PMP11114 USB Type-C
Test Report
8/5/2015

The tests performed were as follows:

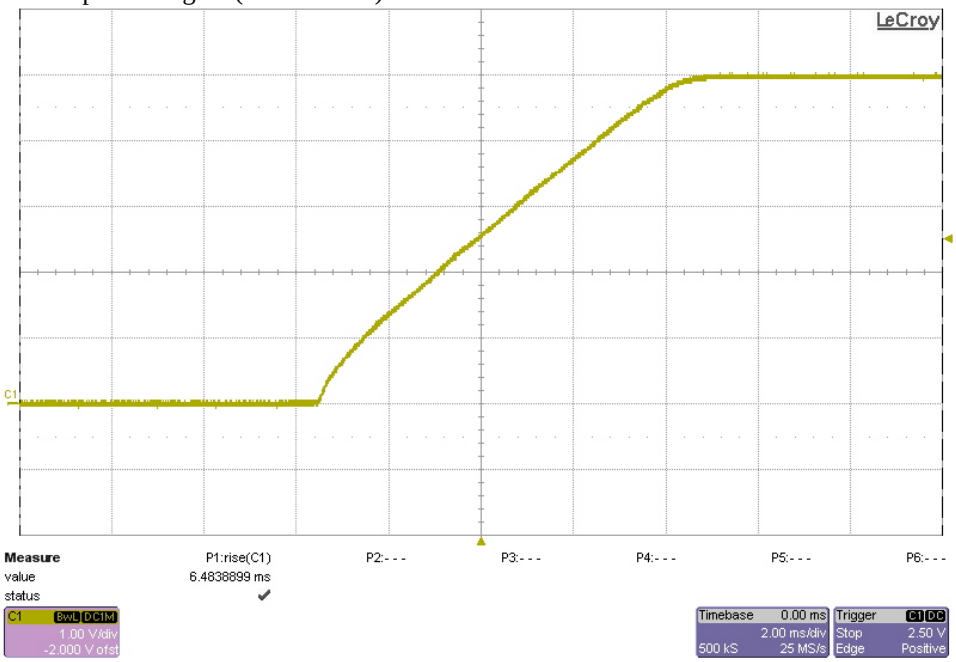
A. LM25117
   1. Turn-On (No Load)
   2. Turn-Off (5Ω Load)
   3. Switch Node (Full Load)
   4. Switch Node (No load)
   5. Switch Node Ringing (Full Load)
   6. Output Voltage Ripple (No Load and Full Load)
   7. Transient Response (100mA to 6A and 3A to 6A Load Step)
   8. Efficiency
   9. Load Regulation
   10. Bode Plot
   11. Board Photo
   12. Thermal Images

PMP11114 Test Results Rev. A

1 Turn On – (LM25117 – No Load)

The photo below shows the startup waveform. The input voltage is 12V, the output is not loaded. The time-base is set to 2ms/Division. This measurement was taken across C12.

Channel 1 – Yellow: Output Voltage – (1V/Division)

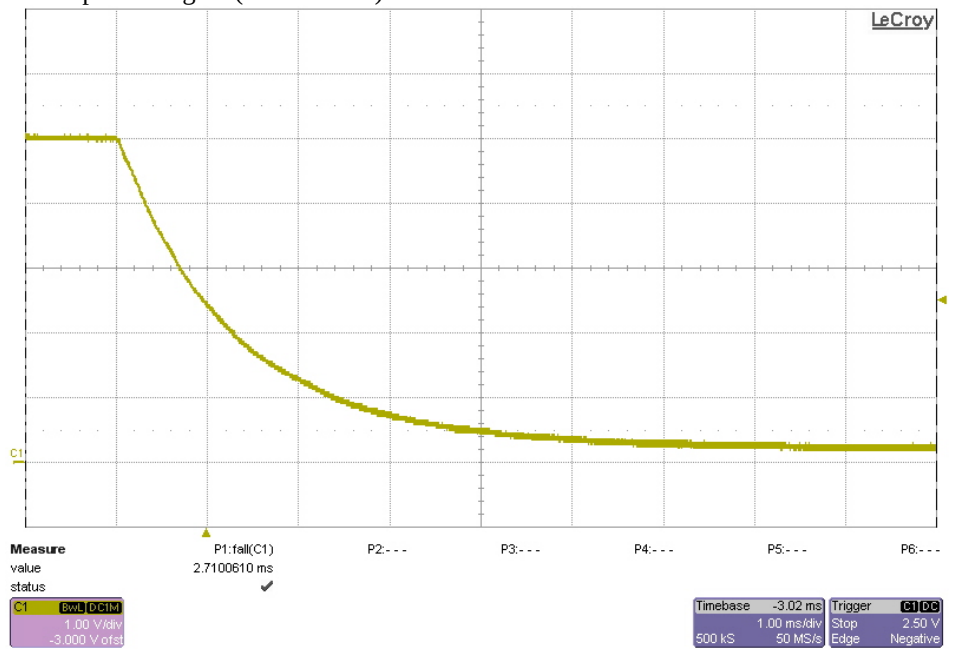


The %10 - %90 rise time is 6.48ms

2 Turn Off – (LM25117 – 5Ω Load)

The photo below shows the turn off waveform. The input voltage is 12V, and the output is loaded with a 5Ω load. The time-base is set to 1ms/Division. This measurement was taken across C12.

