PMP20516 (built and tested on PMP6857)
Test Report
10/25/16

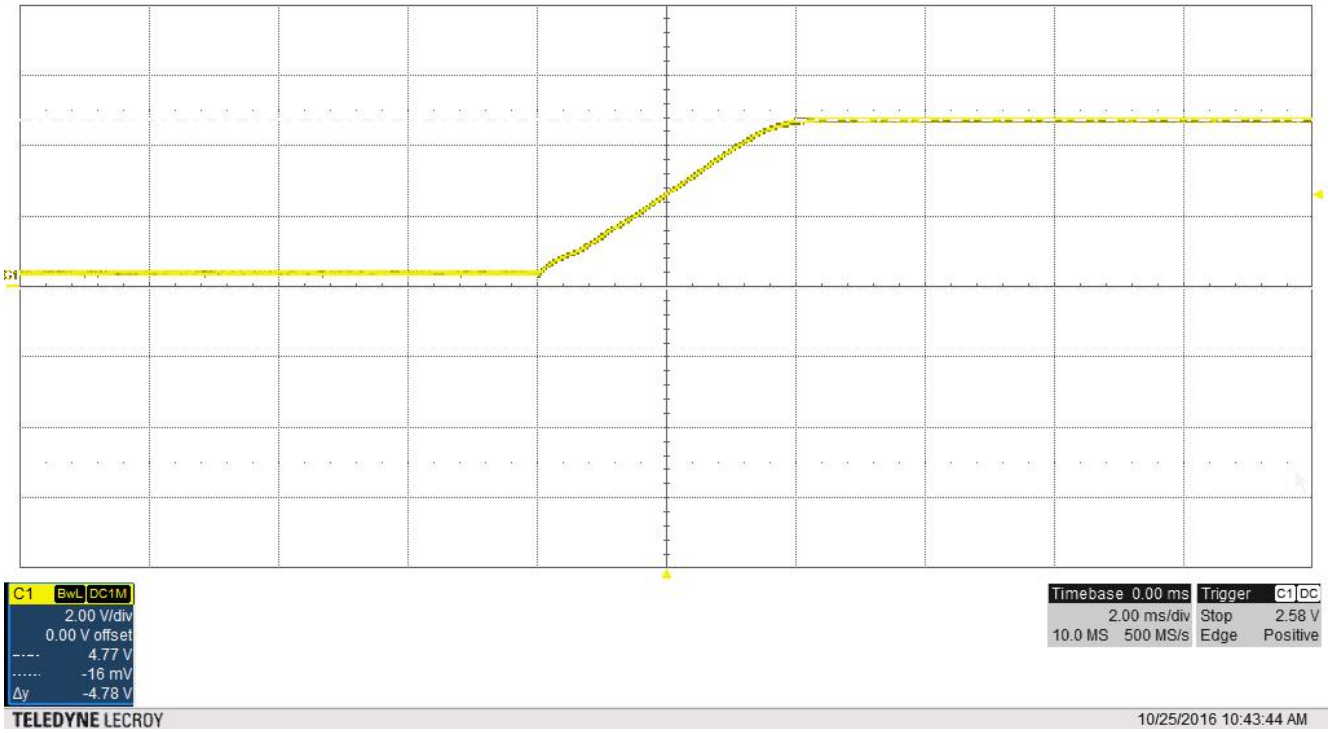
The tests performed were as follows:

A. TPS40322(single output; dual phase)
    1. startup
    2. shutdown
    3. Switch Node
    4. Output Voltage Ripple (No Load and Full Load)
    5. Transient Response
    6. Efficiency
    7. Bode Plot
    8. Thermal images
    9. Board Photos

1 Startup

The picture below shows the startup voltage with no load.

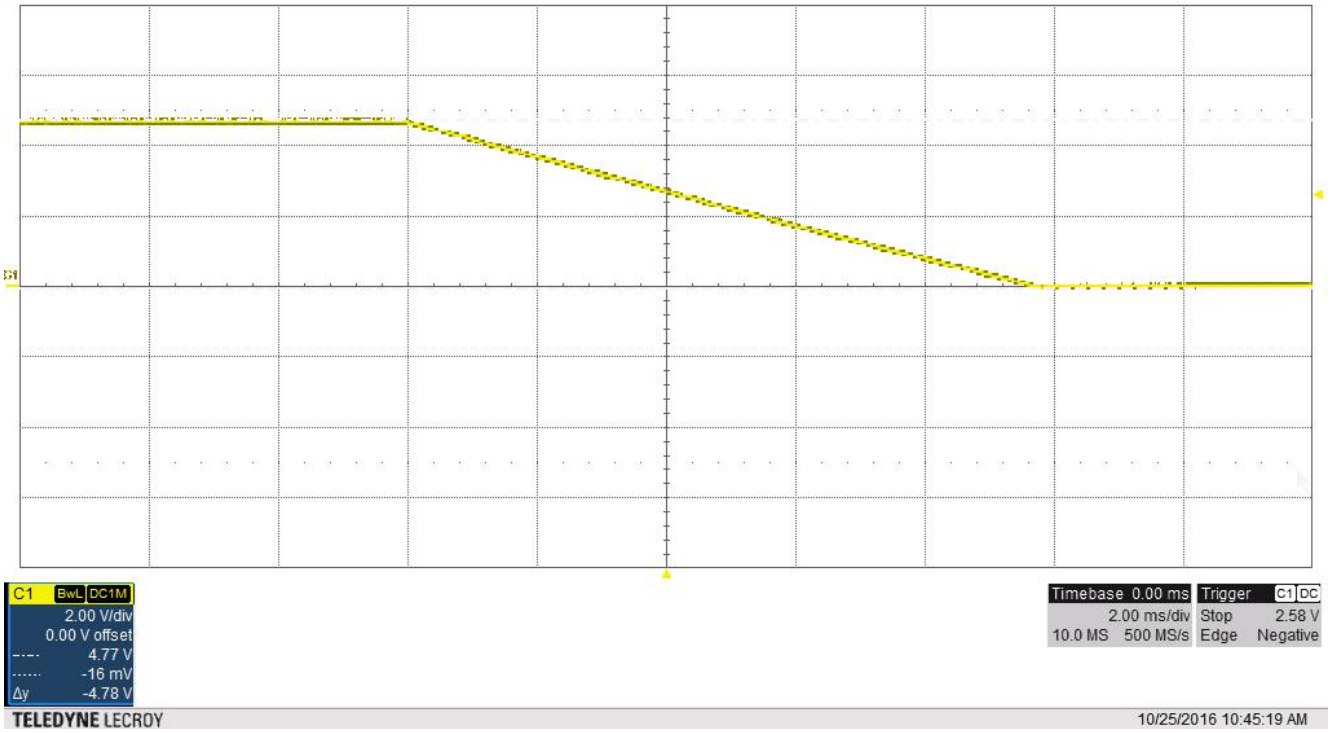
C1-VOUT (2V/div)



2 Shutdown

The picture below shows the output voltage shutdown with 1A load.

