

## AN-2211 LP5560 Evaluation Board

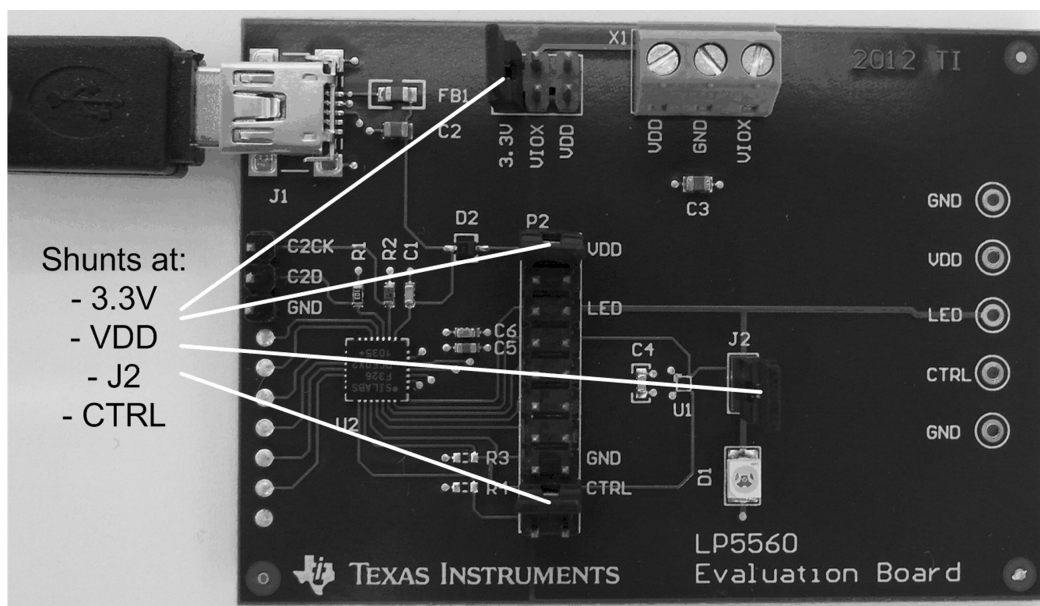
### 1 Evaluation Board Setup

**Figure 1** shows how to set up the LP5560 evaluation board. This configuration uses an on-board microcontroller to control the LP5560's CTRL input; the board is powered from the USB port. If an external source to drive the control signal is preferred, remove the CTRL jumper and connect the external control signal into the pin marked CTRL at the pin rail. The GND pin is located next to the CTRL pin for easy connection.

The evaluation board can be powered from a USB connector or from an external power supply. To use an external power supply, connect the power leads to the power connector and keep the VDD voltage between 2.7V and 5.5V. Connect the positive terminal of the external power supply to the VDD terminal and the negative terminal to GND terminal.

I/O voltage can be supplied from the microcontroller's integrated LDO (3.3V) or from an external power supply. The I/O voltage sets the CTRL signals high level. The external I/O voltage can be connected to VDD; a separate I/O voltage can be connected to VIOX pin. Note that the onboard microcontroller's (Silicon Labs C8051F326) I/O voltage needs to be from 1.8V to 3.6V. The LP5560 accepts I/O logic high levels from 1.1V to VDD.

The onboard microcontroller has a USB interface to communicate with the PC. Connect the evaluation board to the PC with a USB cable. Evaluation software is used to control the LP5560 CTRL input. The evaluation software setup and use are described in the following sections.



