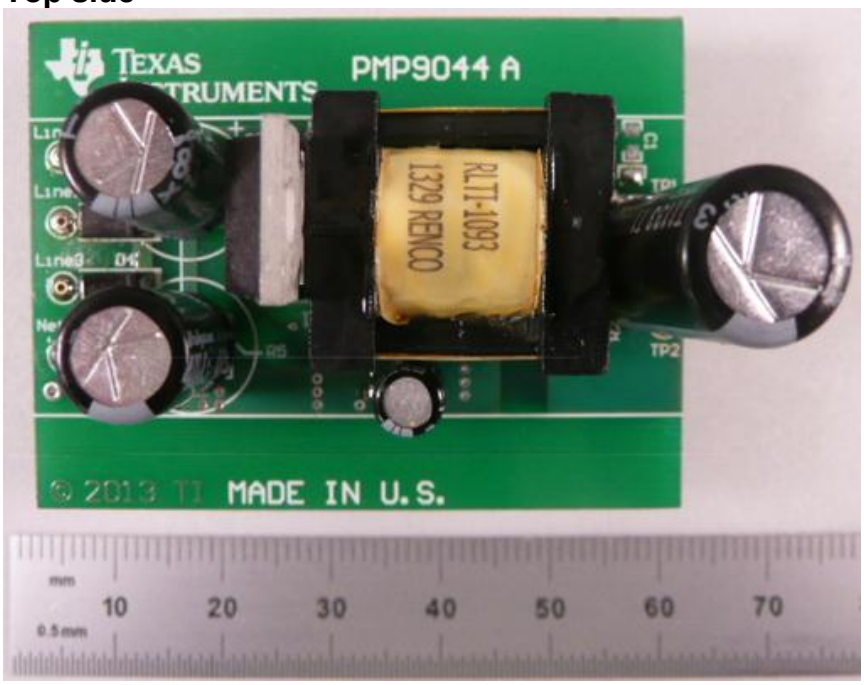
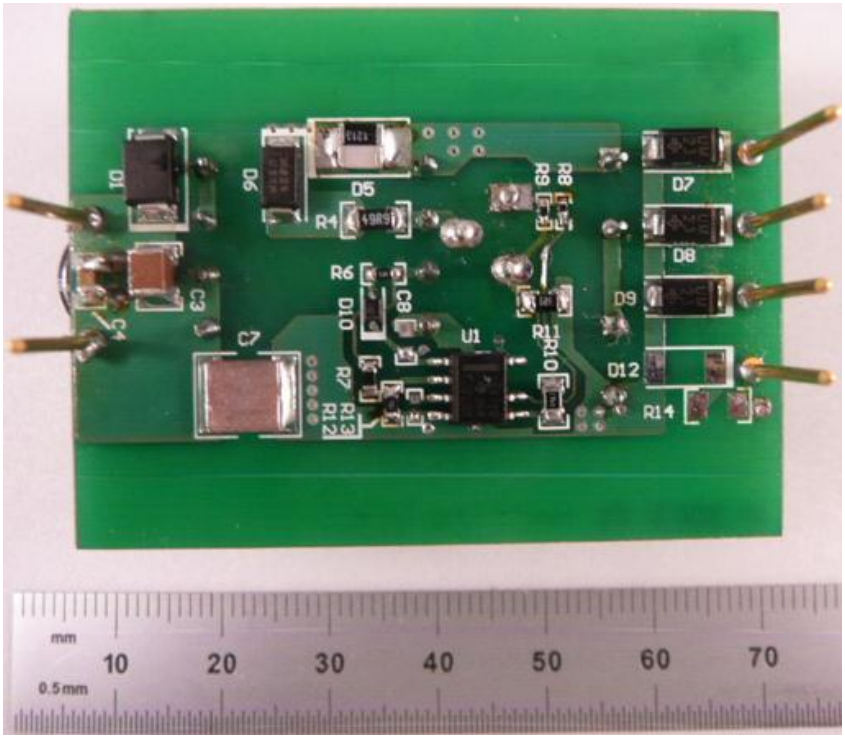
1 Photo

The photographs below show the PMP9044 Rev A assembly. This circuit was built on a PMP9044 Rev A PCB.

