

## Introduction

Silego's SLG46116 combines the functionality and versatility of a GreenPAK Configurable Mixed-signal IC with the power capabilities of Silego's GreenFET technology.

This application note demonstrates how to design a simple state machine using a SLG46116. In this application, a simple state machine controls power LED headlights and tail lights for cycling.

## Bike LED light circuit design

As shown in Figures 1, 2, a four-state machine is implemented using two DFFs (DFF 2 and DFF 3). The first state is off, second state is full LED brightness, third state is 50 percent brightness, and the fourth state is LED's blinking at 5 Hz.

Button bounce is filtered by CNT/DLY0. The states are decoded by two 2-bit LUTs, two 3-bit LUTs and one 4-bit LUT (2-bit LUT3, 2-bit LUT0, 3-bit LUT2, 3-bit LUT3, 4-bit LUT0). Output of 4-bit LUT0 controls a P-FET Power Switch. The 5 Hz generator is implemented using 2-bit LUT2, CNT/DLY1 and a Pipe Delay. The battery charge is monitored by ACMP0. 2-bit LUT1 inverts the output of ACMP0.

## Bike LED light circuit analysis

When this device is powered on it initializes in the first state: the output pins (BAT\_LOW, BAT\_OK, V\_OUT and PWR\_SW\_ON) are LOW. When the Button (PIN 1) is pushed LOW the device goes to the next state. This device and completed PCB were tested and are shown in Figures 3, 4, 5, 6, 7 and 8.

