Test Data
For PMP9431
5/22/2014

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1. Design Specifications

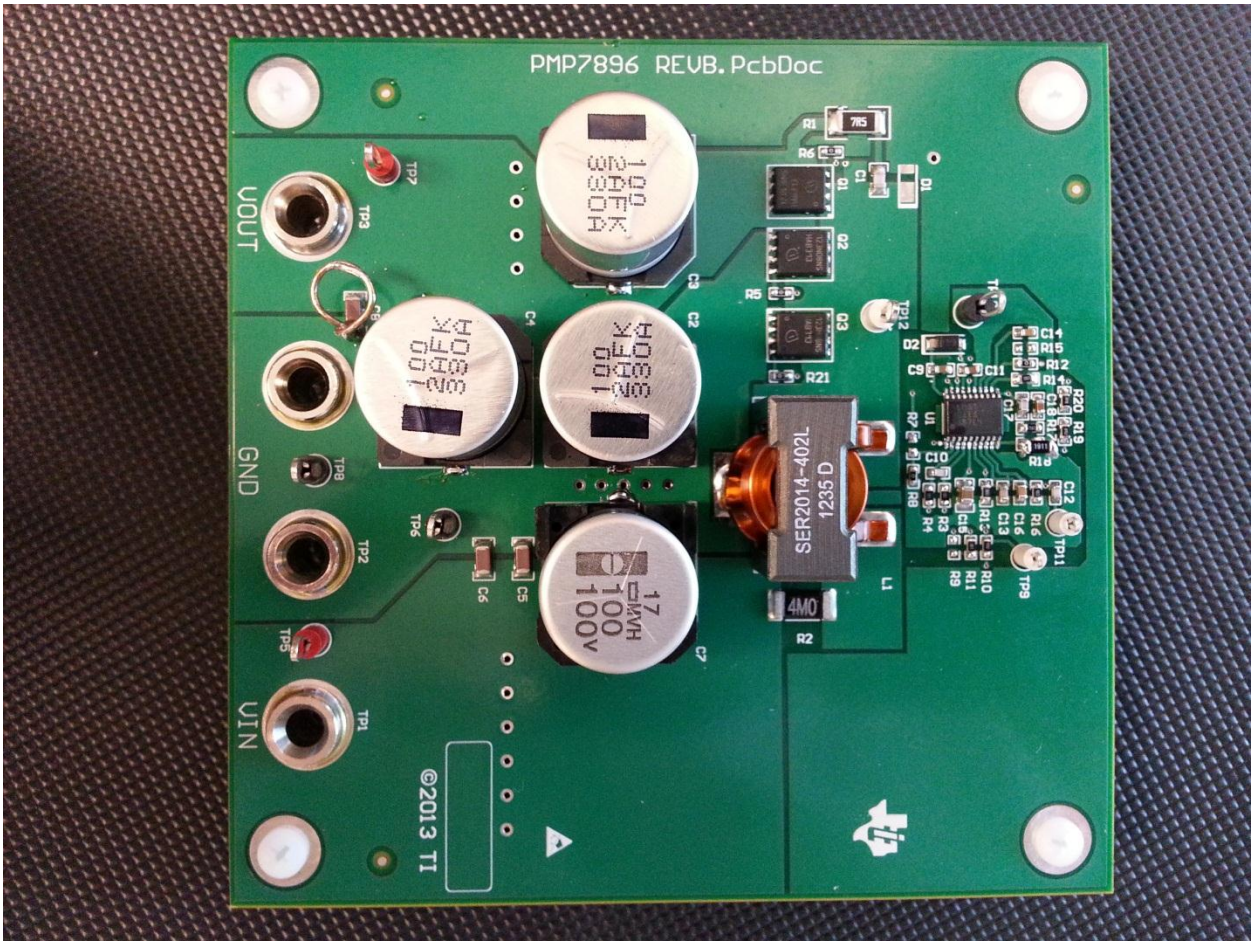
Vin Minimum	**12VDC**
Vin Maximum	**50VDC**
Vout	**54VDC**
Iout	**2.5A**
Switching Frequency	**≈ 235KHz (measured)**

2. Circuit Description

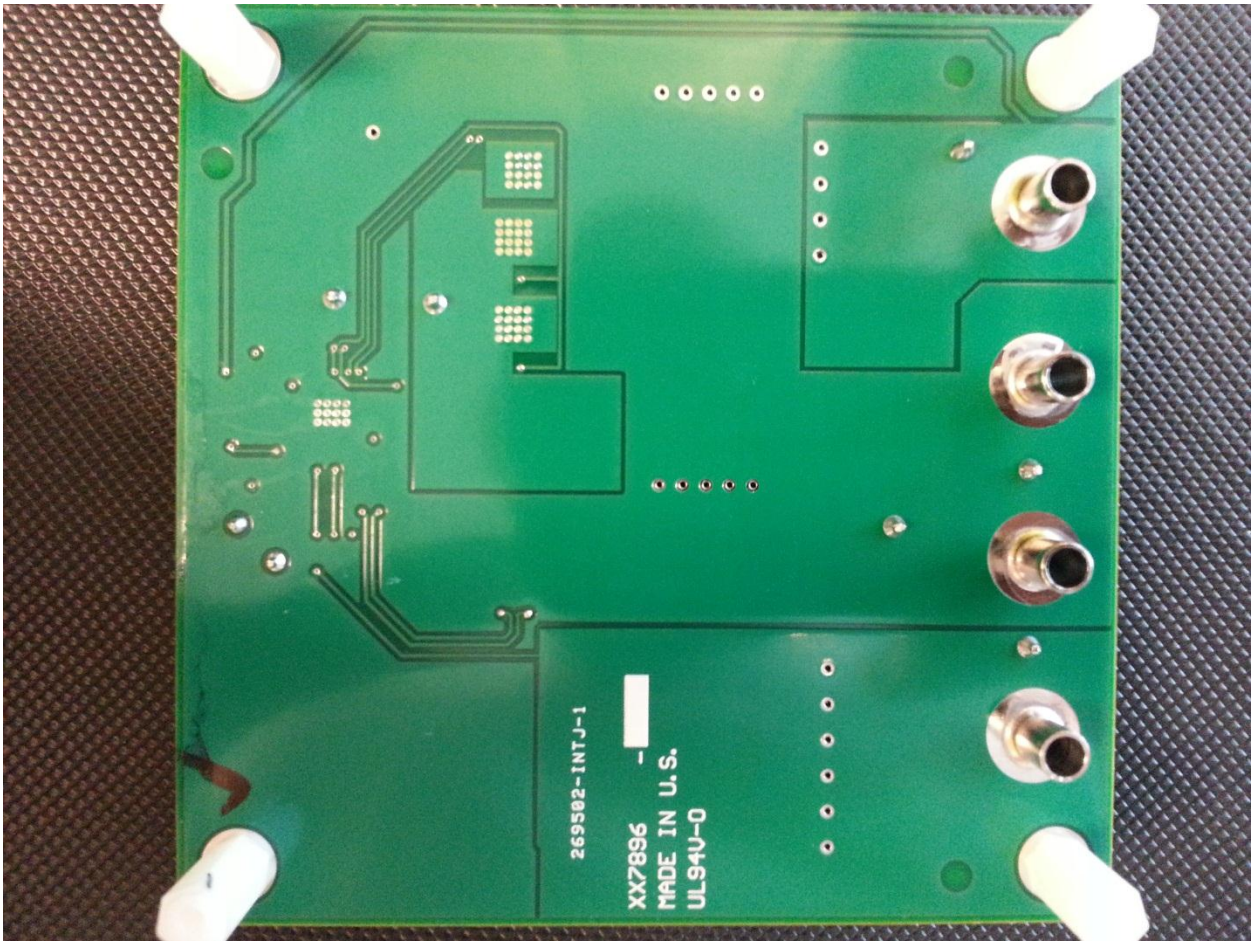
PMP9431 is a Single-Phase Synchronous Boost Converter using the LM5122 controller IC. The design accepts an input voltage of 12Vin to 50Vin and provides an output of 54Vout capable of supplying 2.5A of current to the load. The design was built on the PMP7896 PCB, which was modified to the PMP9431 design configuration.

3. PMP9431 Board Photos

Board Dimensions: 3.96” x 3.85”

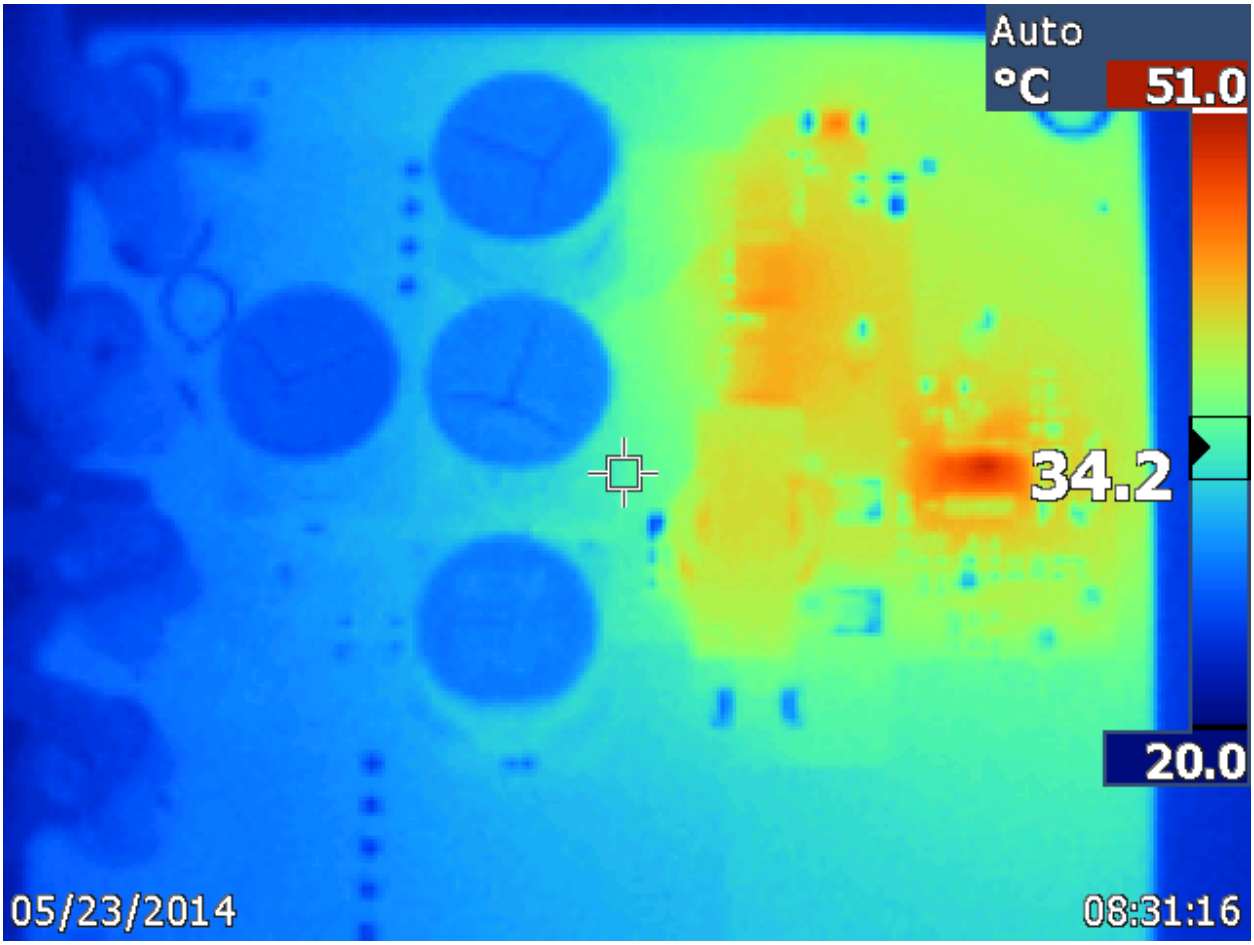


Board Photo (Top)

