AL3644EV1 User Guide

General Description

The AL3644 is a dual LED flash driver that provides a high level of adjustability within a small solution size. The AL3644 utilizes a 2-MHz or 4-MHz fixed frequency synchronous boost converter to provide power to the dual 1.5-A constant current LED sources. The dual 128 level current sources provide the flexibility to adjust the current ratios between LED1 and LED2. An adaptive regulation method ensures the current sources remain in regulation and maximizes efficiency.

Features of the AL3644 are controlled via an I^2C-compatible interface. These features include: hardware flash and hardware torch pins (STROBE and TORCH/TEMP), a TX interrupt, and an NTC thermistor monitor. The device offers independently programmable currents in each output leg to drive the LEDs in a Flash or Movie Mode (Torch) condition.

The 2-MHz or 4-MHz switching frequency options, overvoltage protection (OVP), and adjustable current limit allow for the use of tiny, low-profile inductors and (10-µF) ceramic capacitors. The device operates over a –40°C to 85°C ambient temperature range.

Applications

- Camera Phone White LED Flash

Key Features

- Dual Independent 1.5-A LED Current Source Programmability
- Accurate and Programmable LED Current Range from 1.4mA to 1.5A
- Torch Currents up to 180mA per Channel
- Flash Timeout Values up to 400ms
- Optimized Flash LED Current During Low Battery Conditions (IVFM).
- > 85% Efficiency in Torch Mode (at 100 mA) and Flash Mode (at 1A to 1.5A)
- Grounded Cathode LED Operation for Improved Thermal Management
- Small Solution Size: < 16 mm2
- Hardware Strobe Enable (STROBE)
- Synchronization Input for RF Power Amplifier Pulse Events (TX)
- Hardware Torch Enable (TORCH/TEMP)
- Remote NTC Monitoring (TORCH/TEMP)
- 400-kHz I2C-Compatible Interface
    - AL3644 (I2C Address = 0x63)

AL3644EV1 Specifications

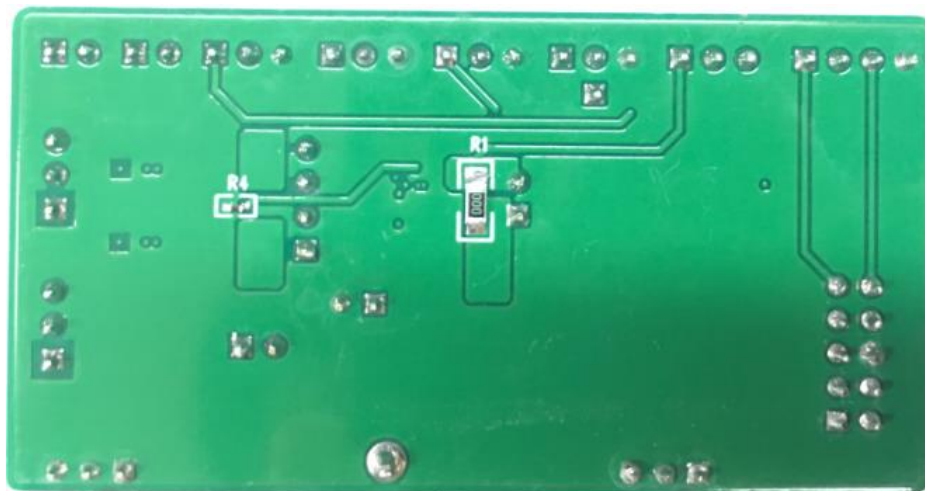| Parameter	Value
Input Voltage	2.7VDC to 5.5VDC
Number of LEDs	2 Channels, 1 LED per Channel
Maximum Torch current / Channel	180mA
Maximum Flash current / Channel	1.5A
XYZ Dimension	70mm x 36mm x 11mm

Figure 1. Top View

Figure 2. Bottom View

Connection Instructions

USB docking board connection:
Connect one end of the USB docking board to the PC using the supplied USB cable and the other end to J2 of the AL3644EVM using the supplied 10-pin ribbon cable.

