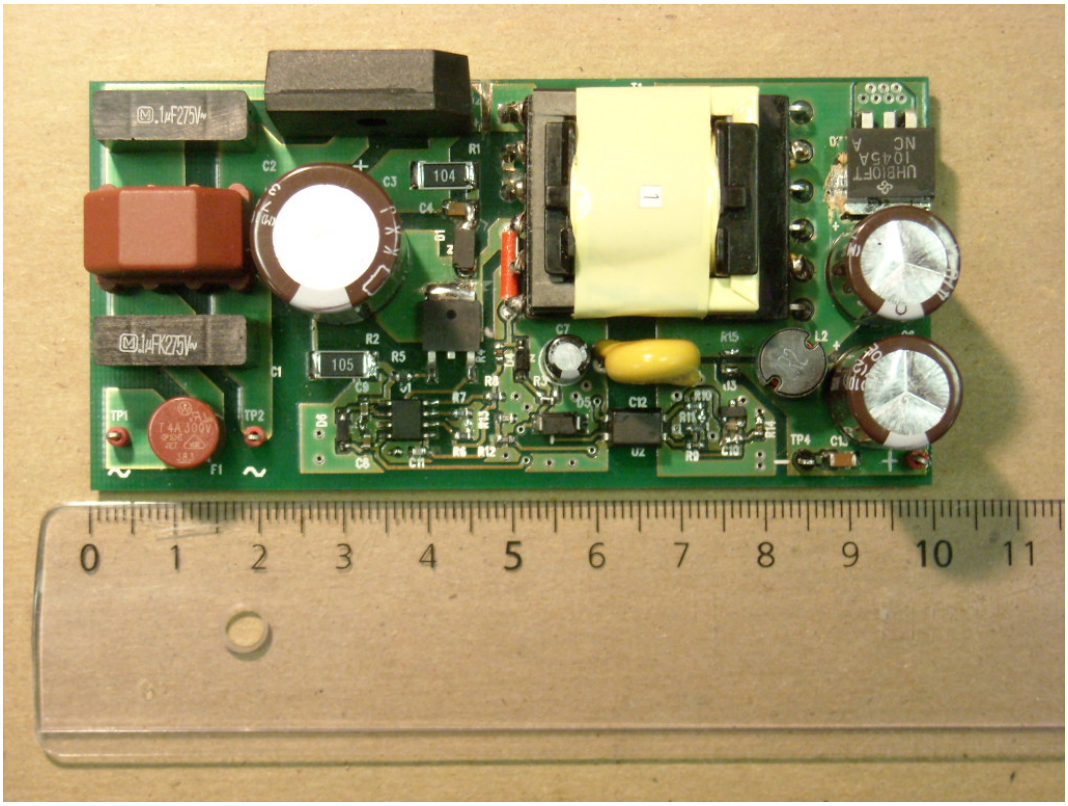
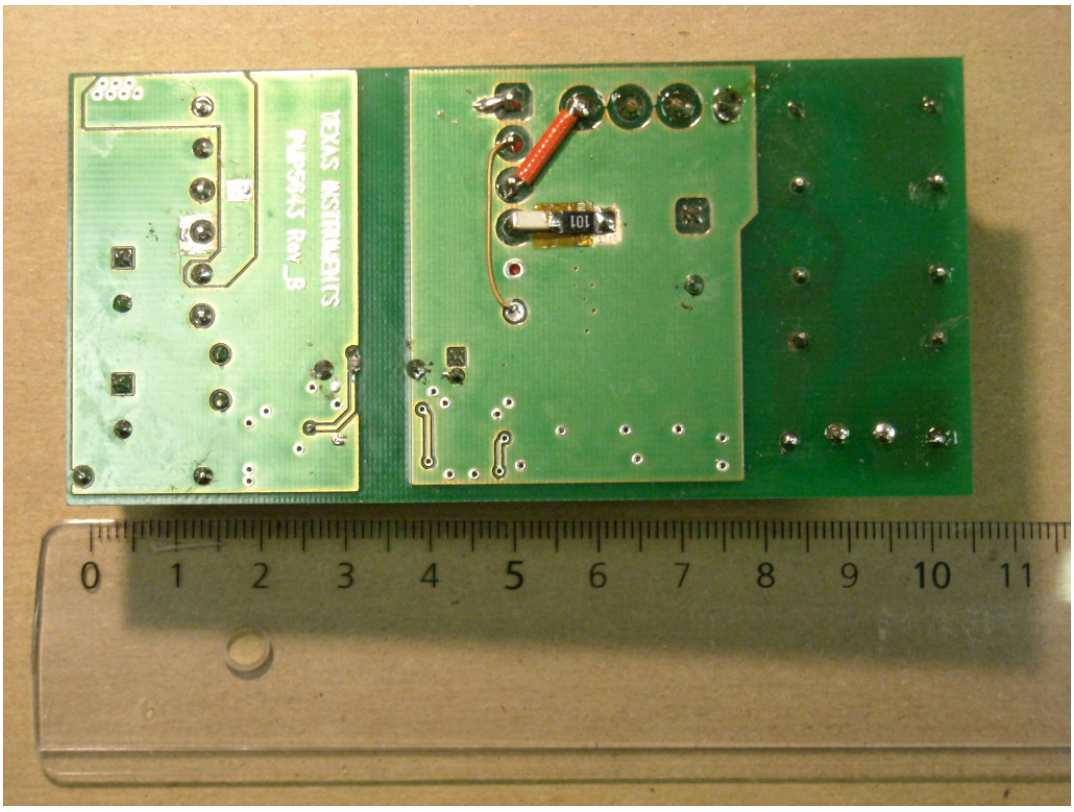
PHOTO OF THE PROTOTYPE:





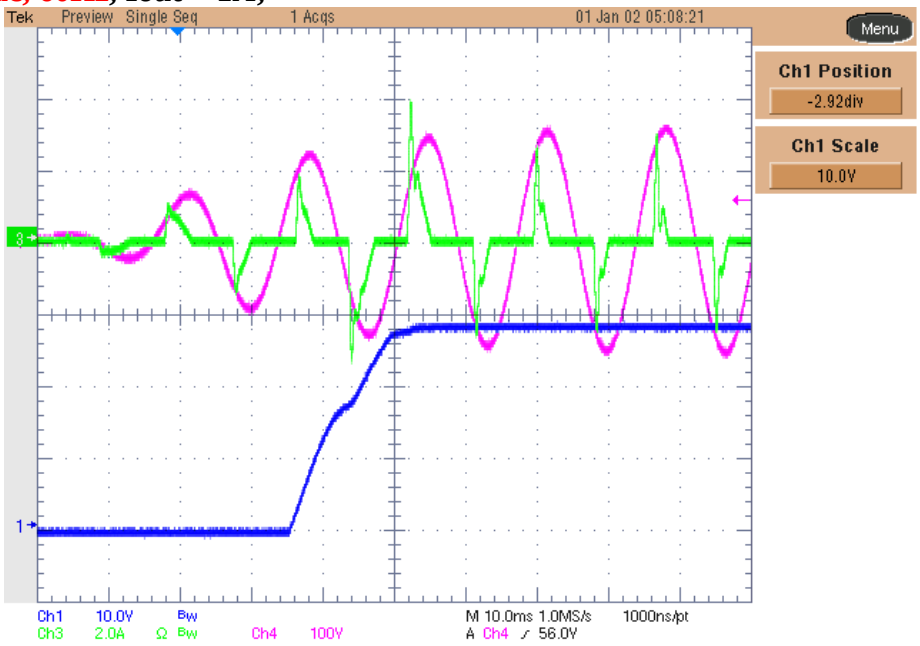
1 Startup

The input AC voltage, input current and output voltage behavior at startup is shown in the images below. The input voltage was set to 115Vac, 60Hz and 230Vac, 50Hz. The output loaded with a 1A load for the first two pictures and unloaded for the last one.

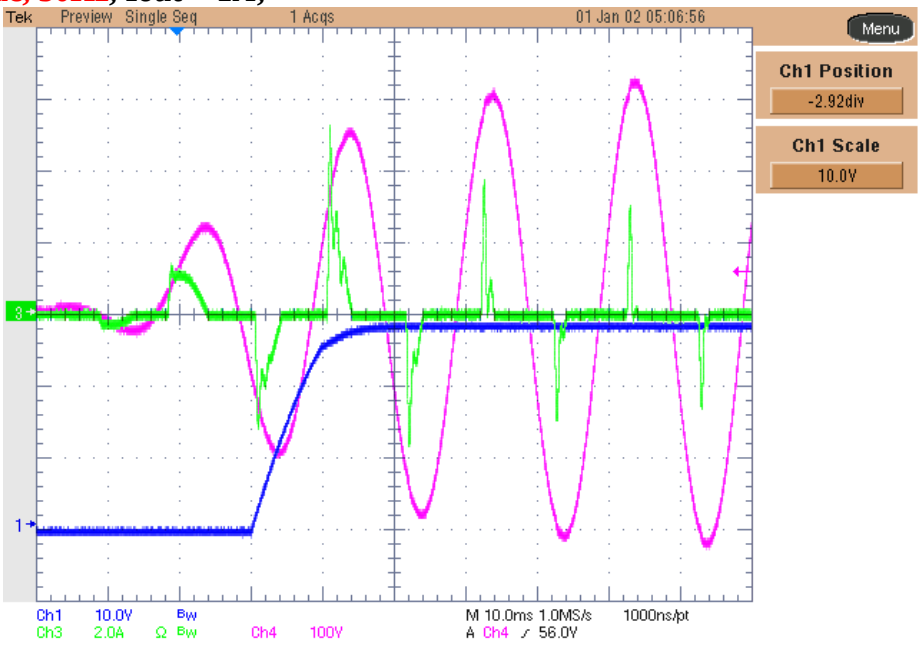
Ch.4: Input voltage (100V/div, 10ms/div), Ch.1: Output voltage (10V/div)

Ch.3: Input current (2A/div)

