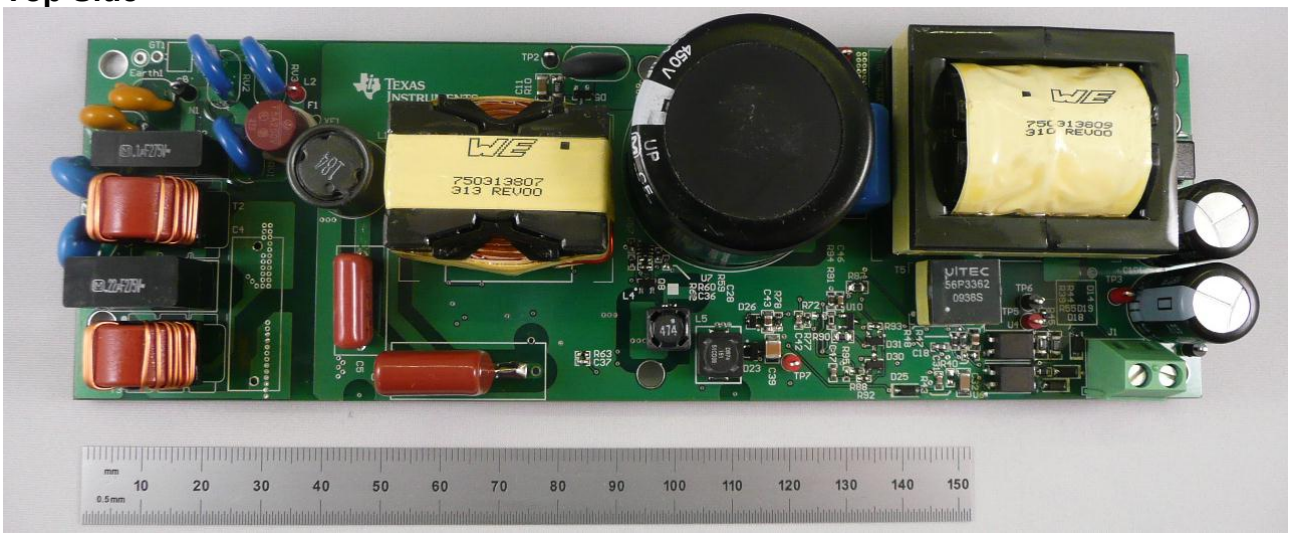
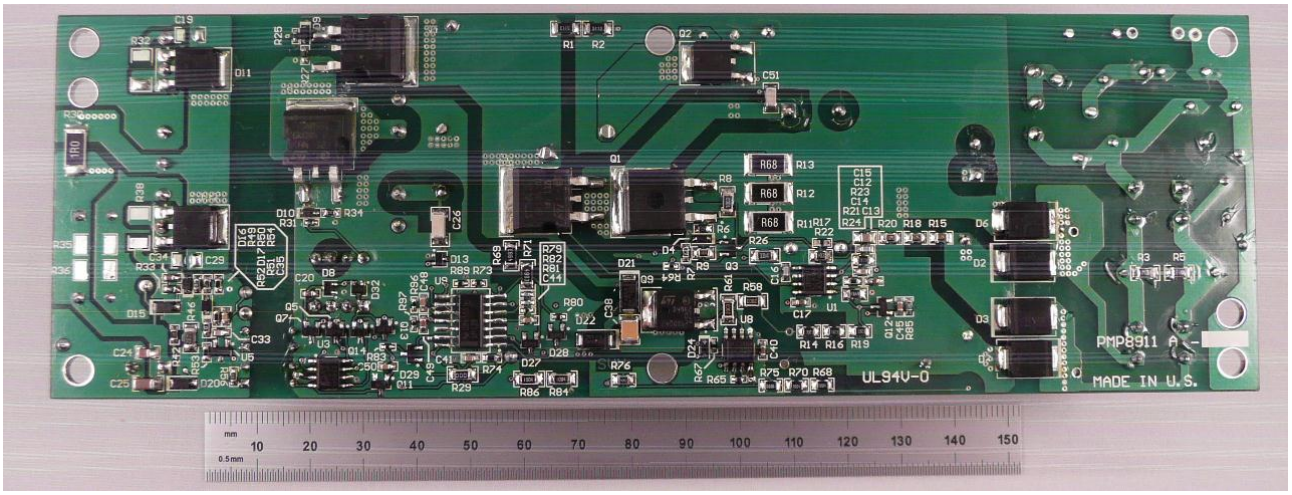
1 Photo

The photographs below show the top and bottom views of the PMP8911 Rev A demo board.

