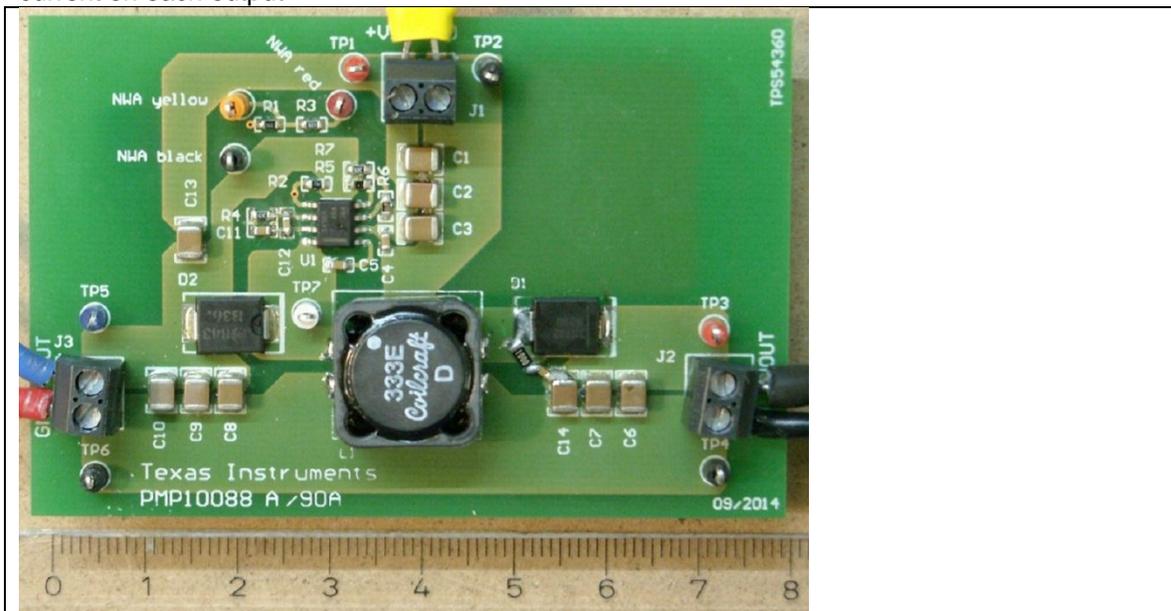


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Topology: Inverting Buck-Boost (dual outputs negative and positive).

Device: TPS54340

Unless otherwise mentioned all measurements were done with 12V input voltage and 0.7A output current on each output



1 Startup

The startup waveform is shown in the Figure 1. The input voltage was set at 12V, with 0.7A load at the output on each output. Power supply was connected.

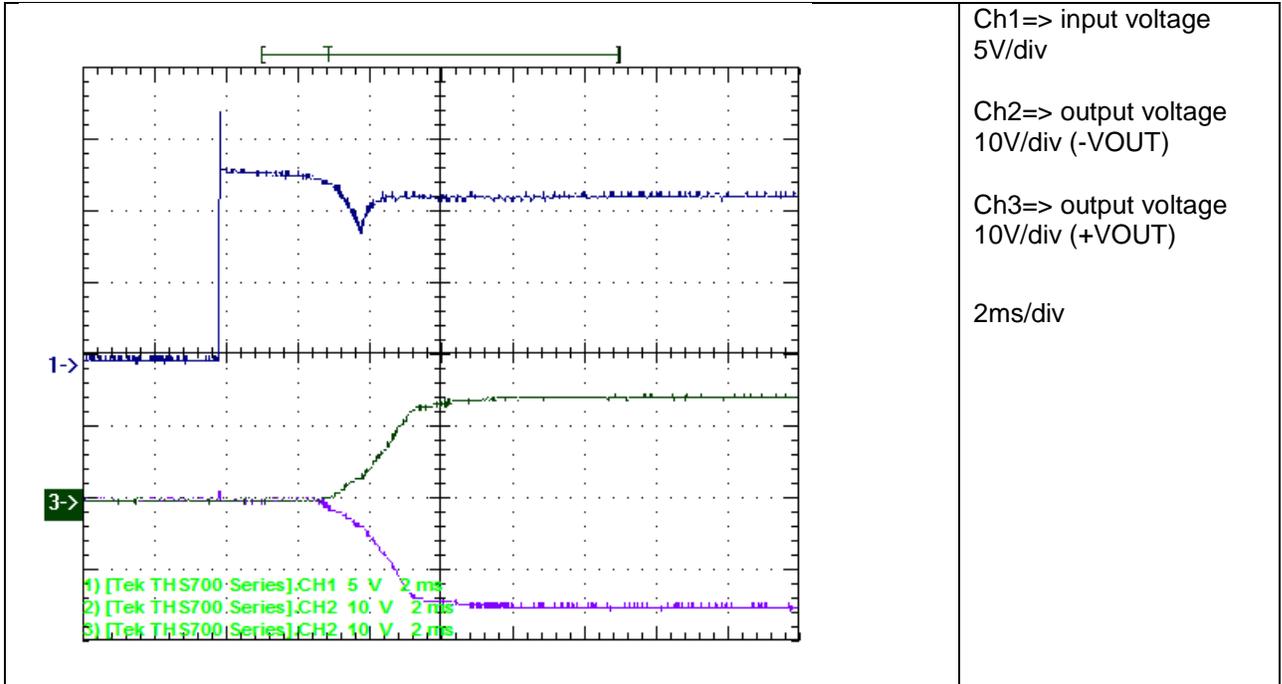


Figure 1

2 Shutdown

The shutdown waveform is shown in the Figure 2. The input voltage was set at 12V, with 0.7A load on each output. Power supply was disconnected.

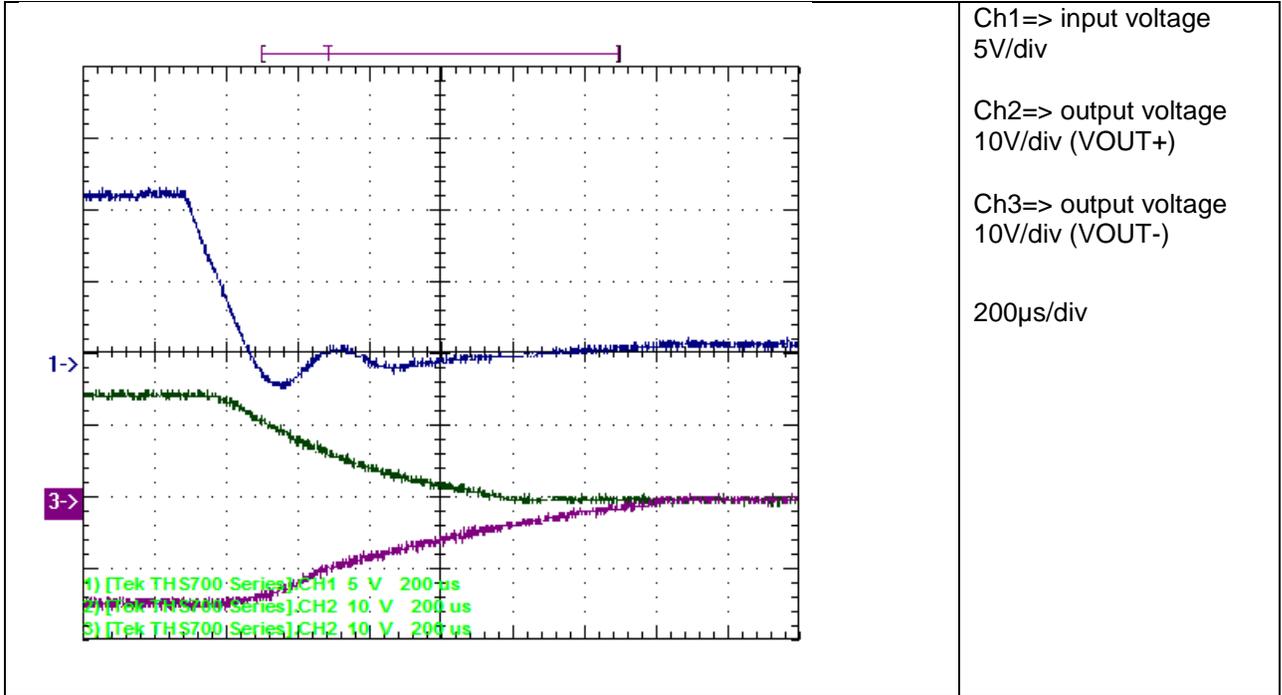


Figure 2

3 Efficiency

The efficiency is shown in the Figure 3 below. The input voltage was set to 12V. The output currents were changed together ($-I_{OUT} = +I_{OUT}$). The discontinuity in the curve reflects the transition from discontinuous to continuous mode.