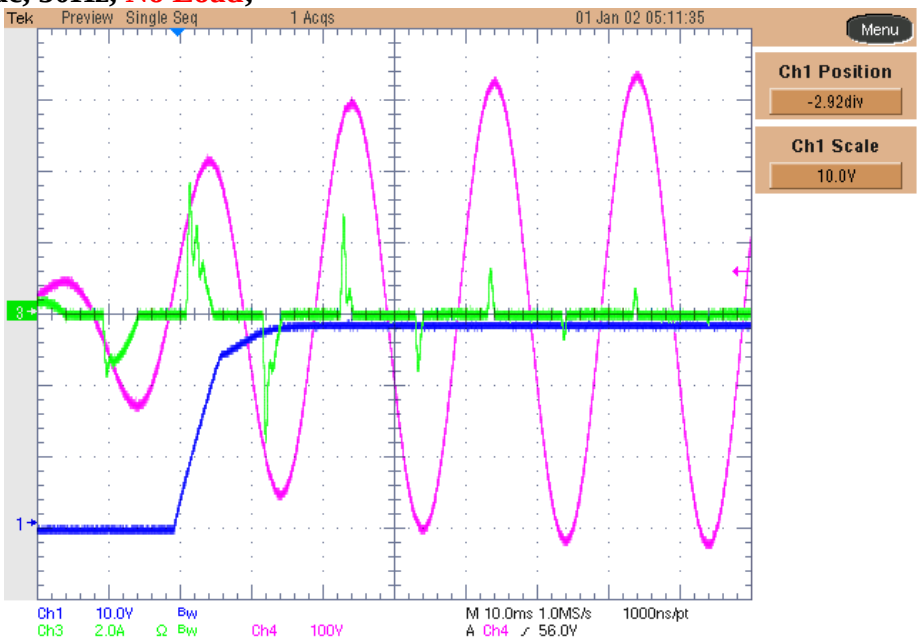
Vin = 115Vac, 60Hz, Iout = 1A;



Vin = 230Vac, 50Hz, Iout = 1A;

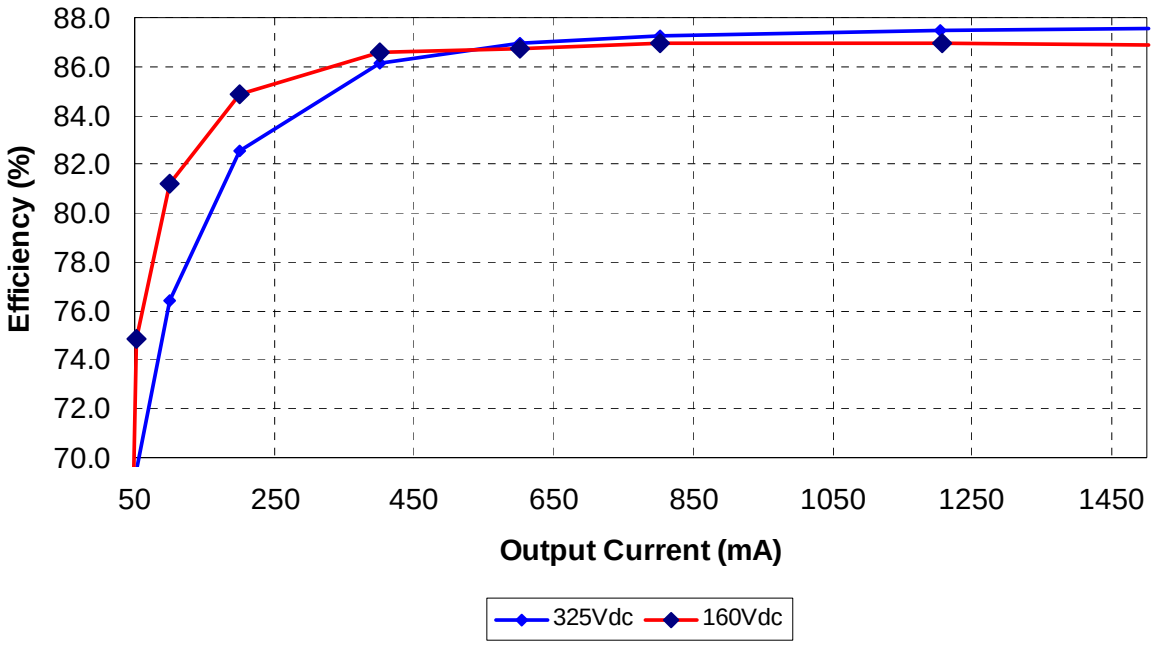


Ch.4: Input voltage (100V/div, 10ms/div), Ch.1: Output voltage (10V/div)
Ch.3: Input current (2A/div)
Vin = 230Vac, 50Hz, No Load;



2 Efficiency

The efficiency data are shown in the tables and graph below. In order to get an accurate measure of the input power, a DC voltage source has been employed, set to the peak value of the two nominal input voltages: 115Vac and 230Vac (160Vdc and 325Vdc).

