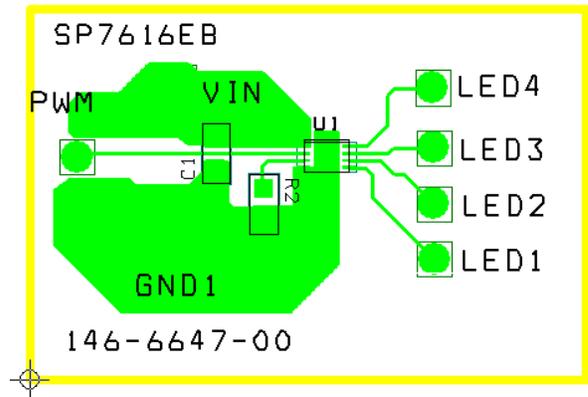# SP7616
Evaluation Board Manual

- LED Drivers for parallel connected LED
- Ultra Low Dropout Voltage of 150mV
- No EMI, no switching noise
- Integrated current matching
- PWM and Analog brightness control
- Enable/Shutdown control
- Shutdown current < 1µA

SP7616 Eval Board Top Side (not to scale)

DESCRIPTION AND BOARD SCHEMATIC

This Evaluation Board is designed to help the user evaluate performance of the SP7616 for use as a LED Driver. The evaluation board is a completely assembled and tested surface mount board which provides easy probe access points to all inputs and outputs so that the user can quickly connect and measure electrical characteristics and waveforms. The Evaluation Board schematic diagram is shown in Figure 1. The SP7616 driver provides a simple solution for a matched current source for any color LED. The current in the LEDs is programmed by an external resistor. The SP7616 is capable of driving up to four LED chains from a source of up to 30Vin.

The evaluation board contains one SP7616 driver, and four locations to solder the led chains for ease of use. The user will need to supply an active high PWM signal or an external power supply with at least 2.5V volts to turn the Sp7616 driver on. (Note R2 on the PCB is referred to as Rset in the data sheet.)
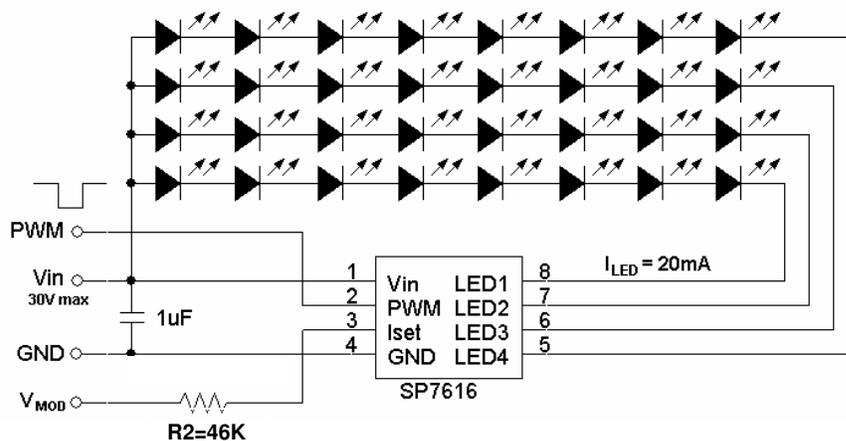

Figure 1. Evaluation Board Schematic Diagram for SP7616

1) Vin requirements and PWM pin

The user of the SP7616 will need to supply Vin and an PWM signal that is active high. The PWM pin signal is a logic level signal and should range between 0 an 5V. The threshold is 2.4V for a logic high.

2) Setting the LED current

The LED current is set through the Iset resistor. The SP7616 provides an internal reference voltage that is set to 1V at the I_{SET}Pin (Pin3). R_{SET} is then determined by using equation 1.

$$R2 = V_{ISET}*I_{MULT}/I_{LED} \text{ (k}\Omega\text{)}, \qquad (1)$$

Where

V_{ISET} is the internal reference (1V)

I_{MULT} Current Multiplication Ratio

I_{LED} is the desired Led current.

In example 1: For a 20mA LED current, the current set resistor should be
R2=1V*920/20mA (kΩ),

R2=46K

3) LED dimming

PWM dimming

The LED dimming control is done through the PWM pin. The acceptable frequency range of this signal is 100Hz to 5 kHz. The acceptable duty cycle range of the signal is 10% to 90% at 1KHZ. When the PWM pin is driven low, only the LED current sources are disabled while the rest of the chip is still enabled. .

