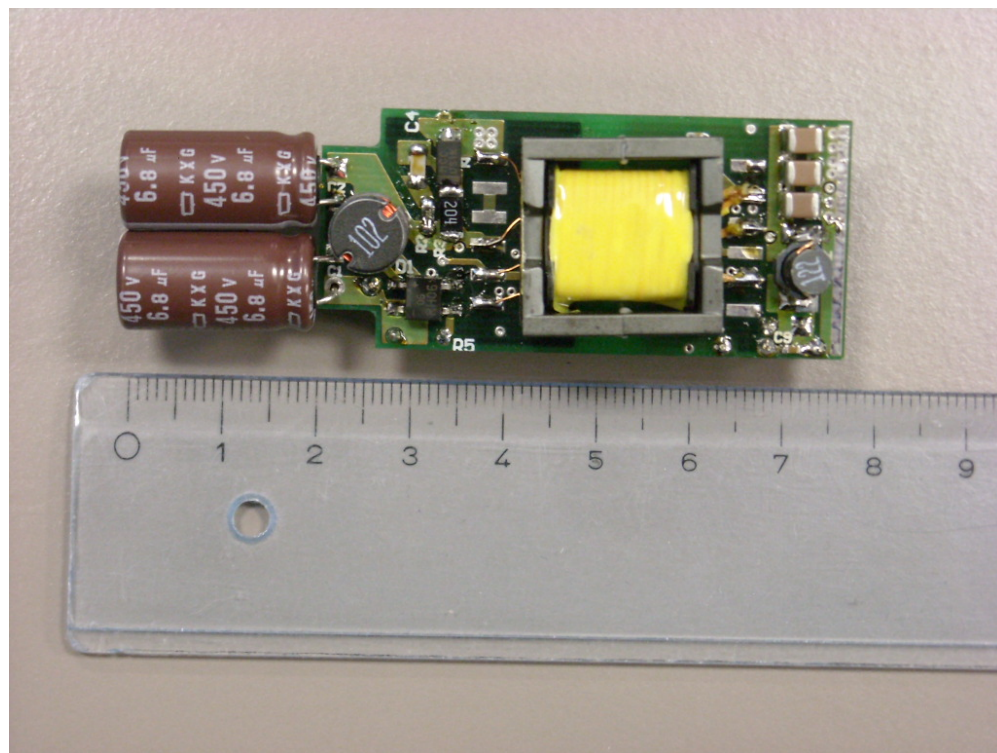
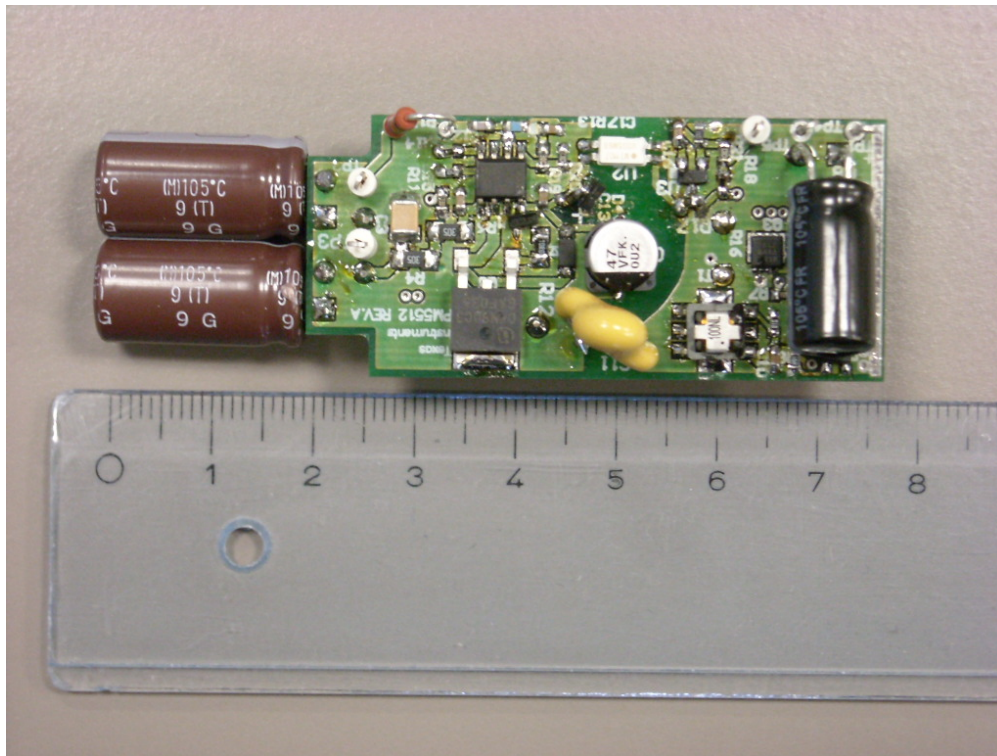


