AL3022EV1 User Guide

General Description

The AL3022 is a constant 140kHz, voltage mode, external compensation boost controller. AL3022 has low reference voltage and make it ideal for low cost LED backlight supplies. AL3022 can support PWM dimming and Analog dimming.

The AL3022 employs complete protection to ensure system security. The device integrates Under Voltage Lockout, Over Voltage Protection, Over Current Protection, Vout short and Over Temperature Protection to protect the circuit.

To satisfy the requirements for small mounting space constraints, this IC is available in SOIC-8 package to save space.

Applications

- LED TV
- LED Monitor
- LED Display Module

Key Features

- Voltage Mode PWM Controller
- Low 0.2V Reference Voltage
- Fixed 140KHz Frequency
- External PWM Dimming and Analog Dimming
- Low Shutdown Current (0.1μA)
- External Compensation
- Built-in UVLO Function
- Built-in OVP
- Built-in OTP
- Built-in OCP
- Built-in VOUT Short to GND Protection

AL3022EV1 Specifications

Parameter	Value
Input Voltage	24VDC
LED Current	480mA
Number of LEDs	19 LEDs in series
XYZ Dimension	77mm x 62mm*20mm

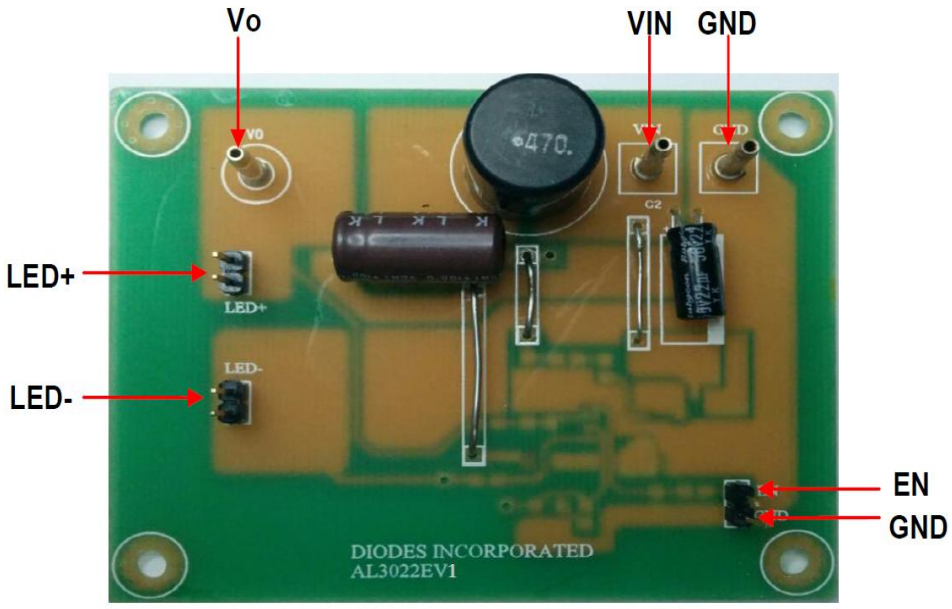


Figure 1: Top View

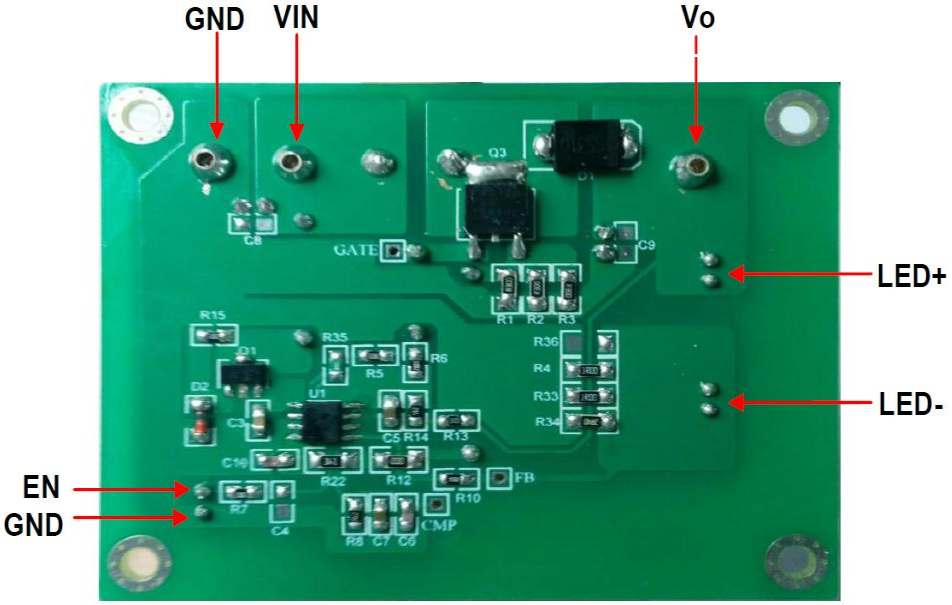


Figure 2: Bottom View

Connection Instructions

Power Supply Input: 24V$_{DC}$ (VIN, GND)
Enable Signal Input: 5V $_{DC}$ (EN, GND)
PWM Signal Input: (EN, GND)
LED Outputs: LED anode (LED+), LED cathode (LED-)

