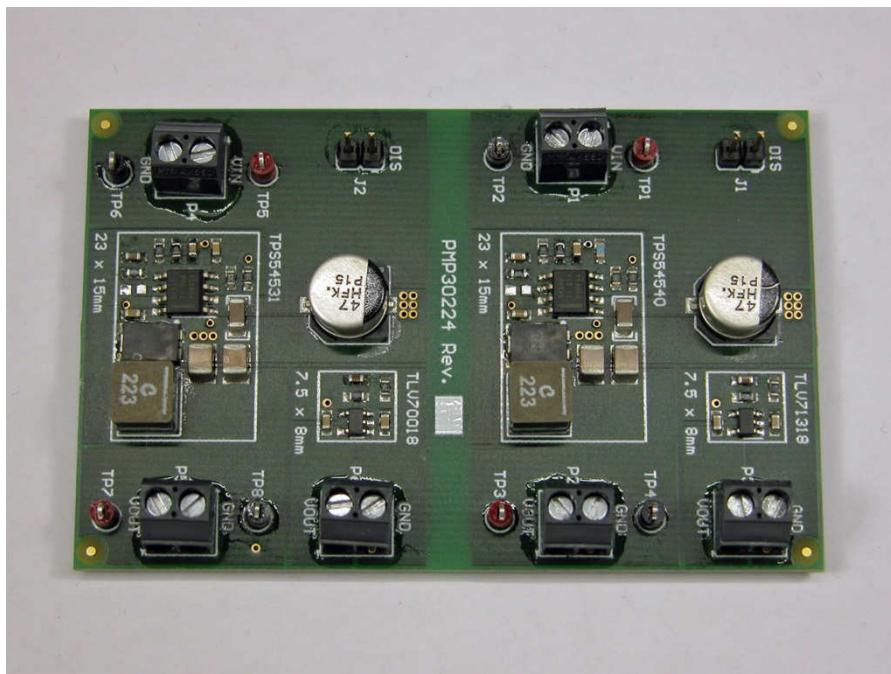


## TAS2555 Power Supply Solution

- Input            TPS54540:     5.0 .. 38.0V  
                     TPS54531:     5.0 .. 26.0V
- Output           5.0V @ 1.0A / 5.0A peak (TPS54540, TPS54531)  
                     1.8V @ 0.075A (TLV71318, TLV70018)
- Free-Running-Switching Frequency of 570 kHz



## 1. Startup – TPS54540

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

- Channel C1    **12.0V Input Voltage**  
2V/div, 5ms/div
- Channel C2    **5.0V Output Voltage**  
1V/div, 5ms/div
- Channel C3    **1.8V Output Voltage**  
1V/div, 5ms/div

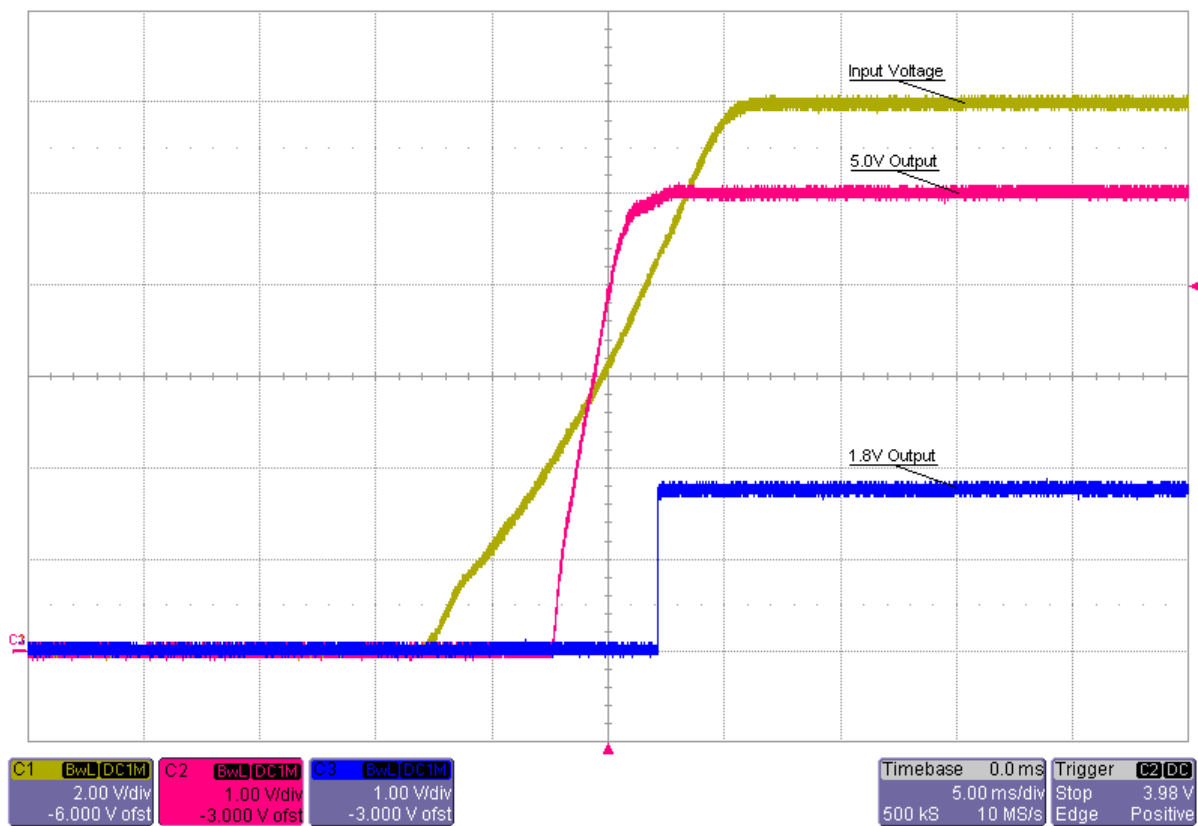


Figure 1

## 2. Shutdown – TPS54540

The shutdown waveform at 12.0V input voltage and 1.0V load on the 5.0V output and 0.075mA load on the 1.8V output are shown in Figure 2.

