

1 Startup

The startup waveform is shown in Figure 1. The input voltage is set at 12V, with no load on the output.

Channel C1: **input voltage**
2V/div, 2ms/div

Channel C2: **output voltage**
1V/div, 2ms/div

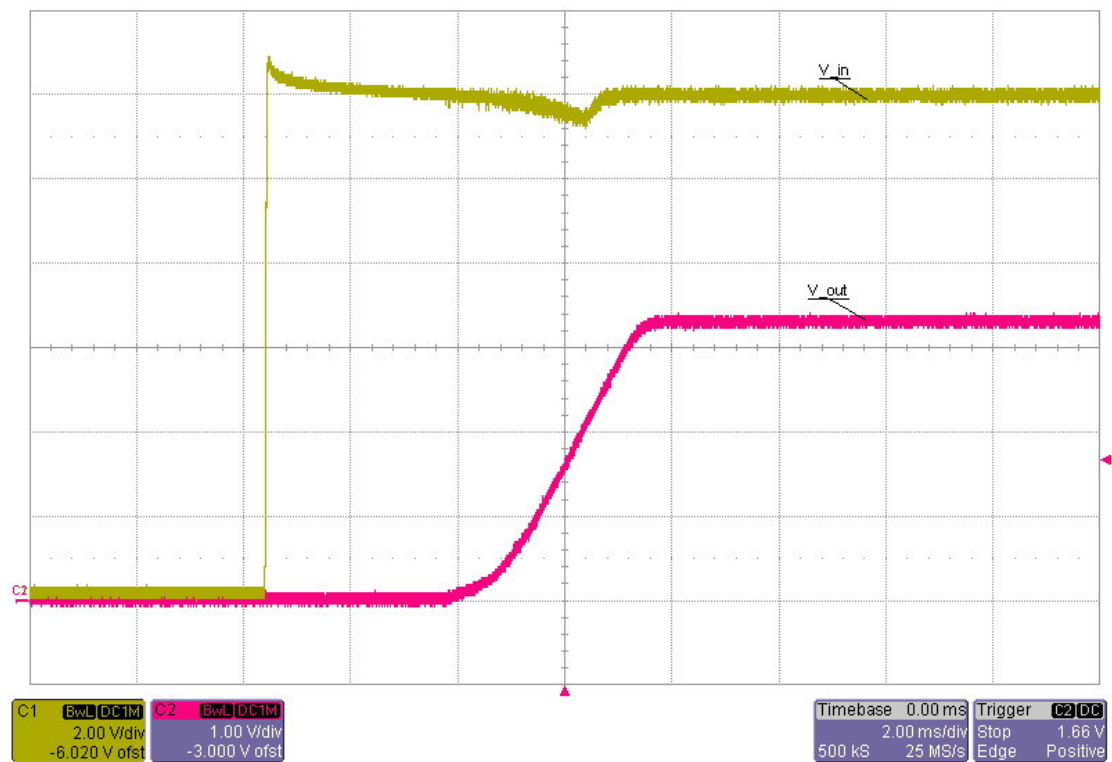


Figure 1

2 Shutdown

The shutdown waveform is shown in Figure 2. The input voltage is set at 12V with a 16.0A load on the output.

