

TOSHIBA PHOTO IC SILICON EPITAXIAL PLANAR

# TPS812, TPS814

PHOTOELECTRIC SWITCHES

COPIERS, PRINTERS, AND FACSIMILES

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

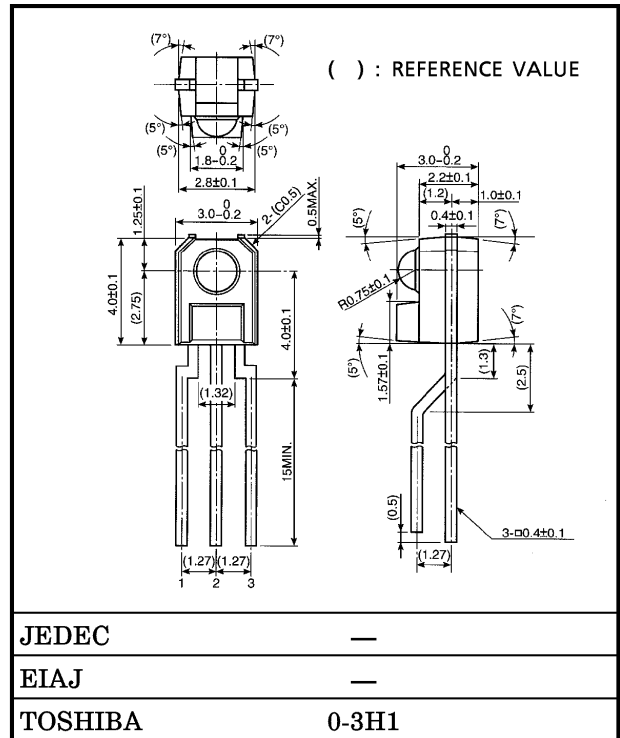
HANDY TERMINALS

The TPS812 and TPS814 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 low when light is input.

- Compact side-view epoxy resin package.
- High speed response  
:  $t_{pLH} = 5.5\mu s$ ,  $t_{pHL} = 2.5\mu s$  (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  
TPS812 .... Open collector  
TPS814 .... With a pull-up resistor

Unit in mm



Weight : 0.12g (TYP.)

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	$V_{CC}$	17	V
Output Voltage	TPS812	30	V
	TPS814	$\leq V_{CC}$	
Output Current	$I_O$	50	mA
Output Current Derating (Ta > 25°C)	$\Delta I_O / ^\circ C$	-0.67	mA / °C
Power Dissipation	$P_O$	250	mW
Power Dissipation Derating	$\Delta P_O / ^\circ C$	-3.33	mW / °C
Operating Temperature Range	$T_{opr}$	-30~85	°C
Storage Temperature Range	$T_{stg}$	-40~100	°C
Soldering Temperature (5s) (Note 1)	$T_{sol}$	260	°C

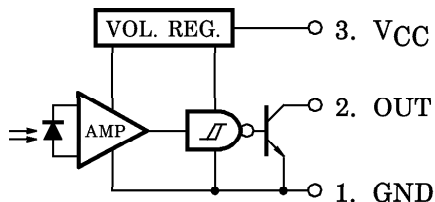
Note 1 : At the location of 1.5mm from the resin package bottom

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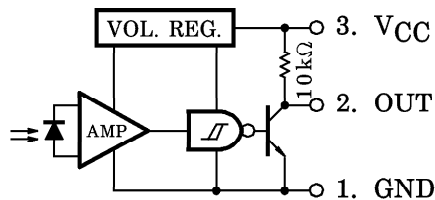
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**PIN CONNECTION**

