

## General Description

The PAM2863 is a continuous mode inductive step-down converter, designed for driving single or multiple series connected LEDs efficiently from a voltage source higher than the LEDs voltage. The device operates from an input supply between 4.5V and 40V and provides an externally adjustable output current output current of up to 2A. Output current can be adjusted below the set value, by applying an external control signal to the VSET pin. The VSET pin will accept either a DC voltage or a PWM waveform

A bill of material, schematics, and layout are included that describes the parts used on this demonstration board along with measured performance characteristics. These materials can be used as a reference design.

## Key Features

- Low Components Count
- Internal 40V NDMOS Switch
- 2A Output Current
- Analog and PWM Dimming
- Efficiency up to 97%
- Soft Start
- Up to 1MHz Switching Frequency
- Open/Short Protection
- Thermal Shutdown

## Applications

- High End LED Flashlight
- LED Light Bar

## PAM2863EV1 Specifications

Parameter	Value
Input Voltage	5 to 40Vdc
LED Current	1.5A (Adjustable)
Number of LEDs	1, 2 (in series)
XYZ Dimension	1.6" x 1.2" x 0.4"

## Evaluation Board

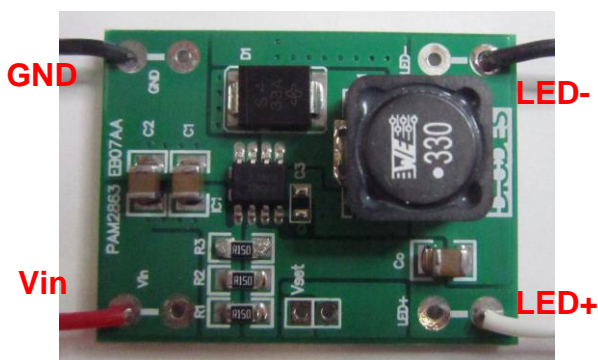


Figure 1: Top View

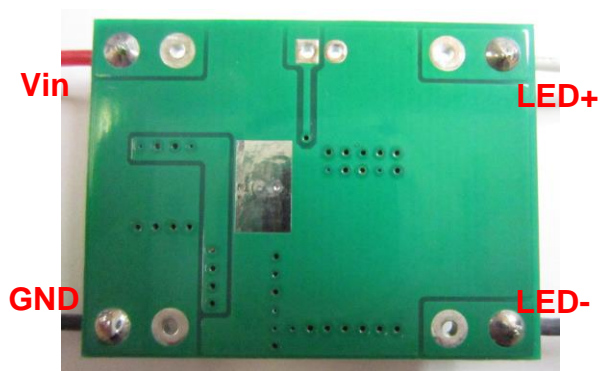


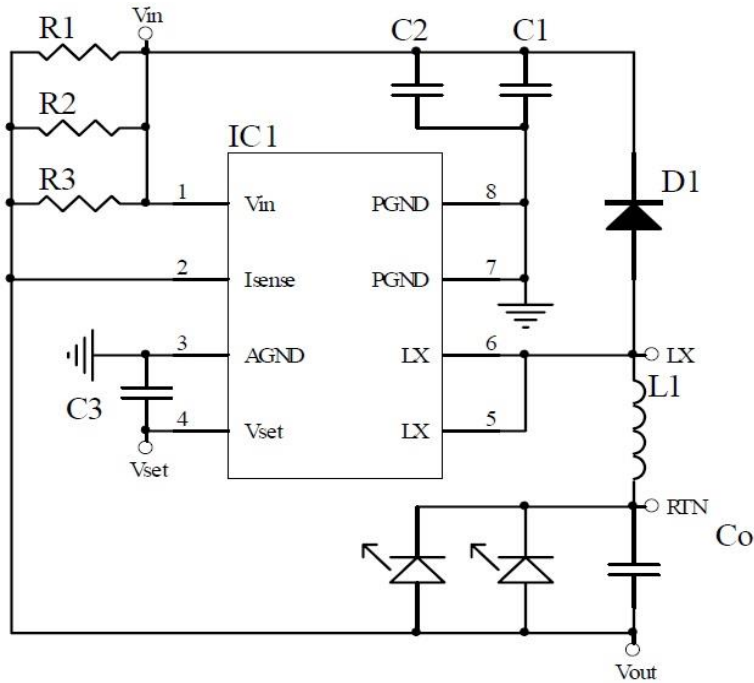
Figure 2: Bottom View

## Connection Instructions

Input Voltage: 8 to 40Vdc (VIN, GND)

