

**Test Data  
For PMP9309  
12/4/2013**



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## 1. Design Specifications

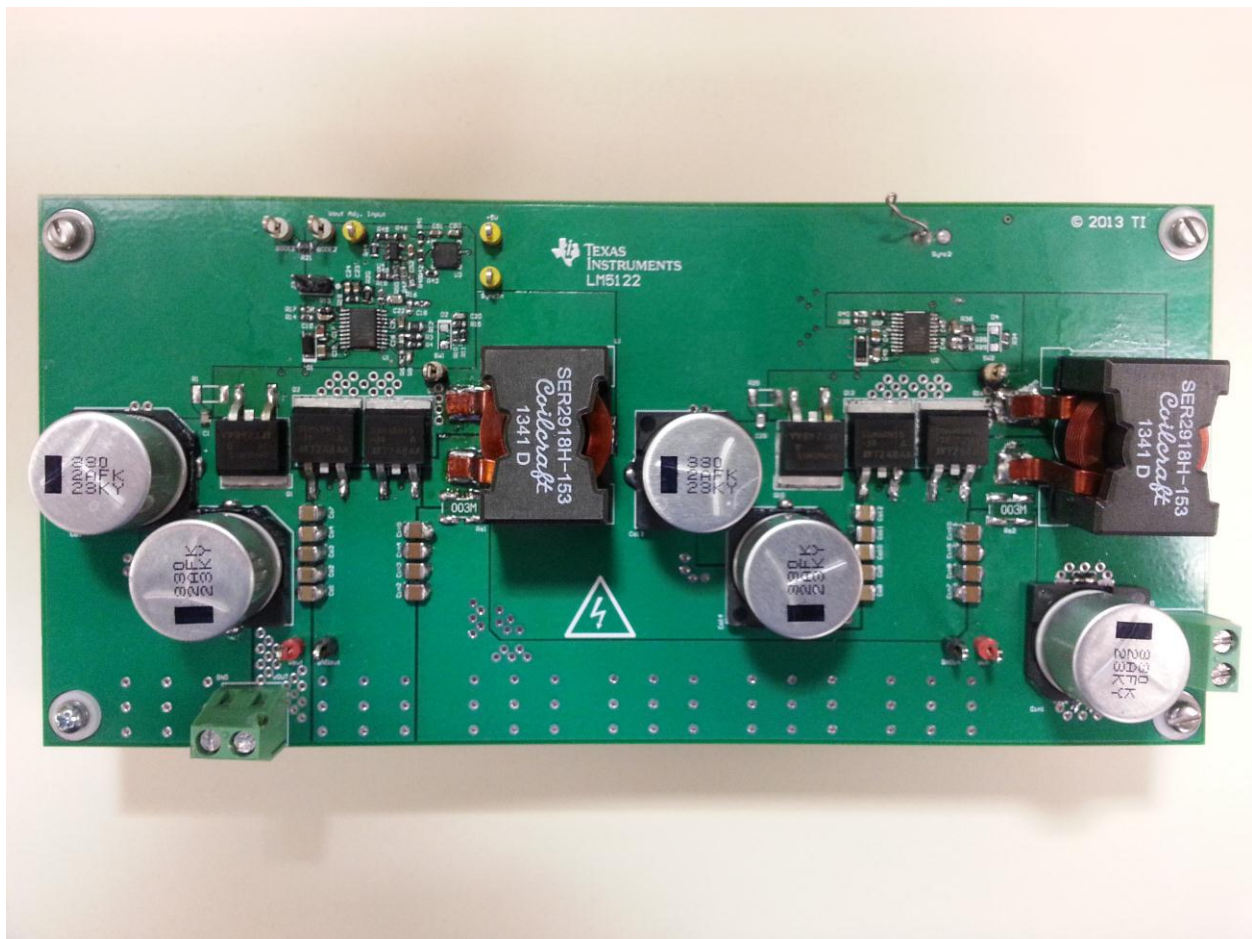
<b>Vin</b>	<b>18VDC to 20VDC</b>
<b>Vout</b>	<b>25VDC to 85VDC</b>
<b>Iout</b>	<b>3A Continuous (5.7A peak)</b>
<b>Approximate Switching Frequency</b>	<b>260KHz Effective (130KHz per phase; shifted 180°)</b>

## 2. Circuit Description

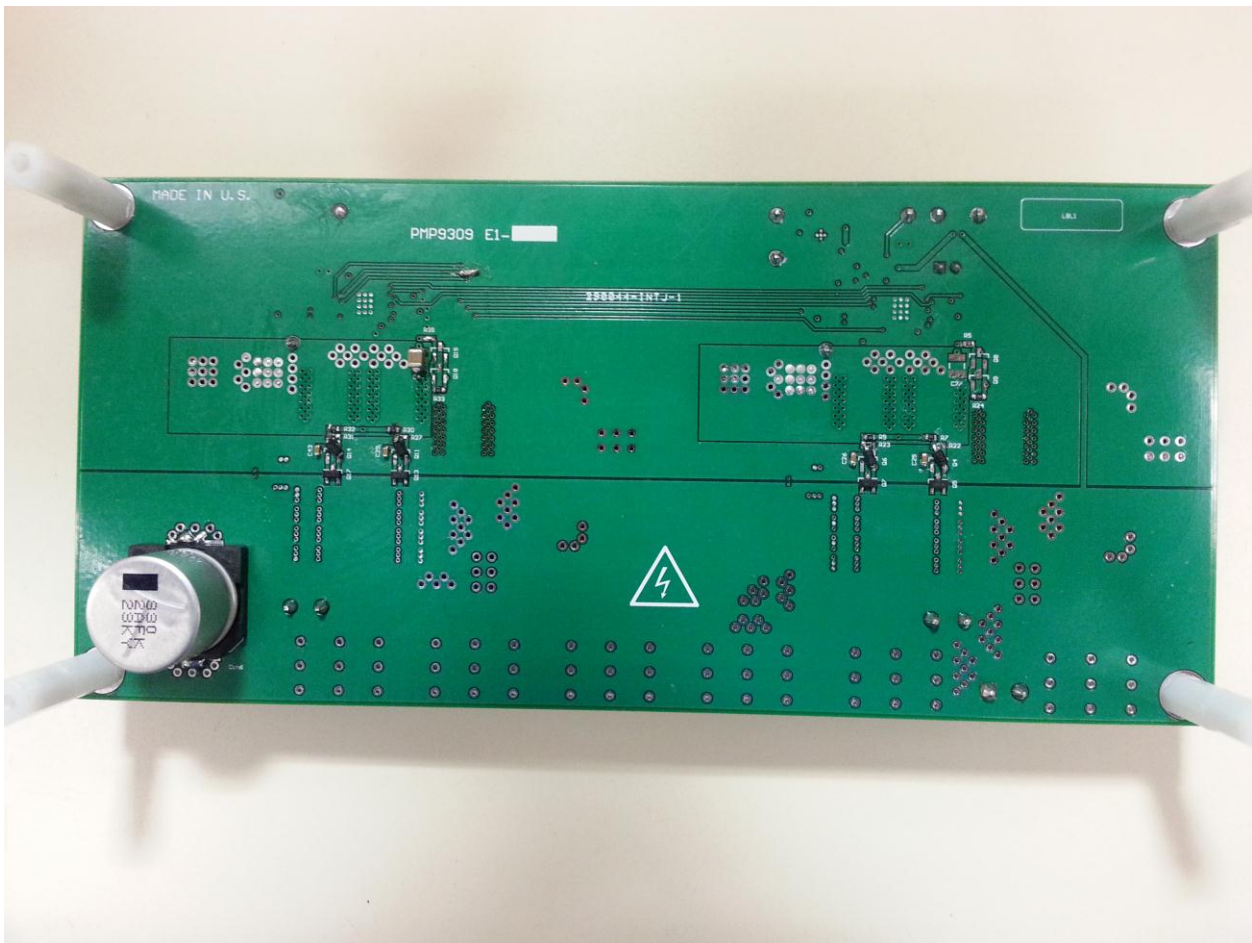
PMP9309 is a Dual Phase Synchronous Boost Converter which accepts an input voltage of 18Vin to 20Vin and provides an output of anywhere between 25Vout and 85Vout. It is capable of supplying 3A of continuous current and 5.7A of peak current to the load. This design was built on a 6-layer PCB and designed for effective heat dissipation.

## 3. PMP9309 Board Photos

Board Dimensions: 7.5" x 3.5"

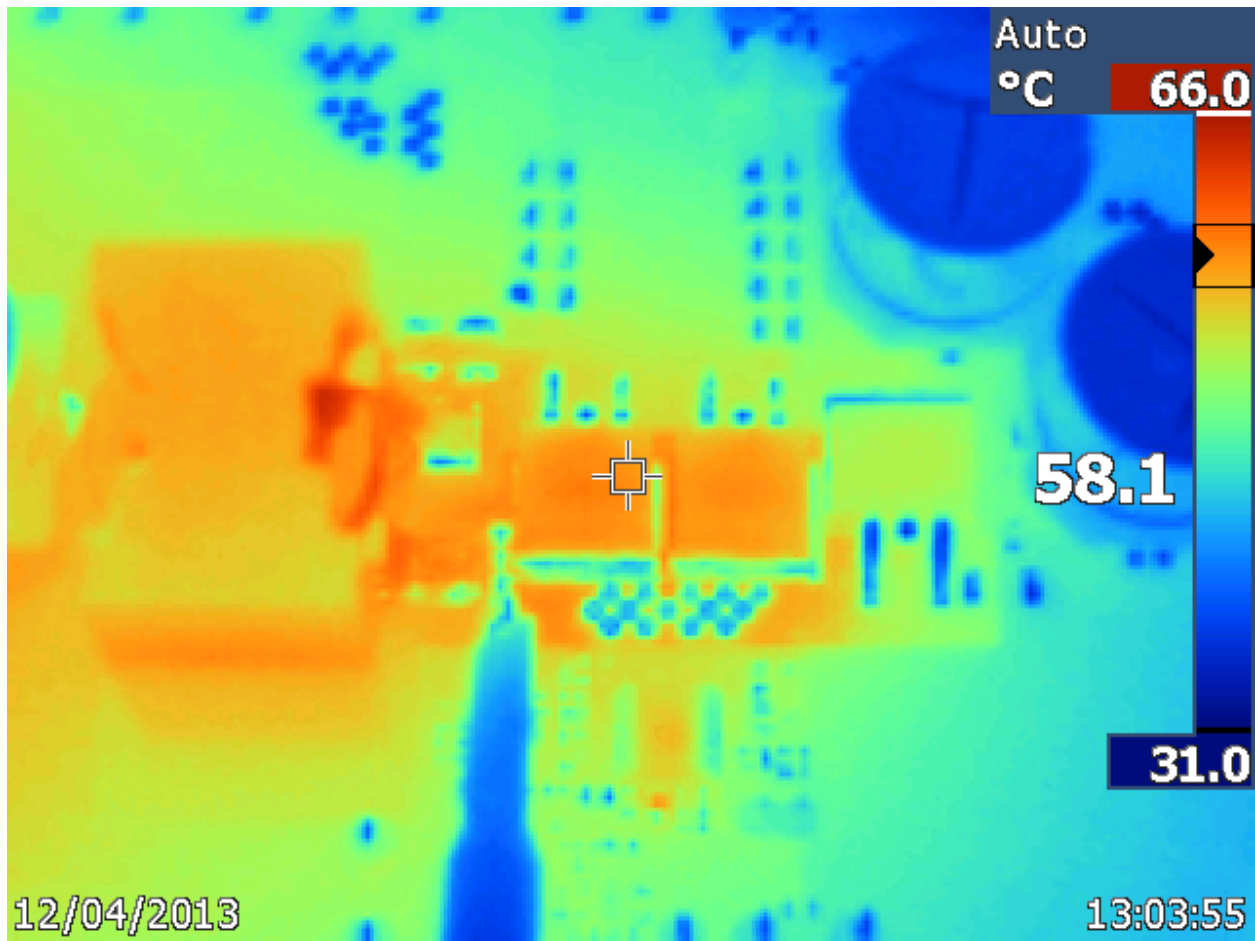


Board Photo (Top)