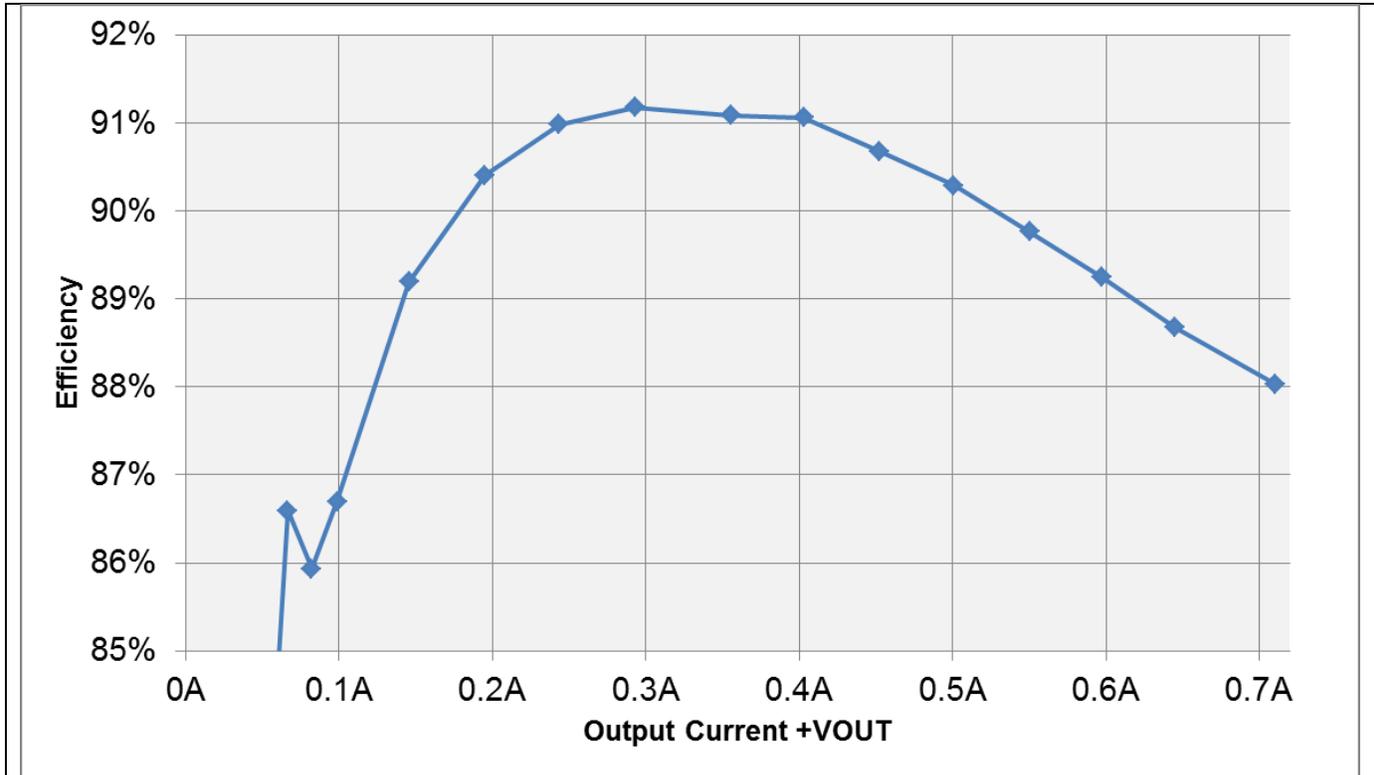


Figure 3

4 Load Regulation

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

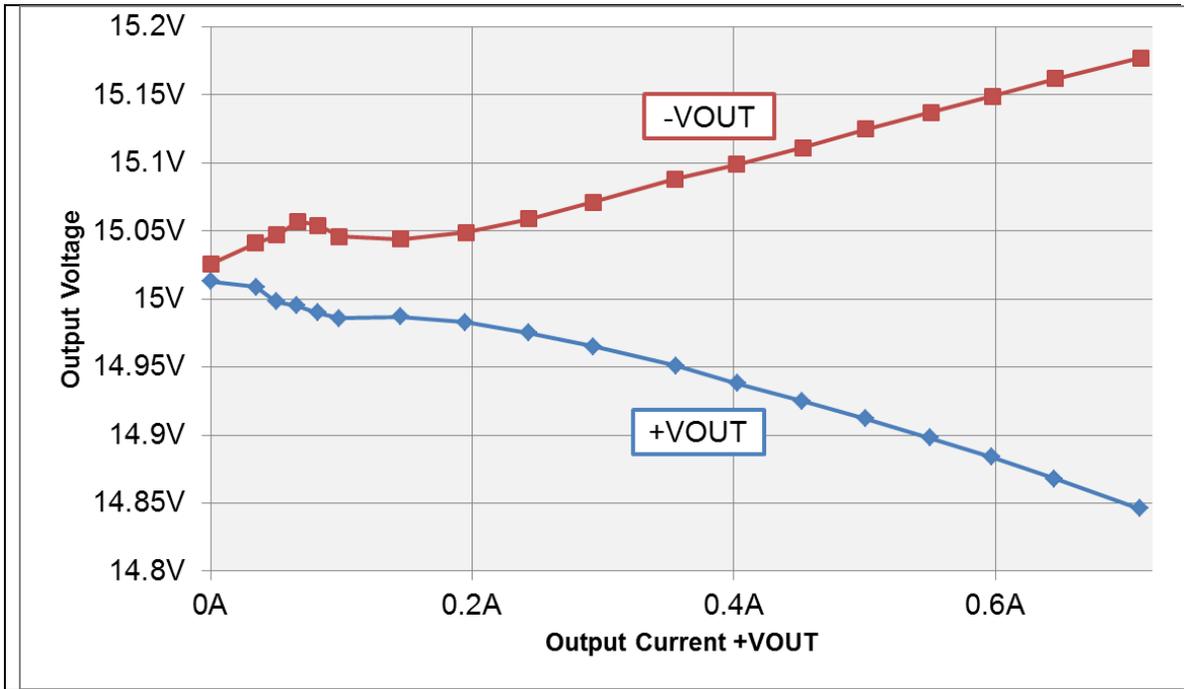


Figure 4

5 Line Regulation

Line regulation at 0.7A output current is shown in Figure 5

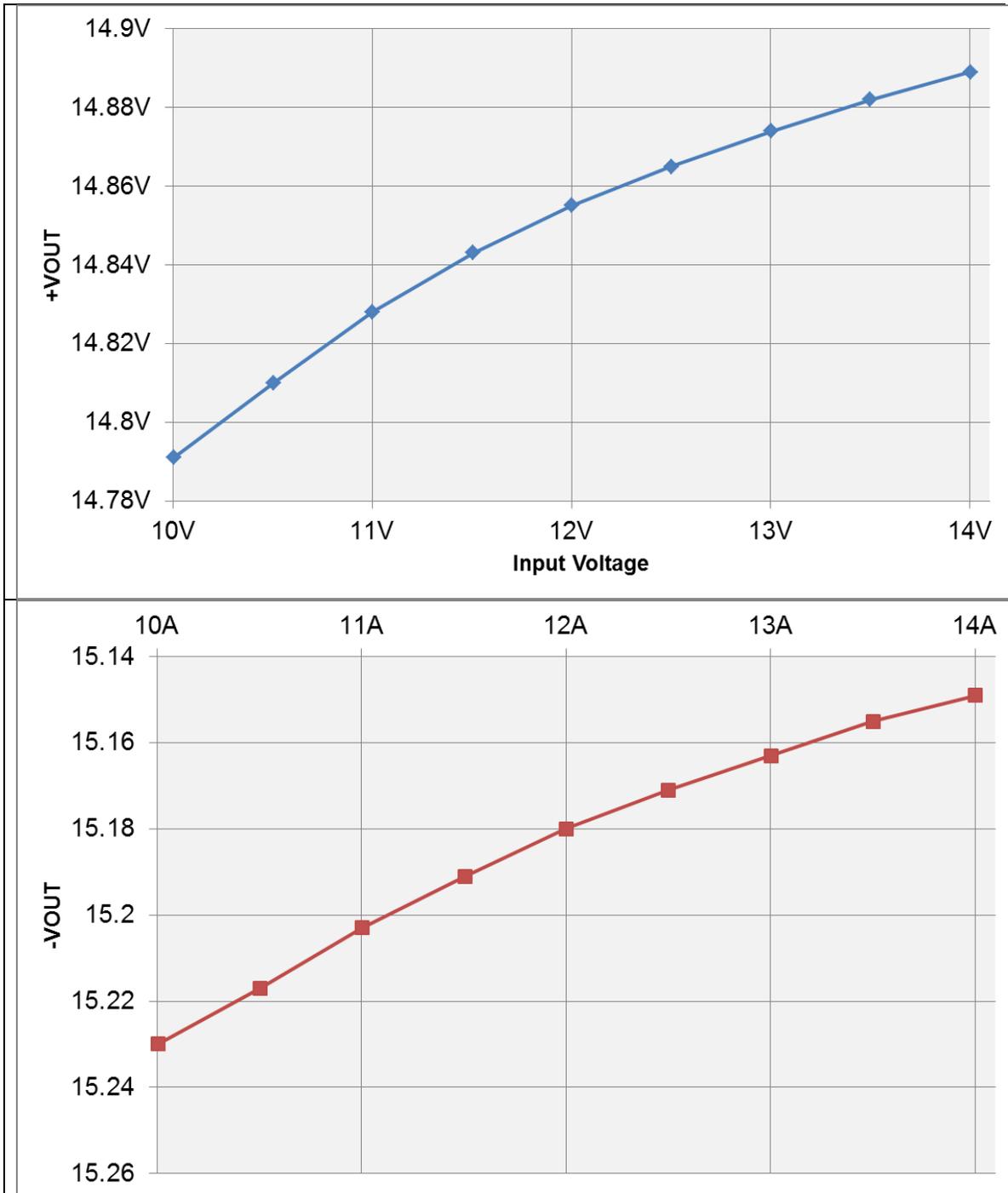


Figure 5

With the same measurement the full load efficiencies across input voltage were calculated

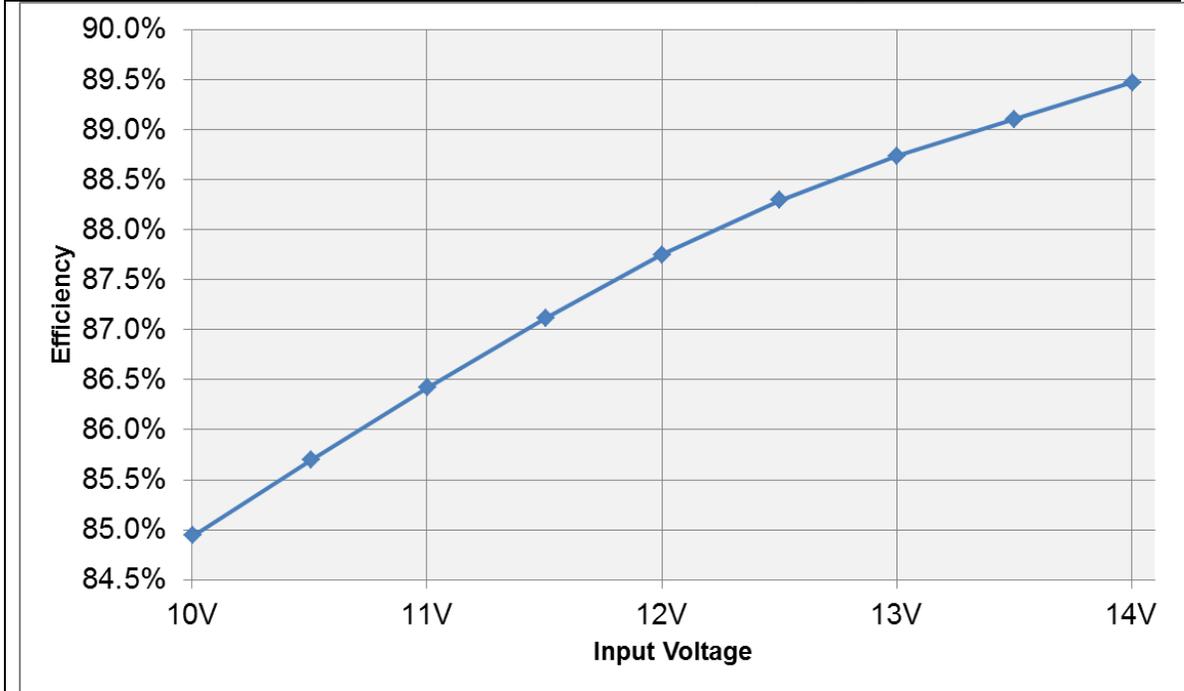


Figure 6

6 Cross Regulation

