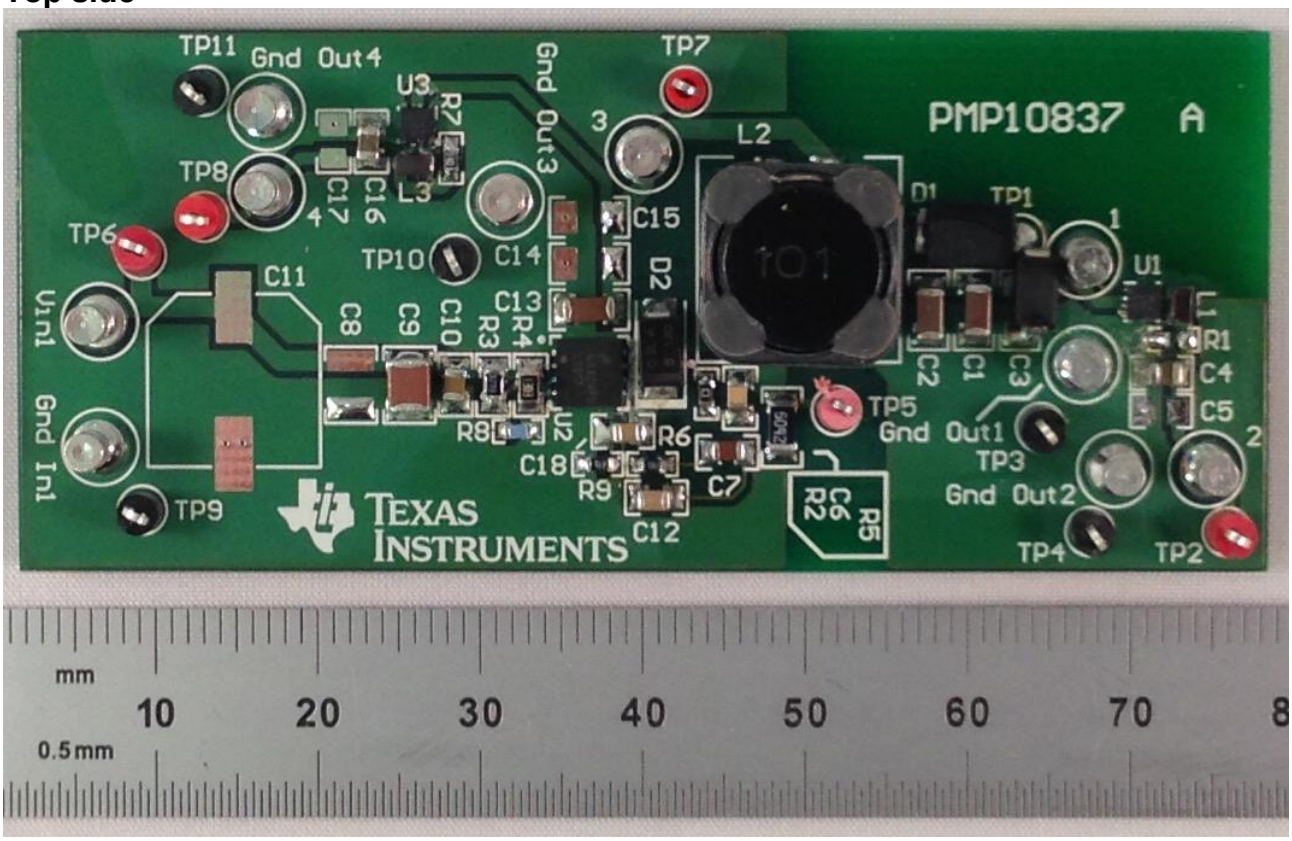
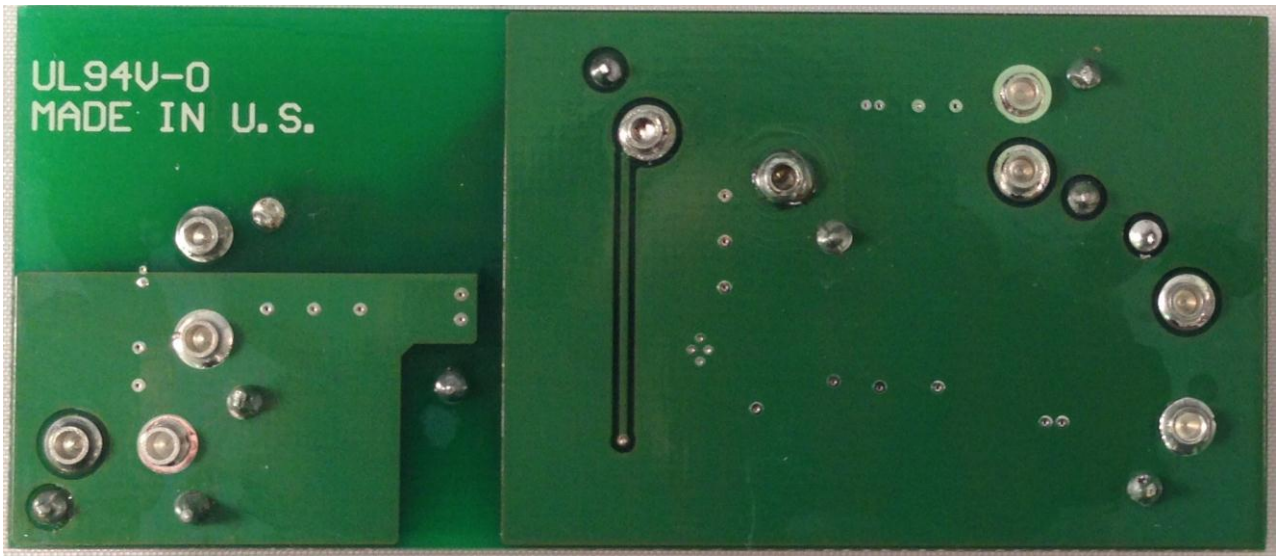
1 Photo

The photographs below show the PMP10837 Rev A assembly. This circuit was built on a PMP10837 Rev A PCB.

Top side



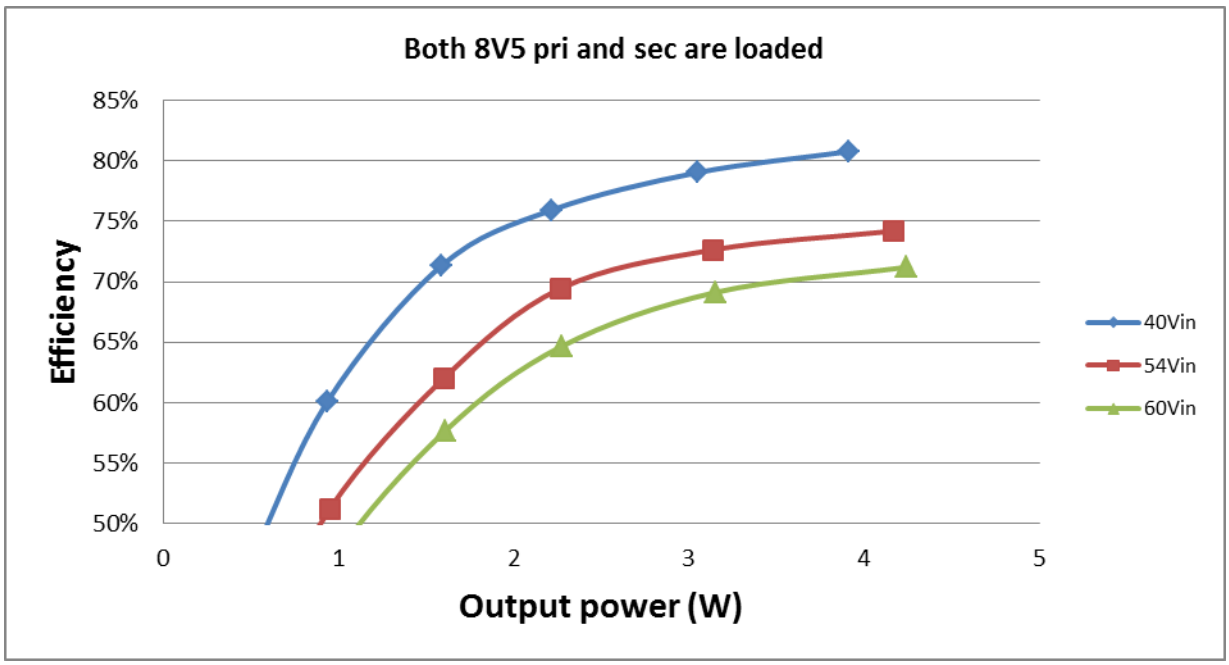
Bottom side



2 Converter Efficiency

The LM5017 Flybuck efficiency data are shown in the tables and graph below. Efficiency test was performed under two conditions: 1. Both 8V5_pri and 8V5_sec are loaded; 2. Only 8V5_sec is loaded. Notice that during this test, 5V and 3.3V are unloaded.

