

**Efficiency and Regulation**

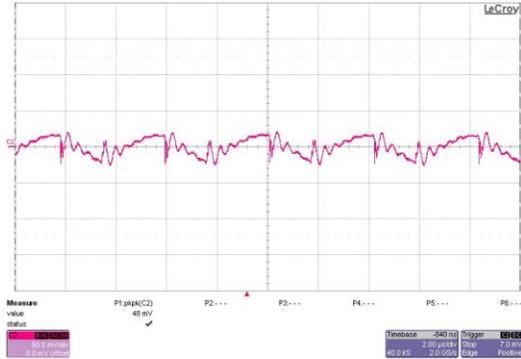
The efficiency and regulation are shown below:

<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>lin</sub></u>	<u>V<sub>in</sub></u>	<u>Eff</u>
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%
						<b>J3</b>	<b>J3</b>	<b>J3</b>
<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>lin</sub></u>	<u>V<sub>in</sub></u>	<u>Eff</u>
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%
						<b>J3</b>	<b>J3</b>	<b>J3</b>
<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>lin</sub></u>	<u>V<sub>in</sub></u>	<u>Eff</u>
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%
<b><u>Max Load Efficiency without bridge</u></b>								
<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>	<u>I<sub>out</sub></u>	<u>V<sub>out</sub></u>			<u>I<sub>lin</sub></u>	<u>V<sub>in</sub></u>	<u>Eff</u>
0.880	3.325	0.350	5.005	0.110	9.498	0.1784	35.37	90.7%
0.880	3.325	0.350	4.999	0.110	9.501	0.1323	47.45	91.1%
0.880	3.325	0.350	4.997	0.110	9.511	0.1113	56.47	91.0%
Vin measured at FB1/FB2								

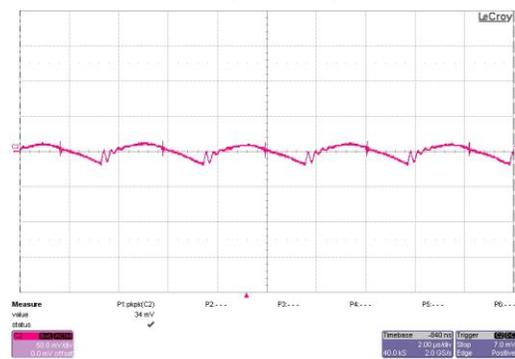
**Ripple and Noise**

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

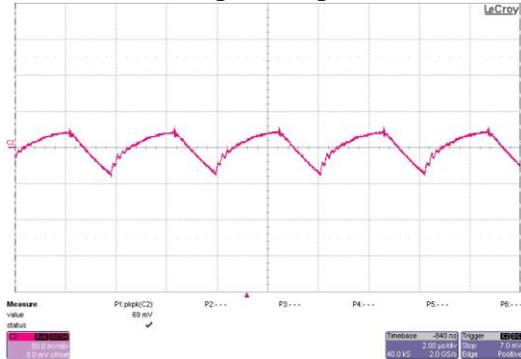
3.3V Output Ripple (C29), 50mV/div  
 Measured 48mVpeak to peak:



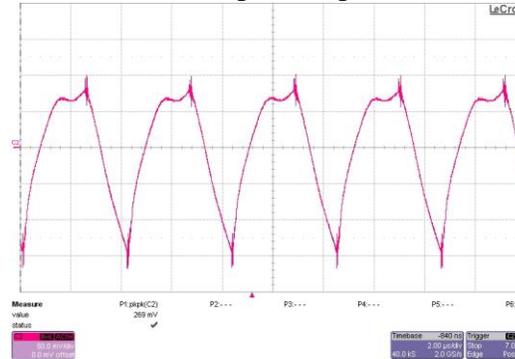
5V Output Ripple (C19), 50mV/div  
 Measured 34mV peak to peak:



10V Output Ripple (C13), 50mV/div  
 Measured 69mVpeak to peak:

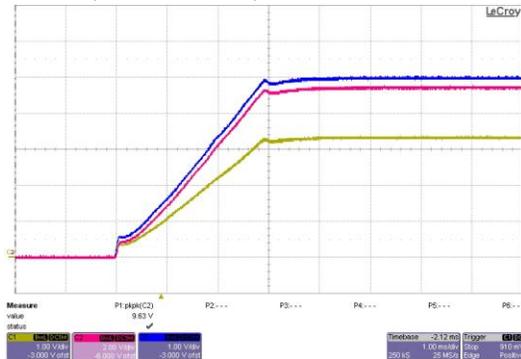


Input Ripple (C21), 50mV/div  
 Measured 269mVpeak to peak:

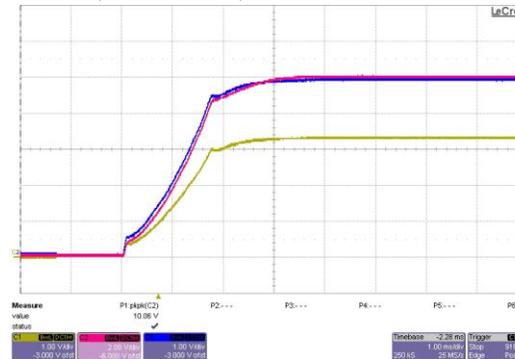


**Turn On Response**

48VIN, Max Loads, 1msec/div:



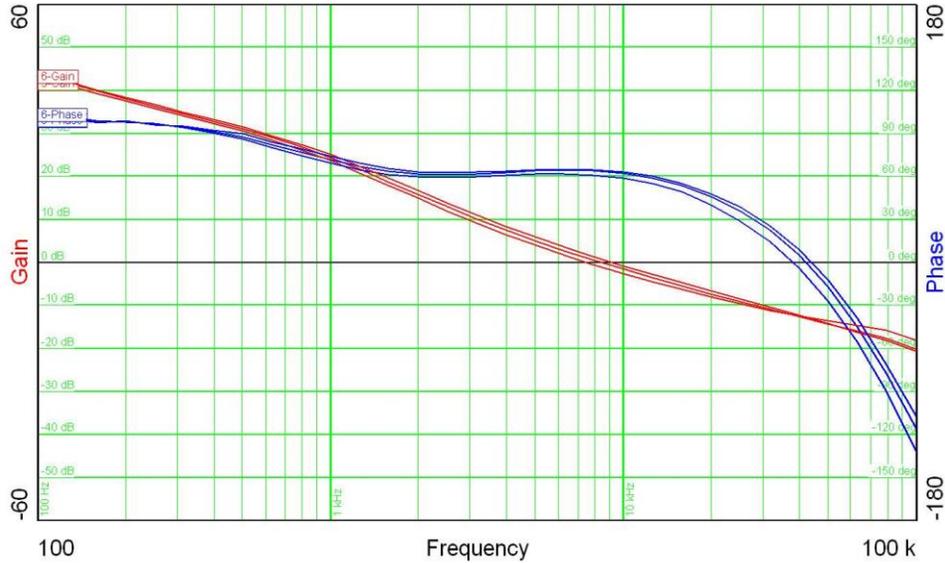
48VIN, 0A Loads, 1msec.div:



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.



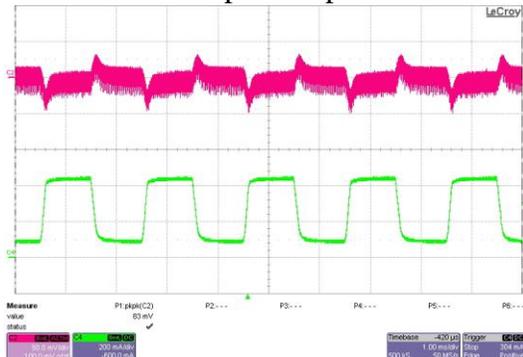
Volts	KHz	degrees	dB
<u>Vin</u>	<u>BW</u>	<u>PM</u>	<u>GM</u>
36.0	7.5	61.0	12.0
48.0	8.4	63.0	13.0
57.0	9.2	63.0	13.0

**Dynamic Loading**

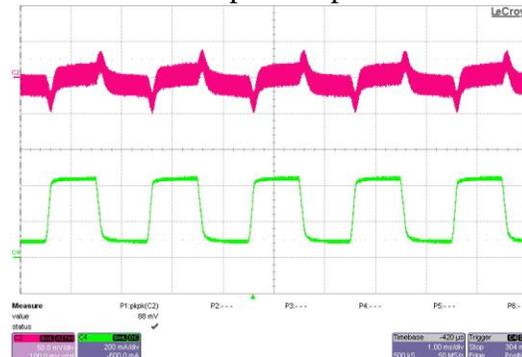
One output at a time was pulsed. The outputs not being pulsed were loaded to their maximum value. The input voltage is 48V at J3.

