LM2623 Design Document

National Semiconductor
LM2623
May 2006

1.0 Design Specifications

Inputs	Outputs #1
VinMin=1.5	Vout1=2
VinMax=3.3	Iout1=0.5

2.0 Design Description

This design is a basic boost that is capable of providing constant current of 350mA and an open circuit maximum voltage of 5V at high efficiency. It is designed to power LUMILEDS 1W LED from single or two cells.

With an LED present, as the output voltage ramps to approximately 3.4V, the LED will turn on causing current to flow through R7. The voltage across R7 is amplified by a factor of 7X by the SOT-5 LM321MF and the gain resistors R5 and R6. This produces a voltage of 1.24 volts at the junction of R4 and R5 when 350mA flows through the LED. The 1.24 volts causes the LM2623 to stop switching which regulates the LED current at a constant value. This current loop controlled boost circuit requires 1 or 2 cells and will operate with full brightness down to 1.0V. It uses the LM2623MM, a mini-SO8 package boost switcher with an internal 1.2amp switch, to boost the input voltage from 2-3V to the required LED voltage of 3.4V.

The LM2623A should be used for single cell operation since it guarantees a peak switch current greater than 2A.

The open circuit voltage with no LED present is set to 5V by the resistor ladder of R3-R6. If the LED is permanent, R3 can be omitted.

Voutmax = Vfb*(1+R3/(R4+R5+R6))

LED current = Vfb/R7*R6/(R6+R5)

The inductor is a Coilcraft DS1608 size, the capacitors are small ceramic, and the diode is a 0.5A rated Schottky in the SOD package.

Notes: Please note that A1 in the schematic is represented as U in the board layout.

