

**Test Data
For PMP12003
11/12/2015**



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1. Design Specifications

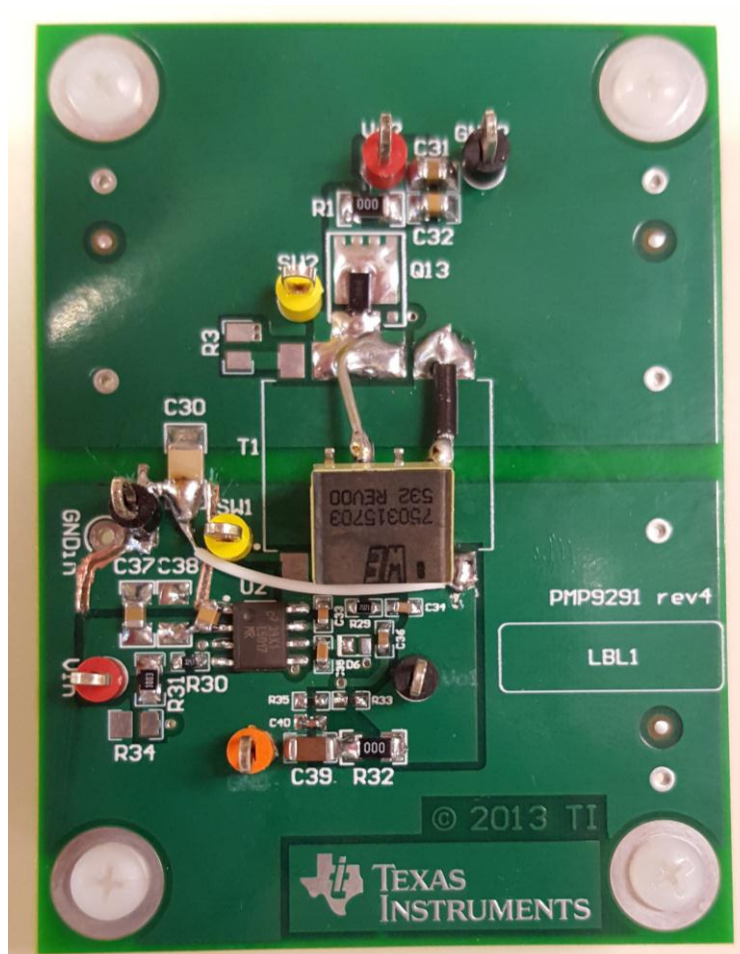
Vin Minimum	9VDC
Vin Maximum	15VDC
Vout	6.5VDC +/-0.5V
Iout	100mA
Nominal Switching Frequency	~ 215KHz

2. Circuit Description

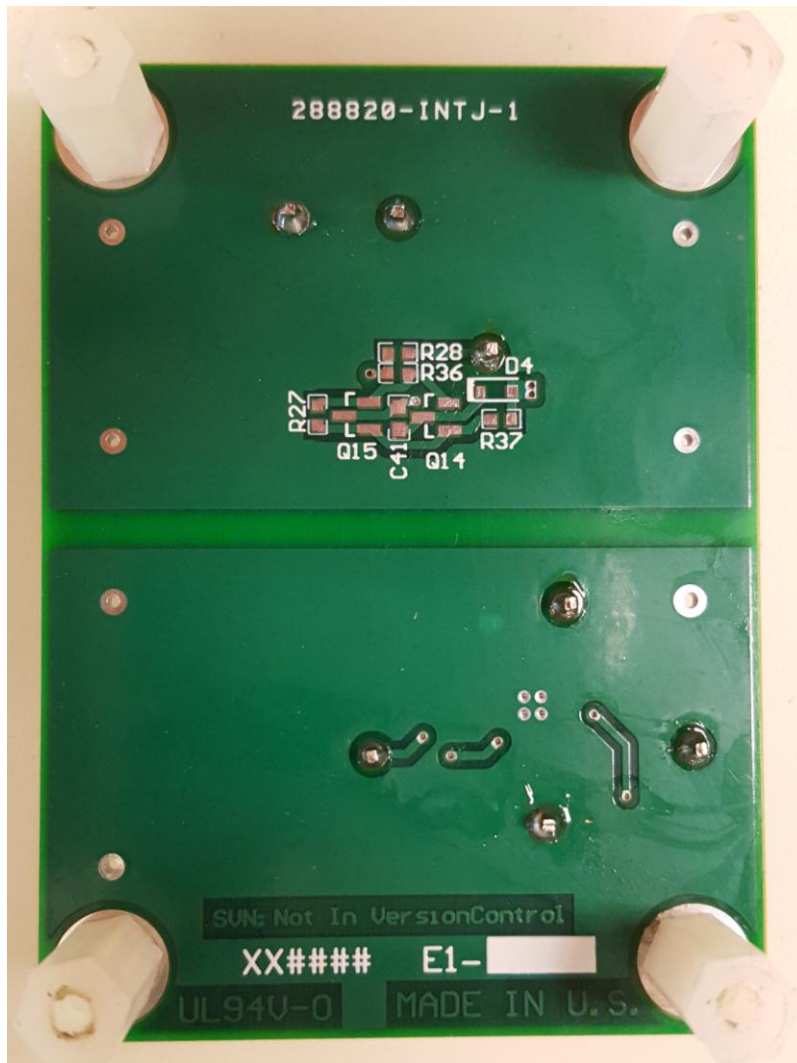
PMP12003 is an Isolated Fly-Buck-Boost Converter with the primary side configured as an inverting buck-boost, using the LM5017 synchronous buck regulator IC. The design accepts an input voltage of 9Vin to 15Vin and provides an isolated output of 6.5Vout (+/-0.5V), capable of supplying 100mA of continuous current to the load. The nominal switching frequency of the design is 215KHz. This design is built on the PMP9291 Rev4 PCB, which is a 4-layer board with 1 oz. copper for the top and bottom layers and 0.5 oz. copper for the two inner layers.

3. PMP12003 Board Photos

Board Dimensions: 2" x 2.7"

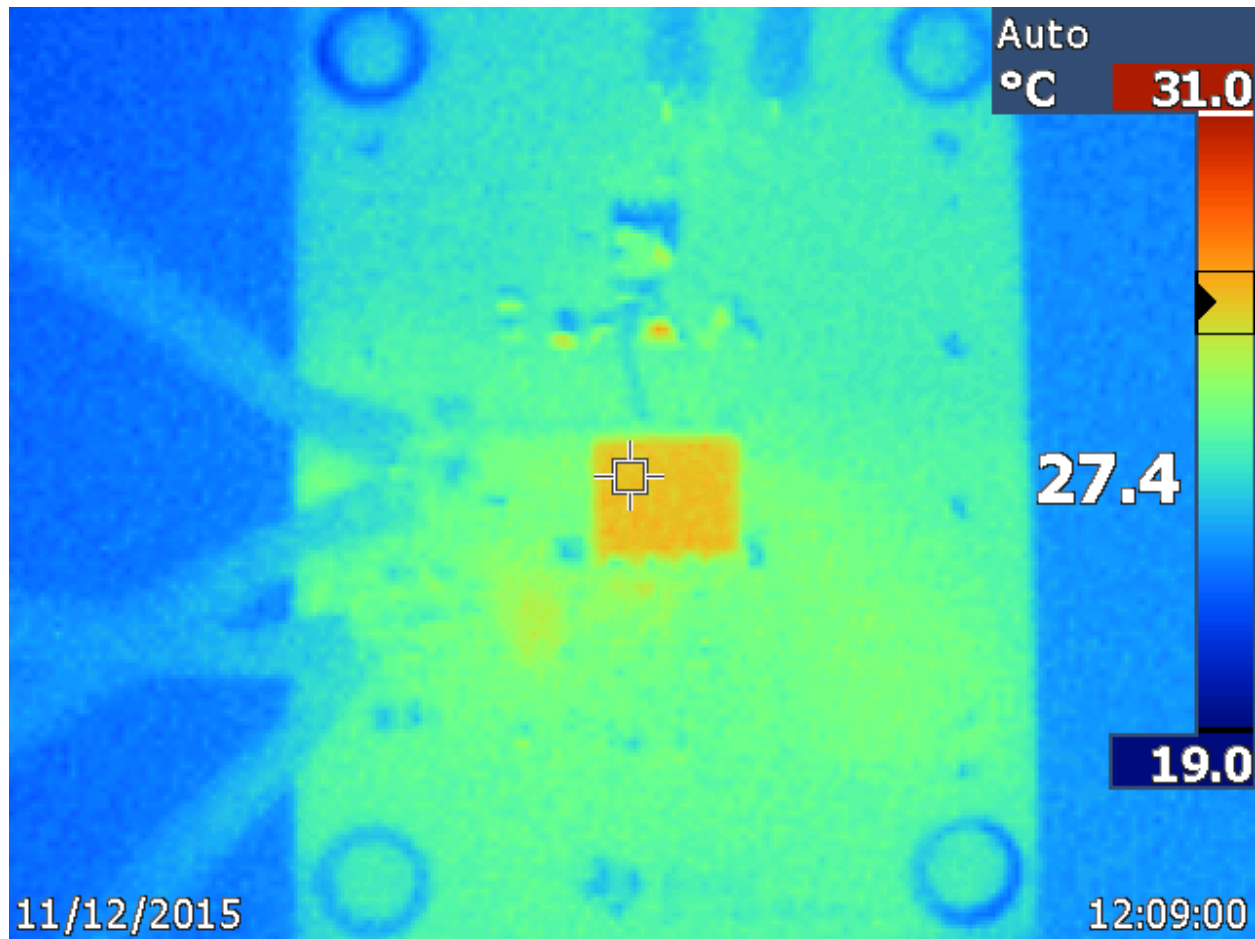


Board Photo (Top)



Board Photo (Bottom)

