Test Data
For PMP21112 Dual-Phase 400W Boost
11/13/2017

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1. Design Specifications

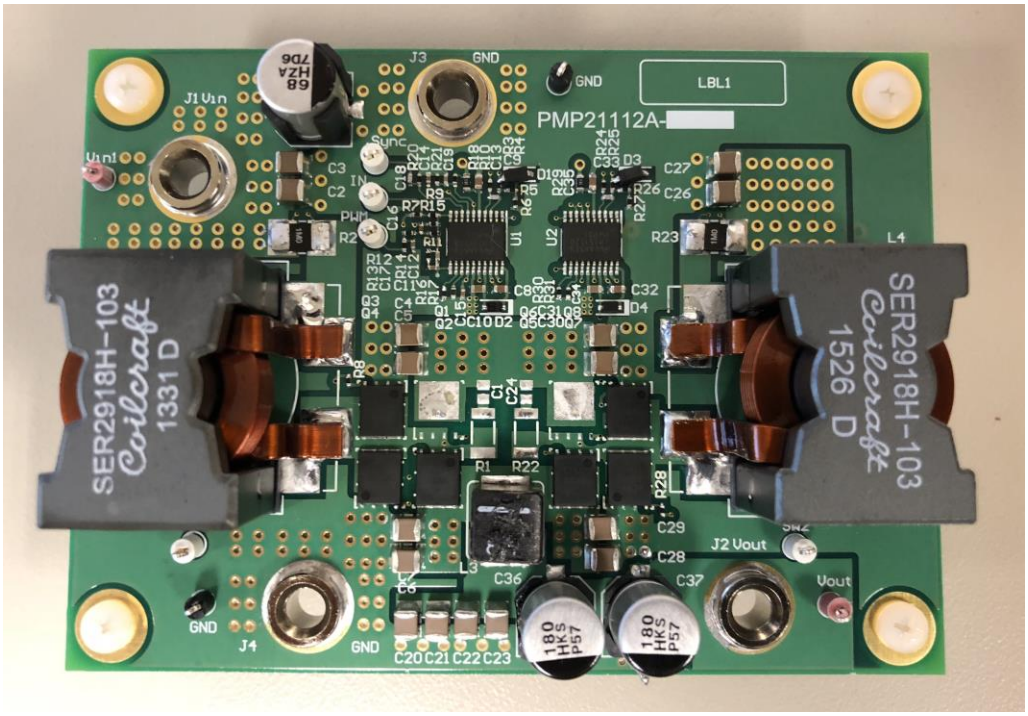
Vin Minimum	**9VDC**
Vin Maximum	**16VDC**
Vout	**16VDC to 40VDC @ 10A**
Nominal Switching Frequency	**≈ 150KHz**

2. Design Specifications

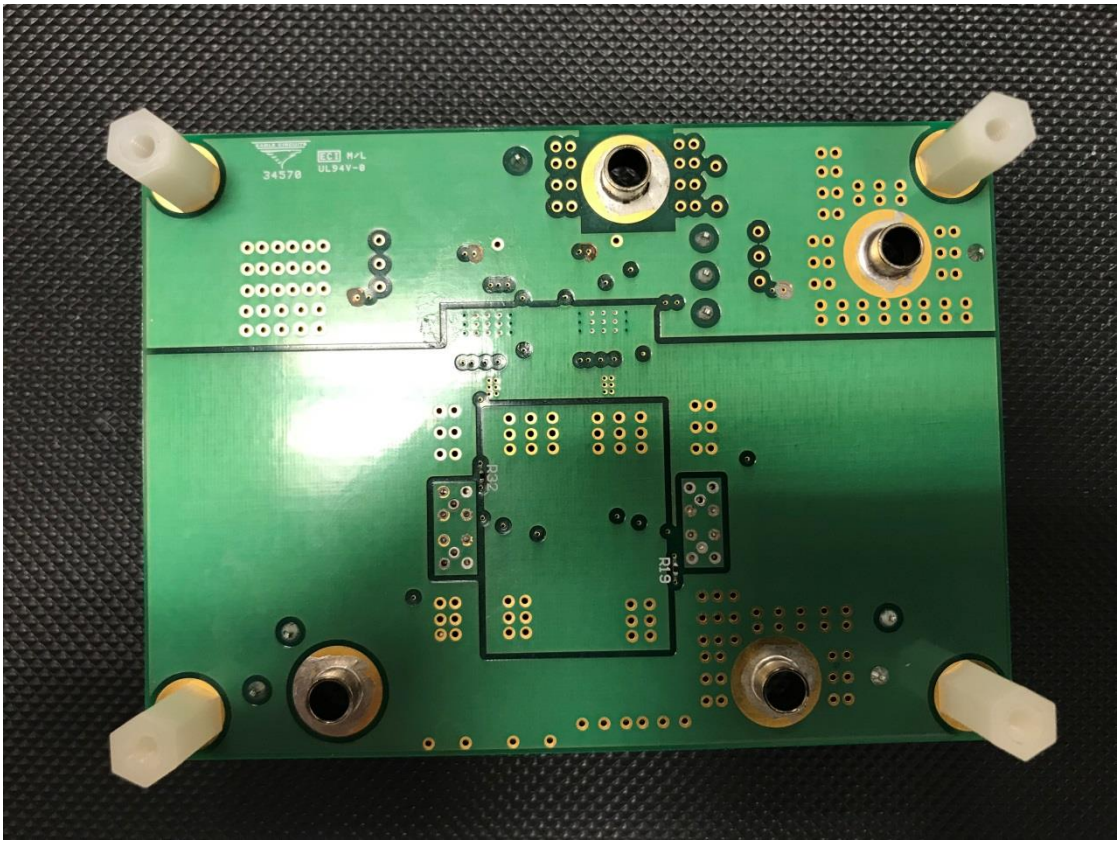
PMP21112 is a dual-phase boost utilizing the LM25112-Q1 controller for automotive applications. This design can operate from 9V to 16V. The design has an adjustable output of 16V to 40V and capable of sourcing 10A continuous current. LM25112-Q1 has a bypass function where Vin is equal or greater than the set output voltage, the device will bypass Vin via the high side sync FET. Output adjustment is achieved via a 3.3V PWM signal, by adjusting the duty cycle of the PWM signal from 10% to 90%, output will go from 40V to 16V respectively. This design is also capable of tracking a sine wave up to 500Hz without distortion and achieve less than 300us delay time between sine wave and the output voltage. Switching frequency is set to 150kHz, and a 4 layer PCB is used. Three 6.8mF, 65V rated electrolytic capacitors are used to damp the input supply's wiring inductance for all test data taken on this test report.

3. Board Photo

Board Dimensions: 97mm x 70mm



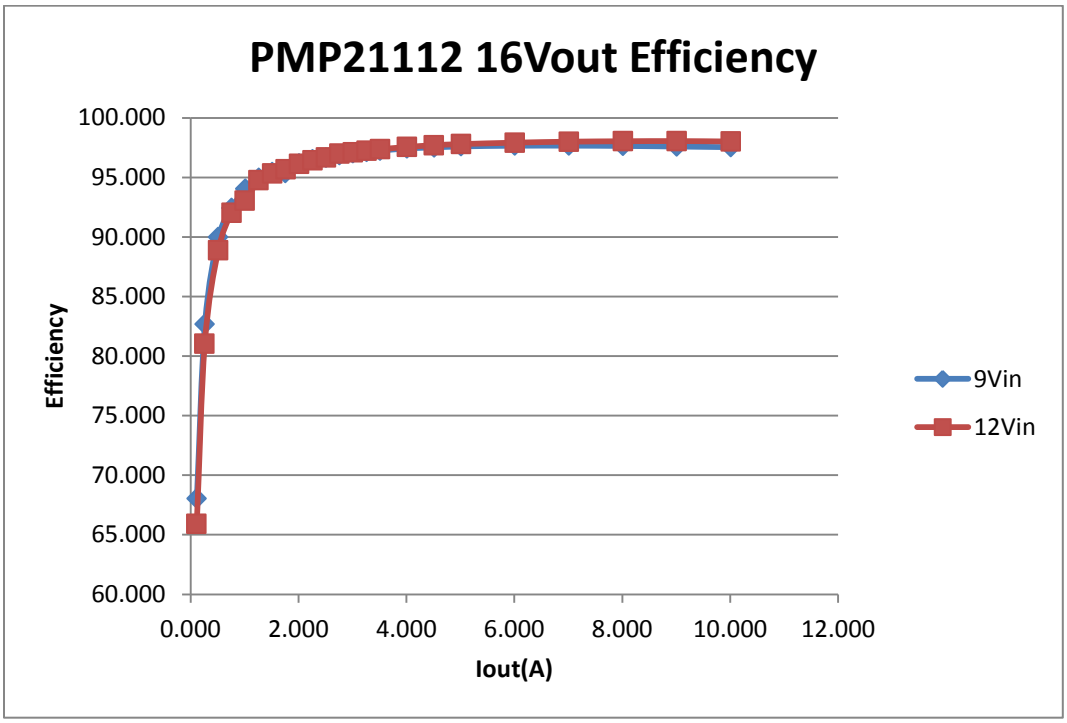
Board Photo (Top)

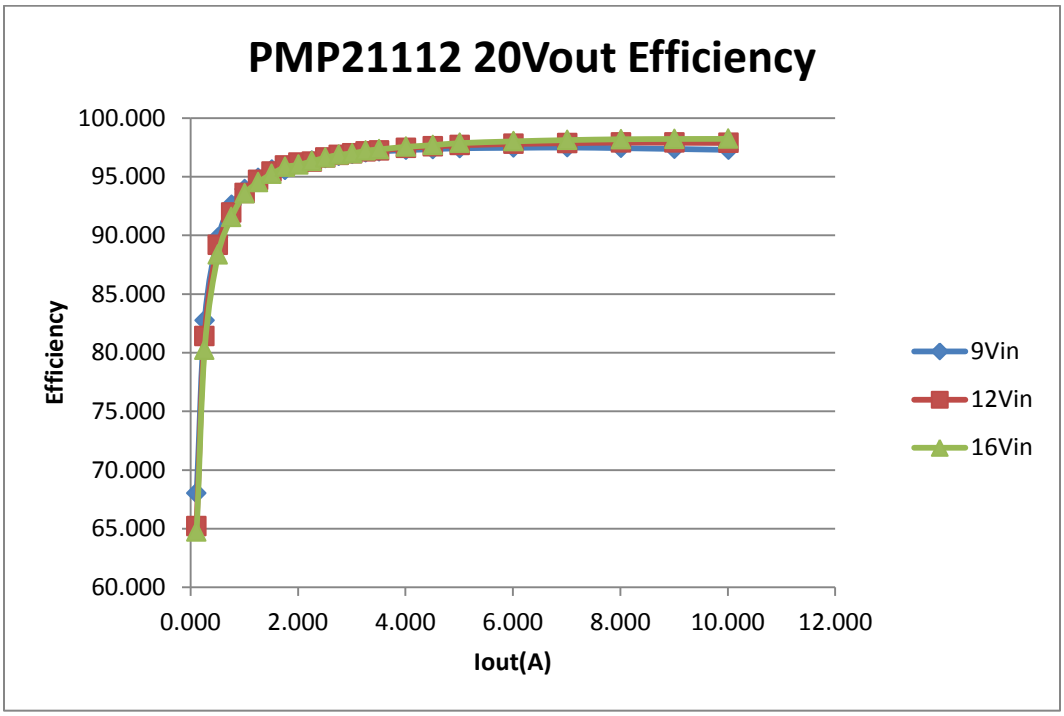


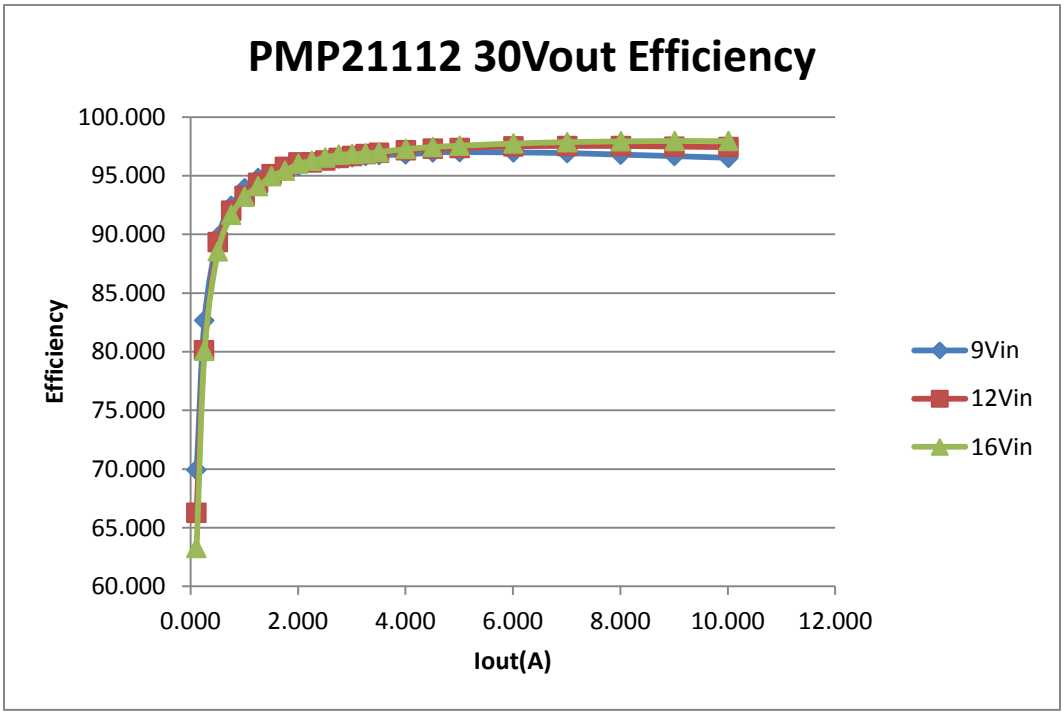
Board Photo (Bottom)

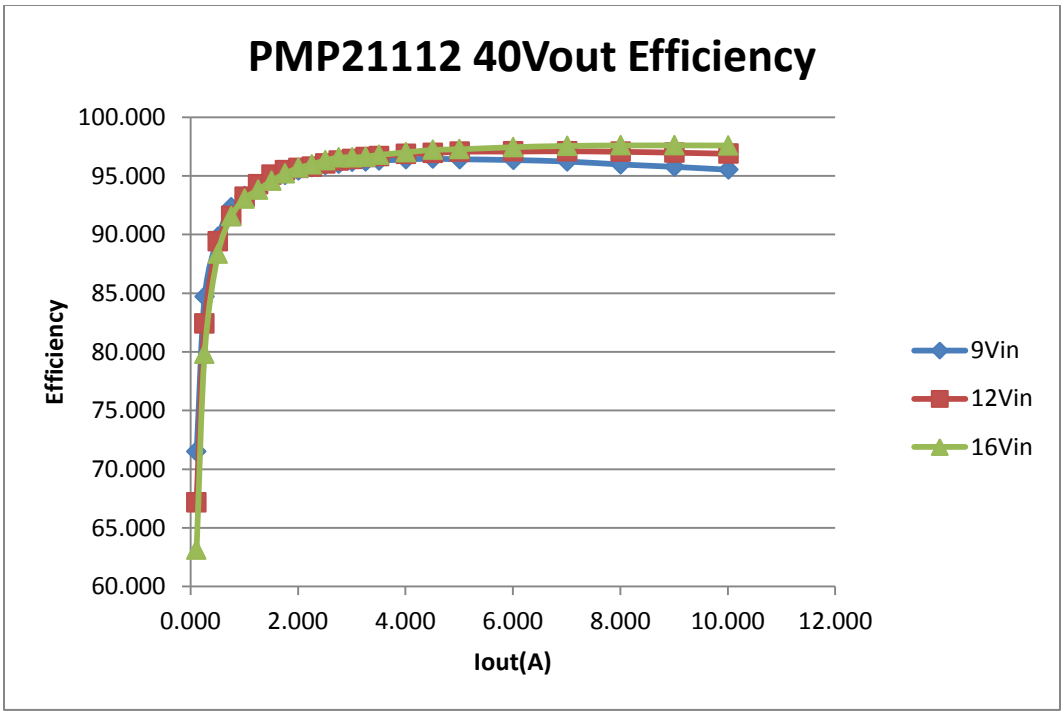
4 Efficiency

4.1 Efficiency Chart









4.2 Efficiency Data

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Pin(W)	Pout(W)	Ploss(W)	Efficiency
9.033	0.302	16.002	0.116	2.728	1.856	0.872	68.046
9.033	0.570	16.002	0.266	5.149	4.256	0.892	82.673

9.032	1.016	16.002	0.516	9.177	8.257	0.920	89.973
9.032	1.468	16.002	0.766	13.260	12.257	1.002	92.441
9.032	1.914	16.003	1.016	17.288	16.259	1.029	94.045
9.033	2.362	16.003	1.266	21.335	20.259	1.075	94.959
9.032	2.814	16.003	1.516	25.417	24.260	1.157	95.446
9.033	3.266	16.002	1.758	29.500	28.132	1.368	95.363
9.033	3.714	16.003	2.016	33.547	32.261	1.286	96.167
9.032	4.160	16.002	2.266	37.574	36.261	1.313	96.505
9.032	4.608	16.002	2.514	41.620	40.229	1.392	96.656
9.032	5.056	16.002	2.764	45.667	44.231	1.436	96.855
9.032	5.504	16.002	3.014	49.713	48.229	1.484	97.015
9.032	5.954	16.003	3.264	53.777	52.232	1.545	97.127
9.032	6.402	16.002	3.514	57.825	56.232	1.593	97.245
9.032	7.302	16.002	4.016	65.953	64.263	1.690	97.437
9.033	8.204	16.001	4.516	74.103	72.262	1.841	97.516
9.032	9.104	16.001	5.016	82.228	80.259	1.970	97.605
9.032	10.908	15.999	6.014	98.523	96.219	2.304	97.661
9.032	12.720	15.998	7.014	114.891	112.210	2.681	97.667
9.032	14.536	15.997	8.014	131.293	128.200	3.093	97.644
9.032	16.354	15.996	9.012	147.711	144.157	3.554	97.594
9.032	18.182	15.996	10.014	164.225	160.182	4.043	97.538
12.041	0.230	16.012	0.114	2.769	1.825	0.944	65.911
12.041	0.430	16.013	0.262	5.178	4.195	0.982	81.028
12.041	0.766	16.012	0.512	9.223	8.198	1.025	88.886
12.041	1.104	16.013	0.764	13.293	12.234	1.060	92.029
12.041	1.438	16.013	1.006	17.315	16.109	1.206	93.035
12.041	1.774	16.013	1.264	21.360	20.240	1.120	94.757
12.041	2.112	16.013	1.514	25.431	24.244	1.188	95.330
12.041	2.452	16.013	1.764	29.525	28.247	1.278	95.672
12.041	2.786	16.013	2.014	33.547	32.250	1.297	96.134
12.041	3.122	16.014	2.264	37.592	36.256	1.337	96.444
12.041	3.458	16.013	2.514	41.639	40.258	1.381	96.683
12.041	3.790	16.013	2.764	45.635	44.261	1.374	96.990
12.041	4.128	16.013	3.014	49.706	48.264	1.442	97.099
12.041	4.464	16.013	3.264	53.751	52.268	1.483	97.241
12.041	4.800	16.014	3.514	57.797	56.273	1.524	97.363
12.041	5.472	16.014	4.014	65.889	64.279	1.610	97.557
12.041	6.144	16.013	4.514	73.982	72.284	1.698	97.705
12.041	6.818	16.013	5.014	82.095	80.288	1.806	97.800

