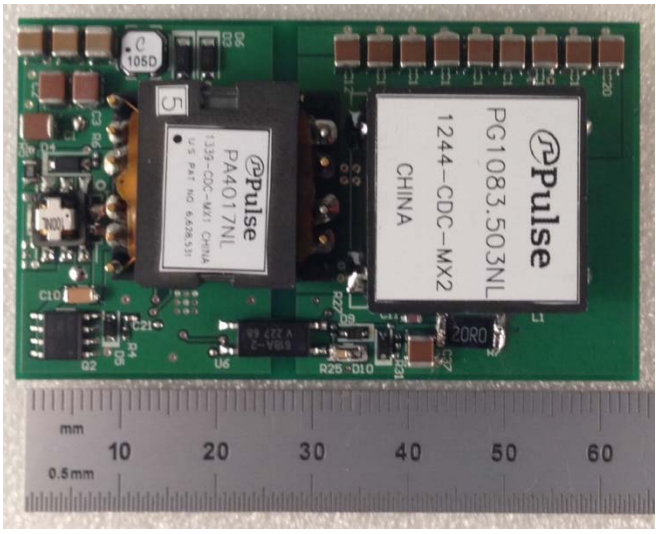
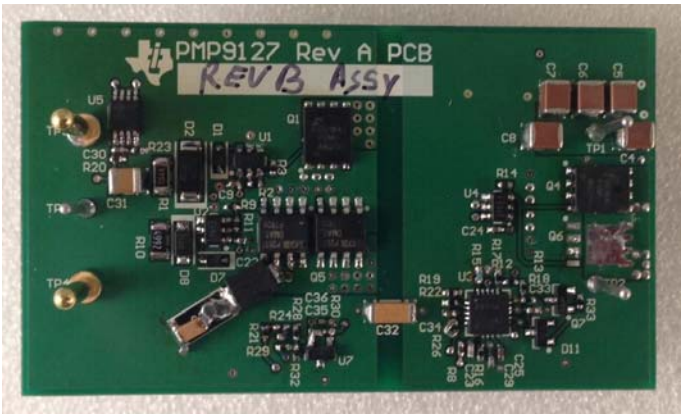
PMP9127 Rev B Test Results

1 Photo

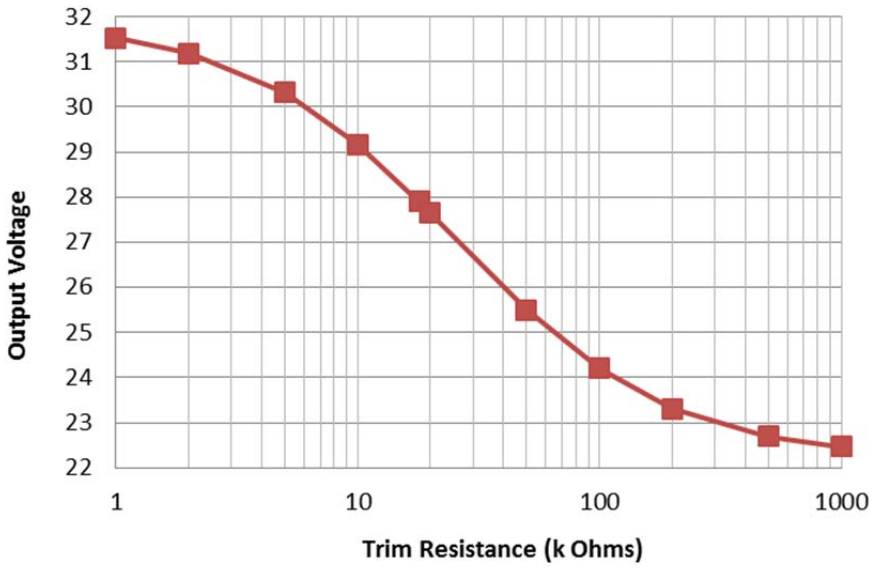
The photographs below show the top and bottom views of the PMP9127 Rev B demo board. The circuit is built on a PMP9127 Rev A PWB.





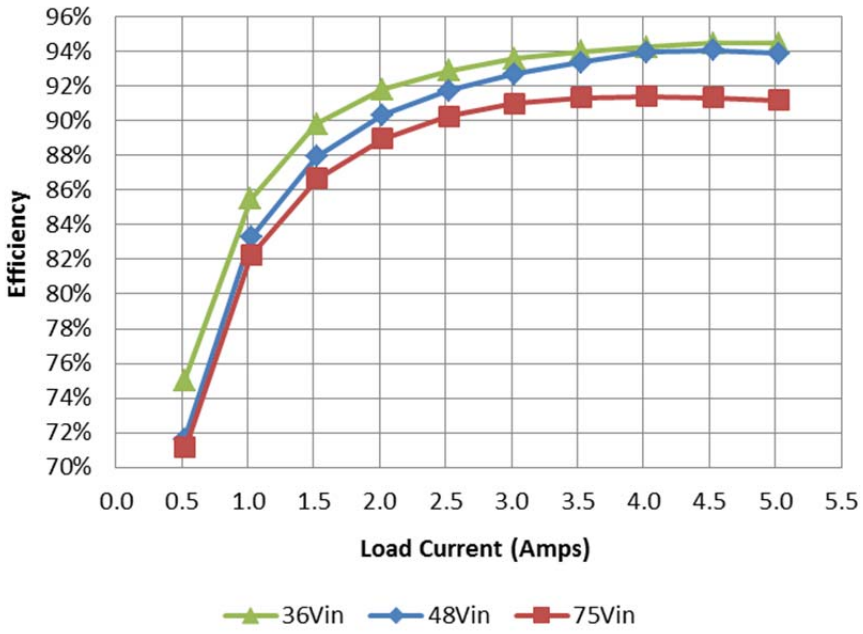
2 Output Trimming

The plot below shows the measured output voltage versus trim resistance. The trim resistance is connected from TP5 to output ground. The input voltage was 48V and the output was unloaded during this test.



3 Efficiency

3.1 22V Output Efficiency

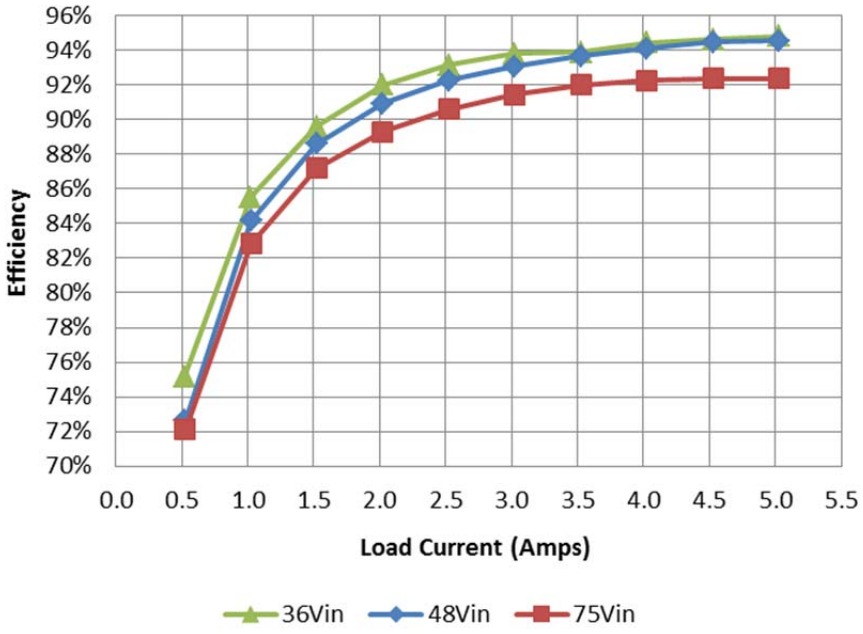


Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	22.22	36.00	0.111	0.05	3.964	1.2%
0.522	22.22	36.00	0.430	11.61	3.870	75.0%
1.023	22.22	36.00	0.739	22.74	3.865	85.5%
1.524	22.22	36.00	1.047	33.86	3.832	89.8%
2.024	22.22	36.00	1.361	44.98	4.016	91.8%
2.52	22.22	36.00	1.677	56.10	4.288	92.9%
3.03	22.22	36.00	1.995	67.21	4.598	93.6%
3.53	22.21	36.00	2.315	78.33	5.006	94.0%
4.03	22.21	36.00	2.636	89.44	5.441	94.3%
4.53	22.21	36.00	2.956	100.56	5.871	94.5%
5.03	22.21	36.00	3.284	111.68	6.537	94.5%

Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	22.25	48.0	0.103	0.05	4.872	1.0%
0.523	22.25	48.0	0.338	11.63	4.613	71.6%
1.024	22.25	48.0	0.570	22.78	4.578	83.3%
1.525	22.24	48.0	0.804	33.91	4.653	87.9%
2.025	22.24	48.0	1.039	45.03	4.815	90.3%
2.53	22.24	48.0	1.275	56.16	5.058	91.7%
3.03	22.23	48.0	1.512	67.28	5.304	92.7%
3.53	22.23	48.0	1.750	78.40	5.588	93.3%
4.03	22.23	48.0	1.985	89.52	5.754	94.0%
4.53	22.22	48.0	2.229	100.63	6.340	94.1%
5.03	22.22	48.0	2.480	111.75	7.285	93.9%

Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	22.26	75.0	0.131	0.05	9.770	0.5%
0.523	22.27	75.0	0.218	11.65	4.729	71.1%
1.025	22.27	75.0	0.370	22.81	4.928	82.2%
1.525	22.26	75.0	0.522	33.95	5.221	86.7%
2.025	22.26	75.0	0.675	45.07	5.585	89.0%
2.53	22.26	75.0	0.830	56.21	6.054	90.3%
3.03	22.25	75.0	0.987	67.34	6.675	91.0%
3.53	22.25	75.0	1.146	78.47	7.446	91.3%
4.03	22.25	75.0	1.307	89.60	8.428	91.4%
4.53	22.25	75.0	1.470	100.74	9.541	91.3%
5.03	22.24	75.0	1.636	111.87	10.820	91.2%

3.2 28V Output Efficiency

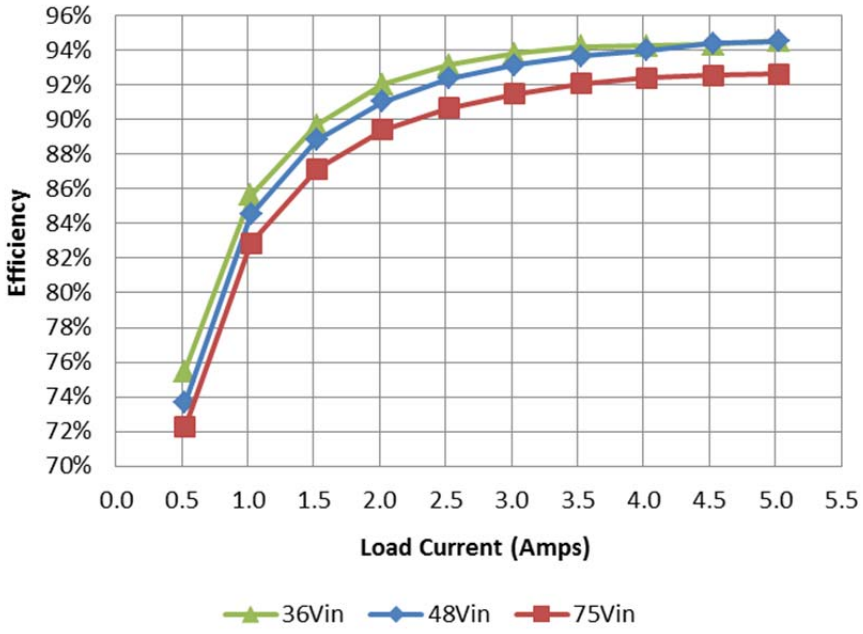


Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	27.89	36.00	0.138	0.05	4.913	1.1%
0.521	27.89	36.00	0.537	14.54	4.809	75.1%
1.022	27.89	36.00	0.926	28.52	4.831	85.5%
1.523	27.89	36.00	1.317	42.48	4.934	89.6%
2.023	27.89	36.00	1.704	56.43	4.919	92.0%
2.52	27.89	36.00	2.100	70.40	5.193	93.1%
3.02	27.89	36.00	2.498	84.36	5.576	93.8%
3.53	27.89	36.00	2.909	98.31	6.388	93.9%
4.03	27.89	36.00	3.302	112.27	6.589	94.5%
4.53	27.88	36.00	3.705	126.23	7.152	94.6%
5.03	27.88	36.00	4.108	140.20	7.673	94.8%

Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	27.93	48.0	0.120	0.05	5.721	0.9%
0.523	27.93	48.0	0.419	14.60	5.501	72.6%
1.024	27.93	48.0	0.708	28.59	5.380	84.2%
1.524	27.93	48.0	1.001	42.56	5.475	88.6%
2.024	27.92	48.0	1.295	56.52	5.642	90.9%
2.52	27.92	48.0	1.592	70.49	5.913	92.3%
3.03	27.92	48.0	1.890	84.45	6.276	93.1%
3.53	27.91	48.0	2.189	98.41	6.665	93.7%
4.03	27.91	48.0	2.488	112.38	7.051	94.1%
4.53	27.91	48.0	2.786	126.34	7.367	94.5%
5.03	27.90	48.0	3.092	140.30	8.114	94.5%

Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	27.95	75.0	0.074	0.05	5.491	1.0%
0.523	27.95	75.0	0.270	14.63	5.657	72.1%
1.024	27.94	75.0	0.461	28.62	5.932	82.8%
1.524	27.94	75.0	0.651	42.59	6.266	87.2%
2.024	27.94	75.0	0.844	56.55	6.766	89.3%
2.53	27.93	75.0	1.038	70.53	7.338	90.6%
3.03	27.93	75.0	1.232	84.51	7.909	91.4%
3.53	27.93	75.0	1.427	98.48	8.571	92.0%
4.03	27.93	75.0	1.625	112.46	9.431	92.3%
4.53	27.92	75.0	1.825	126.42	10.466	92.4%
5.03	27.92	75.0	2.027	140.40	11.622	92.4%

3.3 32V Output Efficiency



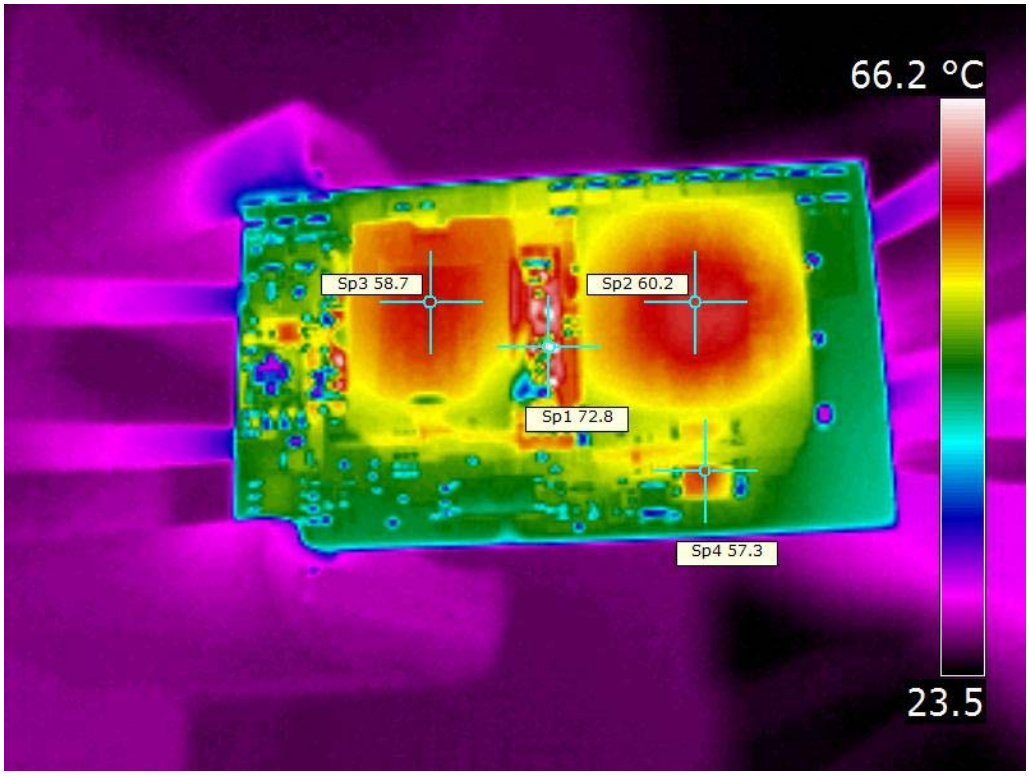
Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	32.02	36.00	0.156	0.06	5.542	1.1%
0.522	32.03	36.00	0.616	16.72	5.444	75.4%
1.023	32.02	36.00	1.063	32.77	5.489	85.7%
1.524	32.02	36.00	1.512	48.79	5.625	89.7%
2.024	32.02	36.00	1.956	64.80	5.619	92.0%
2.52	32.01	36.00	2.410	80.82	5.940	93.2%
3.03	32.01	36.00	2.867	96.83	6.382	93.8%
3.53	32.00	36.00	3.327	112.83	6.939	94.2%
4.03	32.00	36.00	3.798	128.83	7.869	94.2%
4.53	31.99	36.00	4.265	144.84	8.694	94.3%
5.03	31.99	36.00	4.726	160.83	9.292	94.5%

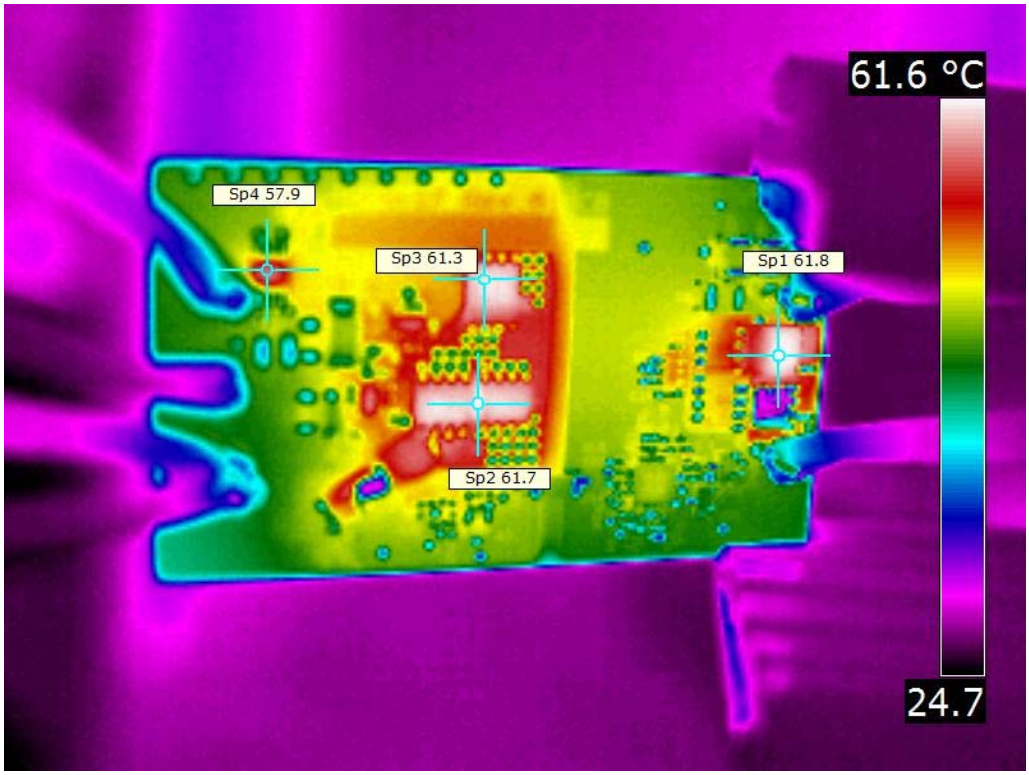
Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	32.05	48.0	0.132	0.06	6.279	0.9%
0.523	32.05	48.0	0.474	16.78	5.989	73.7%
1.024	32.04	48.0	0.809	32.82	6.008	84.5%
1.524	32.04	48.0	1.146	48.84	6.147	88.8%
2.025	32.03	48.0	1.484	64.85	6.373	91.1%
2.53	32.03	48.0	1.825	80.87	6.697	92.4%
3.03	32.02	48.0	2.167	96.88	7.127	93.1%
3.53	32.02	48.0	2.511	112.89	7.643	93.7%
4.03	32.01	48.0	2.857	128.90	8.216	94.0%
4.53	32.00	48.0	3.198	144.90	8.609	94.4%
5.03	32.00	48.0	3.547	160.90	9.329	94.5%

Iout	Vout	Vin	Iin	Pout	Losses	Efficiency
0.002	32.06	75.0	0.083	0.06	6.148	0.9%
0.524	32.06	75.0	0.310	16.79	6.436	72.3%
1.025	32.05	75.0	0.528	32.84	6.787	82.9%
1.525	32.05	75.0	0.747	48.86	7.193	87.2%
2.025	32.04	75.0	0.967	64.88	7.674	89.4%
2.53	32.04	75.0	1.190	80.90	8.317	90.7%
3.03	32.03	75.0	1.413	96.92	9.045	91.5%
3.53	32.03	75.0	1.636	112.94	9.745	92.1%
4.03	32.02	75.0	1.861	128.95	10.617	92.4%
4.53	32.02	75.0	2.088	144.96	11.641	92.6%
5.03	32.01	75.0	2.317	160.96	12.813	92.6%

4 Thermal Images

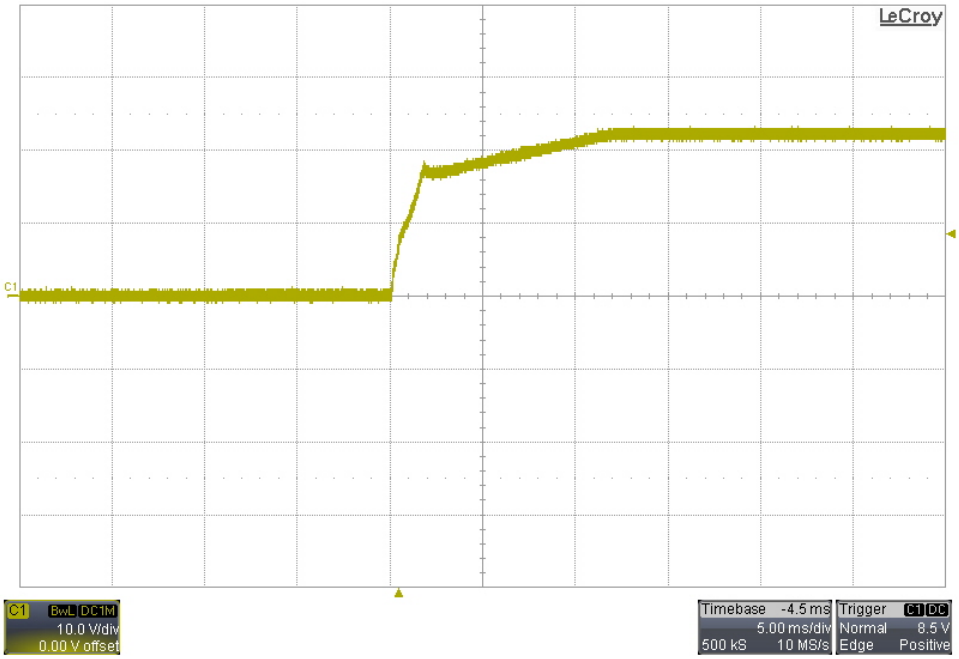
The ambient temperature was 25C with 300LFM of forced air flow. The input was 48V. The output was 28V loaded with 5A.



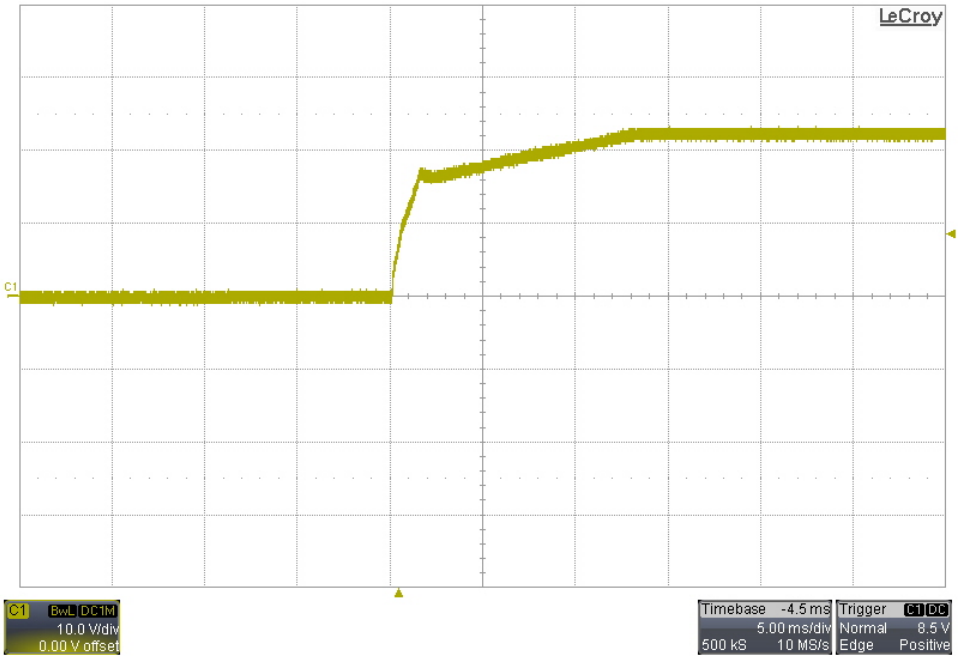


5 Startup

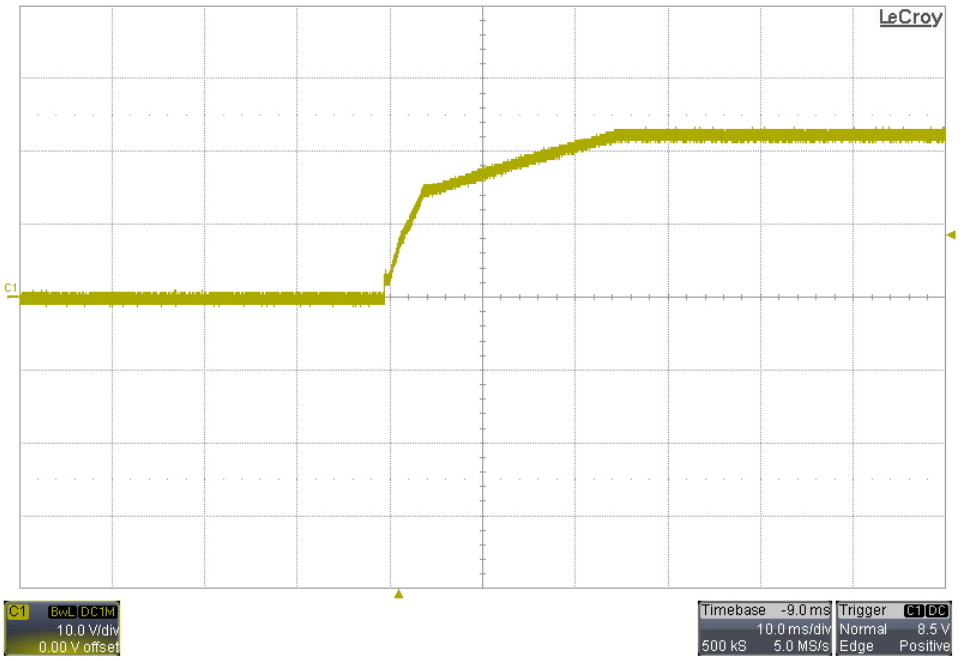
5.1 22V Output, 36V Input, No Load – Startup



