Test Data
For PMP9380
3/31/2014

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1. Design Specifications

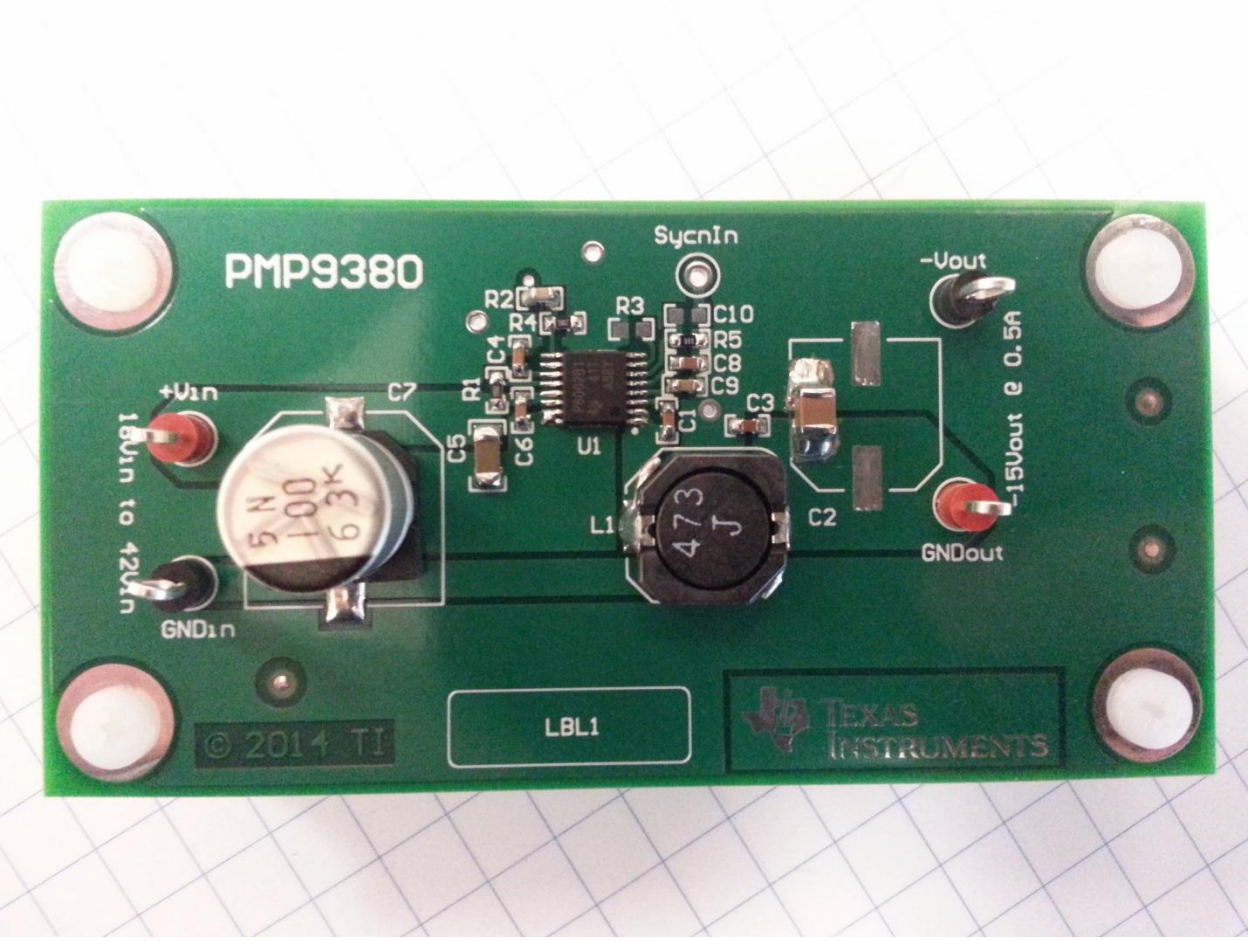
Vin Minimum	**18VDC**
Vin Maximum	**42VDC**
Vout	**-15VDC**
Iout	**0.5A Max.**
Approximate Switching Frequency	**520KHz**

2. Circuit Description

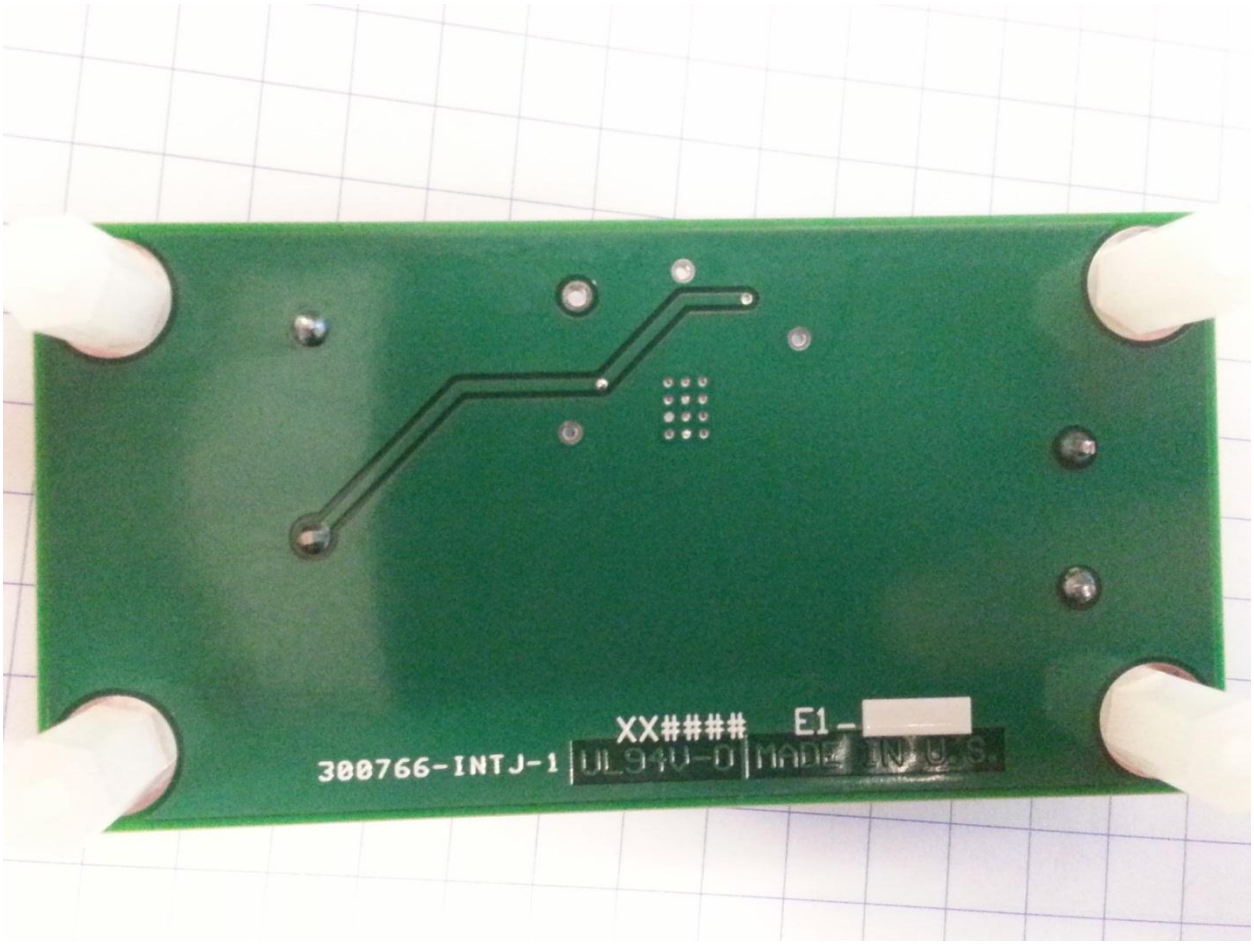
PMP9380 is a Synchronous Buck-Boost Converter using the LM46002 Synchronous Buck Regulator IC. The design accepts an input voltage of 18Vin to 42Vin and provides an output of -15Vout capable of supplying a maximum of 0.5A of current to the load. This design was built on a 4-layered board (1 oz. Copper on Top and Bottom layers, 1/2 oz. Copper on two inner layers). Tests in this report were performed at 18Vin, 30Vin, and 42Vin.

3. PMP9380 Board Photos

Board Dimensions: 3.2” x 1.6”

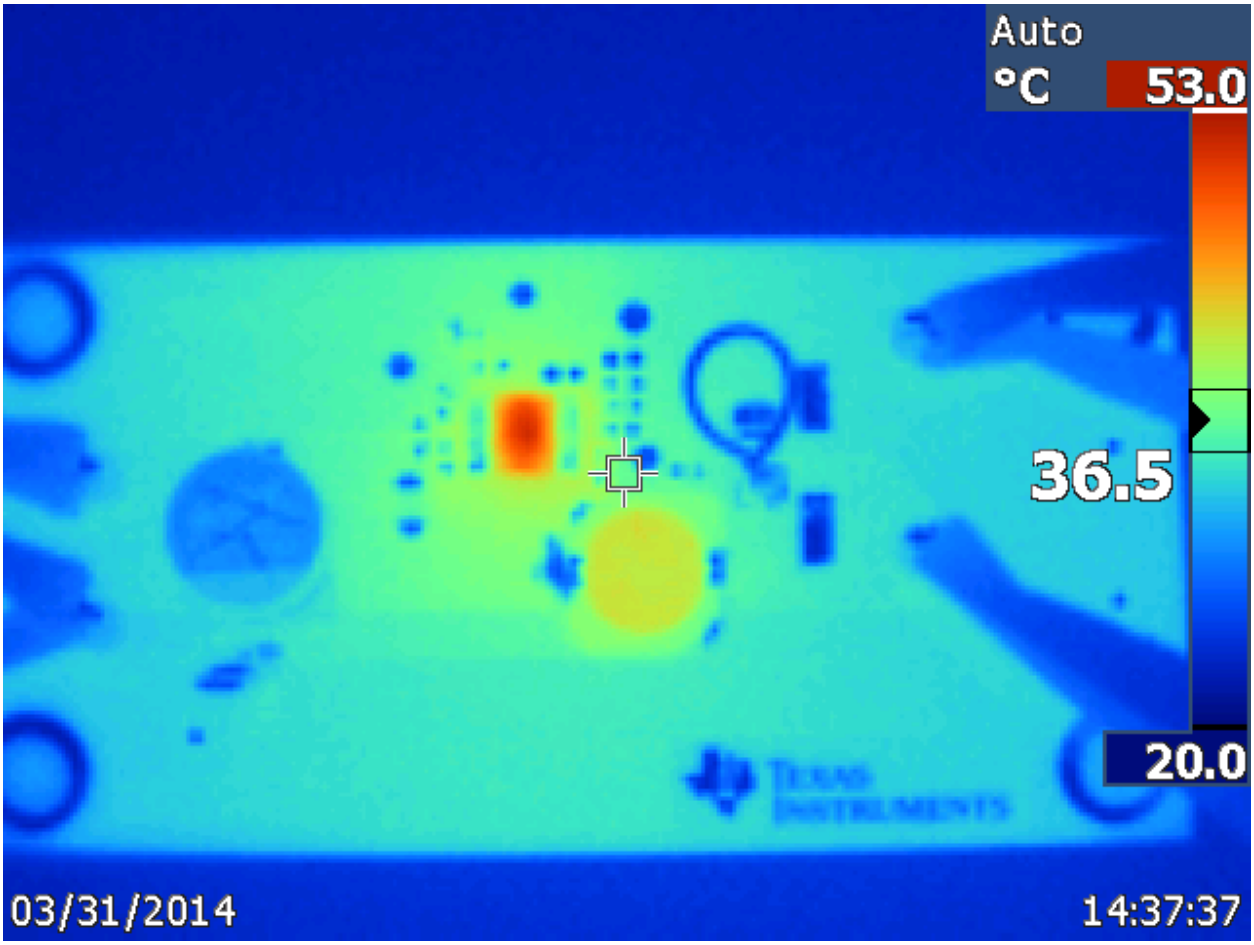


Board Photo (Top)