The output currents were changed separately (0A, 0.2A, 0.4A, 0.7A)

Figure 7 shows the effects on the positive output voltage, if the negative output current is varied. The different curves represent the positive output current settings

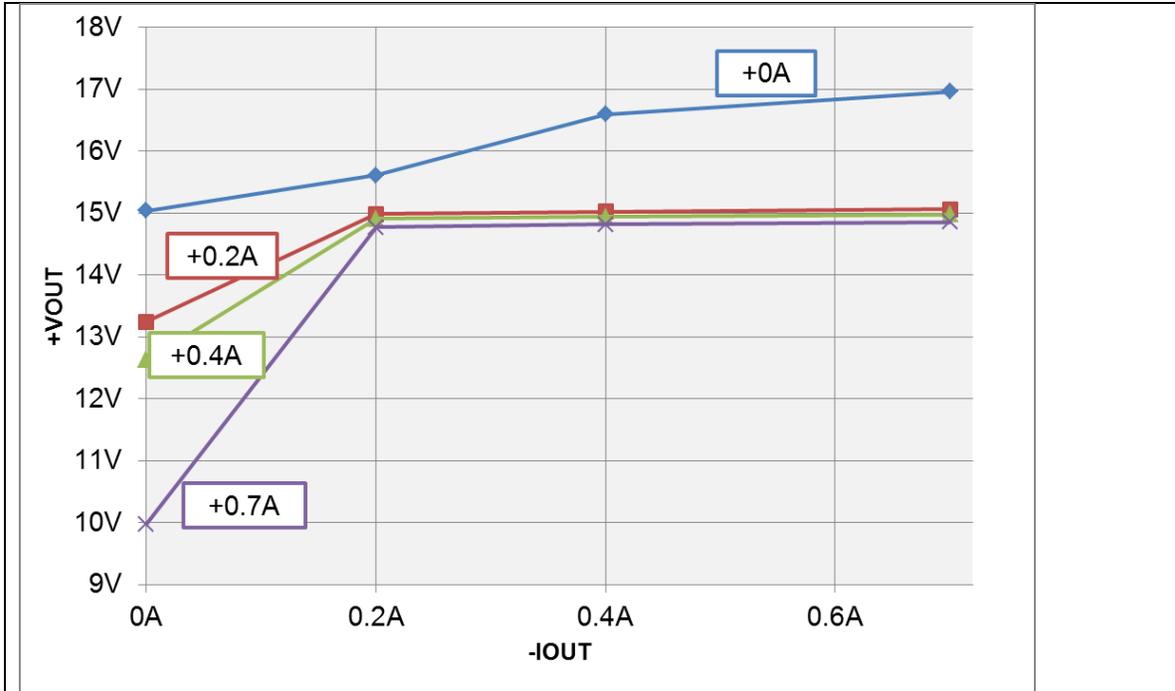


Figure 7

Figure 8 shows the effects on the negative output voltage, if the positive output current is varied. The different curves represent the negative output current settings.

