



LM27403 Synchronous Buck Converter

TI reference design number: PMP10691

Input: 12V

Output: 3.3V @ 35A

DC – DC Test Results

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PMP10691 Test Results

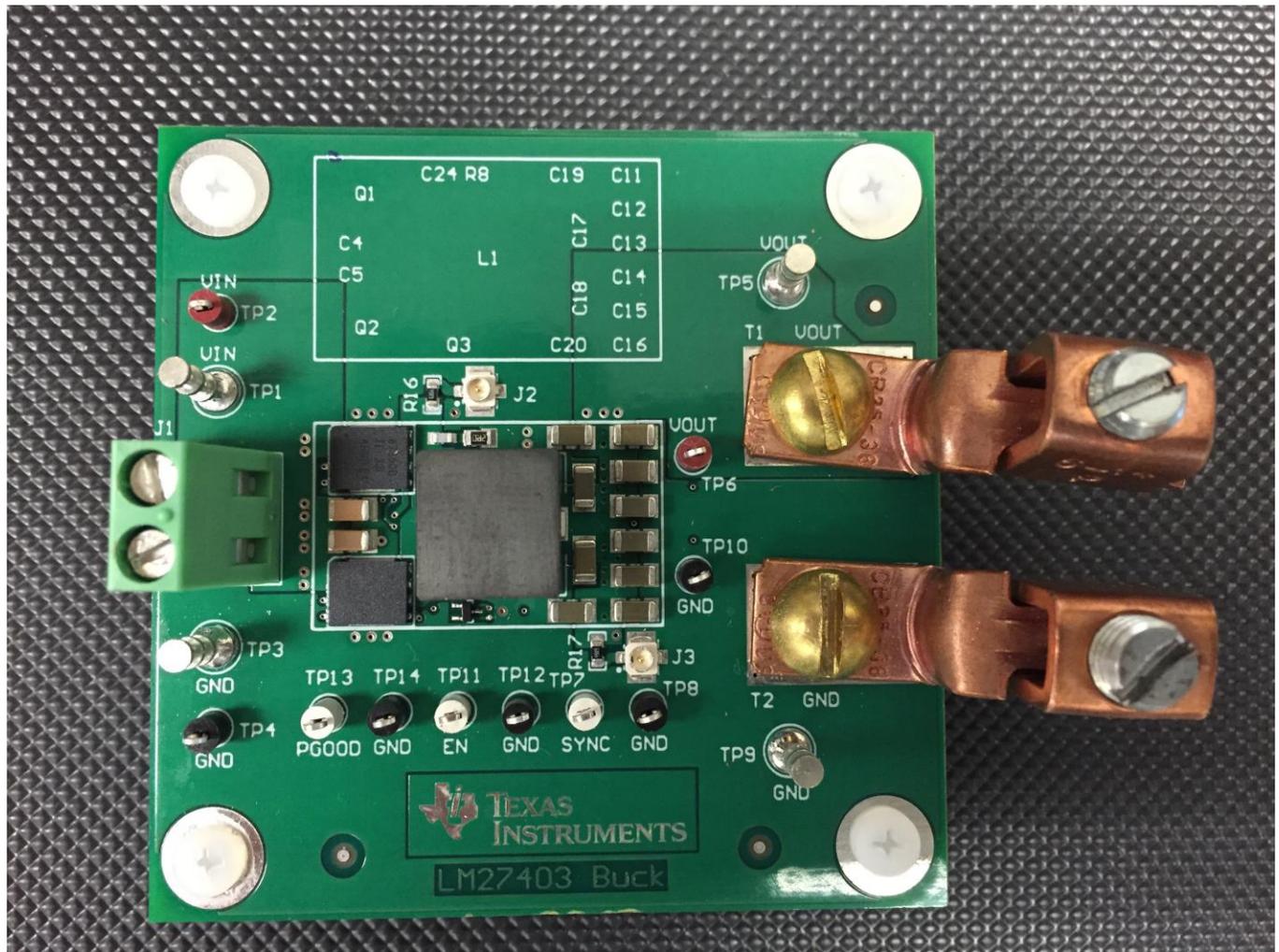
1 Circuit Description

PMP10691 is a single-phase synchronous buck converter rated for 3.3V output at 35A from an input voltage of 12V. This design uses the LM27403 synchronous buck controller at a switching frequency of 500 kHz. CSD87350Q5D power block MOSFETs provide maximum efficiency when combined with a 250nH ferrite output inductor. The design solution uses all ceramic capacitors to fit into a minimum board area.

