PMP7165RevB Test Results

Topology: Buck
Device: TPS40170 "deep impact"

1 Startup

The startup waveform is shown in the Figure 1. The input voltage was set at 40V, with 21A load at the output.

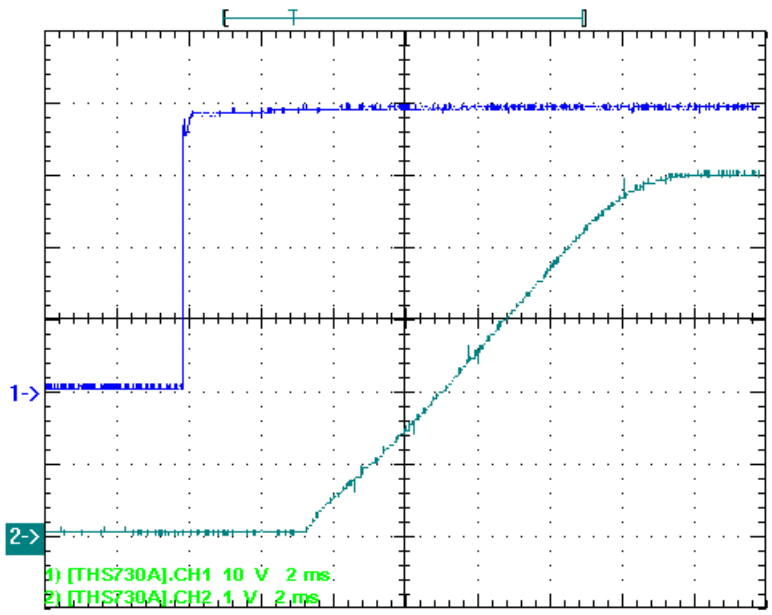


Figure 1

Ch1=> input voltage 10V/div

Ch2=> output voltage 1V/div

2ms/div

2 Shutdown

The shutdown waveform is shown in the Figure 2. The input voltage was set at 40V, with 21A load on the output.

