TOSHIBA PHOTO IC SILICON EPITAXIAL PLANAR

TPS811, TPS813

PHOTOELECTRIC SWITCHES

COPIERS, PRINTERS, AND FACSIMILES

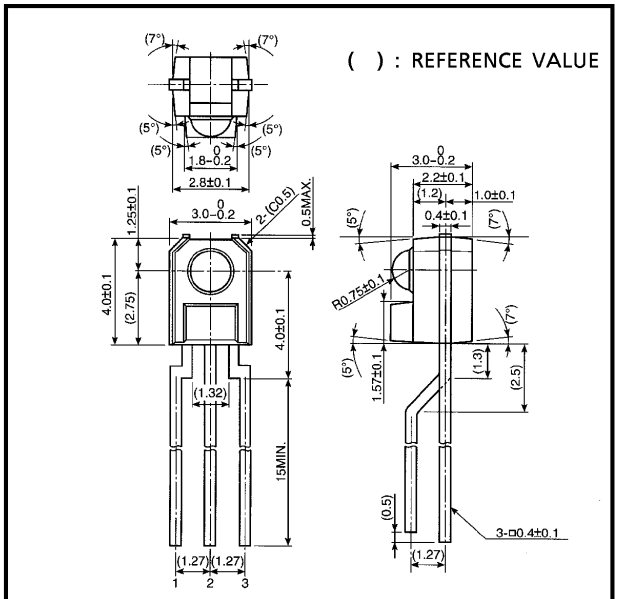
COMMODITY AND TICKET BENDING MACHINES AND TERMINAL EQUIPMENT IN FINANCIAL COMPUTER SYSTEMS

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 / cm² (MAX.)
- Can be directly connected to TTL and CMOS.
- Operates over a wide supply voltage range
  : $V_{CC}=4.5\sim17V$
- Digital output
  TPS811 .... Open collector
  TPS813 .... With a pull-up resistor

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	0-3H1

Weight : 0.12g (TYP.)

MAXIMUM RATINGS (Ta = 25°C)

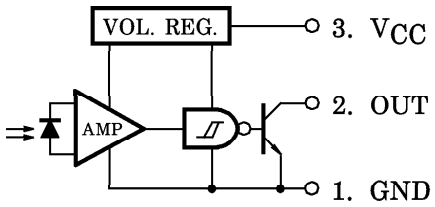
CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	17	V
Output Voltage	TPS811	V_O	30	V
	TPS813		$\leqq V_{CC}$	
Output Current		I_O	50	mA
Output Current Derating (Ta > 25°C)		ΔI_O / °C	−0.67	mA / °C
Power Dissipation		P_O	250	mW
Power Dissipation Derating (Ta > 25°C)		ΔP_O / °C	−3.33	mW / °C
Operating 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 1.3mm from the resin package bottom

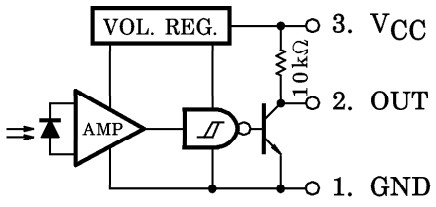
961001EAA2

PIN CONNECTION

TPS811



TPS813



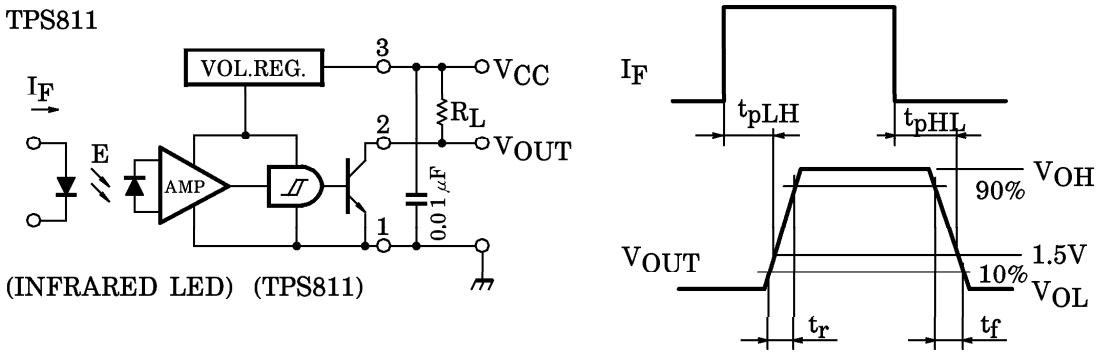
OPTO-ELECTRICAL CHARACTERISTICS (Ta = −30~85°C, V_{CC} = 4.5~17V, Typical values are all at 25°C.)

