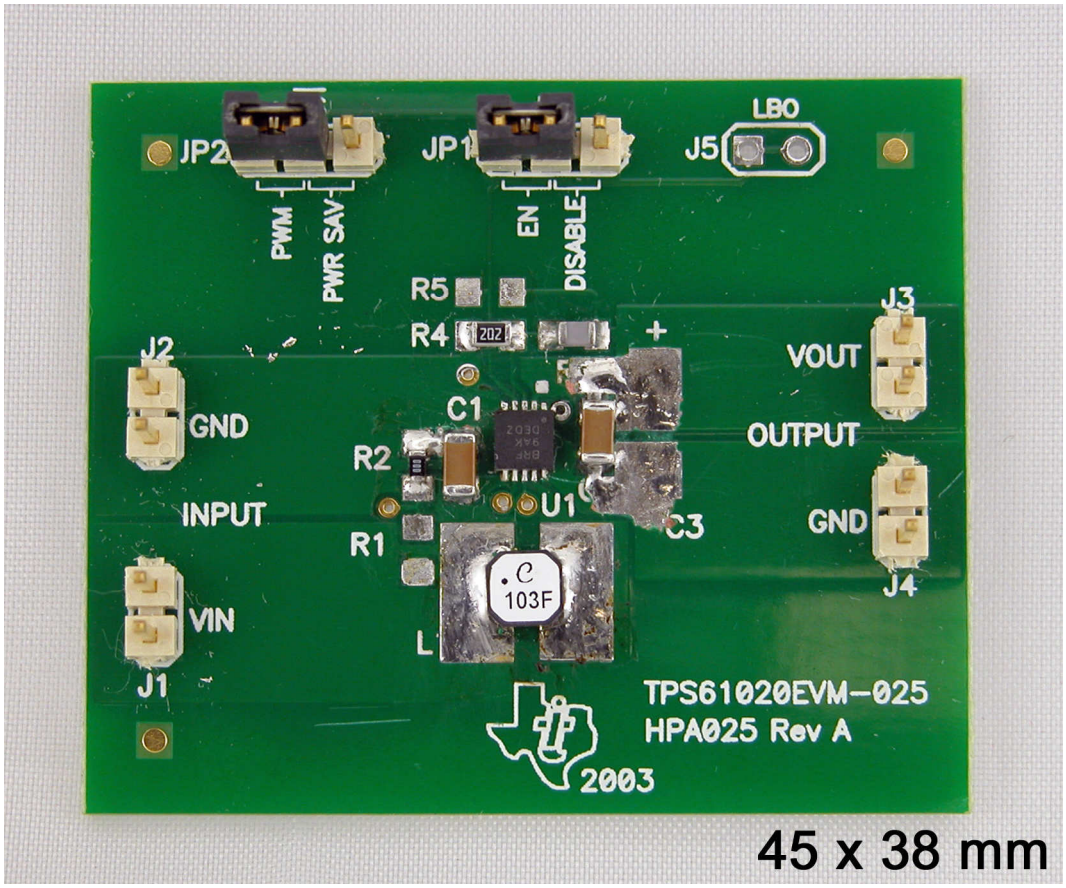
Automotive Synchronous Boost – 5.0V @ 350mA

- Input 3.2..3.4V DC
- Output 5.0V @ 350mA
- Converter TPS61029
- Free-Running switching frequency of 600 kHz
- Working in continuous conduction mode
- Modified TPS61020EVM



1 Startup

The startup waveform is shown in Figure 1. The input voltage is set at 3.3V, with no load on the 5.0V output.

