AN-1202 LM2698 Demo Board

1 Introduction

A printed circuit board (PCB) has been developed to aid in the design and evaluation of the LM2698 DC-DC boost converter. This document contains information about the board.

2 General Description

The LM2698 is a general purpose, high frequency DC-DC converter. This board is intended to demonstrate the primary advantages of the LM2698. The LM2698 is able to operate at 1.25 MHz switching frequency, yielding extremely high power density. The low $R_{DS(ON)}$ internal MOSFET allows for high conversion efficiency. It uses a current mode control scheme, giving superior line and load regulation. The LM2698 is a Simple Switcher®, which includes Switchers Made Simple software for fast, effective designs.

The LM2698 demo board operates with the following parameters:

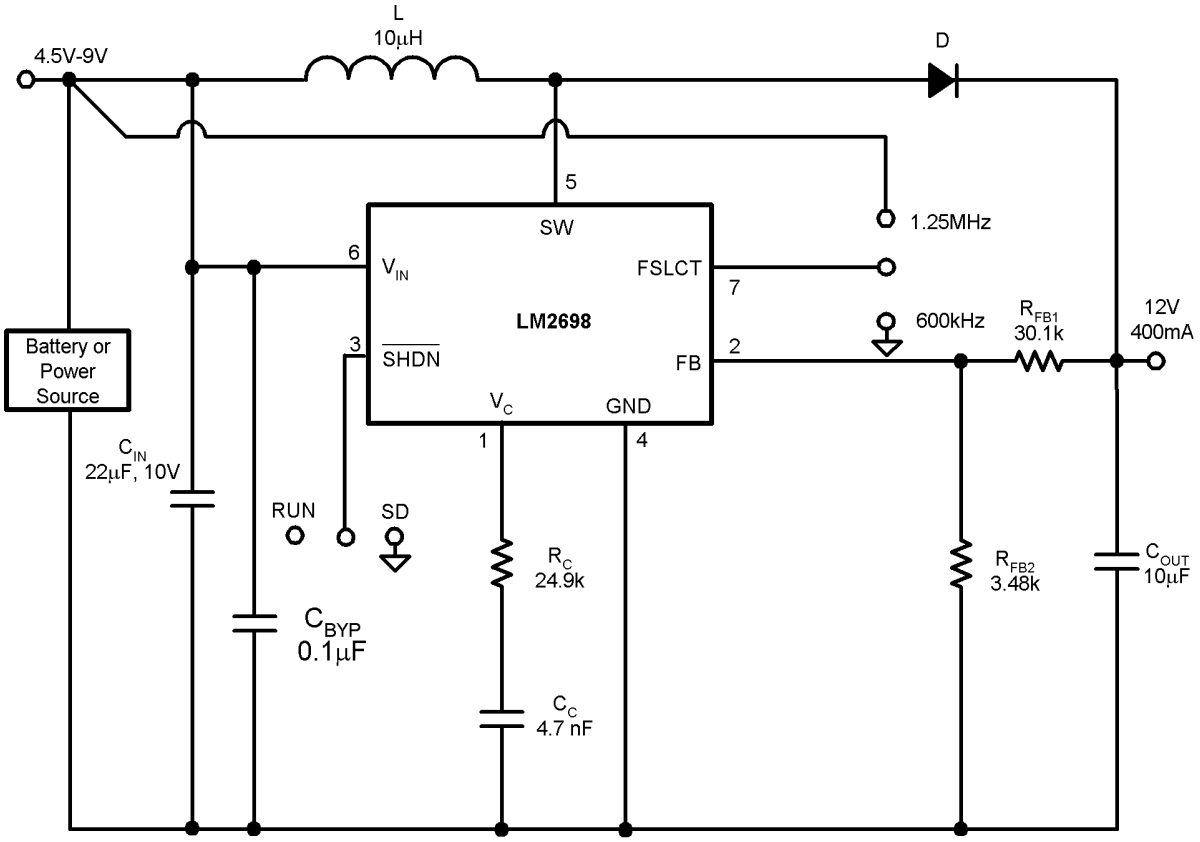
$4.5\ V \le V_{IN} \le 9\ V$

$V_{OUT} = 12\ V$

$0 \le I_{OUT} \le 400\ mA$ (for I_{OUT} vs V_{IN}, see Figure 2)

