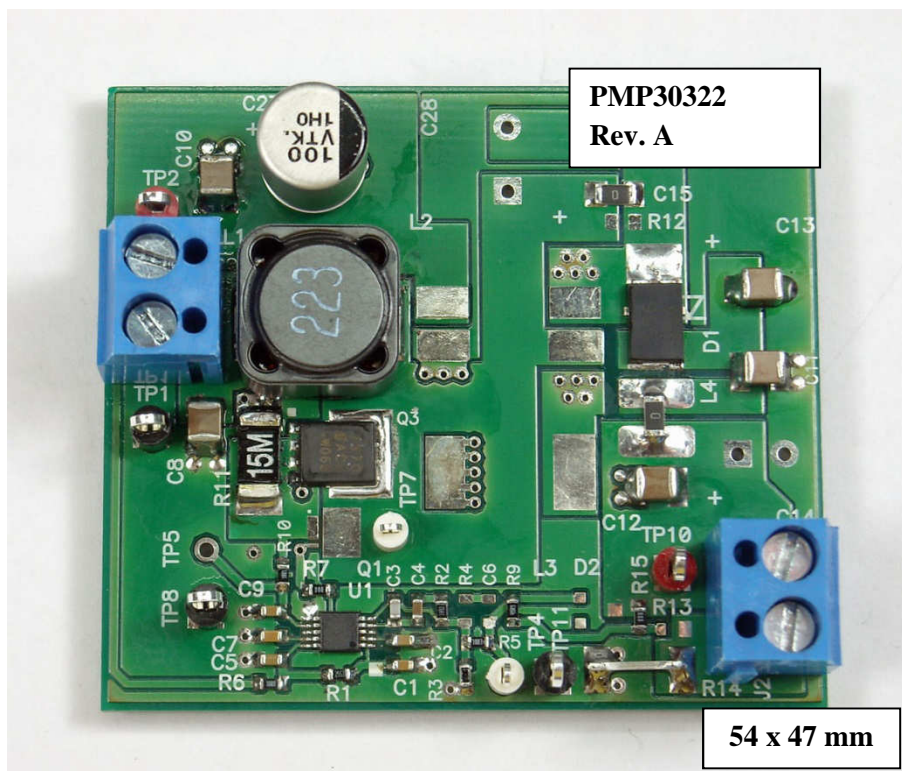


PMP30322 Rev.A – Test Report

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

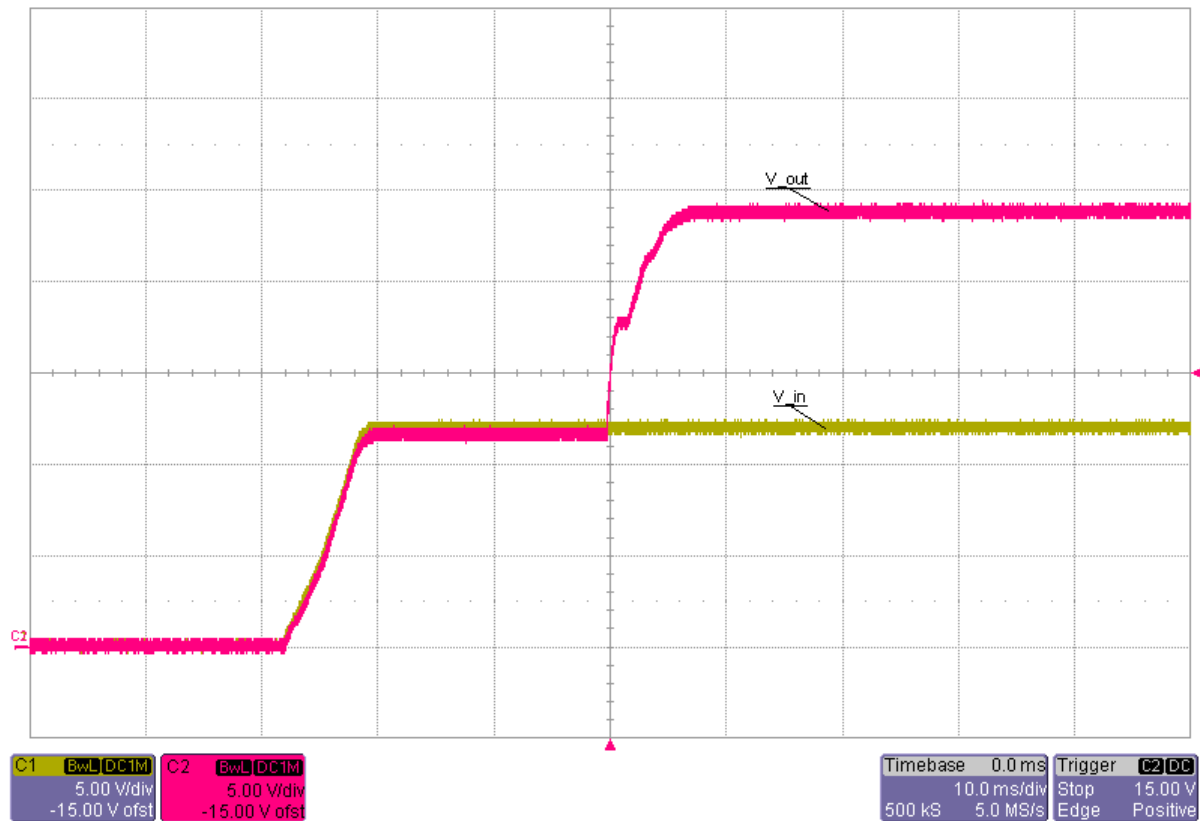


Figure 1

