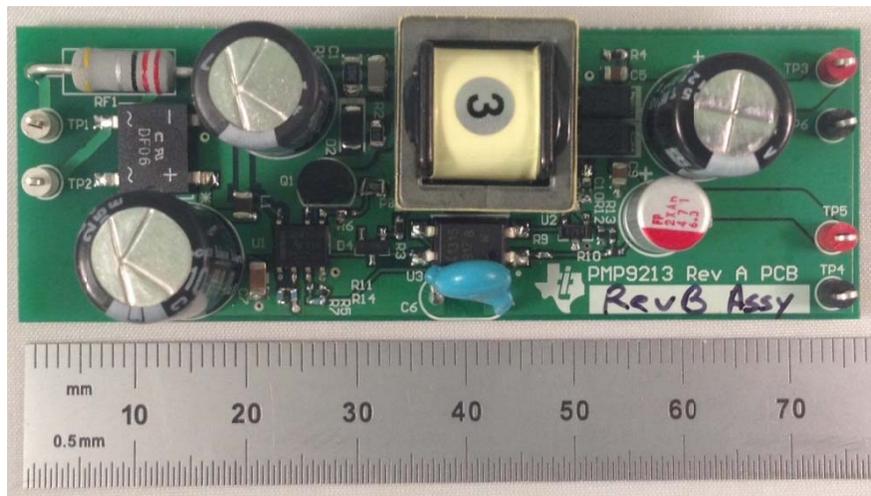
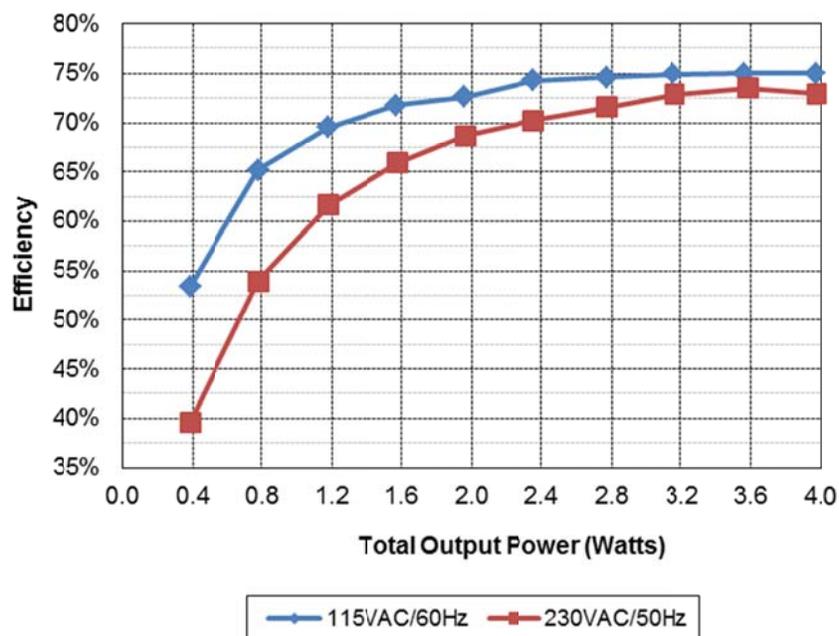


1 Photos

The photograph below shows the PMP9213 Rev B prototype assembly. This circuit was built on a PMP9213 Rev A PCB.



2 Efficiency



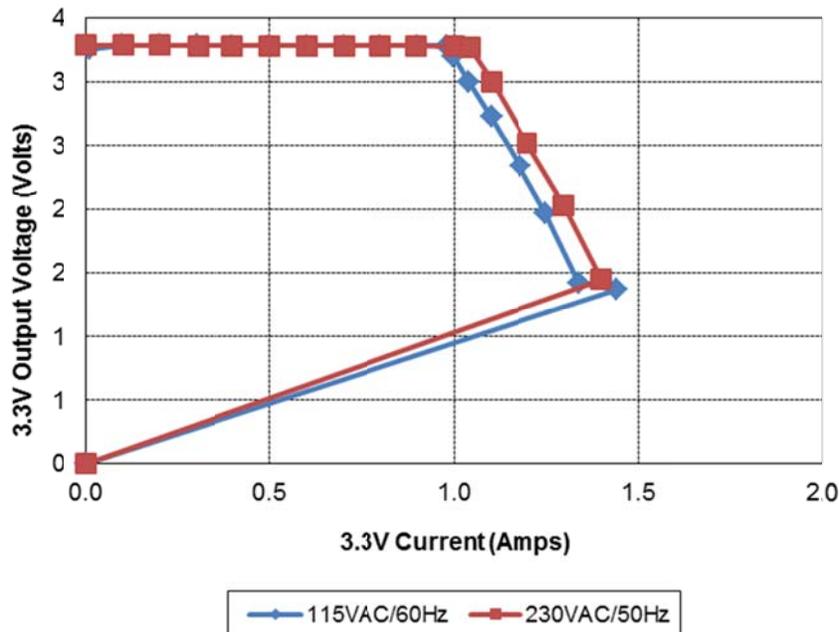
115VAC/60Hz										
3.3V Output		12V Output								
I _{out}	V _{out}	I _{out}	V _{out}	V _{in}	I _{in}	P _{in}	PF	P _{out}	Losses	Efficiency
0.003	3.287	0.000	12.17	115.0	0.0067	0.264		0.01	0.25	3.7%
0.025	3.287	0.025	12.24	115.0	0.015	0.73	0.41	0.39	0.34	53.4%
0.050	3.287	0.050	12.30	115.0	0.023	1.20	0.45	0.78	0.42	65.2%
0.075	3.287	0.075	12.38	115.0	0.031	1.69	0.47	1.18	0.51	69.5%
0.100	3.287	0.100	12.43	115.0	0.039	2.19	0.49	1.57	0.62	71.8%
0.127	3.287	0.123	12.49	115.0	0.046	2.69	0.51	1.95	0.74	72.6%
0.149	3.287	0.149	12.52	115.0	0.053	3.17	0.52	2.36	0.81	74.3%
0.175	3.287	0.175	12.57	115.0	0.060	3.72	0.54	2.77	0.95	74.6%
0.195	3.287	0.200	12.57	115.0	0.067	4.21	0.55	3.15	1.06	74.9%
0.220	3.287	0.226	12.57	115.0	0.074	4.75	0.56	3.56	1.19	75.0%
0.253	3.287	0.249	12.60	115.0	0.081	5.29	0.57	3.97	1.32	75.0%

230VAC/50Hz										
3.3V Output		12V Output								
I _{out}	V _{out}	I _{out}	V _{out}	V _{in}	I _{in}	P _{in}	PF	P _{out}	Losses	Efficiency
0.003	3.287	0.000	12.15	230.0	0.0038	0.271		0.01	0.26	3.6%
0.025	3.287	0.025	12.26	230.0	0.012	0.98	0.34	0.39	0.59	39.5%
0.050	3.287	0.050	12.36	230.0	0.017	1.45	0.37	0.78	0.67	54.0%
0.075	3.287	0.075	12.42	230.0	0.021	1.91	0.39	1.18	0.73	61.7%
0.100	3.287	0.100	12.46	230.0	0.026	2.39	0.40	1.57	0.82	65.9%
0.123	3.287	0.125	12.48	230.0	0.030	2.86	0.41	1.96	0.90	68.7%
0.150	3.287	0.149	12.53	230.0	0.035	3.36	0.42	2.36	1.00	70.2%
0.175	3.287	0.175	12.58	230.0	0.039	3.88	0.43	2.78	1.10	71.6%
0.195	3.287	0.200	12.58	230.0	0.043	4.33	0.44	3.16	1.17	72.9%
0.220	3.287	0.227	12.59	230.0	0.047	4.87	0.45	3.58	1.29	73.5%
0.254	3.286	0.249	12.62	230.0	0.052	5.45	0.46	3.98	1.47	73.0%

3 Current Limit

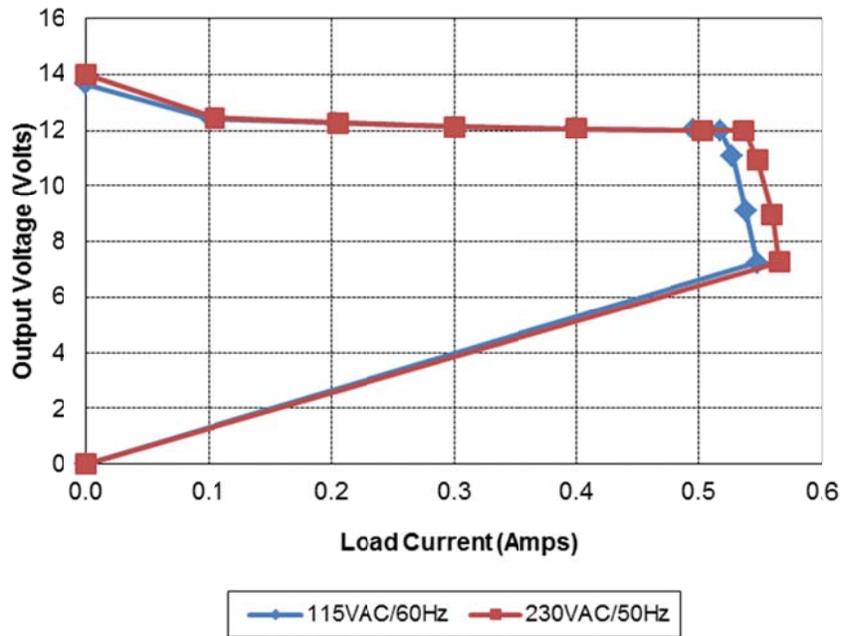
3.1 3.3V Output Current Limit

A plot of the 3.3V output voltage versus load current is shown below. A 50Ω load was present on the 12V output.

