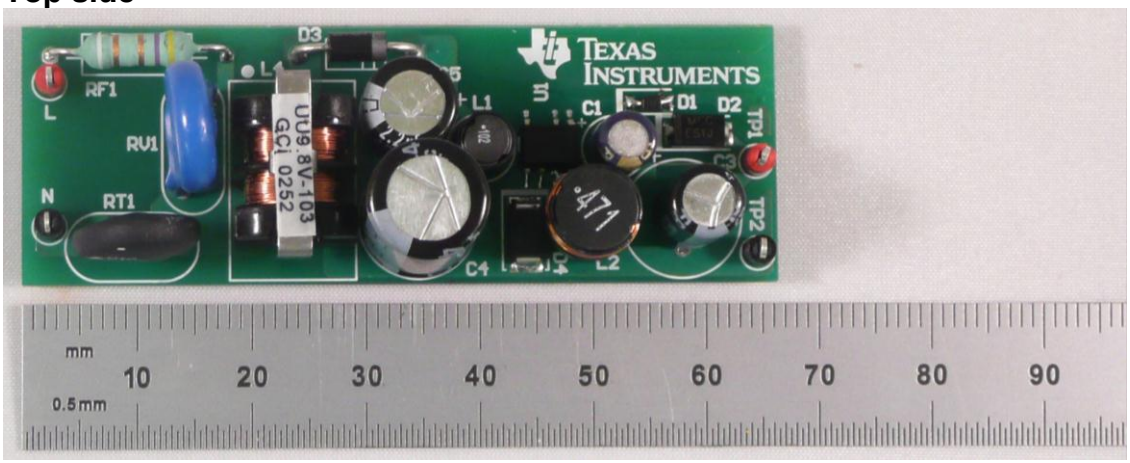
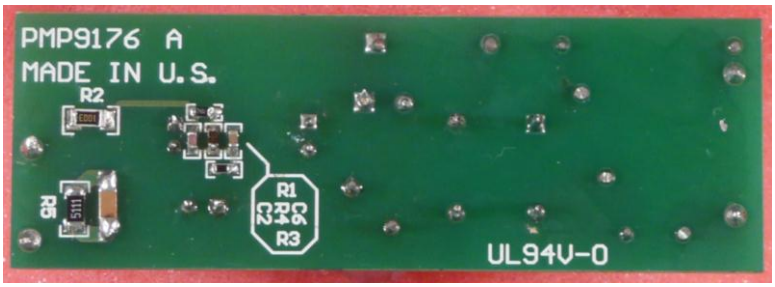
1 Photo

The photographs below show the PMP9176 Rev A assembly. This circuit was built on a PMP9176 Rev A PCB.

Top side

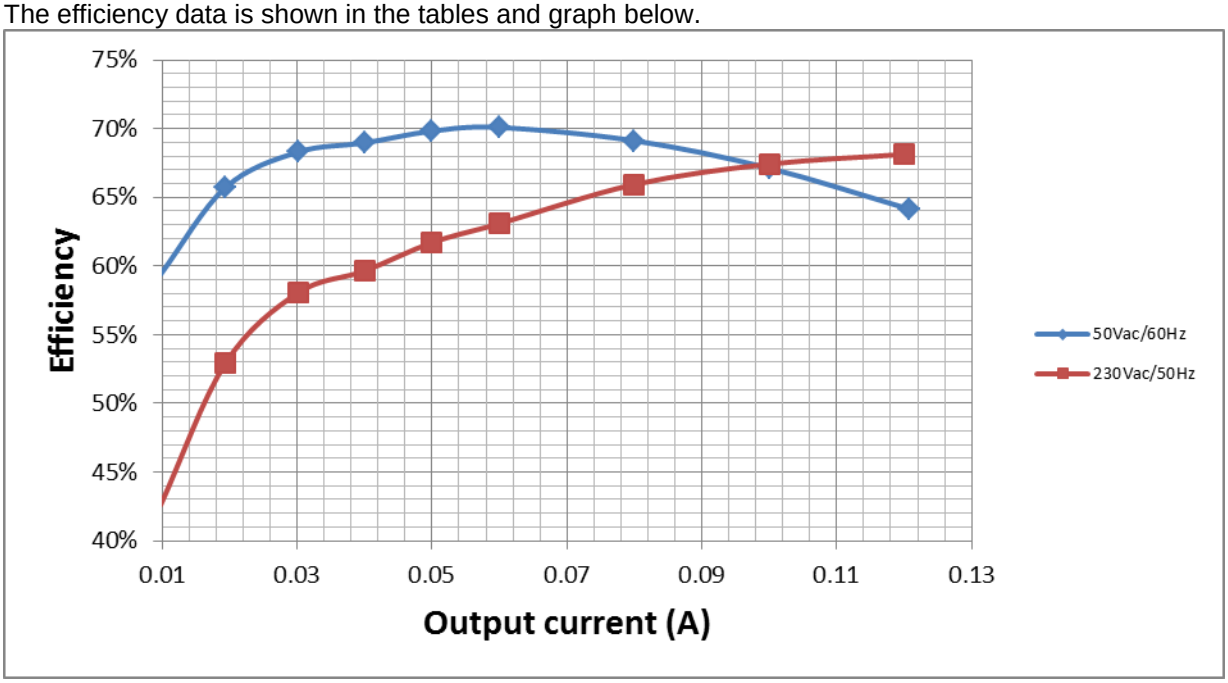


Bottom side



2 Converter Efficiency

The efficiency data is shown in the tables and graph below.