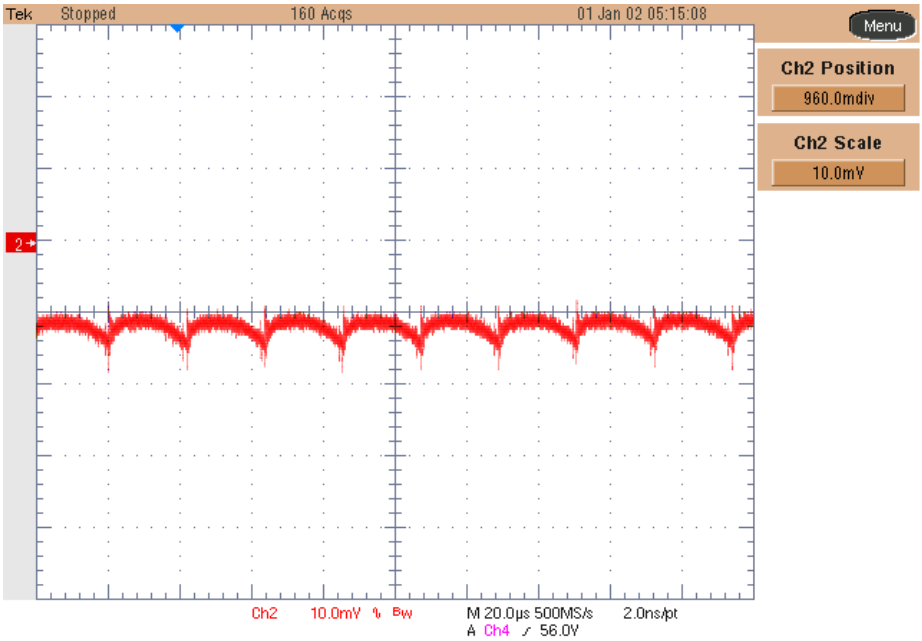


Iout (mA)	Vout (V)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
0.0	28.60	0.00	1.14	160.0	0.18	0.18	0.00
51.5	28.60	1.47	12.28	160.3	1.97	0.50	74.82
100.2	28.58	2.86	22.0	160.3	3.53	0.66	81.17
200.0	28.58	5.72	42.0	160.3	6.73	1.02	84.90
402.4	28.58	11.50	82.9	160.2	13.28	1.78	86.60
602.3	28.57	17.21	123.8	160.2	19.83	2.63	86.76
802	28.57	22.92	164.6	160.1	26.35	3.44	86.96
1206	28.55	34.43	247.5	160.0	39.60	5.17	86.95
1502	28.55	42.88	308.5	160.0	49.36	6.48	86.88

Iout (mA)	Vout (V)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
0.0	28.61	0.00	0.945	325.2	0.31	0.31	0.00
51.5	28.61	1.47	6.52	325.1	2.12	0.65	69.51
100.1	28.60	2.86	11.5	325.1	3.75	0.88	76.44
200.0	28.59	5.72	21.3	325.1	6.92	1.21	82.57
402.5	28.59	11.51	41.1	325.1	13.36	1.85	86.12
602.3	28.58	17.21	60.9	325.0	19.79	2.58	86.97
802	28.57	22.92	80.8	325.0	26.26	3.34	87.27
1203	28.56	34.36	120.8	325.0	39.26	4.90	87.51
1502	28.55	42.88	150.7	324.9	48.96	6.08	87.58

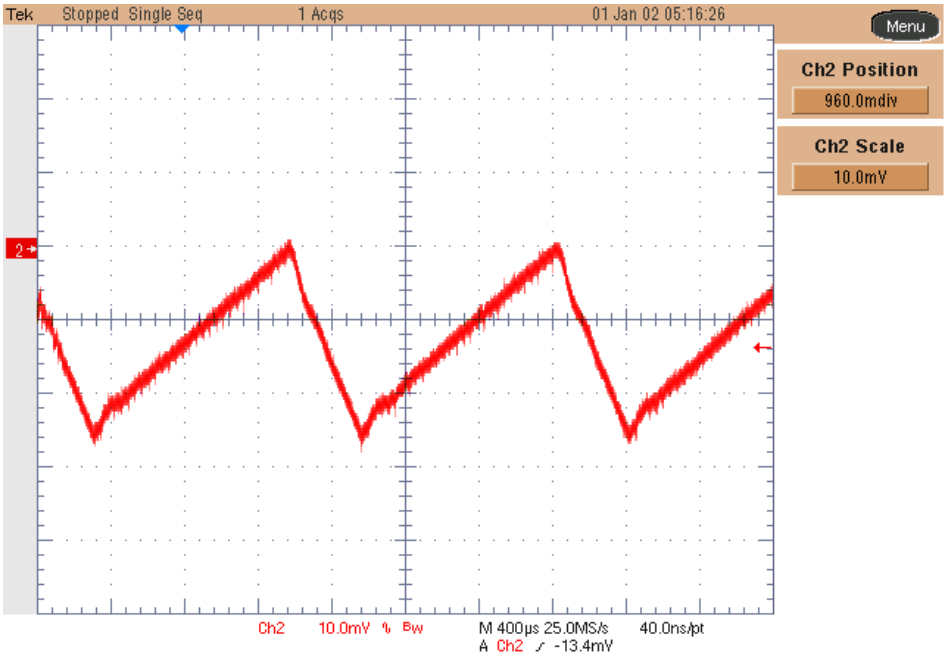
3 Output Ripple Voltage

The output ripple voltage is shown in the plot below. The input was set to 320Vdc and the output to 1A. **Ch.2: Output Voltage (10mV/div, 20us/div, AC coupling, 20MHz BWL)**



The picture below shows how the output ripple voltage is increased during a burst mode condition. The input was unmodified and the output set to 50mA.

