

**Test Report
For PMP10739
09/16/2015**



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1. Design Specifications

| | |
|--|----------------|
| Vin Minimum | 90VDC |
| Vin Maximum | 110VDC |
| Vout | 12 VDC |
| Iout | 0.3A |
| Approximate Switching Frequency | ~150KHz |

2. Circuit Description and PCB details

PMP10739 is a 3.6W buck converter using the UCC28700 controller IC. The design accepts an input voltage of 90Vin to 110Vin and provides an output of 12Vout capable of supplying 0.3A of current to the load. The UCC28700 has a frequency dithering feature for reduced EMI.

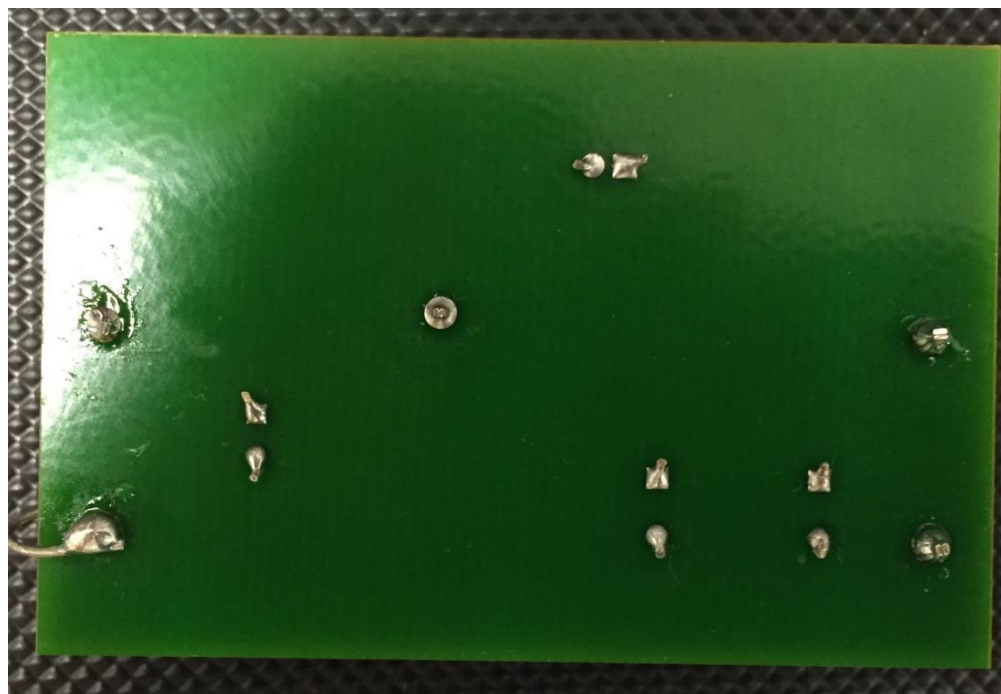
The design was built on PMP10739 with a dimension of 58.4mm * 38.1mm. One layer PCB was used for the design, 1oz copper on top layer.

3. PMP10739 Board Photos

Board Dimensions: 58.4mm x 38.1mm

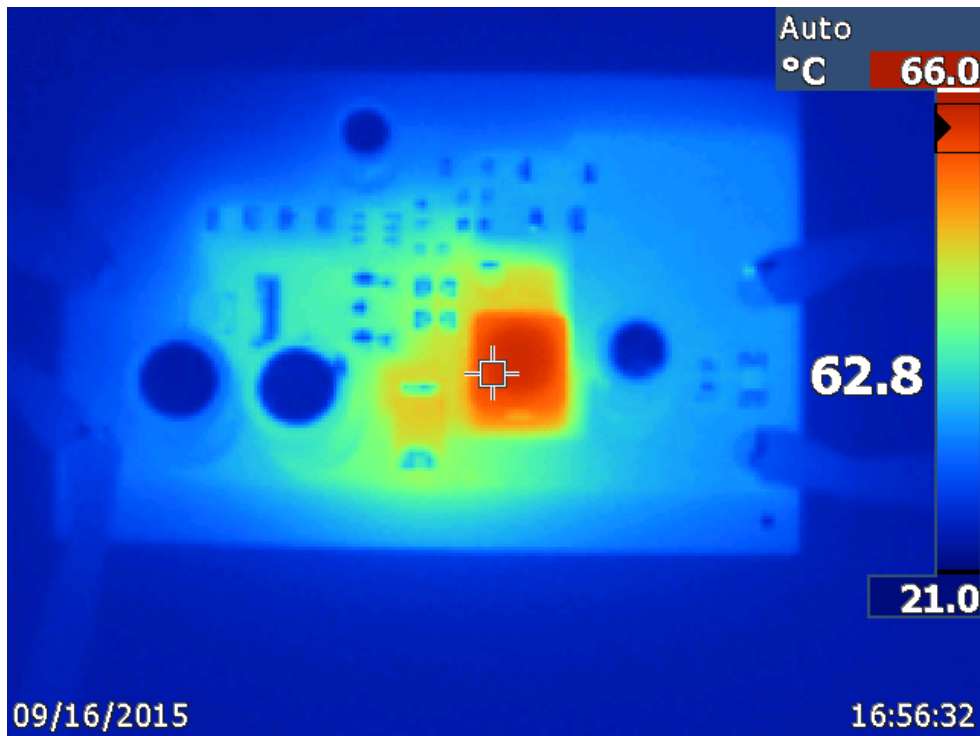


Board Photo (Top)

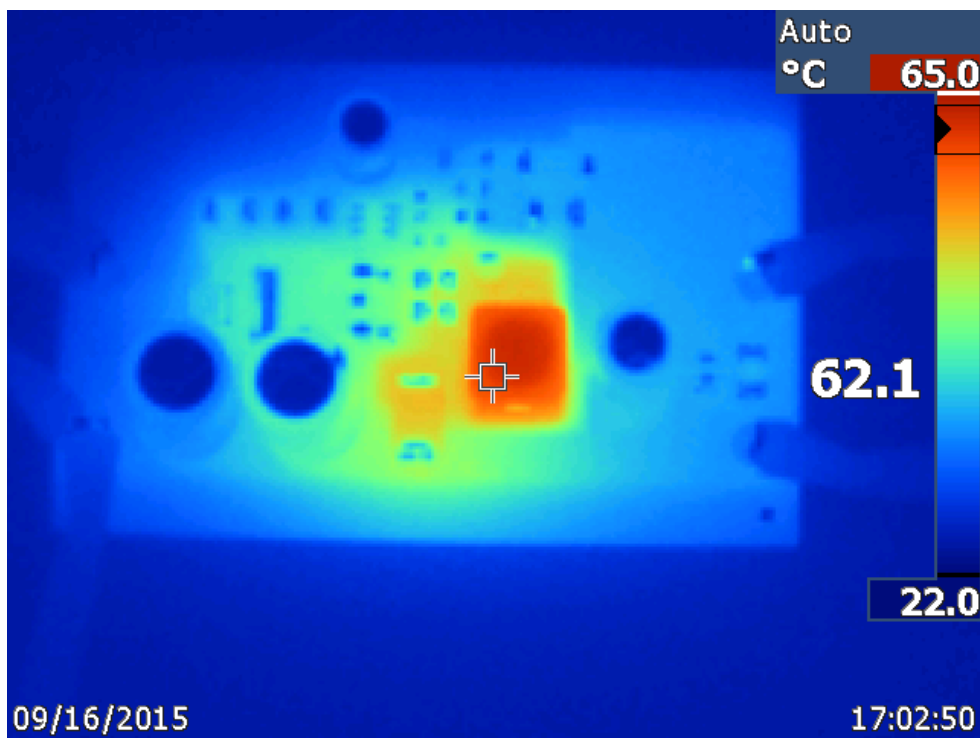


Board Photo (Bottom)

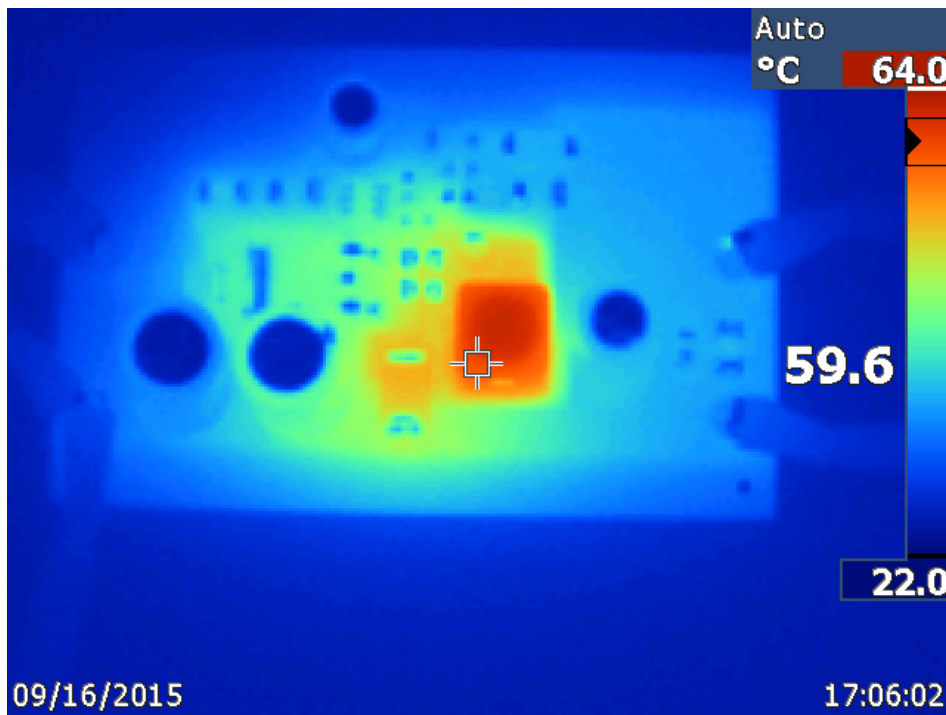
4. Thermal Data



IR thermal image taken at steady state with 110V_{in} and 0.3A load (no airflow)



