DESCRIPTION

The IS31LT3360 is a continuous mode inductive step-down converter, designed for driving a single LED or multiple series connected LEDs efficiently from a voltage source higher than the LED voltage. The chip operates from an input supply between 6V and 40V and provides an externally adjustable output current of up to 1.2A.

The IS31LT3360 includes an integrated output switch and a high-side output current sensing circuit, which uses an external resistor to set the nominal average output current.

Output current can be adjusted linearly by applying an external control signal to the ADJ pin. The ADJ pin will accept either a DC voltage or a PWM waveform. This will provide either a continuous or a gated output current.

Applying a voltage of 0.2V or lower to the ADJ pin turns the output off and switches the chip into a low current standby state.

The chip is assembled in SOT89-5 package.

IS31LT3360 3CH DEMO board is used in RGB lamp or the general LED lamp.

FEATURES

- Simple low parts count
- Internal 40V power switch
- Wide input voltage range: 6V to 40V
- Up to 1.2A output current
- High efficiency (up to 98%)
- Typical 1200:1 dimming rate
- Typical 3% output current accuracy
- Single pin on/off and brightness control using DC voltage or PWM
- Up to 1MHz switching frequency
- Inherent open-circuit LED protection
- Thermal shutdown protection circuitry
- RoHS & Halogen-Free Compliance
- TSCA Compliance

QUICK START

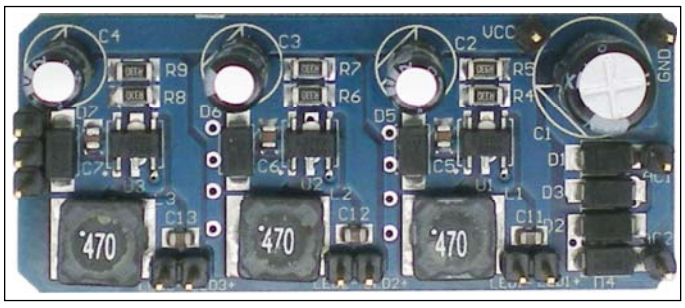

Figure 1 Photo of IS31LT3360-3CH Evaluation Board

RECOMMENDED EQUIPMENT

- 40VDC power supply
- 3 pcs of LED panel (3 WLEDs, 10 LEDs in series on each panel)
- Multi-meter

RECOMMENDED INPUT AND OUTPUT RATINGS

- Input: 6~40VDC
- Output: 1~10 LEDs in series/667mA

Note: The input voltage must be 2V higher than the output voltage (total V_F).

ABSOLUTE MAXIMUM RATINGS

- Input voltage ≤ 40VDC

Caution: Do not exceed the conditions listed above, otherwise the board will be damaged.

PROCEDURE

The IS31LT3360 DEMO Board is fully assembled and tested. Follow the steps listed below to verify board operation.

Caution: Do not turn on the power supply until all connections are completed.

1) Connect the terminals of the power supply to the AC1 and AC2 pin (If the board don't have the rectifier(D1-D4), Connect the positive terminal of the power supply to the VCC of the board and the negative terminal of power supply to the GND of the board) .
2) Connect the negative of the one of LED panel (LED arrays) to the LED1- terminal. And connect the positive of the same LED panel (LED arrays) to the LED1+ terminal.
3) Connect the other two LED panels to LED2 and LED3 as above.
4) Turn on the power supply and the LED panels (LED arrays) will be light.

ORDER INFORMATION

Part No.	Temperature Range	Package
IS31LT3360-SDLS3-EB3CH IS31LT3360-SDLS4-EB3CH	-40°C to +105°C (Industrial) -40°C to +125°C (Industrial)	SOT89-5, Lead-free

For pricing, delivery, and ordering information, please contacts Lumissil's analog marketing team at analog@Lumissil.com or (408) 969-6600.

DETAILED DESCRIPTION

LED Current Control

The nominal average output current in the LED(s) is determined by the value of the external current sense resistor (R_S) connected between V_{IN} and I_{SENSE} and in is given by:

$$I_{OUT_NOM} = 0.1/Rs \text{ [for } Rs>0.082\Omega\text{]}$$

The table below gives values of nominal average output current for several preferred values of current setting resistor (Rs) in the typical application circuit shown on Page 1:

R_S (Ω)	Nominal Average Output Current (mA)
0.082	1200
0.1	1000
0.15	667
0.3	333

V_{SENSE} is divided into two ranges to improve current accuracy, please refer to bin information on Page 3.

