

General Description

This demonstration board utilizes the AP3041 high voltage low-side N-channel MOSFET controller ideal for boost regulators. It contains all the features needed to implement single-ended primary topology DC/DC converters. The input voltage of AP3041 ranges from 5V to 27V. Its operation frequency is adjustable from 100kHz to 1MHz.

The AP3041 has UVLO (Under Voltage Lock Out) circuit. It uses two external resistors to set the UVLO voltage. The AP3041 also has an over output voltage protection to limit the output voltage. The OVP voltage can be set through external resistors. If the output voltage is higher than the OVP high threshold point, it will disable the driver and the system is latched up. The output short circuit protection as well as LED low side short to ground detection function can be applied in system.

The AP3041 has other protection functions, such as LED short protection, LED high side short to ground protection, diode short protection, over current protection, over temperature protection and so on.

Applications

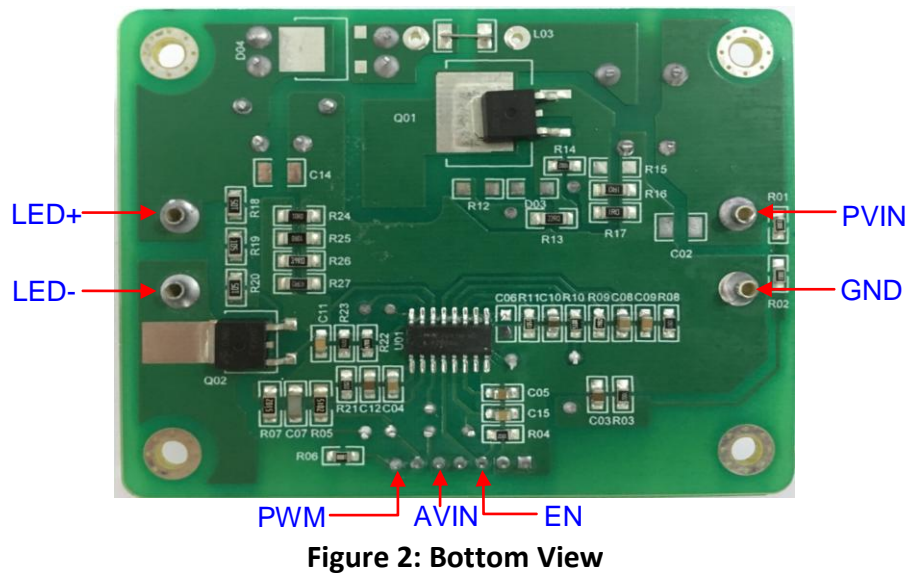
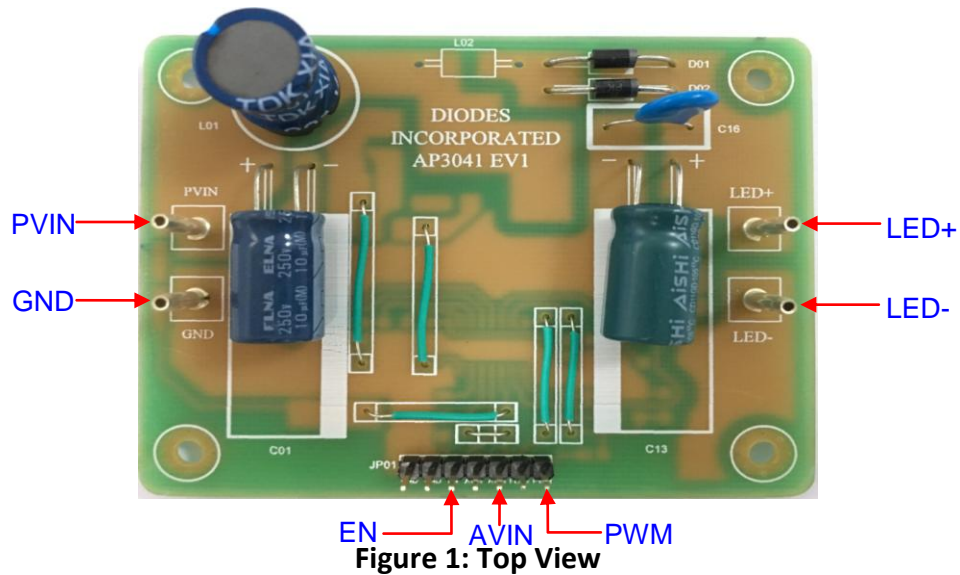
- LED Lighting
- LED TV
- LCD Display Modules

Key Features

- Input Voltage Range: 5V to 27V
- 1A Peak and 10V MOSFET Gate Driver
- 20ns Quick MOSFET Gate Driver
- Duty Cycle Limit of 90%
- Programmable UVLO
- PWM Dimming Control
- Programmable Over Voltage Protection
- LED Open Protection
- LED Short Circuit Protection
- Diode Short Circuit Protection
- Output Short Circuit Protection
- LED Low-side Short to Ground Detection
- OV Pin Under Voltage Protection
- Over Current Protection
- Programmable Slope Compensation
- Adjustable Soft-start
- Adjustable Protection Delay
- Fault Status Indication
- Adjustable Operation Frequency from 100kHz to 1MHz
- Over Temperature Protection

