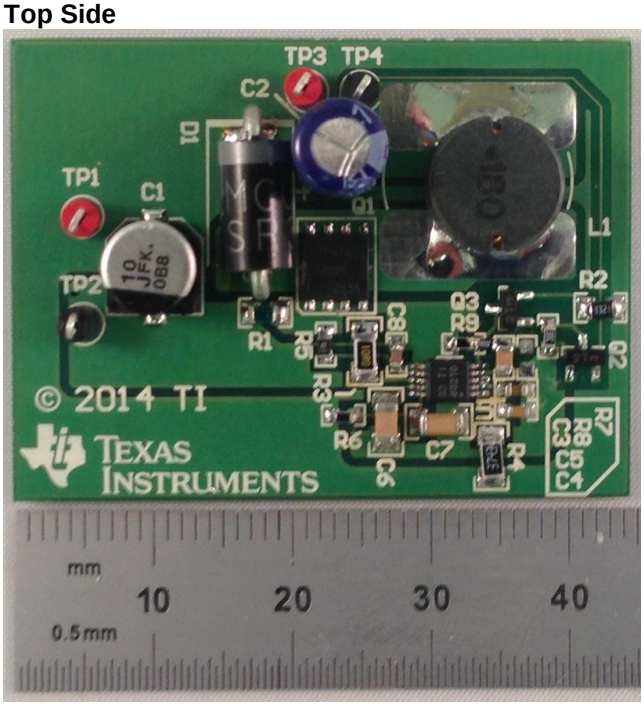
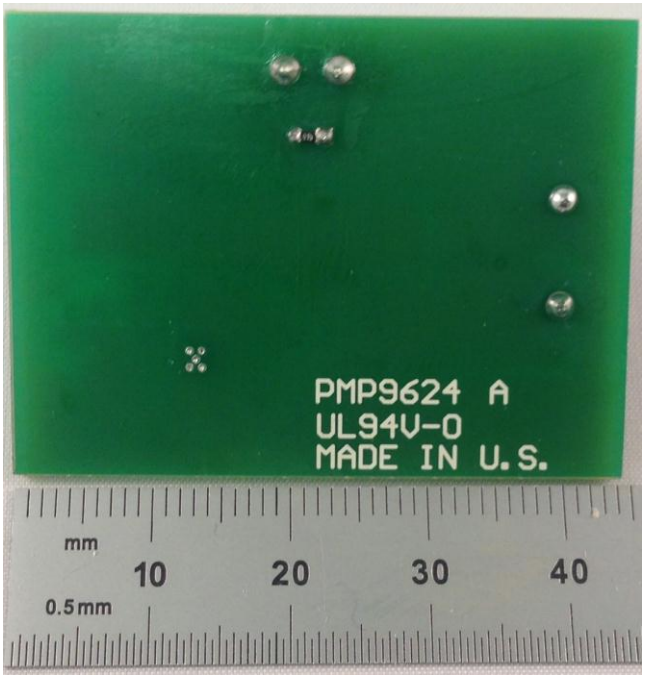
1 Photo

The photographs below show the PMP9624 Rev C assembly. This circuit was built on a PMP9624 Rev A PCB, which is a single layer board.

