Test Report
For PMP9398
04/04/2014

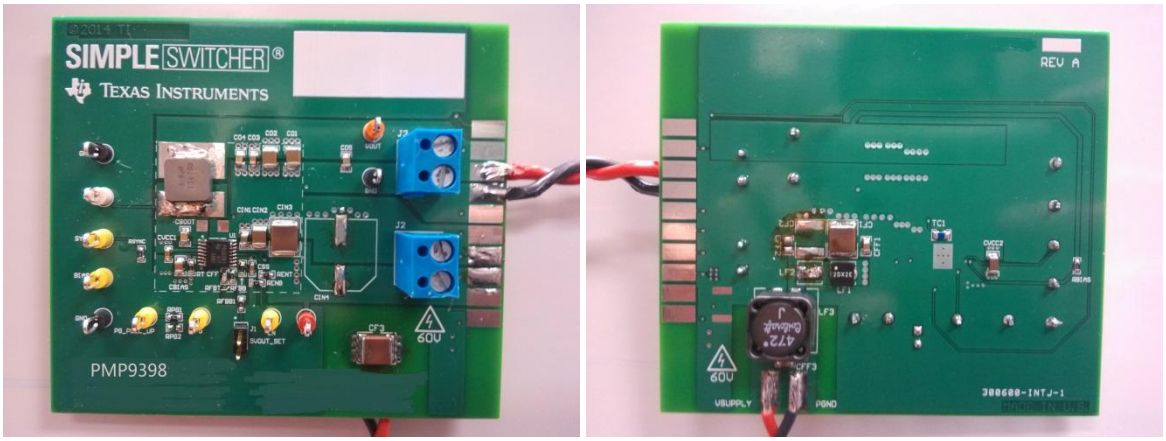
Overview

The reference design is a conducted EMI optimized 6.6W power supply design for automotive application. It features the SIMPLE SWITCHER® LM46002 synchronous buck regulator and provides a 3.3V, max 2A output. The input voltage range is 4.5V to 60V suitable for 12V automotive battery supply. The reference design has the input EMI filter stage, and the conducted EMI is tested under the CISPR 25 automotive EMC standard. The design is compliant with the Class 5 conducted emissions standard.

Power Specification

Vin range:	4.5V~60V
Nominal Vin:	12V
Output:	3.3V@2A
Fsw:	500kHz

Board Photos



Power Board Front Power Board Back

Figure 1

Size: 75x86 mm

Efficiency

The efficiency is measured separately for Vin= 4.5V, 13V, 60V.

