1 Startup

The startup waveform is shown in Figure 1. The input voltage is set at 12.0V, with no load on the 3.3V output.

Channel C1: **input voltage**
5V/div, 1ms/div

Channel C2: **output voltage**
2V/div, 1ms/div

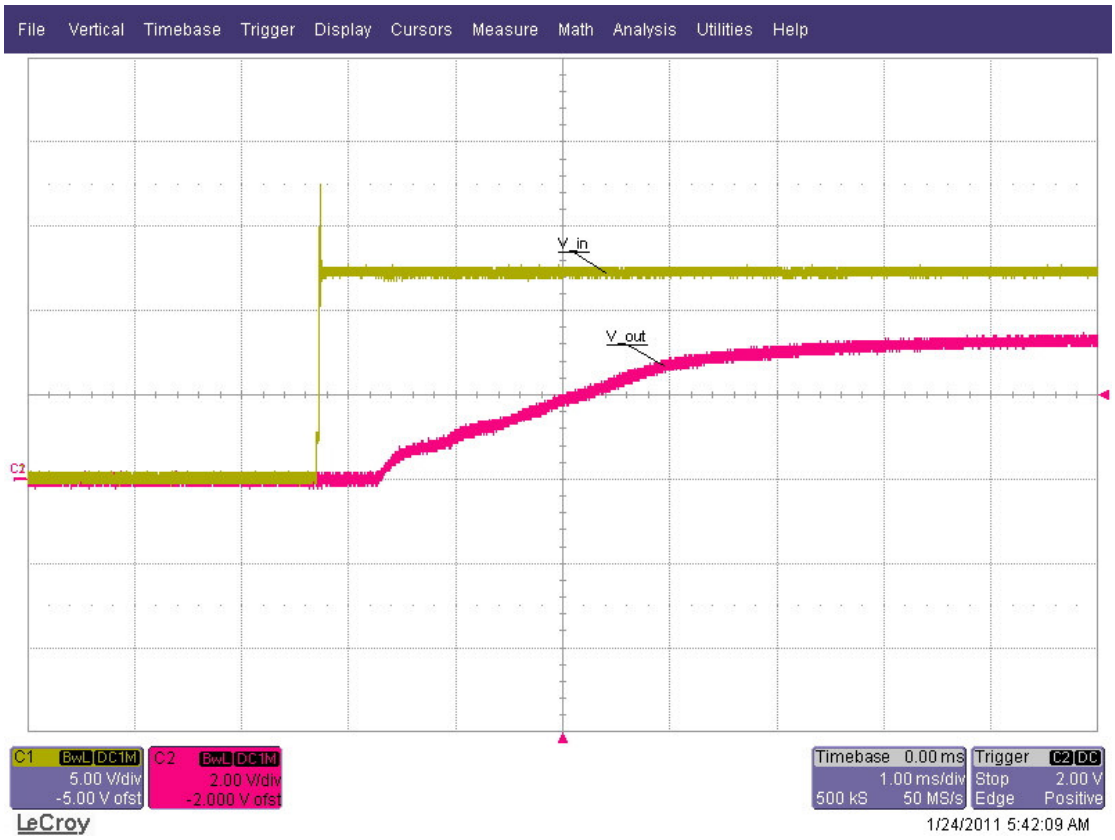


Figure 1

2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set at 12.0V with a 2.0A load on the 3.3V output.

