

**Test Data  
For PMP10632  
4/23/2015**



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## 1. Design Specifications

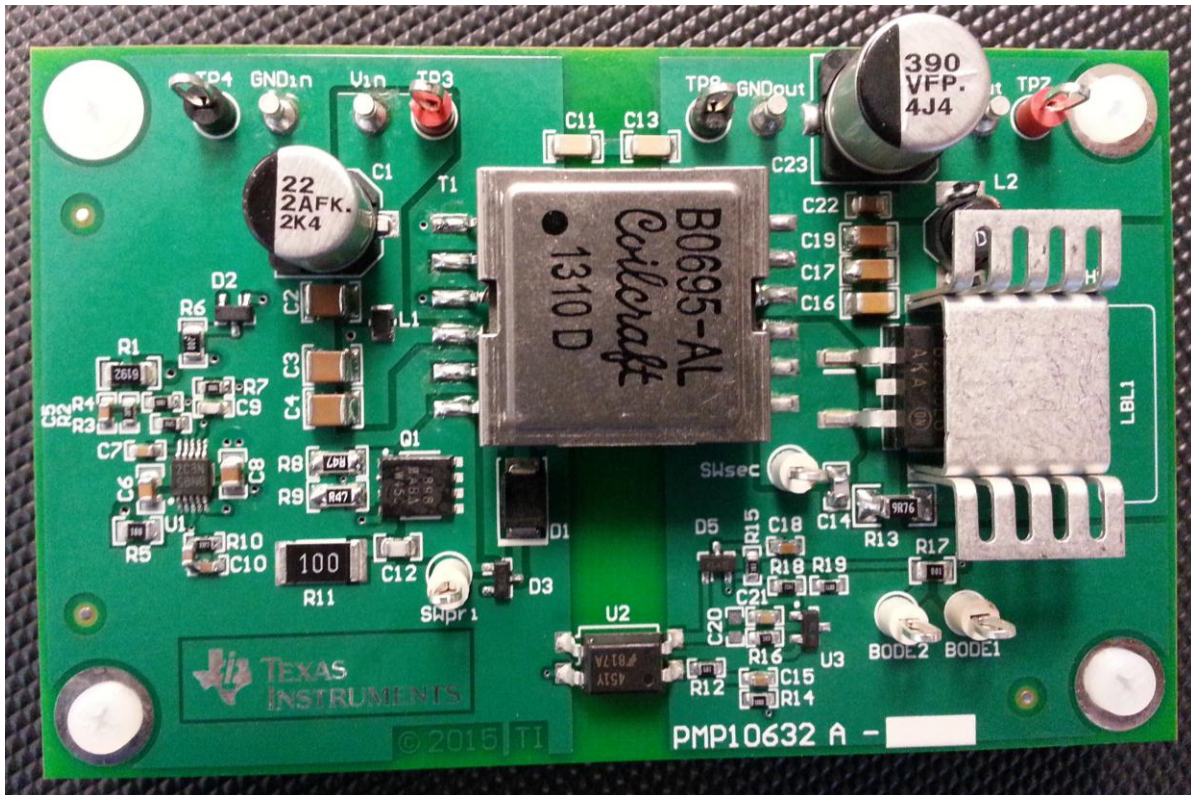
<b>Vin Minimum</b>	<b>36VDC</b>
<b>Vin Nominal</b>	<b>48VDC</b>
<b>Vin Maximum</b>	<b>75VDC</b>
<b>Vout</b>	<b>3.3VDC @ 4A</b>
<b>Nominal Switching Frequency</b>	<b>~ 250 KHz</b>

## 2. Circuit Description

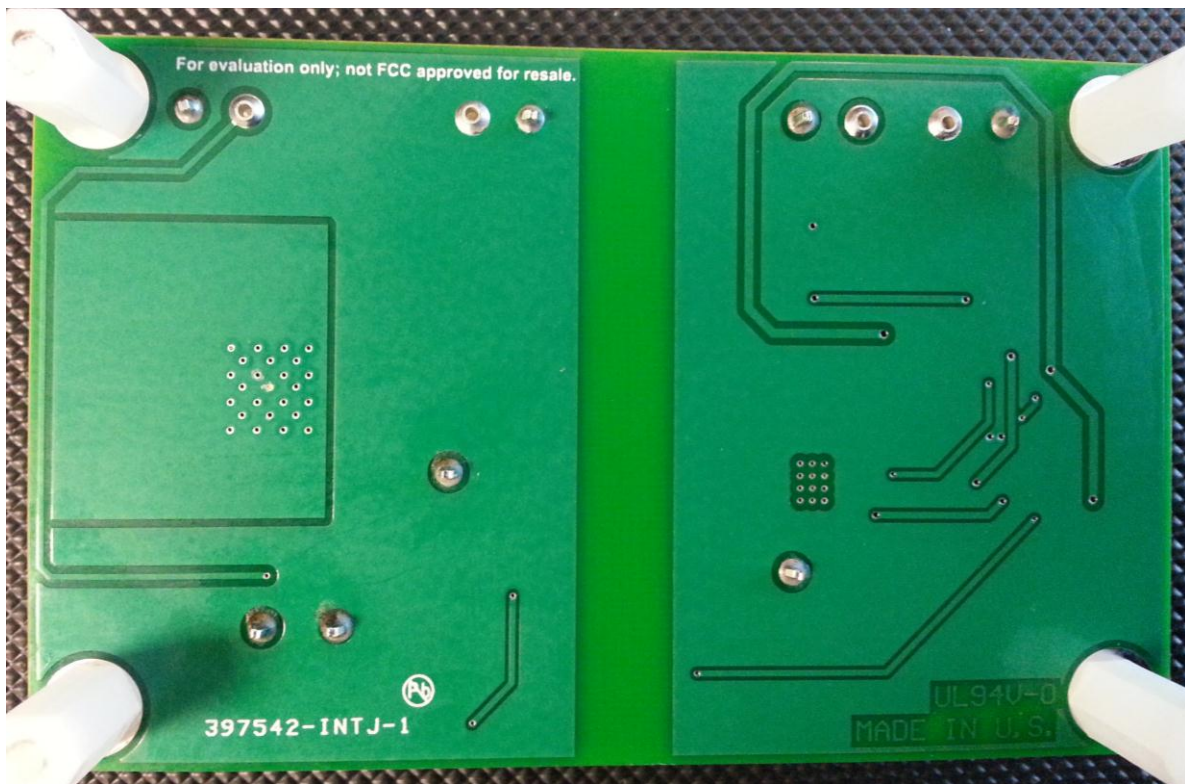
PMP10632 is an Isolated Flyback Converter using the LM5020-2 controller IC. The design accepts an input voltage of 36Vin to 75Vin (48Vin nominal) and provides an isolated output of 3.3Vout, capable of supplying 4A of continuous current to the load. The nominal switching frequency of the design is approximately 250 KHz. All tests for this report were performed at 36Vin, 48Vin, and 75Vin. The board is a 2-layer PCB with 1oz. copper.

### 3. PMP10632 Board Photos

Board Dimensions: 3.7" x 2.3"

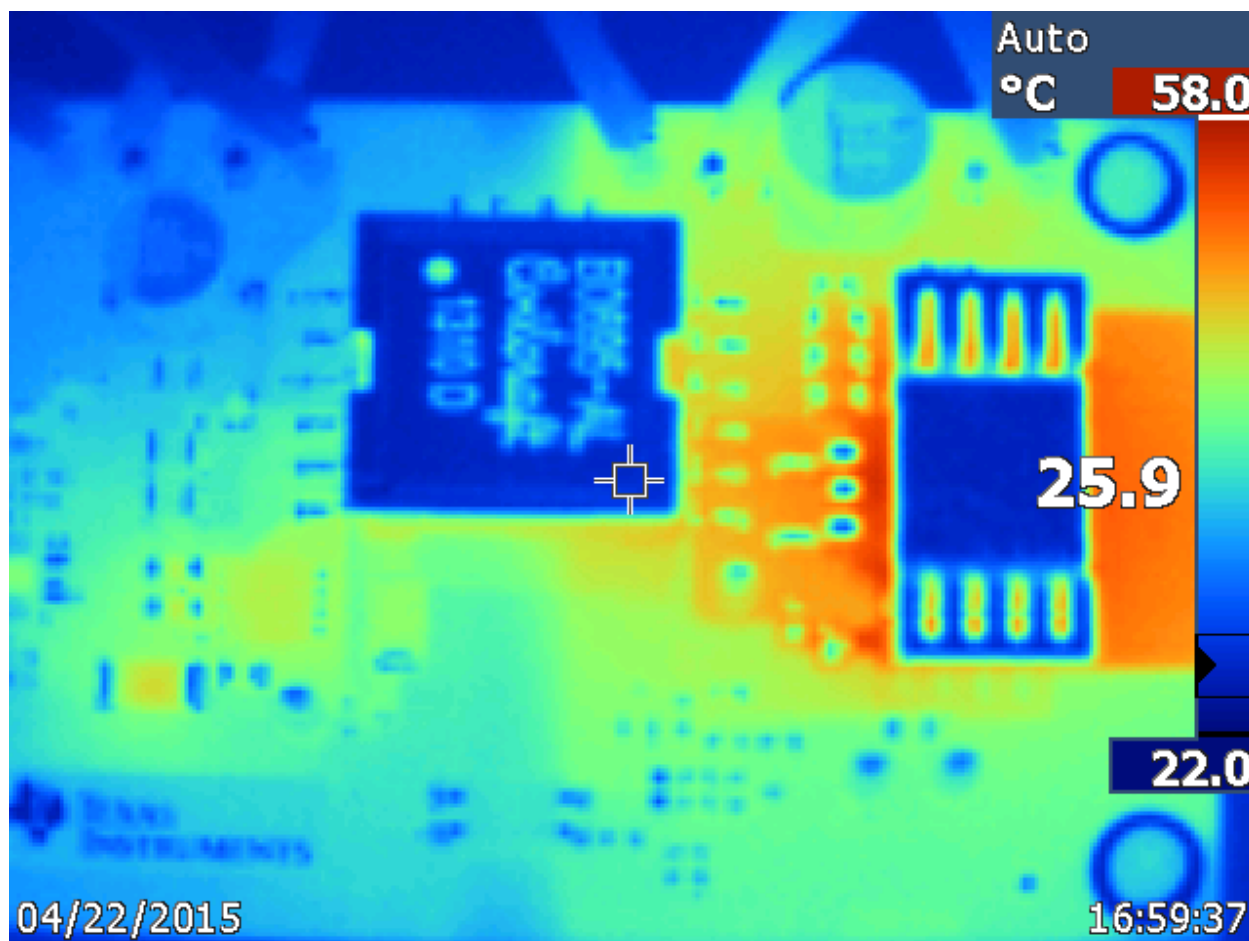


Board Photo (Top)