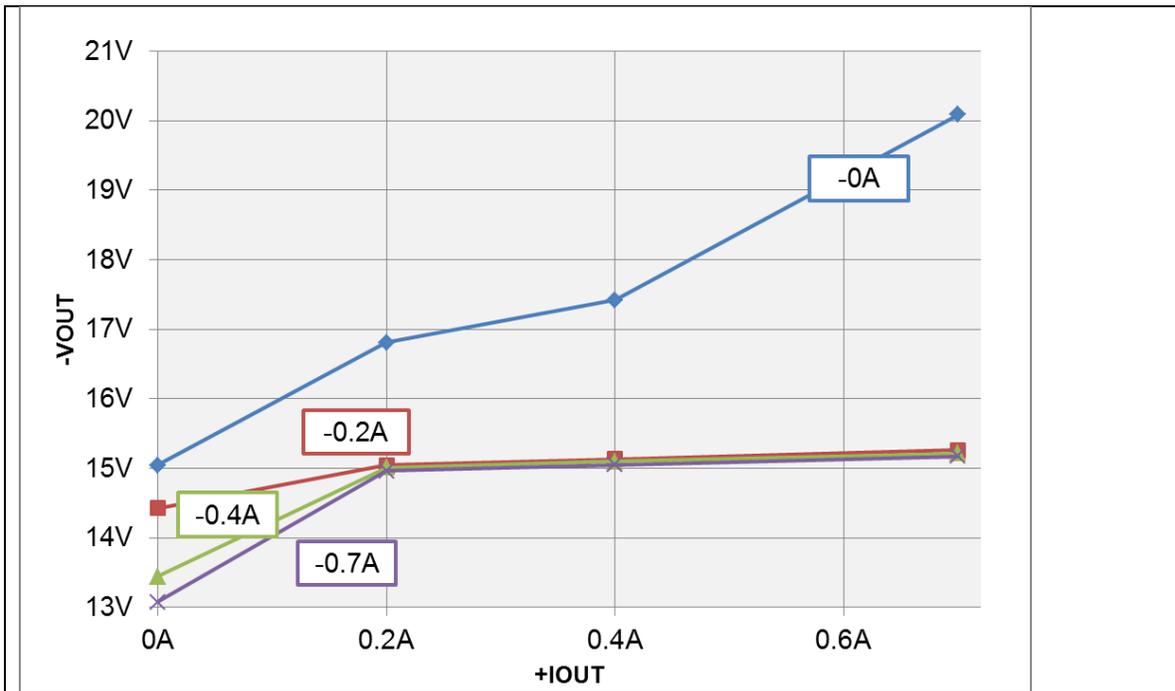


Figure 8

7 Ripple Voltage

7.1 Positive Output

The output ripple voltage is shown in Figure 9. The image was taken with a 0.7A and 12V at the input.

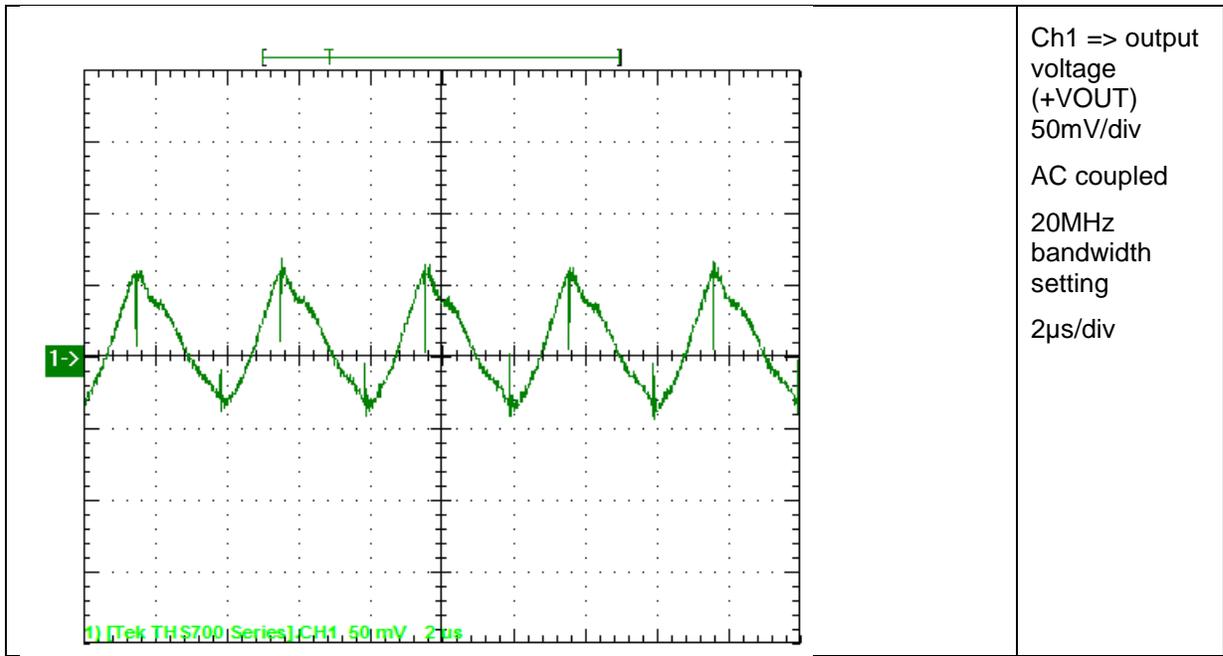


Figure 9

Positive output voltage ripple is at full load is <1%

7.2 Negative Output

The negative output ripple voltage is shown in Figure 10. The image was taken with a 0.7A load 12V at the input.

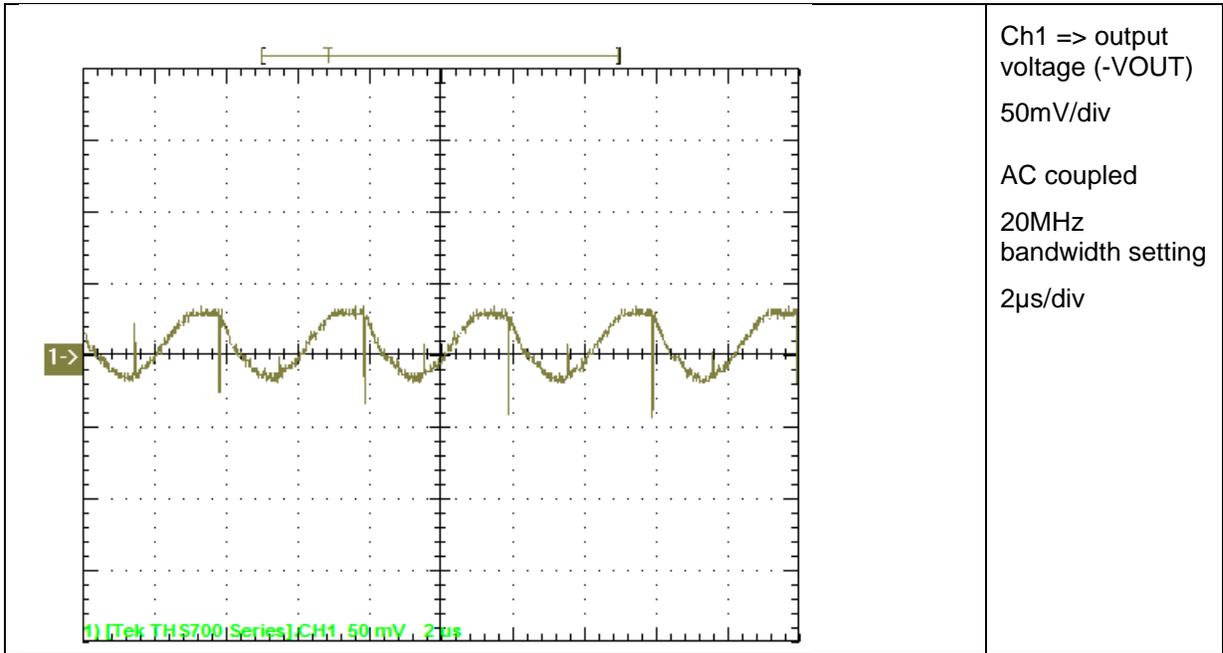


Figure 10

Negative output voltage ripple at full load is <1%

7.3 Input Voltage

The input ripple voltage is shown in Figure 11.

