Efficiency and Regulation

The efficiency and regulation are shown below:

Iout	Vout	Iout	Vout	Iout	Vout	Iin	Vin	Eff	
0.880	3.325	0.350	5.005	0.110	9.498	0.1784	36.0	**89.1%**	
0.880	3.325	0.350	5.011	0.000	10.369	0.1464	36.0	88.8%	
0.880	3.325	0.000	5.029	0.110	9.497	0.1247	36.0	88.4%	
0.000	3.326	0.350	4.949	0.110	9.343	0.0878	36.0	87.3%	
0.880	3.325	0.000	5.035	0.000	10.251	0.0930	36.0	87.4%	
0.000	3.326	0.000	4.971	0.110	9.336	0.0361	36.0	79.0%	
0.440	3.326	0.175	4.992	0.055	9.565	0.0897	36.0	88.7%	
0.000	3.326	0.000	4.976	0.000	10.004	0.0053	36.0	0.0%	

Iout	Vout	Iout	Vout	Iout	Vout	J3 Iin	J3 Vin	J3 Eff	
0.880	3.325	0.350	4.999	0.110	9.501	0.1323	48.0	**90.1%**	
0.880	3.325	0.350	5.005	0.000	10.326	0.1090	48.0	89.4%	
0.880	3.325	0.000	5.021	0.110	9.504	0.0931	48.0	88.9%	
0.000	3.326	0.350	4.952	0.110	9.372	0.0660	48.0	87.3%	
0.880	3.325	0.000	5.025	0.000	10.220	0.0696	48.0	87.6%	
0.000	3.326	0.000	4.972	0.110	9.370	0.0277	48.0	77.5%	
0.440	3.326	0.175	4.989	0.055	9.568	0.0674	48.0	88.5%	
0.000	3.326	0.000	4.976	0.000	10.011	0.0046	48.0	0.0%	

Iout	Vout	Iout	Vout	Iout	Vout	J3 Iin	J3 Vin	J3 Eff	
0.880	3.325	0.350	4.997	0.110	9.511	0.1113	57.0	**90.2%**	
0.880	3.325	0.350	5.002	0.000	10.306	0.0918	57.0	89.4%	
0.880	3.325	0.000	5.017	0.110	9.508	0.0786	57.0	88.7%	
0.000	3.326	0.350	4.954	0.110	9.387	0.0559	57.0	86.8%	
0.880	3.325	0.000	5.021	0.000	10.208	0.0587	57.0	87.5%	
0.000	3.326	0.000	4.972	0.110	9.385	0.0237	57.0	76.4%	
0.440	3.326	0.175	4.987	0.055	9.570	0.0569	57.0	88.3%	
0.000	3.326	0.000	4.975	0.000	10.020	0.0044	57.0	0.0%	

Max Load Efficiency without bridge

| Iout	Vout	Iout	Vout			Iin	Vin	Eff	
0.880	3.325	0.350	5.005	0.110	9.498	0.1784	35.37	90.7%	36.0V J3
0.880	3.325	0.350	4.999	0.110	9.501	0.1323	47.45	91.1%	48.0V J3
0.880	3.325	0.350	4.997	0.110	9.511	0.1113	56.47	91.0%	57.0V J3

Vin measured at FB1/FB2

Ripple and Noise

48V input; 3.3V/880mA, 5V/350mA, and 10V/110mA loads; 20MHz BWL.