Top side

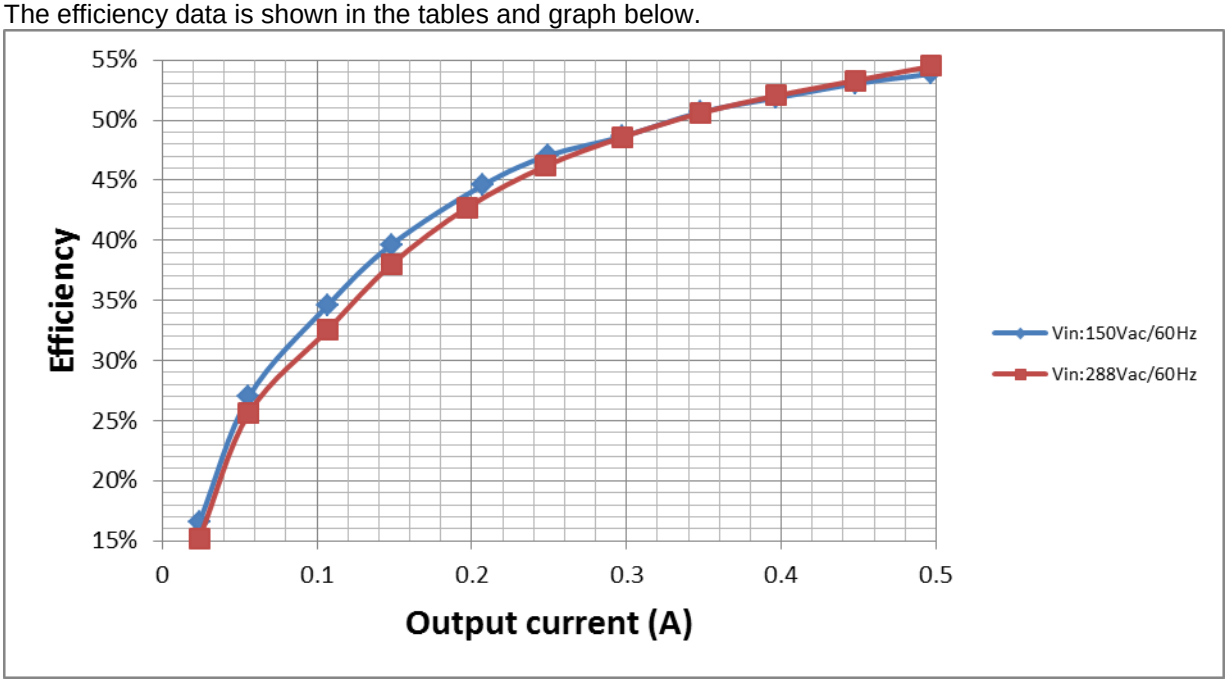


Bottom side



2 Converter Efficiency

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



V_{in}=150V_{AC}/60Hz, single phase

Vin(V)	Iin(mA)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency (%)
150.07	41.4	3.092	3.35	0.497	1.66495	1.42705	53.85%
150.08	38.59	2.83	3.35	0.448	1.5008	1.3292	53.03%
150.08	35.6	2.557	3.34	0.397	1.32598	1.23102	51.86%
150.09	32.67	2.294	3.34	0.348	1.16232	1.13168	50.67%
150.09	29.61	2.028	3.32	0.297	0.98604	1.04196	48.62%
150.1	26.52	1.768	3.34	0.249	0.83166	0.93634	47.04%
150.1	23.87	1.551	3.34	0.207	0.69138	0.85962	44.58%
150.11	20.03	1.251	3.35	0.148	0.4958	0.7552	39.63%
150.12	17.181	1.039	3.36	0.107	0.35952	0.67948	34.60%
150.13	12.592	0.7052	3.4	0.056	0.1904	0.5148	27.00%
150.13	9.4	0.4947	3.41	0.024	0.08184	0.41286	16.54%
150.13	6.867	0.3464	3.44	0	0	0.3464	0.00%

V_{in}=288V_{AC}/50Hz, single phase

Vin(V)	Iin(mA)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency (%)
288	27.3	3.065	3.36	0.497	1.66992	1.39508	54.48%
288	25.51	2.816	3.35	0.448	1.5008	1.3152	53.30%
288	23.57	2.556	3.35	0.397	1.32995	1.22605	52.03%
288	21.66	2.304	3.35	0.348	1.1658	1.1382	50.60%
288	19.663	2.042	3.34	0.297	0.99198	1.05002	48.58%
288	17.686	1.793	3.34	0.248	0.82832	0.96468	46.20%
288	15.595	1.54	3.34	0.197	0.65798	0.88202	42.73%
288	13.575	1.305	3.35	0.148	0.4958	0.8092	37.99%
288	11.818	1.104	3.36	0.107	0.35952	0.74448	32.57%
288	8.306	0.7408	3.39	0.056	0.18984	0.55096	25.63%
288	6.015	0.535	3.39	0.024	0.08136	0.45364	15.21%
288	4.333	0.3905	3.4	0	0	0.3905	0.00%

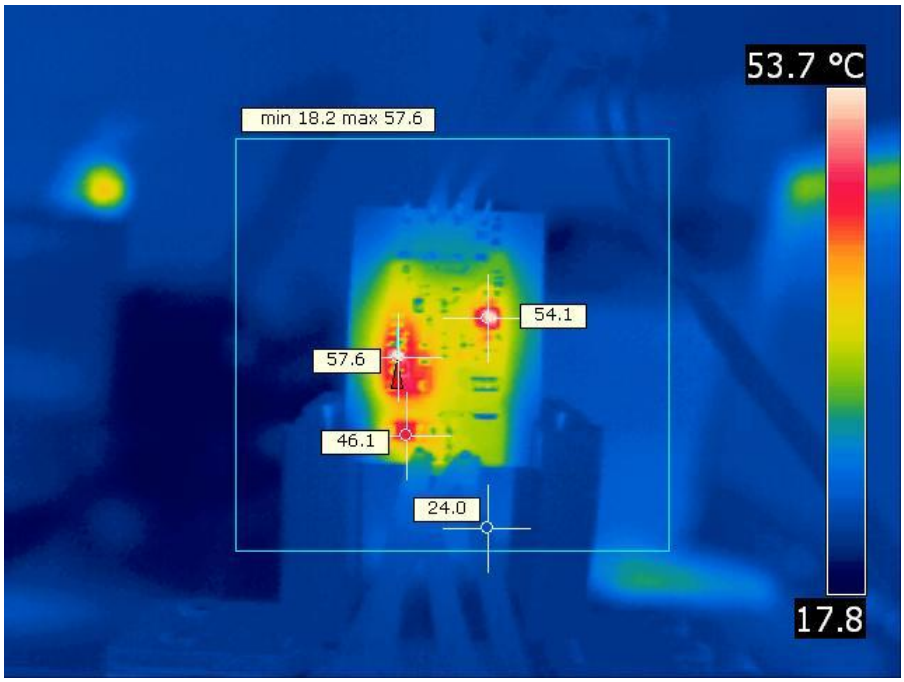
3 Thermal Images

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/0.5A.