Top Side

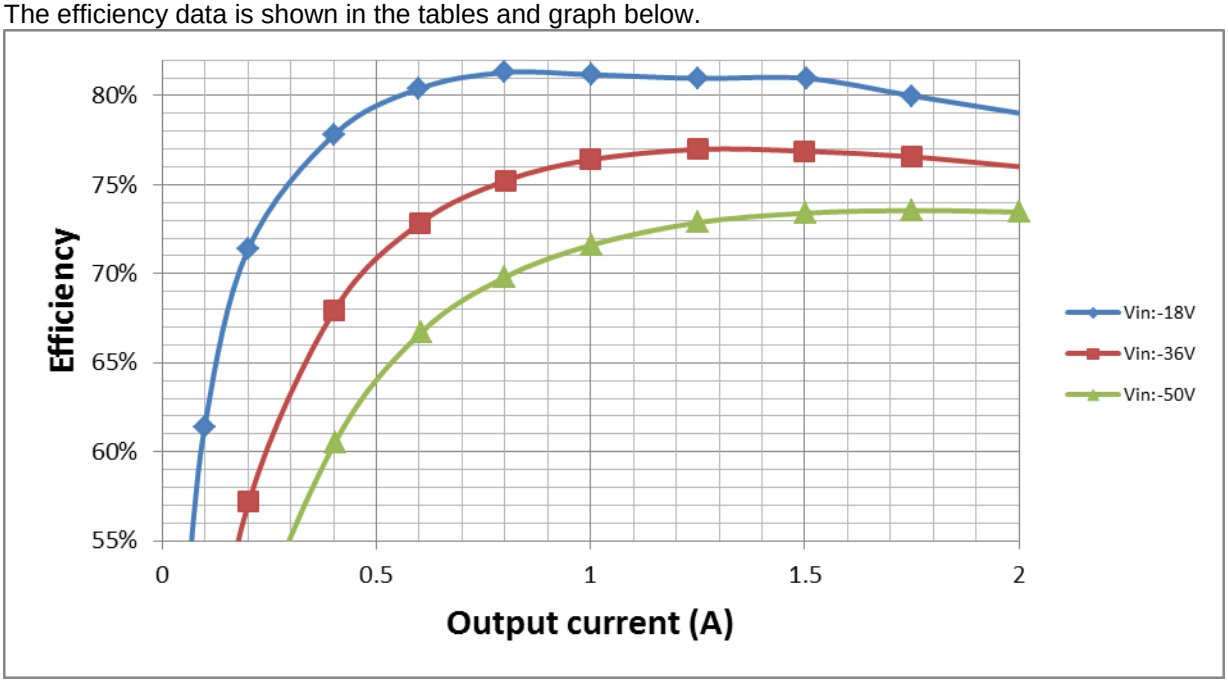


Bottom Side



2 Converter Efficiency

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



V_{in}=-18V_{DC}

|Vin|(V)	Iin(mA)	Pin(W)	|Vout|(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency (%)
17.931	469.7	8.372	3.306	2.001	6.615306	1.756694	79.02%
17.942	406	7.237	3.308	1.75	5.789	1.448	79.99%
17.951	345.1	6.148	3.31	1.504	4.97824	1.16976	80.97%
17.961	287.3	5.114	3.31	1.251	4.14081	0.97319	80.97%
17.968	230	4.084	3.312	1.001	3.315312	0.768688	81.18%
17.977	184.28	3.26	3.313	0.8	2.6504	0.6096	81.30%
17.986	140.85	2.474	3.315	0.6	1.989	0.485	80.40%
17.996	99	1.709	3.316	0.401	1.329716	0.379284	77.81%
18.007	57.93	0.929	3.315	0.2	0.663	0.266	71.37%
18.009	39.32	0.5346	3.316	0.099	0.328284	0.206316	61.41%
18.012	31.59	0.3364	3.316	0.051	0.169116	0.167284	50.27%
18.012	25.86	0.09329	3.317	0	0	0.09329	0.00%

V_{in}=-36V_{DC}

|Vin|(V)	Iin(mA)	Pin(W)	|Vout|(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency (%)
36.05	241.5	8.592	3.257	2.005	6.530285	2.061715	76.00%
36.07	209.6	7.446	3.258	1.75	5.7015	1.7445	76.57%
36.09	179.35	6.356	3.26	1.499	4.88674	1.46926	76.88%
36.11	150.08	5.299	3.261	1.251	4.079511	1.219489	76.99%
36.14	121.87	4.271	3.263	1	3.263	1.008	76.40%
36.16	100.3	3.48	3.264	0.802	2.617728	0.862272	75.22%
36.18	79.42	2.702	3.265	0.603	1.968795	0.733205	72.86%
36.21	59.4	1.933	3.267	0.402	1.313334	0.619666	67.94%
36.23	40.79	1.154	3.267	0.202	0.659934	0.494066	57.19%
36.24	32.56	0.7486	3.267	0.101	0.329967	0.418633	44.08%
36.24	29.24	0.5523	3.267	0.051	0.166617	0.385683	30.17%
36.25	25.36	0.18523	3.268	0	0	0.18523	0.00%

