PMP11399 APEC Board

Test Results

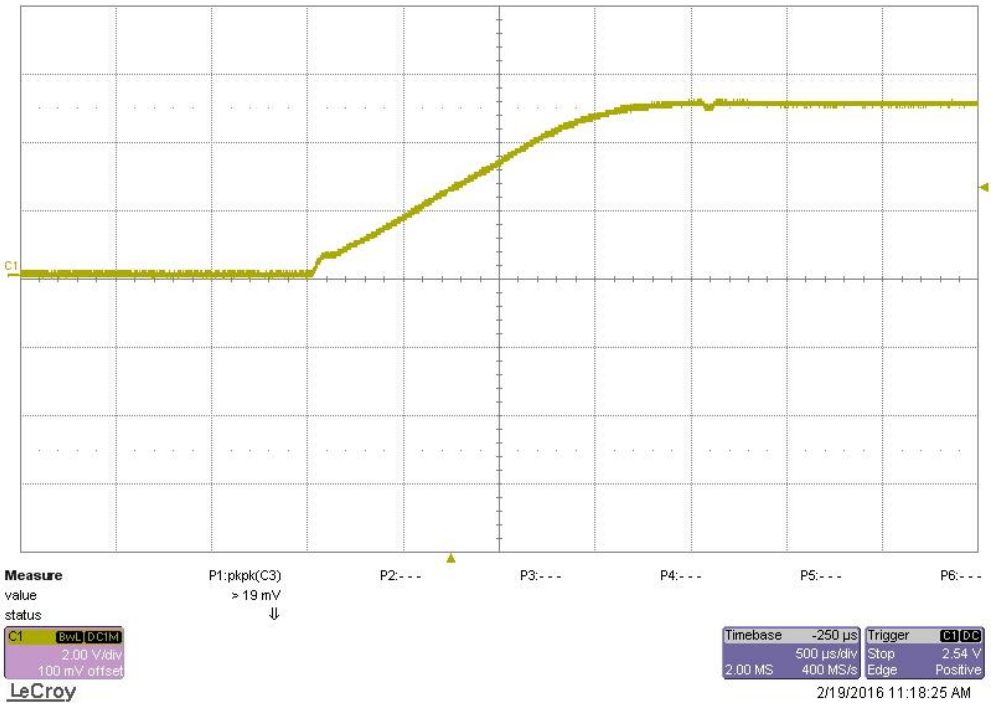
TEXAS INSTRUMENTS

3/1/2016

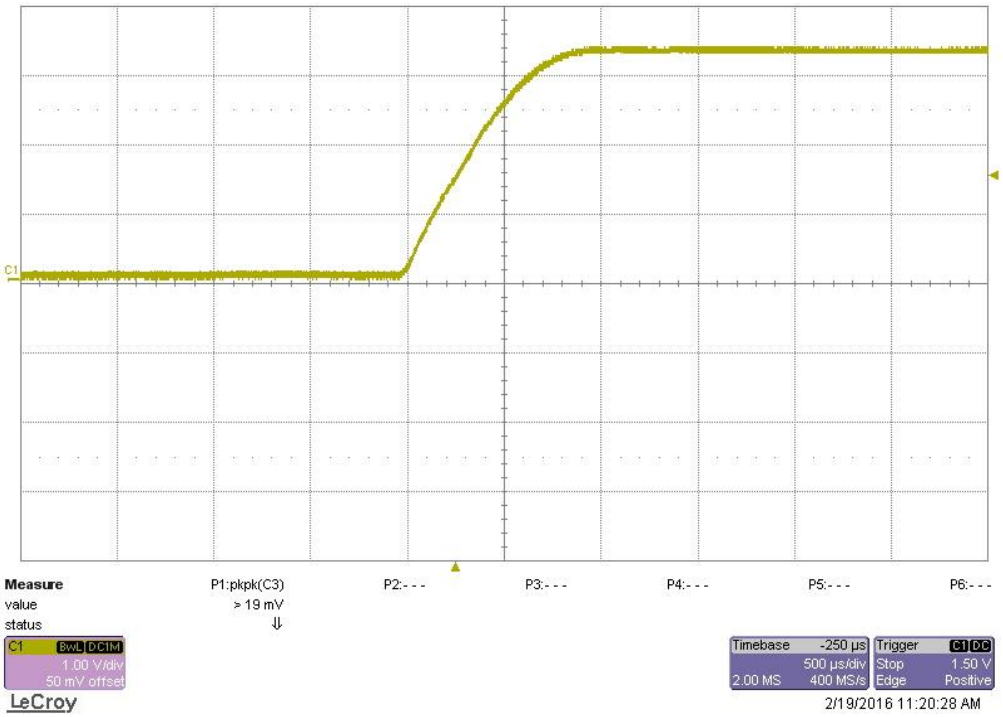
The PMP11399 board was developed for demonstration purposes at APEC. It is used in conjunction with TI's Fusion Power GUI and the PMBUS interface for control. The following measurements were taken with an input voltage of 12V.