Evaluation Board Schematic

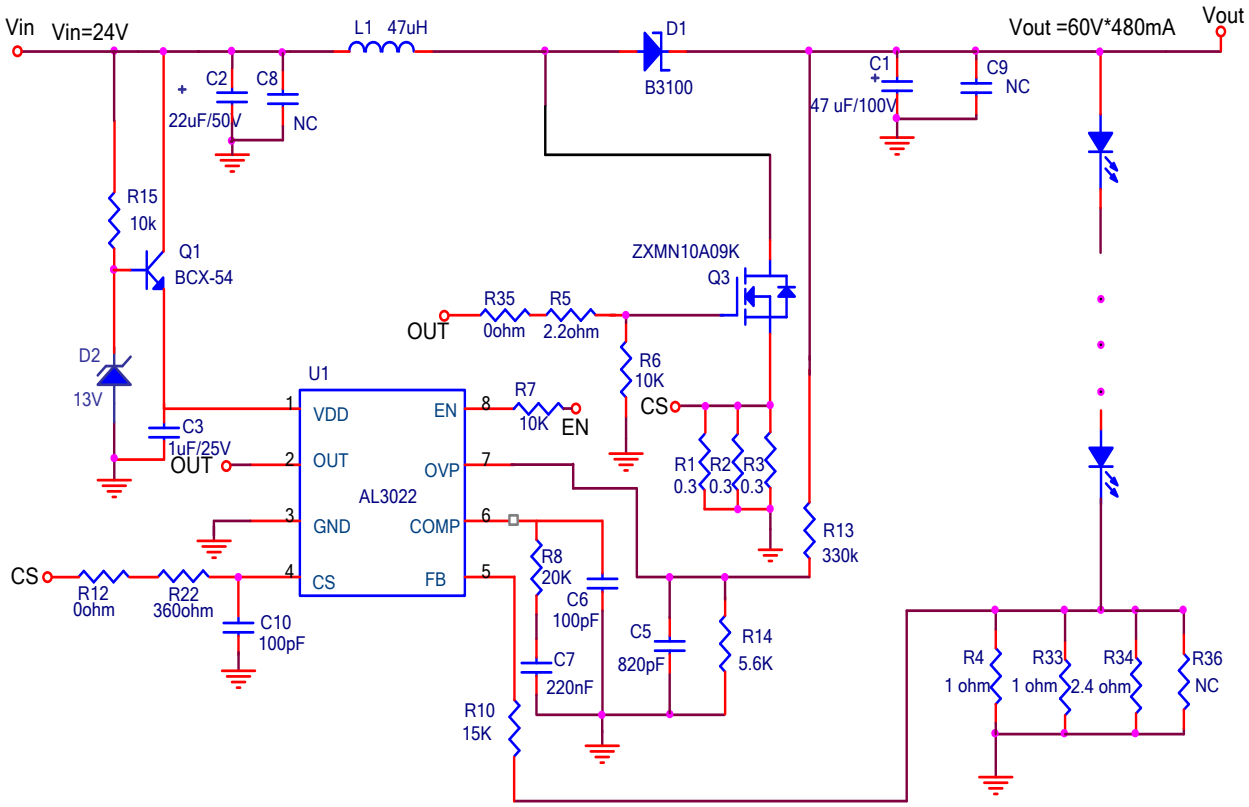


Figure 3: Evaluation Board Schematic

Evaluation Board Layout

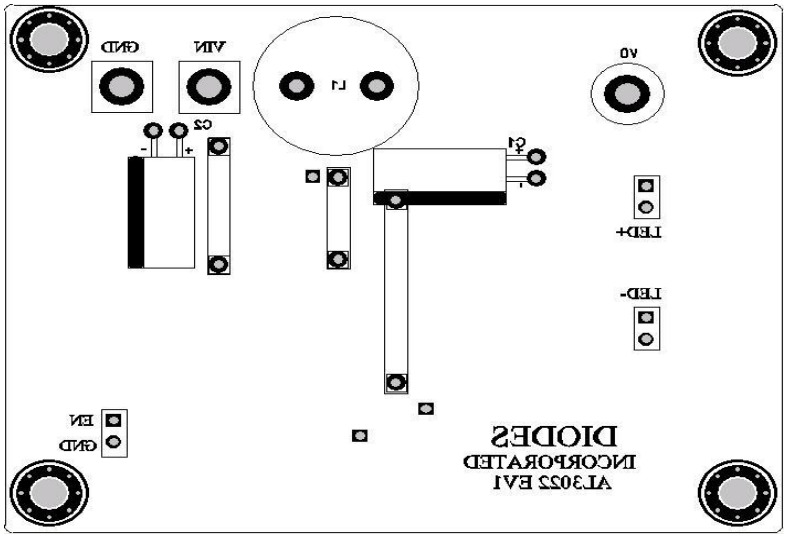


Figure 4: PCB Board Layout Top View

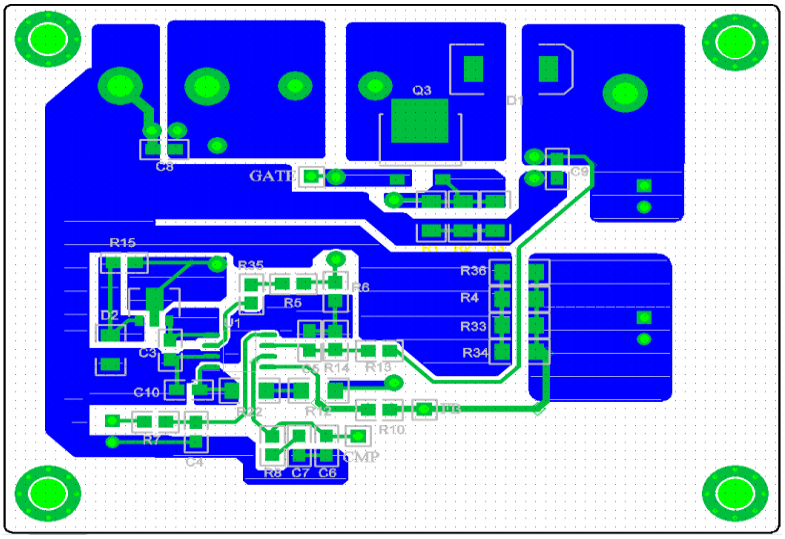


Figure 5: PCB Board Layout Bottom View

Quick Start Guide

1. Connect the anode wire of external LED string to LED+.
2. Connect the cathode wire of external LED string to LED-.
3. Power Supply: Connect the 24V$_{DC}$ to Vin & GND pin to supply AL3022.
4. Enable the IC: Connect 3.3V$_{DC}$ to EN & GND pin to enable the circuit.
5. PWM Dimming: Connect a synchronal PWM signal to EN pin to dim the LEDs.
6. Analog Dimming: Connect a DC voltage ranging from 0.8V to 2.4V to EN pin to dim the LEDs.

