

**Test Data
For PMP10503
6/30/2014**



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1. Design Specifications

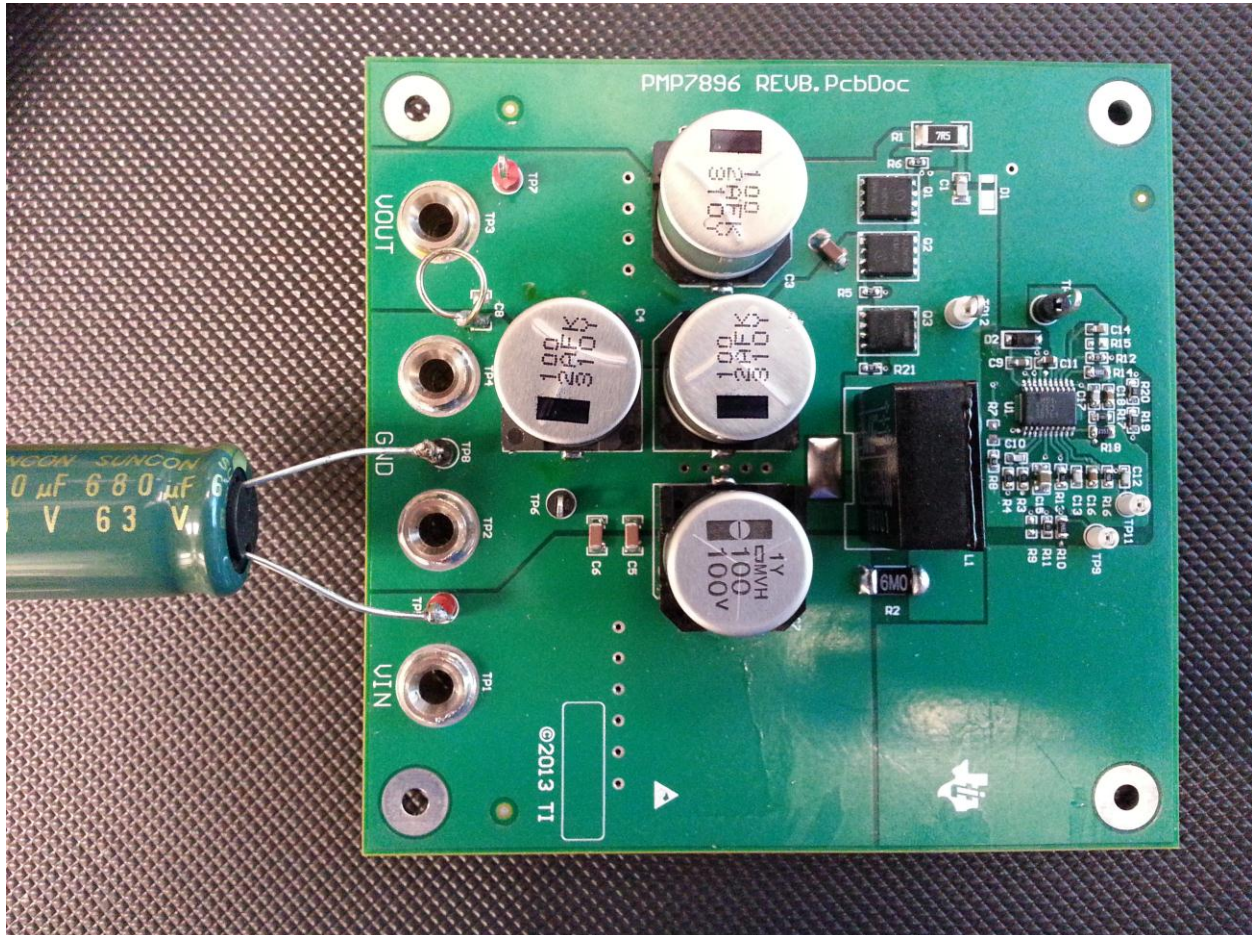
Vin Minimum	7VDC
Vin Maximum	36VDC
Vin Nominal	14VDC
Vout	48VDC
Iout	1A Max.
Switching Frequency	≈ 135KHz

2. Circuit Description

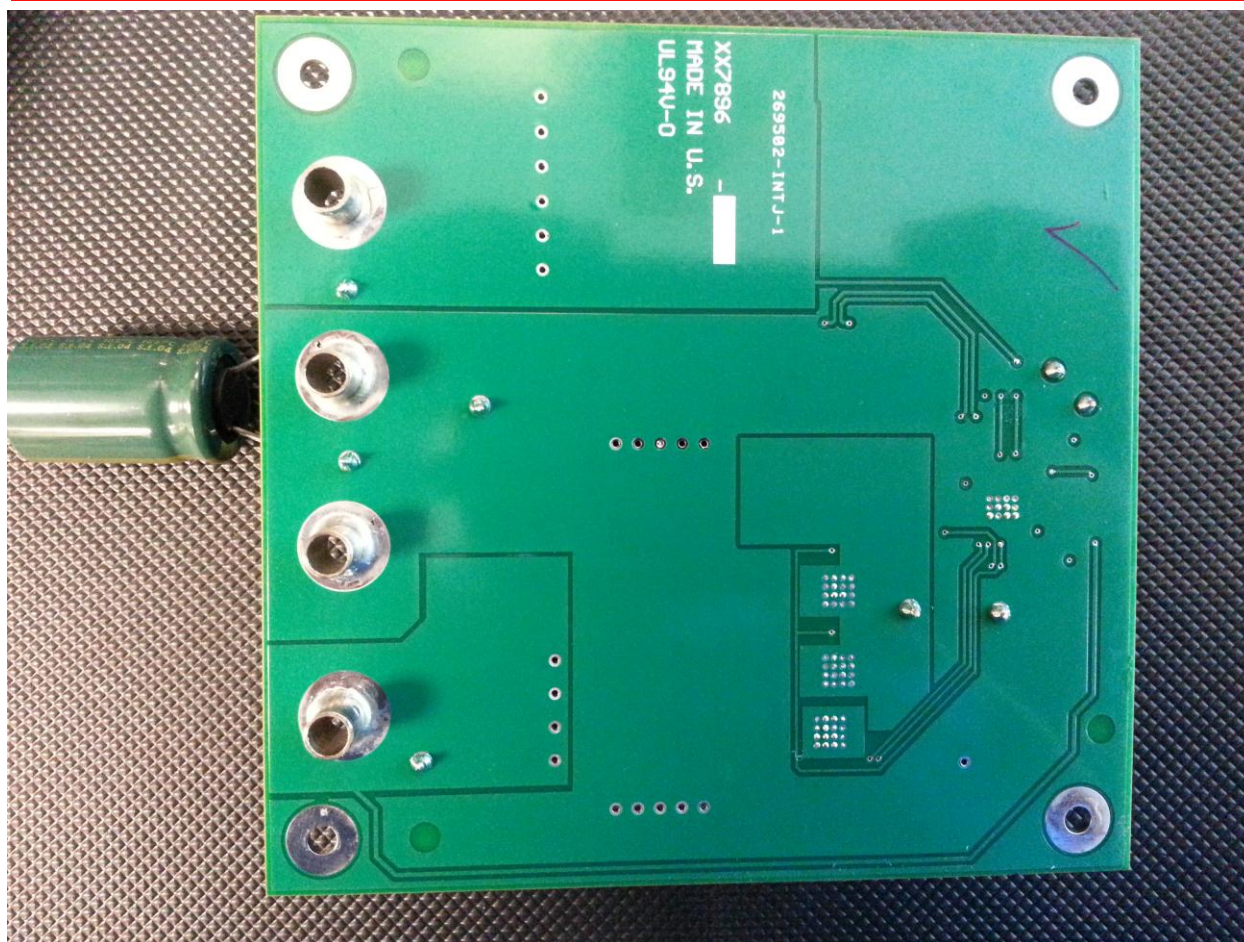
PMP10503 is a Single-Phase Synchronous Boost Converter using the LM5122 controller IC. The design accepts an input voltage of 7Vin to 36Vin (14Vin Nominal) and provides an output of 48Vout capable of supplying 1A of continuous current to the load. The design was built on the PMP7896 RevB PCB, which was modified to the PMP10503 design configuration and requirements.

3. PMP10503 Board Photos

Board Dimensions: 3.96" x 3.85"