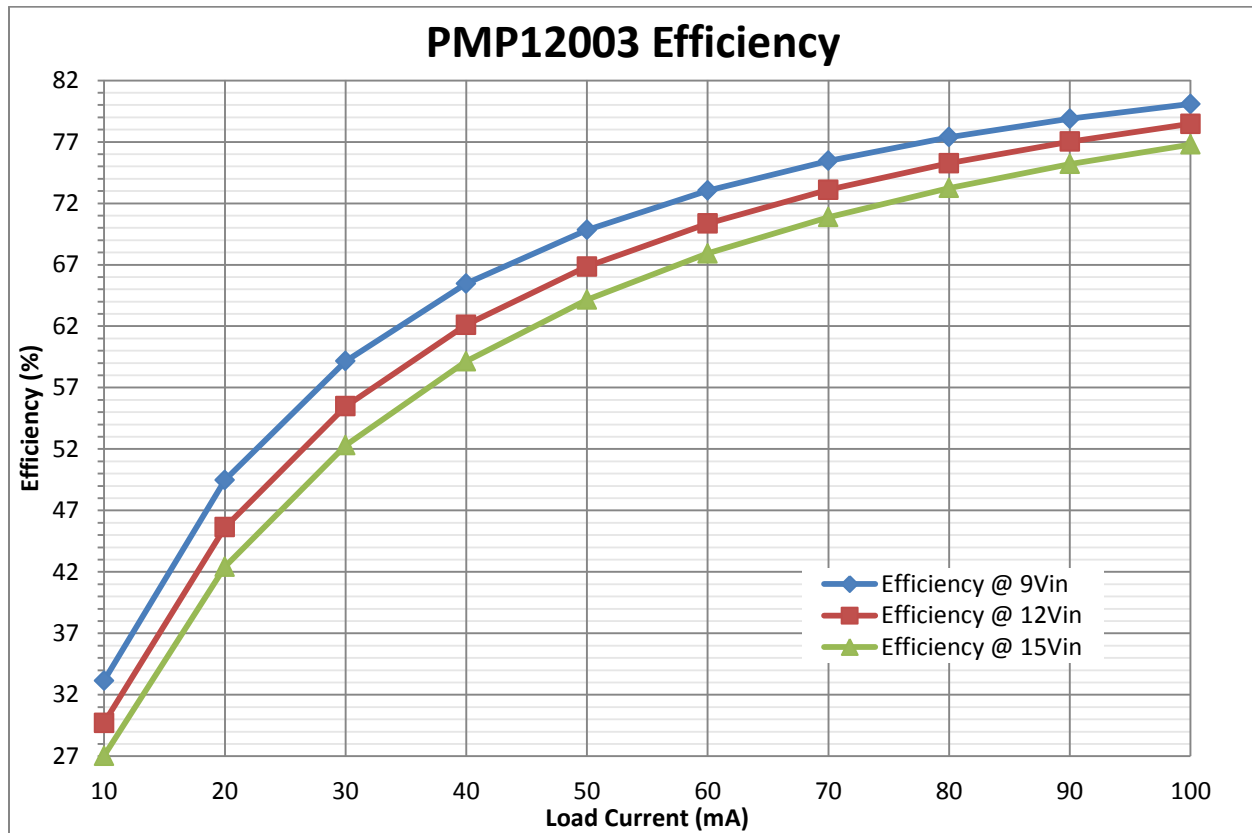
4. Thermal Data



IR Thermal Image Taken at Steady State at 15V_{in} and 100mA Load (V_{out} Primary is not loaded)

5. Efficiency

5.1 Efficiency Chart



5.2 Efficiency Data

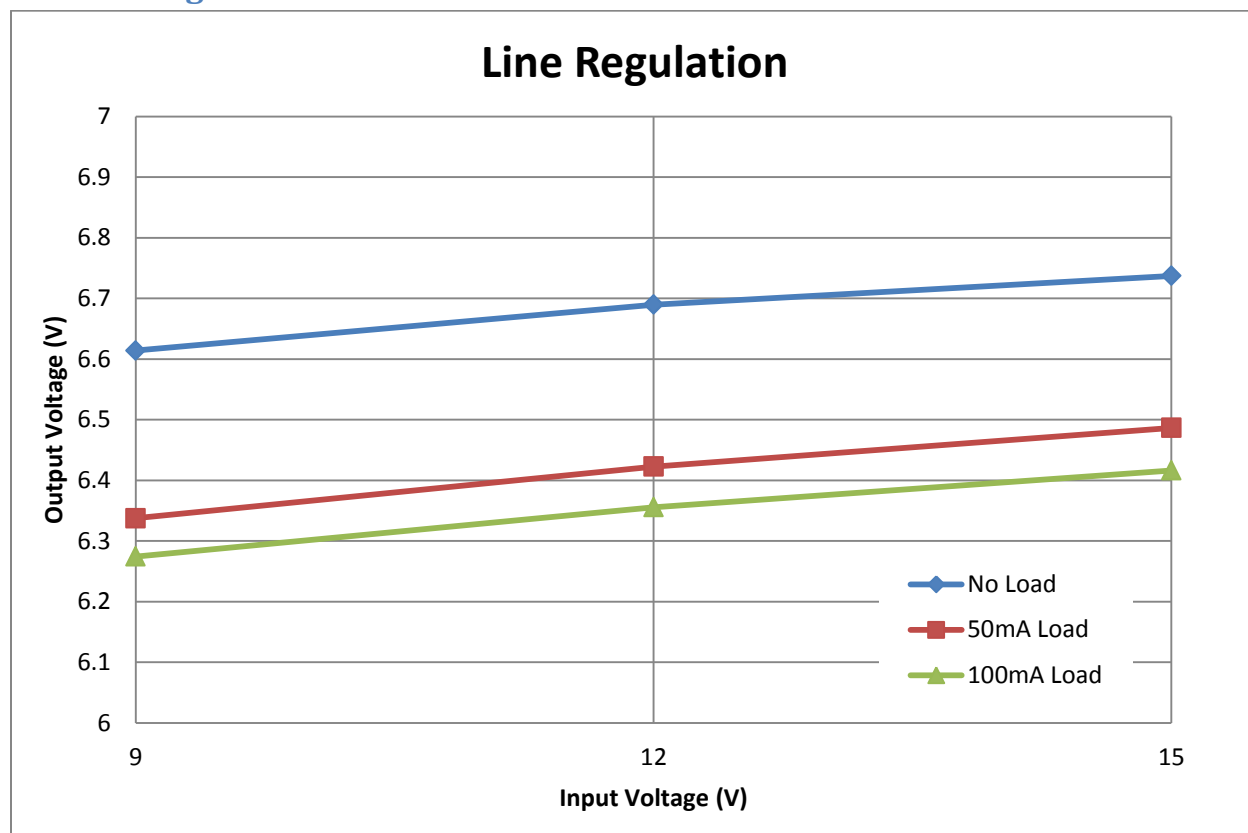
Vin (V)	Iin (mA)	Vout (V)	Iout (mA)	Pin (mW)	Pout (mW)	Ploss (mW)	Efficiency (%)
9	21.664	6.453	10	195.0	64.5	130.4	33.1
9	28.8	6.4068	20	259.2	128.1	131.1	49.4
9	35.96	6.3767	30	323.6	191.3	132.3	59.1
9	43.18	6.3556	40	388.6	254.2	134.4	65.4
9	50.45	6.3375	50	454.1	316.9	137.2	69.8
9	57.75	6.3223	60	519.8	379.3	140.4	73.0
9	65.068	6.3089	70	585.6	441.6	144.0	75.4
9	72.37	6.2965	80	651.3	503.7	147.6	77.3
9	79.72	6.285	90	717.5	565.7	151.8	78.8
9	87.105	6.2744	100	783.9	627.4	156.5	80.0

Vin (V)	Iin (mA)	Vout (V)	Iout (mA)	Pin (mW)	Pout (mW)	Ploss (mW)	Efficiency (%)
12	18.375	6.542	10	220.5	65.4	155.1	29.7
12	23.75	6.4961	20	285.0	129.9	155.1	45.6
12	29.162	6.4656	30	349.9	194.0	156.0	55.4
12	34.6	6.442	40	415.2	257.7	157.5	62.1
12	40.058	6.4227	50	480.7	321.1	159.6	66.8
12	45.558	6.4062	60	546.7	384.4	162.3	70.3
12	51.04	6.392	70	612.5	447.4	165.0	73.1
12	56.54	6.3788	80	678.5	510.3	168.2	75.2
12	62.04	6.367	90	744.5	573.0	171.5	77.0
12	67.542	6.3556	100	810.5	635.6	174.9	78.4

Vin (V)	Iin (mA)	Vout (V)	Iout (mA)	Pin (mW)	Pout (mW)	Ploss (mW)	Efficiency (%)
15	16.323	6.6065	10	244.8	66.1	178.8	27.0
15	20.648	6.5611	20	309.7	131.2	178.5	42.4
15	24.995	6.5303	30	374.9	195.9	179.0	52.3
15	29.36	6.5065	40	440.4	260.3	180.1	59.1
15	33.73	6.4864	50	506.0	324.3	181.6	64.1
15	38.126	6.4693	60	571.9	388.2	183.7	67.9
15	42.528	6.4544	70	637.9	451.8	186.1	70.8
15	46.932	6.4406	80	704.0	515.2	188.7	73.2
15	51.322	6.4278	90	769.8	578.5	191.3	75.1
15	55.739	6.4163	100	836.1	641.6	194.5	76.7

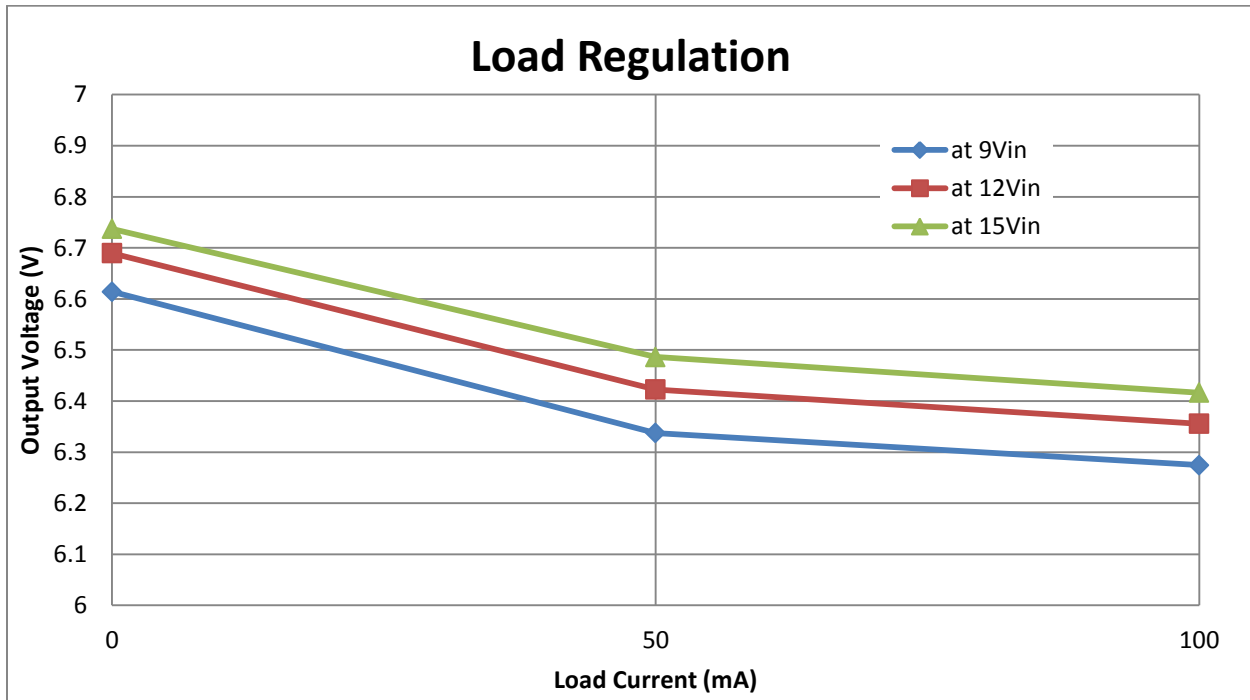
6 Output Voltage Regulation

6.1 Line Regulation



Line Regulation Data			
	No Load	50mA Load	100mA Load
Vin (V)	Vout (V)	Vout (V)	Vout (V)
9	6.614	6.3375	6.2744
12	6.6896	6.4227	6.3556
15	6.7371	6.4864	6.4163