Channel C1: **input voltage**
5V/div, 100us/div

Channel C2: **output voltage**
2V/div, 100us/div

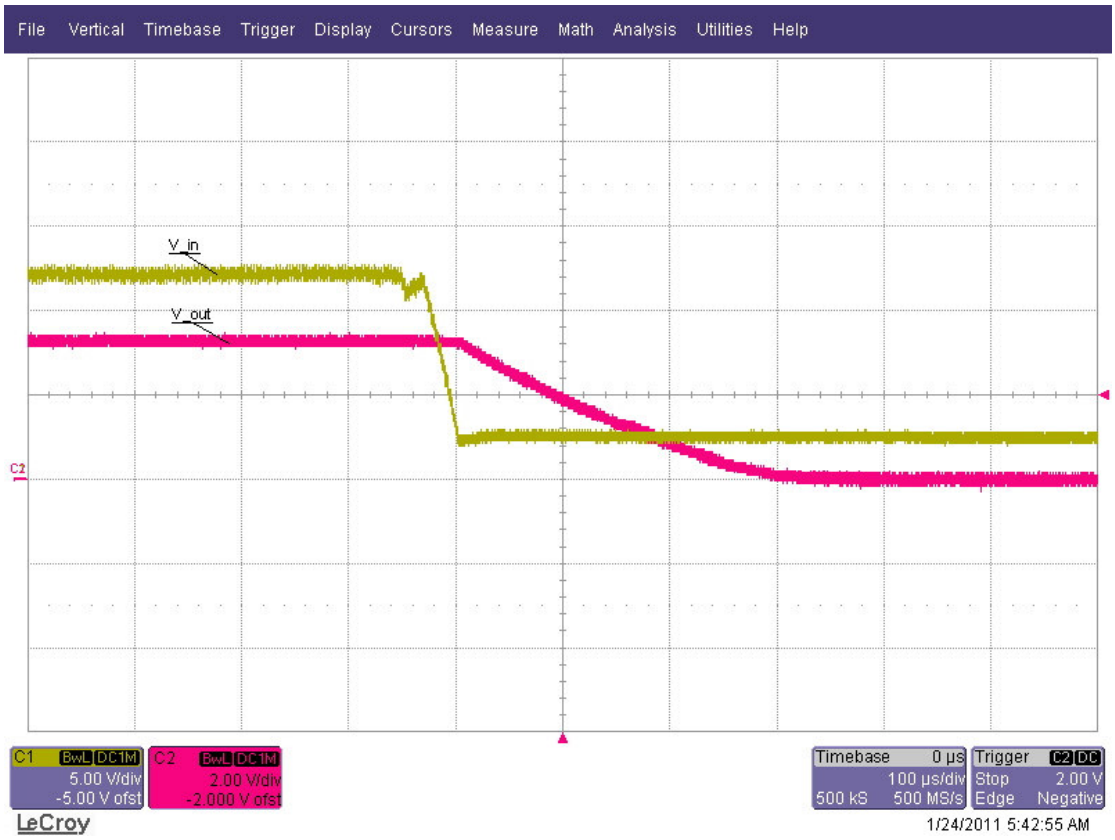


Figure 2

3 Efficiency

The efficiency is shown in Figure 3.

