Test Data
For PMP20127
March 18, 2016

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1. Design Specifications

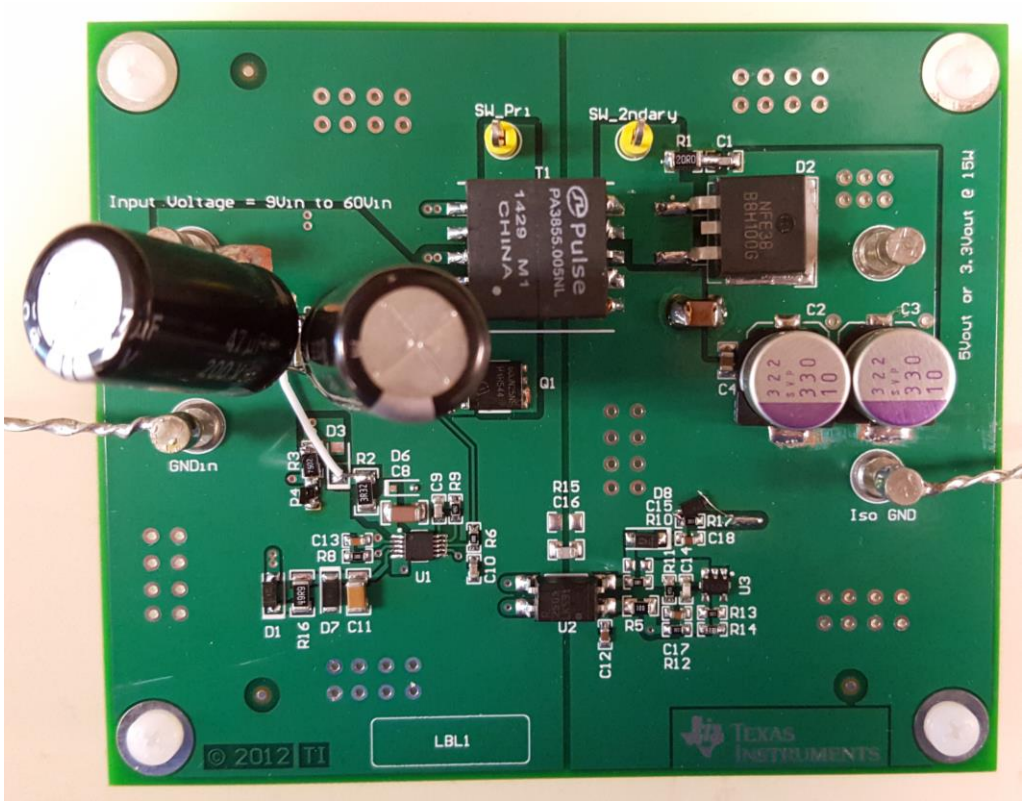
Vin Minimum	**9VDC**
Vin Maximum	**125VDC**
Vout	**5VDC**
Iout	**3A Max.**
Nominal Switching Frequency	**≈ 325KHz**

2. Circuit Description

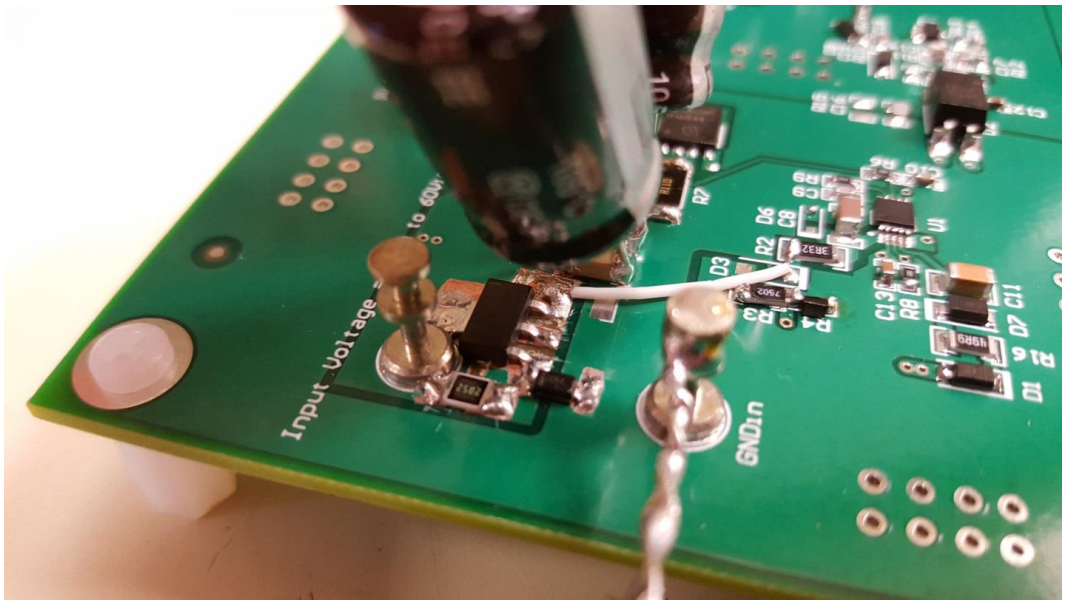
PMP20127 is an Isolated Flyback Converter using the LM5022 controller IC. The design accepts an input voltage of 9VDCin to 125VDCin and provides an output of 5Vout capable of supplying 3A of maximum current to the load. The nominal switching frequency of the design is approximately 325KHz. The design is built on the PMP9253 PCB, which is a 4-layer FR-4 board with 1 oz. copper for the top and bottom layers and 0.5 oz. copper for the two inner layers.

3. PMP20127 Board Photos

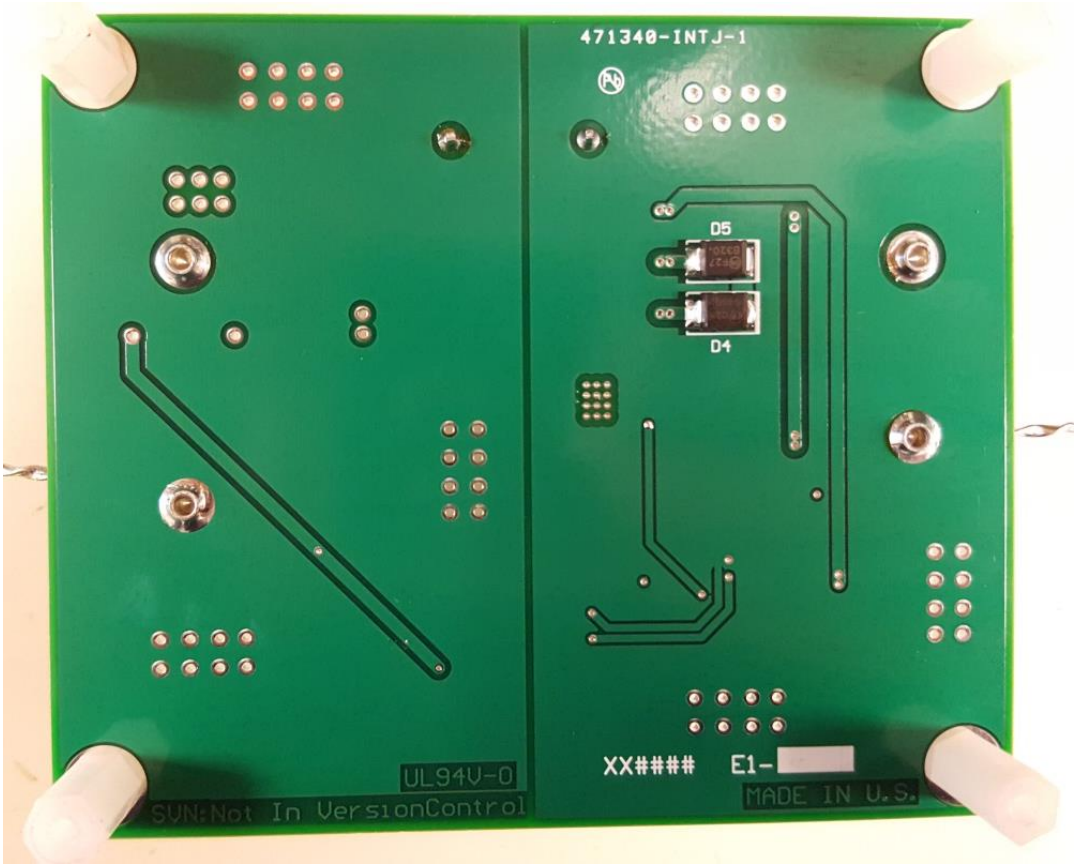
Board Dimensions: 3.7” x 3.1”



Board Photo (Top)

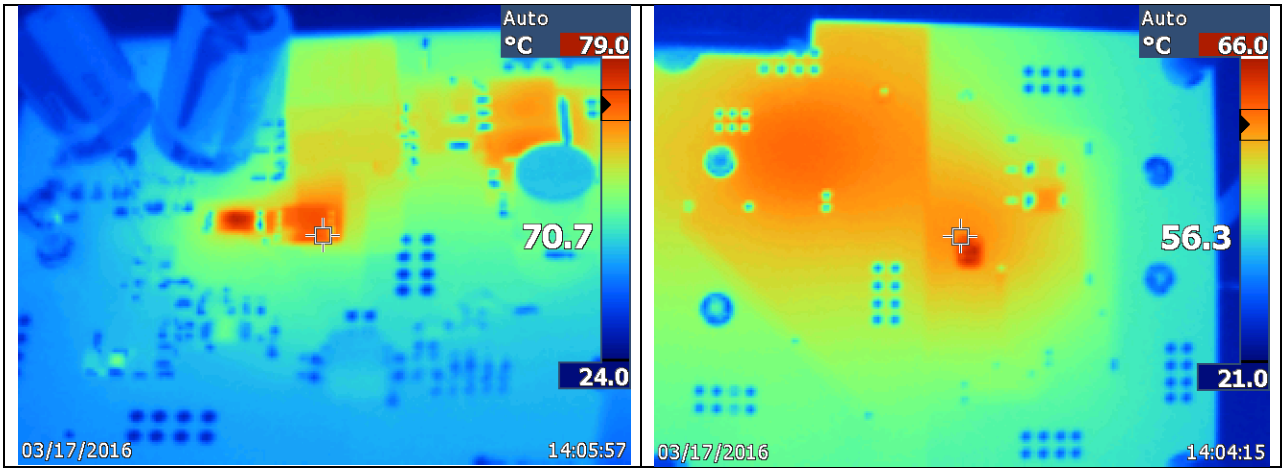


Board Photo (Top; Zoomed-in on the Zener-BJT regulator circuit)