12.041	8.164	16.011	6.012	98.304	96.259	2.045	97.920
12.041	9.516	16.010	7.014	114.581	112.291	2.290	98.001
12.041	10.868	16.009	8.014	130.863	128.297	2.567	98.039
12.041	12.222	16.008	9.014	147.164	144.298	2.866	98.053
12.041	13.582	16.007	10.014	163.541	160.297	3.244	98.016

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Pin(W)	Pout(W)	Ploss(W)	Efficiency
9.032	0.372	20.045	0.114	3.360	2.285	1.075	68.007
9.033	0.708	20.045	0.264	6.395	5.292	1.103	82.750
9.033	1.270	20.045	0.514	11.471	10.303	1.169	89.814
9.033	1.836	20.045	0.766	16.584	15.354	1.230	92.586
9.033	2.396	20.044	1.014	21.642	20.325	1.317	93.915
9.032	2.956	20.044	1.264	26.700	25.336	1.364	94.890
9.032	3.520	20.044	1.516	31.794	30.387	1.408	95.573
9.032	4.092	20.044	1.762	36.961	35.317	1.644	95.553
9.032	4.652	20.043	2.014	42.018	40.367	1.651	96.070
9.032	5.214	20.043	2.264	47.095	45.378	1.717	96.354
9.032	5.776	20.042	2.514	52.171	50.386	1.785	96.578
9.032	6.338	20.043	2.764	57.247	55.398	1.849	96.771
9.032	6.900	20.042	3.014	62.323	60.405	1.918	96.923
9.032	7.462	20.042	3.264	67.400	65.417	1.983	97.058
9.032	8.026	20.042	3.514	72.495	70.426	2.068	97.147
9.032	9.156	20.040	4.014	82.701	80.442	2.259	97.268
9.032	10.288	20.039	4.514	92.926	90.458	2.468	97.344
9.032	11.418	20.039	5.014	103.132	100.476	2.656	97.425
9.033	13.684	20.037	6.012	123.601	120.462	3.138	97.461
9.032	15.960	20.036	7.014	144.154	140.533	3.621	97.488
9.032	18.244	20.034	8.014	164.781	160.554	4.226	97.435
9.032	20.530	20.033	9.012	185.429	180.538	4.891	97.362
9.032	22.828	20.031	10.014	206.184	200.593	5.591	97.288
12.041	0.286	20.050	0.112	3.444	2.246	1.198	65.208
12.041	0.536	20.051	0.262	6.454	5.253	1.201	81.395
12.041	0.956	20.050	0.512	11.511	10.266	1.246	89.180
12.041	1.380	20.050	0.762	16.617	15.278	1.339	91.941
12.041	1.804	20.050	1.014	21.722	20.331	1.391	93.594
12.041	2.222	20.050	1.264	26.755	25.343	1.412	94.721
12.041	2.642	20.050	1.514	31.812	30.355	1.456	95.422
12.041	3.062	20.050	1.764	36.870	35.369	1.501	95.929

12.041	3.486	20.050	2.014	41.975	40.380	1.595	96.199
12.041	3.912	20.049	2.262	47.105	45.351	1.754	96.276
12.041	4.332	20.049	2.514	52.162	50.403	1.759	96.627
12.041	4.752	20.049	2.764	57.219	55.416	1.803	96.849
12.041	5.172	20.048	3.012	62.277	60.386	1.891	96.964
12.041	5.594	20.048	3.264	67.359	65.438	1.921	97.148
12.041	6.014	20.048	3.512	72.414	70.407	2.006	97.229
12.041	6.858	20.048	4.014	82.578	80.471	2.107	97.449
12.041	7.702	20.046	4.514	92.741	90.489	2.252	97.572
12.041	8.546	20.046	5.014	102.902	100.509	2.394	97.674
12.041	10.234	20.044	6.012	123.228	120.507	2.721	97.792
12.041	11.928	20.043	7.012	143.624	140.544	3.079	97.856
12.041	13.624	20.042	8.014	164.048	160.616	3.433	97.908
12.041	15.322	20.041	9.012	184.492	180.605	3.887	97.893
12.041	17.028	20.040	10.014	205.039	200.683	4.355	97.876
16.052	0.220	20.055	0.114	3.532	2.286	1.245	64.738
16.052	0.408	20.055	0.262	6.549	5.254	1.295	80.231
16.052	0.724	20.056	0.512	11.622	10.268	1.353	88.354
16.052	1.040	20.055	0.762	16.694	15.282	1.413	91.538
16.052	1.354	20.055	1.014	21.735	20.336	1.399	93.563
16.052	1.668	20.055	1.262	26.775	25.309	1.466	94.525
16.052	1.986	20.055	1.514	31.879	30.363	1.516	95.244
16.052	2.300	20.055	1.764	36.920	35.377	1.543	95.820
16.052	2.618	20.055	2.012	42.025	40.350	1.675	96.014
16.052	2.934	20.055	2.262	47.097	45.364	1.733	96.320
16.052	3.248	20.054	2.512	52.138	50.375	1.762	96.620
16.052	3.562	20.054	2.762	57.178	55.388	1.790	96.869
16.052	3.880	20.054	3.012	62.282	60.401	1.880	96.981
16.052	4.192	20.053	3.262	67.291	65.414	1.877	97.211
16.052	4.508	20.054	3.512	72.363	70.428	1.935	97.326
16.052	5.138	20.053	4.012	82.475	80.454	2.021	97.550
16.052	5.770	20.052	4.512	92.620	90.477	2.144	97.685
16.052	6.400	20.052	5.014	102.734	100.539	2.195	97.863
16.052	7.662	20.051	6.012	122.992	120.545	2.447	98.011
16.052	8.926	20.049	7.012	143.281	140.586	2.694	98.120
16.052	10.194	20.049	8.014	163.636	160.675	2.961	98.190
16.052	11.460	20.048	9.012	183.955	180.672	3.283	98.215
16.052	12.730	20.047	10.012	204.341	200.713	3.628	98.225

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Pin(W)	Pout(W)	Ploss(W)	Efficiency
9.032	0.540	29.918	0.114	4.878	3.411	1.467	69.925
9.032	1.042	29.918	0.260	9.412	7.779	1.633	82.649
9.032	1.896	29.917	0.514	17.125	15.378	1.748	89.794
9.032	2.738	29.917	0.764	24.731	22.856	1.874	92.421
9.032	3.576	29.916	1.014	32.300	30.334	1.965	93.915
9.032	4.416	29.915	1.264	39.887	37.813	2.074	94.800
9.032	5.280	29.914	1.514	47.690	45.290	2.400	94.967
9.032	6.122	29.914	1.764	55.296	52.767	2.528	95.428
9.032	6.962	29.914	2.014	62.882	60.246	2.636	95.808
9.032	7.802	29.913	2.264	70.469	67.724	2.745	96.105
9.032	8.644	29.912	2.514	78.075	75.199	2.876	96.317
9.032	9.484	29.912	2.762	85.662	82.618	3.044	96.447
9.032	10.330	29.912	3.012	93.303	90.096	3.207	96.563
9.032	11.174	29.911	3.262	100.925	97.568	3.357	96.674
9.032	12.020	29.910	3.512	108.568	105.045	3.523	96.755
9.032	13.716	29.909	4.010	123.886	119.937	3.950	96.812
9.032	15.414	29.909	4.514	139.224	135.009	4.214	96.973
9.032	17.114	29.908	5.014	154.580	149.957	4.623	97.009
9.032	20.524	29.905	6.012	185.376	179.791	5.585	96.987
9.032	23.958	29.903	7.014	216.394	209.740	6.655	96.925
9.032	27.402	29.900	8.012	247.489	239.556	7.934	96.794
9.032	30.860	29.898	9.012	278.728	269.442	9.286	96.668
9.032	34.340	29.895	10.014	310.148	299.368	10.780	96.524
12.041	0.420	29.922	0.112	5.057	3.351	1.706	66.266
12.041	0.794	29.923	0.256	9.561	7.660	1.900	80.123
12.041	1.424	29.922	0.512	17.146	15.320	1.826	89.348
12.041	2.058	29.921	0.762	24.780	22.799	1.981	92.006
12.041	2.696	29.921	1.012	32.463	30.280	2.183	93.276
12.041	3.322	29.921	1.262	40.000	37.760	2.240	94.399
12.041	3.950	29.920	1.512	47.562	45.239	2.323	95.116
12.041	4.578	29.920	1.764	55.126	52.778	2.347	95.742
12.041	5.206	29.919	2.014	62.686	60.256	2.430	96.124
12.041	5.852	29.918	2.264	70.465	67.735	2.730	96.125
12.041	6.482	29.919	2.512	78.051	75.155	2.895	96.291
12.041	7.110	29.918	2.762	85.612	82.634	2.978	96.522
12.041	7.740	29.918	3.012	93.197	90.112	3.085	96.689
12.041	8.370	29.917	3.262	100.785	97.589	3.197	96.828
12.041	9.000	29.917	3.512	108.370	105.068	3.302	96.953

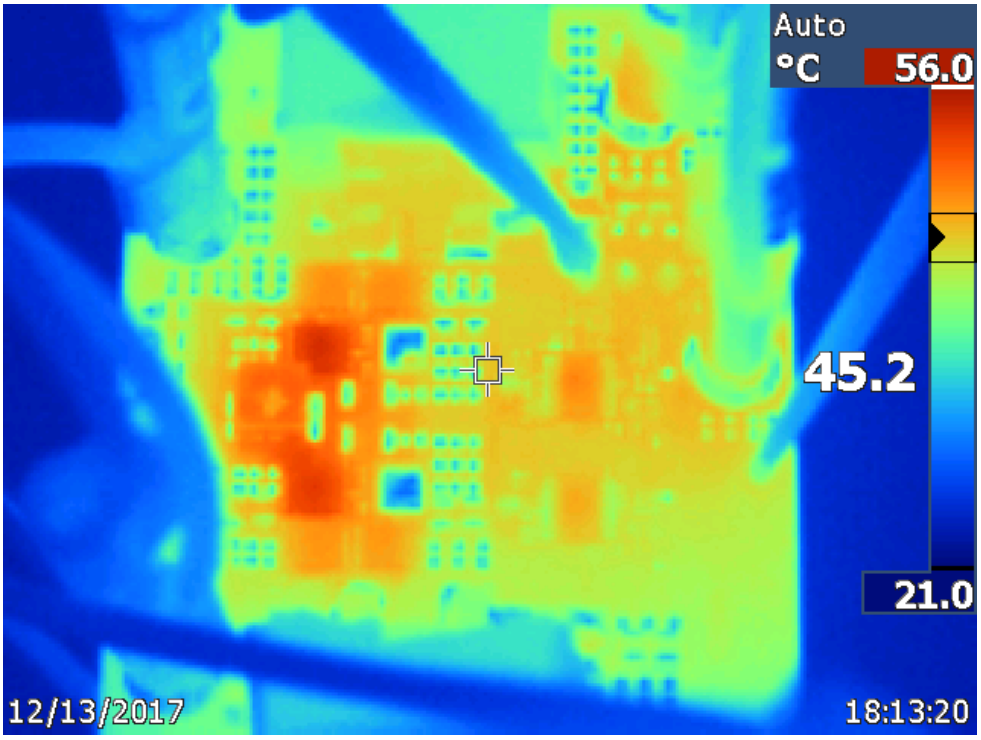
12.041	10.262	29.915	4.014	123.566	120.080	3.486	97.179
12.041	11.526	29.915	4.514	138.786	135.035	3.751	97.297
12.041	12.790	29.914	5.012	154.004	149.929	4.075	97.354
12.041	15.322	29.912	6.014	184.492	179.889	4.603	97.505
12.041	17.864	29.911	7.014	215.100	209.793	5.307	97.533
12.041	20.410	29.909	8.014	245.757	239.689	6.068	97.531
12.041	22.962	29.907	9.012	276.483	269.519	6.964	97.481
12.041	25.526	29.906	10.014	307.355	299.474	7.882	97.436
16.052	0.330	29.926	0.112	5.297	3.352	1.946	63.272
16.052	0.610	29.926	0.262	9.792	7.841	1.951	80.074
16.052	1.078	29.925	0.512	17.304	15.322	1.983	88.542
16.052	1.550	29.925	0.762	24.881	22.803	2.078	91.647
16.052	2.024	29.925	1.012	32.490	30.284	2.205	93.212
16.052	2.500	29.925	1.262	40.131	37.765	2.366	94.104
16.052	2.972	29.925	1.514	47.708	45.306	2.402	94.966
16.052	3.442	29.924	1.762	55.252	52.727	2.525	95.429
16.052	3.910	29.923	2.014	62.765	60.266	2.499	96.018
16.052	4.380	29.924	2.262	70.309	67.688	2.621	96.272
16.052	4.850	29.923	2.512	77.854	75.167	2.686	96.549
16.052	5.320	29.923	2.762	85.398	82.646	2.752	96.778
16.052	5.798	29.923	3.012	93.071	90.127	2.944	96.837
16.052	6.276	29.922	3.262	100.744	97.606	3.137	96.886
16.052	6.748	29.921	3.512	108.319	105.083	3.236	97.012
16.052	7.692	29.921	4.014	123.475	120.102	3.372	97.269
16.052	8.634	29.920	4.514	138.594	135.060	3.533	97.451
16.052	9.576	29.919	5.012	153.713	149.956	3.758	97.555
16.052	11.464	29.918	6.012	184.019	179.864	4.155	97.742
16.052	13.358	29.917	7.014	214.425	209.838	4.587	97.861
16.052	15.252	29.915	8.014	244.828	239.741	5.087	97.922
16.052	17.148	29.914	9.014	275.261	269.644	5.617	97.959
16.052	19.052	29.913	10.014	305.826	299.547	6.280	97.947

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Pin(W)	Pout(W)	Ploss(W)	Efficiency
9.033	0.706	39.994	0.114	6.377	4.559	1.818	71.496
9.032	1.380	39.994	0.264	12.465	10.558	1.906	84.706
9.032	2.534	39.993	0.514	22.888	20.556	2.331	89.815
9.032	3.664	39.992	0.764	33.094	30.554	2.540	92.326
9.032	4.814	39.991	1.014	43.482	40.551	2.930	93.260
9.032	5.952	39.990	1.264	53.760	50.547	3.213	94.024

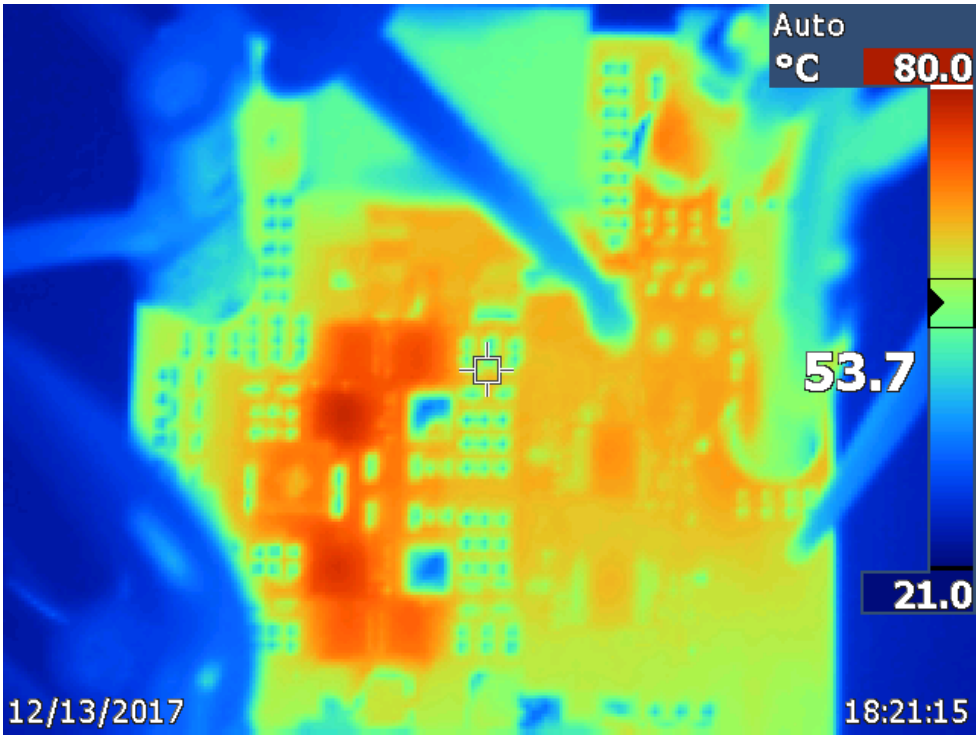
9.032	7.086	39.990	1.514	64.002	60.544	3.458	94.597
9.032	8.214	39.988	1.764	74.192	70.539	3.653	95.077
9.032	9.342	39.987	2.014	84.380	80.534	3.846	95.442
9.032	10.472	39.987	2.264	94.584	90.530	4.054	95.714
9.032	11.604	39.986	2.514	104.809	100.524	4.286	95.911
9.032	12.734	39.985	2.762	115.016	110.438	4.579	96.019
9.032	13.870	39.984	3.014	125.275	120.512	4.763	96.198
9.032	15.008	39.983	3.262	135.553	130.426	5.127	96.218
9.032	16.146	39.982	3.512	145.834	140.418	5.416	96.286
9.032	18.430	39.981	4.014	166.462	160.484	5.978	96.409
9.032	20.716	39.979	4.514	187.107	180.467	6.640	96.451
9.032	23.010	39.978	5.012	207.821	200.368	7.453	96.414
9.032	27.618	39.975	6.012	249.441	240.328	9.113	96.347
9.032	32.262	39.972	7.014	291.381	280.365	11.016	96.219
9.032	36.936	39.969	8.010	333.592	320.151	13.441	95.971
9.031	41.642	39.966	9.012	376.088	360.173	15.916	95.768
9.031	46.388	39.963	10.014	418.948	400.189	18.759	95.522
12.041	0.554	40.000	0.112	6.671	4.480	2.191	67.160
12.041	1.056	39.999	0.262	12.715	10.480	2.235	82.420
12.041	1.902	39.999	0.512	22.902	20.479	2.422	89.423
12.040	2.764	39.998	0.762	33.280	30.479	2.801	91.582
12.041	3.606	39.998	1.012	43.419	40.478	2.942	93.225
12.041	4.446	39.997	1.262	53.534	50.476	3.058	94.288
12.041	5.288	39.996	1.514	63.673	60.554	3.119	95.102
12.041	6.130	39.996	1.762	73.810	70.473	3.337	95.479
12.041	6.992	39.995	2.014	84.190	80.549	3.641	95.676
12.041	7.844	39.994	2.262	94.447	90.465	3.981	95.785
12.041	8.686	39.993	2.512	104.587	100.464	4.123	96.057
12.041	9.528	39.993	2.762	114.725	110.460	4.265	96.282
12.041	10.374	39.993	3.012	124.911	120.458	4.453	96.435
12.041	11.218	39.992	3.262	135.072	130.455	4.617	96.582
12.041	12.066	39.991	3.512	145.287	140.450	4.837	96.671
12.041	13.762	39.990	4.014	165.705	160.519	5.186	96.871
12.041	15.458	39.989	4.512	186.130	180.431	5.699	96.938
12.041	17.156	39.987	5.014	206.569	200.497	6.072	97.061
12.040	20.560	39.985	6.010	247.552	240.307	7.245	97.073
12.041	23.980	39.982	7.012	288.737	280.357	8.380	97.098
12.041	27.412	39.980	8.012	330.057	320.321	9.736	97.050
12.040	30.856	39.978	9.012	371.513	360.281	11.232	96.977