**Figure 1. Evaluation Board Setup**

## 2 Evaluation Board Schematic

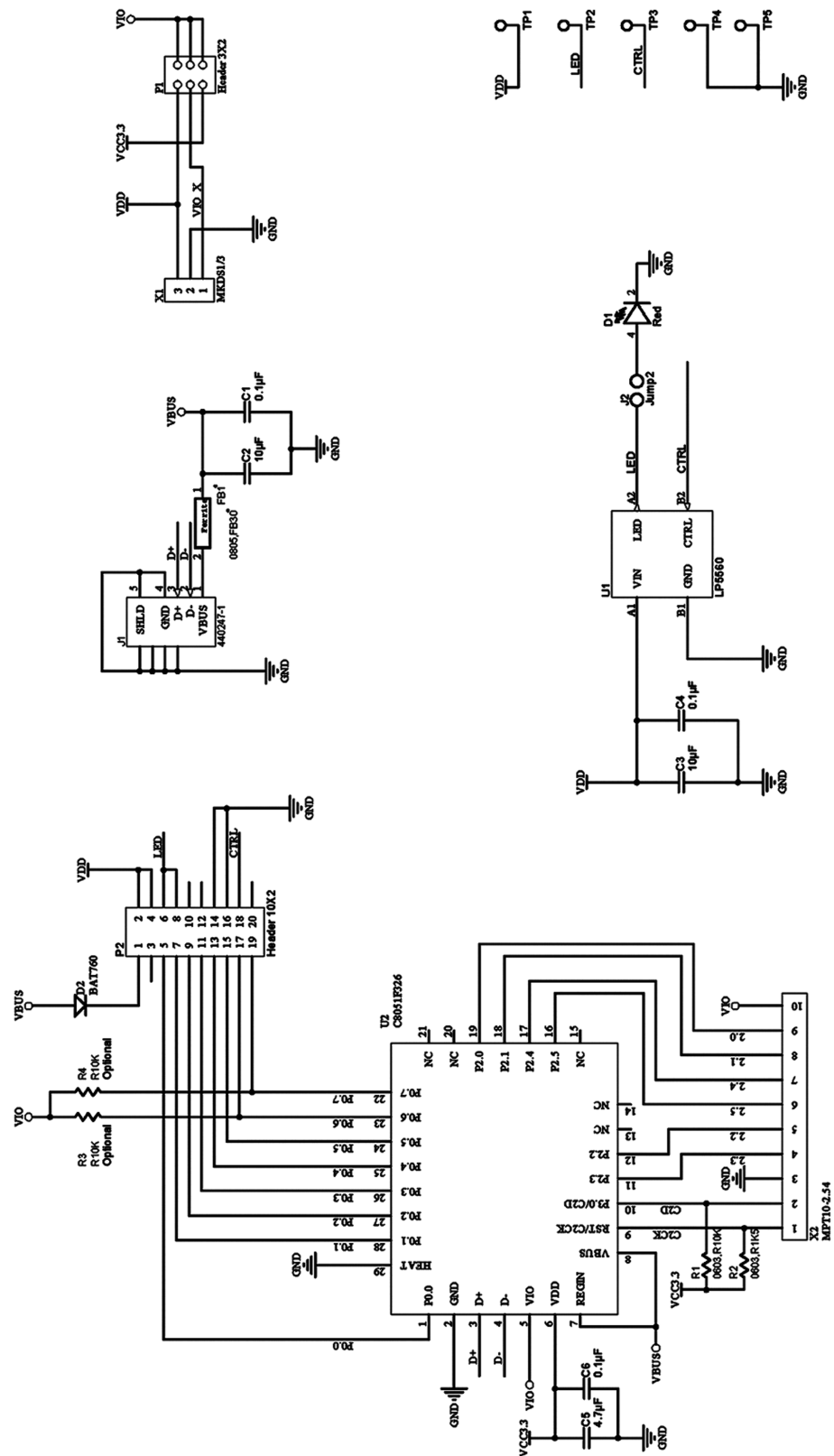
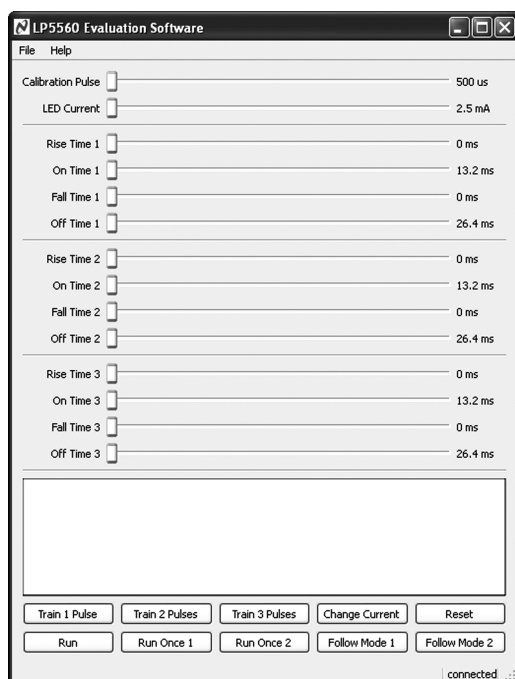


Figure 2. Evaluation Board Schematic

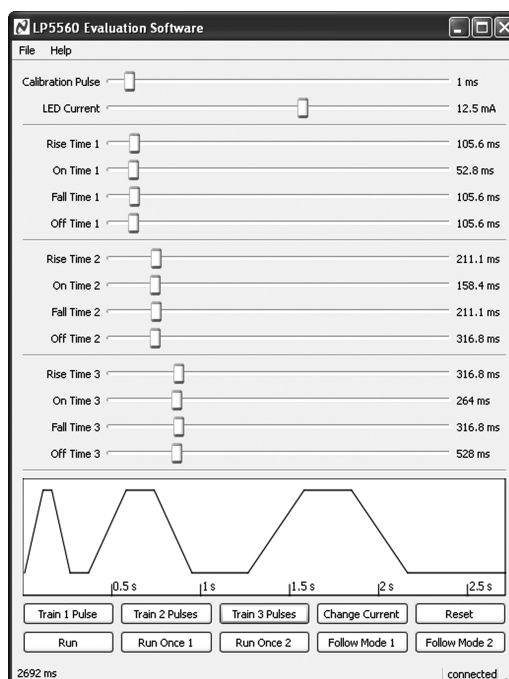
### 3 Evaluation Software

Copy the evaluation software (LP5560.exe) and all the included .dll files to your hard drive. The evaluation software doesn't need installation and can be run by double-clicking the icon. If the evaluation board is set up correctly the evaluation software's user interface should look like [Figure 3](#). The status bar at the right side of the bottom row should say "connected". This indicates that the connection between the microcontroller and the computer's USB interface is working correctly. If the connection fails the status bar will say "not connected". In this case check that the evaluation board is connected to the USB port and that the evaluation board's jumpers are in the correct places. If the external I/O voltage is used verify that the I/O voltage is at an acceptable level (between 1.8V to 3.6V).