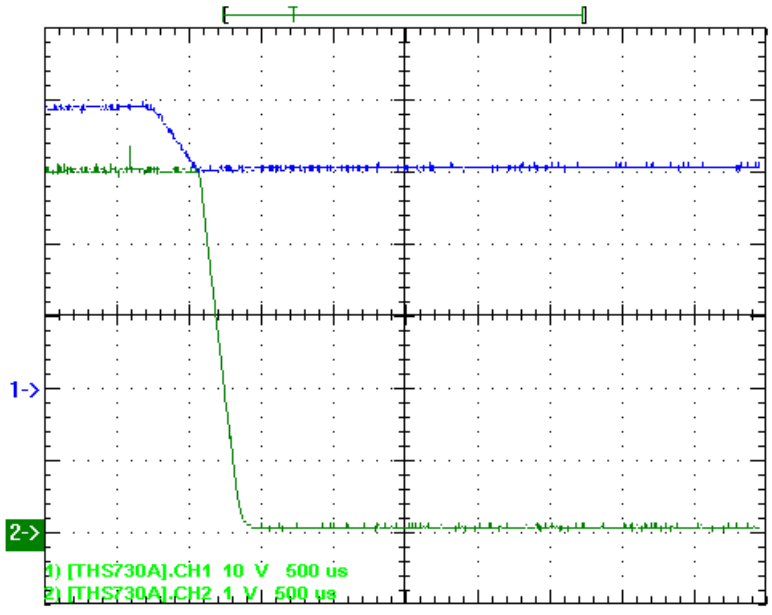


Figure 2

Ch1=> input voltage 10V/div

Ch2=> output voltage 1V/div

500µs/div

3 Efficiency

The efficiency is shown in the Figure 3 below. The input voltage was set to 40V

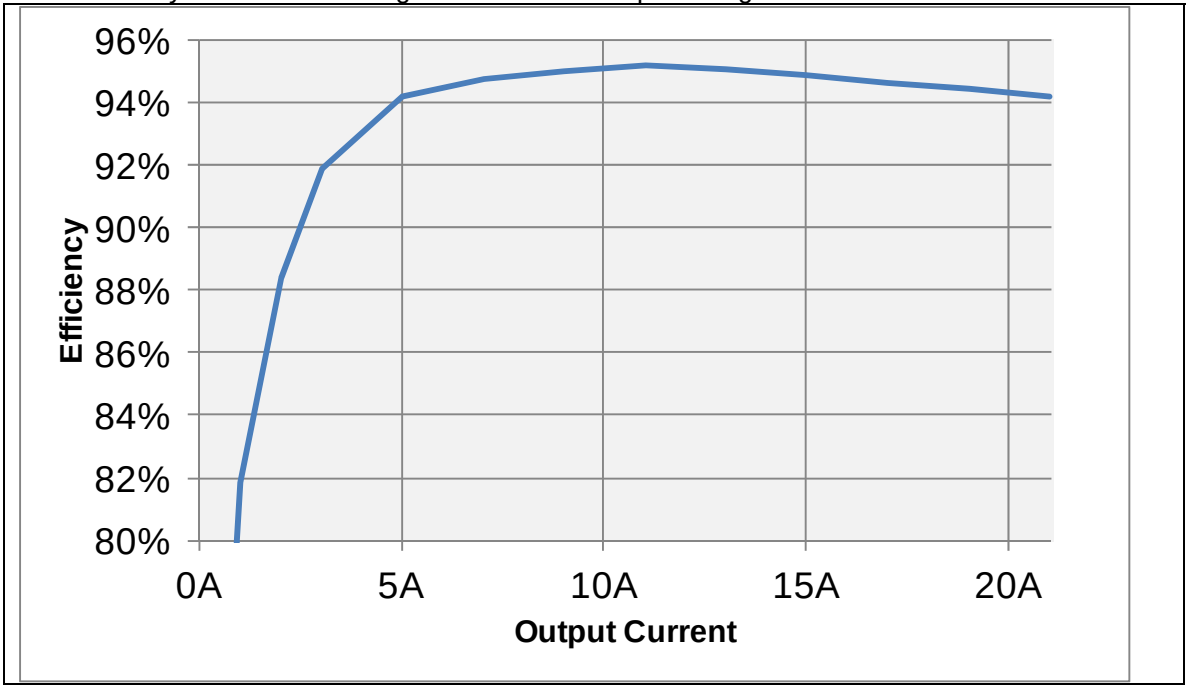


Figure 3

4 Load Regulation

The load regulation of the output is shown in the Figure 4 below. The input voltage was set to 40V.

