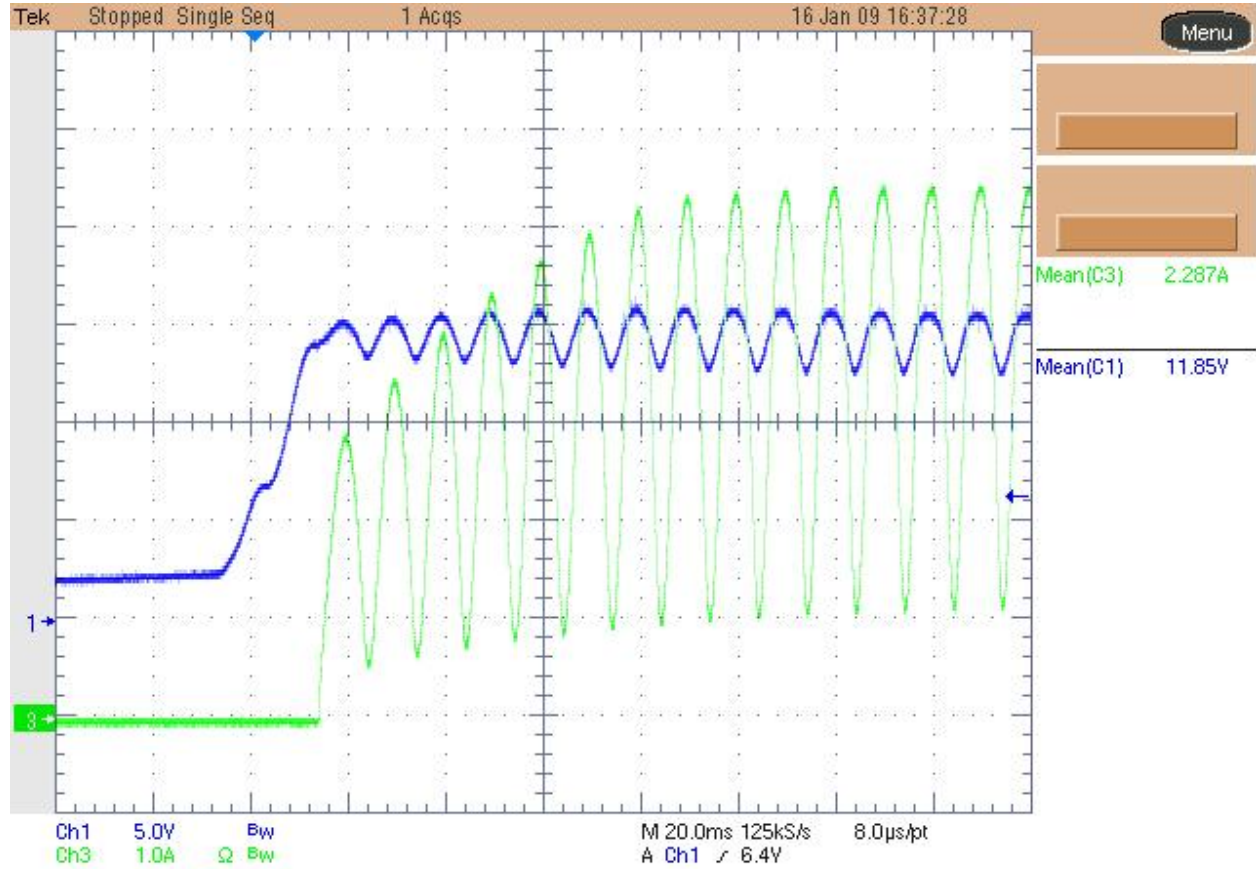


## 1 Startup

The output voltage and current at startup are shown in the image below. Input voltage is 230Vac. The output was loaded with 3.5A, 50W.

