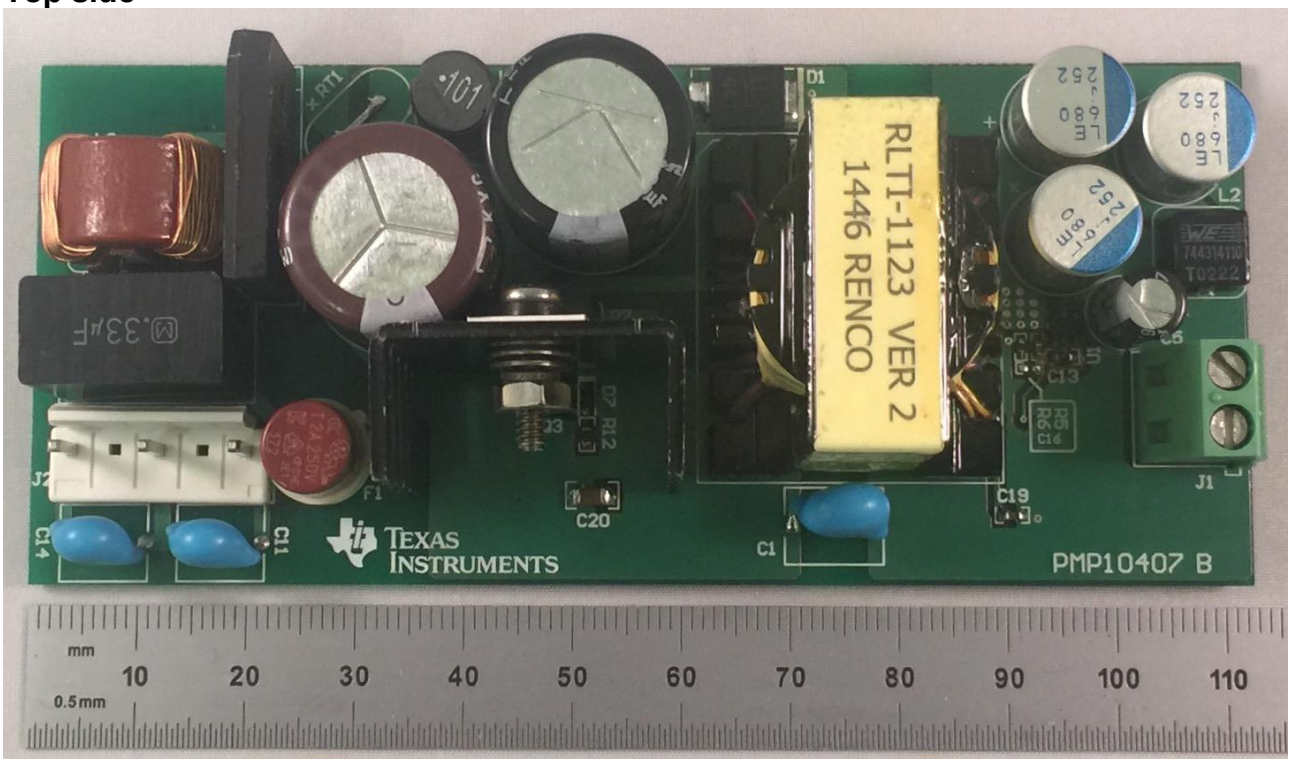
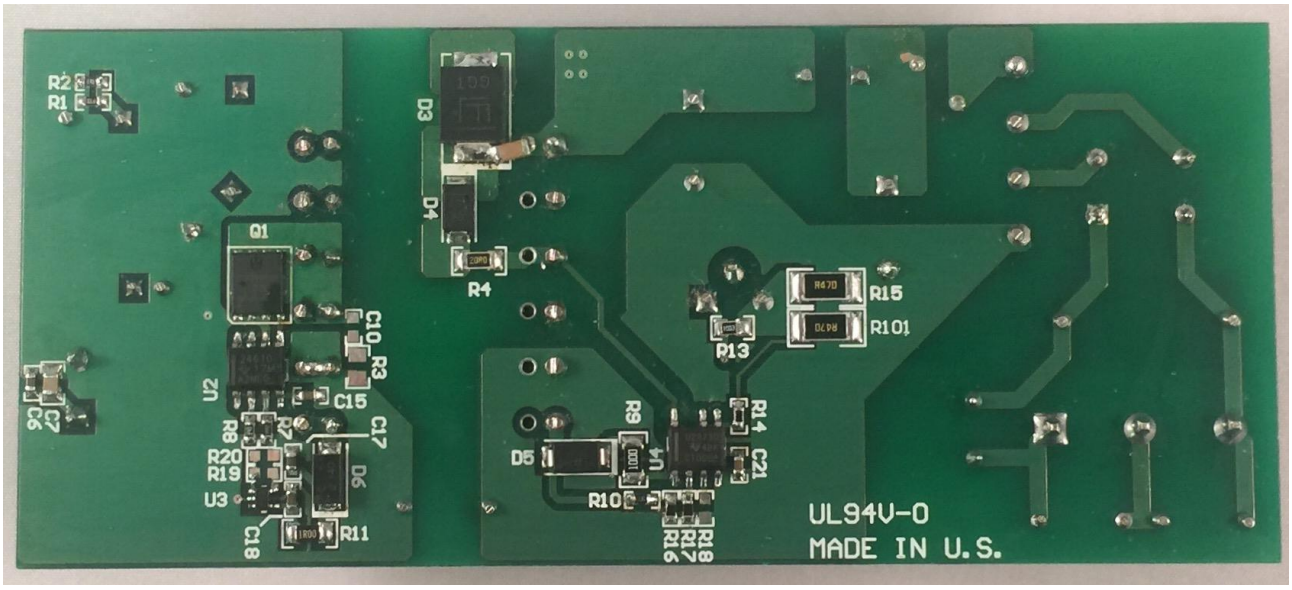
1 Photo