Photo of the prototype

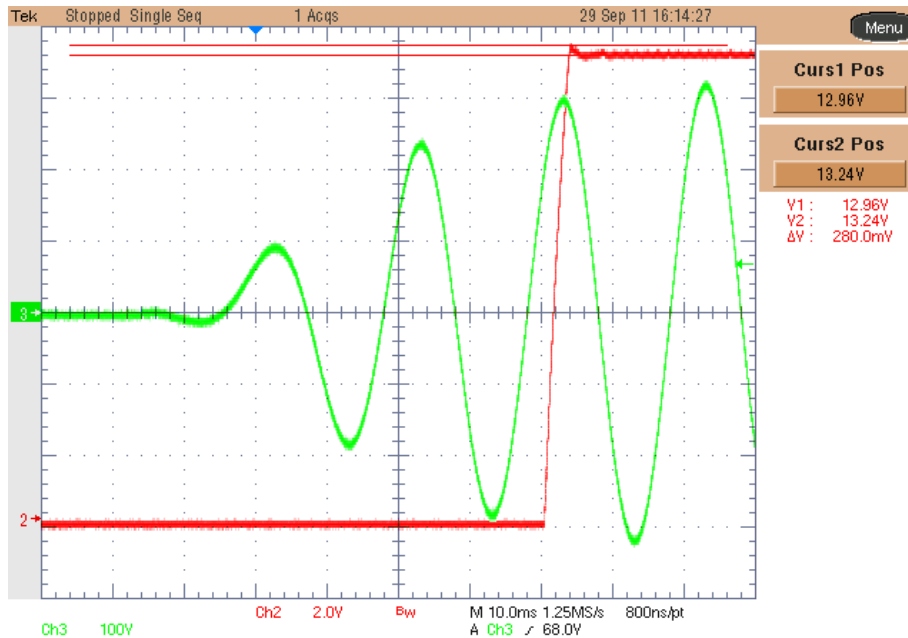
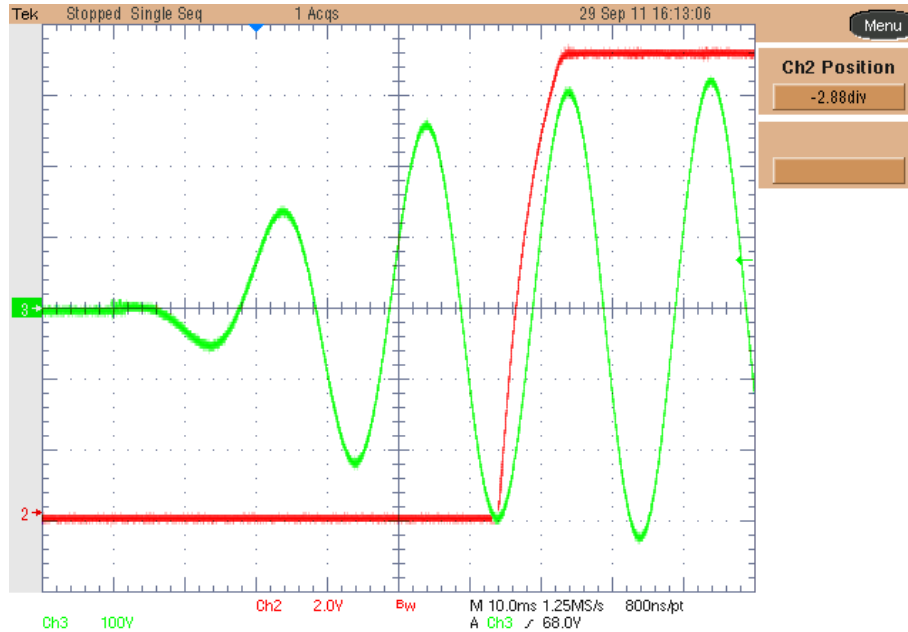


1. Startup

The input and output voltage waveforms at startup are shown in the images below. The input voltage has been set at 230Vac, 50Hz. The output was loaded with 1.6A constant current for the upper picture and with no load for the lower one.

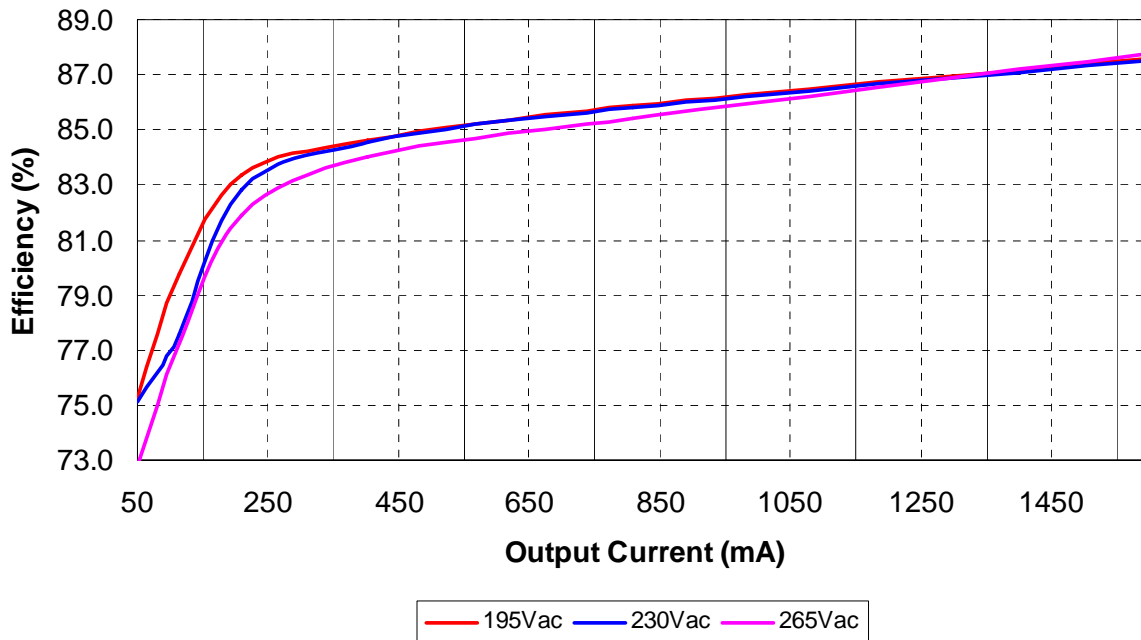
Channel 3: Input voltage (100 V/div, 10ms/div, no BWL).

