AL5819EV1 User Guide

ADJUSTABLE 36V LINEAR LED DRIVER

General Description

The AL5819 is a 36V low-dropout linear LED driver offering excellent temperature stability and adjustable output current handling capability. The AL5819 simplifies the design of linear and isolated or non-isolated LED drivers by setting the LED current with standard value resistors. It is a simple and elegant solution to deliver constant current for a single LED string.

The AL5819 has an open-drain output that can swing up to 36V, enabling it to drive long LED chains. Its RSET pin is outside of the LED current path and regulated accuracy while minimizing the required overheads to regulate the LED current. This reduces its power dissipation when compared to traditional linear LED drivers.

The AL5819 is available in the SOT26 (Type SM) package.

Applications

- LED strips
- LED displays and channel letters
- Architectural and landscape lighting
- Retail lighting in fridges, freezer cases, and vending machines
- Signage and decorative LED lighting

Key Features

- Up to 36V Vin Open-Drain Output
- Support up to 100mA Output Current
- -40°C to +125°C Temperature Range
- 5kV ESD HBM for VIN Pin, 2kV ESD HBM for All Other Pins
- No External Capacitor Required for Normal Operation
- Support LED Dimming Through Power Supply Vin
- Support LED Dimming Through RSET Control
- Connect Devices in Parallel to Increase Output Current
- High LED Current Tolerance: ±5% @ 30mA
- Low Dropout Voltage on LED Pin: 250mV Max @ 60mA
- High Power Supply Rejection
- Low Temperature Drift
- Thermal Fold Back

AL5819EV1 Specifications

Parameter	Value
Input Voltage	$5V_{DC}$ to $36V_{DC}$
LED Current	30/50/100mA
Number of LEDs	1~11 pcs
XY Dimension	48mm x 43mm

EVB Physical Pictures

Figure 1: Top View

Figure 2: Bottom View

Connection Instructions

- Power Supply Input: 4.5~16V_{DC} (VIN, GND).
- Connect LED string between “HS LED+” and “HS LED-” for high-side connection.
- Connect LED string between “LS LED+” and “LS LED-” for low-side connection.
- For PWM dimming operation: supply a 0-3.3V 200Hz~500Hz signal between PWM & GND.

Quick Start Guide

1. By default, the LED current of the evaluation board is preset at 50mA per channel.
2. Ensure that the DC source is switched OFF or disconnected before soldering or connecting.
3. For LED high-side connection:
   - Connect the anode wire of the external LED string to **HS LED+**.
   - Connect the cathode wire of the external LED string to **HS LED-**.
   - J1 and J4 are open; J2 and J3 are shorted by Jumper (Default).
   - For PWM dimming operation, J1, J3, and J4 are open; J2 is shorted by Jumper.
4. For LED low-side connection:
   - Connect the anode wire of the external LED string to **LS LED+**.
   - Connect the cathode wire of the external LED string to **LS LED-**.
   - J1 and J2 are open; J3 and J4 are shorted by Jumper.
   - PWM dimming operation is **NOT** supported in low-side connection.
5. Connect two DC-line wires to the VIN and GND terminals on the evaluation board.
6. 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.
7. Turn on the main switch. The LED string should light up.

