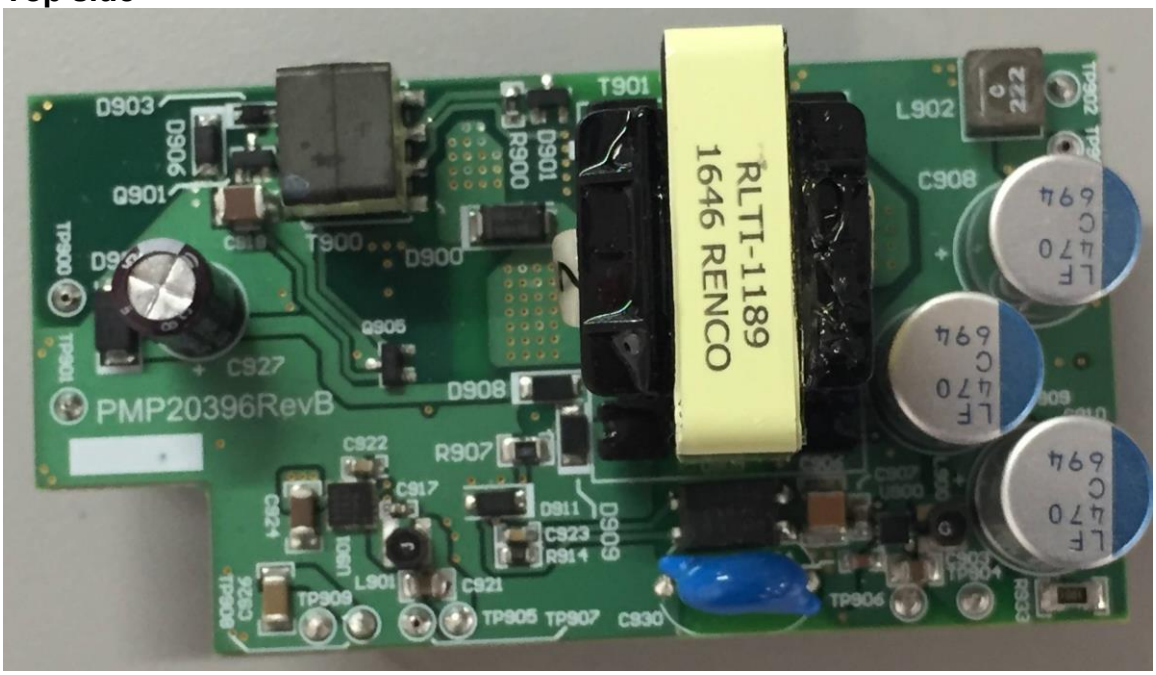
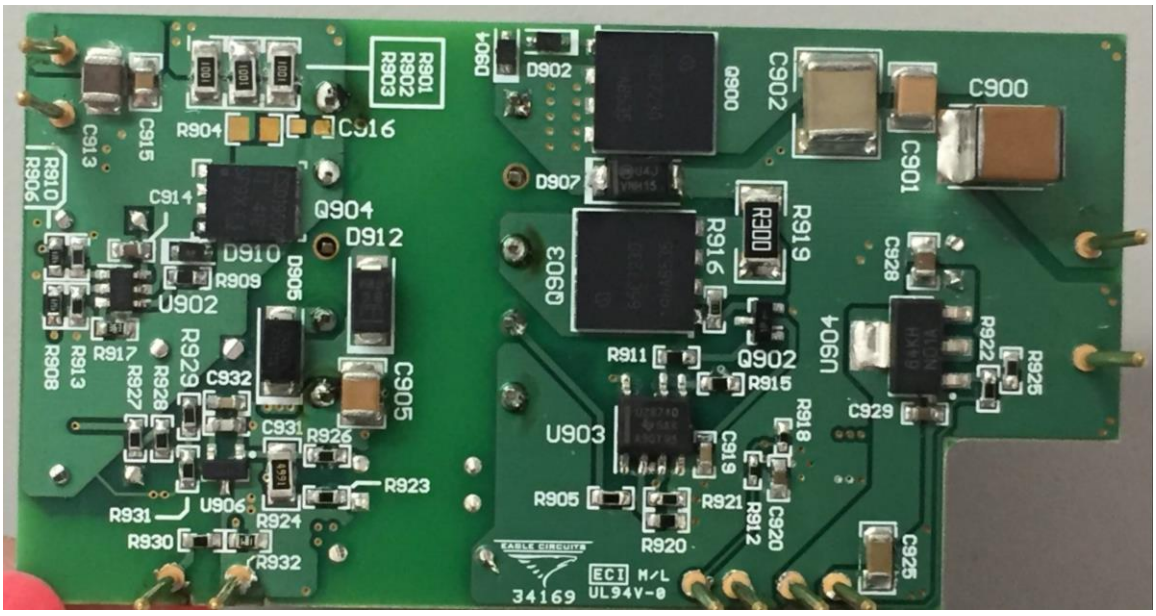
1 Photo

The photographs below show the PMP20396 Rev B assembly. This circuit was built on a PMP20396 Rev A PCB.

Top side

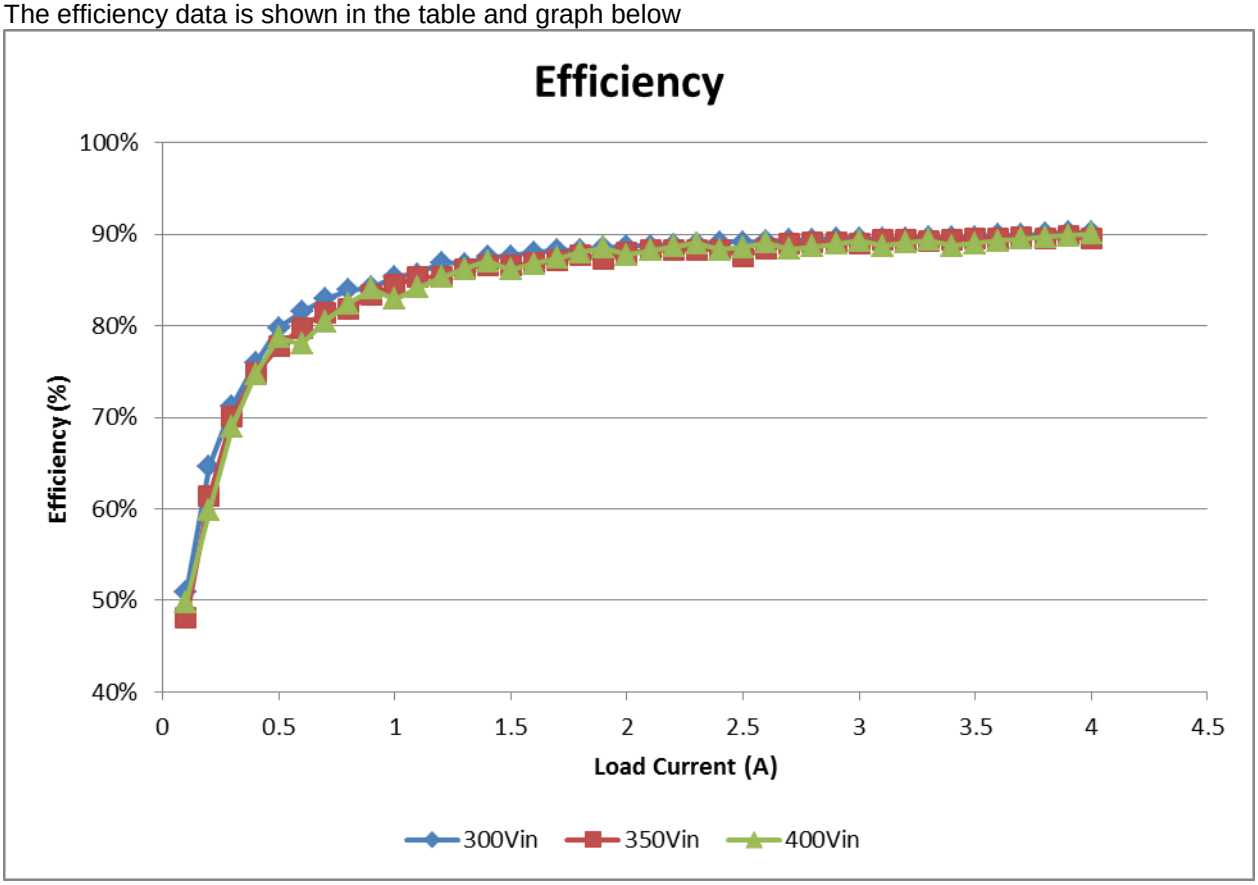


Bottom side



2 Converter Efficiency

The efficiency data is shown in the table and graph below



V_{IN} = 300V_{DC}:

Vin DC	Pin	Vout	Iout	Pout	Eff @300VDC
300	52.8	11.91	4	47.64	90%
300	50.26	11.91	3.8	45.258	90%
300	47.7	11.91	3.6	42.876	90%
300	45.2	11.92	3.4	40.528	90%
300	42.6	11.92	3.2	38.144	90%
300	39.9	11.91	3	35.73	90%
300	37.3	11.91	2.8	33.348	89%
300	34.74	11.92	2.6	30.992	89%
300	32.11	11.93	2.4	28.632	89%
300	29.54	11.93	2.2	26.246	89%
300	26.92	11.94	2	23.88	89%
300	24.34	11.94	1.8	21.492	88%
300	21.7	11.94	1.6	19.104	88%
300	19.12	11.95	1.4	16.73	88%
300	16.5	11.95	1.2	14.34	87%
300	14	11.95	1	11.95	85%
300	11.4	11.95	0.8	9.56	84%
300	8.8	11.96	0.6	7.176	82%
300	6.3	11.96	0.4	4.784	76%
300	3.7	11.96	0.2	2.392	65%
300	2.35	11.96	0.1	1.196	51%

V_{IN} = 350V_{DC}:

Vin DC	Pin	Vout	Iout	Pout	Eff @350VDC
350	53	11.87	4	47.48	90%
350	50.4	11.88	3.8	45.144	90%
350	47.8	11.89	3.6	42.804	90%
350	45.22	11.89	3.4	40.426	89%
350	42.6	11.9	3.2	38.08	89%
350	40.1	11.9	3	35.7	89%
350	37.4	11.9	2.8	33.32	89%
350	35	11.91	2.6	30.966	88%
350	32.4	11.92	2.4	28.608	88%
350	29.7	11.92	2.2	26.224	88%
350	27.1	11.93	2	23.86	88%
350	24.5	11.94	1.8	21.492	88%
350	22	11.94	1.6	19.104	87%
350	19.3	11.94	1.4	16.716	87%
350	16.8	11.94	1.2	14.328	85%
350	14.15	11.95	1	11.95	84%
350	11.68	11.95	0.8	9.56	82%
350	9	11.96	0.6	7.176	80%
350	6.4	11.97	0.4	4.788	75%
350	3.9	11.97	0.2	2.394	61%
350	2.49	11.97	0.1	1.197	48%

V_{IN} = 400V_{DC}:

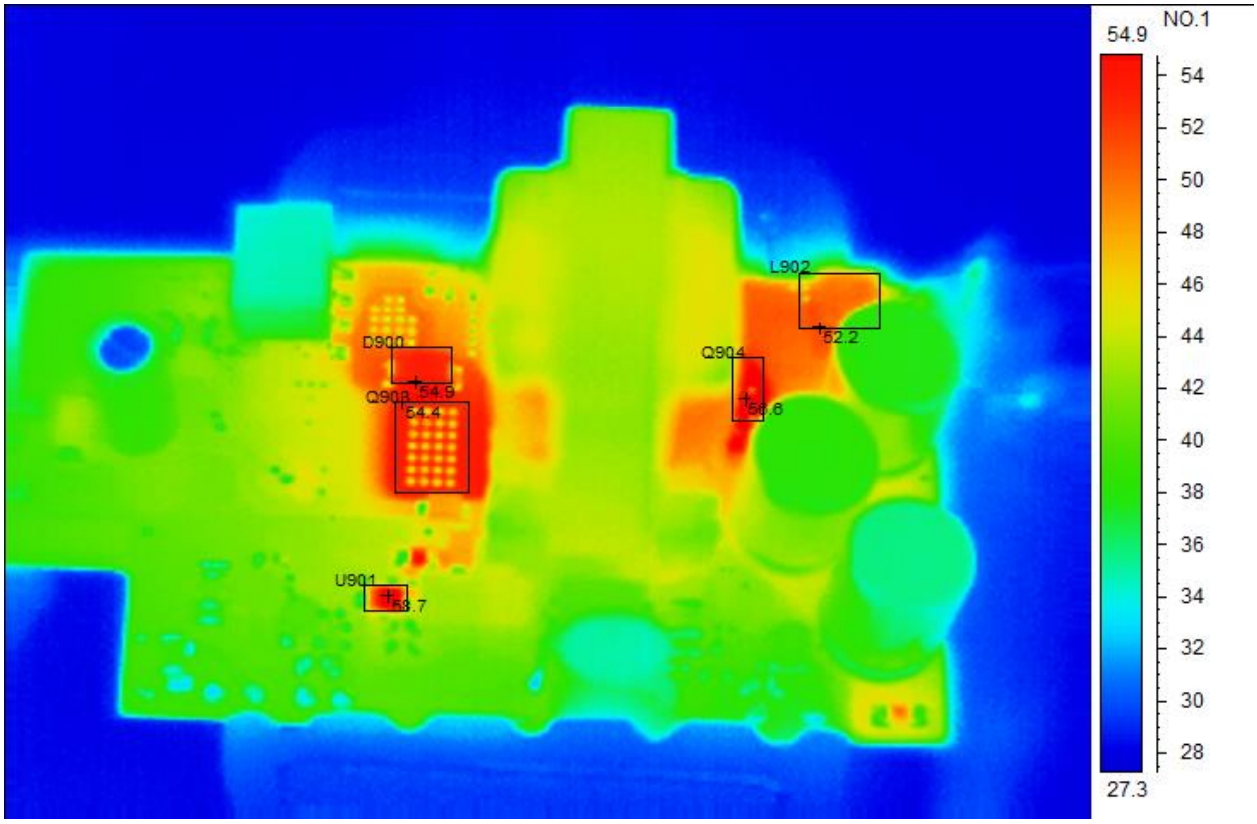
Vin DC	Pin	Vout	Iout	Pout	Eff @400VDC
400	52.8	11.89	4	47.56	90.08%
400	50.4	11.9	3.8	45.22	89.72%
400	48	11.9	3.6	42.84	89.25%
400	44	11.9	3.4	40.46	91.95%
400	42.8	11.91	3.2	38.112	89.05%
400	40	11.9	3	35.7	89.25%
400	37.6	11.9	2.8	33.32	88.62%
400	34.8	11.92	2.6	30.992	89.06%
400	32.4	11.92	2.4	28.608	88.30%
400	29.6	11.93	2.2	26.246	88.67%
400	27.2	11.93	2	23.86	87.72%
400	24.4	11.93	1.8	21.474	88.01%
400	22	11.93	1.6	19.088	86.76%
400	19.2	11.94	1.4	16.716	87.06%
400	16.8	11.94	1.2	14.328	85.29%
400	14.4	11.94	1	11.94	82.92%
400	11.6	11.95	0.8	9.56	82.41%
400	9.2	11.96	0.6	7.176	78.00%
400	6.4	11.96	0.4	4.784	74.75%
400	4	11.96	0.2	2.392	59.80%
400	2.4	11.96	0.1	1.196	49.83%

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 12V/4A load.

V_{in} : 400V_{DC}

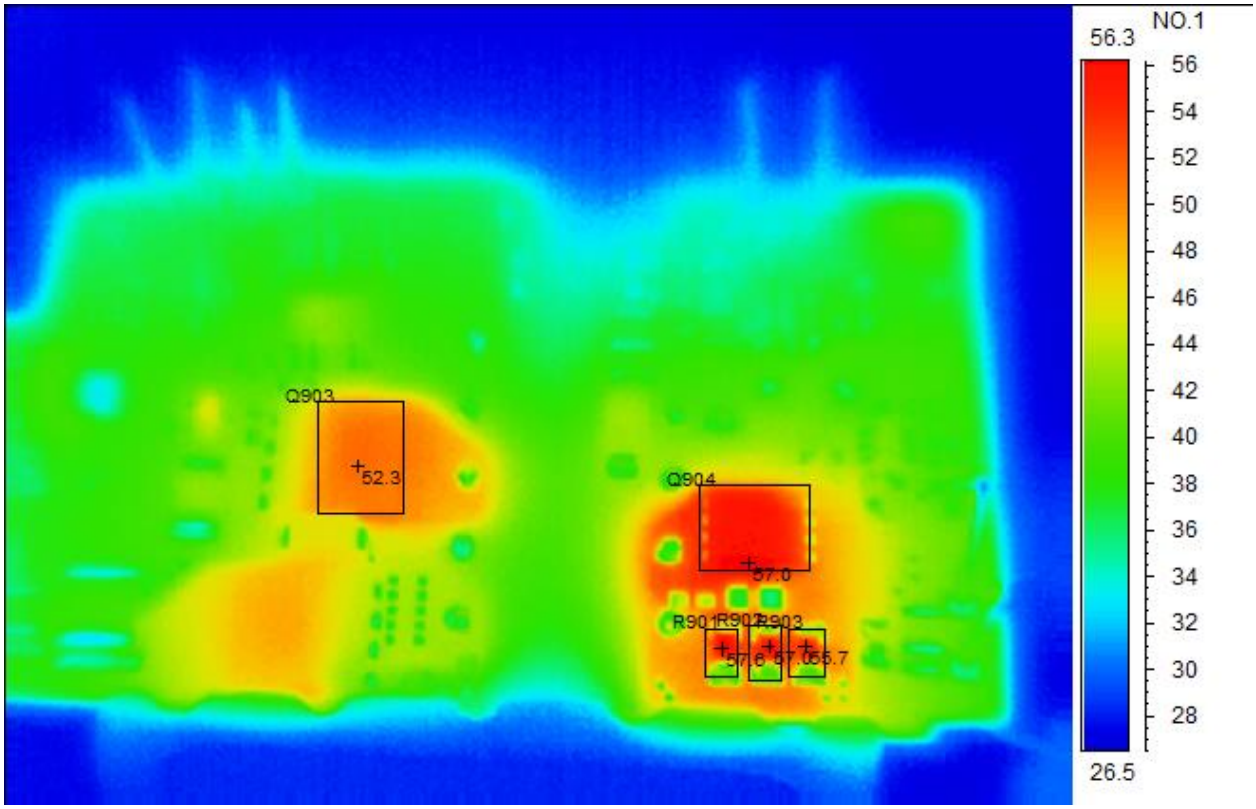
- **Top side**



Parameters	Value
Ambient	36.2°C
Area analysis	**Value**
Q903 Max	52.3°C
Q904Max	57.0°C
R901Max	57.6°C
R902Max	57.0°C
R903 Max	55.7°C

V_{in} : 400V_{DC}

- **Bottom side**



Parameters	Value
Ambient	36.2°C
Area analysis	**Value**
Q903 Max	52.3°C
Q904Max	57.0°C
R901Max	57.6°C
R902Max	57.0°C
R903 Max	55.7°C

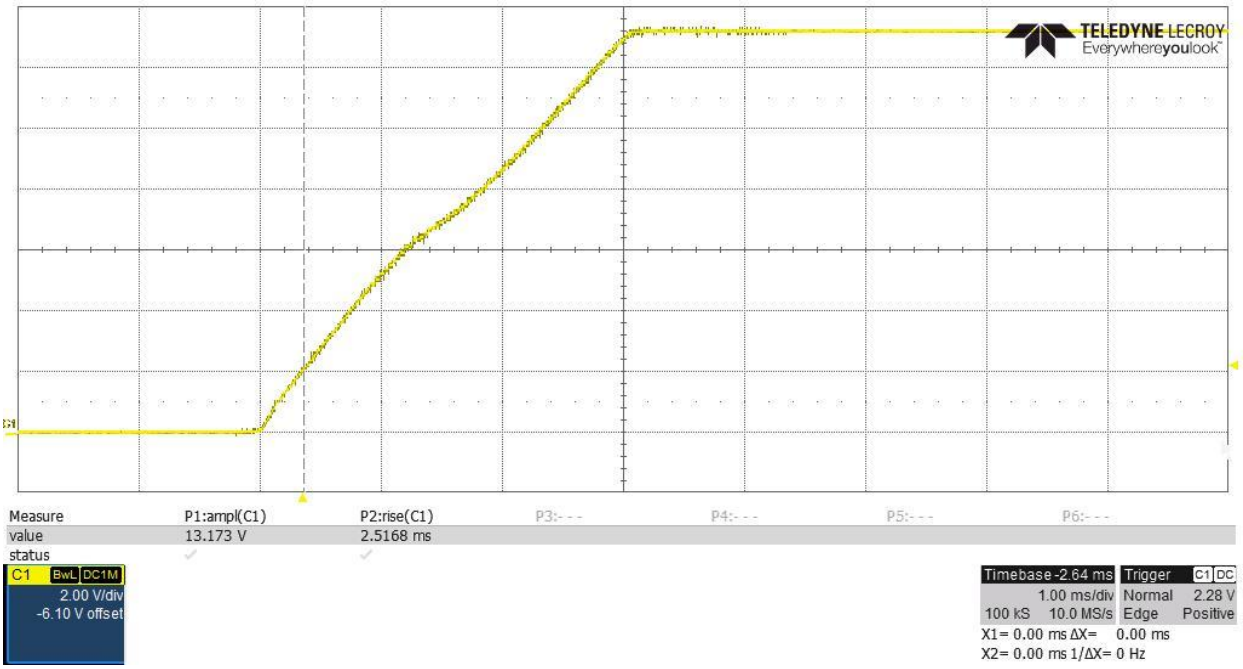
4 Startup

The output voltage at startup is shown in the images below.

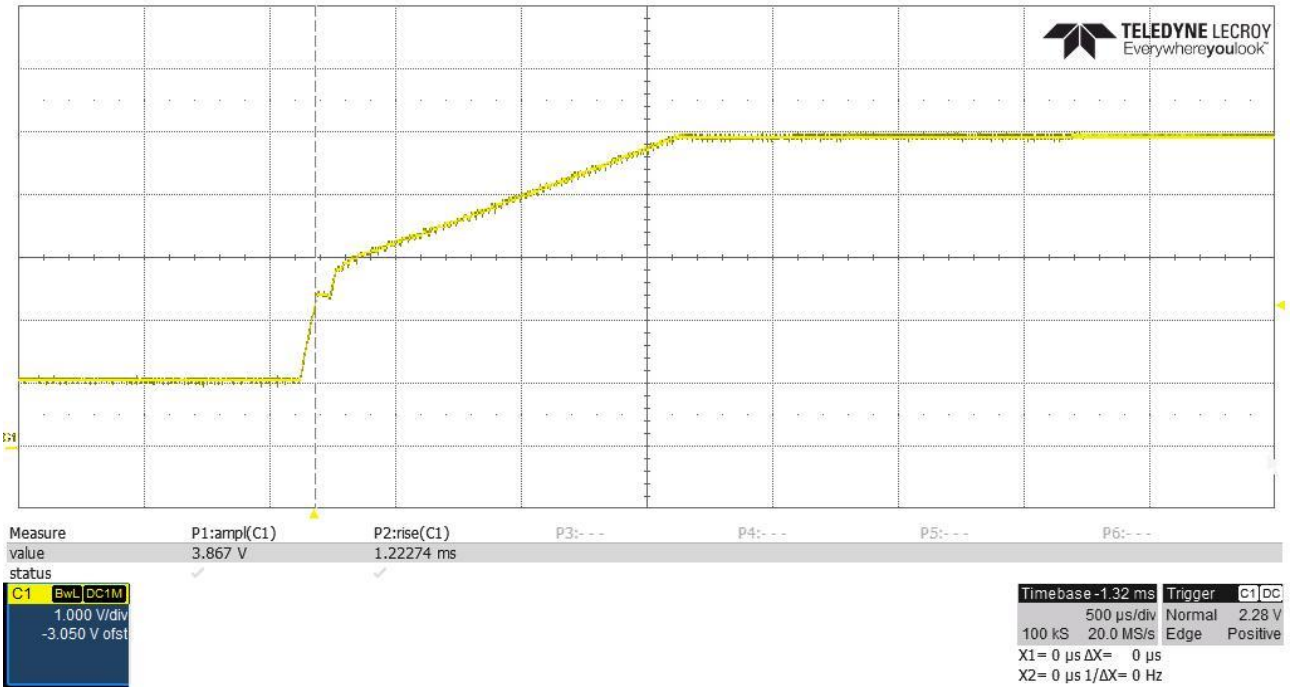
4.1.1 Start Up @ 120V_{DC}: 5V_p/0A, 12V_p/0A, 5V_s/0A, and 12V_s/0A.