The above values assume that the ADJ pin is floating and at a nominal voltage of V_{REF} =1.2V.

Note that R_S=0.082Ω is the minimum allowed value of sense resistor under these conditions to maintain switch current below the specified maximum value.

It is possible to use different values of R_S if the ADJ pin is driven from an external voltage.

Inductor selection

Recommended inductor values are in the range 47μH to 220μH.

Higher values of inductance are recommended at higher supply voltages and low output current in order to minimize errors due to switching delays, which result in increased ripple and lower efficiency. Higher values of inductance also result in a smaller change in output current over the supply voltage range. The inductor should be mounted as close to LX pin as possible with low resistance connections to LX and V_{IN} pins.

PCB LAYOUT CONSIDERATION

Decoupling Capacitors And Coil

It is particularly important to mount the coil and the input decoupling capacitor close to the chip to minimize parasitic resistance and inductance, which will degrade efficiency. The input decoupling capacitor (0.1μF fixed) must be placed as close to the V_{IN} and GND pins as possible. It is also important to take account of any trace resistance in series with current sense resistor R_S.

LX Pin

The LX pin of the chip is a fast switching node, so PCB traces should be kept as short as possible. To minimize ground 'bounce', the ground pin of the chip should be soldered directly to the ground plane.

ADJ Pin

The ADJ pin is a high impedance input, so when left floating, PCB traces to this pin should be as short as possible to reduce noise pickup. ADJ pin can also be connected to a voltage between 1.2V~5V. In this case, the internal circuit will clamp the output current at the value which is set by V_{ADJ}=1.2V.

High Voltage Traces

Avoid running any high voltage traces close to the ADJ pin, to reduce the risk of leakage due to board contamination. Any such leakage may raise the ADJ pin voltage and cause excessive output current. A ground ring placed around the ADJ pin will minimize changes in output current under these conditions.