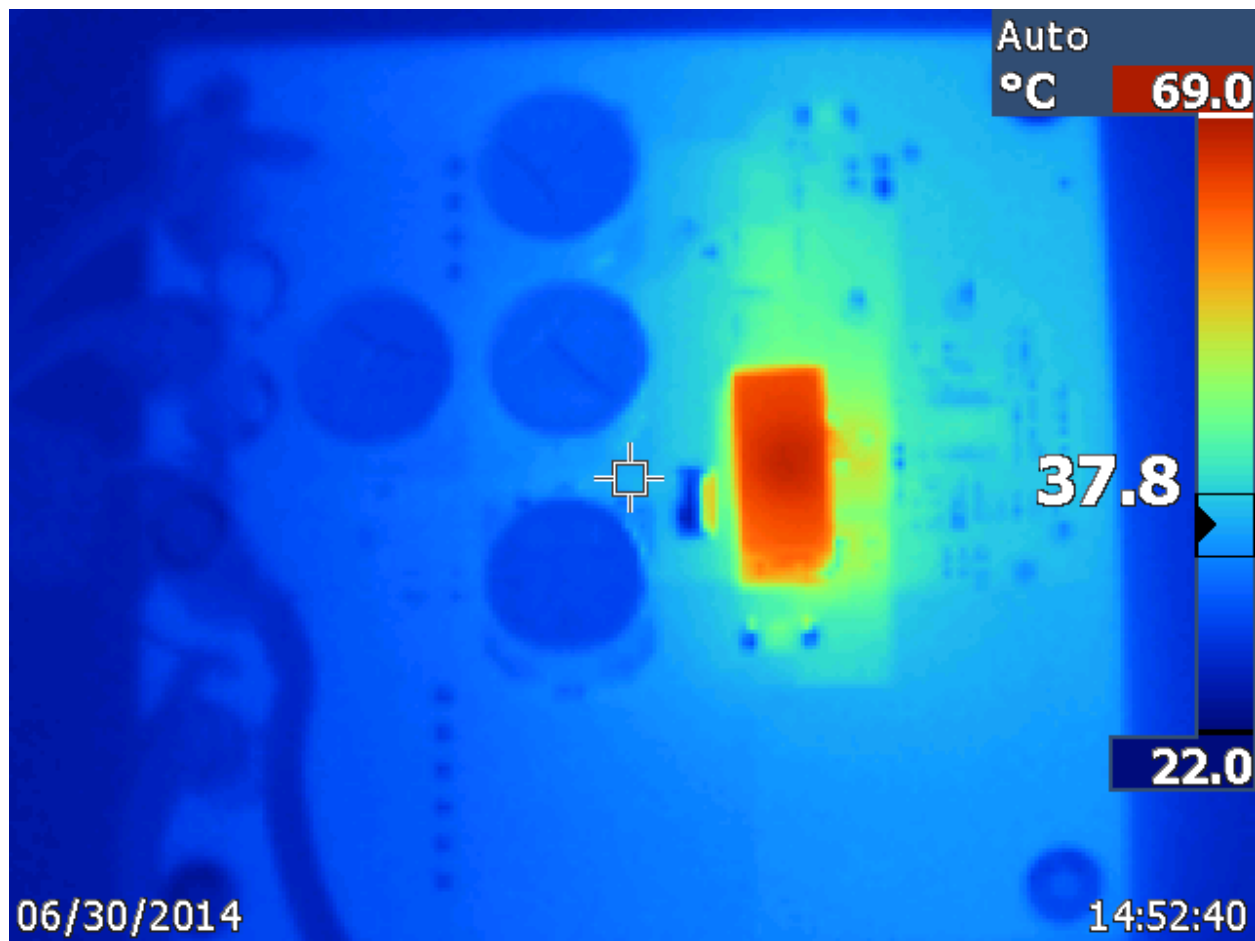


Board Photo (Top)

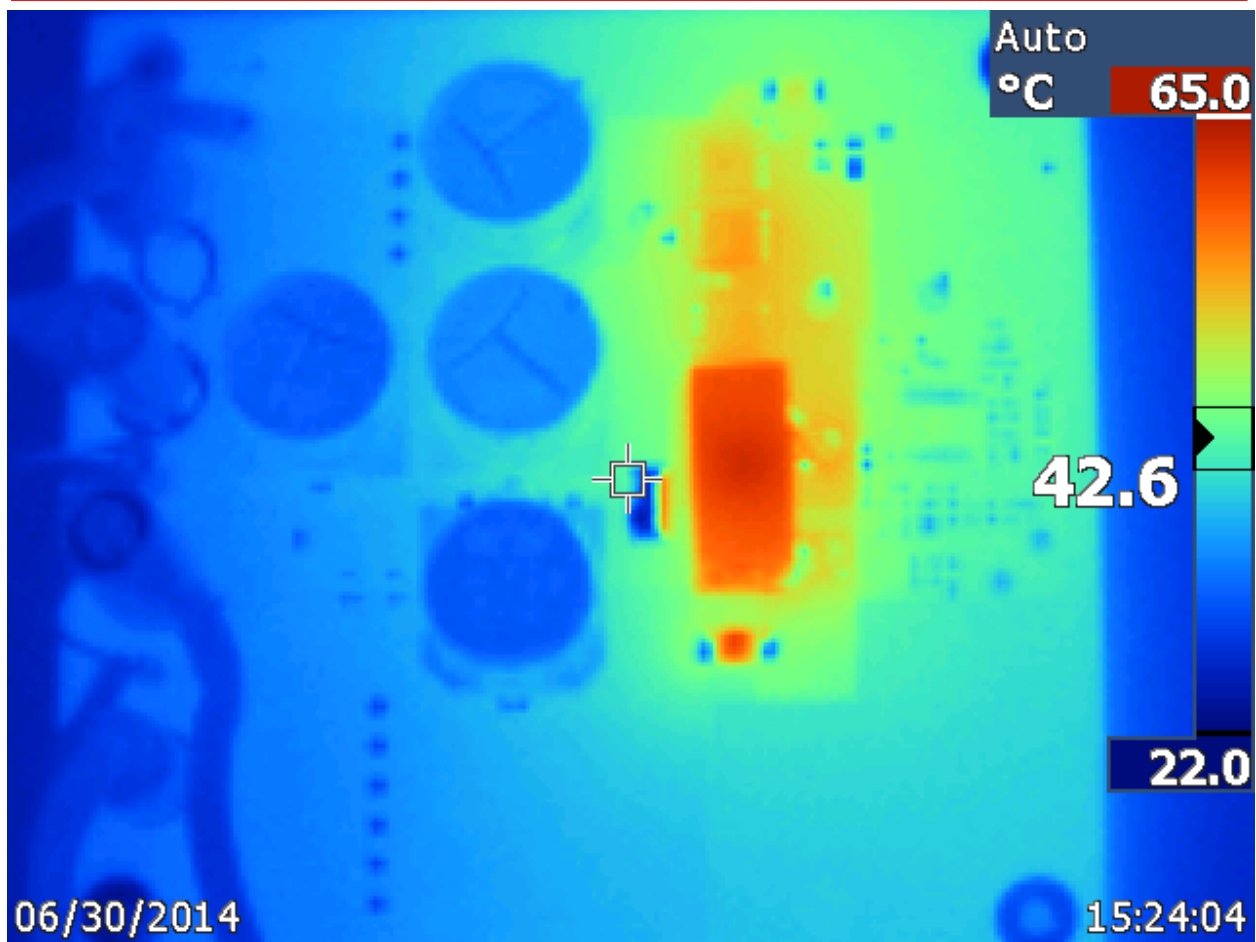


Board Photo (Bottom)

4. Thermal Data



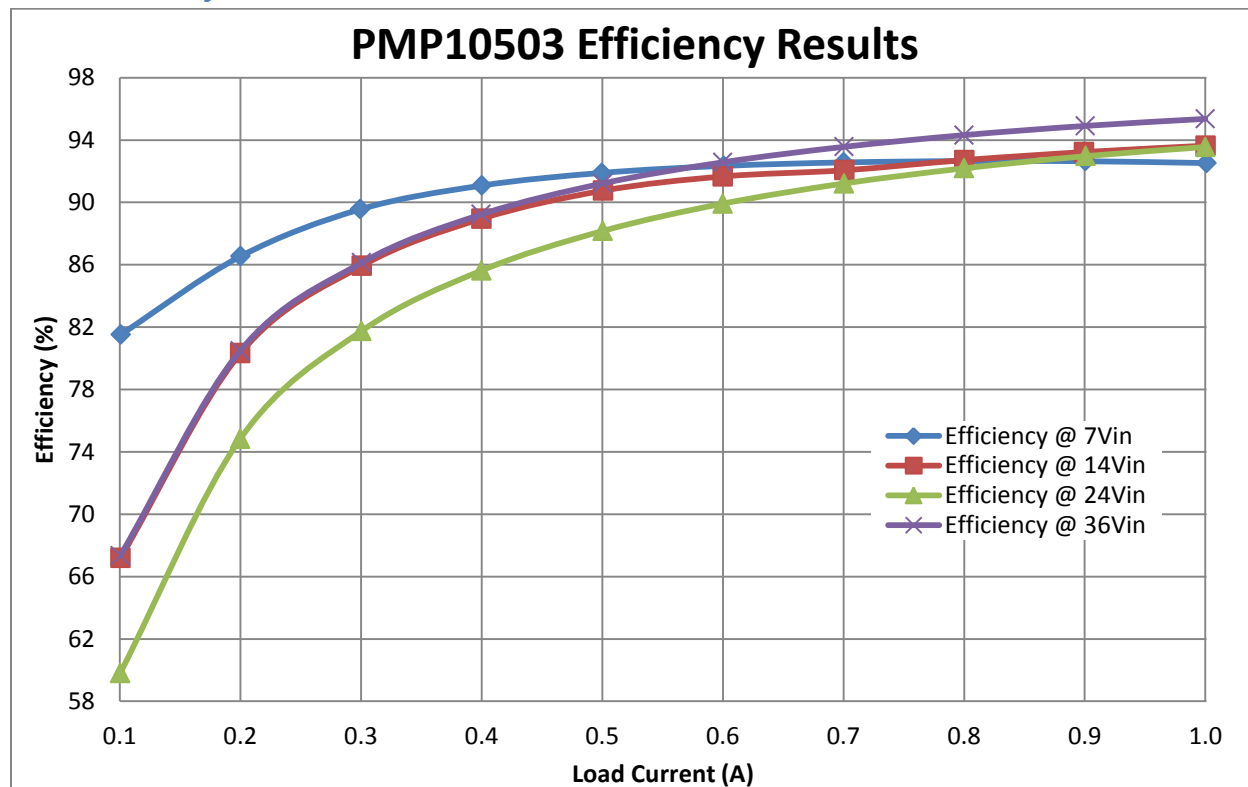
IR thermal image taken at steady state with 14Vin and 1A load (no airflow)



IR thermal image taken at steady state with 7Vin and 1A load (no airflow)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
7	0.8533	48.278	0.10087	5.9731	4.869802	81.5
7	1.595	48.277	0.20015	11.165	9.662642	86.5
7	2.3058	48.276	0.29944	16.1406	14.45577	89.6
7	3.0302	48.276	0.4002	21.2114	19.32006	91.1
7	3.7508	48.275	0.4998	26.2556	24.12785	91.9
7	4.486	48.275	0.60068	31.402	28.99783	92.3
7	5.2163	48.273	0.70017	36.5141	33.79931	92.6
7	5.9528	48.273	0.79978	41.6696	38.60778	92.7
7	6.7029	48.273	0.90047	46.9203	43.46839	92.6
7	7.4606	48.272	1.001	52.2242	48.32027	92.5

