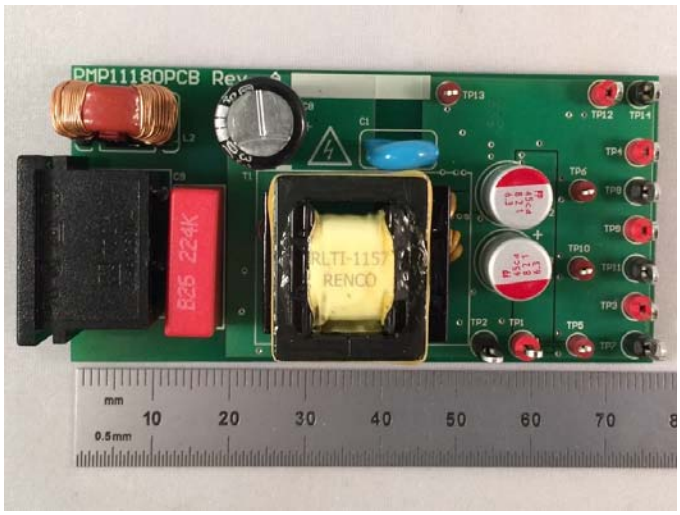
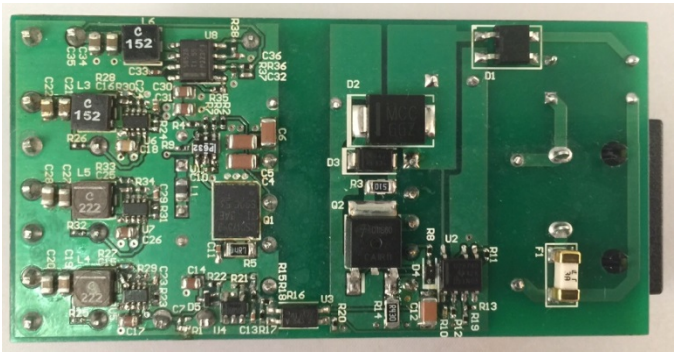
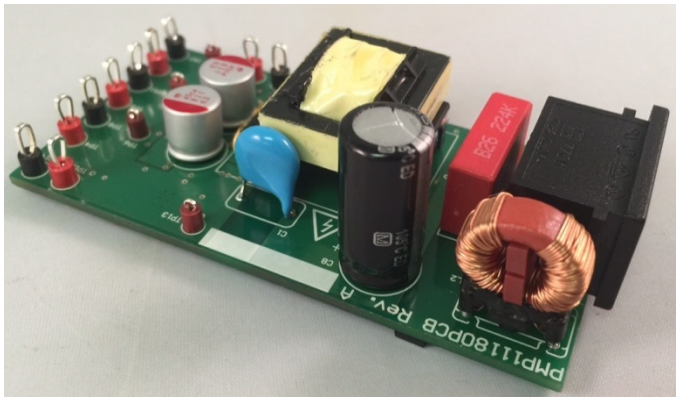
Contents

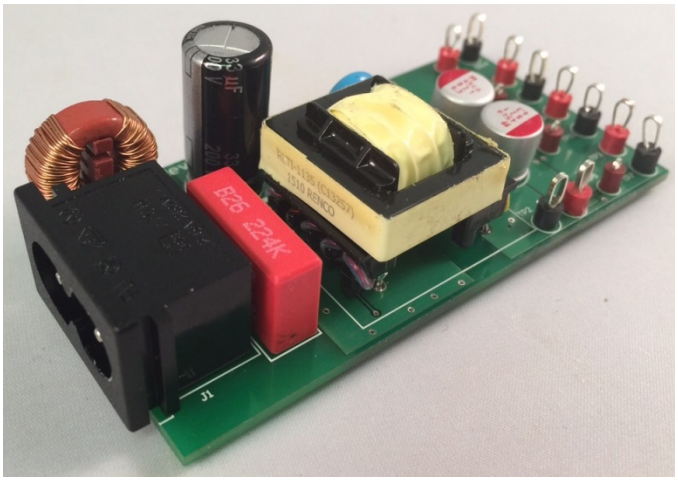
1 Photos

The photographs below show the PMP11180 Rev A prototype assembly.









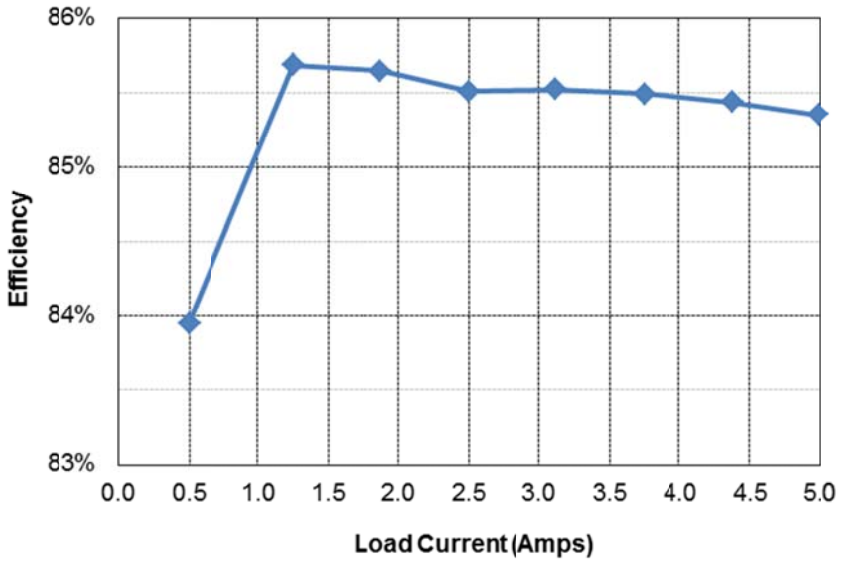
2 No Load Input Power

Supply	Input Power	Test Setup
All Supplies Enabled	69mW	No modifications
5V Flyback Only	61mW	R23, R24, R31, and R35 removed
3.3V Buck Only	8mW	R1, R15, R24, R31, and R35 removed; U1-pin 6 lifted; External 5V input supply
2.5V Buck Only	7mW	R1, R15, R23, R24, and R35 removed; U1-pin 6 lifted; External 5V input supply
1.5V Buck Only	6mW	R1, R15, R23, R31, and R35 removed; U1-pin 6 lifted; External 5V input supply
1.0V Buck Only	8mW	R1, R15, R23, R24, and R31 removed; U1-pin 6 lifted; External 5V input supply

3 Efficiency

3.1 5V Flyback

All other supplies were disabled during this test.

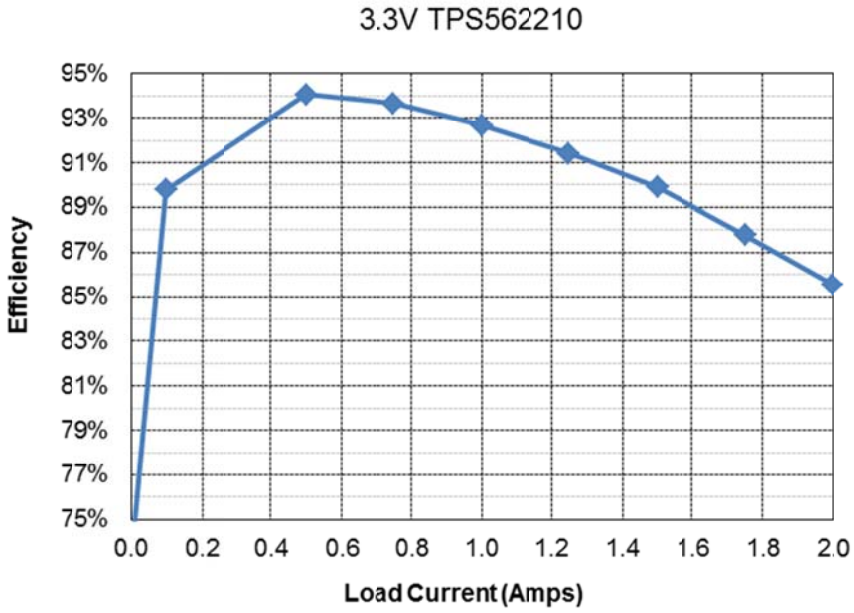


120VAC/60Hz								
Iout	Vout	Vin	Iin	Pin	PF	Pout	Losses	Efficiency
0.000	4.98	120.1	0.0108	0.06112		0.00	0.061	
0.00100	4.98	120.1	0.0108	0.06767		0.00	0.063	7.4%
0.00996	4.98	120.1	0.0114	0.12655		0.05	0.077	39.2%
0.100	4.97	119.9	0.0224	0.673	0.251	0.50	0.18	73.8%
0.500	4.97	119.9	0.075	2.96	0.327	2.49	0.48	84.0%
1.250	4.97	119.9	0.150	7.25	0.403	6.21	1.04	85.7%
1.875	4.97	119.9	0.205	10.88	0.442	9.32	1.56	85.7%
2.500	4.97	119.9	0.257	14.53	0.471	12.43	2.11	85.5%
3.125	4.97	119.9	0.307	18.16	0.494	15.53	2.63	85.5%
3.750	4.97	119.9	0.355	21.80	0.513	18.64	3.16	85.5%
4.375	4.97	119.9	0.402	25.45	0.528	21.74	3.71	85.4%
4.989	4.97	119.9	0.449	29.05	0.540	24.80	4.25	85.4%

Vin	Pin	Vout	Iout	Load	Efficiency	Avg. Eff.
120VAC/60Hz	2.96	4.97	0.500	10%	83.95%	
	7.25	4.97	1.250	25%	85.69%	**85.51%**
	14.53	4.97	2.500	50%	85.51%	
	21.80	4.97	3.750	75%	85.49%	
	29.05	4.97	4.989	100%	85.35%	

3.2 3.3V Buck

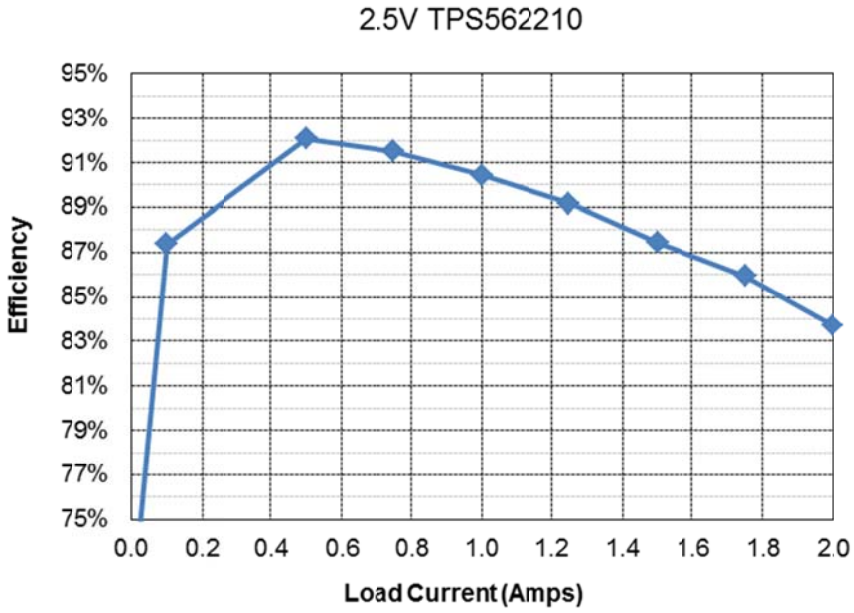
All other supplies were disabled during this test.



Iout	Vout	Vin	Iin	Pin	Pout	Losses	Efficiency
0.000	3.315	4.98	0.00160	0.008	0.00	0.008	
0.00100	3.314	4.98	0.00230	0.011	0.00	0.008	28.9%
0.00999	3.313	4.97	0.00889	0.044	0.03	0.011	74.9%
0.099	3.310	5.00	0.073	0.365	0.33	0.037	89.8%
0.500	3.305	5.02	0.350	1.757	1.65	0.10	94.1%
0.750	3.296	4.99	0.529	2.640	2.47	0.17	93.6%
1.000	3.288	4.99	0.711	3.548	3.29	0.26	92.7%
1.250	3.281	4.99	0.899	4.486	4.10	0.38	91.4%
1.500	3.272	4.99	1.094	5.459	4.91	0.55	89.9%
1.750	3.266	4.99	1.305	6.512	5.72	0.80	87.8%
2.000	3.255	5.01	1.519	7.610	6.51	1.10	85.5%

3.3 2.5V Buck

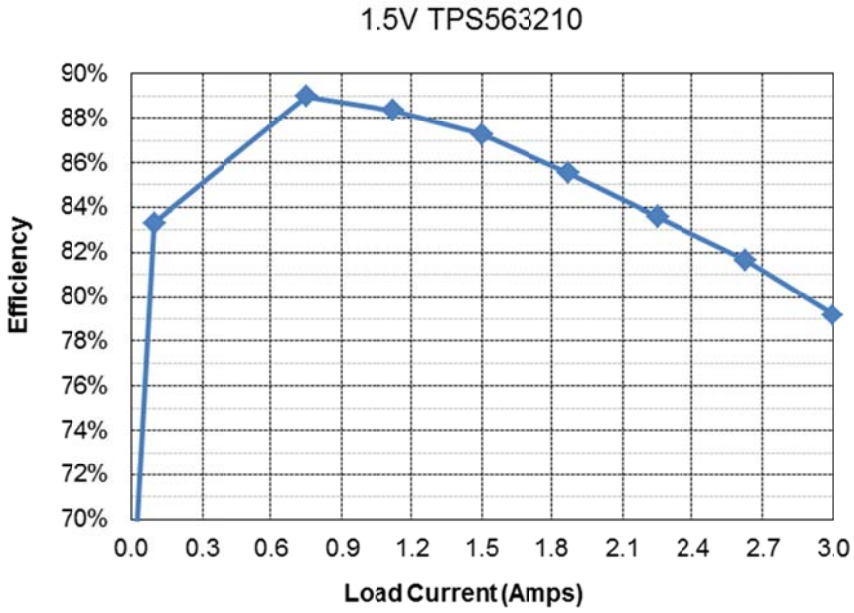
All other supplies were disabled during this test.



