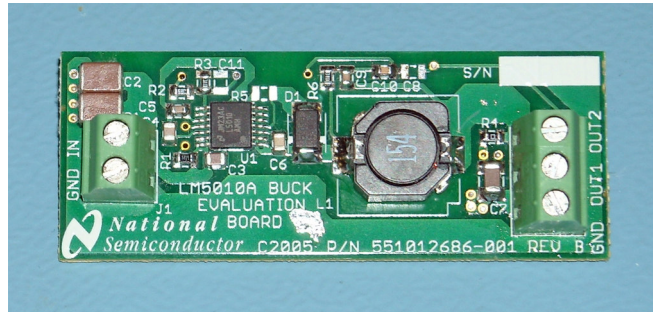


Nonsynchronous Buck with LM5010A for High Temperature

- Input 30 .. 60V
- Output 15.0V @ 160mA
- Switching Frequency 100 kHz nominal



1 Startup

The startup waveform is shown in Figure 1. The input voltage is set at 45.0V, with no load on the 15.0V output.

- Channel C1: **Input voltage**
10V/div, 5ms/div
- Channel C2: **Output voltage**
5V/div, 5ms/div

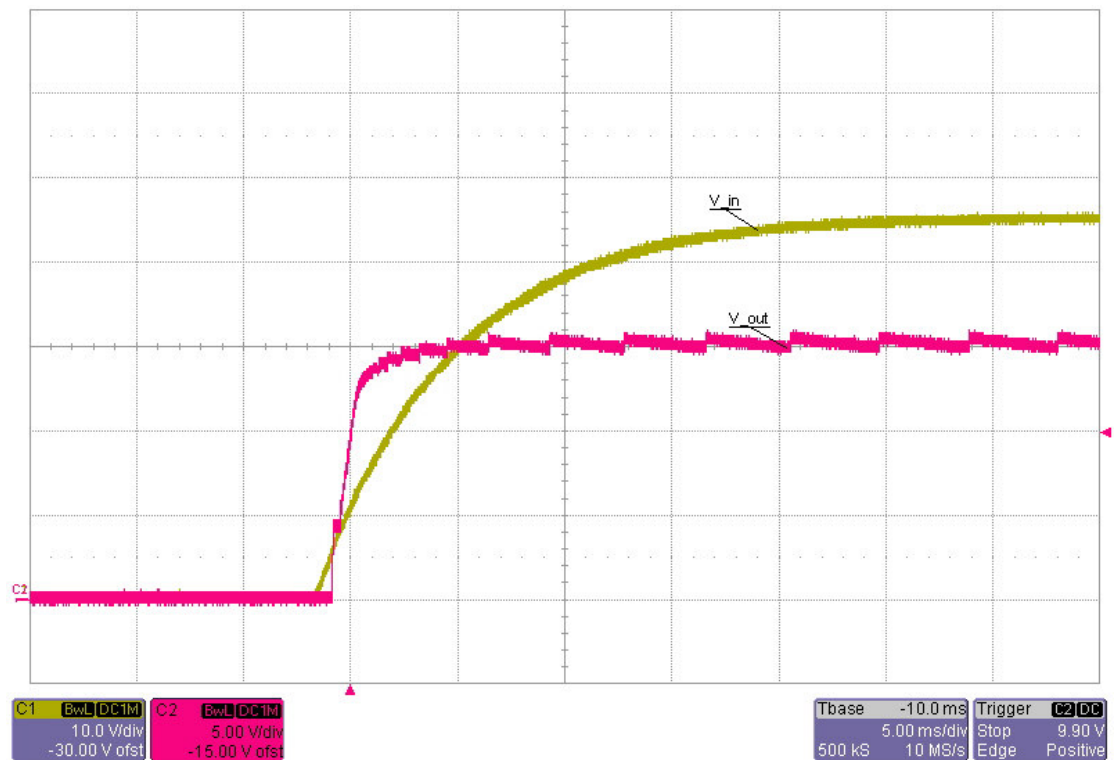


Figure 1

2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set at 45.0V with a 160mA load on the 15.0V output.

