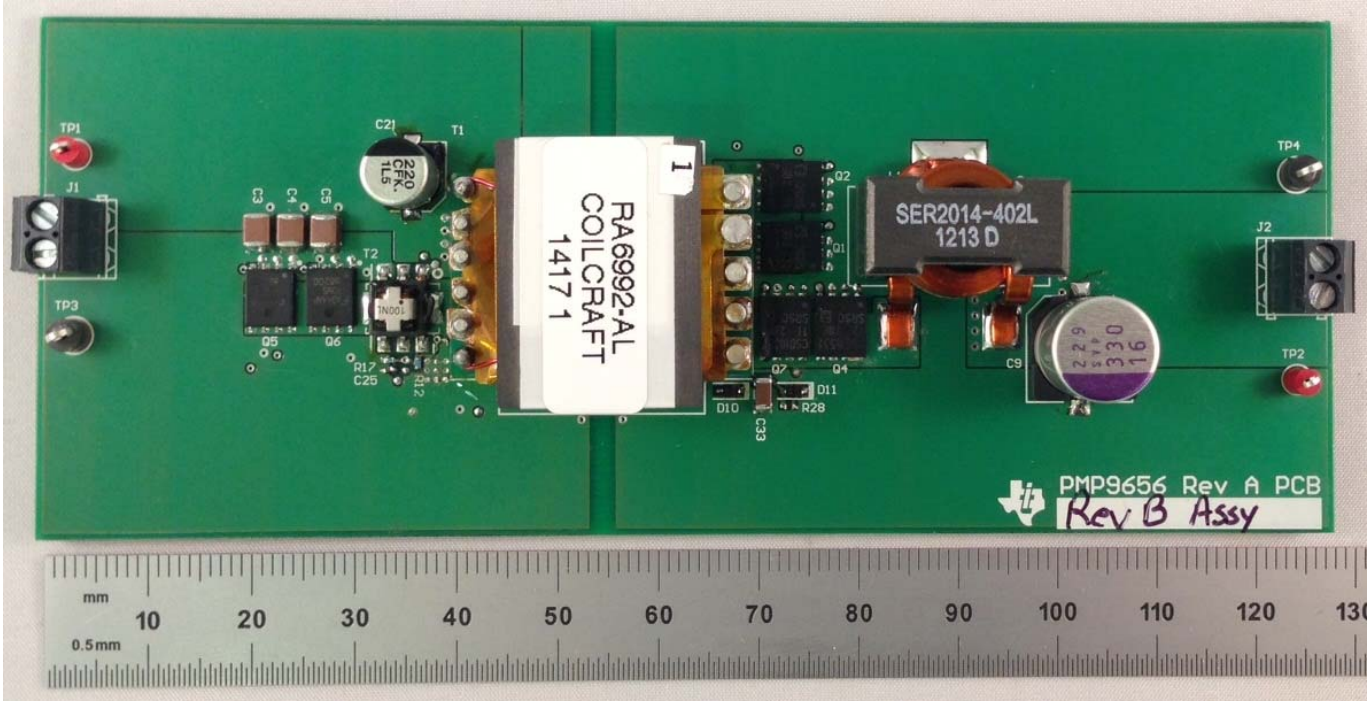
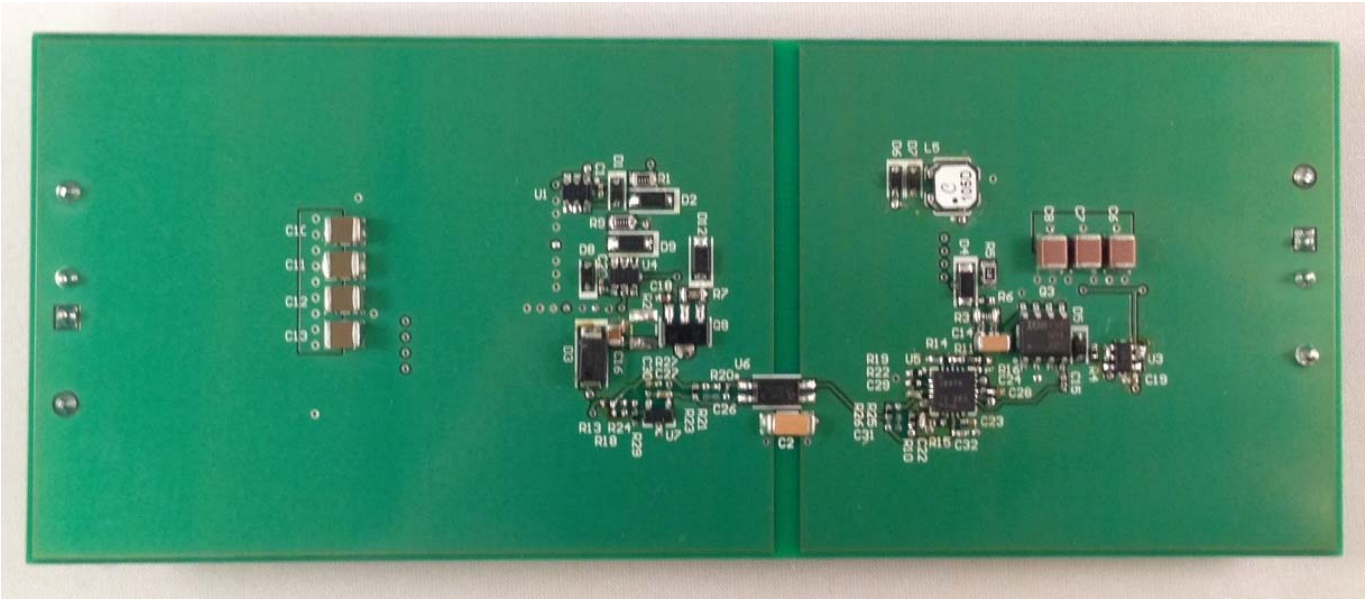
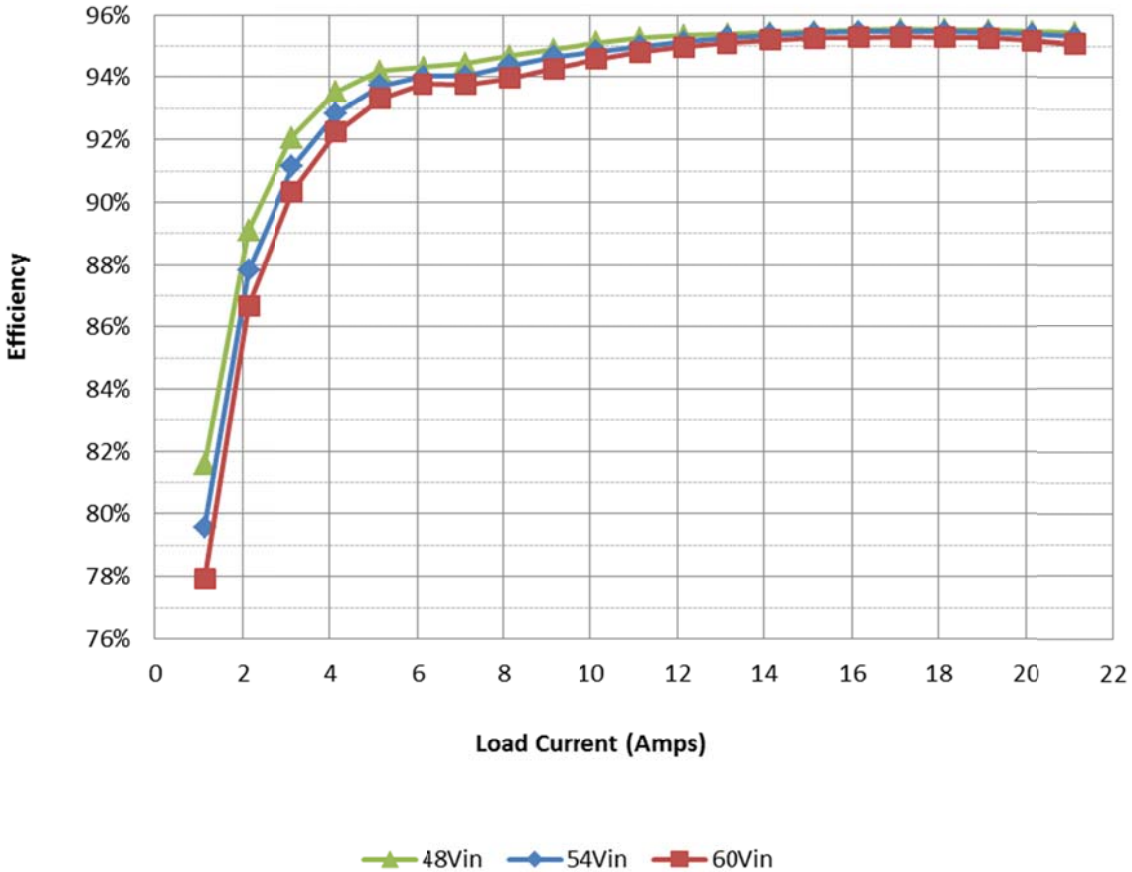
1 Photos