TPS812



TPS814



**OPTO-ELECTRICAL CHARACTERISTICS (Ta = -30~85°C, VCC = 4.5~17V, Typical values are all at 25°C.)**

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Supply Voltage		VCC		4.5	—	17	V	
High Level Supply Current		ICCH	E = 0	—	1.2	3.2	mA	
Low Level Supply Current	TPS812	ICCL	E = 2mW / cm <sup>2</sup> (Note 2)	—	2.5	5.2	mA	
	TPS814			—	4	7.5		
High Level Output Current	TPS812	IOH	VO = 30V, E = 0	—	—	15	μA	
High Level Output Voltage	TPS814	VOH	E = 0	0.9VCC	—	—	V	
Low Level Output Voltage		VOL	E = 2mW / cm <sup>2</sup> IOL = 16mA (Note 2)	—	0.07	0.4	V	
“H”→“L” Threshold Radiant Incidence		EHL	Ta = 25°C	—	0.1	0.3	mW / cm <sup>2</sup>	
				—	—	0.6		
Histerisis Ratio		EHL / ELH	Ta = 25°C	1.1	1.5	2	—	
Peak Sensitivity Wavelength		λP		—	900	—	nm	
Switching Time	Propagation Delay Time	“L”→“H”	Ta = 25°C VCC = 5V E = 2mW / cm <sup>2</sup> RL = 280Ω (Note 3)	—	5.5	15	μs	
		“H”→“L”		—	2.5	9		
	Rise Time			tr	—	0.02		0.5
	Fall Time			tf	—	0.08		0.5

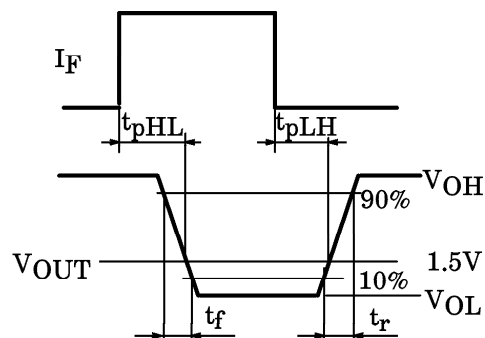
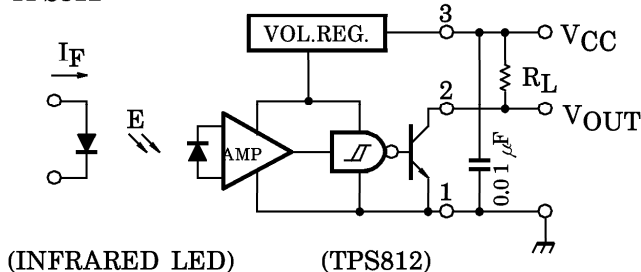
Note 2 : CIE standard light source A (standard tungsten bulb) with color temperature = 2856°K

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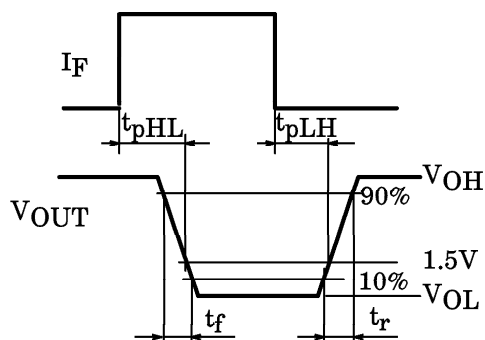
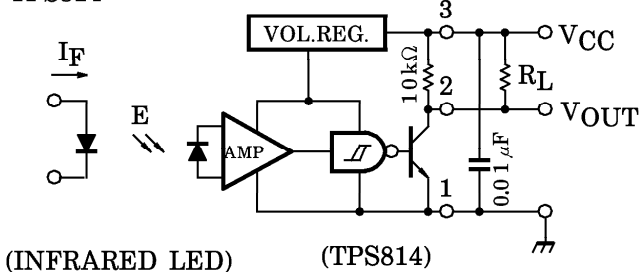
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Note 3 : Switching time measurement circuit and waveform