12.040	34.318	39.976	10.014	413.201	400.316	12.885	96.882
16.052	0.442	40.003	0.112	7.095	4.480	2.615	63.147
16.052	0.818	40.004	0.262	13.130	10.481	2.649	79.822
16.052	1.444	40.004	0.512	23.179	20.482	2.697	88.364
16.052	2.074	40.003	0.762	33.292	30.483	2.809	91.561
16.052	2.710	40.003	1.012	43.501	40.483	3.018	93.062
16.052	3.352	40.003	1.262	53.807	50.483	3.324	93.823
16.052	3.984	40.002	1.512	63.951	60.483	3.468	94.576
16.052	4.612	40.001	1.762	74.032	70.482	3.550	95.205
16.052	5.240	40.001	2.012	84.112	80.482	3.630	95.684
16.052	5.868	40.001	2.260	94.194	90.402	3.792	95.975
16.052	6.498	40.000	2.512	104.305	100.481	3.824	96.334
16.052	7.128	39.999	2.762	114.418	110.478	3.940	96.556
16.052	7.772	39.999	3.012	124.754	120.477	4.276	96.572
16.052	8.412	39.998	3.262	135.028	130.474	4.554	96.627
16.052	9.042	39.998	3.512	145.142	140.472	4.670	96.783
16.052	10.306	39.997	4.012	165.430	160.468	4.962	97.000
16.052	11.570	39.996	4.514	185.719	180.541	5.179	97.211
16.052	12.834	39.995	5.010	206.011	200.374	5.636	97.264
16.052	15.366	39.993	6.010	246.656	240.356	6.300	97.446
16.052	17.908	39.991	7.012	287.458	280.417	7.042	97.550
16.052	20.452	39.988	8.012	328.294	320.387	7.907	97.592
16.052	22.998	39.987	9.010	369.156	360.280	8.876	97.595
16.052	25.556	39.985	10.012	410.223	400.330	9.893	97.588

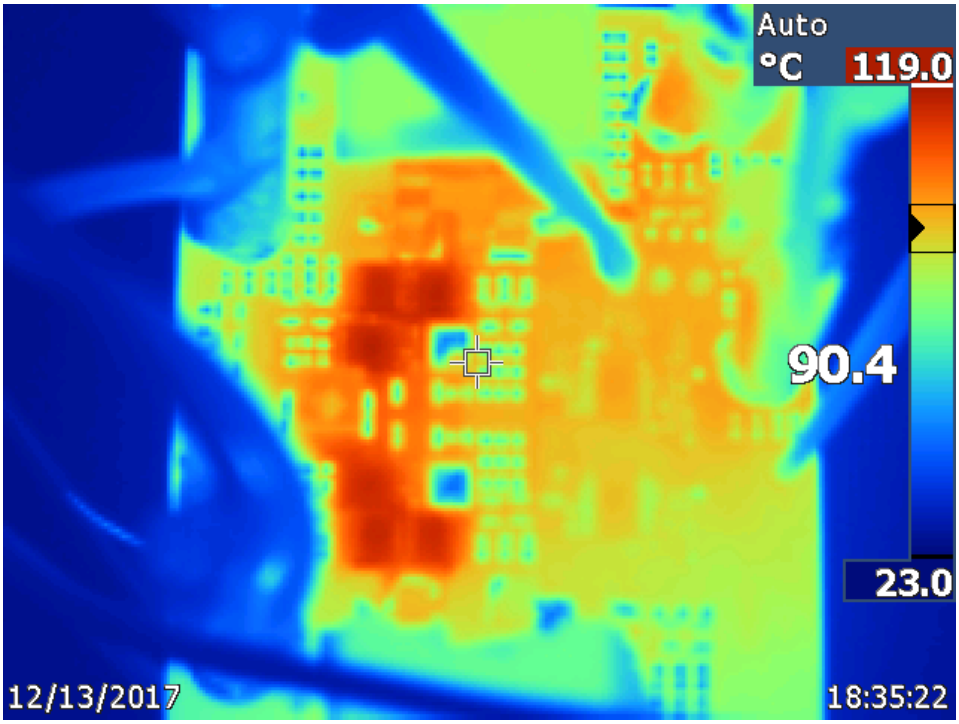
5 Thermal



Thermal at 12Vin, 20Vout @ 10A when the board reaches thermal equilibrium without airflow.



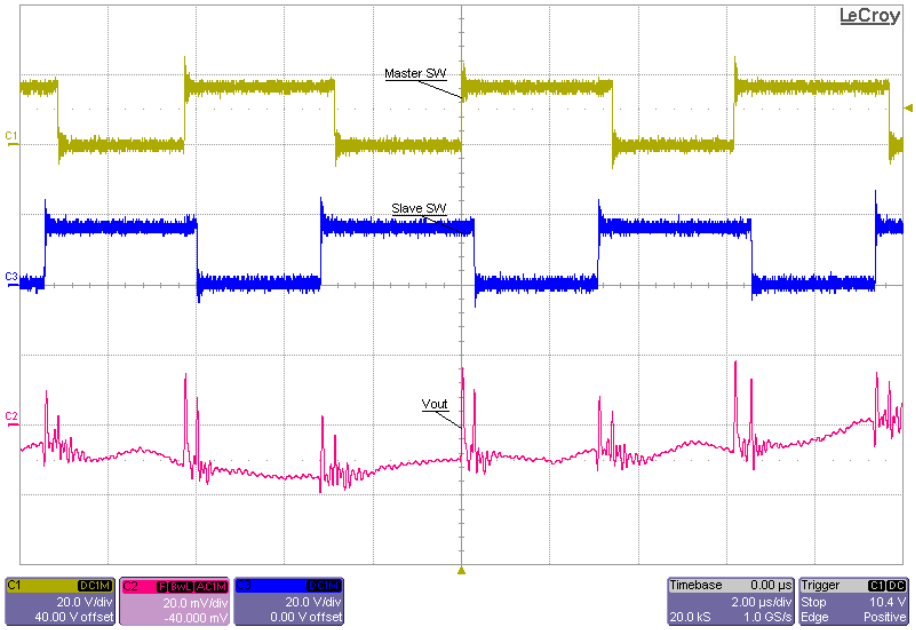
Thermal at 12Vin, 30Vout @ 10A when the board reaches thermal equilibrium without airflow.



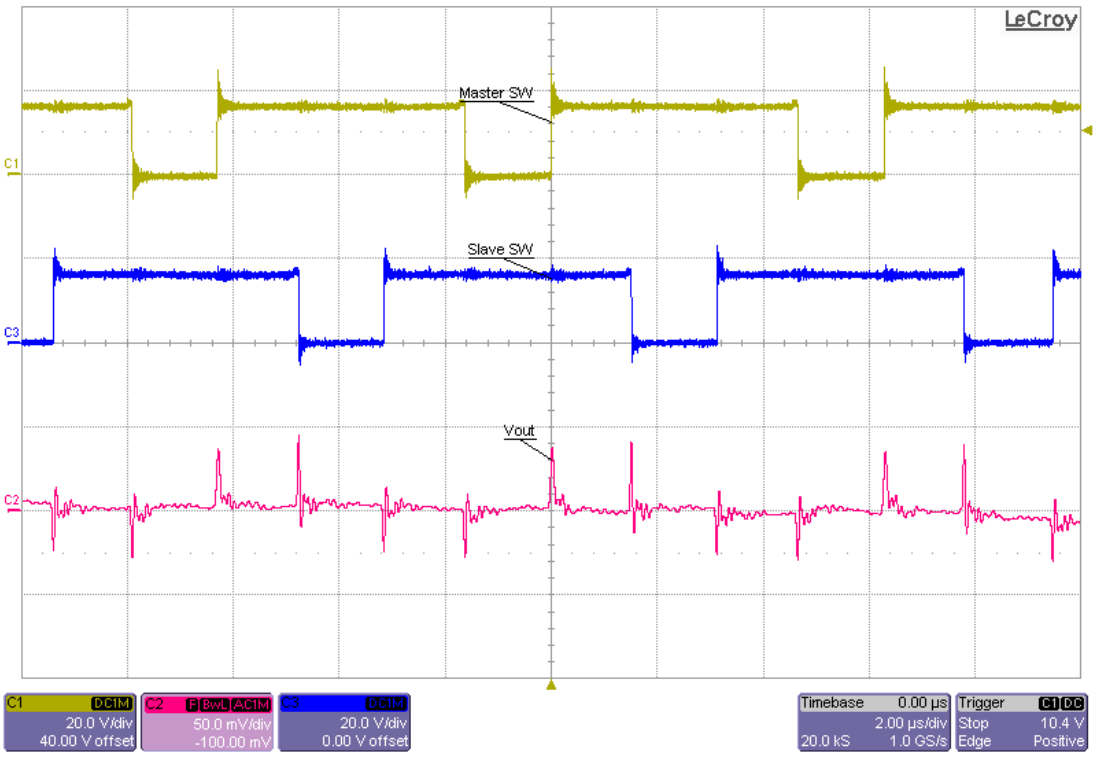
Thermal at 12Vin, 40Vout @ 10A when the board reaches thermal equilibrium without airflow.

6 Thermal

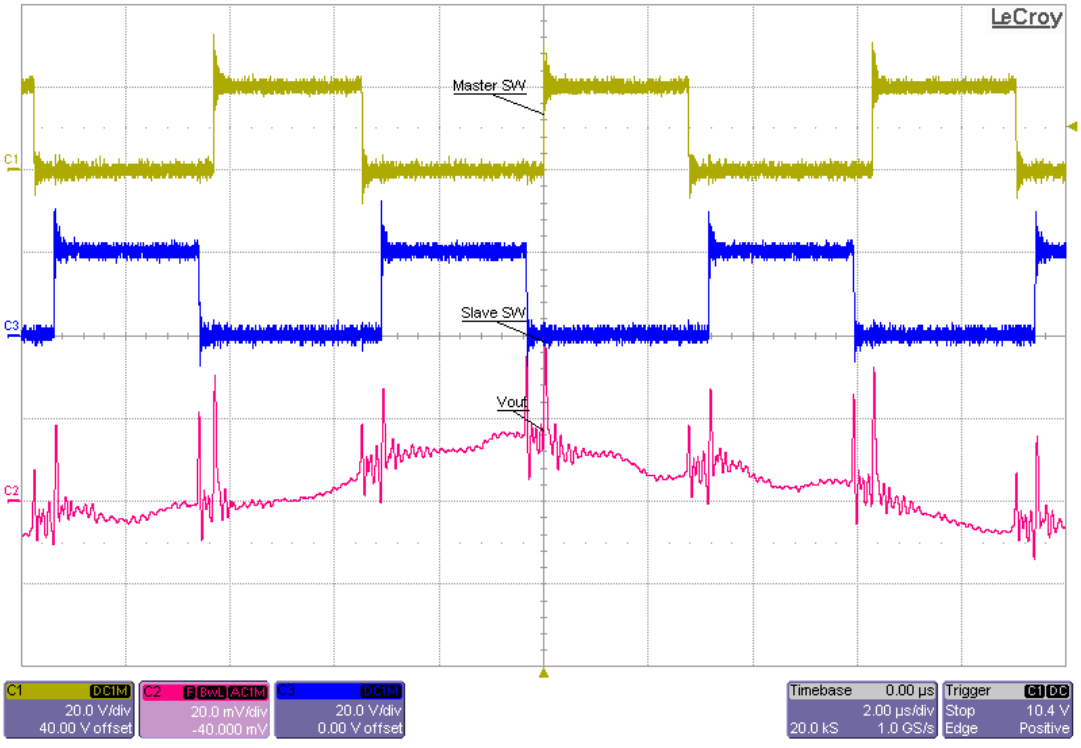
6.1 Switching Waveform and Output Ripple



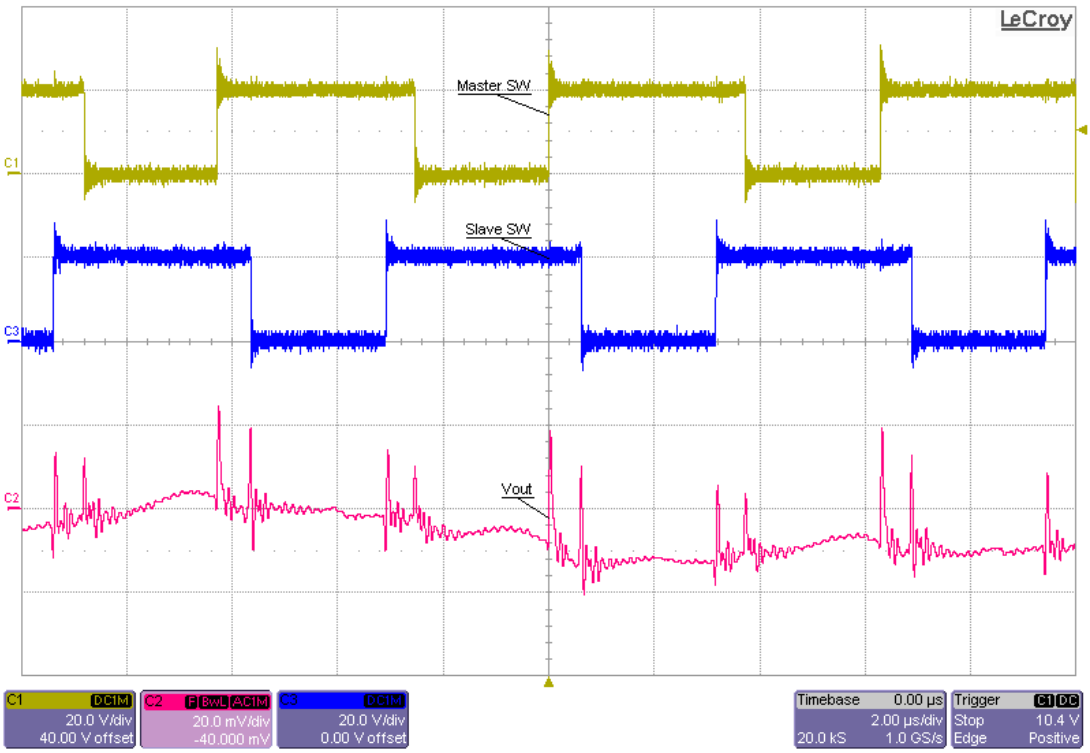
9Vin, 16Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.



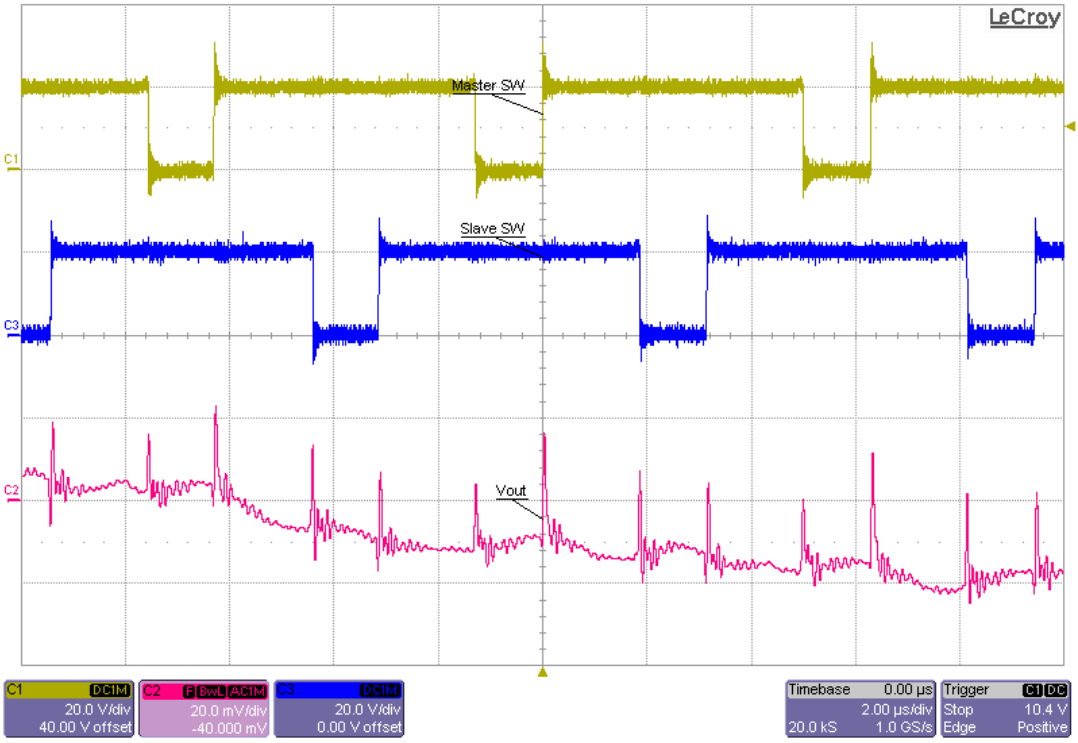
12Vin, 16Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.



