Test Data
For PMP21274 Single Phase 135W Boost
11/29/2017

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1. Design Specifications

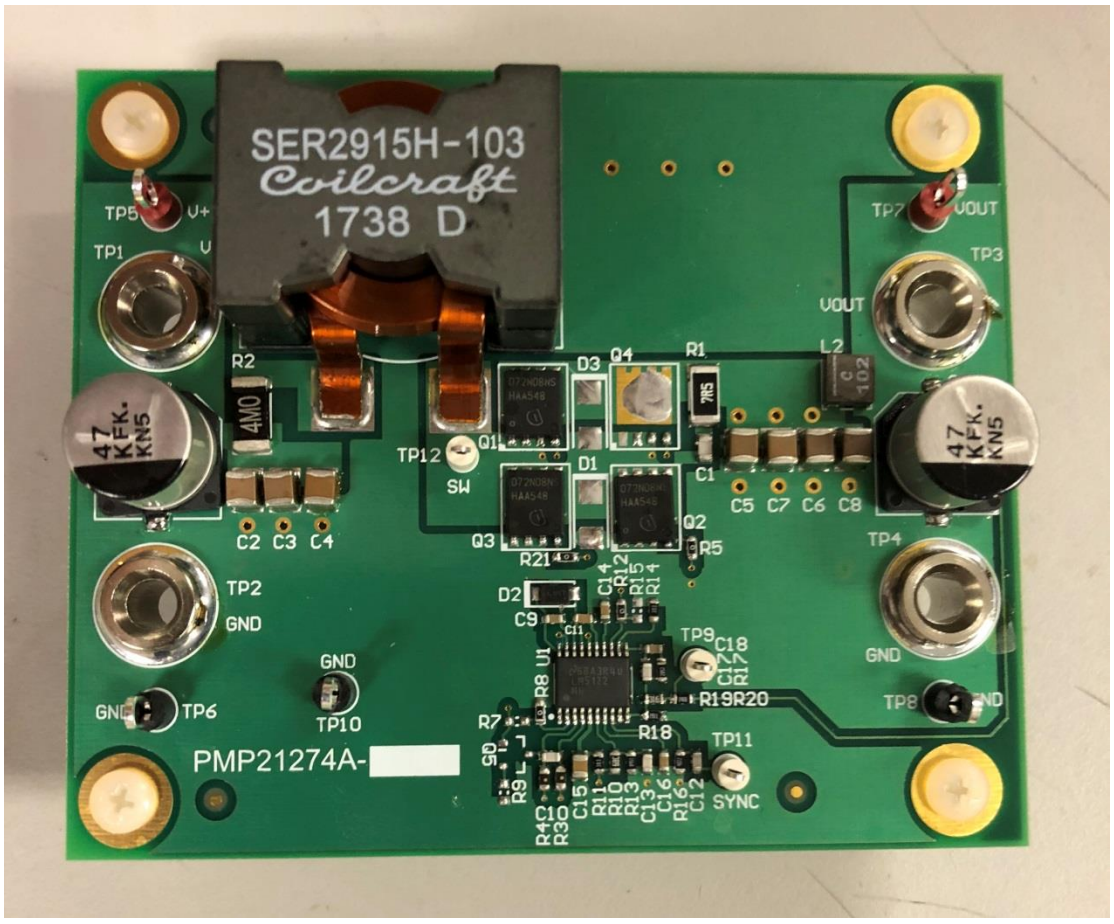
Vin Minimum	**12VDC**
Vin Maximum	**50VDC**
Vout	**54VDC @ 2.5A**
Nominal Switching Frequency	**≈ 230KHz**

2. Design Specifications

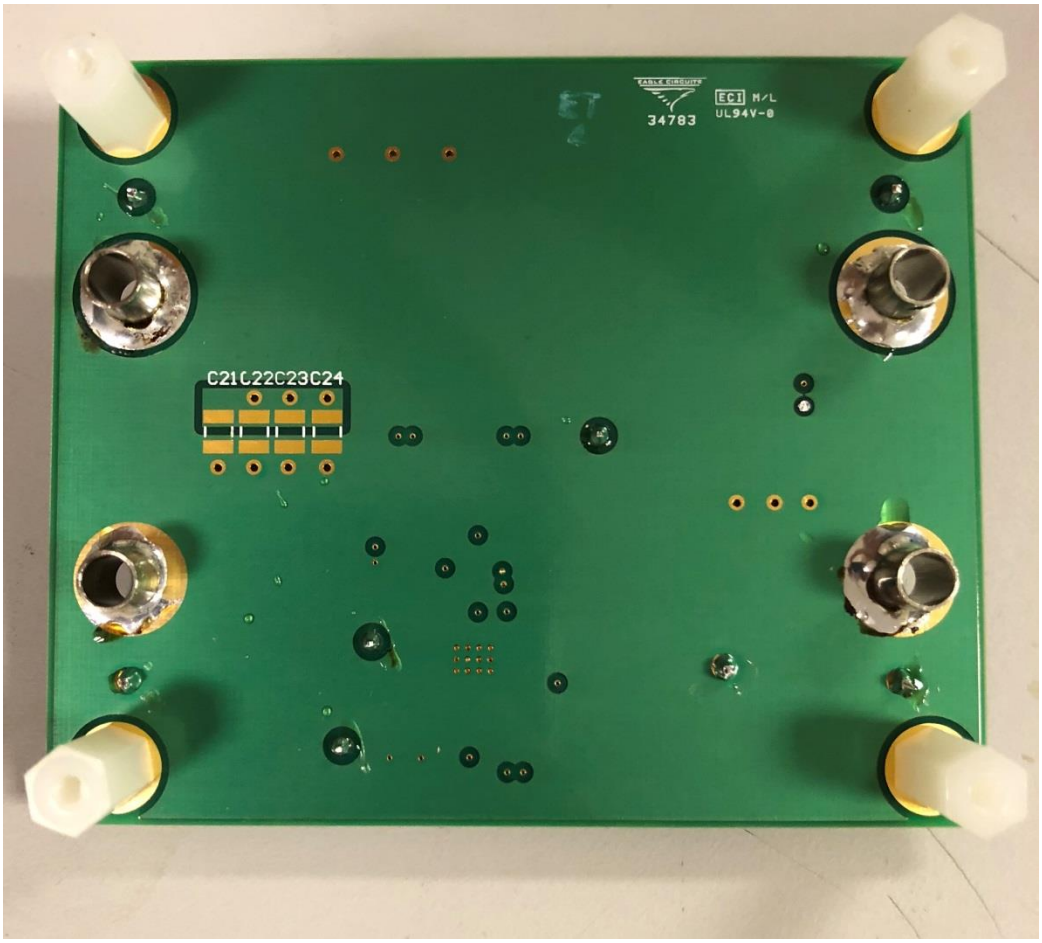
PMP21274 is a single-phase boost utilizing the LM5112 controller. This design can operate from 12V to 50V. The design has an output of 54V and capable of sourcing 2.5A continuous current. LM5112 has a bypass function where Vin is equal or greater than the set output voltage, the device will bypass Vin via the high side sync FET. Switching frequency is set to 230kHz, and a 4 layer PCB is used.

3. Board Photo

Board Dimensions: 82.6mm x 68.6mm



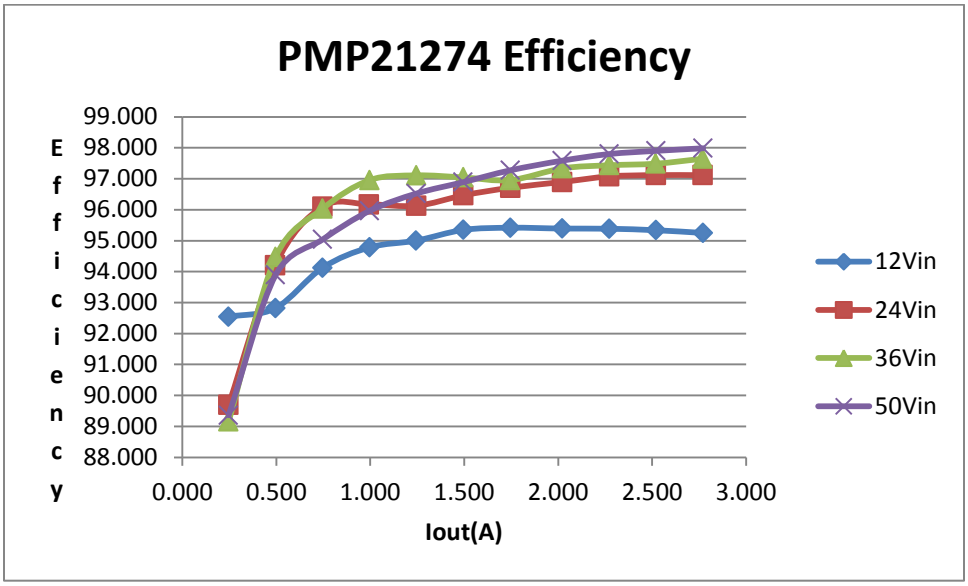
Board Photo (Top)



