LM5000 Design Document

National Semiconductor
LM5000
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1.0 Design Specifications

Inputs	Outputs #1
VinMin=8.0	Vout1=74
VinMax=12.0	Iout1=0.030

2.0 Design Description

This design drives 20 white LEDs in a single string at 30mA to light a vanity mirror. The circuit boosts the input voltage in order to keep 20 LEDs in a single series string. This ensures that the same current flows through each device which results in equal brightness. The resistor Rset is used to set the load current in the following manner: Rset = 1.25V / Load current. To drive the string of LEDs at 30mA, a 41.2ohm resistor can be used for Rset.

The design features the LM5000 which is a monolithic integrated circuit specifically designed and optimized for flyback, boost or forward power converter applications. The internal power switch is rated for a maximum of 80V, with a current limit set to 2A. Protecting the power switch are current limit and thermal shutdown circuits. The current mode control scheme provides excellent rejection of line transients and cycle-by-cycle current limiting. An external compensation pin and the built-in slope compensation allow the user to optimize the frequency compensation. Other distinctive features include softstart to reduce stresses during start-up and an external shutdown pin for remote ON/OFF control. There are two operating frequency ranges available. The LM5000-3 is pin selectable for either 300kHz (FS Grounded) or 700kHz (FS Open). The LM5000-6 is pin selectable for either 600kHz (FS Grounded) or 1.3MHz (FS Open). The device is available in a low profile 16-lead TSSOP package or a thermally enhanced 16-lead LLP package.

