



**PMP20089 Synchronous Buck Converter
Test Report
3/29/16**

The tests performed were as follows:

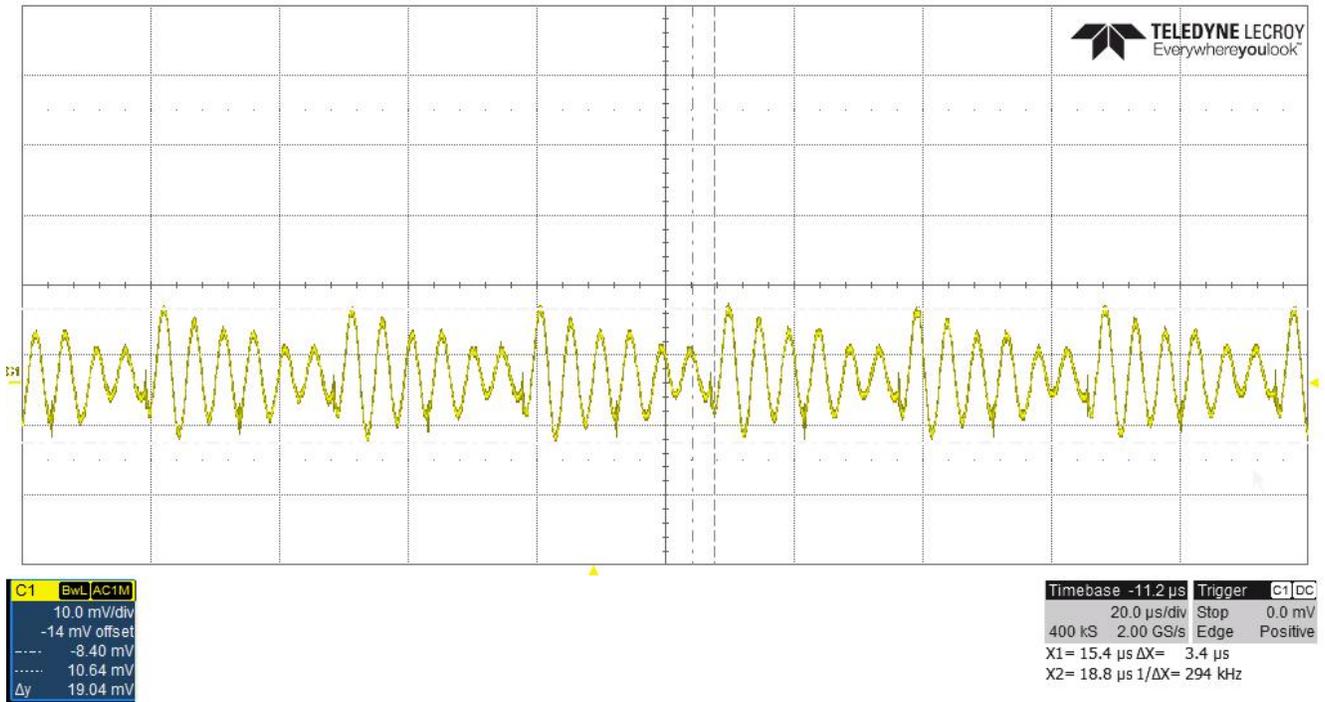
A. TPS5117

1. Output Voltage Ripple (No Load)
2. Output Voltage Ripple (Full Load)
3. Switch Node
4. Transient Response (6A to12A Load Step)
5. Efficiency
6. Bode Plot
7. Thermal images
8. Board photos

1 Output Voltage Ripple- NO LOAD

The output voltage ripple of the converter is shown in the figures below. The input voltage is 48V.