Board Photo (Bottom)

4 Efficiency

4.1 Efficiency Chart

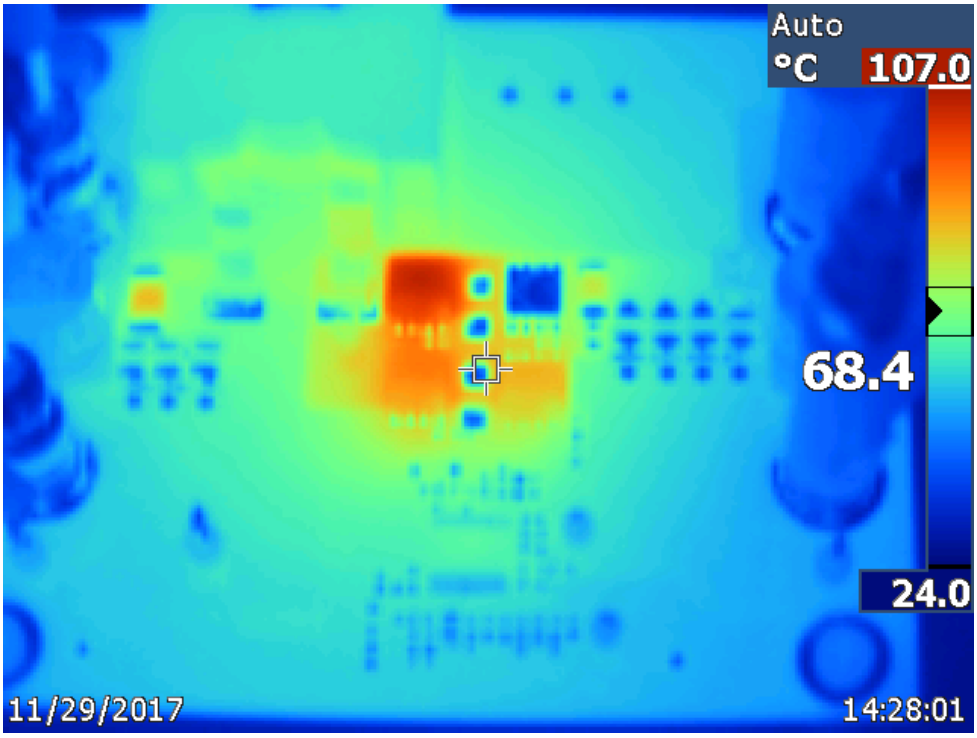


4.2 Efficiency Data

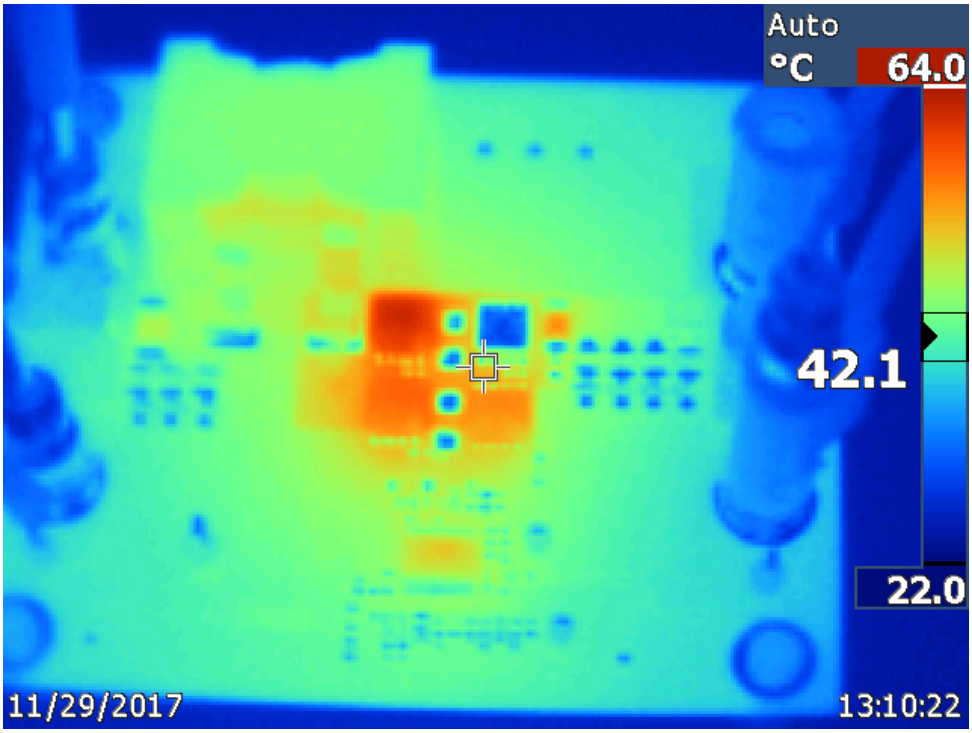
Vin(V)	Iin(A)	Vout(V)	Iout(A)	Pin(W)	Pout(W)	Ploss(W)	Efficiency
12.040	0.056	53.893	0.000	0.674	0.000	0.890	0.000
12.039	0.506	53.895	0.096	6.092	5.174	0.918	84.930
12.039	1.190	53.896	0.246	14.327	13.258	1.068	92.542
12.040	2.392	53.895	0.496	28.799	26.732	2.067	92.823
12.039	3.548	53.894	0.746	42.715	40.205	2.510	94.124
12.039	4.704	53.895	0.996	56.634	53.679	2.954	94.783
12.039	5.862	53.896	1.244	70.574	67.046	3.528	95.001
12.039	7.024	53.896	1.496	84.562	80.629	3.933	95.349
12.039	8.192	53.897	1.746	98.623	94.104	4.519	95.418
12.039	9.490	53.898	2.022	114.247	108.982	5.265	95.392
12.039	10.664	53.899	2.272	128.383	122.460	5.923	95.386
12.039	11.844	53.901	2.522	142.586	135.937	6.649	95.337
12.039	13.030	53.902	2.772	156.869	149.416	7.453	95.249
24.081	0.052	53.906	0.000	1.252	0.000	1.360	0.000
24.080	0.278	53.908	0.096	6.694	5.175	1.519	77.307
24.080	0.614	53.910	0.246	14.785	13.262	1.524	89.695
24.080	1.174	53.911	0.494	28.270	26.632	1.638	94.205
24.080	1.738	53.911	0.746	41.851	40.218	1.633	96.098
24.080	2.314	53.912	0.994	55.722	53.589	2.133	96.172

24.080	2.902	53.911	1.246	69.880	67.174	2.706	96.127
24.080	3.472	53.911	1.496	83.606	80.652	2.954	96.466
24.080	4.042	53.912	1.746	97.332	94.130	3.202	96.710
24.080	4.672	53.912	2.022	112.501	109.010	3.491	96.897
24.080	5.240	53.913	2.272	126.178	122.490	3.688	97.077
24.080	5.814	53.913	2.522	140.002	135.969	4.033	97.119
24.080	6.386	53.914	2.770	153.774	149.341	4.434	97.117
36.111	0.040	53.918	0.000	1.444	0.000	1.552	0.000
36.111	0.188	53.920	0.096	6.789	5.176	1.613	76.247
36.111	0.412	53.921	0.246	14.878	13.265	1.613	89.157
36.111	0.784	53.922	0.496	28.311	26.745	1.566	94.469
36.111	1.160	53.923	0.746	41.889	40.226	1.662	96.031
36.111	1.534	53.923	0.996	55.394	53.707	1.687	96.955
36.111	1.916	53.924	1.246	69.189	67.189	2.000	97.110
36.111	2.302	53.924	1.496	83.127	80.670	2.458	97.043
36.111	2.686	53.924	1.744	96.995	94.043	2.952	96.957
36.111	3.102	53.923	2.022	112.016	109.033	2.984	97.336
36.111	3.482	53.923	2.272	125.737	122.514	3.223	97.436
36.111	3.860	53.923	2.520	139.388	135.887	3.501	97.488
36.111	4.236	53.924	2.770	152.966	149.368	3.598	97.648
50.161	0.032	53.930	0.000	1.605	0.000	1.713	0.000
50.161	0.136	53.933	0.096	6.822	5.178	1.644	75.896
50.161	0.296	53.934	0.246	14.848	13.268	1.580	89.359
50.161	0.568	53.935	0.496	28.492	26.752	1.740	93.893
50.161	0.844	53.935	0.746	42.336	40.235	2.101	95.037
50.161	1.116	53.936	0.996	55.980	53.720	2.260	95.963
50.161	1.388	53.936	1.246	69.624	67.204	2.420	96.524
50.161	1.658	53.936	1.494	83.168	80.581	2.587	96.890
50.161	1.930	53.936	1.746	96.811	94.172	2.639	97.274
50.161	2.228	53.937	2.022	111.758	109.060	2.698	97.586
50.161	2.498	53.937	2.272	125.302	122.545	2.757	97.799
50.161	2.770	53.938	2.522	138.946	136.031	2.915	97.902
50.161	3.042	53.938	2.772	152.590	149.516	3.074	97.986