Top Side



Bottom Side

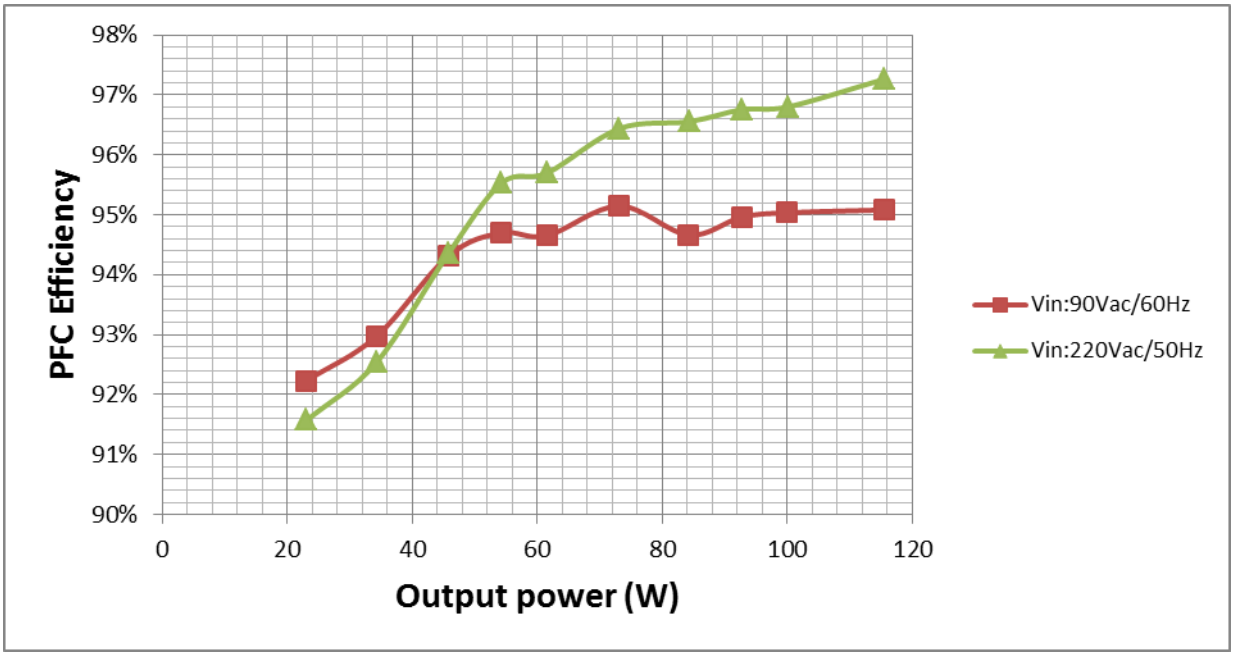


2 Efficiency

The efficiency curves of PFC stage and total supply are shown in the tables and graph below.

2.1 PFC Efficiency

PFC efficiencies are tested with LLC resonant converter and internal bias supply disabled. A 14V external voltage is injected to Bias net. Electronic load is directly connected to PFC output (B+). The external bias condition is 14V/27mA.

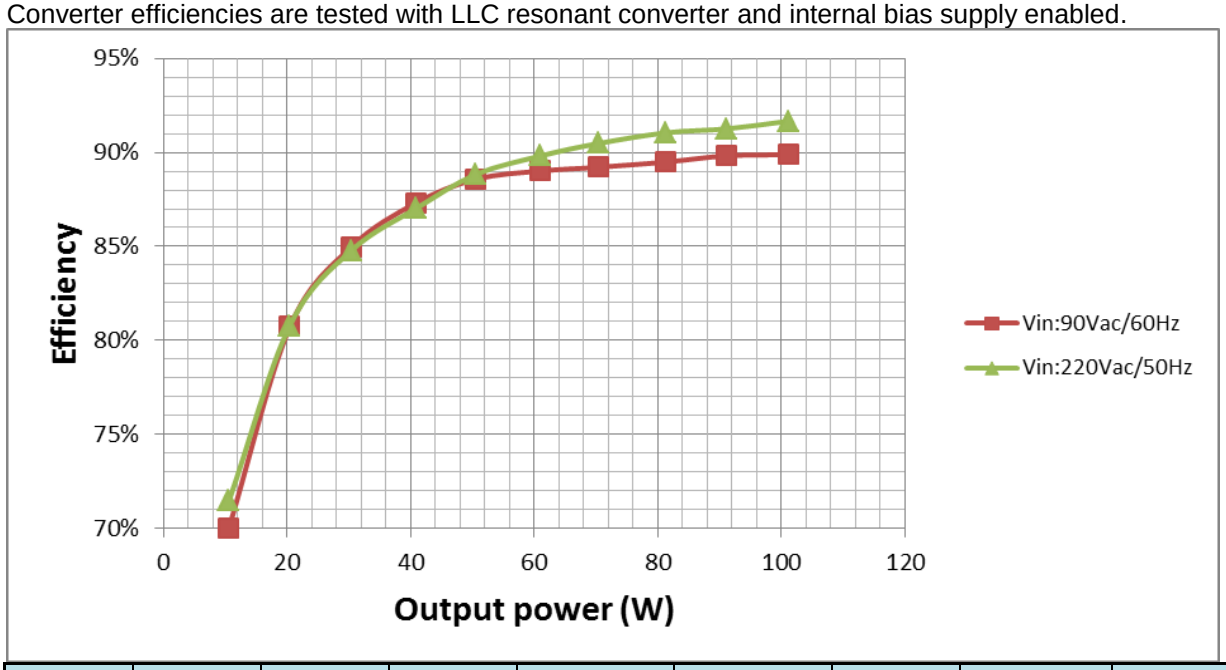


Vin(ac)	Iin(A)	Pin(W)	PF	V_B+(V)	I_B+(A)	Pout(W)	Losses(W)	Eff (%)
90.09	0.2823	25	0.983	384.3	0.06	23.058	1.942	92.23%
90.2	0.4114	36.79	0.992	384.3	0.089	34.2027	2.5873	92.97%
90.09	0.5407	48.49	0.995	384.3	0.119	45.7317	2.7583	94.31%
90.07	0.6374	57.22	0.997	384.3	0.141	54.1863	3.0337	94.70%
90.07	0.7231	64.98	0.998	384.4	0.16	61.504	3.476	94.65%
90.41	0.8506	76.76	0.998	384.4	0.19	73.036	3.724	95.15%
90.08	0.9887	88.93	0.998	384.4	0.219	84.1836	4.7464	94.66%
90.4	1.081	97.58	0.999	384.5	0.241	92.6645	4.9155	94.96%
90.38	1.165	105.22	0.999	384.6	0.26	99.996	5.224	95.04%
89.96	1.351	121.38	0.999	384.7	0.3	115.41	5.97	95.08%

Vin(ac)	Iin(A)	Pin(W)	PF	V_B+(V)	I_B+(A)	Pout(W)	Losses(W)	Eff (%)
220.2	0.139	25.2	0.822	384.6	0.06	23.076	2.124	91.57%
220.1	0.1854	37	0.906	384.7	0.089	34.2383	2.7617	92.54%
220.4	0.2346	48.54	0.939	384.9	0.119	45.8031	2.7369	94.36%
220.3	0.2712	56.81	0.951	384.9	0.141	54.2709	2.5391	95.53%
220.2	0.305	64.35	0.958	384.9	0.16	61.584	2.766	95.70%
220.1	0.3566	75.83	0.967	384.9	0.19	73.131	2.699	96.44%
220.1	0.4069	87.3	0.973	384.9	0.219	84.2931	3.0069	96.56%
220.2	0.4454	95.87	0.977	384.9	0.241	92.7609	3.1091	96.76%
220.2	0.4792	103.38	0.979	384.9	0.26	100.074	3.306	96.80%
220.1	0.5485	118.72	0.984	384.9	0.3	115.47	3.25	97.26%

2.2 Converter efficiency

Converter efficiencies are tested with LLC resonant converter and internal bias supply enabled.