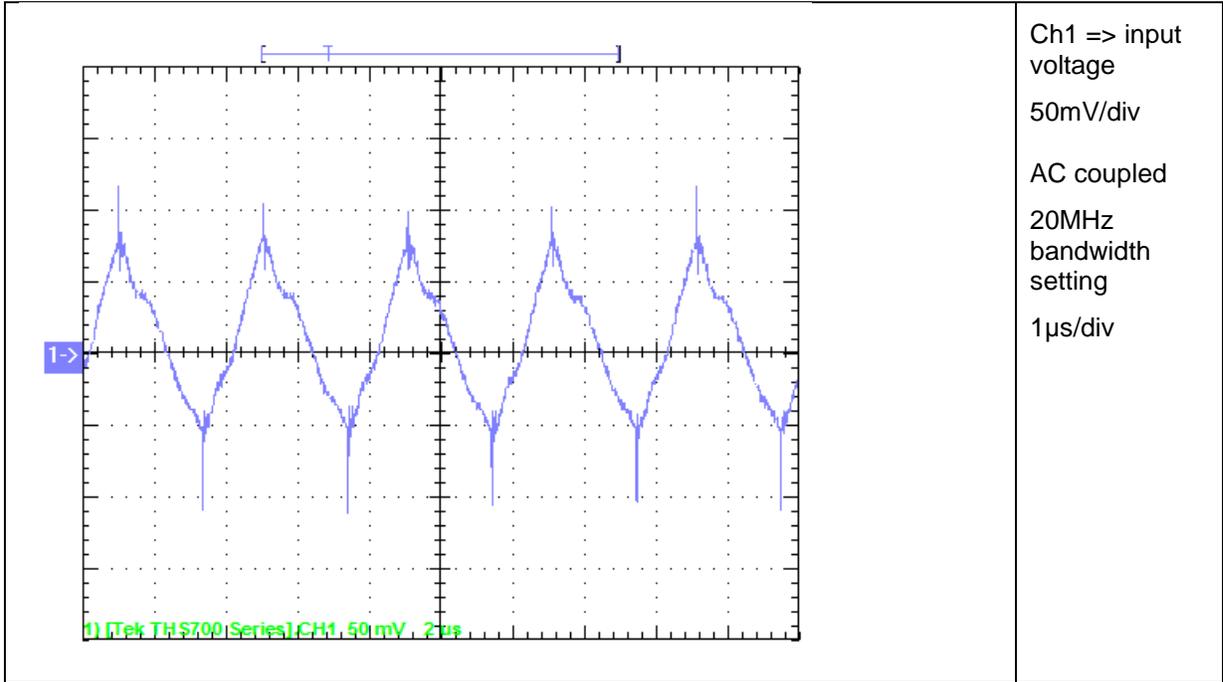


Figure 11

8 Control Loop Frequency Response

Figure 12 shows the loop response with 0.7A load and 12V input.

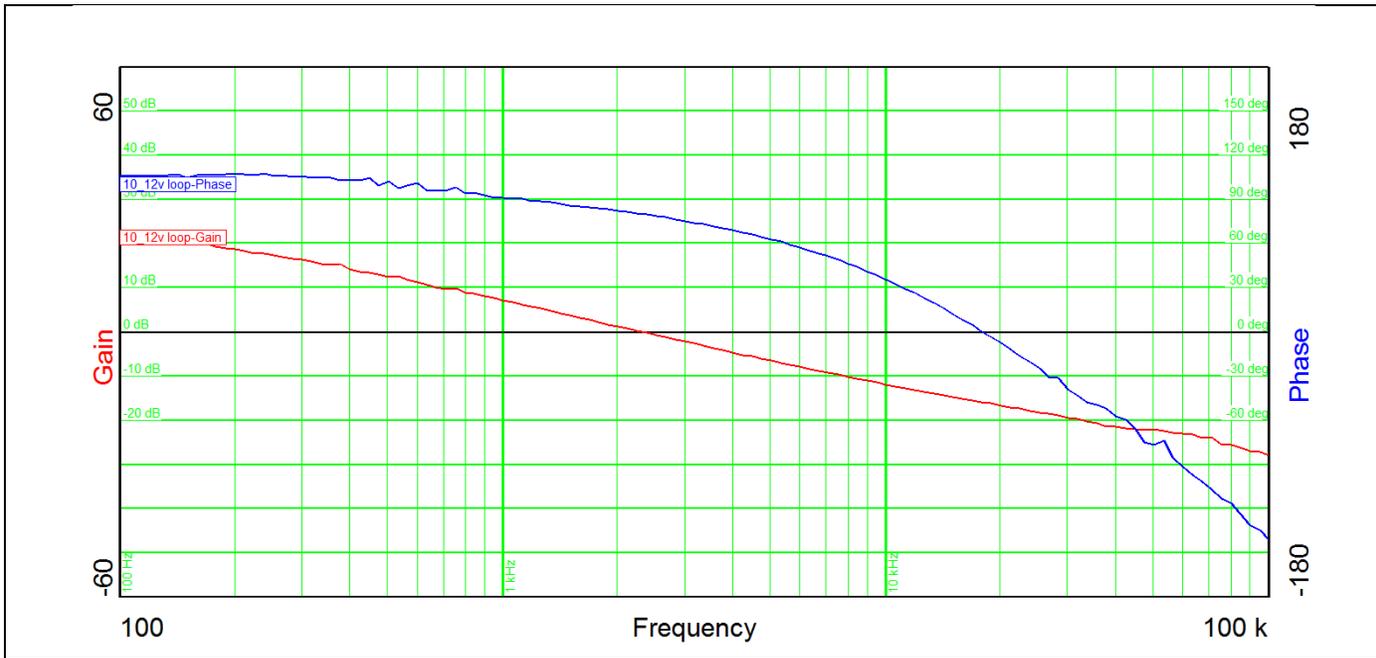


Figure 12

Table 1 summarizes the results

	12V
Bandwidth (kHz)	2.33
Phasemargin	79.8°
slope (20dB/decade)	-0.99
gain margin (dB)	-15.9
slope (20dB/decade)	-0.72
freq (kHz)	18

Table 1

9 Load Transients

9.1 Transient applied at negative VOUT (-VOUT)

The Figure 13 shows the response to load transients. The load is switching from 0.35A to 0.7A (50 Hz). Negative VOUT was measured