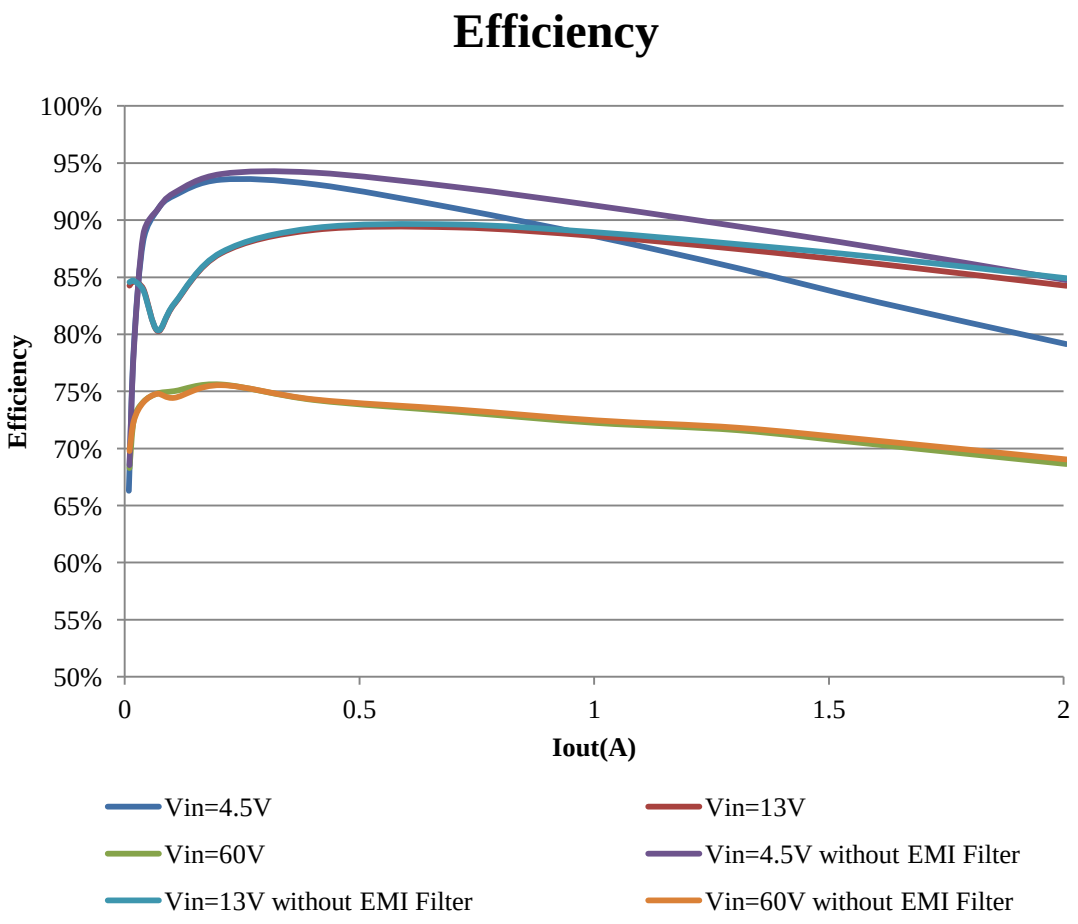


Figure 2

Start Up

Test condition: The input voltage was set at 12V, and the output is set at full load.
Ch1 - Vin, Ch2 -Vout

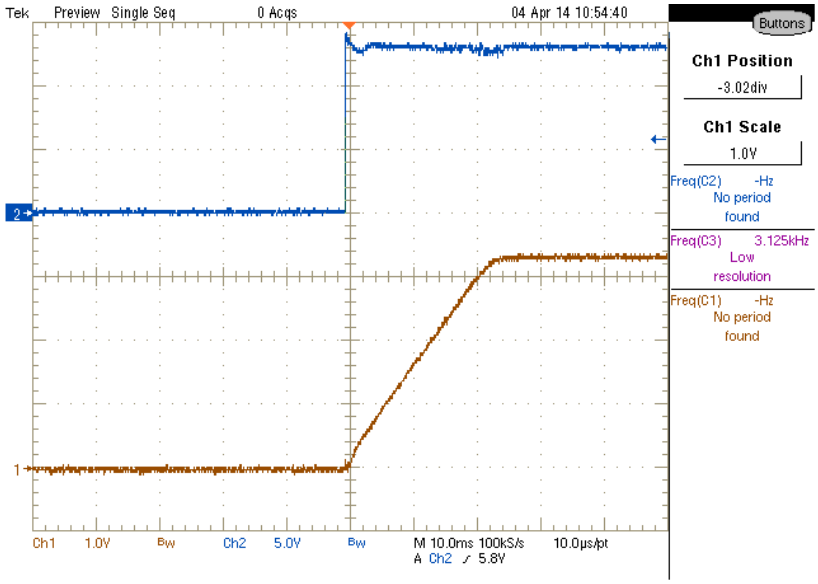


Figure 3

Switch Node Waveform

Test condition: The input voltage was set at 12V, and the output is set at full load

Ch2 – Vsw (switch node voltage).