To start the default blinking sequence, click the Run button and verify that the LED is blinking. Now the evaluation board is working correctly, and you can start testing different blinking sequences. Stop the blinking sequence by clicking the Run button again. New blinking sequences can be trained into the device by selecting the desired on, off, rise and fall times with the sliders. The blinking sequence is trained into the LP5560 by clicking the Train X Pulses button where 'X' is the number of pulses. [Figure 4](#) shows the evaluation software after three pulses are trained into the LP5560. Once the Train X button is pressed a preview of the sequence is shown on the preview window.



**Figure 3. Evaluation SW Start Screen**



**Figure 4. Evaluation Software After Three Pulses are Trained Into the LP5560**

## **4 Evaluation Software Controls**

The LP5560 is a programmable LED driver that can generate a variety of blinking sequences with up to three pulses of a different length per pulse. Blinking sequences can be programmed through a single-wire interface. Programmable parameters include on and off times as well as rise and fall times. The LED current can also be set through the single-wire interface. Evaluation software can control all programmable parameters of LP5560.

### **4.1 Calibration Pulse Slider**

The Calibration Pulse slider controls the calibration pulse length. Calibration pulse can be set from 500  $\mu$ s to 10 ms. The indicator on the right side of the slider shows the selected value.

### **4.2 LED Current Slider**

The LED current slider controls the LED current. A new current can be trained into the device with the Change Current button or together with a new blinking sequence. The indicator on the right side of the slider shows the selected value.

### **4.3 Rise Time X Slider**

The Rise-Time slider sets the LED current rise time for pulse X. Rise time can be set from 0 to 1584 ms. Each pulse has its own rise time control. The indicator on the right side of the slider shows the selected value.

### **4.4 On Time X Slider**

The On-Time control sets the LED on time for pulse X. On time can be set from 13.2 ms to 3009.6 ms. Each pulse has its own on-time control. The indicator on the right side of the slider shows the selected value.

### **4.5 Fall Time X Slider**

The Fall-Time slider sets the LED current fall time for pulse X. Fall time can be set from 0 to 1584 ms. Each pulse has own fall-time control. The indicator on the right side of the slider shows the selected value.

### **4.6 Off Time X Slider**

The Off-Time control sets the LED off time for pulse X. On time can be set from 26.4 ms to 6019.2 ms. Each pulse has own on-time control. Indicator on the right side of the slider shows the selected value.

### **4.7 Train 1 Pulse Button**

The Train 1 Pulse button generates a training sequence for one pulse. Once the button is clicked a preview window is updated.

### **4.8 Train 2 Pulses Button**

The Train 2 Pulse button generates a training sequence for two pulses. Once the button is clicked a preview window is updated.

### **4.9 Train 3 Pulse Button**

The Train 3 Pulse button generates a training sequence for three pulses. Once the button is clicked a preview window is updated.

### **4.10 Change Current Button**

The Change Current button changes the LED current without changing the previously trained blinking sequence. If the device is in Follow mode, it remains in Follow mode, but the current changes.

#### 4.11 **Reset Button**

The Reset button resets the device to factory defaults.

#### 4.12 **Run Button**

The Run button sets the CTRL pin high. This sets the LP5560 to Run mode. The CTRL pin stays high until the Run button is clicked again. While the Run button is active all other control buttons are disabled.

#### 4.13 **Run Once 1 Button**

The Run Once 1 button generates a Run Once command (see *LP5560 Programmable LED Driver with Single-Wire Interface* ([SNVS873](#))) and leaves CTRL high. The LP5560 generates the programmed blinking sequence only once. The CTRL line remains high until the Run Once 1 button is clicked again. While the Run Once 1 button is active all other control buttons are disabled.

#### 4.14 **Run Once 2 Button**

The Run Once 2 button generates a Run Once command (see *LP5560 Programmable LED Driver with Single-Wire Interface* ([SNVS873](#))) and leaves CTRL low. After this, click the Run button to trig the blinking sequence. Once the Run button is clicked, the device generates the programmed blinking sequence only once.

#### 4.15 **Follow Mode 1 Button**

The Follow Mode 1 button sets the LP5560 into Follow mode. In Follow mode the LED stays on as long as CTRL is held high, and Rise Time 1 and Fall Time 1 settings are used to ramp the LED current up and down. To turn the LED to turn on and off without ramps, first train a sequence with Rise Time 1 and Fall Time 1 settings at zero, then set the device into Follow mode.

#### 4.16 **Follow Mode 2 Button**

The Follow Mode 2 button sets the LP5560 into Follow mode and reprograms the Rise Time 1 and LED current settings.

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### 3.2 Canada

##### 3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247

#### Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

#### Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.



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<https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html>

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
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Last updated 10/2025