Iout	Vout	Vin	Iin	Pin	Pout	Losses	Efficiency
0.000	2.497	5.01	0.00142	0.007	0.00	0.007	
0.00100	2.497	5.01	0.00196	0.010	0.00	0.007	25.4%
0.01002	2.497	5.00	0.00693	0.035	0.03	0.010	72.2%
0.100	2.495	5.01	0.057	0.286	0.25	0.036	87.4%
0.499	2.504	4.97	0.273	1.357	1.25	0.11	92.1%
0.750	2.503	4.98	0.412	2.052	1.88	0.17	91.5%
1.000	2.495	4.98	0.554	2.759	2.50	0.26	90.4%
1.250	2.493	5.02	0.696	3.494	3.12	0.38	89.2%
1.500	2.489	5.00	0.854	4.270	3.73	0.54	87.4%
1.750	2.497	4.97	1.023	5.084	4.37	0.71	85.9%
2.000	2.494	5.00	1.192	5.960	4.99	0.97	83.7%

3.4 1.5V Buck

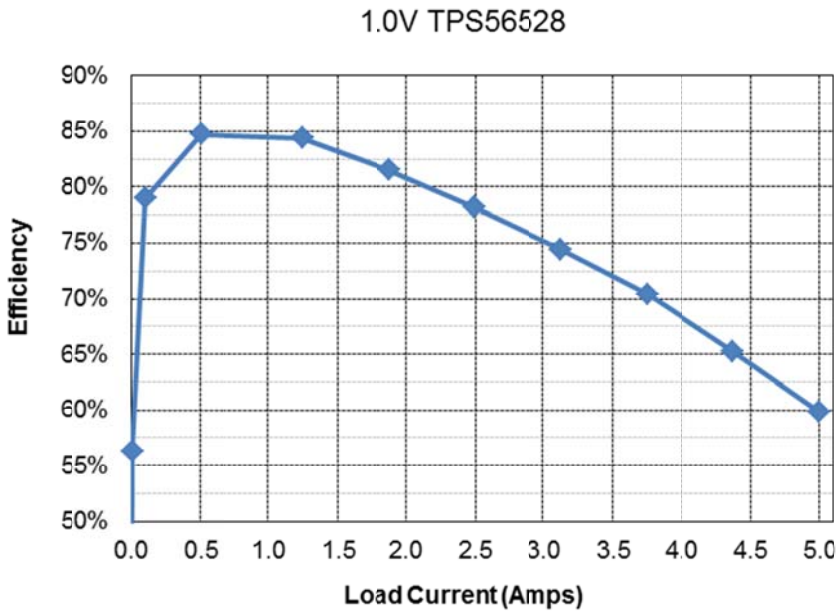
All other supplies were disabled during this test.



Iout	Vout	Vin	Iin	Pin	Pout	Losses	Efficiency
0.000	1.505	4.98	0.00115	0.006	0.00	0.006	
0.00101	1.505	4.98	0.00148	0.007	0.00	0.006	20.6%
0.01004	1.505	4.98	0.00454	0.023	0.02	0.007	66.8%
0.100	1.503	5.01	0.036	0.180	0.15	0.030	83.3%
0.750	1.486	5.01	0.250	1.253	1.11	0.14	89.0%
1.125	1.483	5.01	0.377	1.889	1.67	0.22	88.3%
1.500	1.481	4.99	0.510	2.545	2.22	0.32	87.3%
1.875	1.478	5.00	0.648	3.240	2.77	0.47	85.5%
2.250	1.476	5.01	0.793	3.973	3.32	0.65	83.6%
2.625	1.479	5.01	0.949	4.754	3.88	0.87	81.7%
3.000	1.476	5.01	1.116	5.591	4.43	1.16	79.2%

3.5 1.0V Buck

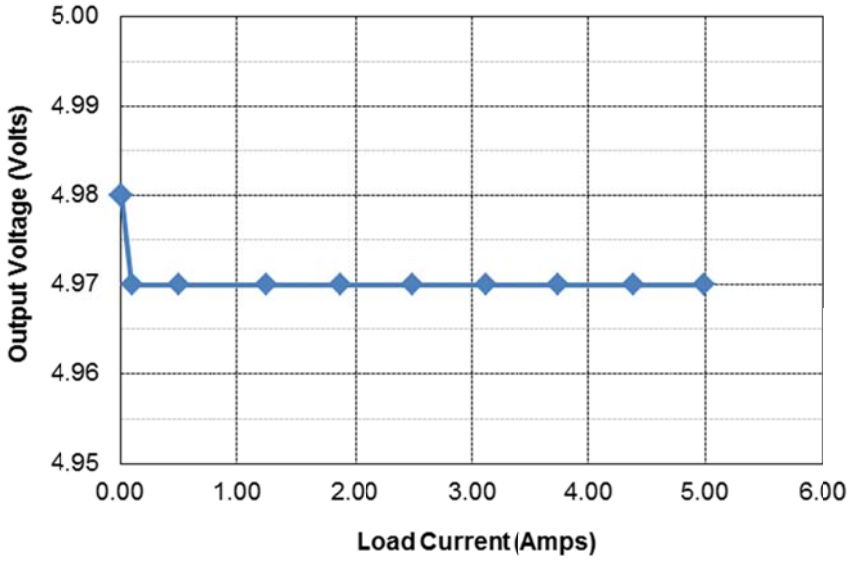
All other supplies were disabled during this test.



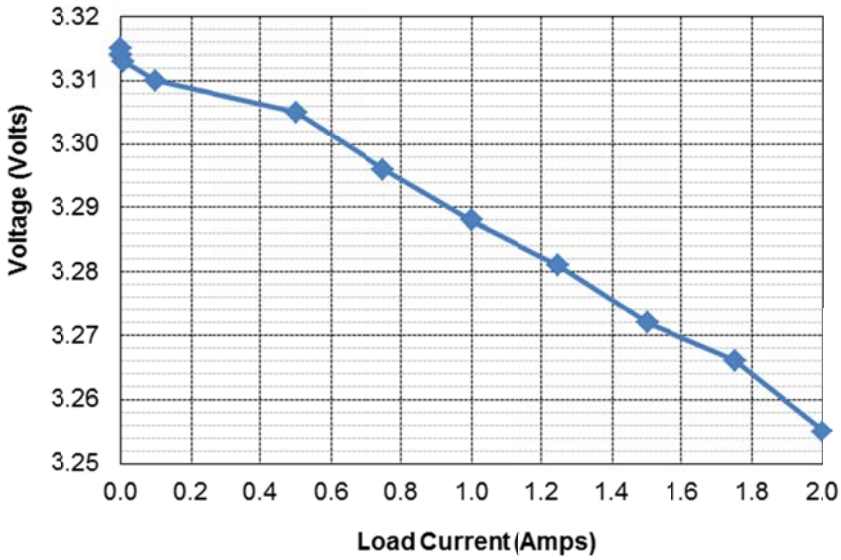
Iout	Vout	Vin	Iin	Pin	Pout	Losses	Efficiency
0.000	1.019	4.98	0.00154	0.008	0.00	0.008	
0.00102	1.016	4.98	0.00147	0.007	0.00	0.006	14.2%
0.01013	1.016	4.98	0.00367	0.018	0.01	0.008	56.3%
0.101	1.019	5.01	0.026	0.130	0.10	0.027	79.0%
0.502	1.013	5.00	0.120	0.600	0.51	0.09	84.8%
1.248	1.011	5.00	0.299	1.495	1.26	0.23	84.4%
1.877	1.010	5.00	0.465	2.325	1.90	0.43	81.5%
2.496	1.010	5.00	0.645	3.225	2.52	0.70	78.2%
3.125	1.009	5.00	0.847	4.235	3.15	1.08	74.5%
3.748	1.010	4.99	1.077	5.374	3.79	1.59	70.4%
4.373	1.010	5.01	1.350	6.764	4.42	2.35	65.3%
5.001	1.013	5.01	1.690	8.467	5.07	3.40	59.8%