1 Startup, No load

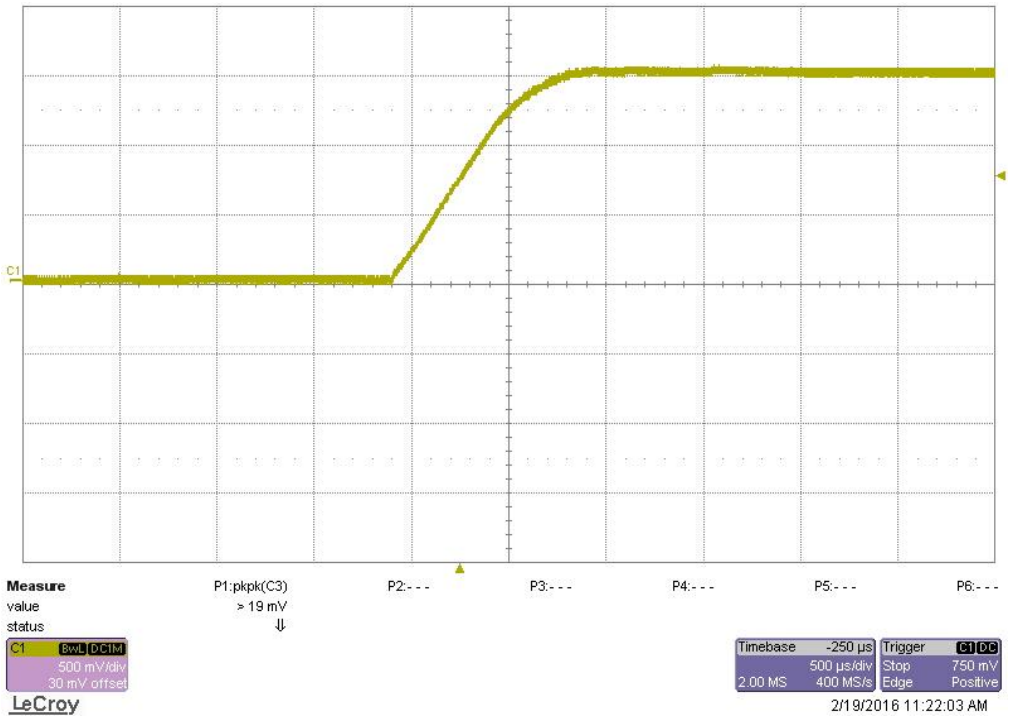
1.1 TPS548D22: 5V



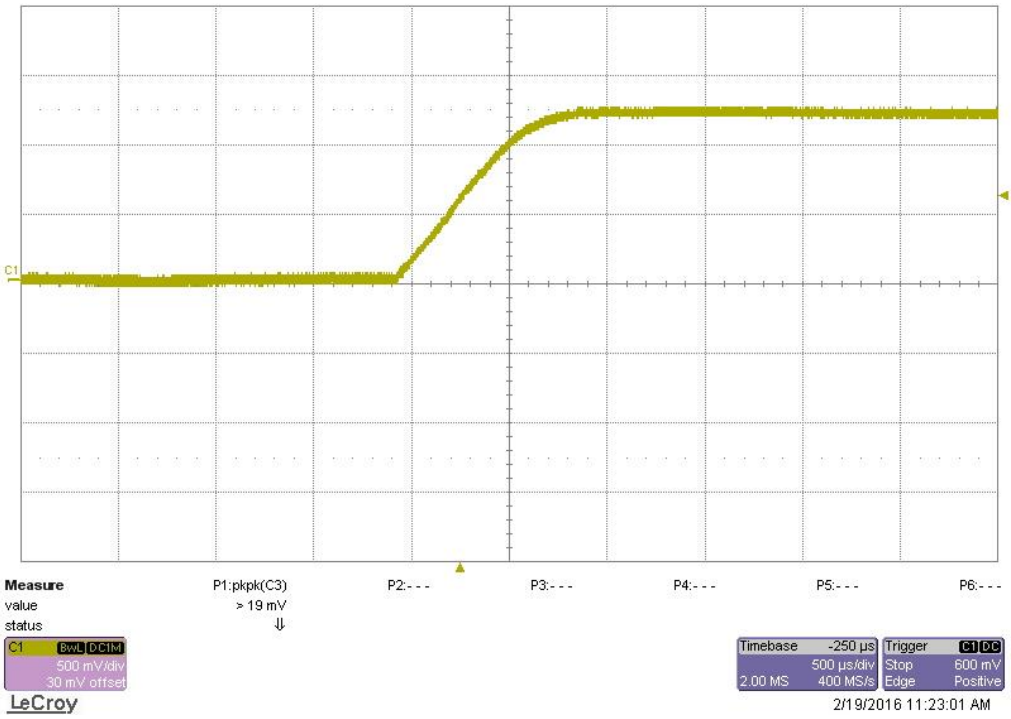
1.2 TPS549A20: 3.3V



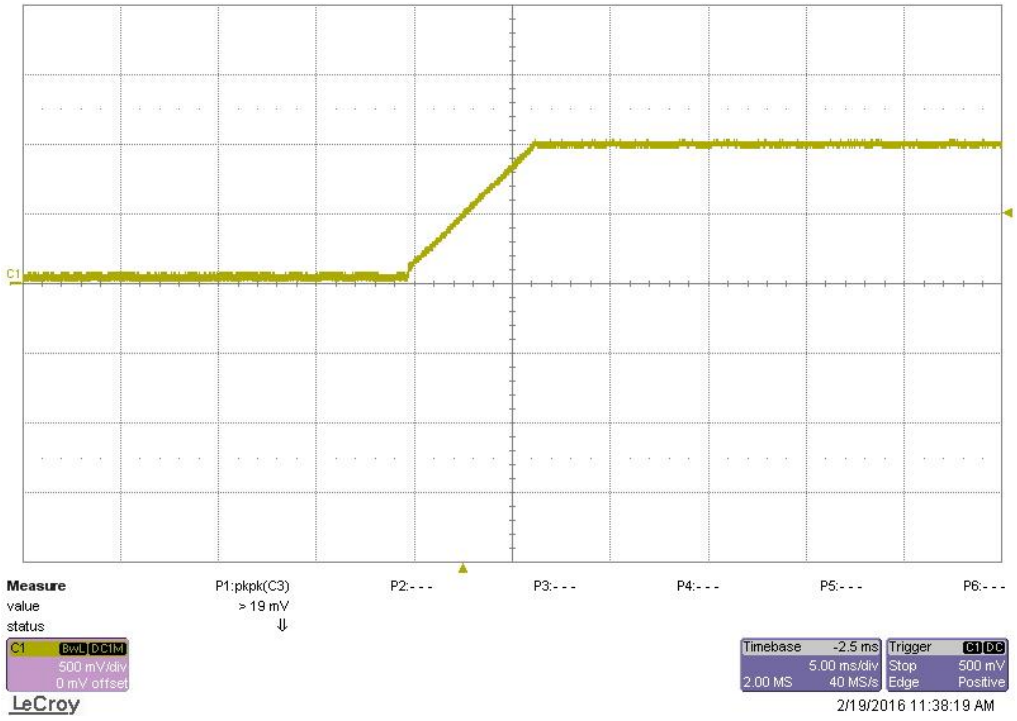
1.3 TPS53513: 1.5V



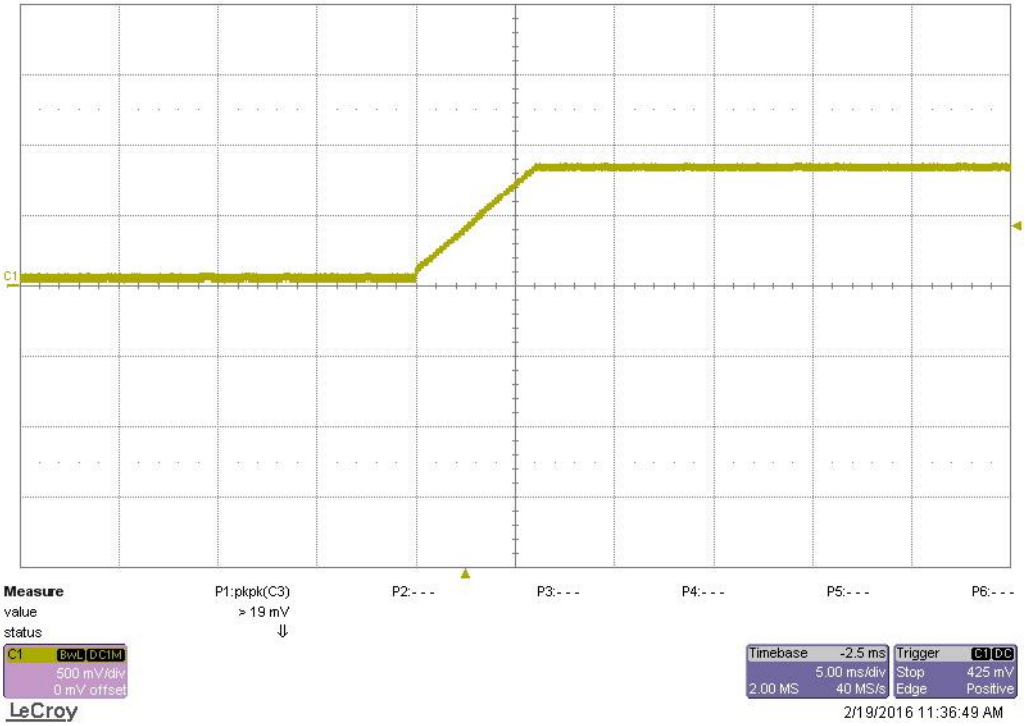
1.4 TPS53515: 1.2V



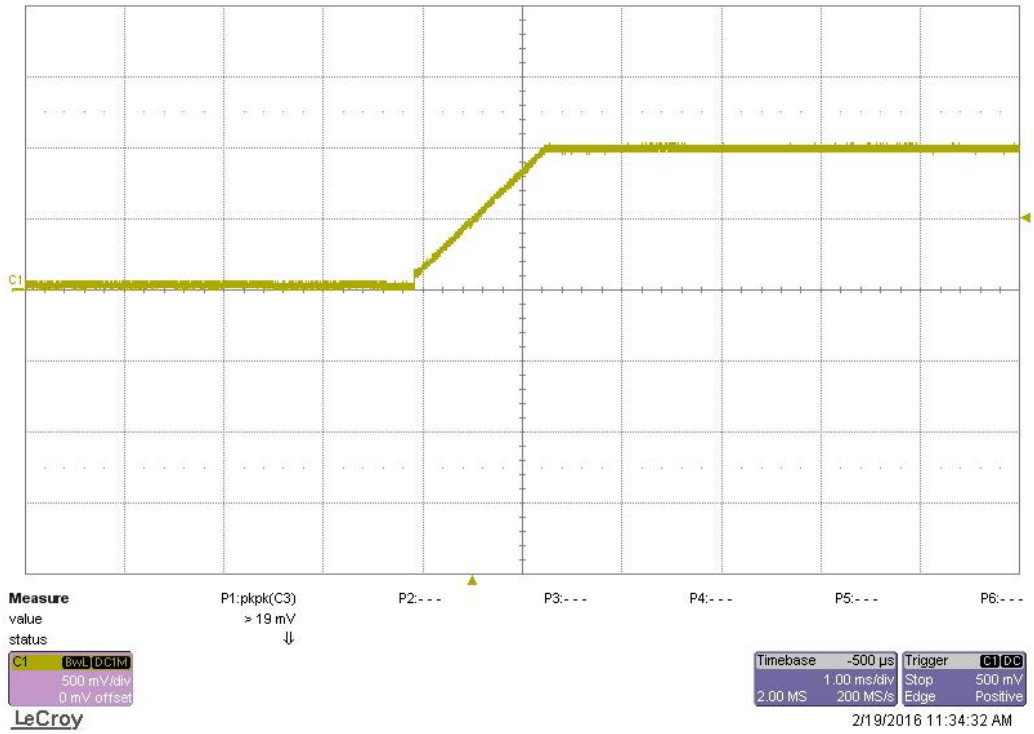
1.5 TPS544C25: 1V



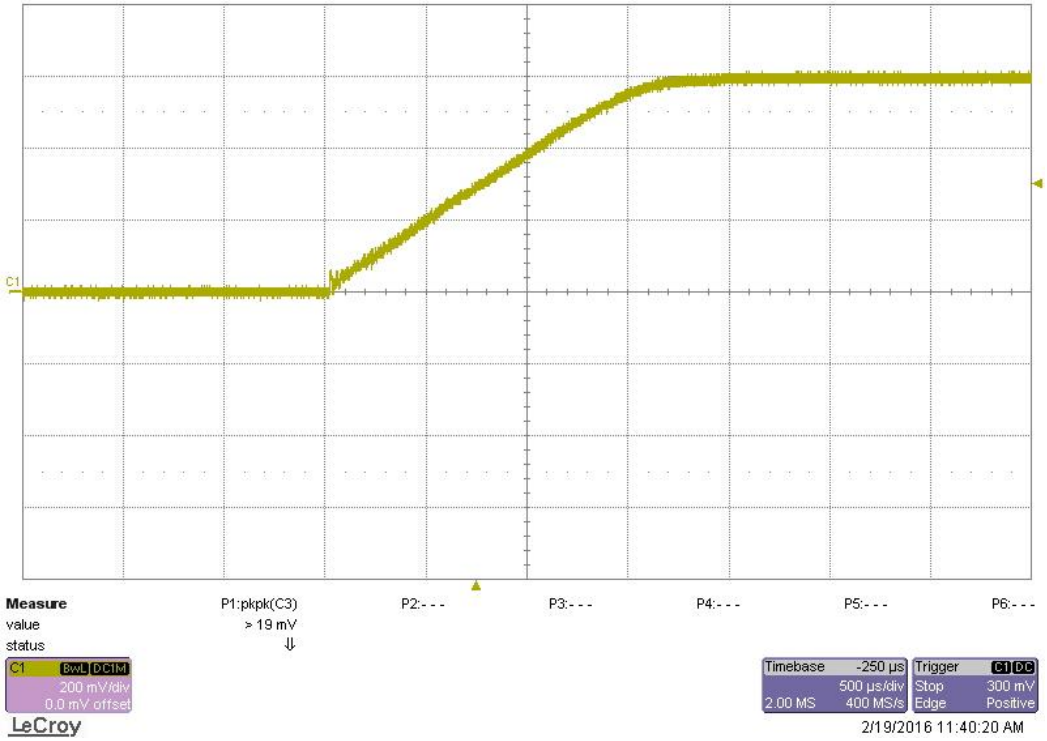
1.6 TPS544C25: 0.85V



1.7 TPS53647: 1V (VCORE)

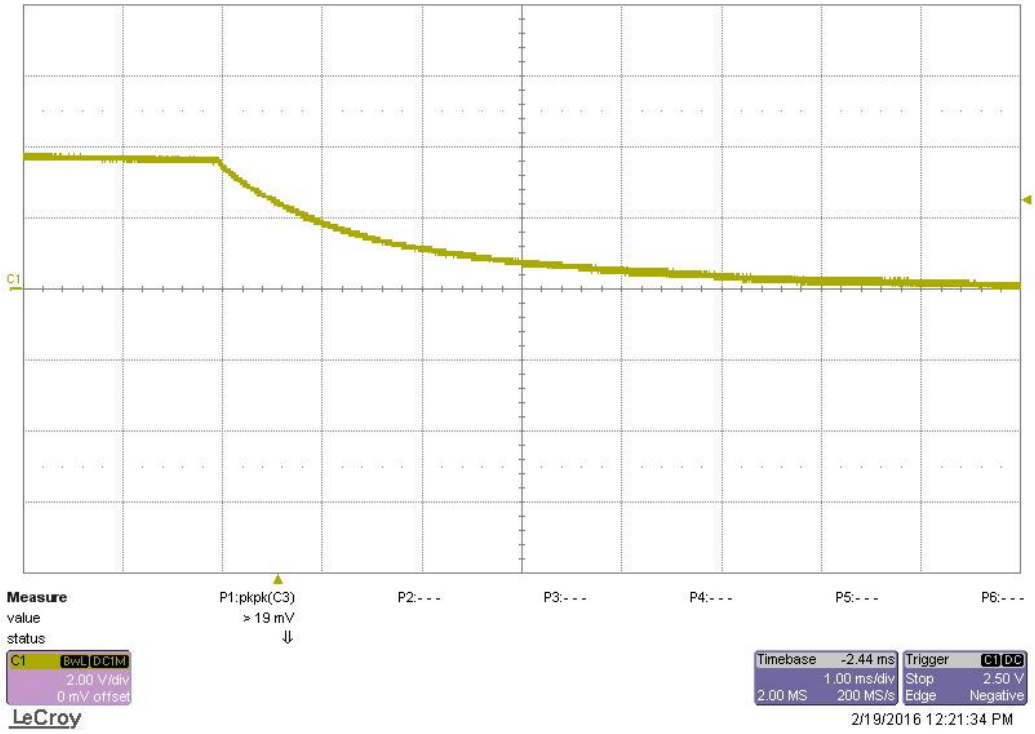


1.8 TPS53317: 0.6V

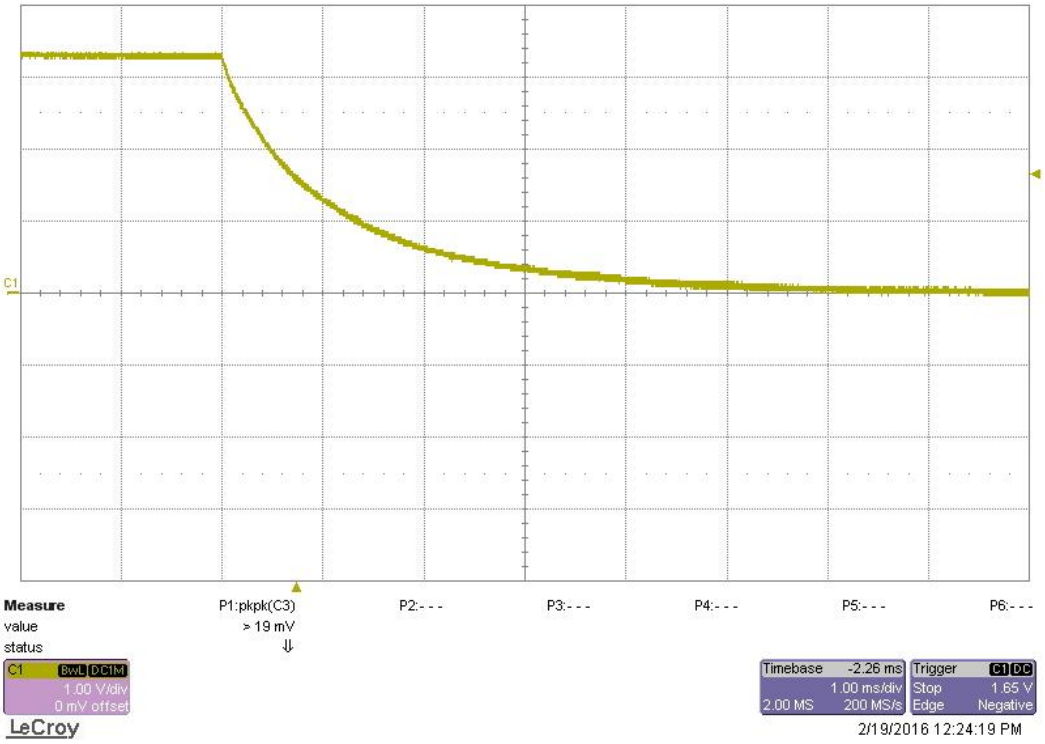


2 Shutdown, 1A Load

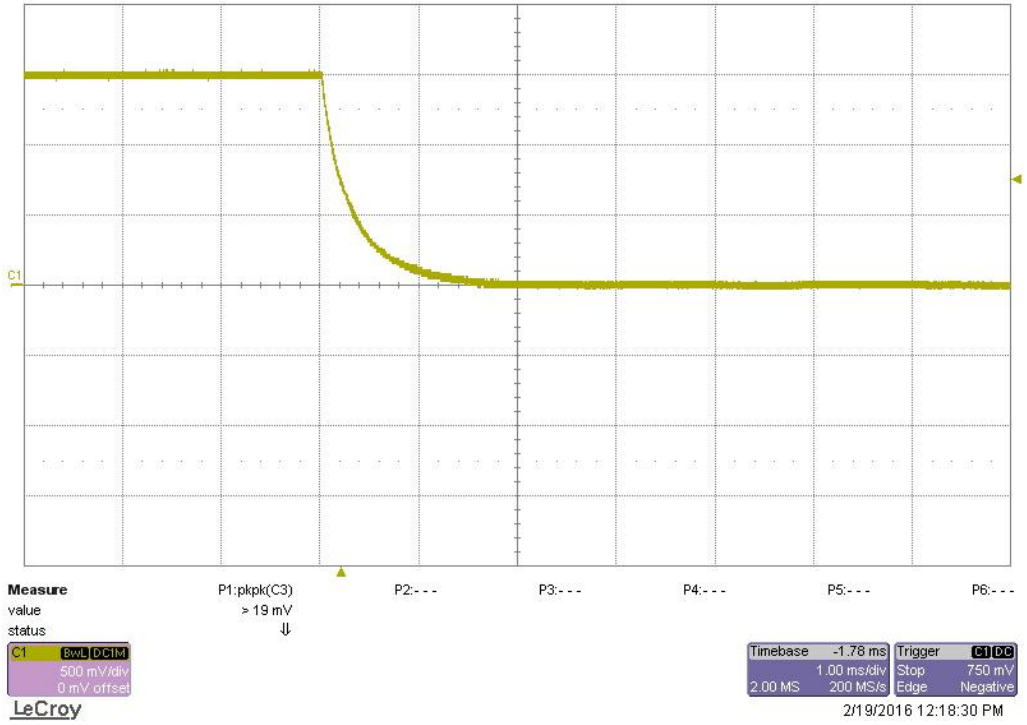
2.1 TPS548D22: 5V



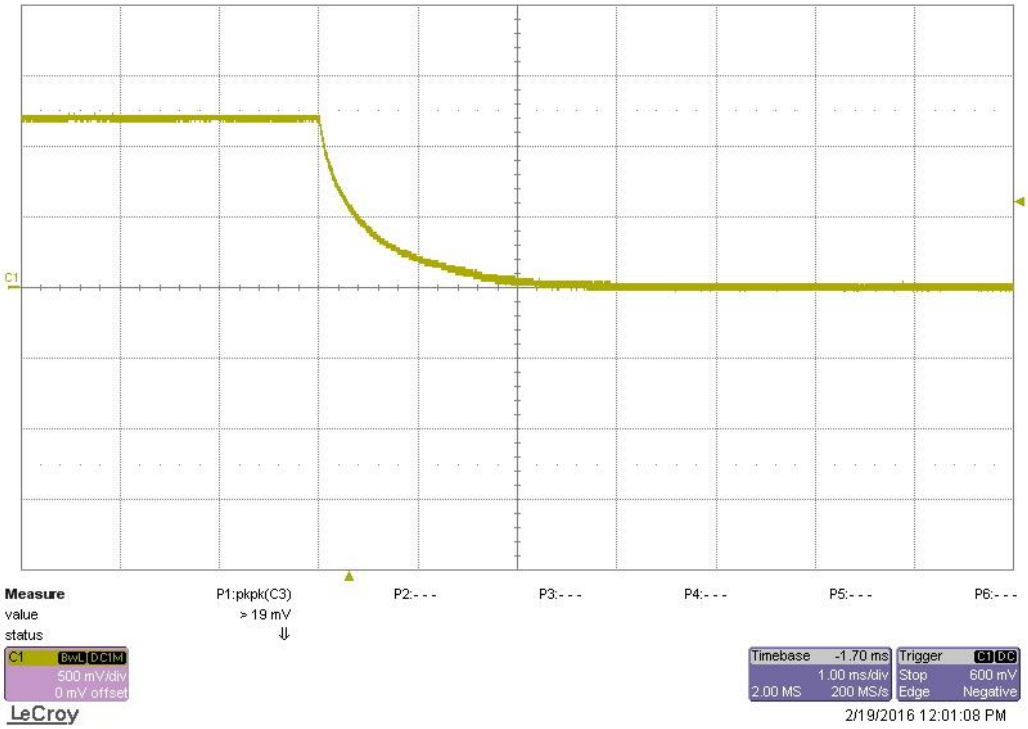
2.2 TPS549A20: 3.3V



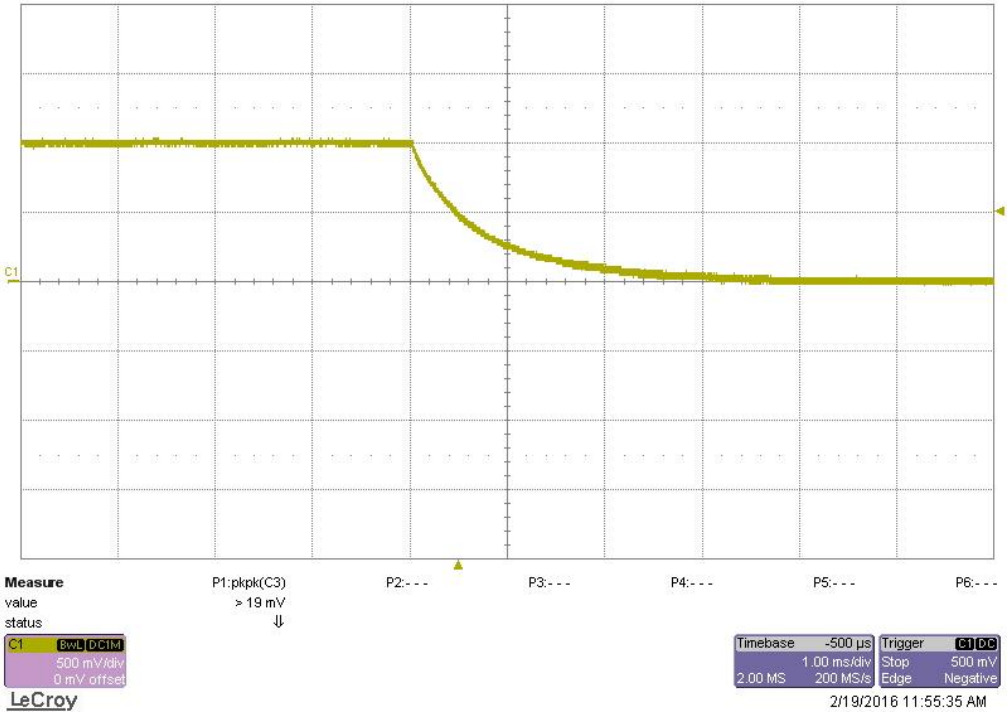
2.3 TPS53513: 1.5V



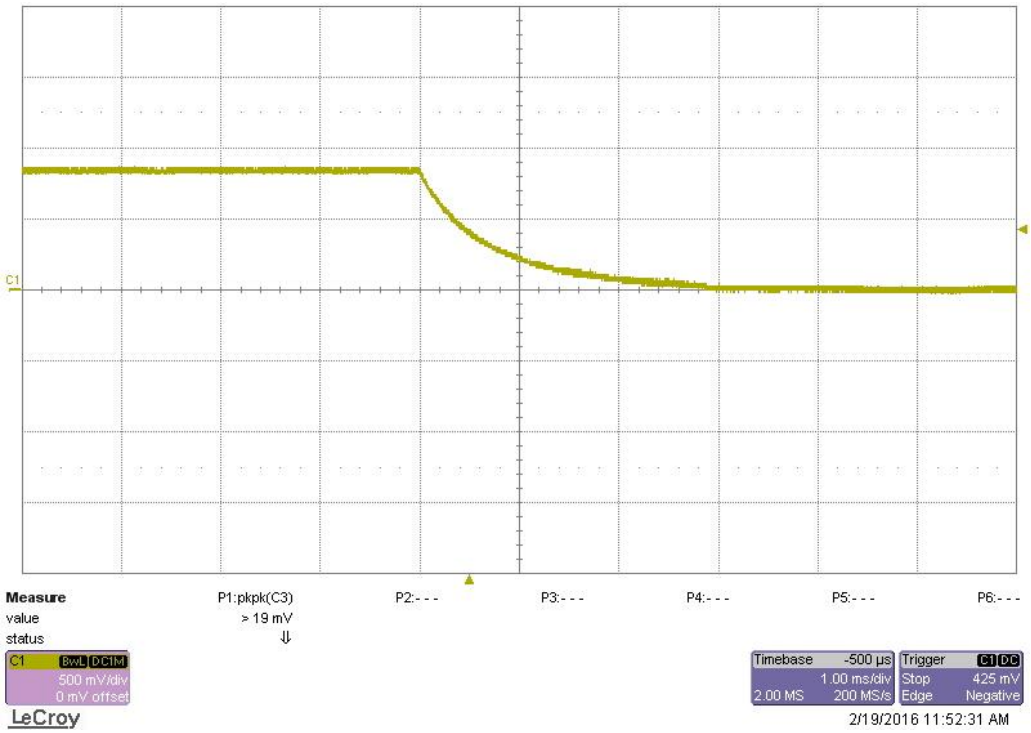
2.4 TPS53515: 1.2V



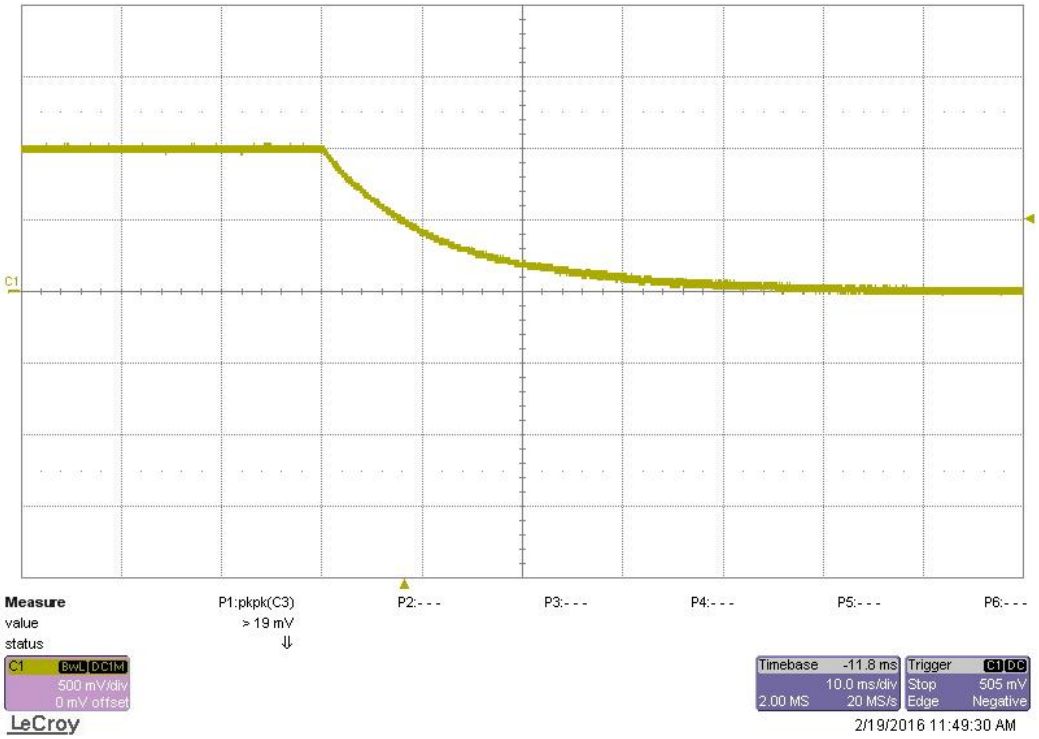
2.5 TPS544C25: 1V



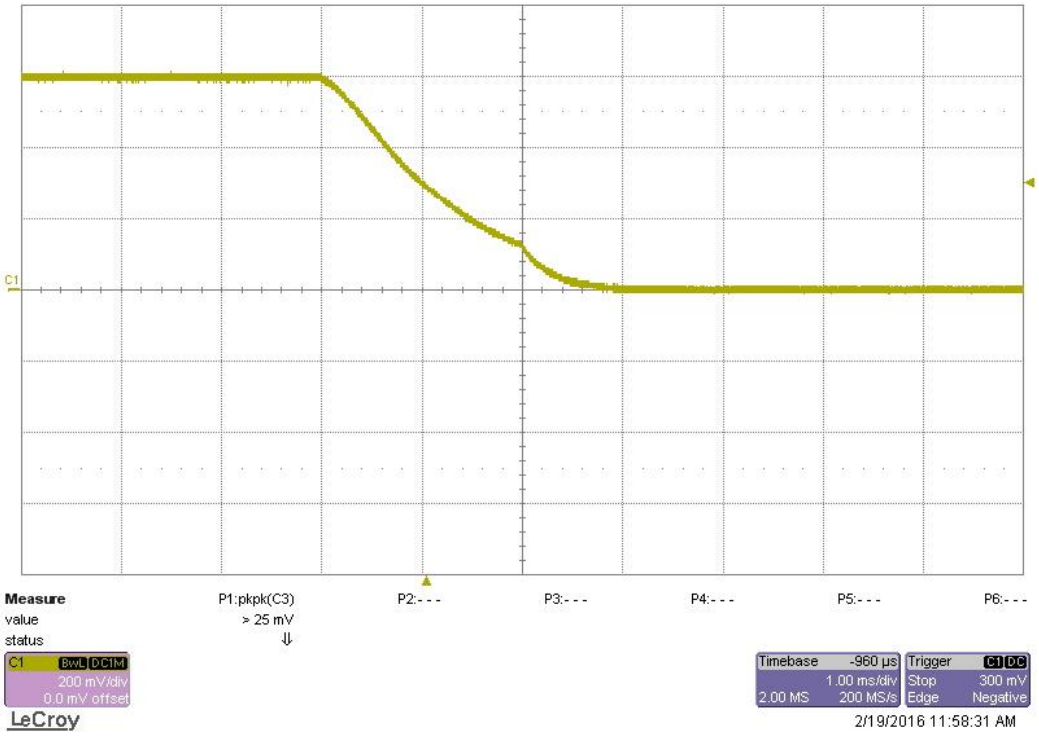
2.6 TPS544C25: 0.85V



2.7 TPS53647: 1V (VCORE)

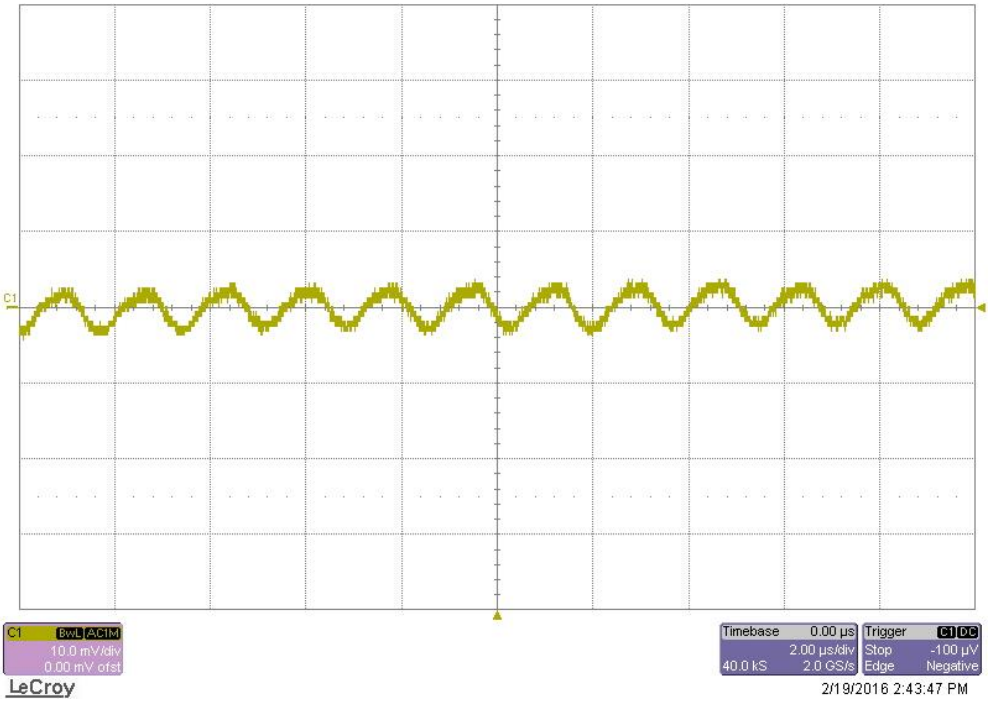


