

TOSHIBA PHOTO IC SILICON EPITAXIAL PLANAR

TPS811, TPS813

PHOTOELECTRIC SWITCHES

COPIERS, PRINTERS, AND FACSIMILES

COMMODITY AND TICKET BENDING MACHINES
AND TERMINAL EQUIPMENT IN FINANCIAL
COMPUTER SYSTEMS

HANDY TERMINALS

The TPS811 and TPS813 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 respond faster than the phototransistor type. They output a high when light is input.

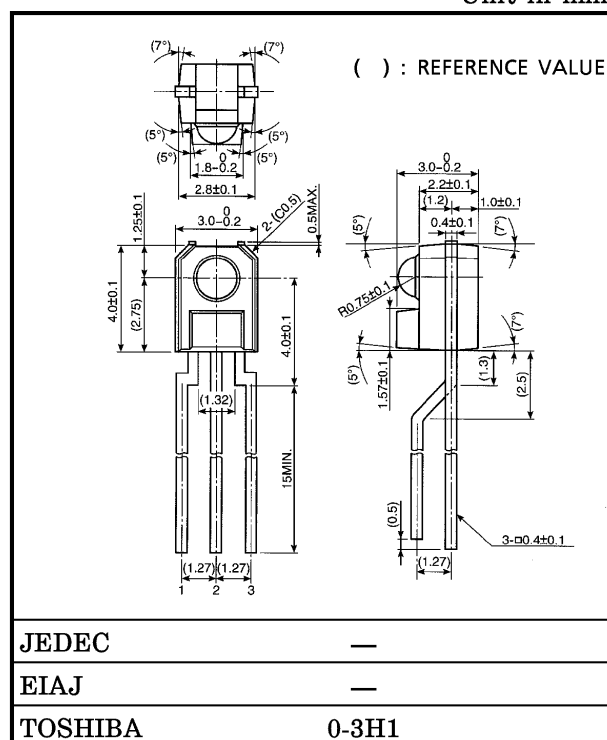
- Compact side-view epoxy resin package
- High speed response
 : $t_{pLH}=2.5\mu s$, $t_{pHL}=5.5\mu s$ (TYP.)
- High sensitivity : $0.3mW/cm^2$ (MAX.)
- Can be directly connected to TTL and CMOS.
- Operates over a wide supply voltage range
 : $V_{CC}=4.5\sim 17V$
- Digital output
 TPS811 Open collector
 TPS813 With a pull-up resistor

MAXIMUM RATINGS (T_a = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	17	V
Output Voltage	TPS811	V_O	30	V
	TPS813		$\leq V_{CC}$	
Output Current		I_O	50	mA
Output Current Derating ($T_a > 25^{\circ}\text{C}$)		$\Delta I_O / ^{\circ}\text{C}$	-0.67	mA/ $^{\circ}\text{C}$
Power Dissipation		P_O	250	mW
Power Dissipation Derating ($T_a > 25^{\circ}\text{C}$)		$\Delta P_O / ^{\circ}\text{C}$	-3.33	mW/ $^{\circ}\text{C}$
Operating Temperature Range		T_{opr}	-30~85	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	-40~100	$^{\circ}\text{C}$
Soldering Temperature (5s) (Note 1)		T_{sol}	260	$^{\circ}\text{C}$

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

Unit in mm



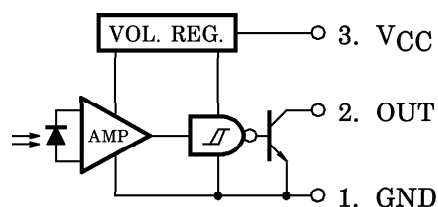
Weight : 0.12g (TYP.)

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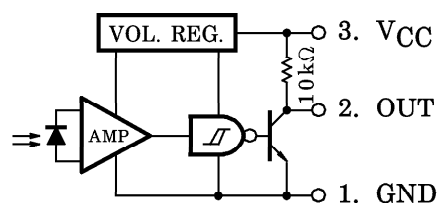
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PIN CONNECTION

TPS811



TPS813



OPTO-ELECTRICAL CHARACTERISTICS ($T_a = -30 \sim 85^\circ\text{C}$, $V_{CC} = 4.5 \sim 17\text{V}$, Typical values are all at 25°C .)