4 Load Regulation

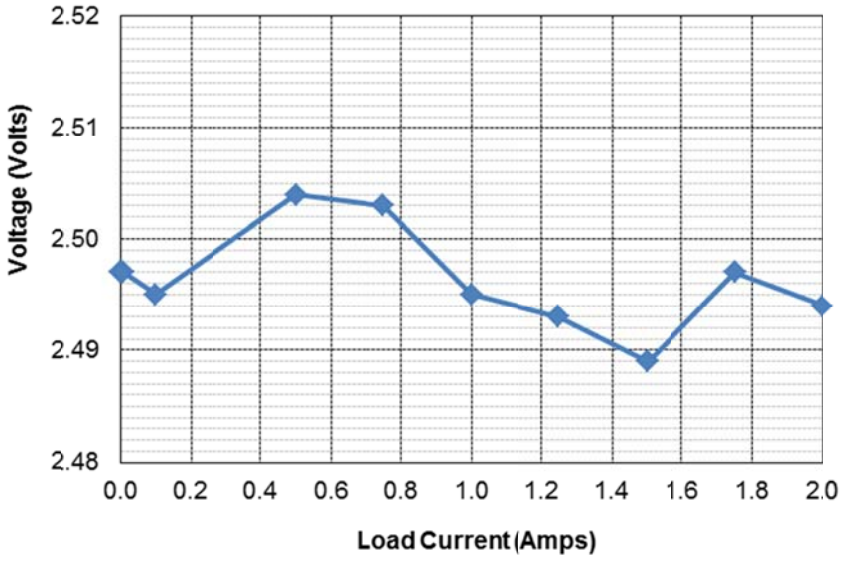
4.1 5V Flyback



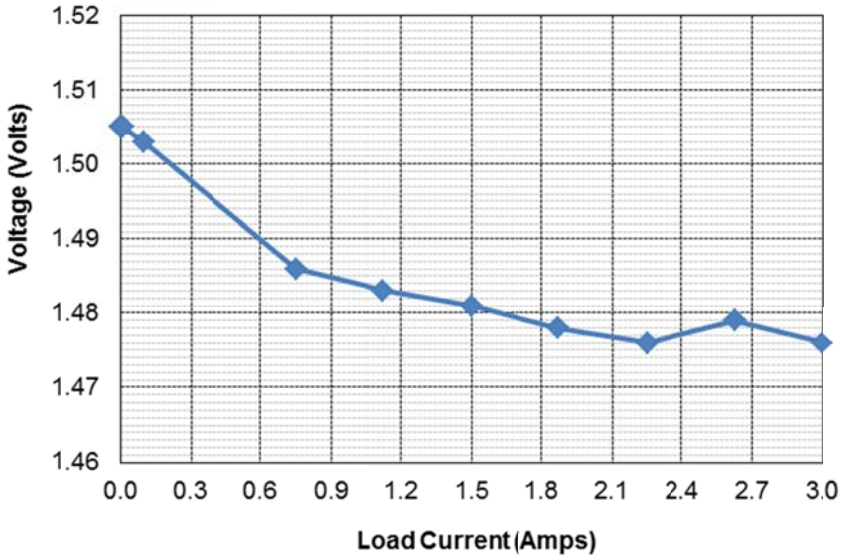
4.2 3.3V Buck



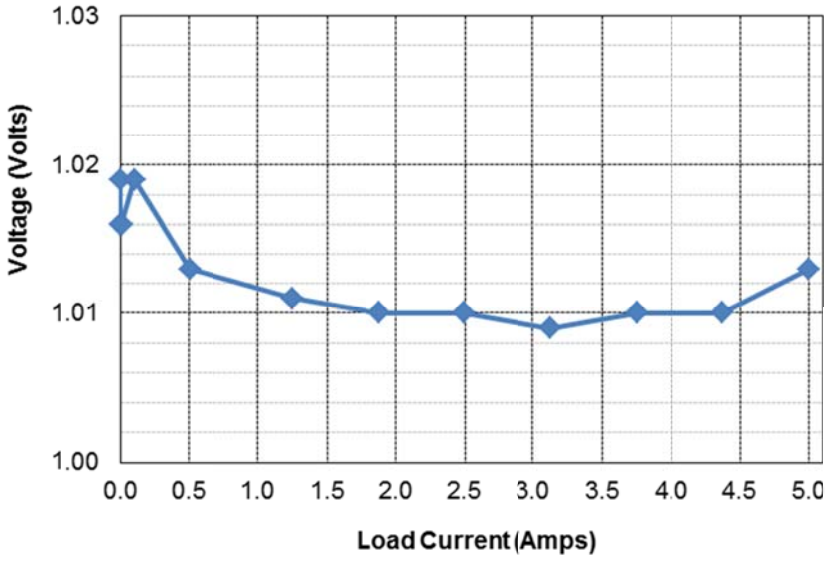
4.3 2.5V Buck



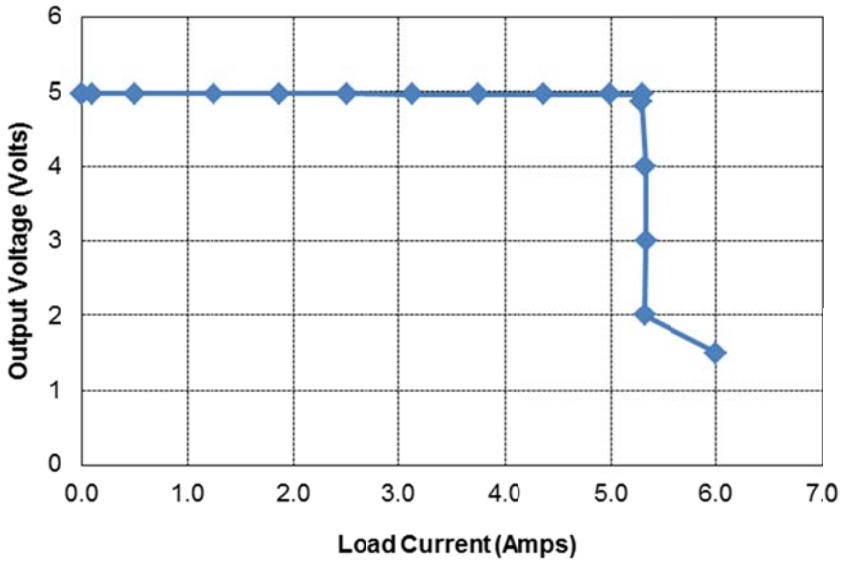
4.4 1.5V Buck



4.5 1.0V Buck



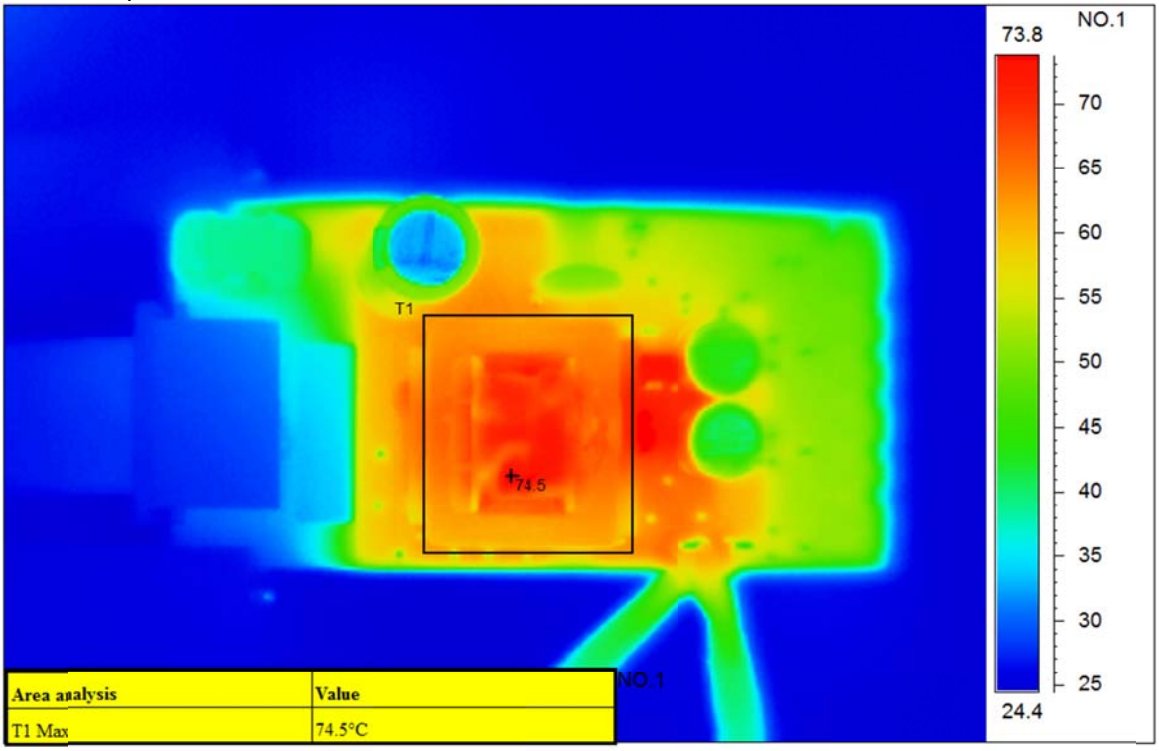
5 5V Flyback Current Regulation



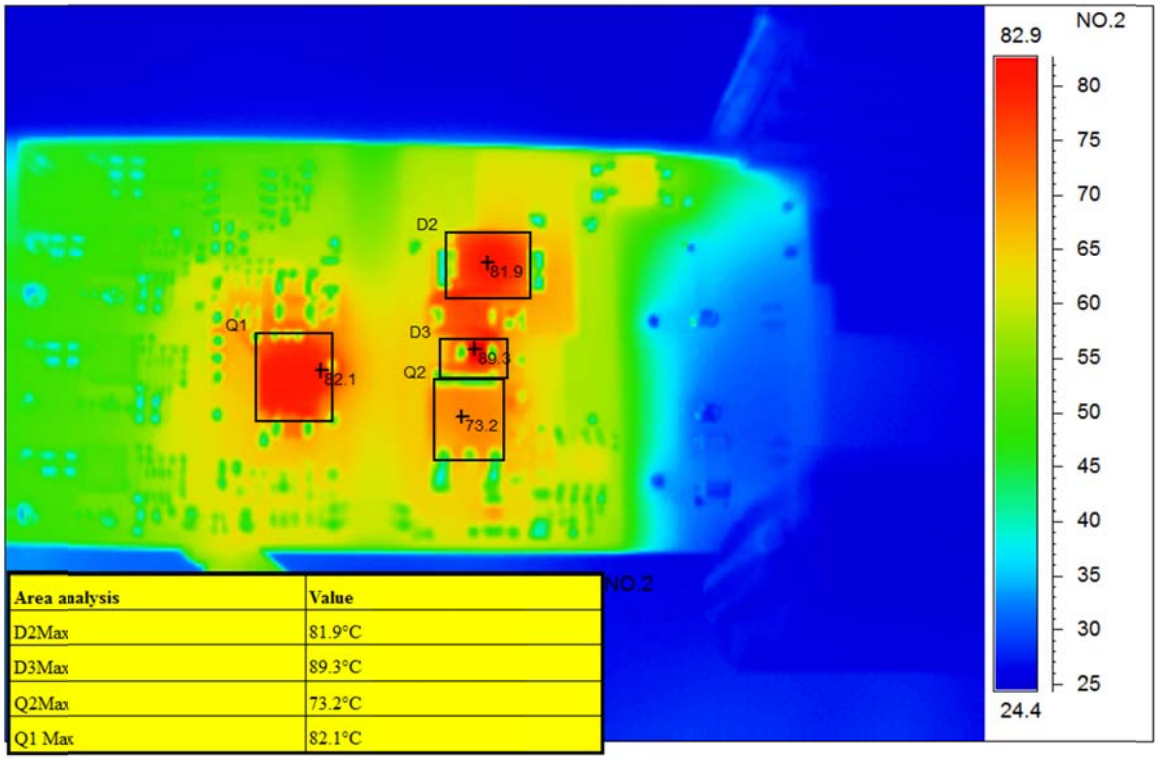
6 Thermal Images

6.1 5V Flyback

All other supplies were disabled during this test. The 5V output was loaded with 5A. The ambient temperature was 25ºC with no forced air flow. The input was 120VAC/60Hz.



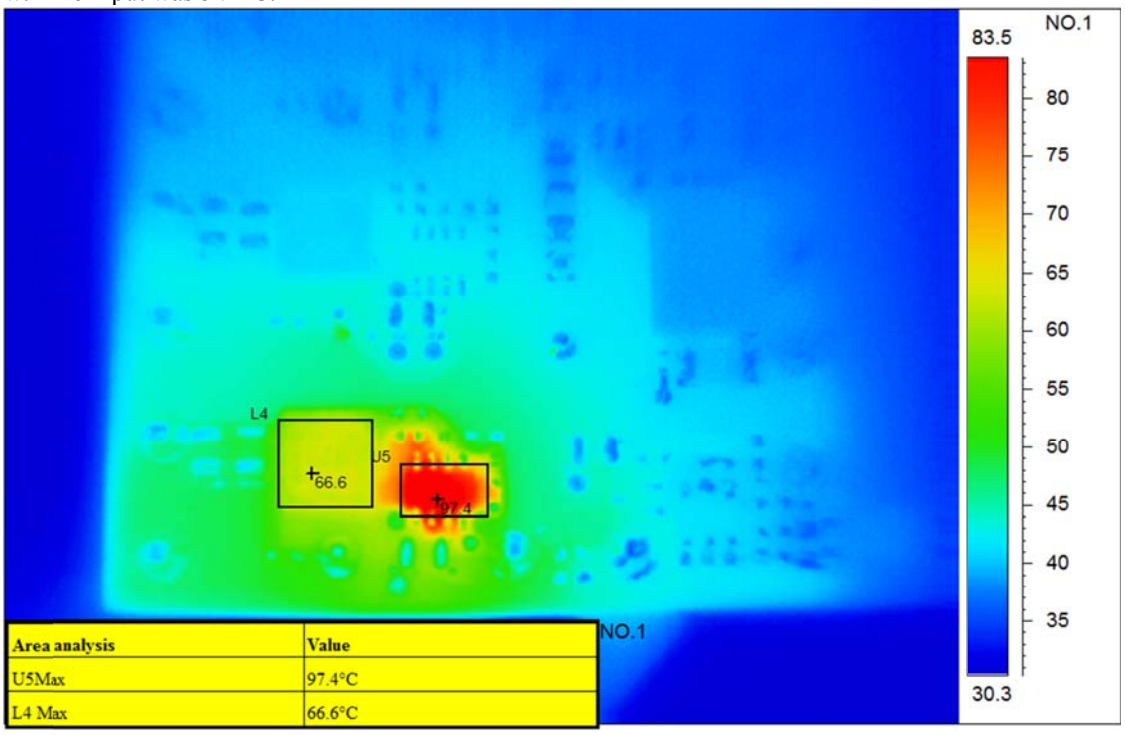
Area analysis	Value
T1 Max	74.5°C



Area analysis	Value
D2Max	81.9°C
D3Max	89.3°C
Q2Max	73.2°C
Q1 Max	82.1°C

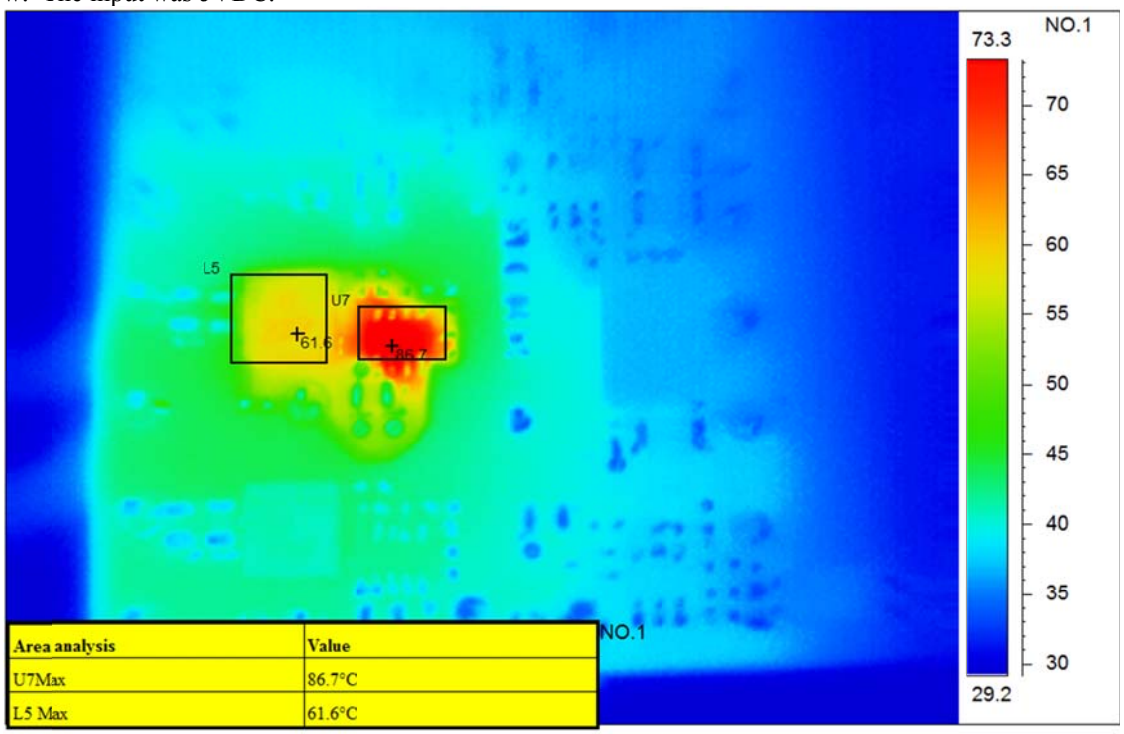
6.2 3.3V Buck

All other supplies were disabled during this test. The 3.3V output was loaded with 2A. The ambient temperature was 25ºC with no forced air flow. The input was 5VDC.



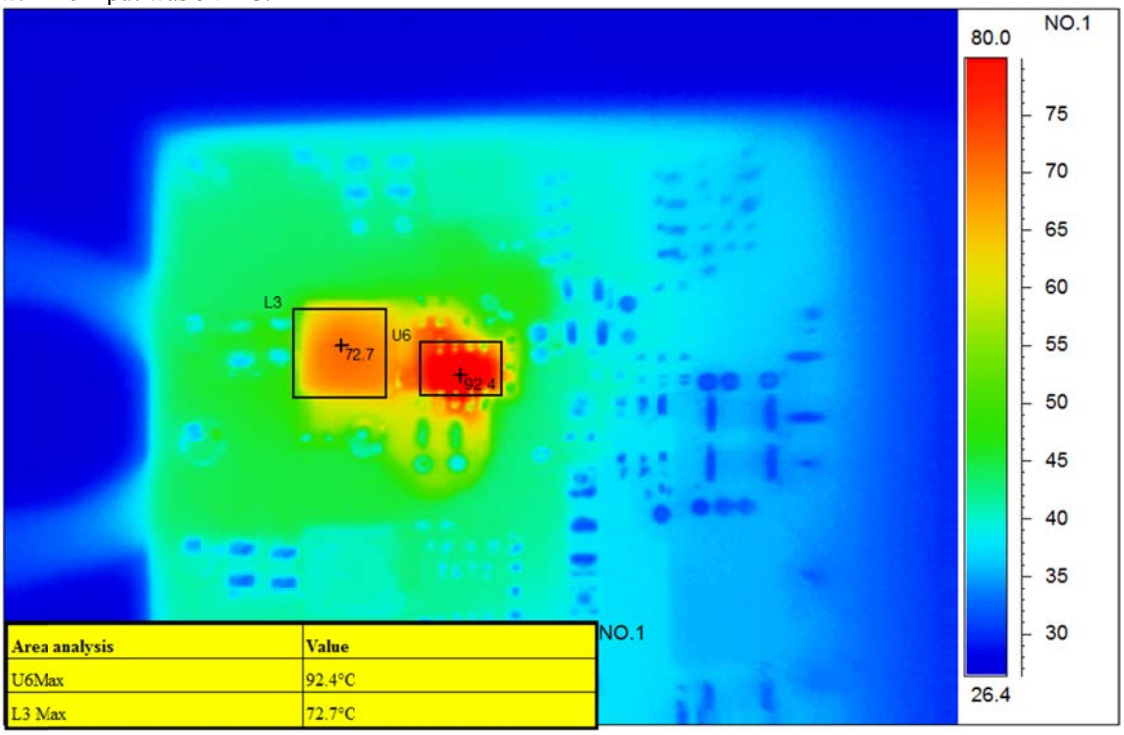
6.3 2.5V Buck

All other supplies were disabled during this test. The 2.5V output was loaded with 2A. The ambient temperature was 25ºC with no forced air flow. The input was 5VDC.



6.4 1.5V Buck

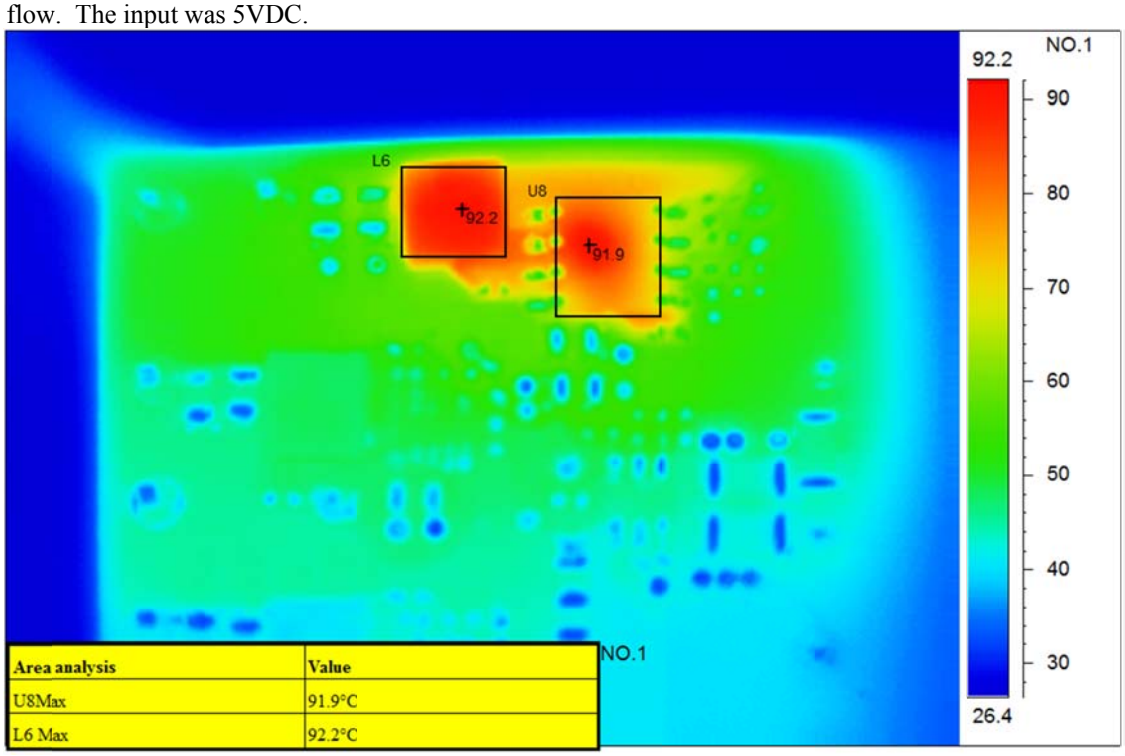
All other supplies were disabled during this test. The 1.5V output was loaded with 3A. The ambient temperature was 25ºC with no forced air flow. The input was 5VDC.



