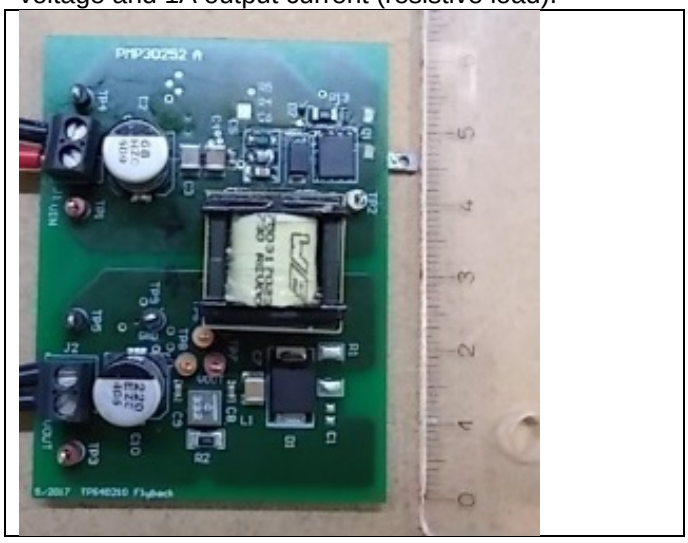
PMP30252RevC Test Results

Topology: DCM Flyback 12W **Device:** TPS40210
Fsw: typical 130kHz (143kHz at prototype); RevC is same as RevB except:
commercial transformer T1 750317023 and 100V FET Q1 BSC440N10NS3 G
For this test report Rev B were reused and efficiency measurements, load regulation and thermal image were redone. Unless otherwise mentioned all measurements were done with 24V input voltage and 1A output current (resistive load).



1 Startup

The startup waveform is shown in the Figure 1. Power supply was connected.

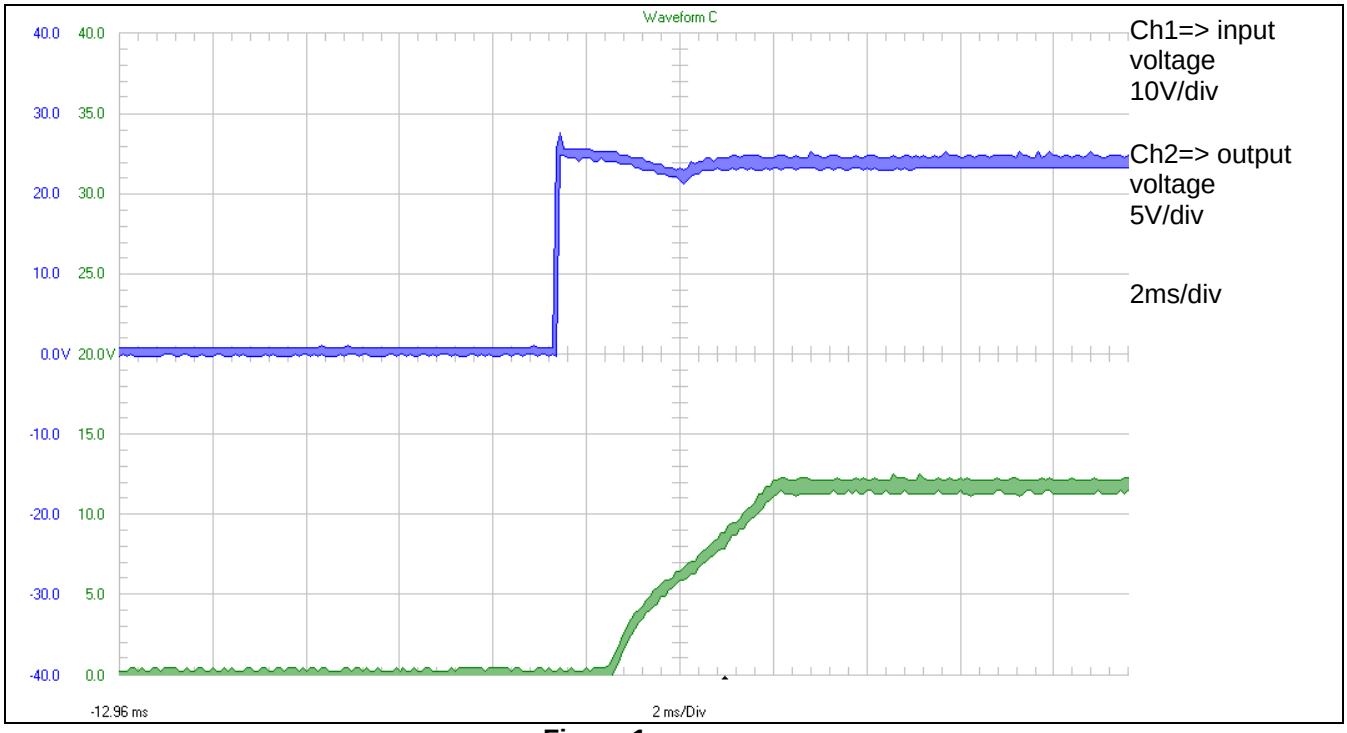


Figure 1

2 Shutdown

The shutdown waveform is shown in the Figure 2. Power supply was disconnected.