Channel C1: **Input voltage**
10V/div, 20ms/div

Channel C2: **Output voltage**
5V/div, 20ms/div

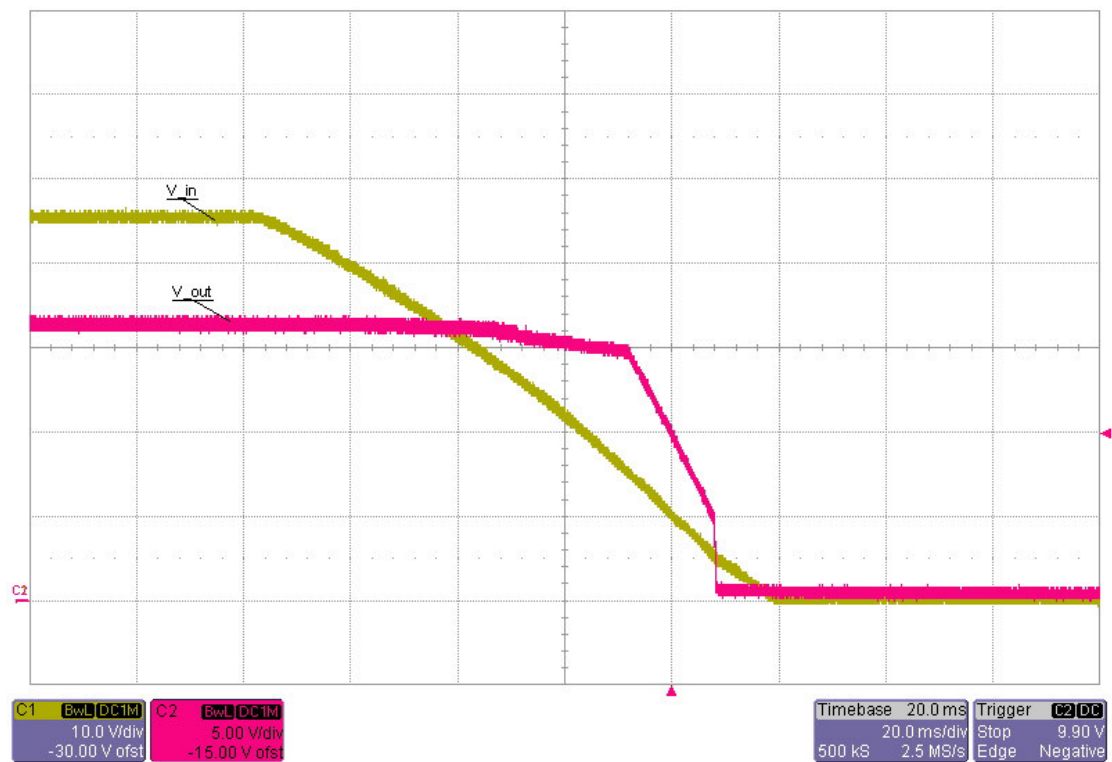


Figure 2

3 Efficiency

The efficiency at 30.0V, 45.0V and 60.0V input voltage is shown in Figure 3.

