Test Data
For PMP10509 Rev1
7/22/2014

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1. Design Specifications

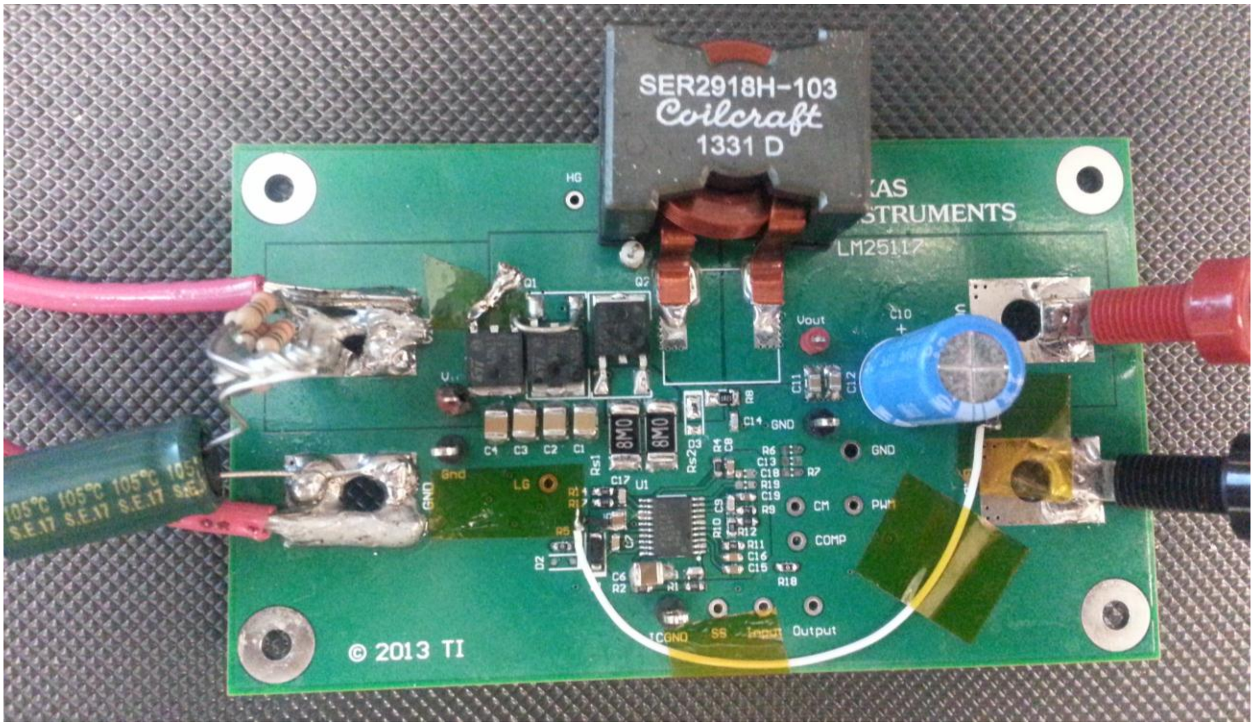
Vin Minimum	**30.4VDC**
Vin Maximum	**33.6VDC**
Vin Nominal	**32VDC**
Vout	**24VDC**
Iout	**18A Max.**
Switching Frequency	**250KHz**

2. Circuit Description

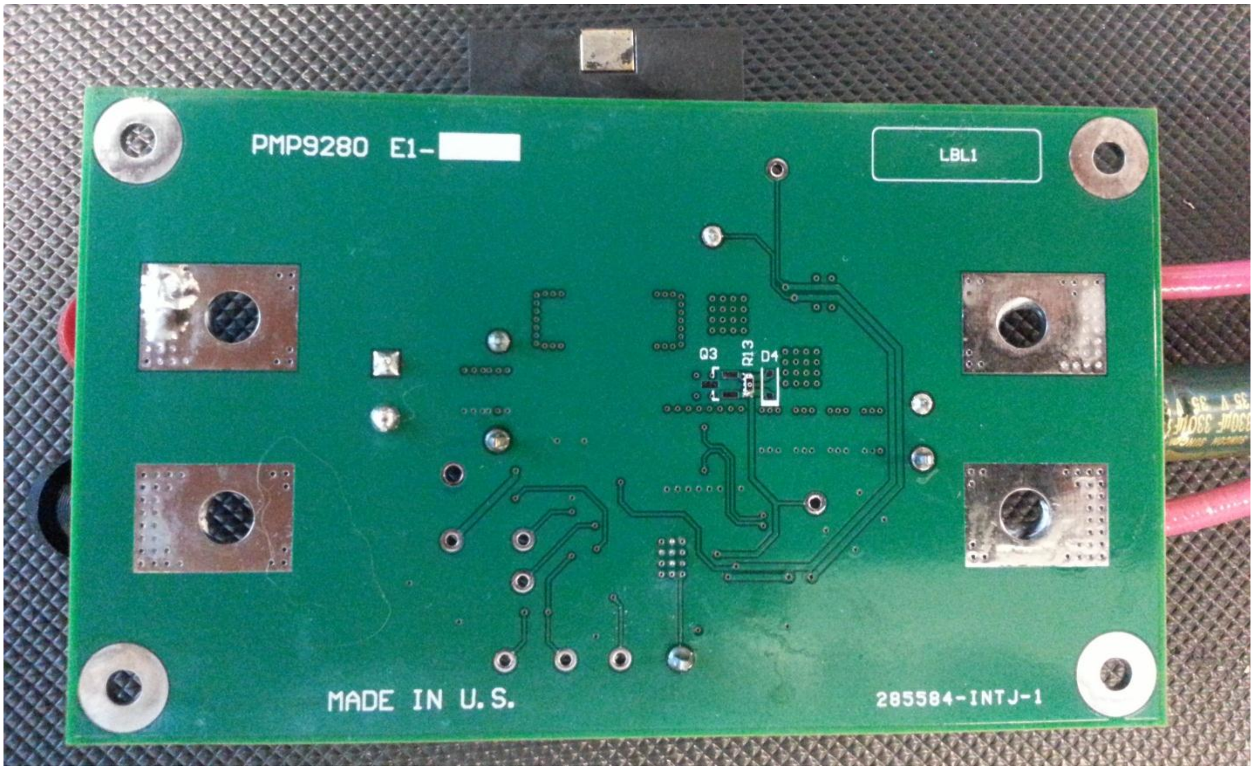
PMP10509 is a Single-Phase Synchronous Buck Converter using the LM25117 controller IC. The design accepts an input voltage of 30.4Vin to 33.6Vin (32Vin Nominal) and provides an output of 24Vout capable of supplying 18A of continuous current to the load. The design was built on the PMP9280 PCB, which was modified to the PMP10509 design configuration and requirements.

3. PMP10509 Board Photos

Board Dimensions: 2.36" x 4.05"

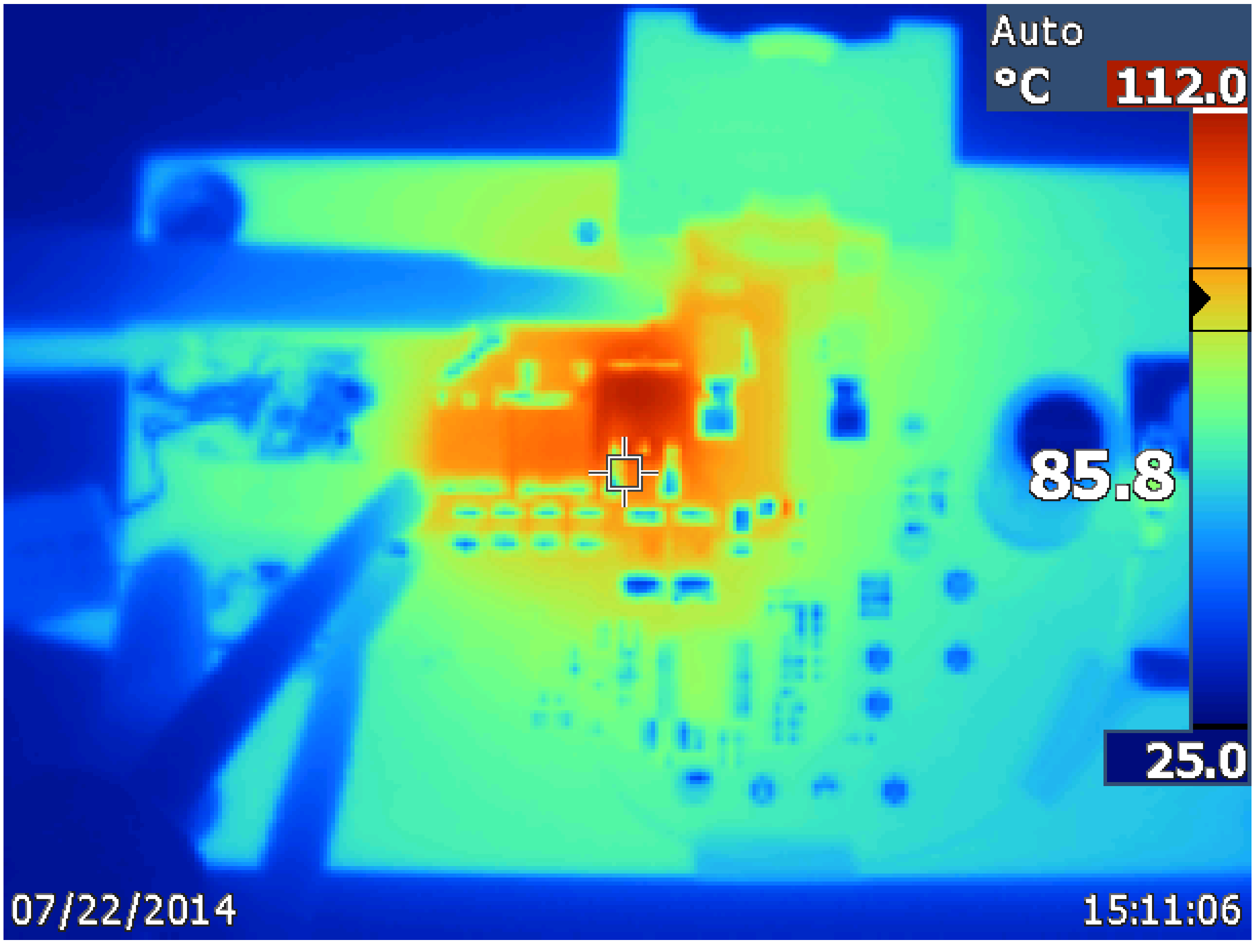


Board Photo (Top)