Channel C1: **input voltage**
2V/div, 100us/div

Channel C2: **output voltage**
1V/div, 100us/div

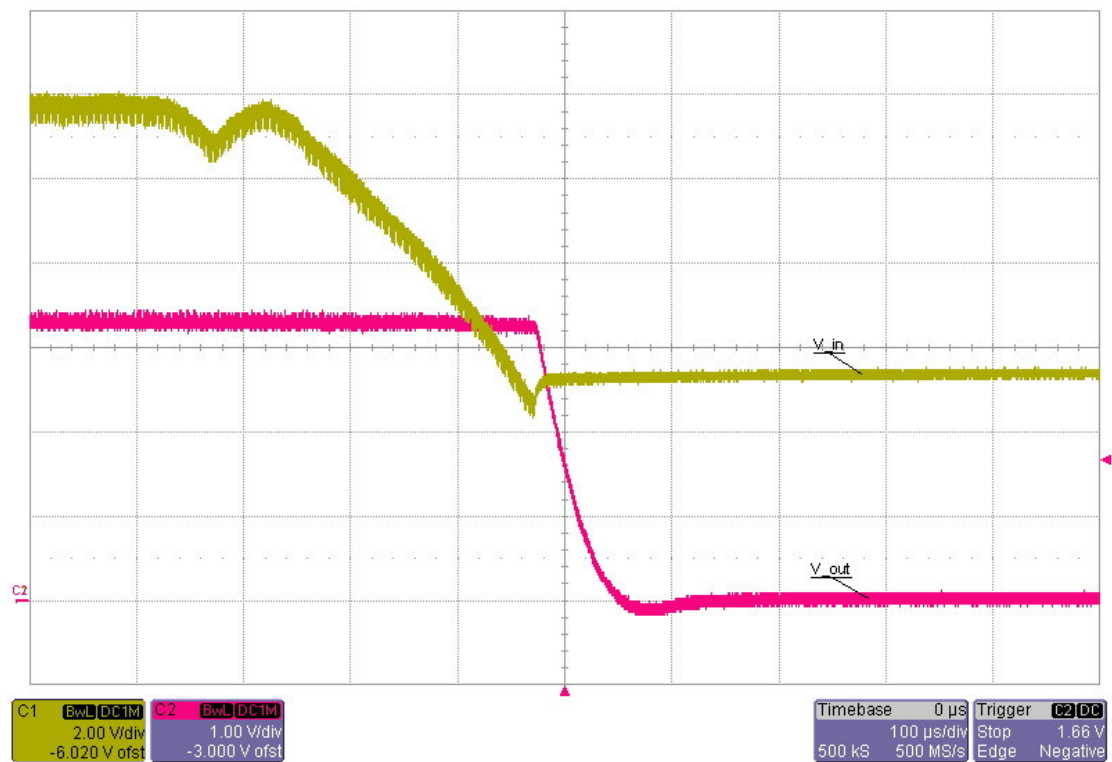


Figure 2

3 Efficiency

The efficiency is shown in Figure 3.

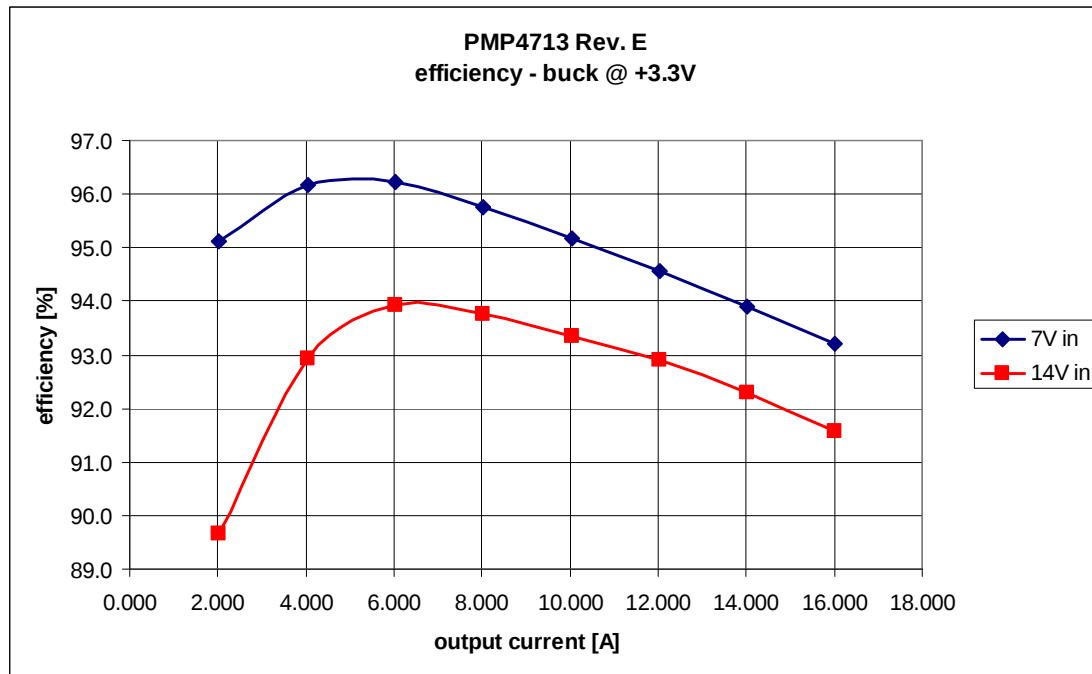


Figure 3

4 Load regulation

The load regulation of the 3.3V output is shown in Figure 4.

