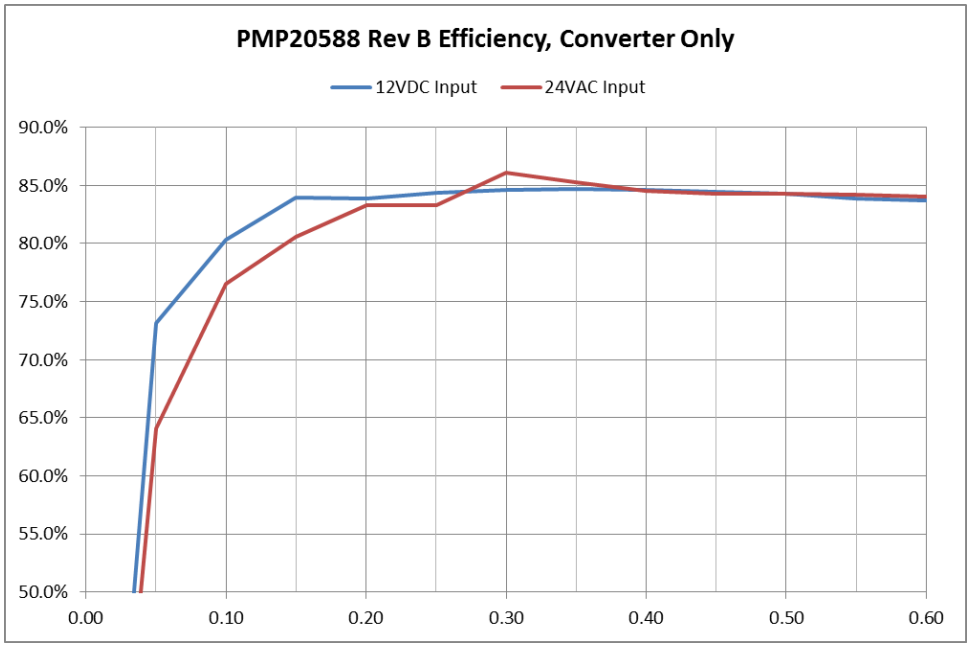
PMP20588 REV B **TEST REPORT**
TEXAS INSTRUMENTS **01-23-2017**

All measurement taken with 600mA load and 20MHz bandwidth unless noted.
All measurements are for flyback converter only, no PSE, unless noted.

Efficiency

12VDC Input						**24VAC Input, Kikusui PCR500M Source plus Voltech PM1000+ power meter**			
Flyback converter only. PSE not connected.						**Flyback Converter only. PSE not connected.**			
Iout	**Vout**	**Iin**	**Vin**	**Eff**		**Iout**	**Vout**	**Pin**	**Eff**
0.00	54.09	0.049	12.01	0.0%		0.00	54.11	1.17	0.0%
0.05	54.09	0.308	12.01	73.1%		0.05	54.10	4.22	64.1%
0.10	54.09	0.560	12.02	80.4%		0.10	54.10	7.07	76.5%
0.15	54.09	0.805	12.00	84.0%		0.15	54.11	10.07	80.6%
0.20	54.09	1.072	12.03	83.9%		0.20	54.12	13.00	83.3%
0.25	54.09	1.334	12.01	84.4%		0.25	54.12	16.25	83.3%
0.30	54.09	1.598	12.00	84.6%		0.30	54.12	18.86	86.1%
0.35	54.09	1.862	12.00	84.7%		0.35	54.12	22.22	85.2%
0.40	54.09	2.125	12.03	84.6%		0.40	54.12	25.61	84.5%
0.45	54.09	2.397	12.02	84.5%		0.45	54.12	28.89	84.3%
0.50	54.09	2.675	12.00	84.3%		0.50	54.12	32.10	84.3%
0.55	54.09	2.955	12.00	83.9%		0.55	54.12	35.36	84.2%
0.60	54.09	3.222	12.03	83.7%		0.60	54.12	38.64	84.0%



With PSE connected, no PD connected:

12.02VDC input/106mA/1.275W

24VAC input/1.706W

With PSE connected and PD connected:

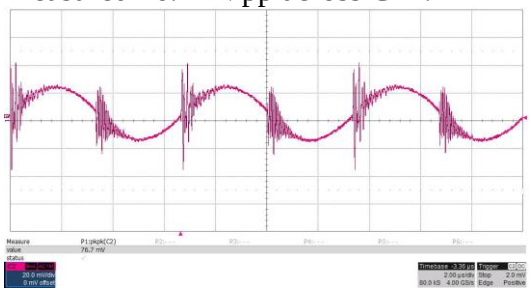
Measured at J2 connector:

52.86V/600mA output, 12.02VDC/3.308A input, 79.7% efficiency

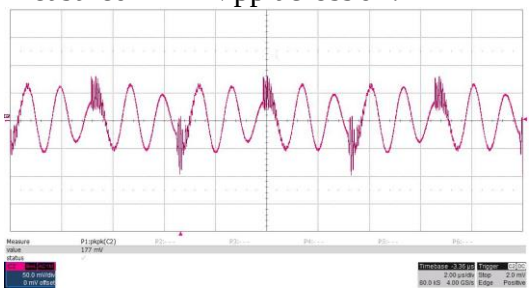
52.87V/600mA output, 39.49W input (24VAC), 80.3% efficiency

Ripple and Noise

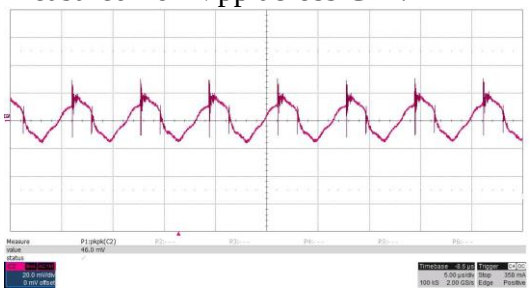
Output ripple, 12VDC input
20mV/div, 2usec/div
Measured 76.7mVpp across C22:



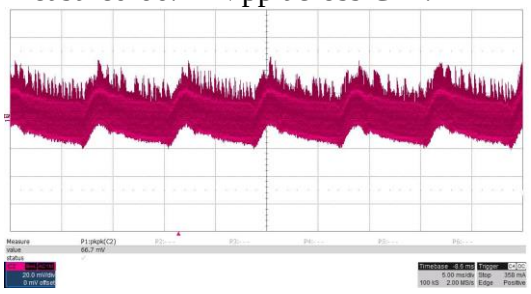
Input ripple, 12VDC input
50mV/div, 2usec/div
Measured 177mVpp across J1:



Output ripple, 24VAC input
20mV/div, 5usec/div
Measured 46mVpp across C22:

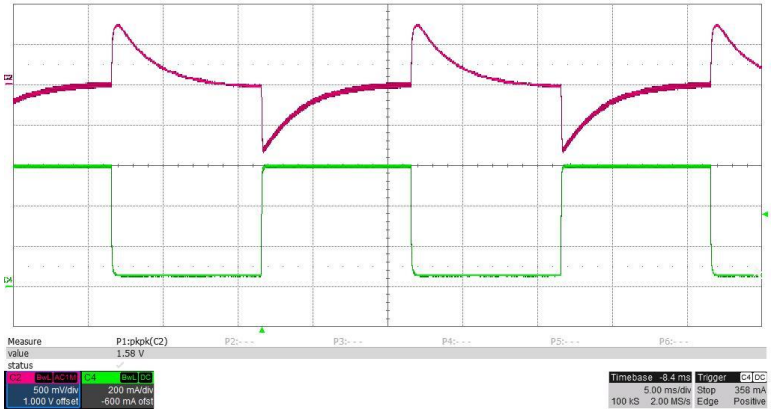


Output ripple, 24VAC input
20mV/div, 5msec/div
Measured 66.7mVpp across C22:

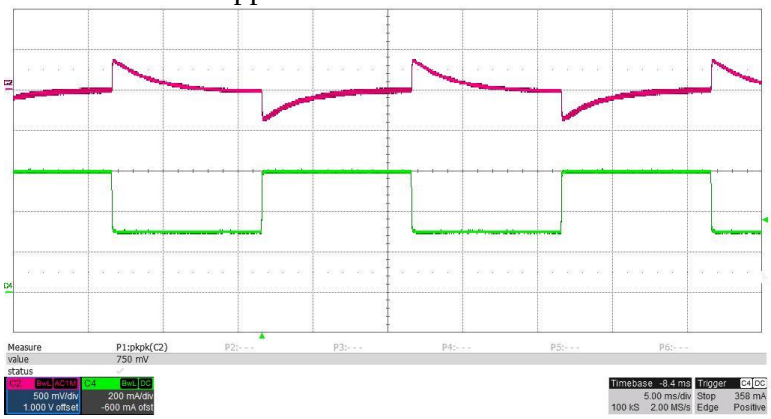


Dynamic Loading

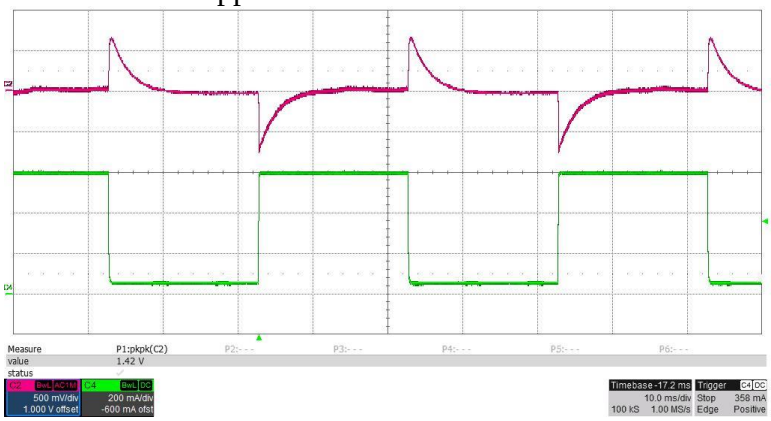
Output load step response, 60mA to 600mA load step, 12VDC input
500mV/div, 200mA/div, 5msec/div, slew rate = 60mA/usec
Measured 1.58Vpp across C22:



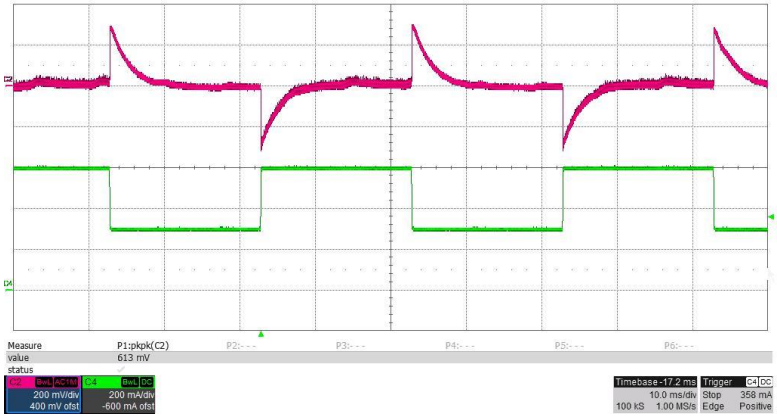
Output load step response, 300mA to 600mA load step, 12VDC input
500mV/div, 200mA/div, 5msec/div, slew rate = 60mA/usec
Measured 750mVpp across C22:



Output load step response, 60mA to 600mA load step, 24VAC input
500mV/div, 200mA/div, 10msec/div, slew rate = 60mA/usec
Measured 1.42Vpp across C22:

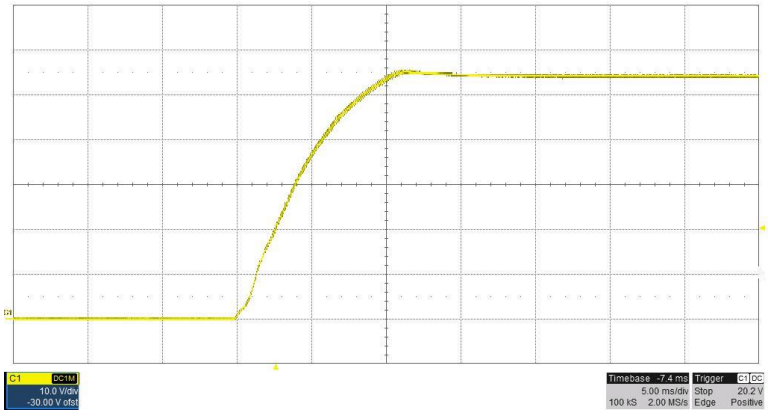


Output load step response, 300mA to 600mA load step, 24VAC input
500mV/div, 200mA/div, 10msec/div, slew rate = 60mA/usec
Measured 613mVpp across C22:

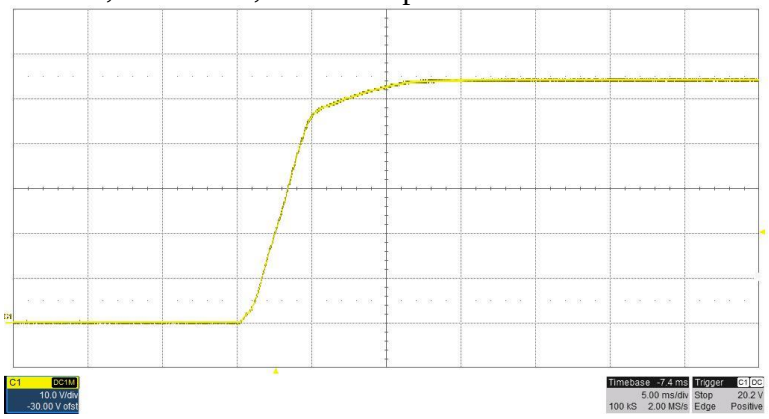


Turn On Response

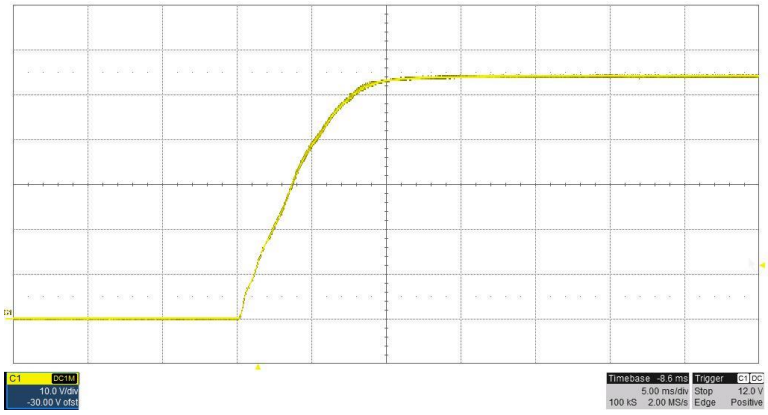
600mA load, 5msec/div, 12VDC input:



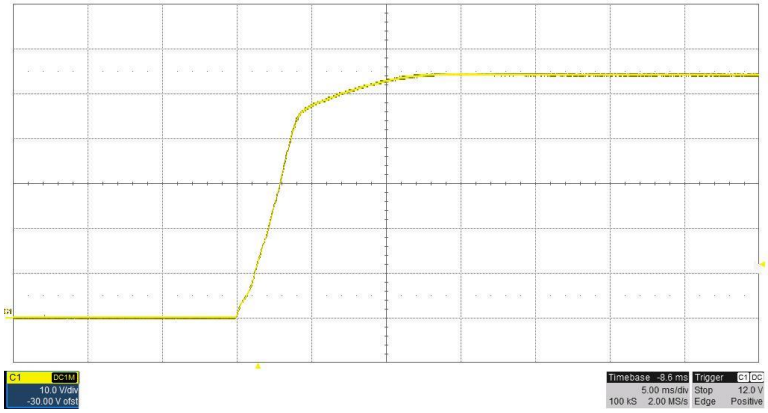
0A load, 5msec/div, 12VDC input:



600mA load, 5msec/div, 24VAC input:



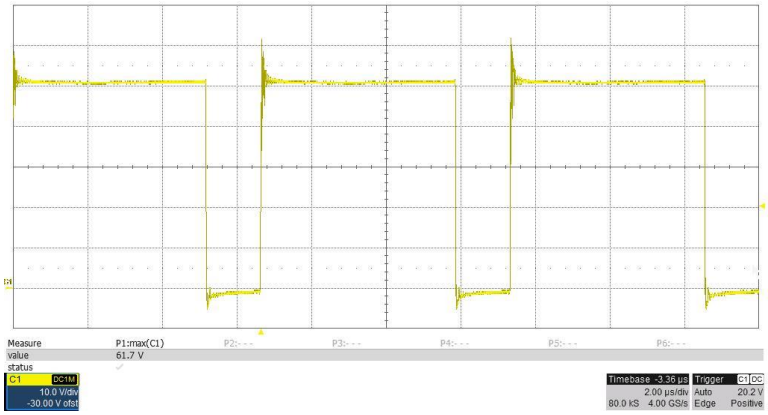
0A load, 5msec/div, 24VAC input



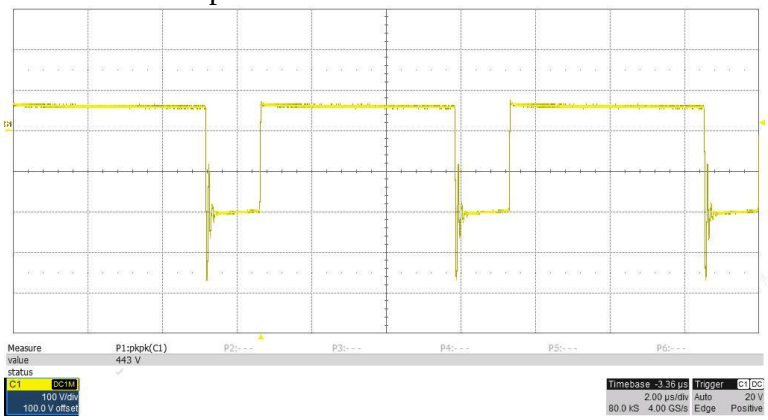
Waveforms

The peak input voltage at 24VAC +10% is 37.3V. For ease of measurement the voltage stress on the primary FET and secondary rectifier were measured with a 40VDC input.

Vds, Q2, 10V/div, 2usec/div, 40VDC input, 750MHz bandwidth
Measured 61.7Vpeak:

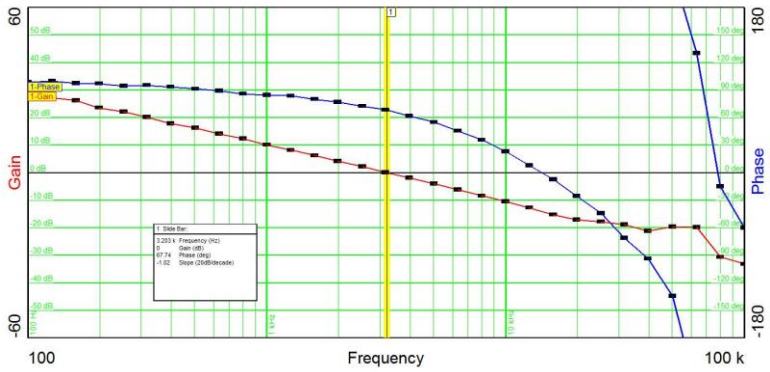


Vanode-GND, D8, 100V/div, 2usec/div, 40VDC input, 750MHz bandwidth
Measured 443Vpeak:



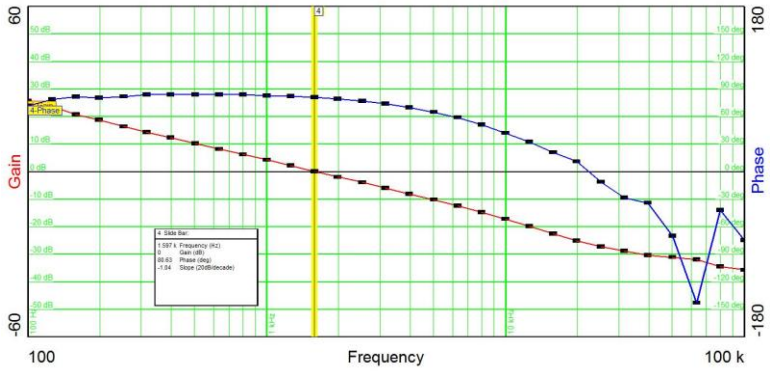
Loop Stability

600mA load, 12VDC input:



Bandwidth= 3.2 kHz Phase Margin=67 degrees Gain Margin=13dB

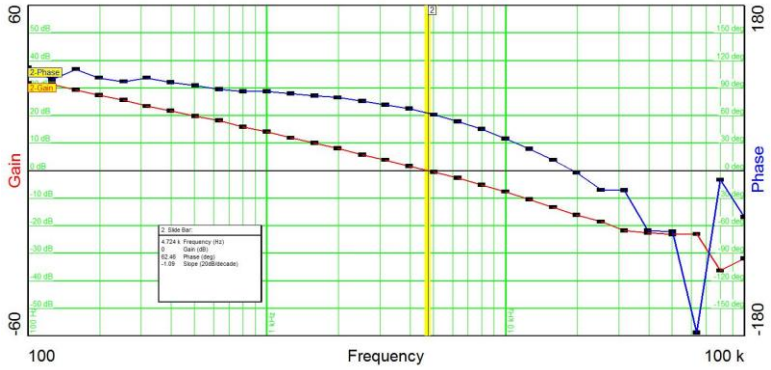
60mA load, 12VDC input:



Bandwidth= 1.6 kHz Phase Margin=80 degrees Gain Margin=27dB

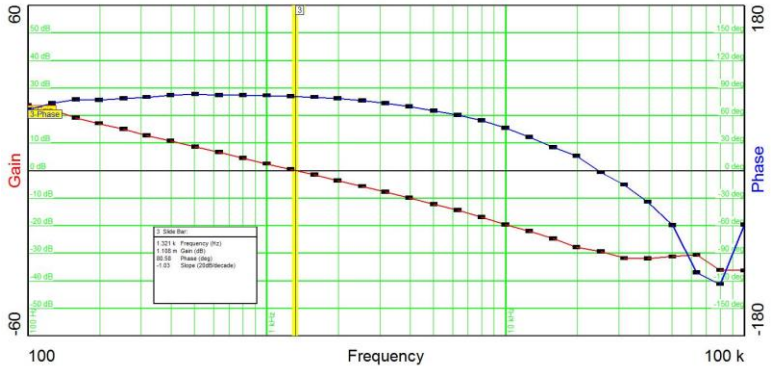
Note: Duty cycle variations made loop measurement impossible with a 24VAC input. The loop was measured with a 34VDC input.

600mA load, 34VDC input:



Bandwidth= 4.7 kHz Phase Margin=62 degrees Gain Margin=16dB

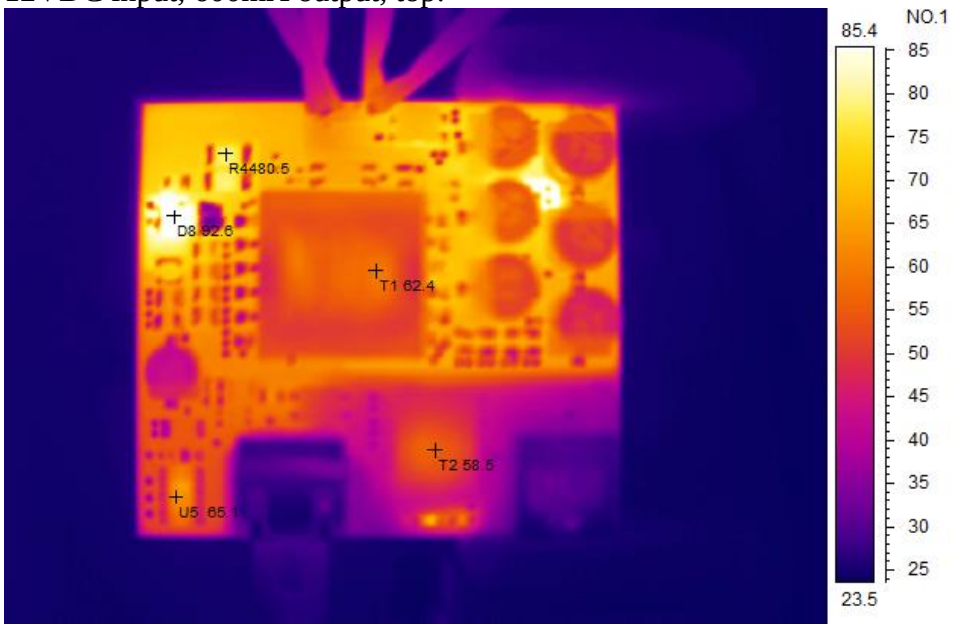
60mA load, 34VDC input:



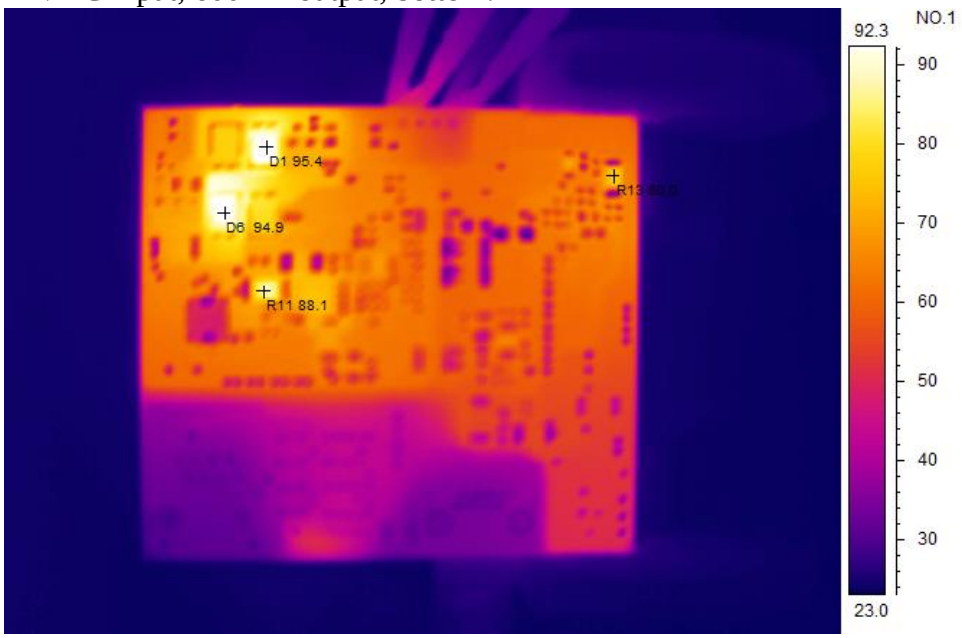
Bandwidth= 1.3 kHz Phase Margin=80 degrees Gain Margin=29dB

Thermal

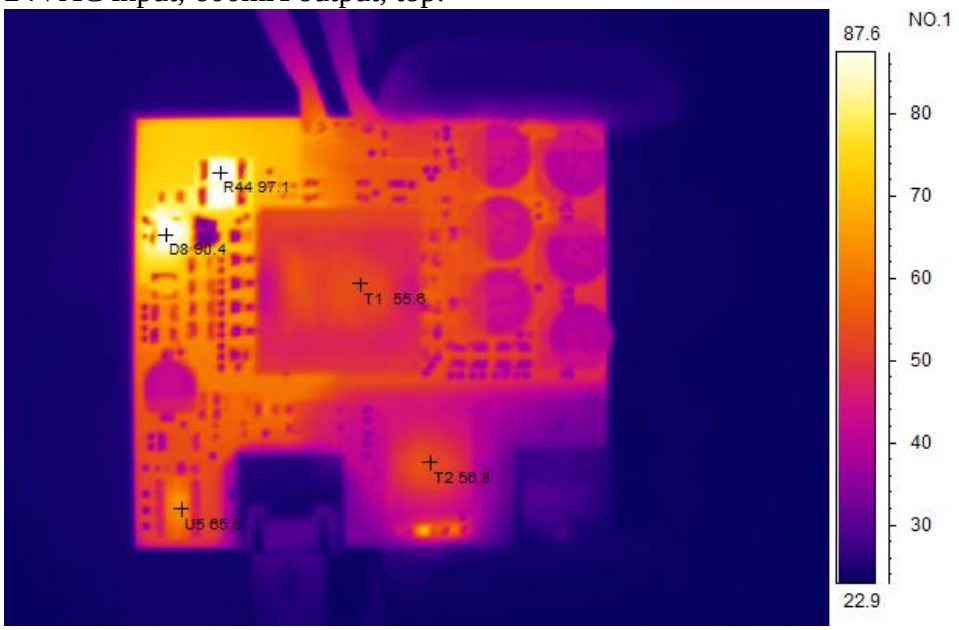
12VDC input, 600mA output, top:



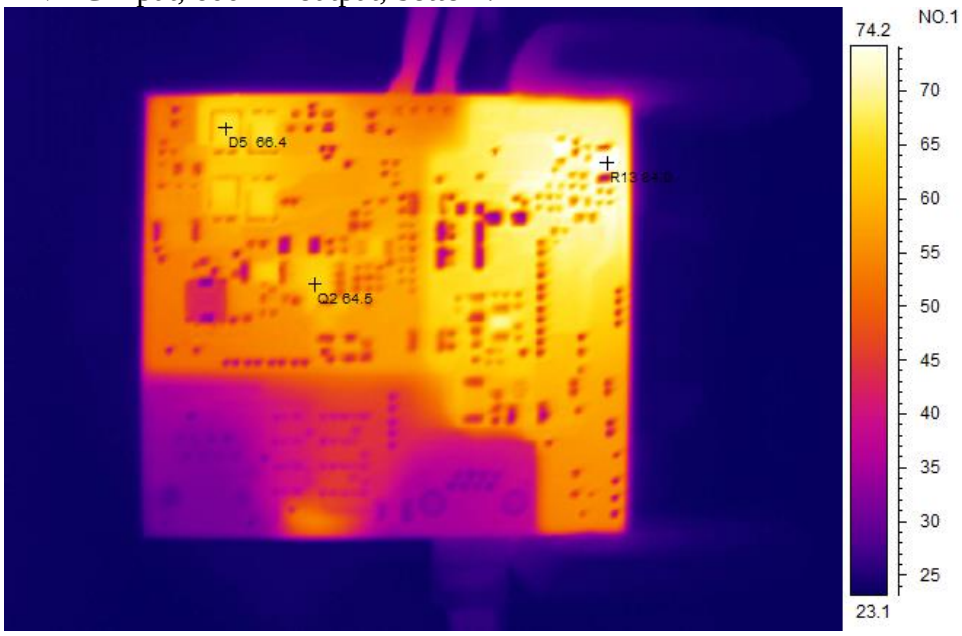
12VDC input, 600mA output, bottom:



24VAC input, 600mA output, top:

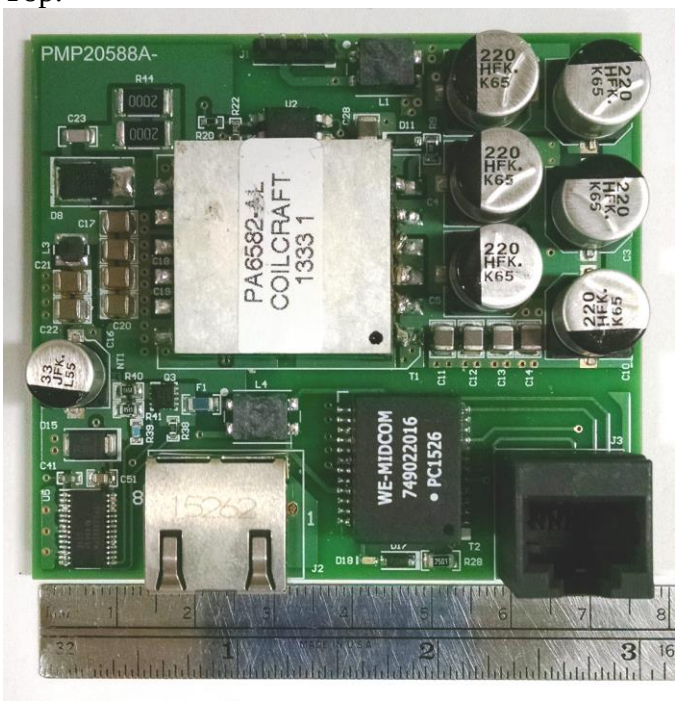


24VAC input, 600mA output, bottom:

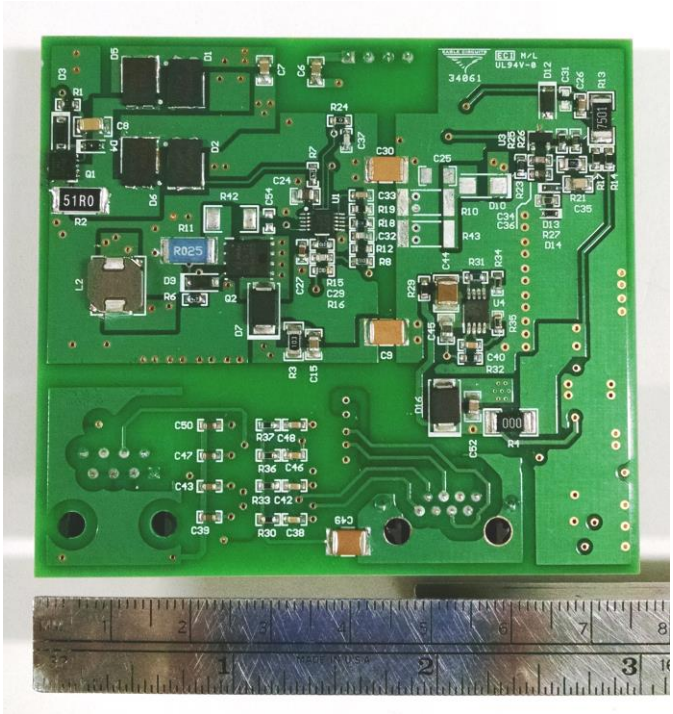


Photo

Top:



Bottom:



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