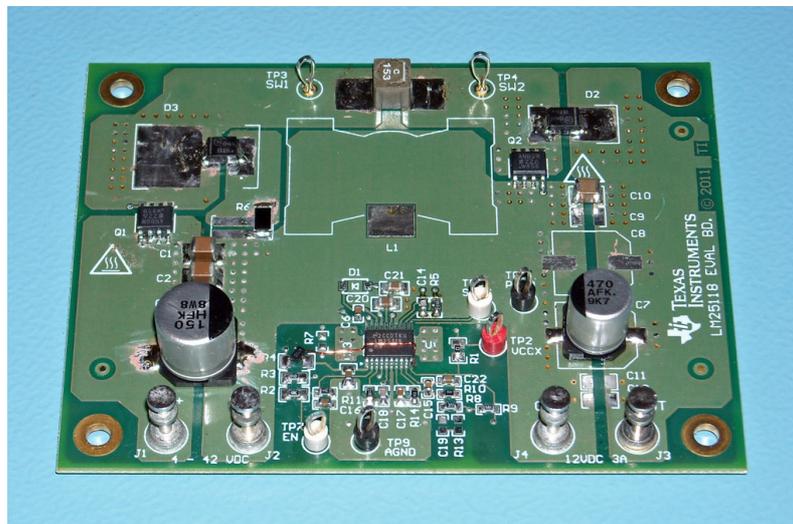


## Buck-Boost Converter with LM25118 – 5.7V @ 1.2A

- Input 3.5 ..35V DC
- Output 5.7V @ 1.2A
- Controller LM25118-Q1
- Master: Free-Running switching frequency of 450 kHz  
Slave: Free-Running switching frequency of 400 kHz, synchronized to 450 kHz  
**All measurements were done at 450 kHz!**
- Modified LM25118 Evaluation Board



## 1 Startup

The startup waveform is shown in Figure 1. The input voltage is set at 14V, with no load on the 5.7V output.