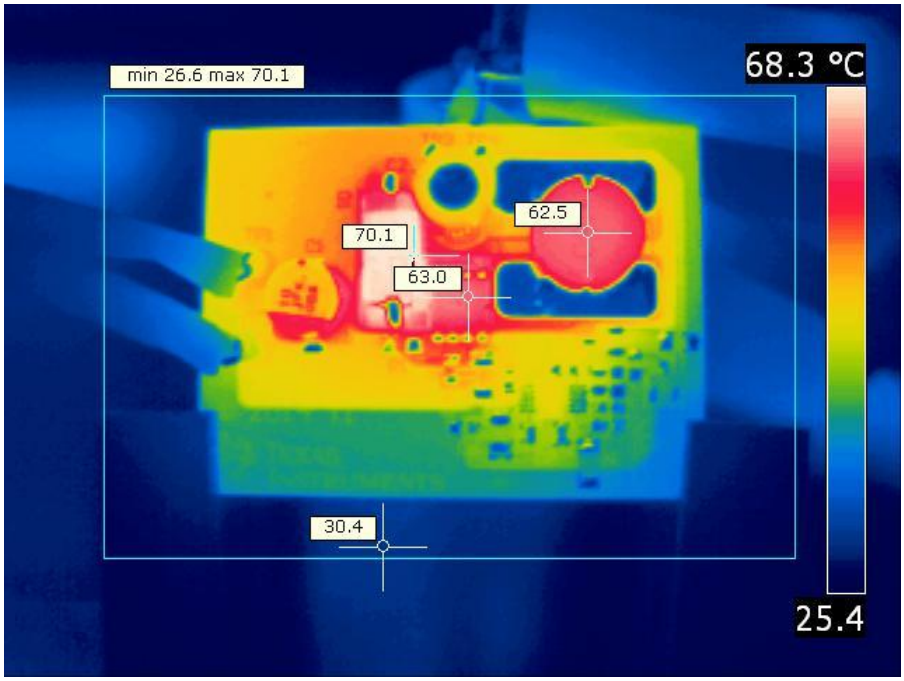
V_{in}=-50V_{DC}

|Vin|(V)	Iin(mA)	Pin(W)	|Vout|(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency (%)
50.08	178.21	8.772	3.222	2	6.444	2.328	73.46%
50.1	156.27	7.673	3.223	1.751	5.643473	2.029527	73.55%
50.13	134.96	6.599	3.225	1.502	4.84395	1.75505	73.40%
50.15	113.87	5.531	3.227	1.249	4.030523	1.500477	72.87%
50.18	94.03	4.518	3.229	1.002	3.235458	1.282542	71.61%
50.2	78.33	3.703	3.231	0.8	2.5848	1.1182	69.80%
50.23	63.68	2.928	3.233	0.604	1.952732	0.975268	66.69%
50.25	49.81	2.158	3.234	0.404	1.306536	0.851464	60.54%
50.28	36.39	1.334	3.235	0.2	0.647	0.687	48.50%
50.28	30.77	0.929	3.235	0.1	0.3235	0.6055	34.82%
50.29	27.8	0.6586	3.235	0.05	0.16175	0.49685	24.56%
50.29	25.02	0.2859	3.237	0	0	0.2859	0.00%

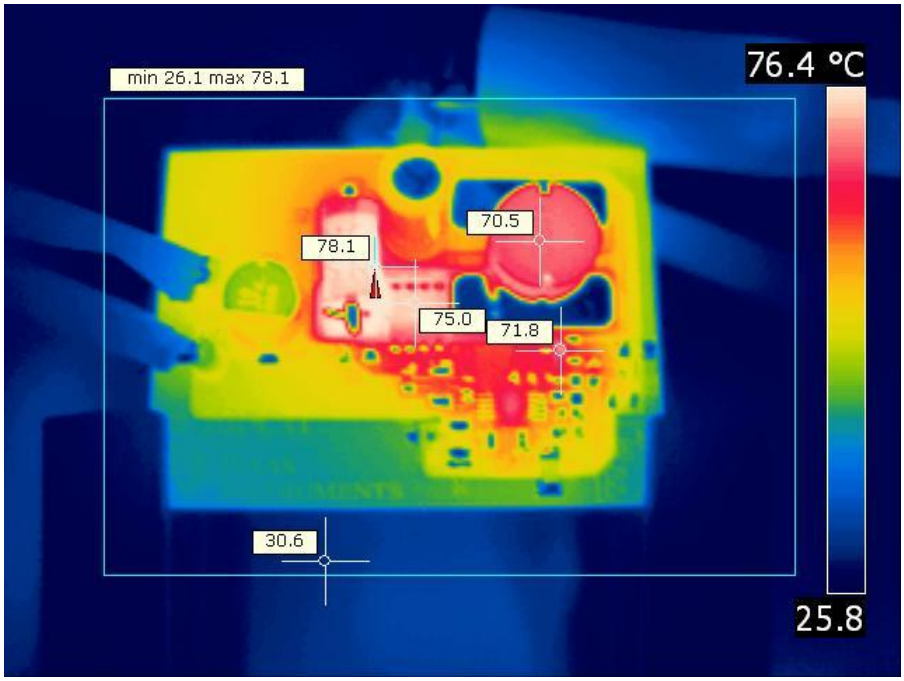
3 Thermal Images

The thermal images below show a top view and bottom view of the board. The ambient temperature was 20ºC with no forced air flow. The output was at full load: -3.3V/2A.