Simple Switcher is a registered trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

Copyright © 2001–2013, Texas Instruments Incorporated



(1) The inductance affects the stability of the converter. For tips on optimizing the inductance value, especially for input voltages less than 5 V, see the *compensation* section in the device-specific data sheet. To operate this demo board at voltages below 4.5 V with the supplied 10 µH inductor and remain in a safe stability region, use a 1.25 MHz switching frequency (if V_{IN} > 5 V, a 600 kHz or 1.25 MHz switching frequency is acceptable).

(2) When operating the LM2698 at 1.25 MHz switching frequency, it is recommended to increase the bypass capacitance, C_{BYP}, to 0.220 µF.

Figure 1. LM2698 Demo Board Schematic

Copyright © 2001–2013, Texas Instruments Incorporated

Table 1. Bill of Materials (BOM)

Component	Value	Description	Model Number
C_{OUT}	10 µF	Output Capacitor	TMK432BJ106MM (Taiyo Yuden)
C_{IN}	22 µF	Input Capacitor	LMK432BJ226MM (Taiyo Yuden)
C_C	4.7nF	Compensation Capacitor	VJ0805Y472MXAAT (Vishay)
C_{BYP}	0.1 µF	Bypass Capacitor	VJ0805Y104KXAAT (Vishay)
D	1A, 20 V	Schottky Power Diode	MBRM120LT3 (ON-Semiconductor)
L	10 µH	Power Inductor	CDRH6D38-100 (Sumida)
R_C	24.9k	Compensation Resistor	CRCW 0805 2492 FRT1 (Vishay)
R_{FB1}	30.1k	Top Feedback Resistor	CRCW 0805 3012 FRT1 (Vishay)
R_{FB2}	3.48k	Bottom Feedback Resistor	CRCW 0805 3481 FRT1 (Vishay)

Table 2. Jumper Settings

Jumper	Setting	Description
J1	600 kHz	600 kHz switching frequency
	1.25 MHz	1.25 MHz switching frequency
J2	Run	LM2698 is regulating
	SD	LM2698 is shutdown

3 Maximum Output Current

The current limit of the LM2698 is with respect to the switch current. This means that the maximum output current to the load is dependent on duty cycle. With a fixed V_{OUT}, the maximum output current will be a function of V_{IN}, as shown in Figure 2.