Channel C1: **14V Input voltage**  
5V/div, 5ms/div

Channel C2: **5.7V Output voltage**  
1V/div, 5ms/div

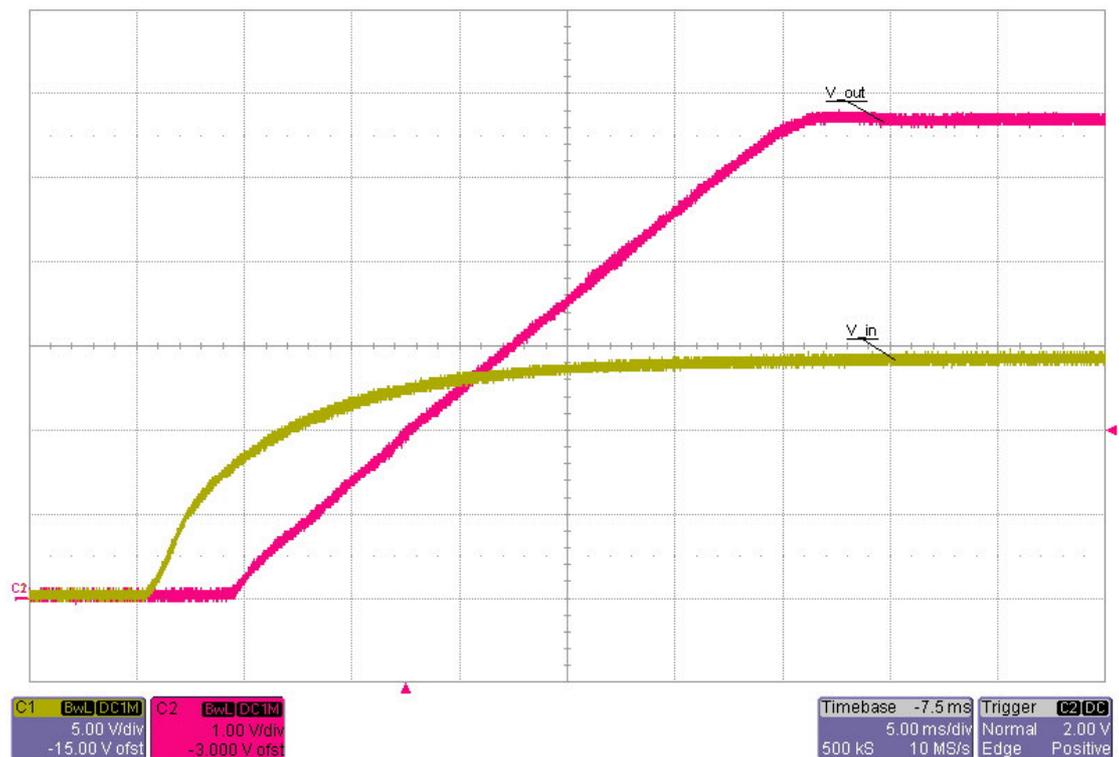


Figure 1

## 2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set at 14V with a 1.2A load on the 5.7V output.

Channel C1: **14V Input voltage**  
5V/div, 10ms/div

Channel C2: **5.7V Output voltage**  
1V/div, 10ms/div

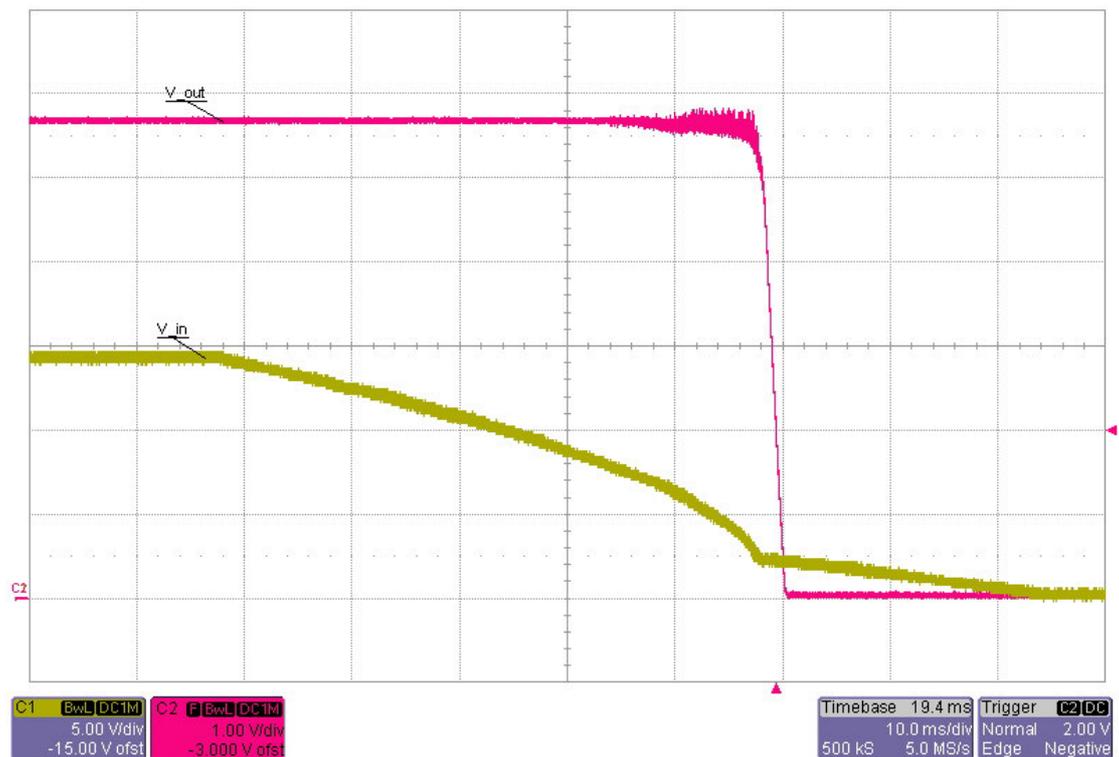


Figure 2

### 3 Efficiency

The efficiency and load regulation are shown in Figure 3 and Figure 4.

