

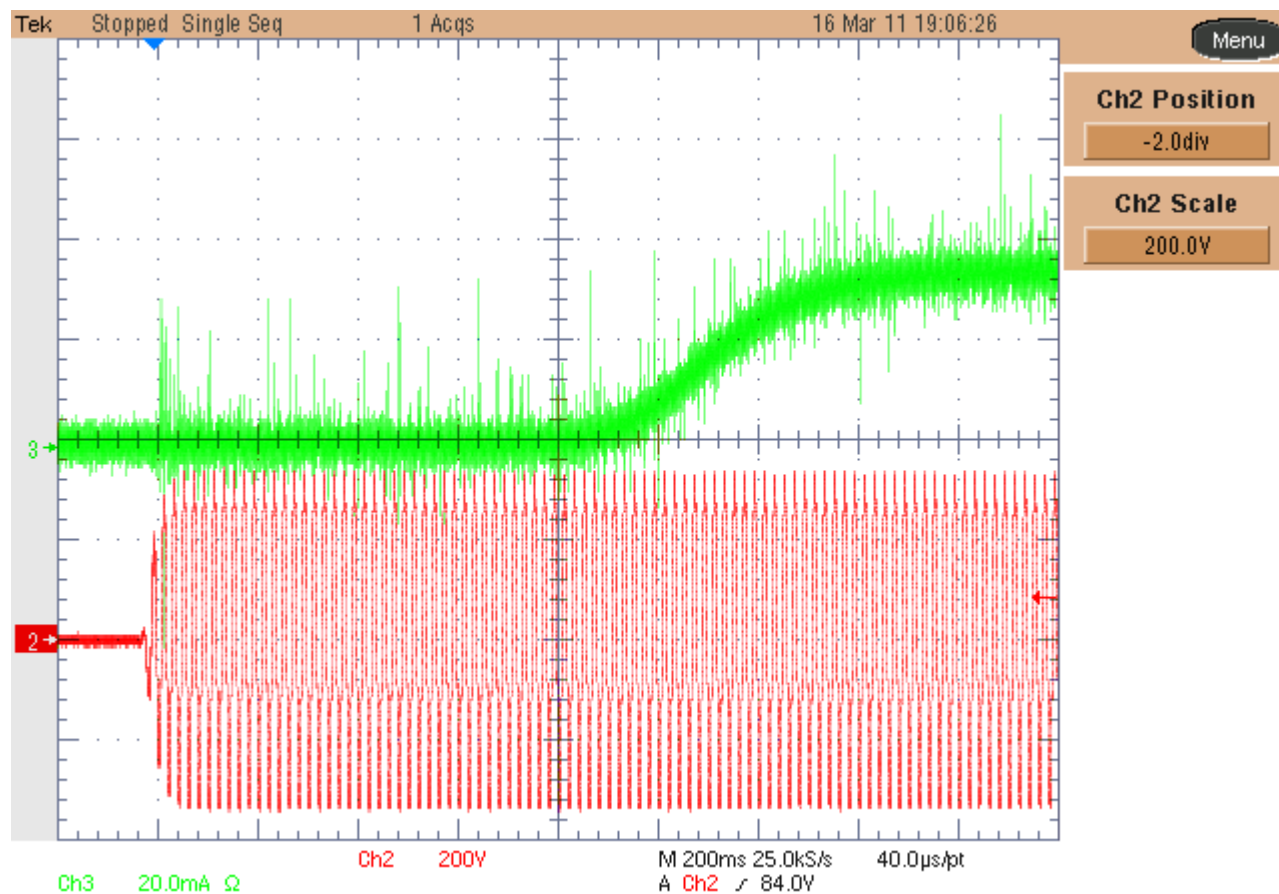
1 Startup

The output current and the input voltage at startup are shown in the image below. Input voltage was set to 320Vac, 50Hz. The control voltage was set to 0V.

The higher the control voltage, the quicker the programmed output current is reached.

Channel 2: Input voltage (200 V/div, 200ms/div).

Channel 3: Output current (20 mA/div, DC coupling).