5Vp/0A

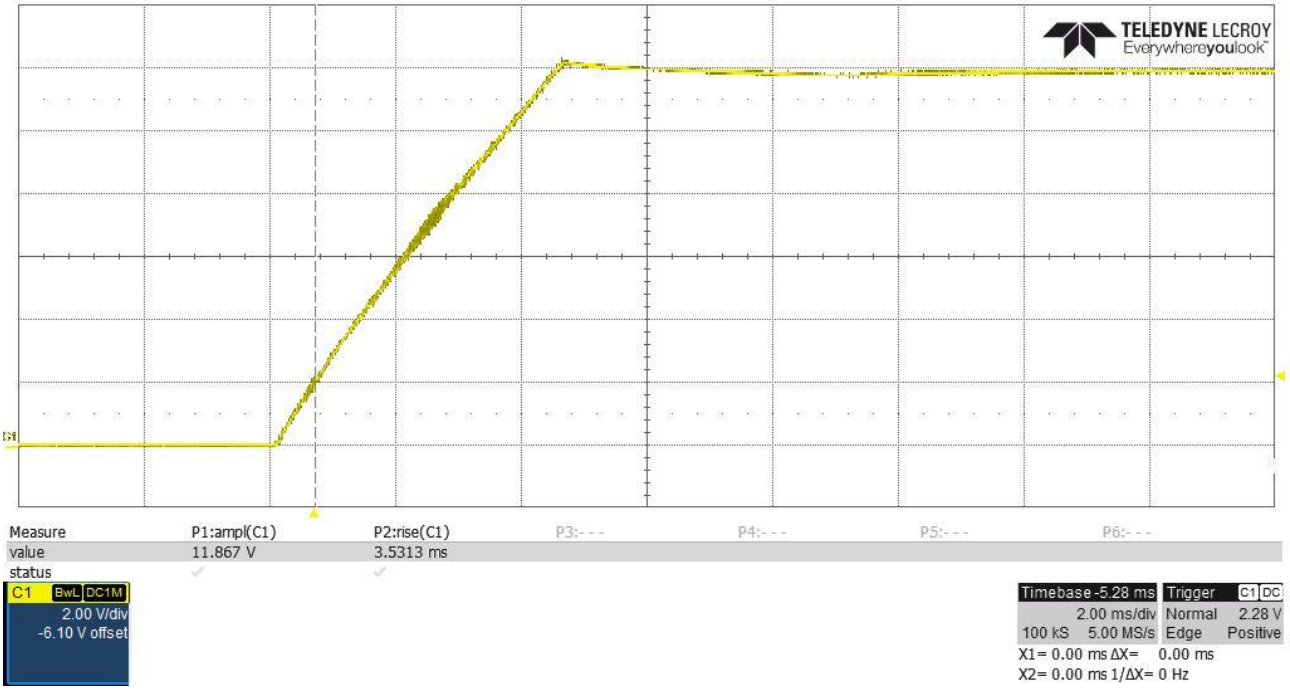
12Vp/0A



5Vs/0A

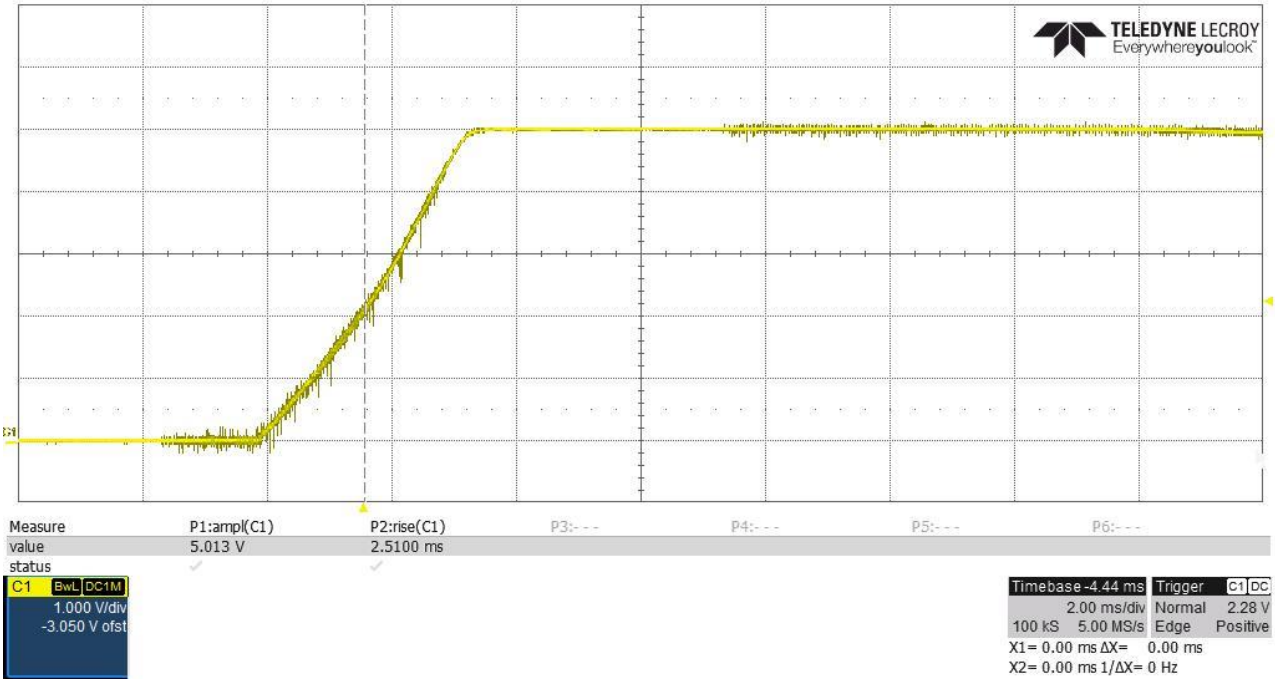


12Vs/0A

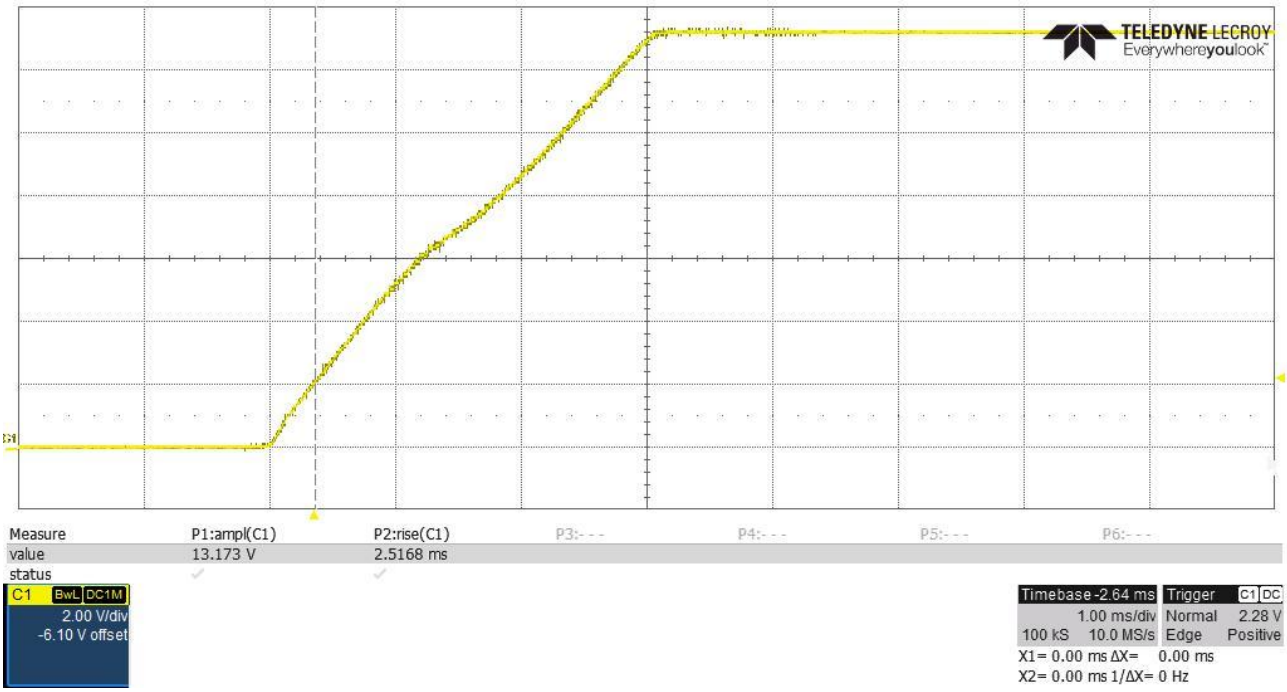


4.1.2 Start Up @ 120V_{DC}: 5V_p/0.3A, 12V_p/0A, 5V_s/0.2A, and 12V_s/0A.

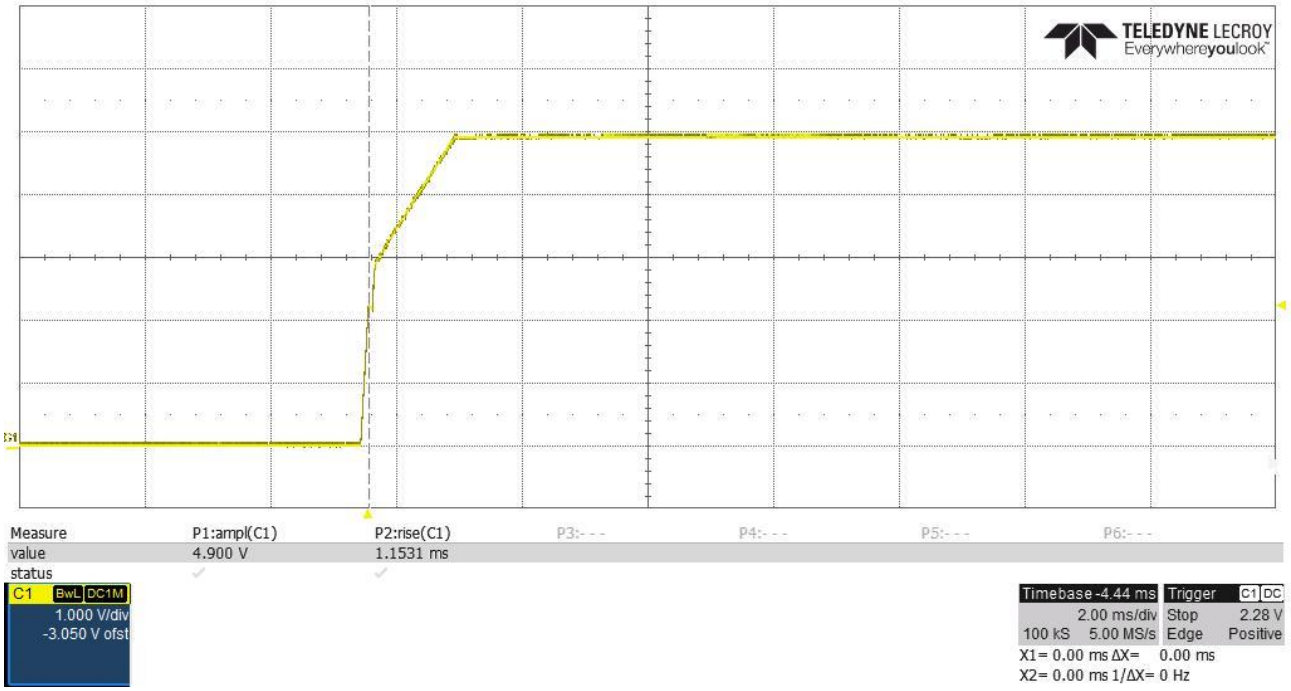