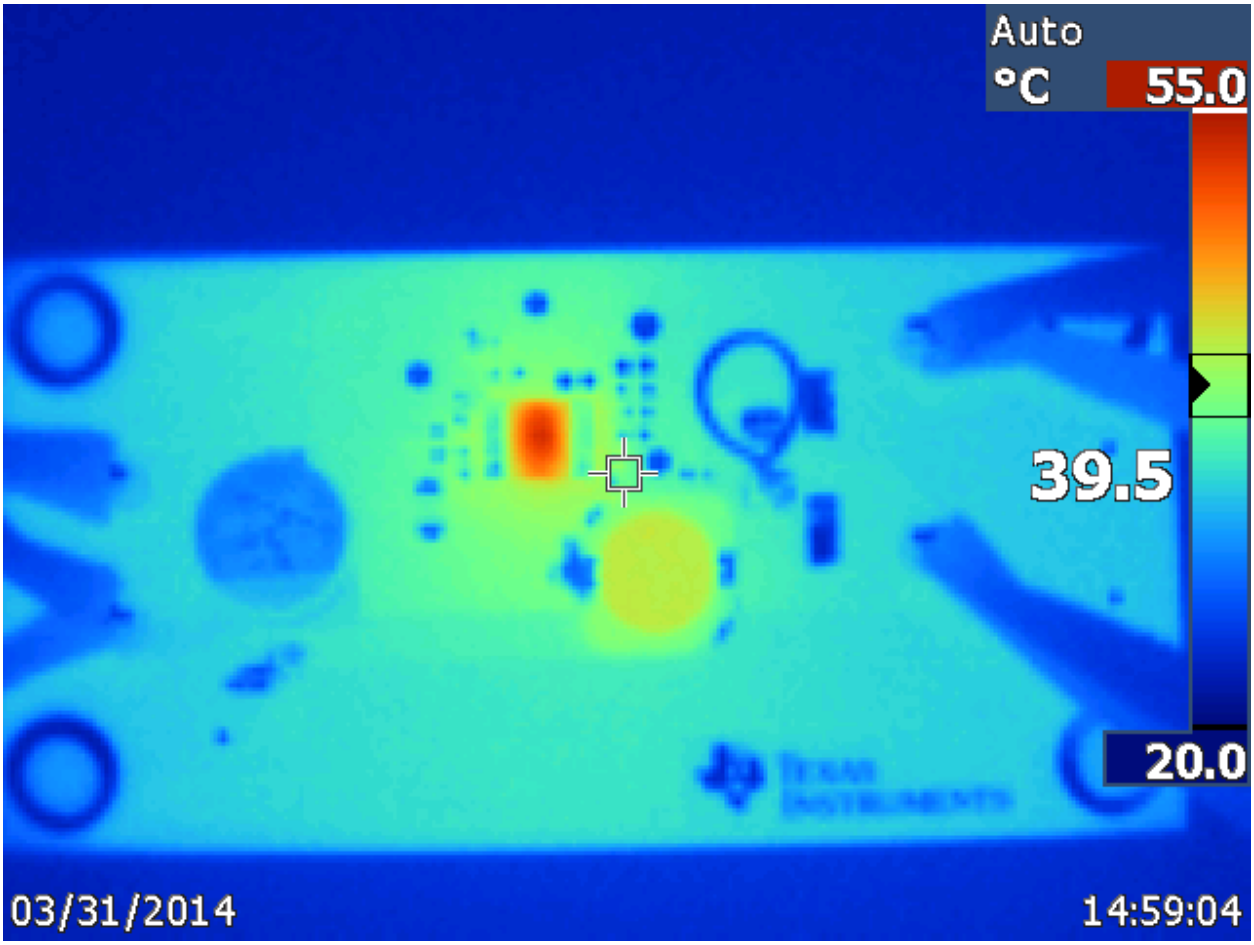


Board Photo (Bottom)

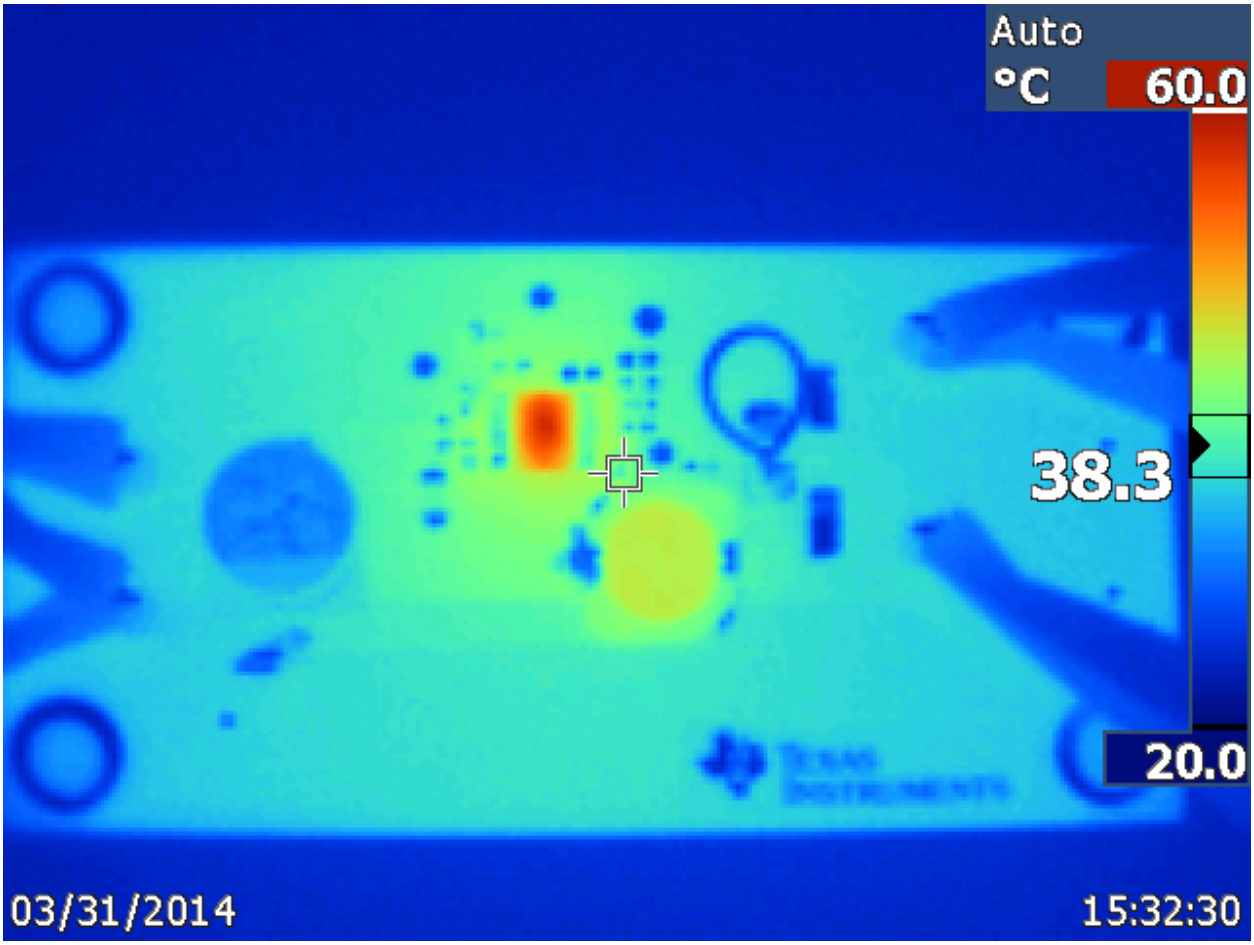
4. Thermal Data



IR thermal image taken at steady state with 18Vin and 0.5A load (no airflow)



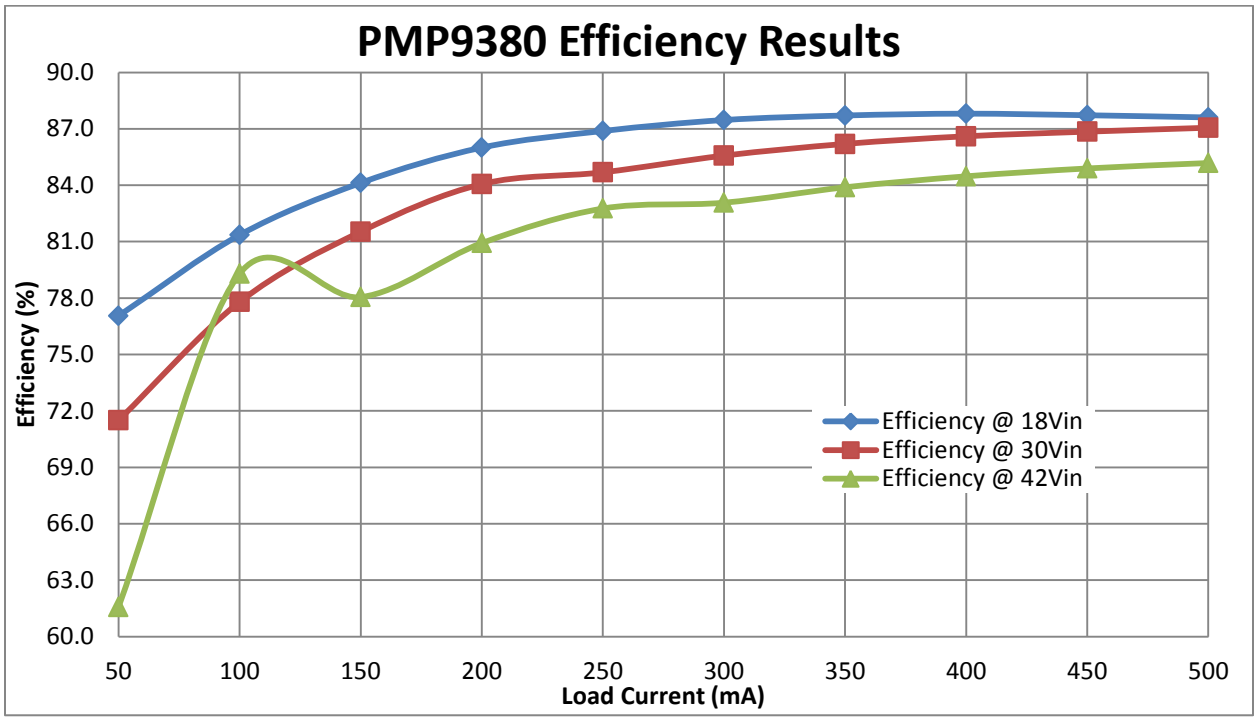
IR thermal image taken at steady state with 30Vin and 0.5A load (no airflow)



IR thermal image taken at steady state with 42Vin and 0.5A load (no airflow)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

