AN-1418 LM2736 Evaluation Board

1 Introduction

The LM2736 demo board is configured to convert 5V input to 1.5V output at 750 mA load current using the LM2736X 1.6 MHz or the LM2736Y 550 kHz step down DC-DC regulator. The tiny low profile thin SOT23 package allows the demo board to be manufactured using less than 1 square inch of a 4-layer printed circuit board.

The circuit is configured with the boost diode connected to V_{IN}, and according to the datasheet, V_{IN} must not exceed the maximum operating limit of 5.5V + V_{fD2} using this configuration. This will ensure that the voltage between the Boost and SW pins, V_{BOOST} - V_{SW}, does not exceed 5.5V for proper operation. For more information regarding this requirement, see the *LM2736 Thin SOT 750mA Load Step-Down DC-DC Regulator Data Sheet* (SNVS316).

A bill of materials below describes the parts used on this demo board. A schematic and layout have also been included below along with measured performance characteristics. The schematics at the end of this document show how to re-configure this demo board for various input and output conditions as discussed in the LM2736 datasheet. Short or leave open the indicated connection as indicated in the schematics. The above restrictions for the input voltage are valid only for the demo board as shipped with the demo board schematic below.

2 Operating Conditions

V_{IN} = 5V

V_O = 1.5V

I_O = 750 mA

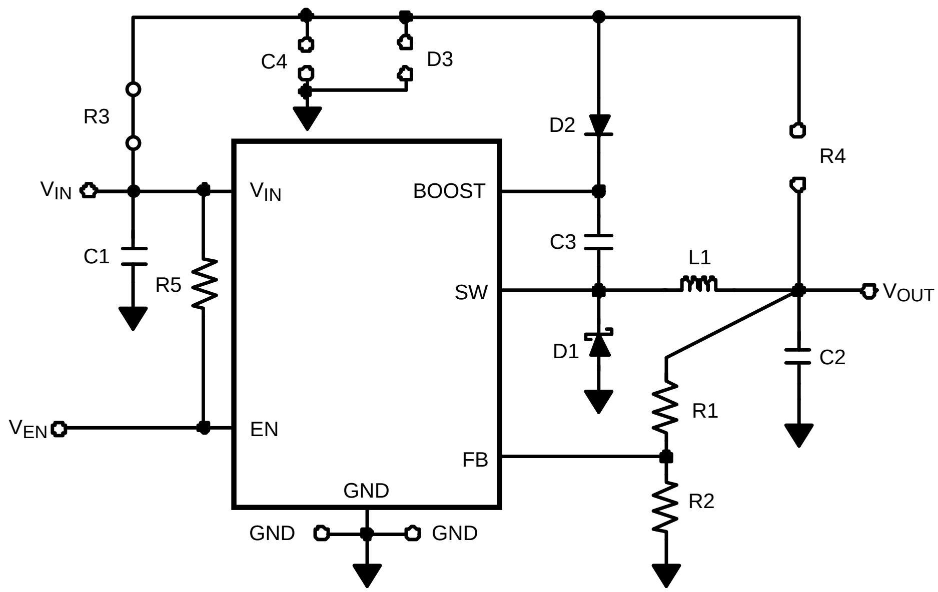