The circuit was built using a PMP9656 Rev A PCB.





2 Efficiency



Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	12.07	48.0	0.065	0.02	3.077	0.7%
1.143	12.07	48.0	0.353	13.80	3.119	81.6%
2.145	12.07	48.0	0.605	25.89	3.163	89.1%
3.148	12.07	48.0	0.860	37.99	3.277	92.1%
4.149	12.07	48.0	1.116	50.07	3.468	93.5%
5.15	12.07	48.0	1.375	62.18	3.829	94.2%
6.15	12.07	48.0	1.641	74.25	4.481	94.3%
7.16	12.07	48.0	1.905	86.36	5.079	94.4%
8.16	12.07	48.0	2.166	98.44	5.516	94.7%
9.16	12.07	48.0	2.428	110.54	5.951	94.9%
10.16	12.07	48.0	2.687	122.63	6.286	95.1%
11.16	12.07	48.0	2.946	134.68	6.693	95.3%
12.16	12.07	48.0	3.207	146.75	7.156	95.4%
13.16	12.07	48.0	3.470	158.83	7.681	95.4%
14.16	12.07	48.0	3.733	170.93	8.205	95.4%
15.16	12.07	48.0	3.995	183.00	8.699	95.5%
17.16	12.07	48.0	4.516	207.08	9.651	95.5%
18.17	12.07	48.0	4.781	219.20	10.253	95.5%
19.17	12.07	48.0	5.045	231.27	10.857	95.5%
20.17	12.07	48.0	5.311	243.36	11.536	95.5%
21.17	12.07	48.0	5.578	255.44	12.249	95.4%