Channel 2: Output Voltage (2V/div, 20MHz BWL).



2. Efficiency

The efficiency data versus output current is shown in the tables and graph below. The converter has been supplied with a AC 50Hz source.



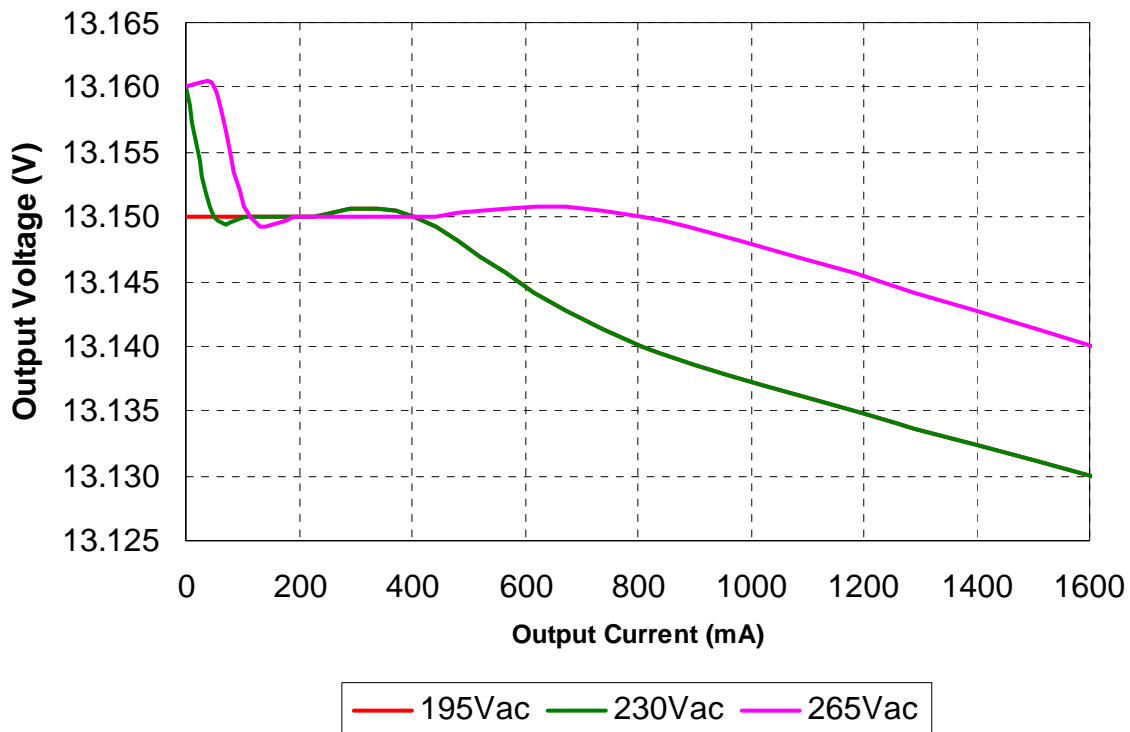
Iout (mA)	Vout (Vdc)	Pout (W)	Vin (Vac)	Pin (W)	Ploss (W)	Eff (%)
0.0	13.15	0.00	195	0.270	0.270	0.0
49.8	13.15	0.655	195	0.870	0.215	75.3
113.4	13.15	1.49	195	1.87	0.379	79.7
209.8	13.15	2.76	195	3.31	0.551	83.3
402.2	13.15	5.29	195	6.25	0.961	84.6
806.9	13.14	10.60	195	12.35	1.747	85.9
1608.8	13.13	21.12	195	24.12	2.996	87.6

Iout (mA)	Vout (Vdc)	Pout (W)	Vin (Vac)	Pin (W)	Ploss (W)	Eff (%)
0.0	13.16	0.00	230	0.320	0.320	0.0
49.7	13.15	0.654	230	0.870	0.216	75.1
113.3	13.15	1.49	230	1.92	0.430	77.6
209.8	13.15	2.76	230	3.33	0.571	82.8
402.0	13.15	5.29	230	6.25	0.964	84.6
807.1	13.14	10.61	230	12.36	1.755	85.8
1608.0	13.13	21.11	230	24.11	2.997	87.6

Iout (mA)	Vout (Vdc)	Pout (W)	Vin (Vac)	Pin (W)	Ploss (W)	Eff (%)
0.0	13.16	0.00	265	0.360	0.360	0.0
49.8	13.16	0.655	265	0.900	0.245	72.8
113.4	13.15	1.49	265	1.93	0.439	77.3
209.8	13.15	2.76	265	3.37	0.611	81.9
402.0	13.15	5.29	265	6.29	1.004	84.0
807.1	13.15	10.61	265	12.43	1.817	85.4
1608.0	13.14	21.13	265	24.07	2.941	87.8

3. Output voltage regulation

The output voltage versus output current is plotted below.