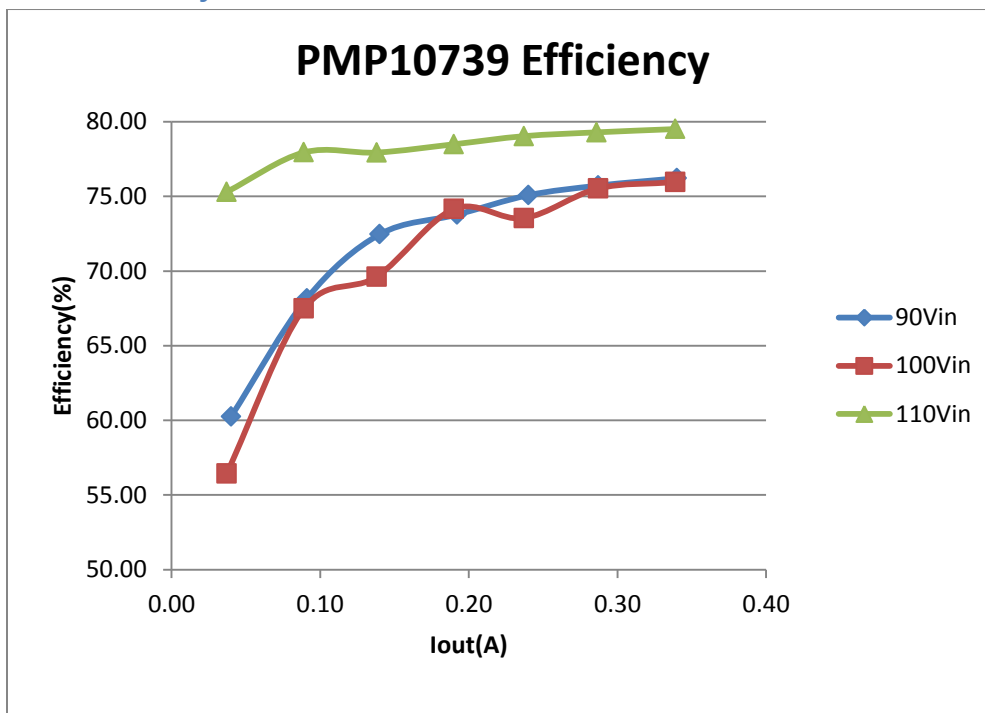
IR thermal image taken at steady state with 100V_{in} and 0.3A load (no airflow)



IR thermal image taken at steady state with 110Vin and 0.3A load (no airflow)

