

**Test Report
For PMP9334
06/01/2015**



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1. Design Specifications

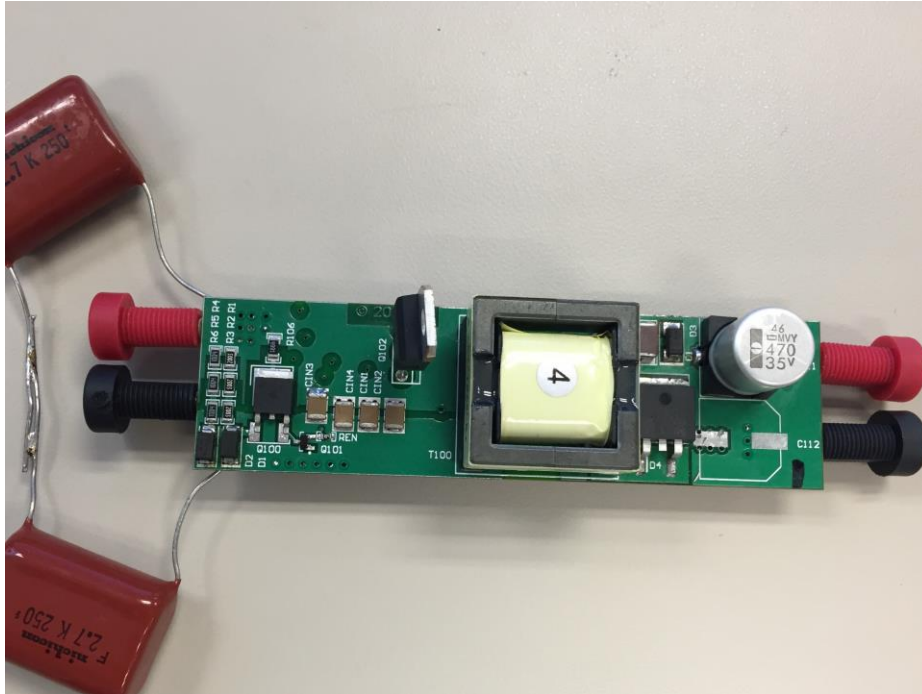
Vin Minimum	30VDC
Vin Maximum	350VDC
Vout	15 VDC
Iout	1A
Approximate Switching Frequency	~80KHz

2. Circuit Description and PCB details

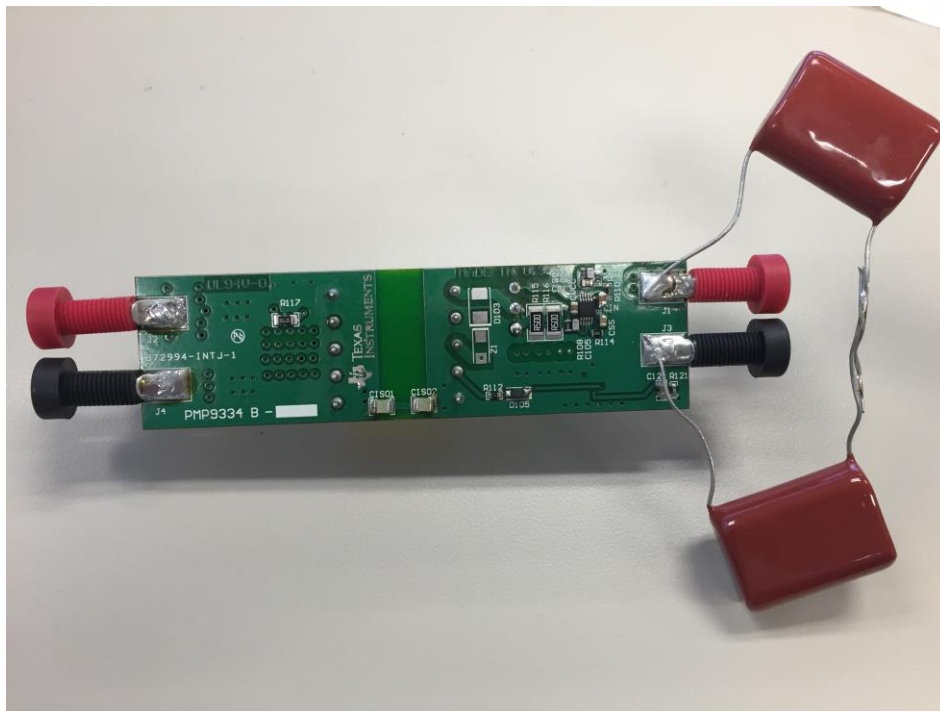
PMP9334 is an isolated Flyback converter utilizing the LM5022 for industrial applications. It uses primary side regulation from an auxiliary winding with a resistor divider network to the Feedback pin of the LM5022. This design has a minimum operating input voltage of 30V and has been tested to 350V. It also utilizes a high voltage standoff voltage and powers itself off the auxiliary winding once the part has started. The output voltage regulation is based on current-mode control, which eases the design of loop compensation. The switching frequency is set to 80 kHz. A Flyback transformer from GCI, part number G094215LF is used in this design and readily available upon request. The board is tested with two 2.7uF 250V rated capacitors in series to suppress input current ripple.

3. PMP9334 Board Photos

Board Dimensions: 101.6mm x 28mm

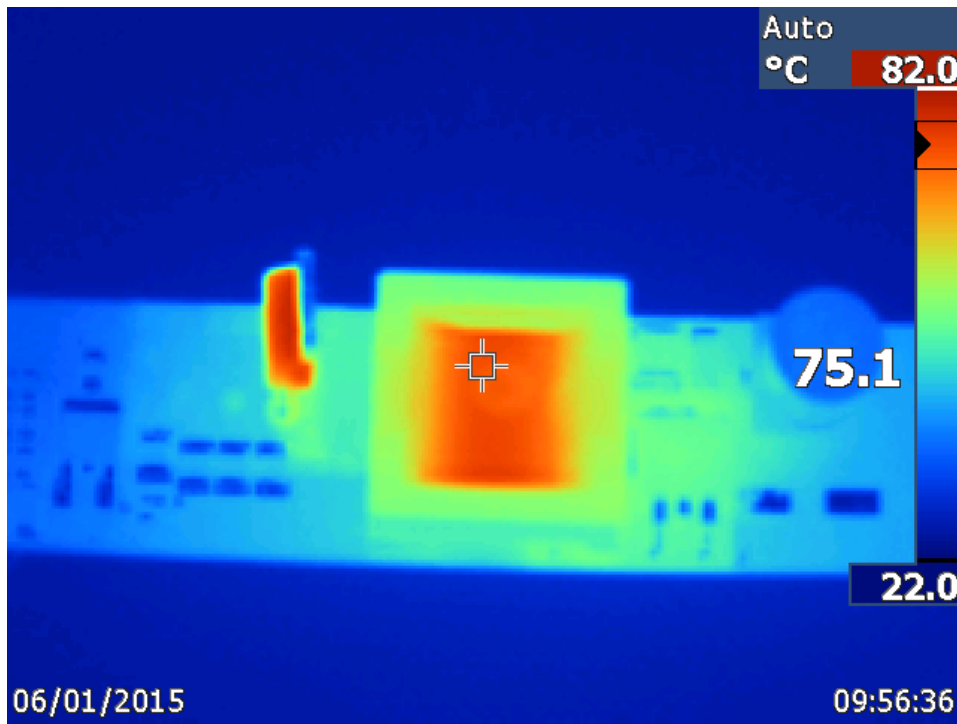


Board Photo (Top)

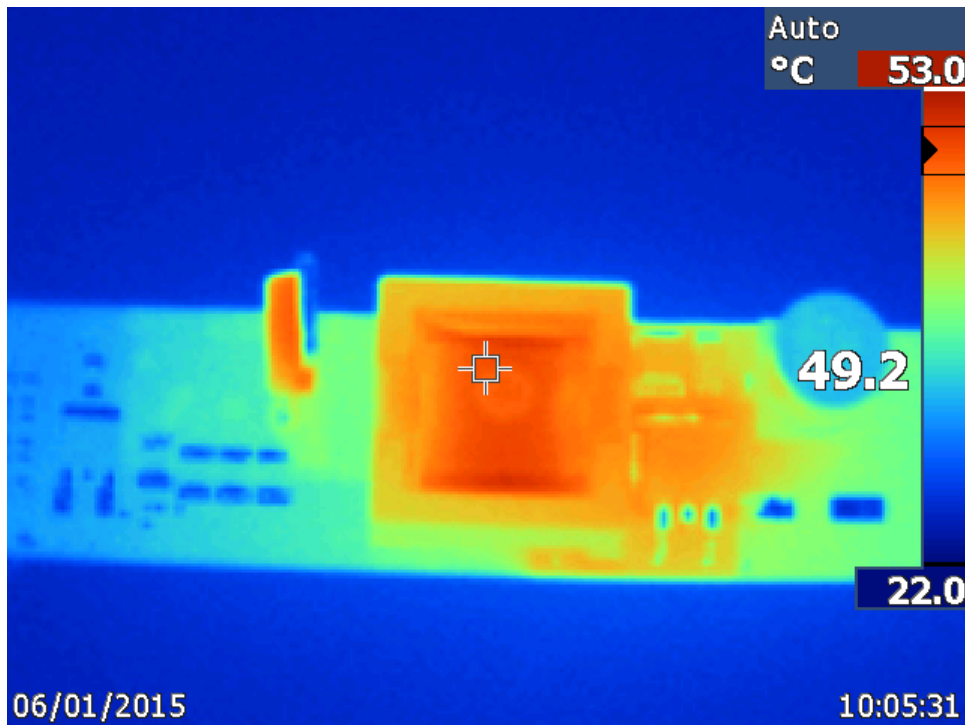


Board Photo (Bottom)

