UM1360
Evaluation Board
User's Guide

Version	Date	Provider	Approve	Note
1.0	2012-11-02	LB		Initial version.

Table of Contents

1 Board Information

The UM1360 is a continuous mode inductive step-down converter, designed for driving single or multiple series connected LEDs efficiently from a voltage source higher than the LED voltage. UM1360 EVB is an evaluation test platform. The board can demonstrate the main function of the chip, allowing users to fully experience the advantages of using the chip. The board also can be used for testing the chip performance by modifying some peripheral component parameters. The user can verify the circuit characteristics and parameters with the board to ensure the practical application of user interests.

1.1 Schematic

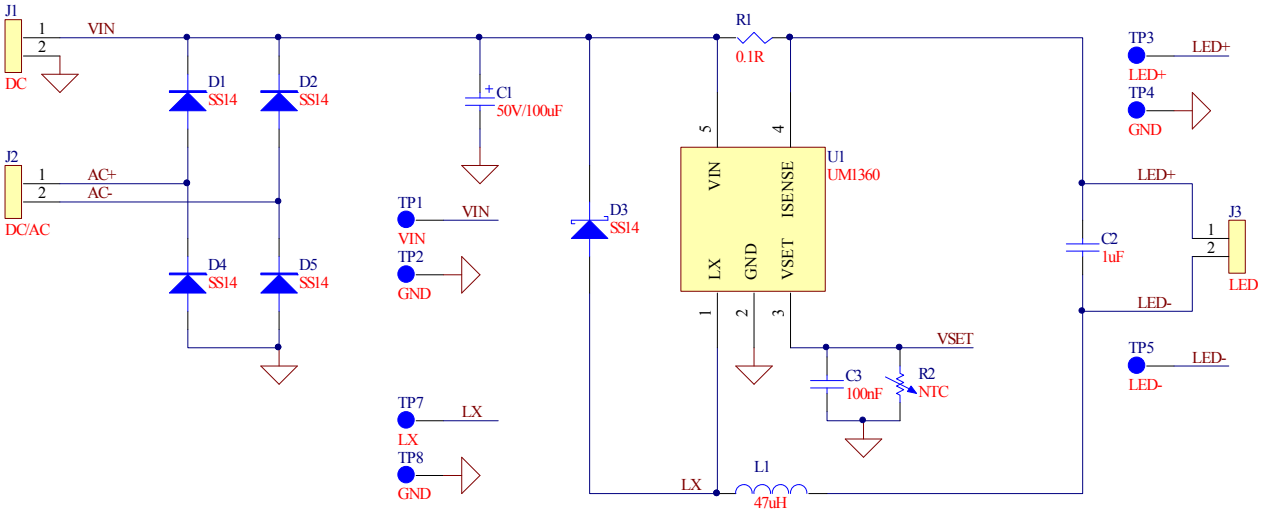

