

# IS31LT3360 HB LED Driver General Evaluation 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 device operates from an input supply between 6V and 40V and provides an externally adjustable output current of up to 1.2A. Depending upon supply voltage and external components, this can provide up to 30 watts of output power. 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.

## Features

- 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
- Inherent open-circuit LED protection
- Thermal shutdown protection circuitry

## Quick Start

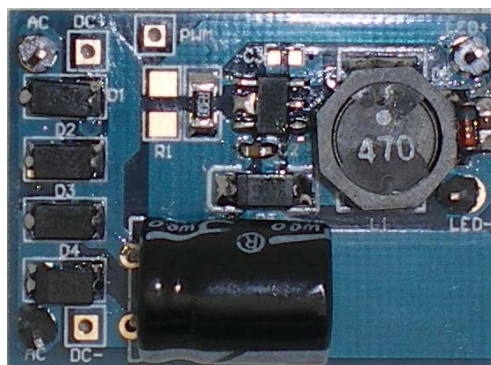


Figure 1: Photo of IS31LT3360 Evaluation Board

## Recommended Equipment

- 60VDC Power supply
- LED panel (5W LED, 10 LEDs in series)

## Recommended Input and Output Ratings

- Input: 6-40VDC
- Output: 1-10 LEDs in series/1A

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

## Absolute Maximum Ratings

- Input voltage  $\leq$  40VDC

**Caution:** Do not exceed the voltage listed above. Doing so may cause damage to the board.

## Ordering Information

| Part No.              | Temperature Range            | IC Package            |
|-----------------------|------------------------------|-----------------------|
| IS31LT3360-SDLS3-EBSG | -40°C to +105°C (Industrial) | SOT89-5 (4mm x 4.5mm) |

Table 1: Ordering Information

**For pricing, delivery, and ordering information, please contact the ISSI team at [analog\\_mkt@issi.com](mailto:analog_mkt@issi.com) or (408) 969-6600.**

# IS31LT3360 HB LED Driver General Evaluation Board Guide

## Procedure

The IS31LT3360 Evaluation 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 LED panel (LED arrays) to the LED- terminal.
- 3) Connect the positive of the LED panel (LED arrays) to the LED+ terminal.
- 4) Turn on the power supply and the LED panel (LED arrays) will light.

## Evaluation Board Operation

### 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:

$$I_{OUT\ nom} = 0.1/R_s \text{ [for } R_s > 0.082\Omega \text{]}$$

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

| $R_s$ ( $\Omega$ ) | 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  $R_s = 0.082\Omega$  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 47 $\mu$ H to 220 $\mu$ H. 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 (0.1 $\mu$ F fixed) must be placed as close to the  $V_{in}$  and GND pins as possible. It is also important to take account of

## IS31LT3360 HB LED Driver General Evaluation Board Guide

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.

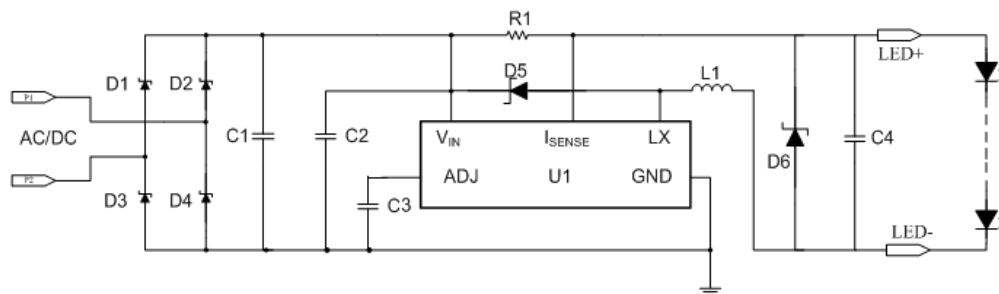


Figure 2: IS31LT3360 Application Schematic. Please refer to the IS31LT3360 datasheet for additional information.

## IS31LT3360 HB LED Driver General Evaluation Board Guide

### Bill of Materials

| Name           | Symbol | Description    | Qty | Supplier | Part No.         |
|----------------|--------|----------------|-----|----------|------------------|
| AL Capacitor   | C1     | 220uF,50V      | 1   |          |                  |
| SMD Capacitor  | C2     | 100nF,50V      | 1   |          |                  |
| SMD Capacitor  | C3     | 10nF,50V       | 1   |          |                  |
| SMD Capacitor  | C4     | 1uF,50V        | 1   |          |                  |
| SMD Resistor   | R1     | 0.5Ω±1%,0805   | 2   |          |                  |
| Schottky Diode | D1-D5  | SS26,2A,60V    | 5   |          |                  |
| Zener Diode    | D6     | 39V,0.25W      | 1   |          |                  |
| SMD Inductor   | L1     | 47uH,Isat≥1.5A | 1   |          |                  |
| IC             | U1     | LED Driver     | 1   | ISSI     | IS31LT3360-SDLS3 |

*Table 2: Bill of Materials. Refer to Figure 2 for more information.*

- Note: 1. C3 is an optional component. C3 can filter the noise coupling to the ADJ pin.  
 2. D6 is an optional component. It can protect the IC as removing the loading with the power on.