Area analysis	Value
U6Max	92.4°C
L3 Max	72.7°C

6.5 1.0V Buck

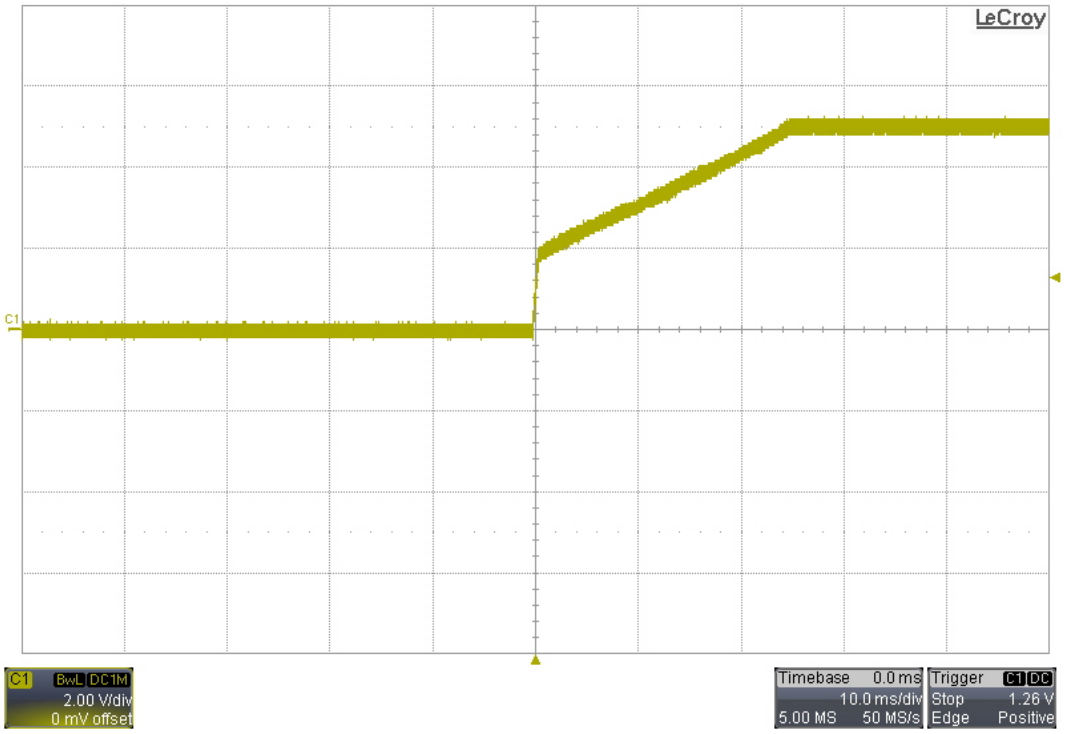
All other supplies were disabled during this test. The 1.0V output was loaded with 3.8A. The ambient temperature was 25ºC with no forced air flow. The input was 5VDC.



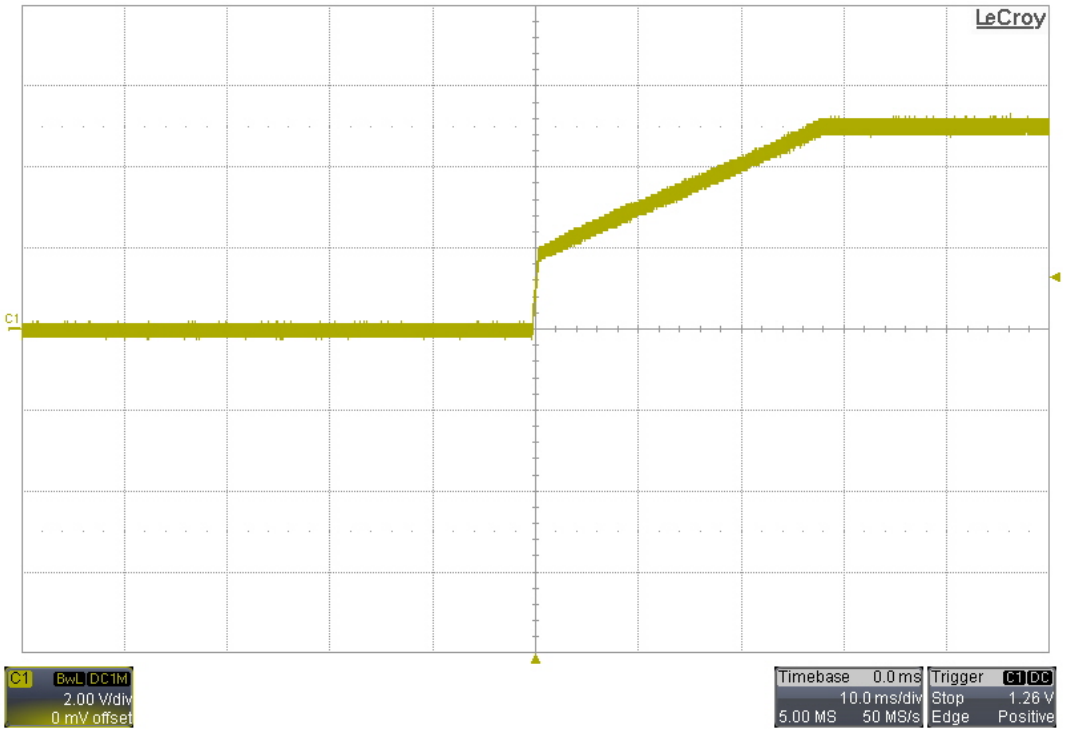
Area analysis	Value
U8Max	91.9°C
L6 Max	92.2°C