Fig 1.1 UM1360 EVB schematic

1.2 PCB Layout

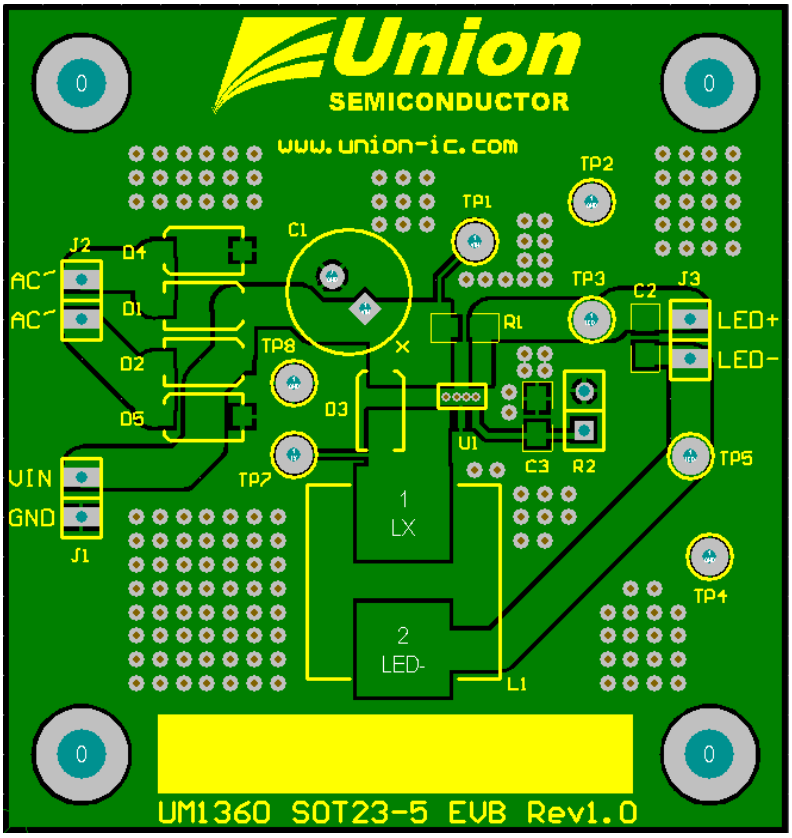

Fig 1.2 UM1360 EVB PCB Top Layer

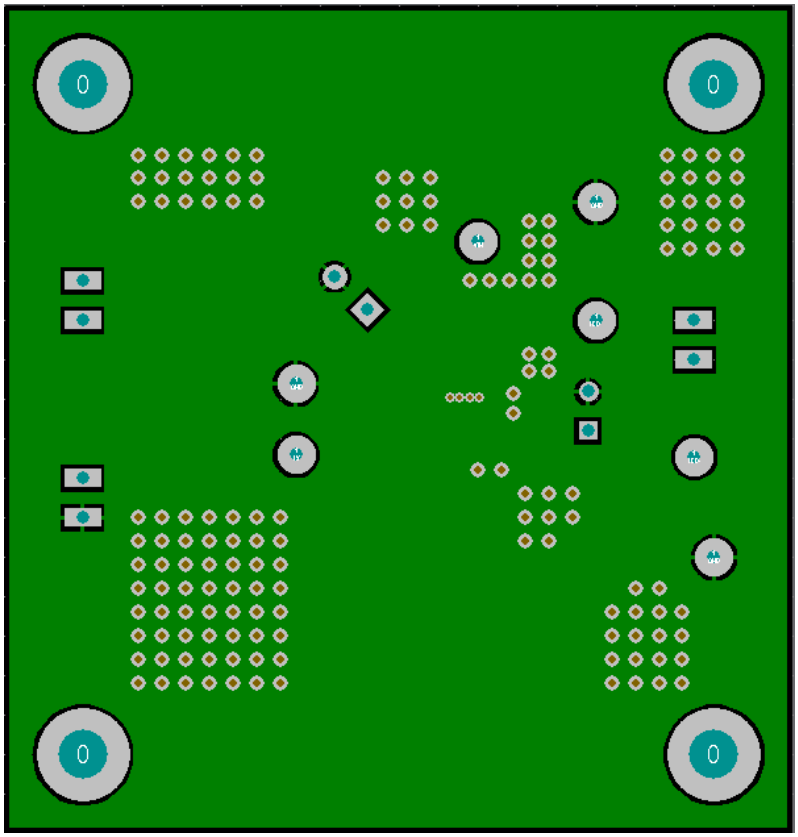

Fig 1.3 UM1360 EVB PCB Bottom Layer

1.3 Jumper and Test Point Definition

Jumper	Description	Note
J1	DC Power supply input	6V to 40V power supply
J2	AC Power supply input	
J3	LED drive output.	Connect to single or multiple series LEDs
Test Point	**Description**	**Note**
TP1	VIN pin test point	Test points
TP3	LED+ test point	
TP5	LED- test point	
TP7	LX pin test point	
TP2,TP4,TP8	GND points	

Tab 1.1 UM1360 EVB Jumper and Test Point Definition

2 Board Operation

When using UM1360 EVB, you need to properly connect an external power supply and external LED load. Fig 2.1 shows typical switching and LED current operation waveforms

