

- Cost Effective LED driver
- Constant current output ideal for Driving LED strings
- Four Channel LED Driver provides matched LED current
- Current adjusted via an external resistor
- PWM dimming possible by using either the ENABLE or the I<sub>SET</sub> pin
- Small 2mm x 3mm DFN power package
- Outputs can be connected in parallel to increase drive
- Constant current for wide cathode voltage range (0.5V to 16V)
- Highly integrated design, minimal components
- Thermal shutdown protects the driver

## DESCRIPTION AND BOARD SCHEMATIC

The **SP7615 Evaluation Board** is designed to help the user evaluate the performance of the SP7615 for use as a single Luxeon 1W LED Driver or 4 LED Driver with matched currents. The evaluation board is a completely assembled and tested surface mount board which provides easy probe access points to all SP7615 inputs and outputs so that the user can quickly connect and measure electrical characteristics and waveforms. Two versions of the Evaluation Board schematic diagram are shown at Figure 1 and Figure 2.

The SP7615 is a linear constant current driver designed to drive multiple LEDs in series from a high input voltage rail or single high current LED. The driver acts as a high current matched four channel current source ensuring constant LED current for a range of input voltage. The SP7615 allows implementing the lowest cost LED driver for a variety of applications. Internal circuitry maintains the pre-set constant current output for a wide voltage range at the LED outputs (LED1, 2, 3, 4). LED current can be adjusted up to 125mA per string with an external resistor R1. The dimming can be achieved by controlling the I<sub>SET</sub> input or by feeding a PWM signal to the EN pin. Fast EN turn-on and turn-off time allows for very fast PWM dimming frequencies completely eliminating flickering. The built-in thermal protection automatically adjusts LED current to prevent overheating.

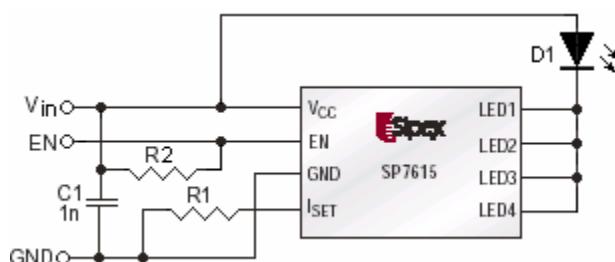
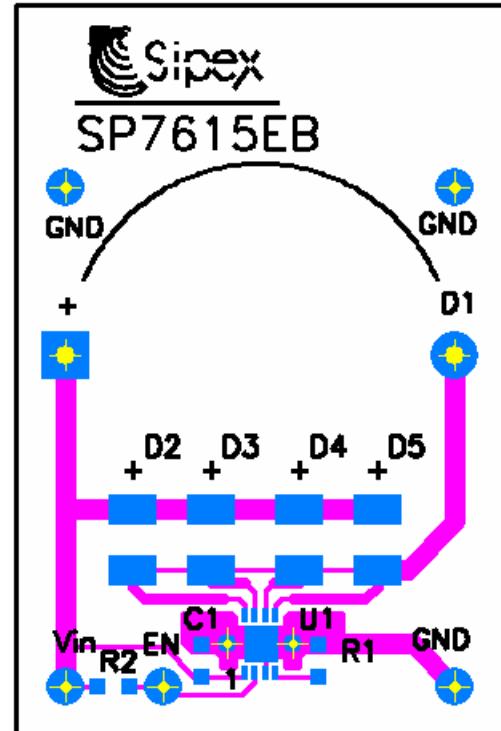