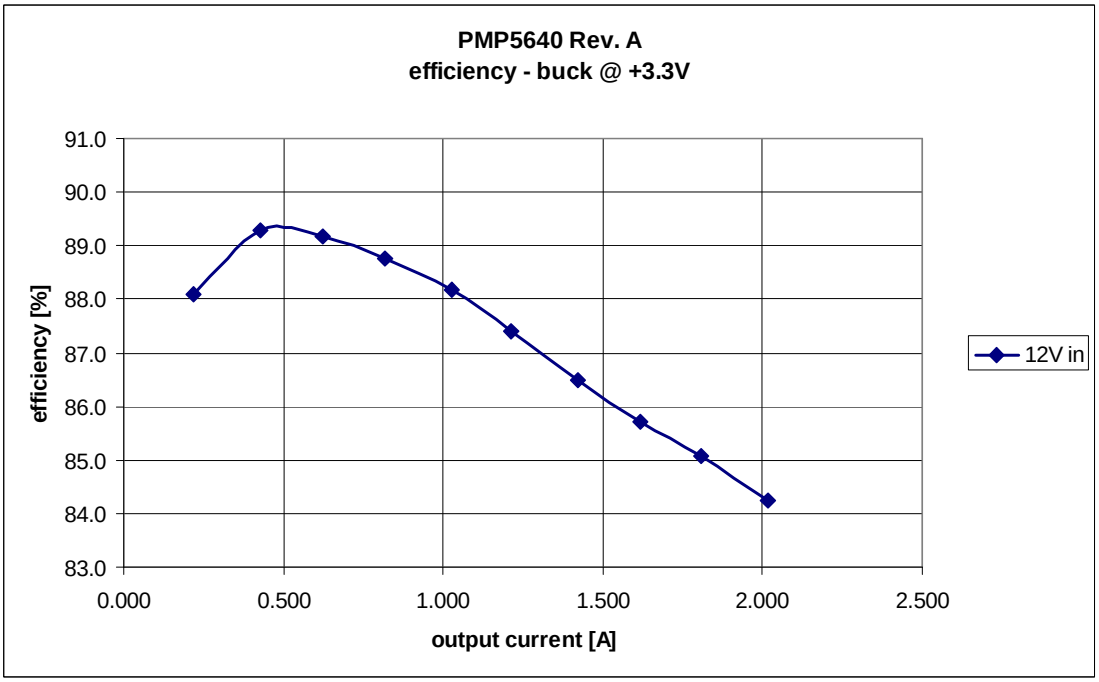


Figure 3

4 Load regulation

The load regulation of the 3.3V output is shown in Figure 4.

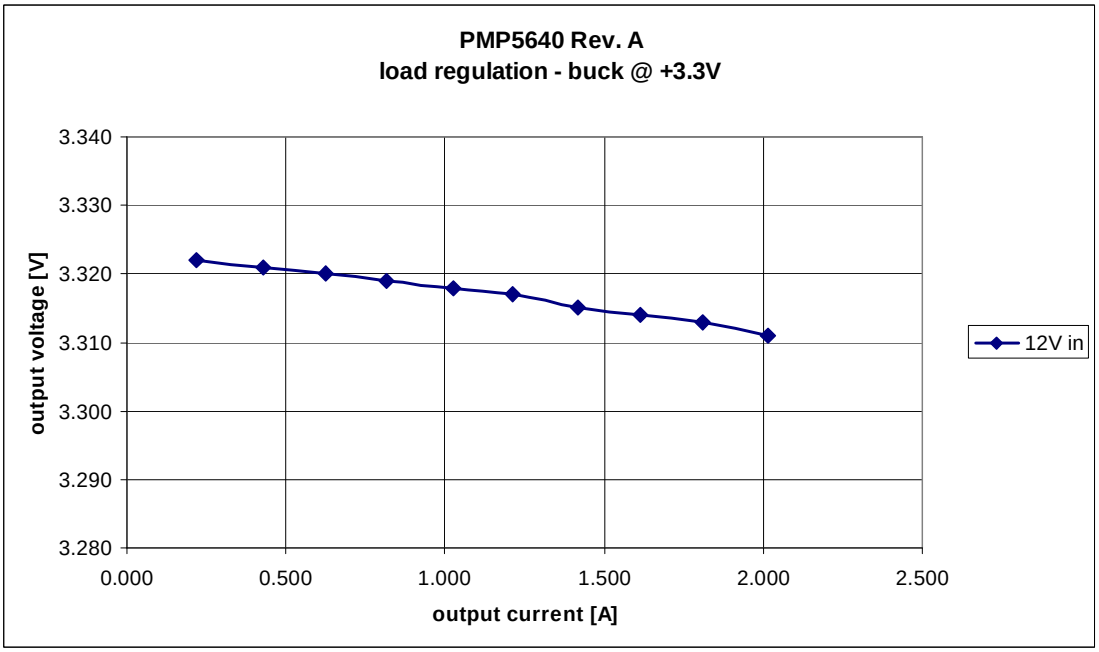


Figure 4

5 Output ripple voltage

The output ripple voltage at 2.0A load and 12.0V input voltage is shown in Figure 5.