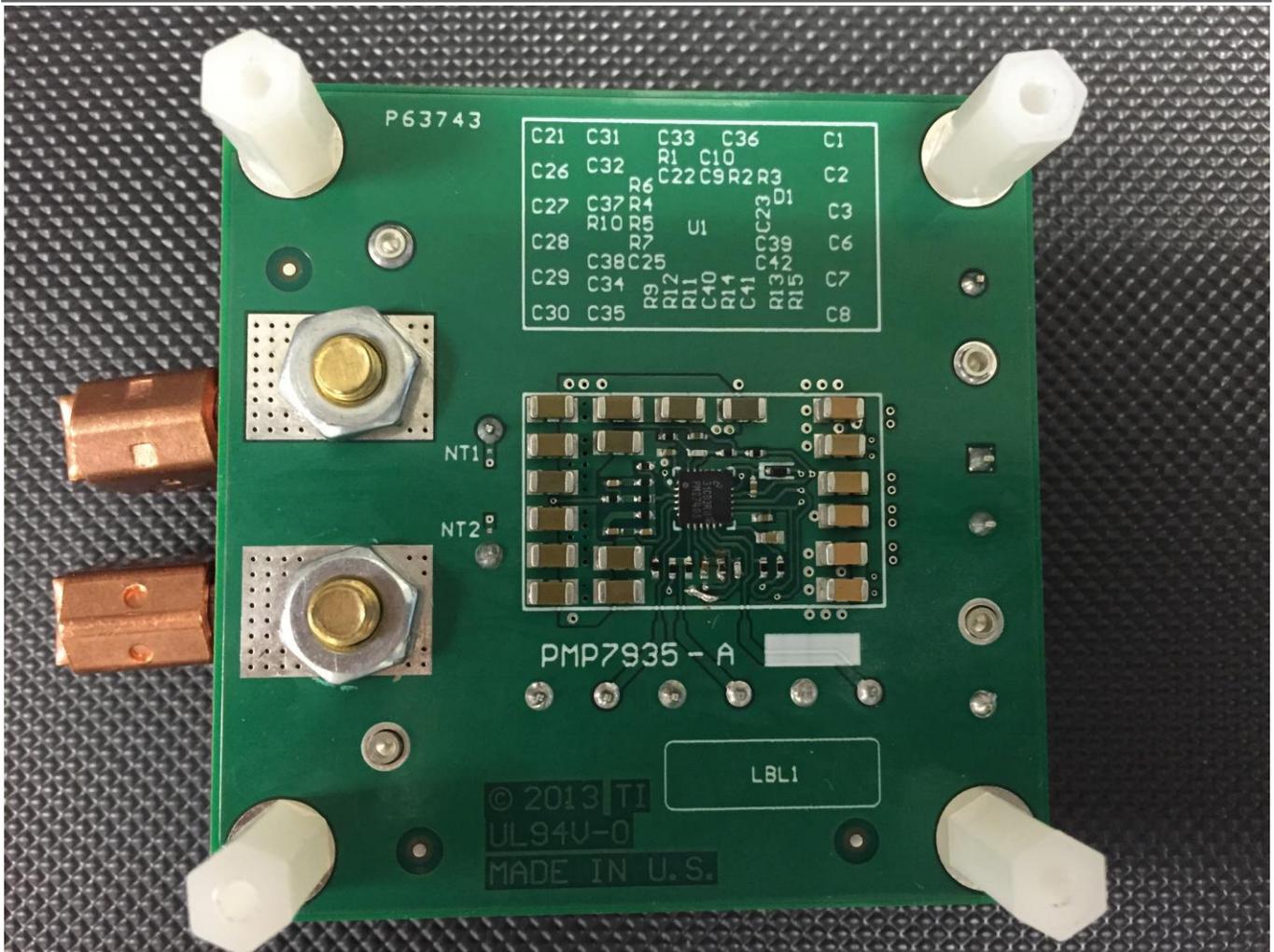
All tests were performed at room temperature on an open bench. A 470 μ F, 25V aluminum electrolytic input capacitor was used for input filter damping.

