

LM2852 Evaluation Board (500kHz version)

National Semiconductor
Application Note 1343
Thatcher Klumpp
May 2005



LM2852 Evaluation Board (500kHz version)

Introduction

This application note describes the evaluation board for the LM2852Y. Three output voltage options are available; all three come with the same bill of materials. The board may be configured in multiple ways providing various enabling schemes, split-rail operation and filtering options. The LM2852 is a 2A step-down buck converter belonging to National's SIMPLE SYNCHRONOUS® family. The LM2852 input voltage can range from 2.85V to 5.5V. Output voltages are factory set from 0.8V to 3.3V in 100mV increments. On-chip type-three compensation facilitates low component count power supply design. This evaluation board enables the power supply designer to investigate various functional configurations.

PVIN and AVIN

The input voltage to the LM2852 is connected to two PVIN pins and an AVIN pin. PVIN is the supply connected to the output power switches; AVIN powers the controller logic of the switcher. Since PVIN and AVIN are dedicated pins on the chip, split rail operation is possible. For example, AVIN can be set to 5V and PVIN to 3.3V. Jumper J₁ on the evaluation board is used to short together the AVIN and PVIN board inputs.

Enable (EN)

The LM2852 enable pin is internally pulled up so that the part is enabled anytime the input voltage exceeds the UVLO threshold. The evaluation board includes an input for enable so the user may set the voltage on the enable pin. Jumper J2 also may be used to short the enable pin to AVIN. Resistor, R_p may be used as a pull down resistor to set the enable input to low.

C_f and R_f

Components C_f and R_f may be used to low-pass-filter the AVIN input. Filtering AVIN may improve line and load regulation by reducing interfering signals on AVIN. 10 Ω and 1 μ F are typical filter components for AVIN.

C_{IN} and C_{INX}

This evaluation board provides two capacitor footprints for the C_{IN} function. The larger footprint holds the bulk of the C_{IN} capacitor, for example 47 μ F. Additional high frequency filtering may also be accomplished by adding a smaller capacitor – C_{INX}. A 1 μ F or 100 nF capacitor is commonly used for high frequency filtering.

C_{SS}

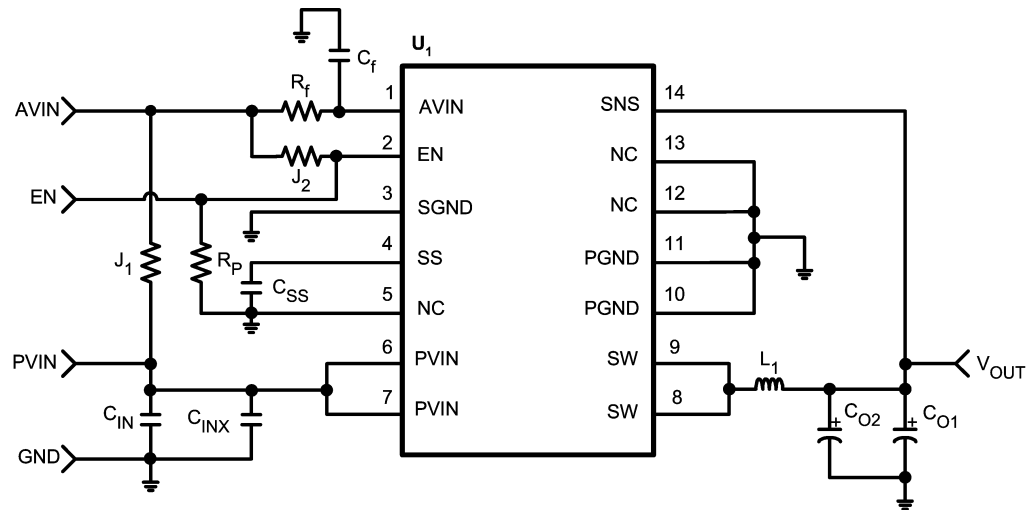
The soft-start capacitor is used to control the start up behavior of the switching regulator. A 2.7 nF capacitor yields approximately a 3 ms start up time.

Output Filter - L₁, C_{O1} and C_{O2}

Since the LM2852 uses on-chip compensation, the output filter component values must be restricted to a certain range. The datasheet includes a table and information on component selection. Generally, the output capacitors must have ESR values commonly found in Tantalum and non-Tantalum solution, Niobium Oxide capacitors.

