

LM3485 LED Demo Board

National Semiconductor
Application Note 1392
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Introduction

The LM3485 LED driver board is a buck regulator derived controlled current source designed to drive high power, high brightness LEDs (HBLEDs) such as the Luxeon™ Emitter at dissipations of 1W to 5W. The board can accept an input voltage ranging from 5V to 30V and can control the output current delivered to series and/or parallel arrays of HBLEDs as long as the forward voltage of all LEDs in series is less than $(0.9 \times V_{IN})$. The accuracy of the output current is $\pm 10\%$.

Setting the LED Current

The forward current I_F delivered to the LED array is set by the program jumper, P2. If no jumper is installed, the LM3485 will default to the lowest current setting, 350 mA. Installing a jumper as shown in *Figure 1* will change the current regulation point to 700 mA, 1000 mA, or 1400 mA, respectively.

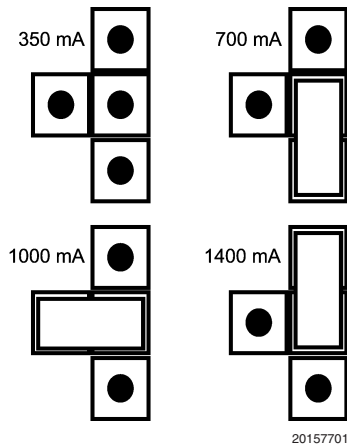


FIGURE 1. Current Settings of P2

PWM Dimming

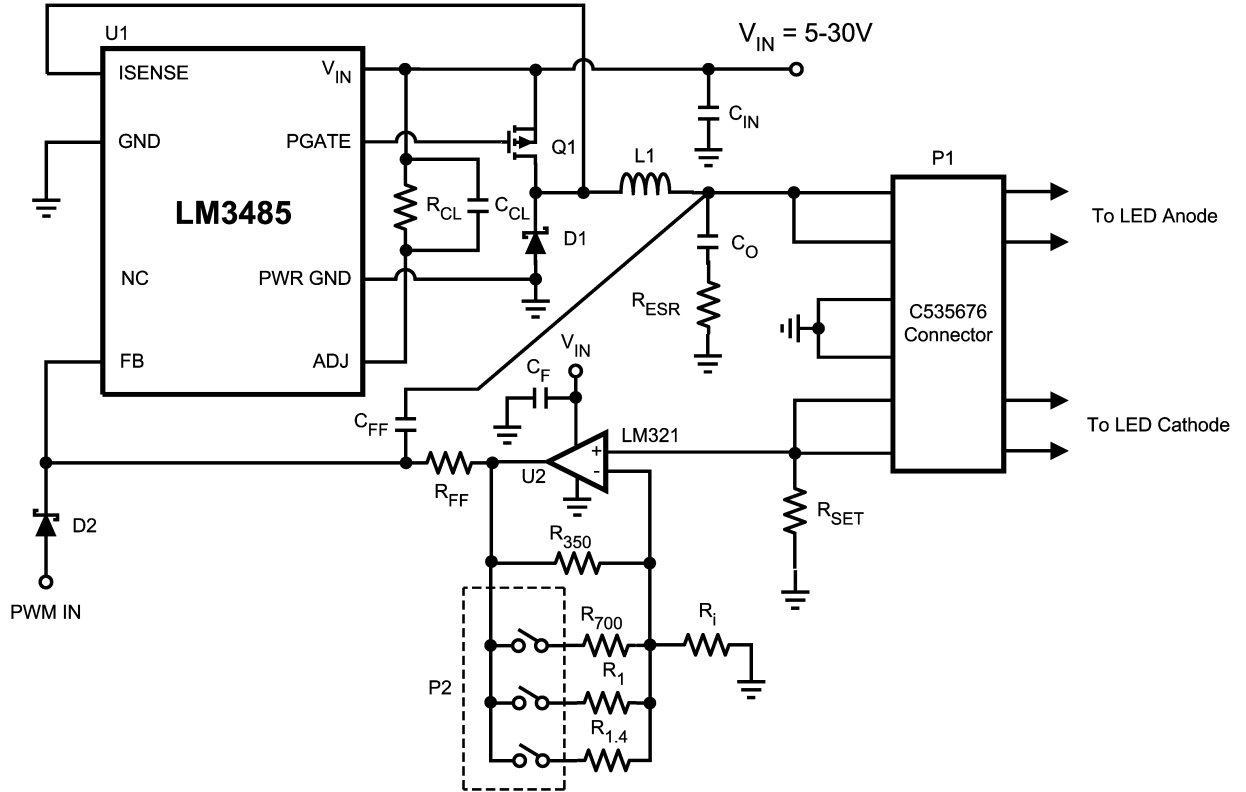
Diode **D2** provides an input for a pulse width modulation signal for dimming of the LED array. In order to fully enable and disable the LM3485 the PWM signal should have a maximum logic low level of 1.0V, a minimum logic high level of 2.0V, and minimum low and high periods of 40 μ s. For example, at 100Hz, the minimum and maximum duty cycles to which the LM3485 can respond are 0.4% and 99.6%, respectively. At 1 kHz, the minimum and maximum duty cycles are 4% and 96%, respectively.