Evaluation Board Schematic

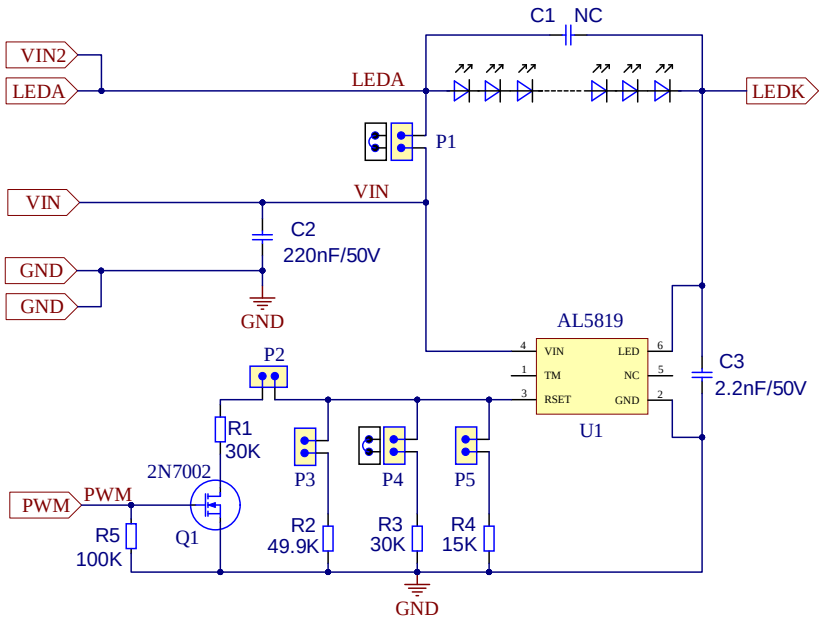


Figure 3: Evaluation Board Schematic

Evaluation Board Layout

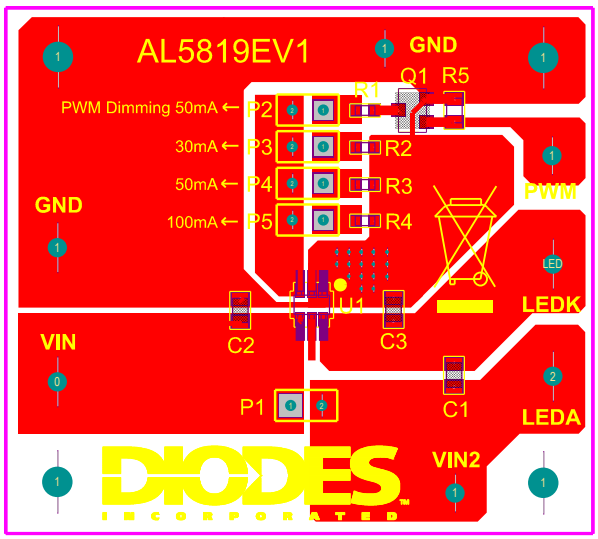


Figure 4: PCB Top Layer View

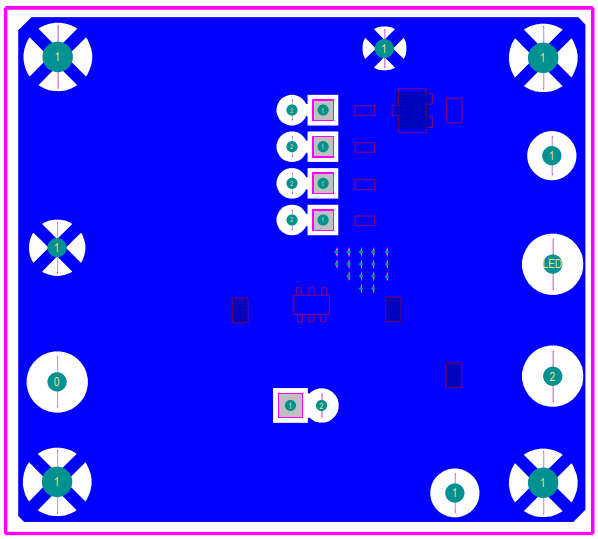
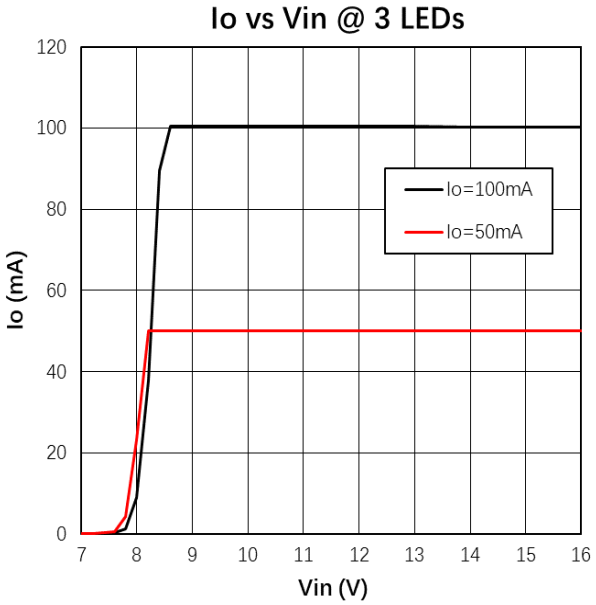


