Description

The Flicker-Free™ IS31LT3935 is a single stage current mode LED driver optimized for high power factor and compatibility with all TRIAC dimmers. The PFC architecture enables excellent power factor over a wide range of operating line and load conditions, even with the simplest of inductor based driver topologies, thereby reducing system cost and size while maximizing efficiency.

The IS31LT3935 LED controller features patent pending AccuDim™ flicker-free dimming technology that mimics the characteristics of an incandescent light bulb. It presents a dynamic impedance to the dimmer and integrates an active bleed circuit for true dimming performance across all dimmers.

The device is available in a tiny 10 lead DFN-EP (3mm ×3mm) package. It operates over the temperature range of -40°C to +85°C.

Features

- Smooth 0-100% Flicker-free Dimming Range
- Compatibility with all TRIAC Dimmers (Digital, Leading and Trailing-edge)
- Near unity PFC without External PFC Circuitry
- Spread Spectrum Switching for Reduced EMI
- Low 500μA Quiescent Current
- Protections:
  - Soft Start
  - Under-voltage, (Over-voltage) Lockout
  - Thermal Shutdown

Applications

- Dimmable Retrofit LED Lamps and Luminaries up to 30W
- Industrial and Commercial Lighting
- Offline LED Driver Modules and Bricks

Quick Start

Recommended Equipment

- 85~265VAC/50~60Hz power supply
- LED array(12 in series)40Vdc-0.3A
- 220V input TRIAC Dimmer

WARNING: Operating this demo board at output voltages other than the designed output target voltage may reduce system performance, and in some cases may damage the IC or other circuit components.

Absolute Maximum Ratings

●≤ 264VAC power supply

●≤ 47V Vout (Total Vf)

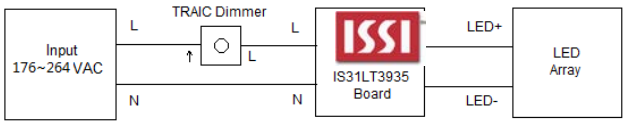
Caution: Do not exceed the conditions listed above, otherwise the board will be damaged or the output will be limited

Procedure

The IS31LT3935 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 positive terminal of the LEDs to the LED+ of the DEMO and the negative terminal of the LEDs to the LED- of the Evaluation Board.
2) Connect the input pin N of the Evaluation Board via the main power switch to AC power supply N.
3) Connect the input pin L of the Evaluation Board via TRAIC Dimmer pin L, Another pin of TRAIC Dimmer Connect to the AC power supply L.
4) Turn on the power supply, Adjust the angle of TRAIC Dimmer



