

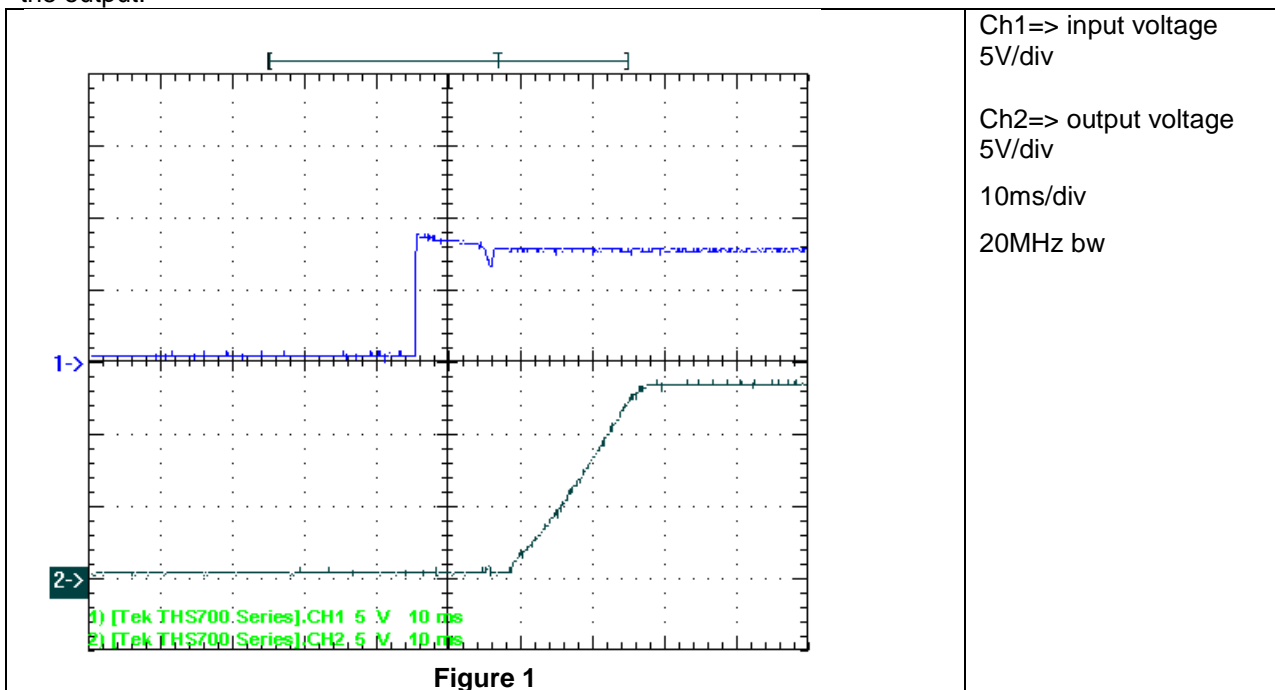
PMP8709RevC Test Results

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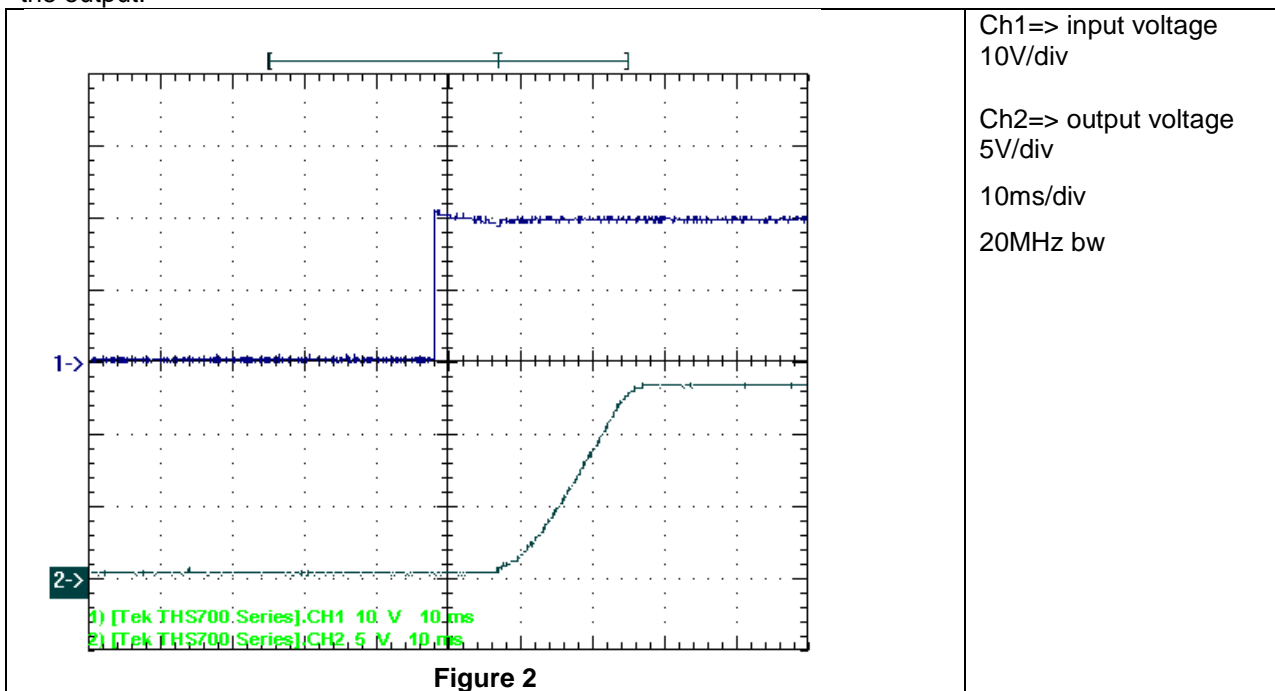
Topology: SEPIC
Device: TPS40210

1 Startup

The startup waveform is shown in the Figure 1. The input voltage was set at 8V, with 2A load at the output.

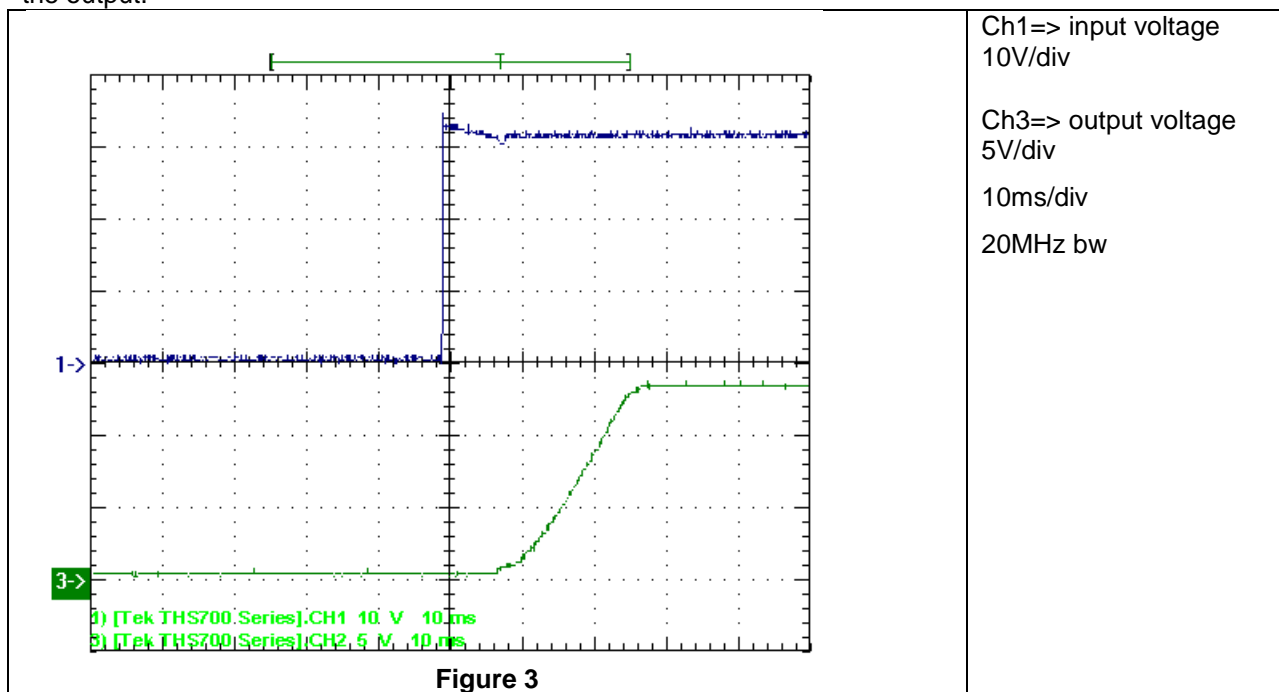


The startup waveform is shown in the Figure 2. The input voltage was set at 20V, with 2A load at the output.



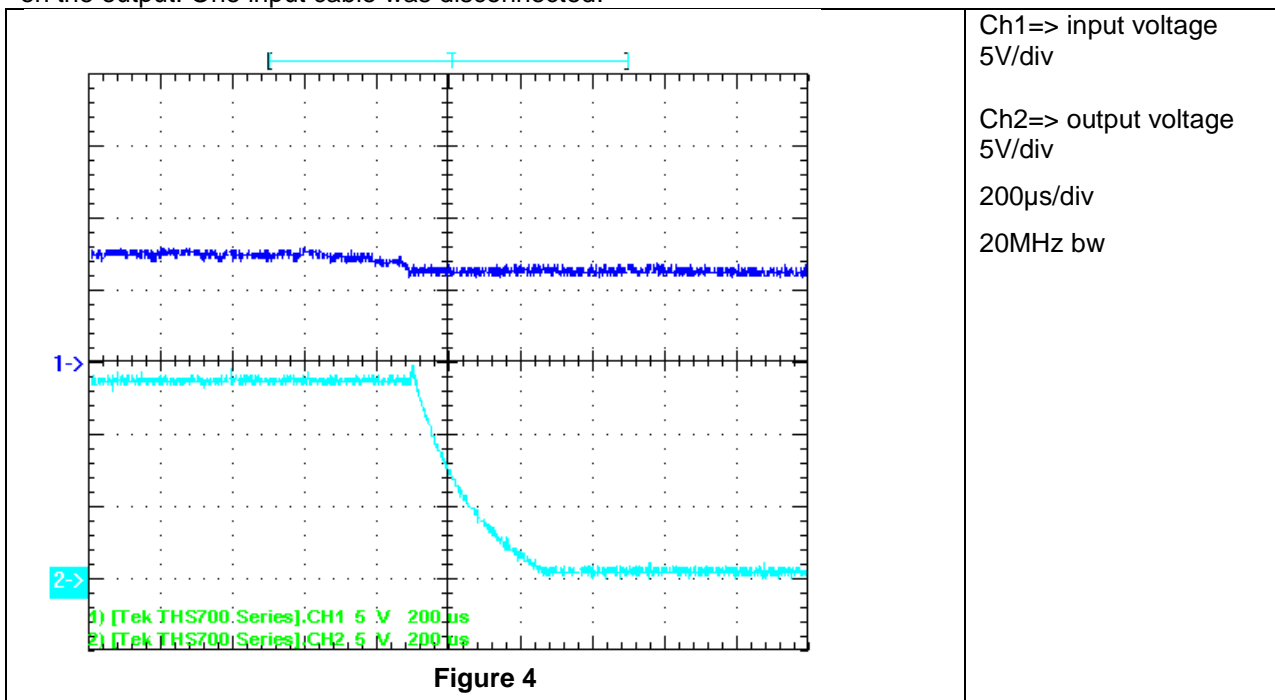
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The startup waveform is shown in the Figure 3. The input voltage was set at 32V, with 2A load at the output.

