

**Test Report
For PMP9361
02/07/2014**



Overview

The reference design provides an EMI optimized 1.5W power supply design for automotive applications. This design features the LM34919C, a 50V, 600mA buck regulator, AEC-Q100 qualified, with a switching frequency up to 2.6MHz and in ultra-small 2x2mm DSBGA package, making it suitable for automotive applications. The power supply generates a 3.3V output at 500mA, and the switching frequency is set at 2.1MHz to avoid AM bands interferences. The design comes with the input EMI filter to suppress the conducted emissions. It is tested under the CISPR 25, the automotive EMC standard, and the result is compliant with the Class 5 conducted emissions standard.

Power Specification

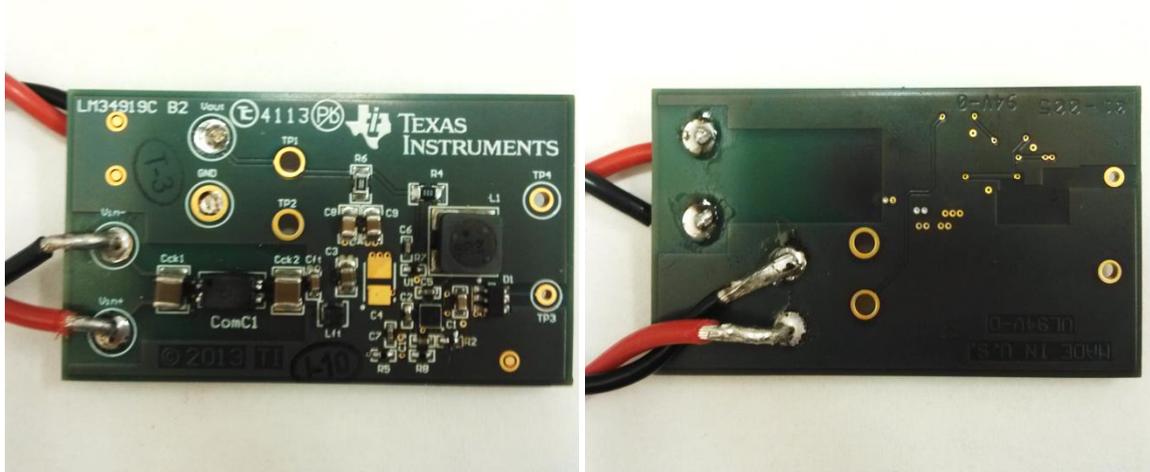
Vin range: 6V – 50V

Nominal Vin: 12V

Outputs: 3.3V@500mA

Fsw: 2.1MHz

Board Photos



Power Board Front

Power Board Back

Figure 1

Size: 50x30mm

Efficiency

The efficiency is measured separately at $V_{in}= 6V, 12V, 24V$.