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

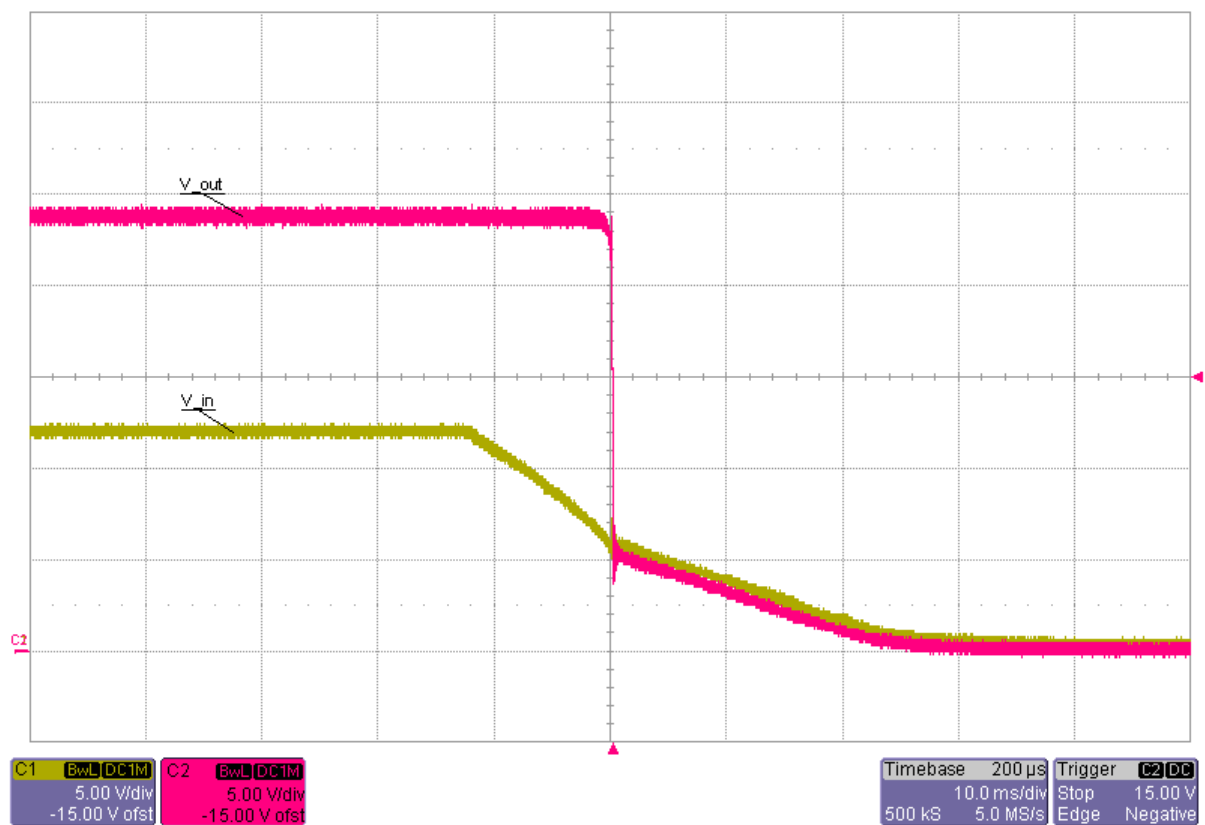


Figure 2

PMP30322 Rev.A – Test Report

3. Efficiency

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

