

IS31LT3948 General DEMO Board Guide

Description

IS31LT3948 is a PFM step-up DC-DC converter designed for driving the white LED arrays for large size LCD panel backlighting applications. With internal OVP circuit, the chip and the system can be safe even if the load is not connected. The device features external PWM dimming or DC dimming, which allows the flexible control of the backlighting luminance. IS31LT3948 incorporates a unique FB scheme which automatically adjusts the integrated DC/DC converter to the optimum output voltage for the system, maximizing the efficiency. IS31LT3948 general DEMO board is used in general lamp.

Features

- ✓ Wide input voltage range: 5V-100V
- ✓ Constant Current Output limited only by external component selection (Note)
- ✓ No loop compensation required
- ✓ Internal over-voltage protection
- ✓ Internal over-temperature protection

Note: The maximum output current is determined by V_{out}/V_{in} ratio as well as the external components. If output current and V_{out}/V_{in} ratio is high, high current components of inductor and NMOS are needed.

Order information

Part Number	Package Type
IS31LT3948-GRLS2-EBAC	SOP-8

Quick Start

Recommended Equipment

- ✓ 30VDC Power supply
- ✓ LED panel (1W LED, 12 LEDs in series)
- ✓ Multi-meter

Recommended Input and Output Ratings

- ✓ Input: 10-25VDC
 - ✓ Output: 4-12LEDs in series/333mA
- Note: The input voltage must be lower than the output voltage(total V_f).

Absolute Maximum Ratings

- ✓ Input voltage $\leq 30VDC$
- ✓ voltage $\leq 44VDC$

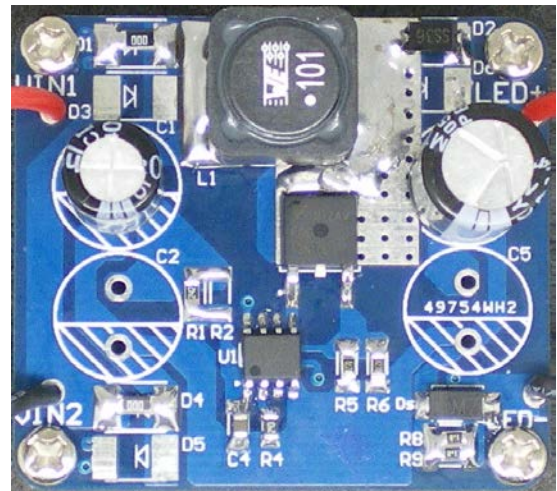
Caution: Do not exceed the conditions listed above, otherwise the board will be damaged or output current will be limited.

Procedure

The IS31LT3948 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 VIN1 pin and the positive terminal to the VIN2 pin.
- 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 be light.



Bill of Materials

No.	Name	Description	Ref Des.	Qty.	Mfr
1	AL Capacitor	220uF $\pm$ 10%,35V	C1	1	
2	AL Capacitor	220uF $\pm$ 10%,50V,Low ESR	C3	1	
3	SMD Capacitor	10uF $\pm$ 20%,25V	C4	1	
4	SMD Resistor	2.4K Ω $\pm$ 5%,1206	R1	1	
5	SMD Resistor	24K Ω $\pm$ 1%,0805	R4	1	
6	SMD Resistor	430K Ω $\pm$ 1%,0805	R3	1	
7	SMD Resistor	10K Ω $\pm$ 1%,0805	R7	1	
8	SMD Resistor	0.135 Ω $\pm$ 1%,0805	R5	1	
9	SMD Resistor	0.9 Ω $\pm$ 1%,0805	R8	1	
10	Schottky Diode	SS36,3A,60V,SMA	D2	1	
11	Diode	1N4007,1A,1000V,SMA	Ds	1	

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12	SMD Inductor	100uH, Isat≥3A	L1	1	
13	MOS	11A,100V,13N10L,NMOS,TO-252	T1	1	
14	IC	IS31LT3948,SOP8	U1	1	

