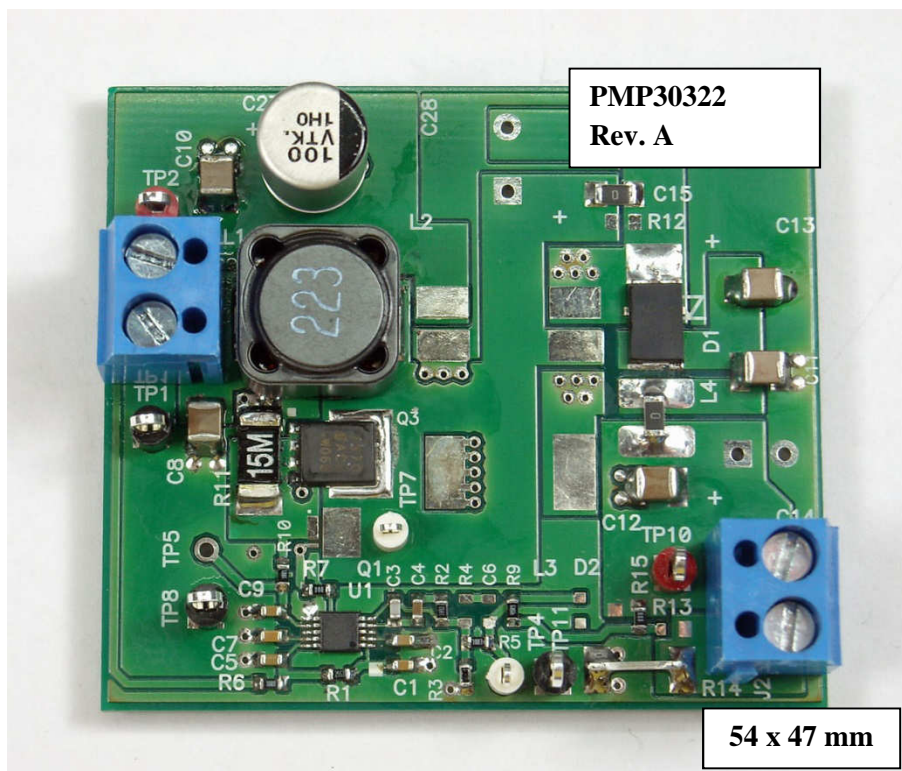


## PMP30322 Rev.A – Test Report

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### Automotive Boost Converter

- Input 6.0 .. 16.0V nominal, 42.0V peak
- Output 24.0V @ 1.5A
- Controller TPS40210-Q1
- Free-Running-Switching Frequency of 300 kHz
- Built on PCB PMP2773 Rev.B



## 1. Startup

The startup waveform at 12.0V input voltage and no load on the 24.0V output is shown in Figure 1.

