

Luxeon Logic



Brightness control for LED torches

Oliver Micic (Germany)

The small super-bright Luxeon LEDs from Philips are suitable for many applications, including small but handy (that is, bright) pocket torches. However, you don't always need maximum brightness, so it would be nice to have a simple brightness control. After giving this question a bit of thought, the author designed the circuit described here. An ATtiny microcontroller enables convenient one-button operation. Three brightness levels can be selected by pressing the button one to three times in succession, and pressing it yet again switches the LED off. In this state the ATtiny enters sleep mode with a current consumption of around 1.2 μA . The current consumption rises to around 12 mA in normal operation, plus the current through the LEDs. At 4.5 V, the currents measured by the author at the three brightness settings were 50 mA, 97 mA, and 244 mA. The LED current can be set to other levels by adjusting the value of R1 in the circuit, although the maximum operating current of the LED should not exceed 350 mA. If you want to use more than one LED, you will have to use a different transistor



Features

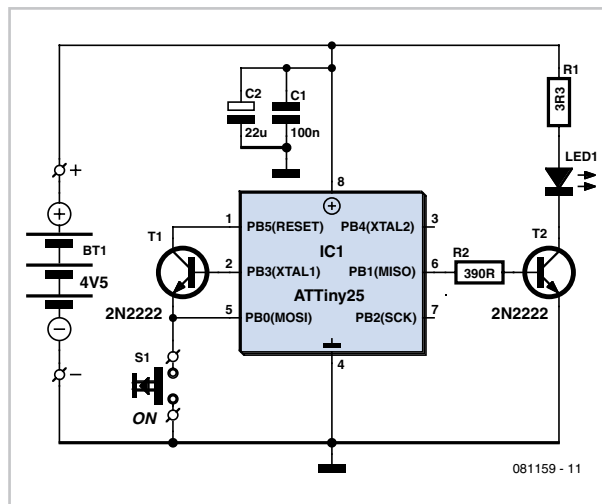
- Three selectable brightness levels
- One-button operation
- Microcontroller control circuit
- Current consumption in sleep mode only 1.2 μA

type, since the maximum rated current of the 2N2222 is 600 mA.

With regard to the quite simple circuit, we can mention that it lacks a crystal because the clock is provided by the internal 8-MHz oscillator of the ATtiny microcontroller. The firmware [1] is written in BASCOM and works with PWM control using the internal clock divider (1:8). If any changes are made, this should be maintained to ensure that the firmware runs at 1 MHz, which reduces the current consumption.

A suitable small PCB is available via the Elektor website, and as usual the layout can be downloaded free of charge [1]. The author [2] designed a round PCB that fits nicely

in a pocket torch with three AA batteries.



(081159-I)

Internet Links

- [1] www.elektor.com/081159
- [2] www.dg7xo.de

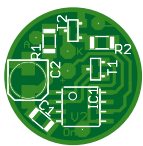
Downloads

- 081159-1: PCB design (.pdf), from [1]
- 081159-11: Source code and hex files, from [1]

Product

081159-41: ATtiny25 microcontroller, ready programmed

COMPONENT LIST



Resistors

R1 = 3 Ω 3 (1206)
R2 = 390 Ω (1206)

Capacitors

C1 = 100nF (1206)
C2 = 22 μF 10V (SMD)

Semiconductors

T1, T2 = 2N2222 (SOT-23)
IC1 = ATtiny25-20SU (SOT-8)
LED1 = Luxeon LED, 1W (SMD), white

Miscellaneous

Pushbutton
PCB # 081159-1 [1]

Preamplifier for RF Sweep Generator



Gert Baars (The Netherlands)

The RF sweep frequency generator ('wobbulator') published in the October 2008 issue of Elektor has a receiver option that allows the instrument to be used as a direct-conversion receiver. This receiver does however have a noise floor of only -80 dBm, which really should have been -107 dBm to obtain a sen-

sitivity of 1 μV . So, for a good receiver some more gain is required. A wideband amplifier, however, generates a lot of additional noise as well and as a consequence will not result in much of an improvement.

As an experiment, the author developed a selective receiver with a bandwidth of about 4 MHz. Because a gain of at least 35 dB is

required, the preamplifier consists of two amplifying elements.

The input amplifier is designed around a dual-gate MOSFET, type BF982. This component produces relatively little noise but provides a lot of gain. The output stage uses a BFR91A for some additional gain.