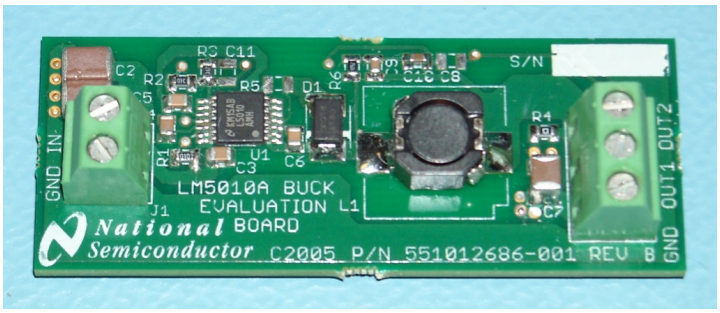
Wide Input Nonsynchronous Buck with LM5010A

- Input 7.5 .. 24.0V (60V peak)
  Works @ 60V input voltage
- Output 5.0V @ 350mA
- Switching Frequency 400 kHz nominal



1 Startup

The startup waveform is shown in Figure 1. The input voltage is set at 12.0V, with no load on the 5.0V output.

Channel C1: **Input voltage**
2V/div, 1ms/div

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

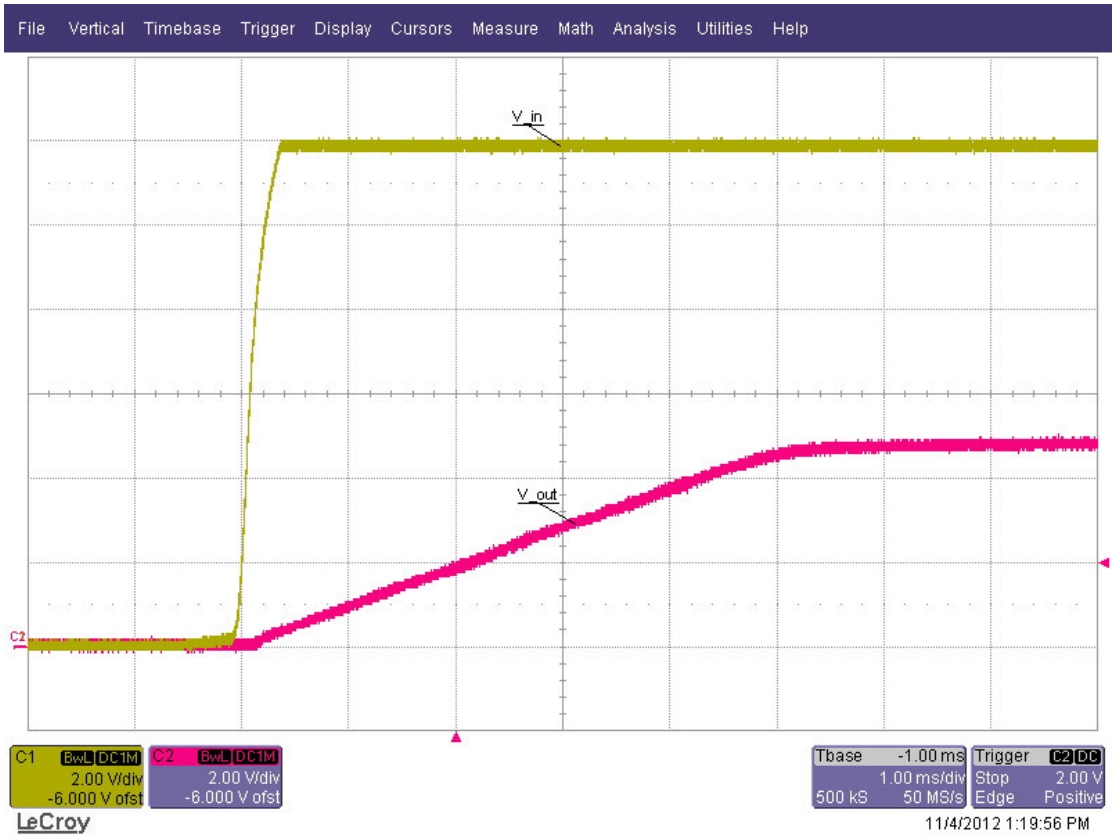


Figure 1

2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set at 12.0V with a 350mA load on the 5.0V output.