2 Photos

The photographs below show the PMP10691 Rev A assembly as built on PMP7935-A printed circuit board. This is a 4 layer board using 2 ounce copper on external layers and 1 ounce copper on internal layers. Power components are mounted on the top side of the board, with the control circuit on the bottom. The overall board dimensions are 2.5" x 2.5". The solution size component area is 1.1" x 0.65". The maximum component height is set by the inductor at 9.4 mm. RevA board requires jumper for NT3 connection which is included in the RevB documentation.

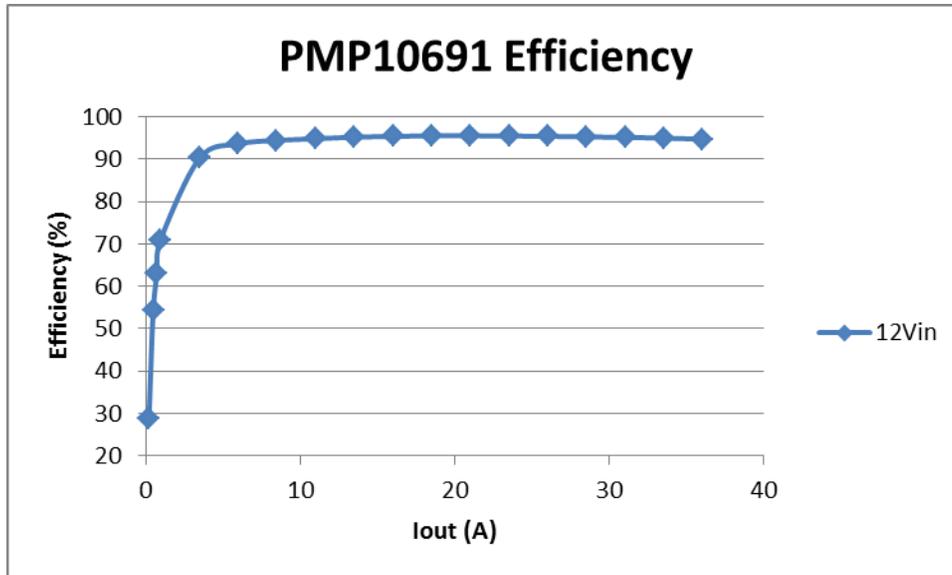


PMP10691 Test Results



3 Efficiency

The efficiency data is shown in the tables and graph below. Load is incremented above full load to show current limit set point.



Vin(V)	Iin(A)	Pin (W)	Vout(V)	Iout(A)	Pout (W)	Losses (W)	Efficiency(%)
12.00	0.11	1.26	3.33	0.00	0.00	1.26	0.00
12.00	0.16	1.86	3.33	0.16	0.53	1.33	28.68
12.00	0.23	2.70	3.34	0.44	1.47	1.23	54.34
12.00	0.30	3.60	3.34	0.68	2.27	1.33	62.98
12.00	0.36	4.32	3.34	0.92	3.07	1.25	71.01
12.00	1.07	12.78	3.34	3.46	11.55	1.24	90.33
12.00	1.77	21.24	3.34	5.96	19.89	1.36	93.62
12.00	2.49	29.82	3.34	8.44	28.17	1.65	94.47
12.00	3.21	38.52	3.34	10.94	36.54	1.98	94.85
12.00	3.94	47.28	3.34	13.48	45.04	2.25	95.25
12.00	4.67	55.98	3.34	15.98	53.42	2.56	95.42
12.00	5.39	64.68	3.34	18.48	61.80	2.88	95.54
12.00	6.12	73.44	3.35	20.98	70.18	3.26	95.56
12.00	6.87	82.44	3.35	23.52	78.72	3.72	95.49
12.00	7.61	91.31	3.35	26.02	87.14	4.17	95.43
12.00	8.36	100.31	3.35	28.52	95.57	4.74	95.27
12.00	9.11	109.30	3.35	31.02	104.04	5.26	95.19
12.00	9.87	118.42	3.36	33.52	112.49	5.93	95.00
12.00	10.65	127.72	3.36	36.04	121.02	6.70	94.76
12.00	11.42	136.95	3.36	38.56	129.56	7.38	94.61
12.00	12.19	146.24	3.36	41.04	137.94	8.31	94.32