3.0 Schematic

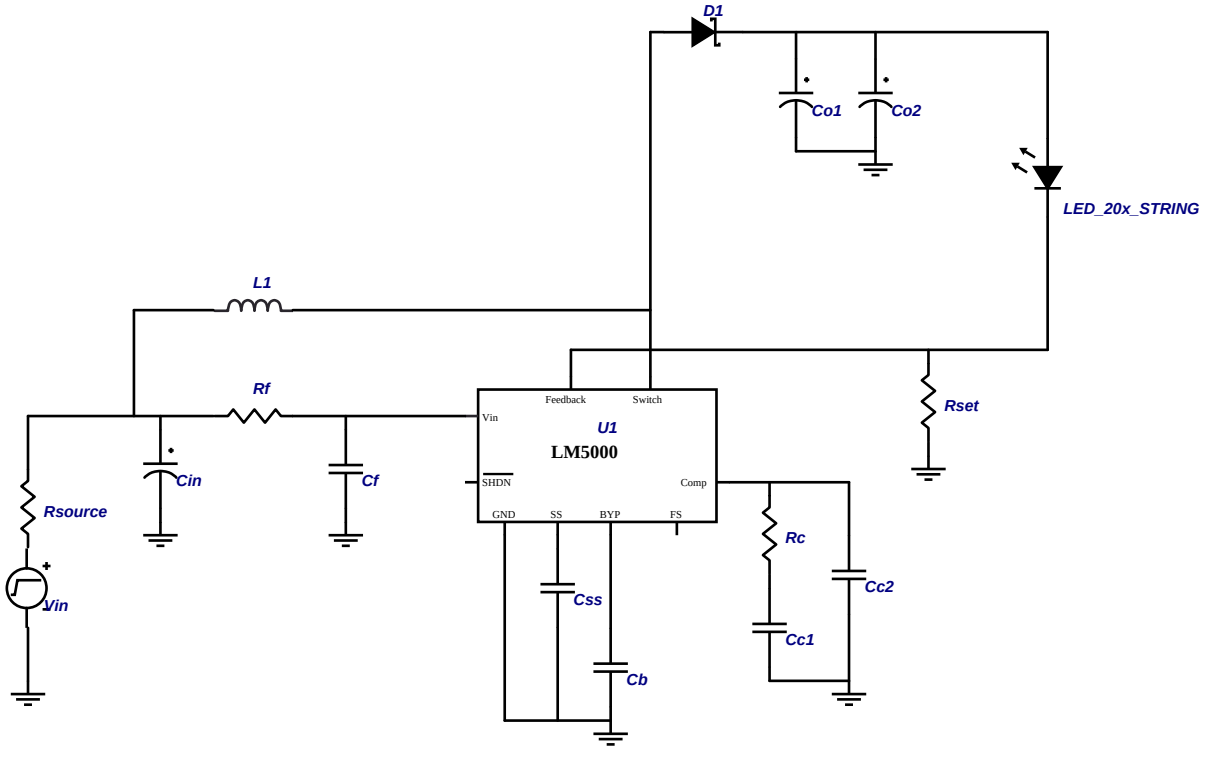

FIGURE 1. Example Schematic Showing Connection for all Components.

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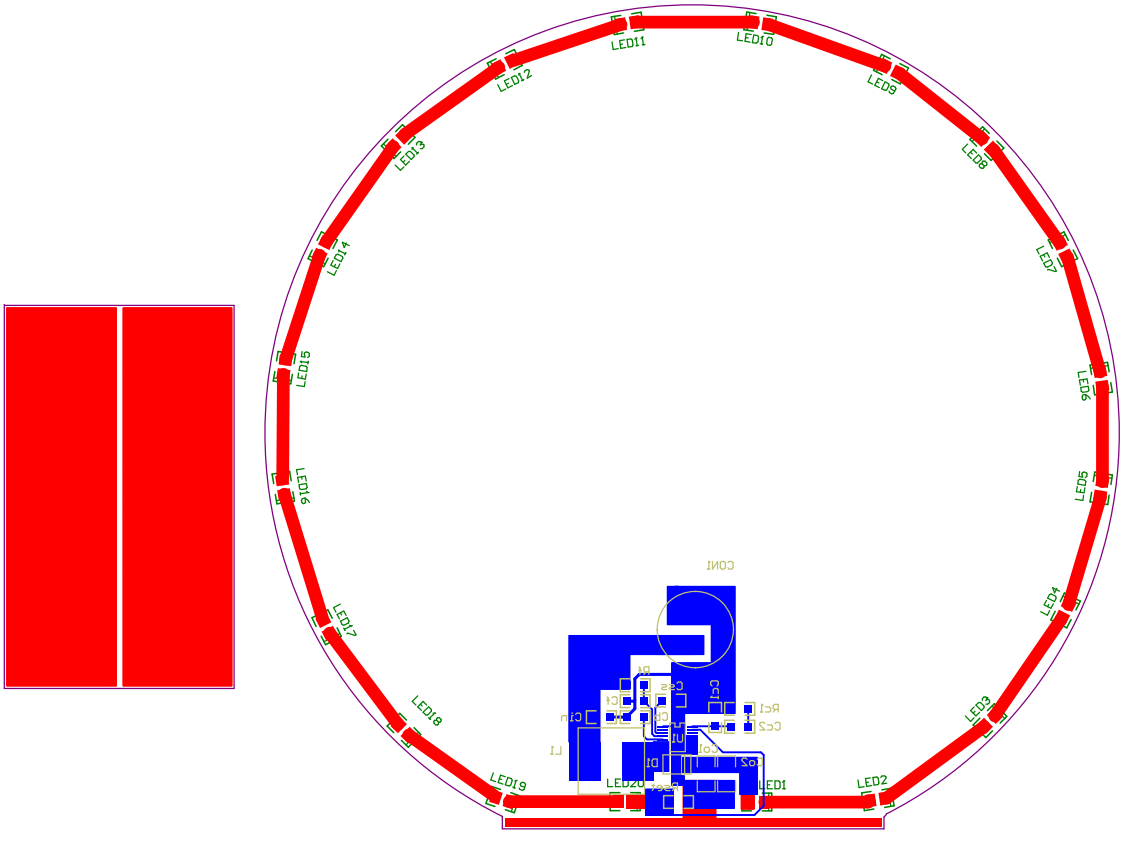
4.0 Bill Of Materials