CHARACTERISTIC			SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage			V_{CC}		4.5	—	17	V
High Level Supply Current			I_{CCH}	E = 2mW / cm² (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 / cm² (Note 2) V_O = 30V	—	—	15	μA
High Level Output Voltage		TPS813	V_{OH}	E = 2mW / cm² (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 / cm²
					—	—	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 / cm² 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	

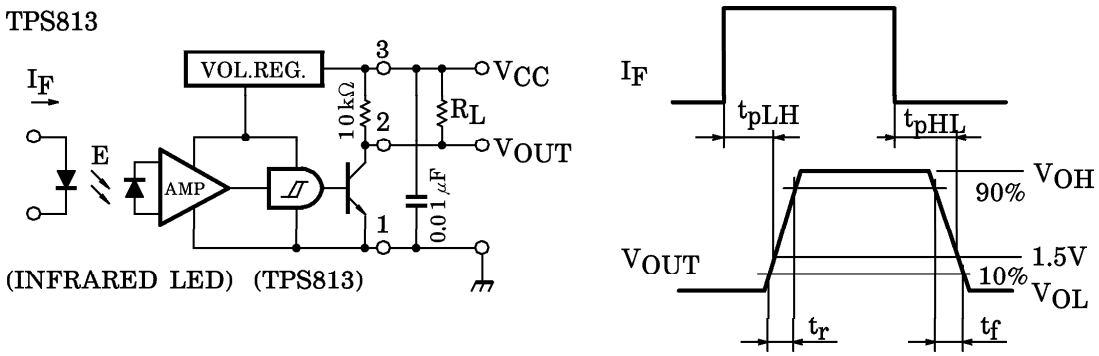
Note 2 : CIE standard light source A (standard tungsten bulb) with color temperature = 2856°K

Note 3 : Switching time measurement circuit and waveform

TPS811



TPS813



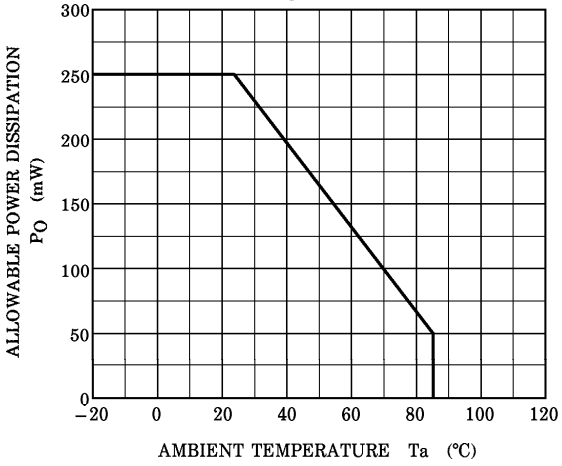
RECOMMENDED OPERATING CONDITIONS

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

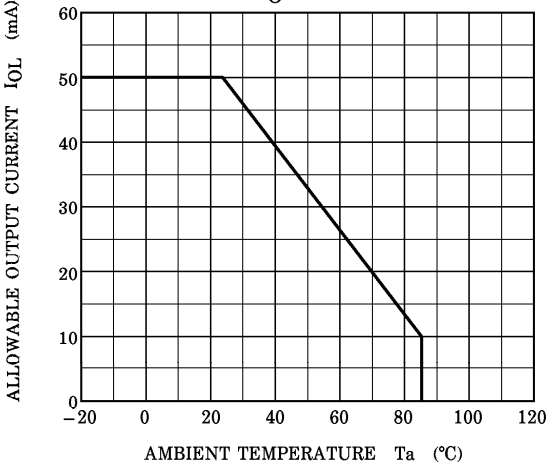
PRECAUTIONS

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.