PMP10691 Test Results

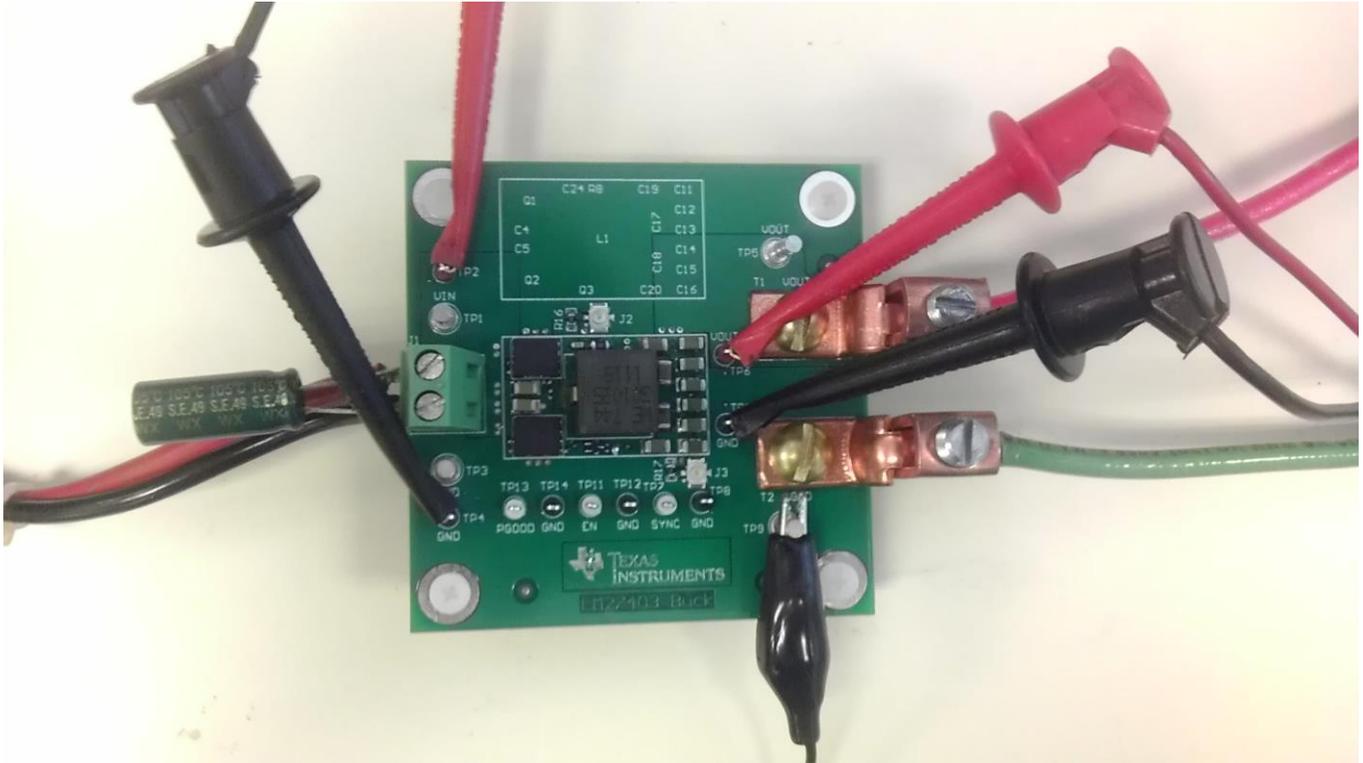
12.00	12.97	155.54	3.36	43.56	146.45	9.09	94.15
12.00	13.76	165.06	3.36	46.08	154.92	10.14	93.86
12.00	14.55	174.48	3.36	48.58	163.33	11.16	93.61
12.00	15.34	184.00	3.36	51.08	171.78	12.22	93.36
12.00	16.15	193.66	3.36	53.58	180.24	13.42	93.07
11.99	16.98	203.66	3.36	56.12	188.79	14.87	92.70
12.00	0.11	1.26	0.00	2.02	0.01	1.25	0.64

