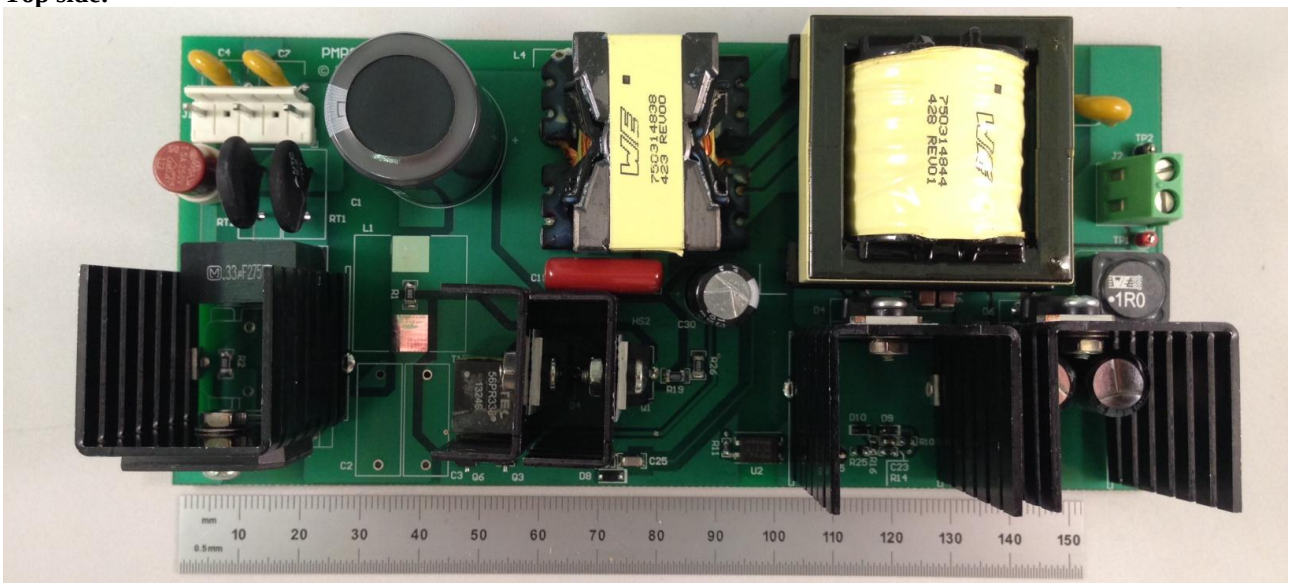
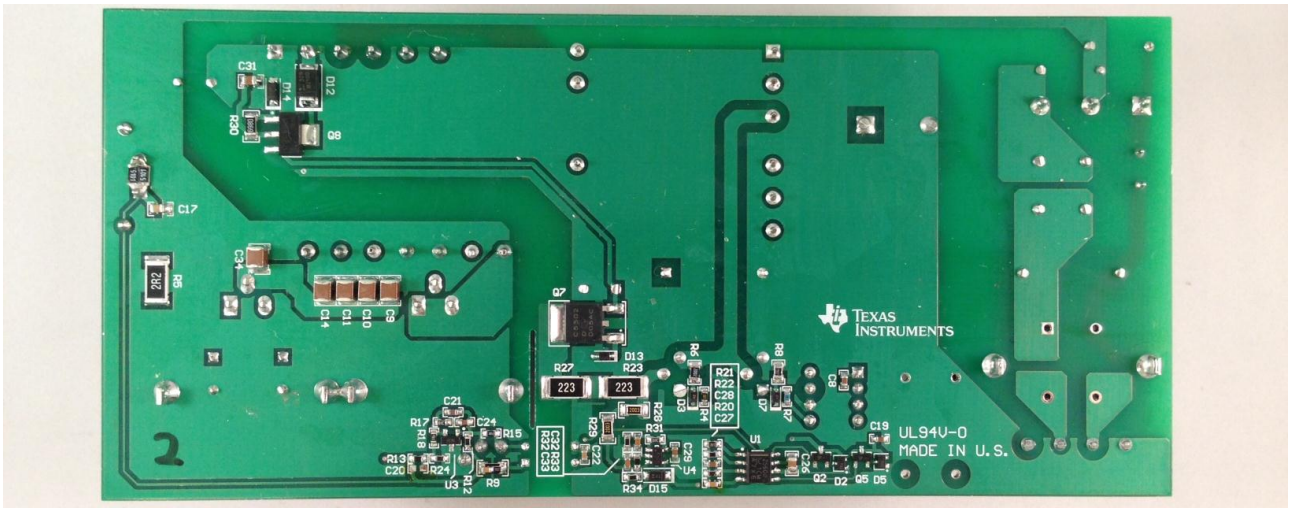
1 Photo

The photographs below show the PMP9739 Rev B assembly. This circuit was built on a PMP9739 Rev B PCB.

