A6216 Evaluation Board User Guide

DESCRIPTION

The A6216 is a single-IC switching regulator that provides constant-current output to drive high-power LEDs. It integrates a high-side N-channel DMOS switch for DC-to-DC step-down (buck) conversion. It can accept input voltage from 4.5 V to 55 V, to drive a single LED string up to 2 Amps. This evaluation board and its user guide provide an easy way to demonstrate the operations of A6216.

EVALUATION BOARD CONTENTS

- A6216 Evaluation Board

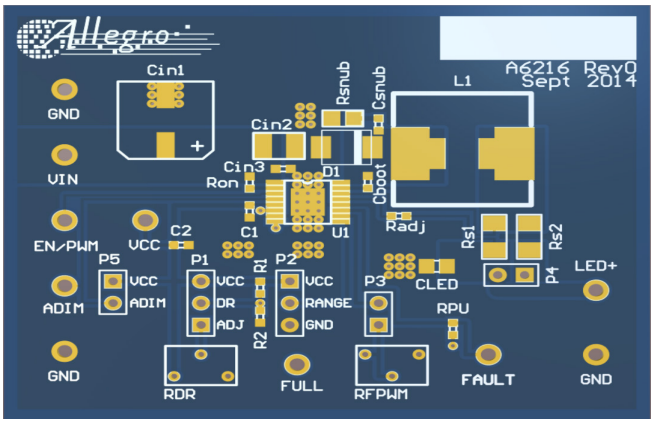

Figure 1: A6216 Evaluation Board

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USING THE EVALUATION BOARD

The following section describes the steps to set up and covers the jumper settings of the A6216 evaluation board.

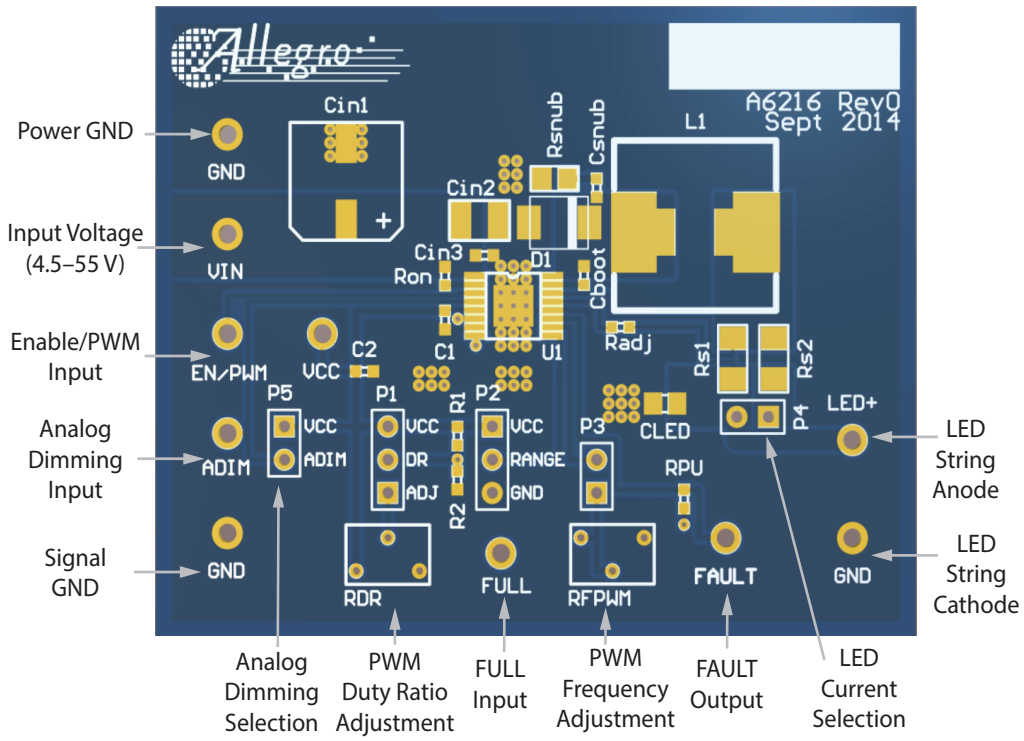

Figure 2: A6216 evaluation board connections

Setup

1. Connect a LED string with suitable current rating between LED+ (anode) and GND (cathode)
2. Select jumper settings for required operation mode (see Jumper Selection table for details)
3. Connect input power between VIN and GND. Valid VIN range is between 4.5 V and 55 V. For LED current regulation, the minimum input voltage must be higher than the LED string's operating voltage. (Refer to "Minimum and Maximum Output Voltages" section in data sheet)
4. Connect EN/PWM to a logic high signal, or connect it to VIN. This will turn on the LED string.
5. For external PWM dimming: connect EN/PWM to a suitable logic signal (such as 0–3 V, 200 Hz, 50%). Vary the PWM duty cycle between 0.1% and 100% to control the brightness of LED string.