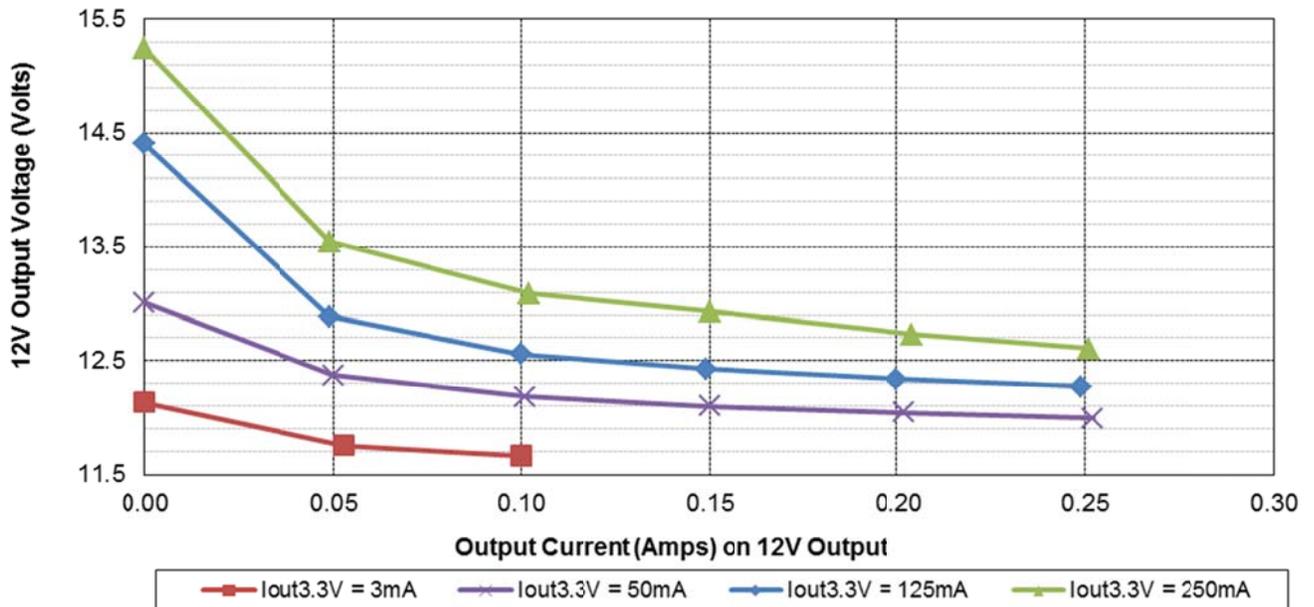


3.2 12V Output Current Limit

A plot of the 12 V output voltage versus load current is shown below. A 33Ω load was present on the 3.3V output.



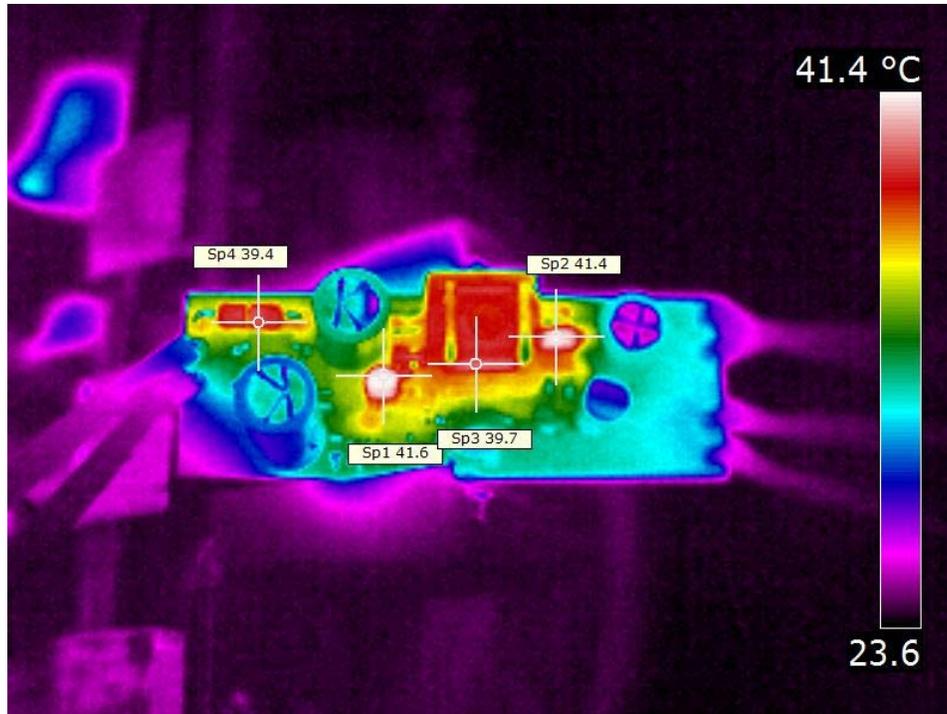
4 12V Regulation



5 Thermal Images

The ambient temperature was 25°C. The 12V output was loaded with 60Ω. The 3.3V output was load with 19Ω.

5.1 115VAC/60Hz Input



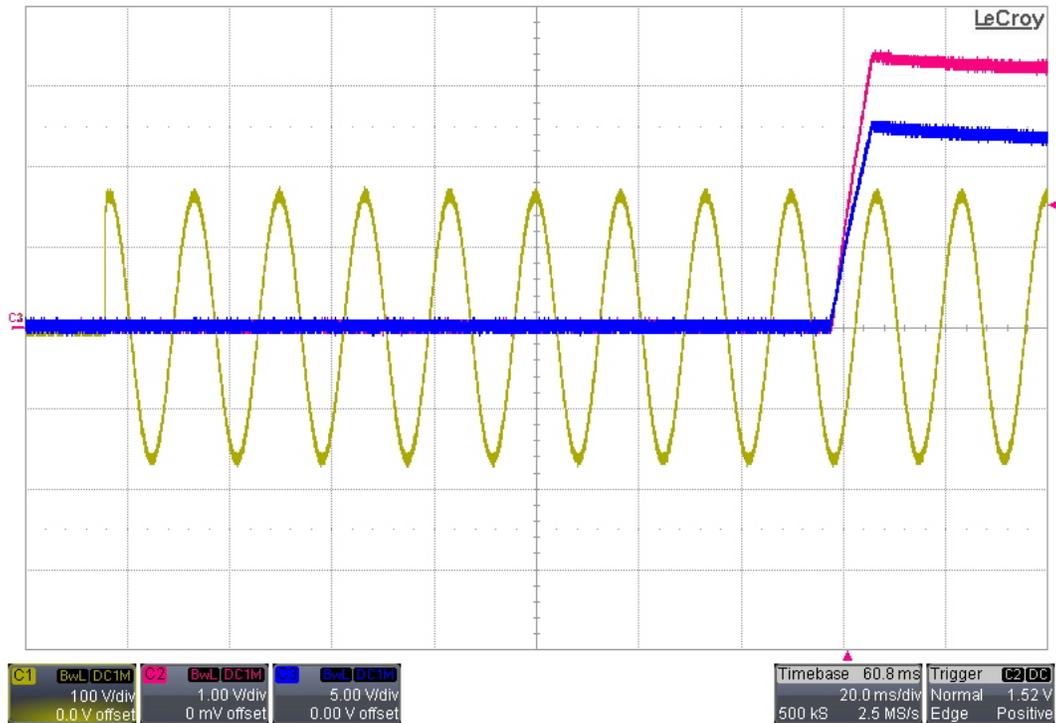
5.2 230VAC/50Hz Input



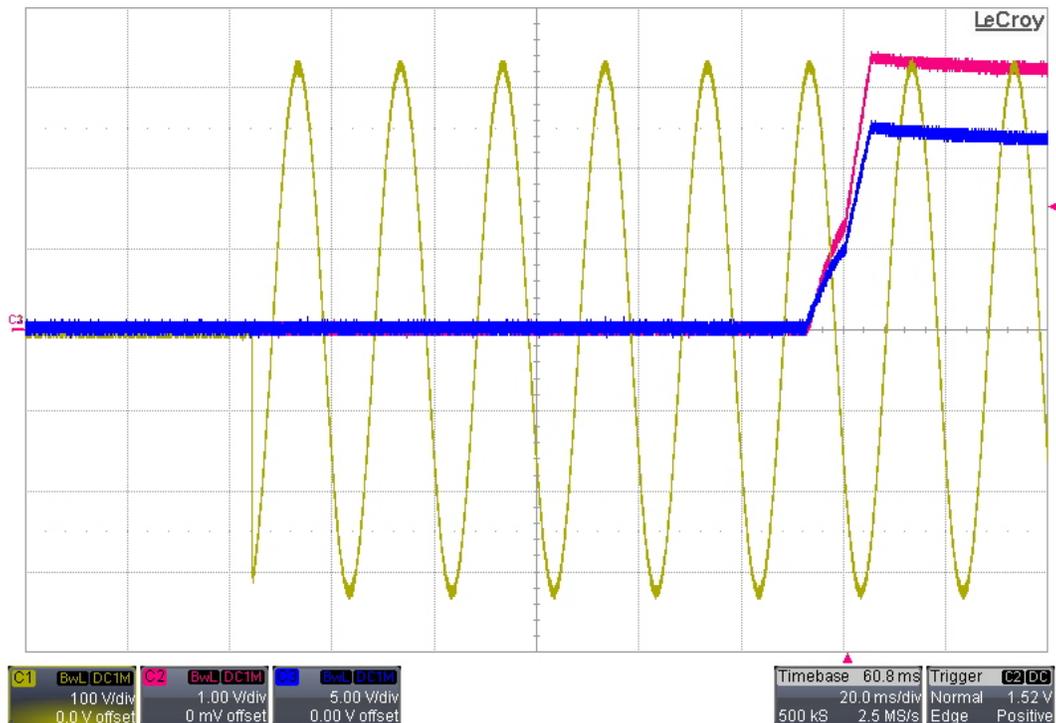
6 Startup

Channel 1 shows the AC input voltage. Channel 1 shows the 3.3V output voltage. Channel 2 shows the 12V output voltage.