Channel C1    **12.0V Input Voltage**  
5V/div, 10ms/div

Channel C2    **24.0V Output Voltage**  
5V/div, 10ms/div

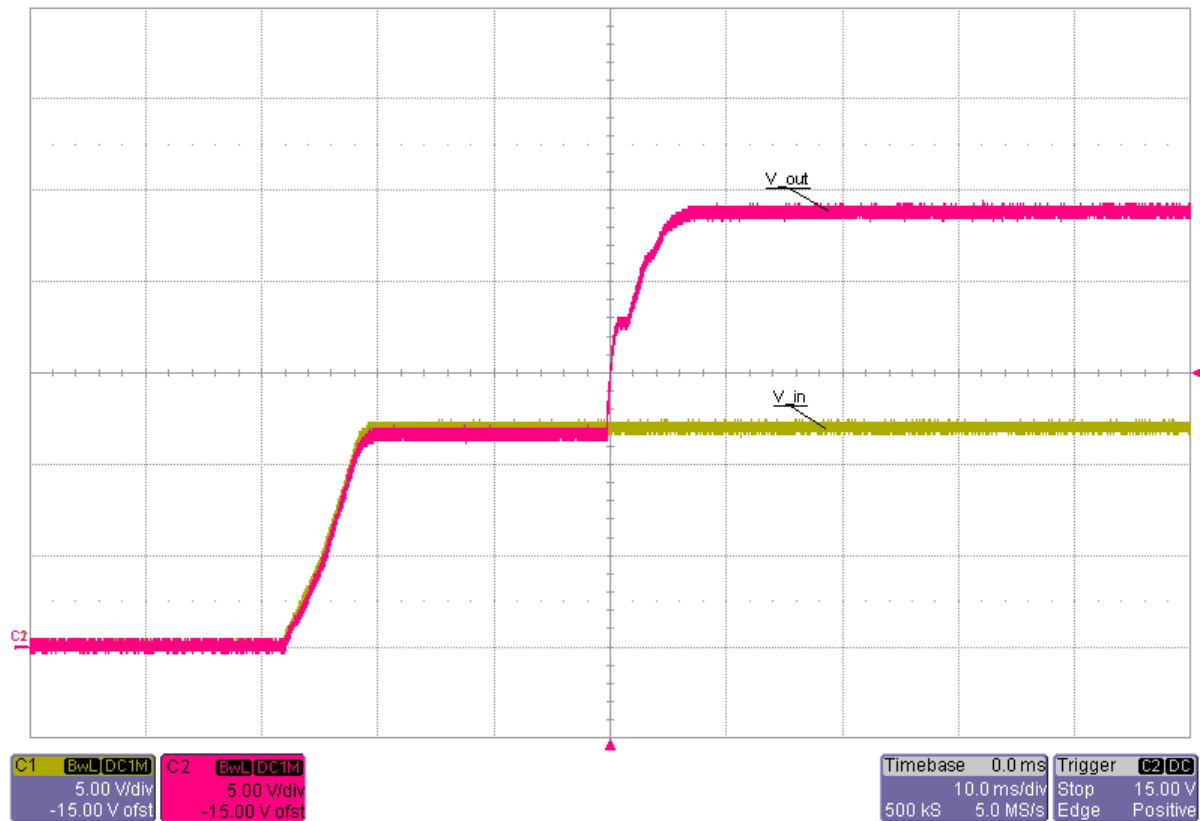


Figure 1

## 2. Shutdown

The shutdown waveform at 12.0V input voltage and 1.5A load at 24.0V output voltage is shown in Figure 2.