5. Efficiency

5.1 Efficiency Chart

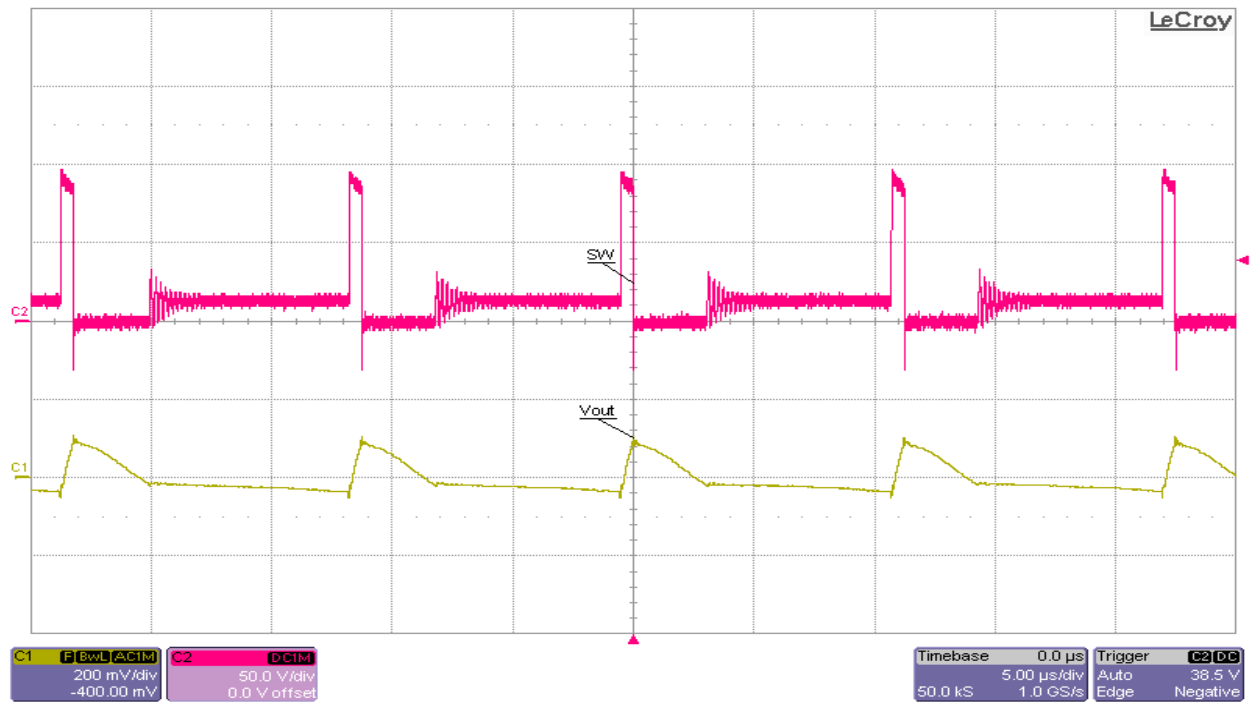


5.2 Efficiency Data

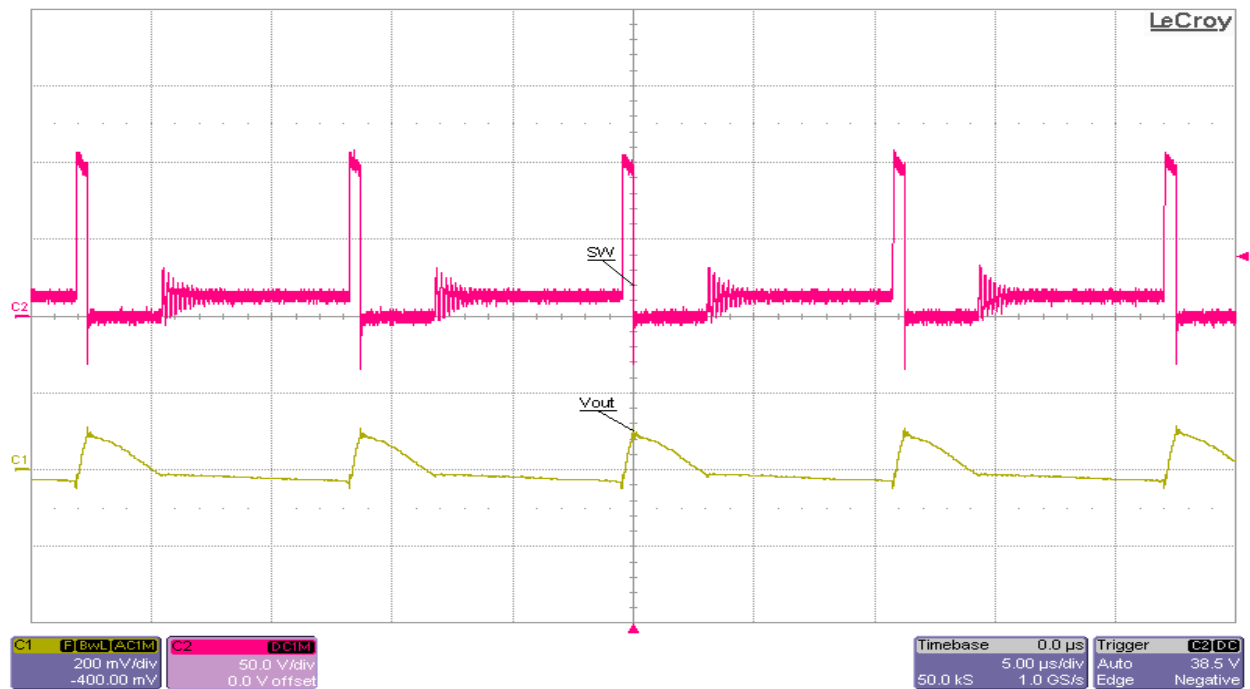
| Vin(V) | Iin(A) | Pin(W) | Vout(V) | Iout(A) | Pout(W) | Losses(W) | Efficiency(%) |
|---------|--------|--------|---------|---------|---------|-----------|---------------|
| 90.046 | 0.002 | 0.180 | 12.184 | 0.000 | 0.000 | 0.180 | 0.000 |
| 90.046 | 0.009 | 0.810 | 12.207 | 0.040 | 0.488 | 0.322 | 60.251 |
| 90.046 | 0.018 | 1.621 | 12.140 | 0.091 | 1.105 | 0.516 | 68.159 |
| 90.046 | 0.026 | 2.341 | 12.117 | 0.140 | 1.696 | 0.645 | 72.458 |
| 90.046 | 0.035 | 3.152 | 12.110 | 0.192 | 2.325 | 0.826 | 73.776 |
| 90.045 | 0.043 | 3.872 | 12.112 | 0.240 | 2.907 | 0.965 | 75.076 |
| 90.045 | 0.051 | 4.592 | 12.116 | 0.287 | 3.477 | 1.115 | 75.720 |
| 90.045 | 0.060 | 5.403 | 12.111 | 0.340 | 4.118 | 1.285 | 76.216 |
| 90.045 | 0.064 | 5.763 | 11.188 | 0.388 | 4.341 | 1.422 | 75.326 |
| 90.045 | 0.061 | 5.493 | 9.451 | 0.438 | 4.140 | 1.353 | 75.364 |
| | | | | | | | |
| 100.049 | 0.002 | 0.200 | 12.175 | 0.000 | 0.000 | 0.200 | 0.000 |
| 100.049 | 0.008 | 0.800 | 12.206 | 0.037 | 0.452 | 0.349 | 56.425 |
| 100.049 | 0.016 | 1.601 | 12.138 | 0.089 | 1.080 | 0.521 | 67.485 |
| 100.049 | 0.024 | 2.401 | 12.114 | 0.138 | 1.672 | 0.729 | 69.621 |
| 100.049 | 0.031 | 3.102 | 12.106 | 0.190 | 2.300 | 0.801 | 74.162 |
| 100.049 | 0.039 | 3.902 | 12.108 | 0.237 | 2.870 | 1.032 | 73.543 |
| 100.049 | 0.046 | 4.602 | 12.112 | 0.287 | 3.476 | 1.126 | 75.531 |
| 100.049 | 0.054 | 5.403 | 12.105 | 0.339 | 4.104 | 1.299 | 75.955 |
| 100.049 | 0.057 | 5.703 | 11.066 | 0.388 | 4.294 | 1.409 | 75.290 |
| 100.048 | 0.055 | 5.503 | 9.244 | 0.440 | 4.067 | 1.435 | 73.917 |
| | | | | | | | |
| 110.000 | 0.001 | 0.064 | 12.160 | 0.000 | 0.000 | 0.064 | 0.000 |
| 110.000 | 0.005 | 0.600 | 12.200 | 0.037 | 0.451 | 0.148 | 75.296 |
| 110.000 | 0.013 | 1.386 | 12.138 | 0.089 | 1.080 | 0.306 | 77.942 |
| 110.000 | 0.020 | 2.145 | 12.114 | 0.138 | 1.672 | 0.473 | 77.936 |
| 110.000 | 0.027 | 2.930 | 12.106 | 0.190 | 2.300 | 0.630 | 78.492 |
| 110.000 | 0.033 | 3.630 | 12.105 | 0.237 | 2.869 | 0.761 | 79.033 |
| 110.000 | 0.040 | 4.367 | 12.107 | 0.286 | 3.463 | 0.904 | 79.290 |
| 110.000 | 0.047 | 5.159 | 12.100 | 0.339 | 4.102 | 1.057 | 79.510 |
| 110.000 | 0.050 | 5.456 | 11.111 | 0.388 | 4.311 | 1.145 | 79.015 |
| 110.000 | 0.048 | 5.280 | 9.300 | 0.440 | 4.092 | 1.188 | 77.500 |

6 Waveforms

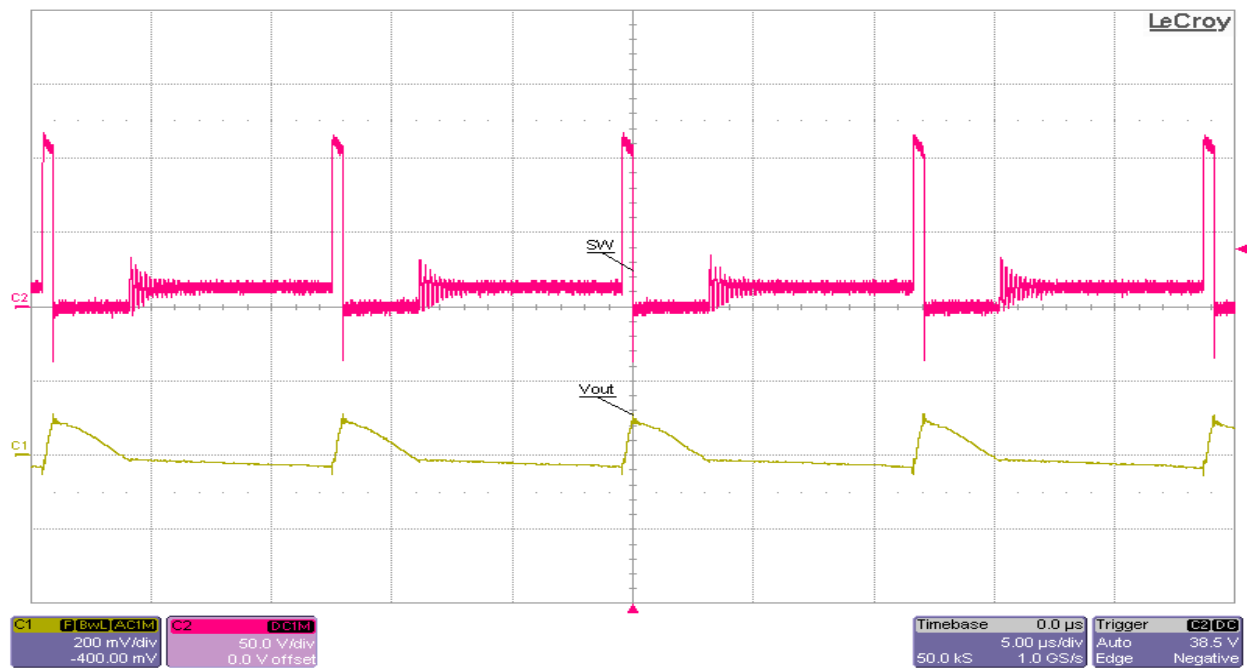
6.1 Switch Node Voltage and Ripple



Switch Node Voltage at 90V_{in} and Full (0.3A) Load. Ch2-Primary SW, Ch1-Vout (AC Coupled).



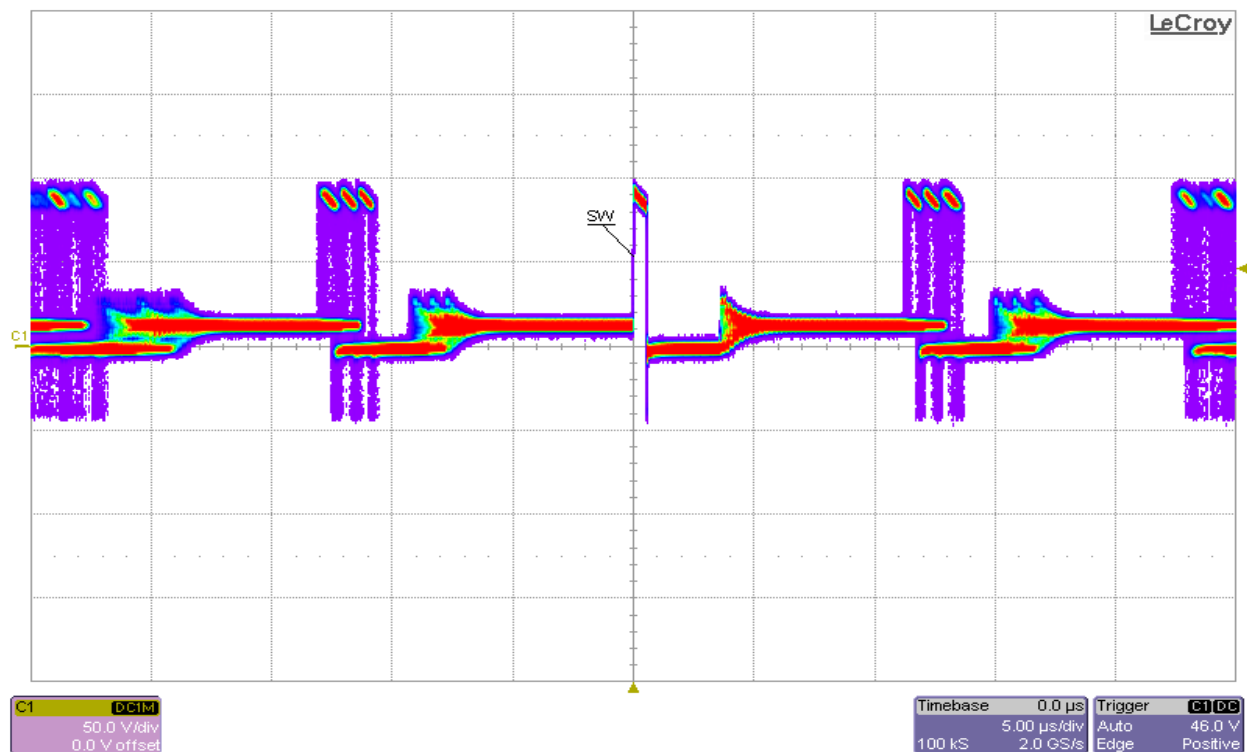
Switch Node Voltage at 100V_{in} and Full (0.3A) Load. Ch2-Primary SW, Ch1-Vout (AC Coupled).