4 Thermal Tests

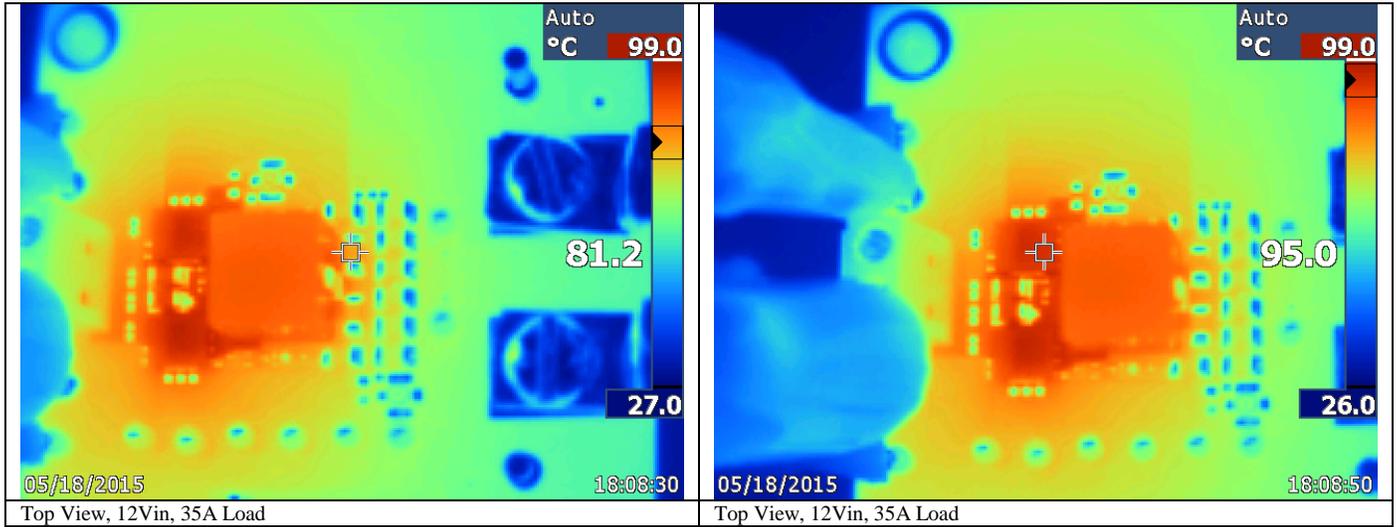
All tests were performed at room temperature on an open bench.

4.1 Test Setup

Thermal data was taken with a Fluke handheld thermal camera.