Channel 1 – Yellow: Output Voltage (10mV/div)-AC coupled



No Load: $V_{rip}(\text{full scale}) = 19.04\text{Mv}$

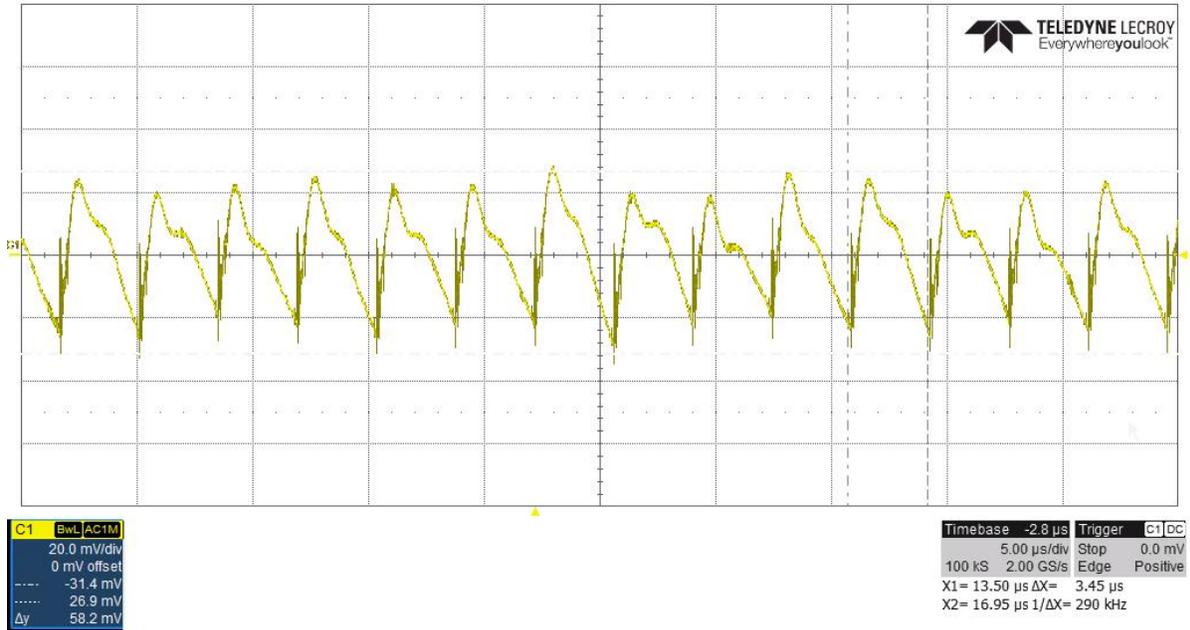
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2 Output Voltage Ripple- FULL LOAD

The output voltage ripple of the converter is shown in the figures below. The input voltage is 48V. Iout is 12A

Channel 1 – Yellow: Output Voltage (20mV/div)-AC coupled



No Load: Vrip(full scale) = 58.2mV

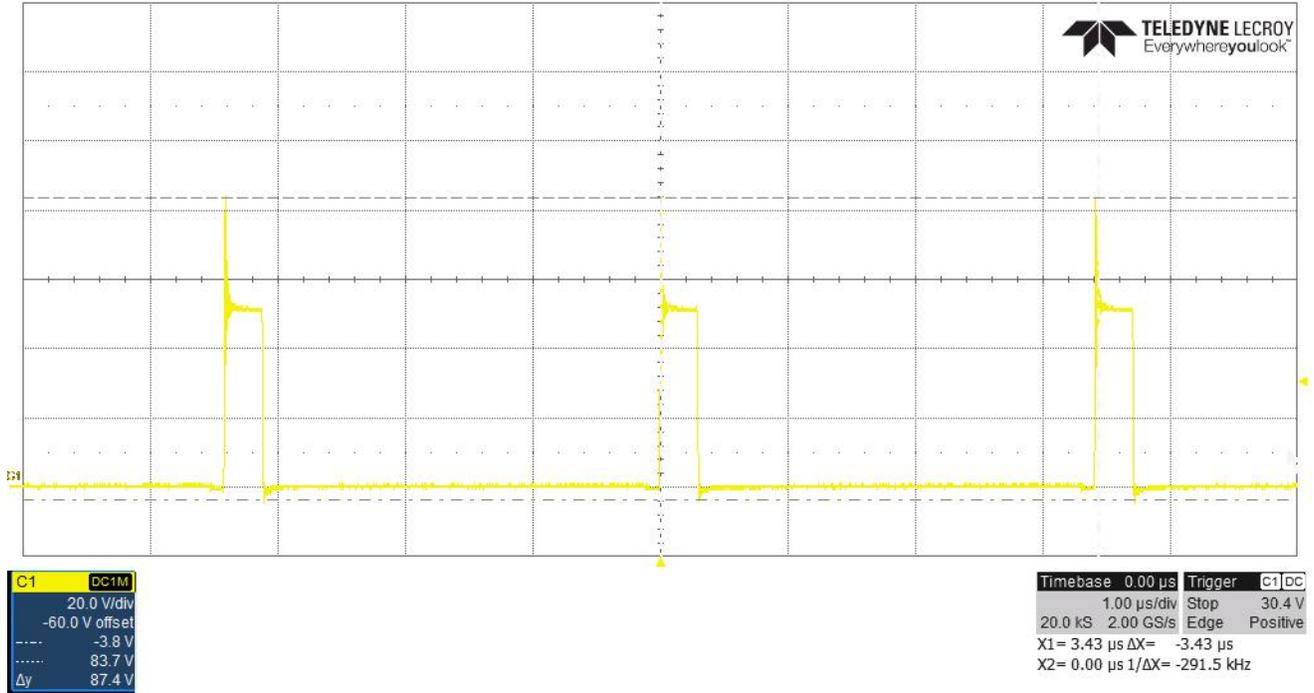
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3 Switch Node

The picture below shows the switching node waveform for the converter. The input voltage is 48V. Iout is 12A