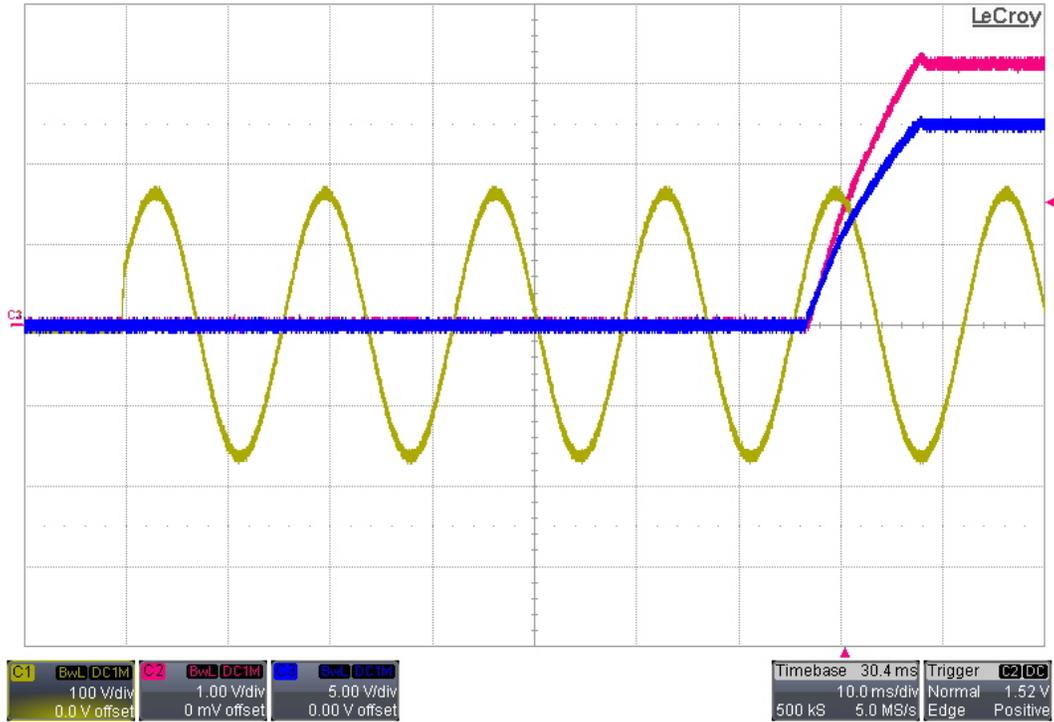
6.1 115VAC/60Hz Startup – No Load



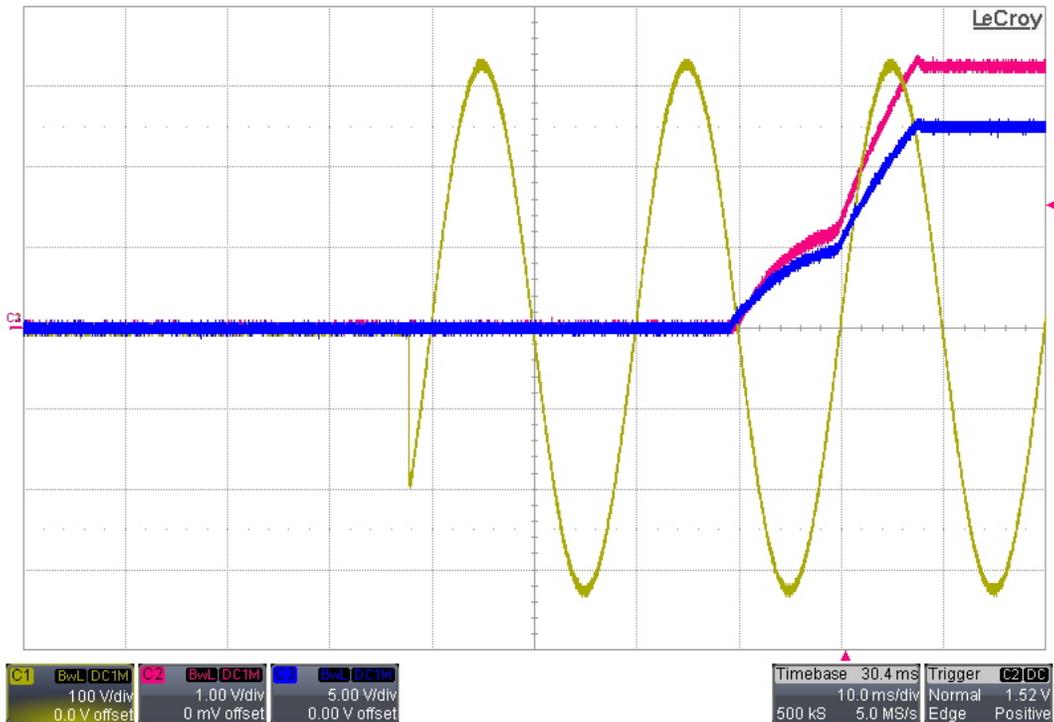
6.2 230VAC/50Hz Startup – No Load



6.3 115VAC/60Hz Startup – 3.3V/19Ω & 12V/60Ω



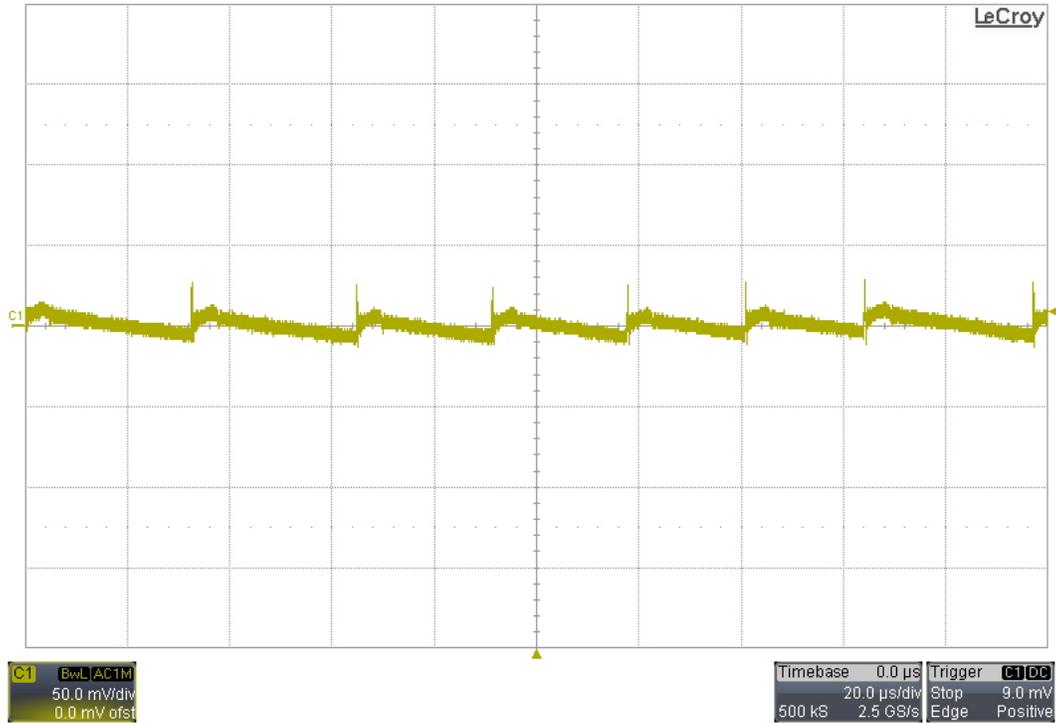
6.4 230VAC/50Hz Startup – 3.3V/19Ω & 12V/60Ω