V_{in}=150V_{AC}/60Hz, single phase

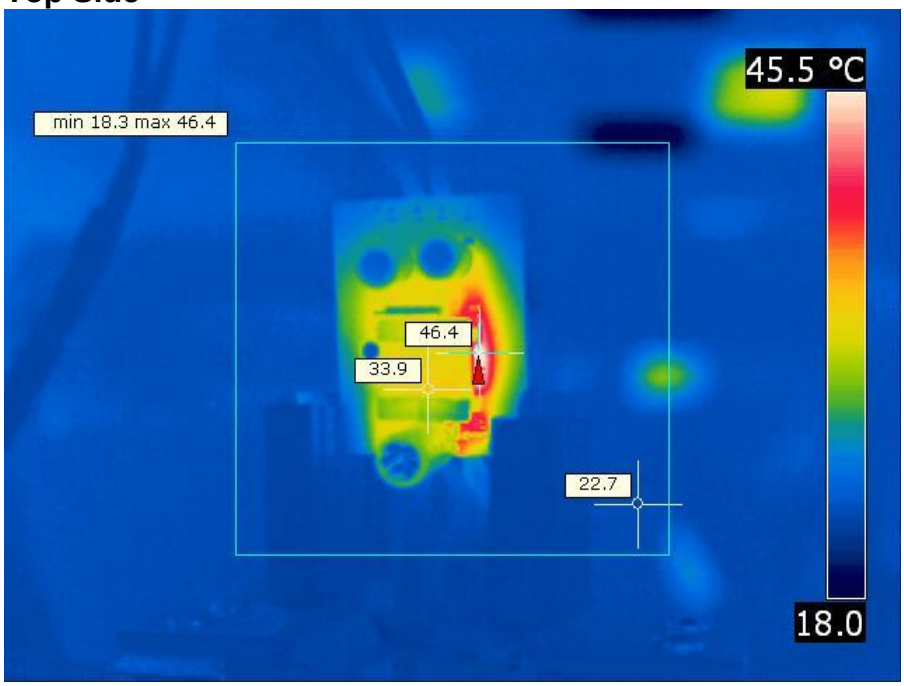
Top Side

Bottom Side

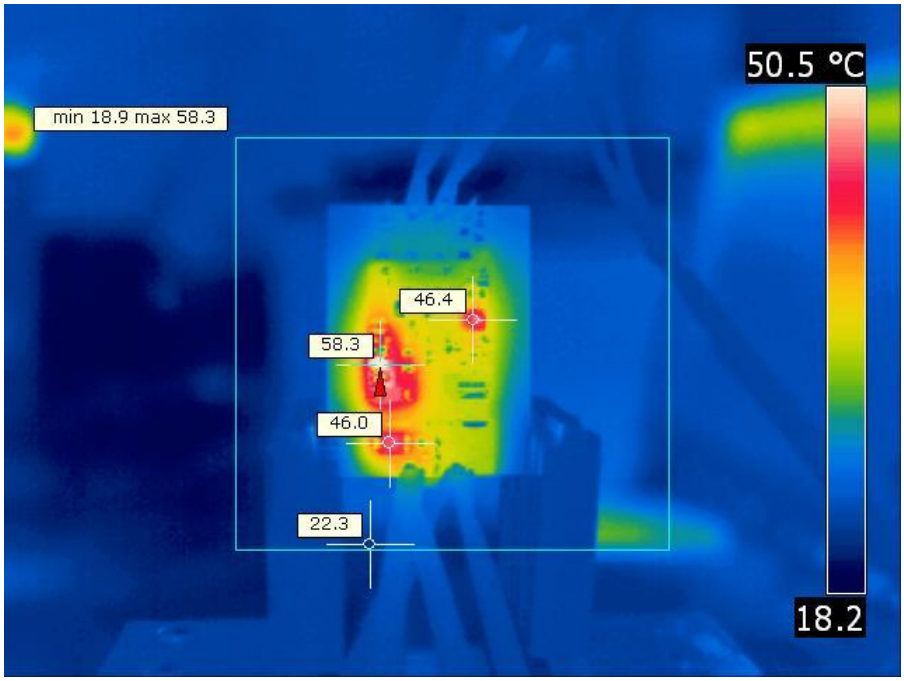


V_{in}=288V_{AC}/50Hz, single phase

Top Side



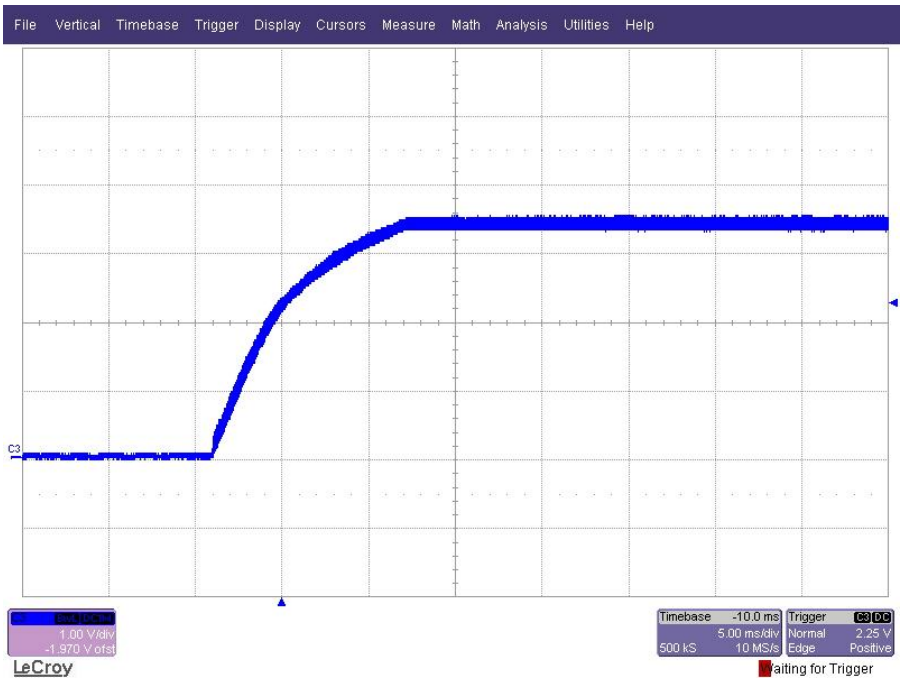