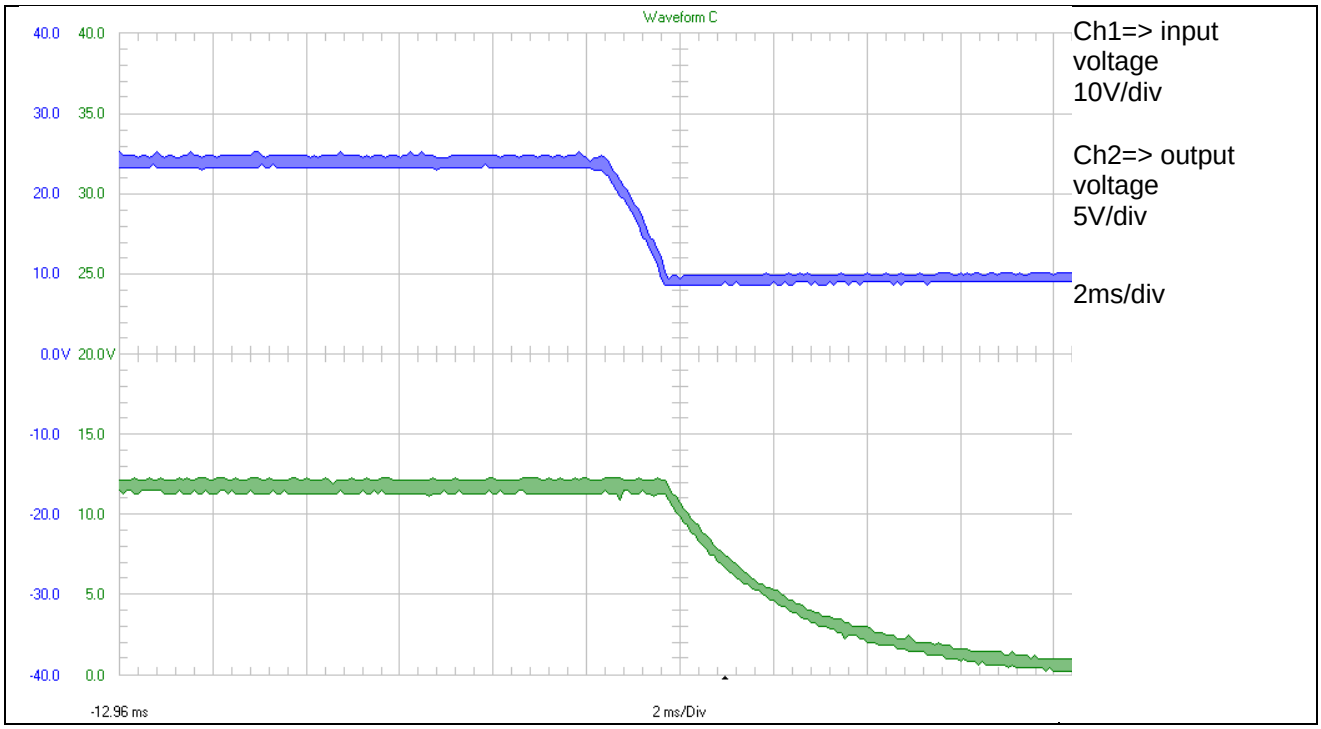


Figure 2

3 Efficiency

The efficiency is shown in the Figure 3 below. The input voltage was set to 24V.

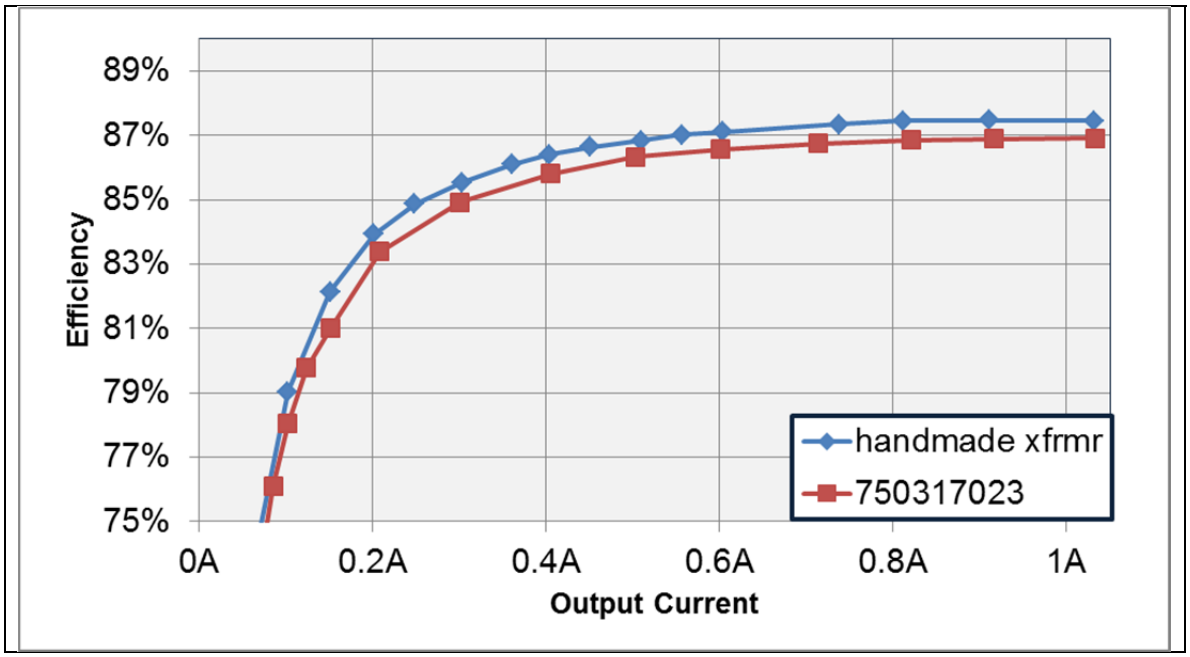


Figure 3

Variable resistor 100R and 1kOhms were used to adjust the output current.

Excellent performance by small commercial WE transformer.

4 Loss

The efficiency is shown in the Figure 4 below. The input voltage was set to 24V.