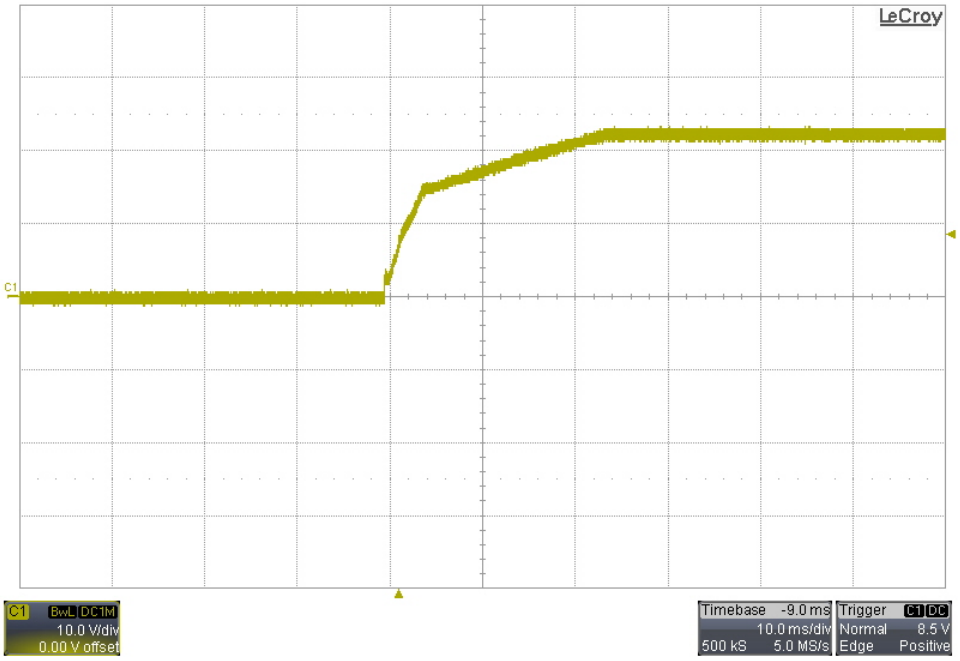
5.2 22V Output, 75V Input, No Load – Startup



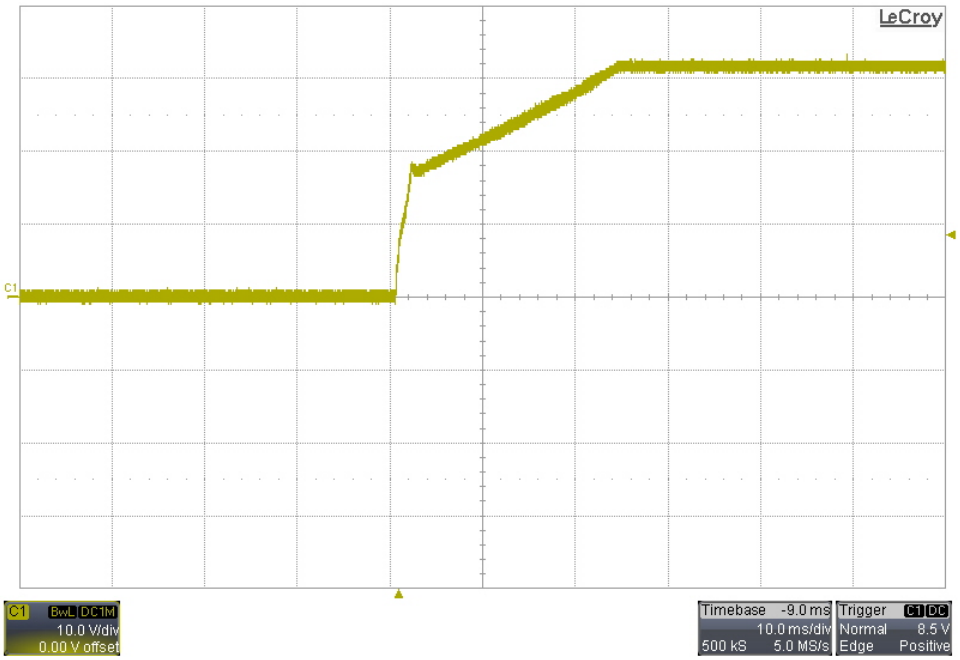
5.3 22V Output, 36V Input, 4Ω Load – Startup



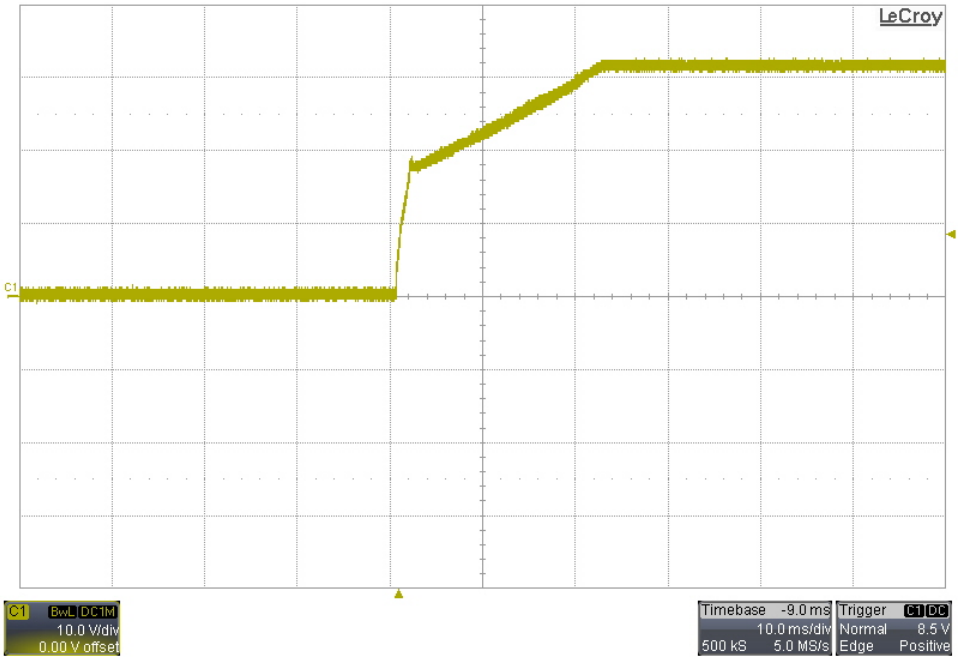
5.4 22V Output, 75V Input, 4Ω Load – Startup



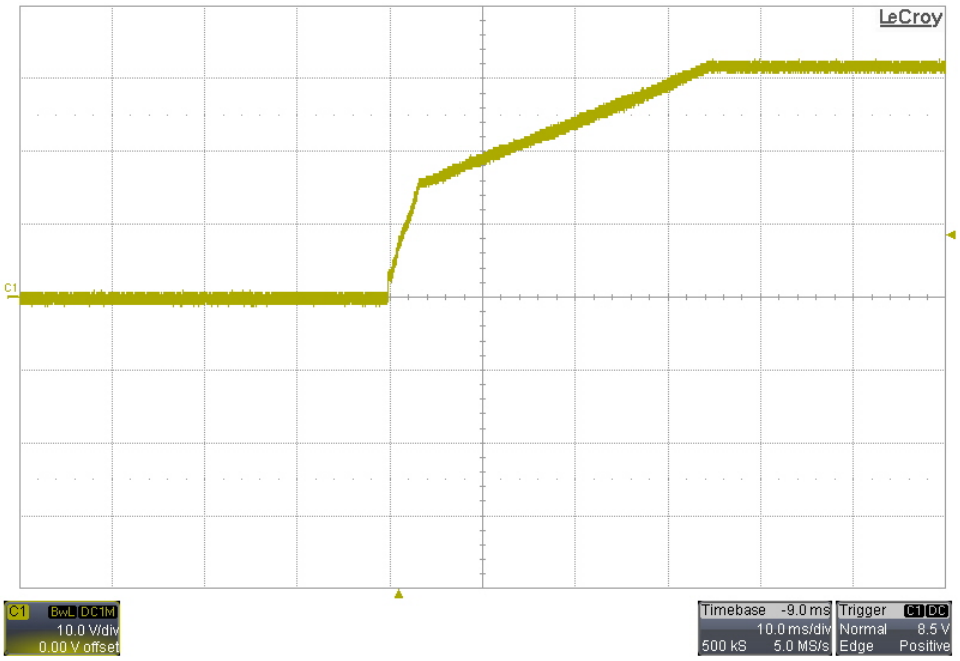
5.5 32V Output, 36V Input, No Load – Startup



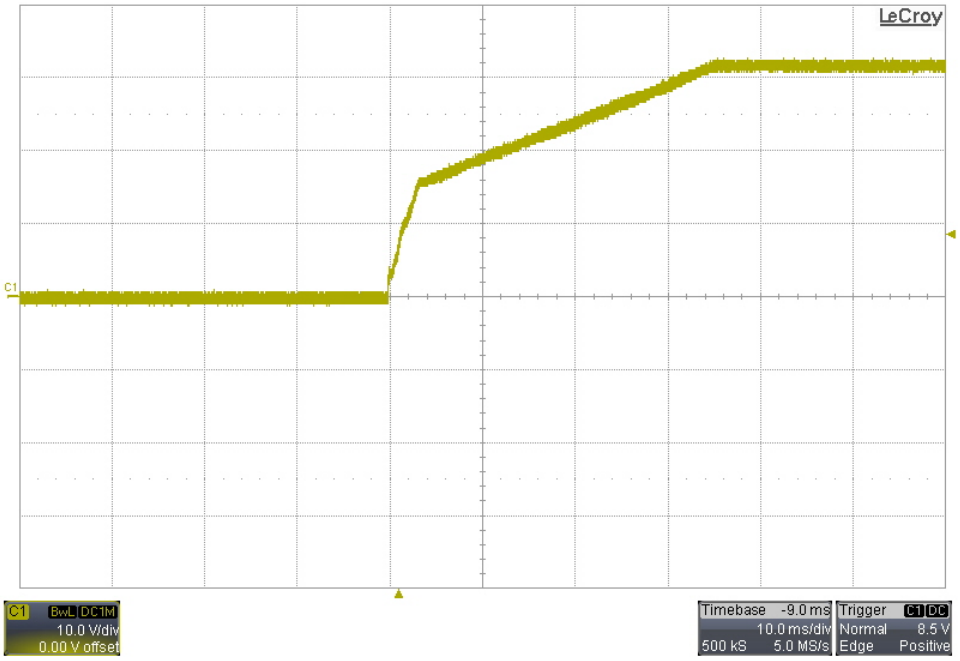
5.6 32V Output, 75V Input, No Load – Startup