3.0 Schematic

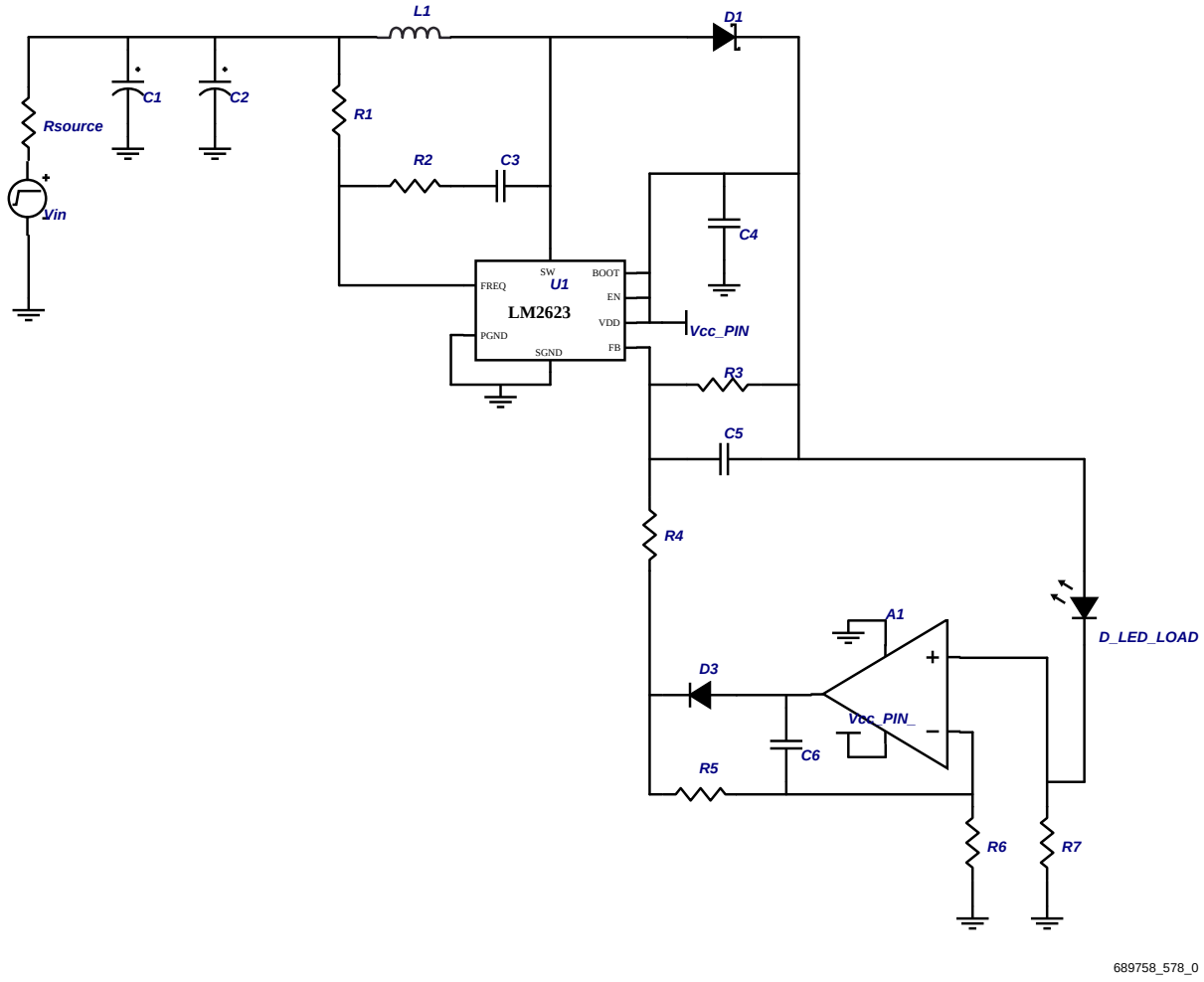

FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
A1	National Semiconductor	LM321	
C1	TDK	C3216X5R0J106M	10u F
C2	TDK	C3216X5R0J106M	10u F
C3	Vitramon	VJ0603A220KXAAB	22p F
C4	TDK	C3216X5R0J106M	10u F
C5	Vitramon	VJ0603A330KXAAB	33p F
C6	Vitramon	VJ0603Y103KXAAT	0.01u F
D1	ONSEMI	MBR0520LT1	0.385 V
D3	ONSEMI	MMSD4148T1	1 V
L1	Coilcraft	DO1608C-472	4.7u H, 0.09 Ohms
R1	Dale	CRCW08059092F	90.9k Ohms
R2	Dale	CRCW08053922F	39.2k Ohms
R3	Dale	CRCW06032103F	210k Ohms
R4	Dale	CRCW06031002F	10k Ohms
R5	Dale	CRCW06036812F	68.1k Ohms

Part	Manufacturer	Part#	Attributes
R6	Dale	CRCW06031002F	10k Ohms
R7	Dale	CRCW05081R0J(USE TWO 1 ohm IN PARALLEL)	0.5 Ohms
U1	National Semiconductor	LM2623	

5.0 Layout

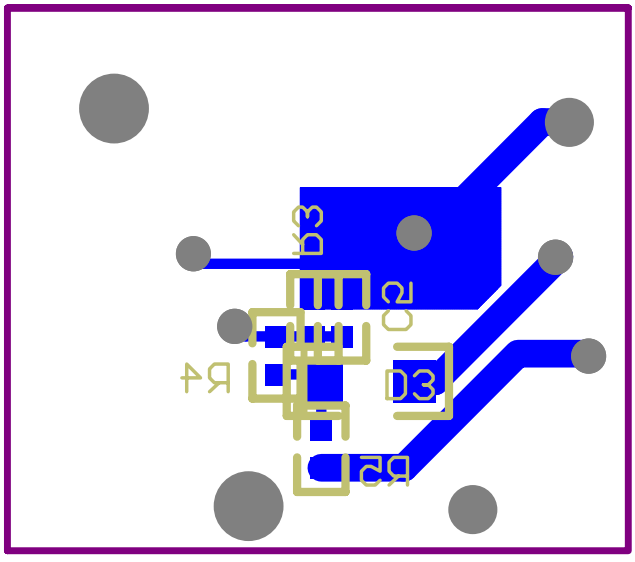

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FIGURE 2. Board's Bottom View