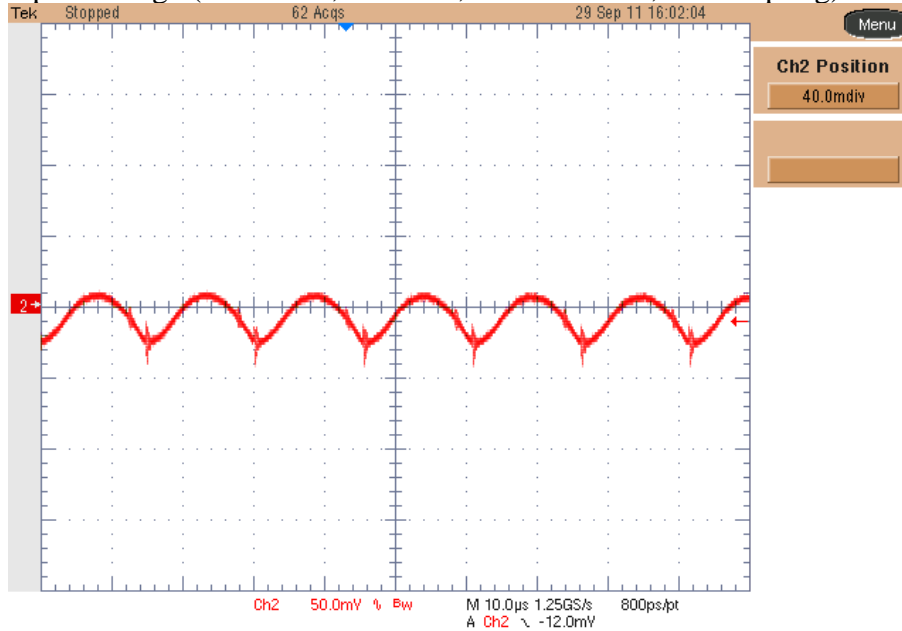


4. Output ripple voltage

The output ripple voltage plots are shown below. A sinusoidal electronic source (California Instruments 2100) has been used as AC source, set to 230Vac, 50Hz.

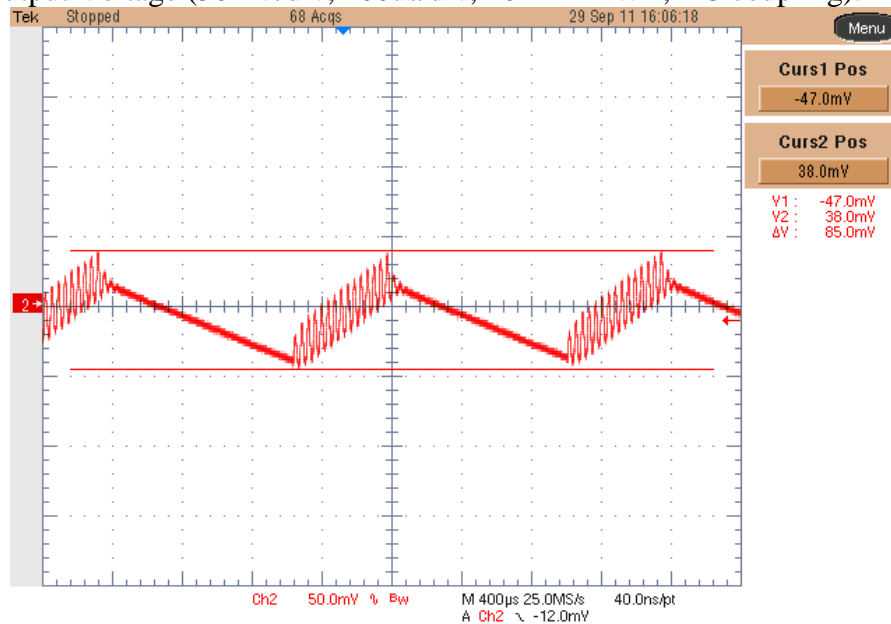
Output current: 1.6A

Channel 2: Output Voltage (50mV/div, 10us/div, 20MHz BWL, AC coupling).



Output current: 30mA

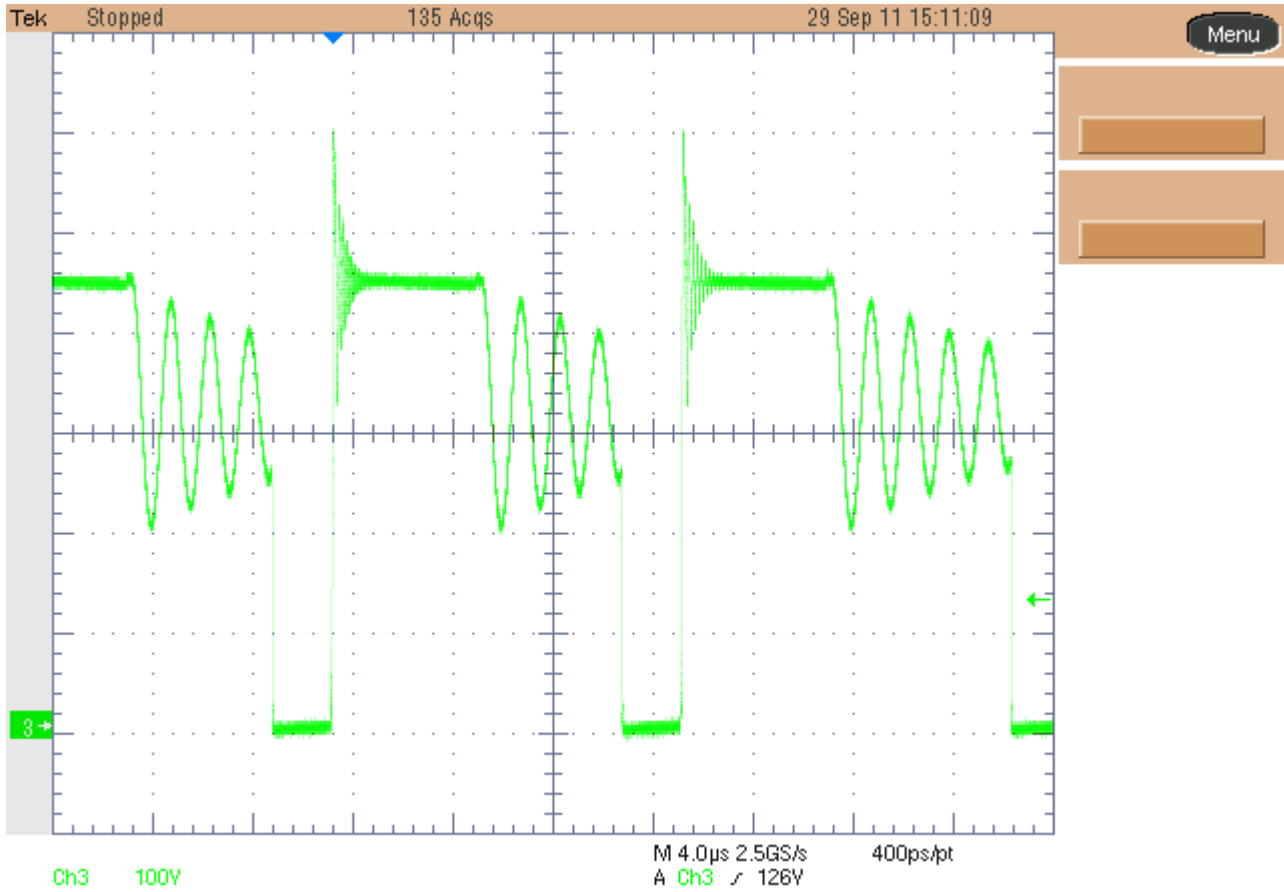
Channel 2: Output Voltage (50mV/div, 400us/div, 20MHz BWL, AC coupling).