2.1 Both 8V5_pri and 8V5_sec are loaded



V_{in}=40V_{DC}

Vin(V)	Iin(A)	Pin(W)	8V5pri(V)	8V5pri(A)	8V5sec(V)	8V5sec(A)	Pout(W)	Eff. (%)
40.1	0.1208	4.84408	9.26	0.2004	7.61	0.2702	3.911926	80.76%
40.15	0.0962	3.86243	9.25	0.1513	8.24	0.2006	3.052469	79.03%
40.19	0.0727	2.921813	9.23	0.1	8.62	0.1503	2.218586	75.93%
40.12	0.0555	2.22666	9.23	0.0757	8.86	0.1004	1.588255	71.33%
40.15	0.0388	1.55782	9.22	0.05078	9.22	0.05071	0.935738	60.07%
40.17	0.02563	1.029557	9.23	0.02501	9.85	0.02478	0.474925	46.13%
40.19	0.01385	27.87	9.24	0	12.25	0	0	0.00%

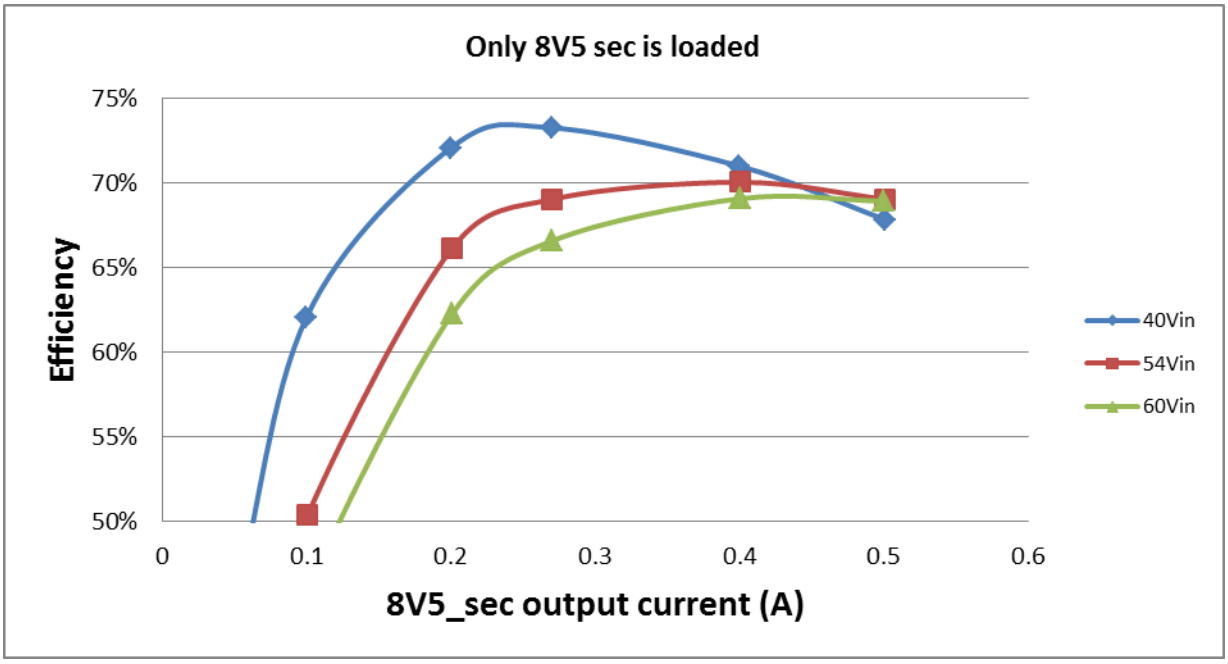
V_{in}=54V_{DC}

Vin(V)	Iin(A)	Pin(W)	8V5pri(V)	8V5pri(A)	8V5sec(V)	8V5sec(A)	Pout(W)	Eff. (%)
54.07	0.104	5.62328	9.27	0.2005	8.55	0.2706	4.172265	74.20%
54.11	0.0799	4.323389	9.28	0.1517	8.66	0.2001	3.140642	72.64%
54.15	0.0603	3.265245	9.28	0.1022	8.76	0.1506	2.267672	69.45%
54.17	0.0477	2.583909	9.27	0.0748	9.08	0.1002	1.603212	62.05%
54.2	0.03421	1.854182	9.24	0.05036	9.66	0.05014	0.949679	51.22%
54.22	0.02442	1.324052	9.24	0.02499	11	0.0251	0.507008	38.29%
54.23	0.01792	27.87	9.25	0	12.37	0	0	0.00%

V_{in}=60V_{DC}

Vin(V)	Iin(A)	Pin(W)	8V5pri(V)	8V5pri(A)	8V5sec(V)	8V5sec(A)	Pout(W)	Eff. (%)
59.95	0.0993	5.953035	9.28	0.2008	8.79	0.2702	4.238482	71.20%
59.99	0.076	4.55924	9.29	0.1491	8.8	0.2007	3.151299	69.12%
60.02	0.0586	3.517172	9.28	0.1008	8.92	0.1501	2.274316	64.66%
60.04	0.0465	2.79186	9.26	0.0747	9.17	0.1002	1.610556	57.69%
60.07	0.0341	2.048387	9.25	0.04987	9.76	0.05082	0.957301	46.73%
60.08	0.02567	1.542254	9.26	0.0251	11.31	0.02515	0.516873	33.51%
60.09	0.02005	27.87	9.27	0	12.38	0	0	0.00%

2.2 Only 8V5_sec is loaded



V_{in}=40V_{DC}

Vin(V)	Iin(A)	Pin(W)	8V5pri(V)	8V5pri(A)	8V5sec(V)	8V5sec(A)	Pout(W)	Eff. (%)
40.12	0.1088	4.365056	9.46	0	5.91	0.501	2.96091	67.83%
40.16	0.0933	3.746928	9.41	0	6.65	0.4	2.66	70.99%
40.2	0.0695	2.7939	9.32	0	7.58	0.27	2.0466	73.25%
40.22	0.0552	2.220144	9.3	0	8	0.2	1.6	72.07%
40.26	0.03497	1.407892	9.25	0	8.74	0.1	0.874	62.08%
40.28	0.02568	1.03439	9.23	0	9.26	0.05	0.463	44.76%
40.3	0.01382	27.87	9.24	0	12.31	0	0	0.00%

V_{in}=54V_{DC}

Vin(V)	Iin(A)	Pin(W)	8V5pri(V)	8V5pri(A)	8V5sec(V)	8V5sec(A)	Pout(W)	Eff. (%)
54.04	0.0927	5.009508	9.44	0	6.9	0.5012	3.45828	69.03%
54.07	0.078	4.21746	9.4	0	7.37	0.4008	2.953896	70.04%
54.11	0.0574	3.105914	9.34	0	7.93	0.2704	2.144272	69.04%
54.13	0.0469	2.538697	9.31	0	8.37	0.2005	1.678185	66.10%
54.15	0.03382	1.831353	9.26	0	9.17	0.1006	0.922502	50.37%
54.17	0.02462	1.333665	9.24	0	9.82	0.05005	0.491491	36.85%
54.18	0.01791	27.87	9.25	0	12.4	0	0	0.00%

