014 White LED Lamp

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K. Walraven

Nowadays you can buy white LEDs, which emit quite a bit of light. They are so bright that you shouldn't look directly at them. They are still expensive, but that is bound to change. You can make a very good solid-state pocket torch using a few of these white LEDs. The simplest approach is naturally to use a separate series resistor for each LED, which has an operating voltage of around 3.5 V at 20 mA. Depending on the value of the supply voltage, quite a bit of power will be lost in the resistors. The converter shown here generates a voltage that is high enough to allow ten LEDs to be connected in series. In addition,
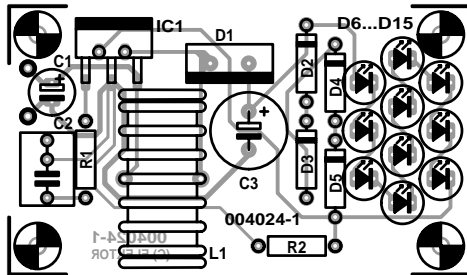
this converter supplies a constant current instead of a constant voltage. A resistor in series with the LEDs produces a voltage drop that depends on the current through the LEDs. This voltage is compared inside the IC to a 1.25-V reference value, and the current is held constant at 18.4 mA (1.25 V ÷ 68 Ω). The IC used here is one of a series of National Semiconductor 'simple switchers'. The value of the inductor is not critical; it can vary by plus or minus 50 percent. The black Newport coil, 220 μH at 3.5 A (1422435), is a good choice. Almost any type of Schottky diode can also be used, as long as it can handle at least 1 A at 50 V. The zener diodes are not actually necessary,

but they are added to protect the IC. If the LED chain is opened during experiments, the voltage can rise to a value that the IC will not appreciate.

The PCB shown here is unfortunately not available ready-made through the Publishers' Readers Services.

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