5Vs/0.2A



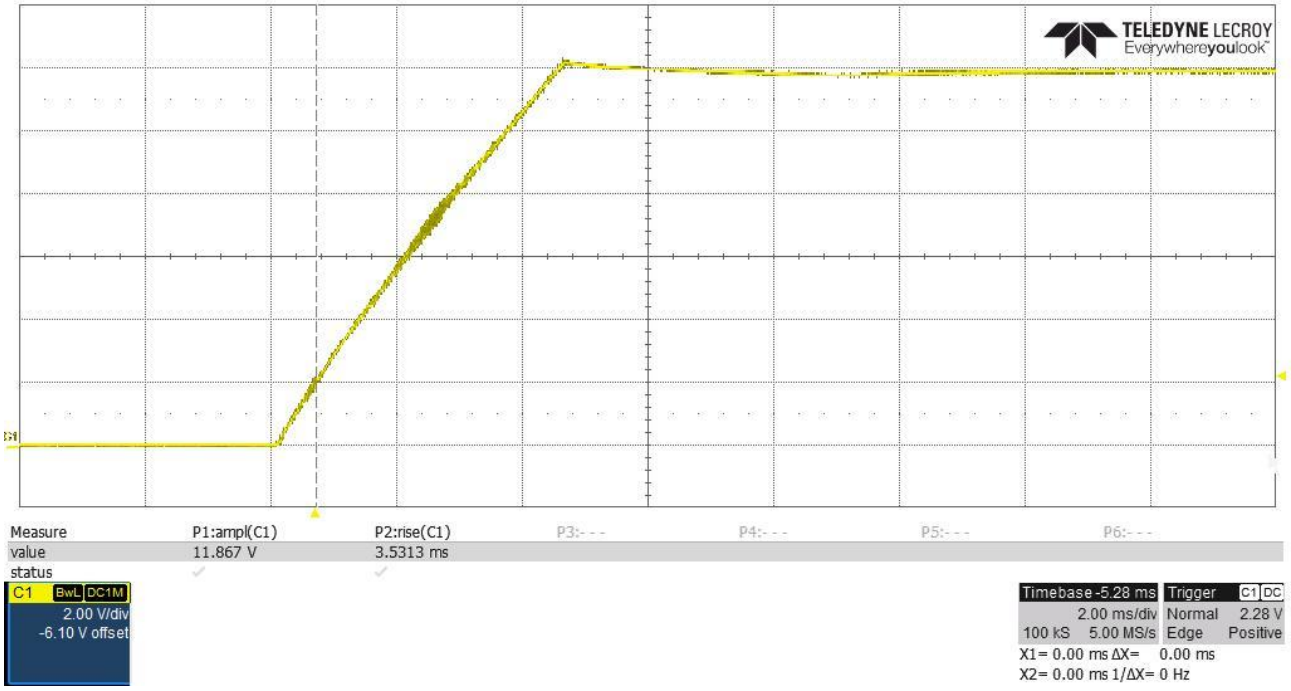
12Vs/0A



5Vp/0.3A

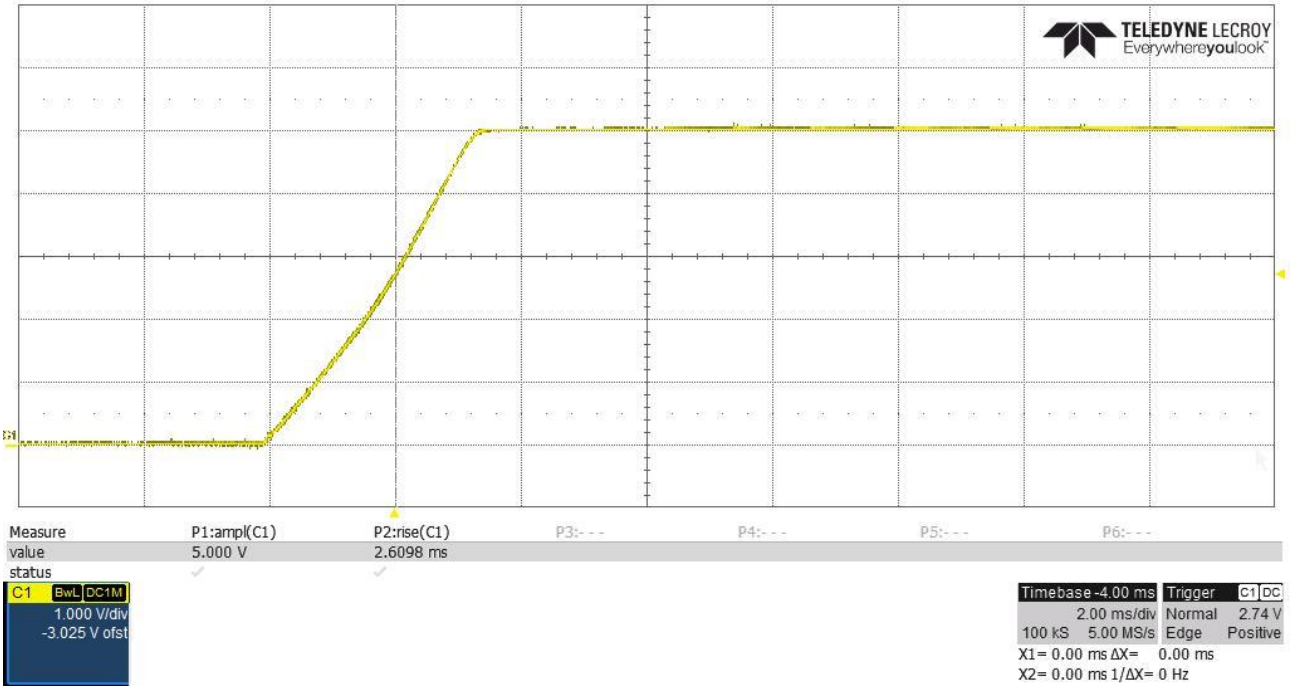


12Vp/0A



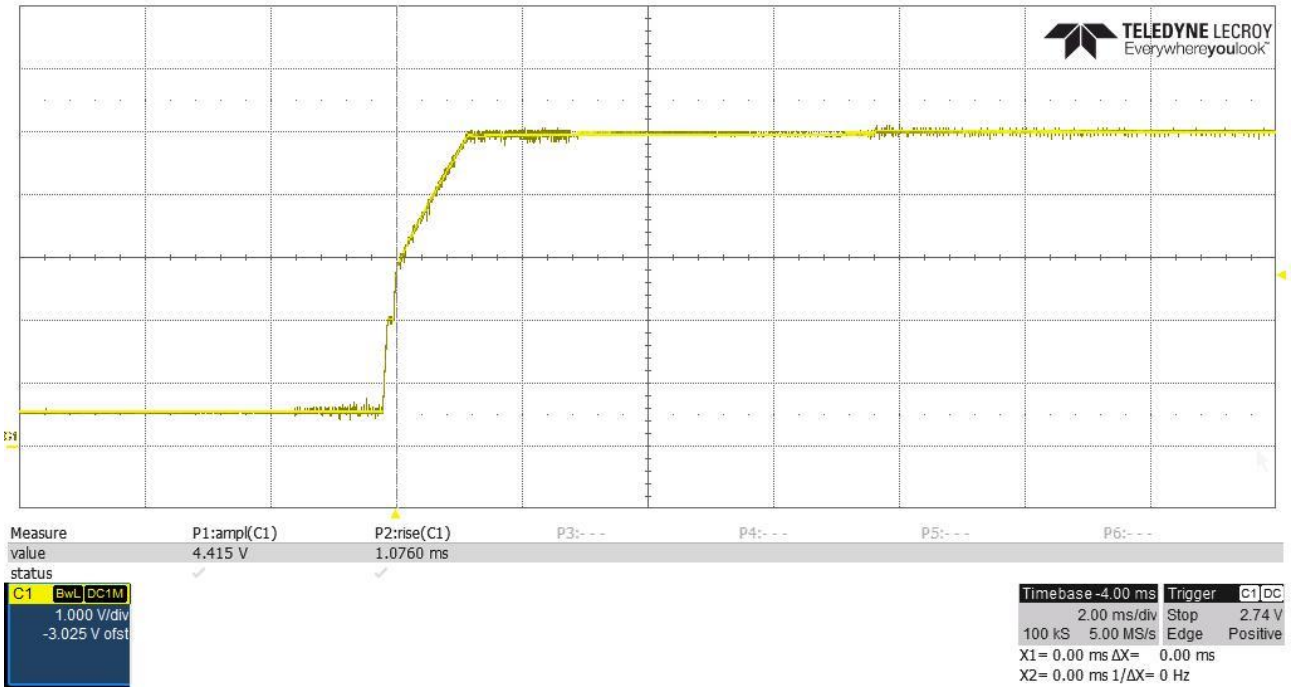
4.1.3 Start Up @ 400V_{DC}: 5V_p/0A, 12V_p/0A, 5V_s/0A, and 12V_s/0A.