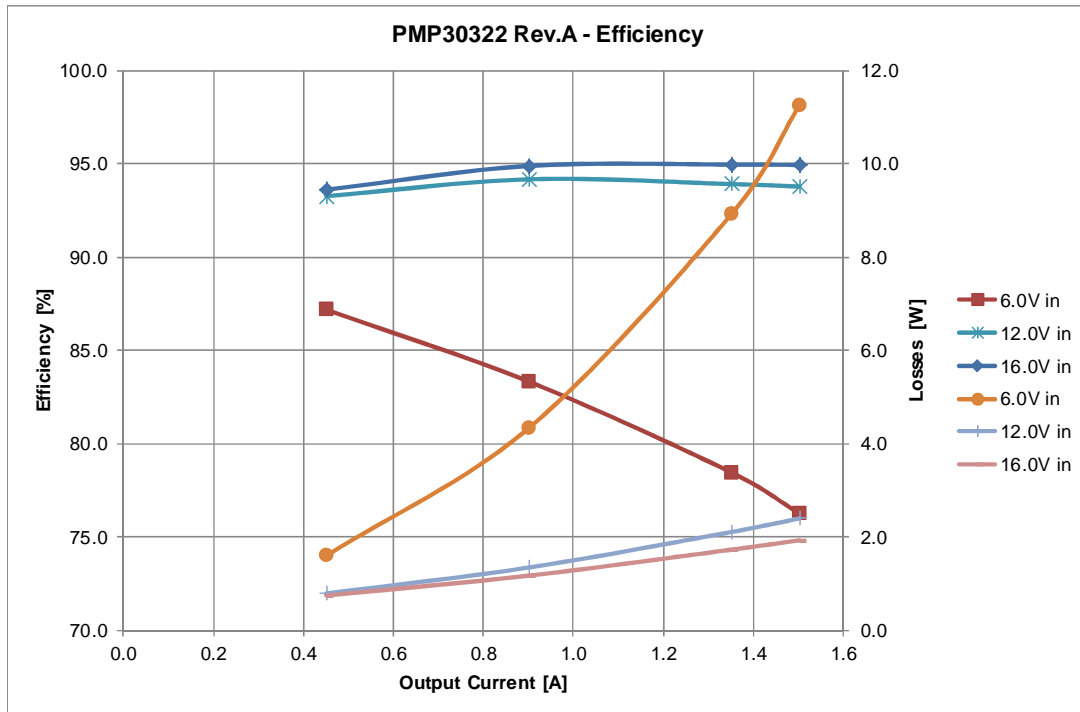


Figure 3

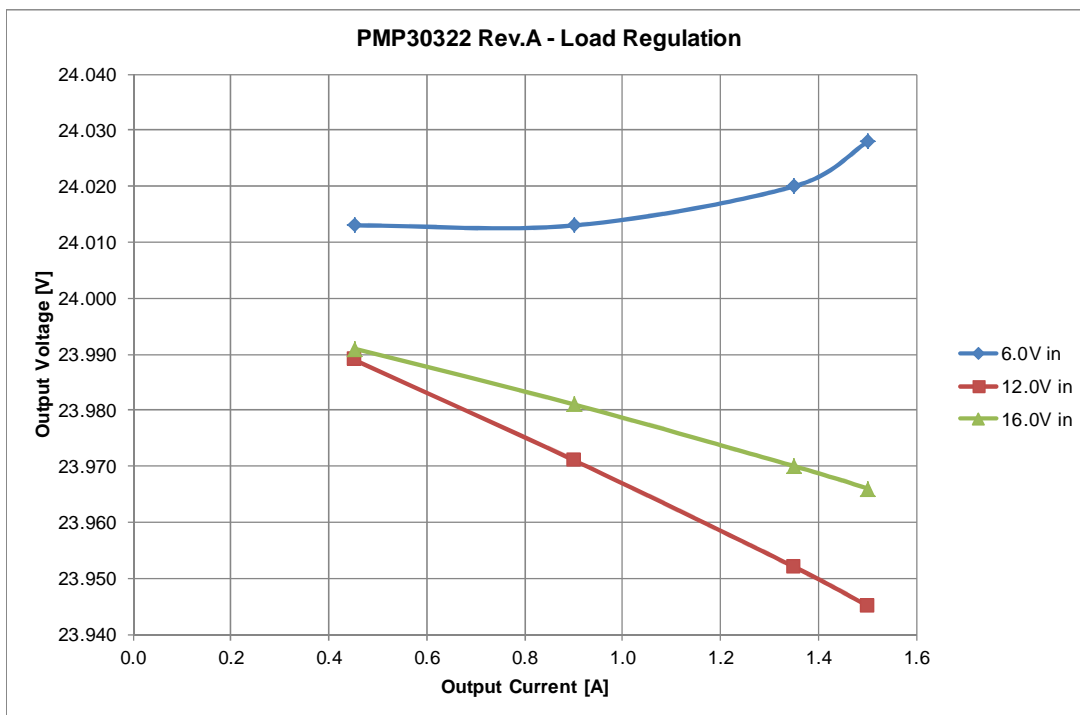


Figure 4

PMP30322 Rev.A – Test Report

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