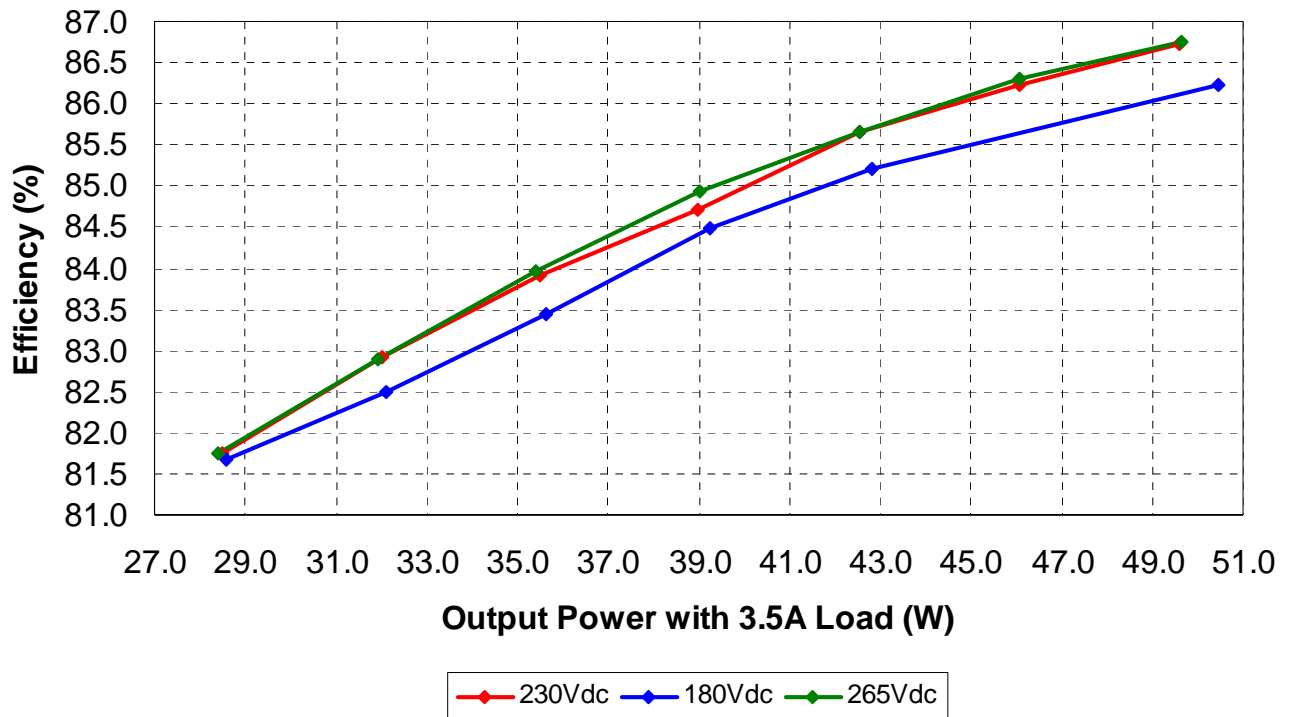
Channel 1 shows the output voltage (5 V/div, 20ms/div).

Channel 3 shows the output current (1 A/div).



## 2 Efficiency

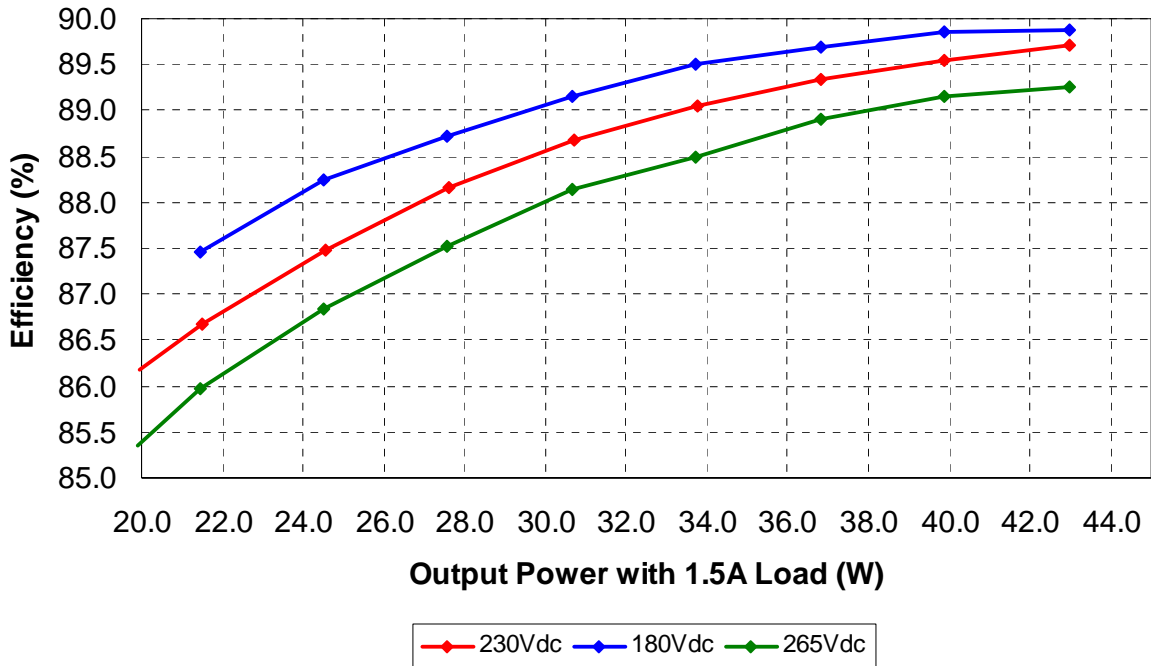
The efficiency data are shown in the tables and graph below. For simplicity and accuracy of measurements, the data was measured using a DC input. In the first graph the load was set to 3.5A and a variable output power was delivered. The second graph shows the 1.5A load behavior.



