

**Preliminary**

TOSHIBA Photo IC Silicon Epitaxial Planar

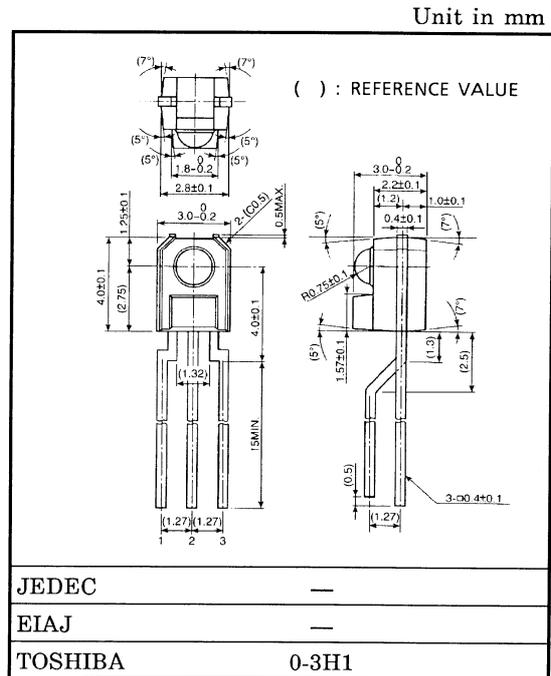
# TPS820

Photo-Electric Switches  
Copiers, Printers, and Facsimiles  
Luminosity Adjustment for Various Types of Equipment

The TPS820 is a linear output photo-IC (current output type) which incorporates a photodiode and a current amp circuit in a single chip.

The sensitivity is superior to that of a phototransistor and its illuminance output linearity is excellent.

- High sensitivity:  $I_L = 2.5 \text{ mA (typ.) @ } E = 0.1 \text{ mW/cm}^2$
- Little fluctuation in light current
- Output linearity of illuminance is excellent.
- Low current consumption:  $I_{CC} = 1 \text{ } \mu\text{A (max) at } V_{CC} = 5 \text{ V}$
- Housed in compact side-view epoxy resin package
- Black package impermeable to visible light
- The TPS820 is suitable for use in combination with the TLN117 infrared LED lamp whose package size is the same.



Weight : 0.12g (TYP.)

## Maximum Ratings (Ta = 25°C)

| Characteristics                     | Symbol                    | Rating        | Unit  |
|-------------------------------------|---------------------------|---------------|-------|
| Supply voltage                      | $V_{CC}$                  | -0.5~7        | V     |
| Output voltage                      | $V_O$                     | $\leq V_{CC}$ | V     |
| Light current                       | $I_L$                     | 10            | mA    |
| Power dissipation                   | P                         | 250           | mW    |
| Power dissipation derating          | $\Delta P/^\circ\text{C}$ | -3.33         | mW/°C |
| Operating temperature range         | $T_{opr}$                 | -25~85        | °C    |
| Storage temperature range           | $T_{stg}$                 | -40~100       | °C    |
| Soldering temperature (5 s) (Note1) | $T_{sol}$                 | 260           | °C    |

Note1: At the location of 1.3 mm from the resin package bottom

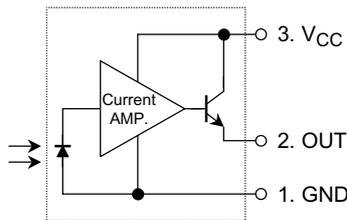
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## Pin Configuration