Figure 1. LM2736 Demo Board Schematic

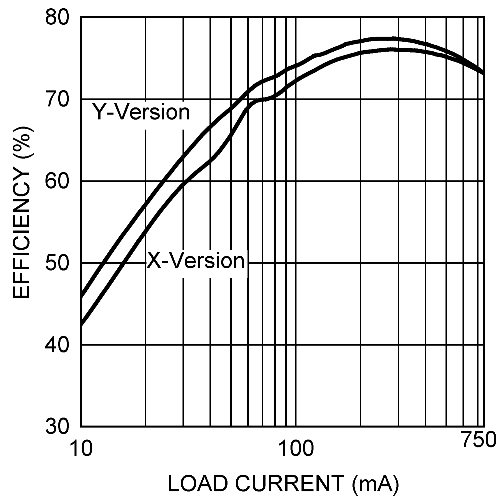

Figure 2. Efficiency vs Load Current

Table 1. Bill of Materials (BOM) X-Version

Part ID	Part Value	Manufacturer	Part Number	Package Type
C1, Input Cap	4.7 µF, 10V, X5R	Murata	GRM42-6X5R475K10	1206
C2, Output Cap	10 µF, 6.3V, X5R	Murata	GRM42-6X5R106K6.3	1206
C3, Boost Cap	0.01 µF	Vishay	VJ1206Y103KXXA	1206
D2, Boost Diode	1V_f @ 50 mA Diode	Diodes, Inc.	1N4148W	SOD-123
R2	10 kΩ, 1%	Vishay	CRCW12061002F	1206
U1	750 mA Buck Regulator	Texas Instruments	LM2736	Thin SOT23-6
D1, Catch Diode	0.34V_f Schottky 1A, 20V_R	International Rectifier	MBRA120	SMA
L1	4.7 µH, 1.6A, 28 mΩ	TDK	SLF6028T-4R7M1R6	6028
R1	2 kΩ, 1%	Vishay	CRCW12062001F	1206
R3	0Ω	Vishay	CRCW12060000F	1206
R5	50 kΩ, 1%	Vishay	CRCW08055002F	0805
D3, C4, R4	Open			

Table 2. Bill of Materials (BOM) Y-Version

Part ID	Part Value	Manufacturer	Part Number	Package Type
C1, Input Cap	10 µF, 10V, X5R	Murata	GRM42-6X5R106K10	1206
C2, Output Cap	10 µF, 6.3V, X5R	Murata	GRM42-6X5R106K6.3	1206
C3, Boost Cap	0.01 µF	Vishay	VJ1206Y103KXXA	1206
D2, Boost Diode	1V_f @ 50 mA Diode	Diodes, Inc.	1N4148W	SOD-123
R2	10 kΩ, 1%	Vishay	CRCW12061002F	1206
U1	750 mA Buck Regulator	Texas Instruments	LM2736	Thin SOT23-6
D1, Catch Diode	0.34V_f Schottky 1A, 20V_R	International Rectifier	MBRA120	SMA
L1	10 µH, 1.3A, 53 mΩ	TDK	SLF6028T-100M1R3	6028
R1	2 kΩ, 1%	Vishay	CRCW12062001F	1206
R3	0Ω	Vishay	CRCW12060000F	1206
R5	50 kΩ, 1%	Vishay	CRCW08055002F	0805
D3, C4, R4	Open			