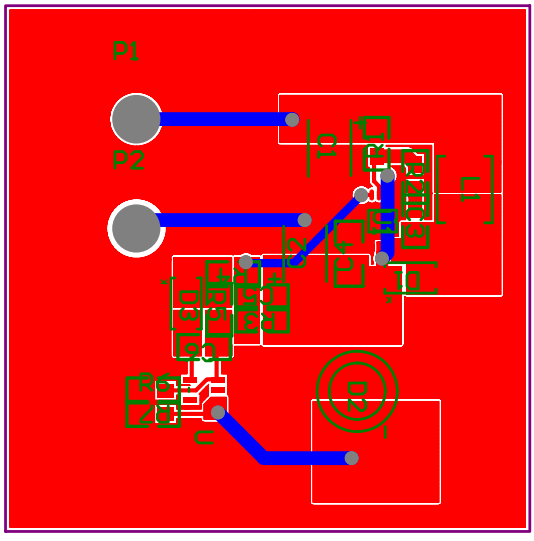

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FIGURE 3. Board's Top View

6.0 Waveforms

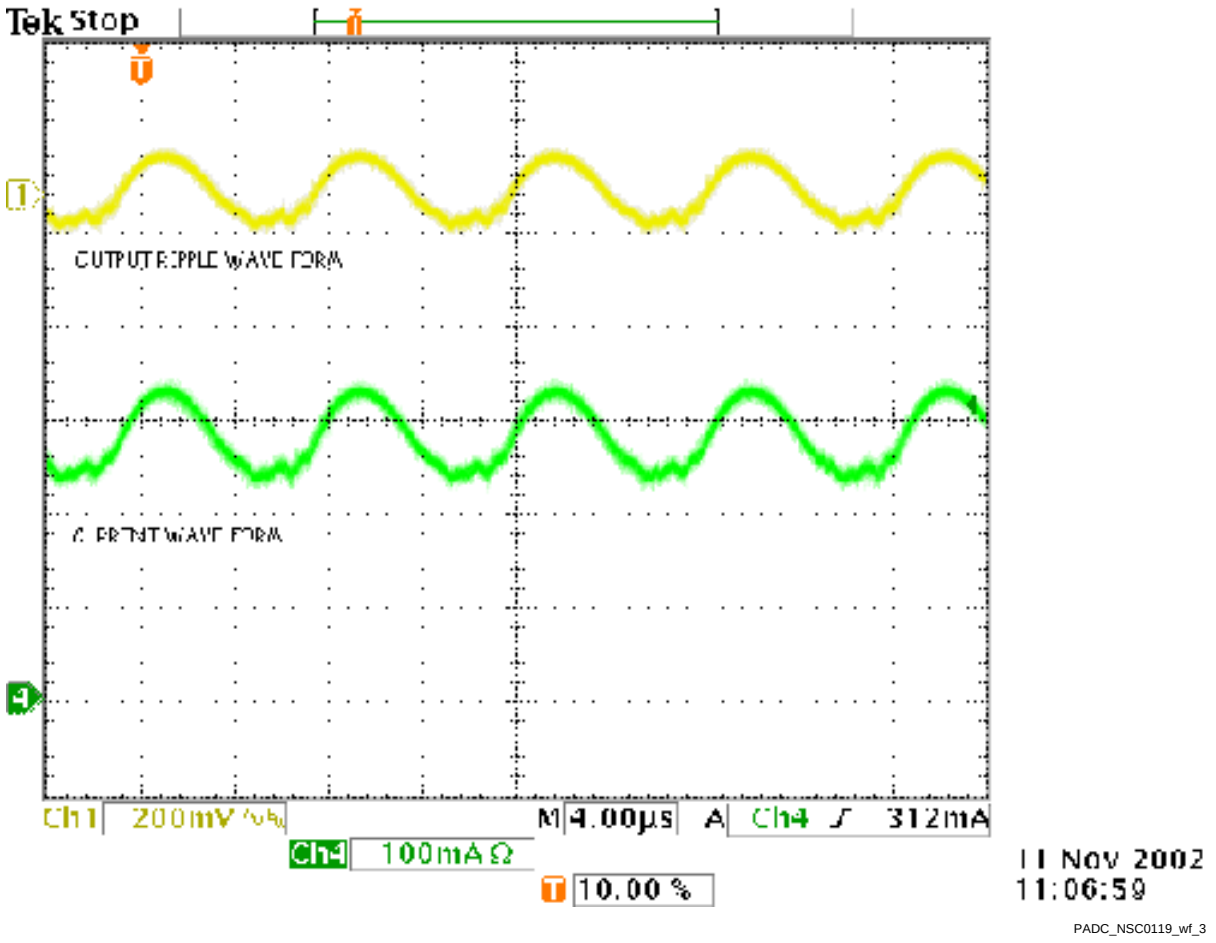