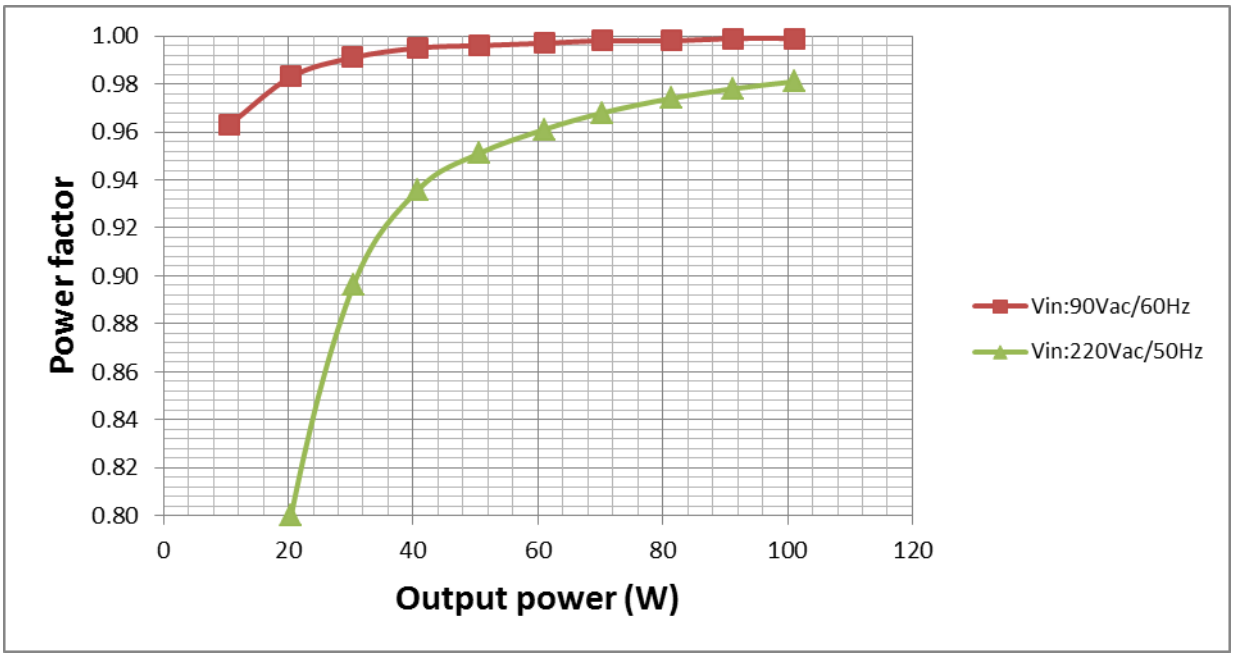


Vin(ac)	Iin(A)	Pin(W)	PF	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff (%)
90.47	0.17346	15.1	0.963	54.8	0.193	10.5764	4.5236	70.04%
90.18	0.2856	25.32	0.983	54.8	0.373	20.4404	4.8796	80.73%
90.1	0.4003	35.73	0.991	54.8	0.554	30.3592	5.3708	84.97%
90.11	0.5217	46.76	0.995	54.8	0.745	40.826	5.934	87.31%
90.25	0.6352	57.1	0.996	54.8	0.923	50.5804	6.5196	88.58%
90.26	0.7612	68.52	0.997	54.8	1.113	60.9924	7.5276	89.01%
90.18	0.876	78.87	0.998	54.8	1.284	70.3632	8.5068	89.21%
90.19	1.009	90.87	0.998	54.8	1.484	81.3232	9.5468	89.49%
90.22	1.127	101.52	0.999	54.8	1.664	91.1872	10.3328	89.82%
89.92	1.252	112.49	0.999	54.8	1.845	101.106	11.384	89.88%

Vin(ac)	Iin(A)	Pin(W)	PF	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff (%)
221.1	106.19	14.8	0.642	54.8	0.193	10.5764	4.2236	71.46%
221	140.39	25.3	0.8	54.8	0.373	20.4404	4.8596	80.79%
220.9	0.1812	35.87	0.896	54.8	0.555	30.414	5.456	84.79%
220.8	0.227	46.92	0.936	54.8	0.745	40.826	6.094	87.01%
220.6	0.2711	56.88	0.951	54.8	0.922	50.5256	6.3544	88.83%
220.5	0.3204	67.91	0.961	54.8	1.113	60.9924	6.9176	89.81%
220.4	0.3644	77.77	0.968	54.8	1.284	70.3632	7.4068	90.48%
220.3	0.4163	89.32	0.974	54.8	1.484	81.3232	7.9968	91.05%
220.2	0.4641	99.92	0.978	54.8	1.664	91.1872	8.7328	91.26%
220	0.5109	110.3	0.981	54.8	1.845	101.106	9.194	91.66%

3 Power Factor

The power factor is shown in the plot below.