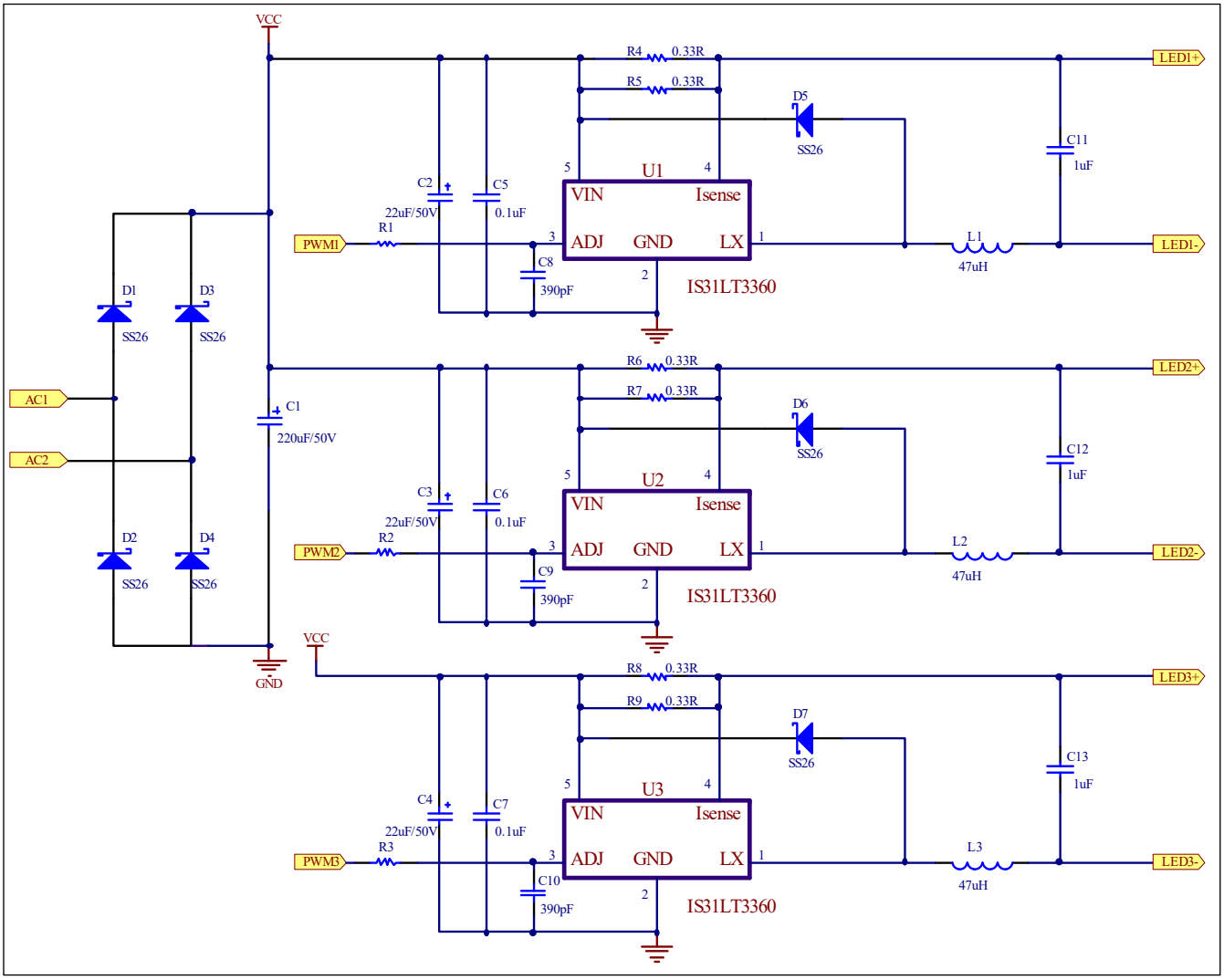

Figure 2 IS31LT3360 3CH Demo Board Schematic

BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
IC	U1~U3	LED driver	3	Lumissil	IS31LT3360
Resistor	R1~R3	RES,1k,1/10W,±1%,SMD	3	Yageo	RL0805FR-071K0L
Resistor	R4~R9	RES,0.3R,1/8W,±1%,SMD	6	Yageo	RL1206FR-070R3L
Capacitor	C1	CAP,220μF,50V,±20%,IND	1	Rubycon	220μF/50V
Capacitor	C2~C4	CAP,22μF,50V,±20%,SMD	3	Rubycon	22μF/50V
Capacitor	C5~C7	CAP,0.1μF,50V,±10%,SMD	3	Yageo	CC0805KRX7R9BB104
Capacitor	C8~C10	CAP,390pF,50V,±10%,SMD	3	Yageo	CC0603KRX7R9BB391
Capacitor	C11~C13	CAP,1μF,50V,±10%,SMD	3	Yageo	CC0805KRX7R9BB105
Diode	D1~D7	Schottky,SS26,2A,60V SMA	7	TOSHIBA	SR260
Inductor	L1~L3	47μH,I_{SAT}≥1A	3	Würth Elektronik	744777147

Bill of materials refers to Figure 2 above.

Note: C8, C9 and C10 are the optional components. They can filter the noise coupling to the ADJ pin.