Channel C1: **switching node**
20V/div, 2us/div

Channel C2: **output voltage**, **no ripple measurably due to ceramic output capacitors**
20mV/div, 2us/div, AC coupled

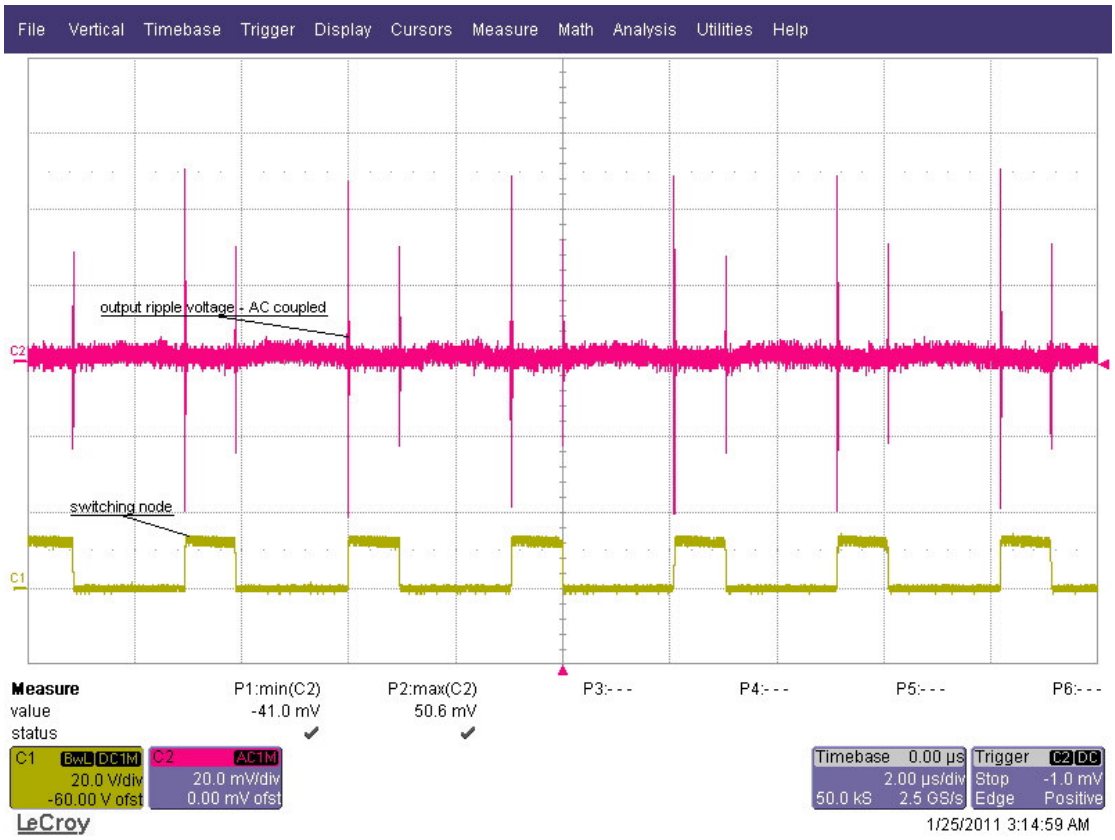


Figure 5

6 Load transients

The response to a load step and a load dump at an input voltage of 12.0V is shown in Figure 6.

Channel C2: **output voltage**, -123mV undershoot, 114mV overshoot
100mV/div, 1ms/div, AC coupled

Channel C1: **load current**, load step 1.0A to 2.0A and vice versa
1A/div, 1ms/div

Figure 6

7 Frequency response

Figure 7 shows the loop response of the 3.3V output with 12.0V input and a 2.0A load.