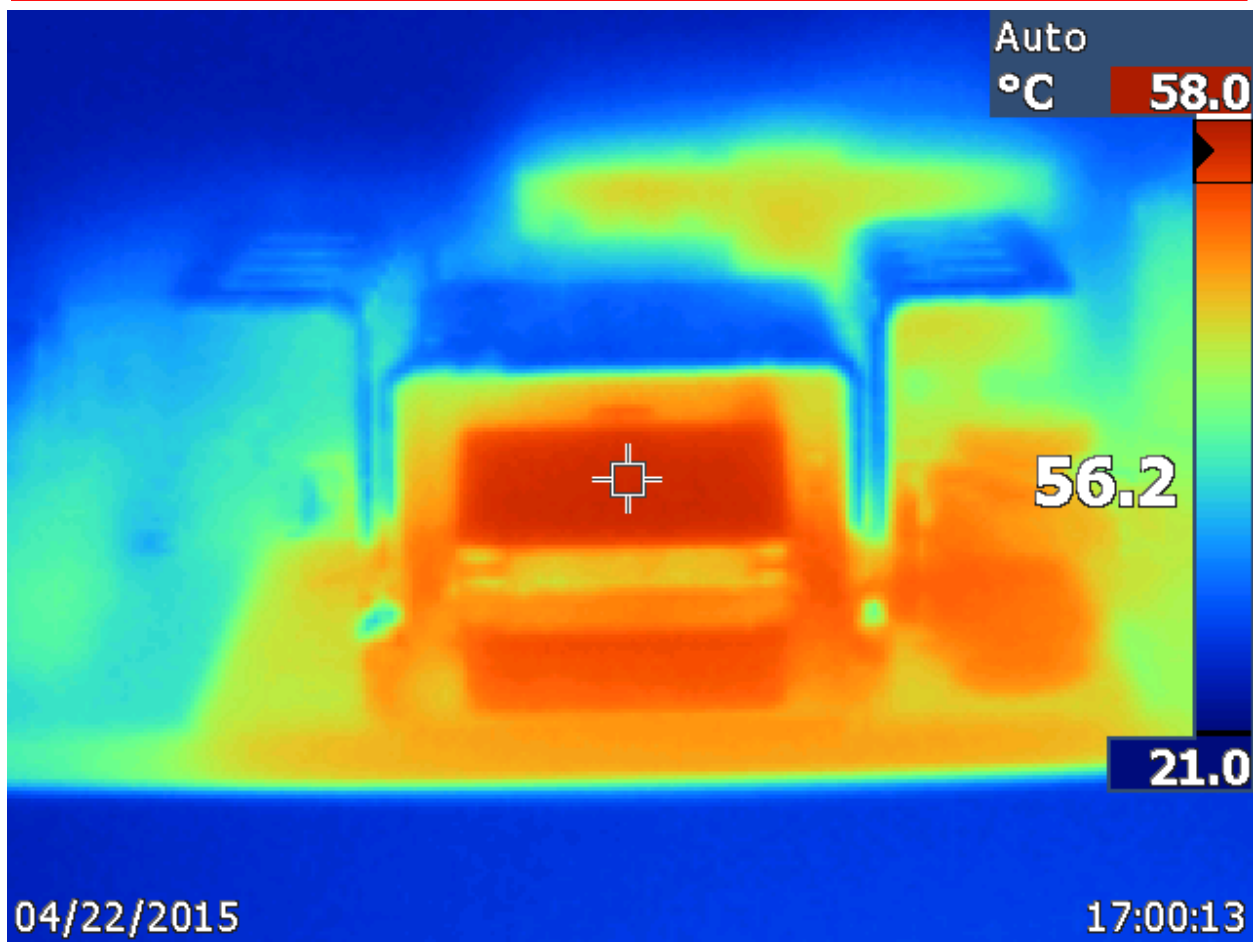
**Board Photo (Bottom)**

#### 4. Thermal Data

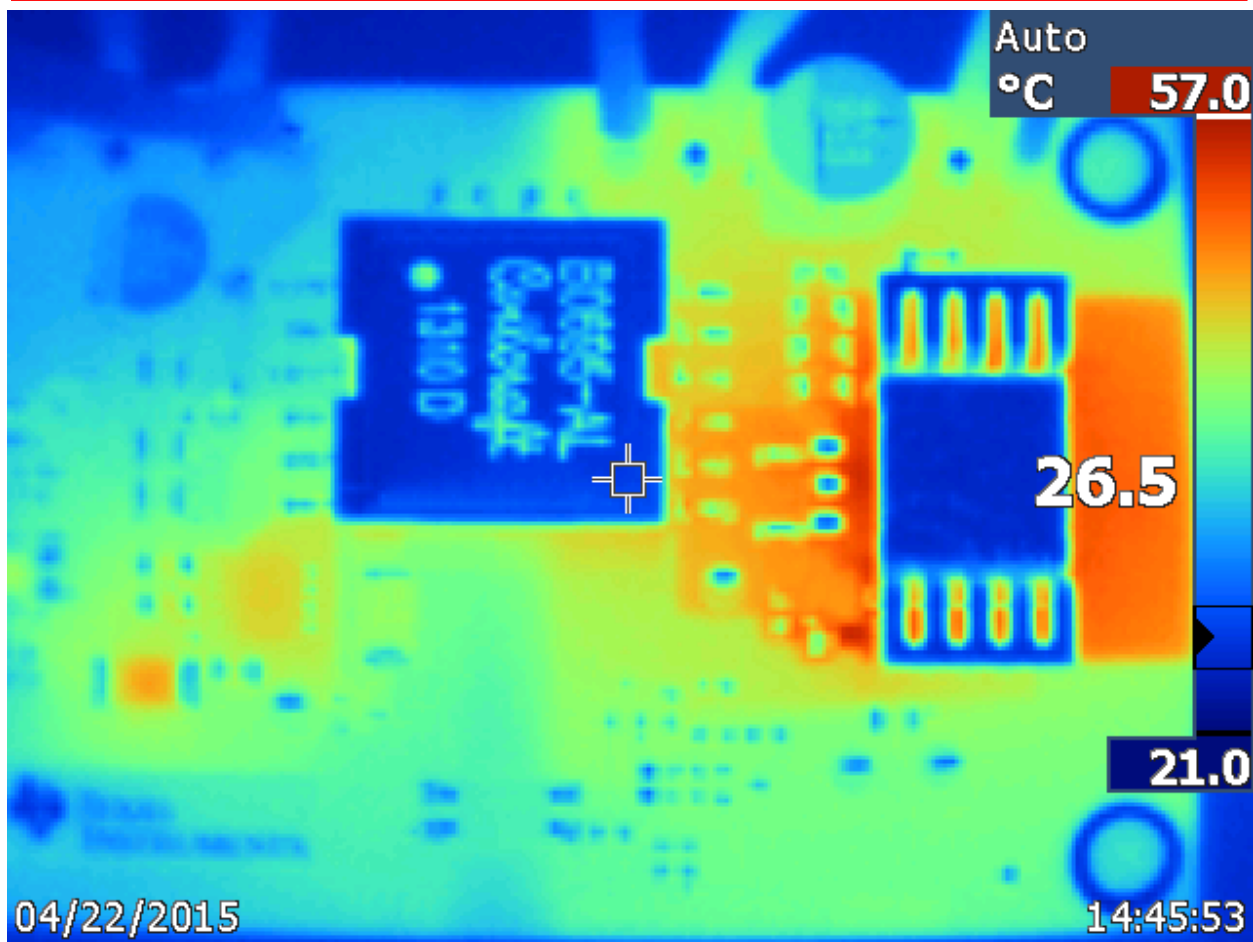


IR Thermal Image Taken at Steady-State at 36Vin and Full (4A) Load with No Airflow at Room Temperature (Top View)



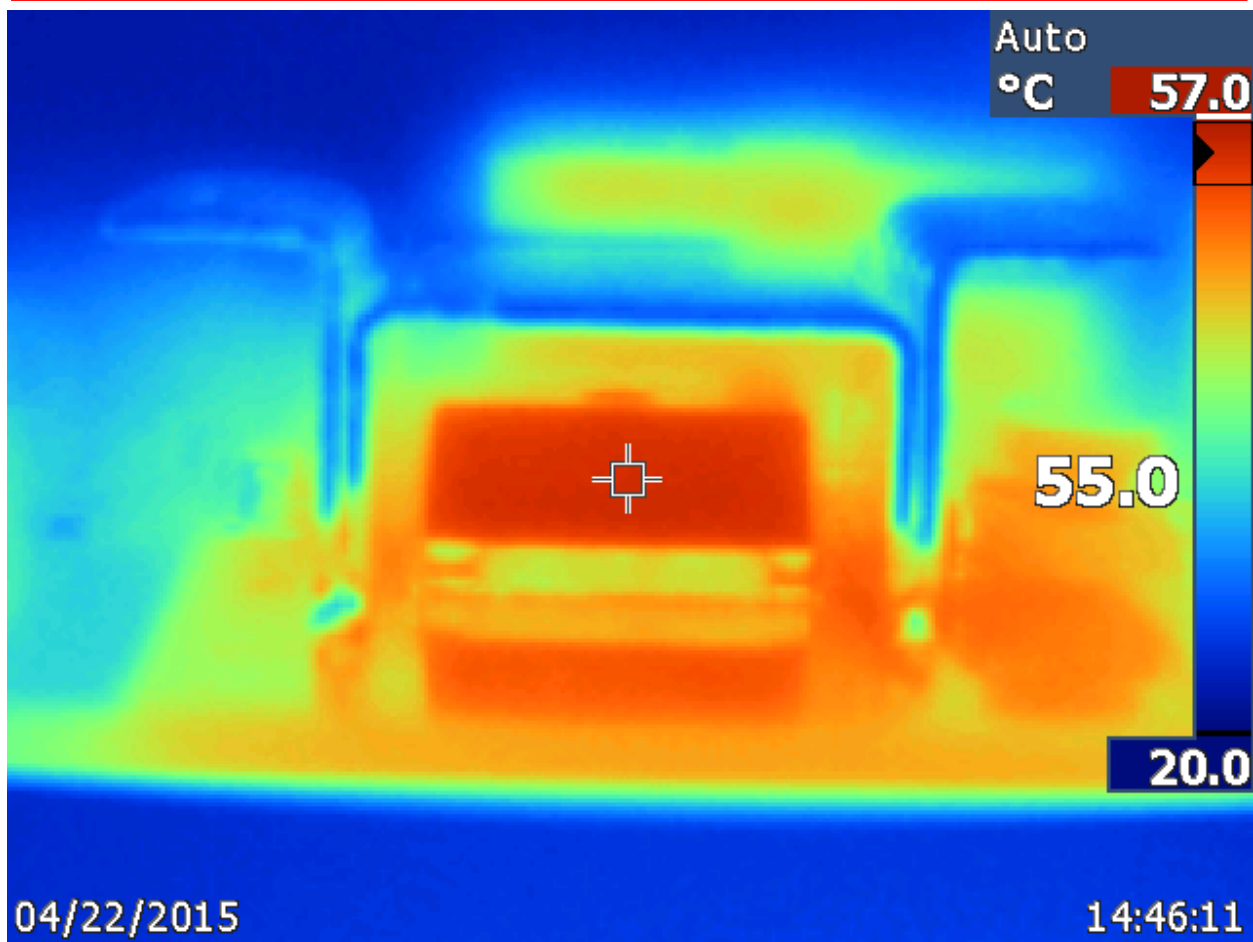


IR Thermal Image Taken at Steady-State at 36Vin and Full (4A) Load with No Airflow at Room Temperature (Secondary-Side Rectifier Side View)

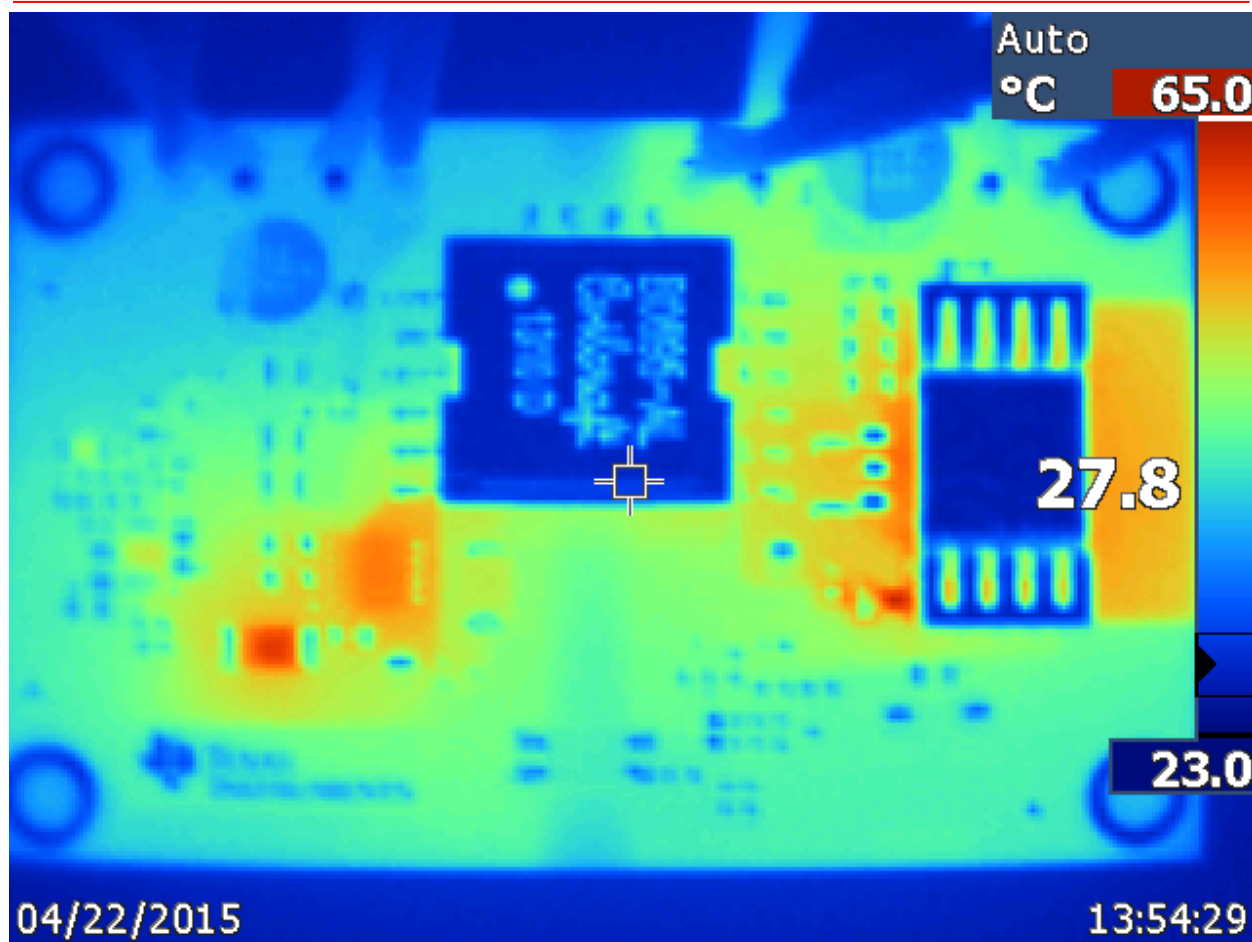


IR Thermal Image Taken at Steady-State at 48Vin and Full (4A) Load with No Airflow at Room Temperature (Top View)