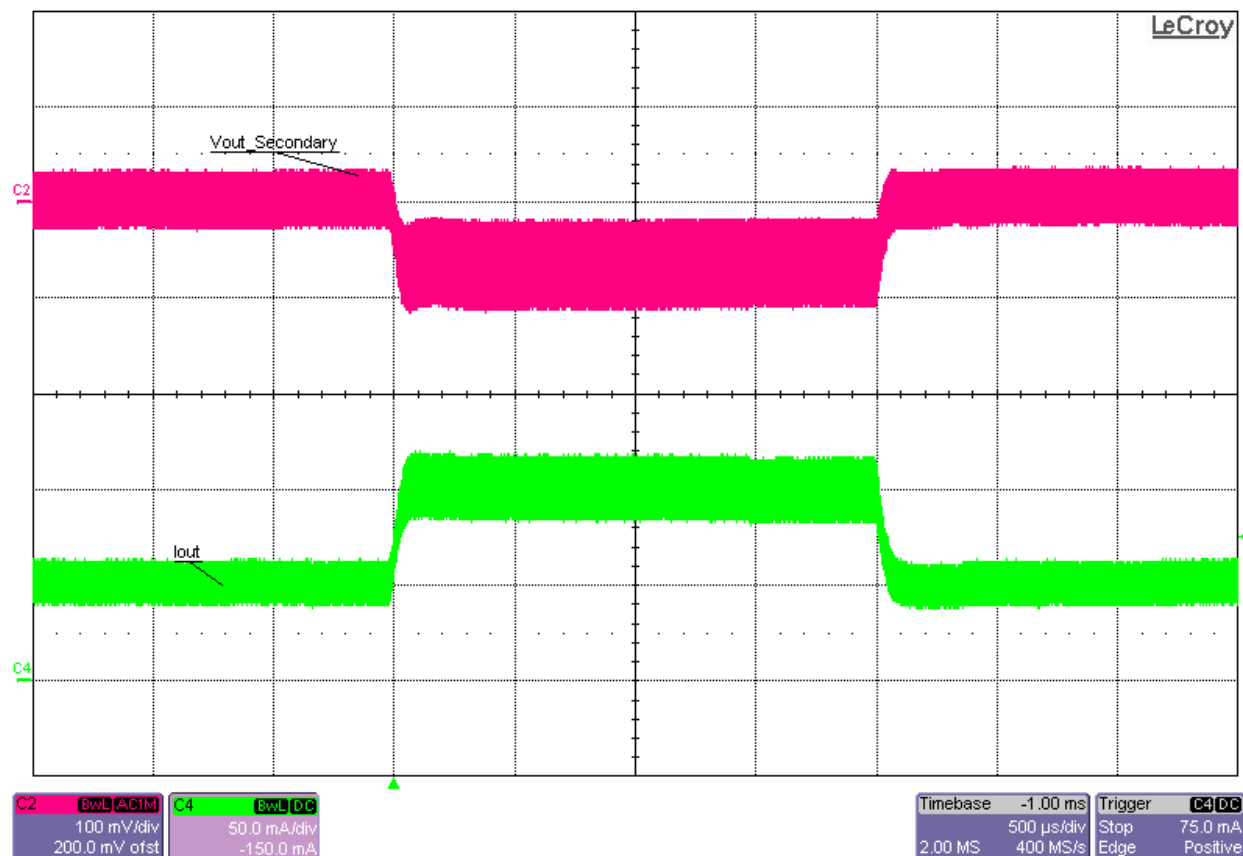
6.2 Load Regulation



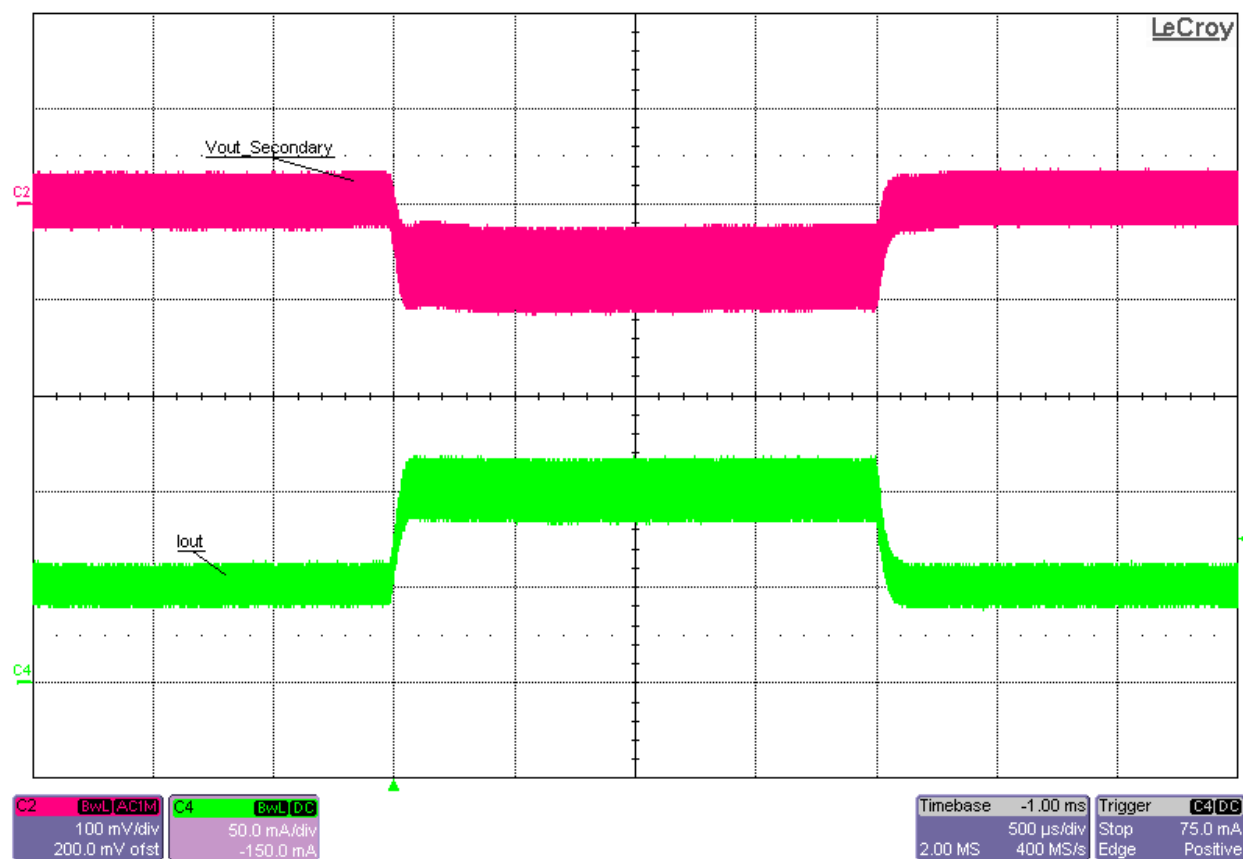
Load Regulation Data			
	9Vin	12Vin	15Vin
Load (mA)	Vout (V)	Vout (V)	Vout (V)
0	6.614	6.6896	6.7371
50	6.3375	6.4227	6.4864
100	6.2744	6.3556	6.4163

7 Waveforms

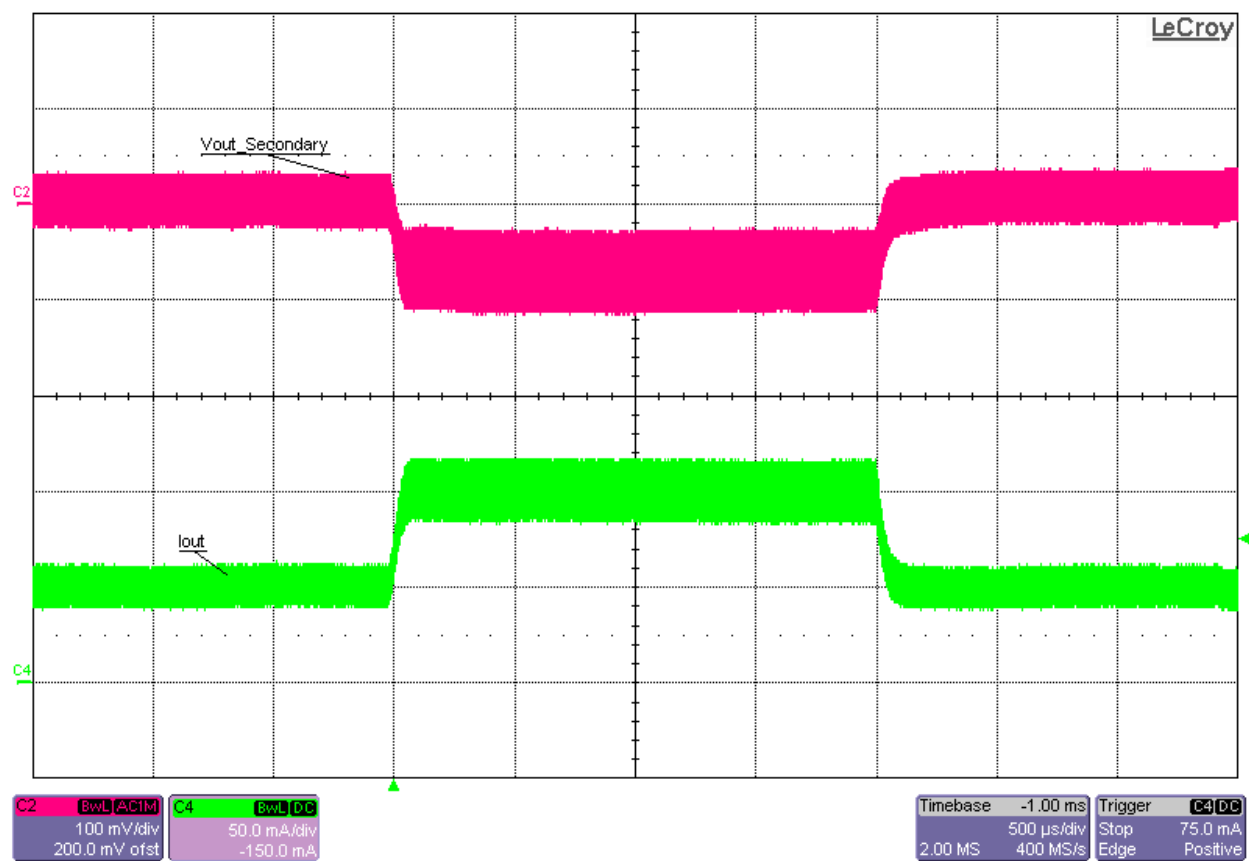
7.1 Load Transient Response



Load Transient Response of Secondary-Side Output Undergoing a 50% to 100% (50mA-to-100mA) Load Step at 9Vin