5Vp/0A

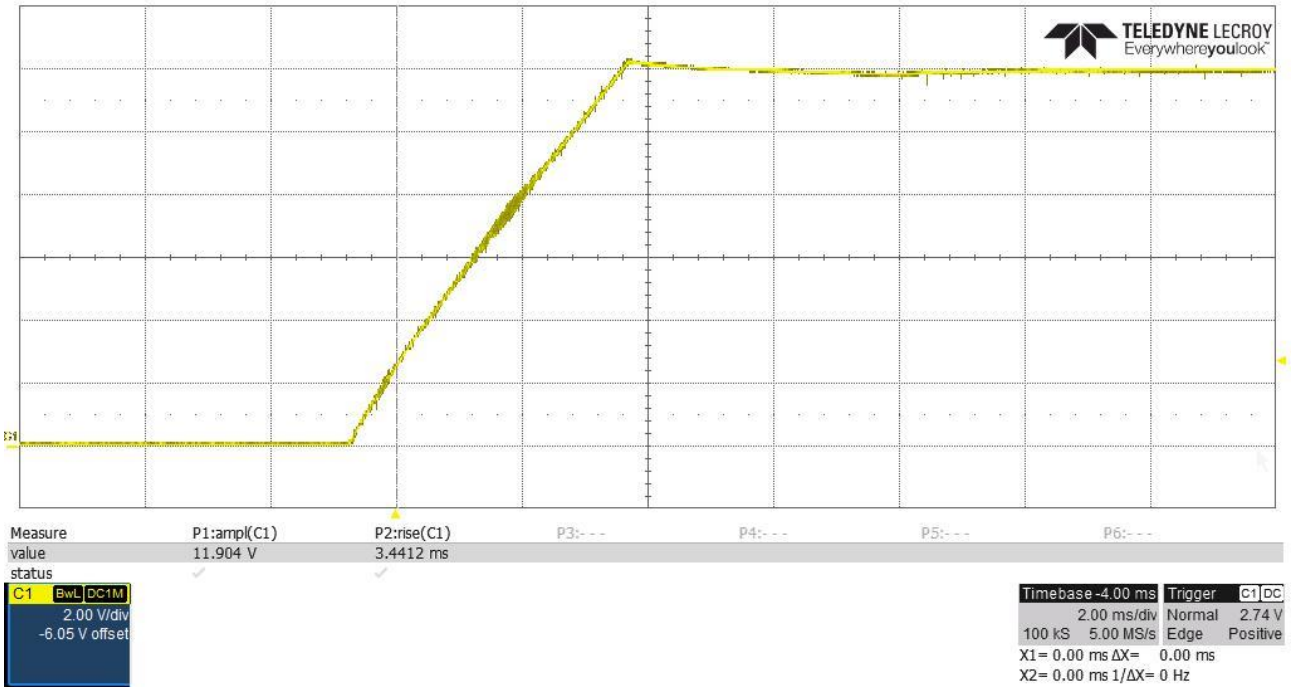


12Vp/0A

5Vs/0A

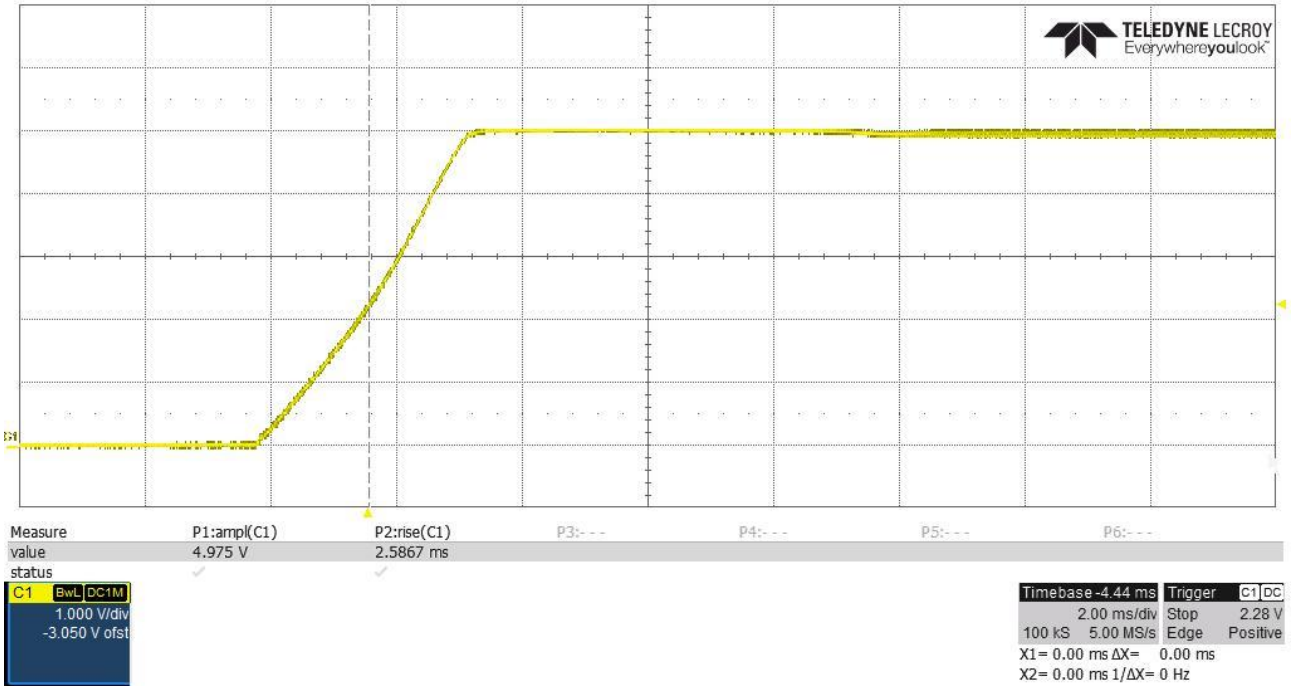


12Vs/0A



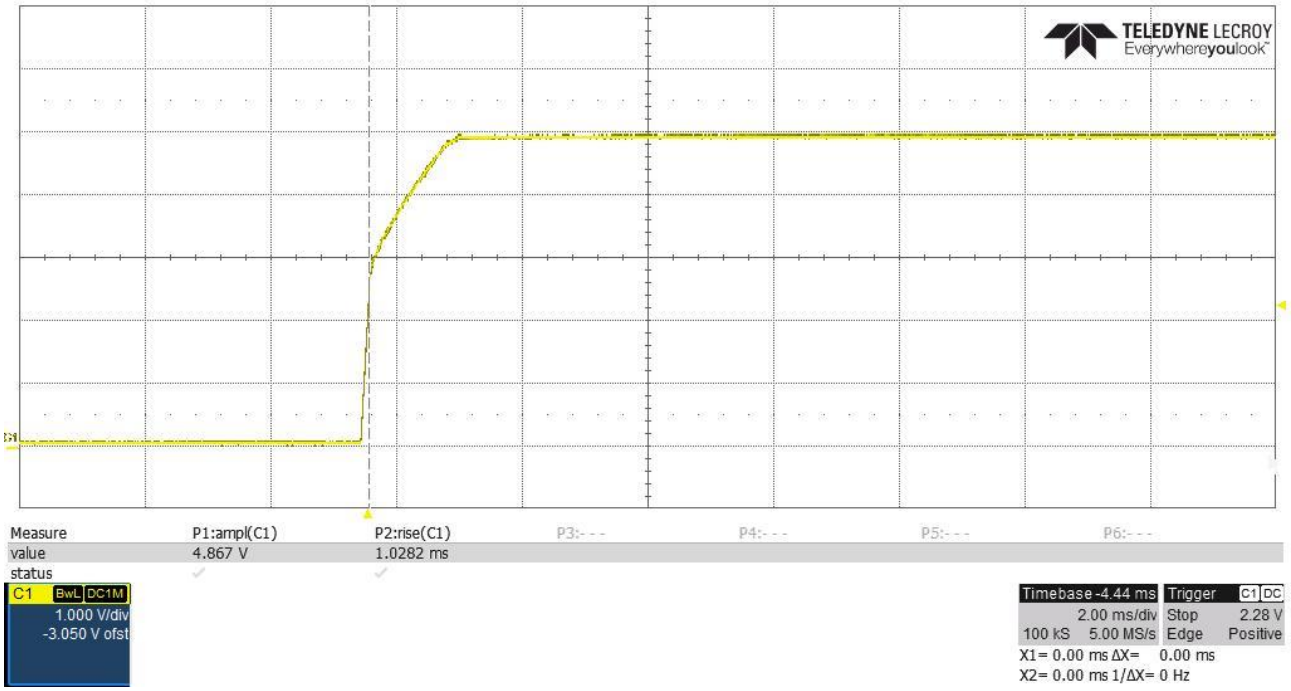
4.1.4 Start Up @ 400V_{DC}: 5V_p/0.3A, 12V_p/0.1A, 5V_s/0.2A, and 12V_s/4A.

5Vp/0.3A

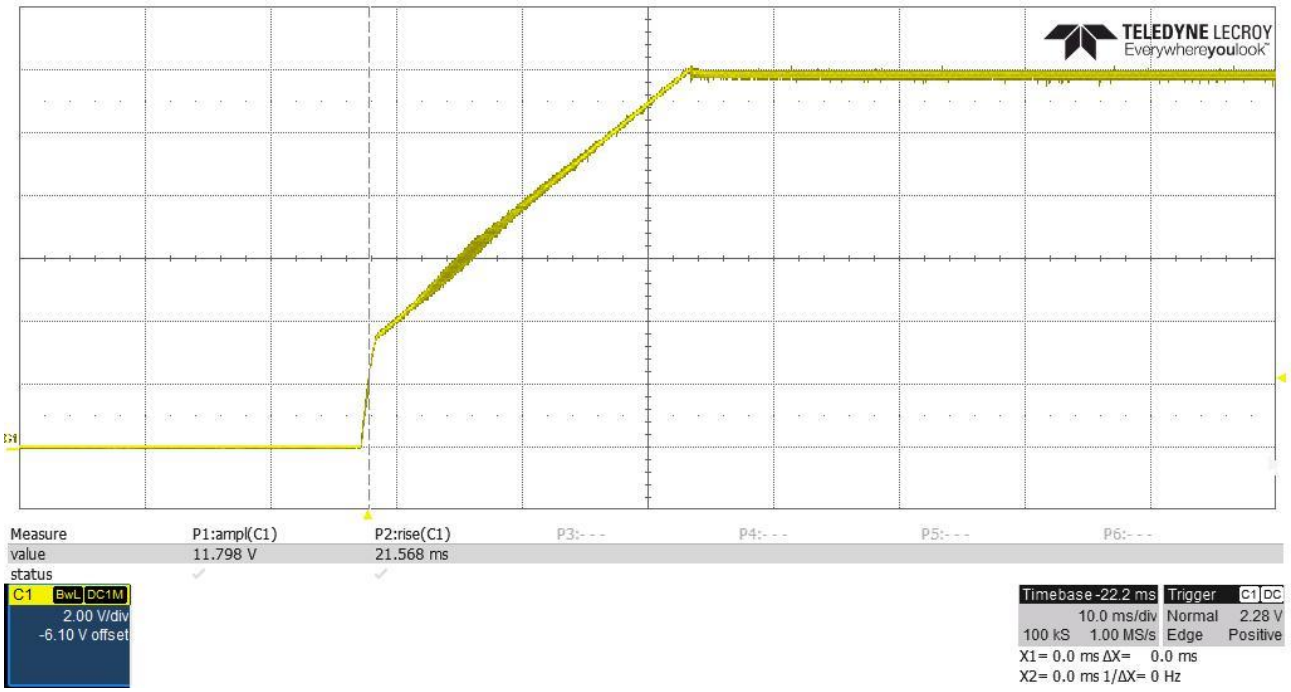


12Vp/0.1A

5Vs/0.2A



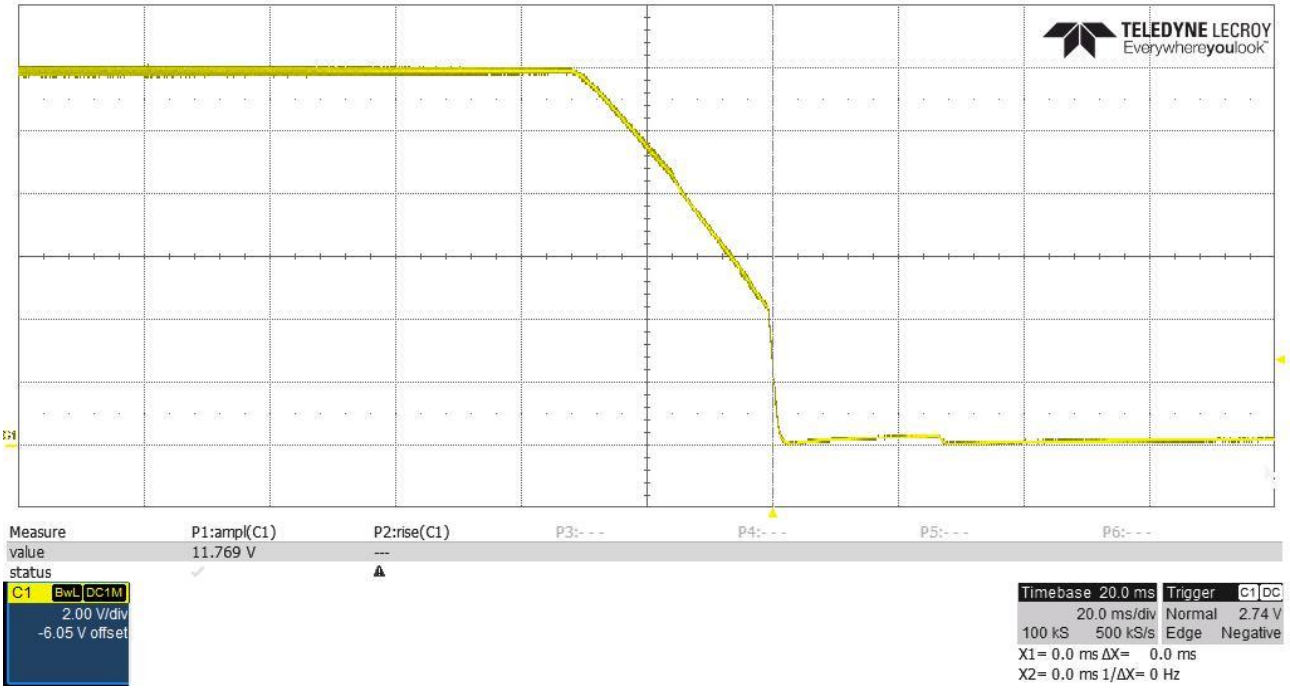
12Vs/4A



5 Turnoff

The output voltage at turnoff is shown in the images below.