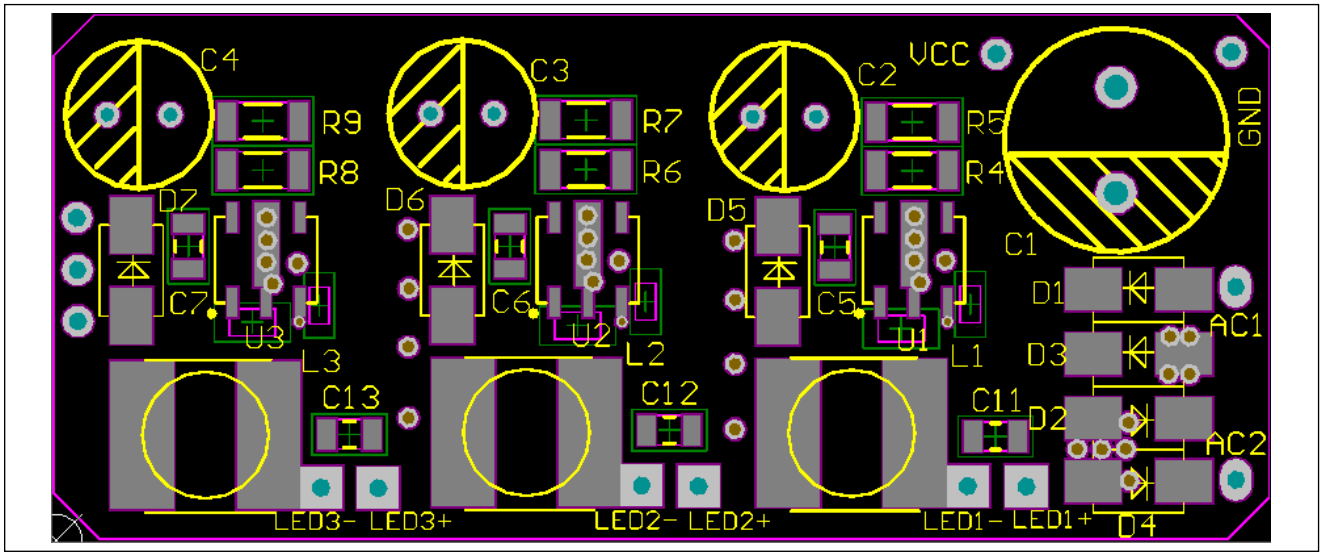

Figure 3 Board Component Placement Guide - Top Layer

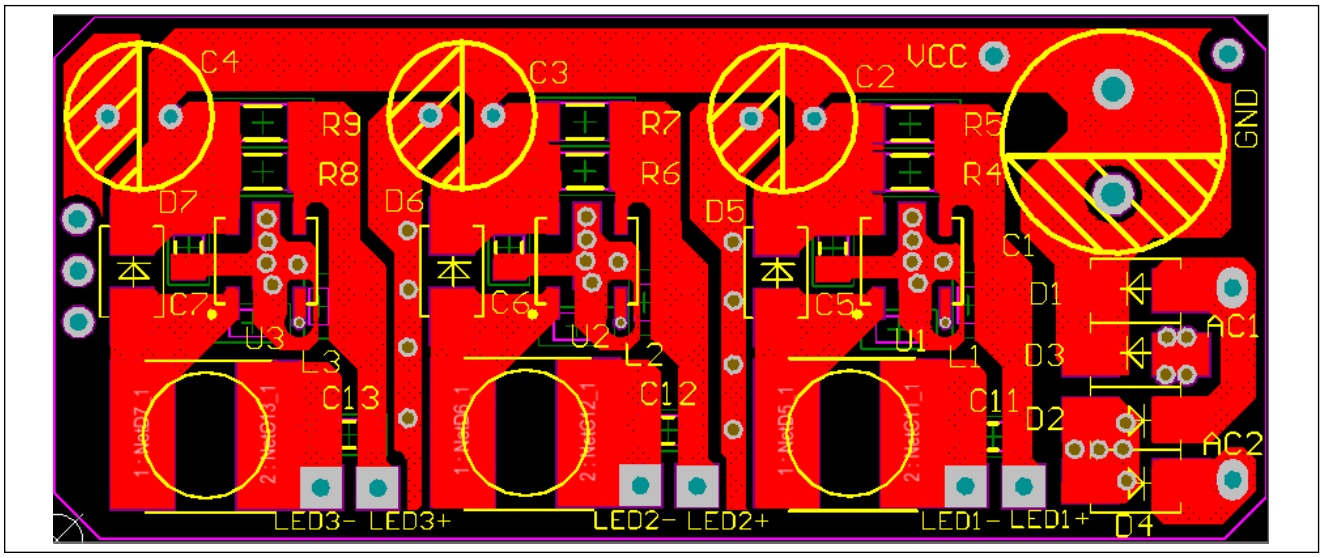

Figure 4 Board PCB Layout - Top Layer

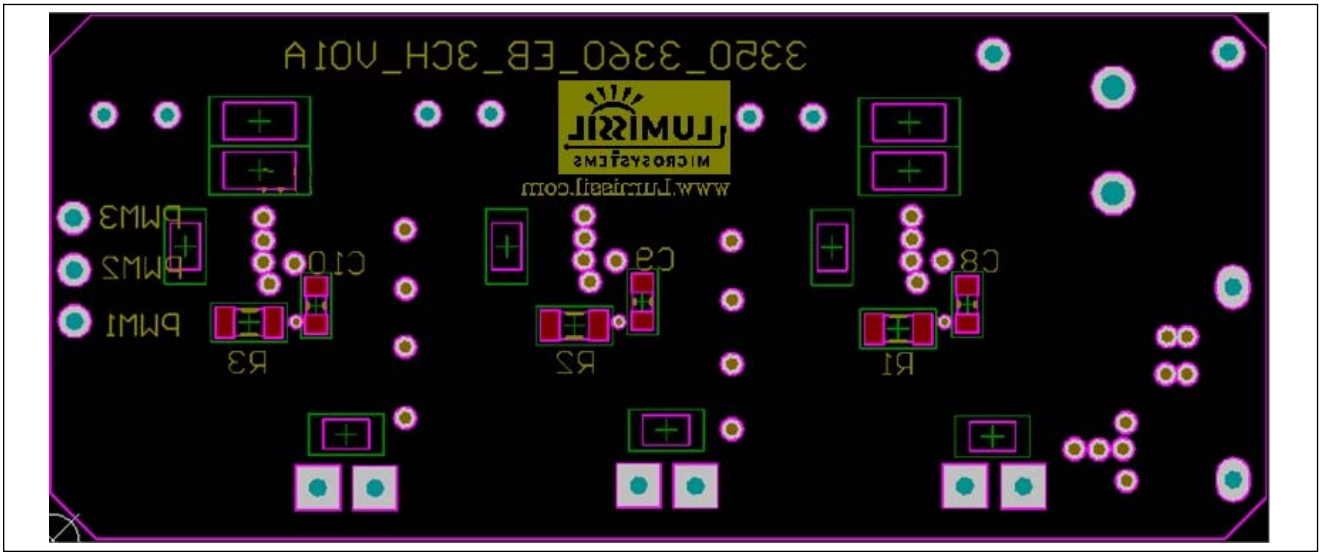

Figure 5 Board Component Placement Guide - Bottom Layer