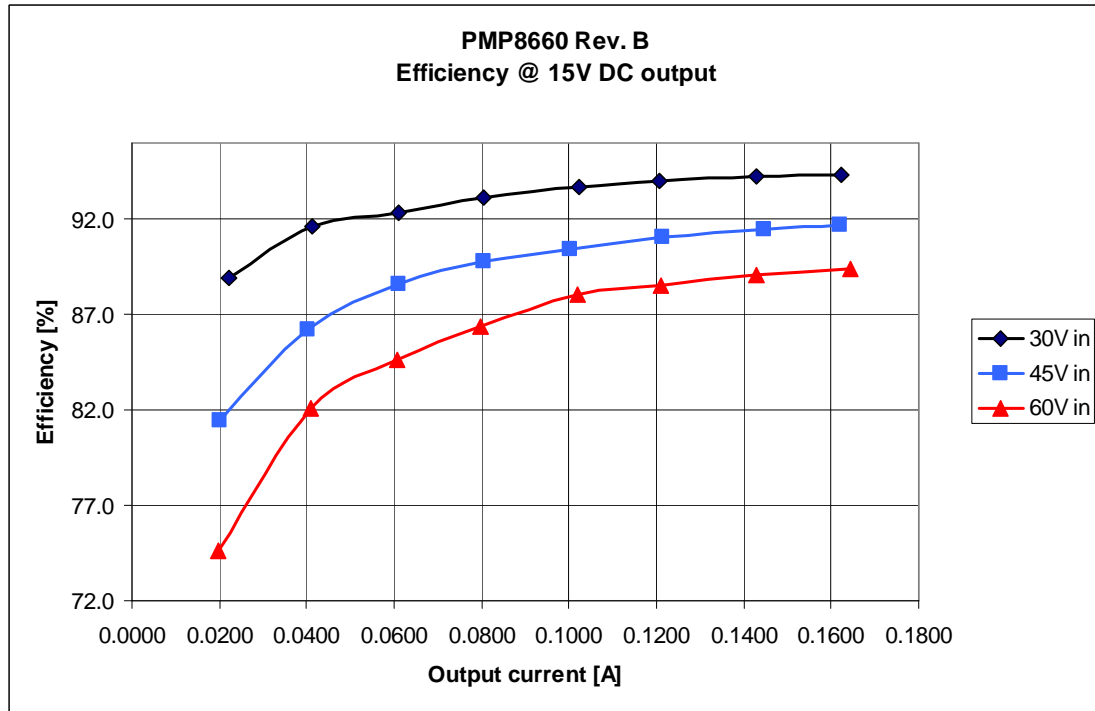


Figure 3

4 Load regulation

The load regulation of the 15.0V output at 30.0V, 45.0V and 60.0V input voltage is shown in Figure 4.

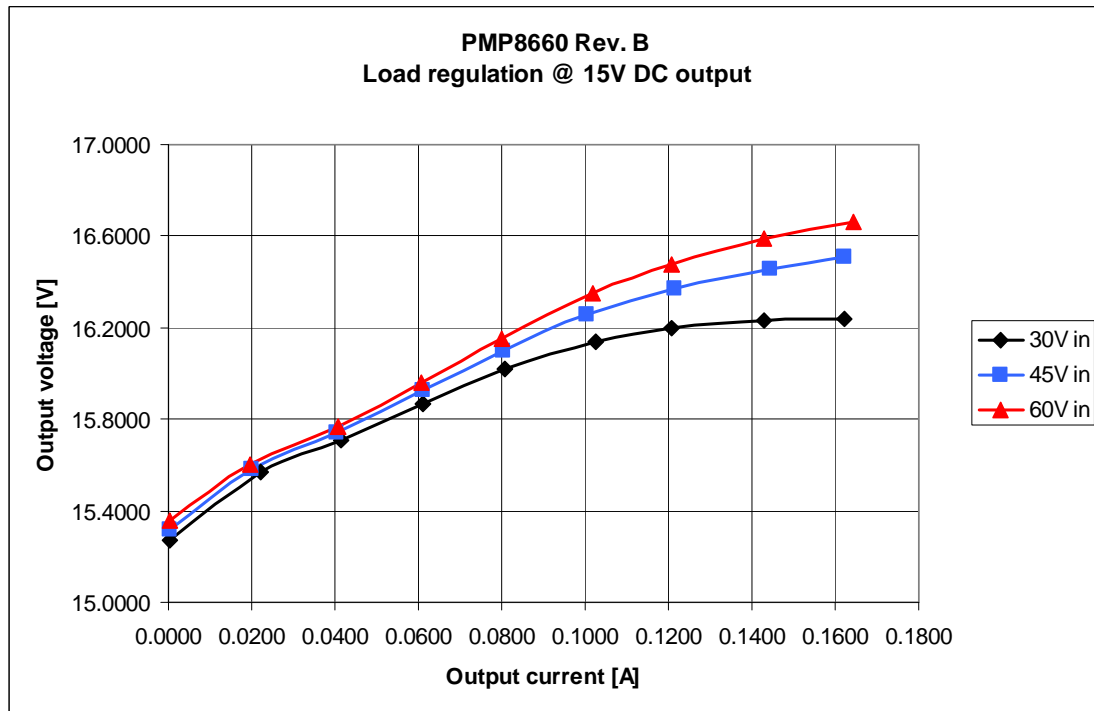


Figure 4

5 Output ripple voltage

The output ripple voltage at 160mA load and 30.0V, 45.0V and 60.0V input voltage is shown in Figure 5.

- Channel M1: **Output voltage @ 30.0V input**, 330mV peak-peak
200mV/div, 5us/div, AC coupled
- Channel M2: **Output voltage @ 45.0V input**, 371mV peak-peak
200mV/div, 5us/div, AC coupled
- Channel M3: **Output voltage @ 60.0V input**, 422mV peak-peak
200mV/div, 5us/div, AC coupled