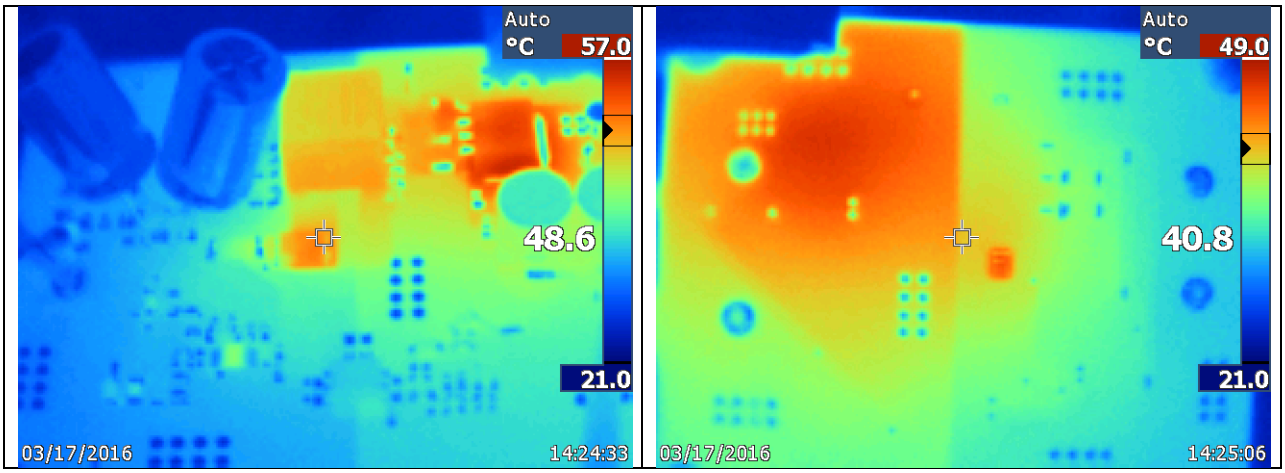


Board Photo (Bottom)

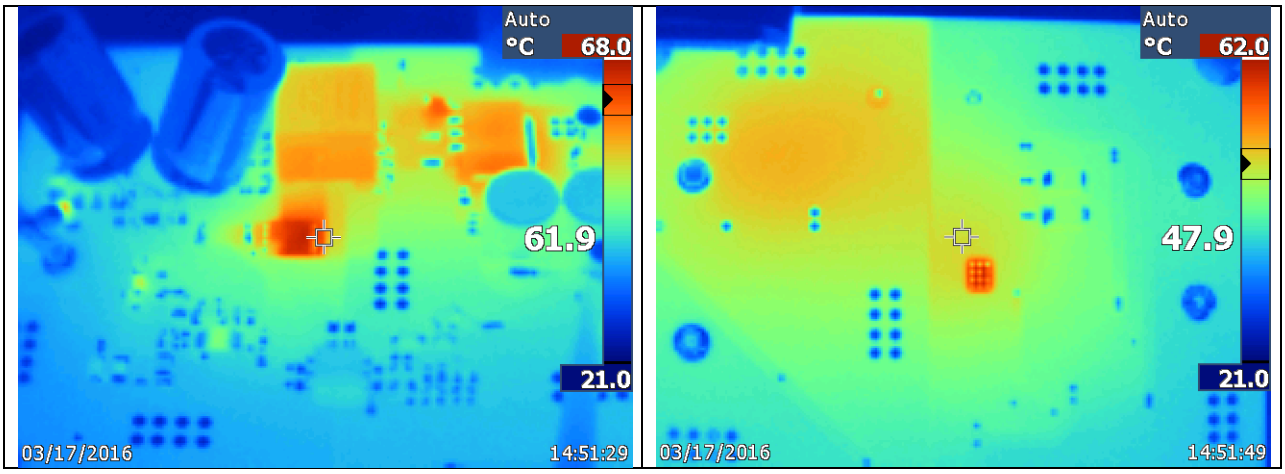
4. Thermal Data



IR Thermal Image Taken at Steady State at 9Vin and 3A Load (Left Image = Board Top; Right Image = Board Bottom; ambient at room temp.; no airflow)



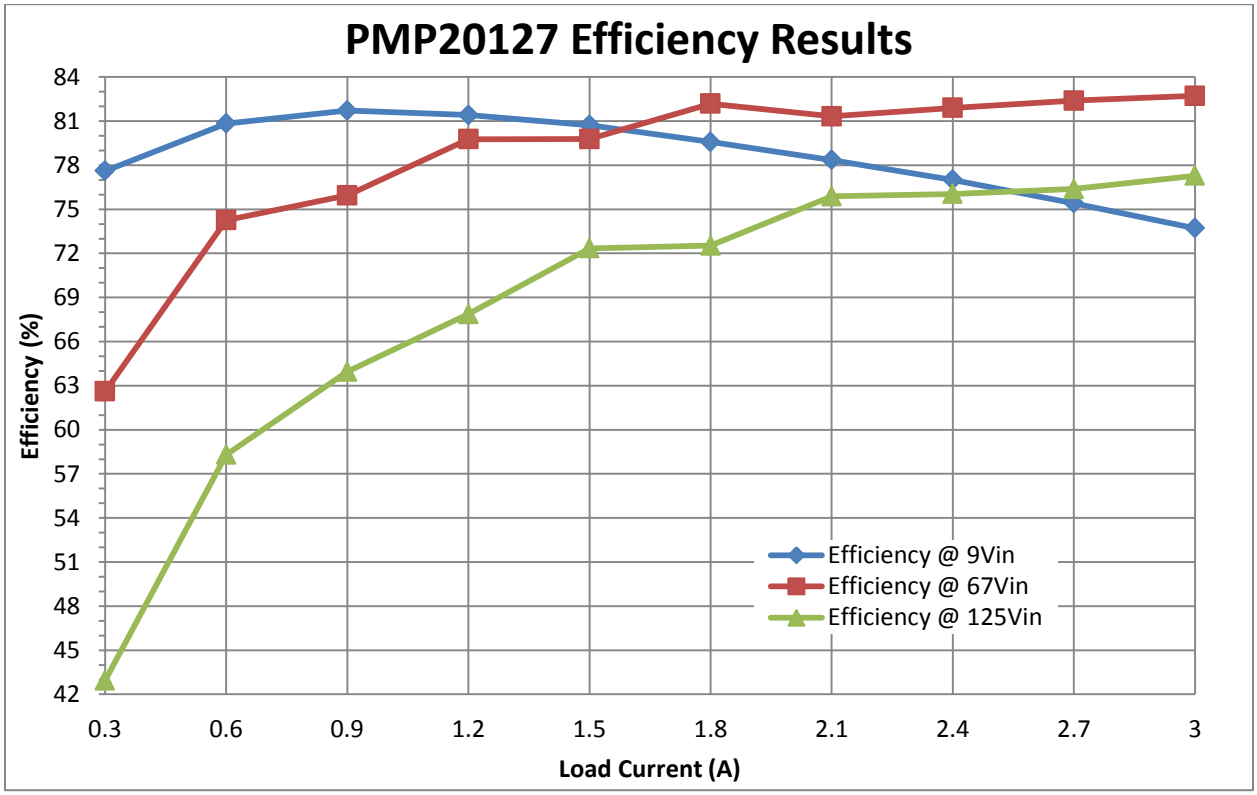
IR Thermal Image Taken at Steady State at 67Vin and 3A Load (Left Image = Board Top; Right Image = Board Bottom; ambient at room temp.; no airflow)



IR Thermal Image Taken at Steady State at 125Vin and 3A Load (Left Image = Board Top; Right Image = Board Bottom; ambient at room temp.; no airflow)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

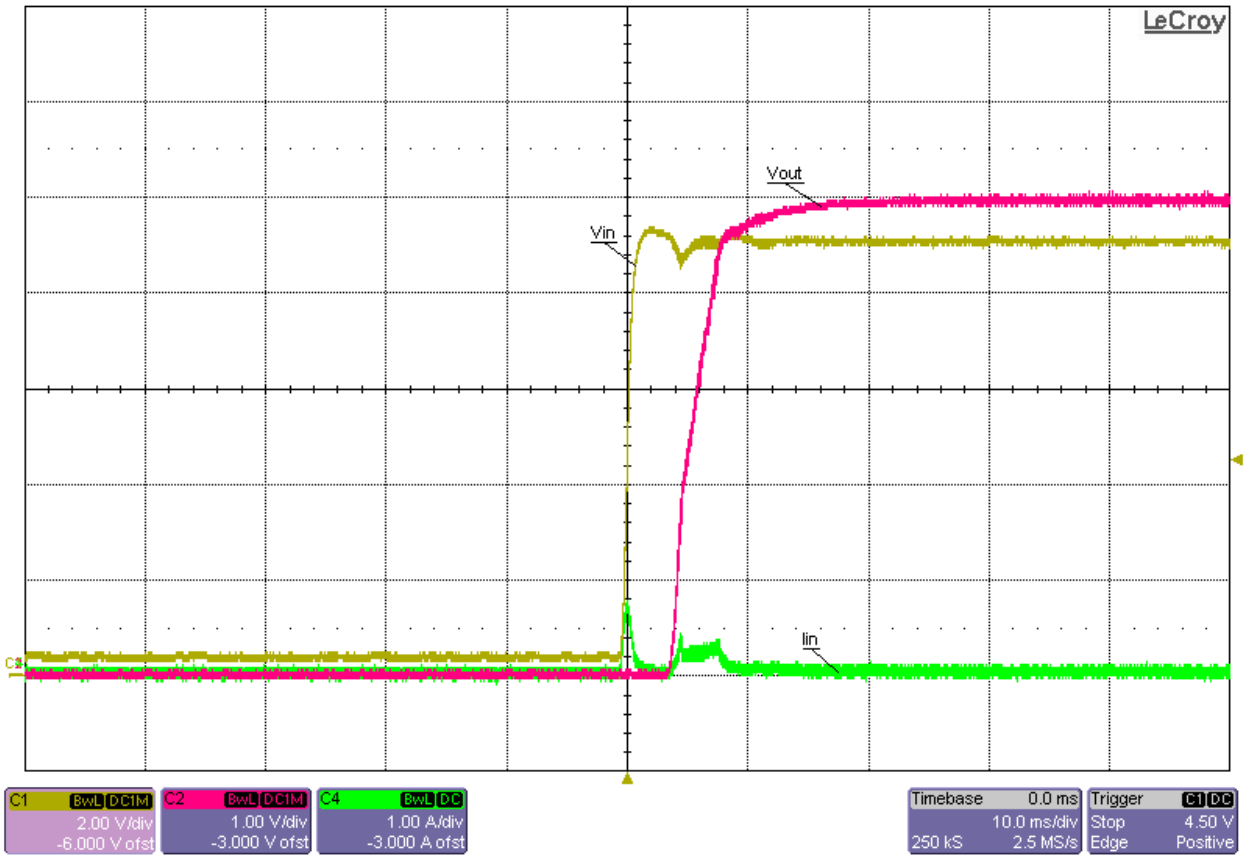
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
9	0.2146	4.9968	0.3	1.931	1.499	0.432	77.6
9	0.4121	4.9965	0.6	3.709	2.998	0.711	80.8
9	0.6114	4.9961	0.9	5.503	4.496	1.006	81.7
9	0.8182	4.9955	1.2001	7.364	5.995	1.369	81.4
9	1.0314	4.9949	1.5001	9.283	7.493	1.790	80.7
9	1.2551	4.9939	1.8	11.296	8.989	2.307	79.6
9	1.4869	4.9929	2.1001	13.382	10.486	2.897	78.4
9	1.7286	4.9915	2.4	15.557	11.980	3.578	77.0
9	1.9852	4.9903	2.7001	17.867	13.474	4.392	75.4
9	2.2561	4.9888	3	20.305	14.966	5.339	73.7