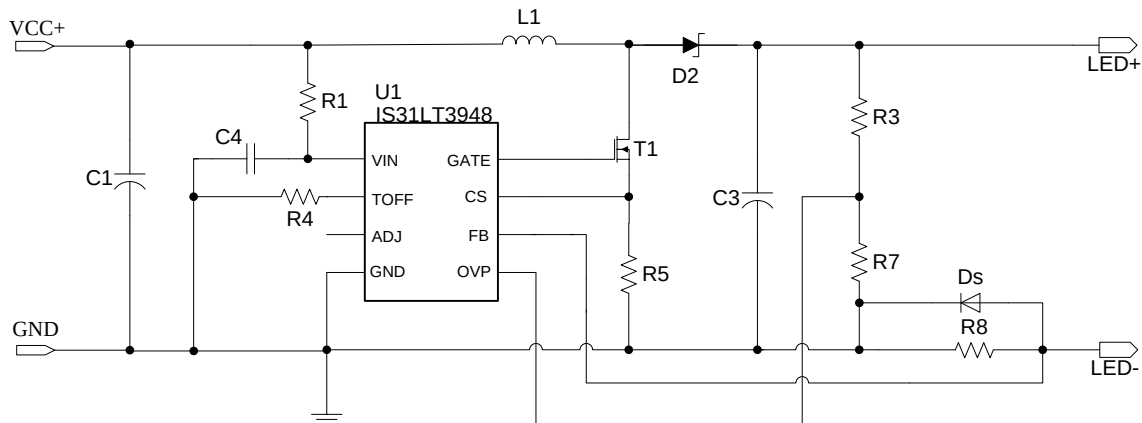


Figure 1 IS31LT3948 General DEMO Board Schematic

Detailed Description

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 its affect on the line regulation and load regulation.

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

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 to minimize the EMI and unnecessary loss.
- The external components ground should be connected to IS31LT3948 ground as short as possible. Especially the R_{cs} and R_{fb} ground to

IS31LT3948 ground connection should be as short and wide as possible to have an accurate LED current.

- The capacitor C1, C2, C3 should be placed as close as possible to IS31LT3948 for good filtering. Especially the output capacitor C3 connection should be as short and wide as possible.
- NMOS drain is a fast switching node. The inductor and Schottky diode should be placed as close as possible to the drain and the connection should be kept as short and wide as possible. Avoid other traces crossing and routing too long in parallel with this node to minimize the noise coupling into these traces. The feedback pin (e.g. CS, FB, OVP) should be as short as possible and routed away from the inductor, the schottky diode and NMOS. 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 NMOS package must be soldered to the large ground plane for ideal power dissipation.