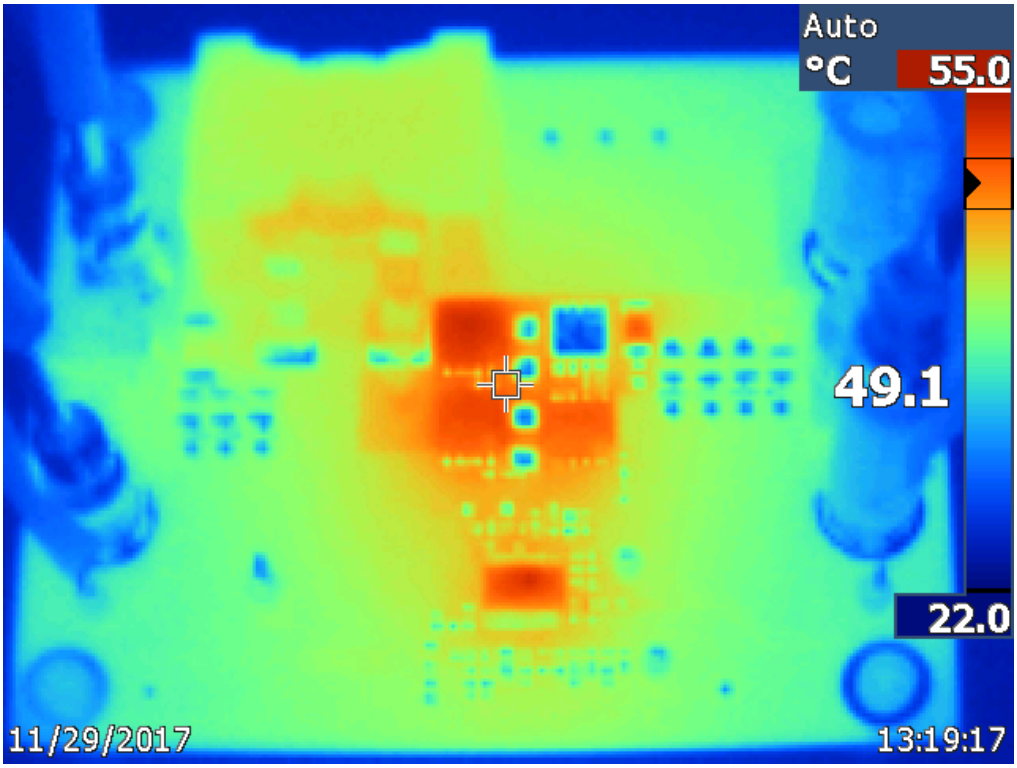
5 Thermal



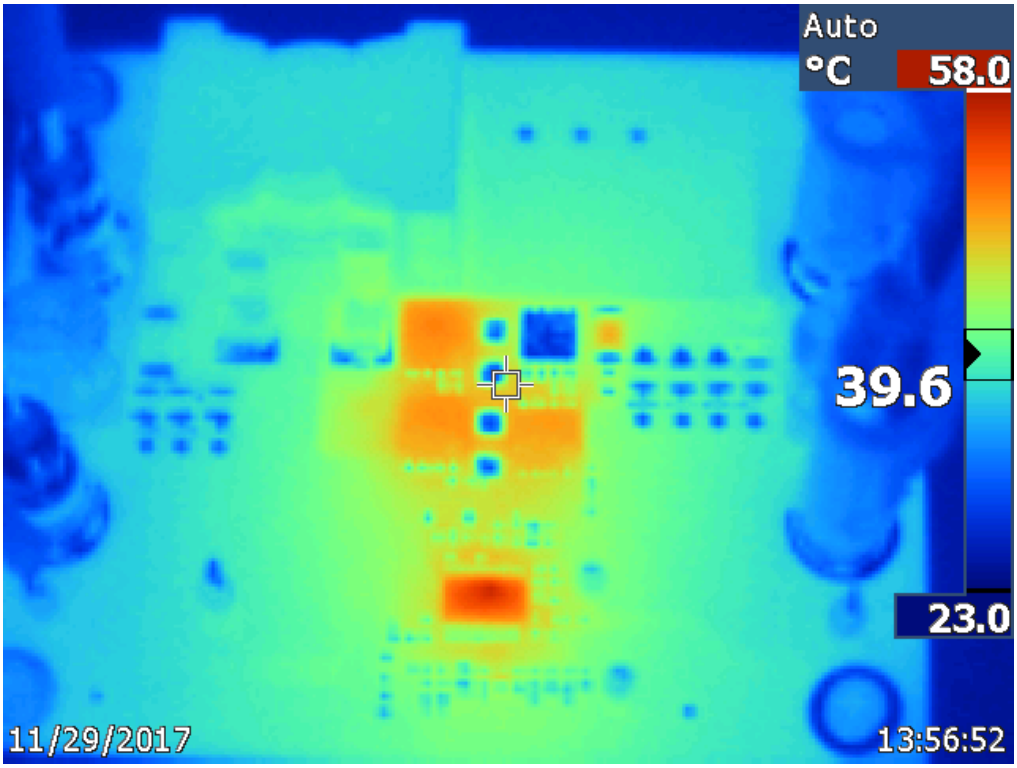
Thermal plot taken at 12Vin, full load and board reaches equilibrium without airflow.



Thermal plot taken at 24Vin, full load and board reaches equilibrium without airflow.



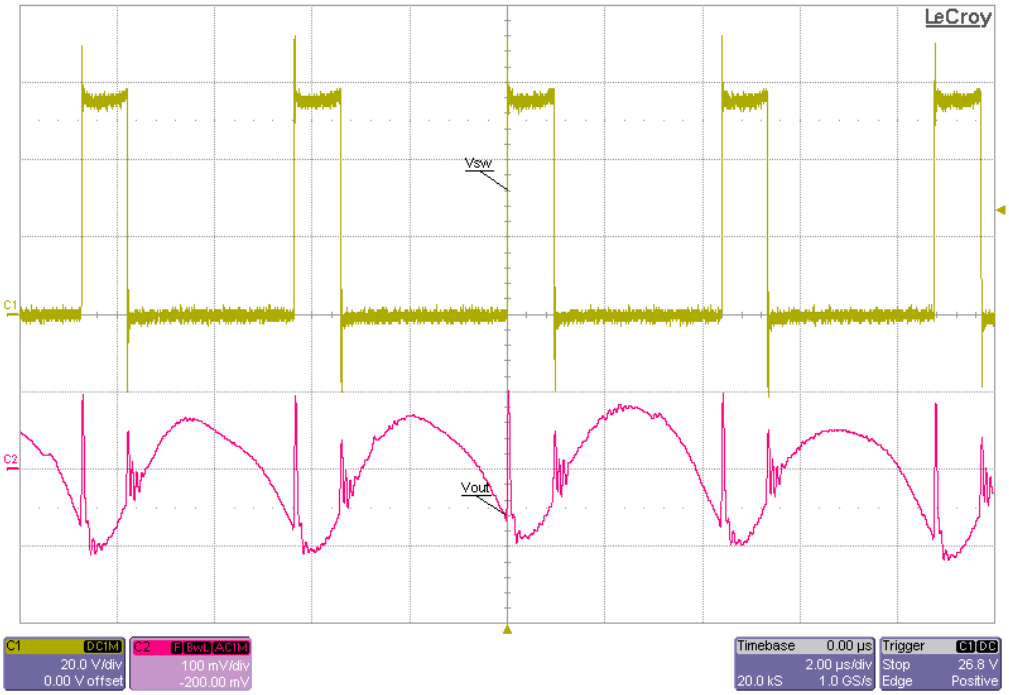
Thermal plot taken at 36Vin, full load and board reaches equilibrium without airflow.



