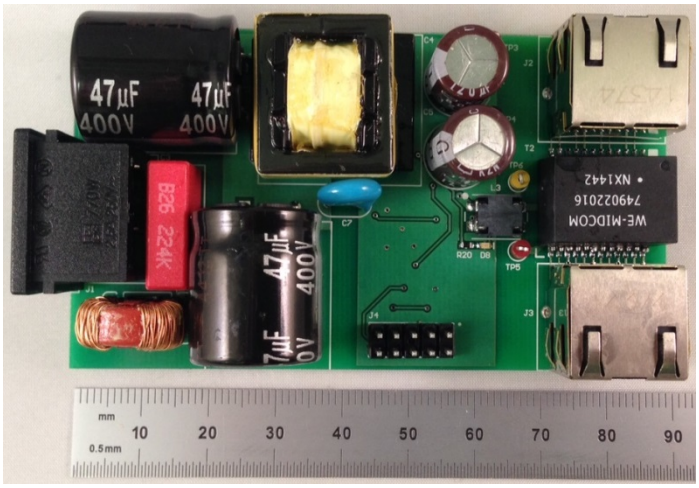
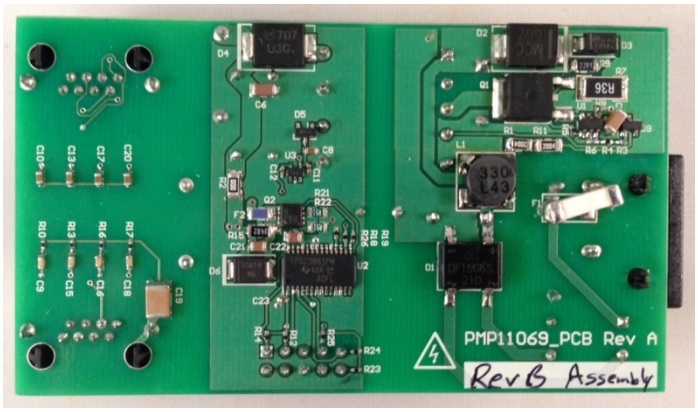
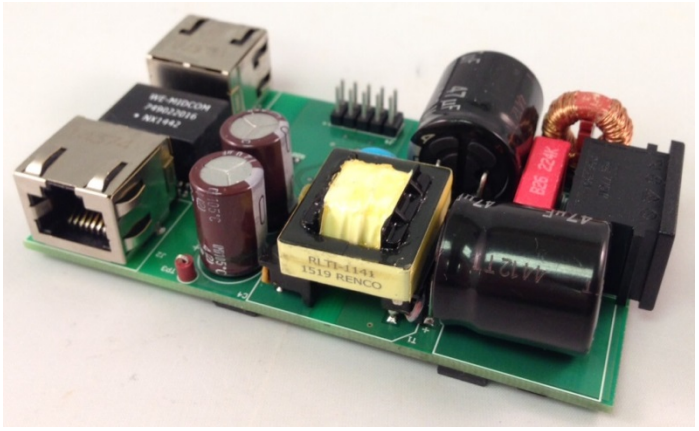
PMP20199 Rev A Test Results

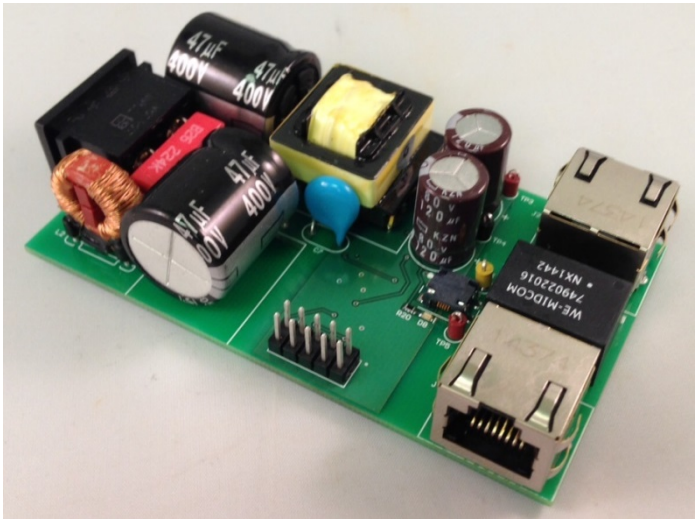
1 Photos

The photographs below show the PMP20199 Rev A prototype assembly. This circuit was built using a PMP11069 Rev A PCB.









2 Standby Power

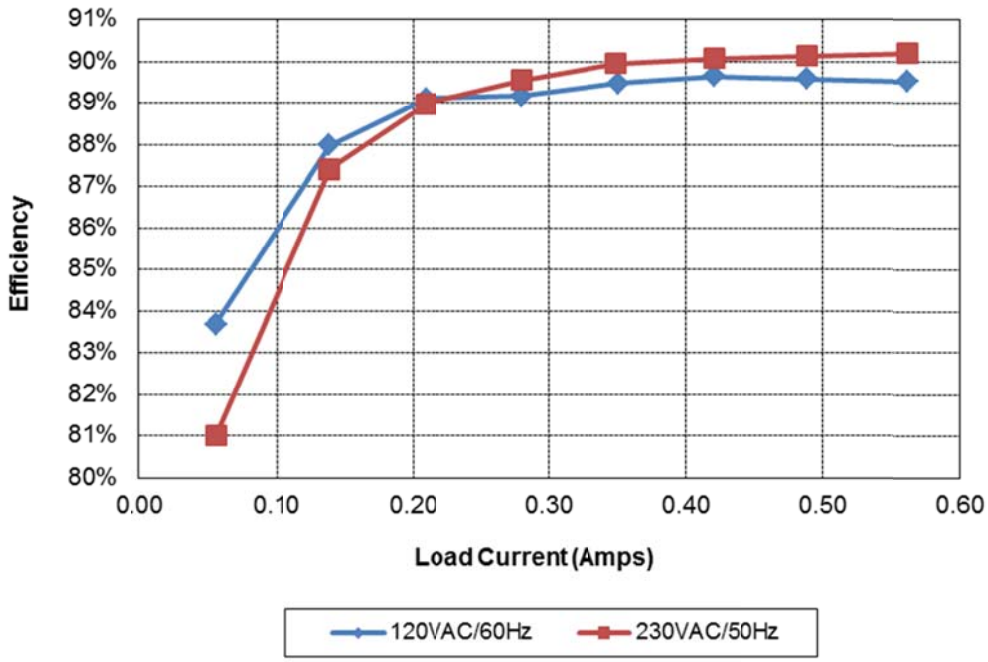
Measured with no load.

	Pin AC (W)
120VAC/60Hz	0.345
230VAC/50Hz	0.377

3 Efficiency

3.1 Total Efficiency

The efficiency measurements below were measured from the AC input to TP5/TP6. R15 was removed for this test.



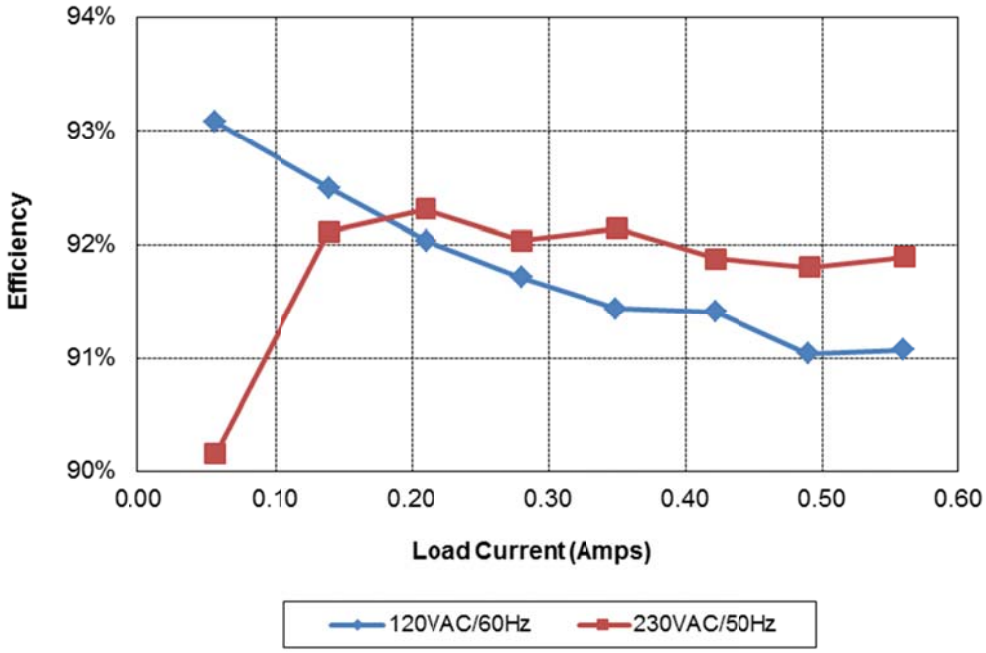
120VAC/60Hz								
Iout	Vout	Vin	Iin	Pin	PF	Pout	Losses	Efficiency
0.0089	53.57	120.0	0.0260	0.830	0.266	0.48	0.35	57.4%
0.056	53.71	120.0	0.0898	3.594	0.334	3.01	0.59	83.7%
0.140	53.56	119.9	0.1924	8.523	0.369	7.50	1.02	88.0%
0.210	53.50	119.9	0.2720	12.609	0.387	11.24	1.37	89.1%
0.280	53.49	119.9	0.3492	16.796	0.401	14.98	1.82	89.2%
0.351	53.43	119.9	0.4216	20.96	0.415	18.75	2.21	89.5%
0.420	53.40	119.9	0.4873	25.02	0.428	22.43	2.59	89.6%
0.488	53.36	119.9	0.5487	29.07	0.442	26.04	3.03	89.6%
0.562	53.33	119.9	0.6118	33.48	0.456	29.97	3.51	89.5%