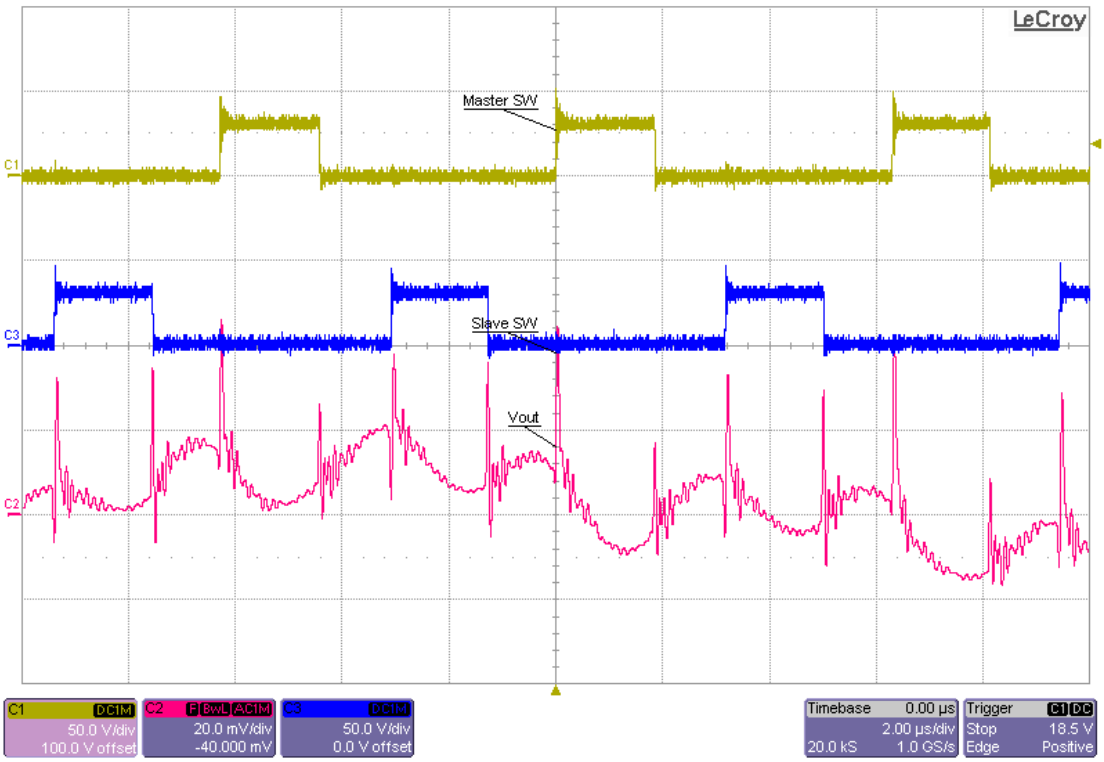
9Vin, 20Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.



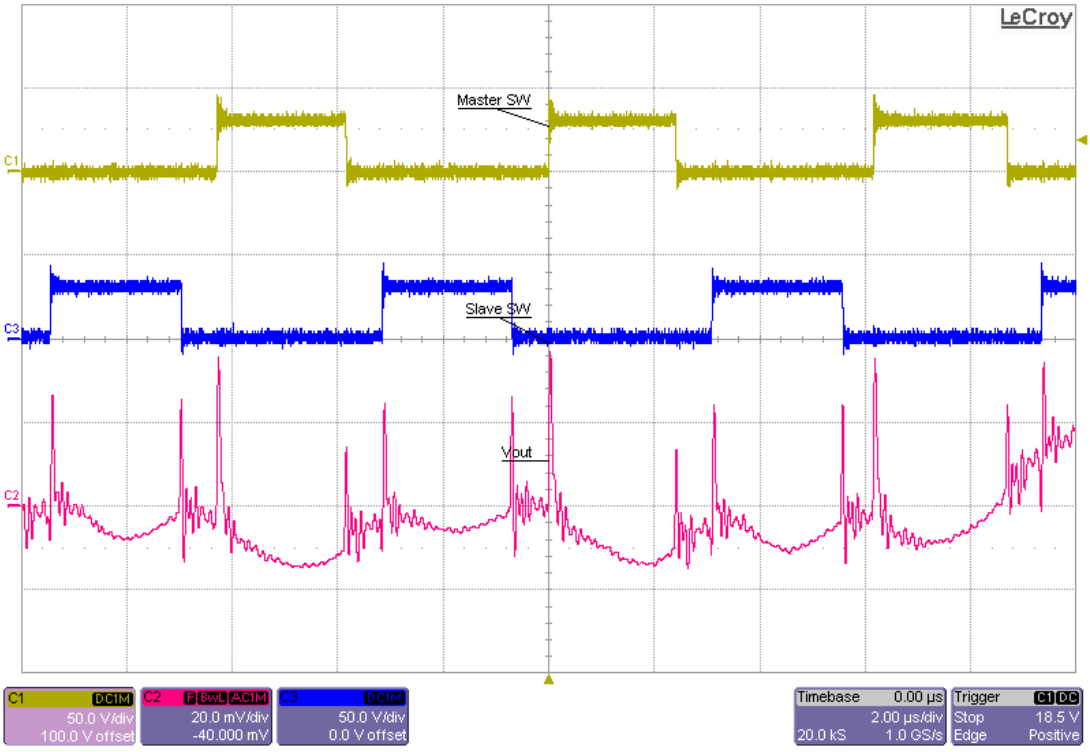
12Vin, 20Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.



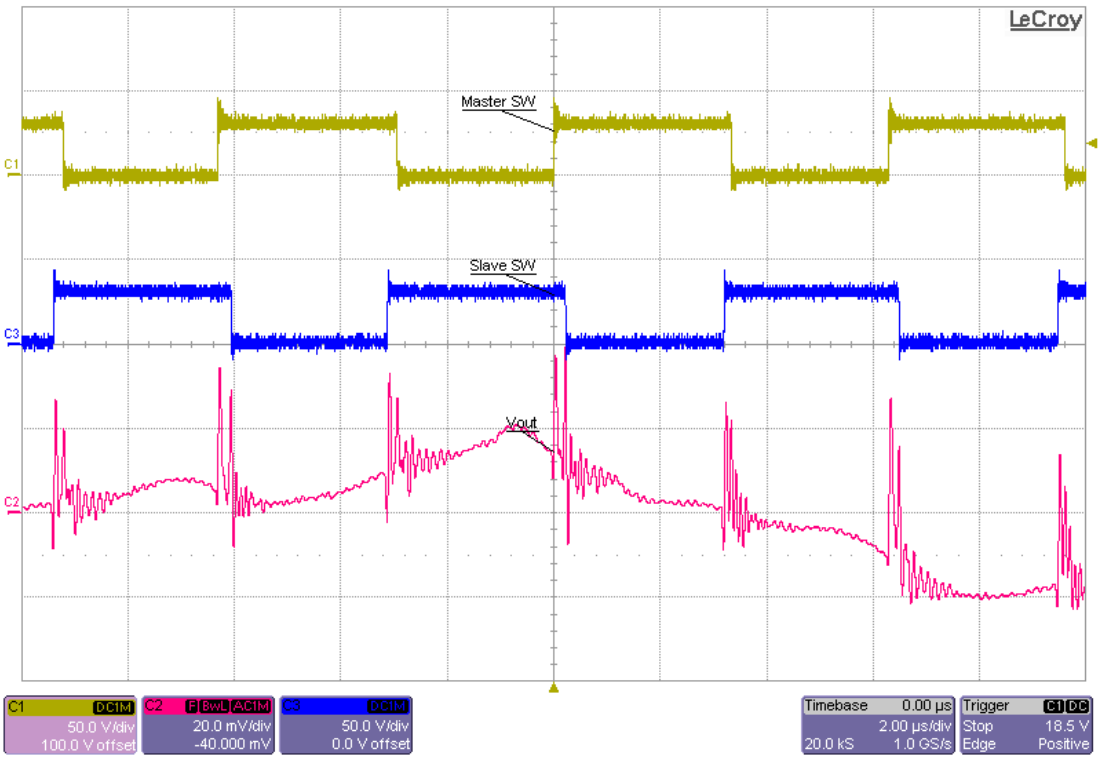
16Vin, 20Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.



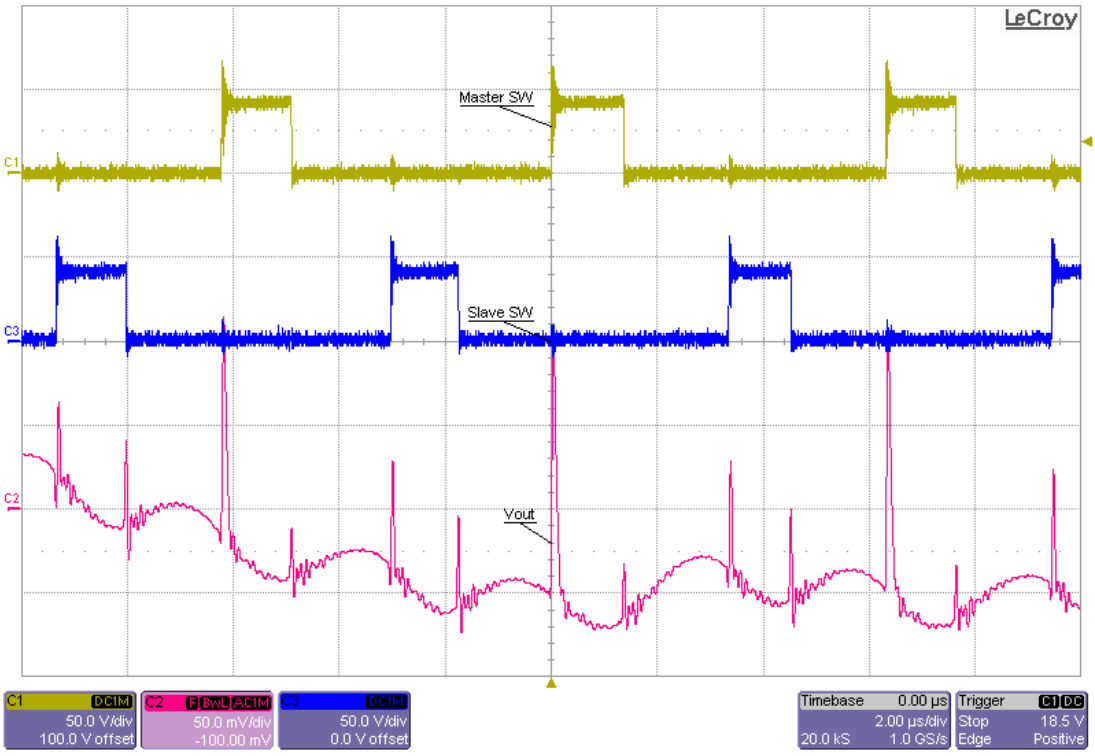
9Vin, 30Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.



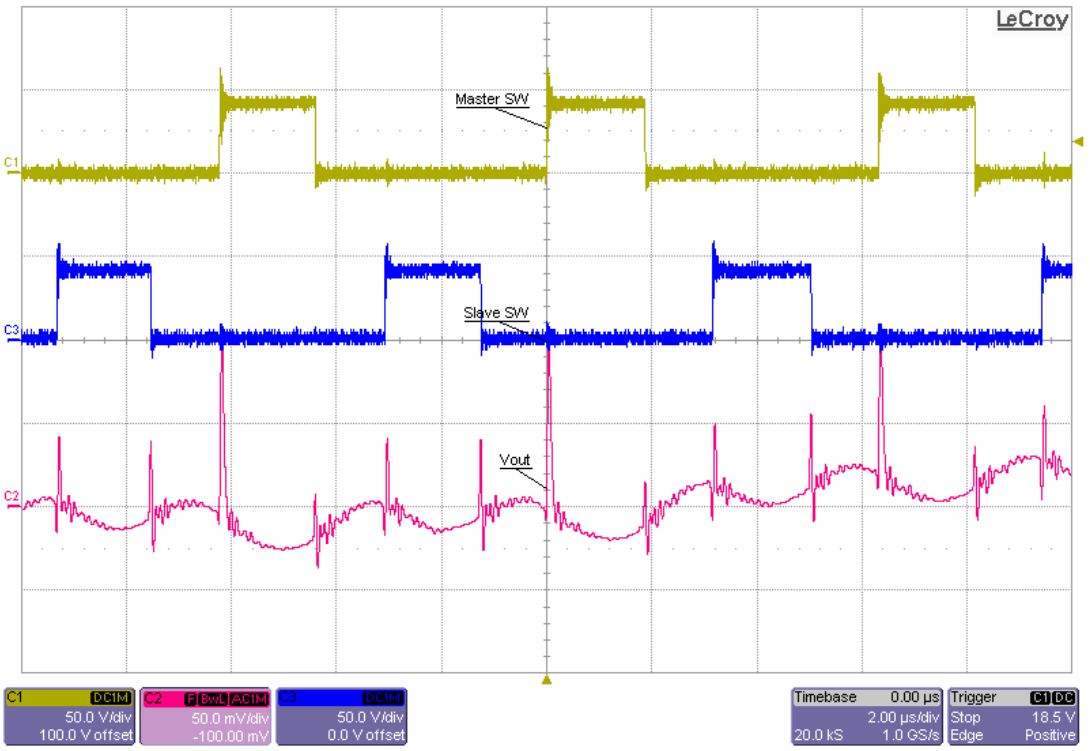
12Vin, 30Vout, full load. Ch1 measures master, Ch2 measures slave, Ch3 measures Vout.



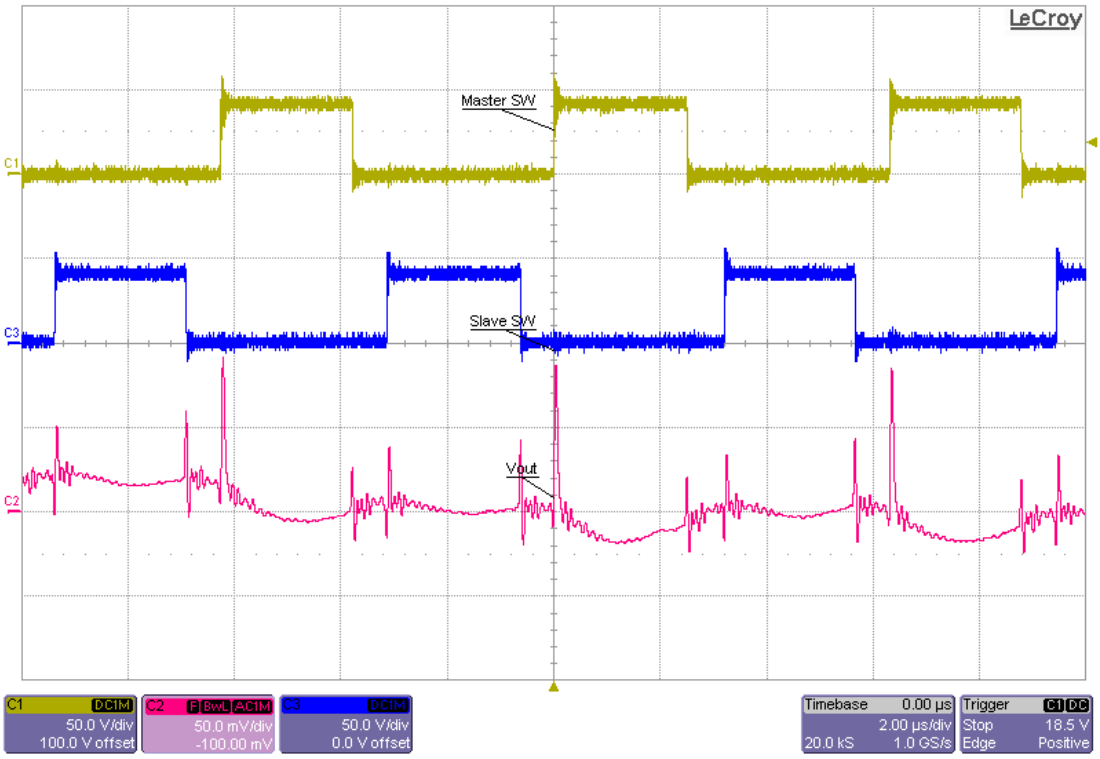
16Vin, 30Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.



9Vin, 40Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.

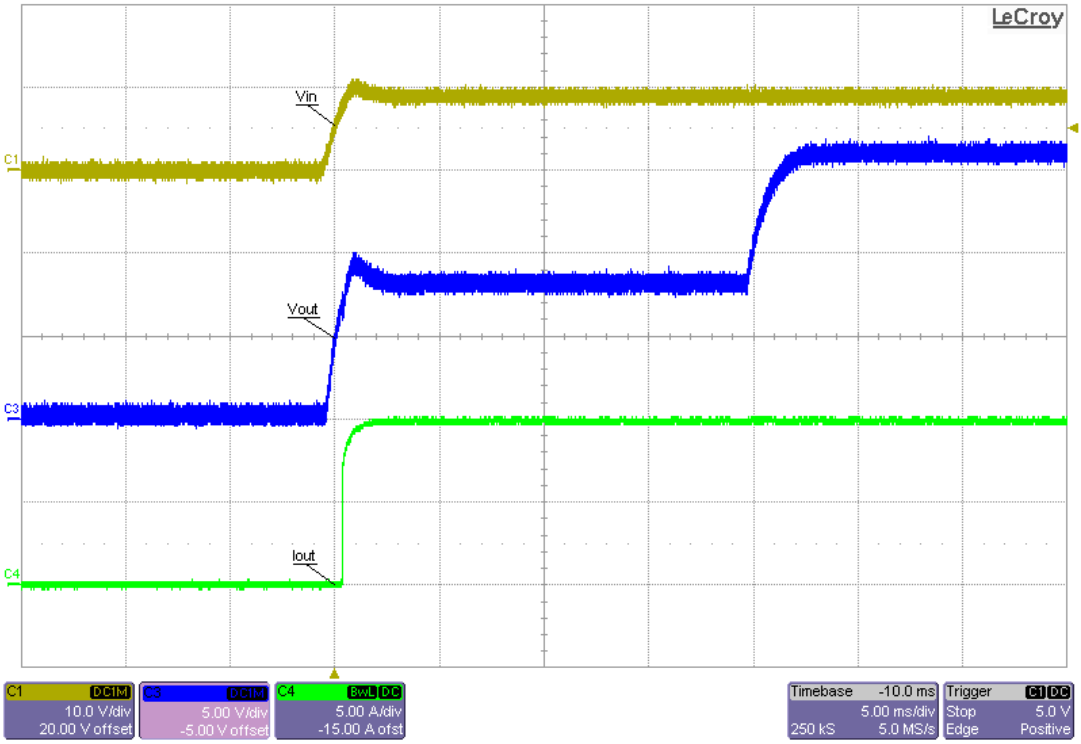


12Vin, 40Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.