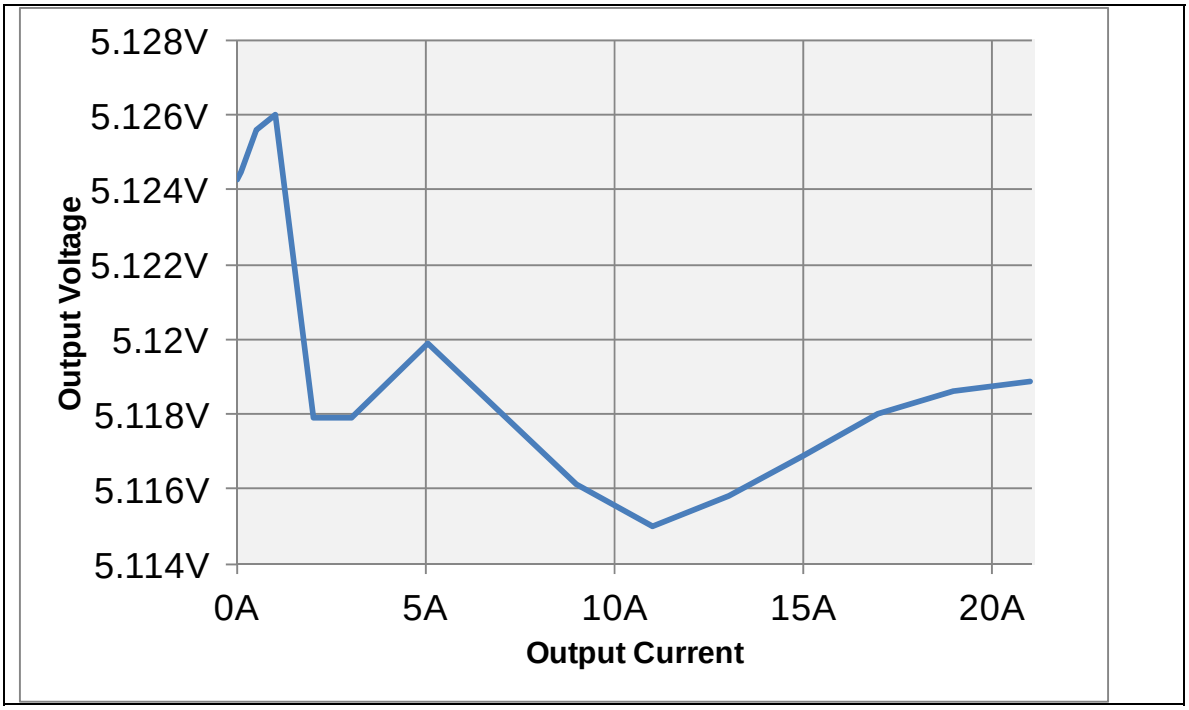


Figure 4

5 Ripple Voltage

The output ripple voltage is shown in Figure 5. The image was taken with a 21A load 40V at the input.