Channel 1 – Yellow: Switch Node – (20V/Division)- FULL bandwidth

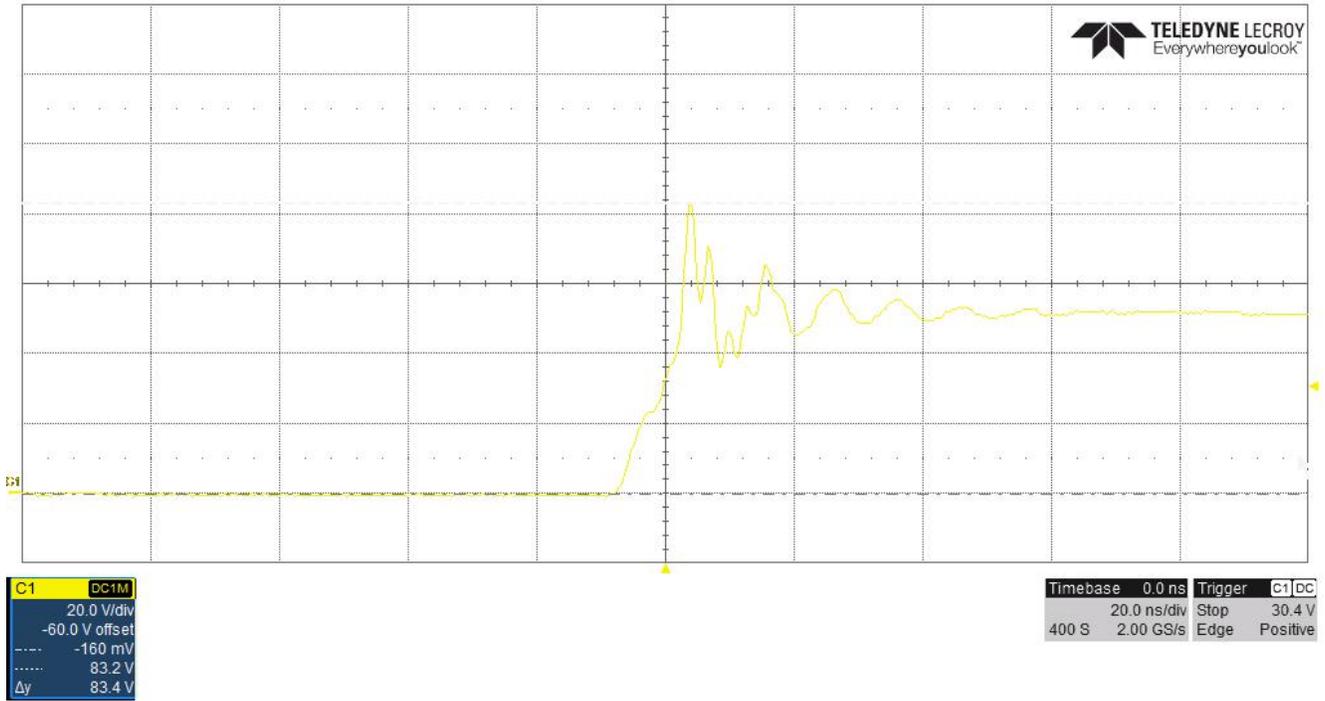


switch node- fsw=291.5kHz

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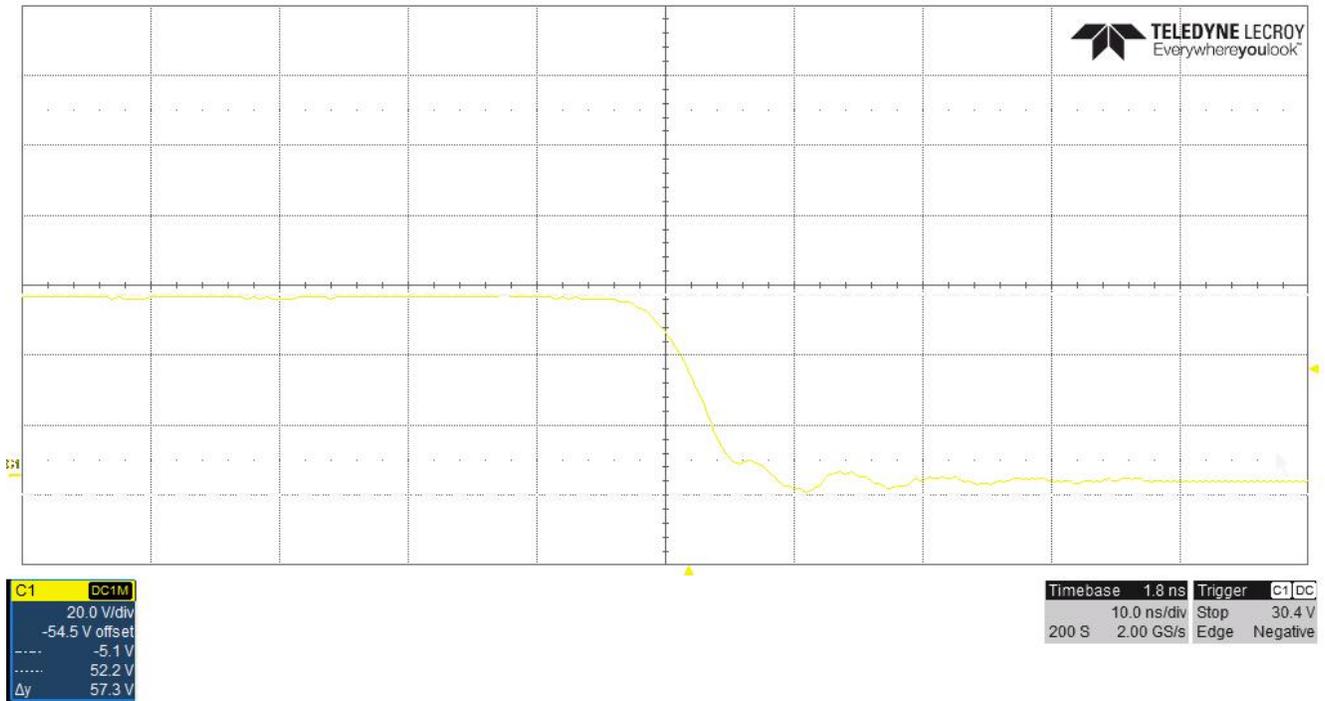