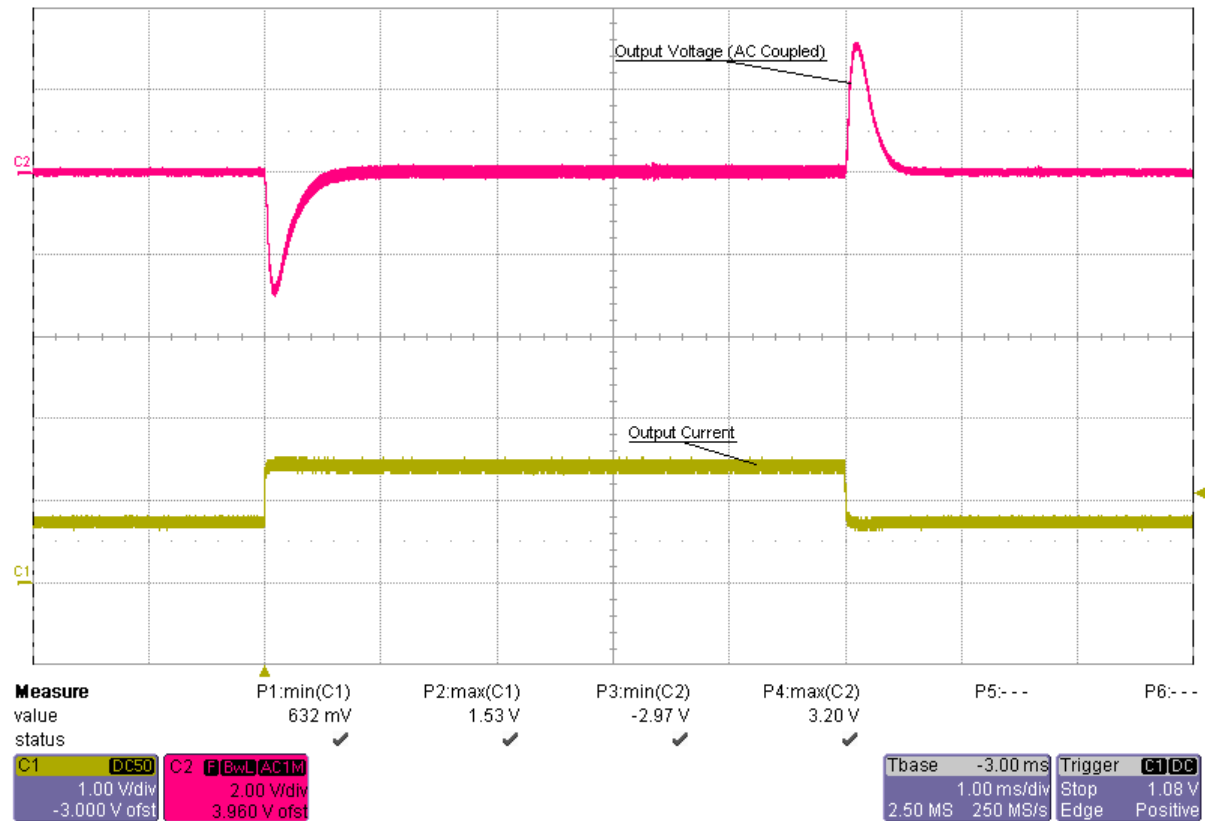


Figure 5

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

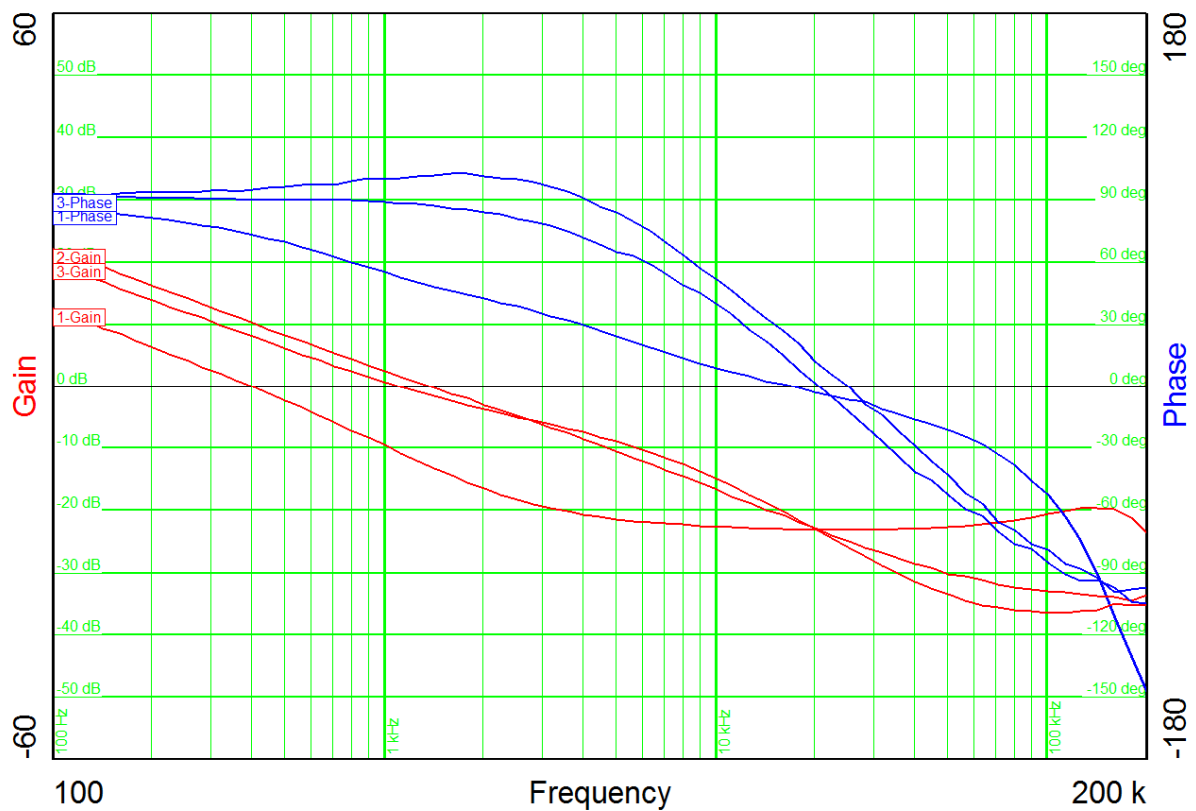


Figure 6