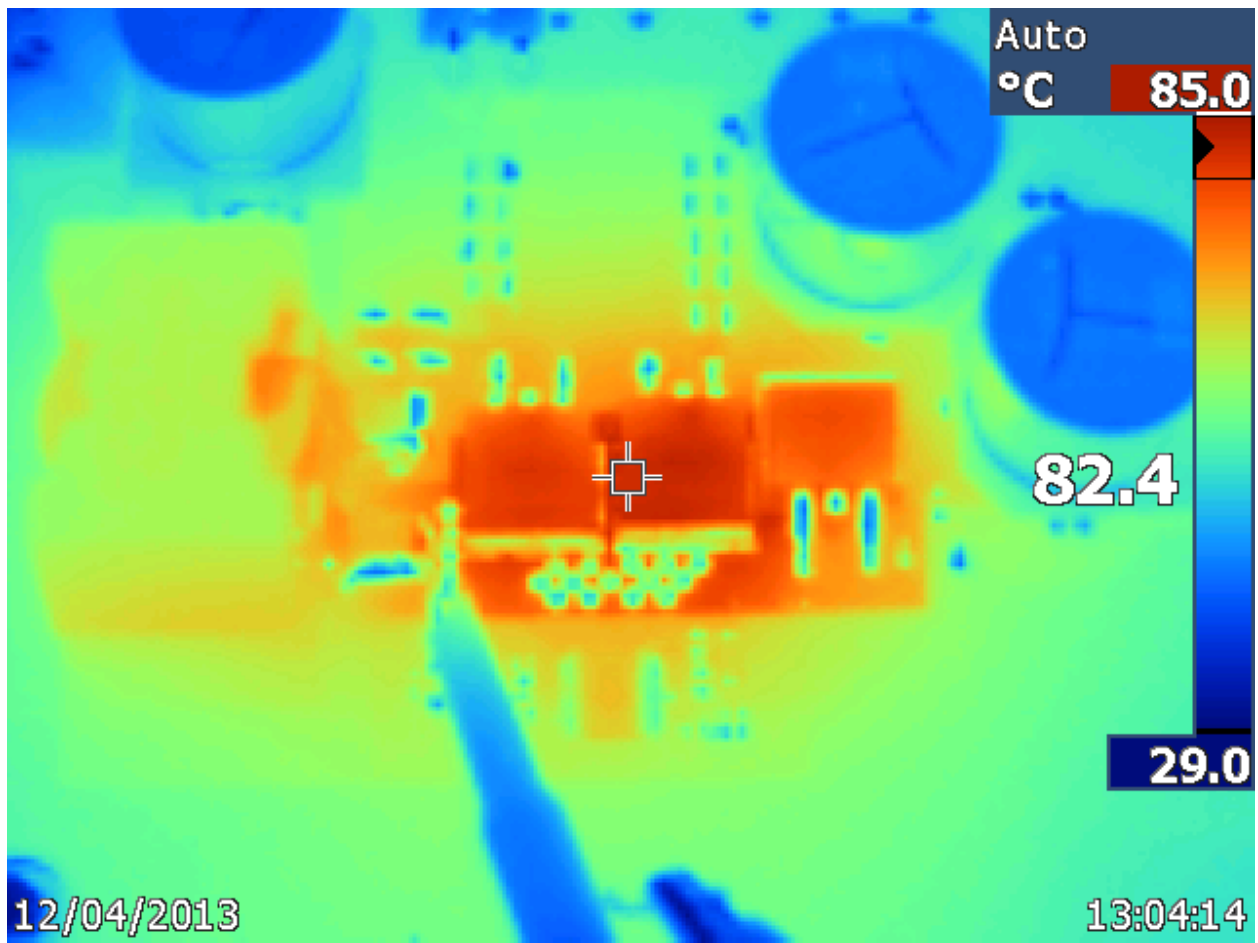


**Board Photo (Bottom)**

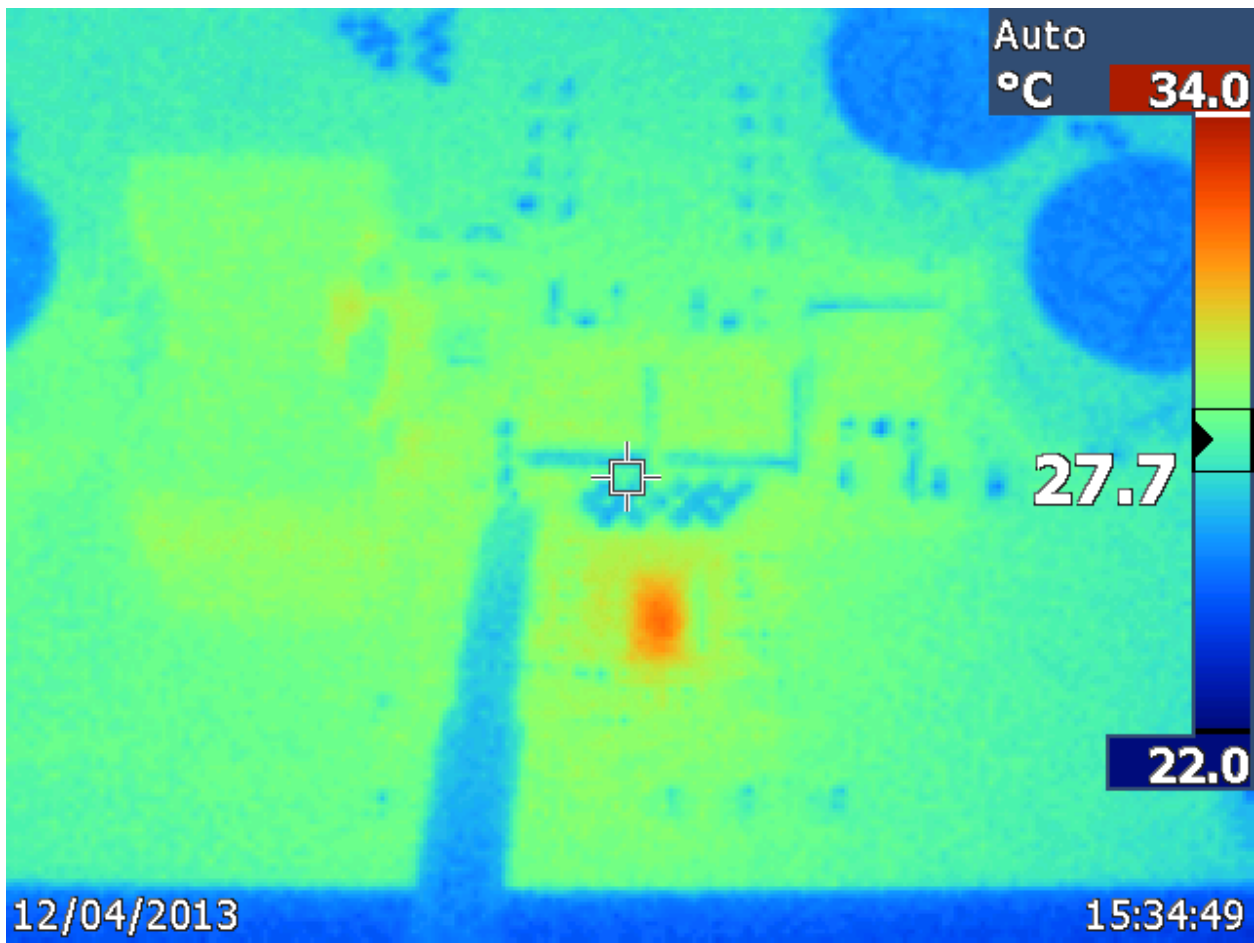
#### 4. Thermal Data



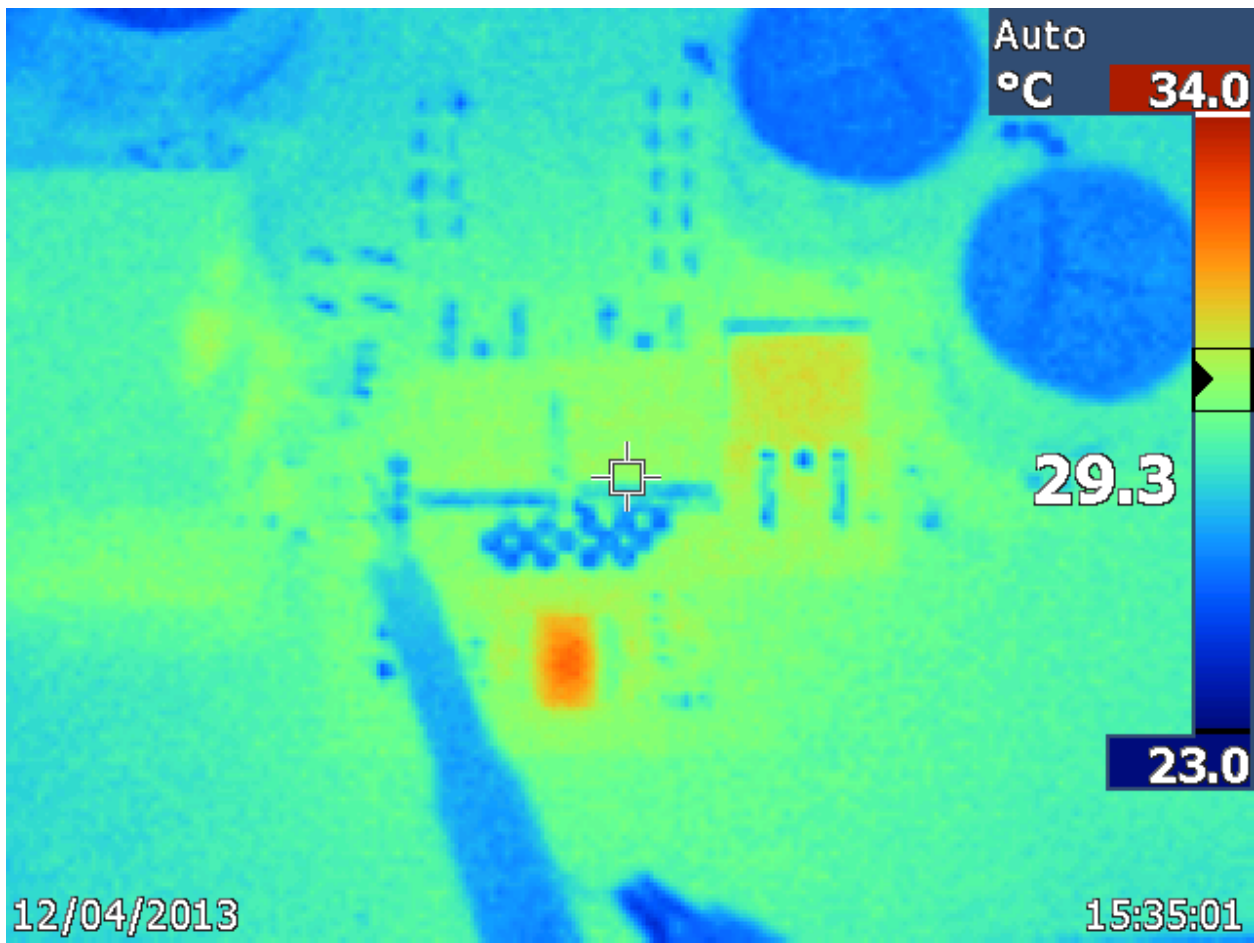
IR thermal image taken of Phase1 at steady state with  $V_{in} = 18V$ ,  $V_{out} = 80V$ , and 3A load (no airflow)



IR thermal image taken of Phase2 at steady state with  $V_{in} = 18V$ ,  $V_{out} = 80V$ , and 3A load (no airflow)



IR thermal image taken of Phase1 at steady state with  $V_{in} = 18V$ ,  $V_{out} = 25V$ , and 3A load (no airflow)