Power Supply connection: Connect a DC power supply between J5 and J6
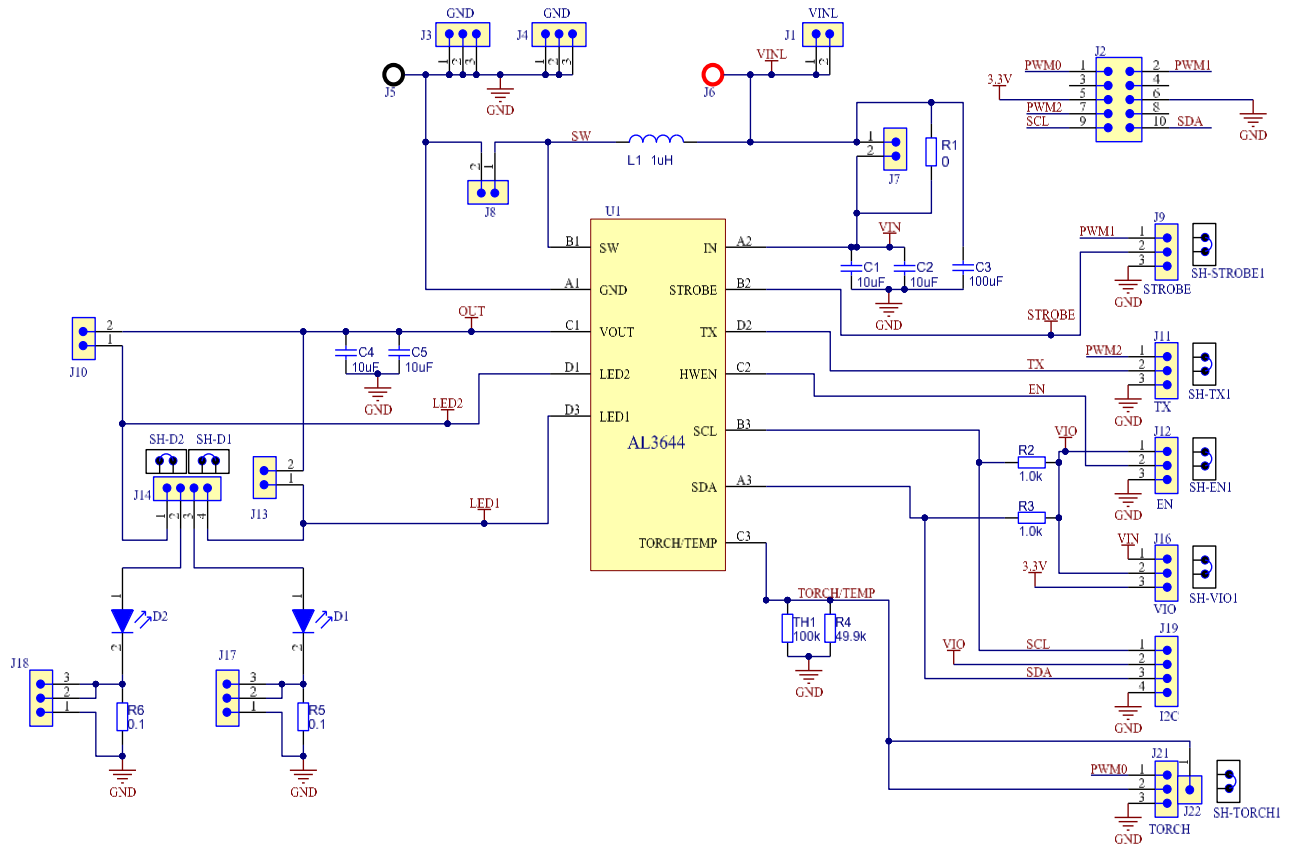
Evaluation Board Schematic