CHARACTERISTIC			SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage			V _{CC}		4.5	—	17	V
High Level Supply Current			I _{CCH}	E = 2mW / cm ² (Note 2)	—	1.2	3.2	mA
Low Level Supply Current	TPS811	I _{CCL}	E = 0	—	2.5	5.2	mA	
	TPS813			—	4	7.5		
High Level Output Current	TPS811	I _{OH}	E = 2mW / cm ² (Note 2) V _O = 30V	—	—	15	μA	
High Level Output Voltage	TPS813	V _{OH}	E = 2mW / cm ² (Note 2)	0.9V _{CC}	—	—	V	
Low Level Output Voltage			V _{OL}	I _{OL} = 16mA, E = 0	—	0.07	0.4	V
“L”→“H” Threshold Radiant Incidence			E _{LH}	Ta = 25°C	—	0.1	0.3	mW / cm ²
					—	—	0.6	
Relative Output Voltage			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} = 5V E = 2mW / cm ² R _L = 280Ω (Note 3)	—	2.5	9	μs
		“H”→“L”	t _{PHL}		—	5.5	15	
	Rise Time		t _r		—	0.08	0.5	
	Fall Time		t _f		—	0.02	0.5	

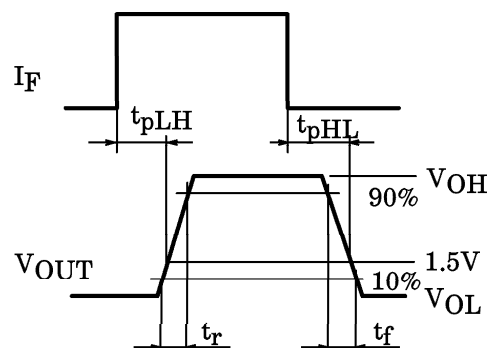
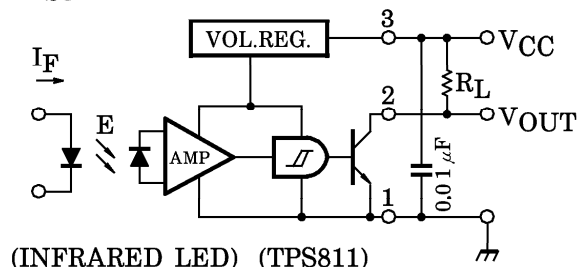
Note 2 : CIE standard light source A (standard tungsten bulb) with color temperature = 2856°K

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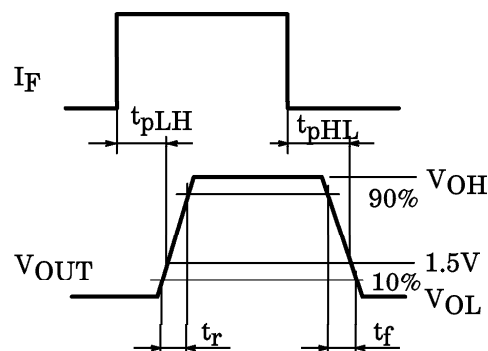
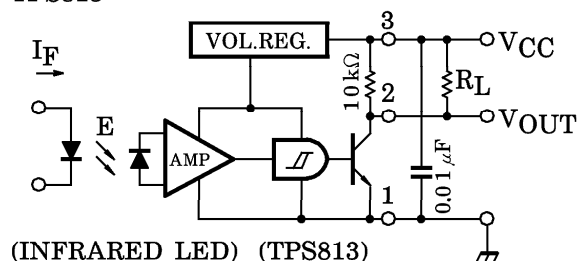
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Note 3 : Switching time measurement circuit and waveform