Channel C1: **3.3V Input voltage**
1V/div, 500us/div

Channel C2: **5.0V Output voltage**
1V/div, 500us/div

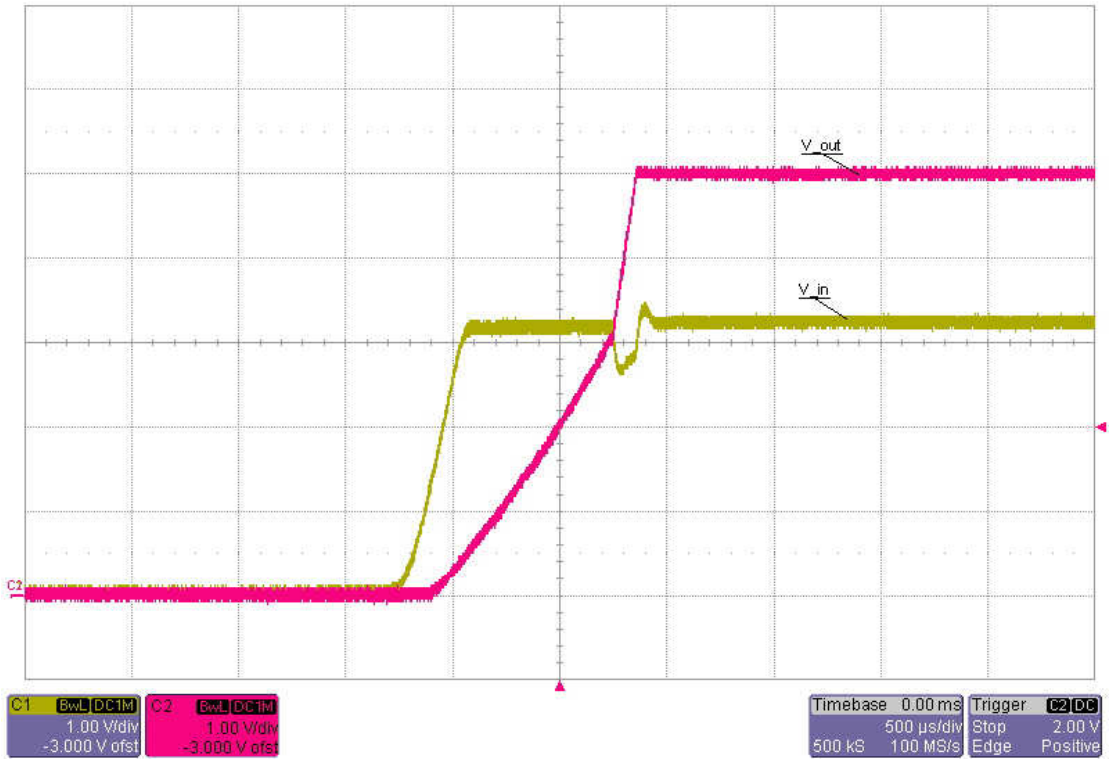


Figure 1

2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set at 3.3V with a 350mA load on the 5.0V output.