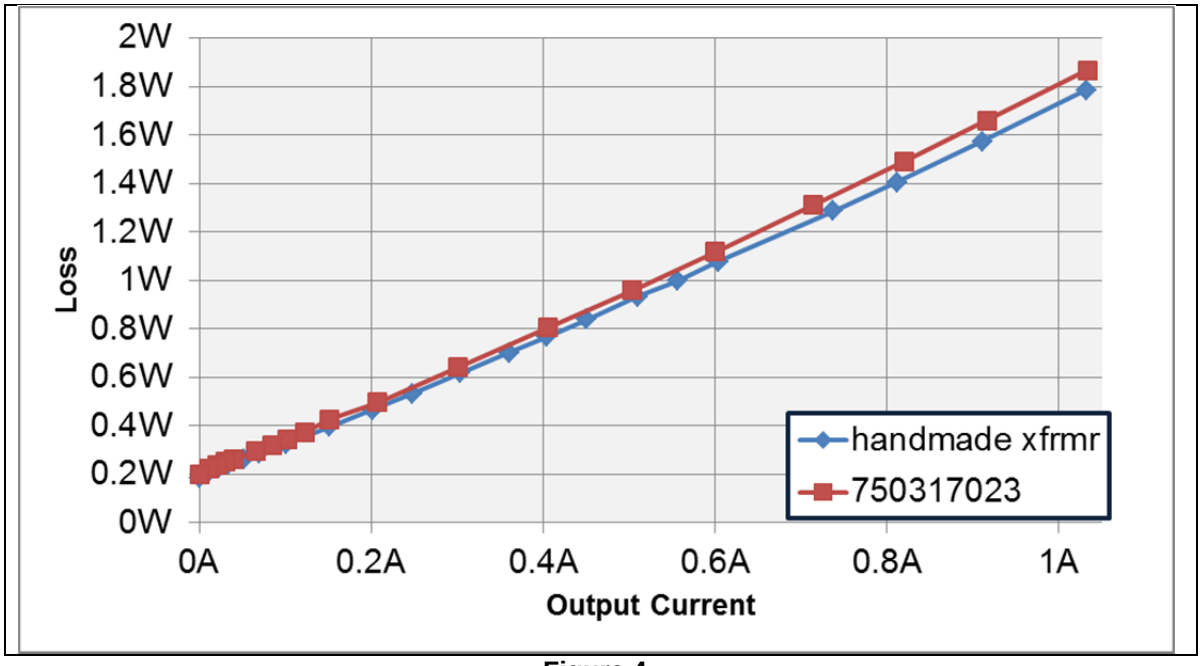


Figure 4

Variable resistor 100R and 1kOhms were used to adjust the output current

5 Load Regulation

The load regulation of the output is shown in the Figure 5 below.

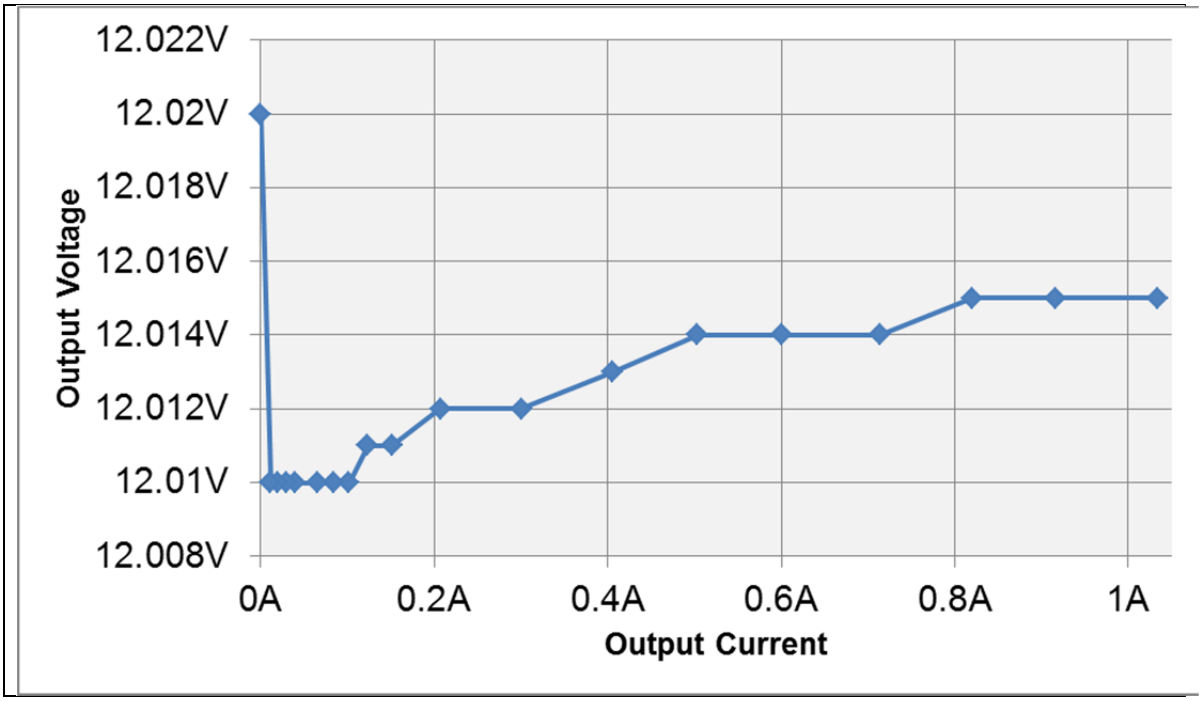
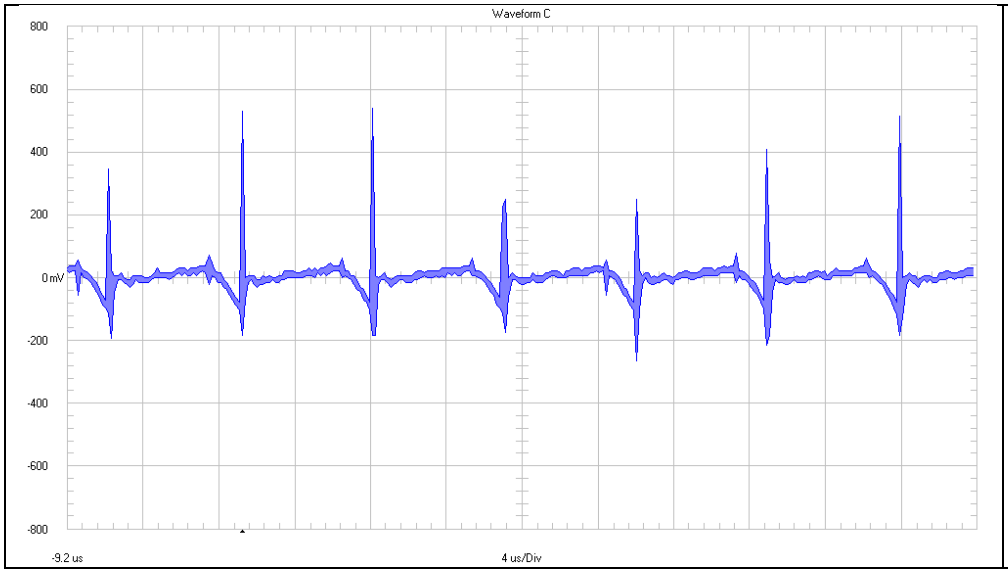


Figure 5

6 Ripple Voltage

6.1 Input

The input ripple voltage is shown in Figure 6.