230VAC/50Hz								
Iout	Vout	Vin	Iin	Pin	PF	Pout	Losses	Efficiency
0.0084	53.41	230.0	0.0245	0.906	0.160	0.45	0.46	49.5%
0.056	53.60	230.0	0.0626	3.706	0.257	3.00	0.70	81.0%
0.140	53.45	230.0	0.1205	8.560	0.309	7.48	1.08	87.4%
0.210	53.39	230.0	0.1671	12.600	0.328	11.21	1.39	89.0%
0.280	53.38	230.0	0.2136	16.690	0.340	14.95	1.74	89.6%
0.349	53.38	230.0	0.2584	20.71	0.349	18.63	2.08	90.0%
0.420	53.36	230.0	0.3039	24.88	0.356	22.41	2.47	90.1%
0.488	53.31	230.0	0.3466	28.86	0.362	26.02	2.84	90.1%
0.562	53.27	230.0	0.3920	33.19	0.368	29.94	3.25	90.2%

Vin	Pin	Vout	Iout	Load	Efficiency	Avg. Eff.
120VAC/60Hz	3.59	53.71	0.056	10%	83.69%	
	8.52	53.56	0.140	25%	87.98%	**89.08%**
	16.80	53.49	0.280	50%	89.17%	
	25.02	53.40	0.420	75%	89.64%	
	33.48	53.33	0.562	100%	89.52%	
230VAC/50Hz	3.71	53.60	0.056	10%	80.99%	
	8.56	53.45	0.140	25%	87.42%	**89.31%**
	16.69	53.38	0.280	50%	89.55%	
	24.88	53.36	0.420	75%	90.08%	
	33.19	53.27	0.562	100%	90.20%	

3.2 AC/DC Only Efficiency

The efficiency measurements below were measured from the AC input to TP3/TP4 with R2/D5 removed.



120VAC/60Hz

Iout	Vout	Vin	Iin	Pin	PF	Pout	Losses	Efficiency
0.00090	53.81	120.0	0.01002	0.0611		0.05	0.01	
0.056	53.72	120.0	0.0821	3.232	0.328	3.01	0.22	93.1%
0.140	53.61	119.9	0.1843	8.114	0.367	7.51	0.61	92.5%
0.210	53.57	119.9	0.2646	12.223	0.385	11.25	0.97	92.0%
0.280	53.60	119.9	0.3416	16.364	0.400	15.01	1.36	91.7%
0.350	53.61	119.9	0.4141	20.52	0.413	18.76	1.76	91.4%
0.422	53.61	119.9	0.4831	24.75	0.427	22.62	2.13	91.4%
0.490	53.62	119.9	0.5453	28.86	0.441	26.27	2.59	91.0%
0.560	53.65	119.9	0.6047	32.99	0.455	30.04	2.95	91.1%

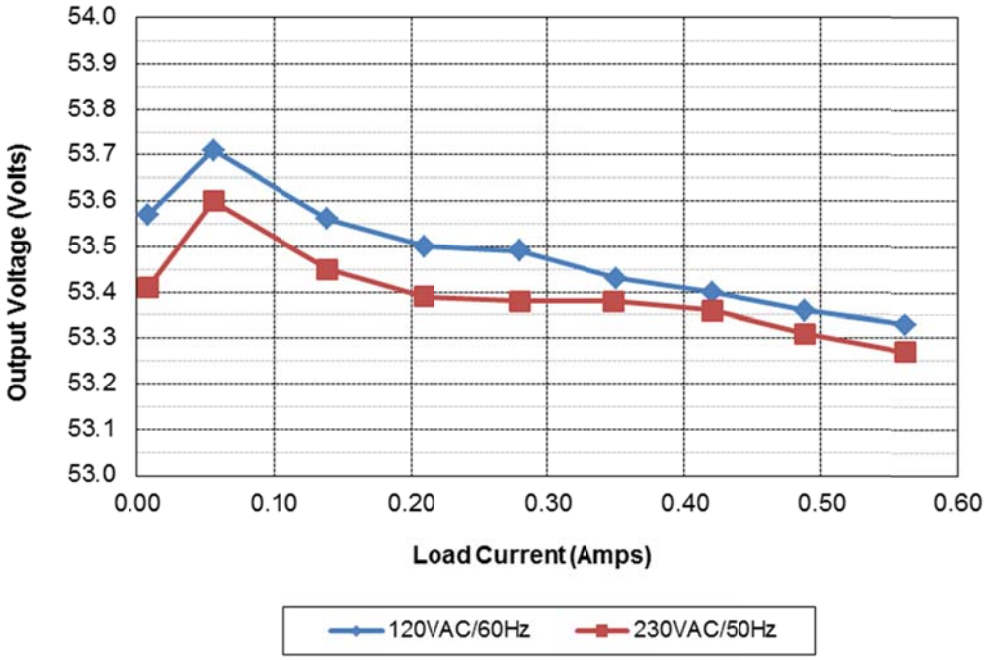
230VAC/50Hz								
Iout	Vout	Vin	Iin	Pin	PF	Pout	Losses	Efficiency
0.00090	53.81	230.0	0.01590	0.0845		0.05	0.04	
0.056	53.74	230.0	0.0594	3.338	0.245	3.01	0.33	90.2%
0.140	53.63	230.0	0.1167	8.151	0.304	7.51	0.64	92.1%
0.210	53.60	230.0	0.1631	12.193	0.325	11.26	0.94	92.3%
0.280	53.61	230.0	0.2098	16.310	0.338	15.01	1.30	92.0%
0.351	53.66	230.0	0.2558	20.44	0.347	18.83	1.61	92.1%
0.422	53.69	230.0	0.3018	24.66	0.355	22.66	2.00	91.9%
0.491	53.68	230.0	0.3451	28.71	0.362	26.36	2.35	91.8%
0.561	53.68	230.0	0.3878	32.77	0.368	30.11	2.66	91.9%

Vin	Pin	Vout	Iout	Load	Efficiency	Avg. Eff.
120VAC/60Hz	3.23	53.72	0.056	10%	93.08%	
	8.11	53.61	0.140	25%	92.50%	**91.67%**
	16.36	53.60	0.280	50%	91.71%	
	24.75	53.61	0.422	75%	91.41%	
	32.99	53.65	0.560	100%	91.07%	
230VAC/50Hz	3.34	53.74	0.056	10%	90.16%	
	8.15	53.63	0.140	25%	92.11%	**91.98%**
	16.31	53.61	0.280	50%	92.03%	
	24.66	53.69	0.422	75%	91.88%	
	32.77	53.68	0.561	100%	91.90%	

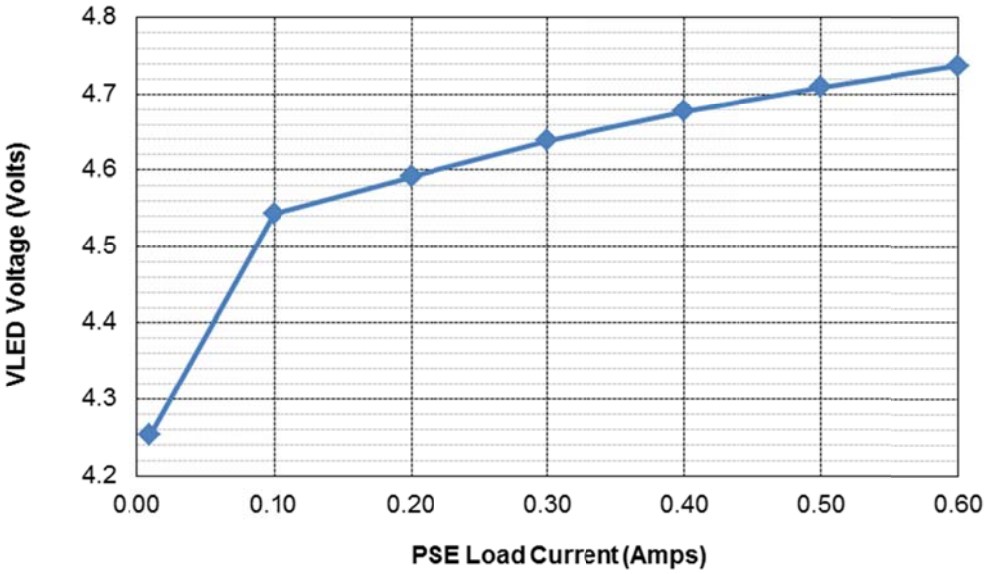
4 Regulation

4.1 PSE Output

Measured at TP5/TP6.