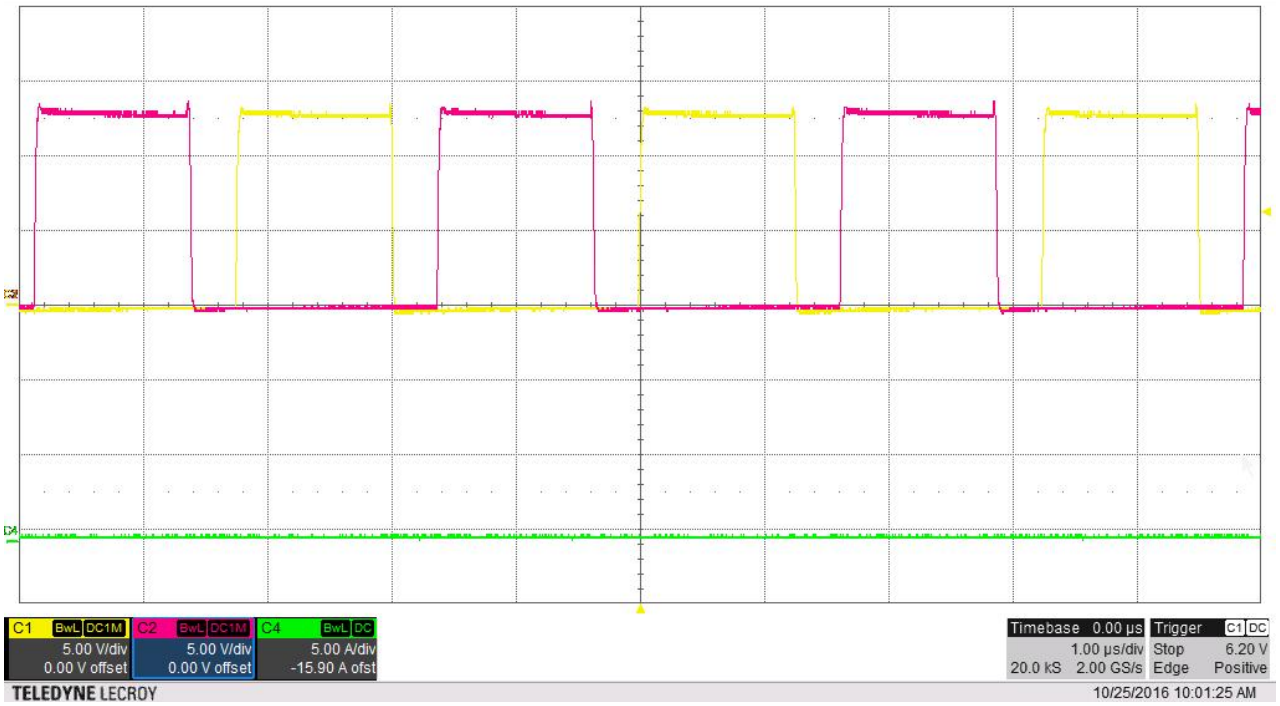
C1-VOUT (2V/div)



3 Switch Node

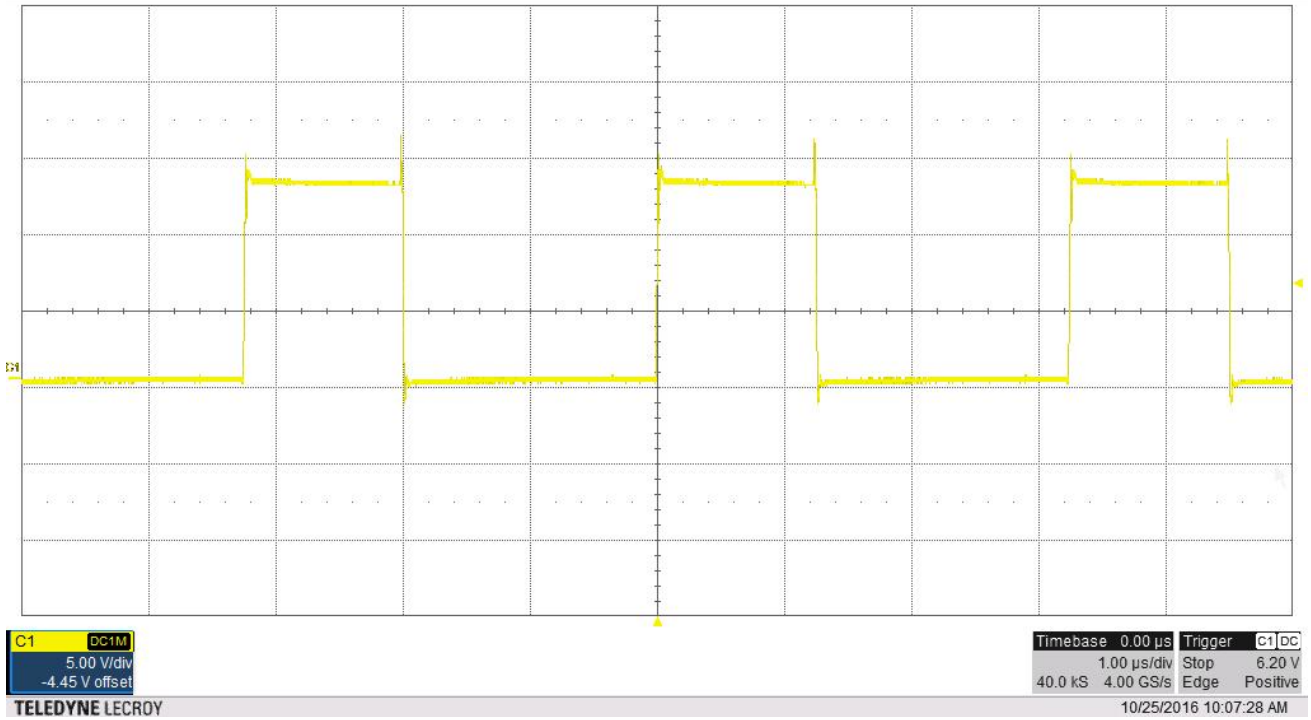
The picture below shows the switching node waveform for both phases. The input voltage is 12V.

Channel 1 – Yellow: Switch Node phase 1 – (5V/Division)
Channel 2 – Pink: Switch Node phase 2 – (5V/Division)
Channel 4 - Green: Iout (1A/div)