Board Photo (Bottom)

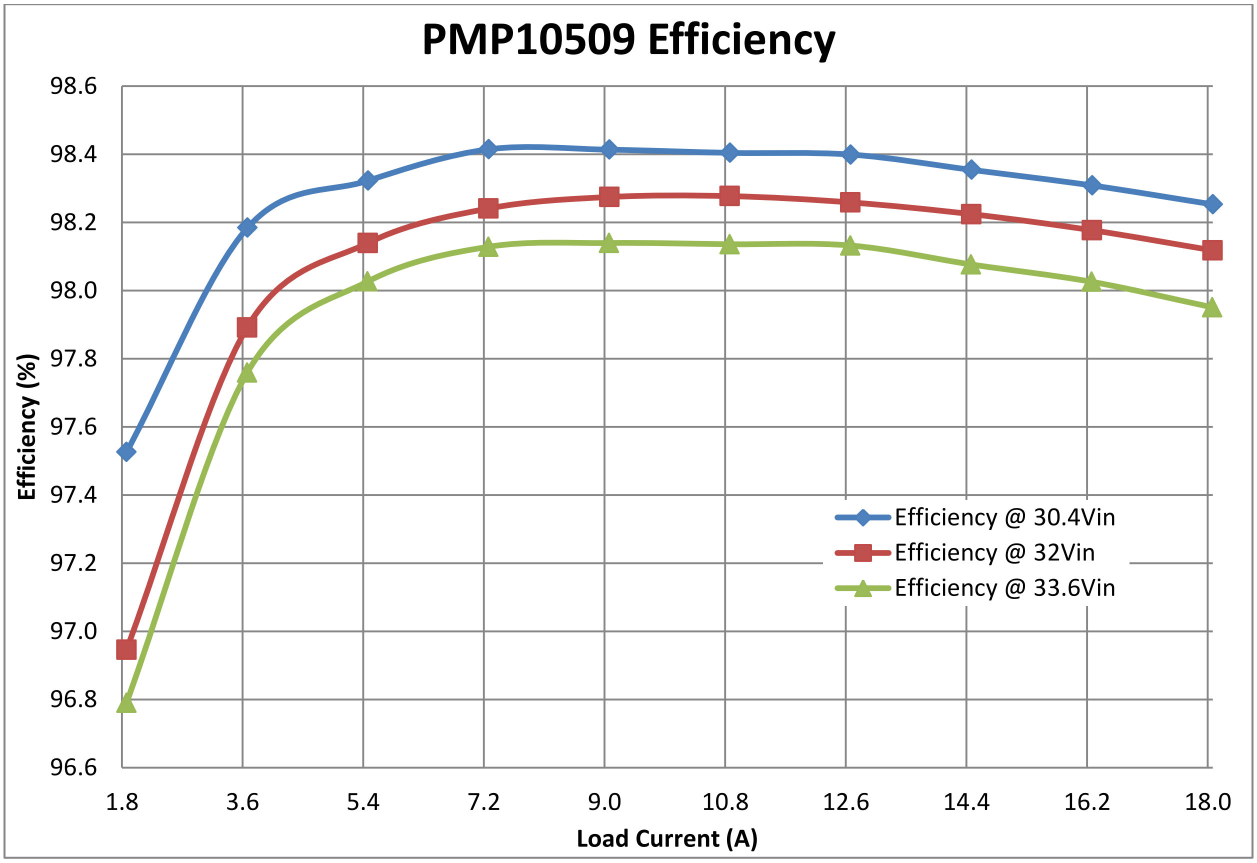
4. Thermal Data



IR thermal image taken at steady state with 32Vin and 18A load (no airflow; Ambient at room temp.; for lower temperature rise, it is recommended to use airflow)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

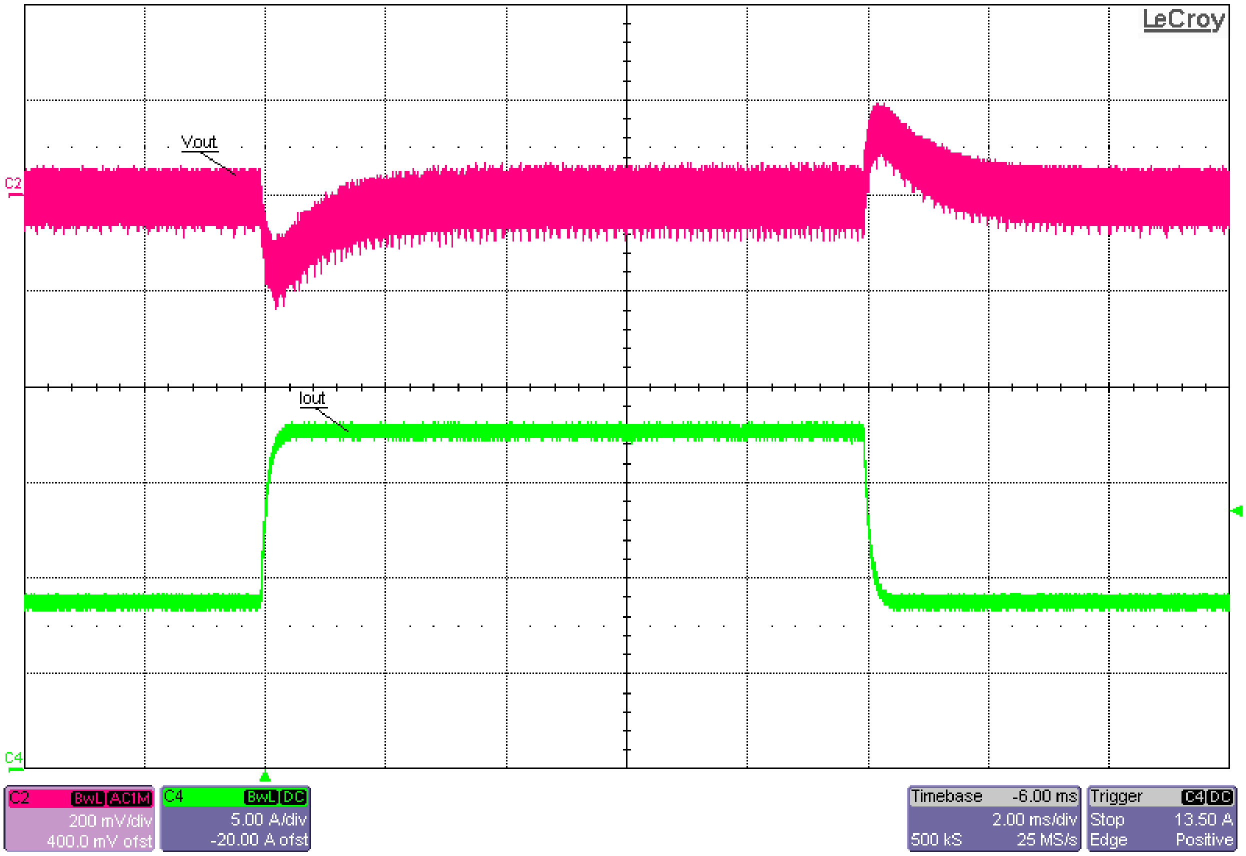
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
30.41	1.525	24.212	1.868	46.37525	45.22802	97.5
30.409	2.979	24.209	3.674	90.58841	88.94387	98.2
30.407	4.432	24.206	5.474	134.7638	132.5036	98.3
30.405	5.884	24.205	7.274	178.903	176.0672	98.4
30.403	7.34	24.203	9.074	223.158	219.618	98.4
30.4	8.797	24.201	10.874	267.4288	263.1617	98.4
30.398	10.256	24.201	12.676	311.7619	306.7719	98.4
30.395	11.72	24.2	14.478	356.2294	350.3676	98.4
30.392	13.184	24.199	16.278	400.6881	393.9113	98.3
30.389	14.651	24.198	18.078	445.2292	437.4514	98.3

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
32.009	1.456	24.213	1.866	46.6051	45.18146	96.9
32.008	2.834	24.209	3.668	90.71067	88.79861	97.9
32.006	4.214	24.207	5.468	134.8733	132.3639	98.1
32.003	5.597	24.205	7.27	179.1208	175.9704	98.2
32	6.982	24.203	9.072	223.424	219.5696	98.3
31.997	8.366	24.202	10.87	267.6869	263.0757	98.3
31.993	9.754	24.201	12.67	312.0597	306.6267	98.3
31.988	11.148	24.2	14.474	356.6022	350.2708	98.2
31.984	12.543	24.199	16.276	401.1753	393.8629	98.2
31.978	13.94	24.197	18.076	445.7733	437.385	98.1