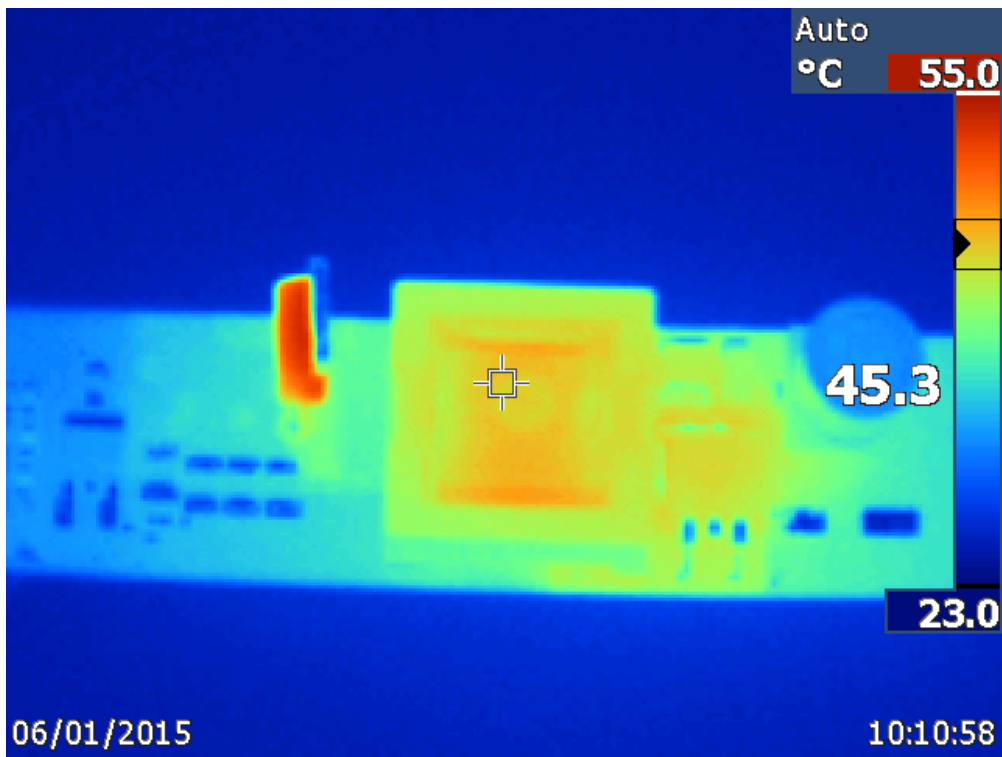
4. Thermal Data



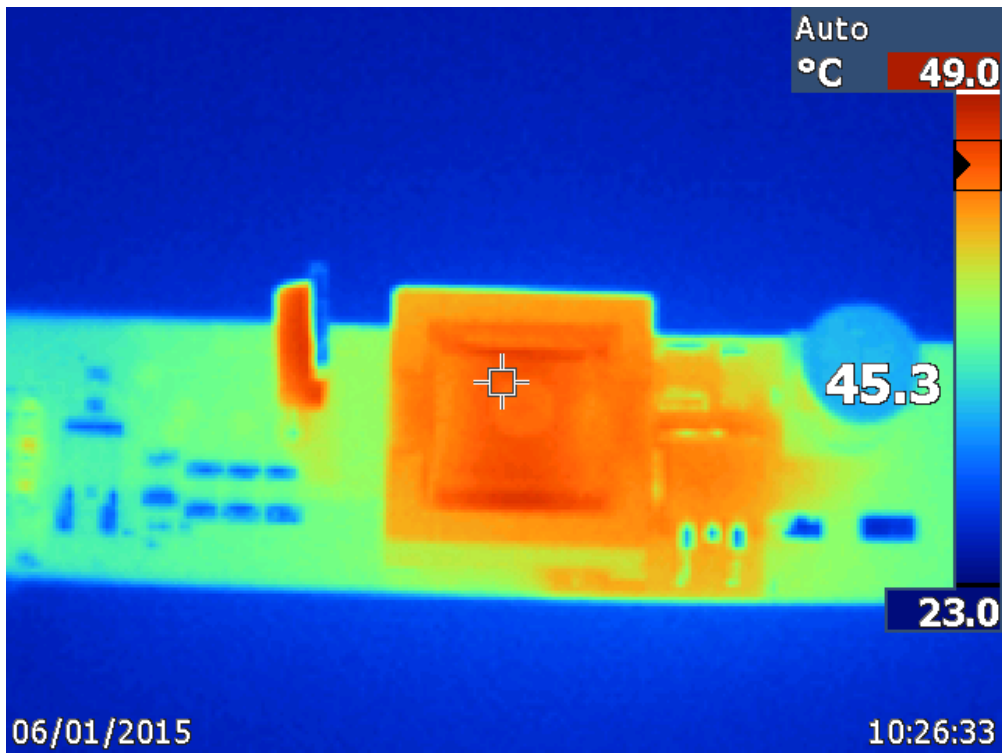
IR thermal image taken at steady state with 30V_{in} and 1A load (no airflow)



IR thermal image taken at steady state with 100V_{in} and 1A load (no airflow)



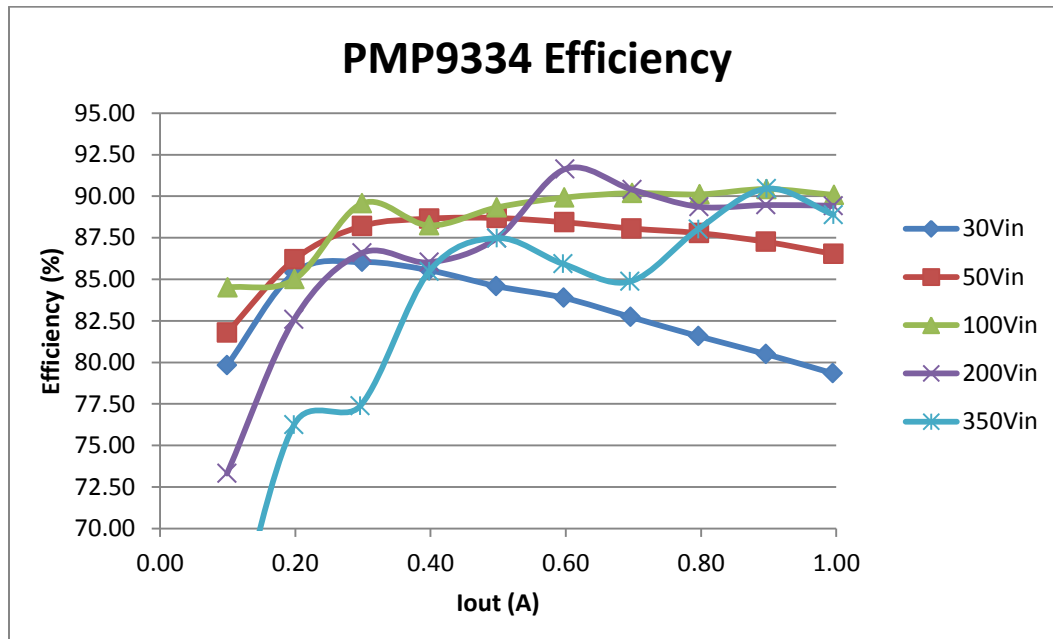
IR thermal image taken at steady state with 200V_{in} and 1A load (no airflow)



IR thermal image taken at steady state with 350V_{in} and 1A load (no airflow)

5. Efficiency and Regulation

5.1 Efficiency Chart

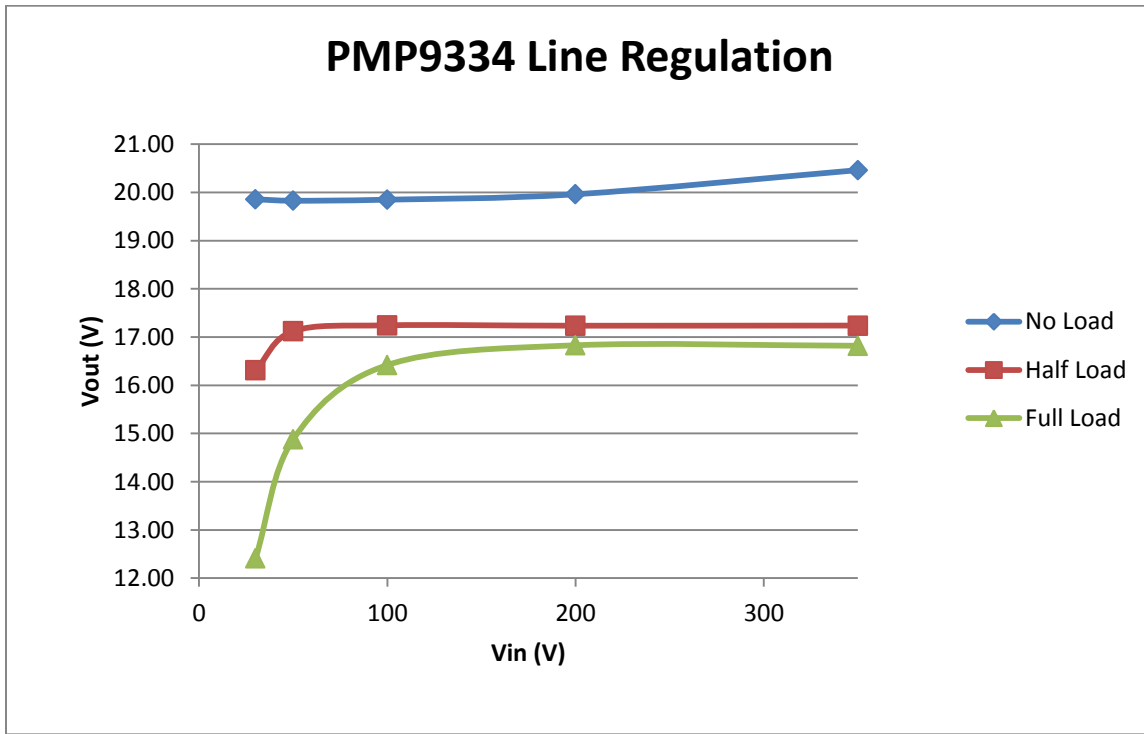


5.2 Efficiency Data

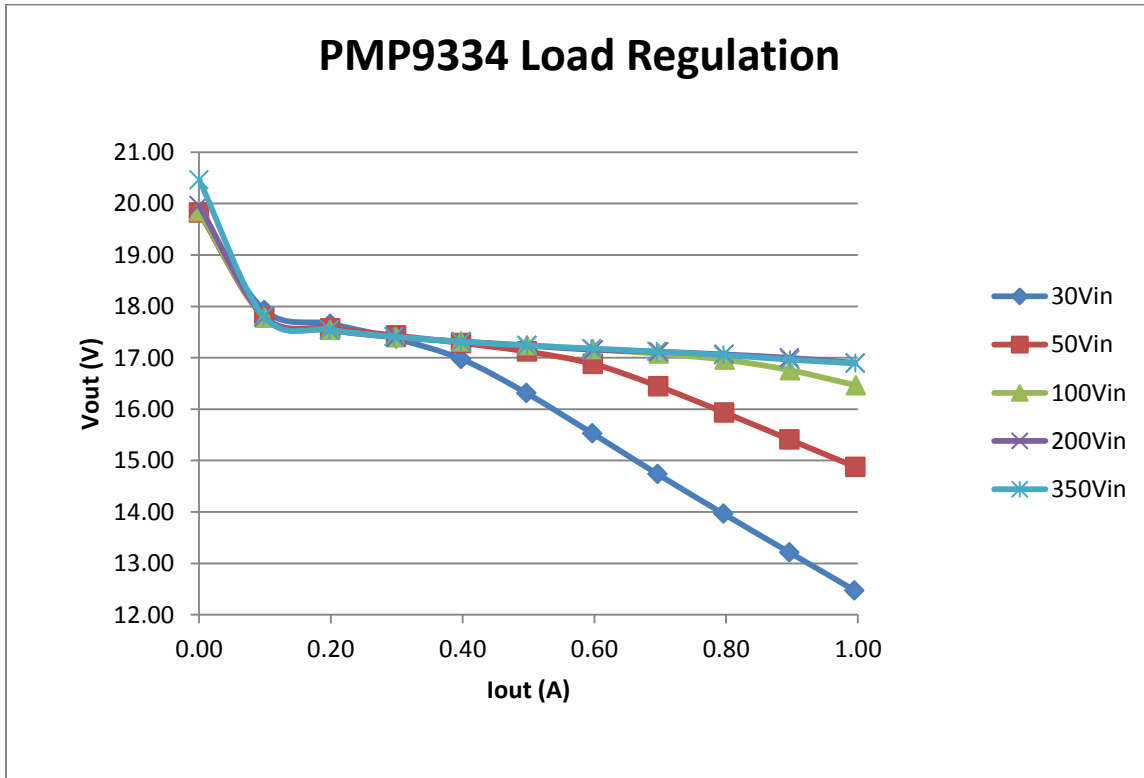
Vin(V)	Iin(A)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Efficiency(%)
30.06	0.01	0.30	19.86	0.00	0.00	0.30	0.00
30.05	0.07	2.22	17.93	0.10	1.77	0.45	79.82
30.04	0.14	4.12	17.66	0.20	3.51	0.60	85.40
30.03	0.20	6.04	17.37	0.30	5.19	0.84	86.04
30.03	0.26	7.90	16.98	0.40	6.76	1.14	85.54
30.04	0.32	9.58	16.31	0.50	8.11	1.48	84.59
30.03	0.37	11.05	15.53	0.60	9.27	1.78	83.89
30.02	0.41	12.40	14.74	0.70	10.26	2.14	82.73
30.02	0.45	13.63	13.97	0.80	11.12	2.51	81.58
30.02	0.49	14.71	13.21	0.90	11.84	2.87	80.50
30.03	0.52	15.64	12.47	1.00	12.41	3.23	79.34
50.09	0.00	0.20	19.83	0.00	0.00	0.20	0.00
50.09	0.04	2.15	17.79	0.10	1.76	0.39	81.79
50.09	0.08	4.06	17.57	0.20	3.50	0.56	86.21
50.08	0.12	5.91	17.43	0.30	5.21	0.70	88.21
50.08	0.16	7.76	17.29	0.40	6.88	0.88	88.65
50.07	0.19	9.61	17.12	0.50	8.53	1.09	88.69
50.07	0.23	11.42	16.88	0.60	10.09	1.32	88.43