I <sub>out</sub> (A)	V <sub>out</sub> (V <sub>dc</sub> )	P <sub>out</sub> (W)	I <sub>in</sub> (mA)	V <sub>in</sub> (V <sub>dc</sub> )	P <sub>in</sub> (W)	P <sub>loss</sub> (W)	Eff (%)
3.530	8.071	28.49	151.4	230.2	34.85	6.36	81.75
3.528	9.069	32.00	167.6	230.2	38.58	6.59	82.93
3.526	10.065	35.49	183.7	230.2	42.29	6.80	83.92
3.524	11.063	38.99	200.0	230.1	46.02	7.03	84.72
3.523	12.080	42.56	216.0	230.0	49.68	7.12	85.66
3.522	13.080	46.07	232.3	230.0	53.43	7.36	86.22
3.521	14.090	49.61	248.7	230.0	57.20	7.59	86.73

Iout (A)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
3.524	8.107	28.57	194.0	180.3	34.98	6.41	81.68
3.525	9.108	32.11	216.0	180.2	38.92	6.82	82.48
3.526	10.106	35.63	237.0	180.2	42.71	7.07	83.44
3.527	11.130	39.26	258.0	180.1	46.47	7.21	84.48
3.530	12.130	42.82	279.0	180.1	50.25	7.43	85.22
3.532	14.280	50.44	325.0	180.0	58.50	8.06	86.22

Iout (A)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
3.519	8.074	28.41	131.0	265.3	34.75	6.34	81.75
3.520	9.071	31.93	145.2	265.3	38.52	6.59	82.89
3.520	10.064	35.43	159.1	265.2	42.19	6.77	83.96
3.521	11.080	39.01	173.2	265.2	45.93	6.92	84.93
3.522	12.080	42.55	187.3	265.2	49.67	7.13	85.65
3.523	13.080	46.08	201.4	265.1	53.39	7.31	86.31
3.524	14.090	49.65	215.9	265.1	57.24	7.58	86.75