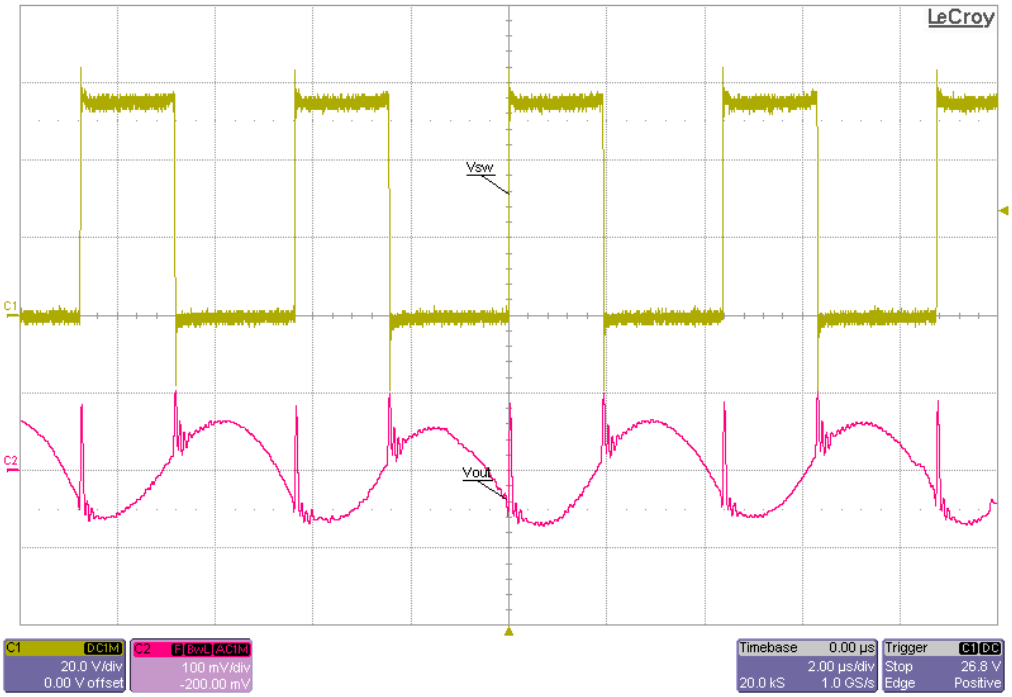
Thermal plot taken at 48Vin, full load and board reaches equilibrium without airflow.

6 Waveforms

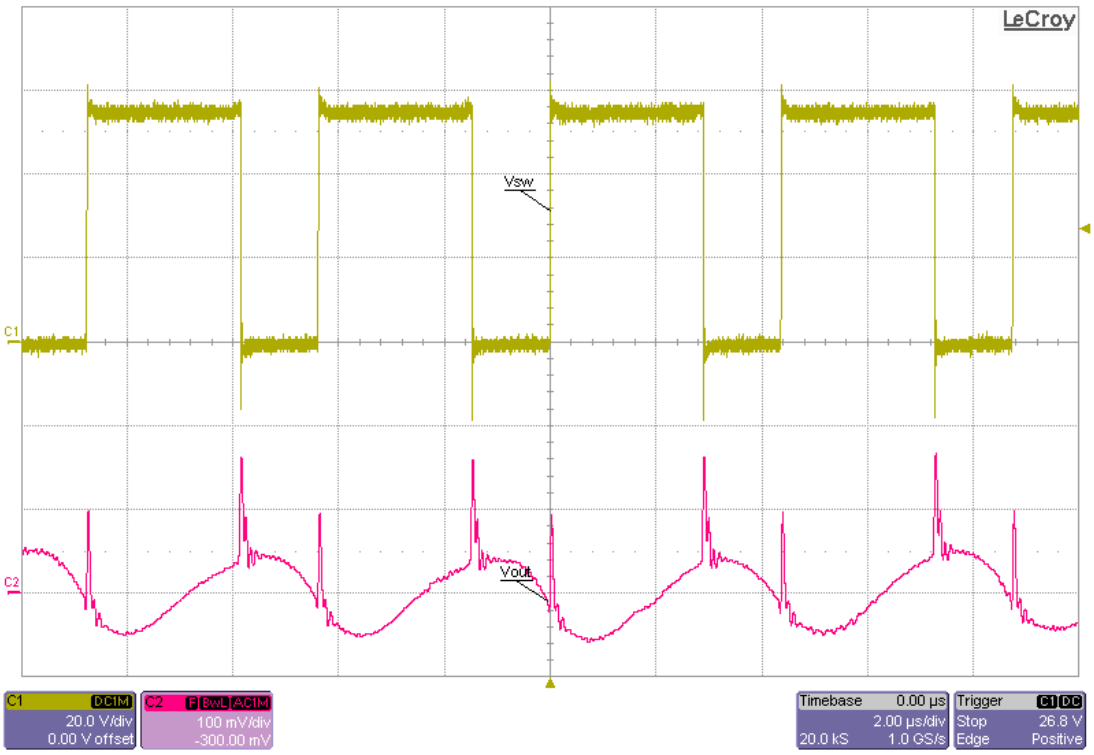
6.1 Switching Waveform and Output Ripple



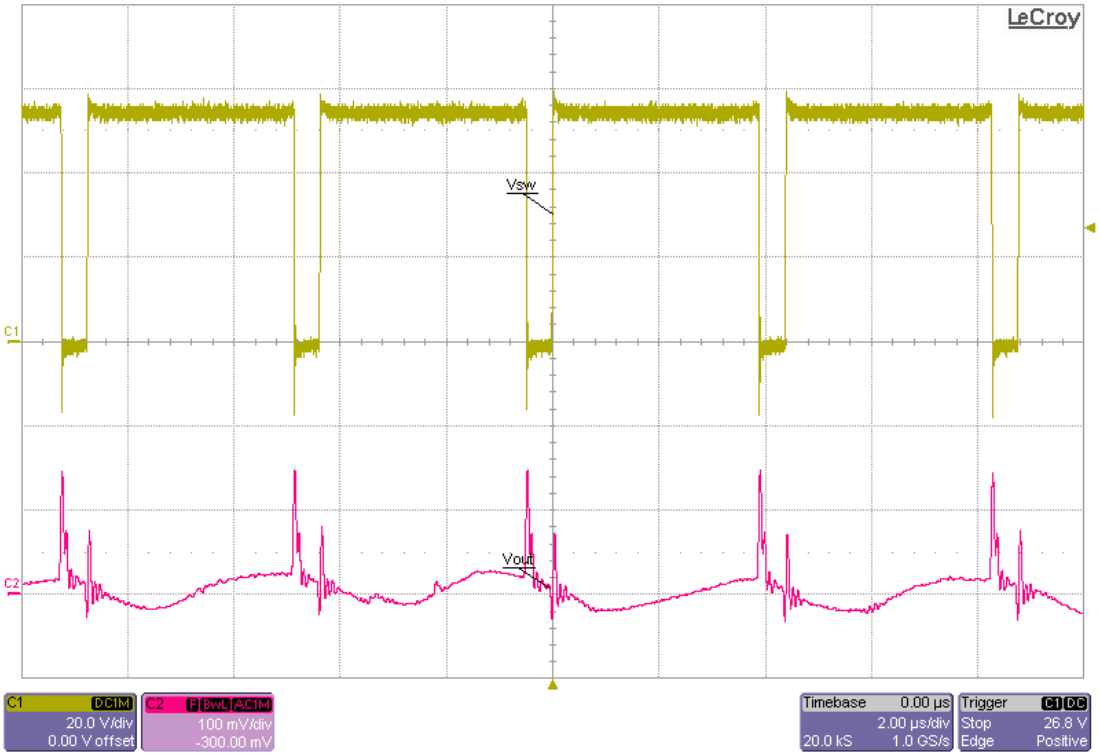
12Vin, 54Vout, full load. Ch1 measures switch, Ch2 measures Vout.



24Vin, 54Vout, full load. Ch1 measures switch, Ch2 measures Vout.