3.1 V_{in}=-18V



3.2 V_{in}=-50V

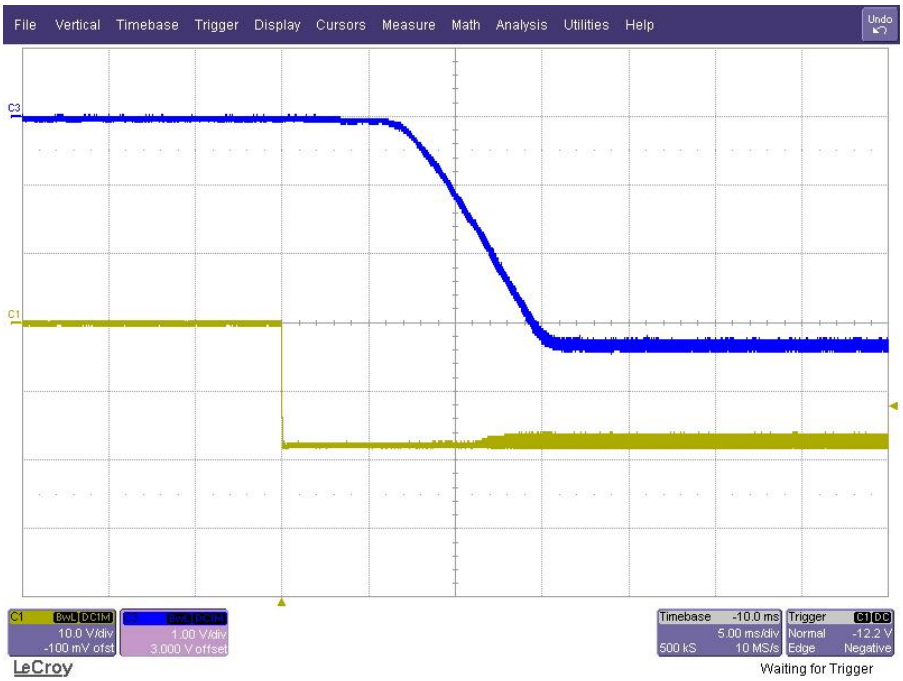


4 Startup

The output voltages during startup are shown in the image below, where CH1 is the input voltage and CH3 is the output voltage.