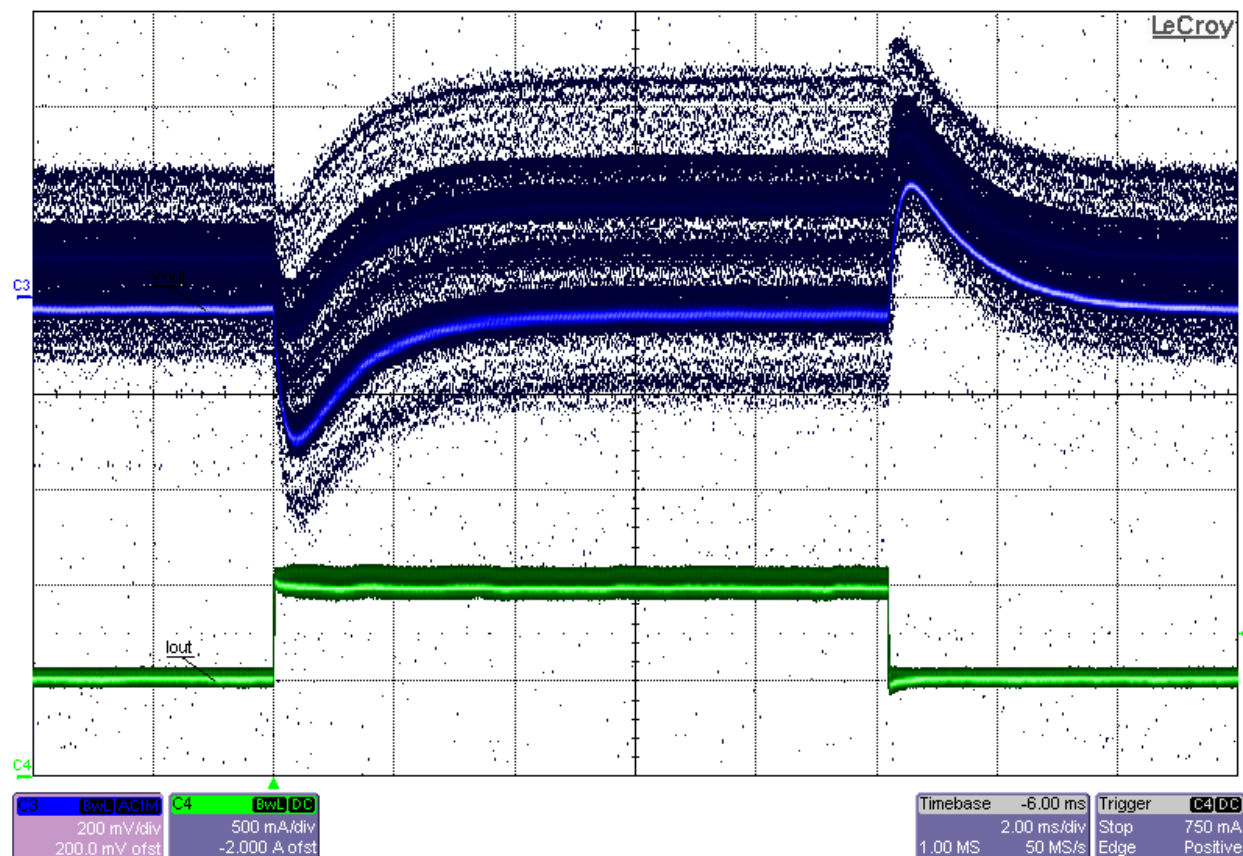
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
14	0.5165	48.276	0.10065	7.231	4.858979	67.2
14	0.8585	48.276	0.19998	12.019	9.654234	80.3
14	1.2063	48.277	0.3006	16.8882	14.51207	85.9
14	1.5502	48.276	0.39991	21.7028	19.30606	89.0
14	1.9023	48.276	0.50066	26.6322	24.16986	90.8
14	2.2574	48.276	0.60009	31.6036	28.96994	91.7
14	2.6246	48.275	0.70074	36.7444	33.82822	92.1
14	2.9759	48.275	0.80018	41.6626	38.62869	92.7
14	3.3272	48.275	0.8996	46.5808	43.42819	93.2
14	3.6837	48.274	1.0004	51.5718	48.29331	93.6

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
24	0.3376	48.276	0.10038	8.1024	4.845945	59.8
24	0.5371	48.276	0.19982	12.8904	9.64651	74.8
24	0.7394	48.276	0.30052	17.7456	14.5079	81.8
24	0.9392	48.276	0.39982	22.5408	19.30171	85.6
24	1.142	48.276	0.50059	27.408	24.16648	88.2
24	1.3421	48.276	0.59998	32.2104	28.96463	89.9
24	1.5449	48.276	0.7006	37.0776	33.82217	91.2
24	1.7457	48.276	0.80007	41.8968	38.62418	92.2
24	1.9491	48.276	0.90085	46.7784	43.48943	93.0
24	2.1501	48.276	1	51.6024	48.276	93.6

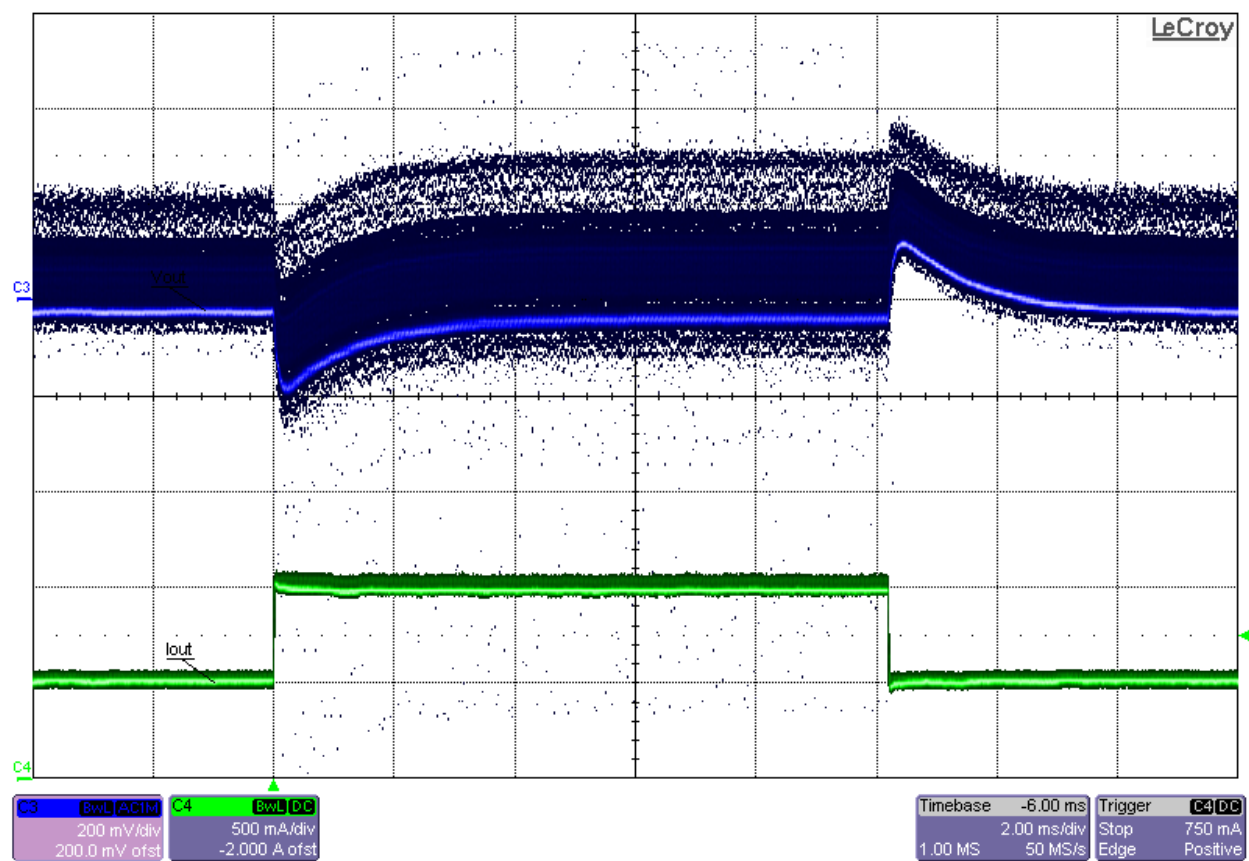
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
36	0.1999	48.277	0.10037	7.1964	4.845562	67.3
36	0.3329	48.277	0.19978	11.9844	9.644779	80.5
36	0.4678	48.278	0.30045	16.8408	14.50513	86.1
36	0.6008	48.278	0.39976	21.6288	19.29961	89.2
36	0.7358	48.278	0.5005	26.4888	24.16314	91.2
36	0.869	48.278	0.59987	31.284	28.96052	92.6
36	1.004	48.278	0.7005	36.144	33.81874	93.6
36	1.1374	48.279	0.79993	40.9464	38.61982	94.3
36	1.2726	48.278	0.90065	45.8136	43.48158	94.9
36	1.4063	48.278	1	50.6268	48.278	95.4