V_{in}=50V_{AC}/60Hz

Vin(V)	Iin(mA)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency (%)
50.04	75.81	1.725	9.16	0.1208	1.106528	0.618472	64.15%
50	59.94	1.363	9.15	0.1	0.915	0.448	67.13%
50.02	47.45	1.06	9.16	0.08	0.7328	0.3272	69.13%
50.04	36.28	0.7841	9.16	0.06	0.5496	0.2345	70.09%
50.07	31.04	0.6566	9.17	0.05	0.4585	0.1981	69.83%
50.06	25.83	0.5318	9.17	0.04	0.3668	0.165	68.97%
50.09	20.4	0.404	9.17	0.03009	0.275925	0.1280747	68.30%
50.12	14.45	0.2706	9.19	0.01935	0.177827	0.0927735	65.72%
50.15	8.732	0.15062	9.21	0.00971	0.089429	0.0611909	59.37%
50.18	1.974	0.02795	9.25	0	0	0.02795	0.00%

V_{in}=230V_{AC}/50Hz

Vin(V)	Iin(mA)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency (%)
230	22.96	1.613	9.16	0.12	1.0992	0.5138	68.15%
230	19.74	1.357	9.15	0.1	0.915	0.442	67.43%
230	16.543	1.11	9.15	0.08	0.732	0.378	65.95%
230	13.306	0.871	9.16	0.06	0.5496	0.3214	63.10%
230	11.51	0.7429	9.17	0.05	0.4585	0.2844	61.72%
230	9.67	0.6156	9.18	0.04	0.3672	0.2484	59.65%
230	7.598	0.4751	9.16	0.03011	0.275808	0.1992924	58.05%
230	5.386	0.3353	9.16	0.01938	0.177521	0.1577792	52.94%
230	3.247	0.2095	9.17	0.00973	0.089224	0.1202759	42.59%
230	0.7799	0.07597	9.25	0	0	0.07597	0.00%

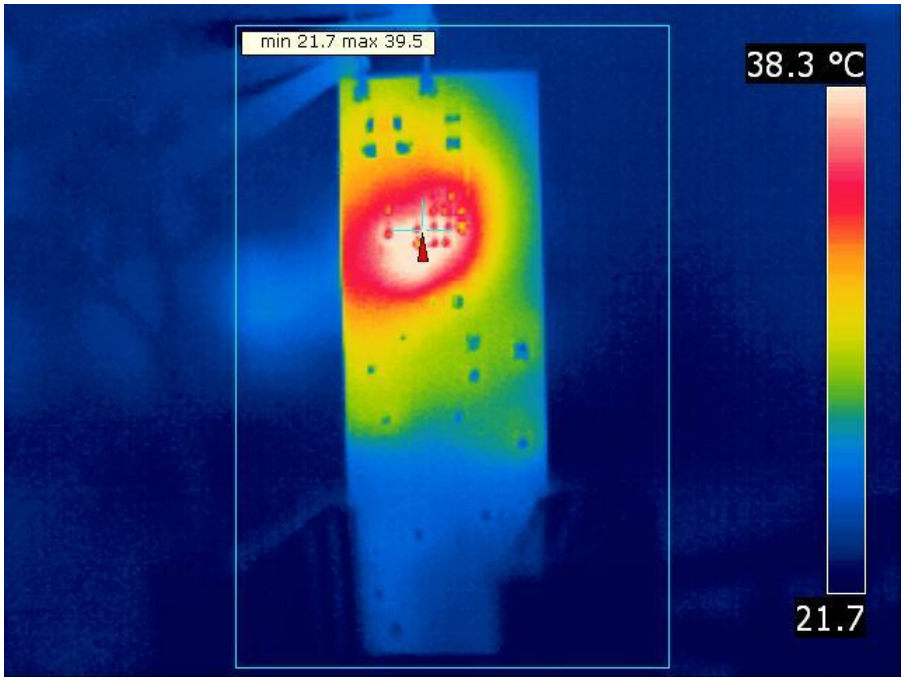
3 Thermal Images

The thermal images below show a top view and bottom view of the board under $50V_{ac}$/60Hz and $230V_{ac}$/50Hz input conditions. The ambient temperature was 20ºC with no forced air flow. The output was at full load: 9V/0.12A.