Analog dimming control

Besides digital PWM control, the LED current can be controlled continuously (from high to low LED current) by raising the voltage at the bottom of R_{SET} from 0V to 1V maximum. R_{SET} value may be determined from equation 1. Equation 2 shows the effect of using a V_{MOD} in the circuit on the Led current

$$I_{LED} = (1V - V_{MOD})*I_{MULT}/R_{SET} \text{ mA} \qquad (2)$$

Where

1V   typical I_{SET} pin voltage

I_{MULT} Current Multiplication Ratio

I_{LED} is the desired Led current.

V_{MOD} is the adjustment voltage

V_{MOD} is an adjustment voltage applied to the bottom side of R2, 920 is a typical current multiplication ratio I_{MULT}, and I_{LED} is a required LED current in mA/channel. Figure 2 shows the location of the external V_{MOD} source.
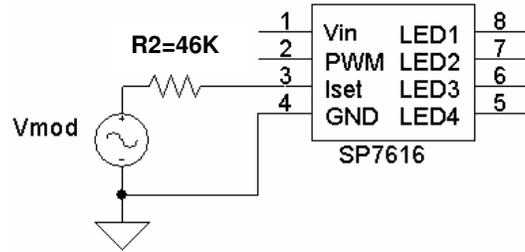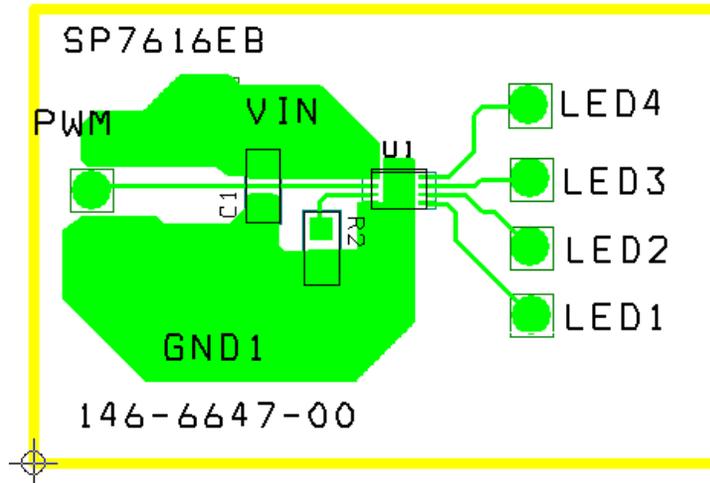
Figure 2

4) EVALUATION BOARD LAYOUT

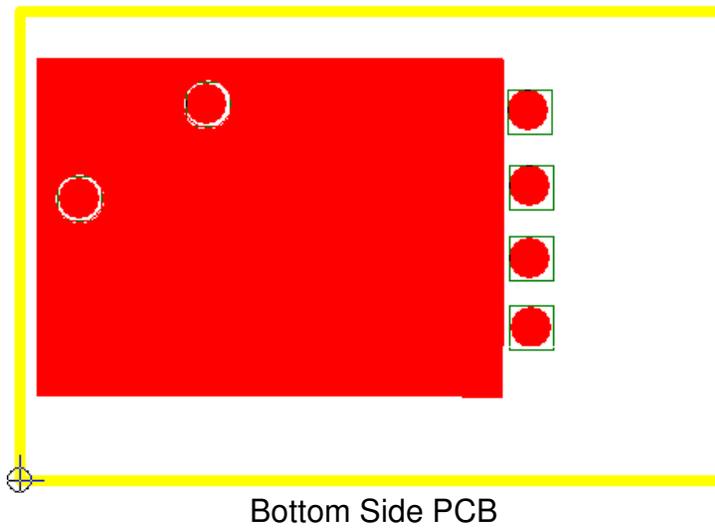Figure 4. SP7616 Evaluation Board Layout top side (not an actual size)

Bottom Side PCB

Figure 5. SP7616 Evaluation Board Layout bottom side (not an actual size)

Table 2. SP761X_EB List of Materials

Count	Reference Designator	Value	Part Number	Manufacturer	Comments
1	U1		SP7616	SP7616	
1	C1	1uF	GRM21BR71H105KA12L	Murata	1uF 50V capacitor 805 size
1	R2 (RSET)	46K	CRCW06034602J	Vishay	
3	GND VIN PWM		K24C/M	Vector Electronic	Post for Vin PWM signal and GND

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ORDERING INFORMATION

Model   **Temperature Range**   **Package Type**

SP7616_EB........................ -40°C to +85°C.. SP7616 Evaluation Board