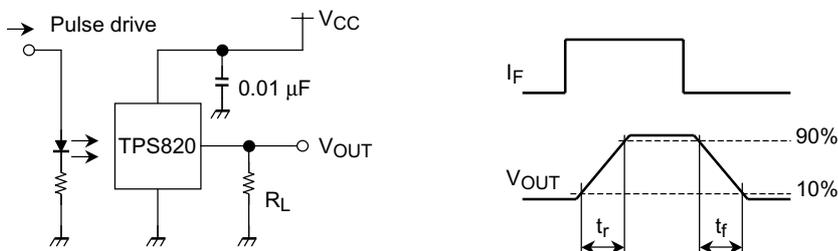


## Optical and Electrical Characteristics (Ta = 25°C, VCC = 5 V)

| Characteristics             | Symbol          | Test Condition  | Min | Typ.  | Max | Unit          |
|-----------------------------|-----------------|---|-----|-------|-----|---------------|
| Current consumption         | $I_{CC}$        | $E = 0$ , $I_L$ must be open between pins                       | —   | 0.017 | 1   | $\mu\text{A}$ |
| Light current (1)           | $I_L(1)$        | $E = 0.01 \text{ mW/cm}^2$ (Note2)                              | 100 | 250   | 400 | $\mu\text{A}$ |
| Light current (2)           | $I_L(2)$        | $E = 0.1 \text{ mW/cm}^2$ (Note2)                               | 1   | 2.5   | 4   | $\text{mA}$   |
| Output linearity            | $I_L(2)/I_L(1)$ | —   | 8   | 10    | 12  | —             |
| Saturation output voltage   | $V_{OUT(sat)}$  | $E = 0.1 \text{ mW/cm}^2$ (Note2)<br>$R_L = 10 \text{ k}\Omega$ | 4.1 | 4.2   | —   | V             |
| Dark current                | $I_D$           | $E = 0$   | —   | —     | 0.5 | $\mu\text{A}$ |
| Peak sensitivity wavelength | $\lambda_p$     | —   | —   | 870   | —   | nm            |
| Rise time                   | $t_r$           | $V_{OUT} = 2.5 \text{ V}$                                       | —   | 250   | —   | $\mu\text{s}$ |
| Fall time                   | $t_f$           | $R_L = 10 \text{ k}\Omega$ (Note3)                              | —   | 700   | —   | $\mu\text{s}$ |