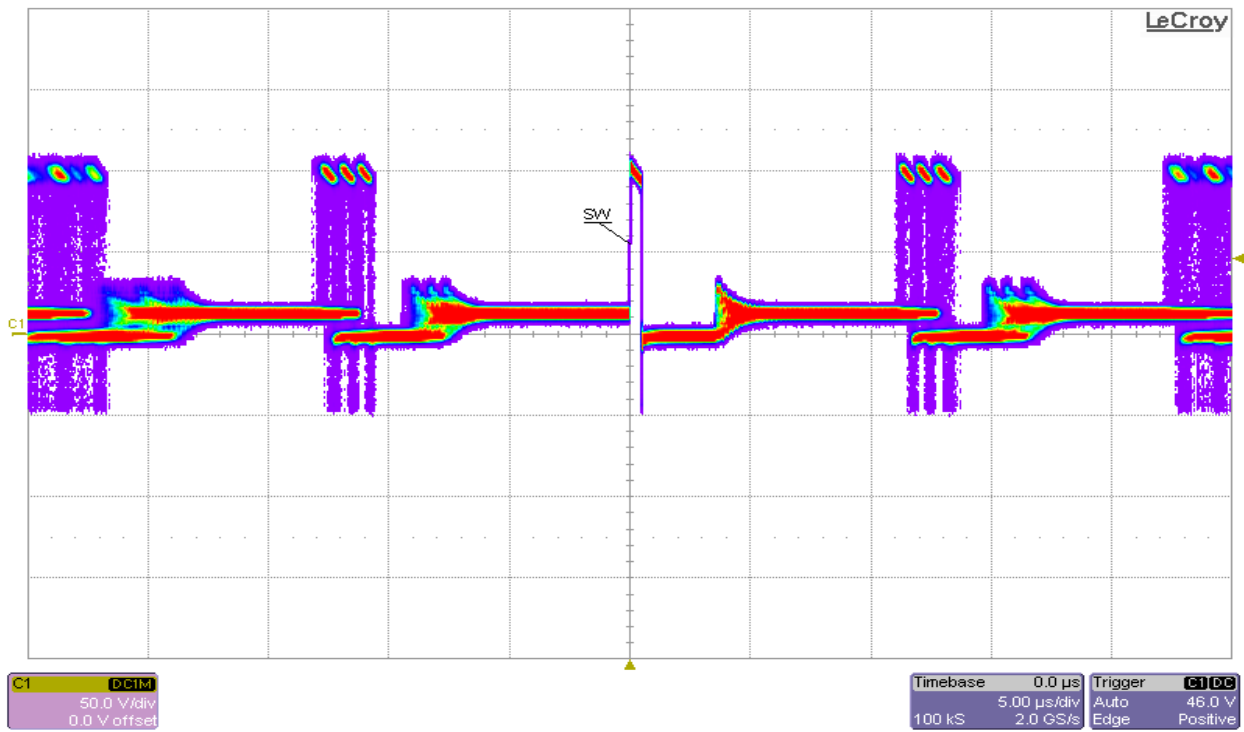
Switch Node Voltage at 110V_{in} and Full (0.3A) Load. Ch2-Primary SW, Ch1-Vout (AC Coupled).

6.2 Frequency Dither

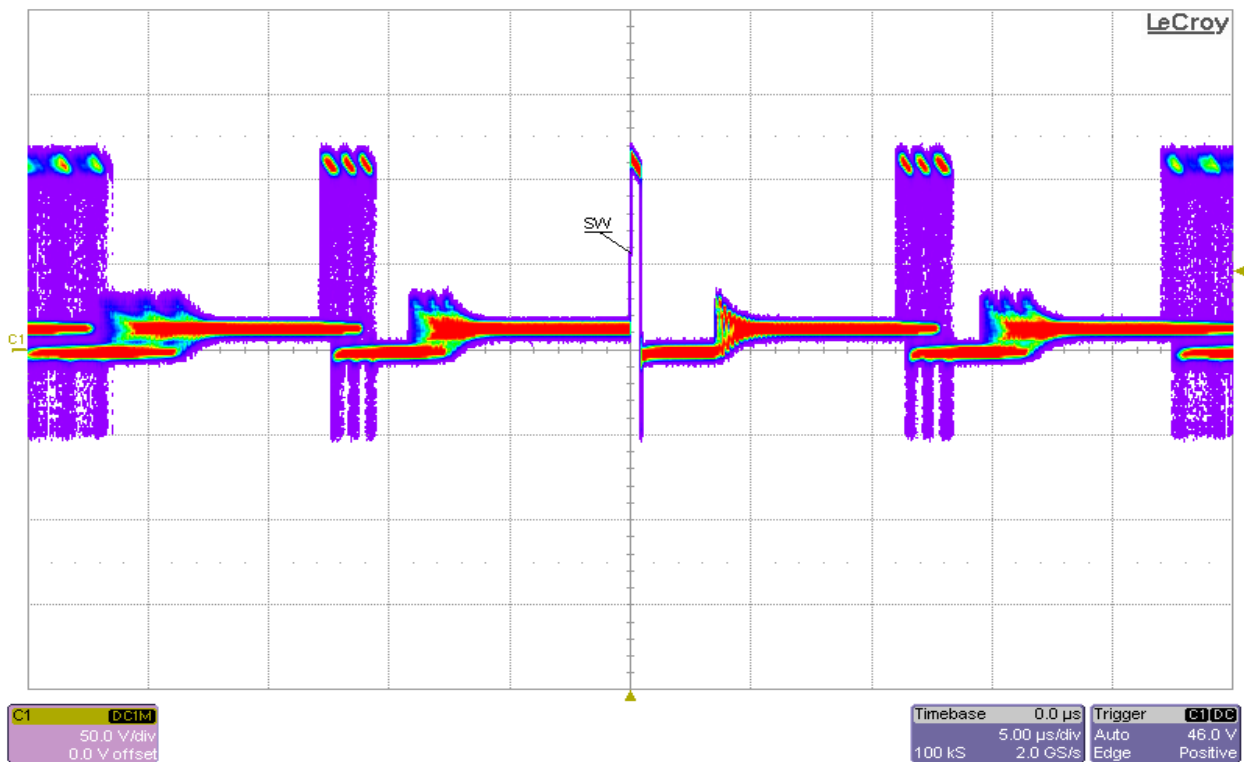
The UCC287xx PSR controller uses a frequency dithering scheme to reduce EMI.



Switch Node Frequency Dither at 90V_{in} and Full (0.3A) Load. Ch1-Primary SW.