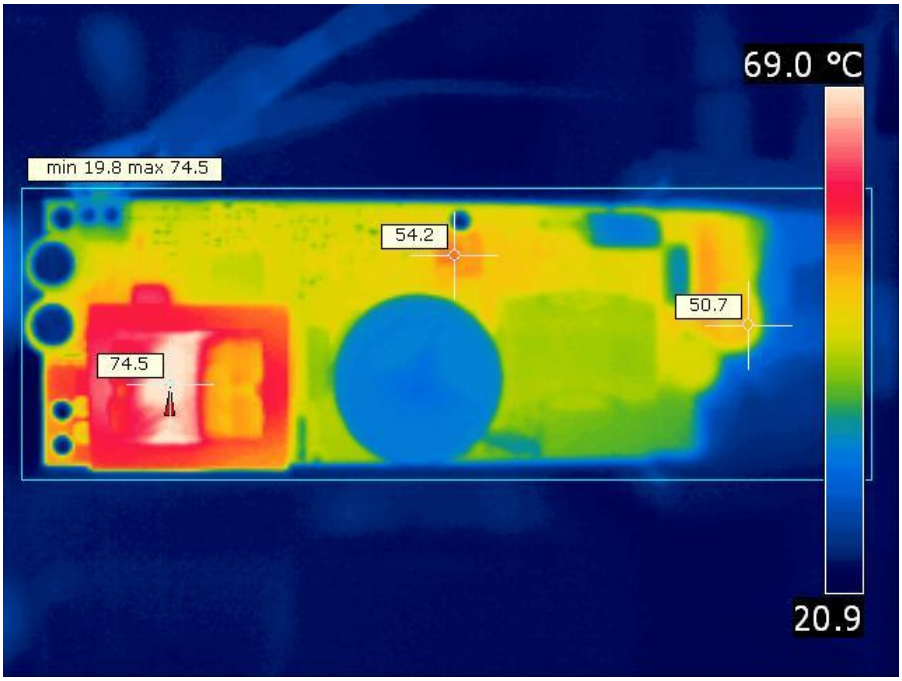


4 Thermal Images

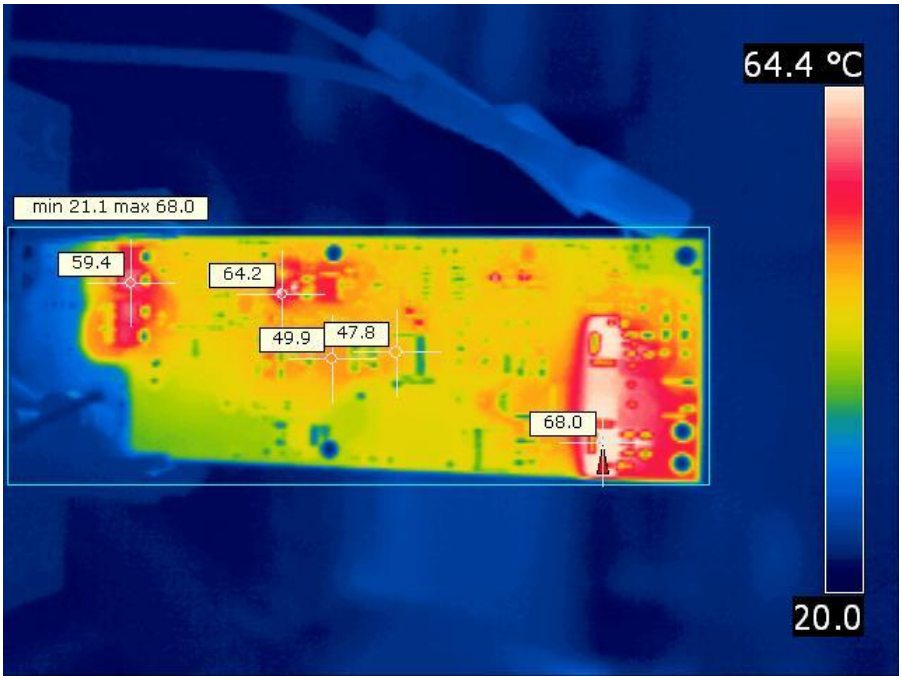
The thermal images below show a top view and bottom view of the board. The ambient temperature was 25ºC with no forced air flow. The output was loaded with 100W.