5.7 32V Output, 36V Input, 6Ω Load – Startup



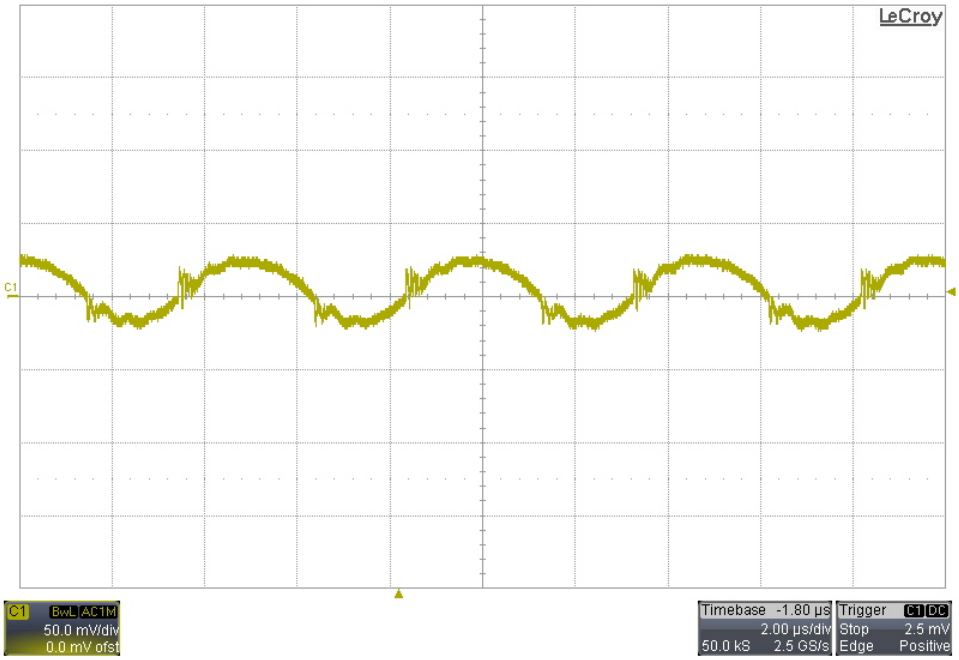
5.8 32V Output, 75V Input, 6Ω Load – Startup



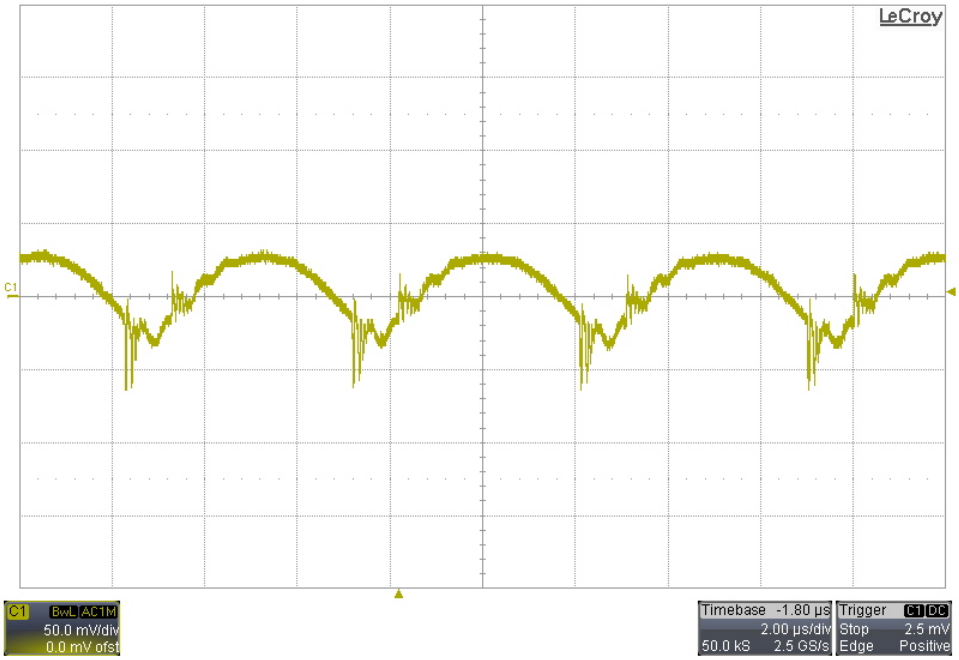
6 Output Ripple Voltage

The output ripple voltage is shown in the plots below. The output was loaded with 5A.

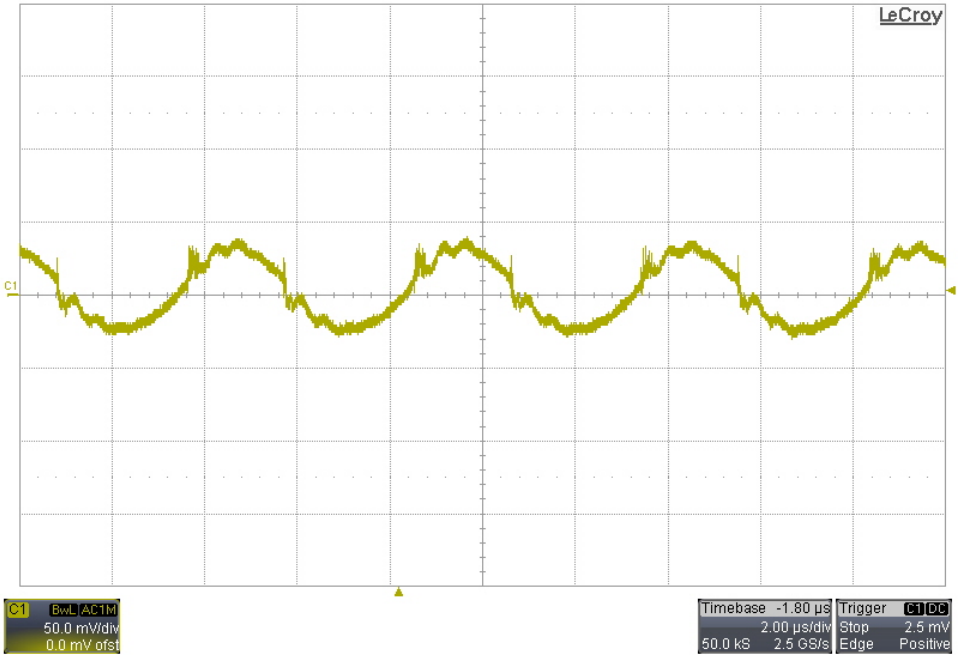
6.1 22V Output, 36V Input – Ripple



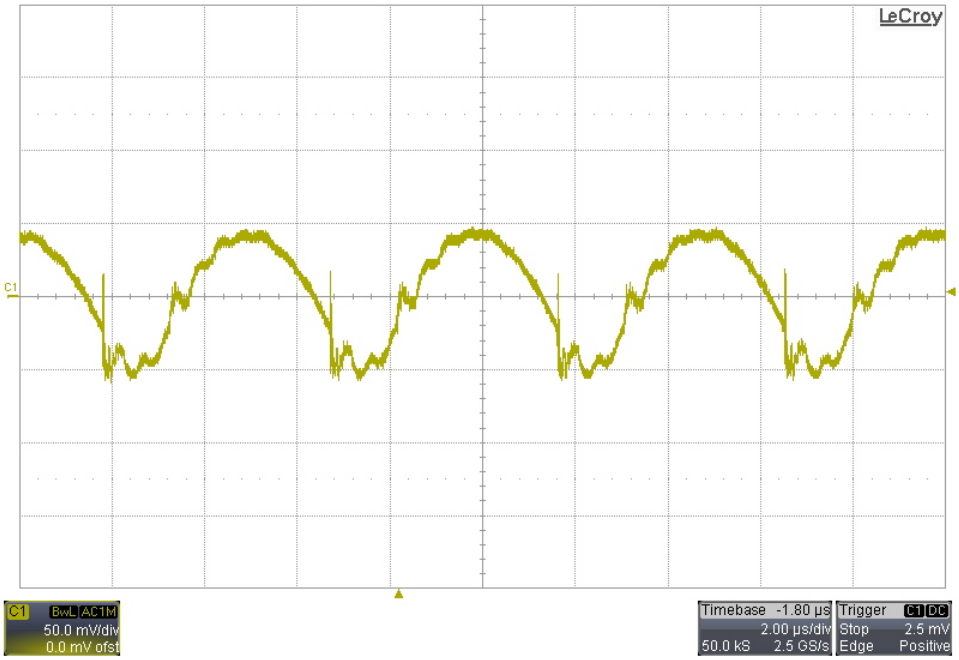
6.2 22V Output, 75V Input – Ripple



6.3 32V Output, 36V Input – Ripple



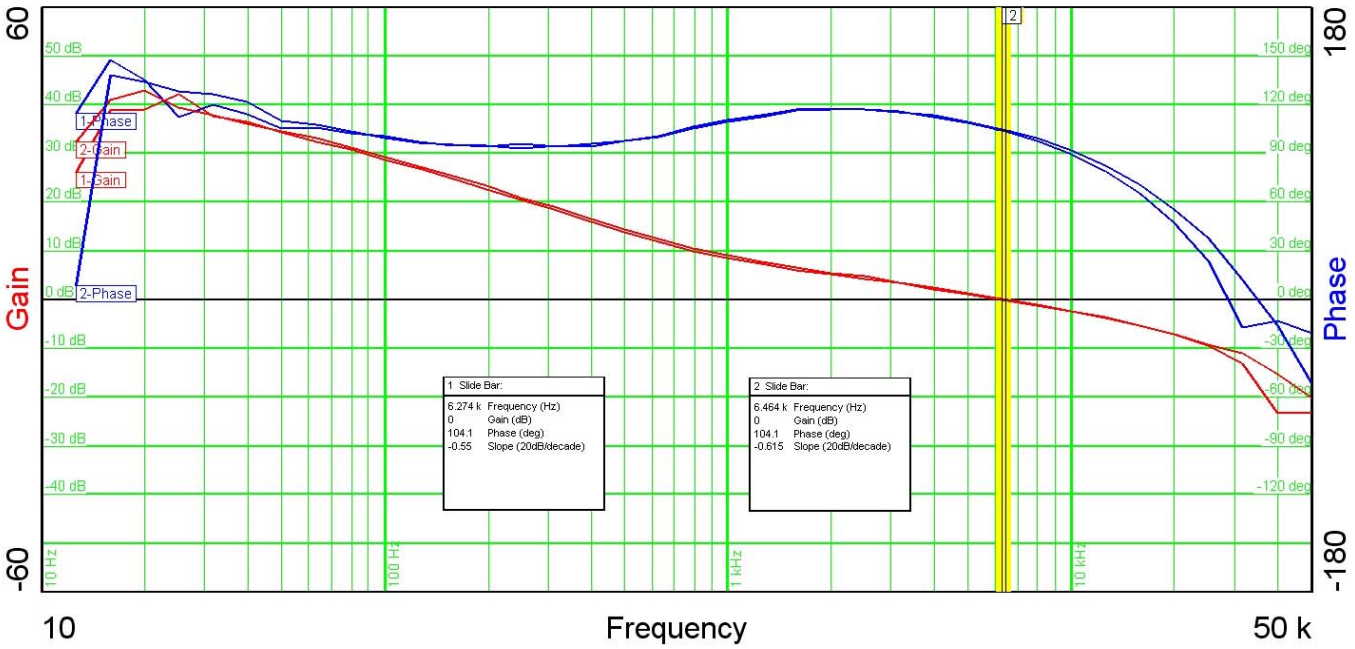
6.4 32V Output, 75V Input – Ripple



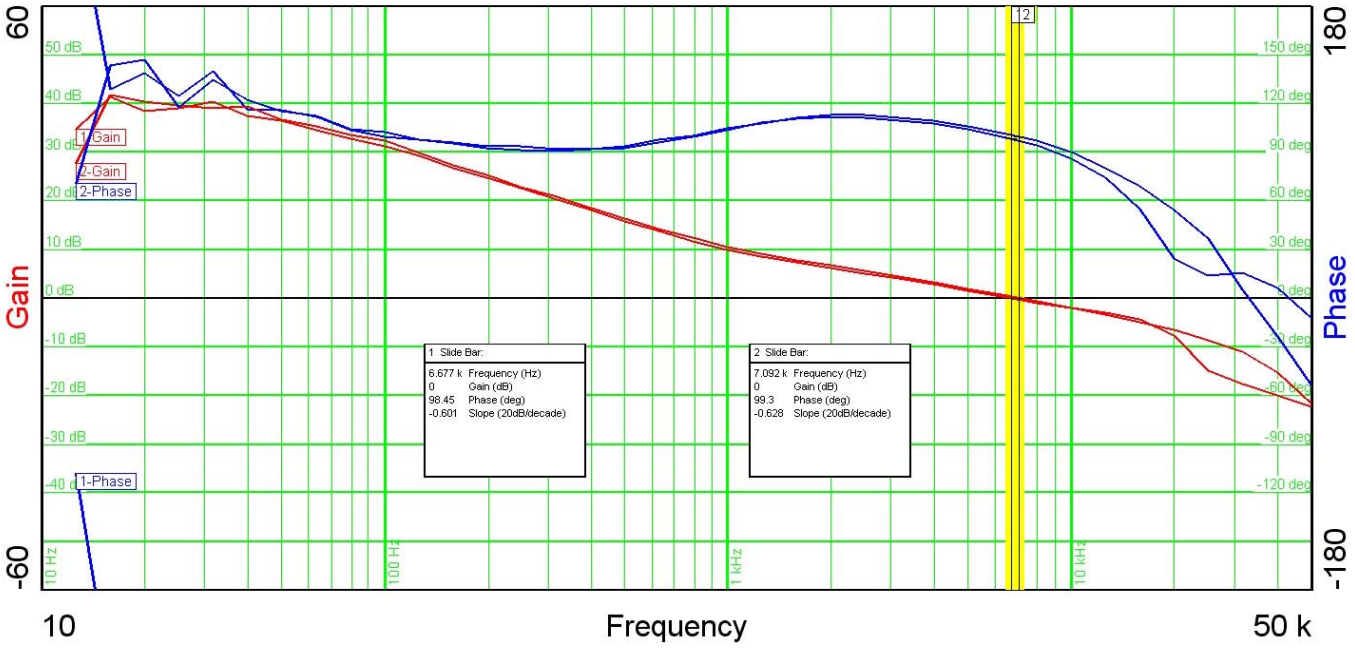
7 Frequency Response

The frequency response of the feedback loops are shown below. For the gain/phase plot #1, the input was set to 36V. For the gain/phase plot #2, the input was set to 75V.