4.1 -18Vin: no load

4.2 -18Vin: -3.3V$_{out}$/2A

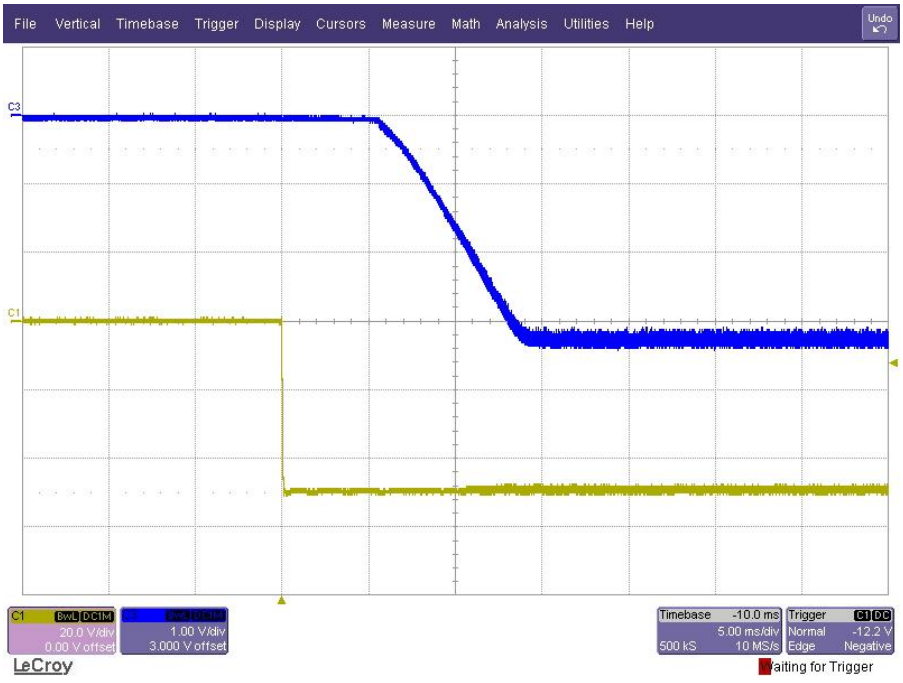


4.3 -36Vin: no load

4.4 -36Vin: -3.3V_{out}/2A

4.5 -50Vin: no load

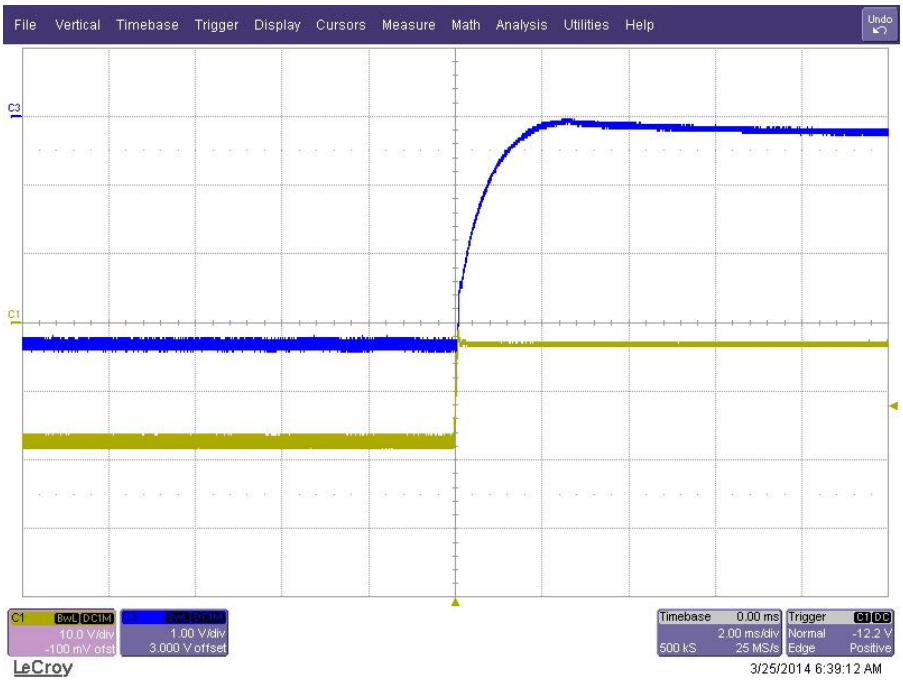
4.6 -50Vin: -3.3V_{out}/2A



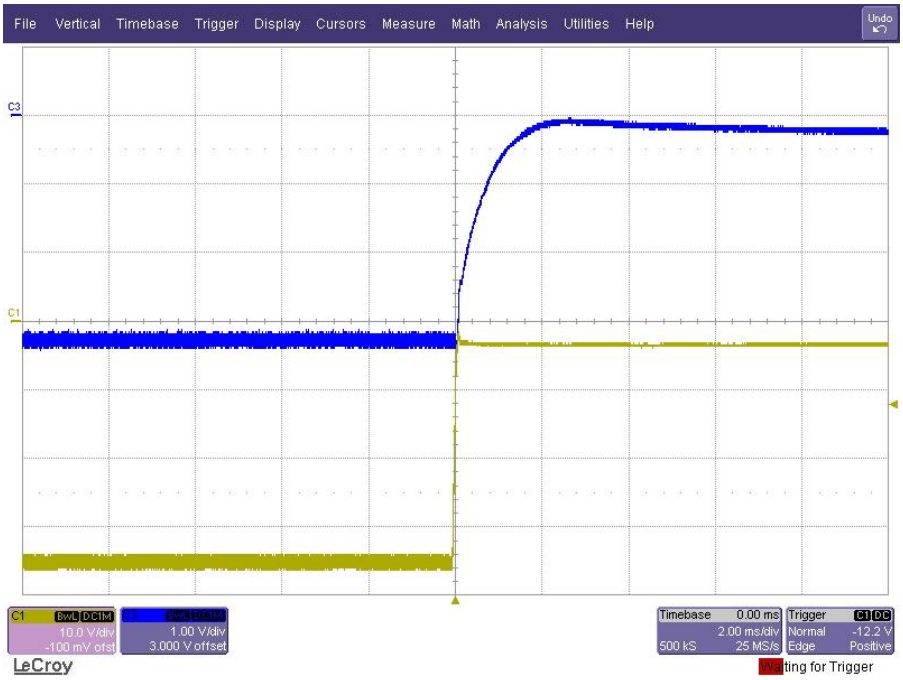
5 Turn off

The output voltages at turn off transient are shown in the image below.