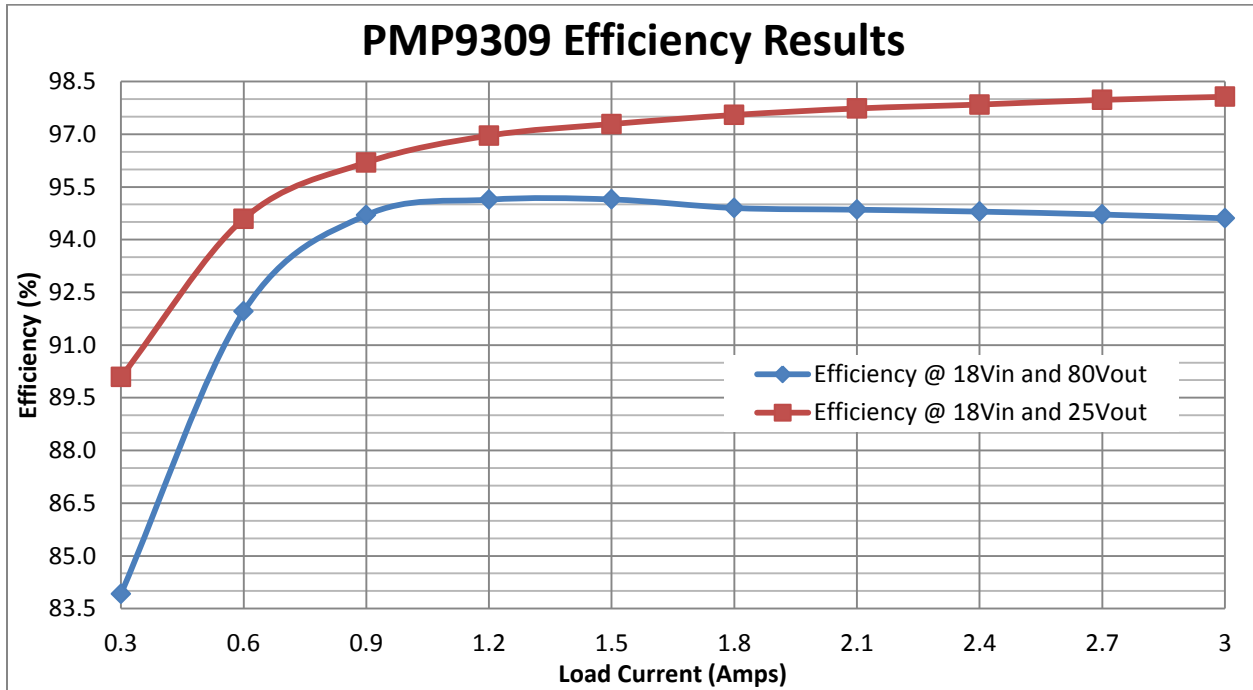


IR thermal image taken of Phase2 at steady state with  $V_{in} = 18V$ ,  $V_{out} = 25V$ , and 3A load (no airflow)



## 5. Efficiency

### 5.1 Efficiency Chart



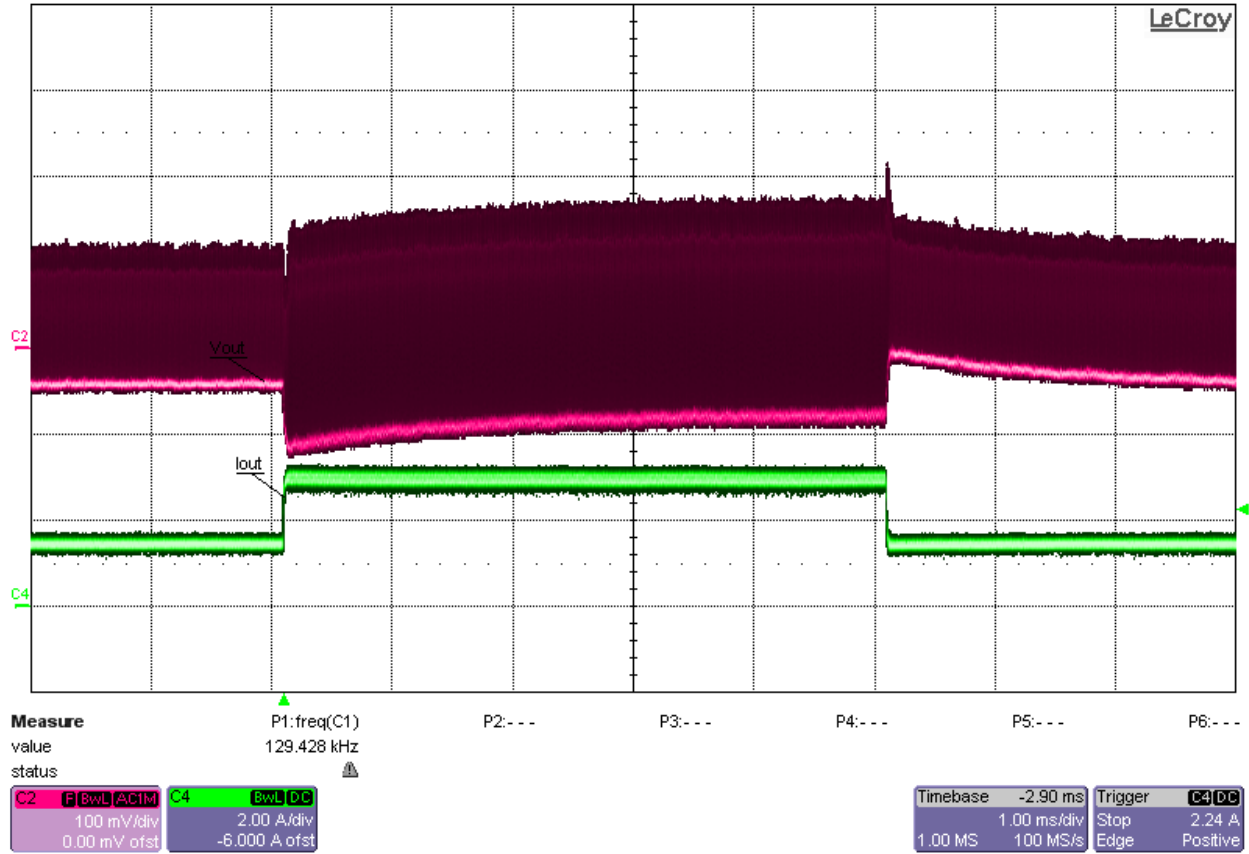
## 5.2 Efficiency Data

<b>Efficiency @ 18Vin and 80Vout</b>						
<b>Vin (V)</b>	<b>Iin (A)</b>	<b>Vout (V)</b>	<b>Iout (A)</b>	<b>Pin (W)</b>	<b>Pout (W)</b>	<b>Efficiency (%)</b>
17.999	1.591	80.106	0.3	28.64	24.03	83.9
17.998	2.904	80.105	0.6	52.27	48.06	92.0
17.998	4.23	80.105	0.9	76.13	72.09	94.7
17.998	5.614	80.106	1.2	101.04	96.13	95.1
17.998	7.017	80.106	1.5	126.29	120.16	95.1
17.998	8.442	80.106	1.8	151.94	144.19	94.9
17.998	9.854	80.106	2.1	177.35	168.22	94.9
17.998	11.268	80.105	2.4	202.80	192.25	94.8
17.998	12.688	80.107	2.7	228.36	216.29	94.7
17.998	14.114	80.108	3	254.02	240.32	94.6

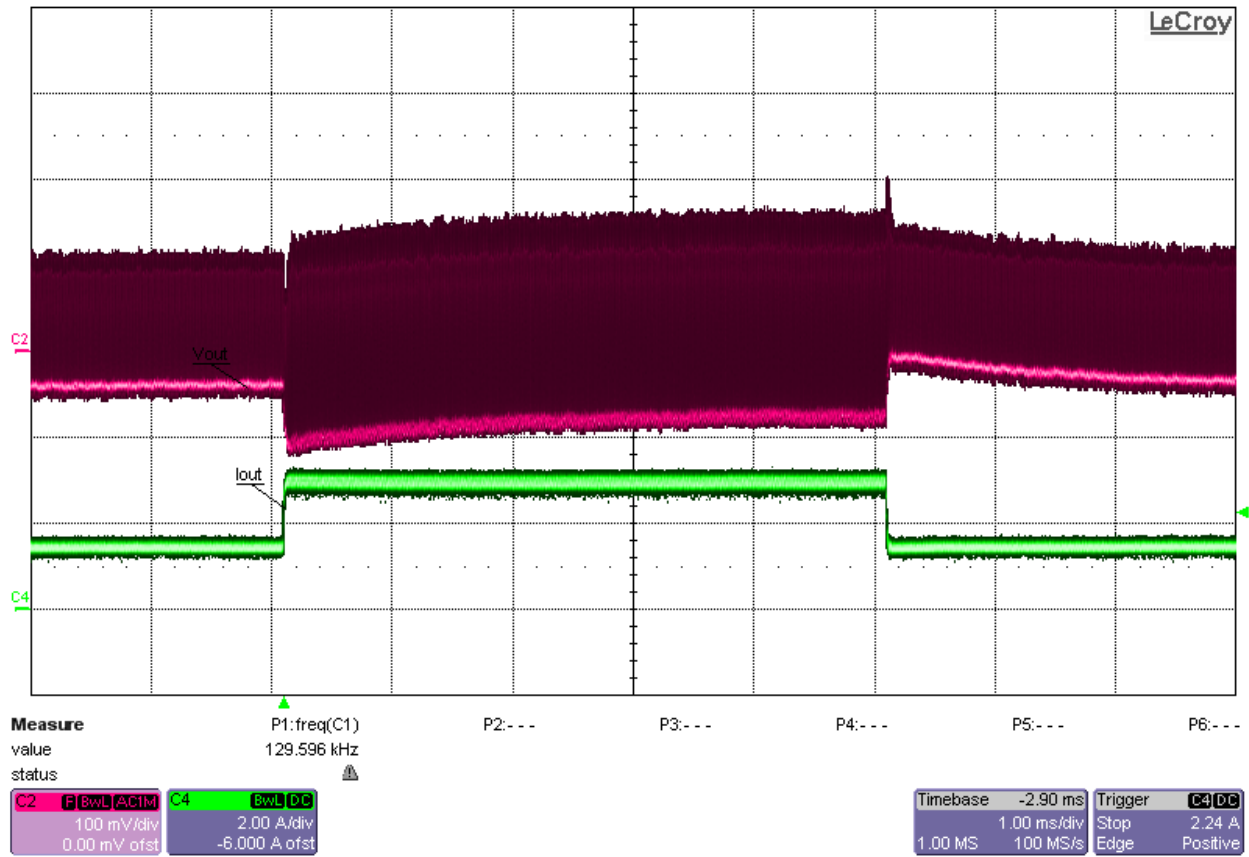
<b>Efficiency @ 18Vin and 25Vout</b>						
<b>Vin (V)</b>	<b>Iin (A)</b>	<b>Vout (V)</b>	<b>Iout (A)</b>	<b>Pin (W)</b>	<b>Pout (W)</b>	<b>Efficiency (%)</b>
17.999	0.462	24.971	0.3	8.32	7.49	90.1
17.999	0.88	24.971	0.6	15.84	14.98	94.6
17.999	1.298	24.971	0.9	23.36	22.47	96.2
17.999	1.717	24.971	1.2	30.90	29.97	97.0
17.999	2.139	24.971	1.5	38.50	37.46	97.3
17.999	2.56	24.971	1.8	46.08	44.95	97.5
17.999	2.981	24.971	2.1	53.66	52.44	97.7
17.999	3.403	24.971	2.4	61.25	59.93	97.8
17.999	3.823	24.97	2.7	68.81	67.42	98.0
17.999	4.244	24.97	3	76.39	74.91	98.1

