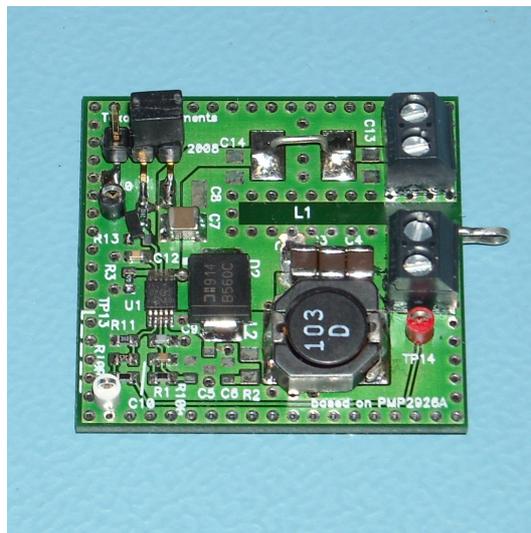


TPS54240 Buck Circuit - 3.8V @ 2.5A

- Input 9..14V DC
Can withstand up to 40V
- Output 3.8V @ 2.5A
- Working in continuous conduction mode
- Enable/disable by logic signal (3.3V or 5.0V)
- Built on PCB PMP2644 Rev.B



1 Startup

The startup waveform is shown in Figure 1. The input voltage is set at 12.0V, with no load on the 3.8V output.

- Channel C1: **Input voltage**
2V/div, 1ms/div
- Channel C2: **Output voltage**
1V/div, 1ms/div

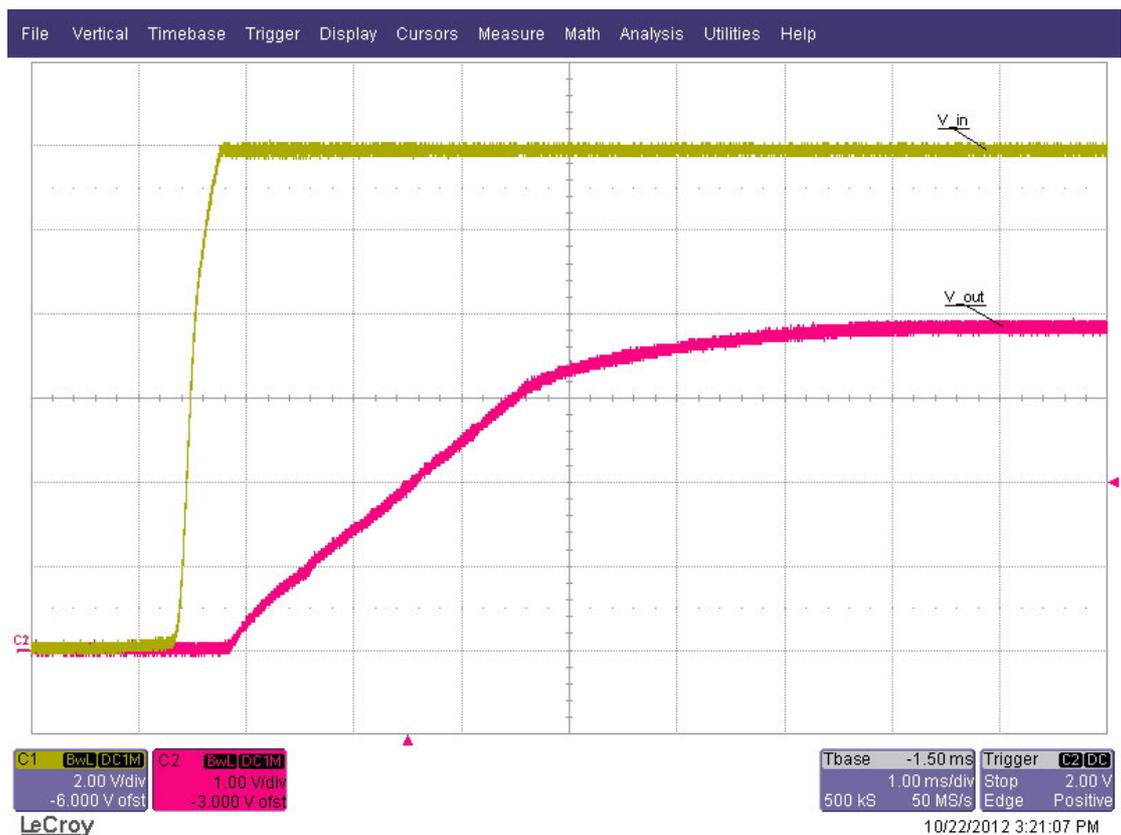


Figure 1

2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set at 12.0V with a 2.5A load on the 3.8V output.