Ch1 => output voltage 200mV/div

AC coupled

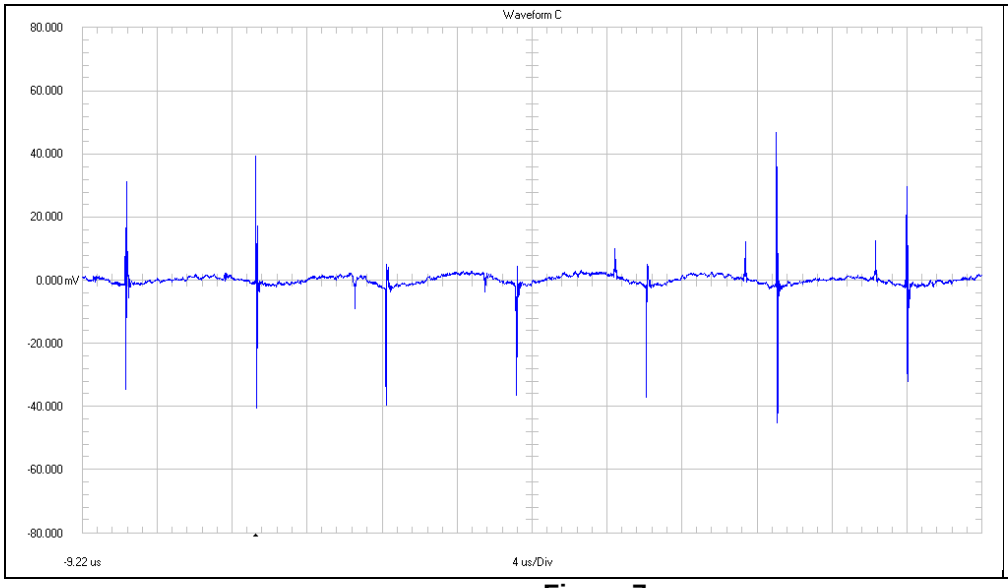
20MHz bandwidth setting

4µs/div

Figure 6

6.2 Output

The output ripple voltage is shown in Figure 7.



Ch1 => output voltage (-VOUT)

20mV/div

AC coupled

20MHz bandwidth setting

4µs/div

Figure 7

6.3 Output before Filter

The output ripple voltage before filter network is shown in Figure 8.

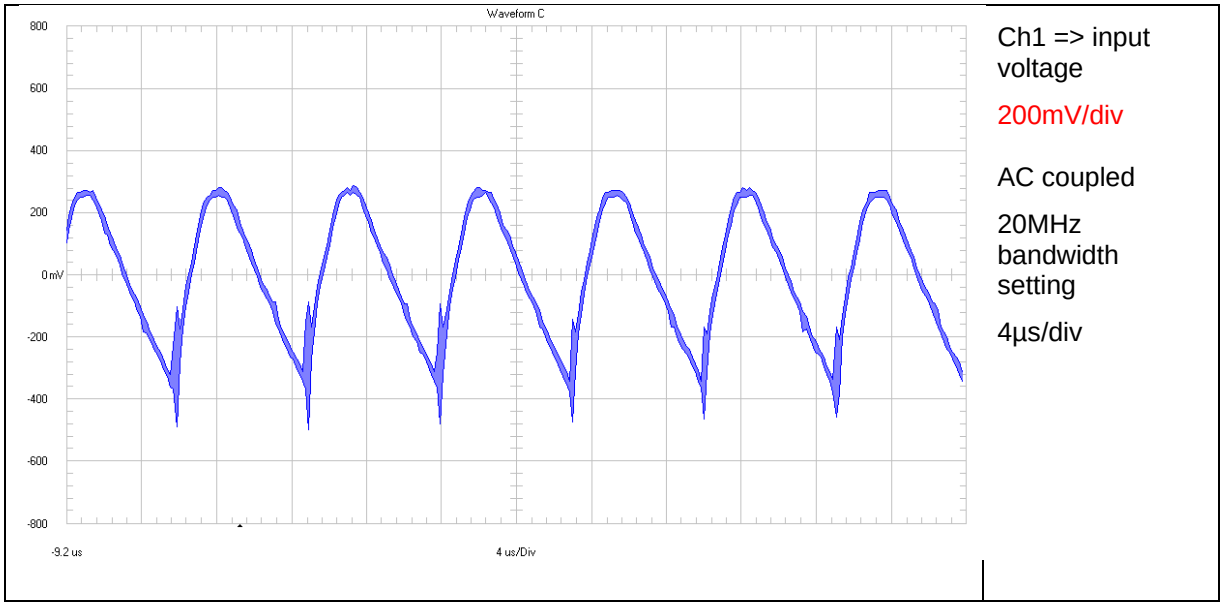


Figure 8

7 Control Loop Frequency Response

Figure 9 shows the loop response with 1A load and 24V input.