The photographs below show the PMP10407 Rev B assembly. This circuit was built on a PMP10407 Rev B PCB.

Top side

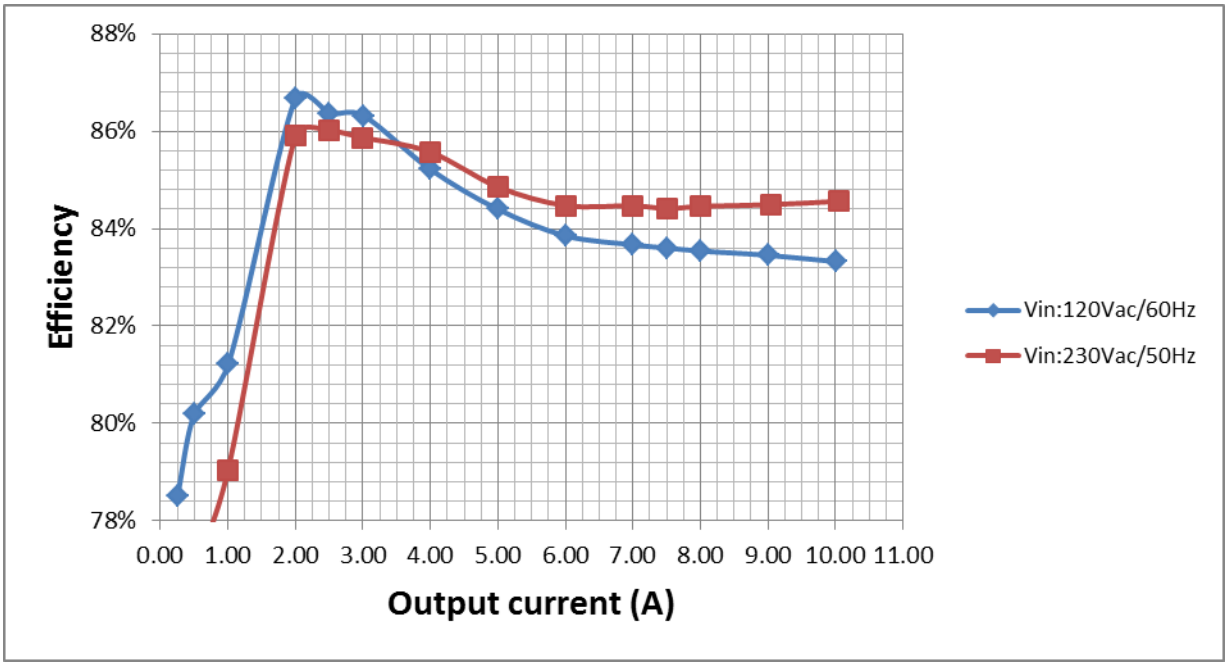


Bottom side



2 Converter Efficiency

The efficiency data is shown in the tables and graph below.