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
67	0.0357	4.9915	0.3	2.392	1.497	0.894	62.6
67	0.0602	4.992	0.6	4.033	2.995	1.038	74.3
67	0.0883	4.9919	0.9	5.916	4.493	1.423	75.9
67	0.1121	4.9923	1.2001	7.511	5.991	1.519	79.8
67	0.1401	4.9919	1.5001	9.387	7.488	1.898	79.8
67	0.1632	4.9923	1.8	10.934	8.986	1.948	82.2
67	0.1924	4.9915	2.1002	12.891	10.483	2.408	81.3
67	0.2183	4.9911	2.4	14.626	11.979	2.647	81.9
67	0.2441	4.9904	2.7001	16.355	13.475	2.880	82.4
67	0.2701	4.9898	3	18.097	14.969	3.127	82.7

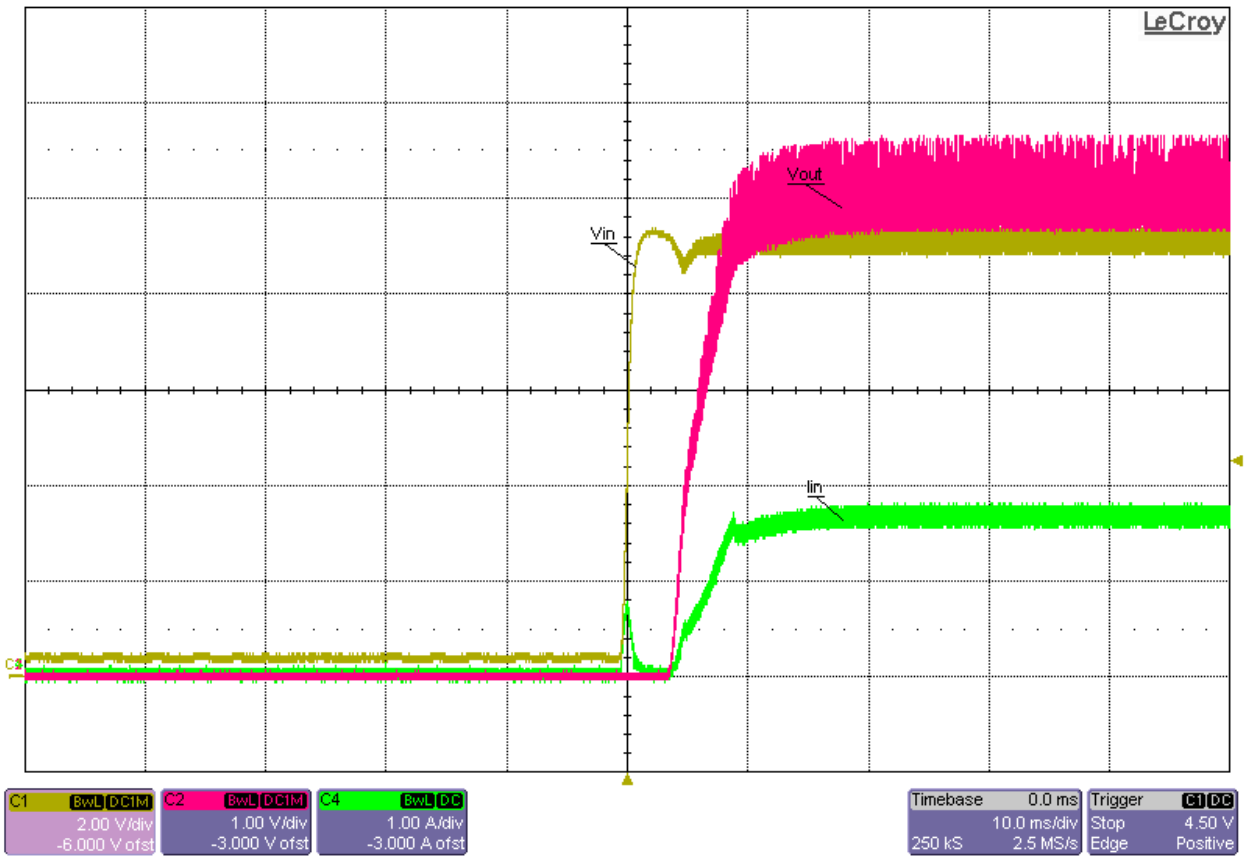
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
125	0.0279	4.9915	0.3	3.488	1.497	1.990	42.9
125	0.0411	4.9919	0.6	5.138	2.995	2.142	58.3
125	0.0562	4.9916	0.9	7.025	4.492	2.533	63.9
125	0.0706	4.9913	1.2	8.825	5.990	2.835	67.9
125	0.0828	4.9916	1.5	10.350	7.487	2.863	72.3
125	0.0991	4.9906	1.8001	12.388	8.984	3.404	72.5
125	0.1105	4.9909	2.1001	13.813	10.481	3.331	75.9
125	0.126	4.9901	2.4001	15.750	11.977	3.773	76.0
125	0.1411	4.989	2.7002	17.638	13.471	4.166	76.4
125	0.1549	4.9878	3	19.363	14.963	4.399	77.3