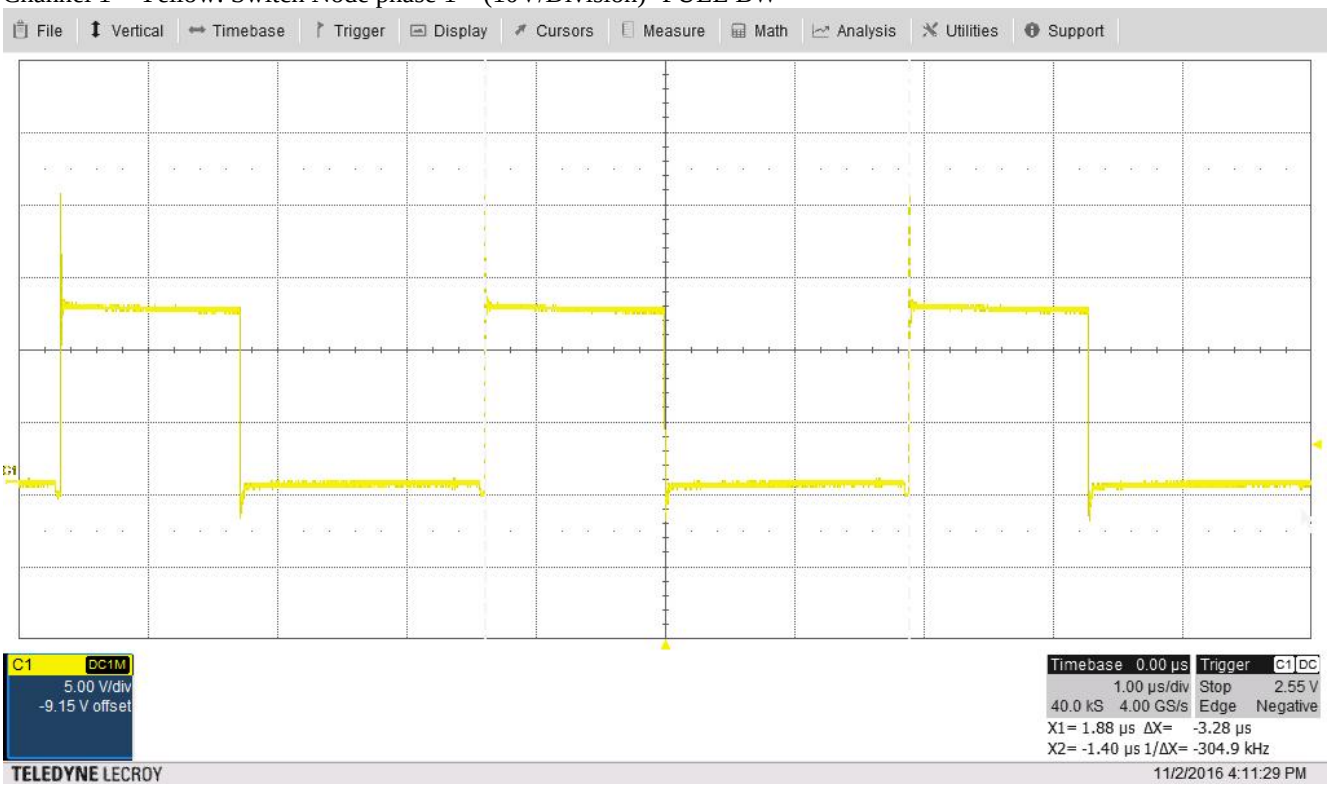
Both phases switching with 180deg phase shift