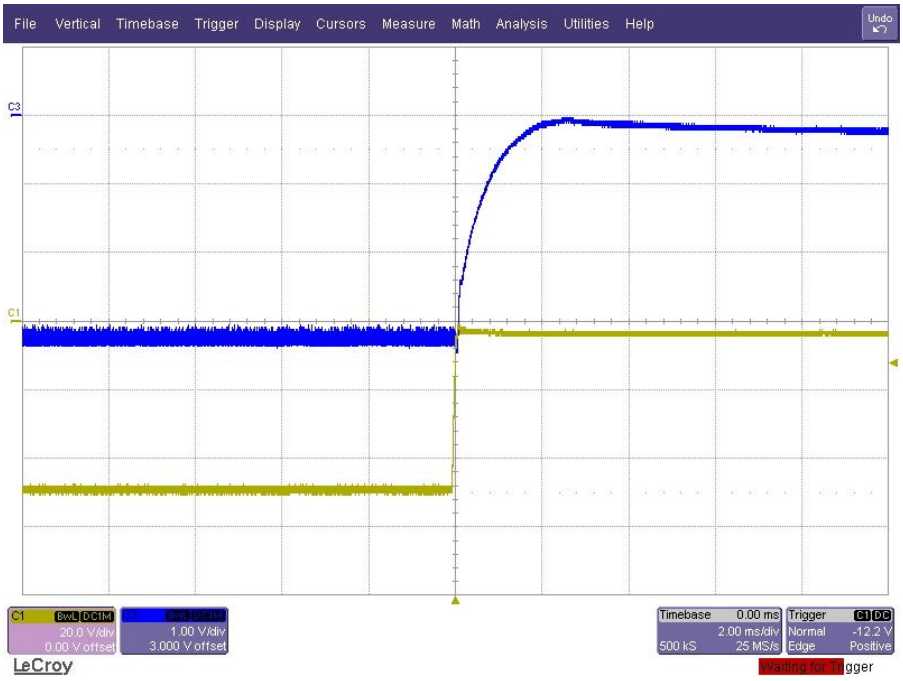
5.1 -18Vin: -3.3V_{out}/2A



5.2 -36Vin: -3.3V_{out}/2A



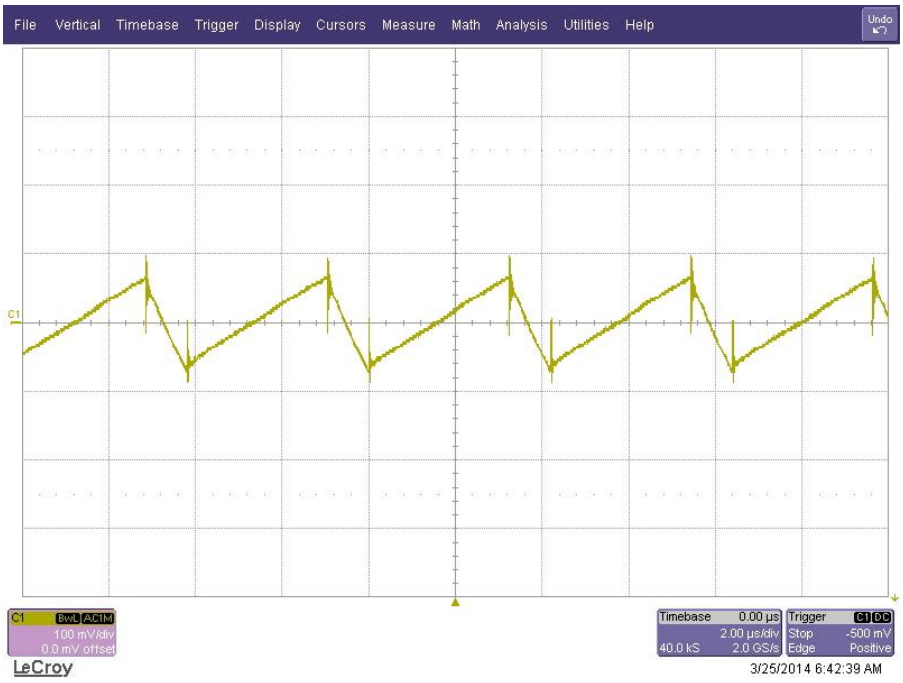
5.3 -50Vin: -3.3V_{out}/2A



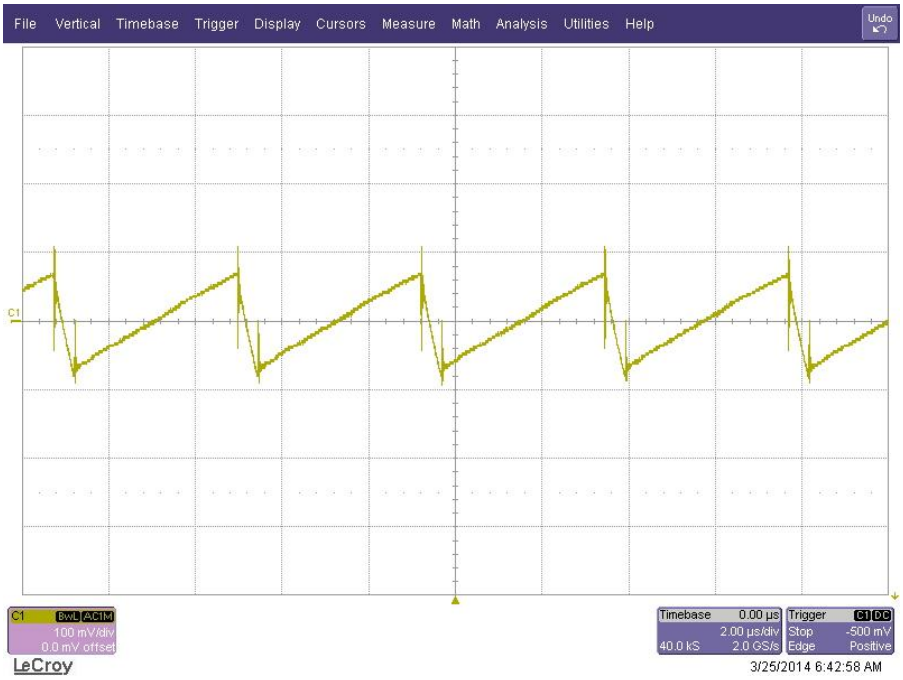
6 Output Ripple Voltages - Full Load

The output ripple voltages are shown in the plots below.