V_{in}=50V_{AC}/60Hz

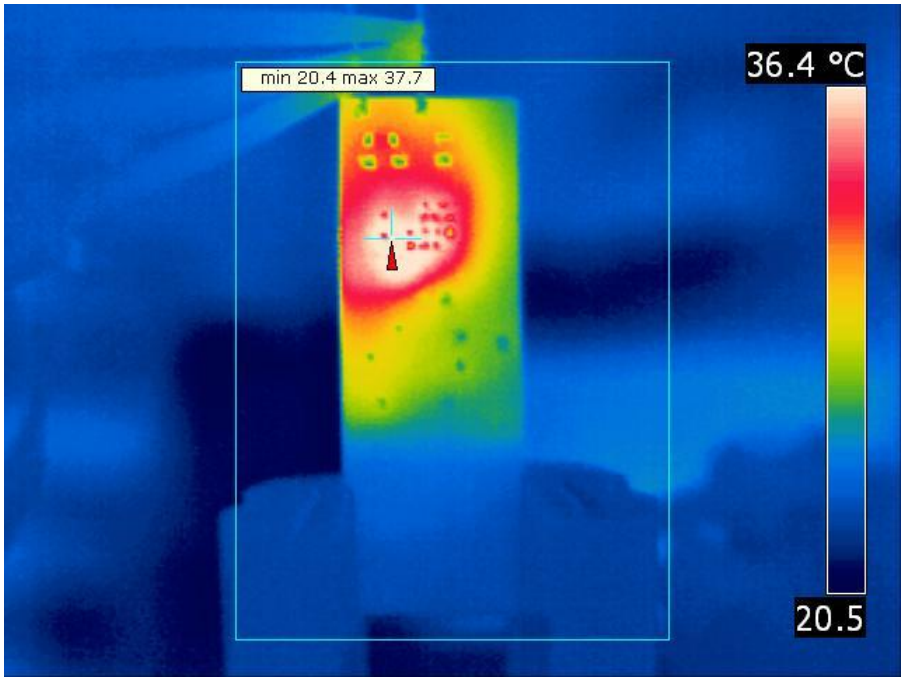
Top Side

Bottom Side



V_{in}=230V_{AC}/50Hz
Top Side

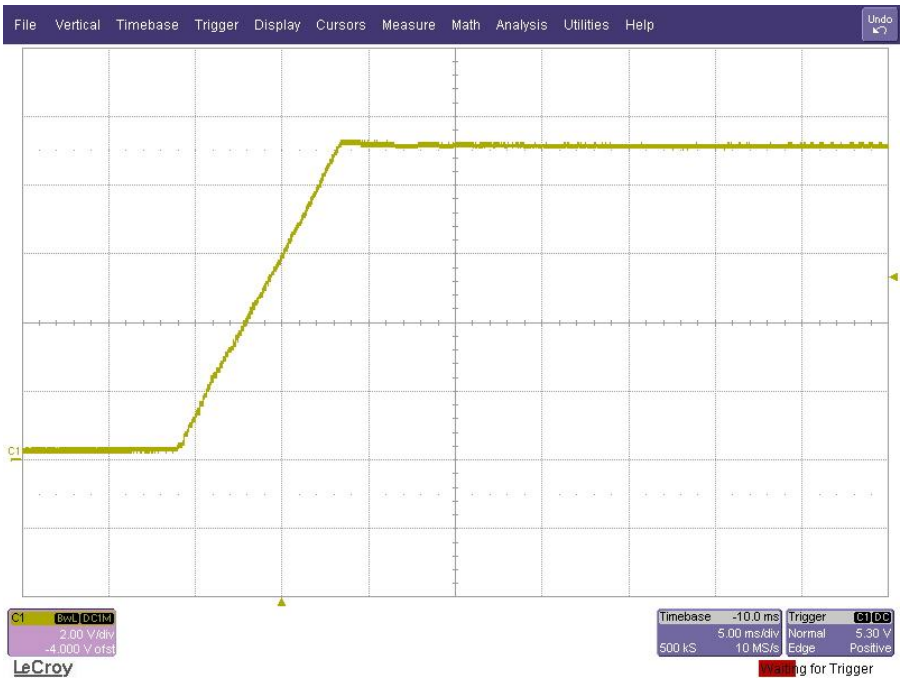
Bottom Side



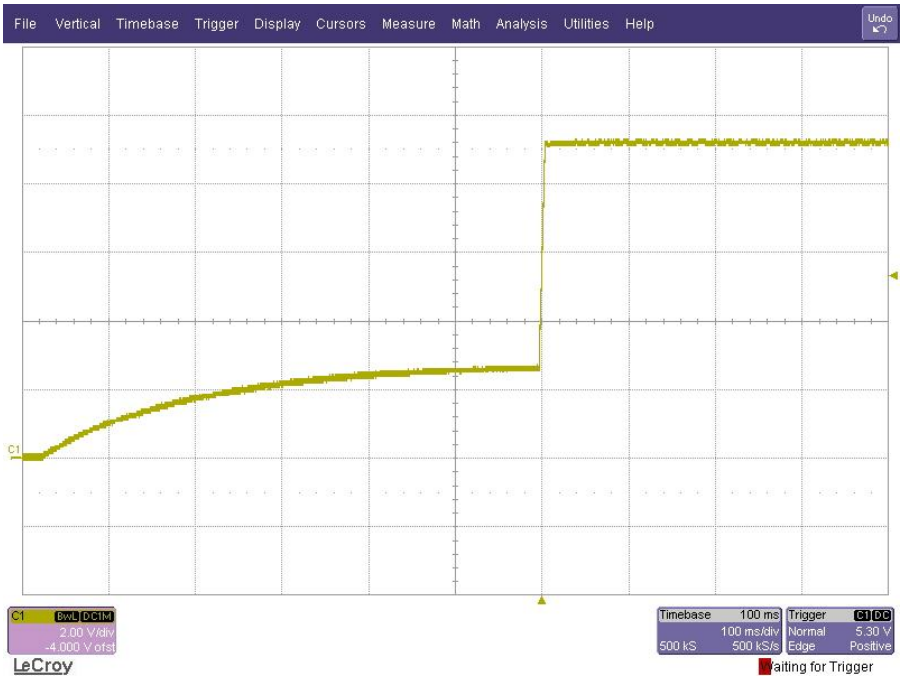
4 Startup Waveforms

The output voltages at startup with constant current load are shown in the images below.

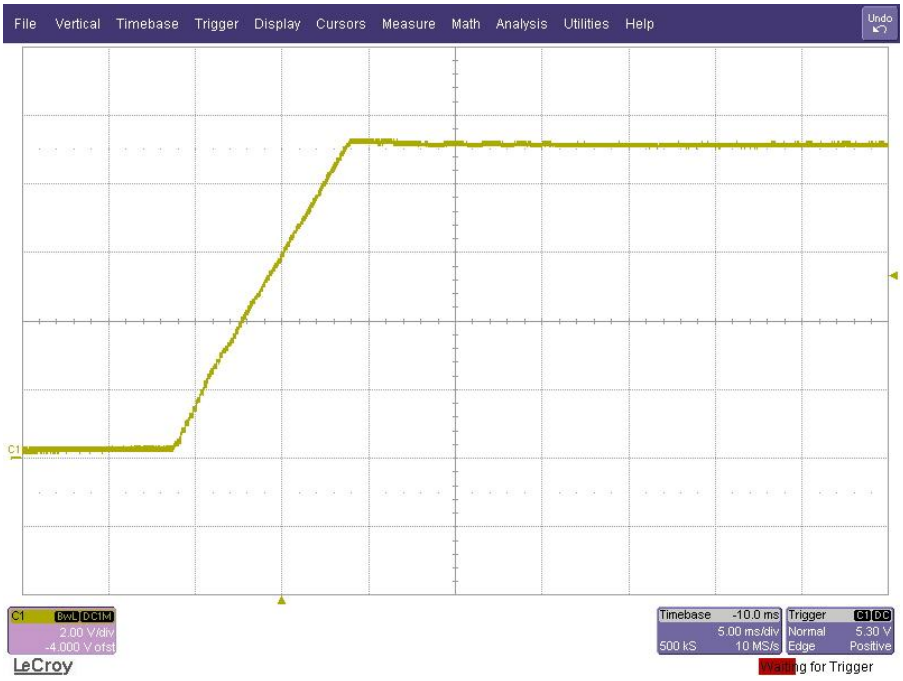
4.1 Start Up @ 50V_{ac}: 9V/0.12A.