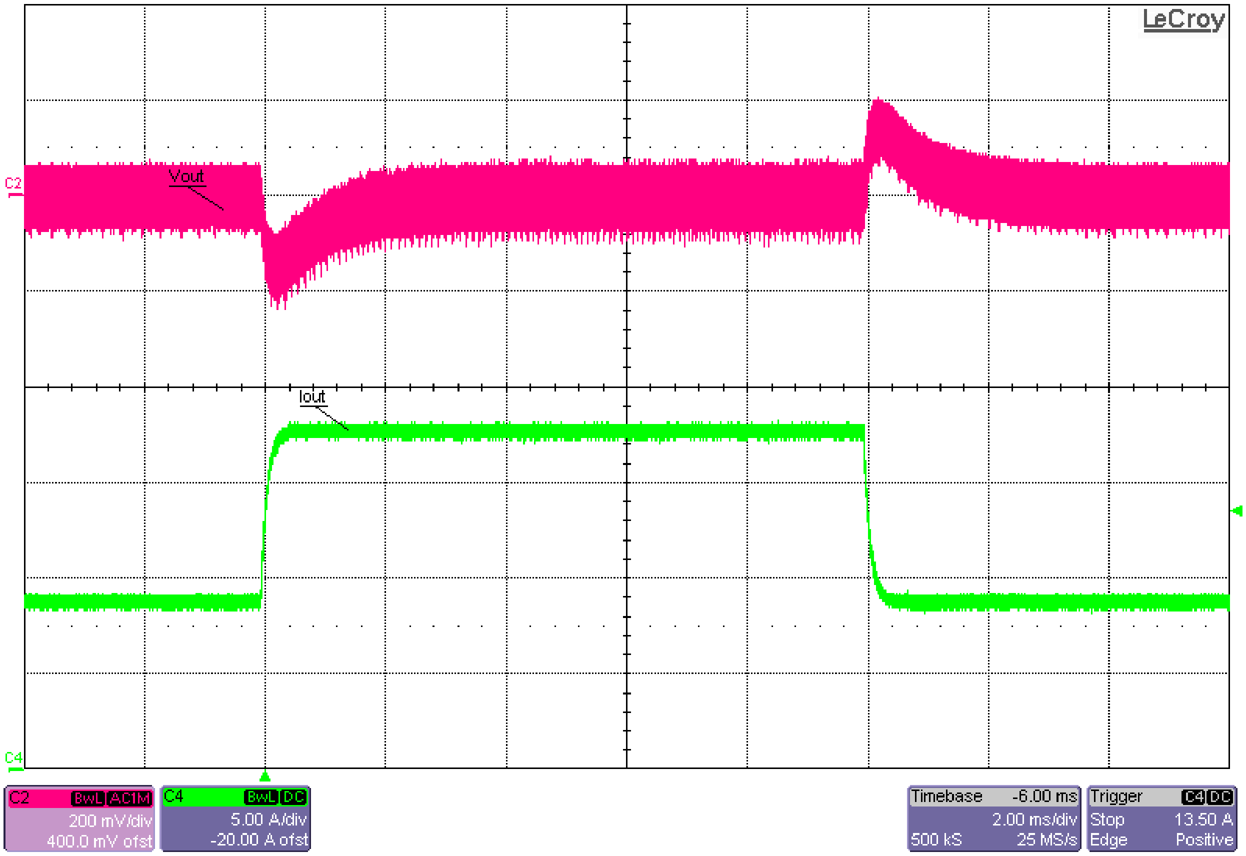
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Efficiency (%)
33.607	1.389	24.213	1.866	46.68012	45.18146	96.8
33.605	2.703	24.209	3.668	90.83432	88.79861	97.8
33.602	4.017	24.207	5.466	134.9792	132.3155	98.0
33.599	5.336	24.206	7.268	179.2843	175.9292	98.1
33.595	6.657	24.204	9.068	223.6419	219.4819	98.1
33.591	7.979	24.202	10.868	268.0226	263.0273	98.1
33.585	9.304	24.202	12.67	312.4748	306.6393	98.1
33.58	10.634	24.2	14.472	357.0897	350.2224	98.1
33.574	11.965	24.2	16.272	401.7129	393.7824	98.0
33.568	13.3	24.198	18.072	446.4544	437.3063	98.0