2.8 TPS53317: 0.6V

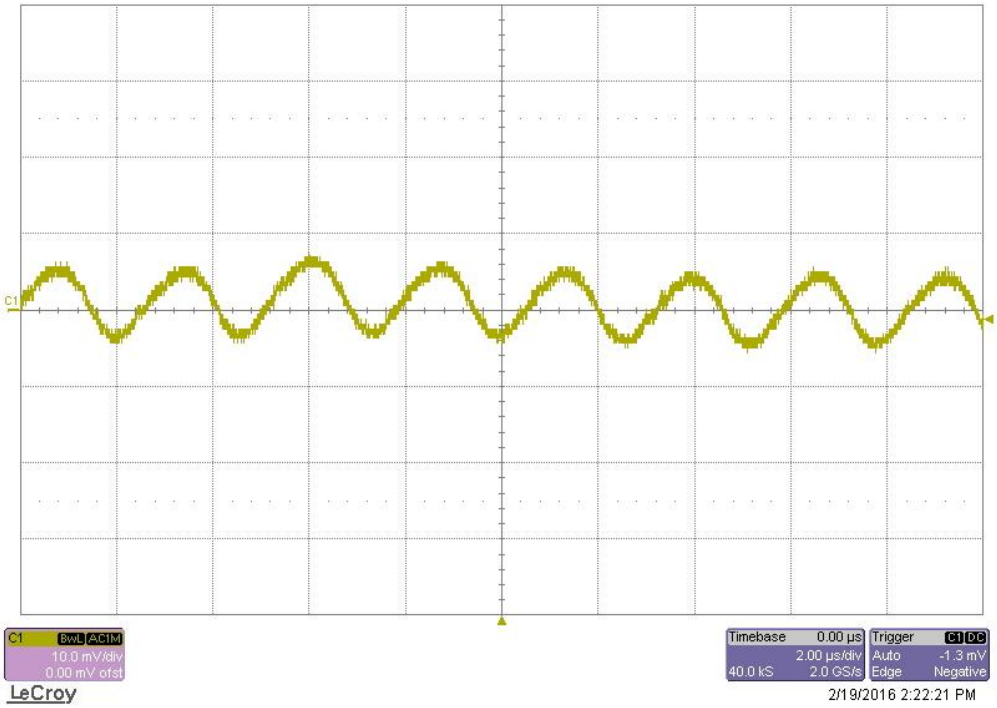


3 Output Ripple, Full Load

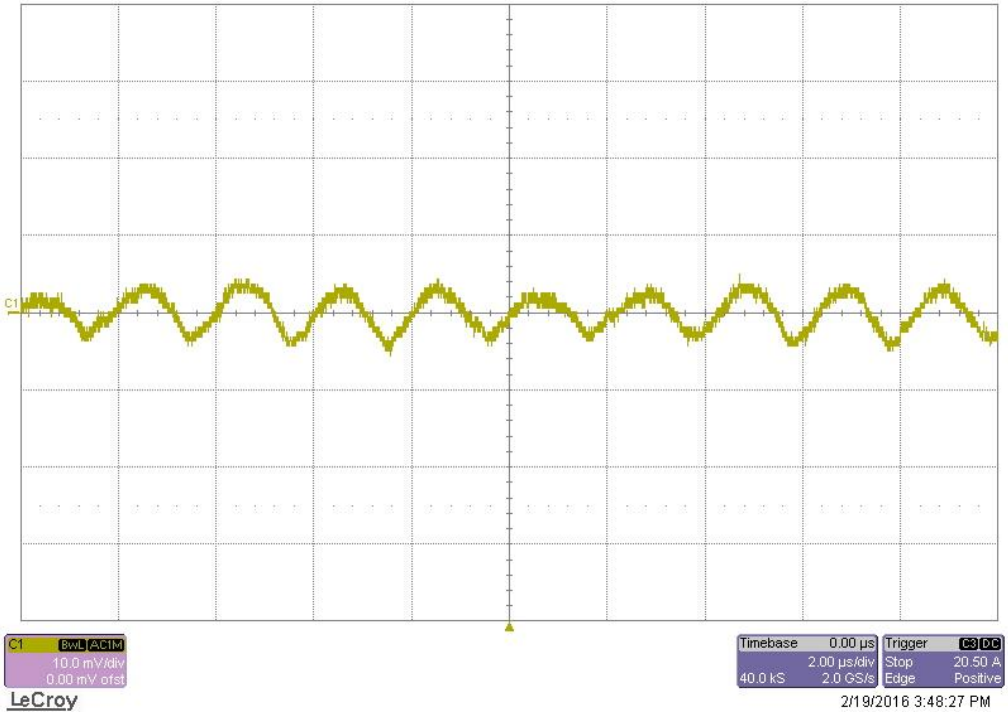
3.1 TPS548D22: 5V@10A



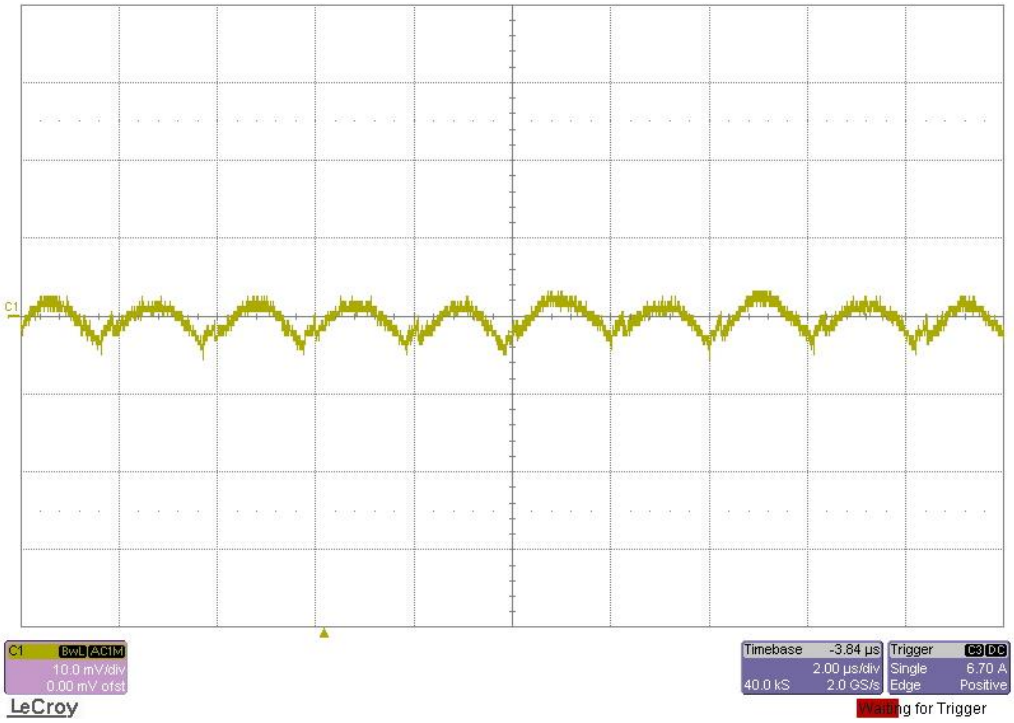
3.2 TPS549A20: 3.3V@14A



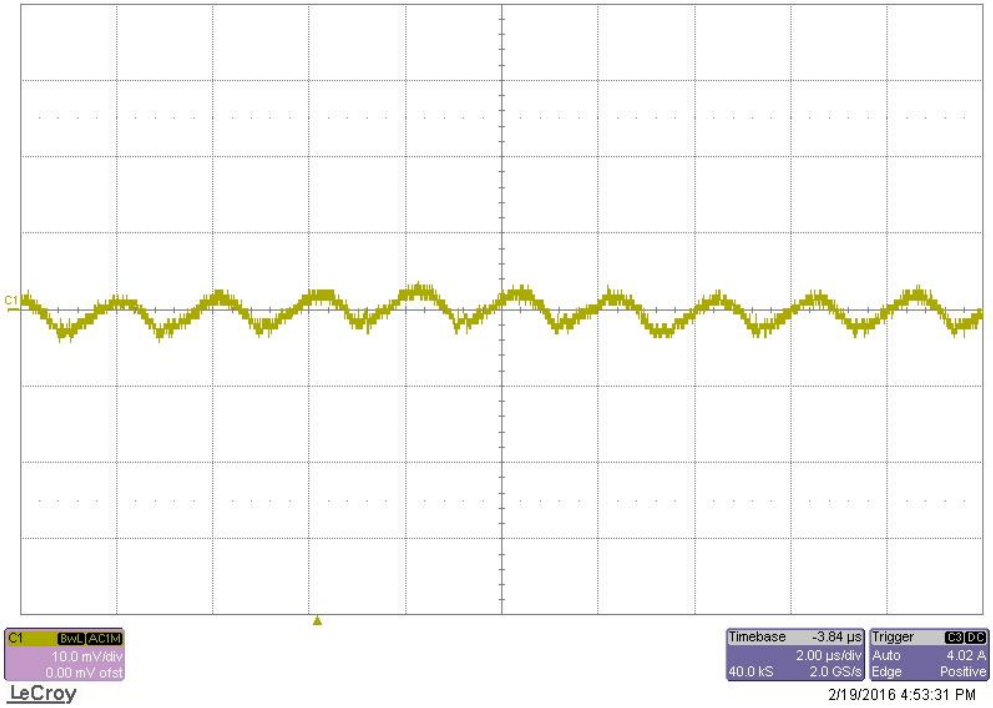
3.3 TPS53513: 1.5V@8A



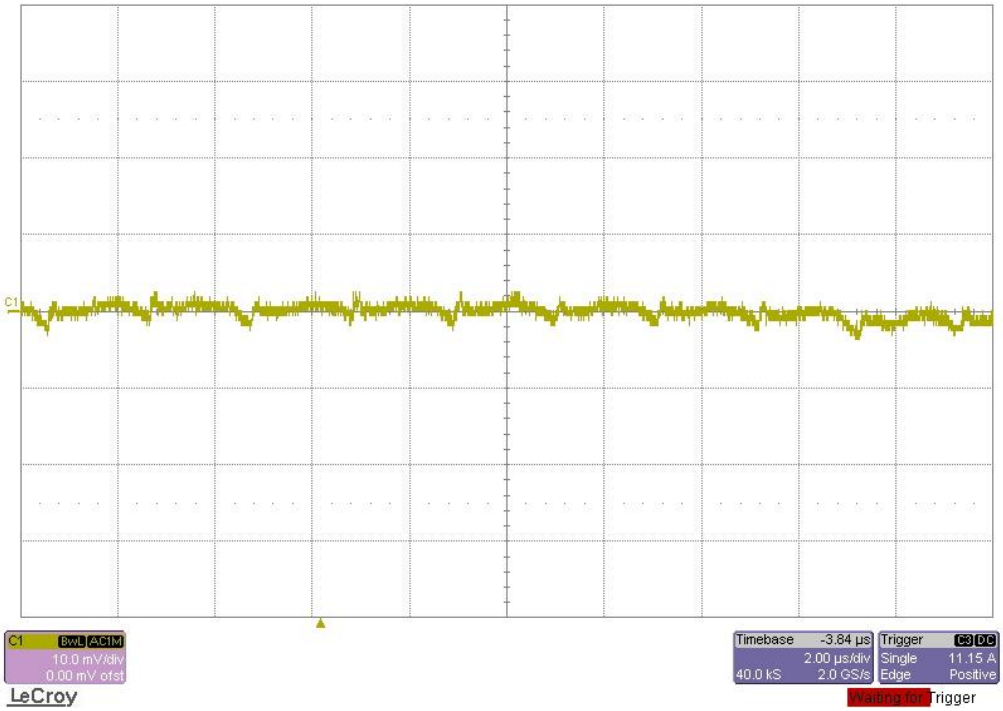
3.4 TPS53515: 1.2V@12A



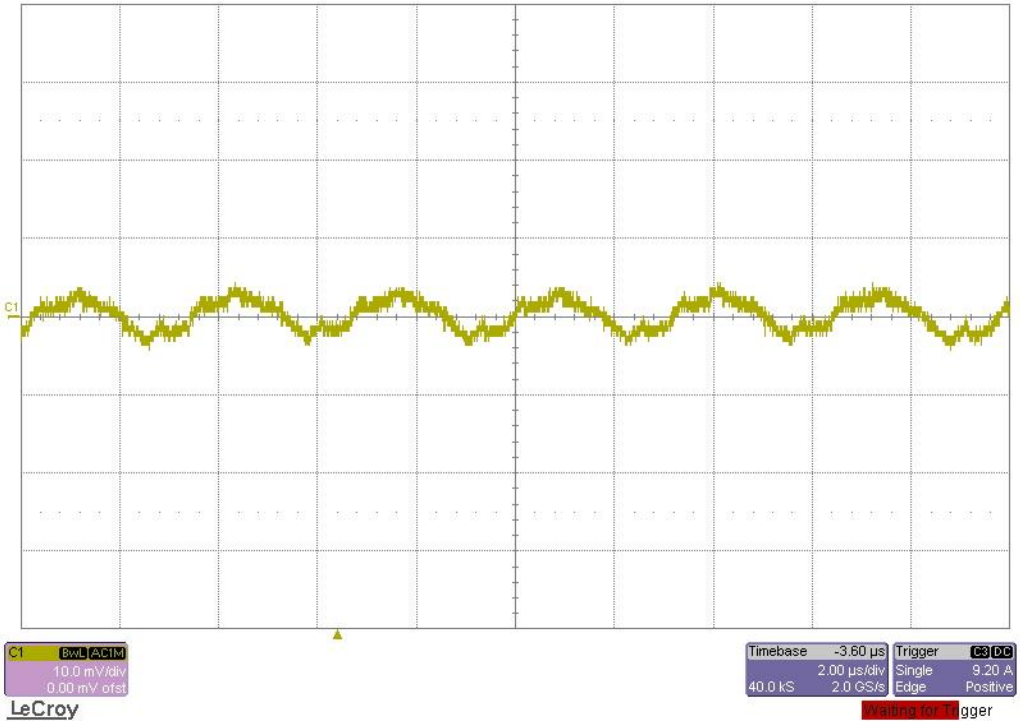
3.5 TPS544C25: 1V@15A



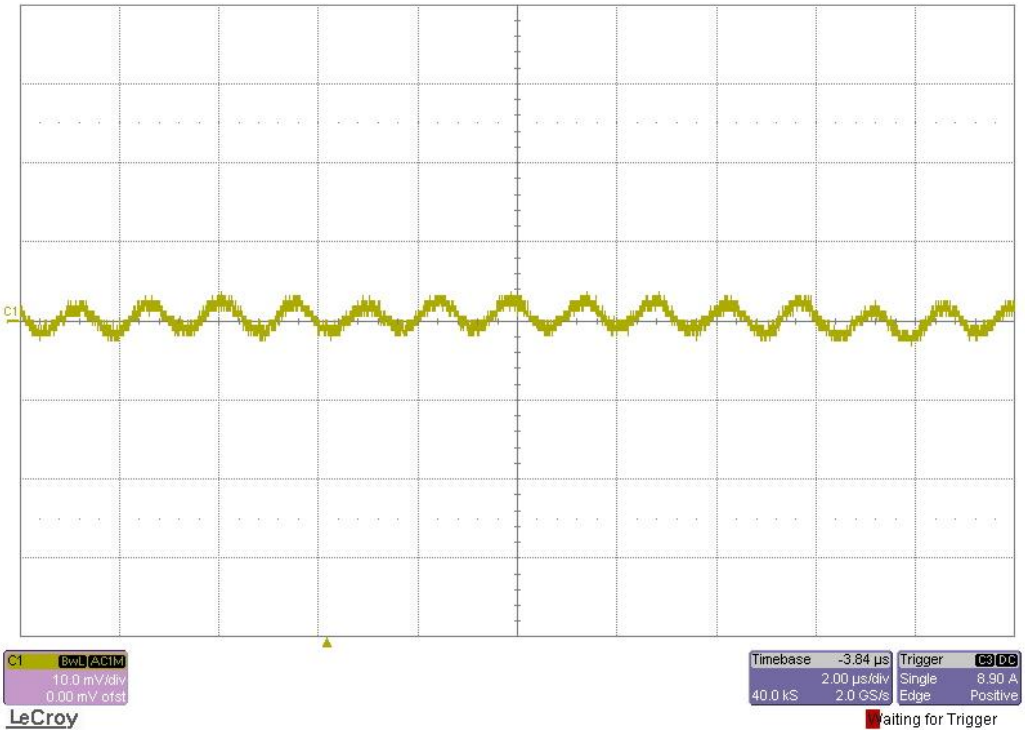
3.6 TPS544C25: 0.85V@15A



3.7 TPS53647: 1V@30A (VCORE)



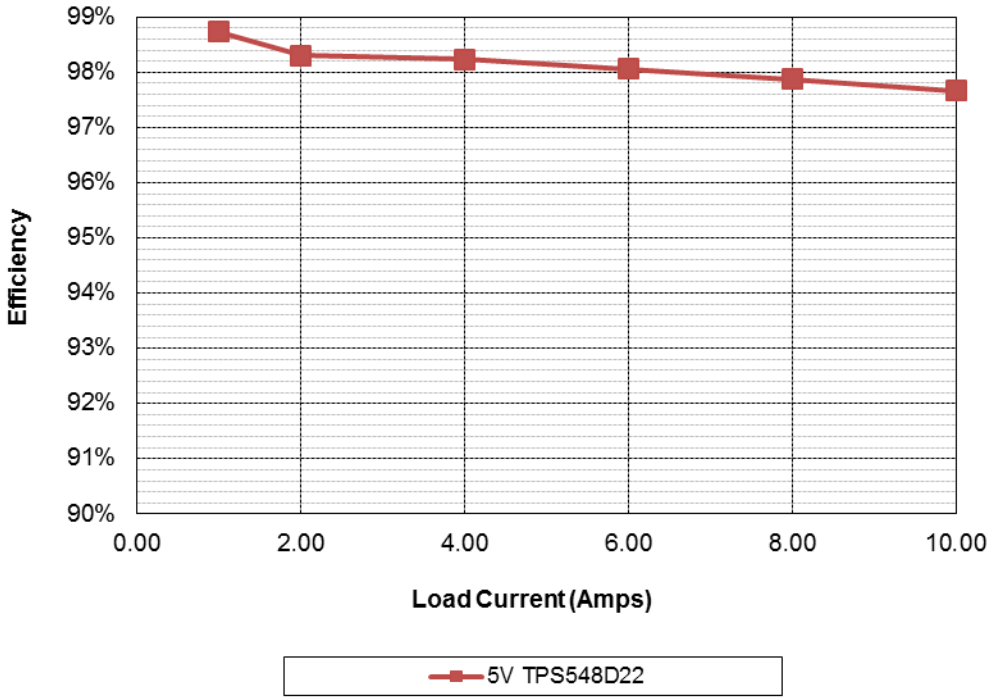
3.8 TPS53317: 0.6V@6A



4 Efficiency

The graphs below approximate the efficiency of each rail. In order to obtain a more accurate depiction of individual rail efficiency, the current draw at no load ("Actual Iin" at Iout = 0A) was subtracted from each "Actual Iin" measurement point to produce an adjusted input current "Iin (adj)". Rails are individually loaded and all rails were enabled.