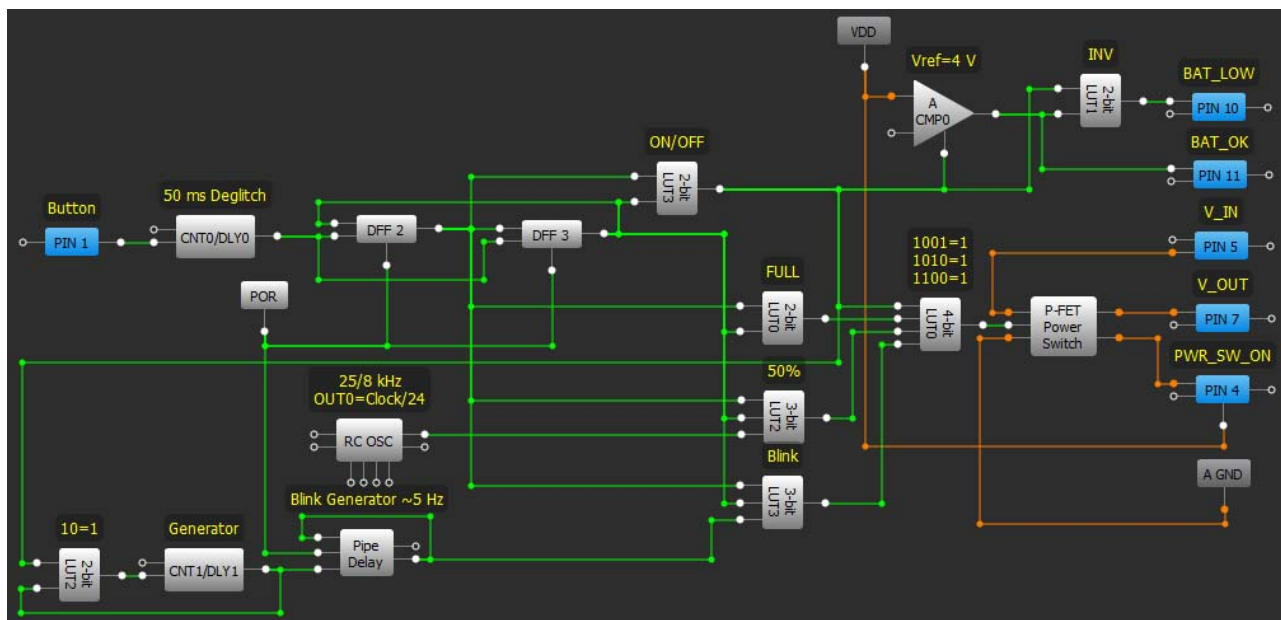


Figure 1. Bike LED headlight circuit design

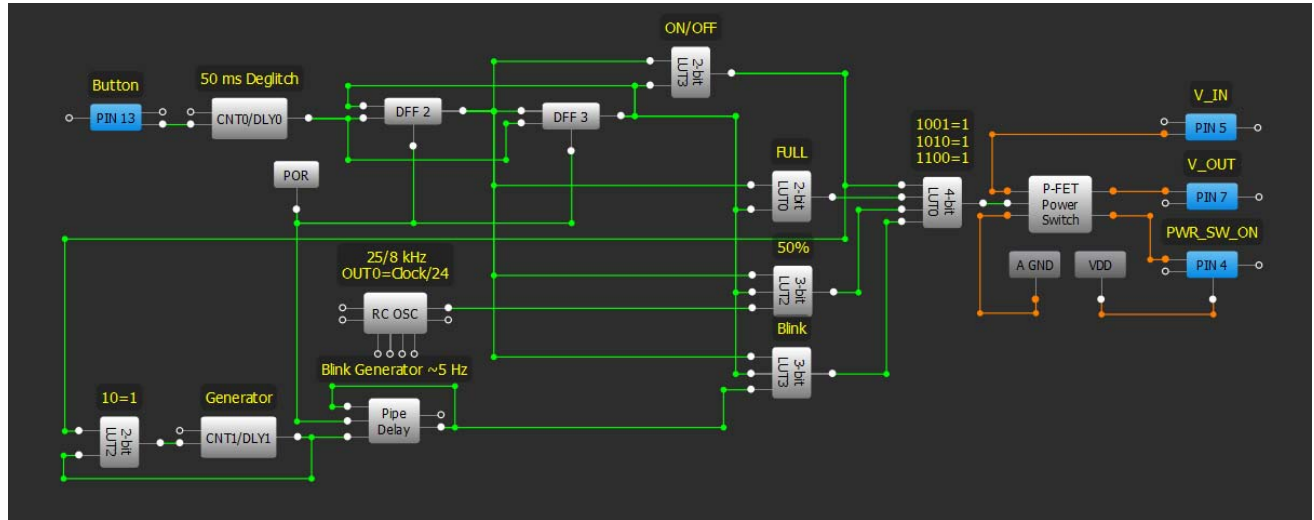


Figure 2. Bike LED tail light circuit design

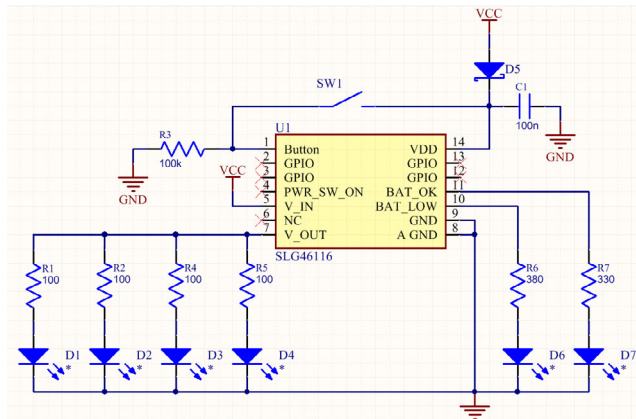


Figure 3. Bike LED headlight typical application circuit

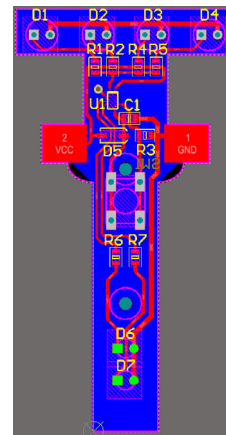


Figure 5. Bike LED headlight PCB layout

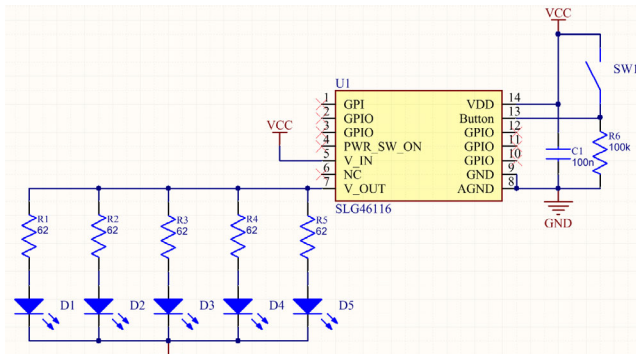


Figure 4. Bike LED tail light typical application circuit

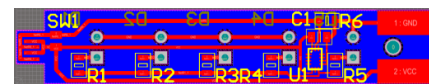
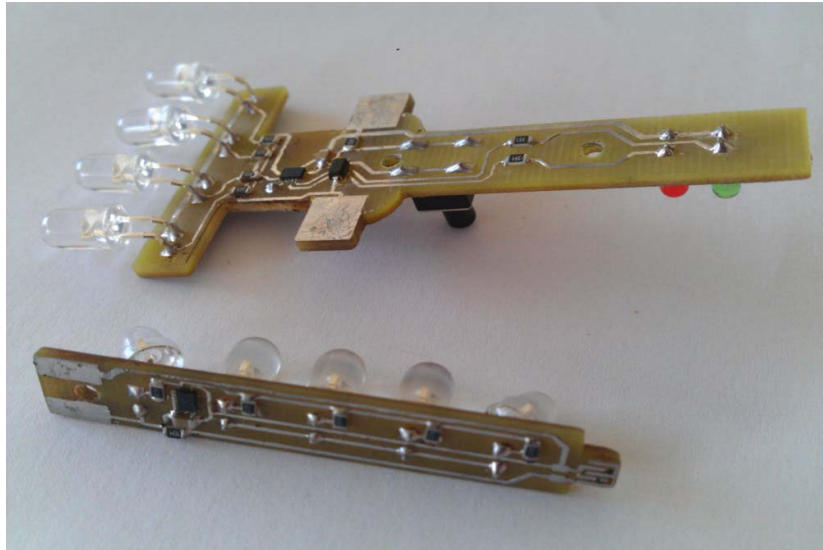


Figure 6. Bike LED tail light PCB layout



**Figure 7. Completed PCBs**



**Figure 8. Completed devices**

### **Conclusion**

A simple state machine and power LED driving can be easily implemented using a SLG46116 IC. It has low power consumption, and only a few external components needed to complete this design.

### **Related Files**

Programming code for [GreenPAK Designer](#).



### About the Author

Name: Oleg Gorodechny

Background: Oleg Gorodechny received Bachelor's degree in "Computer Science" in 2009 and Master's degree in "Information Control Systems and Technologies" in 2011 from Lviv Polytechnic National University. Since 2011 he has been working as a design engineer and in 2013 he began to work for Silego Technology Inc. as an application engineer. Currently he designs analog circuits and their applications

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### Document History

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|----------|-----------------|-----------------|-----------------------|
| A        | Oleg Gorodechny | 06/16/2014      | New application note  |

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