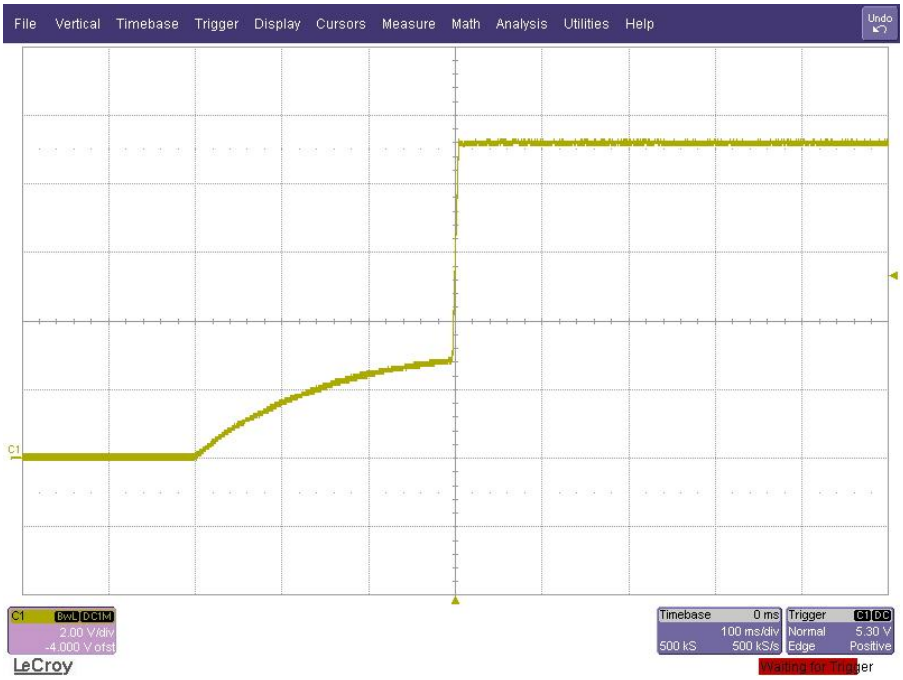
4.2 Start Up @ 50V_{ac}: no load.



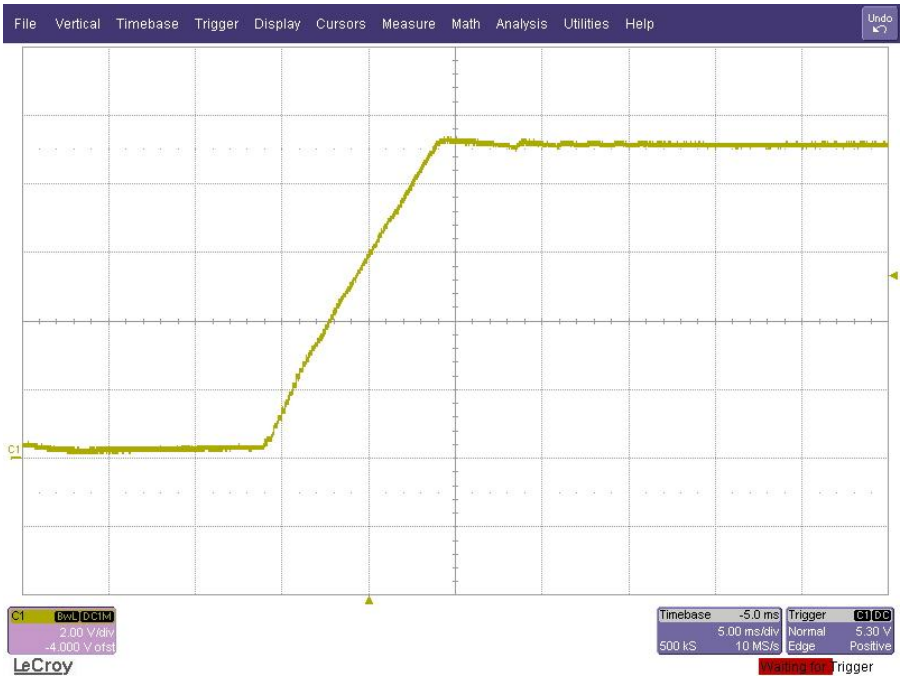
4.3 Start Up @ 120V_{ac}: 9V/0.12A.