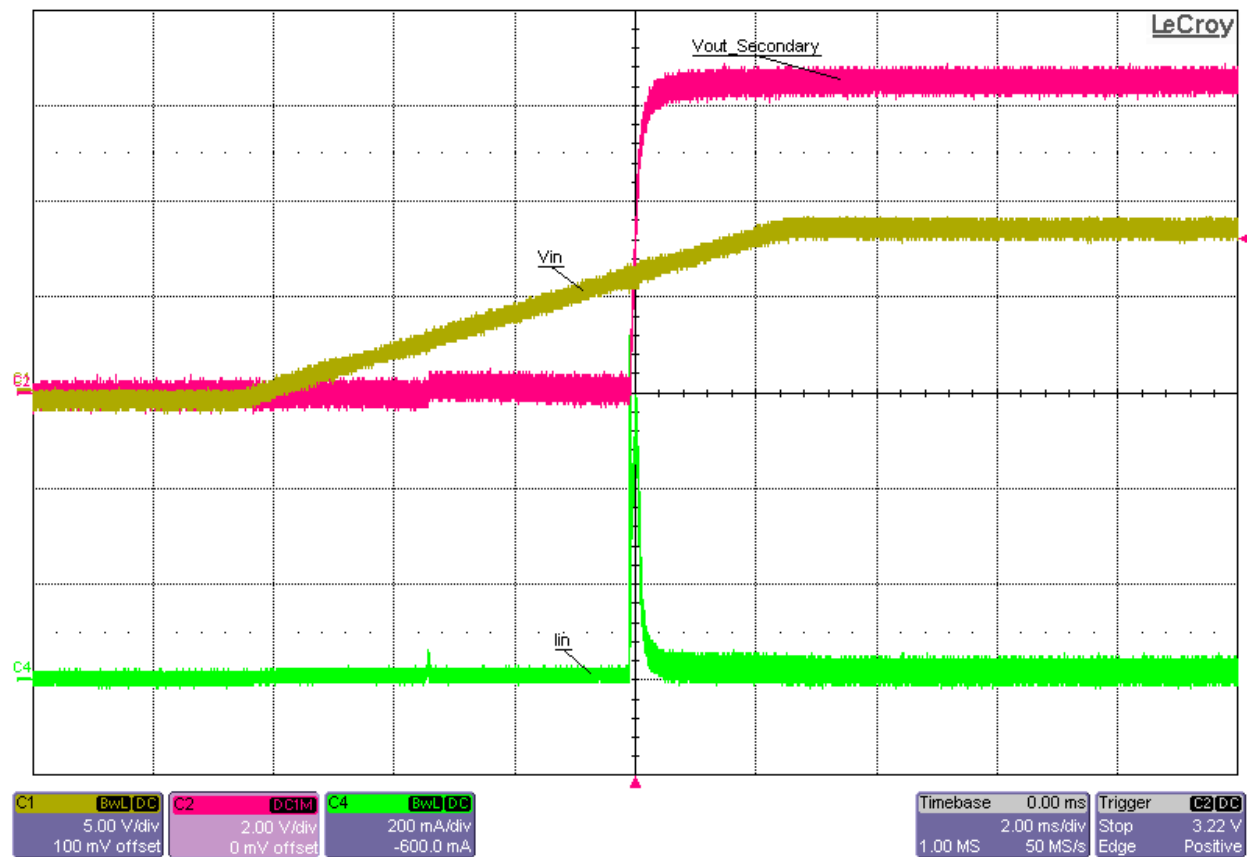


Load Transient Response of Secondary-Side Output Undergoing a 50% to 100% (50mA-to-100mA) Load Step at 12Vin

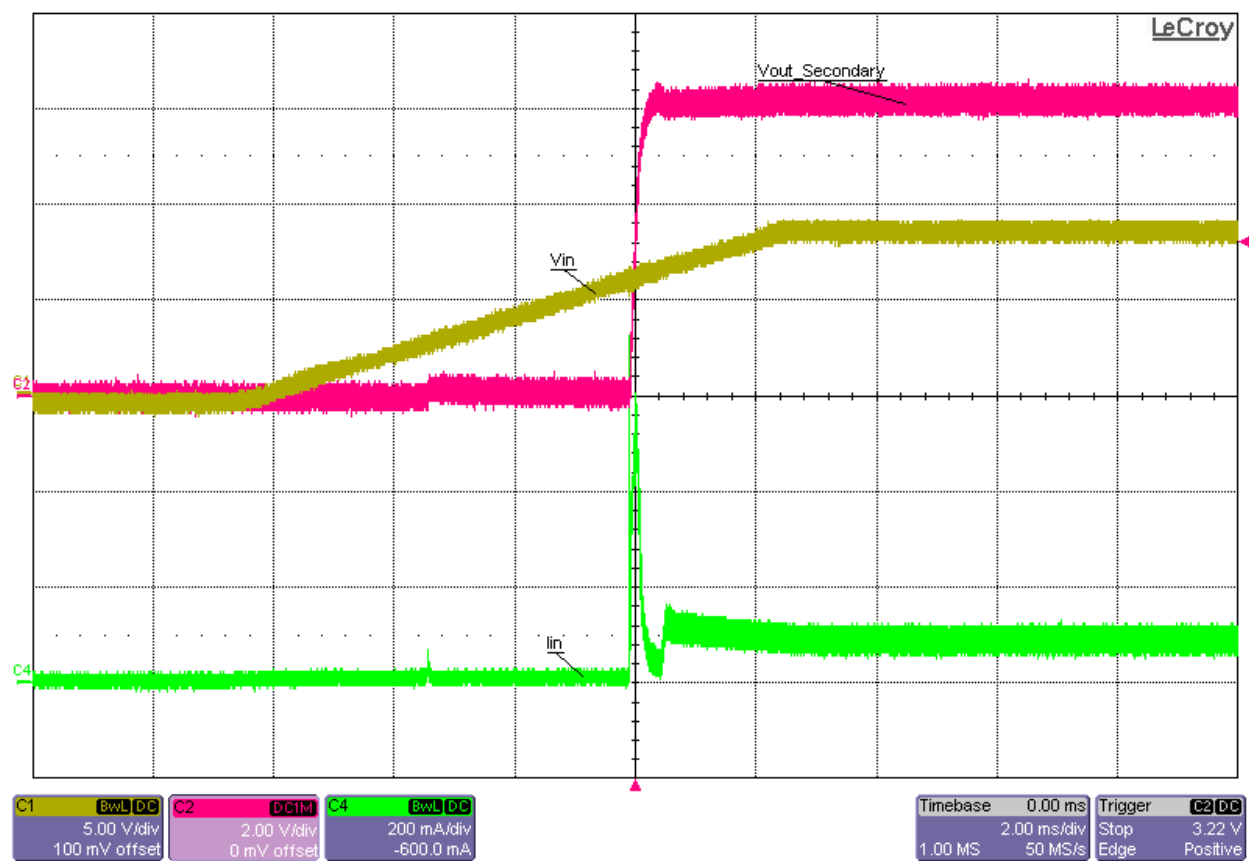


Load Transient Response of Secondary-Side Output Undergoing a 50% to 100% (50mA-to-100mA) Load Step at 15Vin