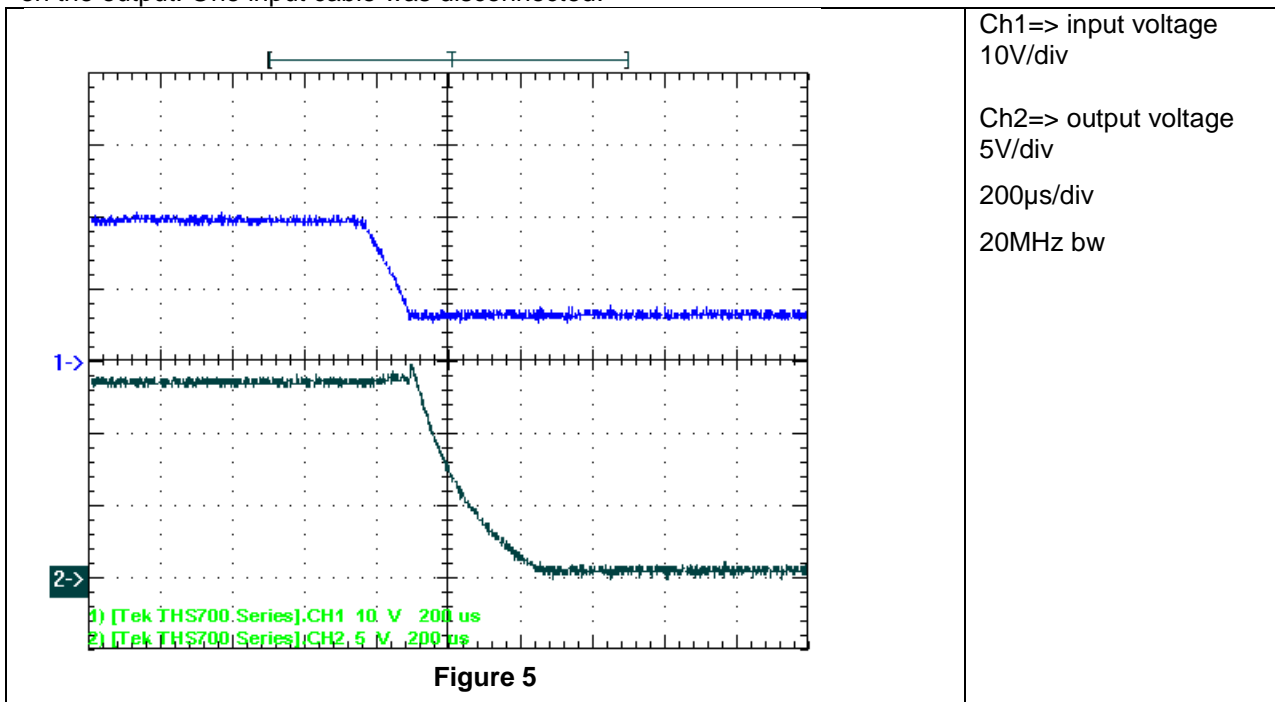


2 Shutdown

The shutdown waveform is shown in the Figure 4. The input voltage was set at 8V, with 2A load on the output. One input cable was disconnected.

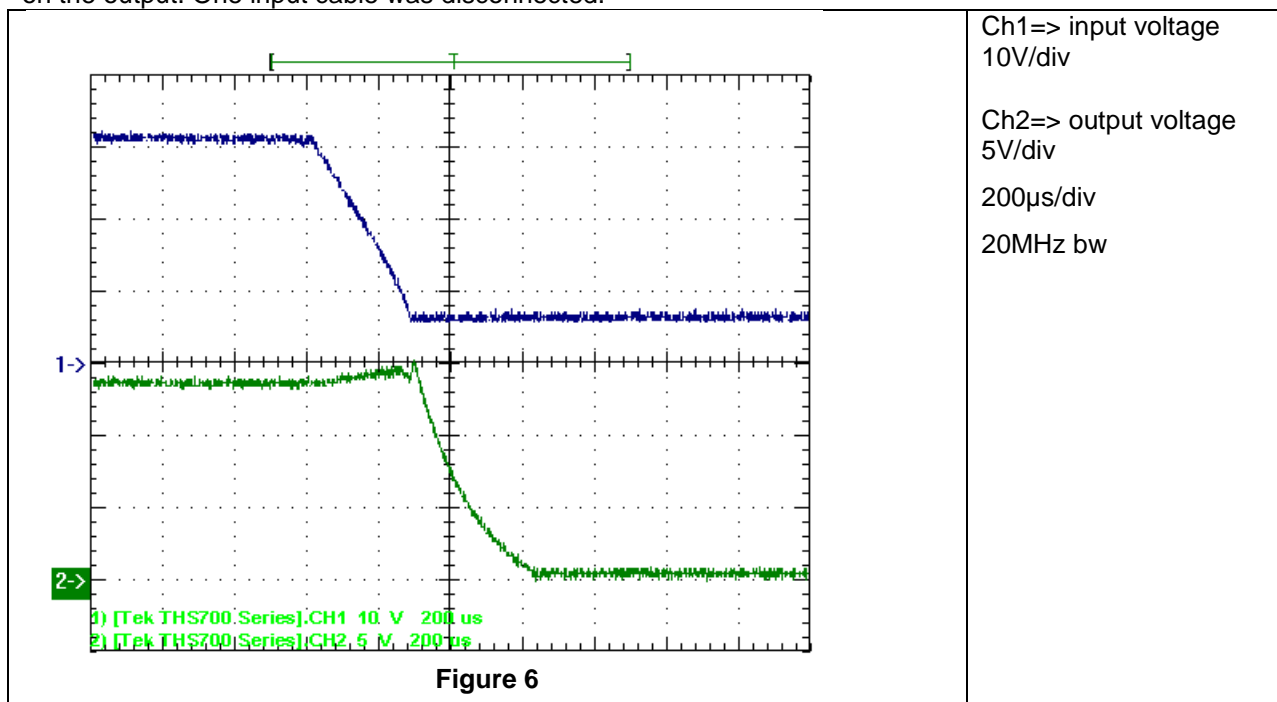


The shutdown waveform is shown in the Figure 5. The input voltage was set at 20V, with 2A load on the output. One input cable was disconnected.



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The shutdown waveform is shown in the Figure 6. The input voltage was set at 32V, with 2A load on the output. One input cable was disconnected.



3 Efficiency

The efficiency is shown in the Figure 7 below. The input voltage was set to 8V, 20V and 32V.

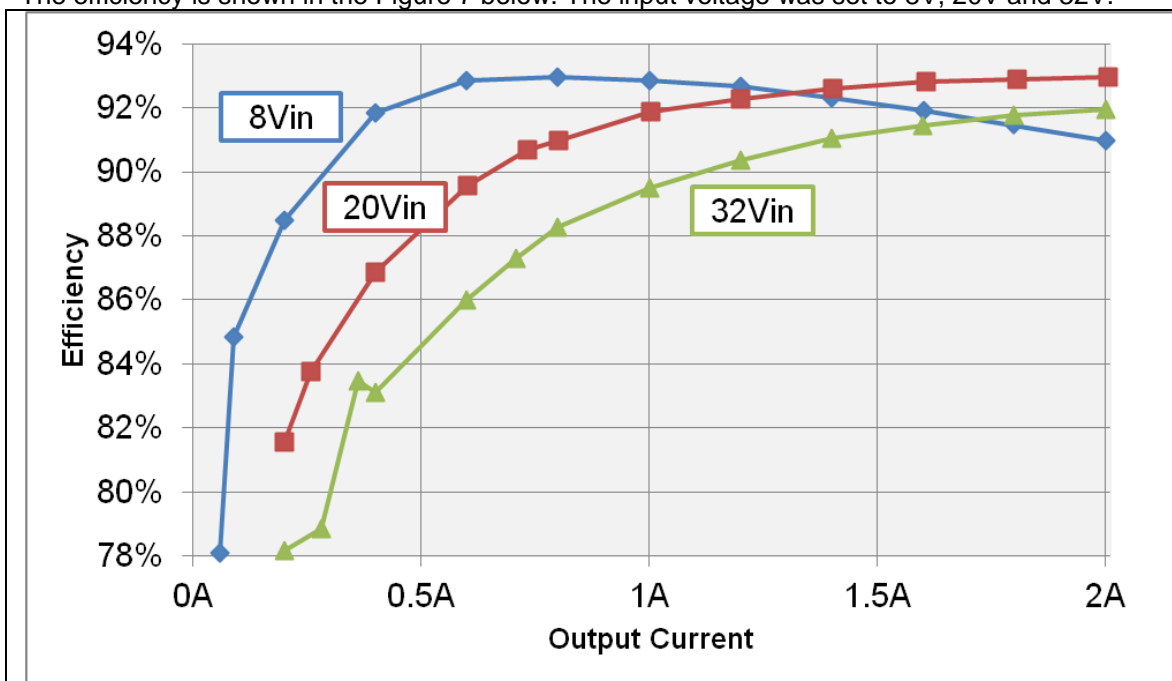


Figure 7

4 Load Regulation

The load regulation of the output is shown in the Figure 8 below. The input voltage was set to 8V, 20V and 32V.

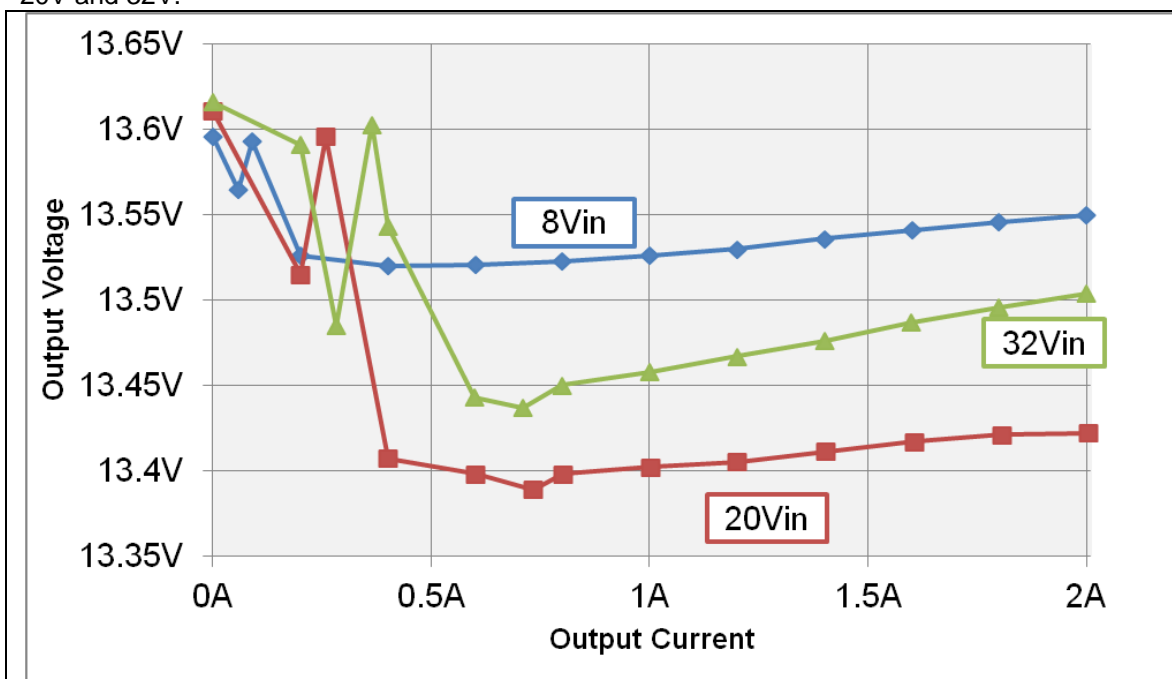


Figure 8

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5 Line Regulation

The line regulation is shown in Figure 9. The output current was set about 2A.