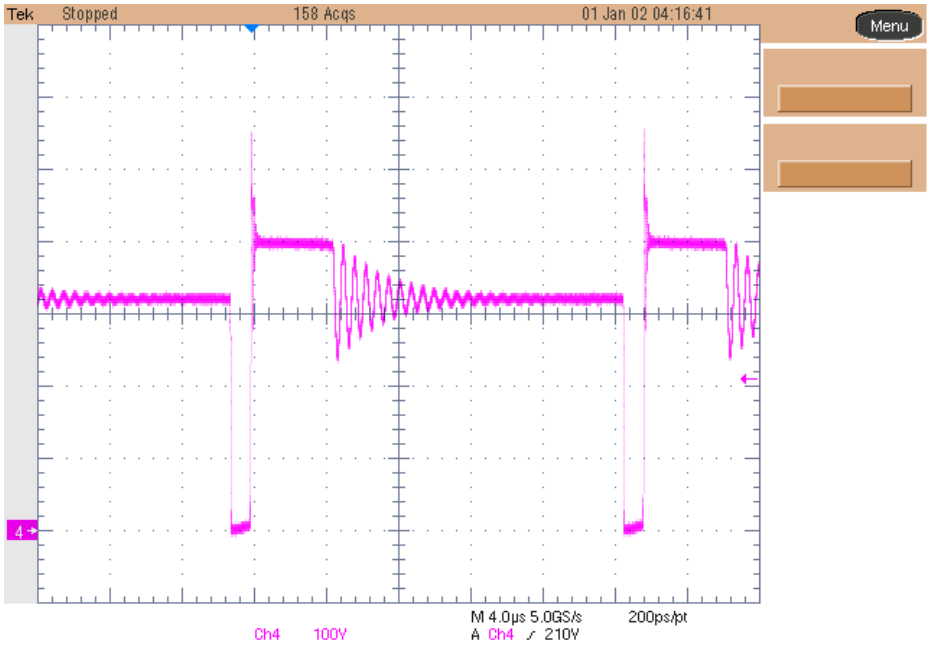
Ch.2: Output Voltage (10mV/div, 400us/div, AC coupling, 20MHz BWL)



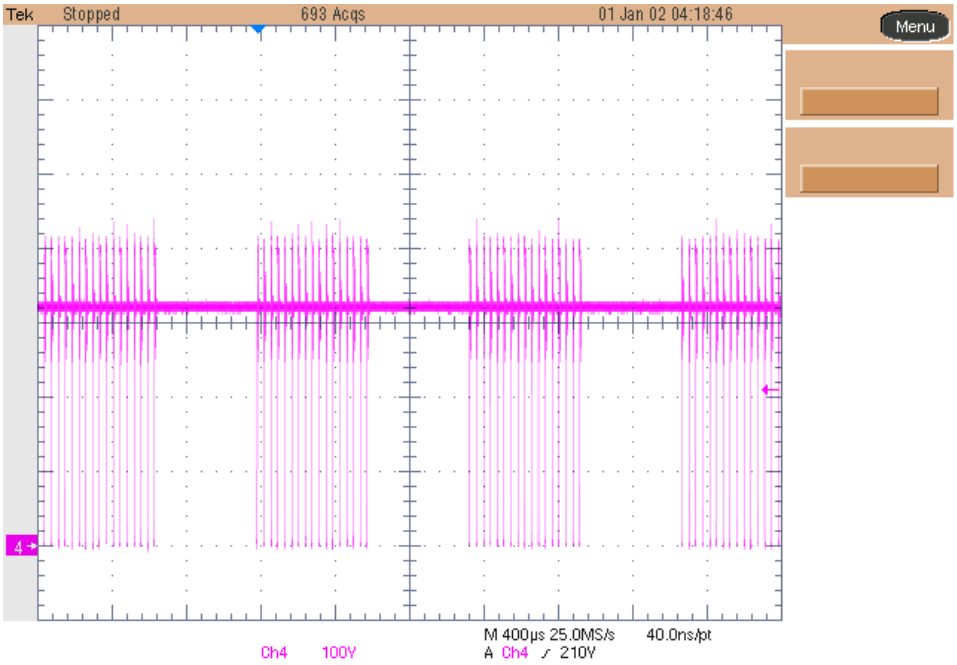
4 Switching Node Waveform

The image below shows the peak voltage on the drain of the Mosfet Q1 with a 320Vdc input, and 1A load.

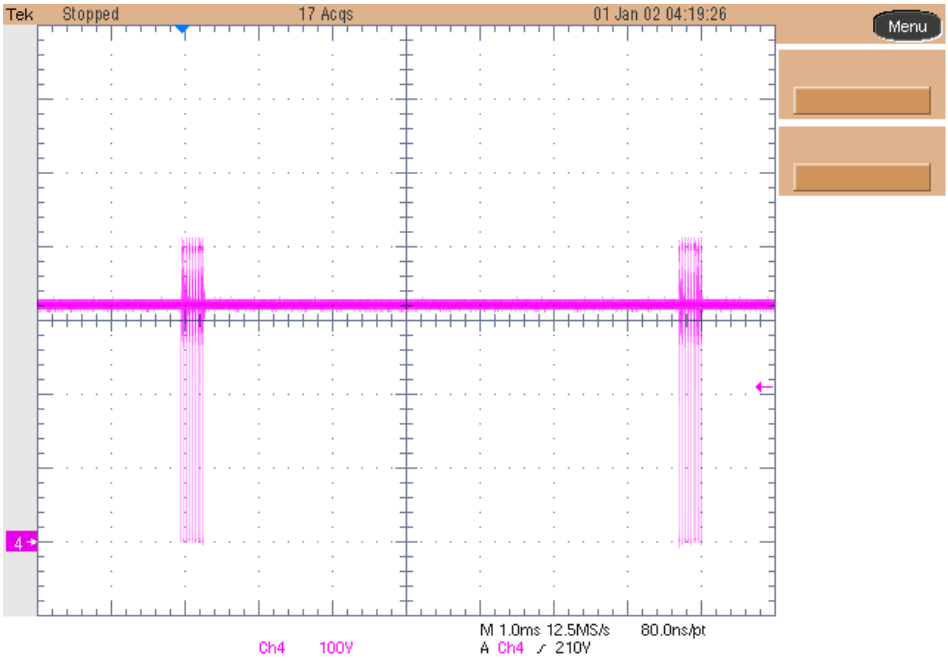
Ch4: Drain voltage (100V/div, 4us/div, No BWL).