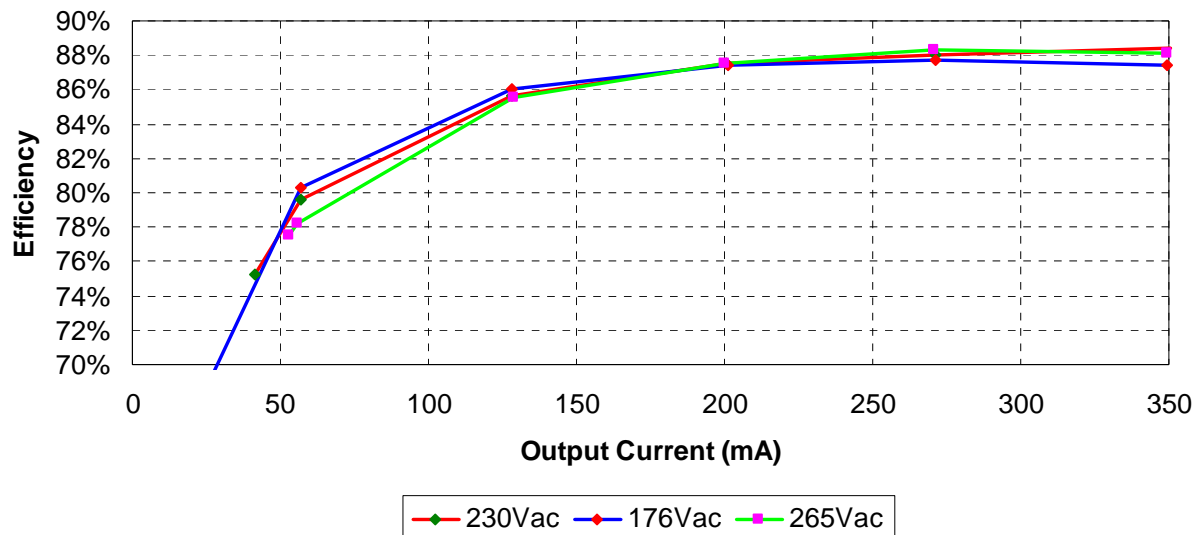


2 Efficiency

The efficiency data is shown in the tables and graph below. The input power has been measured with a digital power meter Yokogawa WT210.

The output power has been varied by adjusting the control voltage, between 0 and 10V.

In order to reach the maximum power, 51 high-brightness LEDs were connected in series.



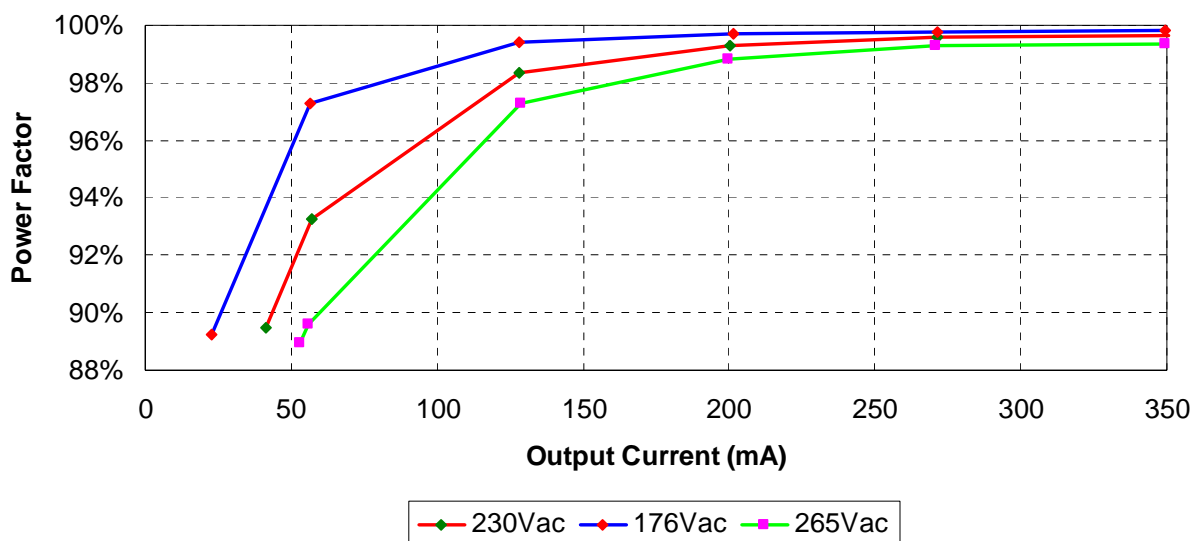
I _{out} (mA)	V _{out} (V)	P _{out} (W)	V _{ac} (V)	P _{in} (W)	P _{loss} (W)	Eff	PF	V _{dim}
41.2	147.6	6.08	230	8.08	2.00	75.26%	89.45%	0.0
57.1	149.7	8.55	230	10.74	2.19	79.59%	93.28%	2.0
128.2	156.2	20.02	230	23.38	3.36	85.65%	98.37%	4.0
200.5	160.6	32.20	230	36.81	4.61	87.48%	99.27%	6.0
271.5	164.0	44.53	230	50.56	6.03	88.07%	99.58%	8.0
350.3	167.6	58.71	230	66.41	7.70	88.41%	99.67%	10.2