Bottom Side



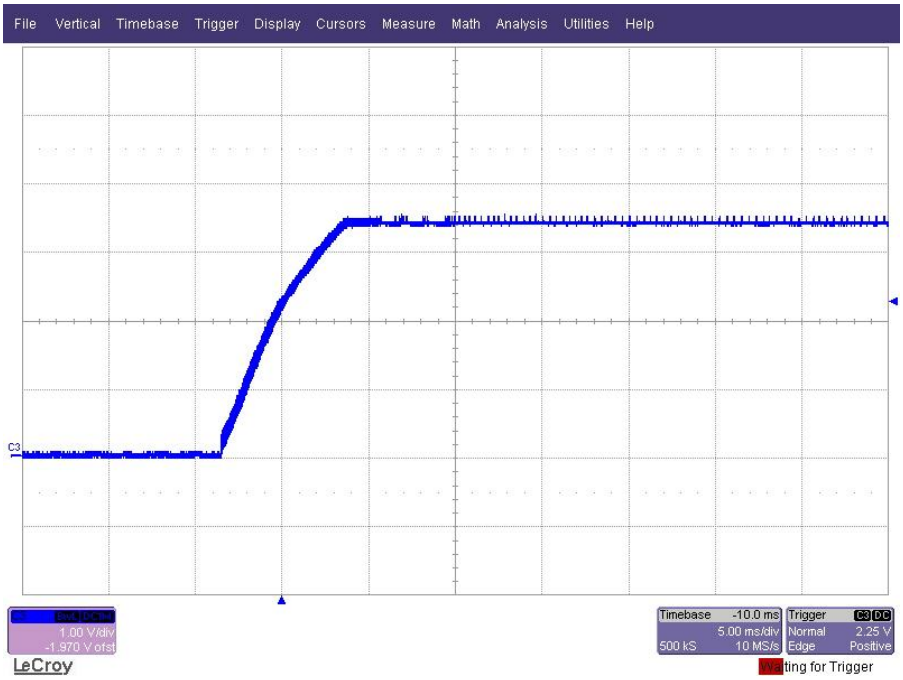
4 Startup

The output voltages at startup are shown in the images below with single phase input voltage.

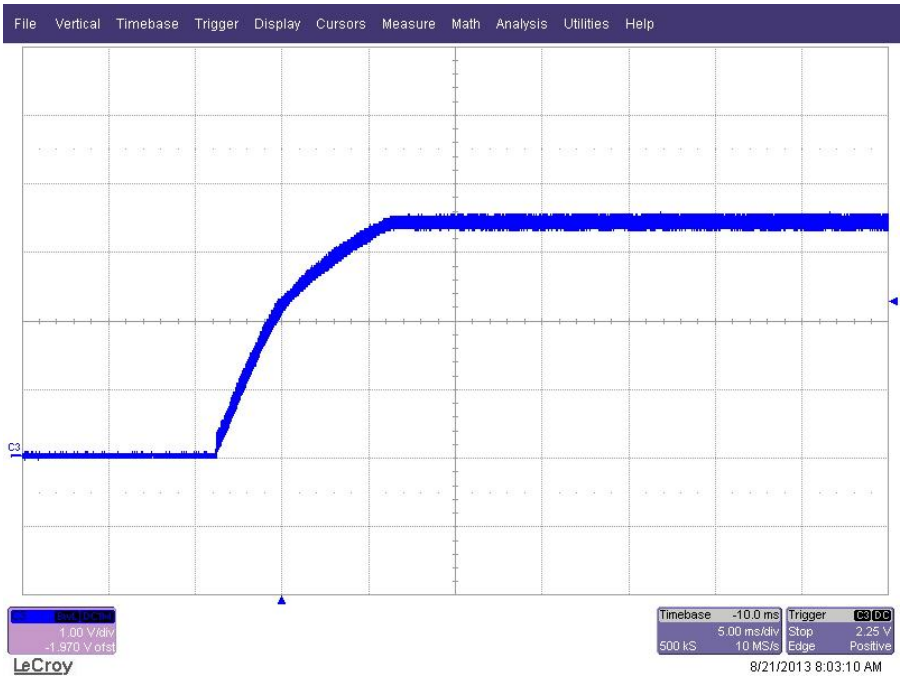
4.1 Start Up @ 150V_{ac}: 3.3V/0.5A.