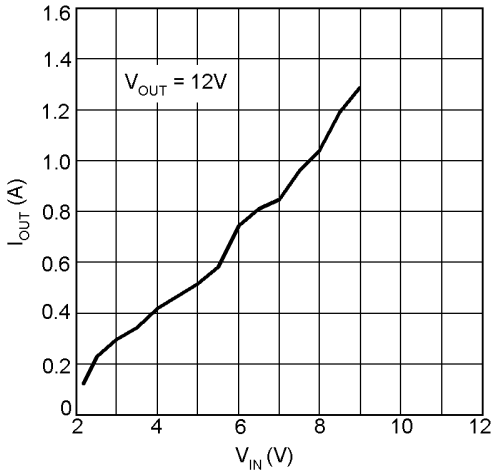


Figure 2. Maximum Output Current vs Input Voltage

Copyright © 2001–2013, Texas Instruments Incorporated

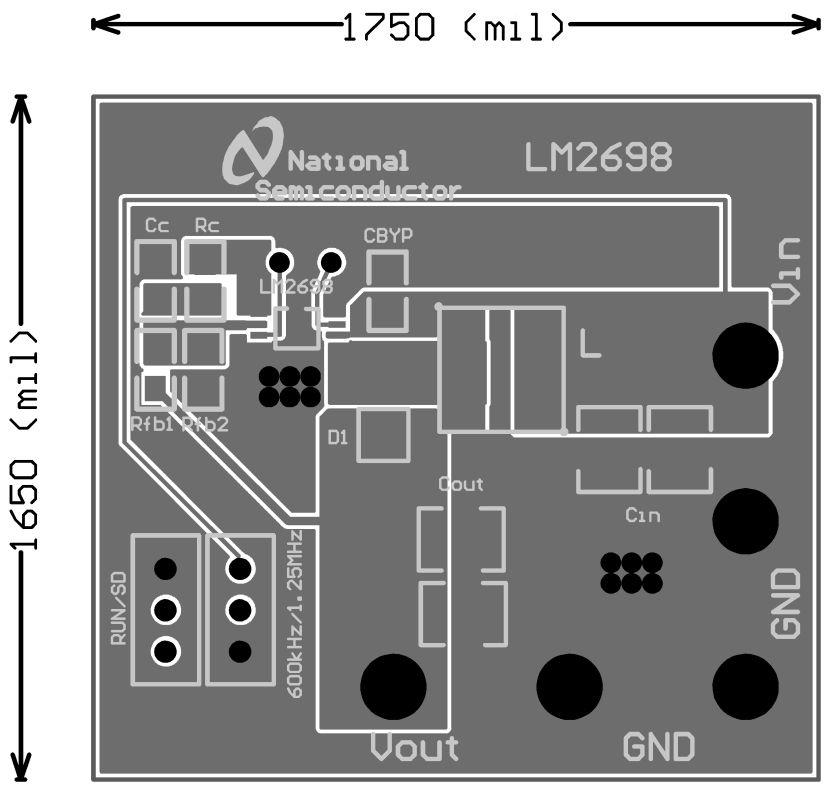


Figure 3. LM2698 Demo Board Top Layer Layout

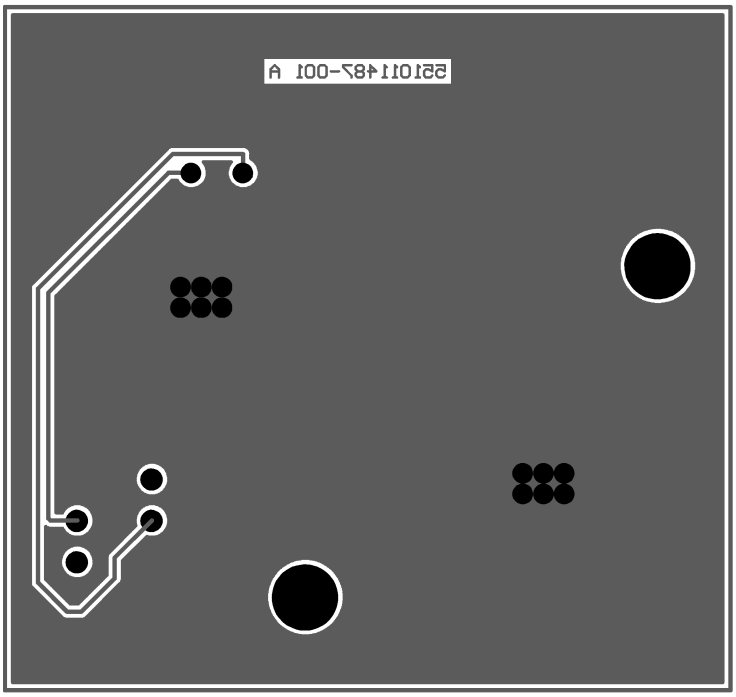


Figure 4. LM2698 Demo Board Bottom Layer Layout

Copyright © 2001–2013, Texas Instruments Incorporated

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2013, Texas Instruments Incorporated