- Channel C1: **Input voltage**
2V/div, 100us/div
- Channel C2: **Output voltage**
1V/div, 100us/div



Figure 2

3 Efficiency

The efficiency and load regulation at 9V and 14V input voltage are shown in Figure 3 and Figure 4.

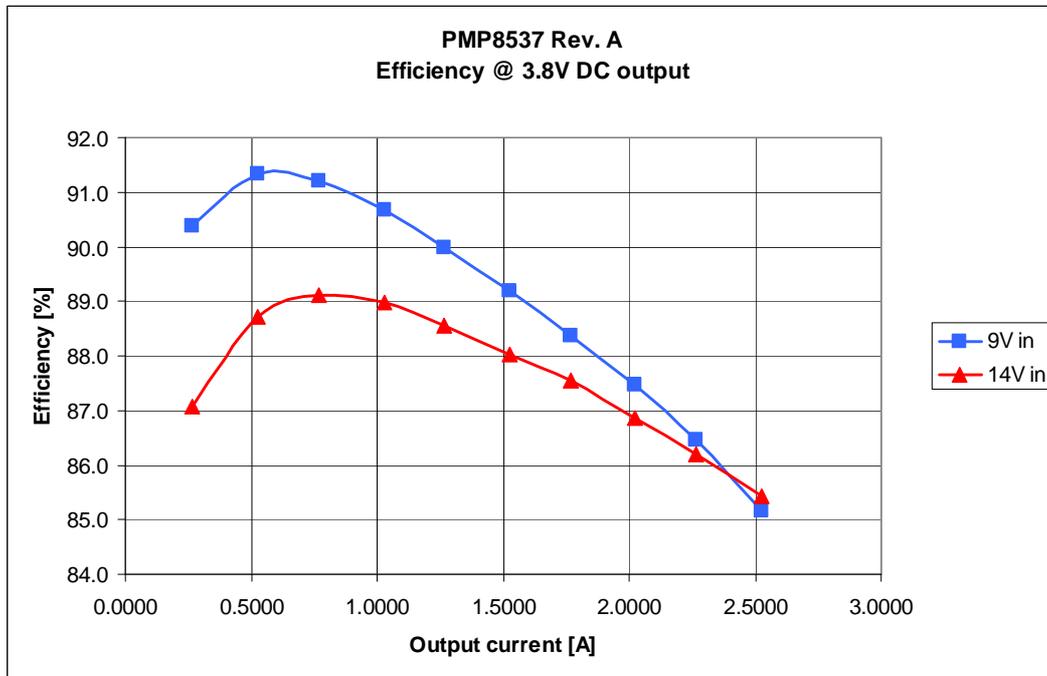


Figure 3

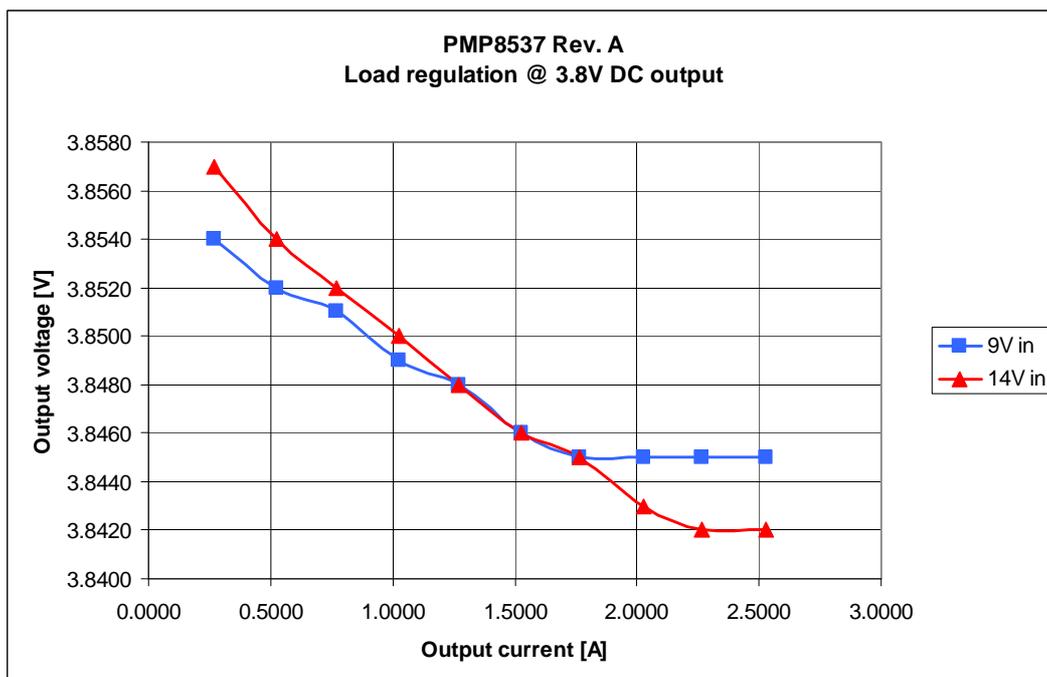


Figure 4

4 Output ripple voltage