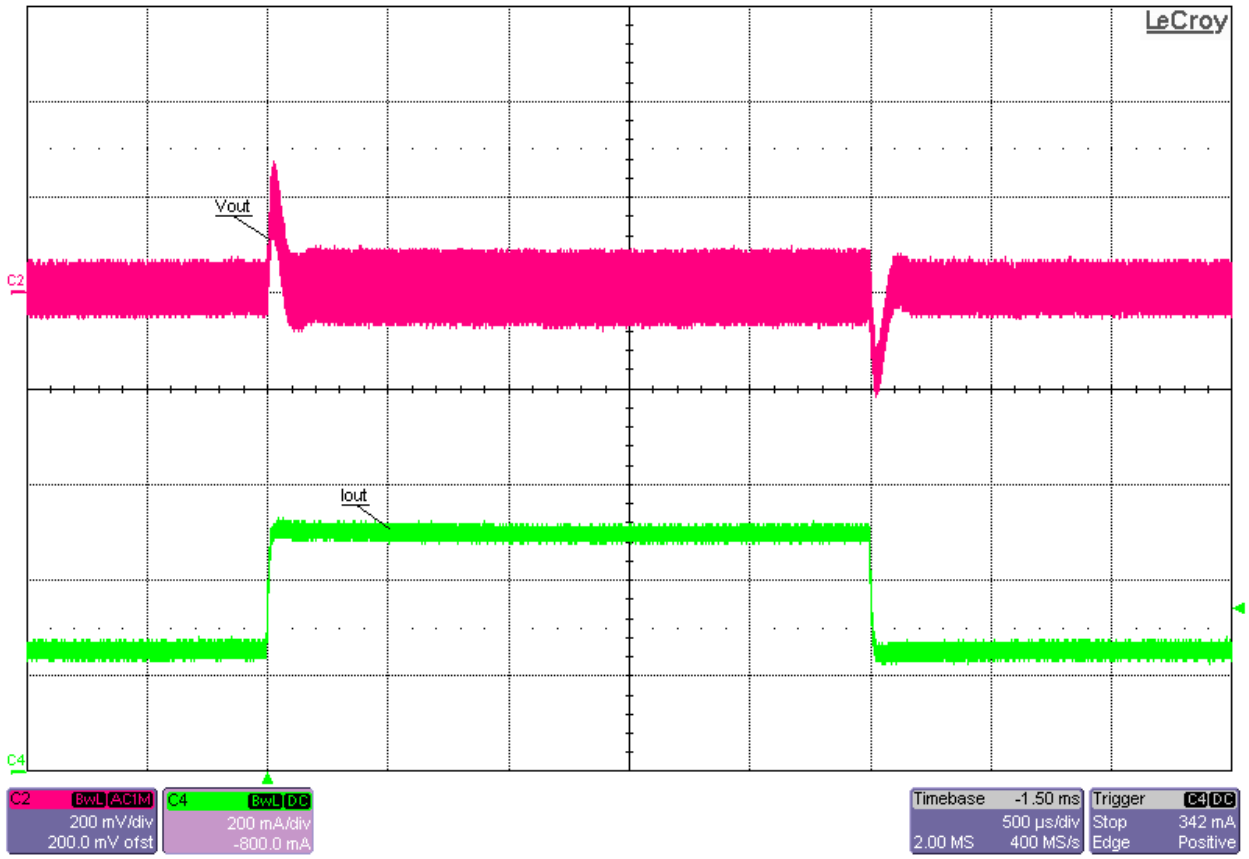
Vin (V)	Iin (mA)	Vout (V)	Iout (mA)	Pin (W)	Pout (W)	Efficiency (%)
18.1	54.16	-15.105	50.006	0.980	0.755	77.1
18.1	102.6	-15.106	100.015	1.857	1.511	81.4
18	149.64	-15.103	150.03	2.694	2.266	84.1
18	195.12	-15.102	200.01	3.512	3.021	86.0
18	241.39	-15.1	250.01	4.345	3.775	86.9
18	287.74	-15.1	300.02	5.179	4.530	87.5
18	334.72	-15.098	350.01	6.025	5.284	87.7
18	382.09	-15.097	400.01	6.878	6.039	87.8
18	430.2	-15.095	450.01	7.744	6.793	87.7
18	478.67	-15.096	500.01	8.616	7.548	87.6

Vin (V)	Iin (mA)	Vout (V)	Iout (mA)	Pin (W)	Pout (W)	Efficiency (%)
30.15	35.04	-15.105	50.008	1.056	0.755	71.5
30.15	64.4	-15.103	100.013	1.942	1.510	77.8
30.15	92.15	-15.1	150.01	2.778	2.265	81.5
30.14	119.2	-15.099	200.02	3.593	3.020	84.1
30	148.6	-15.1	250.02	4.458	3.775	84.7
30	176.44	-15.098	300.02	5.293	4.530	85.6
30	204.34	-15.097	350.01	6.130	5.284	86.2
30	232.42	-15.096	400.01	6.973	6.039	86.6
30	260.7	-15.094	450.01	7.821	6.792	86.8
30	288.97	-15.094	500.01	8.669	7.547	87.1

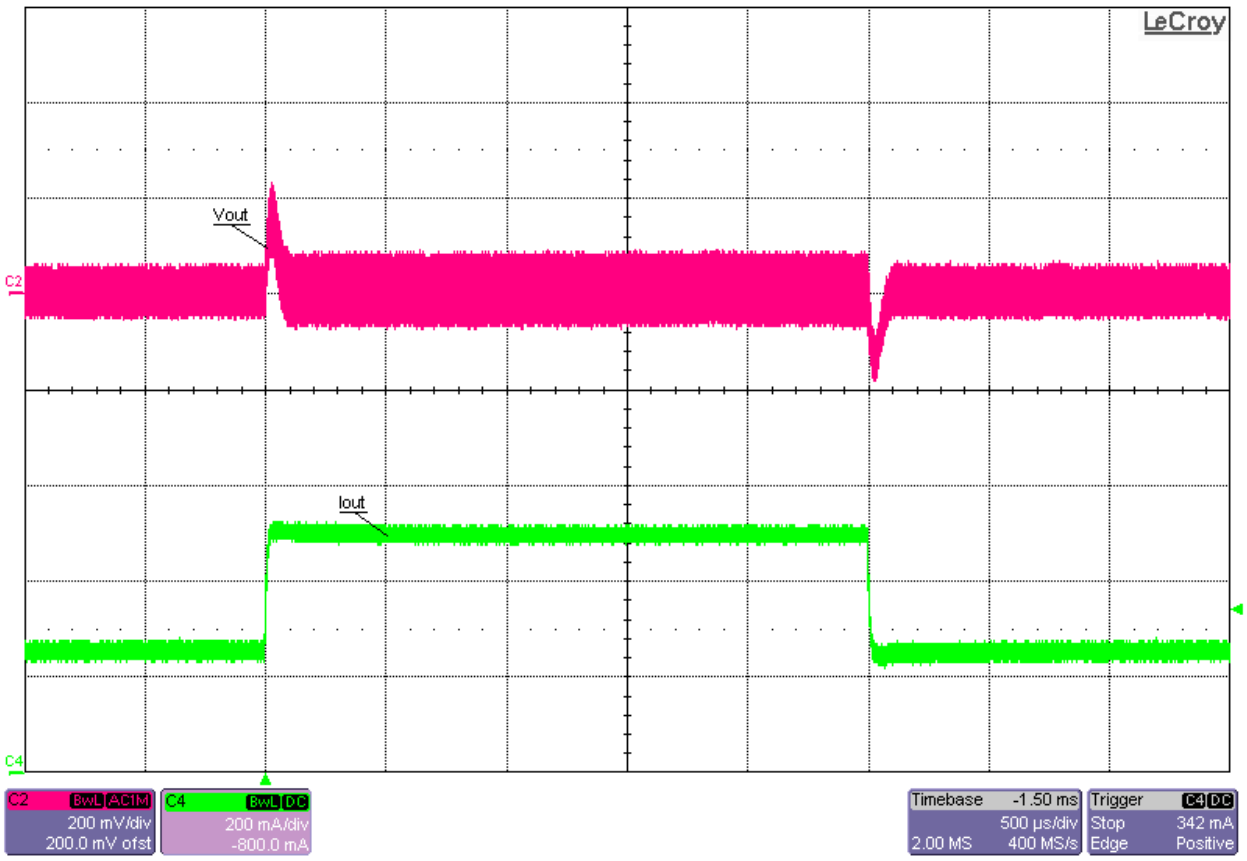
Vin (V)	Iin (mA)	Vout (V)	Iout (mA)	Pin (W)	Pout (W)	Efficiency (%)
42.15	29.1	-15.102	50.006	1.227	0.755	61.6
42.15	45.2	-15.105	100.015	1.905	1.511	79.3
42.15	68.85	-15.099	150.01	2.902	2.265	78.0
42.17	88.5	-15.099	200.02	3.732	3.020	80.9
42.19	108.1	-15.097	250.02	4.561	3.775	82.8
42	129.8	-15.095	300.02	5.452	4.529	83.1
42	149.94	-15.094	350.01	6.297	5.283	83.9
42	170.17	-15.093	400.02	7.147	6.038	84.5
42	190.49	-15.093	450.01	8.001	6.792	84.9
42	210.94	-15.093	500.01	8.859	7.547	85.2