AP3041EV1 Specifications

Parameter	Value	
Input Voltage	IC	12VDC
	System	100VDC
LED Current	125mA	
Number of LEDs	60 LEDs in series (Vo=195V)	
XYZ Dimension	80mm x 65mm x 18mm	



Connection Instructions

- Power Supply Input: 100V_{DC} (PVIN, GND)
- IC Power Supply Input: 12V_{DC} (AVIN, GND)
- Enable Signal Input: 5V_{DC} (EN, GND)
- PWM Signal Input: (PWM, GND)
- LED Outputs: LED+ (LED+), LED- (LED-)

Evaluation Board Layout

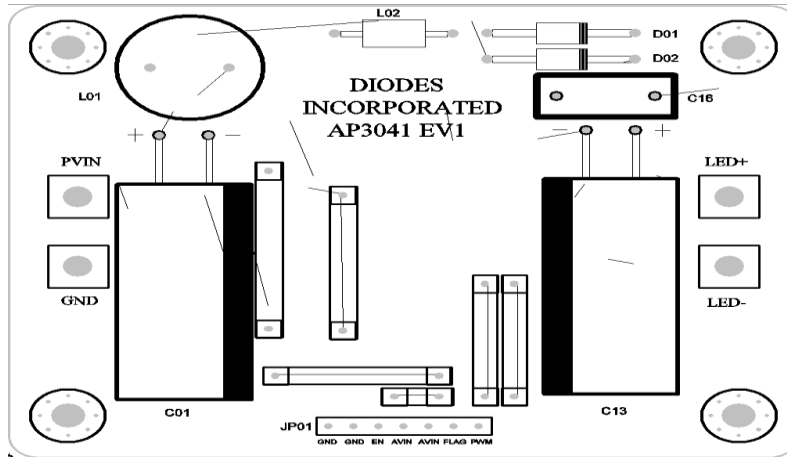


Figure 4: PCB Board Layout Top View

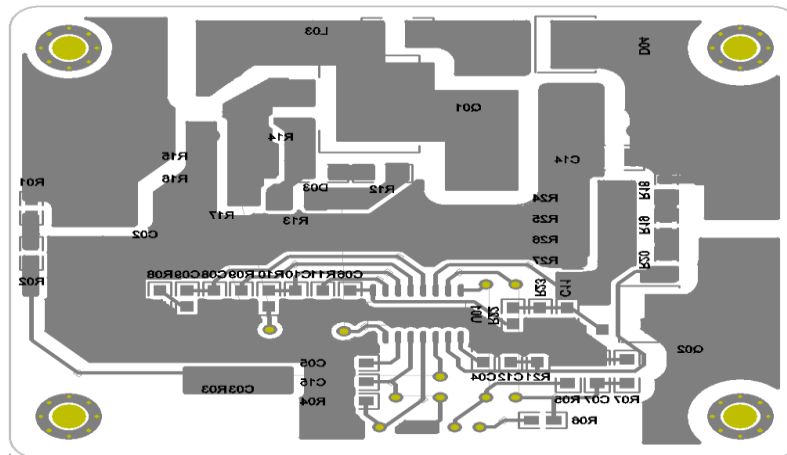


Figure 5: PCB Board Layout Bottom View

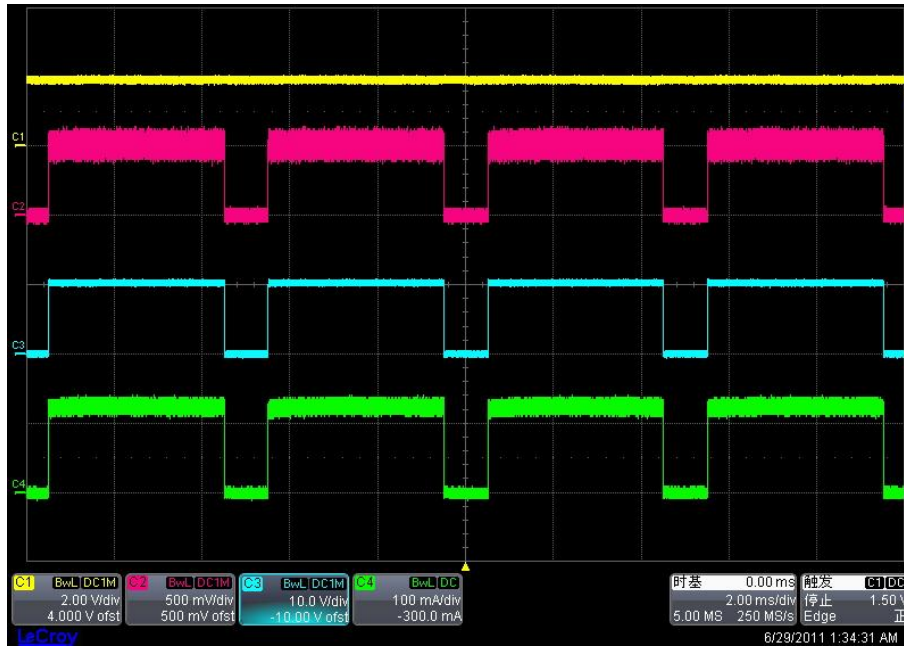
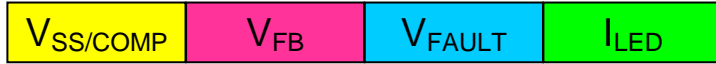
Quick Start Guide