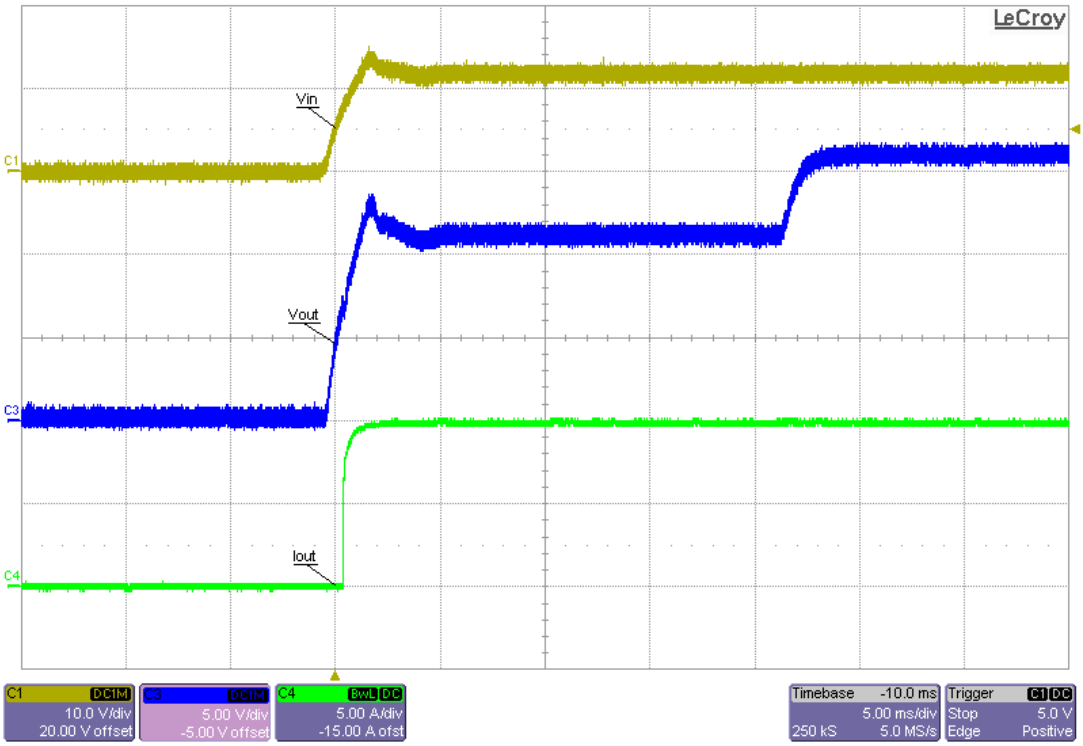


16Vin, 40Vout, full load. Ch1 measures master, Ch3 measures slave, Ch2 measures Vout.

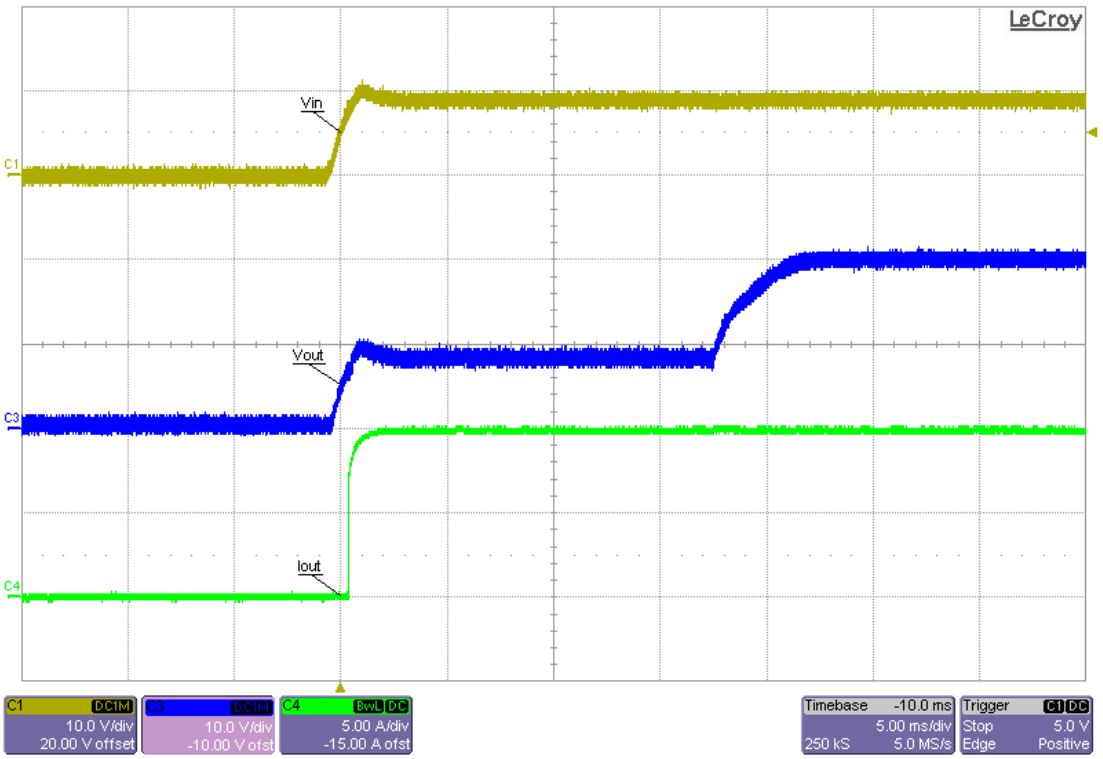
6.2 Start Up



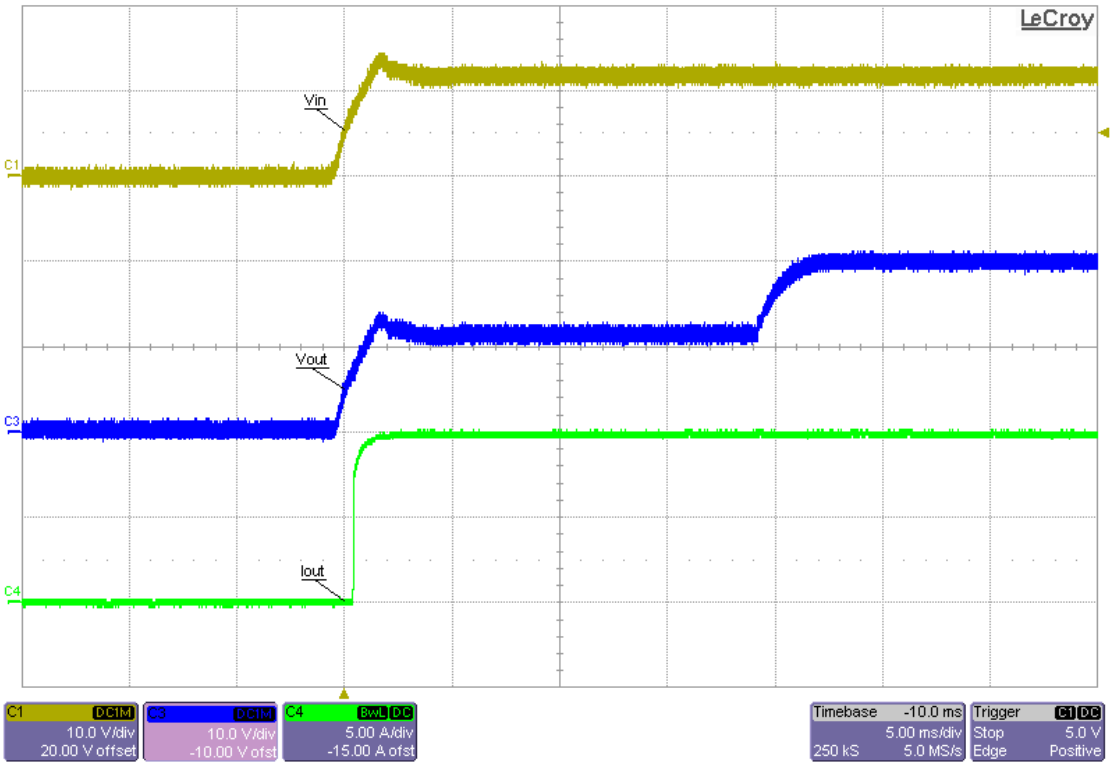
9Vin, 16Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



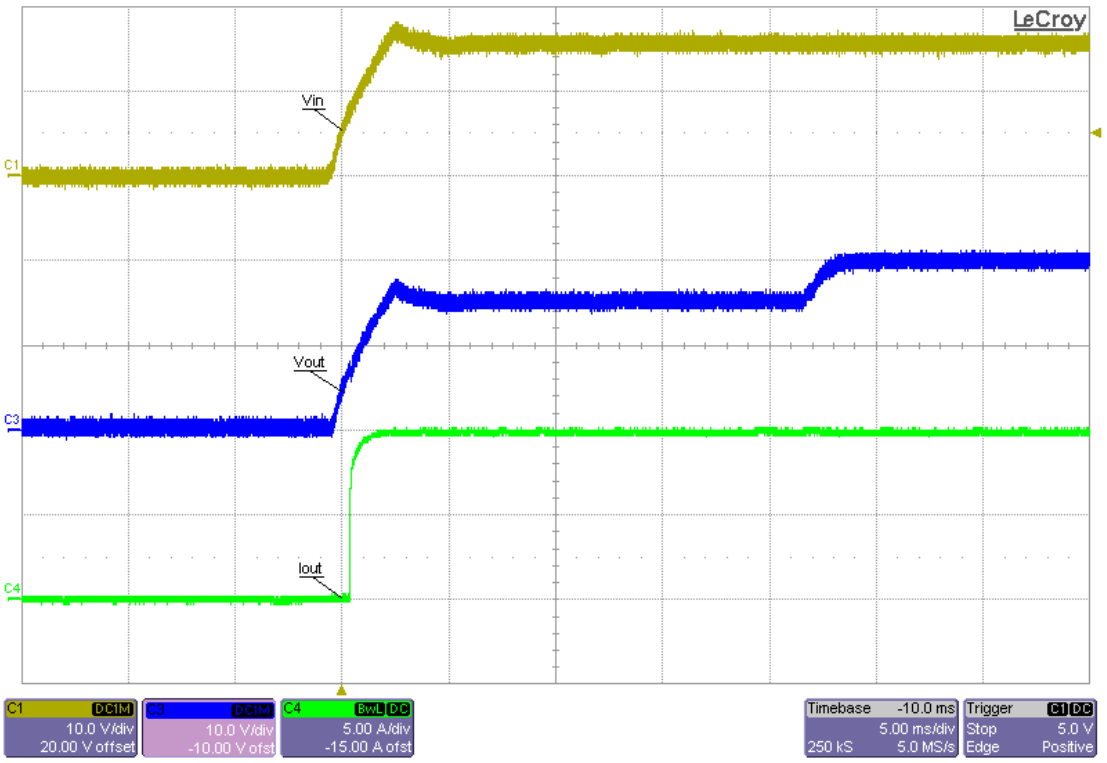
12Vin, 16Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



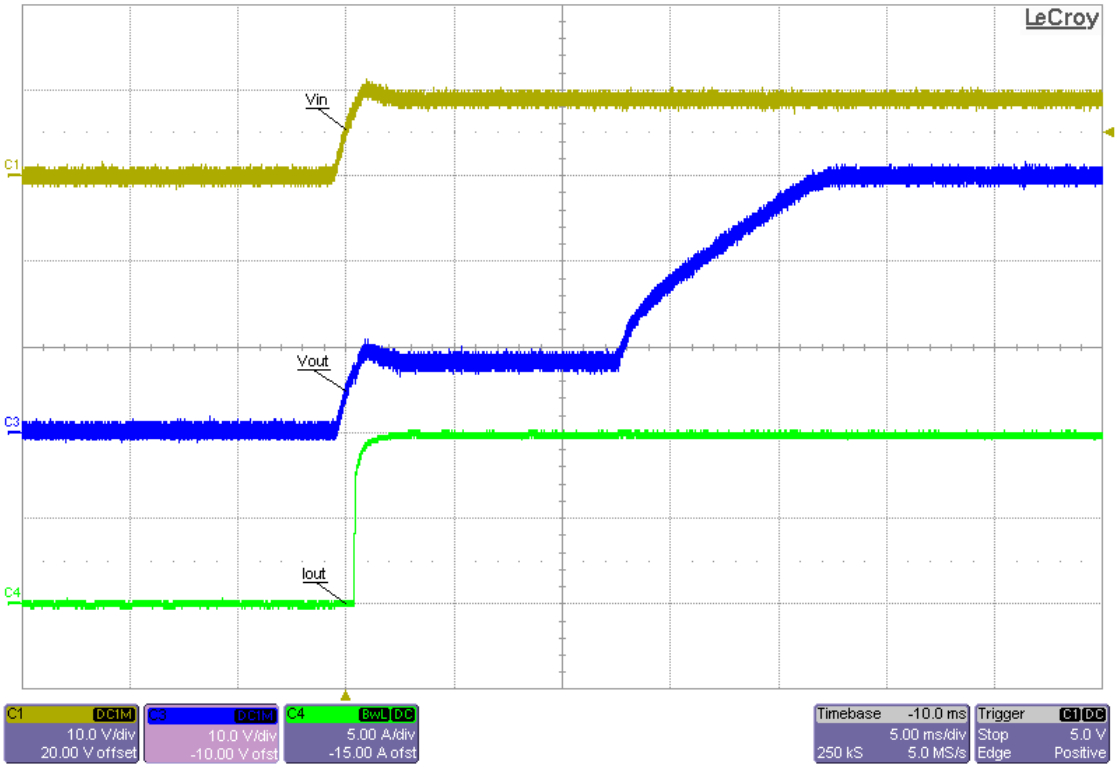
9Vin, 20Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



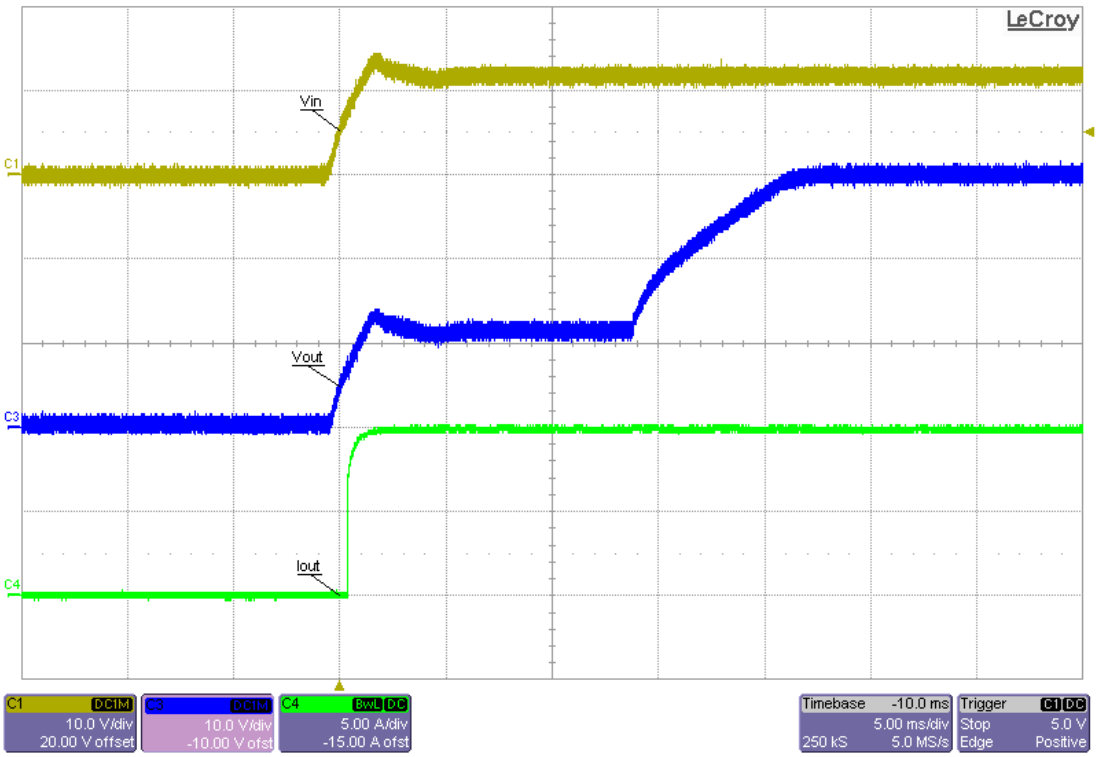
12Vin, 20Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