Channel 1 – Yellow: Output Voltage – (1V/Division)

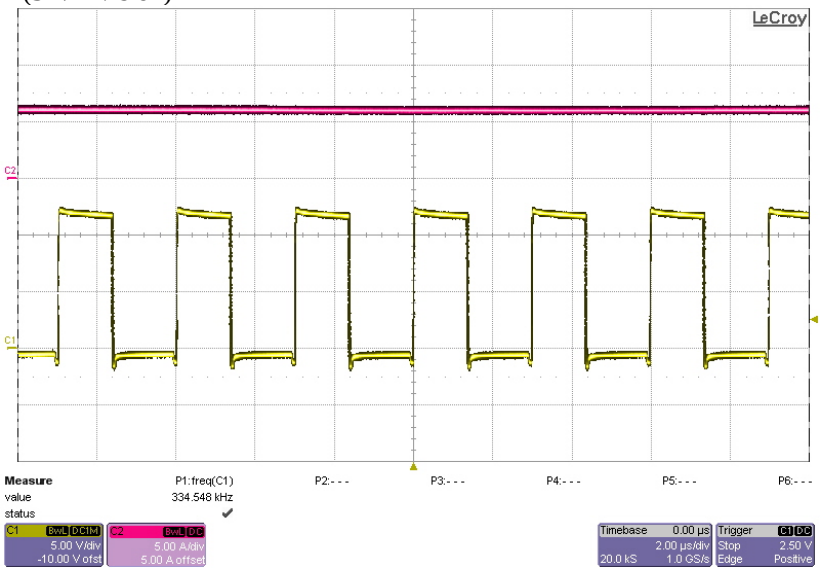


The %10 - %90 fall time is 2.71ms

3 Switch Node – (LM25117 – 5V @ 6A)

The picture below shows the switching waveform for the converter. The input voltage is 12V. The time-base is set to 2us/Division

Channel 1 – Yellow: Switch Node – (5V/Division)
Channel 2 – Pink: Load - (5A/Division)

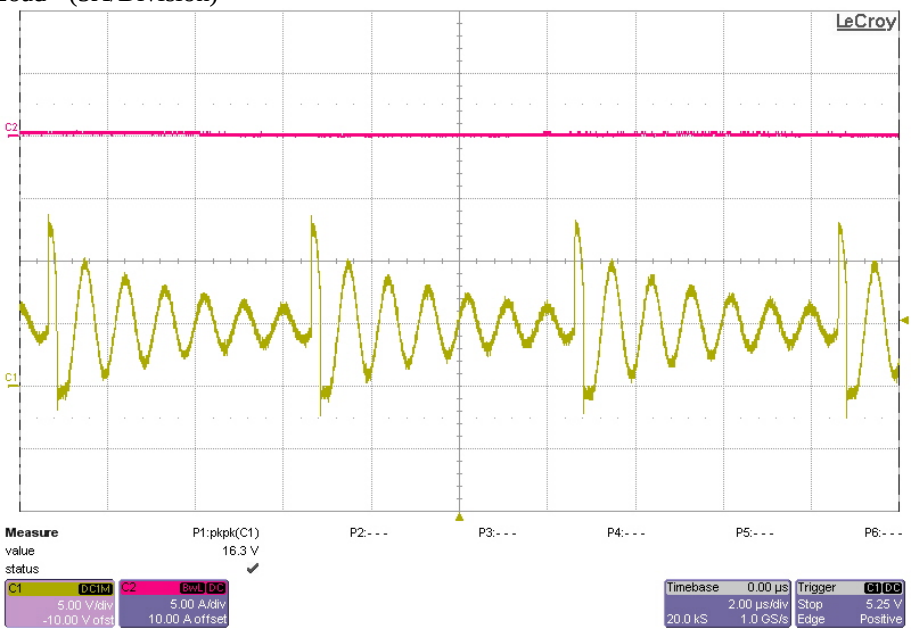


The device is switching at 334 kHz

4 Switch Node – (LM25117 – No Load)

The picture below shows the switching waveform for the converter without a load. The input voltage is 12V. The time-base is set to 2us/Division. This measurement was taken across R10 and C21 in series.

Channel 1 – Yellow: Switch Node – (5V/Division)
Channel 2 – Pink: Load - (5A/Division)