6 Waveforms

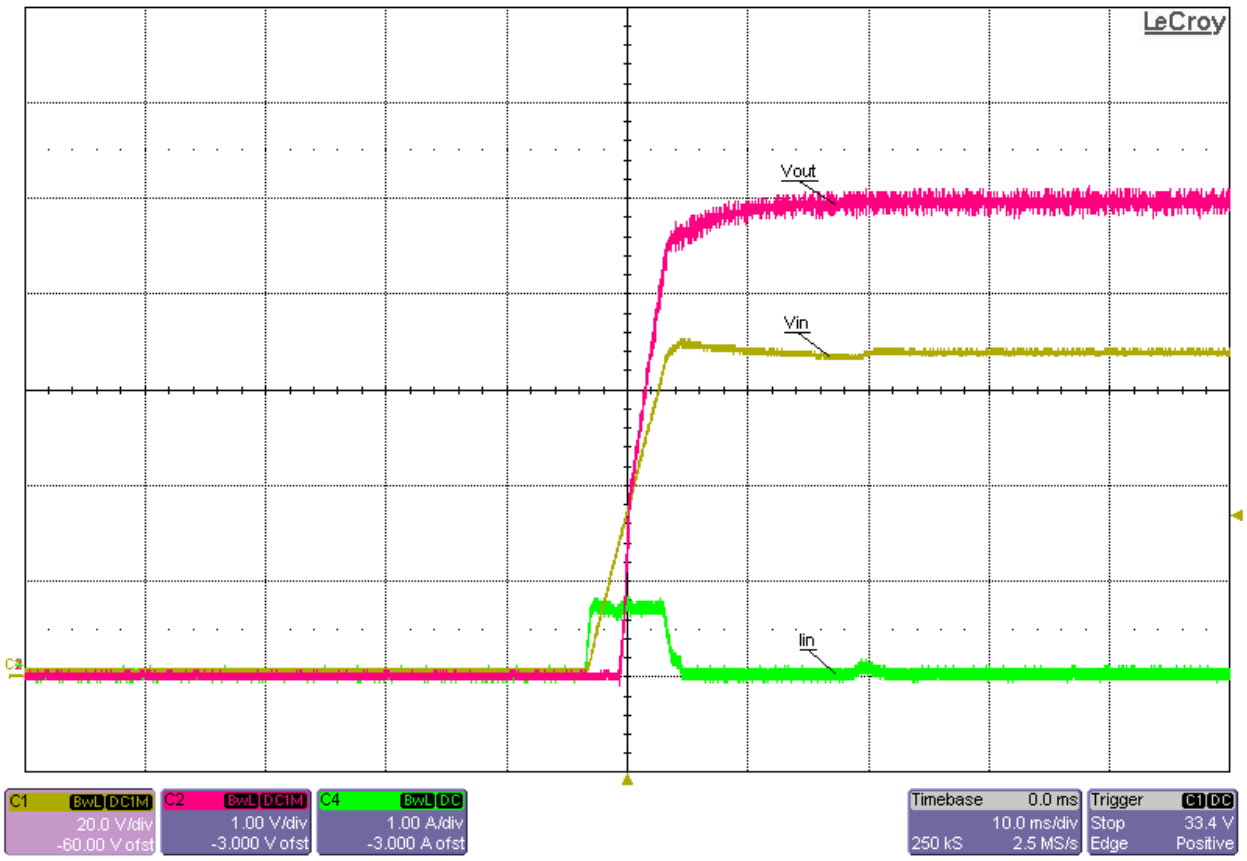
6.1 Startup



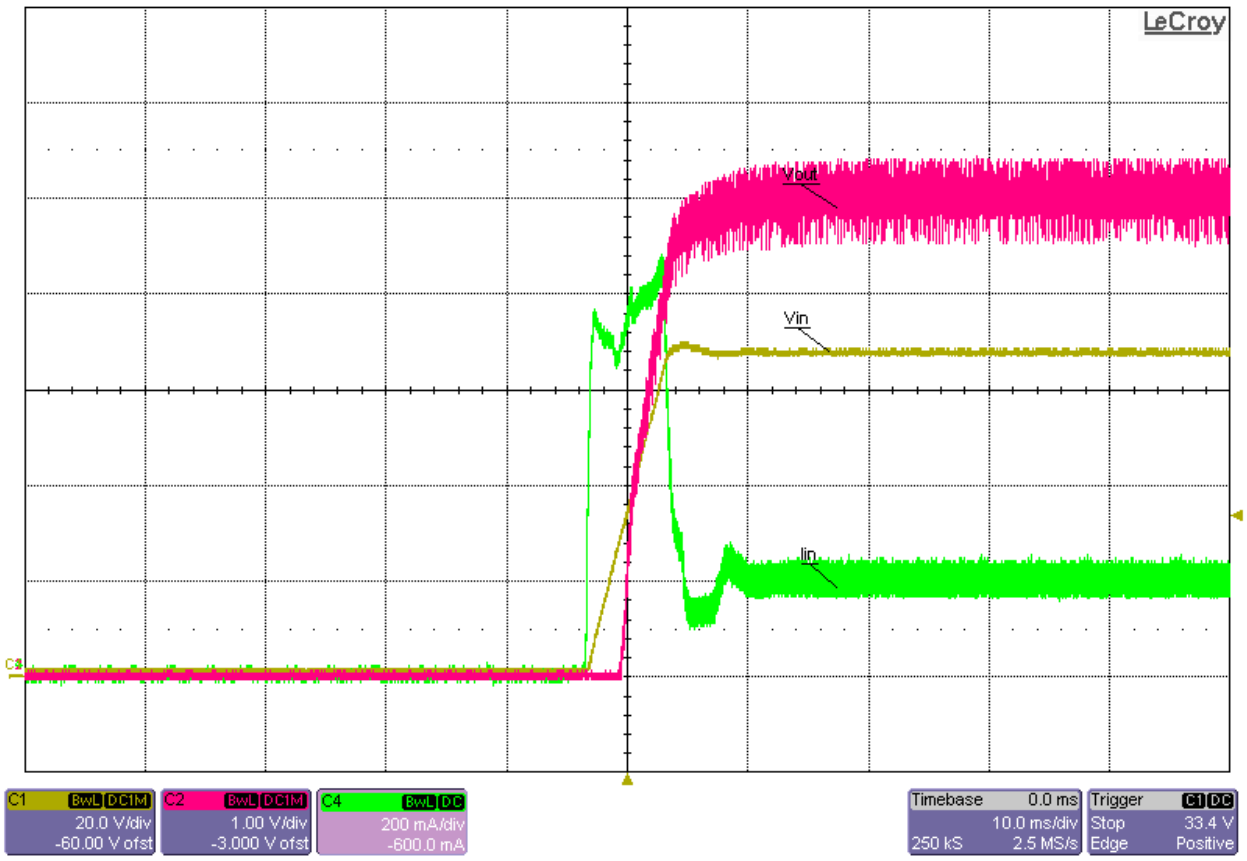
Startup into No Load at 9Vin



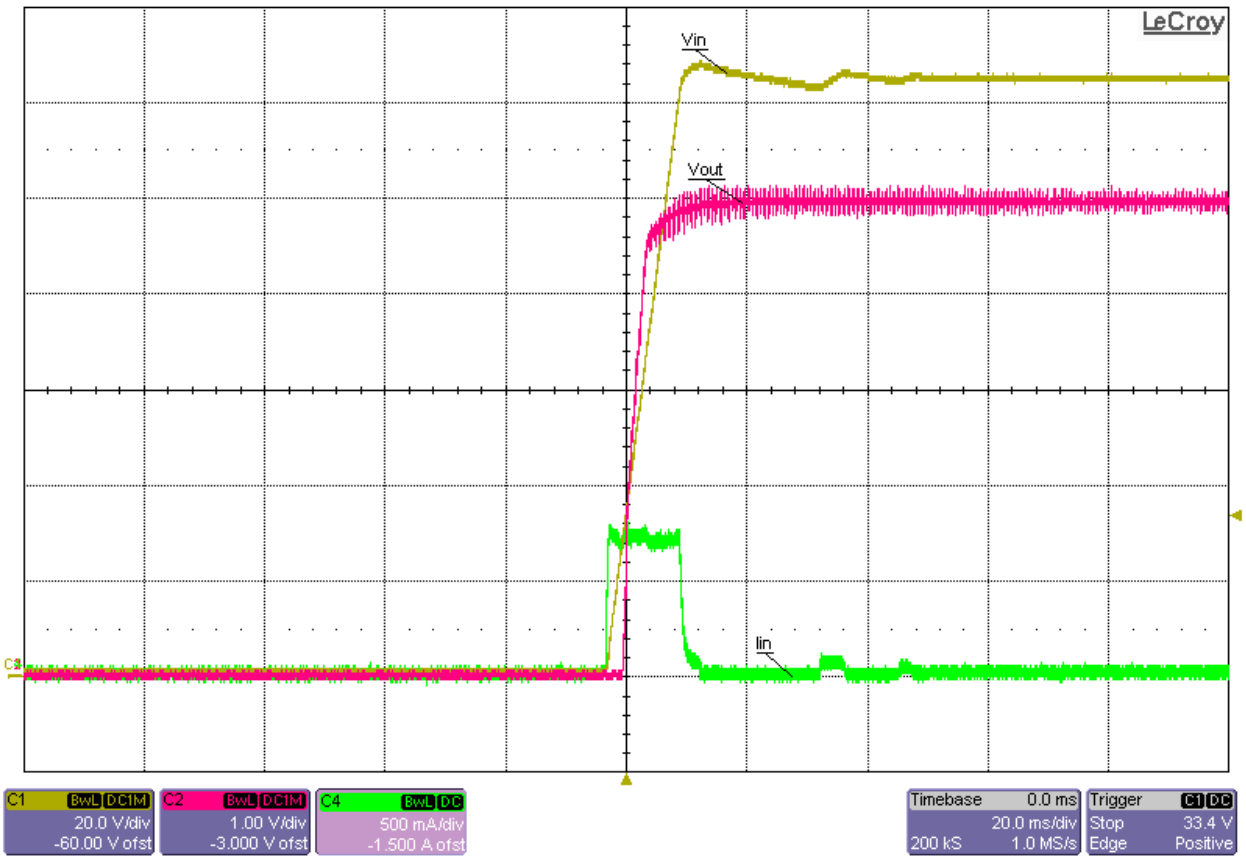
Startup into 3A Resistive Load at 9Vin



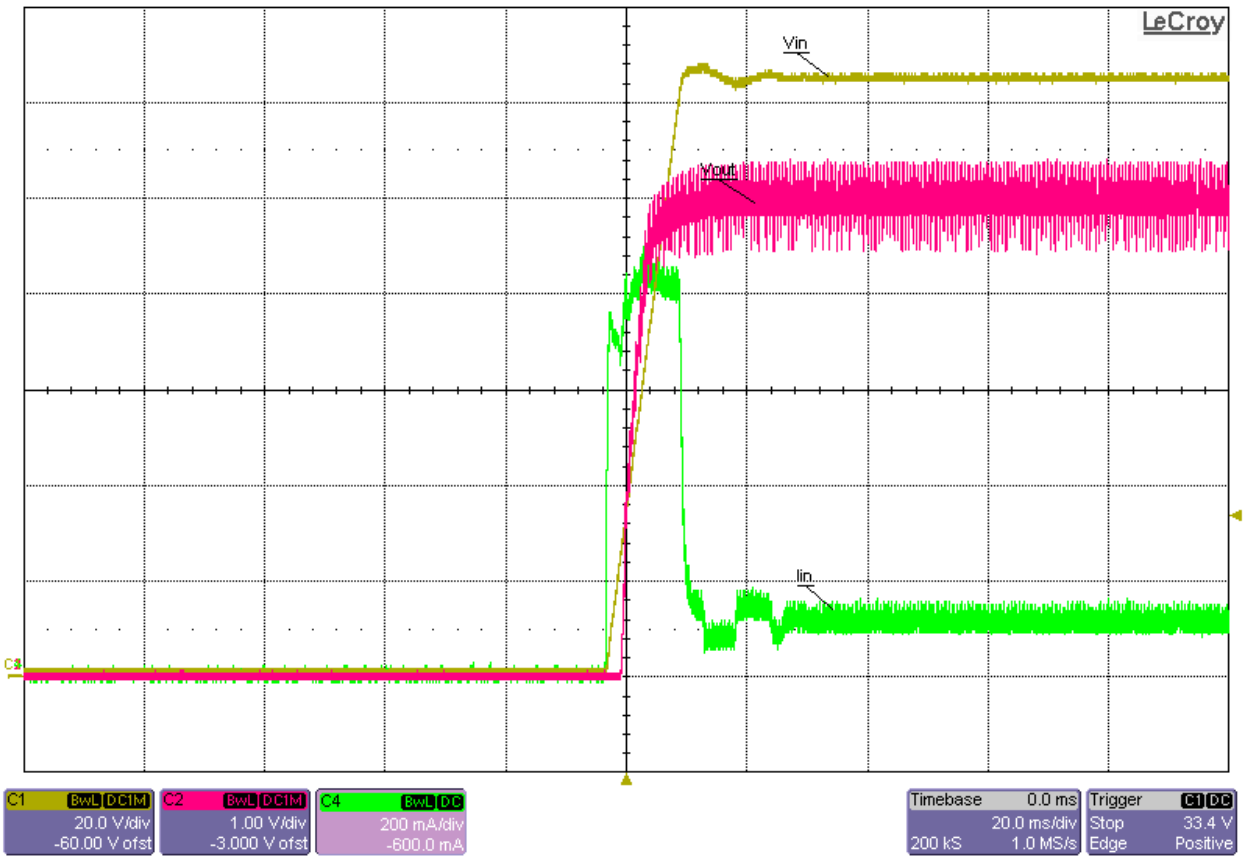
Startup into No Load at 67Vin



Startup into 3A Resistive Load at 67Vin