Channel C1     **12.0V Input Voltage**  
5V/div, 10ms/div

Channel C2     **24.0V Output Voltage**  
5V/div, 10ms/div

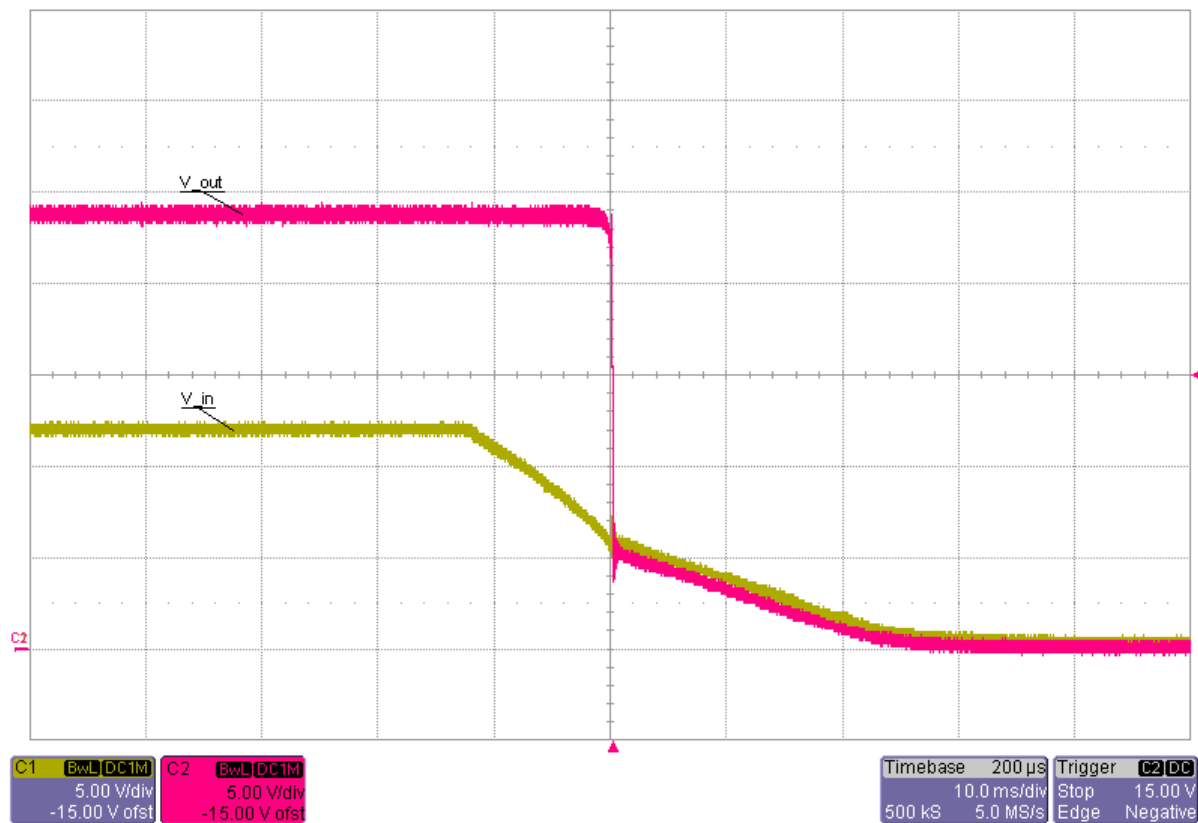


Figure 2

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## 3. Efficiency

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

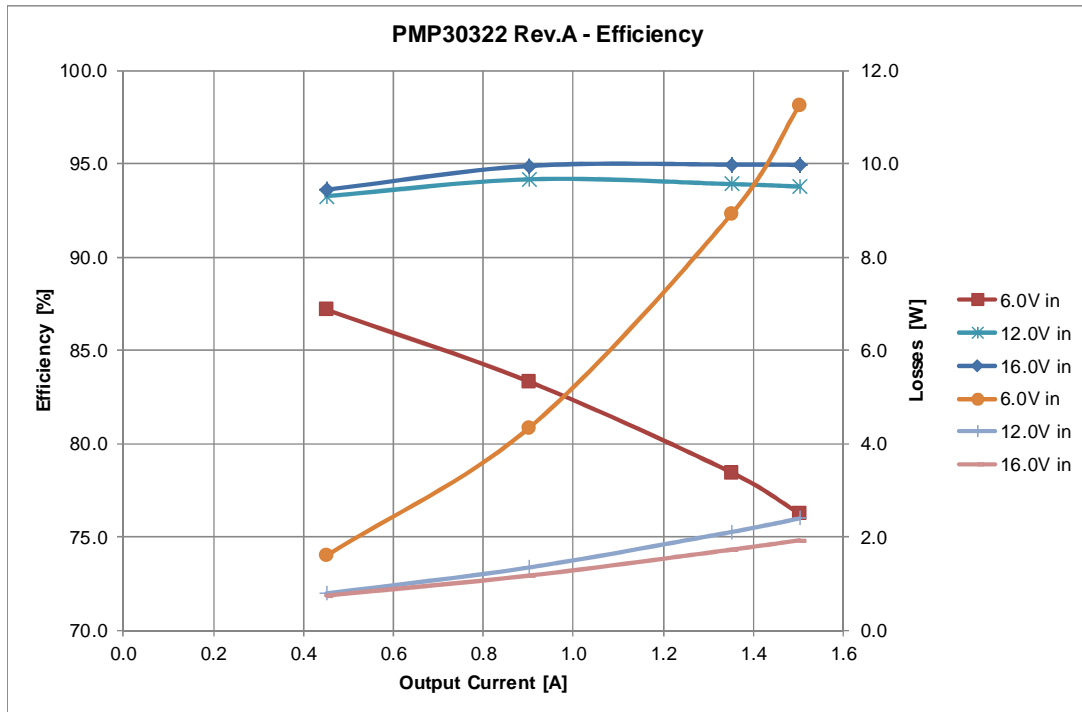


Figure 3

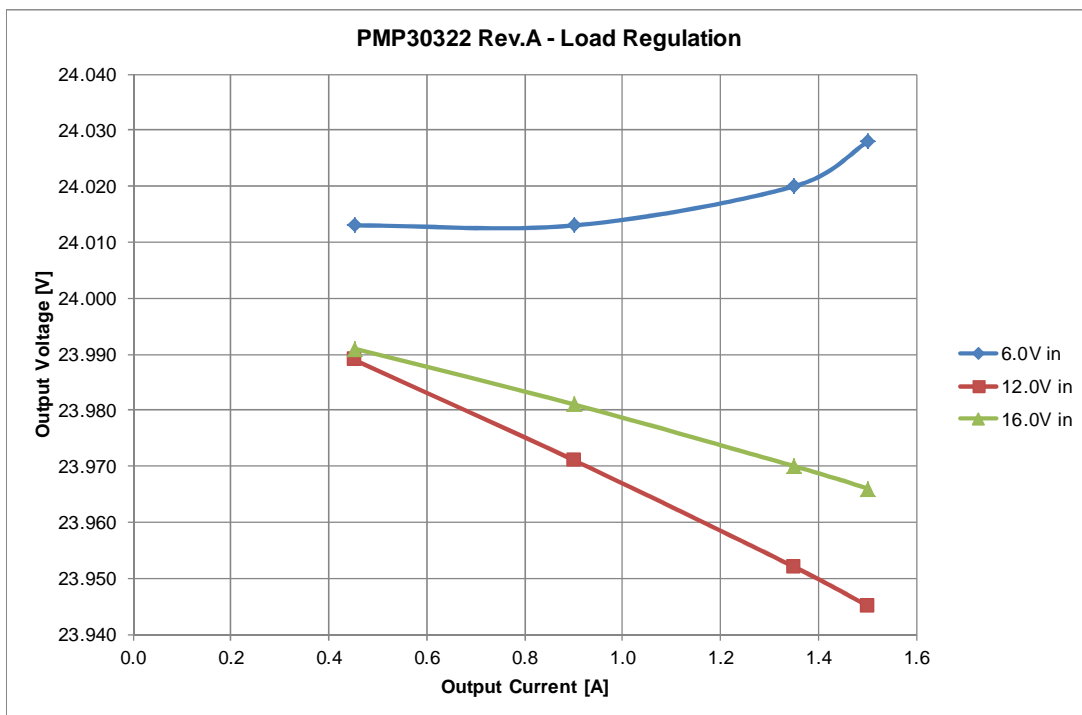


Figure 4

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## 4. Transient Response

The response to a load step at 24.0V output voltage is shown in Figure 5.