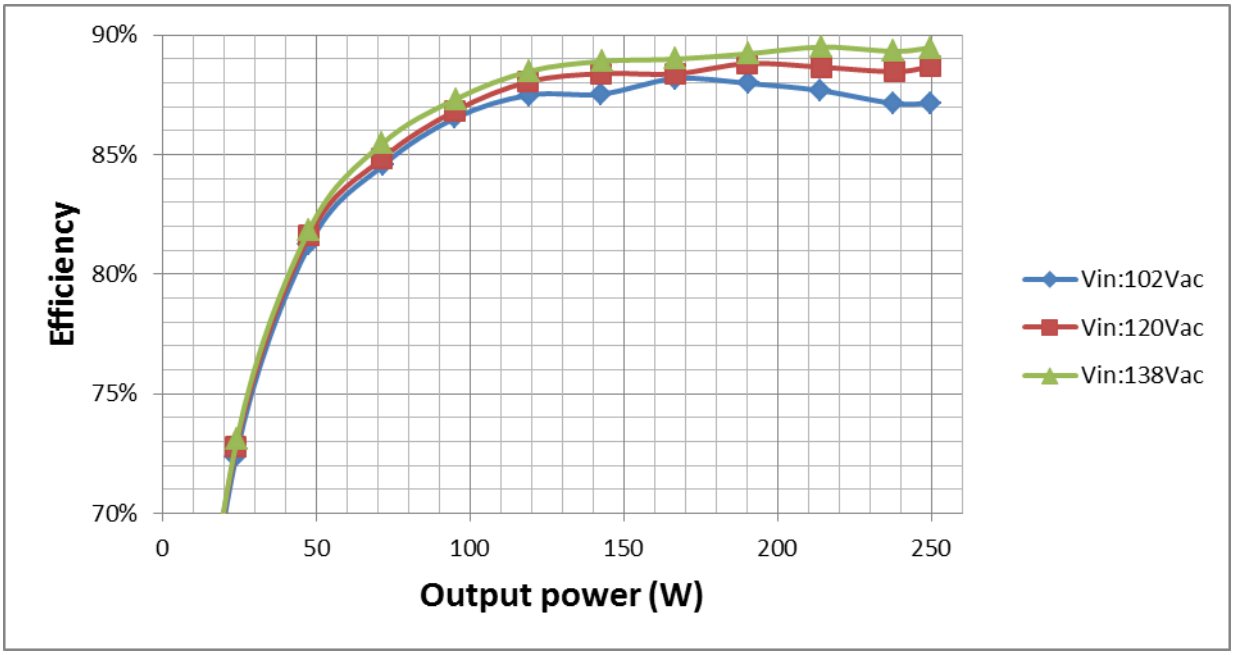
Top side:



Bottom side:



2 Efficiency



102V_{AC}/60Hz

Vin(ac)	Iin(A)	Pin(W)	PF	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff (%)
102.06	3.81	286.5	0.736	23.78	10.50	249.69	36.81	87.15%
102.04	3.65	272.9	0.733	23.78	10.00	237.80	35.10	87.14%
101.98	3.30	244.1	0.726	23.78	9.00	214.02	30.08	87.68%
101.90	2.96	216.5	0.718	23.78	8.01	190.48	26.02	87.98%
102.03	2.62	189.1	0.709	23.79	7.01	166.77	22.35	88.18%
101.97	2.29	163.1	0.697	23.79	6.00	142.74	20.34	87.53%
101.90	1.95	136.2	0.687	23.80	5.01	119.17	17.04	87.49%
101.98	1.61	110.1	0.672	23.80	4.00	95.25	14.82	86.53%
102.05	1.27	85.0	0.656	23.81	3.02	71.88	13.12	84.57%
102.07	0.91	58.8	0.634	23.82	2.00	47.74	11.03	81.22%
101.95	0.54	33.1	0.597	23.82	1.00	23.92	9.13	72.36%
102.00	0.35	20.1	0.564	23.83	0.50	11.84	8.21	59.07%
102.50	0.14	7.0	0.489	23.83	0.00	0.00	7.02	0.00%

PMP9739 Rev B Test Results

120V_{AC}/60Hz

Vin(ac)	Iin(A)	Pin(W)	PF	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff (%)
119.96	3.29	281.7	0.714	23.79	10.50	249.80	31.91	88.67%
120.00	3.15	268.9	0.711	23.79	10.00	237.90	31.00	88.47%
119.98	2.86	241.5	0.703	23.79	9.00	214.11	27.39	88.66%
120.03	2.57	214.3	0.695	23.79	8.00	190.32	23.98	88.81%
119.96	2.30	188.5	0.685	23.80	7.00	166.60	21.92	88.37%
119.89	2.00	161.6	0.675	23.80	6.00	142.80	18.76	88.39%
120.02	1.70	135.2	0.663	23.80	5.00	119.07	16.17	88.04%
120.23	1.41	109.7	0.649	23.81	4.00	95.24	14.44	86.83%
119.85	1.11	84.3	0.632	23.81	3.00	71.50	12.78	84.84%
120.18	0.80	58.5	0.606	23.82	2.00	47.74	10.76	81.60%
120.31	0.48	33.0	0.569	23.83	1.01	24.02	8.98	72.79%
120.30	0.31	20.2	0.535	23.83	0.51	12.11	8.12	59.84%
120.02	0.12	6.5	0.46	23.84	0.00	0.00	6.50	0.00%