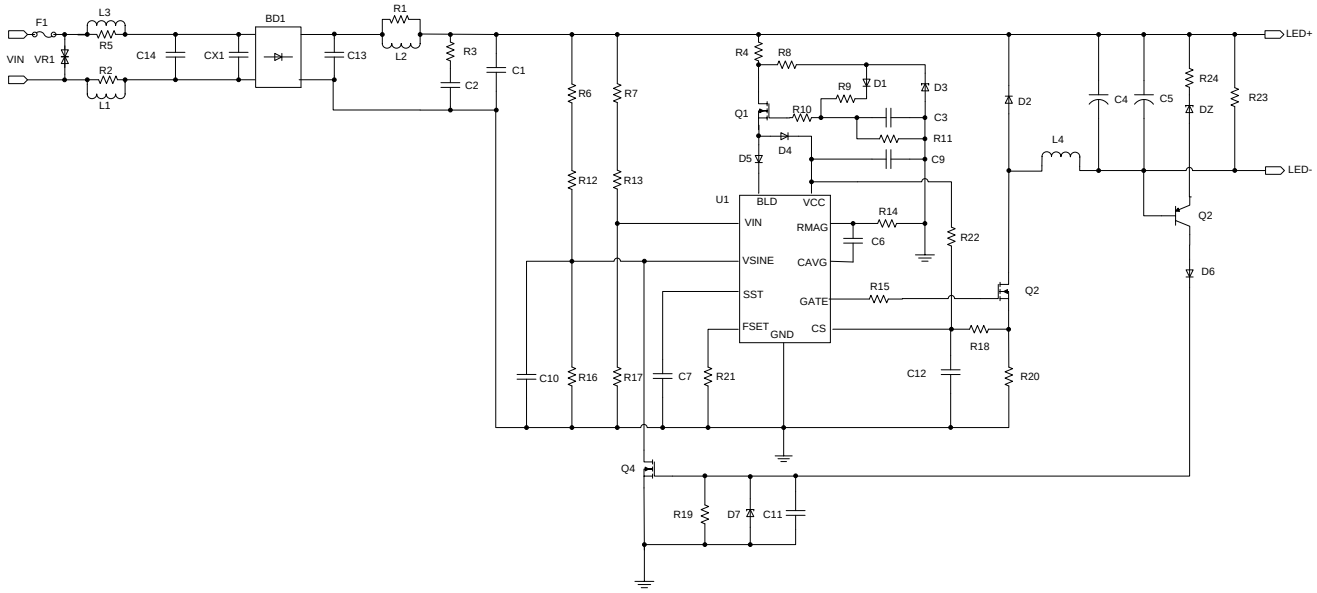
Ordering Information

PART#	TEMP RANGE	IC PACKAGE
IS31LT3935-DLS2-TR	-40 to 125°C	DFN-10 (Exposed Pad)

For pricing, delivery, and ordering information, please contact ISSI at analog_mkt@issi.com

or call +1-408-969-6600

Figure 1 IS31LT3935 Evaluation Board Schematic Note: ISSI Evaluation



Board does not include a LED array

Figure 2 Picture of Evaluation Board

NOTE: Physical dimensions are (L×W×H): 65mm×22mm×20mm

PCB Layout

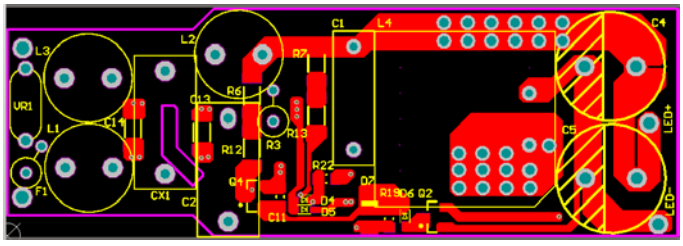


Figure 3 PCB Layout – Top layer

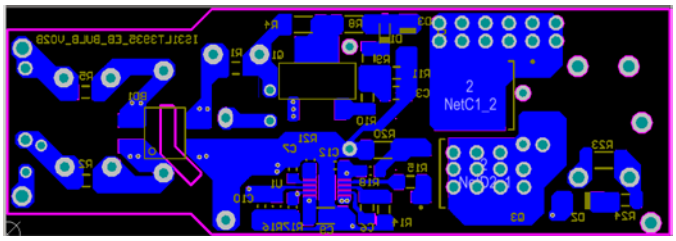


Figure 4 PCB Layout – Bottom layer

Bill of Materials

No.	Name	Symbol	Description	Qty.	Supplier	Part No.
1	fuse	F1	1A250V Φ3	1		
2	mov	VR1	7D471 PIN7	1		
3	Bridge rectifier	BD1	MB6S MBS	1		
4	Inductor	L1，L3	6mH 0810	2		
5	Inductor	L2	10mH 0810	1		
6	Transformer	L4	500uH EE16	1		
7	Resistor	R1，R2，R5	5.1kΩ 1% 0805 SMD	3		
8	Resistor	R3	510Ω 1% 2W	1		
9	Resistor	R6	160kΩ 1% 1206 SMD	1		
10	Resistor	R12	150kΩ 1% 1206 SMD	1		
11	Resistor	R16	5.1kΩ 1% 0805 SMD	1		
12	Resistor	R7	270kΩ 1% 1206 SMD	1		
13	Resistor	R13	200kΩ 1% 1206 SMD	1		
14	Resister	R17	4.7kΩ 1% 0805 SMD	1		
15	Resistor	R4,R14	10Ω 1% 1206 SMD	1		
16	Resistor	R8	200kΩ 1% 1206 SMD	1		
17	Resistor	R9	10kΩ 1% 0805 SMD	1		
18	Resistor	R15	1.0Ω 1% 0805 SMD	1		
19	Resistor	R10	100Ω 1% 0805 SMD	1		
20	Resistor	R11	240kΩ 1% 0805 SMD	1		
21	Resistor	R23	NC SMD	0		
22	Resistor	R20	0.18Ω 1% 1206 SMD	1		
23	Resistor	R18	470Ω 1% 0603 SMD	1		
24	Resistor	R21	180kΩ 1% 0805 SMD	1		
25	Resistor	R24	51Ω 1% 0805 SMD	1		
26	Resistor	R19	10KΩ 1% 0603 SMD	1		
27	Resistor	R22	120KΩ 1% 0603 SMD	1		
28	Capacitor	C1	CBB-CAP 47nF 630V pin10	1		
29	Capacitor	C2	CL21-CAP 220nF 400V pin10	1		
30	Capacitor	C4,C5	E-CAP 330uF 50V 1020	2		
31	Capacitor	C3	22nF 25V X7R 0805 SMD	1		
32	Capacitor	C6,C7	1uF 25V X7R 0805 SMD	2		
33	Capacitor	C9	10uF 25V X7R 1206 SMD	2		
34	Capacitor	C10	33PF 25V X7R 0603 SMD	1		
35	Capacitor	C11	1uF 25V X7R 0603 SMD	1		
36	Capacitor	C12, CX1	NC SMD	0		
37	Capacitor	C13,C14	1nF 1KV X7R 1206 SMD	2		