PMP30322 Rev.A – Test Report

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

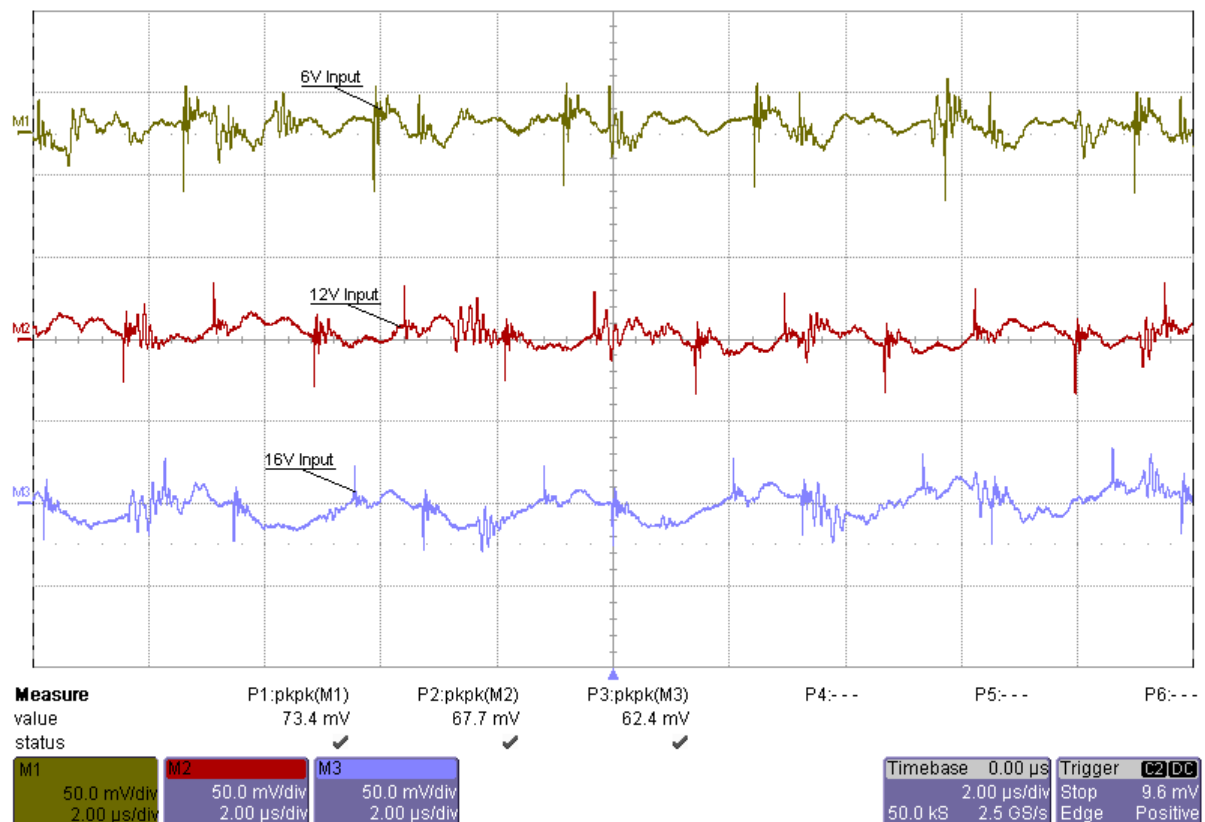


Figure 7

PMP30322 Rev.A – Test Report

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

