

# 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

## QUICK START

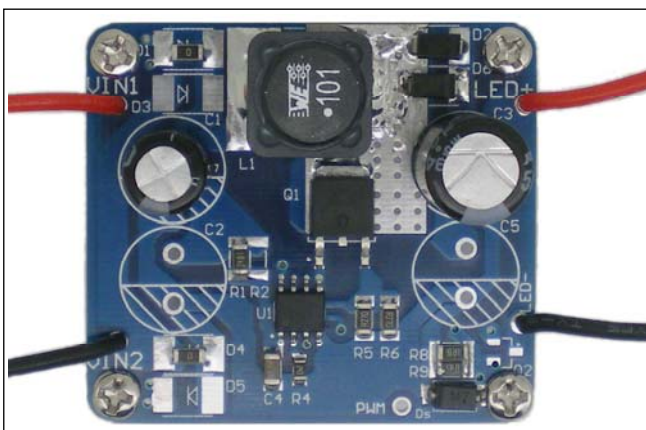


Figure 1: Photo of IS31LT3948 Evaluation Board

## RECOMMENDED EQUIPMENT

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

## RECOMMENDED INPUT AND OUTPUT RATINGS

- Input: 12VDC
- Output: 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  $\leq$  45VDC

*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 terminals of the power supply to the VIN1 and VIN2 pin (If the board don't have the rectifier(D1,D3-D5), Connect the positive terminal of the power supply to the VIN1 of the board and the negative terminal of power supply to the VIN2 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 be light.

*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.*

## ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31LT3948-GRLS4-EB	-40°C ~ +125°C (Industrial)	SOP-8-EP, Lead-free

Table 1: Ordering Information

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

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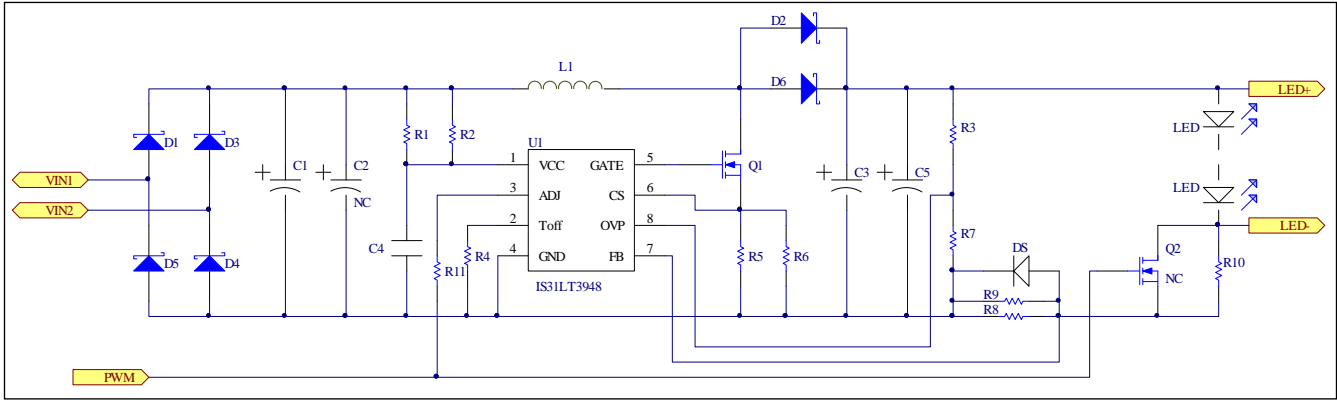


Figure 2: IS31LT3948 General DEMO Board Schematic

## BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U1	LED Driver	1	Lumissil	IS31LT3948
Resistor	R1	RES,2.4K,1/8W,±5%,SMD	1	YAGEO	RC1206JR-072K4L
Resistor	R3	RES,430K,1/10W,±1%,SMD	1	YAGEO	RC0805FR-07430KL
Resistor	R4	RES,24K,1/10W,±1%,SMD	1	YAGEO	RC0805FR-0724KL
Resistor	R5,R6	RES,0.27R,1/8W,±1%,SMD	2	YAGEO	RL1206FR-070R27L
Resistor	R7	RES,10K,1/8W,±1%,SMD	1	YAGEO	RC1206FR-0710KL
Resistor	R8,R9	RES,1R8,1/8W,±1%,SMD	2	YAGEO	RC1206FR-071R8L
Resistor	R10	RES,0R,1/8W,±1%,SMD (As PWM Dimming, R10 must be removed)	1	YAGEO	RL1206FR-070R0L
Diode	D1,D4	RES,0R,1/8W,±1%,SMD	2	YAGEO	RL1206JR-070R0L
Capacitor	C1	CAP,220µF,35V,±20%,IND	2	Rubycon	35ZLH220MEFCM8X11.5
Capacitor	C3	CAP,220µF,50V,±20%,IND	1	Rubycon	50YXG220MEFC10X16
Capacitor	C4	CAP,10µF,25V,±10%,SMD	1	YAGEO	CC12006JKX7R8BB106
	R2,C2,C5, R11,D3,D5	Not installed	6		
Schottky Diode	D2,D6	SS26,2A,60V,DO-214AA SMB	2	Diodes	SS26-E3
Diode	DS	1N4007,1A,1000V,DO-214AA SMB	1	Diodes	S1MB-13
Inductor	L1	100µH, ±20%,Isat=3.1A	1	Würth Elektronik	7447709271
NMOS	Q2	2.1A, 55V, NMOS, SOT-23-3 (The default is not installed. As PWM Dimming, Q2 must be installed.)	1	AO	AO3422
NMOS	Q1	10A,100V,13N10L,NMOS, TO-252-3	1	Fairchild	FQD13N10LTM