I _{out} (mA)	V _{out} (V)	P _{out} (W)	V _{ac} (V)	P _{in} (W)	P _{loss} (W)	Eff	PF	V _{dim}
22.7	143.6	3.26	176	4.81	1.55	67.77%	89.23%	0.0
56.7	149.1	8.45	176	10.53	2.08	80.28%	97.26%	2.0
128.0	155.7	19.93	176	23.16	3.23	86.05%	99.41%	4.0
201.3	160.3	32.27	176	36.89	4.62	87.47%	99.72%	6.0
271.4	163.5	44.37	176	50.60	6.23	87.70%	99.79%	8.0
349.7	166.6	58.26	176	66.62	8.36	87.45%	99.81%	10.2

I _{out} (mA)	V _{out} (V)	P _{out} (W)	V _{ac} (V)	P _{in} (W)	P _{loss} (W)	Eff	PF	V _{dim}
53.0	148.3	7.86	265	10.14	2.28	77.51%	88.96%	0.0
55.8	148.7	8.30	265	10.61	2.31	78.20%	89.60%	2.0
128.5	155.5	19.98	265	23.37	3.39	85.50%	97.26%	4.0
200.0	159.9	31.98	265	36.53	4.55	87.54%	98.82%	6.0
270.8	163.4	44.25	265	50.13	5.88	88.27%	99.27%	8.0
349.7	166.2	58.12	265	65.93	7.81	88.15%	99.34%	10.2

3 Power Factor

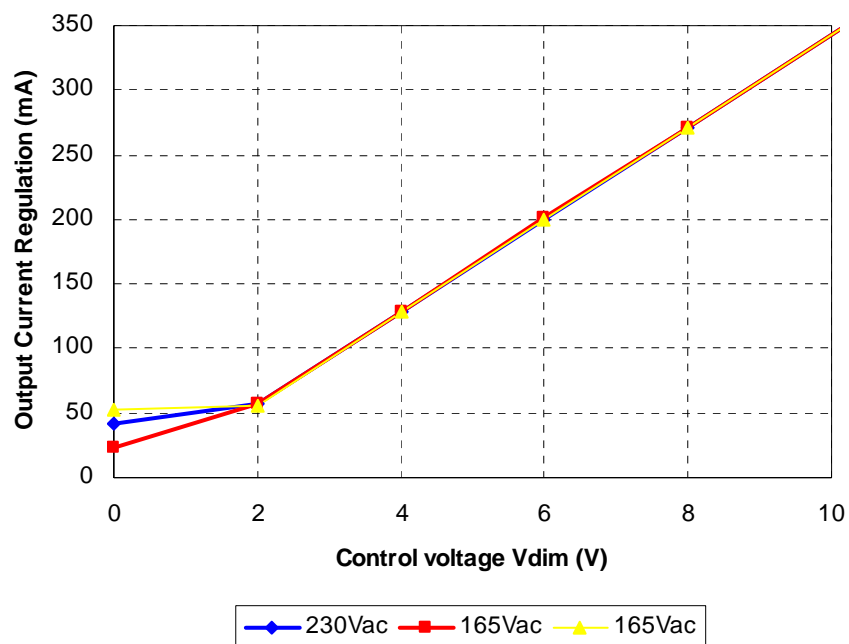
By using the data from the above tables we can draw the graph of the power factor versus output current, for each input AC voltage.