1. By default, the evaluation board is preset at 125mA LED Current.
2. Connect the anode wire of external LED string to LED+ pin.
3. Connect the cathode wire of external LED string to LED- pin.
4. System Power Supply: Apply 100Vdc to PVIN & GND pin.
5. Enable the IC: Apply 12Vdc to AVIN & GND pin, and apply 5Vdc to EN & GND pin to enable AP3041.
6. Dimming Signal: Apply a synchronal PWM signal ($V_{pp}=5V$) to PVIN & GND pin to dim the LEDs. When the dimming function is not applied, please apply 5 Vdc to PVIN & GND pin.
7. LED string should light up after 4~6 steps.

Bill of Material

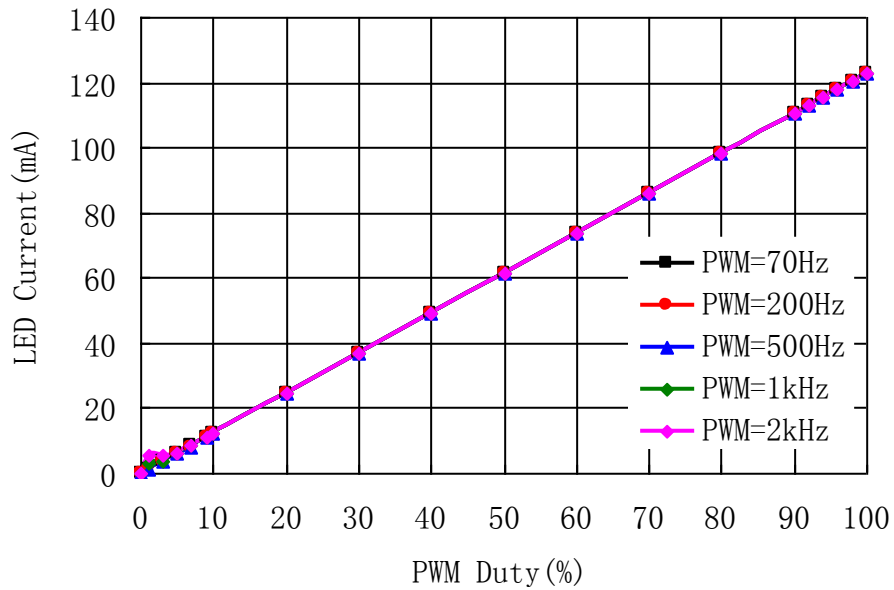
#	Name	Quantity	Package	Description
1	U01	1	SO-16	AP3041
2	C01	1	RAD-0.2	250V/10uF
3	C13	1	RAD-0.2	400V/10uF
4	C03 C12	2	0805	1nF
5	C04 C15 C08	3	0805	0.1uF
6	C16	1	RAD-0.2	1000V/0.01uF
7	C07	1	1206	100pF
8	C10	1	0805	100pF
9	C09 C11	2	0805	10nF
10	C05	1	0805	1uF
11	C06	1	0805	NC
12	D01 D02	2	DO-41	MUR160
13	D03	1	LL-34	NC
14	L01	1	RAD-0.2	330uH
15	L02	1	CASE 59-04	WIRE JUMPER
16	Q01 Q02	2	DPAK	DMG4N60SK3
17	R06	1	0805	100
18	R24 R25	2	1206	10
19	R03 R04 R14	3	0805	10k
20	R11	1	0805	150K
21	R18 R19 R20	3	0805	1M
22	R16 R17	2	1206	1
23	R08	1	0805	1k
24	R21	1	0805	22K
25	R13	1	1206	22
26	R01 R02	2	0805	300k
27	R09	1	0805	39K
28	R26	1	1206	39R
29	R22	1	0805	47R
30	R27	1	1206	47R
31	R10	1	0805	511
32	R23	1	0805	51K
33	R05 R07	2	1206	51k
34	C02 C14 R12 R15	4	1206	NC

Functional Waveforms



PWM Dimming Waveform (Dimming=200Hz; Duty=80%; ILED=120mA)

Functional Data Curves



PWM Dimming (Output Current vs. Duty Cycle)

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

- A. Life support devices or systems are devices or systems which:
 - 1. are intended to implant into the body, or
 - 2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.
- B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2013, Diodes Incorporated

www.diodes.com