3 PCB Layout

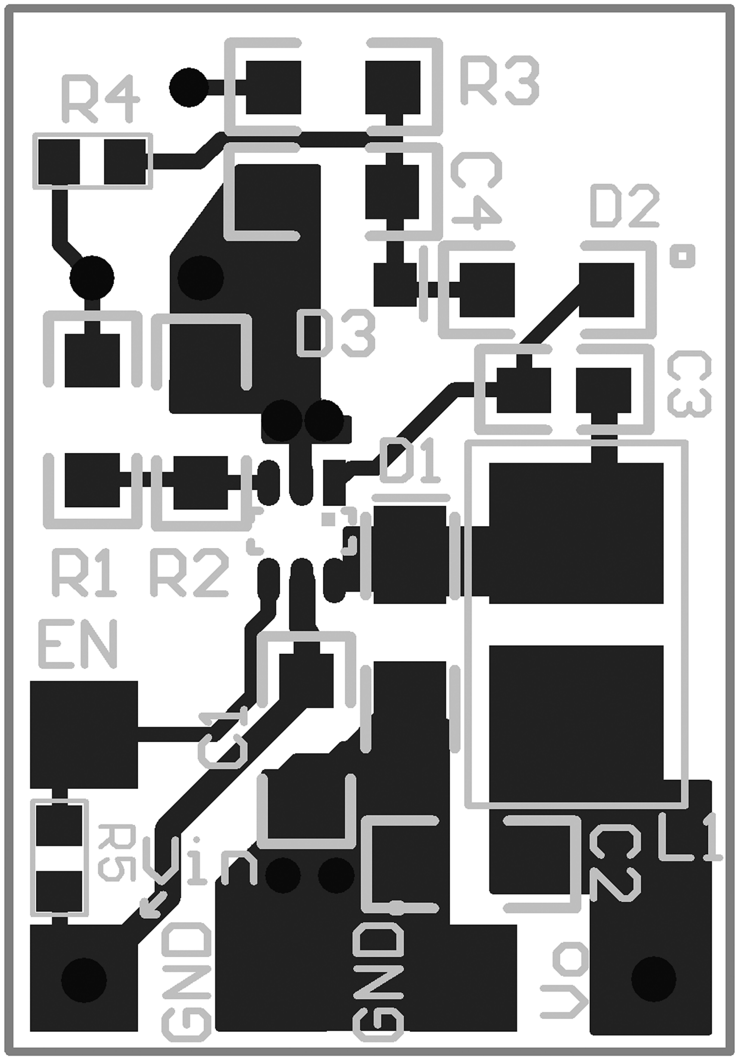

Figure 3. Top Layer

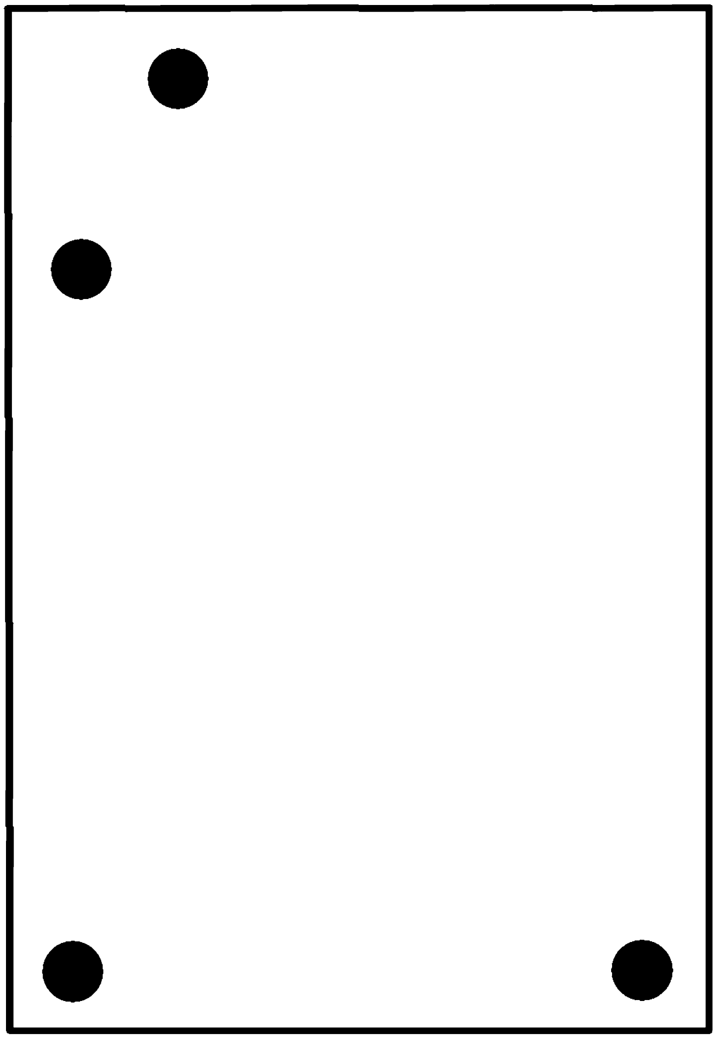

Figure 4. Internal Plane 1 (GND)