6 Waveforms

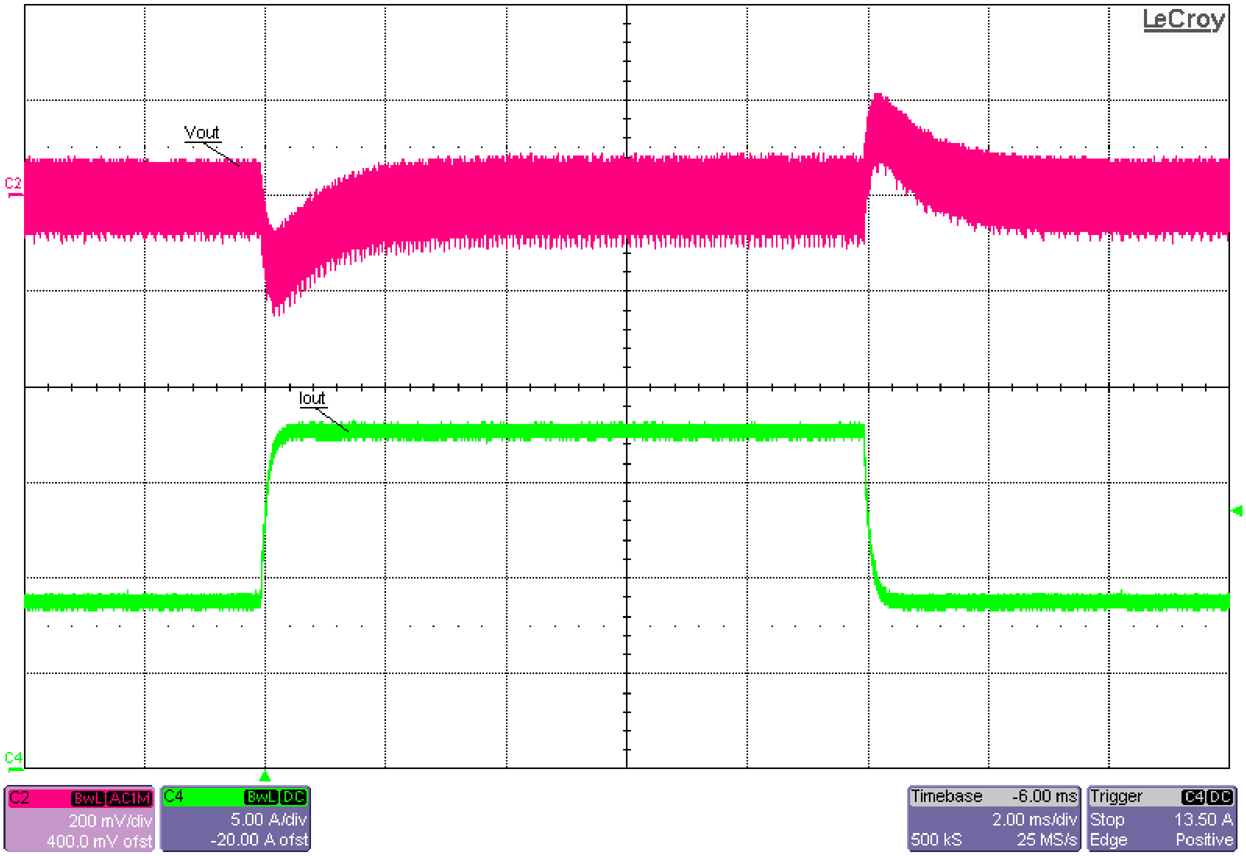
6.1 Load Transient Response



Load Transient Response at 30.4Vin and 50%-to-100% (9A-to-18A) Load Step

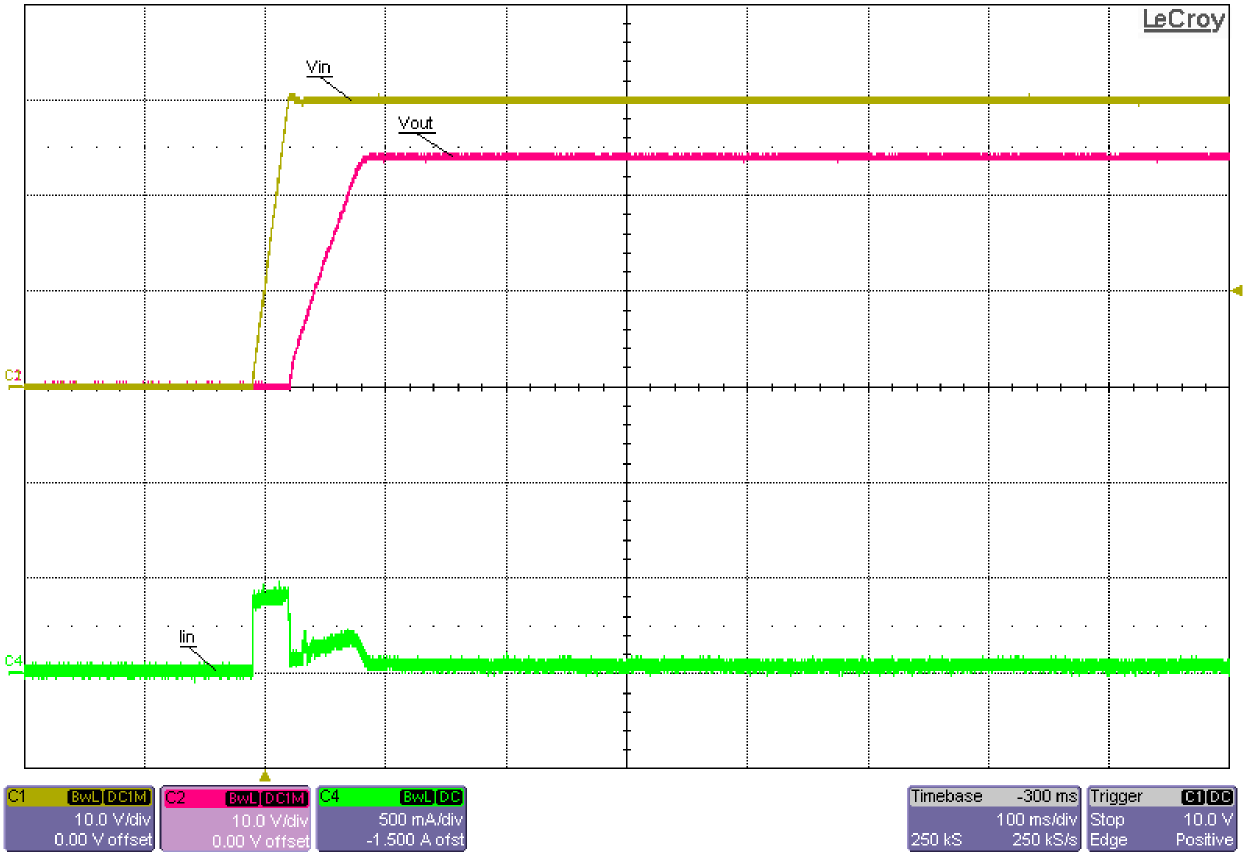


Load Transient Response at 32Vin and 50%-to-100% (9A-to-18A) Load Step

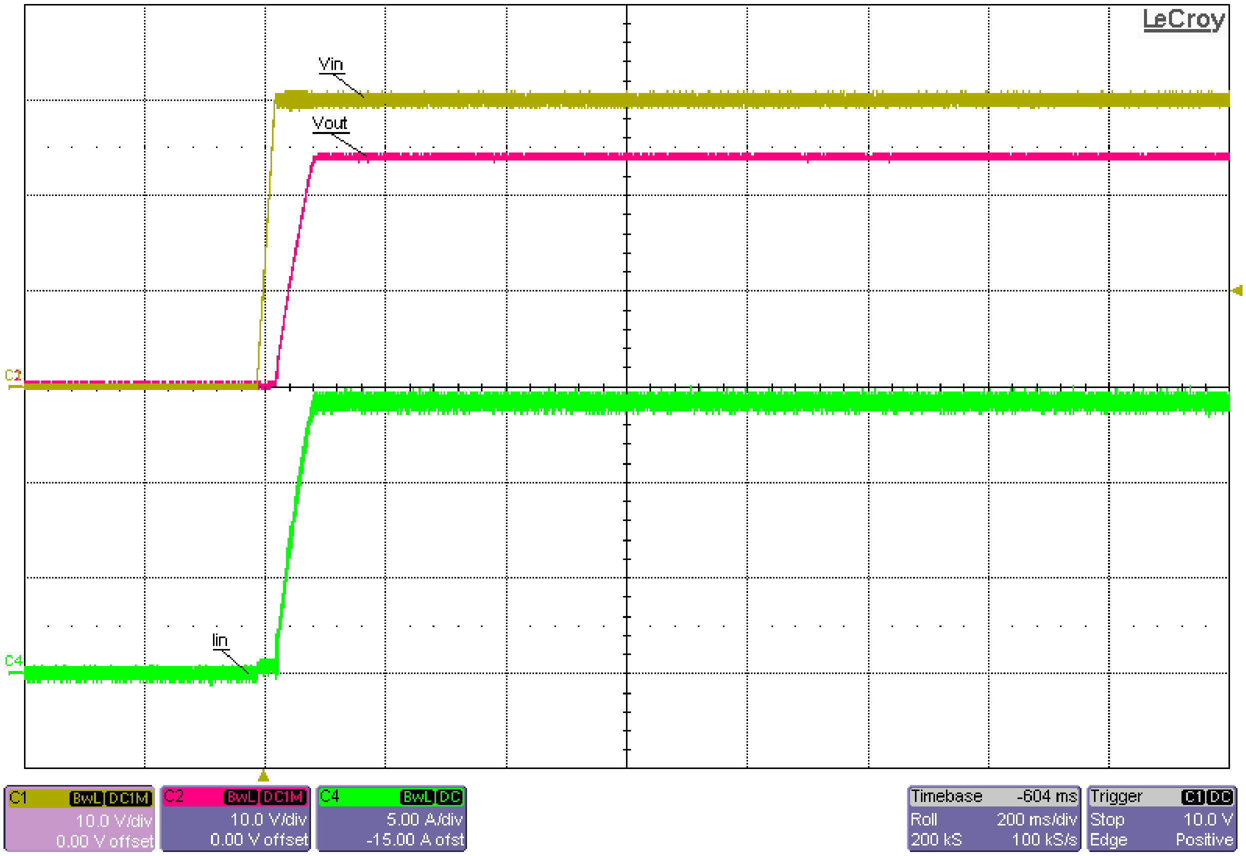