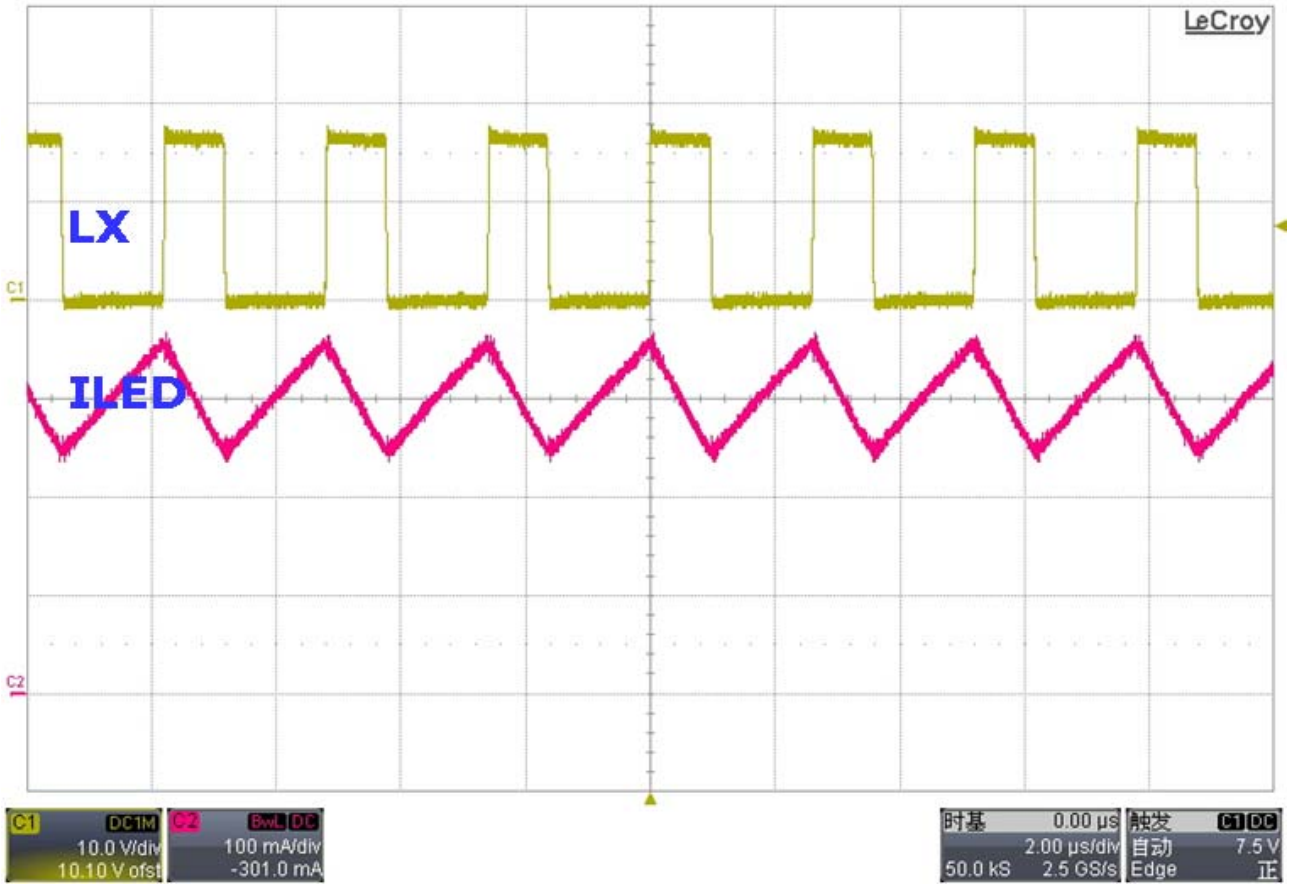

Fig 2.1 Typical Switching Operation Waveforms (3 LEDs,100uH,Vin=16V,Rs=0.33Ω)

2.1 Power and Load Connection

Connect DC power supply to J1 or AC power supply to J2. The power supply voltage range: 6.0V - 40.0V.

When using power supply, you need to confirm current limit setting have enough allowance. Input power cable should be thicker to reduce the loss of input voltage when the load current is larger.