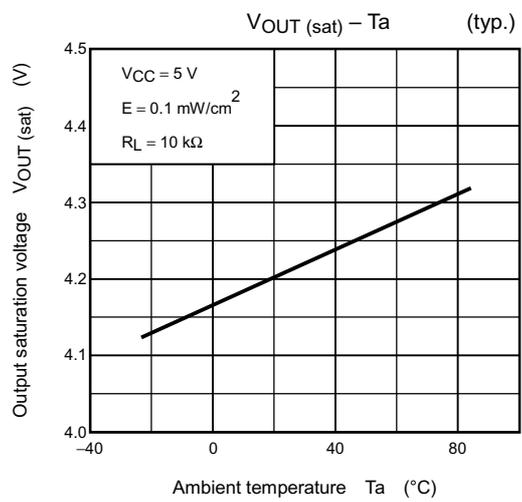
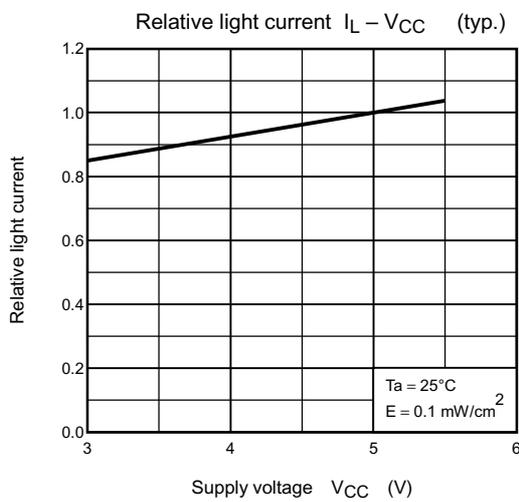
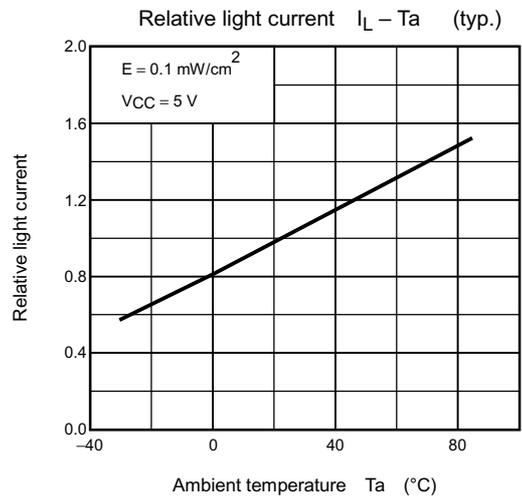
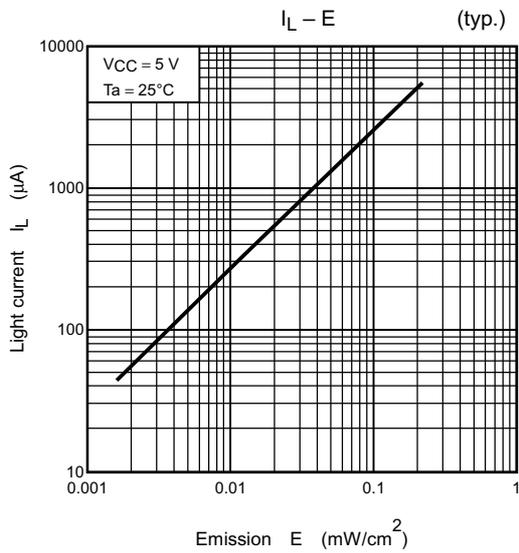
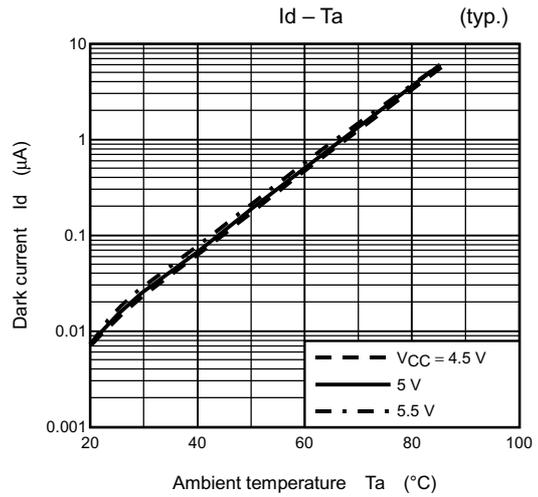
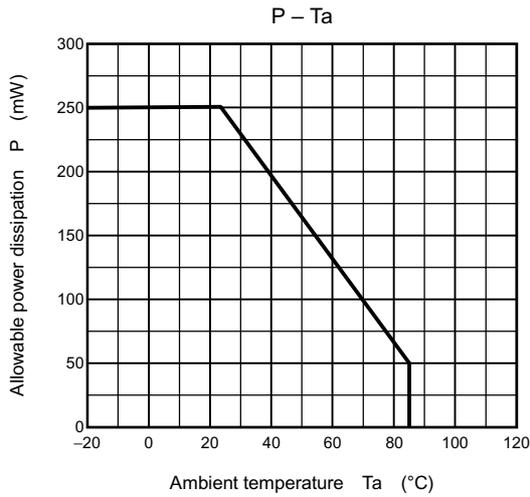
Note2: The light used is a CIE standard A light source (a standard tungsten bulb with a color temperature of 2856K)