Figure 1. SP7615 Evaluation board with a single Luxeon 1W LED

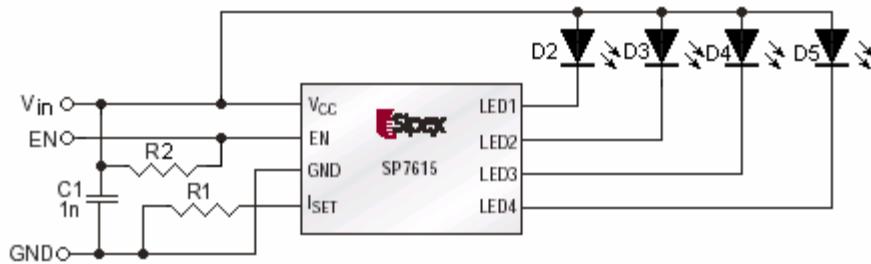


Figure 2. SP7615 Evaluation board with four LED with matched currents

Capacitor C1 is a decoupling capacitor. Resistor R2 is used to turn device on at power on. The SP7615 has internal pull down resistor at EN input and will be in the Sleep Mode if EN pin isn't connected to Vin voltage. If EN pin isn't used for modulation, it may be connected to Vin voltage directly.

## USING THE EVALUATION BOARD

### 1) Powering Up the SP7615 Circuit

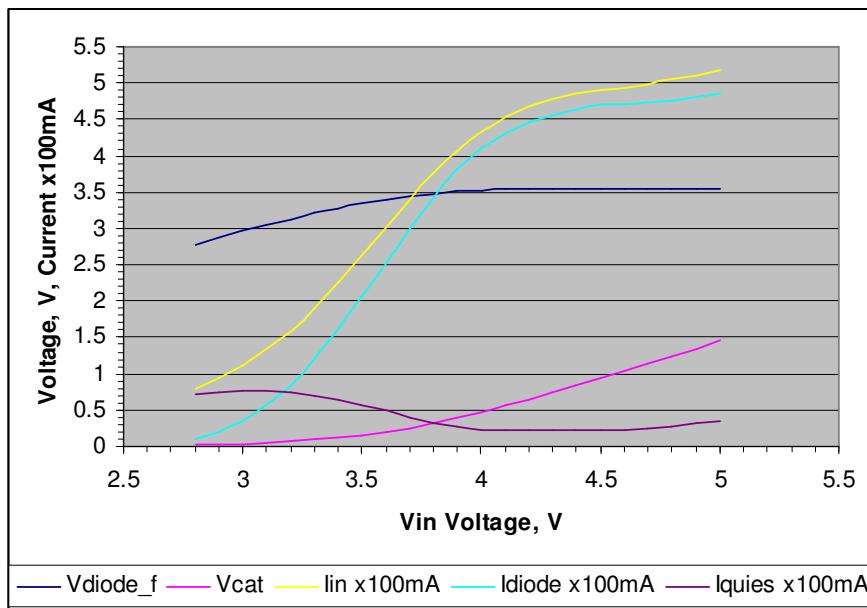
The SP7615 Evaluation Board can be powered from a 4.5V power supply or from 3 alkaline cells. Connect 4.5V source pin with short lead directly to the "Vin" and -4.5V /GND pin to the "GND" posts.