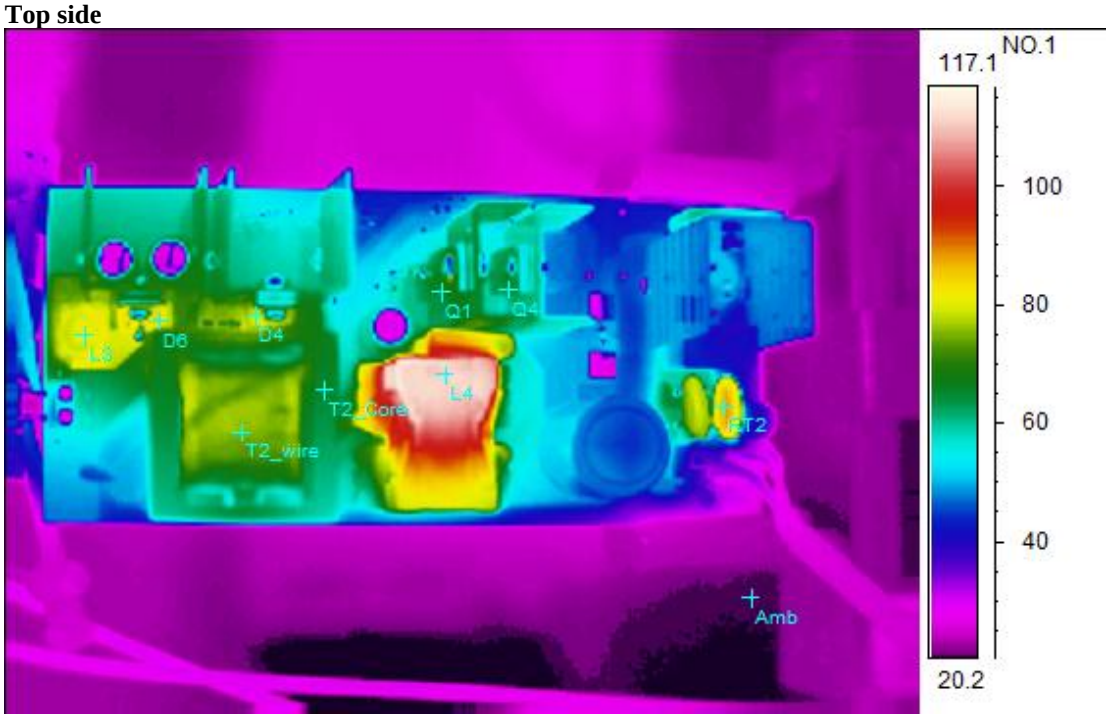
138V_{AC}/60Hz

Vin(ac)	Iin(A)	Pin(W)	PF	Vout_pri(V)	Iout_pri(A)	Pout(W)	Losses(W)	Eff (%)
137.98	2.92	279.2	0.694	23.79	10.50	249.80	29.41	89.47%
137.92	2.80	266.2	0.689	23.80	9.99	237.76	28.44	89.32%
137.99	2.55	239.6	0.681	23.80	9.01	214.44	25.16	89.50%
137.96	2.30	213.5	0.672	23.81	8.00	190.48	23.02	89.22%
138.05	2.05	187.6	0.662	23.81	7.01	166.91	20.64	88.99%
138.02	1.79	160.7	0.652	23.81	6.00	142.86	17.84	88.90%
137.88	1.53	134.7	0.64	23.82	5.00	119.20	15.51	88.48%
137.97	1.27	109.4	0.627	23.82	4.01	95.52	13.86	87.33%
137.91	1.00	83.7	0.609	23.82	3.00	71.48	12.17	85.46%
138.25	0.72	58.3	0.584	23.83	2.00	47.68	10.59	81.83%
137.76	0.44	33.2	0.548	23.83	1.02	24.28	8.93	73.12%
137.98	0.28	20.0	0.515	23.84	0.50	11.94	8.09	59.63%
138.33	0.06	3.4	0.397	25.87	0.00	0.00	3.40	0.00%

3 Thermal Images

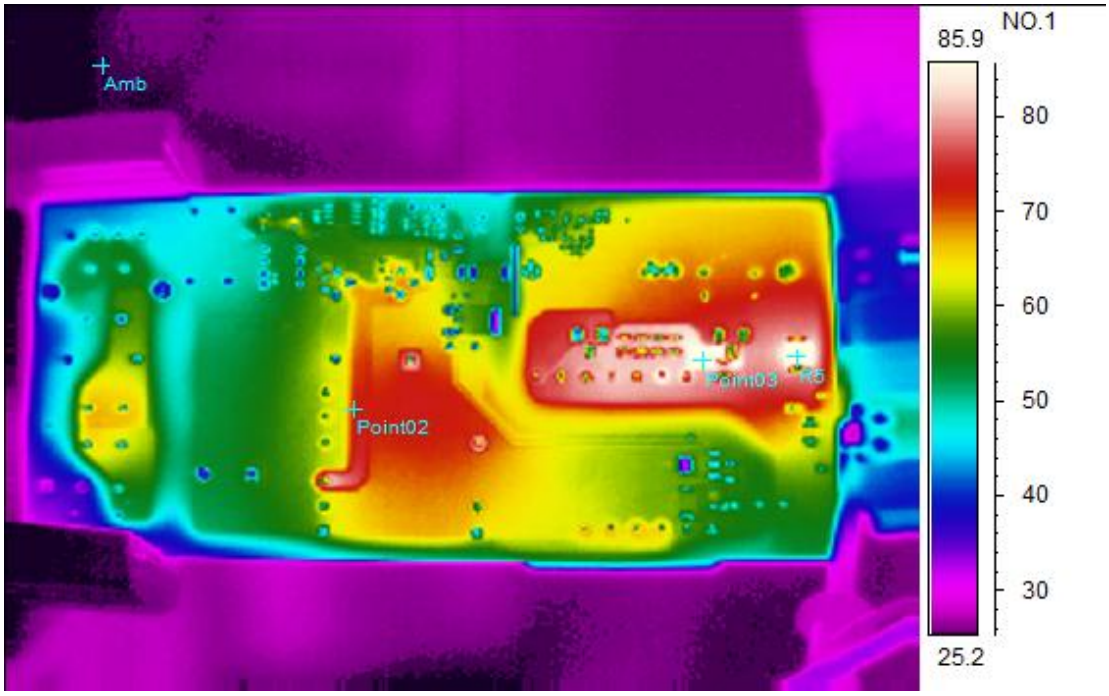
The ambient temperature was 25ºC with no forced air flow. Input was $120V_{AC}$/60Hz. The output was loaded with 24V/10.5A.