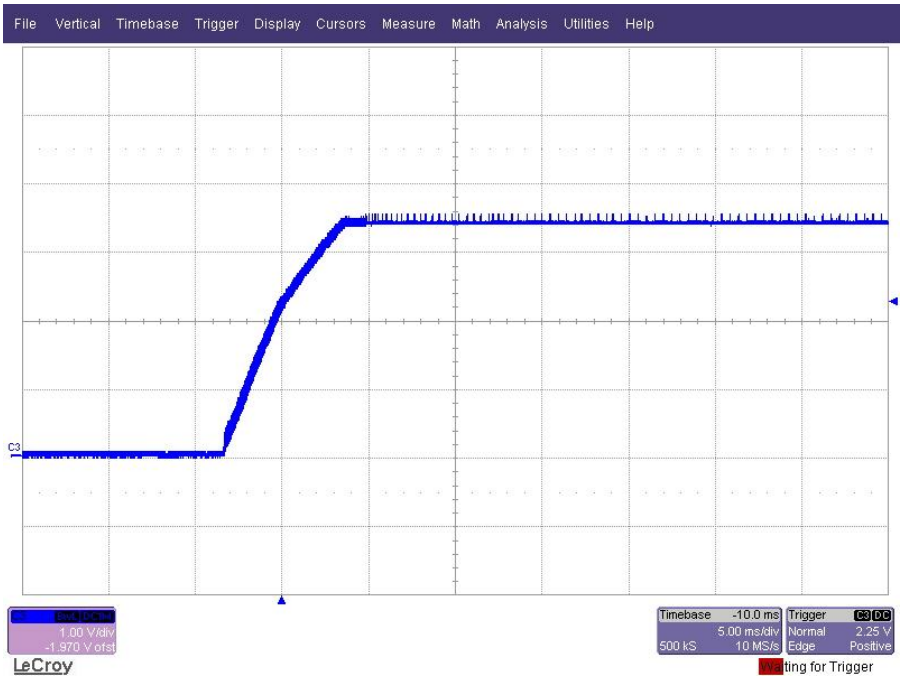
4.2 Start Up @ 150V_{ac}: no load.



4.3 Start Up @ 288V_{ac}: 3.3V/0.5A.

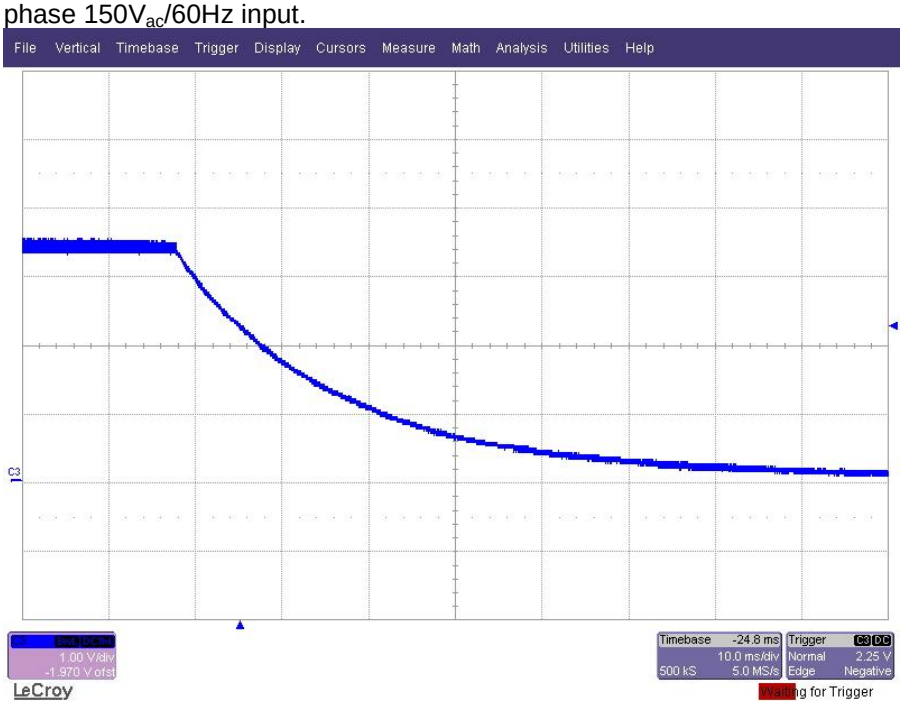


4.4 Start Up @ 288V_{ac}: no load.



5 Turn off

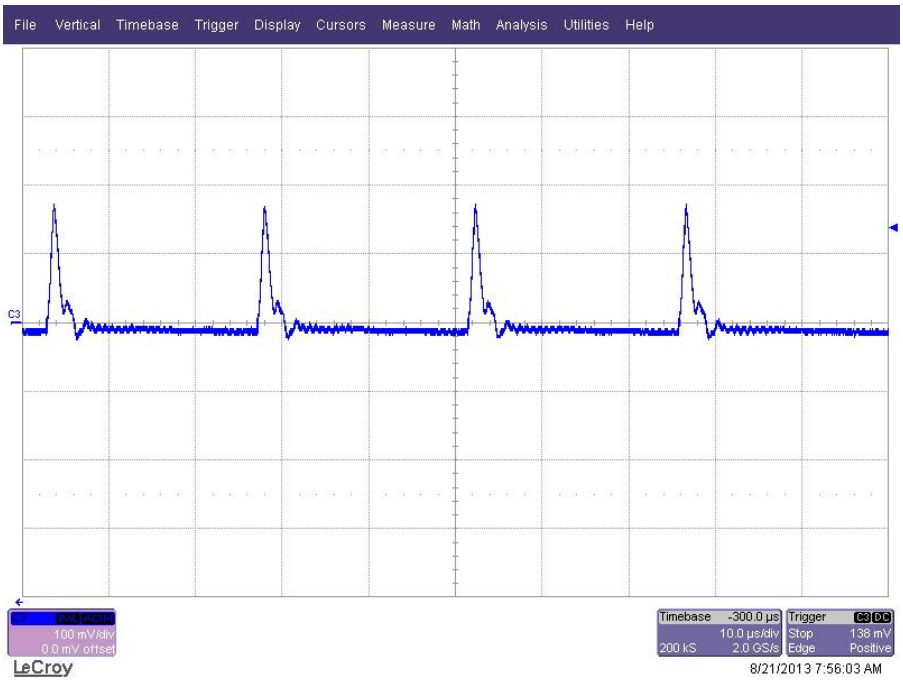
The output voltage at turn off transient is shown in the image below at full load (3.3V/0.5A) and a single phase 150V_{ac}/60Hz input.