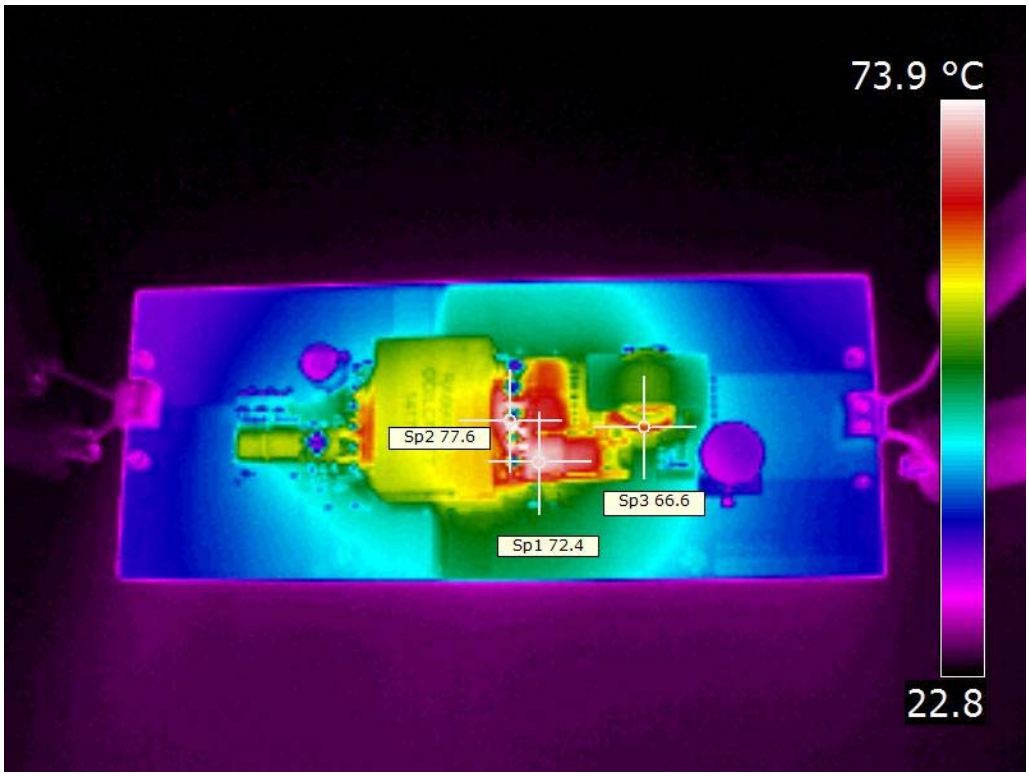
PMP9656 Rev B Test Results

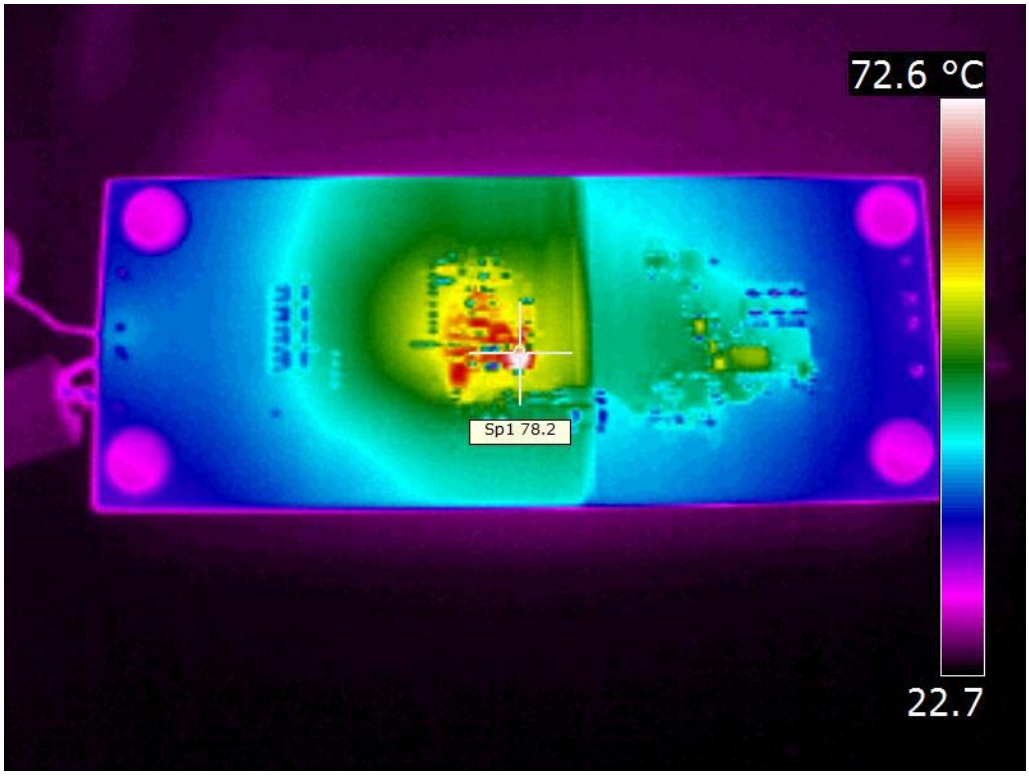
Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	12.09	54.0	0.066	0.03	3.531	0.8%
1.148	12.08	54.0	0.323	13.88	3.560	79.6%
2.150	12.08	54.0	0.548	25.97	3.602	87.8%
3.152	12.08	54.0	0.774	38.08	3.707	91.1%
4.152	12.08	54.0	1.001	50.17	3.874	92.8%
5.16	12.08	54.0	1.231	62.27	4.178	93.7%
6.15	12.08	54.0	1.464	74.34	4.720	94.0%
7.16	12.08	54.0	1.703	86.45	5.487	94.0%
8.16	12.08	54.0	1.934	98.54	5.864	94.4%
9.16	12.08	54.0	2.165	110.63	6.245	94.7%
10.16	12.08	54.0	2.397	122.72	6.688	94.8%
11.16	12.08	54.0	2.628	134.77	7.109	95.0%
12.16	12.07	54.0	2.859	146.84	7.488	95.1%
13.16	12.07	54.0	3.090	158.93	7.882	95.3%
14.16	12.07	54.0	3.322	171.02	8.314	95.4%
15.16	12.07	54.0	3.554	183.09	8.783	95.4%
16.16	12.07	54.0	3.786	195.14	9.277	95.5%
17.16	12.07	54.0	4.021	207.23	9.834	95.5%
18.17	12.07	54.0	4.255	219.31	10.421	95.5%
19.16	12.07	54.0	4.491	231.37	11.071	95.4%
20.17	12.07	54.0	4.727	243.44	11.780	95.4%
21.17	12.07	54.0	4.965	255.51	12.564	95.3%

Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.003	12.09	60.0	0.066	0.04	3.918	1.1%
1.149	12.09	60.0	0.297	13.89	3.936	77.9%
2.150	12.09	60.0	0.500	25.99	3.992	86.7%
3.152	12.09	60.0	0.703	38.10	4.076	90.3%
4.152	12.09	60.0	0.907	50.18	4.223	92.2%
5.15	12.08	60.0	1.113	62.29	4.470	93.3%
6.15	12.08	60.0	1.322	74.36	4.929	93.8%
7.16	12.08	60.0	1.537	86.47	5.753	93.8%
8.16	12.08	60.0	1.748	98.55	6.326	94.0%
9.16	12.08	60.0	1.956	110.64	6.720	94.3%
10.16	12.08	60.0	2.163	122.73	7.027	94.6%
11.157	12.08	60.0	2.370	134.78	7.384	94.8%
12.157	12.08	60.0	2.577	146.85	7.757	95.0%
13.159	12.08	60.0	2.786	158.94	8.178	95.1%
14.160	12.08	60.0	2.995	171.03	8.626	95.2%
15.160	12.08	60.0	3.204	183.09	9.122	95.3%
16.158	12.08	60.0	3.414	195.14	9.674	95.3%
17.16	12.08	60.0	3.625	207.22	10.228	95.3%
18.16	12.08	60.0	3.837	219.29	10.855	95.3%
19.16	12.08	60.0	4.049	231.36	11.524	95.3%
20.16	12.07	60.0	4.264	243.43	12.312	95.2%
21.16	12.07	60.0	4.480	255.50	13.202	95.1%

3 Thermal

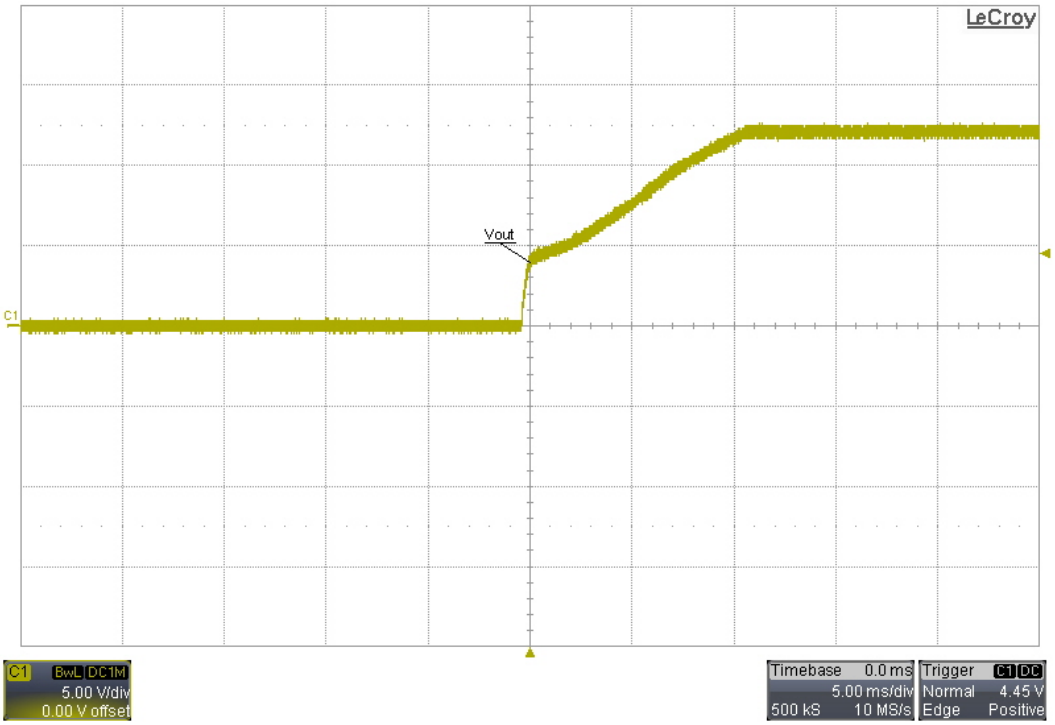
The thermal images below show the circuit board with a 54V input and 21A load. The ambient temperature was 25C and the air flow rate was approximately 200lfm (1m/s).