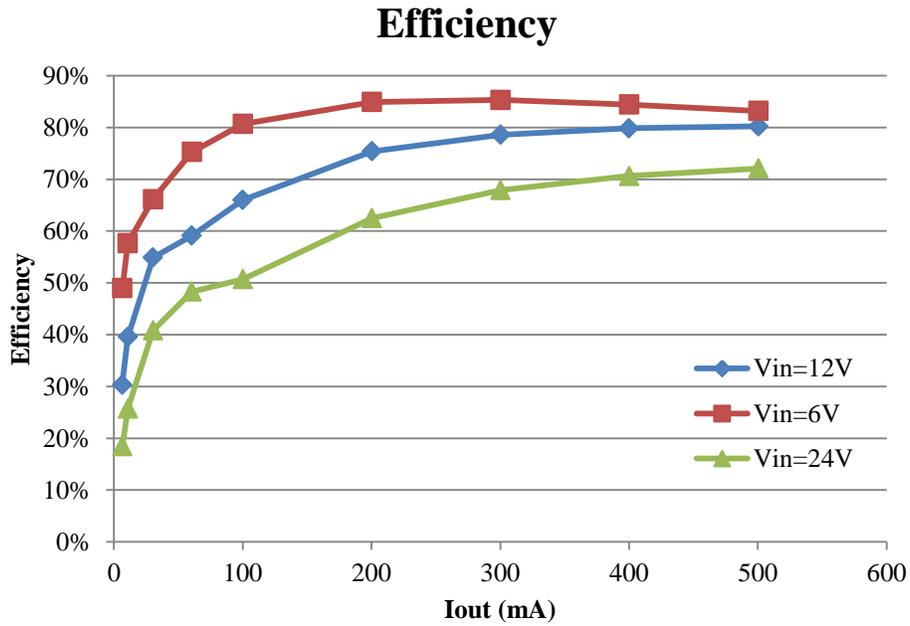


Figure 2

Start Up

Test condition: The input voltage was set at 12V, and the output is set at full load.
Ch2 - Vin, Ch3 -Vout, Ch4-Iout

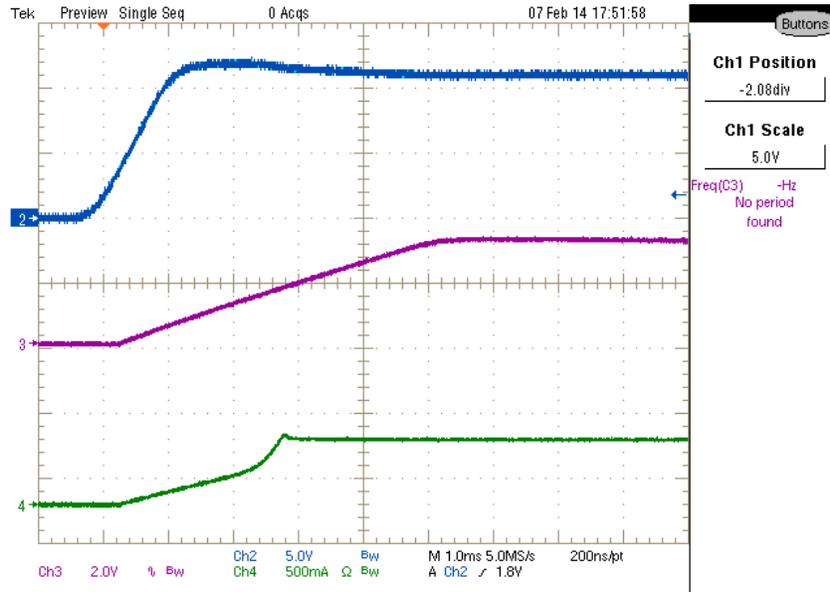


Figure 3

Switch Node Waveform

Test condition: The input voltage was set at 12V, 6V and 48V, and the output is set at full load. The switching frequency is stable at 2.1MHz around nominal Vin 12V, but it would decrease at high Vin above 24V as the minimal on-time is reached.

Ch3 – Vsw (switch node voltage).