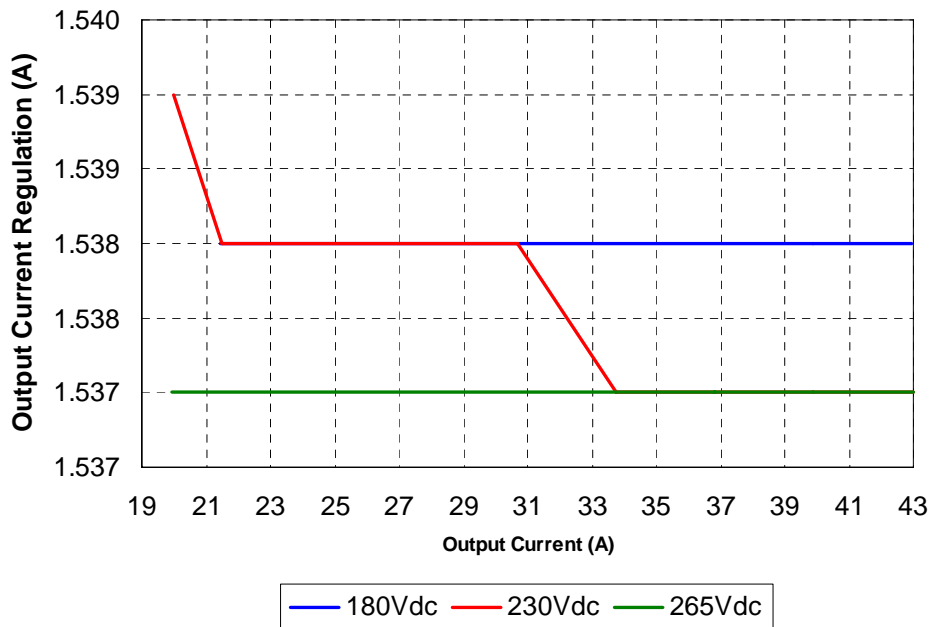
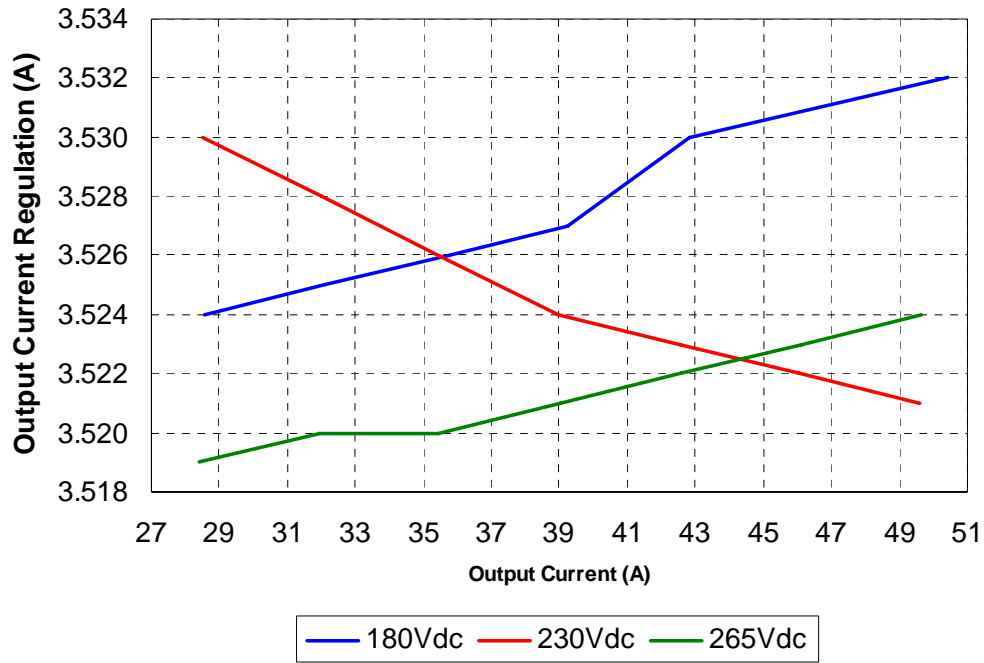
Iout (A)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
1.539	12.980	19.98	100.6	230.4	23.18	3.20	86.19
1.538	13.970	21.49	107.6	230.4	24.79	3.31	86.67
1.538	15.960	24.55	121.8	230.4	28.06	3.52	87.47
1.538	17.960	27.62	136.0	230.4	31.33	3.71	88.15
1.538	19.970	30.71	150.4	230.3	34.64	3.92	88.67
1.537	21.960	33.75	164.6	230.3	37.91	4.15	89.04
1.537	23.950	36.81	178.9	230.3	41.20	4.39	89.35
1.537	25.960	39.90	193.5	230.3	44.56	4.66	89.54
1.537	27.960	42.97	208.1	230.2	47.90	4.93	89.71

Iout (A)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
1.538	13.94	21.44	135.8	180.5	24.51	3.07	87.47
1.538	15.94	24.52	154.0	180.4	27.78	3.27	88.24
1.538	17.93	27.58	172.3	180.4	31.08	3.51	88.72
1.538	19.94	30.67	190.7	180.4	34.40	3.73	89.14
1.538	21.94	33.74	209.1	180.3	37.70	3.96	89.50
1.538	23.93	36.80	227.6	180.3	41.04	4.23	89.69
1.538	25.94	39.90	246.4	180.2	44.40	4.51	89.85
1.538	27.94	42.97	265.3	180.2	47.81	4.84	89.89

Iout (A)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
1.537	12.96	19.92	88.0	265.2	23.34	3.42	85.35
1.537	13.96	21.46	94.1	265.2	24.96	3.50	85.98
1.537	15.95	24.52	106.5	265.1	28.23	3.72	86.83
1.537	17.95	27.59	118.9	265.1	31.52	3.93	87.53
1.537	19.96	30.68	131.3	265.1	34.81	4.13	88.14
1.537	21.95	33.74	143.8	265.1	38.12	4.38	88.50
1.537	23.95	36.81	156.2	265.1	41.41	4.60	88.90
1.537	25.96	39.90	168.9	265.0	44.76	4.86	89.15
1.537	27.96	42.97	181.7	265.0	48.15	5.18	89.25