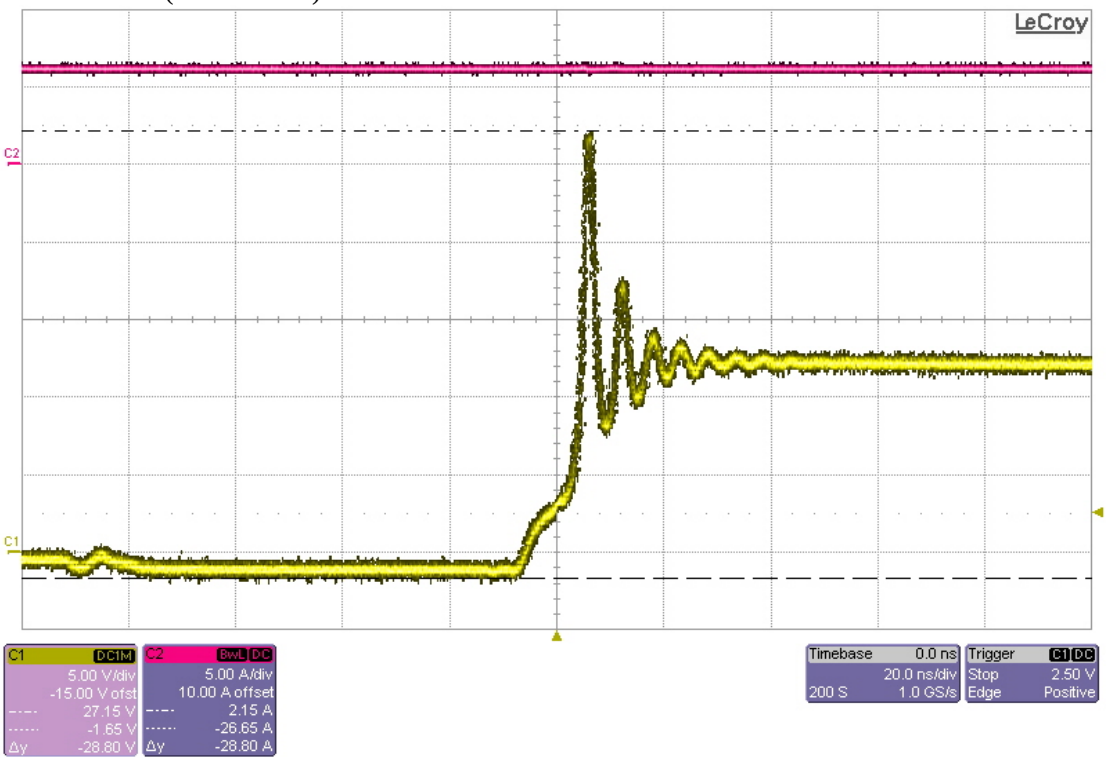


The peak to peak voltage is 16.3V

5 Switch Node Ringing - (LM25117 – 5V @ 6A)

The picture below shows the ringing on the rising edge of the switching node. The time-base is set to 20ns/Division. This measurement was taken across R10 and C21 in series.

Channel 1 – Yellow: Switch Node – (5V/Division)
Channel 2 – Pink: Load - (5A/ Division)

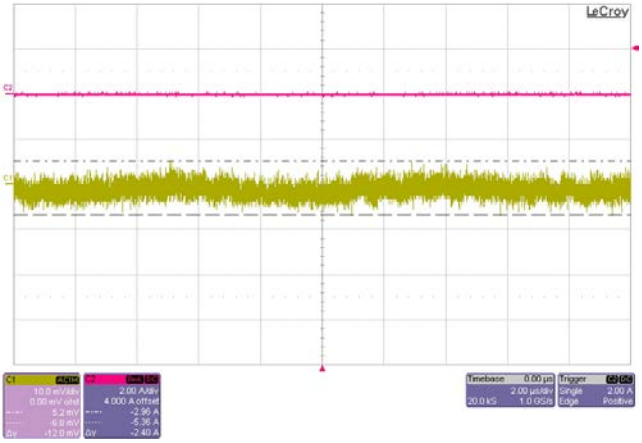


Switch Node Ringing - There is a total change of 28.80V

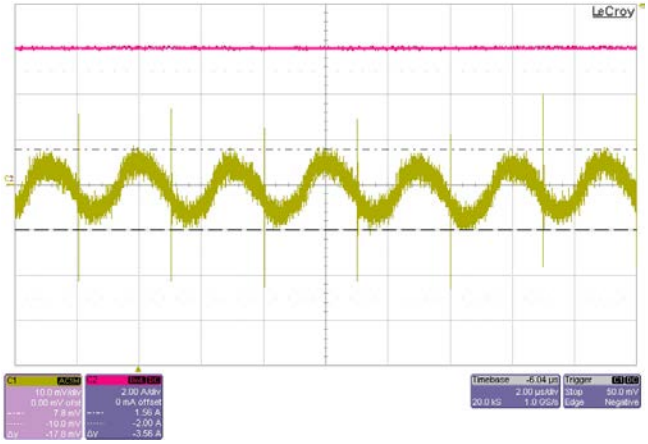
6 Output Voltage Ripple – (LM25117 – 5V @ No load and 6A)

The output voltage ripple of the converter is shown in the figures below. The input voltage is 12V. The time-base is set to 2us/div. These measurements were taken across C12.

Channel 1 – Yellow: Output Voltage (10mV/Division; AC Coupled)
Channel 2 – Pink: Load - (2A/Division)