Connect external LEDs across pins 'LED+' and 'LED-'. 'LED+' is the LEDs' anode connection point and 'LED-' is the LEDs' cathode connection point. The number of

external LEDs that can be connected depends on their operating power and forward voltage drop. For an external load other than LEDs, the positive terminal of the load should be connected to test pin 'LED+' and the negative terminal of the load should be connected to test pin 'LED-'.

2.2 LED Current Setting

For changing the LED current, you need to follow these steps:

1. Remove R1.

2. Calculate and fit a new sense resistor, R1, the value of which is based on the required LED current without dimming. R1 can be calculated using following equation :

$R1 = 0.1V/I_{OUT}$

where

I_{OUT} = the LED current.

R1 = the sense resistor value in ohms.

0.1V is the nominal sense voltage with 'VSET' open circuit or set to 2.5V.

2.3 Shutdown and Dimming

The VSET pin is a Multi-function On/Off and brightness control pin:

Leave the VSET pin floating for normal operation.

Driving the VSET pin below 0.2V will shutdown the output current and the supply current will fall to a low standby level of 20μA nominal. So shorting R2 will make the chip into shutdown mode.

For DC dimming, the VSET pin may be driven between 0.3V and 2.5V.

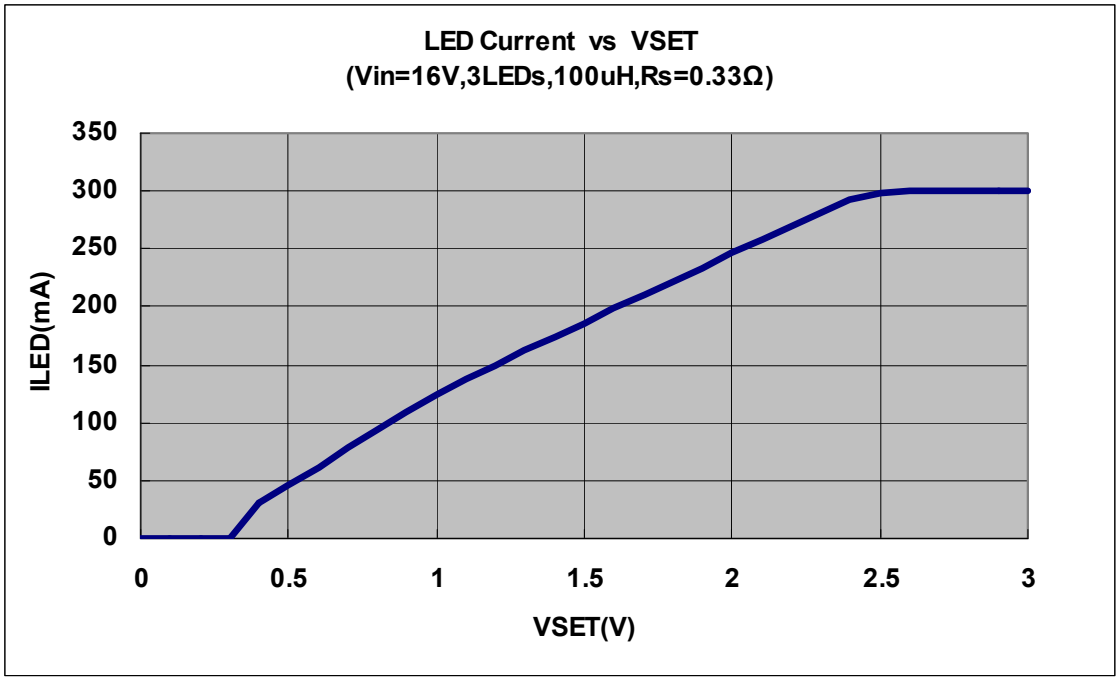

Fig 2.2 DC Dimming

For PWM dimming, an external open-collector NPN transistor or open-drain N-channel MOSFET can be used to drive the VSET pin. The PWM frequency should be low, around 100Hz to 500 Hz.