**3.3V load step, 88mA to 440mA:**

3.3V Response  
 50mV/div, 1msec/div  
 Measured 83mV peak to peak:



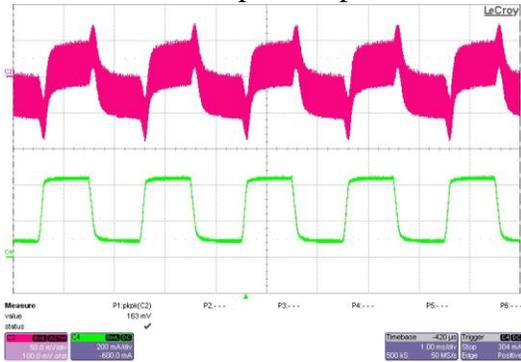
5V Response  
 50mV/div  
 Measured 88mV peak to peak:



**10V Response**

100mV/div, 1msec/div

Measured 163mV peak to peak:

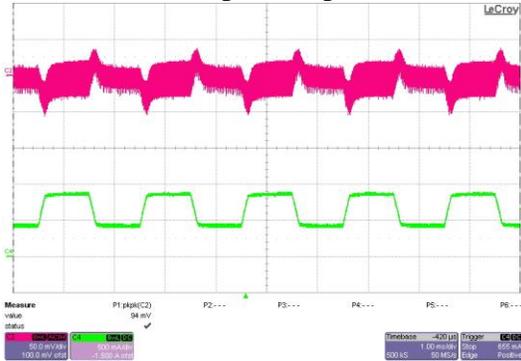


**3.3V load step, 440mA to 880mA:**

**3.3V Response**

50mV/div, 1msec/div

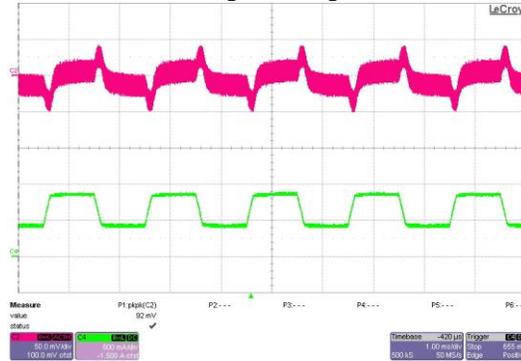
Measured 94mV peak to peak:



**5V Response**

50mV/div

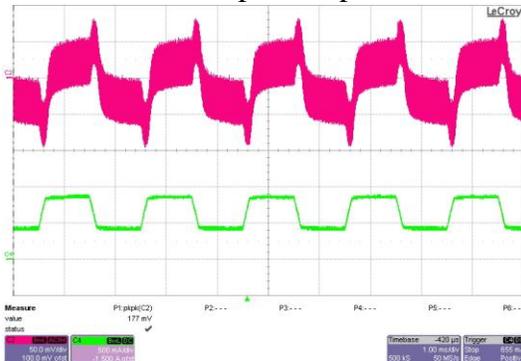
Measured 92mV peak to peak:



**10V Response**

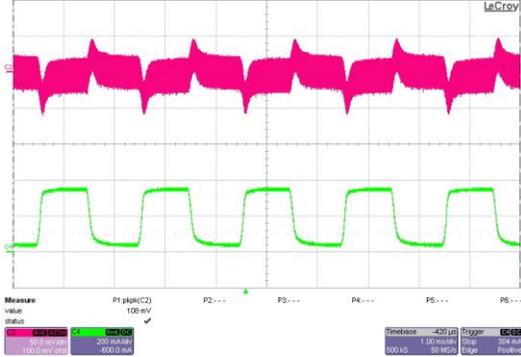
100mV/div, 1msec/div

Measured 177mV peak to peak:

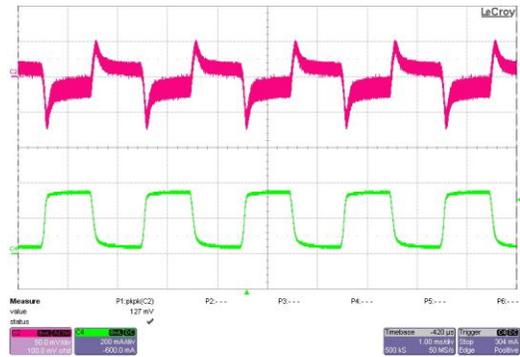


**5V load step, 35mA to 350mA:**

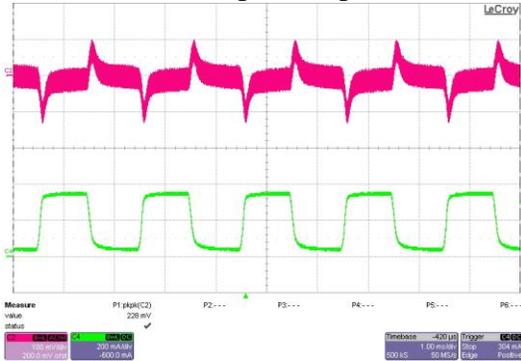
3.3V Response  
50mV/div, 1msec/div  
Measured 108mV peak to peak:



5V Response  
50mV/div  
Measured 127mV peak to peak:

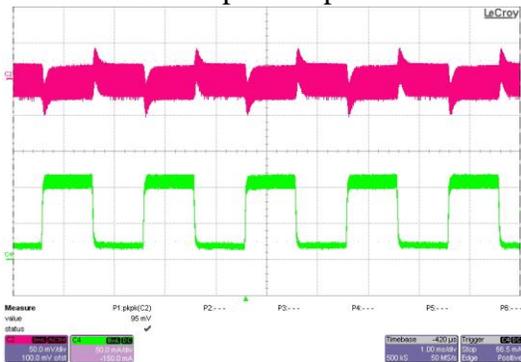


10V Response  
50mV/div, 1msec/div  
Measured 228mV peak to peak:

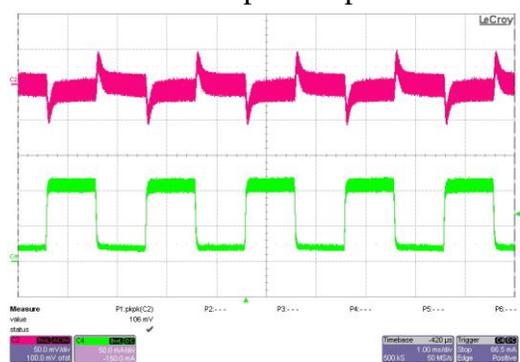


**10V load step, 20mA to 110mA:**

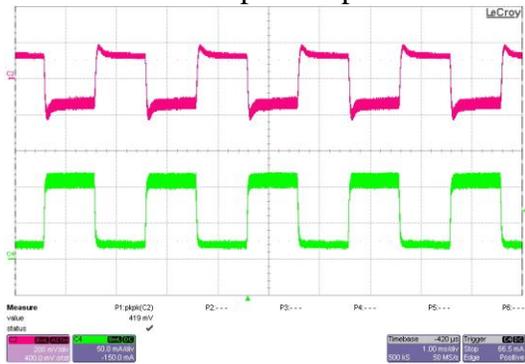
3.3V Response  
50mV/div, 1msec/div  
Measured 95mV peak to peak:



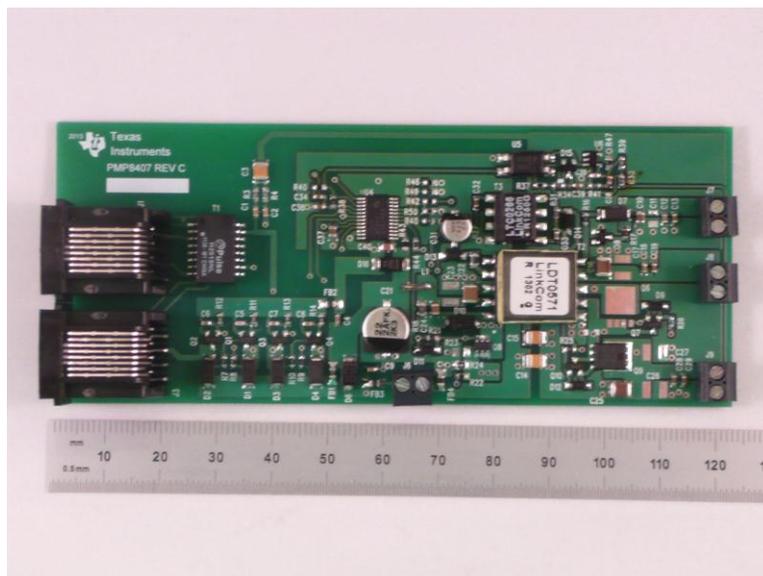
5V Response  
50mV/div  
Measured 106mV peak to peak:



10V Response  
200mV/div, 1msec/div  
Measured 419mV peak to peak:



**Photo**



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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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