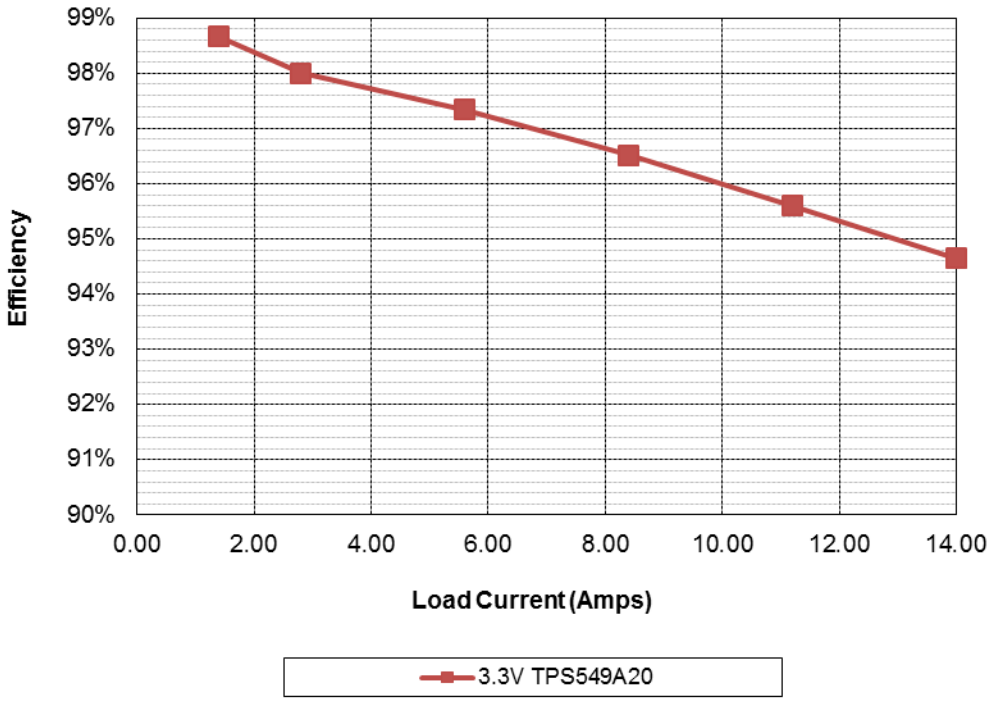
4.1 TPS548D22: 5V@10A



5V@10A - TPS548D22

Iout	Vout	Vin	Iin (adj)	Actual Iin	Pin	Pout	Losses	Efficiency
0.000	5.010	12.3		0.74900		0.00		0.0%
1.000	5.010	12.2	0.4150	1.1640	5.074	5.01	0.06	98.7%
2.000	5.010	12.2	0.8370	1.586	10.193	10.02	0.17	98.3%
4.000	5.010	12.1	1.6890	2.438	20.400	20.04	0.36	98.2%
6.000	5.010	12.0	2.5600	3.309	30.656	30.06	0.60	98.1%
8.000	5.010	11.9	3.4500	4.199	40.952	40.08	0.87	97.9%
10.000	5.010	11.8	4.3630	5.112	51.300	50.10	1.20	97.7%

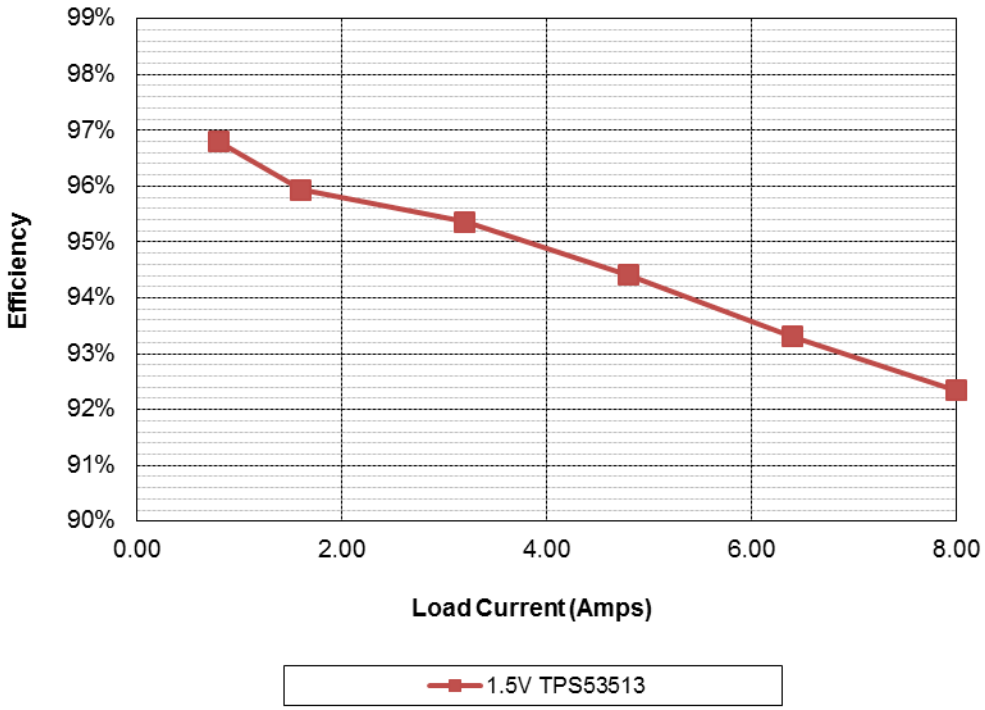
4.2 TPS549A20: 3.3V@14A



3.3V@14A - TPS549A20

Iout	Vout	Vin	Iin (adj)	Actual Iin	Pin	Pout	Losses	Efficiency
0.000	3.311	12.3		0.74900		0.00		0.0%
1.400	3.311	12.2	0.3840	1.1330	4.698	4.64	0.06	98.7%
2.800	3.311	12.2	0.7760	1.525	9.460	9.27	0.19	98.0%
5.600	3.310	12.1	1.5740	2.323	19.044	18.54	0.51	97.3%
8.400	3.309	12.0	2.3990	3.148	28.800	27.80	1.00	96.5%
11.200	3.307	11.9	3.2540	4.003	38.745	37.04	1.71	95.6%
14.000	3.305	11.8	4.1430	4.892	48.887	46.27	2.62	94.6%

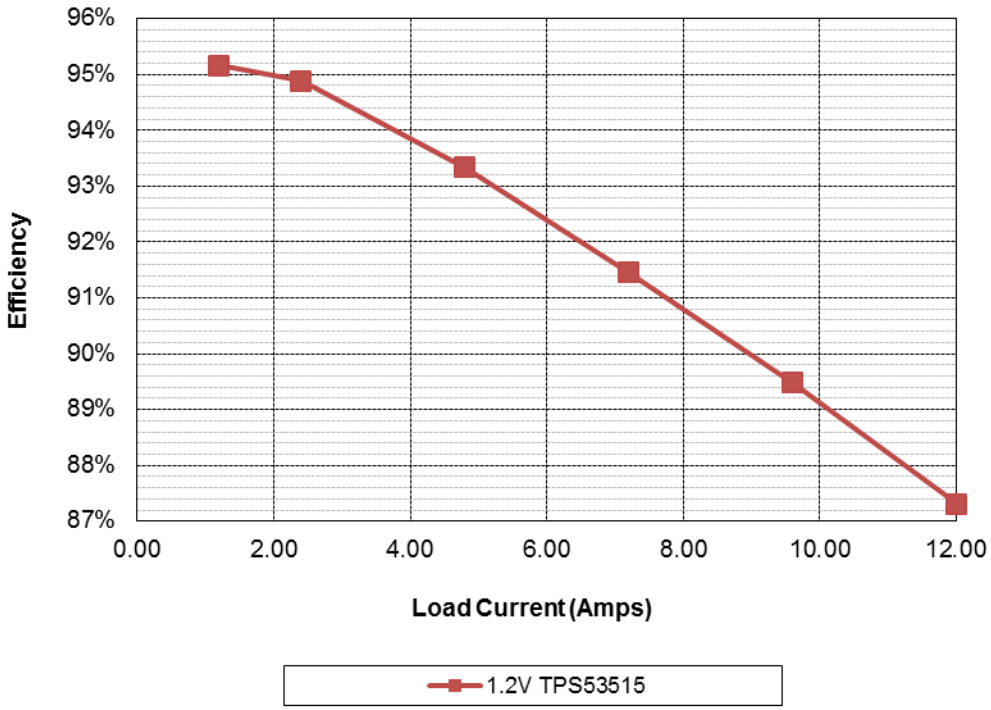
4.3 TPS53513: 1.5V@8A



1.5V@8A - TPS53513

Iout	Vout AC/DC	Vin	Iin (adj)	Actual Iin	Pin	Pout AC/DC	Losses	Efficiency
0.000	1.499	12.3		0.74800		0.00		0.0%
0.800	1.499	12.3	0.1010	0.8490	1.239	1.20	0.04	96.8%
1.600	1.499	12.3	0.2040	0.952	2.500	2.40	0.10	95.9%
3.200	1.498	12.2	0.4110	1.159	5.027	4.79	0.23	95.4%
4.800	1.498	12.2	0.6240	1.372	7.617	7.19	0.43	94.4%
6.400	1.497	12.2	0.8430	1.591	10.269	9.58	0.69	93.3%
8.000	1.497	12.2	1.0670	1.815	12.969	11.98	0.99	92.3%

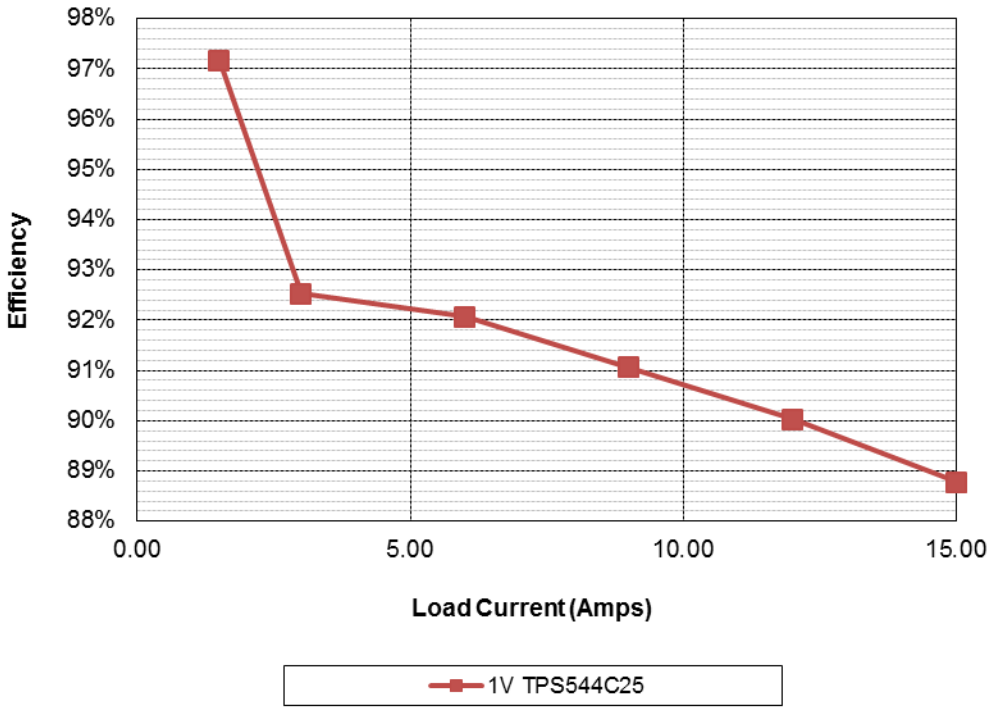
4.4 TPS53515: 1.2V@12A



1.2V@12A - TPS53515

Iout	Vout	Vin	Iin (adj)	Actual Iin	Pin	Pout	Losses	Efficiency
0.000	1.196	12.3		0.75000		0.00		0.0%
1.200	1.196	12.3	0.1230	0.8730	1.508	1.44	0.07	95.2%
2.400	1.196	12.2	0.2470	0.997	3.025	2.87	0.15	94.9%
4.800	1.195	12.2	0.5030	1.253	6.146	5.74	0.41	93.3%
7.200	1.195	12.2	0.7720	1.522	9.408	8.60	0.80	91.5%
9.600	1.194	12.2	1.0540	1.804	12.809	11.46	1.35	89.5%
12.000	1.193	12.1	1.3530	2.103	16.396	14.32	2.08	87.3%

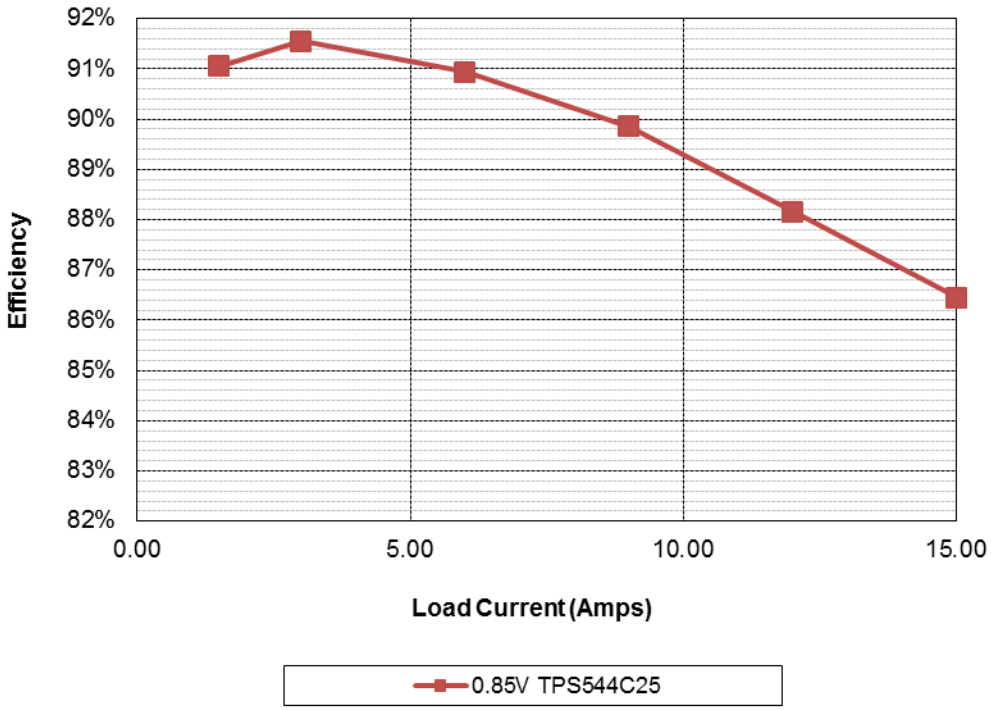
4.5 TPS544C25: 1V@15A



1V@15A - TPS544C25

Iout	Vout	Vin	Iin (adj)	Actual Iin	Pin	Pout	Losses	Efficiency
0.000	1.001	12.3		0.74900		0.00		0.0%
1.500	1.001	12.3	0.1260	0.8750	1.545	1.50	0.04	97.2%
3.000	1.001	12.2	0.2650	1.014	3.245	3.00	0.24	92.5%
6.000	1.001	12.2	0.5340	1.283	6.523	6.01	0.52	92.1%
9.000	1.001	12.2	0.8120	1.561	9.893	9.01	0.88	91.1%
12.000	1.001	12.2	1.0980	1.847	13.342	12.01	1.33	90.0%
15.000	1.001	12.1	1.3960	2.145	16.914	15.02	1.90	88.8%

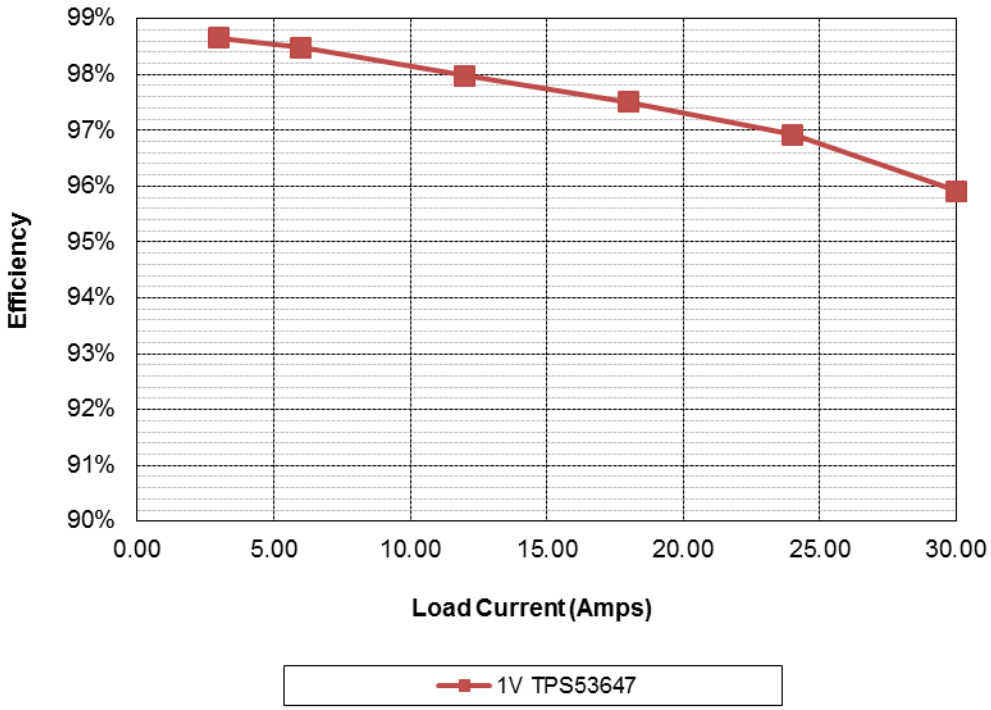
4.6 TPS544C25: 0.85V@15A



0.85V@15A - TPS544C25

Iout	Vout	Vin	Iin (adj)	Actual Iin	Pin	Pout	Losses	Efficiency
0.000	0.850	12.0		0.75300		0.00		0.0%
1.500	0.849	12.3	0.1140	0.8670	1.399	1.27	0.13	91.1%
3.000	0.849	12.3	0.227	0.980	2.782	2.55	0.23	91.6%
6.000	0.849	12.2	0.458	1.211	5.601	5.09	0.51	90.9%
9.000	0.848	12.2	0.696	1.449	8.494	7.63	0.86	89.9%
12.000	0.848	12.2	0.948	1.701	11.543	10.18	1.37	88.2%
15.000	0.848	12.1	1.212	1.965	14.712	12.72	1.99	86.5%

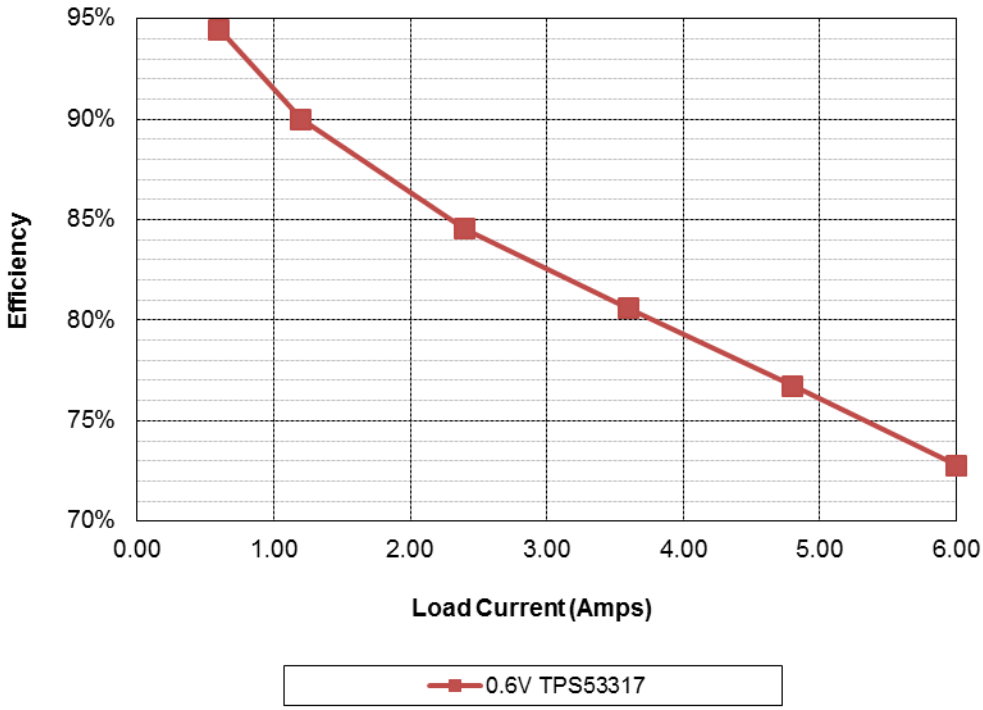
4.7 TPS53647: 1V@30A (VCORE)