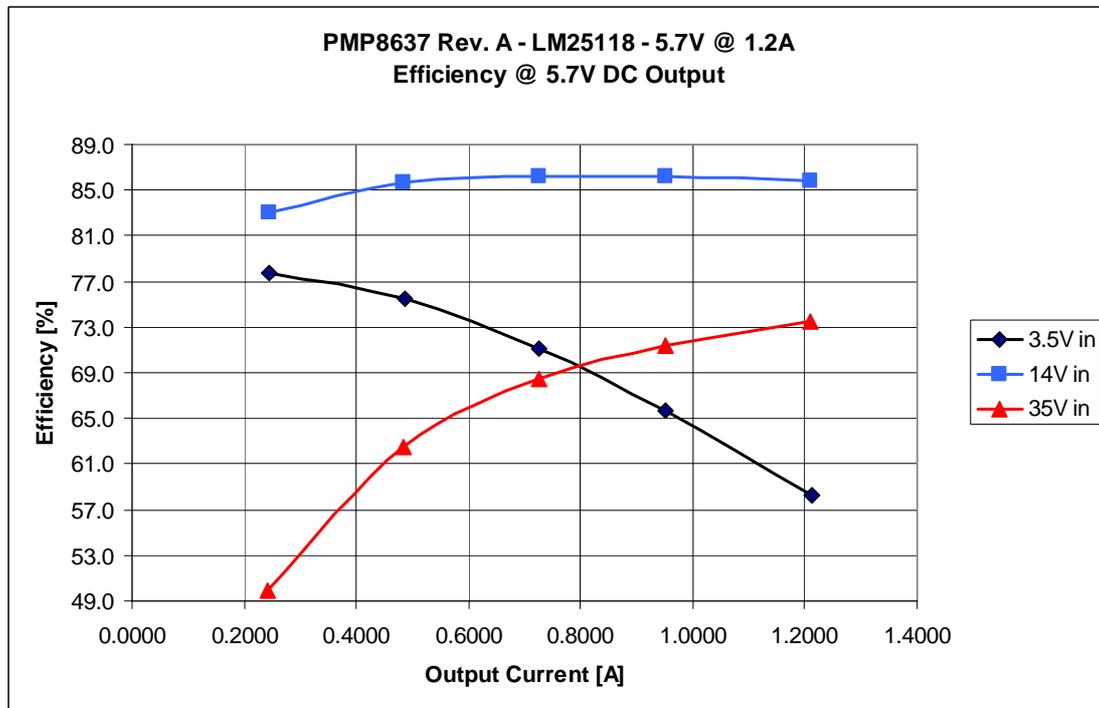


Figure 3

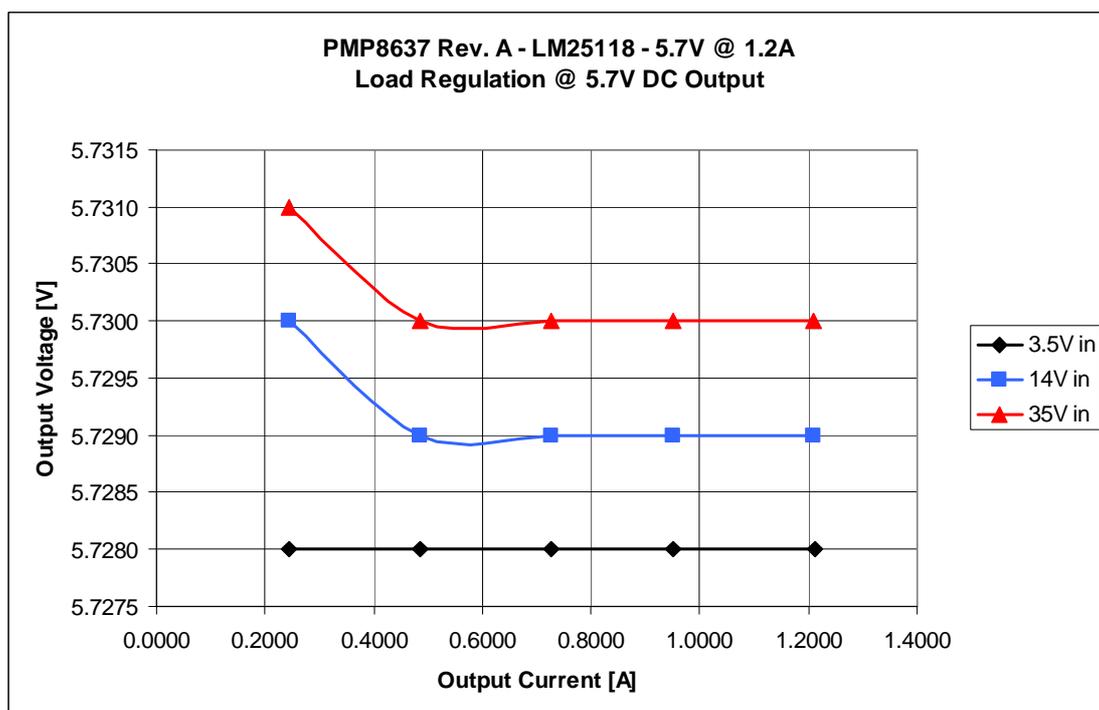


Figure 4

## 4 Load step

The response to a load step and a load dump for the 5.7V output at an input voltage of 14V is shown in Figure 5.

Channel C2: **Output voltage**, -110mV undershoot (-1.9%), 107mV overshoot (+1.9%)  