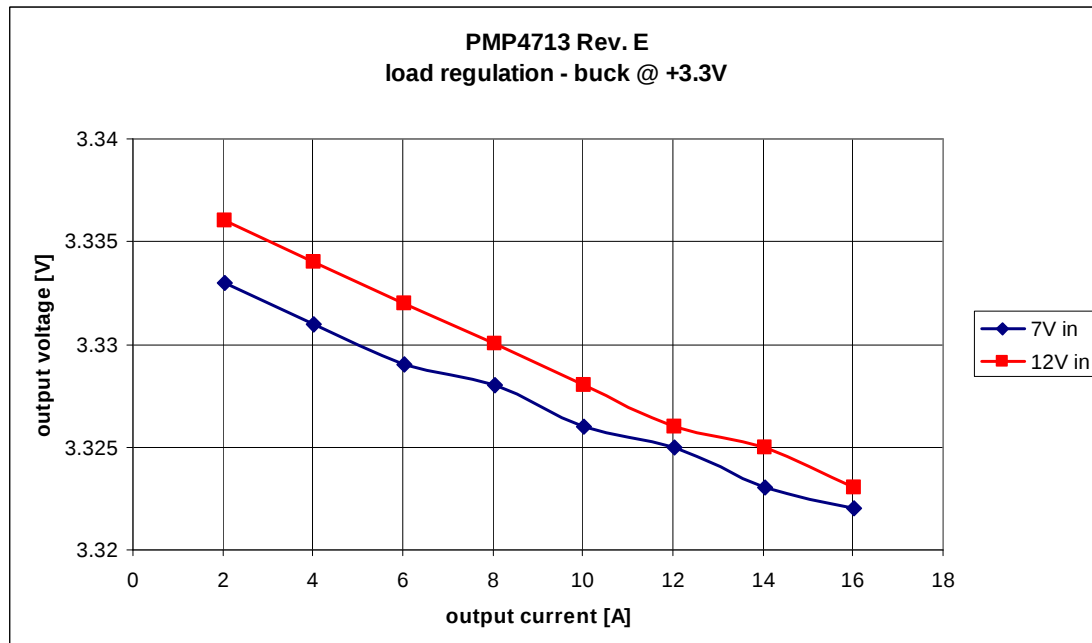


Figure 4

5 Output ripple voltage

The output ripple voltage at 16.0A load and 7.0V, 12.0V and 14.0V input voltage is shown in Figure 5.