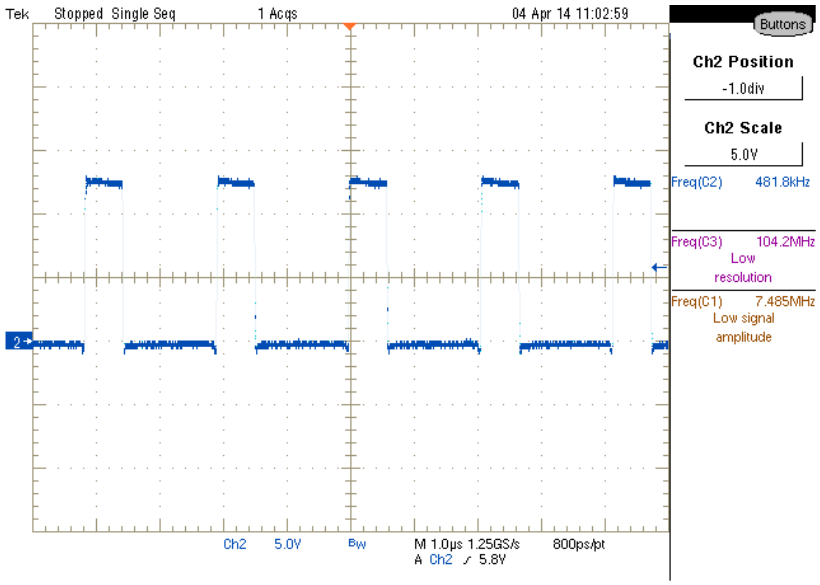


Figure 4

Load Transients

Test condition: Vin = 12V, Iout from 0A to 2A

Ch1- Vout (AC coupled) Ch4- Iout

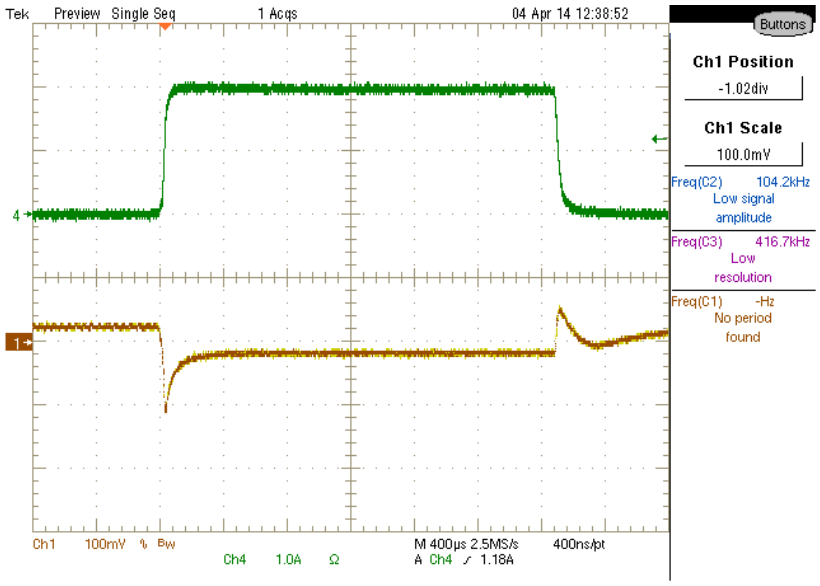


Figure 5

Output Voltage Ripples

Test condition: The input voltage is set at 12V, and the output is set at full load.
Ch1 - Vout (AC coupled)

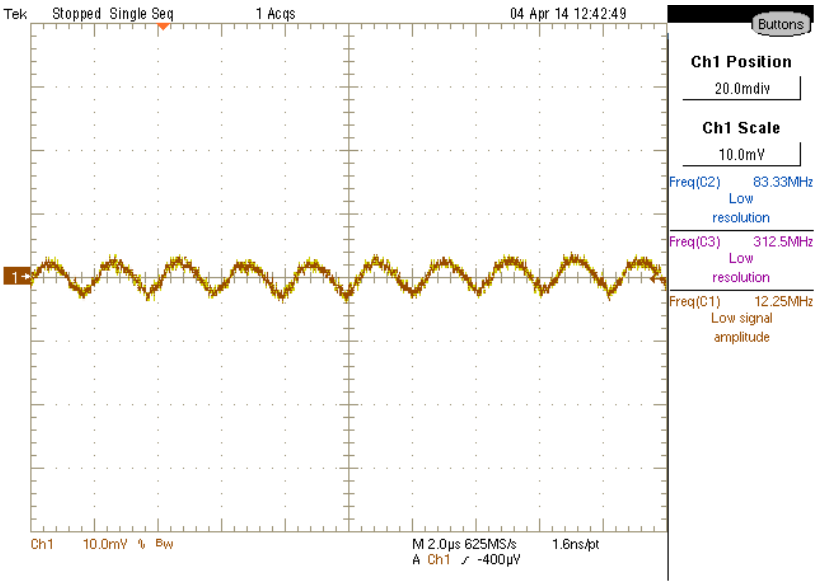


Figure 6

Conducted Emissions

The conducted emissions is tested followed the of CISPR 25 standards. The frequency band examined spans from 150 kHz to 108 MHz covering the AM, FM radio bands, VHF band, and TV band specified in the CISPR 25.

The test results are shown in Figure 7~10. The Figure 7 and Figure 8 show the test result using peak detector measurement, and the Figure 9 and Figure 10 show the test result using average detector measurement. The limit lines shown in red are the Class 5 limits for conducted disturbances specified in the CISPR 25; the yellow trace is the test result. It can be seen that the power supply operates quietly and the noise is below the Class 5 limits.