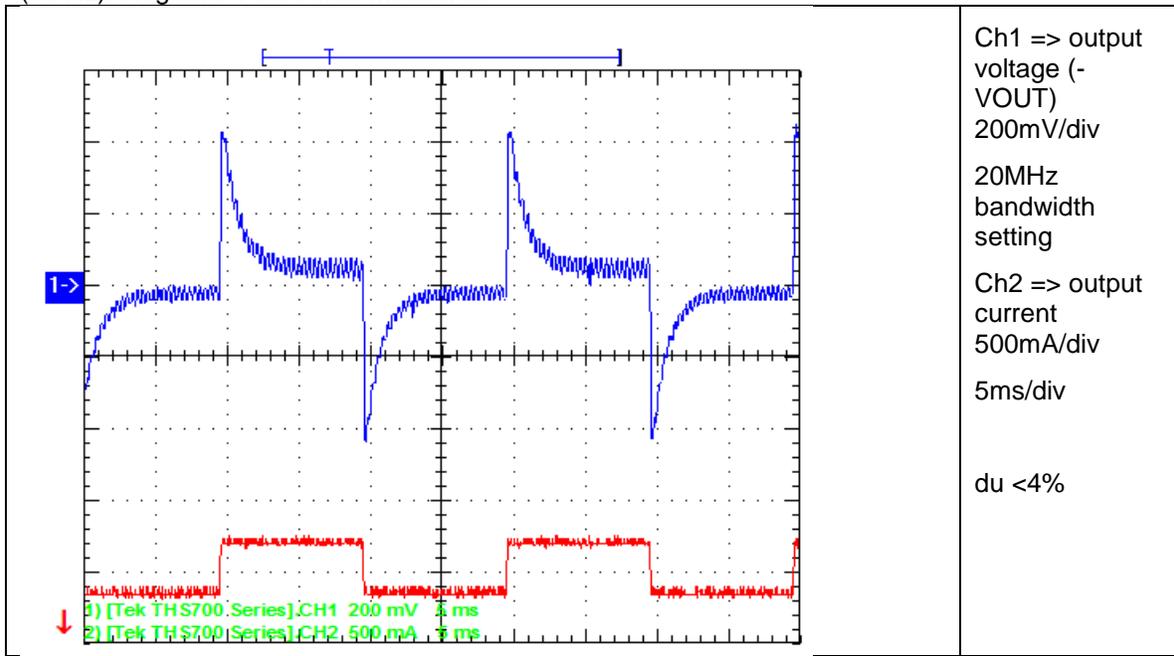


Figure 13

The Figure 14 shows the response to load transients. The load is switching from 0.35A to 0.7A (50 Hz). Positive VOUT was measured

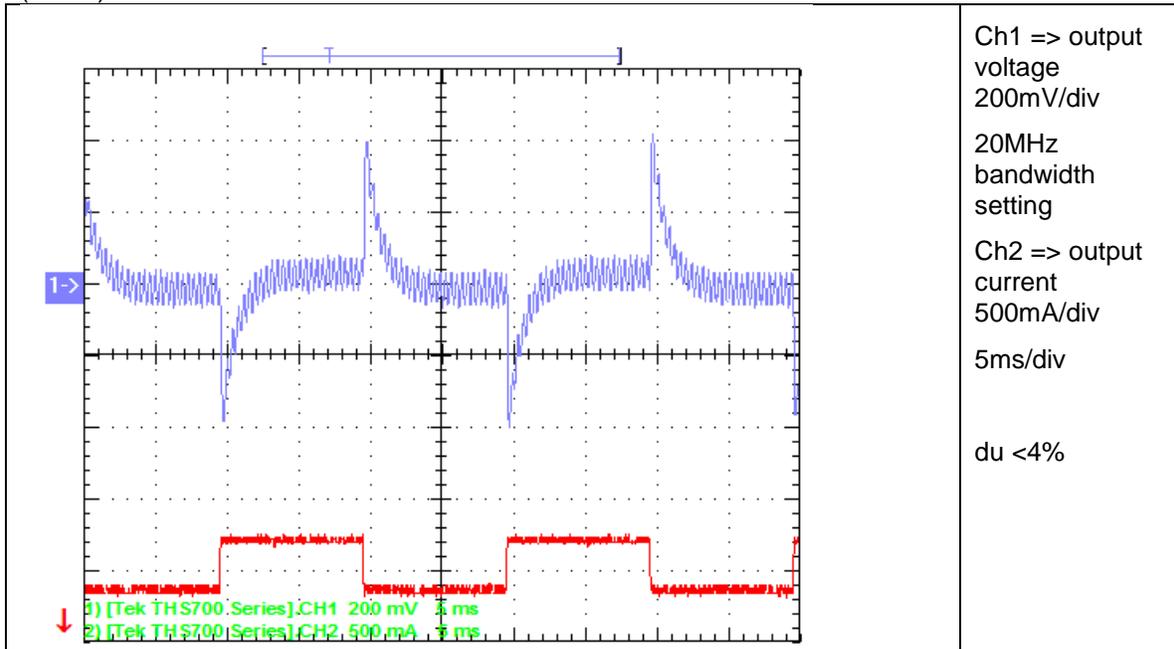


Figure 14

9.2 Transient applied at positive VOUT (+VOUT)

The Figure 13 shows the response to load transients. The load is switching from **0.34A to 0.86A** (load precision !) (50 Hz). Negative VOUT was measured

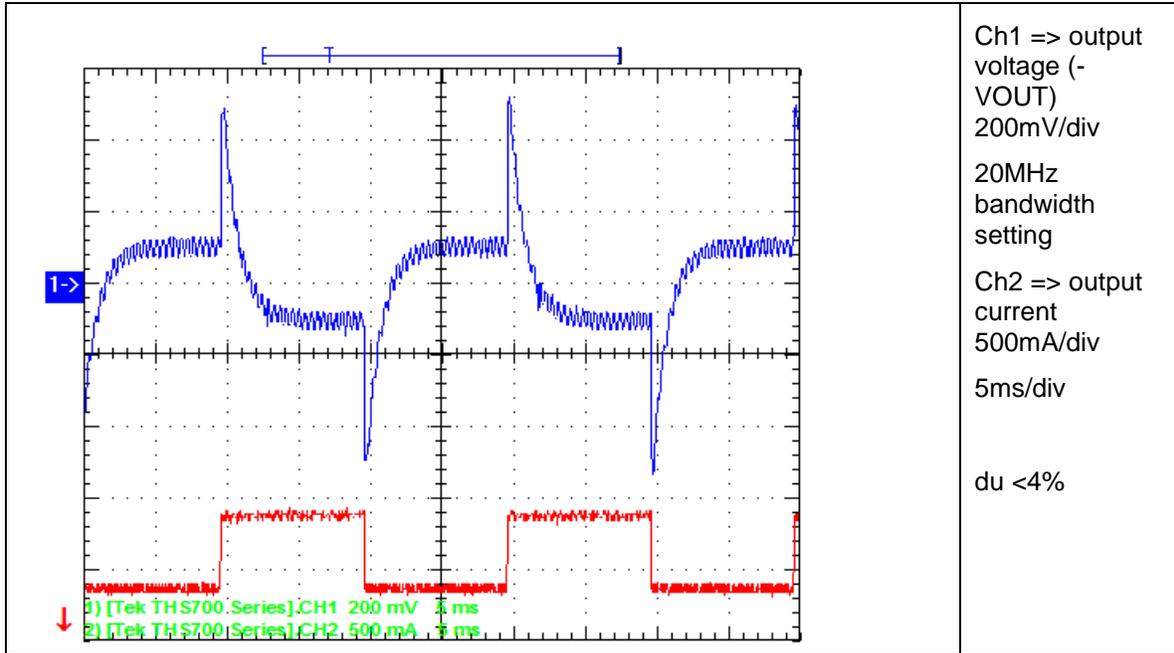


Figure 15

The Figure 14 shows the response to load transients. The load is switching from **0.34A to 0.86A** (50 Hz). Positive VOUT was measured