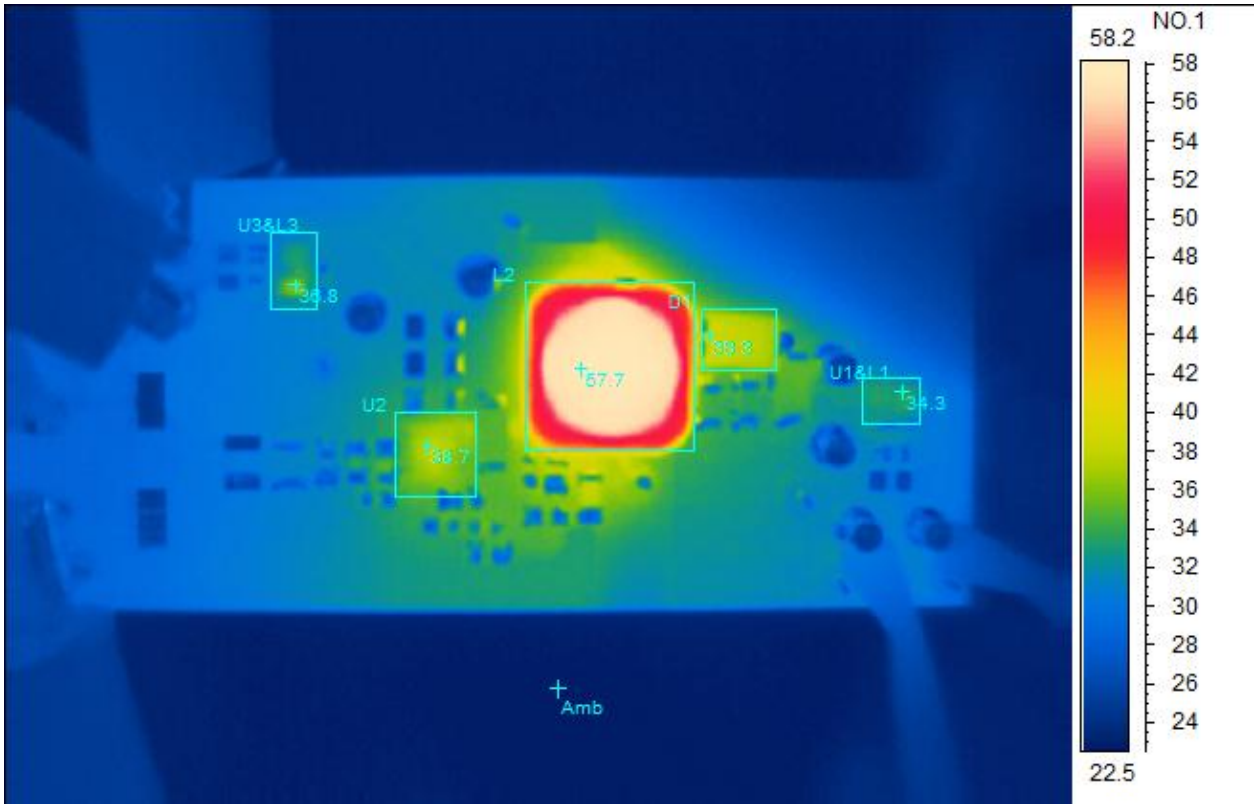
V_{in}=60V_{DC}

Vin(V)	Iin(A)	Pin(W)	8V5pri(V)	8V5pri(A)	8V5sec(V)	8V5sec(A)	Pout(W)	Eff. (%)
59.98	0.0876	5.254248	9.41	0	7.24	0.5002	3.621448	68.92%
60	0.0737	4.422	9.38	0	7.63	0.4003	3.054289	69.07%
60.04	0.0547	3.284188	9.33	0	8.09	0.2703	2.186727	66.58%
60.05	0.0456	2.73828	9.3	0	8.49	0.2008	1.704792	62.26%
60.08	0.0336	2.018688	9.26	0	9.24	0.1	0.924	45.77%
60.09	0.02544	1.52869	9.26	0	10.03	0.04996	0.501099	32.78%
60.1	0.02005	27.87	9.27	0	12.41	0	0	0.00%

3 Thermal Images

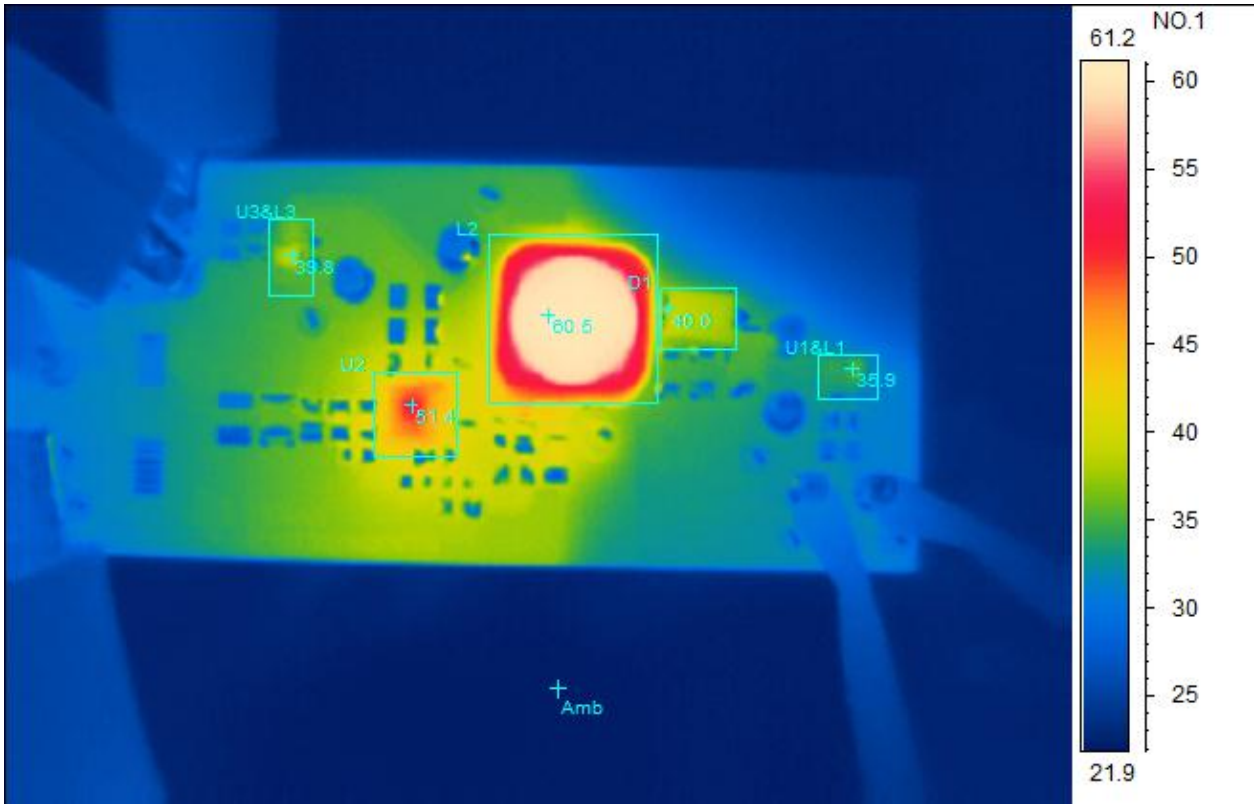
The thermal images below show the top view of the board under different input conditions. The ambient temperature was 20ºC with no forced air flow.

3.1 V_{in}=40V_{DC}, 8V5_pri@200mA, 8V5_sec@270mA, 3.3V@150mA, 5V@100mA



Spot analysis	Value
Amb Temperature	22.7°C
Area analysis	**Value**
L2Max	57.7°C
D1Max	39.3°C
U2Max	38.7°C
U3&L3Max	36.8°C
U1&L1Max	34.3°C

3.2 V_{in}=54V_{DC}, 8V5_pri@200mA, 8V5_sec@270mA, 3.3V@150mA, 5V@100mA

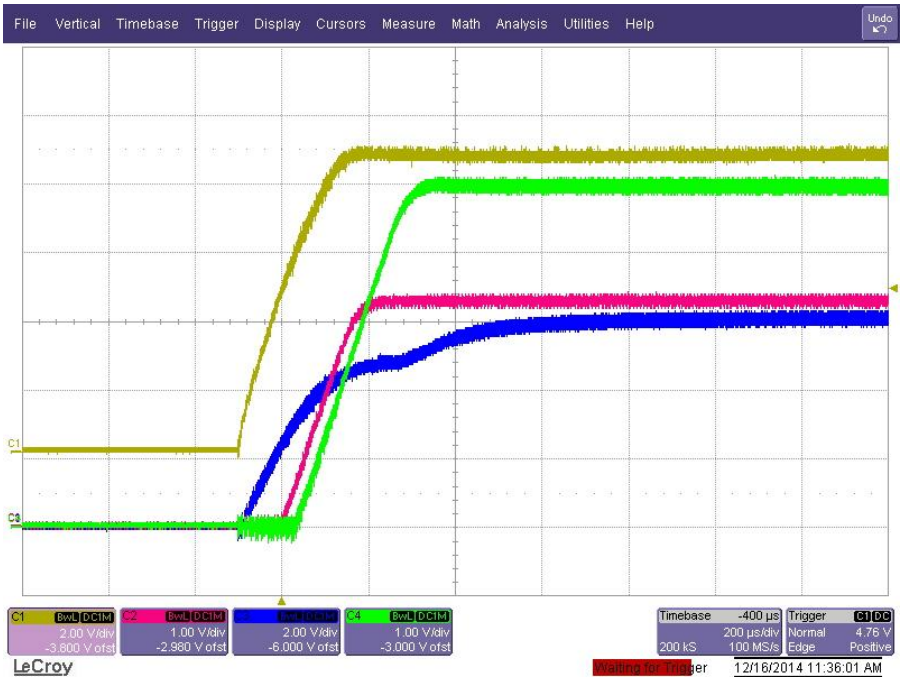


Spot analysis	Value
Amb Temperature	22.2°C
Area analysis	**Value**
L2Max	60.5°C
D1Max	40.0°C
U2Max	51.4°C
U3&L3Max	39.8°C
U1&L1Max	35.9°C