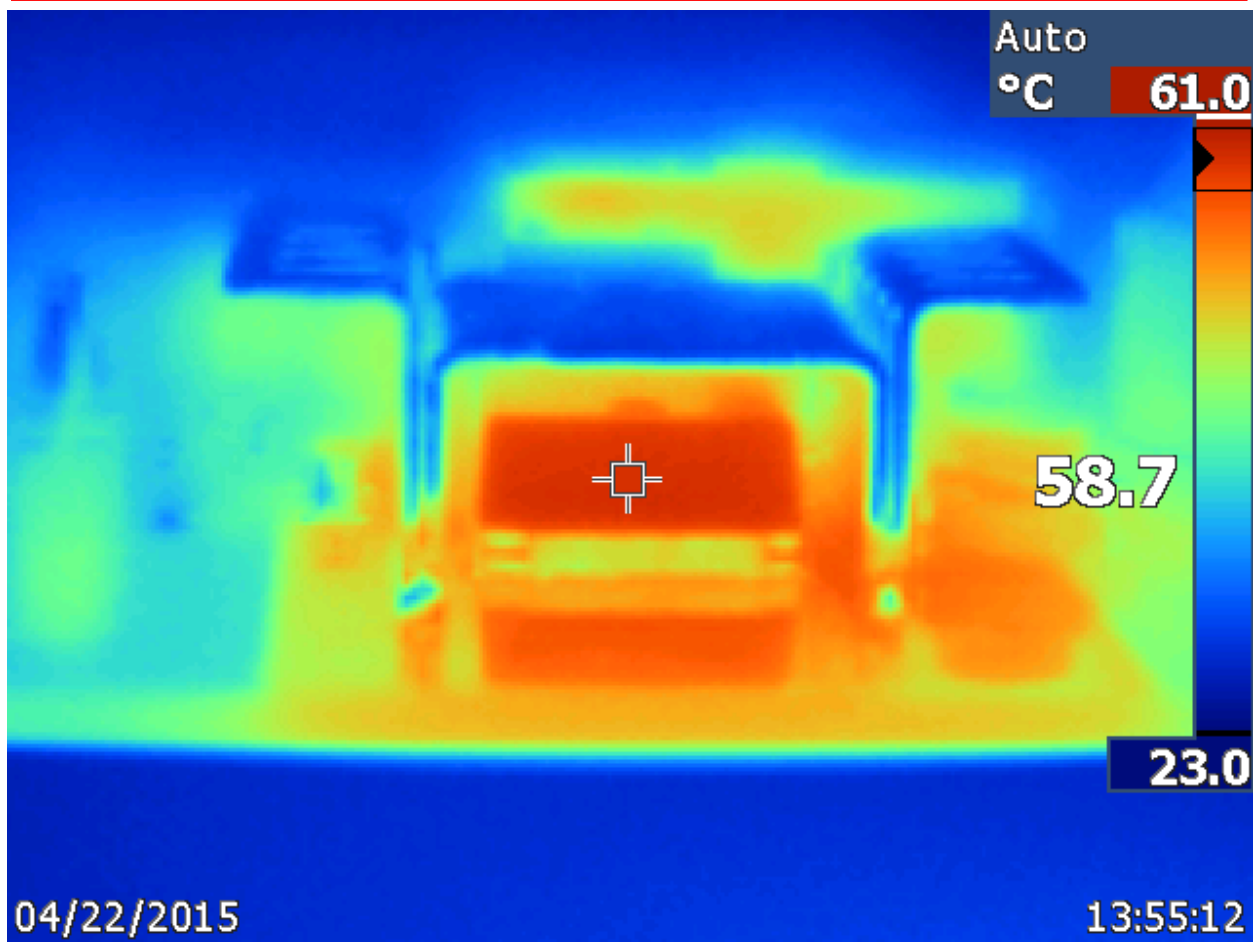




IR Thermal Image Taken at Steady-State at 48Vin and Full (4A) Load with No Airflow at Room Temperature (Secondary-Side Rectifier Side View)



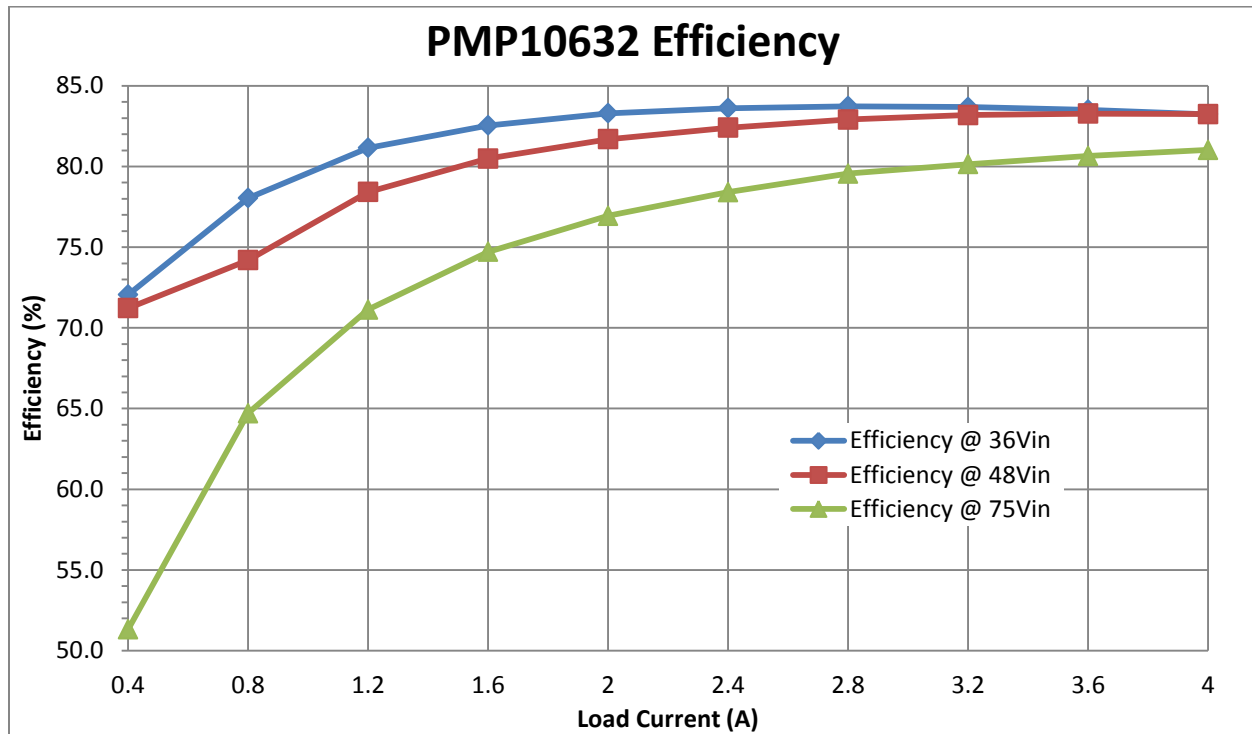
IR Thermal Image Taken at Steady-State at 75V<sub>in</sub> and Full (4A) Load with No Airflow at Room Temperature (Top View)



IR Thermal Image Taken at Steady-State at 75Vin and Full (4A) Load with No Airflow at Room Temperature (Secondary-Side Rectifier Side View)

## 5. Efficiency

### 5.1 Efficiency Chart



## 5.2 Efficiency Data

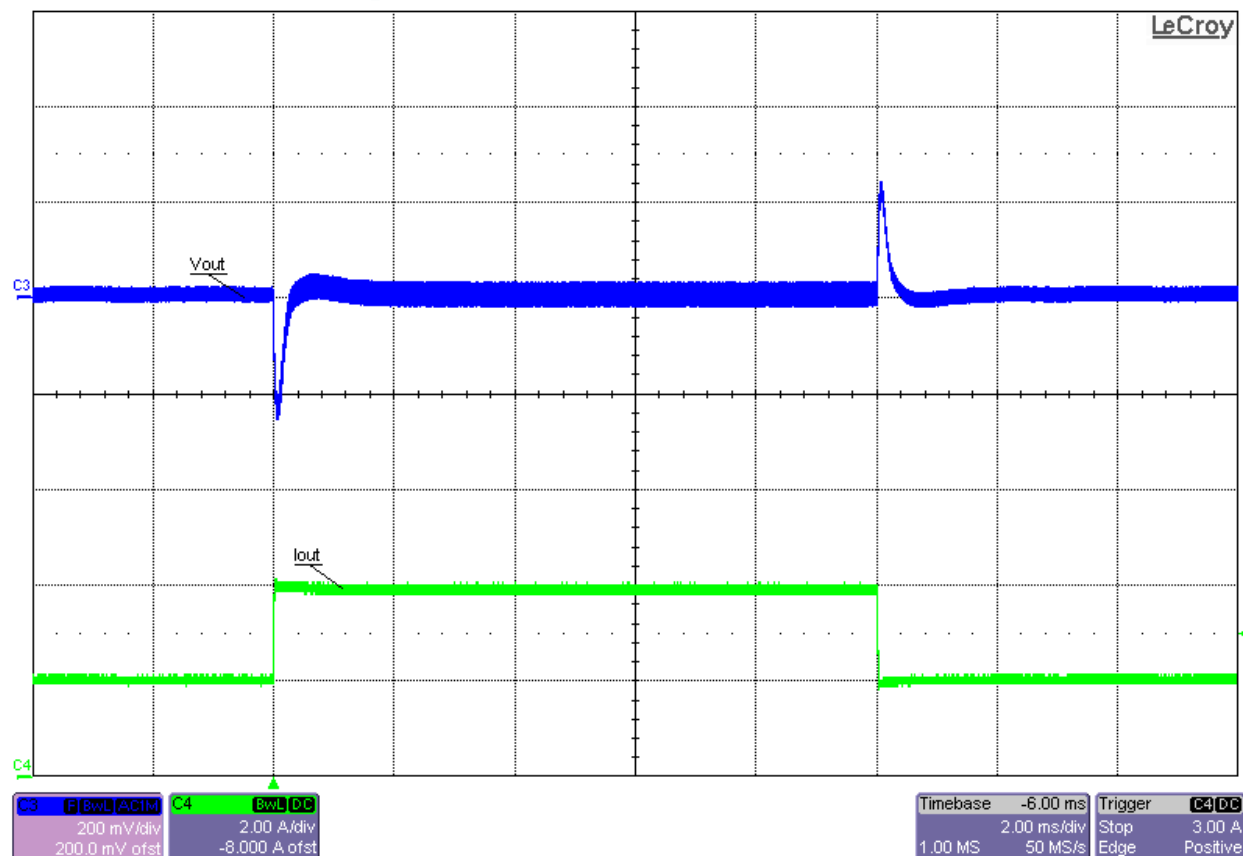
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
36	0.0507	3.2879	0.4	1.8252	1.3152	0.5100	72.1
36	0.09361	3.2873	0.8	3.3700	2.6298	0.7401	78.0
36	0.135	3.2867	1.2	4.8600	3.9440	0.9160	81.2
36	0.17693	3.2861	1.6	6.3695	5.2578	1.1117	82.5
36	0.21913	3.2856	2	7.8887	6.5712	1.3175	83.3
36	0.26193	3.285	2.4	9.4295	7.8840	1.5455	83.6
36	0.30509	3.2844	2.8	10.9832	9.1963	1.7869	83.7
36	0.34881	3.2838	3.2	12.5572	10.5082	2.0490	83.7
36	0.39312	3.2832	3.6	14.1523	11.8195	2.3328	83.5
36	0.4382	3.2826	4	15.7752	13.1304	2.6448	83.2