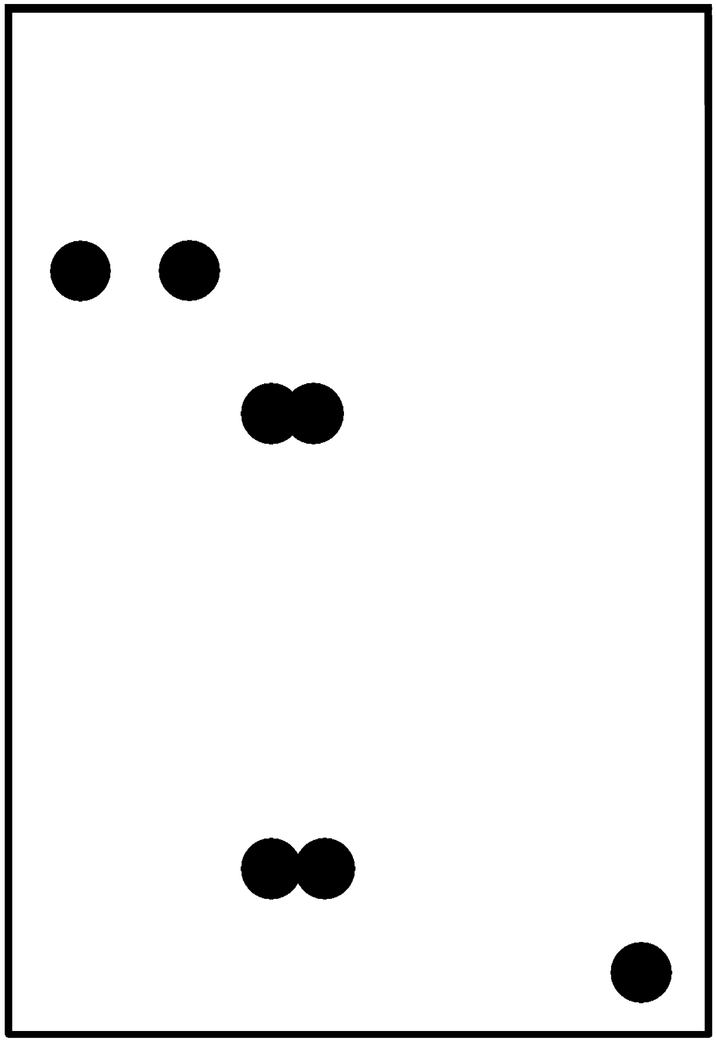

Figure 5. Internal Plane 2 (V_{IN})