Channel C1    **12.0V Input Voltage**  
2V/div, 10ms/div

Channel C2    **5.0V Output Voltage**  
1V/div, 10ms/div

Channel C3    **1.8V Output Voltage**  
1V/div, 10ms/div

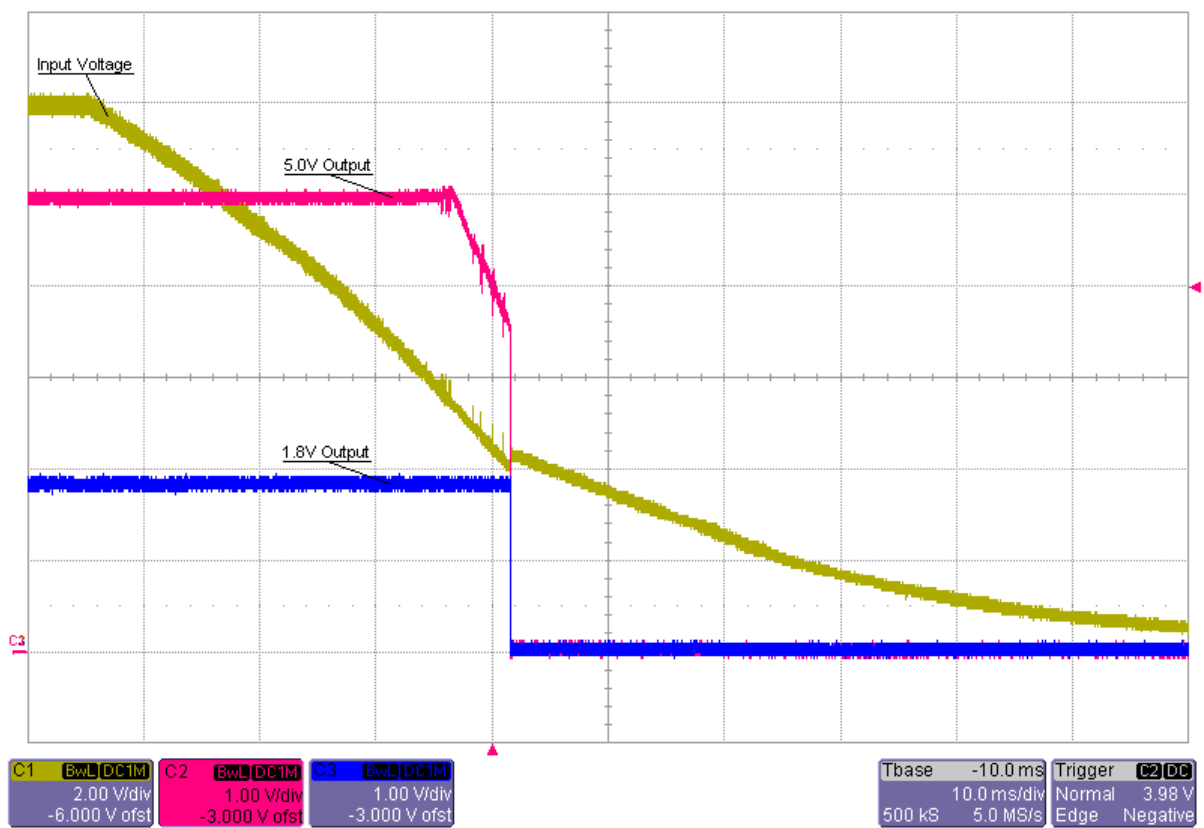


Figure 2

### 3. Efficiency – TPS54540

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

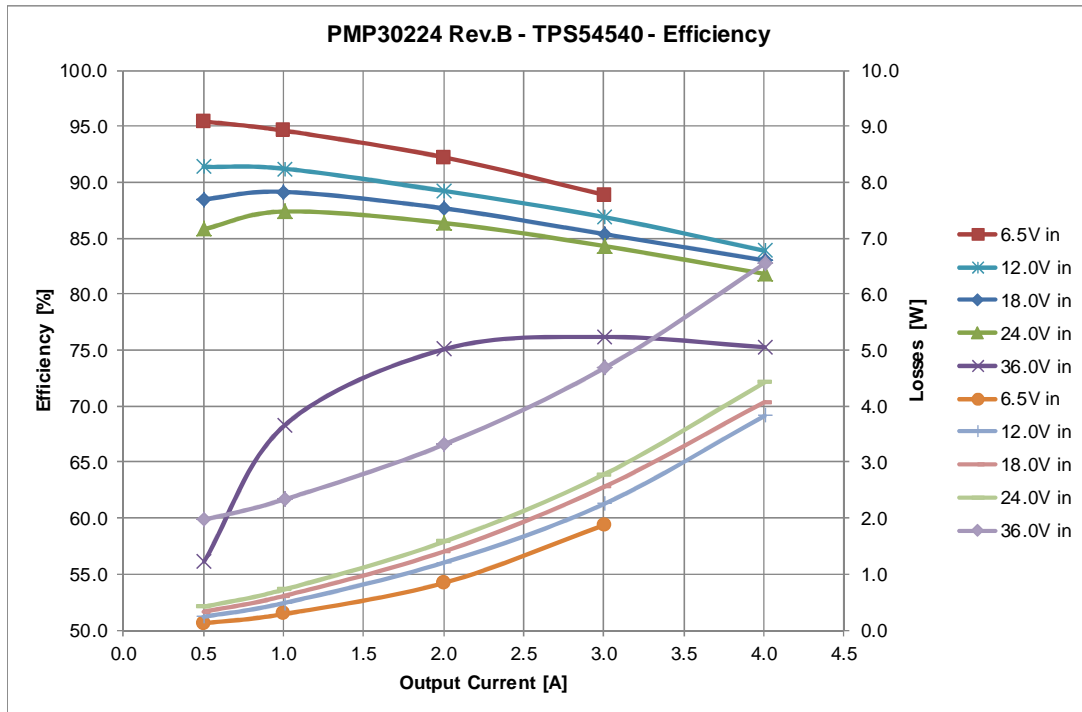


Figure 3

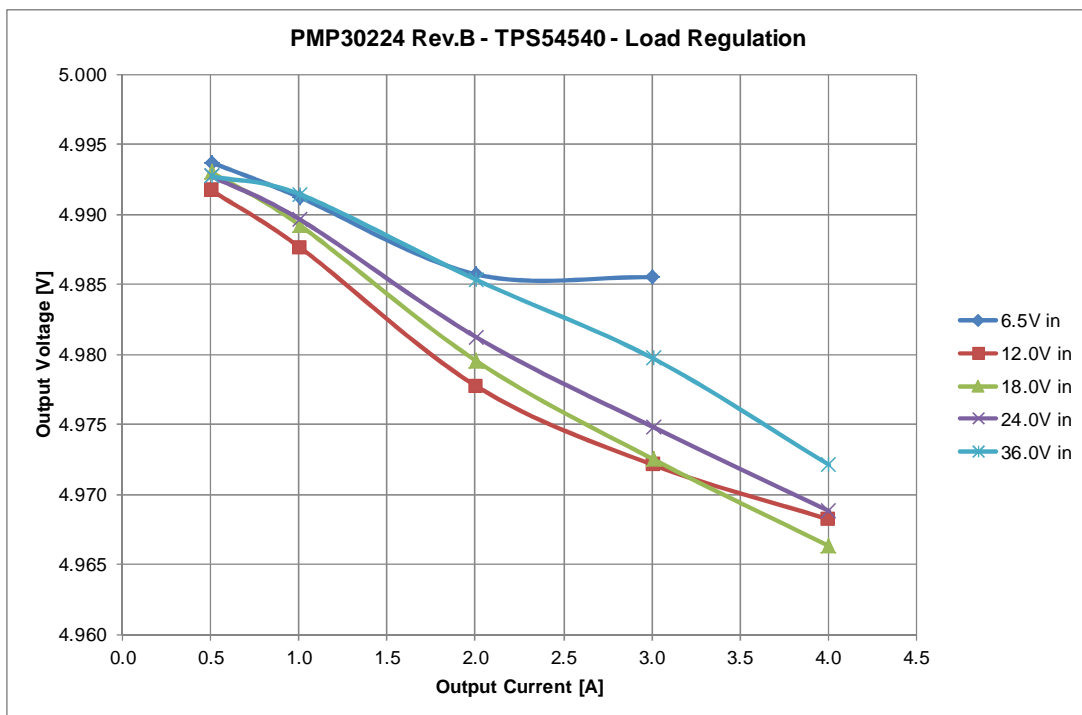


Figure 4

## 4. Transient Response – TPS54540

The response to a load step at 12.0V input voltage is shown in Figure 5.

Channel C1 **Output Current**, Load Step 1.0A to 2.0A  
1A/div, 1ms/div

Channel C2 **Output Voltage**, -82mV undershoot (1.6%), 79mV overshoot (1.6%)  
50mV/div, 1ms/div, AC coupled