Channel 1 – Yellow: Switch Node phase 1 – (5V/Division)- FULL BW



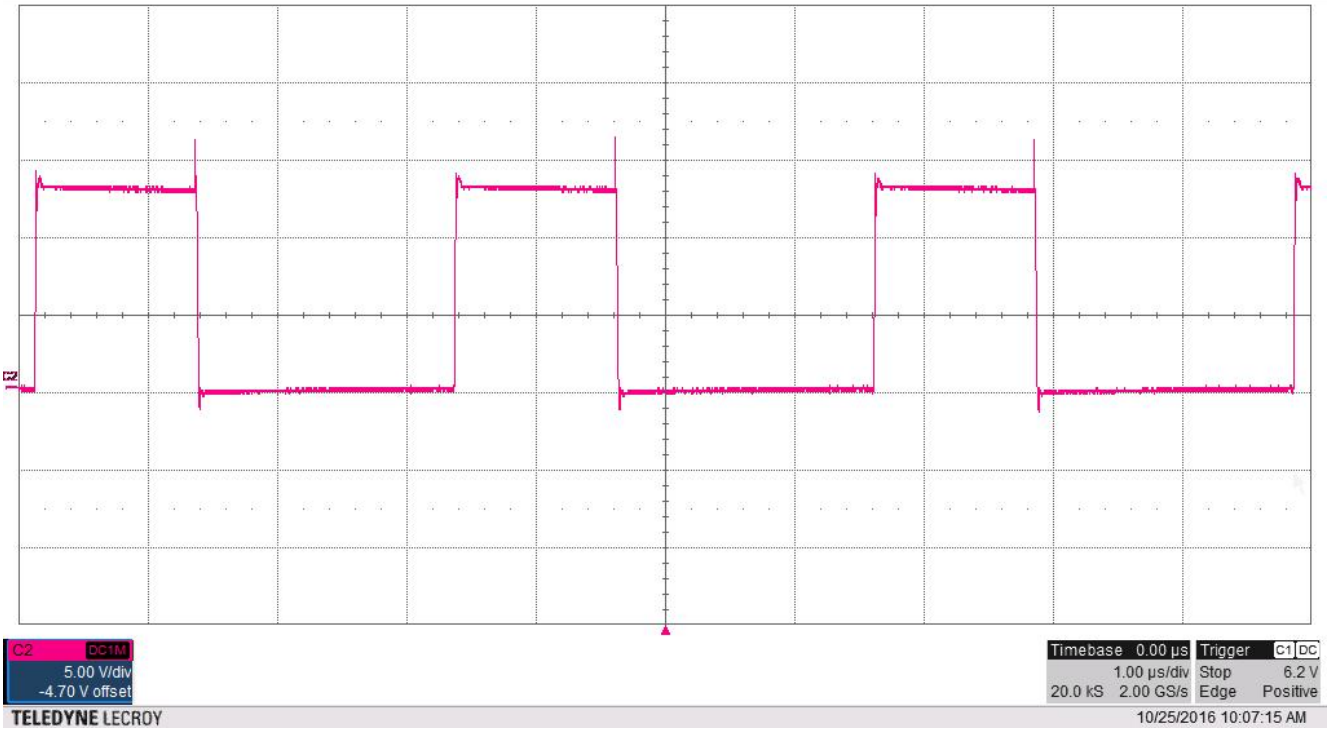
Phase 1 switch node- NO LOAD

Channel 1 – Yellow: Switch Node phase 1 – (10V/Division)- FULL BW



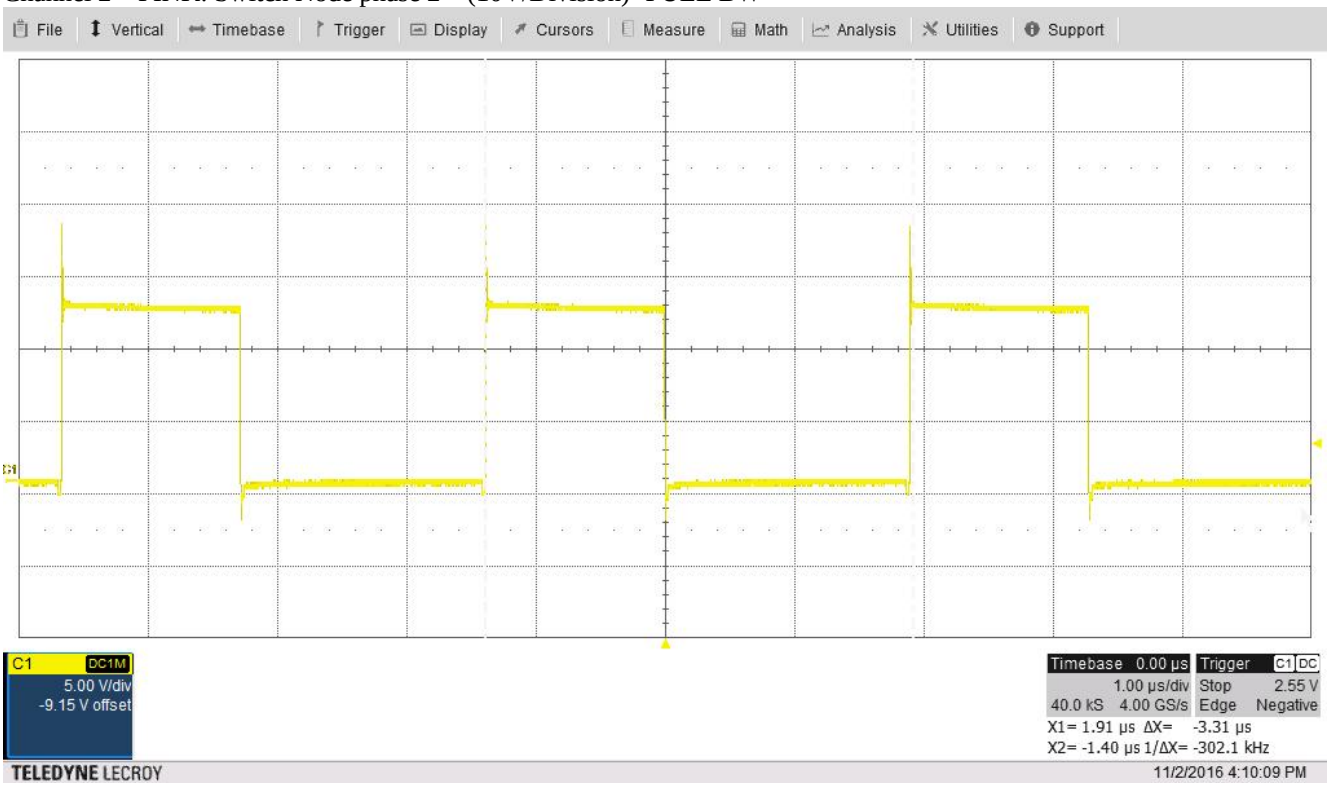
Phase 1 switch node- FULL LOAD(Vpk = 20.72V)

Channel 2 – PINK: Switch Node phase 2 – (5V/Division)- FULL BW



Phase 2 switch node- NO LOAD

Channel 2 – PINK: Switch Node phase 2 – (10V/Division)- FULL BW



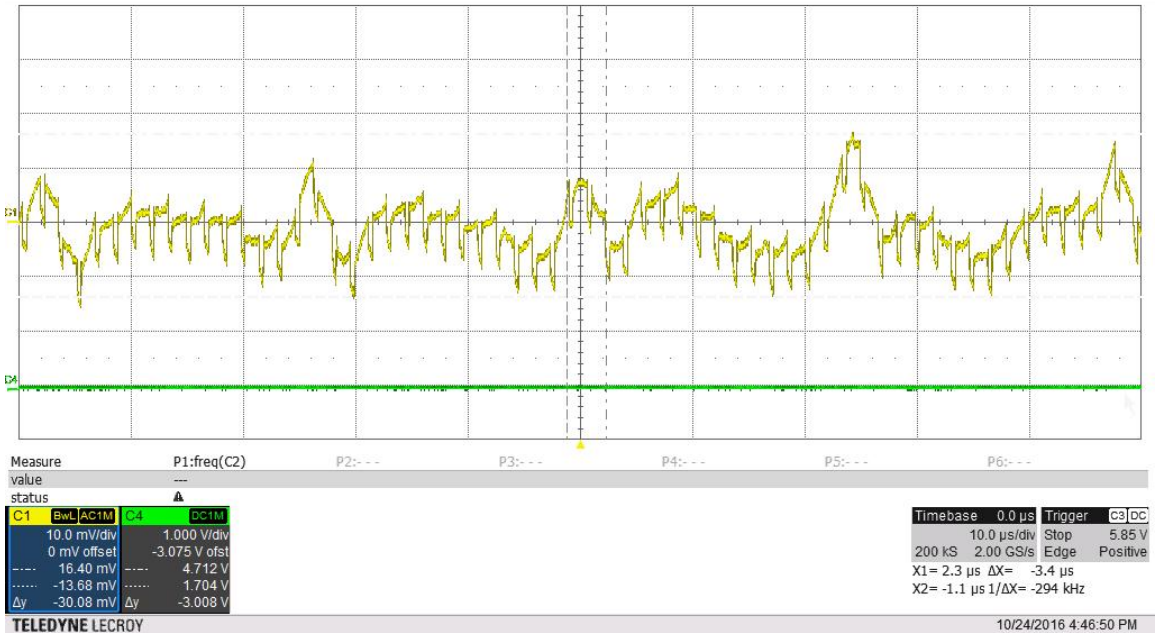
Phase 2 switch node- FULL LOAD(Vpk = 18.6V)

4 Output Voltage Ripple

The output voltage ripple of the converter with no load and full load is shown in the figures below. The input voltage is 12V.

Channel 1 – Yellow: Output Voltage (10mV/div)-AC coupled

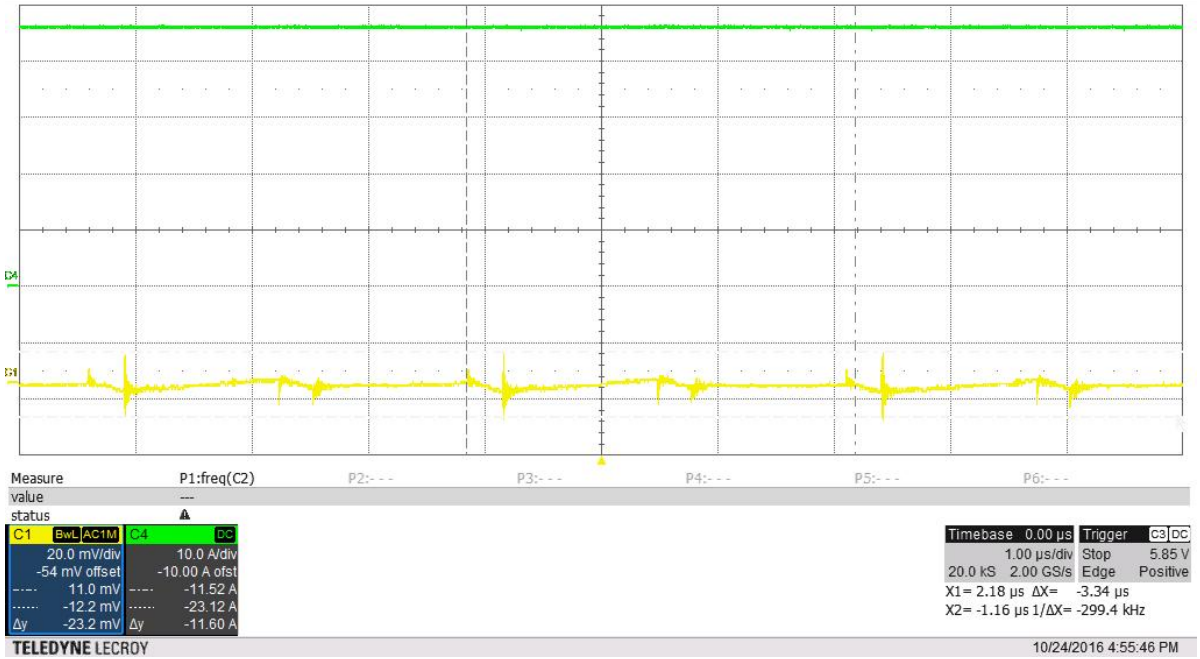
Channel 4 – Green: Output Load



No Load: Vrip = 30.08mVpp

Channel 1 – Yellow: Output Voltage (20mV/div)-AC coupled

Channel 4 – Green: Output Load (10A/div)

