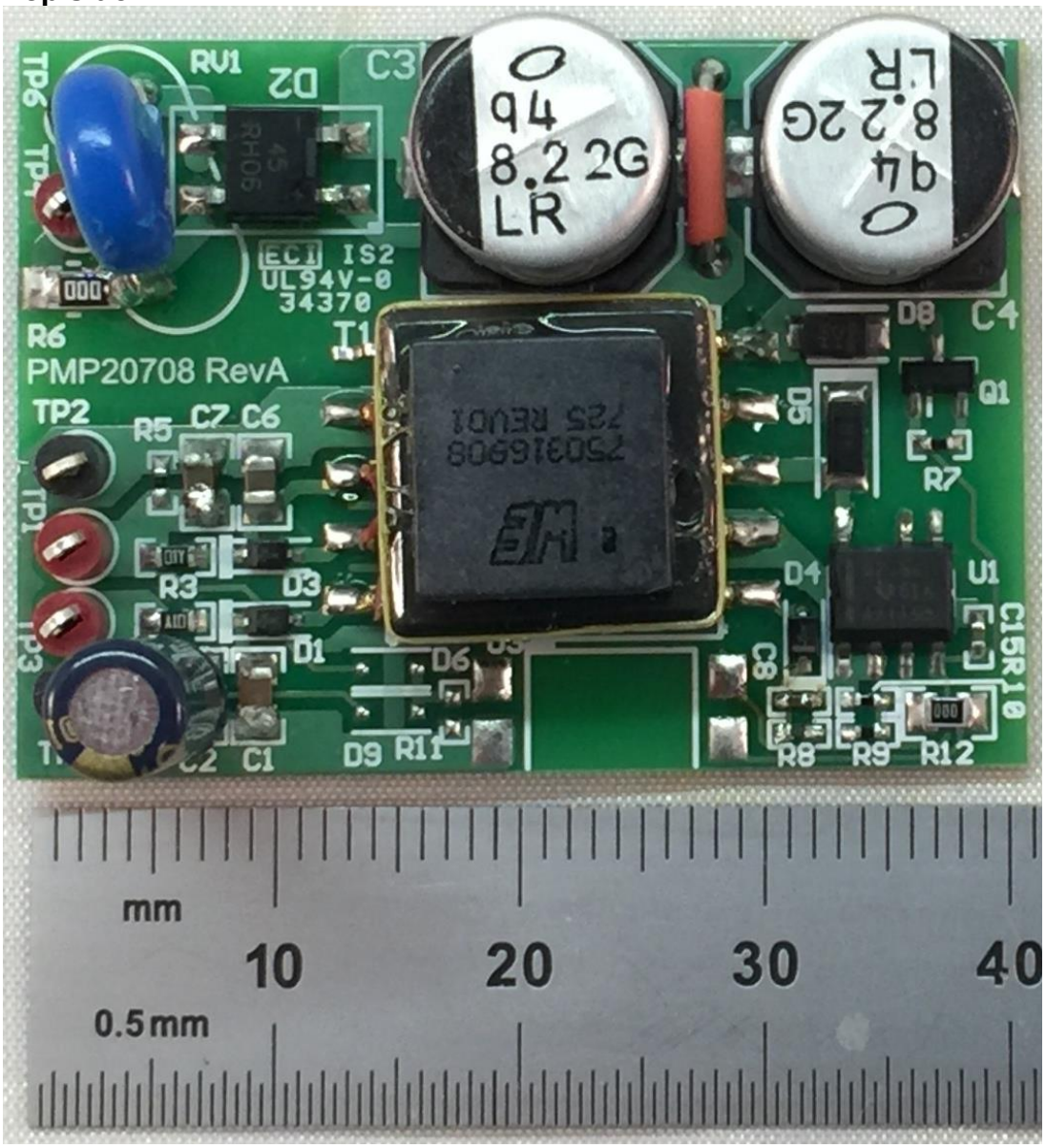
1 Photo

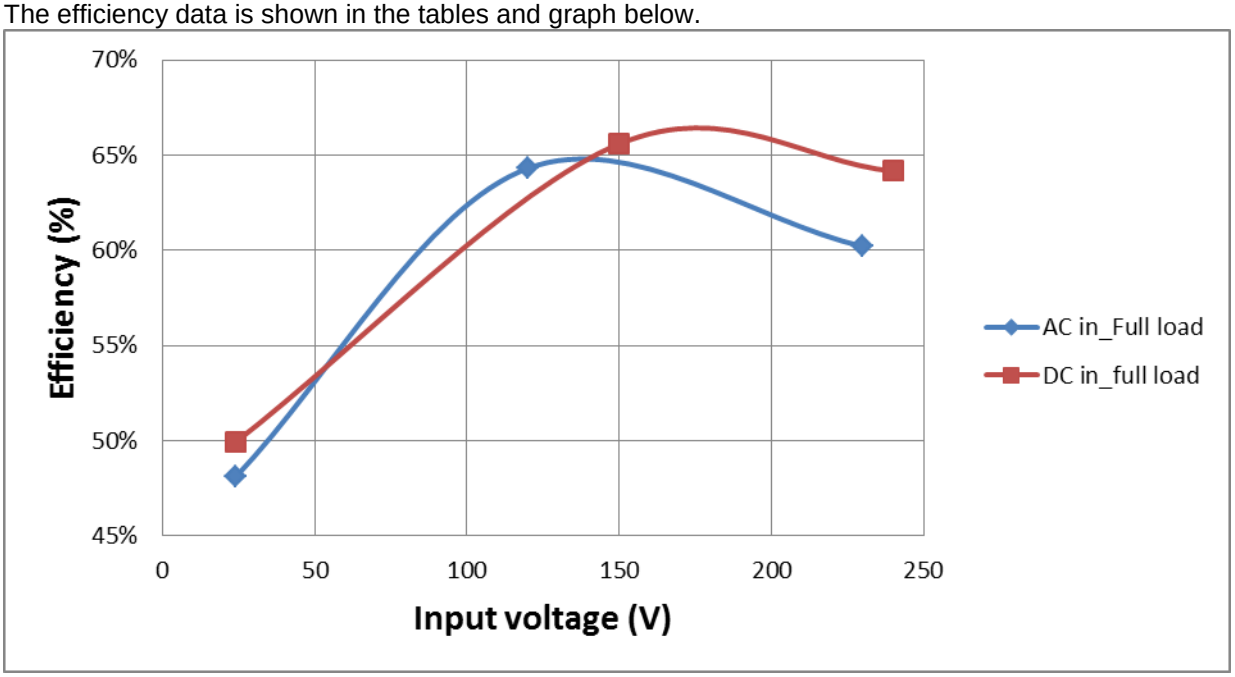
The photographs below show the PMP20708 Rev A assembly. This circuit was built on a PMP20708 Rev A PCB.