50.07	0.26	13.02	16.45	0.70	11.46	1.55	88.06
50.07	0.29	14.47	15.94	0.80	12.70	1.77	87.78
50.08	0.32	15.82	15.41	0.90	13.81	2.02	87.26
50.08	0.34	17.13	14.88	1.00	14.82	2.31	86.53
100.16	0.00	0.20	19.85	0.00	0.00	0.20	0.00
100.15	0.02	2.10	17.77	0.10	1.78	0.33	84.51
100.15	0.04	4.11	17.54	0.20	3.49	0.62	85.01
100.15	0.06	5.81	17.40	0.30	5.20	0.61	89.57
100.15	0.08	7.81	17.32	0.40	6.89	0.92	88.24
100.15	0.10	9.61	17.24	0.50	8.59	1.03	89.32
100.14	0.11	11.42	17.17	0.60	10.27	1.15	89.92
100.14	0.13	13.22	17.08	0.70	11.92	1.30	90.19
100.14	0.15	15.02	16.96	0.80	13.54	1.49	90.11
100.14	0.17	16.62	16.76	0.90	15.03	1.59	90.43
100.13	0.18	18.22	16.47	1.00	16.42	1.81	90.08
200.27	0.00	0.40	19.96	0.00	0.00	0.40	0.00
200.27	0.01	2.40	17.80	0.10	1.76	0.64	73.31
200.27	0.02	4.21	17.54	0.20	3.47	0.73	82.57
200.26	0.03	6.01	17.40	0.30	5.20	0.81	86.59
200.27	0.04	8.01	17.32	0.40	6.89	1.12	86.03
200.26	0.05	9.81	17.24	0.50	8.58	1.23	87.47
200.26	0.06	11.21	17.16	0.60	10.28	0.94	91.64
200.26	0.07	13.22	17.12	0.70	11.95	1.27	90.40
200.26	0.08	15.22	17.07	0.80	13.60	1.62	89.37
200.26	0.09	17.02	17.00	0.90	15.23	1.79	89.47
200.26	0.09	18.82	16.90	1.00	16.83	1.99	89.43
350.49	0.00	0.70	20.46	0.00	0.00	0.70	0.00
350.50	0.01	2.80	17.81	0.10	1.75	1.06	62.24
350.48	0.01	4.56	17.54	0.20	3.47	1.08	76.24
350.54	0.02	6.66	17.41	0.30	5.15	1.51	77.38
350.48	0.02	8.06	17.31	0.40	6.89	1.17	85.48
350.48	0.03	9.81	17.24	0.50	8.59	1.23	87.48
350.51	0.03	11.92	17.18	0.60	10.24	1.68	85.93
350.52	0.04	14.02	17.12	0.70	11.90	2.12	84.87
350.48	0.04	15.42	17.05	0.80	13.57	1.85	88.02
350.48	0.05	16.82	16.96	0.90	15.22	1.61	90.45
350.49	0.05	18.93	16.89	1.00	16.82	2.10	88.89