TPS812



TPS814

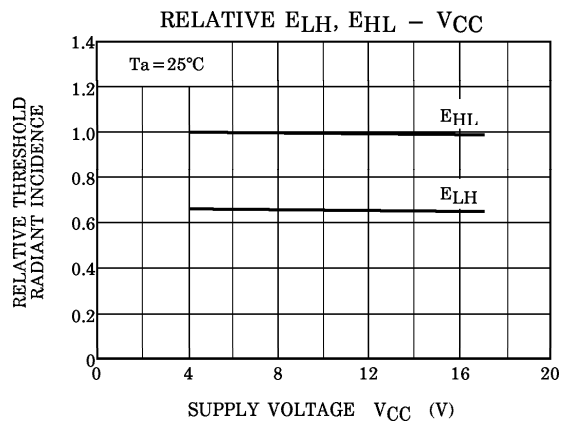
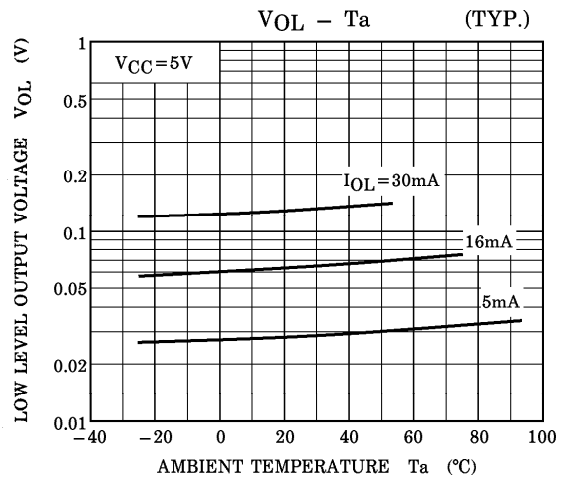
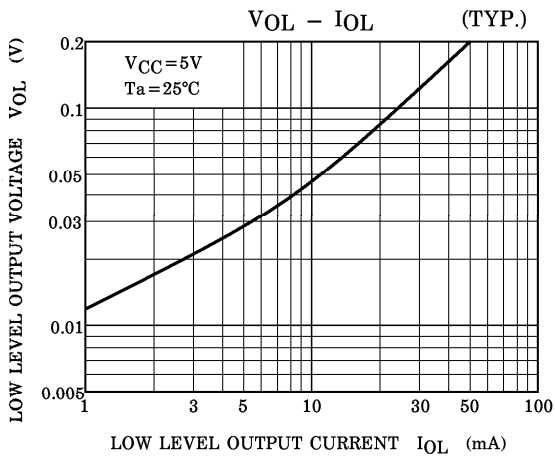
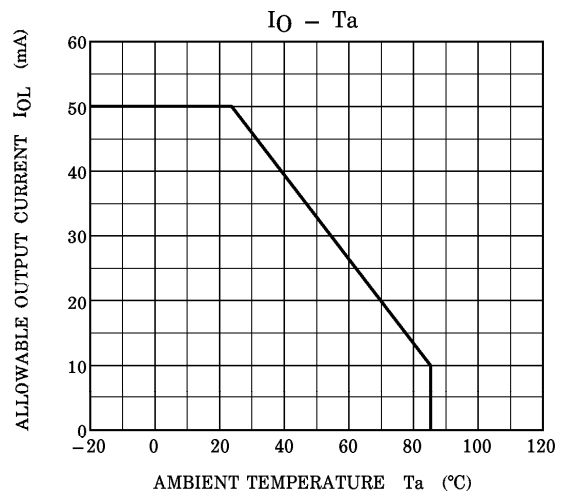
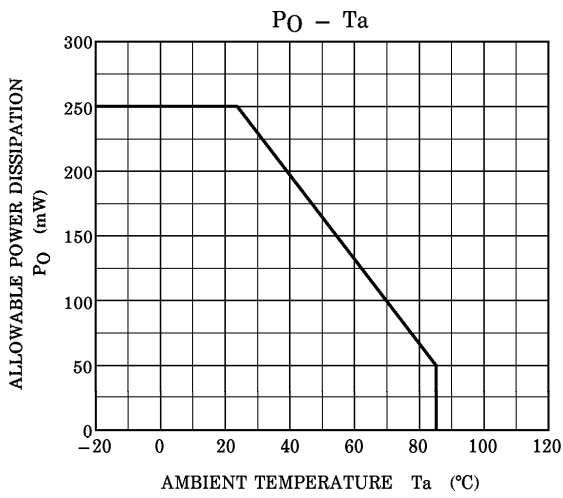