V_{IN}=120V_{AC}/60Hz

Vin(AC)	Iin(A)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Eff. (%)
120.13	0.868	61.810	5.145	10.010	51.501	83.32%
120.12	0.785	55.420	5.133	9.010	46.248	83.45%
120.01	0.703	49.030	5.12	8.000	40.960	83.54%
120.13	0.662	45.860	5.112	7.500	38.340	83.60%
120.13	0.621	42.710	5.105	7.000	35.735	83.67%
120.02	0.537	36.400	5.087	6.000	30.522	83.85%
120.1	0.453	30.060	5.074	5.000	25.370	84.40%
120.19	0.367	23.780	5.066	4.000	20.264	85.21%
120.06	0.281	17.622	5.055	3.009	15.210	86.32%
120.1	0.238	14.630	5.054	2.500	12.635	86.36%
120.17	0.195	11.647	5.05	1.999	10.095	86.67%
120.1	0.112	6.180	4.985	1.007	5.020	81.23%
120.2	0.063	3.141	4.998	0.504	2.519	80.20%
120.04	0.036	1.592	4.999	0.250	1.250	78.50%
120.07	0.014	0.039	4.965	0.000	0.000	0.00%

V_{IN}=230V_{AC}/50Hz

Vin(AC)	Iin(A)	Pin(W)	Vo1(V)	Io1(A)	Pout(W)	Eff. (%)
229.9	0.534	61.290	5.157	10.050	51.828	84.56%
230.0	0.485	55.090	5.149	9.040	46.547	84.49%
230.0	0.435	48.660	5.137	8.000	41.096	84.46%
230.1	0.411	45.580	5.13	7.500	38.475	84.41%
230.1	0.385	42.360	5.119	6.990	35.782	84.47%
230.1	0.336	36.260	5.105	6.000	30.630	84.47%
230.2	0.285	30.010	5.093	5.000	25.465	84.86%
230.3	0.232	23.690	5.081	3.990	20.273	85.58%
230.3	0.180	17.713	5.07	3.000	15.210	85.87%
230.4	0.153	14.717	5.063	2.500	12.658	86.01%
230.4	0.127	11.790	5.064	2.000	10.128	85.90%
230.5	0.075	6.316	4.992	1.000	4.992	79.04%
230.5	0.046	3.256	5.004	0.500	2.502	76.84%
230.5	0.031	1.686	5.006	0.250	1.252	74.23%
230.5	0.022	0.043	4.966	0.000	0.000	0.00%