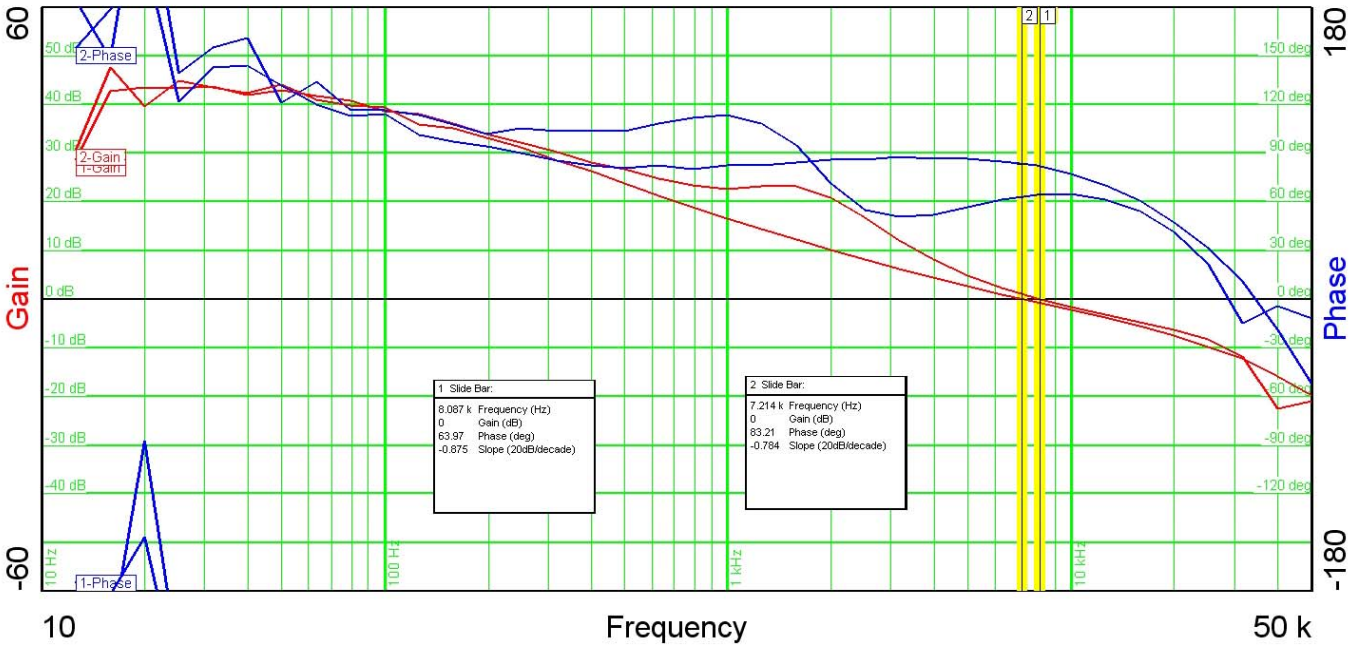
7.1 Measured Across R21 – 22V Output, 5A Load



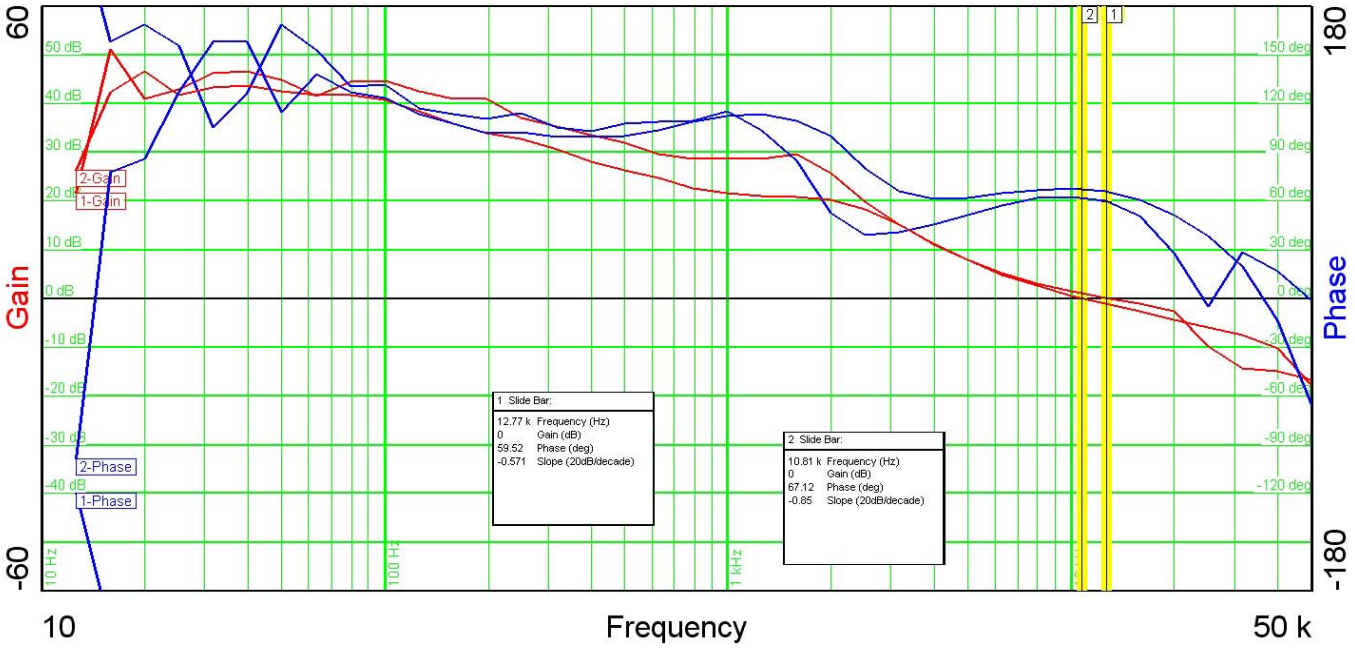
7.2 Measured Across R21 – 32V Output, 5A Load



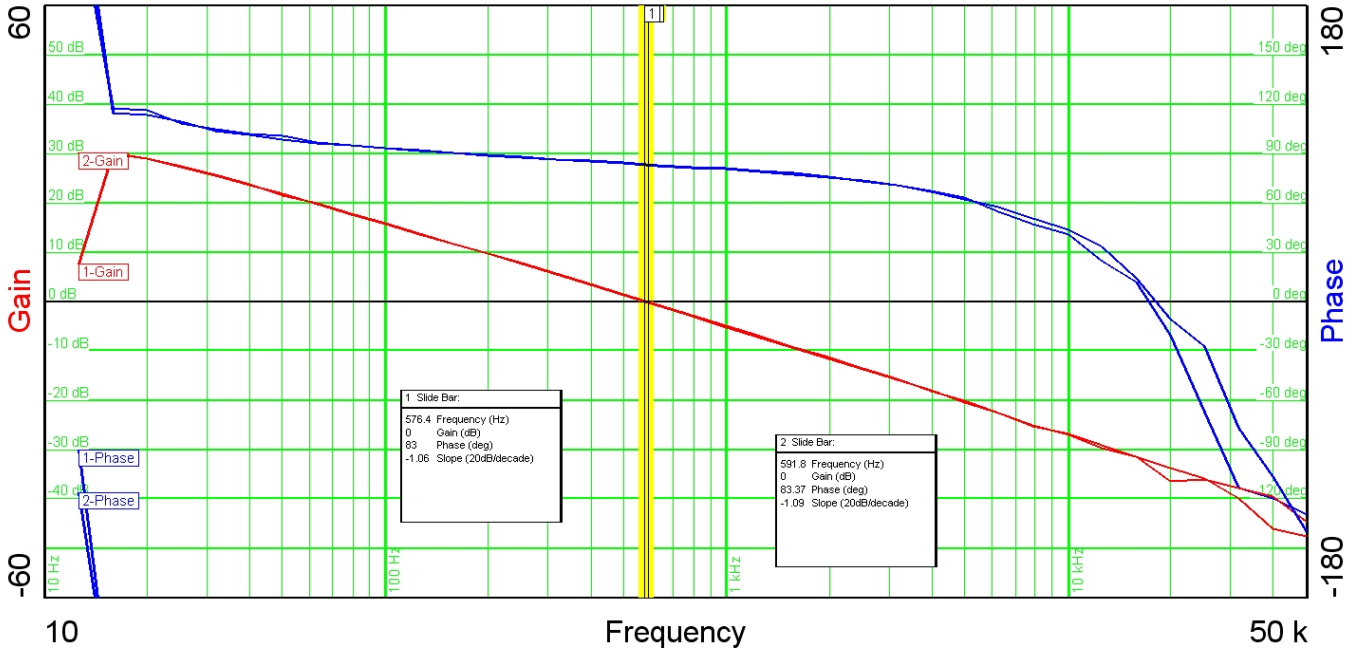
7.3 Measured Across R21 – 22V Output, No Load



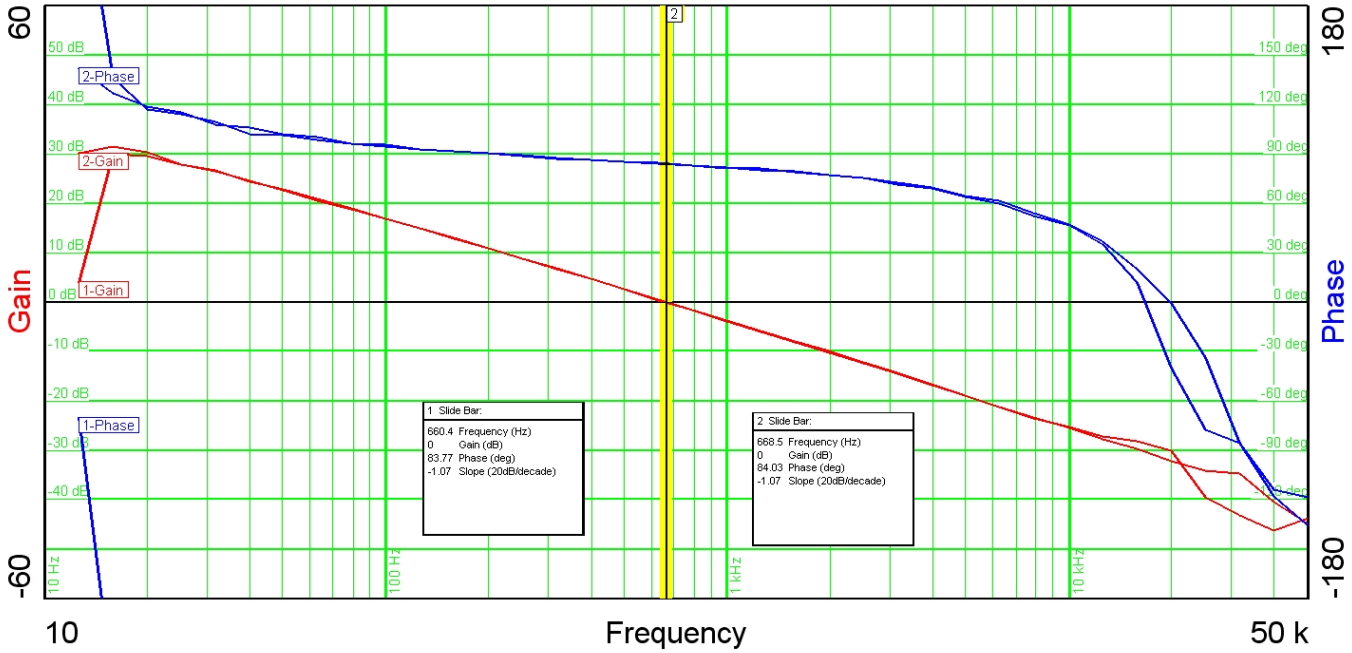
7.4 Measured Across R21 – 32V Output, No Load