5. Switching Node Waveform: Main Mosfet

The image below shows the voltage on the drain of the switching node with a 230Vac input, and 1.6A load.

Channel 3: Voltage on Mosfet's drain (100 V/div, 4us/div, no BWL).

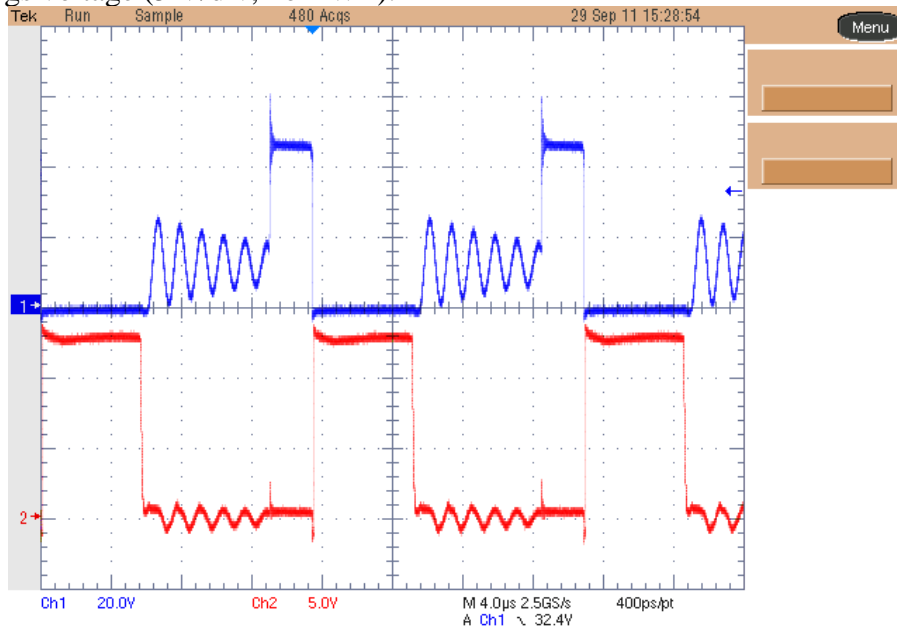


6. Switching Node Waveform: Sync Mosfet

The images below show the voltage on the drain of the sync Mosfet and its gate voltage. The upper picture is taken at full load, the lower at no load. The input voltage was 320Vdc, and the load set at 1.6A.

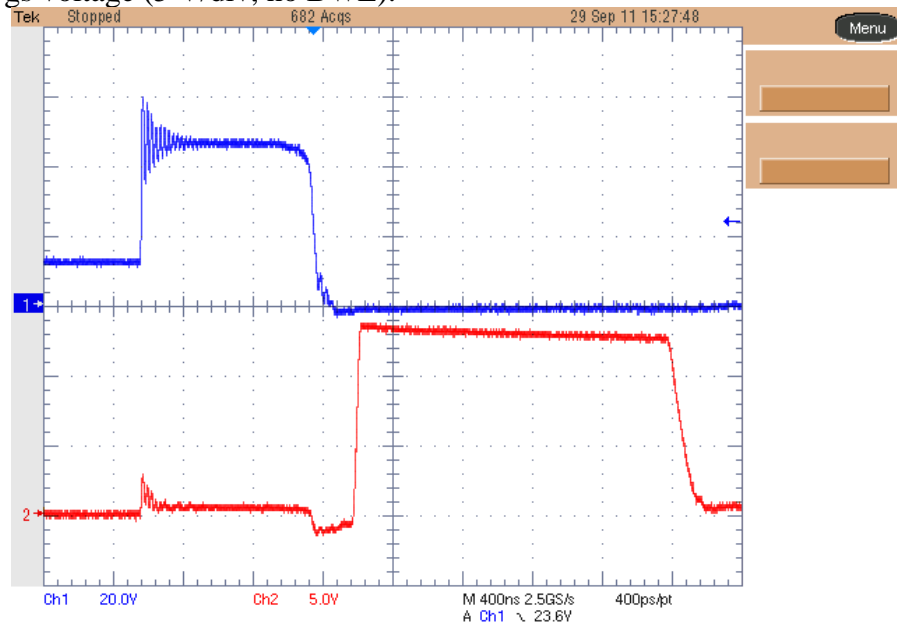
Channel 1: Vds voltage (20 V/div, **4 μ s/div**, no BWL).