## 6 Waveforms

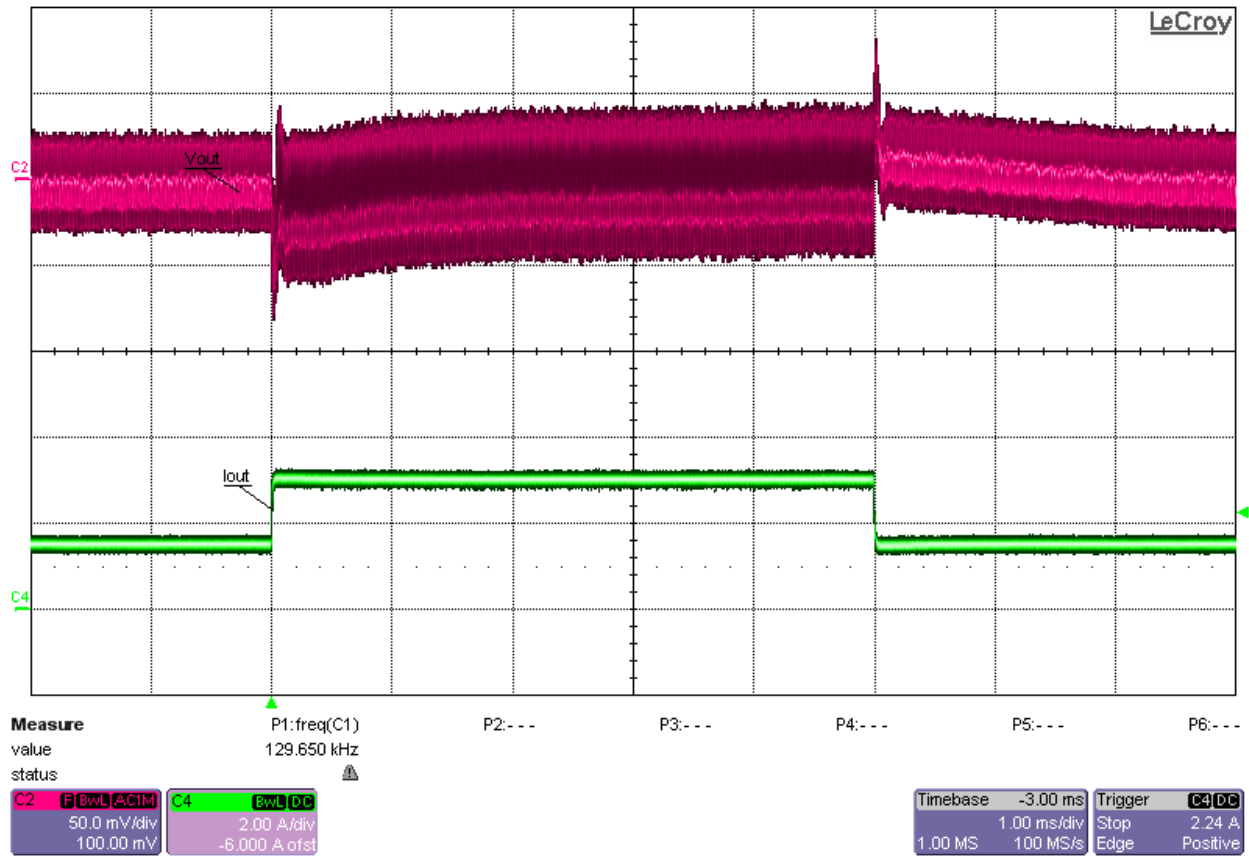
### 6.1 Load Transient Response



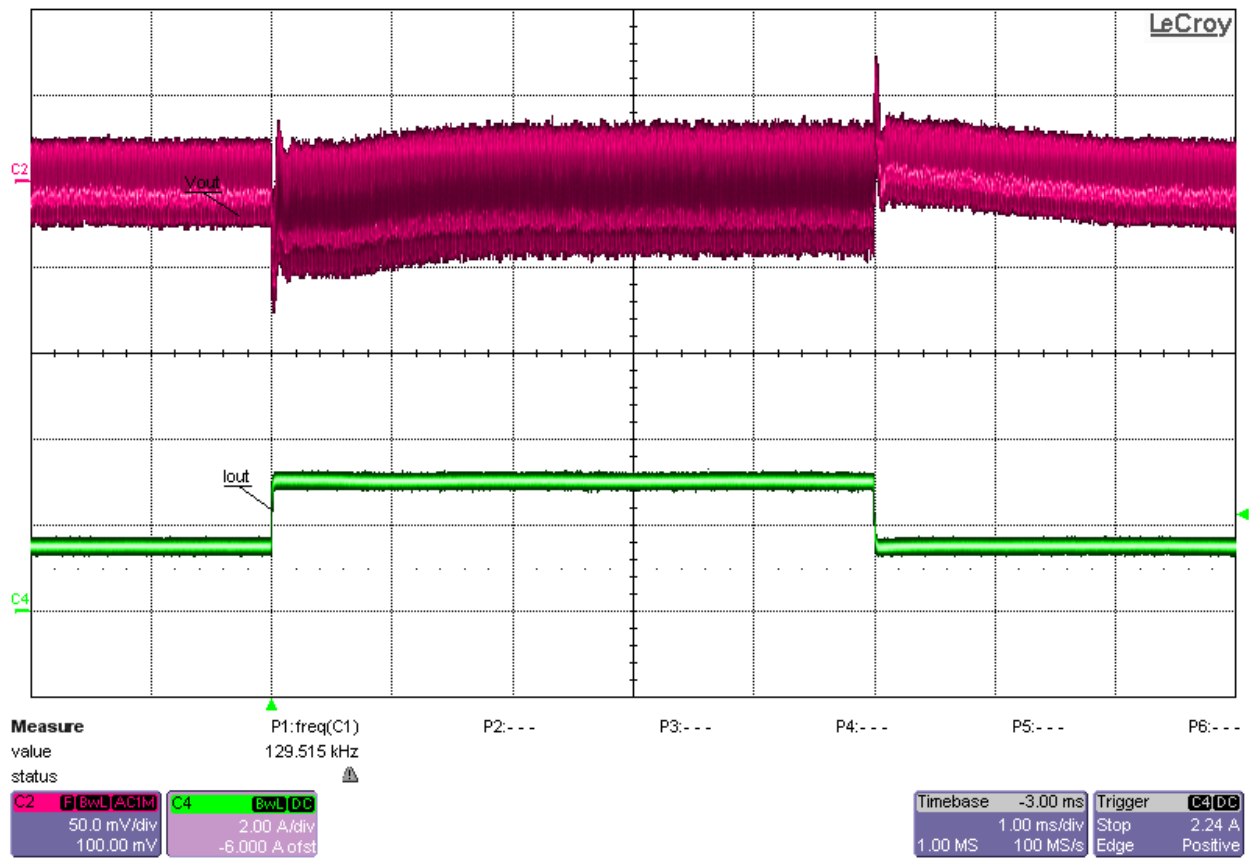
**Load Transient Response at  $V_{in} = 18V$ ,  $V_{out} = 80V$ ; 50%-to-100% (1.5A-to-3A) Load Step**