3 Average Efficiency

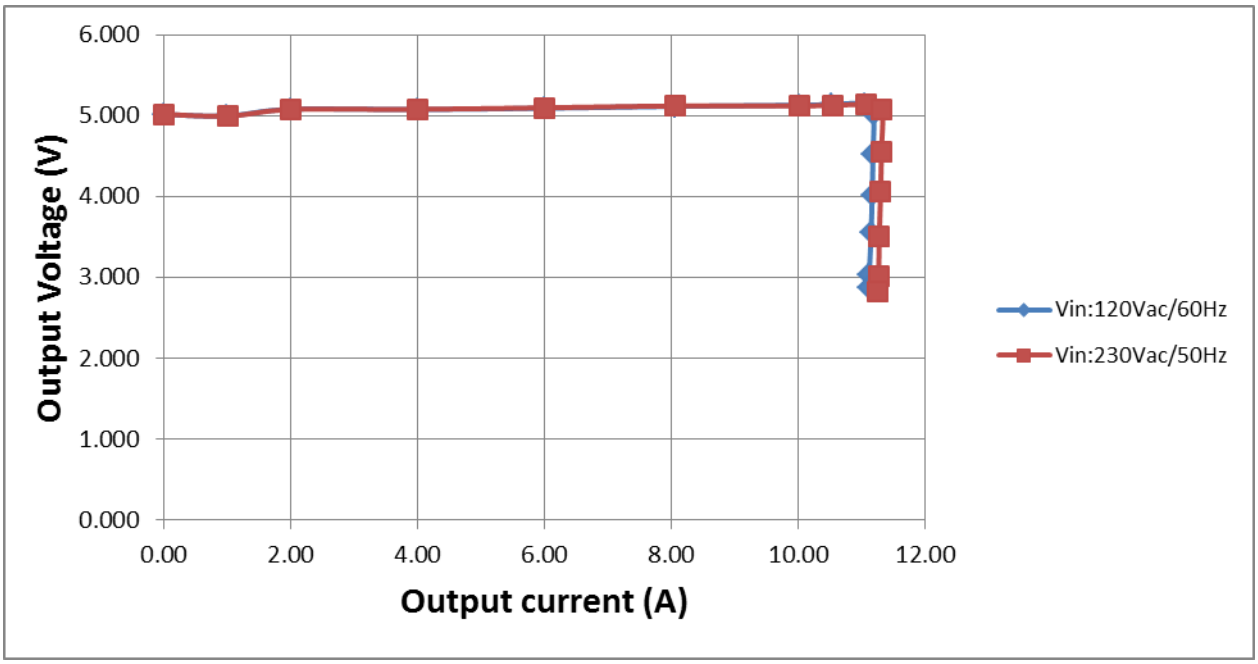
Vin	Pin(W)	Vout(V)	Iout(A)	Load	Avg Eff.
120VAC/60Hz	14.630	5.054	2.500	25%	84.42%
	30.060	5.074	5.000	50%	
	45.860	5.112	7.500	75%	
	61.810	5.145	10.010	100%	
230VAC/50Hz	14.717	5.063	2.500	25%	84.96%
	30.010	5.093	5.000	50%	
	45.580	5.13	7.500	75%	
	61.290	5.157	10.050	100%	

4 Standby Power

With no load attached to the output of the supply, the unit draws 39mW of input power with an 120VAC/60Hz input, and 43mW with a 230VAC/50Hz input.

5 Current Limit