100mV/div, 1ms/div, AC coupled

Channel C1: **Load current**, load step 0.6A to 1.2A and vice versa  
500mA/div, 1ms/div

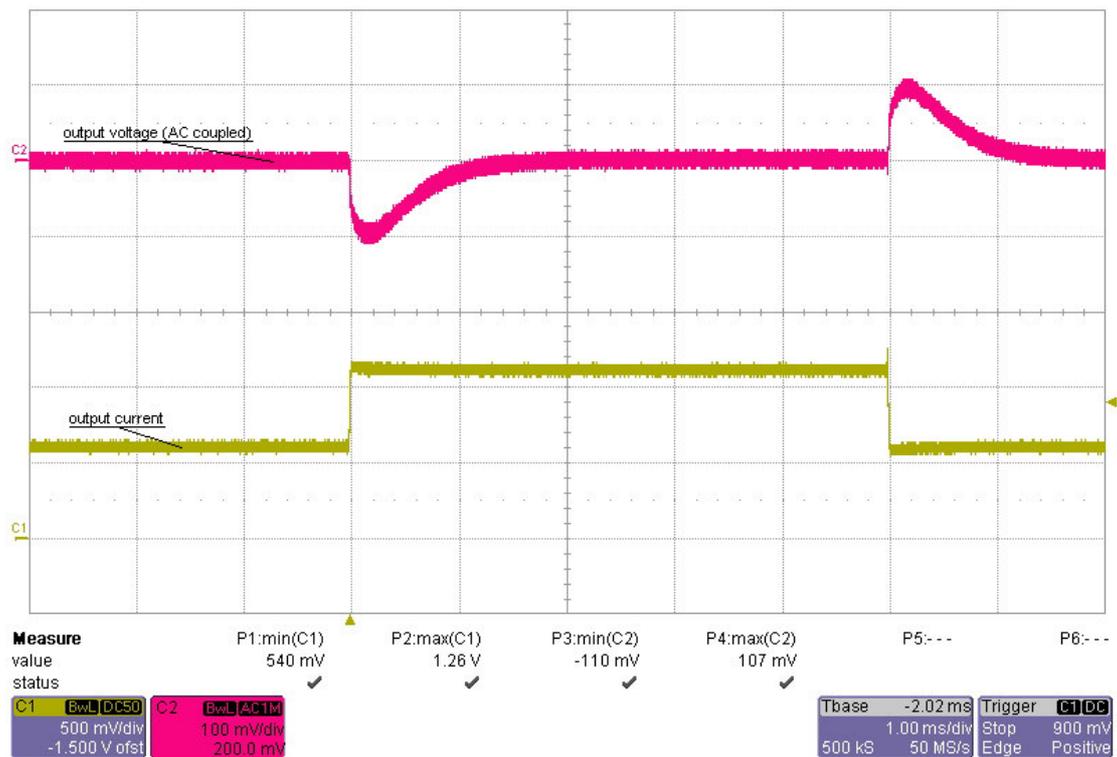


Figure 5

The response to a load step and a load dump for the 5.7V output at an input voltage of 3.5V is shown in Figure 6.