6 Waveforms

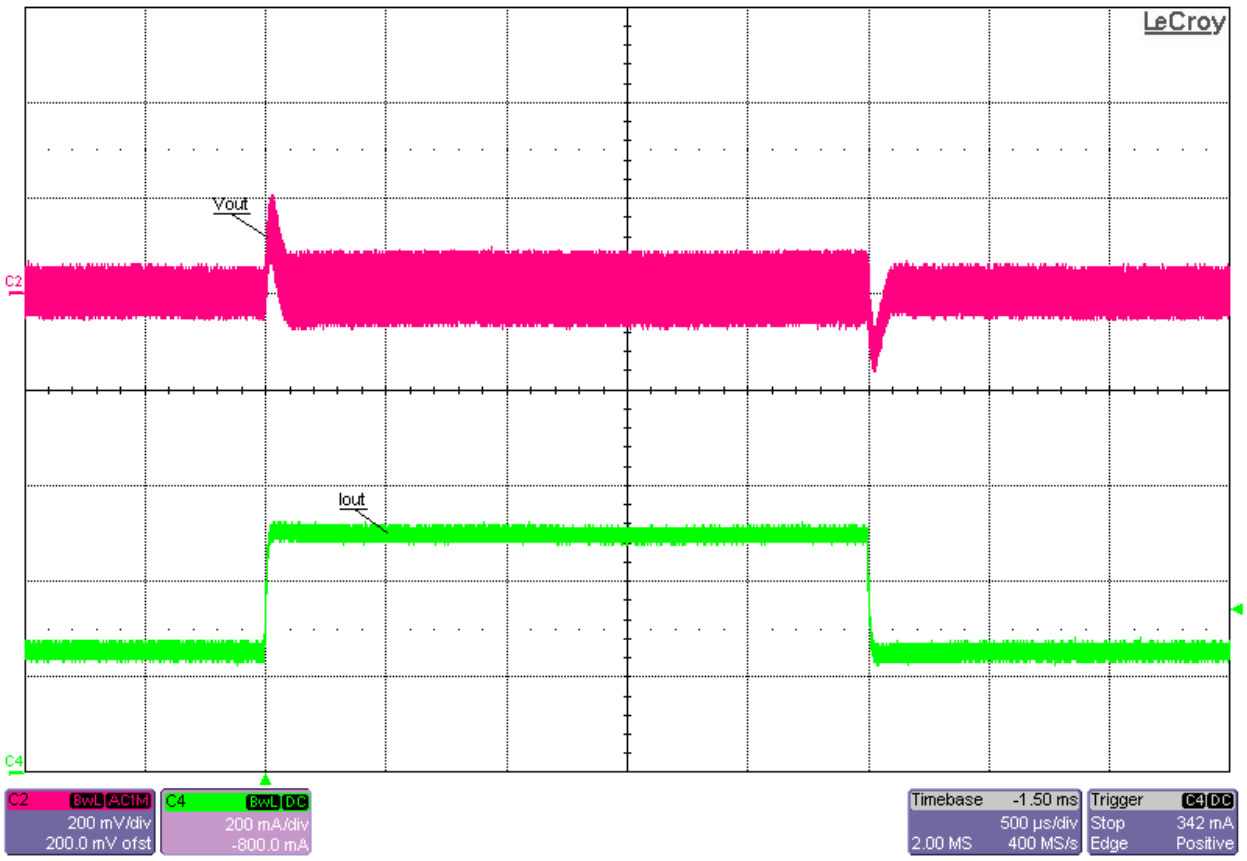
6.1 Load Transient Response



Load Transient Response at 18Vin and 50%-to-100% (0.25A-to-0.5A) Load Step

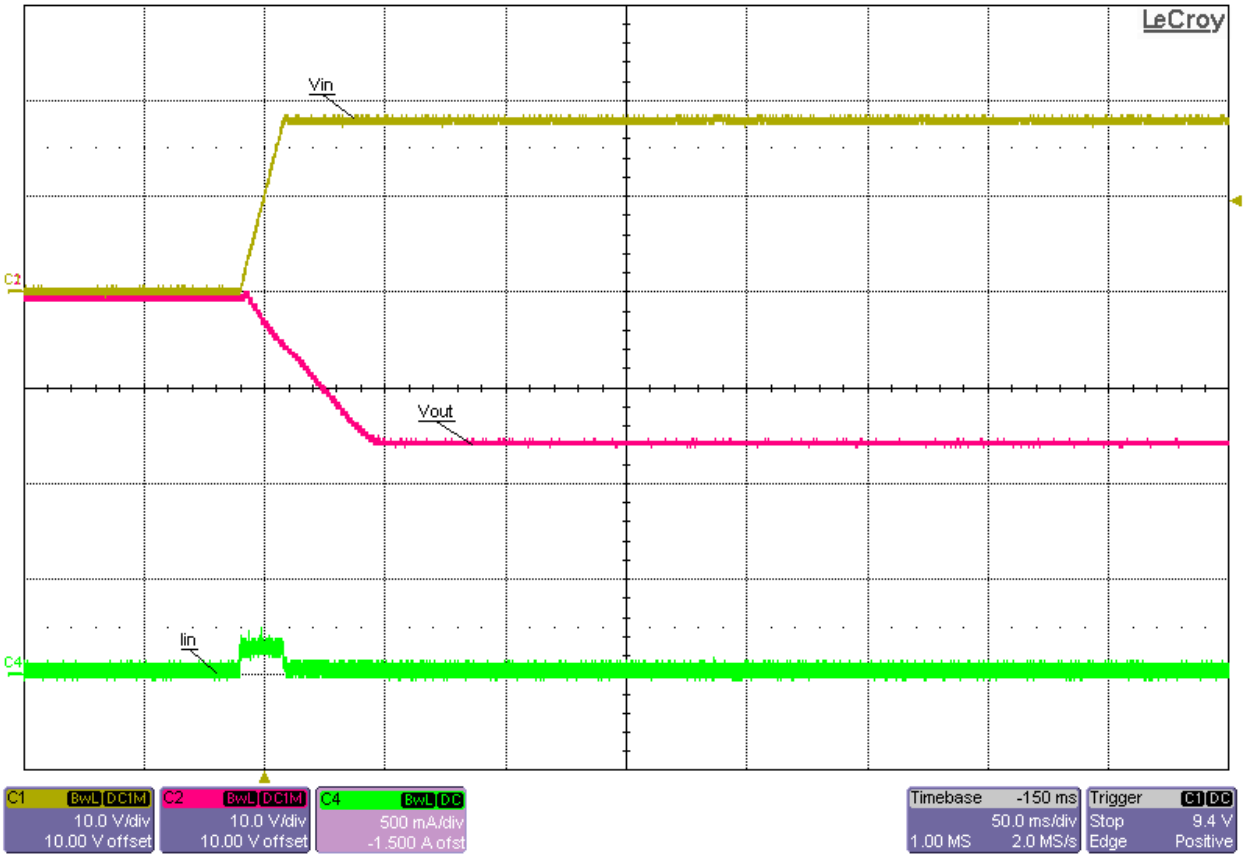


Load Transient Response at 30Vin and 50%-to-100% (0.25A-to-0.5A) Load Step

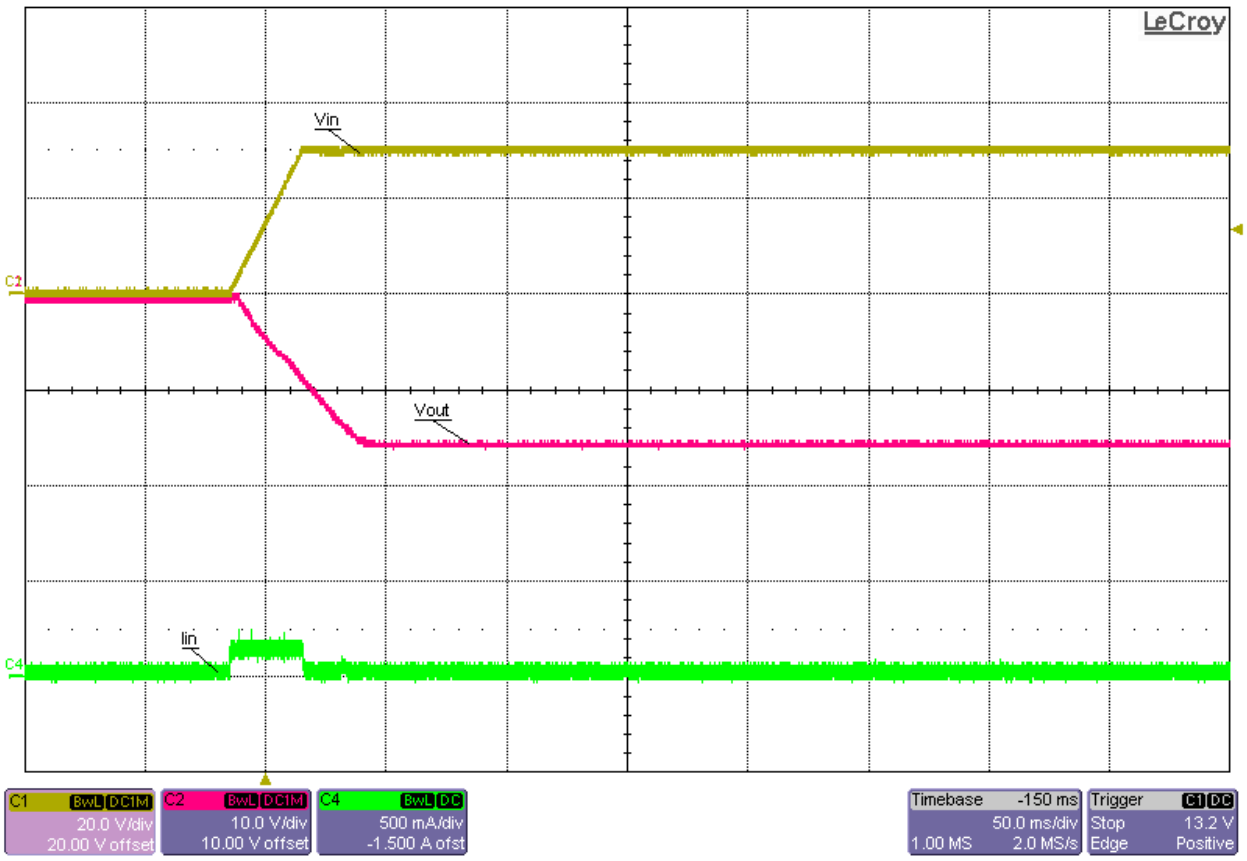


Load Transient Response at 42Vin and 50%-to-100% (0.25A-to-0.5A) Load Step