4 Output current regulation

The output current versus control voltage is plotted below.

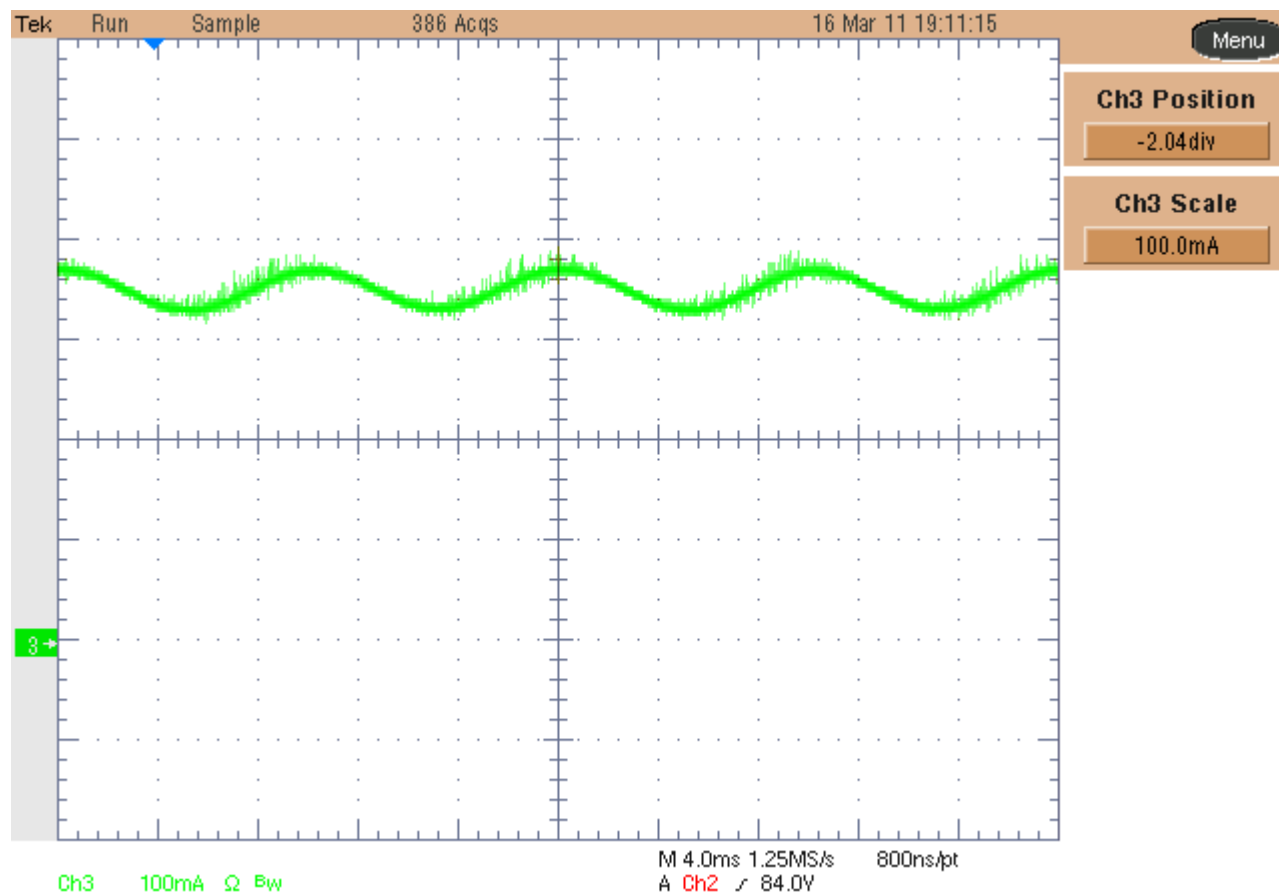
The minimum output current, when a 0V control voltage is applied, depends on the minimum ON time of the TPS92210, which goes as low as 700nsec.



5 Output ripple current

The output ripple current is shown in the plot below. The input was set at 230Vac and the load was set to 350mA.