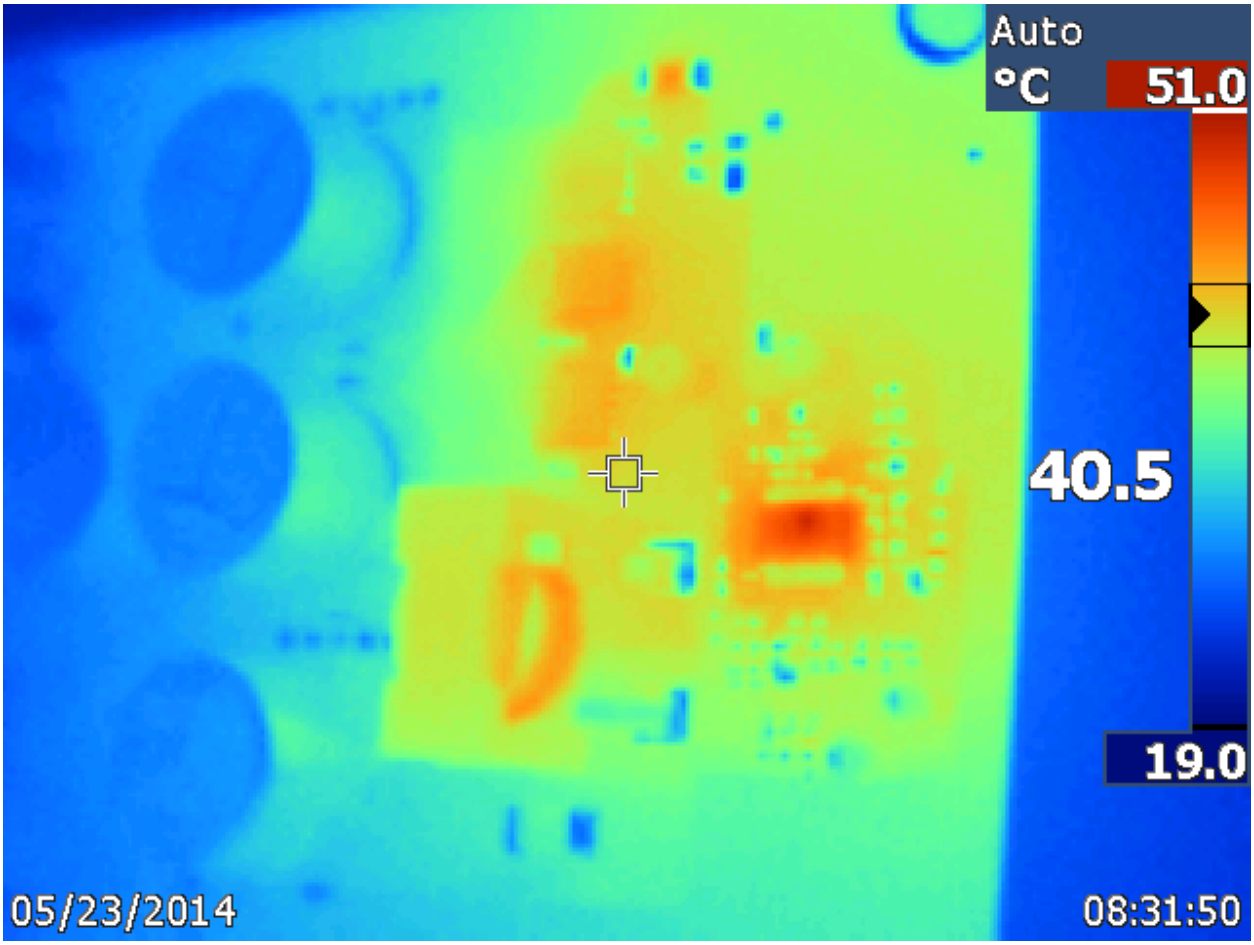


Board Photo (Bottom)

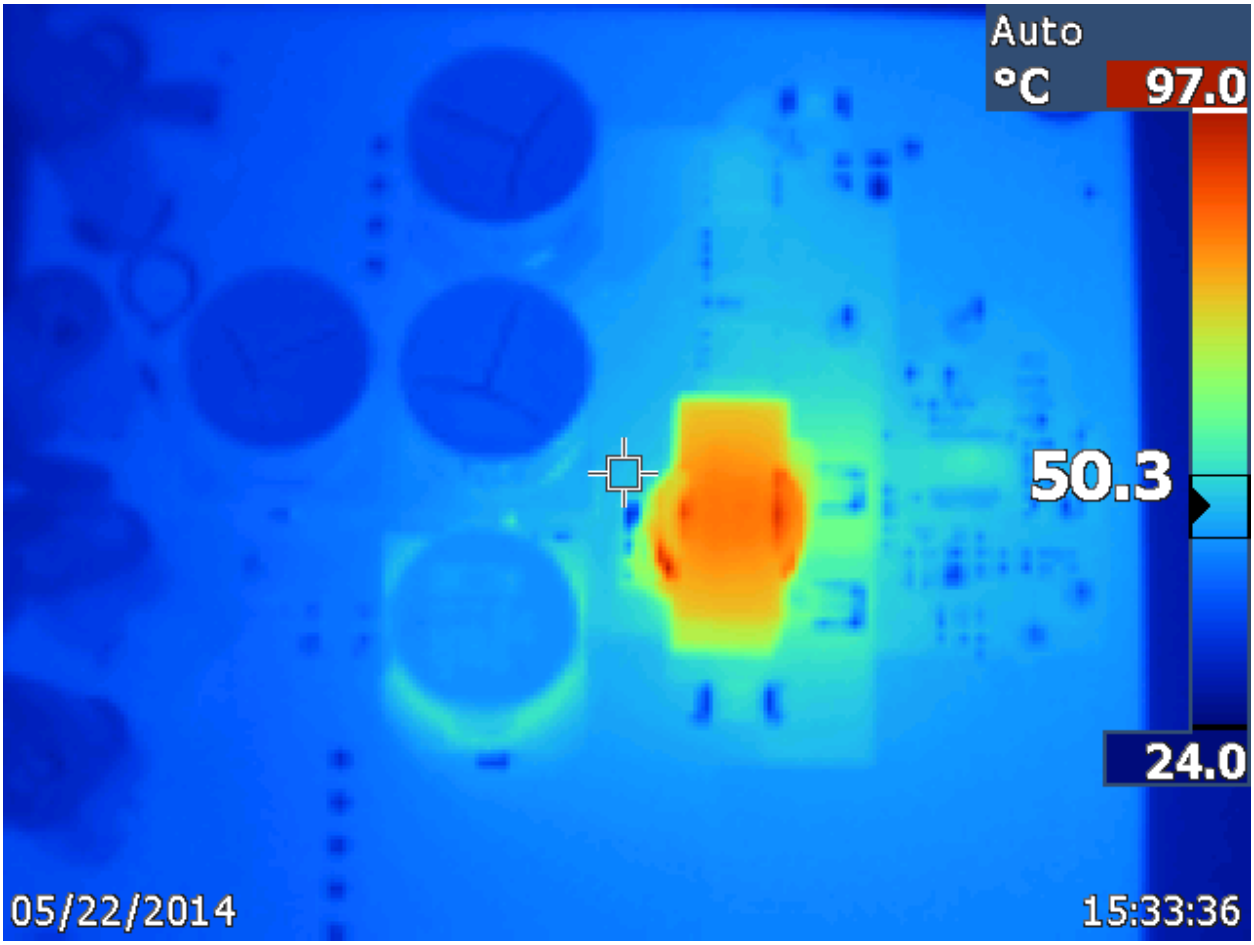
4. Thermal Data



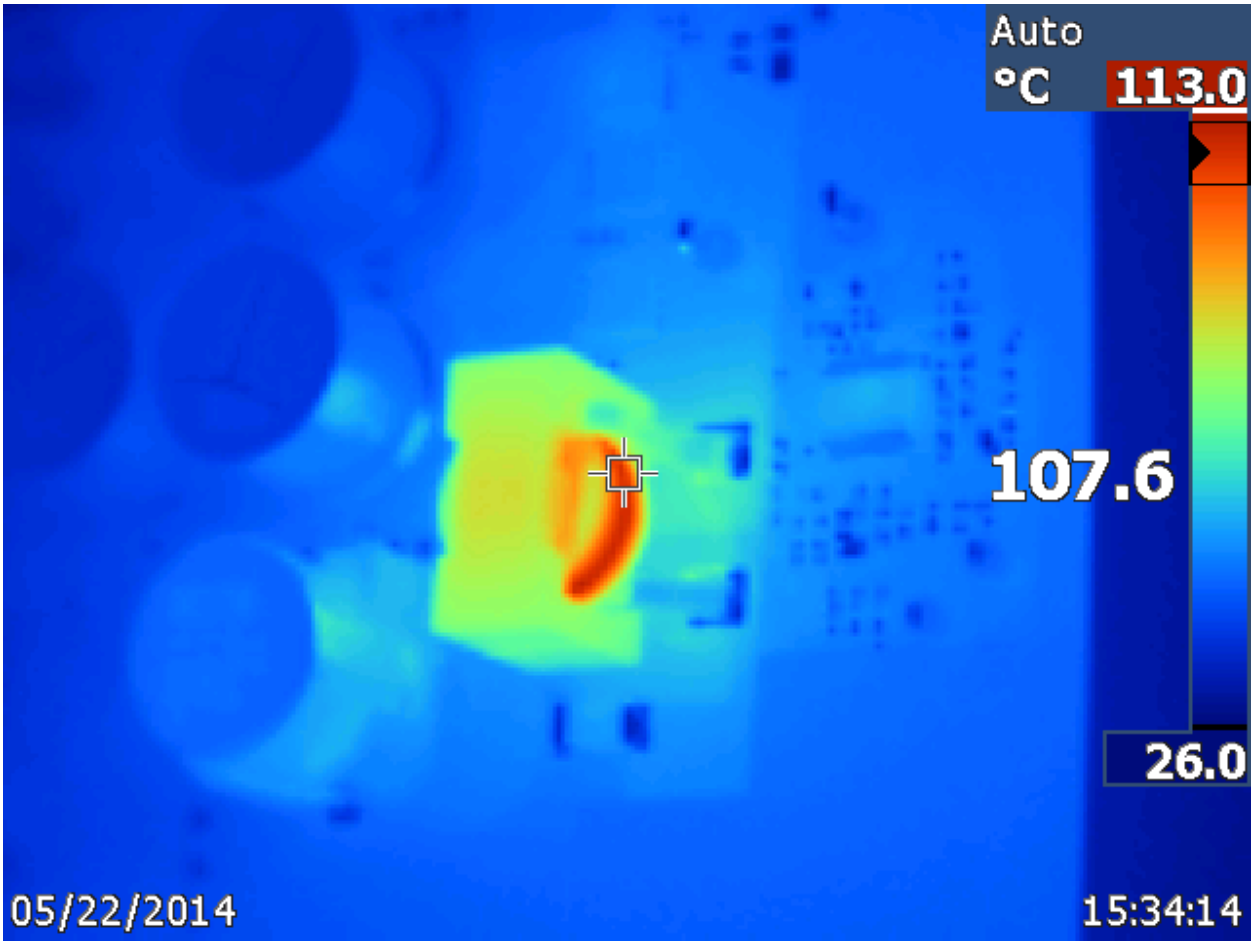
IR thermal image taken at steady state with 50Vin and 2.5A load (no airflow; Top View)