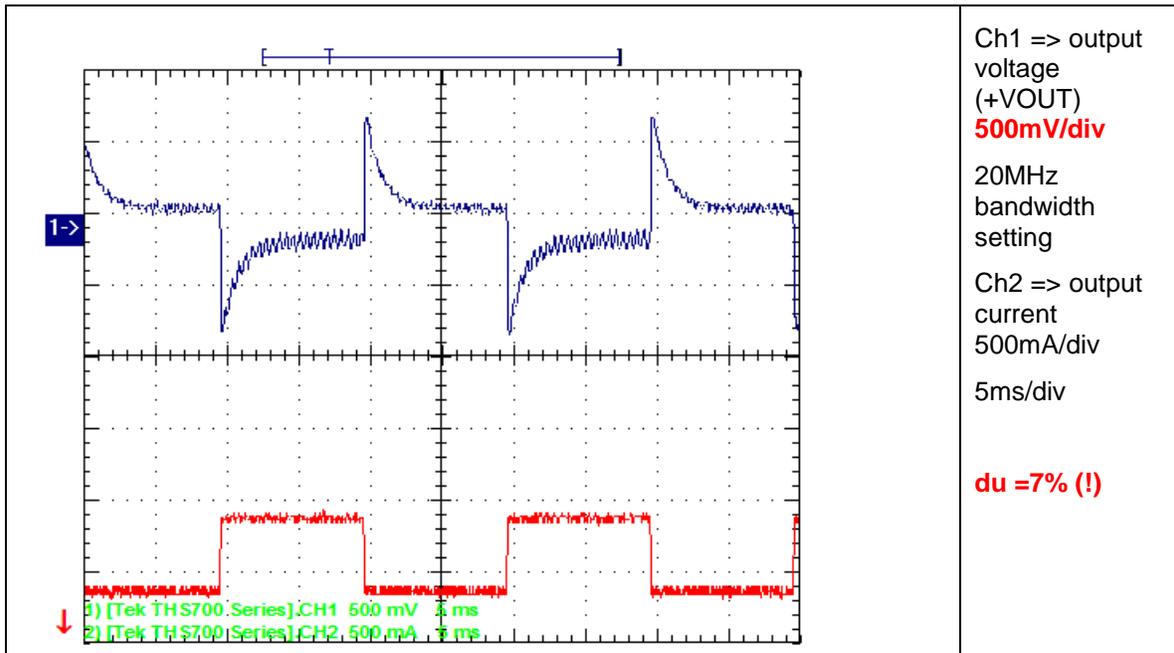


Figure 16

For better transient response just increase output capacitance.

10 Miscellaneous Waveforms

Switch node ("SW" to -VOUT)) waveform shown in Figure 17

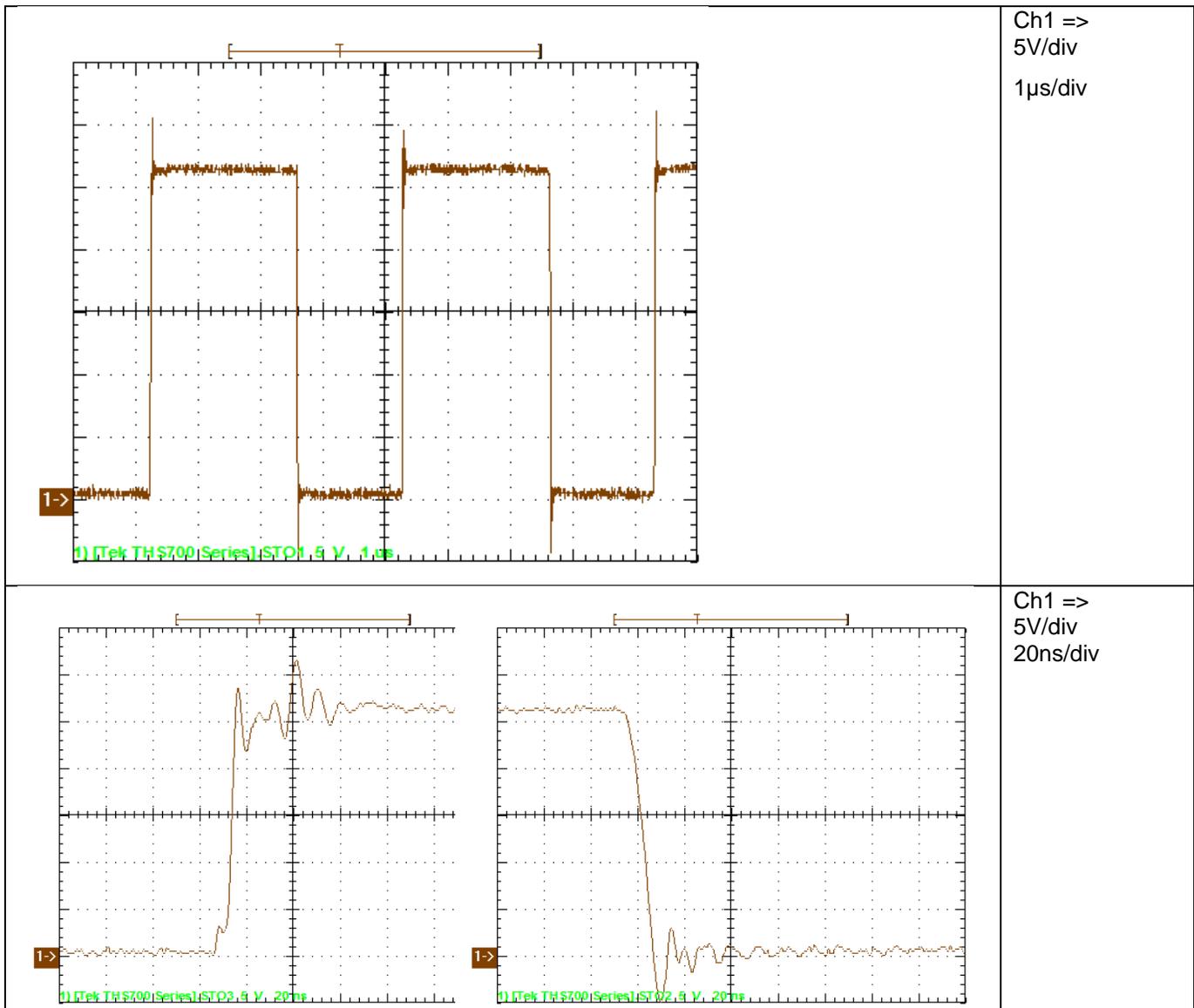


Figure 17

"Secondary" switchnode (measured at the inductor pads): the waveform is shown in **Figure 19**.