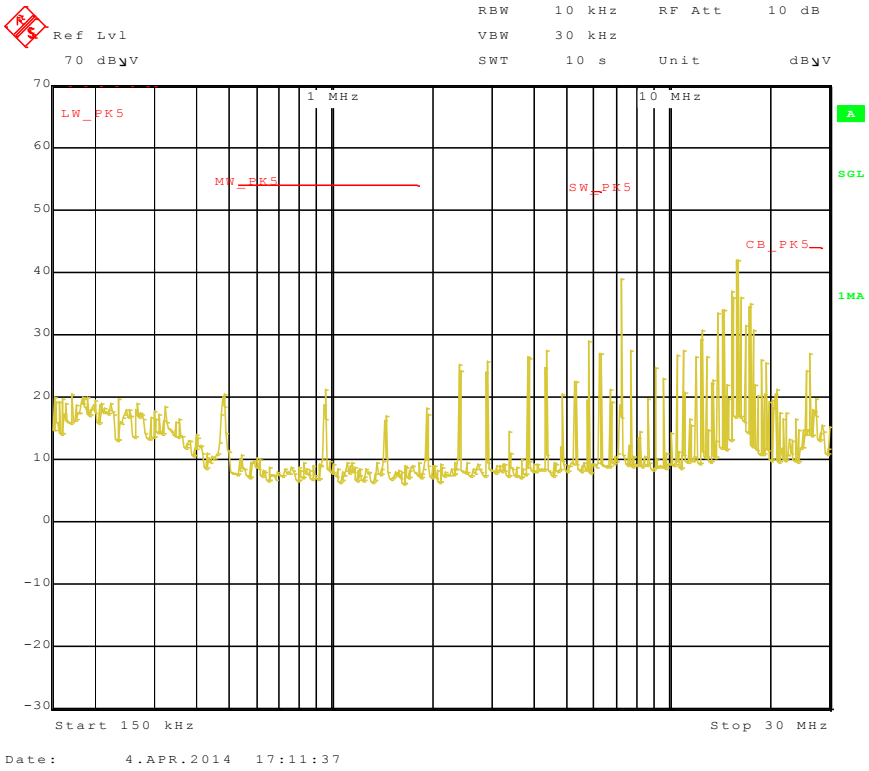


Figure 7 Peak detect, 150kHz – 30MHz

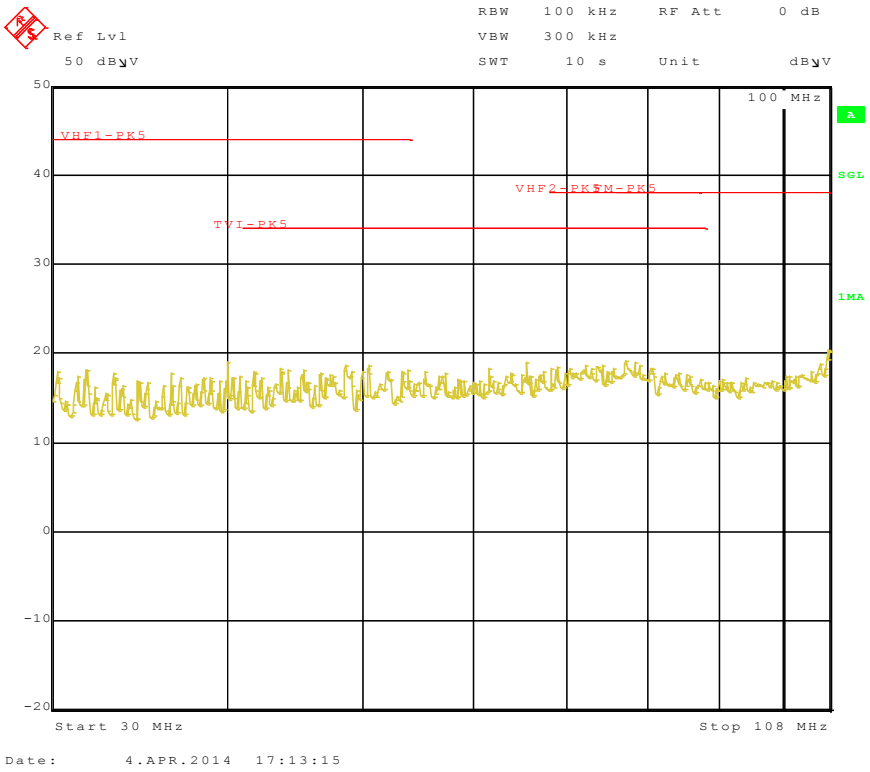


Figure 8 Peak detect, 30MHz – 108MHz

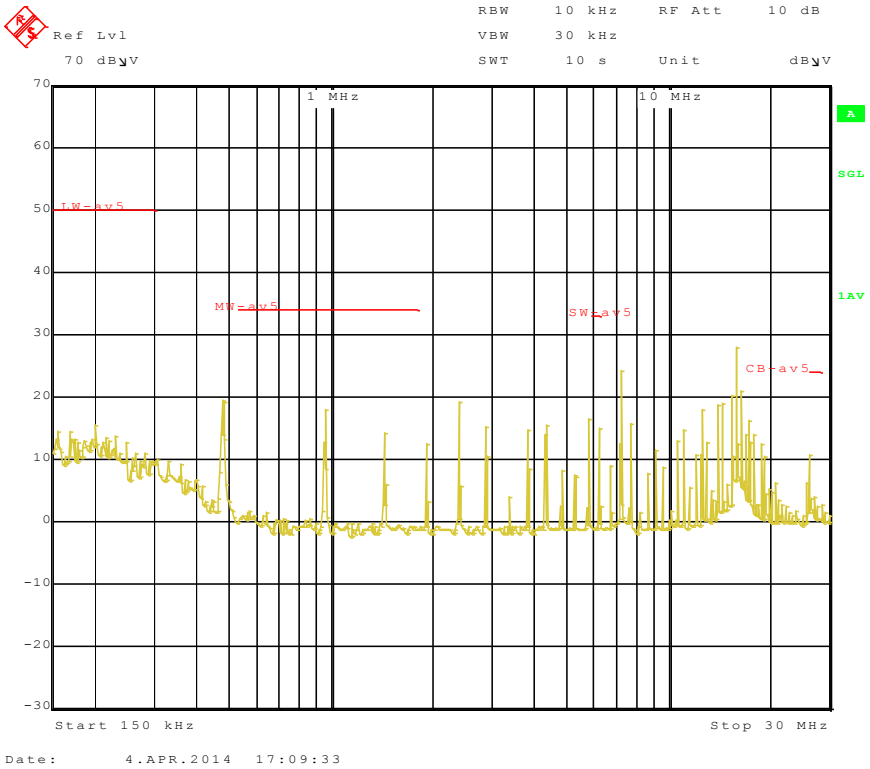


Figure 9 Average detect, 150kHz – 30MHz