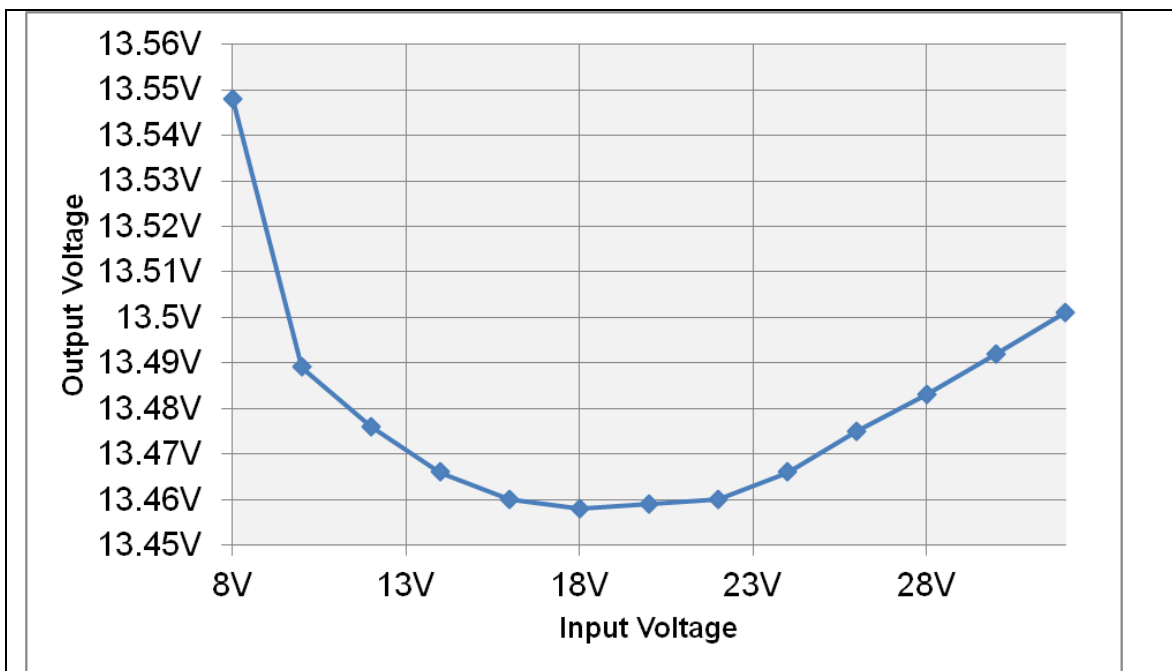


Figure 9

With the same setup the efficiencies are shown in Figure 10.

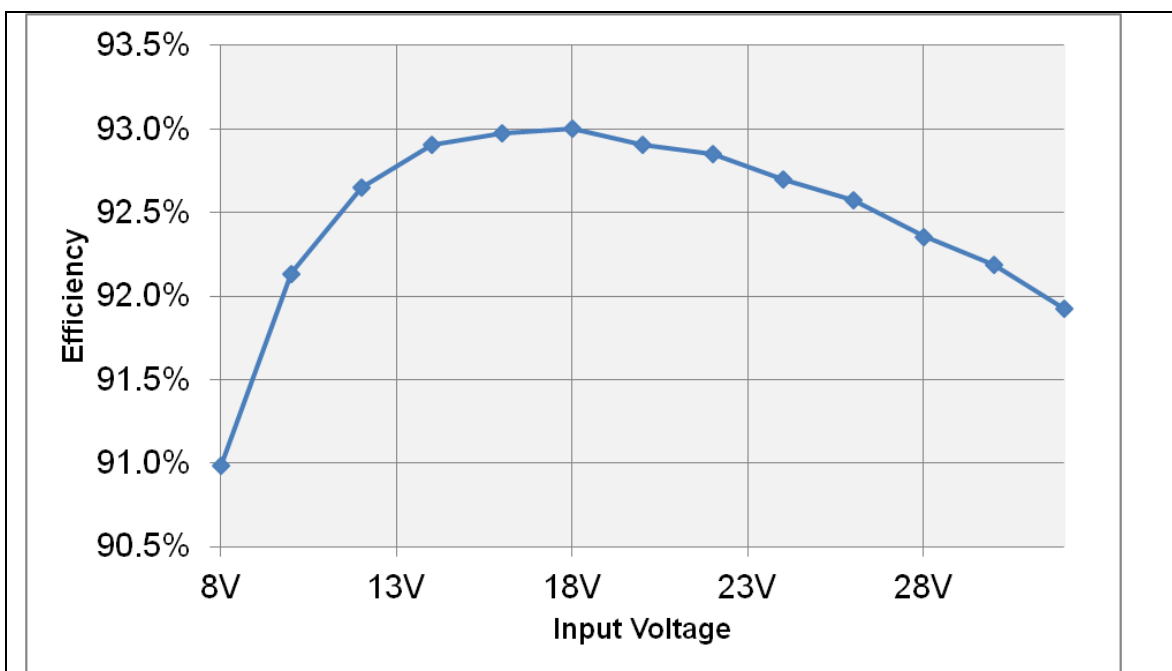
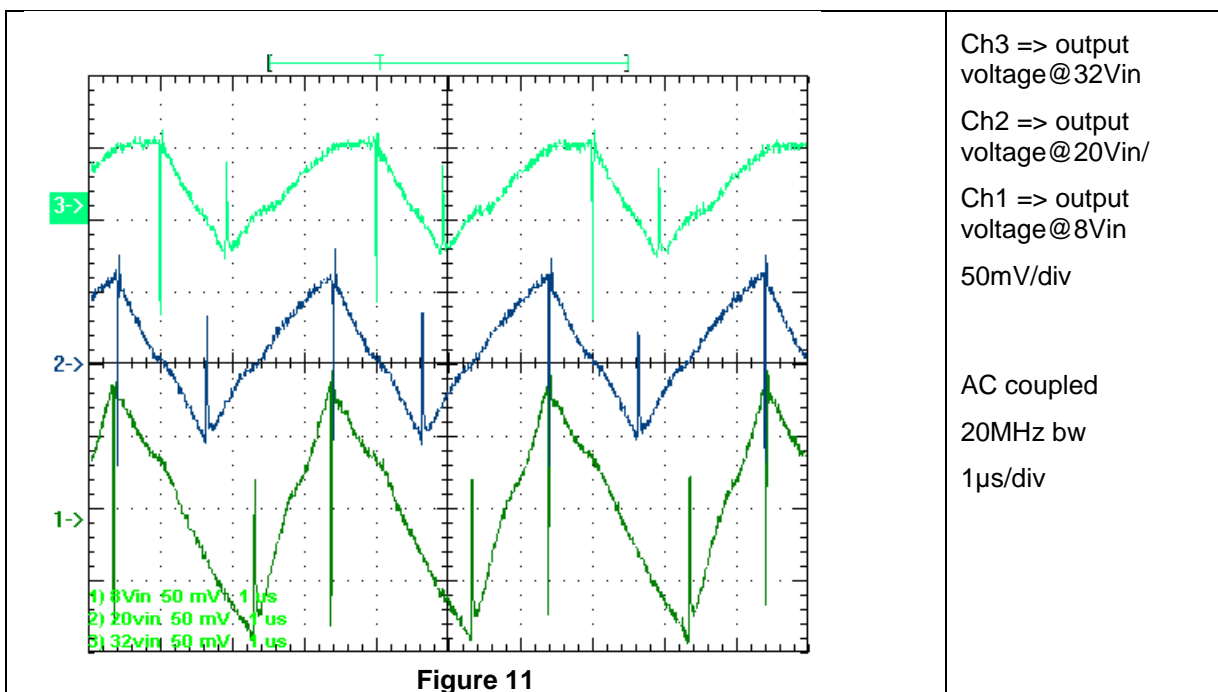


Figure 10

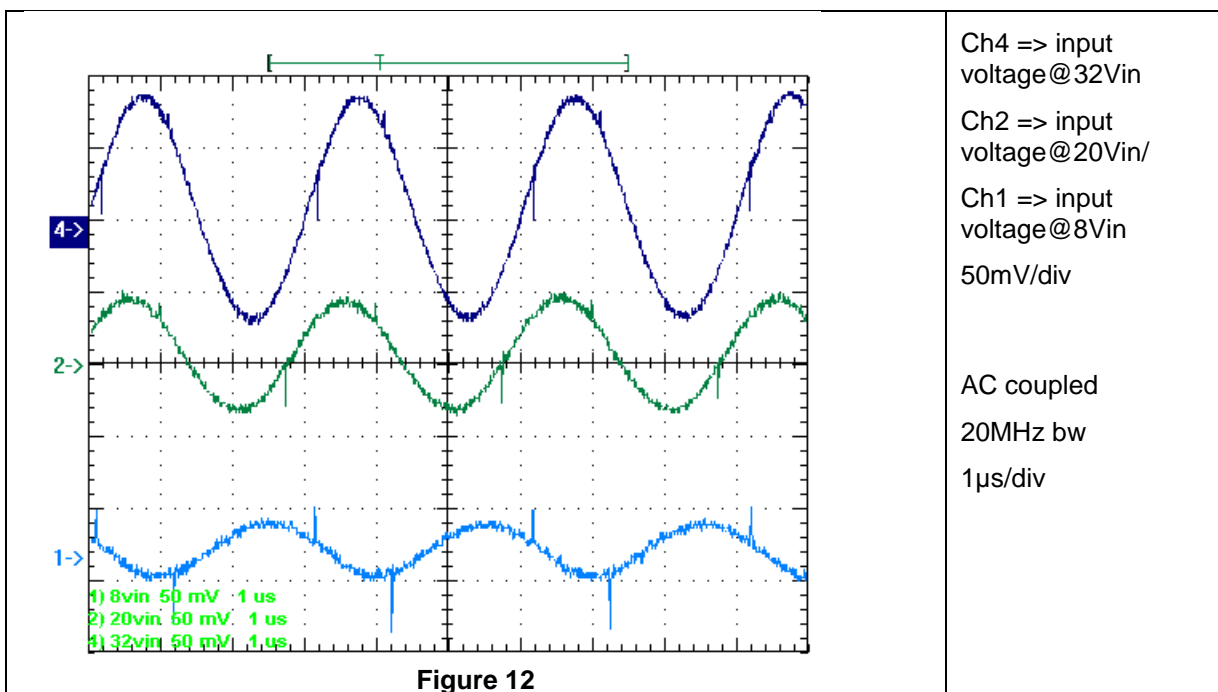
6 Output Ripple Voltage

The output ripple voltage is shown in Figure 11. The output current was set to 2A



7 Input Ripple Voltage

The output ripple voltage is shown in Figure 12. The output current was set to 2A



8 Load Transients

The Figure 13 shows the response to load transients. The load is switching from 1A to 2A. The input voltage was set to 8V