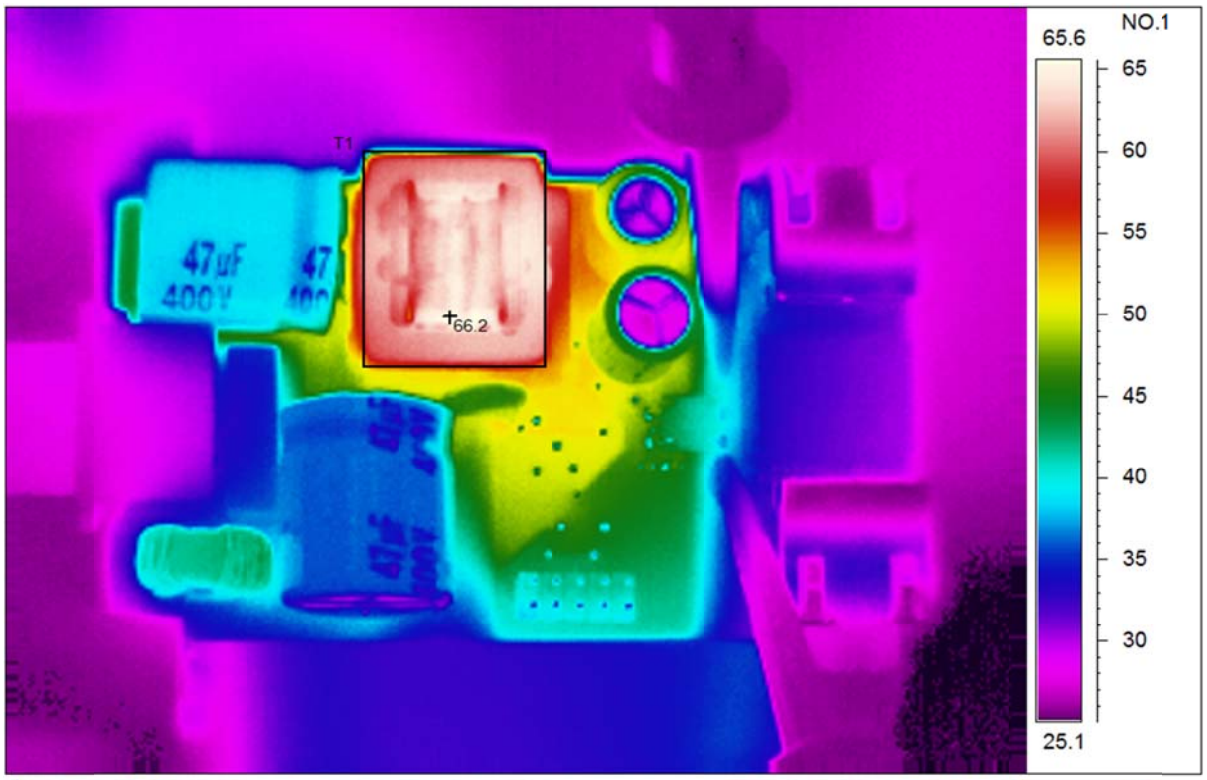
4.2 VLED regulation

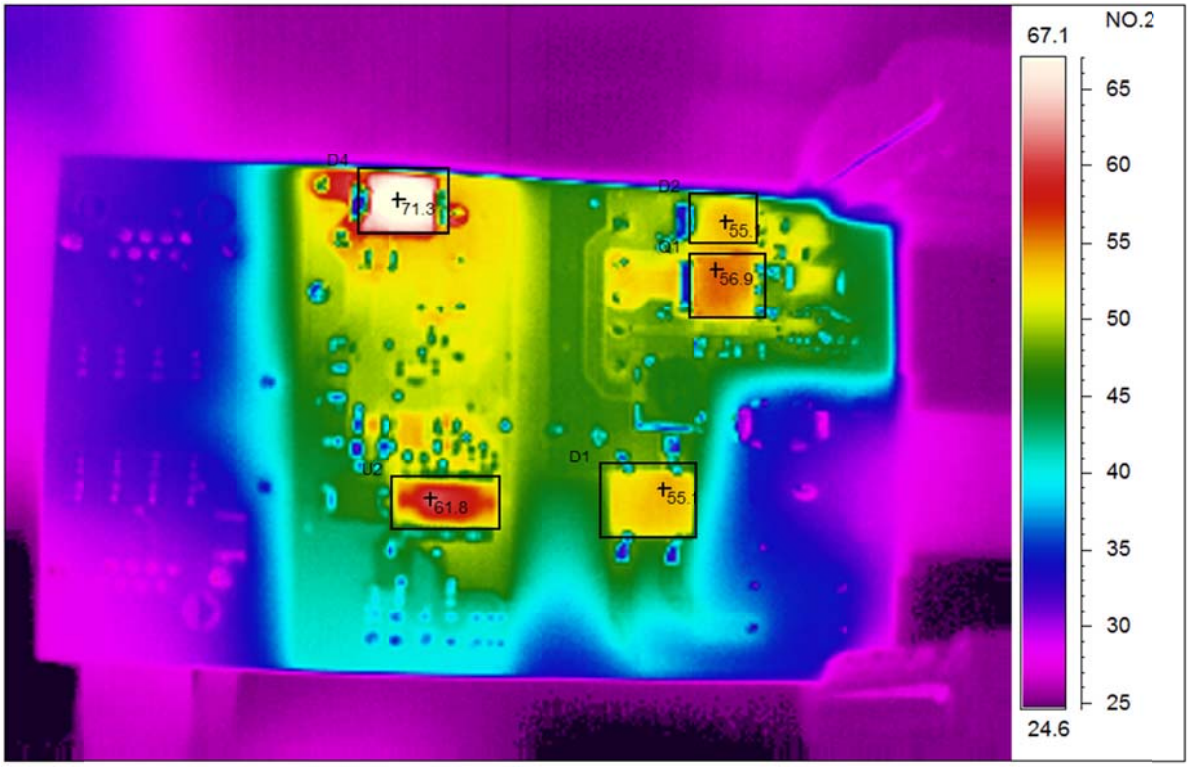


5 Thermal Images

The thermal images below show the assembly with both ports loaded with 2.5A each. The ambient temperature was 25ºC.