6 Waveforms

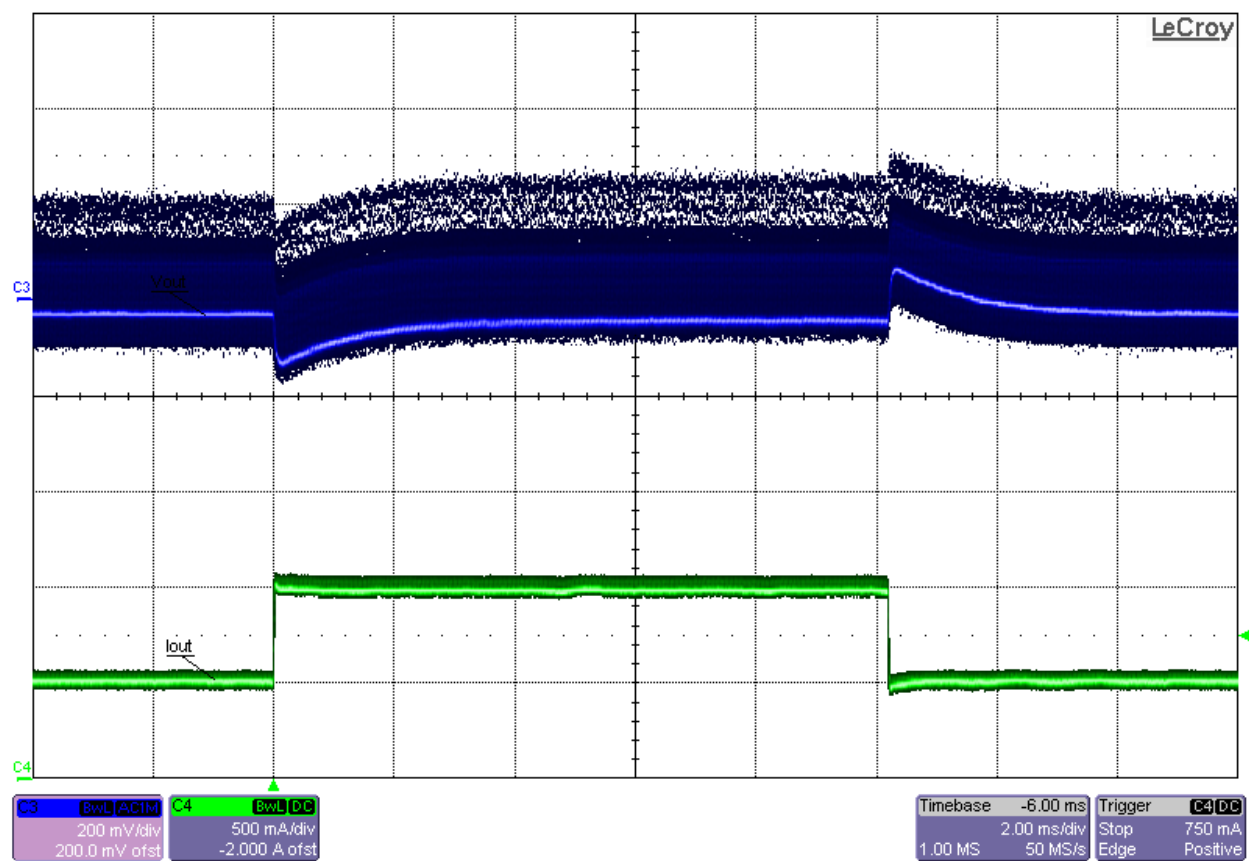
6.1 Load Transient Response



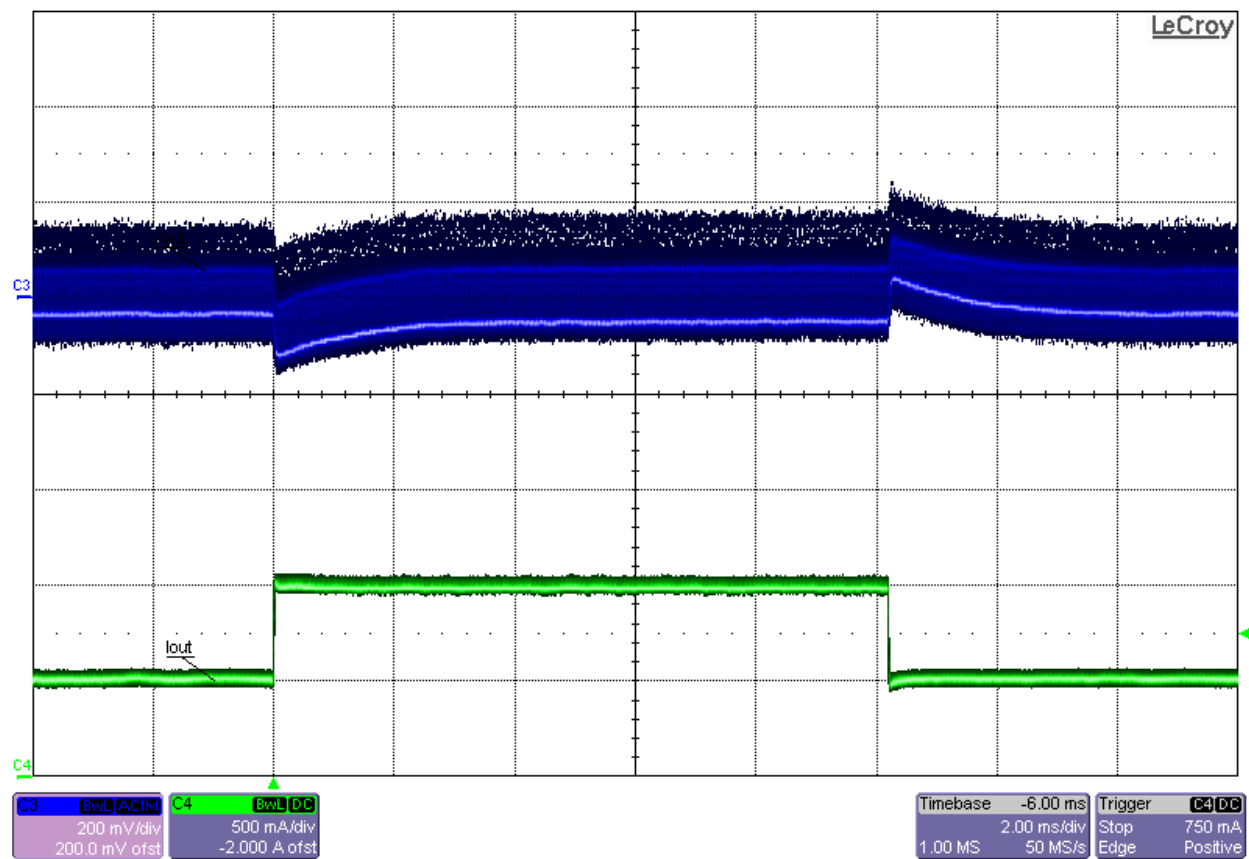
Load Transient Response at 7Vin and 50%-to-100% (0.5A-to-1A) Load Step