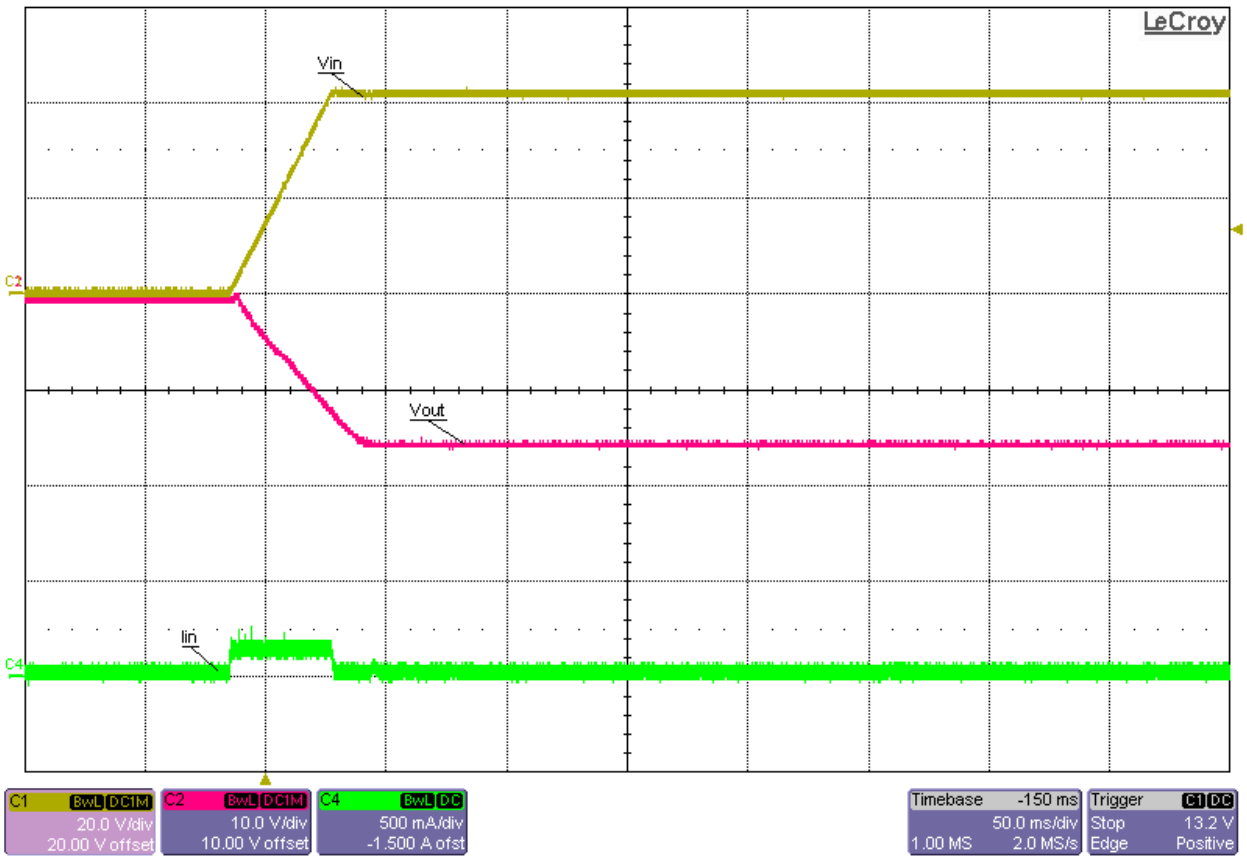
6.2 Startup



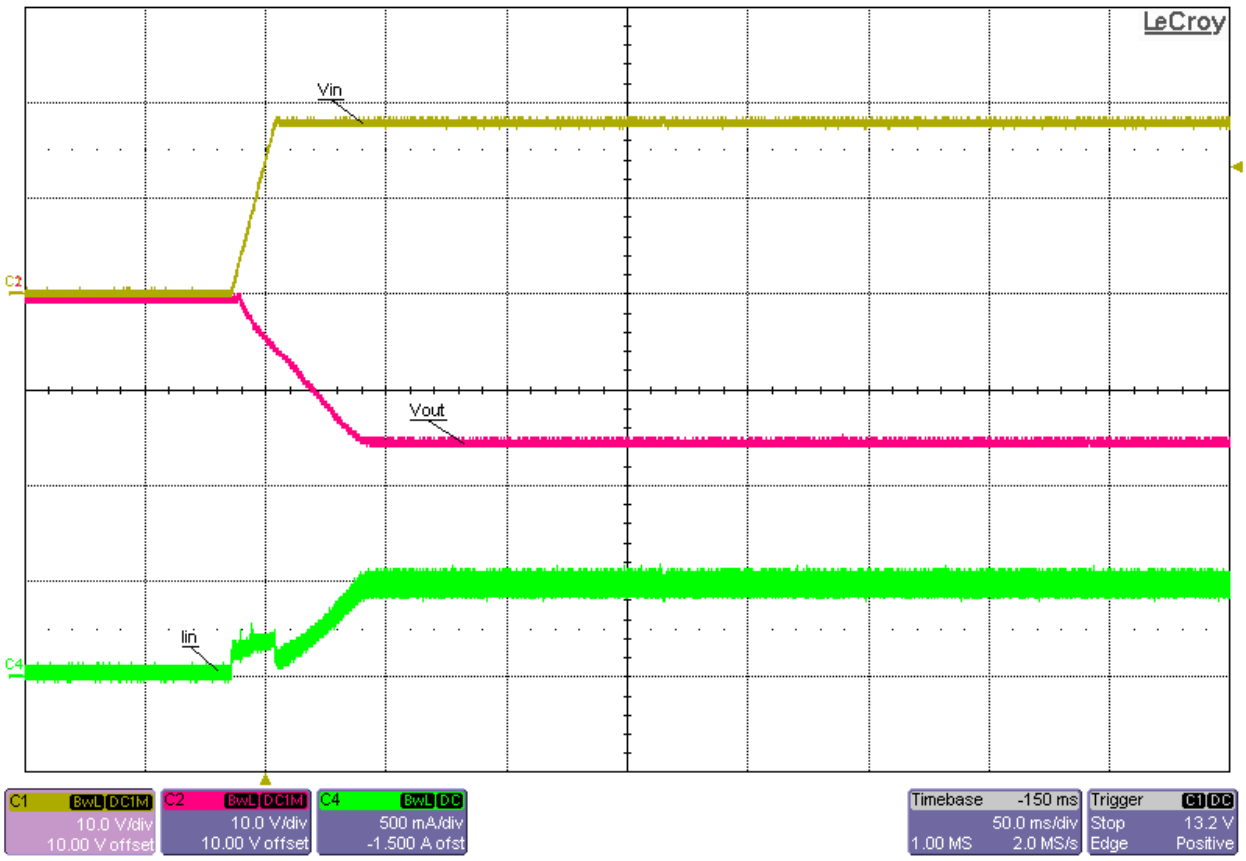
Startup into No Load at 18Vin



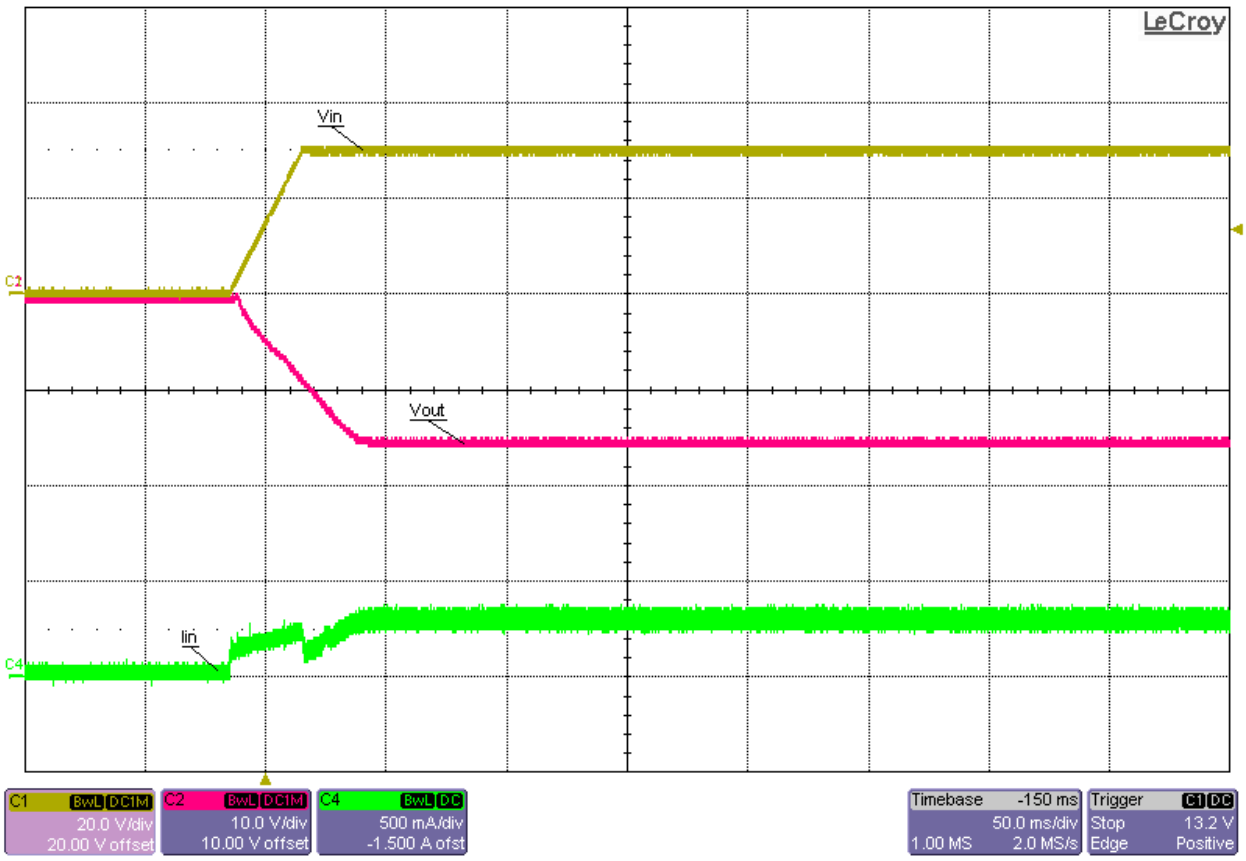
Startup into No Load at 30Vin



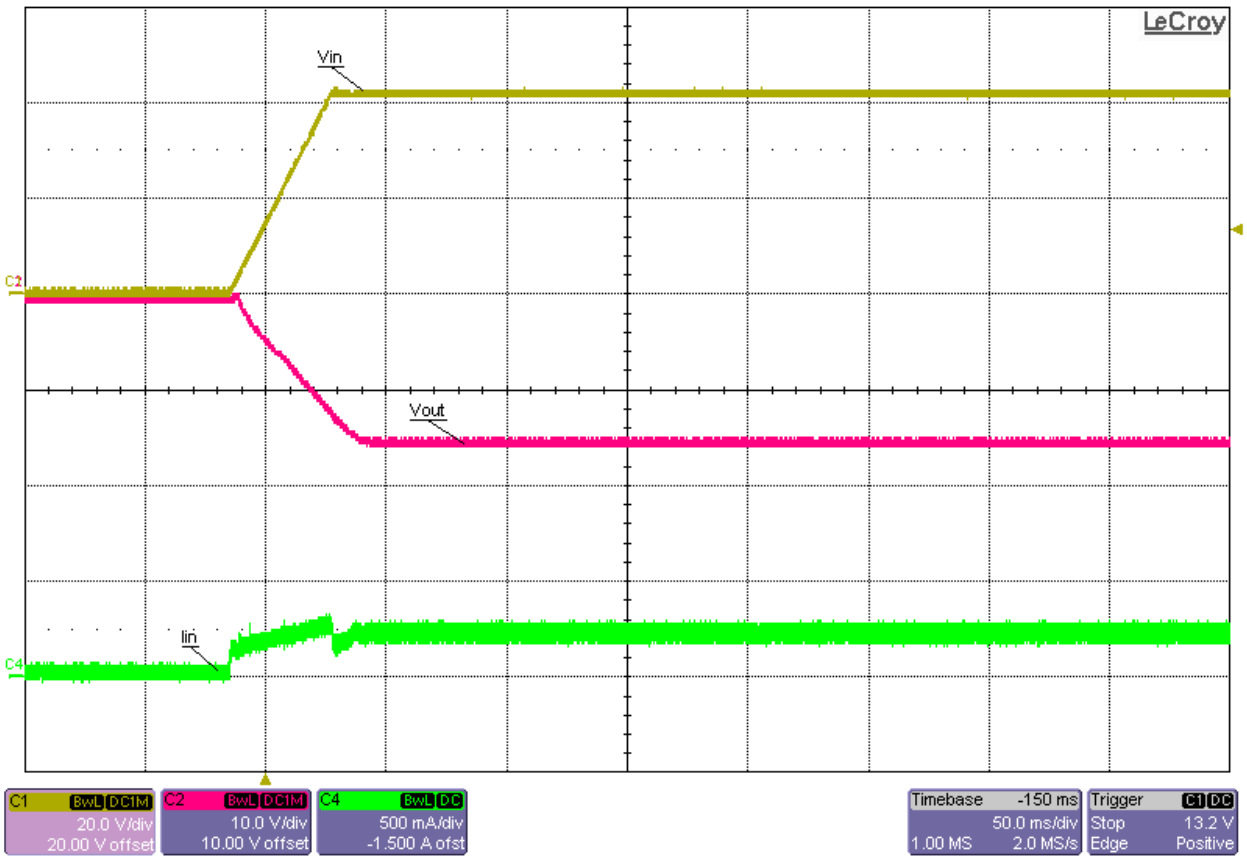
Startup into No Load at 42Vin



Startup into Full (0.5A) Load at 18Vin

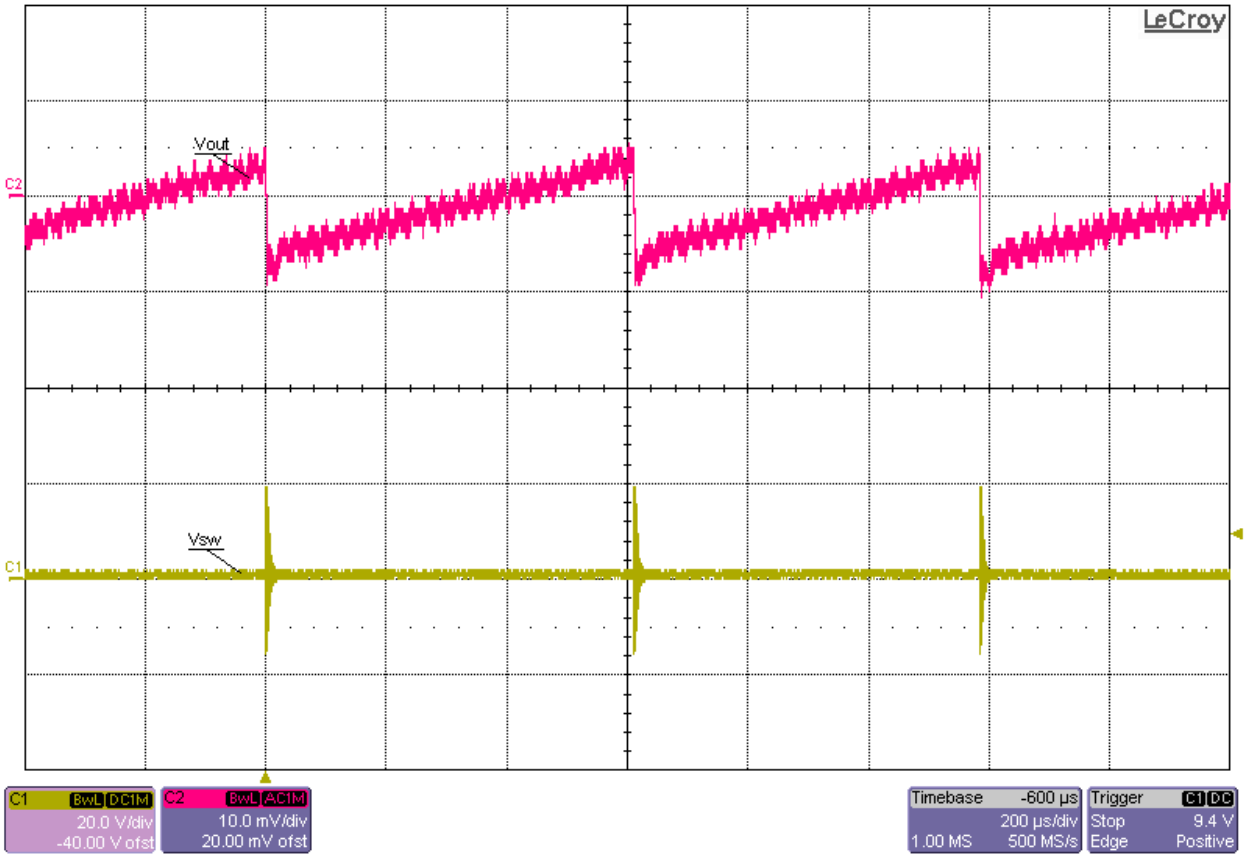


Startup into Full (0.5A) Load at 30Vin

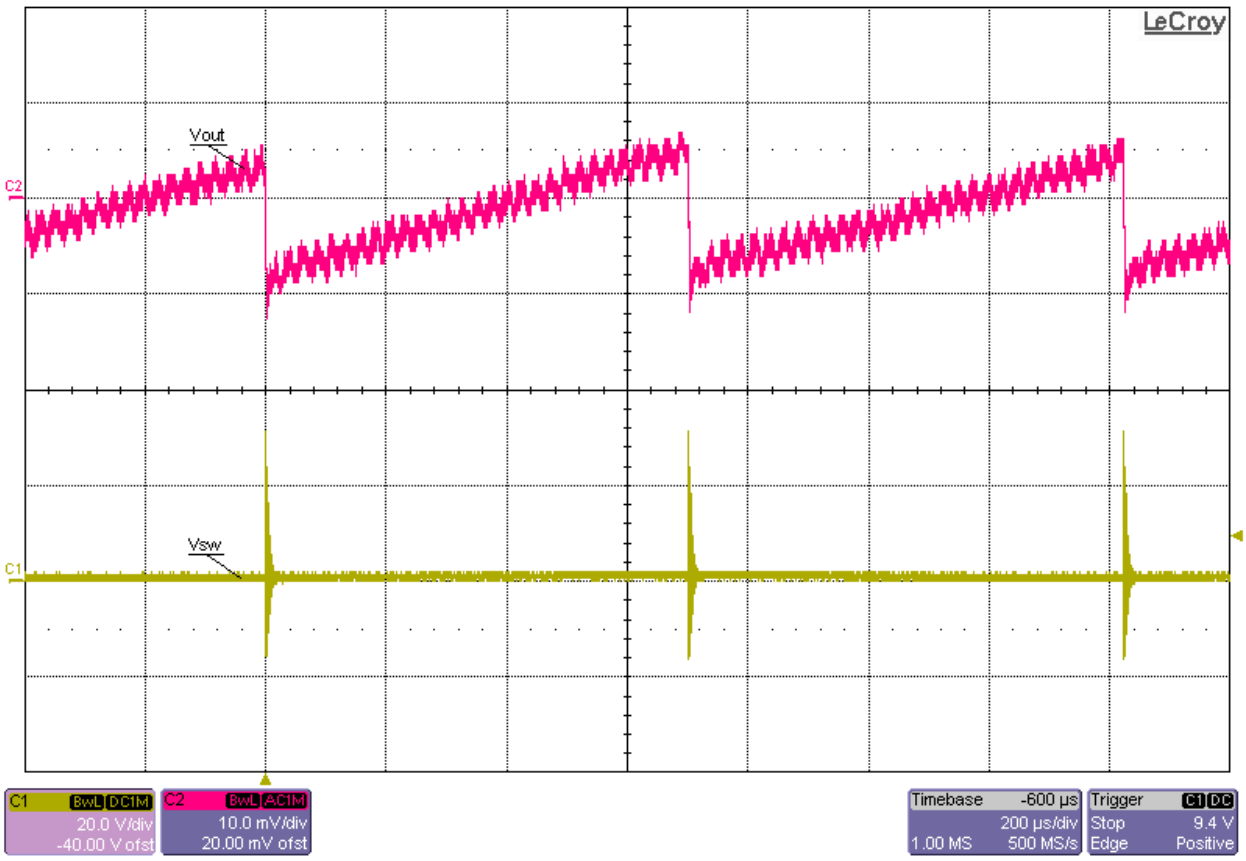