Load Transient Response at 33.6Vin and 50%-to-100% (9A-to-18A) Load Step

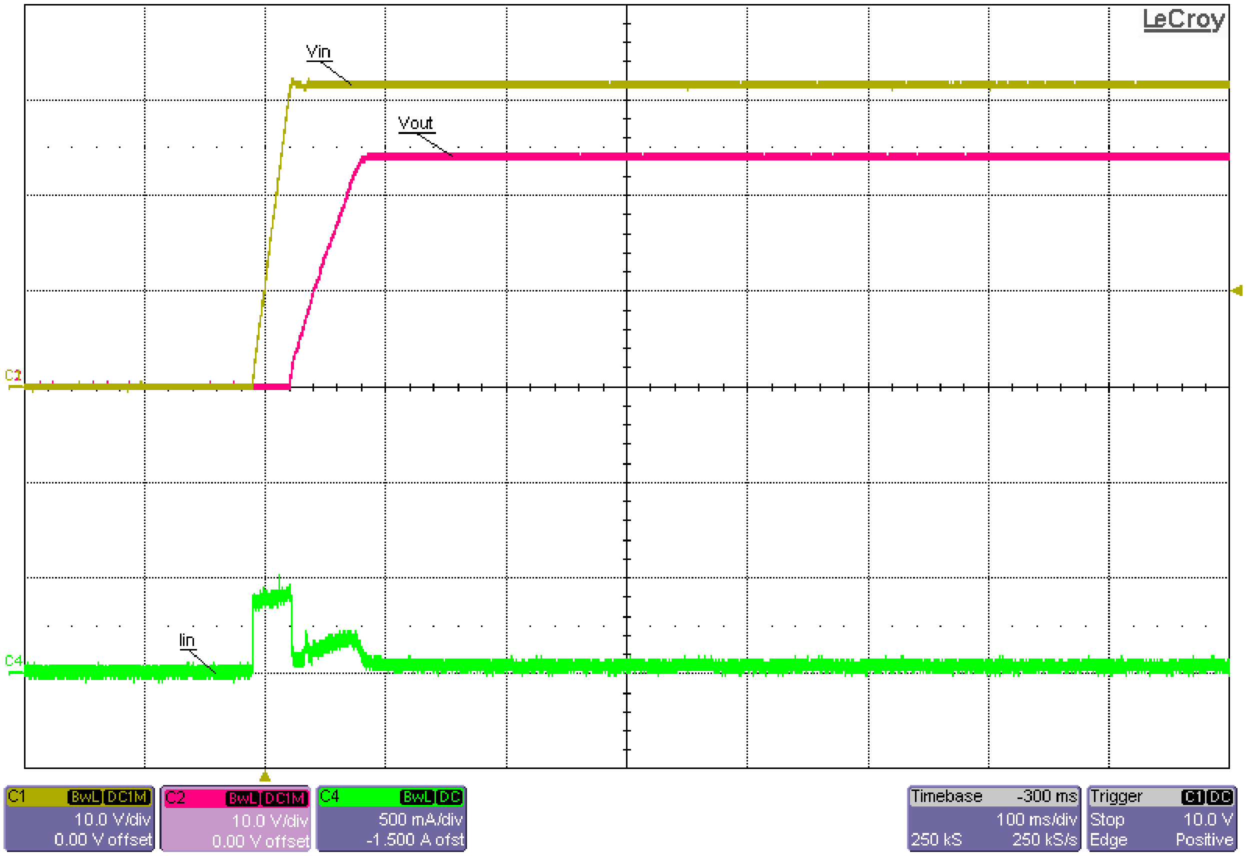
6.2 Startup



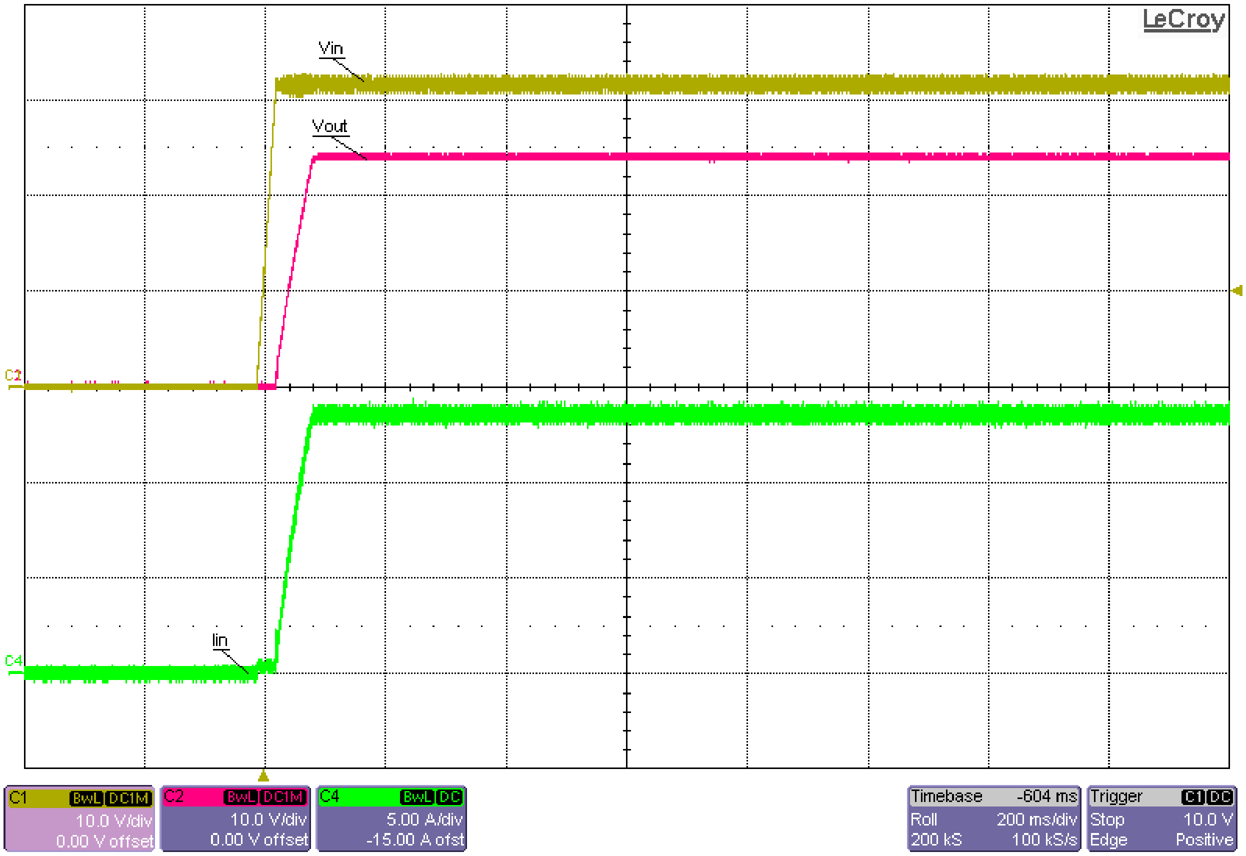
Startup into No Load at 30.4Vin



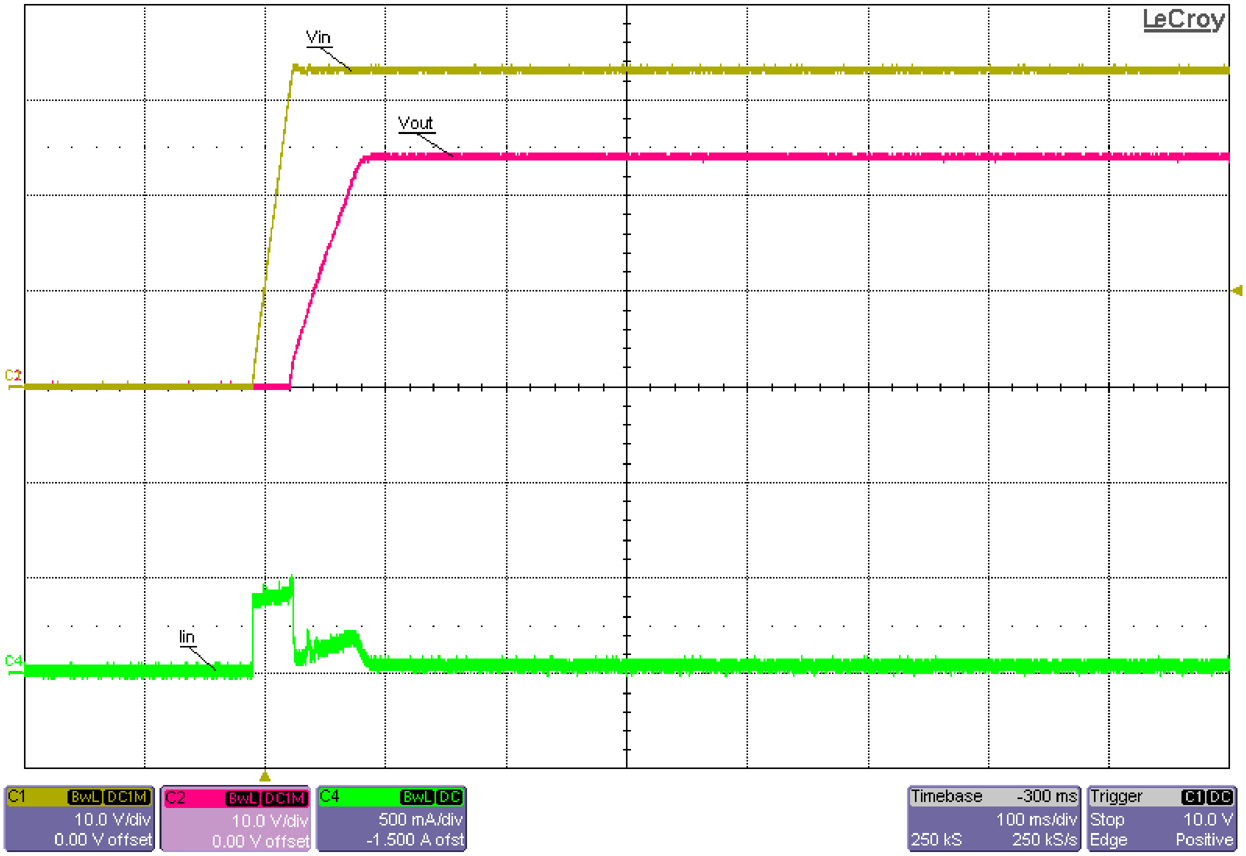
Startup into 18A Constant-Current Load at 30.4Vin