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
48	0.03845	3.2862	0.4	1.8456	1.3145	0.5311	71.2
48	0.07381	3.2856	0.8	3.5429	2.6285	0.9144	74.2
48	0.10474	3.2852	1.2	5.0275	3.9422	1.0853	78.4
48	0.13604	3.2848	1.6	6.5299	5.2557	1.2742	80.5
48	0.16754	3.2845	2	8.0419	6.5690	1.4729	81.7
48	0.19926	3.2841	2.4	9.5645	7.8818	1.6826	82.4
48	0.23102	3.2836	2.8	11.0890	9.1941	1.8949	82.9
48	0.2631	3.283	3.2	12.6288	10.5056	2.1232	83.2
48	0.29563	3.2824	3.6	14.1902	11.8166	2.3736	83.3
48	0.32854	3.2818	4	15.7699	13.1272	2.6427	83.2

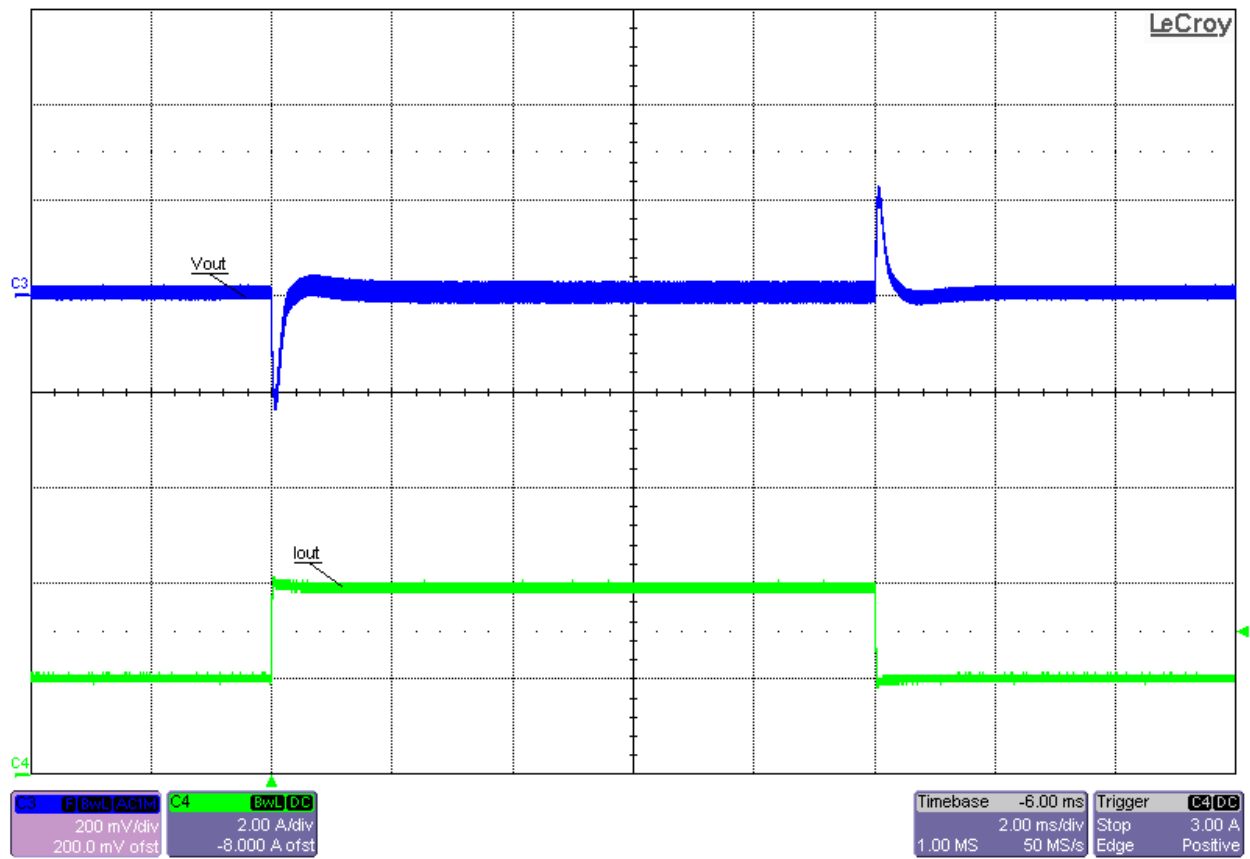
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pin (W)	Pout (W)	Ploss (W)	Efficiency (%)
75	0.03414	3.2849	0.4	2.5605	1.3140	1.2465	51.3
75	0.05415	3.2848	0.8	4.0613	2.6278	1.4334	64.7
75	0.07388	3.2845	1.2	5.5410	3.9414	1.5996	71.1
75	0.09378	3.2842	1.6	7.0335	5.2547	1.7788	74.7
75	0.11381	3.2838	2	8.5358	6.5676	1.9682	76.9
75	0.134	3.2834	2.4	10.0500	7.8802	2.1698	78.4
75	0.15406	3.283	2.8	11.5545	9.1924	2.3621	79.6
75	0.17475	3.2825	3.2	13.1063	10.5040	2.6023	80.1
75	0.19534	3.282	3.6	14.6505	11.8152	2.8353	80.6
75	0.216	3.2814	4	16.2000	13.1256	3.0744	81.0

## 6 Waveforms

### 6.1 Load Transient Response

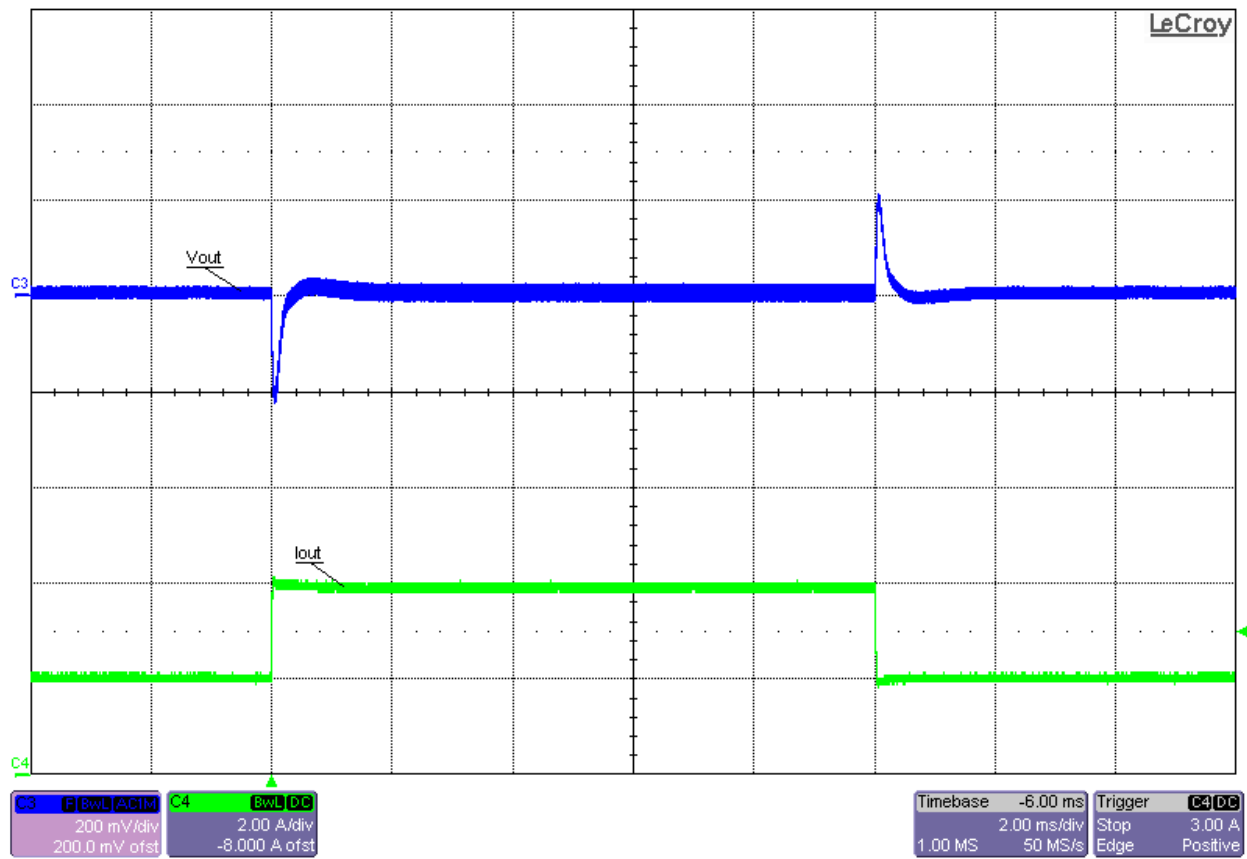


**Load Transient Response of Output Rail Undergoing 50% to 100% (2A-to-4A) Load Step and Input Voltage at 36Vin**



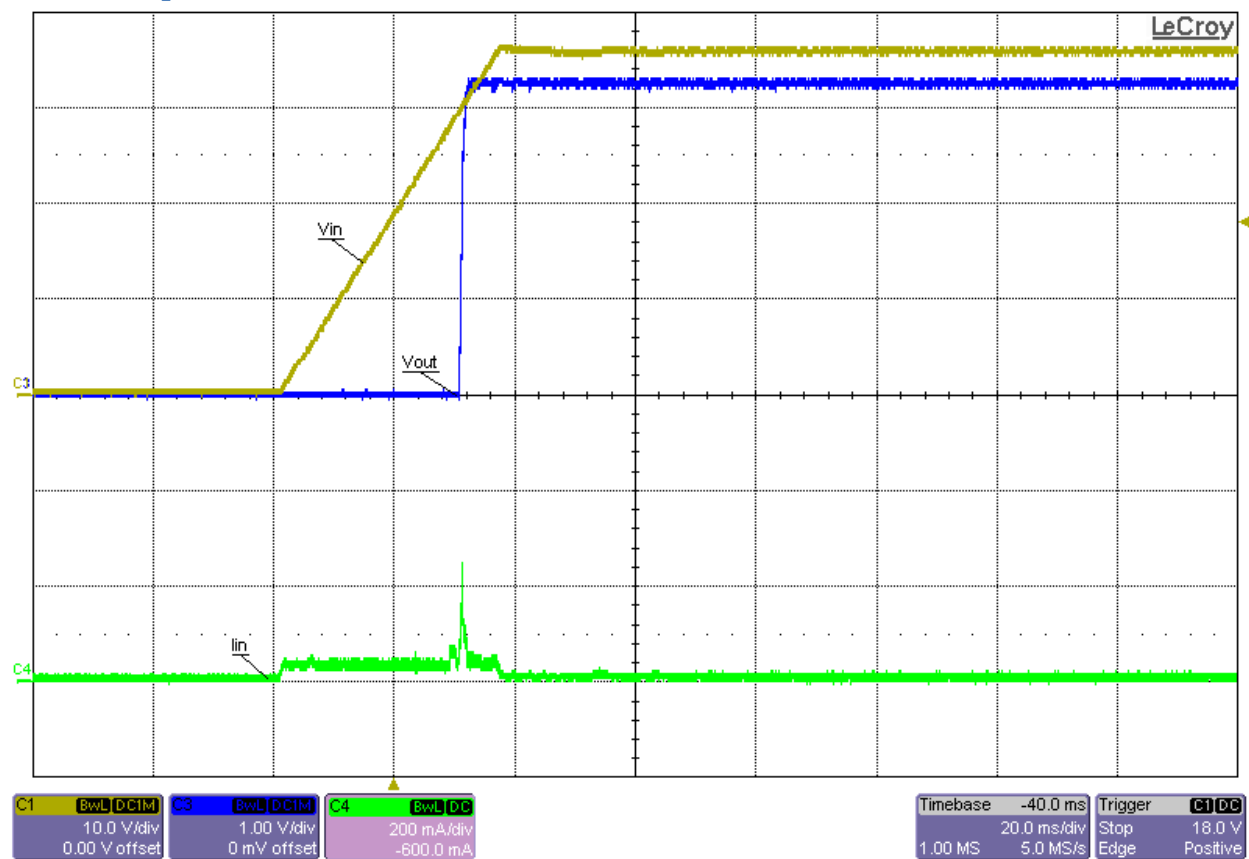
**Load Transient Response of Output Rail Undergoing 50% to 100% (2A-to-4A) Load Step and Input Voltage at 48Vin**