IR thermal image taken at steady state with 50Vin and 2.5A load (no airflow; Side View)



IR thermal image taken at steady state with 36Vin and 2.5A load (no airflow; Top View)

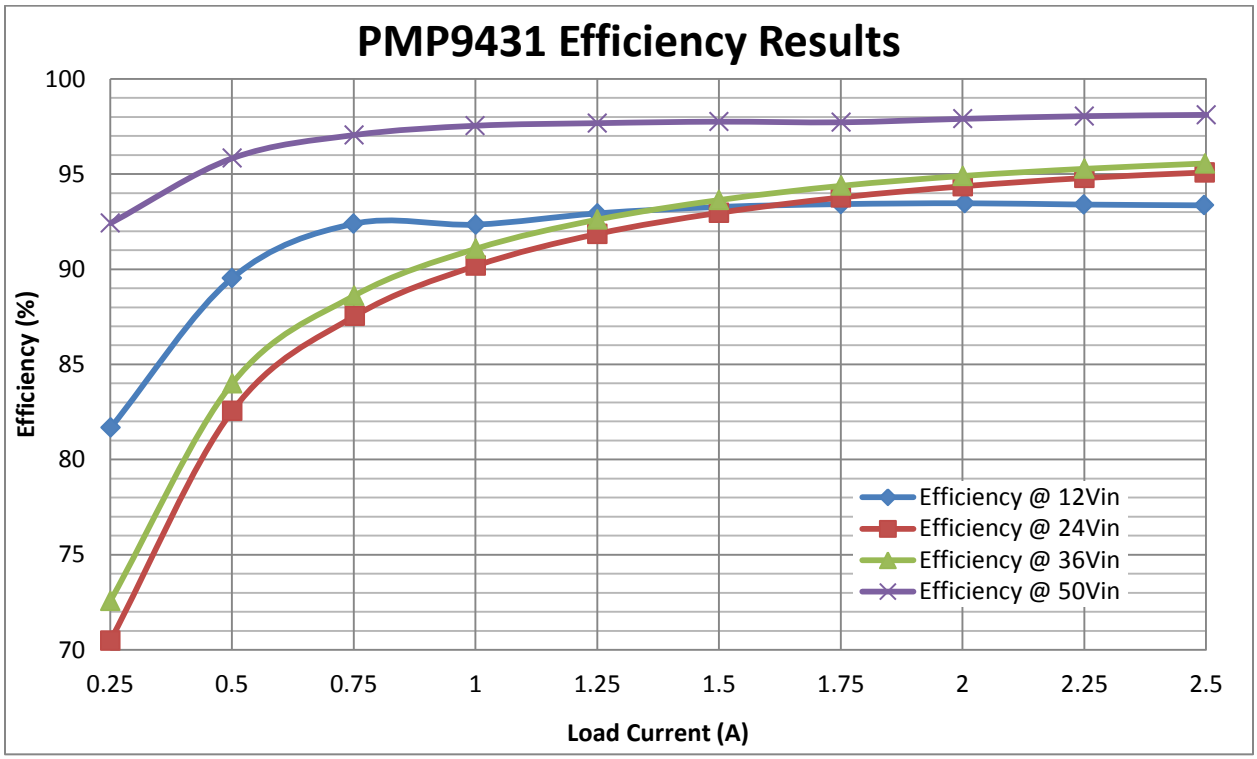


IR thermal image taken at steady state with 36Vin and 2.5A load (no airflow; Side View)

(Temperature rise can be significantly reduced if a larger inductor of the same value is used, as well as airflow, if needed)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
12	1.385	54.039	0.2512	16.62	13.5746	81.7
12	2.517	54.039	0.5004	30.204	27.04112	89.5
12	3.655	54.04	0.7498	43.86	40.51919	92.4
12	4.88	54.039	1.0007	58.56	54.07683	92.3
12	6.058	54.039	1.2502	72.696	67.55956	92.9
12	7.242	54.038	1.5	86.904	81.057	93.3
12	8.438	54.038	1.7505	101.256	94.59352	93.4
12	9.657	54.038	2.0044	115.884	108.3138	93.5
12	10.846	54.04	2.2494	130.152	121.5576	93.4
12	12.042	54.042	2.4963	144.504	134.905	93.4

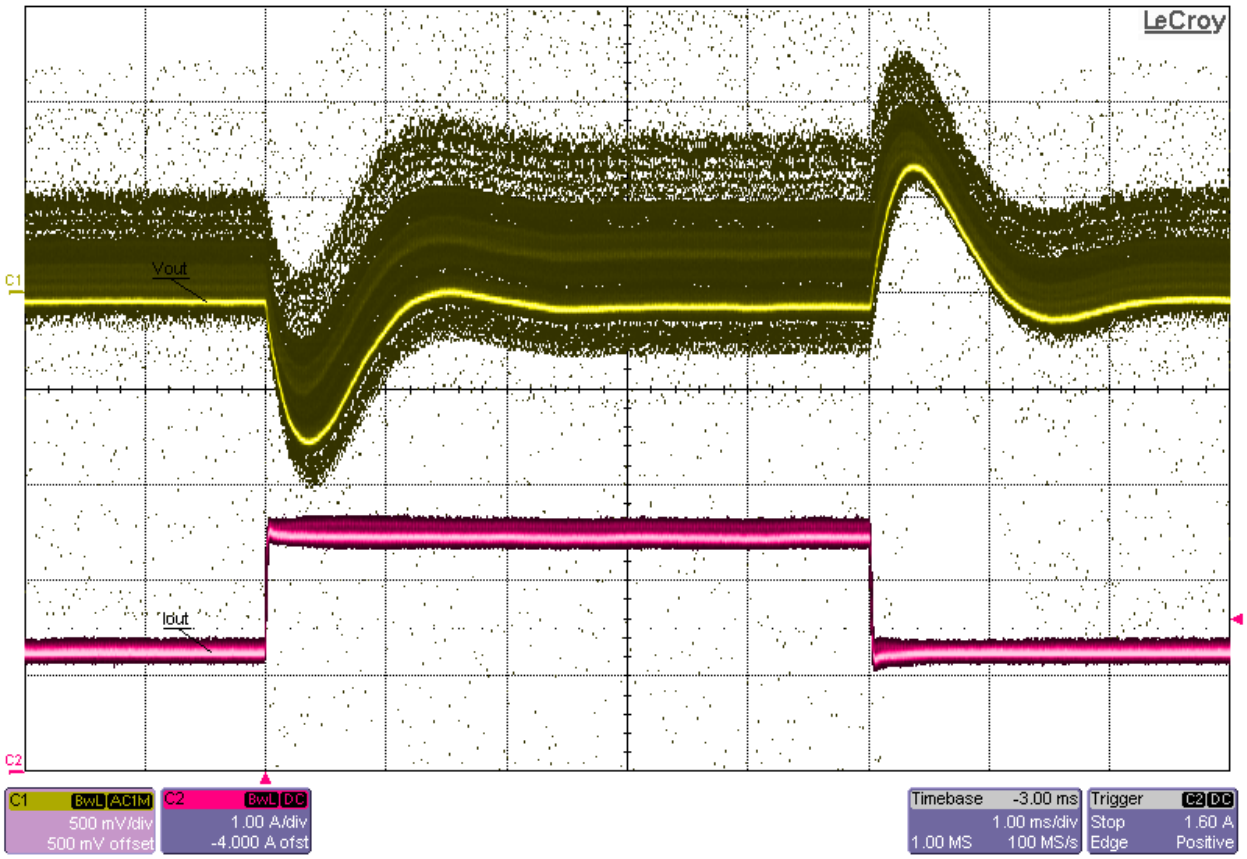
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
24	0.8	54.042	0.2504	19.2	13.53212	70.5
24	1.366	54.042	0.5008	32.784	27.06423	82.6
24	1.936	54.042	0.7527	46.464	40.67741	87.5
24	2.499	54.042	1.0008	59.976	54.08523	90.2
24	3.065	54.042	1.2503	73.56	67.56871	91.9
24	3.633	54.042	1.4999	87.192	81.0576	93.0
24	4.204	54.042	1.7507	100.896	94.61133	93.8
24	4.774	54.042	2.0005	114.576	108.111	94.4
24	5.345	54.042	2.2501	128.28	121.5999	94.8
24	5.915	54.042	2.4977	141.96	134.9807	95.1

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
36	0.518	54.043	0.2504	18.648	13.53237	72.6
36	0.895	54.044	0.5008	32.22	27.06524	84.0
36	1.273	54.044	0.7514	45.828	40.60866	88.6
36	1.65	54.044	1.001	59.4	54.09804	91.1
36	2.027	54.044	1.2504	72.972	67.57662	92.6
36	2.405	54.045	1.5	86.58	81.0675	93.6
36	2.785	54.045	1.7509	100.26	94.62739	94.4
36	3.165	54.046	2.0007	113.94	108.1298	94.9
36	3.546	54.046	2.2504	127.656	121.6251	95.3
36	3.925	54.046	2.4983	141.3	135.0231	95.6