The plot and table below shows the output voltages on each port versus output current as the load is increased into current limit.



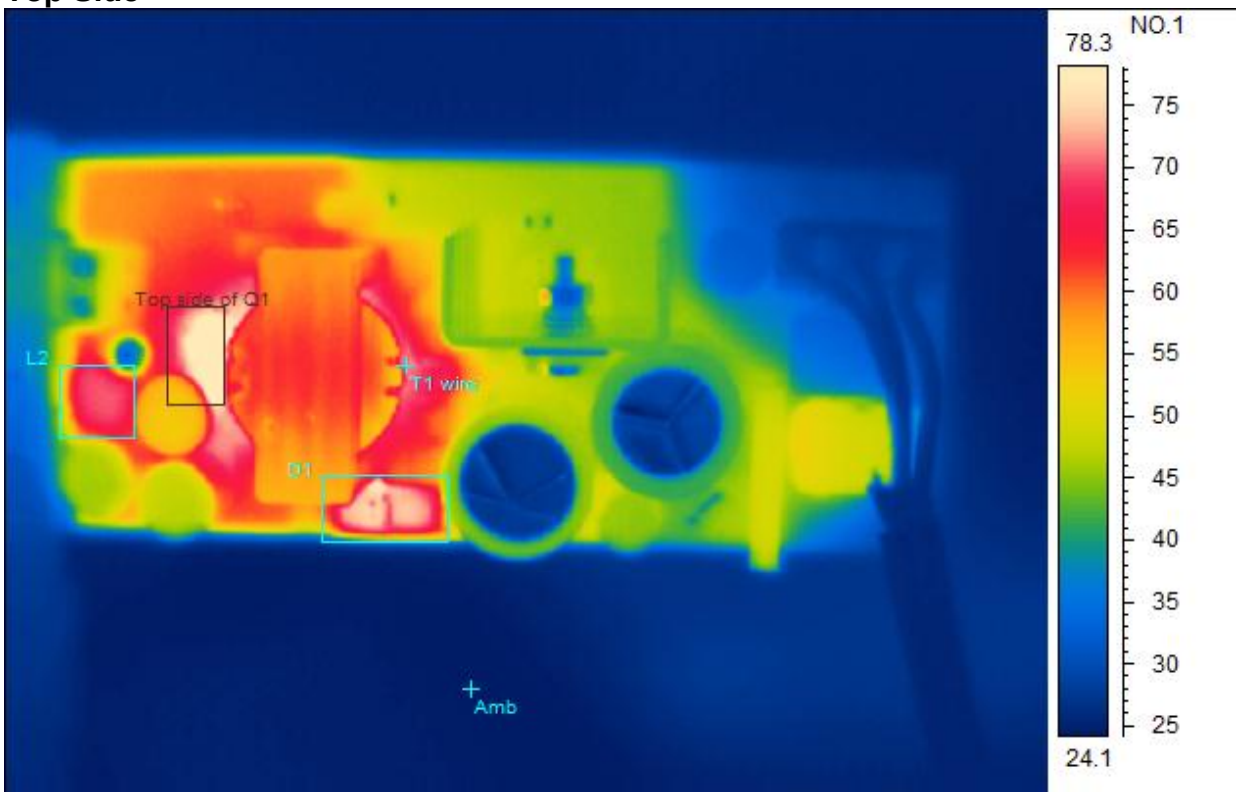
120Vac/60Hz		230Vac/50Hz	
Vout	Iout	Vout	Iout
5.013	0.000	5.015	0.000
4.995	0.974	4.994	1.000
5.078	1.989	5.075	2.000
5.075	4.000	5.077	3.990
5.091	6.000	5.097	6.000
5.113	8.060	5.119	8.050
5.129	10.016	5.120	10.020
5.138	10.514	5.127	10.544
5.144	11.038	5.136	11.072
5.010	11.176	5.074	11.308
4.511	11.172	4.557	11.304
4.006	11.158	4.066	11.292
3.550	11.142	3.501	11.272
3.033	11.112	3.014	11.258
2.865	11.100	2.817	11.238