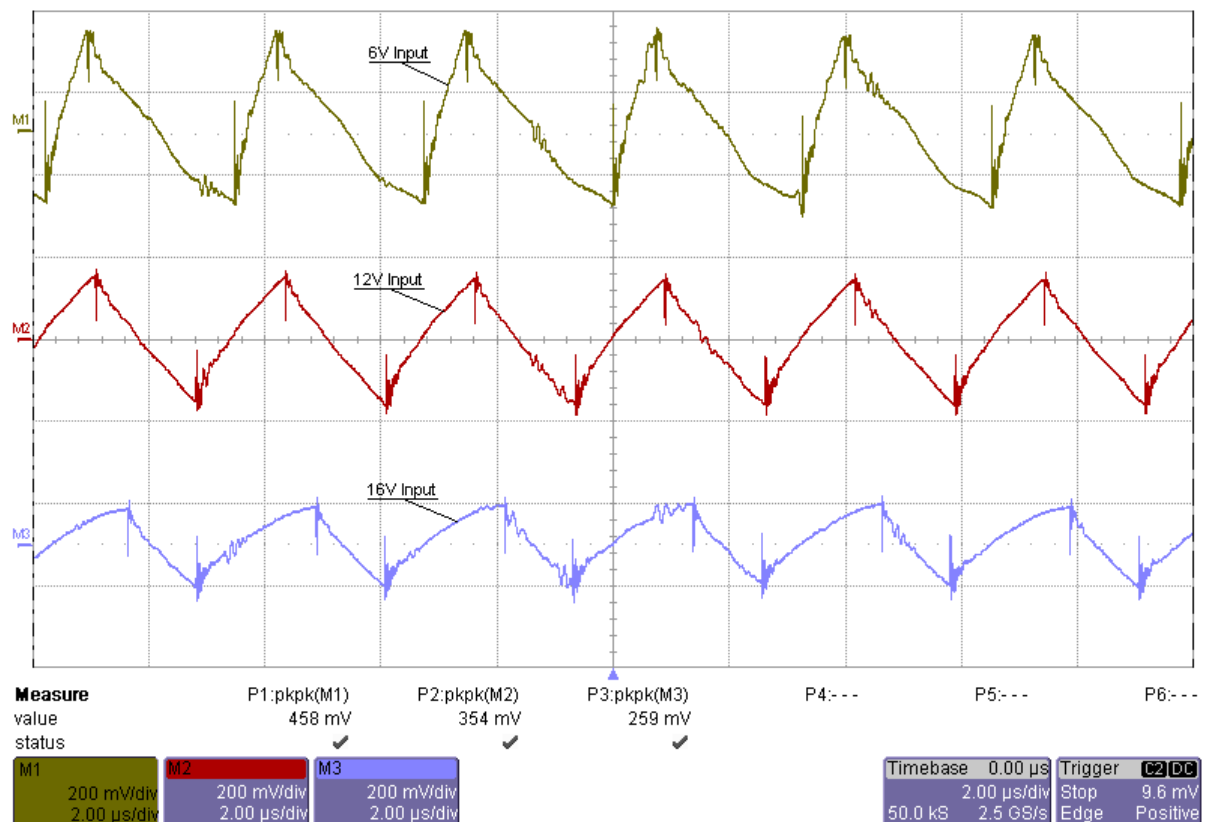


Figure 8

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

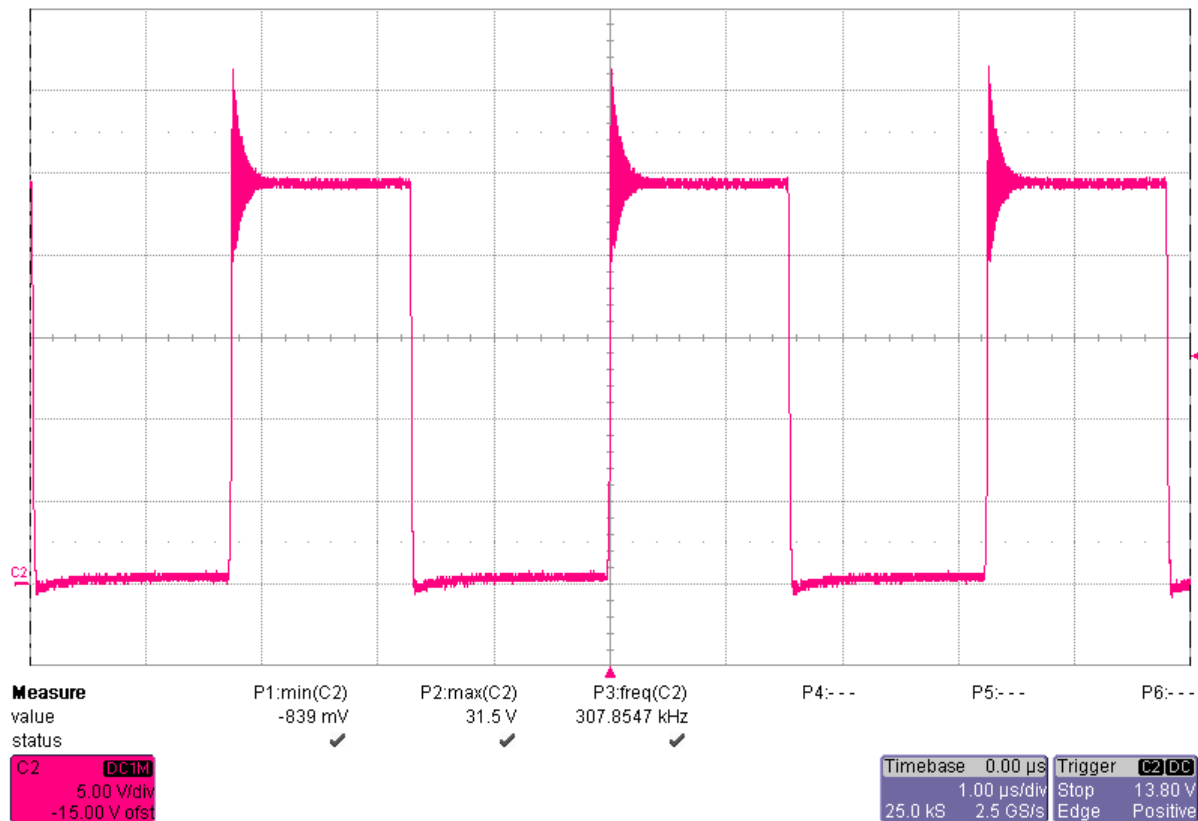


Figure 9

