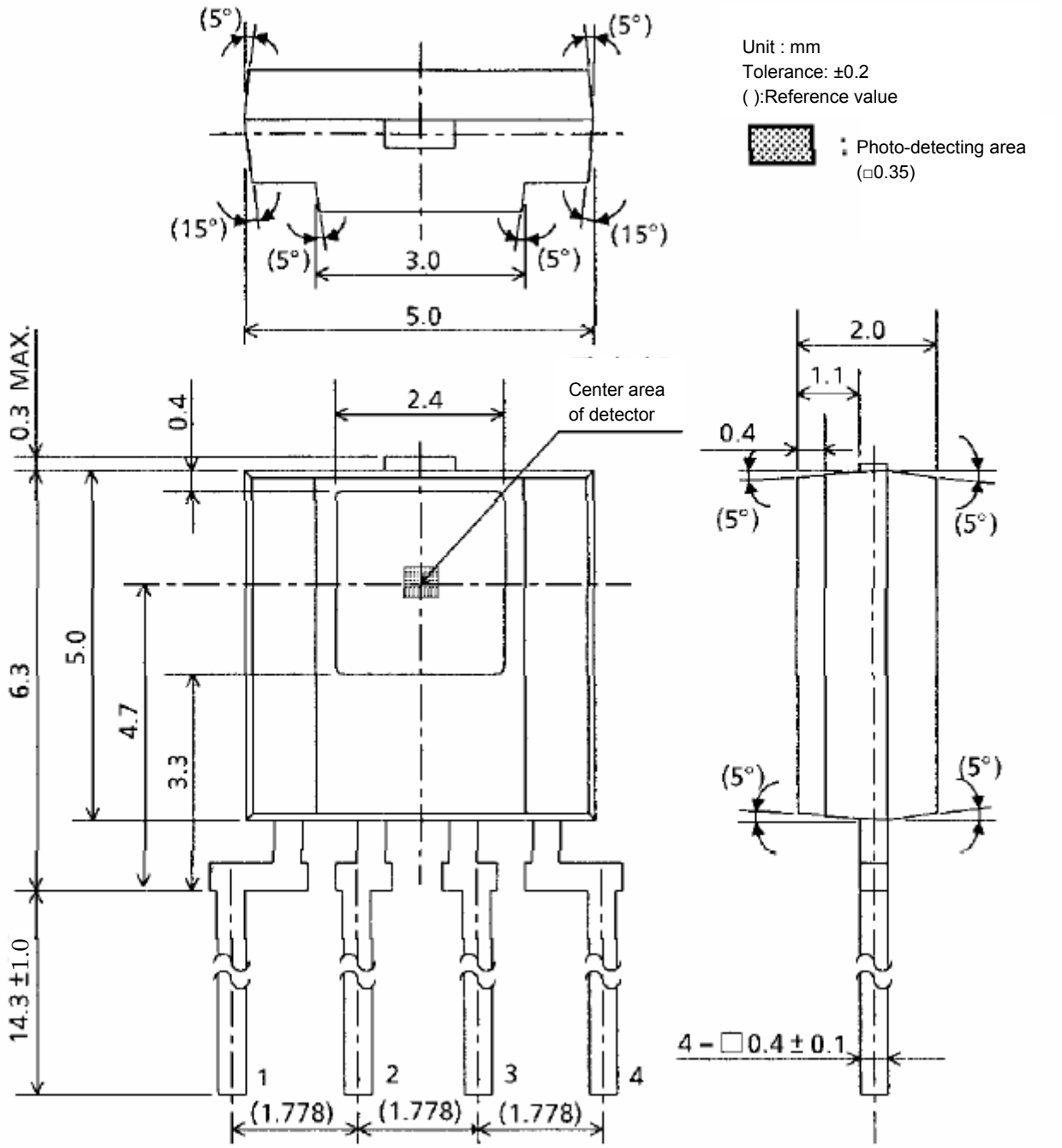
Note 4: Light current measuremen circuit



Note 5: Rise time/fall time measurement method

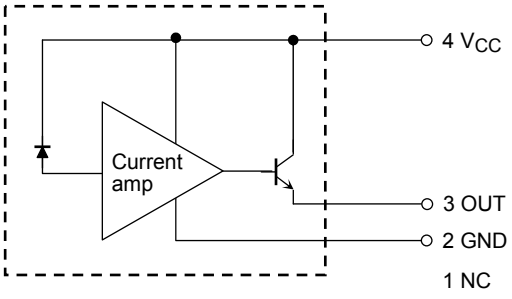


Package Dimensions: TOSHIBA 0-5K1



Weight: 0.20 g (typ.)