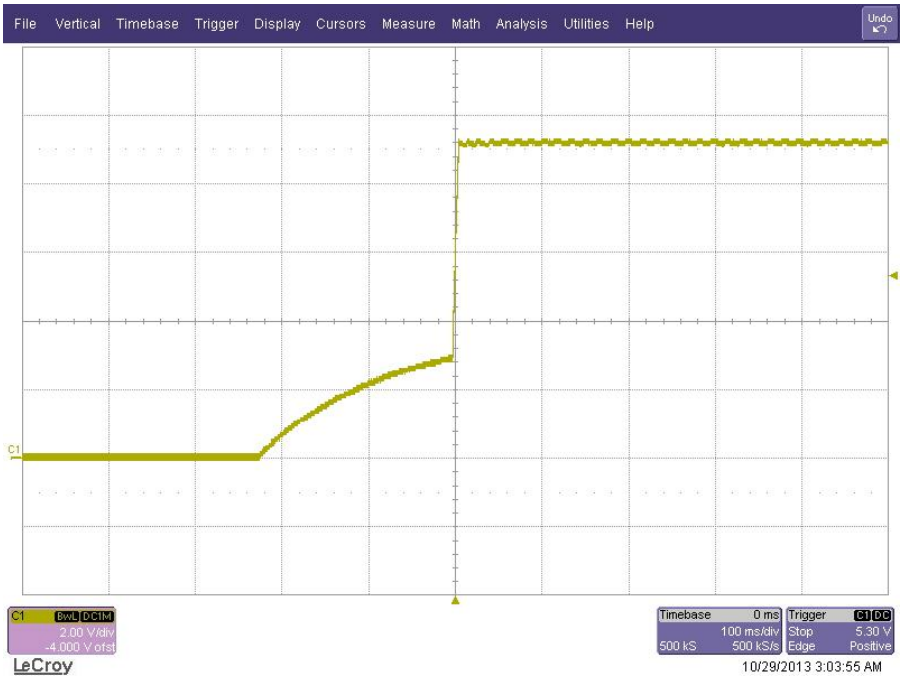
4.4 Start Up @ 120V_{ac}: no load.



4.5 Start Up @ 230V_{ac}: 9V/0.12A.

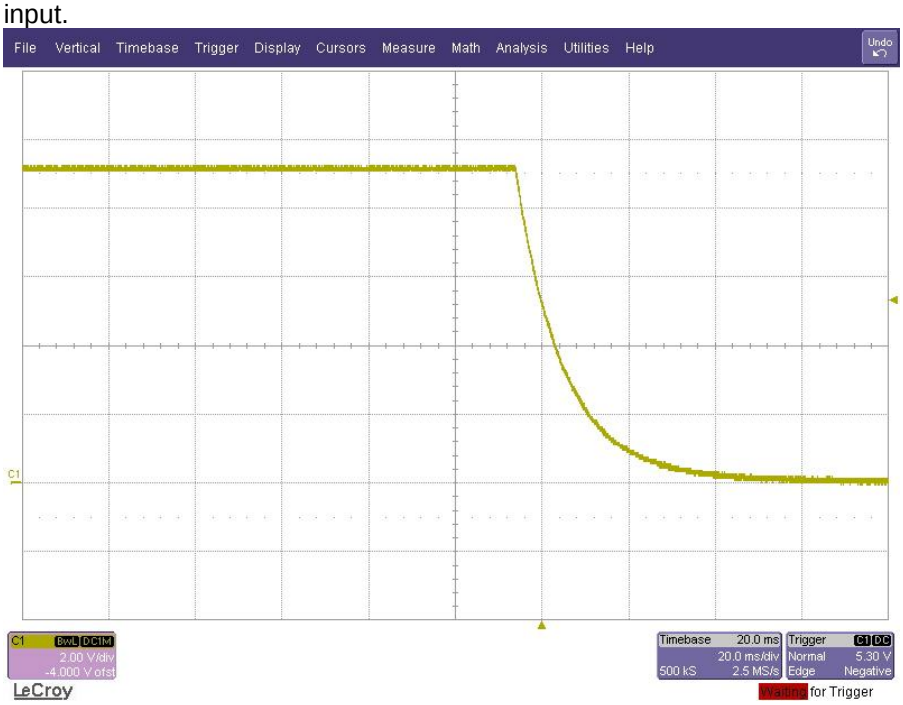


4.6 Start Up @ 230V_{ac}: no load.



5 Turn off

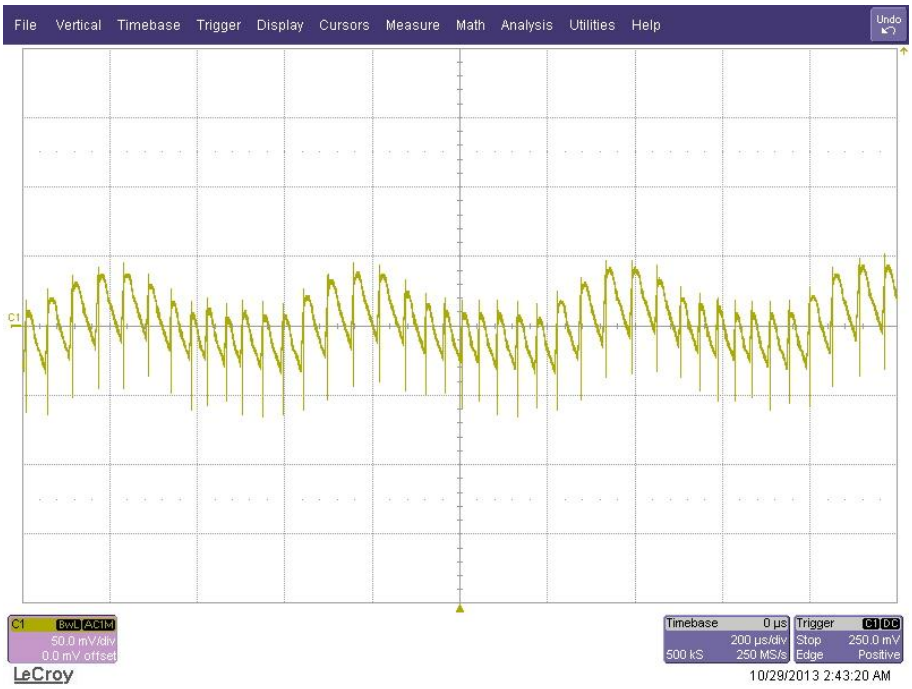
The output voltage at turn off transient is shown in the image below at full load (9V/0.12A) and 120V_{ac}/60Hz input.