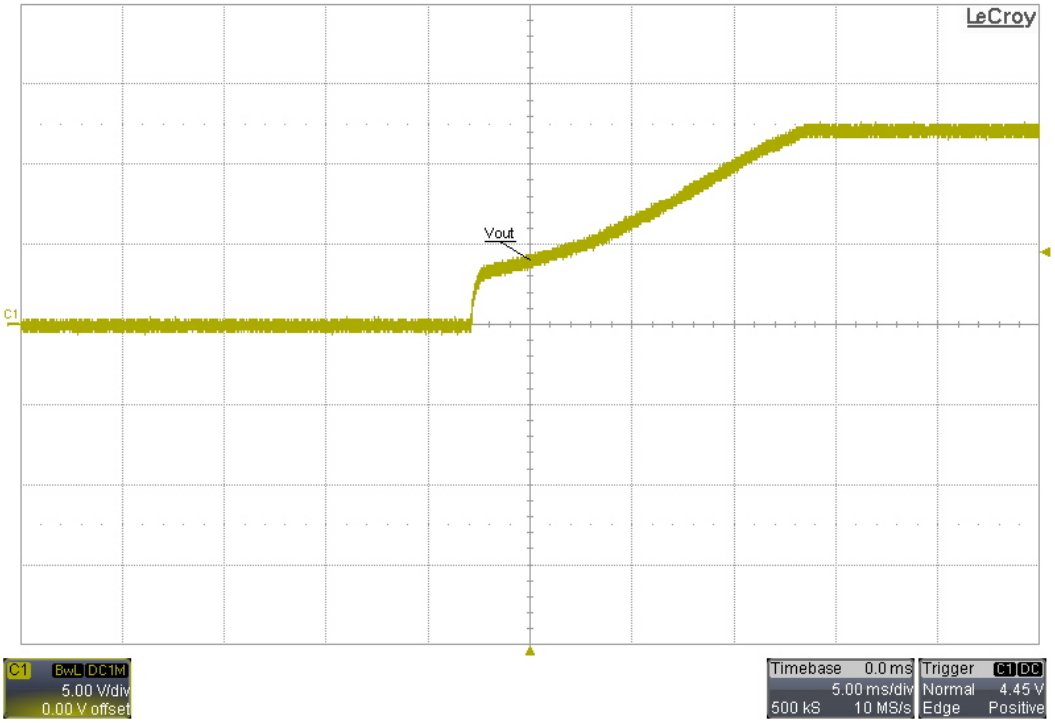


4 Startup

4.1 54V Input, No Load

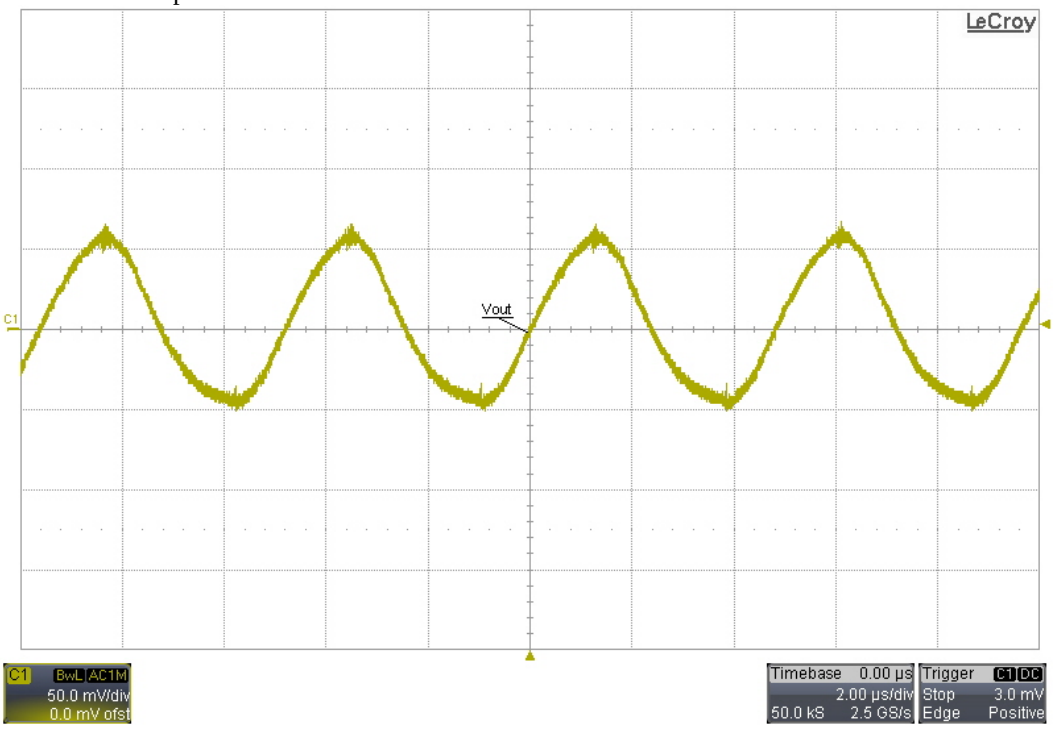


4.2 54V Input, 1Ω Load



5 Output Ripple Voltage

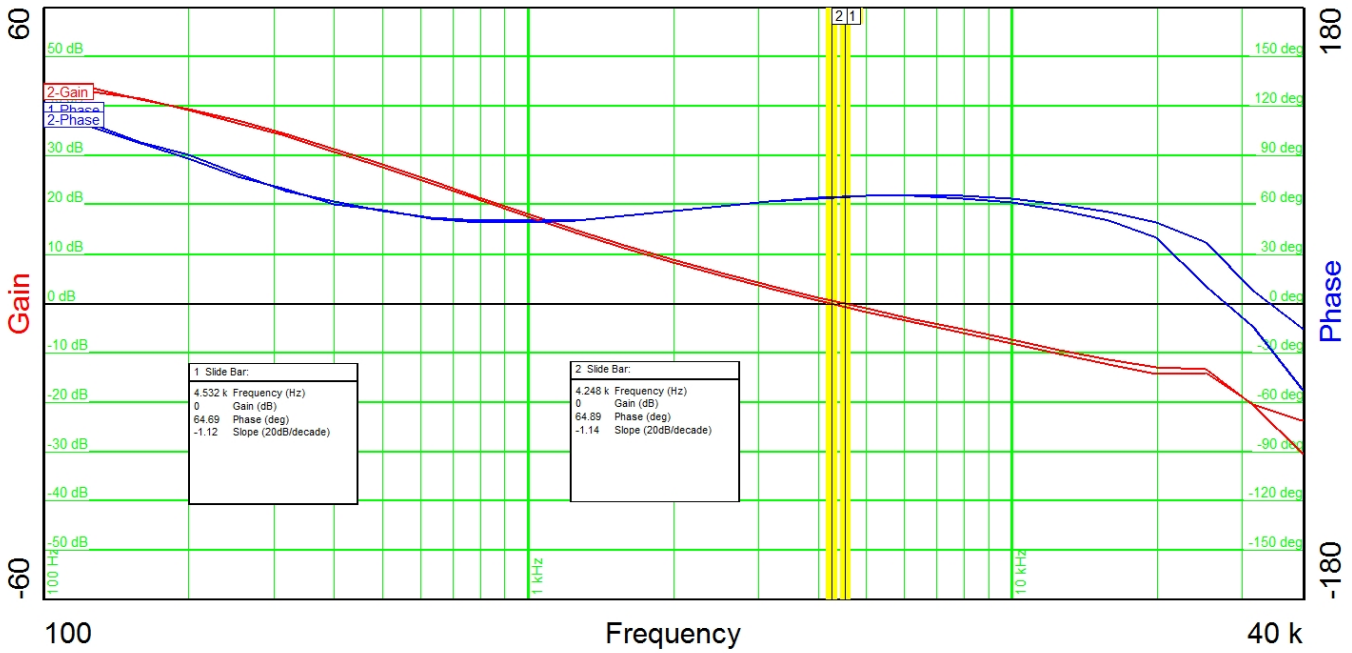