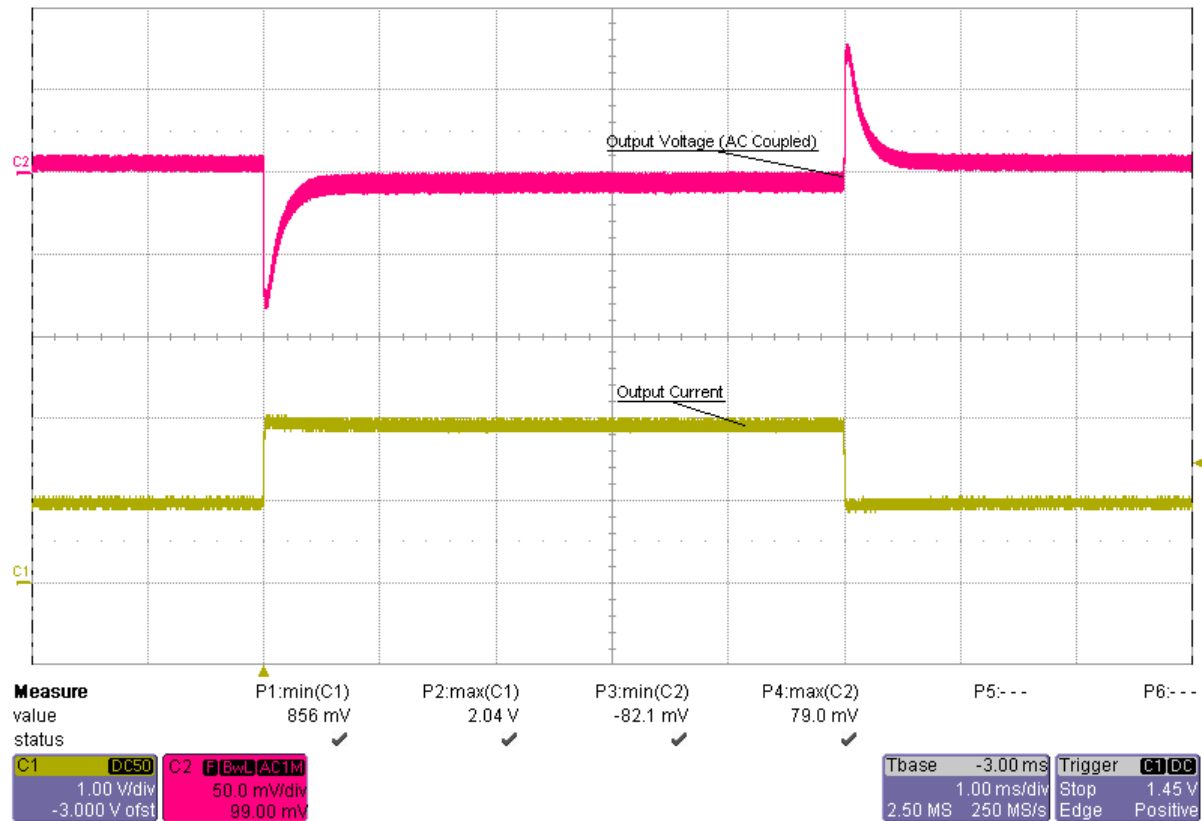


Figure 5

## 5. Frequency Response – TPS54540

6.5V Input, 1.0A Load

36.5 kHz Bandwidth, 62 deg Phase Margin, -32 dB Gain Margin

6.5V Input, 2.5A Load

38.3 kHz Bandwidth, 65 deg Phase Margin, -29 dB Gain Margin

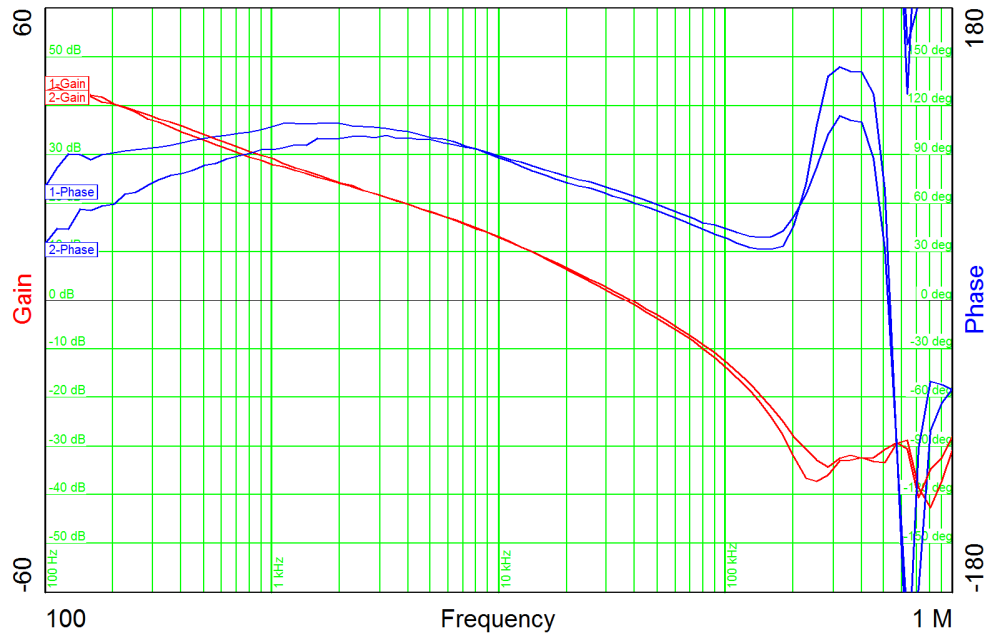


Figure 6

12.0V Input, 1.0A Load

47.0 kHz Bandwidth, 62 deg Phase Margin, -25 dB Gain Margin

12.0V Input, 2.5A Load

47.9 kHz Bandwidth, 64 deg Phase Margin, -25 dB Gain Margin

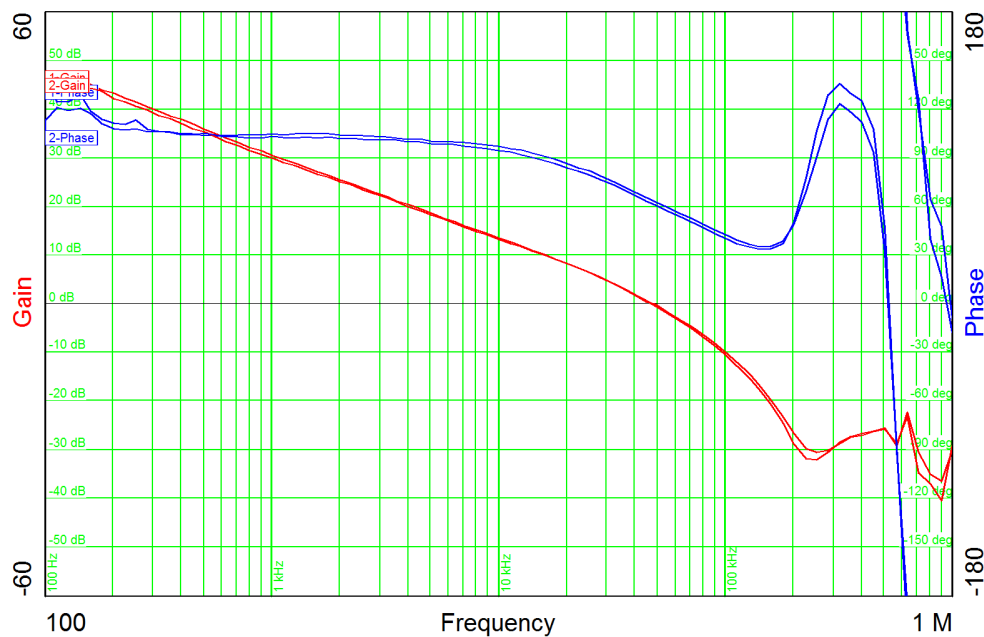


Figure 7

PMP30224 Rev.B – Test Report

18.0V Input, 1.0A Load  
 18.0V Input, 2.5A Load

65.6 kHz Bandwidth, 61 deg Phase Margin, -23 dB Gain Margin  
 70.0 kHz Bandwidth, 63 deg Phase Margin, -23 dB Gain Margin

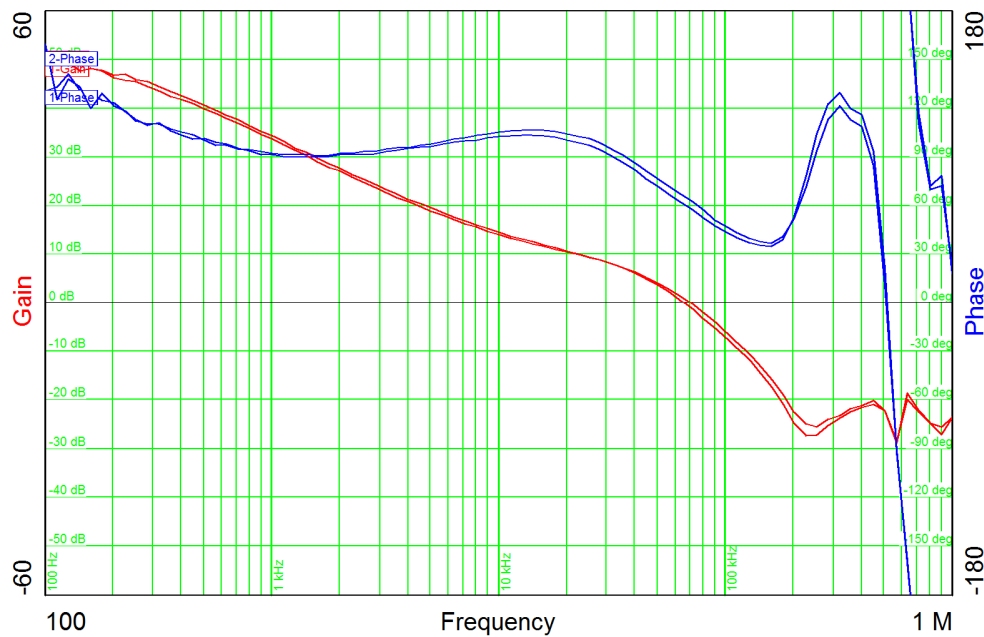


Figure 8

24.0V Input, 1.0A Load  
 24.0V Input, 2.5A Load

52.4 kHz Bandwidth, 64 deg Phase Margin, -25 dB Gain Margin  
 62.3 kHz Bandwidth, 65 deg Phase Margin, -24 dB Gain Margin

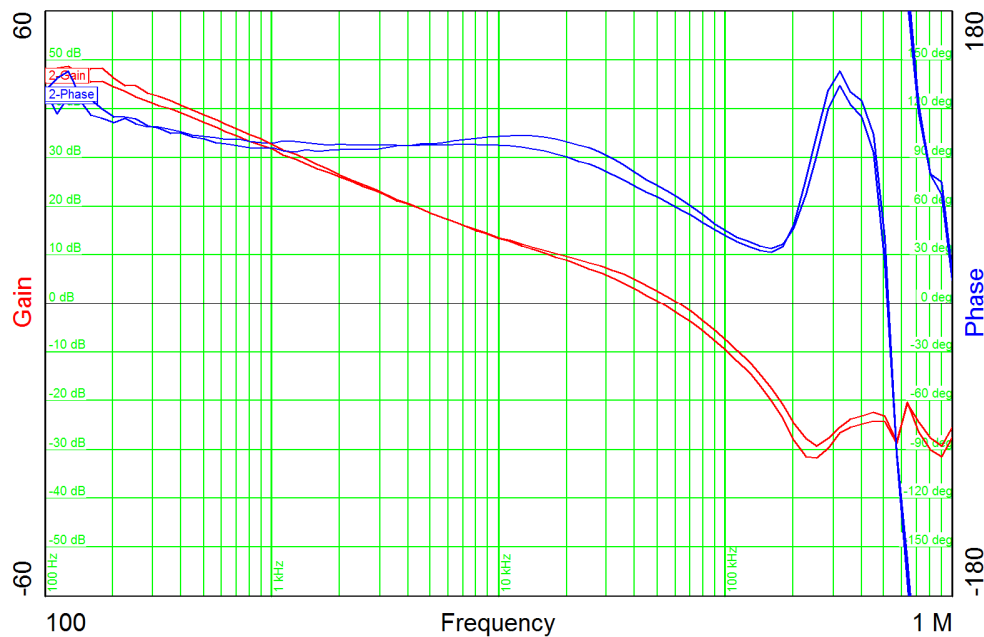
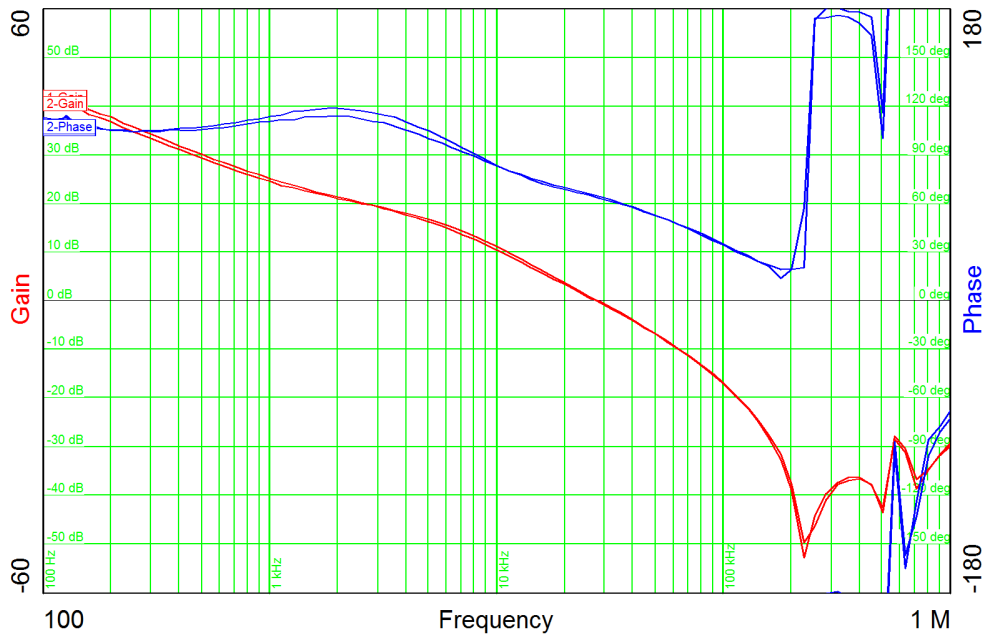