Figure 3. Evaluation Board Schematic
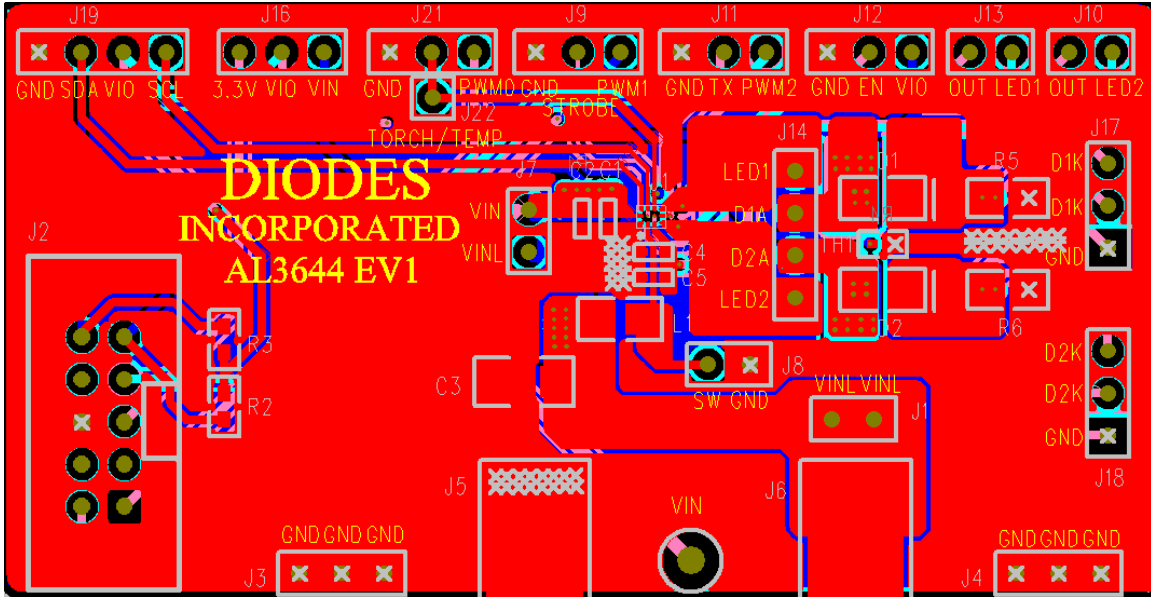
Evaluation Board Layout
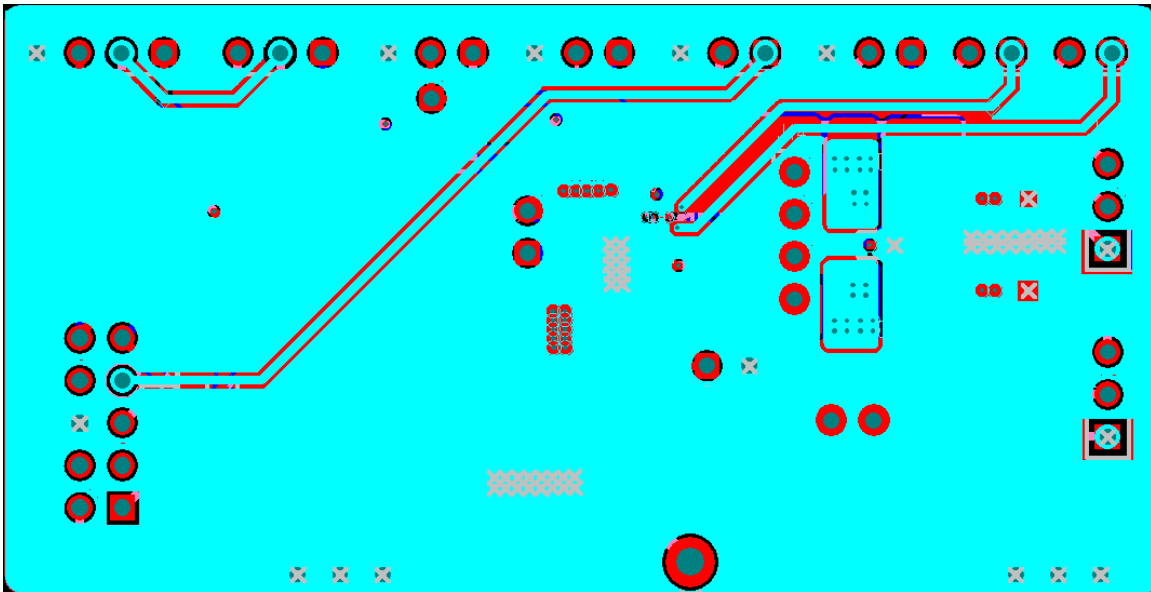