No Load - Vrip = 12mV

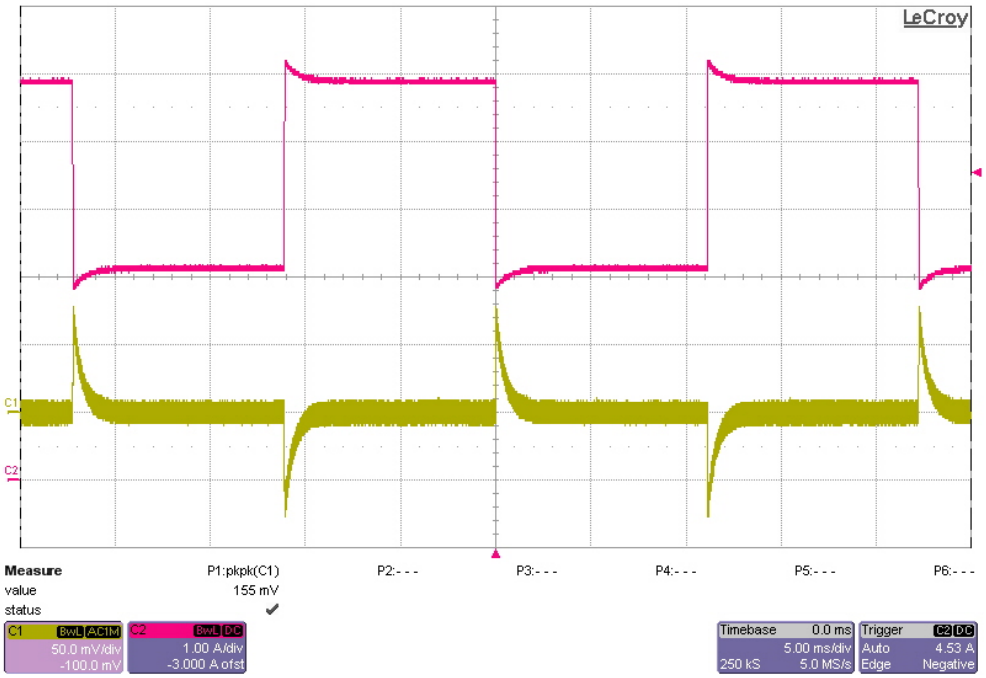


6A Load - Vrip = 17.8mV

7 Transient Response – (LM25117 – 5V)

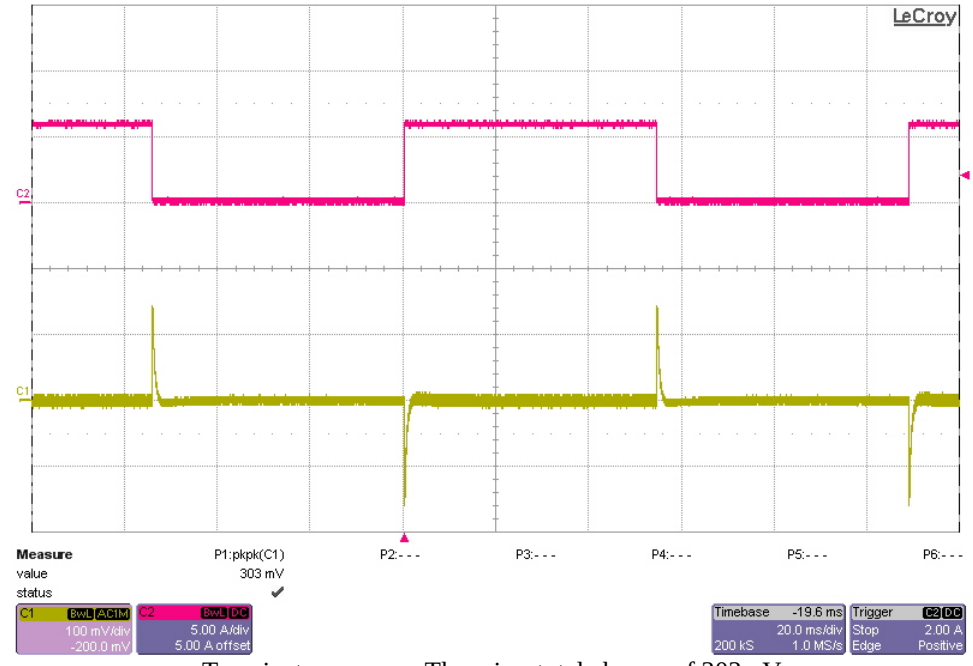
The transient response of the converter is shown in the figures below. The input voltage is 12V. The load is stepped from 3A to 6A in the first figure and 100mA to 6A in the second. This measurement was taken across C12.

Channel 1 – Yellow: Output Voltage (50mV/Division; AC Coupled)
Channel 2 – Pink: Output Current – (1A/Division)



Transient response - There is a total change of 155mV

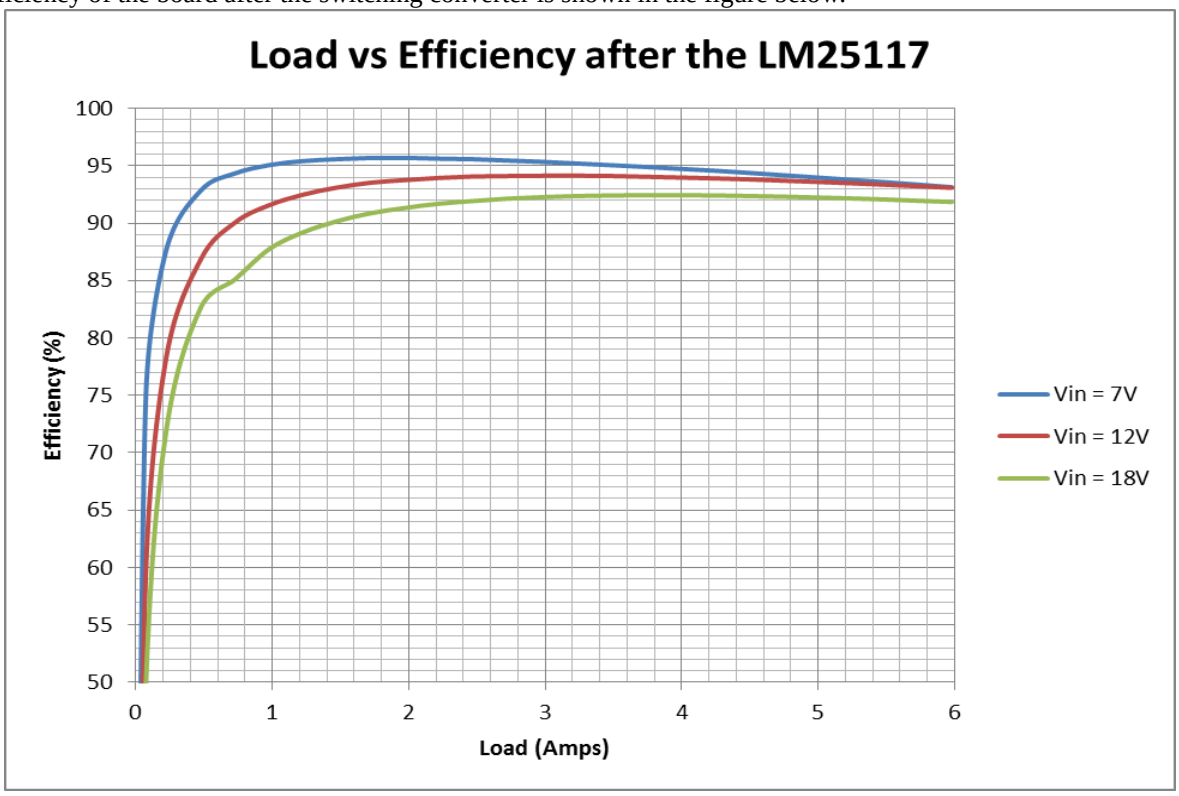
Channel 1 – Yellow: Output Voltage (100mV/Division; AC Coupled)