Startup into Full (0.5A) Load at 42Vin

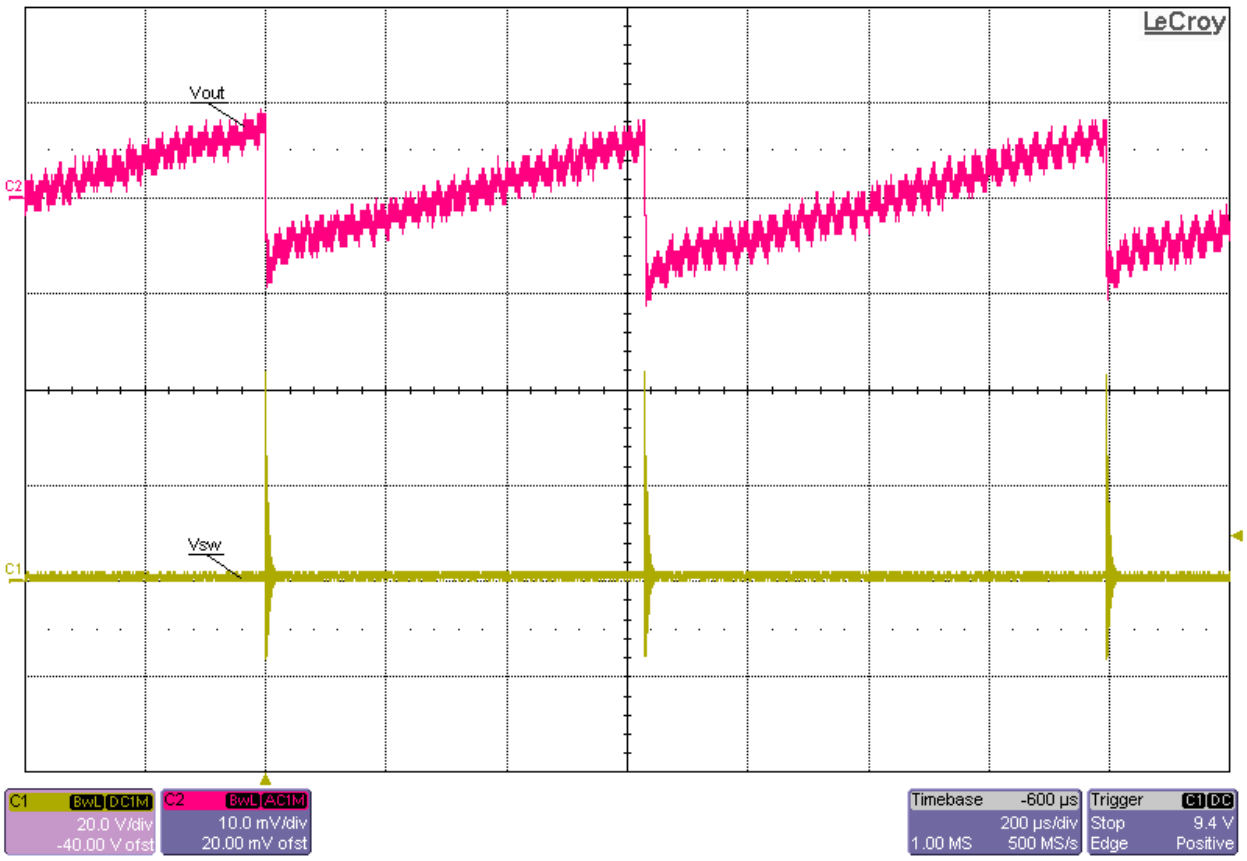
6.3 Output Voltage Ripple and Switch Node Voltage



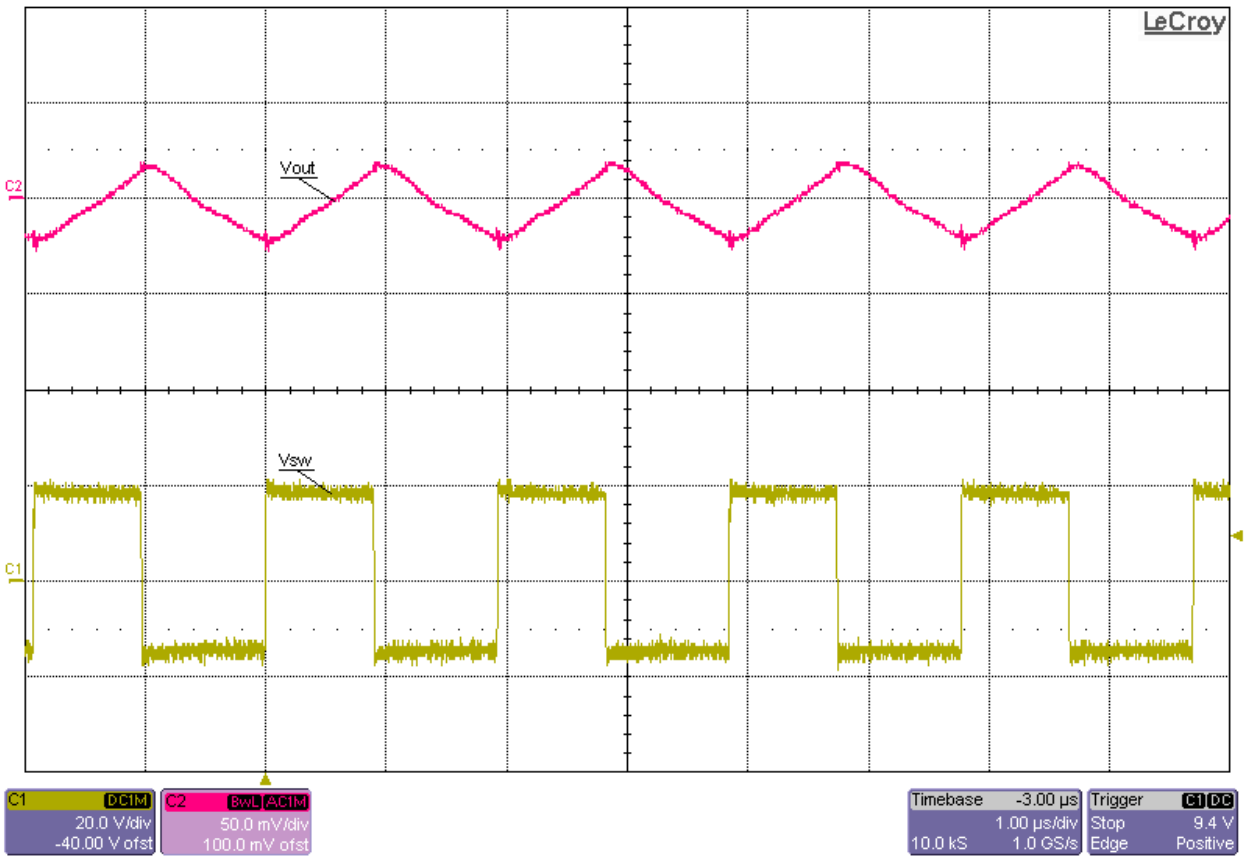
Switch Node Voltage and Output Voltage Ripple at 18Vin and No Load (Vripple ≈ 13mVp-p)



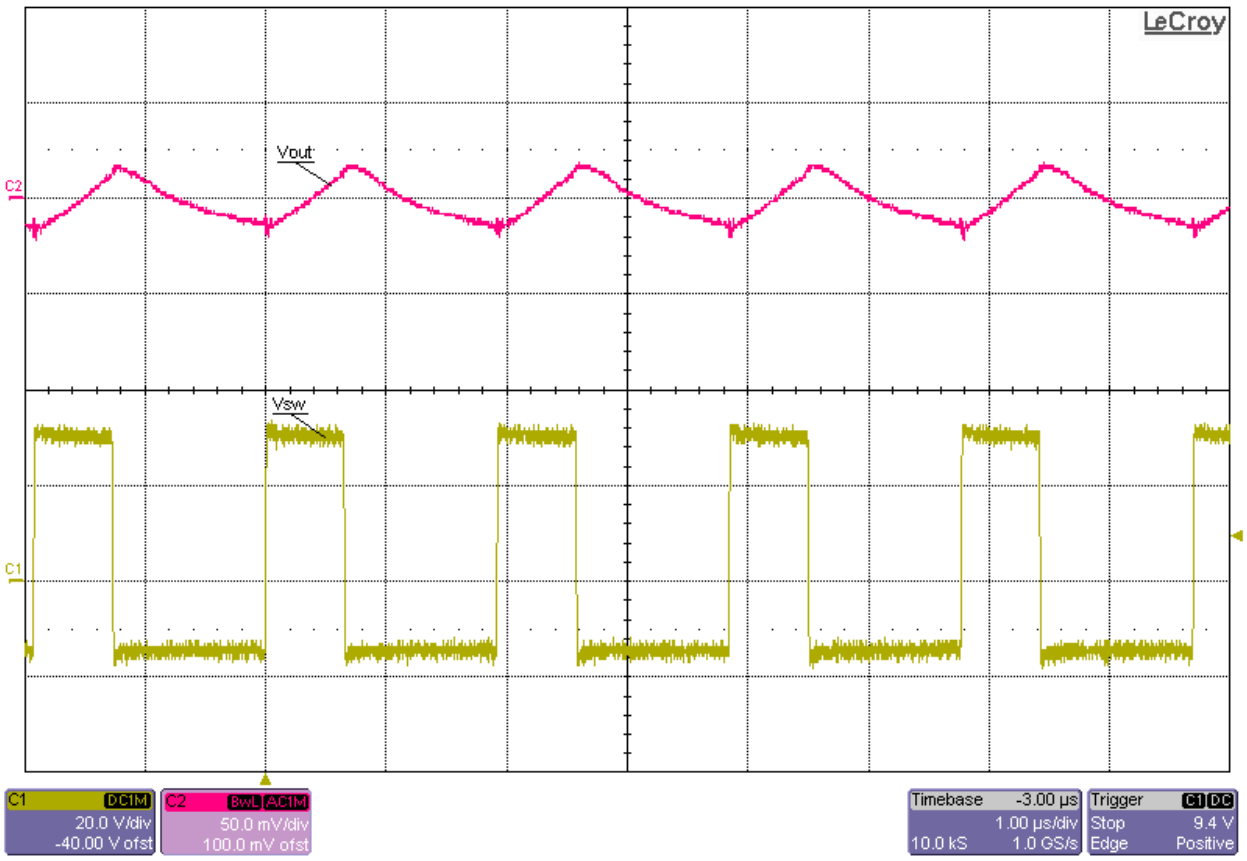
Switch Node Voltage and Output Voltage Ripple at 30Vin and No Load (Vripple ≈ 15mVp-p)