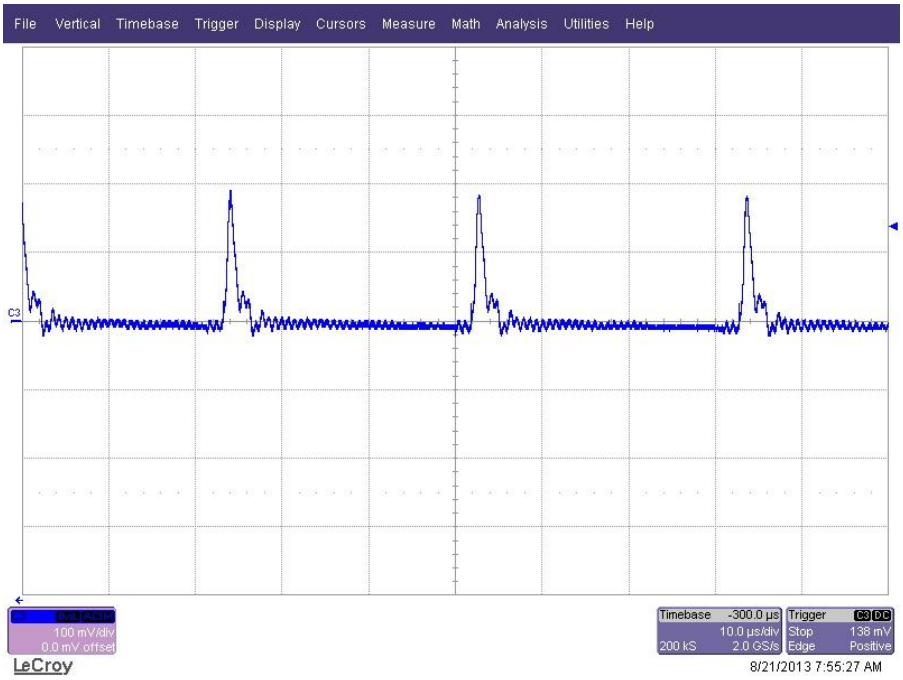
6 Output Ripple Voltages

The output ripple voltages are shown in the plots below with single phase input voltage.