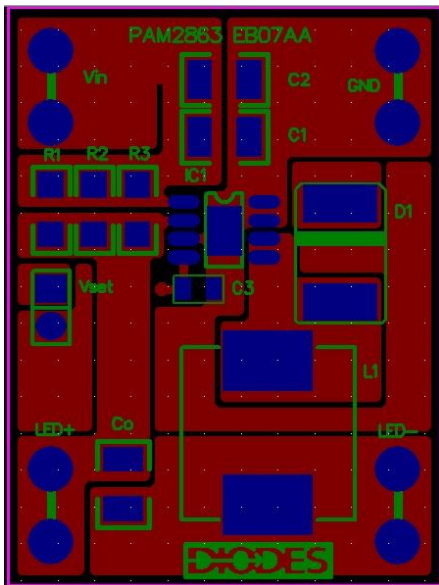
LED Outputs: LED+ (White), LED- (Black)

**Evaluation Board Schematic**

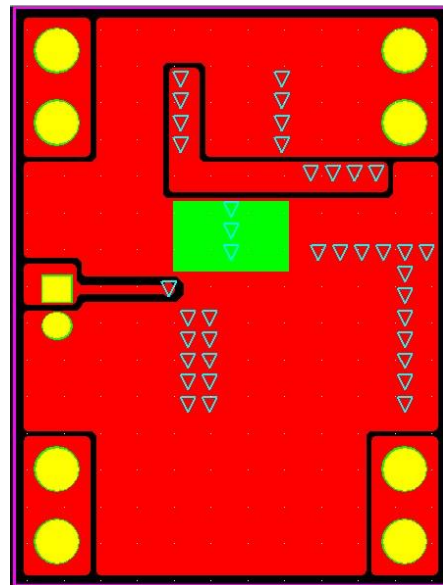


**Figure 3: Evaluation Board Schematic**

**Evaluation Board Layout**



**Figure 4: PCB Layout Top View**



**Figure 5: PCB Layout Bottom View**

## Quick Start Guide

1. By default, the evaluation board is preset at 2A LED Current by R1, R2, R3 (0.15 Ohm).
2. Ensure that the DC source is switched OFF or disconnected.
3. Connect the 5 to 40V<sub>DC</sub> DC line wires of power supply to Vin and GND on the board.
4. Connect the anode wire of external LED string to LED+ output test point.
5. Connect the cathode wire of external LED string to LED- output test point.
6. Turn on the main switch. LED string should light up.

## Bill of Material

#	Name	Quantity	Part number	Manufacturer	Description
1	IC1	1	PAM2863	Diodes Inc	LED Driver PSOP-8 (EP)
2	C1,C2, C <sub>o</sub>	3	UMK325BJ106KM-T	Taiyo	10μF Cer Cap 50V 10% X5R 1210
3	C3	0	Not Fitted		
4	R1,R2, R3	3	RL0805FR-070R15L	Yageo	0.15Ω Resistor 1/8W 5% 0805 SMD
5	L1	1	744770133	Würth	33μH, 3.2A Inductor SDR127
6	D1	1	SS34-E3/57T	Vishay	3A/40V Schottky diode SMC
7	Vset	0	Not Fitted		
8	PCB	1	PAM2863 EB07AA		