By reducing the load, the converter enters the burst mode, as shown in the picture below.
Ch4: Drain voltage (100V/div, 4us/div, No BWL).
Vin = 320Vdc, Iout=40mA



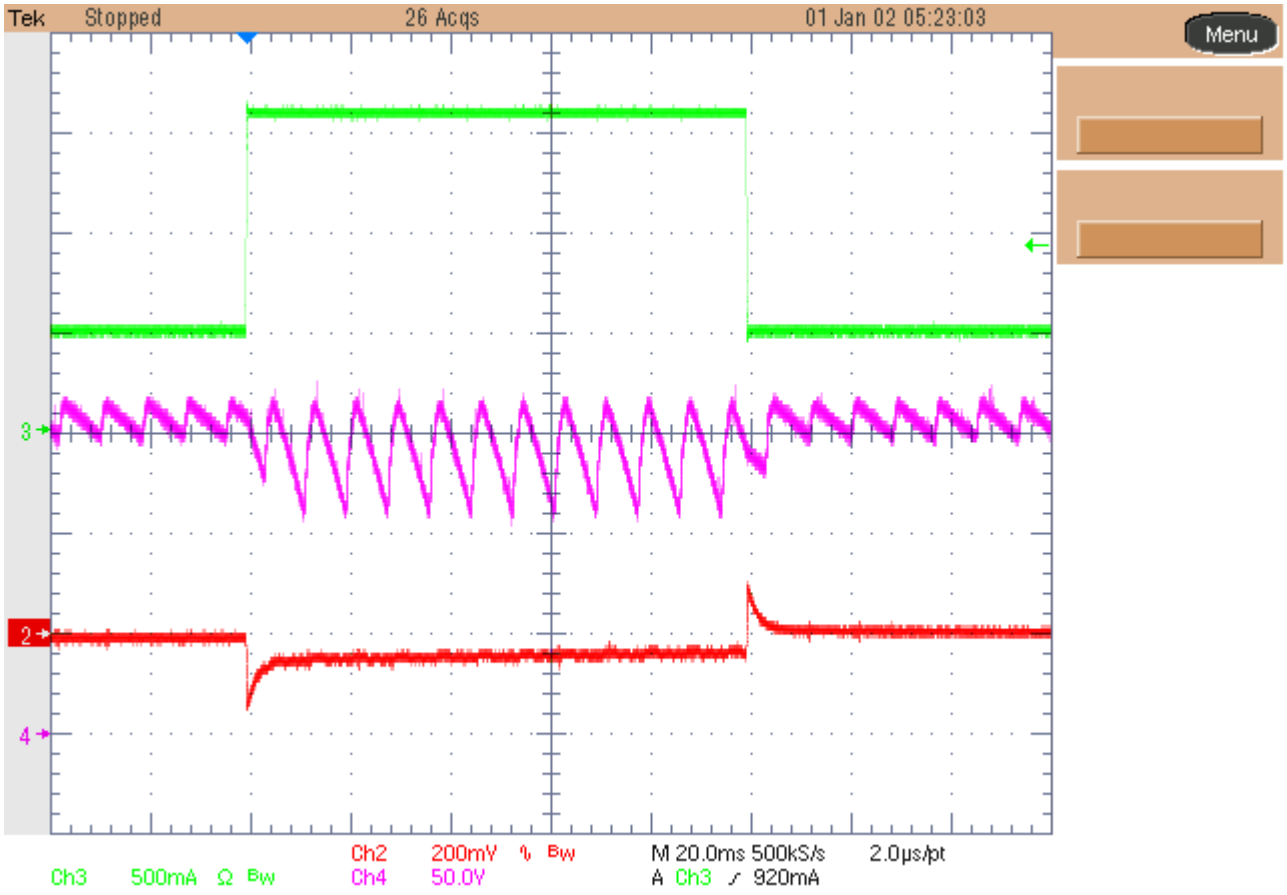
Ch4: Drain voltage (100V/div, 1msec/div, No BWL).
Vin = 320Vdc, No Load