4.1 90V/60Hz

Top Side

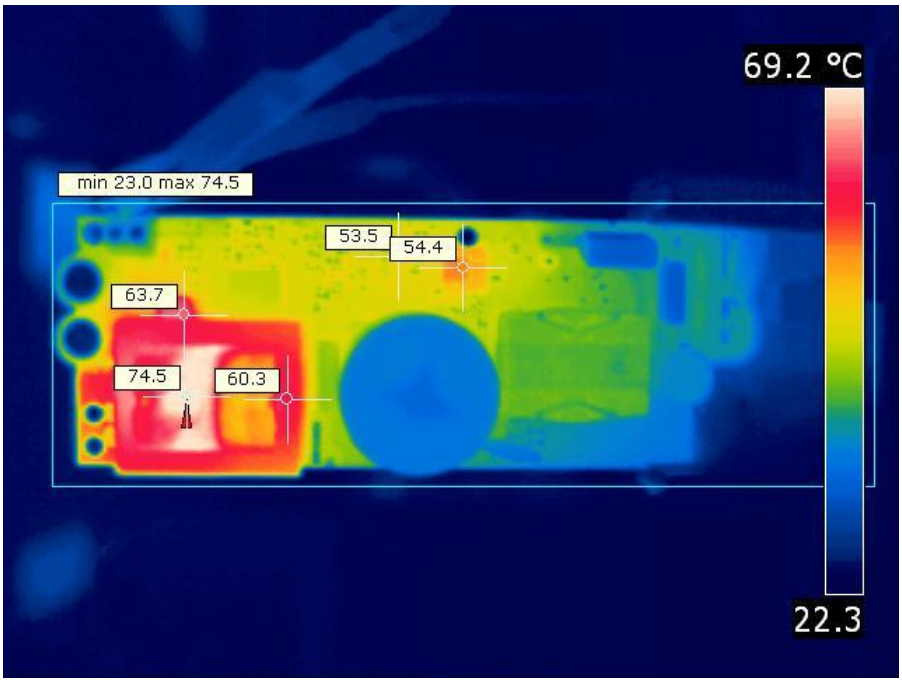


Bottom Side

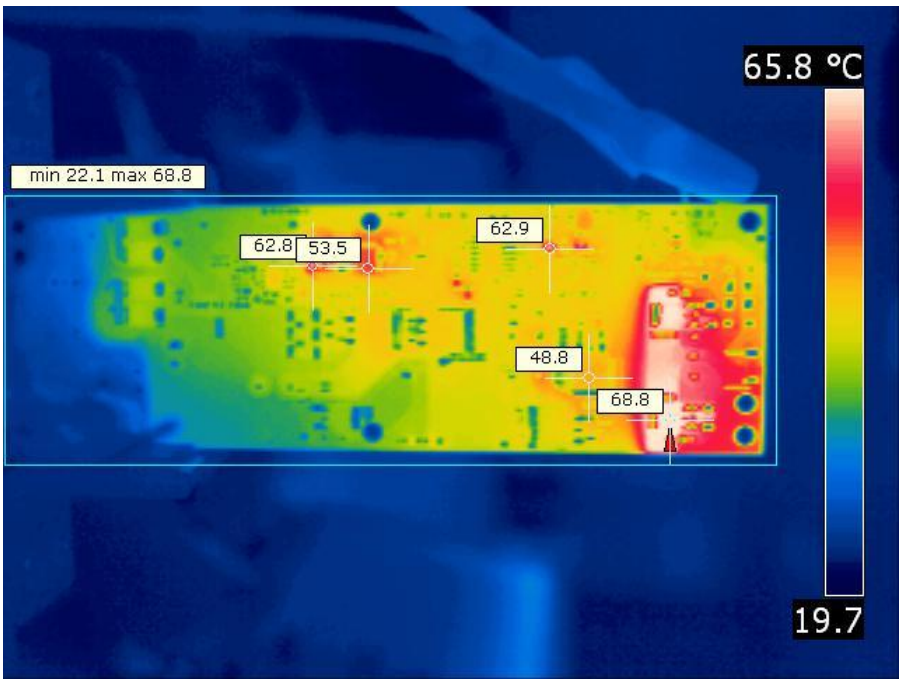


4.2 220V/50Hz

Top Side

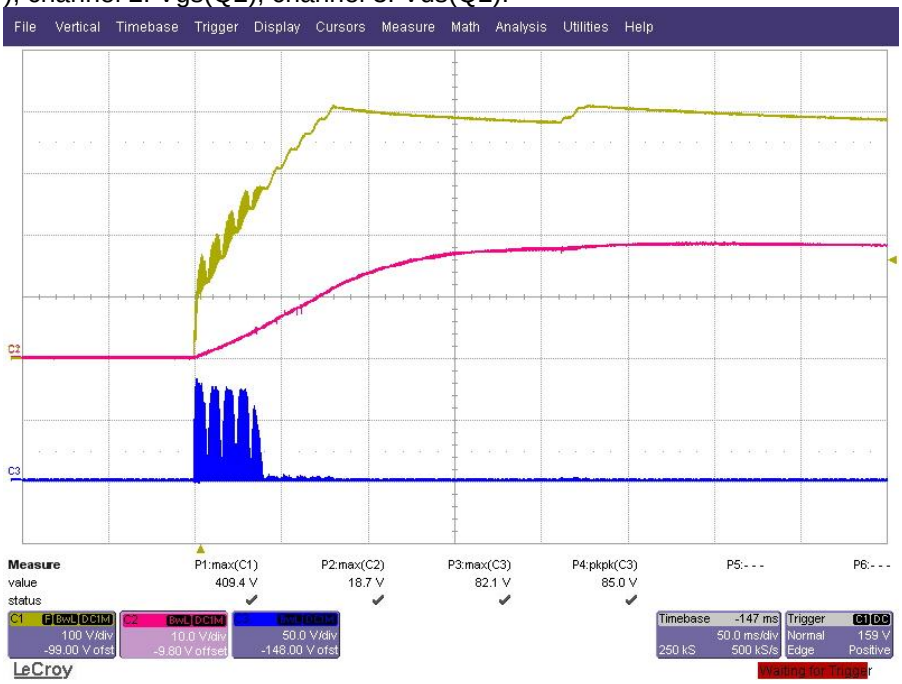


Bottom Side



5 Inrush current limiter circuit waveform

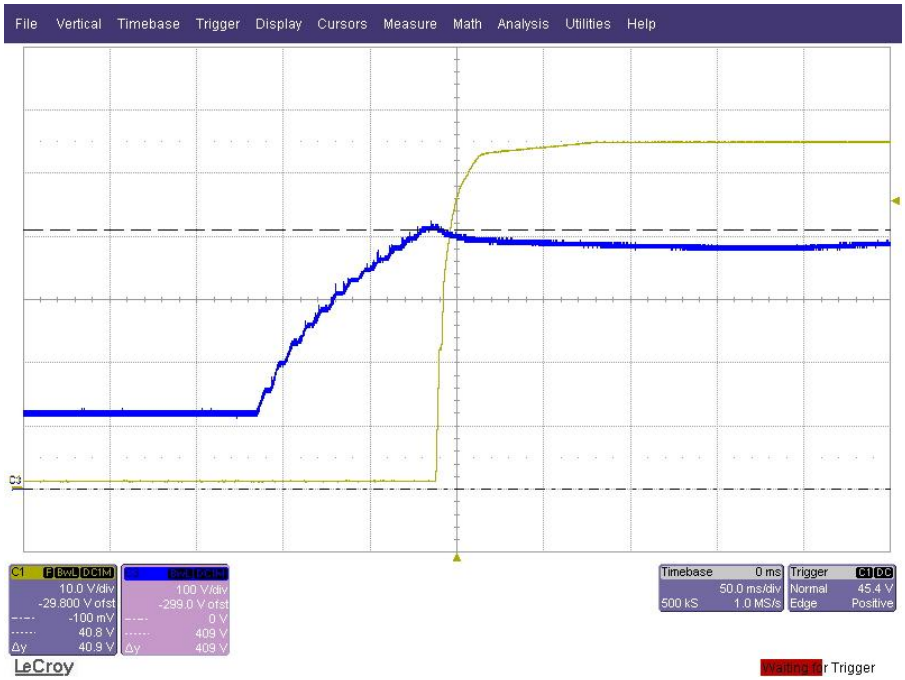
The waveform was taken with 90Vac input voltage, LLC converter disabled, and applied 30kohm to net B+. Channel 1: V(B+), channel 2: Vgs(Q2), channel 3: Vds(Q2).