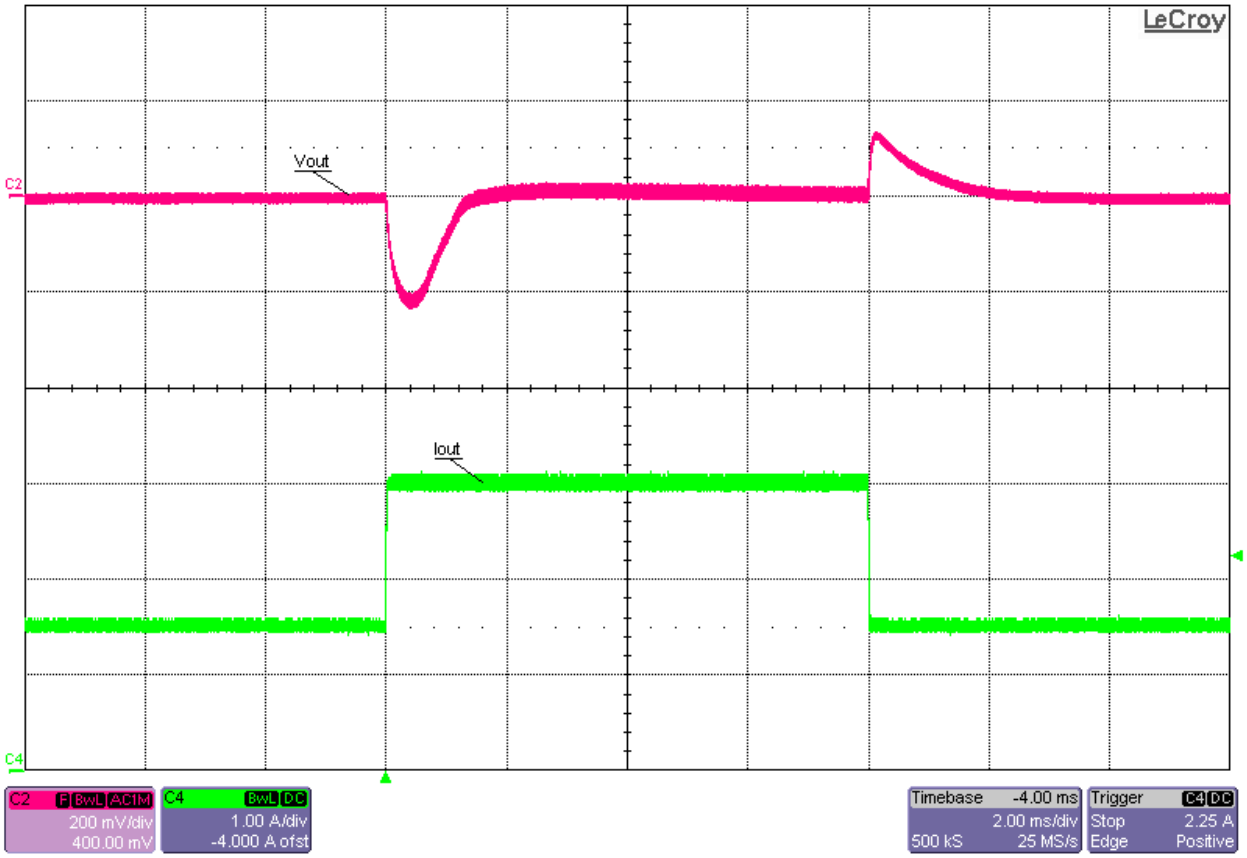


Startup into No Load at 125Vin

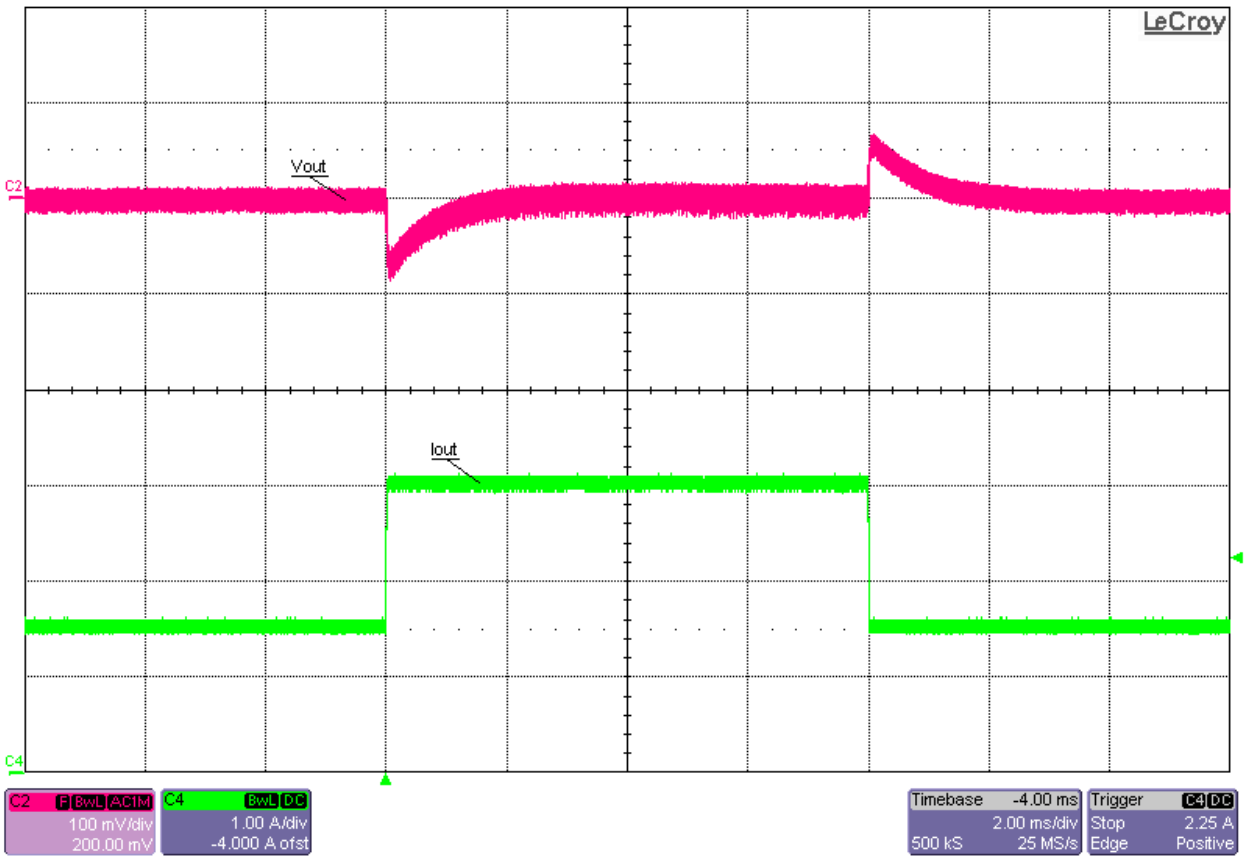


Startup into 3A Resistive Load at 125Vin

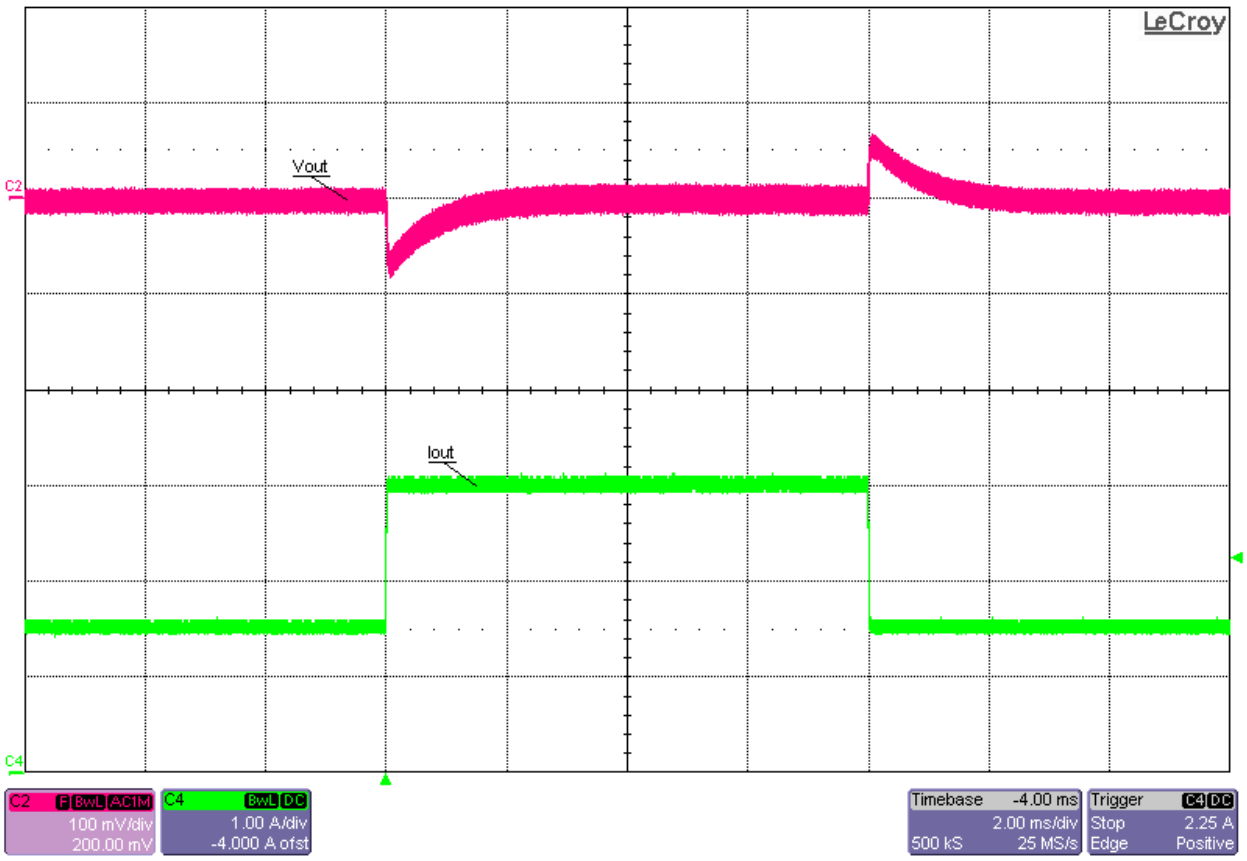
6.2 Load Transient Response



Load Transient Response of Output Undergoing a 50% to 100% (1.5A-to-3A) Load Step at 9Vin

