TOSHIBA Photo-IC Silicon Epitaxial Planar

TPS841(F),TPS843(F)

Lead(Pb)-Free

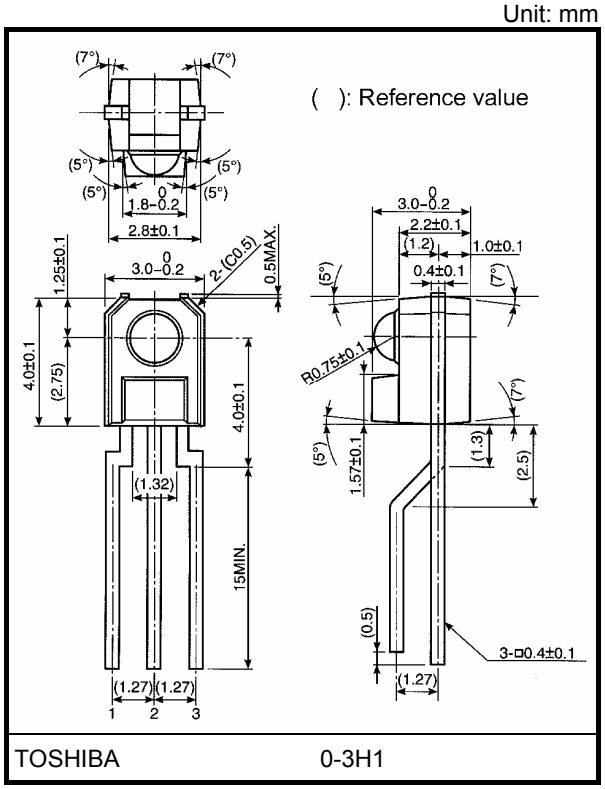
Photoelectric Switches

Copiers, Printers, and Facsimiles

Vending Machines

Handy Terminals

Unit: mm



TOSHIBA 0-3H1

Weight: 0.12 g (typ.)

The TPS841(F) and TPS843(F) represent a Si photo IC of digital output type that integrates a photodiode, amplifier circuit, and Schmitt trigger circuit into a single chip.

These devices are low voltage drive types, and they allow construction of low voltage systems which thus consume less power.

These devices respond faster than the phototransistor type. They output a high when light is input.

- Compact side-view epoxy resin package
- Operates over a wide supply voltage range : V_{CC} = 2.7 to 15 V
- High speed response : t_{pLH} = 9 μs, t_{pHL} = 15 μs (max)
- High sensitivity: 0.3 mW/cm² (max)
- Can be directly connected to TTL and CMOS.
- Digital output: TPS841(F) …. open collector
  TPS843(F) …. with a pull-up resistor

Absolute Maximum Ratings (Ta = 25°C)

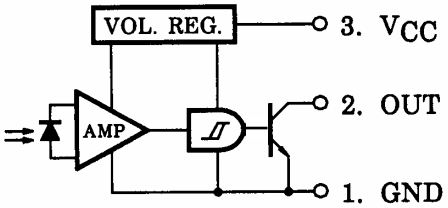
Characteristics		Symbol	Rating	Unit
Supply voltage		V_{CC}	15	V
Output voltage	TPS841(F)	V_O	15	V
	TPS843(F)		=V_{CC}	
Output current		I_O	16	mA
Output current derating (Ta > 25°C)		ΔI_O/°C	−0.213	mA/°C
Power dissipation		P	250	mW
Power dissipation derating (Ta > 25°C)		ΔP/°C	−3.33	mW/°C
Operating temperature range		T_{opr}	−30 to 95	°C
Storage temperature range		T_{stg}	−40 to 100	°C
Soldering temperature (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).

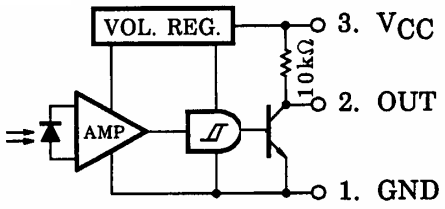
Note 1: At the location of 1.3 mm from the resin package bottom.