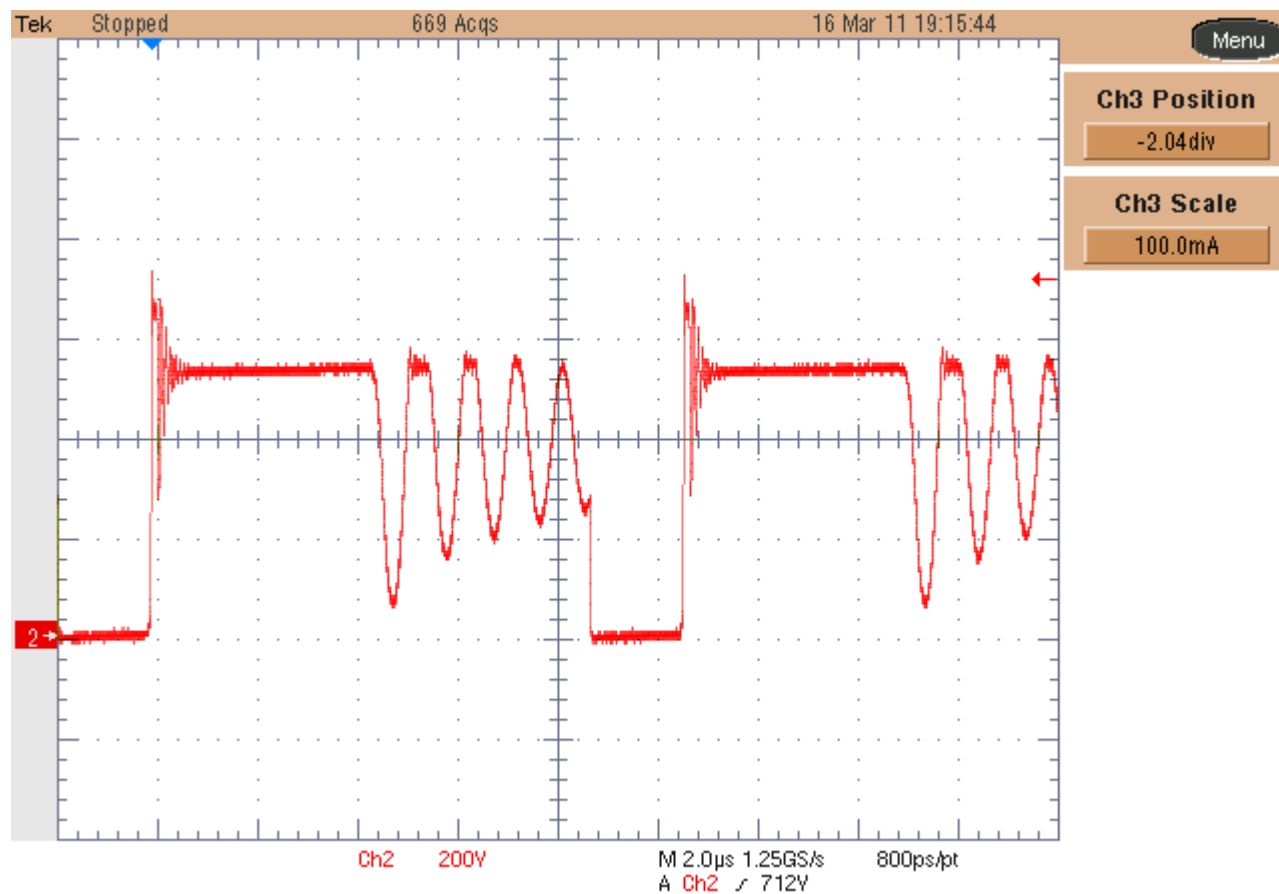
Channel 3: Output current (100 mA/div, 4ms/div, DC coupling, 20MHz BWL).



6 Switch-node

The image below shows the switch-node waveform (drain of Q1). The input voltage was set to 265Vac during a full load condition.

Channel 2: Q1 Vds voltage (200 V/div, 4us/div, No BWL).