### 2) Selecting the Bias Resistor

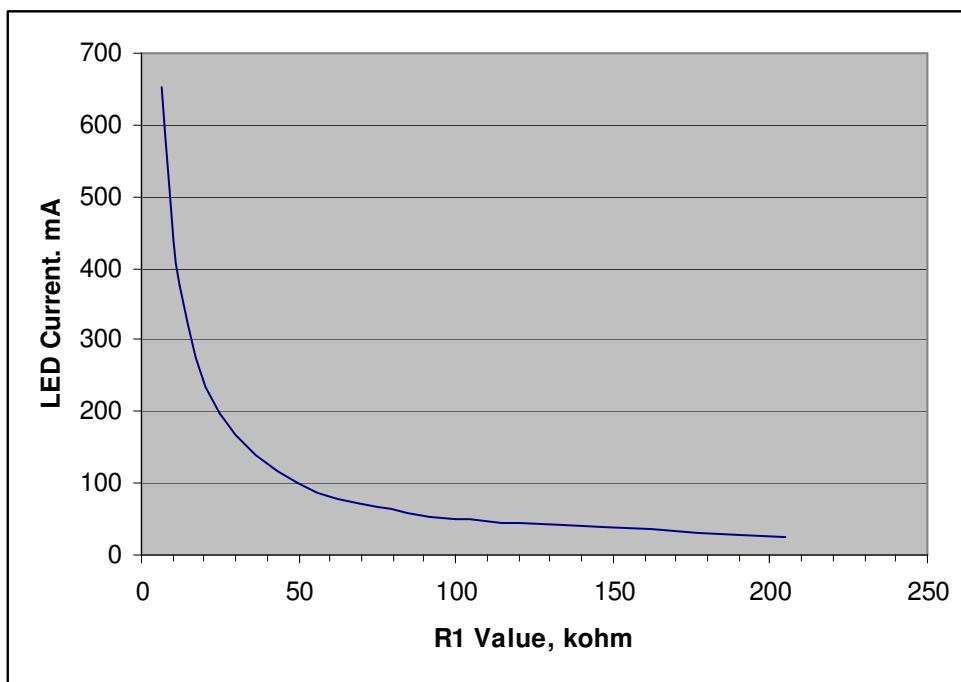
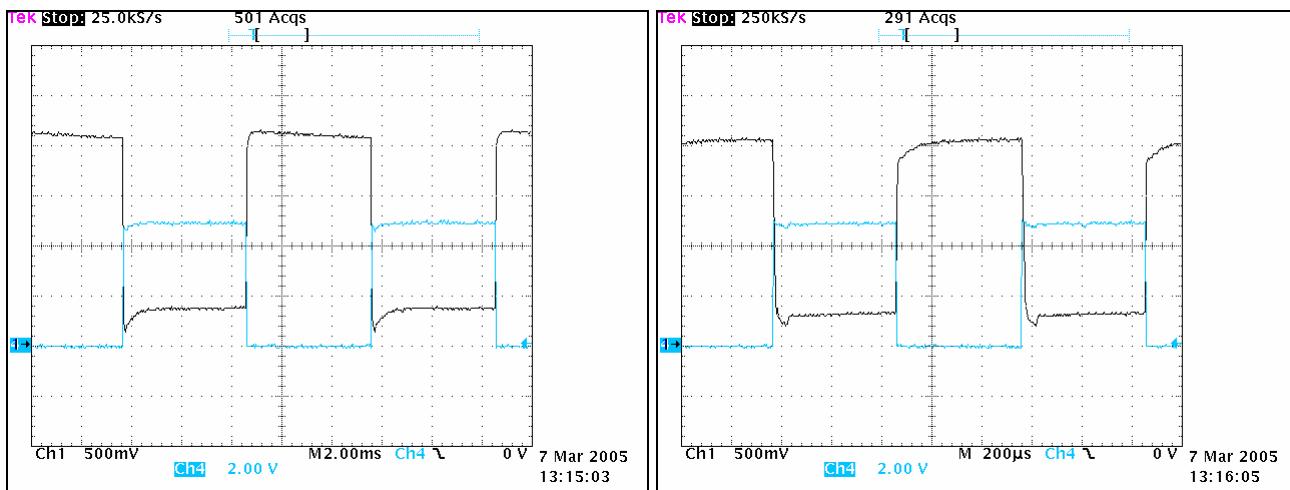
LED current can be adjusted up to 125mA per string with an external resistor R1. The R1 value may be determined as  $R1 = 1.26 * 1000/I_{OUT}$ , kohm, where 1.26 is a typical  $I_{SET}$  pin voltage, 1000 is a typical current multiplication ratio, and  $I_{OUT}$  is a required one string current in mA.

### 3) Dimming

The device has an enable function that is designed for TTL level inputs. This input will also track the **VCC** pin so levels up to **VCC** are acceptable. The enable pin can also be used to control the LED brightness with a pulse width modulated control signal. Duty Cycle or PWM control of the LED current maintains constant LED color while brightness is changing. The SP7615 responds in less than 10 $\mu$ s to PWM signals applied to this pin. To change LED brightness apply 70Hz – 1kHz PWM rectangle pulse TTL level to EN post in respect to GND. Logic one turns the device on and logic zero turns it off.