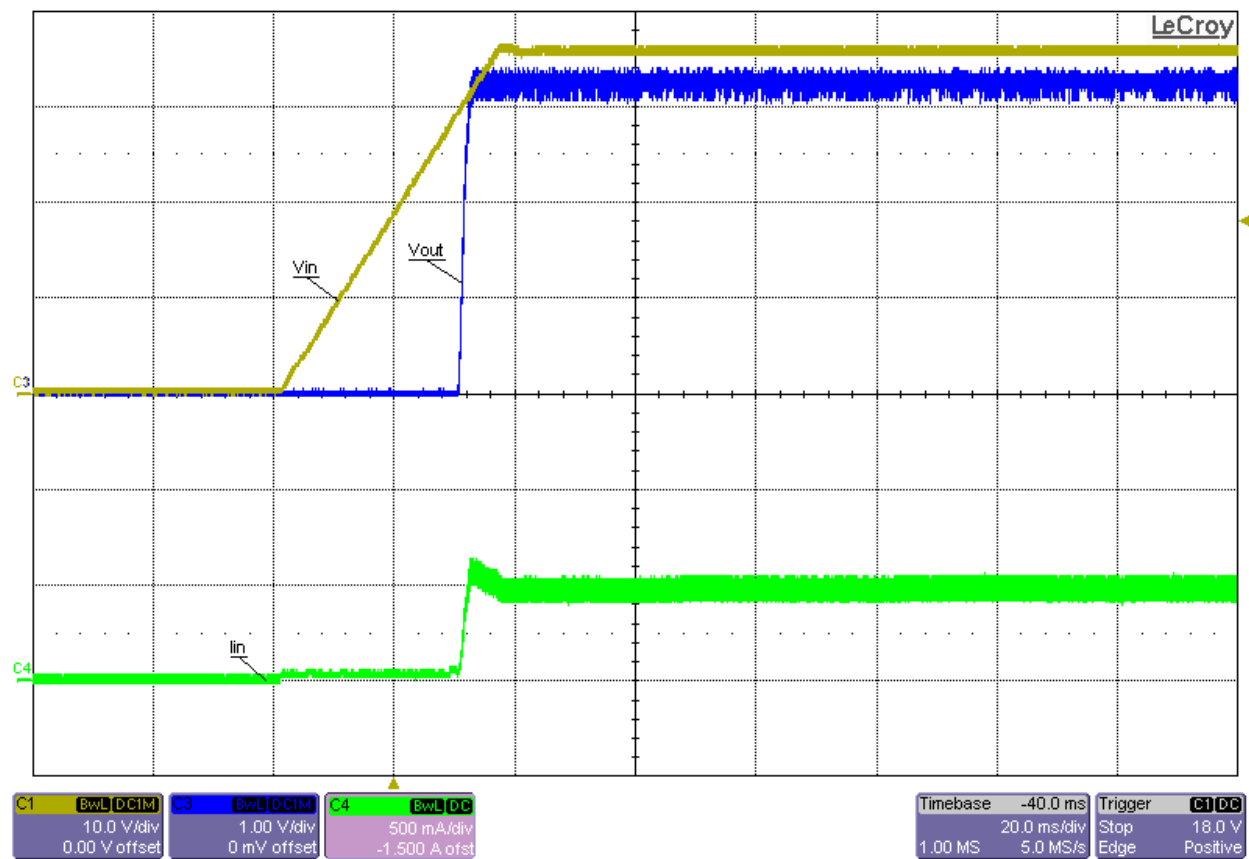


**Load Transient Response of Output Rail Undergoing 50% to 100% (2A-to-4A) Load Step and Input Voltage at 75Vin**

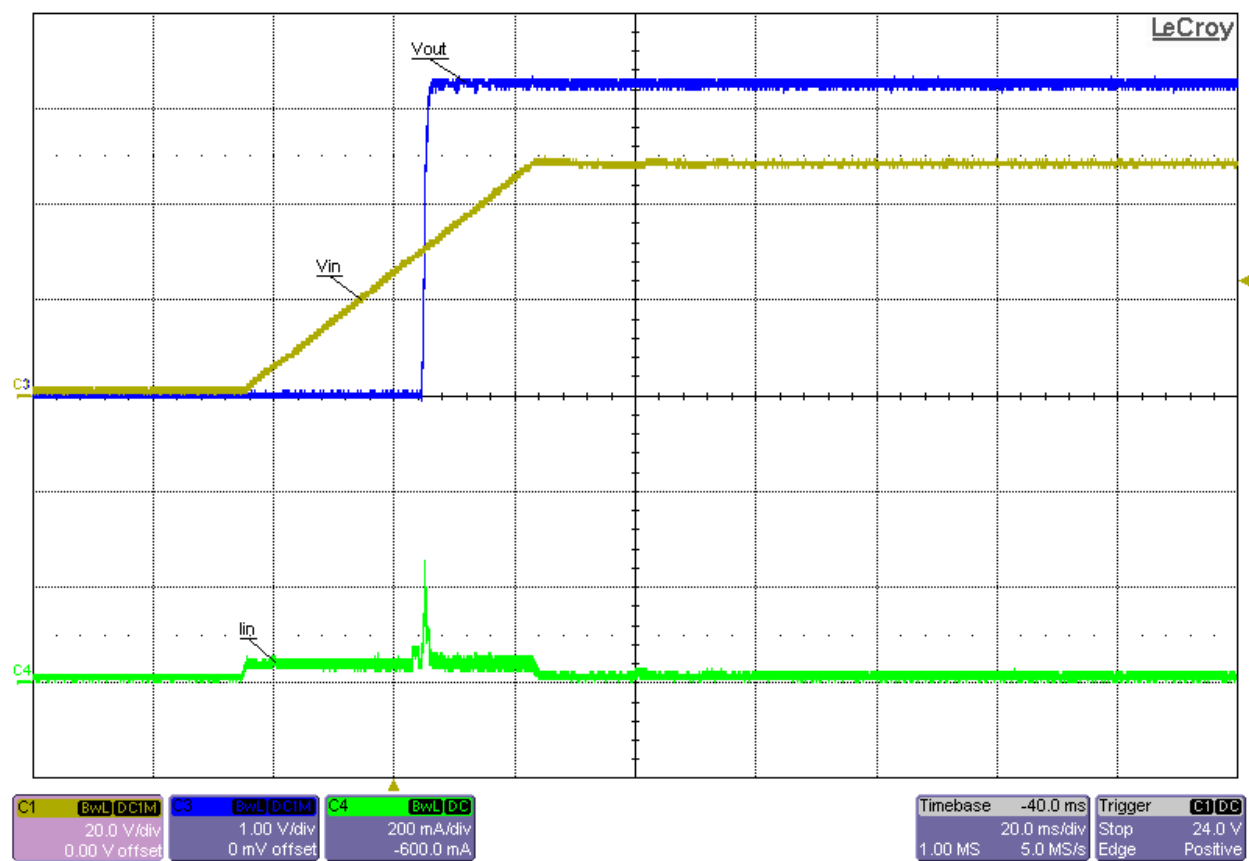
## 6.2 Startup



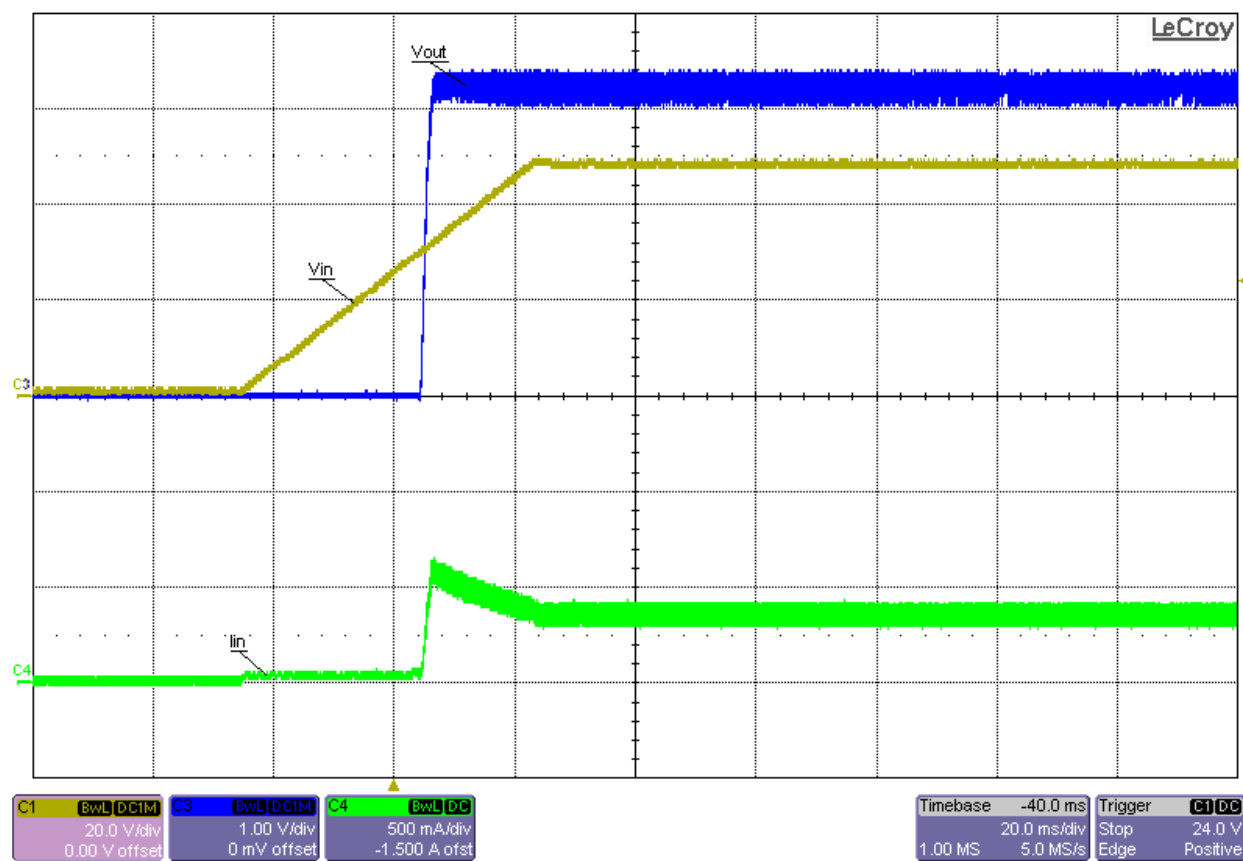
Startup into No Load at 36Vin



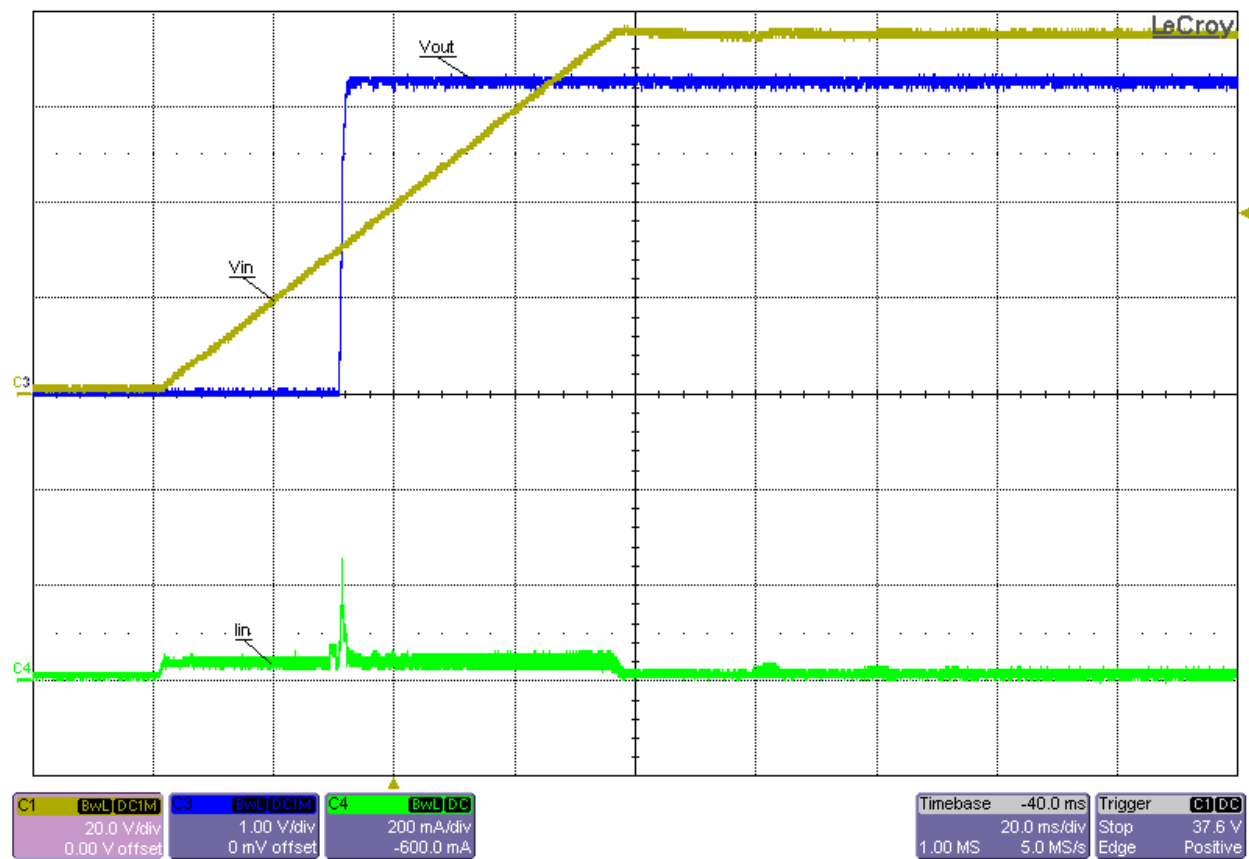
**Startup into Full (4A) Constant-Resistance Load at 36V<sub>in</sub>**



