LP5522 Evaluation Kit

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General Description

The LP5522 is a simple single wire programmable LED controller in six bump micro SMD package. It provides constant current flow through high side driver. Output current can be set from 1 mA to 20 mA by using an external resistor on the ISET pin. If no external resistor is used, output current is set to 5 mA default current. The LP5522 is controlled using only one signal. The signal controls either directly the LED driver or it launches previously programmed blinking sequence.

The LP5522 works autonomously without a clock signal from the master device. Very low LED driver headroom voltage makes possible to use supply voltages close to LED forward voltage. Current consumption of the LP5522 is minimized when LED is turned off and once controller is disabled all supporting functions are also shut down. Very small micro SMD package together with minimum number of external components is a best fit for handheld devices.

Evaluation Kit Overview

LP5522 Evaluation Kit is based on a modular system, where the actual evaluation board is plugged on top of the PC interface board. The interface operates through the USB port.

The kit supports complete functional evaluation of the circuit. The evaluation kit consists of:

- LP5522 evaluation board
- USB interface board
- USB interface cable
- CD—ROM including:
  — Evaluation software
  — LP5522 datasheet
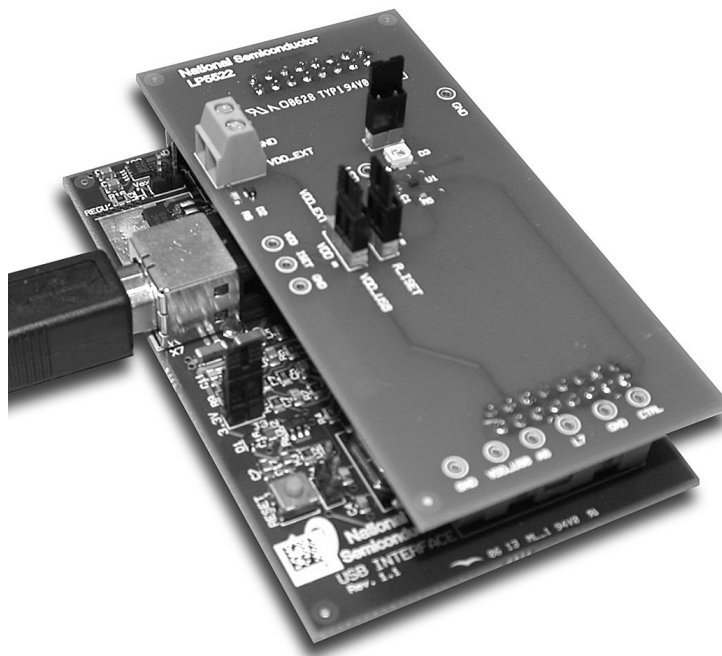 — Evaluation kit document (this doc.)

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Figure 1. LP5522 Evaluation board with USB interface board

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Evaluation Software

LP5522 evaluation software (LP5522.exe) is supplied on the delivery CD together with all available documentation regarding the circuit. Copy the LP5522.exe an the usblptio.dll to your PC's hard disk. The usblptio.dll needs to be in the same directory as the evaluation software. The software is run by double clicking its icon. The software does not require any installation