38	diode	D1,D4,D5,D6	1N914BWM SOD-523 SMD	4		
39	diode	D2	C3D02060 TO-252 SMD	1		
40	diode	D3	9.1V SOD-80 SMD	1		
41	diode	D7	5.1V SOD-80 SMD	1		
42	diode	DZ	47V SOD-80 SMD	1		
43	MOS-FET	Q1	BSP125 SOT223 SMD	1		
44	MOS-FET	Q3	AOD4S60 TO-252 SMD	1		
45	MOS-FET	Q4	NDS7002 SOT-23 SMD	1		
46	BJT	Q2	FMMT 558 PNP SOT-23 SMD	1		
47	IC	U1	IS31LT3935 DFN10(Exposed Pad)	1	ISSI	IS31LT3935-DLS2-TR

NOTE：Please ensure that the Dimmer specifications are suitable for the application voltage and frequency.

Inductor Design

ELECTRICAL SPECIFCATIONS:

1.Primary inductance(Lp)=500uH@10kHz

2. Electrical Strength = 3KV, 50/60Hz,1Min

MATERIALS:

1. Core:EE16(Ferrite Material TDK PC40 or equivalent)
2. Bobin:EE16 Primary 5,Secondary:5
3.. Magnet Wires (Pri) : Type 2-UEW
4. Magnet Wire (Sec) : Triple Insulated Wires
5. Layer Insulation Tape :3M1298 or equivalent.

SCHEMTIC

NO.	winding	Start	End	number of turns	diameter	number of plies	tape	remarks
1	NP1	2	4	128T	0.30mm-2-UEW	2	0.02*9.3mm	

Line Regulation and Efficiency

Input Voltage	Input Power	THD	PF	Output Voltage	Output Current	Efficiency
100Vac/50Hz	12.77	25.7%	0.967	38.50	285	85.92%
110Vac/50Hz	13.18	32.8%	0.949	38.50	296	86.46%
120Vac/50Hz	13.53	34.8%	0.928	38.34	306	86.71%

Load Regulation and Efficiency

Input Voltage	Input Power	THD	PF	Output Voltage	Output Current	Efficiency
110Vac/50Hz	12.24	31.8%	0.950	34.46	308	86.71%
110Vac/50Hz	13.18	32.8%	0.949	38.50	296	86.46%