5.3 Line Regulation

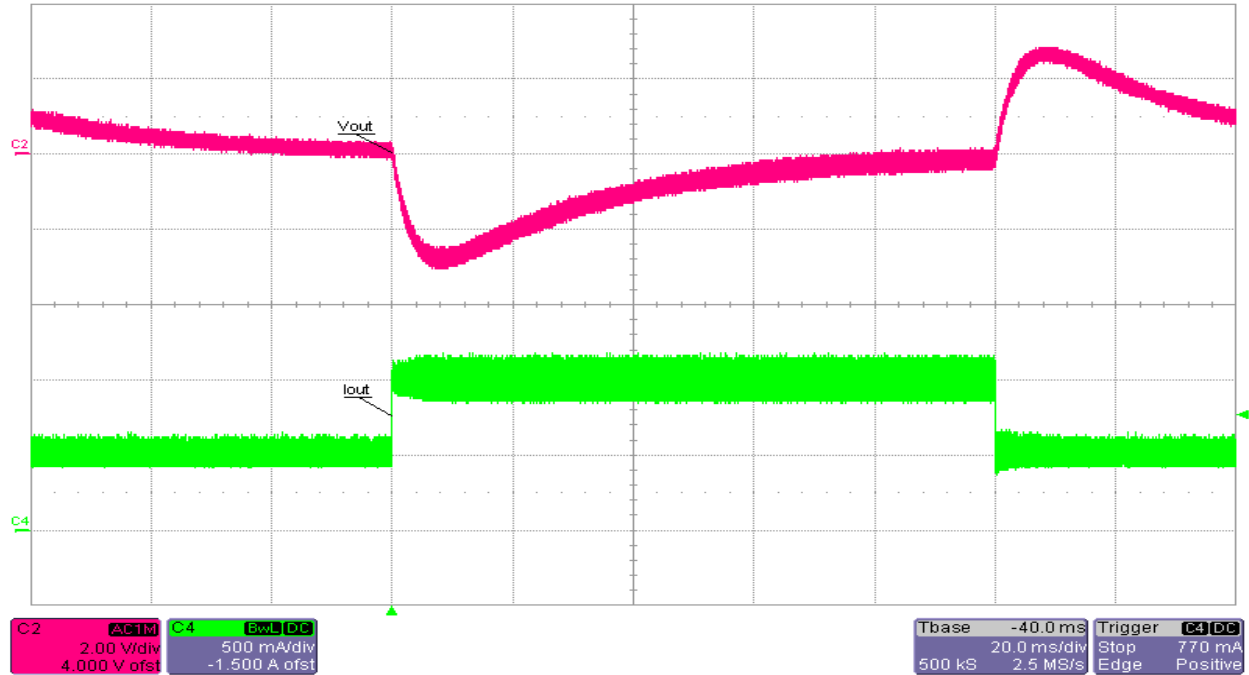


5.4 Load Regulation

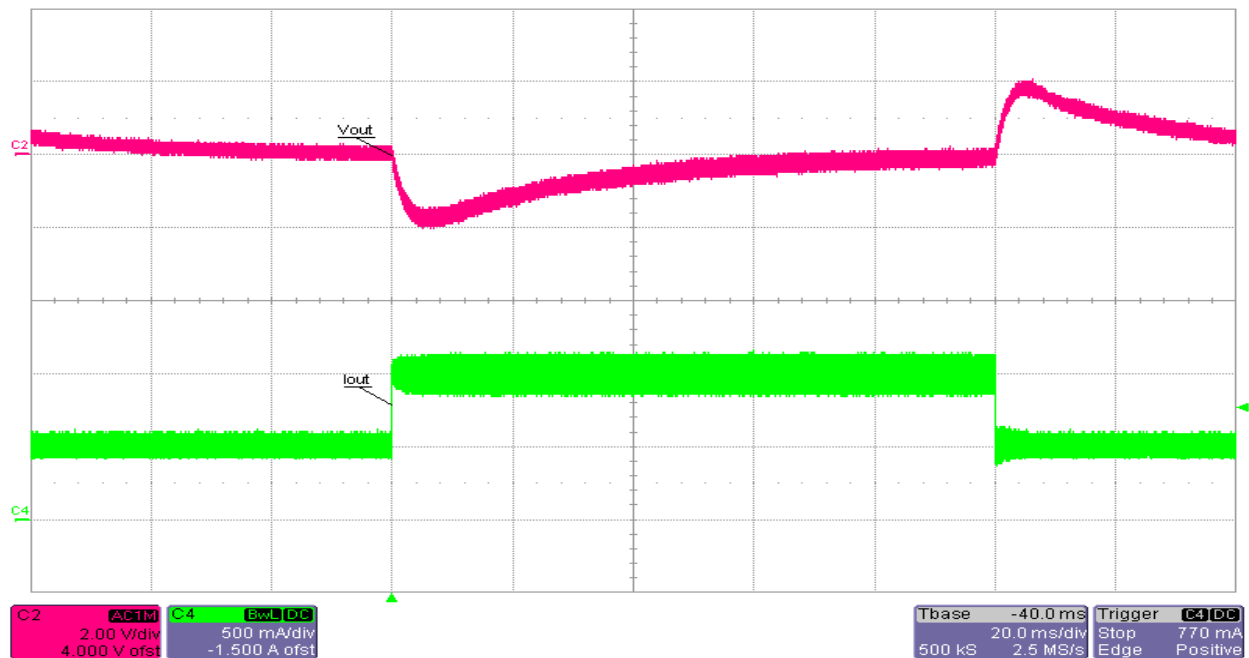


6 Waveforms

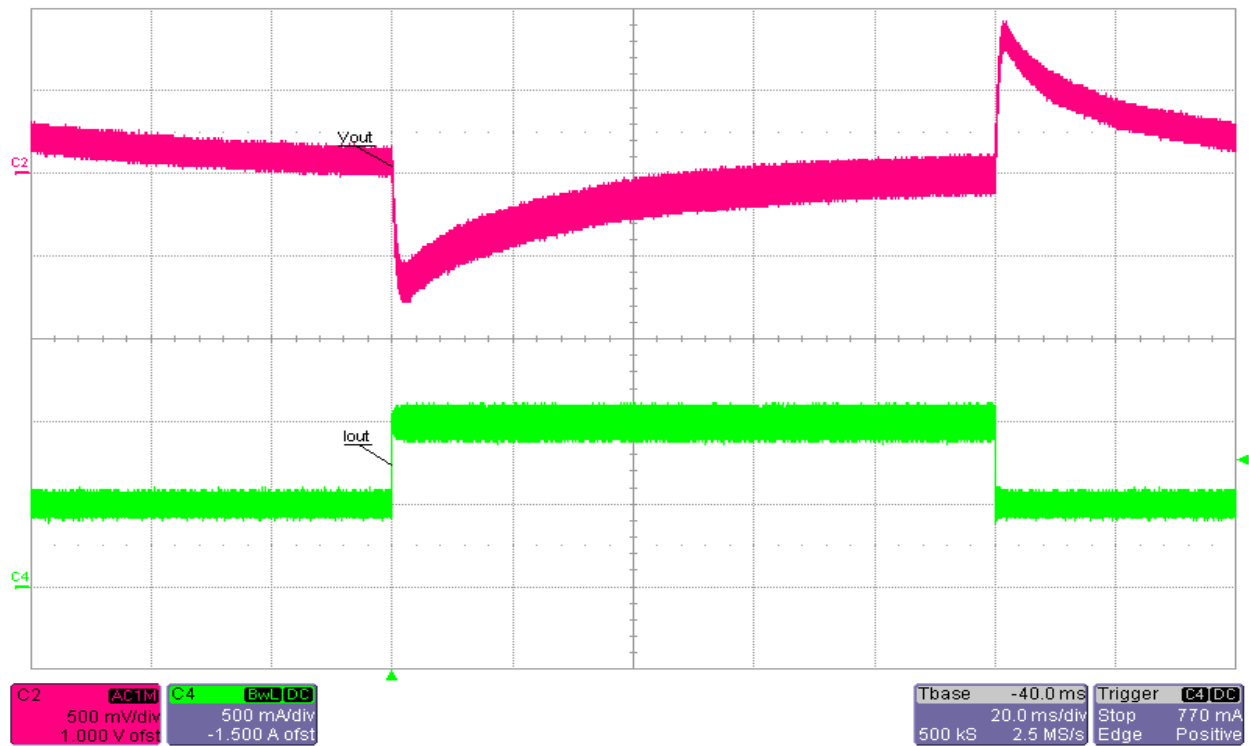
6.1 Load Transient Response



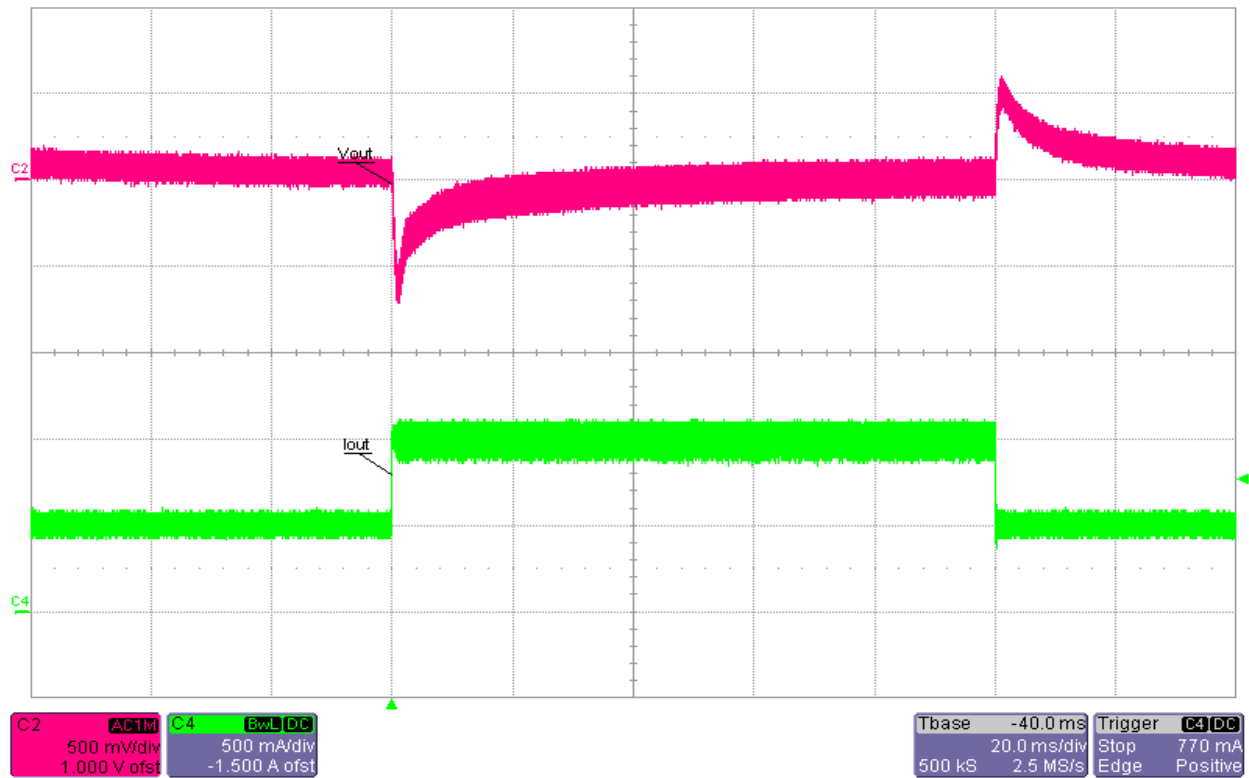
Load Transient Response at 30V_{in} and 50%-to-100% (0.5A-to-1A) Load Step, Ch2 – V_{out}, Ch4- I_{out}.



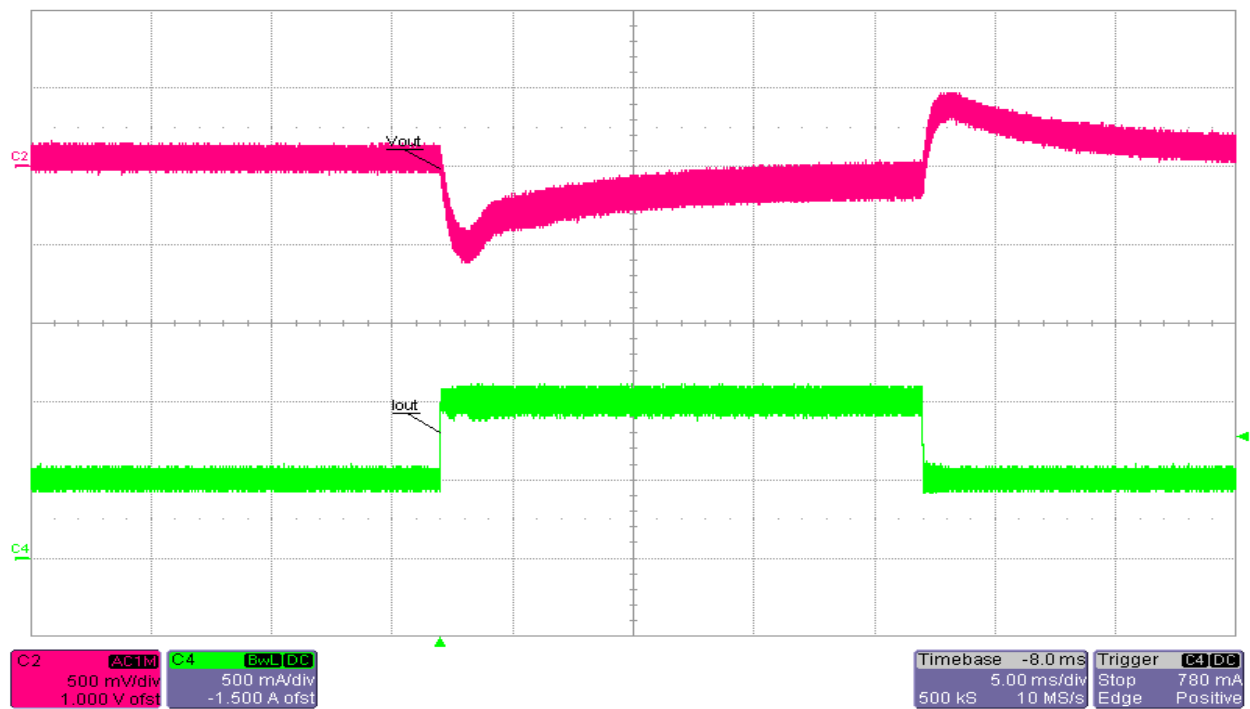
Load Transient Response at 50V_{in} and 50%-to-100% (0.5A-to-1A) Load Step, Ch2 – V_{out}, Ch4- I_{out}.



Load Transient Response at 100Vin and 50%-to-100% (0.5A-to-1A) Load Step, Ch2 – Vout, Ch4- Iout.

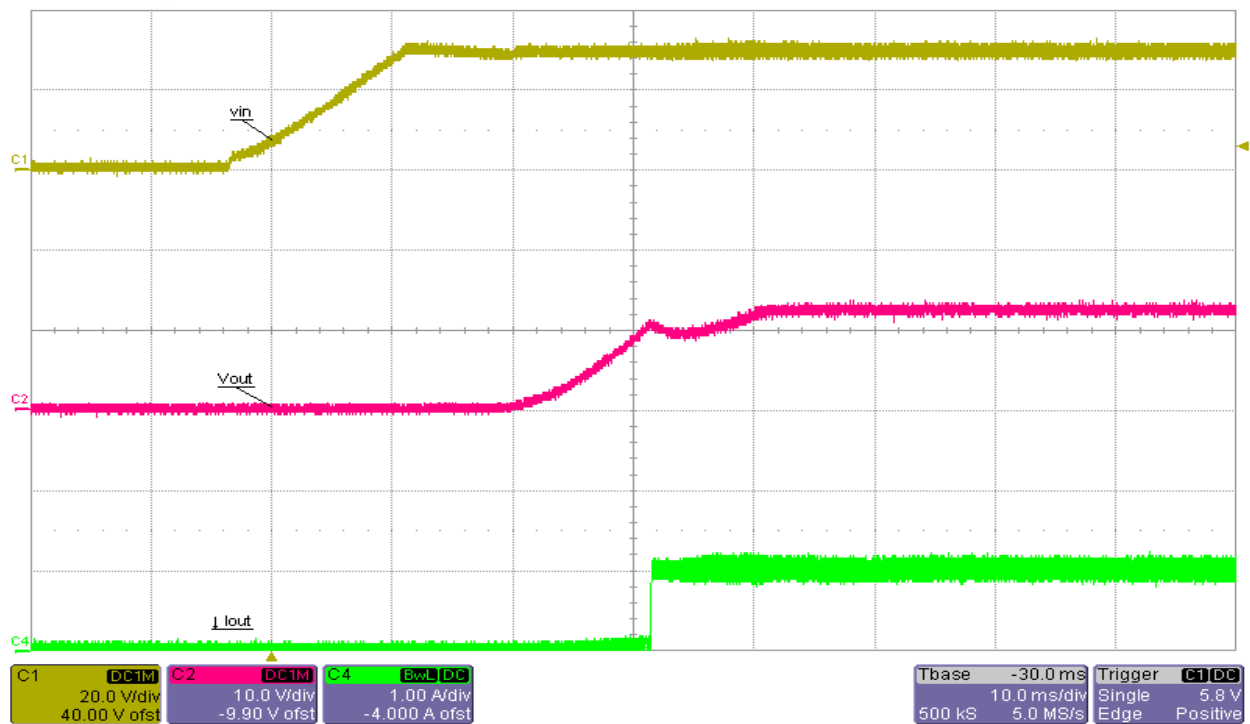


Load Transient Response at 200Vin and 50%-to-100% (0.5A-to-1A) Load Step, Ch2 – Vout, Ch4- Iout.

