# IS31LT3360 3CH DEMO Board Guide

## 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 general LED lamp applications.

## 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

## Quick Start

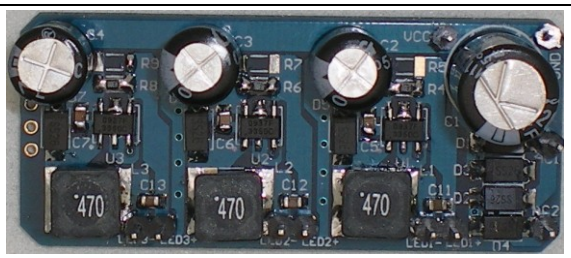

*Figure 1: Photo of IS31LT3360-SDLS3-EB3CH*

### Recommended Equipment

- ✓ 40VDC Power supply
- ✓ 3 pcs of LED panel (3W LED, 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 Vf).

### 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 DC+ of the board and the negative terminal of power supply to the DC- 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.

## Ordering Information

| Part No. | Temperature Range | Package |
|---|---|---|
| IS31LT3360-SDL3-EB3H | -40°C ~ +85°C (Industrial) | SOT 89-5 (3mmx3mm) |

*Table1: Ordering Information*

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

**Bill of Materials**

| No. | Name | Description | Ref Des. | Qty. | Mfr |
|---|---|---|---|---|---|
| 1 | AL Capacitor | 220uF±10%,50V | C1 | 1 | |
| 2 | AL Capacitor | 22uF±10%,50V | C2,C3,C4 | 3 | |
| 2 | SMD Capacitor | 100nF±20%,50V,0805 | C5,C6,C7 | 3 | |
| 3 | SMD Capacitor | 390pF±20%,50V,0603 | C8,C9,C10 | 3 | |
| 4 | SMD Capacitor | 1uF±20%,50V,0805 | C11,C12,C13 | 3 | |
| 5 | SMD Resistor | 1KΩ±5%,0805 | R1,R2,R3 | 3 | |
| 6 | SMD Resistor | 0.3Ω±1%,0805 | R4,R6,R8 | 6 | |
| 7 | Schottky Diode | SS26,2A,60V,SMA | D1-D7 | 7 | |
| 8 | SMD Inductor | 47uH,Isat≥1A | L1,L2,L3 | 3 | |
| 9 | IC | IS31LT3360,SOT89-5 | U1,U2,U3 | 3 | |