Figure 9

# PMP30224 Rev.B – Test Report

36.0V Input, 1.0A Load  
36.0V Input, 2.5A Load

27.3 kHz Bandwidth, 65 deg Phase Margin, enough Gain Margin  
30.0 kHz Bandwidth, 64 deg Phase Margin, enough Gain Margin



**Figure 10**



## 6. Output Ripple – TPS54540

The output ripple voltage is shown in Figure 11.

- Channel M1 **Output Voltage @ 6.5V Input / 2.0A Load, 42mV peak-peak (0.8%)**  
500mV/div, 2us/div
- Channel M2 **Output Voltage @ 12.0V Input / 2.0A Load, 48mV peak-peak (1.0%)**  
500mV/div, 2us/div
- Channel M3 **Output Voltage @ 18.0V Input / 2.0A Load, 51mV peak-peak (1.0%)**  
500mV/div, 2us/div
- Channel M4 **Output Voltage @ 24.0V Input / 2.0A Load, 52mV peak-peak (1.0%)**  
500mV/div, 2us/div

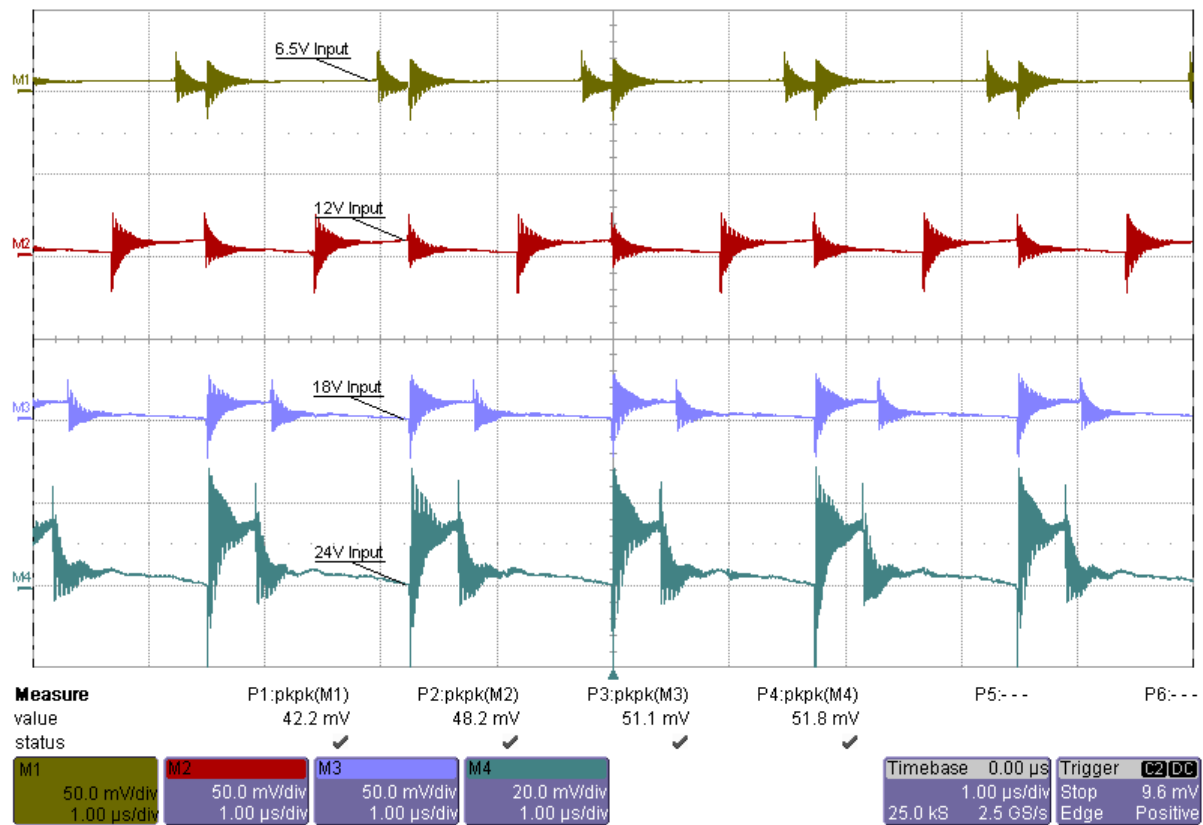


Figure 11

## 7. Switching Node – TPS54540

The switching node at 12.0V input voltage and 2.0A load on the output is shown in Figure 12.

Channel C1 **Drain-Source Voltage**, -1.5V minimum, 13.2V maximum  
2V/div, 1us/div

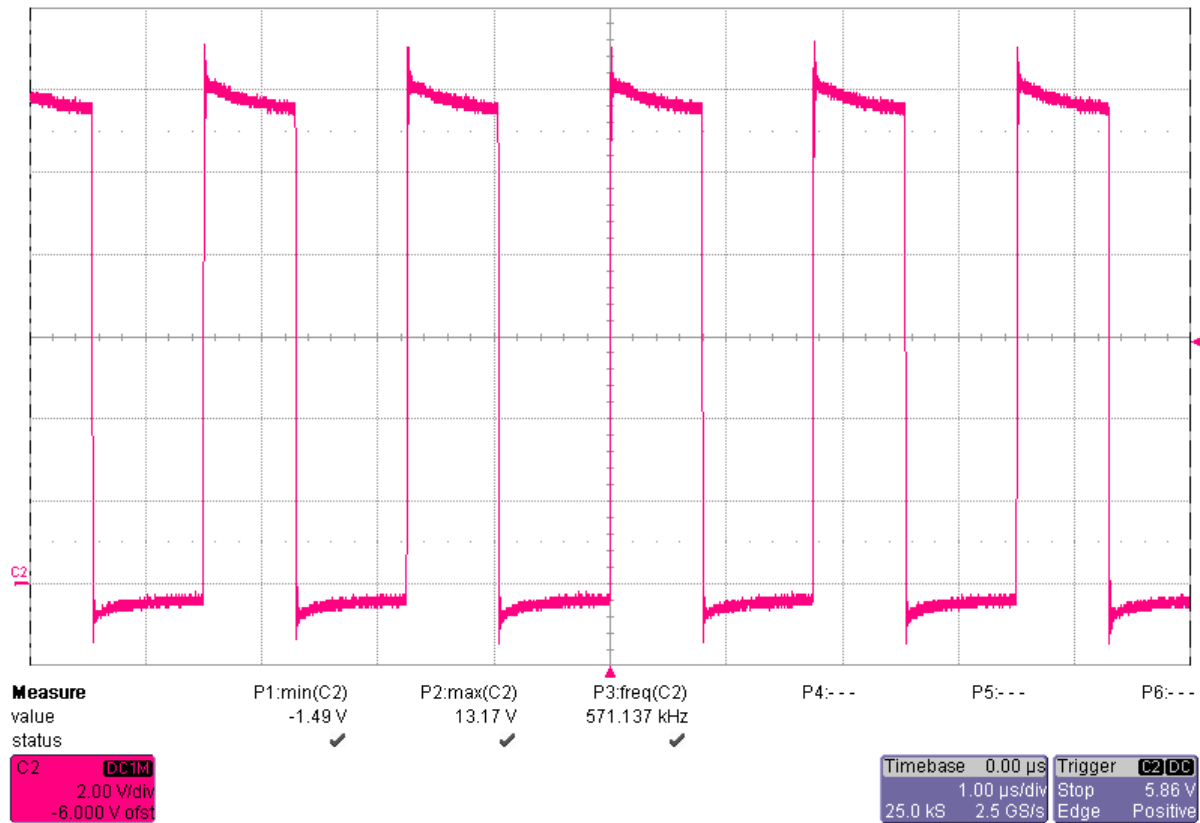


Figure 12

## 9. Thermal Image – TPS54540

The thermal image (Figure 13) shows the circuit at an ambient temperature of 21°C with an input voltage of 12.0V and 2.0A load on the output.