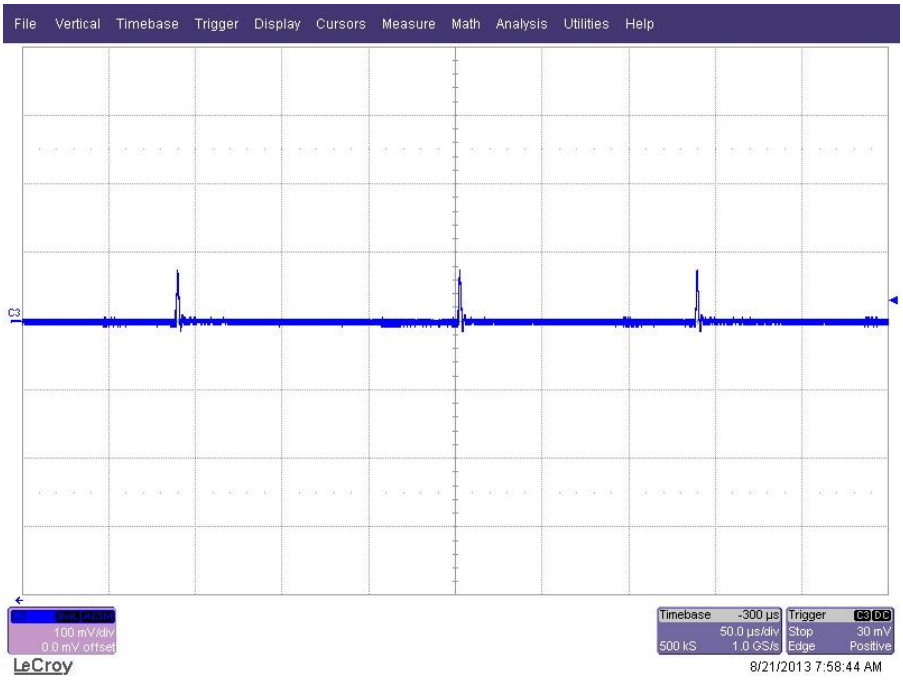
6.1 150V/60Hz – 3.3V/0.5A



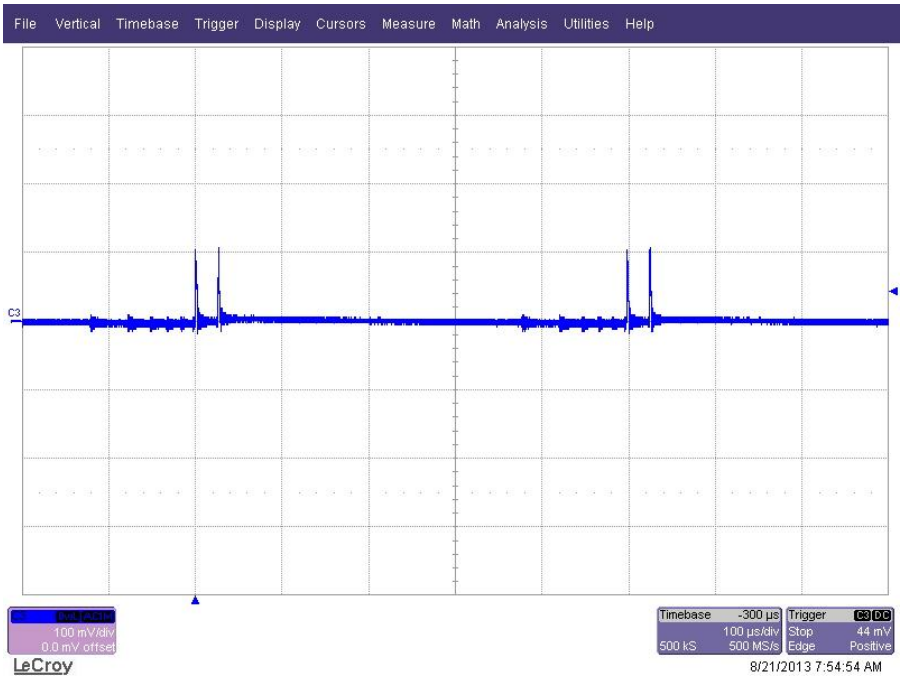
6.2 288V/50Hz – 3.3V/0.5A



6.3 150V/60Hz – 3.3V/0A

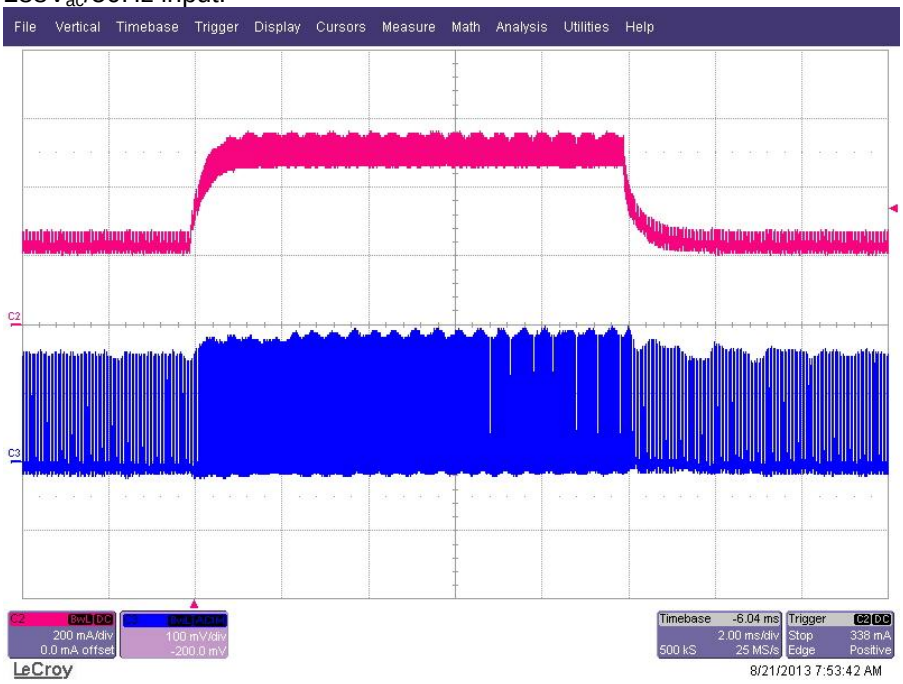


6.4 288V/50Hz – 3.3V/0A



7 Load Transient

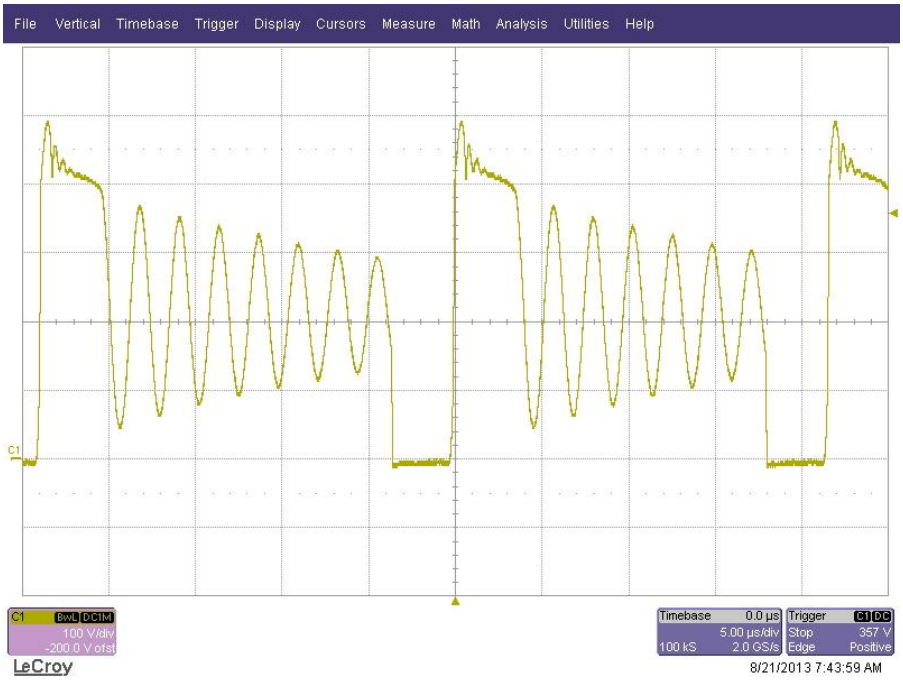
The image below shows 3.3V_{out} voltage response to a **0.25A** to **0.5A** load transient at a single phase 288V_{ac}/50Hz input.