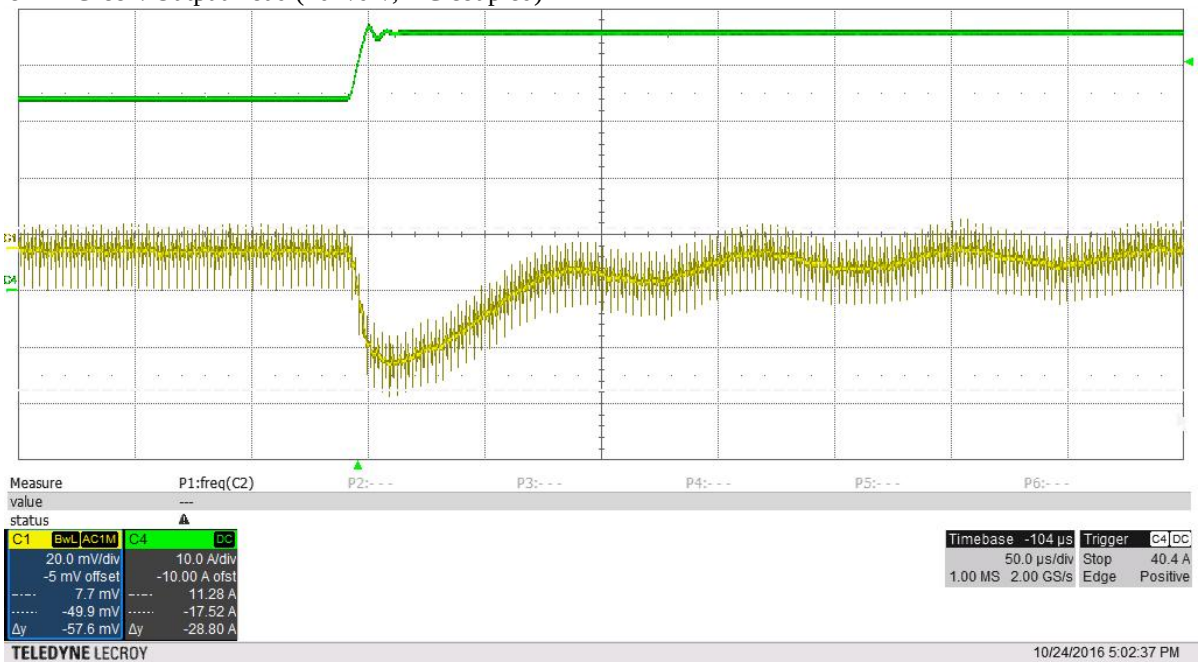


Full Load: Vrip = 23.2mVpp

5 Transient Response

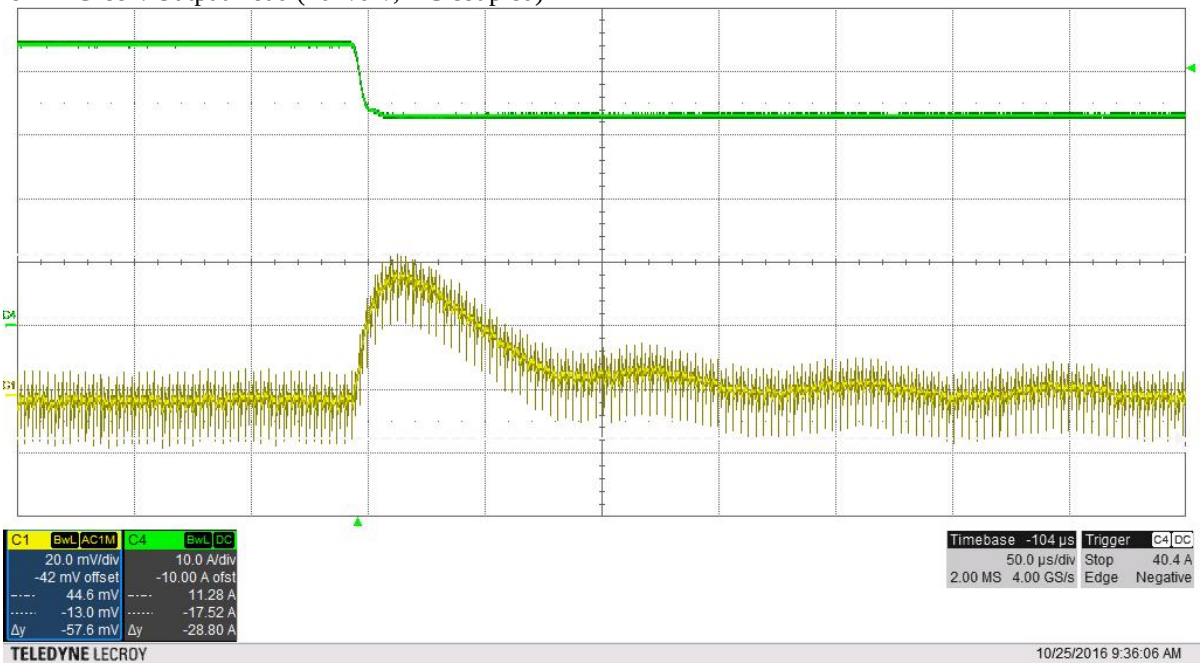
The transient response of the converter is shown in the figures below. The input voltage is 12V. The load is stepped from 33.75A to 45A.

Channel 1 – Yellow: Output Voltage (20mV/div)-AC coupled
Channel 4 – Green: Output Load (10A/div; DC coupled)



Transient Response – There is a total change of 57.6mV to the output voltage

Channel 1 – Yellow: Output Voltage (20mV/div)-AC coupled
Channel 4 – Green: Output Load (10A/div; DC coupled)