5 Transient Response

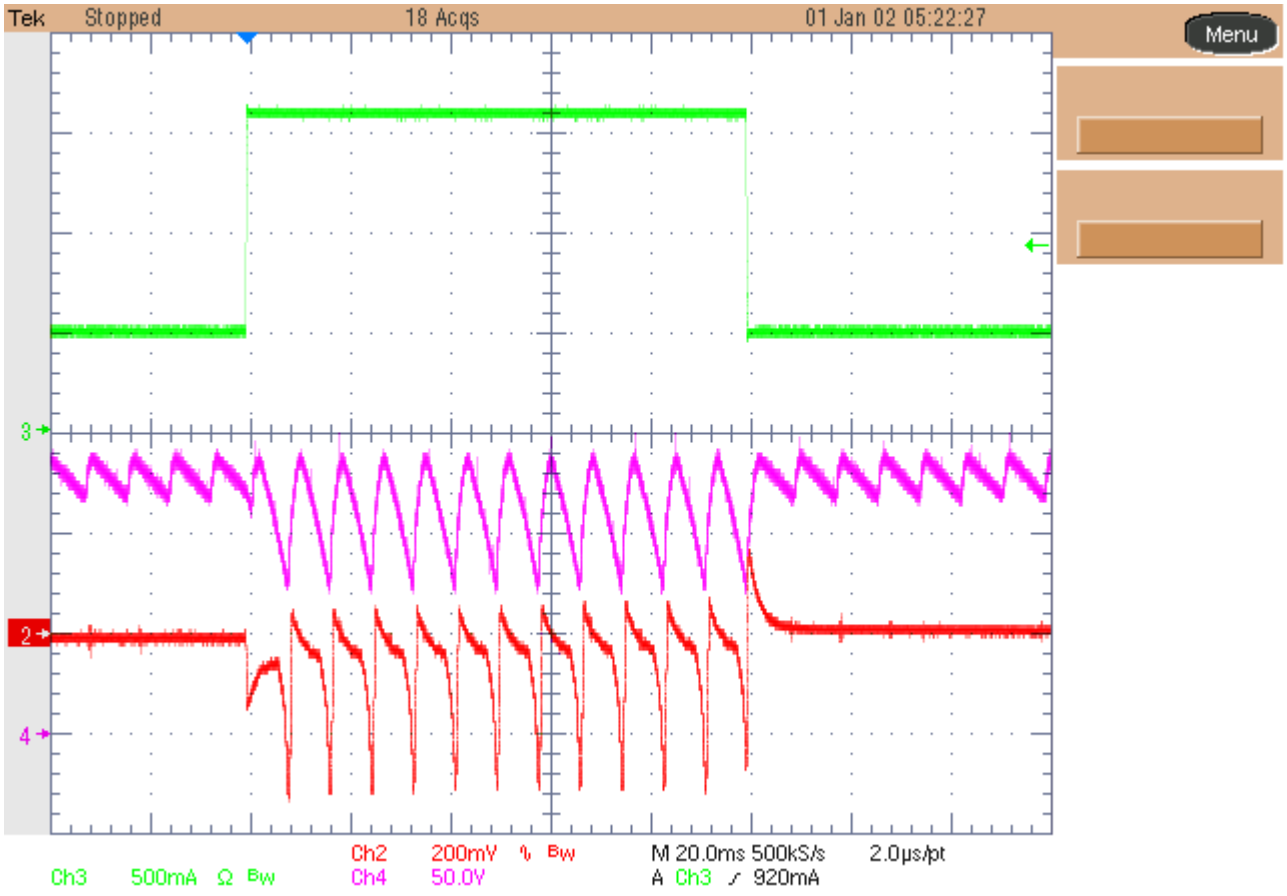
The image below shows the transient response of the output voltage when the load has been switched between 0.5A and 1.75A. The input voltage was set to 115Vac, 60Hz. The channel 4 shows the bulk capacitor (C3) voltage.

Ch2: Output Voltage (200mV/div, 20ms/div, AC coupled, 20MHz BWL).
Ch3: Output Current (500mA/div, DC coupled)
Ch4: C3 capacitor voltage (50V/div, DC coupled)



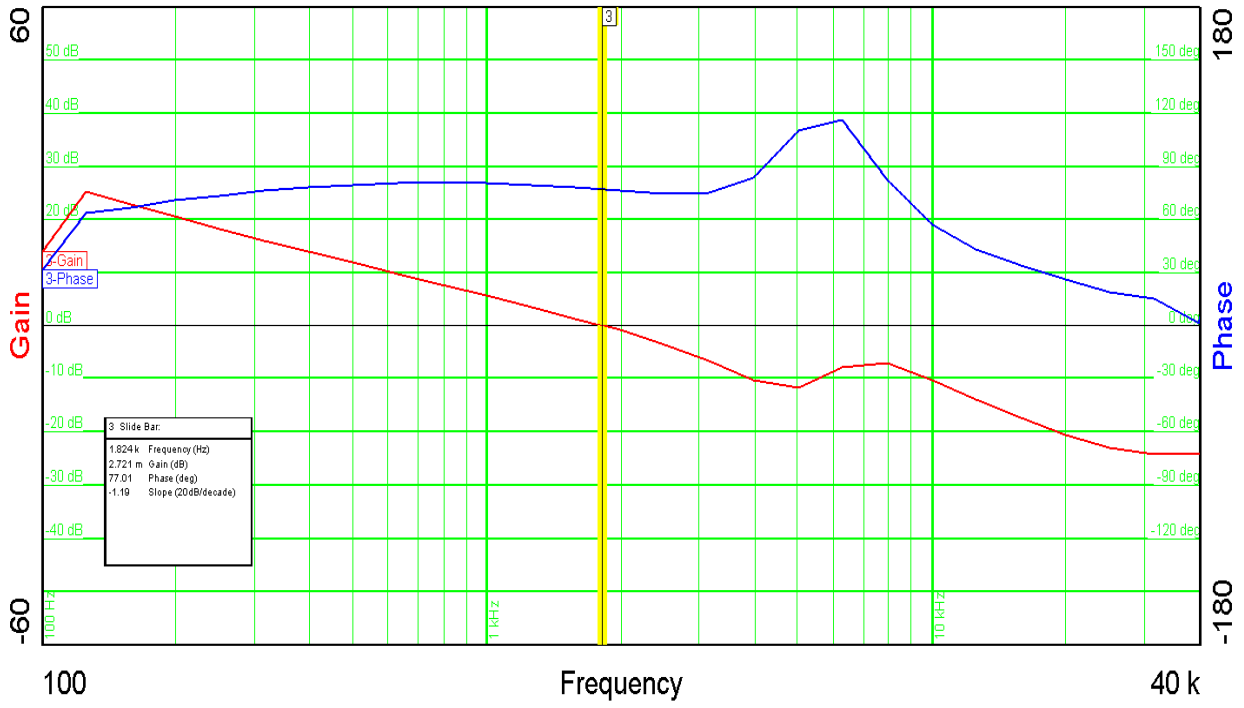
The worst case condition has been measured at 96Vac input. The converters doesn't regulate anymore at 50W peak due to large 120Hz ripple. If full power is needed at these conditions, it is advisable to increase the bulk capacitor C3. The load has not been changed from the previous measurement.