1V@30A - TPS53647

Iout	Vout	Vin	Iin (adj)	Actual Iin	Pin	Pout	Losses	Efficiency
0.000	0.999	12.3		0.74900		0.00		0.0%
3.000	0.999	12.3	0.2480	0.9970	3.038	3.00	0.04	98.7%
6.000	0.999	12.2	0.4980	1.247	6.087	5.99	0.09	98.5%
12.000	0.998	12.2	1.0050	1.754	12.224	11.98	0.25	98.0%
18.000	0.998	12.1	1.5220	2.271	18.422	17.96	0.46	97.5%
24.000	0.998	12.0	2.0520	2.801	24.712	23.95	0.76	96.9%
30.000	0.998	12.0	2.6060	3.355	31.217	29.94	1.28	95.9%

4.8 TPS53317: 0.6V@6A

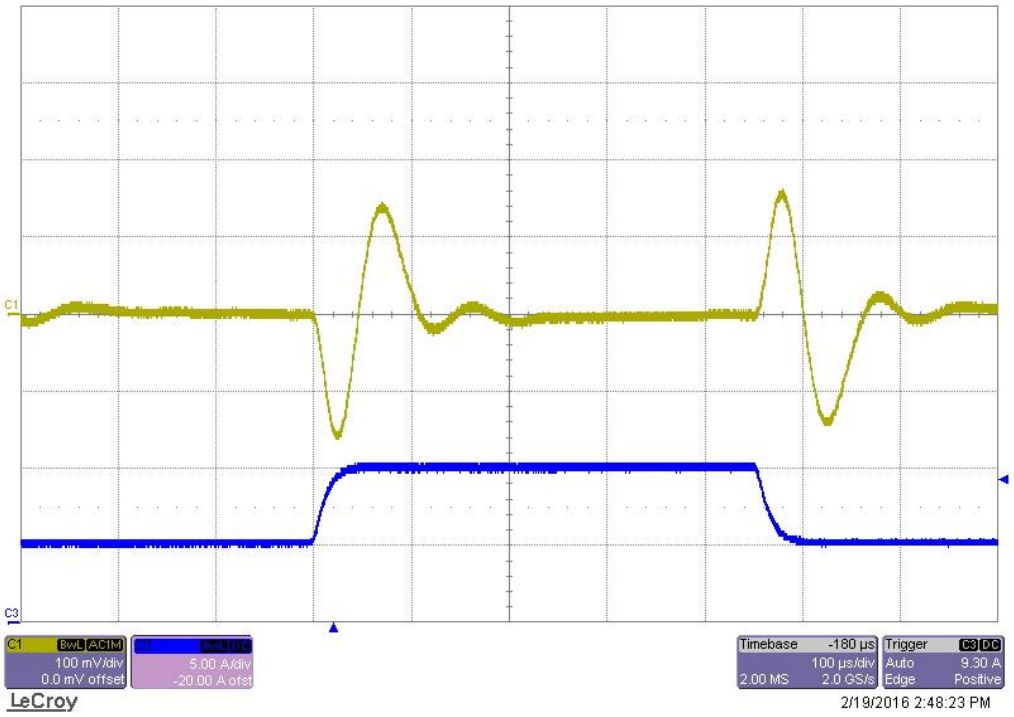


0.6V@6A - TPS53317

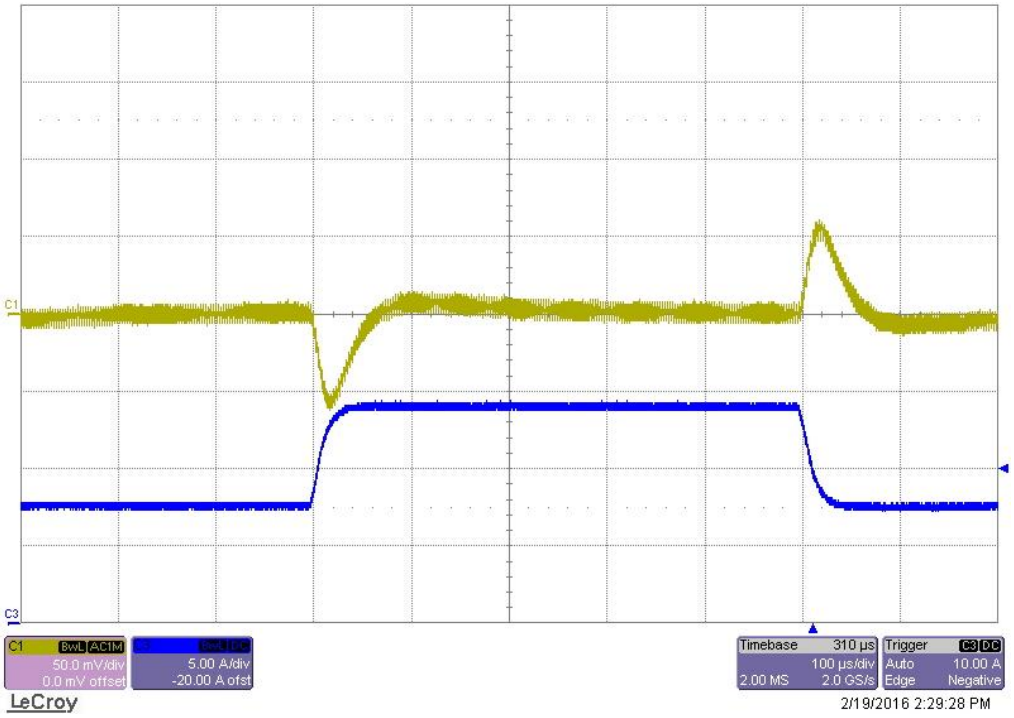
Iout	Vout	Vin	Iin (adj)	Actual Iin	Pin	Pout	Losses	Efficiency
0.000	0.600	12.3		0.74900		0.00		0.0%
0.600	0.599	12.3	0.0310	0.7800	0.380	0.36	0.02	94.5%
1.200	0.598	12.3	0.0650	0.814	0.797	0.72	0.08	90.0%
2.400	0.596	12.3	0.1380	0.887	1.692	1.43	0.26	84.5%
3.600	0.595	12.3	0.2170	0.966	2.658	2.14	0.52	80.6%
4.800	0.593	12.2	0.3030	1.052	3.709	2.85	0.86	76.7%
6.000	0.592	12.2	0.3990	1.148	4.880	3.55	1.33	72.8%