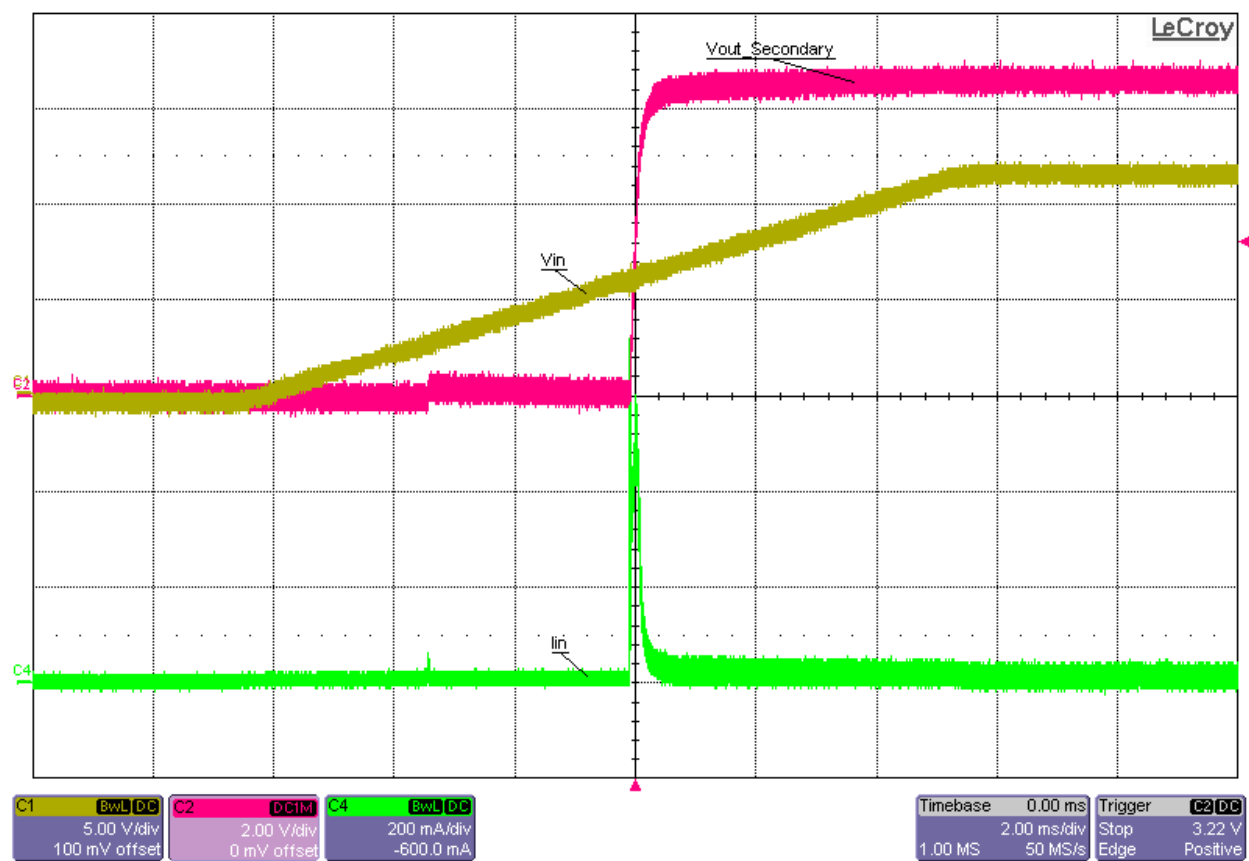
7.2 Startup



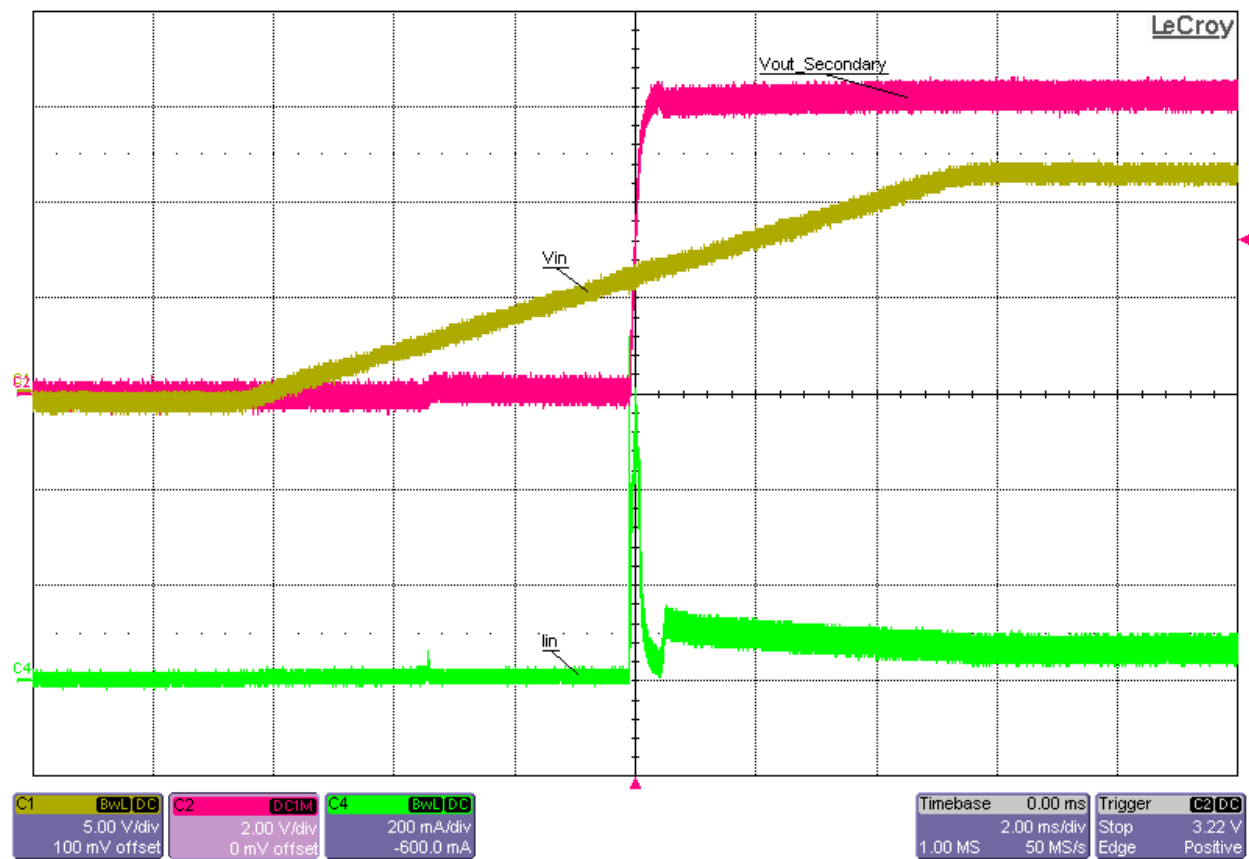
Startup into No Load at 9Vin



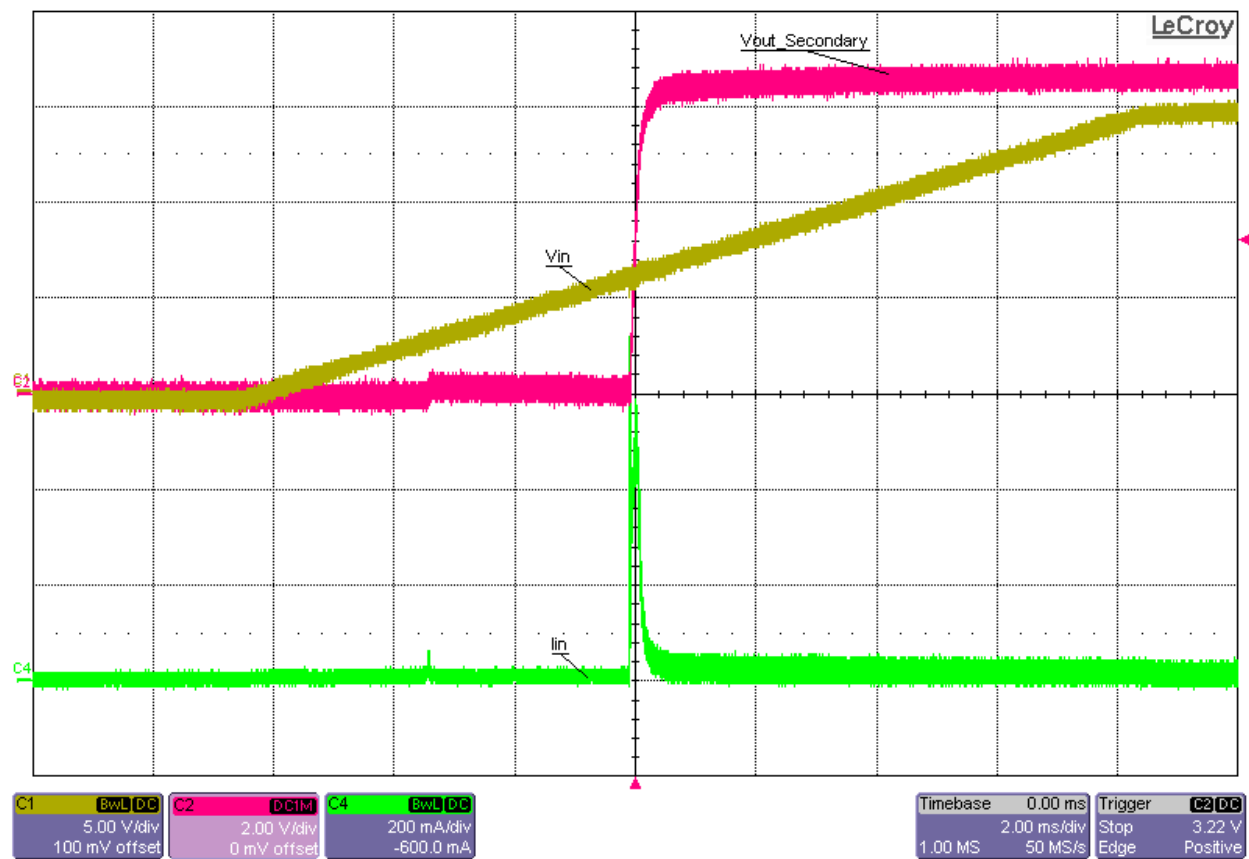
Startup into 100mA Constant-Current Load at 9Vin