Top side



Spot analysis	Value
L4Temperature	113.2°C
RT2Temperature	95.6°C
T2_wireTemperature	84.0°C
T2_CoreTemperature	74.2°C
D6Temperature	92.2°C
D4Temperature	87.4°C
L3Temperature	89.1°C
Q1Temperature	75.4°C
Q4 Temperature	73.2°C
AmbTemperature	21.0°C

Bottom side

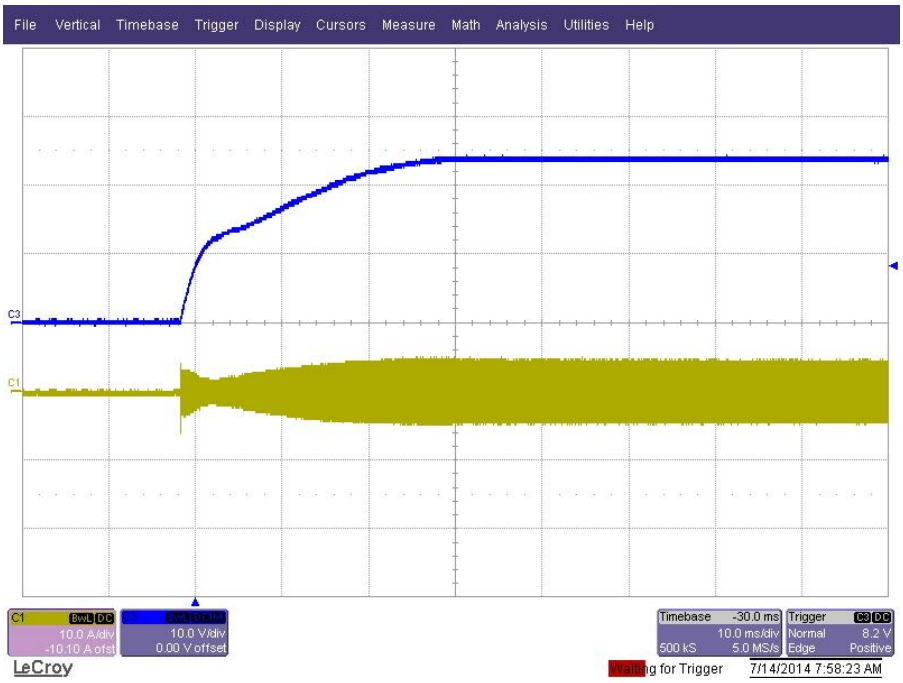


Spot analysis	Value
AmbTemperature	25.5°C
Point02Temperature	74.9°C
Point03Temperature	86.7°C
R5 Temperature	101.5°C

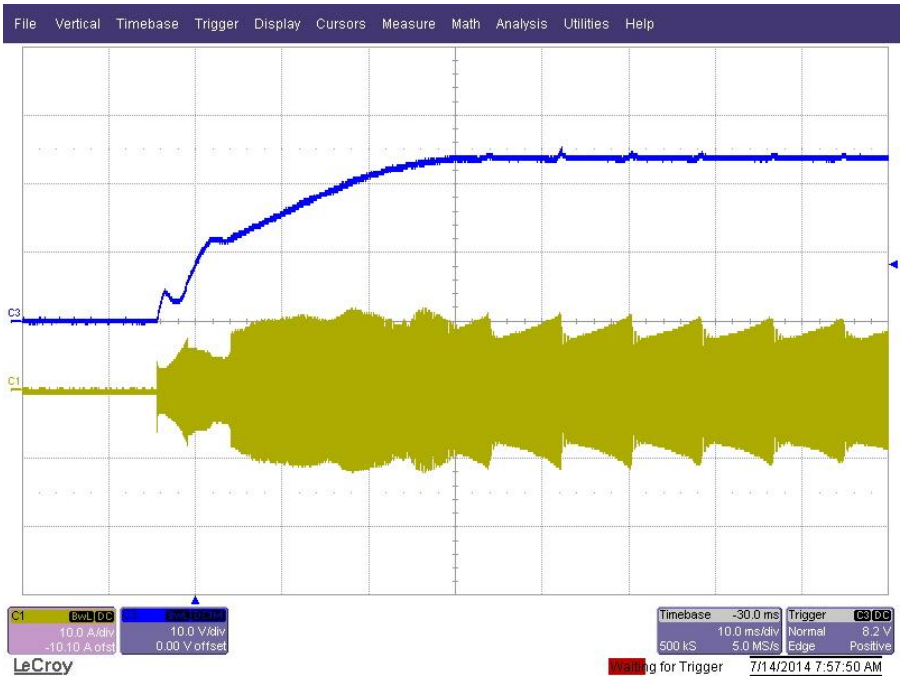
4 Startup

The output voltages at startup are shown in the images below. CH1: Current on C18, CH3: V_{out}.