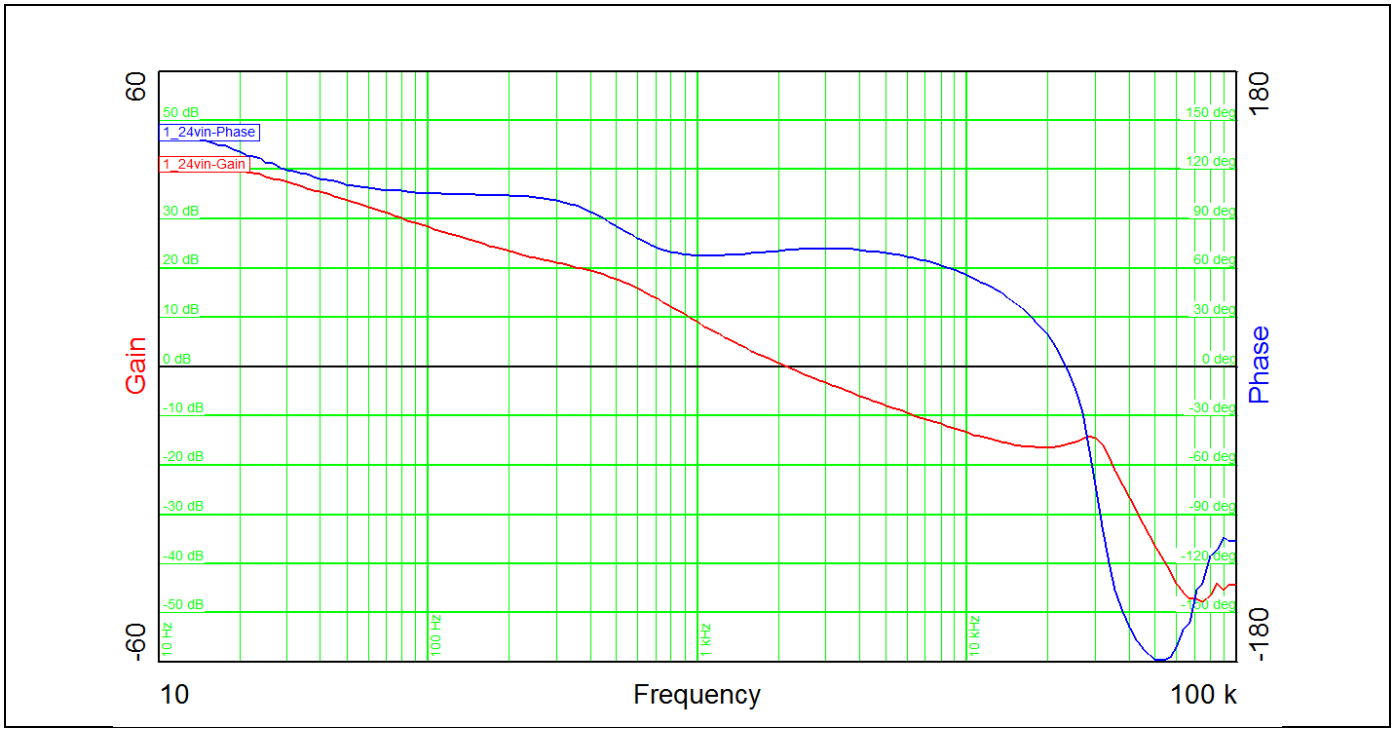


Figure 9

Figure 10 shows the loop response with 1A load and 12V input.

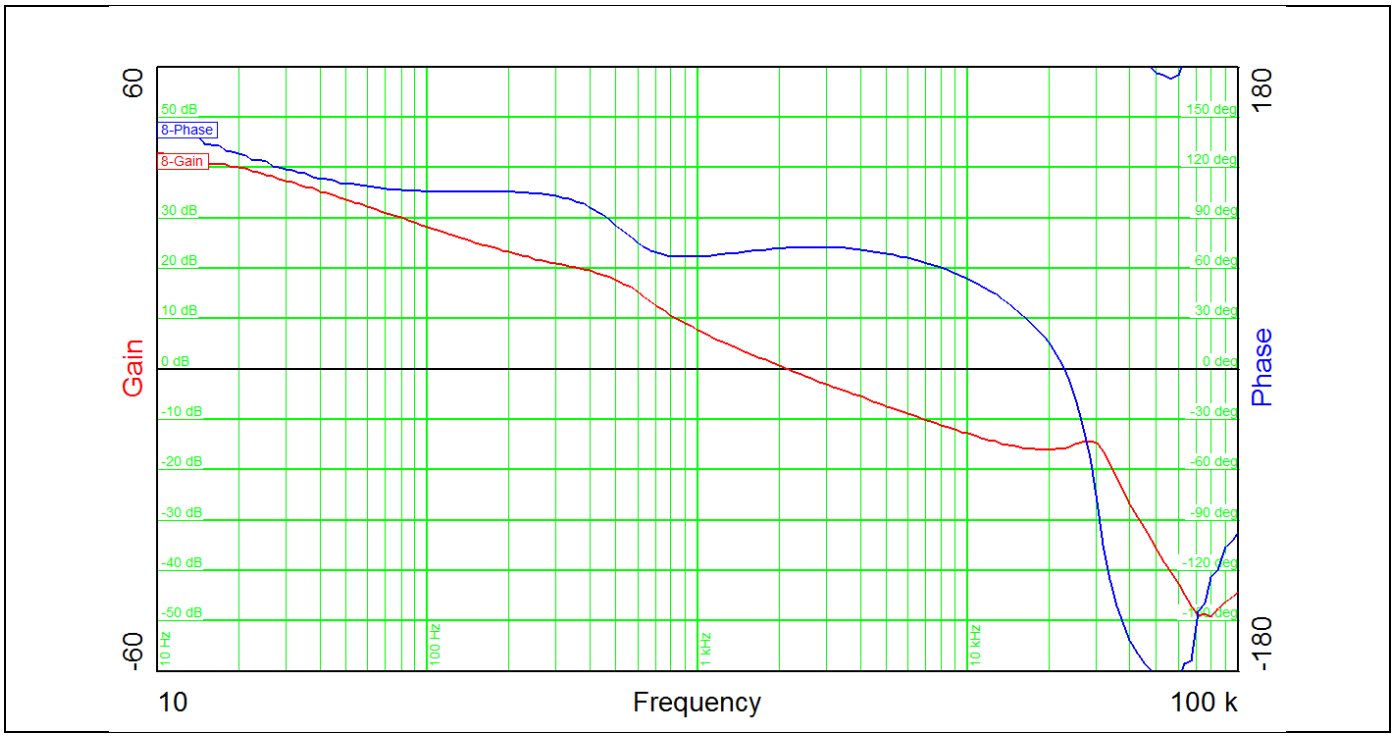


Figure 10

Table 1 summarizes the results:

	24V	12V
Bandwidth (kHz)	2.13	2.15
Phasemargin	70.7°	72°
slope (20dB/decade)	-1.2	-1
gain margin (dB)	-15.8	-15.7
slope (20dB/decade)	-0.74	-0.59
freq (kHz)	23.4	22.8

Table 1

8 Load Transients

The Figure 11 shows the response to load transients. The load is switching from 0.5A to 1A (200 Hz with electronic load 6060B).