6 Startup

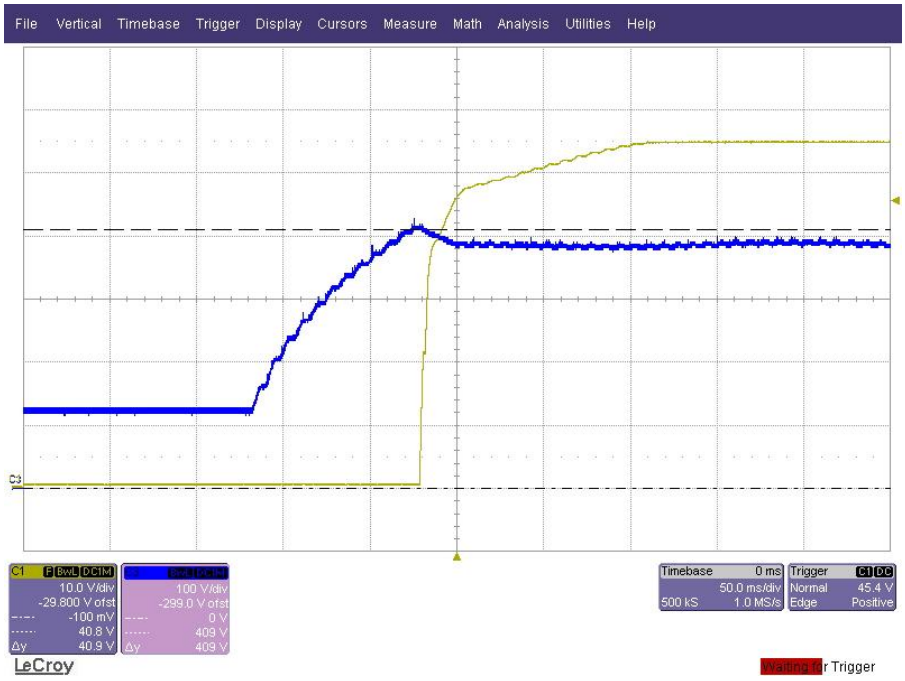
The voltages at startup are shown in the images below. The 54V output is shown on channel 1. The PFC output is shown on channel 3.

6.1 85VAC/60Hz – No Load

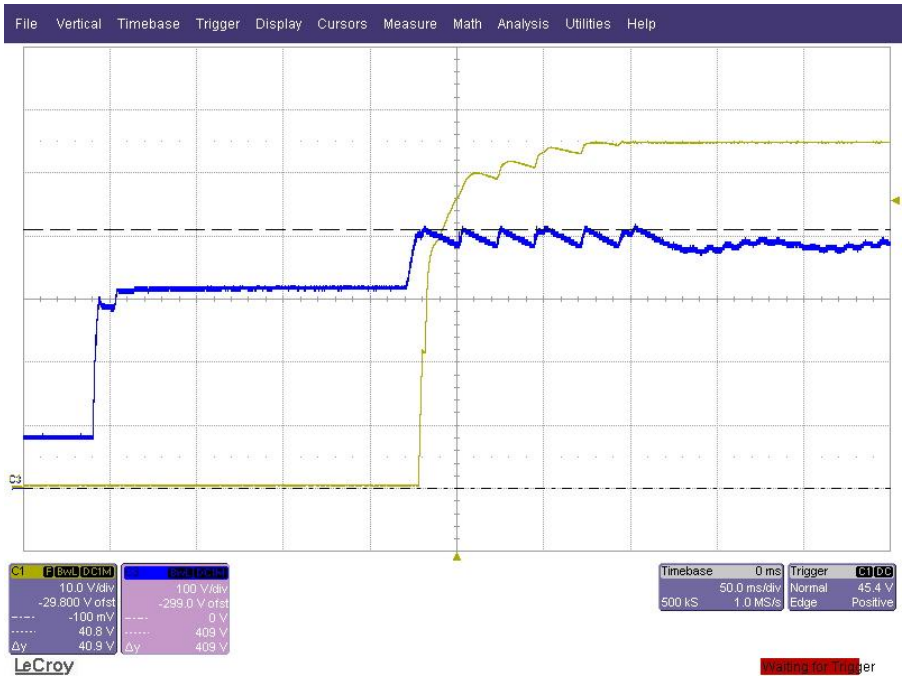


6.2 220VAC/50Hz – No Load

6.3 85VAC/60Hz – Full Load (P_{out}=100W)



