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

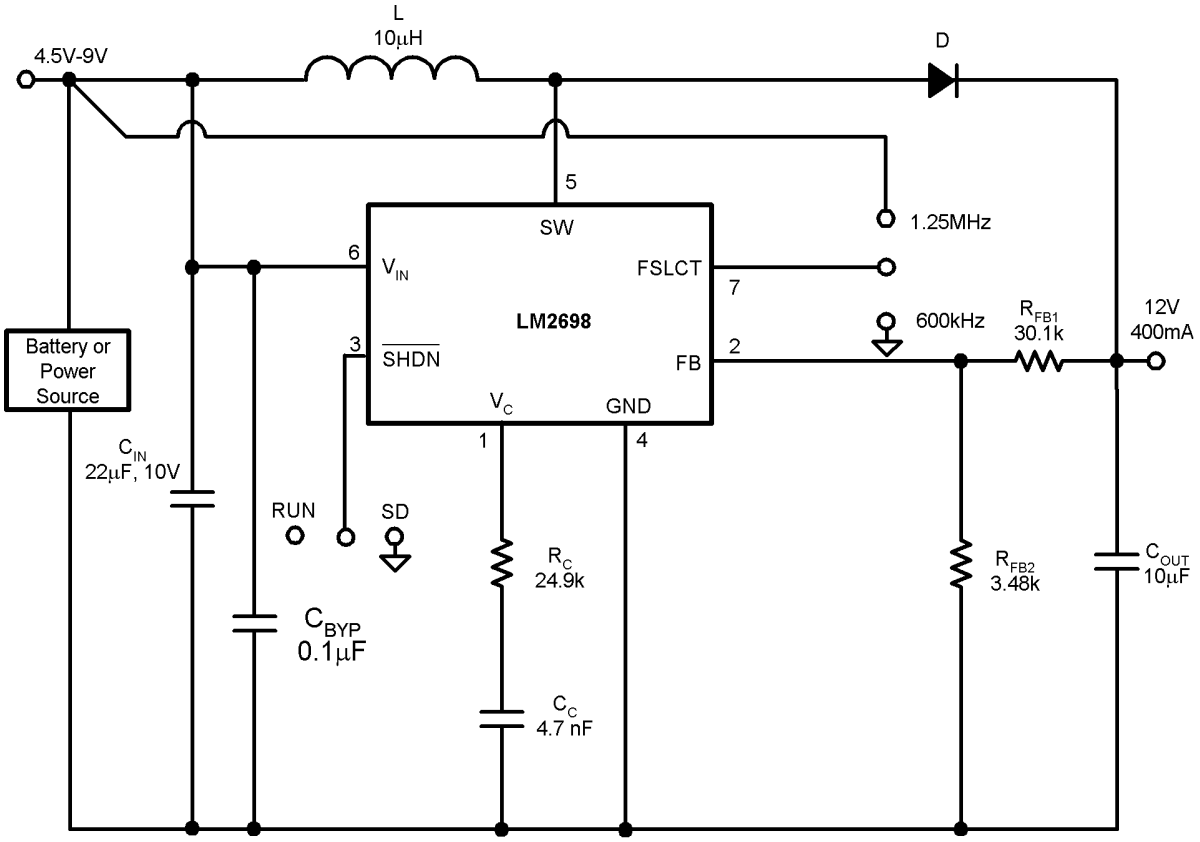
The LM2698 is a general purpose, high frequency DC-DC converter. This board is intended to demonstrate the primary advantages of the LM2698. The LM2698 is able to operate at 1.25 MHz switching frequency, yielding extremely high power density. The low $R_{DS(ON)}$ internal MOSFET allows for high conversion 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)



(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

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.