Note3: Switching time measurement circuit and waveform

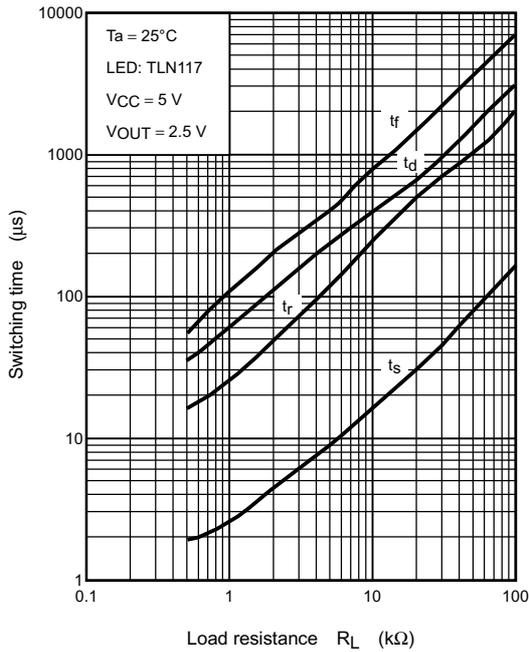


## Precautions

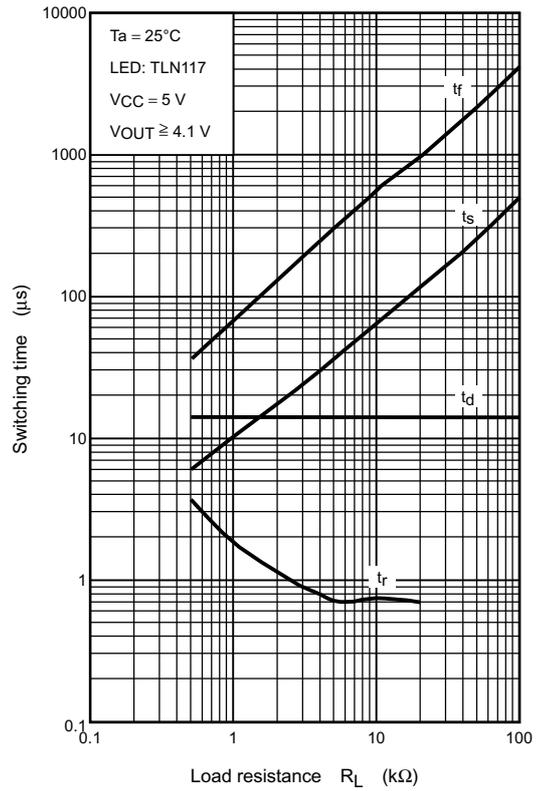
- When this device is used in combination with an LED lamp, the lamp must be an infrared LED lamp.
- To stabilize the power line, insert a bypass capacitor of up to 0.01  $\mu\text{F}$  between VCC and GND, close to the device.
- When the power is turned on, the output value will fluctuate for 1 ms as the internal circuit stabilizes.



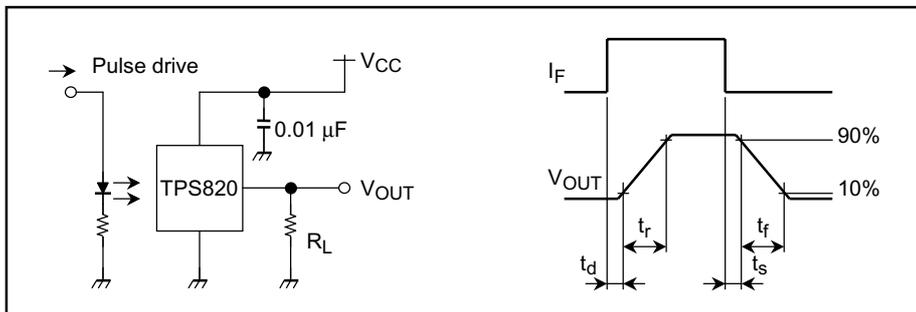
Switching characteristics (no saturation) (typ.)



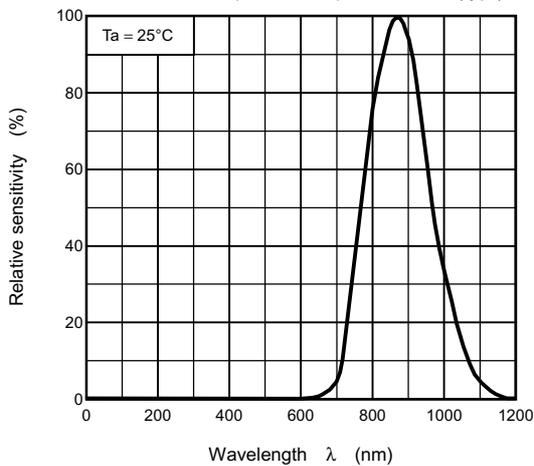
Switching characteristics (saturation) (typ.)



Switching time measurement circuit and waveform



Spectral response (typ.)



Radiation pattern (typ.)