Channel C1: **3.3V Input voltage**
1V/div, 500us/div

Channel C2: **5.0V Output voltage**
1V/div, 500us/div

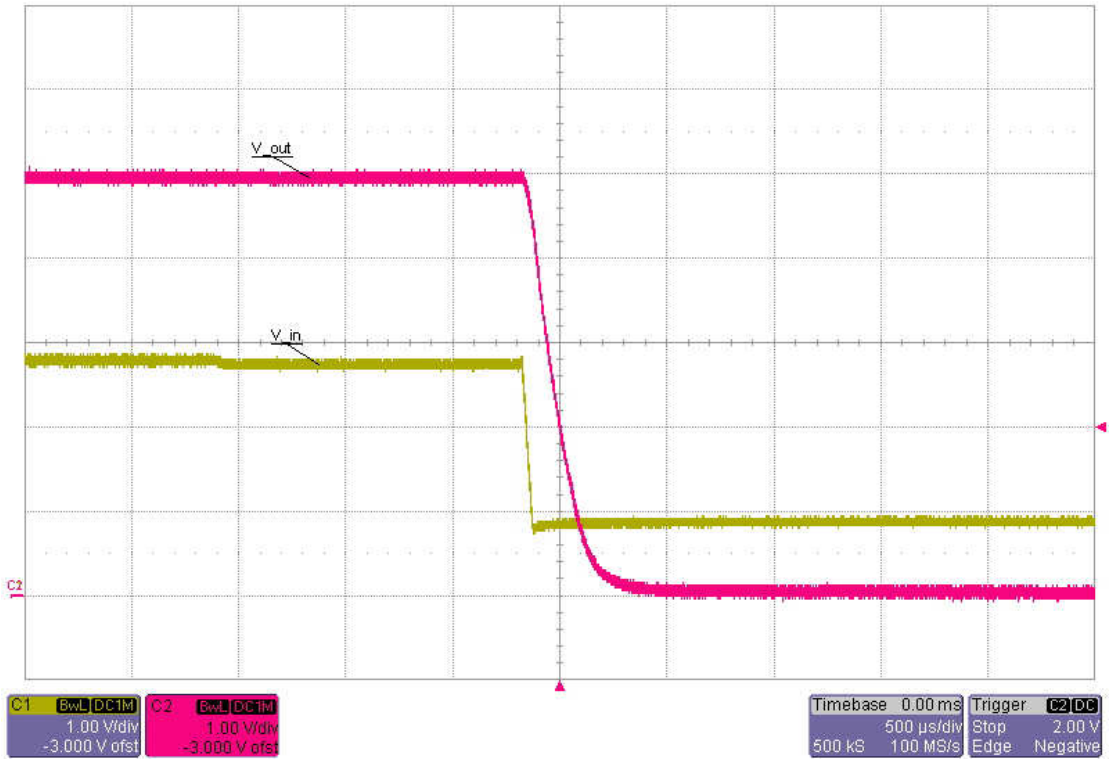


Figure 2

3 Efficiency & Load Regulation

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

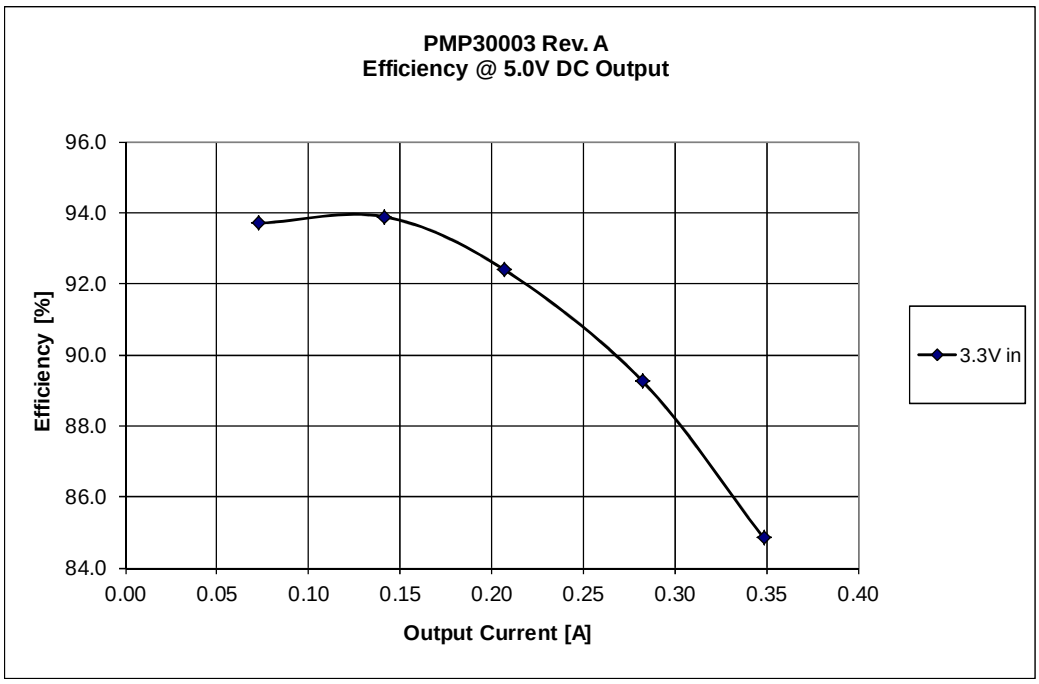


Figure 3

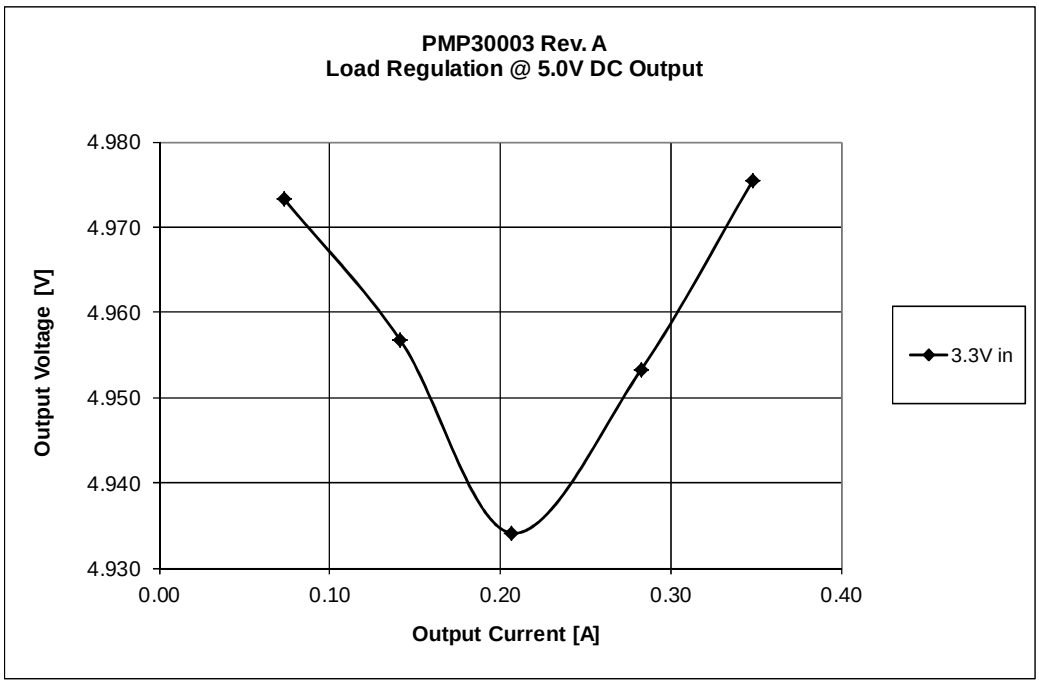


Figure 4

4 Load Step

The response to a load step and a load dump for the 5.0V output at an input voltage of 3.3V is shown in Figure 5.

Channel C2: **Output voltage**, -29mV undershoot (0.6%), 24mV overshoot (0.5%)
20mV/div, 2ms/div, AC coupled

Channel C1: **Load current**, load step 100mA to 150mA and vice versa
50mA/div, 2ms/div