Top side



2 Converter Efficiency

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

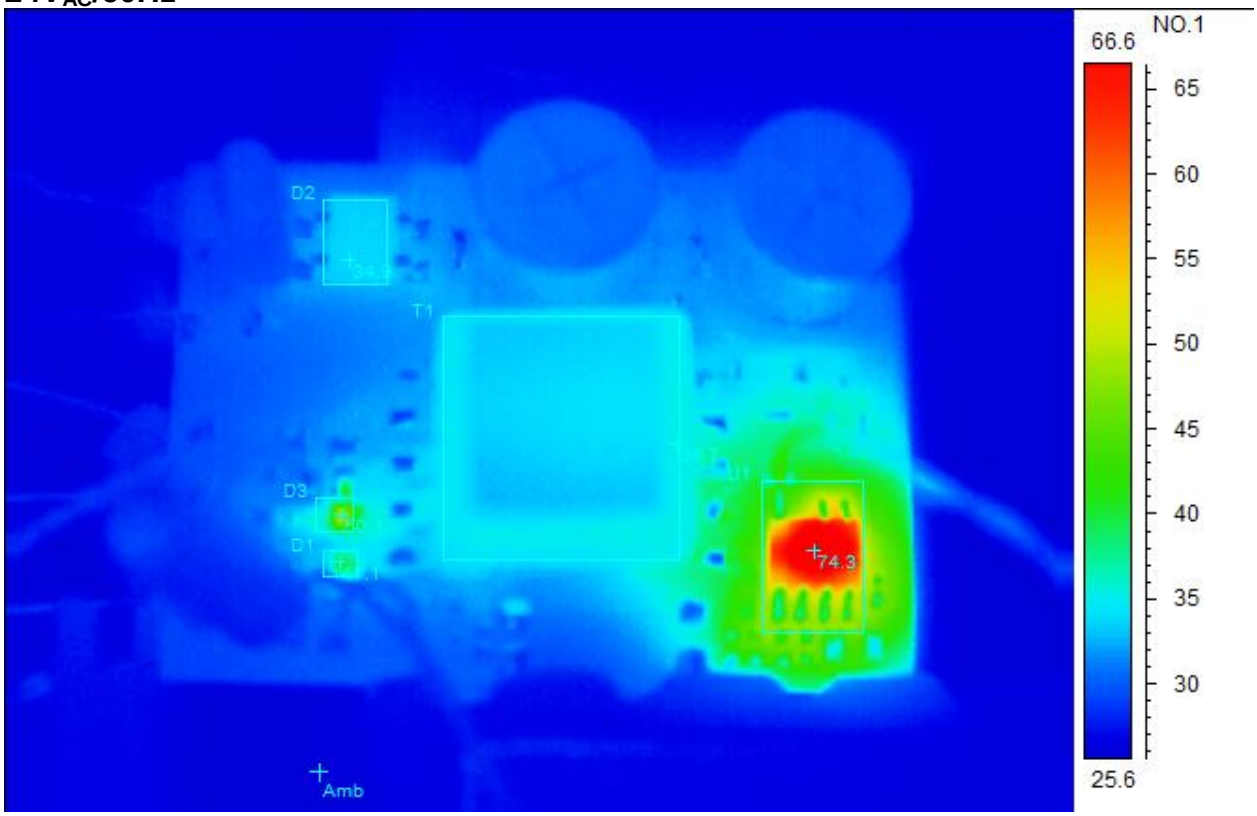


DC input								
Vin(V)	Iin(mA)	Pin(W)	Vo1(V)	Io1(mA)	Vo2(V)	Io2(mA)	Pout(W)	Eff(%)
24.19	22.44	0.542824	5.87	10.62	27.16	7	0.252459	46.51%
24.11	61.1	1.473121	5.33	10.6	23.88	30.05	0.774092	52.55%
24.17	29.3	0.708181	5	30.09	25.35	7.01	0.328154	46.34%
24.09	70.7	1.703163	5.01	30.09	23.25	30.09	0.850343	49.93%
150	3.408	0.5112	6.43	10.6	29.39	7	0.273888	53.58%
150	7.89	1.1835	5.5	10.59	24.3	30.02	0.787731	66.56%
150	4.25	0.6375	5.31	30.08	26.77	7	0.347115	54.45%
150	8.658	1.2987	5.05	30.09	23.33	30	0.851855	65.59%
240	2.272	0.54528	6.56	10.6	29.95	7	0.279186	51.20%
240	5.072	1.21728	5.54	10.62	24.42	30.02	0.791923	65.06%
240	2.79	0.6696	5.36	30.09	27.09	7	0.350912	52.41%
240	5.54	1.3296	5.05	30.09	23.37	30	0.853055	64.16%
AC input (60Hz with 24V or 120V input, 50Hz with 230V input)								
24.19	39.19	0.5804	6.11	10.24	28.05	7.04	0.260038	44.80%
24.06	95.57	1.531	5.3	10.25	23.68	29.98	0.764251	49.92%
24.16	48.96	0.7479	5.09	29.71	25.75	7.01	0.331731	44.36%
24.03	104.5	1.709	4.84	29.7	22.6	30	0.821748	48.08%
120.1	11.8	0.5307	6.49	10.25	29.59	7.01	0.273948	51.62%
120.08	24.4	1.21	5.52	10.25	24.36	30.02	0.787867	65.11%
120.1	14.297	0.6586	5.35	29.7	26.93	7	0.347405	52.75%
120.07	26.4	1.326	5.07	29.7	23.4	30.01	0.852813	64.31%
230.1	9.13	0.626	6.71	10.23	30.5	7	0.282143	45.07%
230.1	17.925	1.307	5.58	10.25	24.56	30	0.793995	60.75%
230.1	10.823	0.7527	5.43	29.69	27.42	7.01	0.353431	46.96%
230	19.321	1.421	5.07	29.71	23.44	30.07	0.855471	60.20%

3 Thermal Images

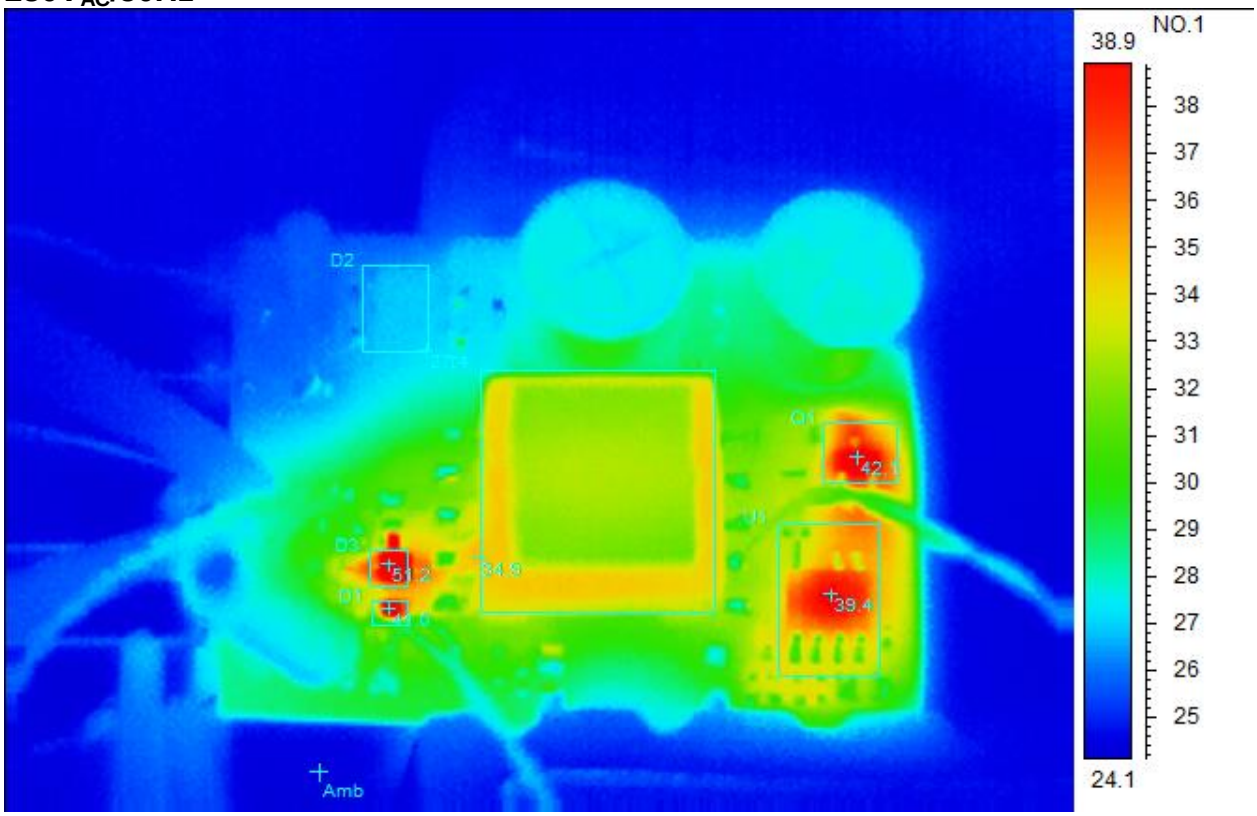
The thermal images below show a top view and bottom view of the board. The ambient temperature was 20ºC with no forced air flow. The outputs were at 12V/30mA and 5V/30mA loads.

24V_{AC}/60Hz



Spot analysis	Value
Amb Temperature	26.0°C
Area analysis	**Value**
D3Max	50.1°C
T1Max	36.7°C
D2Max	34.9°C
U1Max	74.3°C
D1Max	41.1°C

230V_{AC}/50Hz



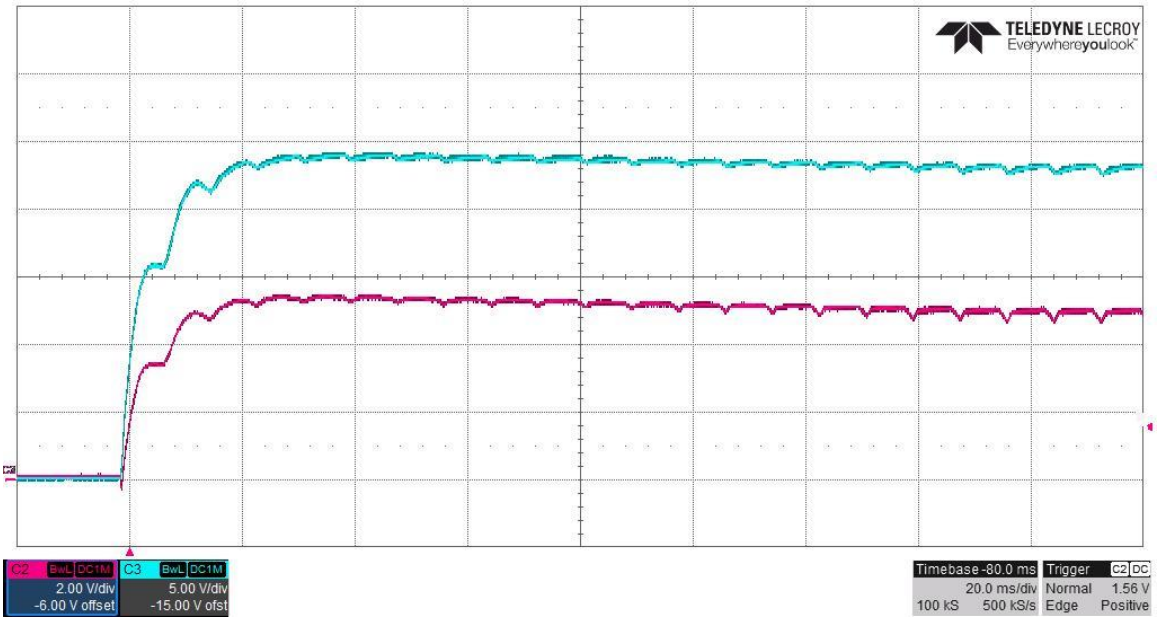
Spot analysis	Value
Amb Temperature	24.5°C
Area analysis	**Value**
D3Max	51.2°C
T1Max	34.9°C
D2Max	27.4°C
U1Max	39.4°C
D1Max	41.0°C
Q1 Max	42.1°C