6 Thermal Images

The thermal images below show a top view and bottom view of the board. The ambient temperature was 20ºC with no forced air flow. The output was at 5V/10A.

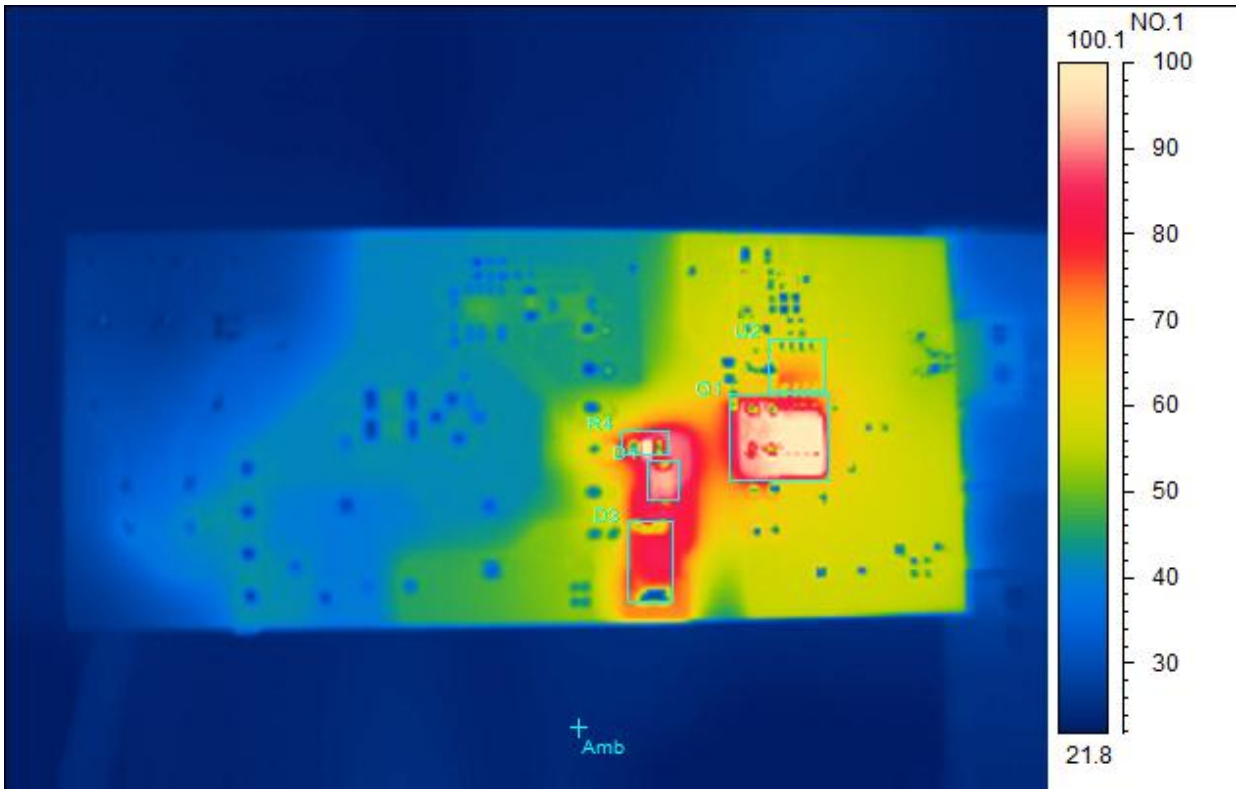
120V_{AC}/60Hz

Top Side



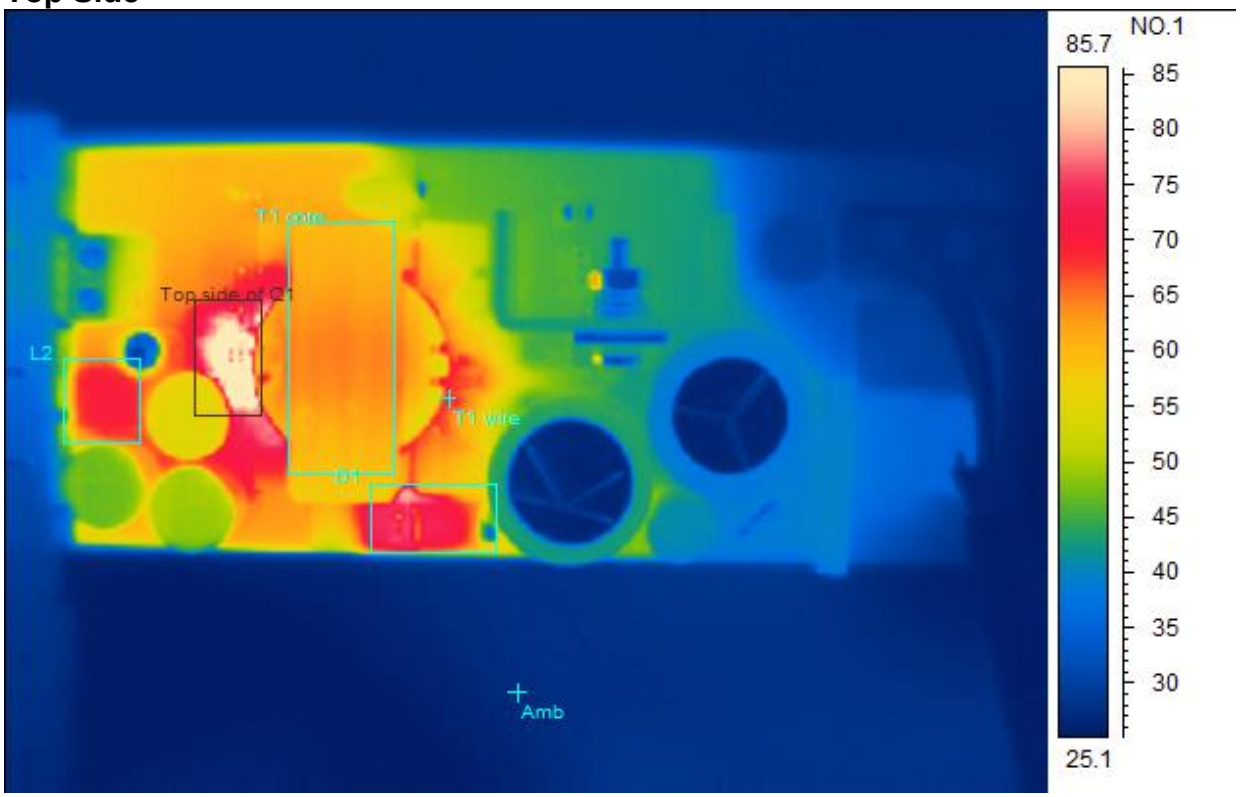
Spot analysis	Value
T1 wireTemperature	72.3°C
Amb Temperature	24.1°C
Area analysis	**Value**
D1 Max	76.8°C
L2 Max	71.3°C
Top side of Q1 Max	90.1°C