**Load Transient Response at Vin = 20V, Vout = 80V; 50%-to-100% (1.5A-to-3A) Load Step**

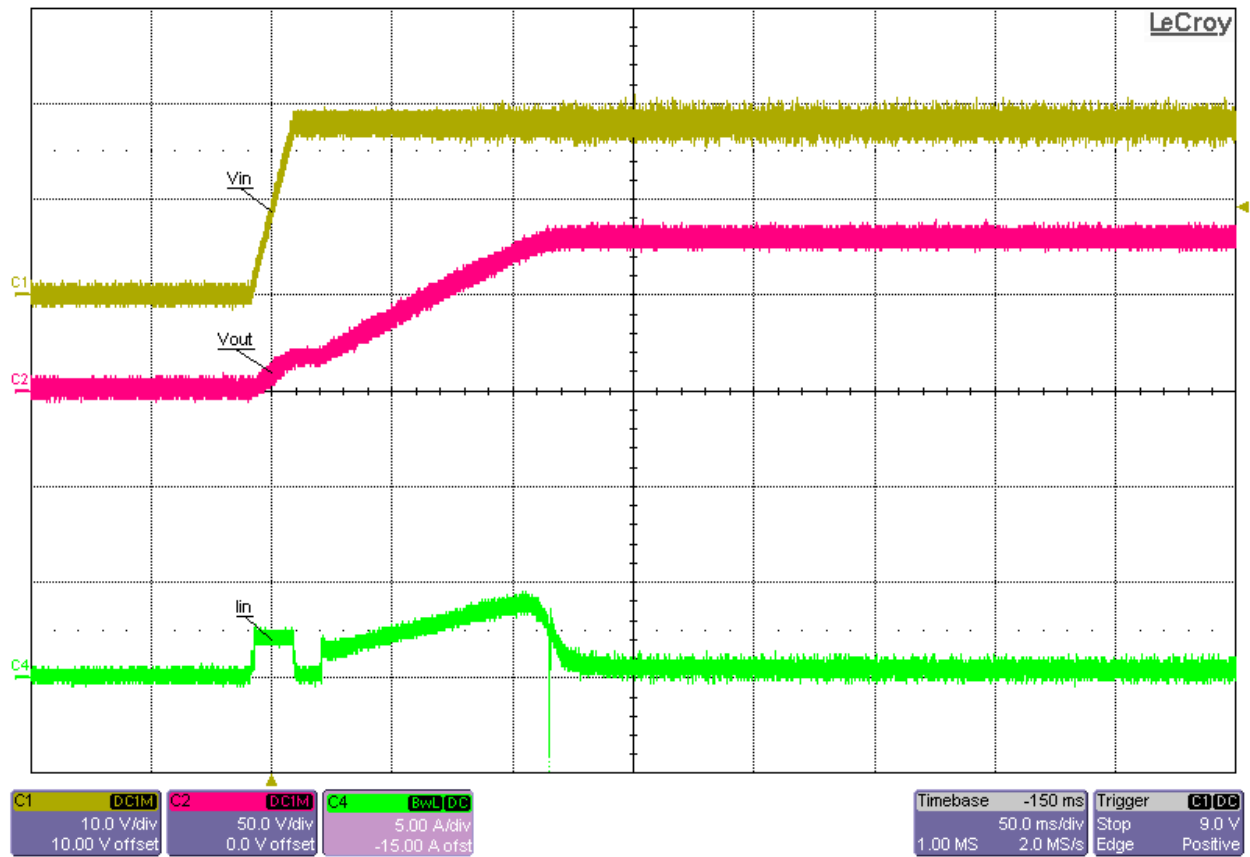


**Load Transient Response at Vin = 18V, Vout = 25V; 50%-to-100% (1.5A-to-3A) Load Step**

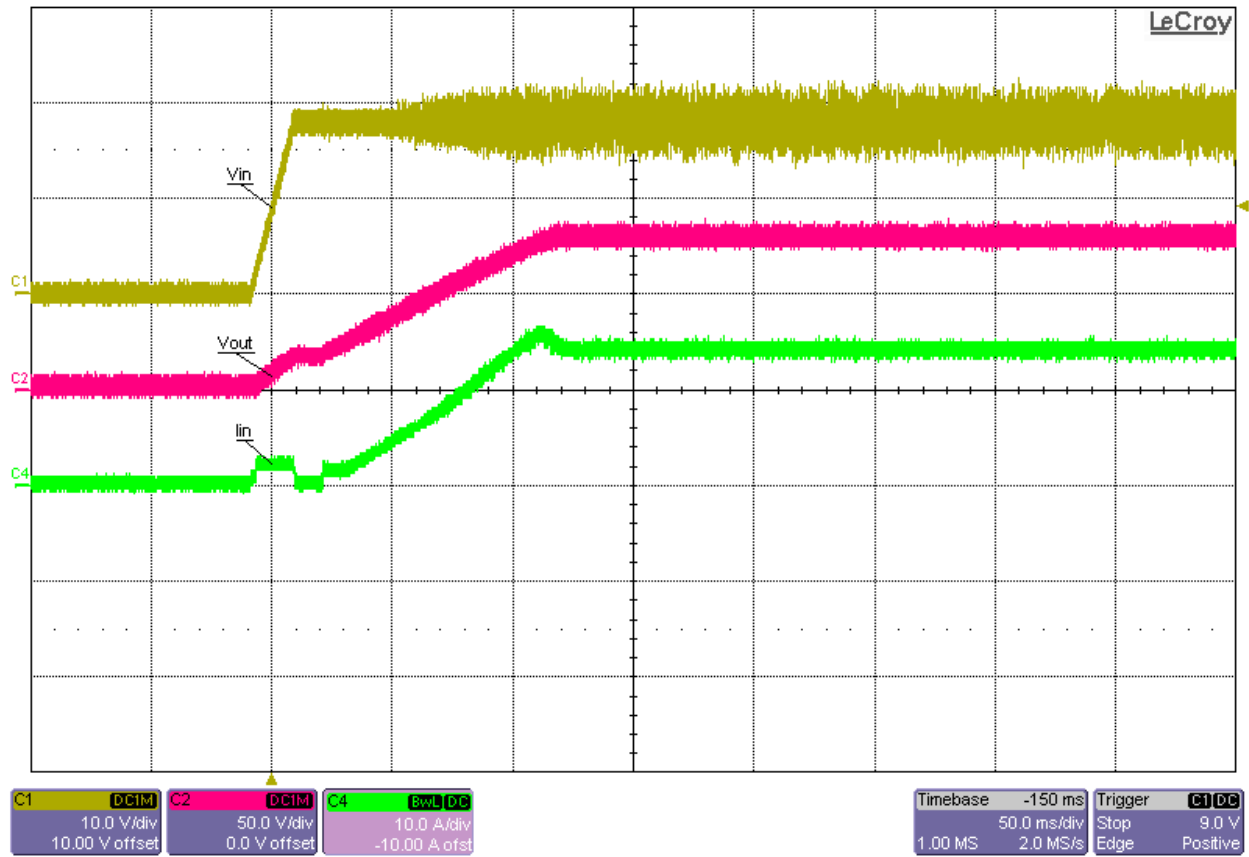


**Load Transient Response at Vin = 20V, Vout = 25V; 50%-to-100% (1.5A-to-3A) Load Step**

## 6.2 Startup

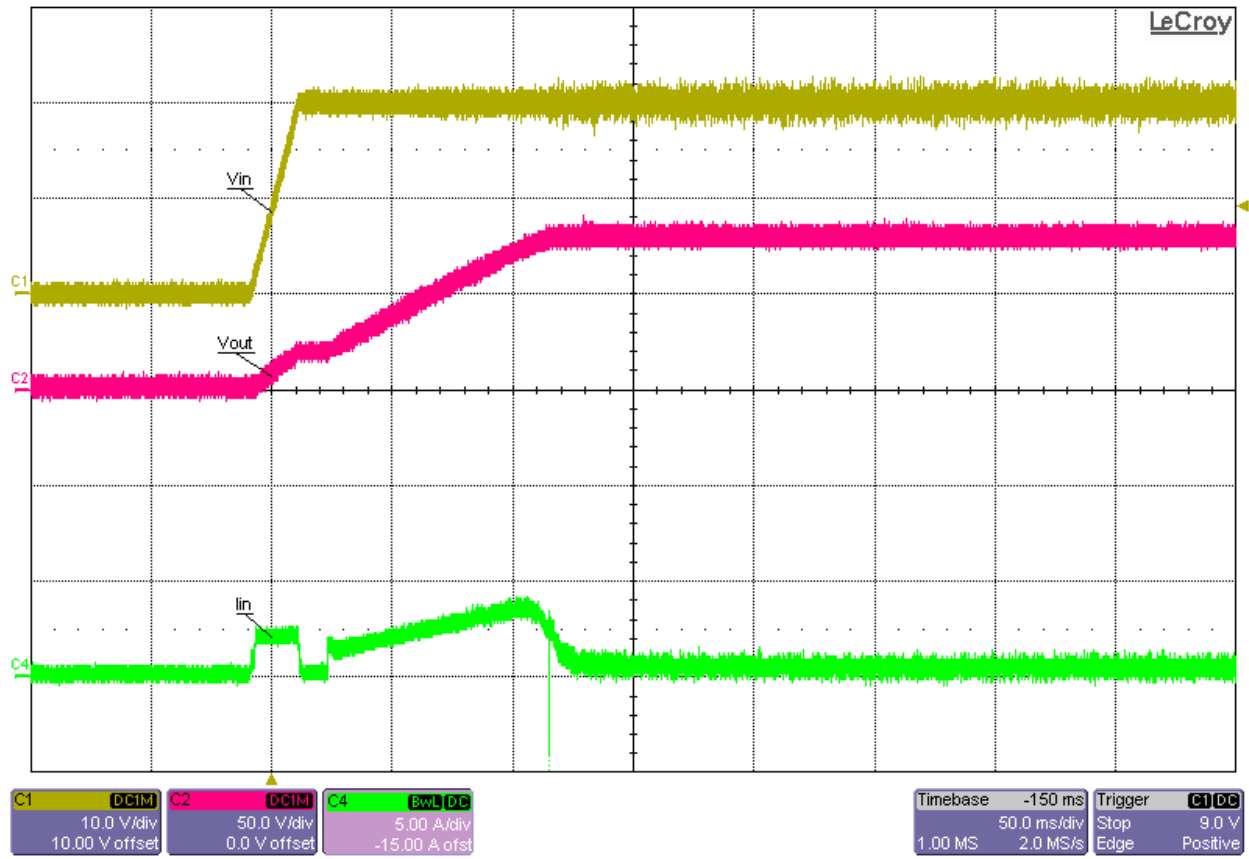


Startup into No Load ( $V_{in} = 18V$ ,  $V_{out} = 80V$ )

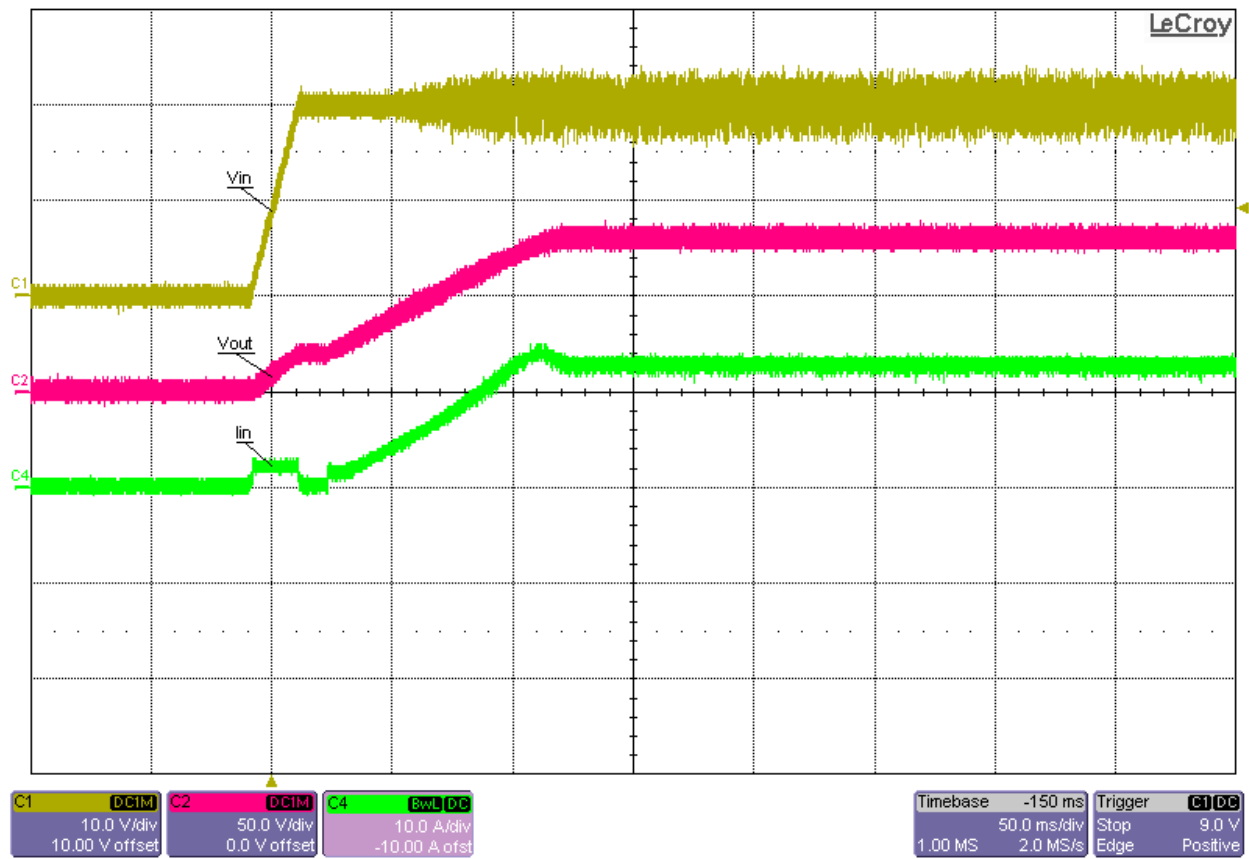


**Startup into Full (3A) Load (Vin = 18V, Vout = 80V)**

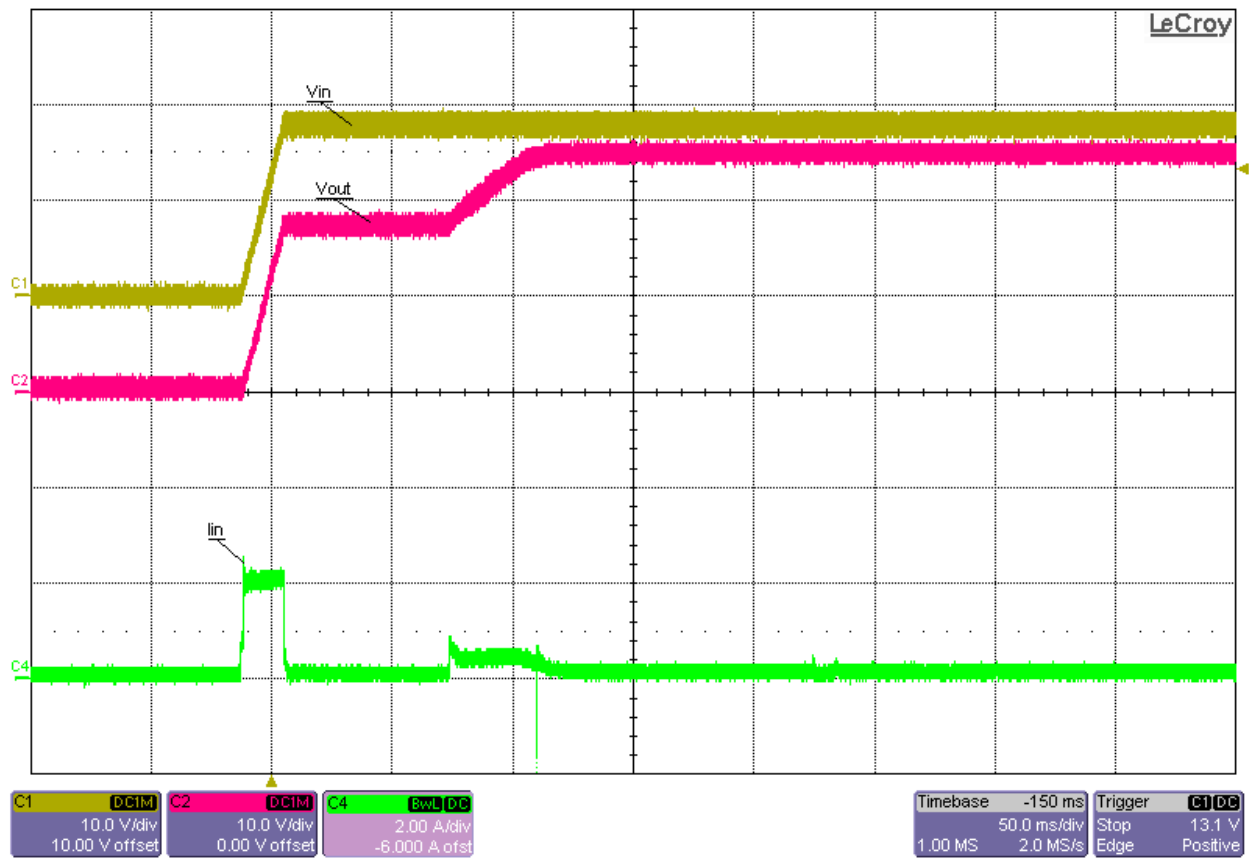




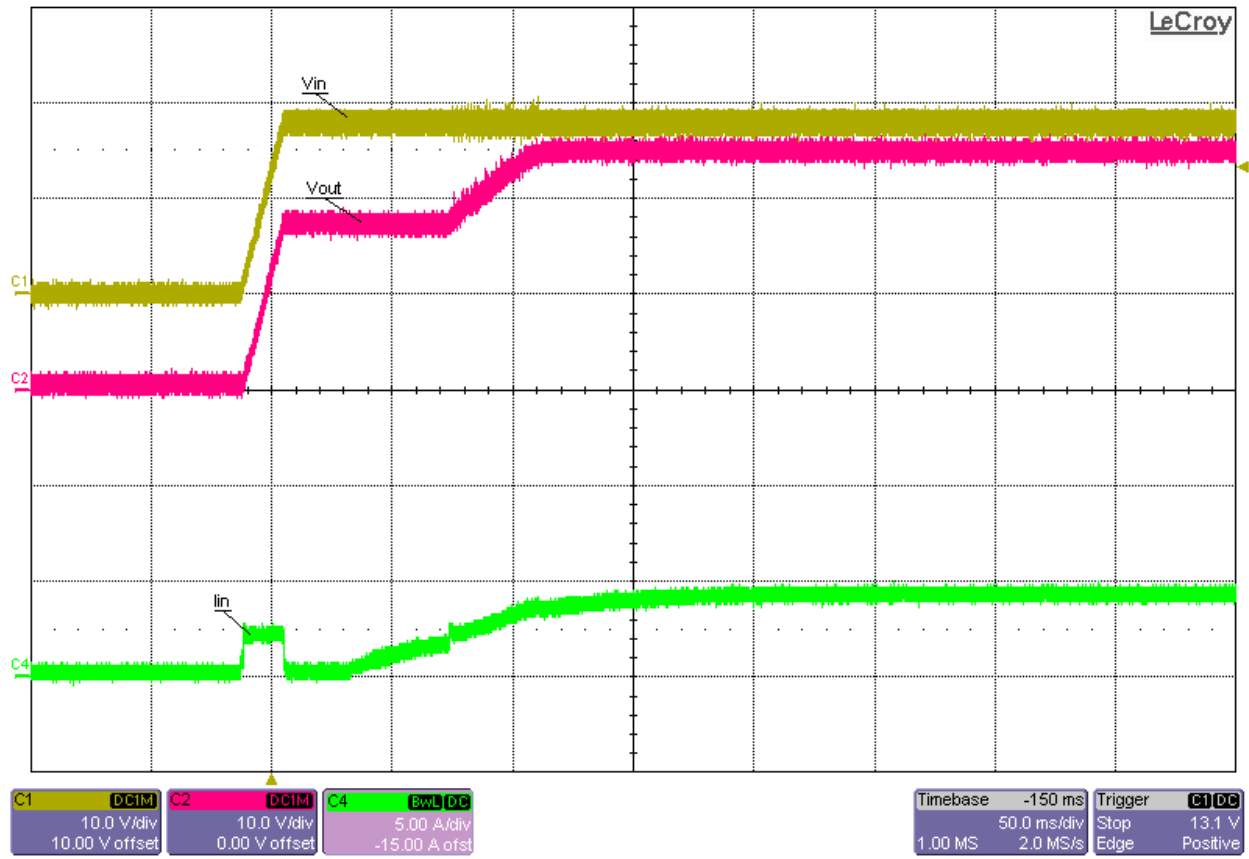
**Startup into No Load ( $V_{in} = 20V$ ,  $V_{out} = 80V$ )**