The input was 54V and the output was loaded with 21A.



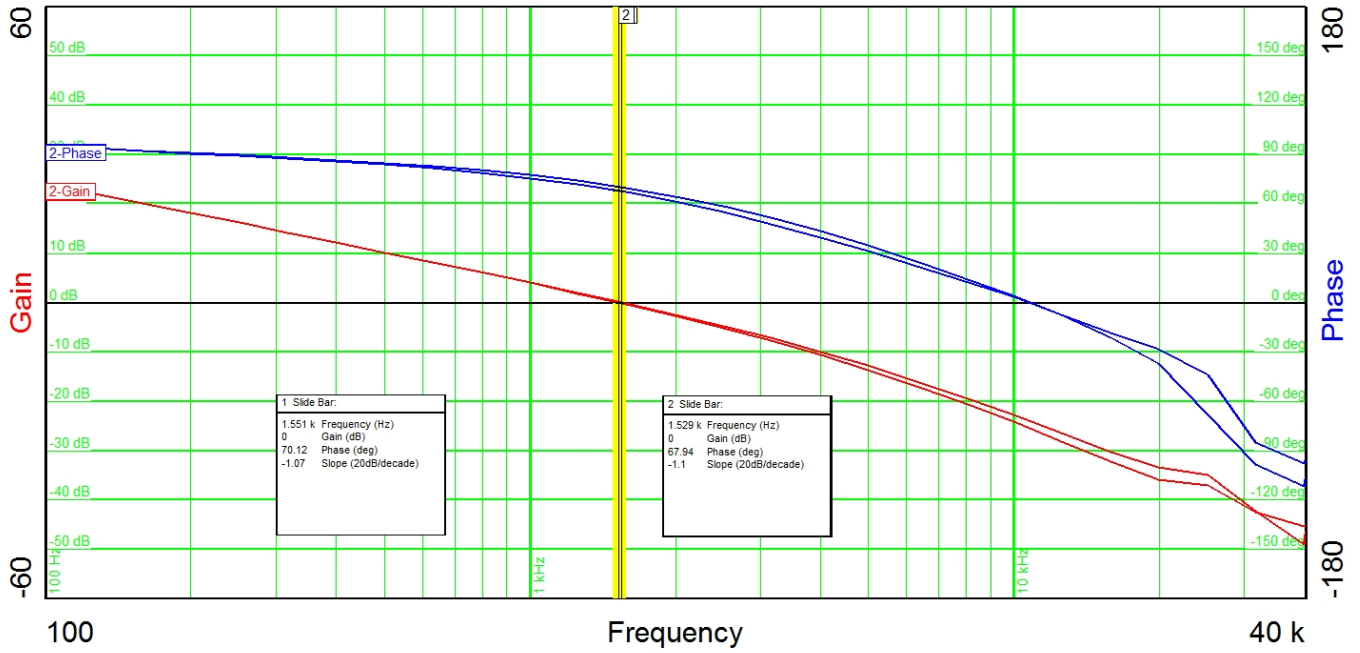
6 Frequency Response

The output was loaded with 21A. For gain/phase plot #1, the input was 48V. For gain/phase plot #2, the input was 60V.