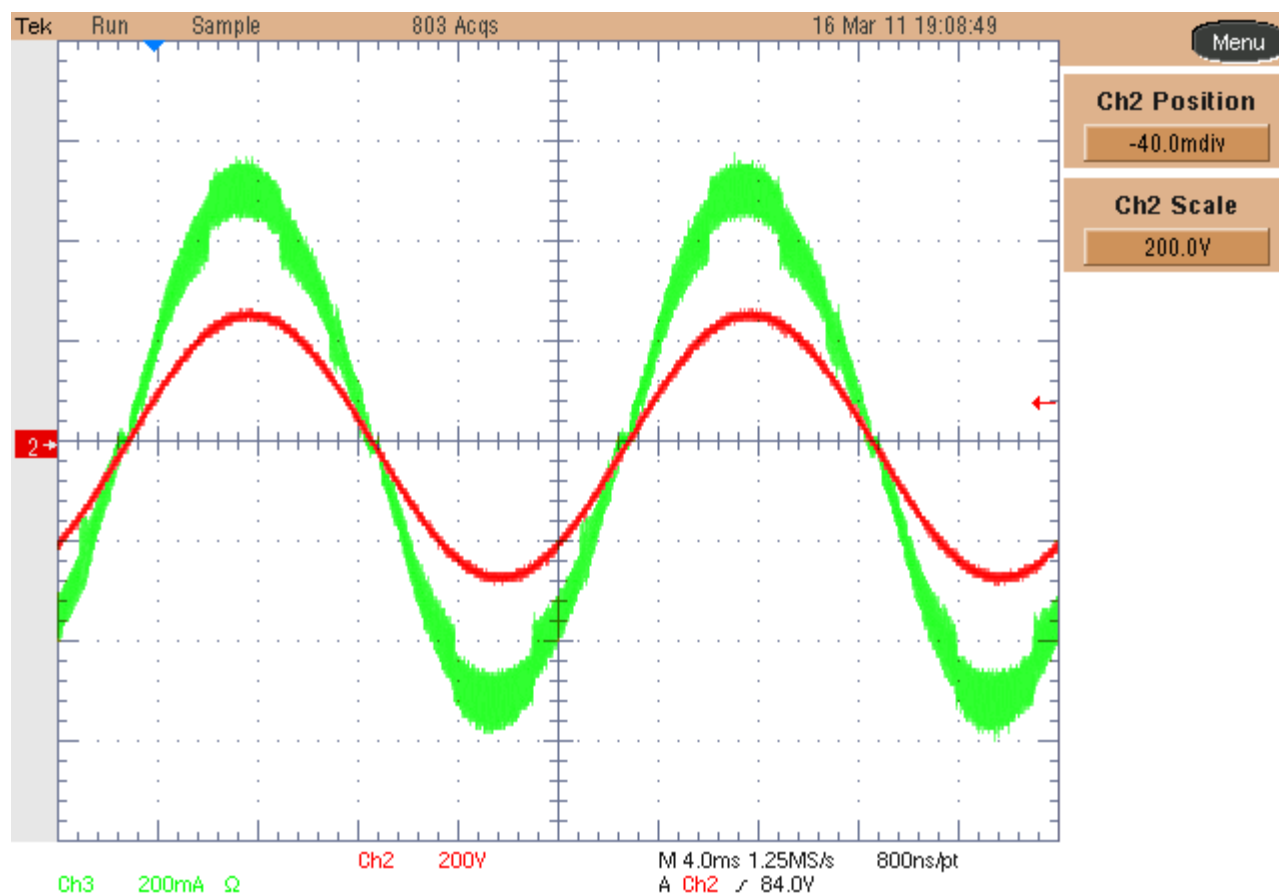


7 Input voltage and current

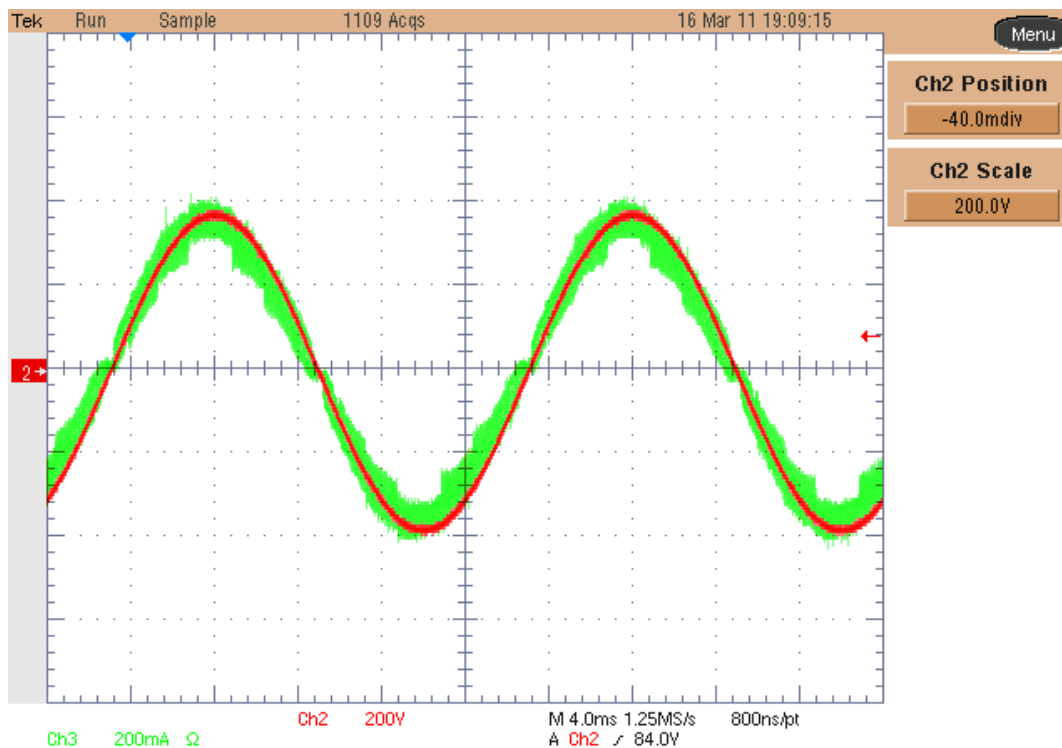
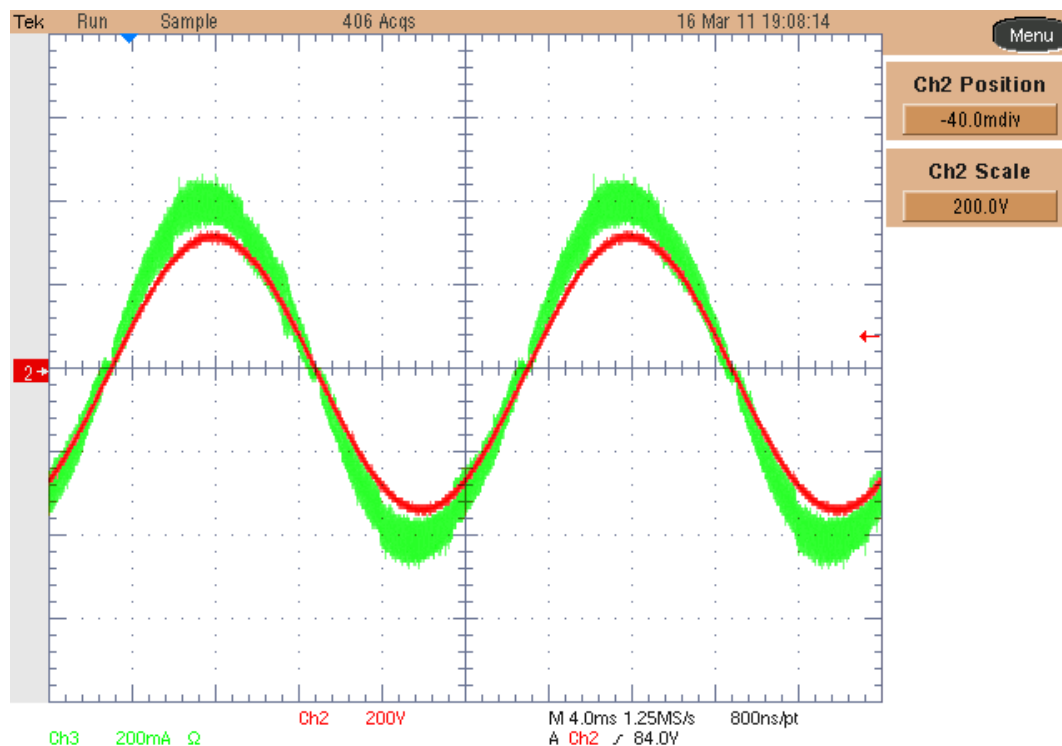
The input current and voltage are shown in the screenshots below. The input voltage was set respectively to 176Vac, 230Vac and 265Vac, 50Hz. The control voltage was set to 10.2V, to reach 350mA load current.