Pin Connection

TPS841(F)



TPS843(F)



Opto-Electrical Characteristics

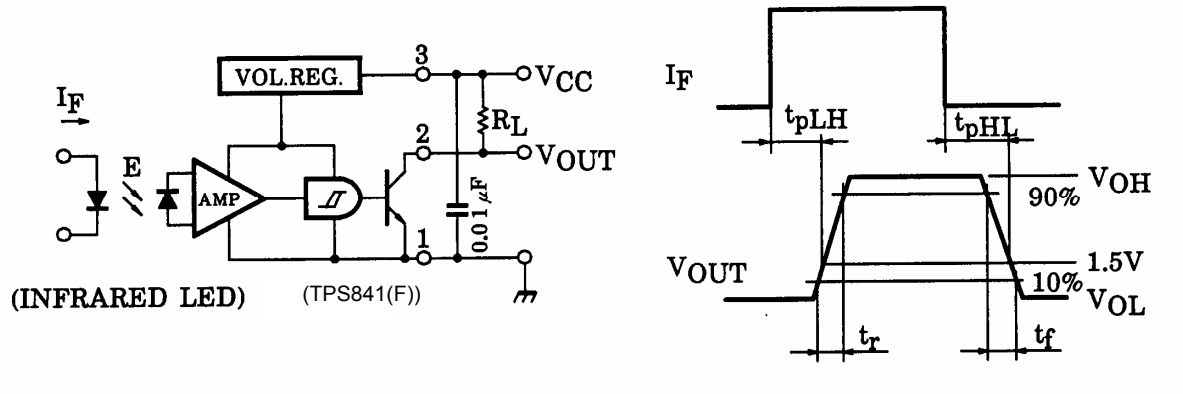
(Ta = –30 to 95°C, V_{CC} = 2.7 to 15 V, typical values are all at 25°C.)

Characteristics			Symbol	Test Condition	Min	Typ.	Max	Unit
Supply voltage			V_{CC}	—	2.7	—	15	V
High level supply current			I_{CCH}	E = 2 mW/cm^2 (Note 2)	—	0.5	1.2	mA
Low level supply current	TPS841(F)		I_{CCL}	E = 0	—	0.9	2	mA
	TPS843(F)				—	2.9	4	
High level output current	TPS841(F)		I_{OH}	E = 2 mW/cm^2 (Note 2) V_O = 15 V	—	—	6.3	μA
High level output voltage	TPS843(F)		V_{OH}	E = 2 mW/cm^2 (Note 2)	0.9*V_{CC}	—	—	V
Low level output voltage			V_{OL}	I_{OL} = 16 mA, E = 0	—	0.07	0.4	V
"L→H" Threshold radiant incidence			E_{LH}	Ta = 25°C	—	0.2	0.3	mW/cm^2
				—	—	—	0.6	
Hysteresis ratio			E_{HL}/E_{LH}	Ta = 25°C	0.5	0.65	0.9	—
Peak sensitivity wavelength			λ_P	—	—	900	—	nm
Switching time	Propagation delay time	"L→H"	t_{pLH}	Ta = 25°C V_{CC} = 3.3 V E = 2 mW/cm^2 R_L = 10 kΩ (Note 3)	—	—	9	μs
		"H→L"	t_{pHL}		—	—	15	
	Rise time		t_r		—	0.02	0.5	
	Fall time		t_f		—	0.8	3	

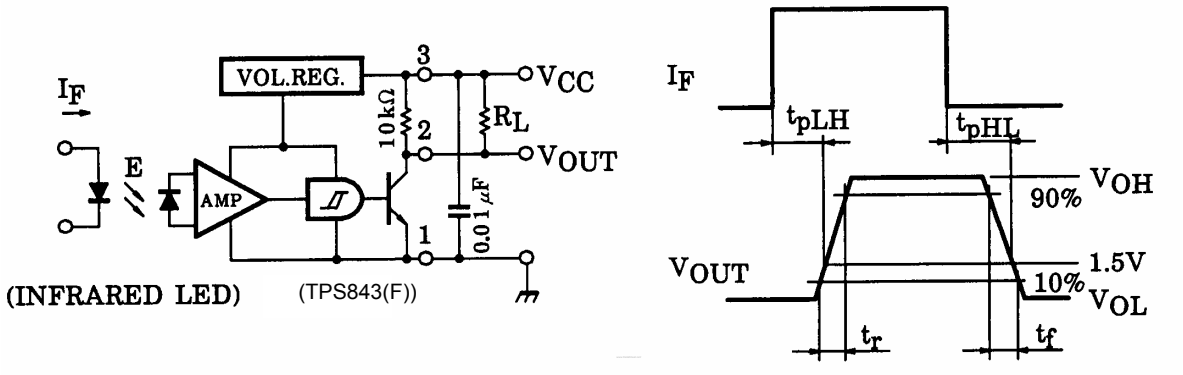
Note 2: CIE standard light source A (standard tungsten bulb) with color temperature = 2856 K.

Note 3: Switching time measurement circuit and waveform.