6.1 Loop Broken at R13



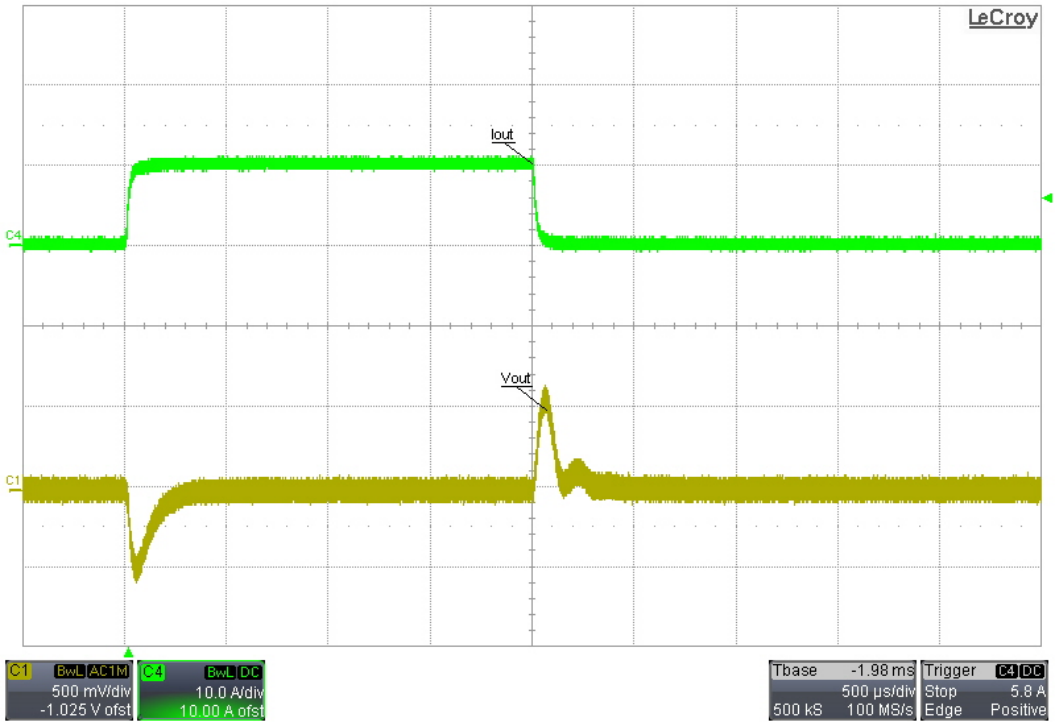
6.2 Loop Broken at R18



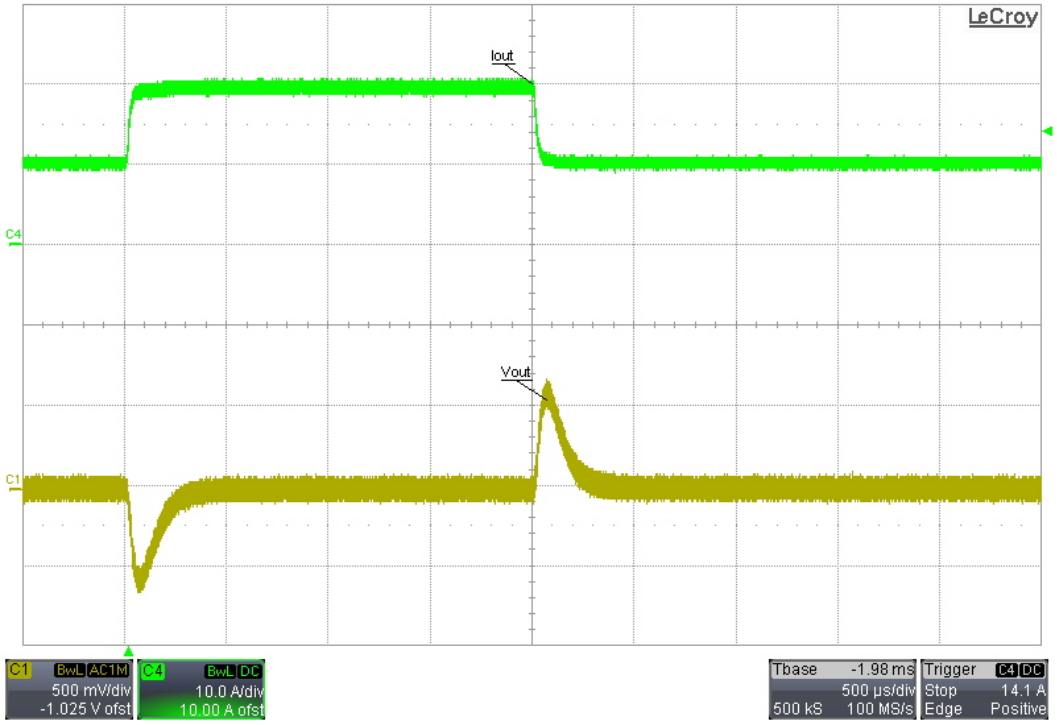
7 Load Transients

The input was set to 54V.