6 Output Ripple Voltages

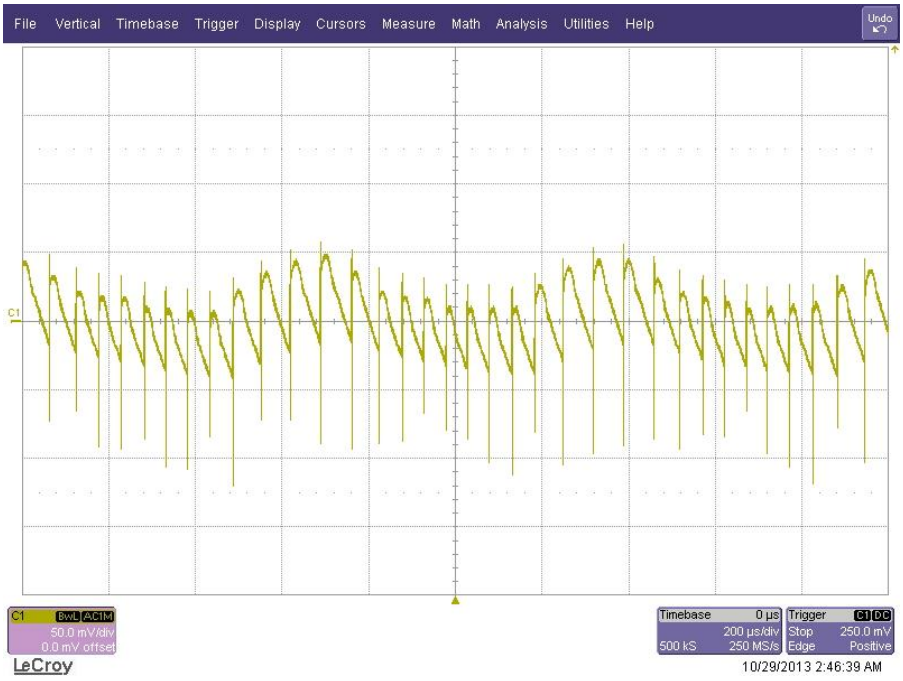
The output ripple voltages are shown in the plots below.

6.1 50V_{ac}: 9V/0.12A.



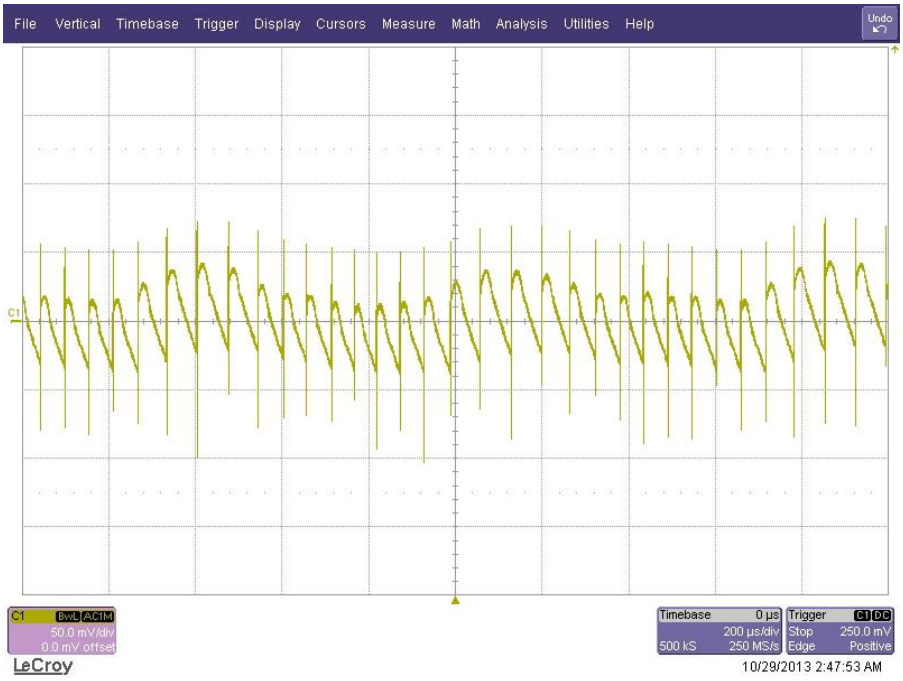
6.2 50V_{ac}: No load.

6.3 120V_{ac}: 9V/0.12A.

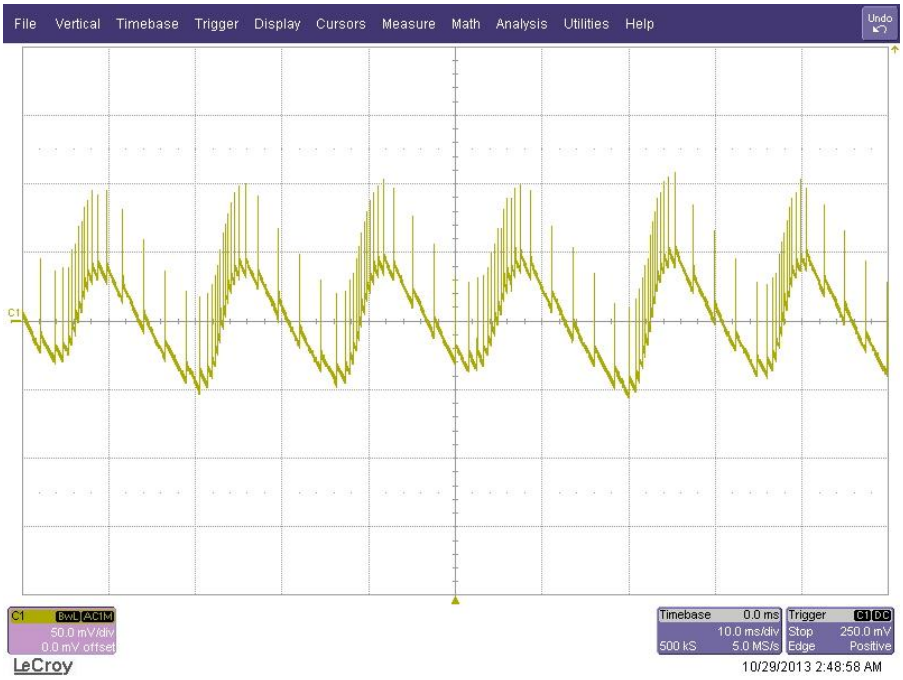


6.4 120V_{ac}: No load.