## Functional Performance (1 LED, 2 LEDs @1.5A)

V <sub>in</sub> (DC)	P <sub>in</sub> (W)	V <sub>out</sub> (V)	I <sub>out</sub> (mA)	P <sub>out</sub> (W)	Efficiency (%)	# of LEDs
5	4.663	3.55	1061	3.76	80.73	1
6	6.175	3.61	1267	4.57	74.07	
8	6.505	3.63	1315	4.77	73.38	
10	6.228	3.63	1325	4.81	77.21	
12	6.337	3.63	1337	4.85	76.59	
V <sub>in</sub> (DC)	P <sub>in</sub> (W)	V <sub>out</sub> (V)	I <sub>out</sub> (mA)	P <sub>out</sub> (W)	Efficiency (%)	# of LEDs (in series)
8	8.412	6.83	1095	7.48	88.87	2
12	10.934	6.94	1303	9.05	82.74	
24	11.589	6.96	1370	9.54	82.31	
30	12.132	6.97	1400	9.75	80.40	
36	12.615	6.97	1420	9.89	78.42	
40	12.310	6.97	1420	9.76	79.25	

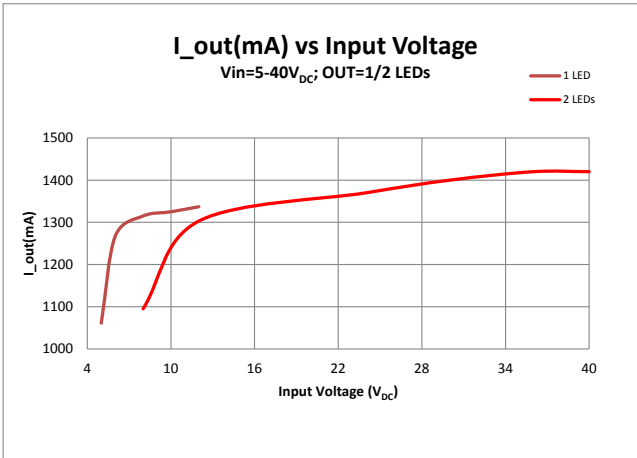


Figure 6 Vin (DC) vs. Iout (mA)

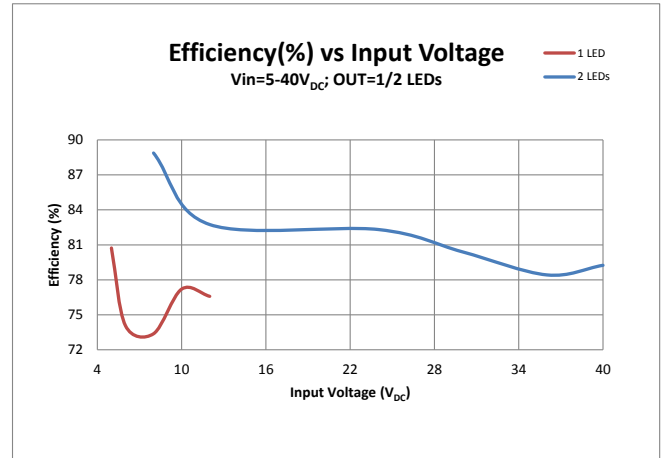


Figure 7 Vin (DC) vs. Efficiency (%)

## Application Information

### Setting the Output Current:

The internal feedback (FB) voltage is 0.1V (Typical). The output current is calculated as below:  
 $I_{LED} = 0.1/R_S$  where  $R_S = R1//R2//R3$

The output Current is given by the following table.

$R_S$ ( $\Omega$ )	$I_{LED}$ (mA)
0.05	2000
0.067	1500
0.1	1000
0.13	760
0.15	667
0.3	333

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## PCB Layout Guidelines

- (1) Connect L1, LX, D1 with short and wide connections. Minimize the switching circuit area to avoid unexpected radiation.
- (2) Make sure the LX trace not across other sensitive traces.
- (3) Place the Iset resistor R1, R2, R3 as close to the sense pin as possible. This resistor will flow through large current, pay attention to the thermal dissipation.
- (4) Make sure the current flow path has a wide trace. When current path need vias, use the multiple vias to decrease impedance.
- (5) PAM2863 integrates the power MOSFET and has a thermal pad. Make sure the thermal pad is soldering to PCB and heat dissipation area is large enough.
- (6) Pay attention to the D1 and L1 thermal dissipation.

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