Channel M1: **output voltage**, 20mV peak-peak
50mV/div, 5us/div, AC coupled

Channel M1: **output voltage**, 17mV peak-peak
50mV/div, 5us/div, AC coupled

Channel M3: **output voltage**, 15mV peak-peak
50mV/div, 5us/div, AC coupled

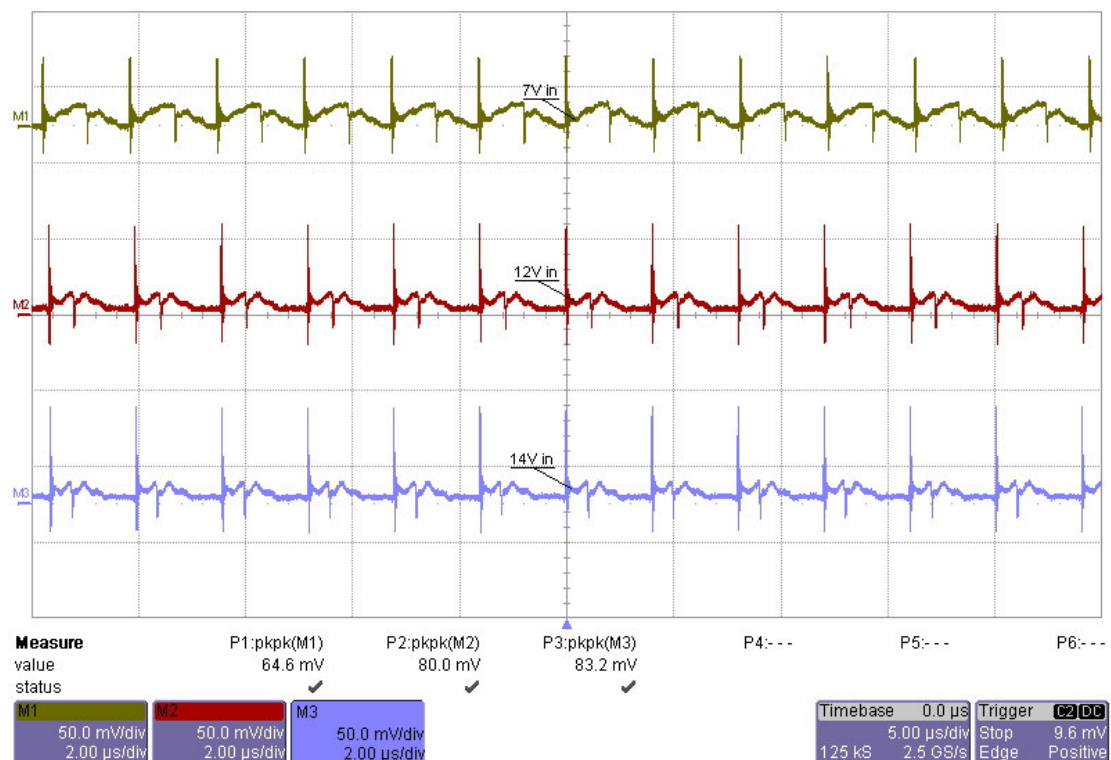


Figure 5

6 Load transients

The response to a load step and a load dump at an input voltage of 12.0V is shown in Figure 6 and Figure 7.

Channel C2: **output voltage**, -50mV undershoot, 0mV overshoot
50mV/div, 50us/div, AC coupled

Channel C1: **load current**, load step 8.0A to 16.0A
10A/div, 50us/div

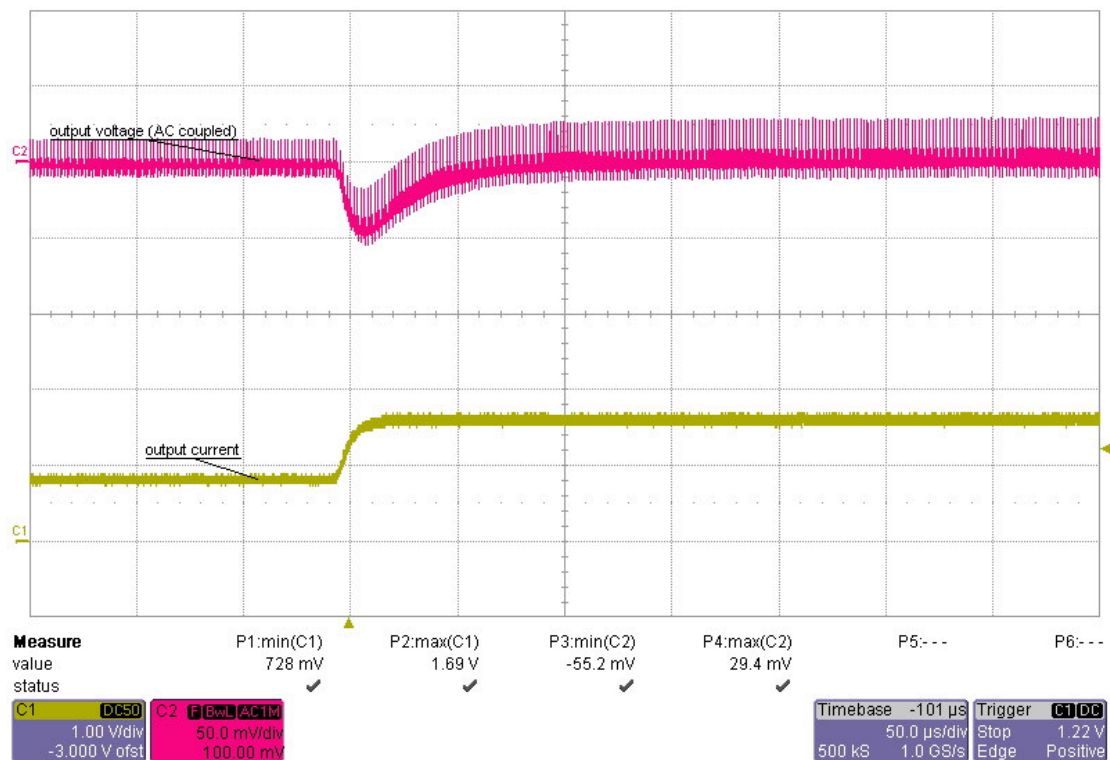


Figure 6

Channel C2: **output voltage**, 40mV overshoot, 0mV undershoot
50mV/div, 50us/div, AC coupled