## IS31LT3360 HB LED Driver General Evaluation Board Guide

NOTE: Physical dimensions are (L x W x H): 36mm x 26mm x 12mm

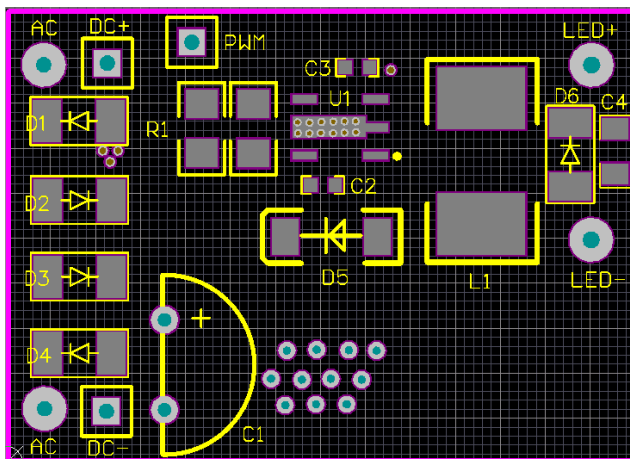


Figure 3: Board Component Placement Guide -Top Layer

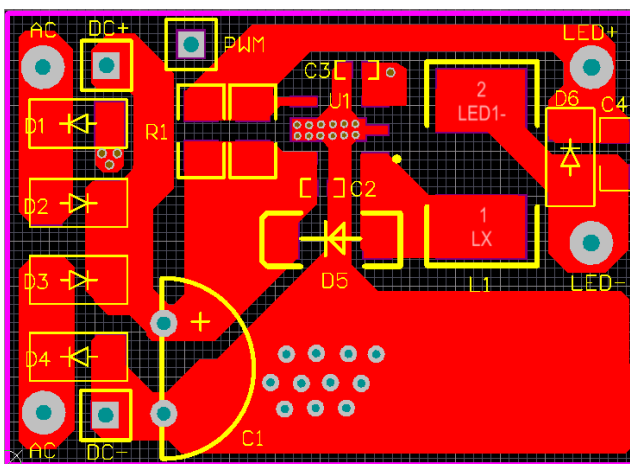


Figure 4: Board PCB Layout- Top Layer

## IS31LT3360 HB LED Driver General Evaluation Board Guide

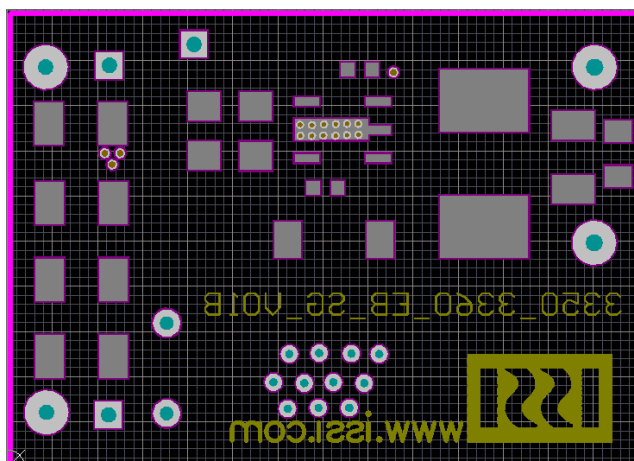


Figure 5: Board Component Placement Guide -Bottom Layer

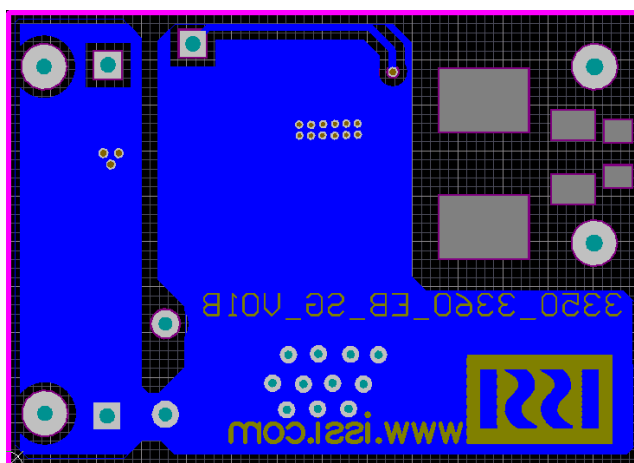


Figure 6: Board PCB Layout-Bottom Layer

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