5 Load Transients, 50% to 100% load step

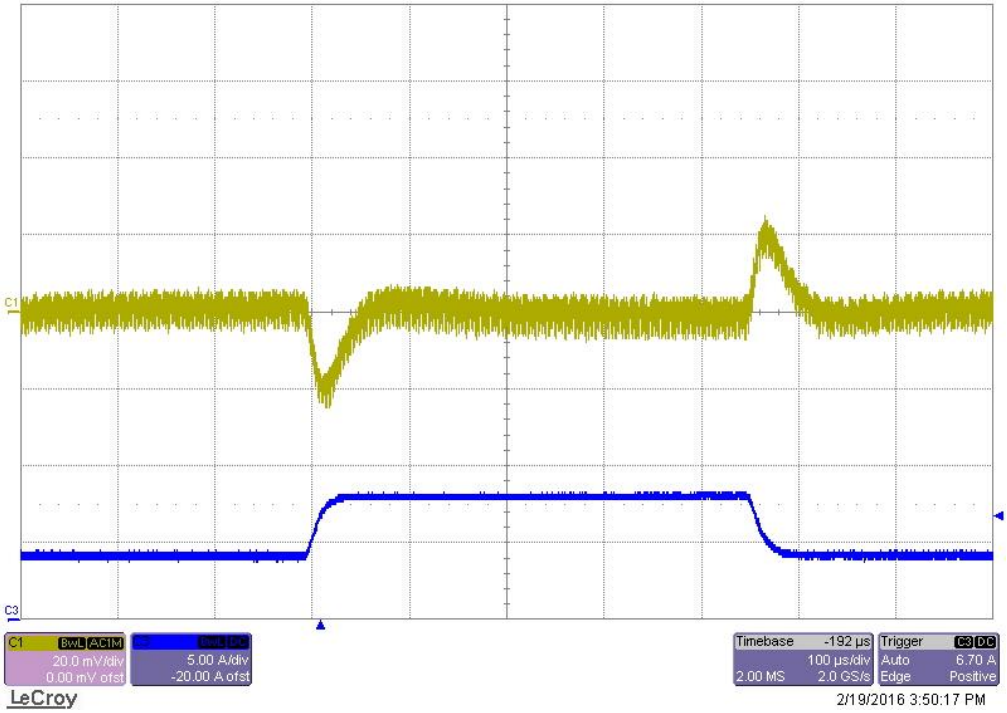
5.1 TPS548D22: 5V@10A



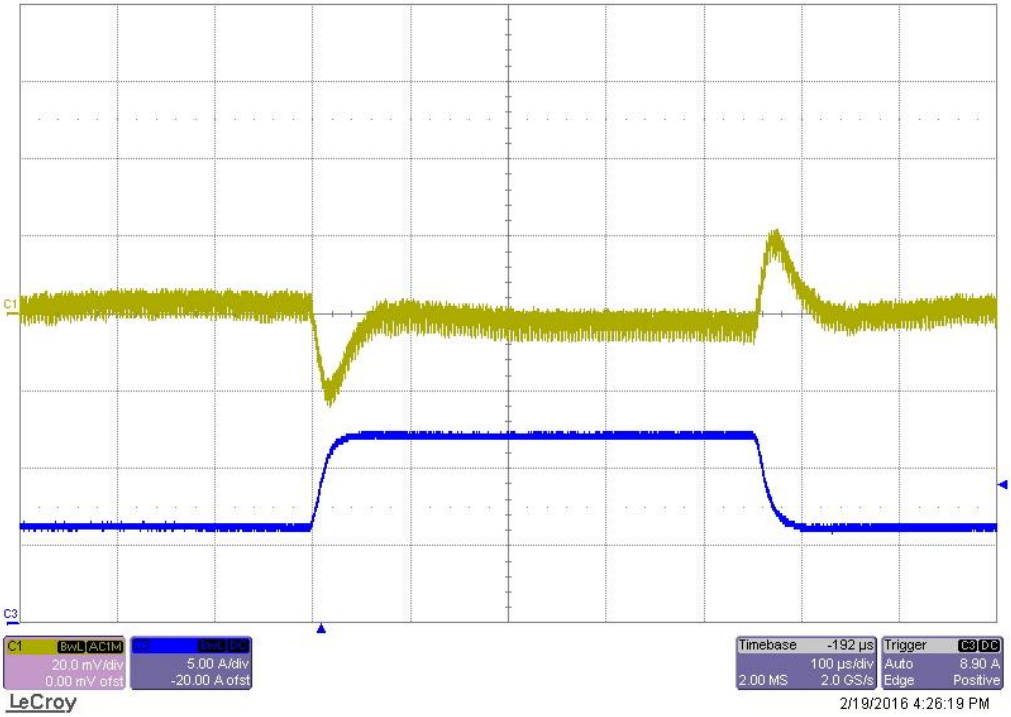
5.2 TPS549A20: 3.3V@14A



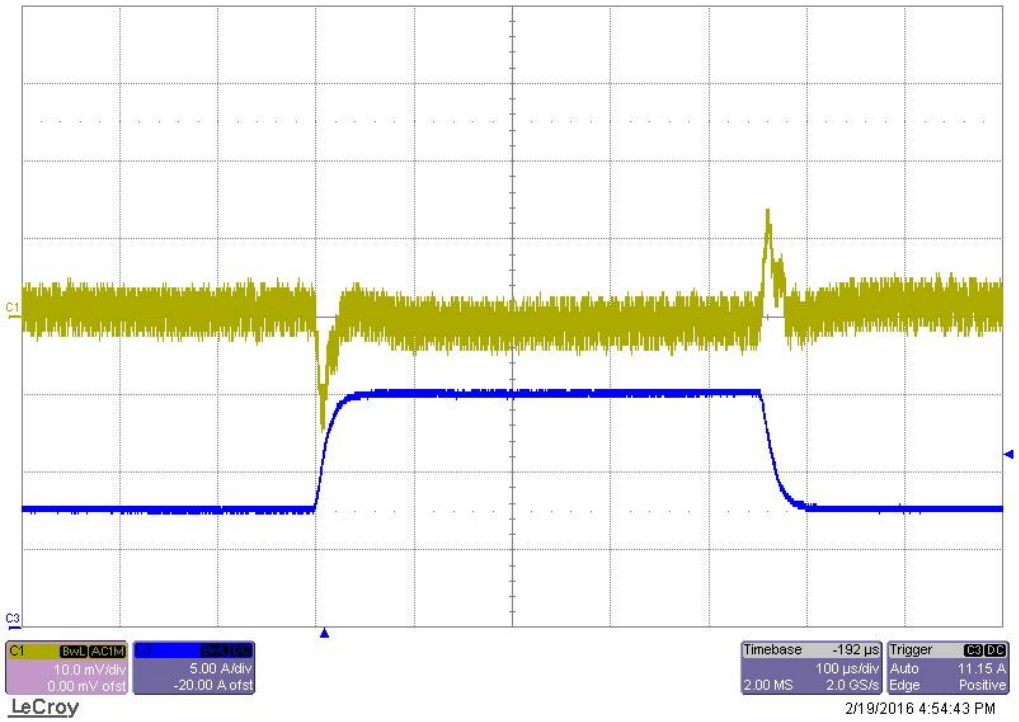
5.3 TPS53513: 1.5V@8A



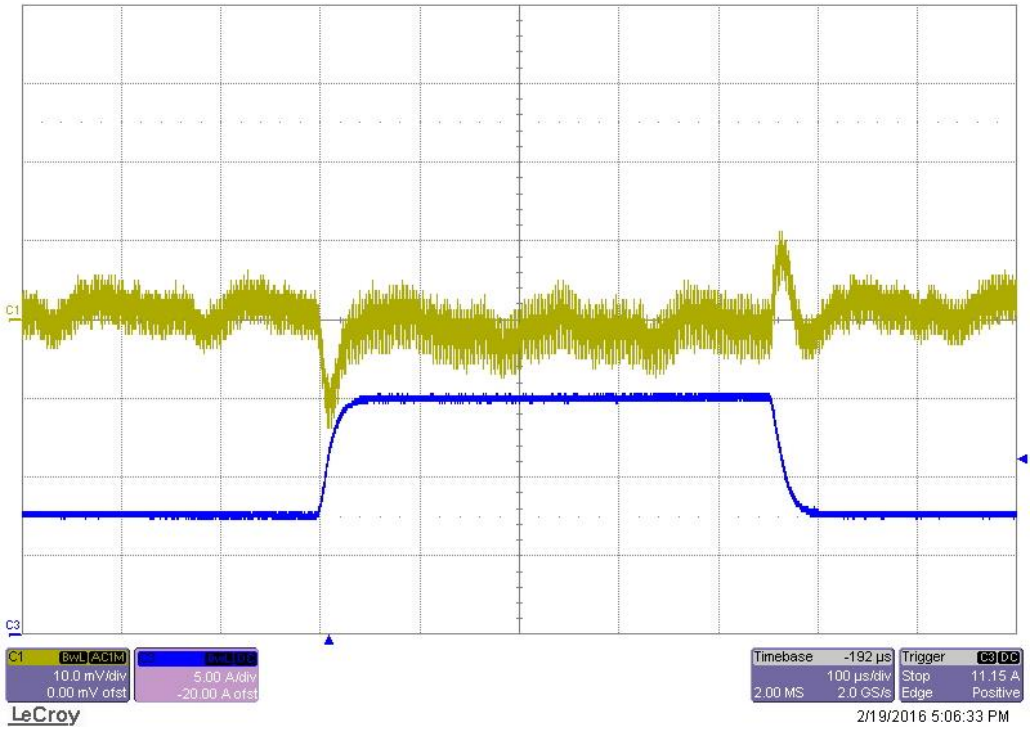
5.4 TPS53515: 1.2V@12A



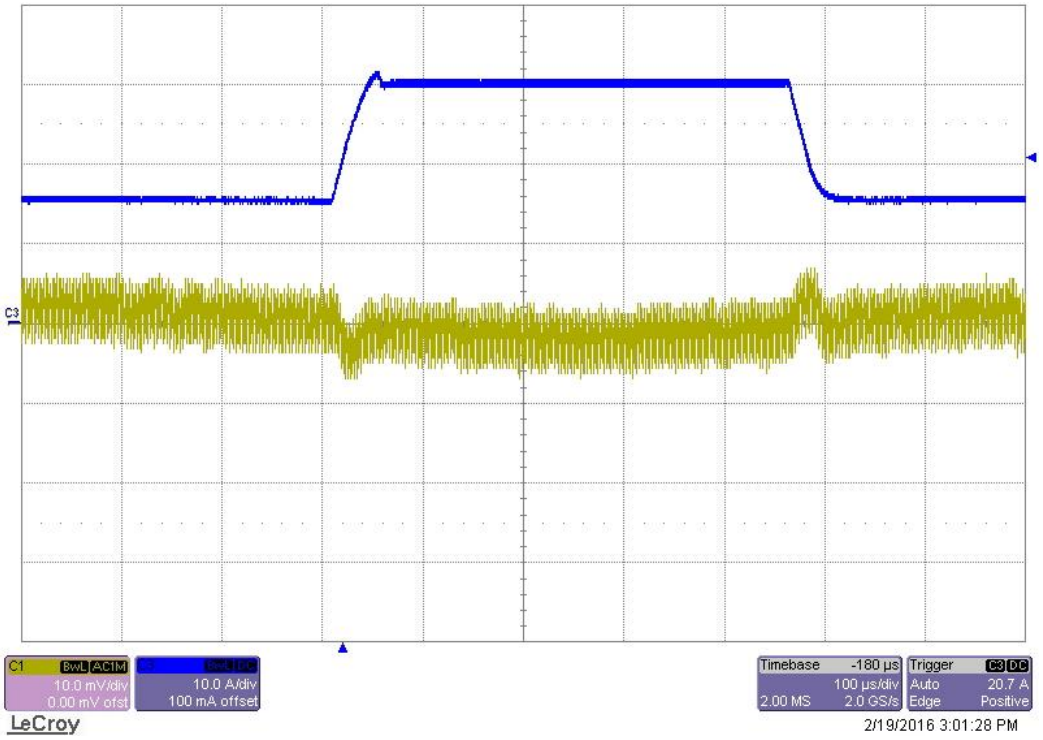
5.5 TPS544C25: 1V@15A



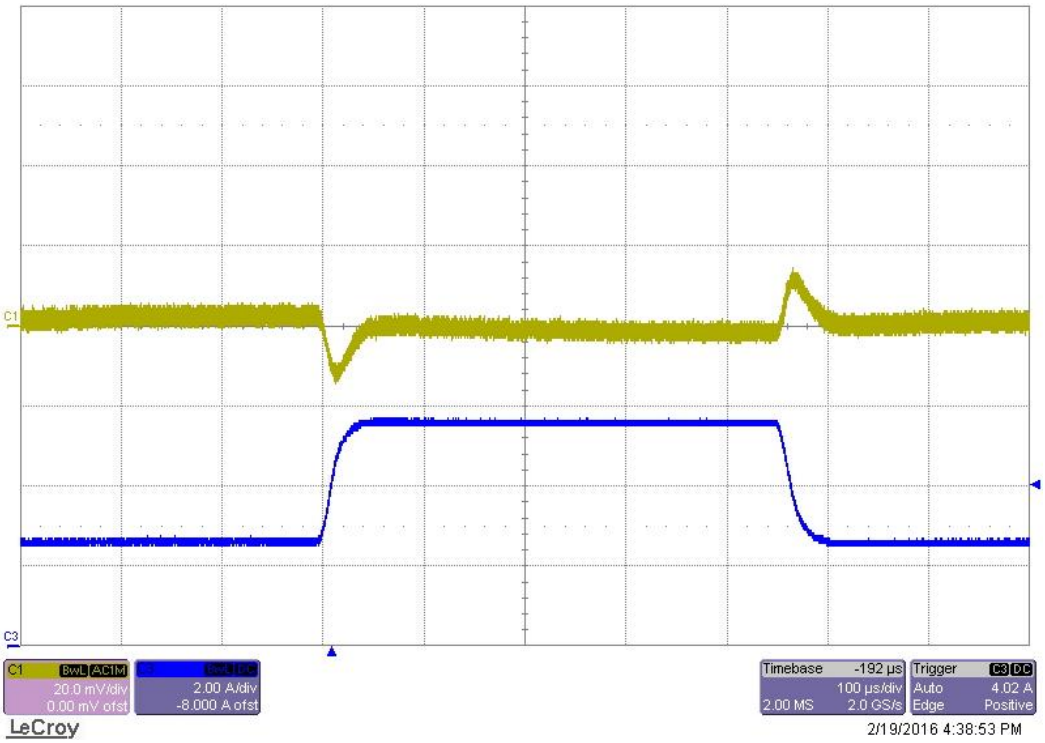
5.6 TPS544C25: 0.85V@15A



5.7 TPS53647: 1V@30A (VCORE)

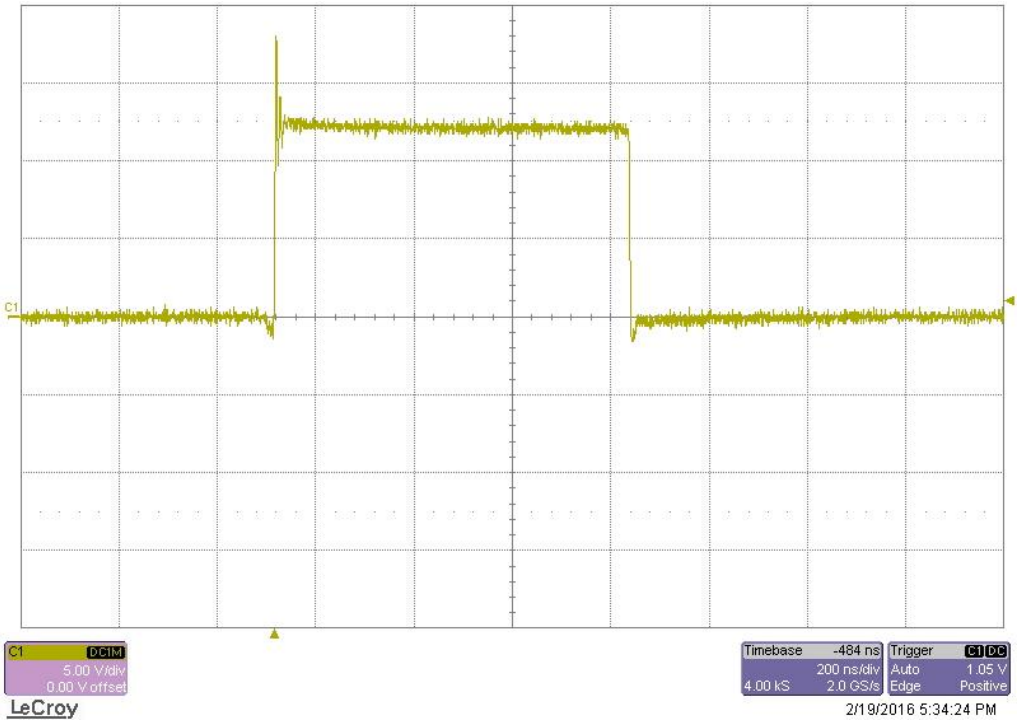


5.8 TPS53317: 0.6V@6A

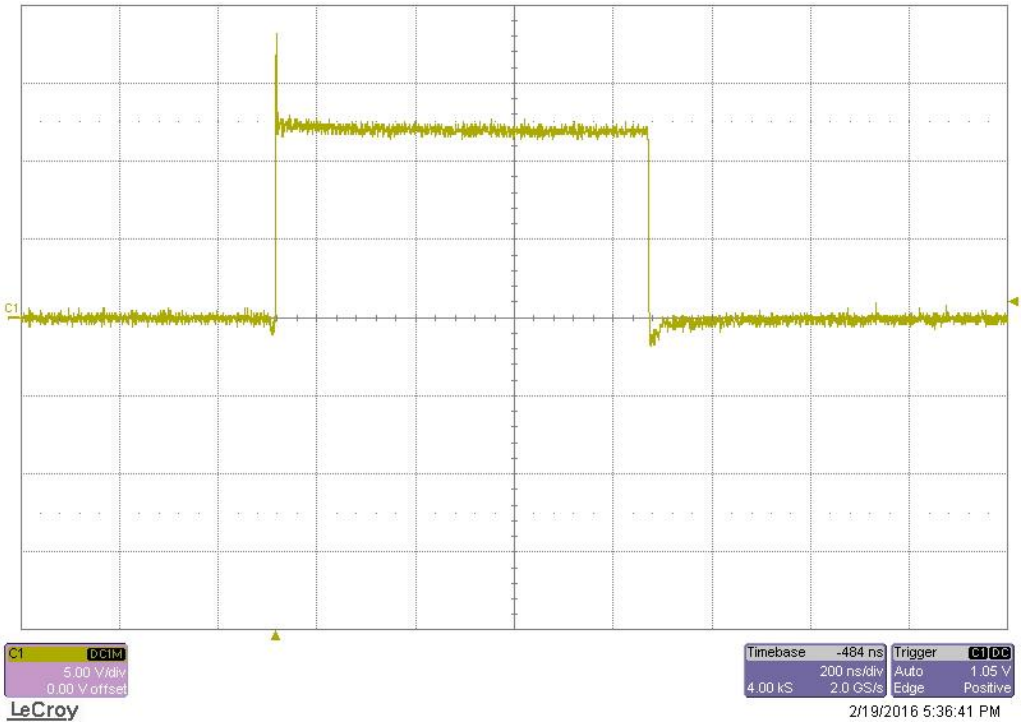


6 Switching Waveforms, Full Load

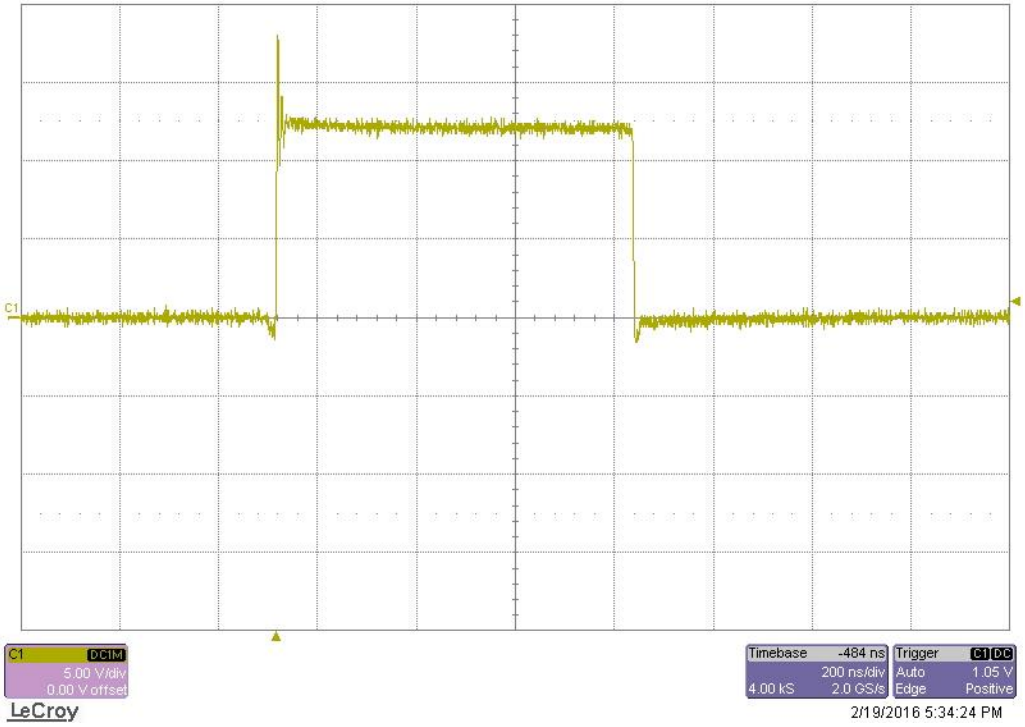
6.1 TPS548D22: 5V@10A



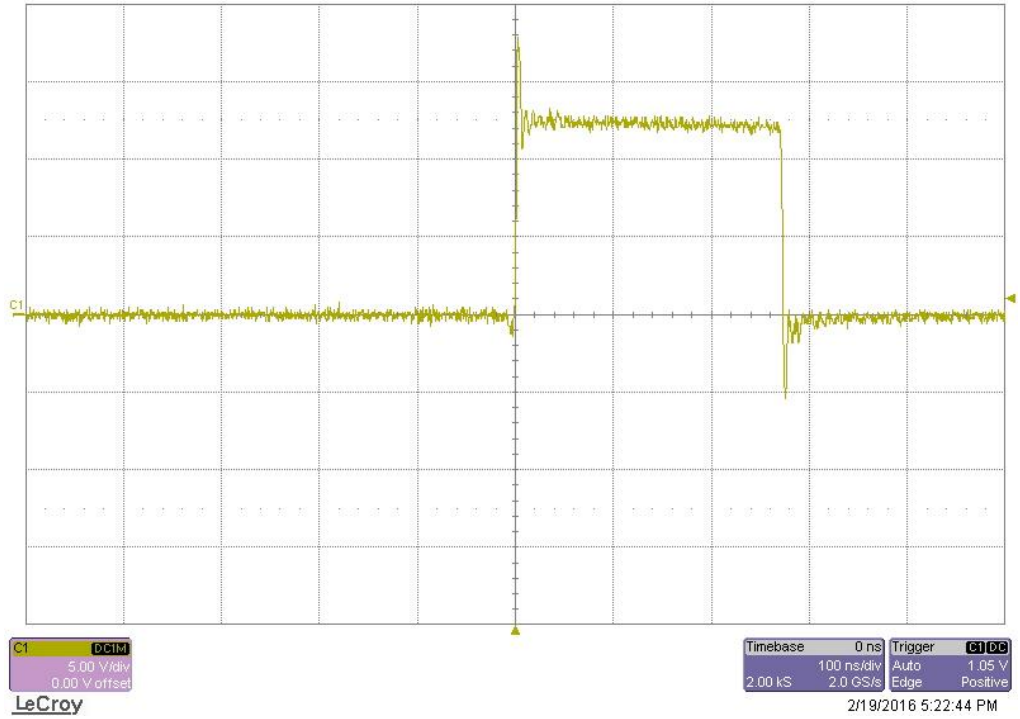
6.2 TPS549A20: 3.3V@14A



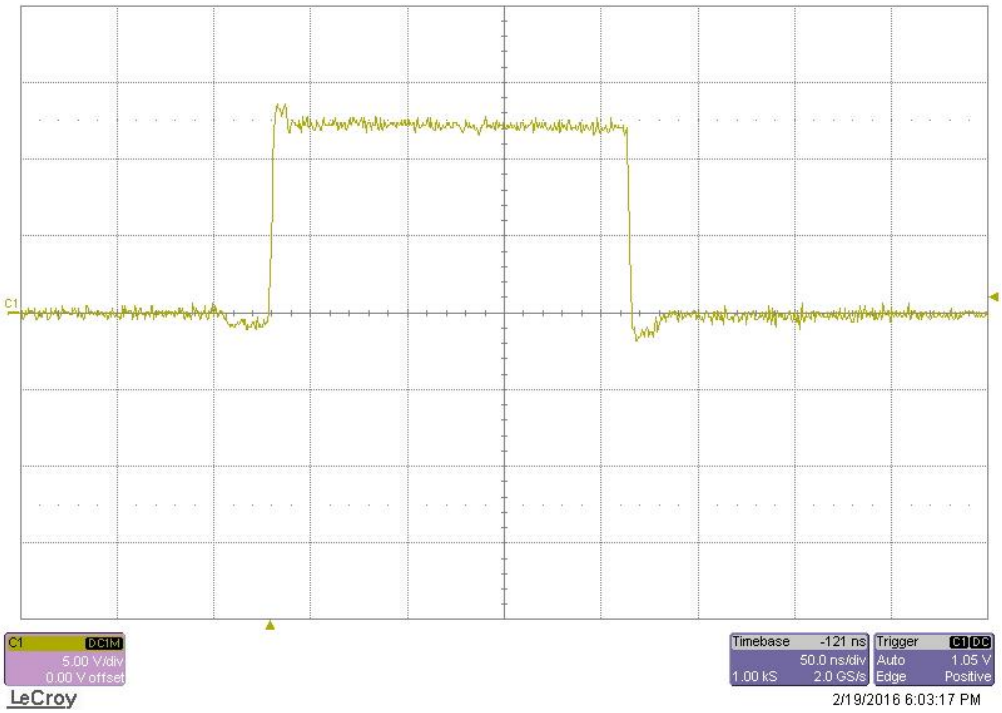
6.3 TPS53513: 1.5V@8A



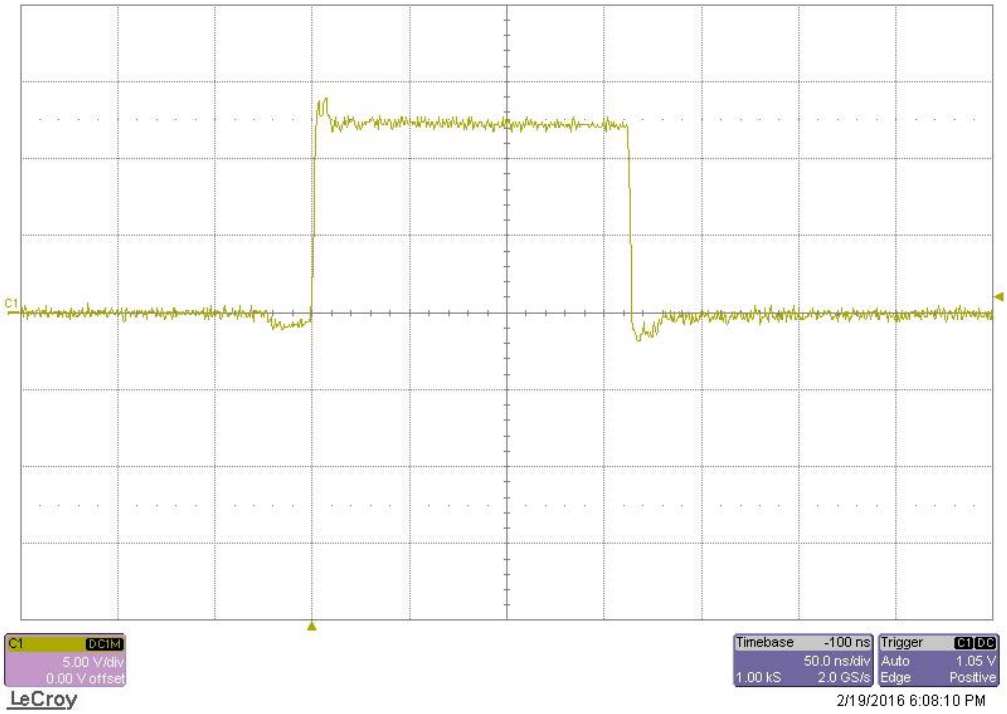