5.1 120VAC/60Hz





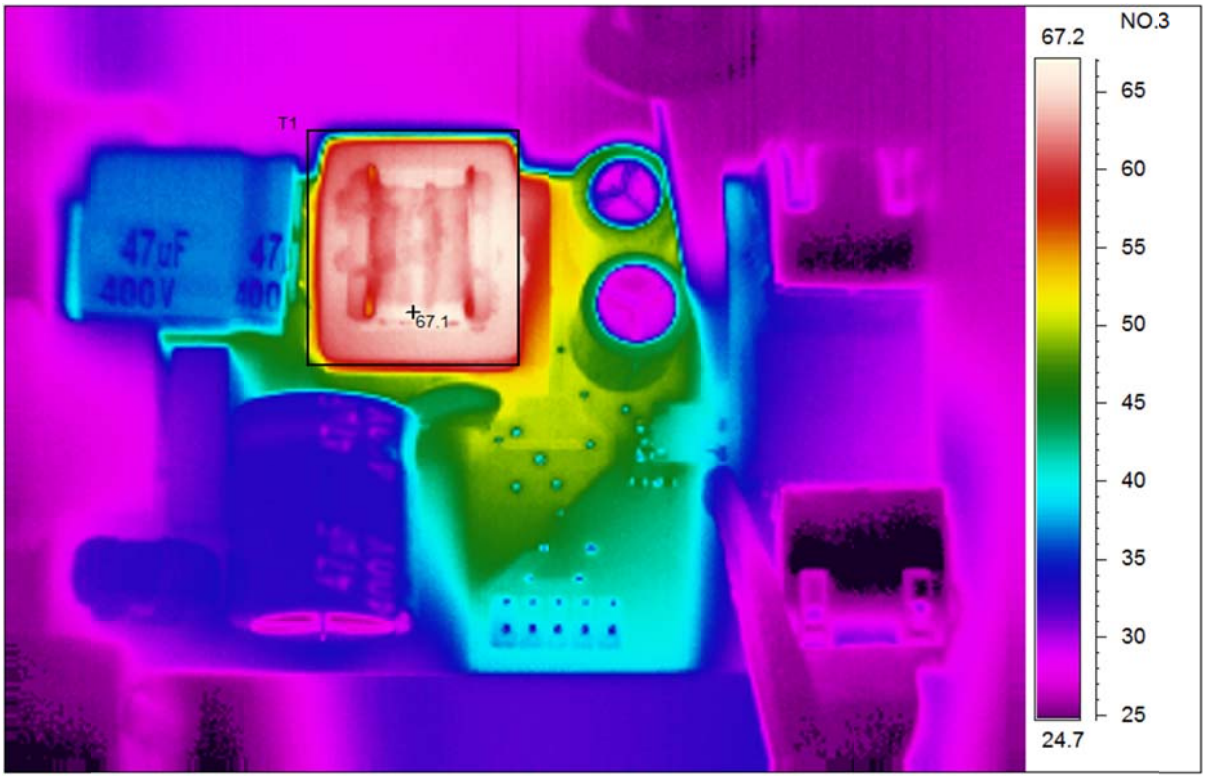
Area analysis	Value
T1 Max	66.2°C

NO.1

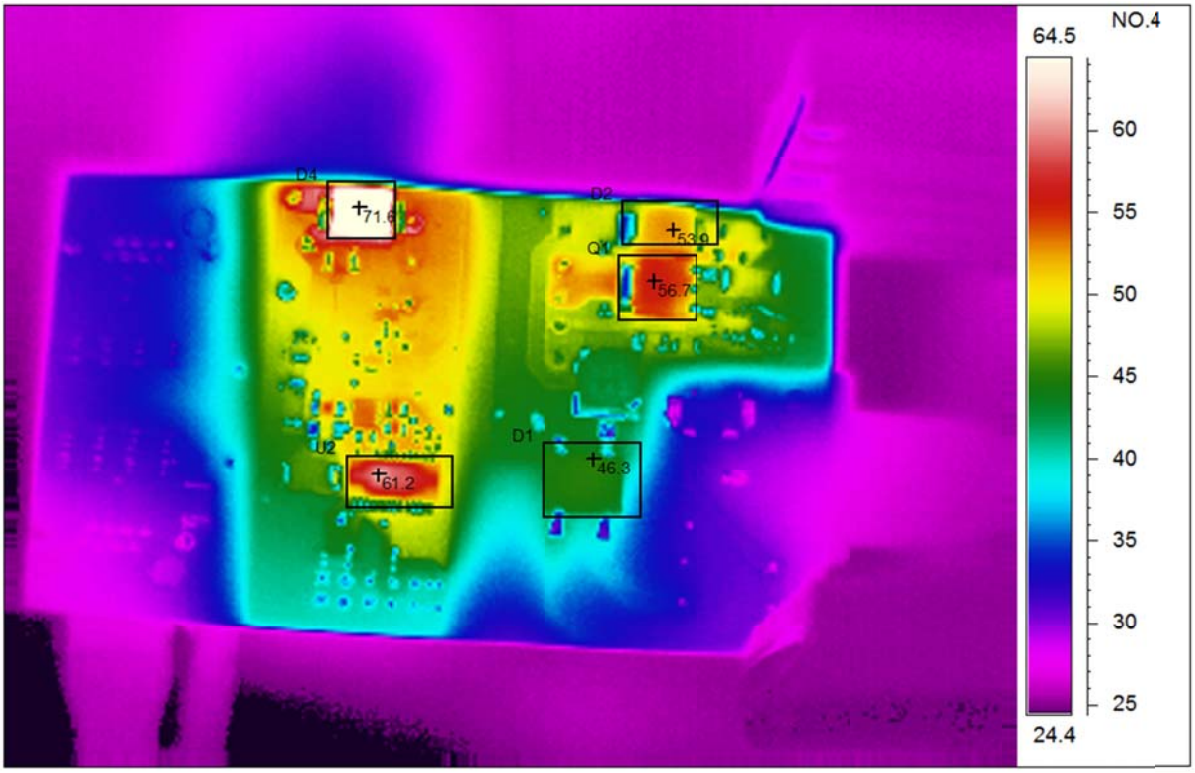
Area analysis	Value
D1Max	55.1°C
D4Max	71.3°C
Q1Max	56.9°C
U2Max	61.8°C
D2 Max	55.1°C

NO.2

5.2 230VAC/50Hz



NO.3



NO.3

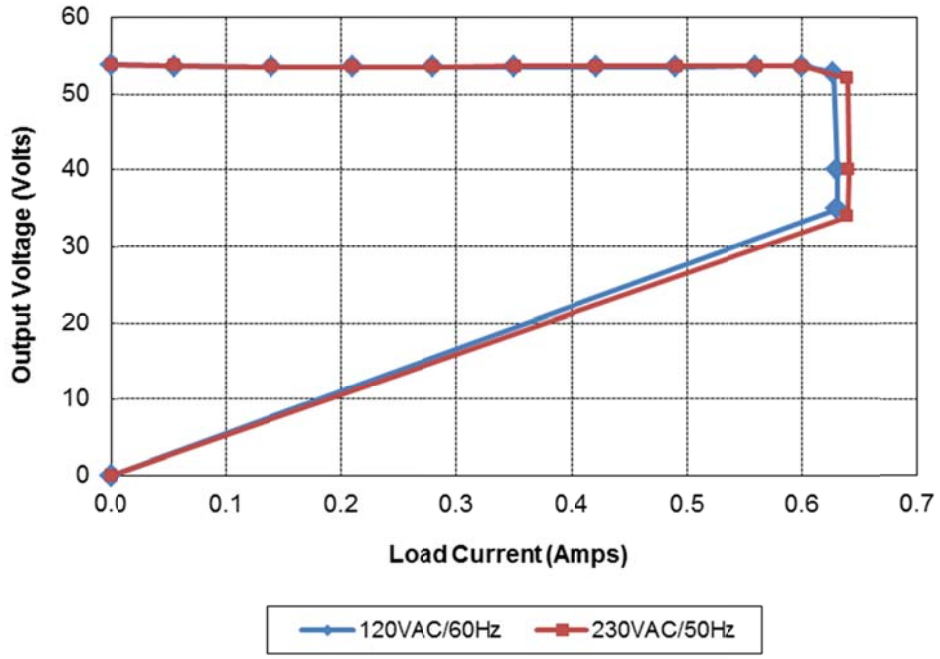
Area analysis	Value
T1 Max	67.1°C

NO.4

Area analysis	Value
D1Max	46.3°C
D4Max	71.6°C
Q1Max	56.7°C
U2Max	61.2°C
D2 Max	53.9°C

6 Current Limit

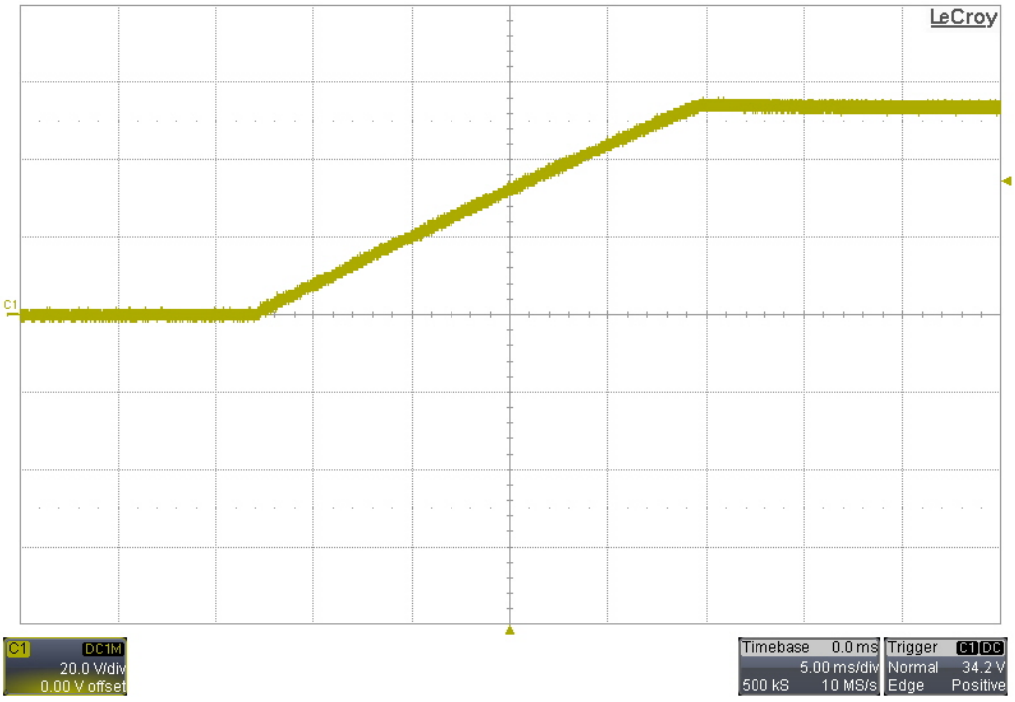
The plot below shows the output voltage on TP3/TP4 versus output current as the load is increased into current limit.