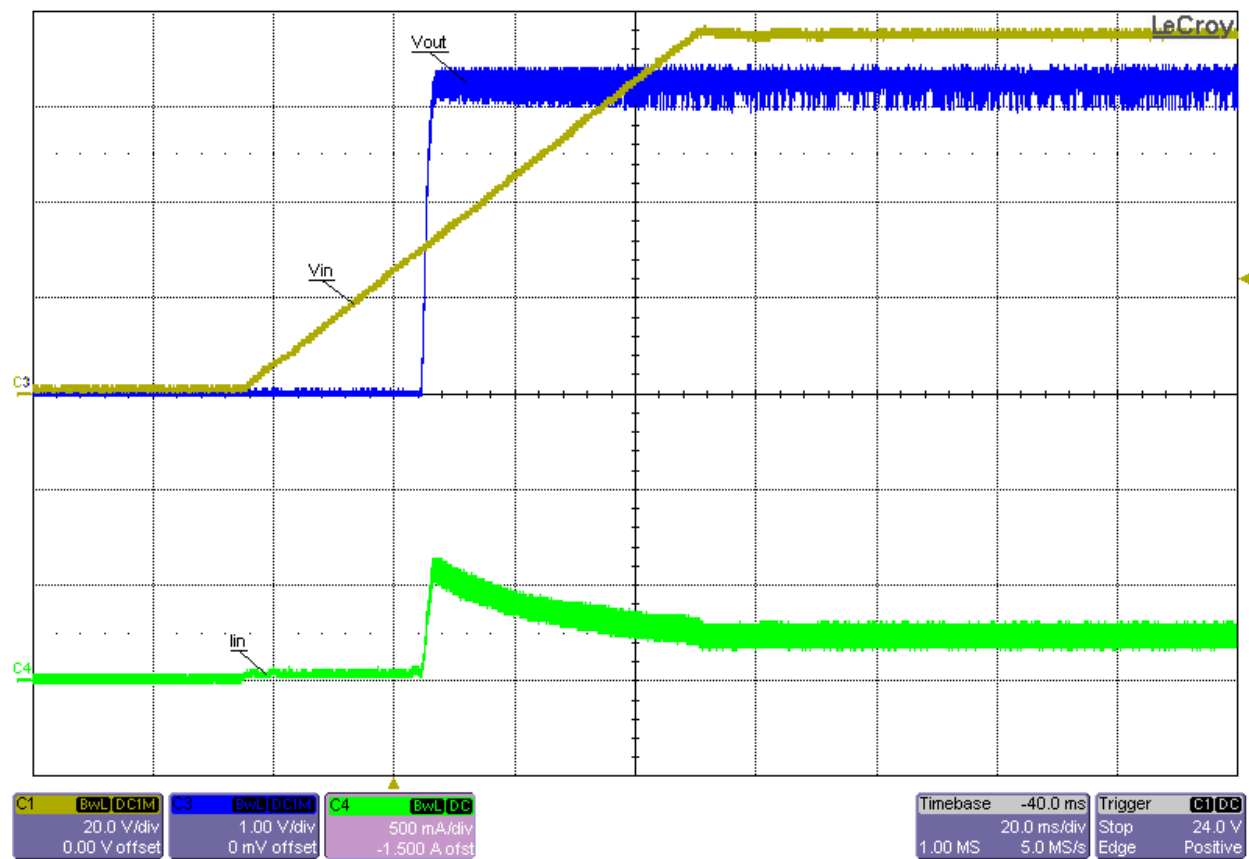
**Startup into No Load at 48Vin**



**Startup into Full (4A) Constant-Resistance Load at 48Vin**



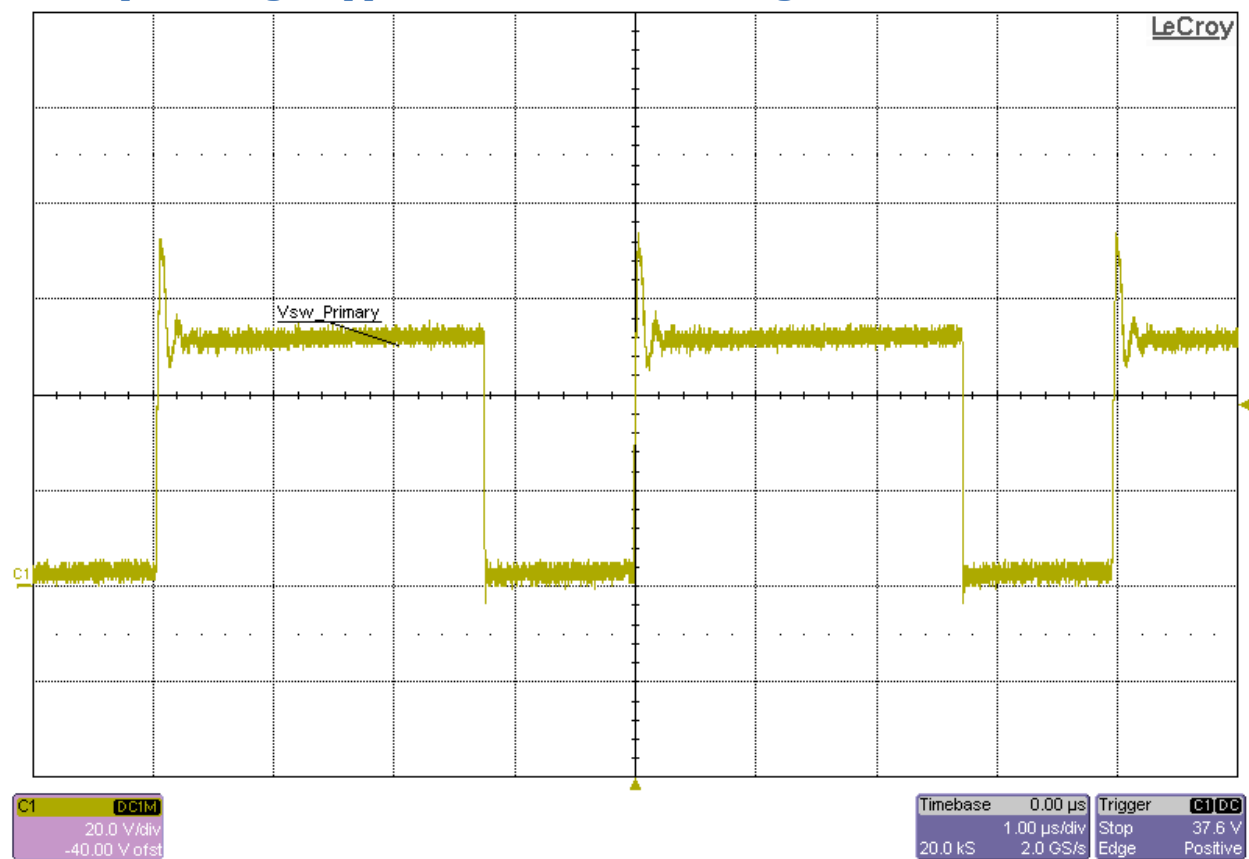
**Startup into No Load at 75Vin**



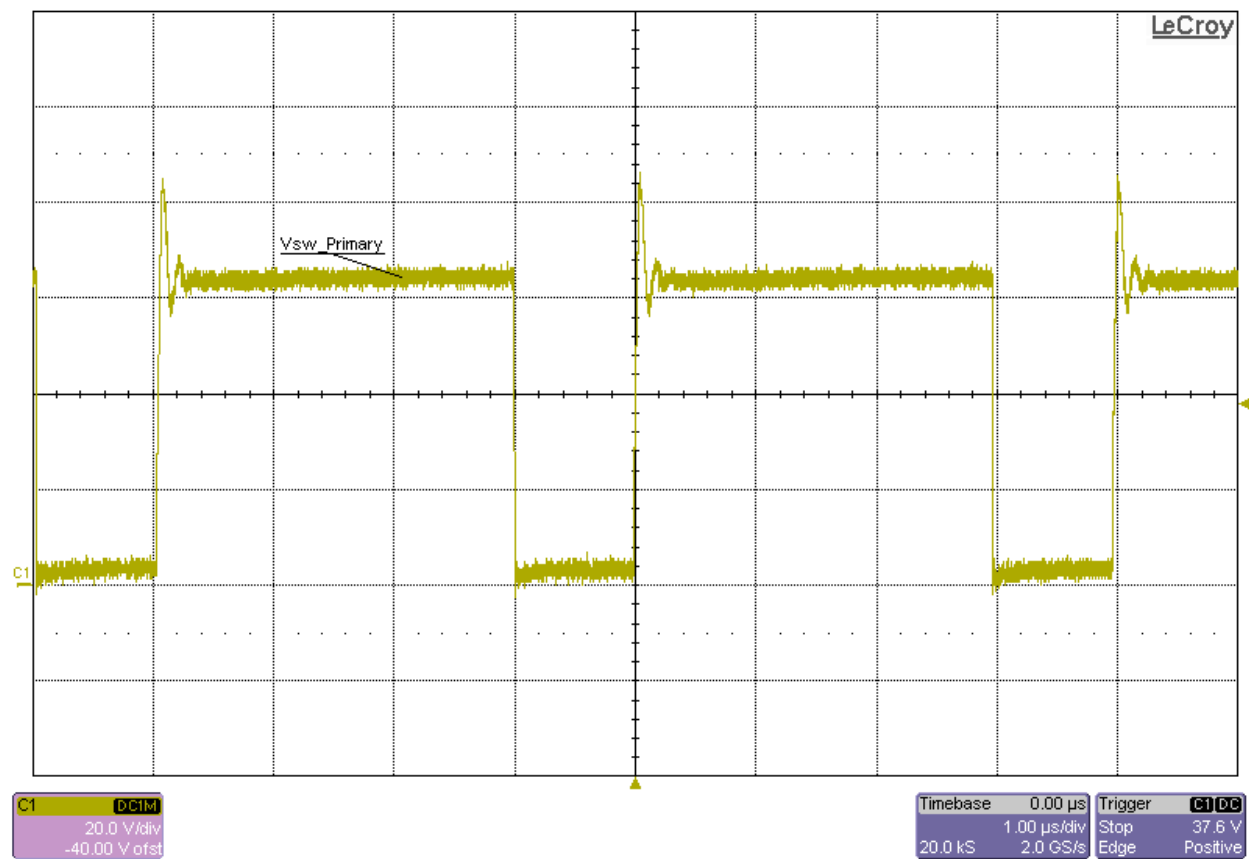
**Startup into Full (4A) Constant-Resistance Load at 75Vin**