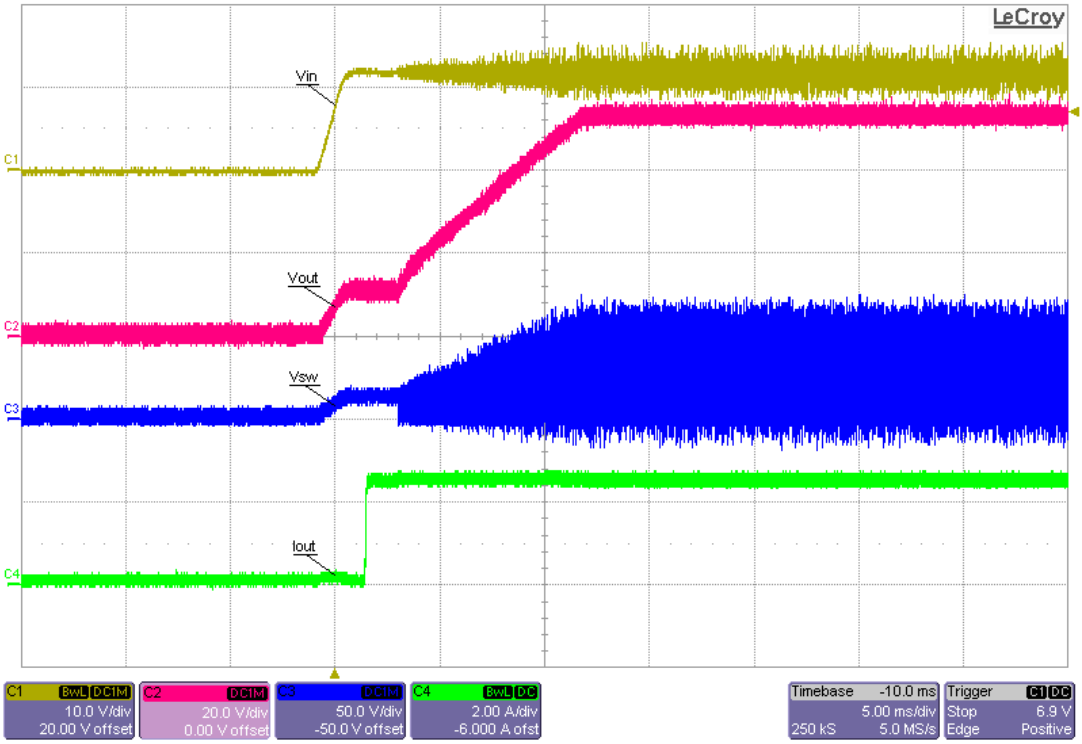


36Vin, 54Vout, full load. Ch1 measures switch, Ch2 measures Vout.

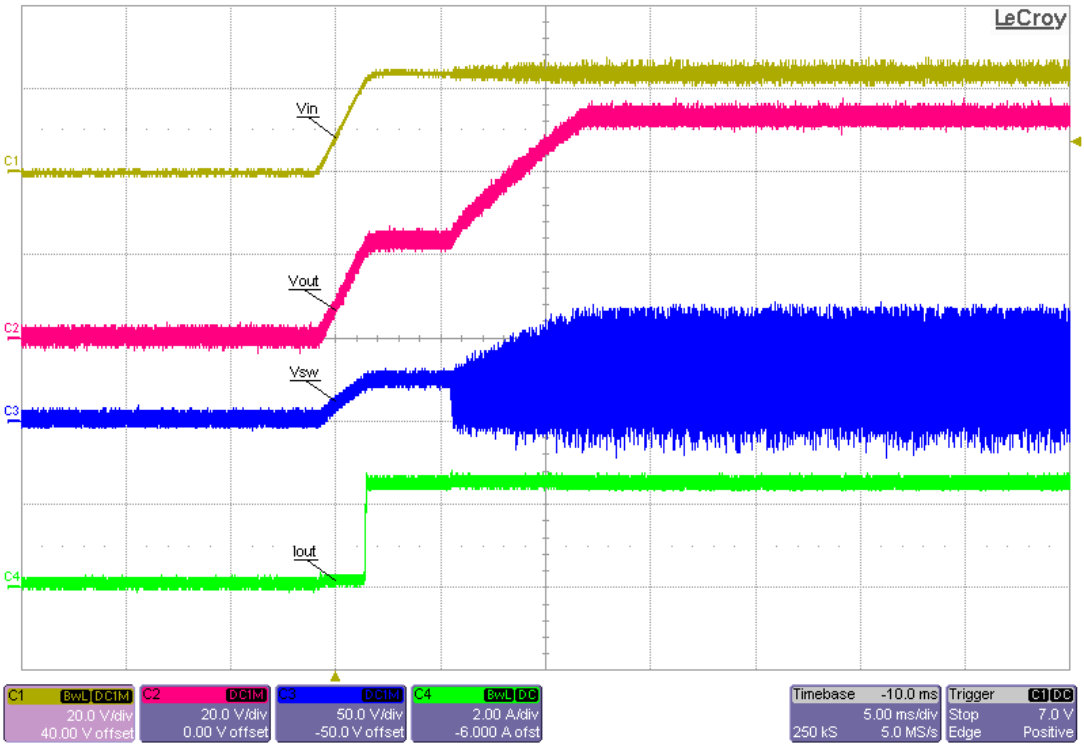


48Vin, 54Vout, full load. Ch1 measures switch, Ch2 measures Vout.