3.3V Output Ripple (C29), 50mV/div
Measured 48mVpeak to peak:
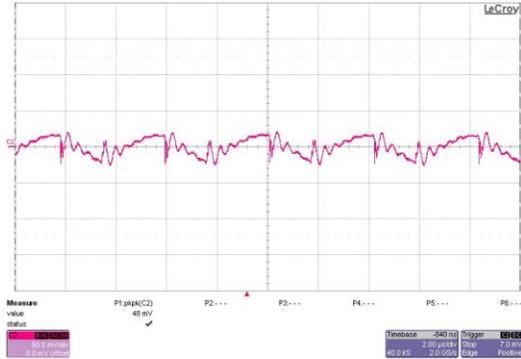
5V Output Ripple (C19), 50mV/div
Measured 34mV peak to peak:
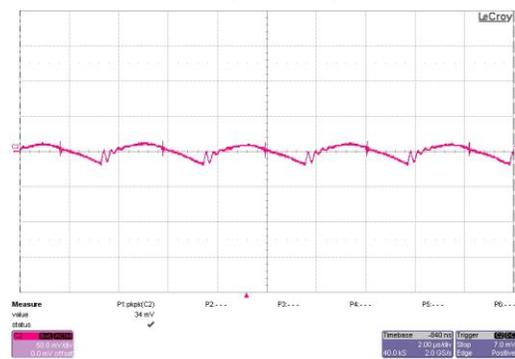
10V Output Ripple (C13), 50mV/div
Measured 69mVpeak to peak:
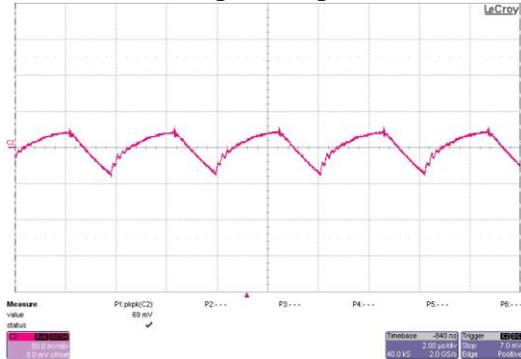
Input Ripple (C21), 50mV/div
Measured 269mVpeak to peak:
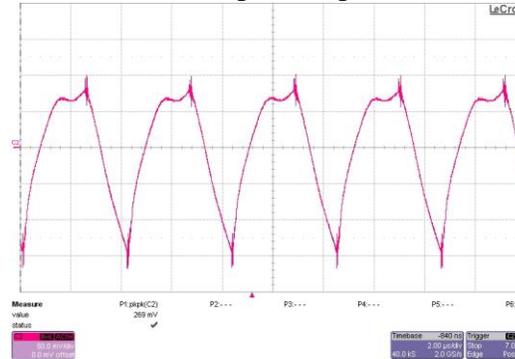
Turn On Response

48VIN, Max Loads, 1msec/div:
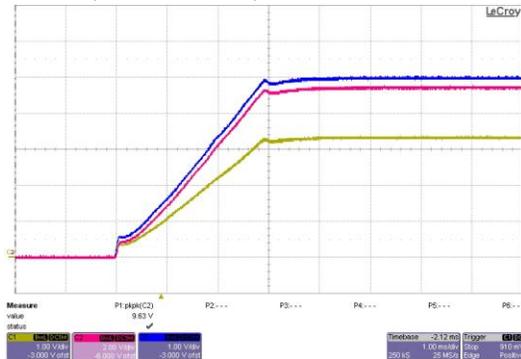
48VIN, 0A Loads, 1msec.div:
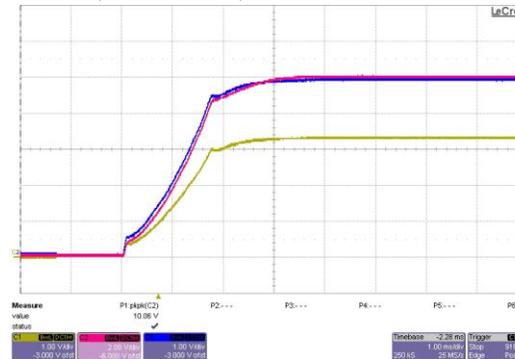
Top, 5V output, 1V/div; Middle, 10V output, 2V/div; Bottom, 3.3V output, 1V/div