Channel C2: **Output voltage**, -360mV undershoot (-6.3%), 349mV overshoot (+6.1%)  
200mV/div, 1ms/div, AC coupled

Channel C1: **Load current**, load step 0.6A to 1.2A and vice versa  
500mA/div, 1ms/div

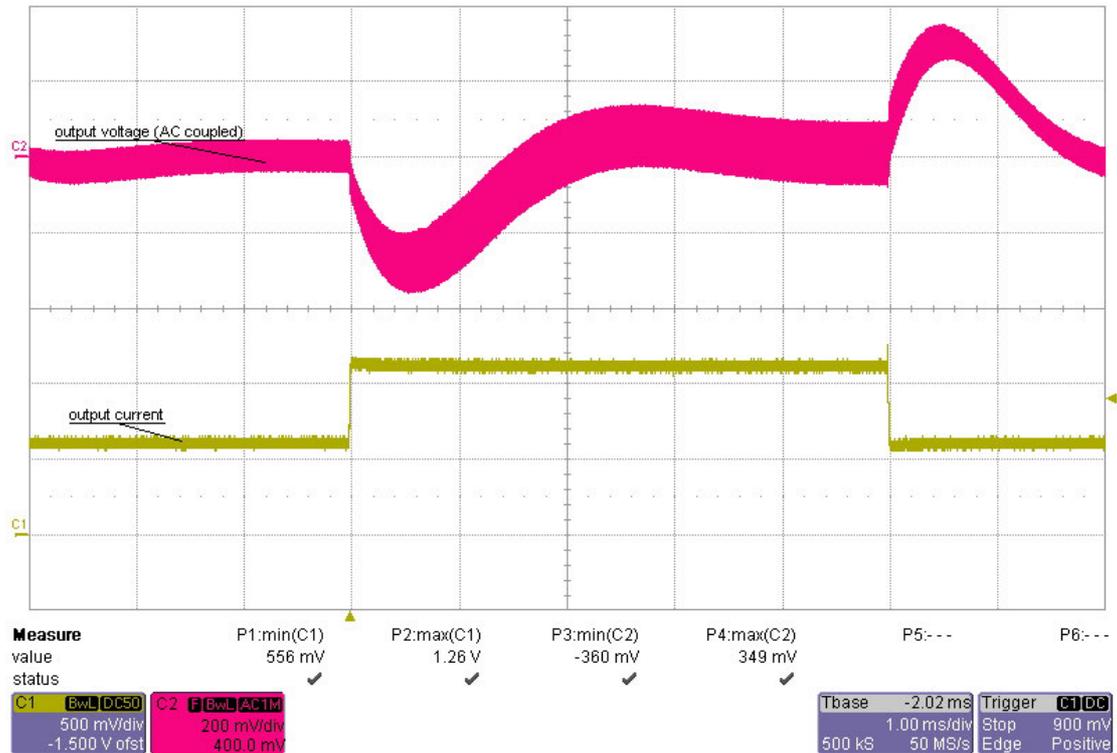


Figure 6

## 5 Frequency response

Figure 7 shows the loop response at 3.5V, 5V, 14V and 35V input voltage and a load of 1.2A.