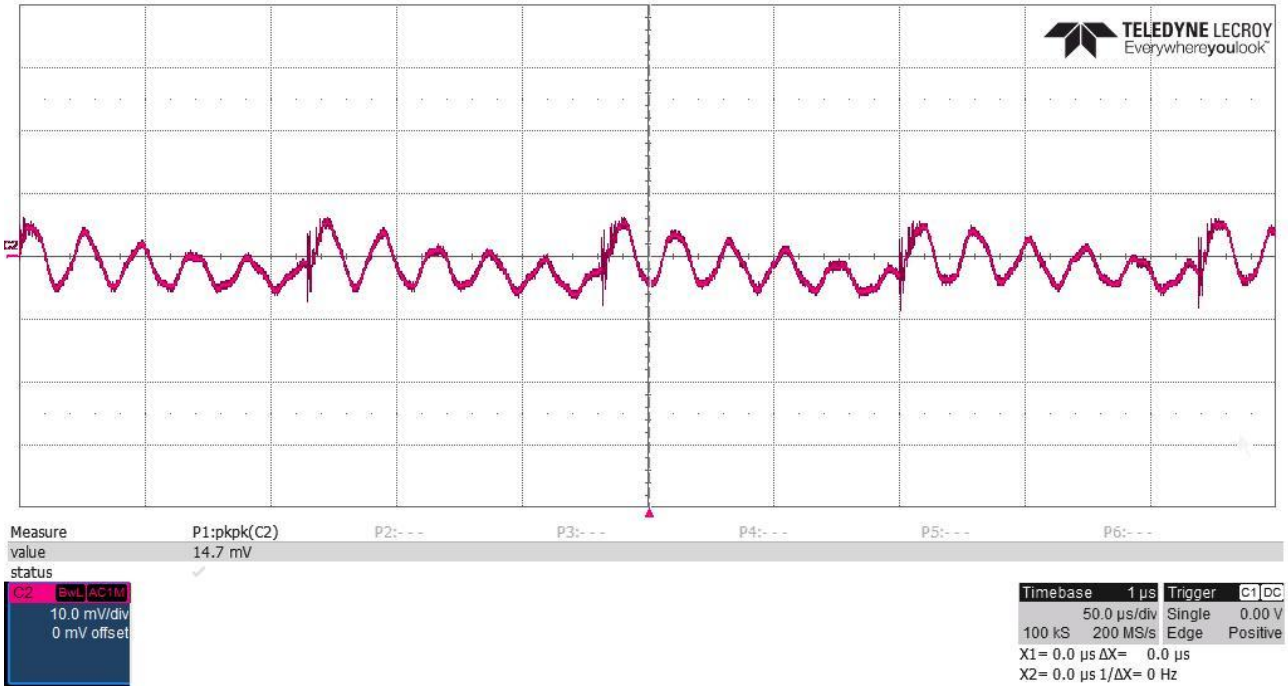
5.1.1 Turnoff @ 400V_{DC}: 5V_p/0A, 12V_p/0A, 5V_s/0A, and 12V_s/4A.



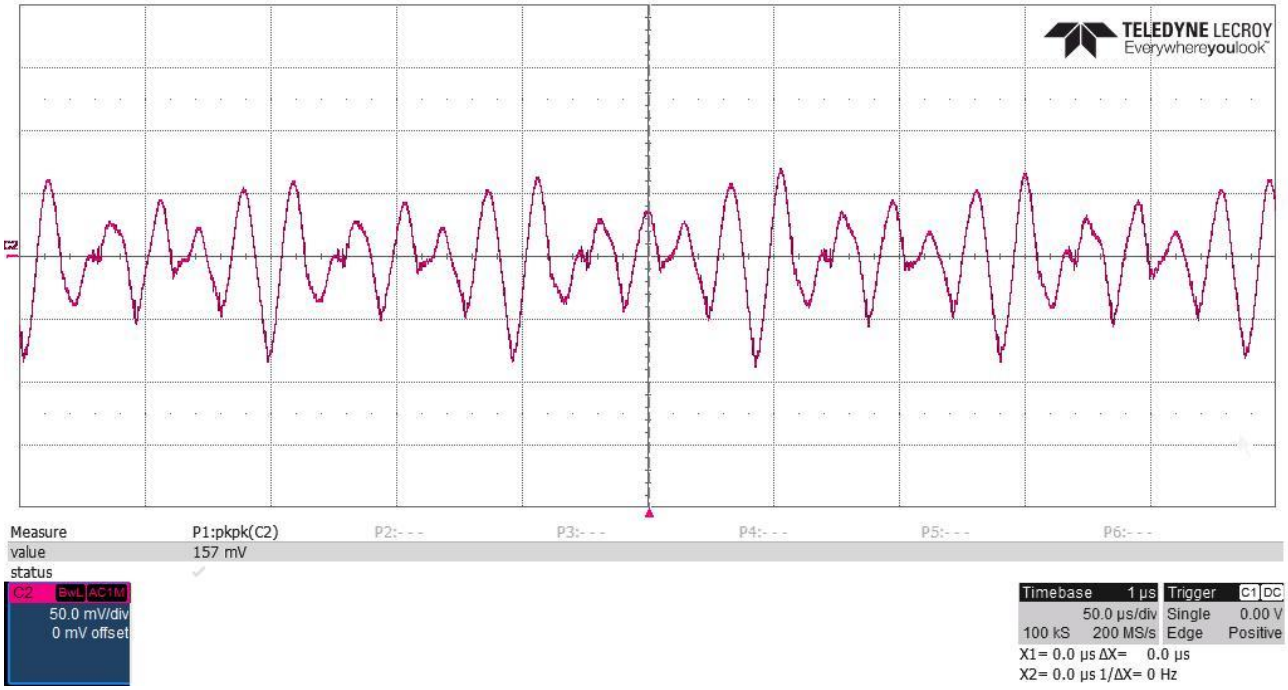
6 Output Ripple Voltage

The output voltage ripple was measured with additional 2.2uF/50V ceramic capacitor on the probe BNC connector.

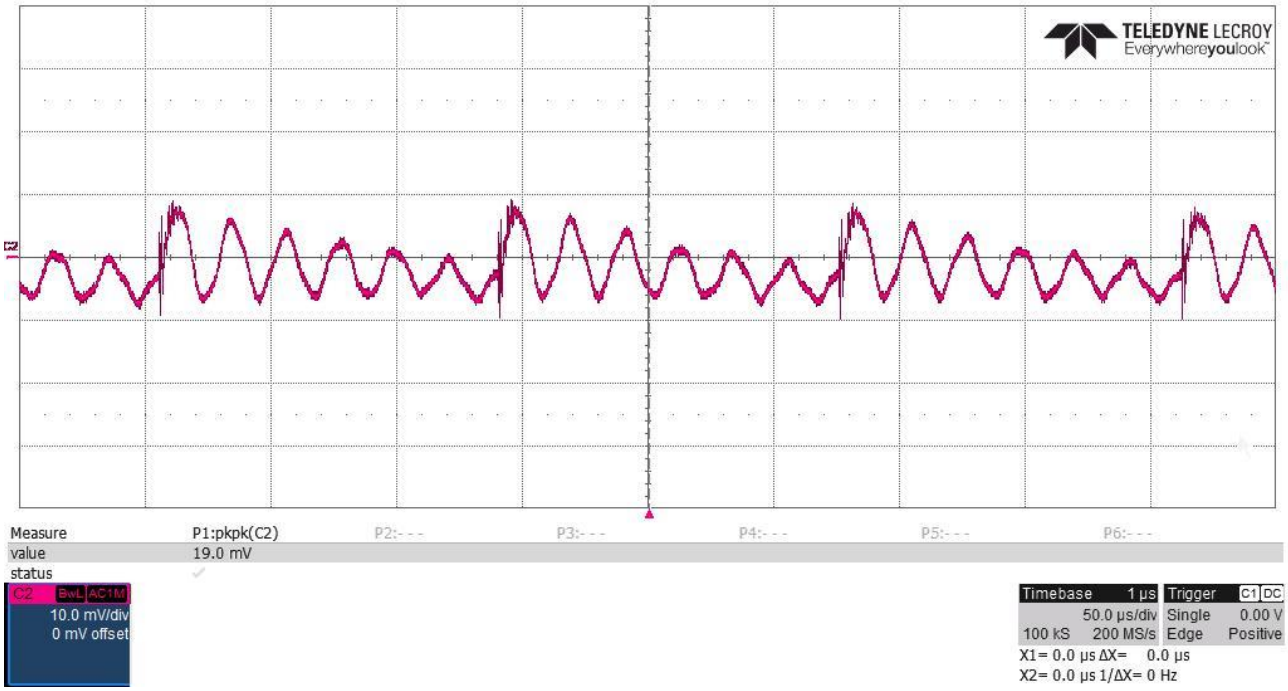
6.1.1 Output Ripple @ 300V_{DC}: 12V/0A.



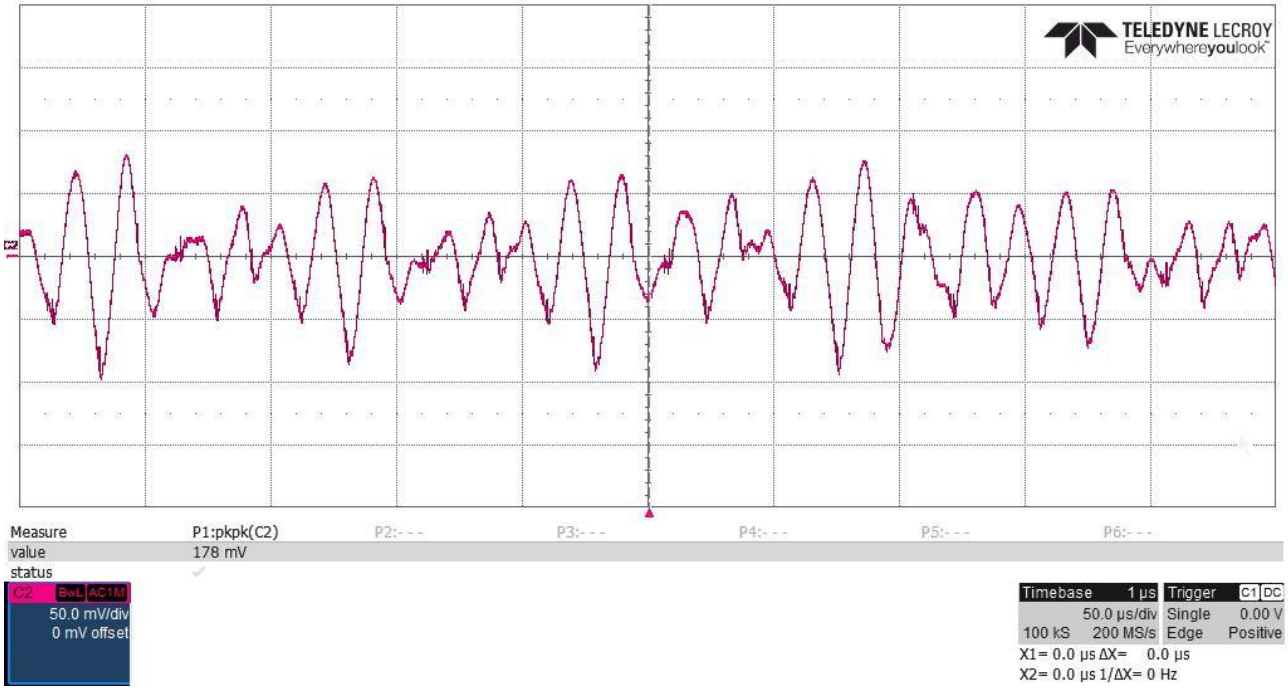
6.1.2 Output Ripple @ 300V_{DC}: 12V/4A.