Channel 1 – Yellow: Switch Node – (20V/Division)- FULL bandwidth



Switch node rising- Vmax= 83.2V

Channel 1 – Yellow: Switch Node – (20V/Division)- FULL bandwidth



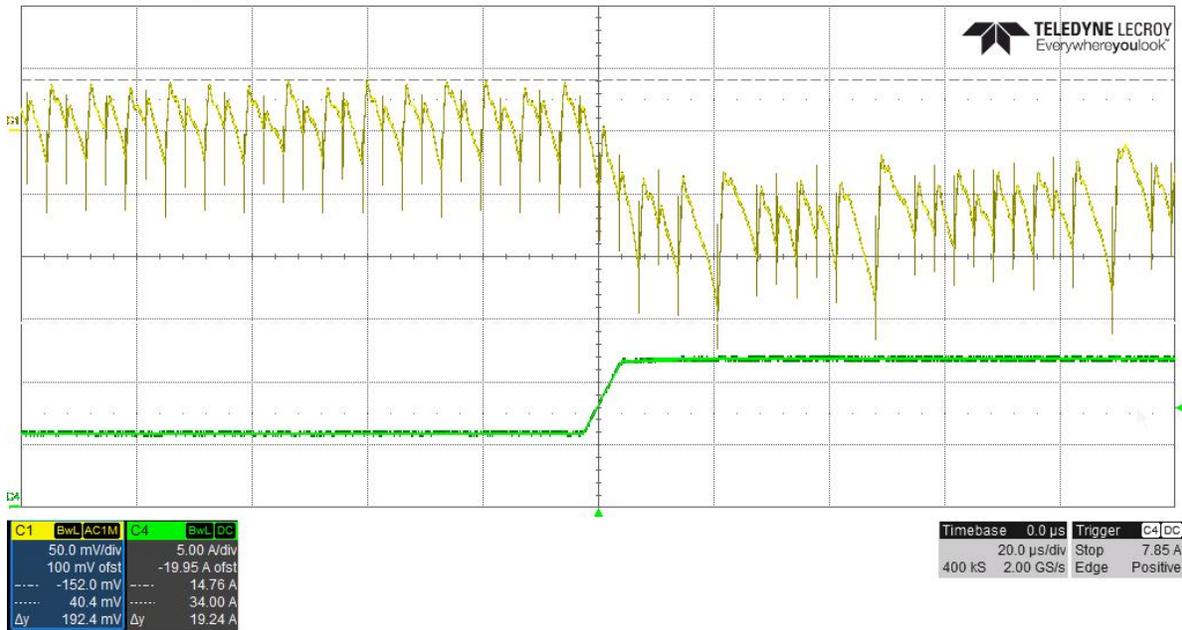
Switch node rising- Vmin= 5.1V

4 Transient Response

The transient response of the converter is shown in the figures below. The input voltage is 48V. The load is stepped from 6A to 12A.