6.5 230V_{ac}: 9V/0.12A.

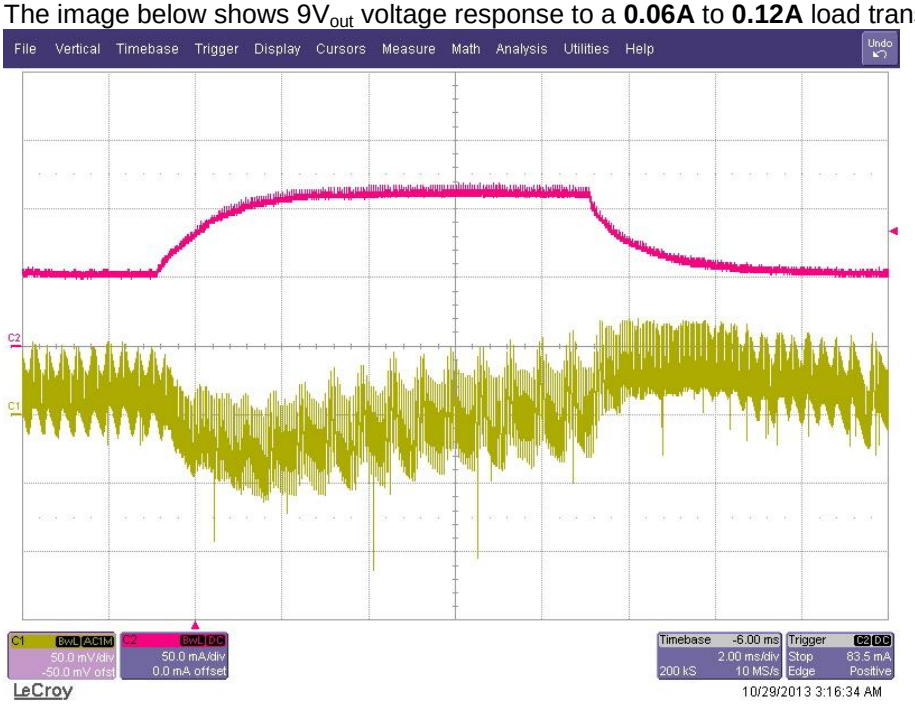


6.6 230V_{ac}: No load.



7 Load Transient

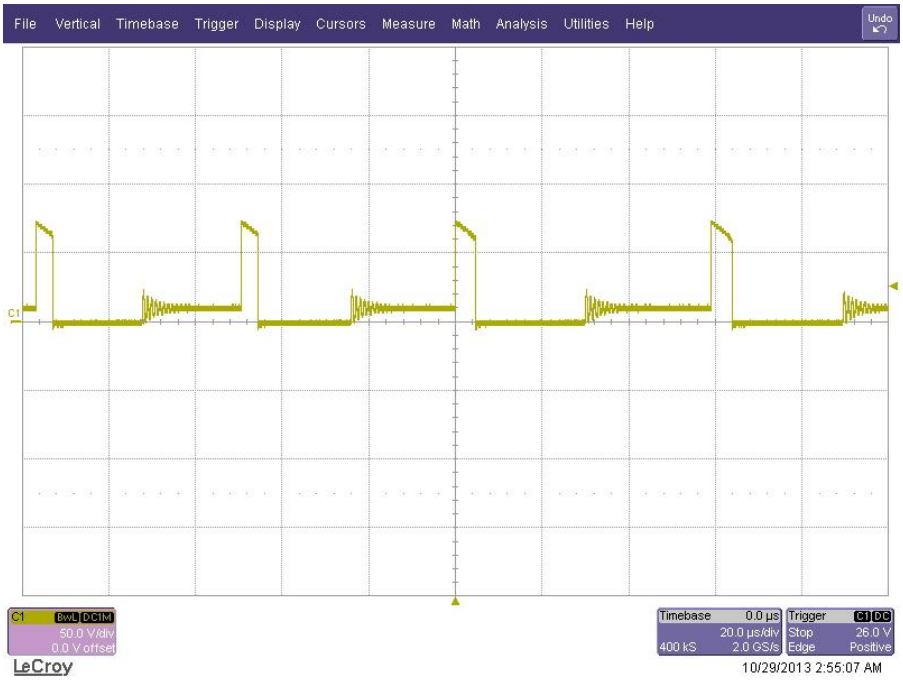
The image below shows $9V_{out}$ voltage response to a **0.06A** to **0.12A** load transient @ $120V_{ac}$/60Hz.