Channel C1: **Input voltage**
2V/div, 200us/div

Channel C2: **Output voltage**
2V/div, 200us/div

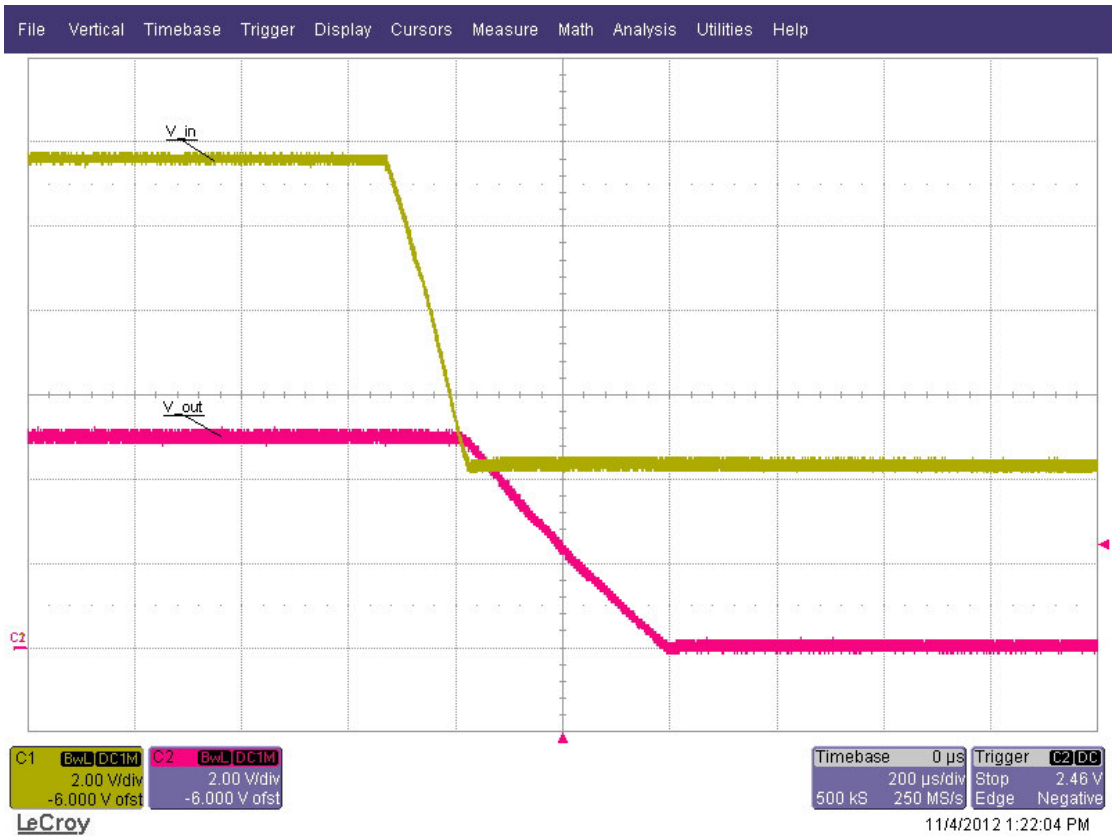


Figure 2

3 Efficiency

The efficiency at 7.5V, 14.0V and 24.0V input voltage is shown in Figure 3.