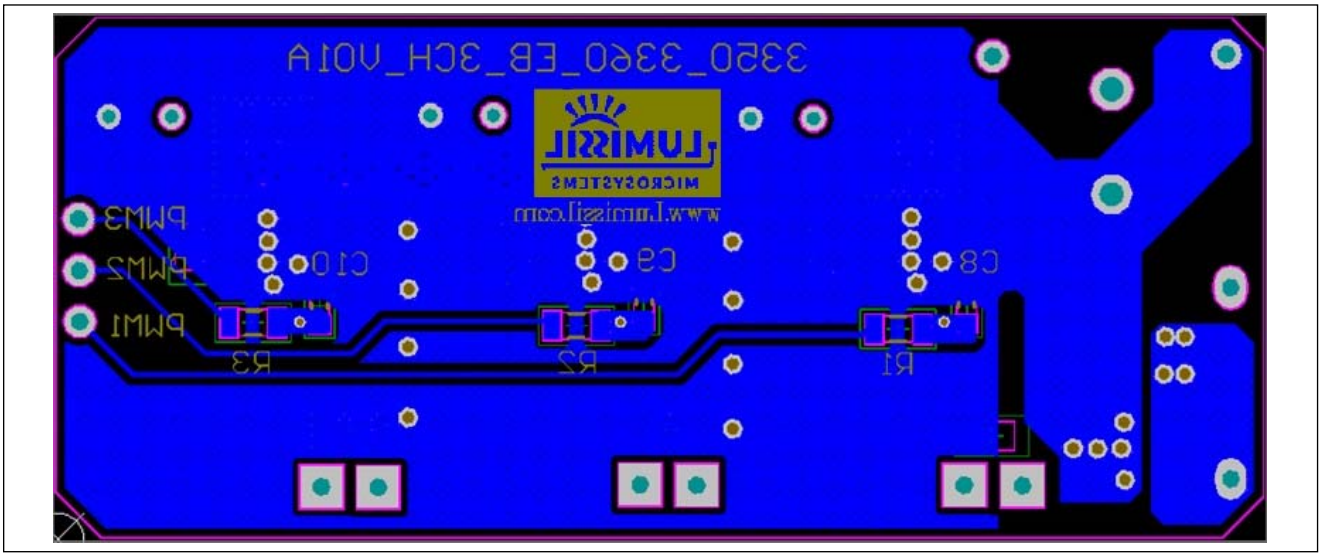

Figure 6 Board PCB Layout - Bottom Layer

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REVISION HISTORY

Revision	Detail Information	Date
B	Initial release	2016.04.27
C	Update to new Lumissil logo and add RoHS	2024.12.02