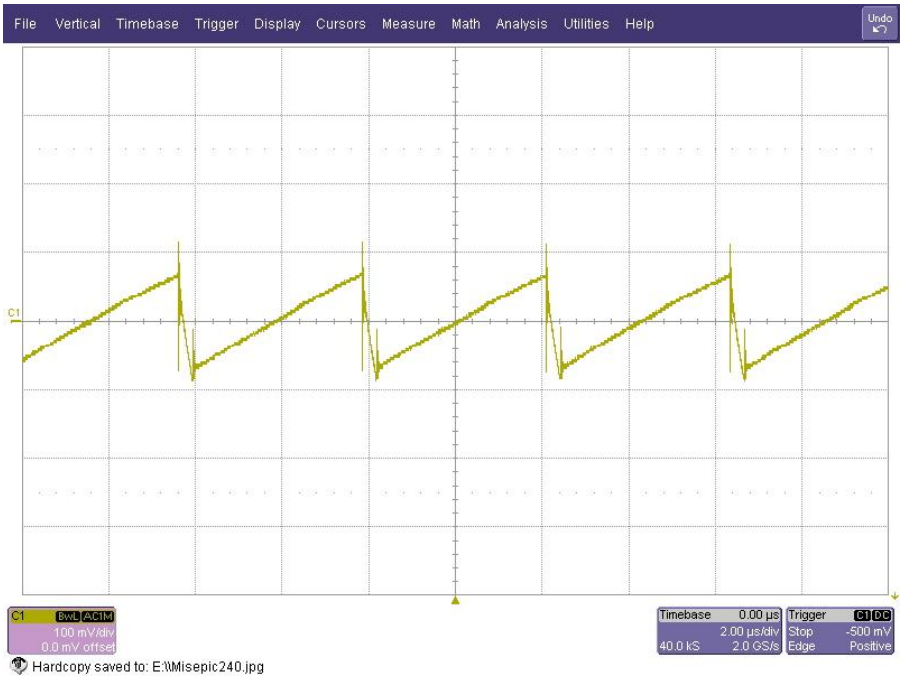
6.1 -18Vin: -3.3V_{out}/2A



6.2 -36Vin: -3.3V_{out}/2A

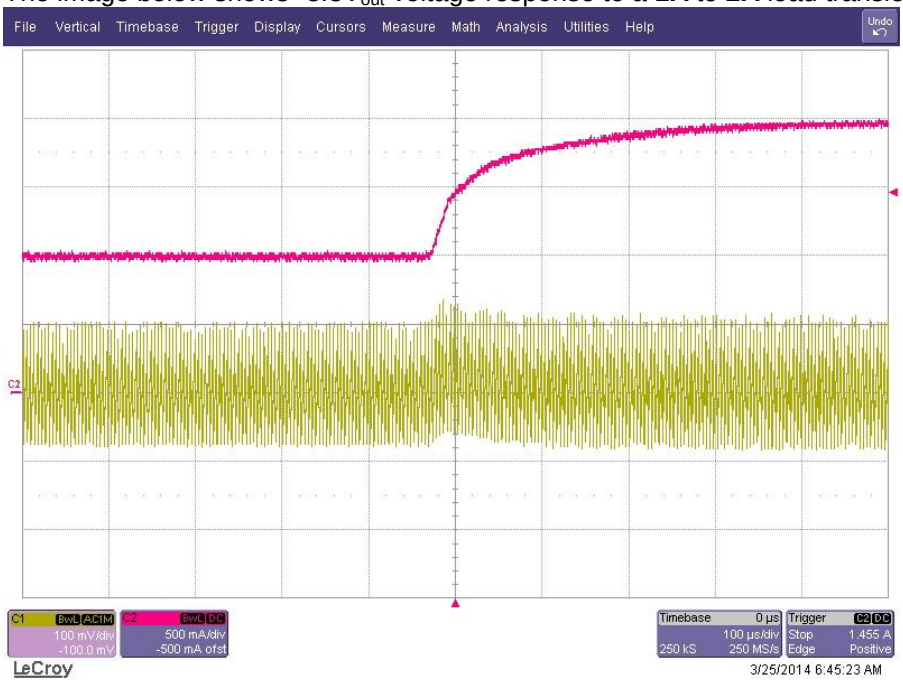


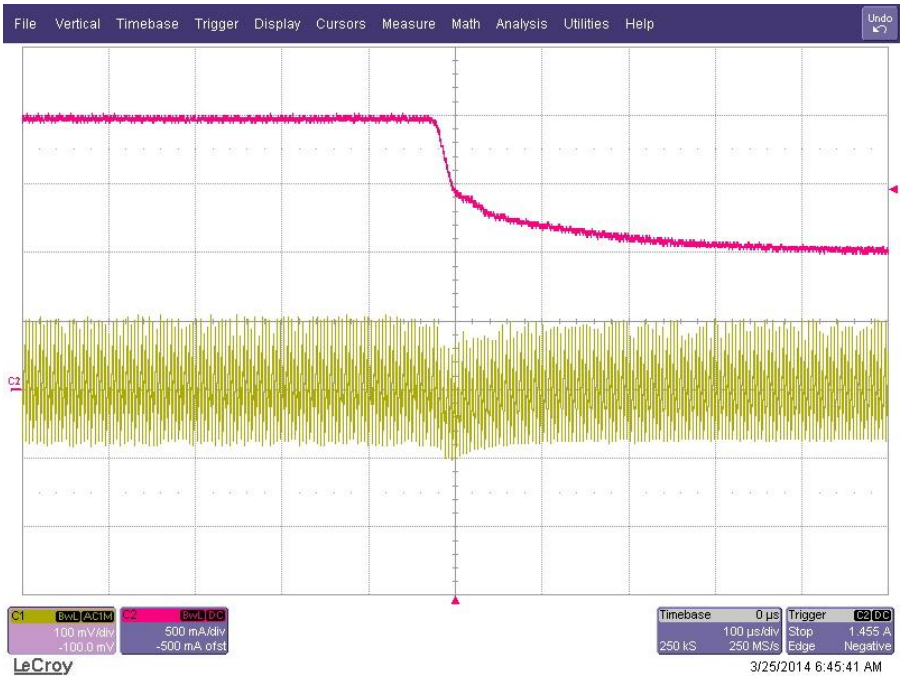
6.3 -50Vin: -3.3V_{out}/2A



7 Load Transient

The image below shows -3.3V_{out} voltage response to a **1A** to **2A** load transient at -36V_{in}.