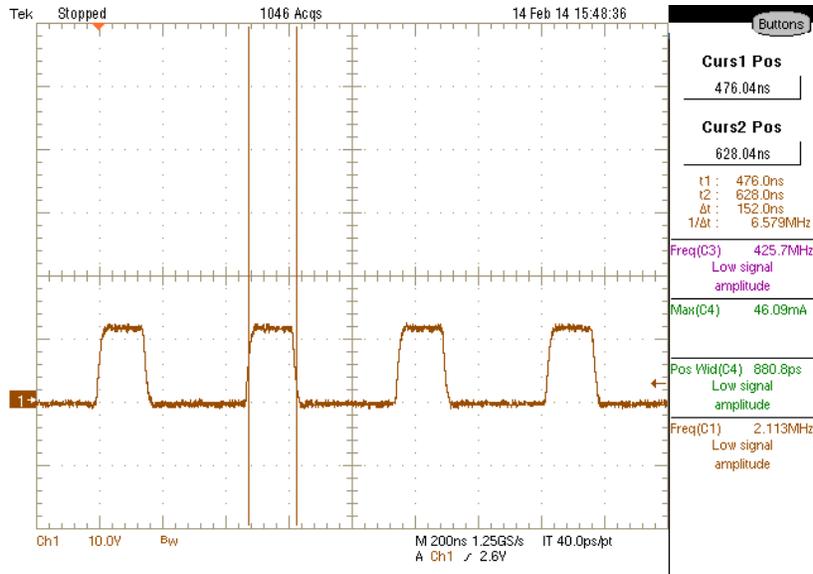


Figure 4 Vin=12V

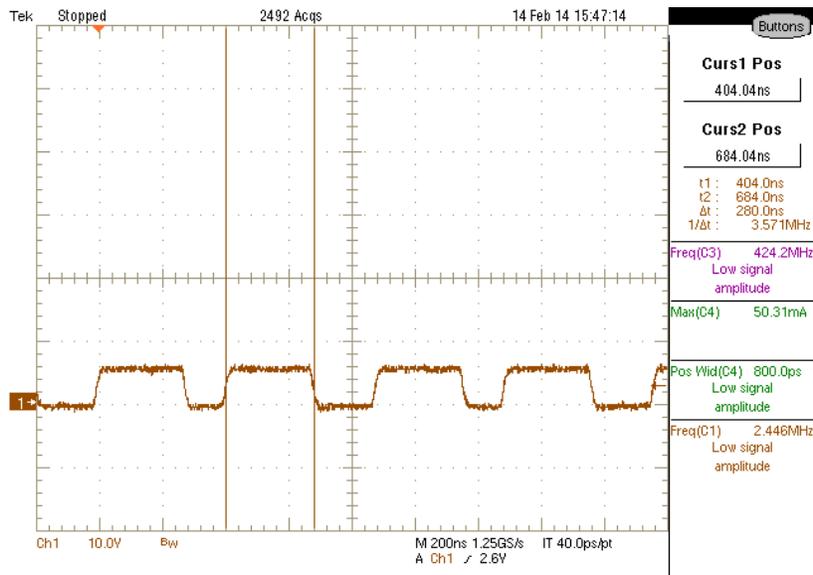


Figure 5 Vin=6V

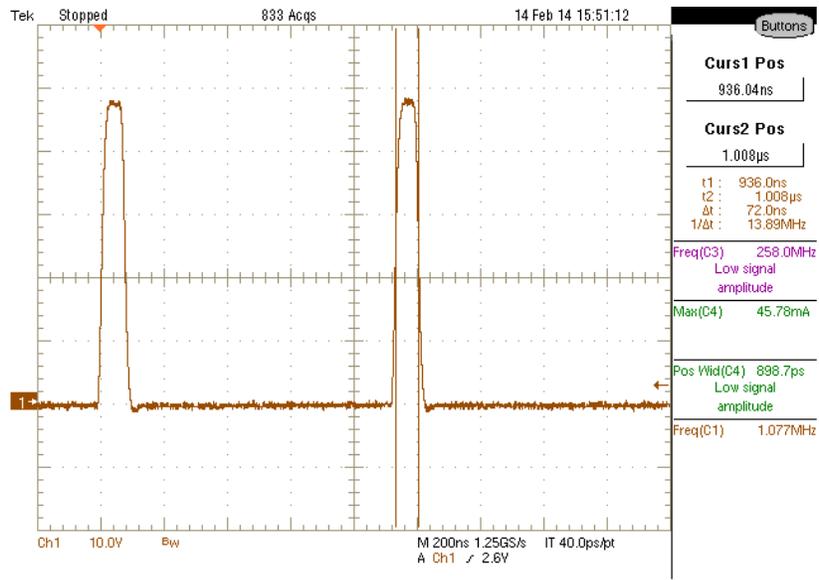


Figure 6 Vin=48V

Load transients

Test condition: $V_{in} = 12V$, I_{o1} from 0.0A to 0.5A

Ch3- V_{out} (AC coupled) Ch4- I_{out}

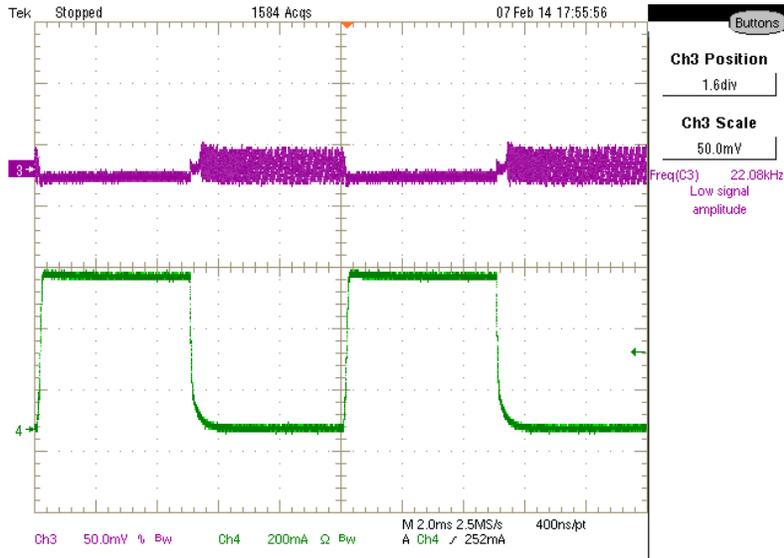


Figure 7

Output Voltage Ripples

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

Ch2 - Vout (AC coupled)