Channel C1 **Output Current**, Load Step 0.75A to 1.5A  
1A/div, 1ms/div

Channel C2 **Output Voltage**, -2.97V undershoot (12.4%), 3.20V overshoot (13.3%)  
2V/div, 1ms/div, AC coupled

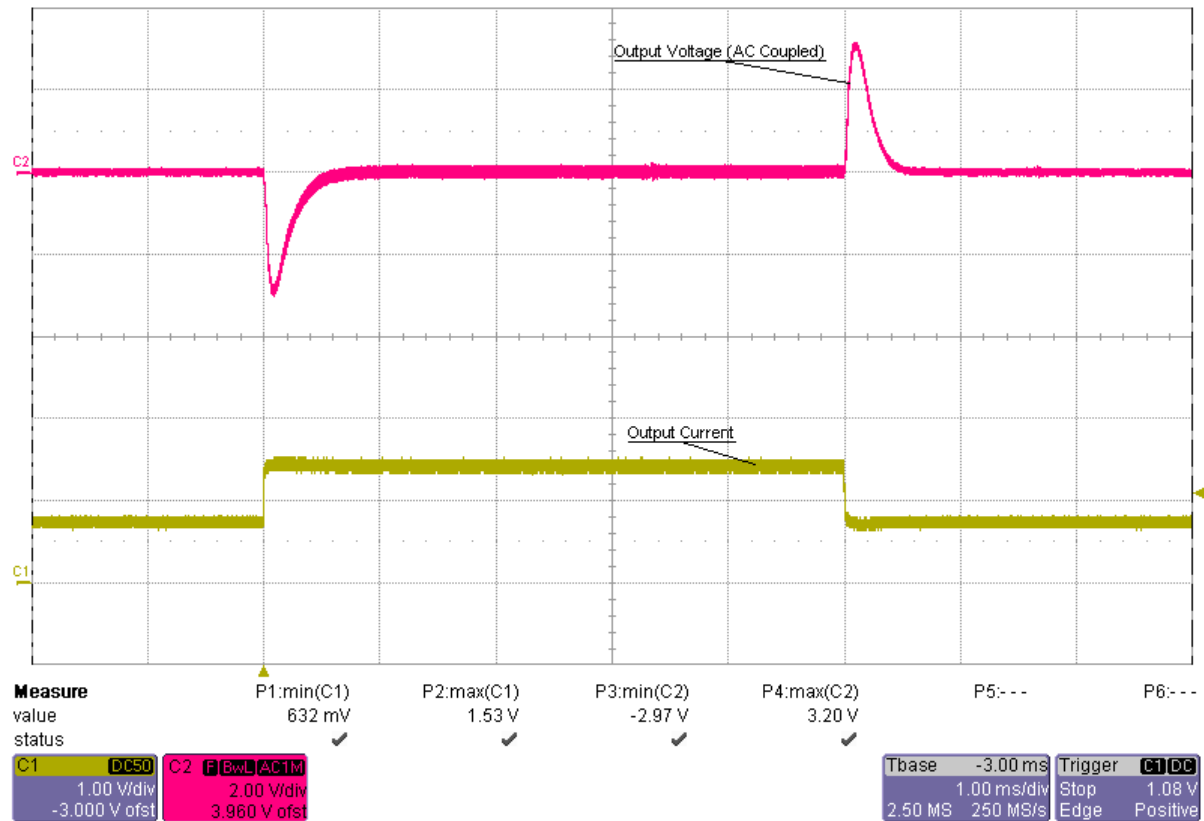


Figure 5

## 5. Frequency Response

The frequency response is shown in Figure 6.

6.0V Input, 1.5A Load	0.4 kHz Bandwidth, 74 deg Phase Margin, -23 dB Gain Margin
12.0V Input, 1.5A Load	1.1 kHz Bandwidth, 100 deg Phase Margin, -25 dB Gain Margin
16.0V Input, 1.5A Load	1.4 kHz Bandwidth, 87 deg Phase Margin, -23 dB Gain Margin