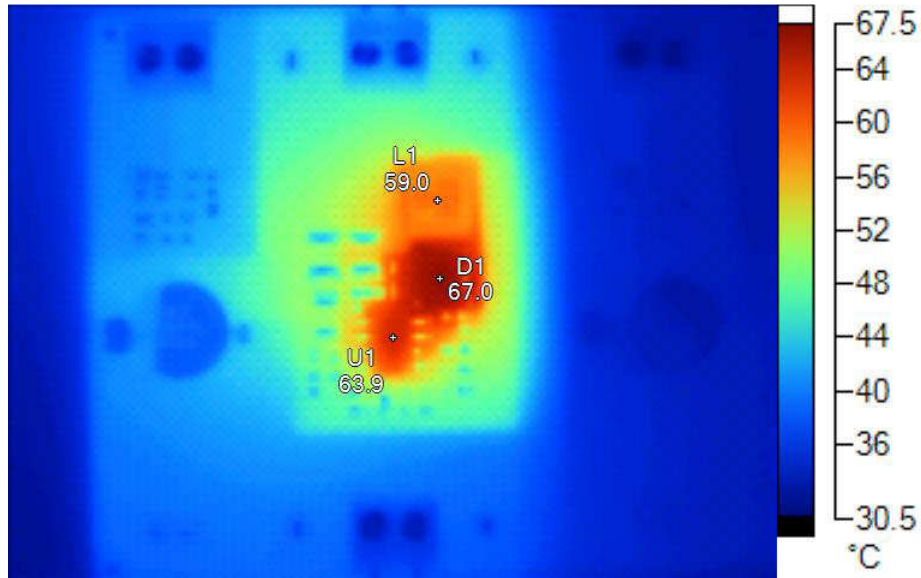


Figure 13

Name	Temperature	Emissivity	Background
U1	63.9°C	0.95	21.0°C
D1	67.0°C	0.95	21.0°C
L1	59.0°C	0.95	21.0°C

## 10. Startup – TPS54531

The startup waveform at 12.0V input voltage and no load on the outputs is shown in Figure 14.

Channel C1    **12.0V Input Voltage**  
2V/div, 5ms/div

Channel C2    **5.0V Output Voltage**  
1V/div, 5ms/div

Channel C3    **1.8V Output Voltage**  
1V/div, 5ms/div

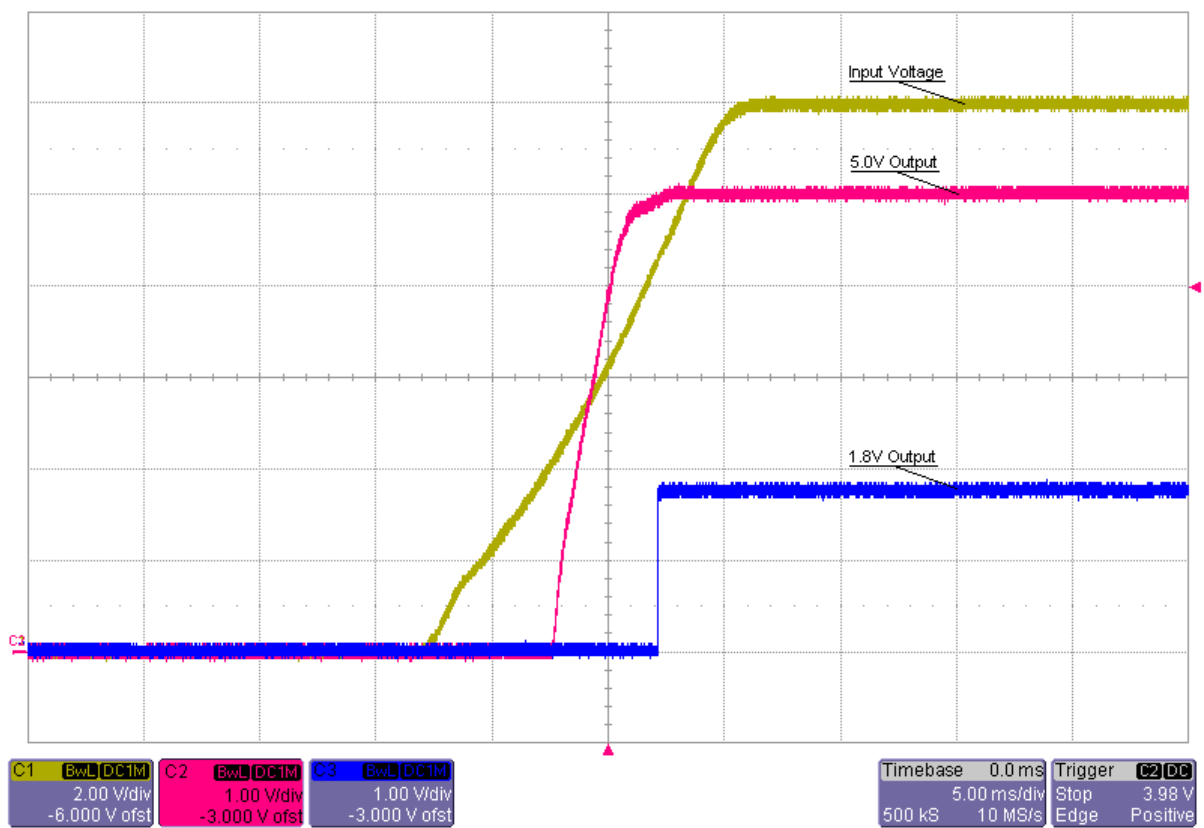


Figure 14

## 11. Shutdown – TPS54531

The shutdown waveform at 12.0V input voltage and 1.0V load on the 5.0V output and 0.075mA load on the 1.8V output are shown in Figure 15 Figure 2.

Channel C1    **12.0V Input Voltage**  
2V/div, 10ms/div

Channel C2    **5.0V Output Voltage**  
1V/div, 10ms/div

Channel C3    **1.8V Output Voltage**  
1V/div, 10ms/div

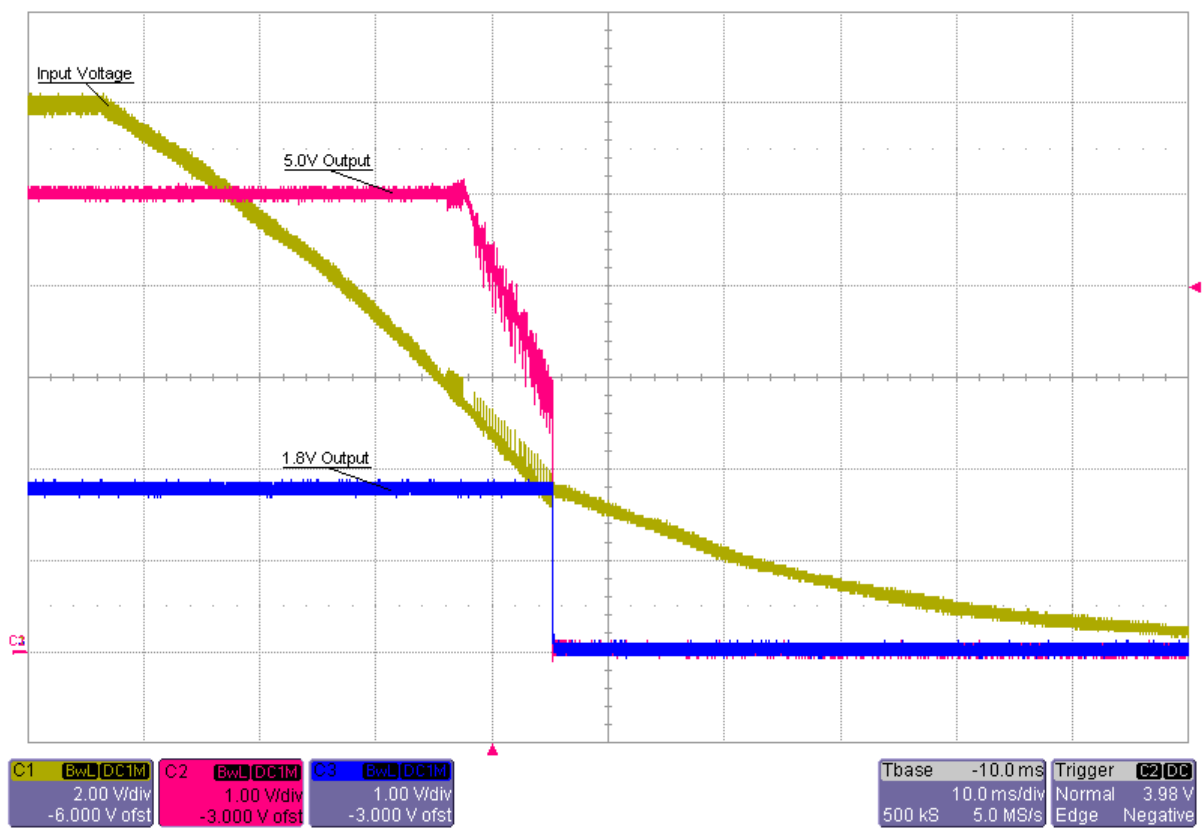


Figure 15

## 12. Efficiency – TPS54531

The efficiency and load regulation are shown in Figure 16 and Figure 17.