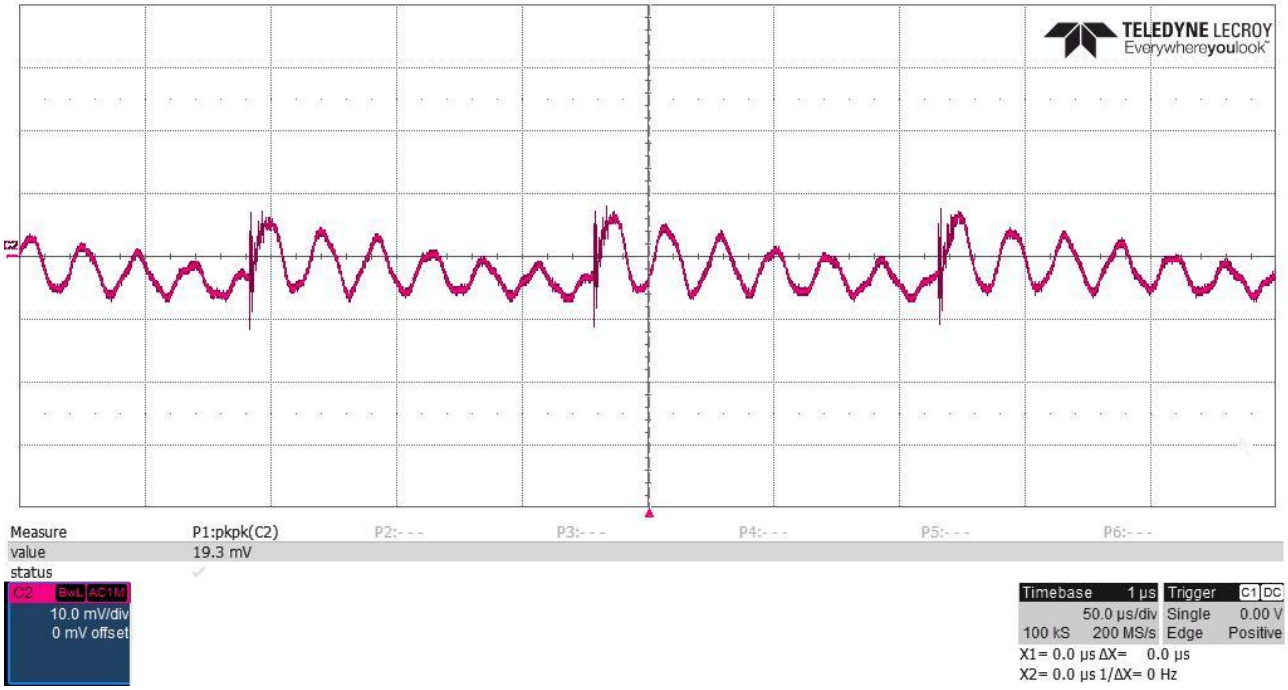
6.1.3 Output Ripple @ 350V_{DC}: 12V/0A.



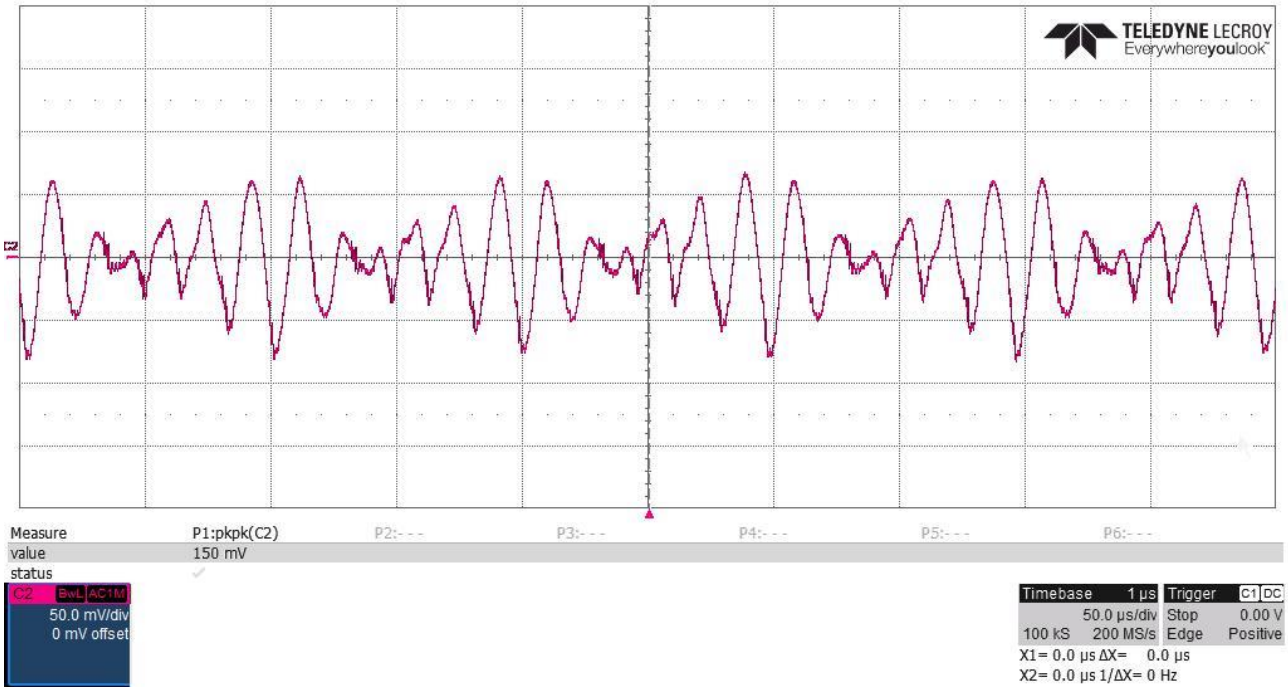
6.1.4 Output Ripple @ 350V_{DC}: 12V/4A.