4 Startup

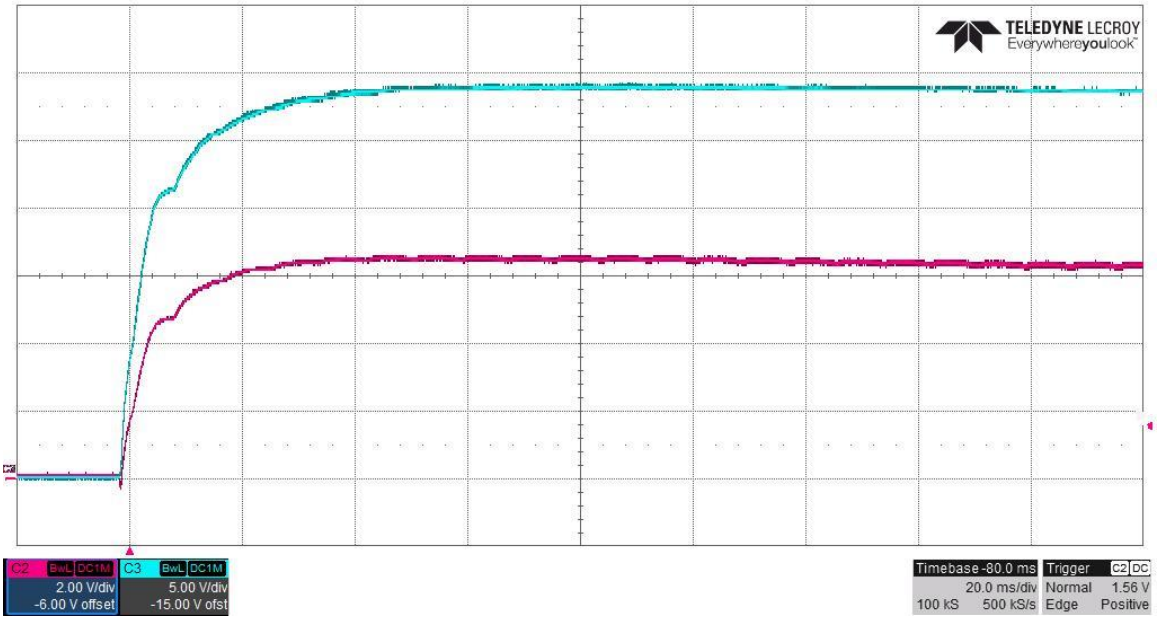
The output voltages during startup are shown in the images below. C2: $5V_{out}$; C3: $12V_{out}$.

4.1 24V_{AC}/60Hz input:

4.1.1 Start Up with 12V/30mA, 5V/30mA full load:

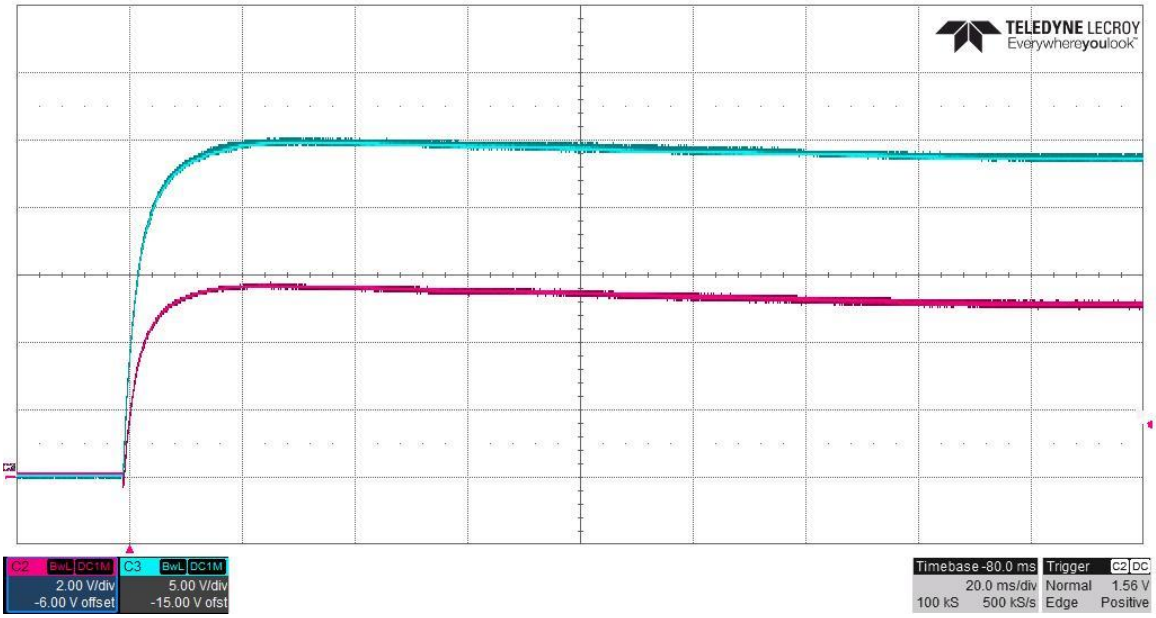


4.1.2 Start Up with 12V/7mA, 5V/10mA minimum load:

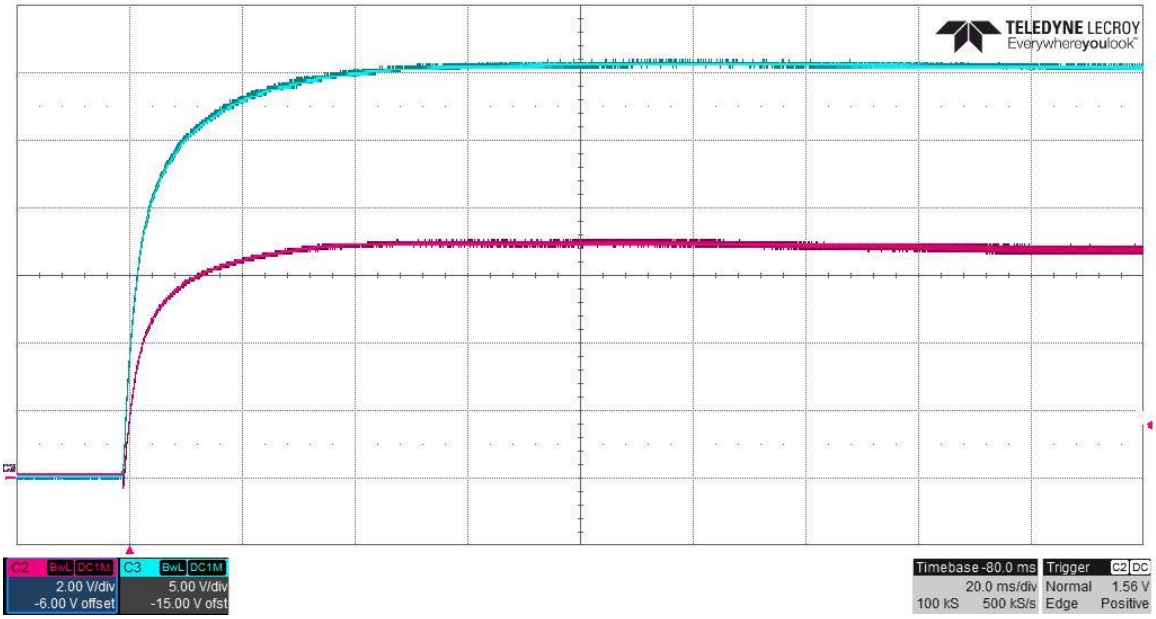


4.2 120V_{AC}/60Hz input:

4.2.1 Start Up with 12V/30mA, 5V/30mA full load:

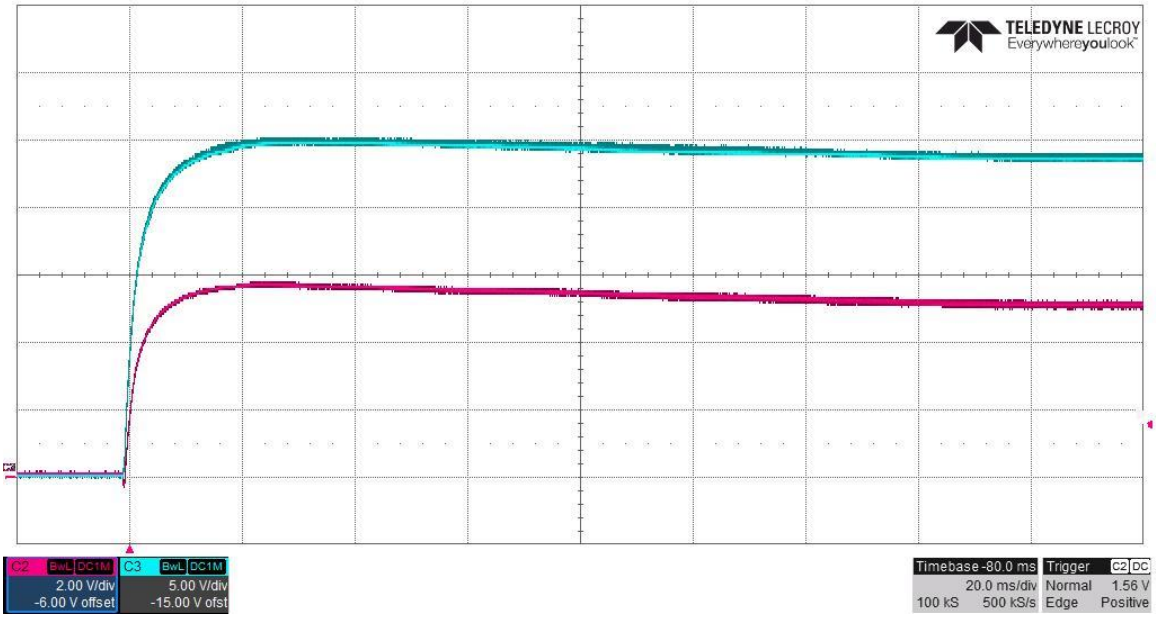


4.2.2 Start Up with 12V/7mA, 5V/10mA minimum load:

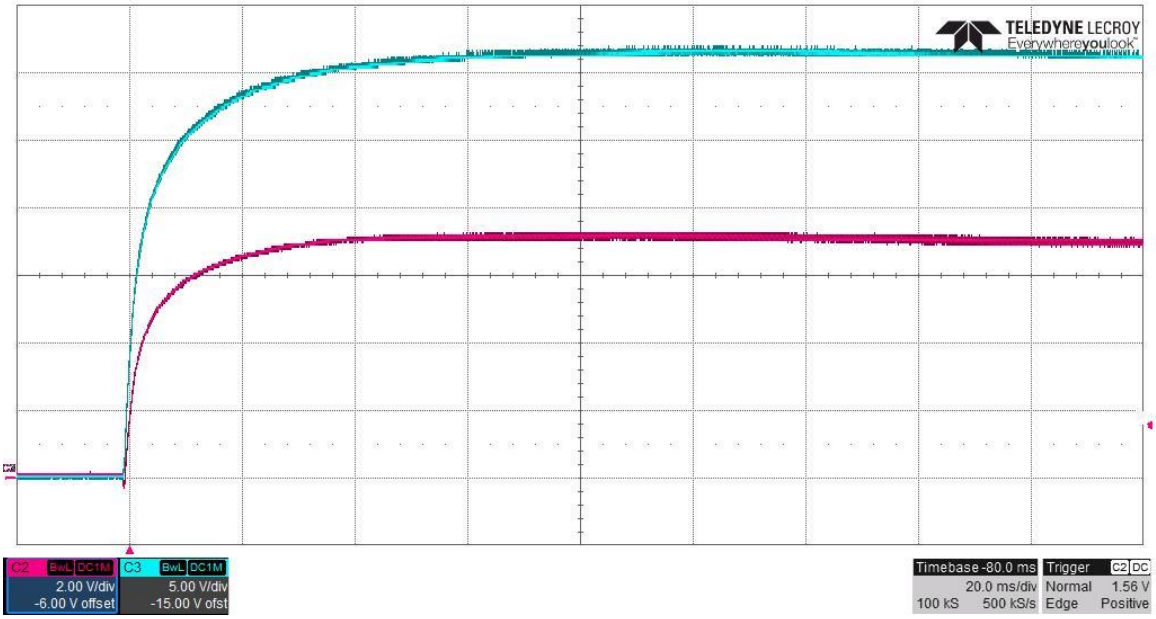


4.3 230V_{AC}/50Hz input:

4.3.1 Start Up with 12V/30mA, 5V/30mA full load:



4.3.2 Start Up with 12V/7mA, 5V/10mA minimum load:



5 Cross regulation

Output voltage cross regulation is tested with DC input.

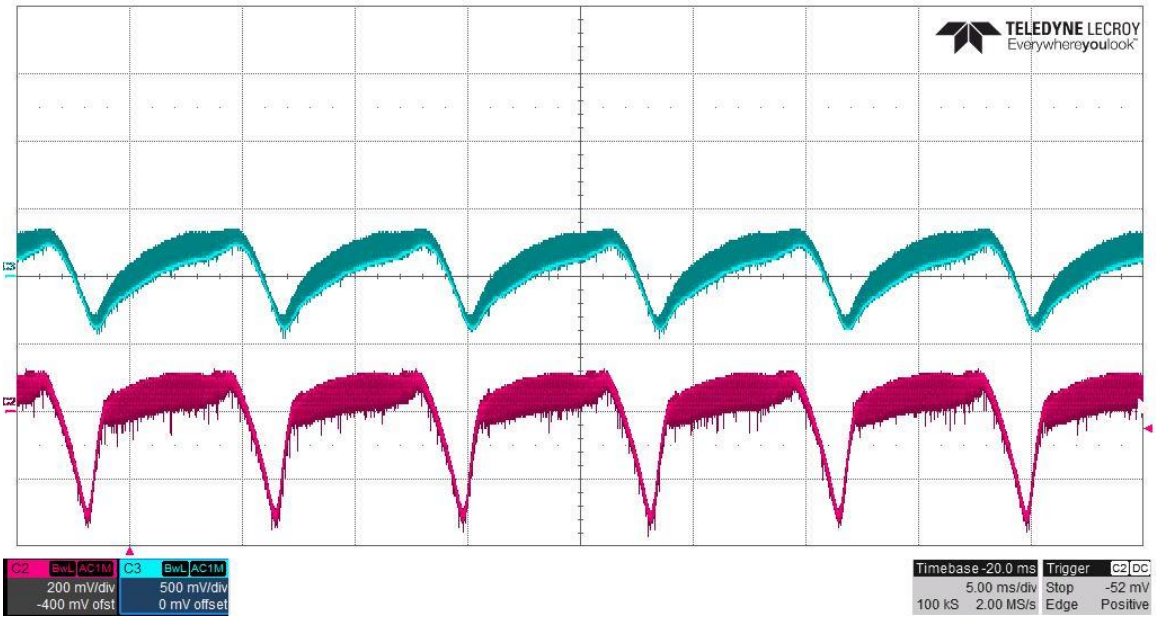
DC input				
Vin(V)	Vo1(V)	Io1(mA)	Vo2(V)	Io2(mA)
24.19	5.87	10.62	27.16	7
24.11	5.33	10.6	23.88	30.05
24.17	5	30.09	25.35	7.01
24.09	5.01	30.09	23.25	30.09
150	6.43	10.6	29.39	7
150	5.5	10.59	24.3	30.02
150	5.31	30.08	26.77	7
150	5.05	30.09	23.33	30
240	6.56	10.6	29.95	7
240	5.54	10.62	24.42	30.02
240	5.36	30.09	27.09	7
240	5.05	30.09	23.37	30
AC input (60Hz with 24V or 120V input, 50Hz with 230V input)				
24.19	6.11	10.24	28.05	7.04
24.06	5.3	10.25	23.68	29.98
24.16	5.09	29.71	25.75	7.01
24.03	4.84	29.7	22.6	30
120.1	6.49	10.25	29.59	7.01
120.08	5.52	10.25	24.36	30.02
120.1	5.35	29.7	26.93	7
120.07	5.07	29.7	23.4	30.01
230.1	6.71	10.23	30.5	7
230.1	5.58	10.25	24.56	30
230.1	5.43	29.69	27.42	7.01
230	5.07	29.71	23.44	30.07
dVo1	1.87			
dVo2			7.9	
Vo(mid)	5.775		26.55	
dV	0.32381		0.297552	