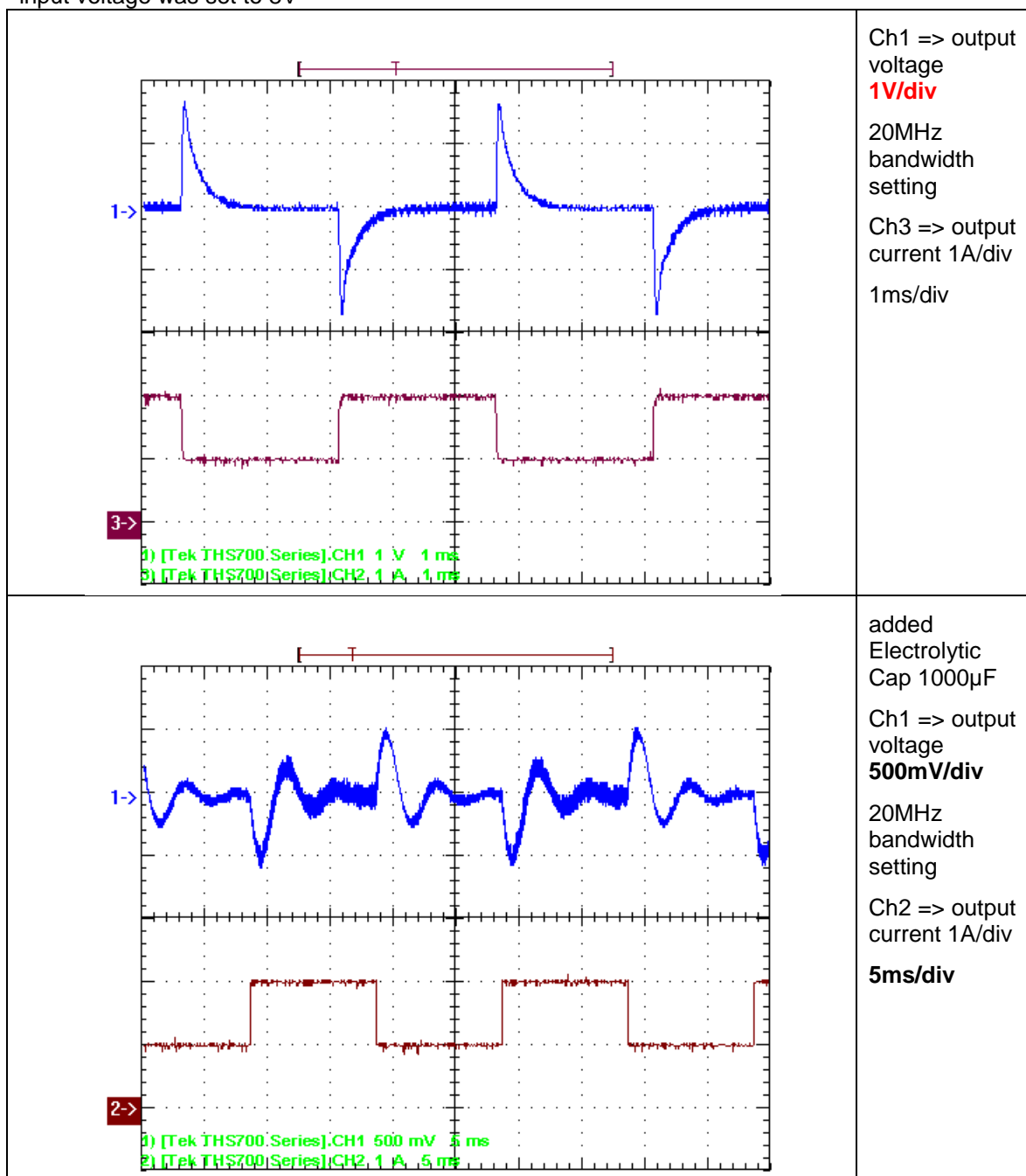


Figure 13

Upper pic shows transient response for ceramics only, lower pic w/ 1000uF added;
For use of this design powering a capacitor bank for pulsed loads **gain needs to be adjusted**.

The Figure 14 shows the response to load transients. The load is switching from 1A to 2A. The input voltage was set to 20V

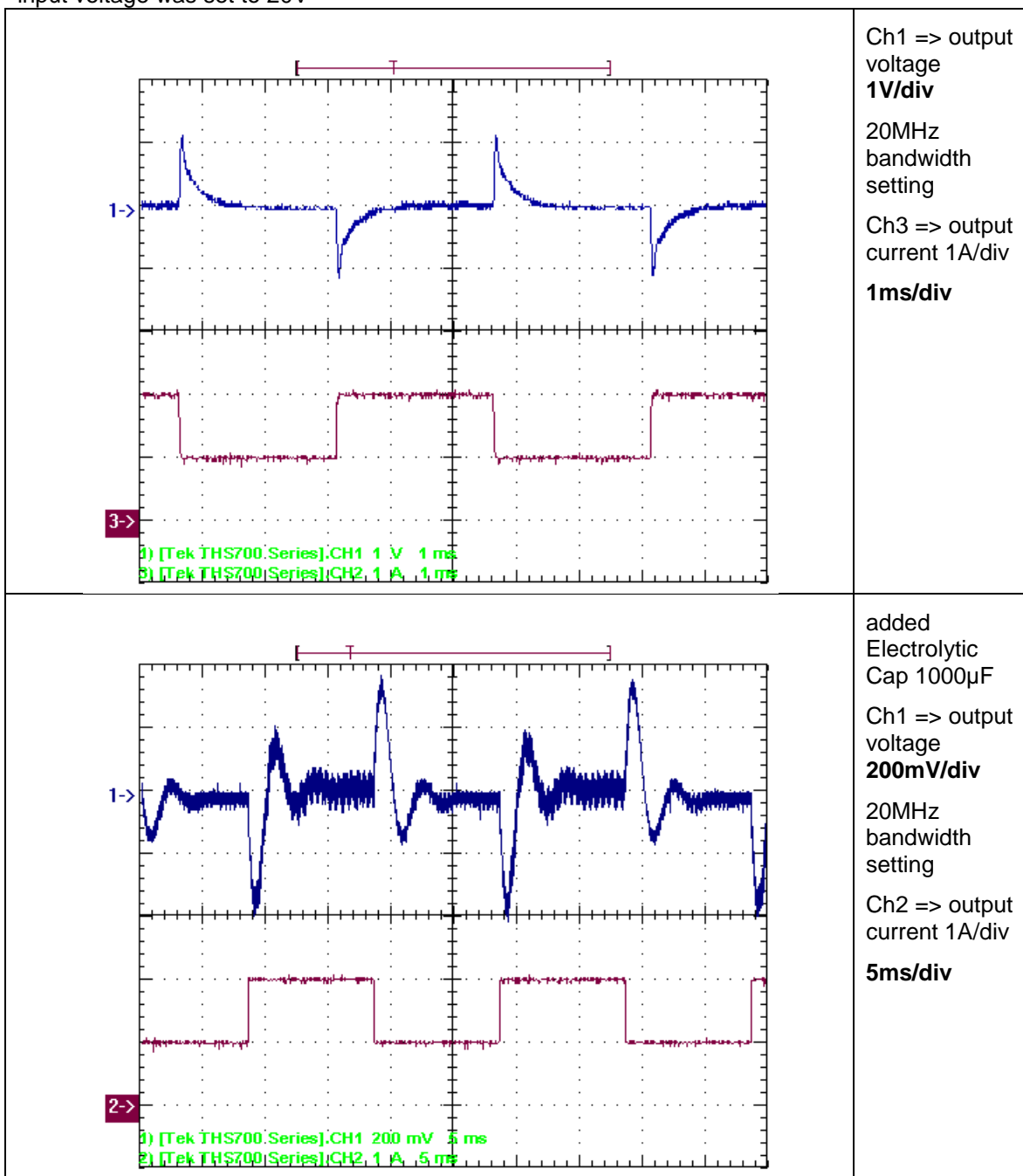


Figure 14

Upper pic shows transient response for ceramics only, lower pic w/ 1000uF added;
For use of this design powering a capacitor bank for pulsed loads **gain needs to be adjusted**.

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The Figure 15 shows the response to load transients. The load is switching from 1A to 2A. The input voltage was set to 32V

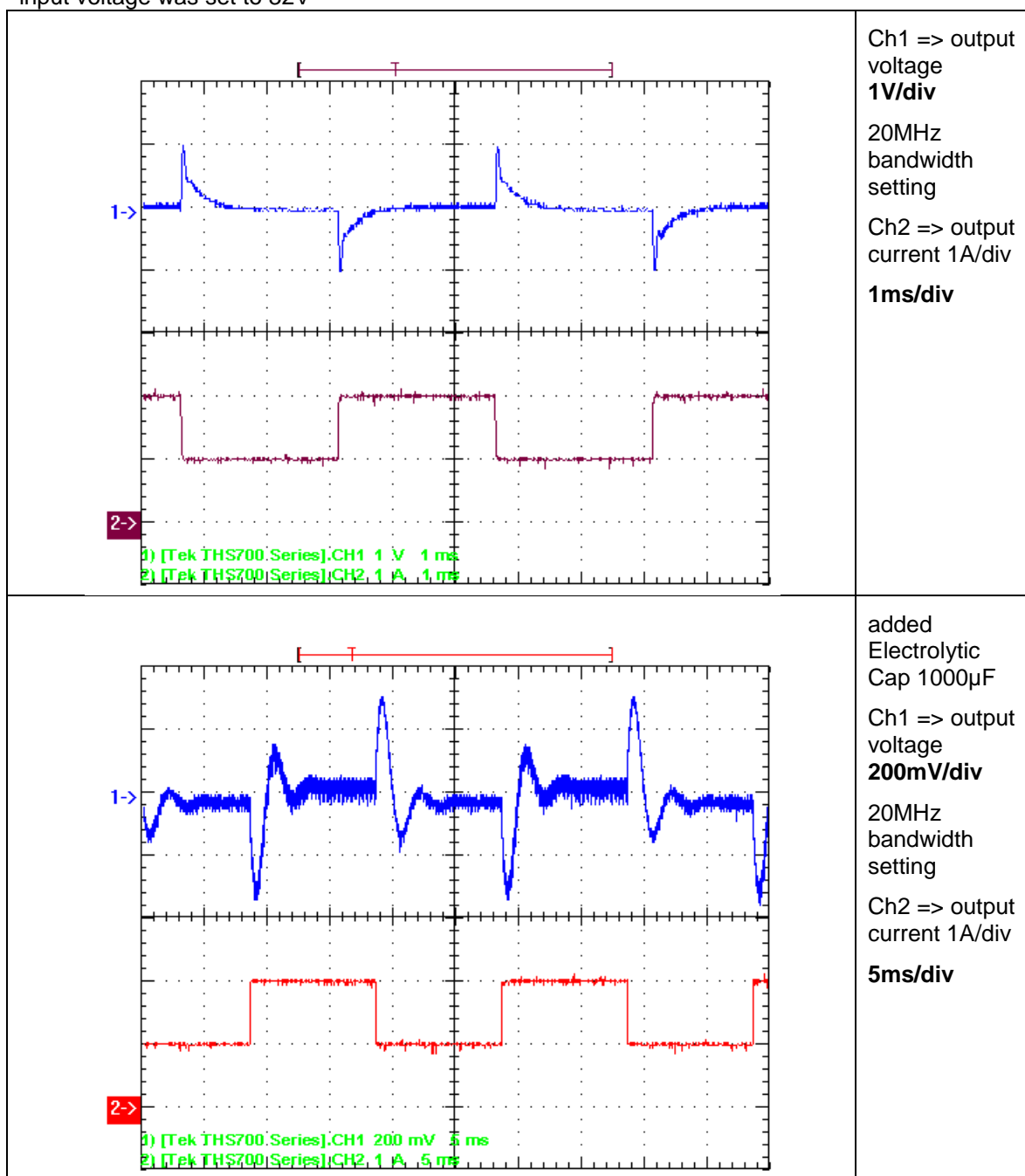


Figure 15

Upper pic shows transient response for ceramics only, lower pic w/ 1000uF added;
For use of this design powering a capacitor bank for pulsed loads **gain needs to be adjusted**.

9 Control Loop Frequency Response

Figure 16 shows the loop response. 2A-load applied. The input voltage was set to 8V.

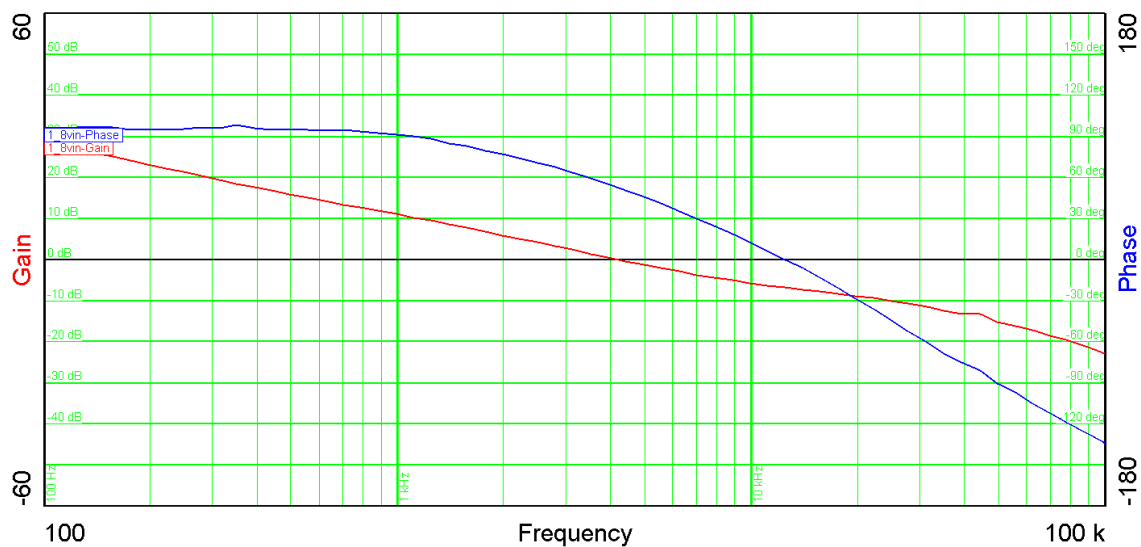


Figure 16

Figure 17 shows the loop response. 2A-load applied. The input voltage was set to 20V.