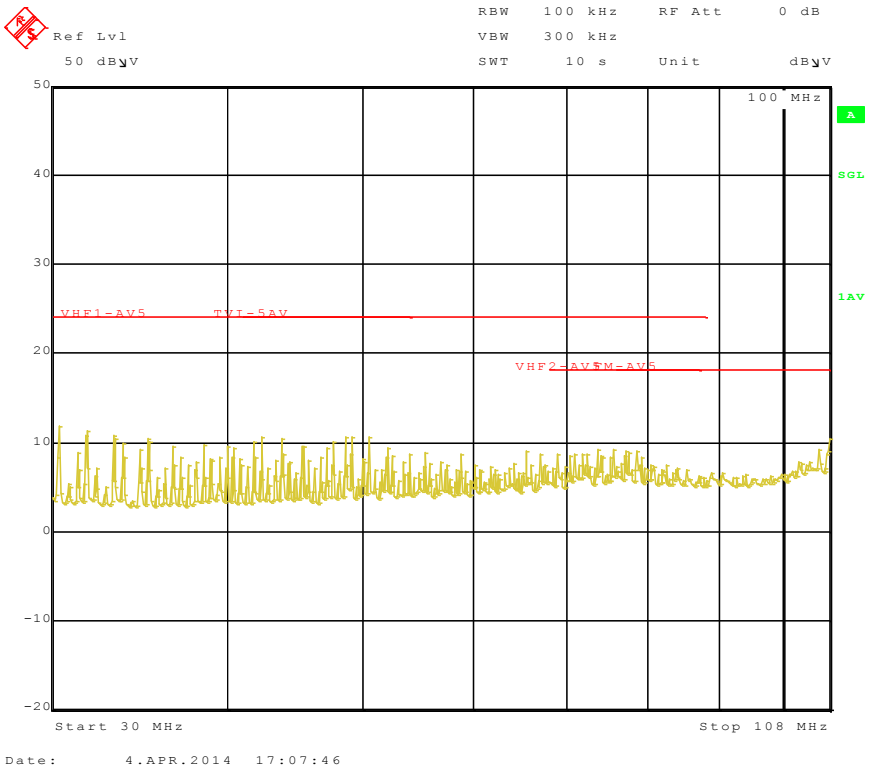


Figure 10 Average detect, 30MHz – 108MHz

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale (https:www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265