Block Diagram



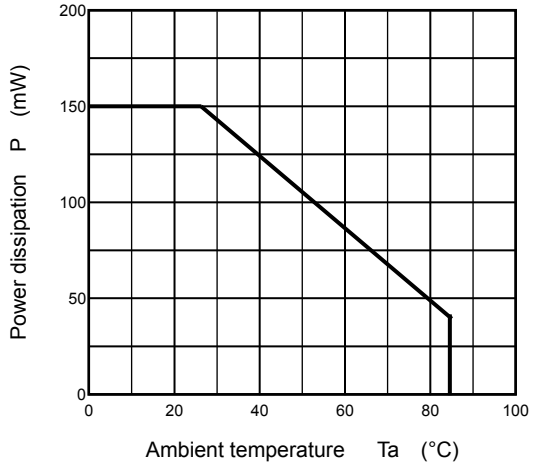
Handling Precautions

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.

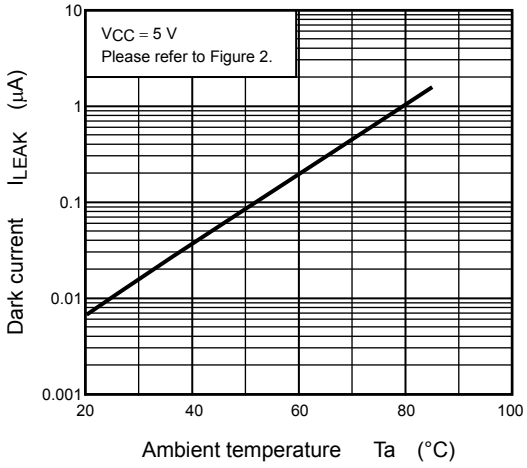
Mounting Precautions

(1) When forming the leads, bend each lead under the lead stopper. Soldering must be performed after the leads have been formed.
(2) Soldering must be performed under the stopper.
(3) To stabileze the power line, insert a bypass capacitor of up to 0.01 μ F between V_{CC} and GND, close to the device.

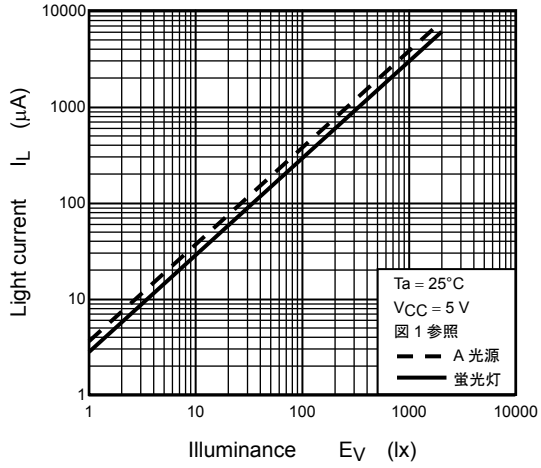
P – Ta



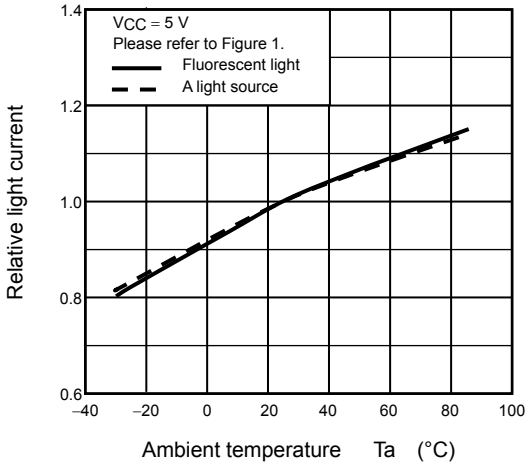
I_{LEAK} – Ta (typ.)