7 Startup

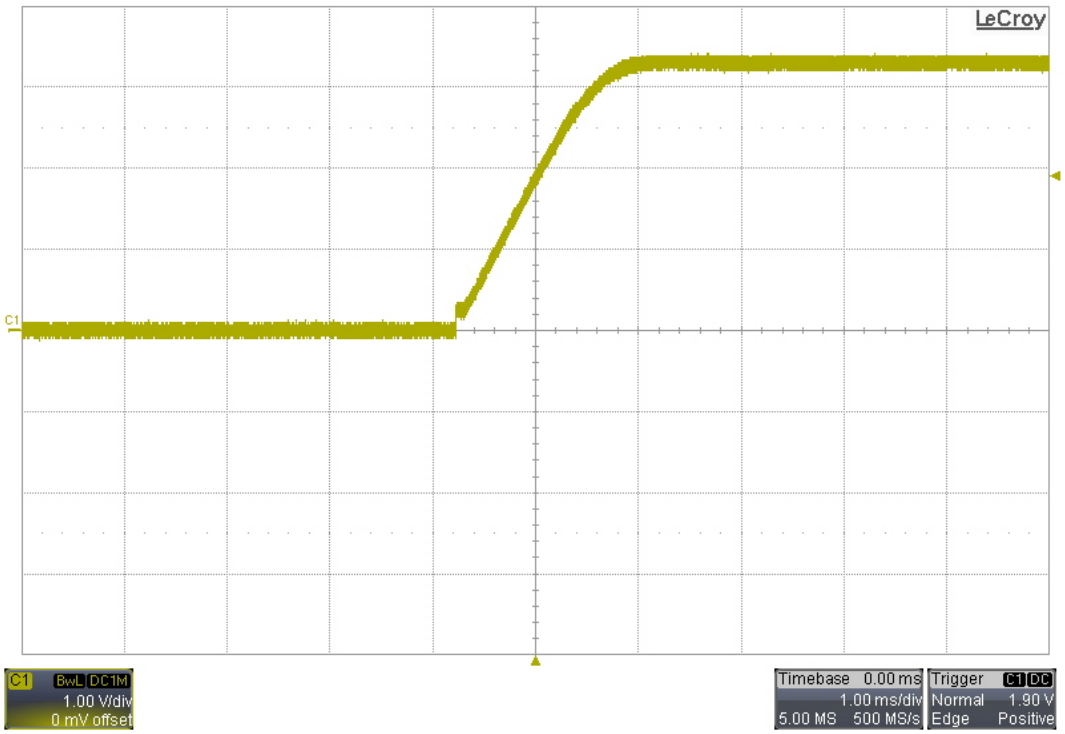
7.1 5V Flyback; 120VAC/60Hz – No Load



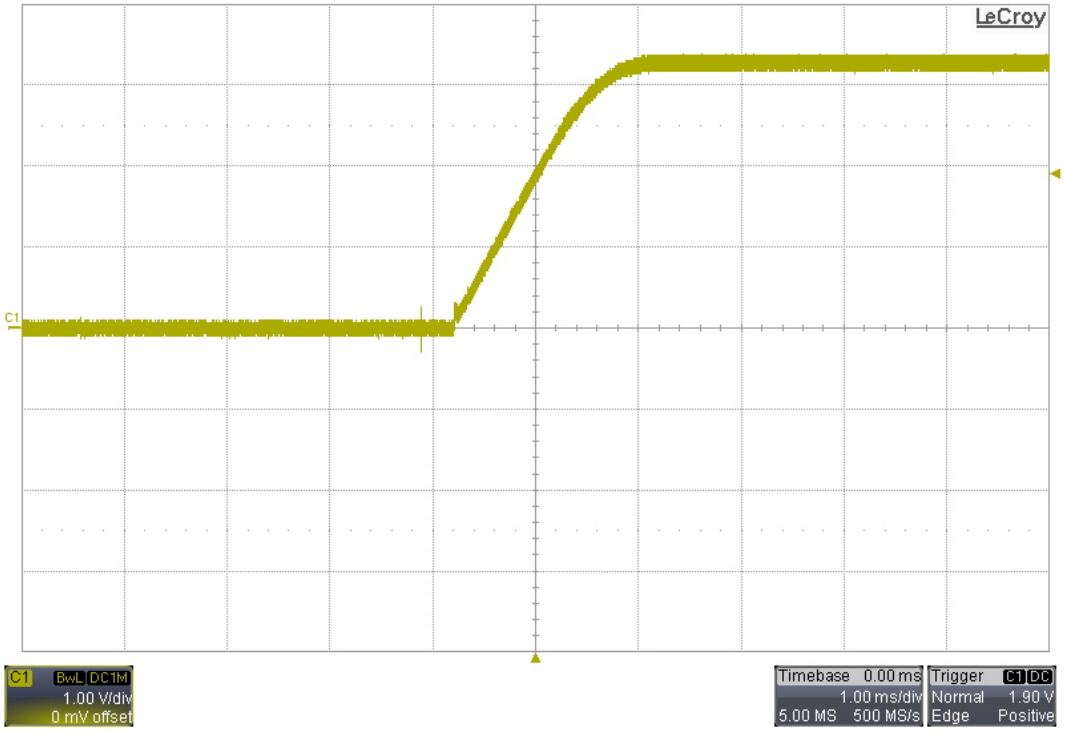
7.2 5V Flyback; 120VAC/60Hz – 1Ω Load



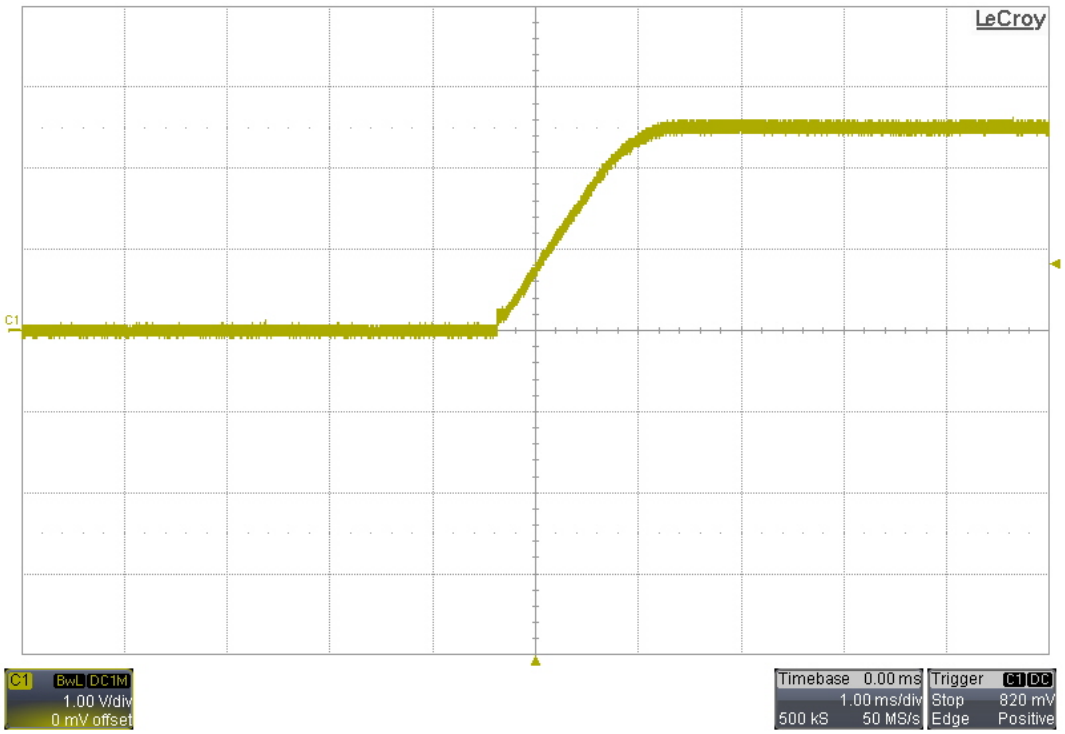
7.3 3.3V Buck; 5V Input – No Load



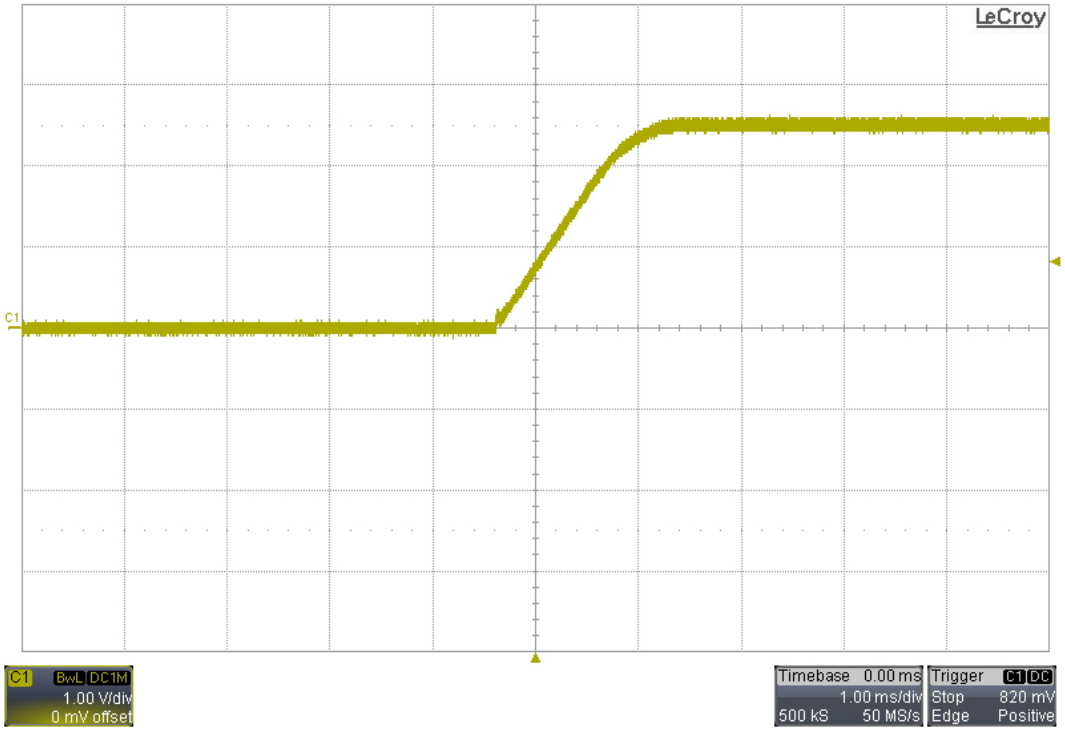
7.4 3.3V Buck; 5V Input – 2Ω Load



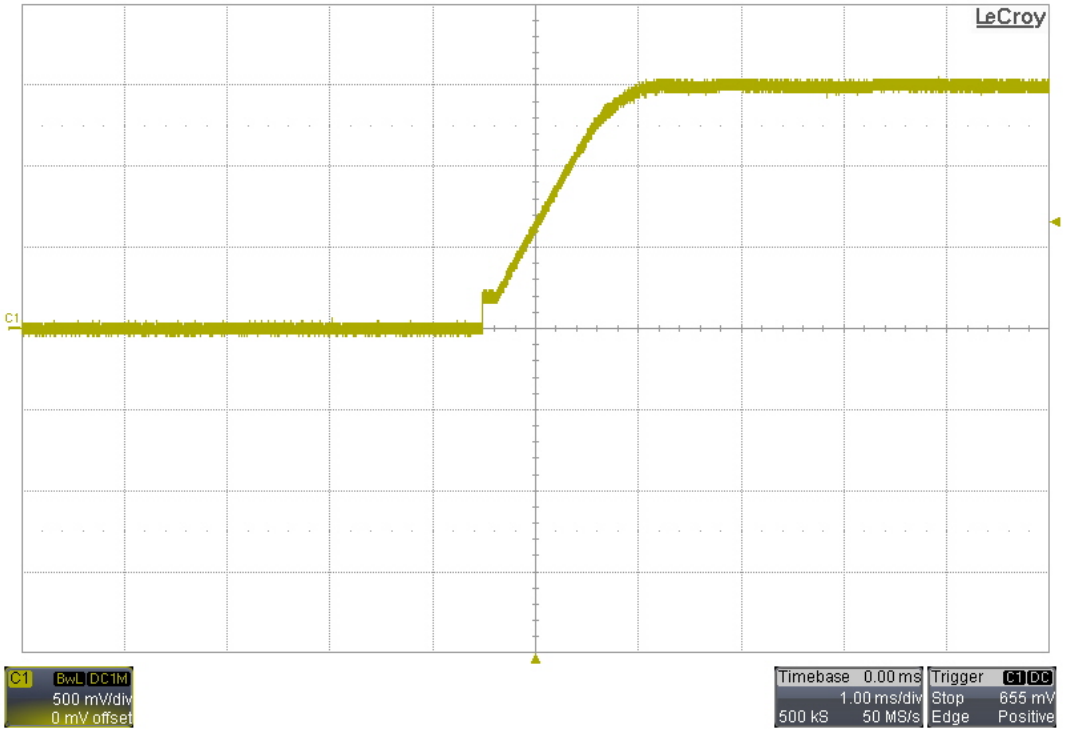
7.5 2.5V Buck; 5V Input – No Load



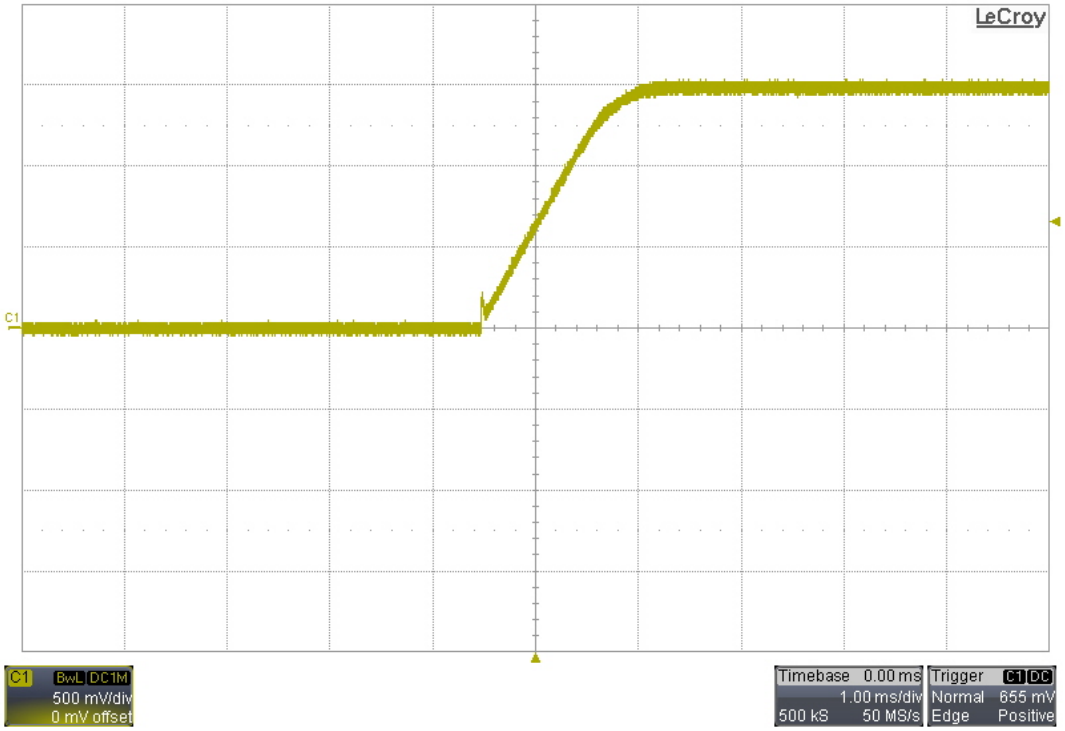
7.6 2.5V Buck; 5V Input – 2Ω Load