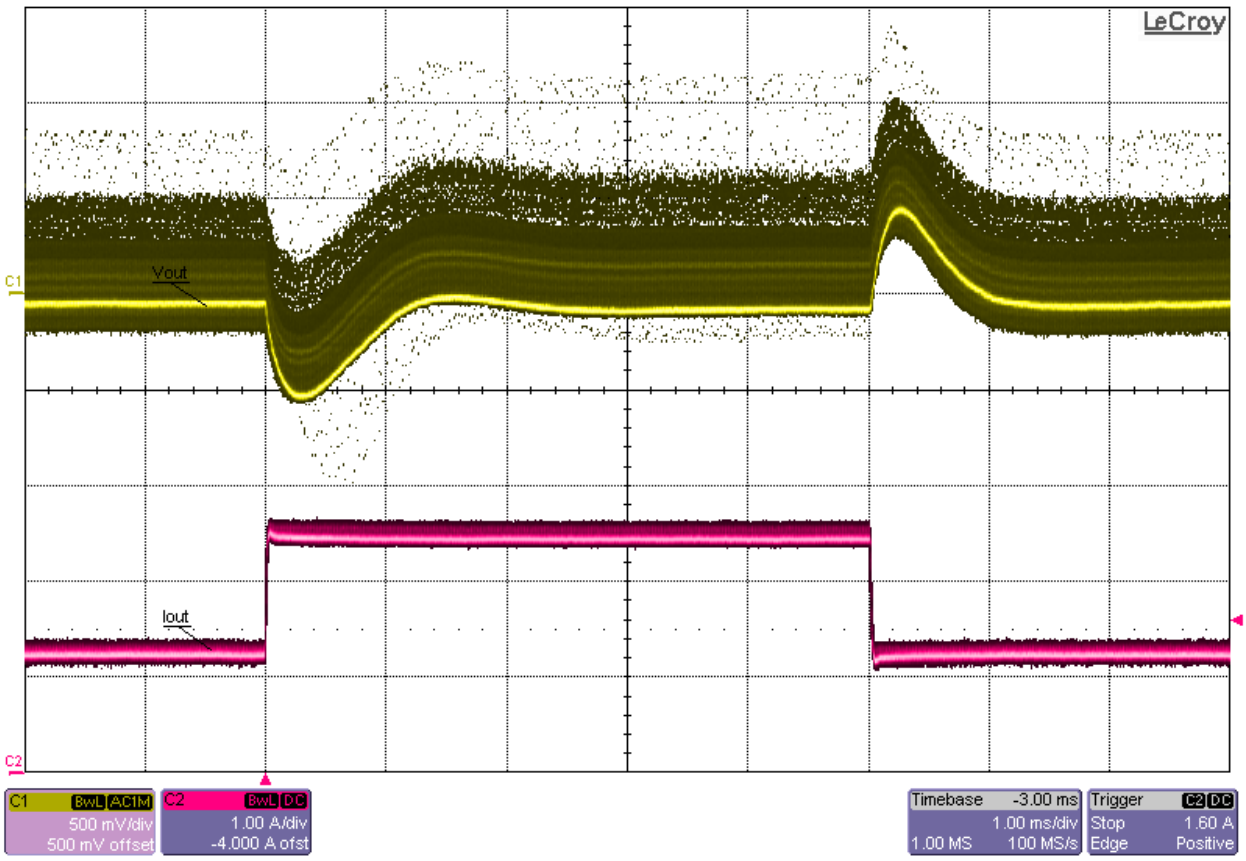
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
50	0.293	54.047	0.2505	14.65	13.53877	92.4
50	0.565	54.047	0.5009	28.25	27.07214	95.8
50	0.837	54.047	0.7515	41.85	40.61632	97.1
50	1.108	54.047	0.9998	55.4	54.03619	97.5
50	1.384	54.047	1.2506	69.2	67.59118	97.7
50	1.659	54.047	1.5003	82.95	81.08671	97.8
50	1.937	54.047	1.7511	96.85	94.6417	97.7
50	2.209	54.047	2.0007	110.45	108.1318	97.9
50	2.481	54.047	2.2503	124.05	121.622	98.0
50	2.755	54.047	2.5006	137.75	135.1499	98.1

6 Waveforms

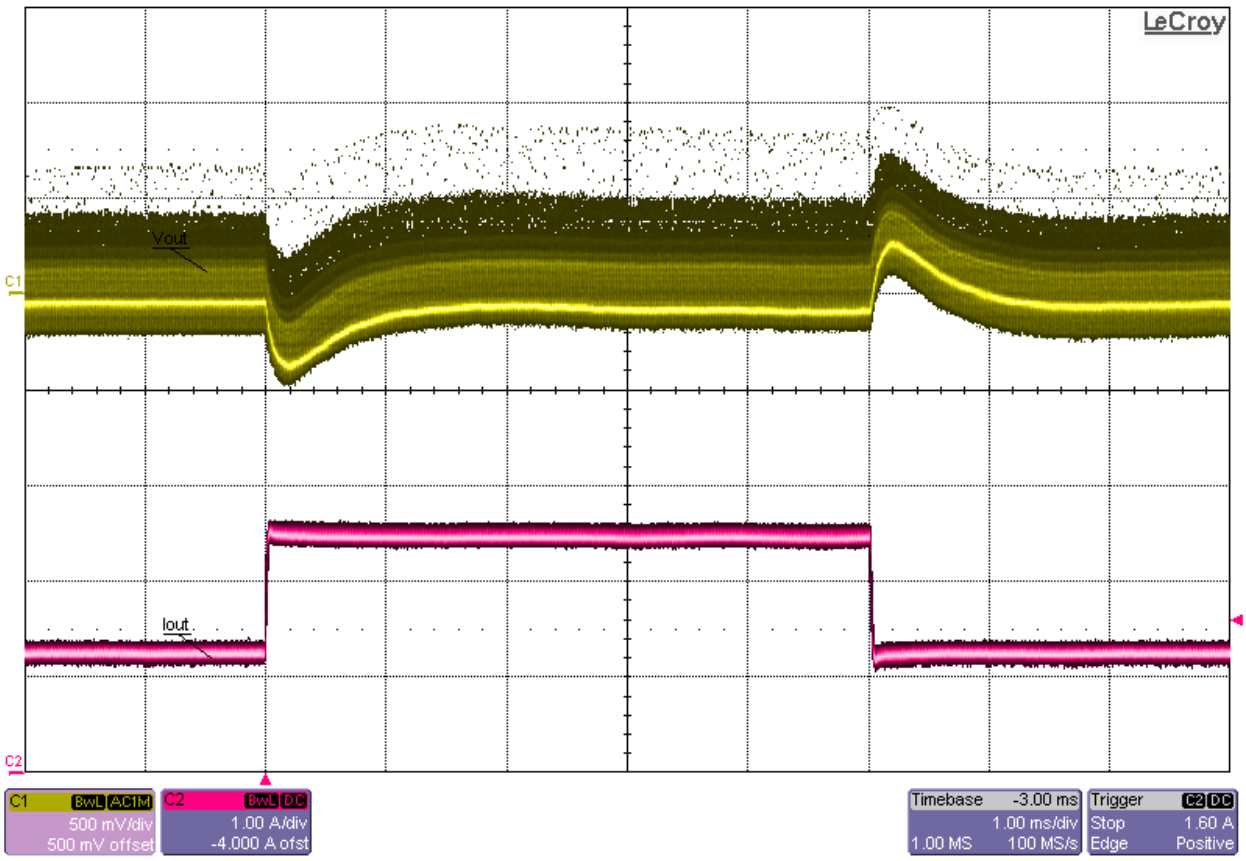
6.1 Load Transient Response



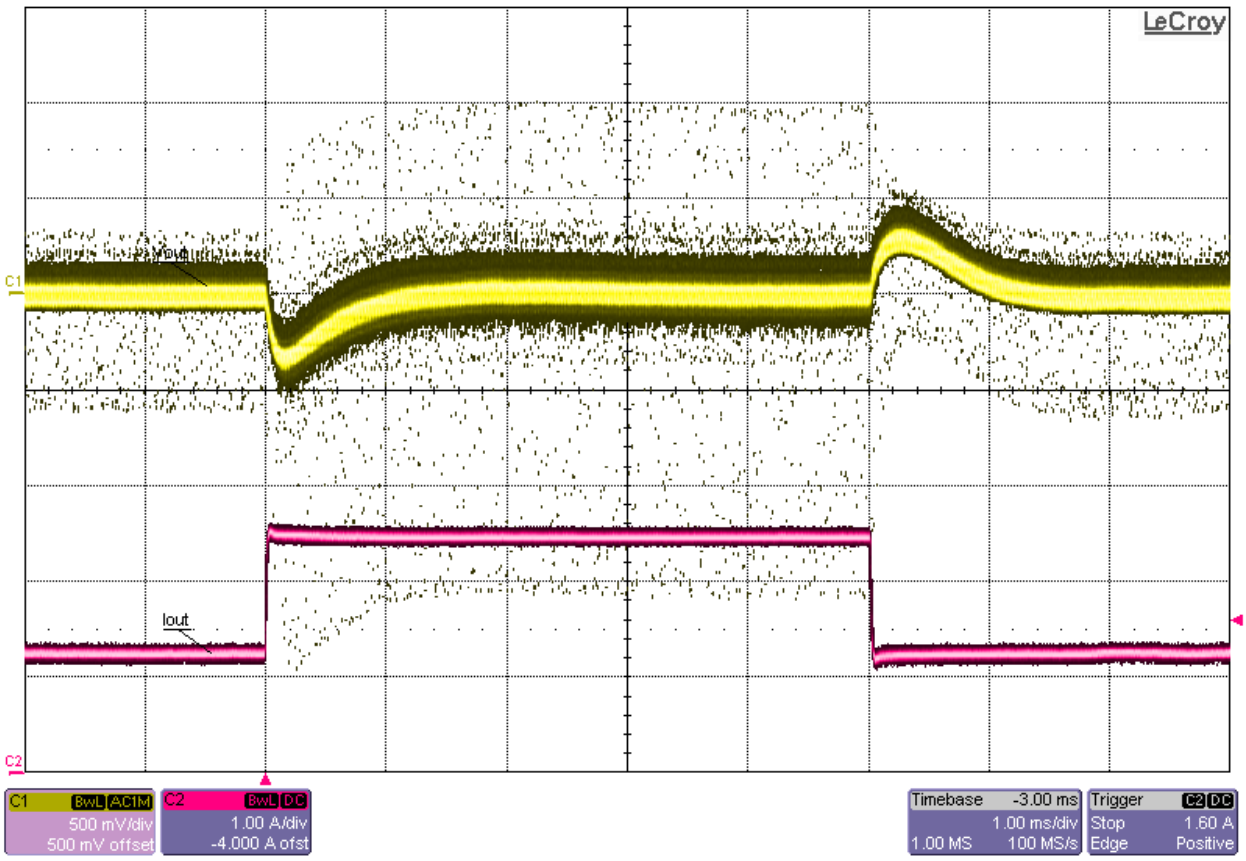
Load Transient Response at 12Vin and 50%-to-100% (1.25A-to-2.5A) Load Step