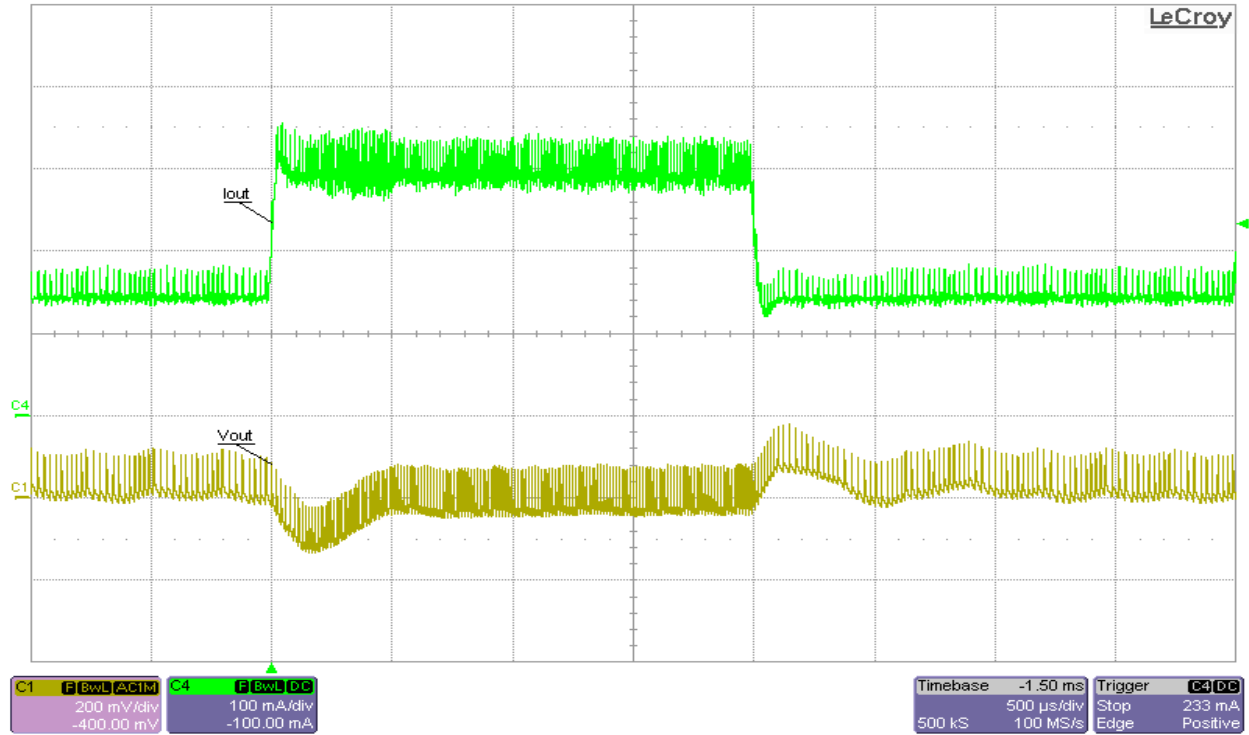


Switch Node Frequency Dither at 100V_{in} and Full (0.3A) Load. Ch1-Primary SW.

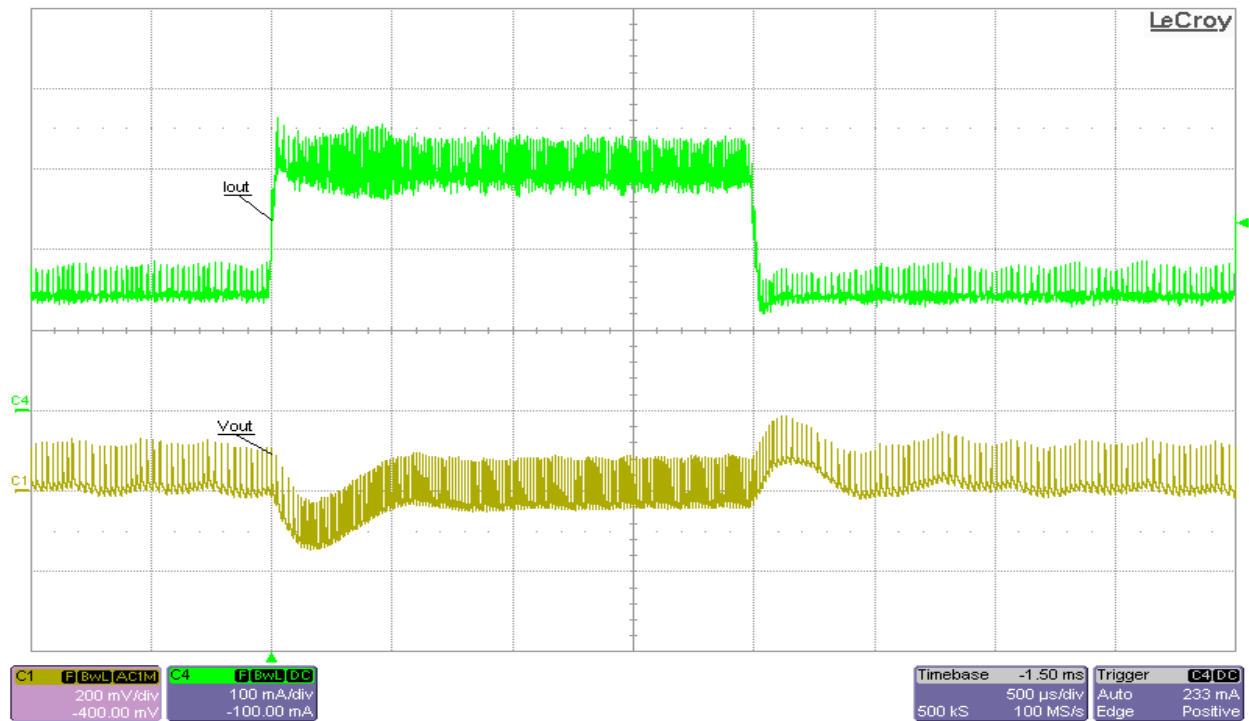


Switch Node Frequency Dither at 110V_{in} and Full (0.3A) Load. Ch1-Primary SW.

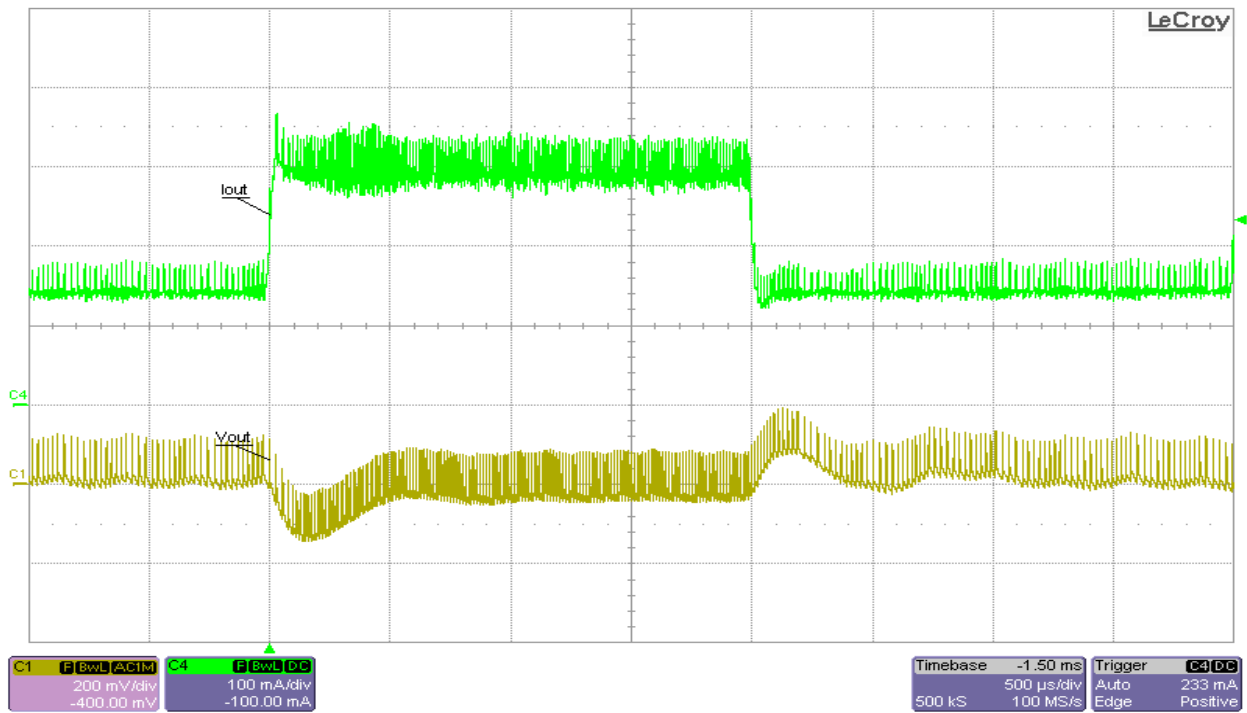
6.3 Load Transient



Load Transient from 50% Load to 100% Load at 90V_{in}. Ch1-V_{out}, Ch4-I_{out}.