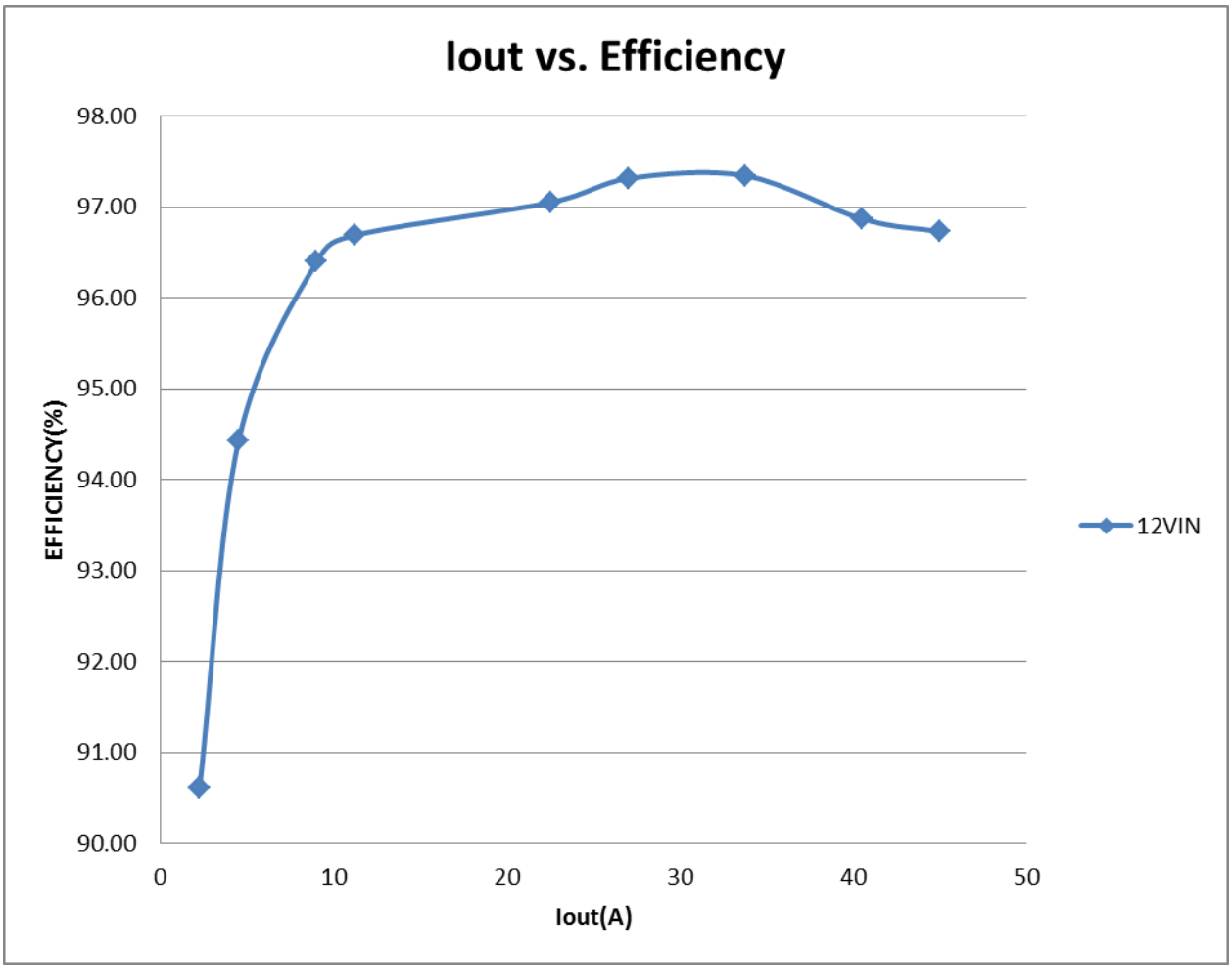


Transient Response – There is a total change of 57.6mV to the output voltage

6 Efficiency

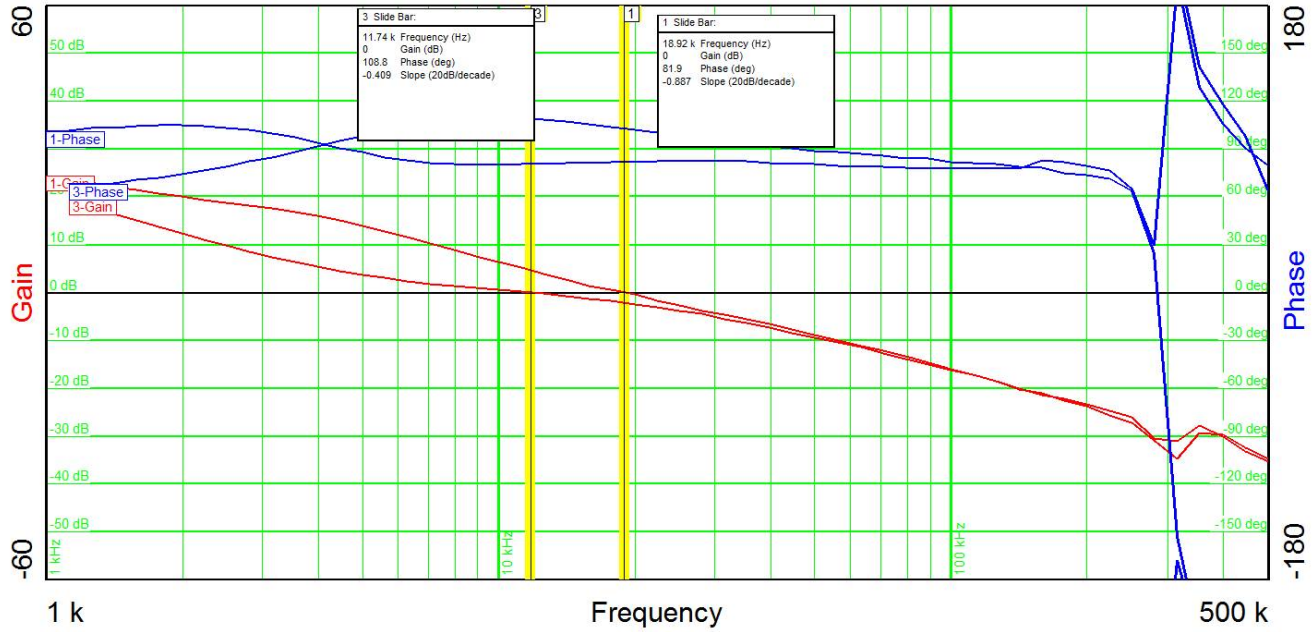
The efficiency of the board measured at the output with varying load currents

VIN(V)	Iin(A)	VOUT(V)	IOUT(A)	EFF(%)
12.358	0.086	4.77	0	0.00
12.275	0.965	4.77	2.25	90.60
12.189	1.865	4.77	4.5	94.42
12.026	3.711	4.78	9	96.40
12.038	4.62	4.78	11.25	96.69
12.098	9.16	4.78	22.5	97.05
12.002	11.05	4.78	27	97.31
12.043	13.79	4.79	33.75	97.34
12.086	16.57	4.79	40.5	96.87
12	18.57	4.79	45	96.73



7 Bode Plot

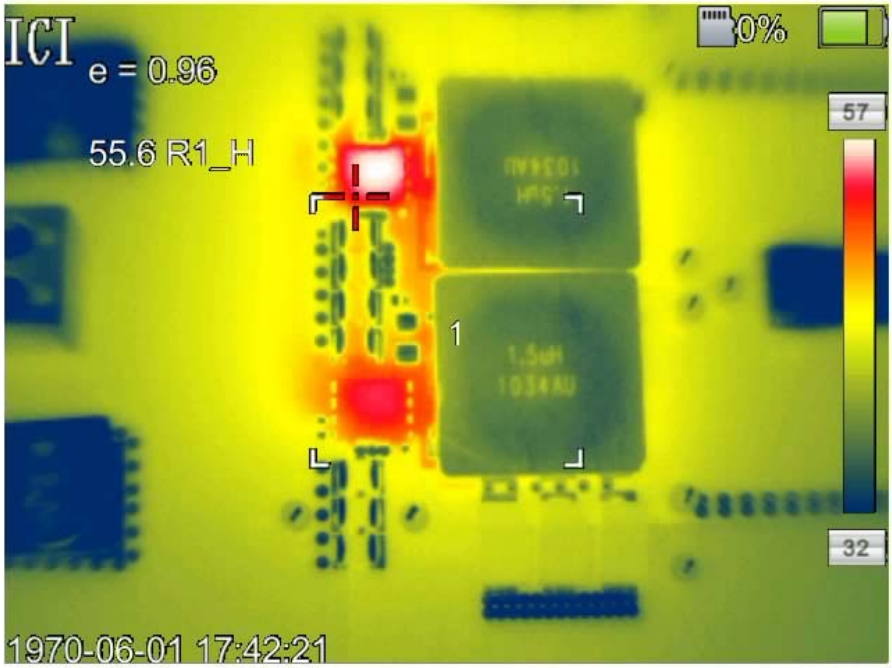
The Bode Plot of the converter is shown in the figure below. The input is 12V. The output was tested at NO load and full load.