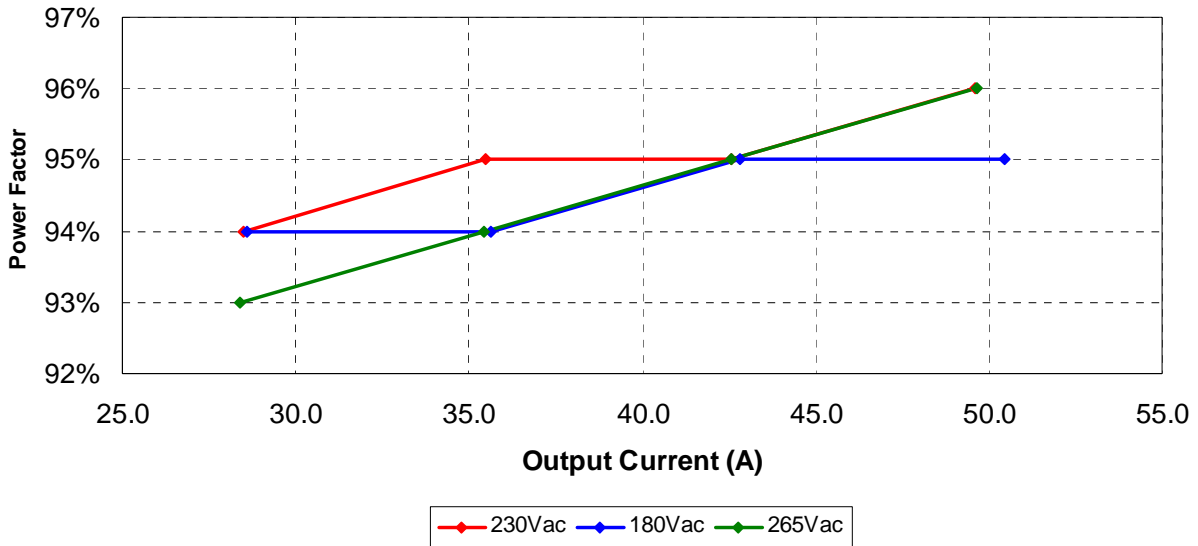
### 3 Output Current Regulation

The output current versus output power graphs are plotted below.



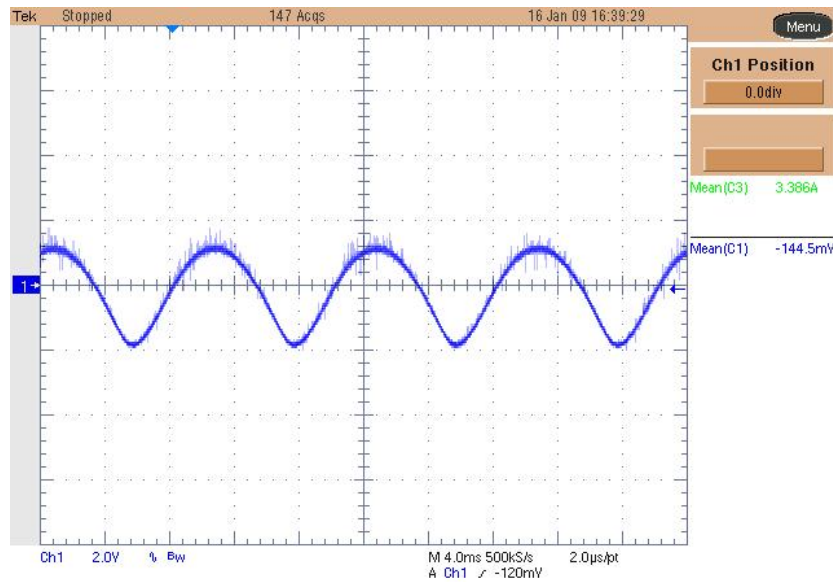
### 4 Power Factor

The Power Factor graph for the three input voltages is shown below:



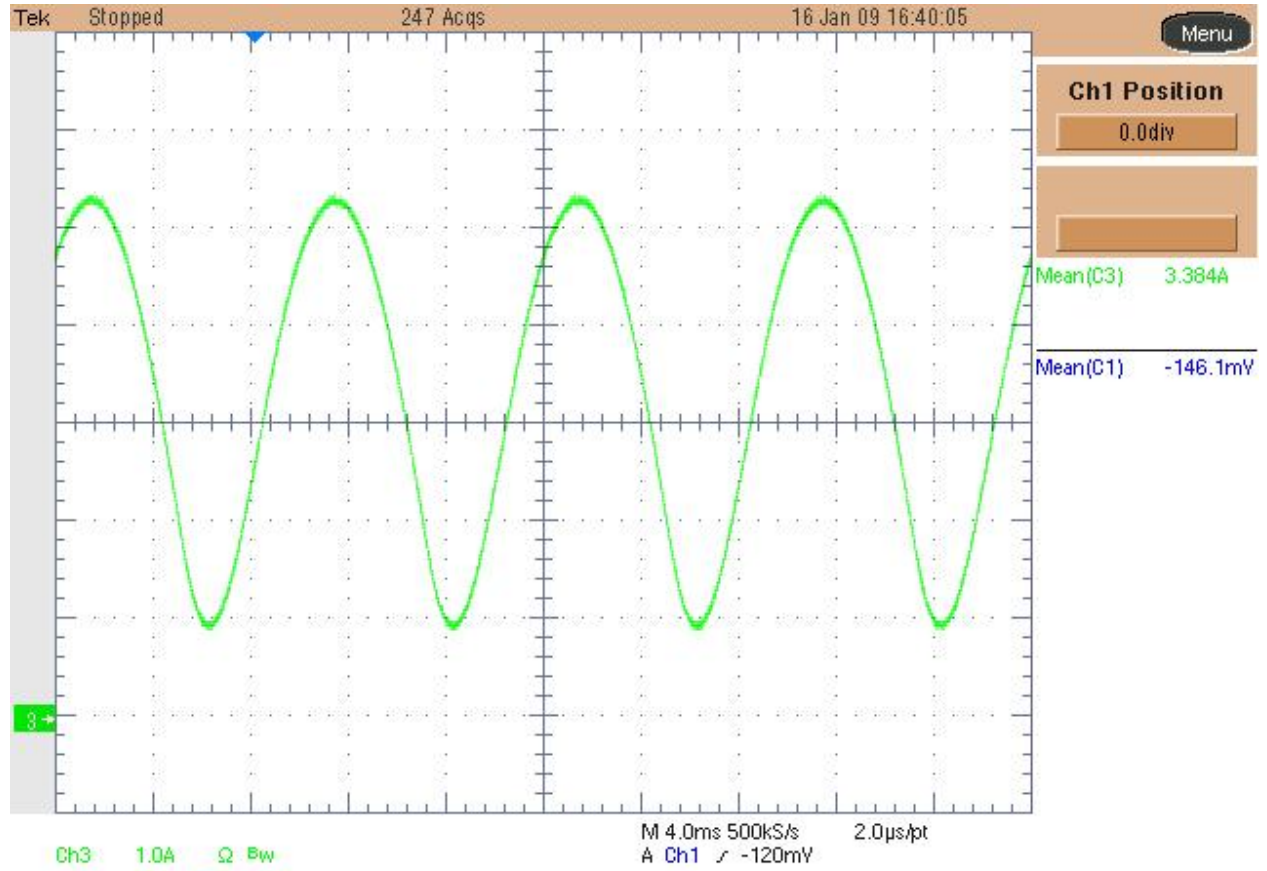
### 5 Output Ripple Voltage

The output ripple voltage is shown in the plot below. The input was set at 230Vac and the load was set to 3.5A, 50W, 14.28Vdc. Channel 1 shows the output ac voltage (2 V/div, 4ms/div).



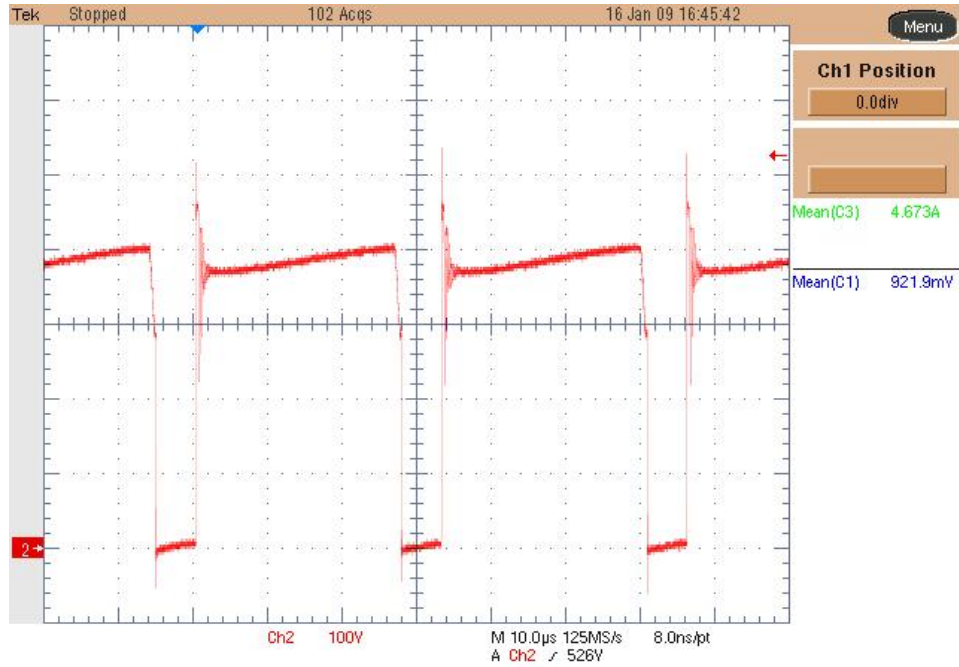
## 6 Output Ripple Current

The output ripple current is shown in the plot below. The input was set at 230Vac and the load was set to 3.5A, 50W, 14.28Vdc. Channel 1 shows the output current (1 A/div, 4ms/div).

