DESCRIPTION

IS31LT3505 is a constant current boost converter with an internal NMOS. The device topology allows for series type connections of white LEDs, with identical output currents for each channel. This allows for consistent, uniform lighting output and it also ensures that any linked system components receive their respective voltage source(s). The LED current can be adjusted by tuning an external resistor. Dimming of the panel is achieved through Pulse-width-modulation (PWM) or through a DC voltage signal. The driver features a 1MHzswitching frequency. Feedback voltage is set at 0.3V to minimize power drain. Safety features of the device include Over-voltage Protection, Over-temperature Protection, and Open-circuit LED protection. This ensures that the chip will maintain a maximum level of reliability for the overall system, even under abnormal situations such as when no load is present. IS31LT3505 may be used in a versatile array of general lighting applications.

FEATURES

- Supply Voltage: 6V to30V
- Efficiency: 90% (typical)
- PWM or DC Voltage Dimming Control
- 1.0MHz Switching Frequency
- 35V High-powered Internal NMOS
- Open-circuit LED Protection
- Over-temperature, voltage Protection
- Package: MSOP-10

QUICK START

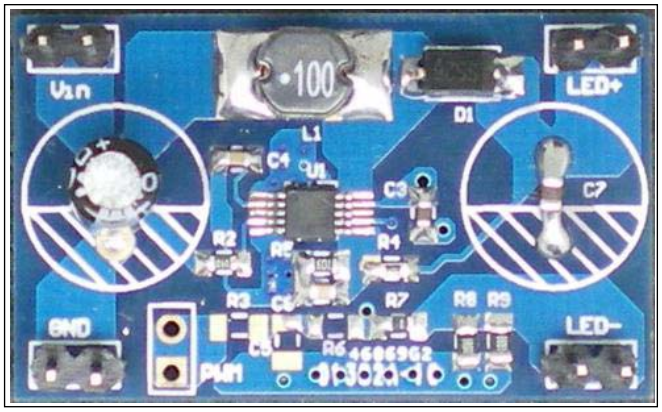

Figure 1: Photo of IS31LT3505 Evaluation Board

RECOMMENDED EQUIPMENT

- 30VDC power supply
- LED panel/array (1 WLED, 9 LEDs in series)
- Multi-meter

RECOMMENDED INPUT AND OUTPUT RATINGS

- Input: 10~25VDC
- Output: 4~9 LEDs in series/350mA

Note: The input voltage must be 10%×V_{OUT} lower than the output voltage ($\sum V_F$) and input average current should be ≤1000mA.

ABSOLUTE MAXIMUM RATINGS

- Input voltage ≤ 30VDC

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

PROCEDURE

The IS31LT3505 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 negative terminal of the power supply to the GND pin and the positive terminal to the VIN pin.
2) Connect the negative end of the LED panel (LED arrays) to the LED-terminal.
3) Connect the positive end of the LED panel (LED arrays) to the LED+ terminal.
4) Turn on the power supply and the LED panel (LED arrays) will turn on.

ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31LT3505-SLS2-EBDC	-40°C to +85°C (Industrial)	MSOP-10

Table 1: Ordering Information

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

DEVICE OPERATION

Component Selection

The component selection is very important. They have a significant effect on the operating state of the demo board. The output capacitor must be a low ESR capacitor so as to minimize it's affect on the line regulation and load regulation.

Please read the datasheet carefully to get more information about the component selection.

LED Current Control

The IS31LT3505 regulates the LED current by setting the external resistor connecting to feedback and ground. The internal feedback reference voltage is 0.3V (Typical). The LED current can be set from the Formula (1) easily.

$I_{LED} = V_{FB}/R_{SET}$

Where: $R_{SET}=R_8//R_9$

In order to have an accurate LED current, precision resistors must be used (1% is recommended).

PCB Layout Consideration

As for all switching power supplies, especially those providing high current and using high switching frequencies, layout is an important design step. If layout is not carefully done, the regulator could show instability as well as EMI problems.

Wide traces should be used for connection of the high current loop.

When laying out signal ground (pin 5), it is recommended to use the traces separate from power ground (pin1) traces and connect them together at the input capacitor negative terminal or the large ground plane that will avoid the signal ground shift. Pin 3 GND must be connected to signal ground (pin 5). Both of signal and power ground should be as wide as possible. Other components ground must be connected to signal ground. Especially the RSET ground to signal ground (pin 5) connection should be as short as possible to have an accurate LED current.