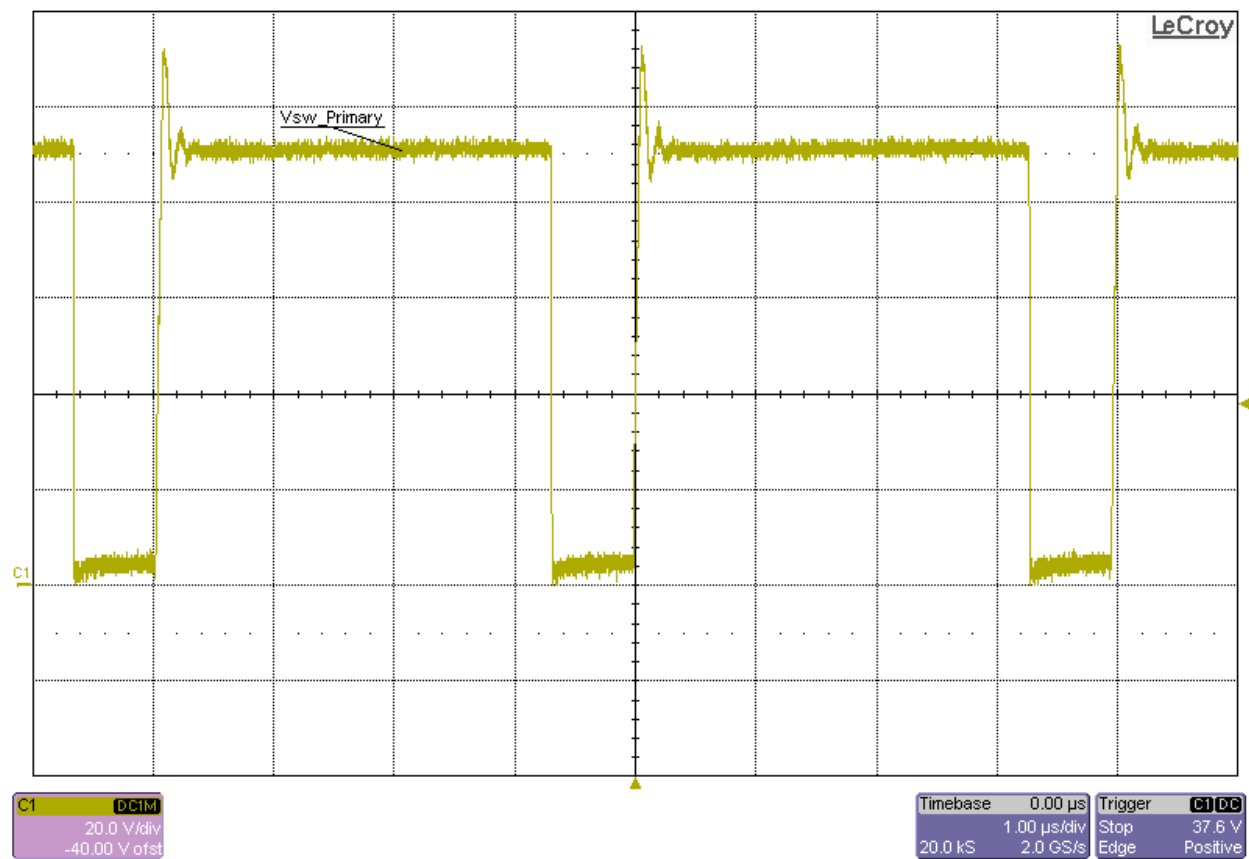
### 6.3 Output Voltage Ripple and Switch Node Voltages



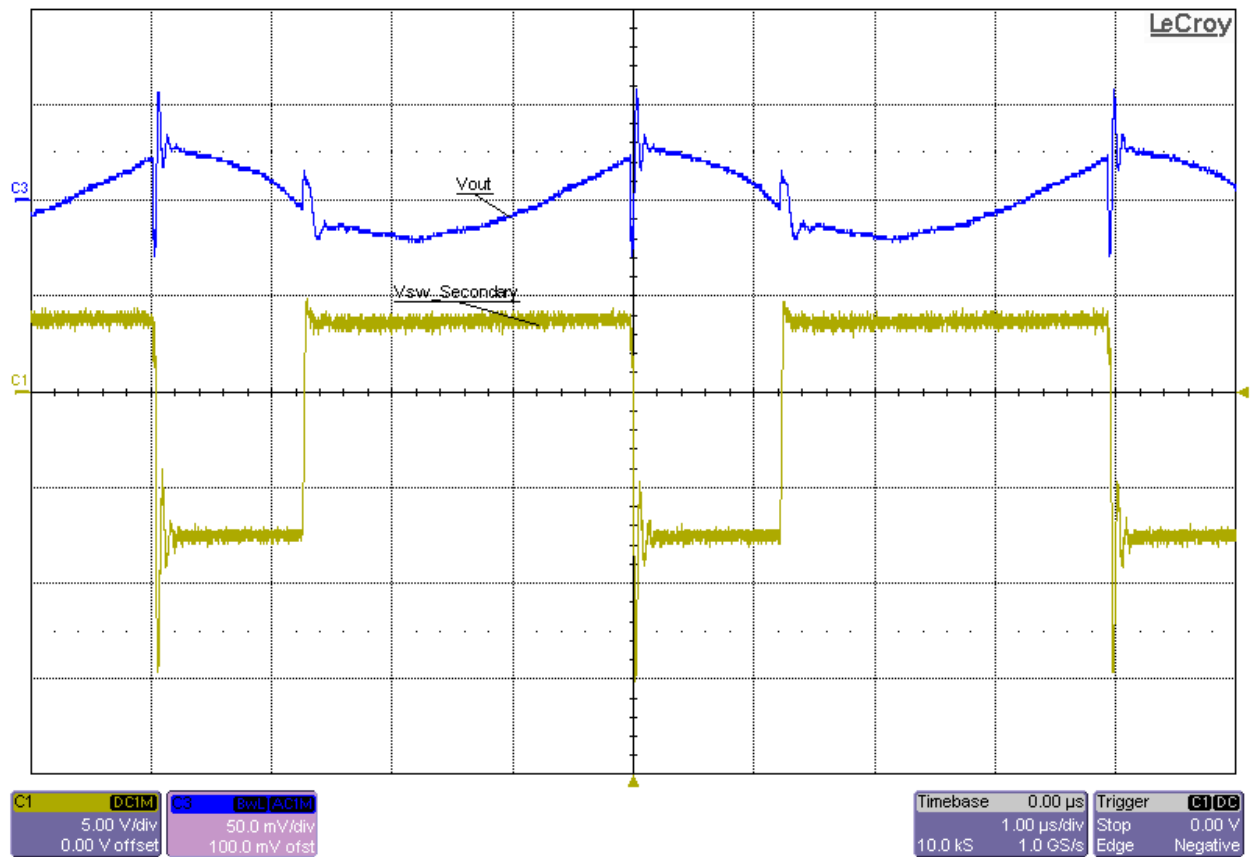
Primary Side Switch Node at 36Vin and Full (4A) Load



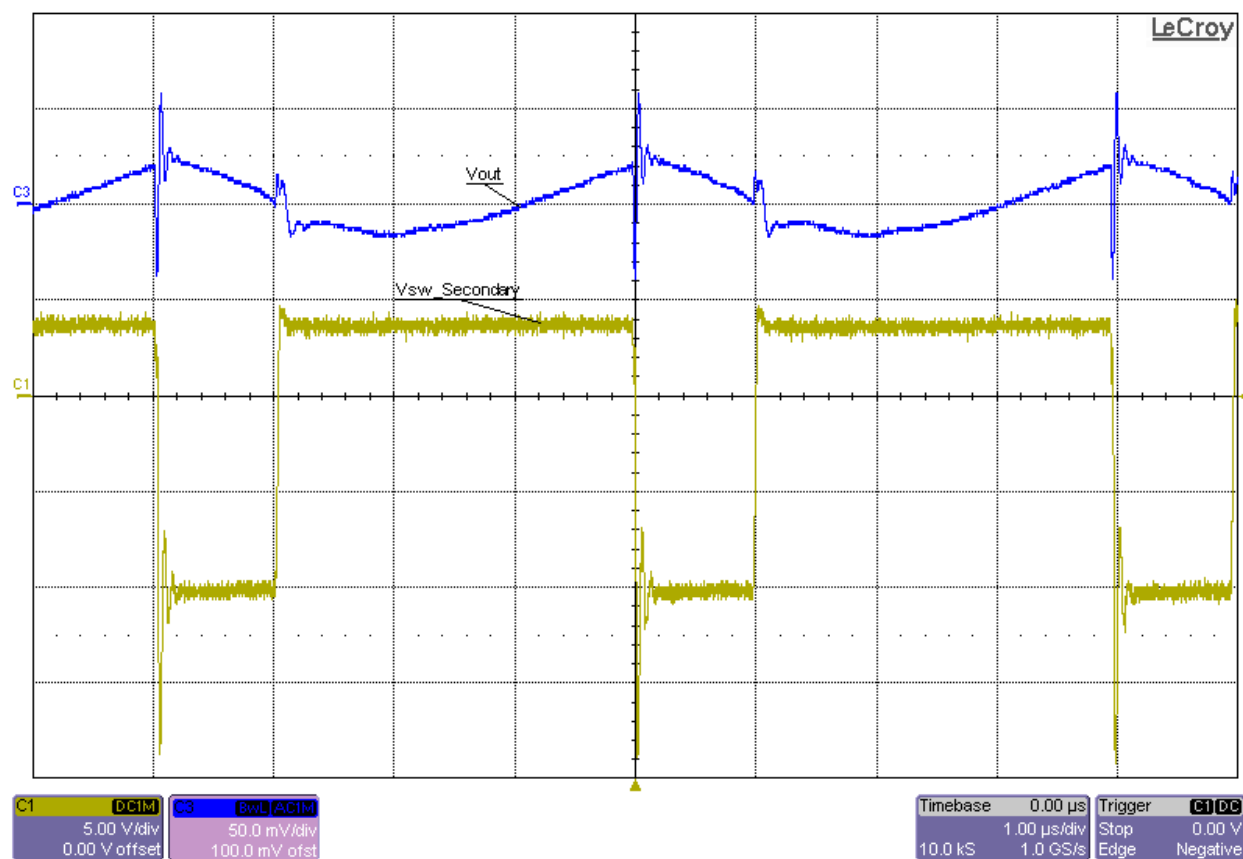
**Primary Side Switch Node at 48Vin and Full (4A) Load**



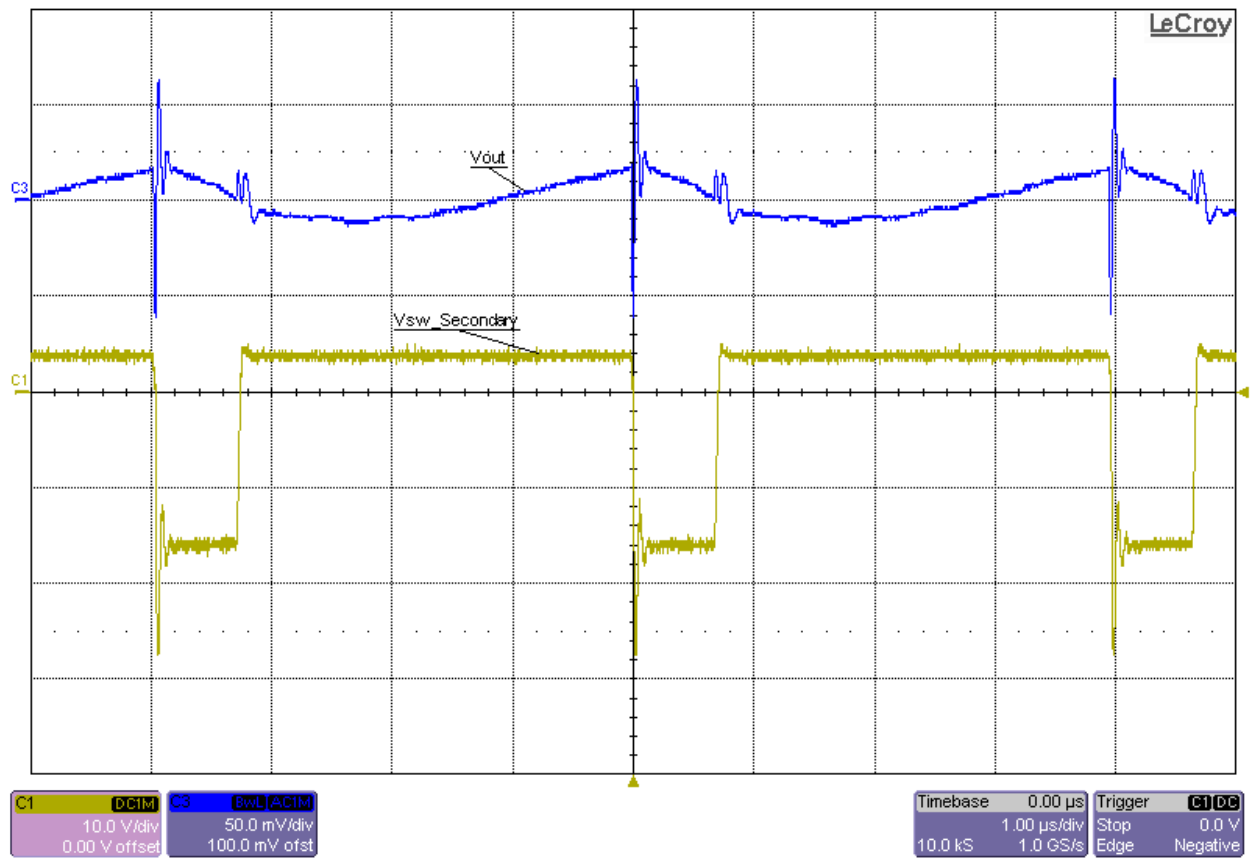
**Primary Side Switch Node at 75V<sub>in</sub> and Full (4A) Load**