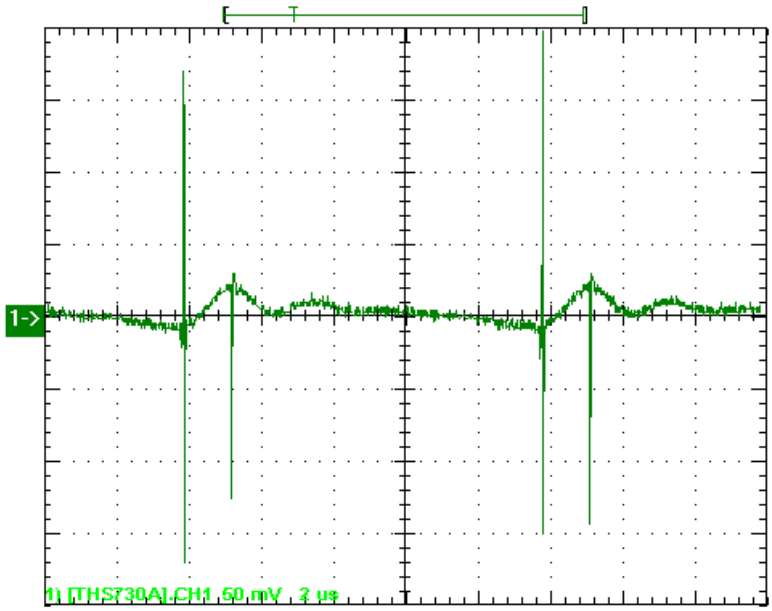


Figure 5

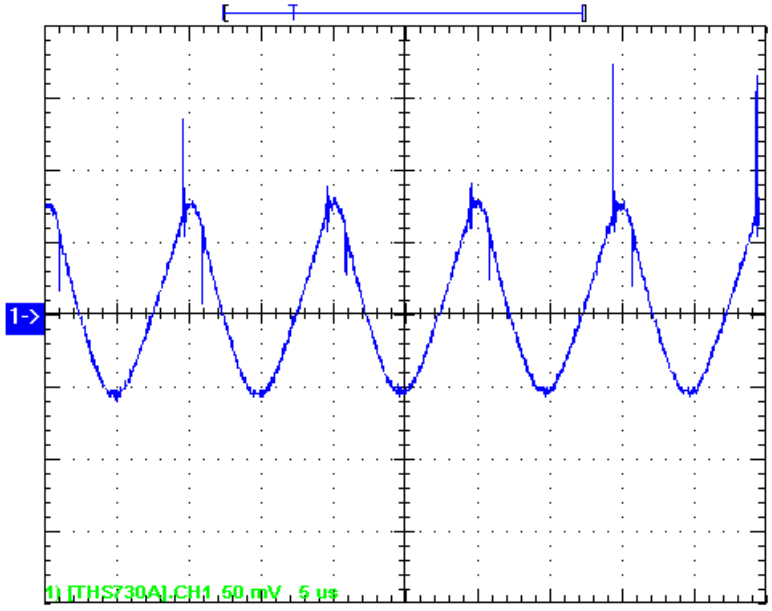
Ch1 => output voltage

50mV/div
AC coupled

20MHz bandwidth setting

2µs/div

The input ripple voltage is shown in Figure 6. The image was taken with a 21 A load 40V at the input.



Ch1 => input voltage

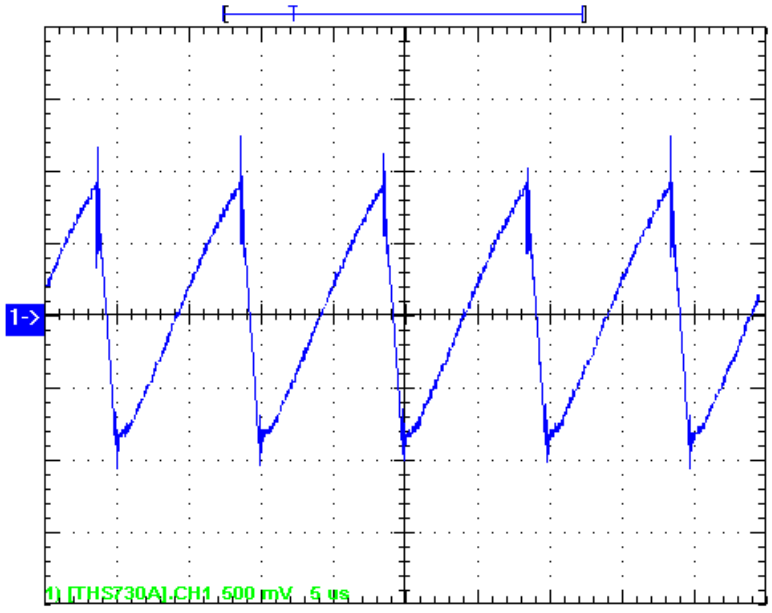
50mV/div

20MHz bandwidth setting

5µs/div

Figure 6

Figure 7 shows the ripple after the input filtering



Ch1 => input voltage

500mV/div

20MHz bandwidth setting

5µs/div

Figure 7

6 Control Loop Frequency Response

Figure 8 shows the loop response with 21A load and 40V input.