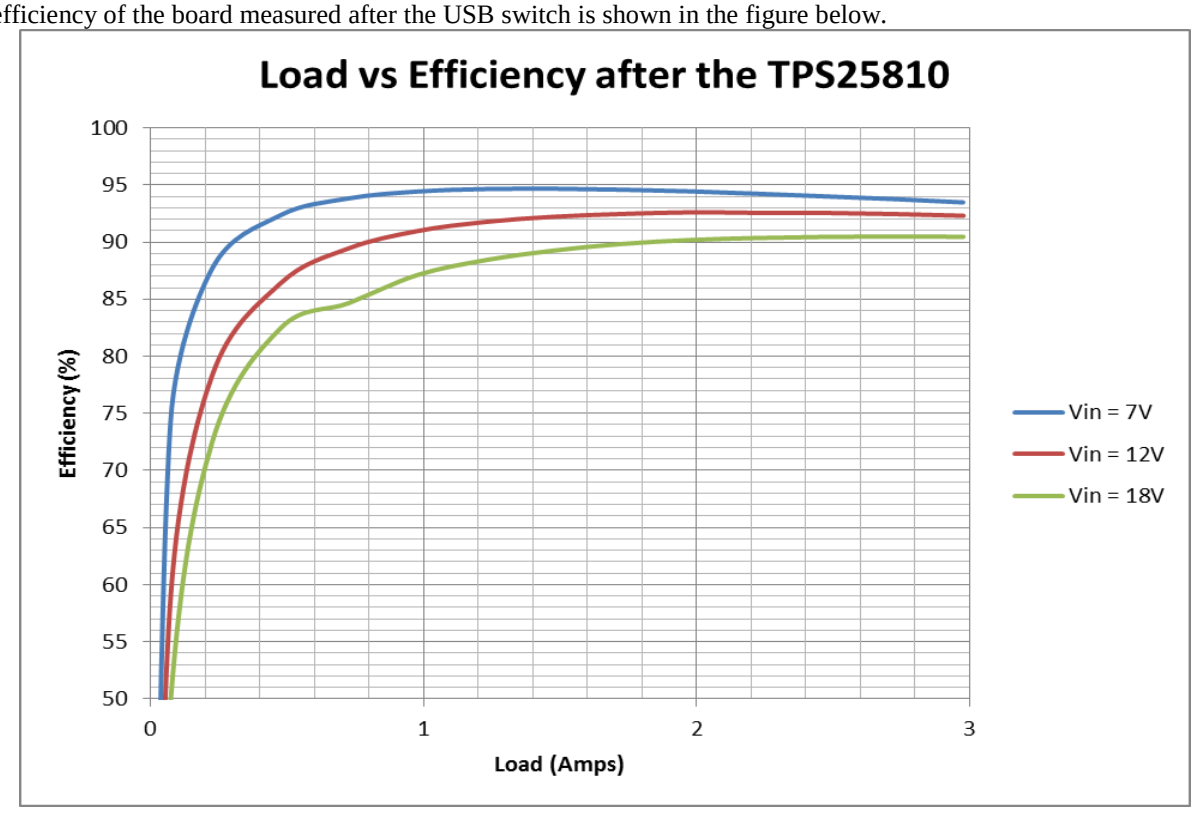
Transient response - There is a total change of 303mV