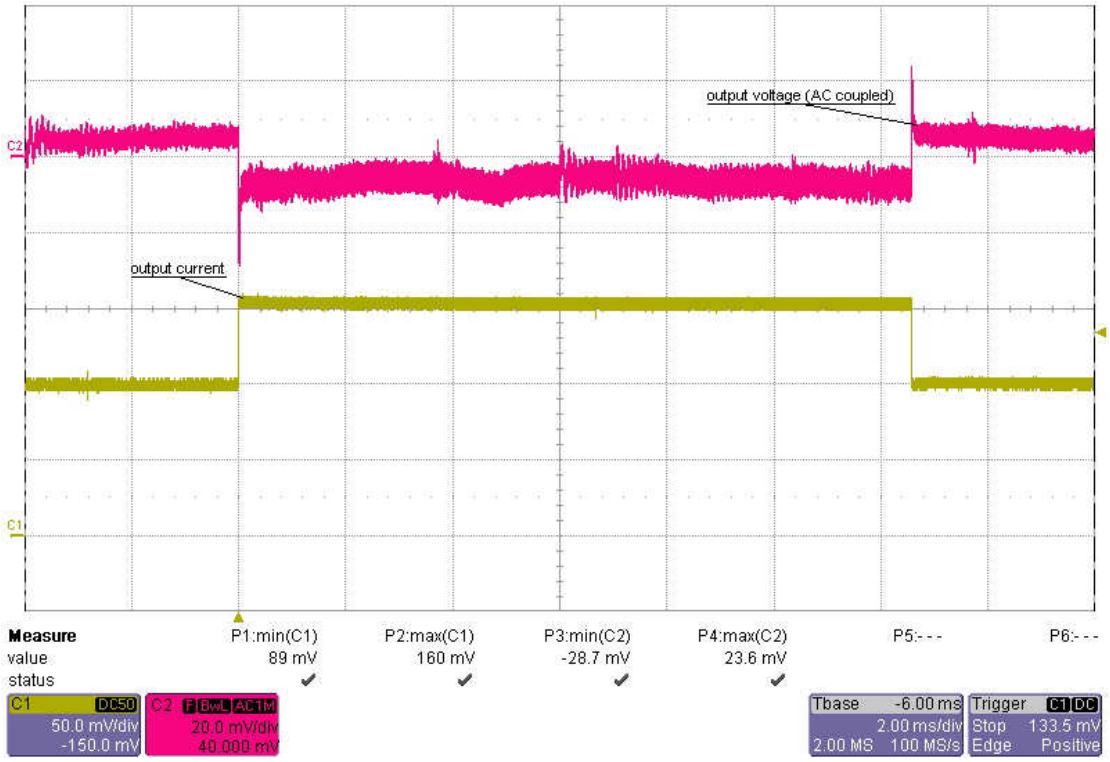


Figure 5

5 Frequency Response

Figure 6 shows the loop response at 3.3V input voltage and 350mA load.

3.3V input

- 1.6A load 60 deg phase margin, 9.7 kHz bandwidth, -10 dB gain margin

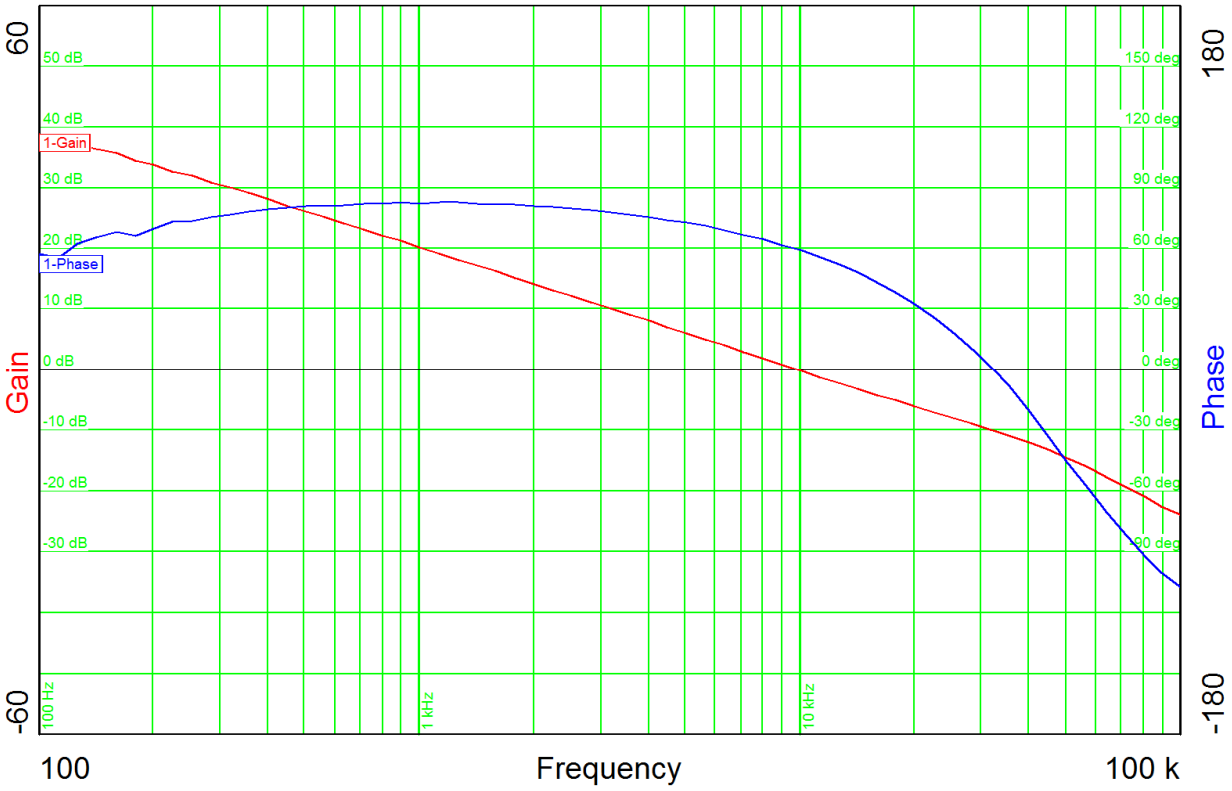


Figure 6

6 Switching Node

The drain-source voltage on the switching node is shown in Figure 7. The image was captured with 3.3V input and 350mA load.