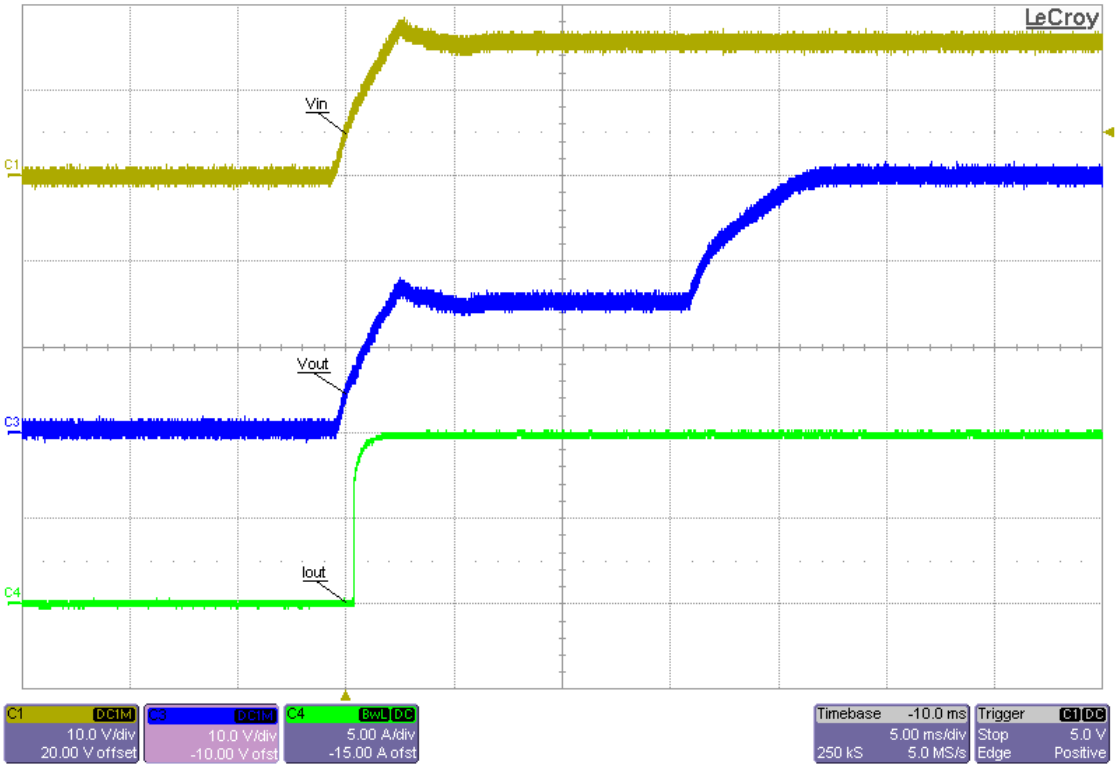
16Vin, 20Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



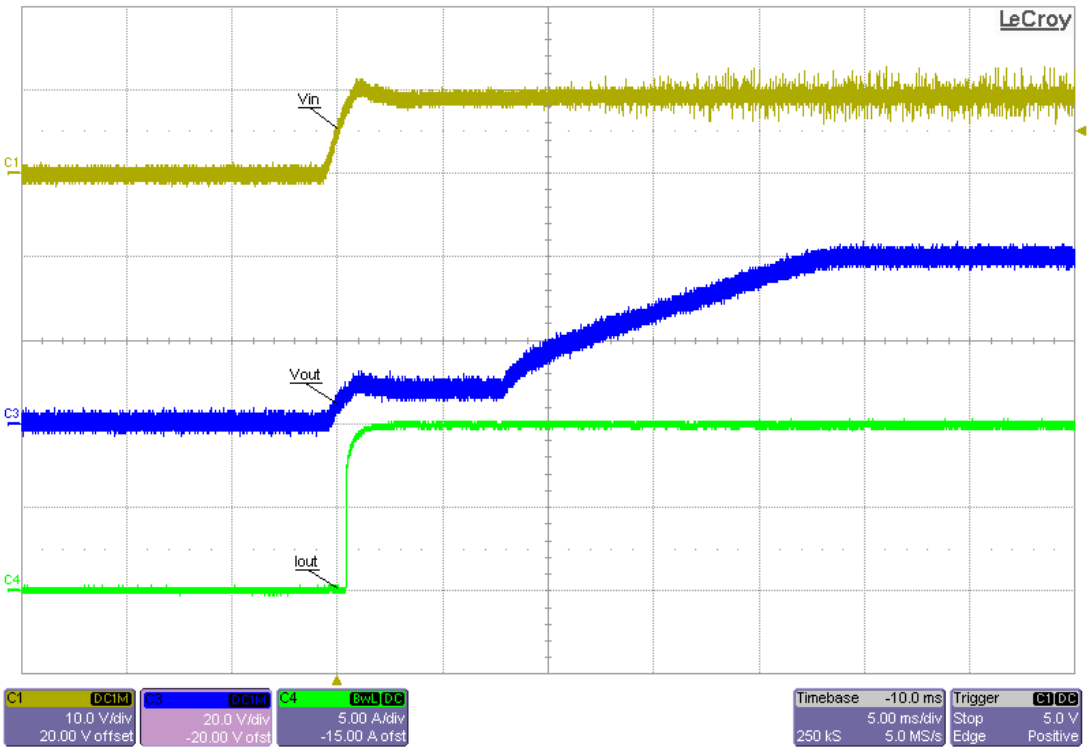
9Vin, 30Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



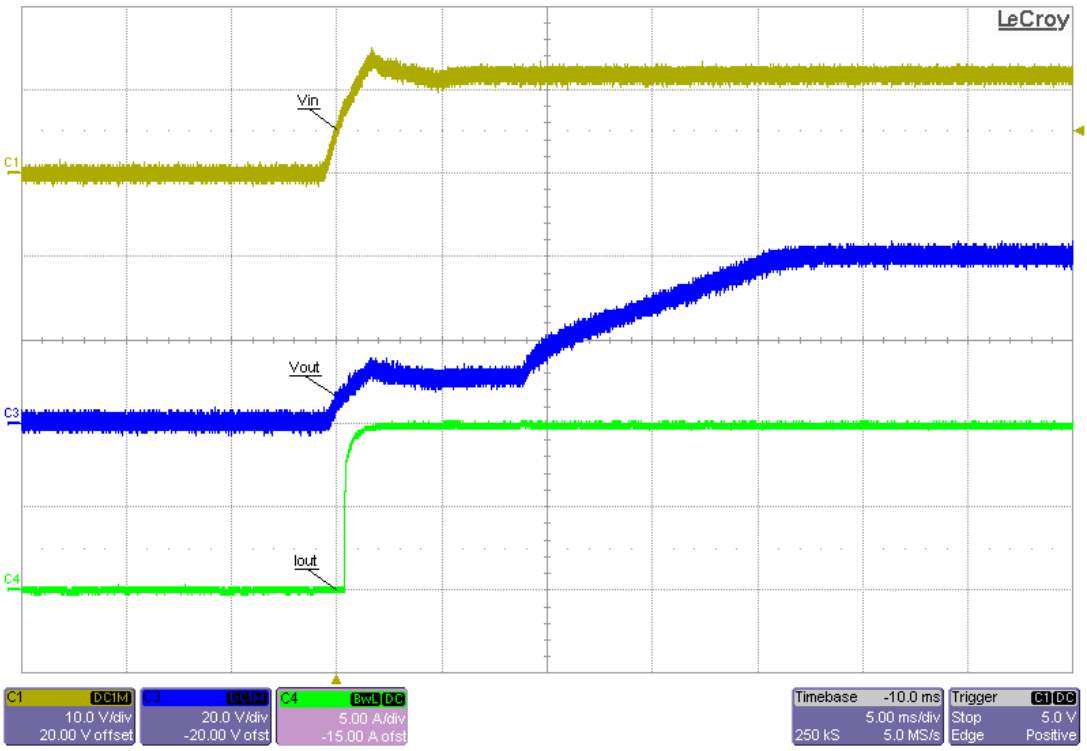
12Vin, 30Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



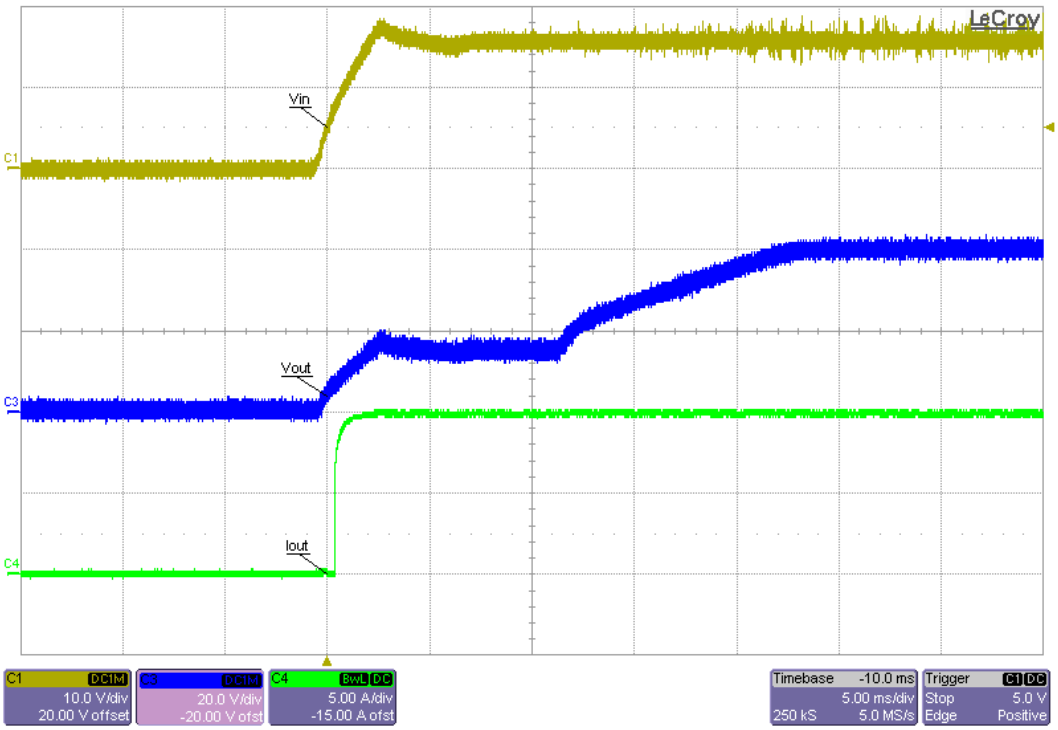
16Vin, 30Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.



9Vin, 40Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.

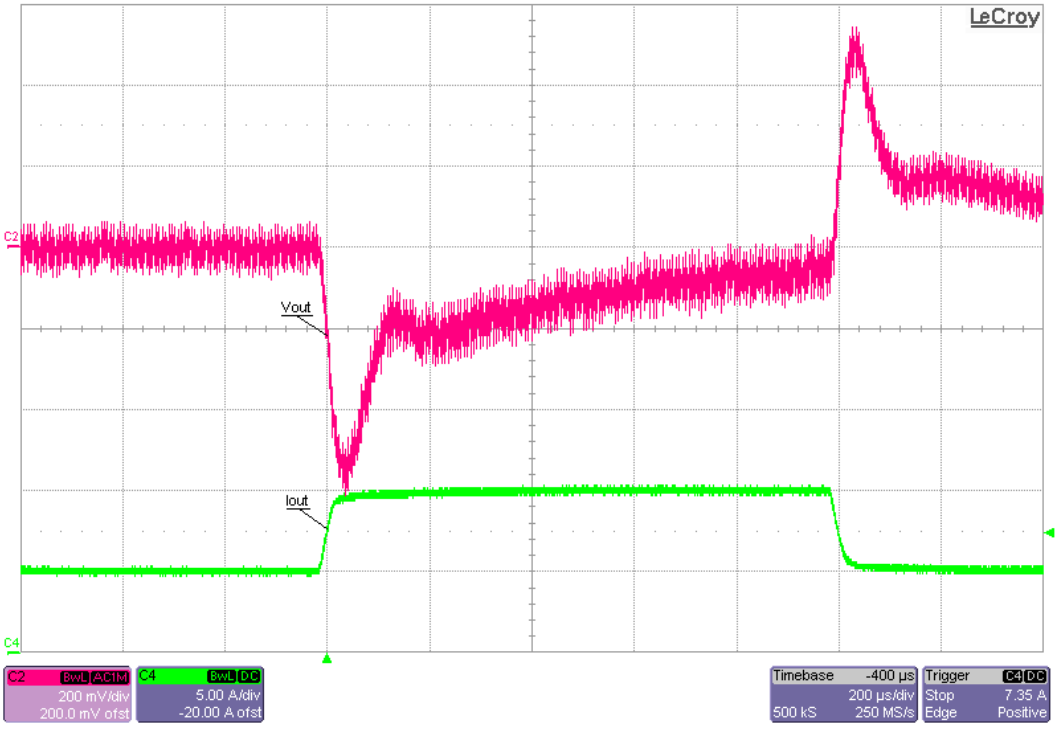


12Vin, 40Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.

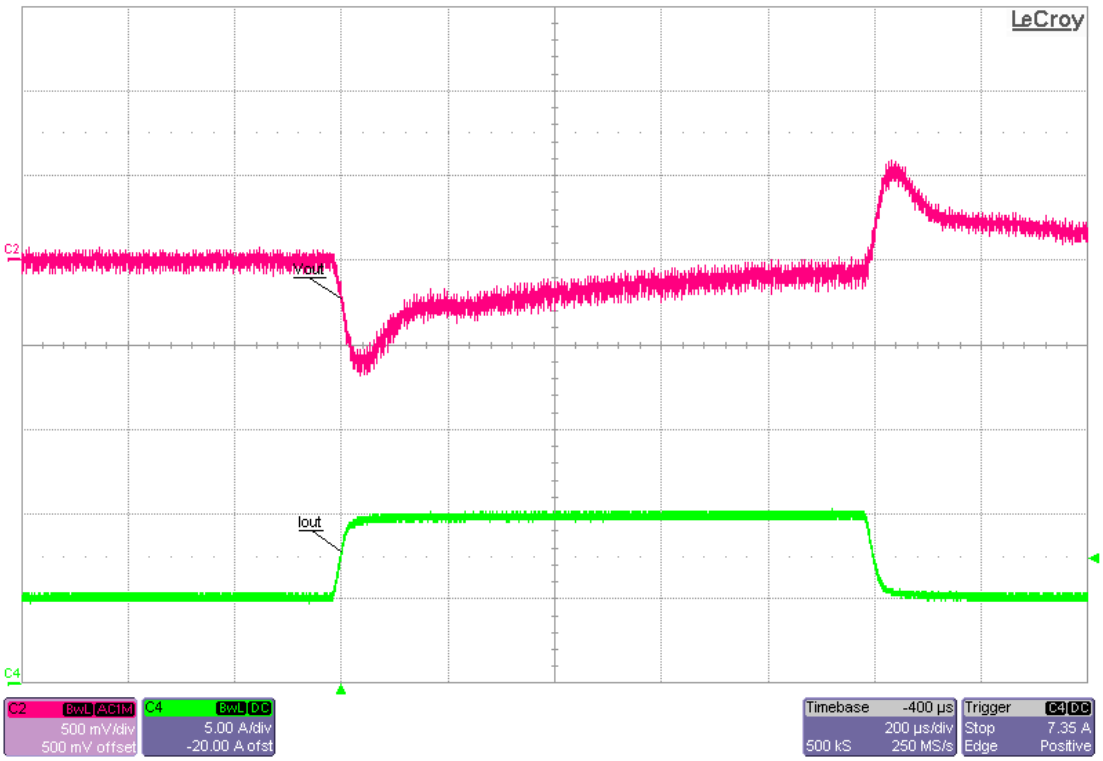


16Vin, 40Vout full load start up. Ch1 measures Vin, Ch3 measures Vout, and Ch4 measures Iout.

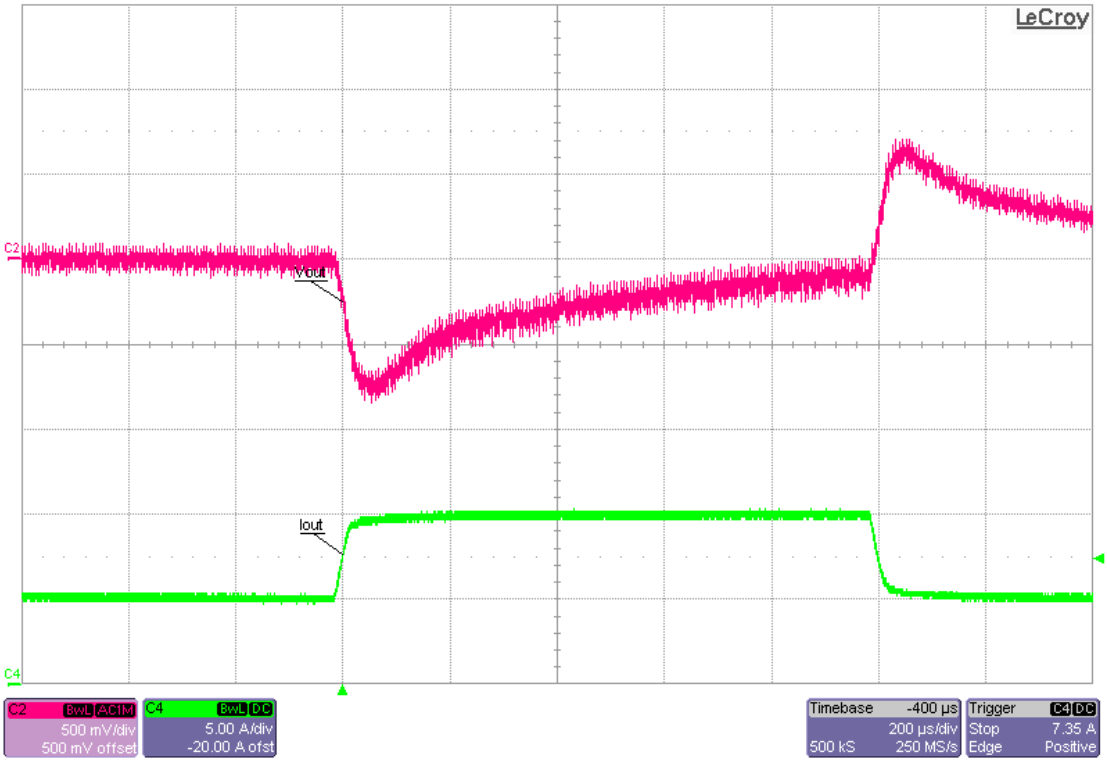
6.3 Transient Response



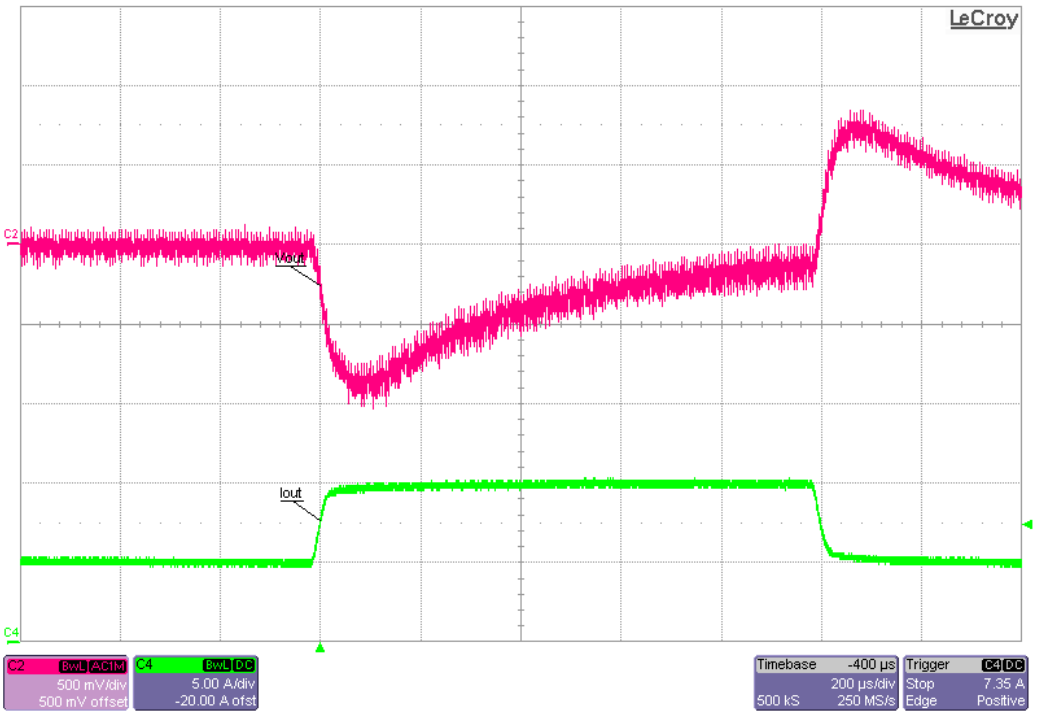
12Vin, 16Vout 5A to 10A load transient. Ch4 measures Iout, and Ch2 measures Vout.