7.1 0A to 10A

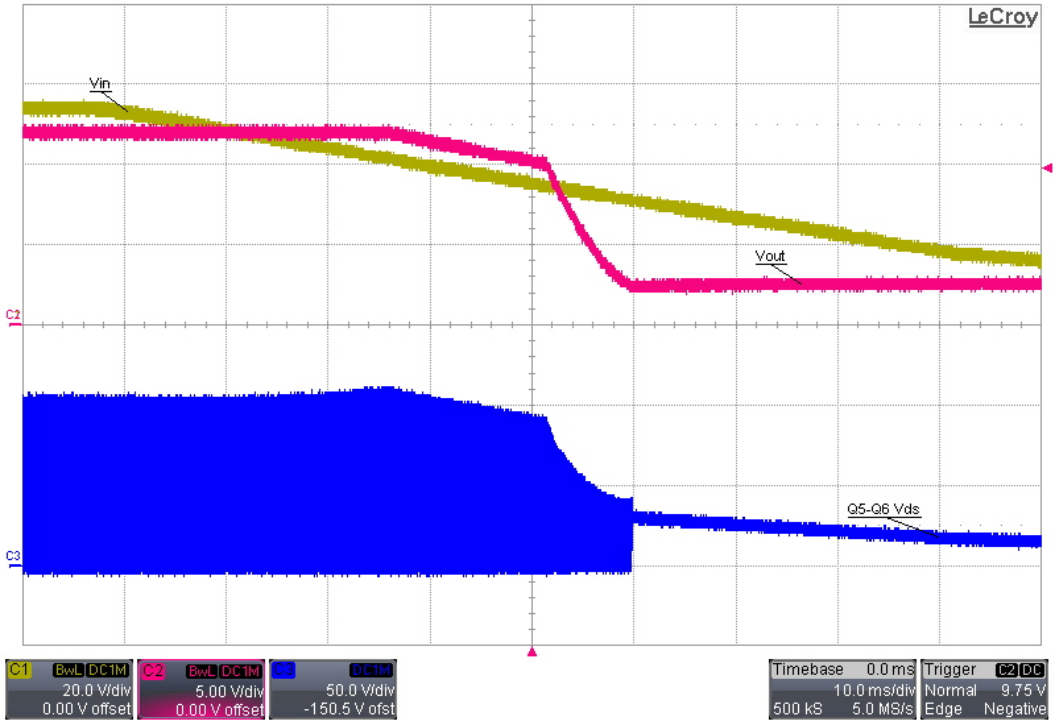


7.2 10A to 20A



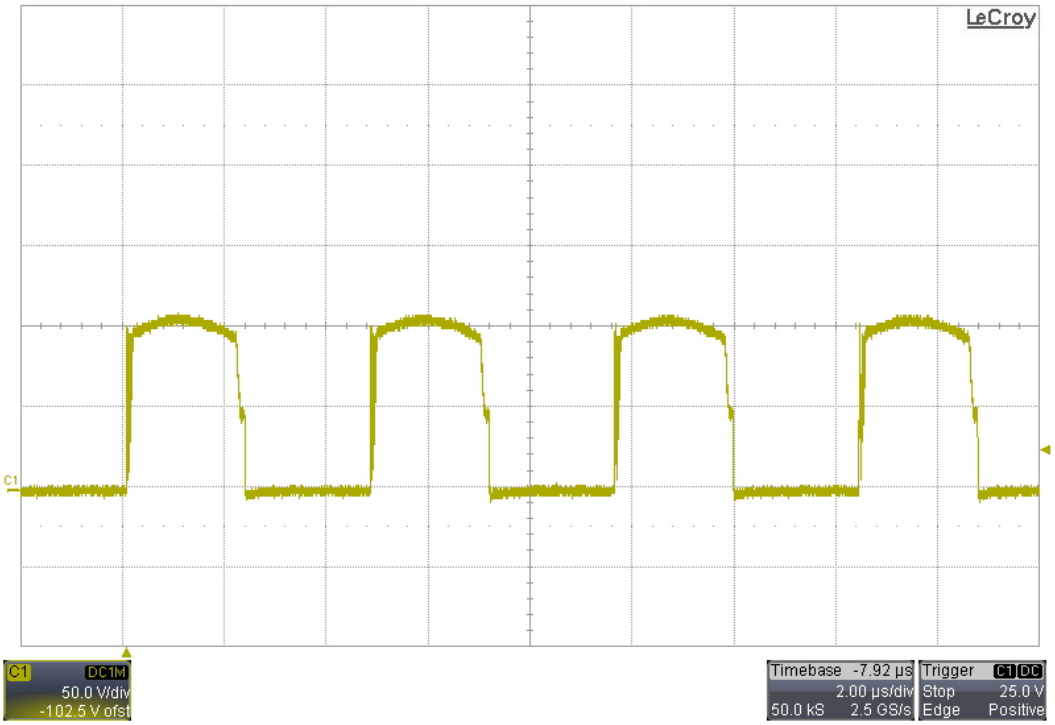
8 Shutdown

The output was unloaded.

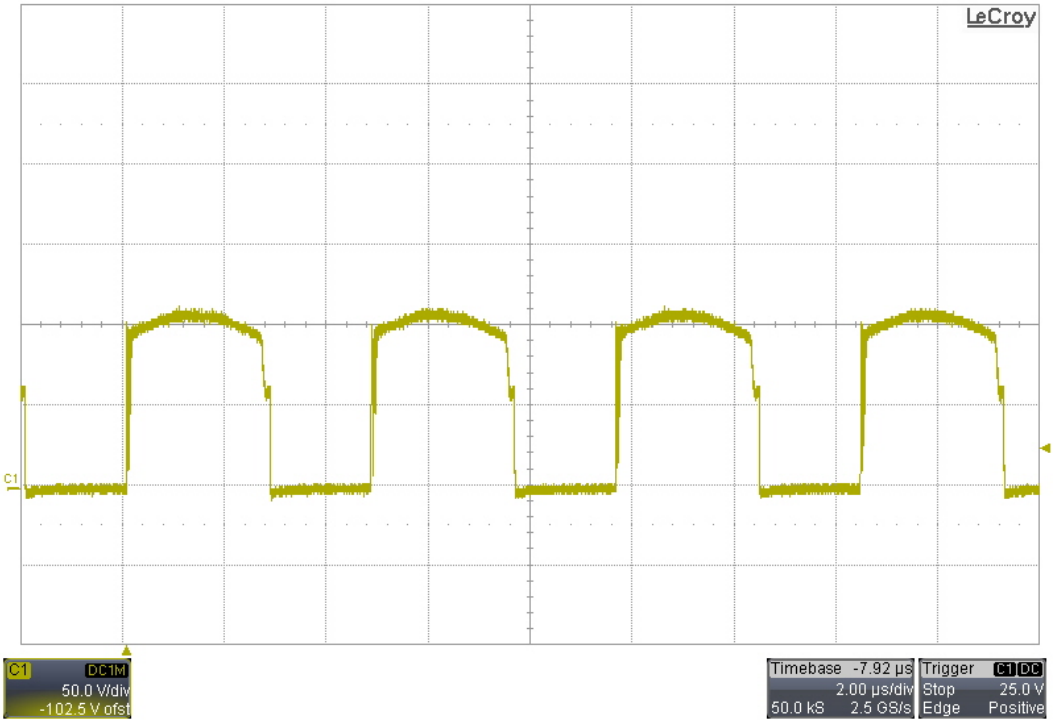


9 Switching Waveforms

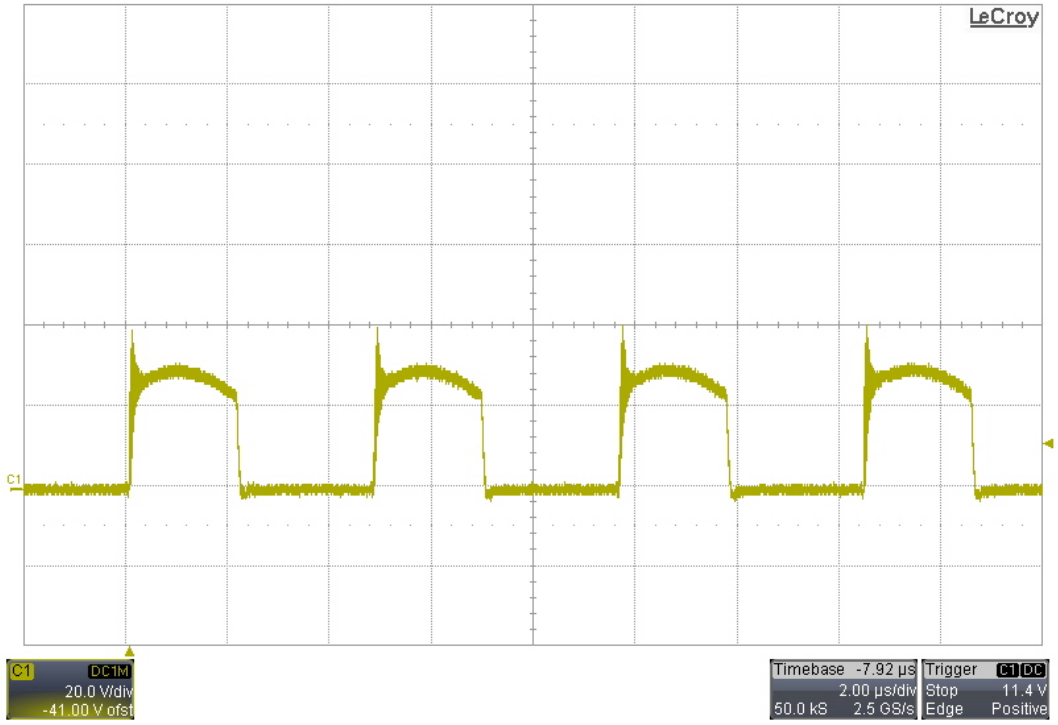
9.1 Primary FETs Vds (Q5 and Q6) – 48Vin, 21A Load