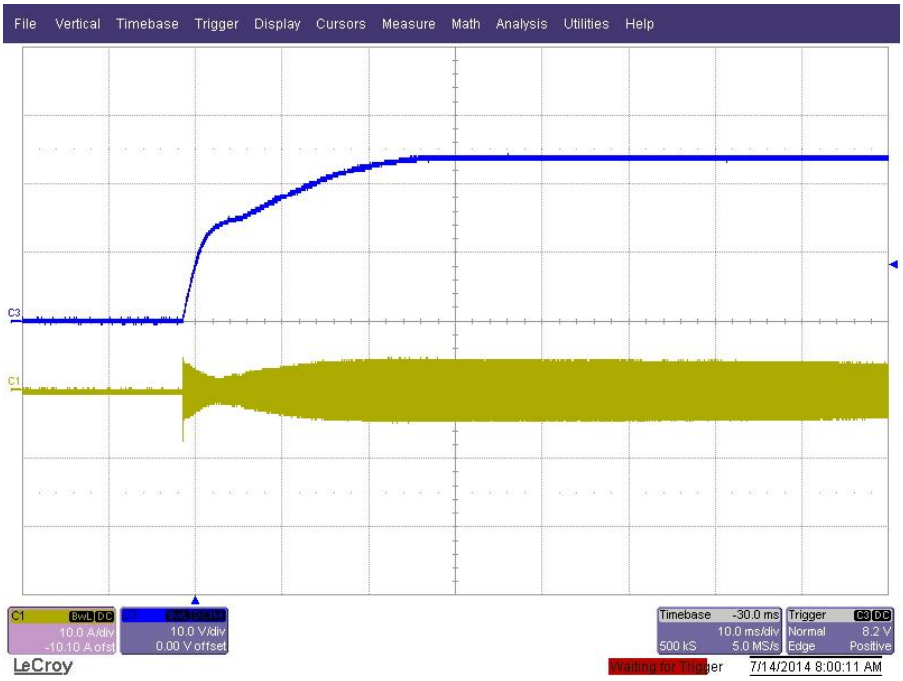
4.1 No Load @ 102Vac/60Hz



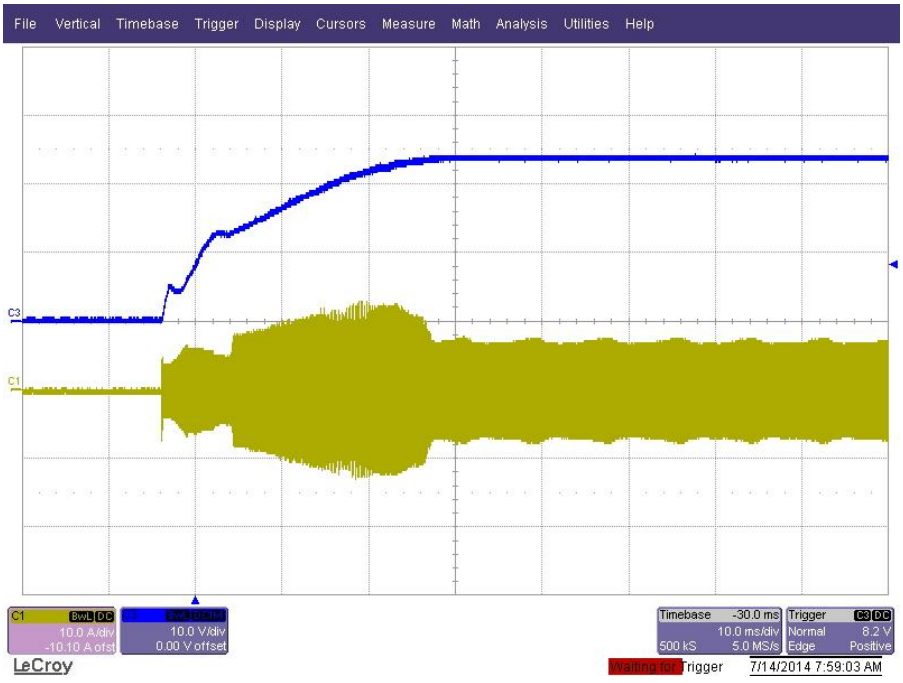
4.2 24V/10.5A @ 102Vac/60Hz



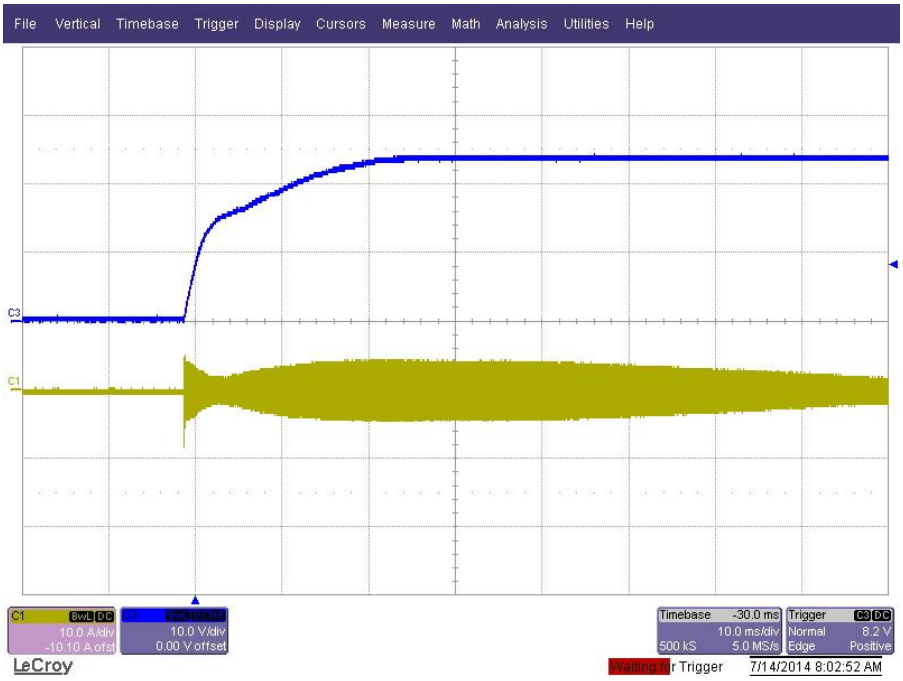
4.3 No Load @ 120Vac/60Hz



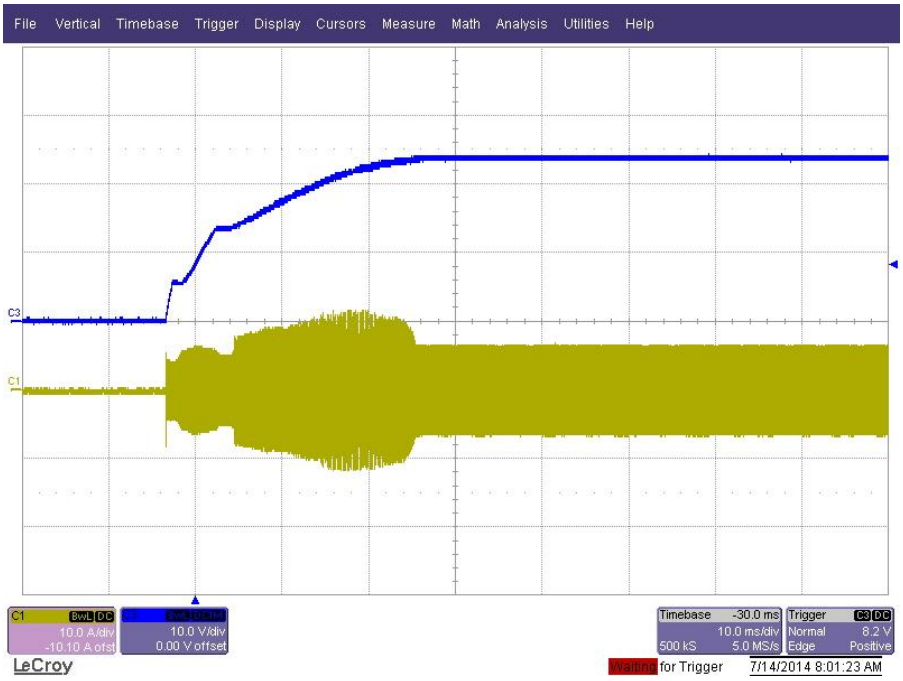