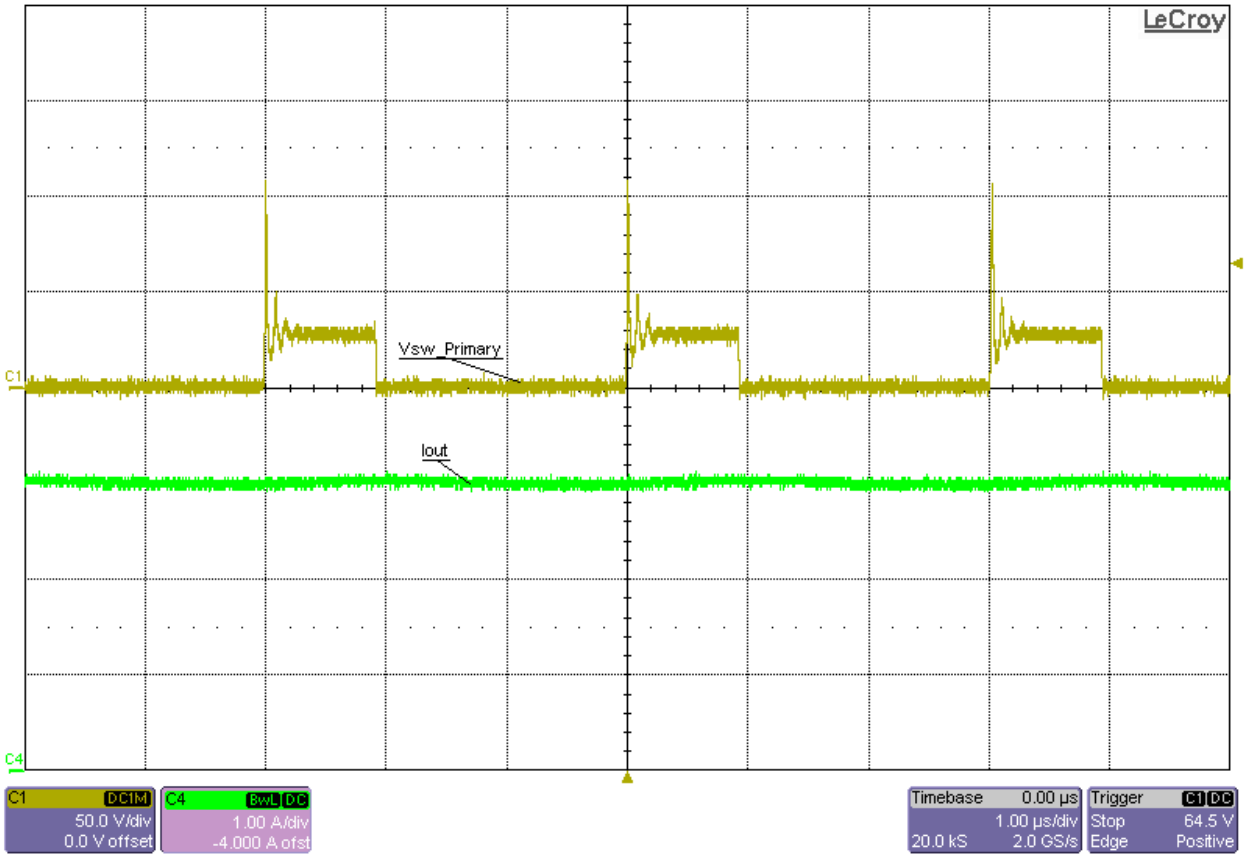


Load Transient Response of Output Undergoing a 50% to 100% (1.5A-to-3A) Load Step at 67Vin

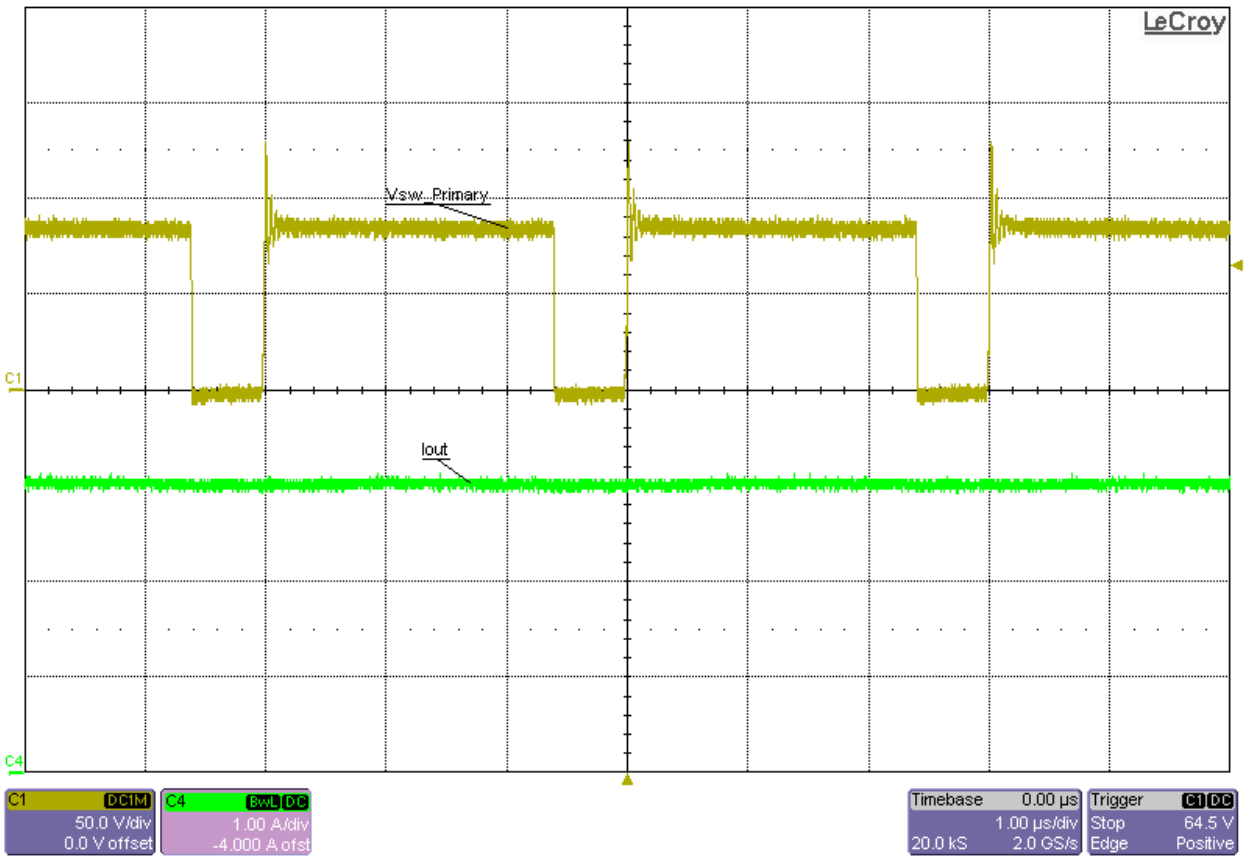


Load Transient Response of Output Undergoing a 50% to 100% (1.5A-to-3A) Load Step at 125Vin

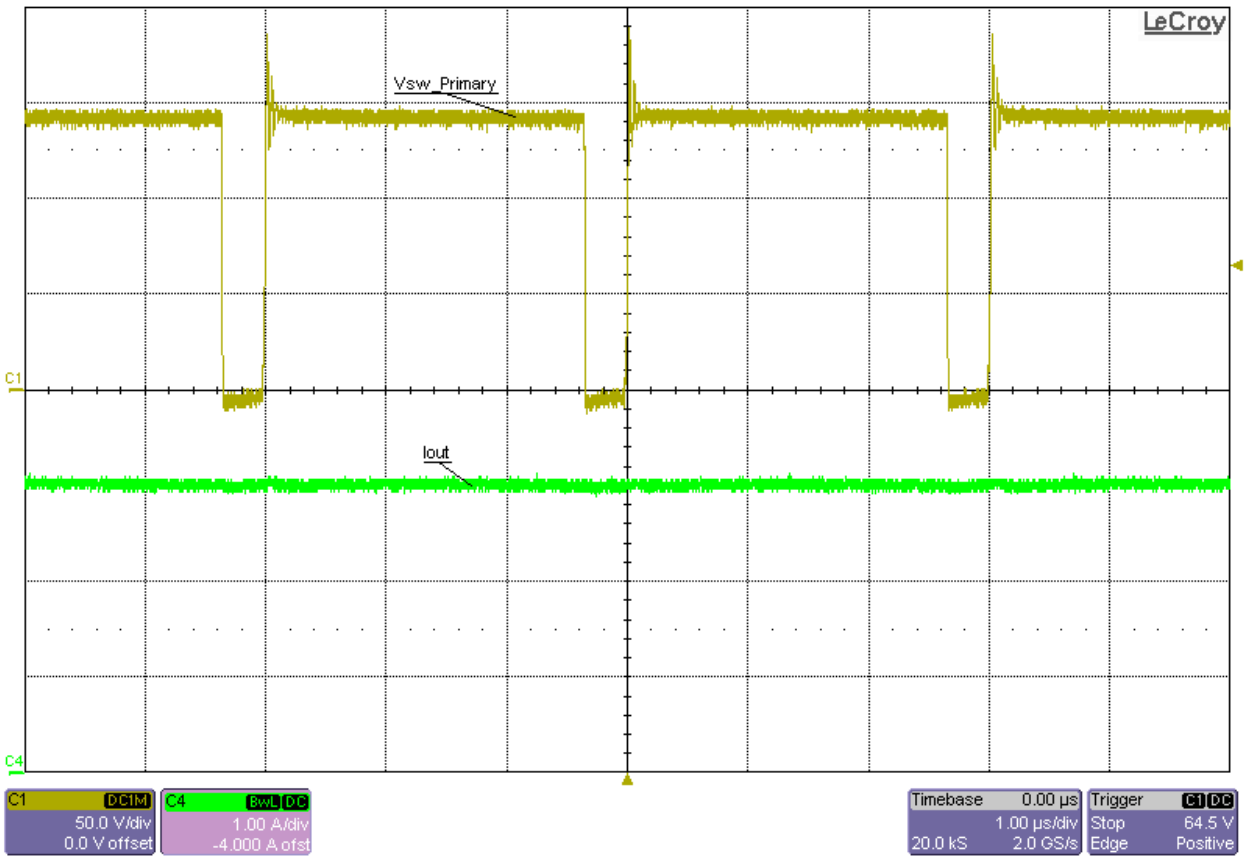
6.3 Output Voltage Ripple and Switch Node Voltages