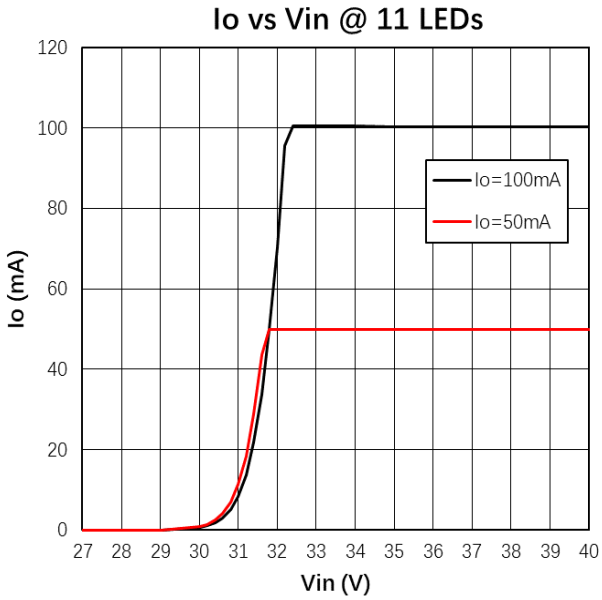
Figure 5: PCB Bottom Layer View

Bill of Materials

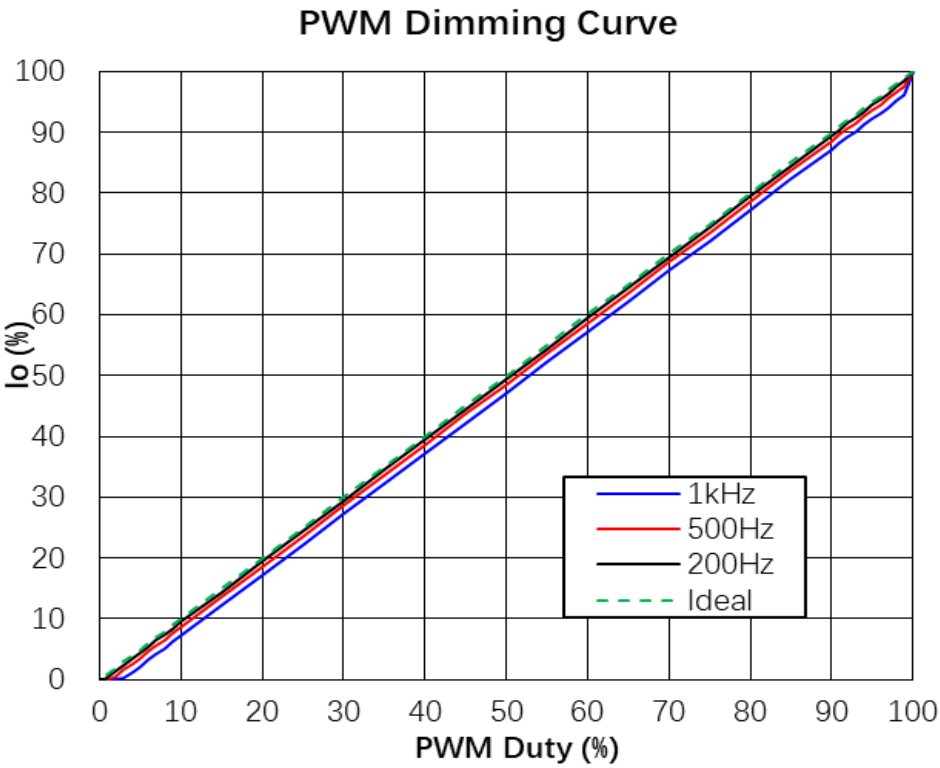
Location	Description	Package
R1,R3	30K ohm, 1%	0603
R2	49.9K ohm, 1%	0603
R4	15K ohm, 1%	0603
R5	100K ohm, 5%	0805
C2	MLCC, 220nF, 50V, X7R, 0805,CL21B224KBFNNNE,SAMSUNG(三星)	0805
C3	MLCC, 2.2nF, 50V, X7R, 0805,CC0805KRX7R9BB222,YAGEO(国巨)	0805
U1	IC, AL5819, DIODES	SOT26
Q1	MOSFET, 2N7002-7-F, 60V, DIODES	SOT-23
P1, P2, P3, P4, P5	Connector, 2pin, pitch=2mm	DIP
PWM, VIN2	Connector, Orange color	DIP
GND	Connector, Black color	DIP
LEDK	Connector, White color	DIP
LEDA	Connector, Red color	DIP
on P1, P4	2-PIN Jumper, pitch=2mm	DIP