4.4 24V/10.5A @ 120Vac/60Hz



4.5 No Load @ 138Vac/60Hz



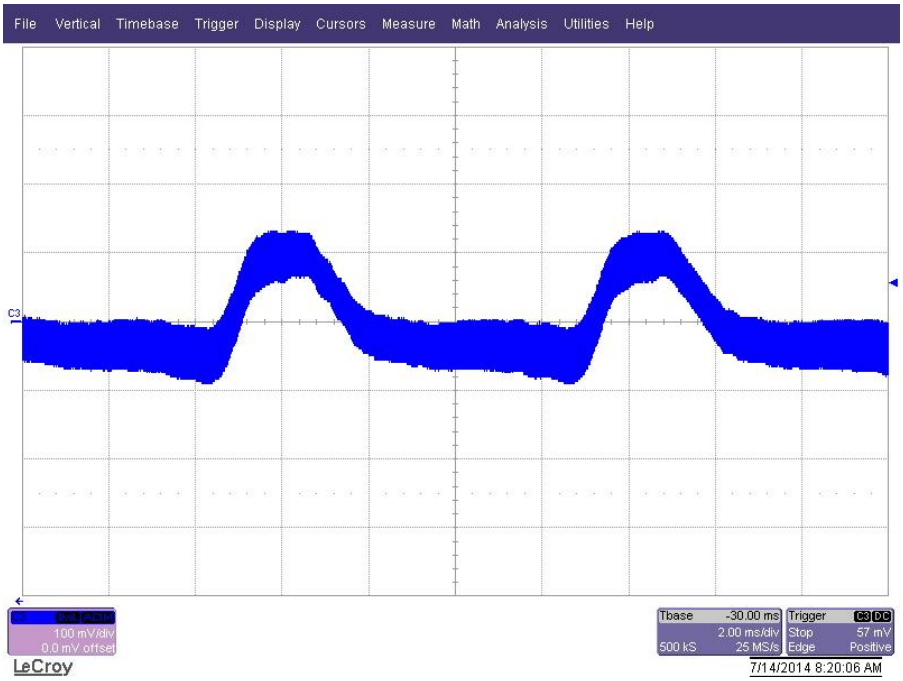
4.6 24V/10.5A @ 138Vac/60Hz



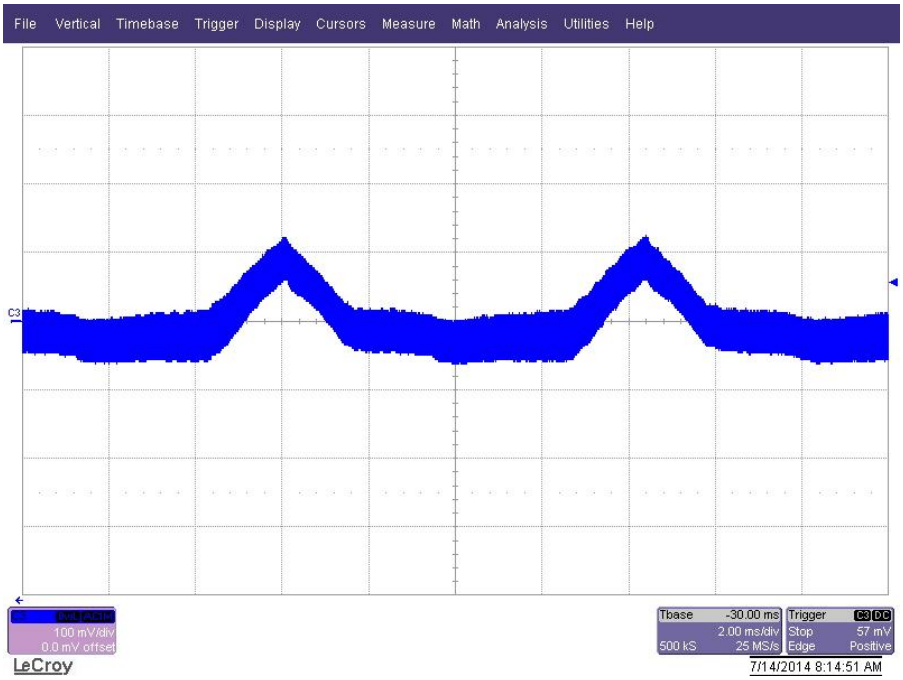
5 Output Ripple Voltage

The output ripple voltage at 10.5A load current is shown in the plots below.