60 deg phase margin @ crossover frequency 9.7 kHz

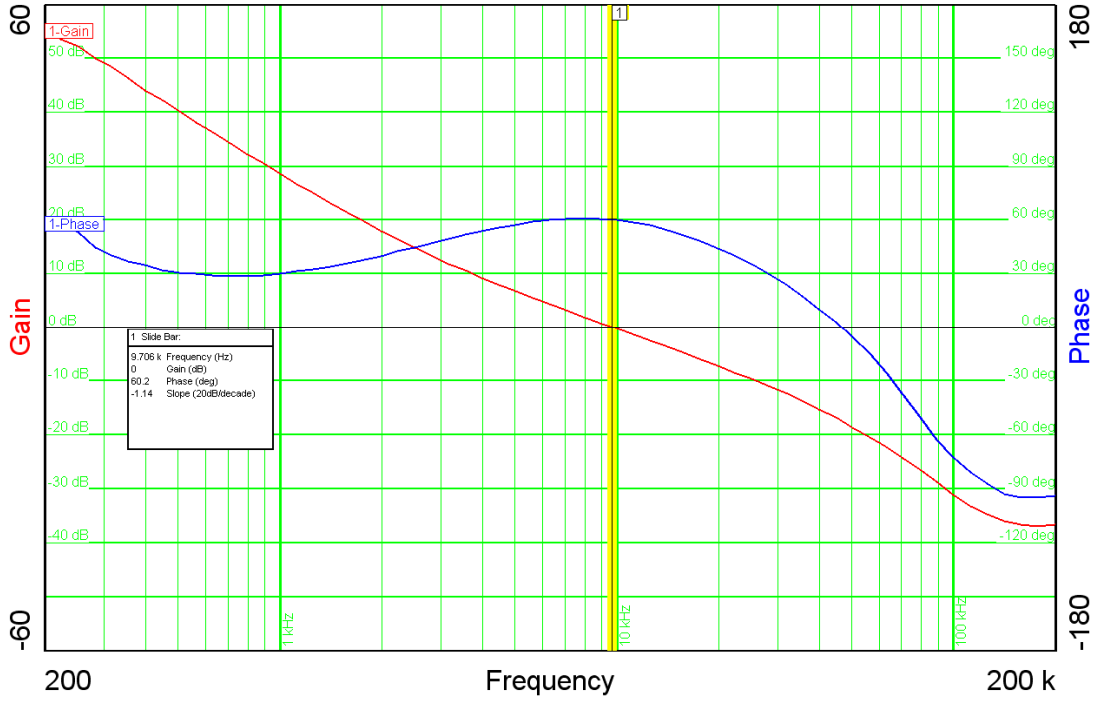


Figure 7

8 Miscellaneous waveforms

The drain-source voltage on the switching node is shown in Figure 8. The image was captured with a 12.0V input and a 2.0A load.

Channel C2: **drain-source voltage**, -1.8V minimum voltage, 14.2V maximum voltage
5V/div, 1us/div