Note: To achieve PWM dimming, the Q2 and R11 is necessary. Use 0Ω resistor at R11 and remove R10.

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### DETAILED DESCRIPTION

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#### 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.

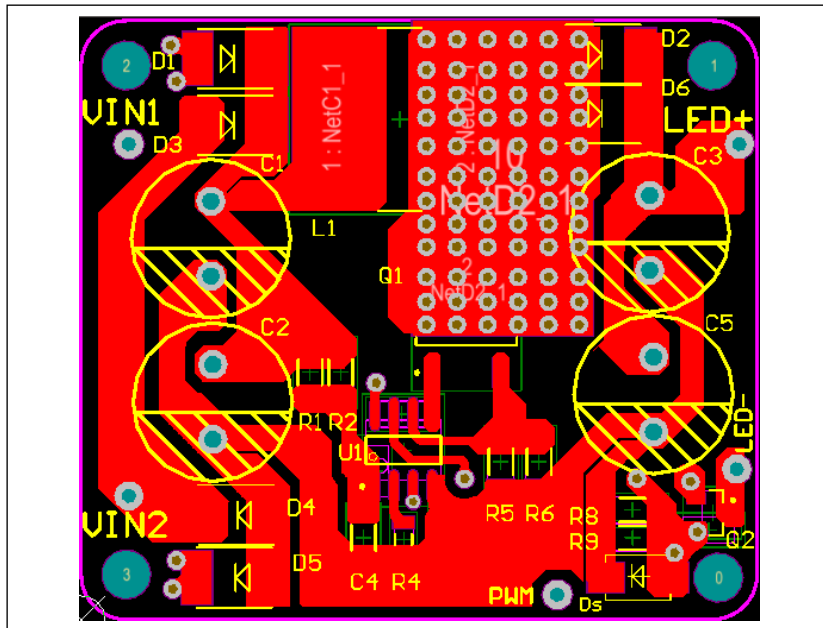
- Wide traces should be used for connection of the high current loop to minimize the EMI and unnecessary loss.
- The external components ground should be connected to IS31LT3948 ground as short as possible. Especially the Rcs and Rfb ground to IS31LT3948 ground connection should be as short

and wide as possible to have an accurate LED current.

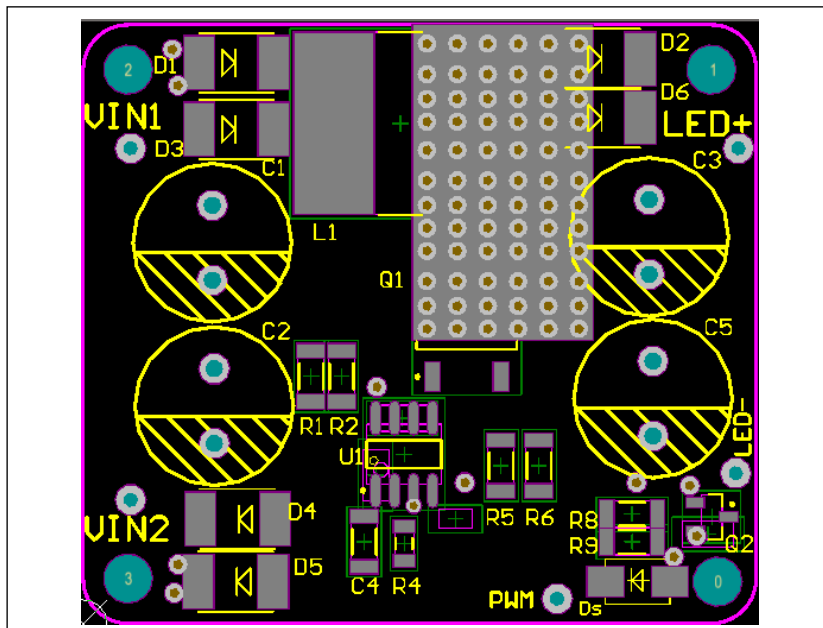
- The capacitor C1, C2, C3 should be placed as close as possible to IS31LT3948 for good filtering. Especially the output capacitor C3 connection should be as short and wide as possible.
- NMOS drain is a fast switching node. The inductor and Schottky diode should be placed as close as possible to the 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.

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*Figure 3: Board PCB Layout - Top Layer*



*Figure 4: Component Placement Guide - Top Layer*