AN-1343

Board Schematic

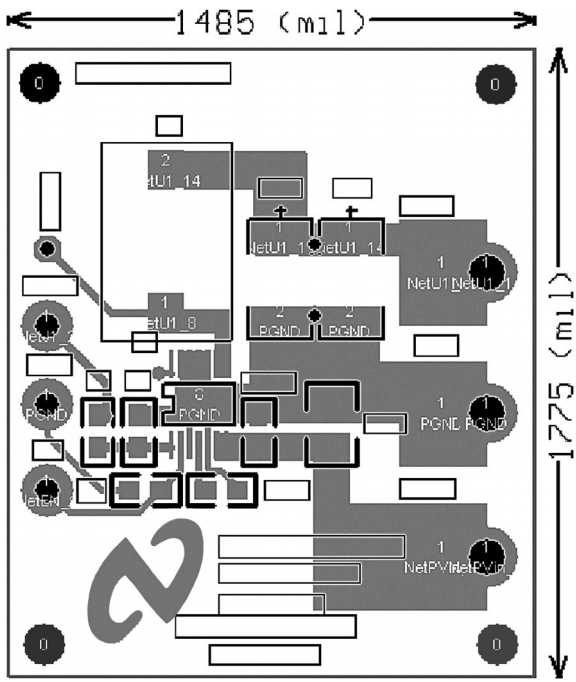


20127201

Bill of Materials

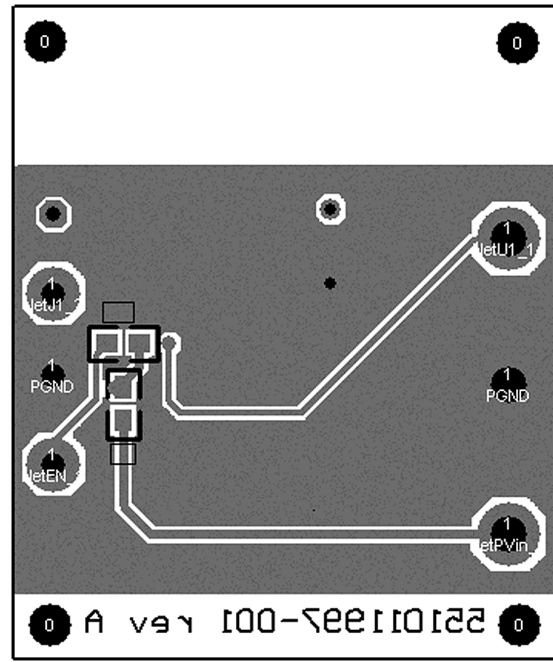
ID	Part Number	Type	Size	Parameters	Qty	Vendor
U ₁	LM2852YMXA-1.2, LM2852YMXA-1.8 or LM2852YMXA-2.5	2A Buck	ETSSOP-14		1	NSC
L ₁	DO3316P-153	Inductor		15 μ H	1	Coilcraft
C _{O1}	NOSD107M006R0100	Capacitor		100 μ F	1	AVX
C _{O2}	Not Populated				0	
C _{IN}	GRM32ER60J476ME20B	Capacitor	1210	47 μ F/X5R/6.3V	1	Murata
C _{INX}	GRM21BR71C105KA01B	Capacitor	0805	1 μ F/X7R/16V	1	Murata
C _{SS}	VJ0805Y272KXXA	Capacitor	0805	2.7nF/X7R/25V	1	Vishay-Vitramon
R _f	CRCW060310R0F	Resistor	0603	10 Ω \pm 10%	1	Vishay-Dale
C _f	GRM21BR71C105KA01B	Capacitor	0805	1 μ F/X7R/16V	1	Murata
J ₁	CRCW06030R0F	Resistor	0603	0 Ω	1	Vishay-Dale
J ₂	Not Populated				0	
R _P	Not Populated				0	

PCB Layouts



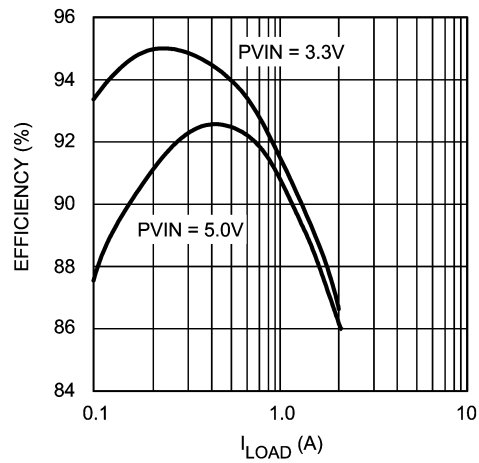
Top Layer

20127202



Bottom Layer

20127203



Typical Efficiency for 2.5V Output

20127204

Notes

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

For the most current product information visit us at www.national.com.

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

BANNED SUBSTANCE COMPLIANCE

National Semiconductor manufactures products and uses packing materials that meet the provisions of the Customer Products Stewardship Specification (CSP-9-111C2) and the Banned Substances and Materials of Interest Specification (CSP-9-111S2) and contain no "Banned Substances" as defined in CSP-9-111S2.



National Semiconductor
Americas Customer
Support Center
Email: new.feedback@nsc.com
Tel: 1-800-272-9959

www.national.com

National Semiconductor
Europe Customer Support Center
Fax: +49 (0) 180-530 85 86
Email: europa.support@nsc.com
Deutsch Tel: +49 (0) 69 9508 6208
English Tel: +44 (0) 870 24 0 2171
Français Tel: +33 (0) 1 41 91 8790

National Semiconductor
Asia Pacific Customer
Support Center
Email: ap.support@nsc.com

National Semiconductor
Japan Customer Support Center
Fax: 81-3-5639-7507
Email: jpn.feedback@nsc.com
Tel: 81-3-5639-7560