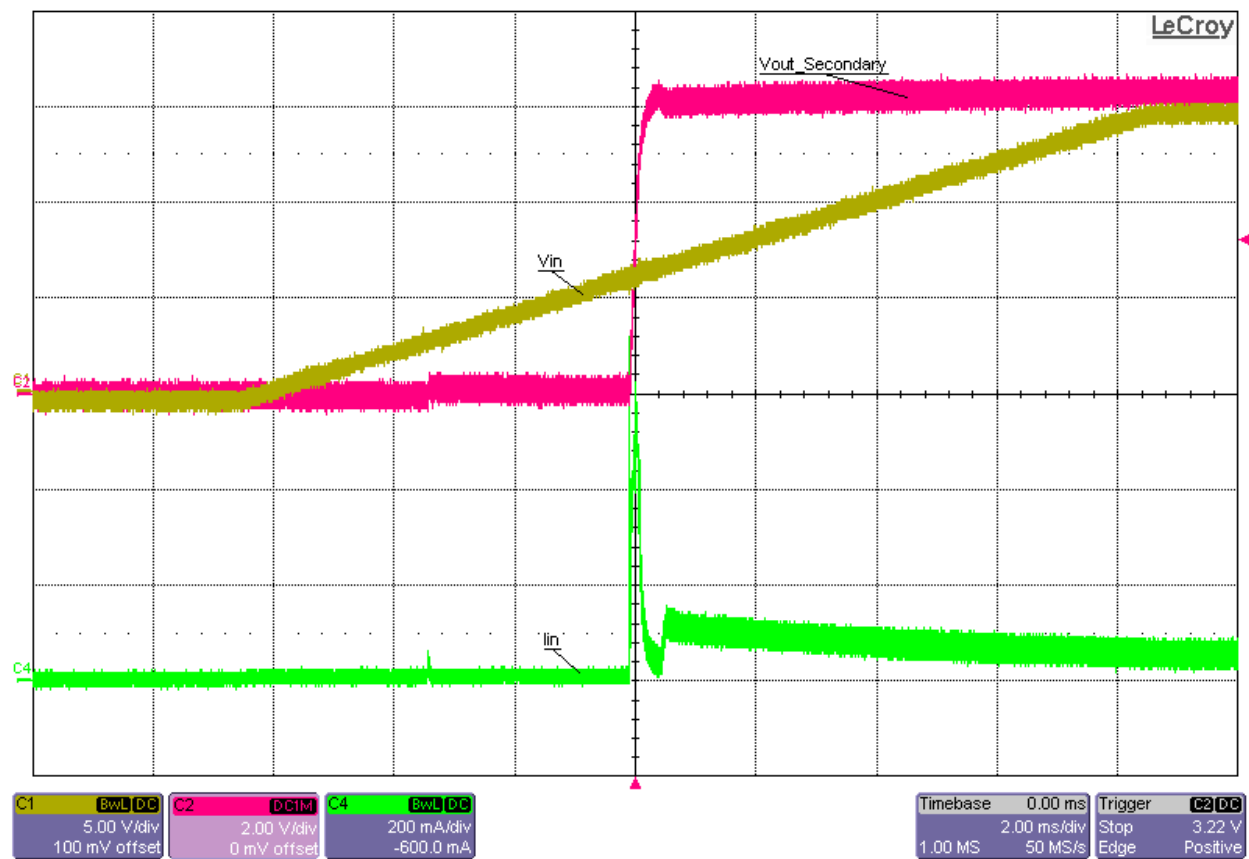
Startup into No Load at 12Vin



Startup into 100mA Constant-Current Load at 12Vin

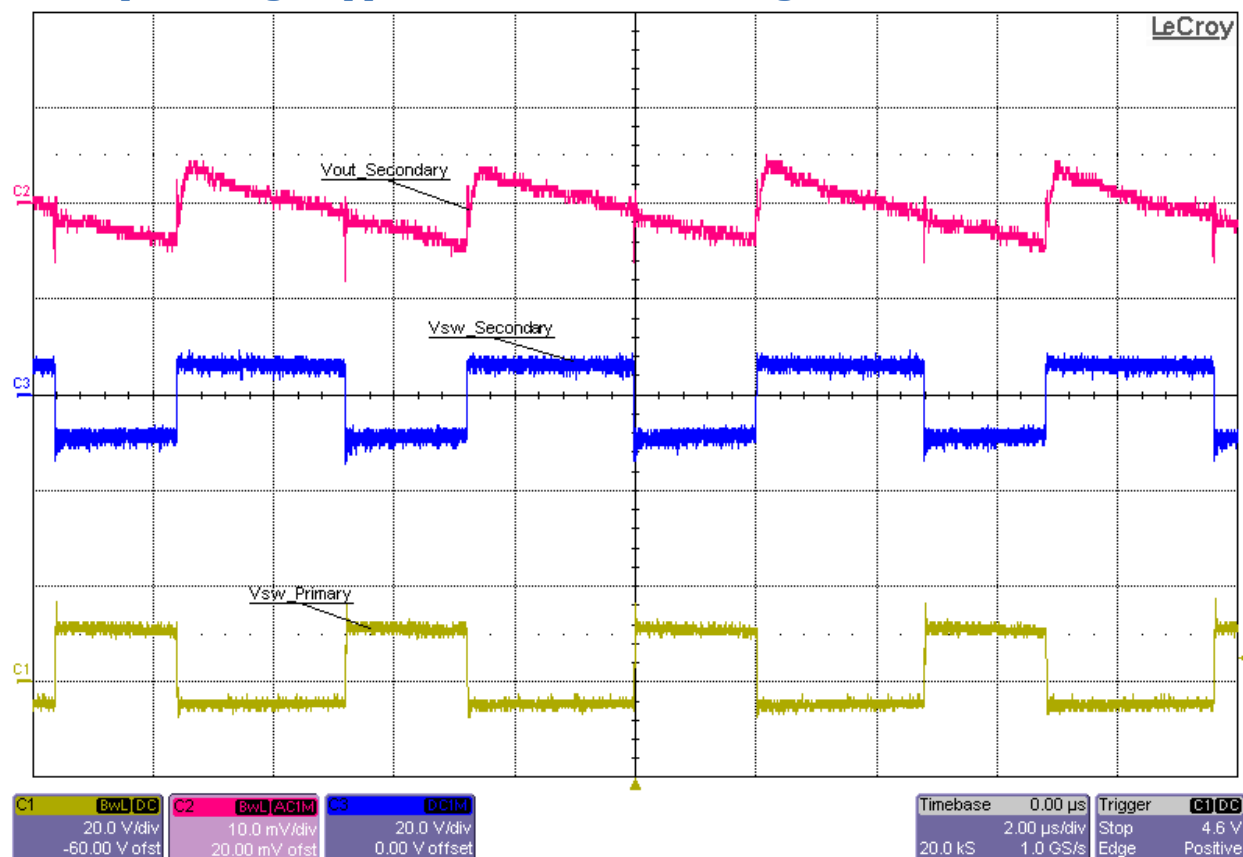


Startup into No Load at 15Vin

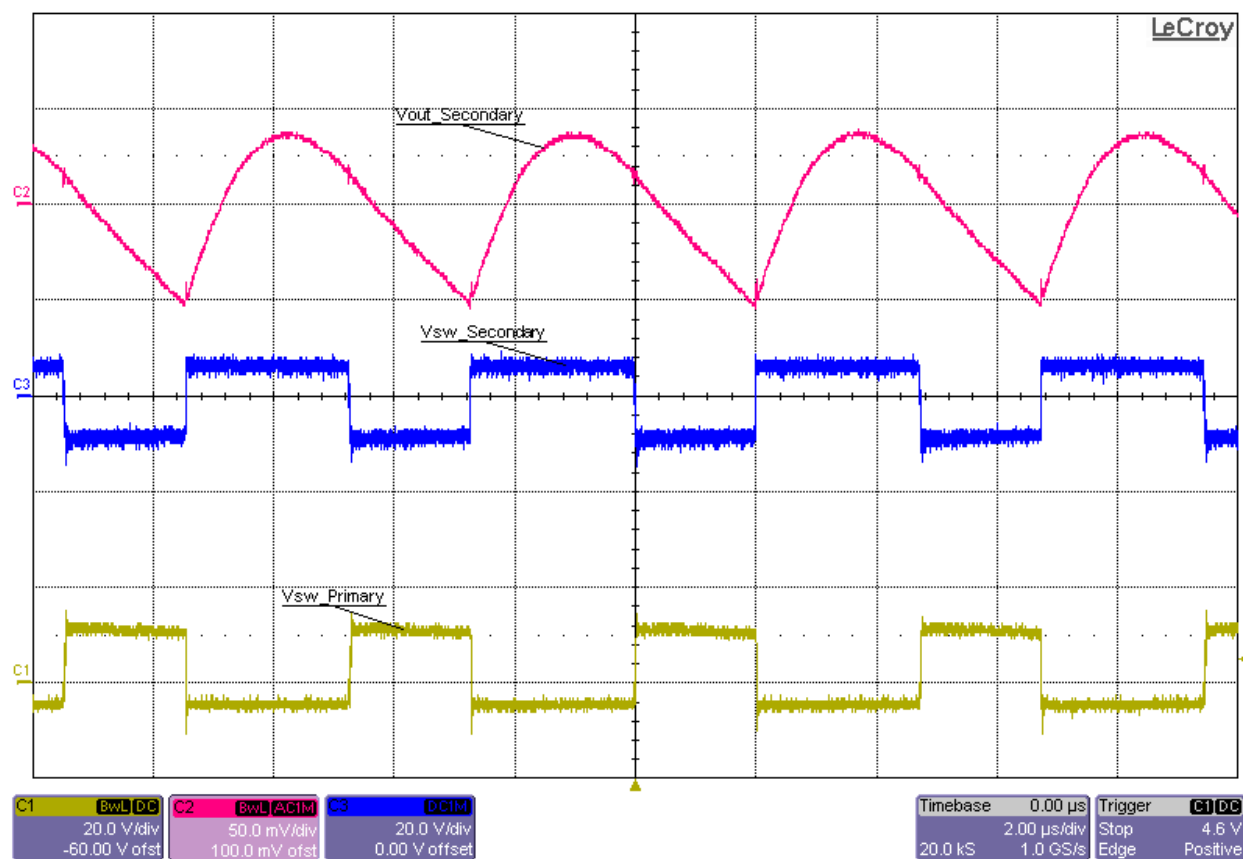


Startup into 100mA Constant-Current Load at 15Vin

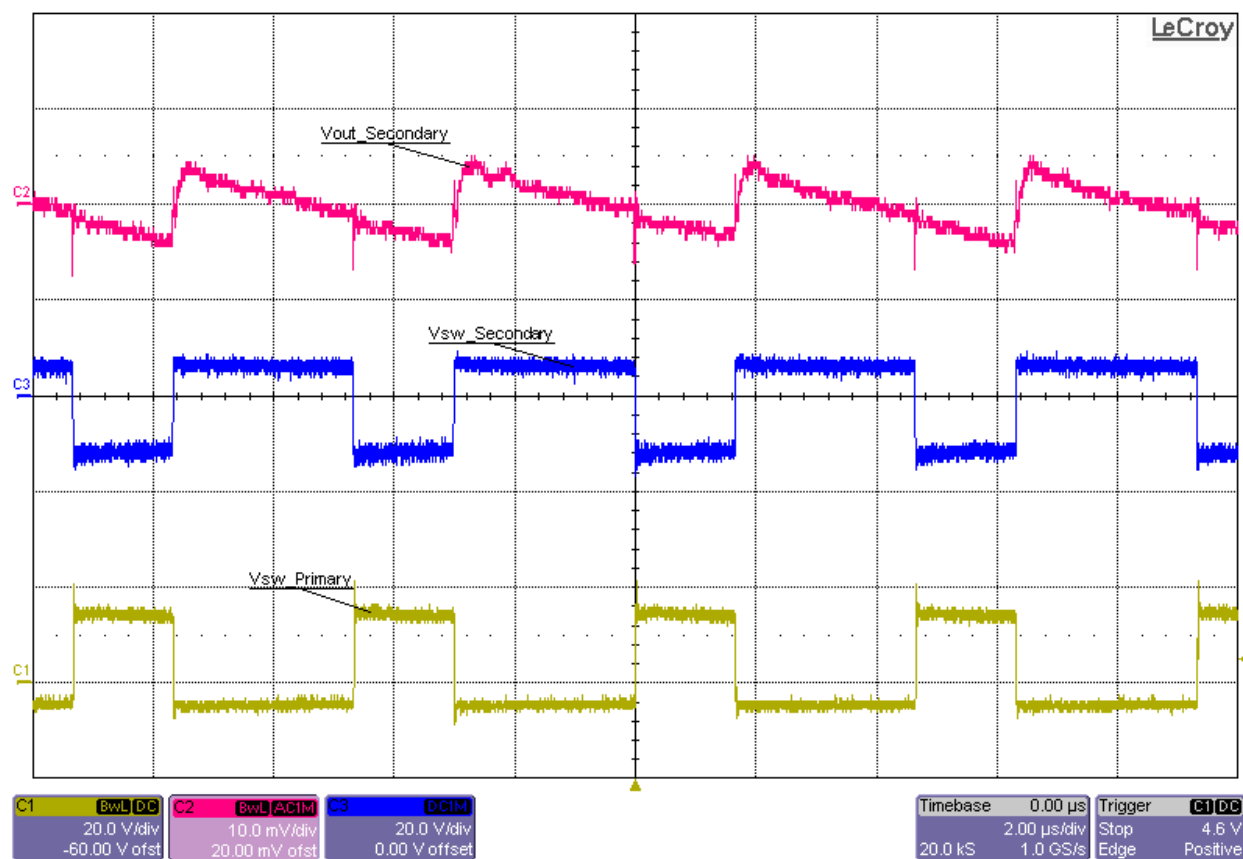
7.3 Output Voltage Ripple and Switch Node Voltage