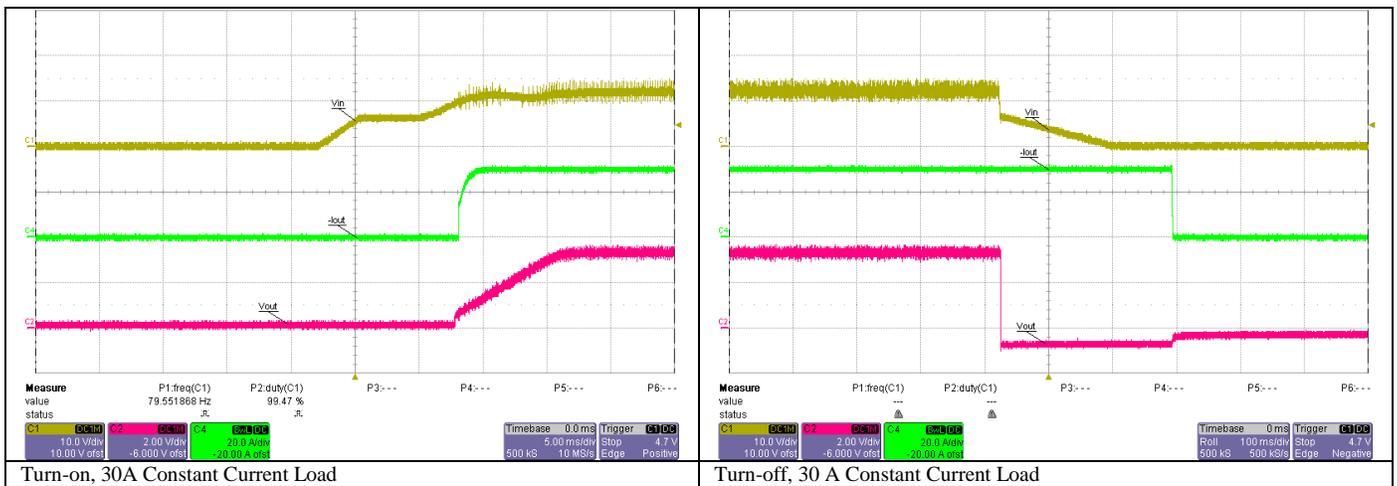
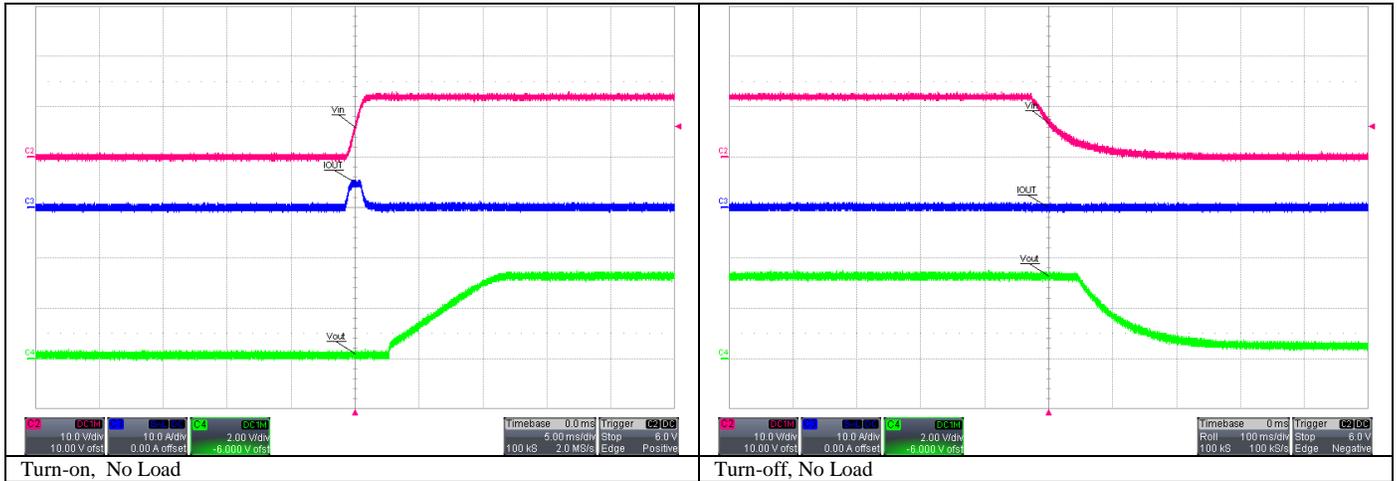
4.2 35A Load, No Airflow



