# LP5524 Evaluation Kit

National Semiconductor AN-1702 Anssi Raisanen March 17, 2008



\_P5524 Evaluation Kit

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## LP5524 Overview

The LP5524 is a highly integrated dual-zone LED driver that can drive up to four LEDs in parallel with a total output current of 100 mA. Regulated high side internal current sources deliver excellent current and brightness matching in all LEDs. Extremely low minimum headroom voltage allows the use of operating voltages that are colse to LED forvard voltages.

LED driver current sources are split into two independently controlled banks for driving secondary displays, keypads and indicator LEDs. Brightness control is achieved by applying PWM signals to each enable pin. Default LED current is 5mA and an optional external resistor can be used to set initial brightness to user required values. LP5524 is available in National's tiny 9-bump Micro SMD package.

## **Evaluation Kit Overview**

LP5524 Evaluation Kit enables designers an easy way to evaluate the performance of the device. The evaluation board has jumpers for each enable pin for easy on / off type control. These inputs can also be fed with external PWM source. Jumpers on LED outputs allow easy LED current measuring. ISET pin has a jumper for selecting between two LED current levels

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

- LP5524 evaluation board
- LP5524 datasheet
- Evaluation kit document (this doc.)



### Jumper Description

This describes the jumpers and the connectors on the LP5524

Evaluation Board.



Figure 2. LP5524 Evaluation Board Top View

#### VIN – J1

This connector is the positive input for power supply. Evaluation board can operate with supply voltages from 2.7V to 5.5V. The input leads from power supply should be twisted and kept as short as possible. There is an input capacitor (C1) on board to smooth the input voltage.

#### GND – J4

This is the negative input for power supply.

#### J2

This jumper disconnects all LED cathodes from the GND. This can be used to separate the LED currents from the circuit current.

#### D1B – J6

This jumper can be used to disconnect the D1B output from the LED anode. This can be used to measure the D1B current.

#### D2B - J3

This jumper can be used to disconnect the D2B output from the LED anode. This can be used to measure the D2B current.

#### D2A – J7

This jumper can be used to disconnect the D2A output from the LED anode. This can be used to measure the D2A current. D1A - J5

This jumper can be used to disconnect the D1A output from the LED anode. This can be used to measure the D1A current.

#### D2A – J7

This jumper can be used to disconnect the D2A output from the LED anode. This can be used to measure the D2A current.

#### ENB – J8

This is the ENB input. A three pin connector is applied to allow ENB to be connected either to VIN or to GND. The center pin is connected directly to ENB pin. This pin can be used to connect external PWM signal. Smaller than 300 Hz PWM frequency is recommended.

#### ISET - J10

ISET pin jumper. This can be used to connect the ISET pin either to VIN or to onboard RISET resistor. Connecting ISET to VIN sets the LED current to default 5mA and connecting it to RISET sets the current to 15.6mA. Center pin is connected directly to ISET pin and it can be used to connect external current set resistors.

#### ENA – J9

This is the ENA input. A three pin connector is applied to allow ENA to be connected either to VIN or to GND. The center pin is connected directly to ENA pin. This pin can be used to connect external PWM signal. Smaller than 300 Hz PWM frequency is recommended.



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## **Getting Started**

The formula in the set of the set

- Check the onboard jumpers. Jumpers on the LED outputs (J3, J5-J7) and the jumper from LED cathodes to gnd (J2) should be on. Remove jumpers from enables (J8 and J9). ISET can be connected either to VDD or RISET.
- 2. Connect evaluation board to a power supply. Check that operation voltage is between 2.7V to 5.5V.
- 3. Set the enable jumpers to ON position. ENA jumper enables drivers D1A and D2A and ENB jumper enables drivers D1B and D2B.
- 4. The Evaluation Kit is now ready to use.

#### **Current Measurements**

To measure the current of a single LED driver remove the jumper from that driver's output and connect current meter to jumper's pins. To measure the current of all LEDs remove the J2 jumper and connect current meter to J2 pins. To measure the current consumption of the device separate the LED ground current from the board's ground current by removing the J2 jumper and conecting the LED ground to power supply ground with separated wire. Then connect the current meter to evaluation board's ground wire. Figure 3 illustrates how to measure different currents.

#### **PWM Dimming**

To dim the LEDs feed a proper PWM signal to ENx pin. Less than 300 Hz PWM frequency is recommended. Ensure that PWM signals high and low levels are adequate.





#### **Board Layout** 查询LP5524供应商

A four layer board was used to enable the use of micro-VIAs. Micro VIA is required for routing the center pad of the LP5524. The evaluation board layers are:

- 1. Top, component side, signal
- 2. Layer 2, Vin plane (signal)
- 3. Layer 3, GND plane
- 4. Bottom, GND plane



Figure 4. LP5524 Evaluation Board Layer 1 (Top).



Figure 5. LP5524 Evaluation Board Layer 2.

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Ceramic X5R	TDK	0402 (1005)
	m/6-12-1	0402 (1005)
LED Red	Osram	3.0 mm x 3.4 mm x 2.1 mm
150.00	NSC	1.215 mm x 1.215 mm x 0.6 mm
	LED Red	LED Red Osram

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## Notes

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