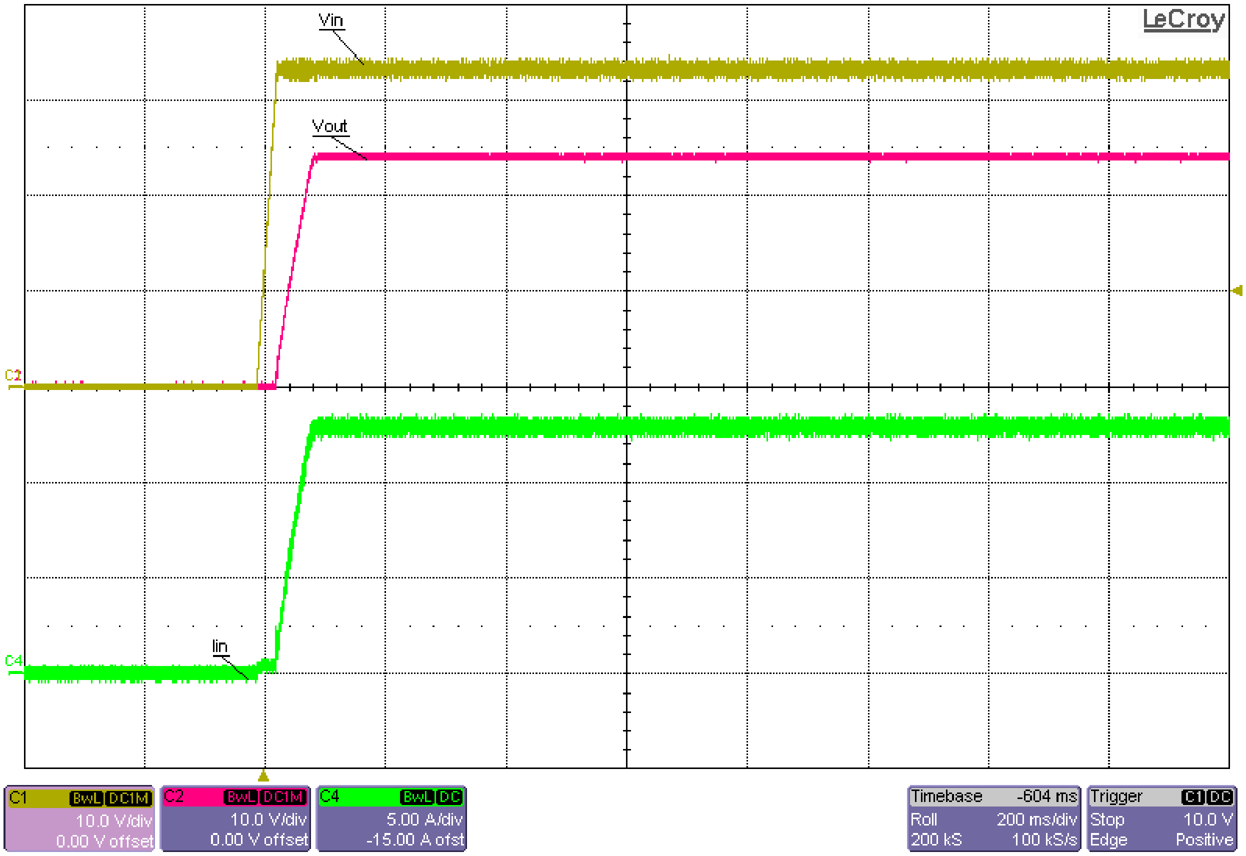
Startup into No Load at 32Vin



Startup into 18A Constant-Current Load at 32Vin

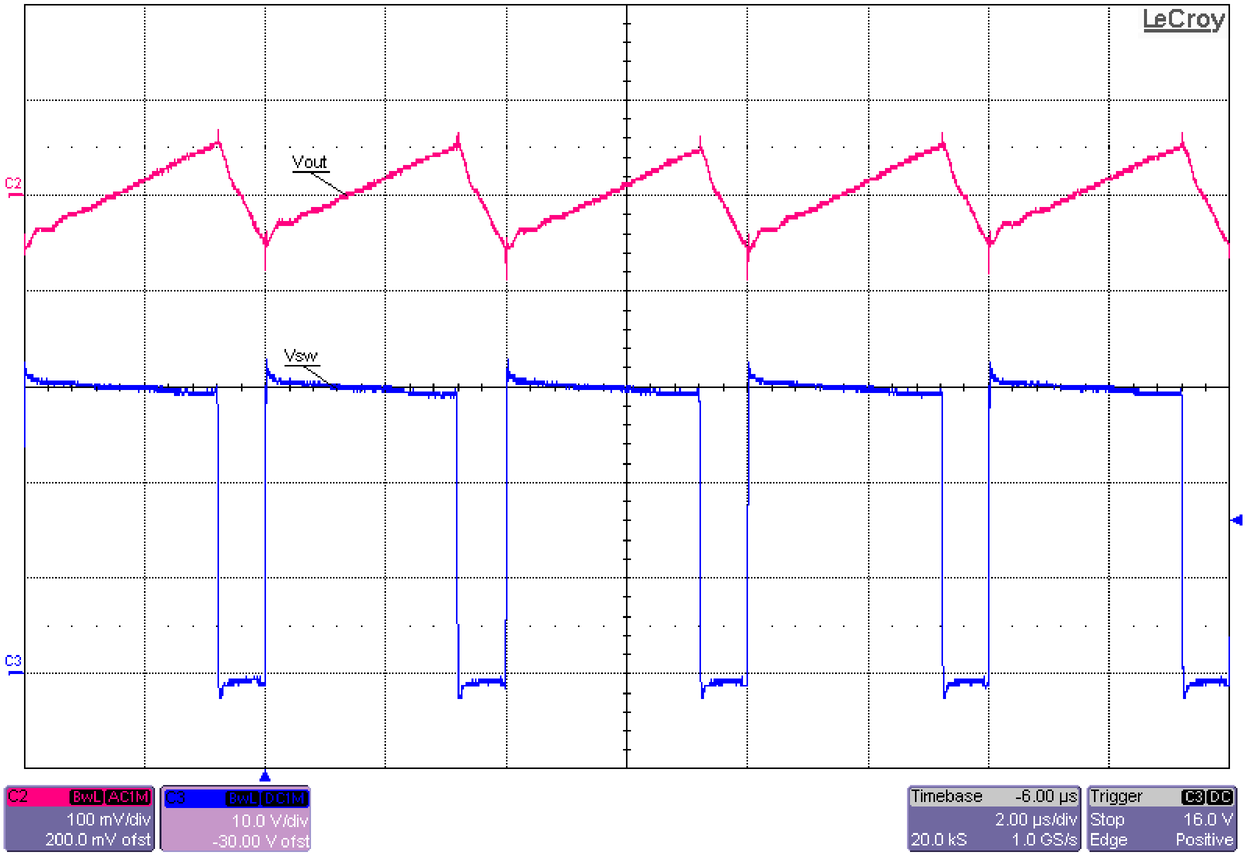


Startup into No Load at 33.6Vin

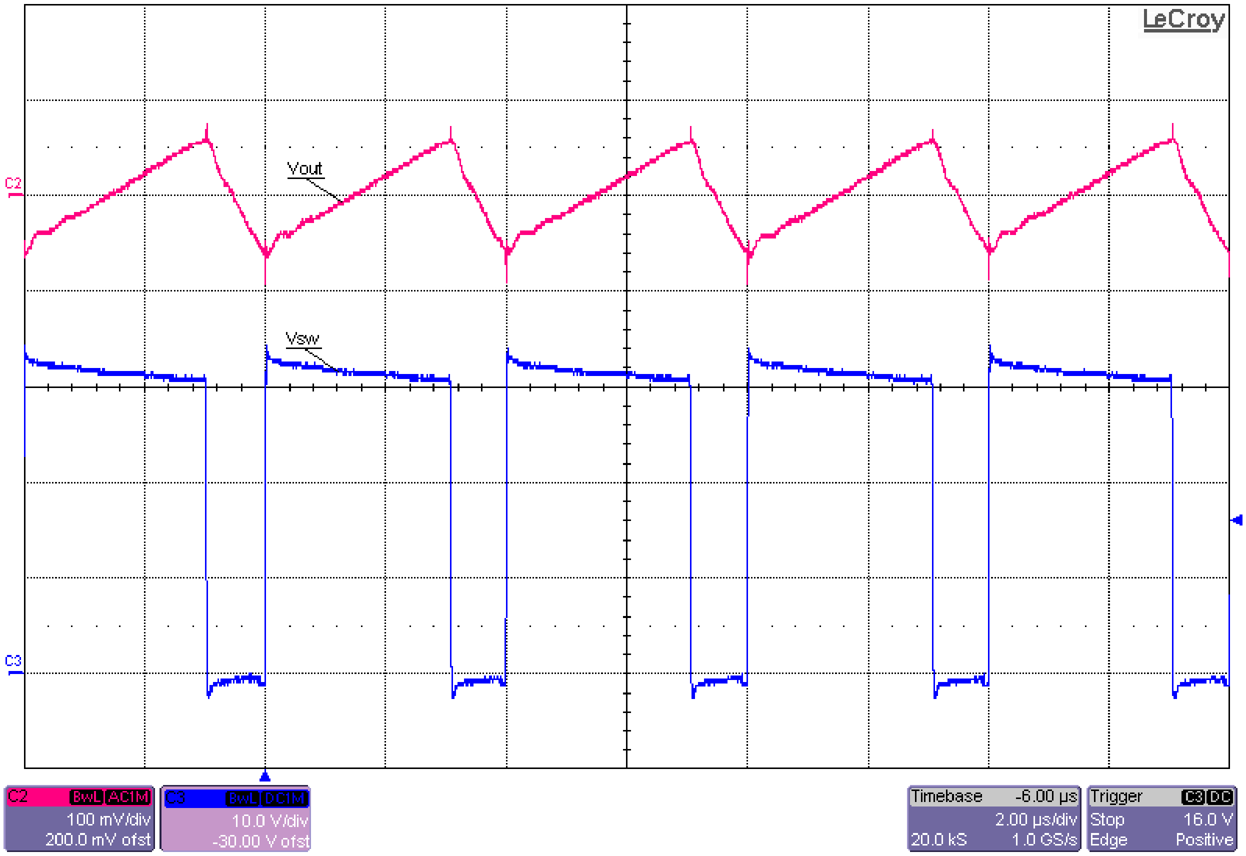


Startup into 18A Constant-Current Load at 33.6Vin

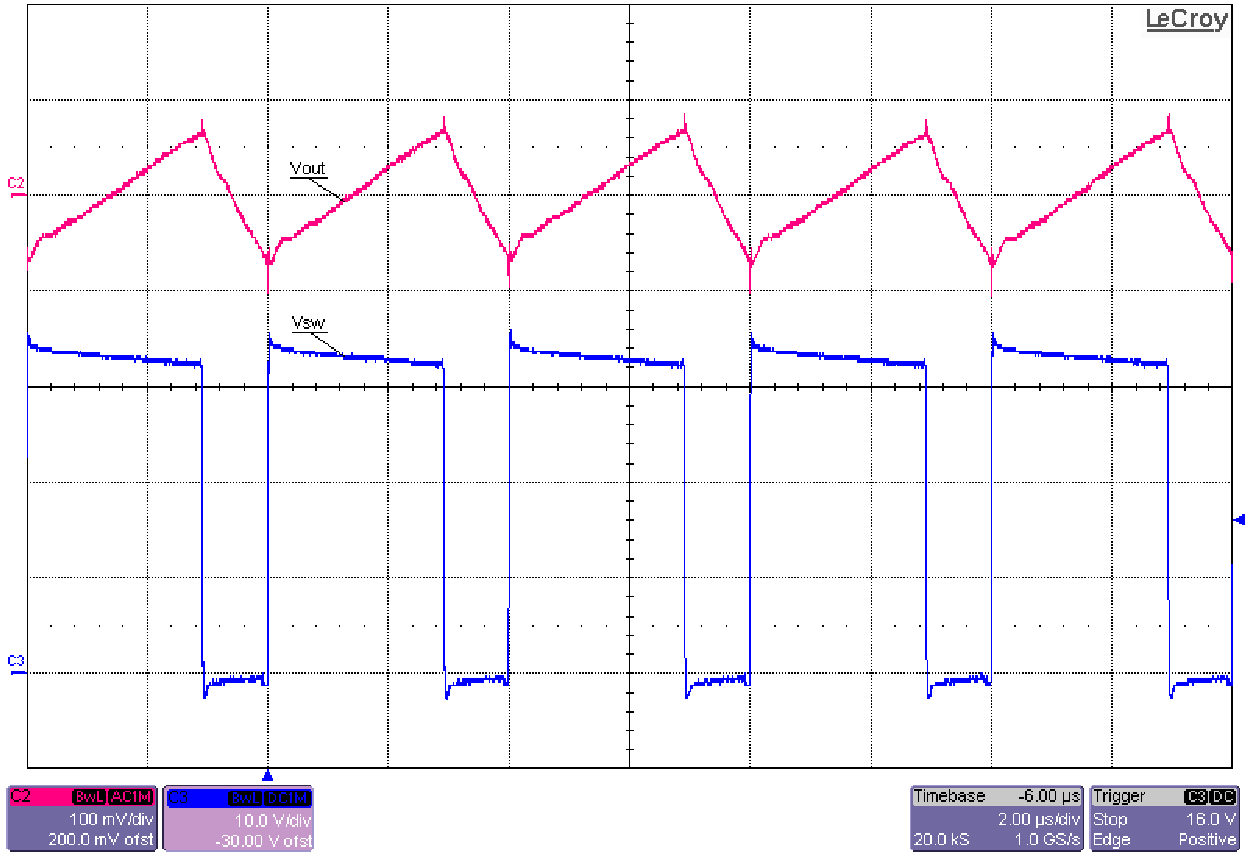
6.3 Output Voltage Ripple and Switch Node Voltage



Switch Node Voltage and Output Voltage Ripple at 30.4Vin and 18A Load (Vripple ≈ 110mVp-p)