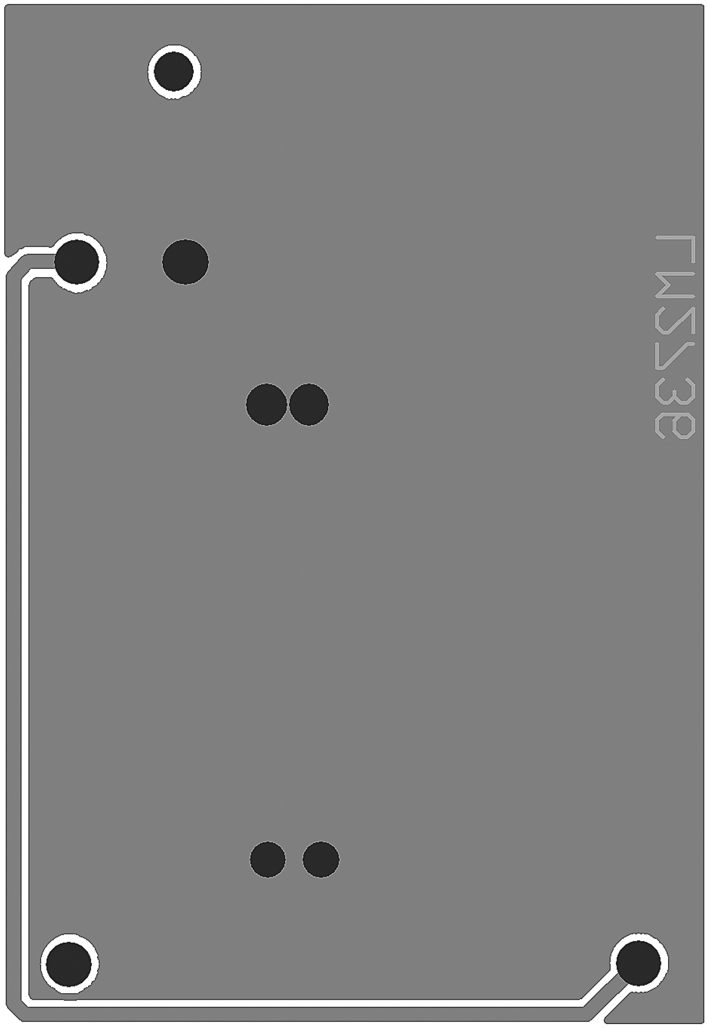

Figure 6. Bottom Layer

4 Additional Circuit Configuration Schematics

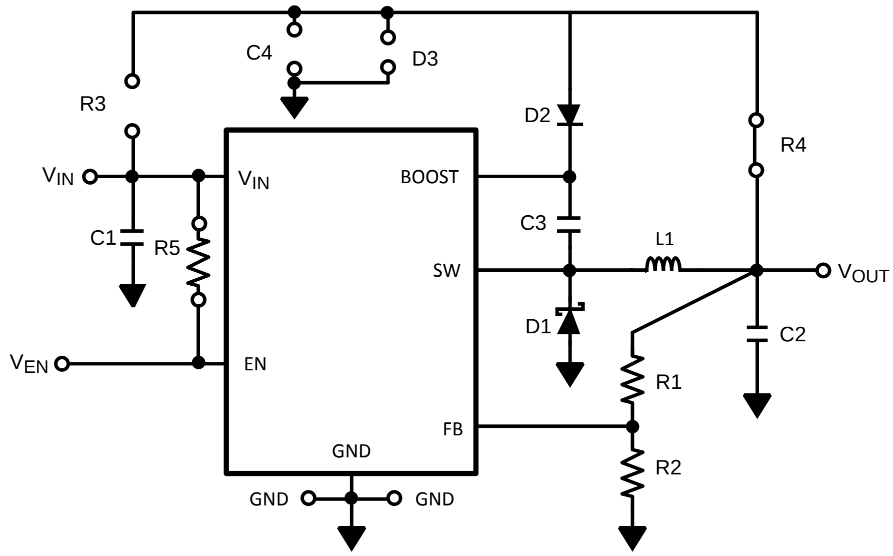

Figure 7. V_{BOOST} Derived From V_{OUT}

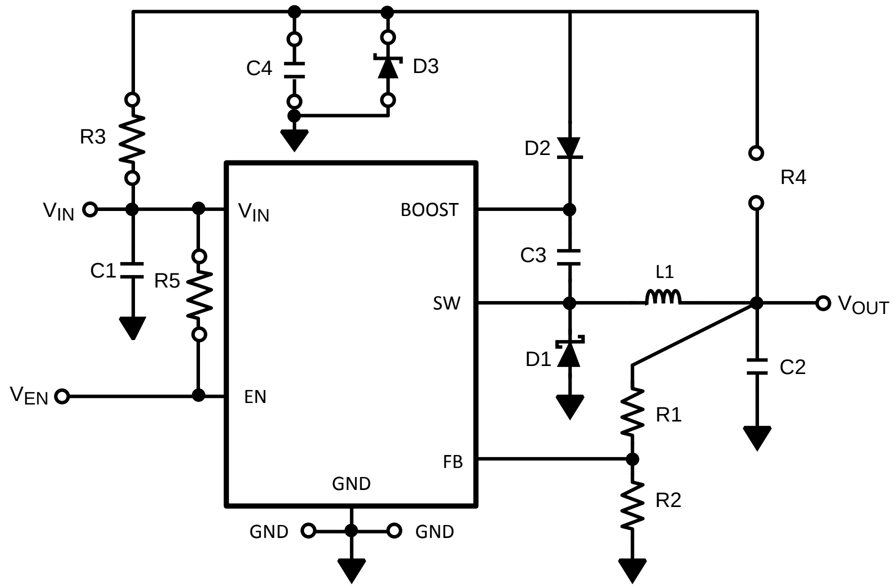

Figure 8. V_{BOOST} Derived From V_{SHUNT}