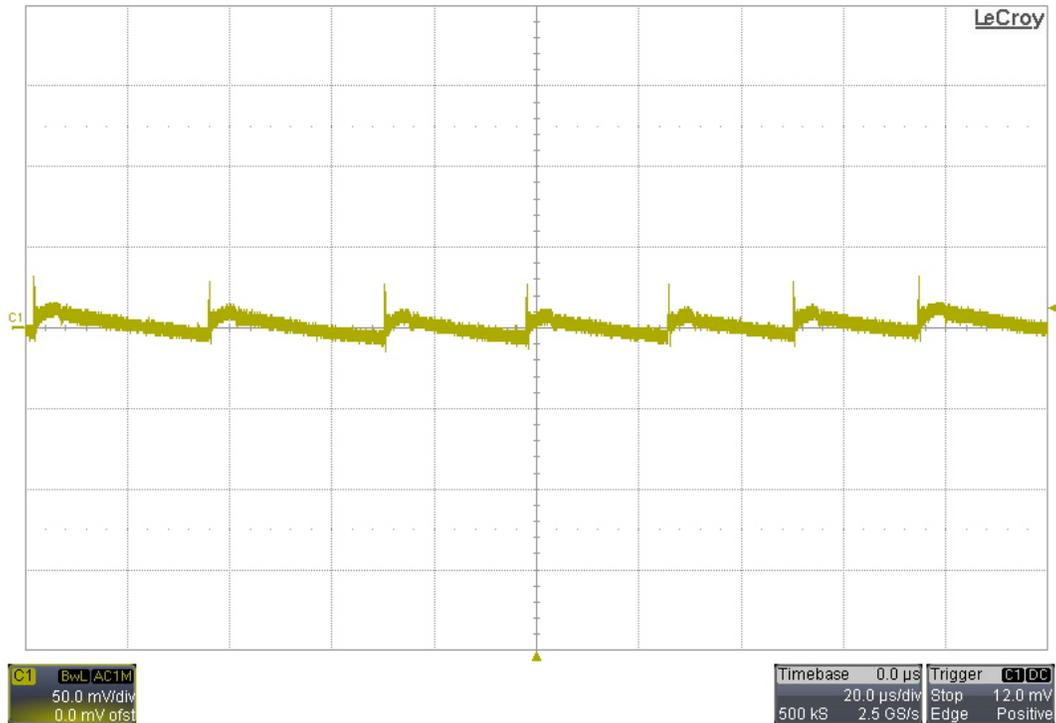
7 Output Ripple Voltage

The 3.3V output was loaded with 19Ω and the 12V output was loaded with 60Ω.

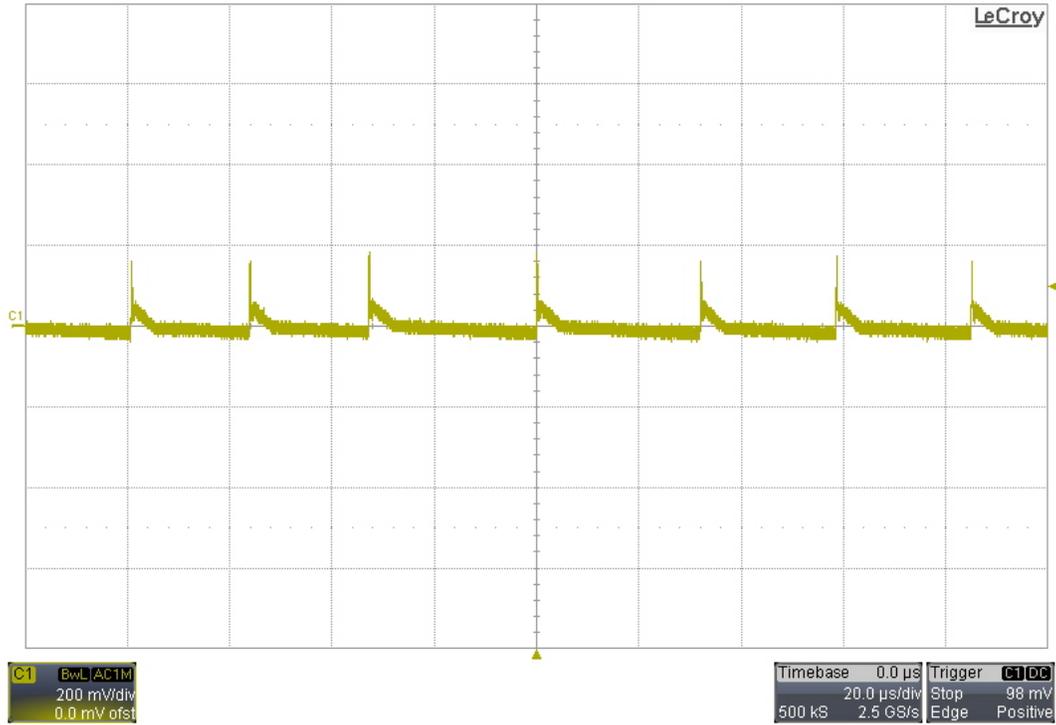
7.1 115VAC/60Hz 3.3V Output Ripple Voltage



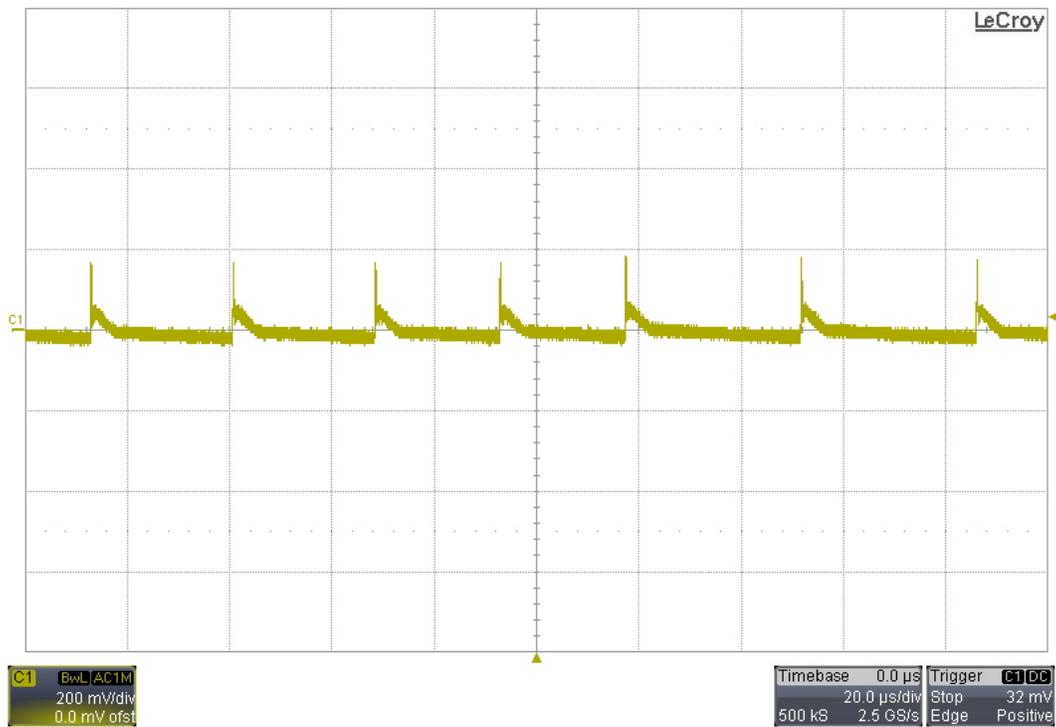
7.2 230VAC/50Hz 3.3V Output Ripple Voltage