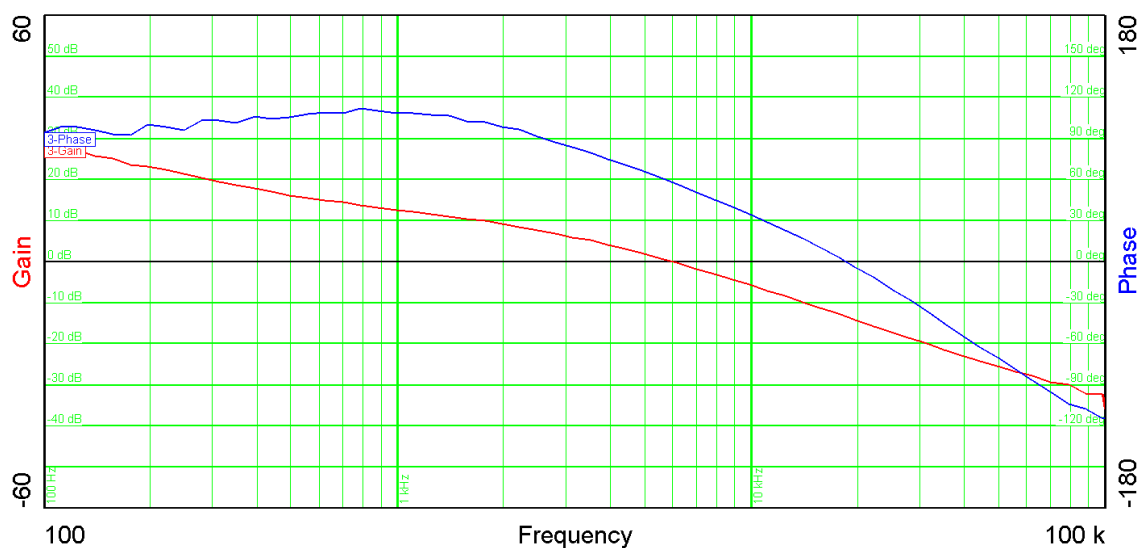


Figure 17

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Figure 18 shows the loop response. 2A-load applied. The input voltage was set to 32V.

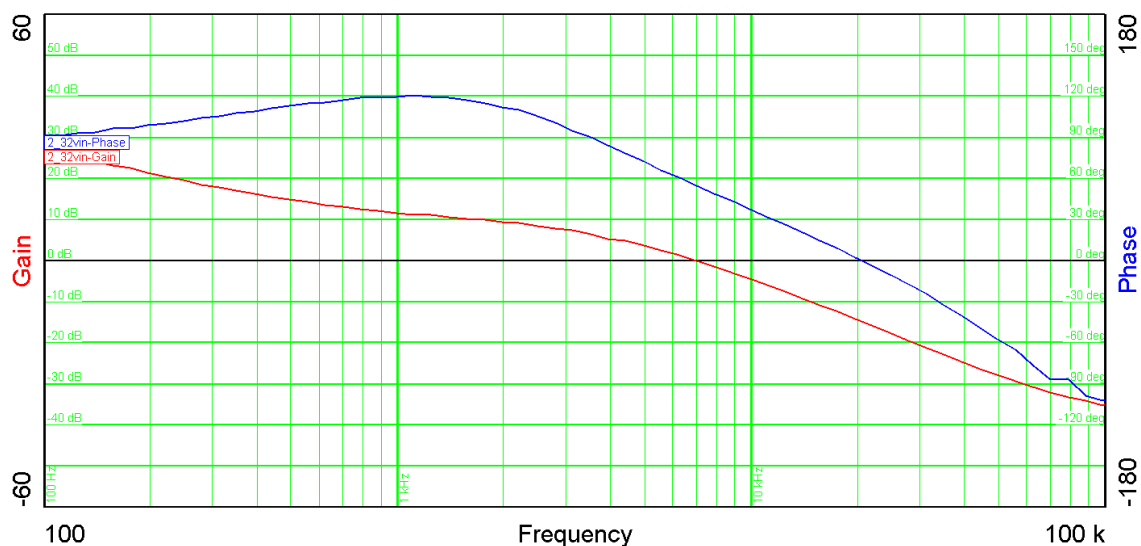


Figure 18

Table 1 summarizes the results from Figure 16 Figure 17 and Figure 18.

| Vin | 8V | 20V | 32V |
|---------------------|-------|-------|-------|
| Bandwidth (kHz) | 4.23 | 5.95 | 6.94 |
| Phase margin | 52° | 58 | 55 |
| slope (20dB/decade) | -0.89 | -1.23 | -1.34 |
| | | | |
| gain margin (dB) | -6.86 | -13.4 | -14.9 |
| slope (20dB/decade) | -0.54 | -1.52 | -1.79 |
| freq (kHz) | 12.5 | 18.5 | 20.6 |

Table 1

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Figure 19 and Figure 20 shows the influence of an additional output electrolytic cap (1000 μ F/25V). The input voltage was set to 20V with 2A output current..

without cap

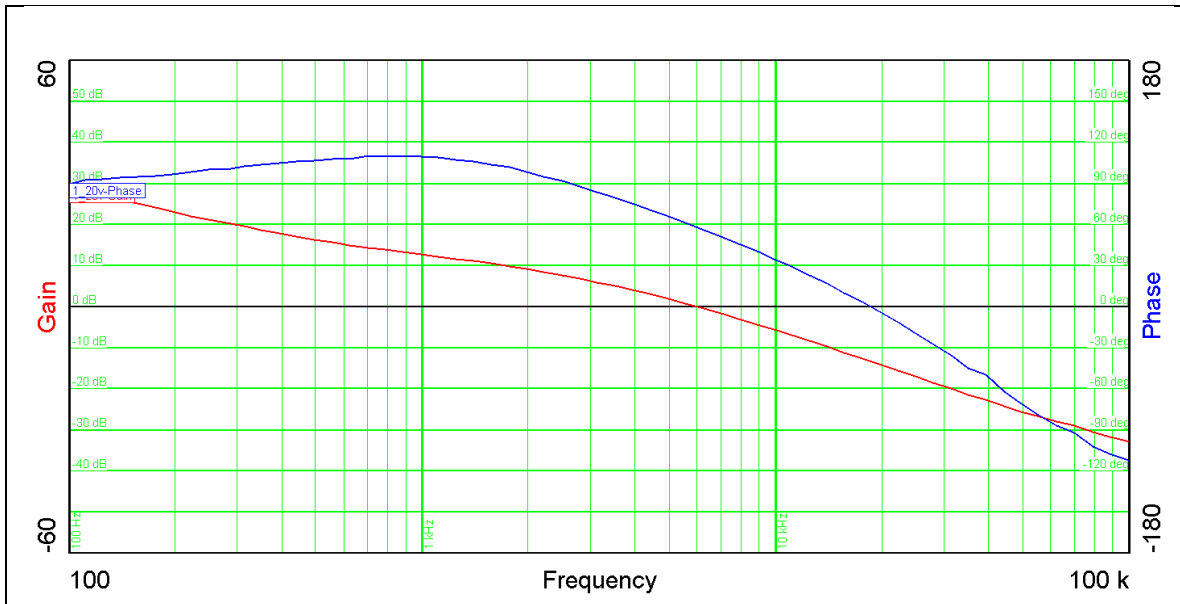


Figure 19

added 1000 μ F

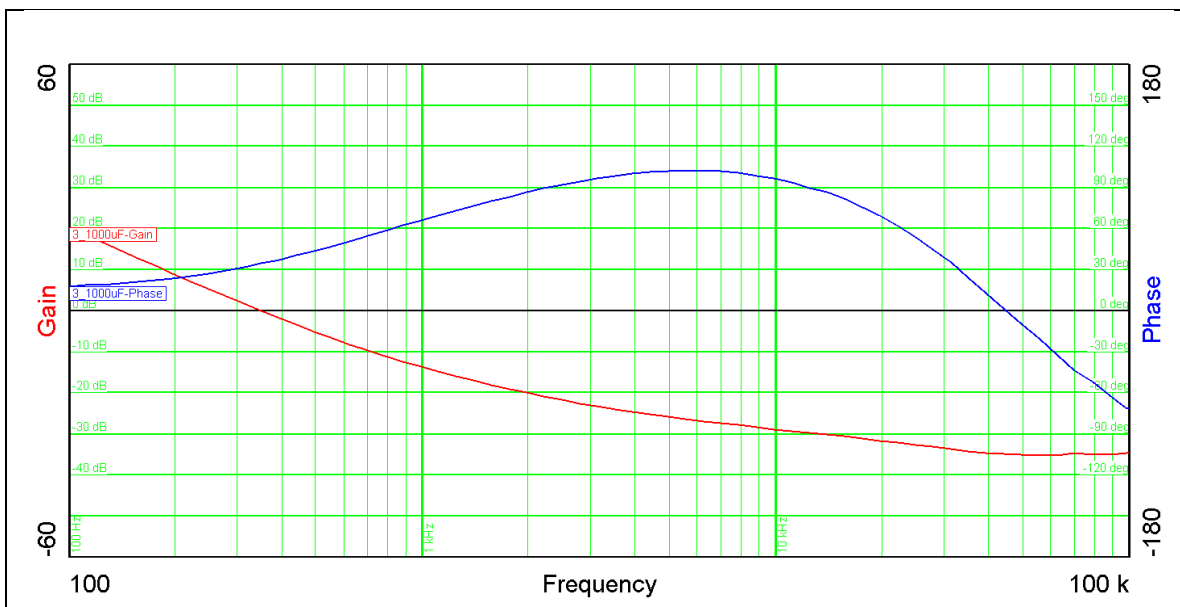


Figure 20

Upper pic shows Bode plot for ceramics only, lower pic w/ 1000 μ F added;
For use of this design powering a capacitor bank for pulsed loads **gain needs to be adjusted**.
Here in example gain has to be increased **by 20dB** to achieve bw 2kHz.
(reduce Zero to 200Hz, set Pole to 20kHz)

| | no added Cap | 1000 μ F |
|---------------------|--------------------|--------------|
| Bandwidth (kHz) | 5.98 | 0.349 |
| Phase margin | 58° | 34.3 |
| slope (20dB/decade) | -1.19 | -1.23 |
| | | |
| gain margin (dB) | -13.4 | -34.9 |
| slope (20dB/decade) | -1.45 | -0.194 |
| freq (kHz) | 18.6 | 44.9 |

Table 2

10 Miscellaneous Waveforms

The waveform of the voltage on Q1 (Drain-Source) is shown in Figure 21. Input voltage was set to 8V and output current to 2A.