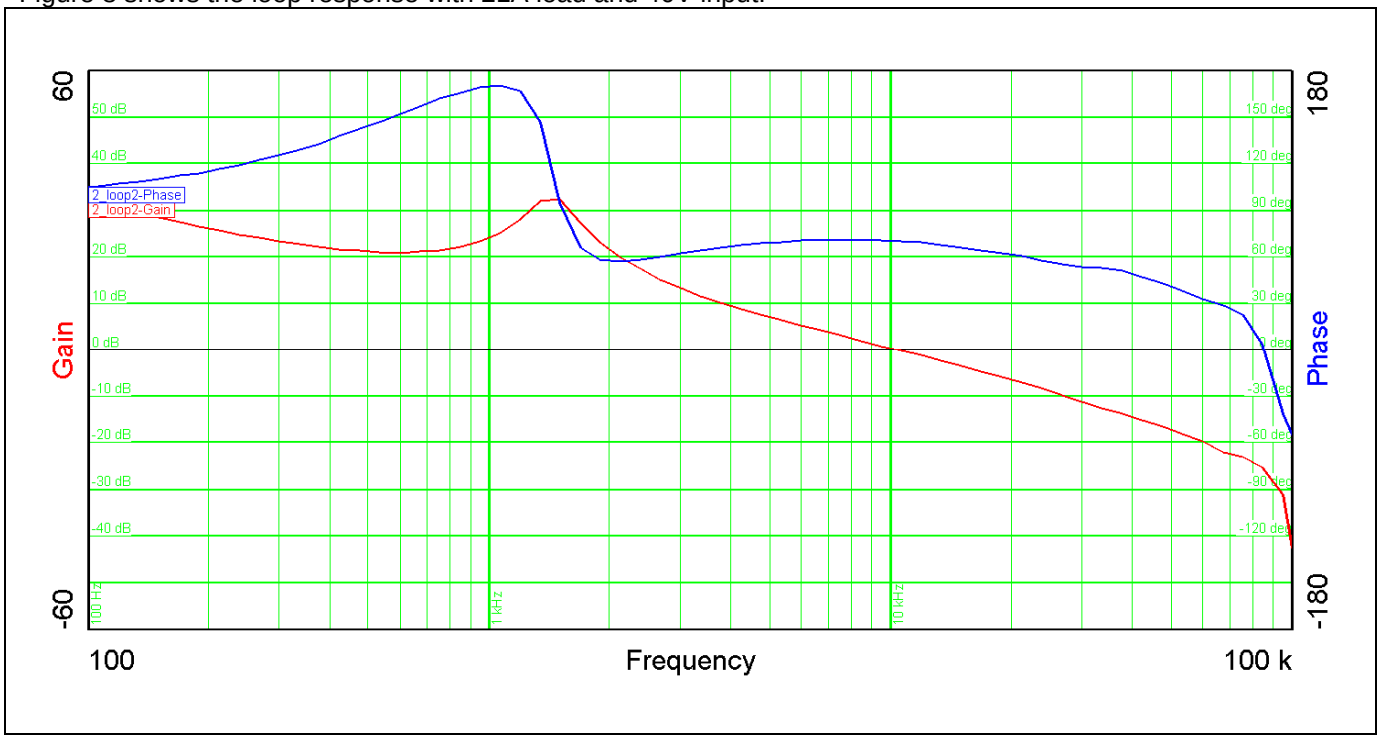


Figure 8

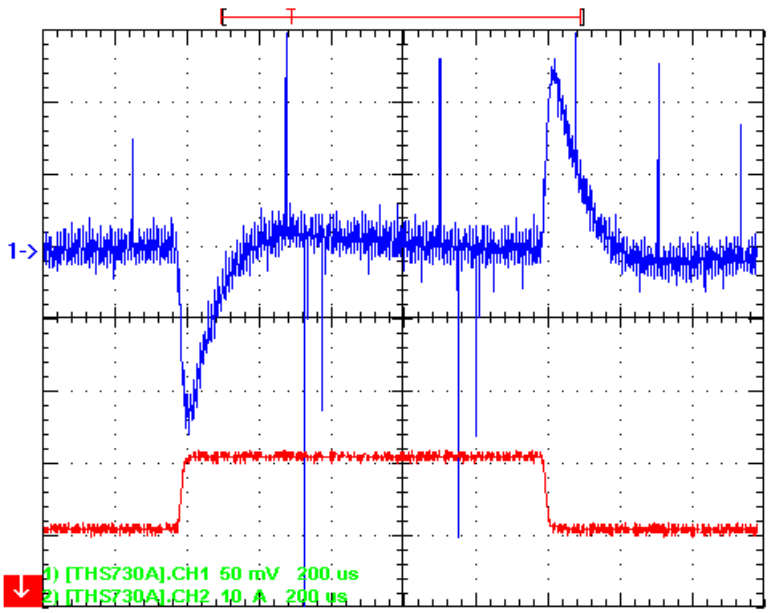
Table 1 summarizes the results from Figure 8

Bandwidth (kHz)	10.4
Phasemargin	70°
slope (20dB/decade)	-1.08
gain margin (dB)	-25.8
slope (20dB/decade)	-5.9
freq (kHz)	85.6

Table 1

7 Load Transients

The Figure 9 shows the response to load transients. The load is switching from 10A to 20A.with 500Hz frequency. The input voltage was set to 40V