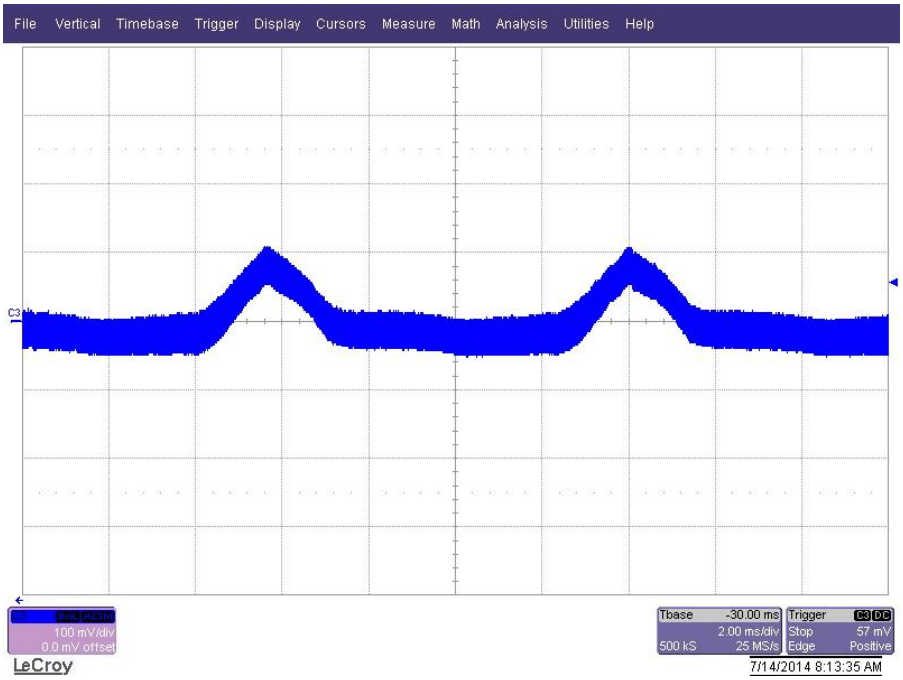
5.1 102Vac/60Hz



5.2 120Vac/60Hz



5.3 138Vac/60Hz



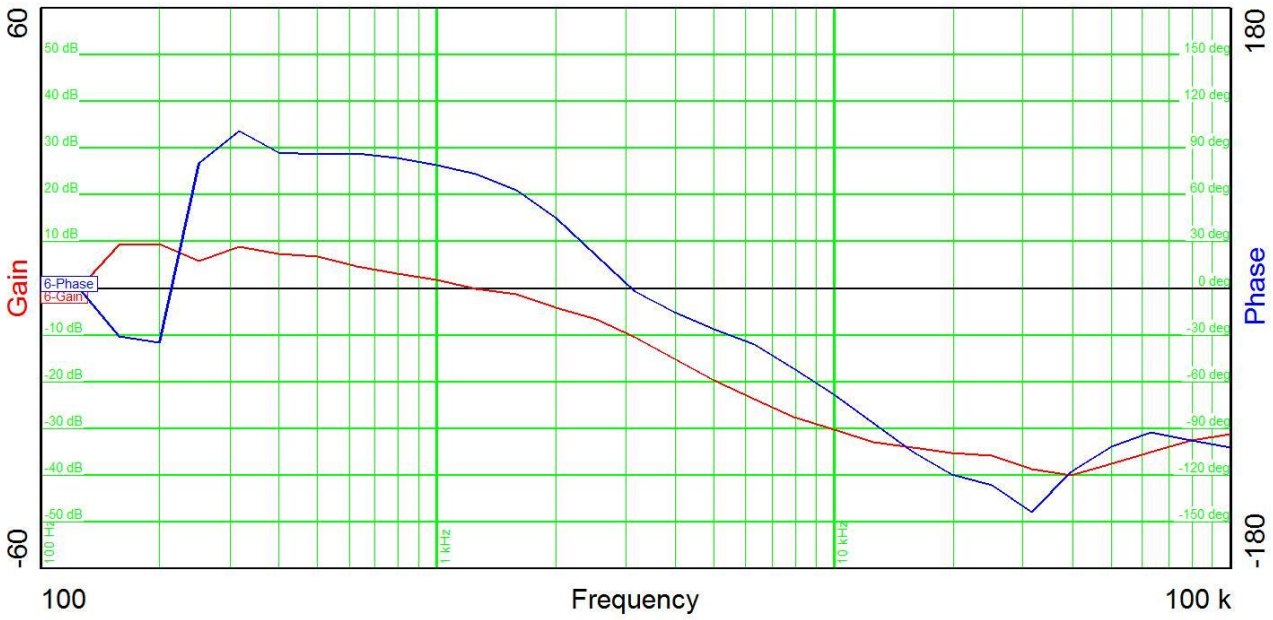
6 Load Transients

The image below shows the output voltage response to a 5A to 10A load transient. The input voltage was set to 120VAC/60Hz. Channel 1 shows the 24V output voltage (ac coupled). Channel 4 shows the output load current.