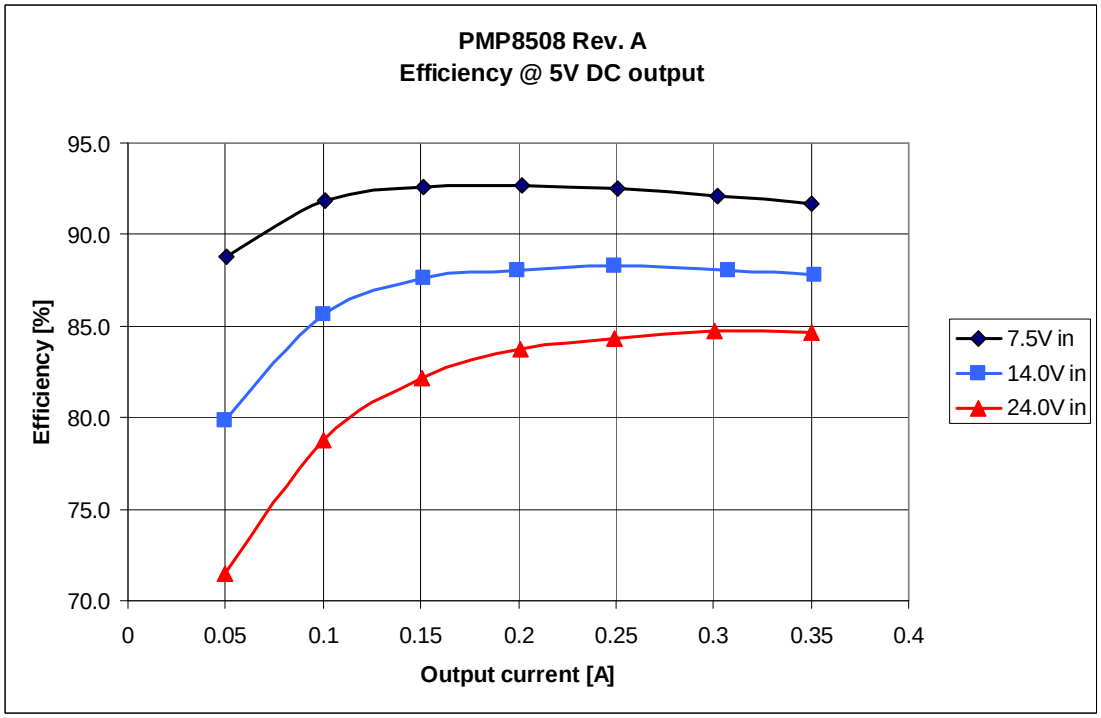


Figure 3

4 Load regulation

The load regulation of the 5.0V output at 7.5V, 14.0V and 24.0V input voltage is shown in Figure 4.

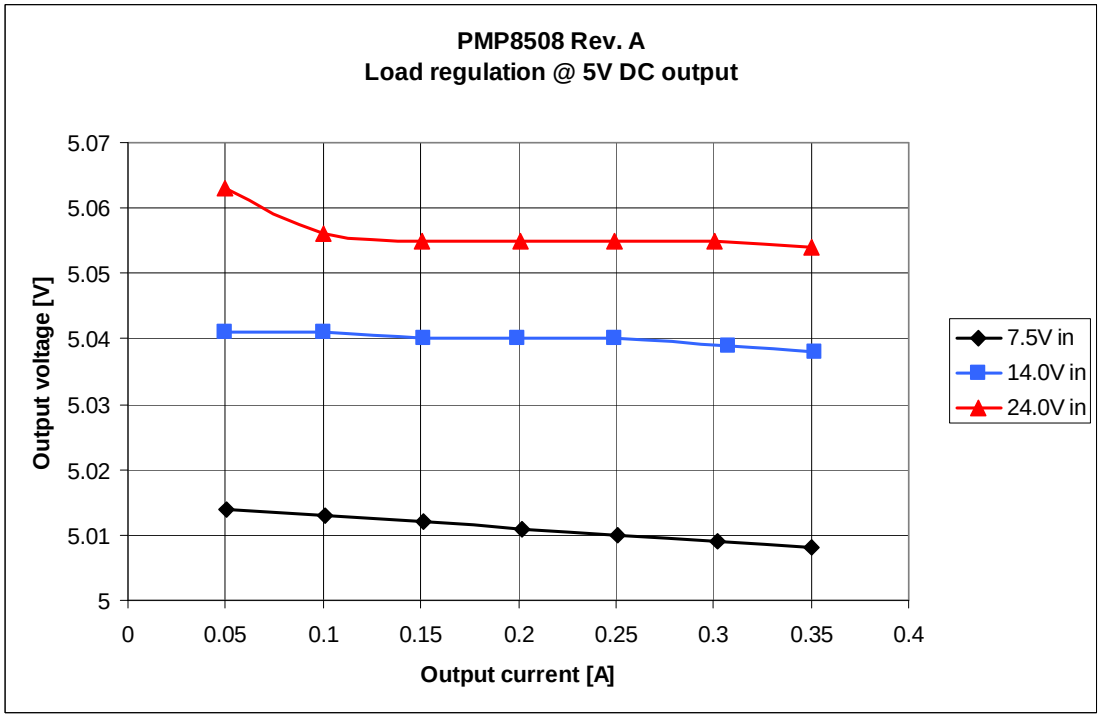


Figure 4

5 Output ripple voltage

The output ripple voltage at 350mA load and 7.5V, 12.0V and 24.0V input voltage is shown in Figure 5.