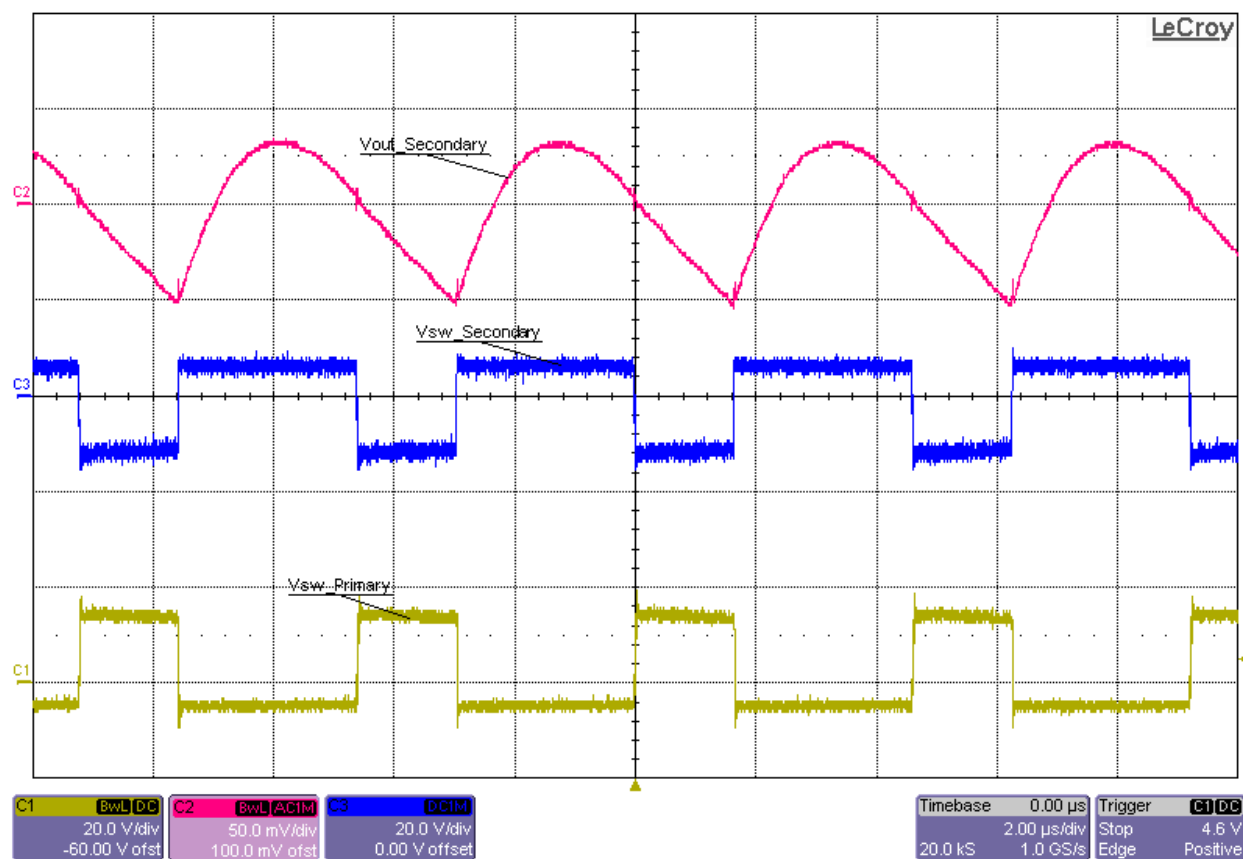
Primary-Side and Secondary-Side Switch Node Voltages and Secondary-Side Output Voltage Ripple at 9Vin and No Load ($V_{\text{ripple}} \approx 10\text{mVp-p}$)



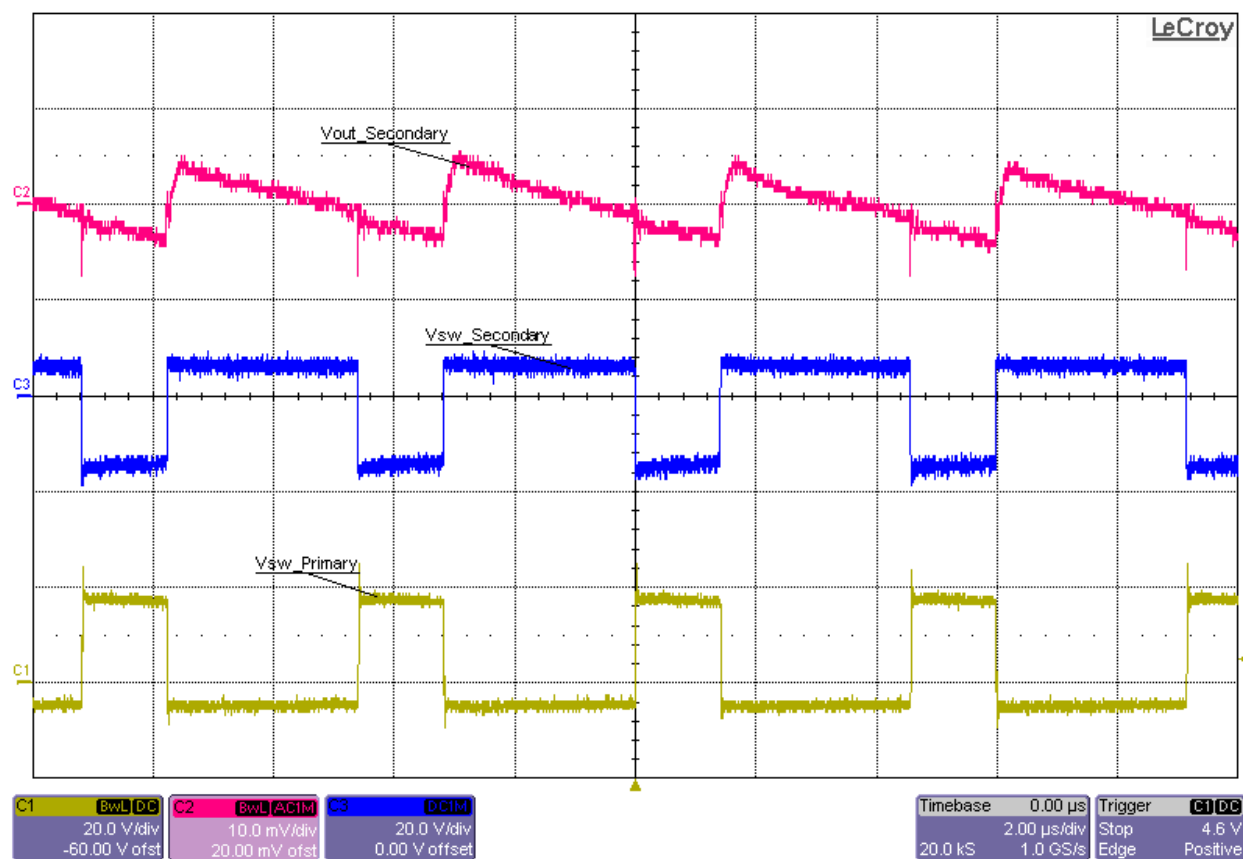
Primary-Side and Secondary-Side Switch Node Voltages and Secondary-Side Output Voltage Ripple at 9Vin and 100mA Load ($V_{\text{ripple}} \approx 85\text{mVp-p}$)



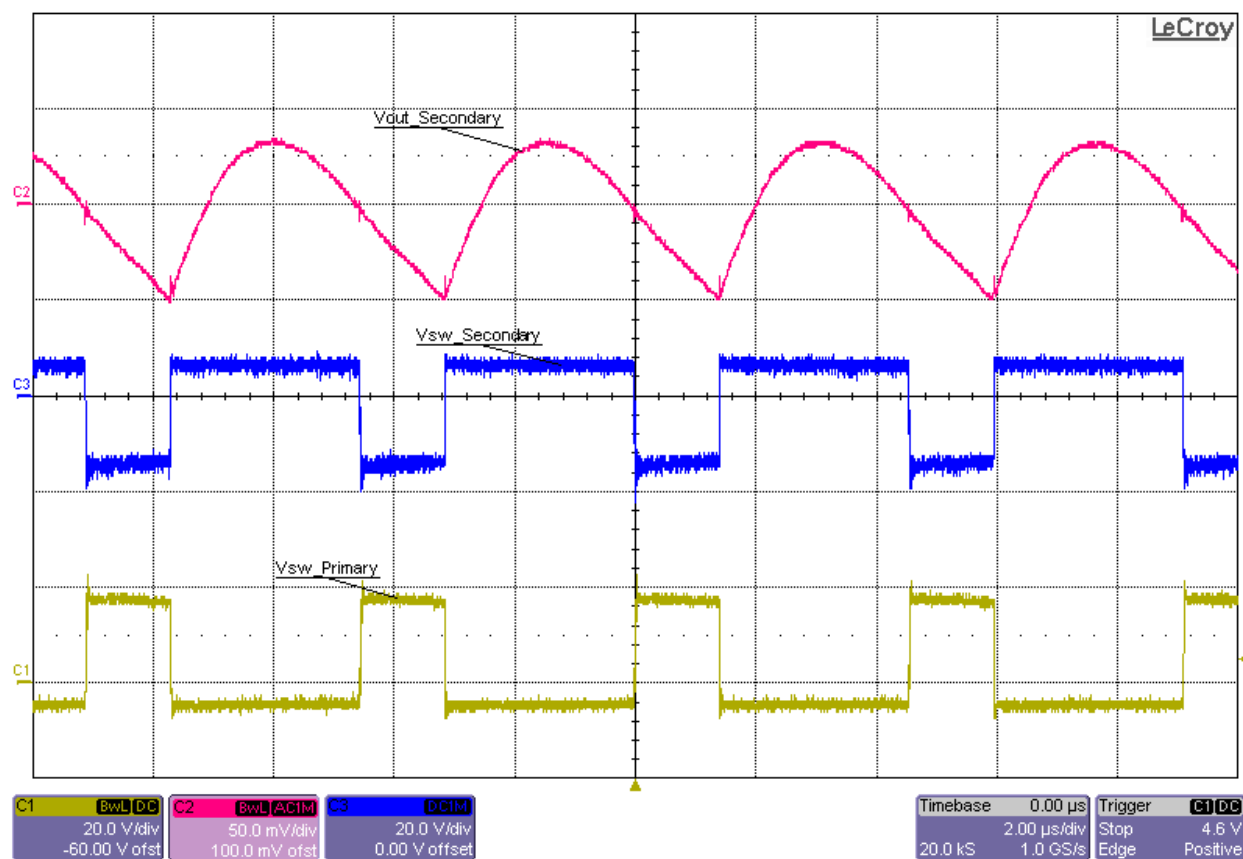
Primary-Side and Secondary-Side Switch Node Voltages and Secondary-Side Output Voltage Ripple at 12Vin and No Load ($V_{\text{ripple}} \approx 11\text{mV}_{\text{p-p}}$)



Primary-Side and Secondary-Side Switch Node Voltages and Secondary-Side Output Voltage Ripple at 12Vin and 100mA Load ($V_{\text{ripple}} \approx 82\text{mVp-p}$)