Bill of Material

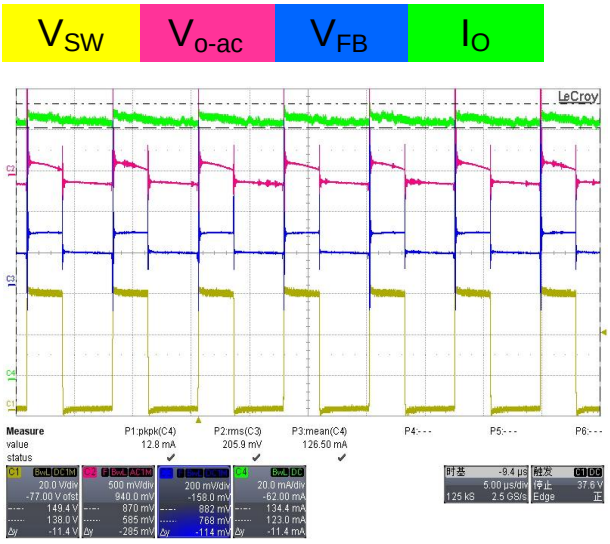
#	Name	Quantity	Package	Description
1	U1	1	SOIC-8	Diodes Inc : AL3022
2	C1	1	Φ6	47uF/100V Electrolytic
3	C2	1	Φ6	22uF/50V Electrolytic
4	C3	1	0805	1uF/16V, Ceramic X7R
5	C5	1	0805	820pF/16V, Ceramic X7R
6	C6,C10	2	0805	100pF/16V, Ceramic X7R
7	C7	1	0805	220nF/16V, Ceramic X7R
8	Q3	1	DPAK	Diodes Inc : ZXMN10A09K,100V/7.7A;
9	D1	1	SMC	Diodes Inc : B3100,100V/3A
10	D2	1	POWERDI123	Diodes Inc : DFLZ13,13V Zener
11	Q1	1	SOT89	Diodes Inc : BCX54
12	L1	1	DIP-2	47uH/3A
13	R1,R2,R3	3	1206	0.3Ω, 1% precision
14	R5	1	0805	2.2Ω, 5% precision
15	R6,R7,R15	3	0805	10kΩ, 5% precision
16	R8	1	0805	20kΩ, 5% precision
17	R10	1	0805	15kΩ, 5% precision
18	R12	1	1206	0Ω, 5% precision
19	R13	1	0805	330kΩ, 5% precision
20	R14	1	0805	5.6kΩ, 5% precision
21	R22	1	1206	360Ω, 5% precision
22	R4,,R33	2	1206	1Ω, 5% precision
23	R34	1	1206	2.4Ω, 5% precision
24	R35	1	0805	0Ω, 5% precision