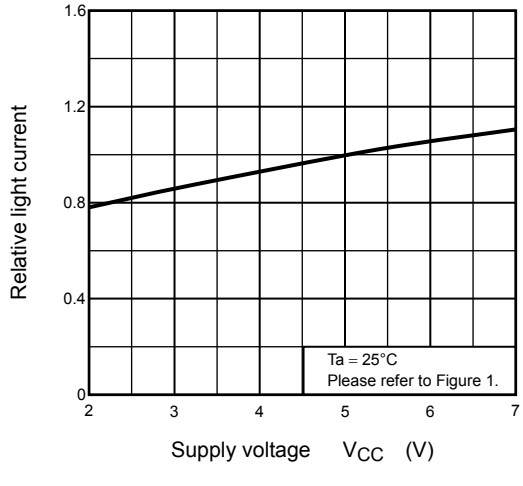
I_L – E_V (typ.)



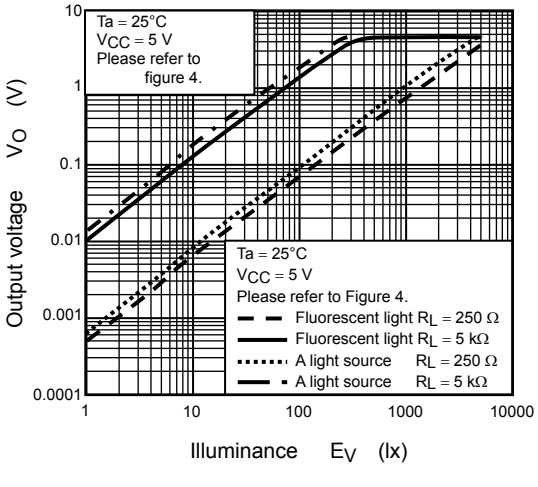
Relative I_L – Ta (typ.)



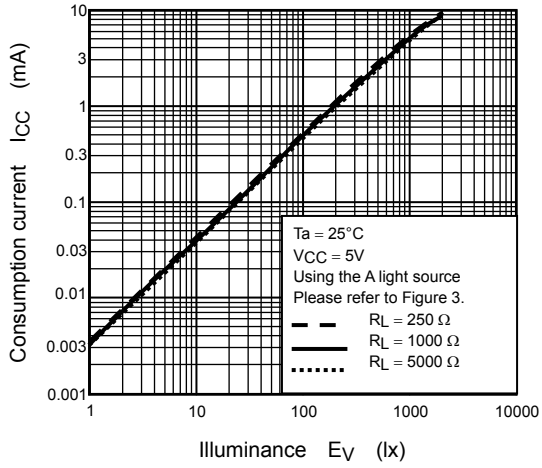
Relative I_L – V_{CC} (typ.)



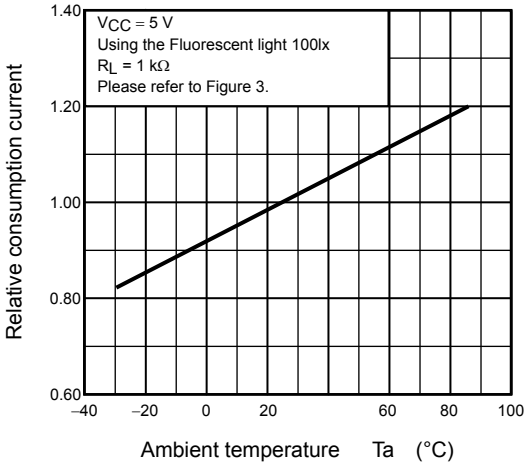
V_O – E_V (typ.)