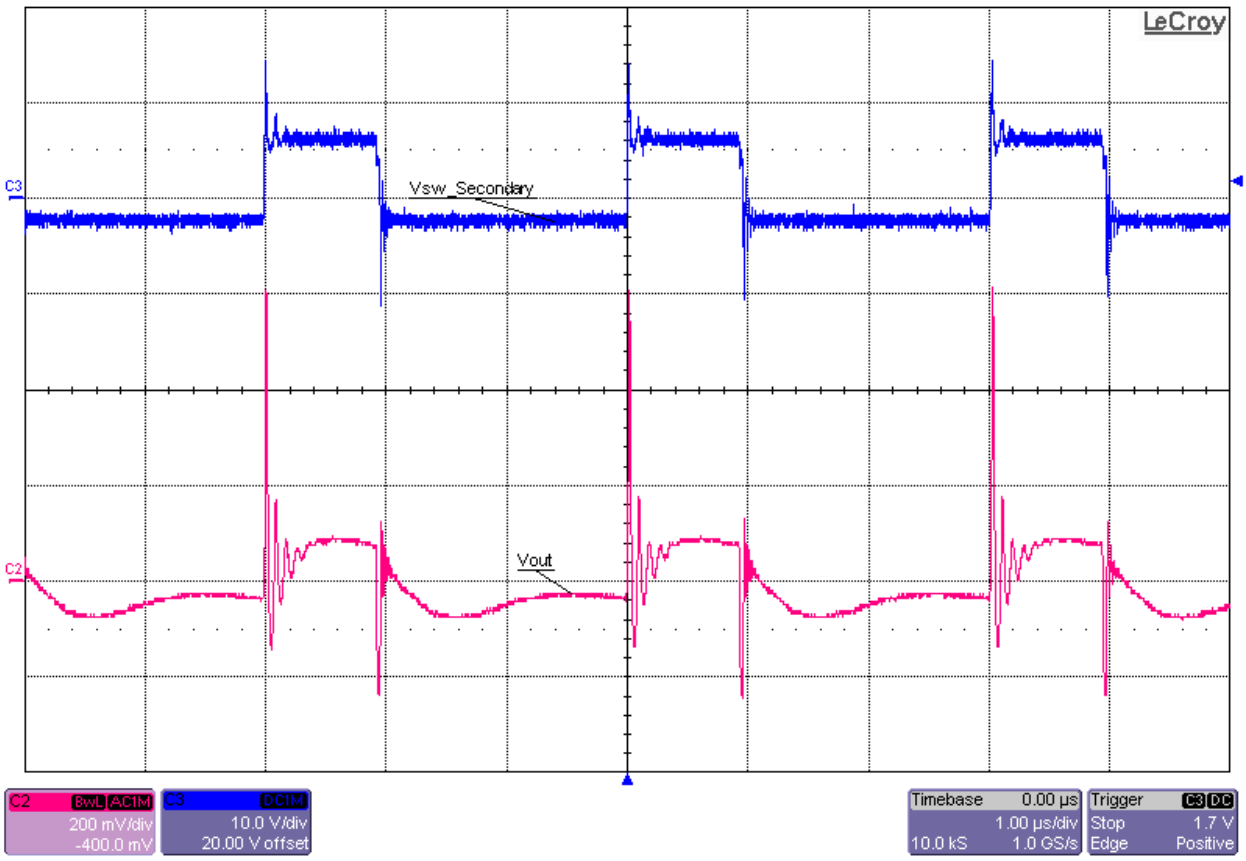
Primary-Side Switch Node Voltage at 9Vin and 3A Constant-Current Load



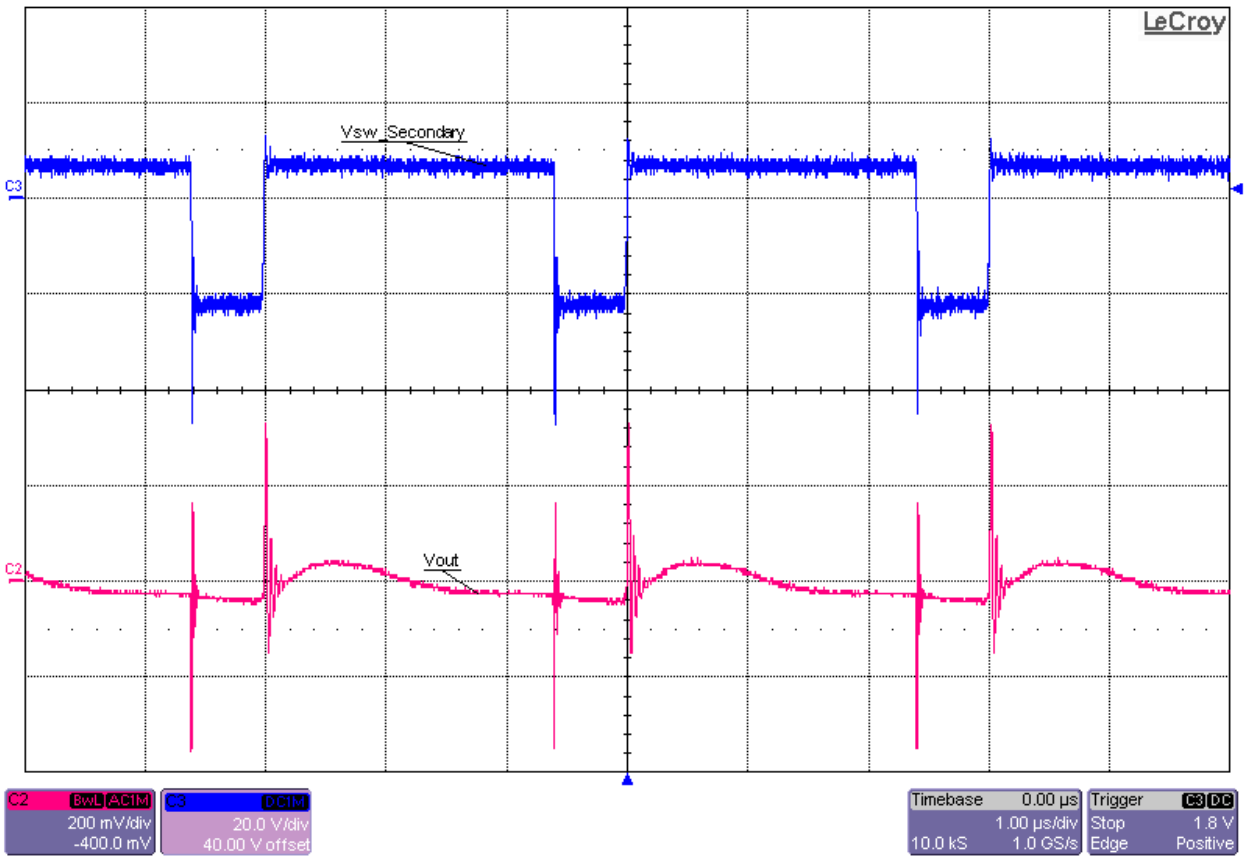
Primary-Side Switch Node Voltage at 67Vin and 3A Constant-Current Load



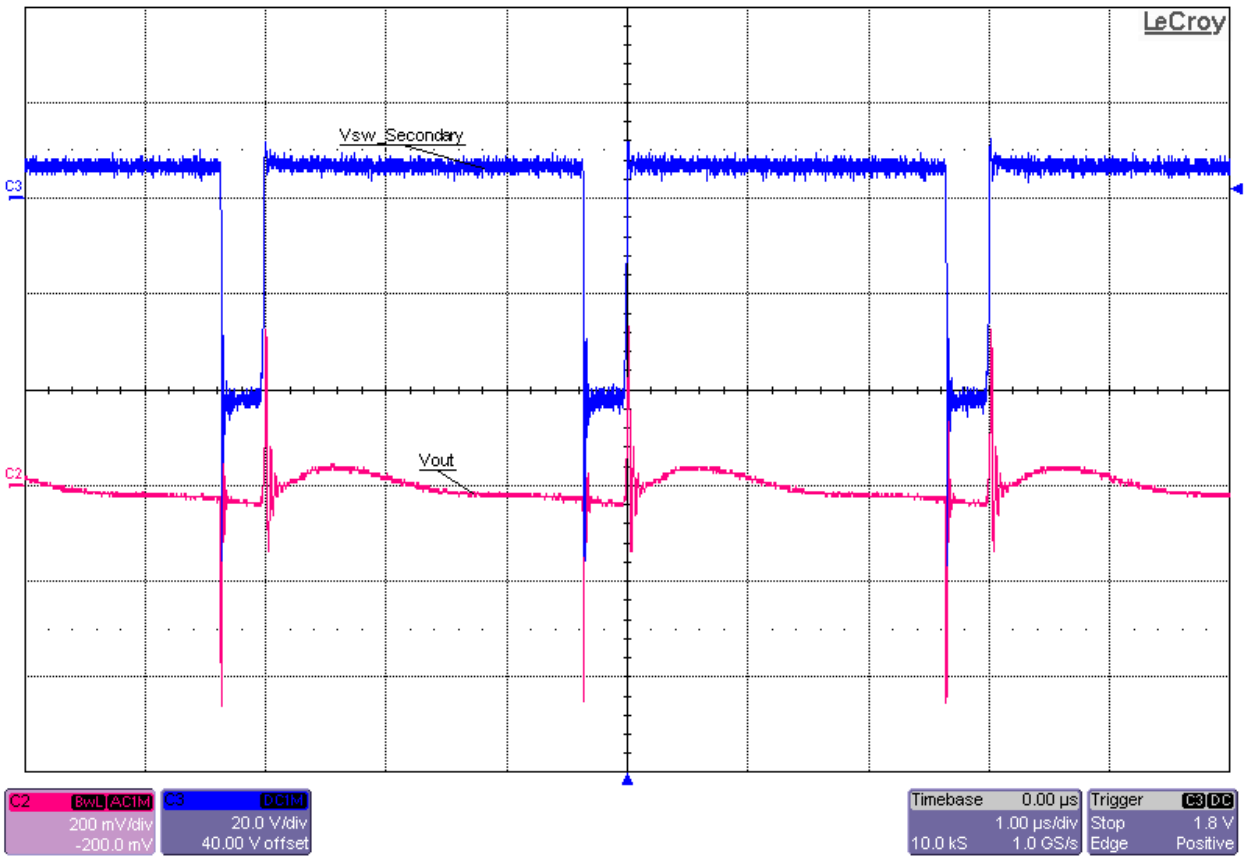
Primary-Side Switch Node Voltage at 125Vin and 3A Constant-Current Load



Secondary-Side Switch Node Voltage and Output Voltage Ripple at 9Vin and 3A Constant-Current Load (Vripple ≈ 200mVp-p)

