



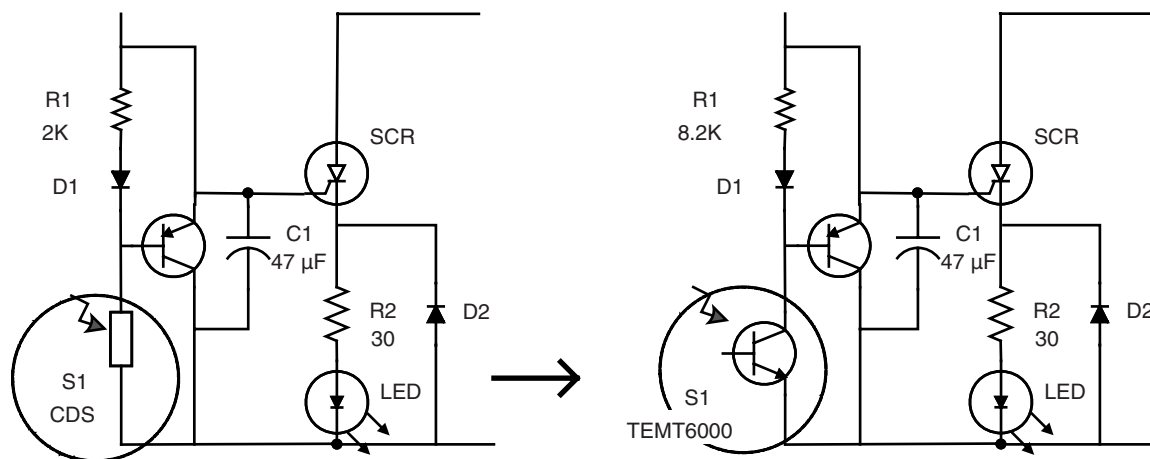
# Ambient Light Sensors

## Replacing a Photo Resistor (CdS) with a Phototransistor

**Ambient light sensors** are used to detect light in a manner similar to the human eye. They are used in applications where settings need to be adjusted to ambient light conditions with a response similar to the human eye. Ambient light sensors are most commonly found in industrial lighting, consumer electronics, and automotive applications. They are typically used to turn features on and off or adjust them as a convenience, in order to conserve battery power or to provide added safety. The most common application for ambient light sensors is to turn on and off street lights, night lights, and other outdoor lighting. Nearly every city street light in North America and Western Europe features an ambient light sensor to turn on the lights at dusk. In the past, cadmium sulfide-based photo resistors were used to sense the ambient light. However, cadmium is a hazardous substance and can no longer be used (RoHS 2002/95/EC). In addition, the variability of the resistance value often required that the system be calibrated. Silicon based phototransistors like Vishay's TEMT6000X01 have replaced photo resistors in these types of applications. They are not made from hazardous substances and the photo current output has low variability.



In most cases, using a Vishay phototransistor in place of a photo resistor requires only a change in a resistor value. Figure 1 shows how the photo resistor, S1-CDS, is replaced by the TEMT6000X01 phototransistor. The light-to-current transfer factor of the TEMT6000X01 is about 25 % of the 4-mm photo resistor. For the same performance, the value of the resistor R1 must be increased approximately four times to 8.2 k $\Omega$ .



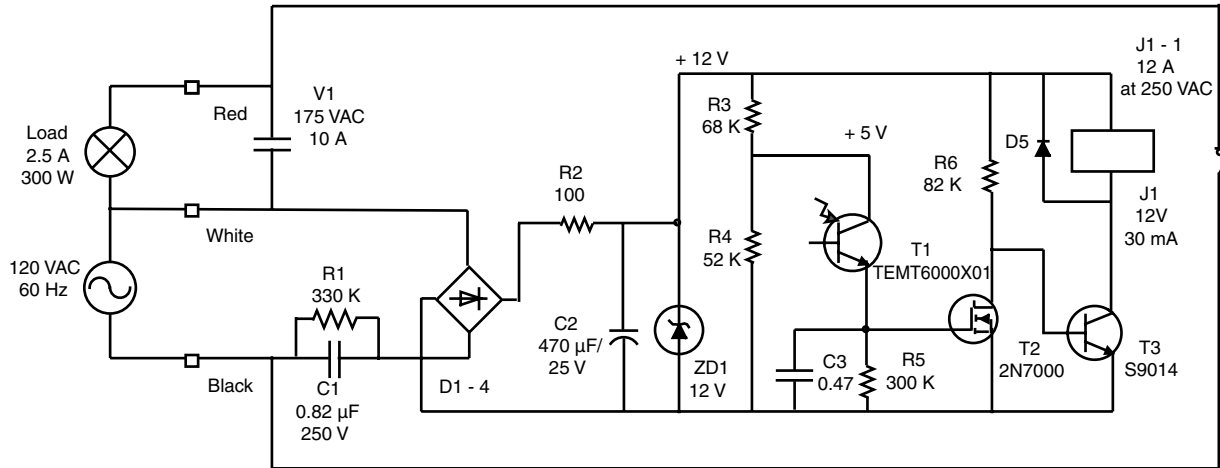
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Figure 1. Replacing S1 CdS with TEMT6000X01