Channel C2: **Drain-source voltage**, -0.1V minimum voltage, 8.0V maximum voltage
2V/div, 500ns/div

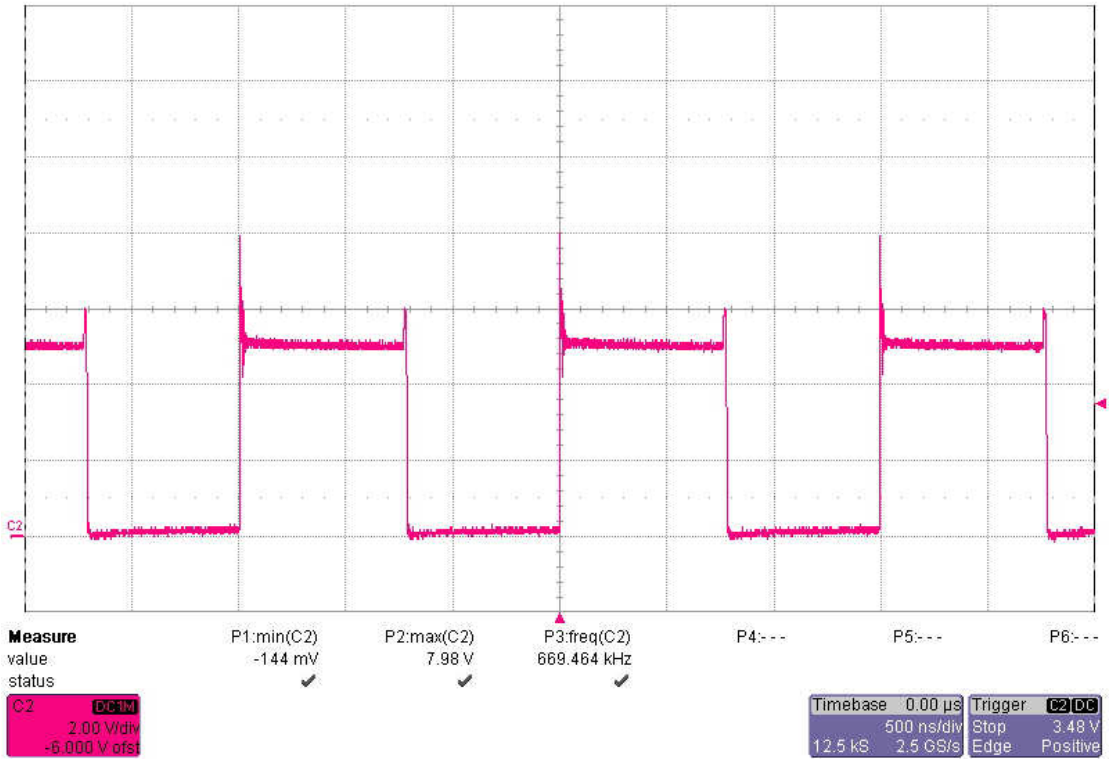


Figure 7

7 Output Ripple Voltage

The output ripple voltage at 350mA load and 3.3V input voltage is shown in Figure 8.

Channel C1: **Load current**
100mA/div, 1us/div

Channel C2: **Output voltage @ 3.3V input**, 30mV peak-peak (ripple)
50mV/div, 1us/div, AC coupled