12Vin, 20Vout 5A to 10A load transient. Ch4 measures Iout, and Ch2 measures Vout.

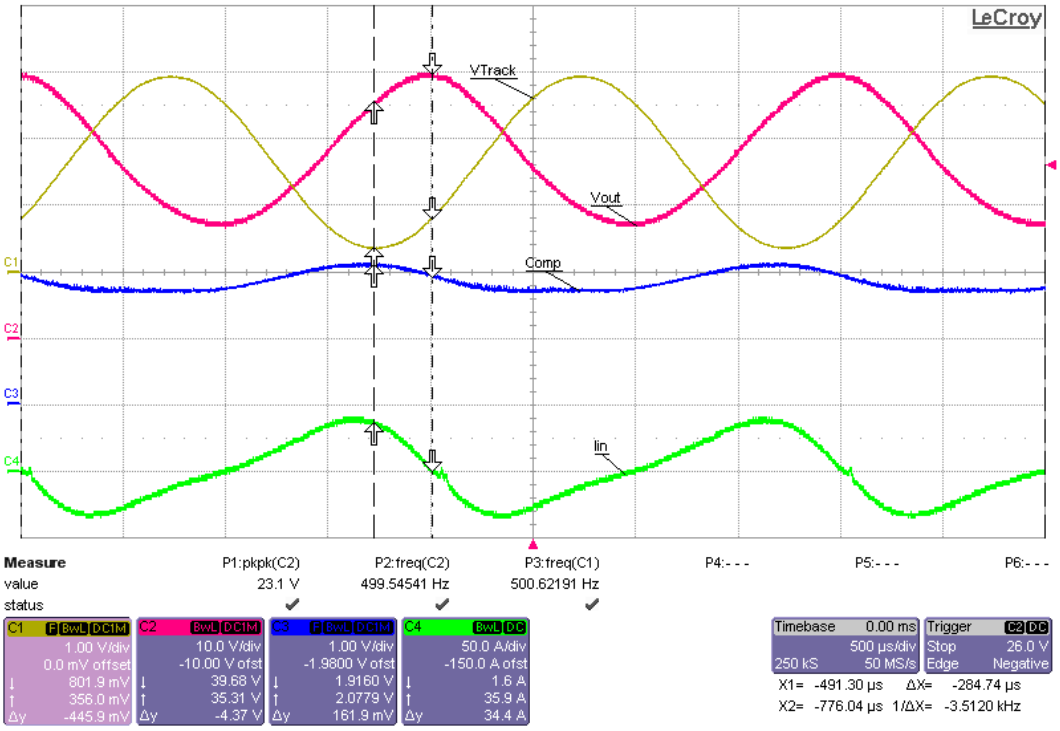


12Vin, 30Vout 5A to 10A load transient. Ch4 measures Iout, and Ch2 measures Vout.

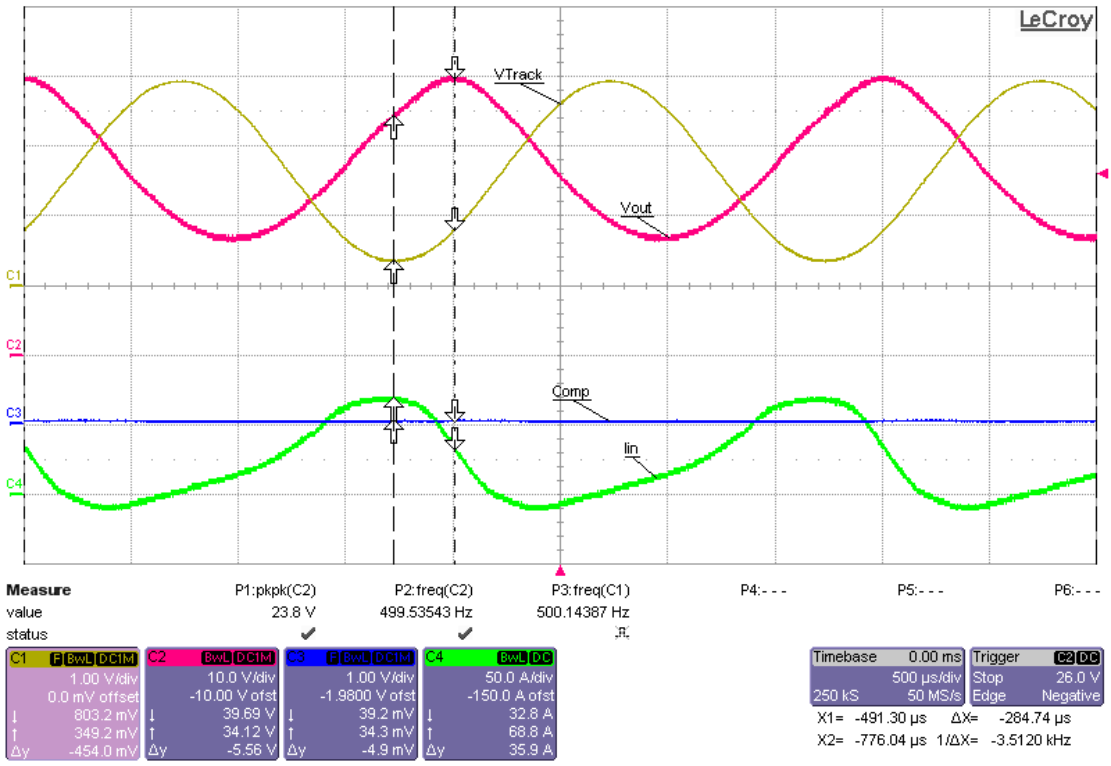


12Vin, 40Vout 5A to 10A load transient. Ch4 measures Iout, and Ch2 measures Vout.

6.4 Envelope Tracking

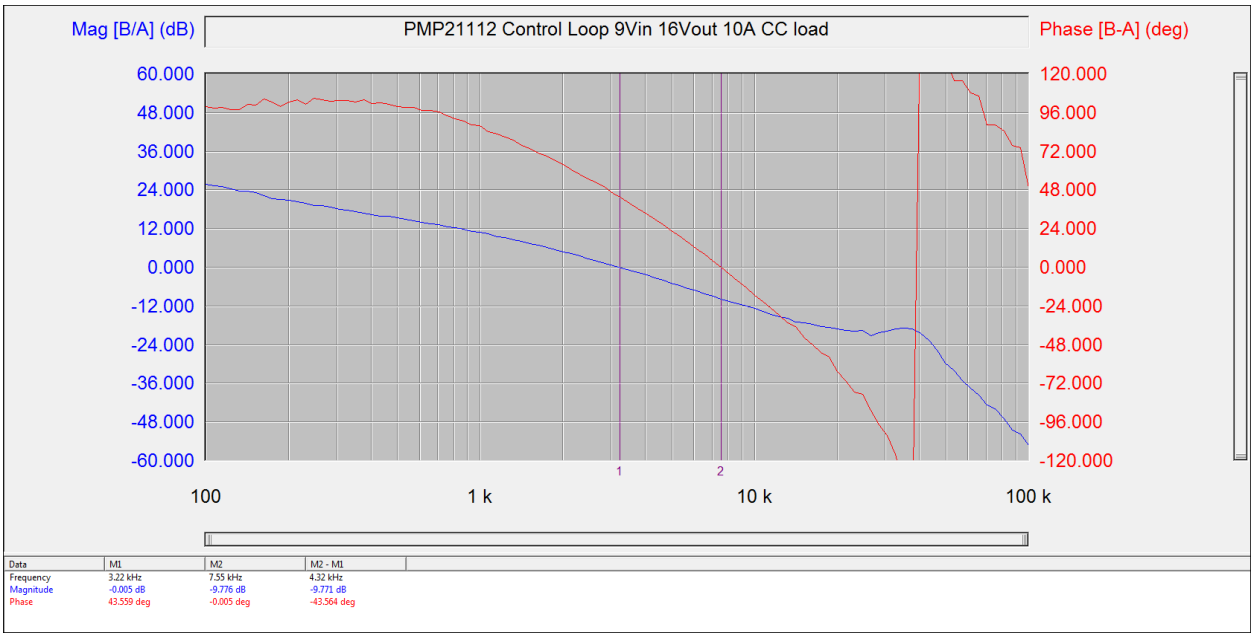


12Vin, full load, 500Hz sine wave with 0.3V to 3V amplitude applied on PWM test point. CH1 measures 500Hz sine wave, Ch2 measures Vout, Ch3 measueres Comp, and Ch4 measures Iin.

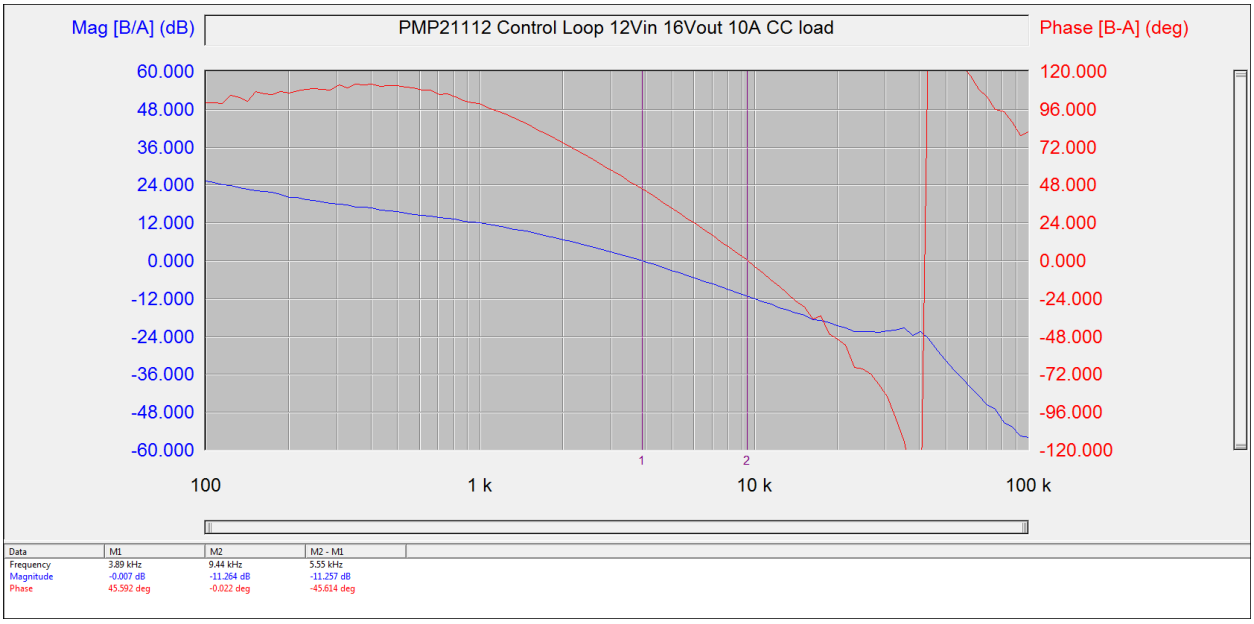


12Vin, full load, 500Hz sine wave with 0.3V to 3V amplitude applied on PWM test point. CH1 measures 500Hz sine wave, Ch2 measures Vout, Ch3 measueres Comp, and Ch4 measures Iin.

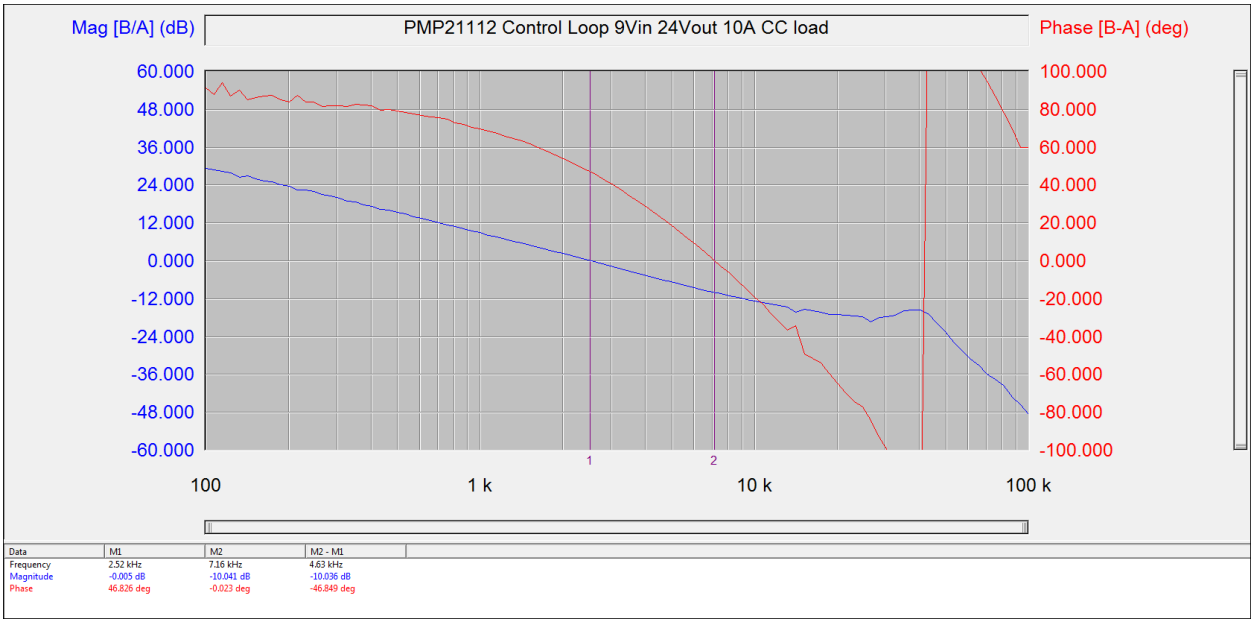
6.4 Frequency Response



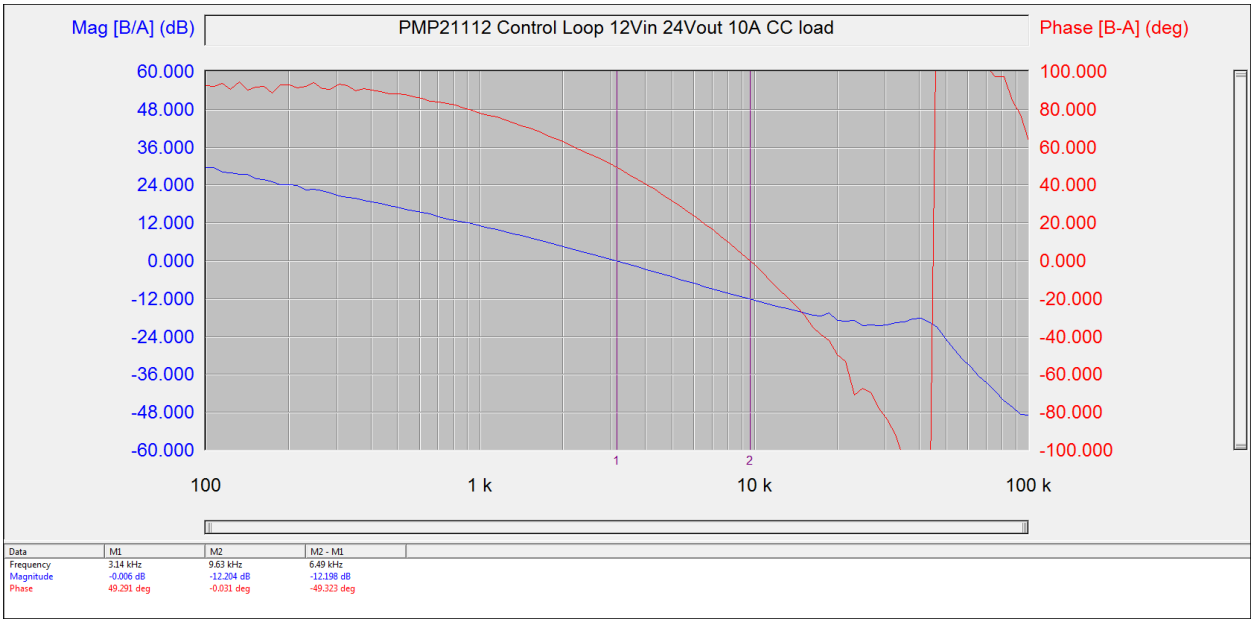
9Vin, 16Vout 10A load. 43.56 degrees phase margin, -9.78dB gain margin.