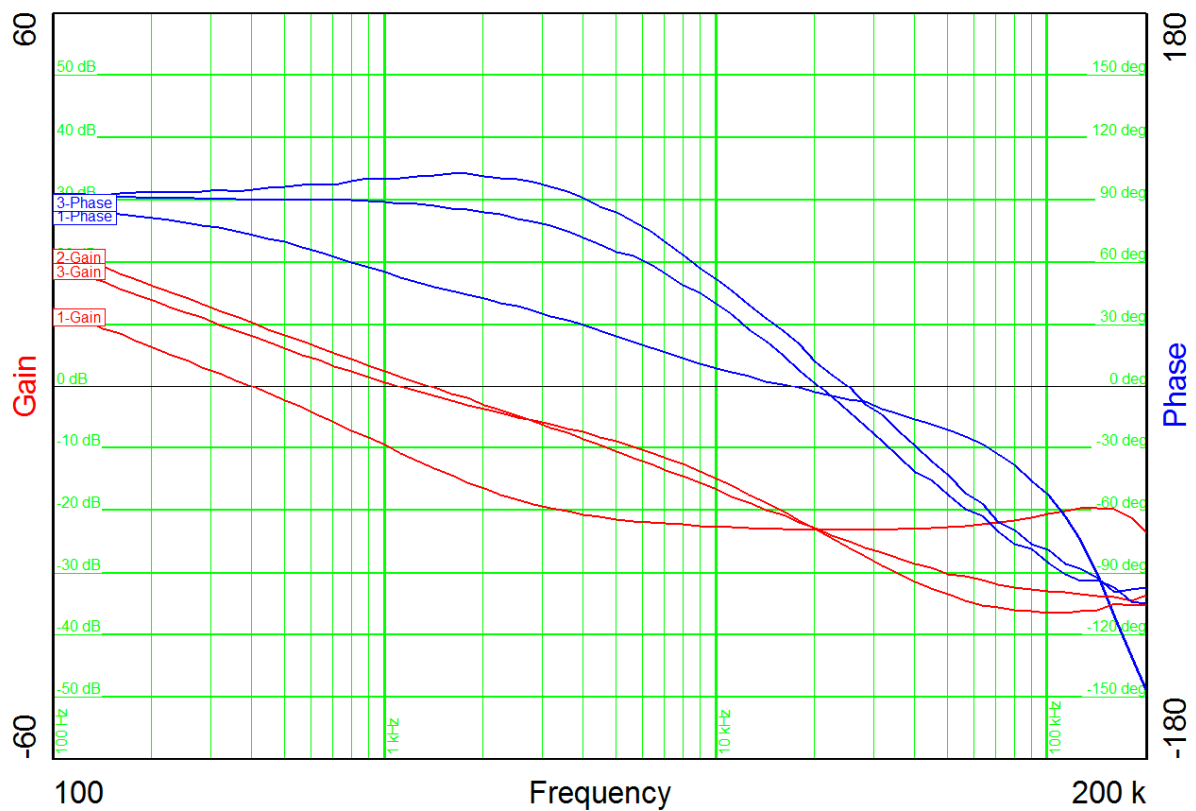


Figure 6

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### 6. Input Ripple

The input ripple is shown in Figure 7.

Channel M1 **Input Voltage @ 6.0V Input / 1.5A Load**, 73mV peak-peak (1.2%)

50mV/div, 2us/div, AC coupled

Channel M2 **Input Voltage @ 12.0V Input / 1.5A Load**, 68mV peak-peak (0.6%)

50mV/div, 2us/div, AC coupled

Channel M3 **Input Voltage @ 16.0V Input / 1.5A Load**, 62mV peak-peak (0.4%)

50mV/div, 2us/div, AC coupled

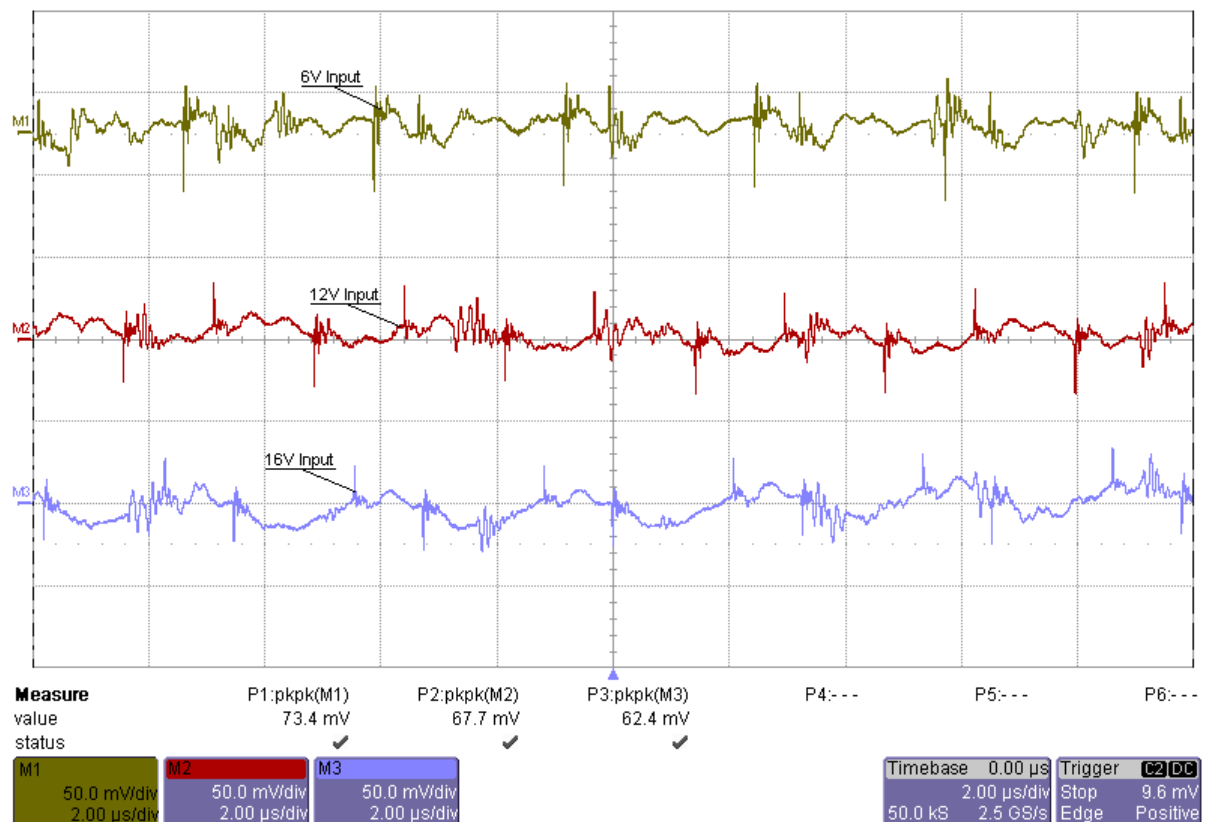


Figure 7

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### 7. Output Ripple

The output ripple voltage is shown in Figure 8.