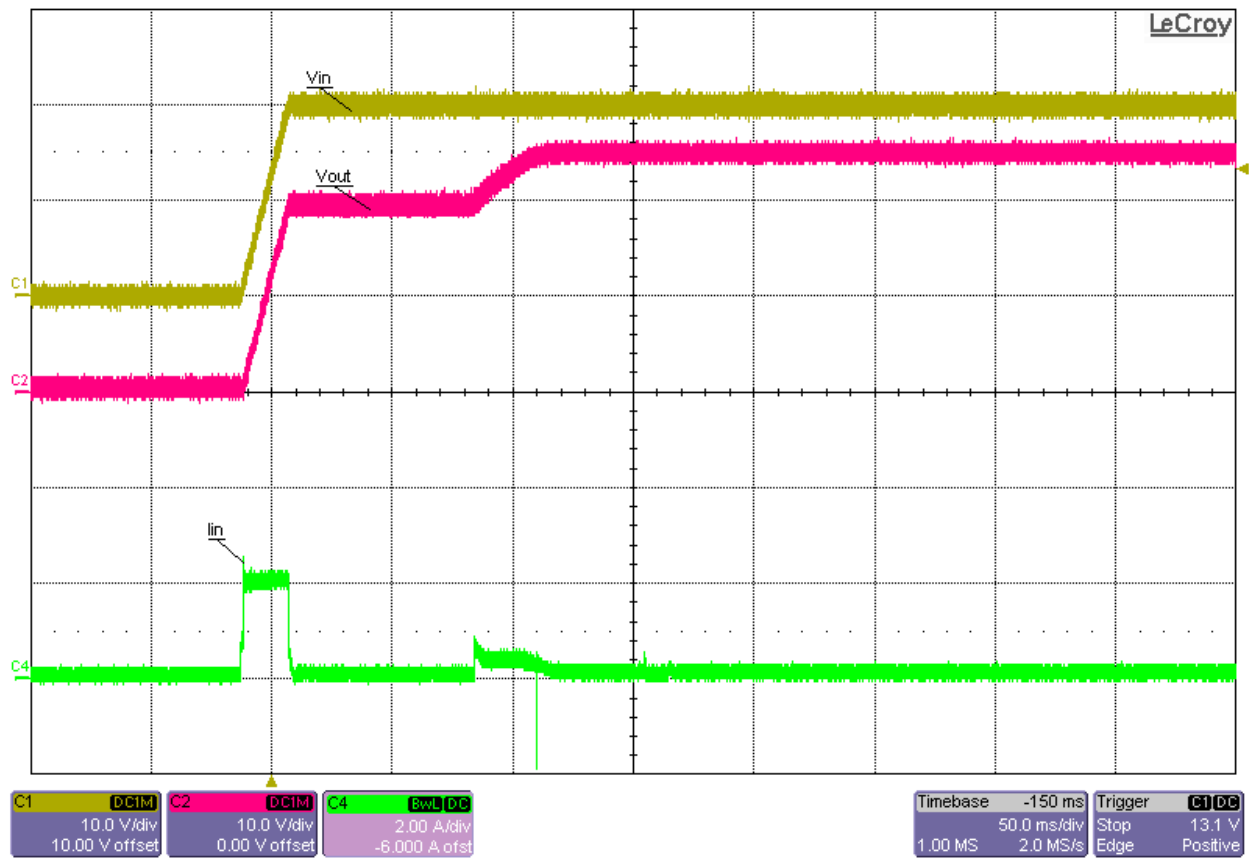
**Startup into Full (3A) Load (Vin = 20V, Vout = 80V)**



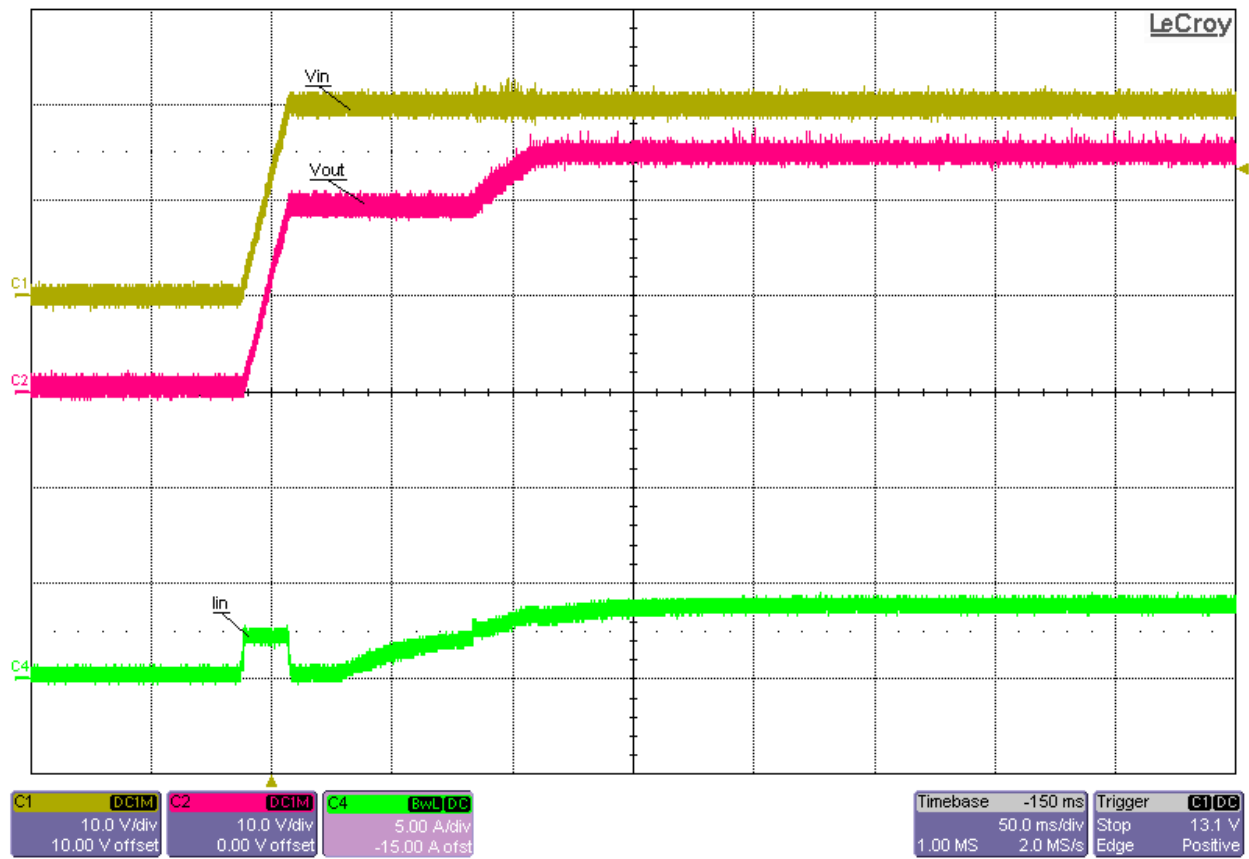
Startup into No Load ( $V_{in} = 18V$ ,  $V_{out} = 25V$ )



Startup into Full (3A) Load ( $V_{in} = 18V$ ,  $V_{out} = 25V$ )