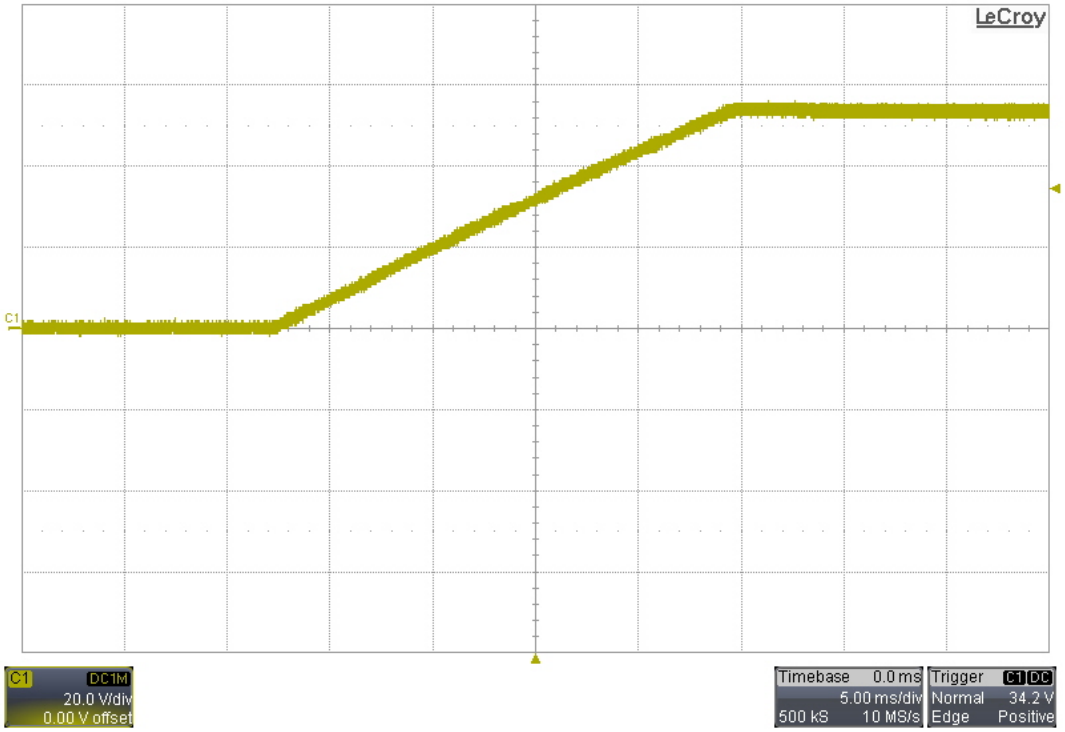
7 Startup

The images below show the output voltage on TP3/TP4 at startup with no load.