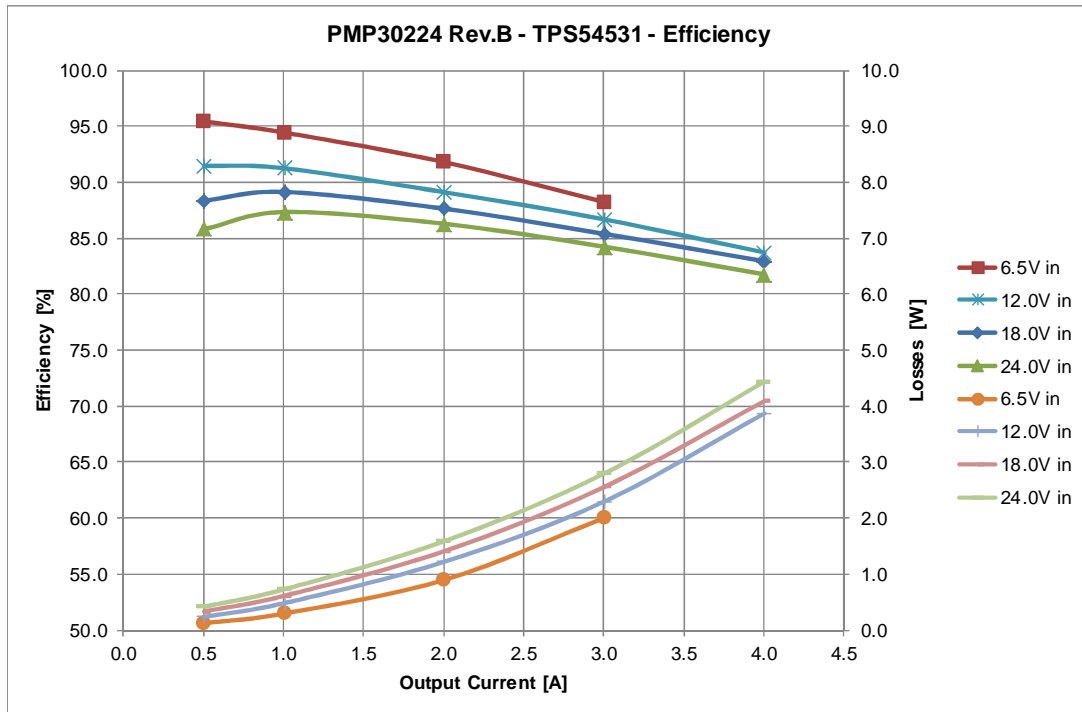


Figure 16

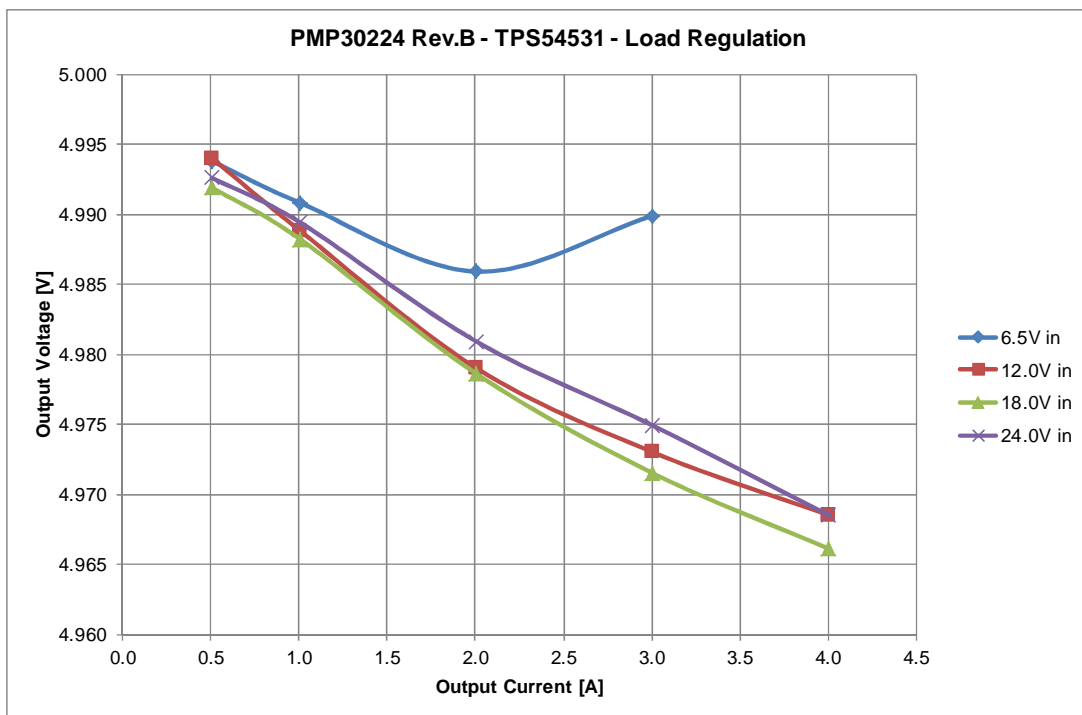


Figure 17

### 13. Transient Response – TPS54531

The response to a load step at 12.0V input voltage is shown in Figure 18Figure 5.

Channel C1 **Output Current**, Load Step 1.0A to 2.0A  
1A/div, 1ms/div

Channel C2 **Output Voltage**, -87mV undershoot (1.7%), 77mV overshoot (1.5%)  
50mV/div, 1ms/div, AC coupled

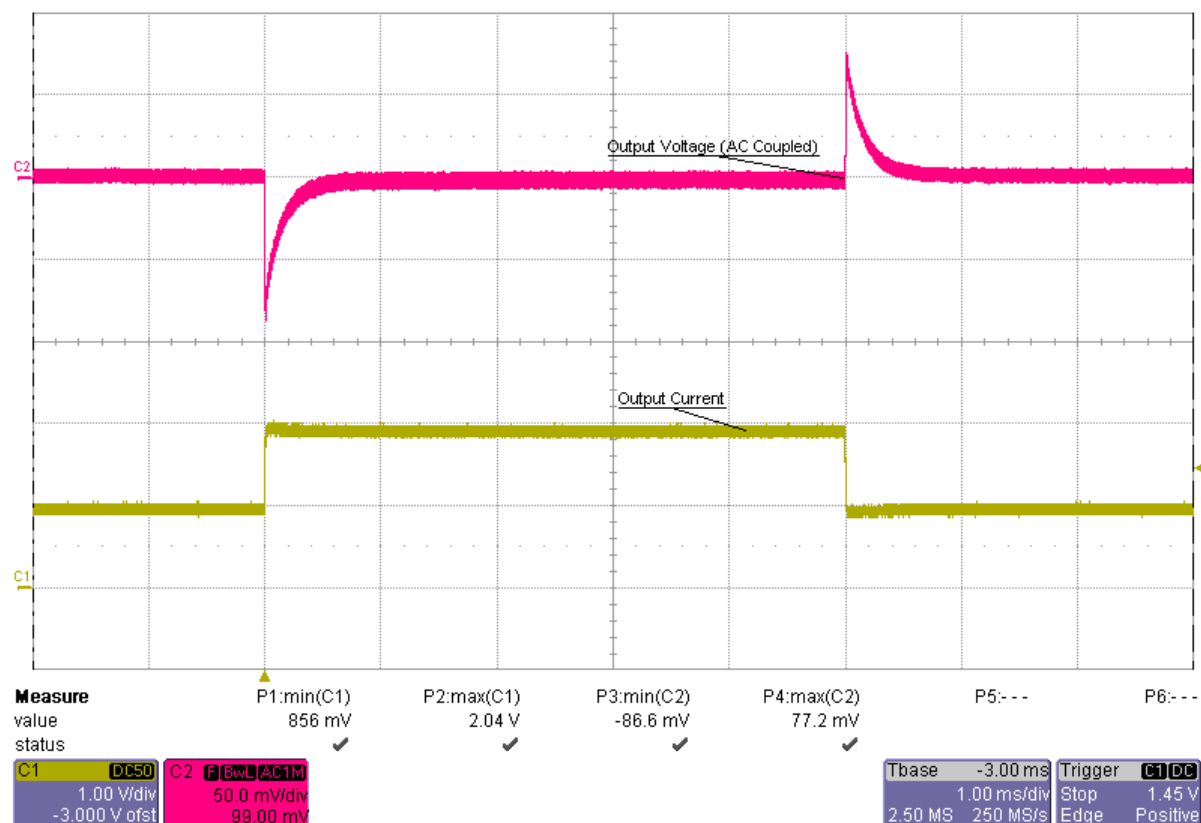


Figure 18

## 14. Frequency Response – TPS54531

6.5V Input, 1.0A Load  
6.5V Input, 2.5A Load

21.9 kHz Bandwidth, 58 deg Phase Margin, -40 dB Gain Margin  
22.7 kHz Bandwidth, 60 deg Phase Margin, -46 dB Gain Margin