Loop Stability

The measured Bode plot of the converter is shown below.
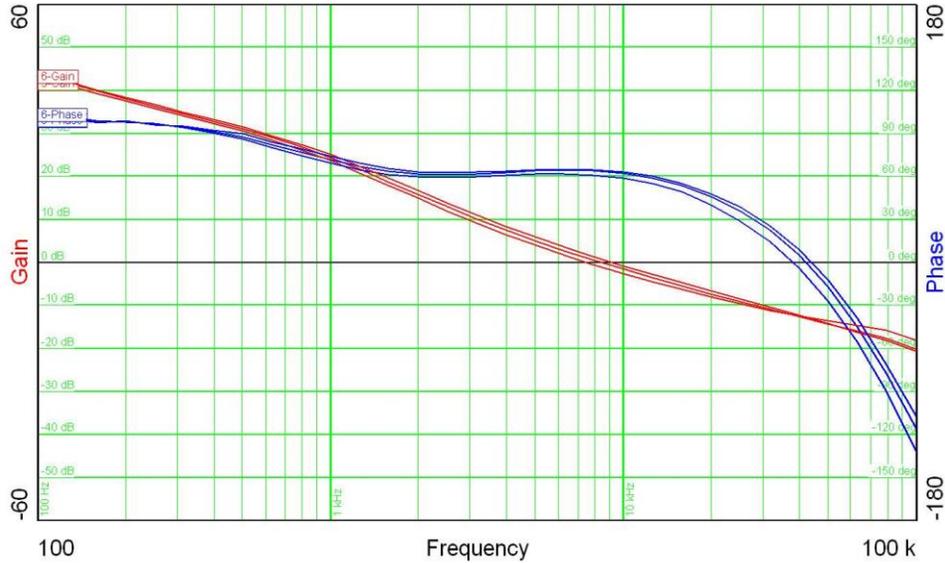
Volts	KHz	Degrees	dB
Vin	**BW**	**PM**	**GM**
36.0	7.5	61.0	12.0
48.0	8.4	63.0	13.0
57.0	9.2	63.0	13.0

Dynamic Loading

One output at a time was pulsed. The outputs not being pulsed were loaded to their maximum value. The input voltage is 48V at J3.

3.3V load step, 88mA to 440mA:

3.3V Response
50mV/div, 1msec/div
Measured 83mV peak to peak:
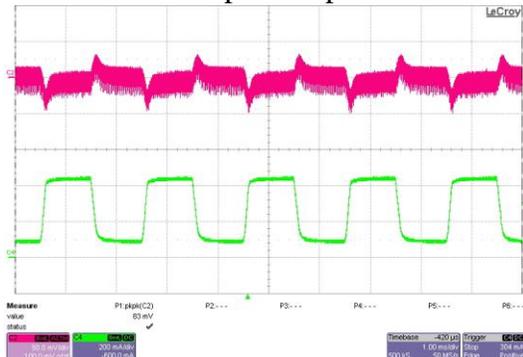
5V Response
50mV/div
Measured 88mV peak to peak:
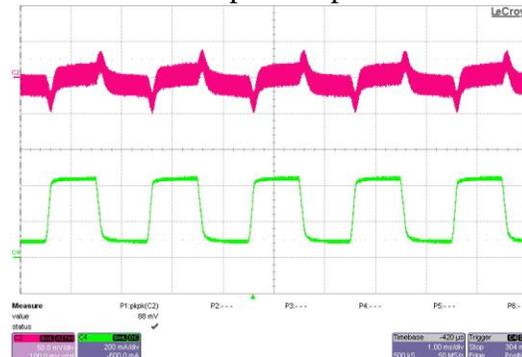
10V Response
100mV/div, 1msec/div
Measured 163mV peak to peak:
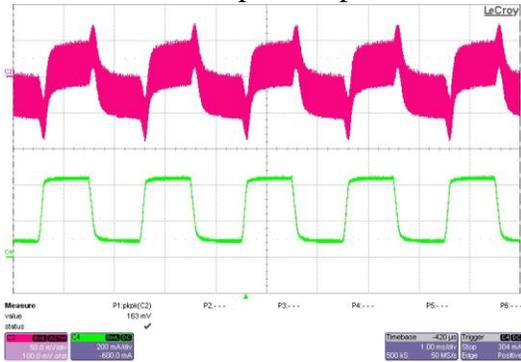
3.3V load step, 440mA to 880mA:

3.3V Response
50mV/div, 1msec/div
Measured 94mV peak to peak:
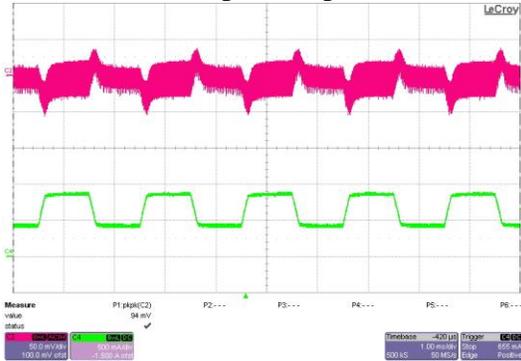
5V Response
50mV/div
Measured 92mV peak to peak:
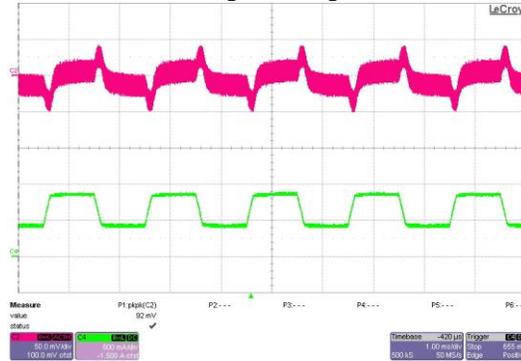
10V Response
100mV/div, 1msec/div
Measured 177mV peak to peak:

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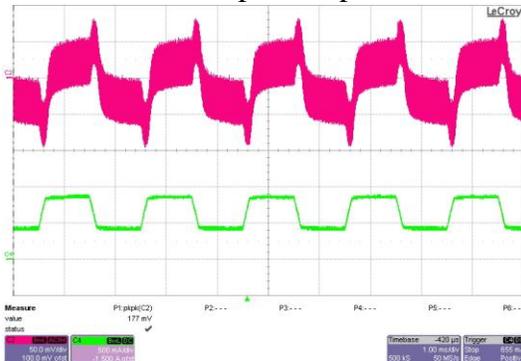
5V load step, 35mA to 350mA:

3.3V Response
50mV/div, 1msec/div
Measured 108mV peak to peak:
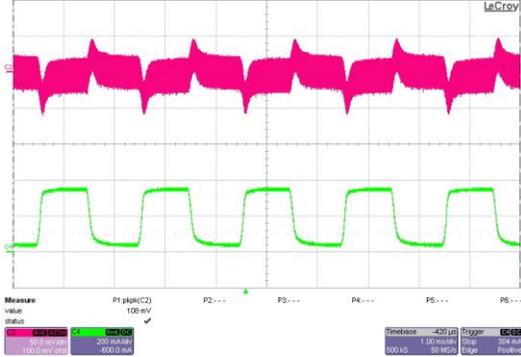
5V Response
50mV/div
Measured 127mV peak to peak:
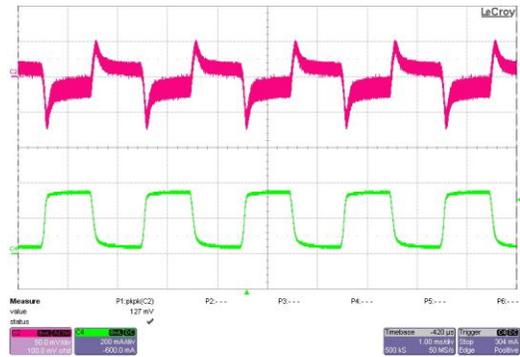
10V Response
50mV/div, 1msec/div
Measured 228mV peak to peak:
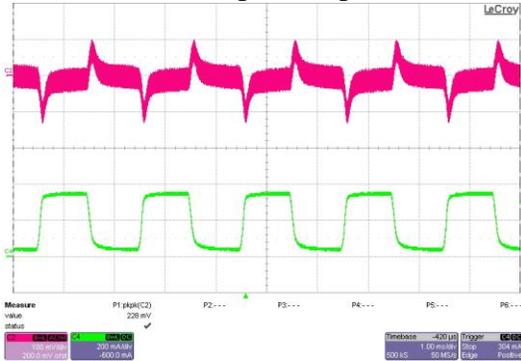
10V load step, 20mA to 110mA:

3.3V Response
50mV/div, 1msec/div
Measured 95mV peak to peak:
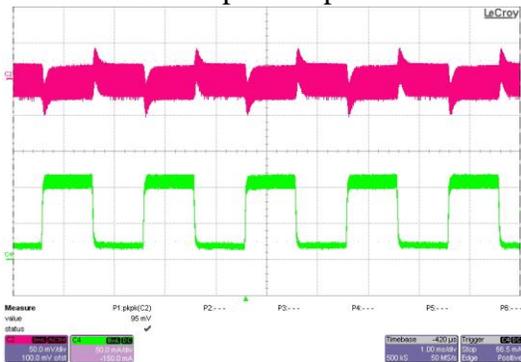
5V Response
50mV/div
Measured 106mV peak to peak:
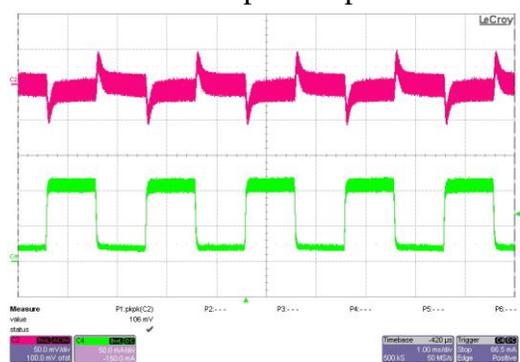
10V Response
200mV/div, 1msec/div
Measured 419mV peak to peak:
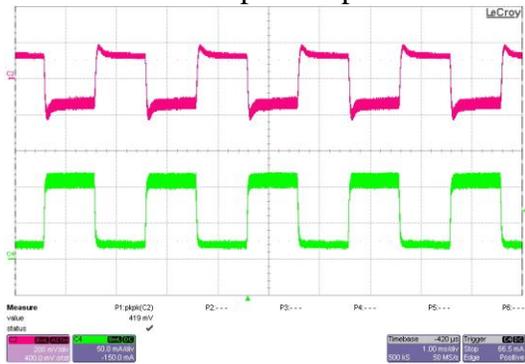
Photo
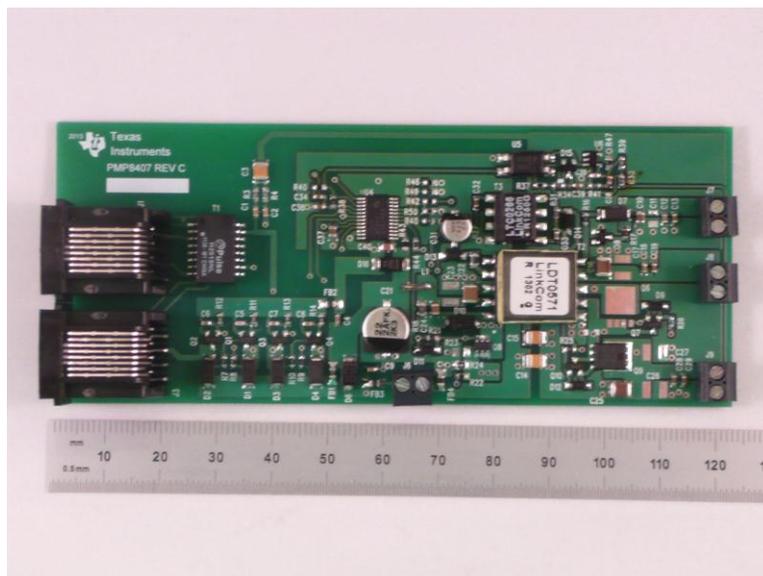
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