Load Transient Response at 14Vin and 50%-to-100% (0.5A-to-1A) Load Step

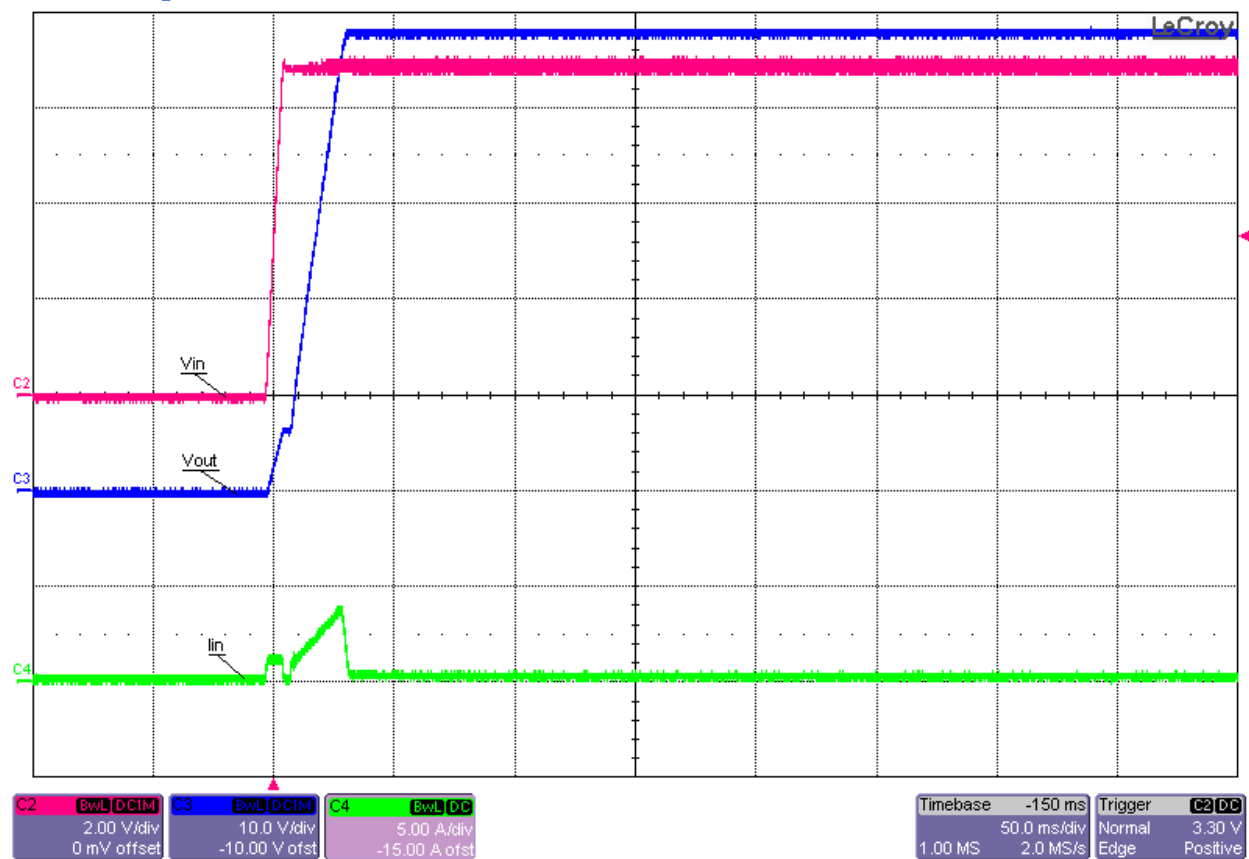


Load Transient Response at 24Vin and 50%-to-100% (0.5A-to-1A) Load Step

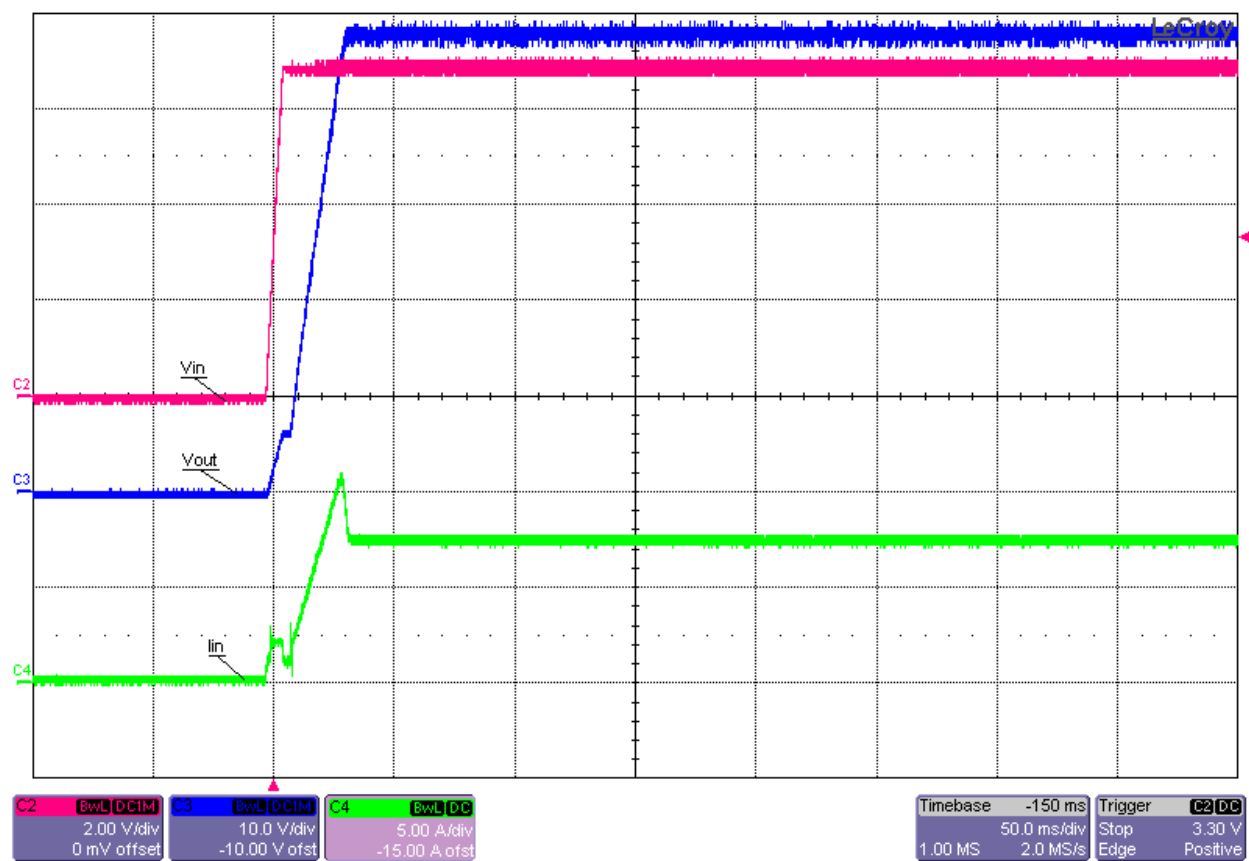


Load Transient Response at 36Vin and 50%-to-100% (0.5A-to-1A) Load Step

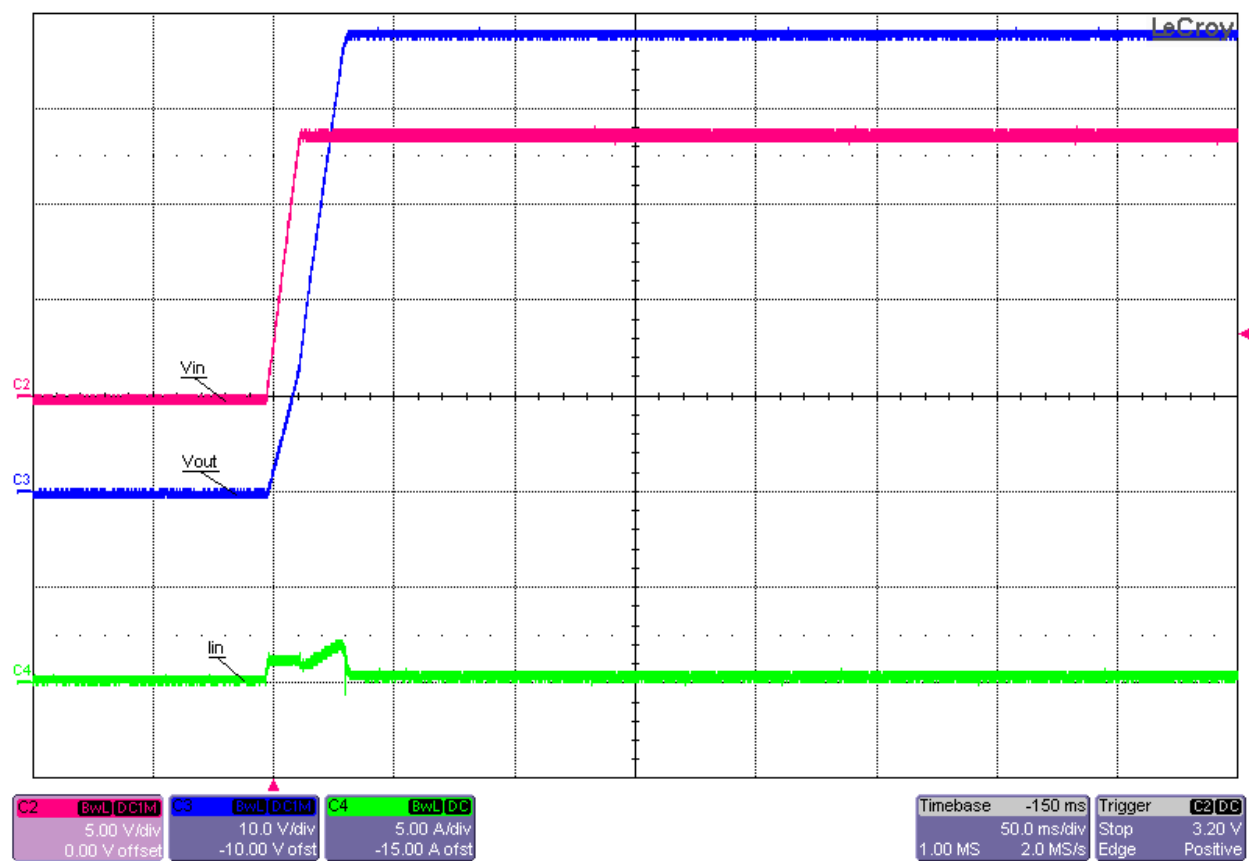
6.2 Startup



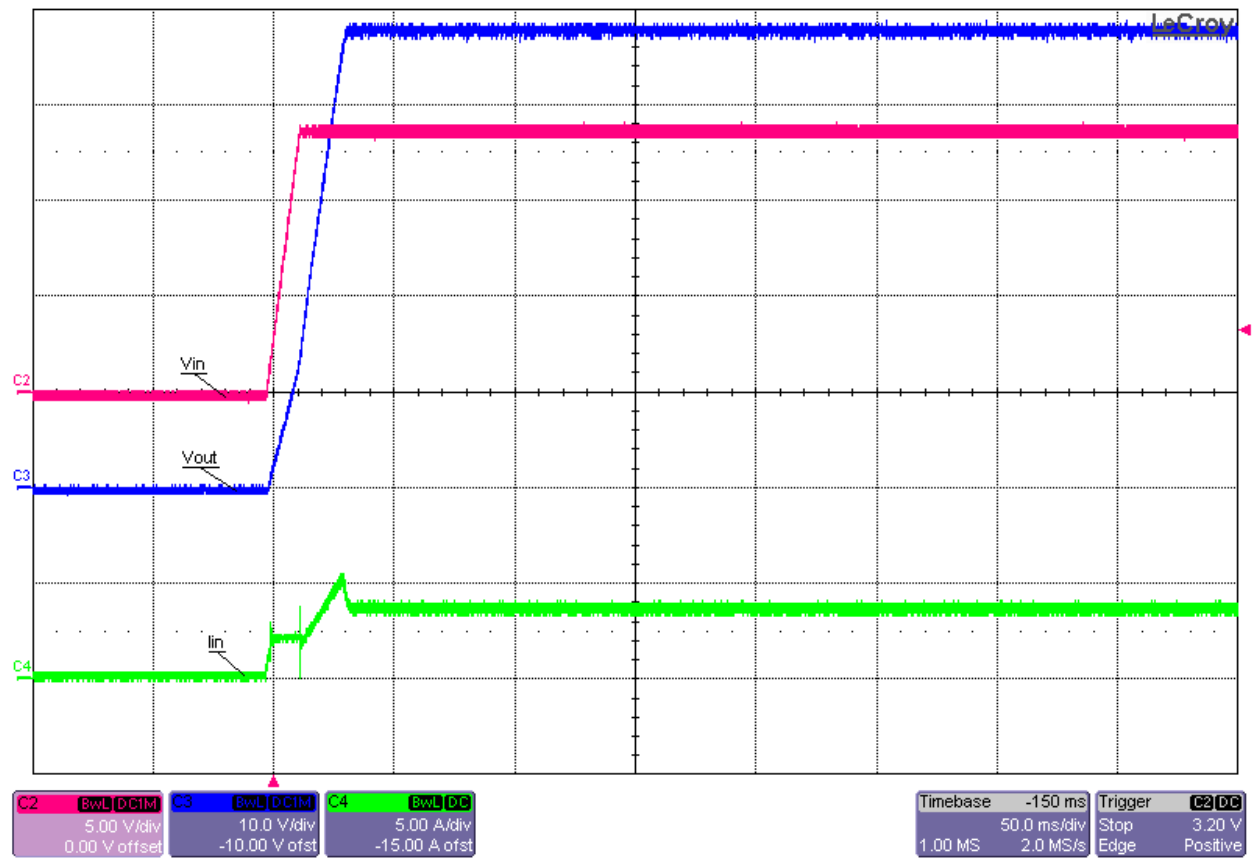