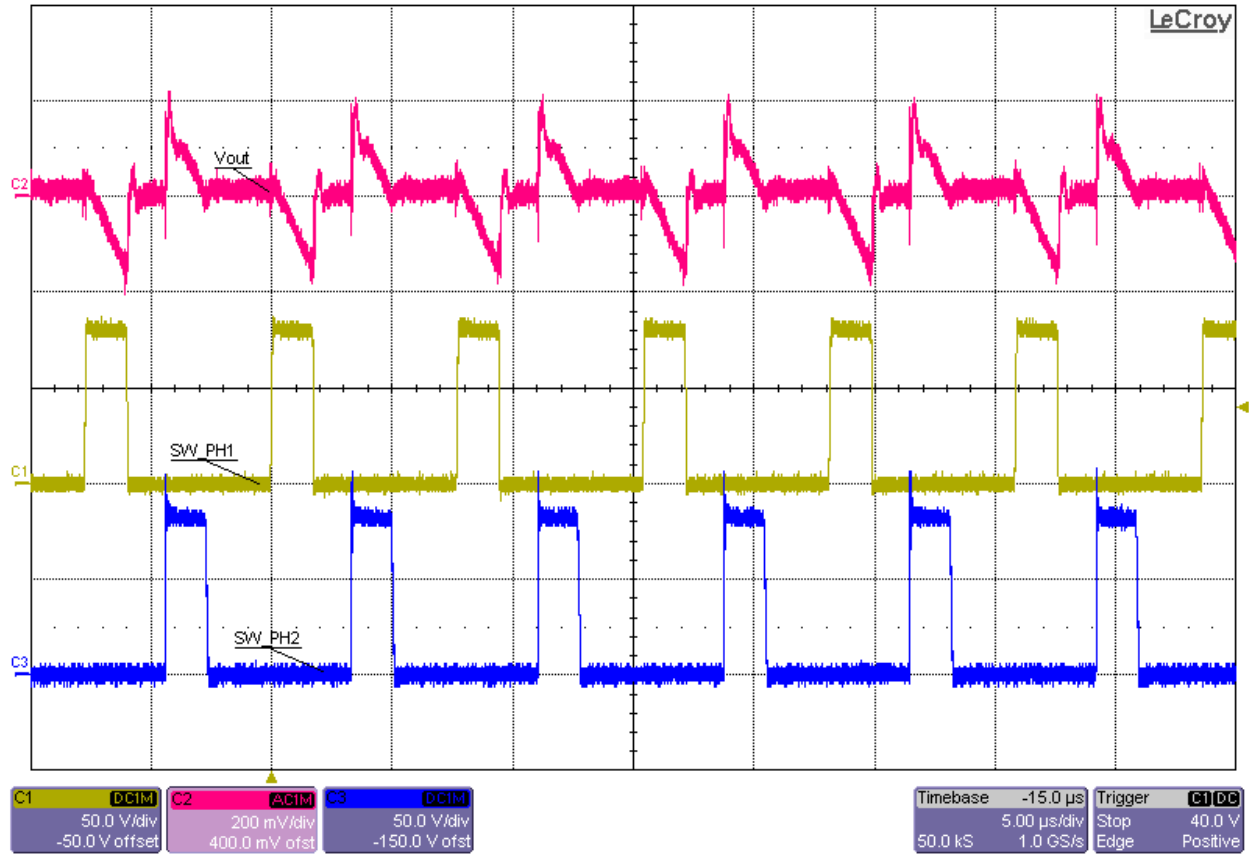


**Startup into No Load ( $V_{in} = 20V$ ,  $V_{out} = 25V$ )**

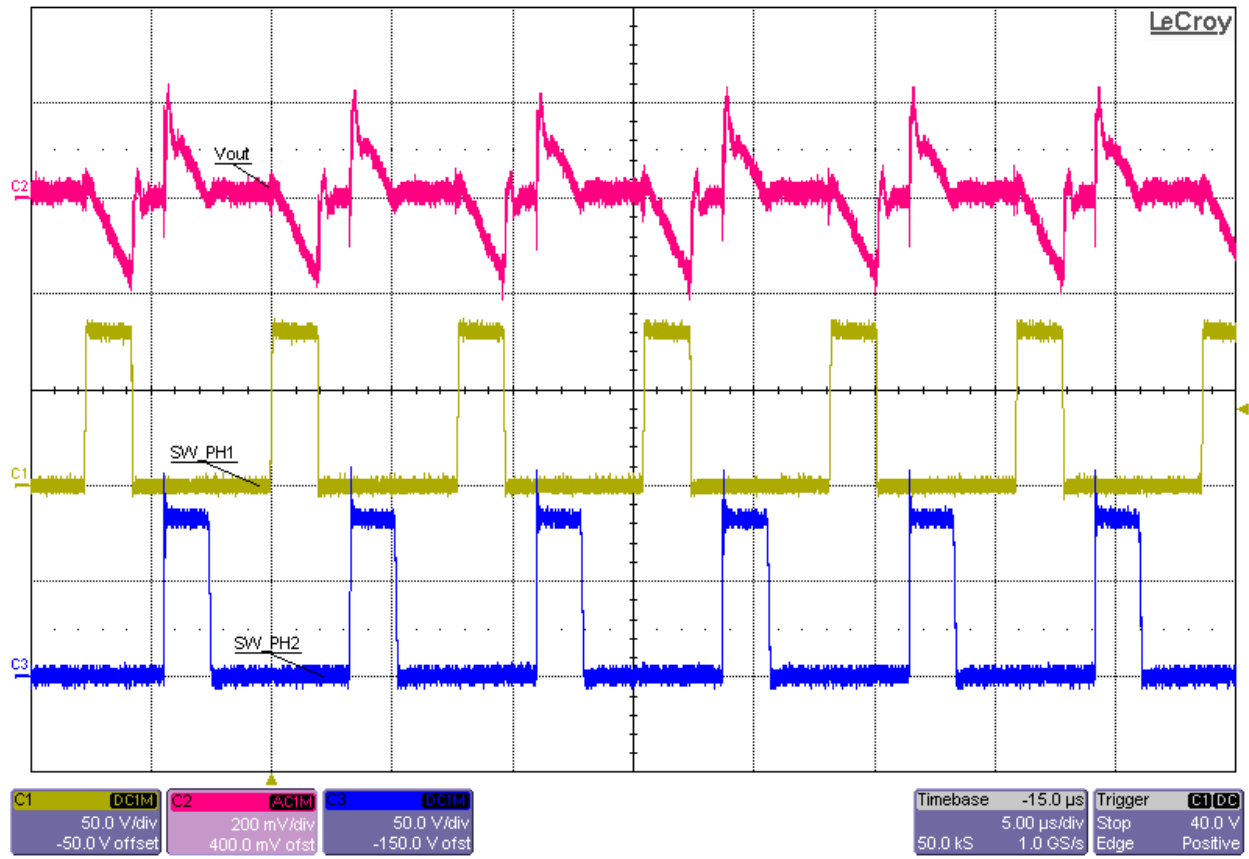


Startup into Full (3A) Load ( $V_{in} = 20V$ ,  $V_{out} = 25V$ )

### 6.3 Output Voltage Ripple and Switch Node Voltage

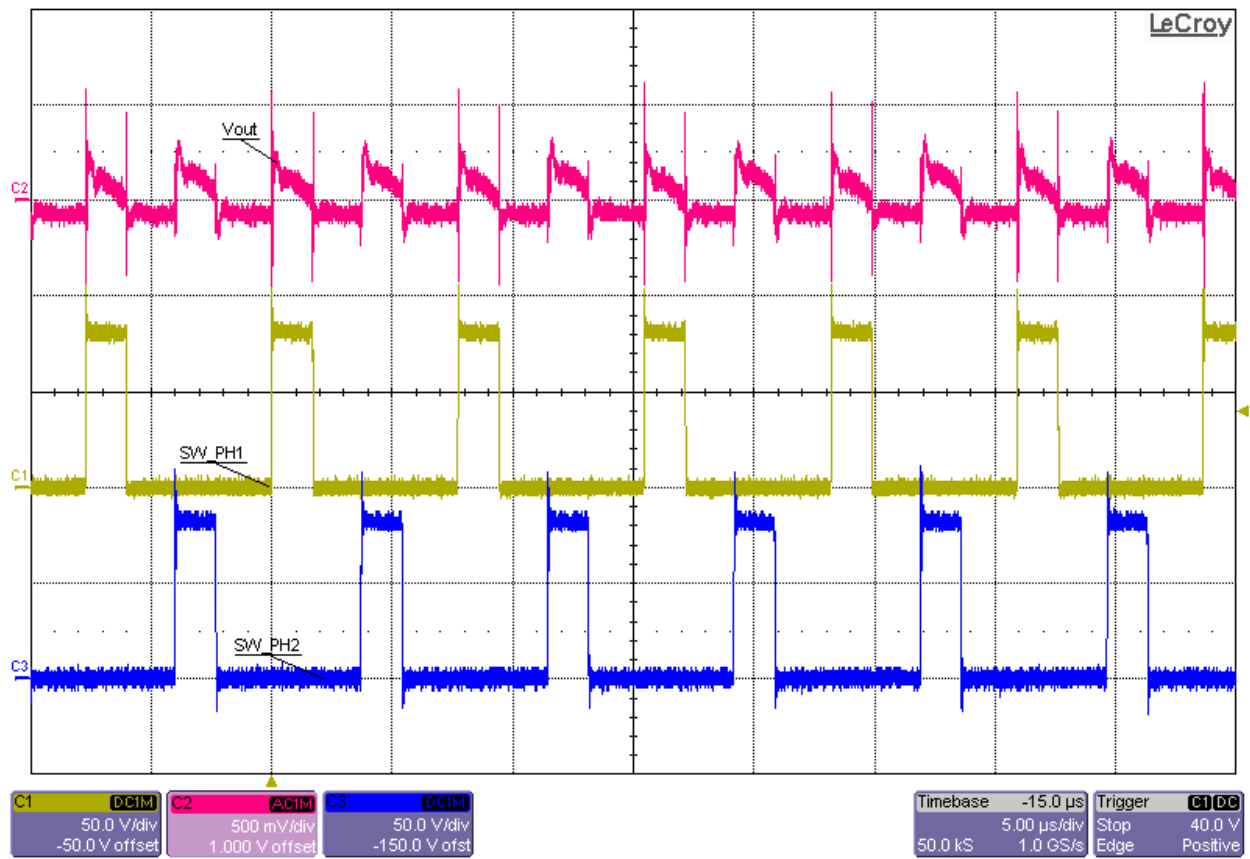


Switch Node and Output Voltage Ripple at  $V_{in} = 18V$ ,  $V_{out} = 80V$ , and No Load ( $V_{ripple} \approx 340mVp-p$ )



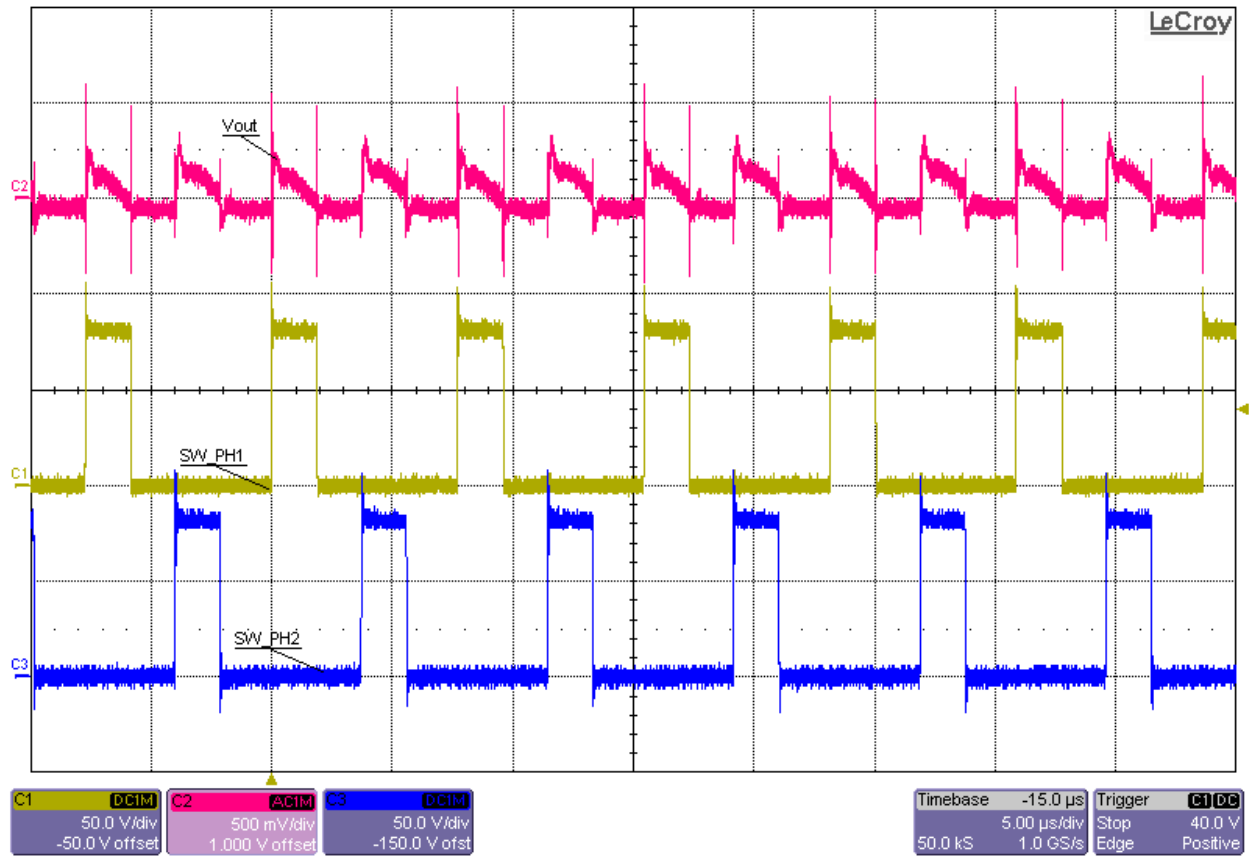
Switch Node and Output Voltage Ripple at  $V_{in} = 20V$ ,  $V_{out} = 80V$ , and No Load (Vripple  $\approx 360mVp-p$ )





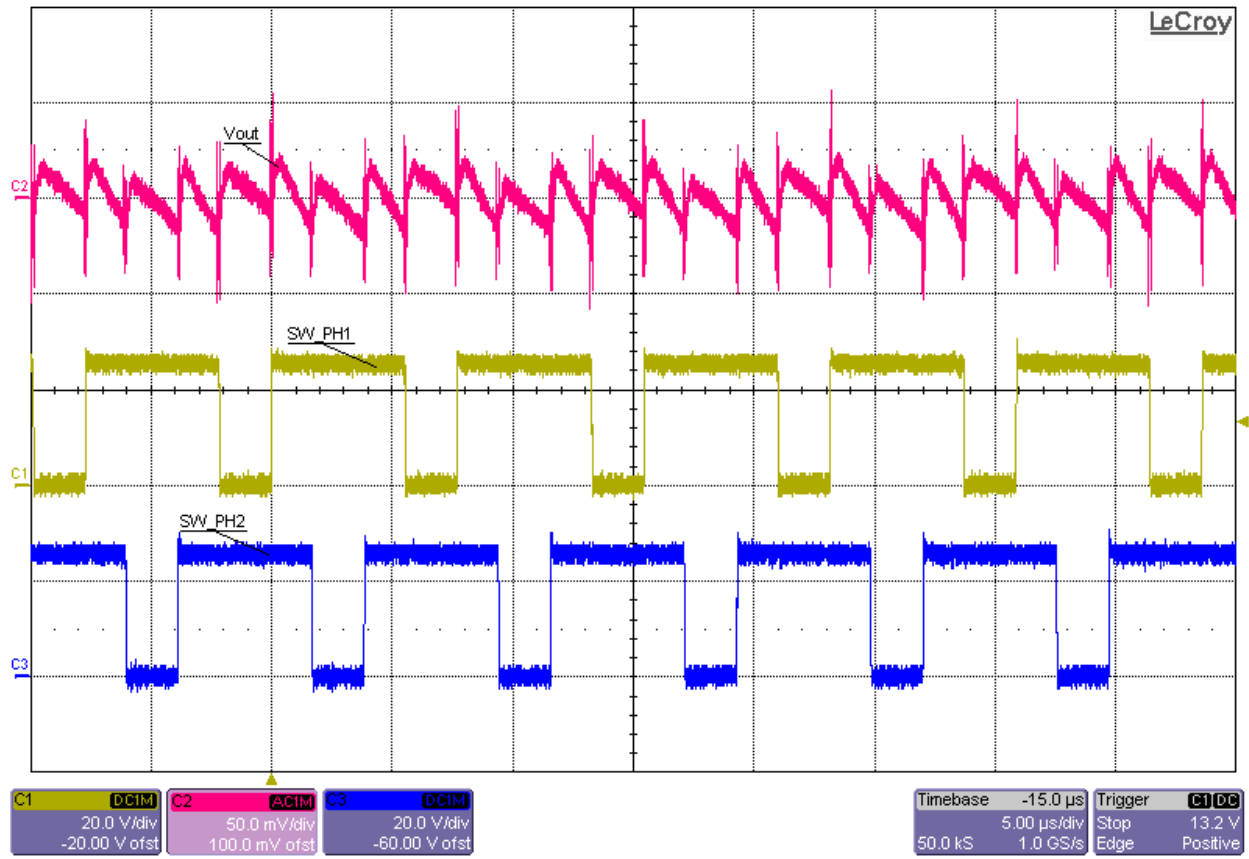
Switch Node and Output Voltage Ripple at  $V_{in} = 18V$ ,  $V_{out} = 80V$ , and Full (3A) Load