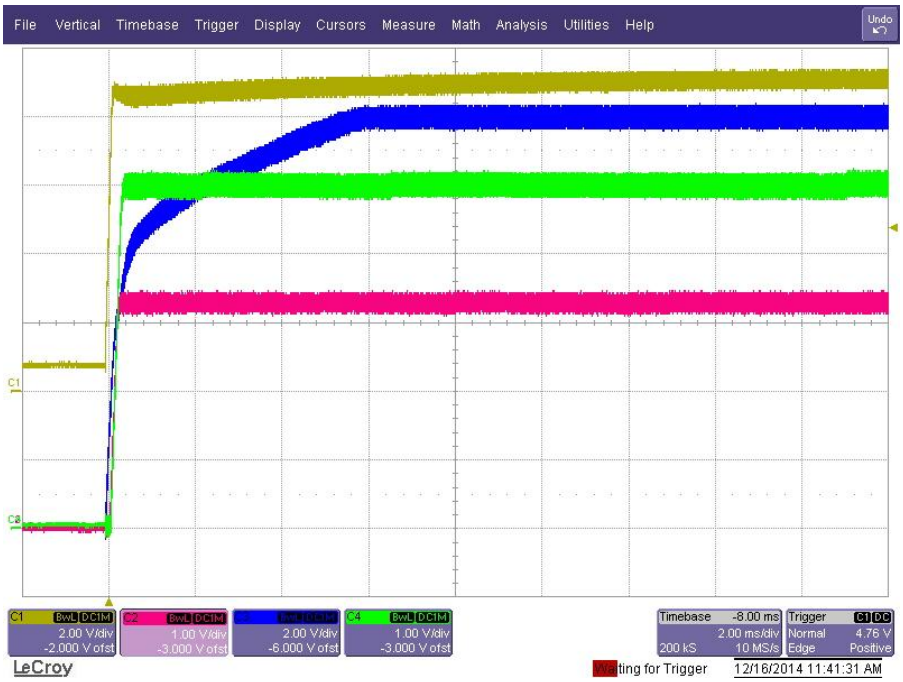
4 Startup Waveforms

The output voltages at startup are tested with resistive loads and are shown in the images below. CH1: 8V5pri, CH2: 3.3V, CH3: 8V5sec, CH4: 5V.