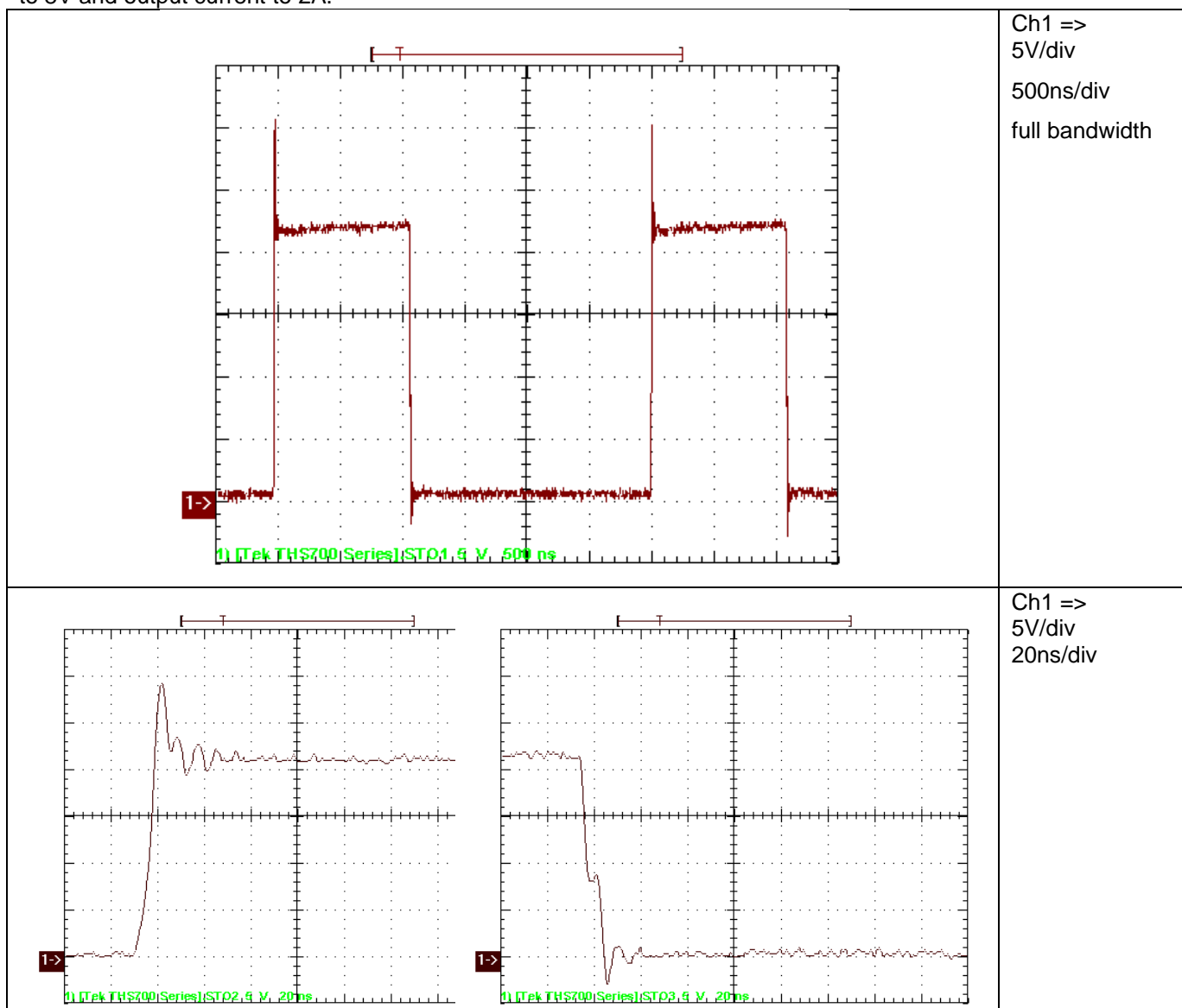


Figure 21

The waveform of the voltage on the gate to source is shown in Figure 22. Input voltage was set to 8V and output current to 2A.

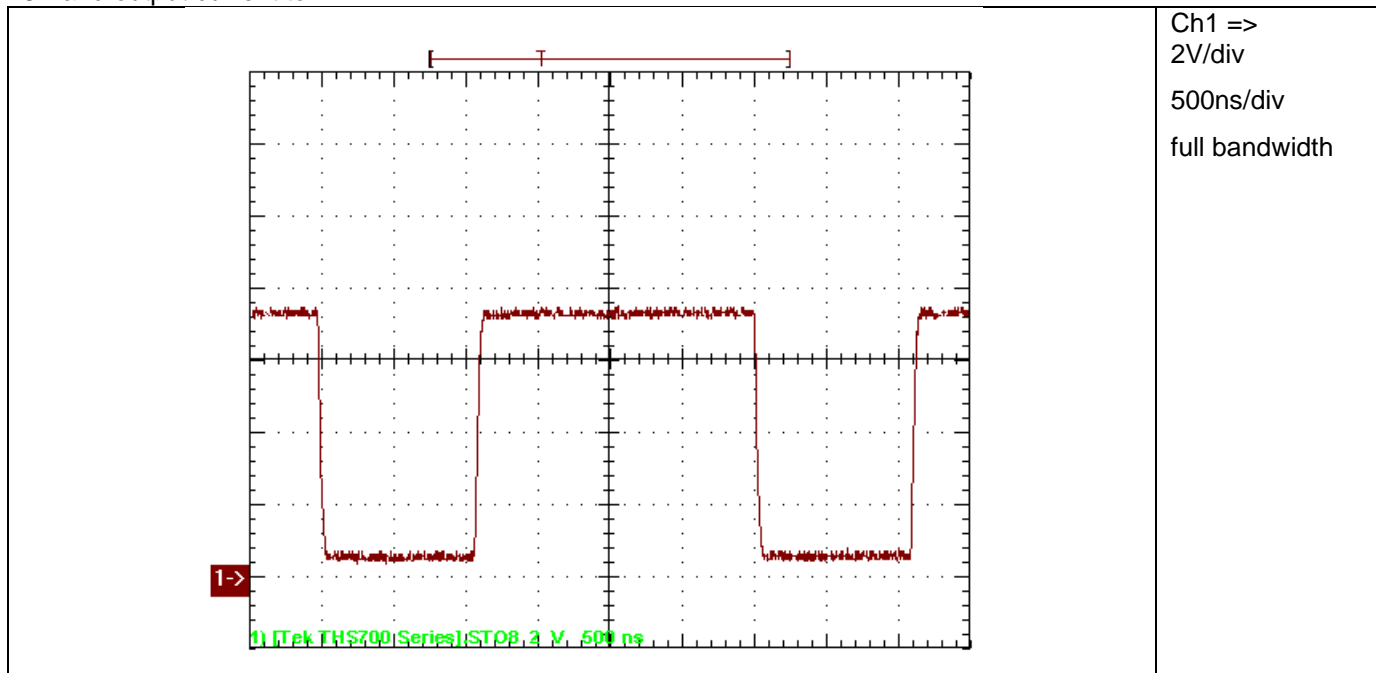


Figure 22

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The waveform of the voltage on Q1 (Drain-Source) is shown in Figure 23. Input voltage was set to 20V and output current to 1A.

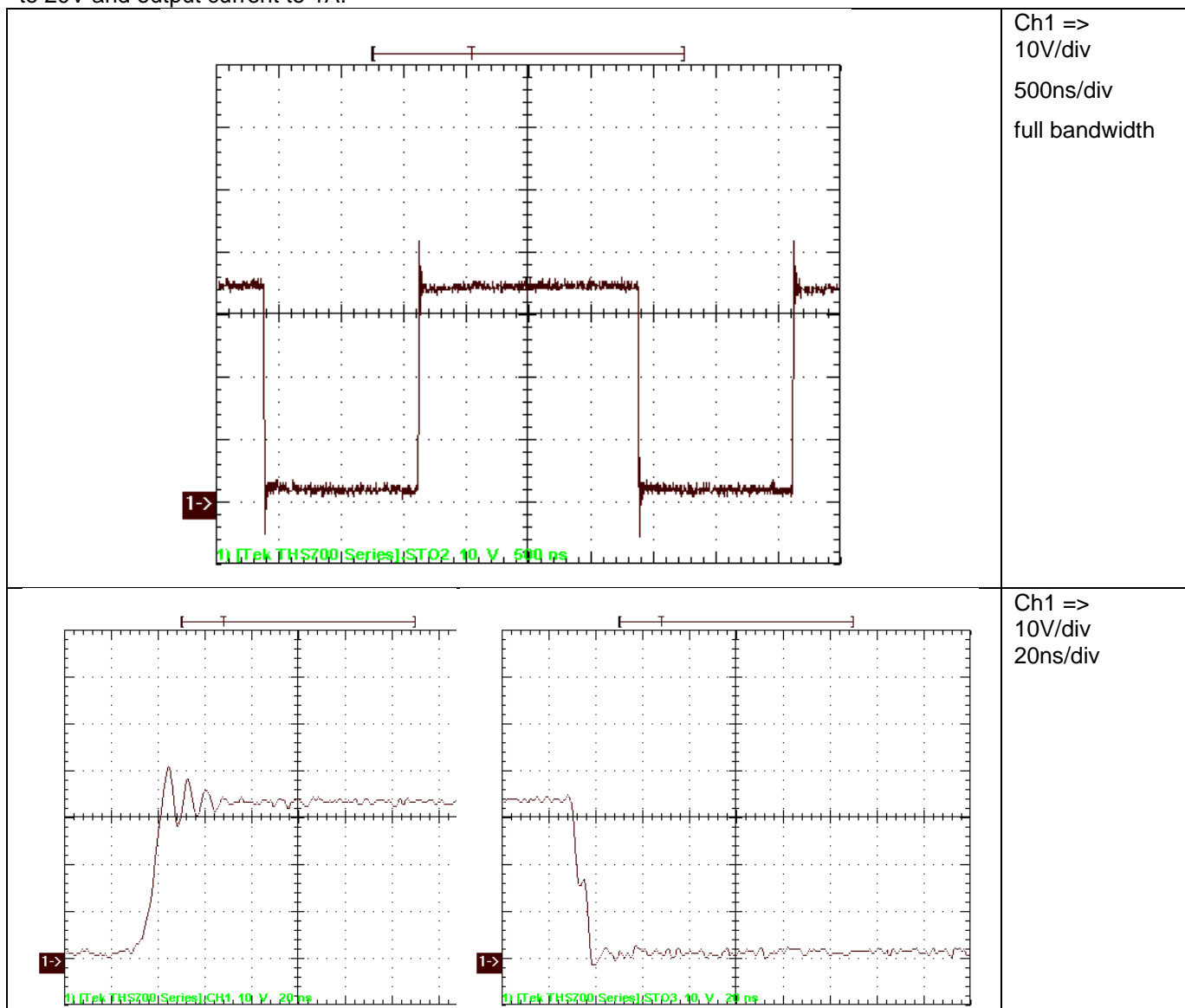


Figure 23

PMP8709RevC Test Results

The waveform of the voltage on the gate to source is shown in Figure 24. Input voltage was set to 20V and output current to 2A.