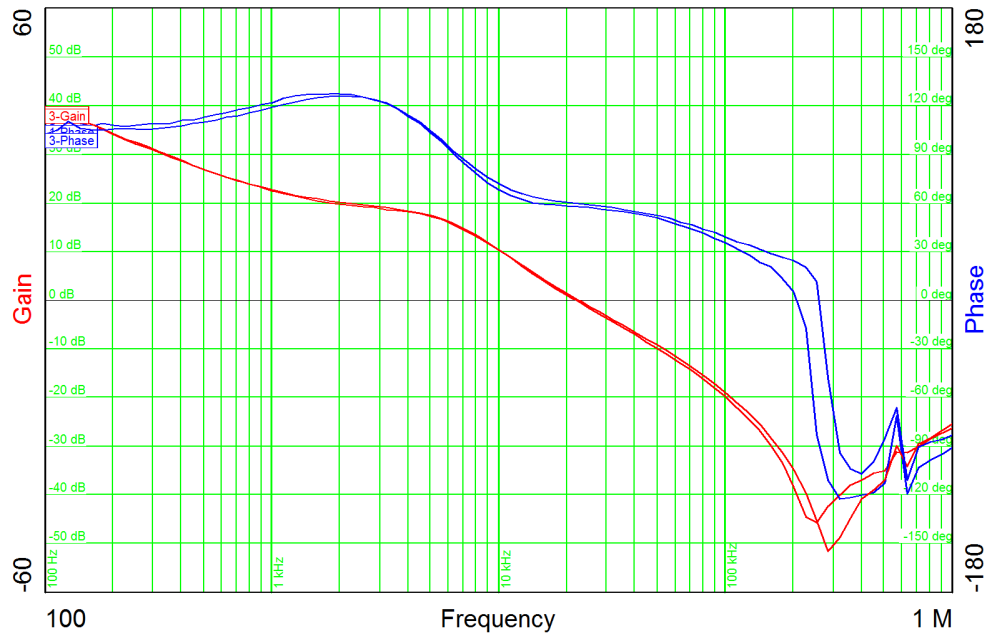


Figure 19

12.0V Input, 1.0A Load  
12.0V Input, 2.5A Load

42.0 kHz Bandwidth, 61 deg Phase Margin, -28 dB Gain Margin  
42.5 kHz Bandwidth, 61 deg Phase Margin, -28 dB Gain Margin

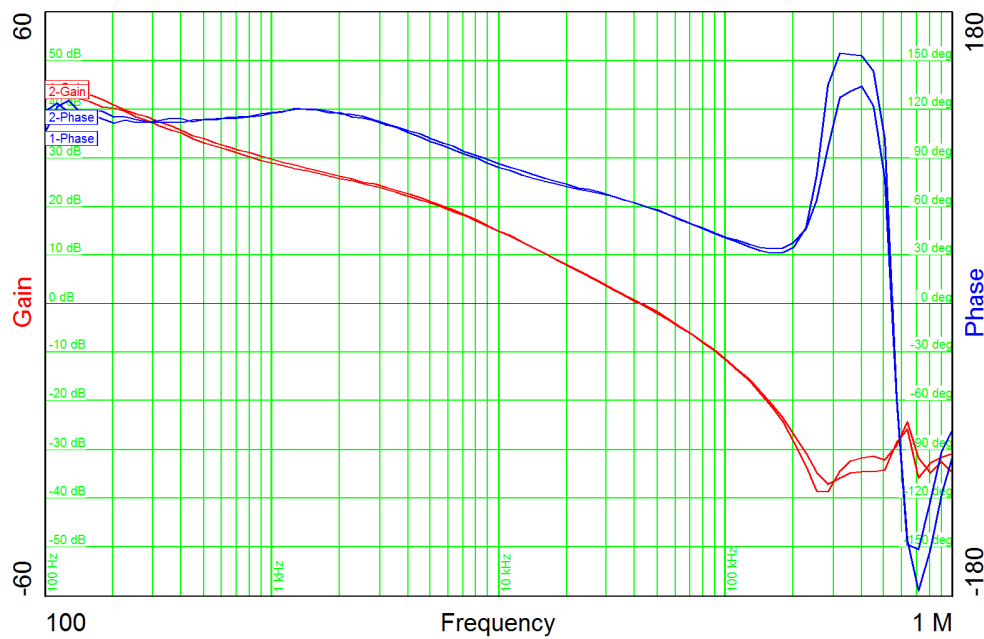


Figure 20



PMP30224 Rev.B – Test Report

18.0V Input, 1.0A Load  
 18.0V Input, 2.5A Load

64.2 kHz Bandwidth, 60 deg Phase Margin, -27 dB Gain Margin  
 63.2 kHz Bandwidth, 60 deg Phase Margin, -27 dB Gain Margin

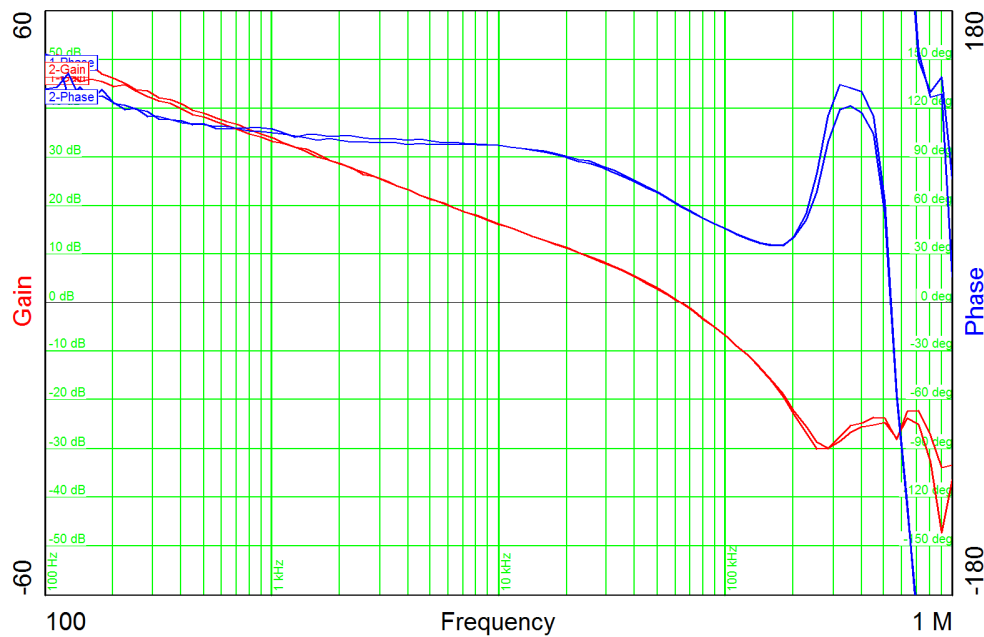


Figure 21

24.0V Input, 1.0A Load  
 24.0V Input, 2.5A Load

65.4 kHz Bandwidth, 60 deg Phase Margin, -26 dB Gain Margin  
 63.0 kHz Bandwidth, 60 deg Phase Margin, -26 dB Gain Margin

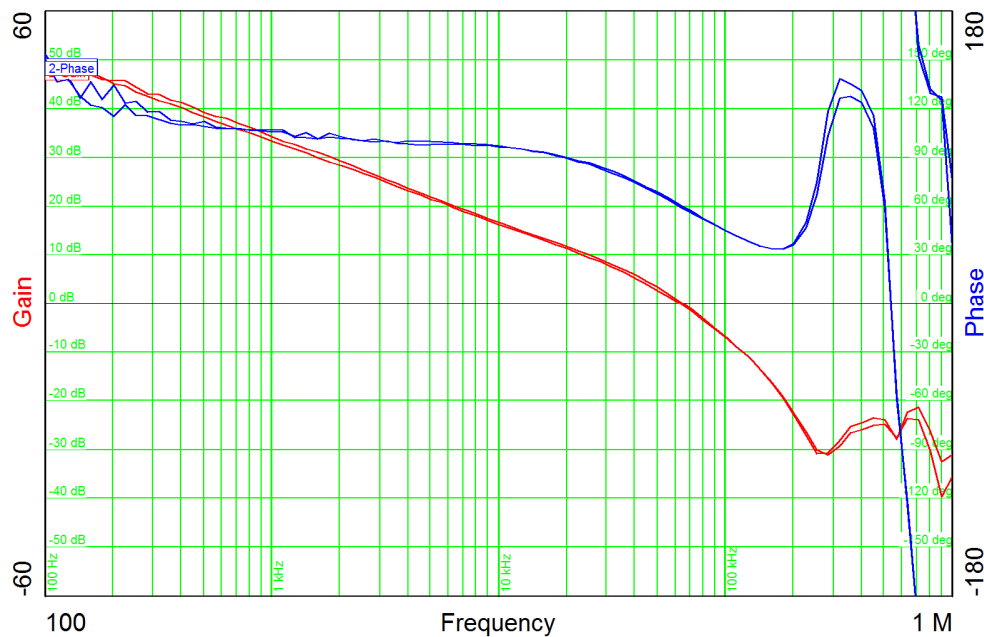


Figure 22

## PMP30224 Rev.B – Test Report

### 15. Output Ripple – TPS54531

The output ripple voltage is shown in Figure 23 (Figure 11).