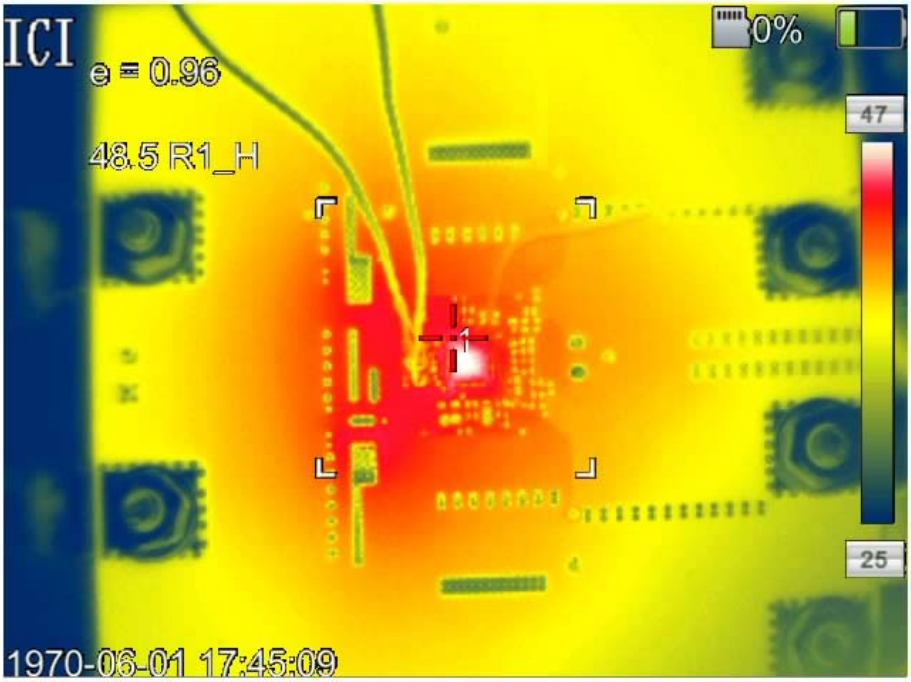
No Load: fco= 11.74kHz; PM = 108.8 degrees
Full Load: fco= 18.92kHz; PM = 81.9 degrees

8 Thermal Images

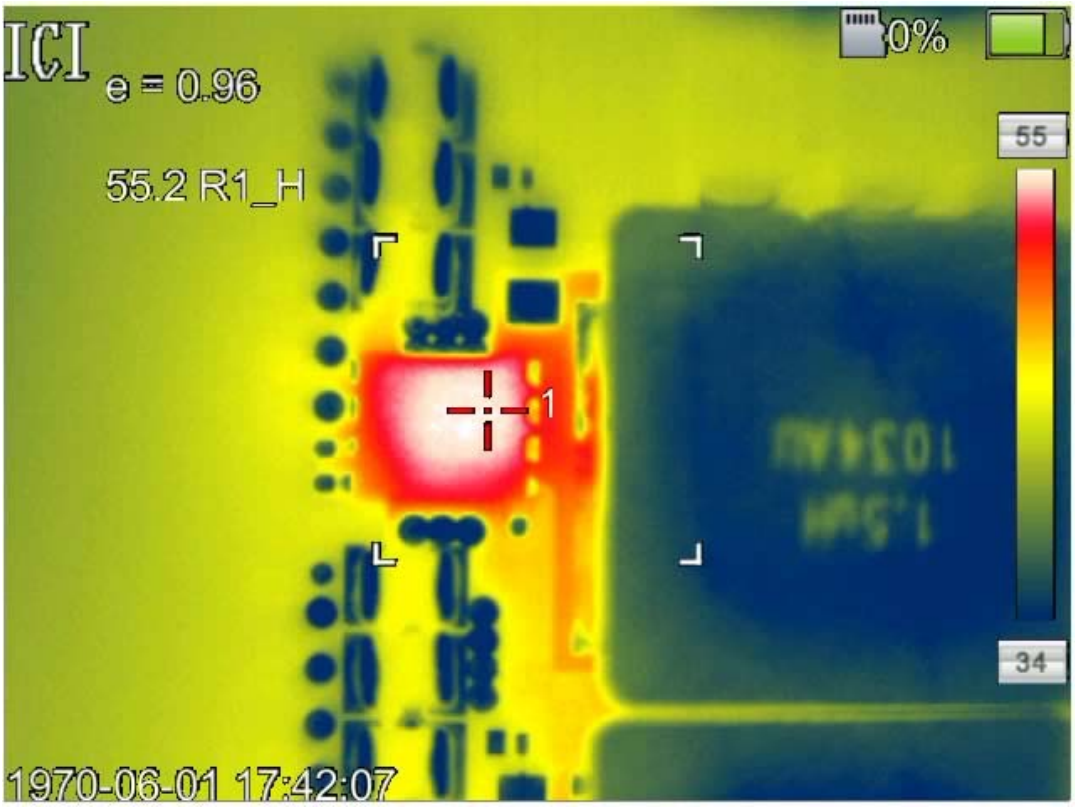
The thermal images were taken below with full load of 45A. For current sharing purposes, both the FETs are shown separately as well.