Load Transient Response at 24Vin and 50%-to-100% (1.25A-to-2.5A) Load Step

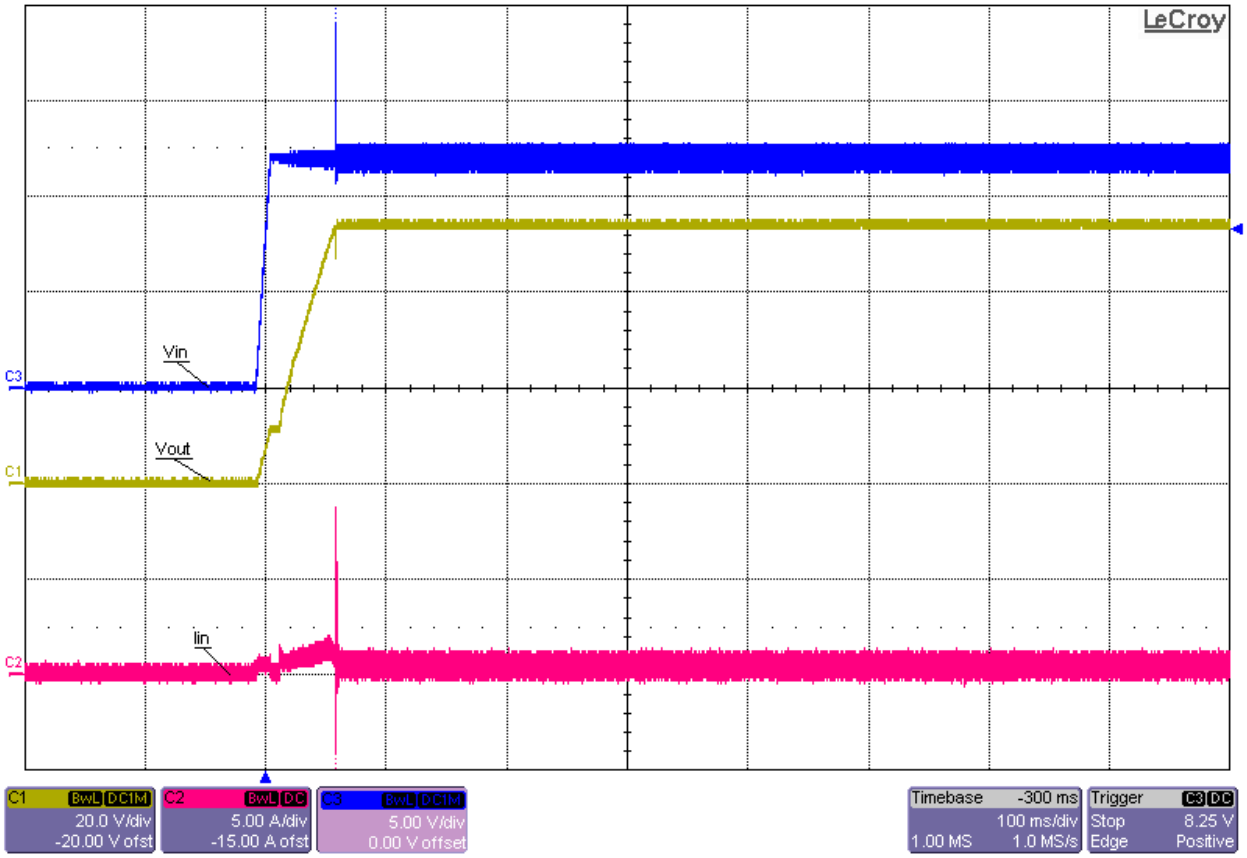


Load Transient Response at 36Vin and 50%-to-100% (1.25A-to-2.5A) Load Step

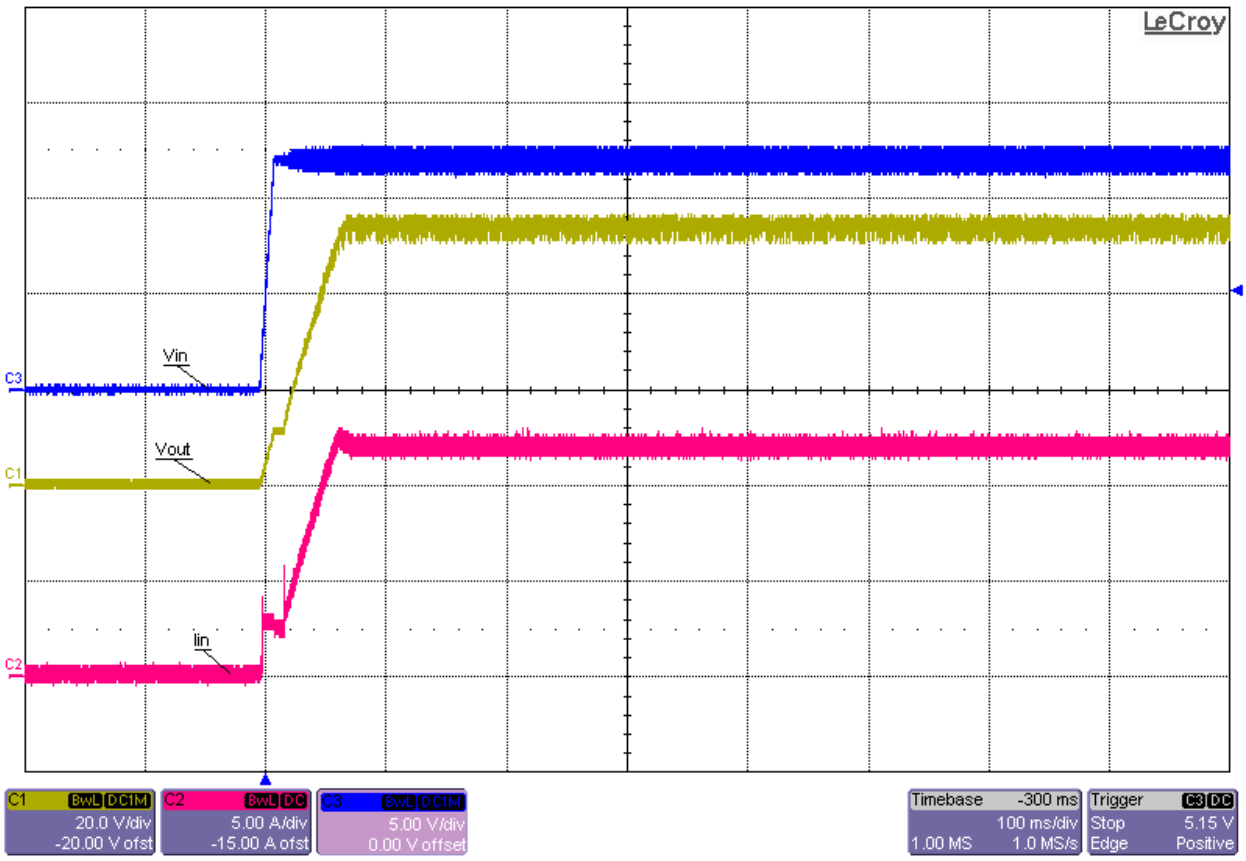


Load Transient Response at 50Vin and 50%-to-100% (1.25A-to-2.5A) Load Step

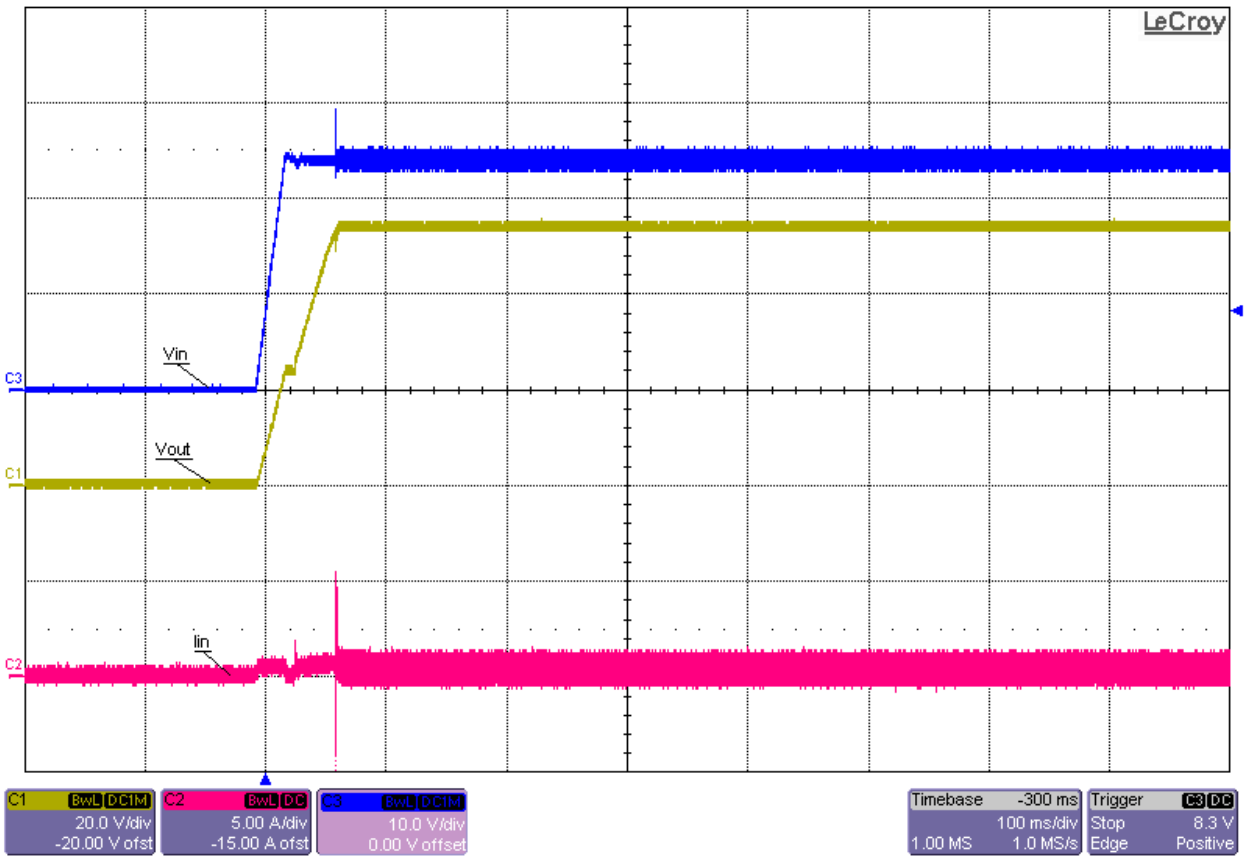
6.2 Startup