6 Output Ripple Voltages

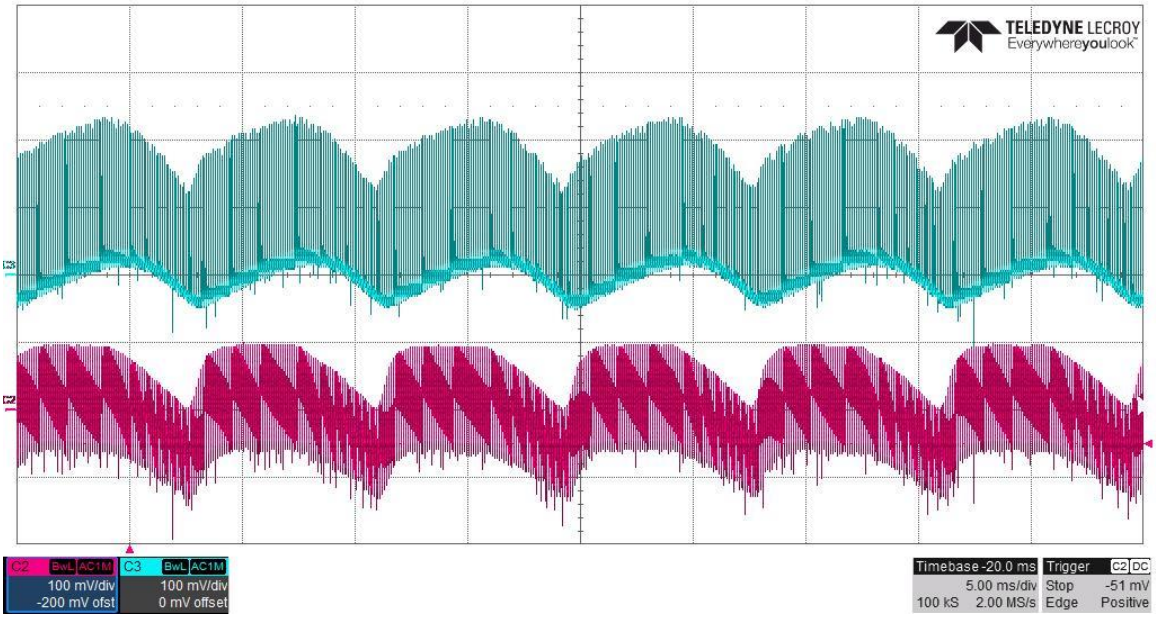
The output ripple voltages are shown in the plots below. C2: $5V_{out}$; C3: $12V_{out}$.

6.1 24V_{AC}/60Hz input:

6.1.1 12V/30mA, 5V/30mA full load:

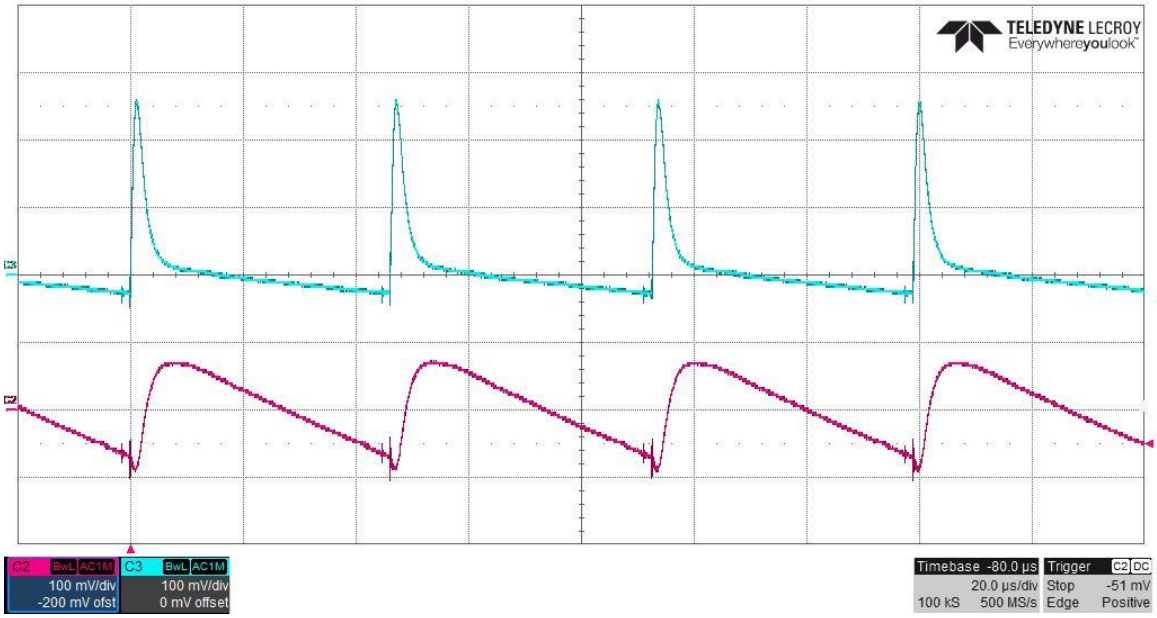


6.1.2 12V/7mA, 5V/10mA minimum load:

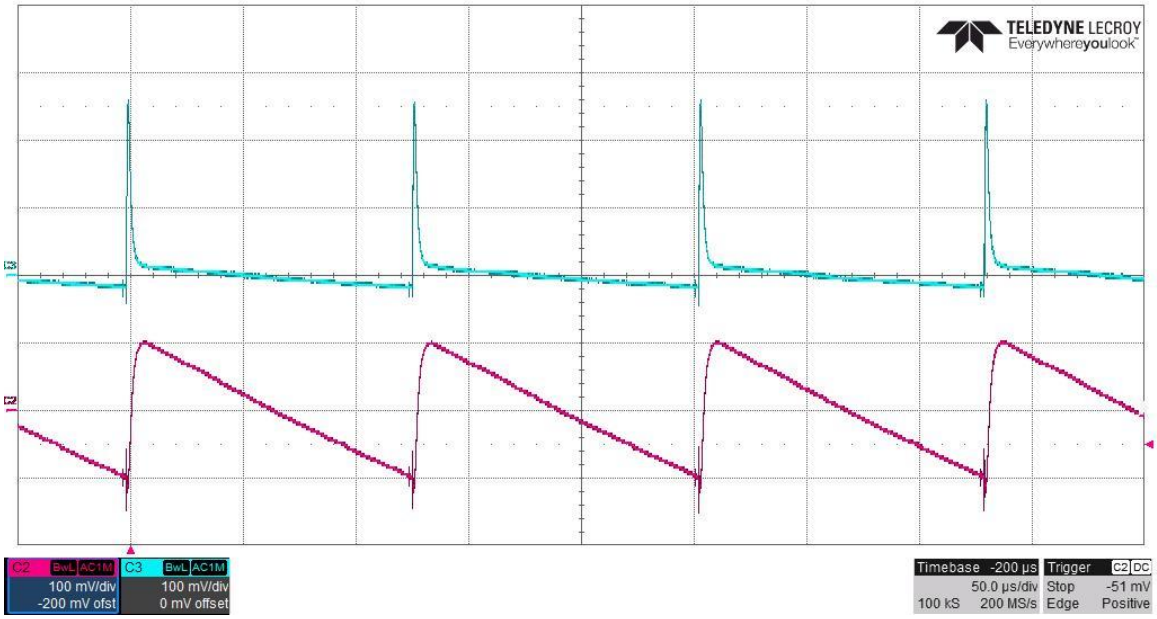


6.2 120V_{AC}/60Hz input:

6.2.1 12V/30mA, 5V/30mA full load:

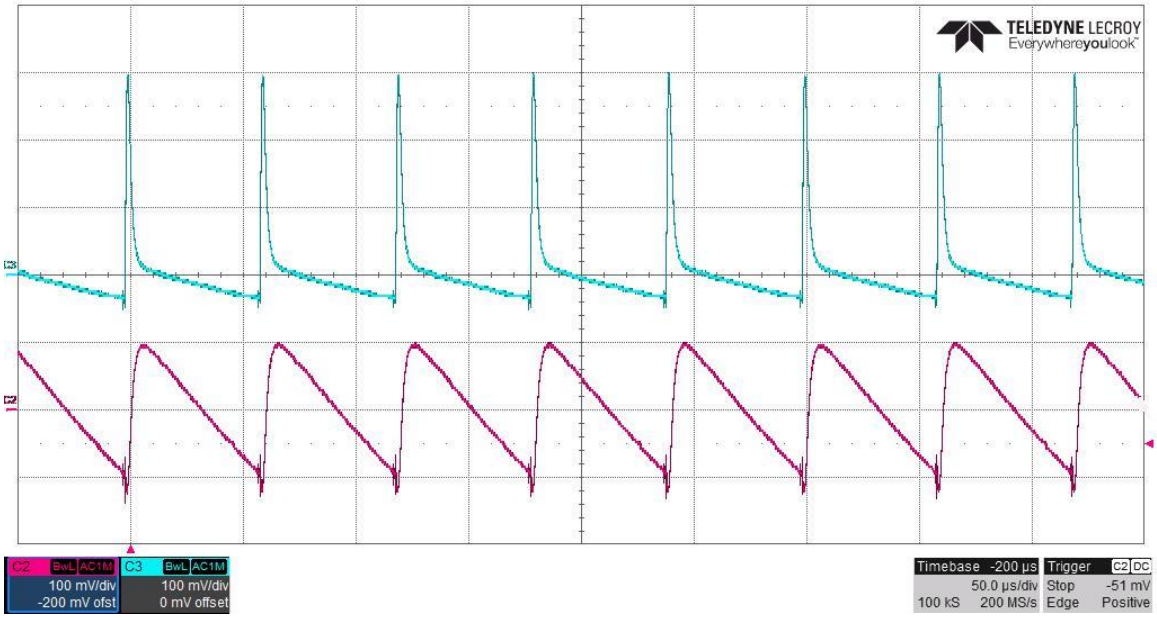


6.2.2 12V/7mA, 5V/10mA minimum load:

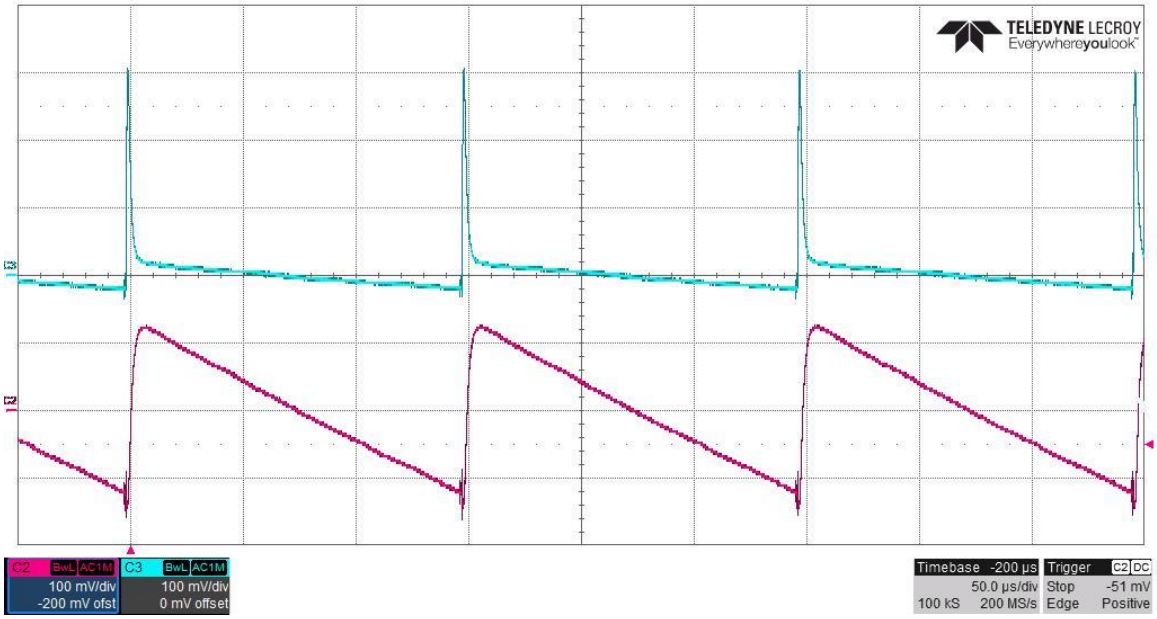


6.3 230V_{AC}/50Hz input:

6.3.1 12V/30mA, 5V/30mA full load:

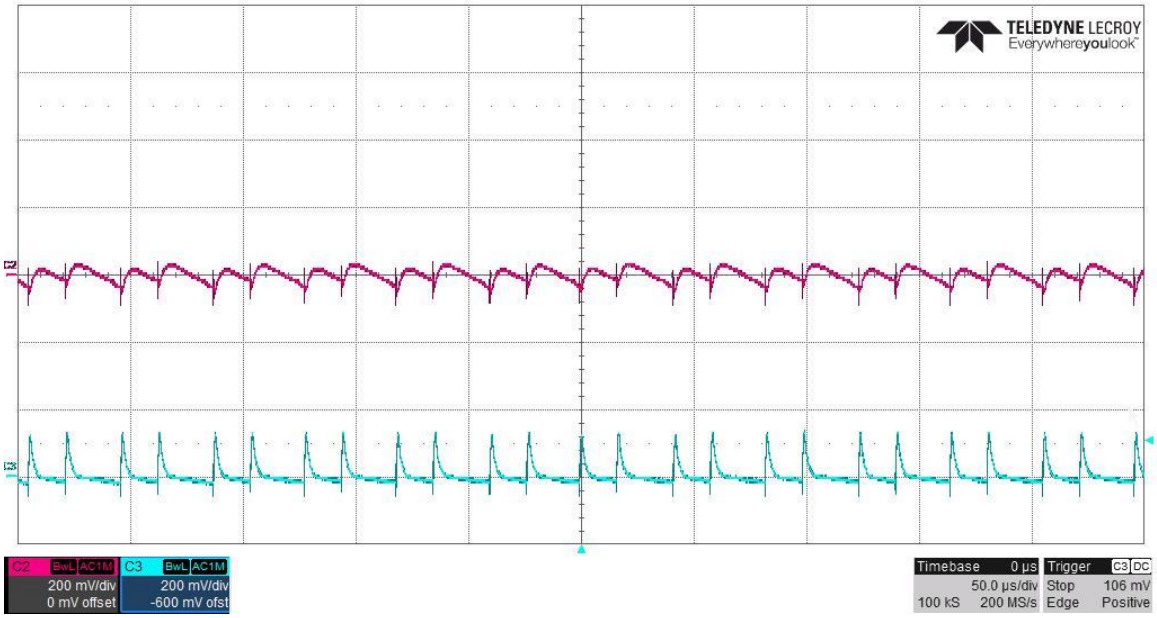


6.3.2 12V/7mA, 5V/10mA minimum load:

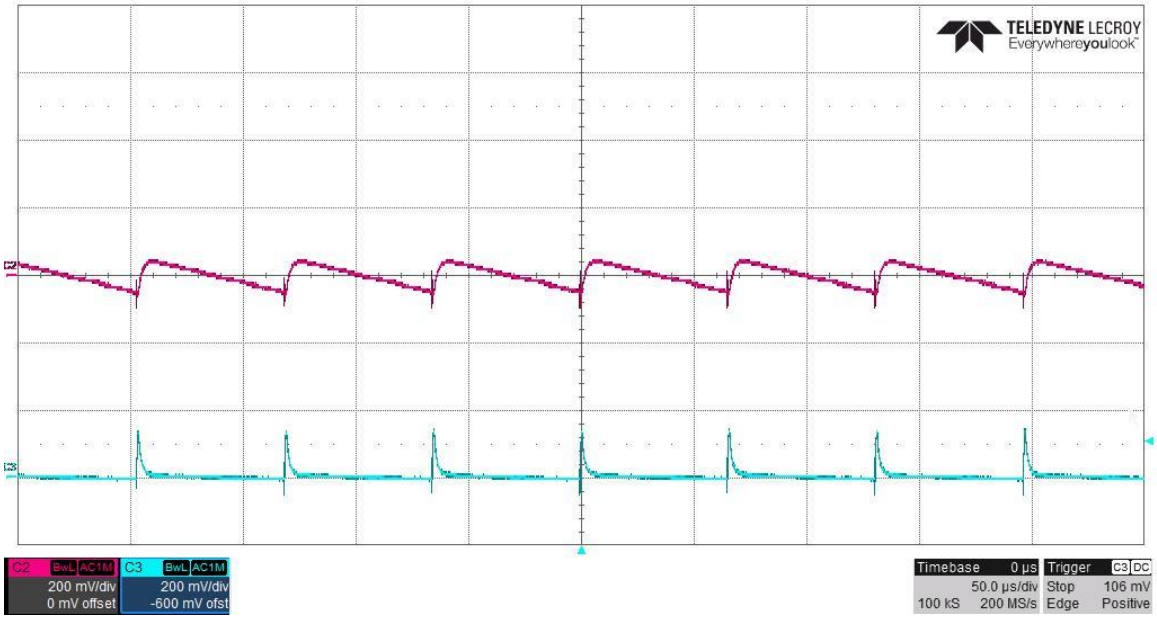


6.4 24V_{DC} input:

6.4.1 12V/30mA, 5V/30mA full load:

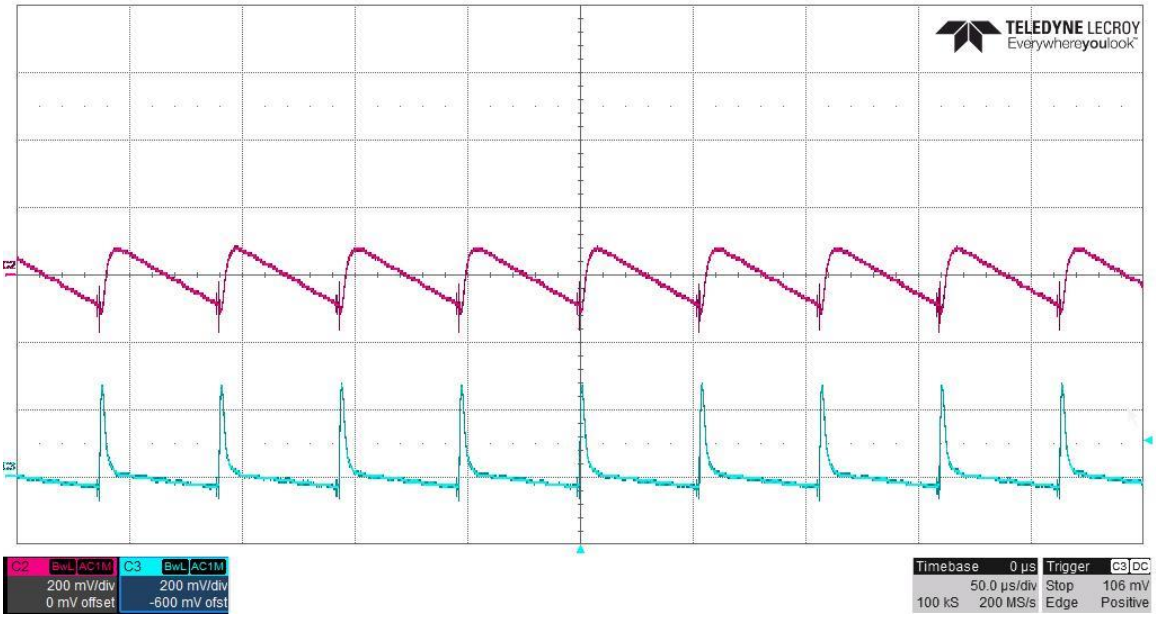


6.4.2 12V/7mA, 5V/10mA minimum load:

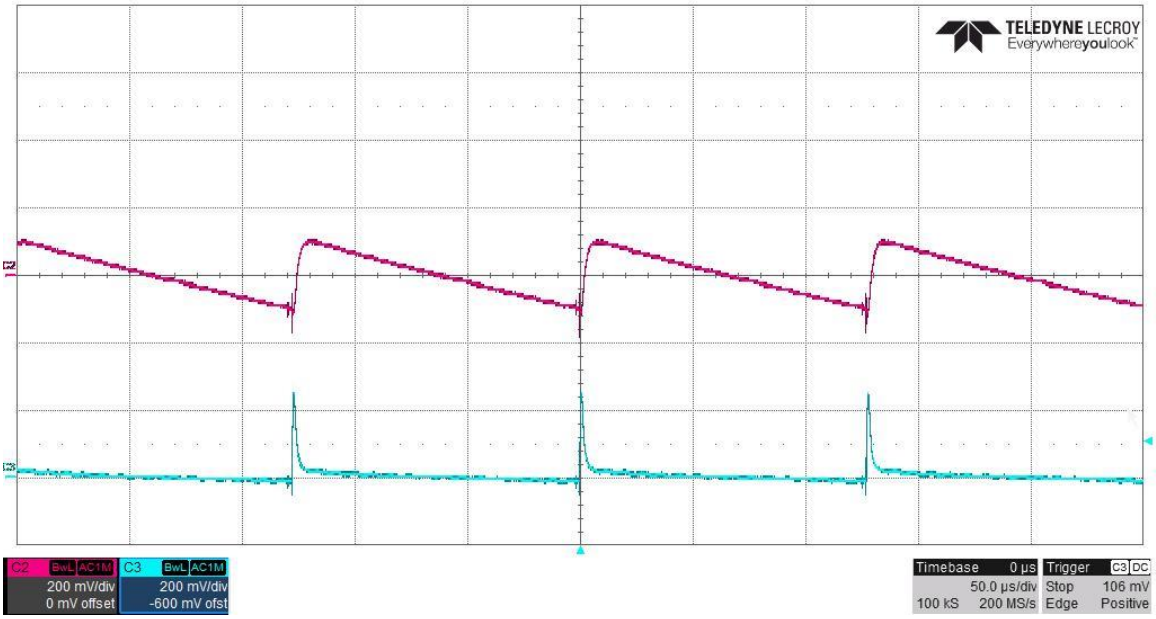


6.5 150V_{DC} input:

6.5.1 12V/30mA, 5V/30mA full load:

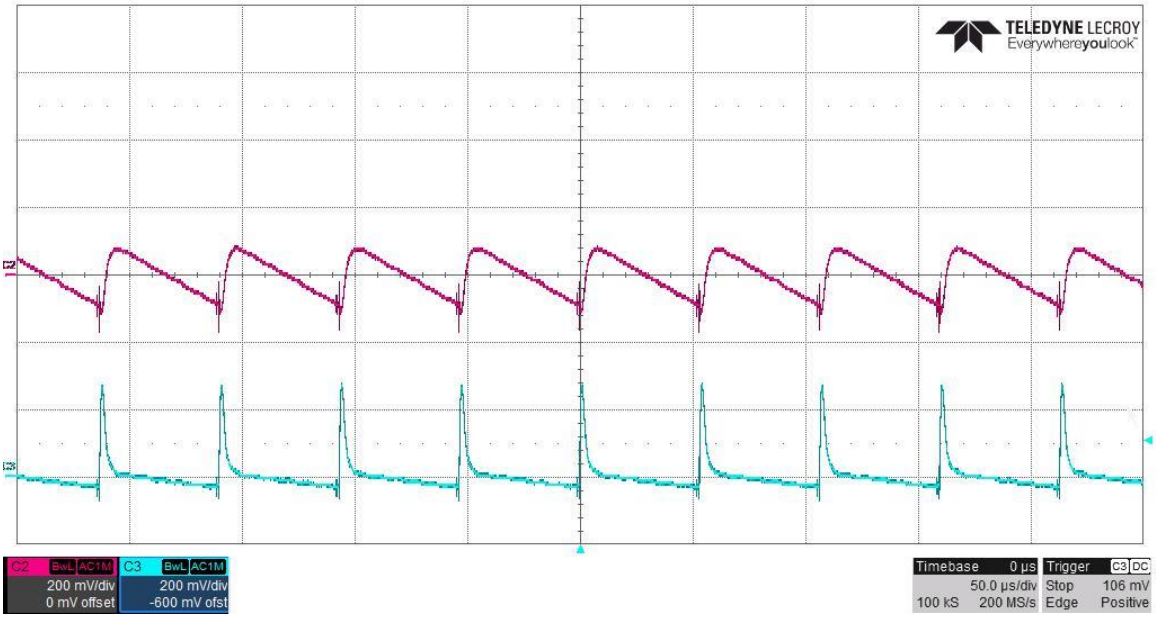


6.5.2 12V/7mA, 5V/10mA minimum load:

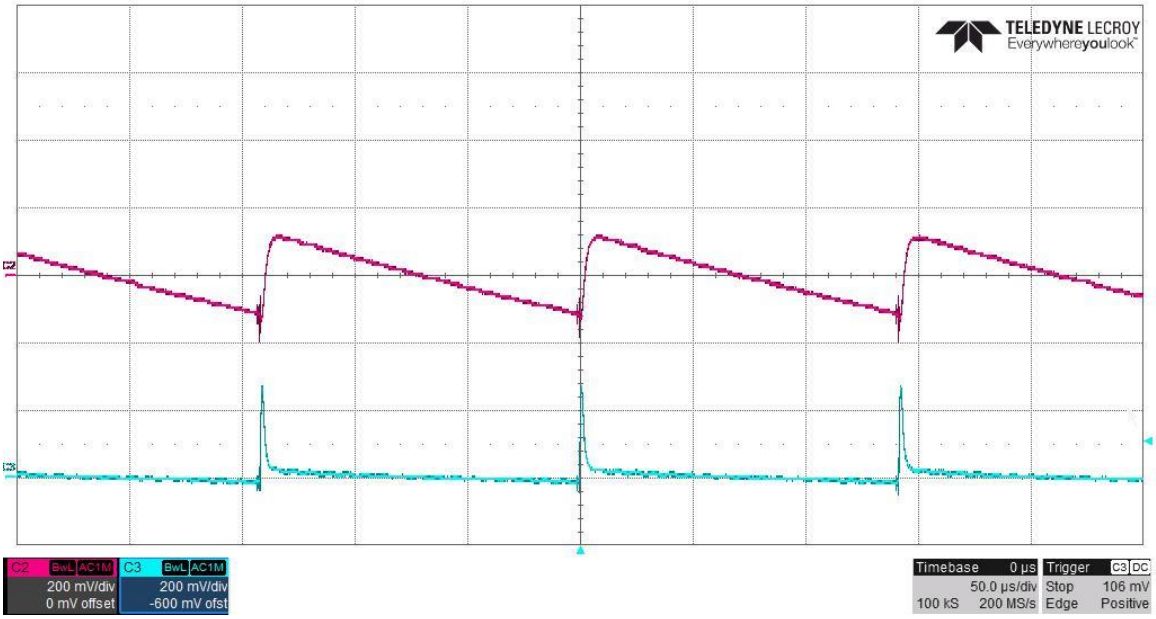


6.6 240V_{DC} input:

6.6.1 12V/30mA, 5V/30mA full load:



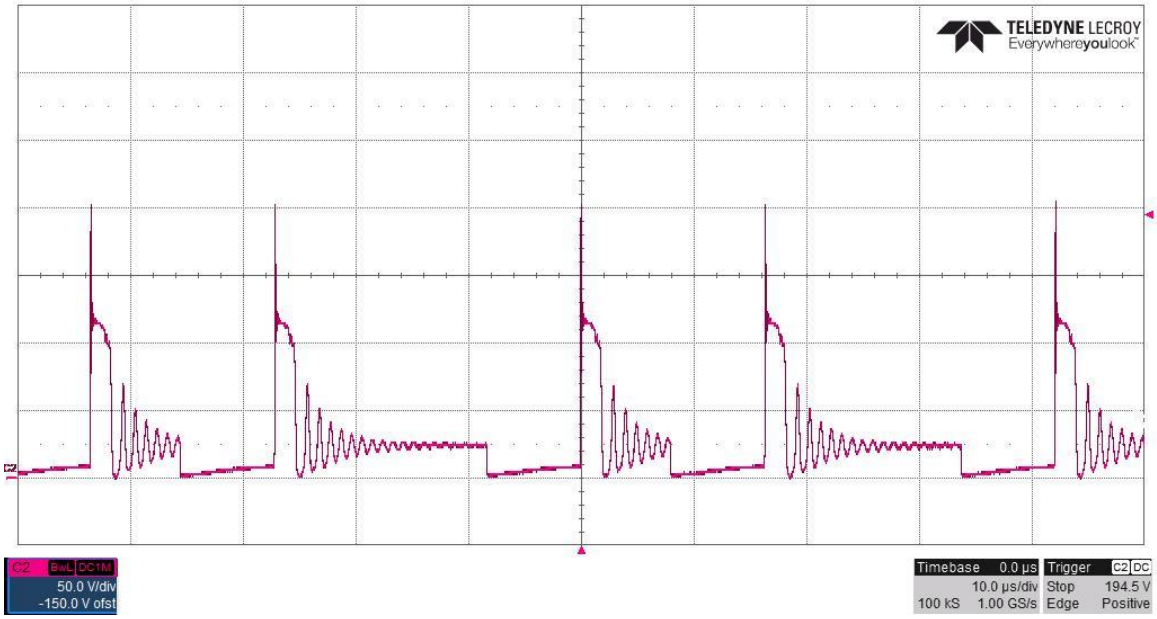
6.6.2 12V/7mA, 5V/10mA minimum load:



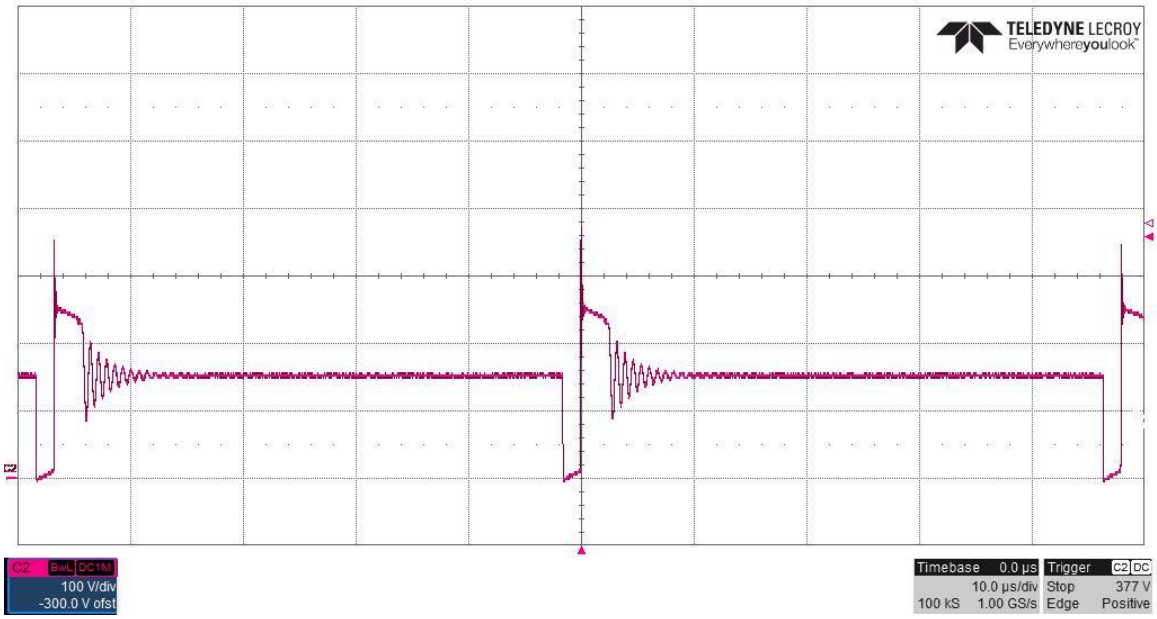
7 Switching Waveforms

The images below show key switching waveforms of PMP20708RevA. The waveforms are measured with 12V/30mA and 5V/30mA full load.

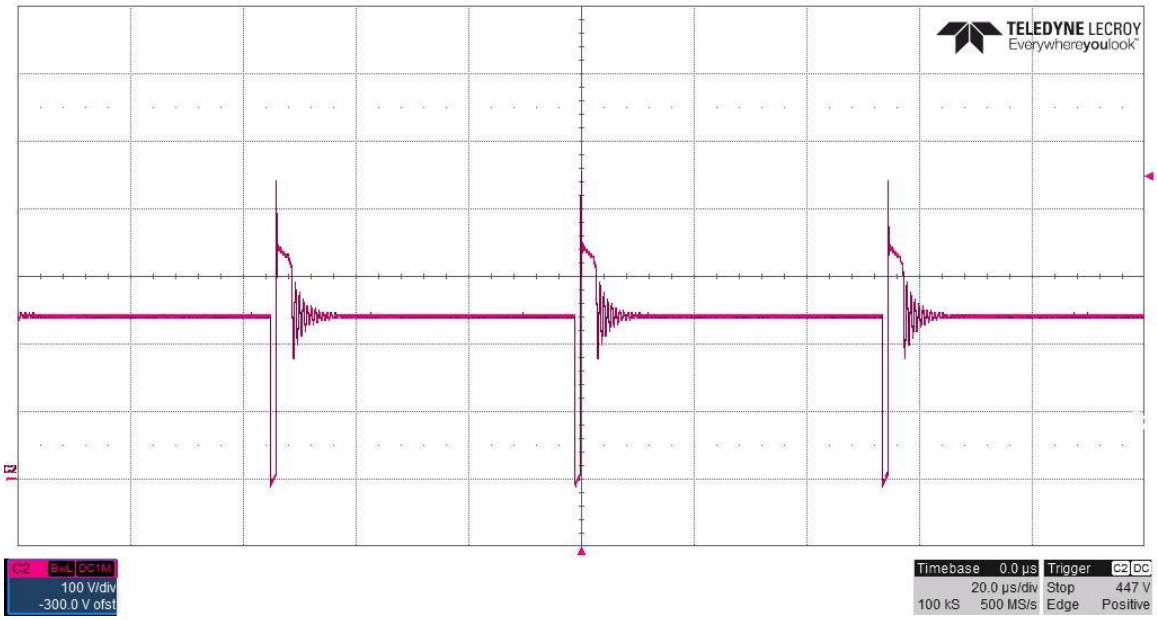
7.1 U1 pin 8 @ 24V_{DC}



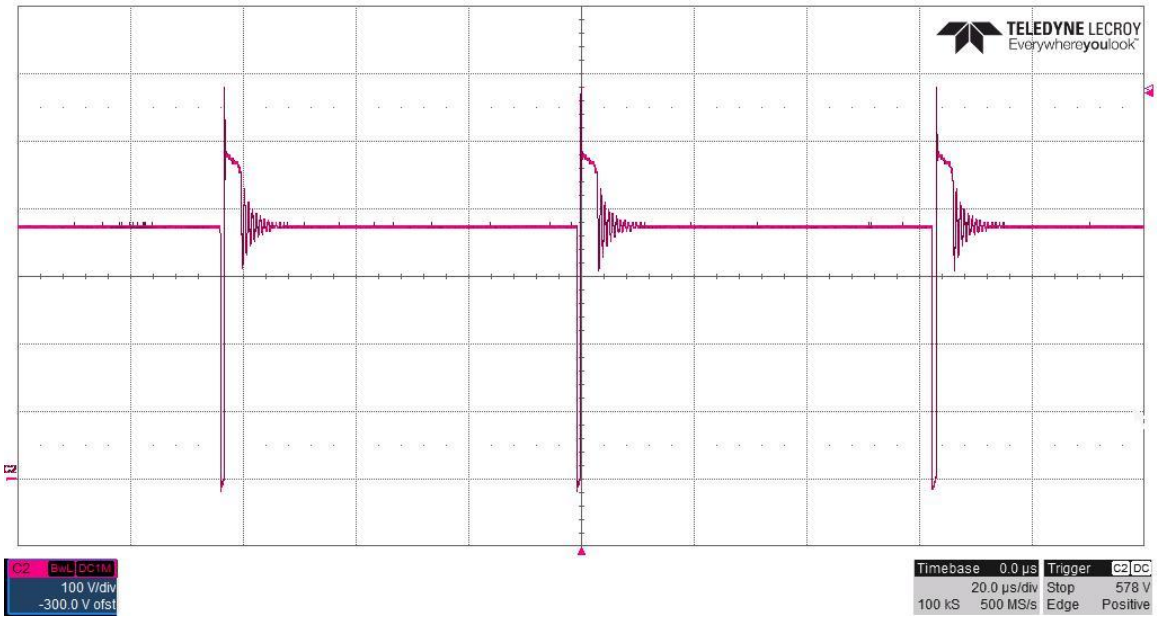
7.2 U1 pin 8 @ 150V_{DC}



7.3 U1 pin 8 @ 240V_{DC}



7.4 U1 pin 8 @ 375V_{DC}



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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265