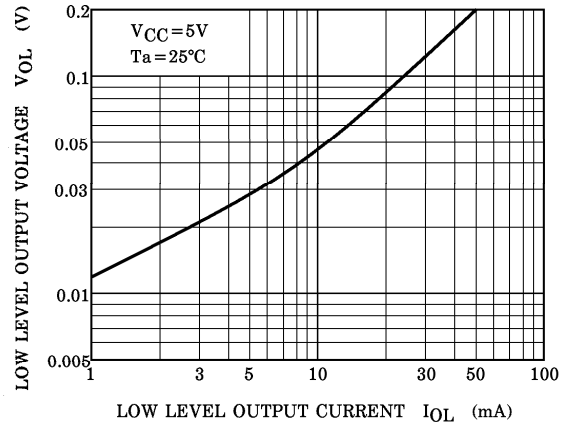
P_O – Ta



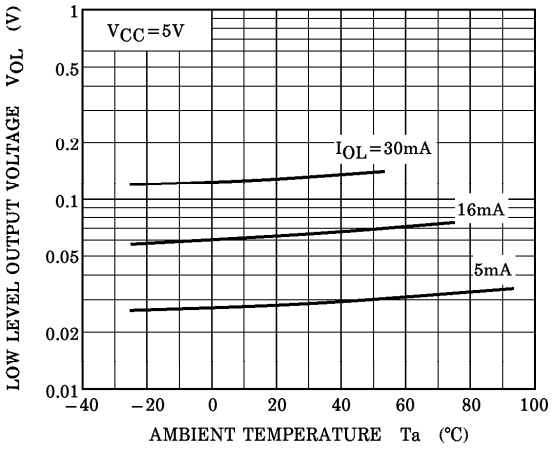
I_O – Ta



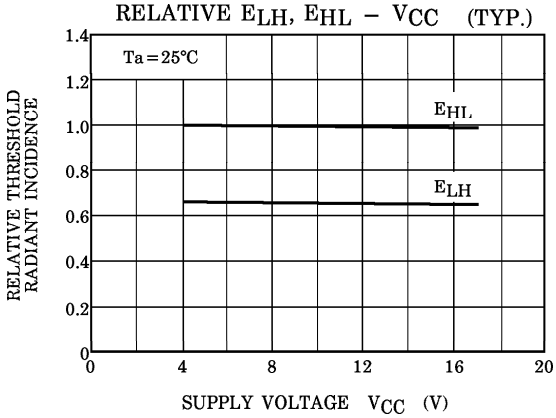
V_{OL} – I_{OL} (TYP.)



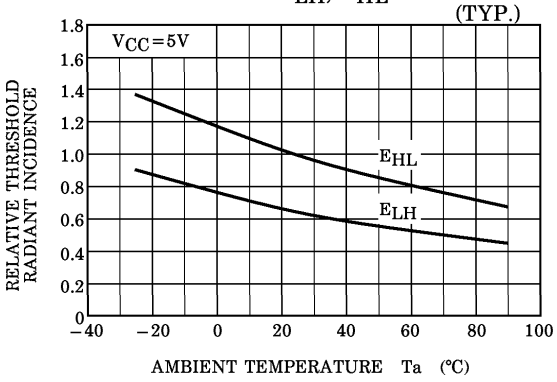
V_{OL} – Ta (TYP.)



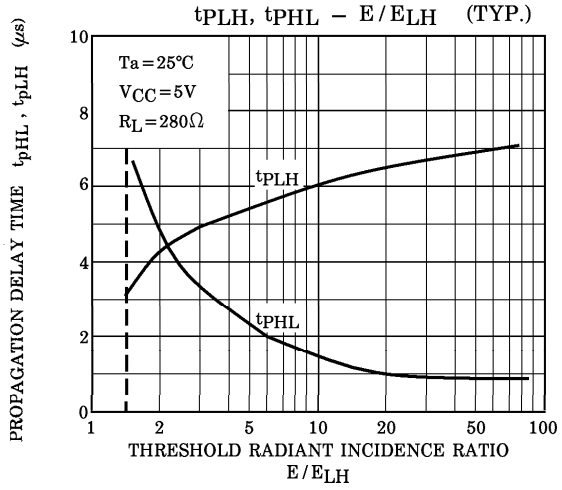
RELATIVE E_{LH}, E_{HL} – V_{CC} (TYP.)



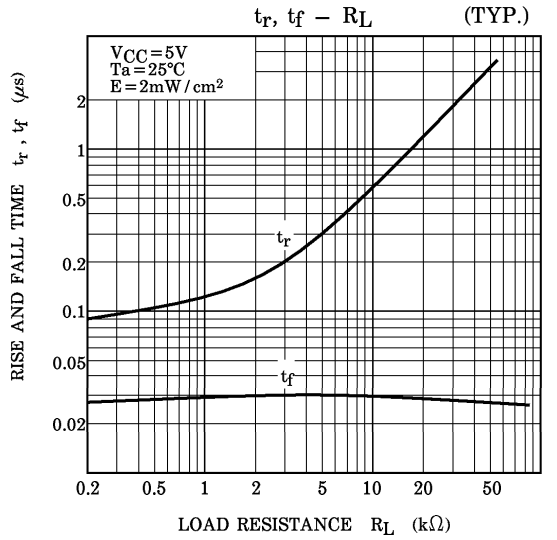
RELATIVE E_{LH}, E_{HL} – Ta (TYP.)



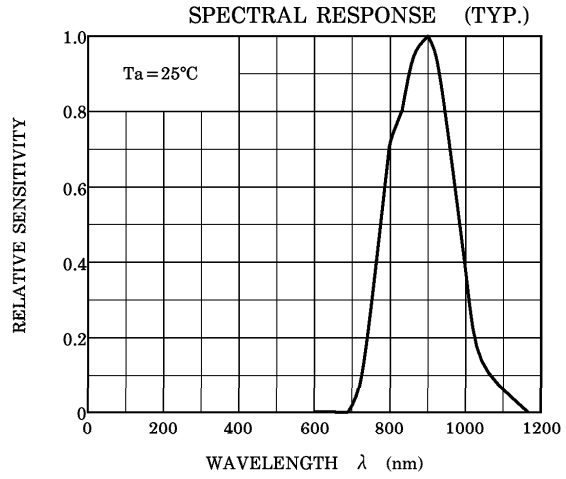
t_{PLH}, t_{PHL} – E/E_{LH} (TYP.)



t_r, t_f – R_L (TYP.)



SPECTRAL RESPONSE (TYP.)



DIRECTIONAL SENSITIVITY CHARACTERISTIC (TYP.)
(Ta=25°C)