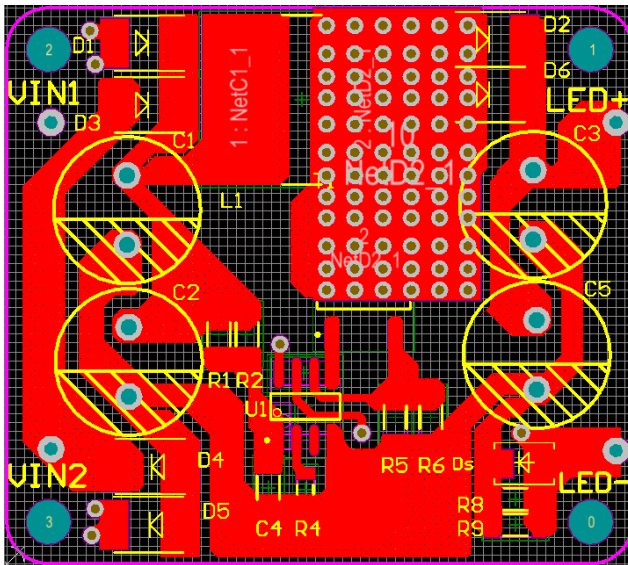


Figure 2 Board PCB Layout- Top Layer

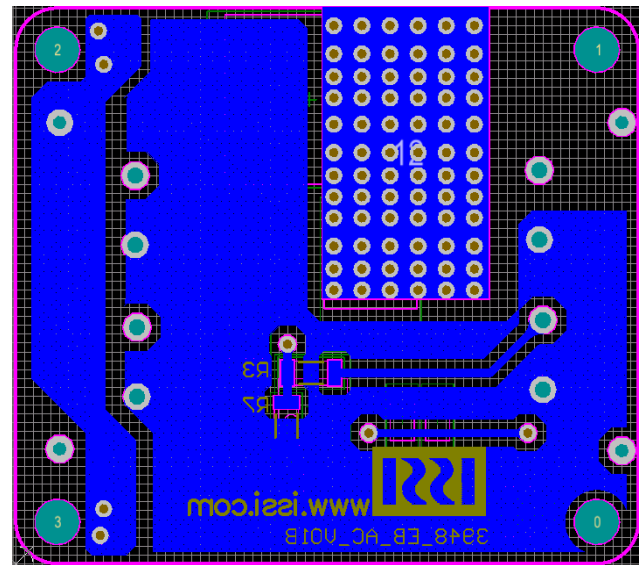


Figure 3 Board PCB Layout-Bottom Layer

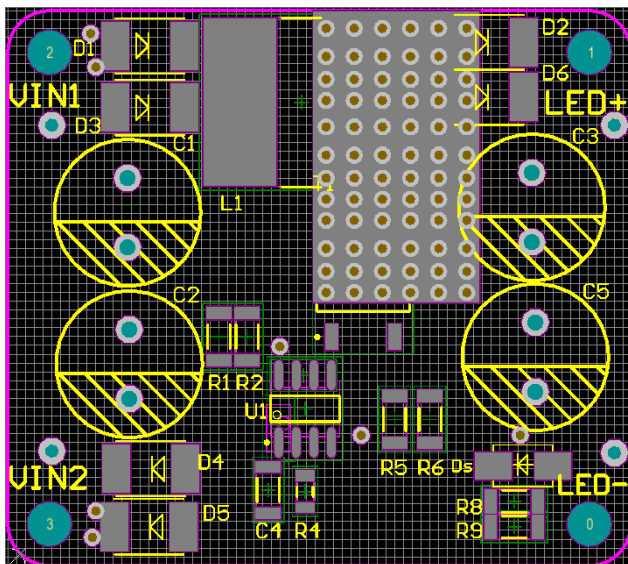


Figure 4 Component Placement Guide -Top Layer

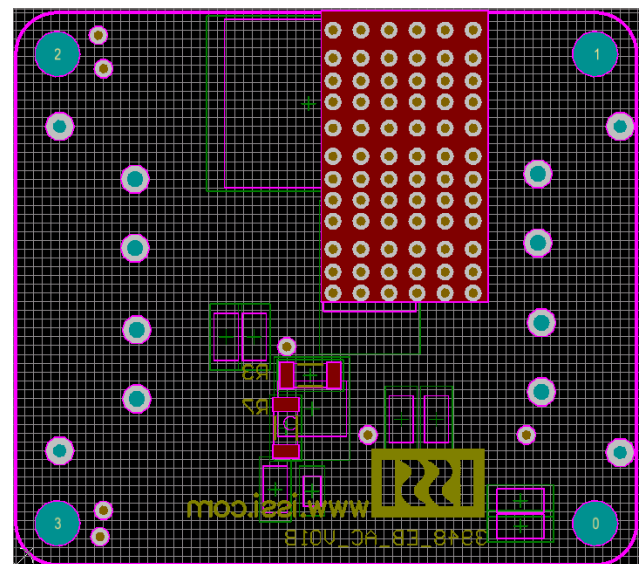


Figure 5 Component Placement Guide -Bottom Layer

Revision history

Date	Revision	Changes
2012.03.06	R1.0	Initial release
2012.04.19	R1.1	1. Recommend output 1-12LEDs change to 4-12LEDs 2. BOM: Add tolerance to cap and resistor. 3. BOM: R1 3KΩ change to 2.4KΩ. 4. BOM: L1 Isat>2.5A change to Isat>3A. 5. BOM: MOS 13N06L change to 13N10L. Add package TO-252. 6. Add order information. 7. Change PCB layout to ISSI logo. 8. Change EVB photo.



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