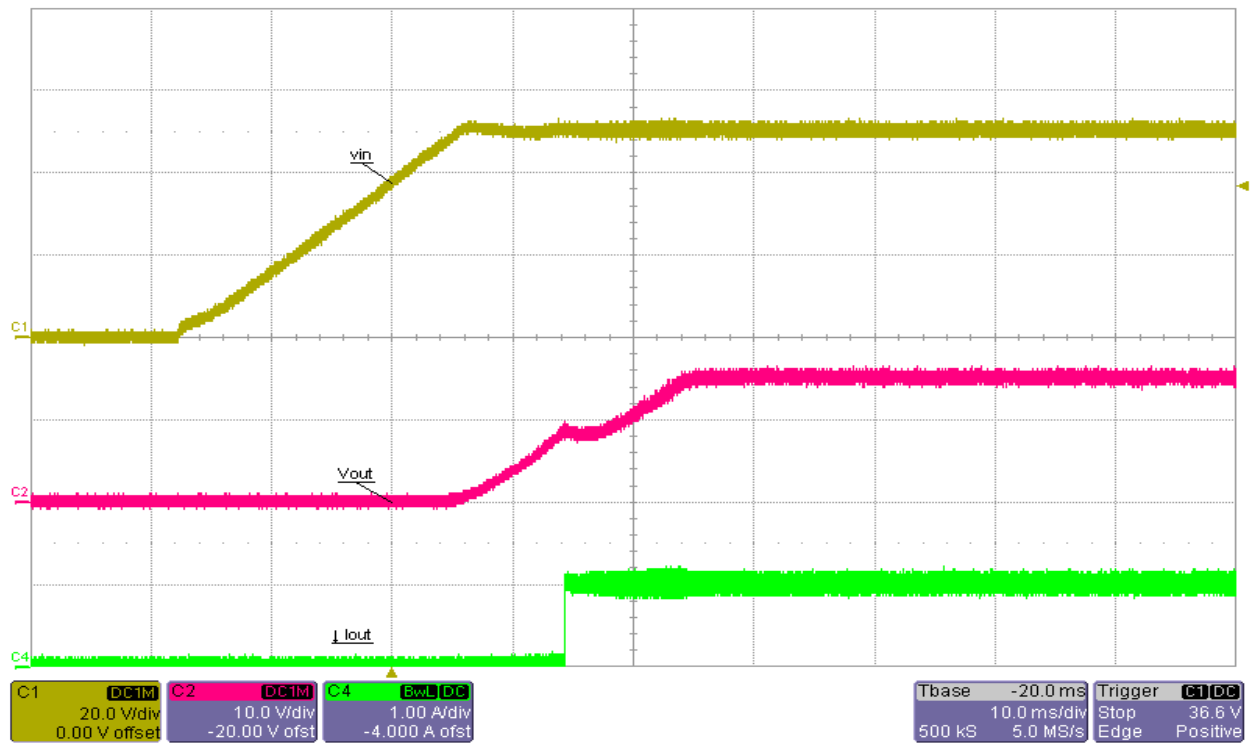


Load Transient Response at 350Vin and 50%-to-100% (0.5A-to-1A) Load Step, Ch2 – Vout, Ch4- Iout.

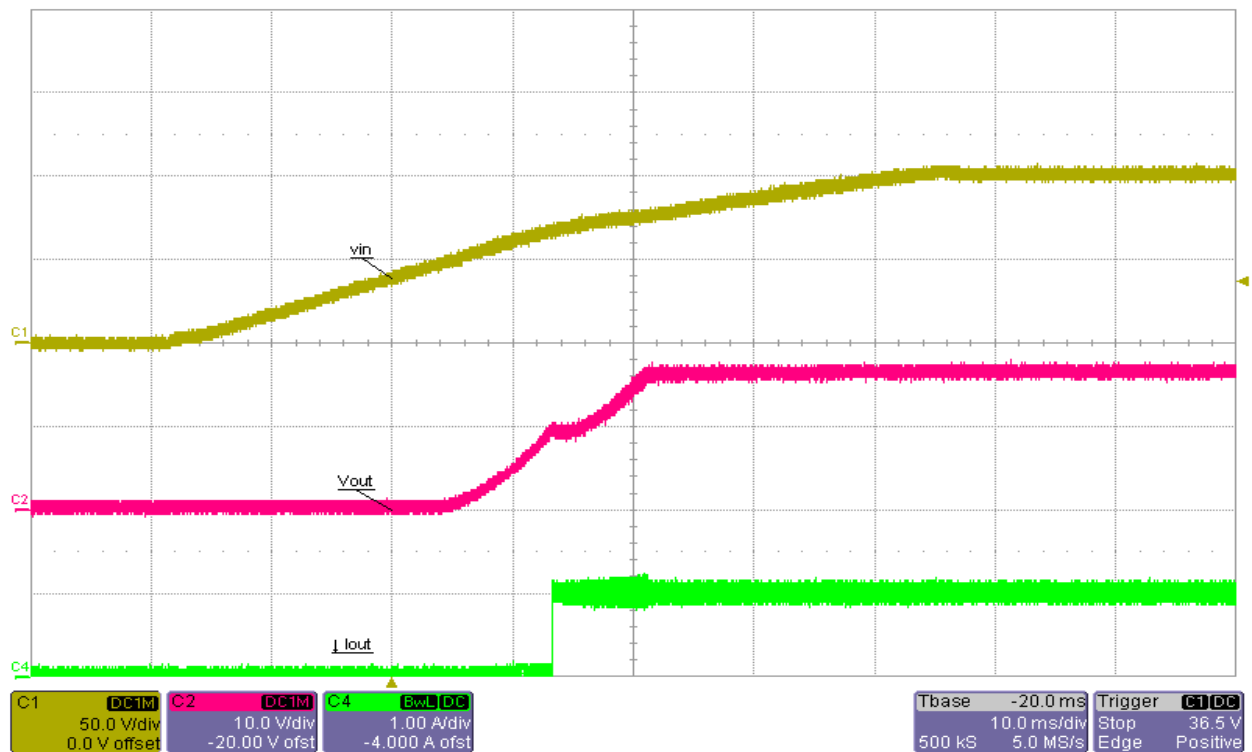
6.2 Startup



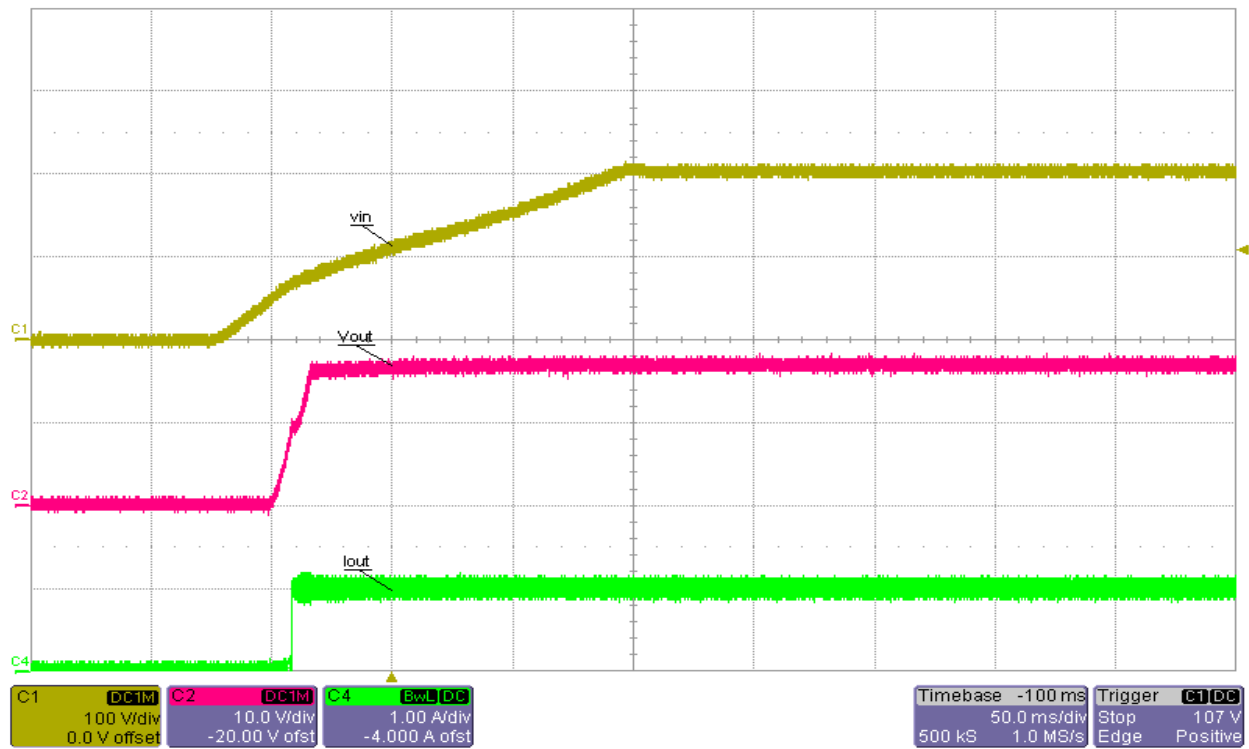
Startup into Full Load at 30Vin, Ch1-Vin, Ch2-Vout, Ch4-Iout