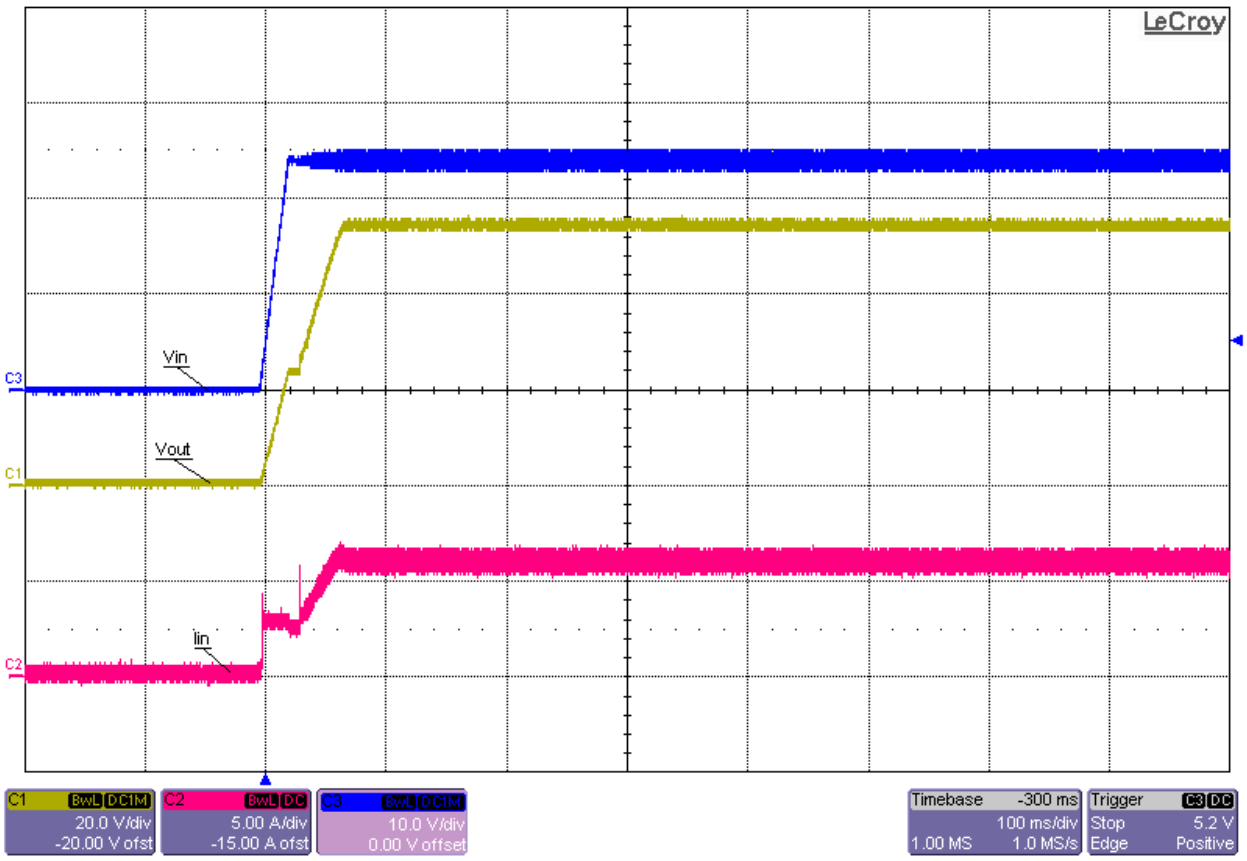
Startup into No Load at 12Vin



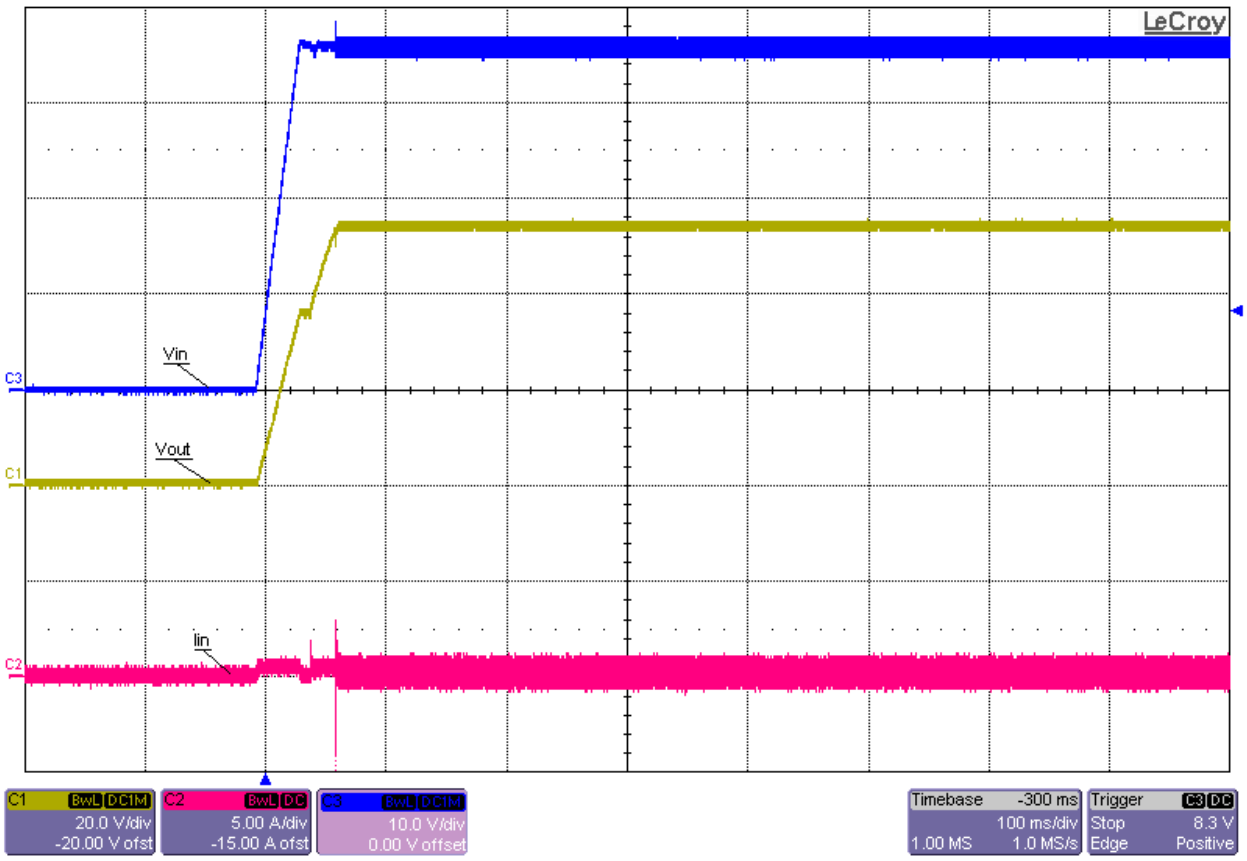
Startup into Full (2.5A) Load at 12Vin



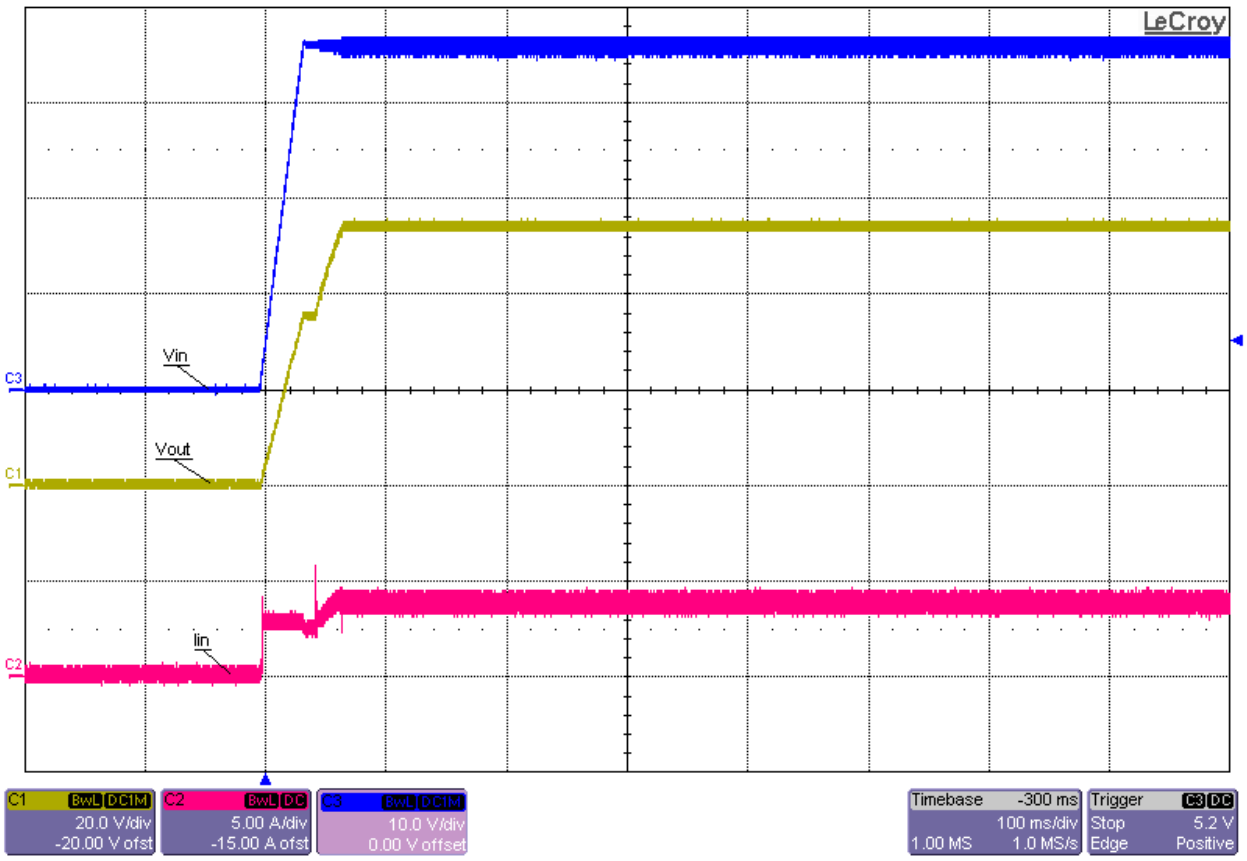
Startup into No Load at 24Vin



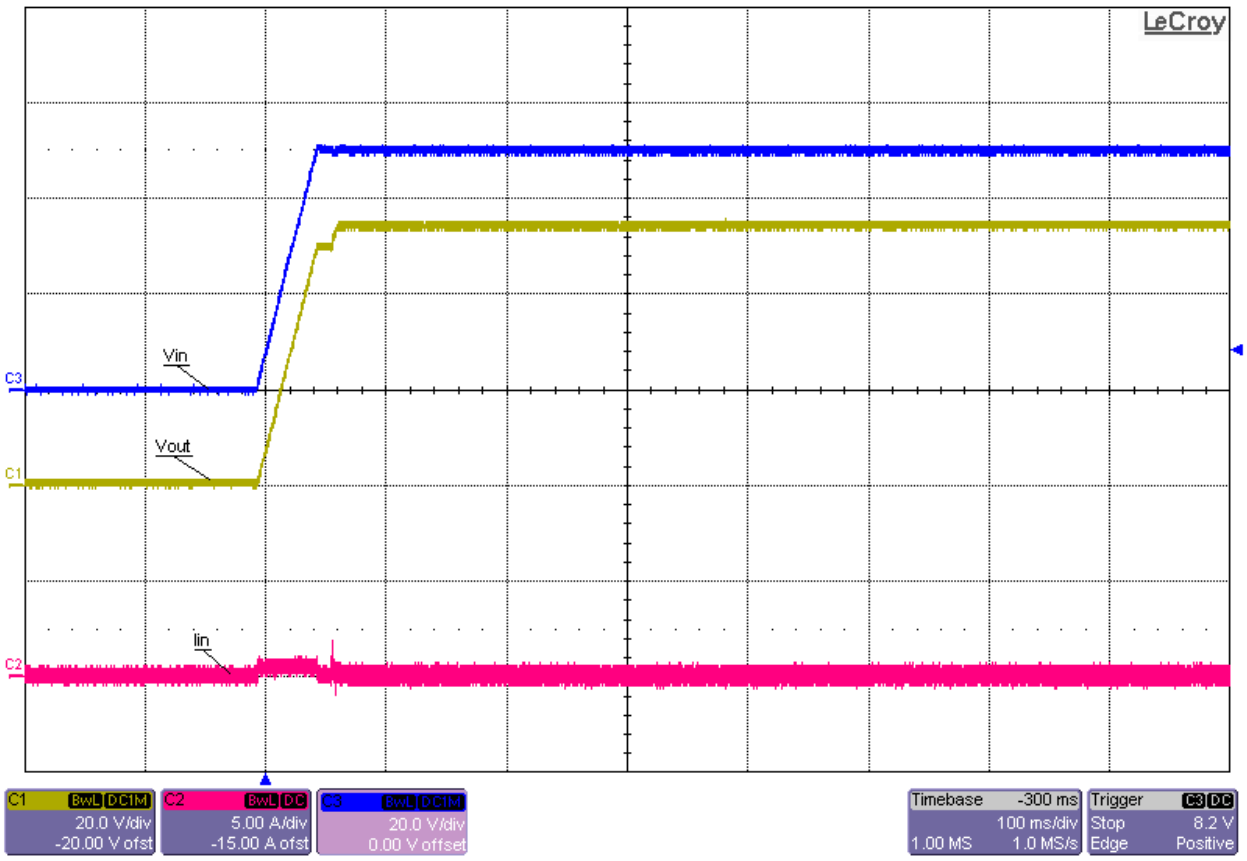
Startup into Full (2.5A) Load at 24Vin



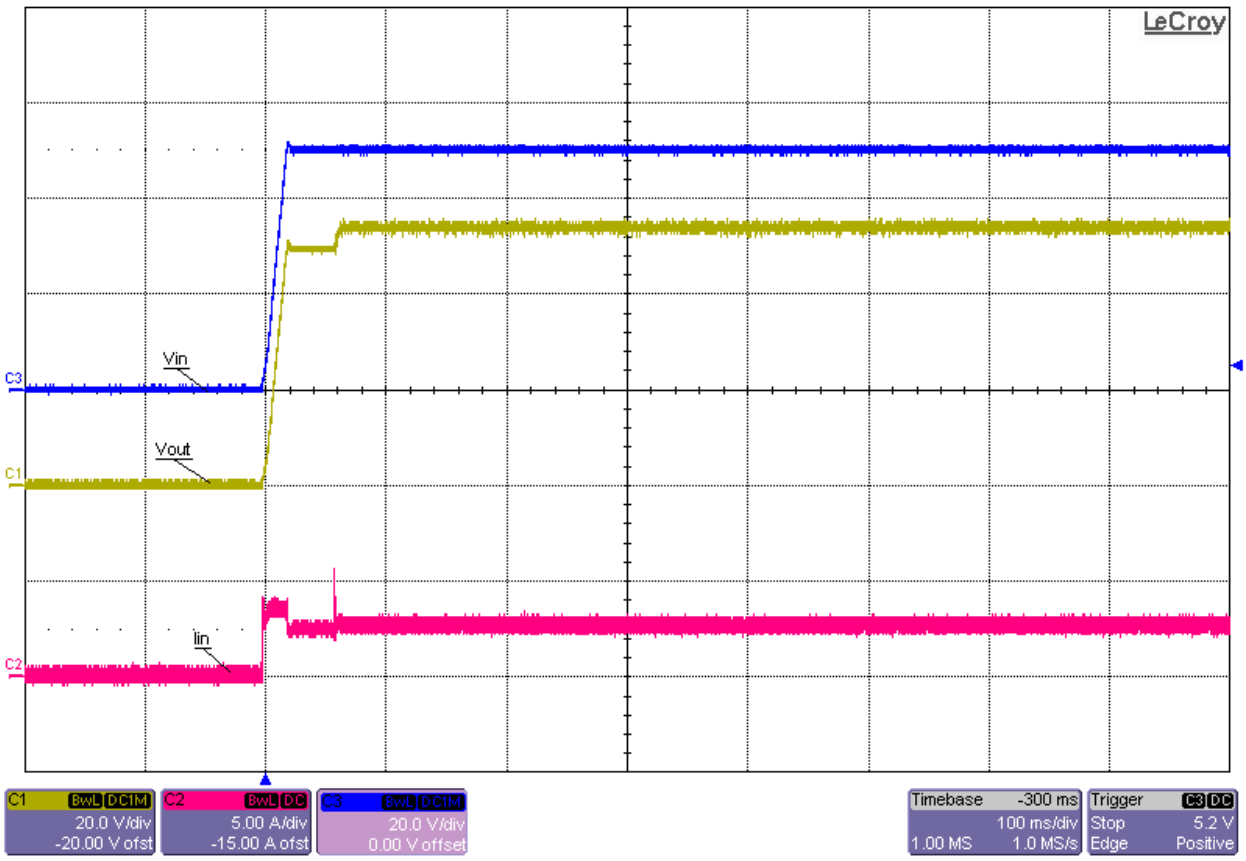
Startup into No Load at 36Vin