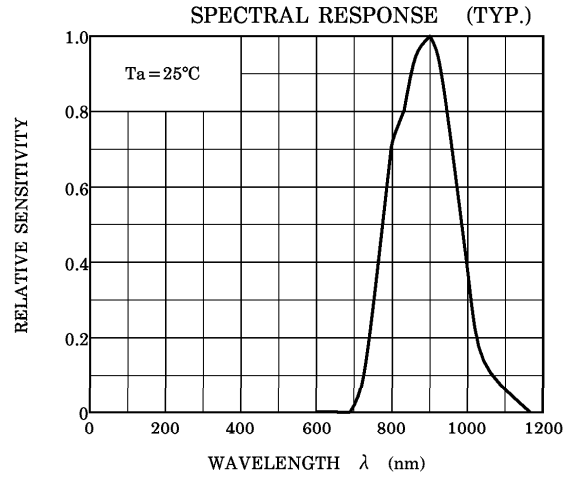
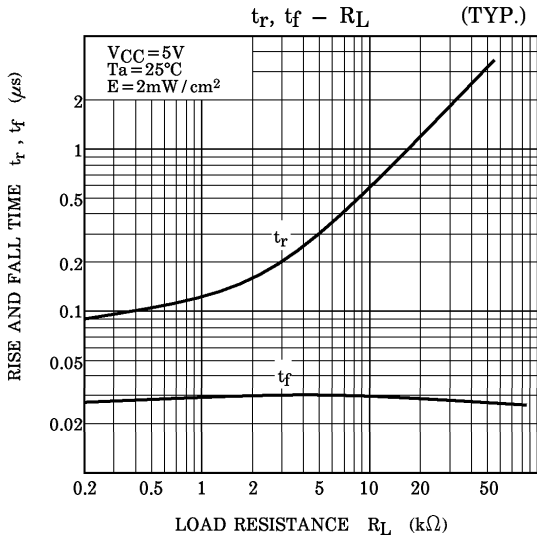
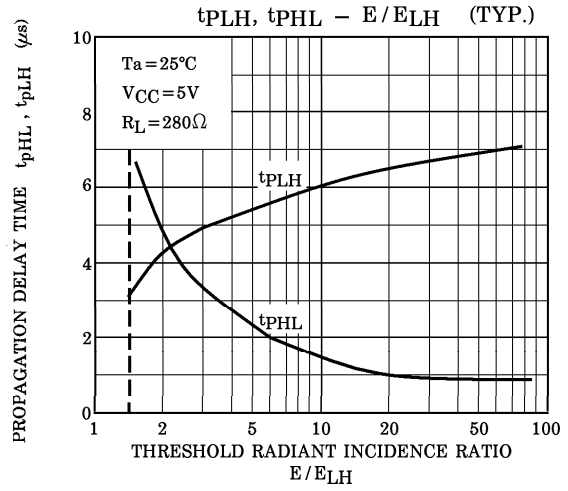
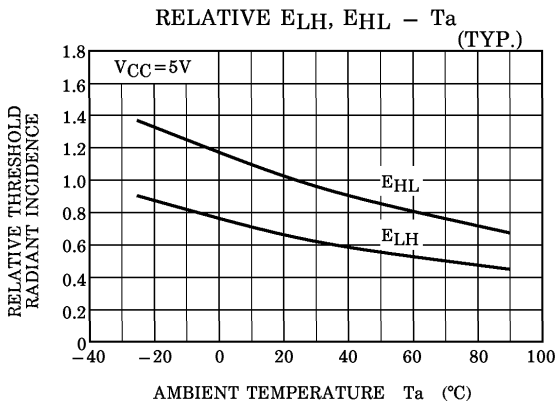
RECOMMENDED OPERATING CONDITIONS

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.)

( $T_a=25^{\circ}C$ )