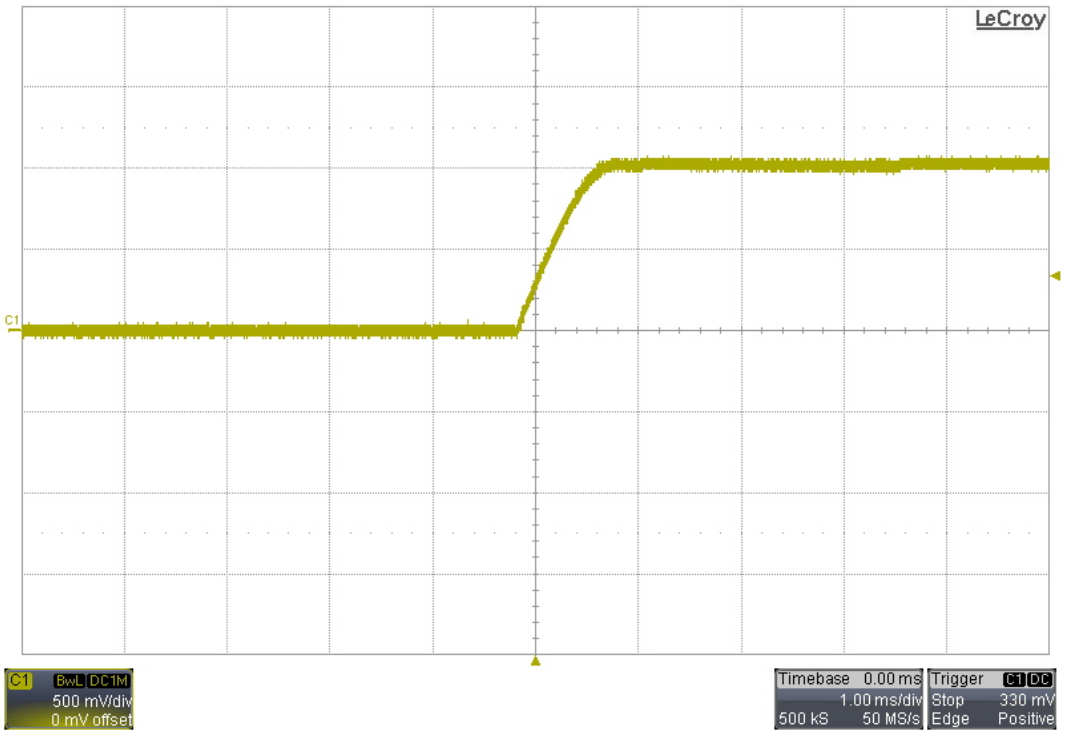
7.7 1.5V Buck; 5V Input – No Load



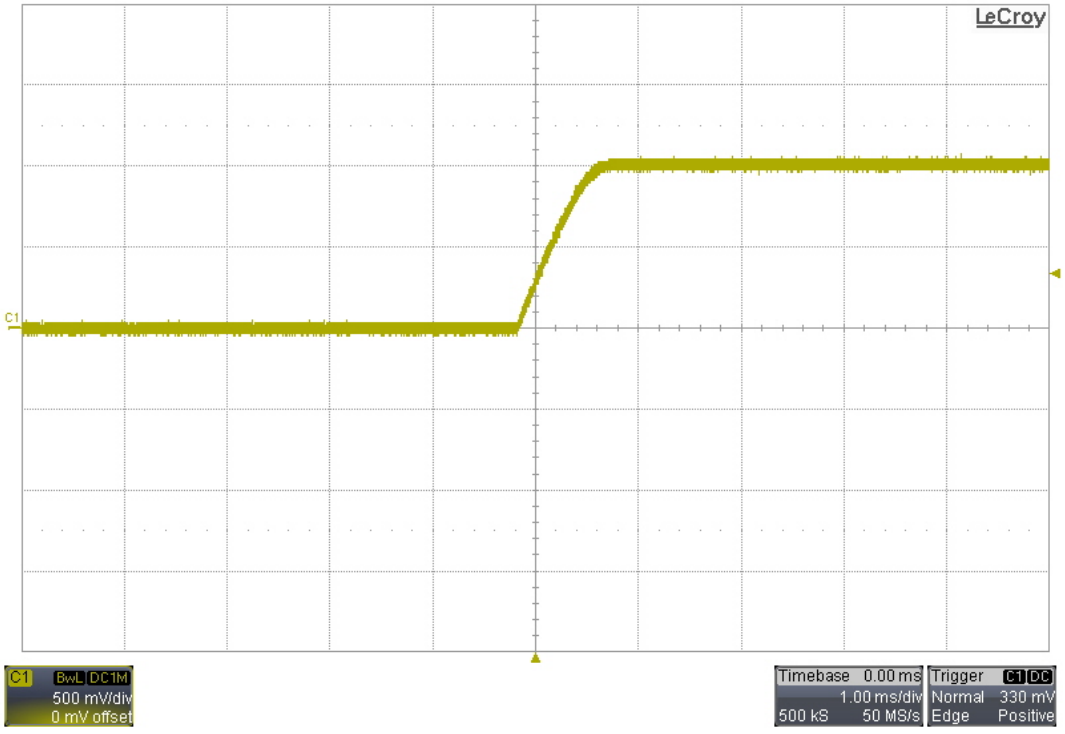
7.8 1.5V Buck; 5V Input – 1Ω Load



7.9 1.0V Buck; 5V Input – No Load

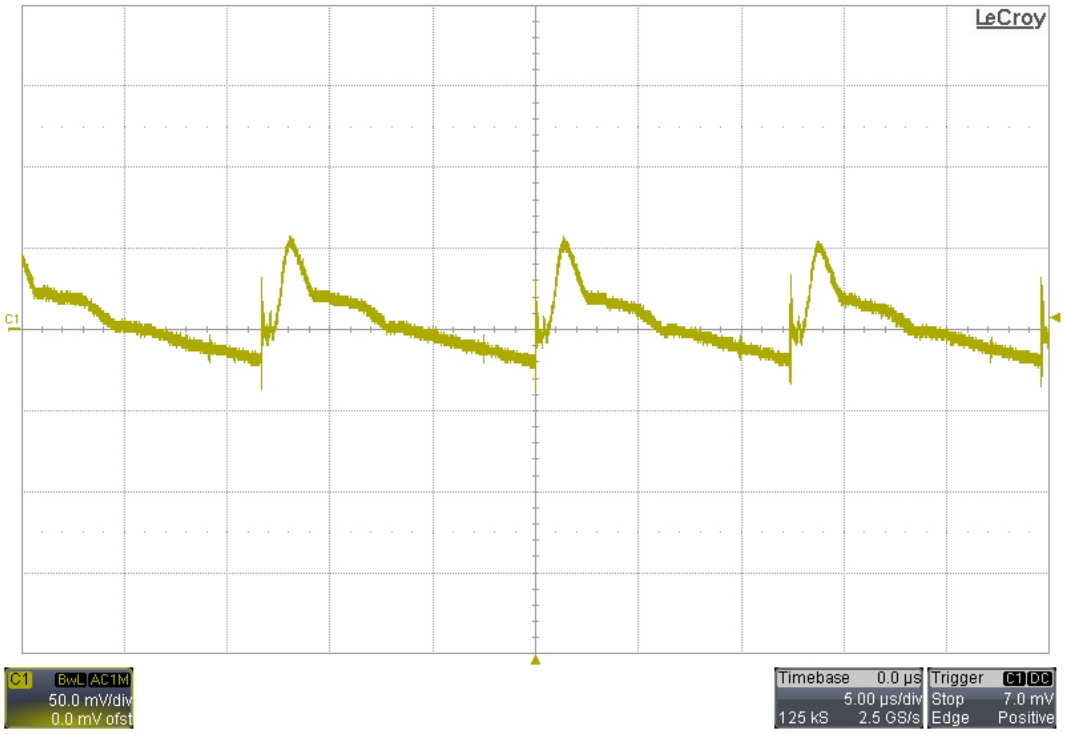


7.10 1.0V Buck; 5V Input – 1Ω Load

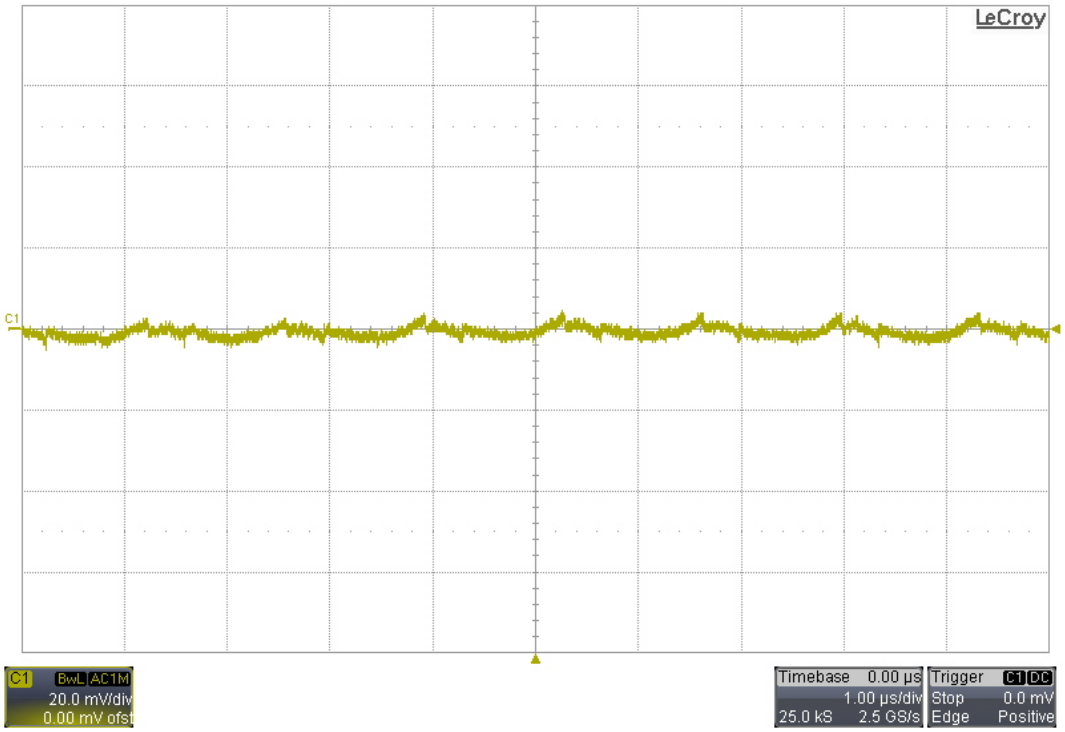


8 Output Ripple Voltage

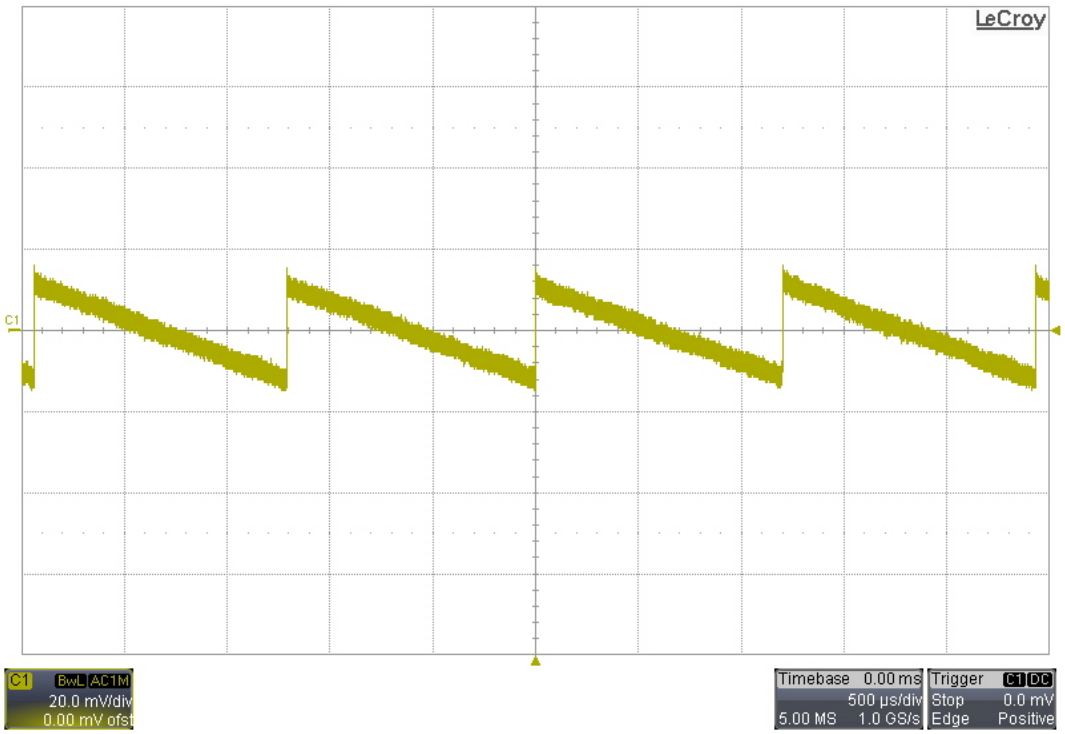
8.1 5V Flyback; 5A Load



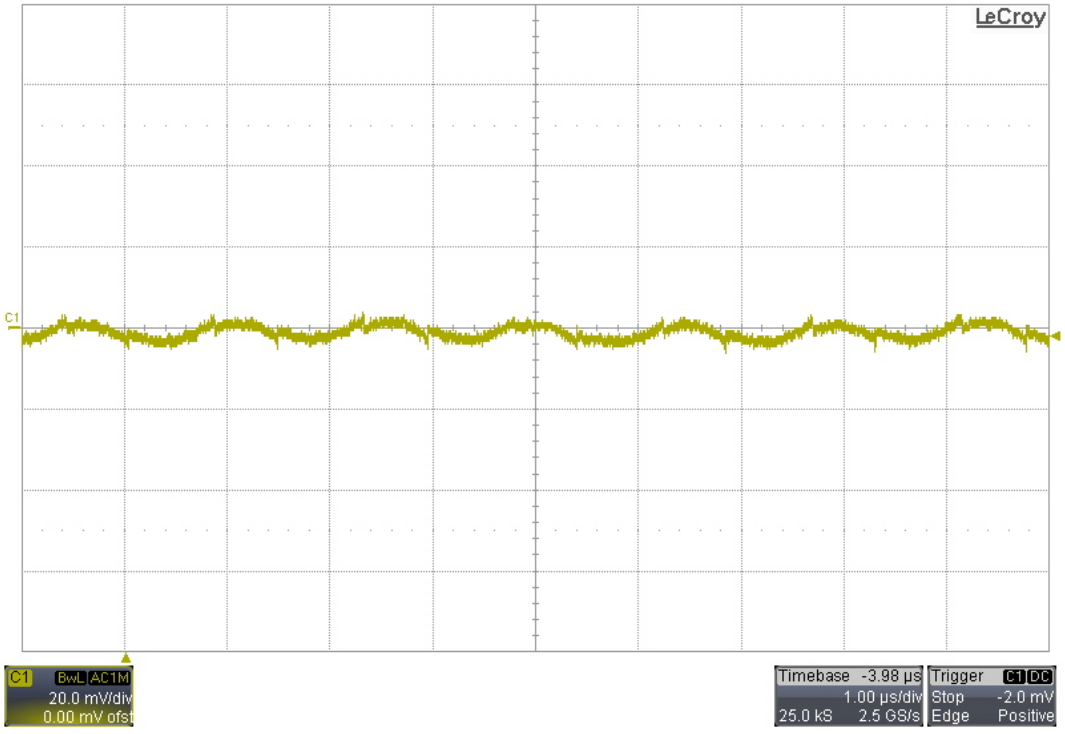
8.2 3.3V Buck; 2A Load



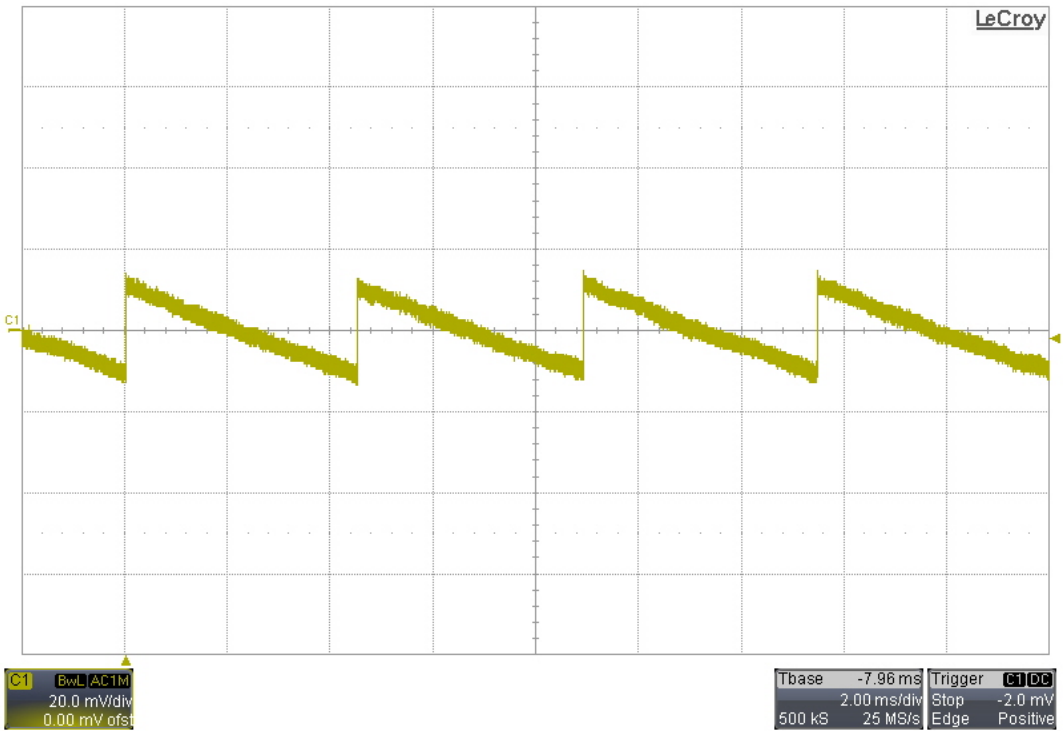