Channel 2: Input voltage (200 V/div, 4ms/div).

Channel 3: Input current (200 mA/div, DC coupling, No BWL).



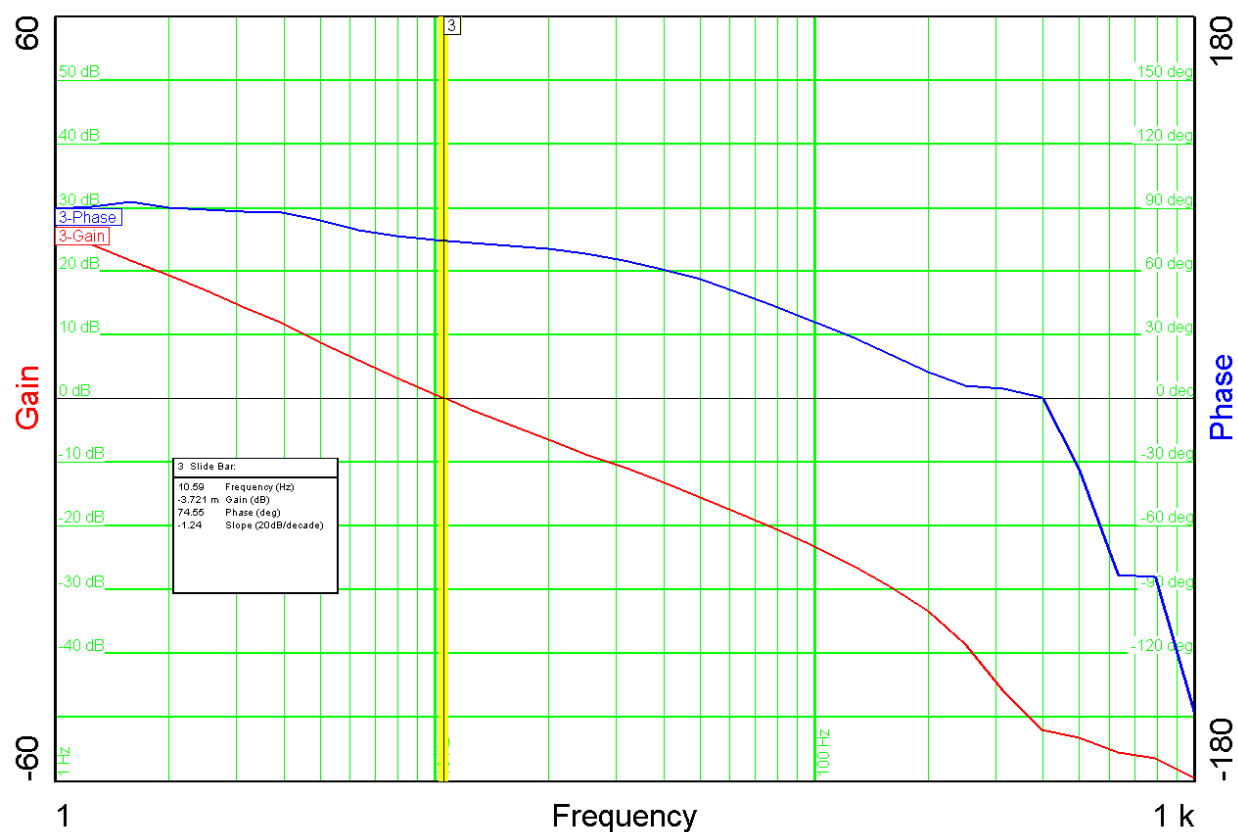
Channel 2 and 3: Same set-up like the 176Vac input voltage.



8 Loop Response

The image below shows the loop response of the converter measured with a 320Vdc input, and full load (51 LEDs @ 350mA ~ 167Vdrop).

The phase margin is 74.55 deg. and crossover frequency is 10.59Hz.



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