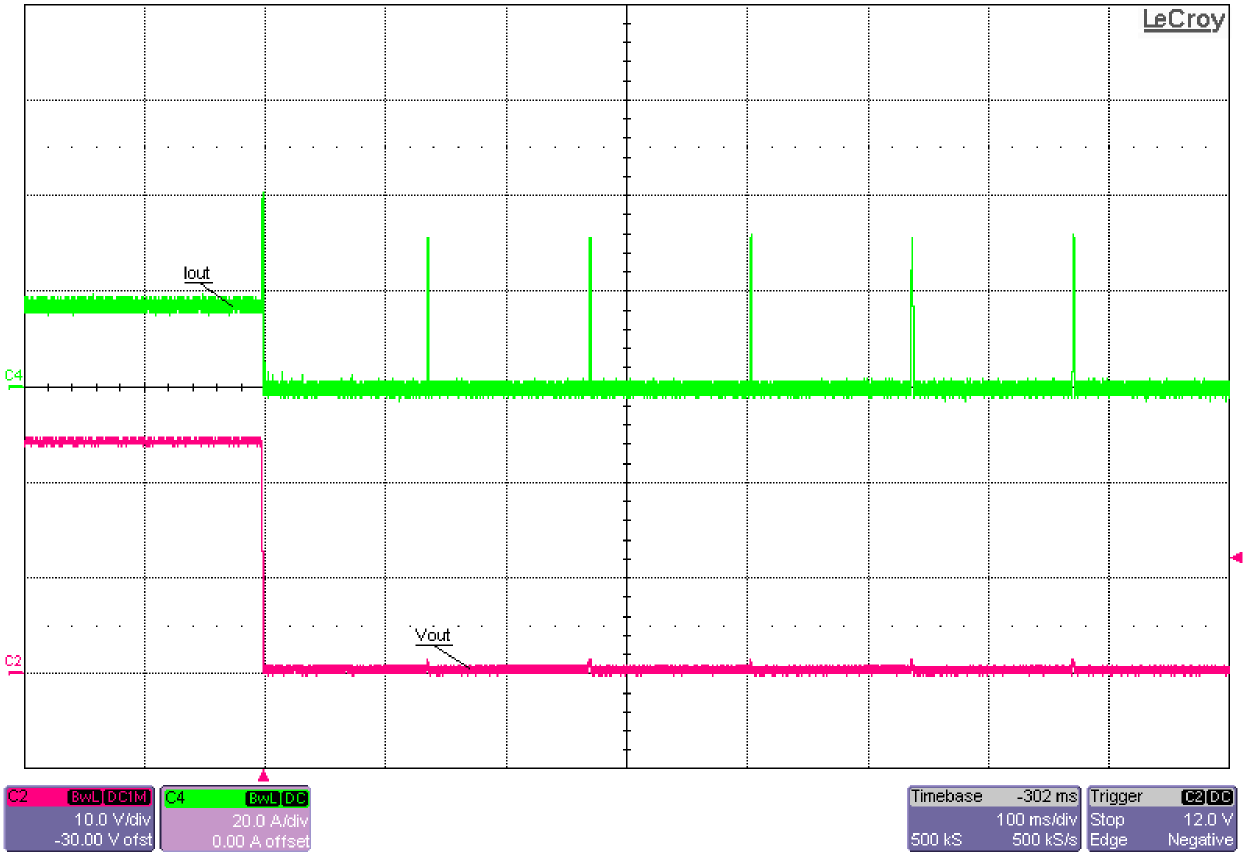


Switch Node Voltage and Output Voltage Ripple at 32Vin and 18A Load (Vripple ≈ 120mVp-p)

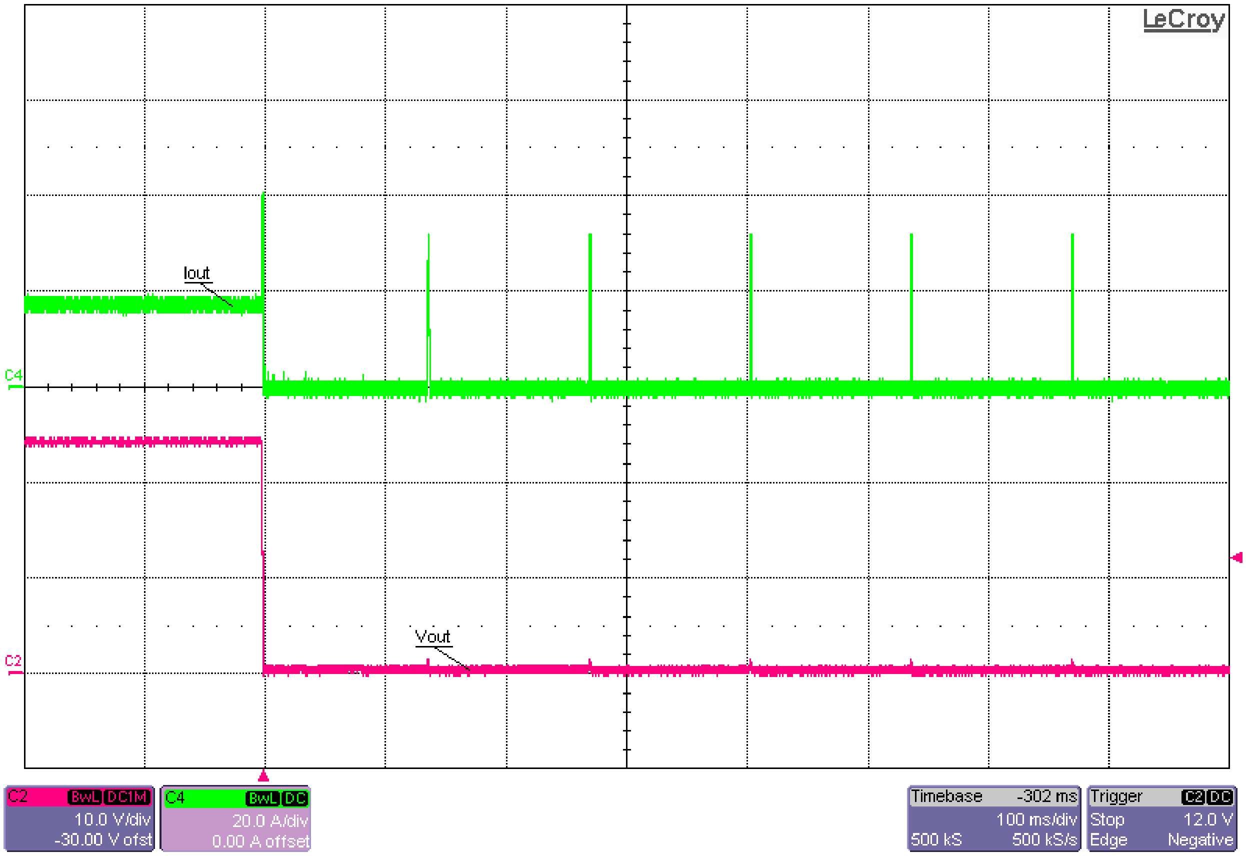


Switch Node Voltage and Output Voltage Ripple at 33.6Vin and 18A Load (Vripple ≈ 150mVp-p)

