

General Description

The AL5892 is an offline dimmable linear LED driver with high integration of constant current control and smart bleeder operation. With the built-in 350V main power MOSFET and 500V bleeder MOSFET, the AL5892 offers users to design a triac dimmable LED driver with extremely few external components and minimized system BOM cost. Because of the linear operation of the IC, the AL5892 LED driver is compliant with EMI standards without adding any EMI components. The AL5892 is optimized to work at 120V_{AC} input mains voltage.

With an innovative efficiency compensation method, the AL5892 operates up to 85% efficiency with driving a single high-voltage LED chain.

The AL5892 detects a triac dimmer signal and controls the smart bleeder to turn on and off, thus it offers the LED driver good dimmer compatibility with both leading edge and trailing edge dimmers. The AL5892 also converts the dimmer signal to optimize the dimming curve to be compliant with NEMA SSL7.

The AL5892 has abundant of protection features, such as LED short protection (OSP), thermal foldback protection (TFP) and over temperature shutdown protection (OTP).

The AL5892 is available in SO-8EP package

to enhance the thermal reliability of the LED driver.

Applications

- LED Lamps
- Retro Fit TRIAC Dimming
- LED power modules

Key Features

- Integrated 350V Main MOSFET and 500V Bleeder MOSFET
- Low operation current ~300uA
- Tight current sense tolerance $\pm 3\%$
- Output Current Programmable up to 75mA
- Wide range of dimmer compatibility
- Dimming Curve compliant to NEMA SSL7
- Internal Protections
- LED Open/Short Protection(OSP)
- Thermal Foldback Protection(TFP)
- Over Temperature Shutdown Protection (OTP)
- Power Factor >0.7
- Efficiency up to 85%
- SO-8EP package

AL5892EV4 Specifications

Parameter	Value
Input Voltage	108V _{AC} ~132V _{AC}
LED Current	58.8mA
LED Voltage	130V~140V
Dimension	Φ51mm x 1.6mm