5 Startup and Shutdown Behavior

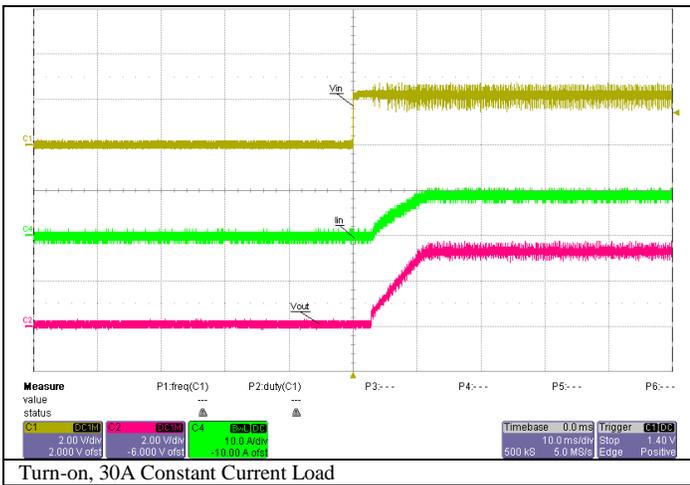
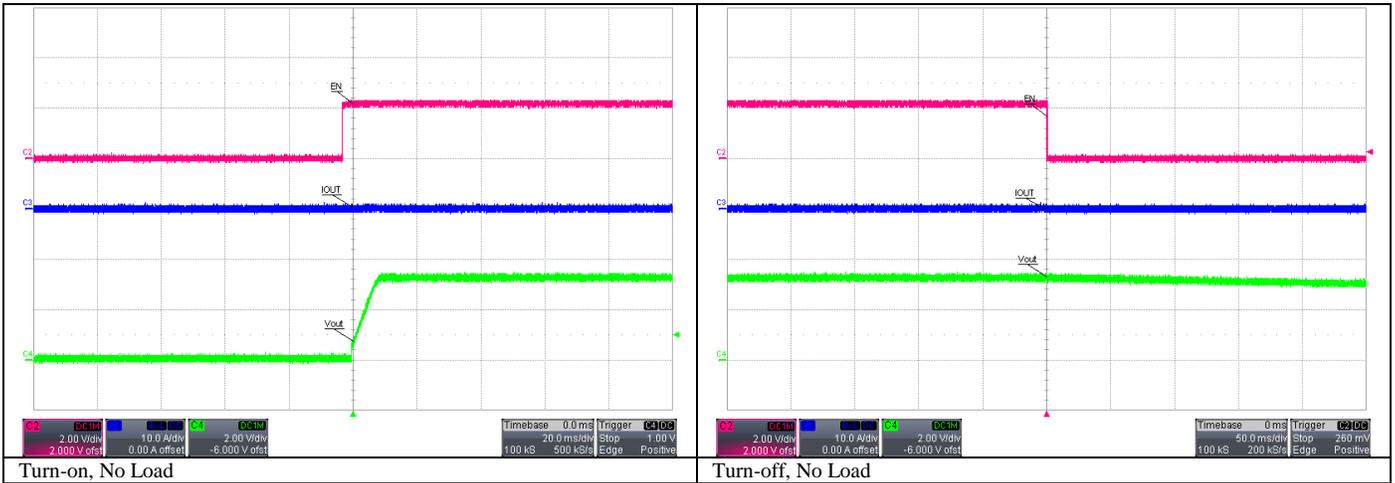
5.1 Turn-on and Turn-off from Vin

The output voltage is well controlled at turn-on, showing no evidence of over-shoot.