EMI TEST REPORT

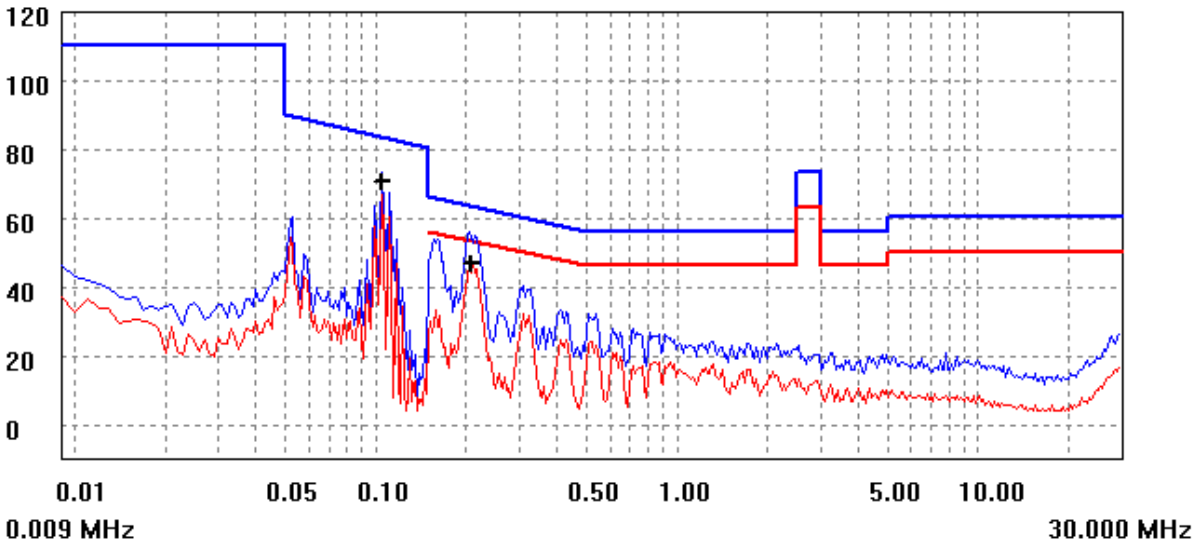
parameter

Organization:		Operator:	JARVIS	EUT:	ISLT3935
Place:	XM	Time:	2014/1/15/11:4		
Detector:	PK+AV	Test-time(ms):	10		
Limit:	EN55015	Transductor:	PK0		
Remark:	110V 300MA 40V L				

freq, step

Start(MHz)	End(MHz)	Step(MHz)
0.009	0.150	0.001
0.150	3.000	0.002
3.000	10.000	0.020
10.000	30.000	0.025

scan result



final test

(AV)	freq(MHz)	lev(dBuV)	Lim(dBuV)	Δ(lev-Lim)
	0.105	70.3	0.0	70.3
	0.207	46.7	54.4	-7.7

Figure 5. L line

EMI TEST REPORT

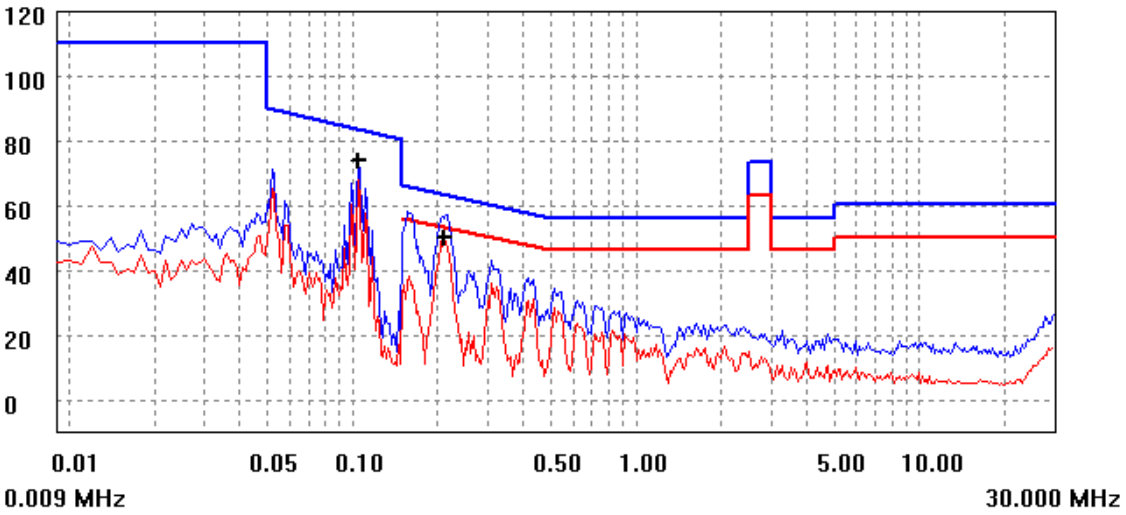
parameter

Organization:		Operator:		EUT:	ISLT3935
Place:	XM	Time:	2014/1/15/11:0		
Detector:	PK+AV	Test-time(ms):	10		
Limit:	EN55015	Transductor:	PK0		
Remark:	110V 300MA 40V N				

freq, step

Start(MHz)	End(MHz)	Step(MHz)
0.009	0.150	0.001
0.150	3.000	0.002
3.000	10.000	0.020
10.000	30.000	0.025

scan result



final test

(AV)	freq(MHz)	lev(dBuV)	Lim(dBuV)	Δ(lev-Lim)
	0.106	73.5	0.0	73.5
	0.211	50.0	54.3	-4.3

Figure 6. N line