7.1 120VAC/60Hz

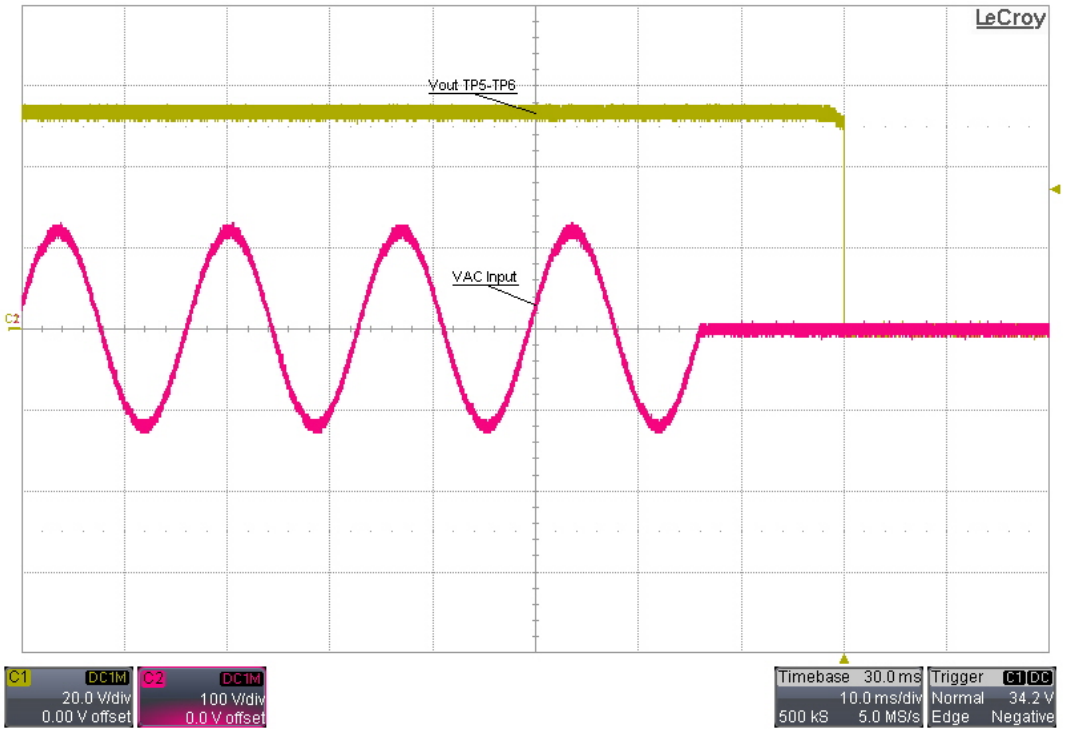


7.2 230VAC/50Hz

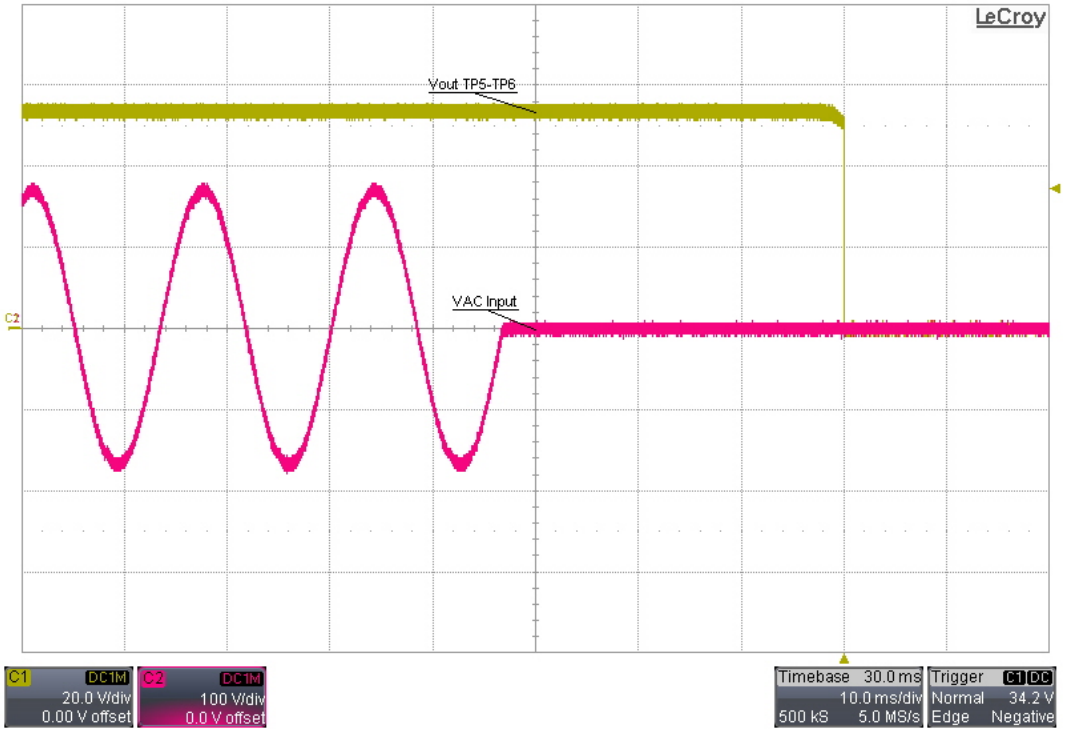


8 Hold up – 95Ω Load

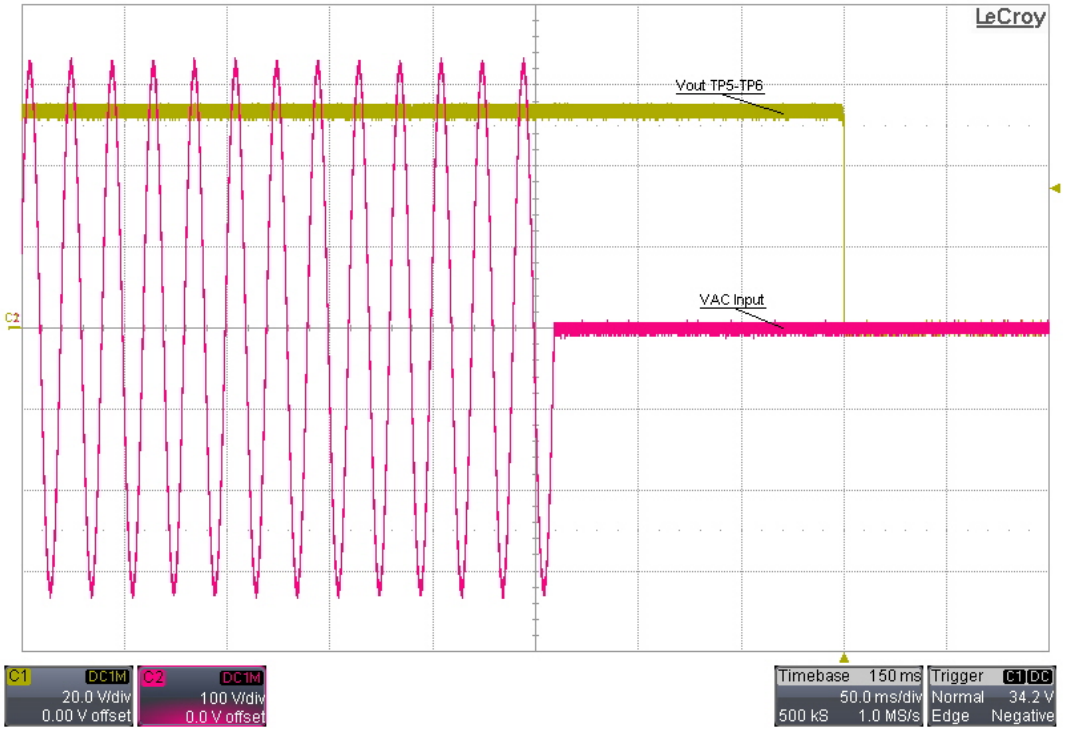
8.1 85VAC/60Hz Input



8.2 120VAC/60Hz Input

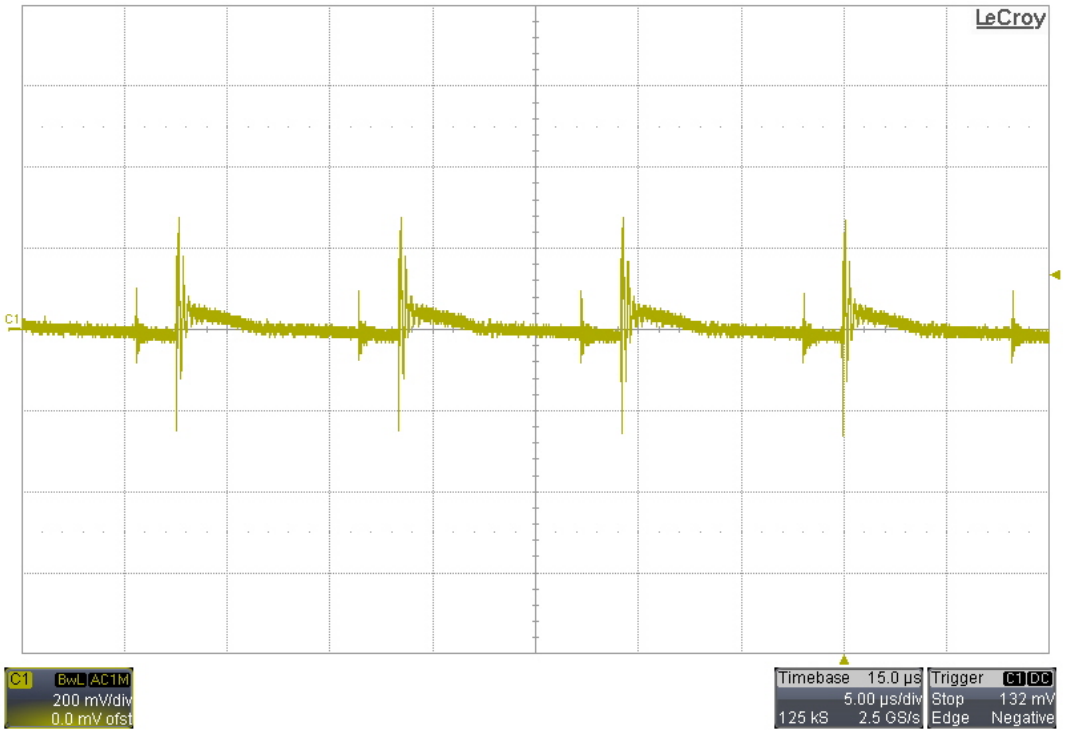


8.3 230VAC/50Hz Input

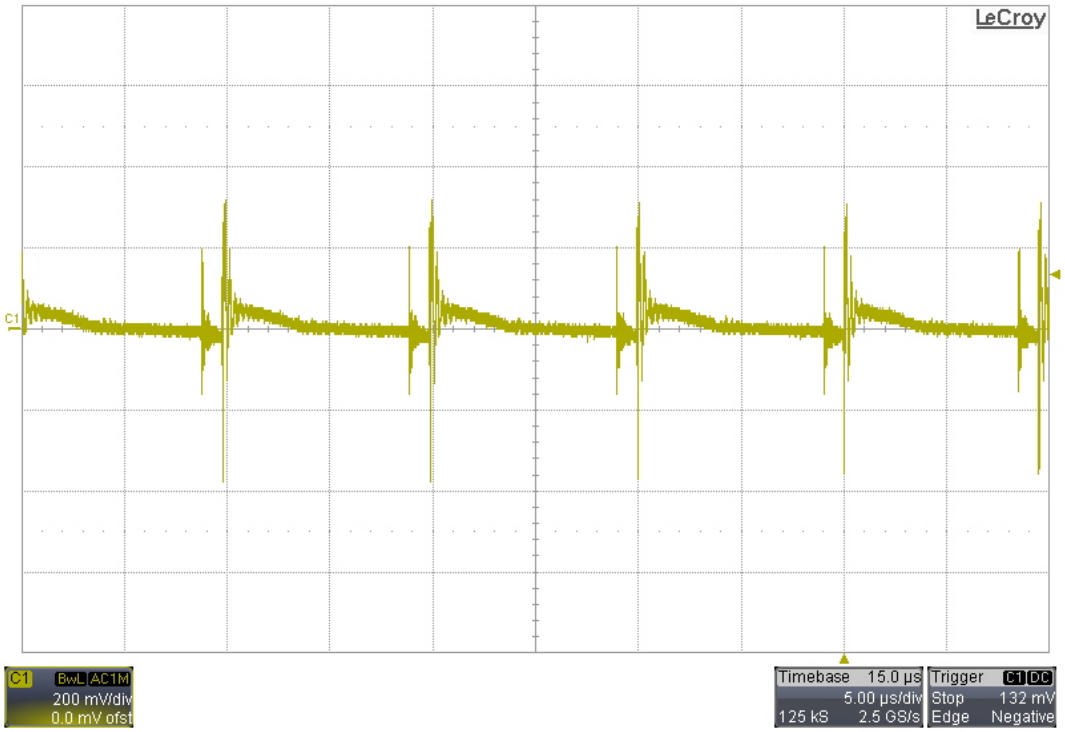


9 Output Ripple Voltage

9.1 120VAC/60Hz – Measured at TP5/TP6 – 0.56A Load