Channel M1 **Output Voltage @ 6.0V Input / 1.5A Load**, 458mV peak-peak (1.9%)  
200mV/div, 2us/div, AC coupled

Channel M2 **Output Voltage @ 12.0V Input / 1.5A Load**, 354mV peak-peak (1.5%)  
200mV/div, 2us/div, AC coupled

Channel M3 **Output Voltage @ 16.0V Input / 1.5A Load**, 259mV peak-peak (1.1%)  
200mV/div, 2us/div, AC coupled

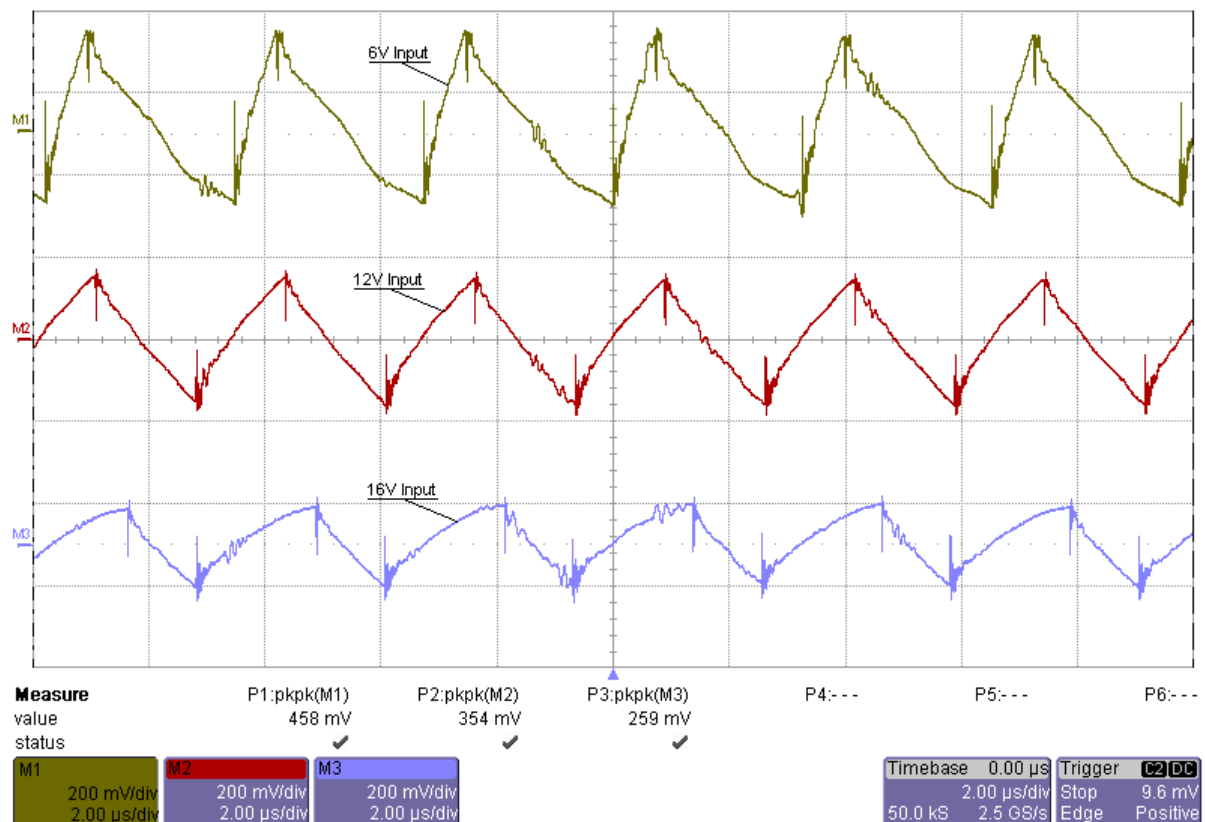


Figure 8



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## 8. Low-Side FET (Switching Node)

The drain-source voltage of the low-side FET at 12.0V input voltage and 1.5A load on the output is shown in Figure 9.