Channel M1: **Output voltage @ 7.5V input**, approx. 6mV peak-peak
20mV/div, 5us/div, AC coupled

Channel M2: **Output voltage @ 12.0V input**, approx. 8mV peak-peak
20mV/div, 5us/div, AC coupled

Channel M3: **Output voltage @ 24.0V input**, approx. 11mV peak-peak
20mV/div, 5us/div, AC coupled

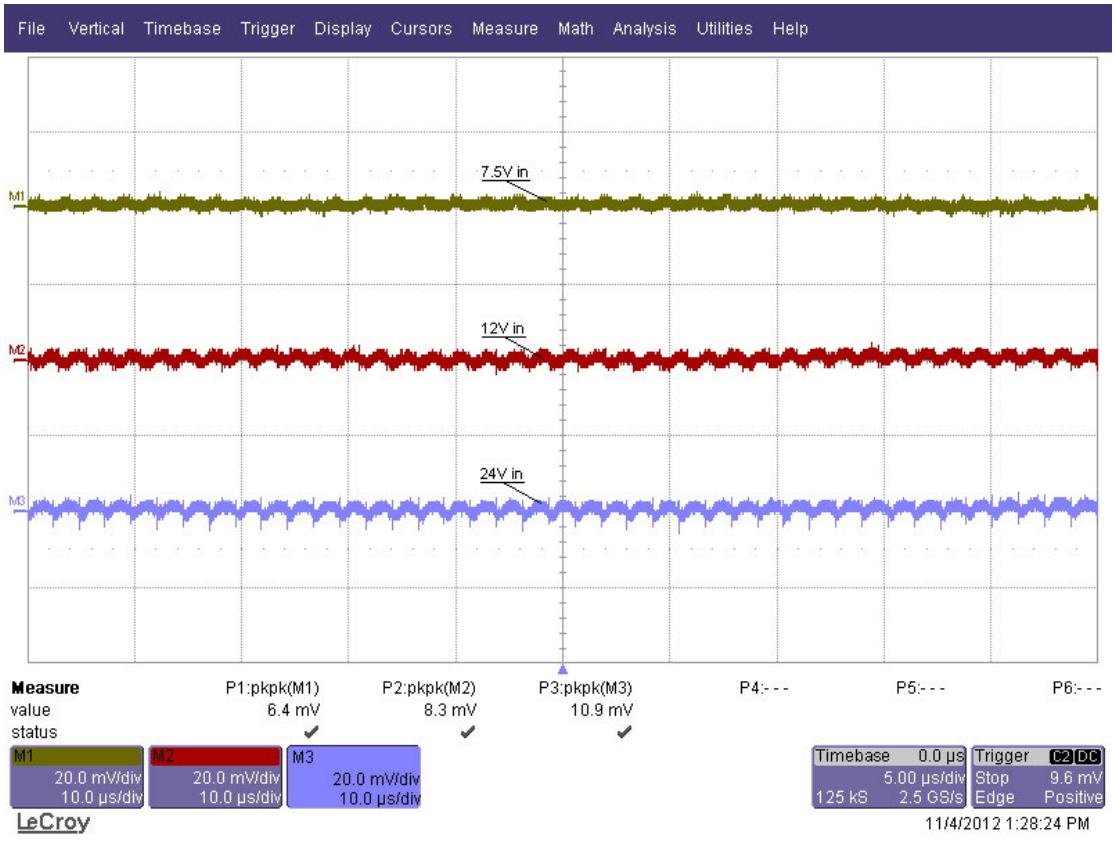


Figure 5

6 Load transient

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**, -120mV undershoot / 117mV overshoot
100mV/div, 1ms/div, AC coupled