8.3 3.3V Buck; 0A Load



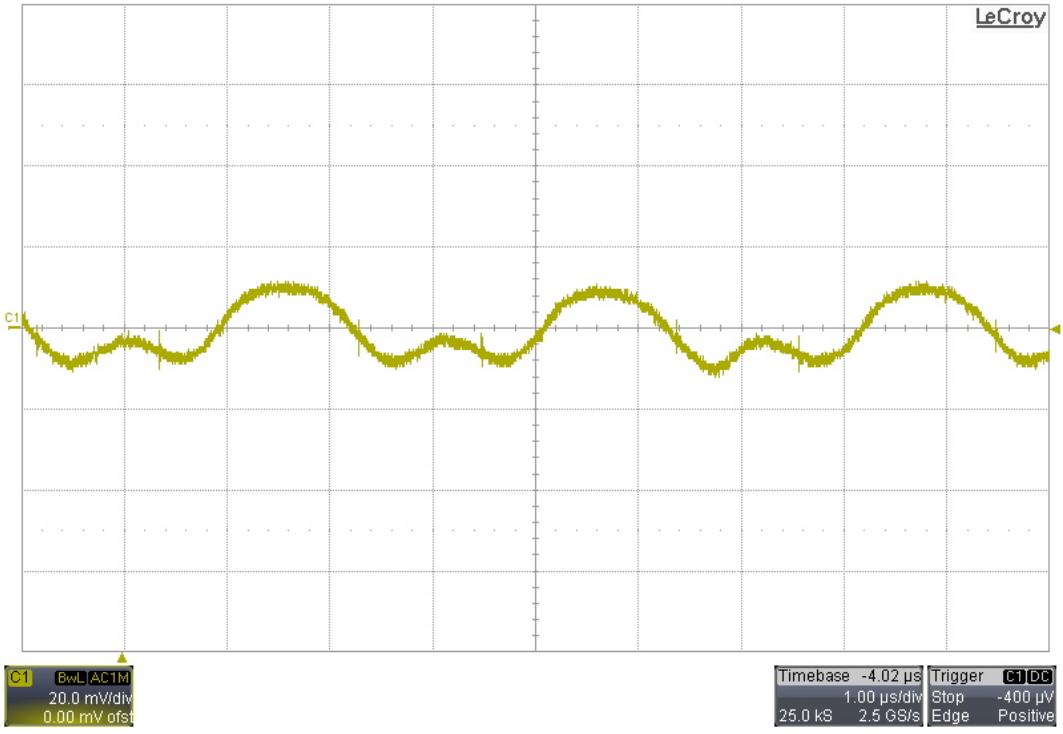
8.4 2.5V Buck; 2A Load



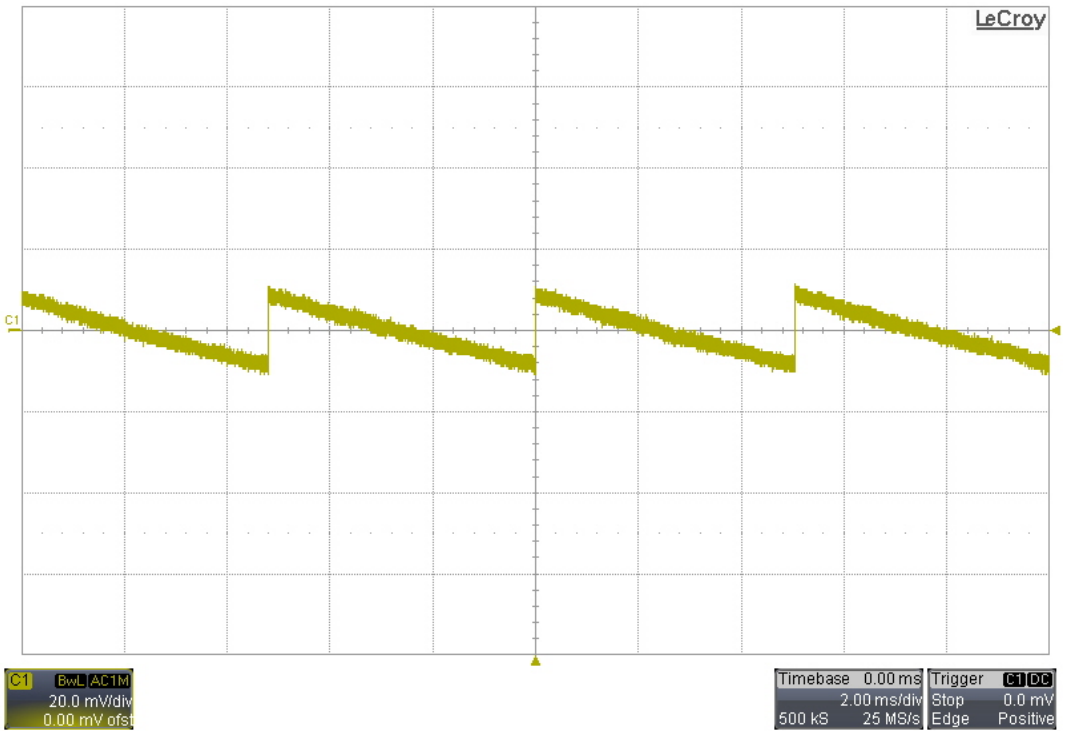
8.5 2.5V Buck; 0A Load



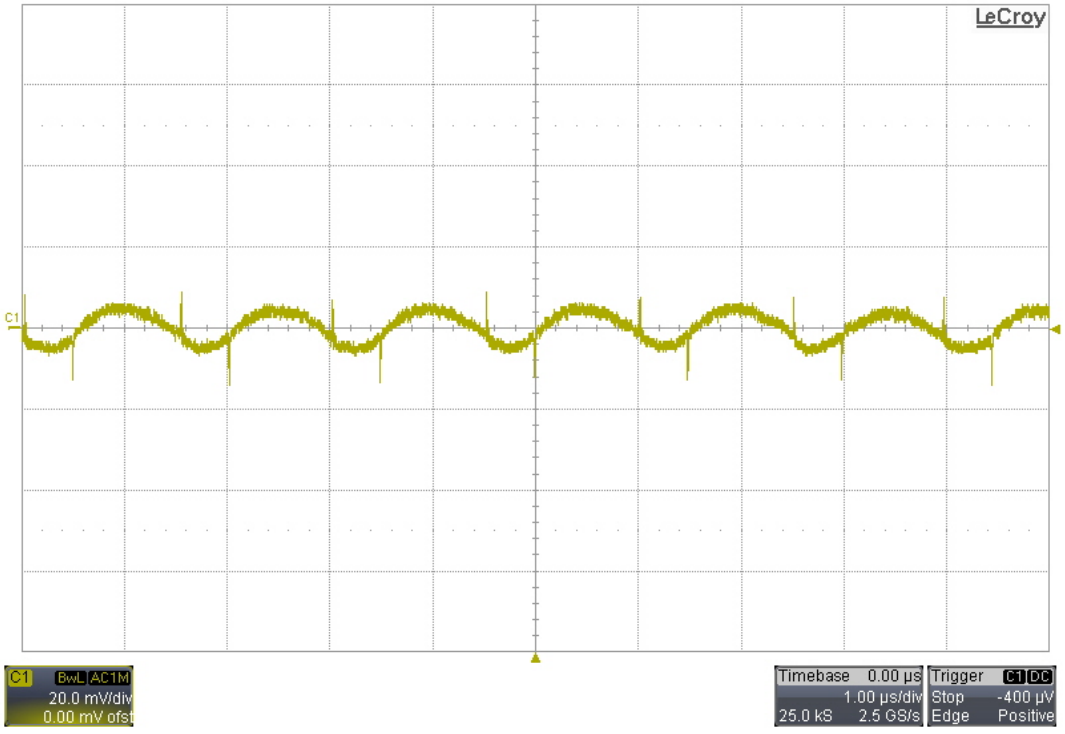
8.6 1.5V Buck; 3A Load



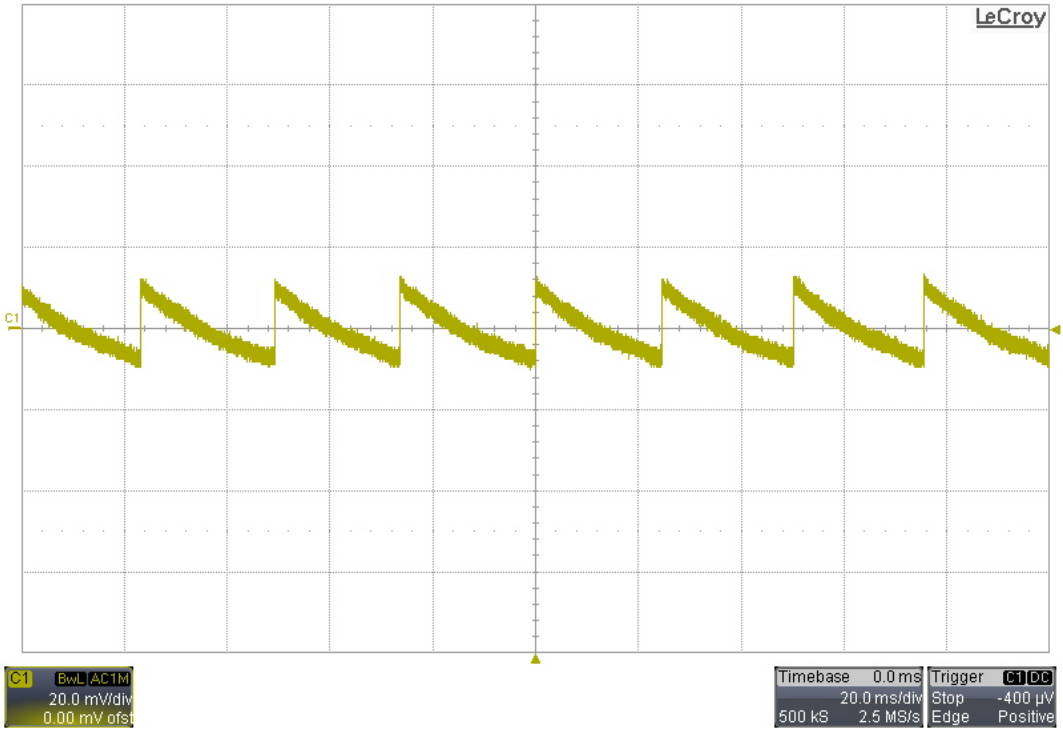
8.7 1.5V Buck; 0A Load



8.8 1.0V Buck; 5A Load

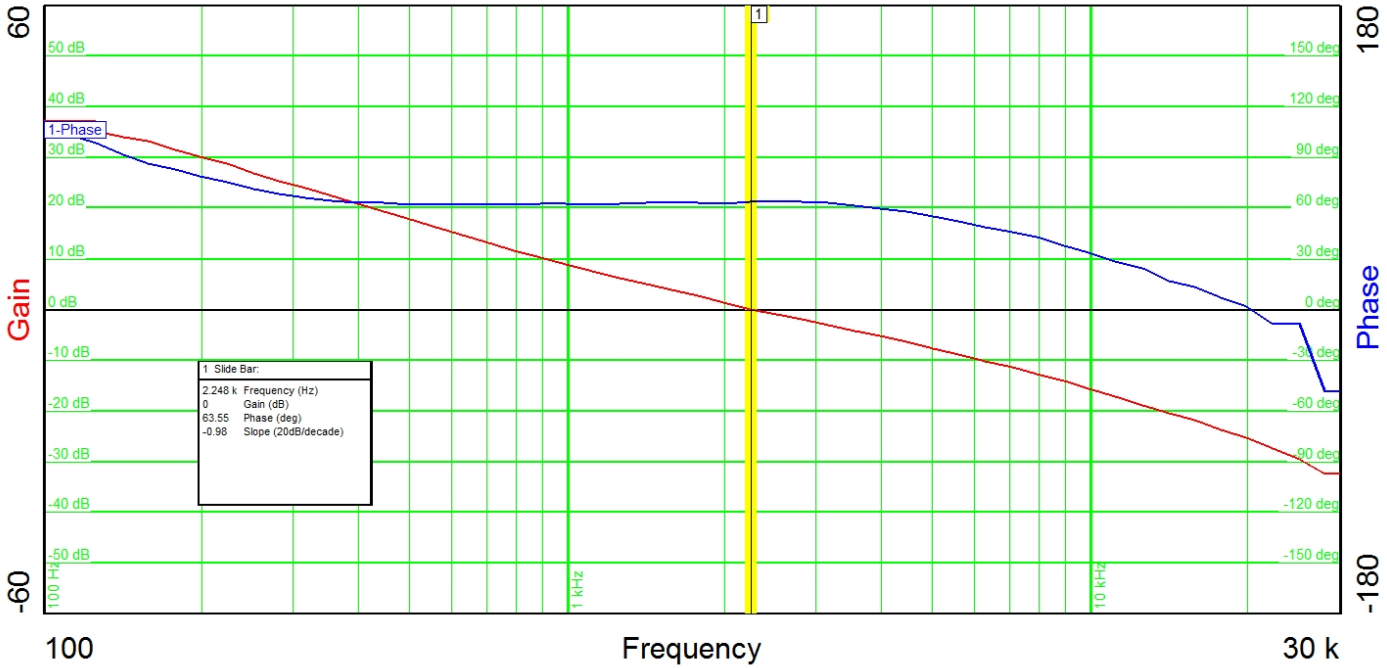


8.9 1.0V Buck; 0A Load



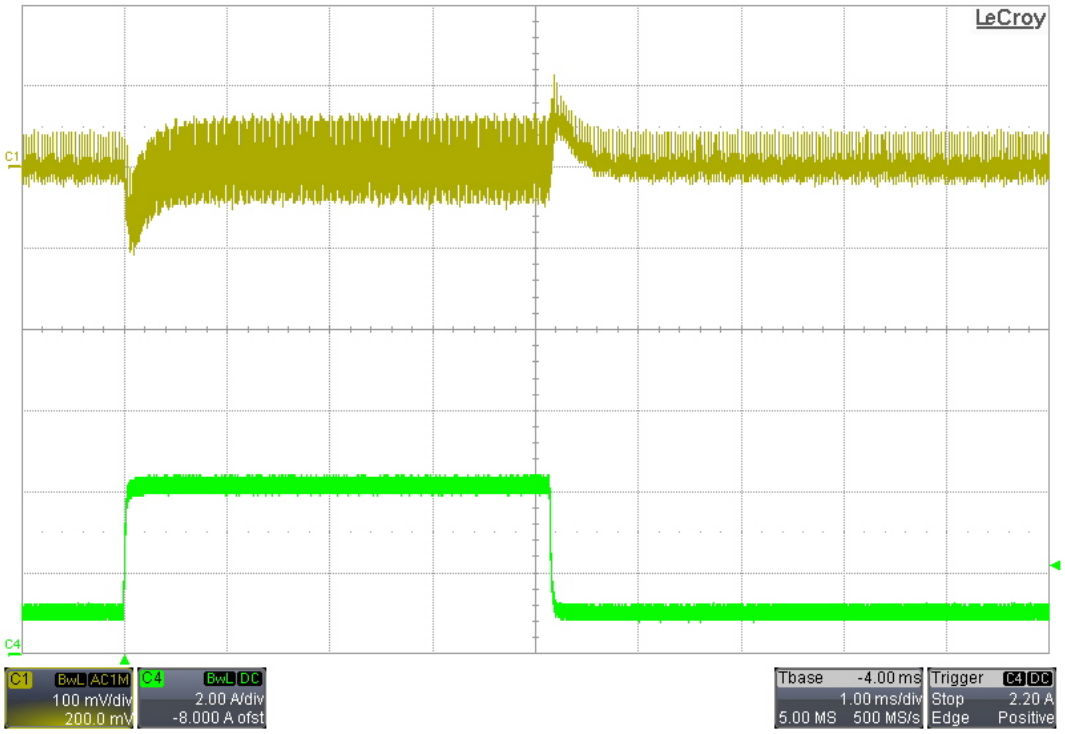
9 5V Flyback Loop Response

Output was loaded with 5A. The input was 120VAC/60Hz.