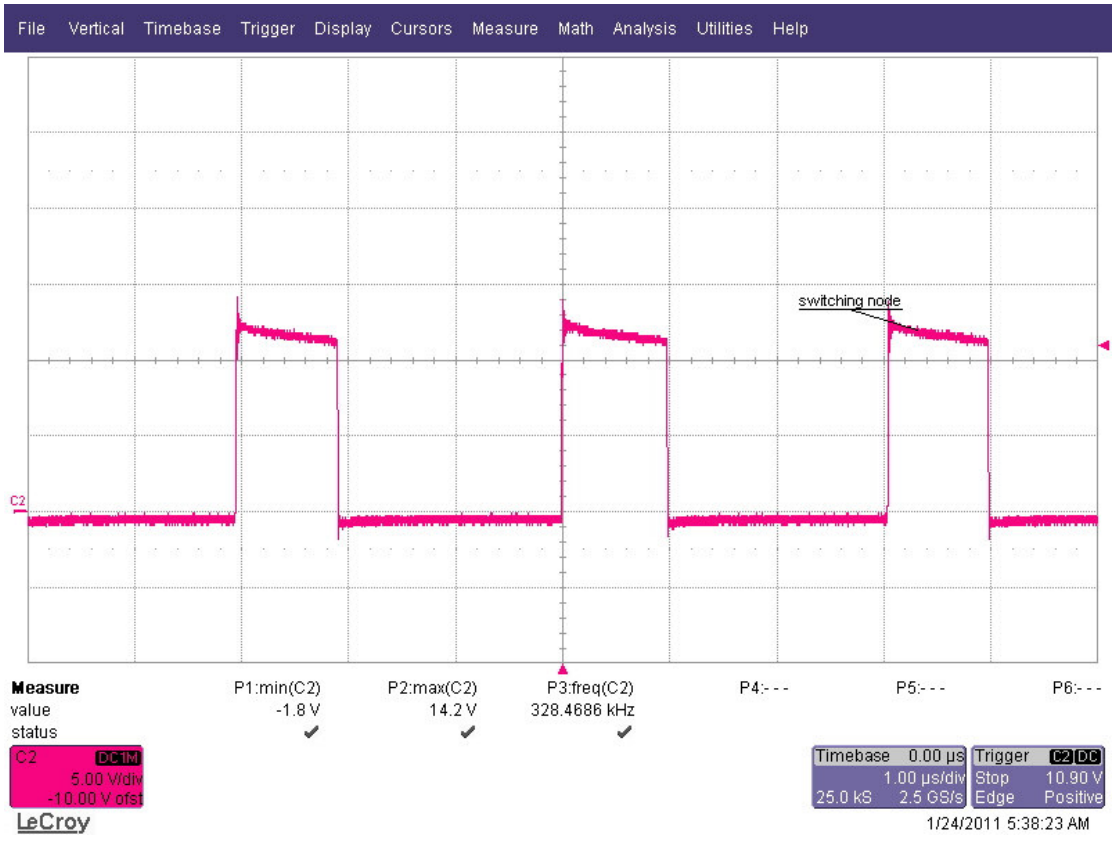


Figure 8

9 Thermal measurement

The thermal image (Figure 9) shows the circuit at an ambient temperature of 21 °C with an input voltage of 5.0V and a load of 6.0A.

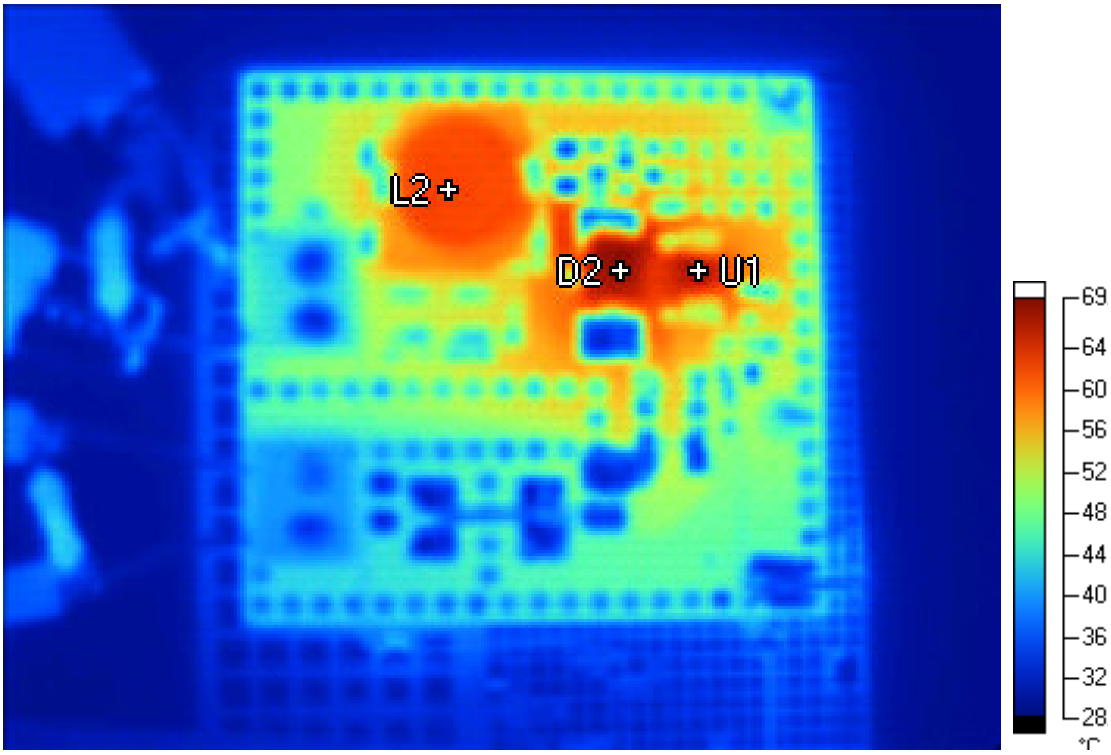


Figure 9

Markers

Label	Temperature	Emissivity	Background
L2	62.6 °C	0.95	21.0 °C
D2	68.4 °C	0.95	21.0 °C
U1	67.6 °C	0.95	21.0 °C

10 Enable signal (U1) during standby

Figure 10 shows the enable pin (U1, pin 3) during standby.
In this mode the enable pin is controlled by U21 (TPS3806). The external input (J21) has to be high.