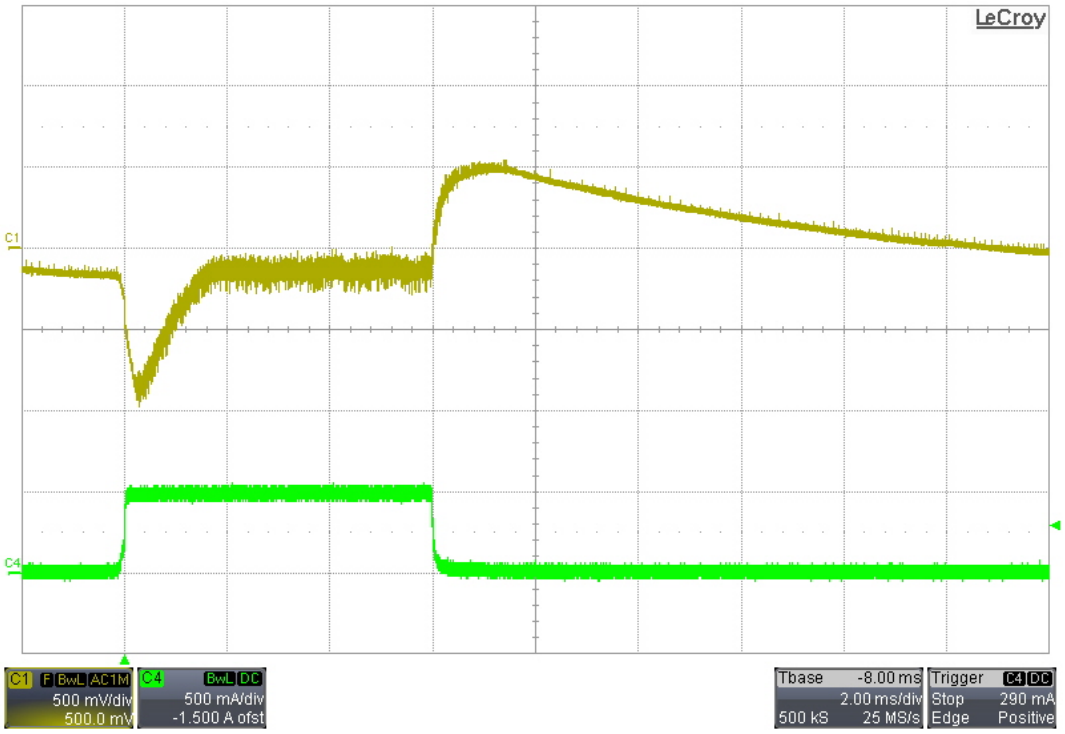


9.2 230VAC/50Hz – Measured at TP5/TP6 – 0.56A Load

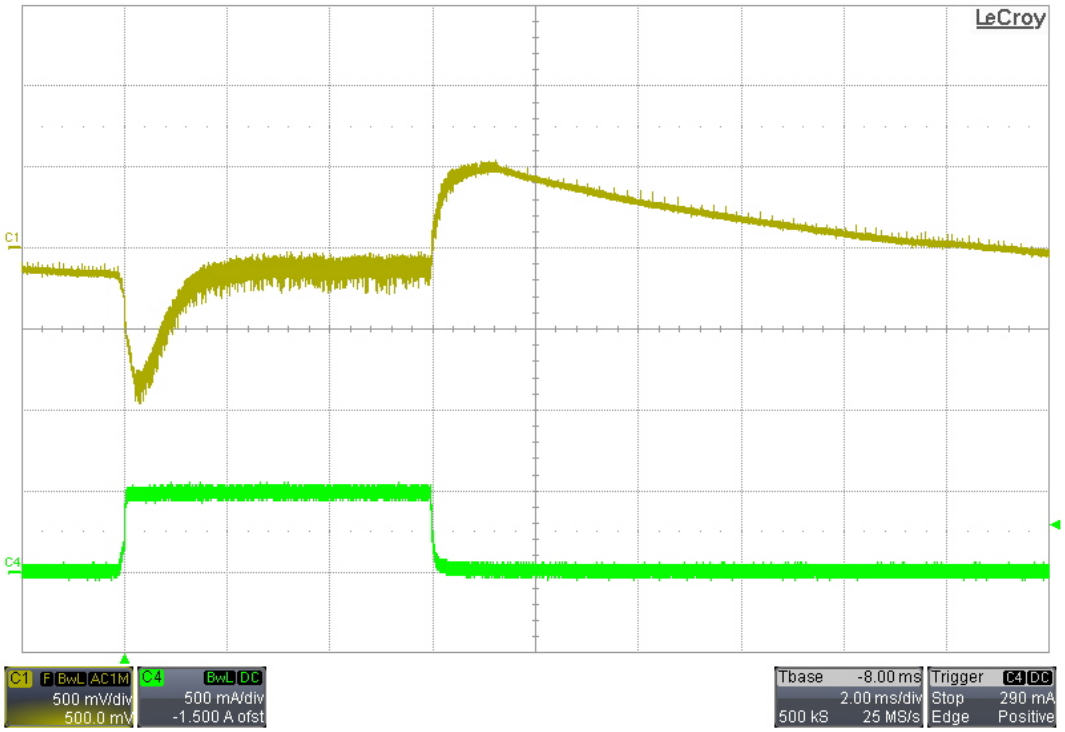


10 Load Transients

10.1 0A to 0.56A Transient on TP5/TP6; 120VAC/60Hz Input



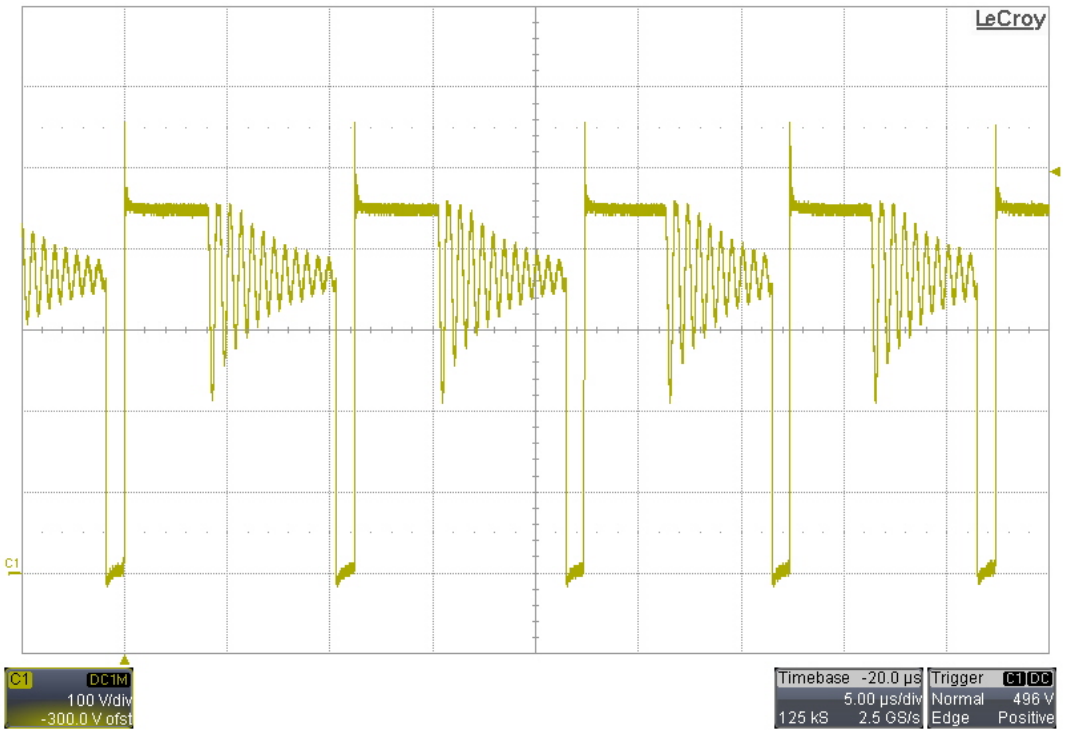
10.2 0A to 0.56A Transient on TP5/TP6; 230VAC/50Hz Input



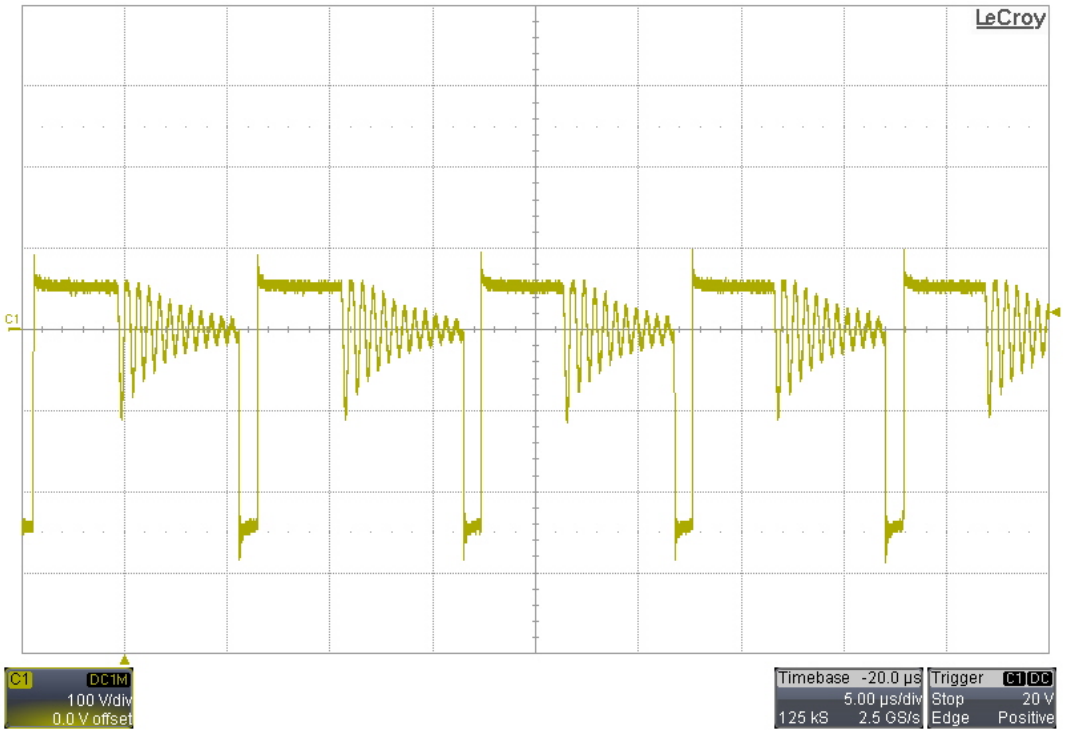
11 Switching Waveforms

The input was 265VAC/50Hz, and TP5/TP6 was loaded with 0.56A.