Channel C2     **Drain-Source Voltage**, -0.8V minimum, 31.5V maximum  
5V/div, 1us/div

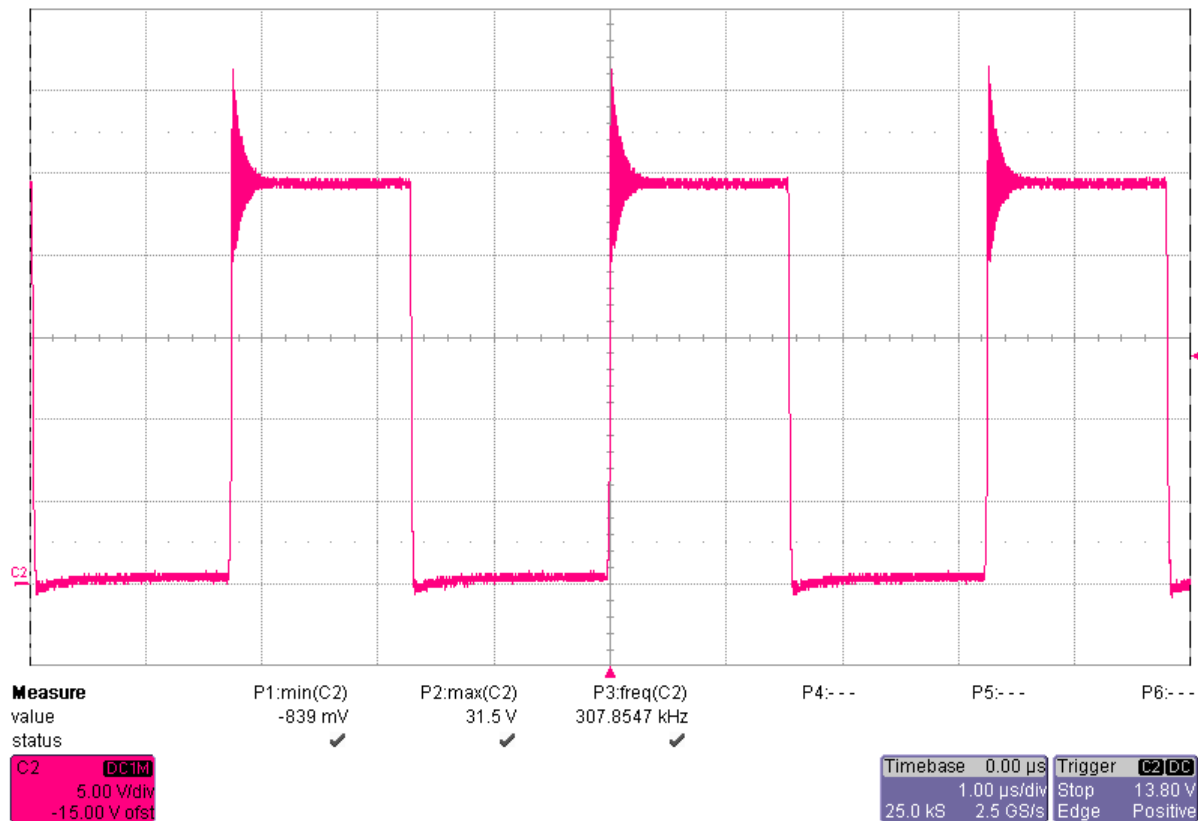


Figure 9

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## 9. Diode

The drain-source voltage of the diode at 12.0V input voltage and 1.5A load on the output is shown in Figure 10.

Channel C2     **Drain-Source Voltage**, -2.0V minimum, 27.2V maximum  
5V/div, 1us/div