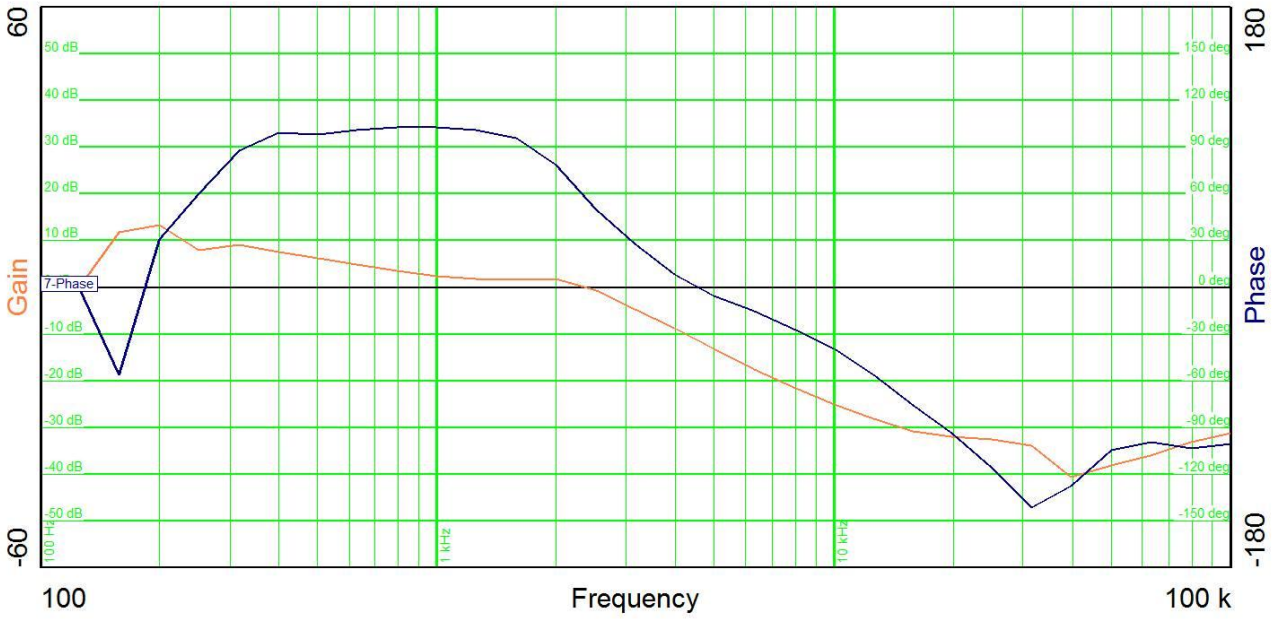
7 Loop Response

The frequency response of the feedback loop is shown in the image below. The frequency response was measured by inserting small signal from TP3 and TP4. The output was loaded with 24V/10.5A.

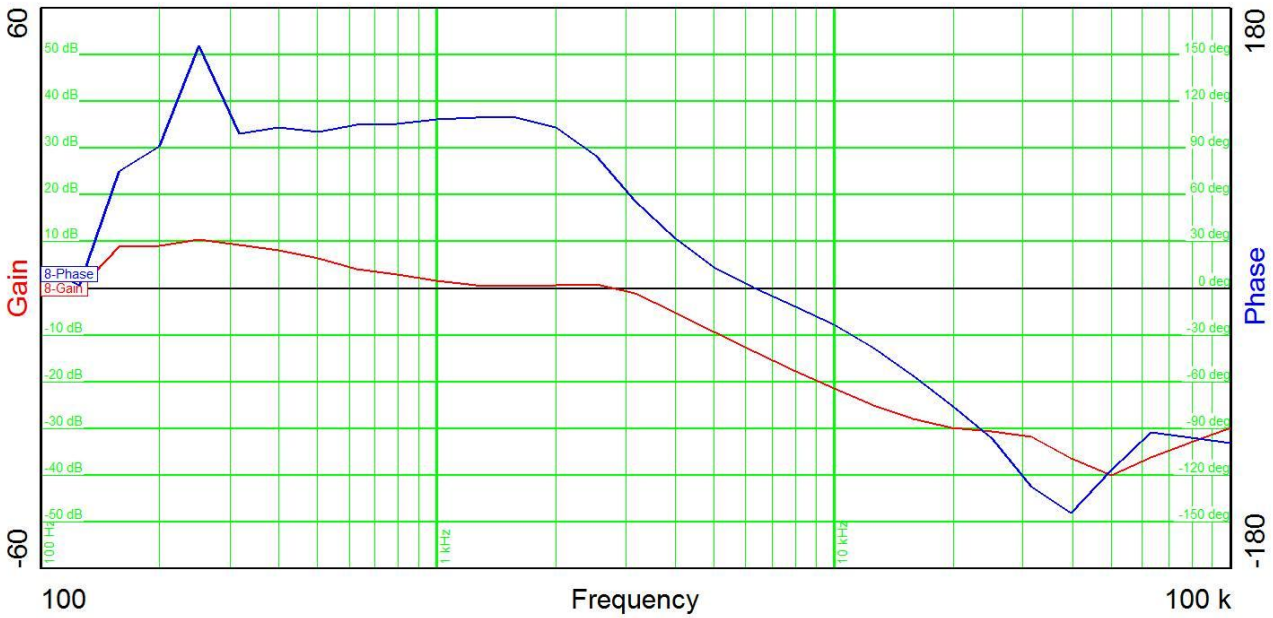
7.1 102Vac/60Hz



7.2 120Vac/60Hz



7.3 138Vac/60Hz



8 Switching Waveforms

8.1 Q4 V_{DS} and C18 voltage @ 102V_{AC}/60Hz, 24Vout/10.5A

Channel 1: Q4 V_{DS}, Channel 2: C18 Voltage

8.2 Q4 V_{DS} and C18 voltage @ 120V_{AC}/60Hz, 24Vout/10.5A

Channel 1: Q4 V_{DS}, Channel 2: C18 Voltage

8.3 Q4 V_{DS} and C18 voltage @ 138V_{AC}/60Hz, 24Vout/10.5A

Channel 1: Q4 V_{DS}, Channel 2: C18 Voltage

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