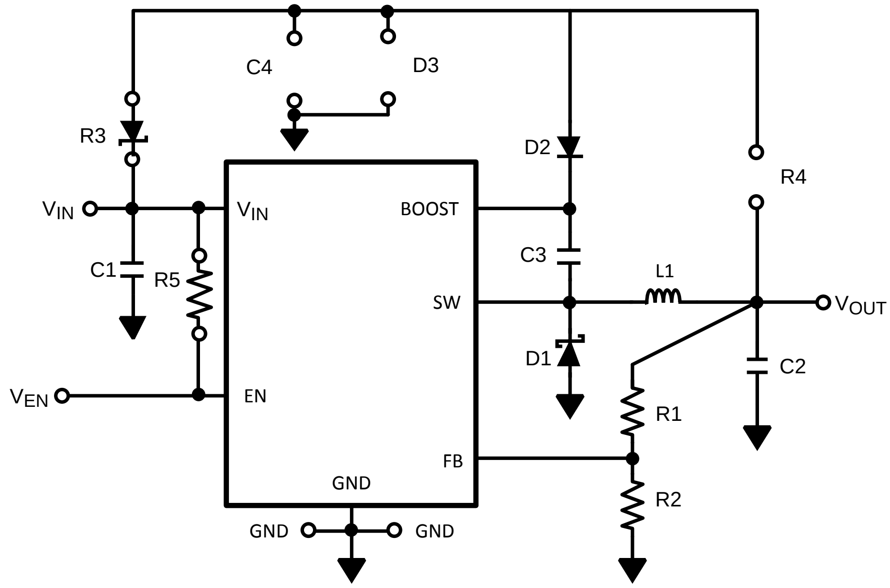

Figure 9. V_{BOOST} Derived From Series Zener Diode (V_{IN})

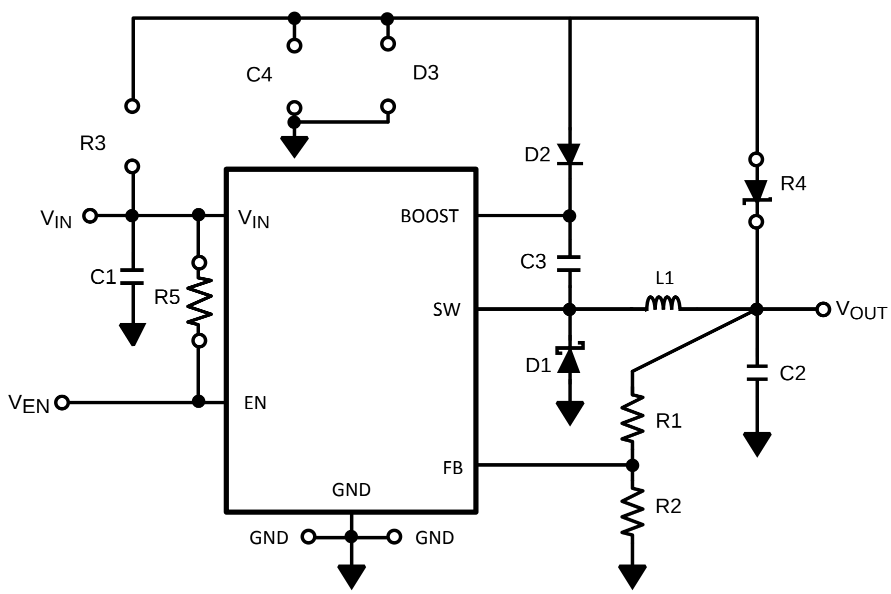

Figure 10. V_{BOOST} Derived From Series Zener Diode (V_{OUT})

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