User interface of the evaluation software is shown on Figure 2. All functions of the chip are controlled from the user interface. Mode field shows the current operation mode of the chip. Trained field indicates is there a blinking sequence programmed to the chip. Blinking sequence is trained to the chip by using the three on- and of time slide bars. Below the slide bars is the blinking sequence preview window. On the bottom of the user interface are the control buttons. Reset button resets the chip to its initial state. Manual button is used to directly control LED on and off and is accessible only when no blinking sequence is programmed to the chip. Train button is used to program the sequence selected on the sequence field to the chip. Run and Run Once buttons are accessible only when there is a blinking sequence trained to the chip. Run button set the chip to continuous run mode until Run butt-ton is pressed again or Reset button is pressed. Run once button runs the trained sequence once and then the chip returns back to standby mode. Quit button shuts down the control program.
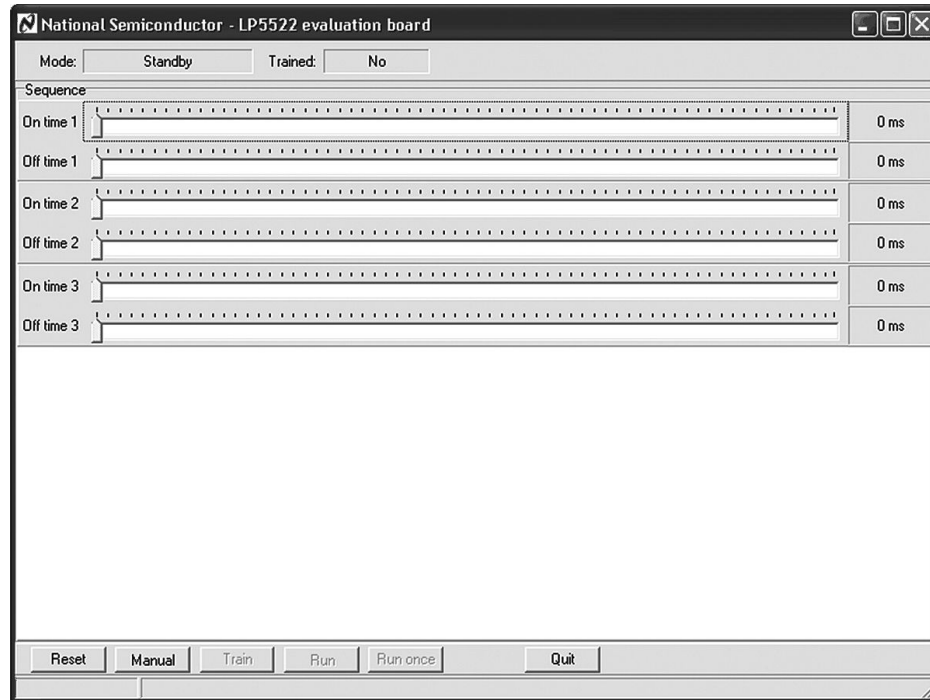

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Figure 2. LP5522 Evaluation Software User Interface

Evaluation Hardware

The evaluation board has the LP5522 circuit with the necessary external components placed around it. Test points for the circuit pins are on the board. USB interface card can supply the VDD voltage. If external power supply is preferred it can be connected to the external power connector (X4).

There is a jumper on board for selecting between power supplies. When there is no external power supply connected the jumper should be connected to VDD_USB. There is also jumper onboard for connecting Iset pin to external current selecting resistor Riset or to VDD. Connecting Iset to VDD sets the LED current to default 5 mA. The onboard current set resistor is 24 kΩ. Connecting Iset pin to Riset results to 20 mA LED current. Jumper J19 disconnects LED from GND. This allows easy LED current measuring.

Two PCB connectors on the bottom side of the board make the connection to the USB interface board
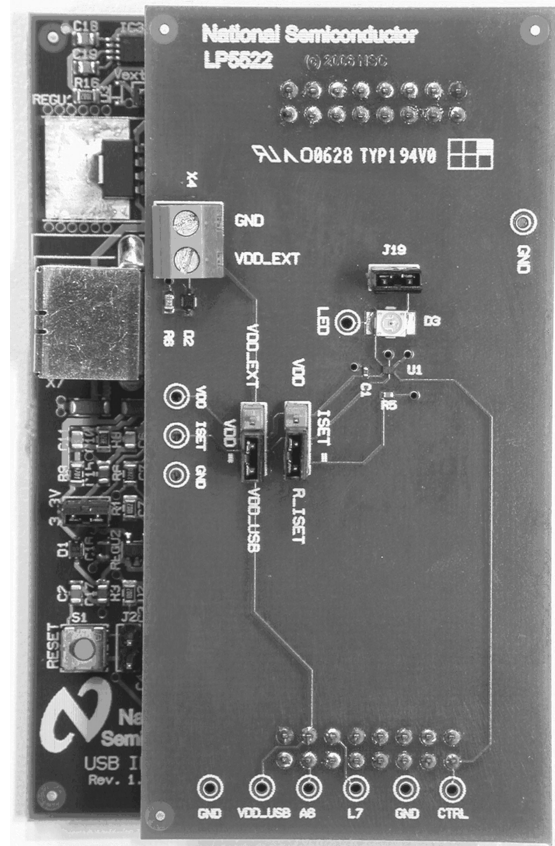
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Figure 3. LP5522 Evaluation Board

USB Interface

The USB interface forms the connection between the PC and the evaluation system. It converts the commands from PC to one wire interface used in LP5522. It also provides the supply voltage for the evaluation board.

Interface board has RESET-button that can be used to reset processor on the interface board if the software or hardware halts for some reason.