(Vripple  $\approx 300mVp-p$ )

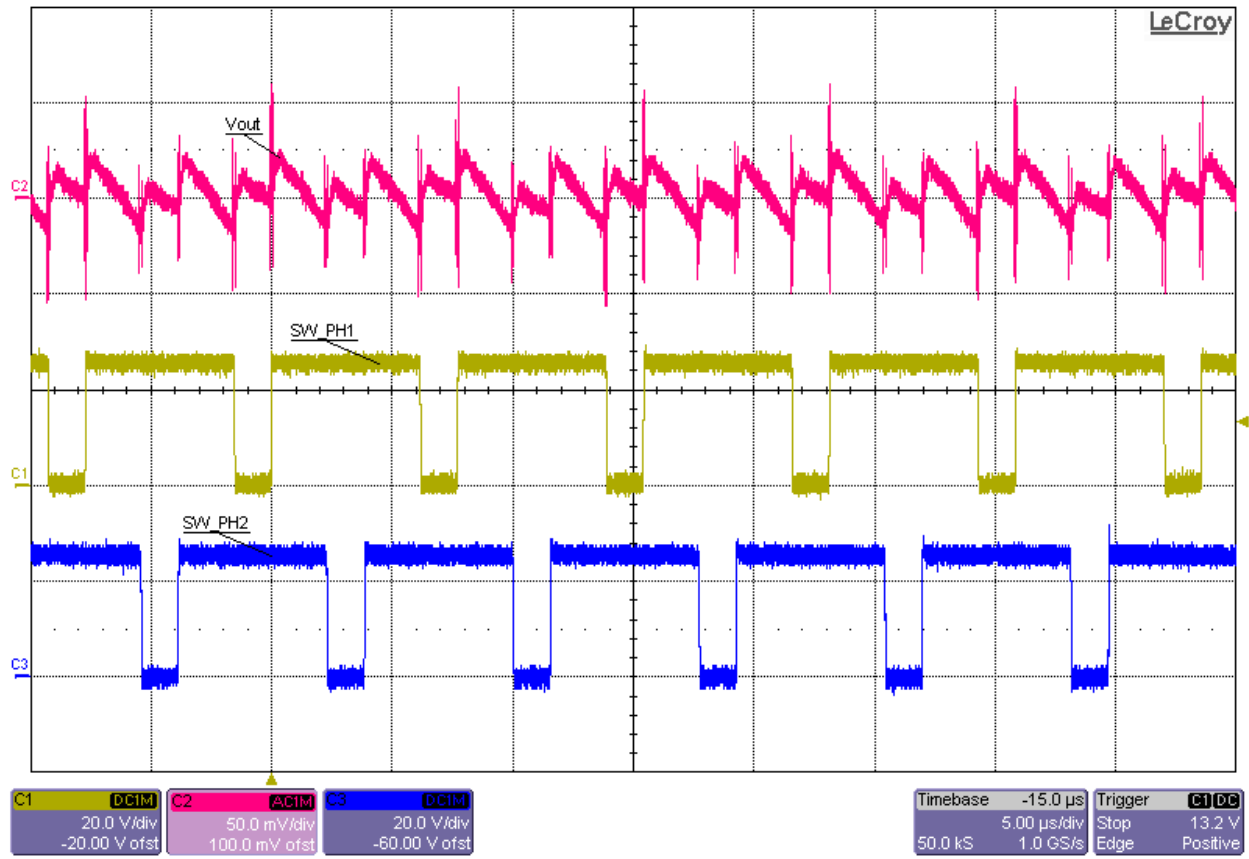


Switch Node and Output Voltage Ripple at  $V_{in} = 20V$ ,  $V_{out} = 80V$ , and Full (3A) Load

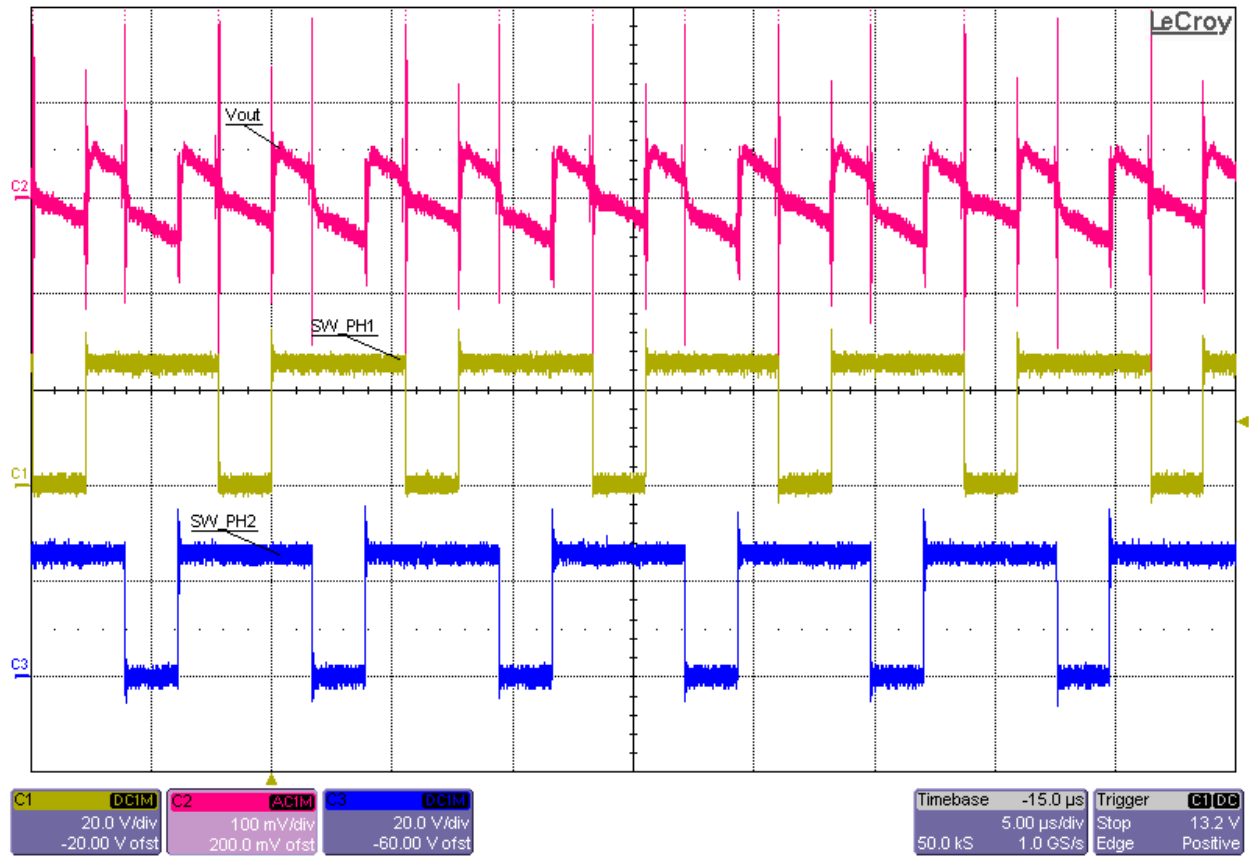
(Vripple  $\approx$  300mVp-p)



Switch Node and Output Voltage Ripple at  $V_{in} = 18V$ ,  $V_{out} = 25V$ , and No Load (Vripple  $\approx 35mV_{p-p}$ )

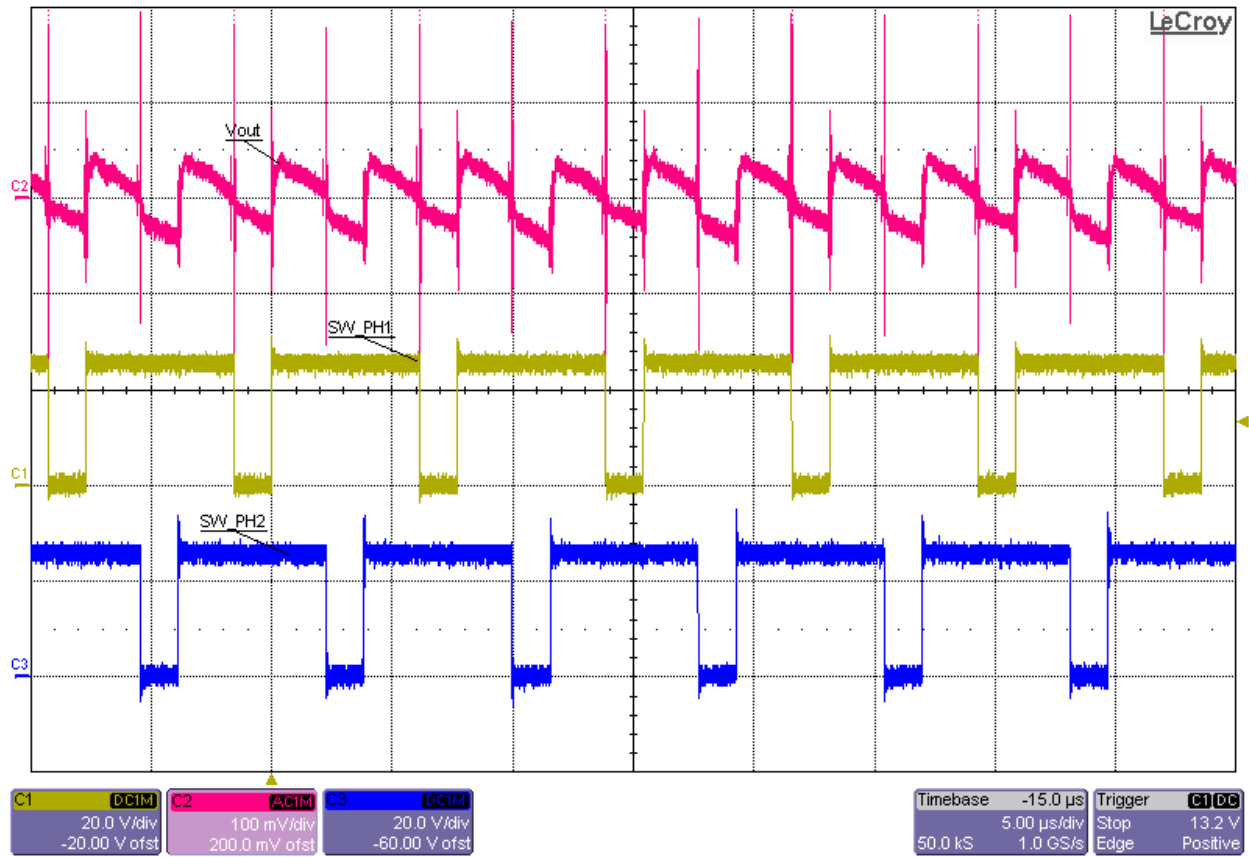


Switch Node and Output Voltage Ripple at  $V_{in} = 20V$ ,  $V_{out} = 25V$ , and No Load (Vripple  $\approx 38mV_{p-p}$ )



Switch Node and Output Voltage Ripple at  $V_{in} = 18V$ ,  $V_{out} = 25V$ , and Full (3A) Load

(Vripple  $\approx 90mVp-p$ )



Switch Node and Output Voltage Ripple at  $V_{in} = 20V$ ,  $V_{out} = 25V$ , and Full (3A) Load

(Vripple  $\approx 90mV_{p-p}$ )

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