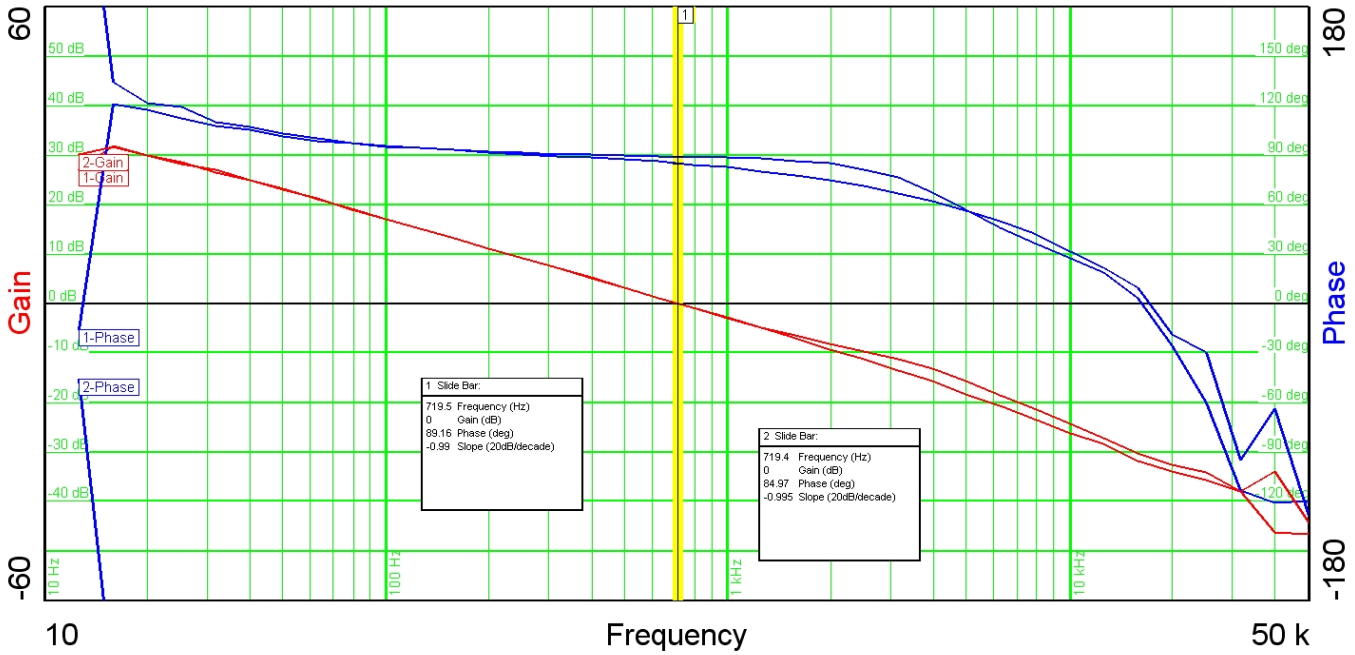
7.5 Measured Across R24 – 22V Output, 5A Load



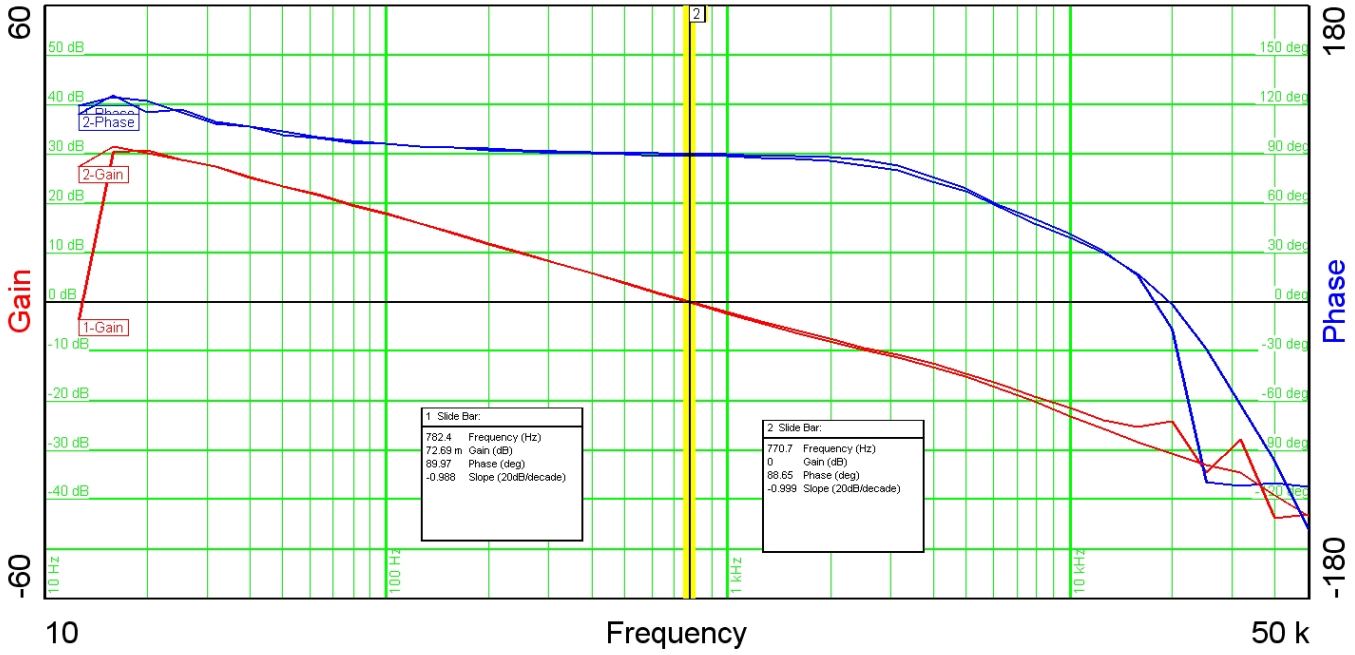
7.6 Measured Across R24 – 32V Output, 5A Load



7.7 Measured Across R24 – 22V Output, No Load



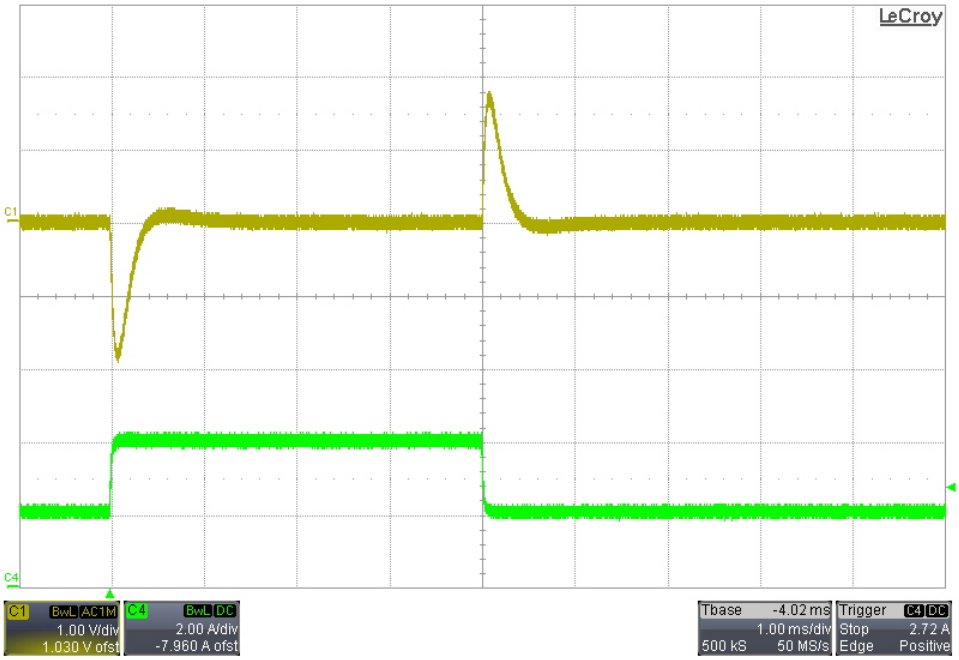
7.8 Measured Across R24 – 32V Output, No Load



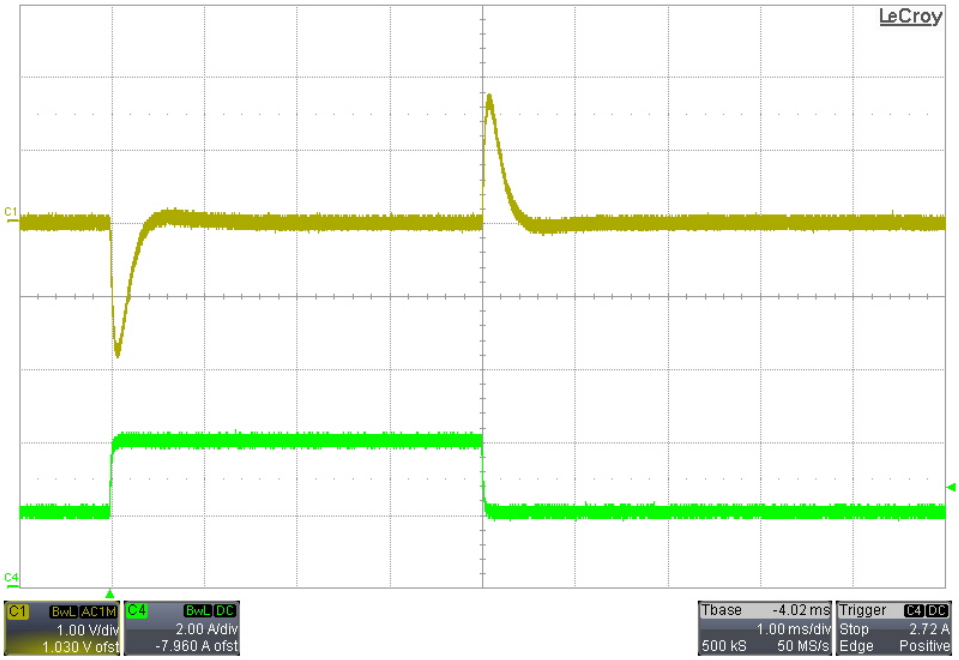
8 Load Transients

The response to a load step from 2A to 4A is shown in the images below. Channel 1: Vout (ac coupled); Channel 4: Iout

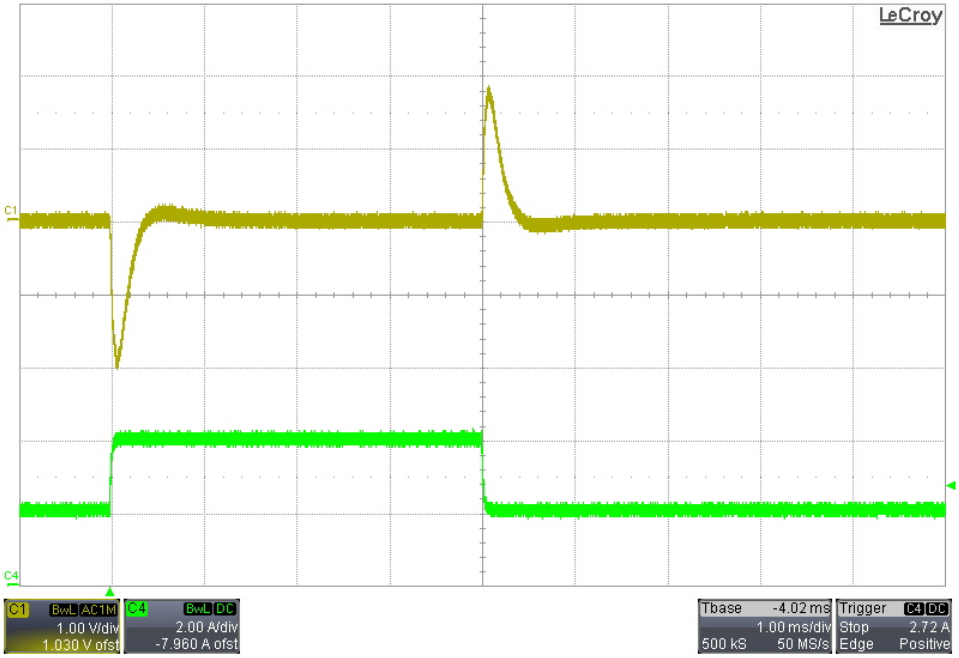
8.1 22V Output, 36V Input – Load Transient



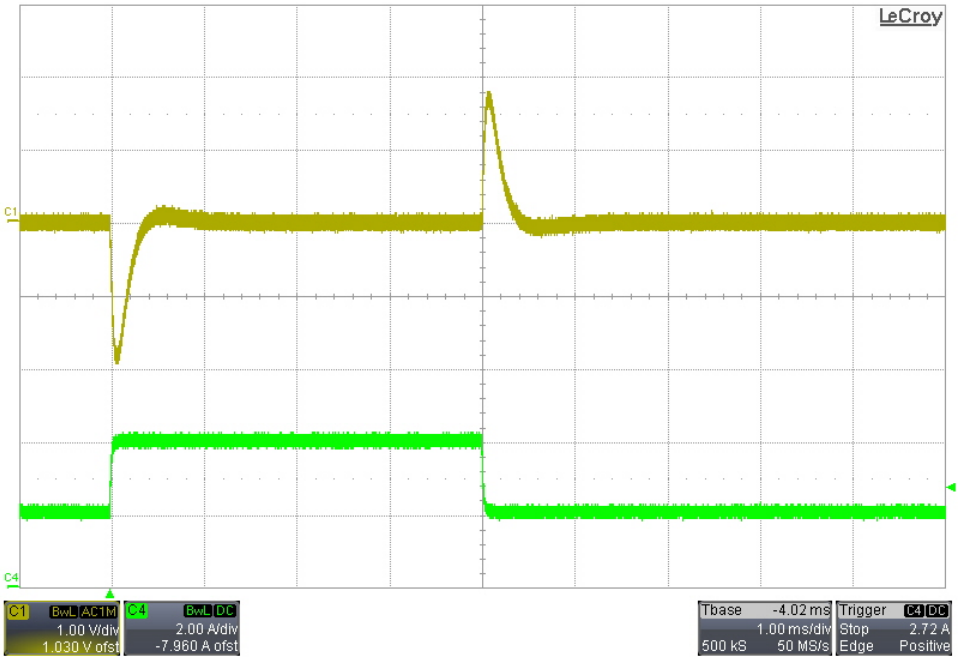
8.2 22V Output, 75V Input – Load Transient