Channel 1 – Yellow: Output Voltage (50mV/div)-AC coupled

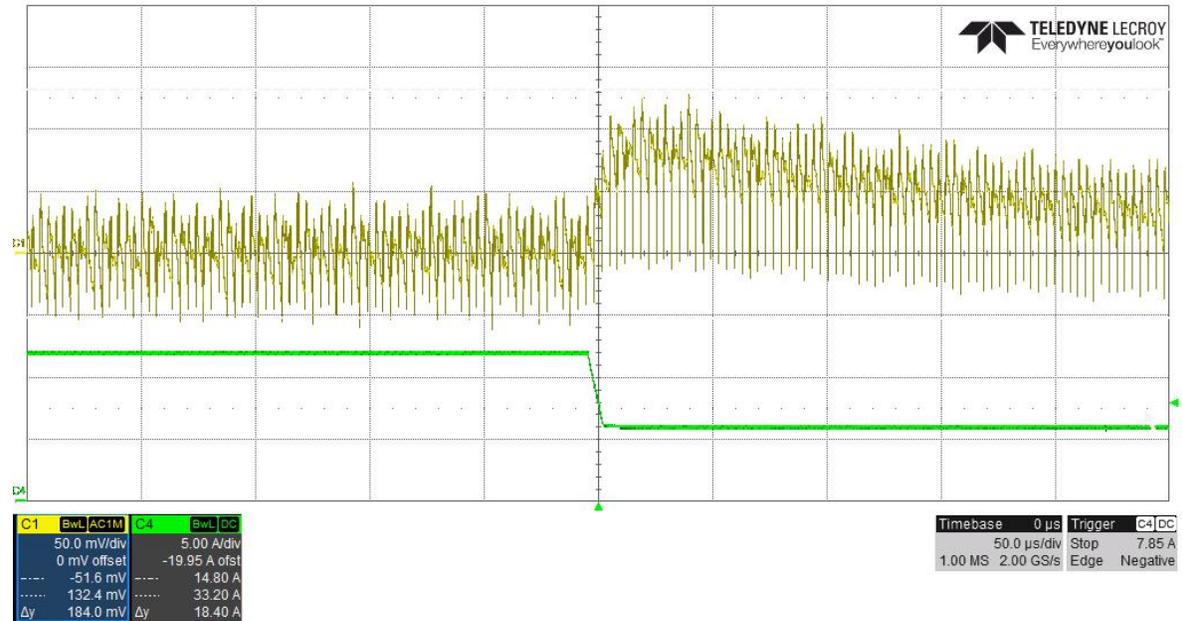
Channel 4 – Green: Output Load (5A/div; DC coupled)



Transient Response – There is a total change of 192.4mV to the output voltage including ripple and transient

Channel 1 – Yellow: Output Voltage (50mV/div)-AC coupled

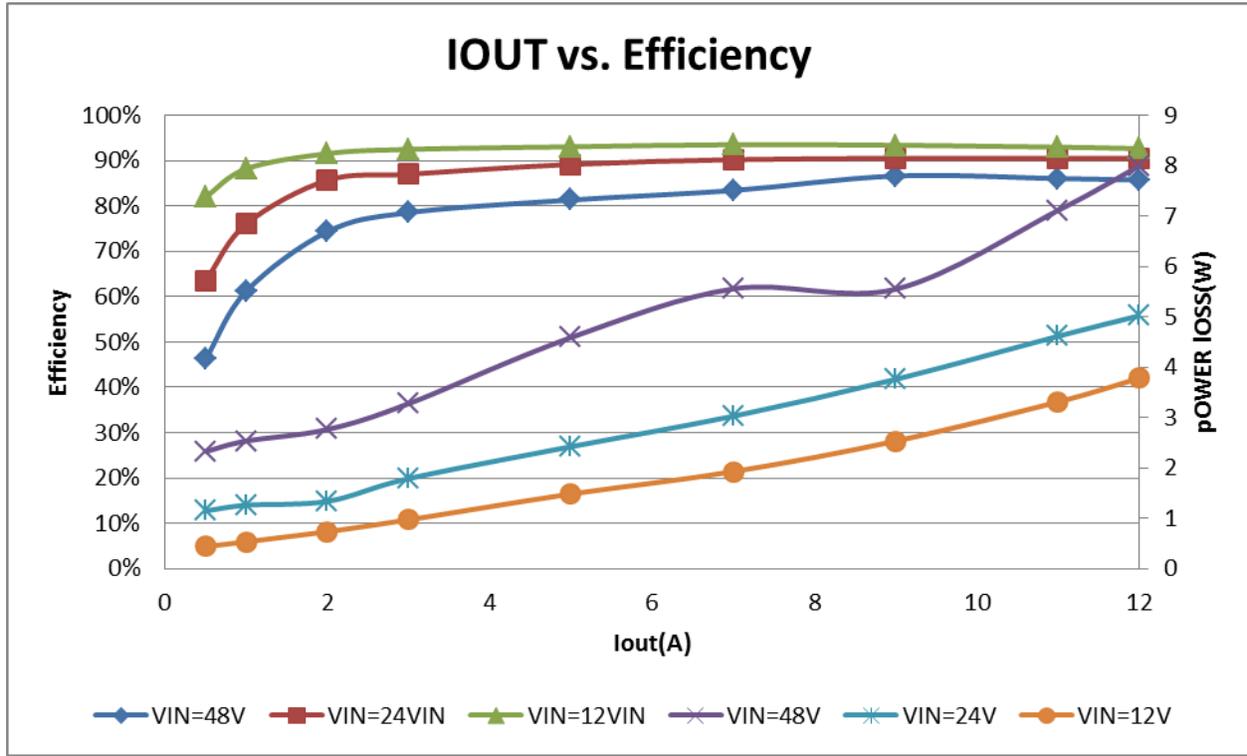
Channel 4 – Green: Output Load (5A/div; DC coupled)



Transient Response – There is a total change of 184mV to the output voltage including ripple and transient

5 Efficiency

The efficiency of the board measured at the output of the 3 modules.