7.3 115VAC/60Hz 12V Output Ripple Voltage

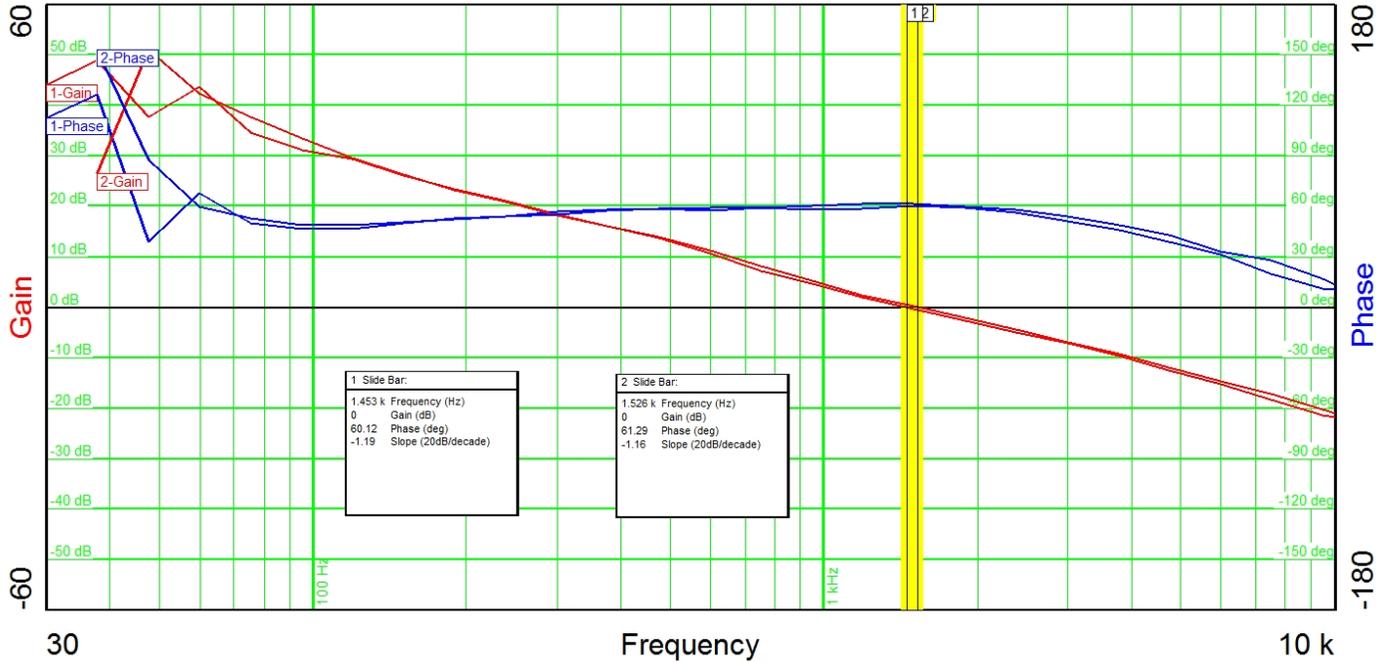


7.4 230VAC/50Hz 12 V Output Ripple Voltage



8 Frequency Response

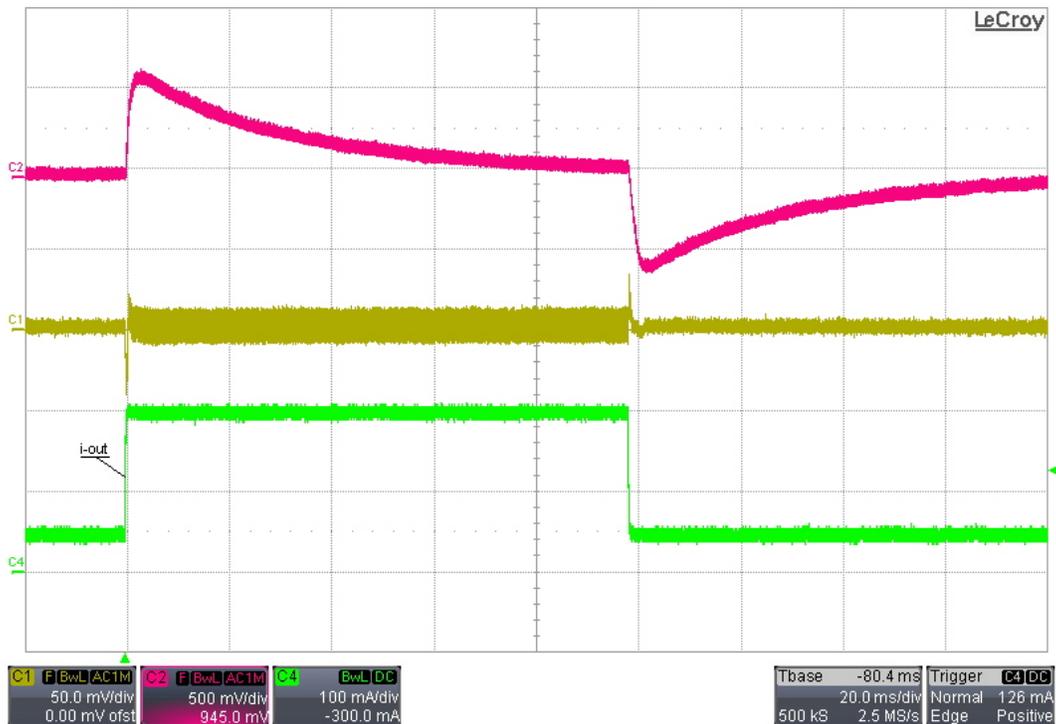
The frequency response of the feedback loop measured at R10 is shown below. For the gain/phase plot #1, the input was set to 115VAC/60Hz. For the gain/phase plot #2, the input was set to 230VAC/50Hz. The 3.3V output was loaded with 200mA, and the 12V output was loaded with 200mA.

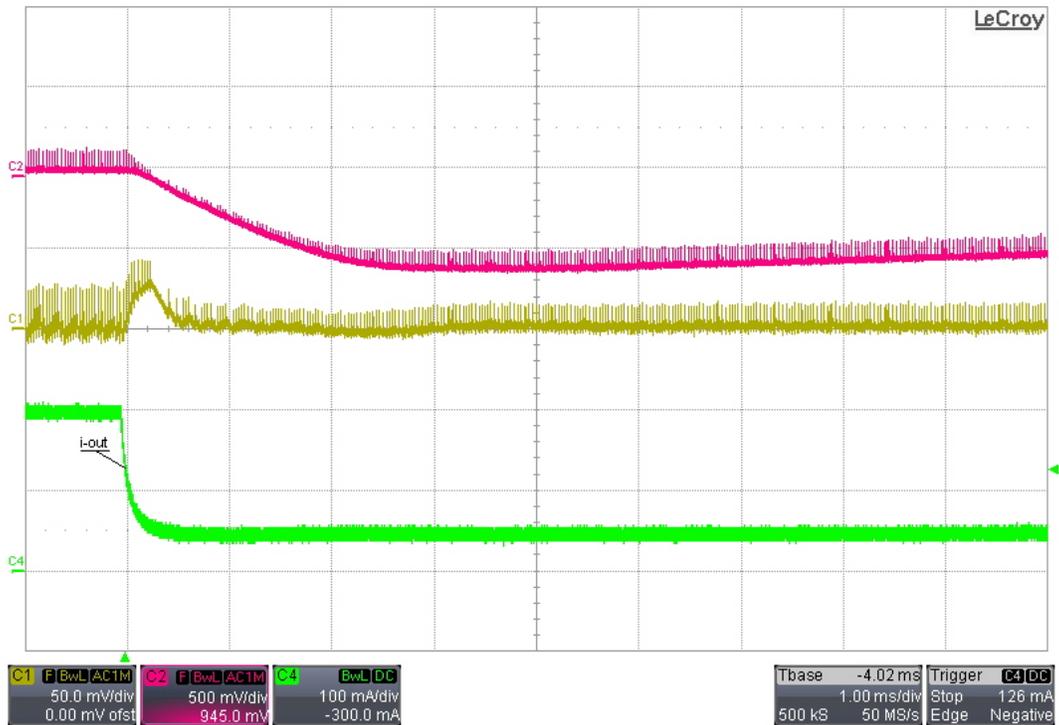
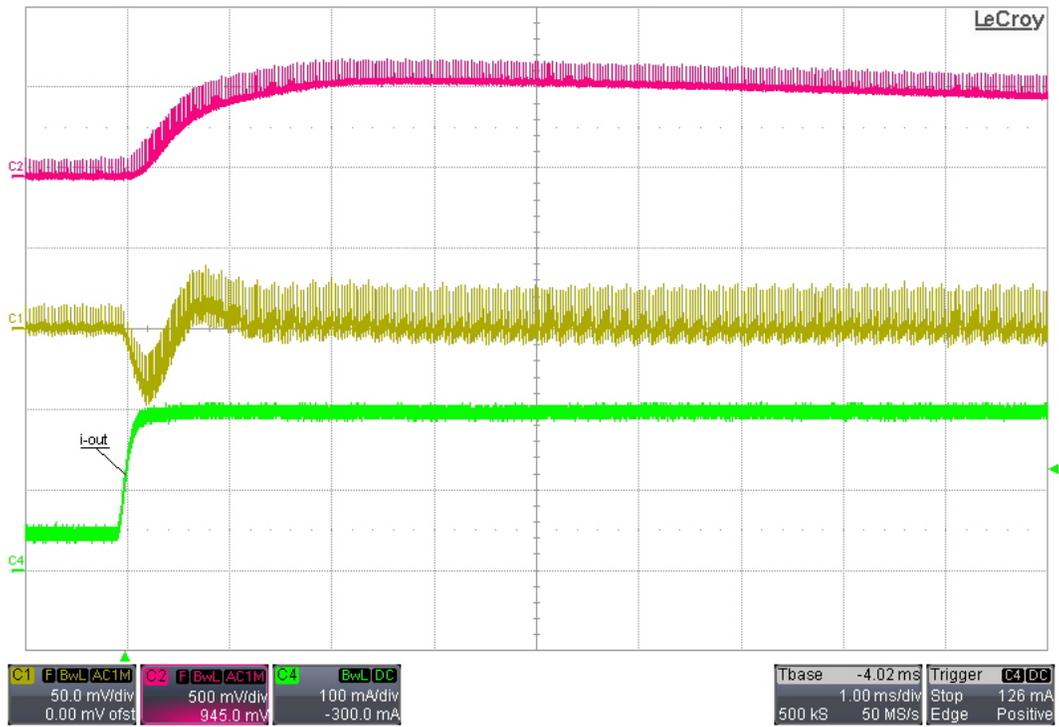