Channel C1: **load current**, load dump 16.0A to 8.0A
10A/div, 50us/div

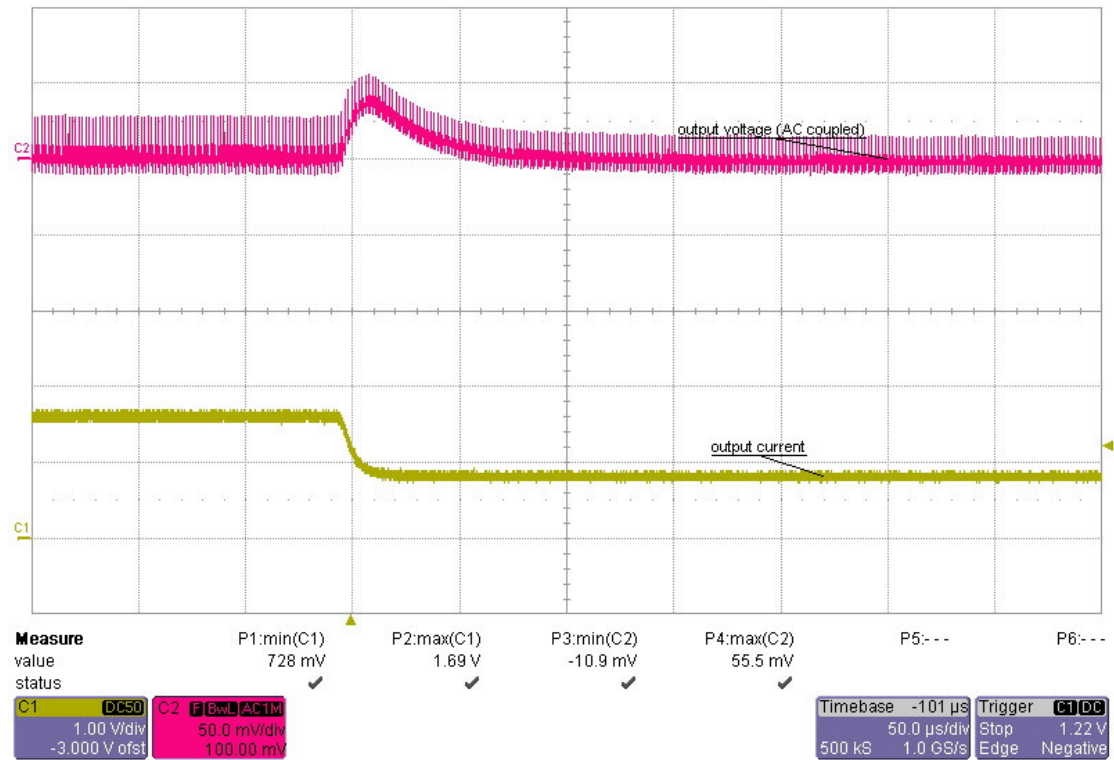


Figure 7

7 Frequency response

Figure 8 shows the loop response of the 3.3V output with 12.0V input and a 16.0A load.