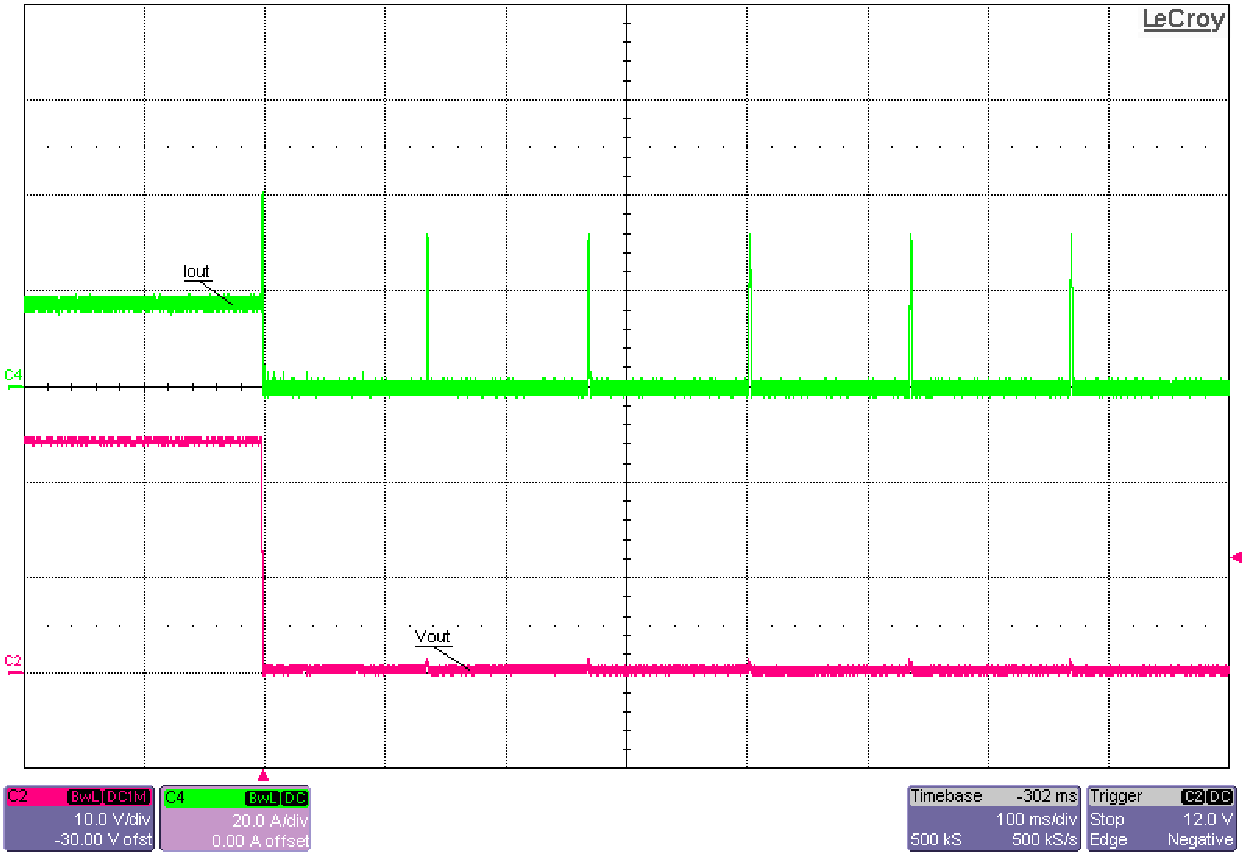
6.4 Short Circuit



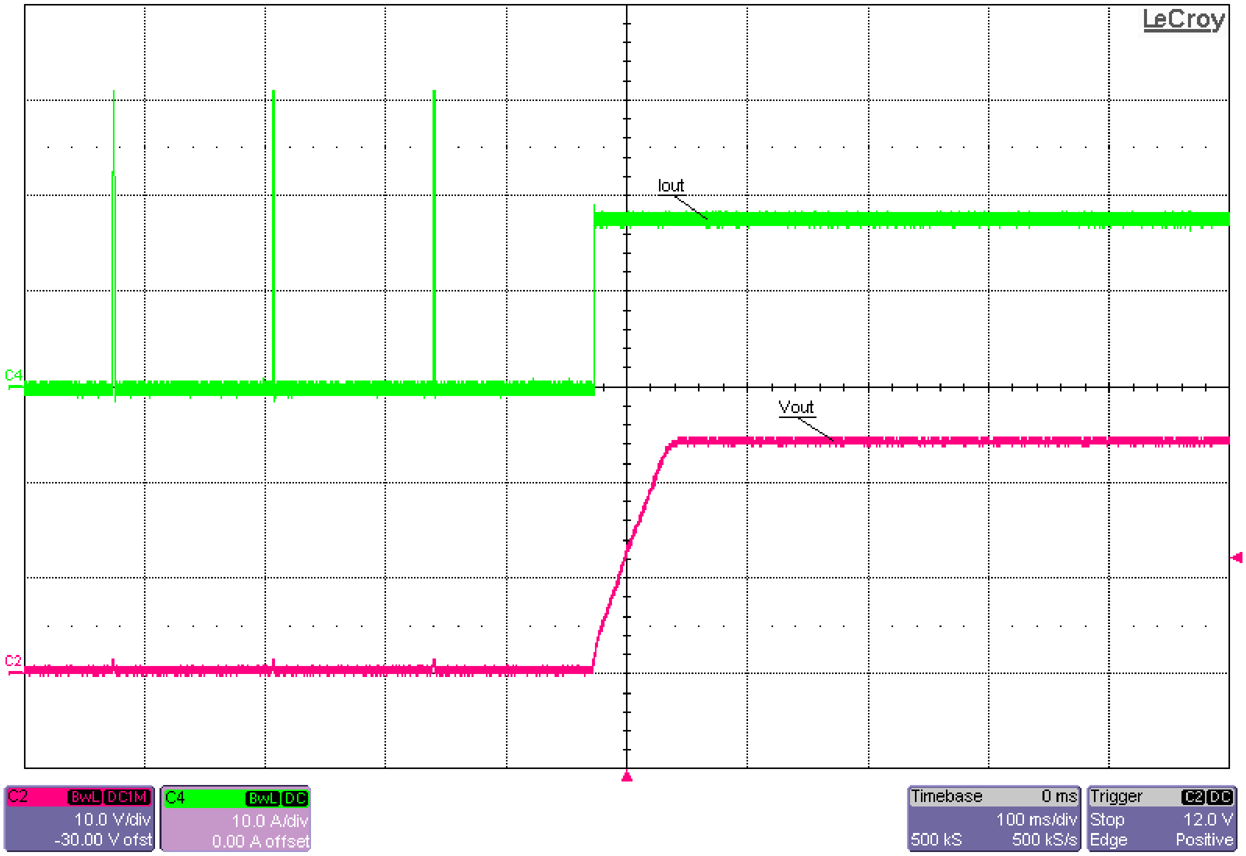
Short Circuit Applied at 30.4Vin from 18A Load



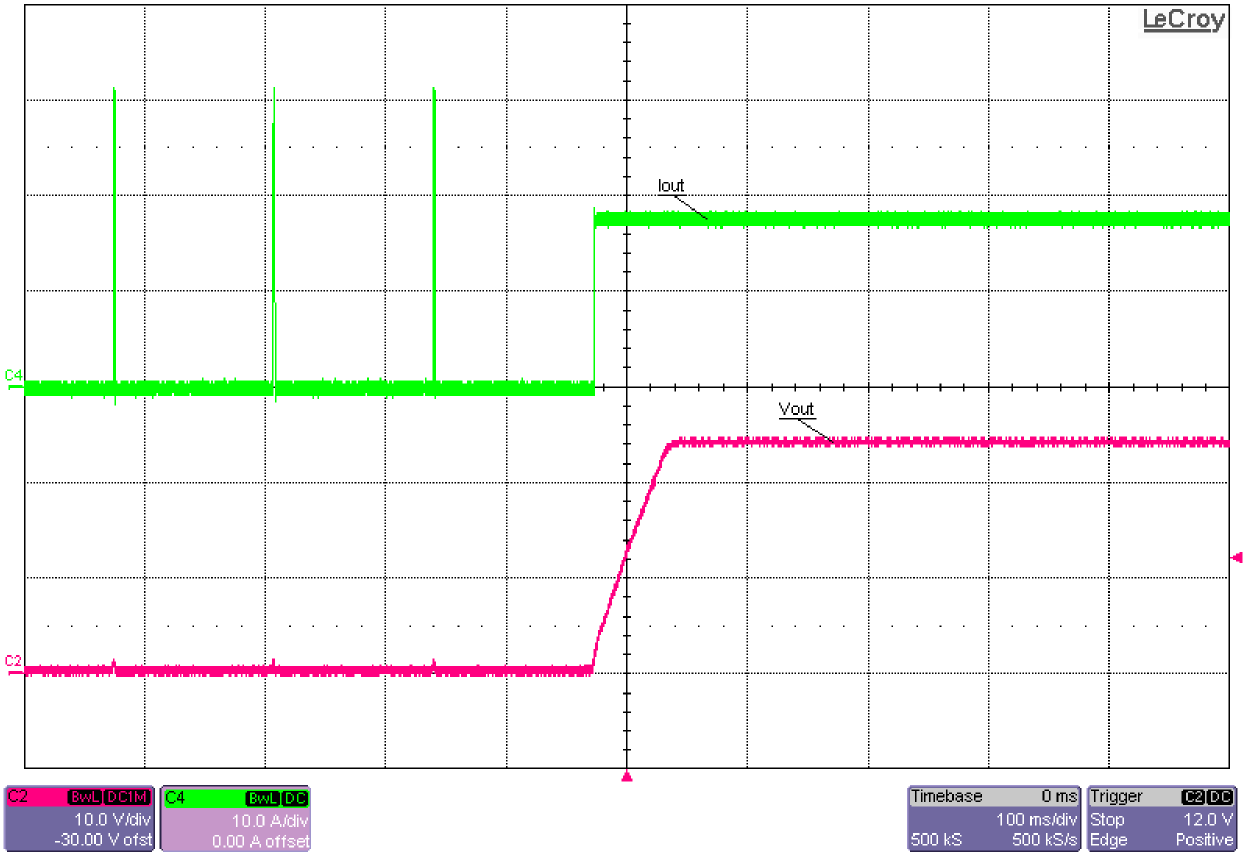
Short Circuit Applied at 32Vin from 18A Load



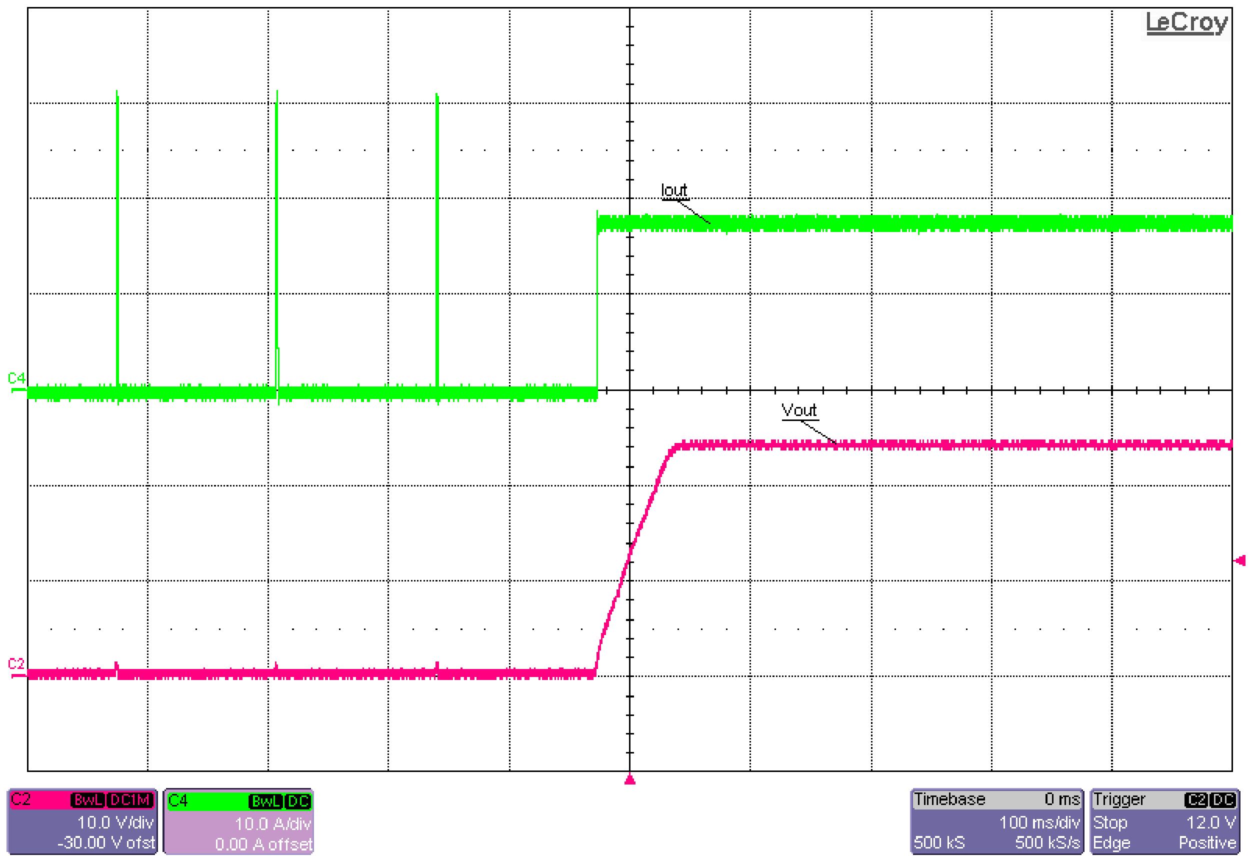
Short Circuit Applied at 33.6Vin from 18A Load



Short Circuit Released at 30.4Vin into 18A Load



Short Circuit Released at 32Vin into 18A Load



Short Circuit Released at 33.6Vin into 18A Load