The logic of the PWM is inverted, hence the LM3485 will deliver regulated output current when the voltage at the PWM IN terminal is low, and the current output is disabled when the voltage at the PWM IN terminal is high. Connecting a constant logic high to the PWM IN will disable the output.

Output Open Circuit

With PWM IN floating or connected to logic low, the LM3485 will begin to operate as soon as it has an input of at least 5V. In the case that the input is powered but no LED array is connected the output voltage will rise to equal the input voltage. The output of the circuit is rated to 30V and will not suffer damage, however care should be taken not to connect an LED array if the output voltage is higher than the target forward voltage of the LED array in steady state.

Typical Application Circuit



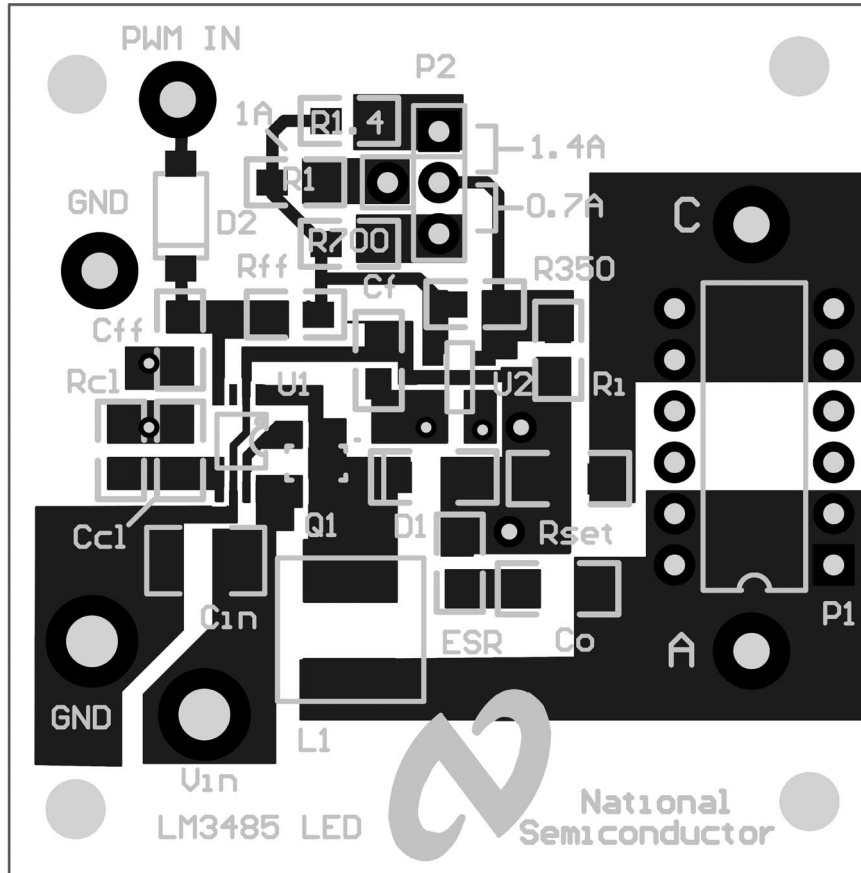
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FIGURE 2. Circuit Schematic

Bill of Materials

ID	Part Number	Type	Size	Parameters	Qty	Vendor
U1	LM3485	Hysteretic Controller	MSOP-8		1	NSC
U2	LM321	Op-amp	SOT23-5	1MHz	1	NSC
L1	SLF7045T-6R8M1R7	Inductor	7.0x7.0 x4.5mm	6.8μH, 1.7A	1	TDK
Q1	Si3483DV	PFET	SuperSOT-6	-30V, 5A	1	Vishay
D1	SS24	Schottky Diode	DO-214A, (SMB)	40V, 2A	1	Vishay
D2	MBR0520	Schottky Diode	SOD-123	20V, 0.5A	1	Vishay
Cff	VJ0805Y102KXXAT	Capacitor	0805	1nF, 10%	1	Vishay
Cf	C2012X7R1H104M	Capacitor	0805	100nF, 50V	1	TDK
Ccl	VJ0805A101KXXAT	Capacitor	0805	100pF, 10%	1	Vishay
Cin, Co	C3216X7R1H105M	Capacitor	1206	1μF 50V	2	TDK
Rff	CRCW08051002F	Resistor	0805	10kΩ, 1%	1	Vishay
Resr	CRCW08051R00F	Resistor	0805	1Ω 1%	1	Vishay
Rcl	CRCW08052552F	Resistor	0805	25.5kΩ 1%	1	Vishay
Rset	CRCW1206R500J	Resistor	1206	0.5Ω 5%	1	Vishay
Ri	CRCW08051002F	Resistor	0805	10kΩ 1%	1	Vishay
R350	CRCW08056192F	Resistor	0805	61.9kΩ 1%	1	Vishay
R700	CRCW08054422F	Resistor	0805	44.2kΩ 1%	1	Vishay
R1	CRCW08051962F	Resistor	0805	19.6kΩ 1%	1	Vishay
R1.4	CRCW08059091F	Resistor	0805	9.09kΩ 1%	1	Vishay
P1	535676-5	Connector	Custom	6 Pins	1	Tyco/AMP
P2		Connector	Custom		4	AMP

PCB Layout Diagram(s)



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FIGURE 3.

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