THE USB INTERFACE FIRMWARE

The USB interface checks for the firmware version of the USB board when the evaluation software is started. If the firmware needs updating, the software prompts you to allow automatic update.
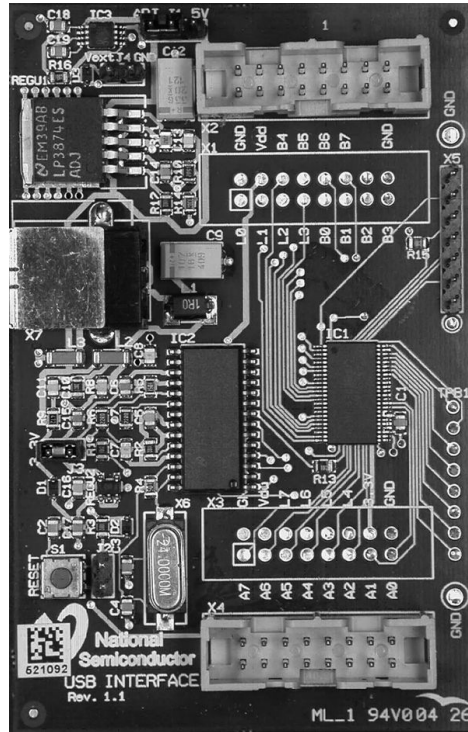
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Figure 6. USB Interface Board

Getting Started

The following instructions show how to use the LP5522 evaluation kit in default conditions with the USB interface board. Please use ESD protection to prevent any unwanted damaging ESD events

1. Check the onboard jumpers. VDD should be connected to VDD_USB and jumper J19 should be on. Removing jumper J19 disconnects LED from GND. ISET can be connected either to VDD or R_ISET.

2. Plug the evaluation board to the USB board. Connect the USB cable to the USB Interface board and to the USB port of your PC. When you plug in the USB board for the first time, your operating system prompts you about "New hardware found" and installs the USB driver. With Win95 and Win98 operating systems you have to accept the installation and click "Next" several times as the installation proceeds.

3. Copy the evaluation software and the support files to your PC's hard disk. Start the software by double-clicking its icon. If USB Interface Boards firmware update is required the software prompts you to allow automatic update.

4. Turn on the LED by bushing the manual button. If system is correctly installed the onboard LED should be light.

5. The Evaluation Kit is now ready to use and the chip can be controlled through the PC software.

You should disconnect the USB cable from the computer always when plugging in or removing the evaluation board from the interface board and also when changing the supply jumper settings. Otherwise the USB board may stop responding.

If the USB board is not responding or the software hangs up, press the reset button on the USB board, or disconnect the USB cable for 5 seconds.

If the evaluation software notices that the firmware on the USB board needs to be updated, the software can propose automatic firmware updating. The new firmware will be included in the evaluation kit software.

PROGRAMMING A SEQUENCE TO THE CHIP

To program a blinking sequence to the chip one to three on- and off sequences must be selected with the slide bars. On time can vary between 1 ms to 255 ms with 1 ms steps and off time can vary between 10 ms to 2550 ms with 10 ms step. Sequences must be selected in numerical order e.g. you must first select on- and off time 1 (sequence 1) in order to be able to use on- and off time 2 (sequence 2). Also both on- and off times must be selected for each used sequences. The preview window shows the currently selected sequences. To program this sequence to the chip push the Train button. During the programming the LED will blink as selected. After programming the Trained window should indicate Yes and the Run and Run once buttons should be available. Also Manual button should be unavailable. Figure 5 shows the evaluation software with two sequences programmed to the chip.