PMP30322 Rev.A – Test Report

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

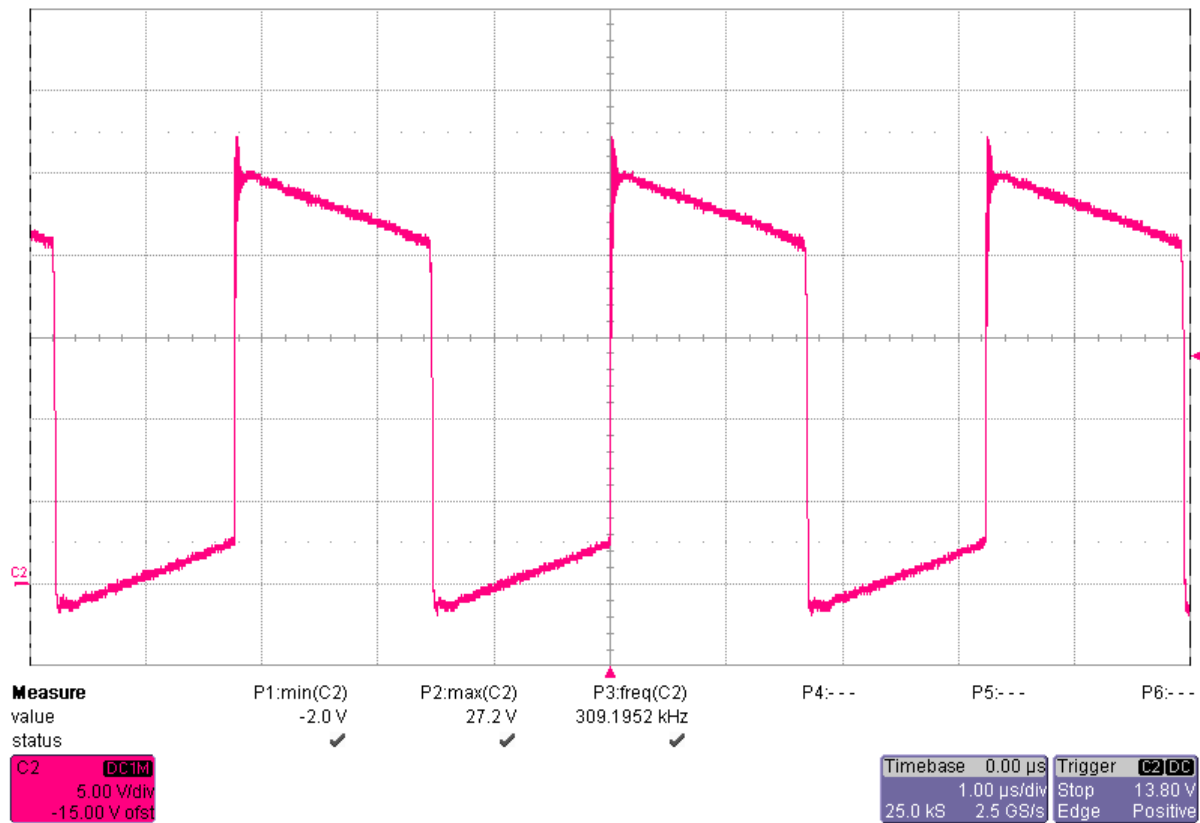


Figure 10

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.