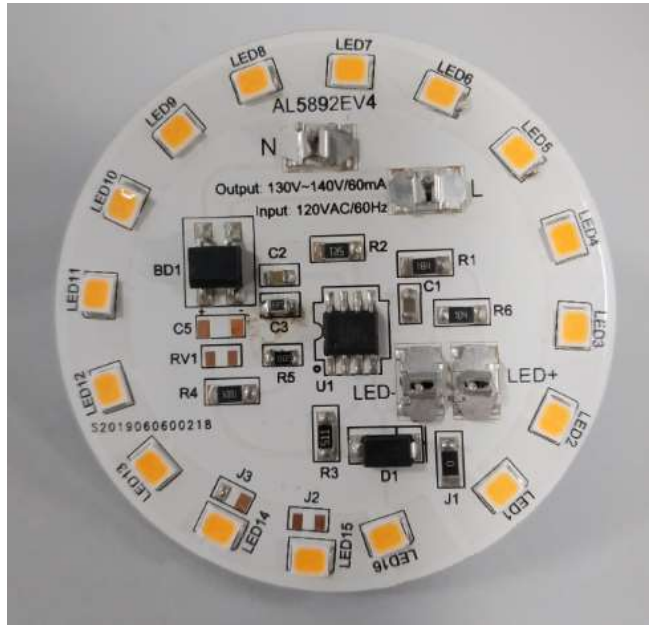


Figure 1: Top View

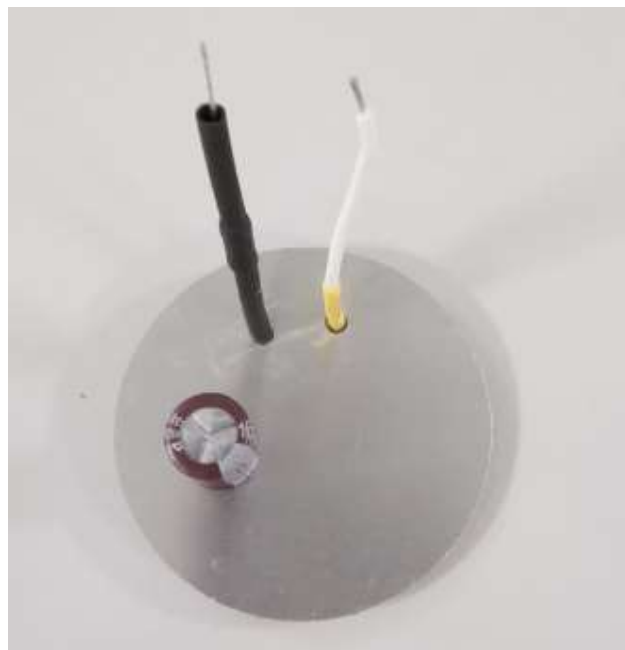


Figure 2: Bottom View

Connection Instructions

Power Supply Input: 120V_{AC} (white: Neutral, black: Line)