Graph 1. LED Forward Voltage (Vdiode\_f), LED cathode voltage (Vcat), Evaluation Board Input Current (lin), sum of LED Currents (Idiode), and Quiescent Current (Iquies) vs. Input Voltage at R1 = 10k



Graph 3. LED Current vs. resistor R1 value at Vin = 4.5V

**Table 1. LED Current vs. resistor R1 value at Vin = 4.5V**

R1, kohm	6.34	11.8	24.9	49.9	75	100	205
$\Sigma$ LED Current. mA	651.2	377.8	198.2	100.9	65.63	49.01	23.8

## EVALUATION BOARD LAYOUT

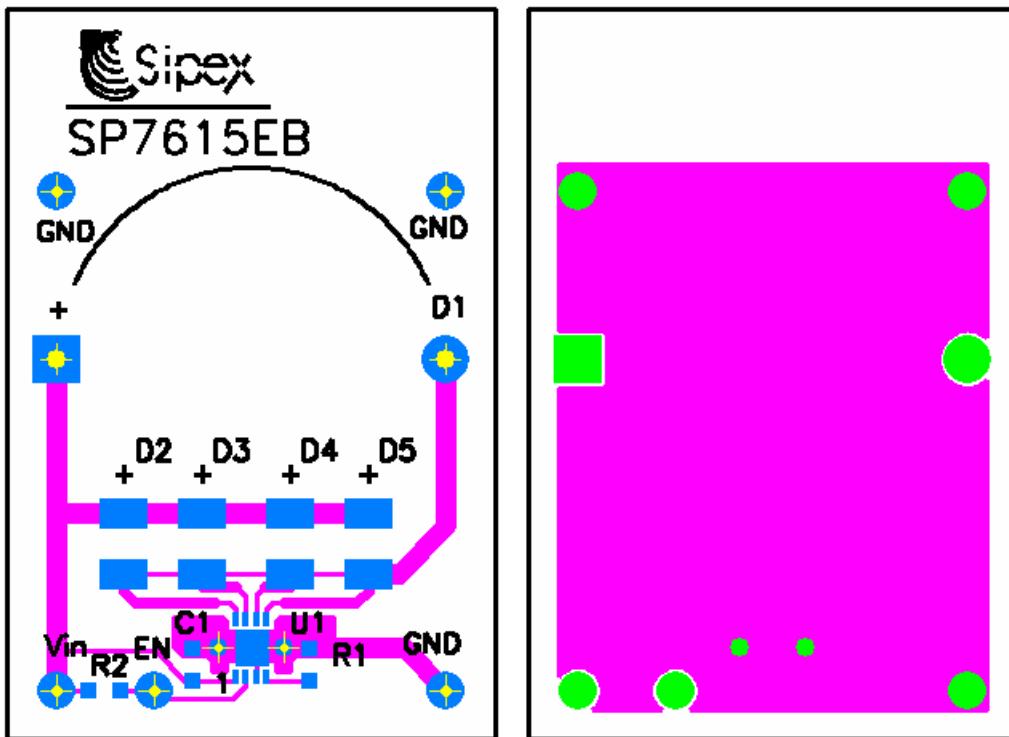


Figure 3. SP7615 Evaluation Board Layout top and bottom side

**Table2. SP7615EB List of Materials**

Reference	Quantity	Value	Type	Manufacturer
C1	1	1nF 10%	06033D102KAT2	AVX
D1*	1		LXHLMW1D	Luxeon
D2, D3, D4, D5*	4		SML-LX2832UWC-TR	Vishay
R1	1	10k 1%	M11251031%P5	Vishay
R2	1	10k 1%	M11251031%P5	Vishay
U1	1		SP7615ER	Sipex

\* Board may contain only D1 or D2 – D5 depend on modification

## ORDERING INFORMATION

Model	Temperature Range	Package Type
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SP7615EB..... -40°C to +85°C..... SP7615 Evaluation Board Configurable for 1 or 4 LED

SP7615ER/TR..... -40°C to +85°C..... 8-pin DFN (2 x 3 mm)

/TR = Tape and Reel

Pack quantity is 3000 for DFN.

Available in lead free packaging. To order add "-L" suffix to part number.

Example: SP7615ER/TR = standard; SP7615ER-L/TR = lead free

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