**Secondary-Side Switch Node Voltage and Output Voltage Ripple at 36Vin and Full (4A) Load (CH1 captured at Full 350MHz Bandwidth; CH3 is captured at 20MHz Bandwidth; Vripple  $\approx$  50mV)**

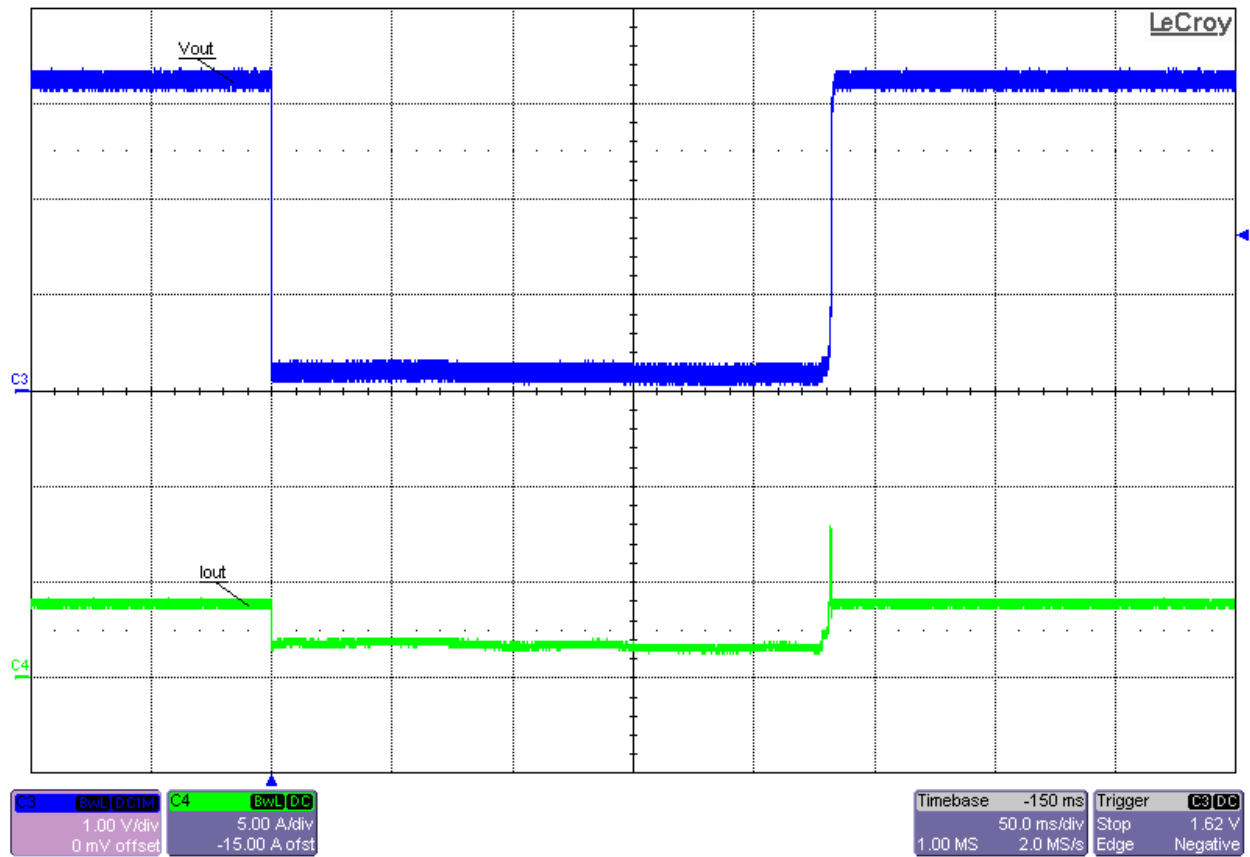


**Secondary-Side Switch Node Voltage and Output Voltage Ripple at 48Vin and Full (4A) Load (CH1 captured at Full 350MHz Bandwidth; CH3 is captured at 20MHz Bandwidth; Vripple ≈ 50mV)**



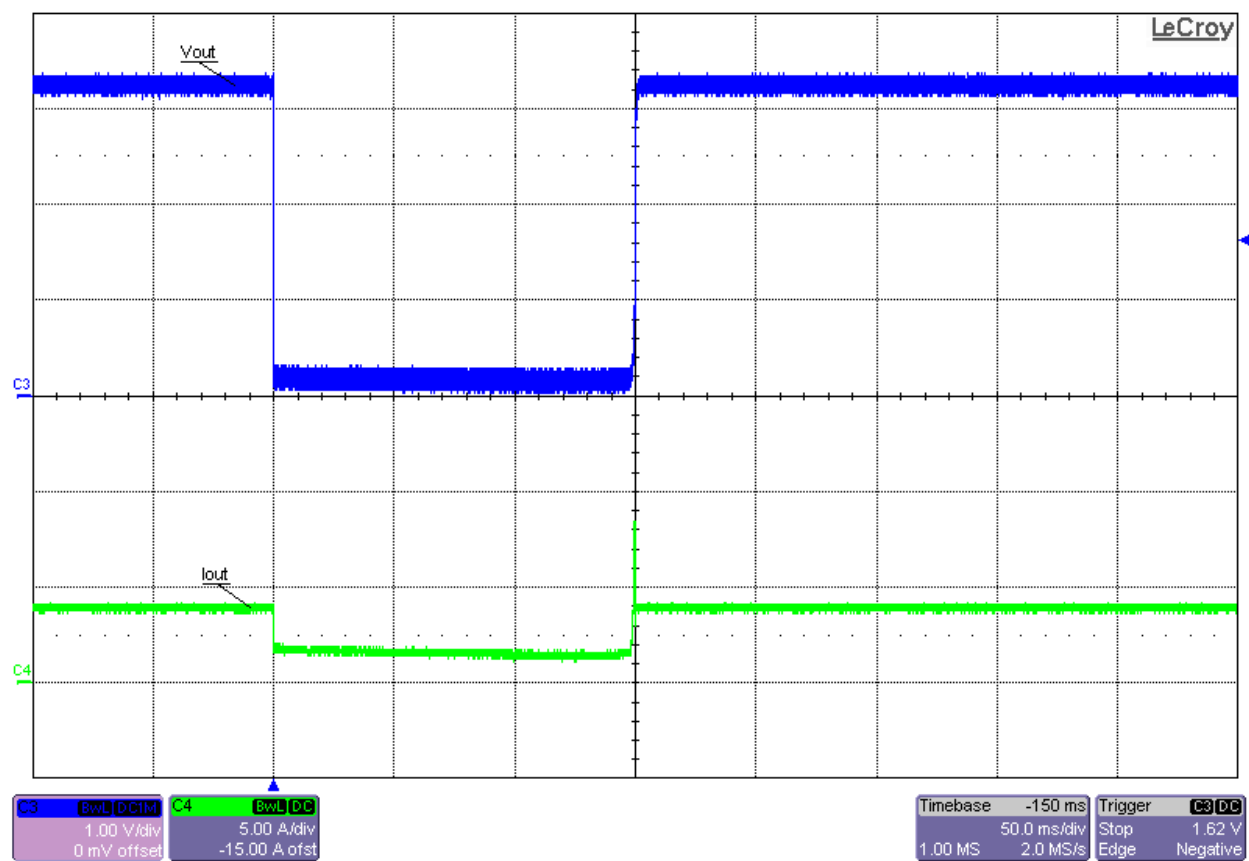
**Secondary Side Switch Node Voltage and Output Voltage Ripple at 75Vin and Full (4A) Load (CH1 captured at Full 350MHz Bandwidth; CH3 is captured at 20MHz Bandwidth; Vripple ≈ 40mV)**

## 6.4 Short Circuit Testing

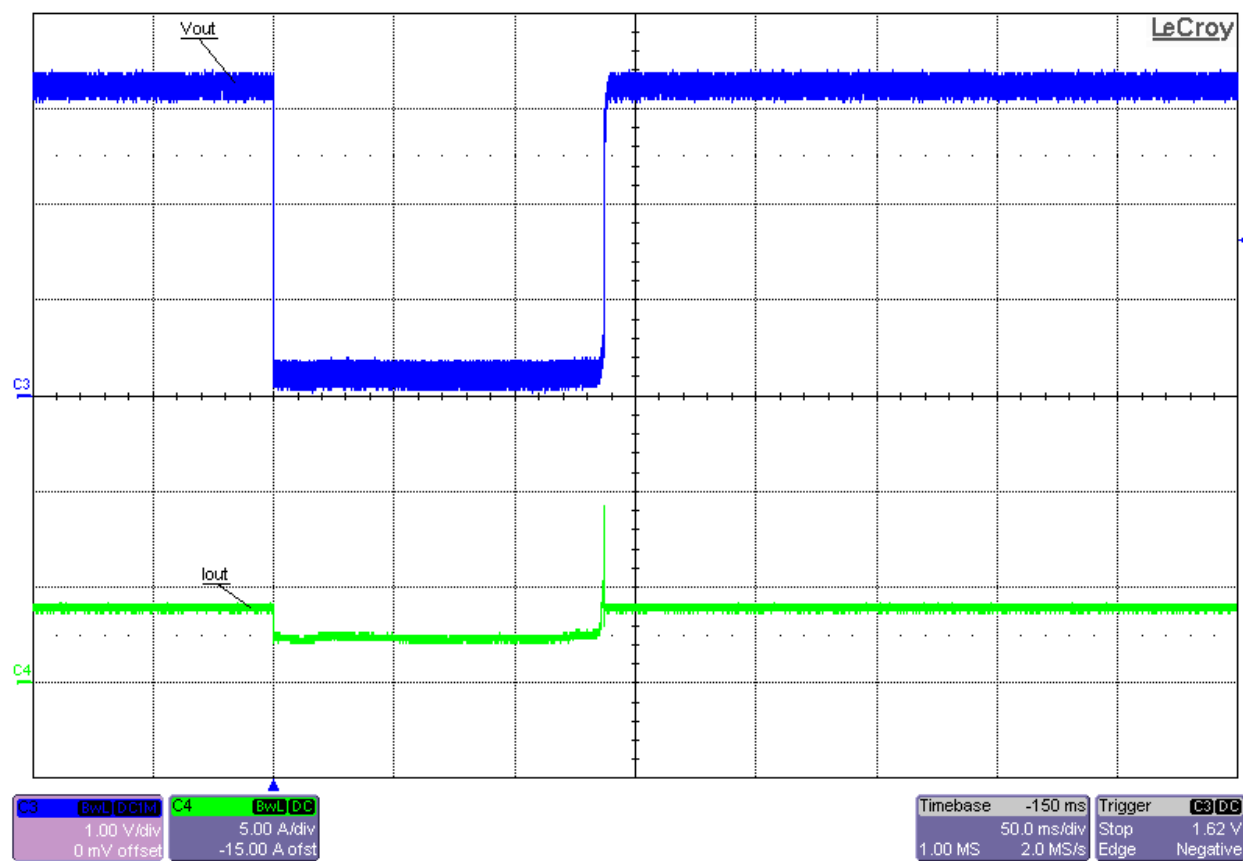


Short Circuit applied from and released into Full (4A) Load; Input Voltage at 36Vin





**Short Circuit applied from and released into Full (4A) Load; Input Voltage at 48Vin**



Short Circuit applied from and released into Full (4A) Load; Input Voltage at 75Vin

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