Figure 4. PCB Board Layout Top Layer

Figure 5. PCB Board Layout Middle Layer 1
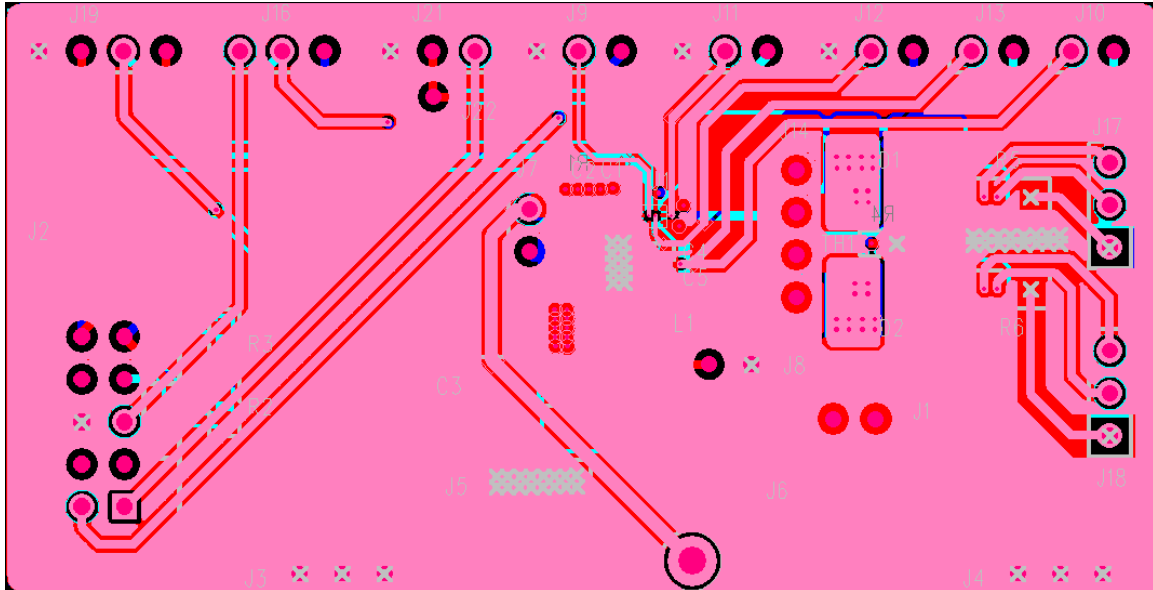
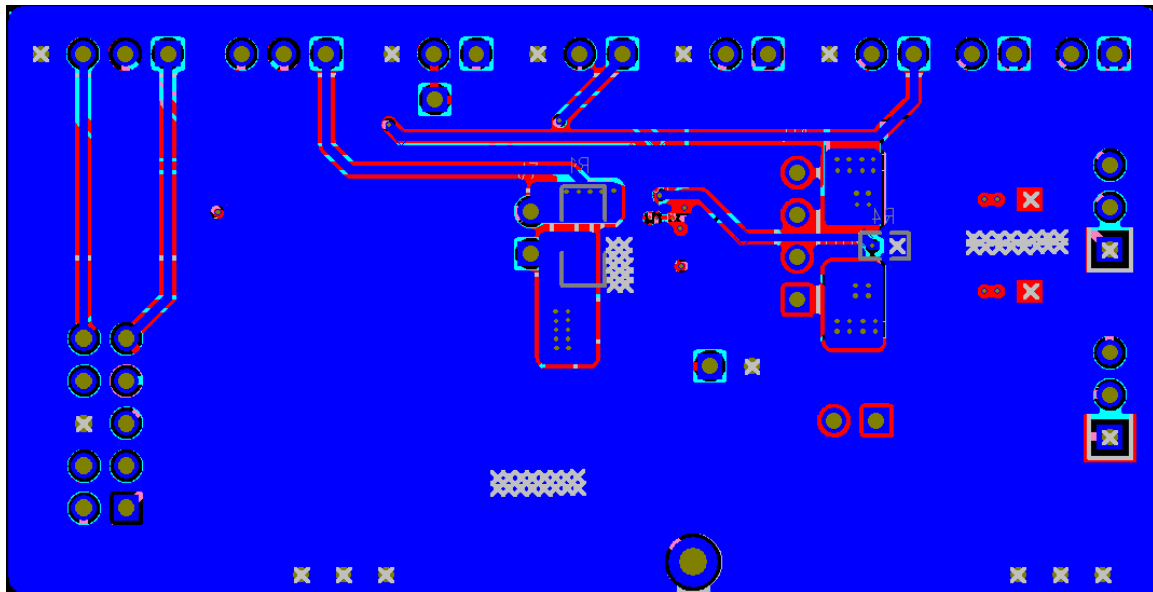## Evaluation Board Layout