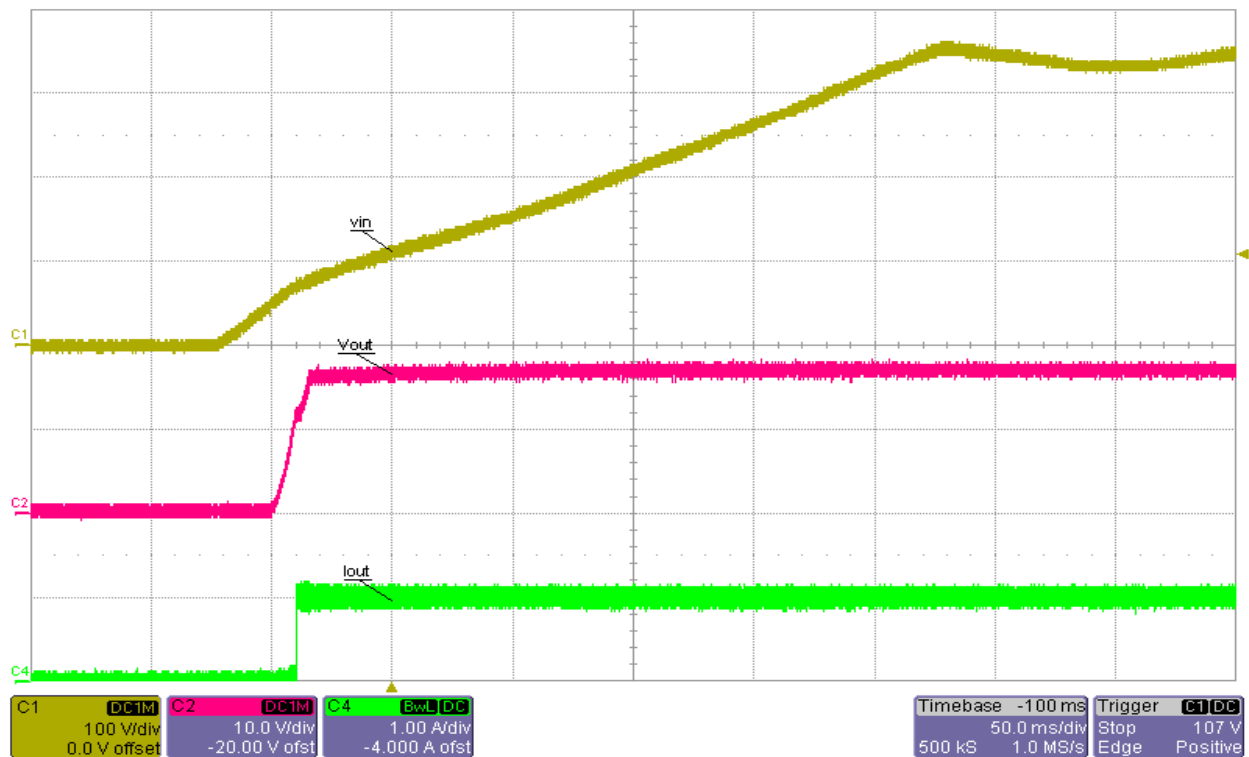
Startup into Full Load at 50Vin, Ch1-Vin, Ch2-Vout, Ch4-Iout



Startup into Full Load at 100Vin, Ch1-Vin, Ch2-Vout, Ch4-Iout

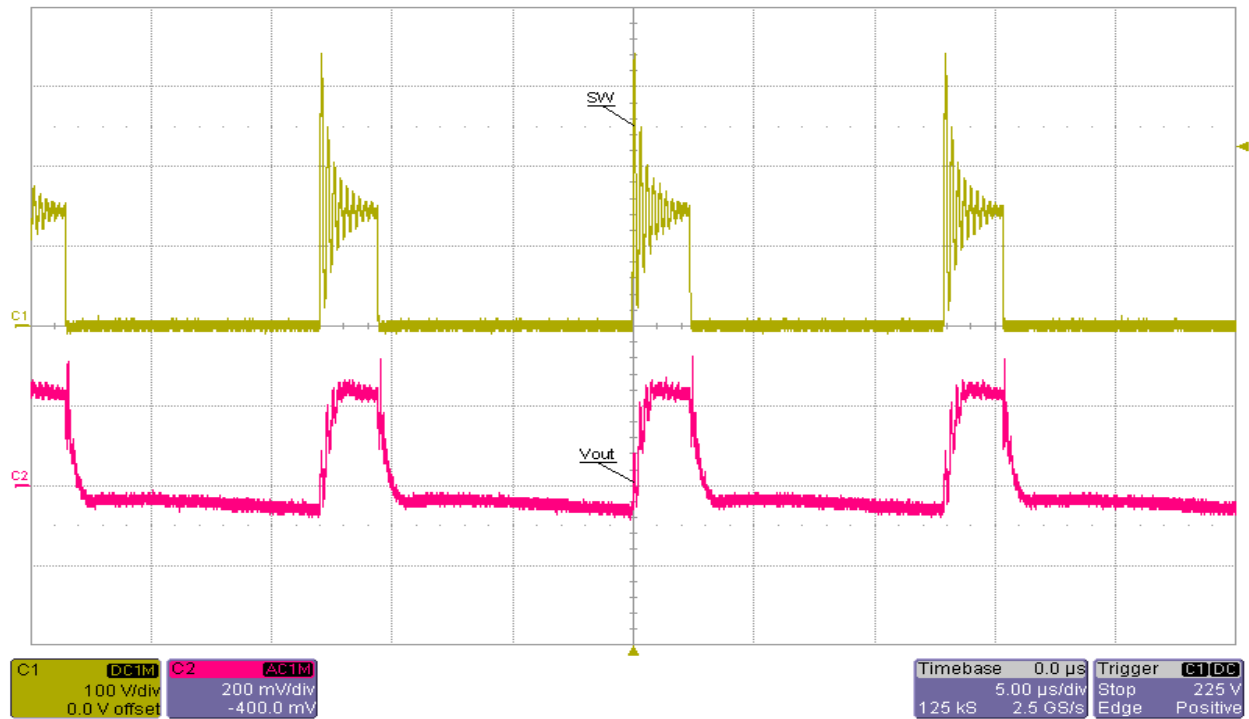


Startup into Full Load at 200Vin, Ch1-Vin, Ch2-Vout, Ch4-Iout

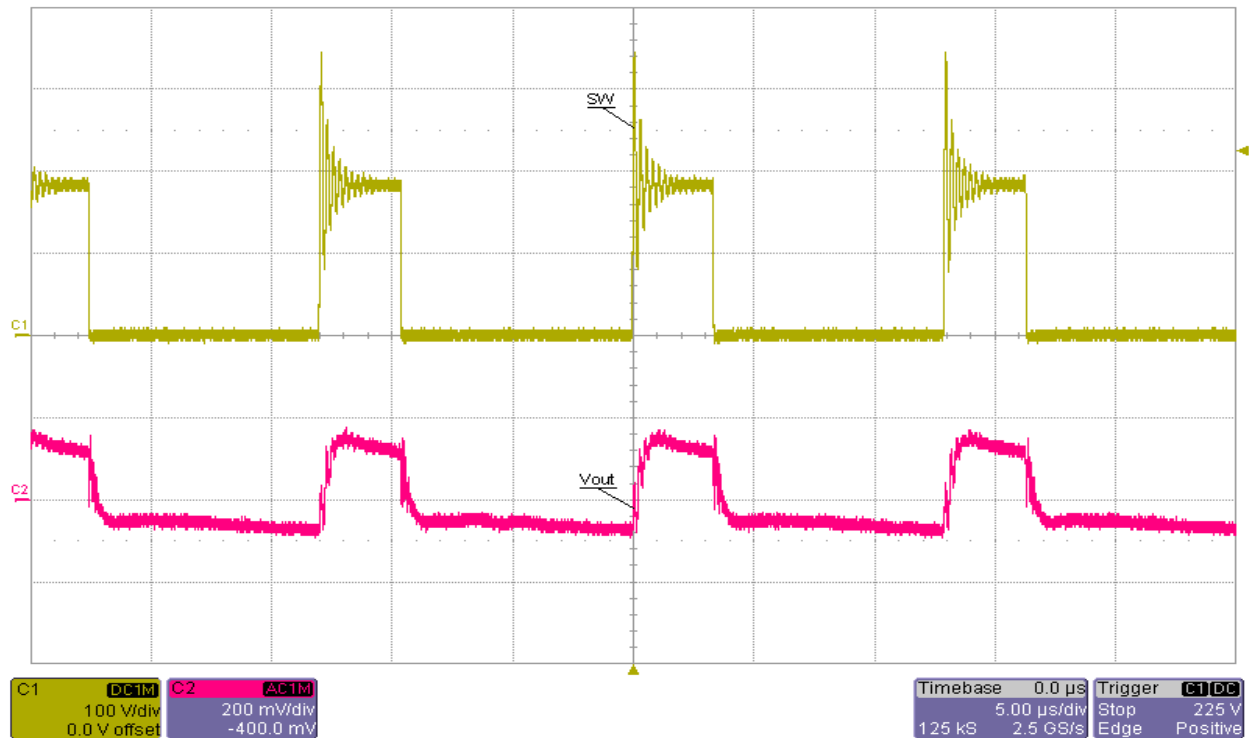


Startup into Full Load at 350Vin, Ch1-Vin, Ch2-Vout, Ch4-Iout

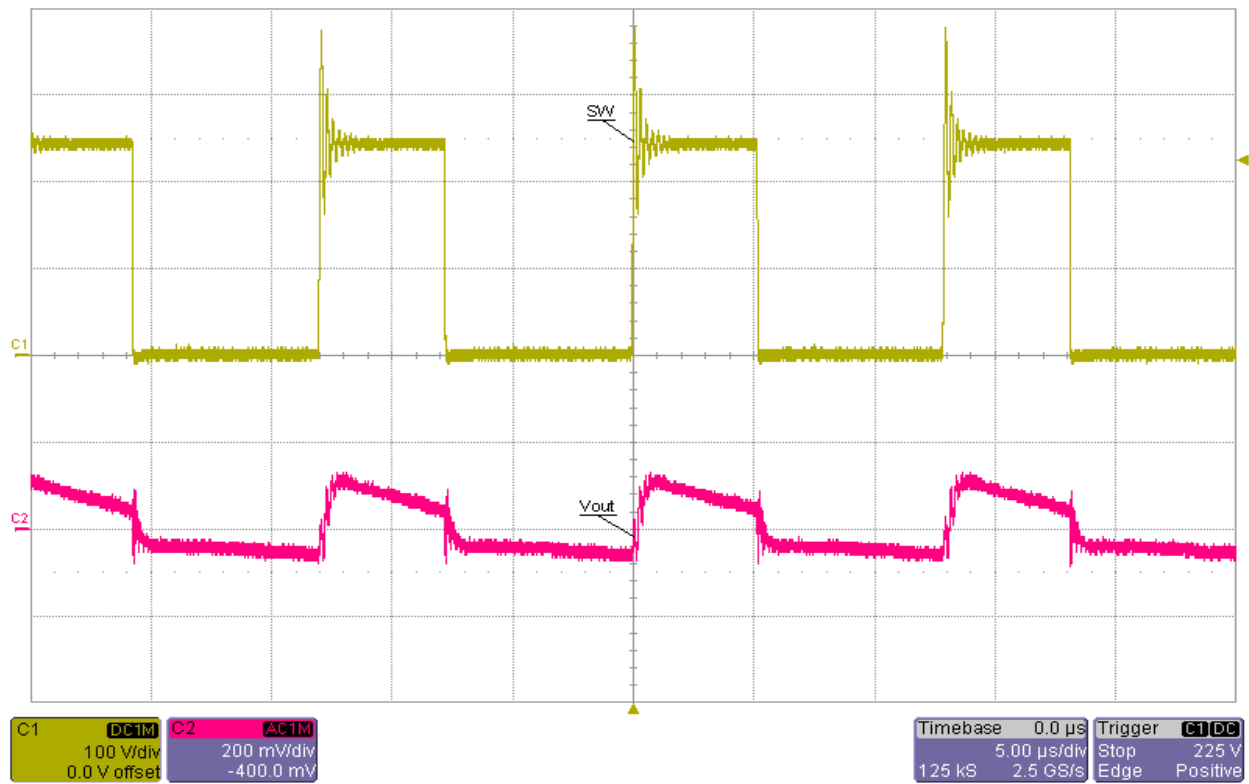
6.3 Switch Node Voltage and Output Ripple