Channel 2: Vgs voltage (5 V/div, no BWL).



Channel 1: Vds voltage (20 V/div, **400ns/div**, no BWL).

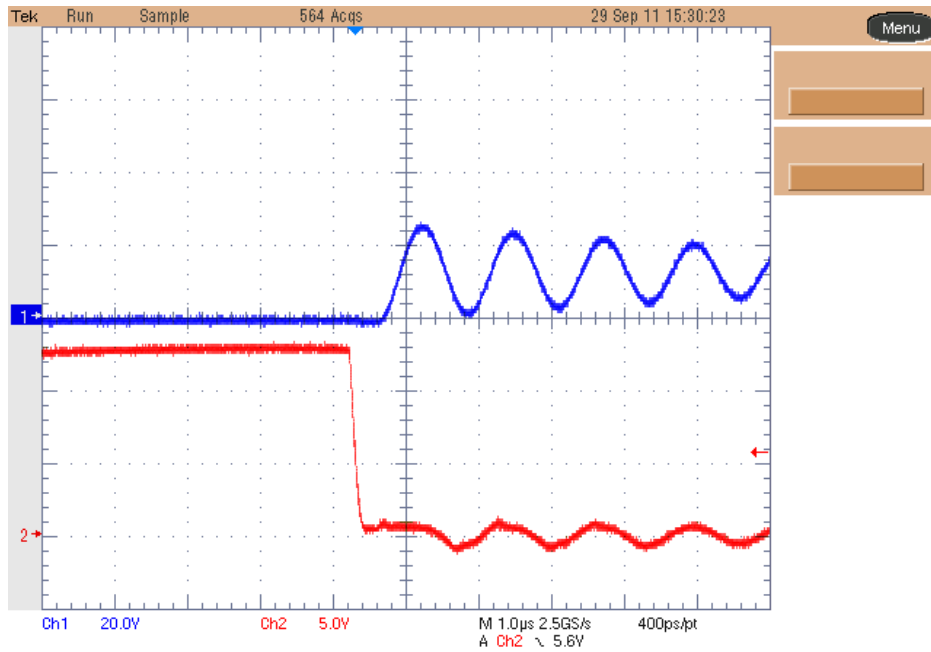
Channel 2: Vgs voltage (5 V/div, no BWL).



Transition to OFF state: 320Vdc_in, 1.6A load

Channel 1: Vds voltage (20 V/div, 1 μ s/div, no BWL).

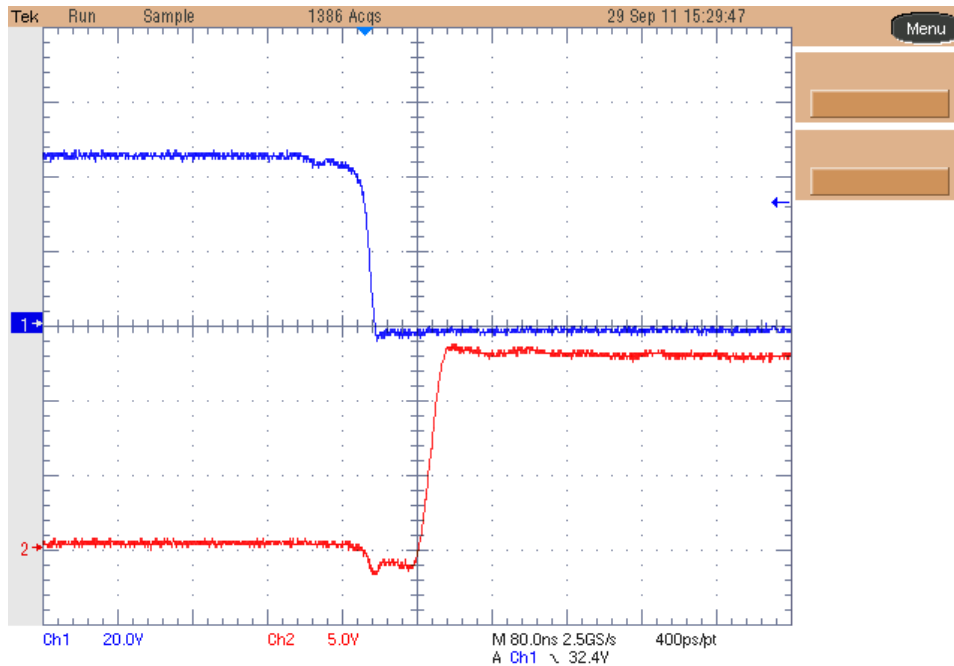
Channel 2: Vgs voltage (5 V/div, no BWL).



Transition to ON state: 320Vdc_in, 1.6A load

Channel 1: Vds voltage (20 V/div, 80ns/div, no BWL).

Channel 2: Vgs voltage (5 V/div, no BWL).