Figure 6. PCB Board Layout Middle Layer 2

Figure 7. PCB Board Layout Bottom Layer

Bill of Materials

#	Name	Quantity	Package	Description
1	U1	1	U-WLB1713-12	AL3644
2	L1	1	SMD	1uH, 2.5A, 0.063Ω
3	D1, D2	2	SMD	LED, Ultra White
4	C1,C2,C4,C5	4	0402	CAP, CERM, 10uF, 6.3V, +/-20%, X5R
5	C3	1	1206	CAP, CERM, 100uF, 6.3V, +/-20%, X5R
6	R1	1	1206	RES, 0Ω, 5%
7	R2,R3	2	0603	RES, 1.0kΩ, 5%
8	R4	1	0402	RES, 49.9kΩ, 1%
9	R5,R6	2	0805	RES, 0.1 ohm, 5%
10	TH1	1	0402	Thermistor NTC, 100k ohm, 5%

Quick Start Guide

1. Connect one end of the USB docking board to the PC using the supplied USB cable and the other end to J2 of the AL3644EVM using the supplied 10-pin ribbon cable.
2. Open the interface program
3. Connect the power supply between J5 and J6 and turn on the power supply.
4. Run the software as explained in the **I^{2}C-Compatible Interface Program and Operation** section.

I²C-Compatible Interface Program and Operation

Diodes Incorporated has created an I²C-compatible program and USB docking board that can help exercise the part in a simple way. Contained in this document is a description of how to use the interface software.

The I2C-compatible interface program provides all of the control that the AL3644 part requires. For proper operation, the USB docking board should be plugged into the PC before the interface program is opened. Once connected, and the program is executed, a basic interface window will open. The image below shows the default settings.
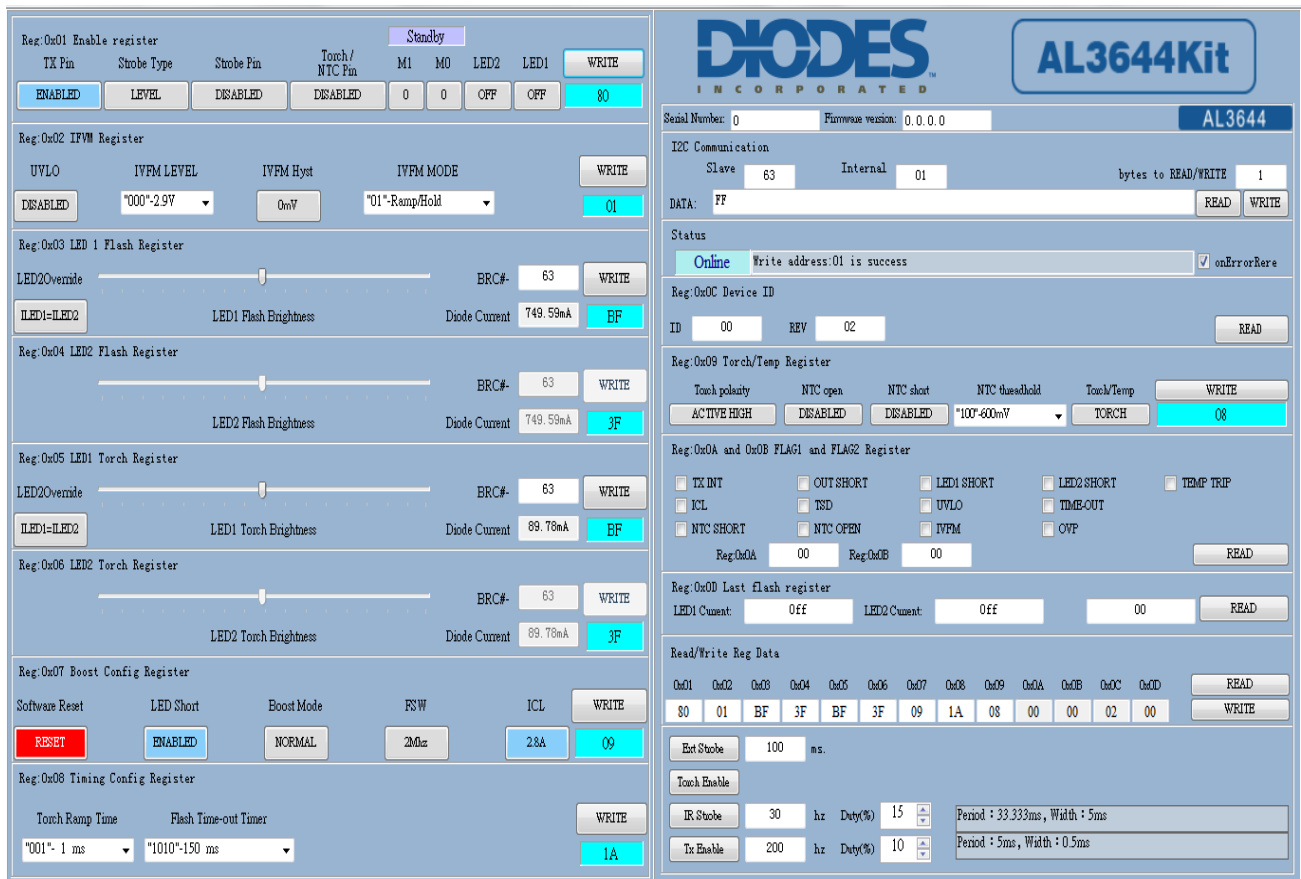