5.2 Turn-on and Turn-off from EN

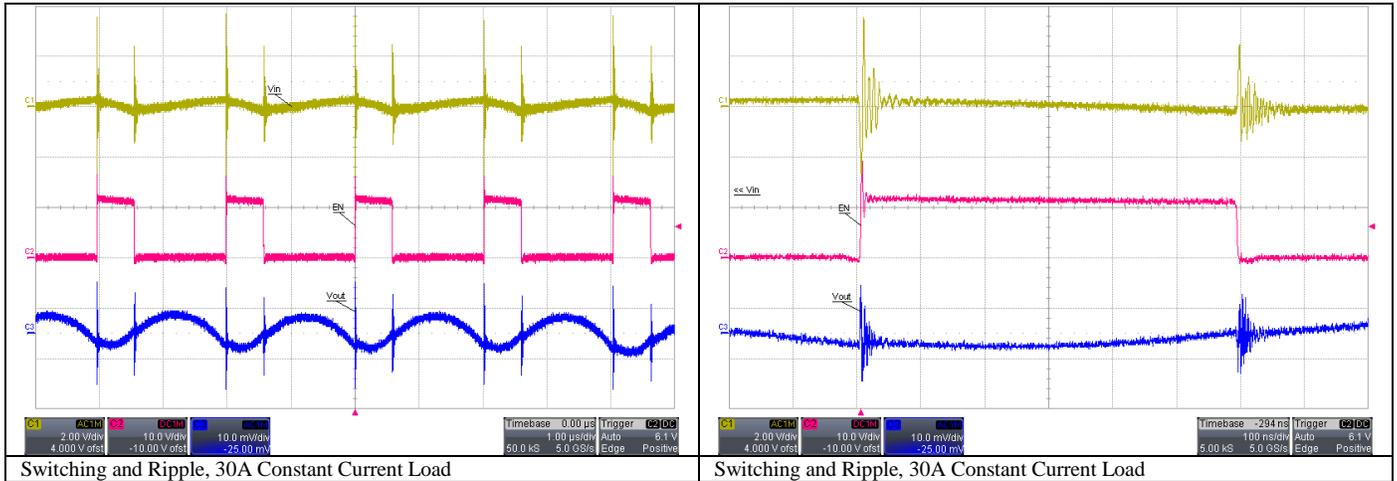
The output voltage is well controlled at turn-on, showing no evidence of over-shoot.



6 Switching and Ripple

6.1 Switching and Ripple

Switching and ripple tests were made with a 470 μ F, 25V aluminum electrolytic input capacitor for input filter damping.

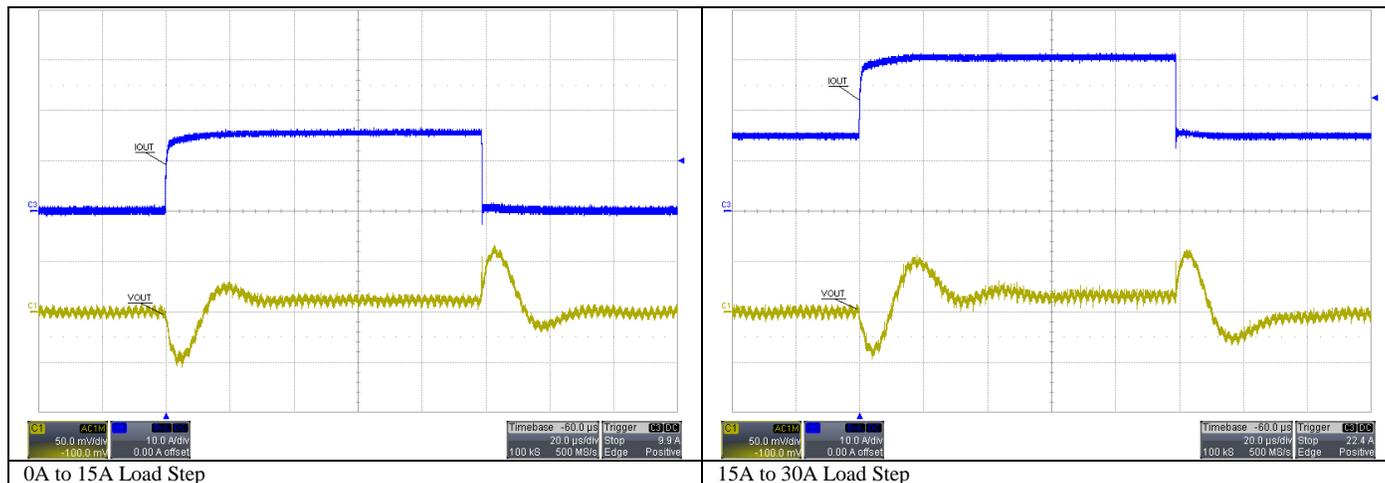


7 Load Transient Response

Load transient response for each condition was taken at two points to represent the minimum and maximum deviation. This difference occurs when the transient step coincides with either the converter off-time or on-time interval.

7.1 Load Transient Response

The output voltage transient is within 60mV for a 15A load step.



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