8.3 32V Output, 36V Input – Load Transient



8.4 32V Output, 75V Input – Load Transient



9 Input Under-Voltage Lock-Out

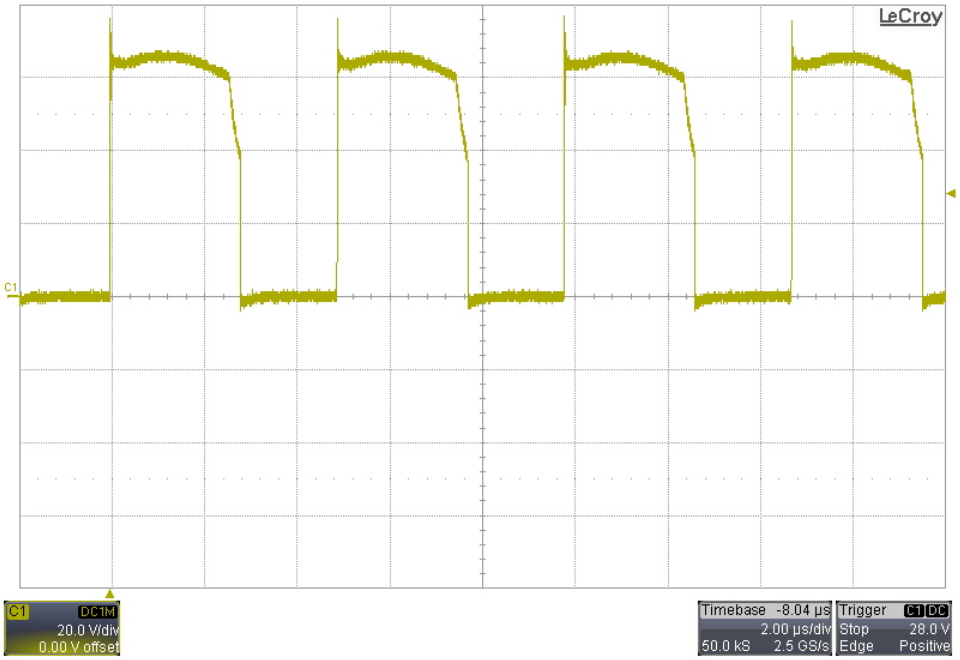
The turn-on and turn-off input voltages were measured and recorded below.

Turn-On	35.1 V
Turn-Off	34.7 V

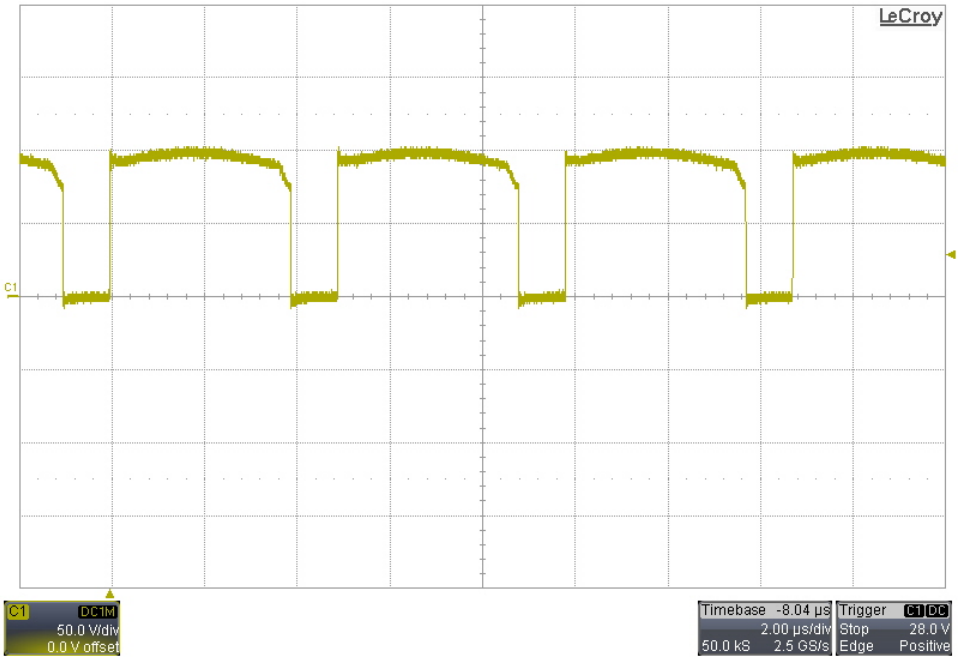
10 Switching Waveforms

For the images below show the output was loaded with 5A.

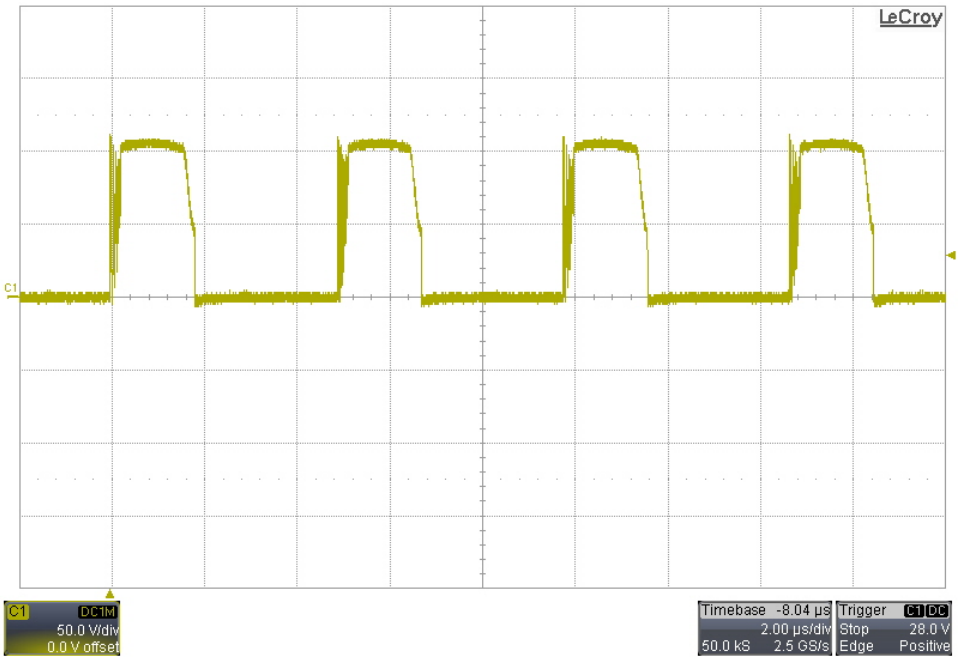
10.1 Q4 Primary FET Vds – 22V Output, 36V Input



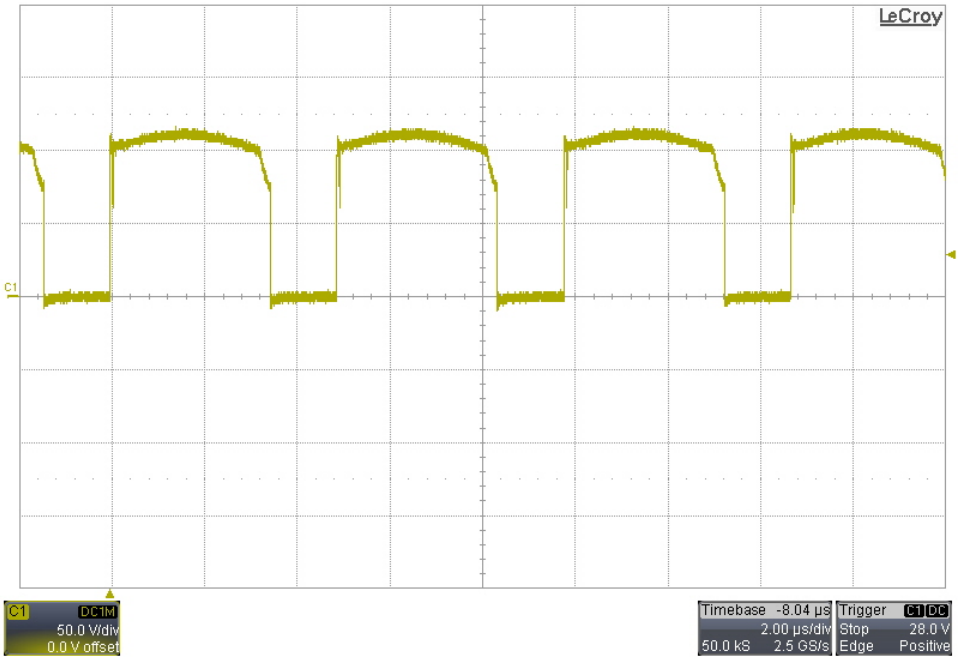
10.2 Q4 Primary FET Vds – 22V Output, 75V Input



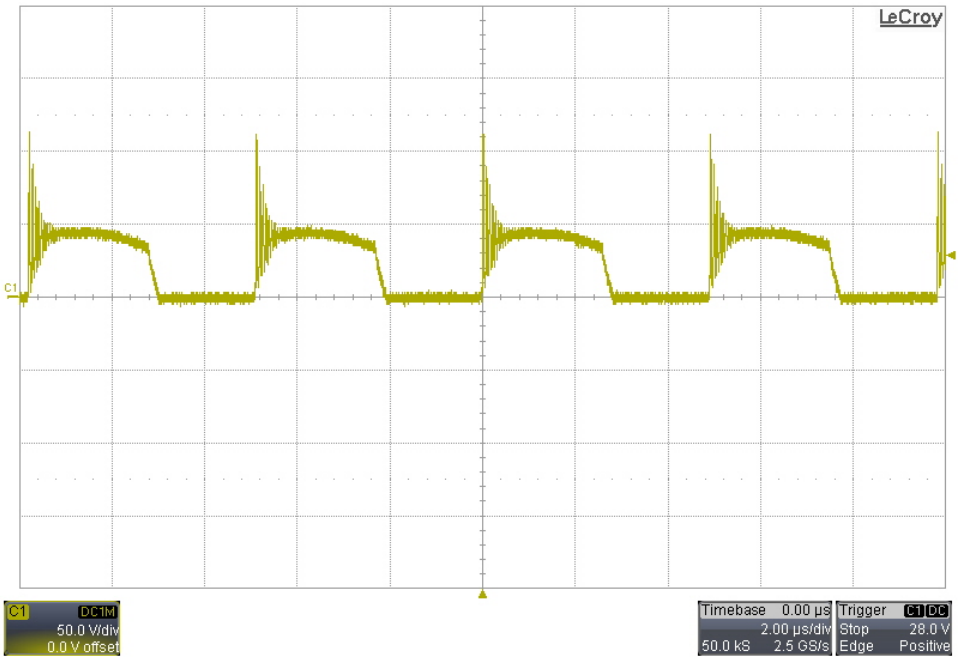
10.3 Q4 Primary FET Vds – 32V Output, 36V Input



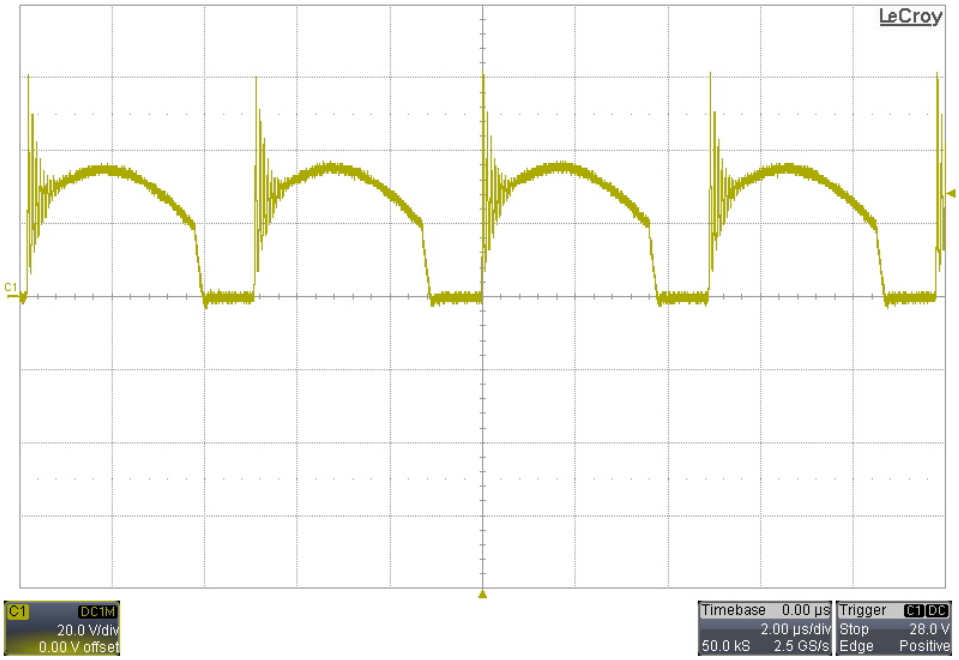
10.4 Q4 Primary FET Vds – 32V Output, 75V Input