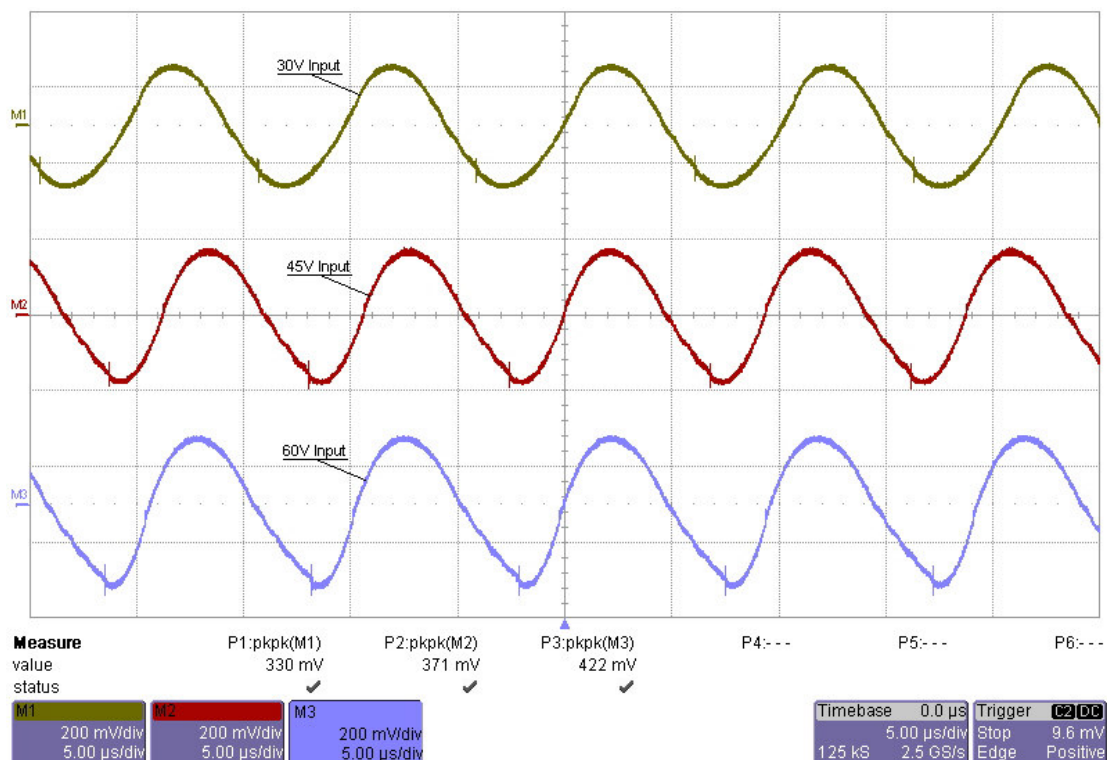


Figure 5

6 Miscellaneous waveforms

The drain-source voltage on the switching node at 30.0V and 60.0V with a load of 160mA is shown in Figure 6 and Figure 7.

30.0V Input Voltage

Channel C1: **Inductor Current**, 393mA peak, 202mA rms
 100mA/div, 5us/div

Channel C2: **Drain-source voltage**, -2.3V minimum voltage, 32.6V maximum voltage
 10V/div, 5us/div

60.0V Input Voltage

Channel C1: **Inductor Current**, 463mA peak, 219mA rms
 100mA/div, 5us/div

Channel C2: **Drain-source voltage**, -3.6V minimum voltage, 56.2V maximum voltage
 10V/div, 5us/div