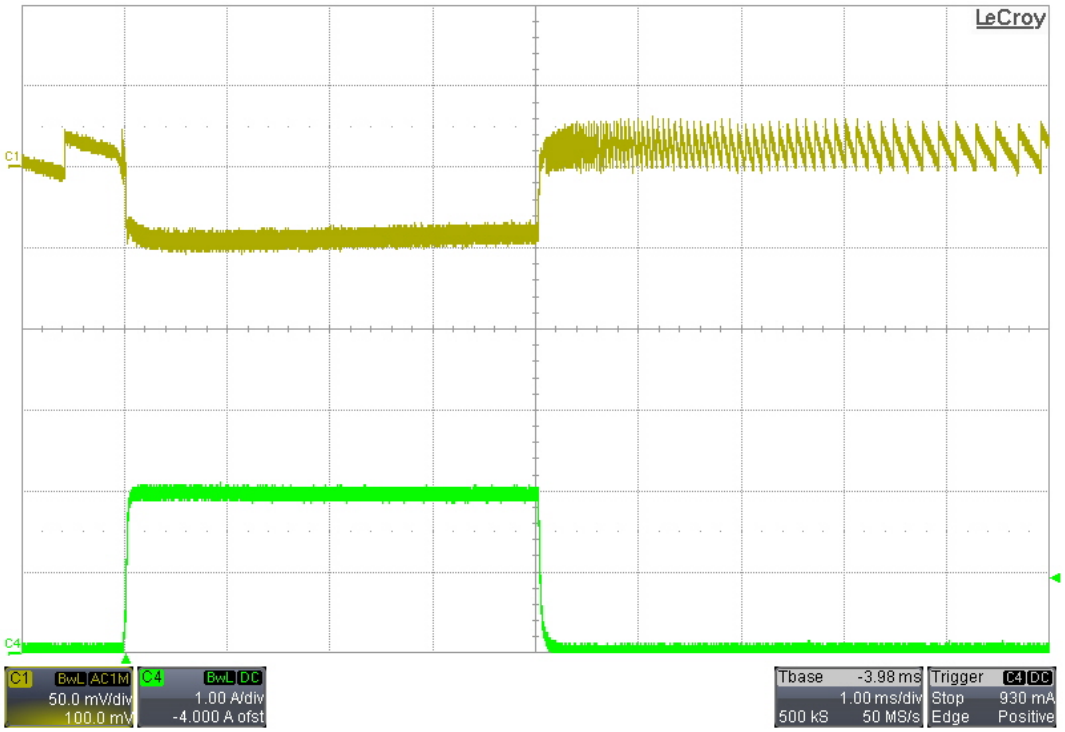


10 Load Transients

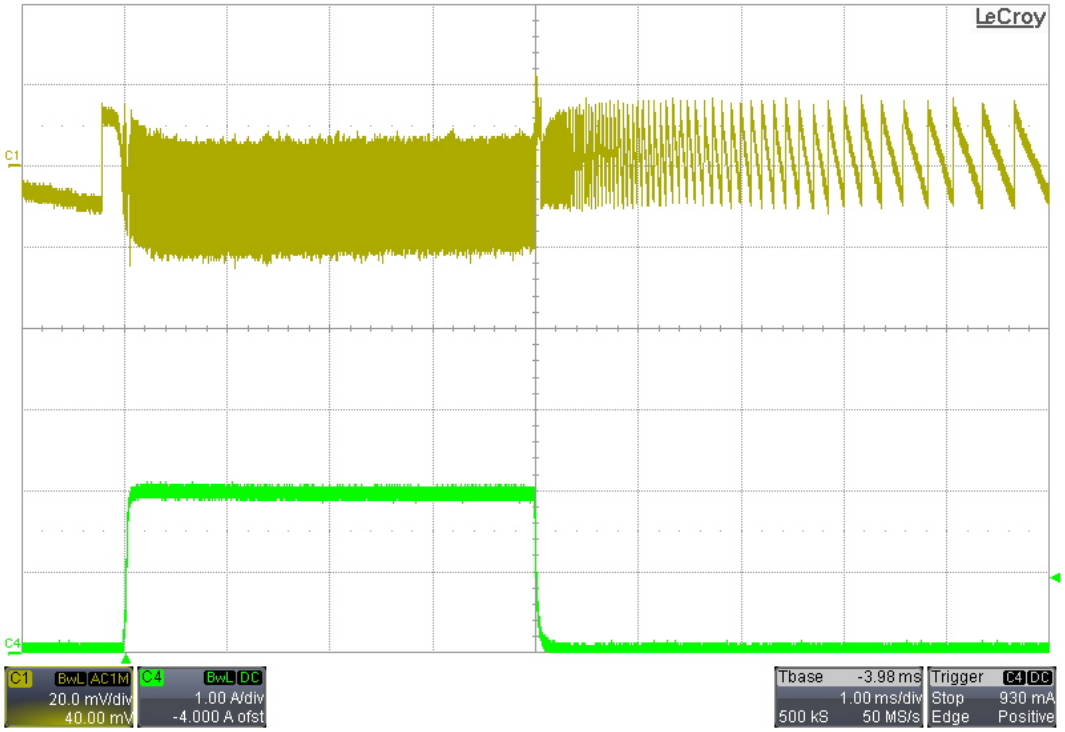
10.1 5V Flyback



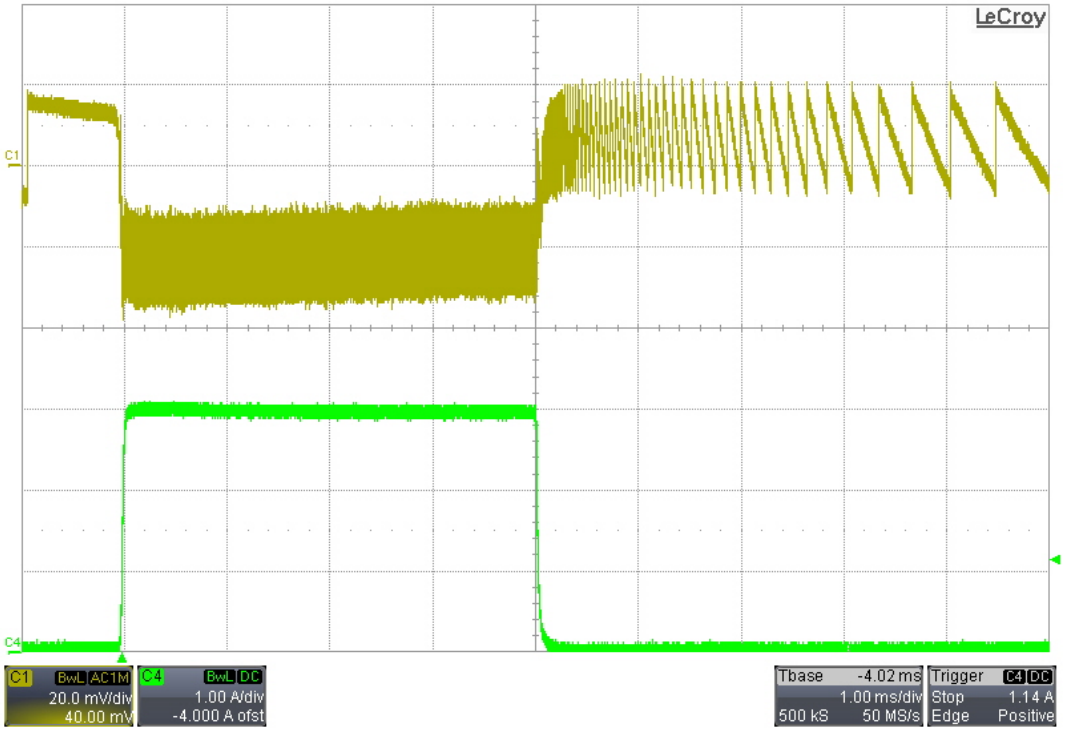
10.2 3.3V Buck



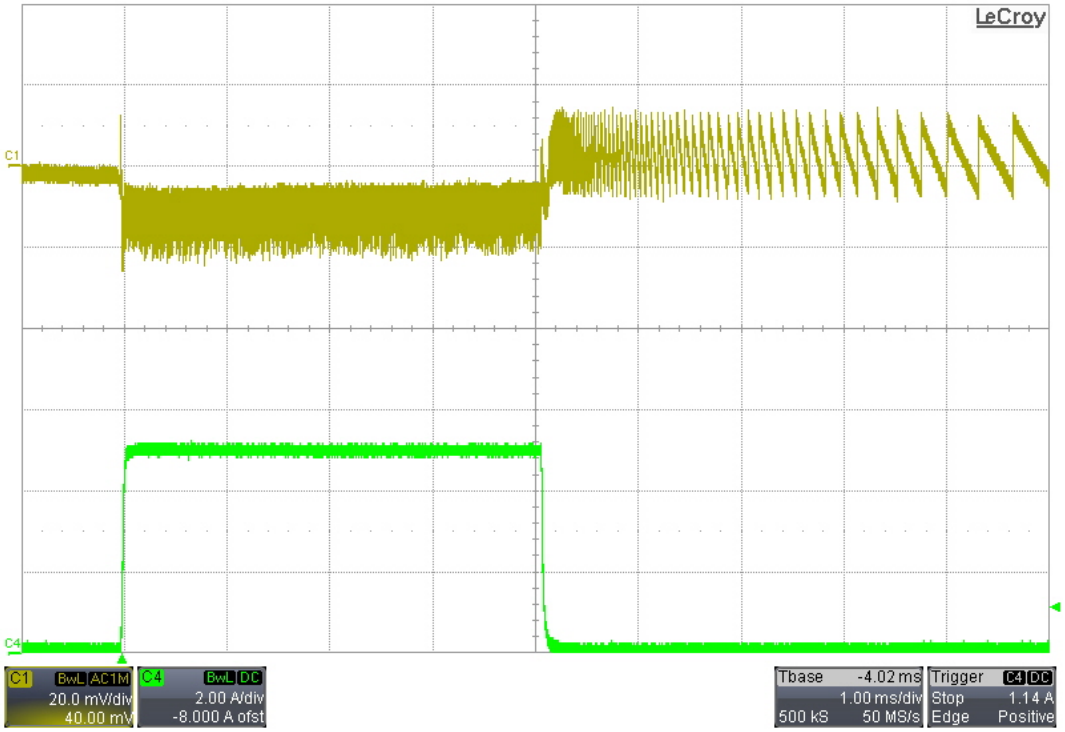
10.3 2.5V Buck



10.4 1.5V Buck



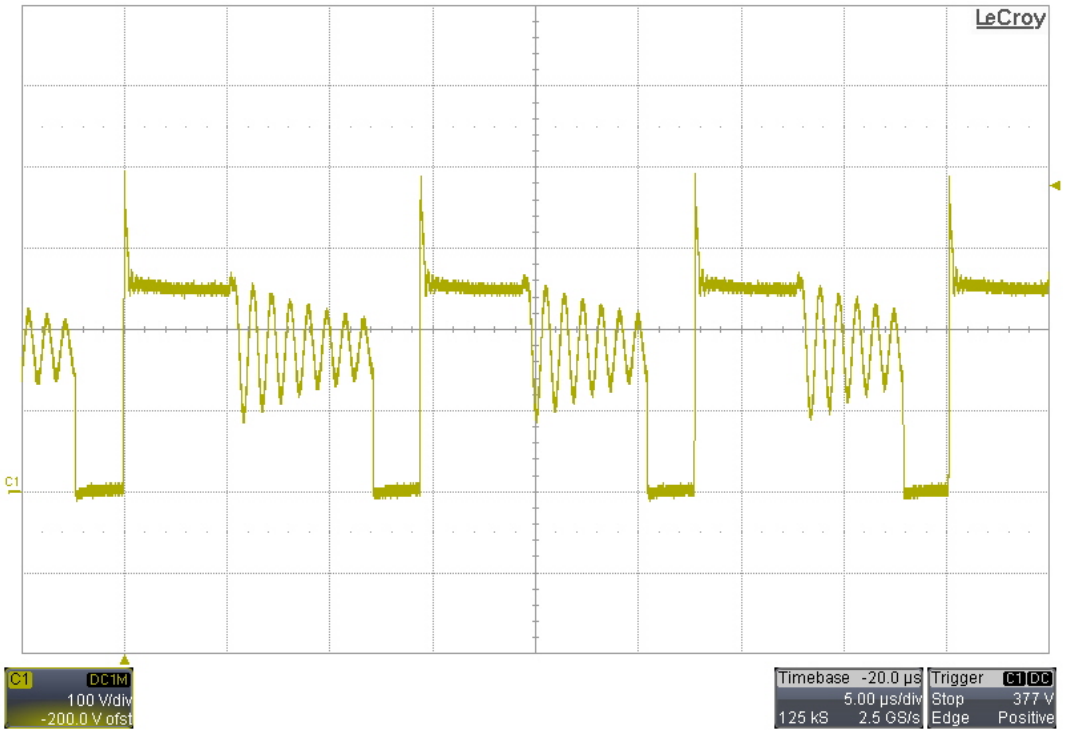
10.5 1.0V Buck



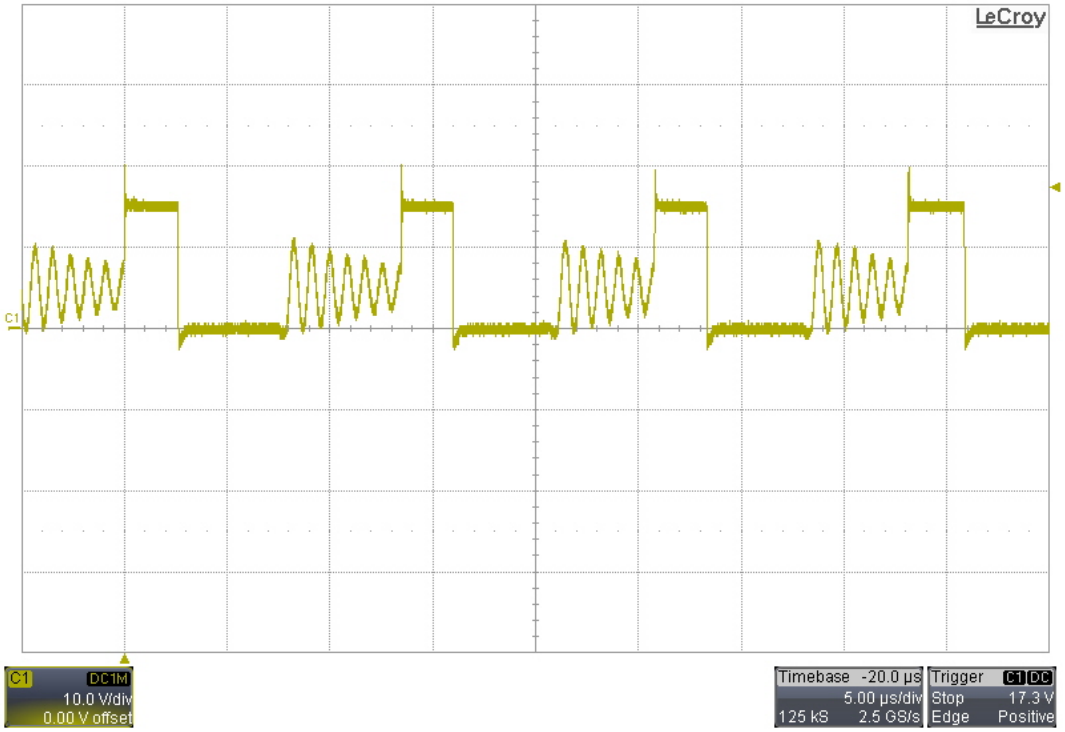
11 5V Flyback Switching Waveforms

The input was 132VAC/60Hz, and the output was loaded with 5A.

11.1 Drain of Primary FET – Q2

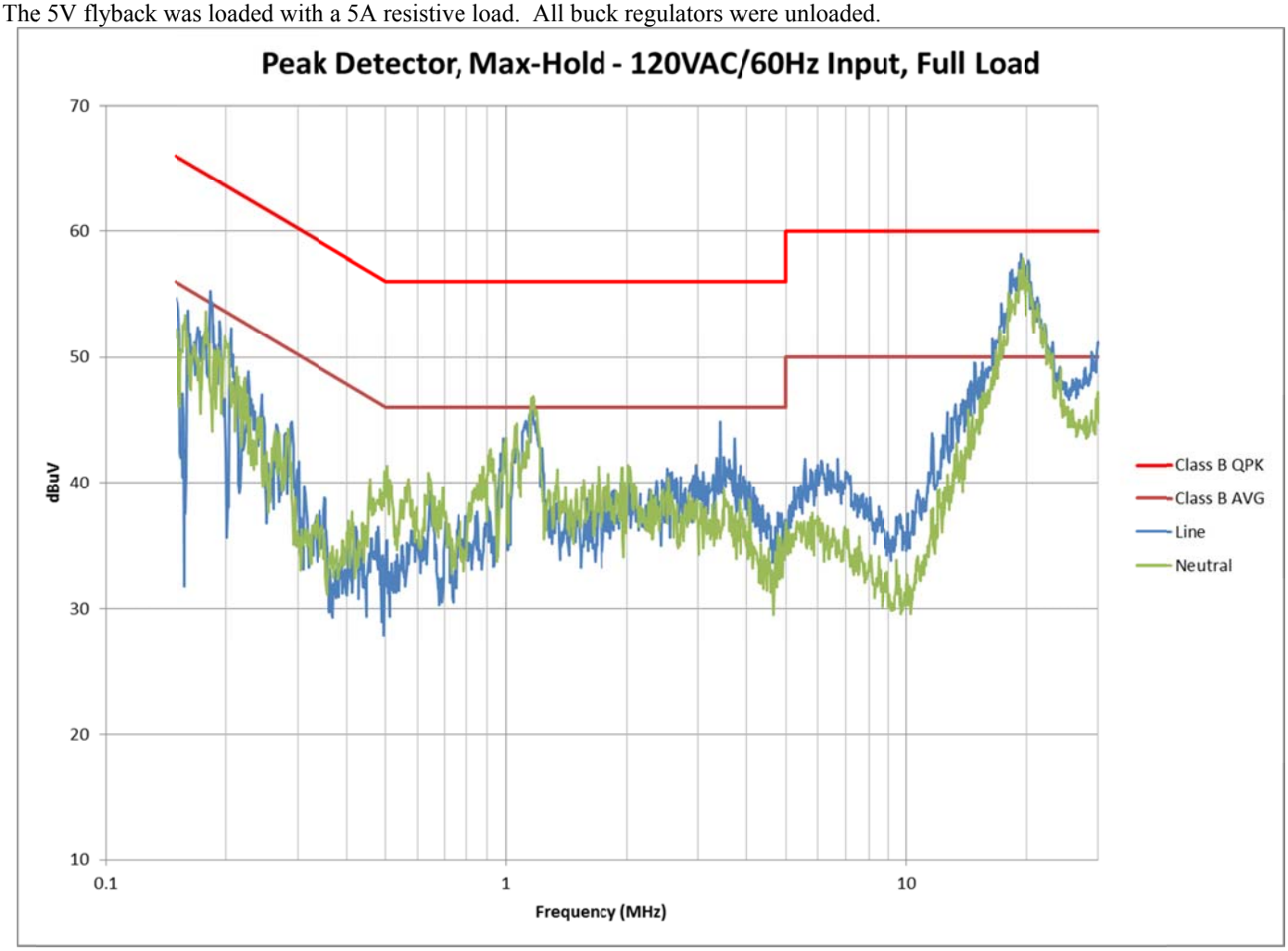


11.2 Drain of Sync FET – Q1



12 Conducted Emissions

The 5V flyback was loaded with a 5A resistive load. All buck regulators were unloaded.



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