8 Efficiency – (LM25117 – 5V Output)

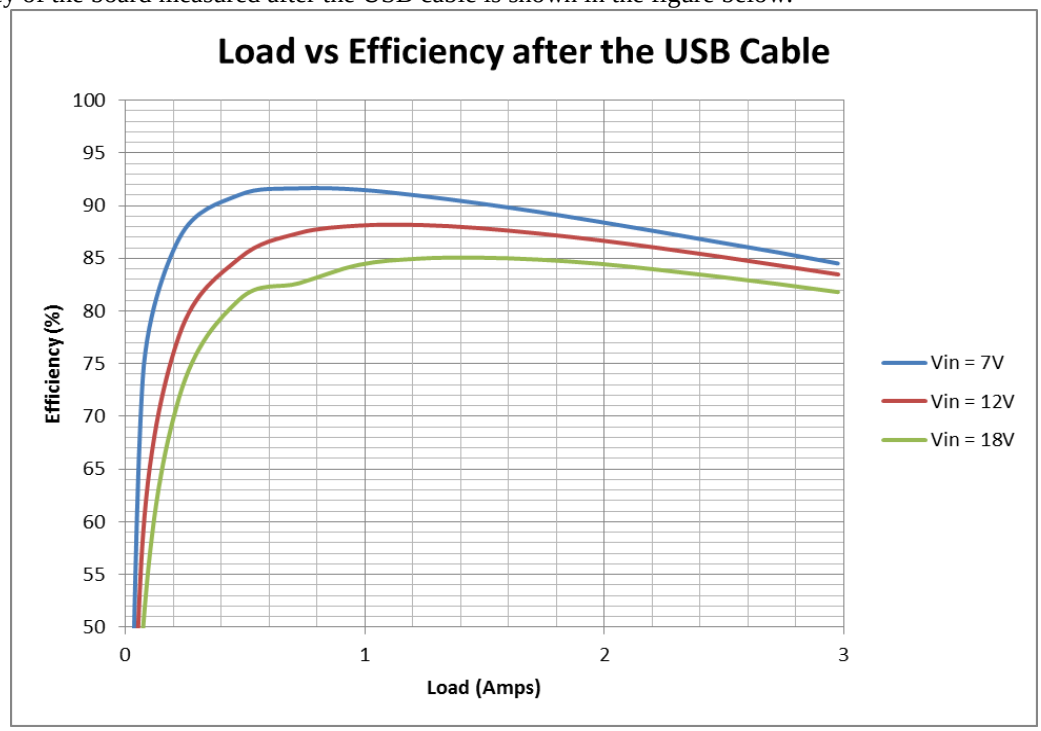
The efficiency of the board after the switching converter is shown in the figure below.



The efficiency of the board measured after the USB switch is shown in the figure below.



The efficiency of the board measured after the USB cable is shown in the figure below.

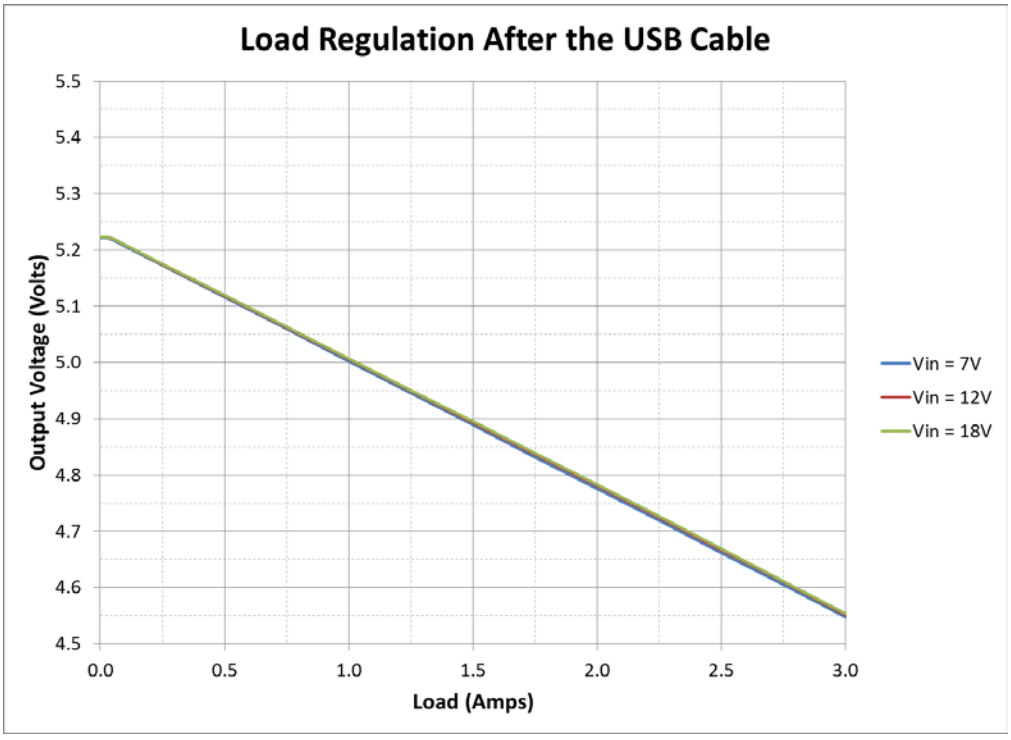


9 Load Regulation – (LM25117 – 5V)

The load regulation of the board measured after the switching converter is shown in the figure below.