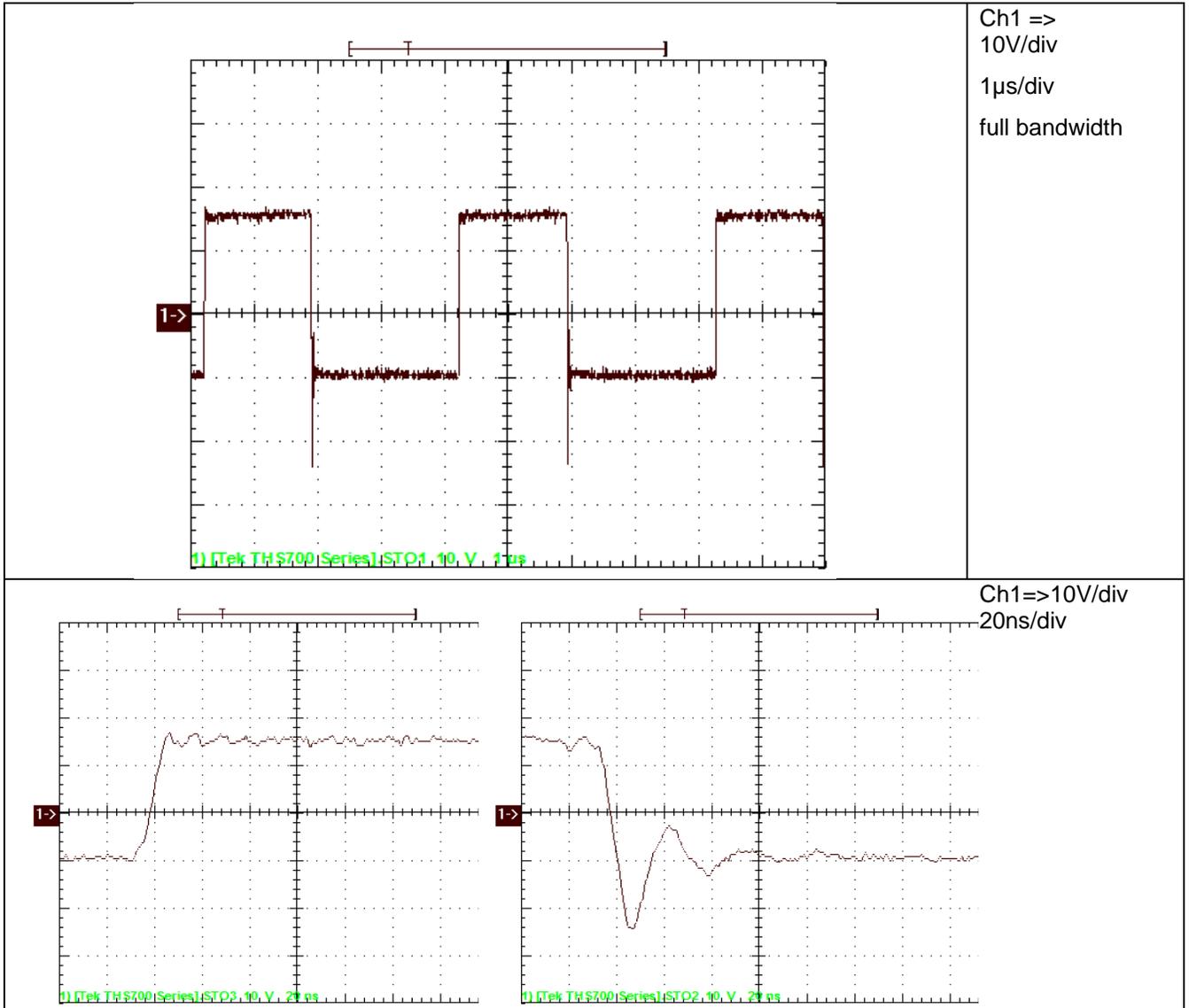


Figure 19

Secondary switchnode (SW2 to +VOUT) the waveform is shown in Figure 20.

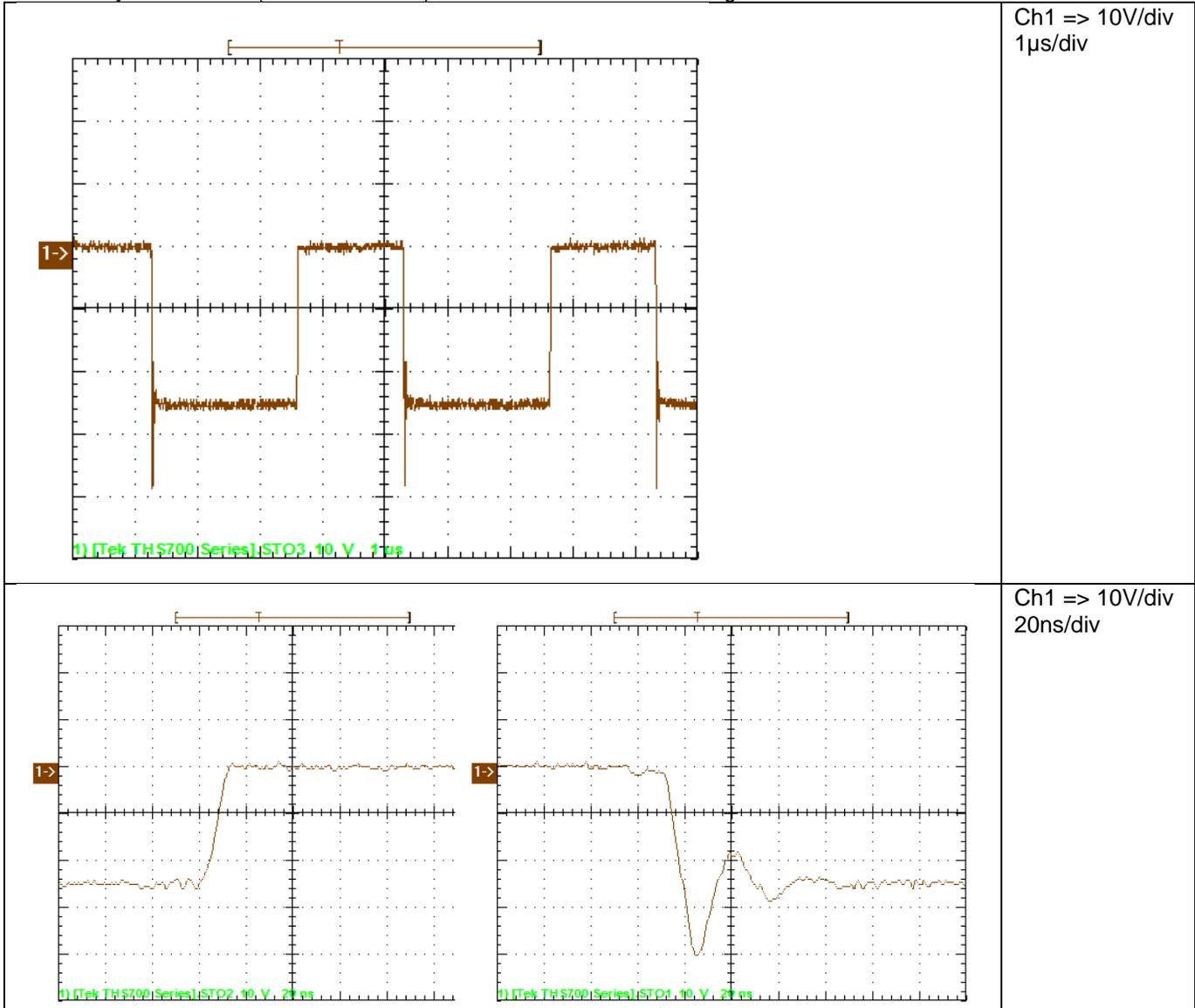


Figure 20

11 Thermal Image

Thermal image is shown in Figure 21. Input voltage was set to 12V and output current **0.5A** on each channel, thermal pic taken after 1hr operation, $dT = 40K$ at U1:

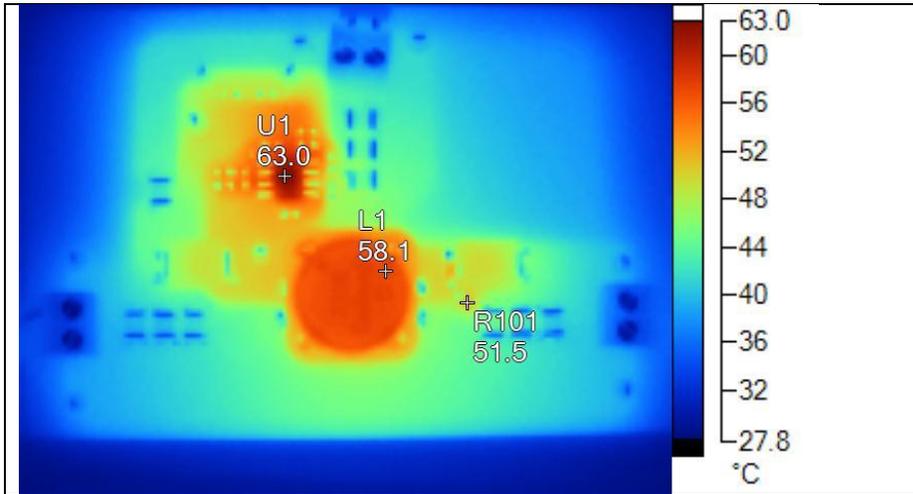


Figure 21

Name	Temperature
U1	63.0°C
L1	58.1°C
R101	51.5°C

Table 2

Continuous full load operation 2x 700mA at ambient temperature +85c needs forced cooling >100lfm / 0.5m/s.

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