APPLICATION NOTE

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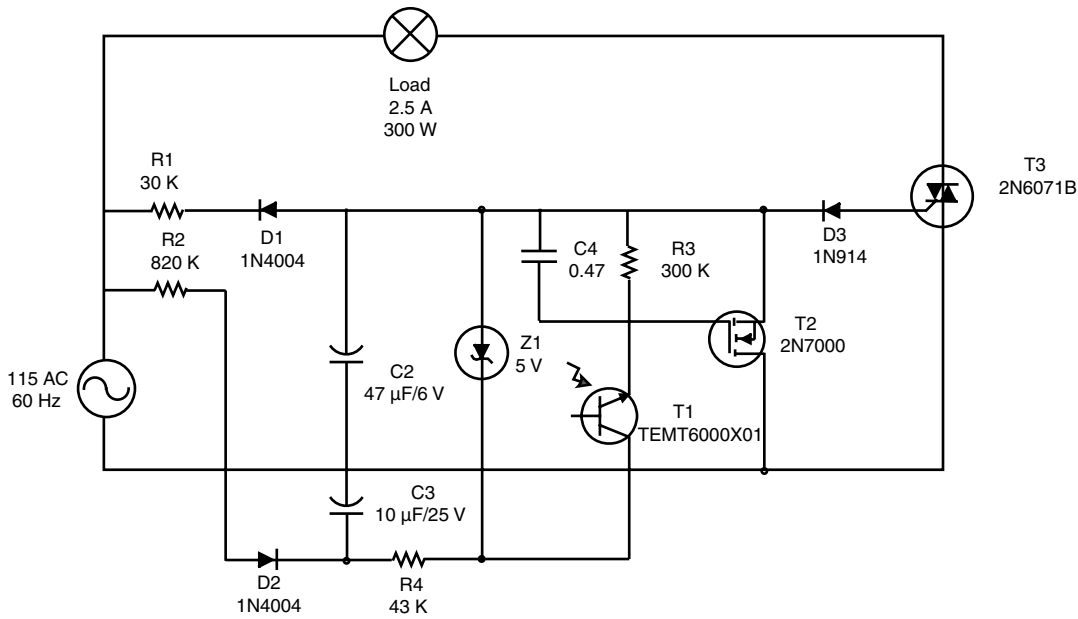
Figure 2 and 3 show how the TEMT6000X01 phototransistor can be used to replace a photo resistor in DC relay and Triac power load applications.



- J1. Relay GOODSKY RHW-SH-112DM 12 A 250 VAC
- T1. Ambient Light Sensor Vishay TEMT6000
- T2. N MOSFET Si1012 (threshold < 1 V)
- T3. NPN S9014-C (50 V, 150 mA, hfe = 200 to 600)
- V1. Varistor VISHAY 2322 593.1716 (SVR 7D271K)

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Figure 2. Photo Light Controller (TEMT6000, Relay)



- T1. TEMT600
- T2. (N MOSFET): Si1012, threshold < 1 V, Vgs(max): 6 V
- T3. (Triac): 2N6071F, Igt: 3 to 15 mA, Vgt: - 1.4 V to - 2.5 V
- R1. On current
- R3. Off current threshold

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Figure 3. Photo Light Controller (TEMT6000, Triac)