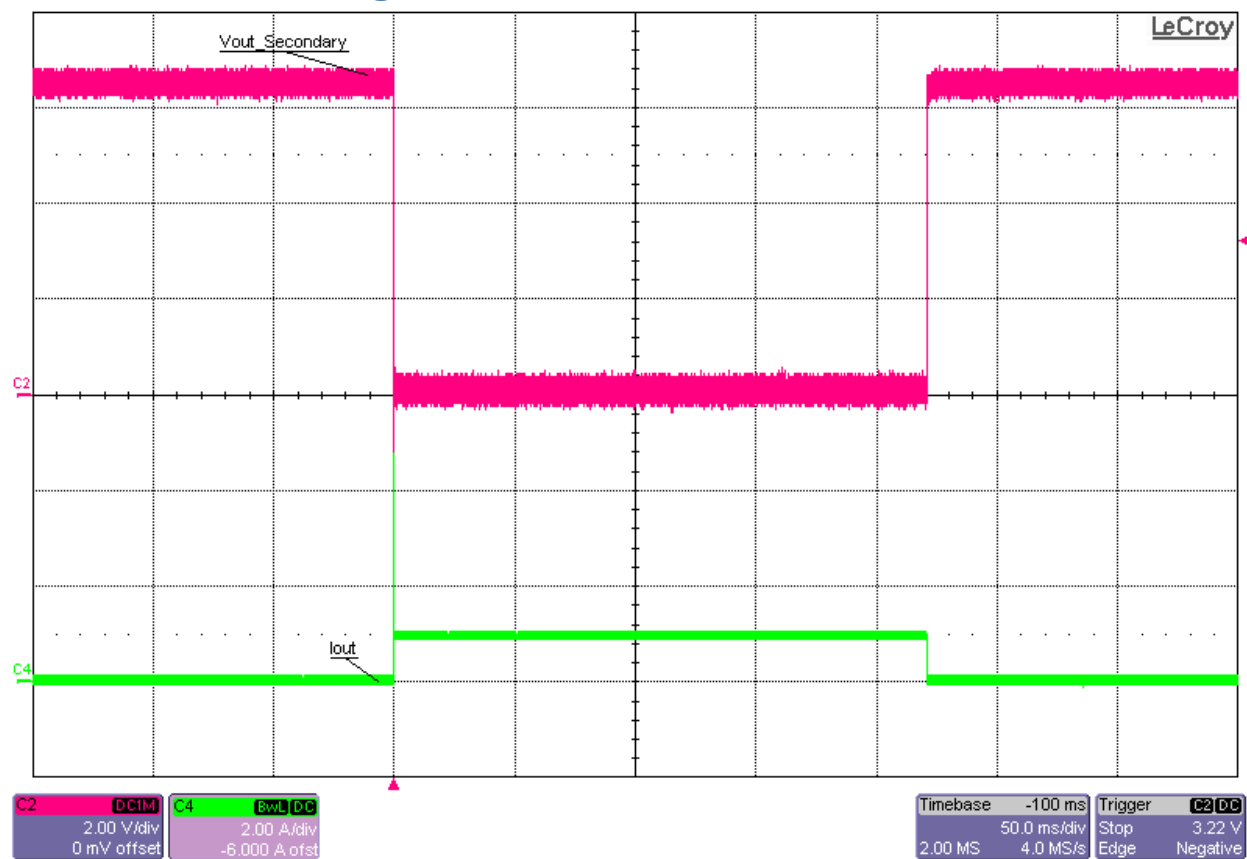


Primary-Side and Secondary-Side Switch Node Voltages and Secondary-Side Output Voltage Ripple at 15Vin and No Load ($V_{\text{ripple}} \approx 12\text{mVp-p}$)

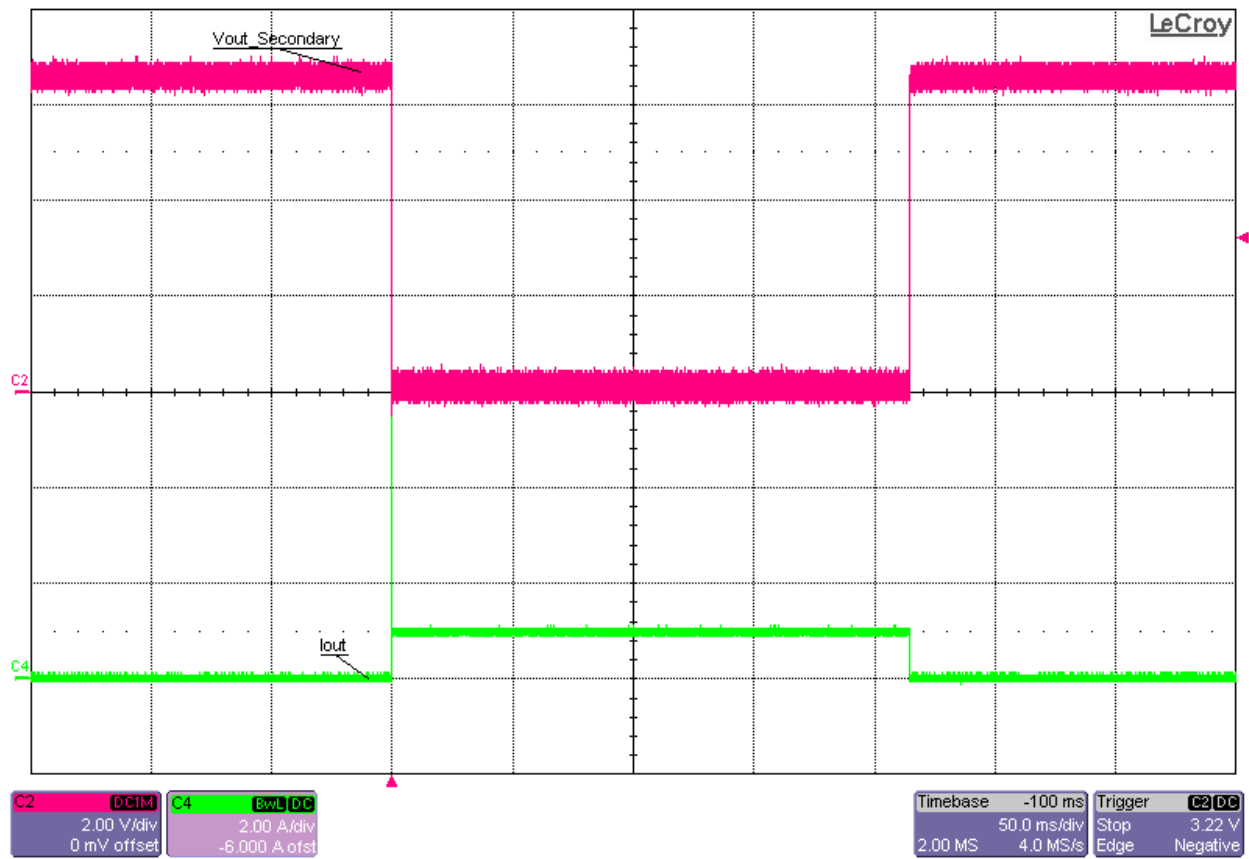


Primary-Side and Secondary-Side Switch Node Voltages and Secondary-Side Output Voltage Ripple at 15Vin and 100mA Load ($V_{\text{ripple}} \approx 83\text{mVp-p}$)

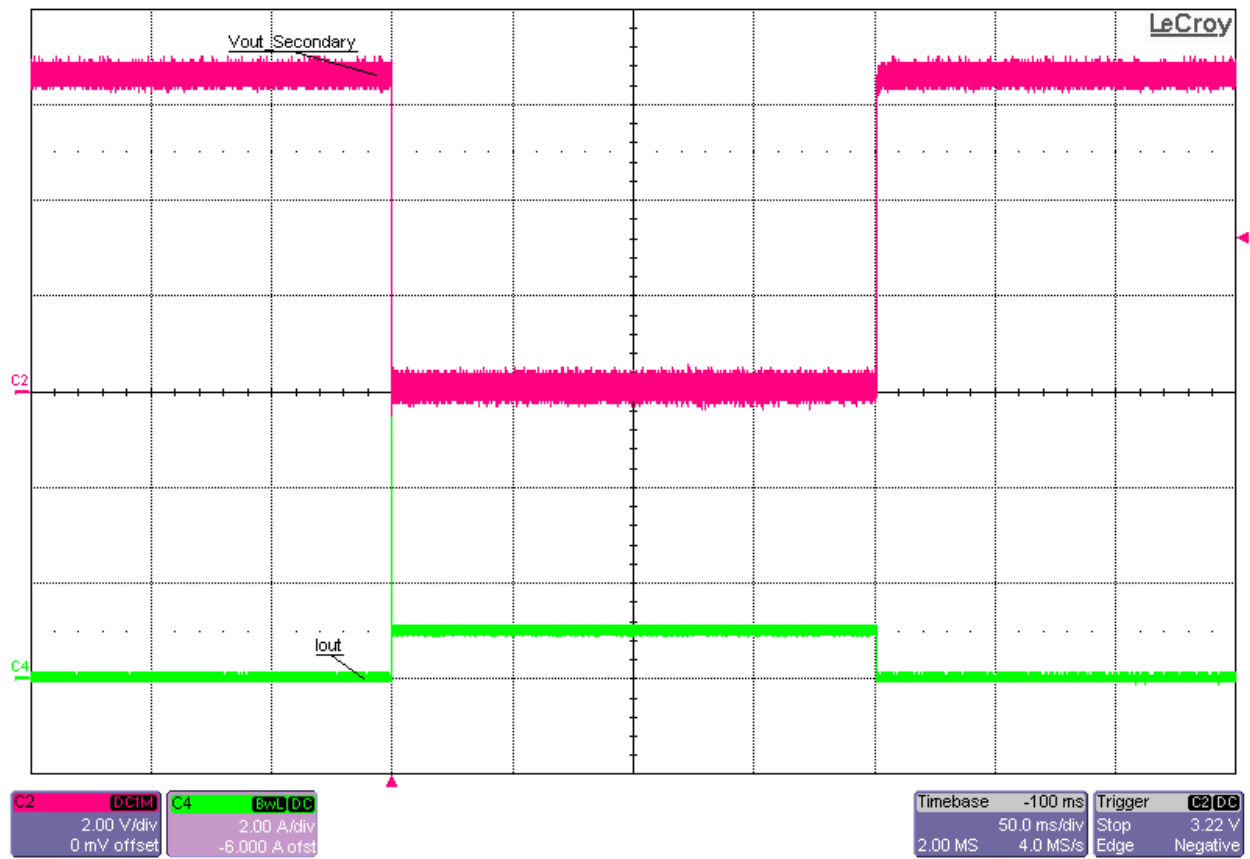
7.4 Short Circuit Testing



Short Circuit Applied to Secondary-Side Output Rail While Unloaded with Input Voltage at 9V



Short Circuit Applied to Secondary-Side Output Rail While Unloaded with Input Voltage at 12V



Short Circuit Applied to Secondary-Side Output Rail While Unloaded with Input Voltage at 15V

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