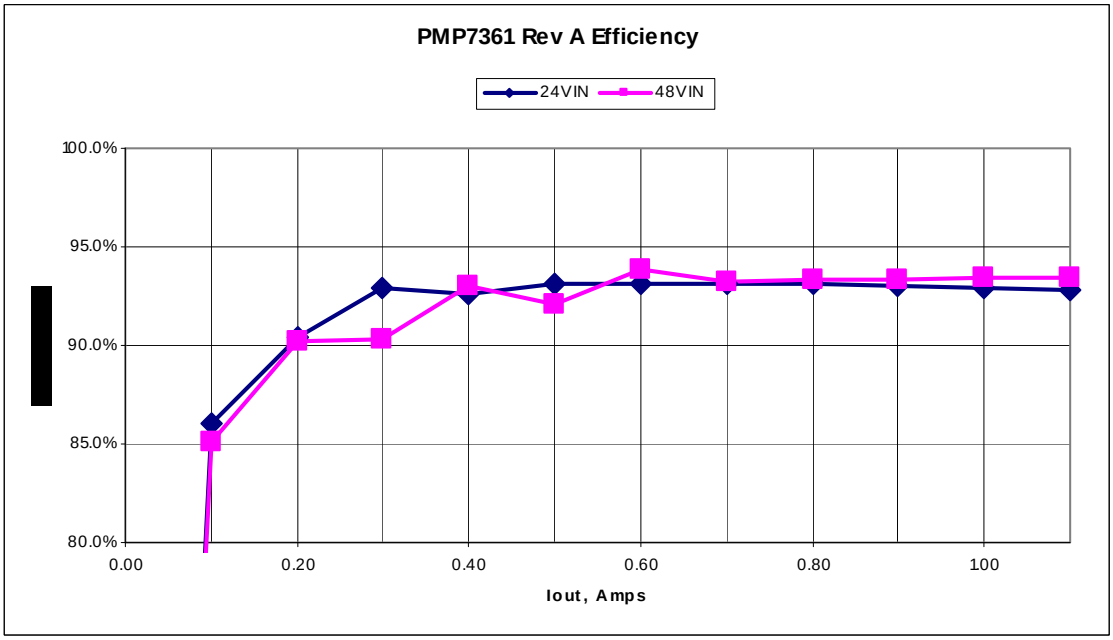
Efficiency

The efficiency of the converter is shown below:

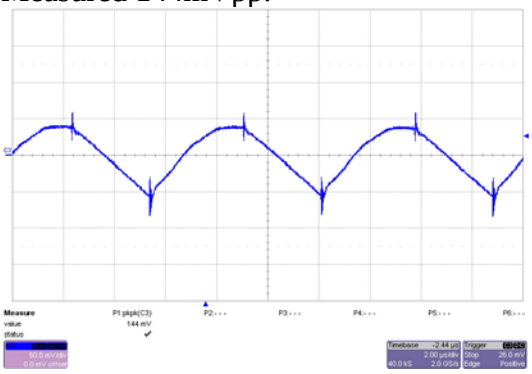
Iout	Vout	J1 Iin	J1 Vin	J1 Eff	Vout	J1 Iin	J1 Vin	J1 Eff
0.00	53.94	0.025	24.0	0.0%	53.96	0.018	48.0	0.0%
0.10	53.92	0.261	24.0	86.1%	53.93	0.132	48.0	85.1%
0.20	53.92	0.497	24.0	90.4%	53.92	0.249	48.0	90.2%
0.30	53.92	0.725	24.0	93.0%	53.92	0.373	48.0	90.3%
0.40	53.91	0.970	24.0	92.6%	53.91	0.483	48.0	93.0%
0.50	53.91	1.206	24.0	93.1%	53.91	0.610	48.0	92.1%
0.60	53.91	1.447	24.0	93.1%	53.91	0.718	48.0	93.9%
0.70	53.91	1.688	24.0	93.2%	53.91	0.843	48.0	93.3%
0.80	53.91	1.930	24.0	93.1%	53.91	0.963	48.0	93.3%
0.90	53.91	2.174	24.0	93.0%	53.91	1.083	48.0	93.3%
1.00	53.90	2.418	24.0	92.9%	53.91	1.202	48.0	93.4%
1.10	53.90	2.6620	24.0	92.8%	53.91	1.3220	48.0	93.5%