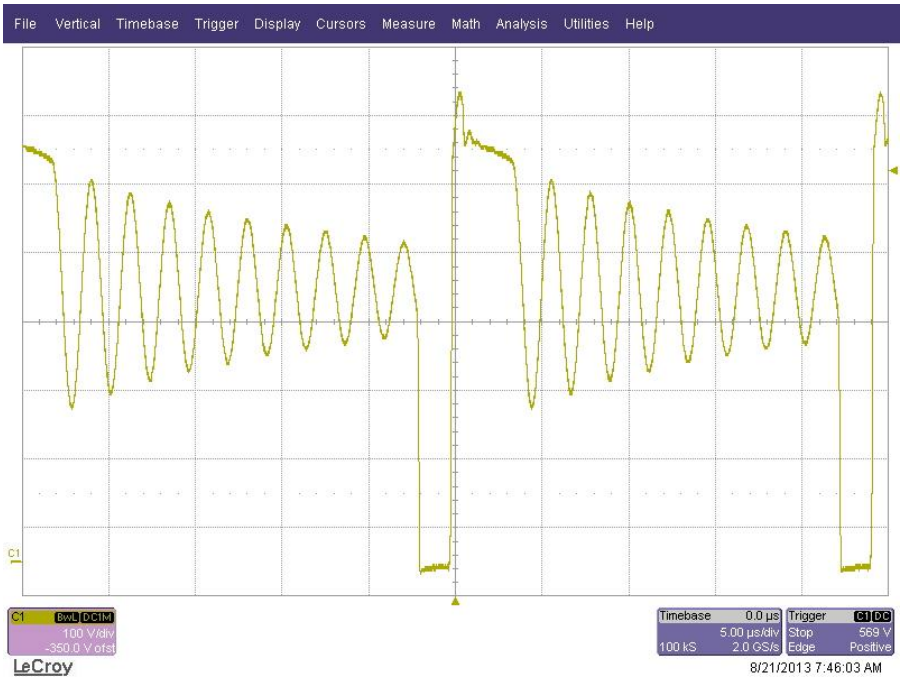
8 Switching Waveforms

The images below show key switching waveforms of PMP9044RevA. The waveforms are measured with 0.5A full load.

8.1 Primary BJT Q_1 @ single phase 150V_{ac}/60Hz



8.2 Primary BJT Q_1@ single phase 288V_{ac}/50Hz

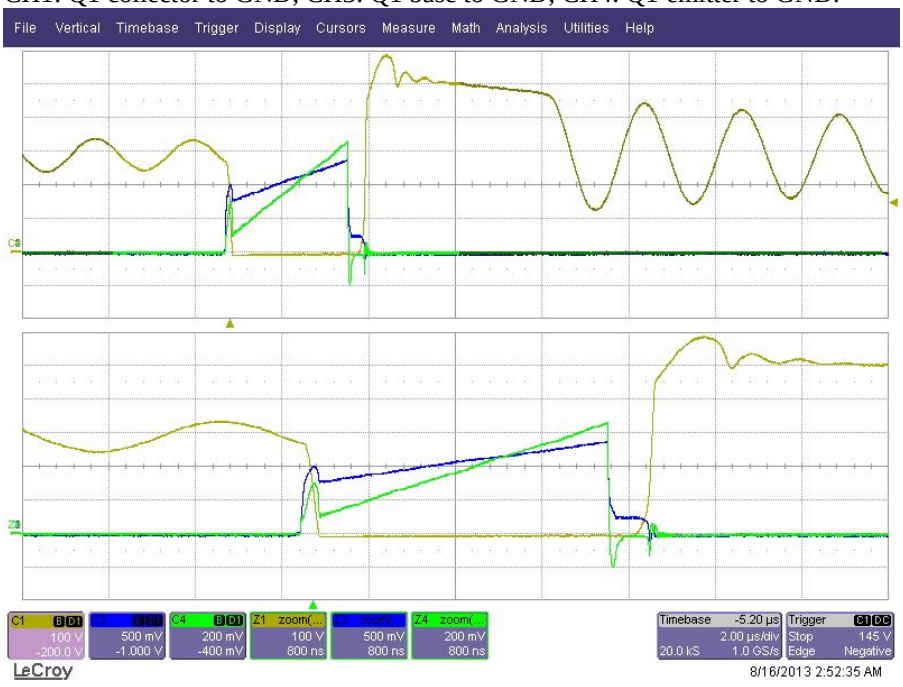


8.3 Primary BJT Q_1 @ single phase 220V_{ac}/50Hz, first switching pulse

CH1: Q1 collector to GND, CH3: Q1 base to GND, CH4: Q1 emitter to GND.

8.4 Primary BJT Q_1 @ single phase 220V_{ac}/50Hz, normal operation

CH1: Q1 collector to GND, CH3: Q1 base to GND, CH4: Q1 emitter to GND.



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