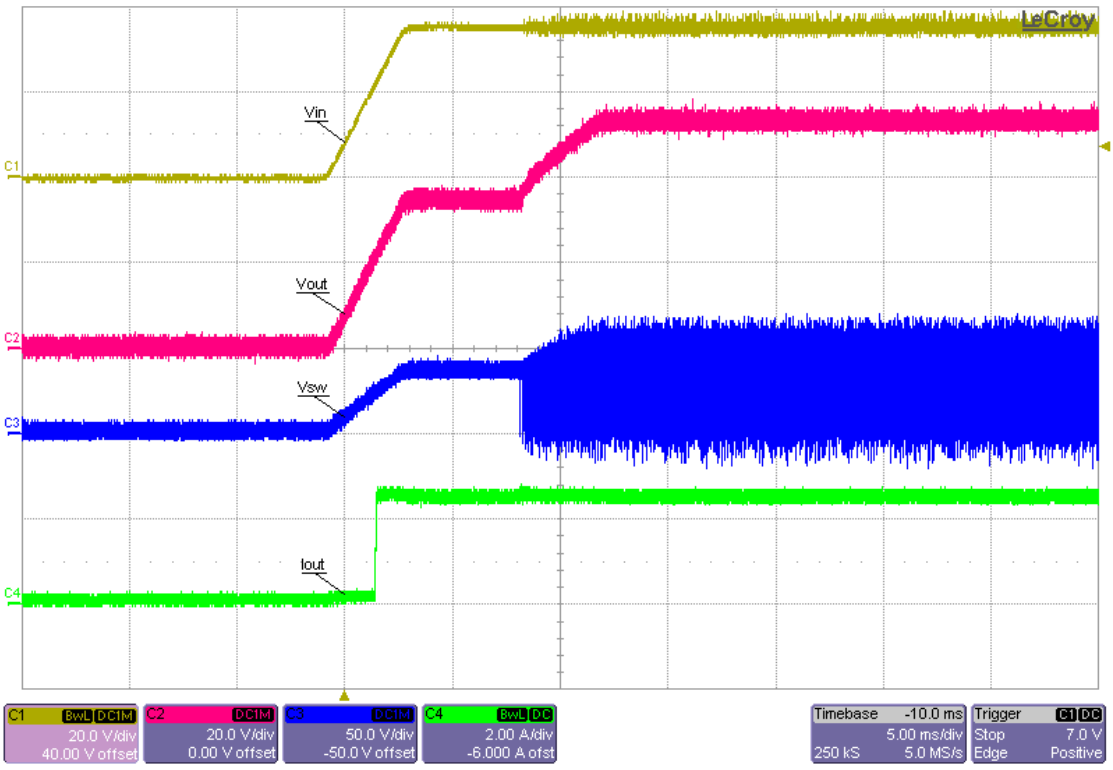
6.2 Start Up



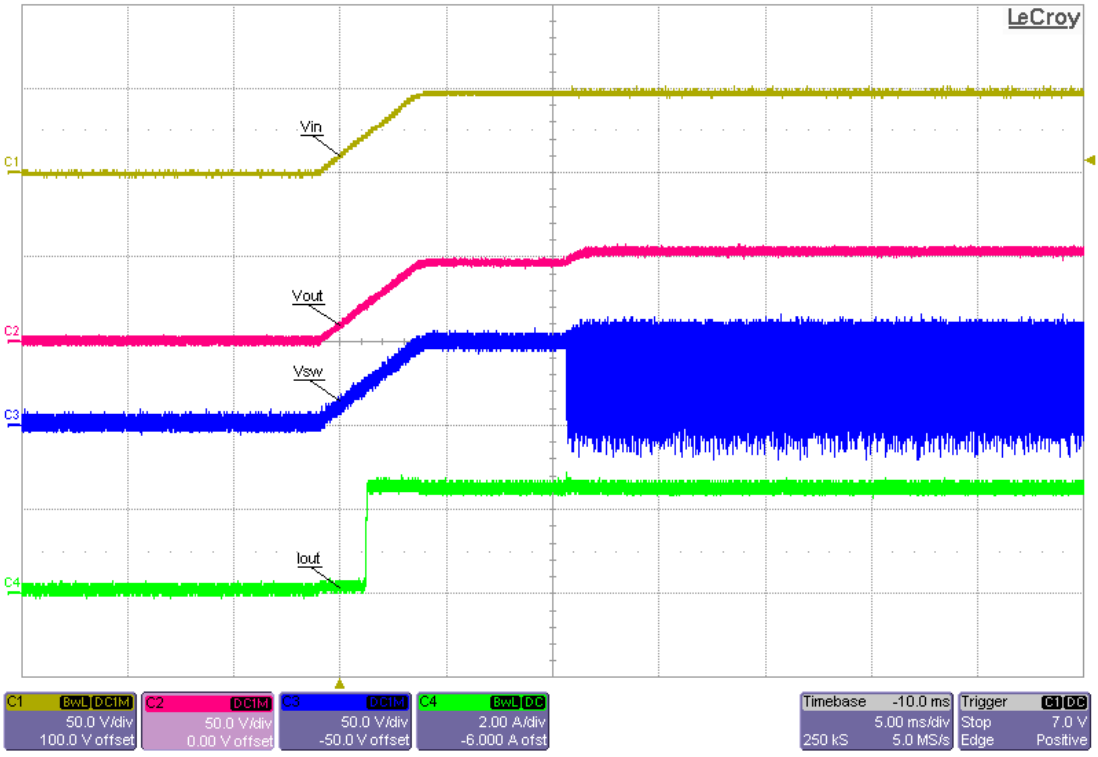
12Vin, 54Vout full load start up. Ch1 Vin, Ch2 Vout, Ch3 switch and Ch4 Iout.



24Vin, 54Vout full load start up. Ch1 Vin, Ch2 Vout, Ch3 switch and Ch4 Iout.

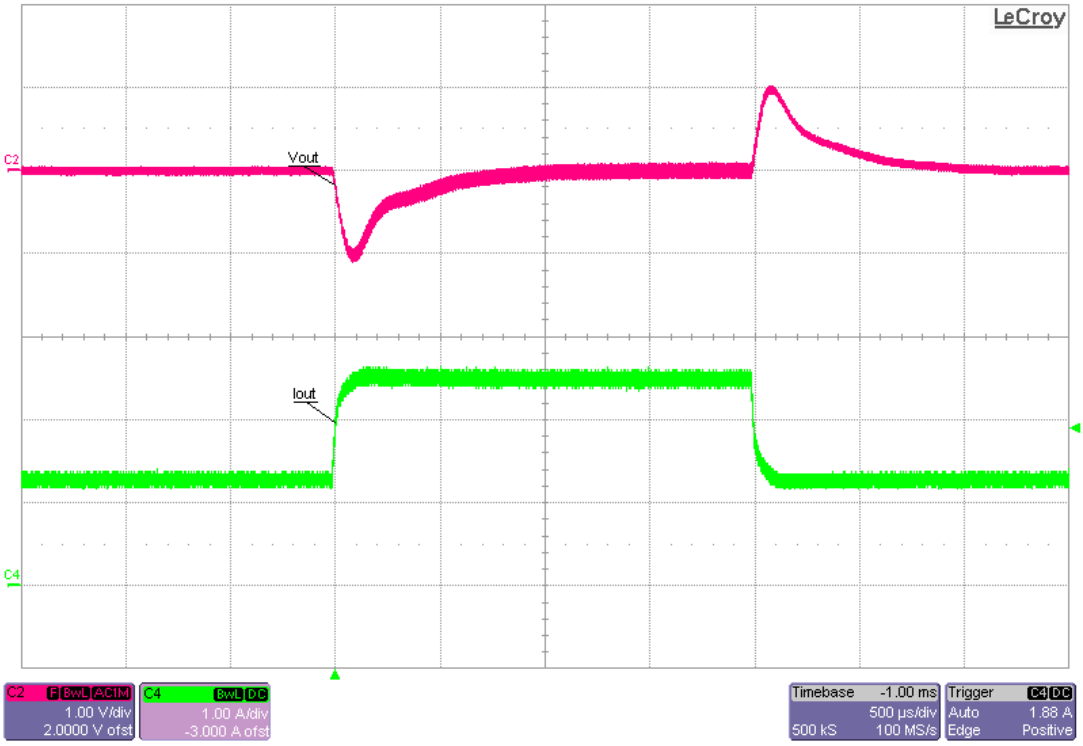


36Vin, 54Vout full load start up. Ch1 Vin, Ch2 Vout, Ch3 switch and Ch4 Iout.

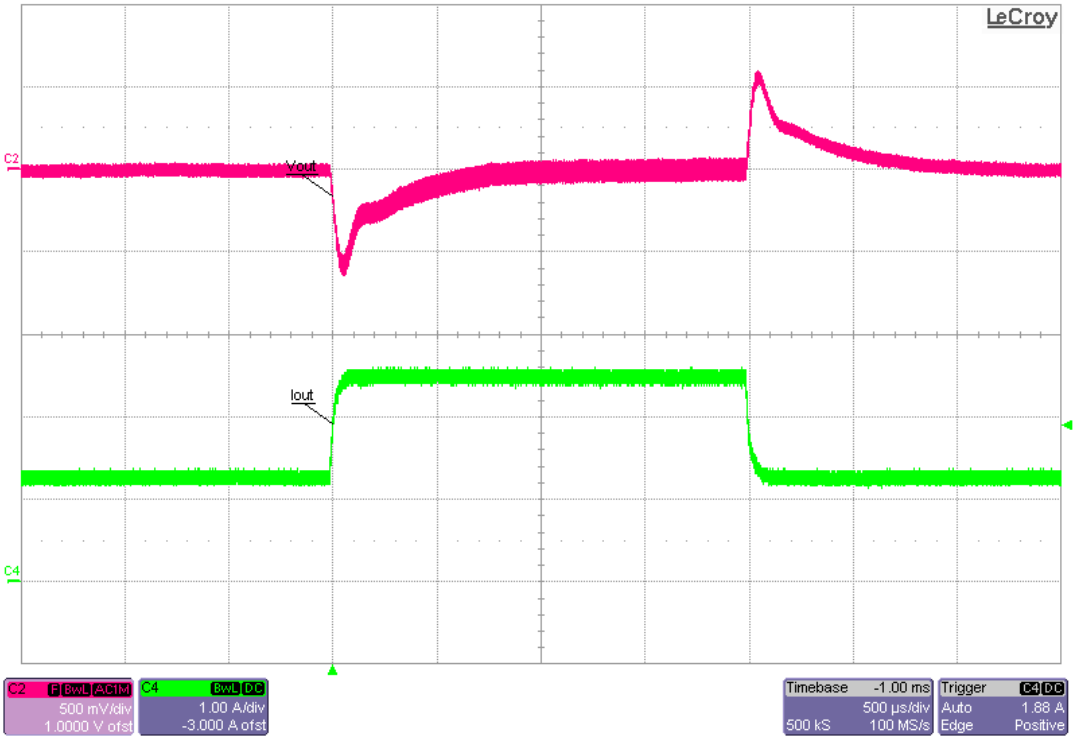


48Vin, 54Vout full load start up. Ch1 Vin, Ch2 Vout, Ch3 switch and Ch4 Iout.