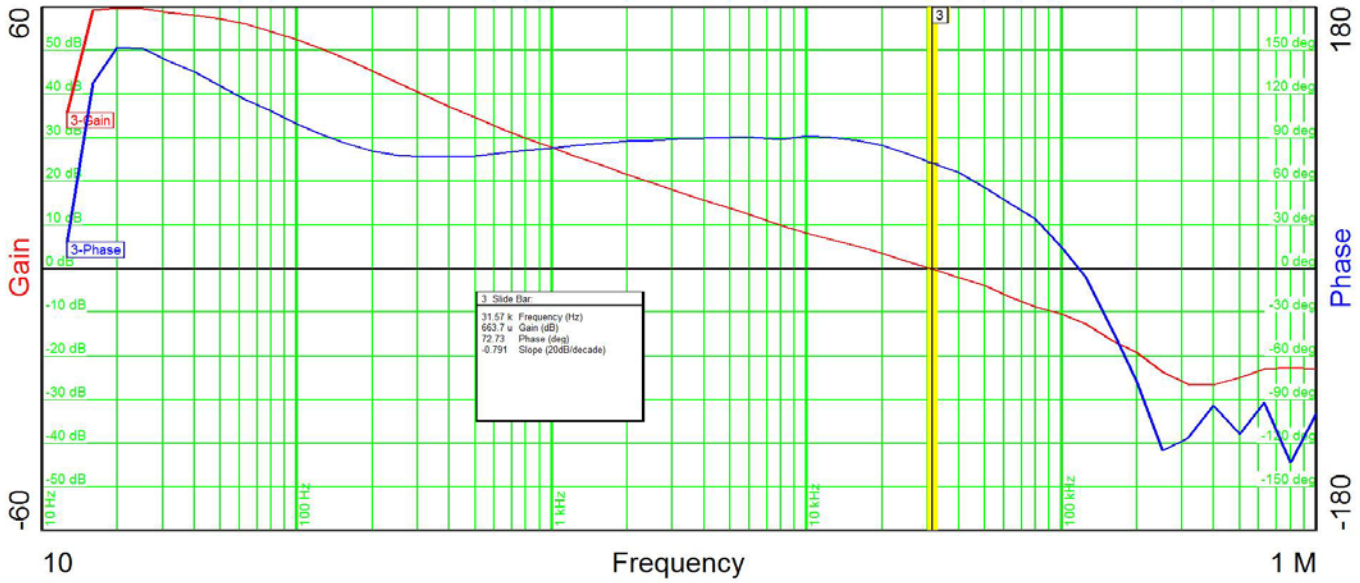
The load regulation of the board measured after the USB switch is shown in the figure below.

The load regulation of the board measured after the USB cable is shown in the figure below.



10 Bode Plot – (LM25117 – 5V @ 6A)

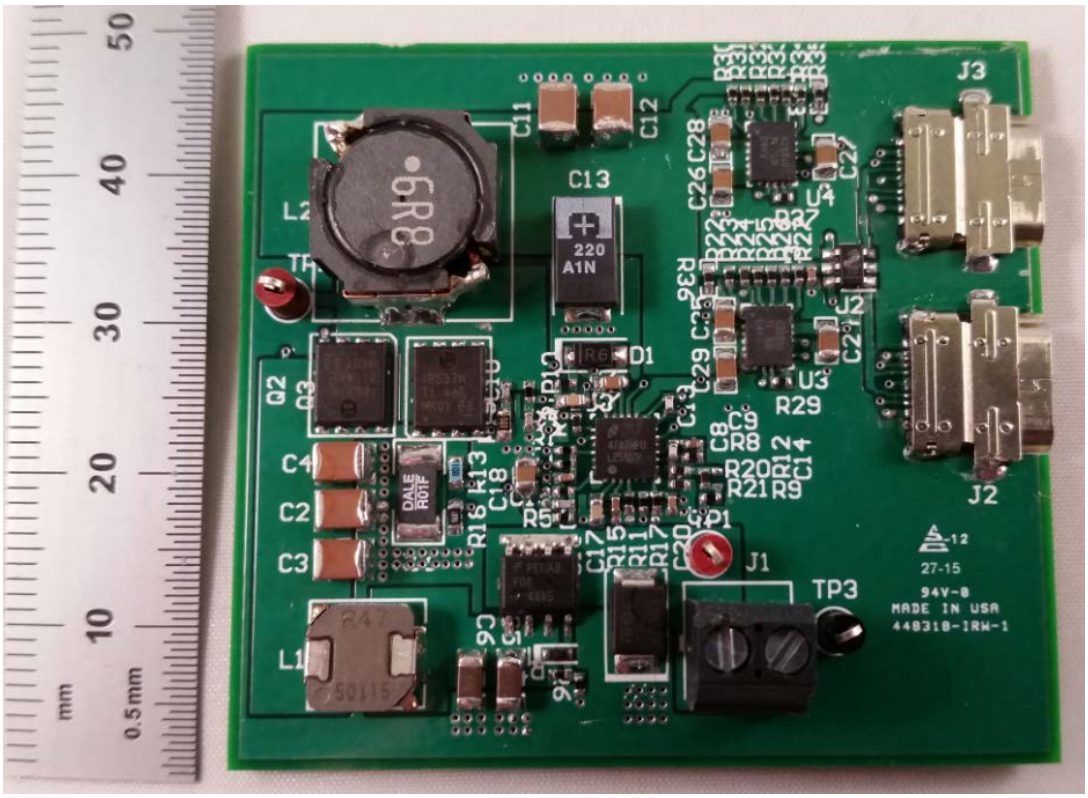
The Bode Plot of the converter is shown in the figure below. The input is 12V.