Channel C1: **Load current**, load step 50mA to 350mA
200mA/div, 1ms/div

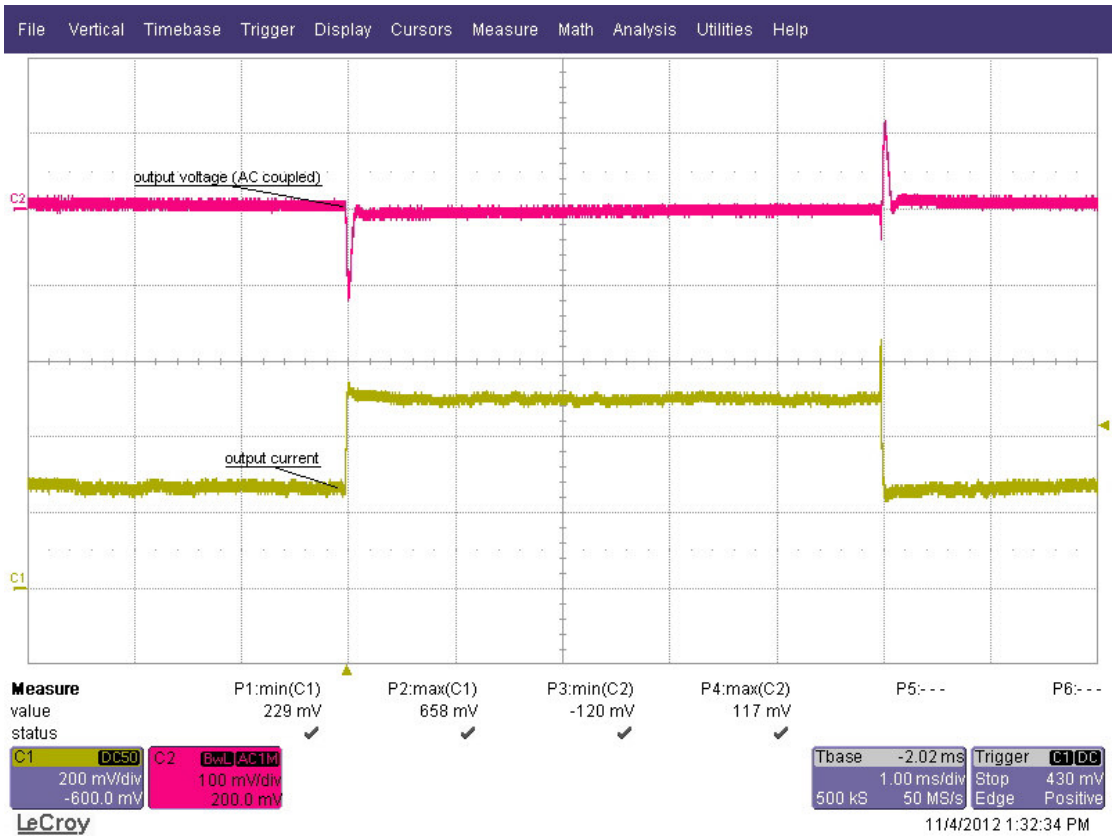


Figure 6

7 Miscellaneous waveforms

The drain-source voltage on the switching node is shown in Figure 7. The image was captured with 24.0V input and a 350mA load.

Channel C2: **Drain-source voltage**, -1.6V minimum voltage, 28.5V maximum voltage 5V/div, 1us/div