Efficiency Curve

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48VIN					
VIN(V)	Iin(A)	VOUT	Iout(A)	Efficiency(%)	Power loss(W)
48.08	0.007	3.998	0	0.00%	0.337
48.07	0.09	4.001	0.5	46.24%	2.326
48.06	0.136	4.001	1	61.21%	2.535
48.06	0.224	4.001	2	74.33%	2.763
48.05	0.318	4.001	3	78.55%	3.277
48.033	0.512	4.001	5	81.34%	4.588
48.016	0.699	4.001	7	83.45%	5.556
47.99	0.866	4.001	9	86.64%	5.550
47.982	1.065	3.999	11	86.08%	7.112
47.972	1.167	3.999	12	85.72%	7.995
24VIN					
24.037	0.006	3.999	0	0.00%	0.144
24.025	0.131	4	0.5	63.55%	1.147
24.017	0.219	4	1	76.05%	1.260
24	0.389	4	2	85.69%	1.336
23.98	0.575	4	3	87.03%	1.789
23.95	0.936	3.999	5	89.19%	2.422
23.917	1.297	3.999	7	90.24%	3.027
23.883	1.664	3.998	9	90.54%	3.759
23.849	2.037	3.997	11	90.50%	4.613
23.83	2.223	3.996	12	90.52%	5.022
12VIN					
12.02	0.007	3.999	0	0.00%	0.084
12.008	0.203	3.999	0.5	82.03%	0.438
11.992	0.378	3.999	1	88.22%	0.534
11.96	0.73	3.998	2	91.58%	0.735
11.927	1.087	3.998	3	92.51%	0.971
11.86	1.81	3.997	5	93.10%	1.482
11.929	2.507	3.997	7	93.56%	1.927
11.859	3.247	3.997	9	93.42%	2.533
11.787	4.011	3.997	11	93.00%	3.311
11.752	4.402	3.996	12	92.69%	3.780

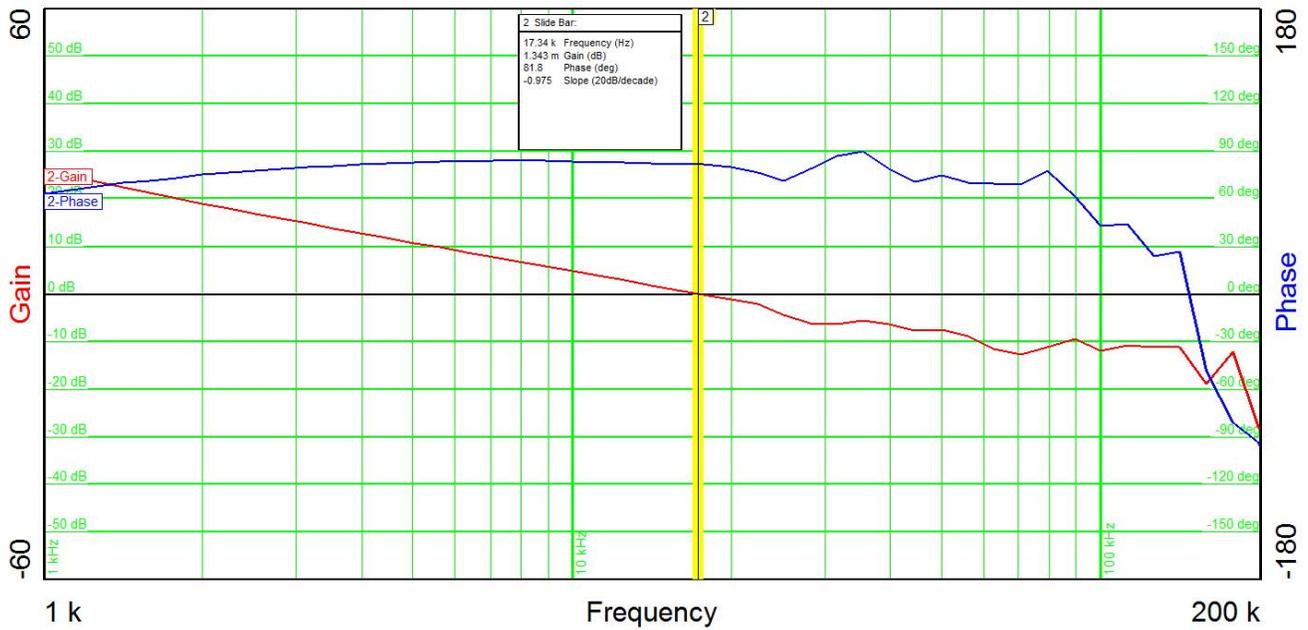
Efficiency Data

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6 Bode Plot

The Bode Plot of the converter is shown in the figure below. The input is 48V. Iout=12A



Fco= 17.34kHz; PM =81.8 degrees

7 Thermal Images

All images were taken at 25C ambient temperature.