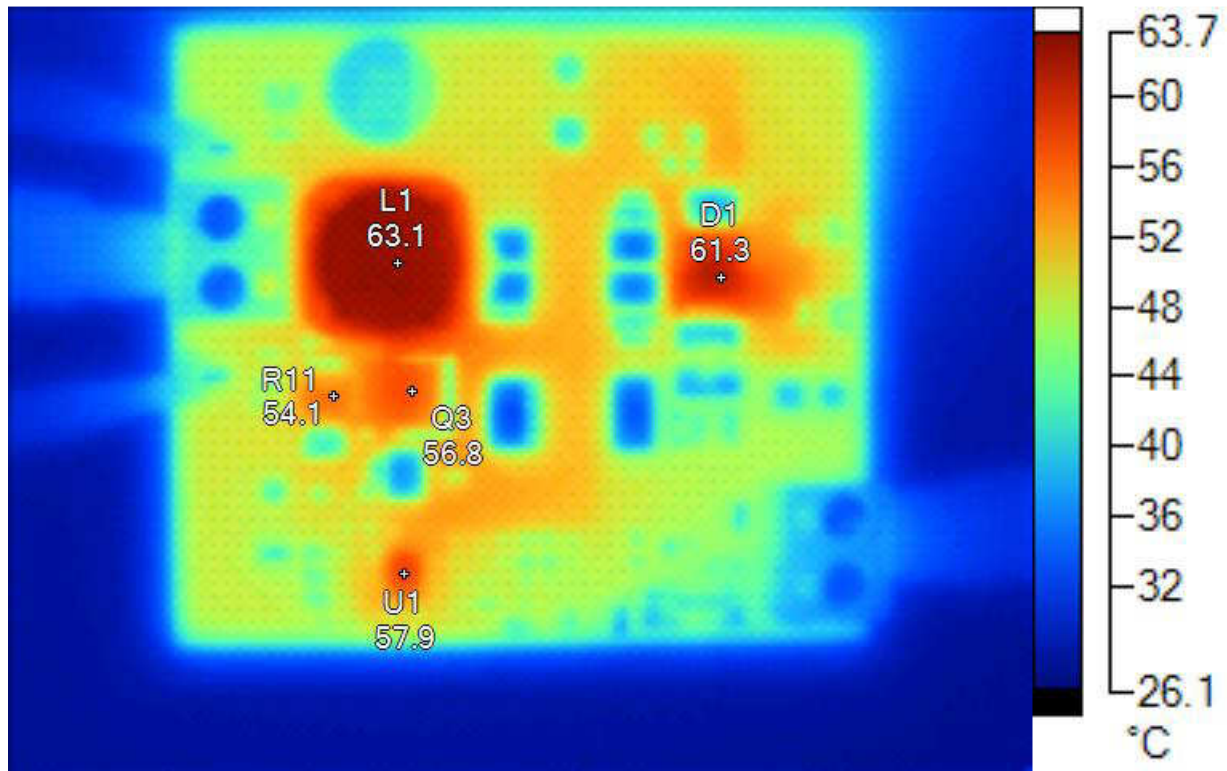


Figure 11

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

IMPORTANT NOTICE FOR TI DESIGN INFORMATION AND RESOURCES

Texas Instruments Incorporated ("TI") technical, application or other design advice, services or information, including, but not limited to, reference designs and materials relating to evaluation modules, (collectively, "TI Resources") are intended to assist designers who are developing applications that incorporate TI products; by downloading, accessing or using any particular TI Resource in any way, you (individually or, if you are acting on behalf of a company, your company) agree to use it solely for this purpose and subject to the terms of this Notice.

TI's provision of TI Resources does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such TI Resources. TI reserves the right to make corrections, enhancements, improvements and other changes to its TI Resources.

You understand and agree that you remain responsible for using your independent analysis, evaluation and judgment in designing your applications and that you have full and exclusive responsibility to assure the safety of your applications and compliance of your applications (and of all TI products used in or for your applications) with all applicable regulations, laws and other applicable requirements. You represent that, with respect to your applications, you have all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. You agree that prior to using or distributing any applications that include TI products, you will thoroughly test such applications and the functionality of such TI products as used in such applications. TI has not conducted any testing other than that specifically described in the published documentation for a particular TI Resource.

You are authorized to use, copy and modify any individual TI Resource only in connection with the development of applications that include the TI product(s) identified in such TI Resource. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information regarding or referencing third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of TI Resources may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI RESOURCES ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING TI RESOURCES OR USE THEREOF, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY YOU AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS EVEN IF DESCRIBED IN TI RESOURCES OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF TI RESOURCES OR USE THEREOF, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

You agree to fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of your non-compliance with the terms and provisions of this Notice.

This Notice applies to TI Resources. Additional terms apply to the use and purchase of certain types of materials, TI products and services. These include; without limitation, TI's standard terms for semiconductor products (<http://www.ti.com/sc/docs/stdterms.htm>), [evaluation modules](#), and [samples](http://www.ti.com/sc/docs/sampterm.htm) (<http://www.ti.com/sc/docs/sampterm.htm>).

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2017, Texas Instruments Incorporated