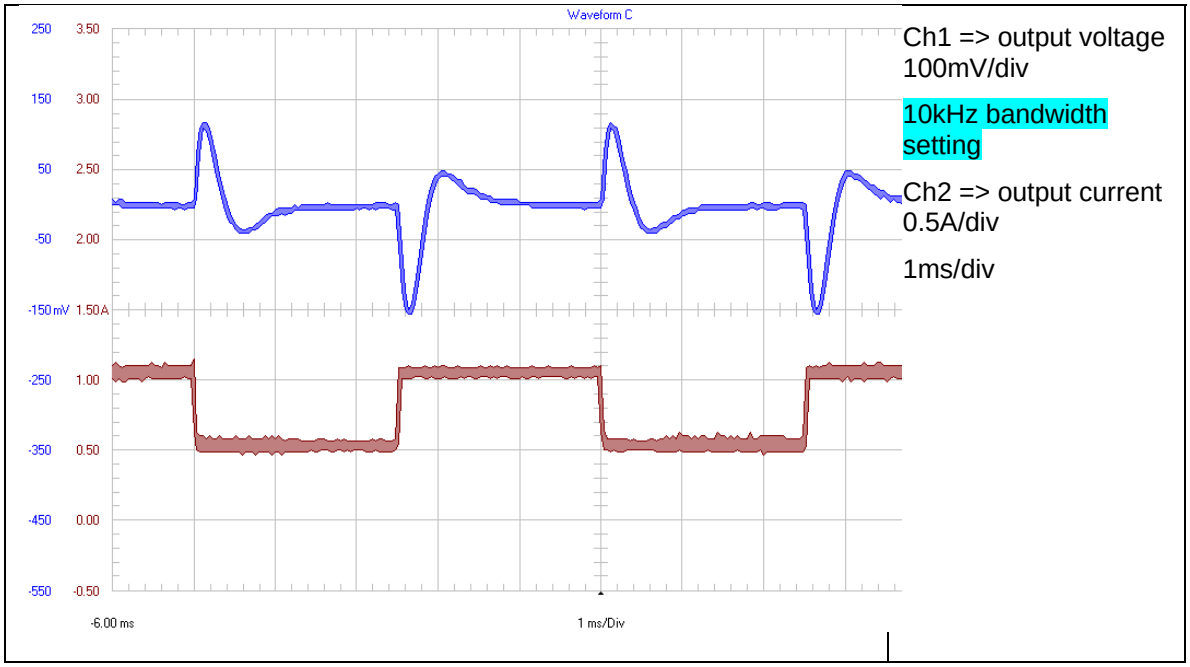
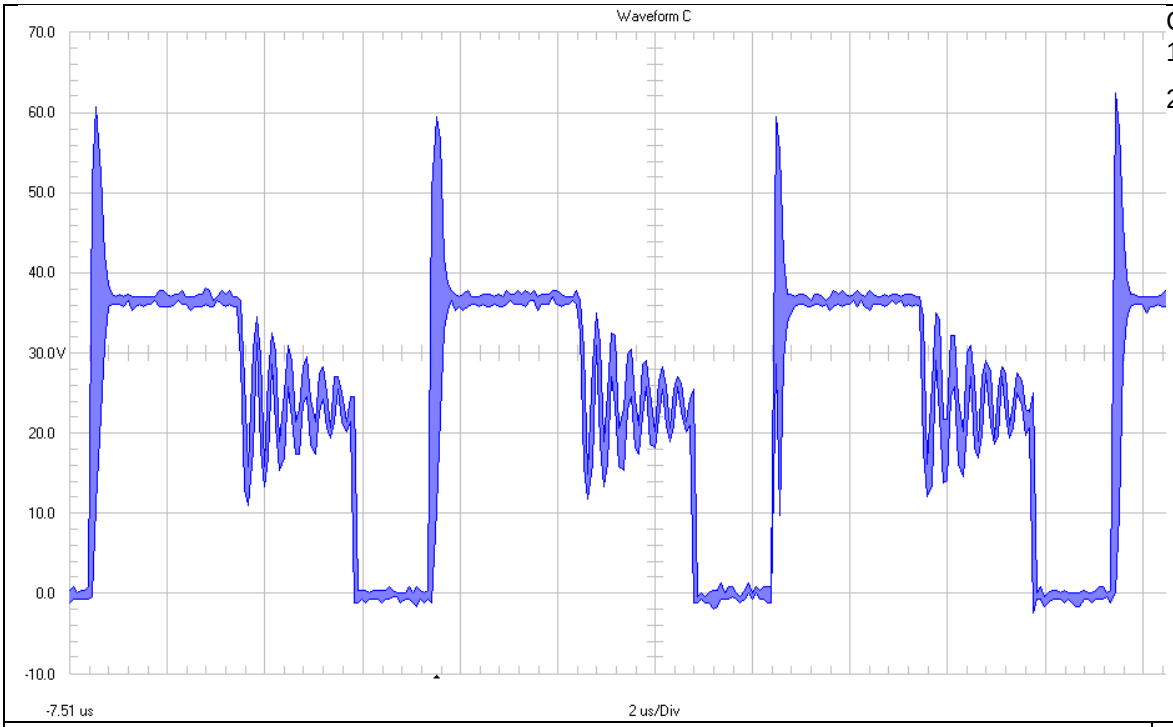