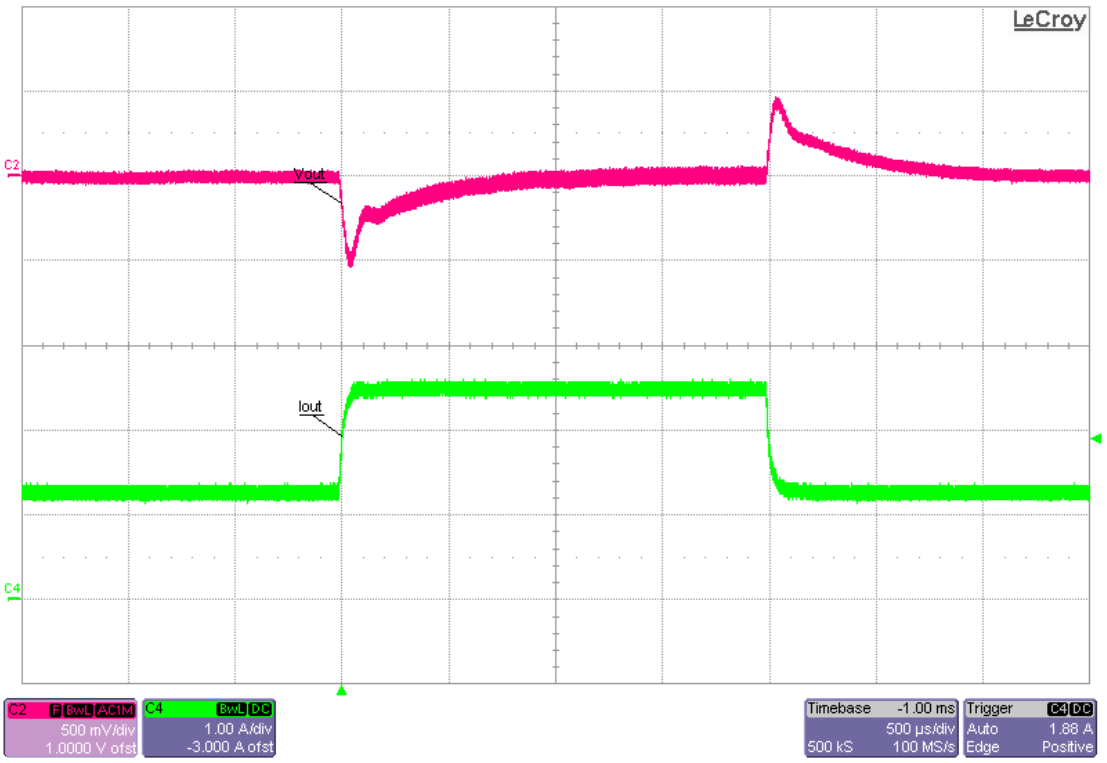
6.3 Transient Response



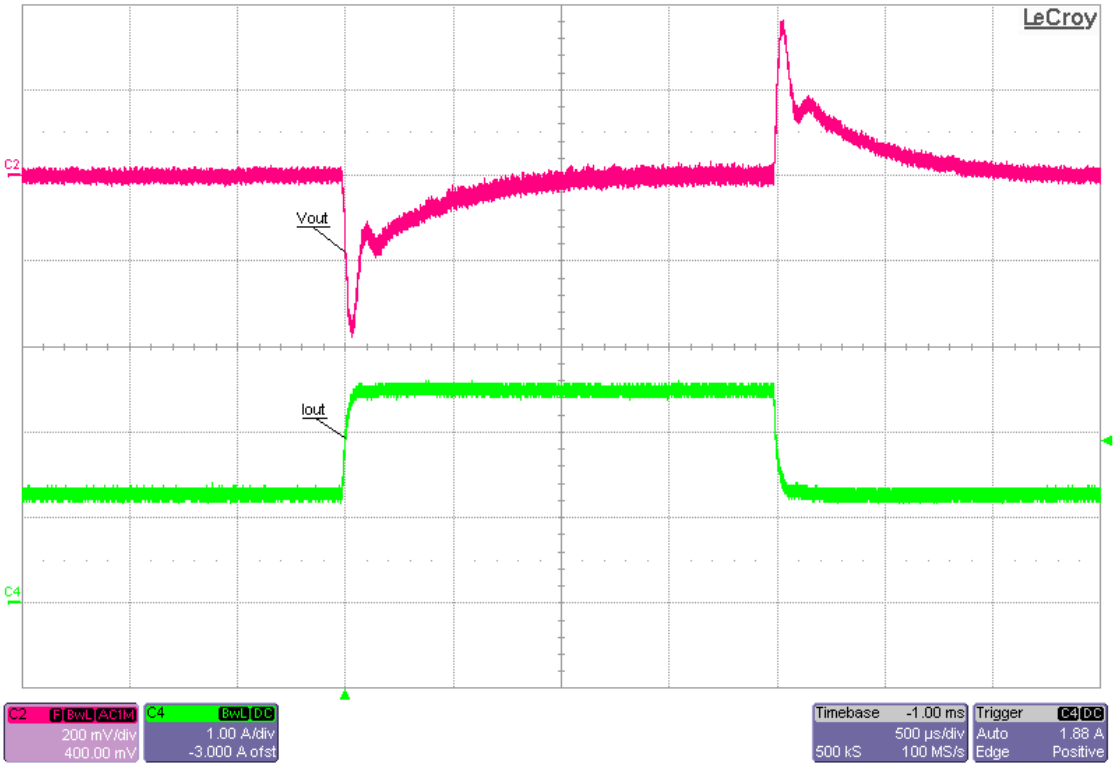
12Vin, 54Vout 1.25A to 2.5A load transient. Ch4 measures Iout, and Ch2 measures Vout.



24Vin, 54Vout 1.25A to 2.5A load transient. Ch4 measures Iout, and Ch2 measures Vout.

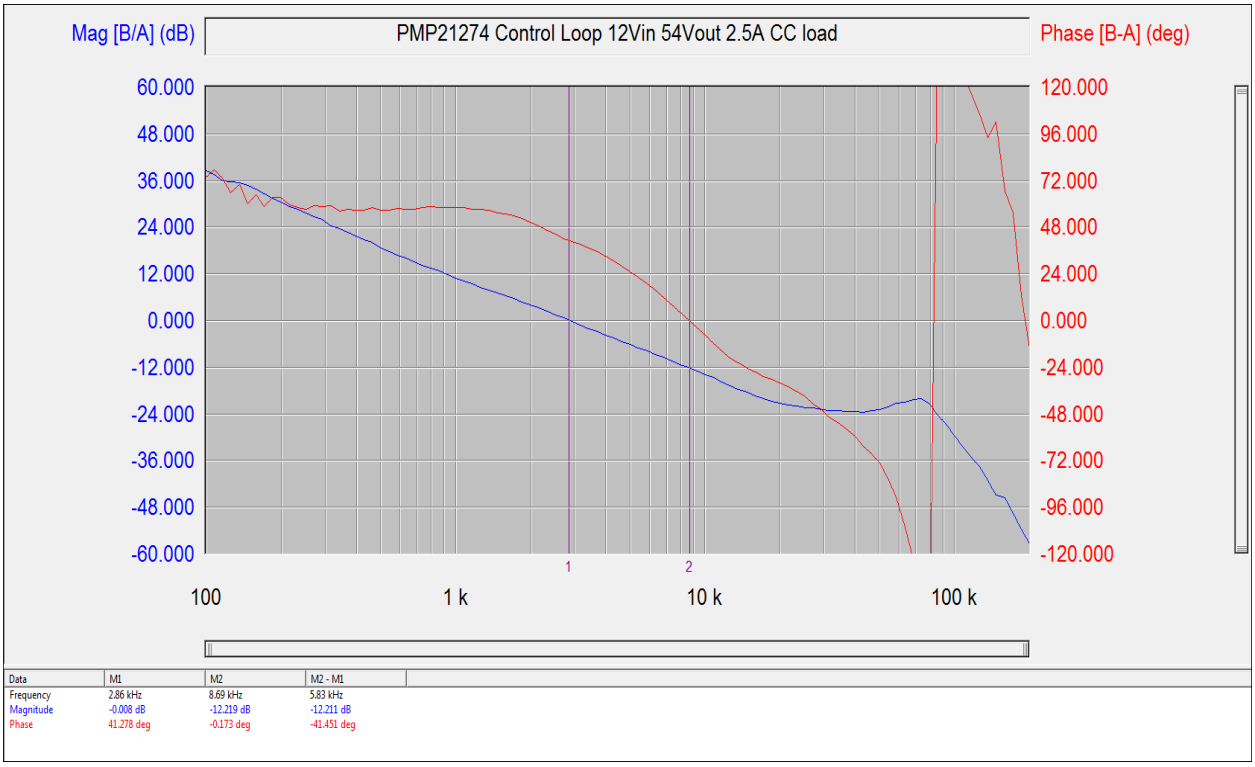


36Vin, 54Vout 1.25A to 2.5A load transient. Ch4 measures Iout, and Ch2 measures Vout.