To run the trained sequence push the Run or Run once button. Pushing the Run once button runs the programmed sequence once and then puts the chip back to standby mode. Pushing Run button puts the chip to continuous run mode. To put the chip back to standby mode push the Run button again. To reset the chip and to remove the trained sequence from chip push Reset button. After reset the chip is on its initial state and the LED follows the Manual button.
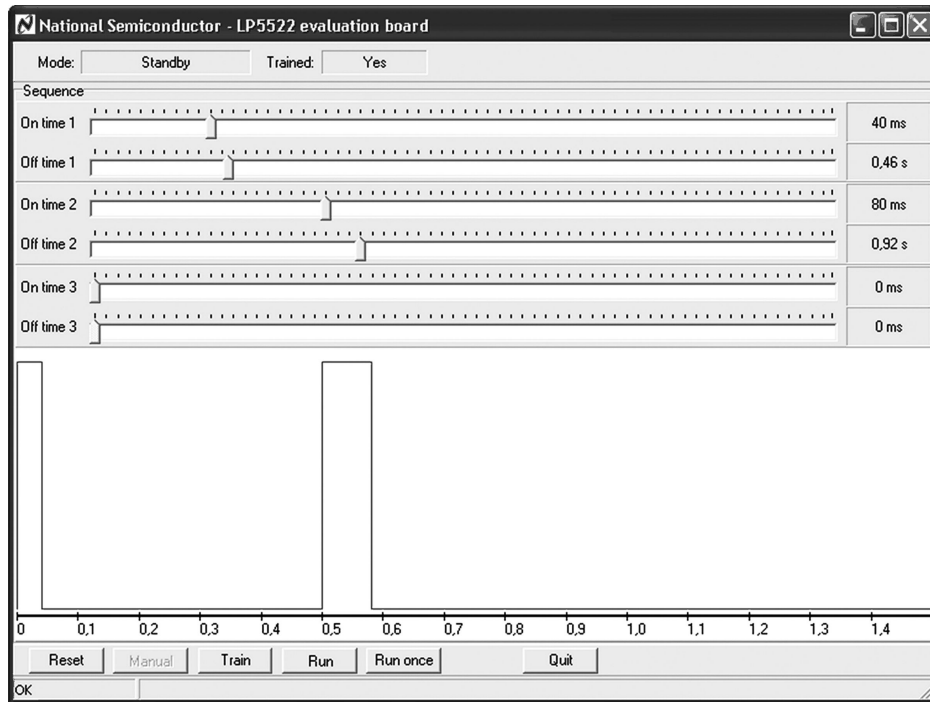
Figure 7. LP5522 Evaluation Software With Two Blinking Sequences Programmed To The Chip

Board Layout

The evaluation board layers are:
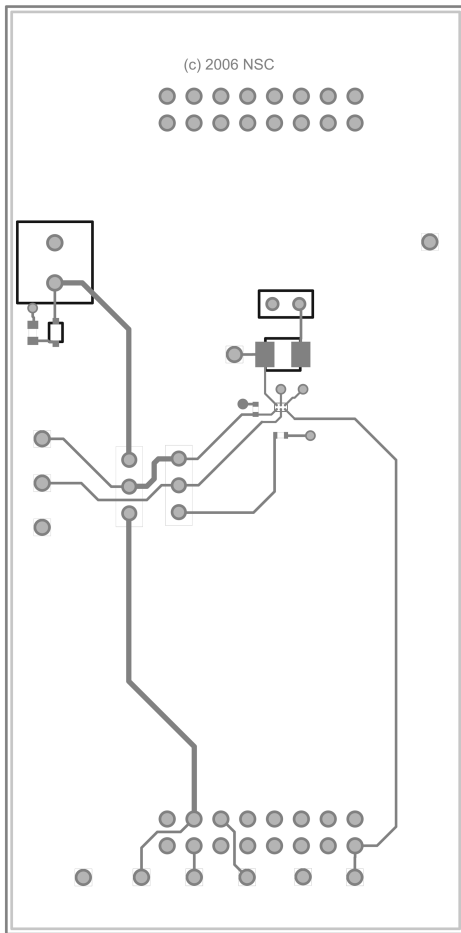
1. Top, component side, signal
2. Bottom, GND plane

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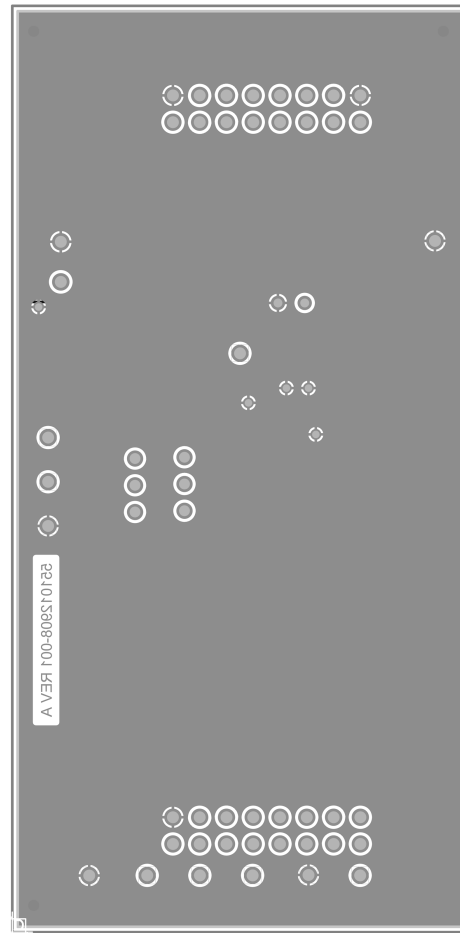**Figure 8. LP5522 Evaluation Board Layer 1 (Top, Signal).**