4.1 Start Up @ 40V_{in}: 8V5$_{pri}$@200mA, 8V5$_{sec}$@270mA, 5V@100mA, 3.3V@150mA.

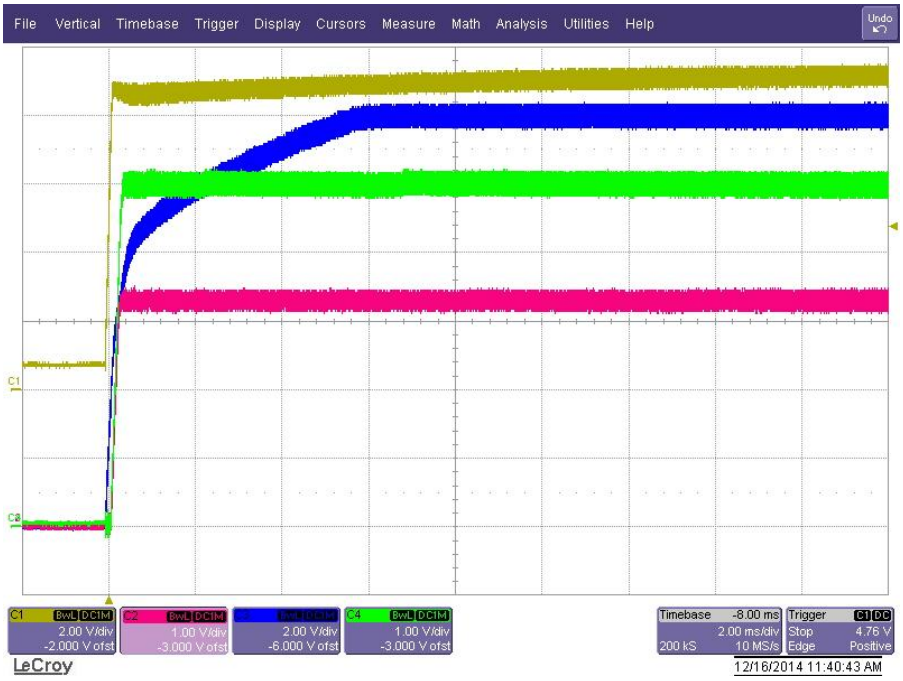


4.2 Start Up @ 40V_{in}: no load.



4.3 Start Up @ 54V_{in}: 8V5$_{pri}$@200mA, 8V5$_{sec}$@270mA, 5V@100mA, 3.3V@150mA.

4.4 Start Up @ 54V_{in}: no load.

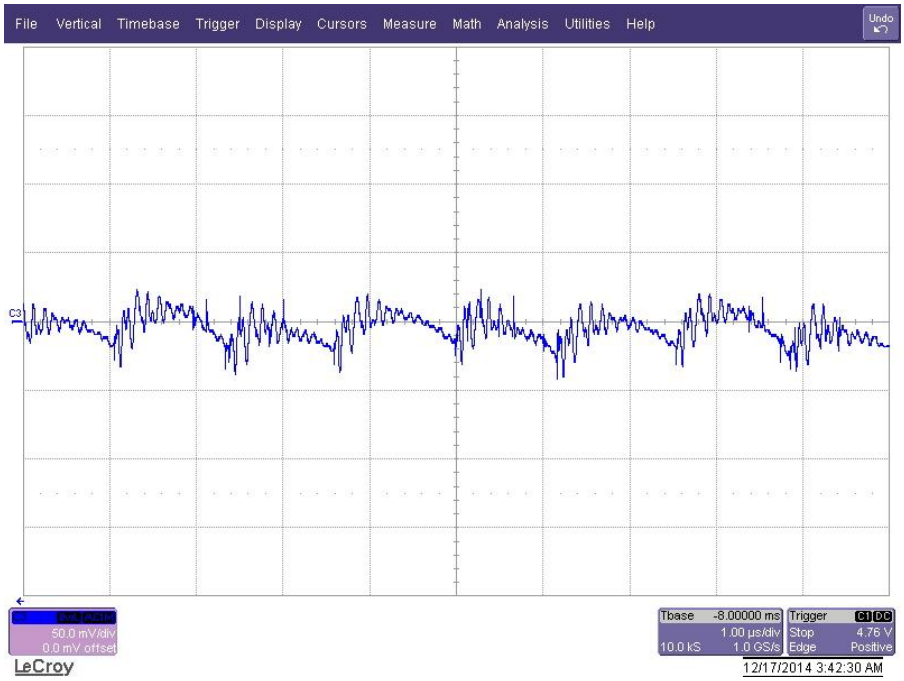


5 Output Ripple Voltages

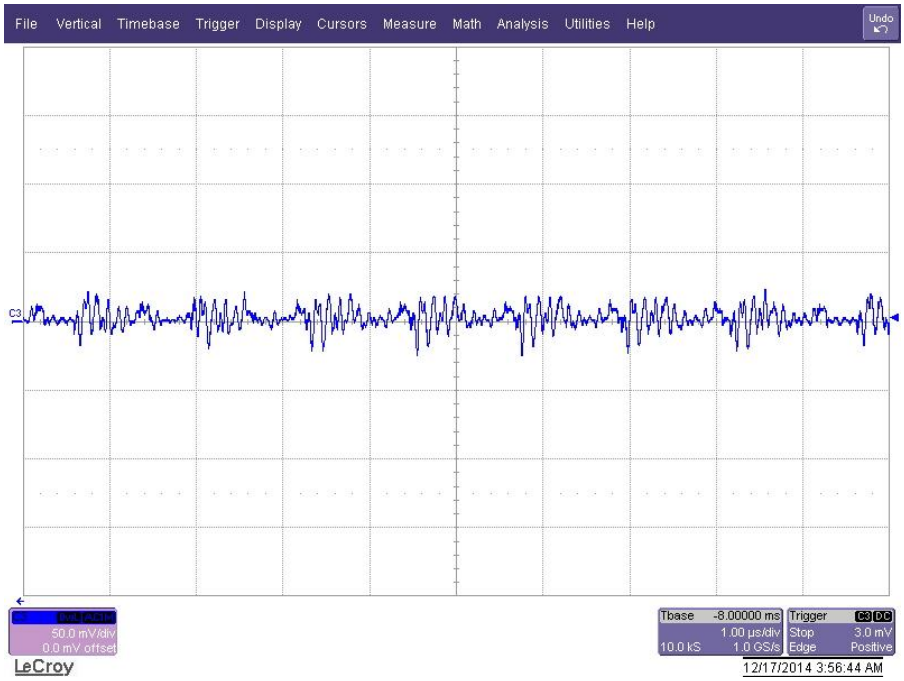
The output ripple voltages are tested with resistive loads and are shown in the plots below.

5.1 40V_{in}: 8V5$_{pri}$@200mA, 8V5$_{sec}$@270mA, 5V@100mA, 3.3V@150mA.

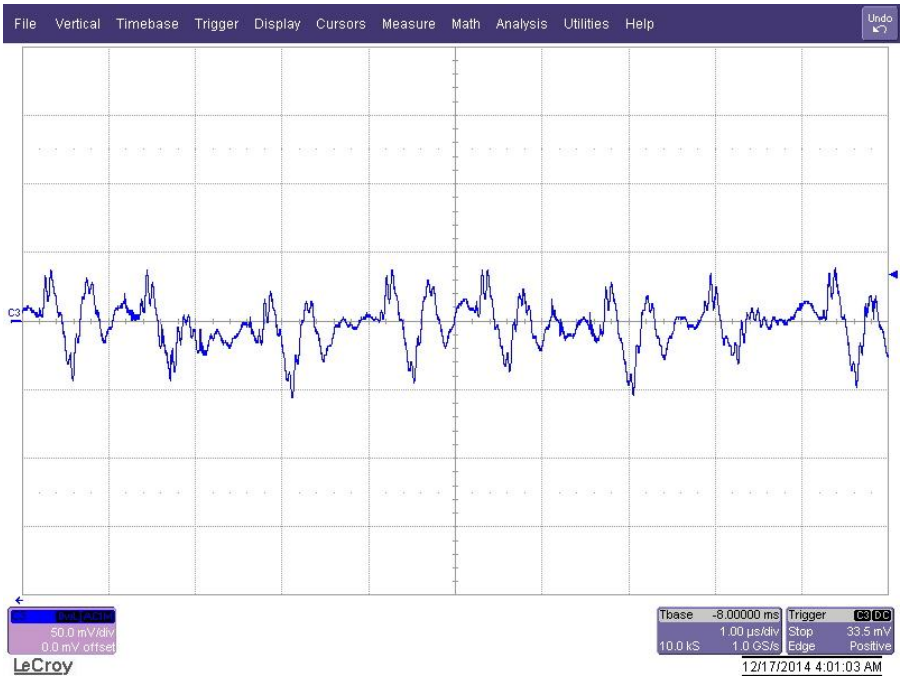
5.1.1 8V5pri:



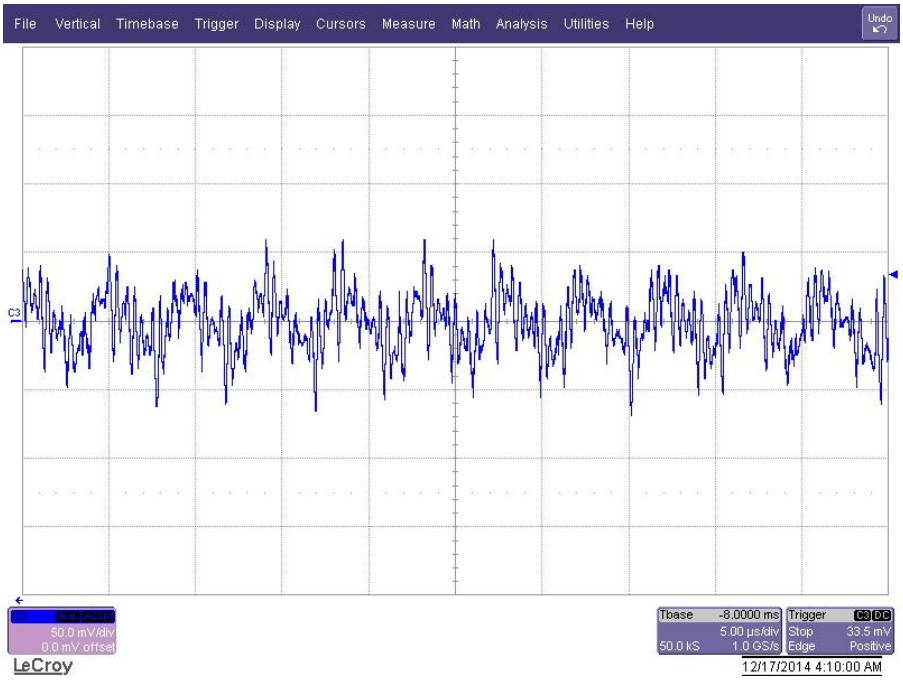
5.1.2 3.3V:



5.1.3 8V5sec:

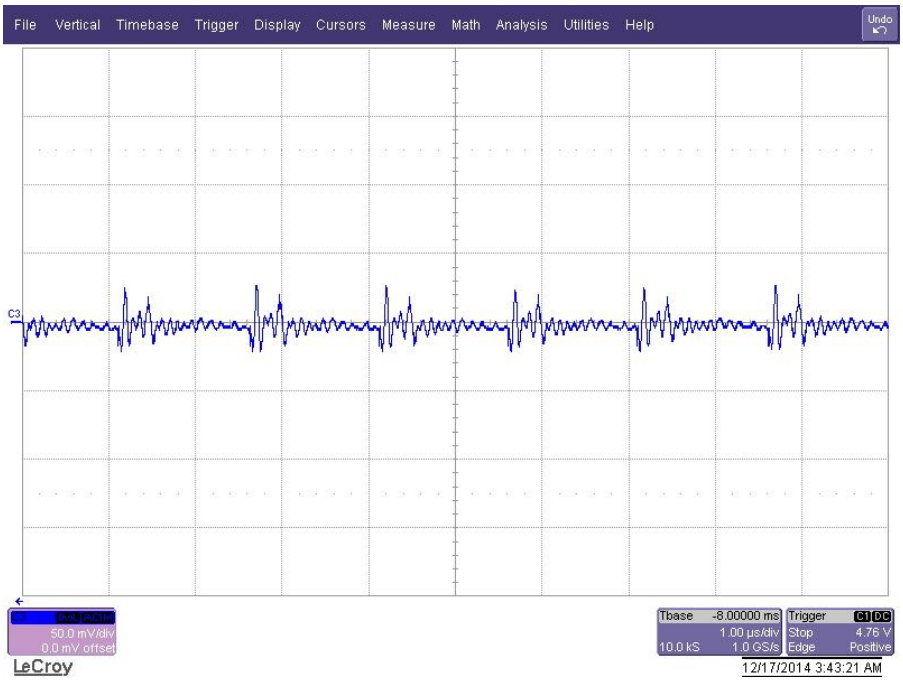


5.1.4 5V:

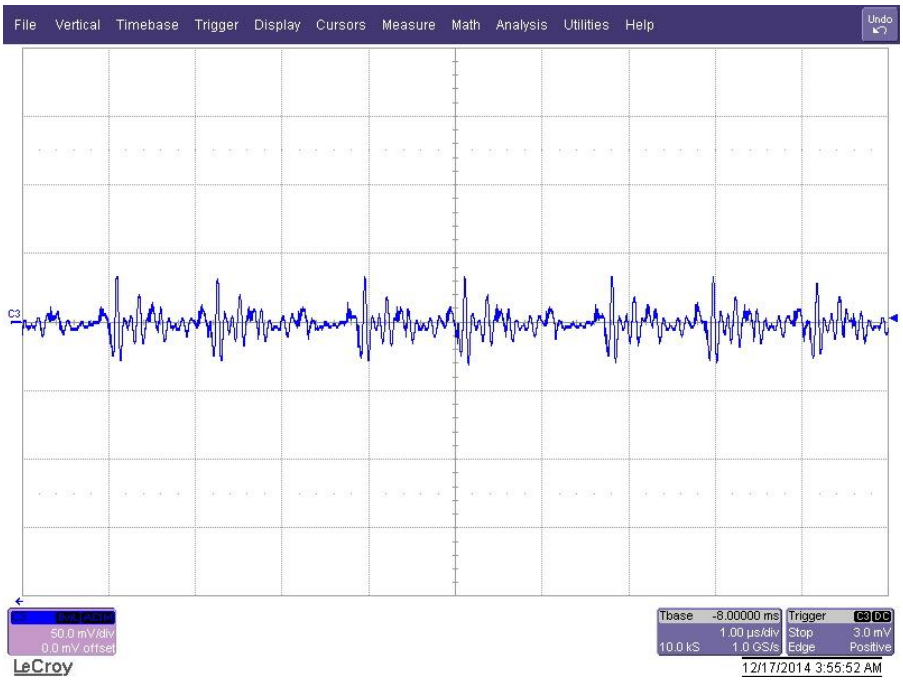


5.2 40V_{in}: No load.

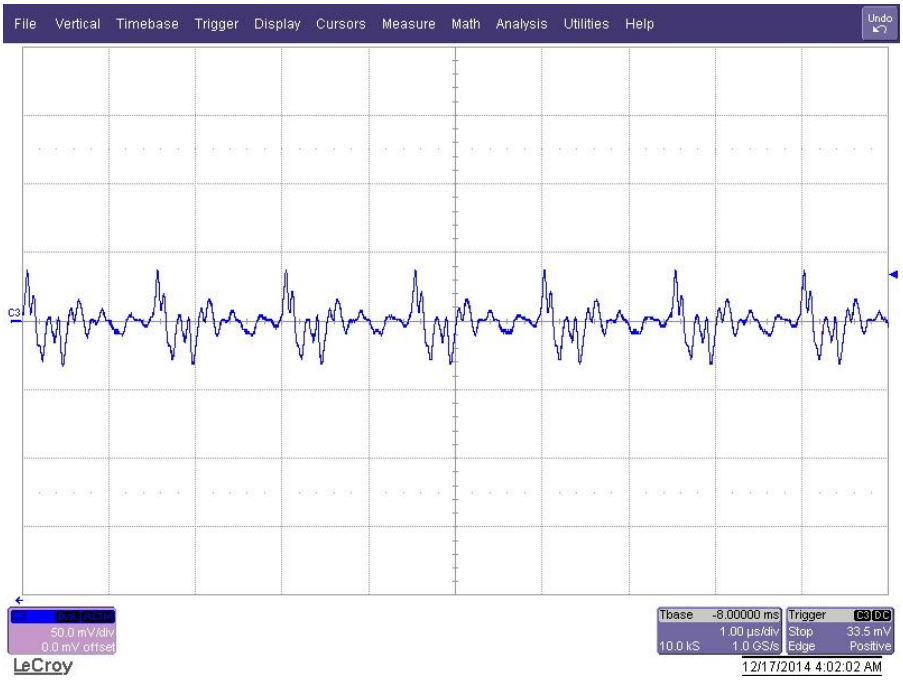
5.2.1 8V5pri:



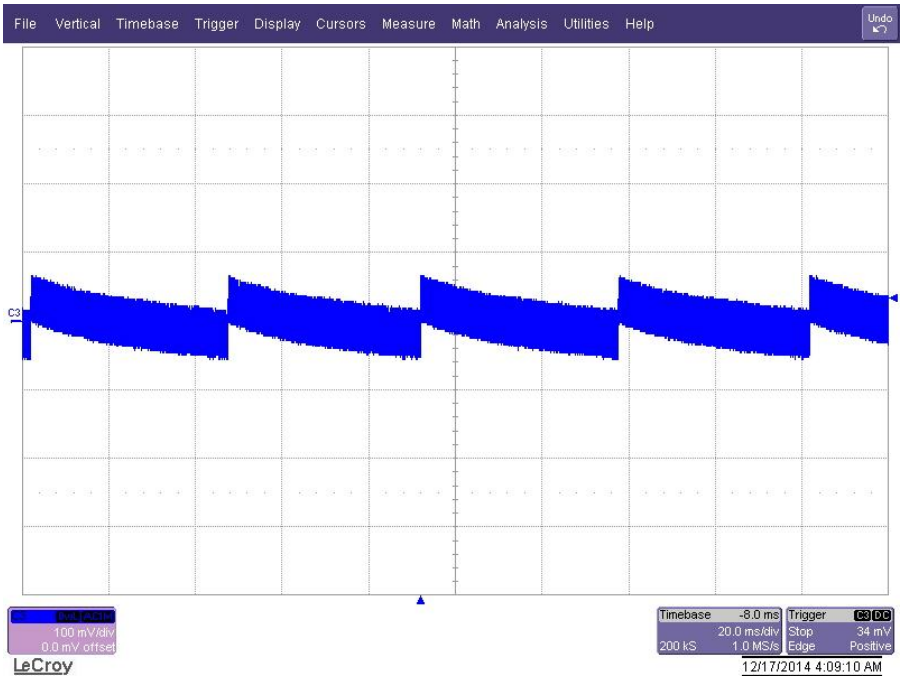
5.2.2 3.3V:



5.2.3 8V5sec:

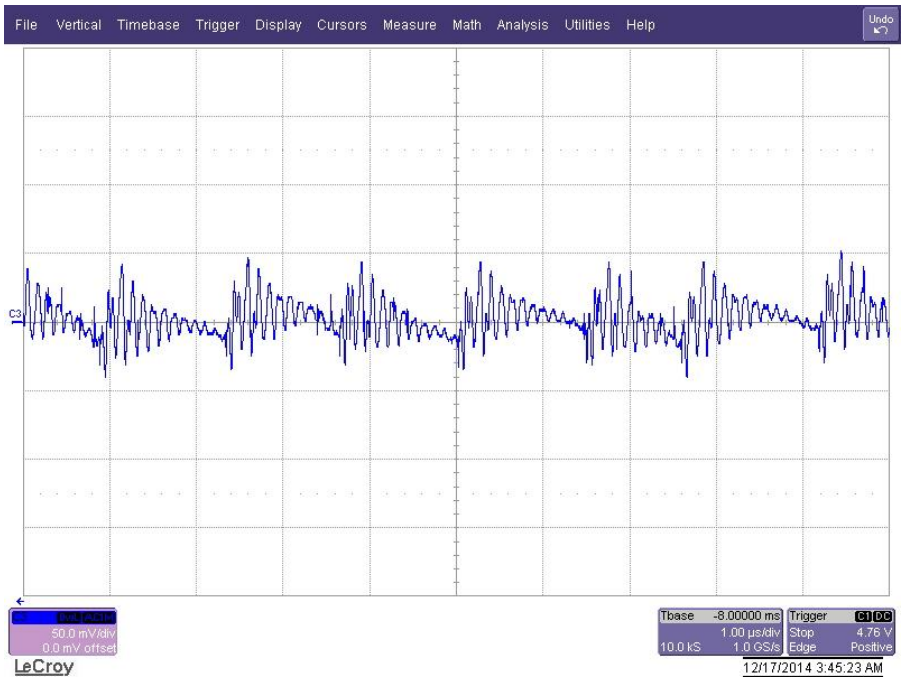


5.2.4 5V:

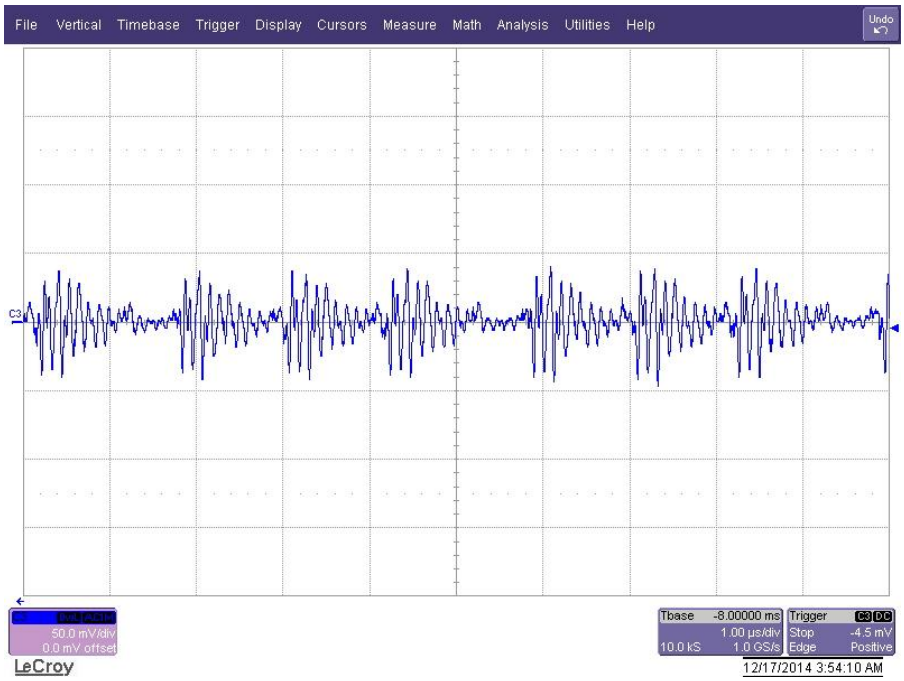


5.3 54V_{in}: 8V5$_{pri}$@200mA, 8V5$_{sec}$@270mA, 5V@100mA, 3.3V@150mA.

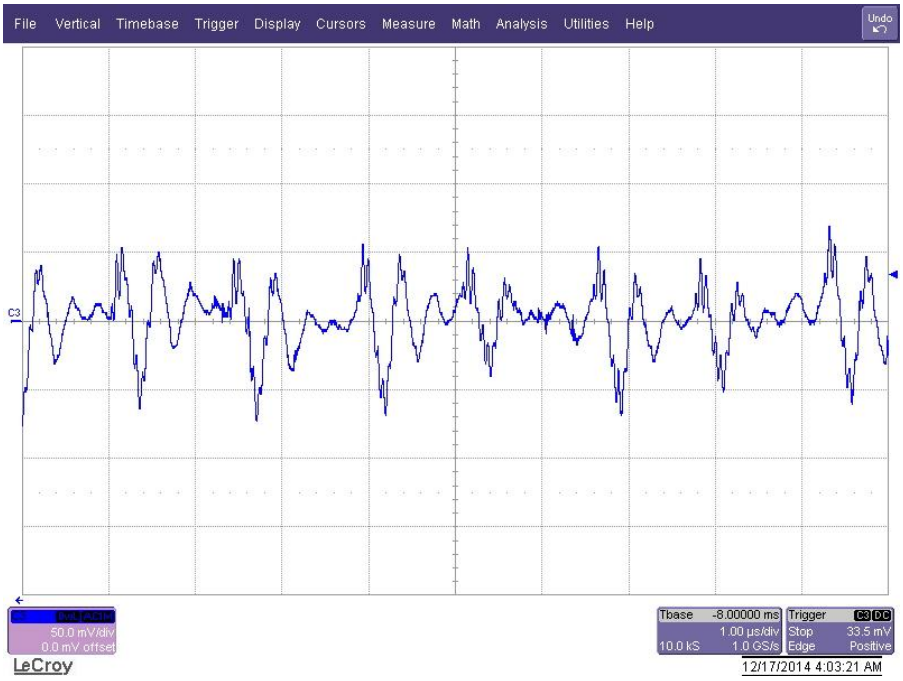
5.3.1 8V5pri:



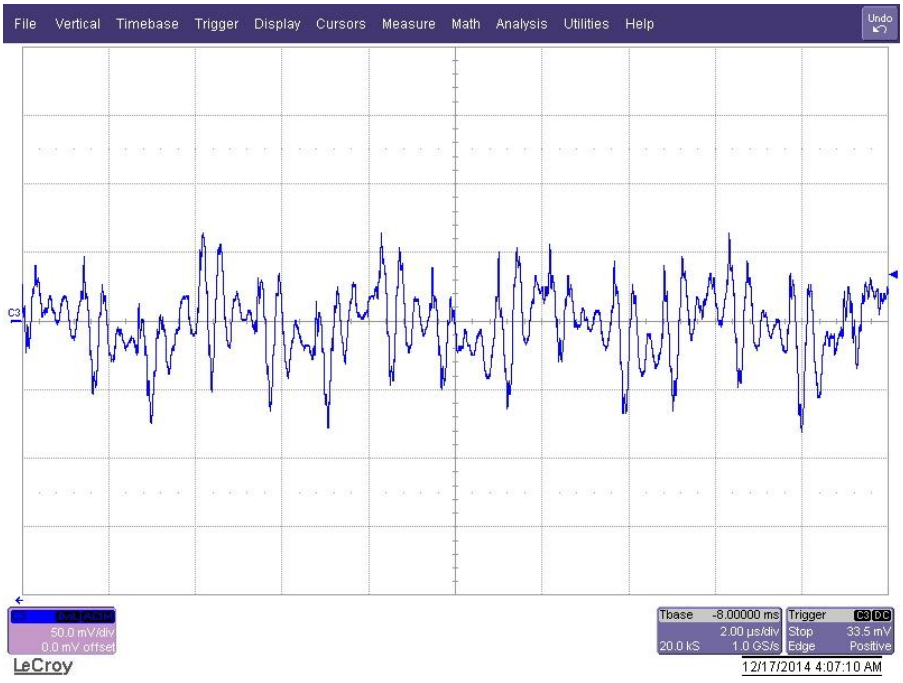
5.3.2 3.3V:



5.3.3 8V5sec:

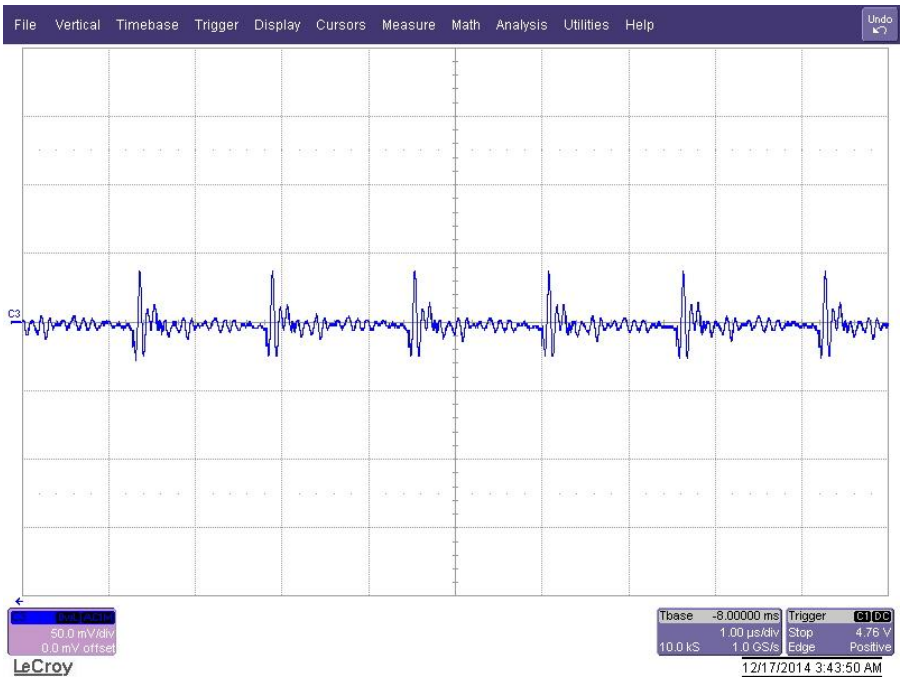


5.3.4 5V:

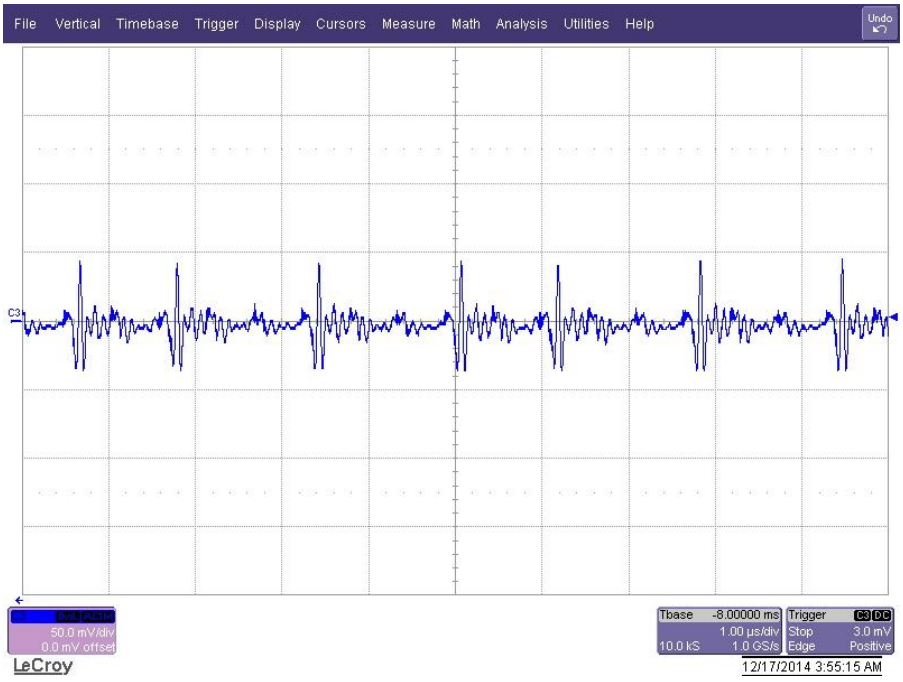


5.4 54V_{in}: No load.

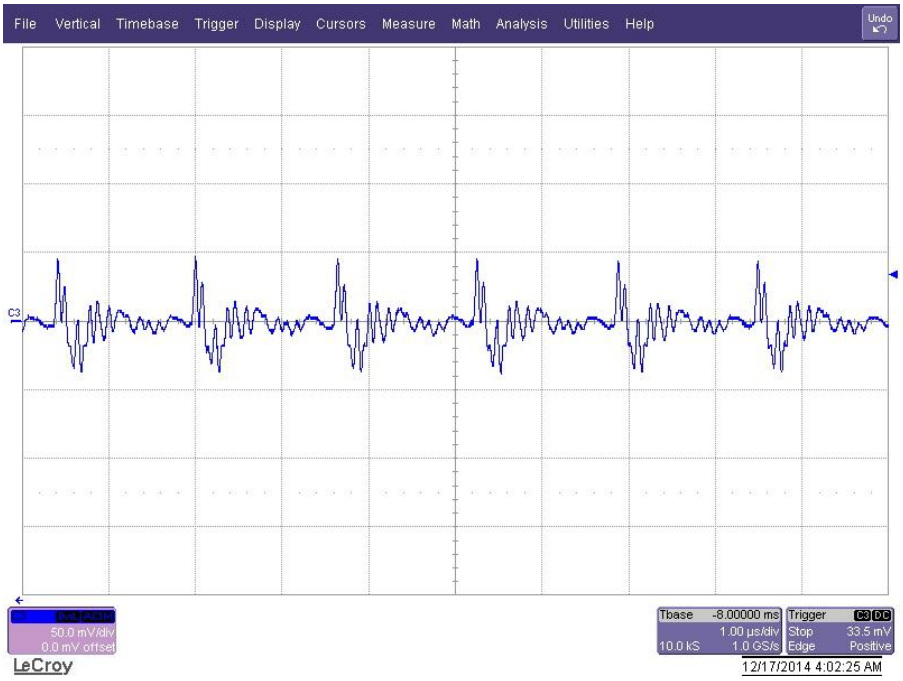
5.4.1 8V5pri:



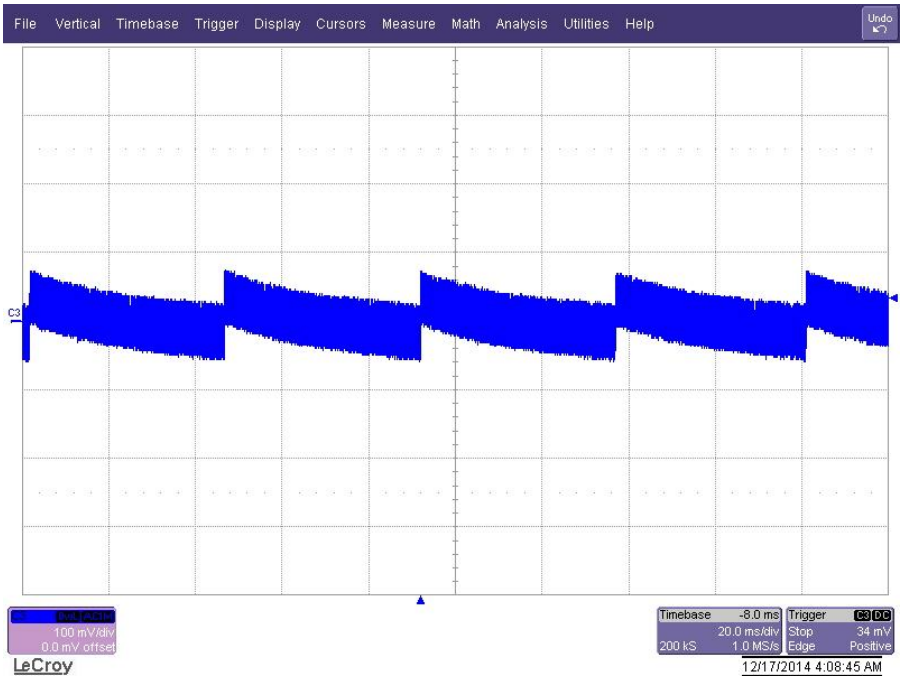
5.4.2 3.3V:



5.4.3 8V5sec:



5.4.4 5V:

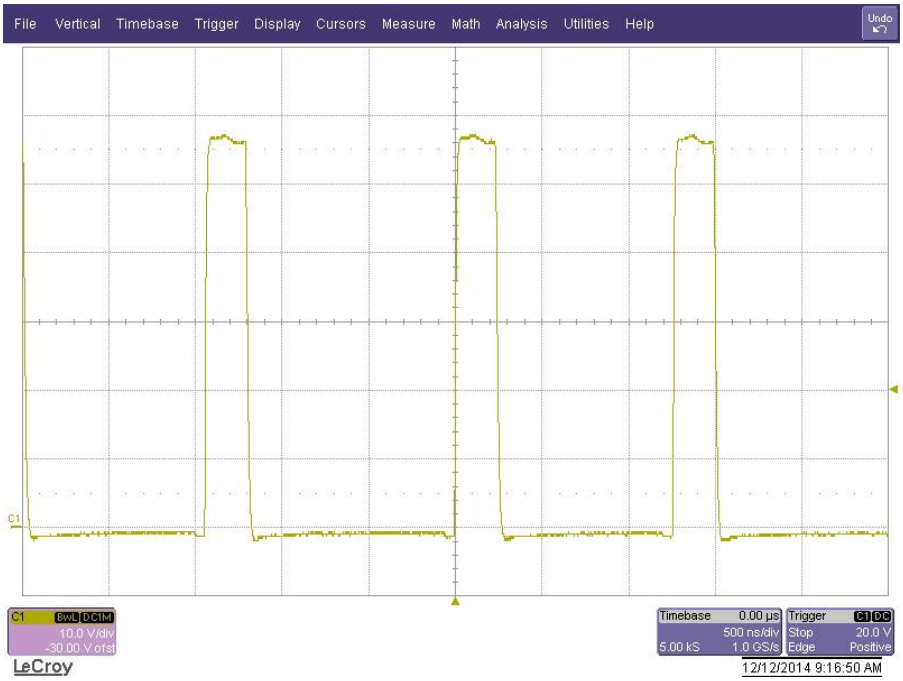


6 Switching Waveforms

The images below show key switching node (U2 pin8) waveforms of PMP10837RevA. The waveforms are measured with $8V5_{pri}$@200mA, $8V5_{sec}$@270mA, 5V@100mA, 3.3V@150mA load.

6.1 $40V_{in}$

6.2 $54V_{in}$



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