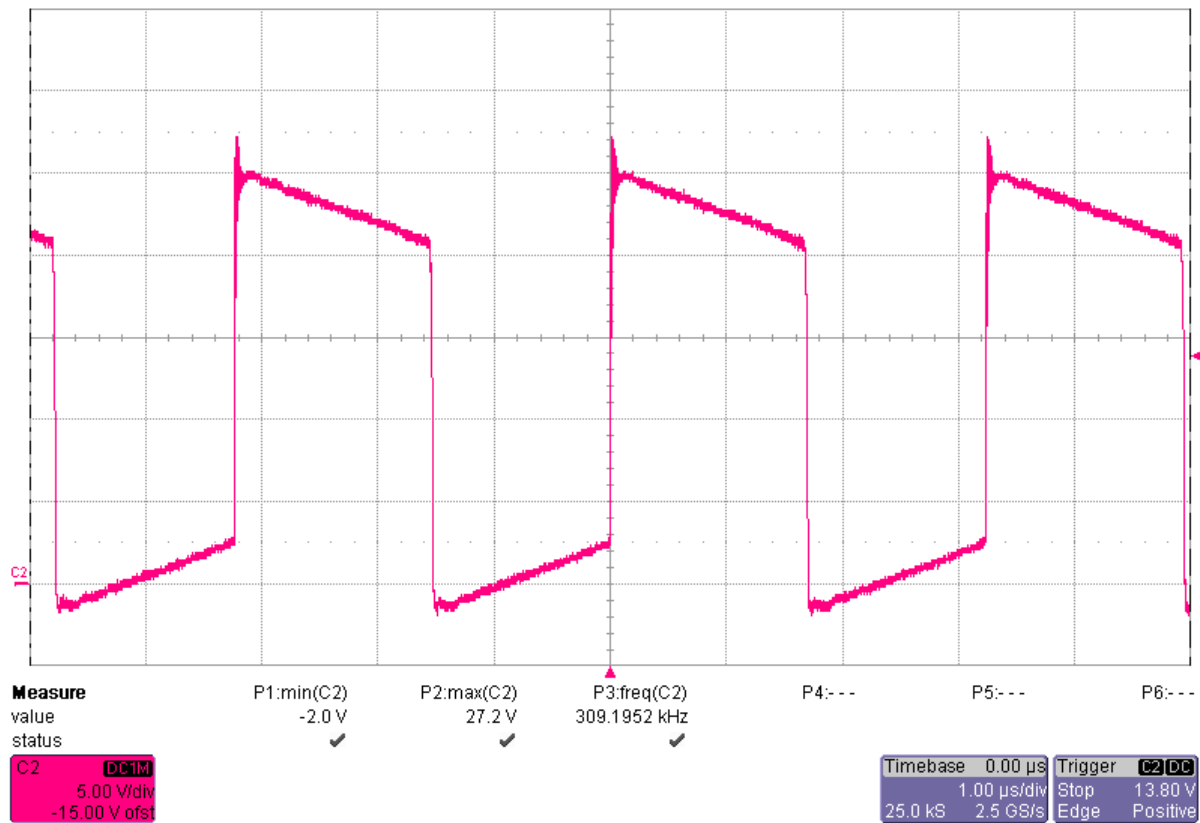


Figure 10

## 10. Thermal Image

The thermal image (Figure 11) shows the circuit at an ambient temperature of 20°C with an input voltage of 12.0V and 1.5A load on the output.

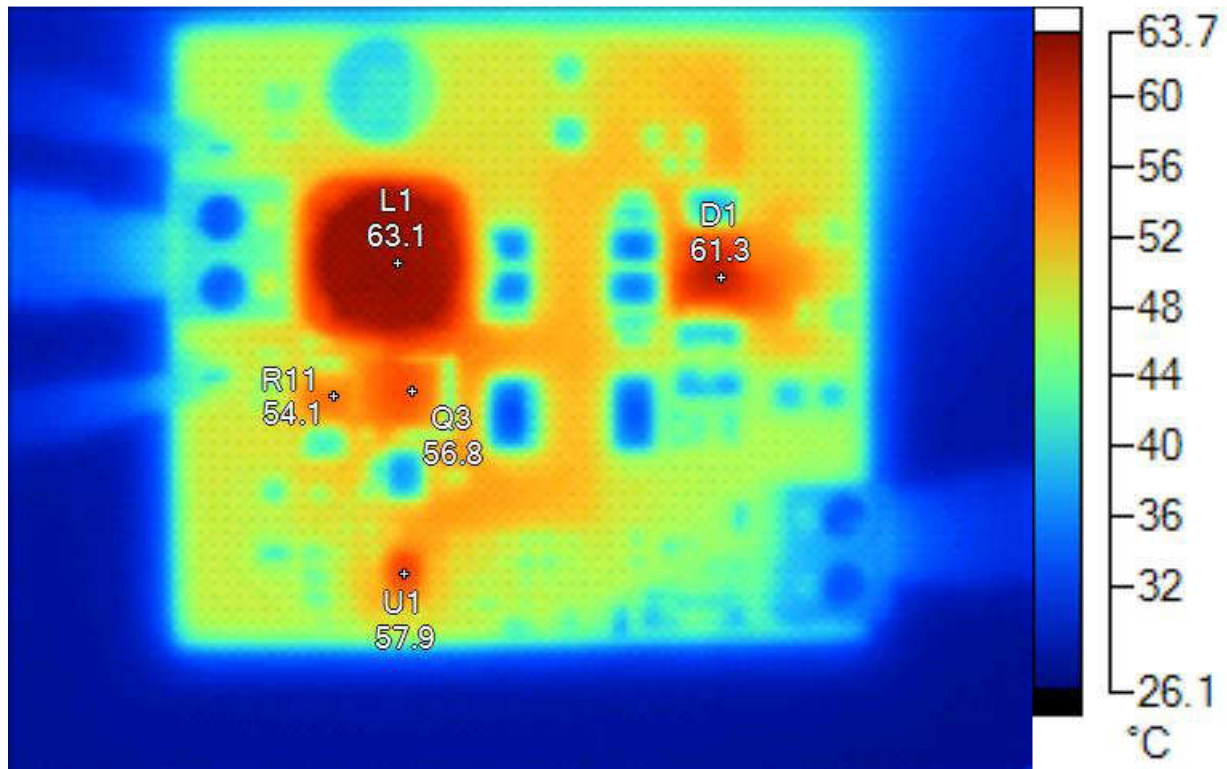


Figure 11

Name	Temperature	Emissivity	Background
L1	63.1°C	0.95	20.0°C
D1	61.3°C	0.95	20.0°C
U1	57.9°C	0.95	20.0°C
R11	54.1°C	0.95	20.0°C
Q3	56.8°C	0.95	20.0°C

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