Efficiency and Thermal Test

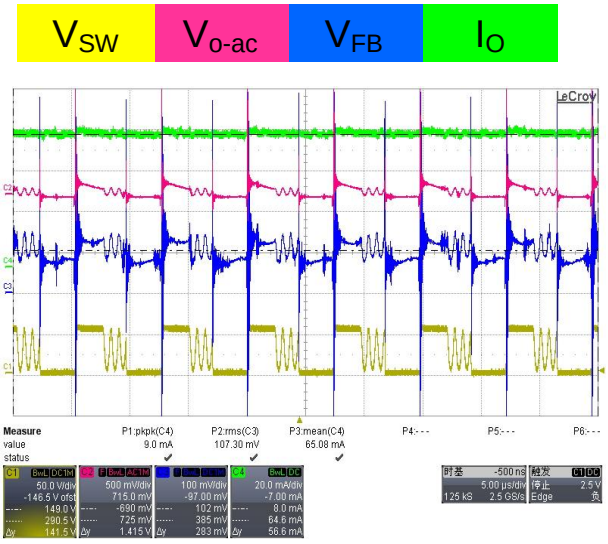
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Efficiency (%)	U1 Temp(℃)	Q3 Temp(℃)	D1 Temp(℃)	L1 Temp(℃)
23.94	1.287	58.89	0.482	92	43.2	55.2	54.7	56.6

Functional Waveforms

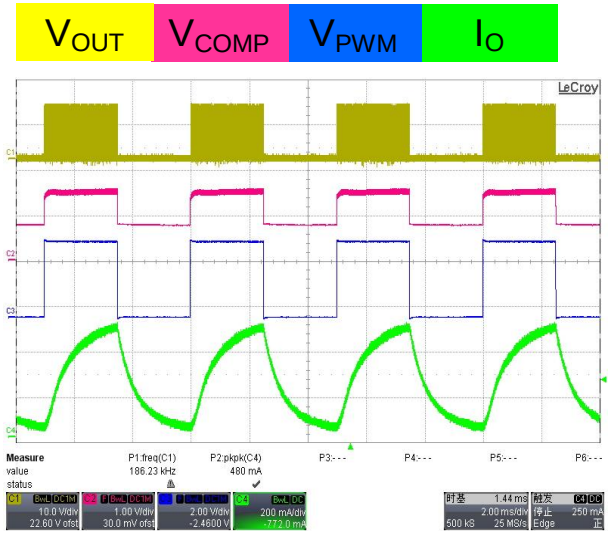
Waveforms:



Operation Waveform
(Vin=24V,VEN=5V, Vout=60V, Iout=480mA)



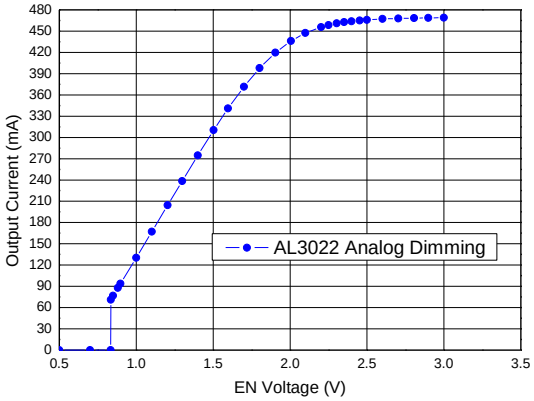
Analog Dimming Waveform
(Vin=24V, VEN=1.28V, Vout=60V, Iout=240mA)



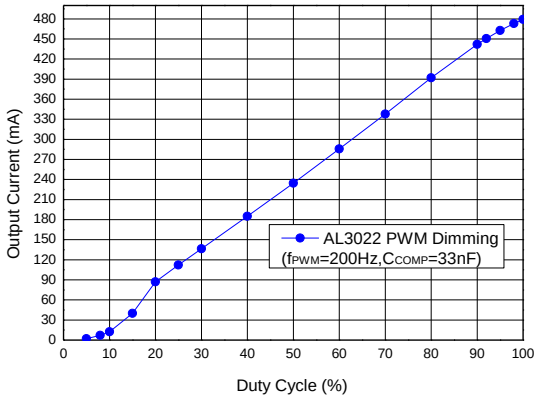
PWM Dimming Waveform

(Vin=24V, C7=33nF, f_{PWM}=200Hz, Duty=50%)

Functional Data Curves



Analog Dimming
Output Current VS EN pin Voltage



PWM Dimming
Output Current VS Duty Cycle

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