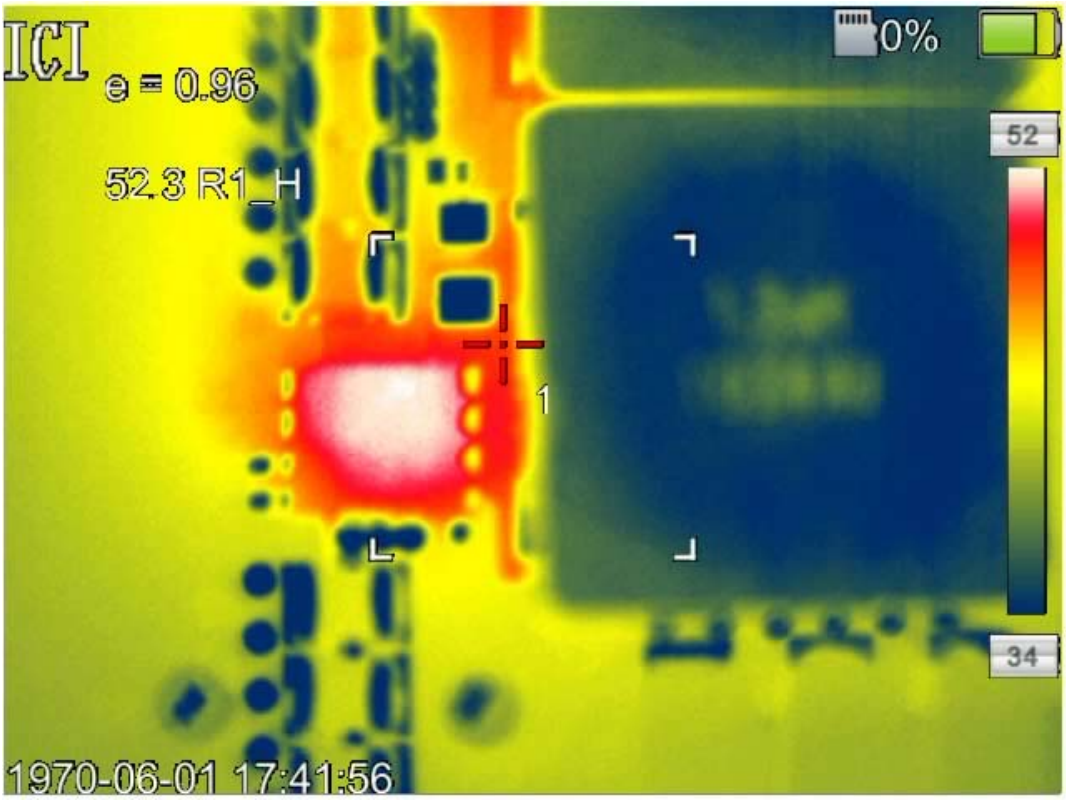
TOP OF BOARD



BOTTOM OF BOARD



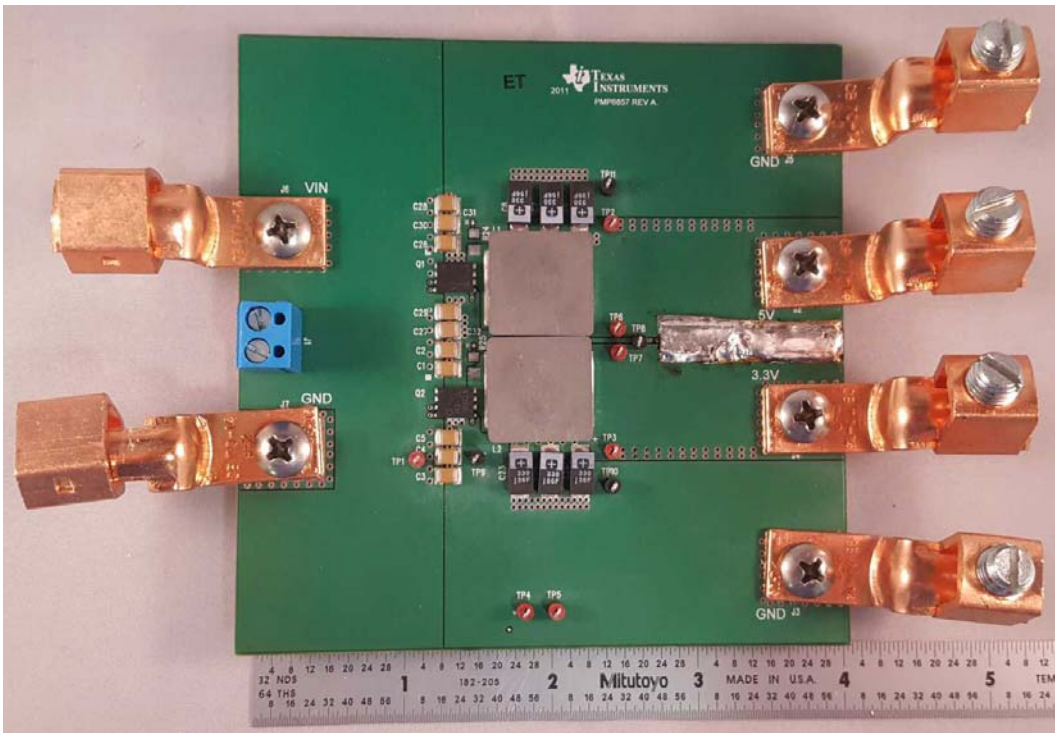
Q1 AT 55C-FULL LOAD



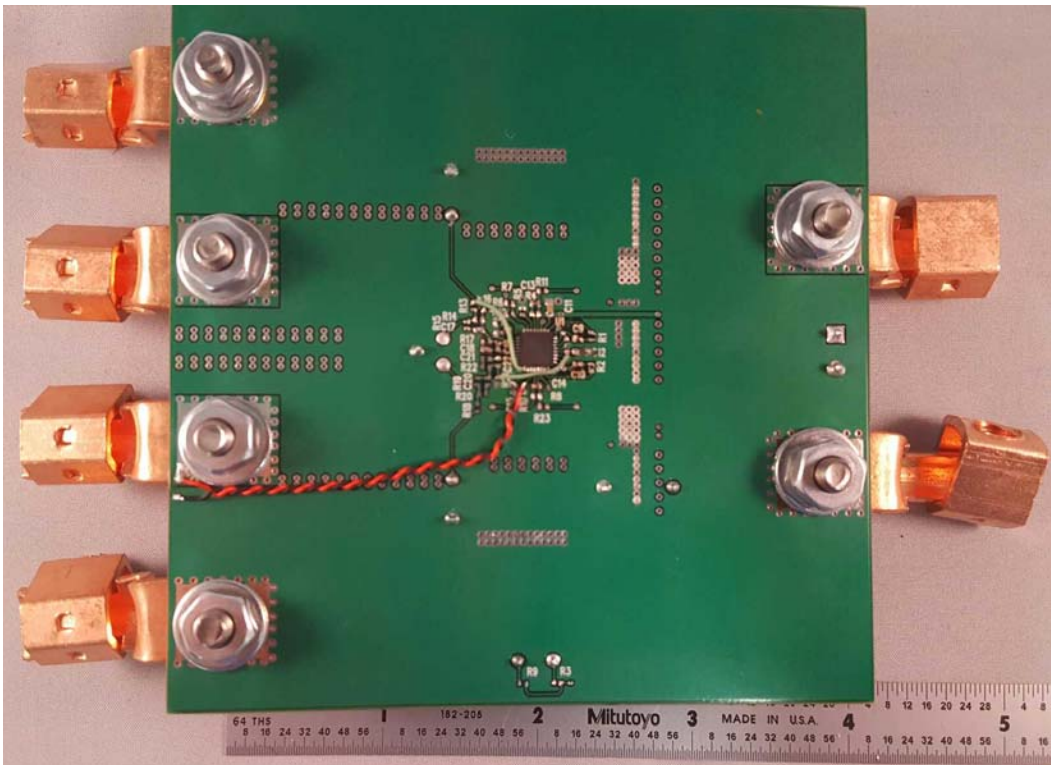
Q2 AT 52C-FULL LOAD

9 Board Photos

Below are pictures of the PMP20516 board after modifications



Front of the board



Back of the board

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