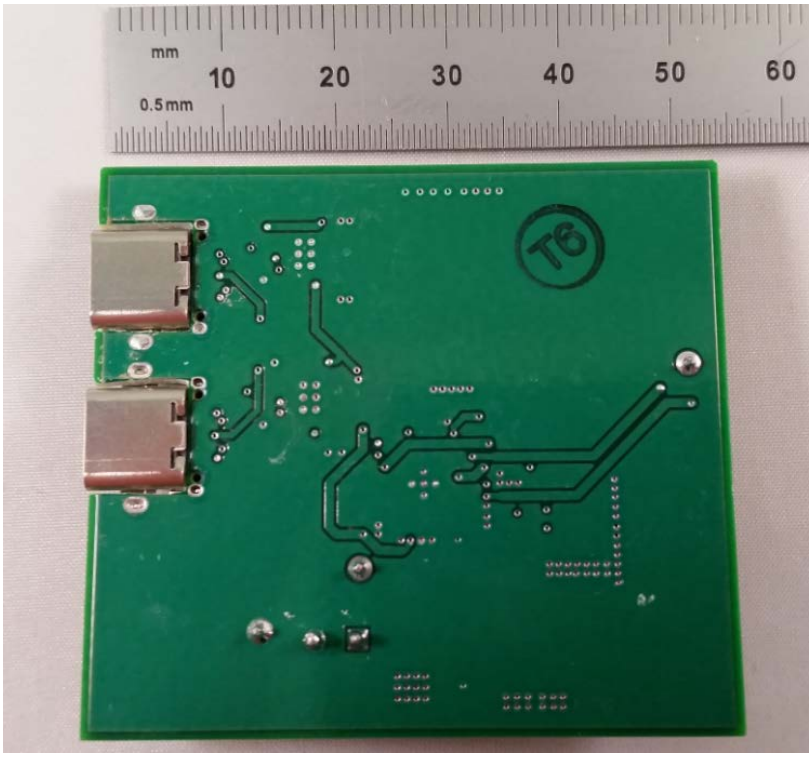
Bode Plot - There is 72 degrees of phase margin

11 Board Photo

The photos below shows the PMP11114 board that is used



Top Side

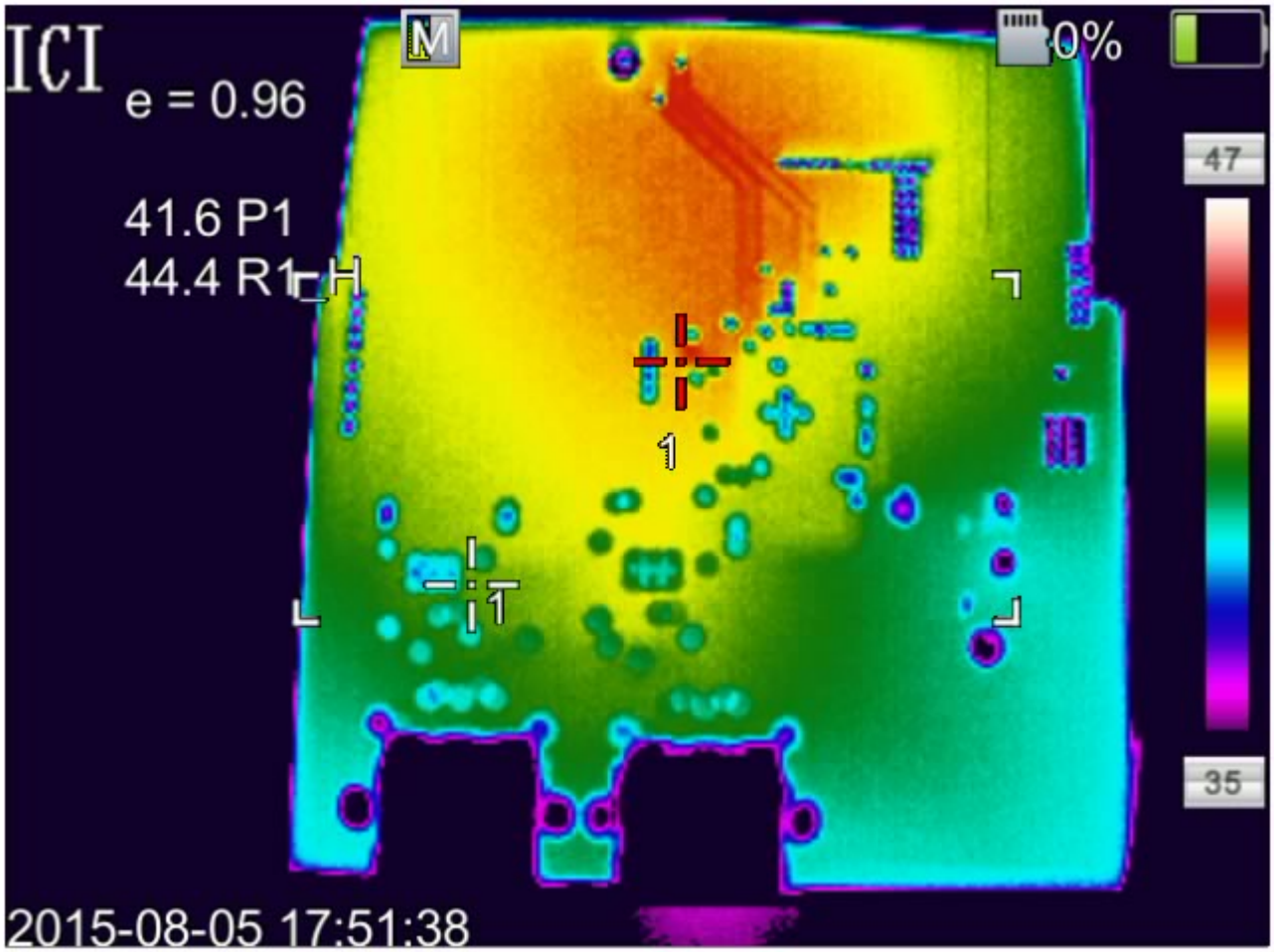


Bottom Side

12 Thermal Images

The images below show the thermal performance of the design. It is important to note that thermal performance is directly proportional to power loss and board size. Different sized and shaped boards will perform differently. The input voltage is 12V, while 3A was drawn out of J3 and 1.5A was drawn out of J2

Top Side



Bottom Side

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