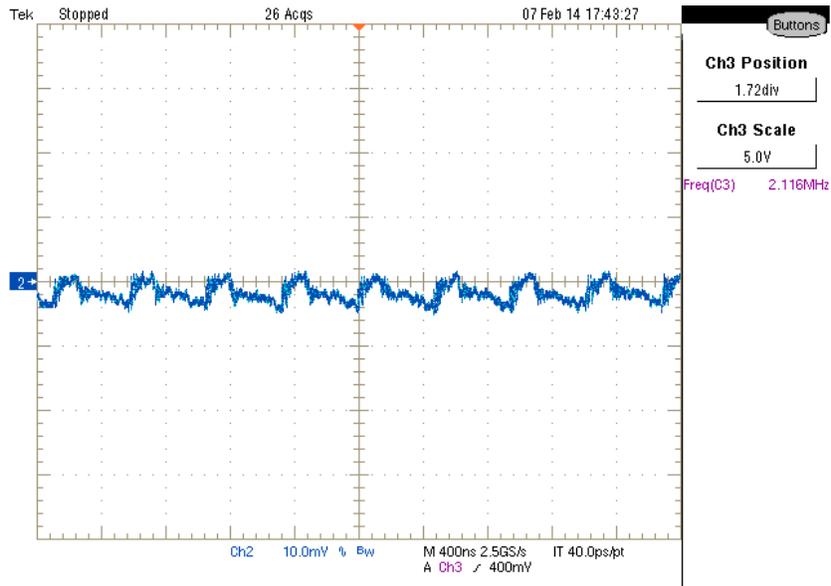


Figure 8

Conducted Emissions

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

The reference board operates at 500mA load. The test results are shown in Figure 9-12. The Figure 9 and Figure 10 show the test result using peak detector measurement, and the Figure 11 and Figure 12 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; and 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 under all the frequency bands.