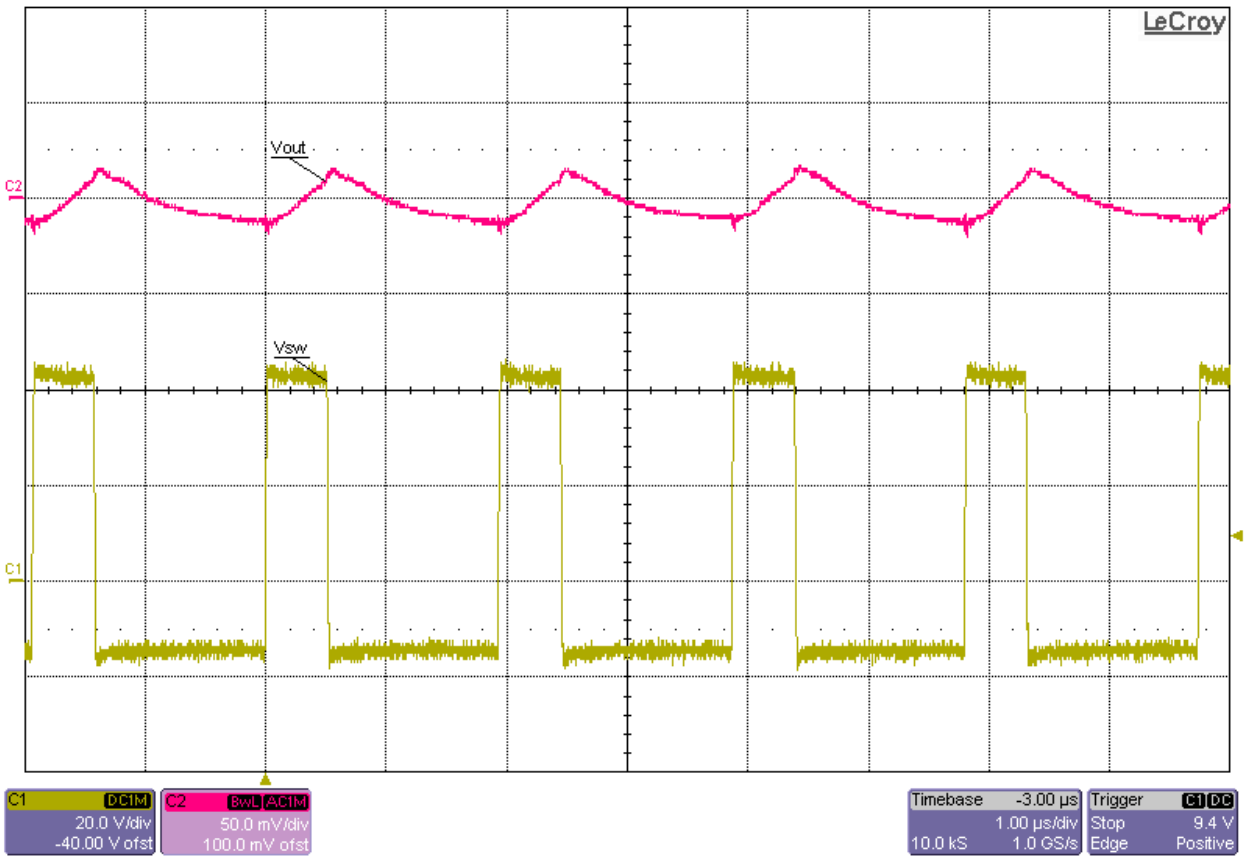
Switch Node Voltage and Output Voltage Ripple at 42Vin and No Load (Vripple ≈ 18mVp-p)



Switch Node Voltage and Output Voltage Ripple at 18Vin and Full (0.5A) Load (Vripple ≈ 40mVp-p)

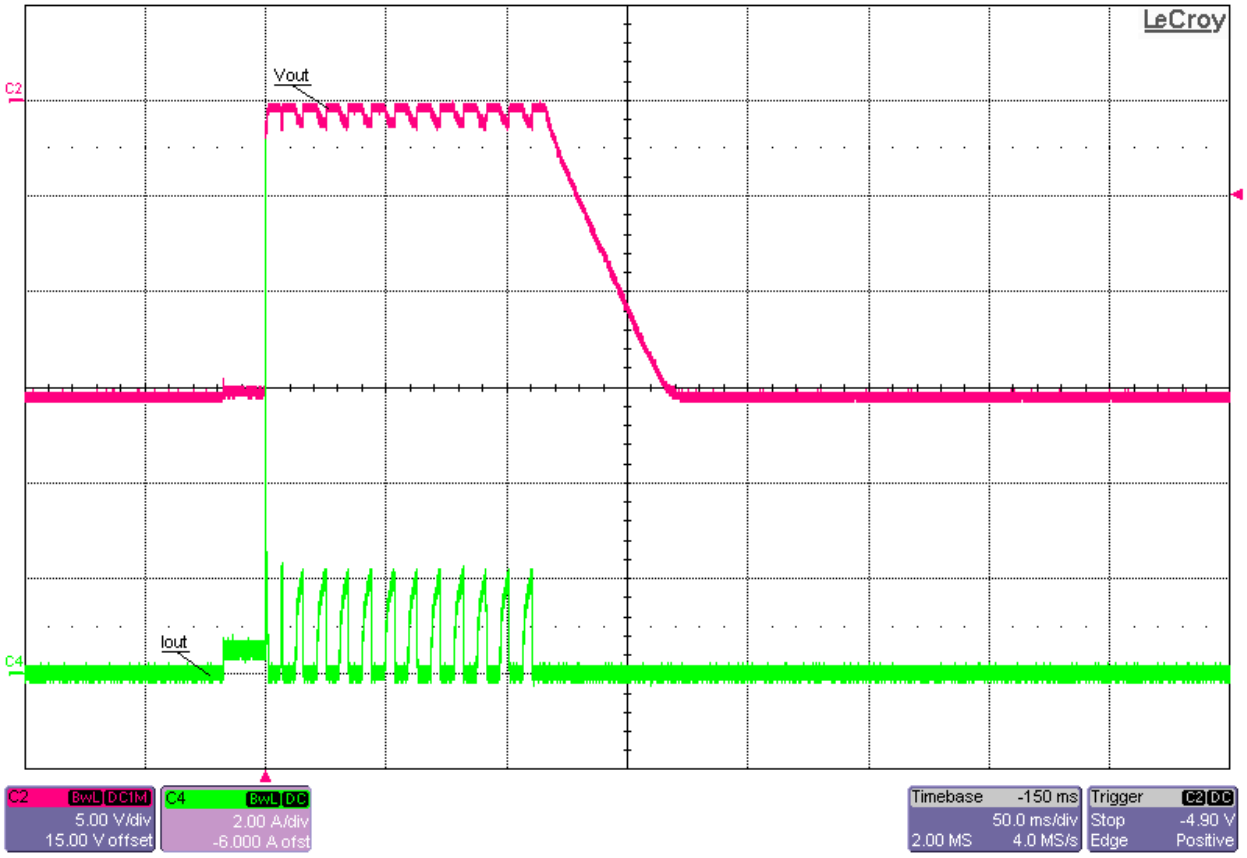


Switch Node Voltage and Output Voltage Ripple at 30Vin and Full (0.5A) Load (Vripple ≈ 35mVp-p)

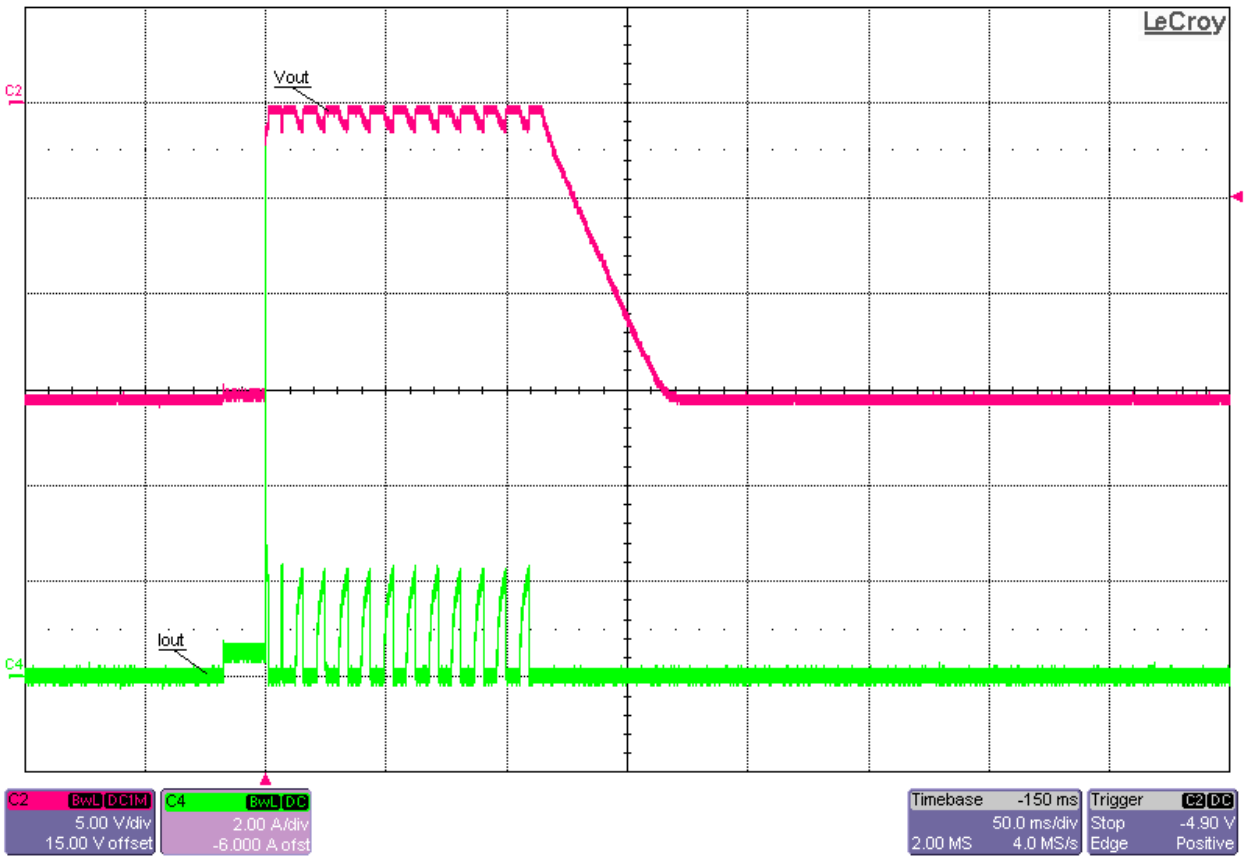


Switch Node Voltage and Output Voltage Ripple at 42Vin and Full (0.5A) Load (Vripple ≈ 25mVp-p)

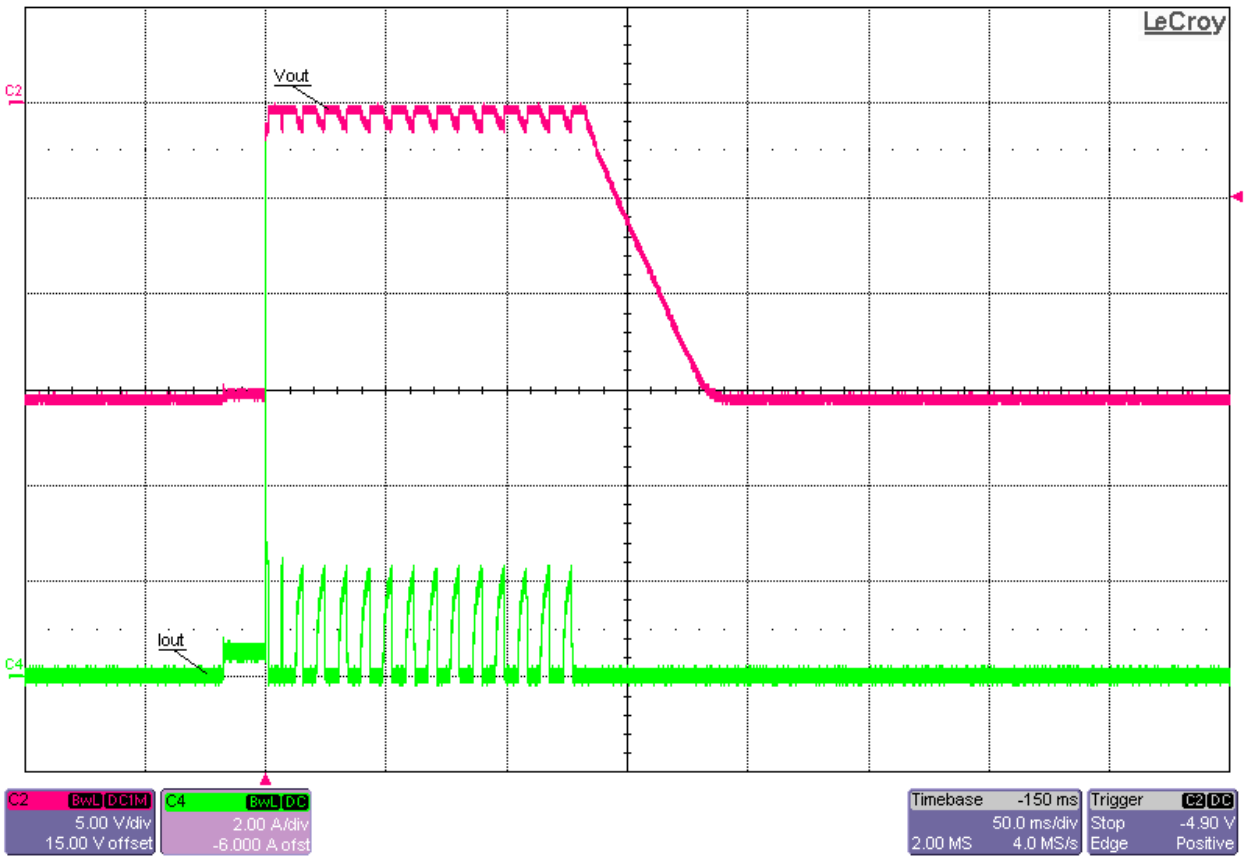
7 Short Circuit Application and Recovery