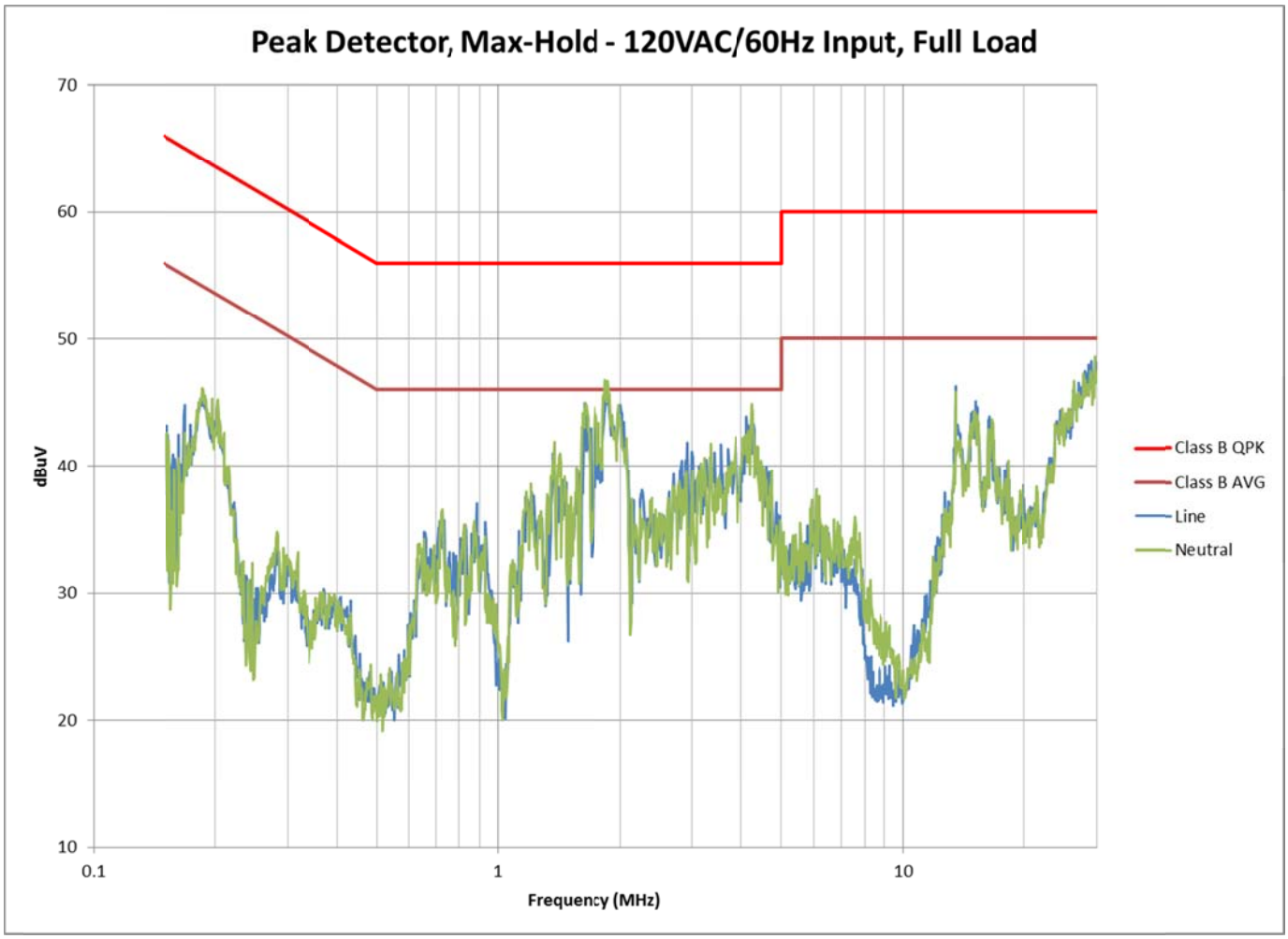
11.1 Drain of Primary FET – Q1

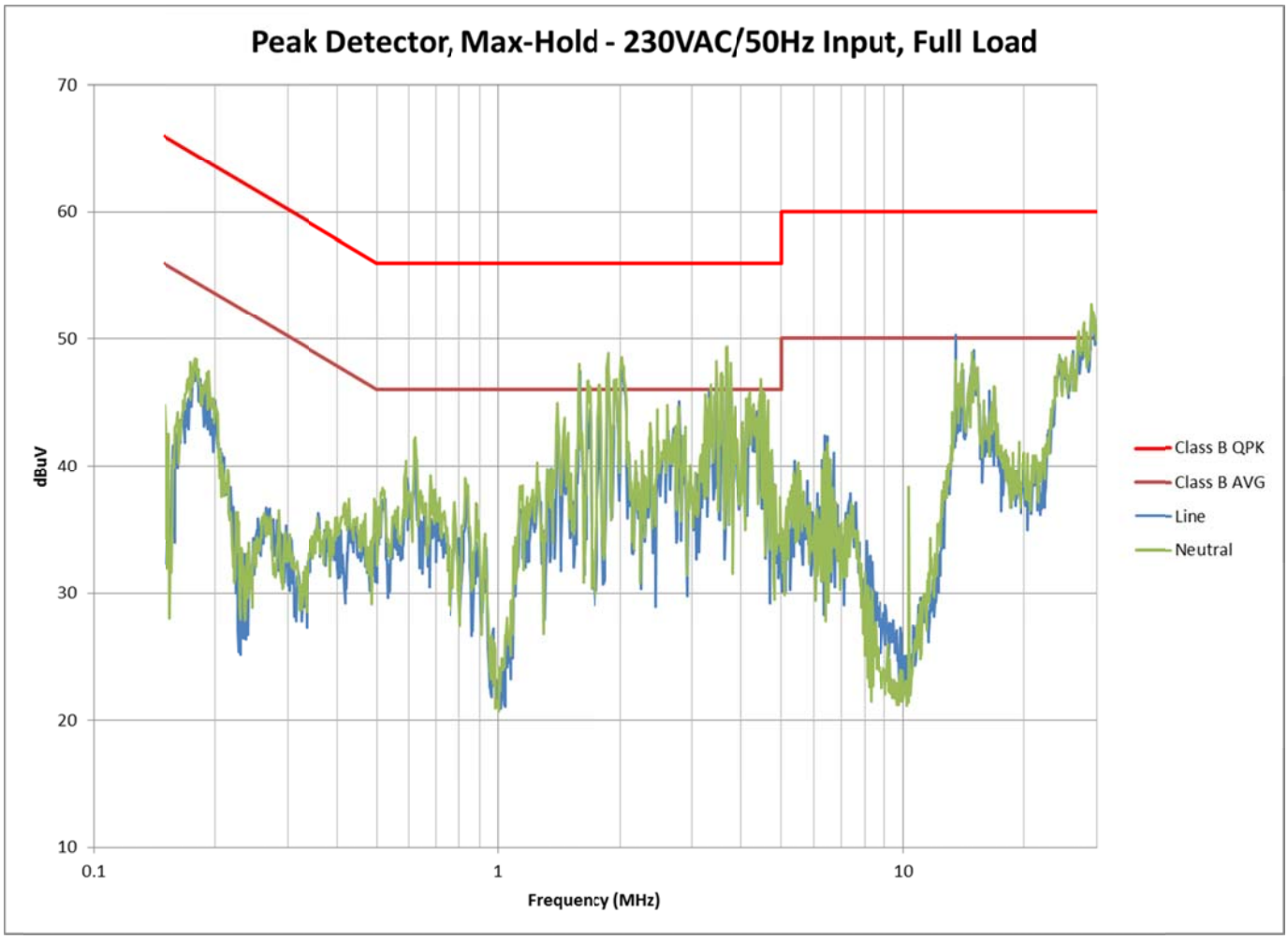


11.2 Anode of Output Diode – D4



12 Conducted Emissions




Peak Detector, Max-Hold - 230VAC/50Hz Input, Full Load
70
60
50
40
30
20
10
dBuV
0.1
1
10
Frequency (MHz)
Class B QPK
Class B AVG
Line
Neutral

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