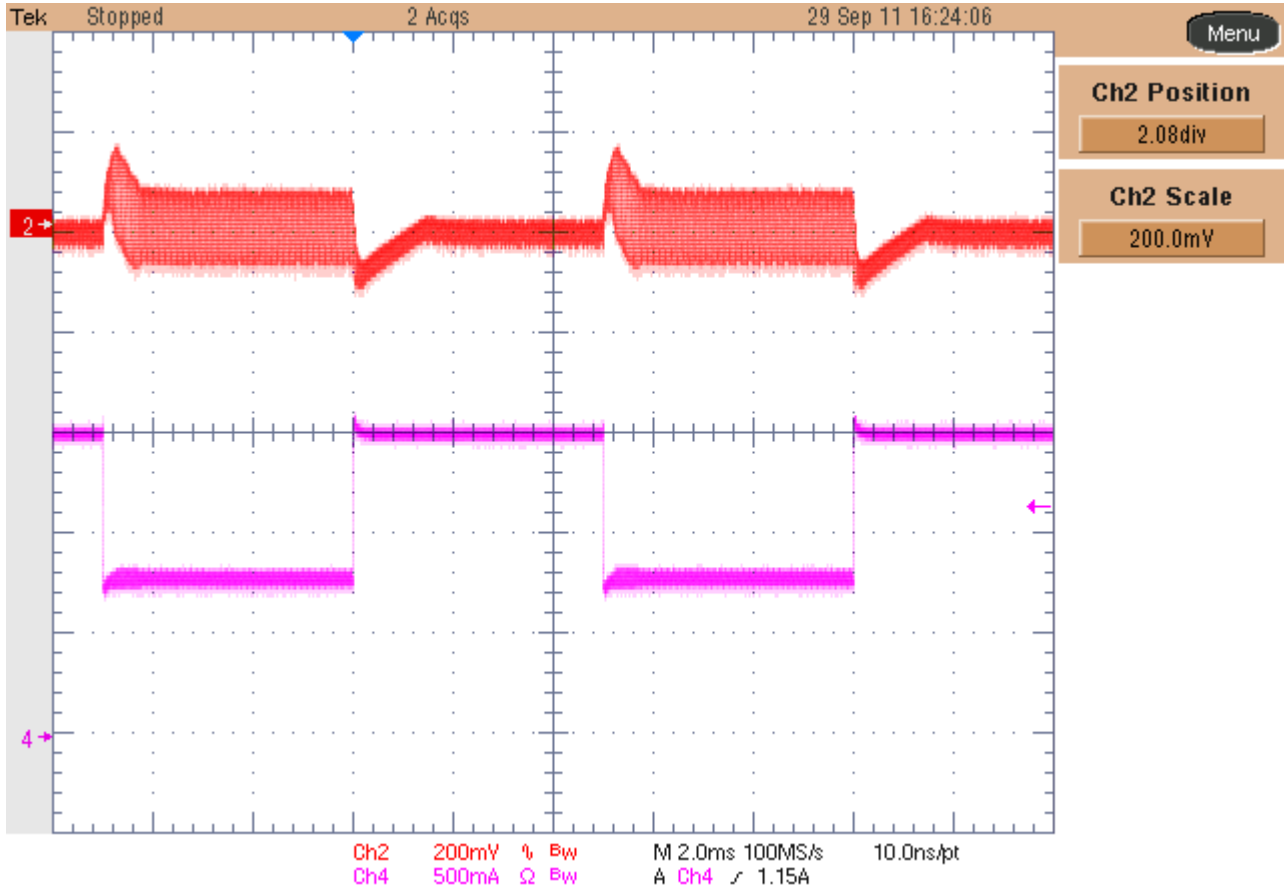


7. Transient Response

The image below shows the transient response of the output voltage while the load has been switched from 800mA to 1.6A (50% to 100% of nominal load). The input voltage was 320Vdc.

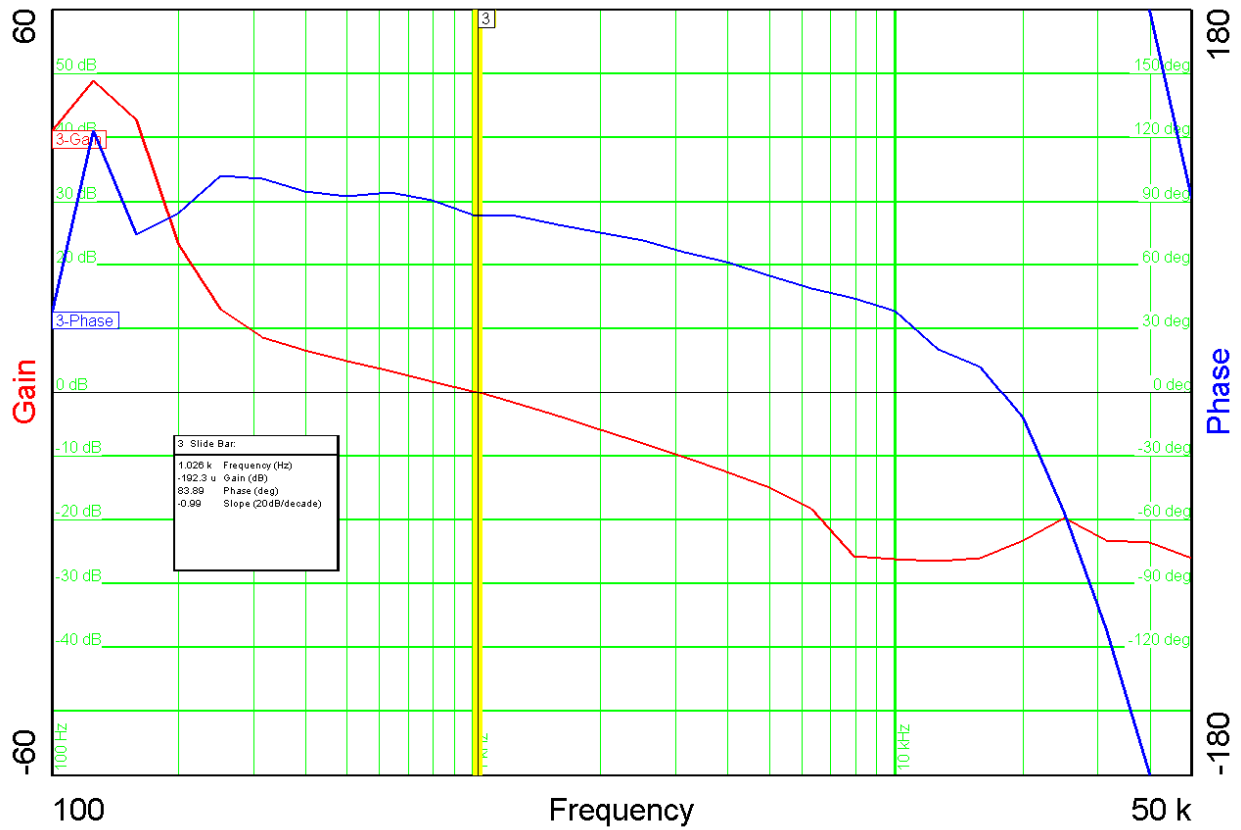
Channel 2: Output Voltage (200mV/div, 2ms/div, 20MHz BWL, AC coupling).