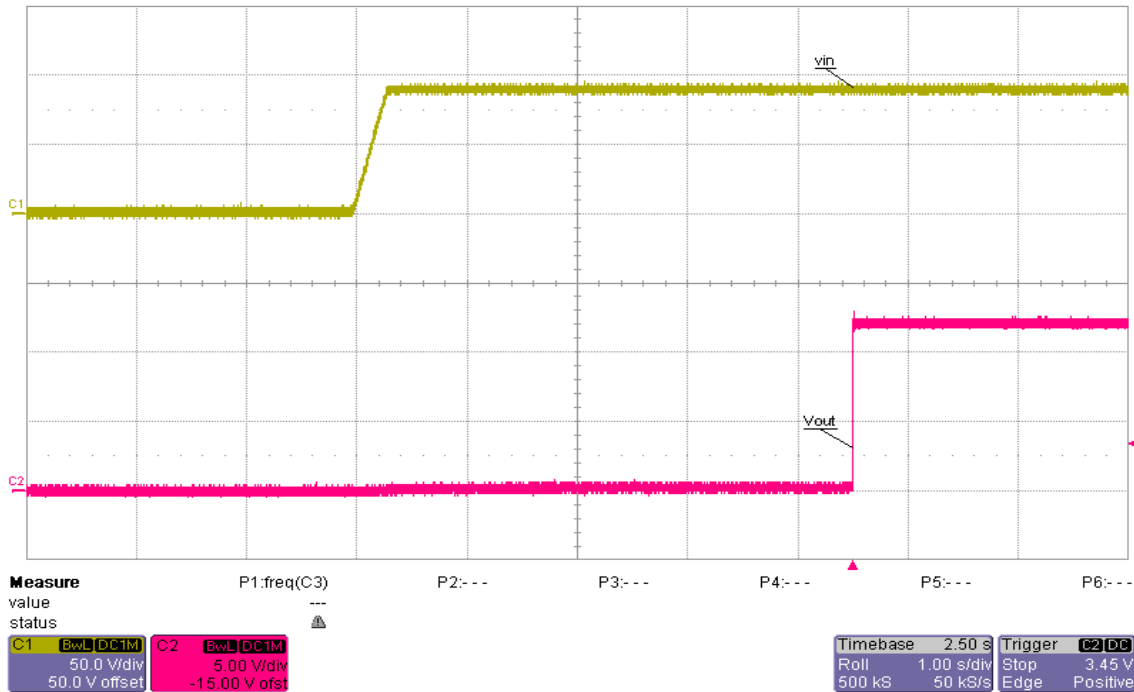
Load Transient from 50% Load to 100% Load at 100V_{in}. Ch1-V_{out}, Ch4-I_{out}.



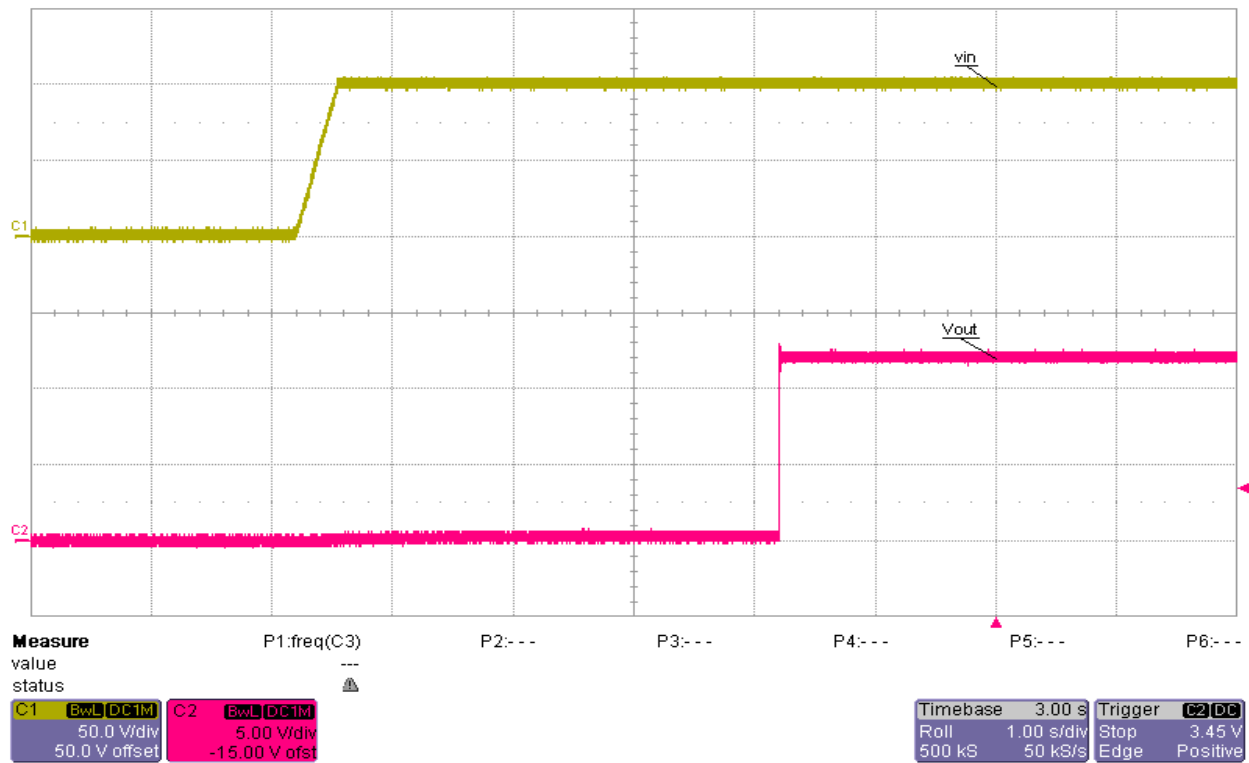
Load Transient from 50% Load to 100% Load at 110Vin. Ch1-Vout, Ch4-Iout.

6.4 Start-up

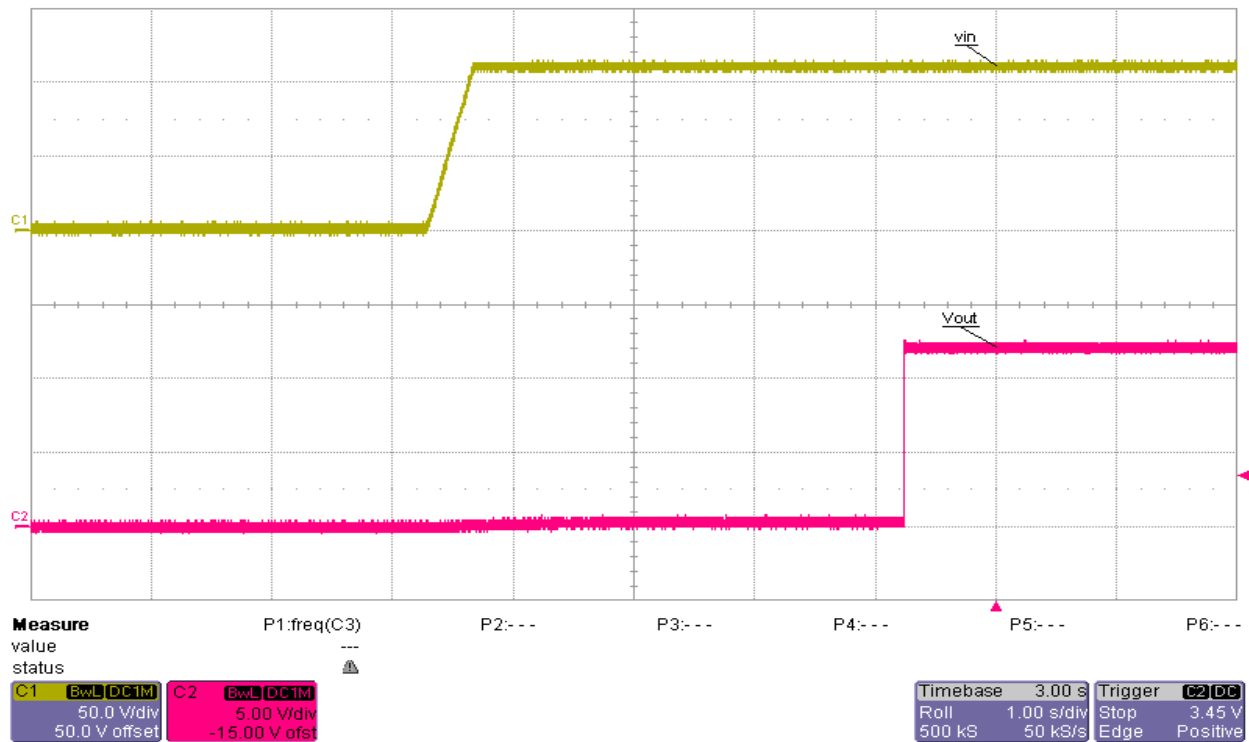
Startup delay time is controlled by 2M Ω VIN to VDD resistor charging 10 μ F bias capacitor.



Start-up into Full Load at 90Vin. Ch1-Vin, Ch2-Vout. ~4.5s Start-up Delay Time.