Figure 10

11 Output voltage during standby

Figure 11 shows the output voltage during standby mode with 500uA load.

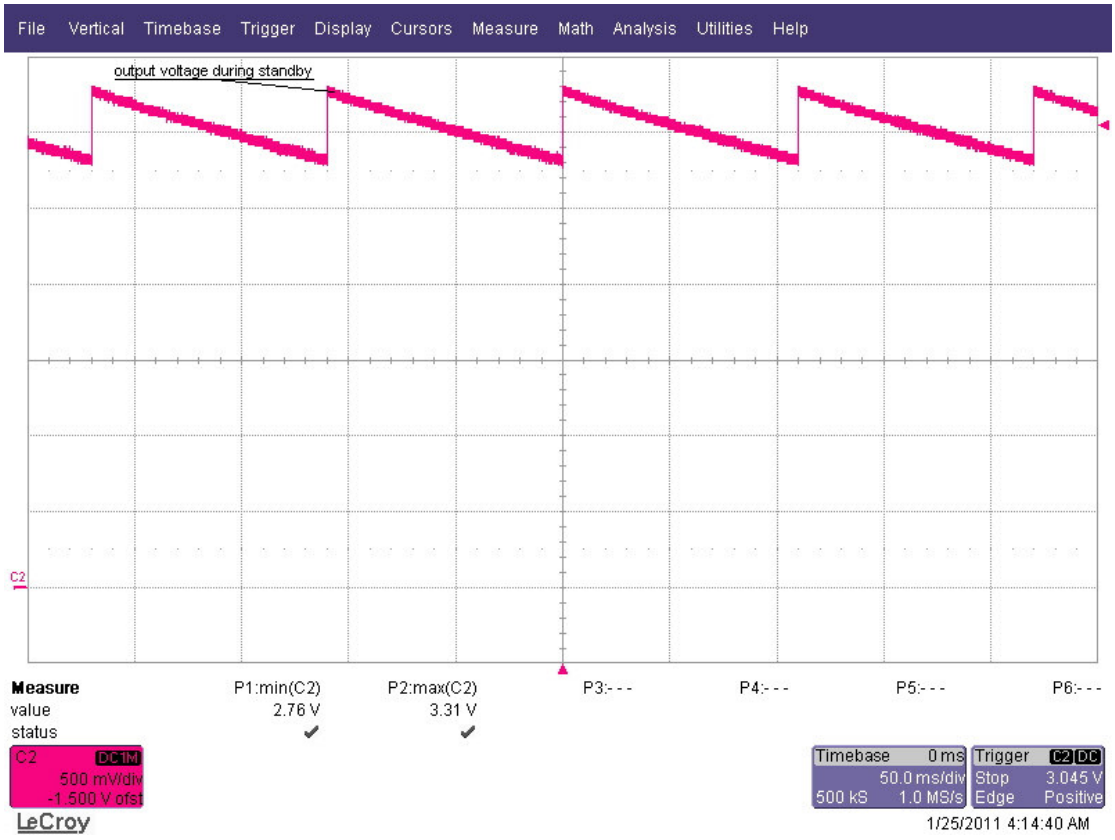


Figure 11

12 Input current during standby

Figure 12 shows the input current during standby mode with 500uA load (6.49kOhm resistor).