Jumper Selection

Jumper	Connection	Operating Mode
Analog Dimming Selection (P5)	ADIM–VCC	Analog dimming disabled. LED current at 100%
	Open	Control LED current level through ADIM voltage (Note: do not leave ADIM floating)
Internal PWM Mode (P1)	DR–VCC	Internal PWM always at 100% (Dimming can still be done through External PWM at EN/PWM pin)
	DR–ADJ	Internal PWM Duty Ratio is controlled by DR pin voltage (adjustable through potential meter RDR)
Internal PWM Range (P2)	RANGE–VCC	Internal PWM Duty Ratio between 5% and 100%
	RANGE–GND	Internal PWM Duty Ratio between 5% and 33% (for better accuracy at low DR pin voltage)
Internal PWM Frequency (P3)	Shorted	Adjust internal PWM frequency through RFPWM
	Open	Only allow when NOT using internal PWM
LED Current Selection (P4)	Shorted	LED current regulated at 1.5 A
	Open	LED current regulated at 1 A

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LED Current

The A6216 evaluation board has it output current set at either 1 A or 1.5 A, depending on jumper setting. If necessary, different output current can be programmed by changing the sense resistor.

$$R_{SENSE} = V_{CSREG} / i_{LED}$$

Where V_{CSREG} = 0.2 V typical.

Switching Frequency

Switching frequency is initially set at around 0.55 MHz for the evaluation board, but it can be changed (between 0.2 and 2.2 MHz) by changing the TON resistor.

$$f_{SW} = 1 / [k \times (R_{TON} + R_{INT})]$$

Where k = 0.00434, with f_{SW} in MHz, R_{TON} and R_{INT} (internal resistance, 20 kΩ) in kΩ.

Note that the default inductance of L1=47 cuH is suitable for f_{SW} < 1.5n MHz. At higher switching frequency, a lower inductance L1 should be used. Refer to “Inductor Selection Chart” in data sheet for details.

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SCHEMATIC

Figure 3 below shows the A6216 evaluation board schematic.

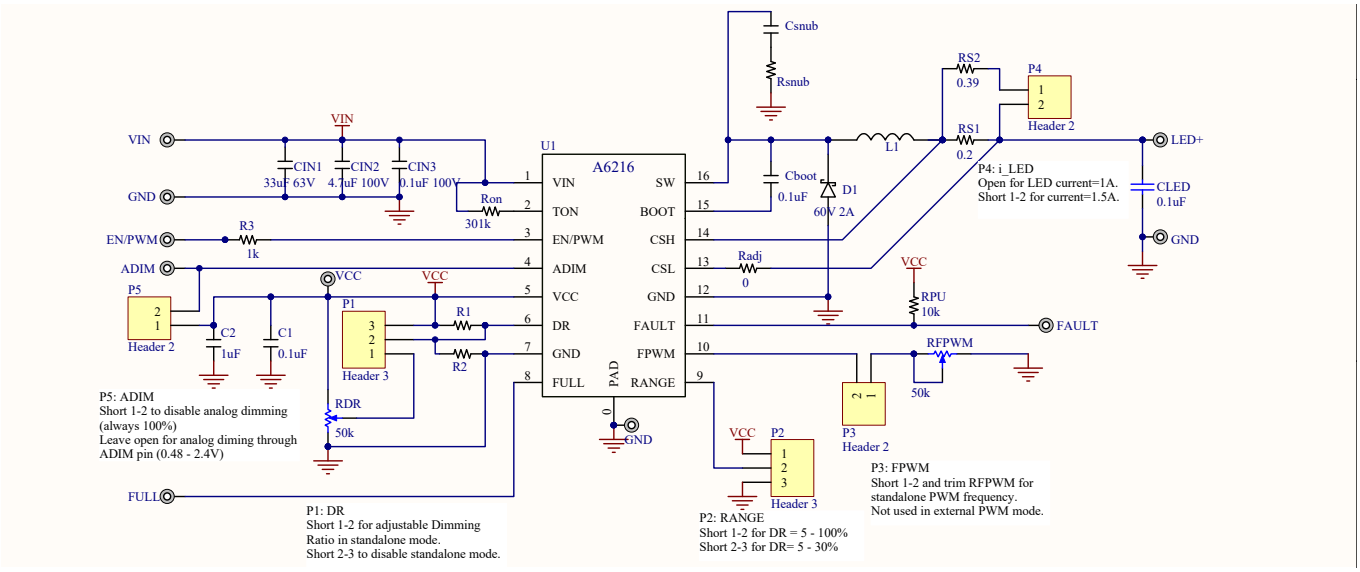

Figure 3: A6216 evaluation board schematic

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LAYOUT

The following figures show the PCB layout of the A6216 evaluation board.