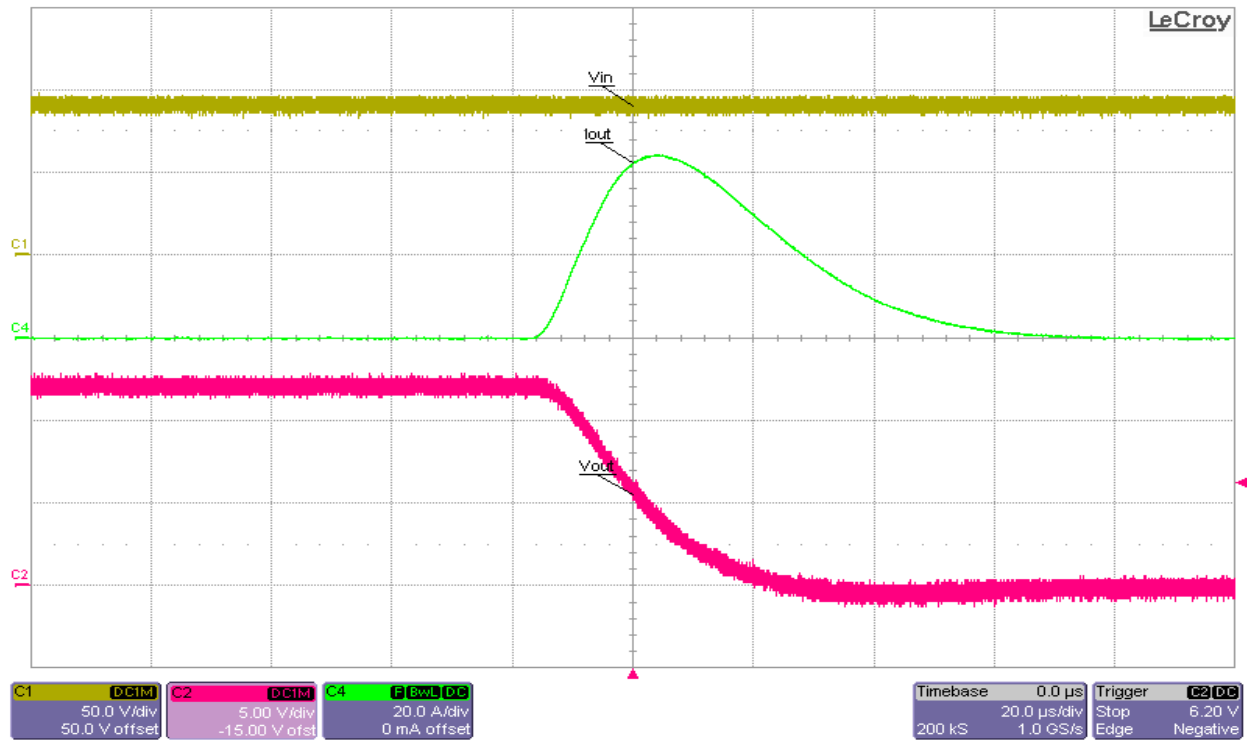


Start-up into Full Load at 100Vin. Ch1-Vin, Ch2-Vout. ~4s Start-up Delay Time.

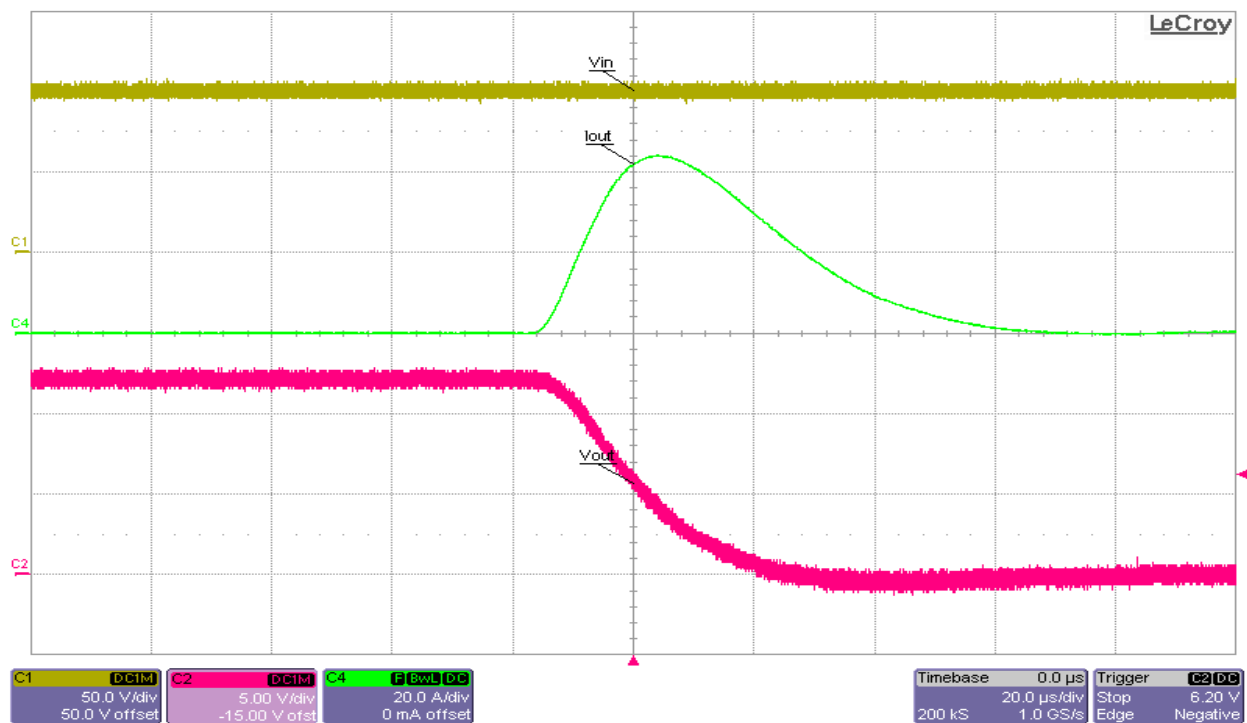


Start-up into Full Load at 110Vin. Ch1-Vin, Ch2-Vout. ~4s Start-up Delay Time.

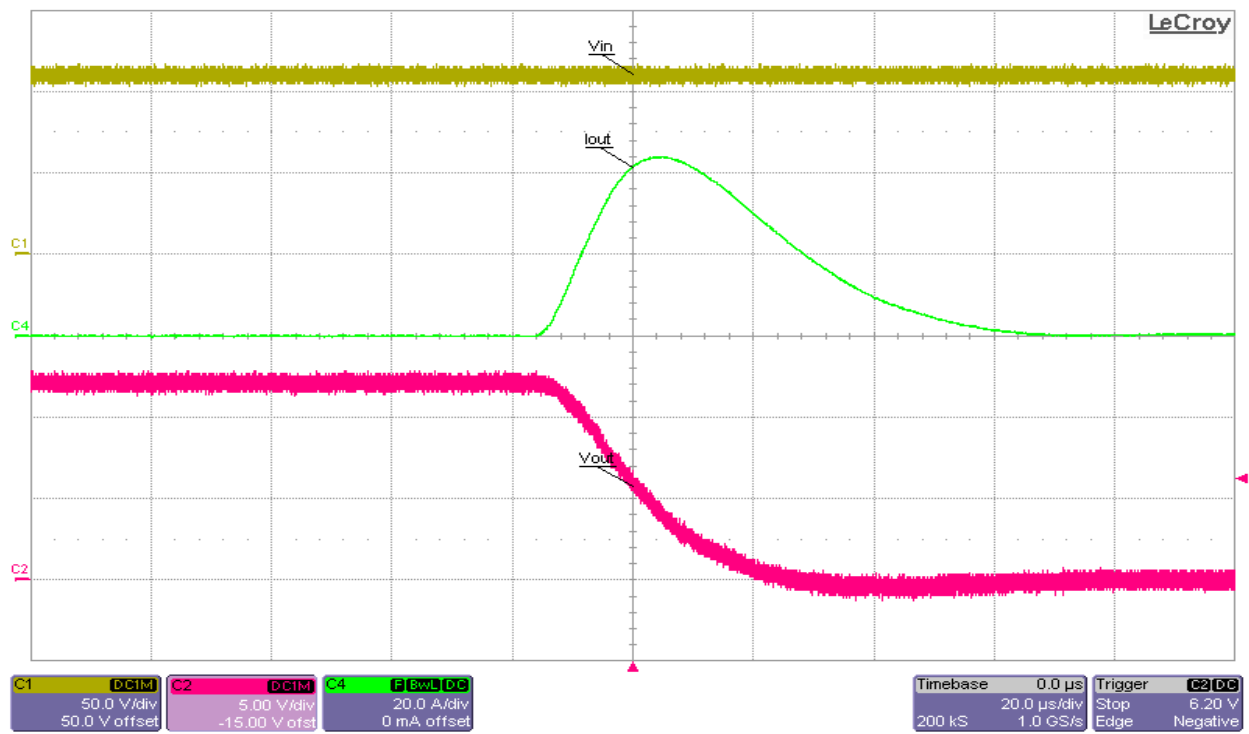
6.5 Short Circuit



No Load Short Circuit at 90V_{in}. Ch1-V_{in}, Ch2-V_{out}, Ch4-I_{out}.