Startup into No Load at 7V_{in}



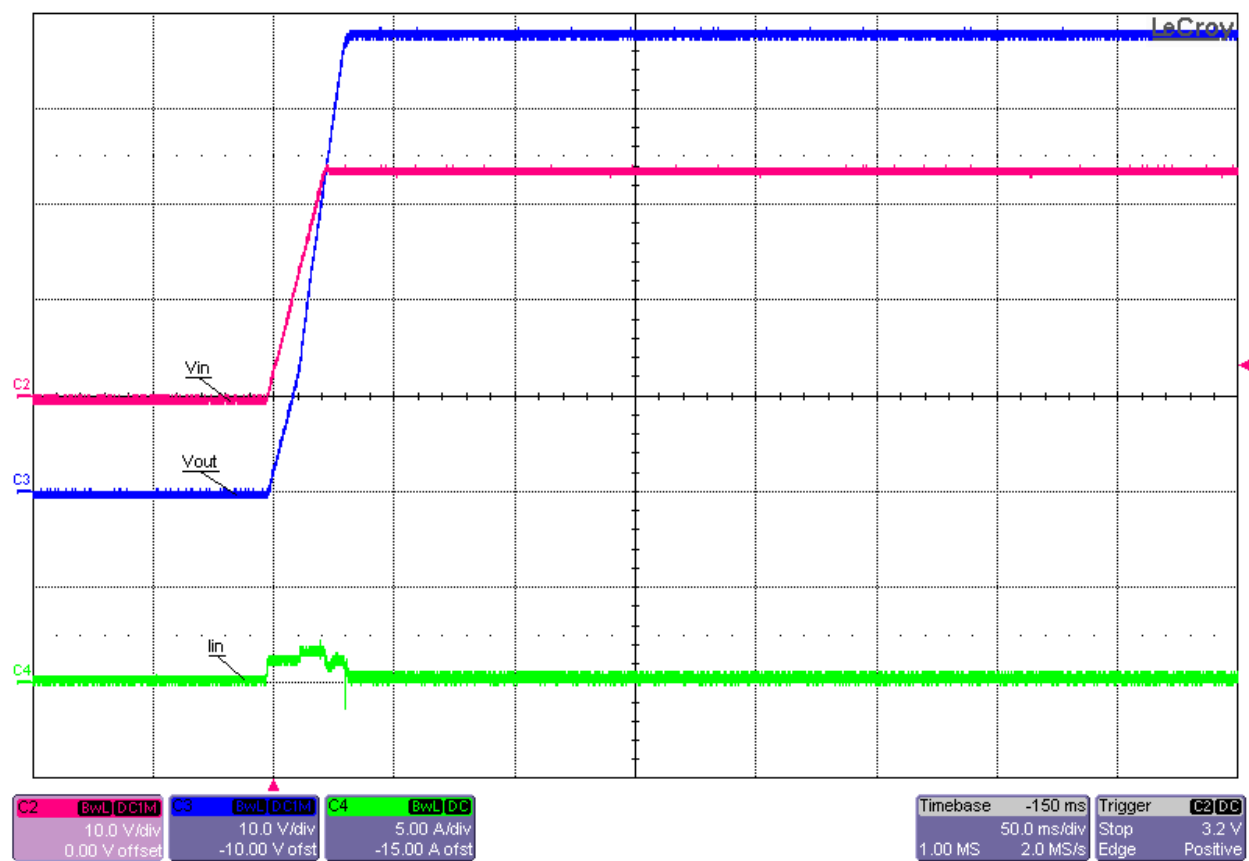
Startup into 1A Load at 7Vin



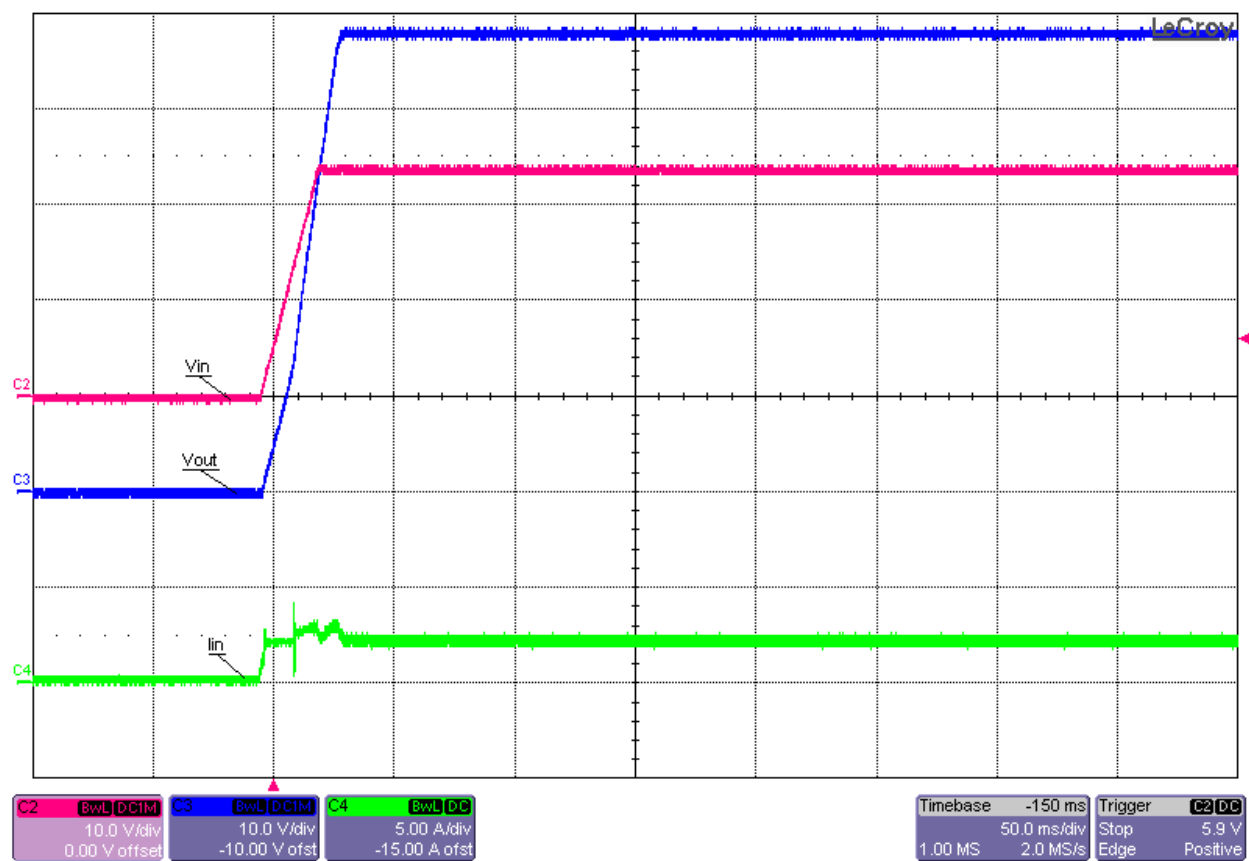
Startup into No Load at 14Vin



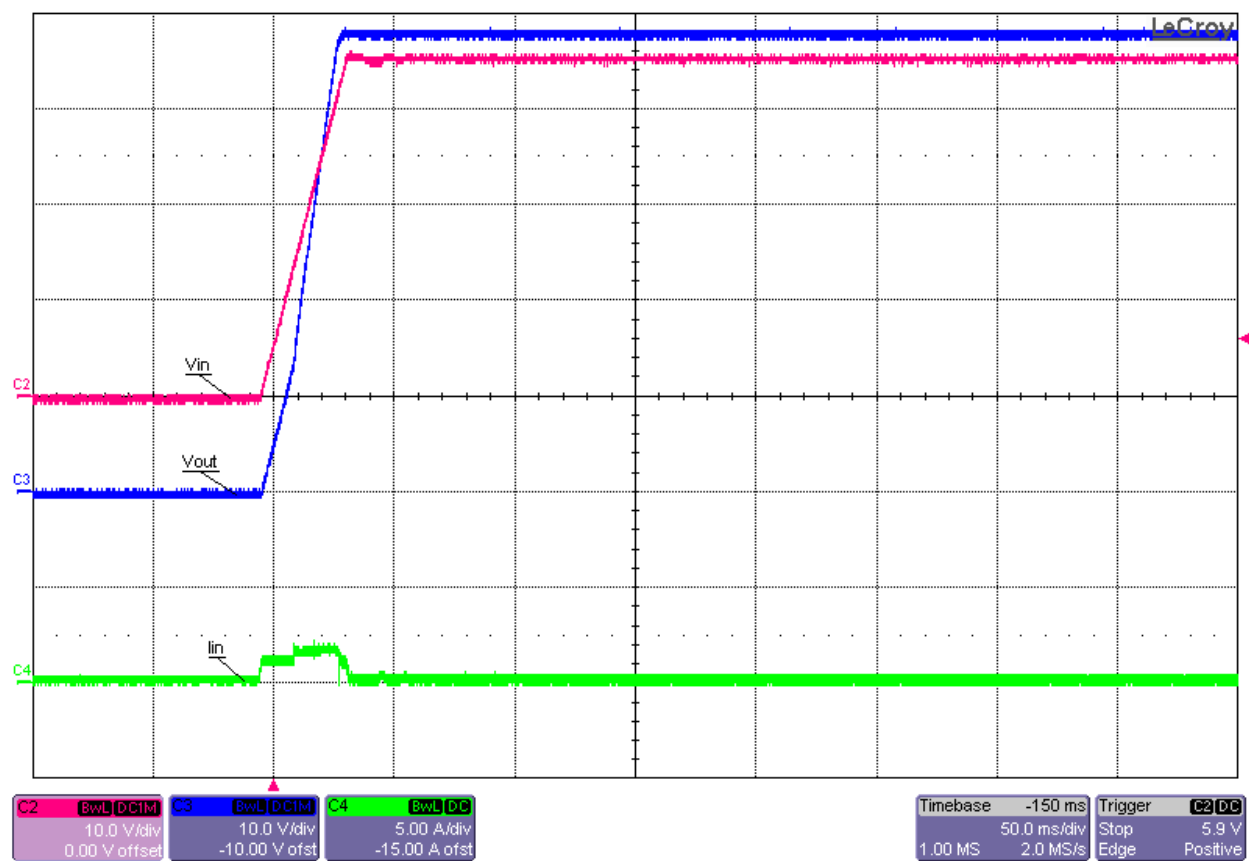
Startup into 1A Load at 14Vin



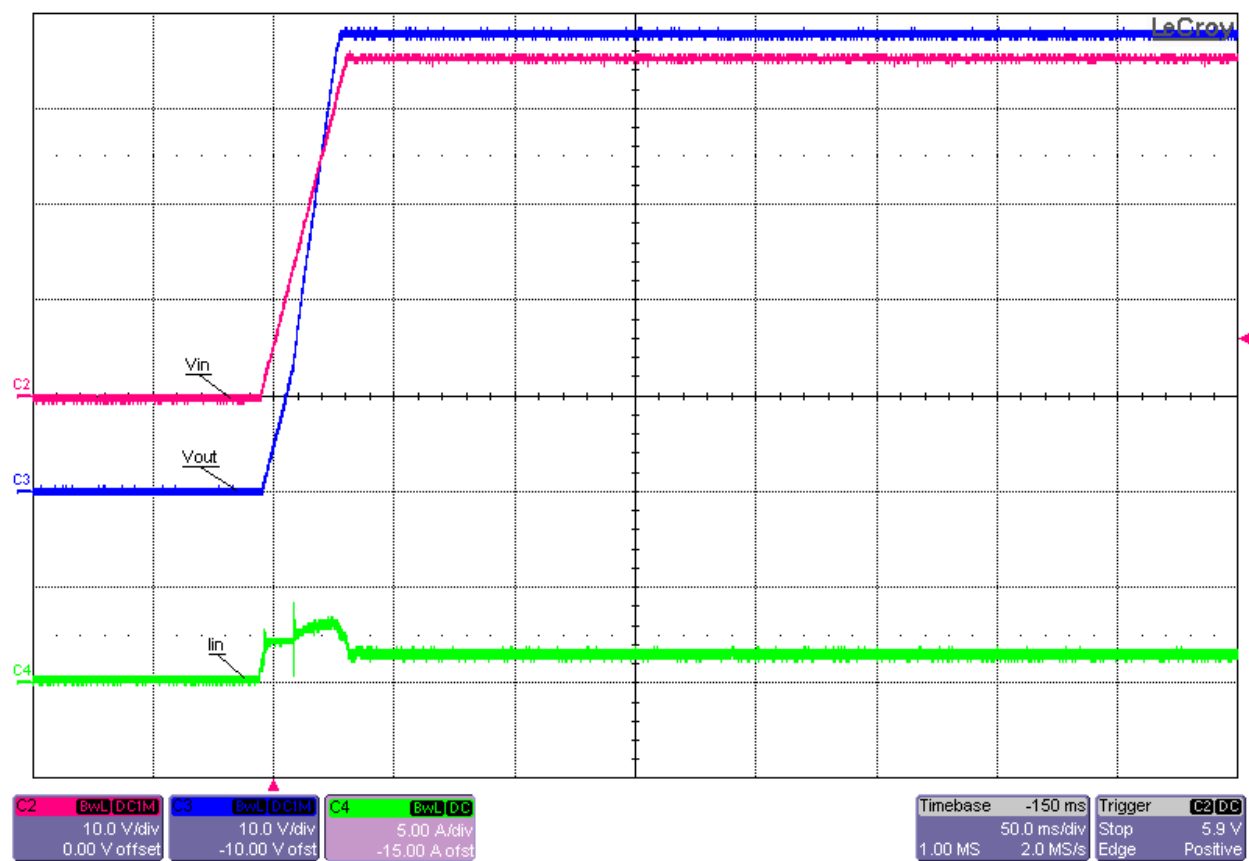
Startup into No Load at 24Vin



Startup into 1A Load at 24Vin