Startup into Full (2.5A) Load at 36Vin

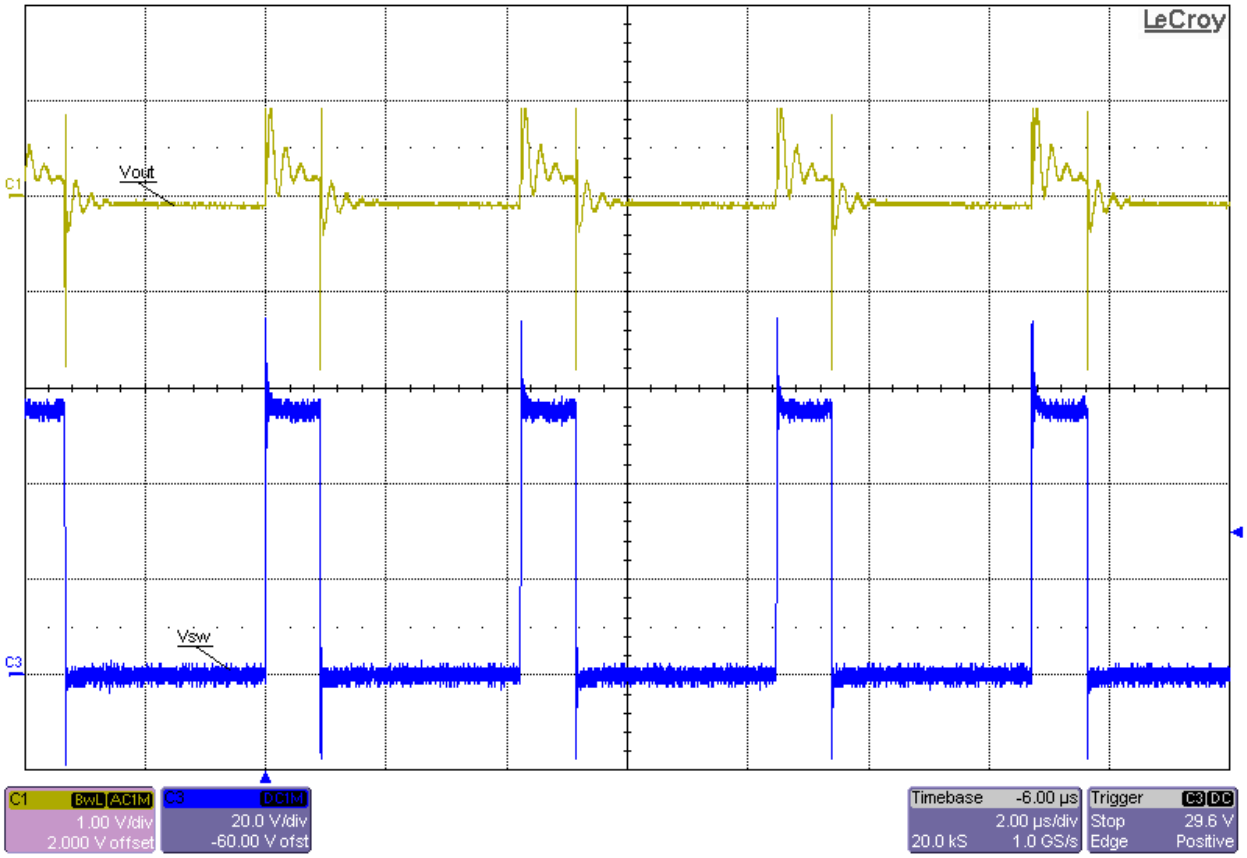


Startup into No Load at 50Vin

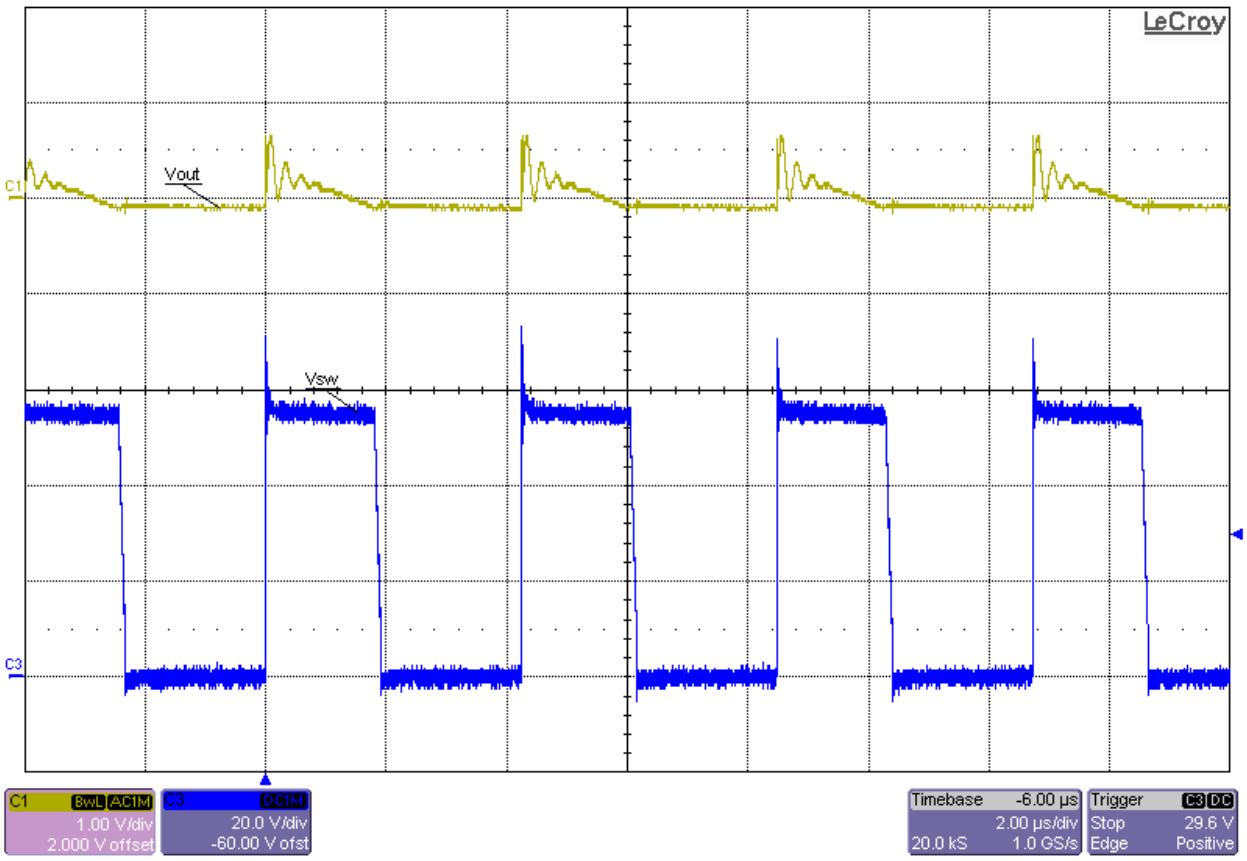


Startup into Full (2.5A) Load at 50Vin

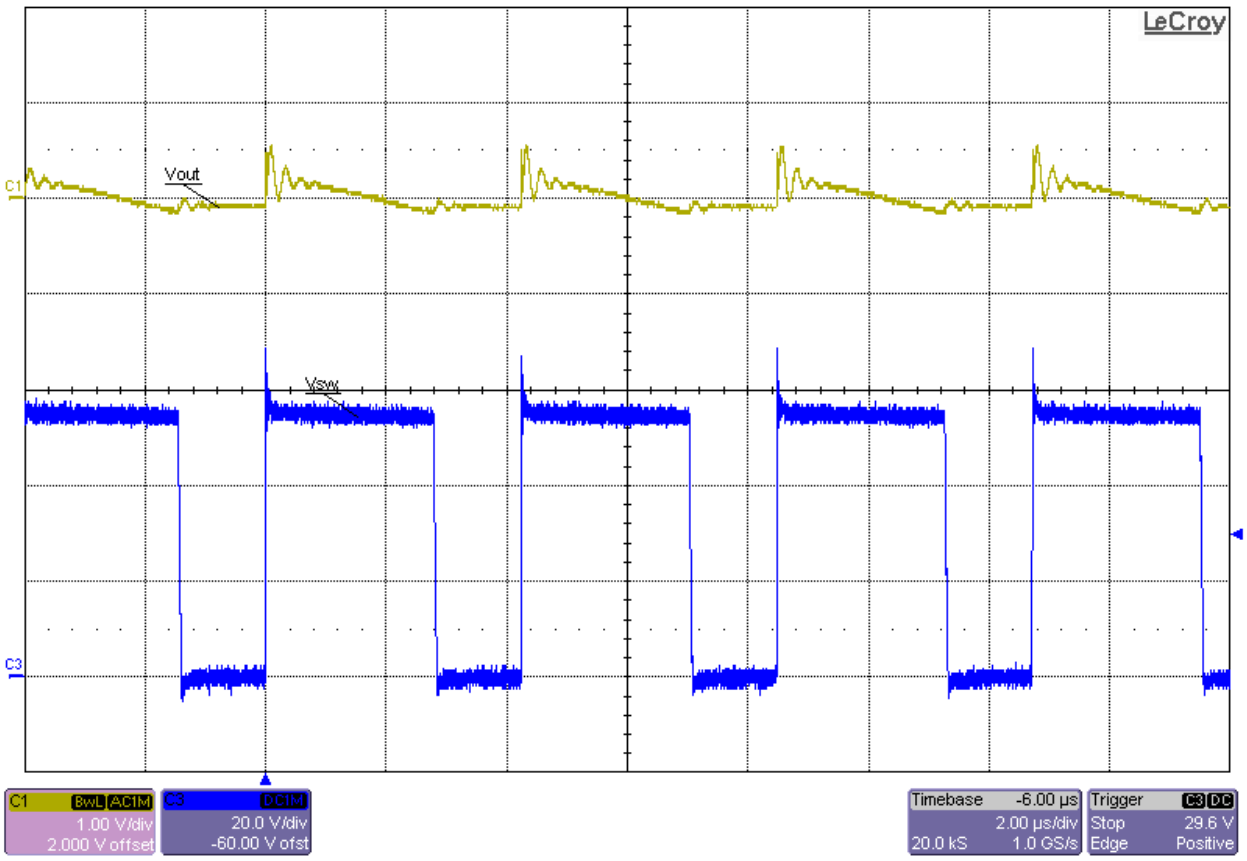
6.3 Output Voltage Ripple and Switch Node Voltage



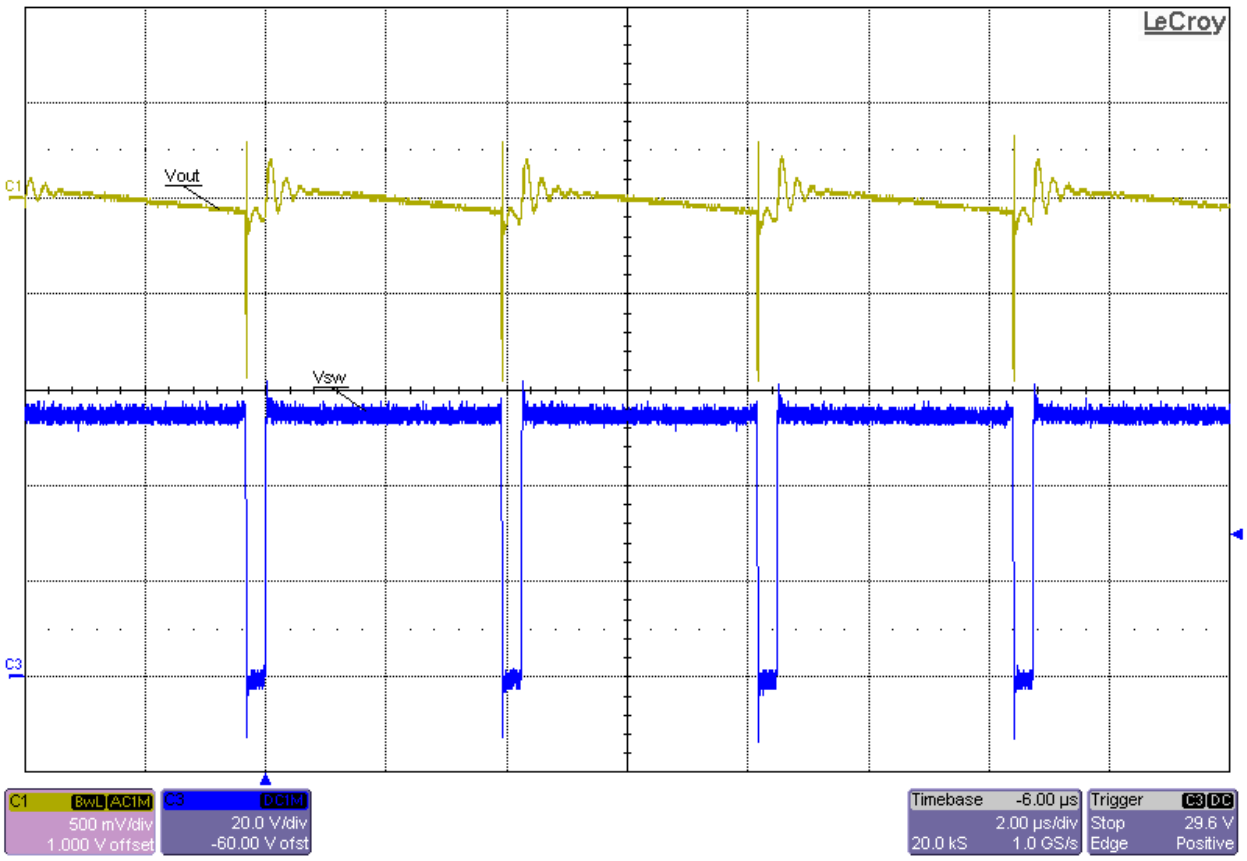
Switch Node Voltage and Output Voltage Ripple at 12Vin and Full (2.5A) Load (Vripple ≈ 1.2Vp-p)



Switch Node Voltage and Output Voltage Ripple at 24Vin and Full (2.5A) Load (Vripple ≈ 800mVp-p)



Switch Node Voltage and Output Voltage Ripple at 36Vin and Full (2.5A) Load (Vripple ≈ 750mVp-p)



Switch Node Voltage and Output Voltage Ripple at 50Vin and Full (2.5A) Load (Vripple ≈ 350mVp-p)

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