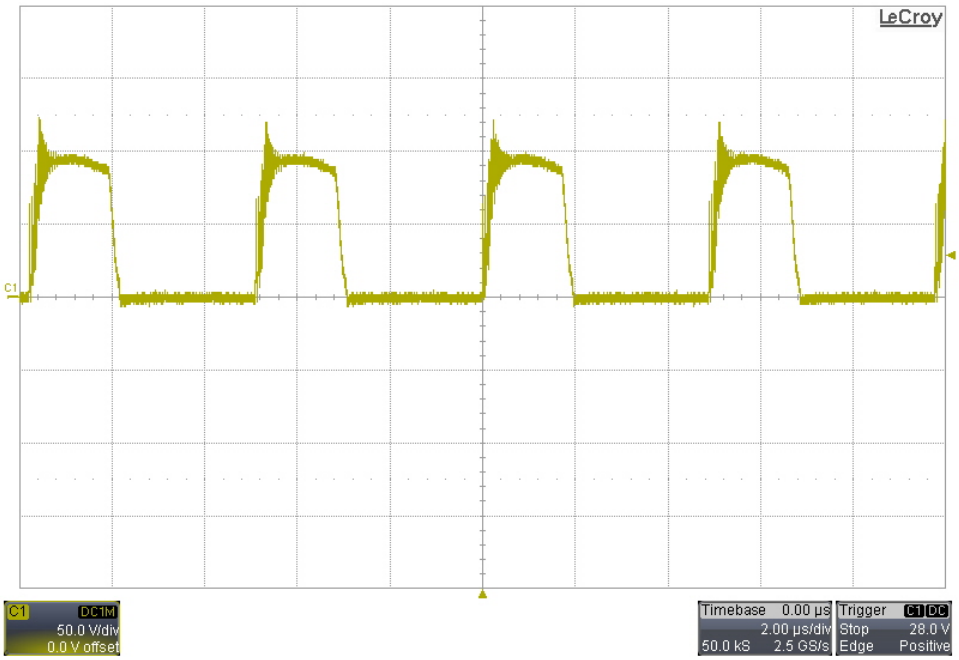
10.5 Q1 Synchronous FET Vds – 22V Output, 36V Input



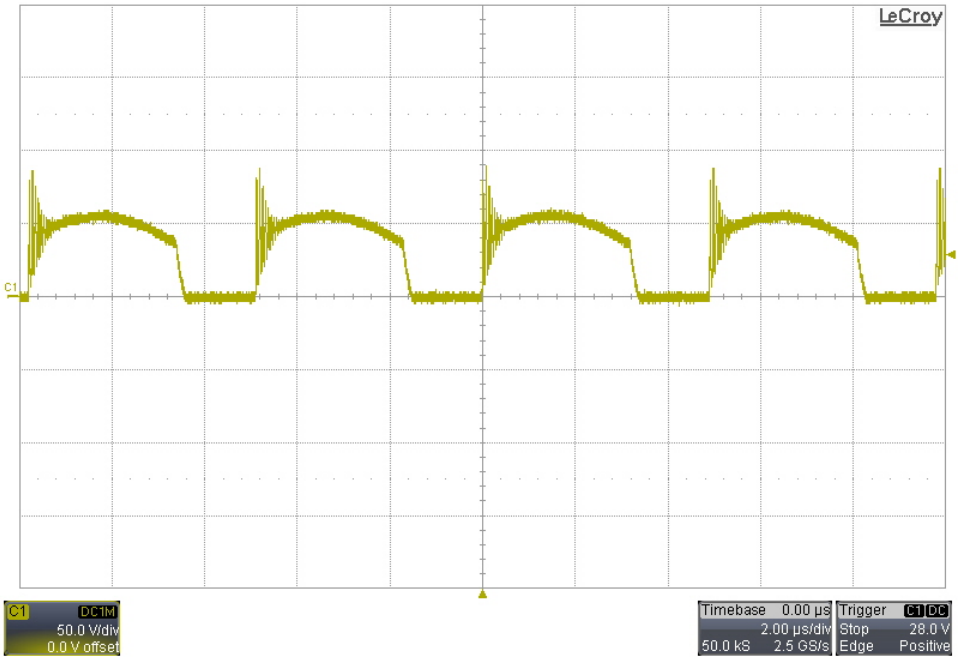
10.6 Q1 Synchronous FET Vds – 22V Output, 75V Input



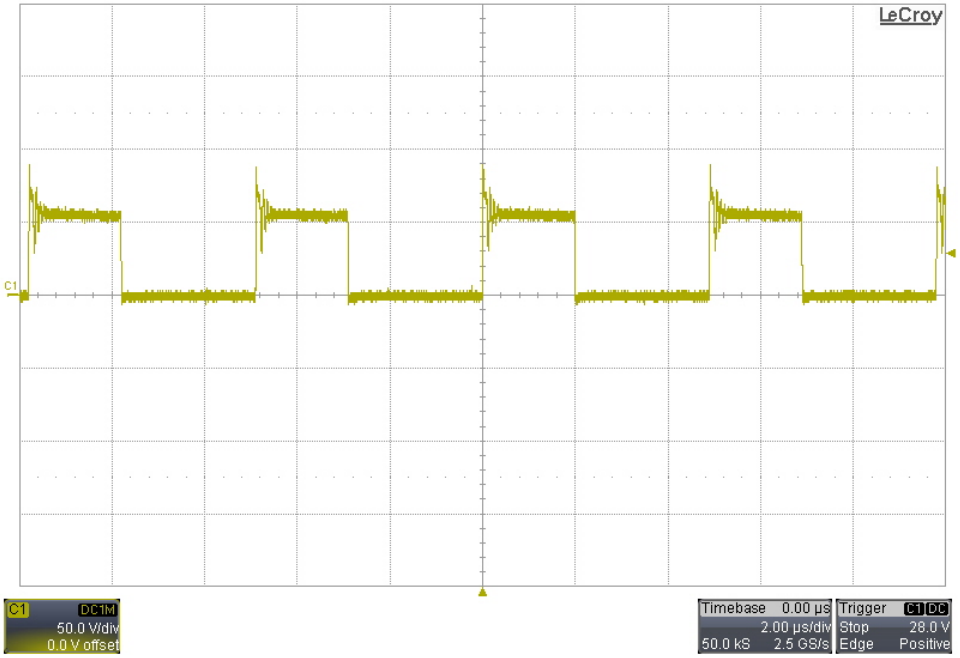
10.7 Q1 Synchronous FET Vds – 32V Output, 36V Input



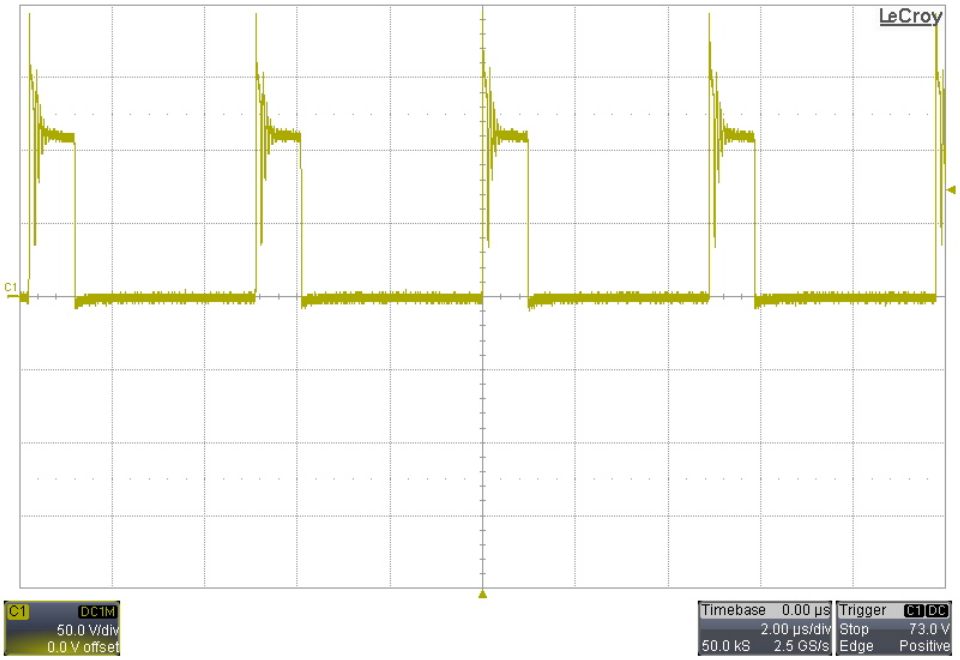
10.8 Q1 Synchronous FET Vds – 32V Output, 75V Input



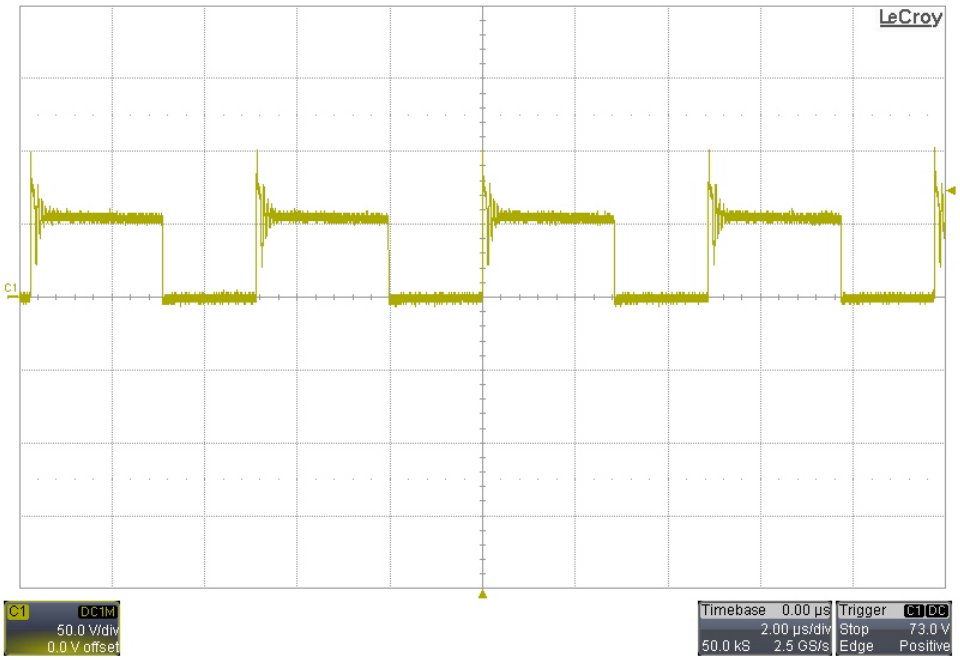
10.9 Q3/Q5 Synchronous FET Vds – 22V Output, 36V Input



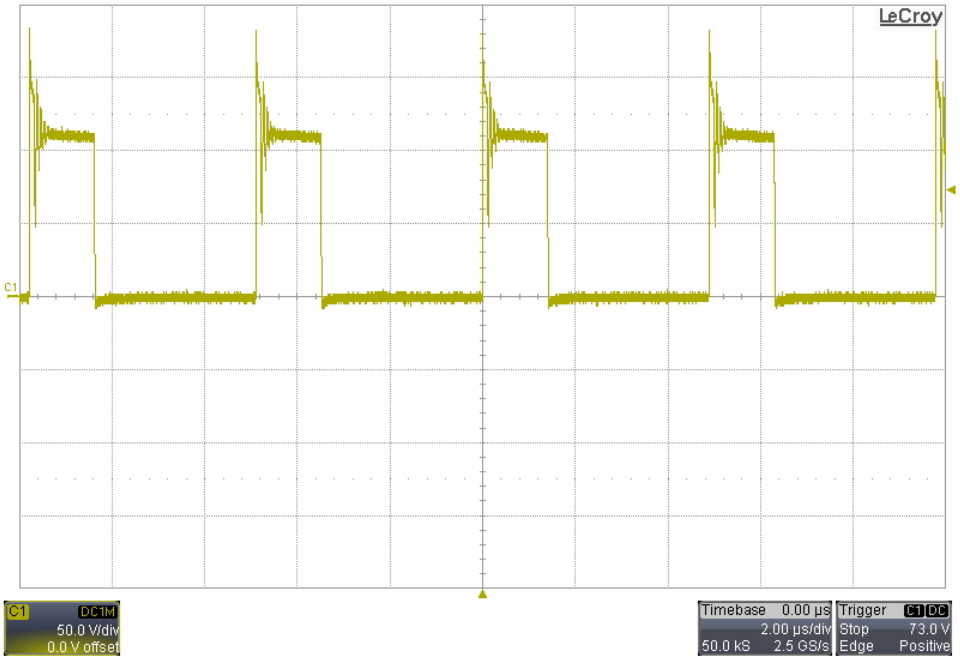
10.10 Q3/Q5 Synchronous FET Vds – 22V Output, 75V Input



10.11 Q3/Q5 Synchronous FET Vds – 32V Output, 36V Input



10.12 Q3/Q5 Synchronous FET Vds – 32V Output, 75V Input



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