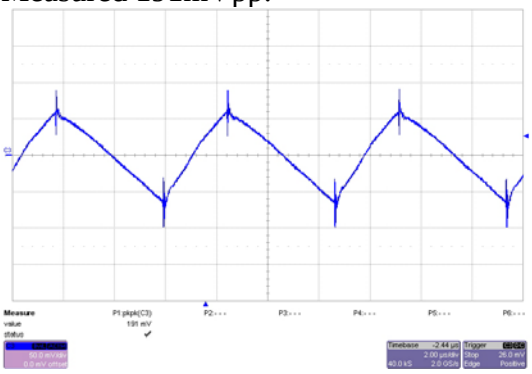
Ripple and Noise

Ripple measurements taken with a 1.1A load and 20MHz BWL.

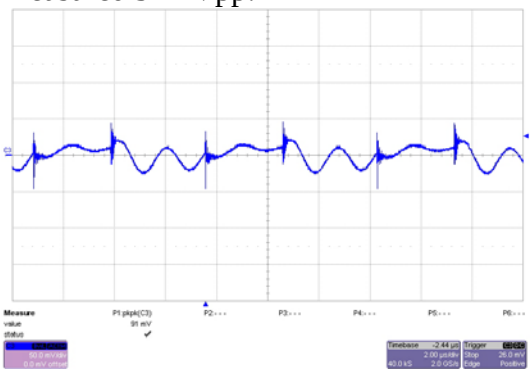
Output ripple across C20, 48Vin
50mV/div; 2usec/div
Measured 144mVpp:



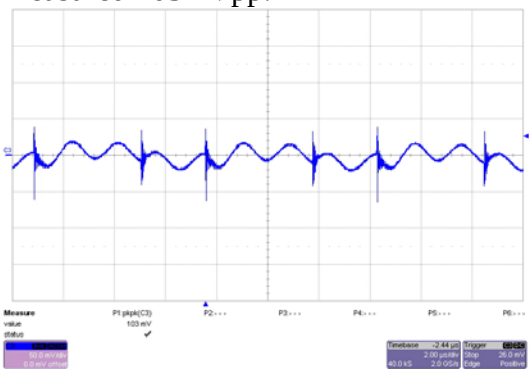
Output ripple across C20, 24Vin
50mV/div; 2usec/div
Measured 191mVpp:



Input ripple across J1, 48Vin
50mV/div; 2usec/div
Measured 91mVpp:

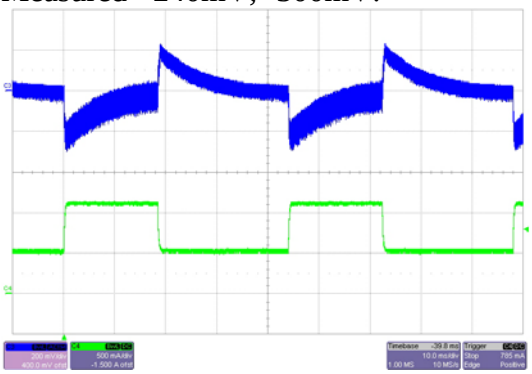


Input ripple across J1, 24Vin
50mV/div; 2usec/div
Measured 103mVpp:

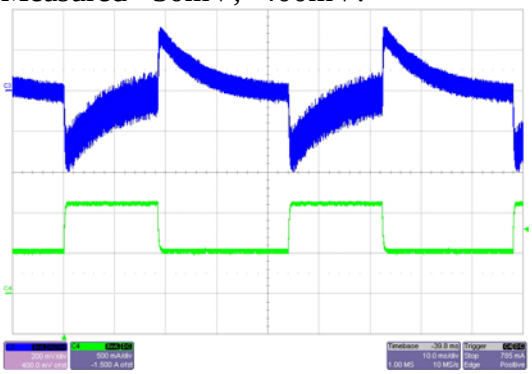


Dynamic Loading

Output load step, 0.55A to 1.1A, 48Vin
200mV/div; 0.5A/div; 10msec/div
Measured +240mV; -300mV:

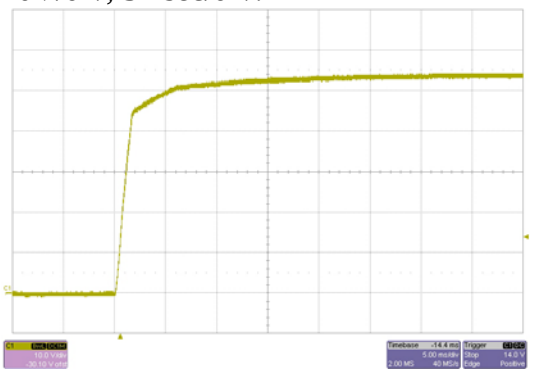


Output load step, 0.55A to 1.1A, 24Vin
200mV/div; 0.5A/div; 10msec/div
Measured +30mV; -400mV:

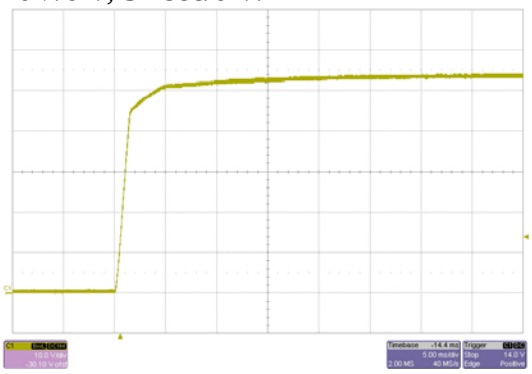


Turn On Response

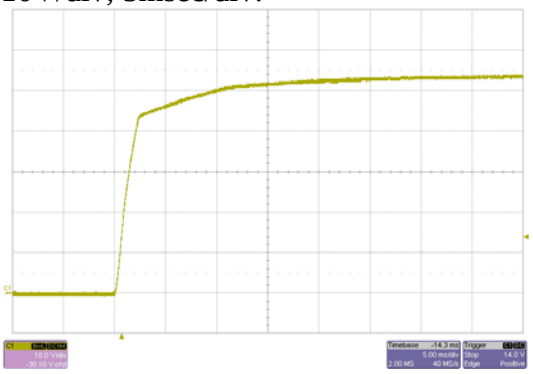
Turn-on response: 48Vin, 1.1 load
10V/div; 5msec/div:



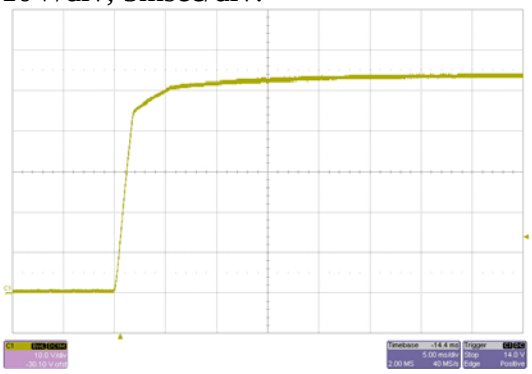
Turn-on response: 48Vin, 0A load
10V/div; 5msec/div:



Turn-on response: 24Vin, 1.1 load
10V/div; 5msec/div:

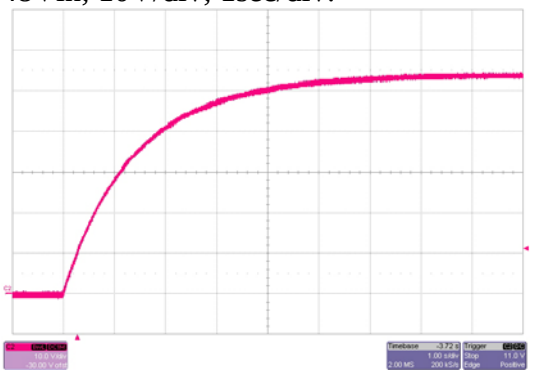


Turn-on response: 24Vin, 0A load
10V/div; 5msec/div:

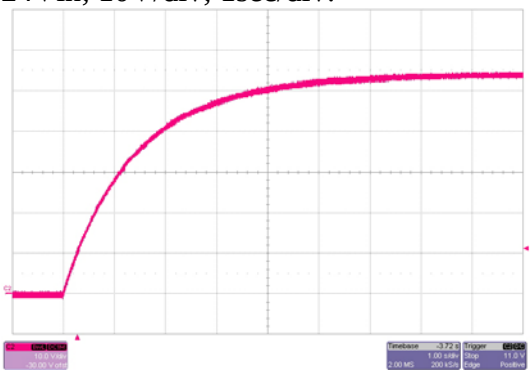


Hold Up Capacitor Charge and Discharge:

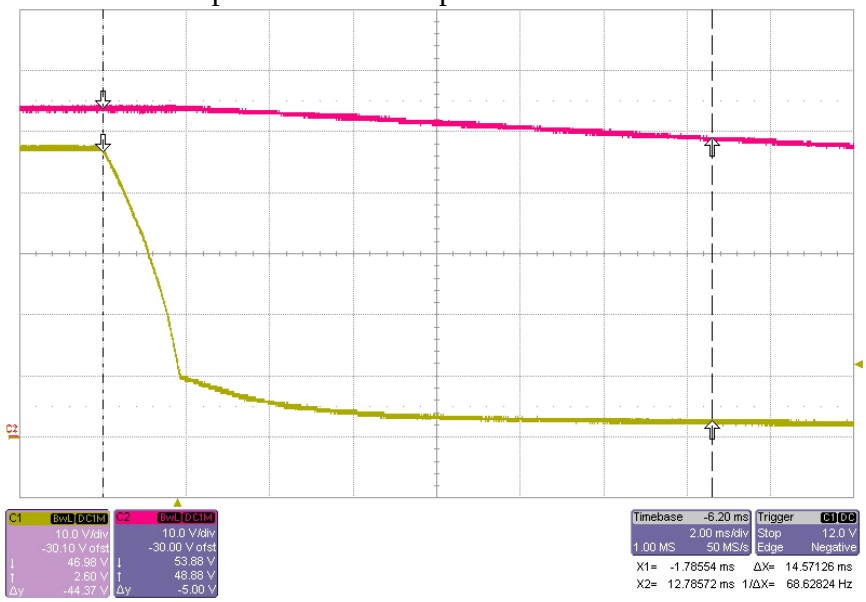
Hold up capacitor charge time
48Vin; 10V/div; 1sec/div:



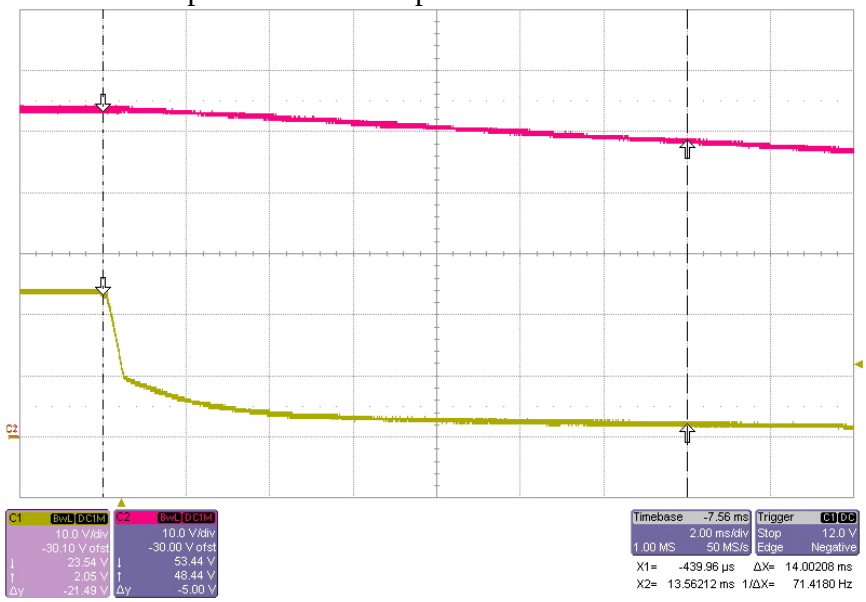
Hold up capacitor charge time
24Vin; 10V/div; 1sec/div:



Hold up time; 48Vin; 1.1A load
Top: Vout
Bottom: Vin
10V/div; 2msec/div
14.5msec hold up time to 5V droop:

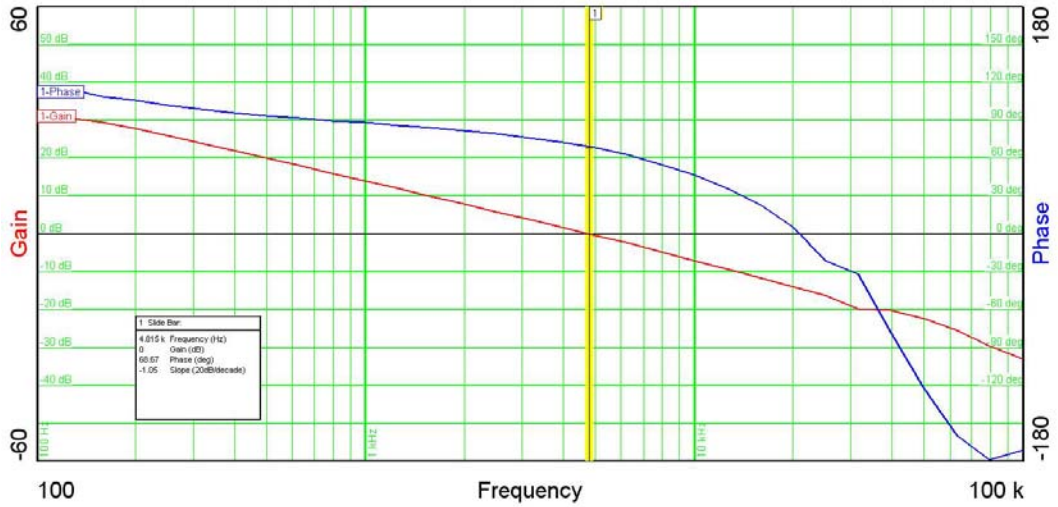


Hold up time; 24Vin; 1.1A load
Top: Vout
Bottom: Vin
10V/div; 2msec/div
14msec hold up time to 5V droop:

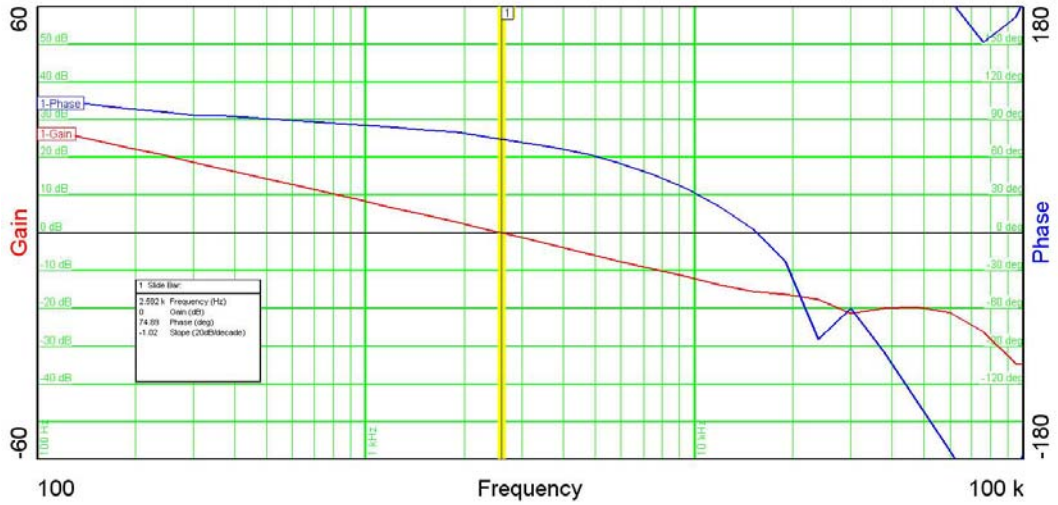


Stability Analysis (Loop Gain)

The figure below is the loop gain of the converter with a 48V input and a 1.1A load. The Bandwidth is 4.8 KHz, the Phase Margin is 68 degrees, and the Gain Margin is 13 dB.