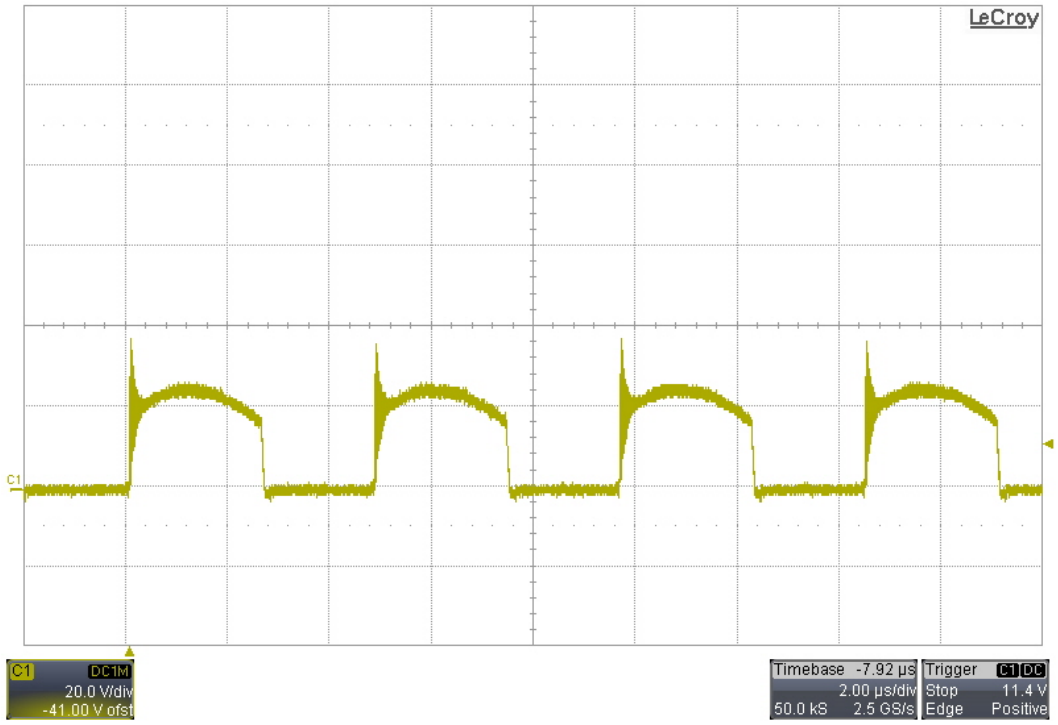
9.2 Primary FETs Vds (Q5 and Q6) – 60Vin, 21A Load



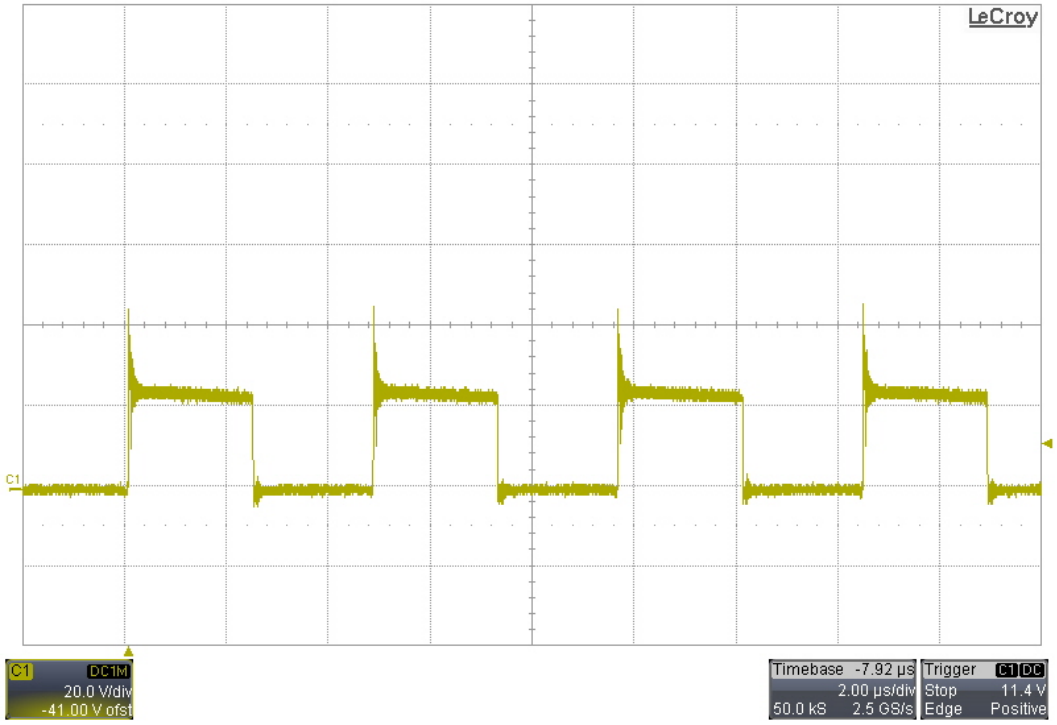
9.3 Sync FETs Vds (Q1 and Q2) – 48Vin, 21A Load



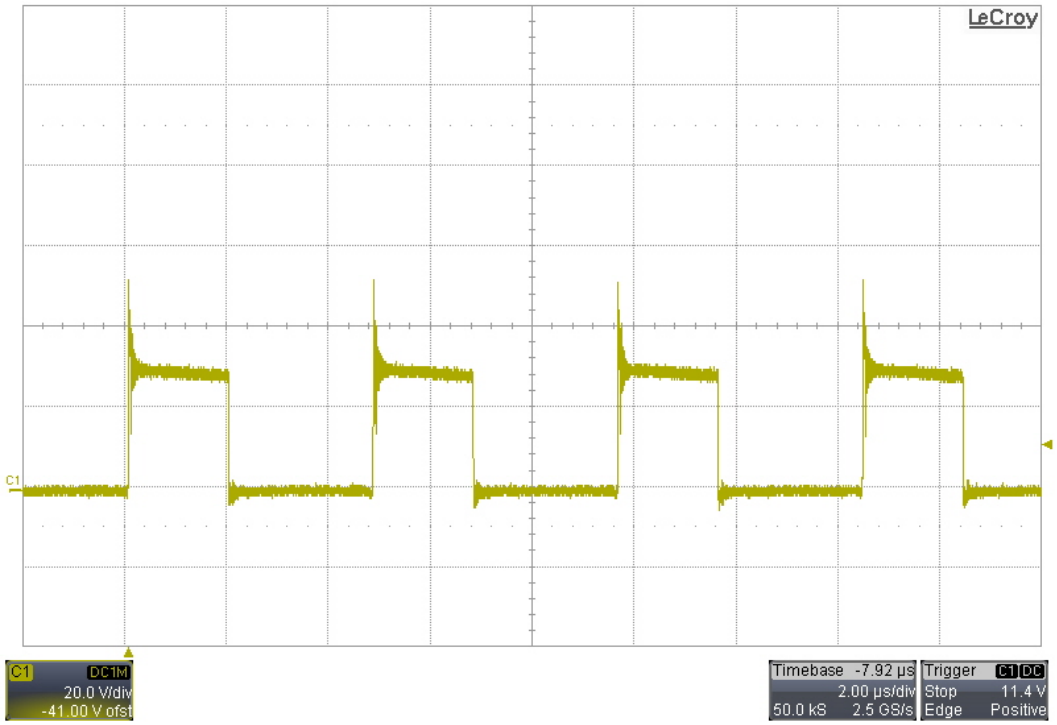
9.4 Sync FETs Vds (Q1 and Q2) – 60Vin, 21A Load



9.5 Sync FETs Vds (Q4 and Q7) – 48Vin, 21A Load



9.6 Sync FETs Vds (Q4 and Q7) – 60Vin, 21A Load



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