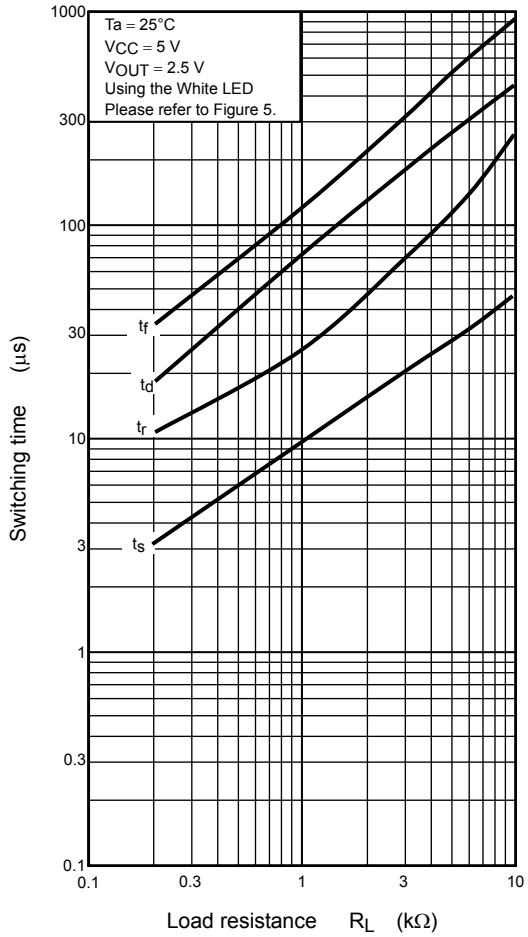
I_{CC} – E_V (typ.)



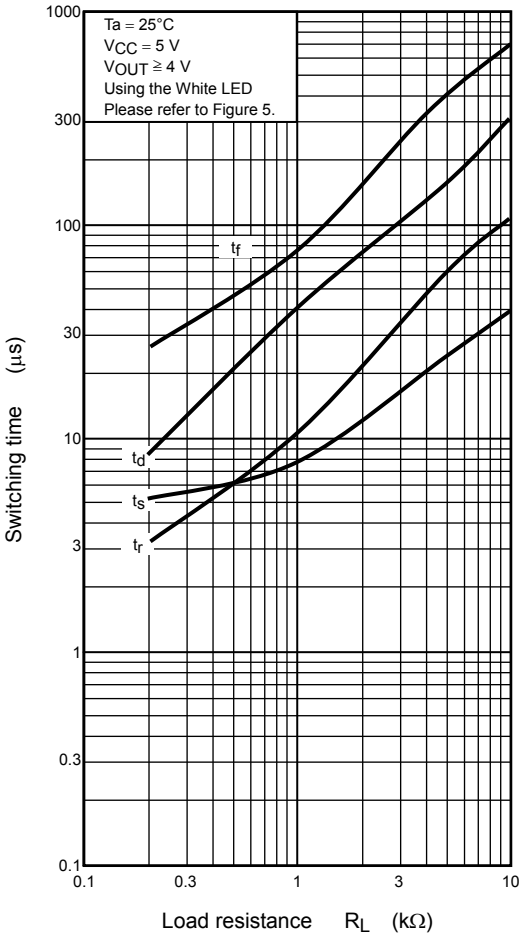
Relative I_{CC} – Ta (typ.)

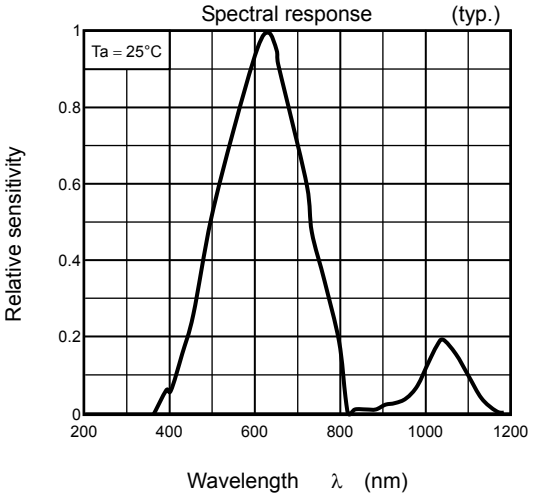


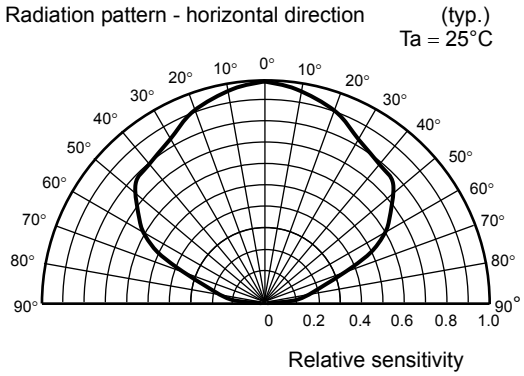
Switching characteristics
(Non-saturating operation) (typ.)