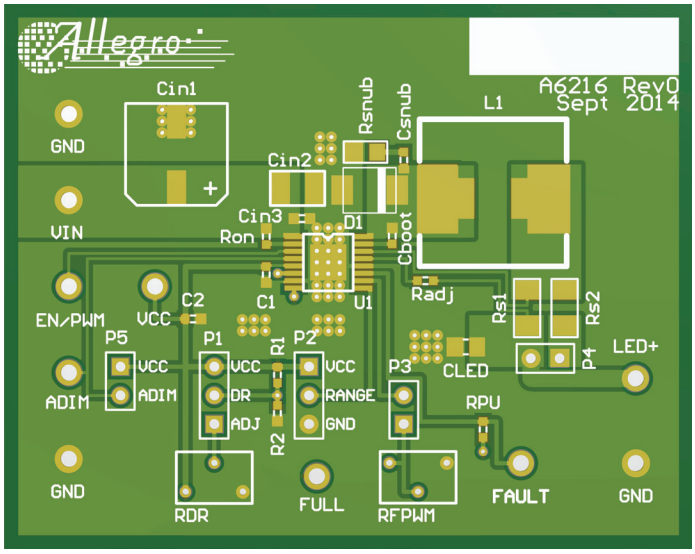

Figure 4: A6216 evaluation board PCB top layer

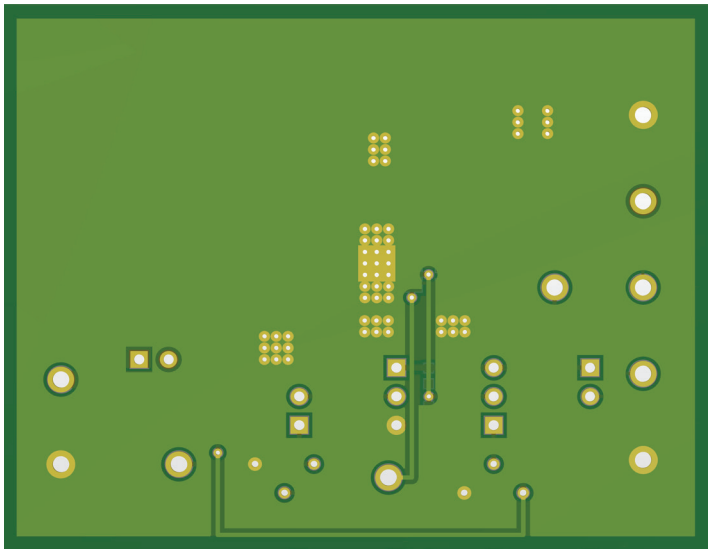

Figure 5: A6216 evaluation board PCB bottom layer

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BILL OF MATERIALS

Table 1: A6216 Evaluation Board Bill of Materials

Designator	Quantity	Description	Manufacturer	Manufacturer Part Number
C1, Cboot	2	CAP CER 0.1 µF, 10 V, 10%, X7R 0603	KEMET	C0603C104K8RACTU
C2	1	CAP CER 1 µF, 10 V, 10%, X7R 0603	TDK Corporation	C1608X7R1A105K080AC
Csnub	0	DNP		
CIN1	1	CAP 33 µF, 63 V, ELECT HXA SMD	Chemi-Con	HHXA630ARA330MHA0G
CIN2	1	CAP CER 4.7 µF, 100 V 20%, X7S 1210	TDK Corporation	C3225X7S2A475M200AB
CIN3	1	CAP CER 0.1 µF, 100 V. 20%, X7S 0603	TDK Corporation	CGA3E3X7S2A104M080AB
CLED	1	CAP CER 0.1 µF, 100 V, 20%, X7R 0805		
D1	1	DIODE SCHOTTKY 60 V, 2.1 A, DO214AC	Vishay	VS-10MQ060NTRPBF
L1	1	CDRH105RNP-470NC (47 µH 2 A, 30%, 130 mΩ, 10×10×5mm)	Sumida America Components, Inc.	CDRH105RNP-470NC
P1, P2	2	HEADER, 3-PIN		
P3, P4, P5	3	HEADER, 2-PIN		
R1, R2	0	DNP		
Radj	1	0 Ω		
Ron	1	392k 0.1 W, 1%		
RS1	1	0.20 Ω, 0.5 W 1%	Susumu	RL1632R-R200-F
RS2	1	0.39 Ω, 0.5 W 1%	Susumu	RL1632R-R390-F
Rsnub	0	DNP		
RDR	1	TRIMMER 50K Ω, 0.25 W, PC PIN	Bourns, Inc.	3266W-1-503LF
RFPWM	1	TRIMMER 50K Ω, 0.25 W, PC PIN	Bourns, Inc.	3266W-1-503LF
VIN, VCC, LED+	3	Test Point, Red	Keystone Electronics	5014
GND	3	Test Point, Black	Keystone Electronics	5014
EN, ADIM,FULL, FAULT	4	Test Point, Yellow	Keystone Electronics	5014
U1	1	A6216	Allegro MicroSystems	

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RELATED LINKS

https://www.allegromicro.com/en/products/regulate/led-drivers/led-drivers-for-lighting/A6214-a6216

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Revision History

Number	Date	Description
–	October 16, 2024	Initial release

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