FIGURE 4. CURRENT AND RIPPLE

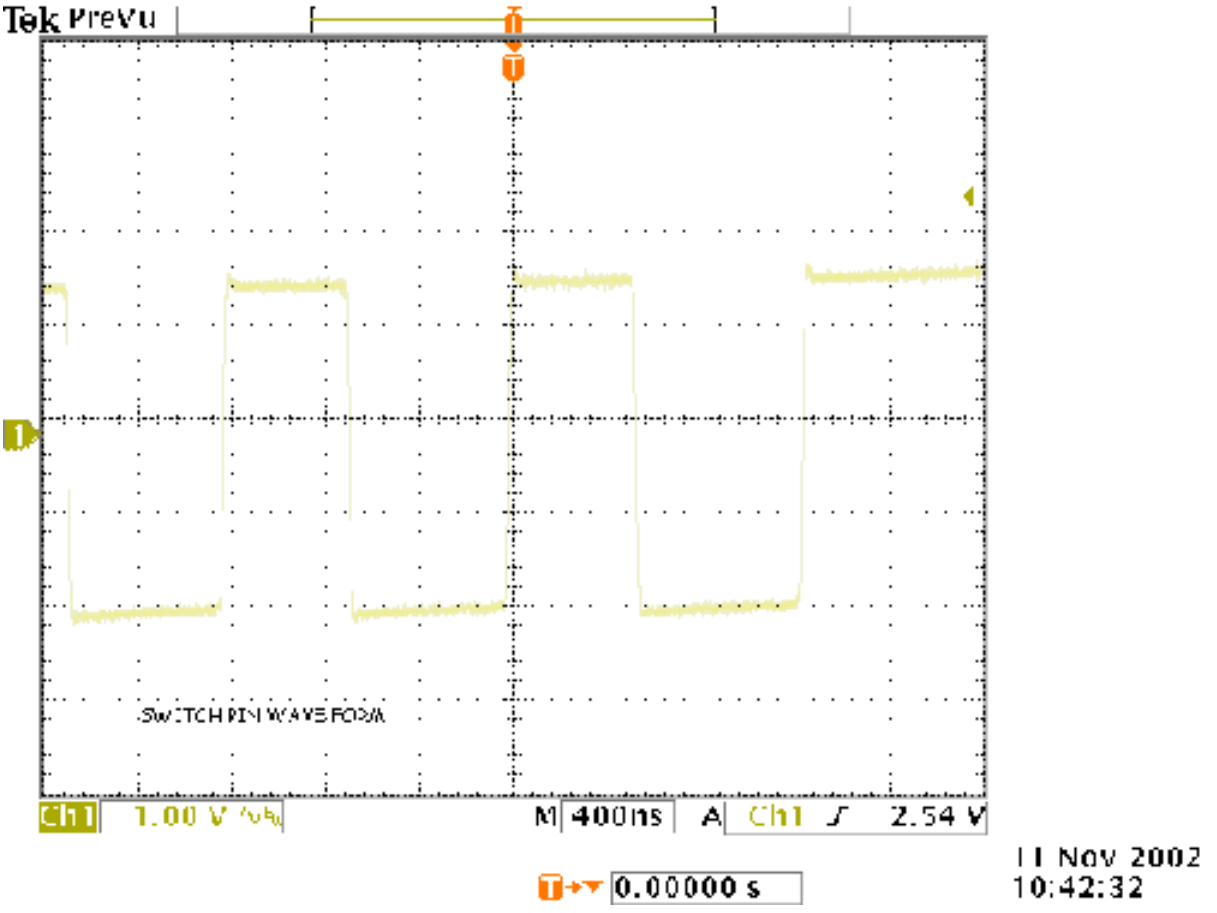

FIGURE 5. SWITCH PIN WAVE FORMS

Notes

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