62 deg phase margin @ crossover frequency 100.3 kHz

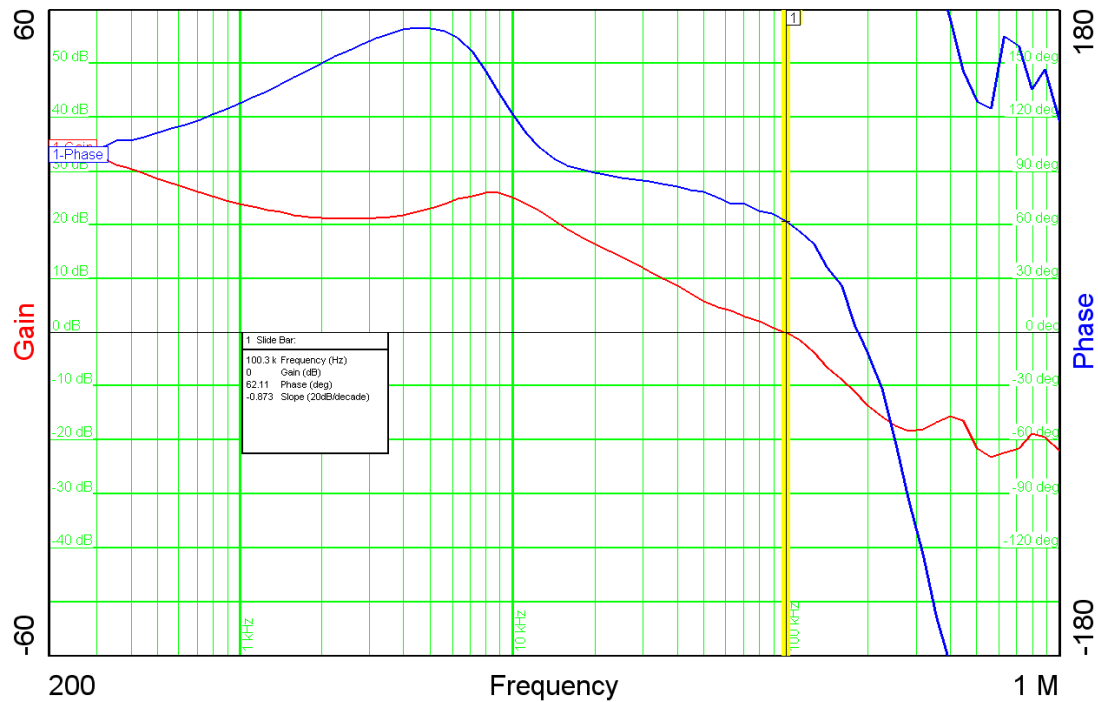


Figure 8

8 Miscellaneous waveforms

The drain-source voltage on the switching node is shown in Figure 9. The image was captured with a 14V input and a 16.0A load.

Channel C2: **drain-source voltage**, -2.0V minimum voltage, 23.5V maximum voltage
5V/div, 1us/div

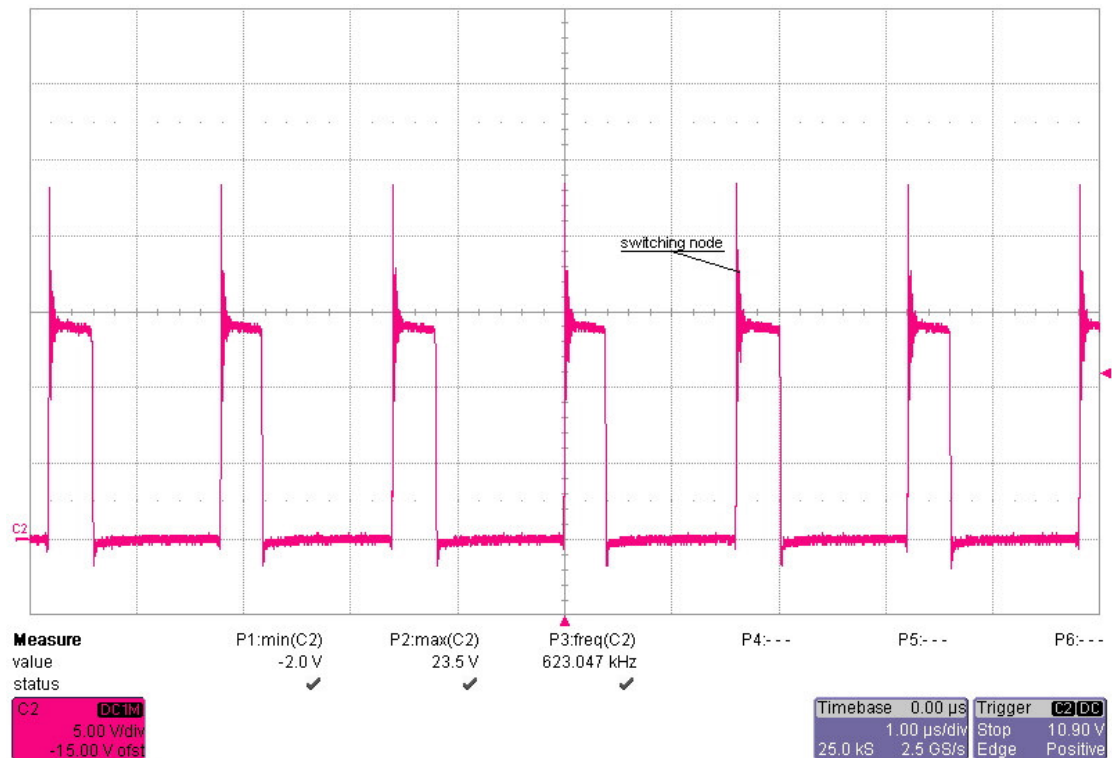


Figure 9

9 Thermal measurement

The thermal image (Figure 10) shows the PCB at an ambient temperature of 21 °C with an input voltage of 12V and a load of 16.0A.