Channel M1 **Output Voltage @ 6.5V Input / 2.0A Load, 40mV peak-peak (0.8%)**  
500mV/div, 2us/div

Channel M2 **Output Voltage @ 12.0V Input / 2.0A Load, 46mV peak-peak (0.9%)**  
500mV/div, 2us/div

Channel M3 **Output Voltage @ 18.0V Input / 2.0A Load, 47mV peak-peak (0.9%)**  
500mV/div, 2us/div

Channel M4 **Output Voltage @ 24.0V Input / 2.0A Load, 48mV peak-peak (1.0%)**  
500mV/div, 2us/div

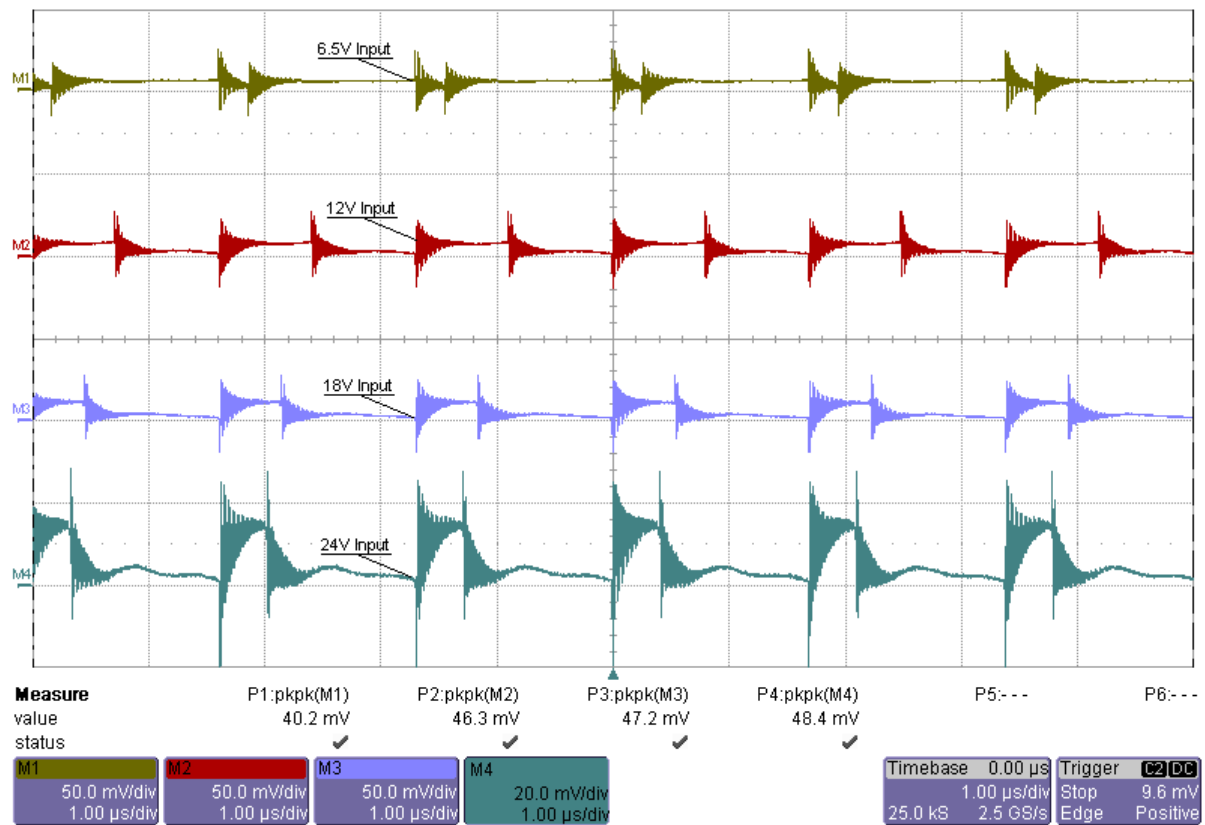


Figure 23

## 16. Switching Node – TPS54531

The switching node at 12.0V input voltage and 2.0A load on the output is shown in Figure 24. Figure 12.

Channel C1 **Drain-Source Voltage**, -1.3V minimum, 12.8V maximum  
2V/div, 1us/div

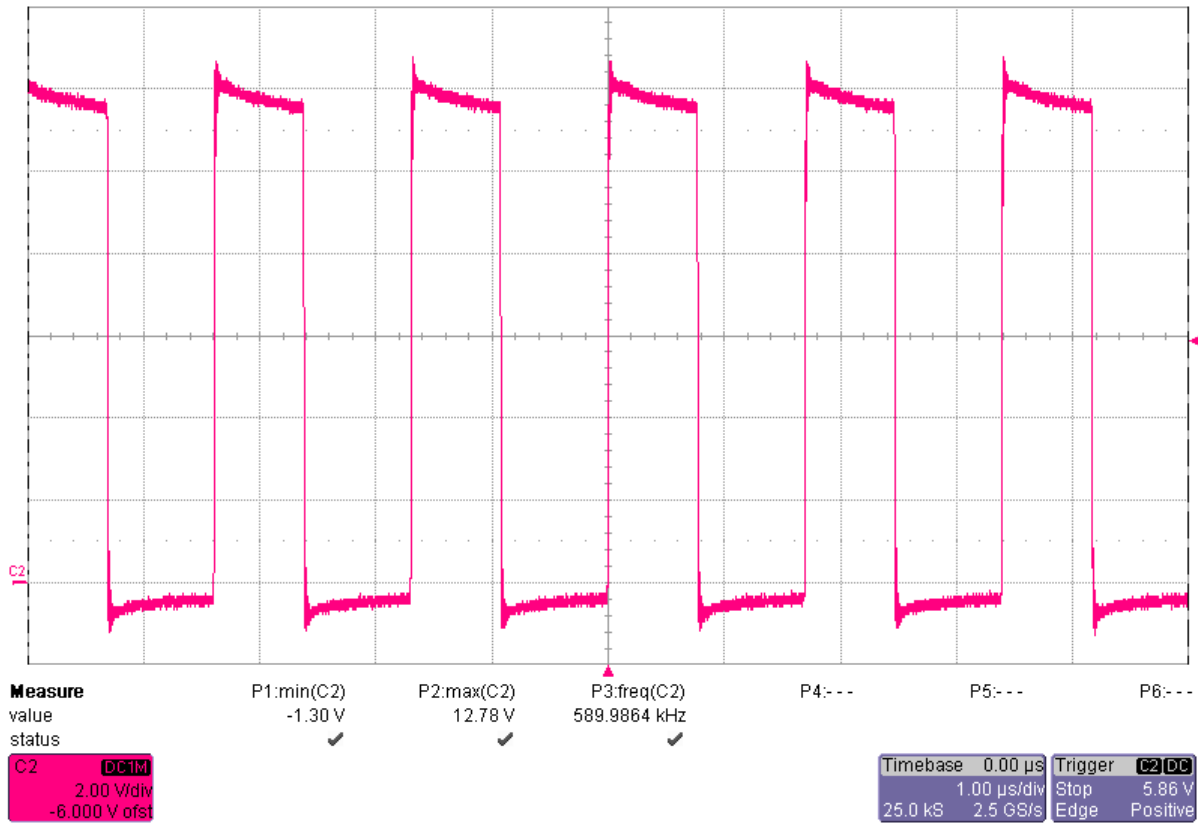


Figure 24

## 18. Thermal Image – TPS54531

The thermal image (Figure 25Figure 13) shows the circuit at an ambient temperature of 21°C with an input voltage of 12.0V and 2.0A load on the output.

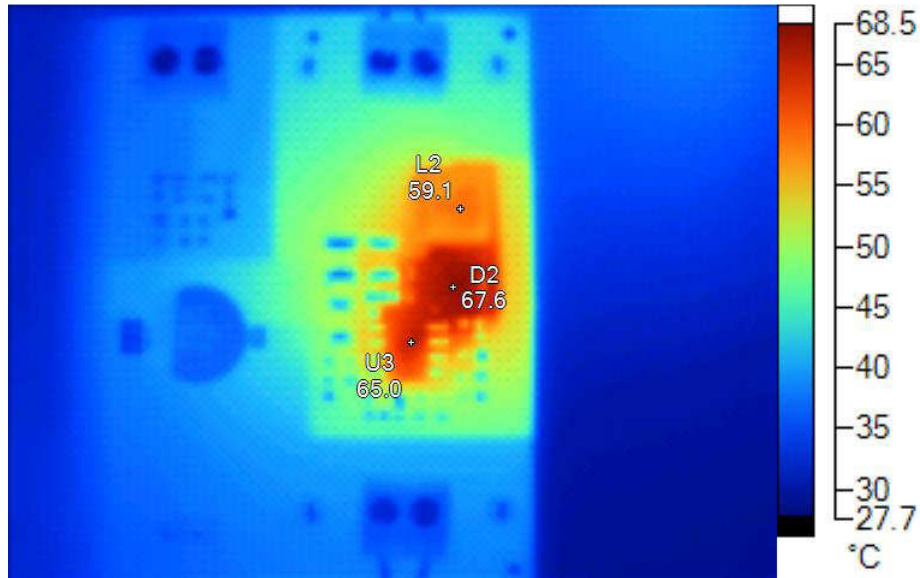


Figure 25

Name	Temperature	Emissivity	Background
U3	65.0°C	0.95	21.0°C
D2	67.6°C	0.95	21.0°C
L2	59.1°C	0.95	21.0°C

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