Ch2: Output Voltage (200mV/div, 20ms/div, AC coupled, 20MHz BWL).
Ch3: Output Current (500mA/div, DC coupled)
Ch4: C3 capacitor voltage (50V/div, DC coupled)



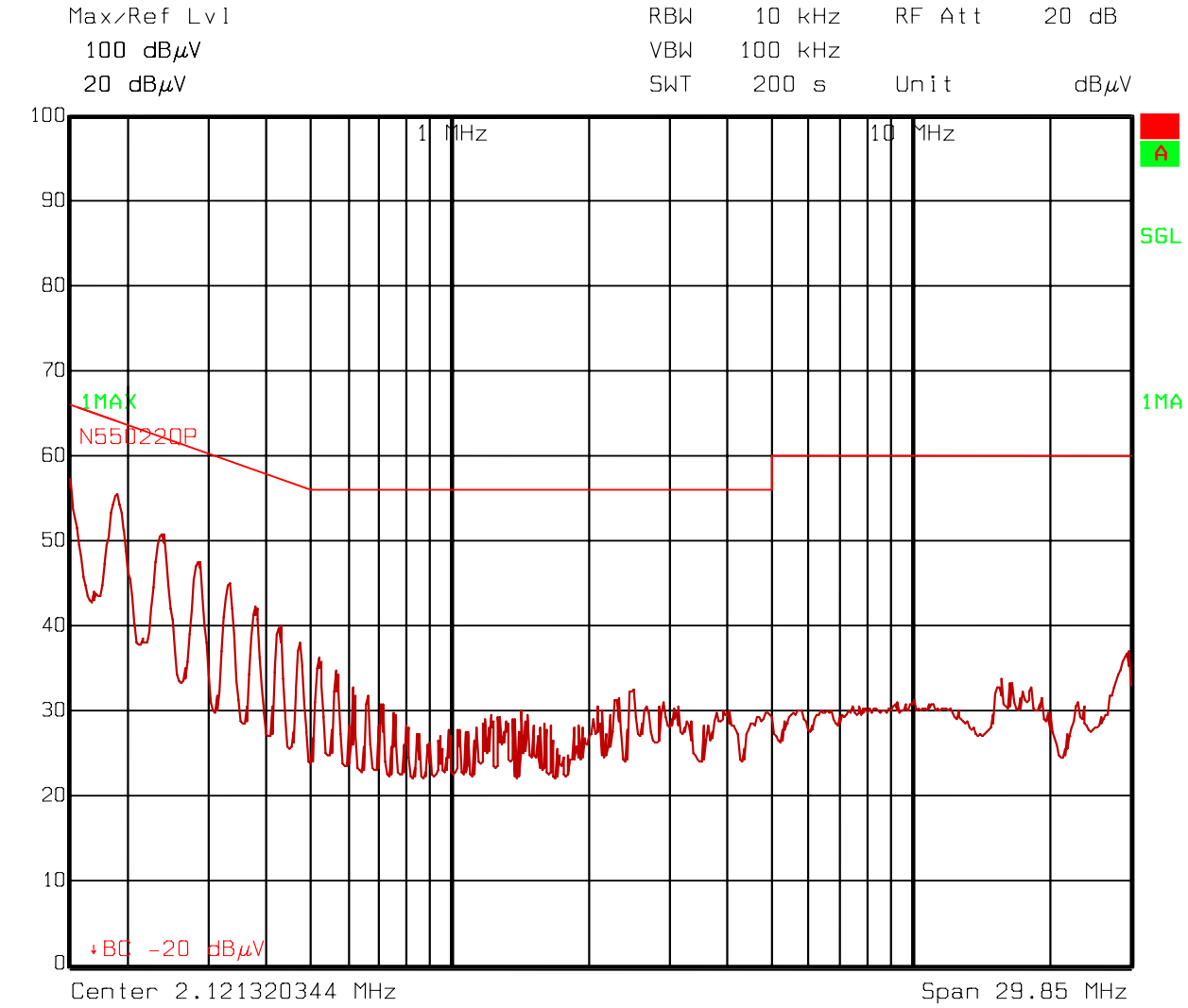
6 Loop Response

The graph below shows the bode-plot analysis. The input voltage was set to 320Vdc and the load to 1A. The crossover frequency was 1.82KHz and the phase margin 77 deg., while the gain margin was 25dB.



7 EMI Measurement

The graph below shows the conducted emission EMI noise and the EN55022 Class-B Quasi-Peak limits. The load was connected to a LISN and an isolation transformer; the load was a power resistor and the resistance value set to get a load of 1A, while the input voltage was 230Vac.The receiver was set to Quasi-peak detector, 10 KHz bandwidth.



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