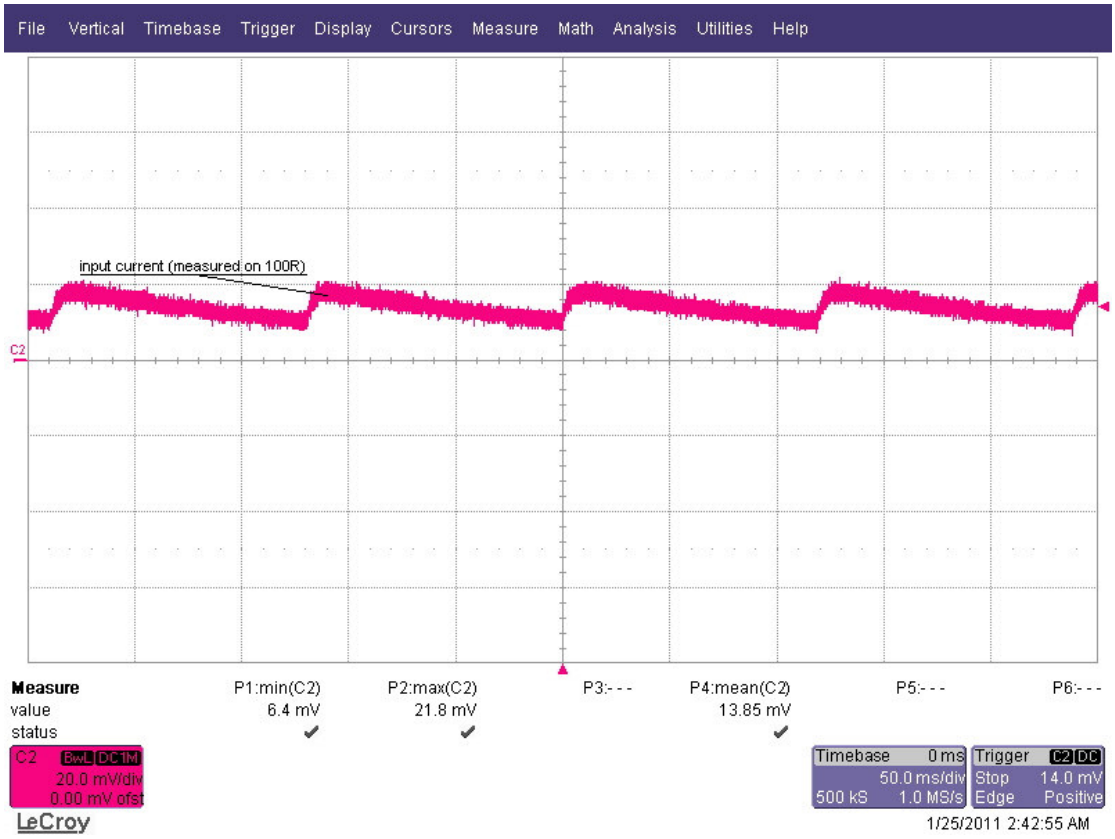
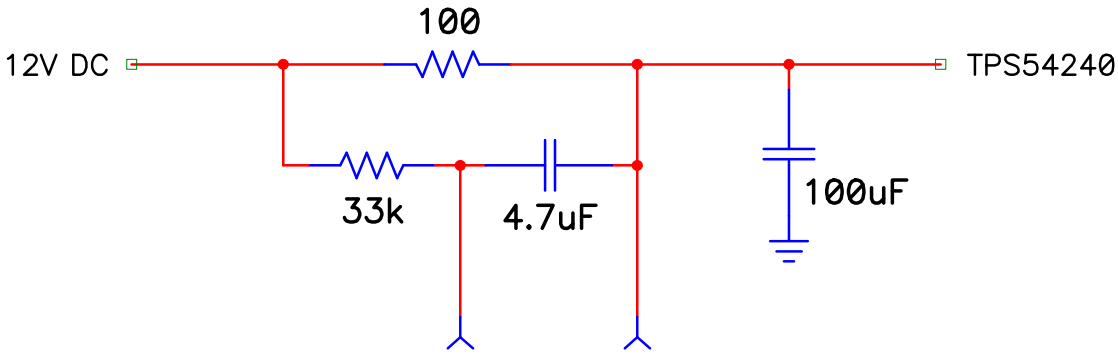


Figure 12

The input is fed via a 100 Ohm resistor. Over this resistor the voltage is measured.
13.9mV on 100 Ohm equals **139uA average input current** (P4 on screenshot).

This values was verified by a measurement setup for a multimeter as shown below.



The sensing network averages the sensed voltage. On this setup a voltage of 14.6mV was measured.
This equals an **average input current of 146uA**.

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