

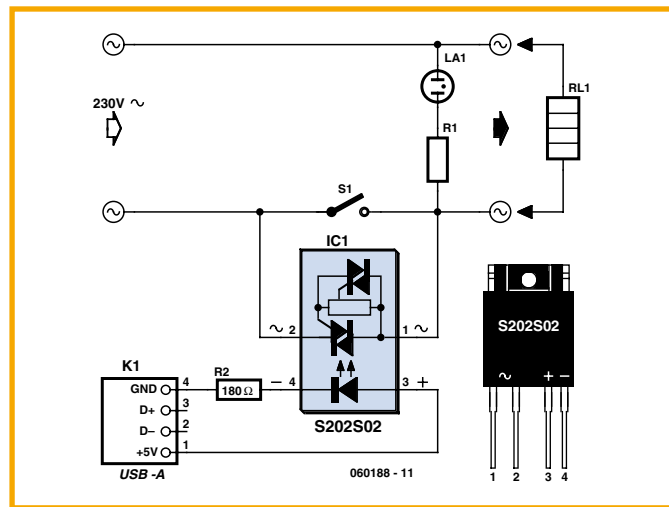
# USB-controlled socket for WLAN router power supply

**Dirk Gehrke**

The idea behind this project is a simple one. The power supplies for a (A)DSL modem and accompanying WLAN router can draw a total power of around 13 watts when idle. Over the course of a year this can add up to a significant amount on one's electricity bill.

The first step to saving some of this energy is to insert an in-line switch into the mains lead. For the prototype we used a switch fitted with a Schuko (continental-style) mains plug and socket made by German manufacturer Düwi [1]. The switched socket allows the two power supplies to be turned off from a central switch.

The next step is to automate the switching. This can be achieved in a relatively straightforward manner with a special-purpose semiconductor device and a USB cable. The special component is an SSR (solid-state relay) made by Sharp, a readily-available device which will be a familiar sight to regular *Elektor Electronics* readers. The S202S02 IC



switches the mains current at the zero-crossing point and therefore produces little interference and dissipates little power. Cooling is not required.

The USB port of a PC can deliver enough voltage and current to drive the solid-state relay. When the PC is switched on, 5 V appears on the USB port. This 5 V supply is used to drive an LED in the SSR via a 180 Ω

resistor, which limits the current flow to 20 mA.

As you can see from the circuit diagram the SSR can be incorporated into the Düwi switched socket, bridging one pair of switching contacts in the mechanical switch. The other contact pair in the mechanical switch must be bridged using a wire link, as the SSR is only a single-pole switch. (Editor's note: for the sake of simplicity we have

shown this bridged contact as a simple wire joining 230 V input and output.)

When the PC is booted up 5 V appears on the USB port and the solid-state relay contact closes. When the PC is shut down the 5 V supply disappears, the switch opens and the two power supplies are disconnected from the mains. The simple modification of the in-line switch has allowed us to switch the power supplies on only when the PC itself is on.

It is also possible to modify a switched extension lead in the same way. If it is desired to use the network when the PC is switched off (for example when using a laptop) it is always possible to use the mechanical switch to bypass the solid-state relay. Of course, you must not forget to switch the network devices off again when you have finished using the laptop or your efforts to save energy will have been in vain!

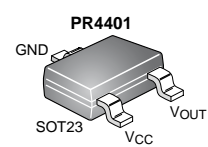
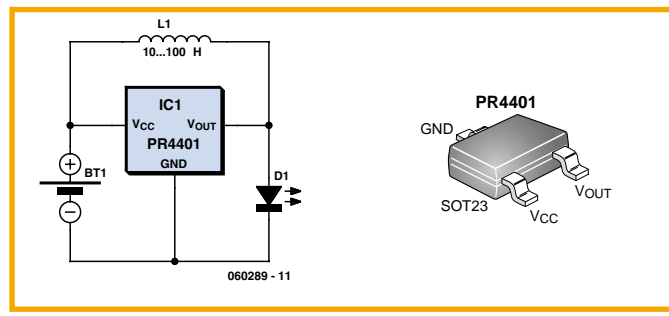
**Internet link:**  
 [1] [www.duewi.de/main.php?lang=ENG](http://www.duewi.de/main.php?lang=ENG)  
 (060188-1)

# PR4401 LED driver

**Burkhard Kainka**

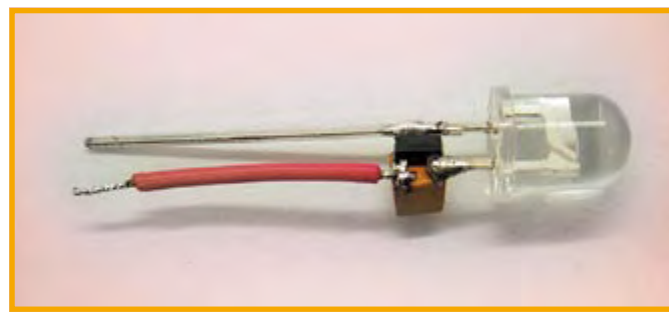
White LEDs have a forward voltage drop of around 3.6 V. If we wish to operate a white LED from a single 1.5 V dry cell or 1.2 V rechargeable cell we therefore need a voltage converter. Until now, solutions to this problem, whether discrete or based around an IC, have required several components. The PR4401 from PREMA is a special-purpose IC designed to drive a white LED with a single small coil as the only external component. In principle the IC would even work using a piece of wire for the inductor!

The device has just three connections and comes in an SOT-23 package which can be hand-soldered. The voltage converter can be fitted into a very tiny space, for example in a pocket torch. Many SMD fixed inductors have the same pin spacing



as the SOT-23 package and so the whole thing can be built with-

out a printed circuit board, as the photograph illustrates.



The current through the LED is determined by the choice of inductor. With a 22 μH inductor the diode current is approximately 12 mA, and with a 10 μH inductor the current is approximately 23 mA. LED brightness is practically constant over a cell voltage range from 0.9 V to 1.5 V. Of course, the current drain increases as the cell voltage decreases. Deviating from the design suggested in the data sheet we experimented with a 100 μH inductor to make a low-current version of the circuit. With a cell voltage of 1.5 V we measured a current consumption of 10 mA, and the LED remained lit down to a cell voltage of 0.7 V.

**Manufacturer:** [www.prema.com](http://www.prema.com)  
**Data sheet:** [www.prema.com/Application/whiteledriver.html](http://www.prema.com/Application/whiteledriver.html)  
**Component source:** [www.ak-modul-bus.de](http://www.ak-modul-bus.de) (site in German only)

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