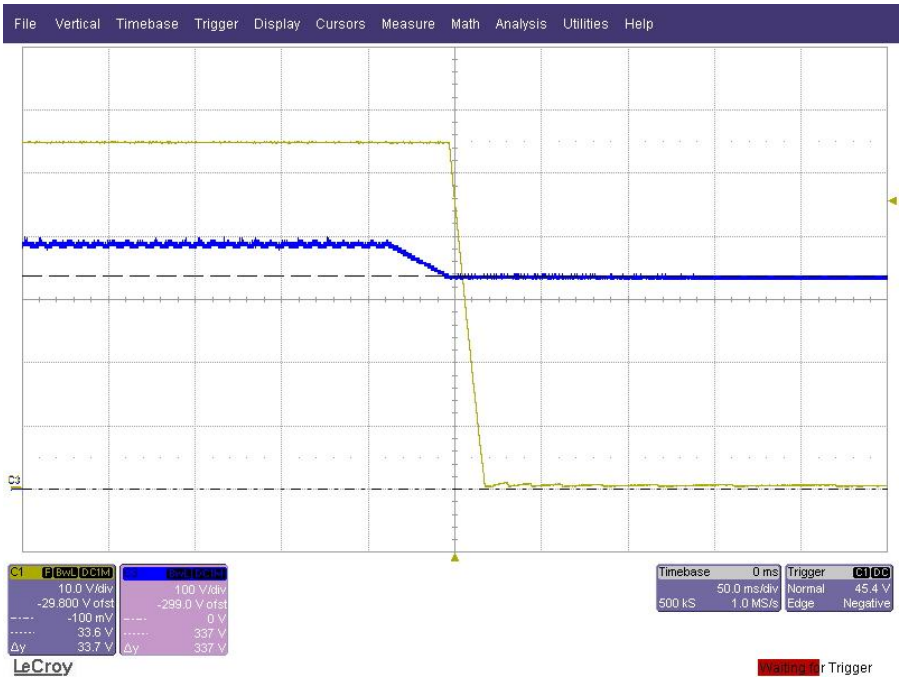
6.4 220VAC/50Hz – Full Load (P_{out}=100W)



7 Turn-off

The voltages at turn-off are shown in the images below. The 54V output is shown on channel 1. The PFC output is shown on channel 3.

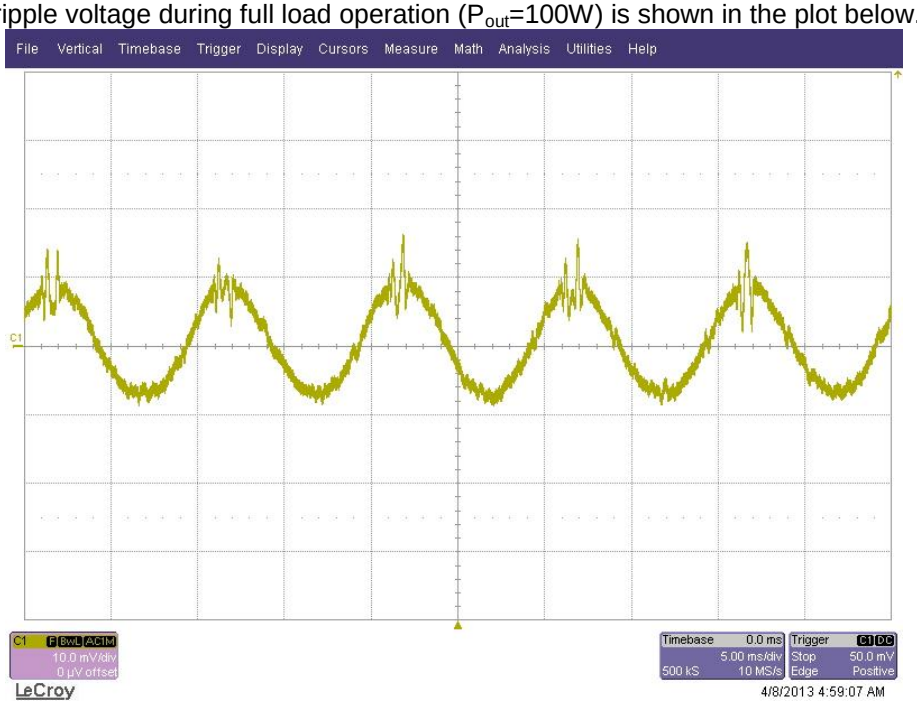
7.1 85VAC/60Hz – Full Load (P_{out}=100W)



7.2 220VAC/50Hz – Full Load (P_{out}=100W)

8 54V Output Ripple Voltage

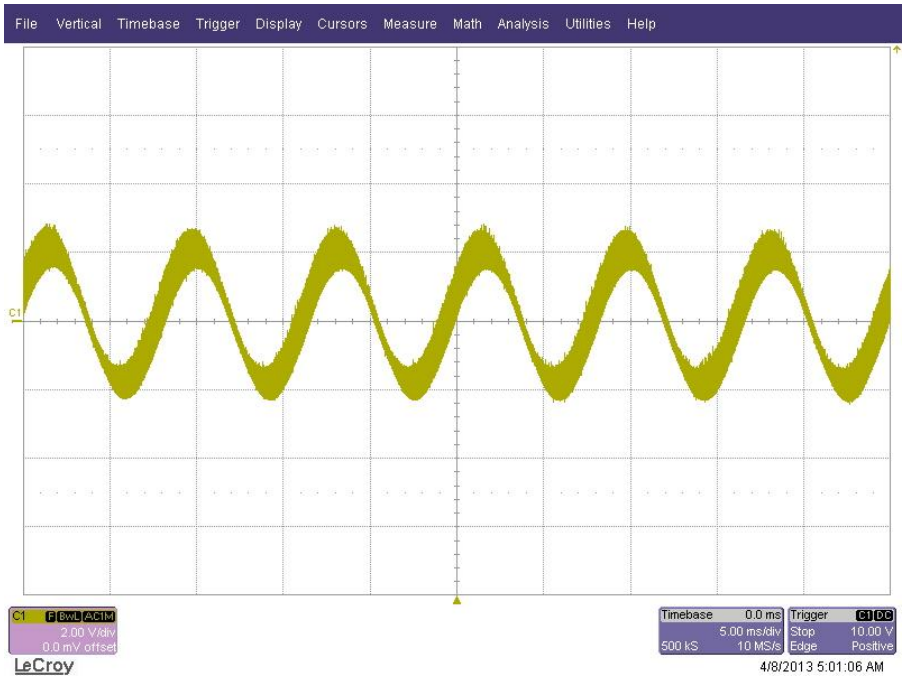
The 54Voutput ripple voltage during full load operation (P_{out}=100W) is shown in the plot below.