Figure 8. AL3644 General User Interface (GUI)

The "I²C Interface" fields may be used to write or read any AL3644 register. Selecting the "RESET" button resets all registers to their default values and updates all GUI fields.

Figure 9. I²C interface Fields

1. User Interface

The AL3644 GUI provides the user with access to all of the registers found on the device. Through a combination of buttons, drop-down boxes and sliders, the user can configure the AL3644 to perform in the desired mode. Please note that no data is written to the device until the Write button found within the corresponding register is pressed.
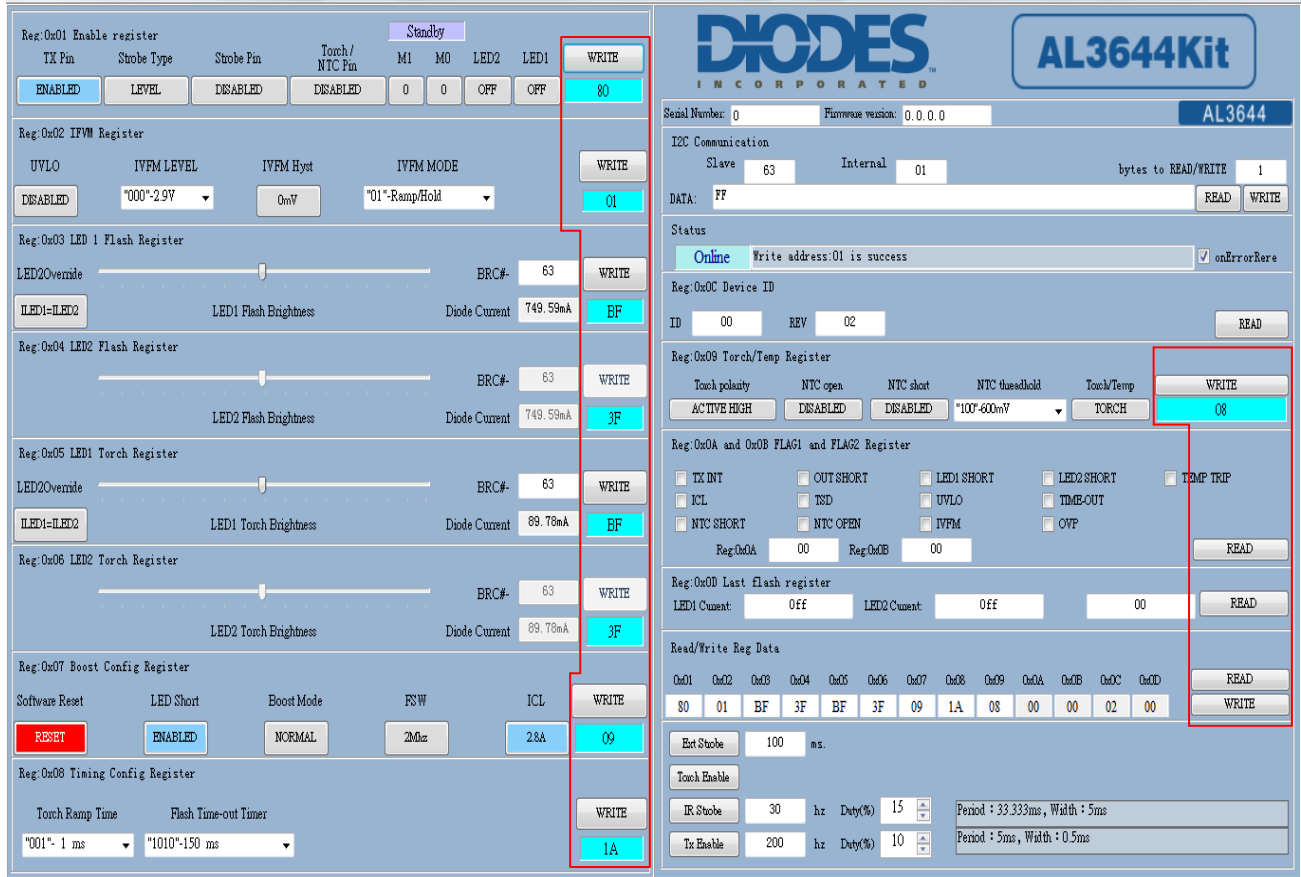