### 3.5V input

- 50 deg phase margin @ crossover frequency 305 Hz
- -29 db gain margin

### 5V input

- 63 deg phase margin @ crossover frequency 505 Hz
- -31 db gain margin

### 14V input

- 78 deg phase margin @ crossover frequency 1.4 kHz
- -39 db gain margin

### 35V input

- 78 deg phase margin @ crossover frequency 1.4 kHz
- -38 db gain margin

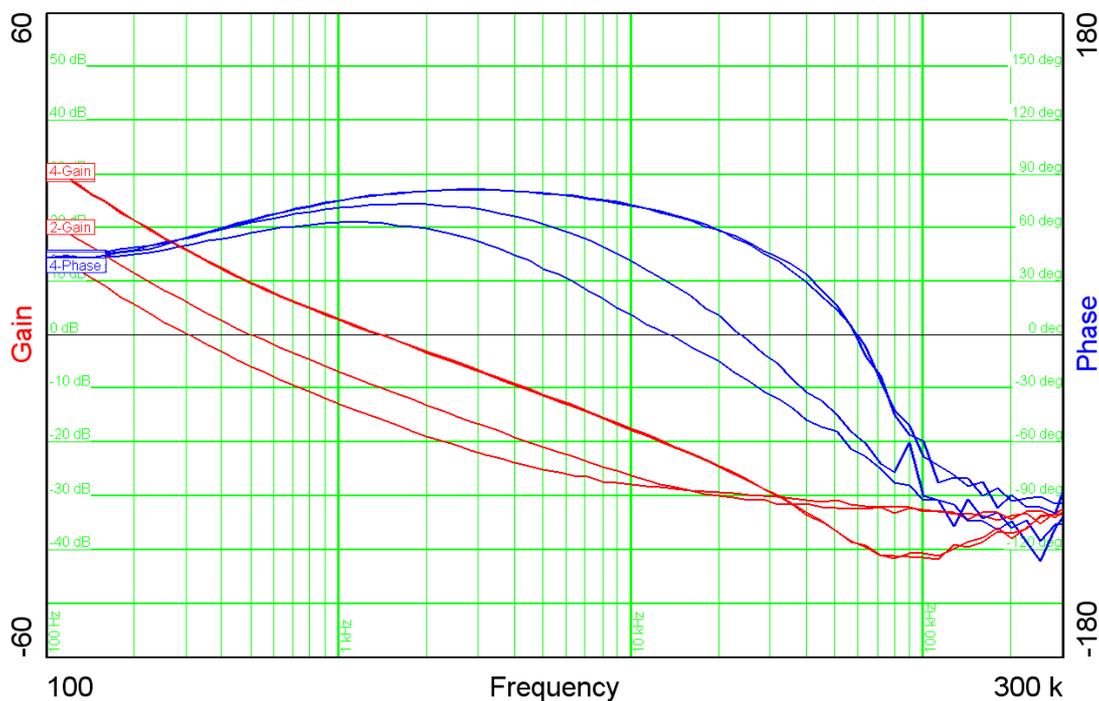


Figure 7

## 6 Switching Node

The drain-source voltage on the switching node of Q1 is shown in Figure 8. The image was captured with 14V input and 1.2A load.

Channel C2: **Drain-source voltage**, -1.0V minimum voltage, 17.4V maximum voltage  
5V/div, 1us/div