6.4 TPS53515: 1.2V@12A



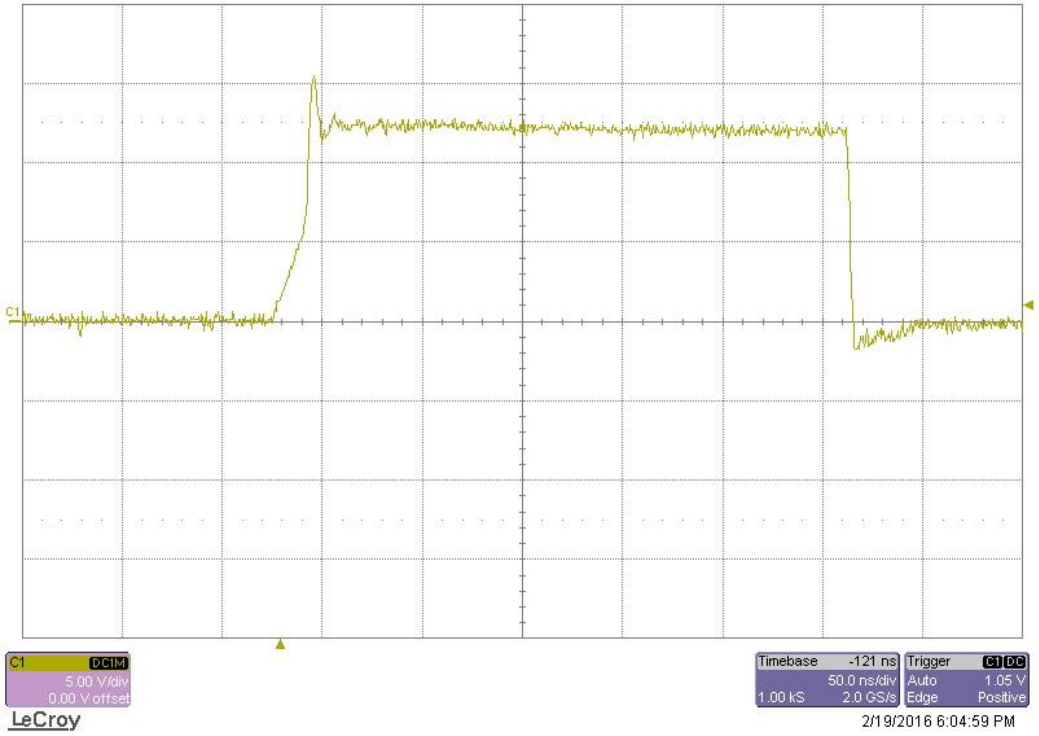
6.5 TPS544C25: 1V@15A



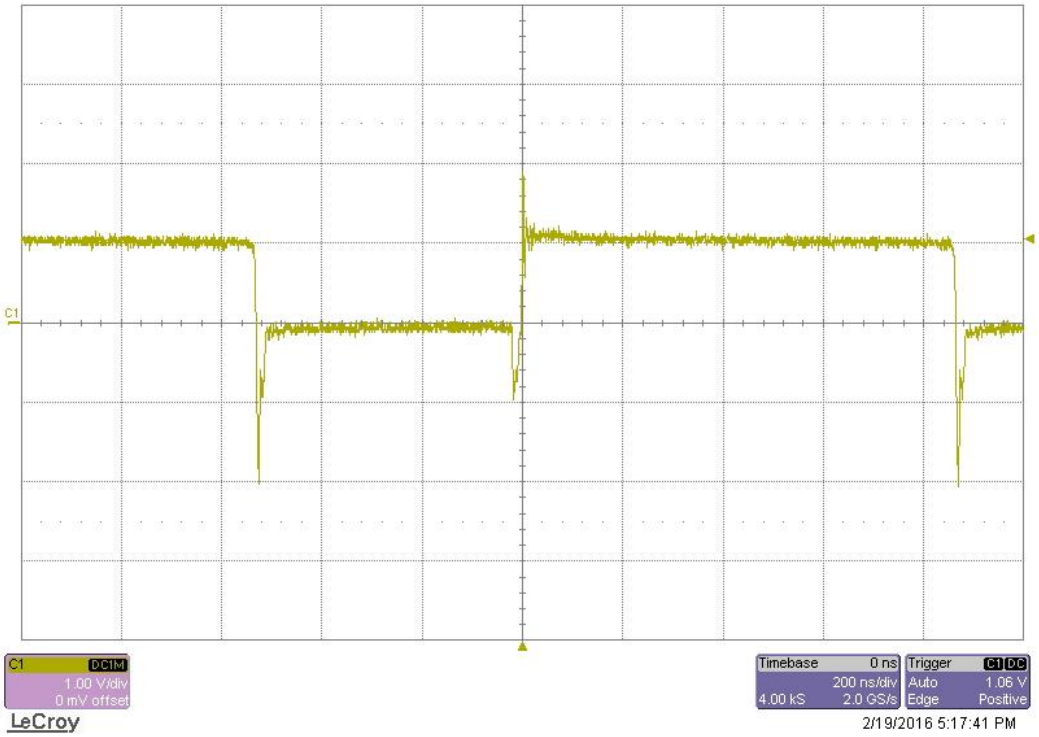
6.6 TPS544C25: 0.85V@15A



6.7 TPS53647: 1V@30A (VCORE)

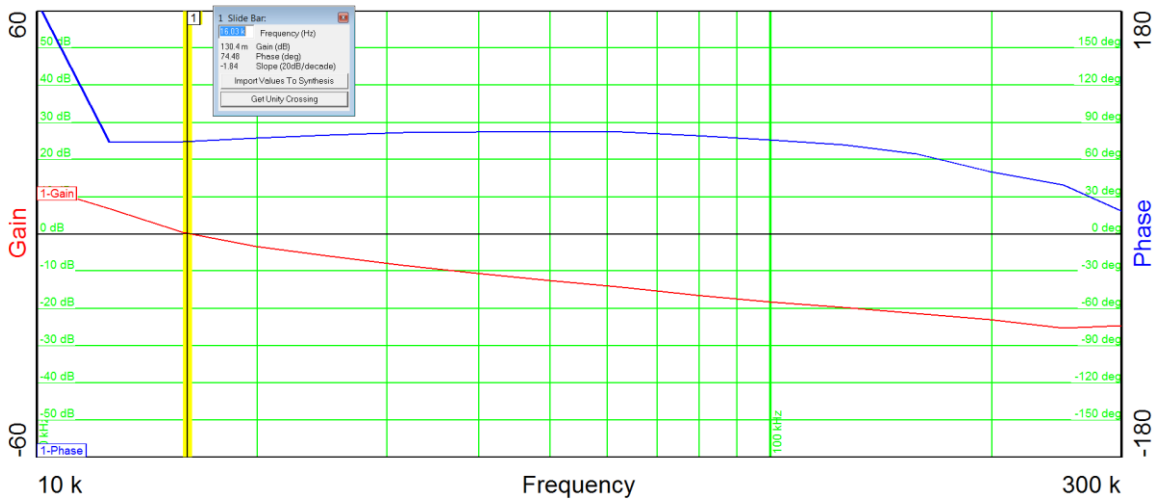


6.8 TPS53317: 0.6V@6A

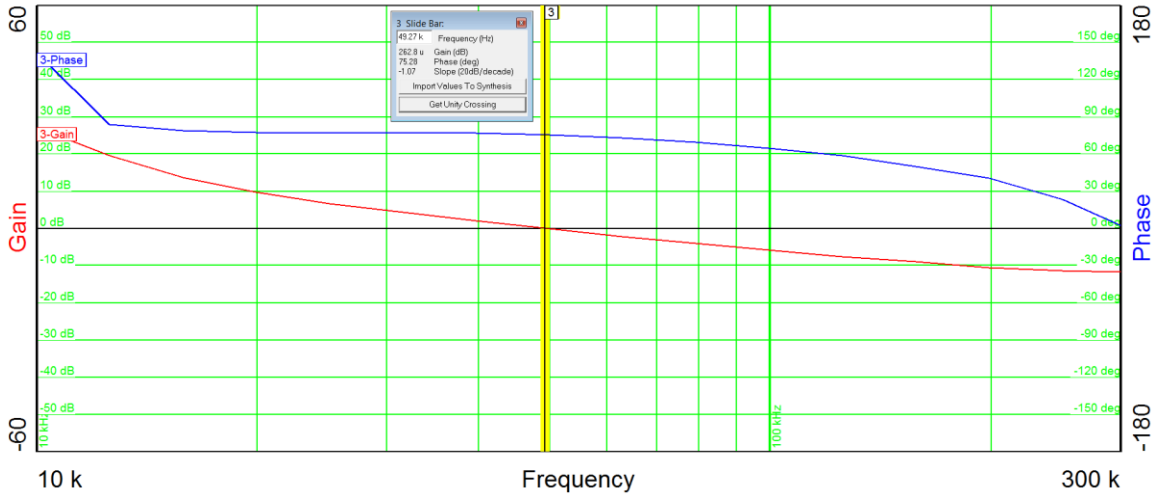


7 Loop Response, Full Load

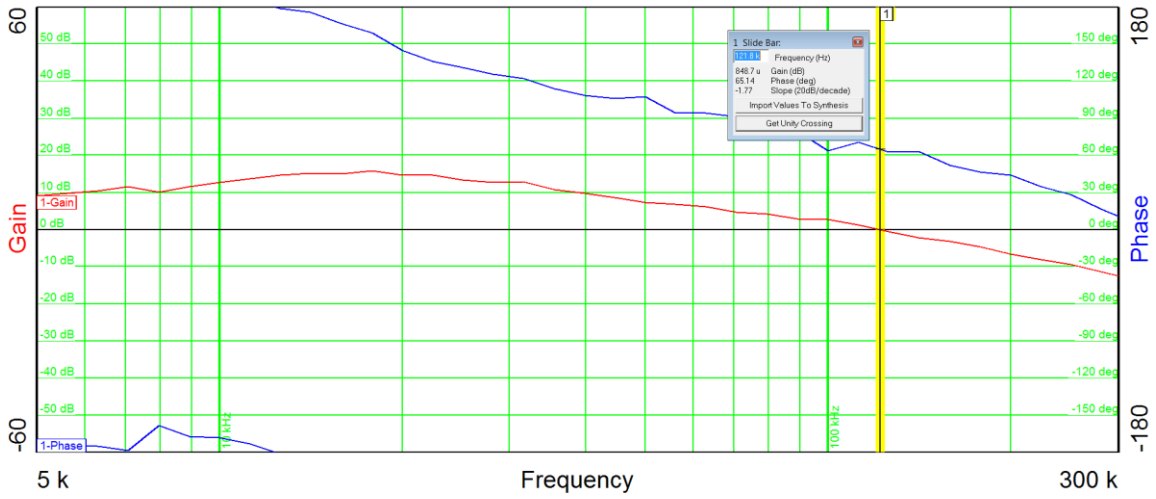
7.1 TPS548D22: 5V@10A



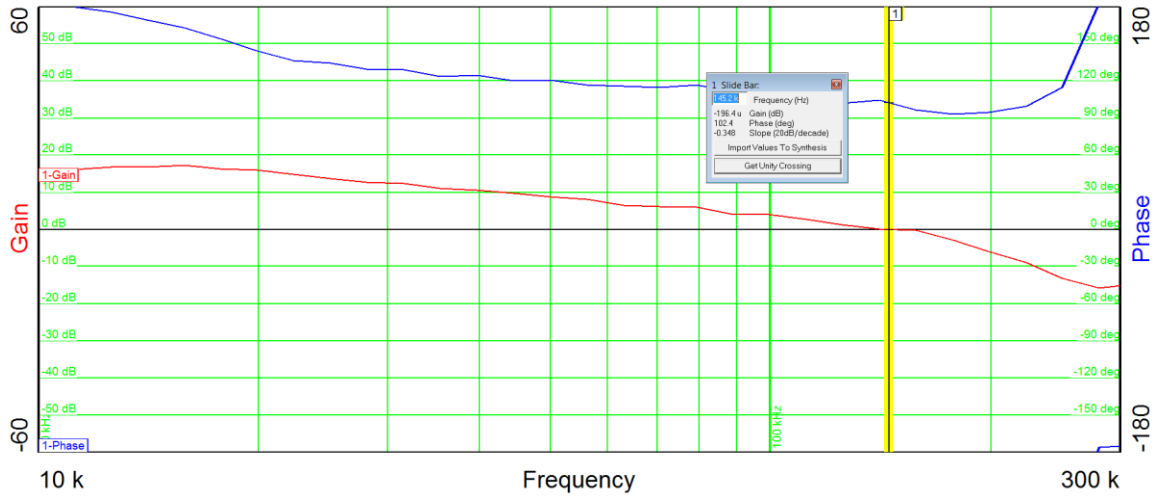
7.2 TPS549A20: 3.3V@14A



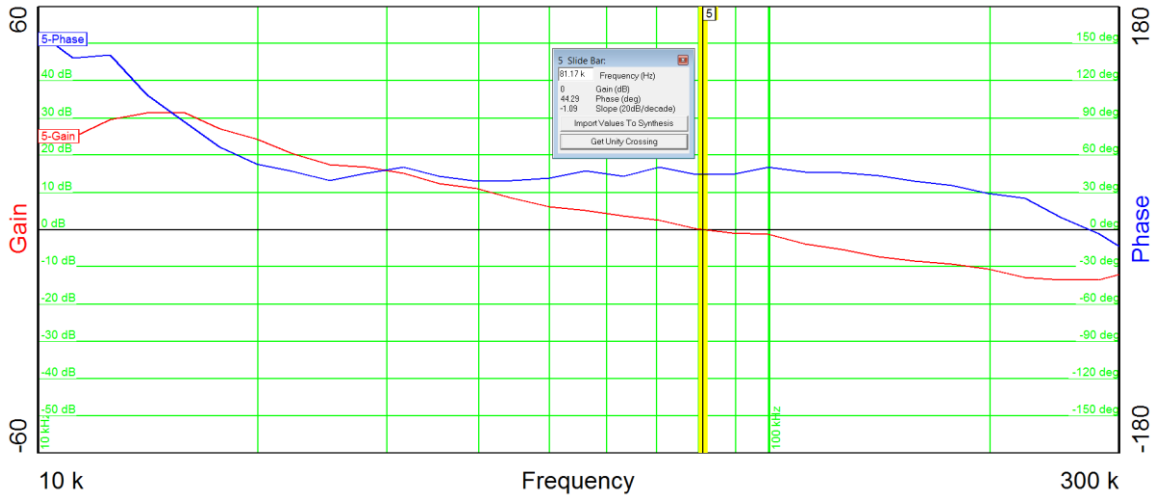
7.3 TPS53513: 1.5V@8A



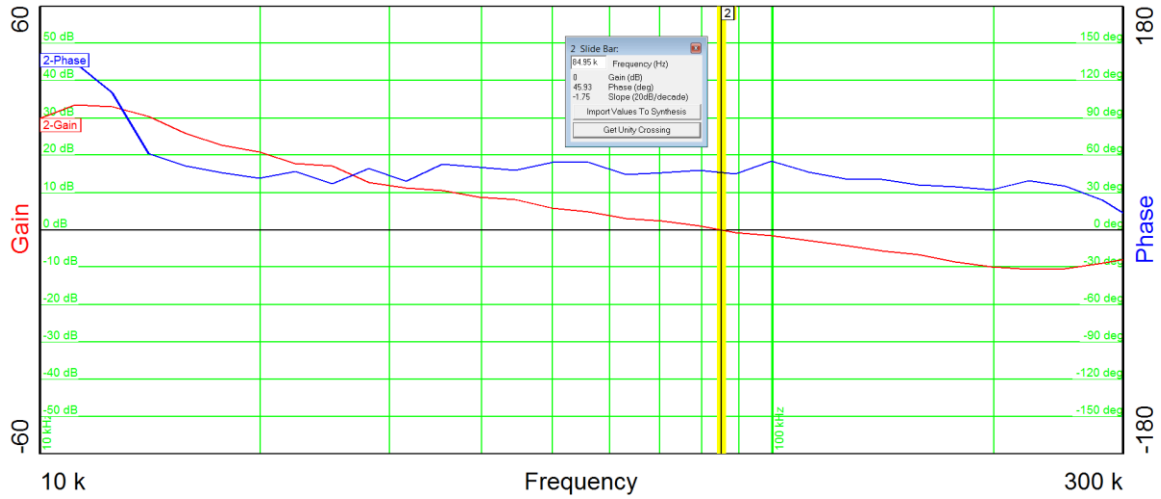
7.4 TPS53515: 1.2V@12A



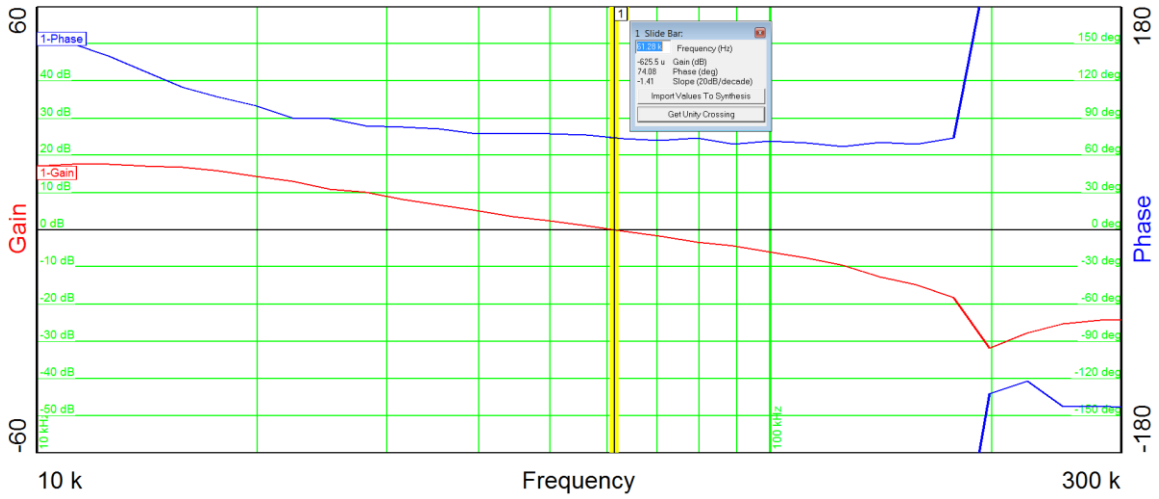
7.5 TPS544C25: 1V@15A



7.6 TPS544C25: 0.85V@15A

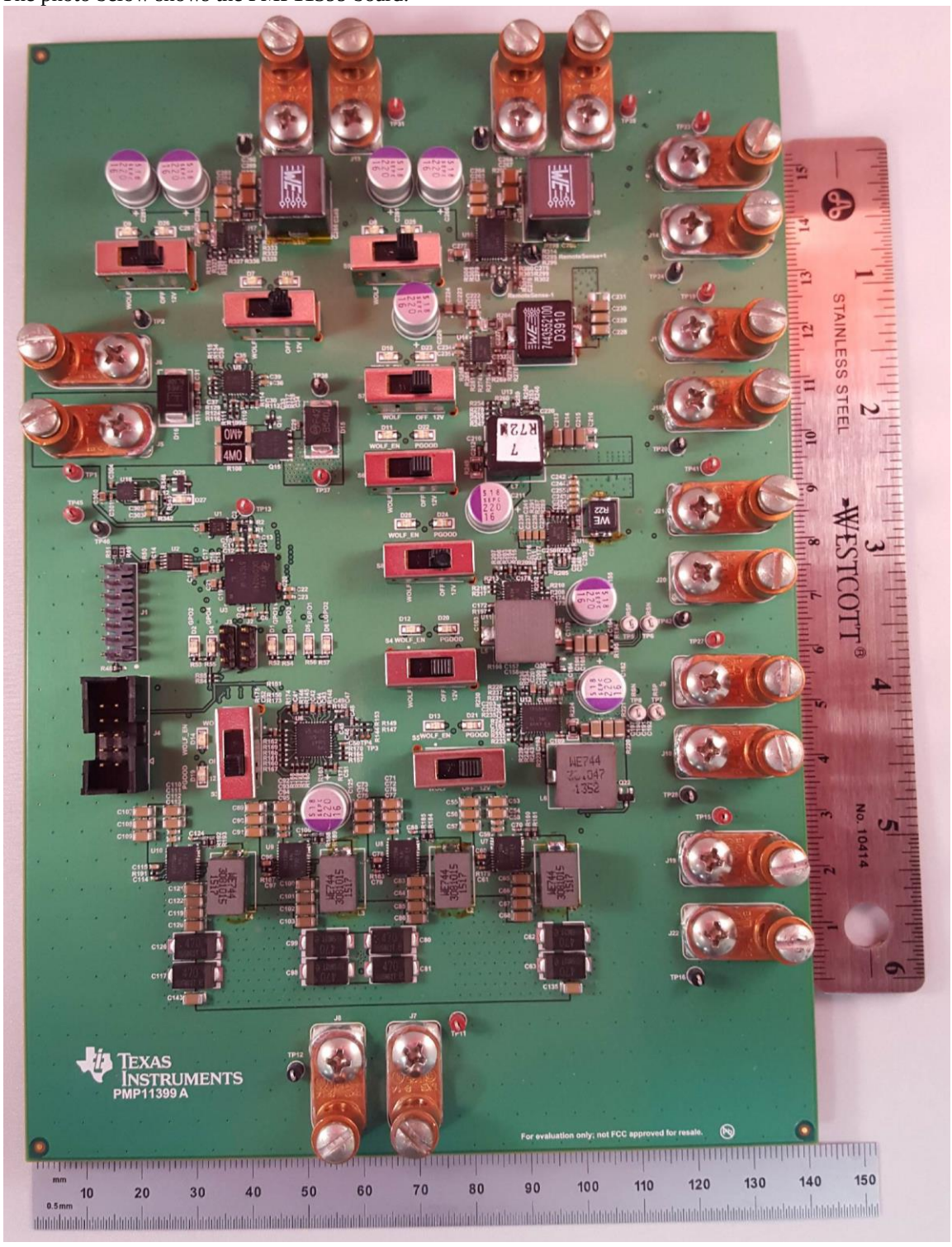


7.7 TPS53317: 0.6V@6A



8 Photo

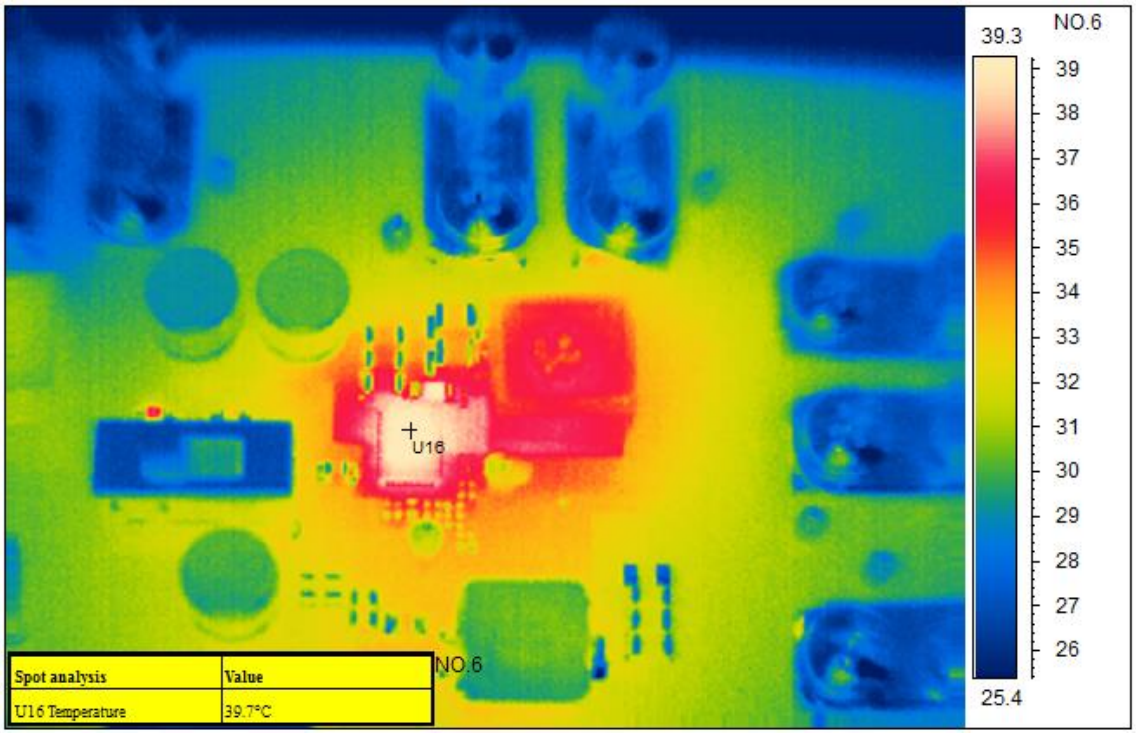
The photo below shows the PMP11399 board.