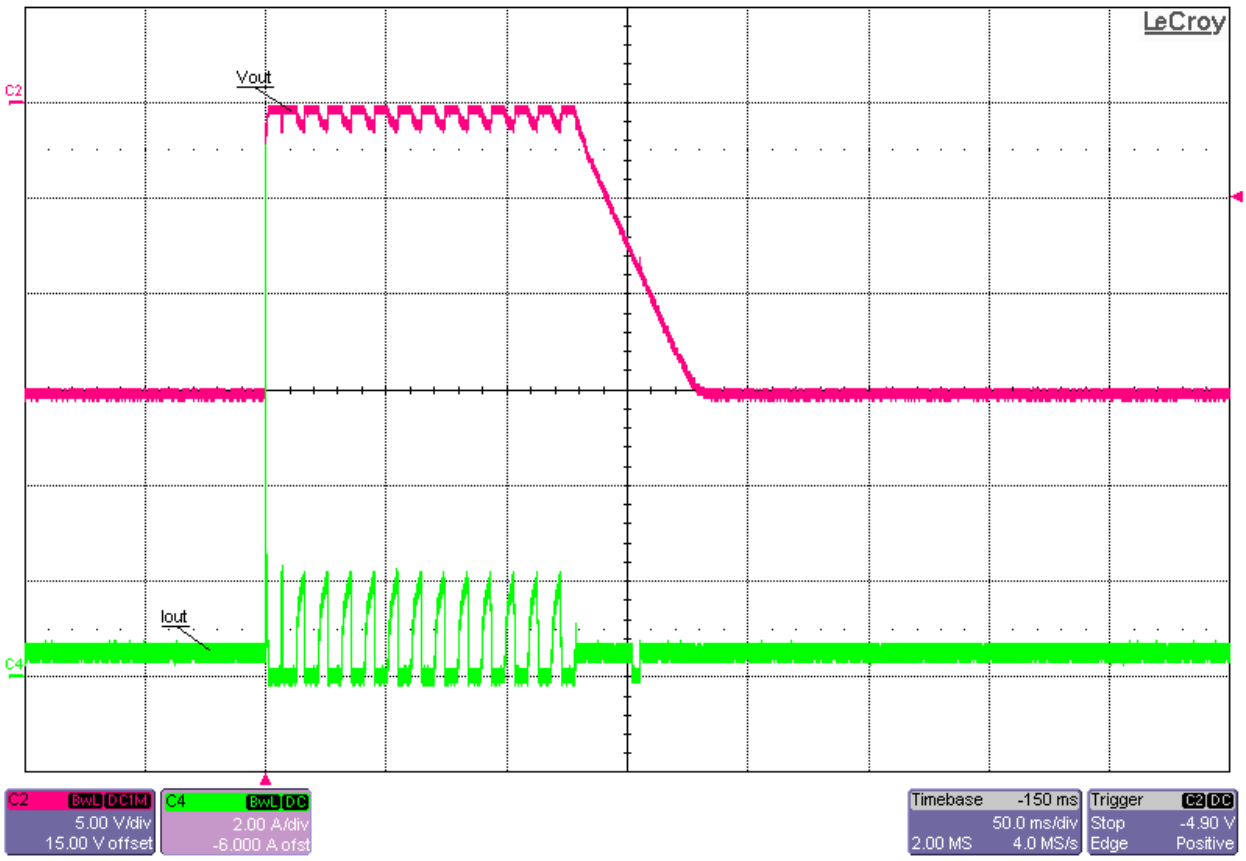
Short-Circuit application from No Load and recovered into No Load at 18Vin



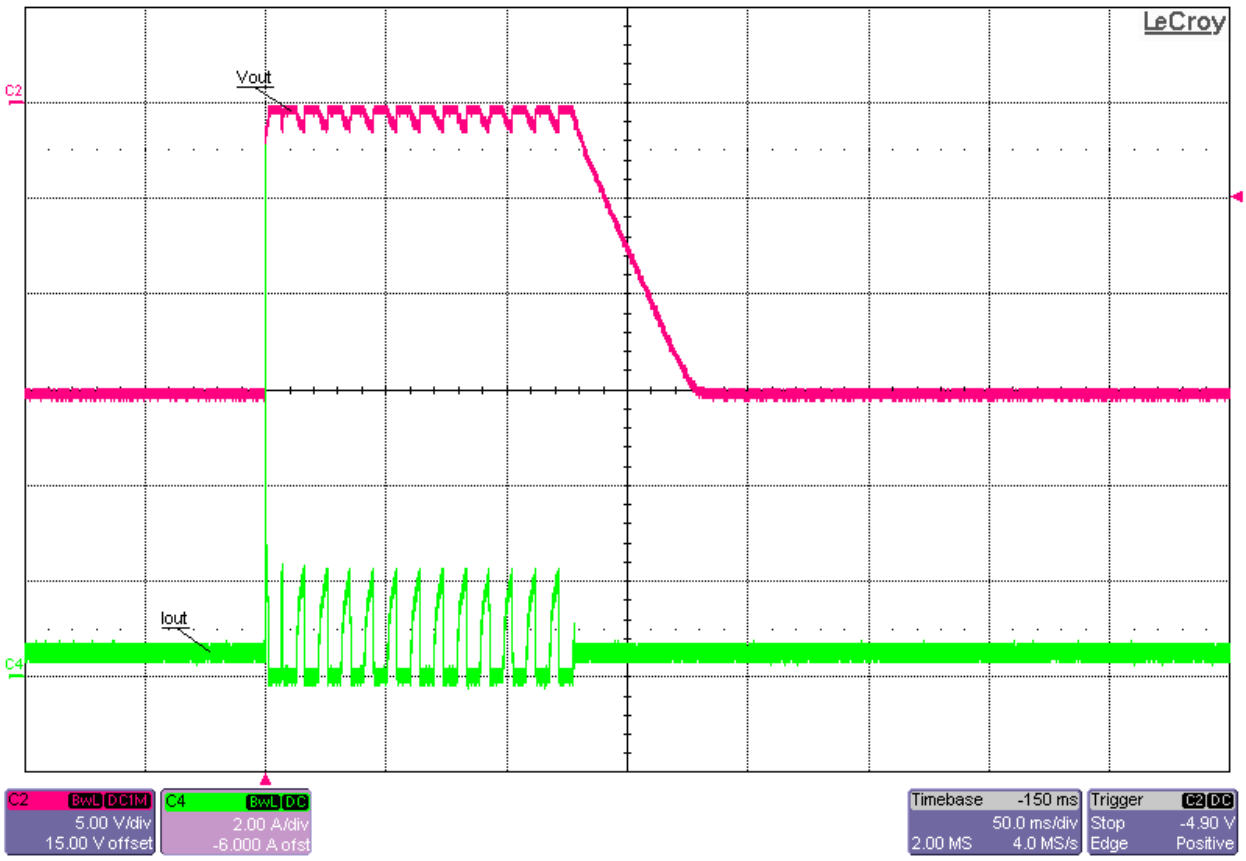
Short-Circuit application from No Load and recovered into No Load at 30Vin



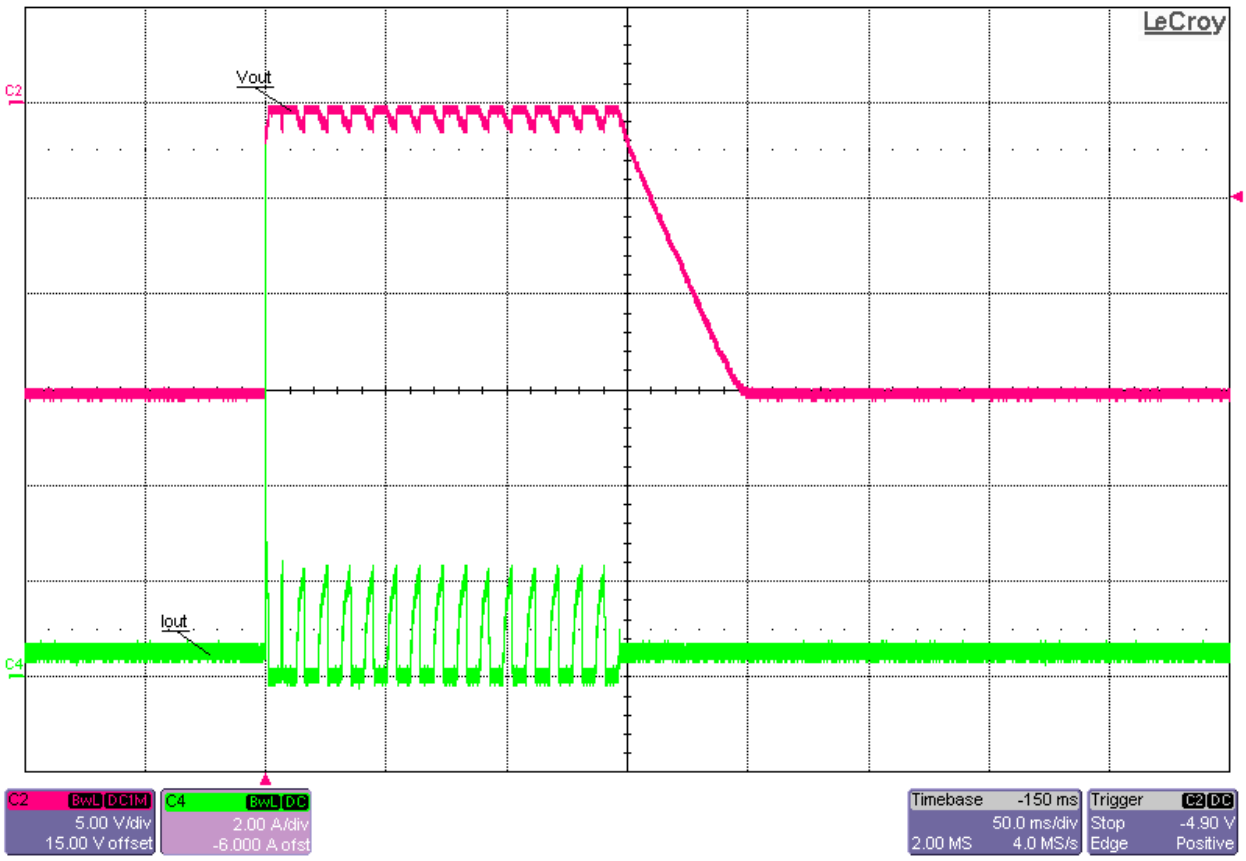
Short-Circuit application from No Load and recovered into No Load at 42Vin



Short-Circuit application from Full (0.5A) Load and recovered into Full (0.5A) Load at 18Vin



Short-Circuit application from Full (0.5A) Load and recovered into Full (0.5A) Load at 30Vin



Short-Circuit application from Full (0.5A) Load and recovered into Full (0.5A) Load at 42Vin

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