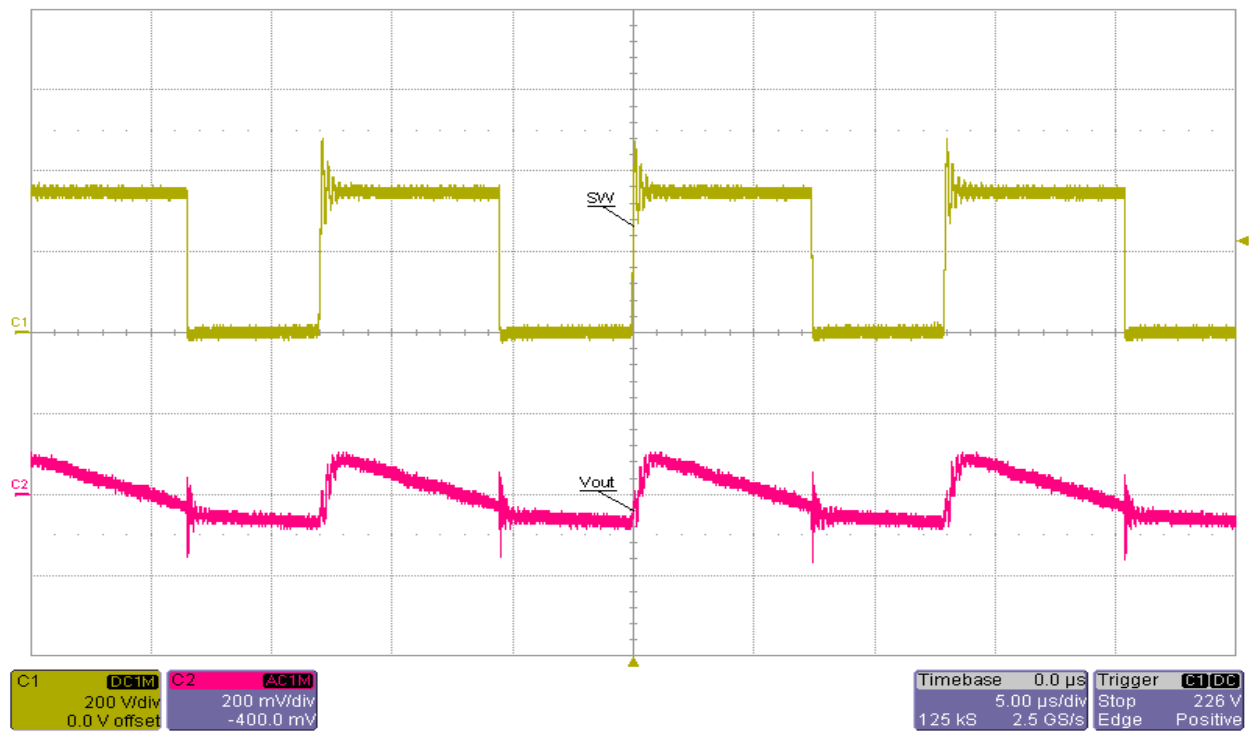
Switch Node Voltage at 30Vin and Full (1A) Load. Ch1-SW, Ch2-Vout (AC Coupled).



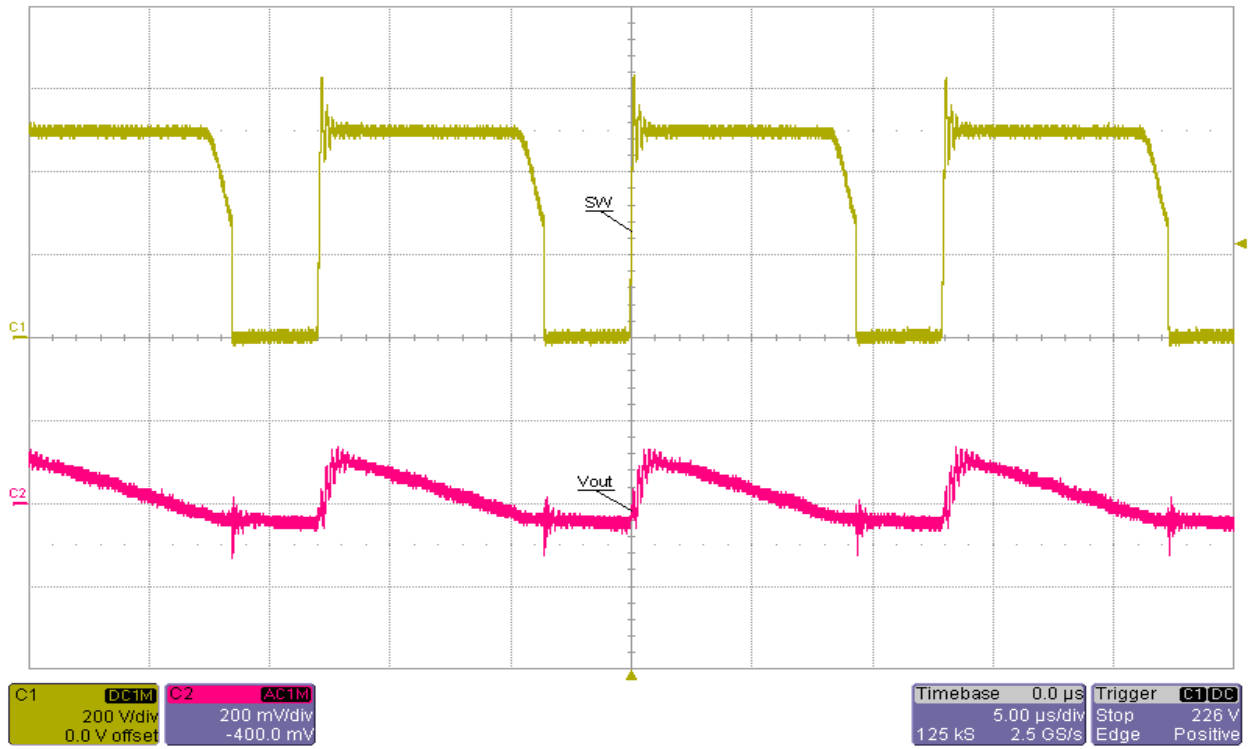
Switch Node Voltage at 50Vin and Full (1A) Load. Ch1-SW, Ch2-Vout (AC Coupled).



Switch Node Voltage at 100V_{in} and Full (1A) Load. Ch1-SW, Ch2-Vout (AC Coupled).

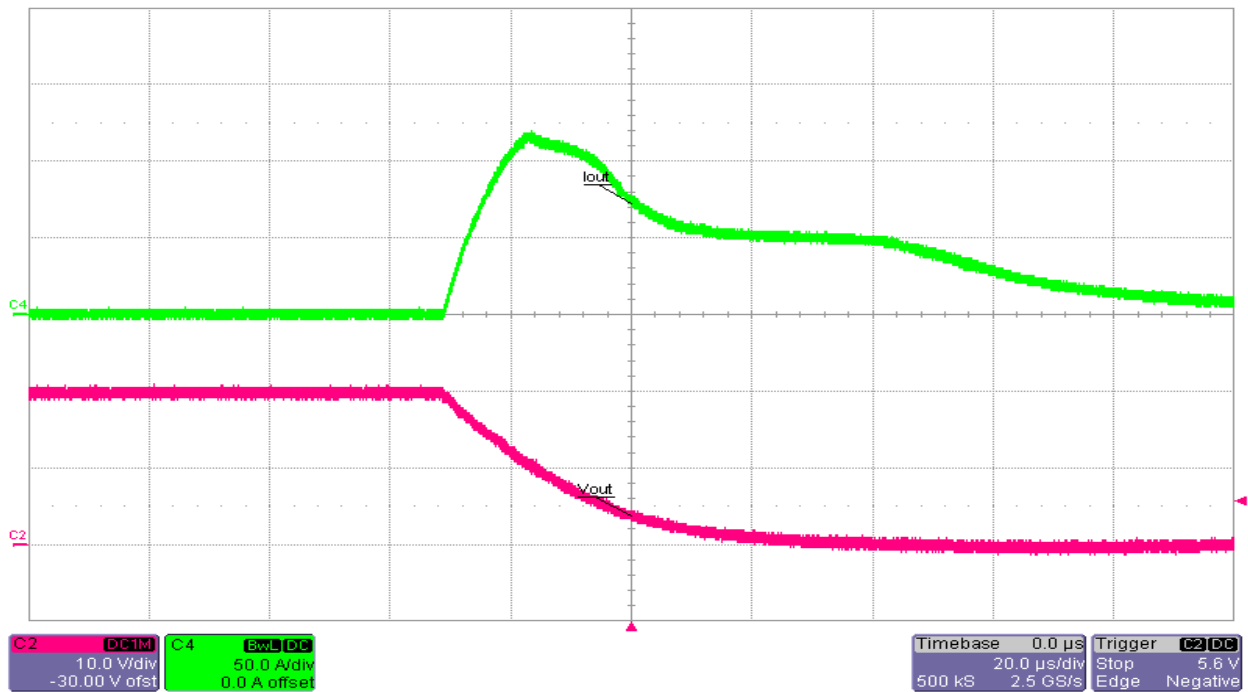


Switch Node Voltage at 200V_{in} and Full (1A) Load. Ch1-SW, Ch2-Vout (AC Coupled).

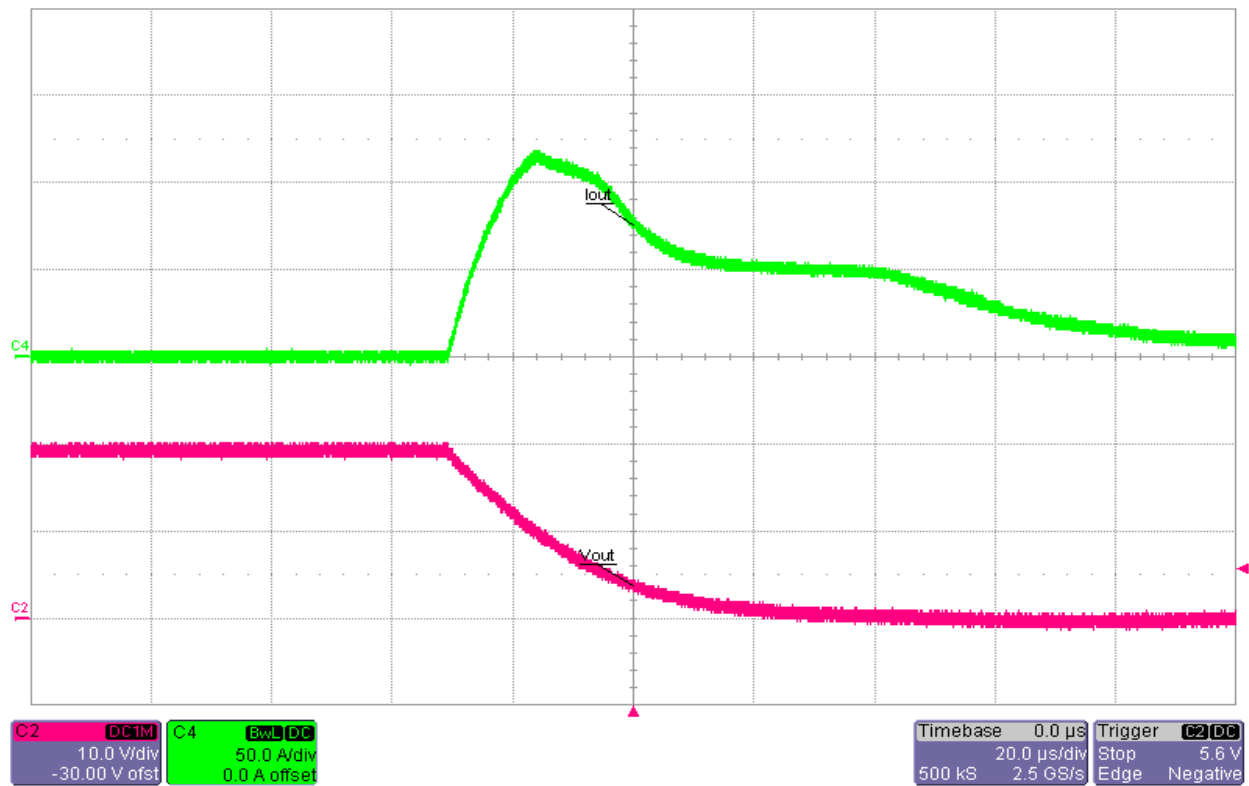


Switch Node Voltage at 350V_{in} and Full (1A) Load. Ch1-SW, Ch2-Vout (AC Coupled).