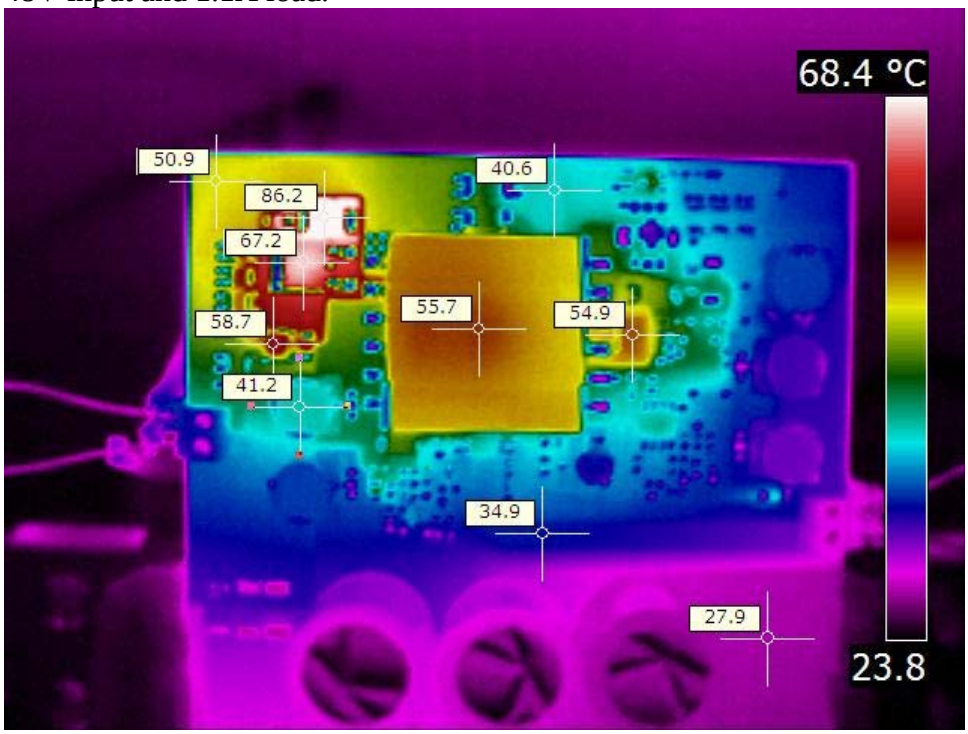


The figure below is the loop gain of the converter with a 24V input and a 1.1A load. The Bandwidth is 2.6 KHz, the Phase Margin is 74 degrees, and the Gain Margin is 16 dB.



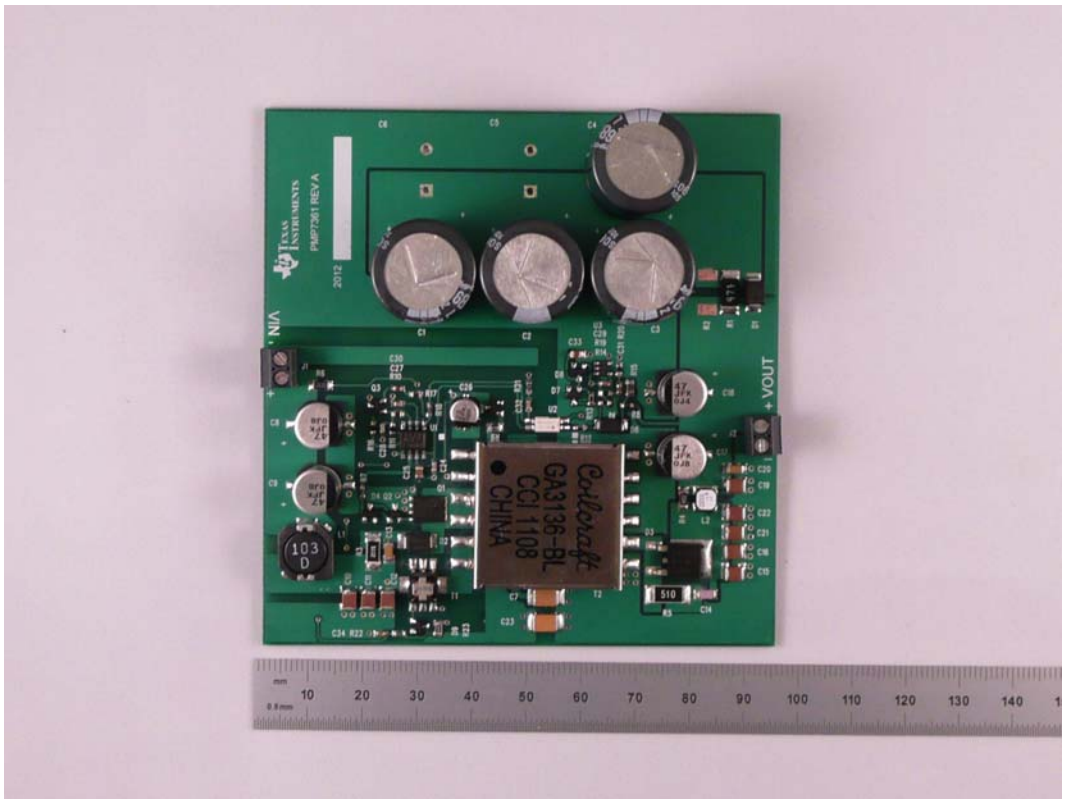
Thermal Plots

48V input and 1.1A load.



24V input and 1.1A load.

Photo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