9 3.3V Load Transients

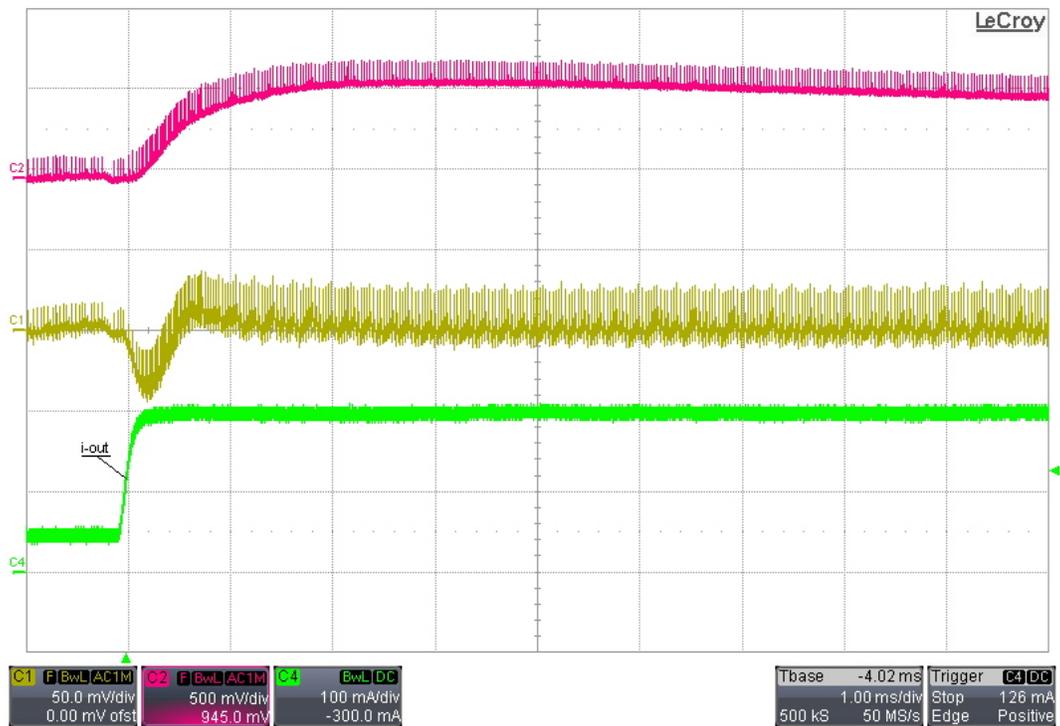
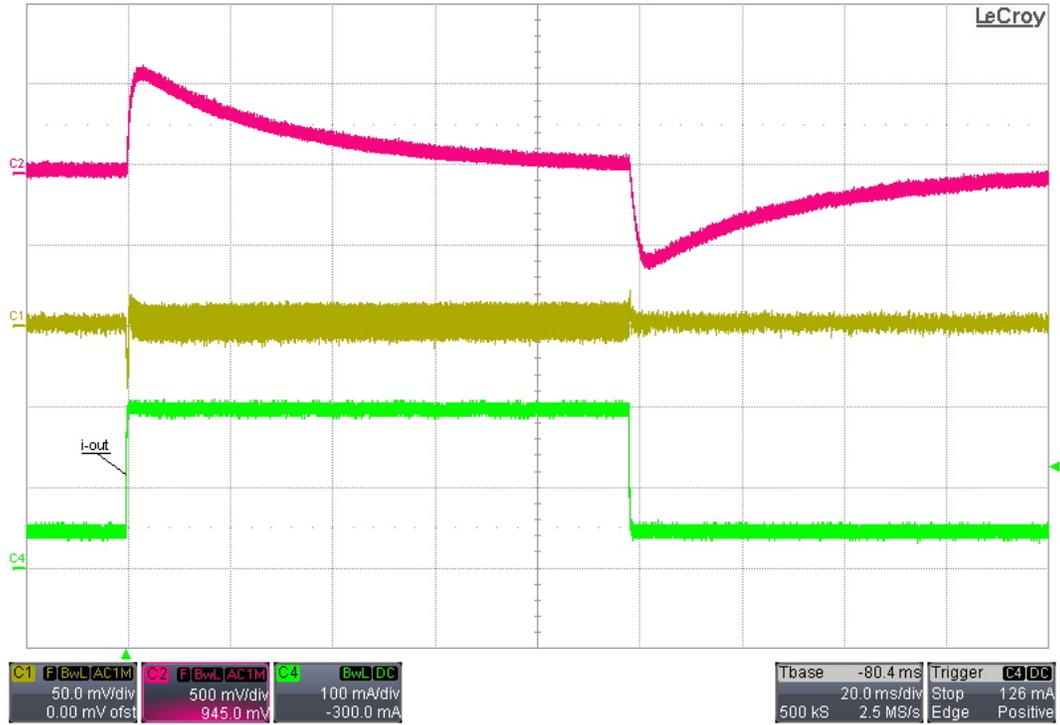
The 12V output was loaded with 100Ω. Channel 1 shows the 3.3V output voltage (ac coupled). Channel 2 shows the 12V output voltage (ac coupled). Channel 4 shows the 3.3V load current.

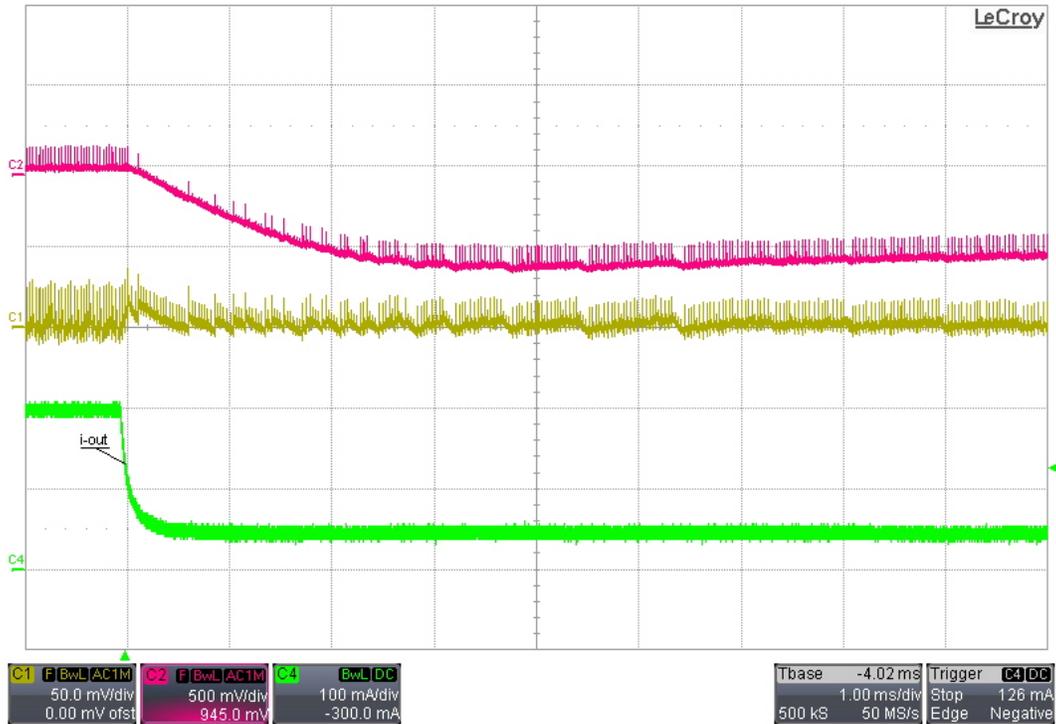
9.1 3.3V, 50mA to 200mA Transient – 115VAC/60Hz Input