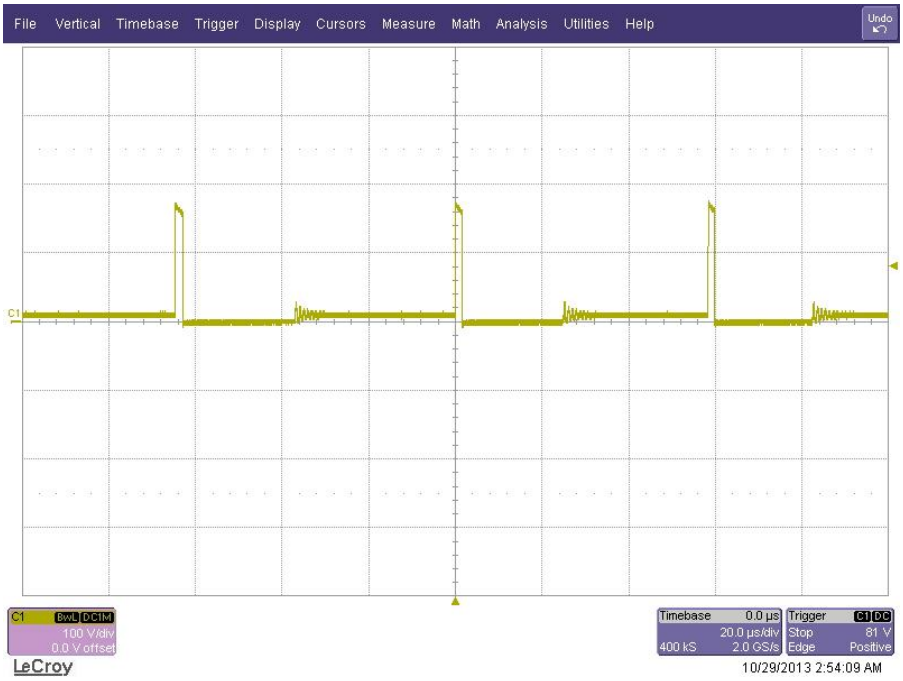
8 Switching Waveforms

The images below show key switching waveforms of PMP9176RevA. The waveforms are measured with 0.12A full load.

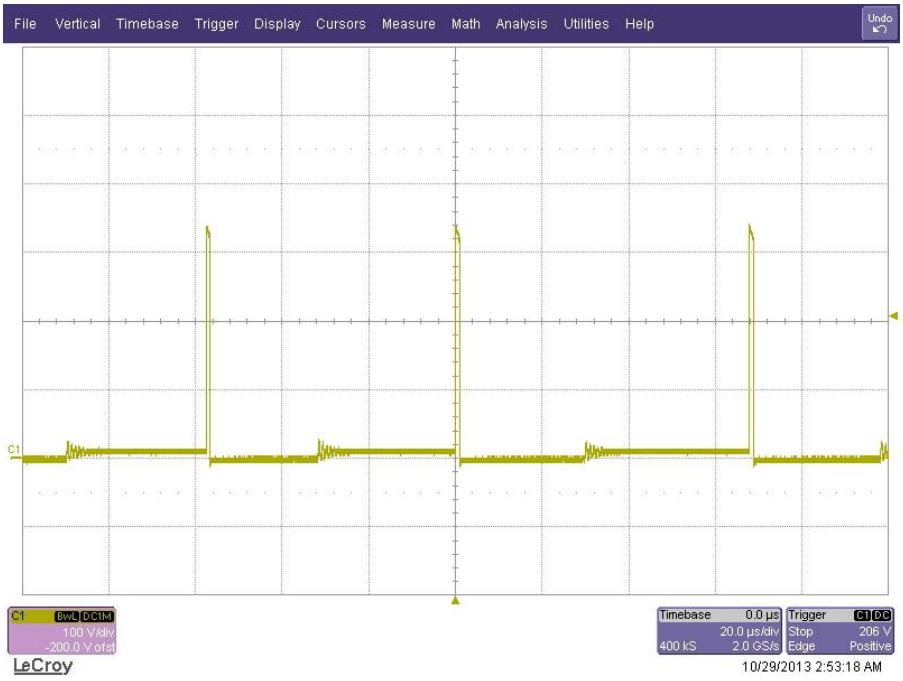
8.1 Diode D4 @ 50V_{ac}/60Hz



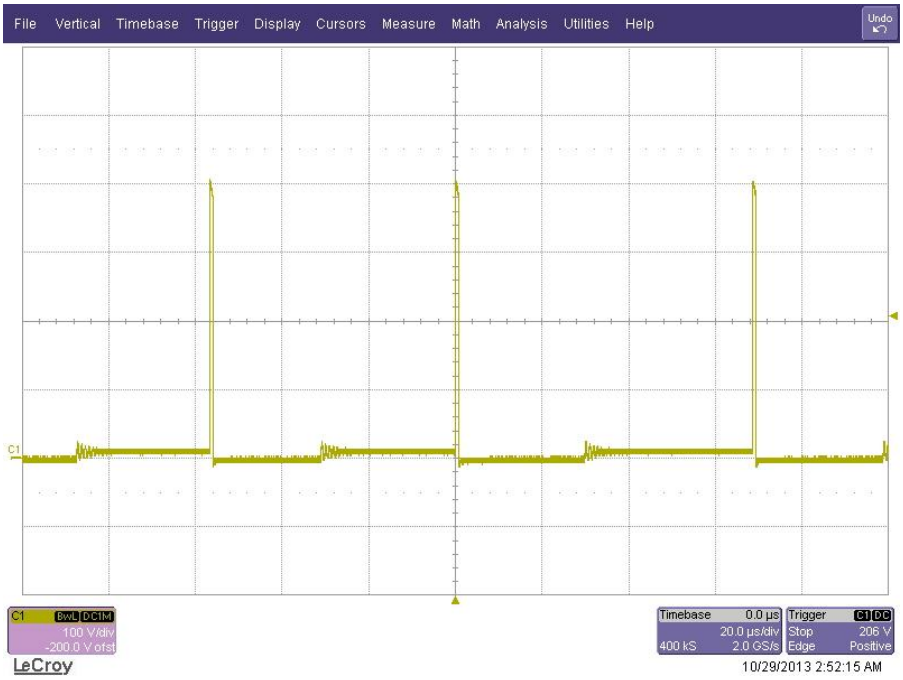
8.2 Diode D4 @ 120V_{ac}/60Hz



8.3 Diode D4 @ 230V_{ac}/60Hz



8.4 Diode D4 @ 275V_{ac}/60Hz



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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265