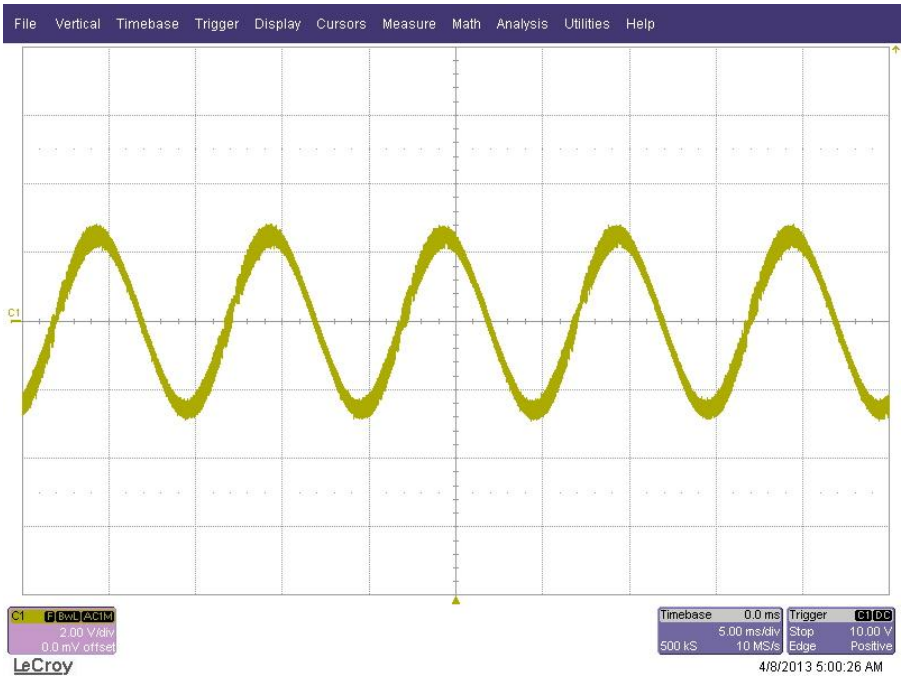
9 PFC Output Ripple Voltage

The PFC output ripple voltage during full load operation (P_{out}=100W) is shown in the plots below.

9.1 85VAC/60Hz

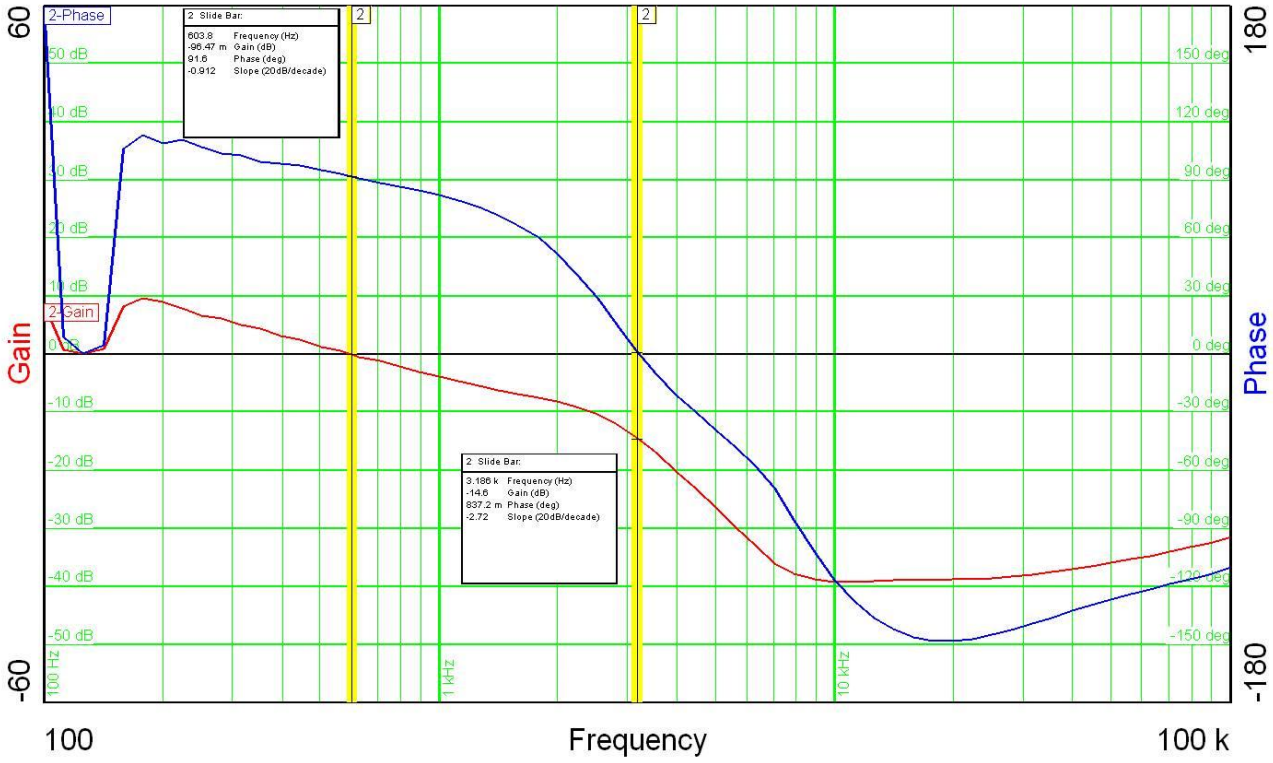


9.2 220VAC/50Hz



10 LLC Half Bridge Frequency Response

The frequency response of the feedback loop is shown in the plot below, where AC signal is injected from TP5 and TP6. The output was loaded with 100W.



11 LLC Half Bridge Load Transient Response

The image below shows the response to a 50W to 100W load transient at 85Vac/60Hz, where channel 1 is the output voltage (AC) and channel 2 is the output current.

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