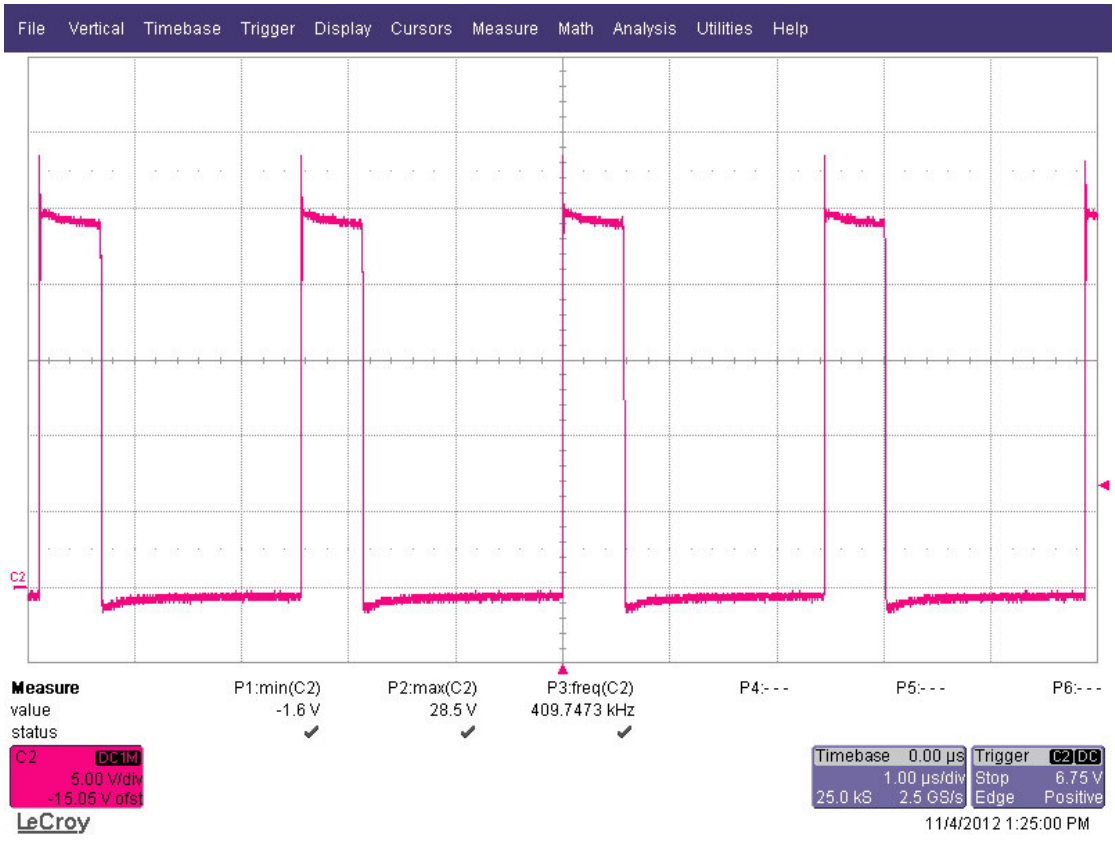


Figure 7

8 Thermal measurement

The thermal image (Figure 8) shows the circuit at an ambient temperature of 21 °C with an input voltage of 4.5V and a load of 0.6A.

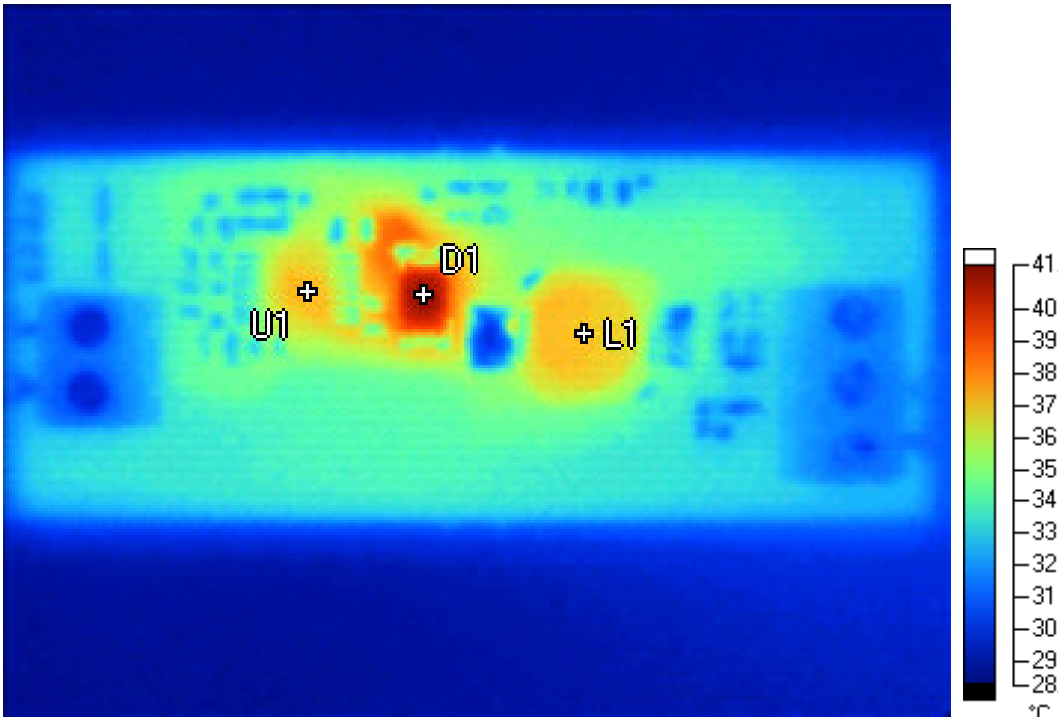


Figure 8

Markers

Label	Temperature	Emissivity	Background
L1	37.1 °C	0.95	21.0 °C
D1	41.3 °C	0.95	21.0 °C
U1	37.2 °C	0.95	21.0 °C

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