TPS811



TPS813

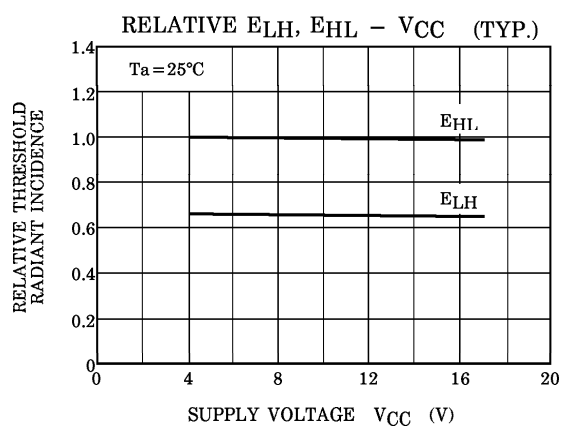
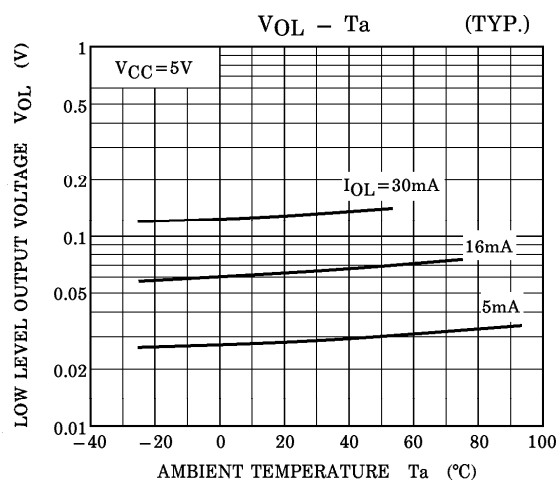
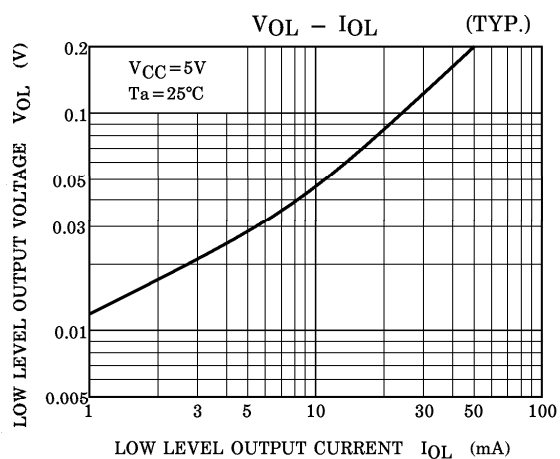
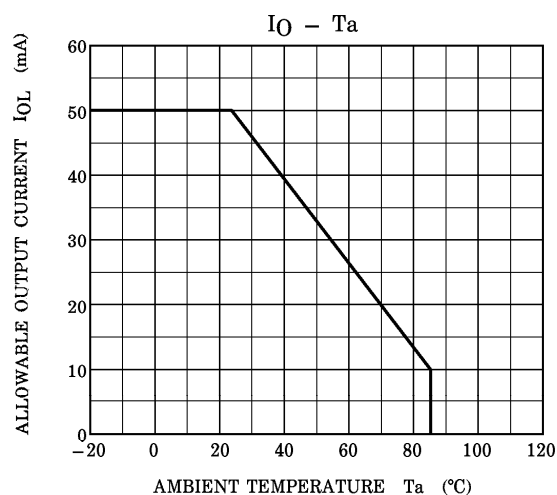
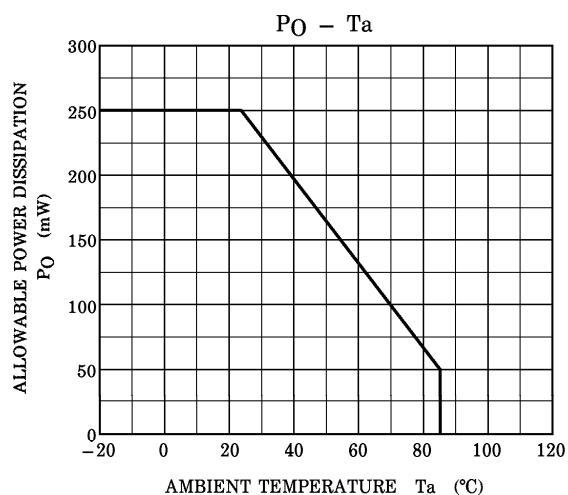