The output ripple voltage at 2.5A load and 12.0V input voltage is shown in Figure 5.

Channel C2: **Output voltage**, AC coupled, <8mV
20mV/div, 5us/div

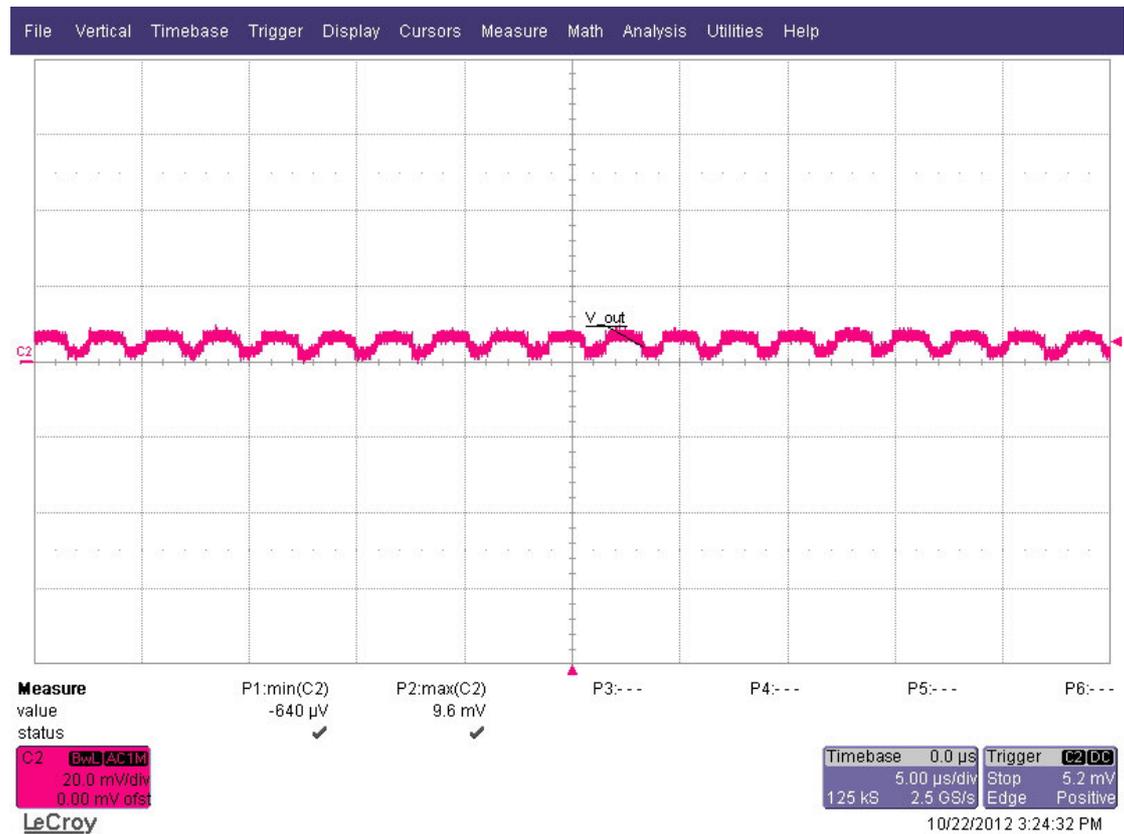


Figure 5

5 Load step

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**, -107mV undershoot, 101mV overshoot
100mV/div, 1ms/div, AC coupled

Channel C1: **Load current**, load step **0.1A to 2.8A** and vice versa
1A/div, 1ms/div