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

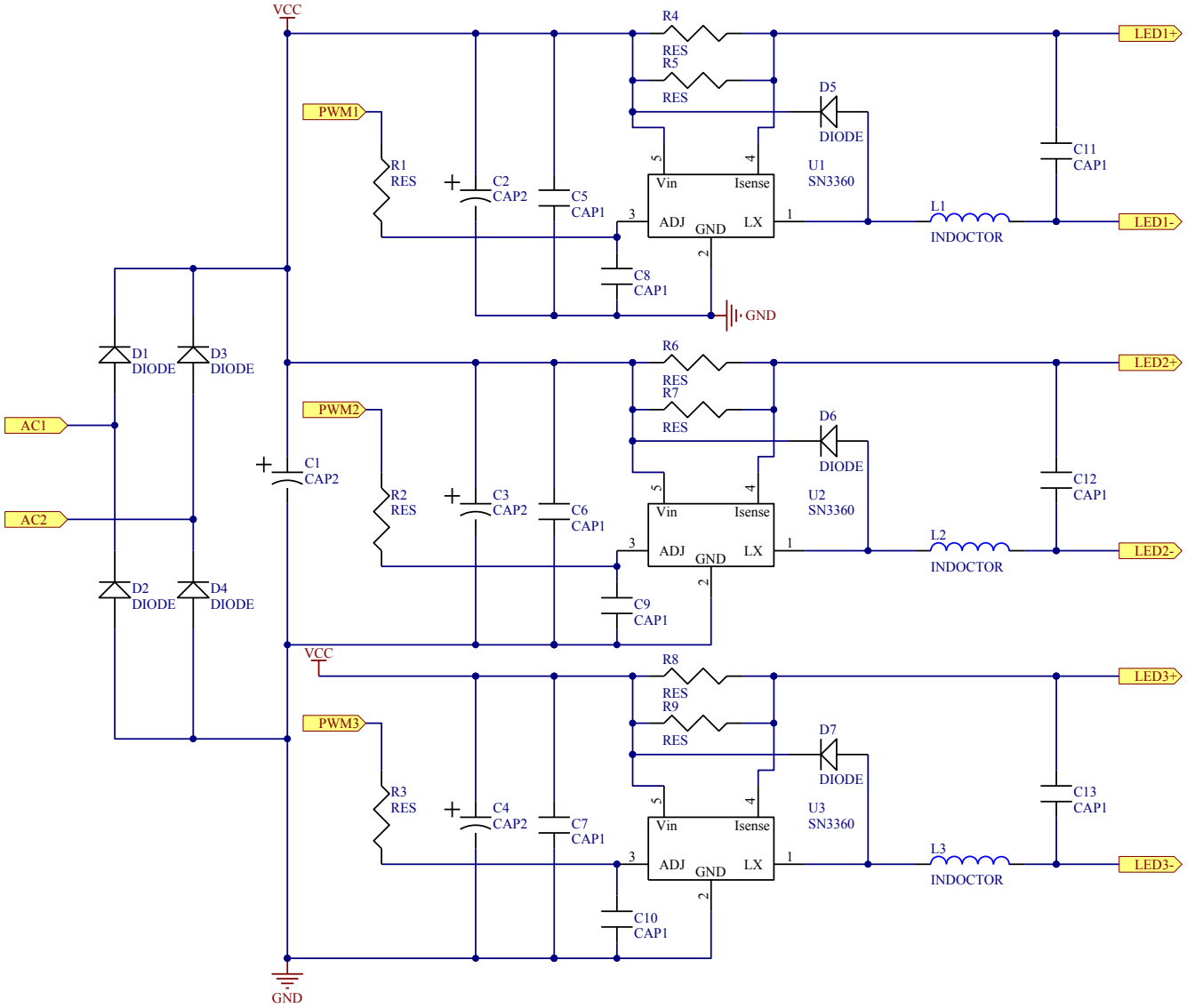


***Figure 2*** *IS31LT3360 3CH DEMO Board Schematic*

## 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 [for Rs>0.082Ω]**

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 |

Vsense is divided into two range 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 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 (0.1uF fixed) must be placed as close to the Vin 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 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.

## PCB Layout

NOTE: Physical dimensions are (L x W x H): 58mm x 25mm x 22mm

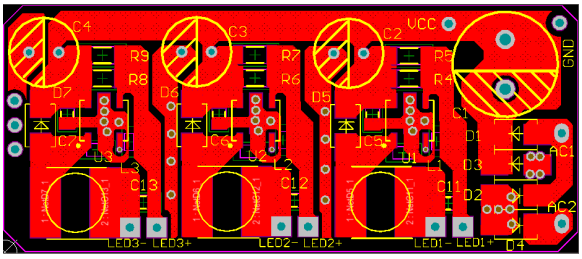


**Figure 2** PCB Layout-Top Layer

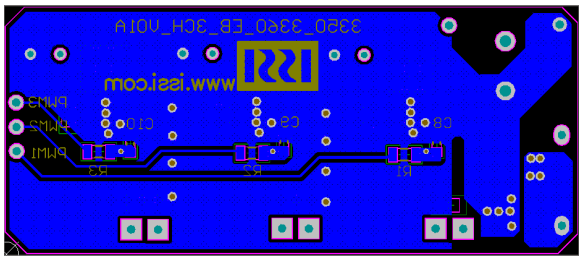


**Figure 3** PCB Layout-Bottom Layer

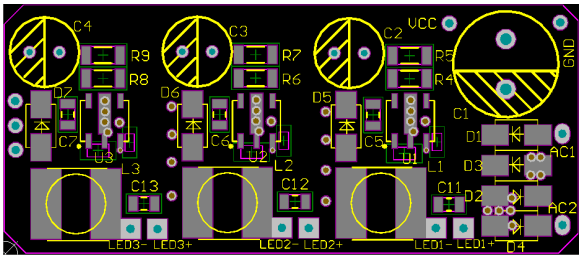


**Figure 4** Component Placement Guide -Top Layer

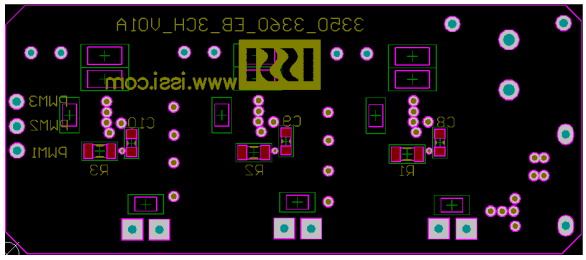


**Figure 5** Component Placement Guide -Bottom Layer

## Revision History

| Date | Revision | Changes |
|---|---|---|
| 2012.03.06 | R1.0 | Initial release |
| 2012.04.19 | R1.1 | 1. Recommend equipment: 60V change to 40V.<br>2. BOM: Add Cap tolerance value.<br>3. BOM: C2,C3,C4 100uF change to 22uF.<br>4. BOM: C8,C9,C10 1nF change to 390pF.<br>5. BOM: Add R5, R7, R9<br>6. Add order information. |
| 2013.05.15 | R1.2 | 1. Revise the BOM of R1-R9.<br>2. Revise the schematic. |