Evaluation Board Schematic

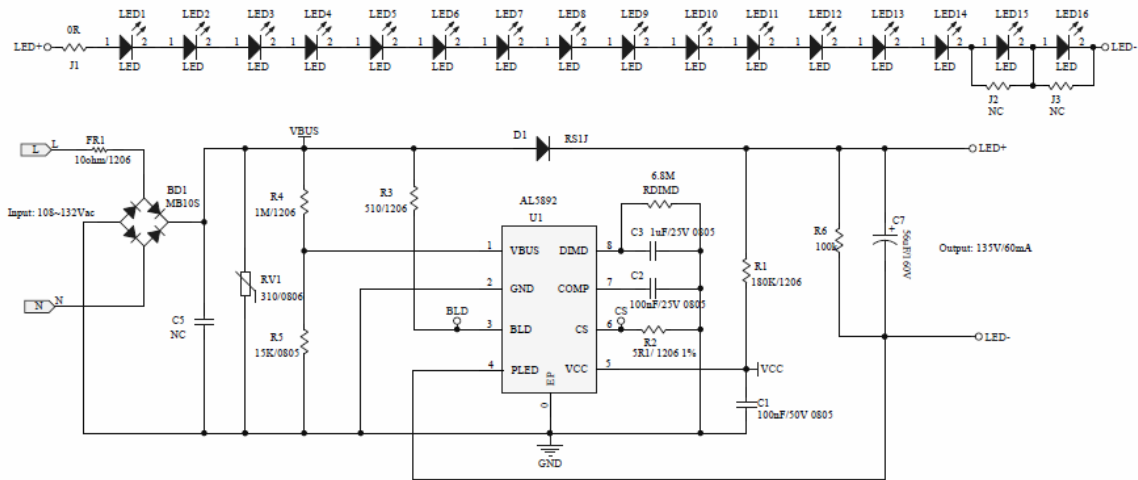


Figure 3: Evaluation Board Schematic

Evaluation Board Layout

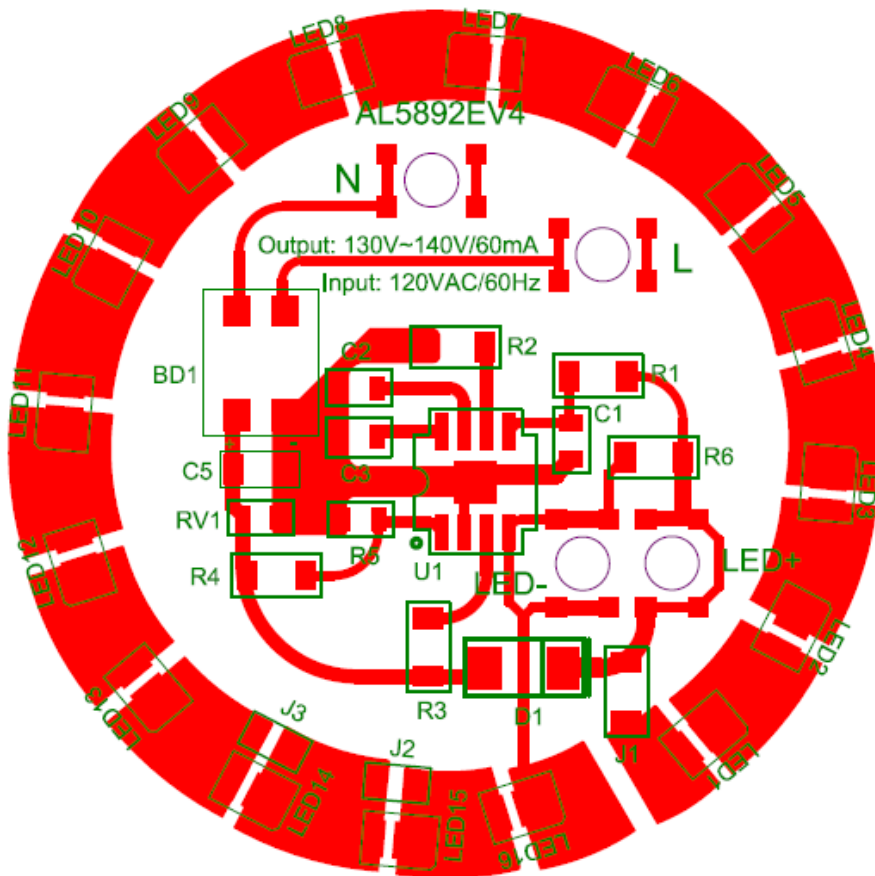


Figure 4: PCB Board Layout Top View

Quick Start Guide

1. By default, the LED current of evaluation board is preset at 59mA.
2. Ensure that the AC source is switched OFF or disconnected before soldering or connecting.
3. Remove the J1 (0ohm), insert an ammeter to measure LED current or monitor LED current waveform.
4. Ensure that the area around the board is clear and safe, and preferably that the board and LEDs are enclosed in a transparent safety cover.
5. Connect AC source Line to Black wire, connect Neutral to white wire.
6. Turn on the main switch. LED string should light up.

Bill of Material

No.	Item	Description	Package	QTY
1	C1,C2	Ceramic Cap, 100nF/50V,X7R	0805	2
2	C3	Ceramic Cap, 1uF/25V,X7R	0805	1
3	C7	E-Cap, 105°C,56uF/160V, 10*16mm	DIP	1
4	BD1	Rectifier Bridge,MB10S,0.5A/1000V	SOPA-4	1
5	D1	Fast Recovery Diode, RS1J, 1A/1KV	SMA	1
6	FR1	Fuse Resistor,10R, 5%, 1W	SMD	1
7	RV1	SMD Varistor, 310V	SMD	1
8	R1	Resistor,180K, 5%, 1/4W	1206	1
9	R2	Resistor,5R1, 1%, 1/4W	0805	1
10	R3	Resistor, 510R, 5%, 1/4W	1206	1
11	R4	Resistor,1M, 1%, 1/4W	1206	1
12	R5	Resistor,15K, 1%, 1/8W	0805	1
13	R6	Resistor,100K, 5%, 1/4W	1206	1
14	U1	AL5892 Diodes Linear Dimmable IC	PSOP8	1
15	J1	Resistor,0R, 5%, 1/4W	1206	1
16	RDIMD	Resistor,6.8M, 5%, 1/8W	0805	1
17	LED1~16	LED, VF=8.4V~10.4V IF=100mA	2835	16