Ch2 => output voltage 50mV/div

20MHz bandwidth setting

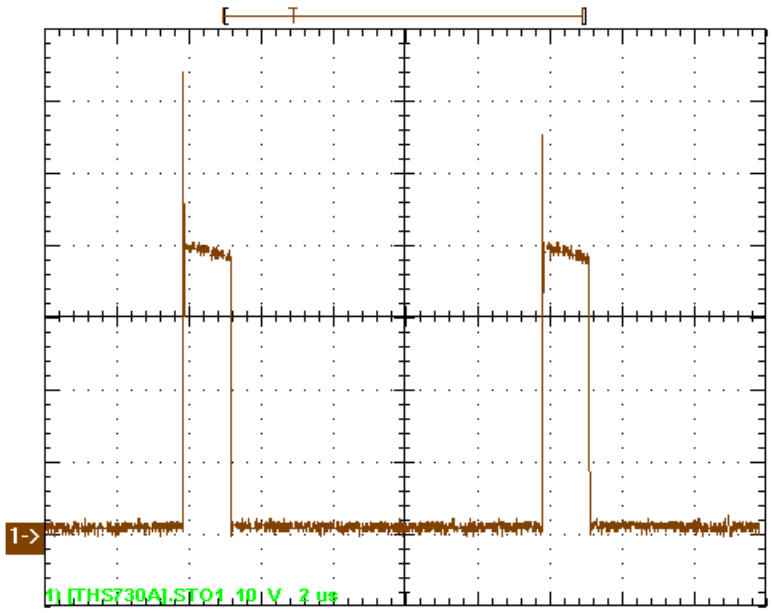
Ch2 => output current 10A/div

200µs/div

Figure 9

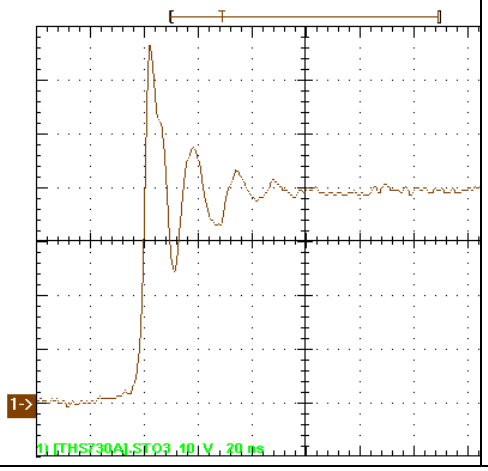
8 Miscellaneous Waveforms

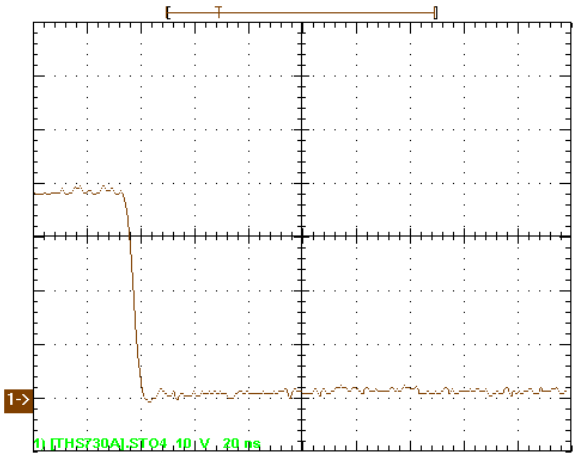
Switch node
With input voltage set to 40V and 21A Iout results in the waveform shown in Figure 10