9.2 3.3V, 50mA to 200mA Transient – 230VAC/50Hz Input

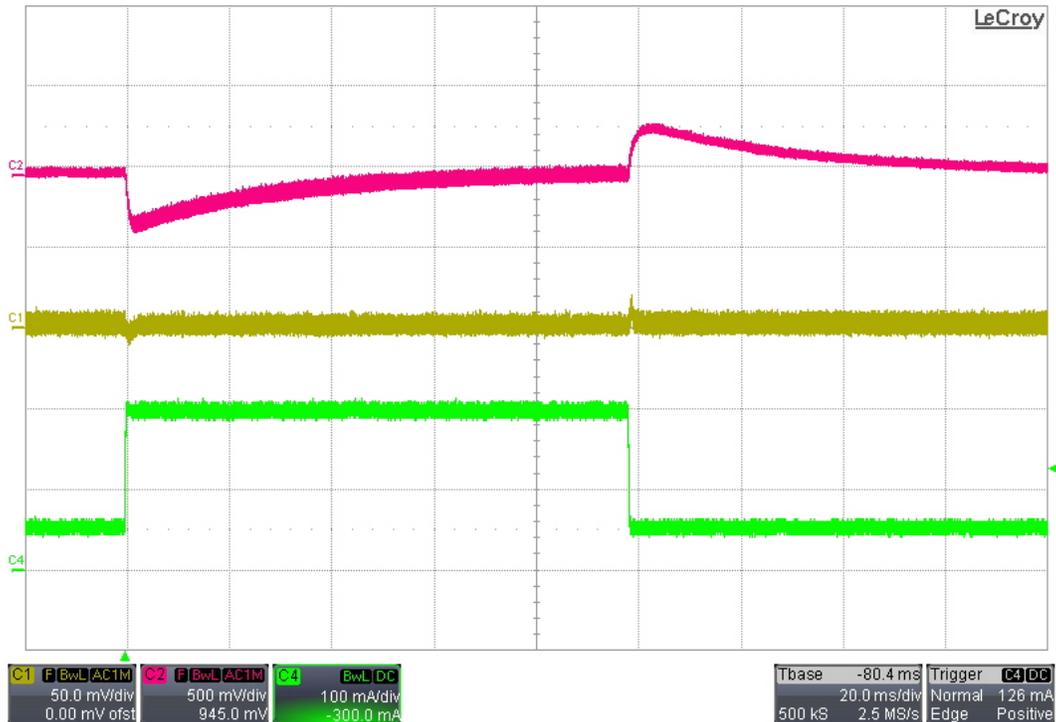


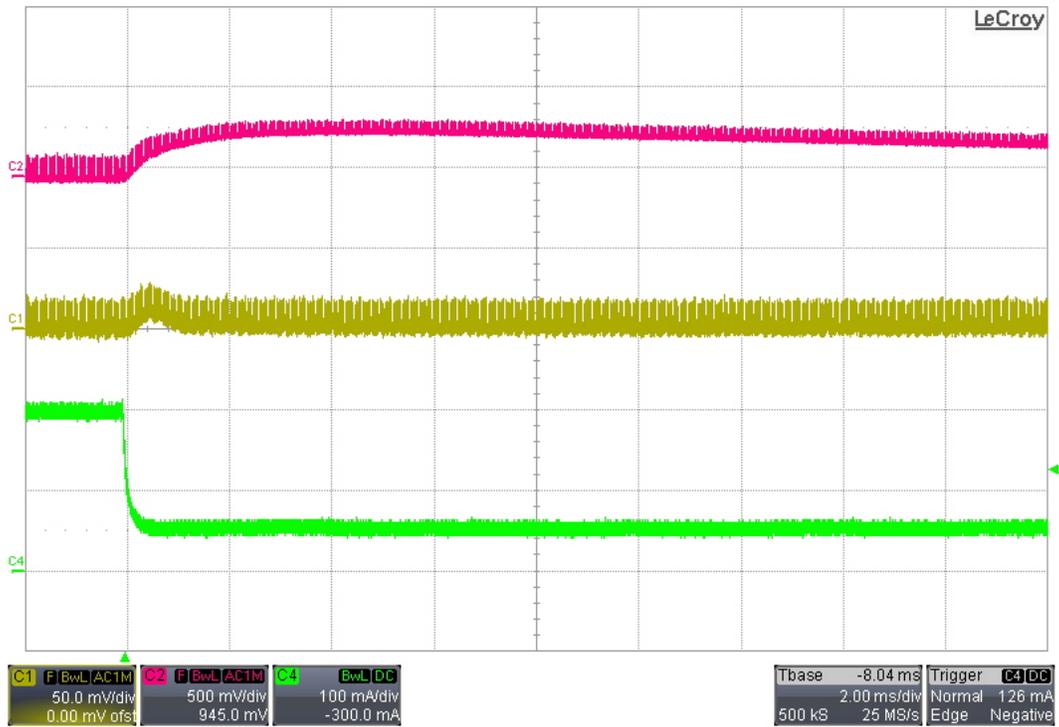
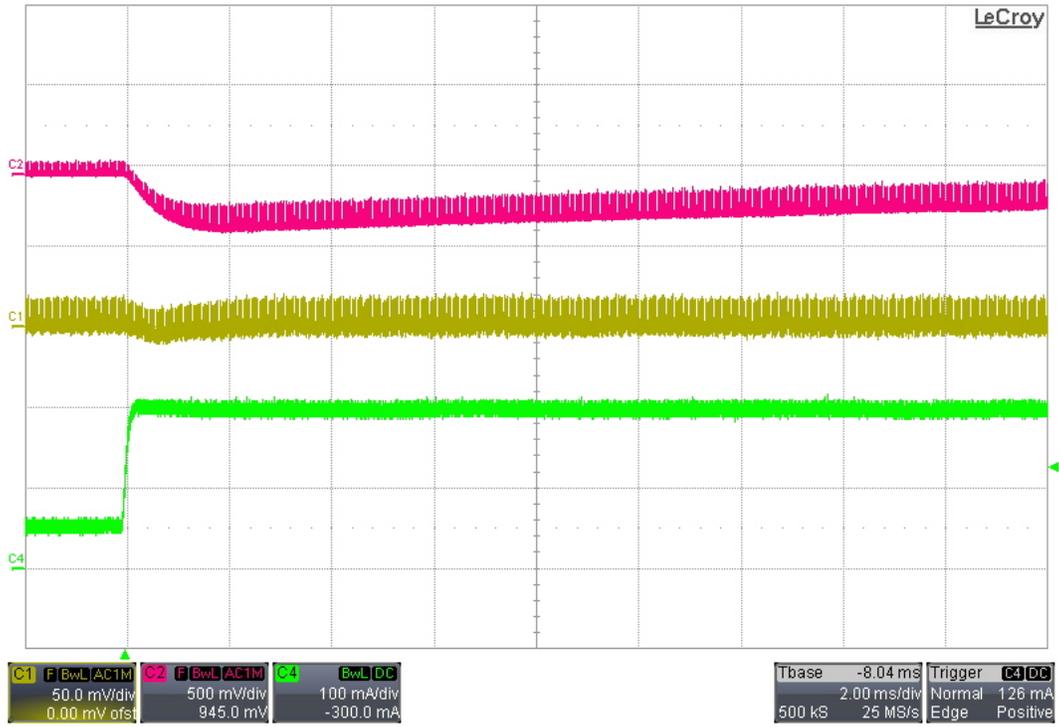


10 12V Load Transients

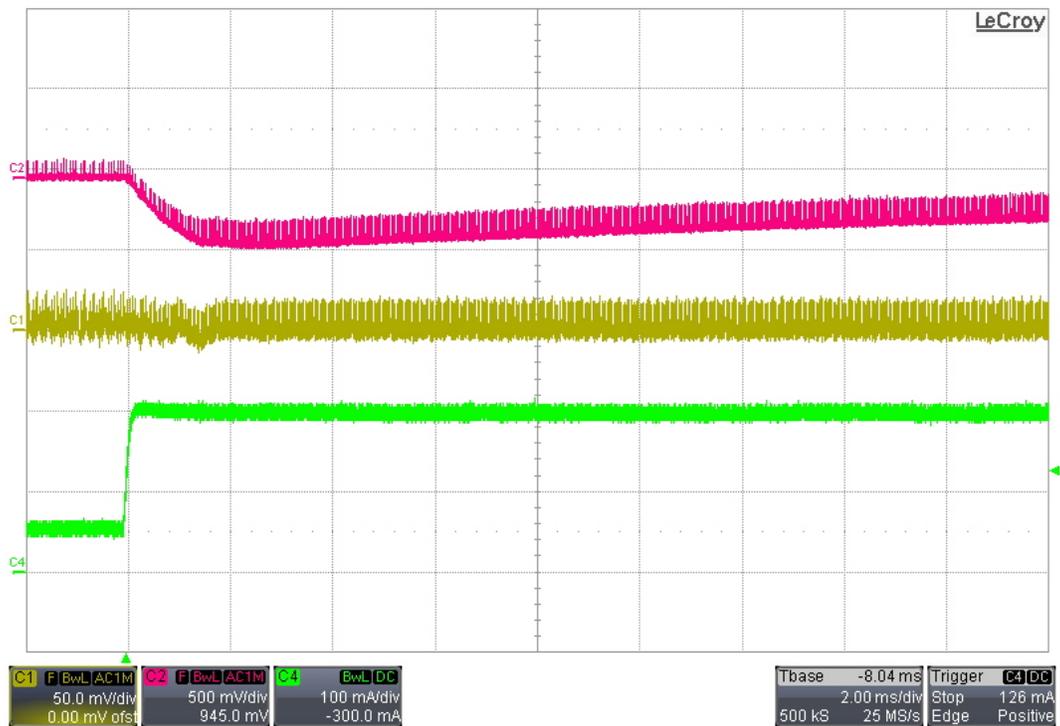
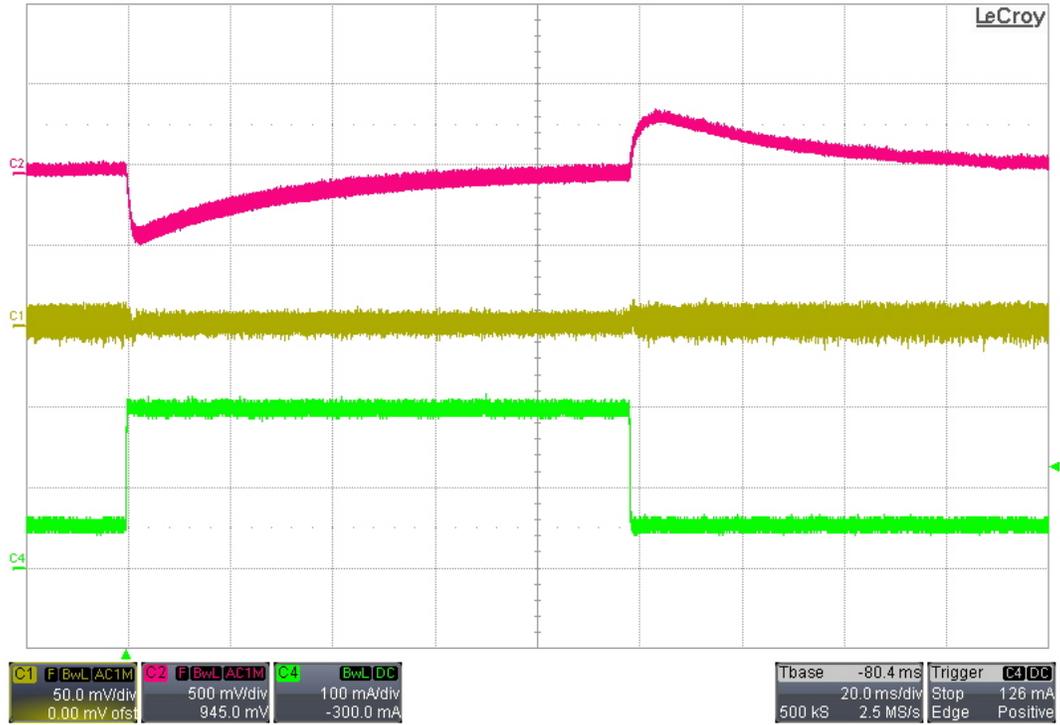
The 3.3V output was loaded with 33Ω. Channel 1 shows the 3.3V output voltage (ac coupled). Channel 2 shows the 12V output voltage (ac coupled). Channel 4 shows the 12V load current.