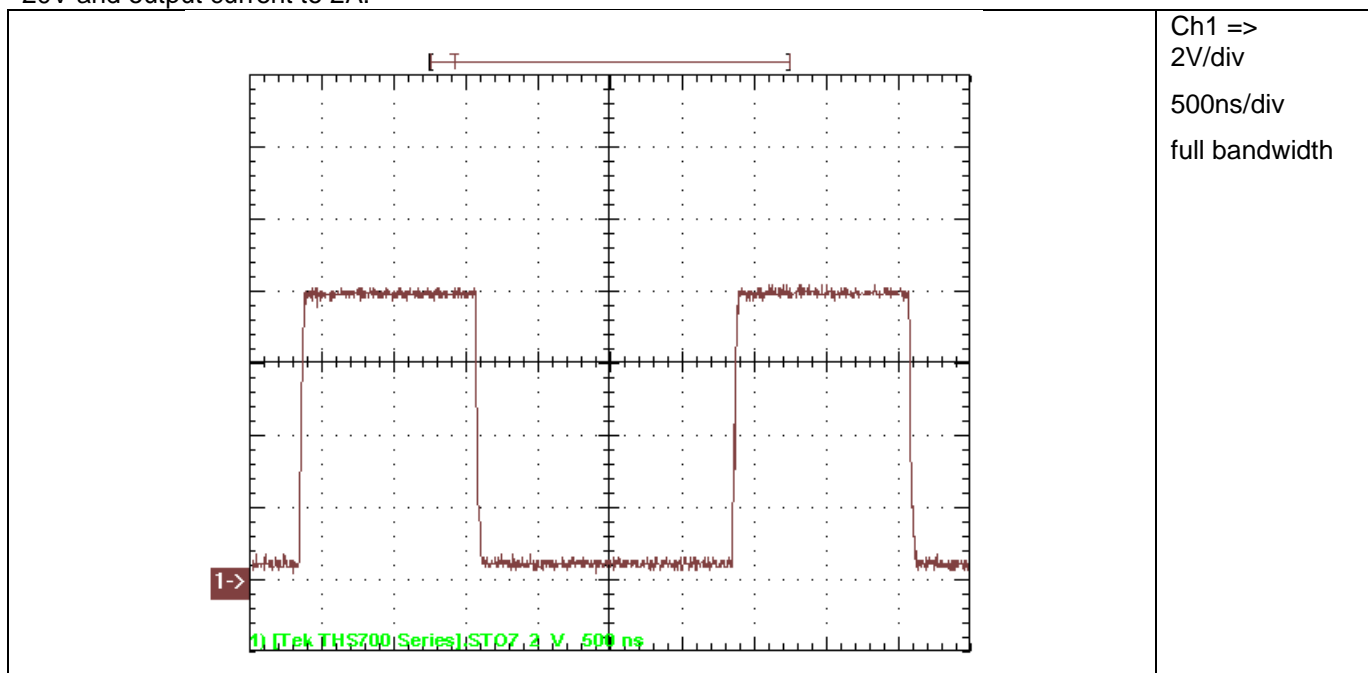


Figure 24

PMP8709RevC Test Results

The waveform of the voltage on Q1 (Drain-Source) is shown in Figure 25. Input voltage was set to 32V and output current to 2A.

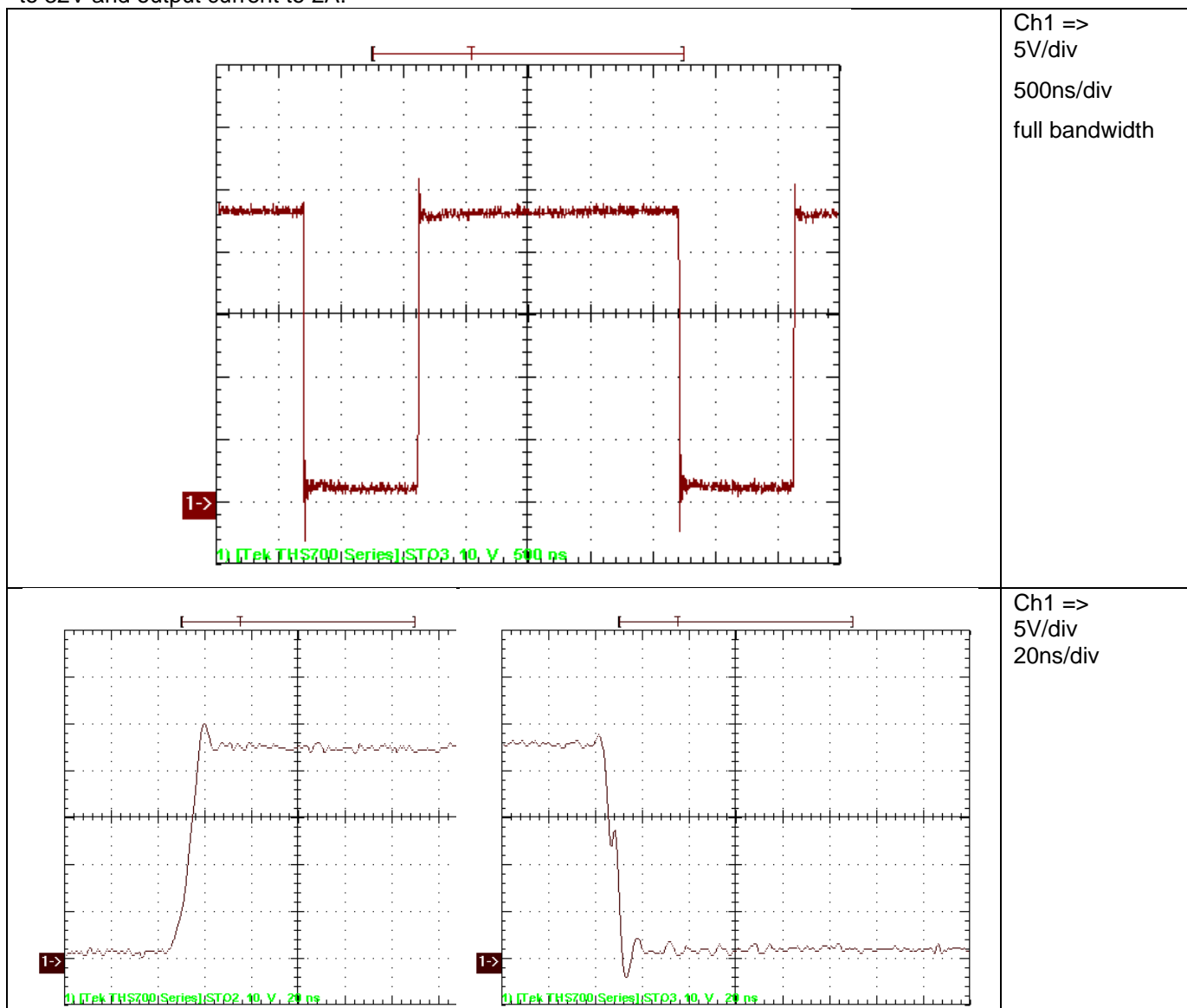


Figure 25

The waveform of the voltage on the gate to source is shown in Figure 26. Input voltage was set to 32V and output current to 2A.

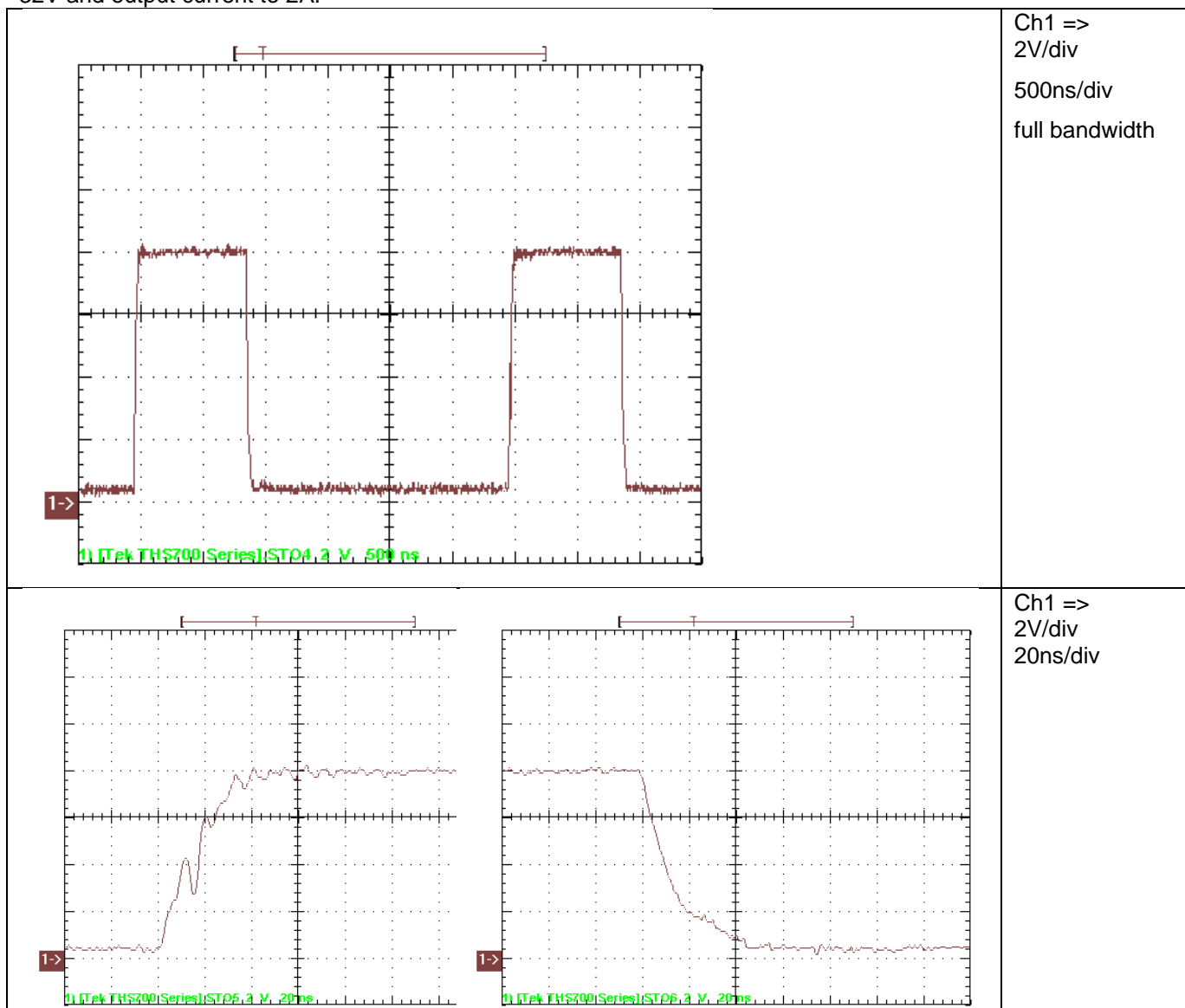


Figure 26

PMP8709RevC Test Results

The waveform of the voltage on D1 (**referenced to VOUT**) is shown in Figure 27. Input voltage was set to 8V and output current to 2A.

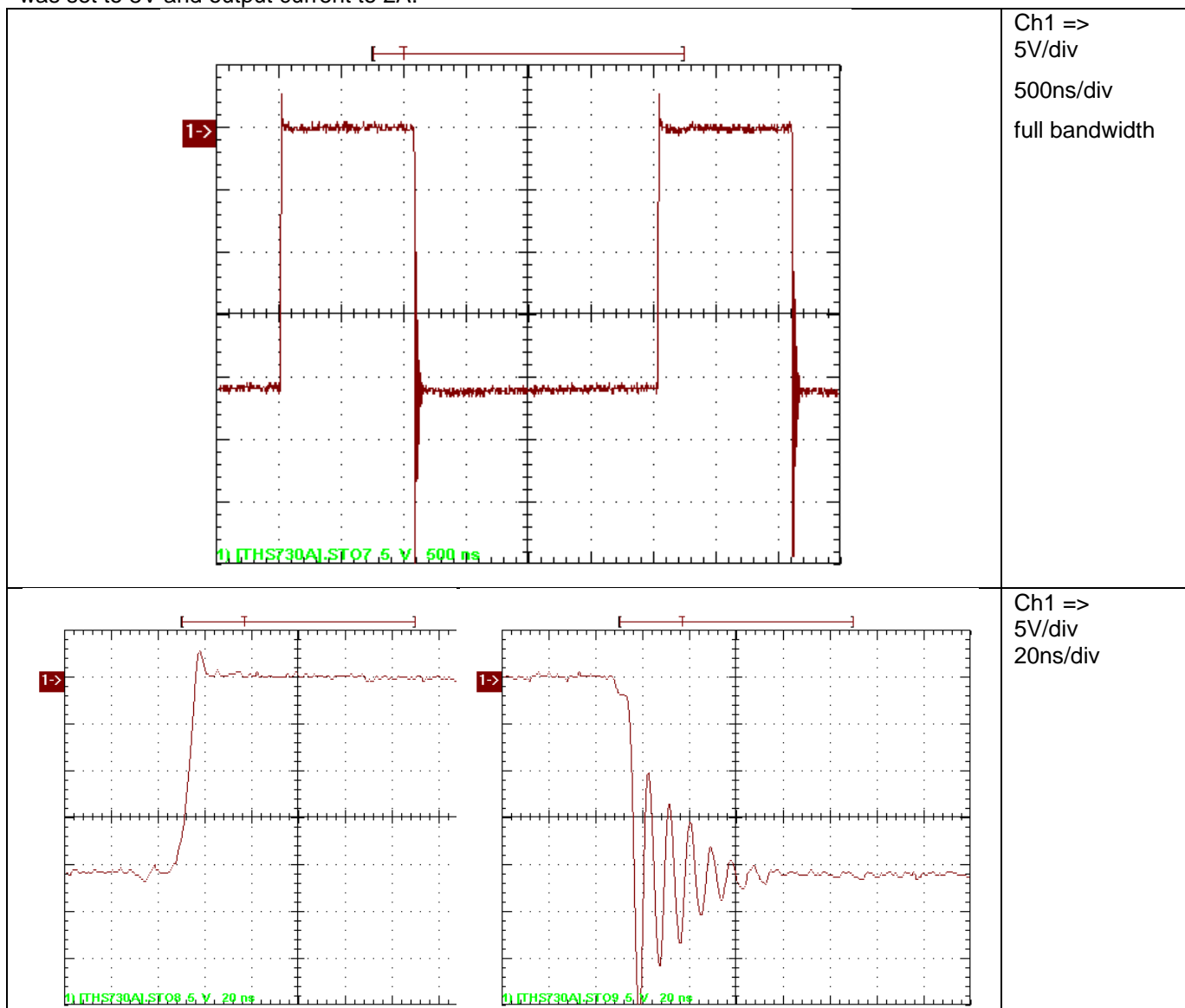


Figure 27

PMP8709RevC Test Results

The waveform of the voltage on D1 (**referenced to VOUT**) is shown in Figure 27. Input voltage was set to 20V and output current to 2A.