System Performance





PWM Dimming Curve
Test @VIN=12V, LED voltage=5.3V



Waveforms

Turn ON:

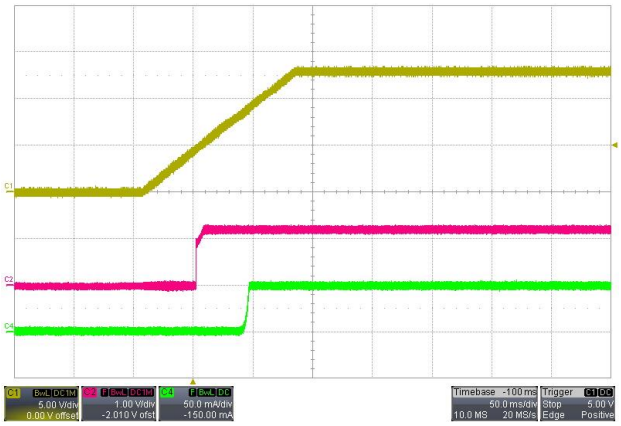


Figure 6 High-Side Startup

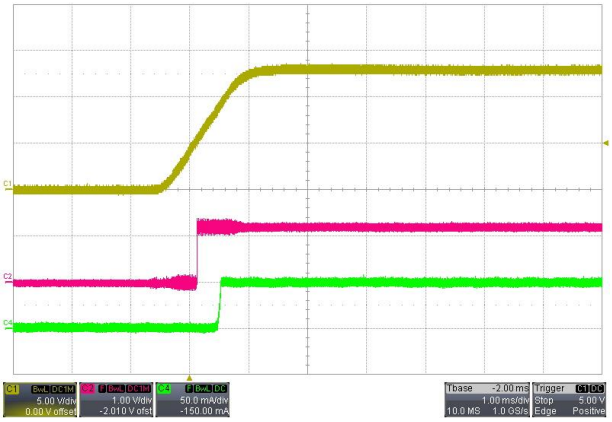


Figure 7 Low-Side Startup

Ripple Current:

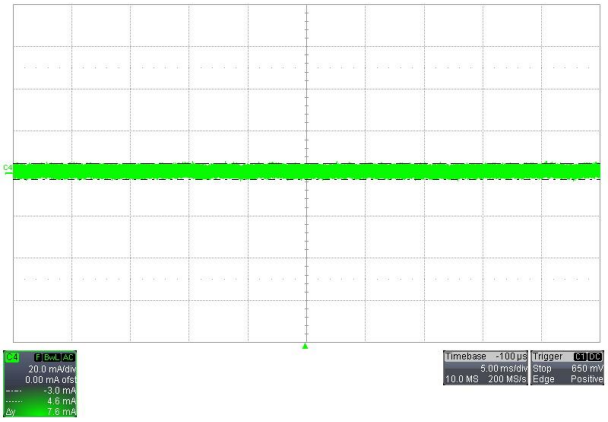


Figure 8 Ripple Current @ Vin=9V

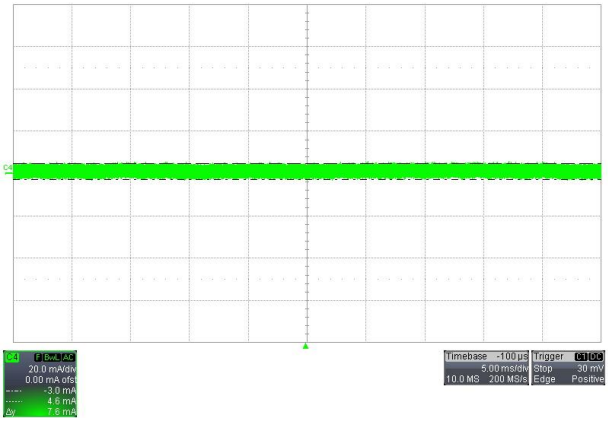
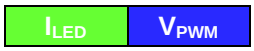