Figure 11

9 Miscellaneous Waveforms

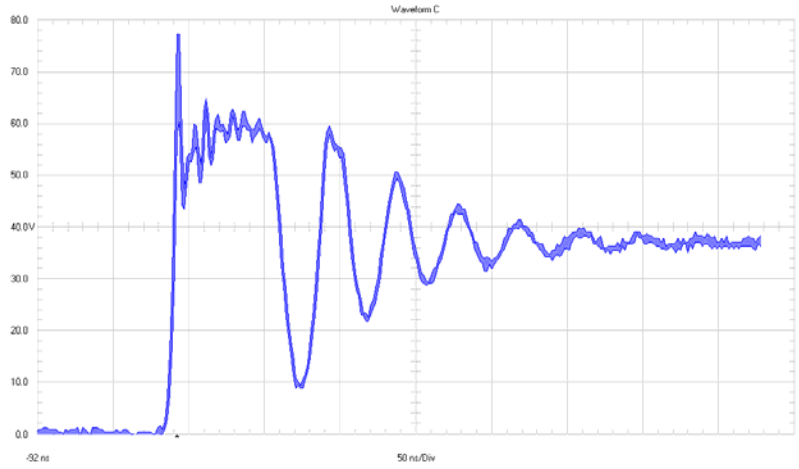
9.1 Switch

Waveform at the switchnode (Q1 to GND) is shown in Figure 12



Ch1 =>
10V/div

2µs/div



Ch1 =>
10V/div
50ns/div

Figure 12

9.2 Gate to GND

Waveform from gate to ground is shown in Figure 13

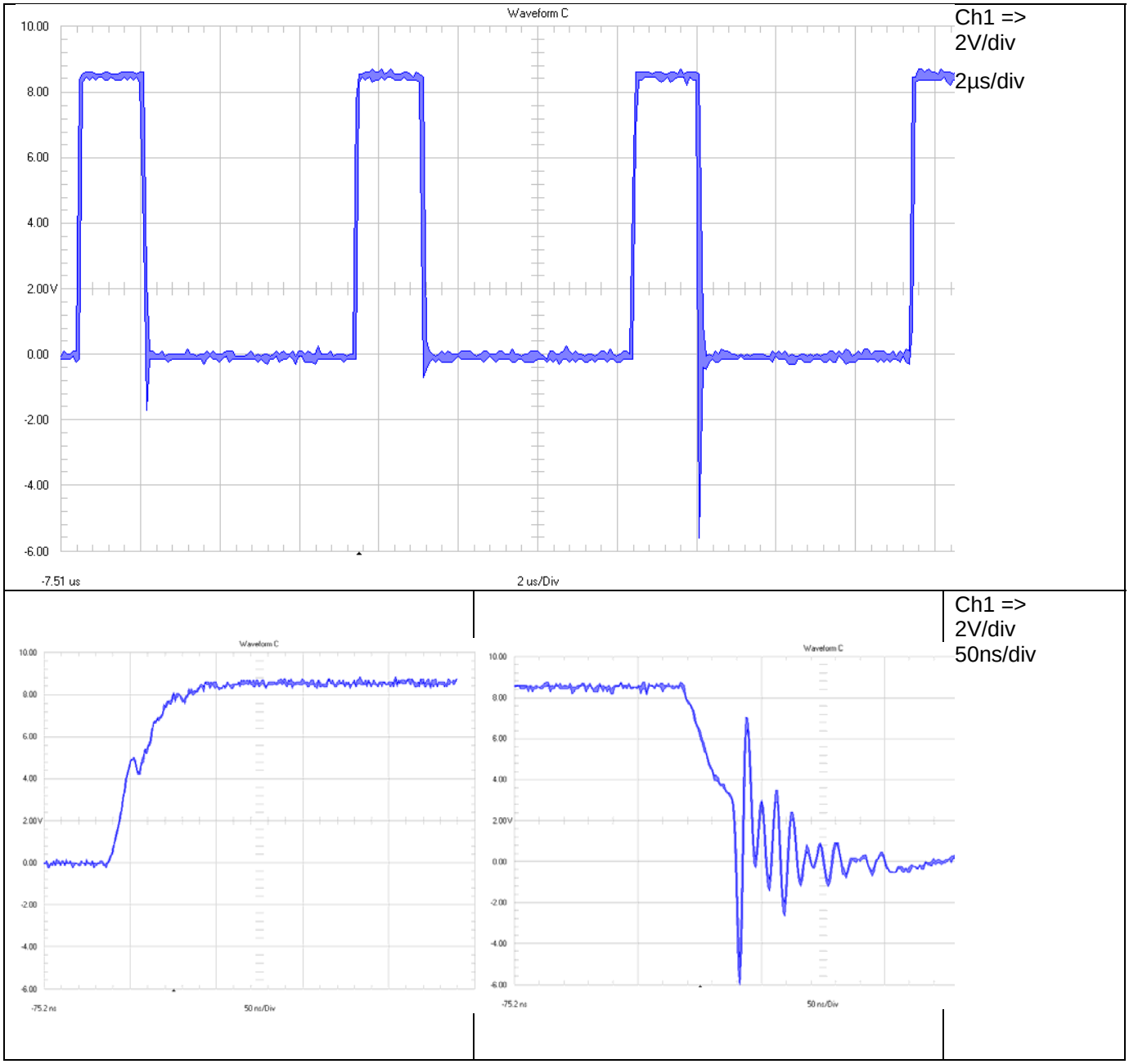


Figure 13

9.3 D1

Waveform at the Diode D1 is shown in Figure 14

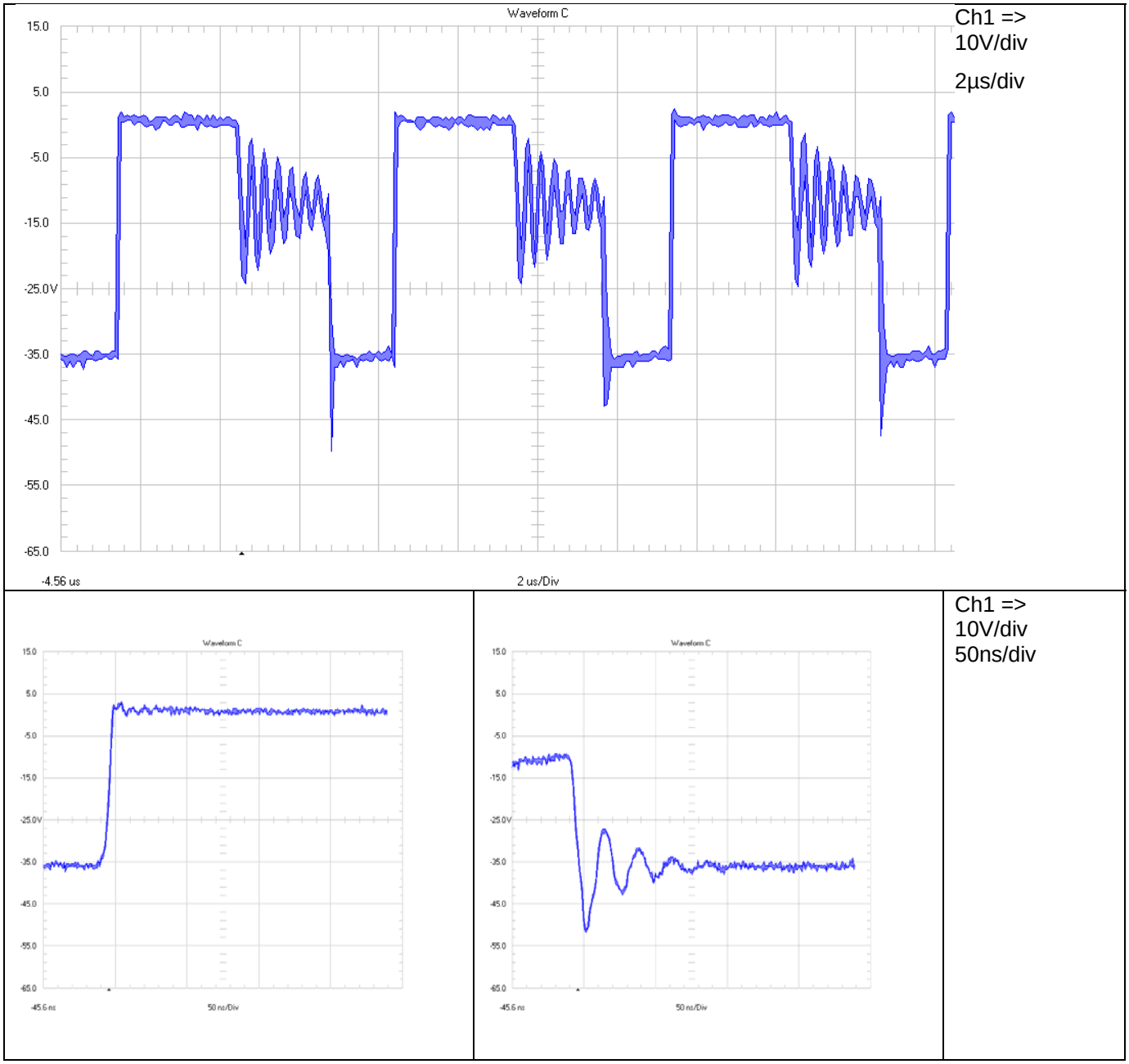
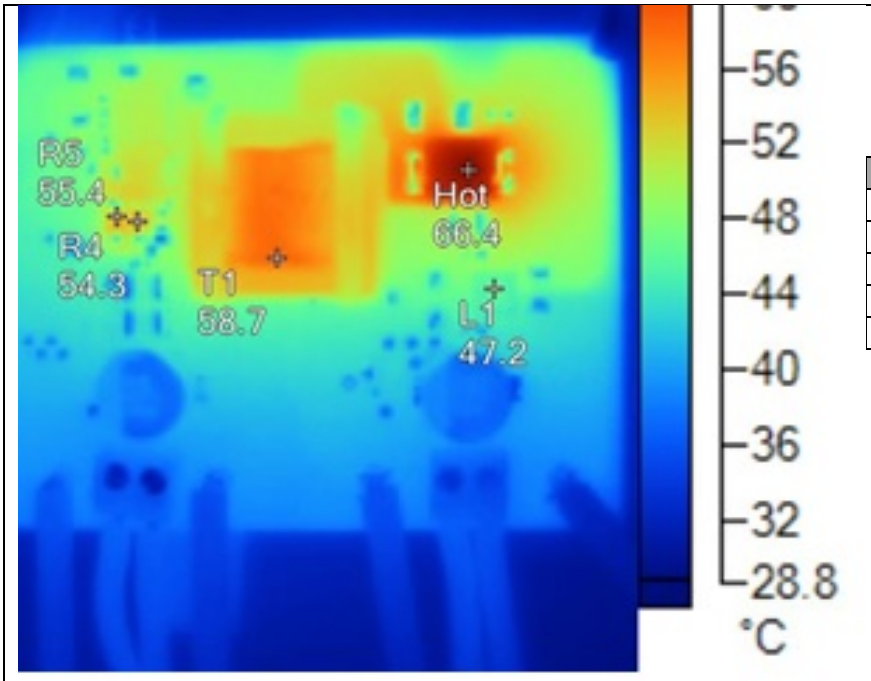


Figure 14

10 Thermal Images at Full Load 1A