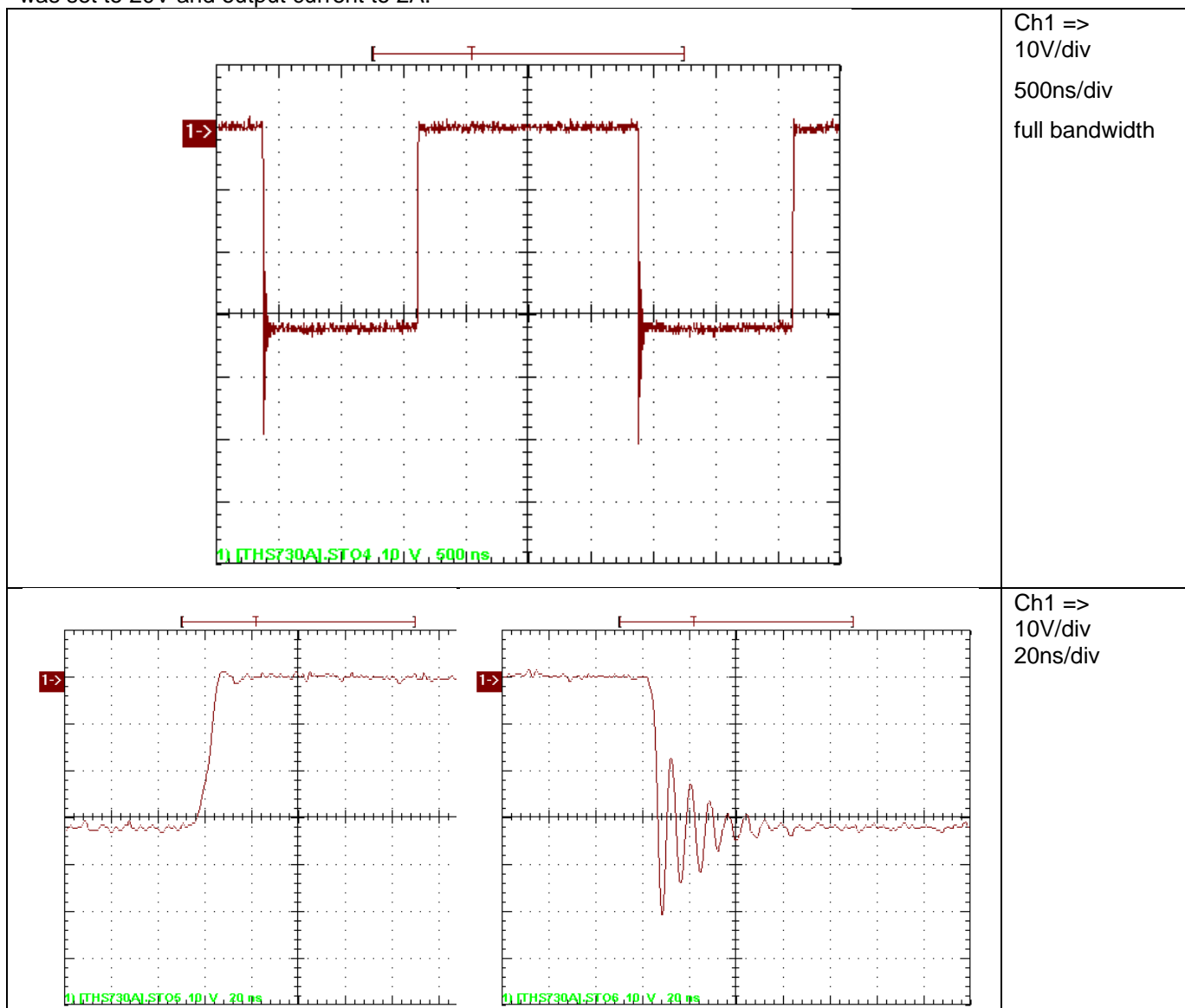


Figure 28

The waveform of the voltage on D1 (**referenced to VOUT**) is shown in Figure 29. Input voltage was set to 32V and output current to 2A.

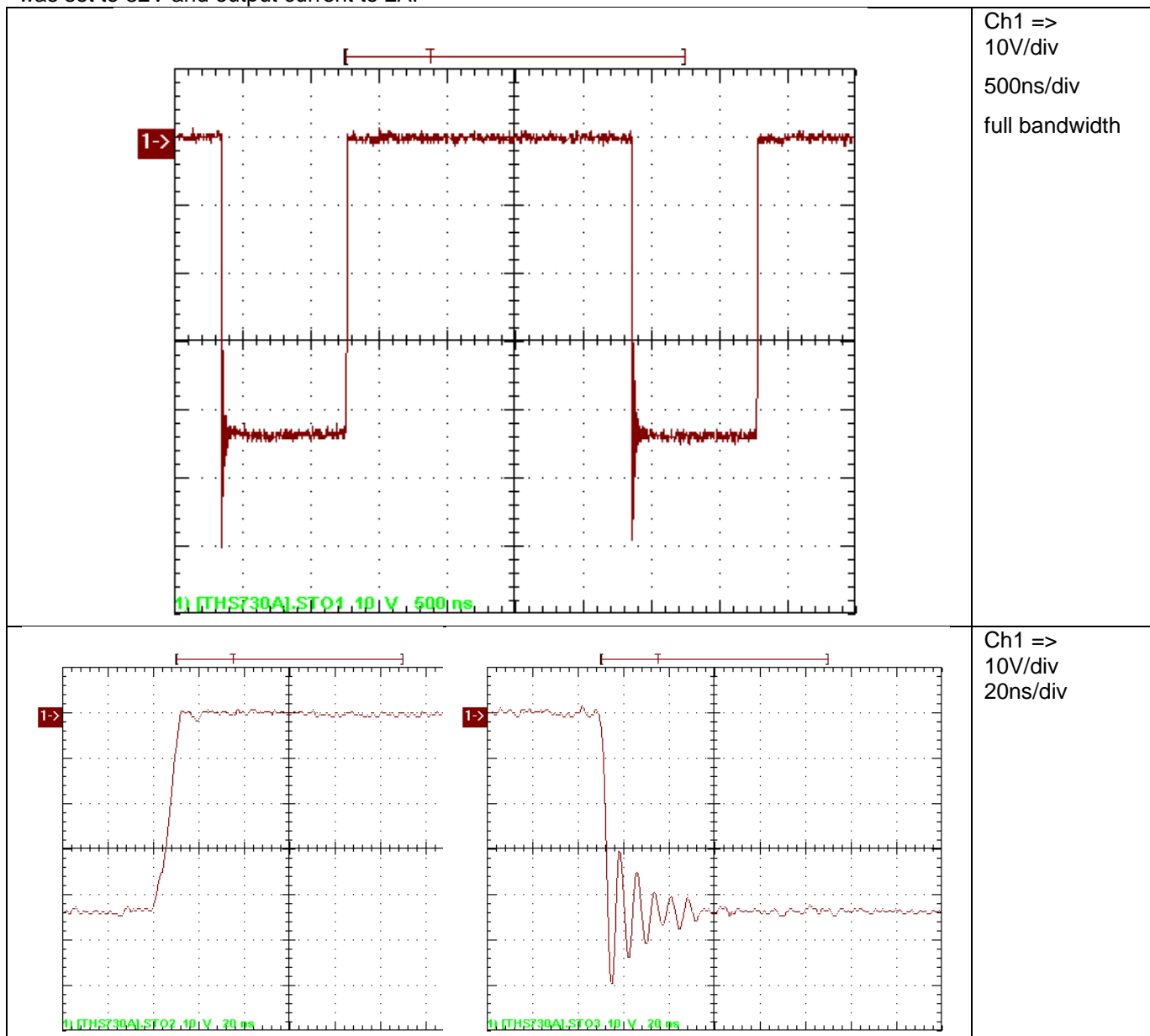


Figure 29

11 Thermal Image

Figure 30 shows the thermal image at 20V input voltage and 2A output current.

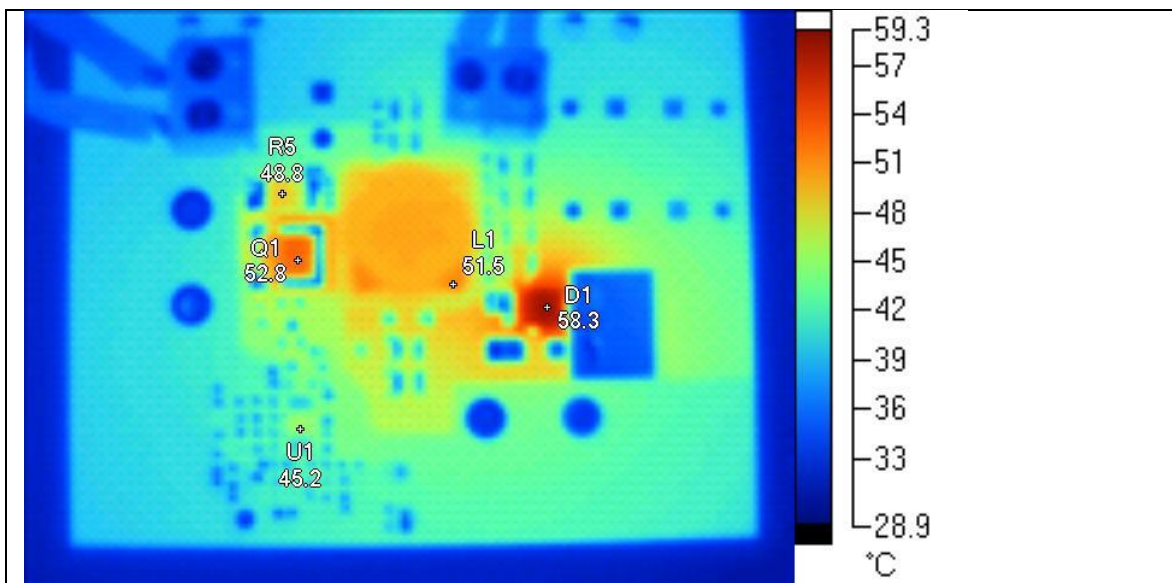


Figure 30

| Name | Temperature |
|------|-------------|
| D1 | 58.3°C |
| Q1 | 52.8°C |
| R5 | 48.8°C |
| U1 | 45.2°C |
| L1 | 51.5°C |

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