TPS841(F)



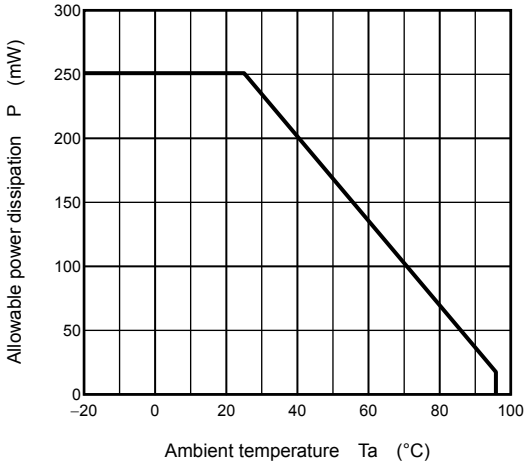
TPS843(F)



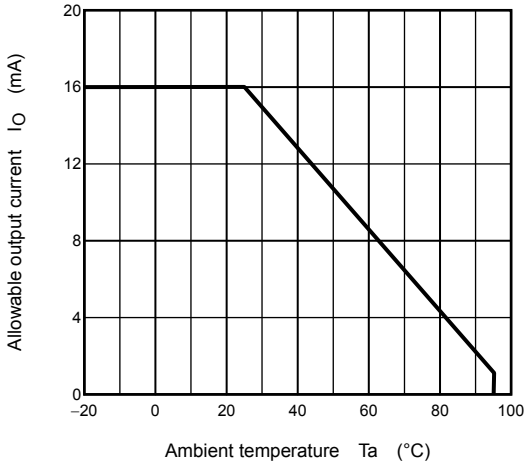
Precautions

- When you consider a combined use with an LED, be sure to use an infrared LED. Visible rays in wavelength of less than 700 nm cannot be detected.
- Make sure the shielding plate that is used to detect positions is manufactured from materials with superior light-shielding characteristics. Insufficient shield can cause malfunction.
- Photo ICs contain a high-sensitivity amplifier. Toshiba recommends connecting a capacitor of about 0.01 μF that has good high-frequency characteristics between V_{CC} and GND near the device to prevent unwanted oscillation.
- Please install so that disturbance light is not irradiated by these products.
  When disturbance light (incandescence light etc.) 700 nm or more is detected, it may incorrect-operate. Please perform sufficient evaluation and verification by set.
- During 100 μs after turning on V_{CC}, output voltage changes for stabilizing the inner circuit.

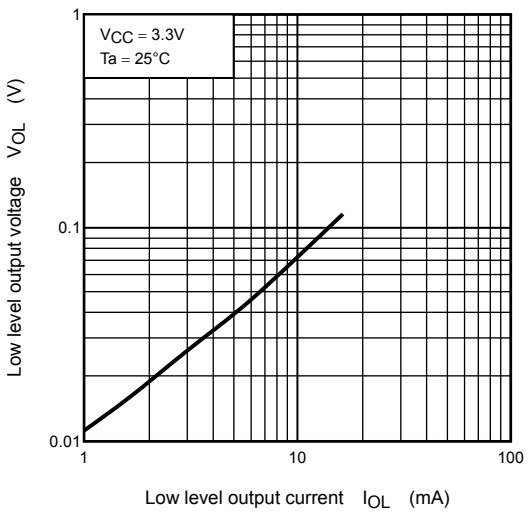
P – Ta



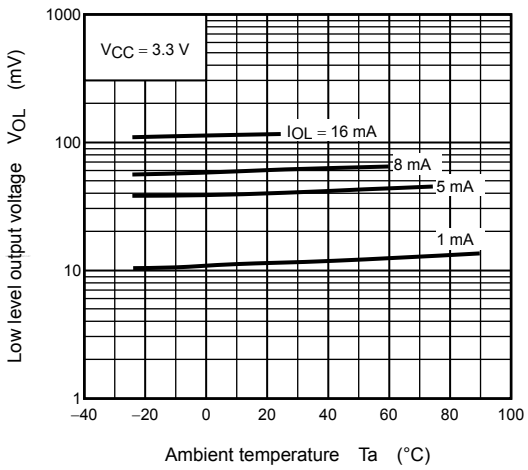
I_O – Ta



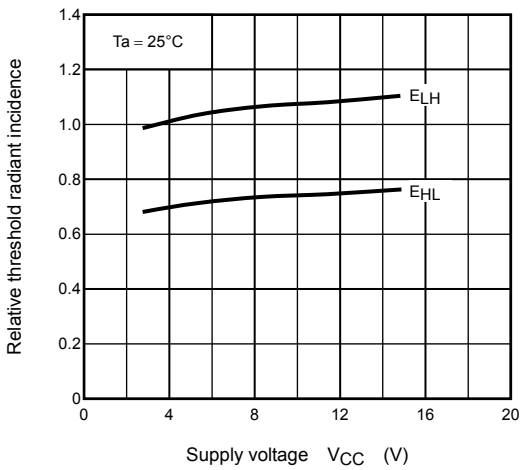
V_{OL} – I_{OL} (typ.)