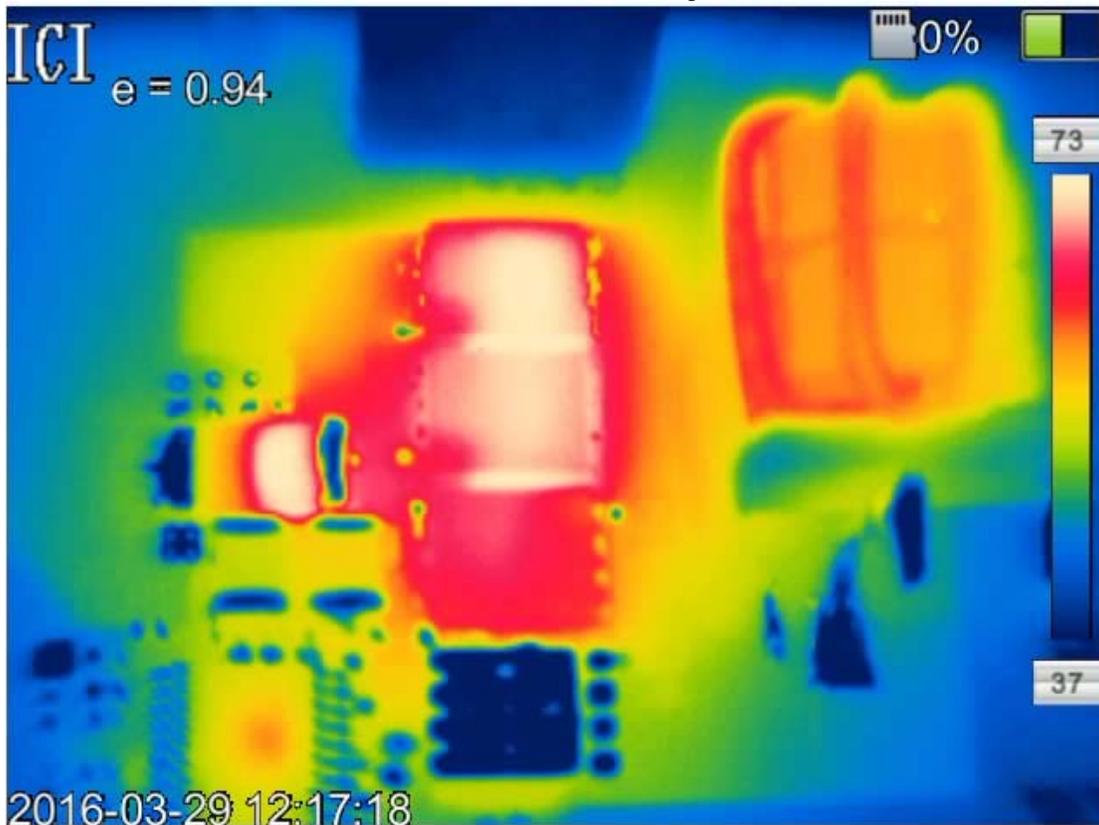


Vin =12V; Iout=12A (max temp 43C)

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Vin =24V; Iout=12A (max temp 55C)