6.1.5 Output Ripple @ 400V_{DC}: 12V/0A.

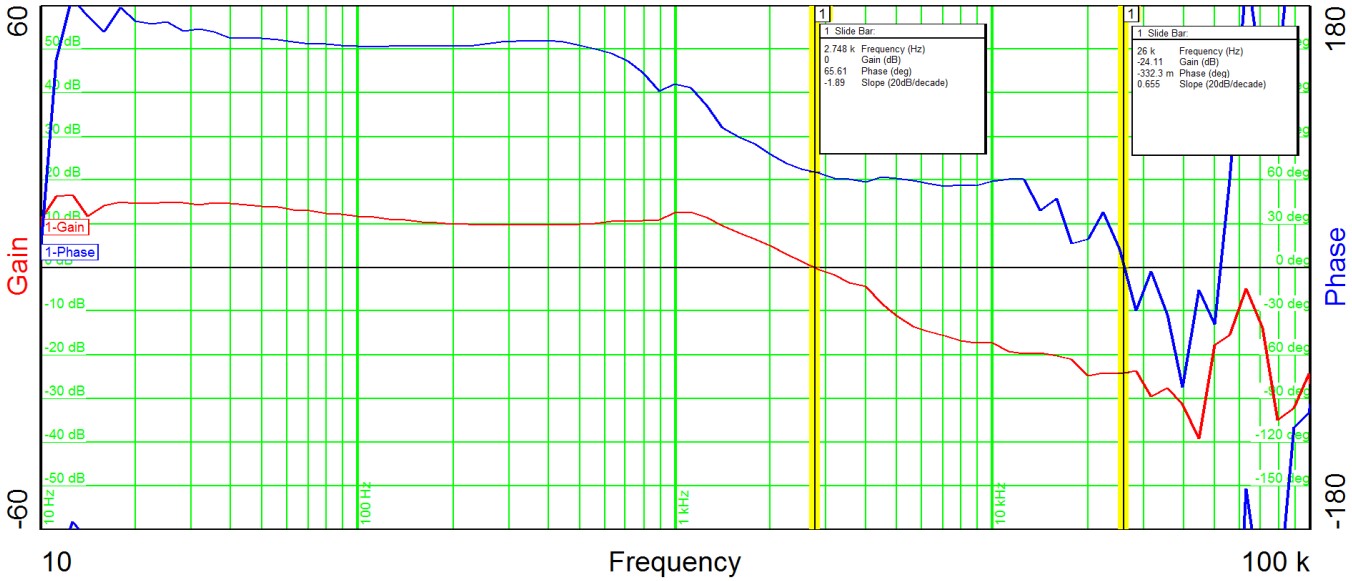


6.1.6 Output Ripple @ 400V_{DC}: 12V/4A.

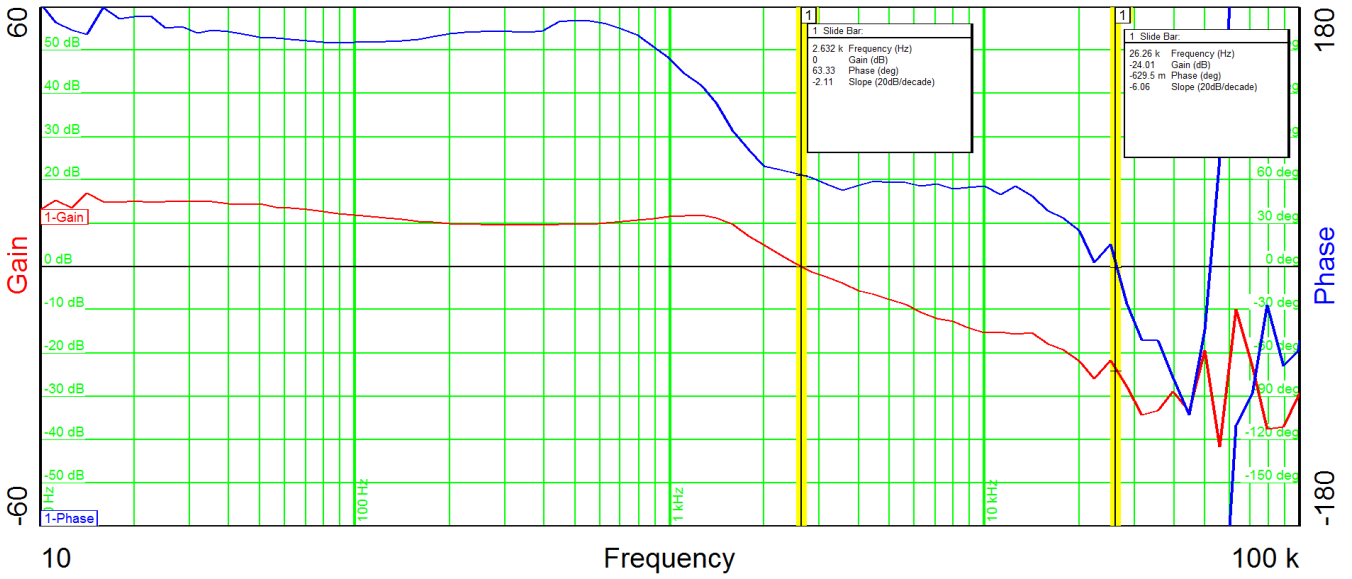


7 Frequency Loop Response

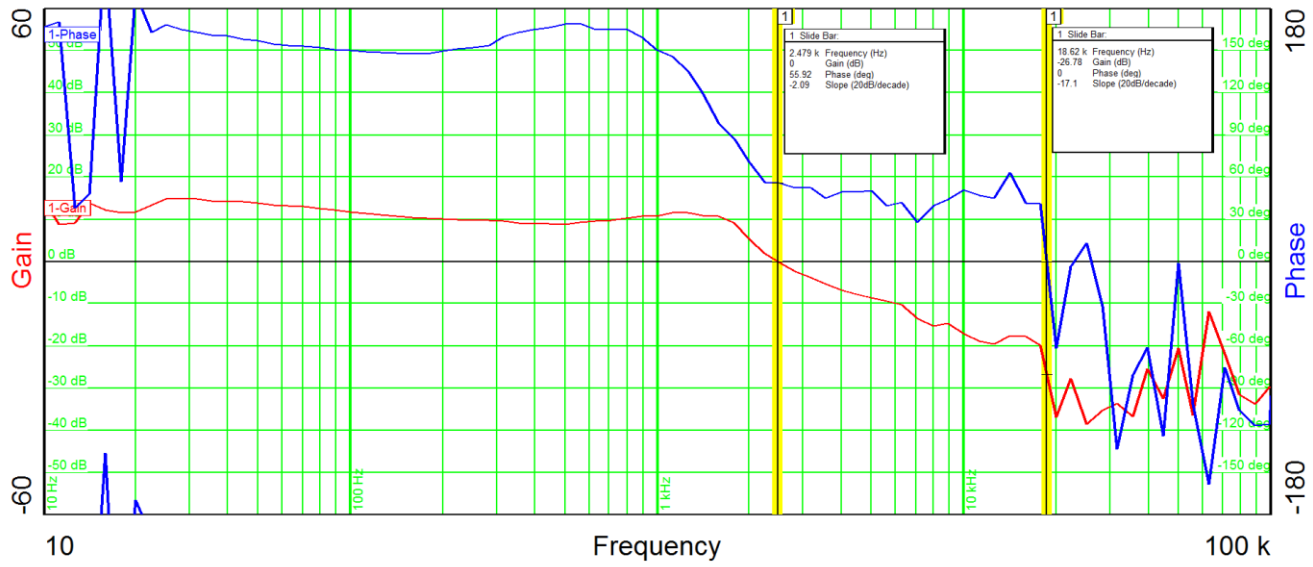
7.1 400V Full load 4A



7.2 350V Full load 4A

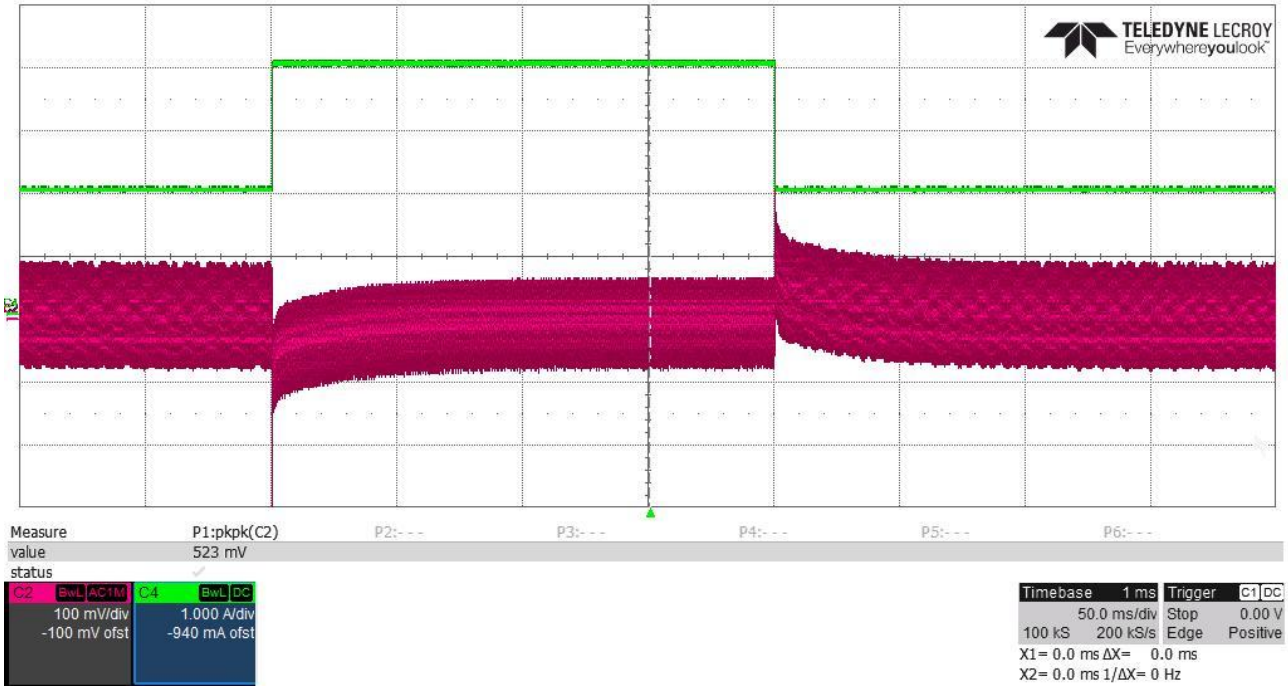


7.3 300V Full load 4A

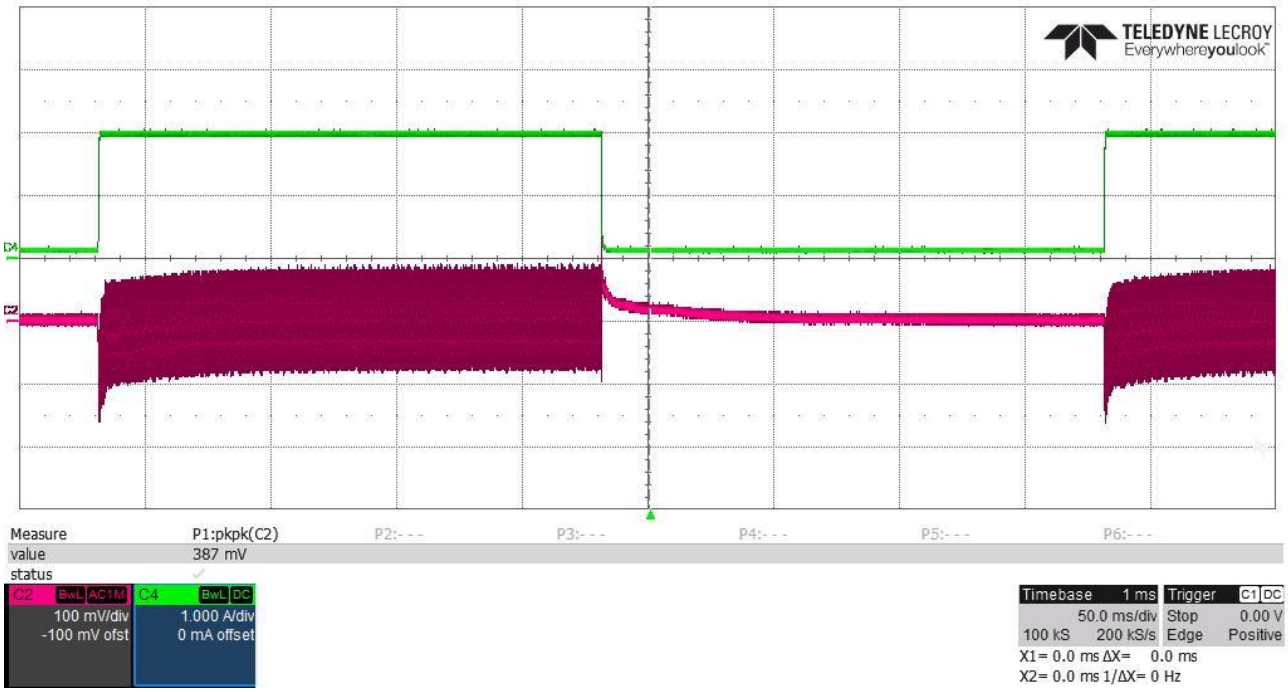


8 Load Transient Response

8.1 Full Load (4A) to Half Load (2A) 400V

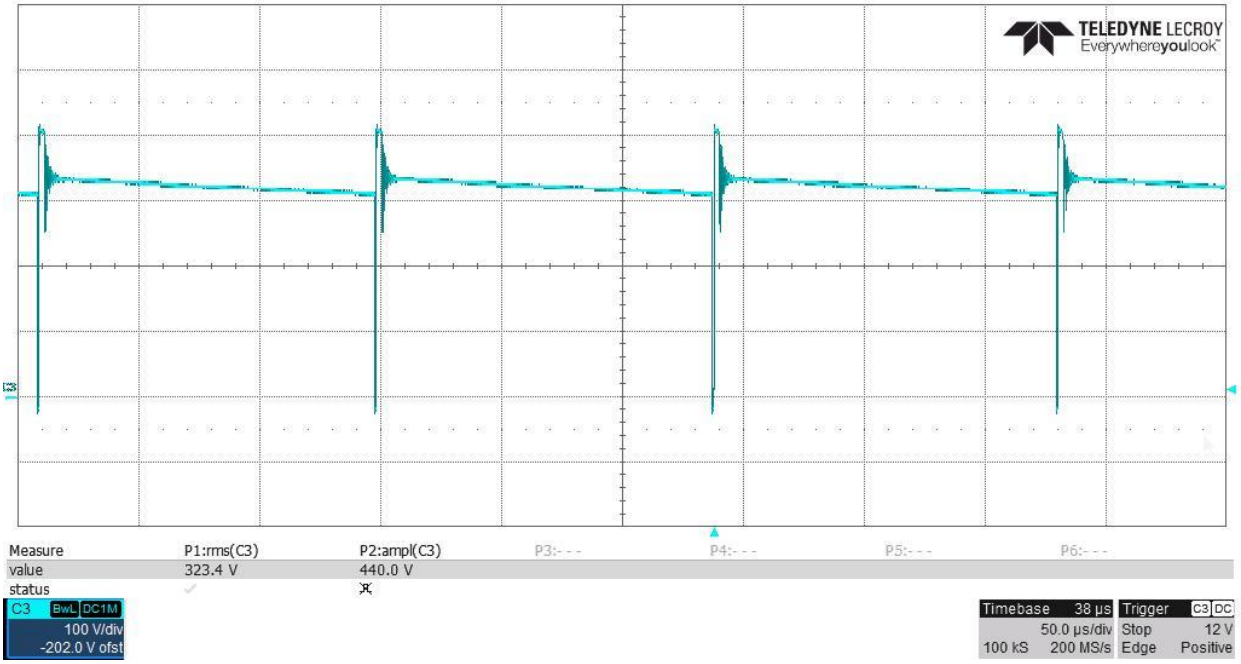


8.2 Half Load (2A) to Light Load (0.1A) 400V

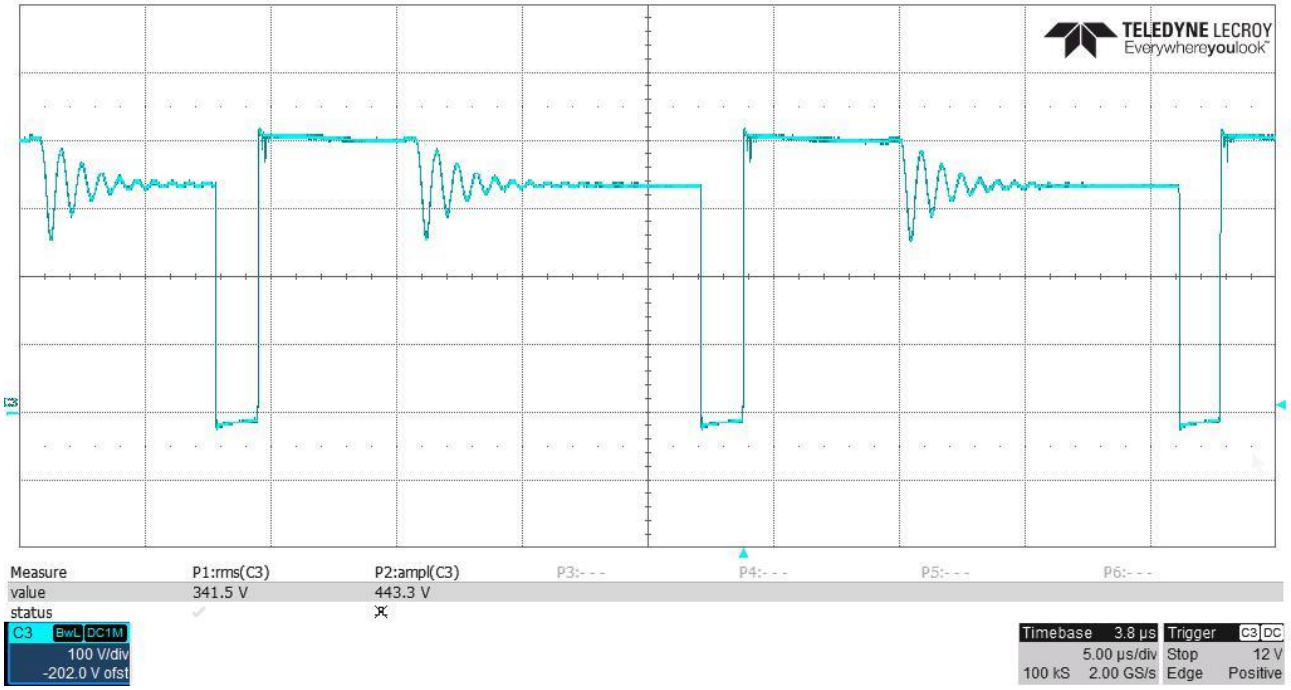


9 Switching Waveforms

9.1.1 *Switching Waveform @ 400V_{DC}: 12V/0A*



9.1.2 Switching Waveform @ 400VDC: 12V/4A



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