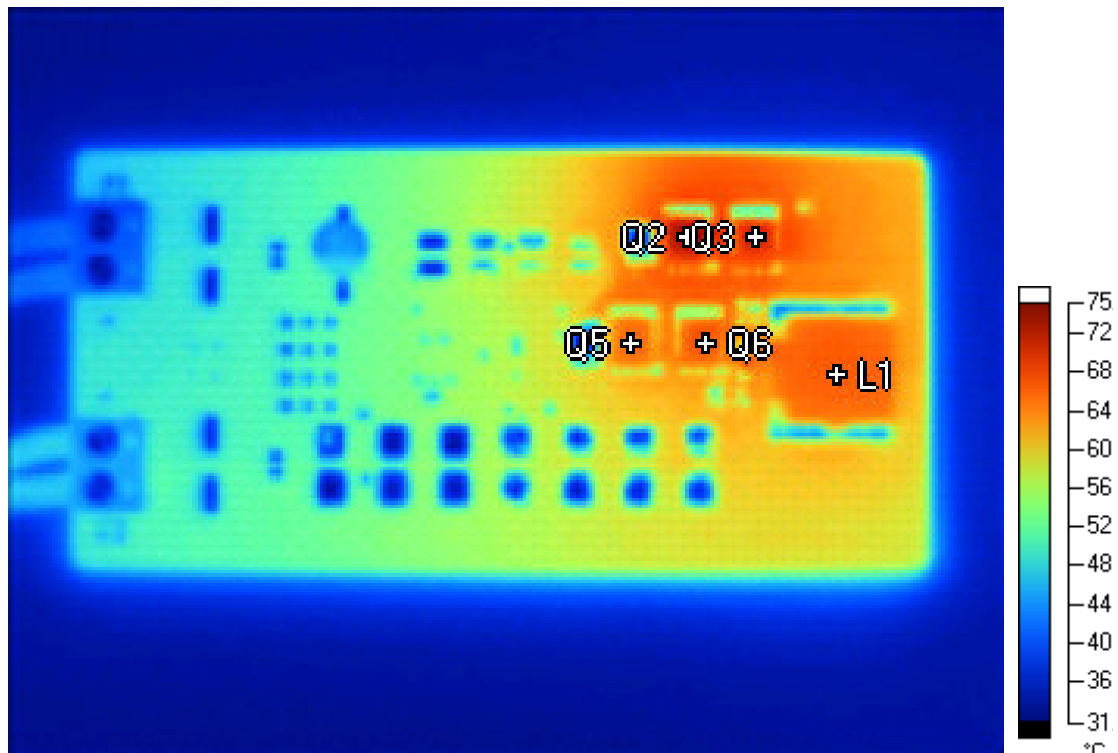


Figure 10

device	max. temperature	measured temp. @ 25 °C
Q2 – CSD16410Q5A	150 °C	74.6 °C
Q3 – CSD16410Q5A	150 °C	71.3 °C
Q5 - CSD16322Q5	150 °C	66.0 °C
Q6 – CSD16322Q5	150 °C	67.5 °C
L1 – Wuerth 7443551200	125 °C	66.7 °C

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information 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.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DLP® Products	www.dlp.com	Communications and Telecom	www.ti.com/communications
DSP	dsp.ti.com	Computers and Peripherals	www.ti.com/computers
Clocks and Timers	www.ti.com/clocks	Consumer Electronics	www.ti.com/consumer-apps
Interface	interface.ti.com	Energy	www.ti.com/energy
Logic	logic.ti.com	Industrial	www.ti.com/industrial
Power Mgmt	power.ti.com	Medical	www.ti.com/medical
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Space, Avionics & Defense	www.ti.com/space-avionics-defense
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video and Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless-apps