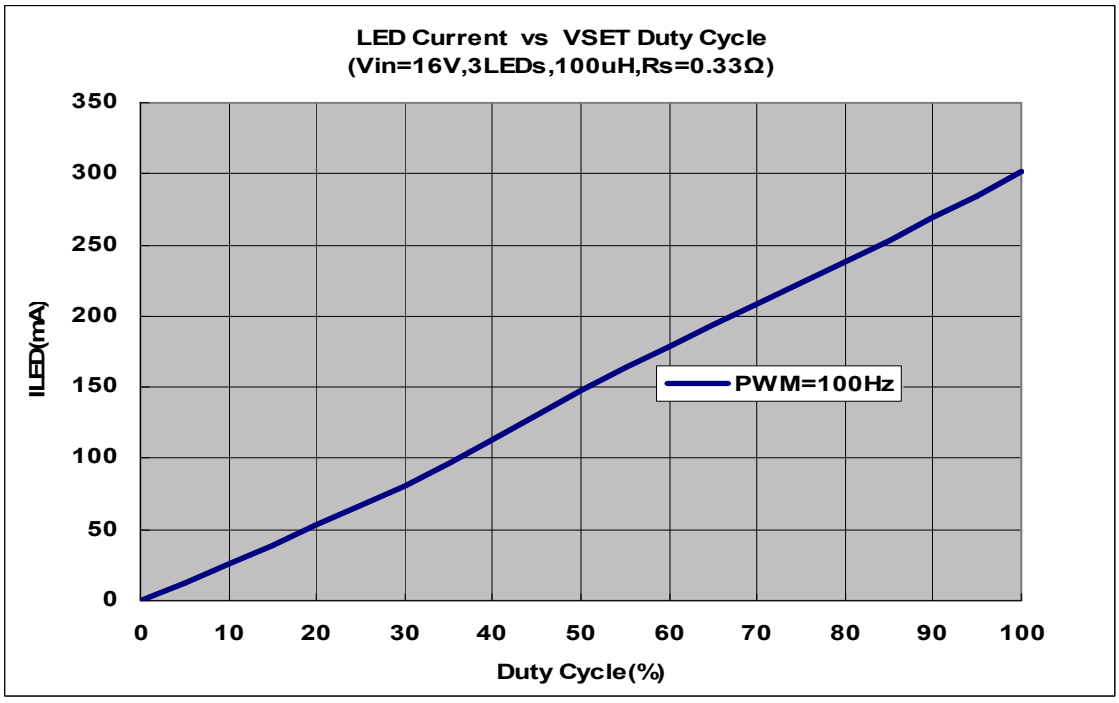

Fig 2.3 PWM Dimming

3 Board Component

Component	Description	Recommended Part No.
U1	LED Driver Chip	UM1360
R1	Resistor, 0R1, 1%, 0805	
L1	Inductor,47uH, 2A, CDRH	
C1	Capacitor, Electrolytic,100uF/50V	
C2	Capacitor, Ceramic, 1uF/50V, 0805	
C3	Capacitor, Ceramic, 0.1uF/50V, 0805	
D1, D2, D3, D4, D5	Schottky diodes,SMT	SS14

Tab 3.1 UM1360 EVB BOM List

3.1 Sense Resistor

In order to ensure accuracy of LED current setting, recommend using 1% precision of sense resistor.

3.2 Inductor

The system efficiency depends on the sense resistor, supply voltage, switching inductor and the number of LEDs.

Following table gives the guideline on inductor selection:

Load Current	Inductor	Saturation Current
Iout>1A	27-47uH	1.3-1.5 times of load current
0.8A<Iout≤1A	33-82uH	
0.4A<Iout≤0.8A	47-100uH	
Iout≤0.4A	68-220uH	

Tab 3.2 Recommended Inductor Value List

4 Temperature Compensation

High luminance LEDs often need to be supplied with a temperature compensated current in order to maintain stable and reliable operation at all drive levels. The LEDs are usually mounted remotely from the device. So, for this reason, the temperature coefficients of the internal circuits for the UM1360 have been optimized to minimize the change in output current when no compensation is employed. If output current compensation is required, it is possible to use an external temperature sensing network - normally using Negative Temperature Coefficient (NTC) thermistors and/or diodes, mounted very close to the LED(s). The output of the sensing network can be used to drive the VSET pin in order to reduce output current with increasing temperature.