Ch1 =>
10V/div

2µs/div





Ch1 =>
10V/div
20ns/div

Figure 10

9 Thermal Image

9.1 top side

Figure 11 shows the thermal image at 40V input and 21A output

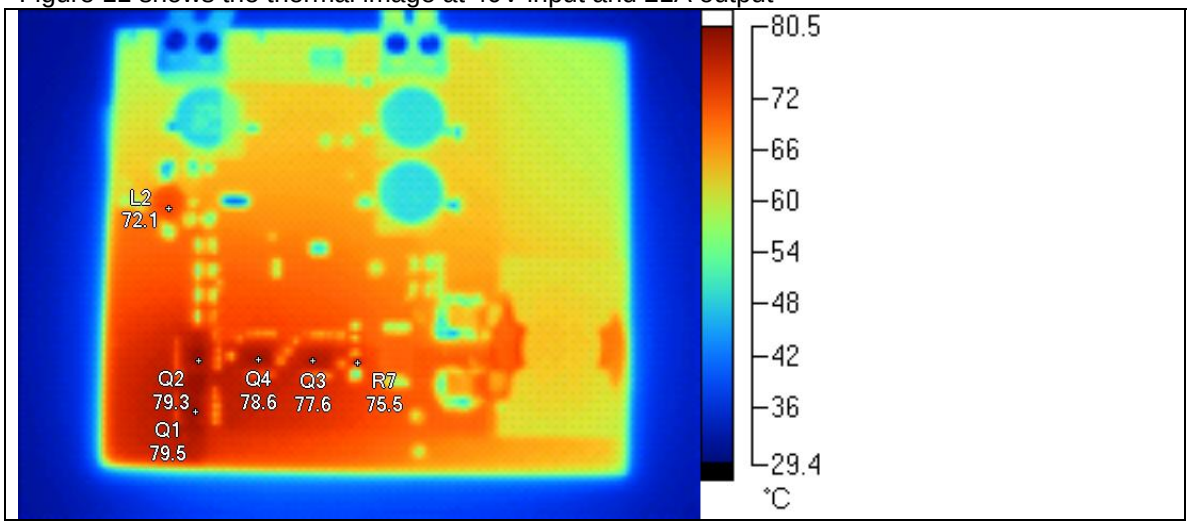


Figure 11

Name	Temperature
Q1	79.5°C
Q2	79.3°C
Q4	78.6°C
Q3	77.6°C
R7	75.5°C
L2	72.1°C

Table 2

9.2 bottom side

Figure 12 shows the thermal image at 40V input and 21A output

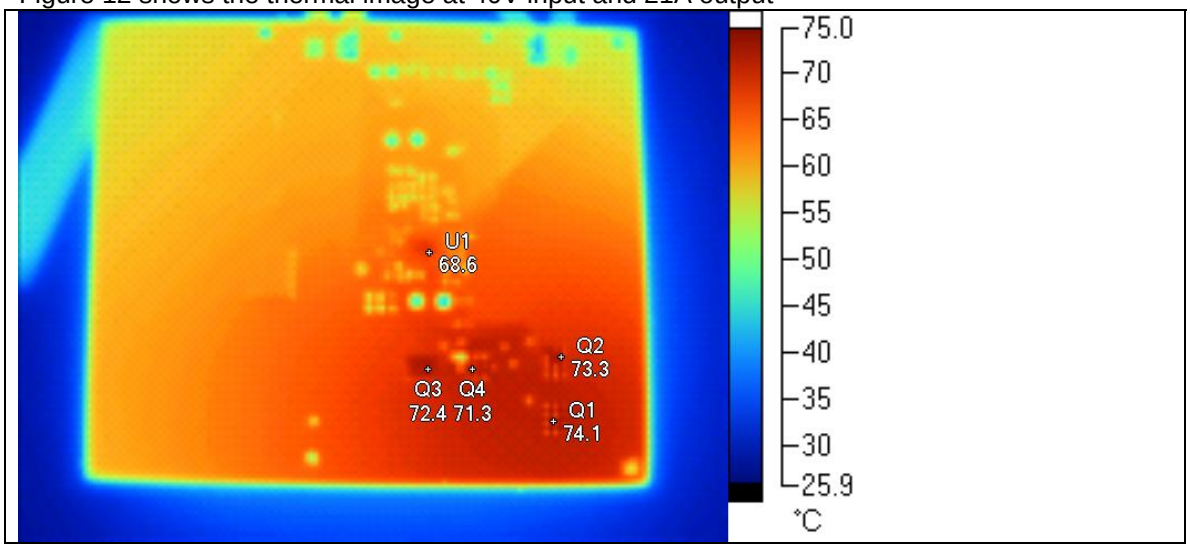


Figure 12

Name	Temperature
Q1	74.1°C
Q2	73.3°C
Q3	72.4°C
Q4	71.3°C
U1	68.6°C

Table 3

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