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Figure 9. LP5522 Evaluation Board Layer 2 (Bottom, GND).
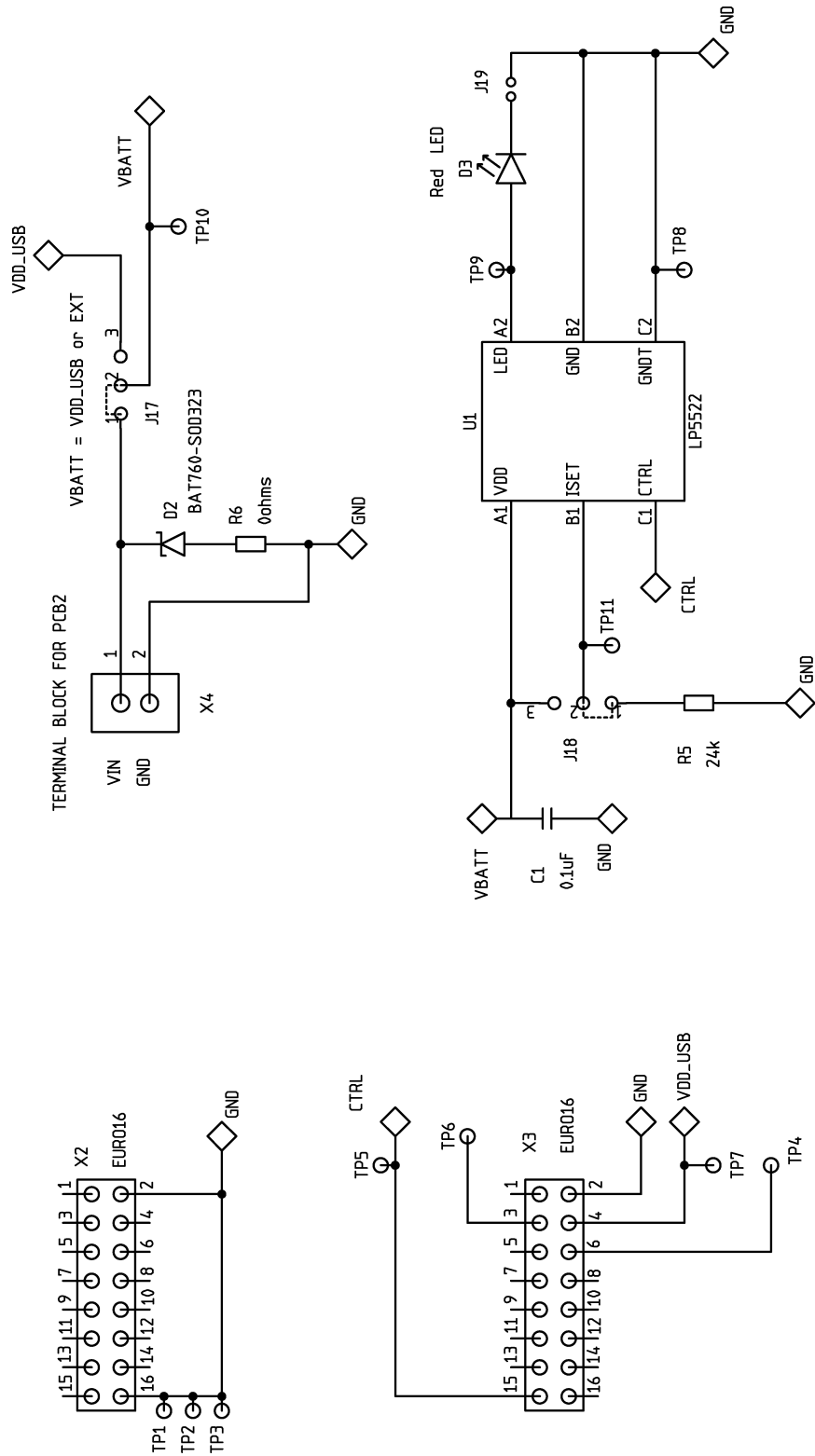
Figure 10. LP5522 Evaluation Board Schematic

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List of Components

Reference	Model	Type	Vendor	Size
C1	100 nF 10V	Ceramic X5R	TDK	0402 (1005)
R5	24kΩ 1%	-	-	0402 (1005)
D3	LS T676	LED Red	Osram	3.0 mm x 3.4 mm x 2.1 mm
U1	LP5522	-	NSC	1.215 mm x 0.815 mm x 0.6 mm

Notes