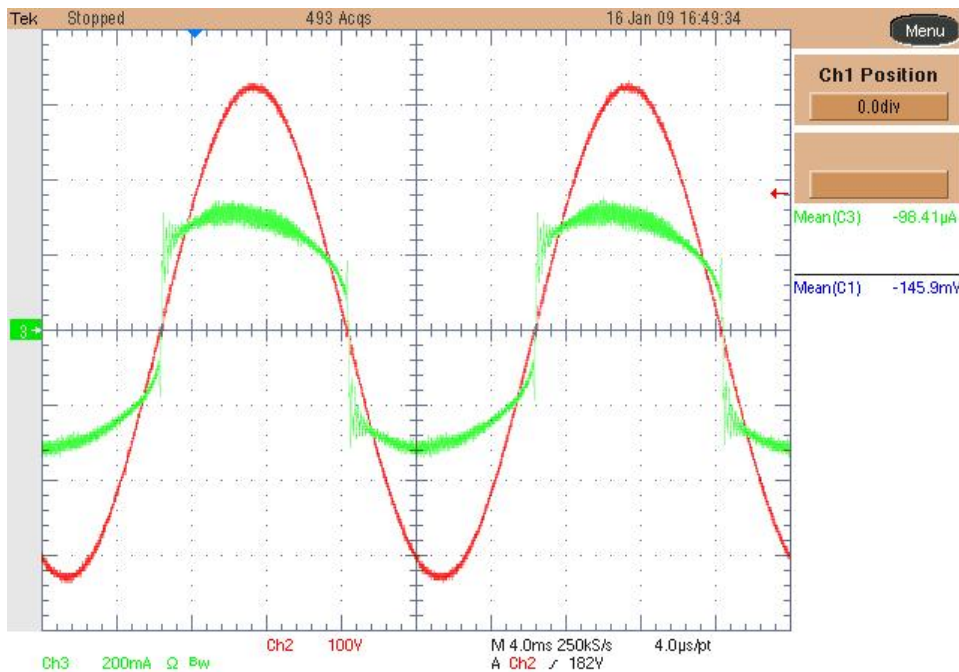


### 7 Switching Node Waveform

The image below shows the voltage on the drain of the switching node (Q1), with a 230Vac input, and a 3.5A, 50W load.



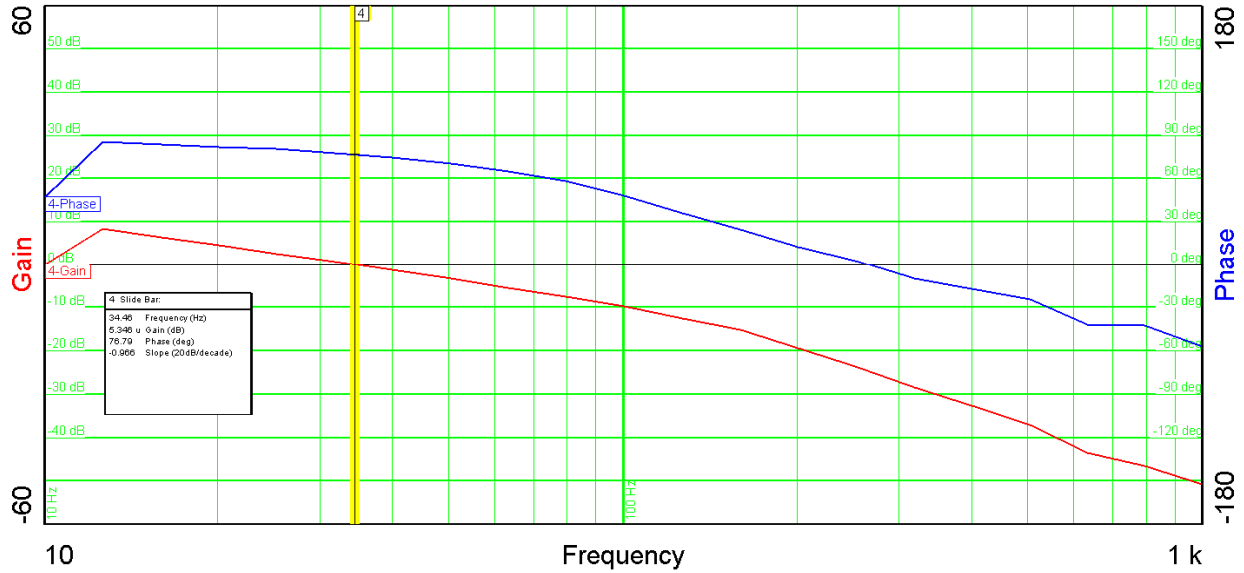
### 8 Input Voltage and Current Waveforms (same conditions)