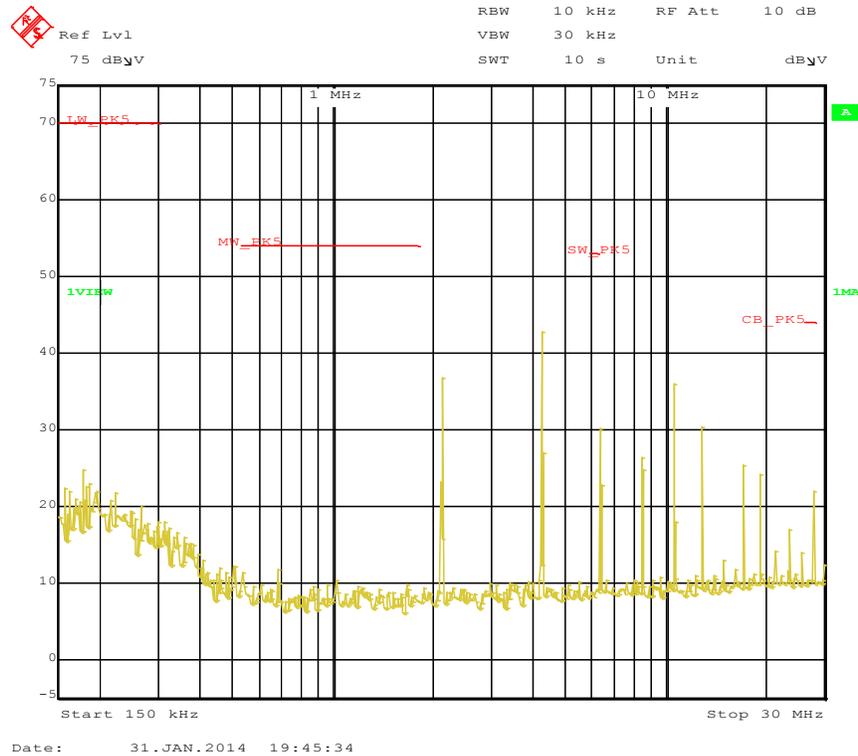


Figure 9 Peak detect, 150kHz – 30MHz

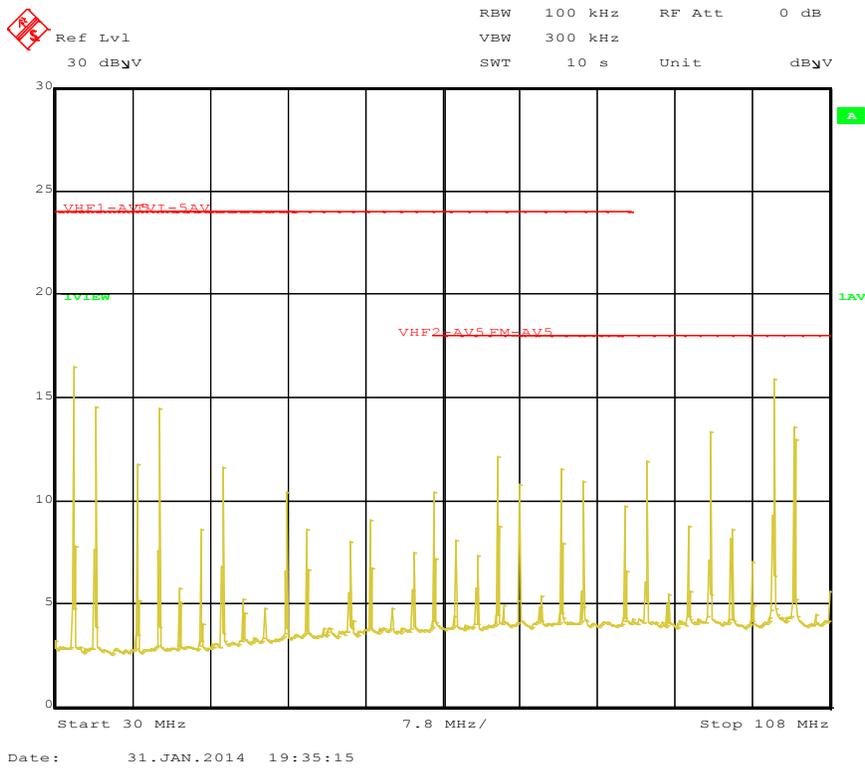


Figure 12 Average detect, 30MHz – 108MHz

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