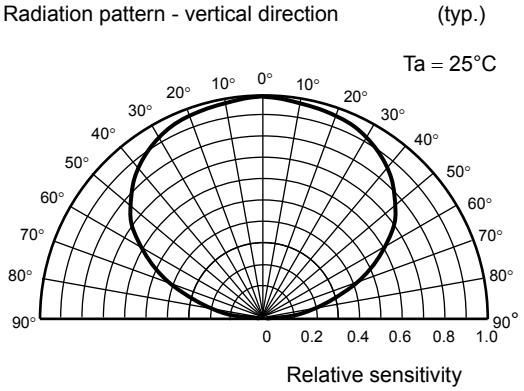


Switching characteristics
(saturating operation) (typ.)









Measurement Circuits

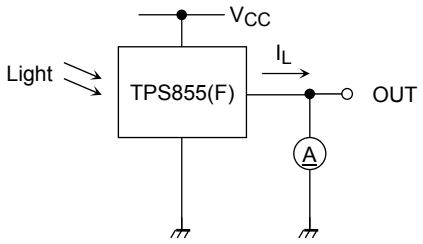


Figure 1 Light current measurement circuit

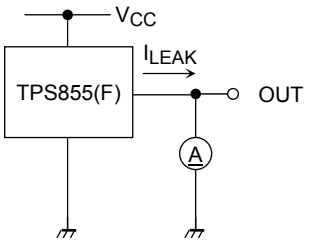


Figure 2 Dark current measurement circuit

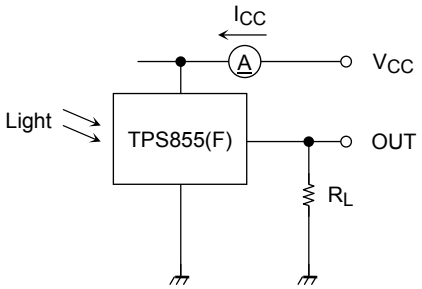


Figure 3 Consumption current measurement circuit

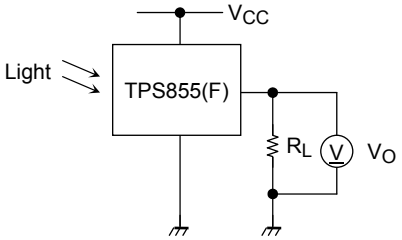
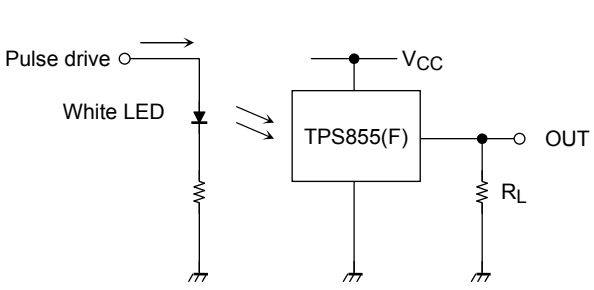


Figure 3 Output voltage measurement circuit



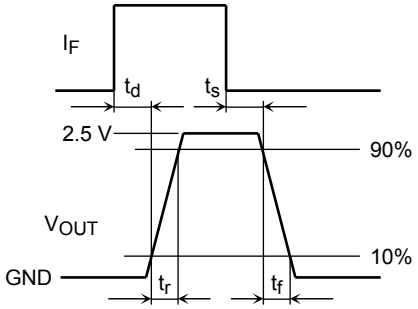


Figure 5 Switching measurement circuit and waveform

RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.).These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in his document shall be made at the customer’s own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patents or other rights of TOSHIBA or the third parties.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.