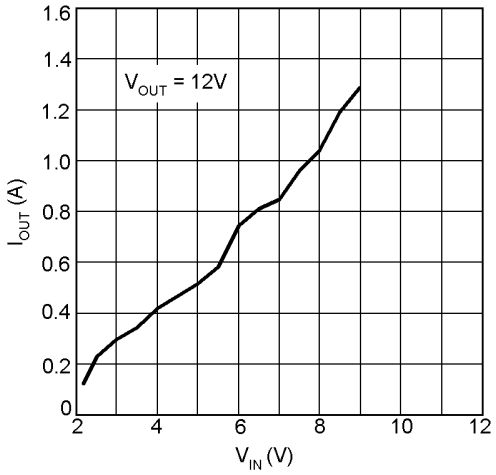


Figure 2. Maximum Output Current vs Input Voltage

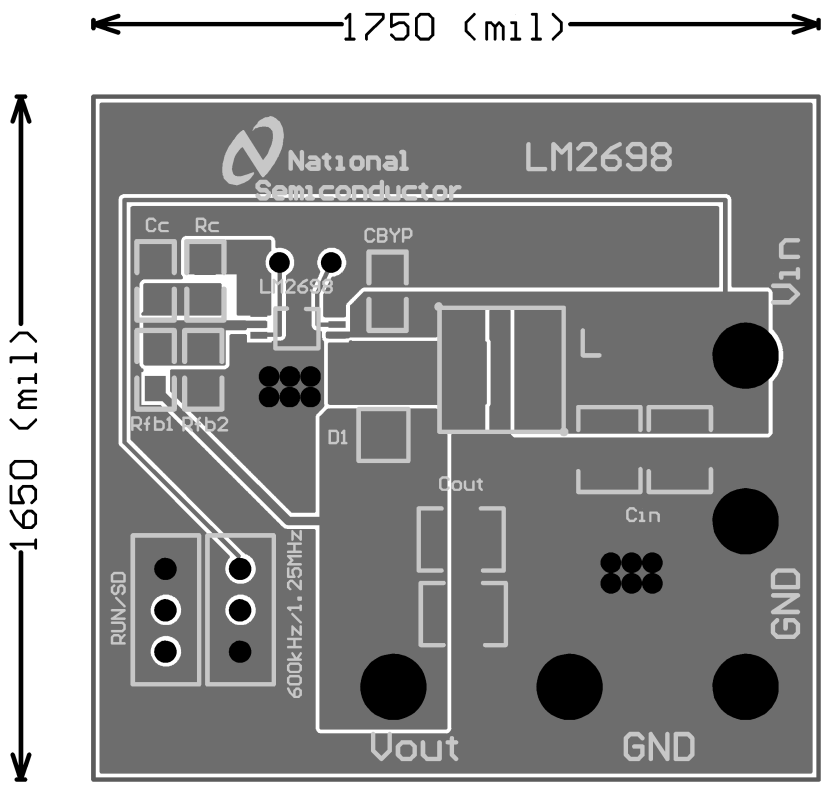


Figure 3. LM2698 Demo Board Top Layer Layout

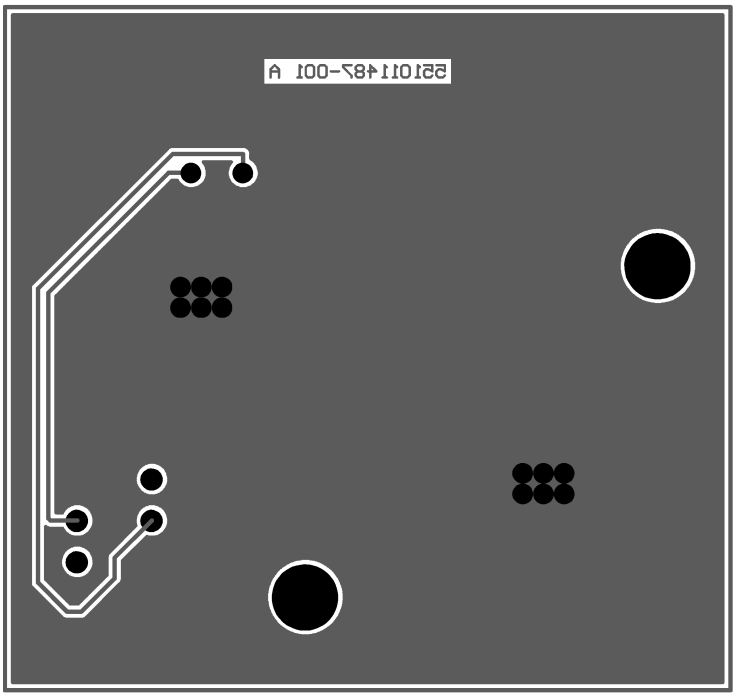


Figure 4. LM2698 Demo Board Bottom Layer Layout

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