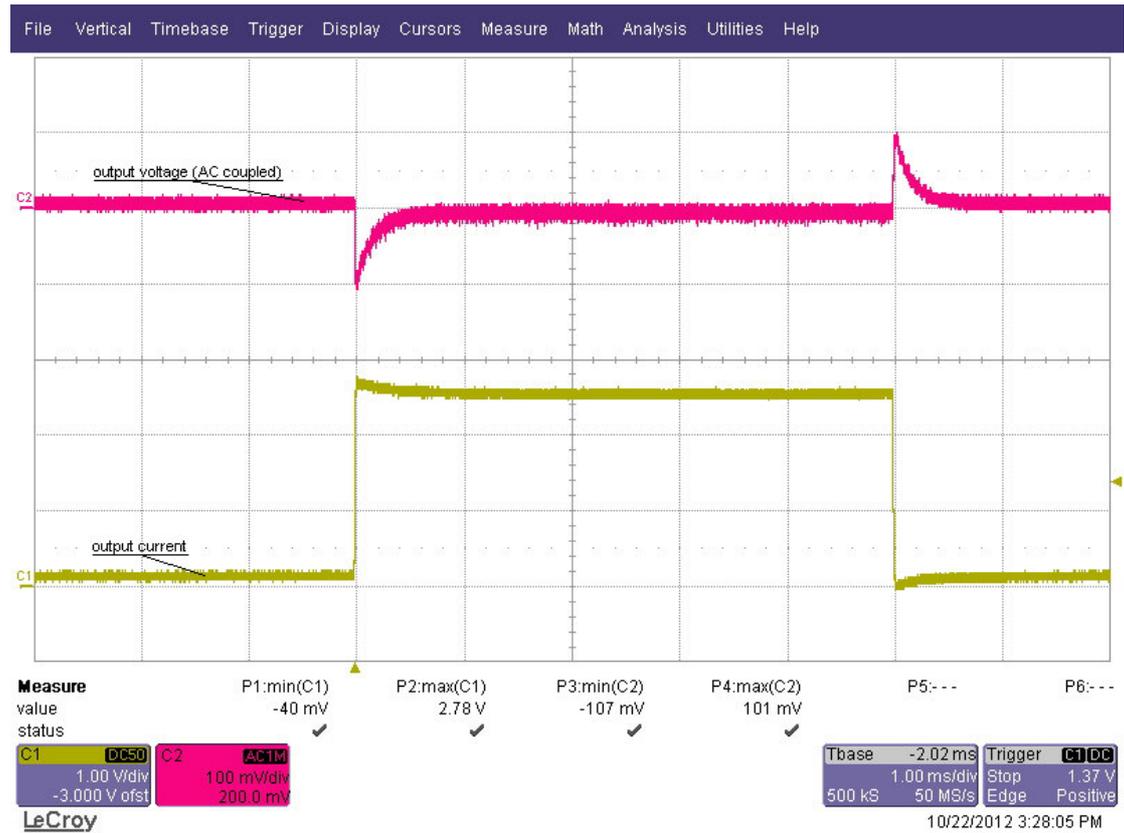


Figure 6

6 Frequency response

Figure 7 shows the loop response of the 3.8V output with 12.0V input voltage and a 2.5A load.