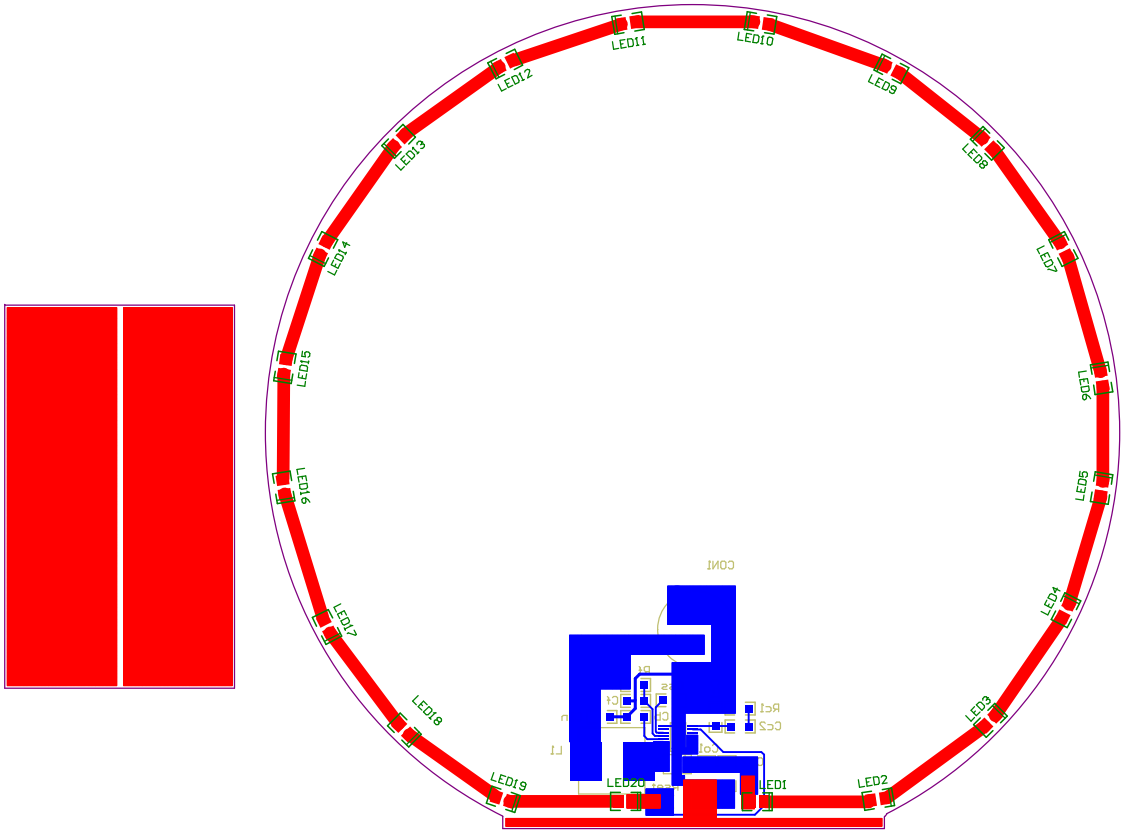
Part	Manufacturer	Part#	Attributes
Cb	Vishay	VJ1206Y103KXXAT	100n F
Cc1	Vishay	VJ1206Y683KXXAT	68n F
Cf	Vishay	VJ1203Y474KXXAT	470n F
Cin	TDK	C3225X5R1C106M	NumCaps=1, 10u F
Co1	TDK	C4532X5R1A225M	2.2u F
Co2	TDK	C4532X5R1A225M	2.2u F
Css	Vishay	VJ1206Y103KXXAT	10n F
D1	ONSEMI	MBRS190T3	0.75 V
L1	TDK	SLF12565T-101M1R6	100n H, 0.1476 Ohms
Rc	Vishay	CRCW12062492F	24.9k Ohms
Rf	Vishay	CRCW1206100J	10 Ohms
Rset	Vishay	CRCW1206xxxJ	
U1	National Semiconductor	LM5000	

5.0 Layout



PADC_LED001_lo_1

FIGURE 2. Board's Bottom View



PADC_LED001_lo_2

FIGURE 3. Board's Top View

Notes

Notes

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