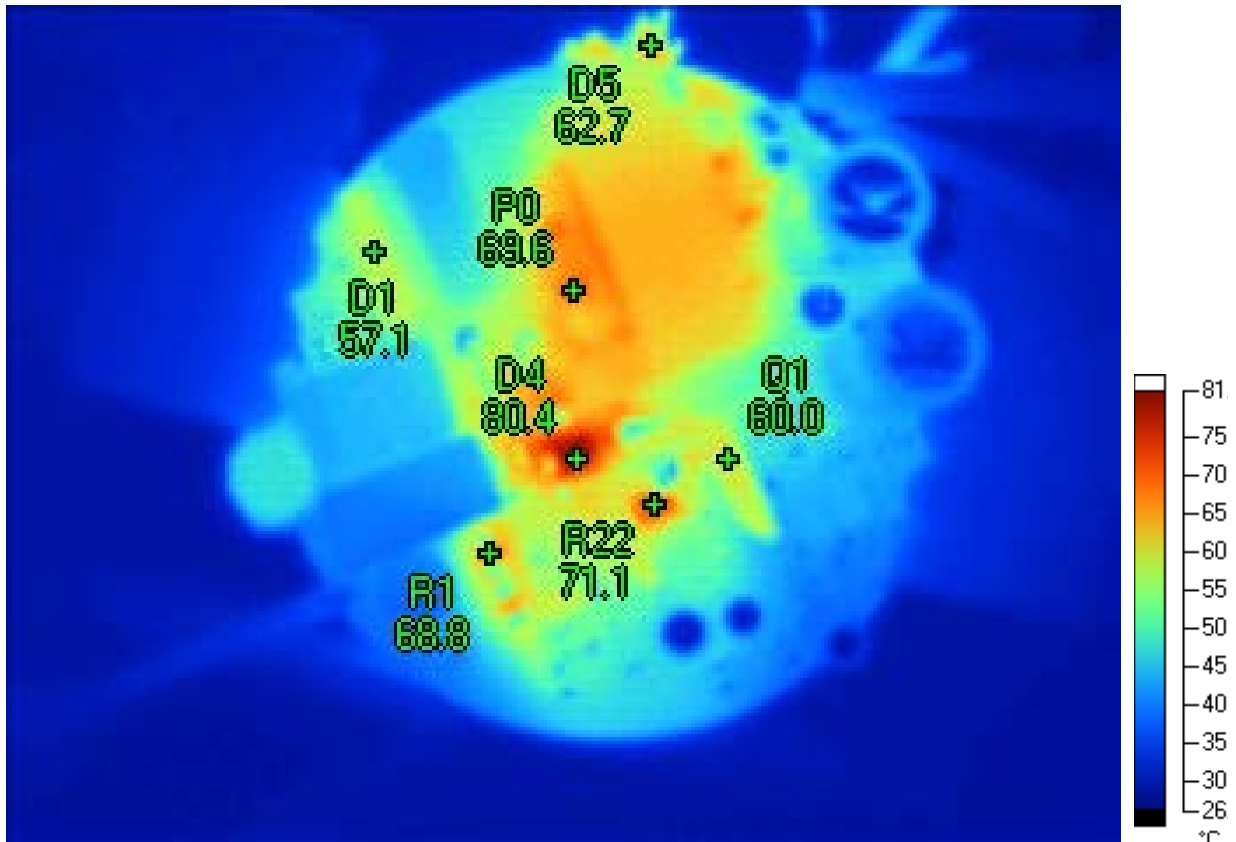
## 9 Loop Response

The image below shows the loop response of the converter measured with a 230Vdc input, and full load (3.5A, 14.8V, 51.8W). Phase margin is 76.79 deg. and crossover frequency is 34.46 Hz.



## 10 Thermal Image

The image below shows the thermal image in still air taken at full load, 230Vac, 3.5A and 50W, while the ambient temperature was 25C.



### Markers

Label	Temperature	Emissivity	Background
D4	80.4 °C	0.95	20.0 °C
Q1	60.0 °C	0.95	20.0 °C
R22	71.1 °C	0.95	20.0 °C
R1	68.8 °C	0.95	20.0 °C
P0	69.6 °C	0.95	20.0 °C
D5	62.7 °C	0.95	20.0 °C
D1	57.1 °C	0.95	20.0 °C

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