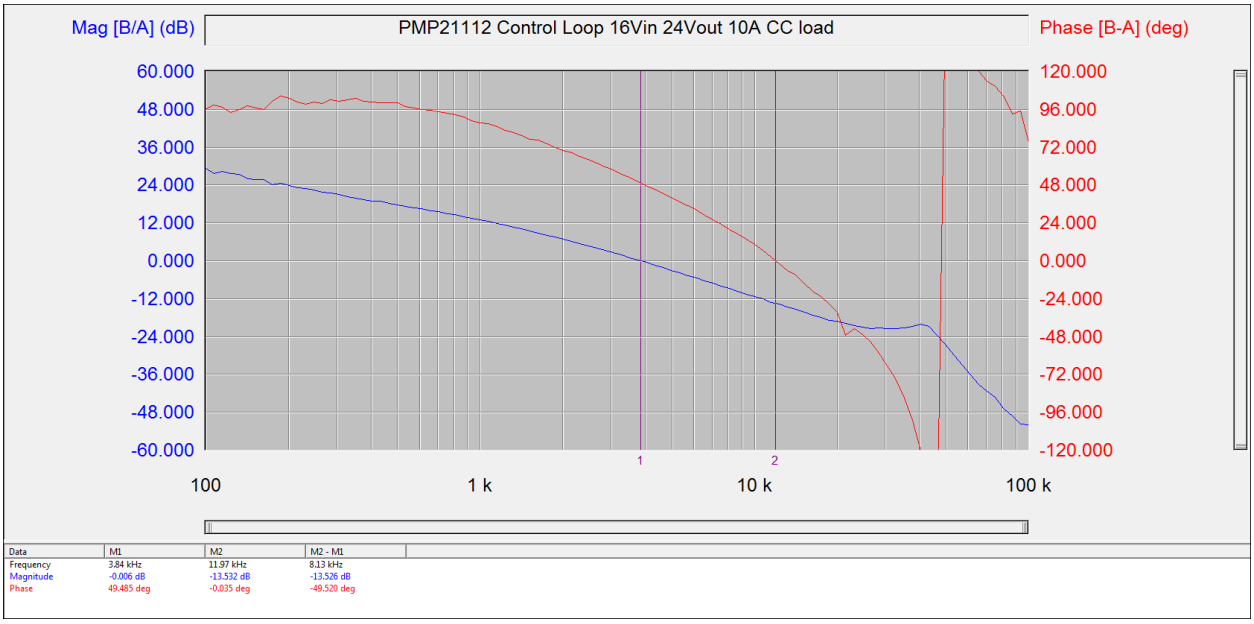
12Vin, 16Vout 10A load. 45.6 degrees phase margin, -11.26dB gain margin.



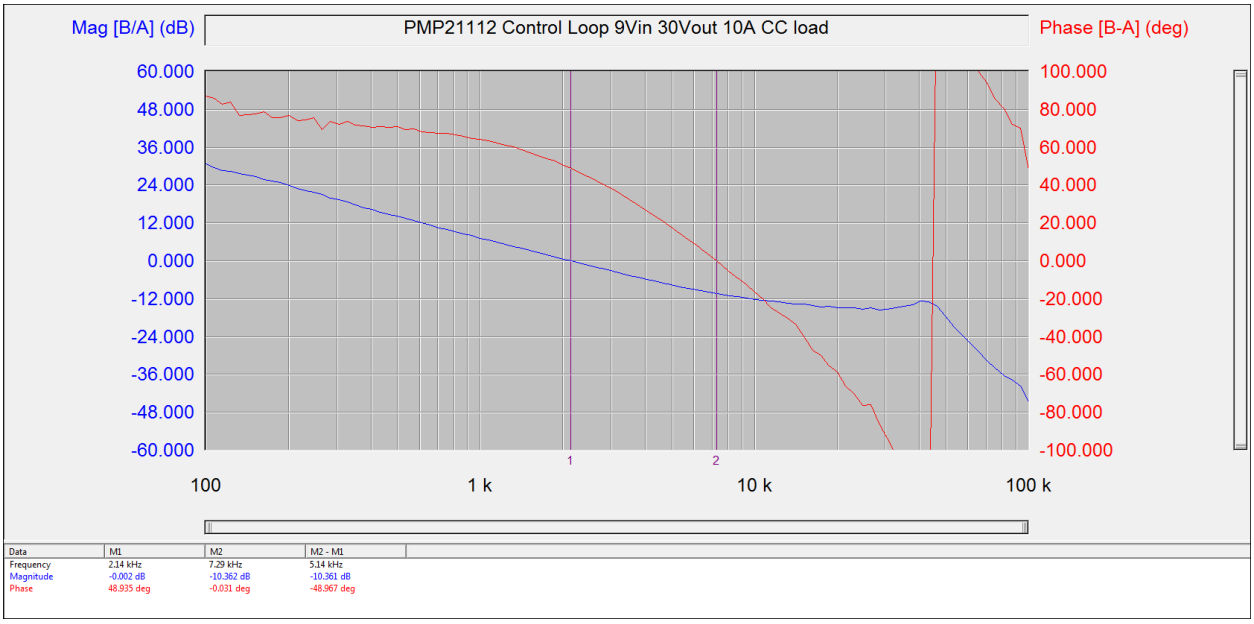
9Vin, 24Vout 10A load. 46.83 degrees phase margin, -10.04dB gain margin.



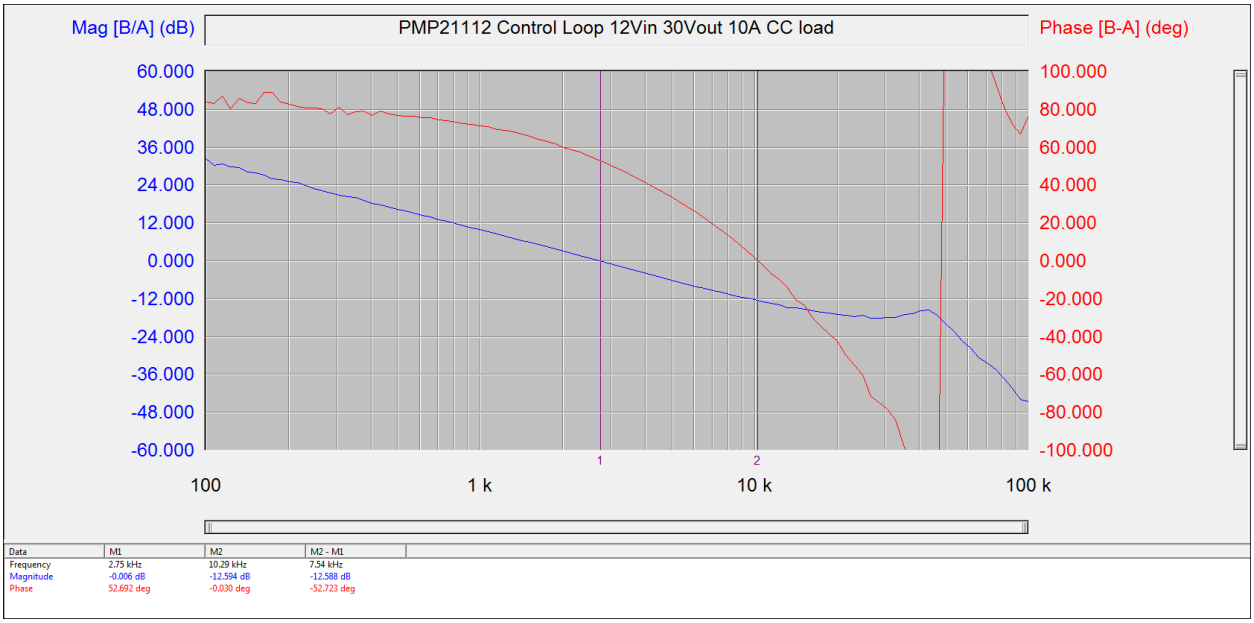
12Vin, 24Vout 10A load. 49.29 degrees phase margin, -12.204dB gain margin.



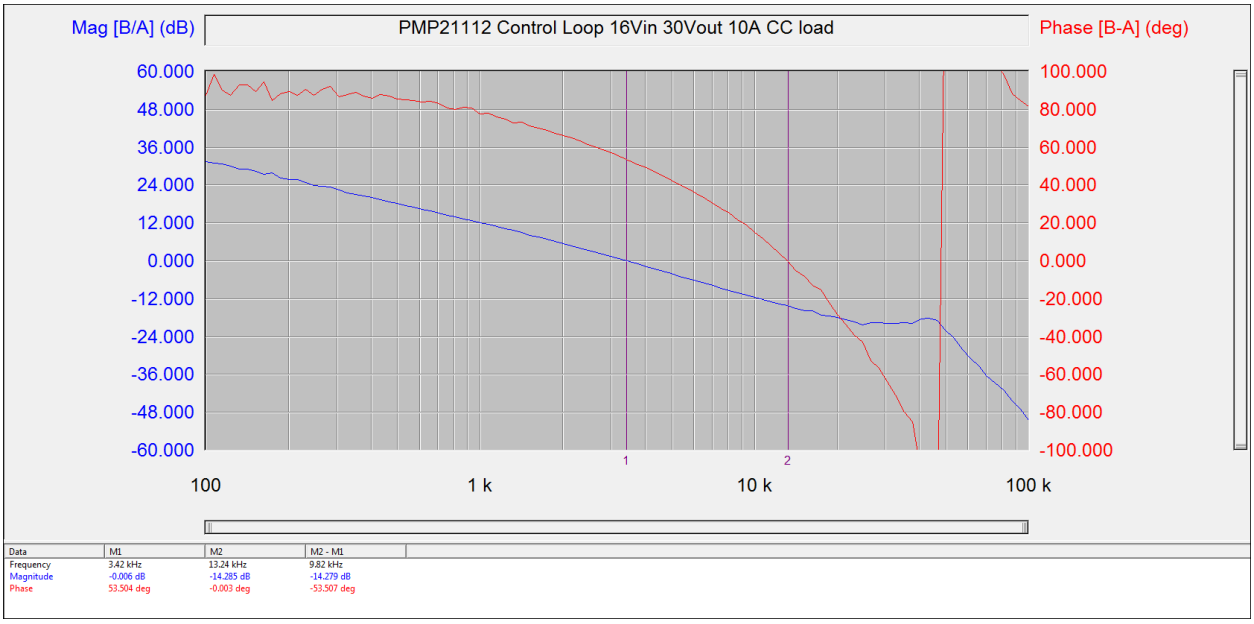
16Vin, 24Vout 10A load. 49.49 degrees phase margin, -13.53dB gain margin.



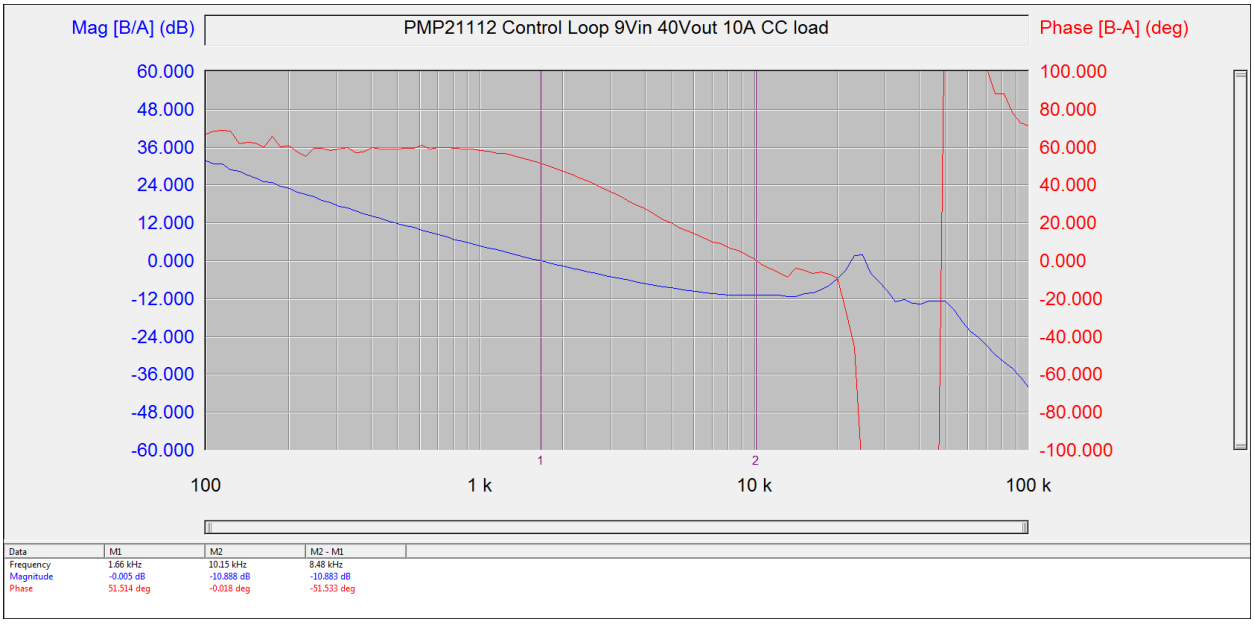
9Vin, 30Vout 10A load. 48.94 degrees phase margin, -10.36dB gain margin.



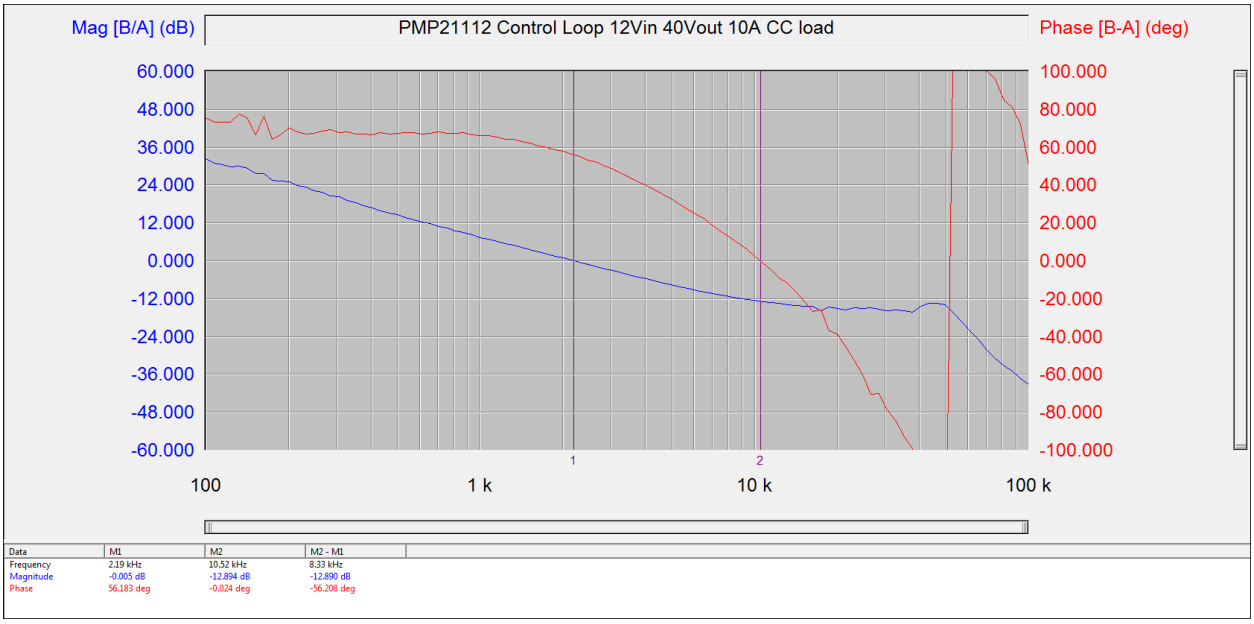
12Vin, 30Vout 10A load. 52.69 degrees phase margin, -12.59dB gain margin.



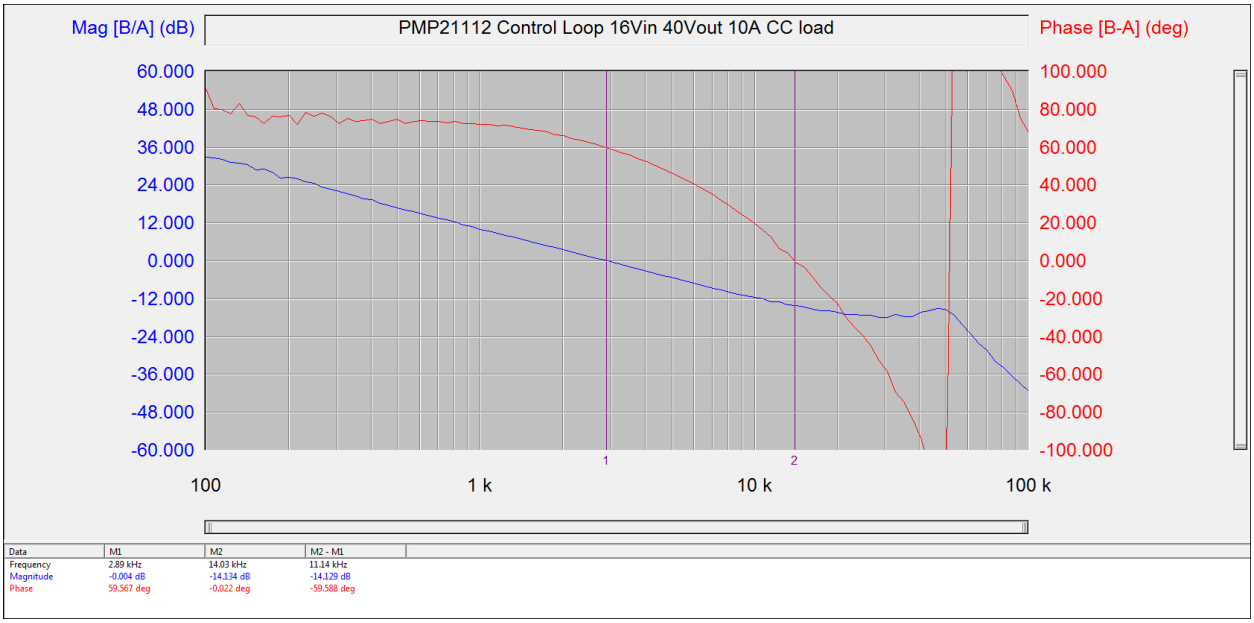
16Vin, 30Vout 10A load. 53.51 degrees phase margin, -14.29dB gain margin.



9Vin, 40Vout 10A load. 51.51 degrees phase margin, -10.89dB gain margin.



12Vin, 40Vout 10A load. 56.18 degrees phase margin, -12.89dB gain margin.



16Vin, 40Vout 10A load. 59.57 degrees phase margin, -14.13dB gain margin.

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