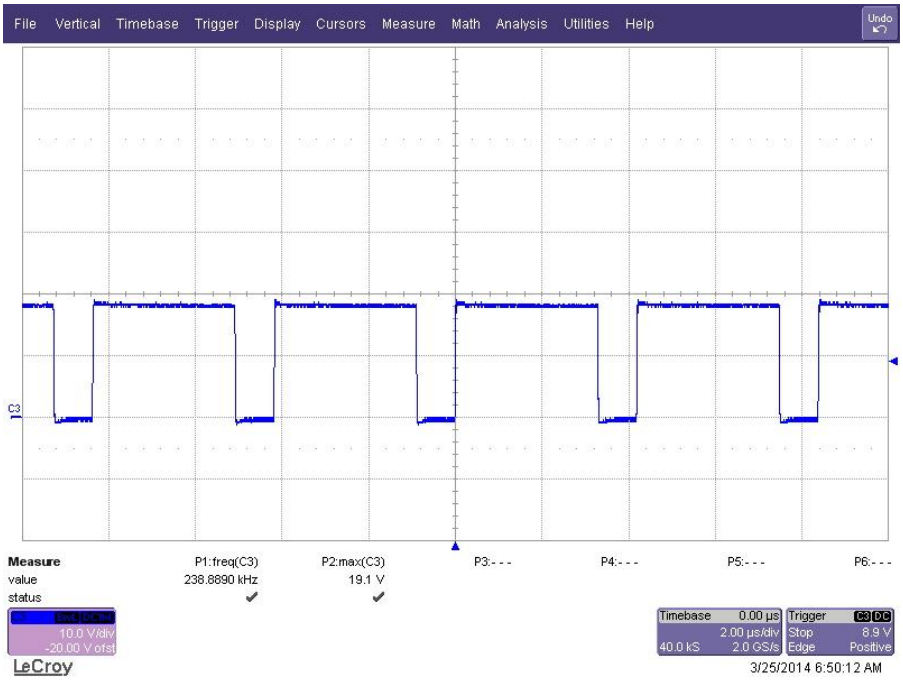




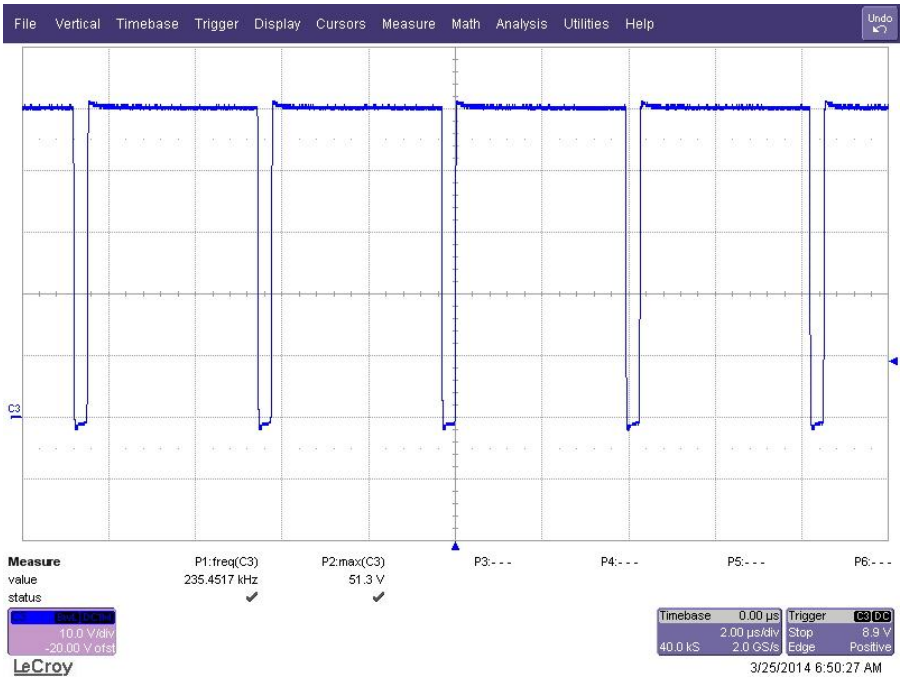
8 Switching Waveforms

The image below shows key switching waveforms of PMP9624RevA. The waveforms are measured with 2A output current with respect to TP2.

8.1 MOSFET Q1 @ -18V_{in}



8.2 MOSFET Q1 @ -50V_{in}



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