The capacitor CVDD and CVP should be placed as close as possible to VDD and VP pin for good filtering.

LX pin is a fast switching node. The inductor and diode should be placed as close as possible to the switch pin and the connection between this pin to the inductor and the schottky diode should be kept as short and wide as possible. Avoid other traces cross and routing too long in parallel with this node to minimum the noise coupling into these traces.

The feedback network (FB, OVP) should be as short as possible and routed away from the inductor, the schottky diode and LX pin. The feedback pin and feedback network should be shielded with a ground plane or trace to minimize noise coupling into this circuit.

The thermal pad on the back of package must be soldered to the large ground plane for ideal power dissipation.

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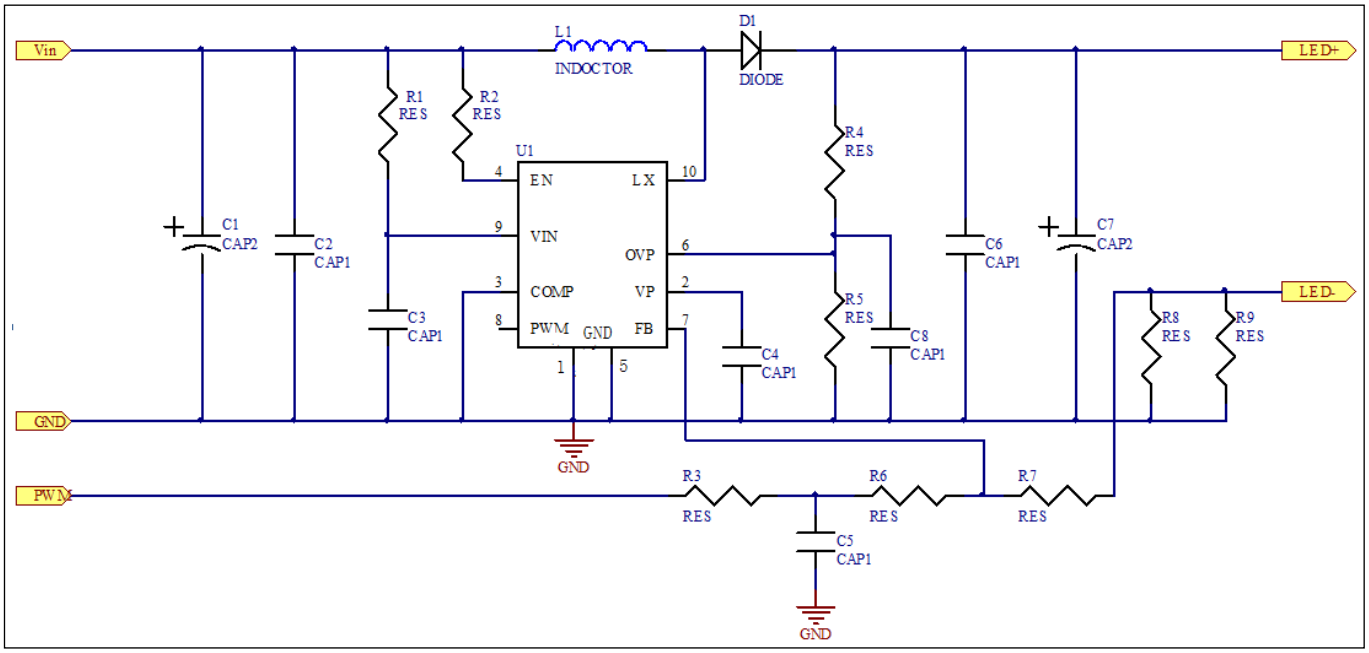

Figure 3: IS31LT3505 Application Schematic

Note: Those components R3, C5, R6 and R7 are used to control dimming of the device.

BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
AL Capacitor	C1	22μF±10%,50V	1		
SMD Capacitor	C7	4.7μF±20%,50V,0805	1		
SMD Capacitor	C2,C6	1μF±20%,50V,0805	2		
SMD Capacitor	C3	220nF±20%,50V,0805	1		
SMD Capacitor	C5	NC	1		
SMD Capacitor	C4	100nF±20%,50V,0805	1		
SMD Capacitor	C8	10nF±20%,50V,0603	1		
SMD Resistor	R1	51Ω±5%,0805	1		
SMD Resistor	R2	100kΩ±5%,0805	1		
SMD Resistor	R3,R6	NC	2		
SMD Resistor	R4	330kΩ±1%,0805	1		
SMD Resistor	R5	10kΩ±1%,0805	1		
SMD Resistor	R7	0Ω,0805	1		
SMD Resistor	R8	1.6Ω±1%,0805	1		
SMD Resistor	R9	1.8Ω±1%,0805	1		
Schottky Diode	D1	SS26,2A,60V,SMA	1		
SMD Inductor	L1	10μH,I_{SET}≥2000mA	1		
IC	U1	LED Driver	1	Lumissil	IS31LT3505

Bill of Materials, refers to Figure 3 above.

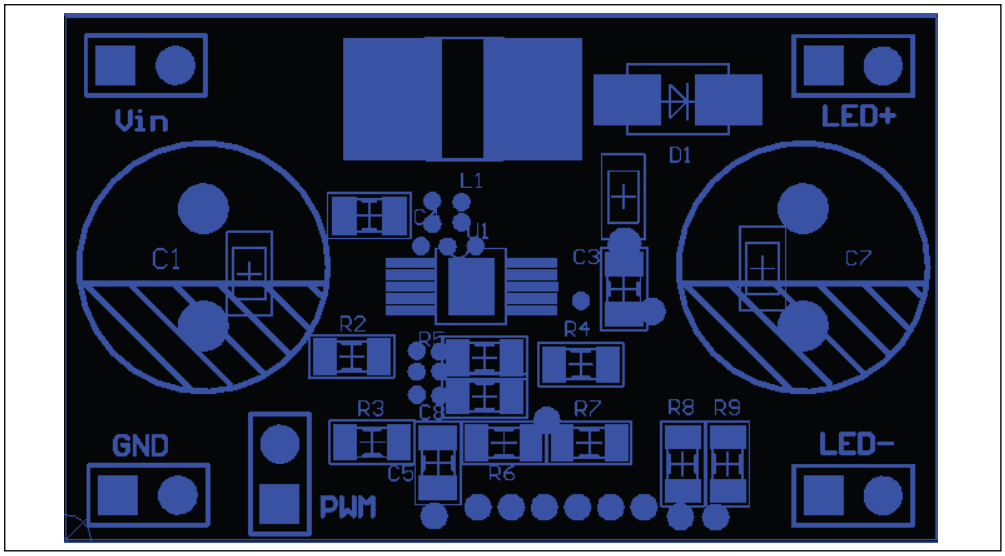

Figure 4: Board Component Placement Guide - Top Layer

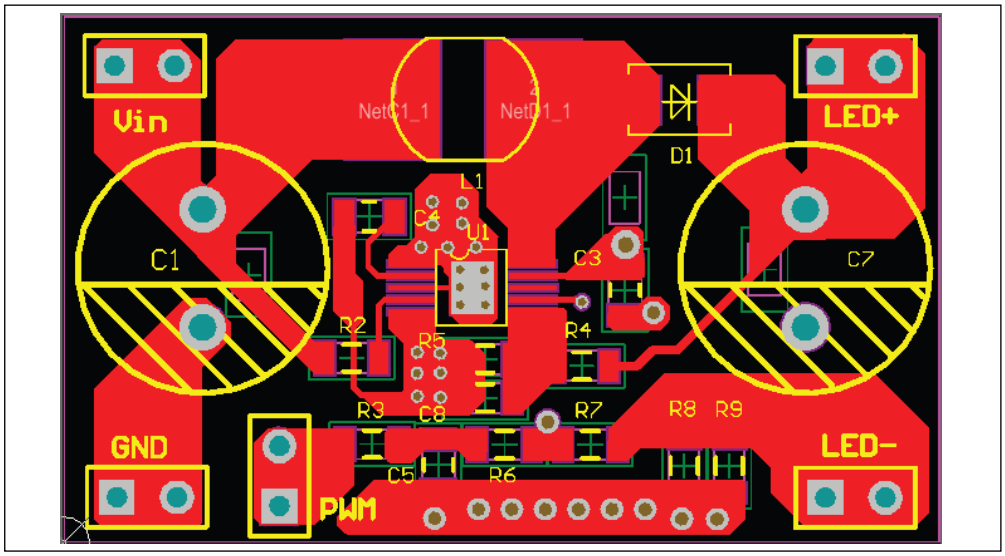

Figure 5: Board PCB Layout - Top Layer