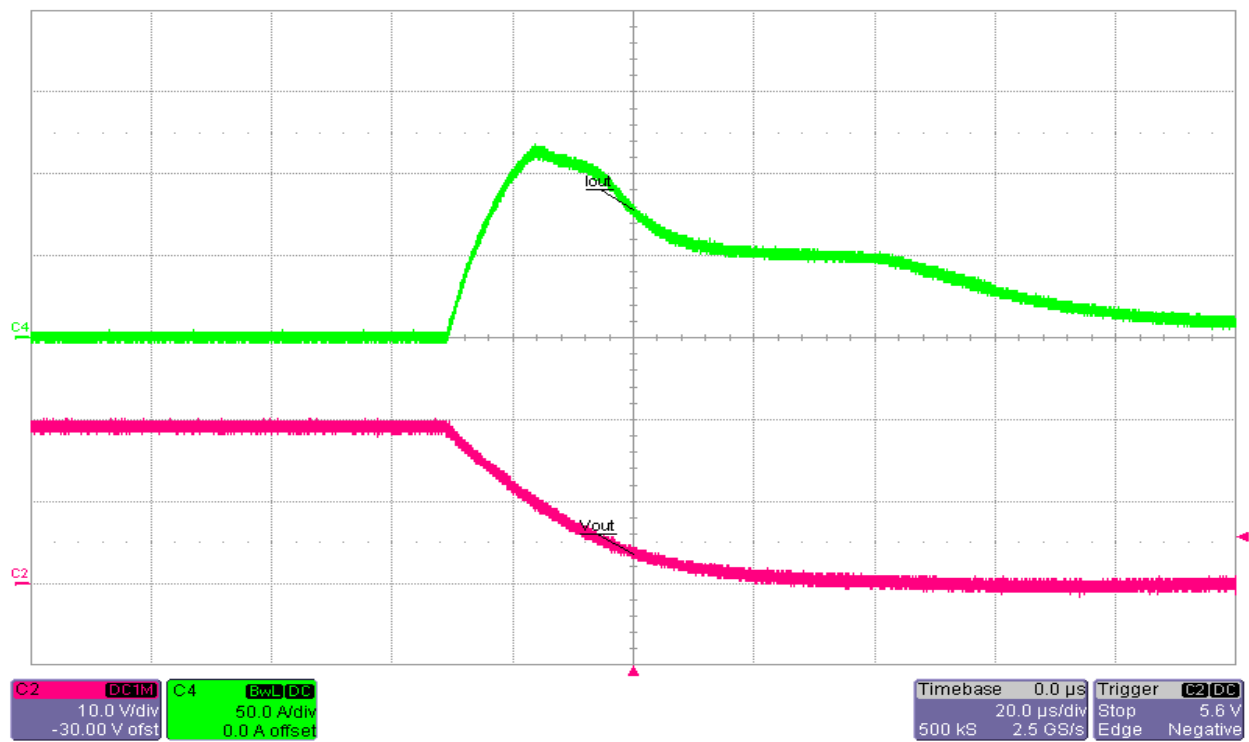
6.4 Short Circuit



Short Circuit at 30V_{in} and No Load. Ch4-Iout, Ch2-Vout.

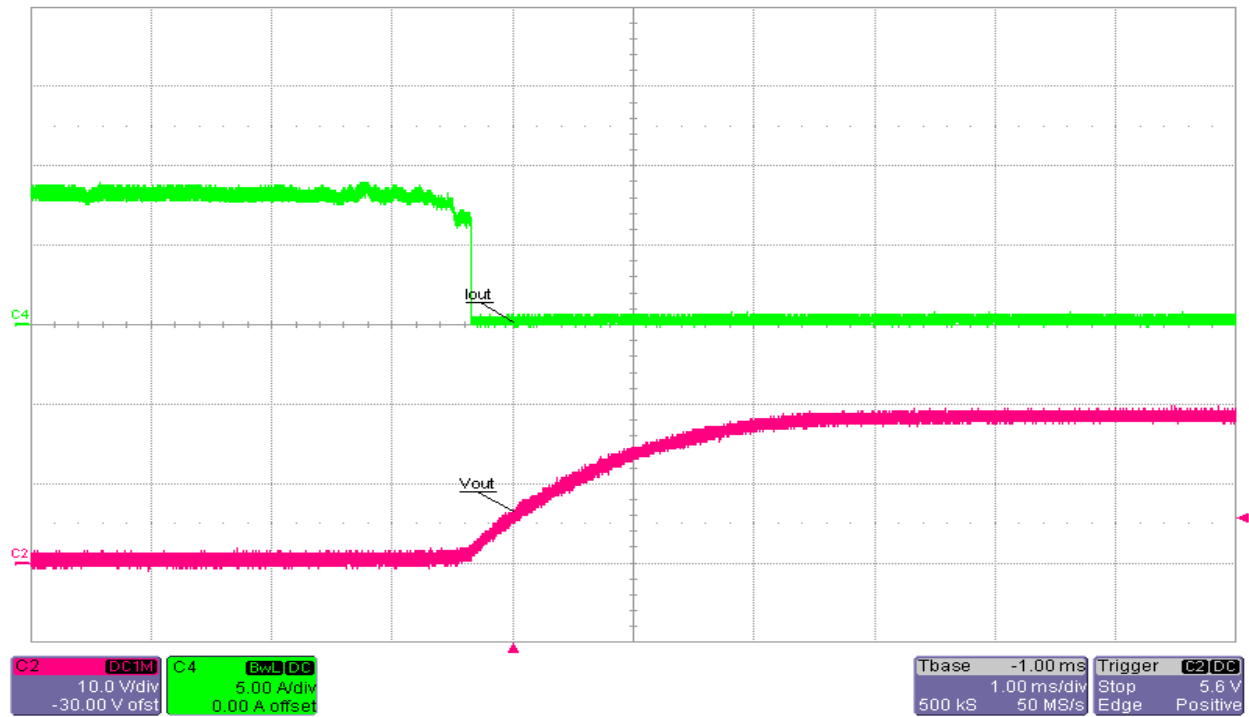


Short Circuit at 200V_{in} and No Load. Ch4-I_{out}, Ch2-V_{out}.

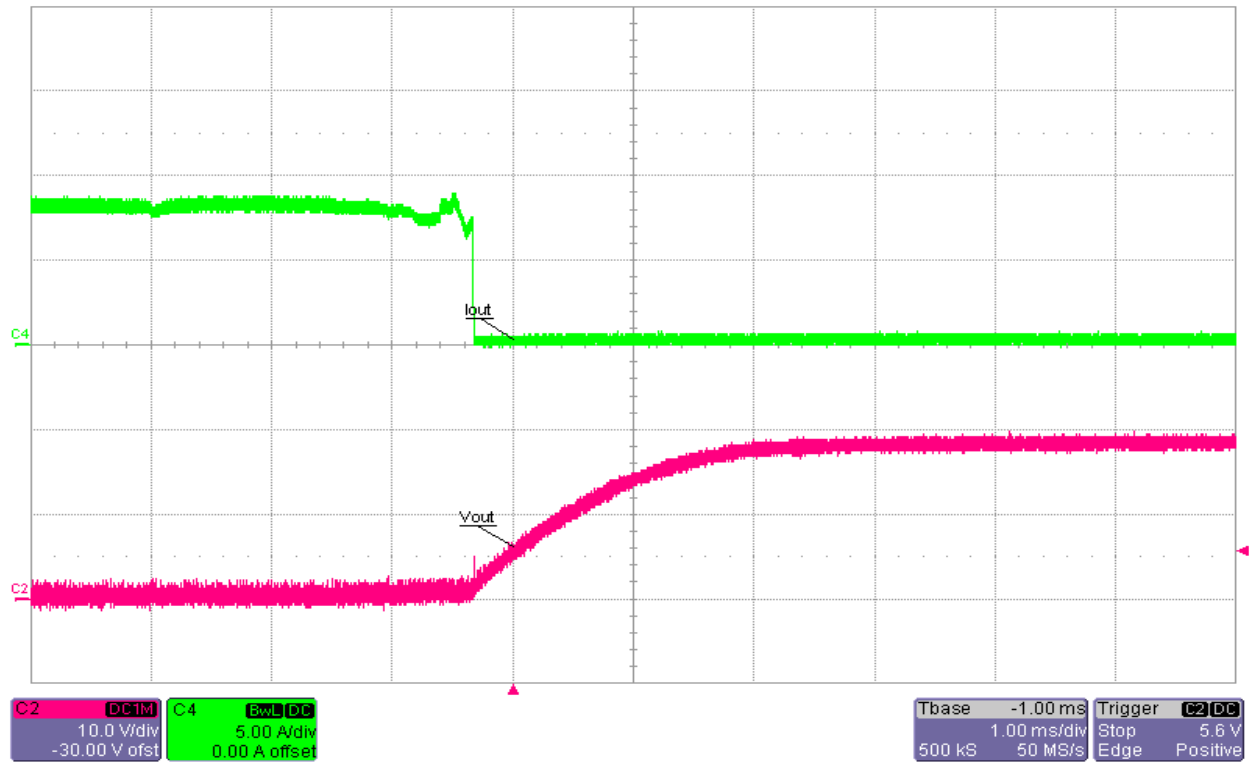


Short Circuit at 350V_{in} and No Load. Ch4-I_{out}, Ch2-V_{out}.

6.5 Short Circuit Recovery



Short Circuit Recovery at 200Vin and No Load. Ch4-Iout, Ch2-Vout.



Short Circuit Recovery at 350Vin and No Load. Ch4-Iout, Ch2-Vout.

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