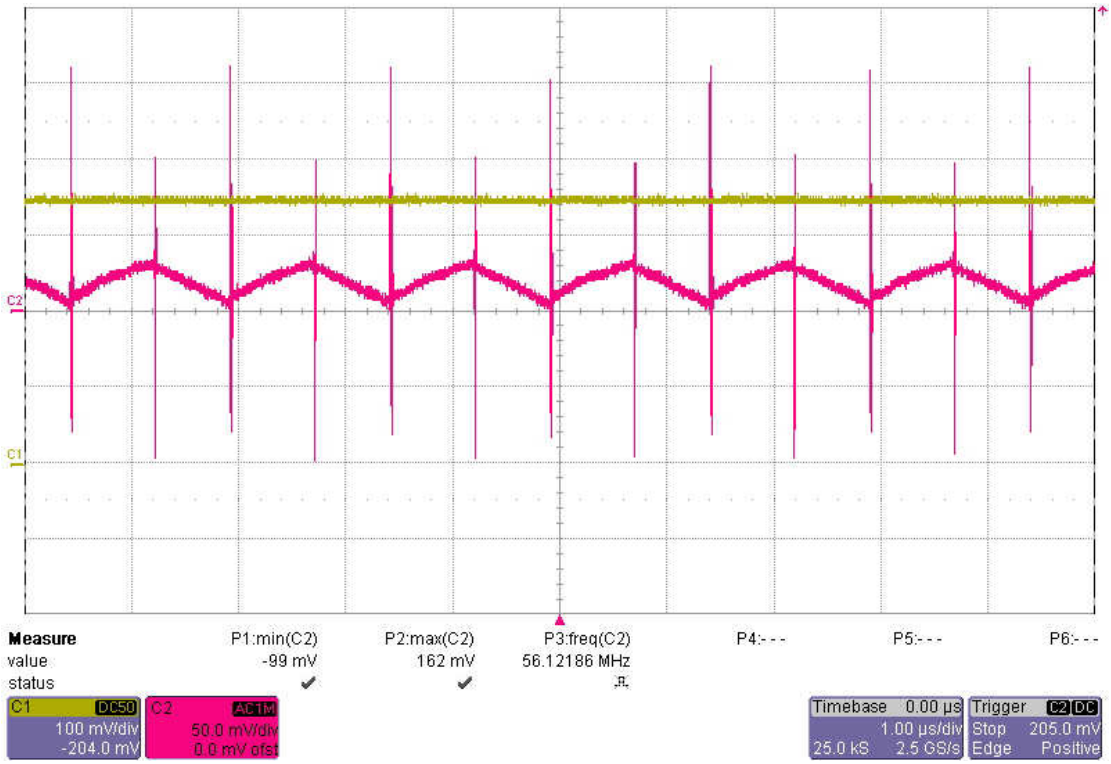


Figure 8

8 Thermal measurement

The thermal image (Figure 9) shows the circuit at an ambient temperature of 21 °C with an input voltage of 3.3V and a load of 350mA.

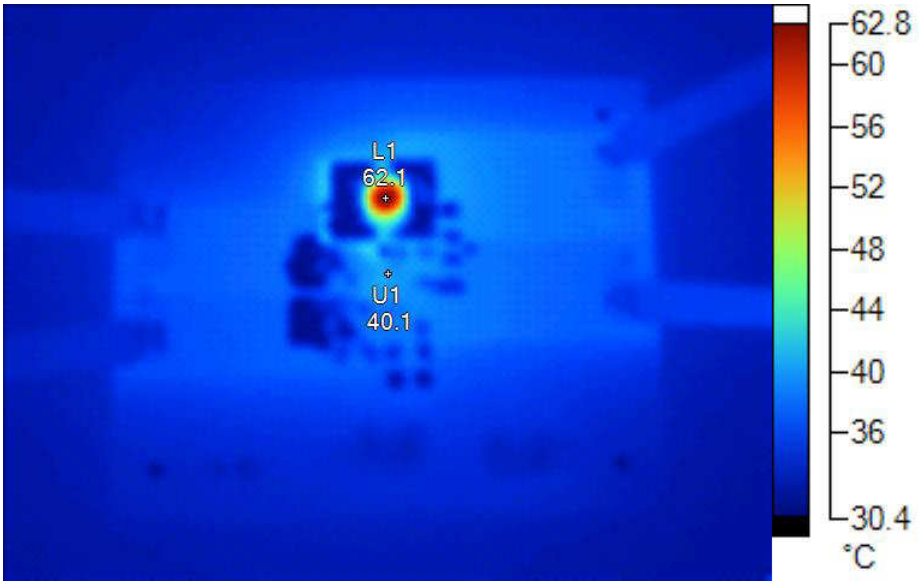


Figure 9

Markers

Label	Temperature	Emissivity	Background
L1	62.1 °C	0.95	21.0 °C
U1	40.1 °C	0.95	21.0 °C

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