Channel 4: Output Current (500mA/div, 20MHz BWL, DC coupling).



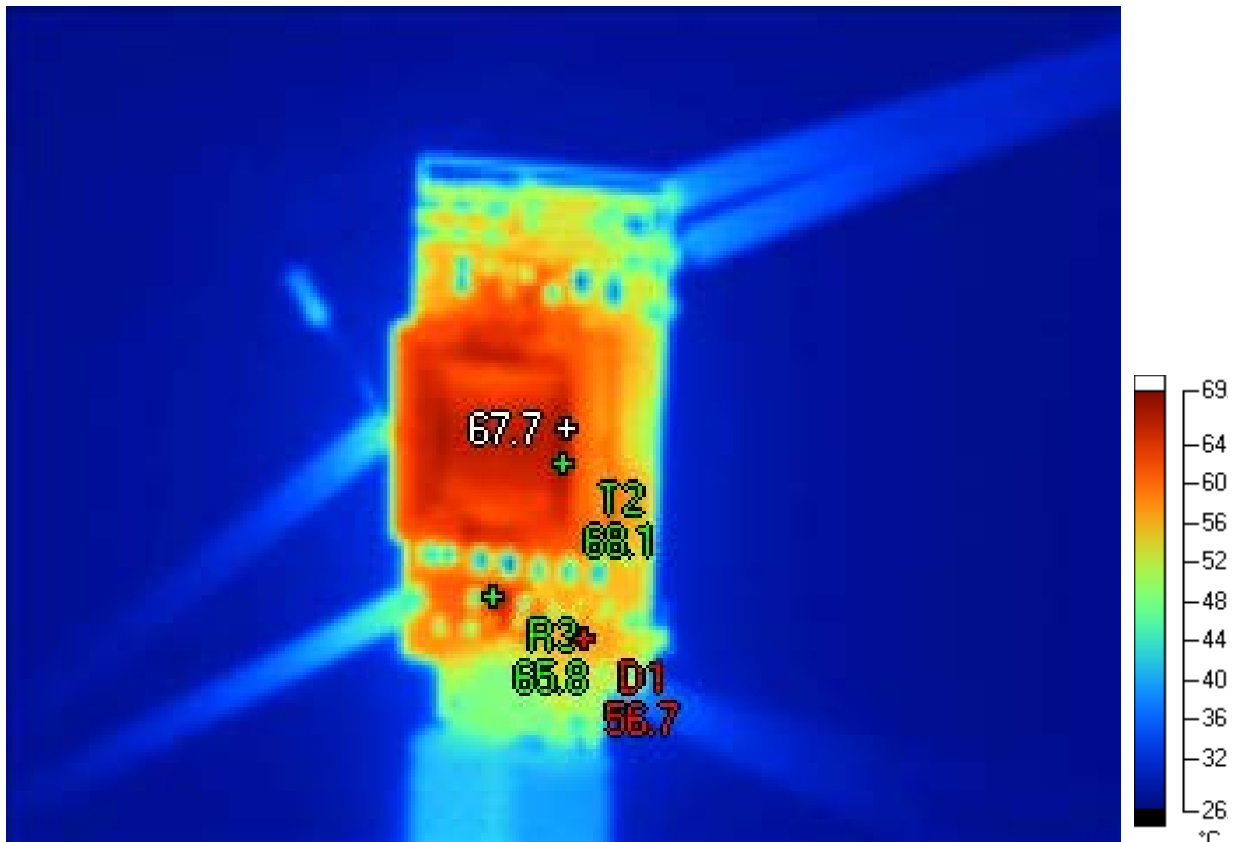
8. Feedback loop

The graph below shows the bode-plot measurement taken on the prototype while the input voltage has been set to 320Vdc and the output load to 1.6A. The crossover frequency was 1.026 KHz, the phase margin 83.89 deg. and the gain margin 24.52dB.



9. Thermal Image

The image below shows the thermal image of the prototype during a full load condition and 230Vac input. The air temperature (still air condition) was 23C; the board was horizontal on the bench.



9/29/2011 2:59:56 PM

Image Info

Average Temperature	33.4 °C
Camera Model	Ti40FT
Image Range	27.0 °C to 68.5 °C
Lens Serial #	40948-4409
Manufacturer	Fluke
Camera Serial Number	Ti40FT-070263

Markers

Label	Temperature	Emissivity	Background
Center Point	67.7 °C	0.95	23.0 °C
T2	68.1 °C	0.95	23.0 °C
R3	65.8 °C	0.95	23.0 °C
D1	56.7 °C	0.95	23.0 °C

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