10.1 Commercial Transformer WE 750317023 final RevC

Thermal image is shown in Figure 15, 24Vin / 1Aout / >20mins

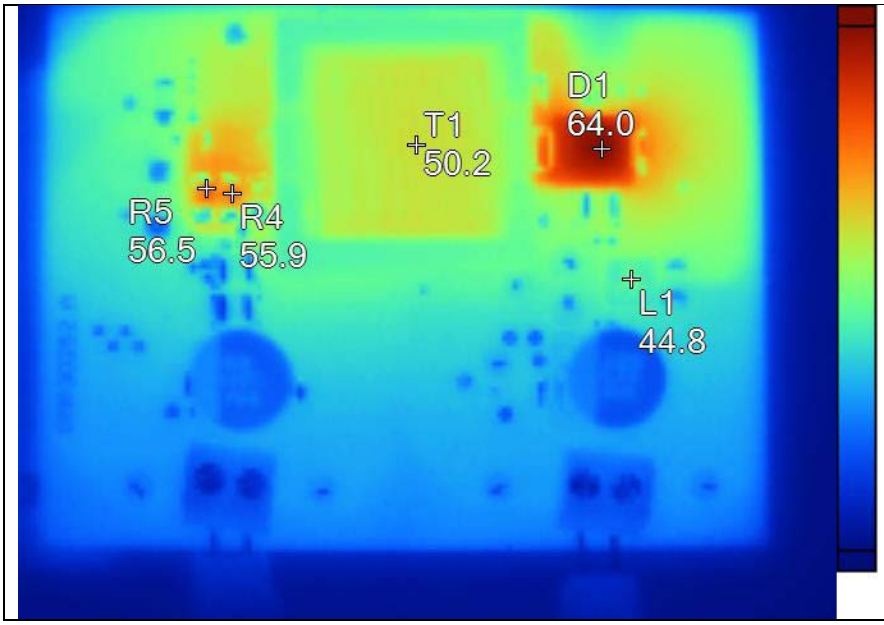


Name	Temperature
D1	66.4°C
L1	47.2°C
R4	54.3°C
R5	55.4°C
T1	58.7°C

Figure 15, excellent thermal performance by small WE transformer

10.2 Handcrafted Transformer RevB

Thermal image is shown in Figure 16, 24Vin / 1Aout / >20mins



Name	Temperature
D1	64.0°C
T1	50.2°C
R5	56.5°C
R4	55.9°C
L1	44.8°C

Figure 16

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