- 63 deg phase margin @ crossover frequency 33.9 kHz
- -26 db gain margin

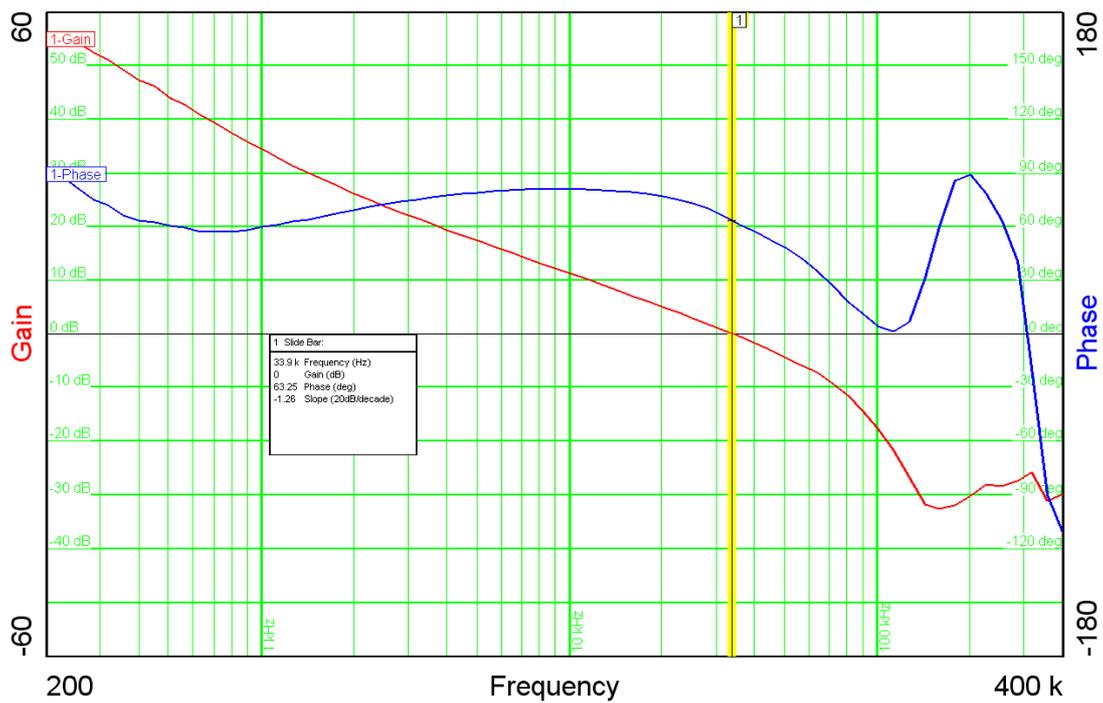


Figure 7

7 Miscellaneous waveforms

The drain-source voltage on the switching node is shown in Figure 8. The image was captured with 12.0V input and a 2.5A load.

Channel C2: **Drain-source voltage**, -1.9V minimum voltage, 13.6V maximum voltage
2V/div, 2 μ s/div



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 12.0V and a load of 2.5A.

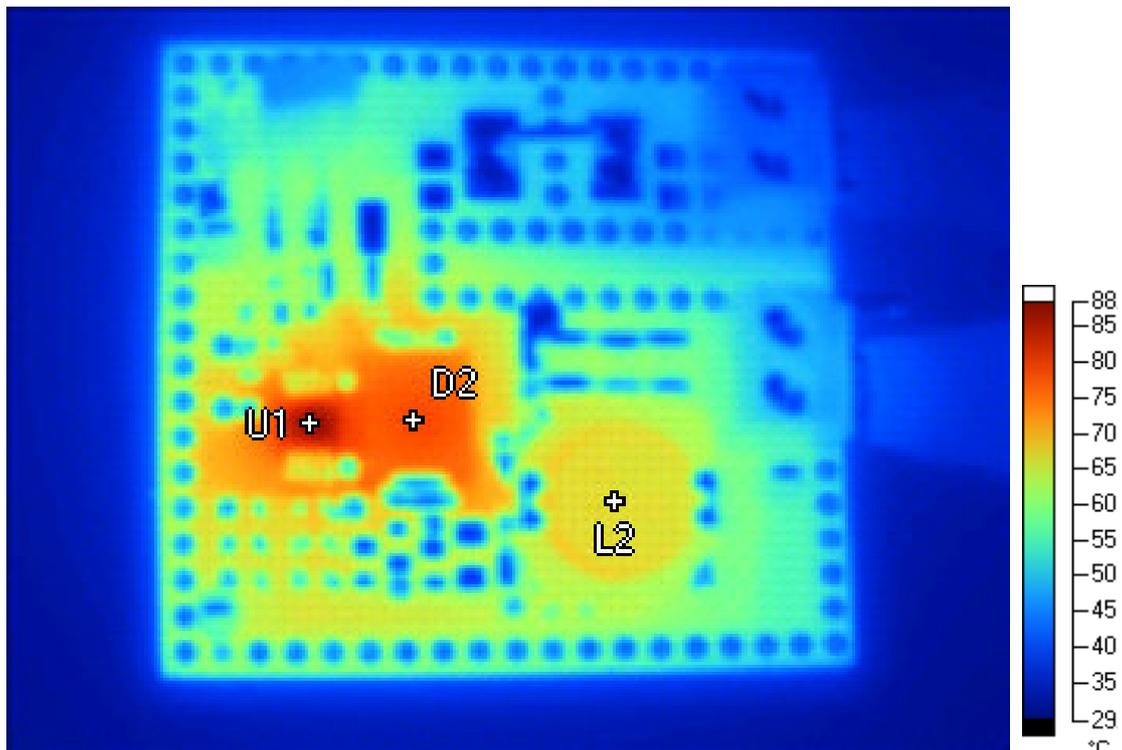


Figure 9

Markers

| Label | Temperature | Emissivity | Background |
|-------|-------------|------------|------------|
| U1 | 87.5 °C | 0.95 | 21.0 °C |
| D2 | 78.6 °C | 0.95 | 21.0 °C |
| L2 | 66.4 °C | 0.95 | 21.0 °C |

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