Figure 9 Ripple Current @ Vin=16V



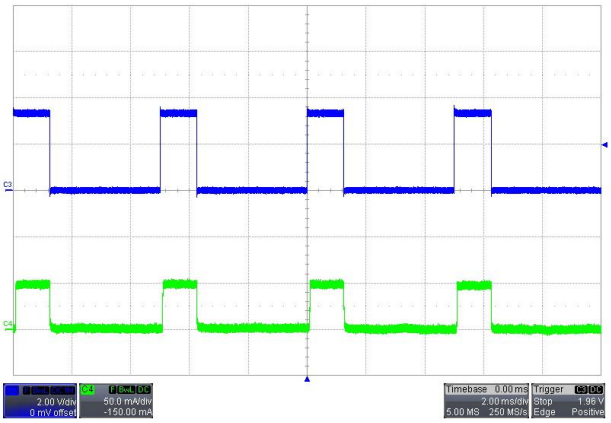


Figure 10 PWM Duty=25%

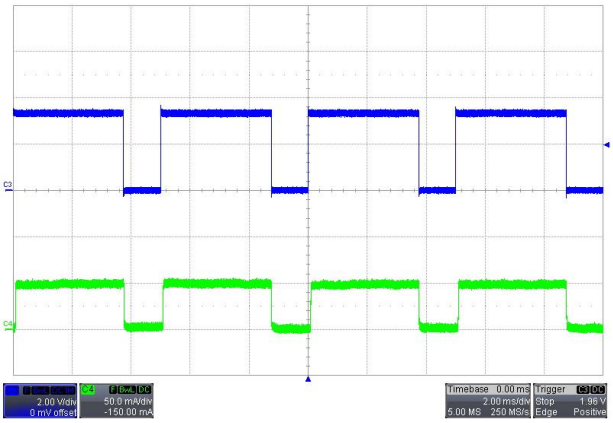


Figure 11 PWM Duty=75%

Thermal Test

IC Tc = 58.8℃ @ ambient = 22.8℃ @VIN-VLED=4V, Io=100mA, temperature rise is about 36℃.

IC Tc = 39.8℃ @ ambient = 21.5℃ @VIN-VLED=2V, Io=100mA, temperature rise is about 18.3℃.

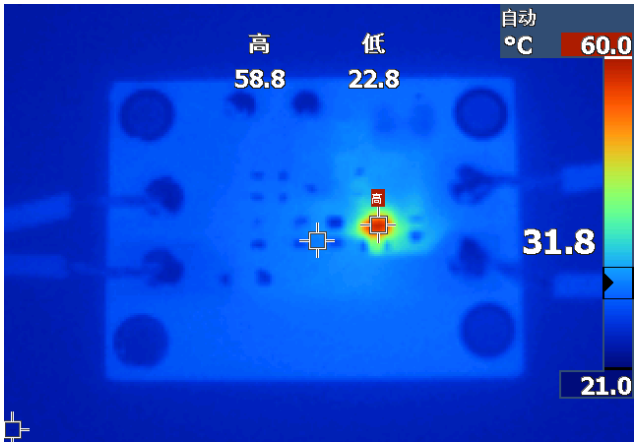


Figure 12 Thermal V_{LED} = 4V ΔT=36℃

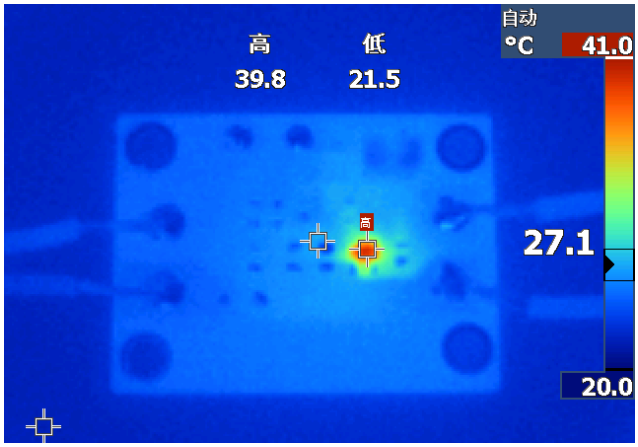


Figure 13 Thermal V_{LED} = 2V ΔT=18.3℃

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