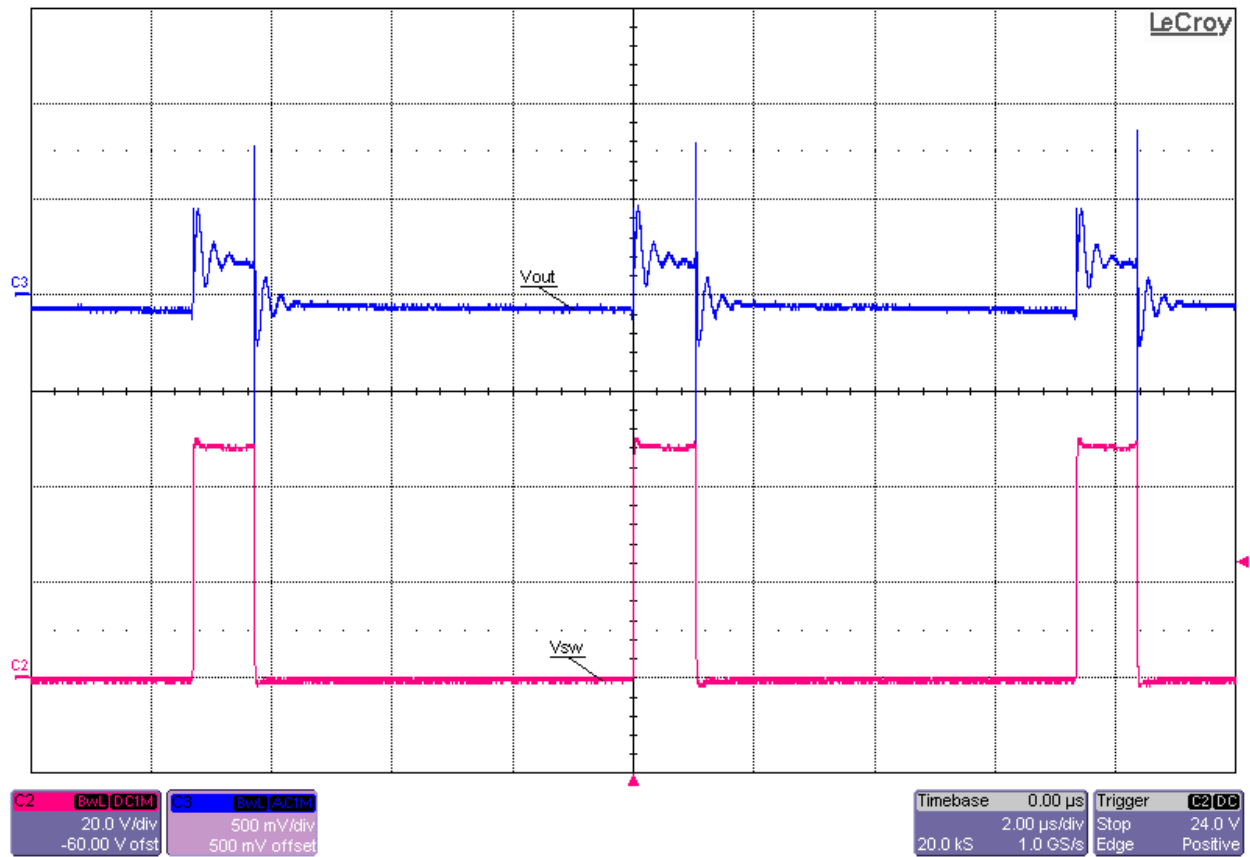


Startup into No Load at 36Vin

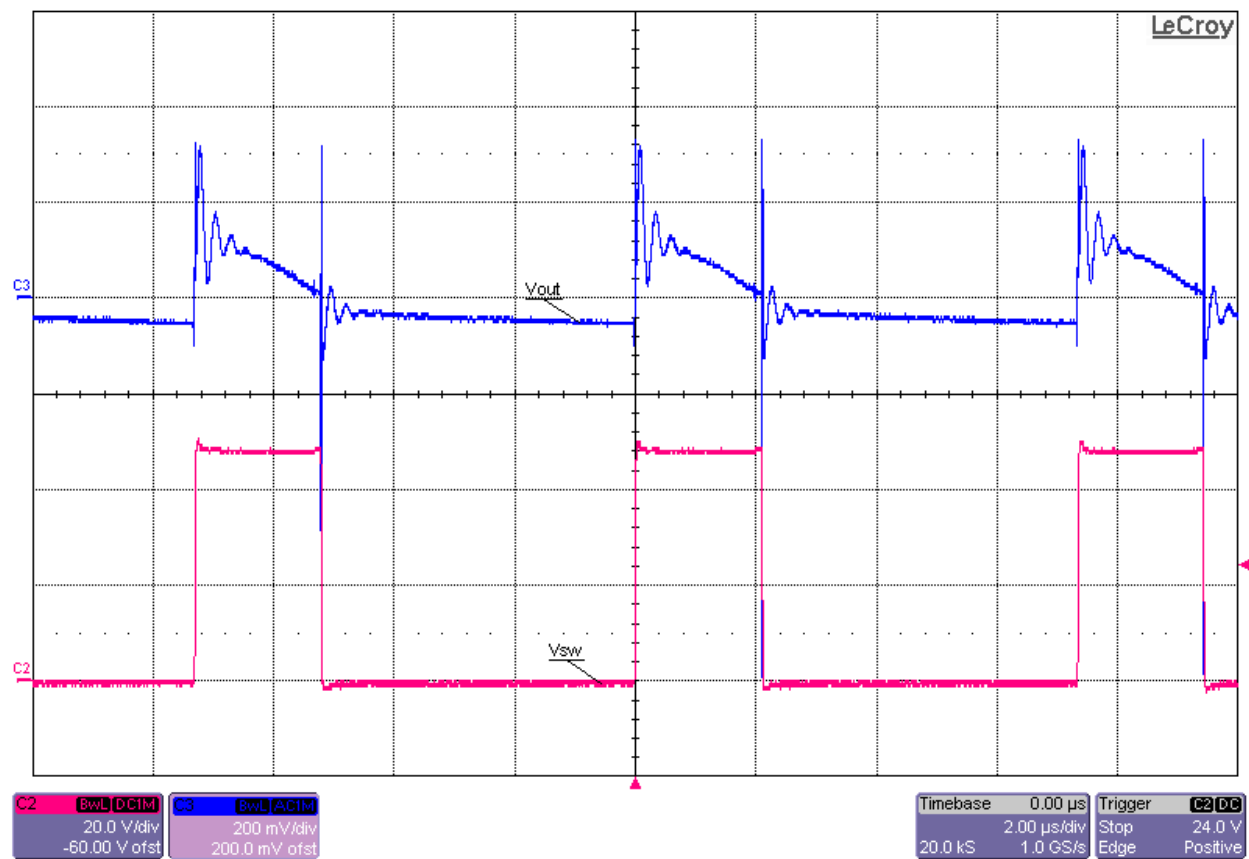


Startup into 1A Load at 36V_{in}

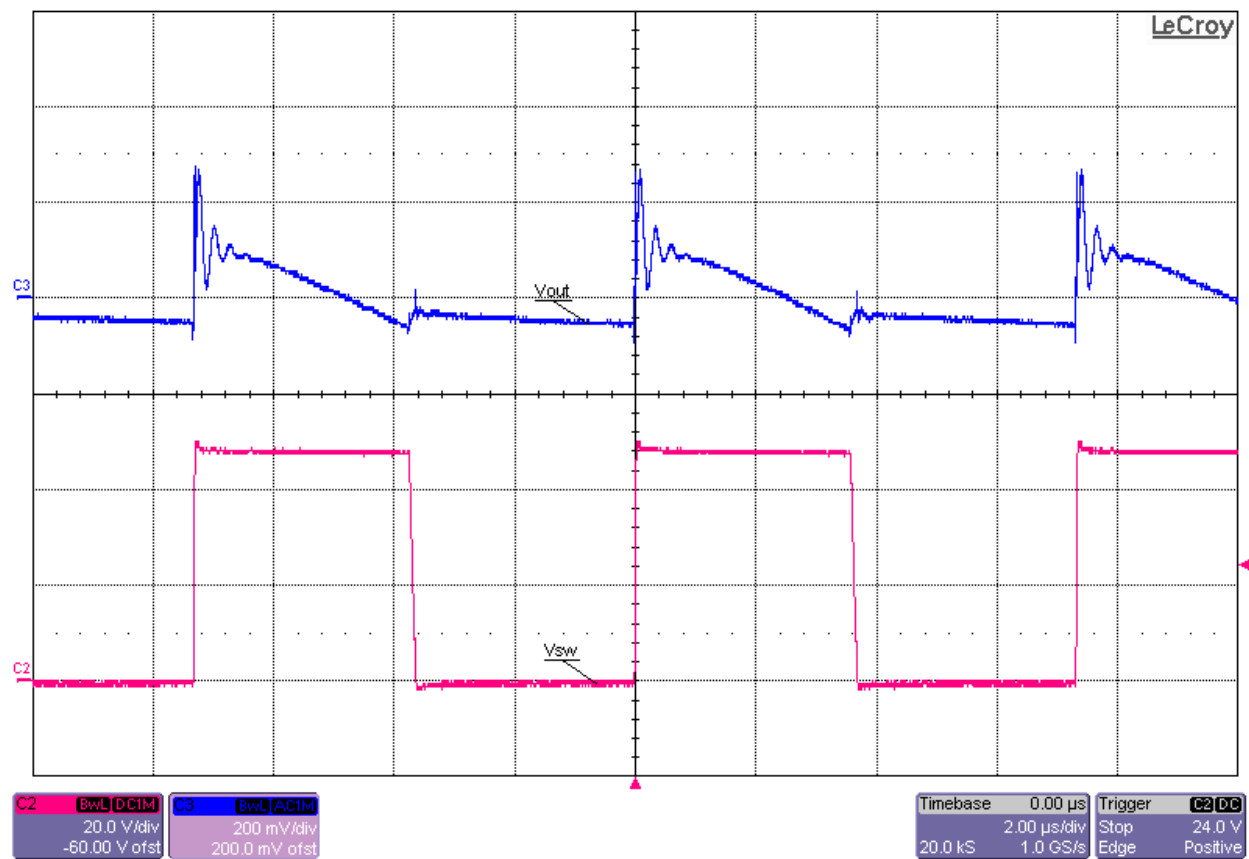
6.3 Output Voltage Ripple and Switch Node Voltage



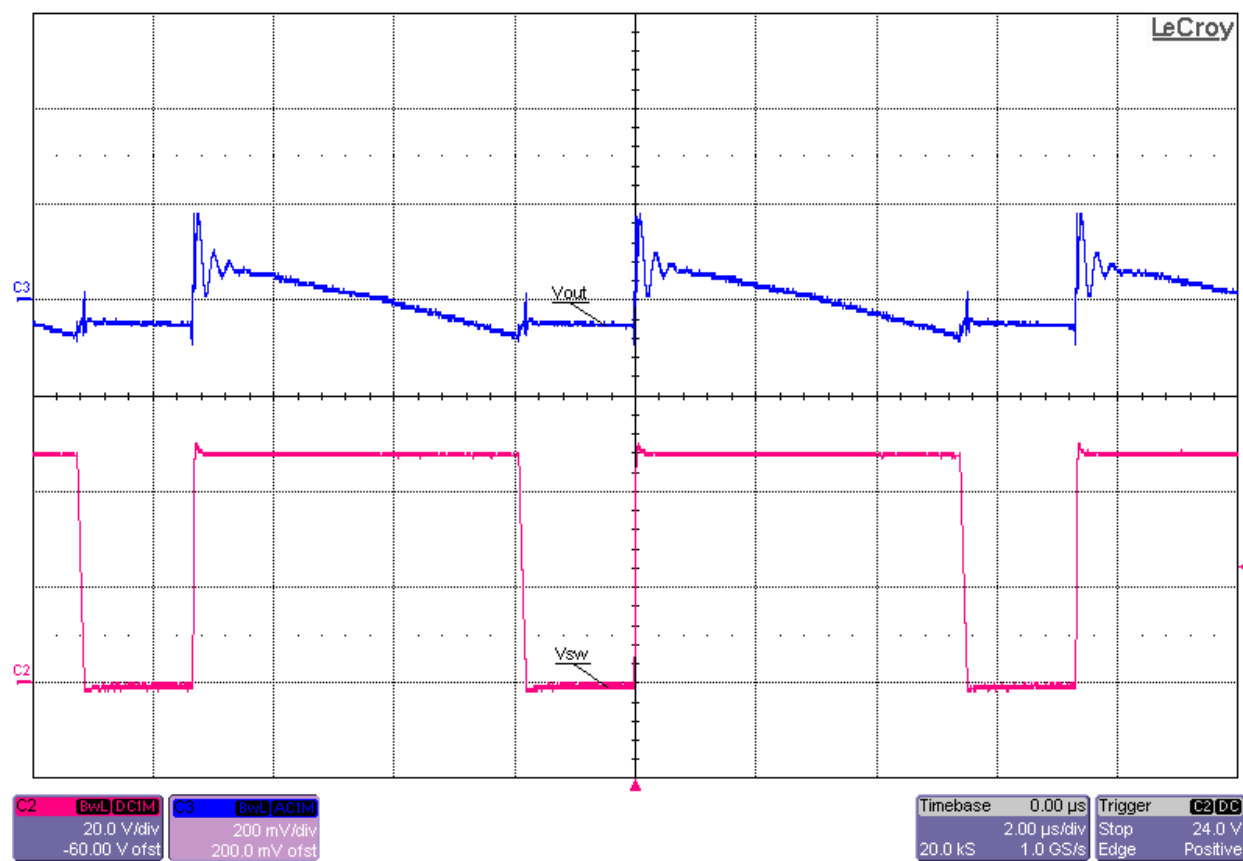
Switch Node Voltage and Output Voltage Ripple at 7V_{in} and 1A Load (V_{ripple} $\approx$ 750mVp-p)



Switch Node Voltage and Output Voltage Ripple at 14Vin and 1A Load ($V_{ripple} \approx 460\text{mVp-p}$)



Switch Node Voltage and Output Voltage Ripple at 24V_{in} and 1A Load (V_{ripple} $\approx$ 360mV_{p-p})



Switch Node Voltage and Output Voltage Ripple at 36V_{in} and 1A Load (V_{ripple} $\approx$ 260mV_{p-p})

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