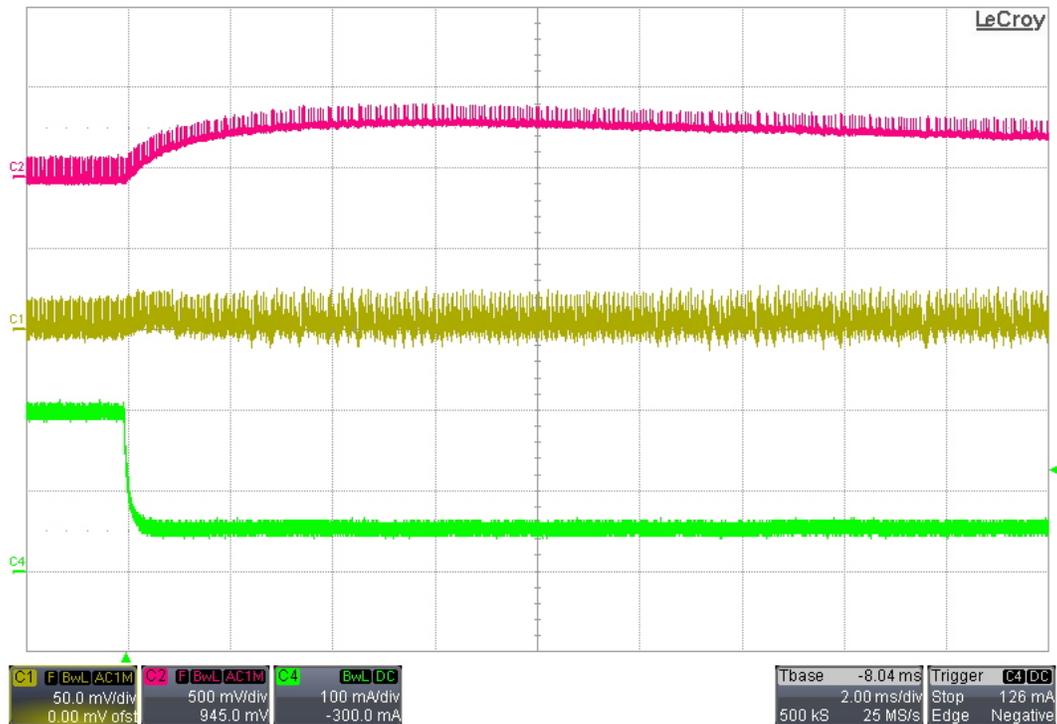
10.1 12V, 50mA to 200mA Transient – 115VAC/60Hz Input





10.2 12V, 50mA to 200mA Transient – 230VAC/50Hz Input



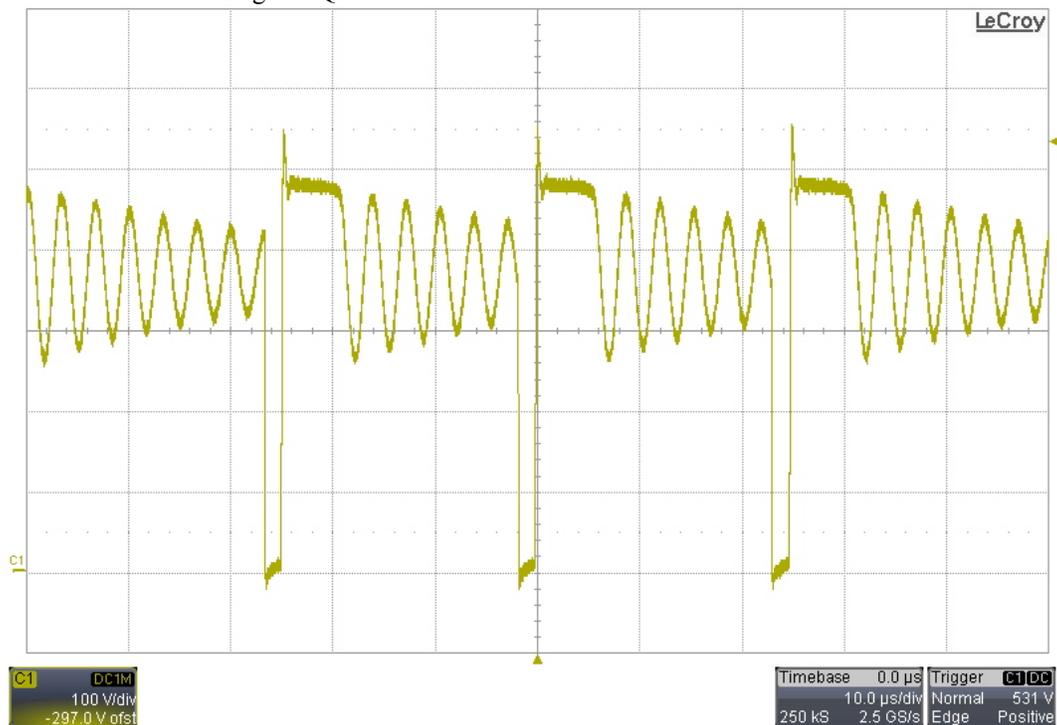


11 Switching Waveforms

The images below show the voltage waveforms on the switching devices within the supply. The input was 265VAC/50Hz. The 3.3V output was loaded with 200mA, and the 12V output was loaded with 200mA.

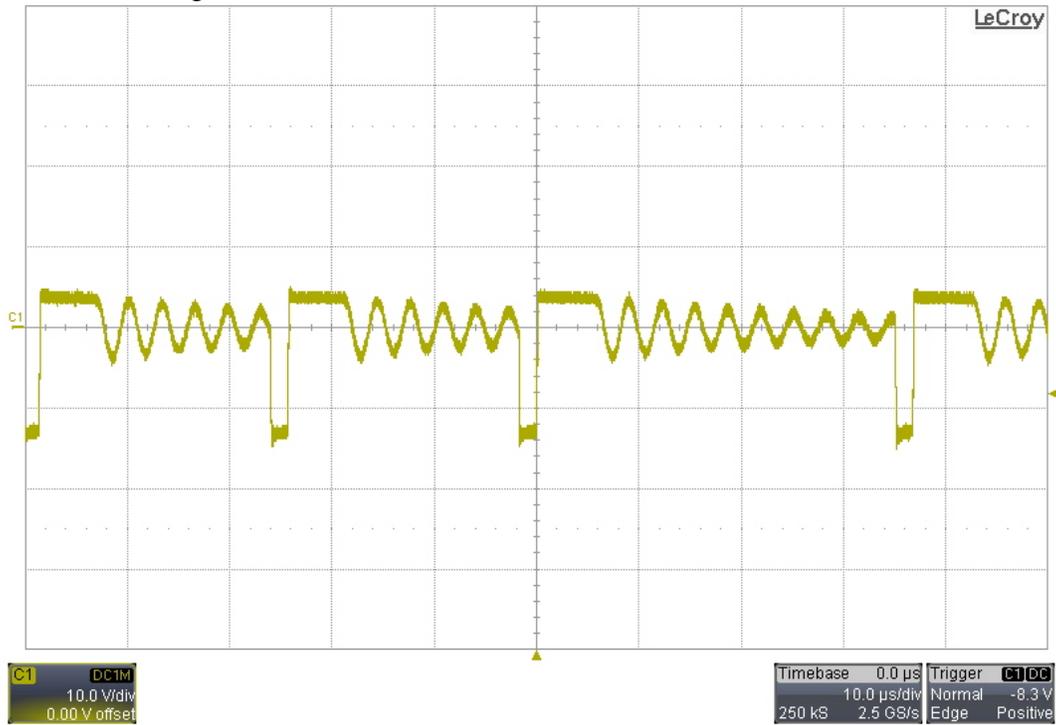
11.1 Primary Waveforms

The image below shows the drain voltage on Q1.



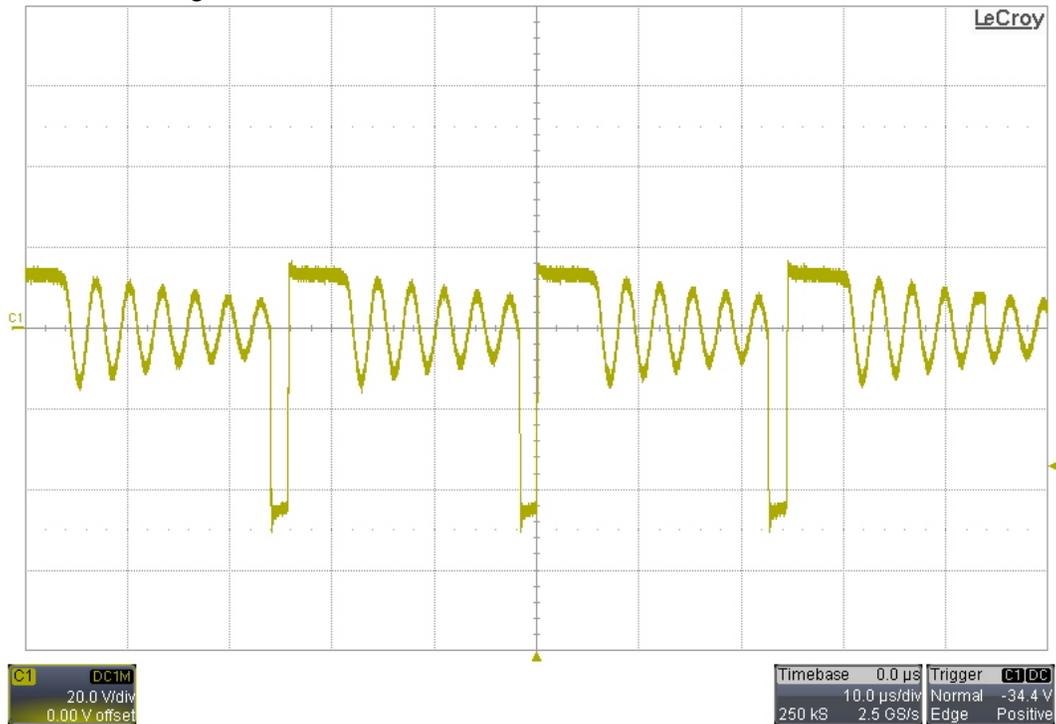
11.2 3.3V Secondary Waveforms

The image below shows the voltage on the anode of D5.



11.3 12V Secondary Waveforms

The image below shows the voltage on the anode of D3.



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