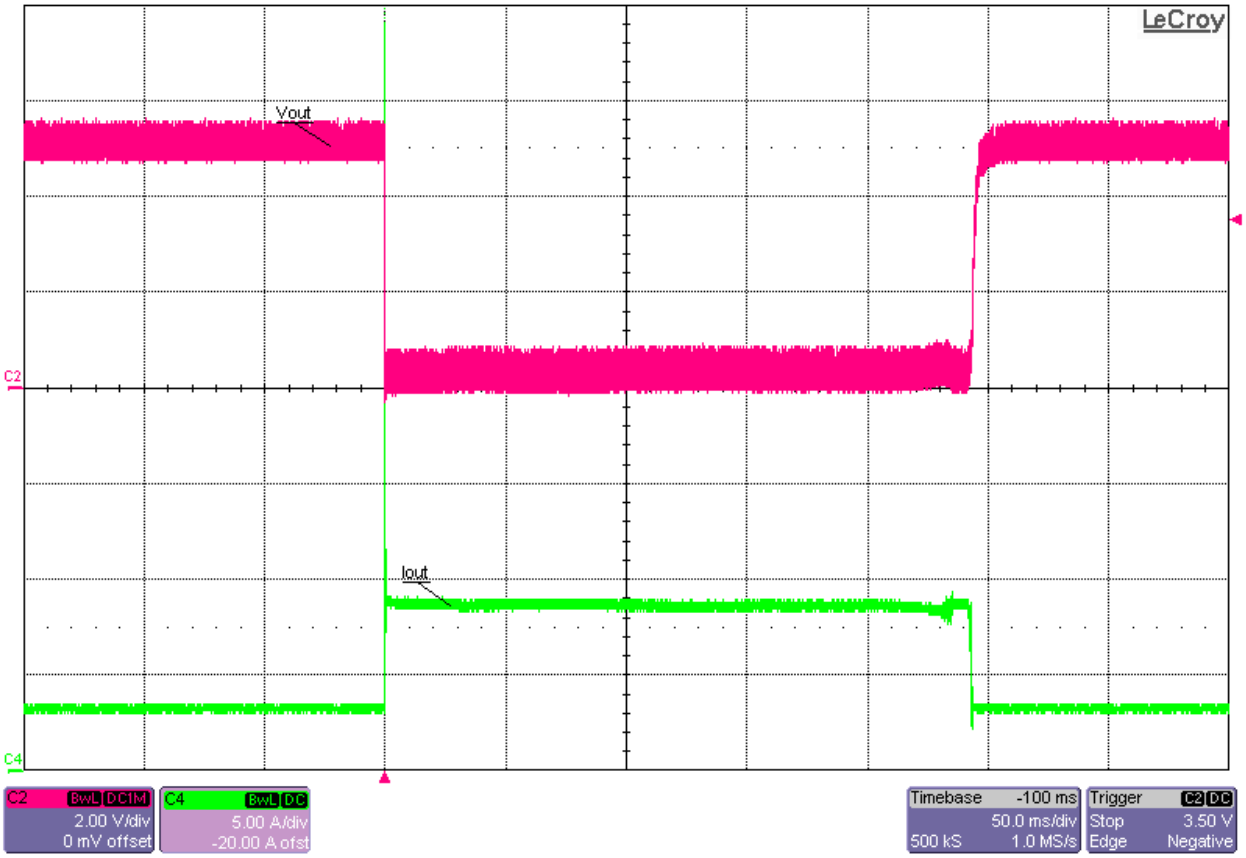


Secondary-Side Switch Node Voltage and Output Voltage Ripple at 67Vin and 3A Constant-Current Load (Vripple ≈ 120mVp-p)

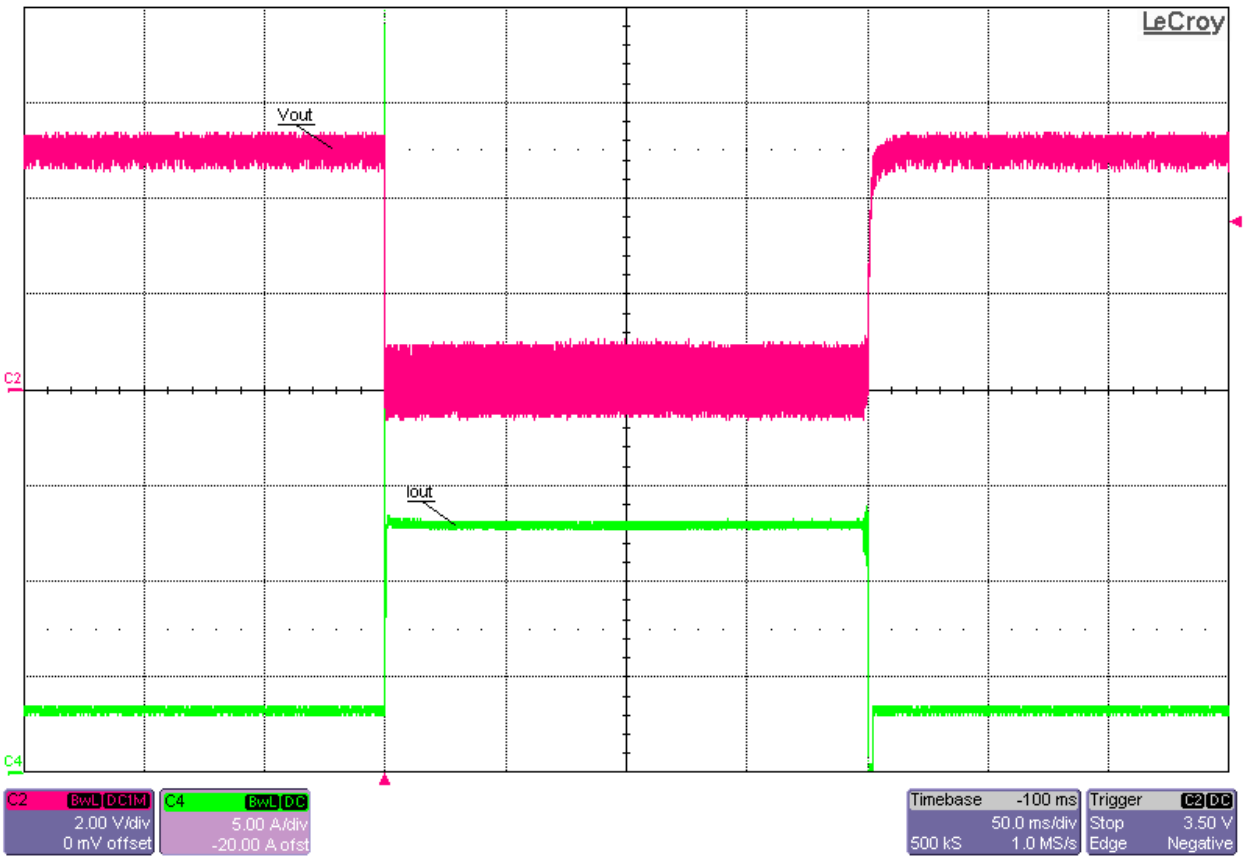


Secondary-Side Switch Node Voltage and Output Voltage Ripple at 125Vin and 3A Constant-Current Load (Vripple ≈ 100mVp-p)

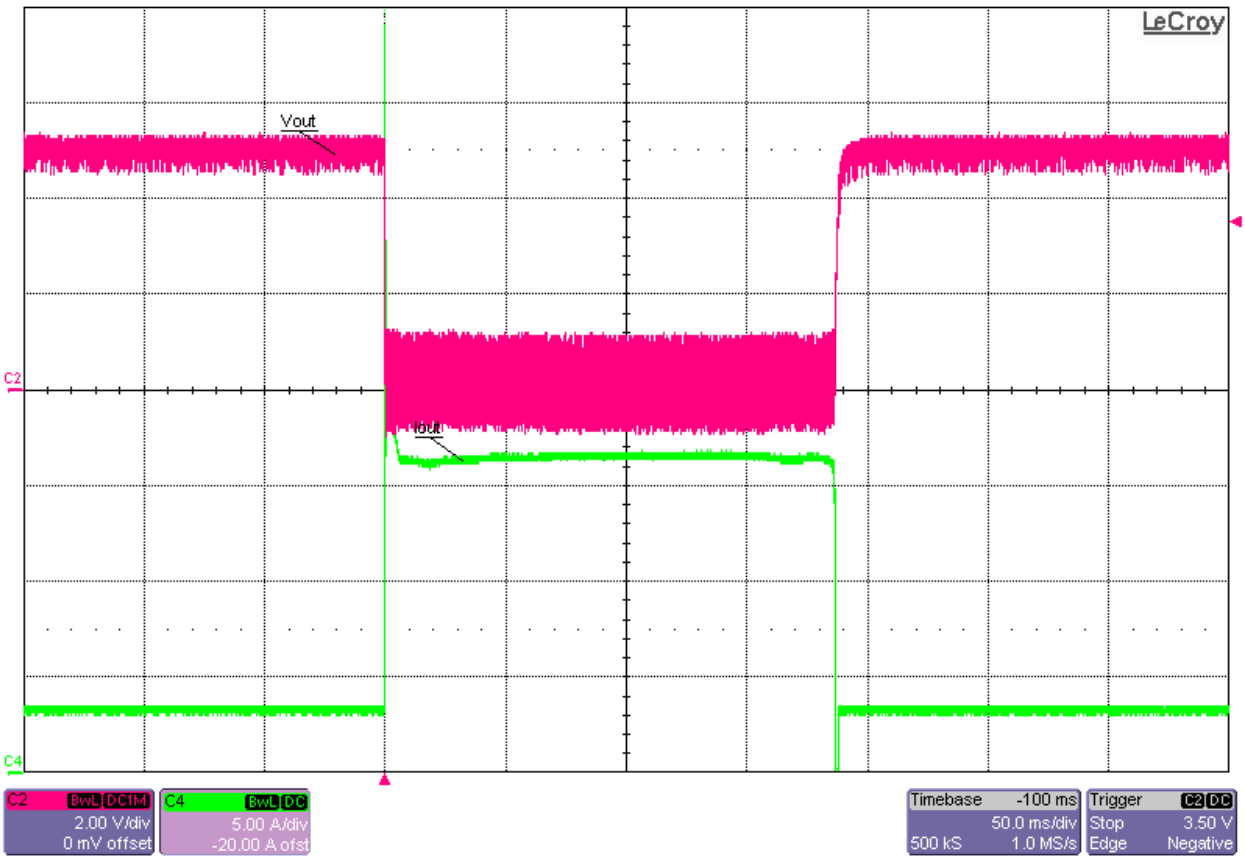
6.4 Short Circuit Testing



Short Circuit Applied and Released on Output Rail While Having an 3A Constant-Current Load with Input Voltage at 9V (momentary short-circuit protection only)



Short Circuit Applied and Released on Output Rail While Having an 3A Constant-Current Load with Input Voltage at 67V (momentary short-circuit protection only)



Short Circuit Applied and Released on Output Rail While Having an 3A Constant-Current Load with Input Voltage at 125V (momentary short-circuit protection only)

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