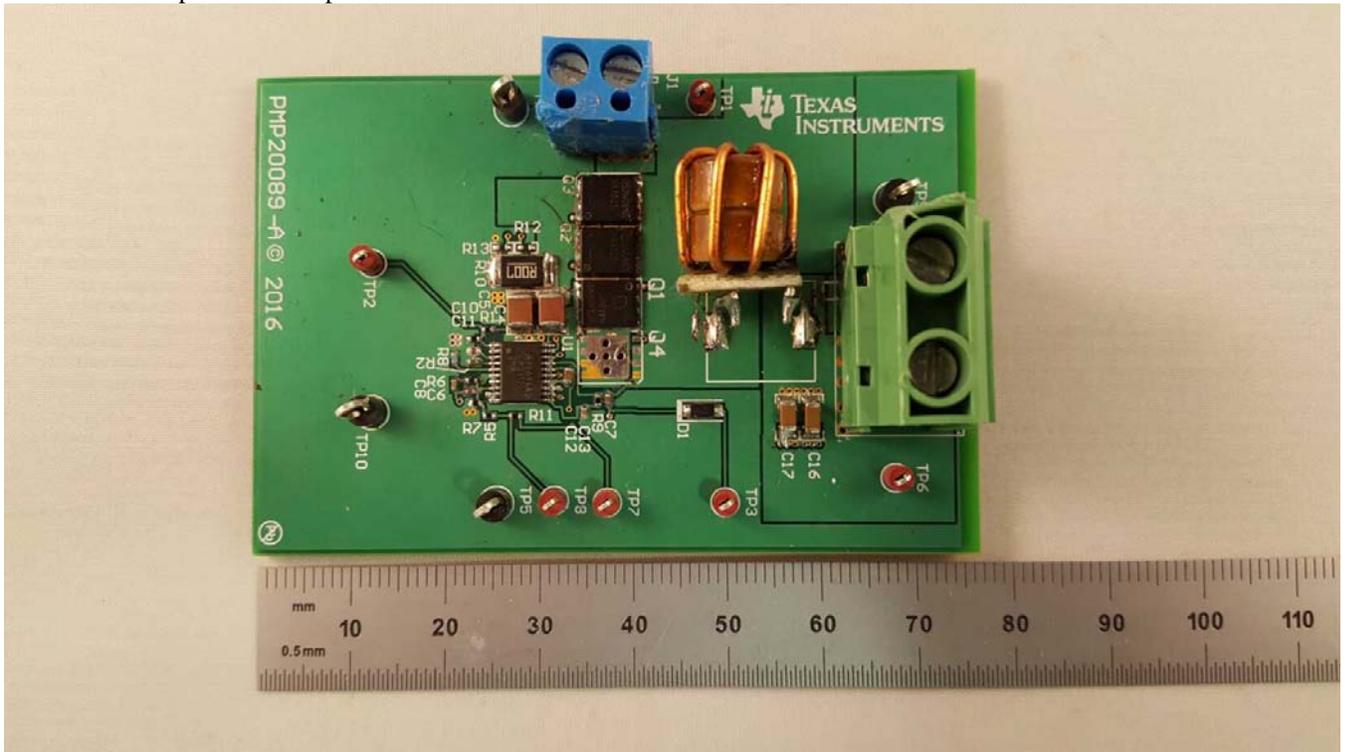


Vin =48V; Iout=12A (max temp 73C)

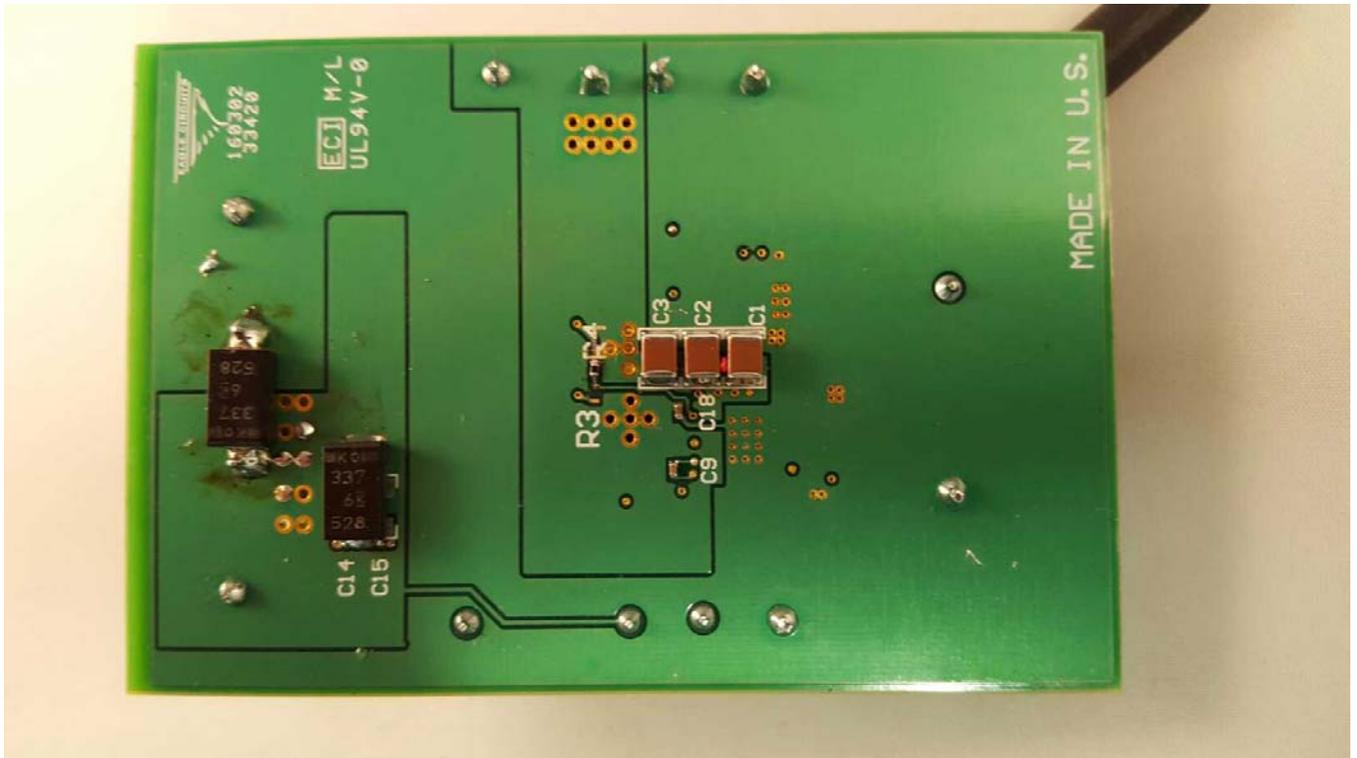
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8 Board Photos

Below are the top and bottom photos for PMP20089 REVA.



FRONT OF PMP20089



BOTTOM OF PMP20089

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