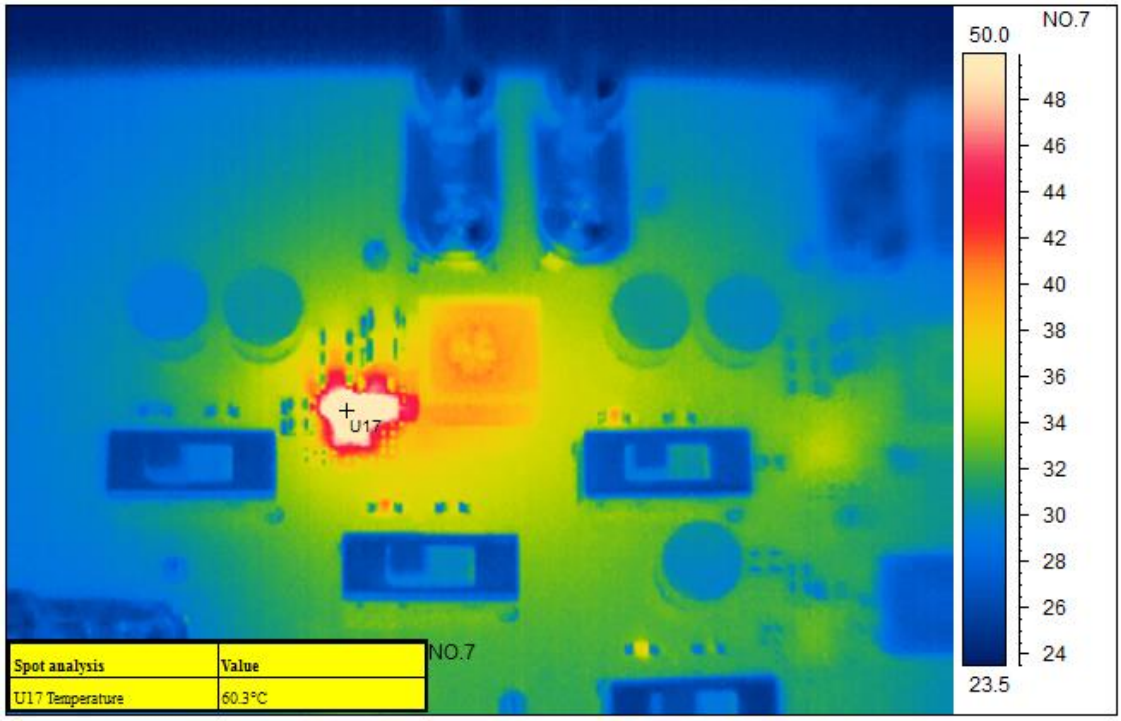
9 Thermal Images, Full Load

The measurements below were taken with rails individually fully loaded at room temperature, with airflow.

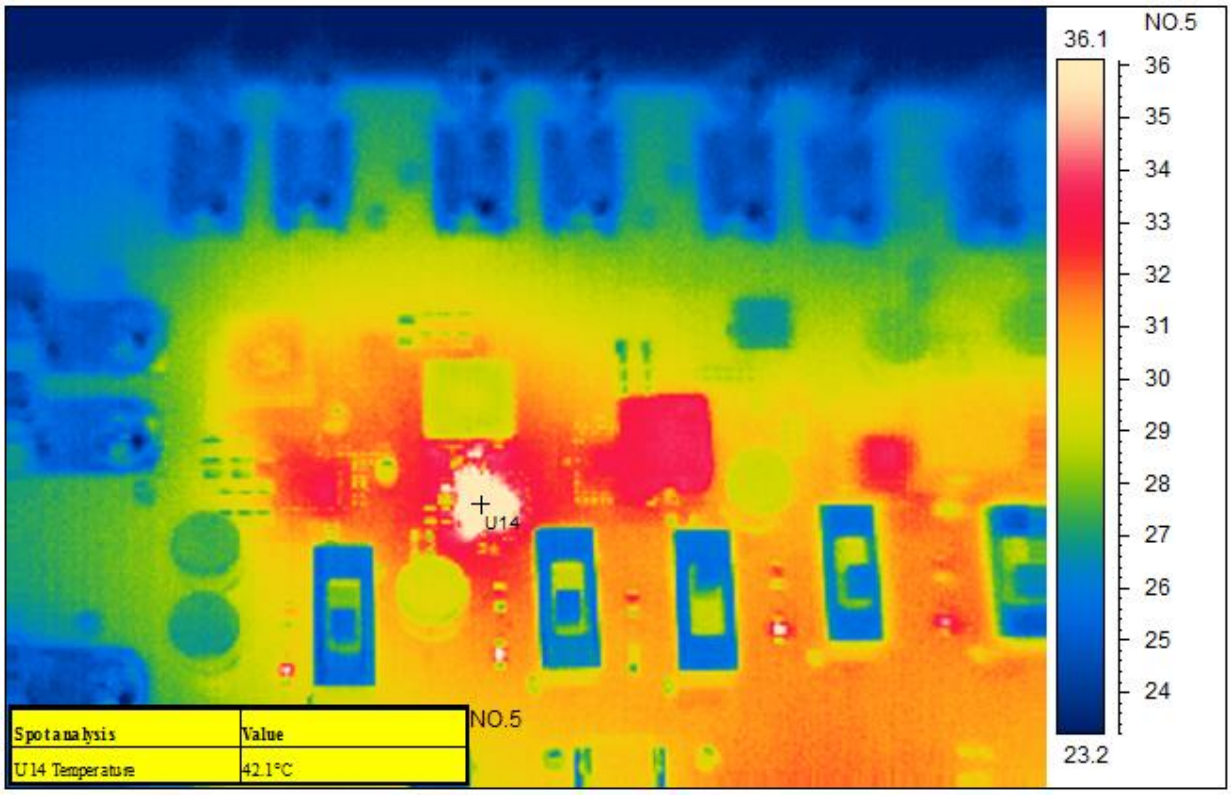
9.1 TPS548D22: 5V@10A



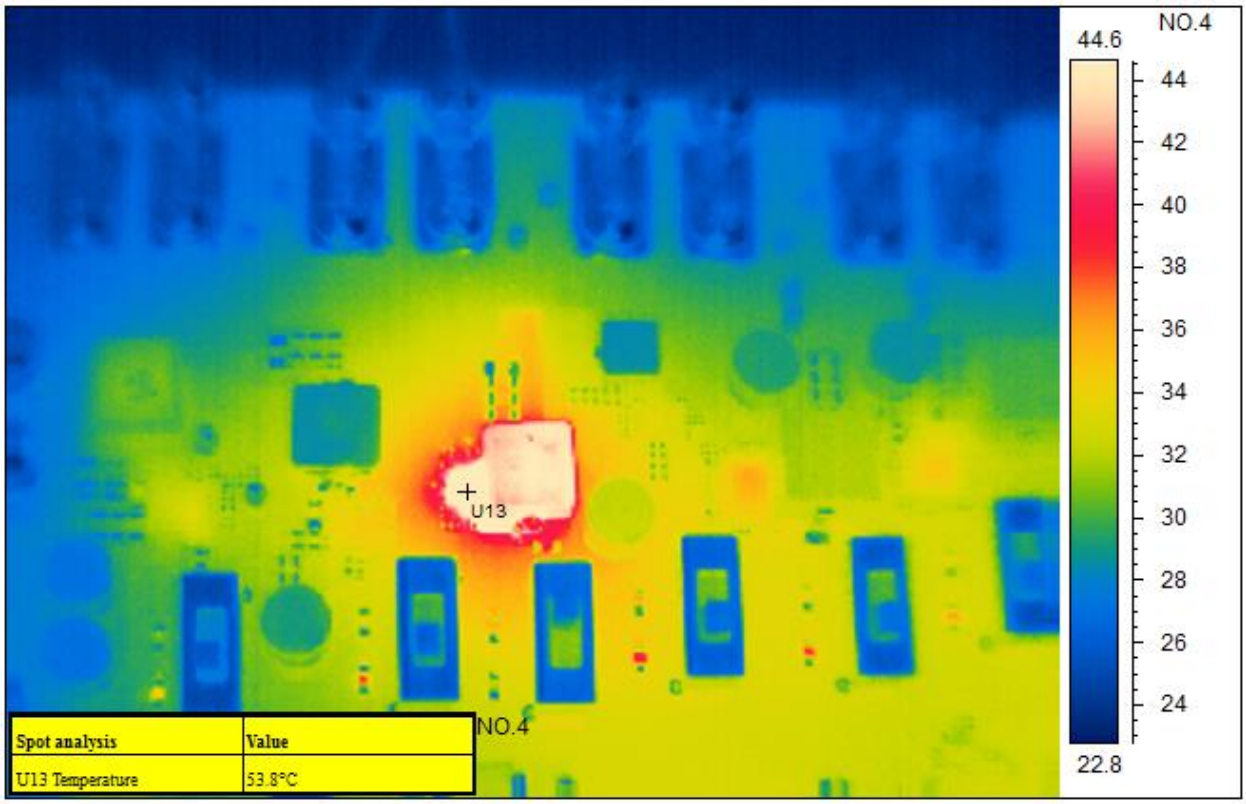
9.2 TPS549A20: 3.3V@14A



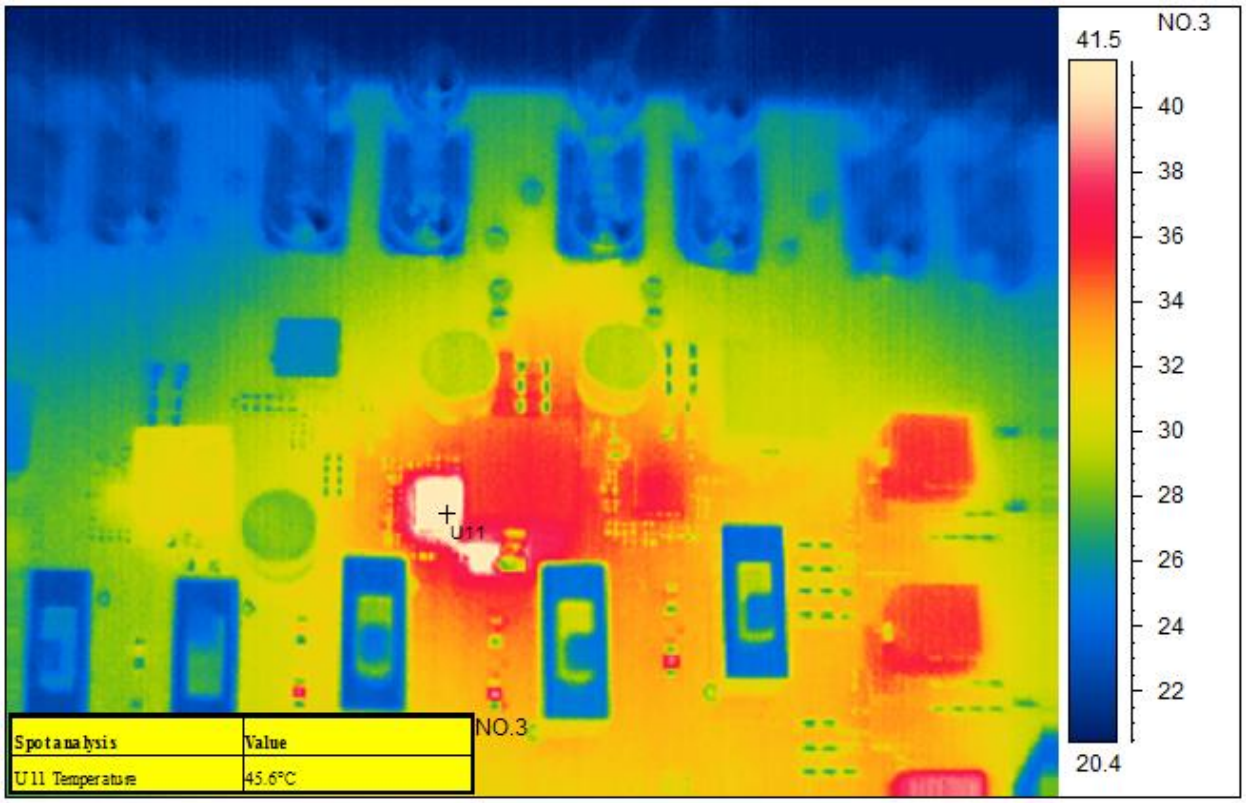
9.3 TPS53513: 1.5V@8A



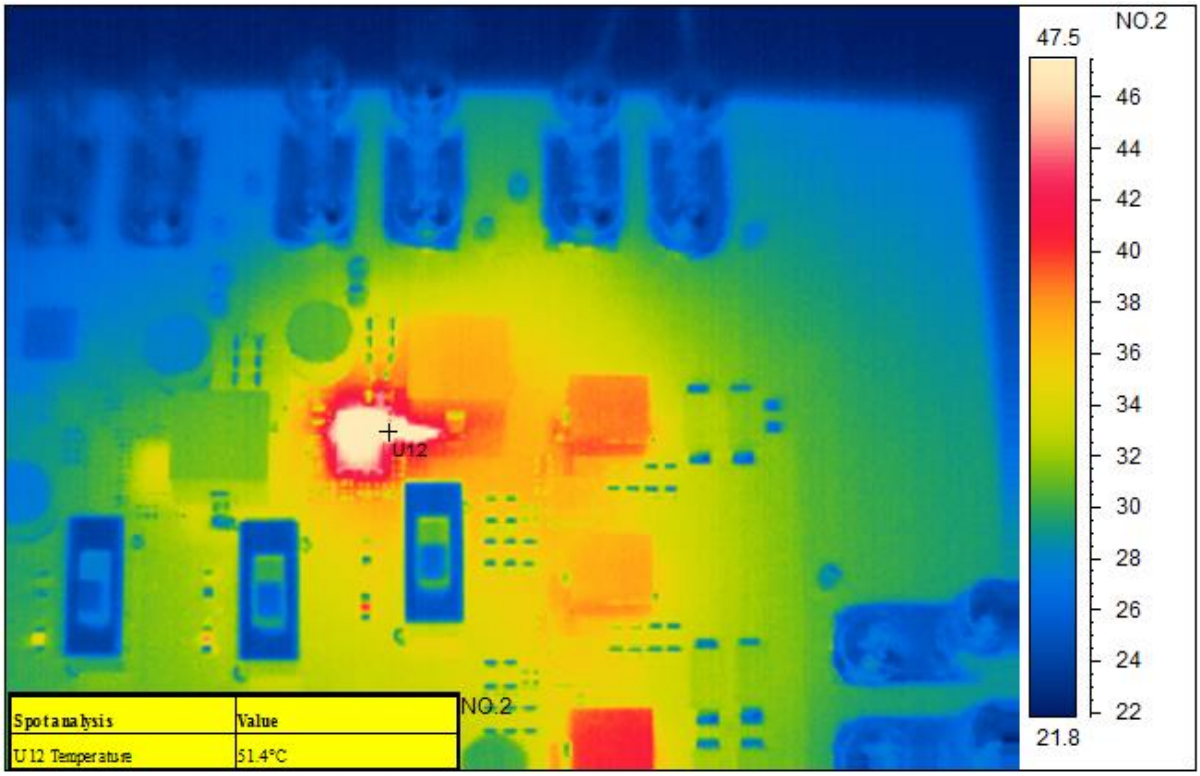
9.4 TPS53515: 1.2V@12A



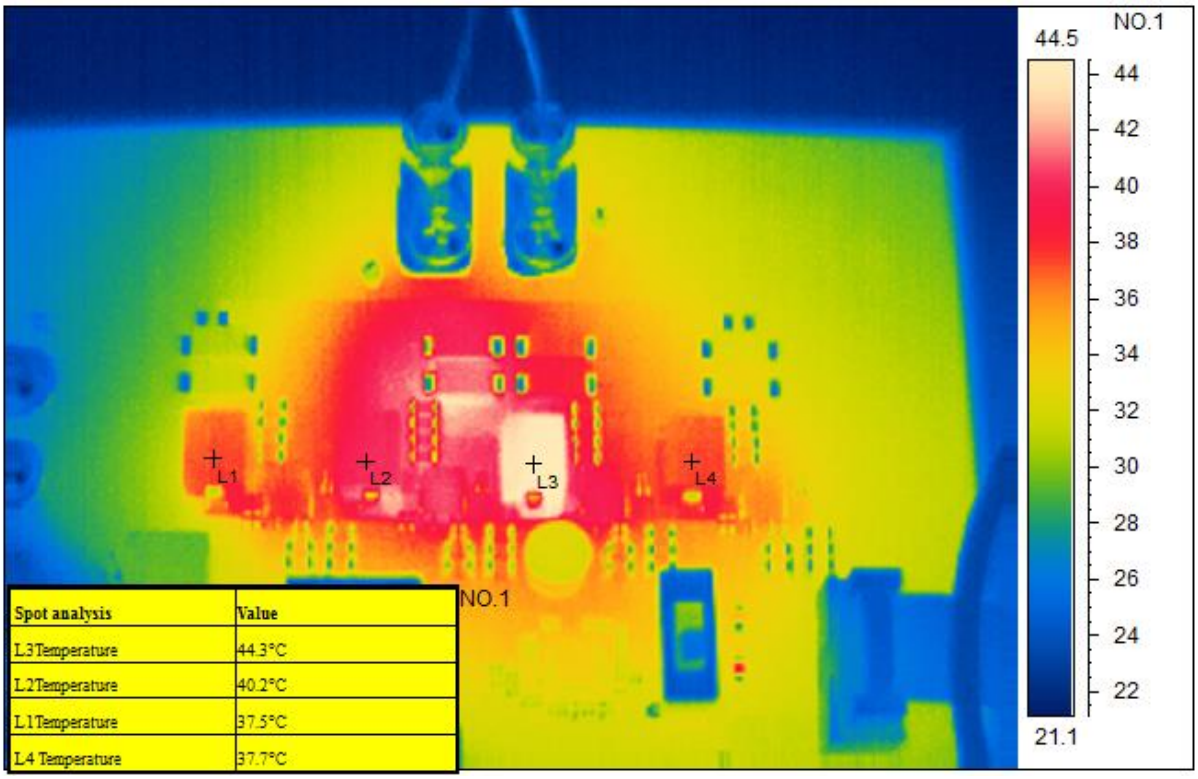
9.5 TPS544C25: 1V@15A



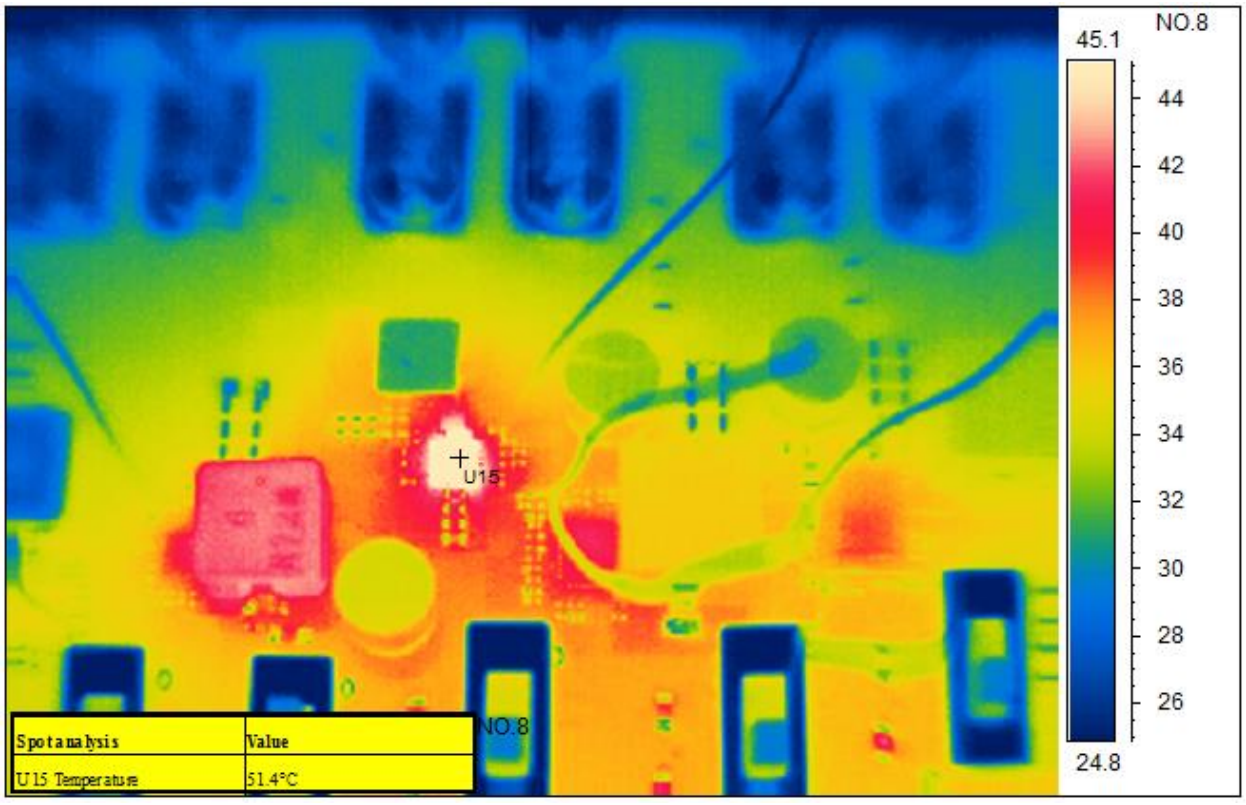
9.6 TPS544C25: 0.85V@15A



9.7 TPS53647: 1V@30A (VCORE)



9.8 TPS53317: 0.6V@6A



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