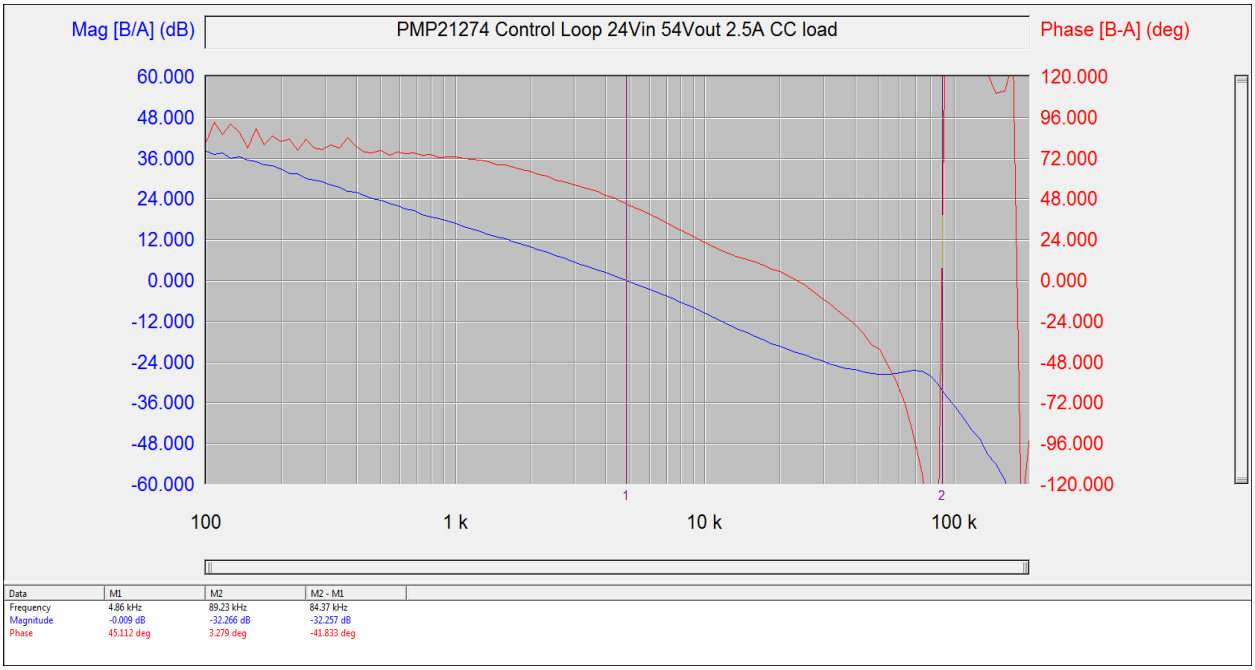


48Vin, 54Vout 1.25A to 2.5A load transient. Ch4 measures Iout, and Ch2 measures Vout.

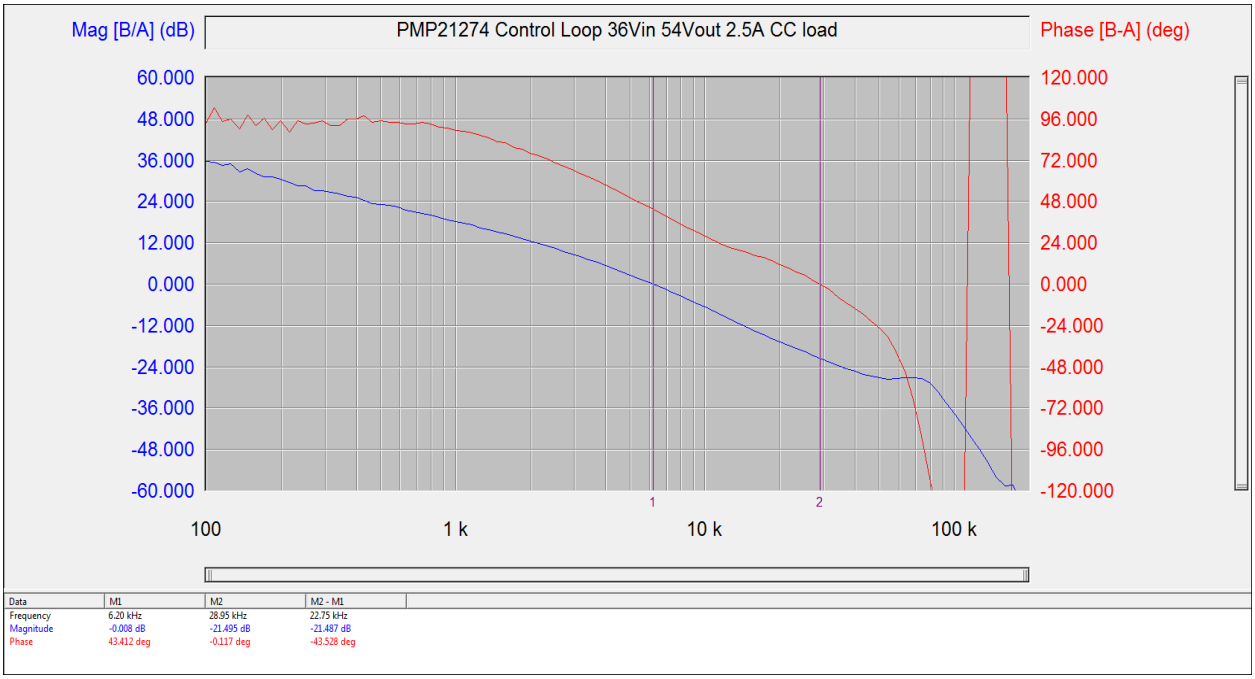
6.4 Frequency Response



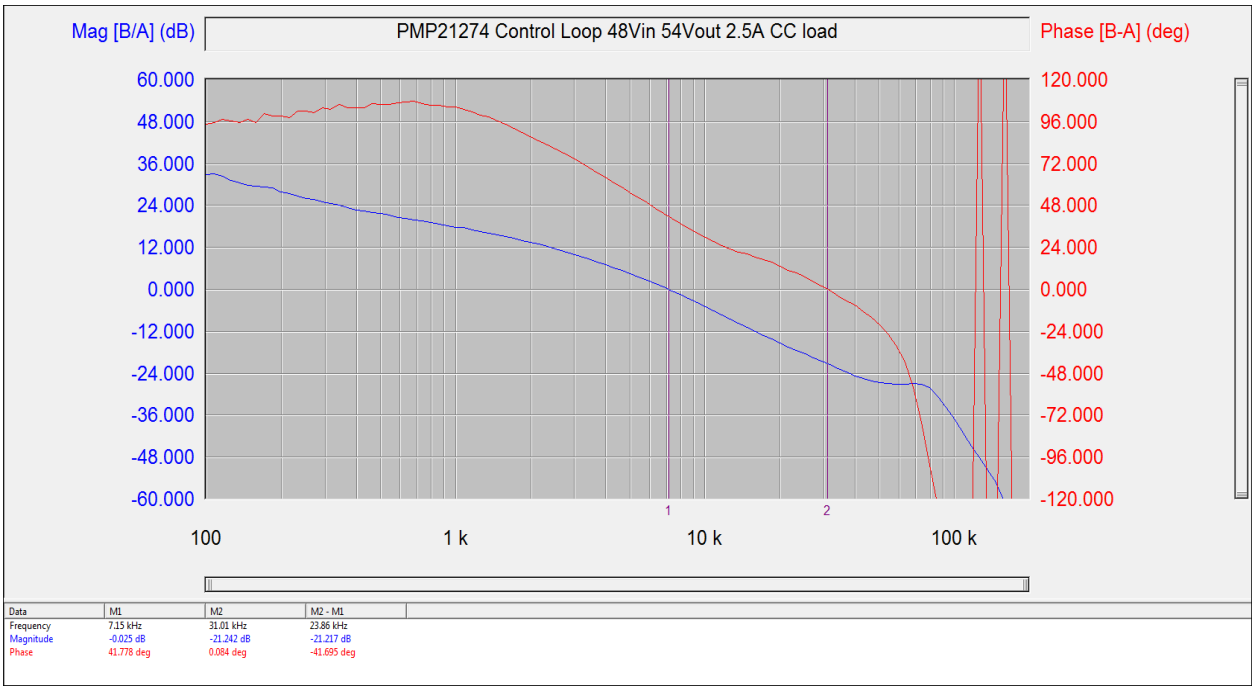
12Vin, 54Vout 2.5A load. 41.28 degrees phase margin, -12.3dB gain margin.



24Vin, 54Vout 2.5A load. 45.11 degrees phase margin, -22.8dB gain margin.



36Vin, 54Vout 2.5A load. 43.4 degrees phase margin, -21.5dB gain margin.



48Vin, 54Vout 2.5A load. 41.78 degrees phase margin, -21.24dB gain margin.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265