System Performance

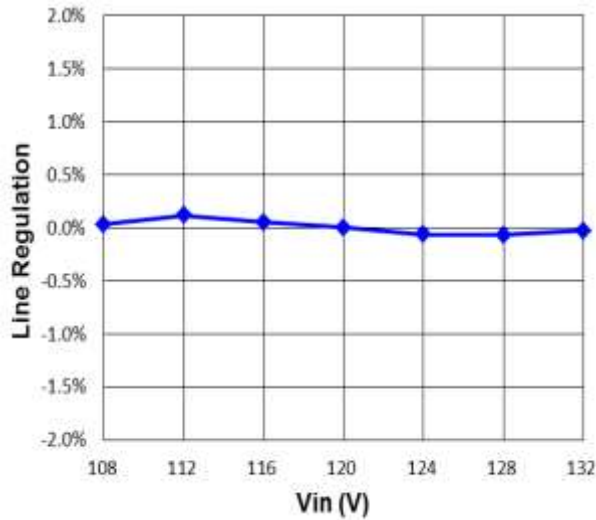


Figure 6: LED current vs input voltage

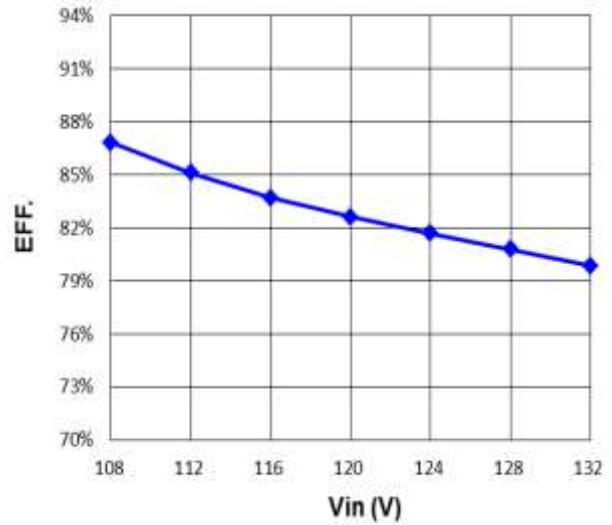


Figure 7: Efficiency vs input voltage

LED current setup

The LED current is set by the reference voltage and the current sensing resistor. The reference voltage is 0.3V.

Then the output current for LED strings can be calculated by:

$$I_{OUT} = 0.3V / R_{SENSE}$$

On the board, the R_{SENSE} is 5.10Ω, so the output current is 58.8mA.

Waveforms:

Test condition: input 120V_{AC}, output 135V/58.8Ma

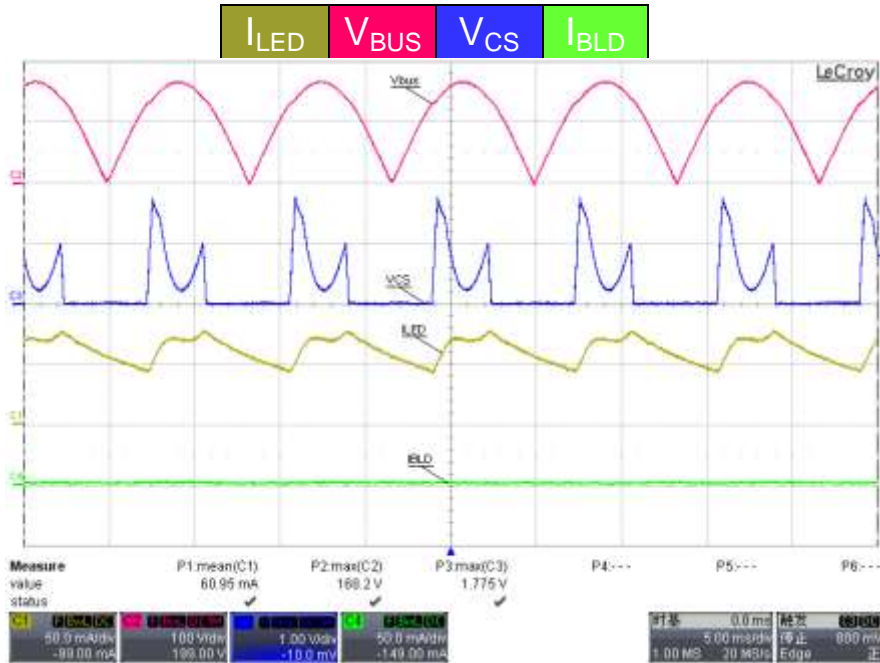


Figure 11: Without dimmer operating

With Leading & Trailing dimmer:

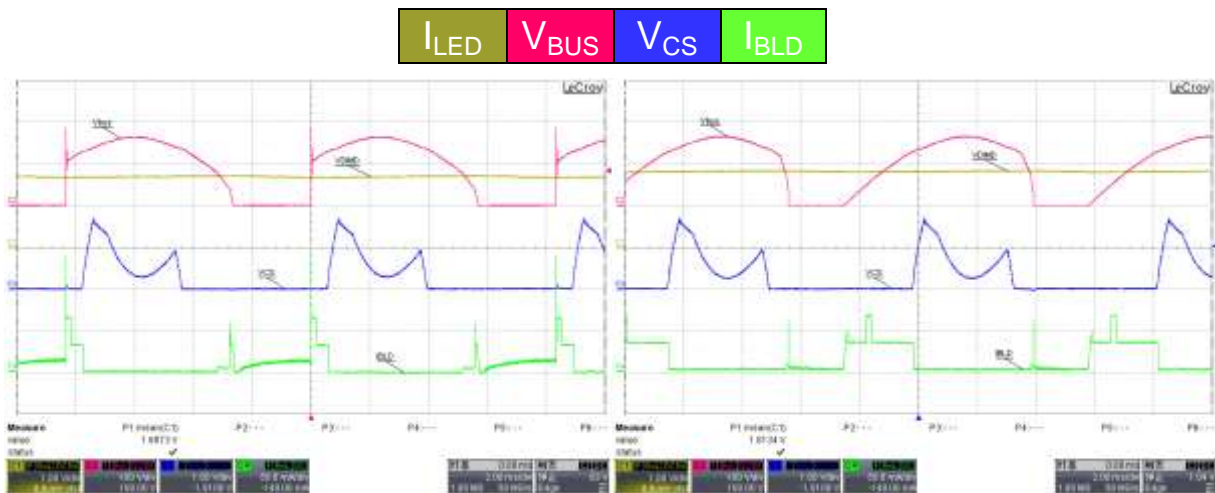


Figure 12: Operating with leading dimmer

Figure 13: Operating with trailing dimmer

Start up:

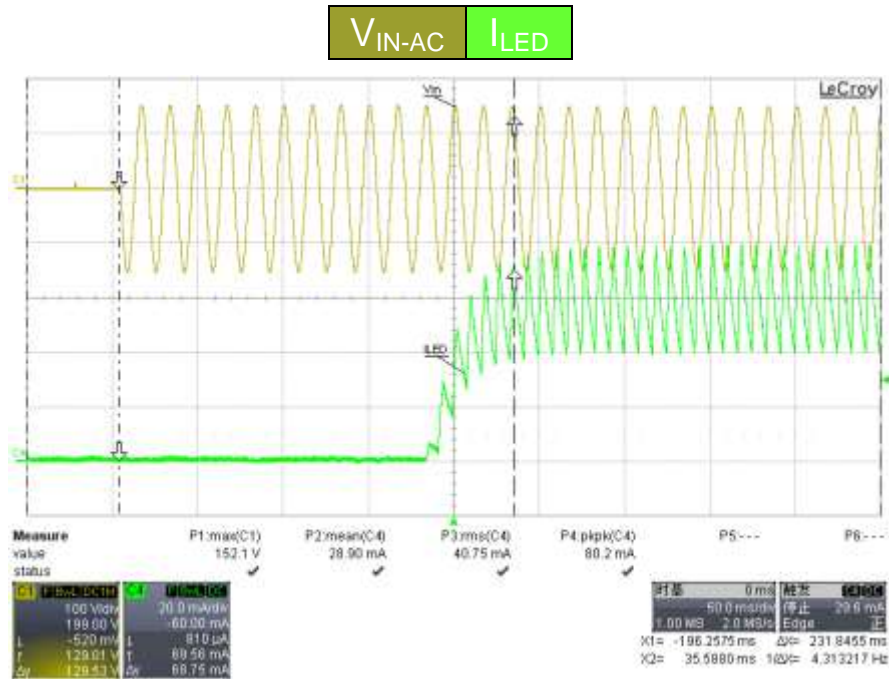


Figure 13: Turn ON

LED short Protection:

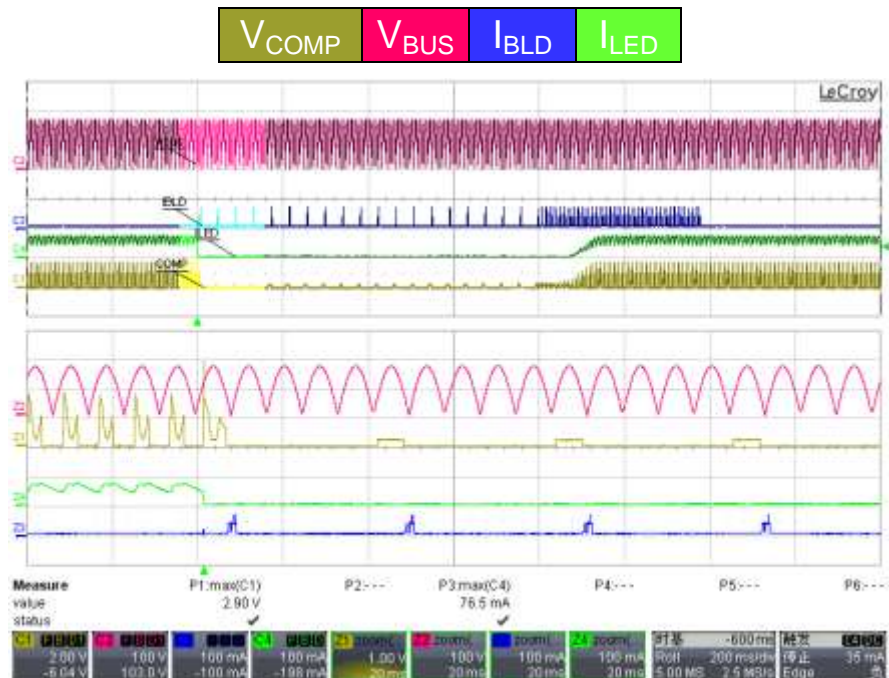
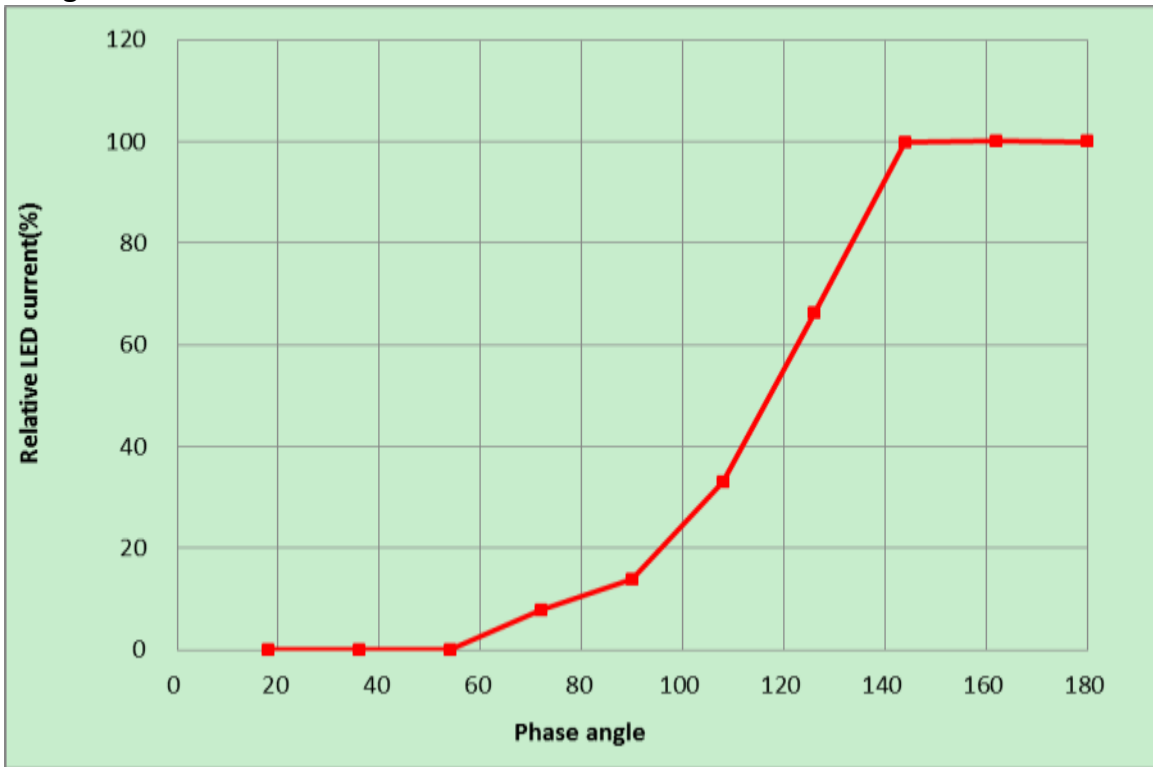


Figure 14: LED Short Protection

Dimming Curve:



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