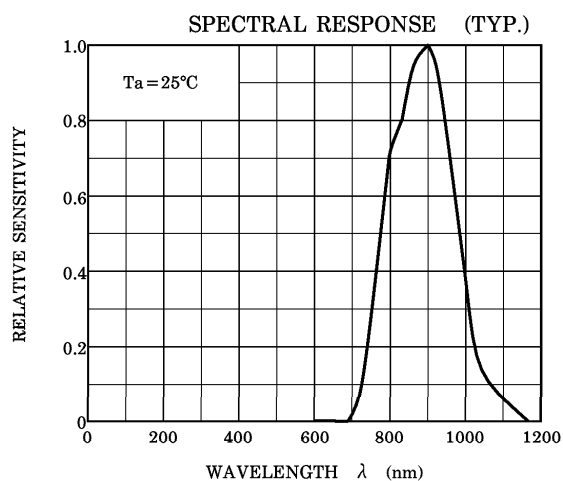
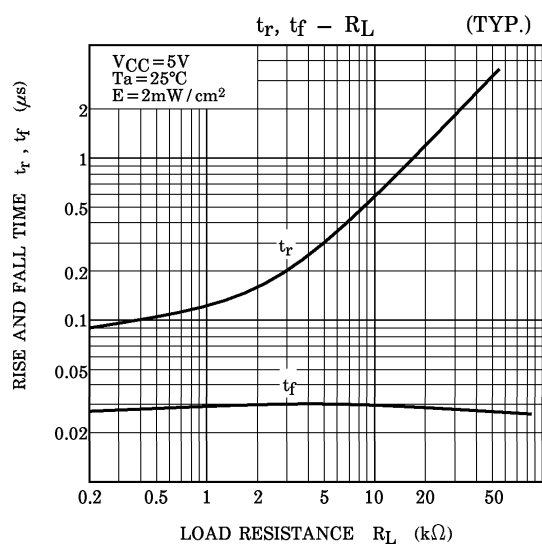
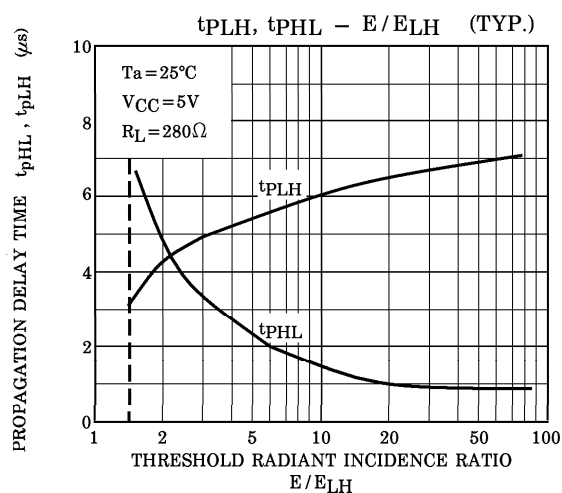
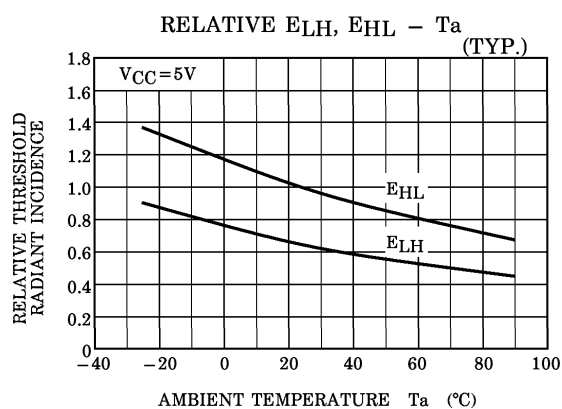
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	4.5	—	17	V
Output Voltage	V_O	4.5	—	17	V
Low Level Output Current	I_{OL}	—	—	16	mA
Operating Temperature	T_{opr}	0	—	70	°C

PRECAUTIONS

1. When you consider a combined use with an LED, be sure to use an infrared LED. Visible rays in wavelength of less than 700nm cannot be detected.
2. 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.
3. Photo ICs contain a high-sensitivity amplifier. Toshiba recommends connecting a capacitor of about 0.01μF that has good high-frequency characteristics between V_{CC} and GND near the device to prevent unwanted oscillation.





DIRECTIONAL SENSITIVITY CHARACTERISTIC (TYP.)
($T_a=25^\circ C$)