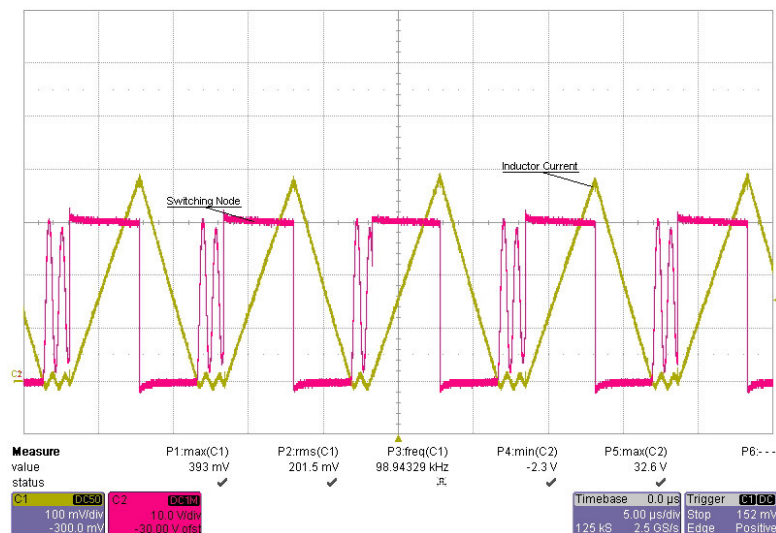


Figure 6

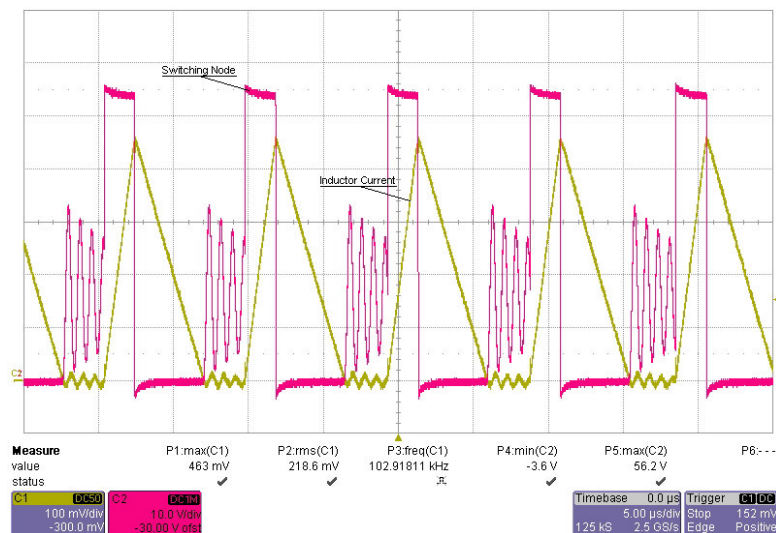


Figure 7

7 Thermal measurement

The thermal image (Figure 8) shows the circuit at an ambient temperature of 21 °C with an input voltage of 60.0V and a load of 160mA.

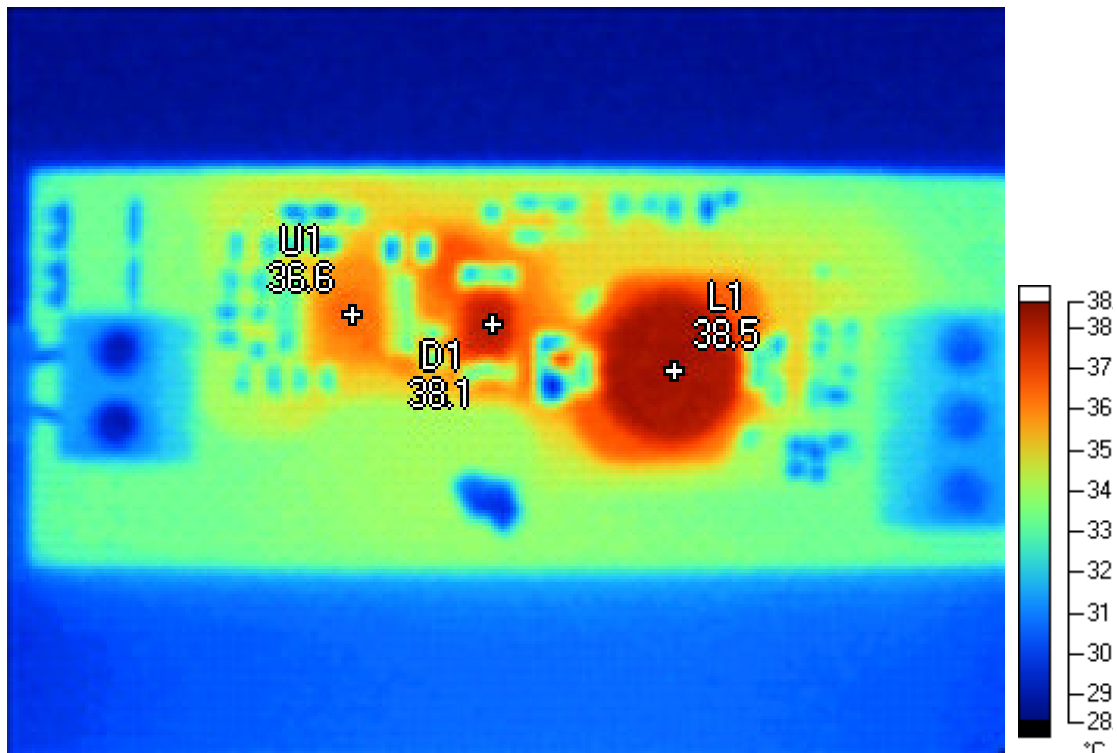


Figure 8

Markers

| Label | Temperature | Emissivity | Background |
|-------|-------------|------------|------------|
| L1 | 38.5 °C | 0.95 | 21.0 °C |
| D1 | 38.1 °C | 0.95 | 21.0 °C |
| U1 | 36.6 °C | 0.95 | 21.0 °C |

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