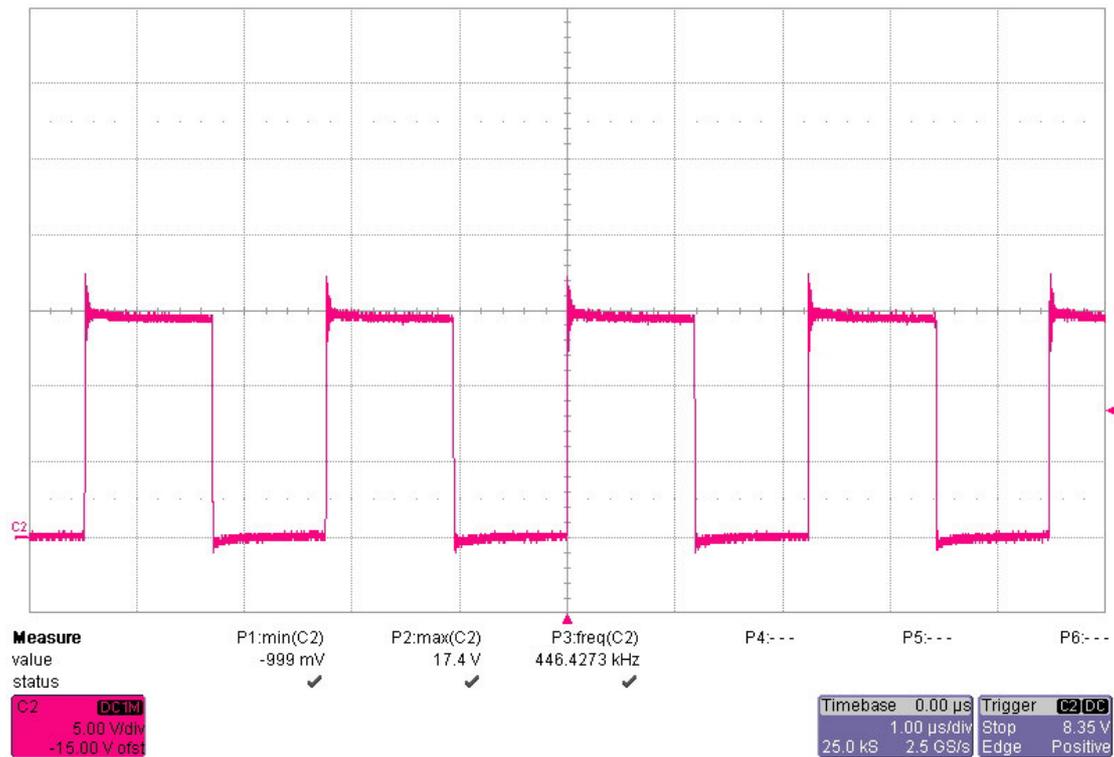


Figure 8

## 7 Thermal measurement

The thermal image (Figure 9) shows the circuit at an ambient temperature of 21 °C with an input voltage of 14V and a load of 500mA.

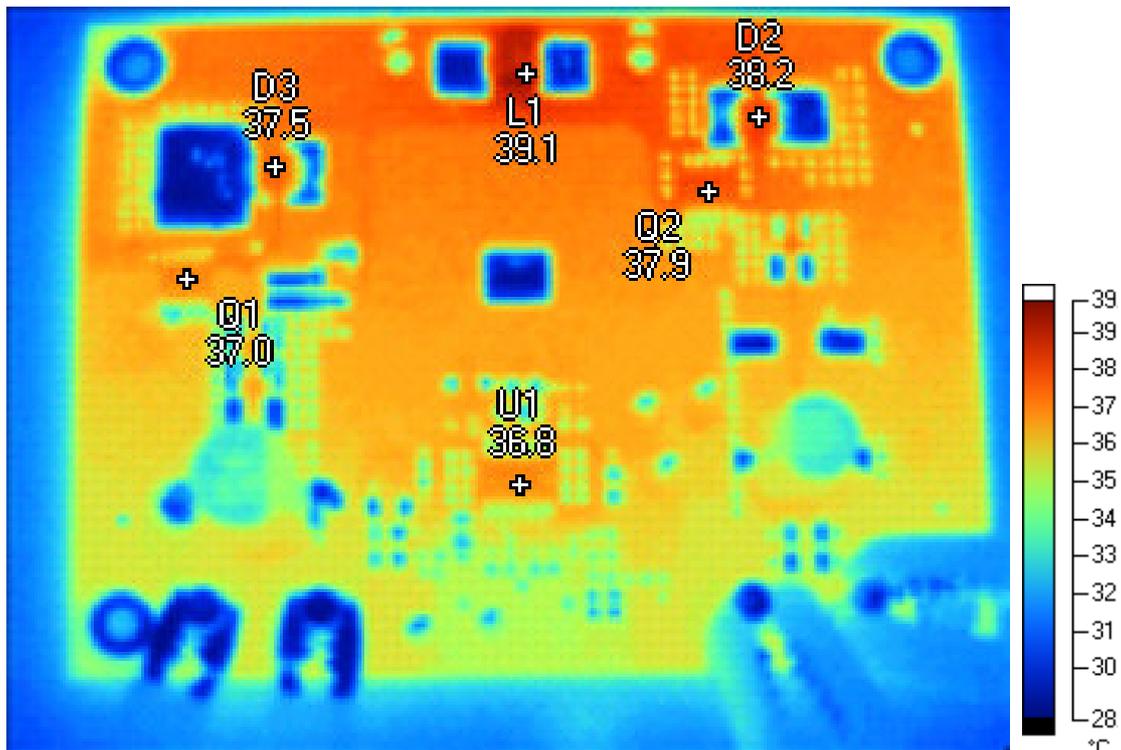


Figure 9

### Markers

Label	Temperature	Emissivity	Background
L1	39.1 °C	0.95	21.0 °C
D3	37.5 °C	0.95	21.0 °C
Q1	37.0 °C	0.95	21.0 °C
Q2	37.9 °C	0.95	21.0 °C
D2	38.2 °C	0.95	21.0 °C
U1	36.8 °C	0.95	21.0 °C

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