Figure 10. Write Buttons

2. Flags

The contents of the AL3644 fault registers are read upon clicking the "Read Flags" button. The registers are cleared upon read back.
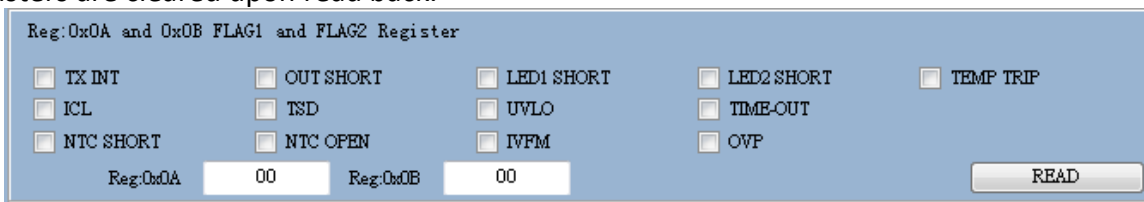

Figure 11. Flags

3. I/O Pin Controls

The AL3644EVM provides the user with the capability to control the TORCH, STROBE and TX inputs without the need of an external supply.

The Ext. Strobe Button toggles the Strobe pin high for the duration entered in the field next to the button.

The Torch Enable button toggles the AL3644's TORCH/TEMP pin high when pressed and low depressed.

The IR Strobe Button along with the hz and Duty fields generate a continuous pulse train that can be used to generate a current pulse pattern on the enabled LEDs.

The TX Enable Button along with the hz and Duty fields generate a continuous pulse train when pressed.
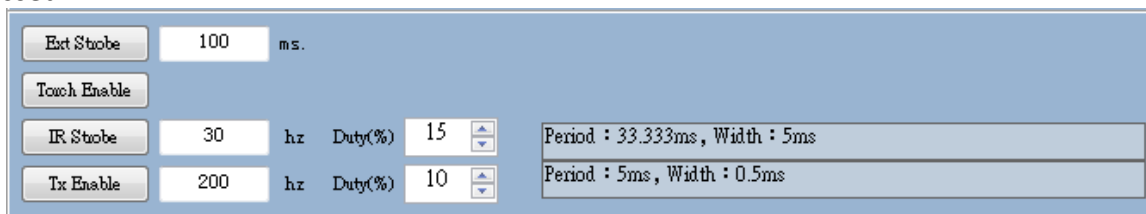

Figure 12. I/O Pin Controls

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