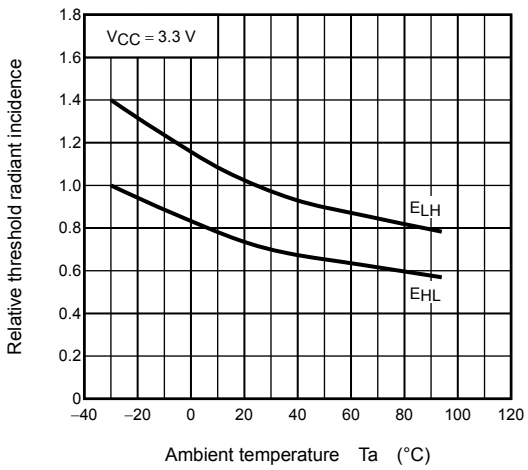
V_{OL} – Ta (typ.)



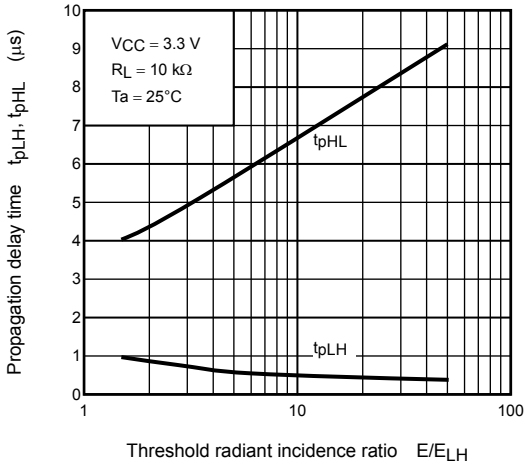
Relative E_{LH}, E_{HL} – V_{CC} (typ.)



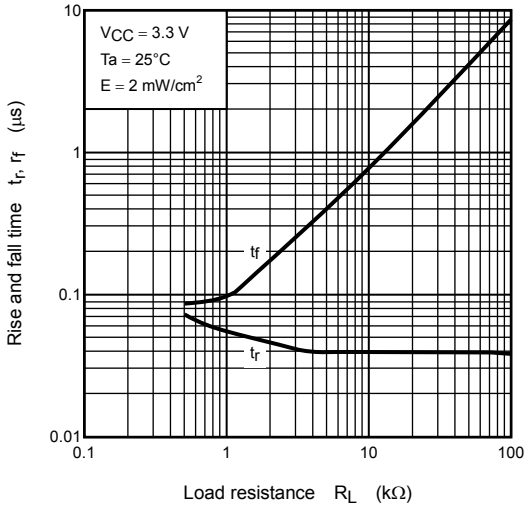
Relative E_{LH}, E_{HL} – Ta (typ.)



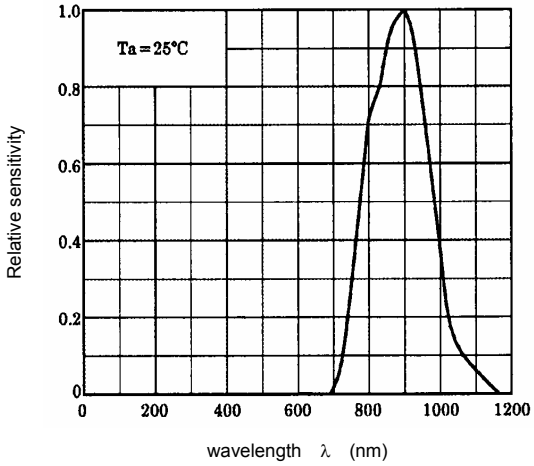
t_{pLH}, t_{pHL} – E/E_{LH} (typ.)



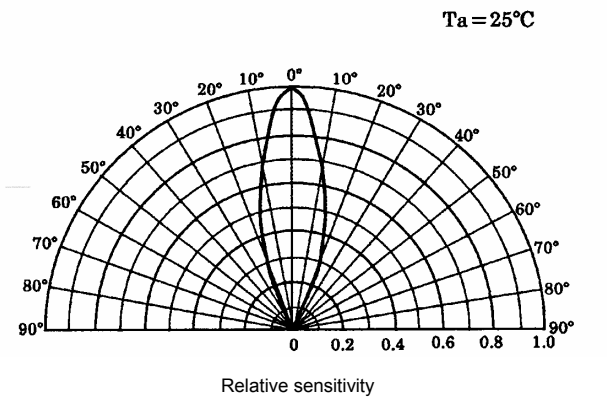
t_r, t_f – R_L (typ.)



Spectral response (typ.)



Directional sensitivity characteristic (typ.)



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20070701-EN GENERAL

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