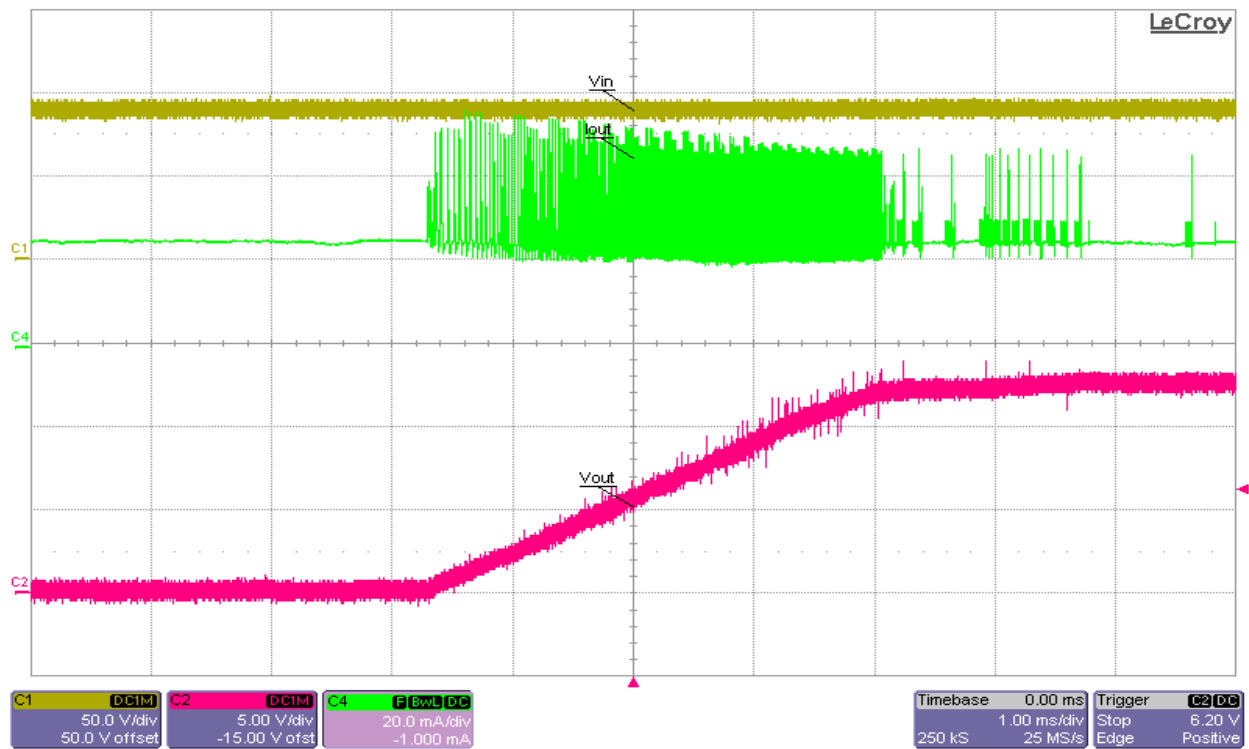


No Load Short Circuit at 100V_{in}. Ch1-V_{in}, Ch2-V_{out}, Ch4-I_{out}.

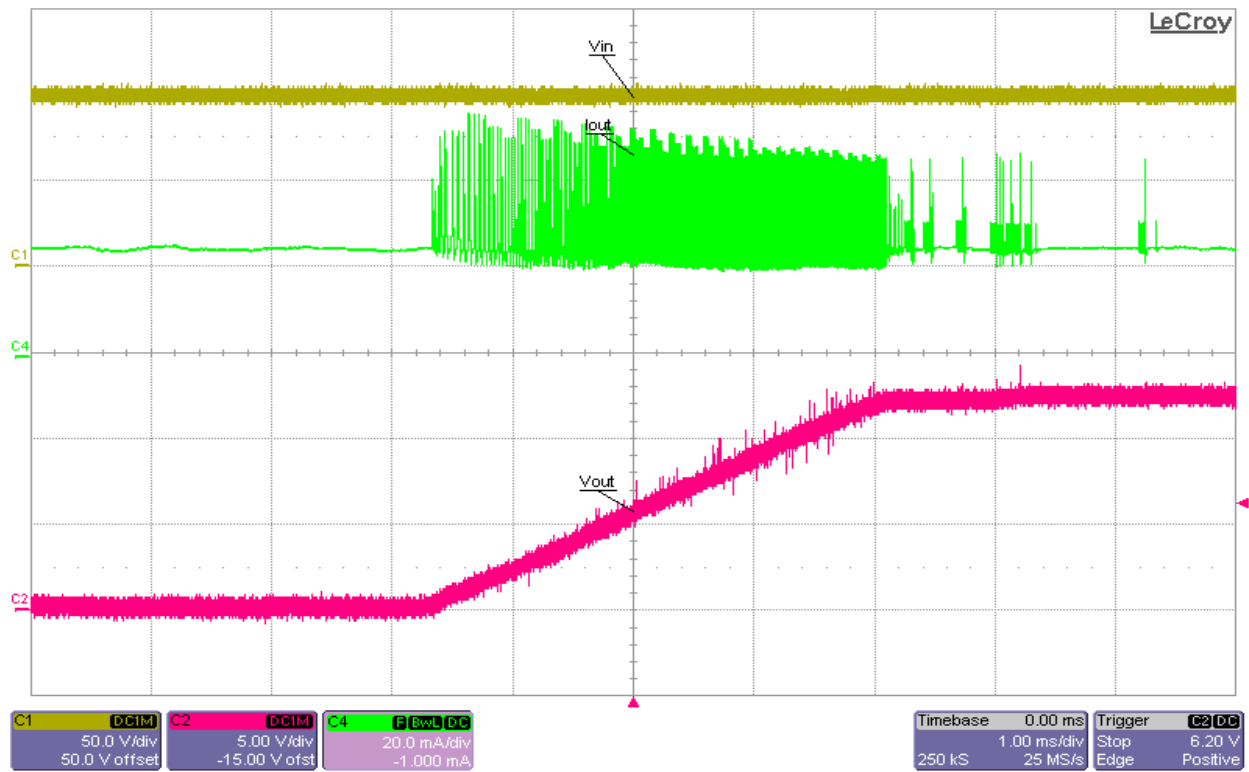


No Load Short Circuit at 110Vin. Ch1-Vin, Ch2-Vout, Ch4-Iout.

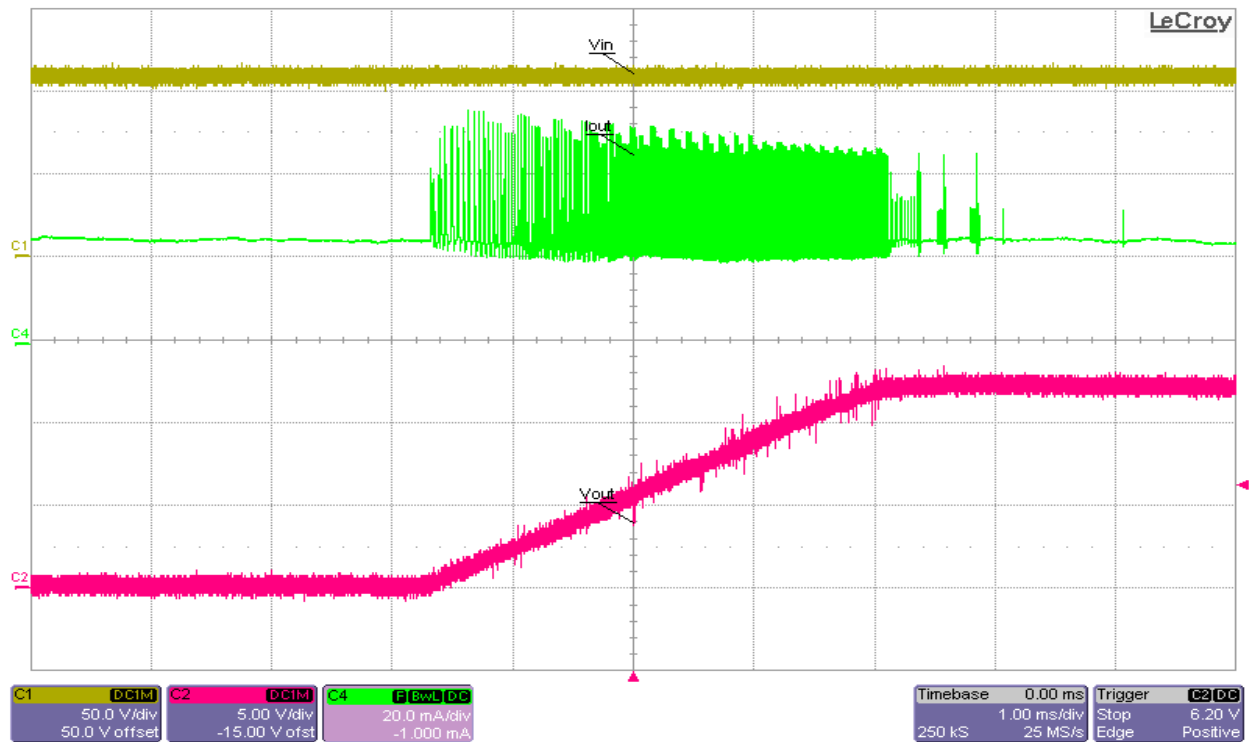
6.6 Short Circuit Recovery



No Load Short Circuit Recovery at 90Vin. Ch1-Vin, Ch2-Vout, Ch4-Iout.



No Load Short Circuit Recovery at 100Vin. Ch1-Vin, Ch2-Vout, Ch4-Iout.



No Load Short Circuit Recovery at 110Vin. Ch1-Vin, Ch2-Vout, Ch4-Iout.

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