120V_{AC}/60Hz
Bottom Side



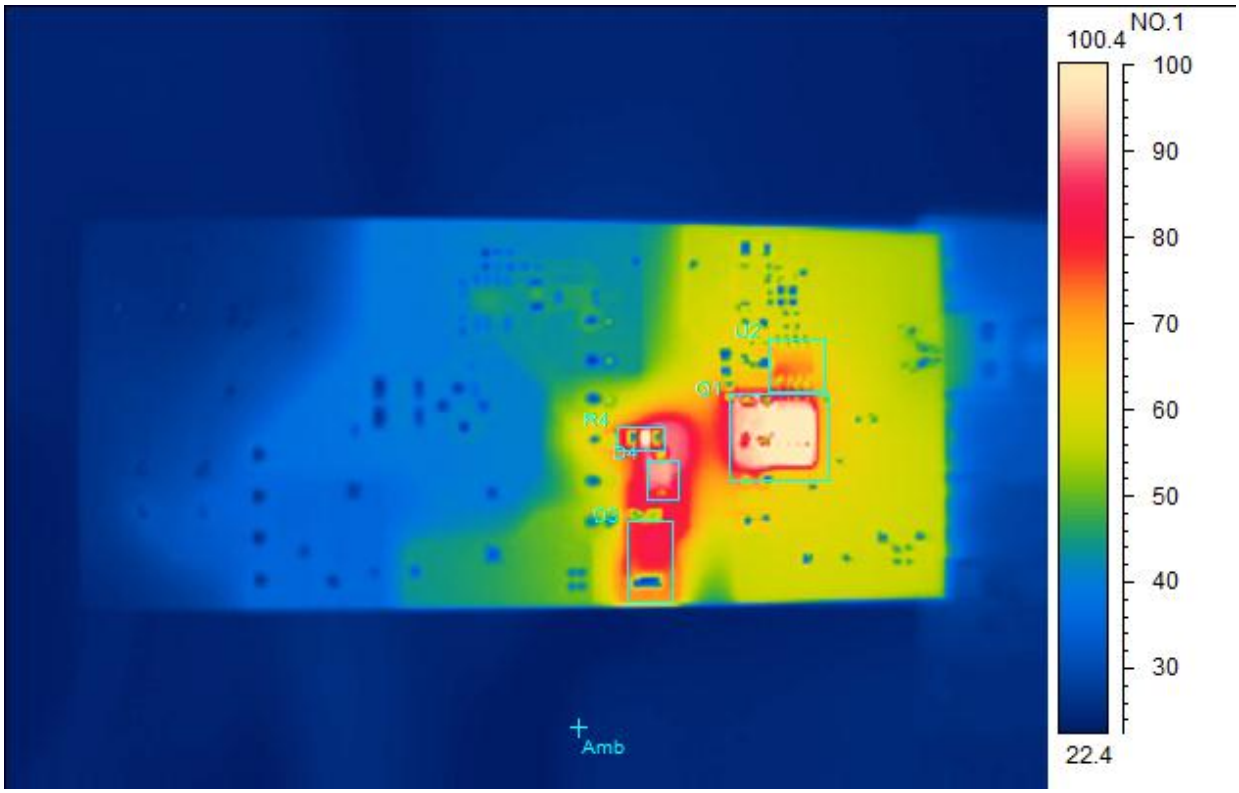
Spot analysis	Value
AmbTemperature	24.5°C
Area analysis	**Value**
Q1Max	104.2°C
R4Max	107.4°C
D3Max	87.2°C
D4Max	94.8°C
U2 Max	79.7°C

230V_{AC}/50Hz
Top Side



Spot analysis	Value
T1 wireTemperature	71.2°C
AmbTemperature	27.5°C
Area analysis	**Value**
L2Max	72.8°C
T1 coreMax	71.2°C
D1Max	81.1°C
Top side of Q1 Max	97.7°C

230V_{AC}/50Hz
Bottom Side

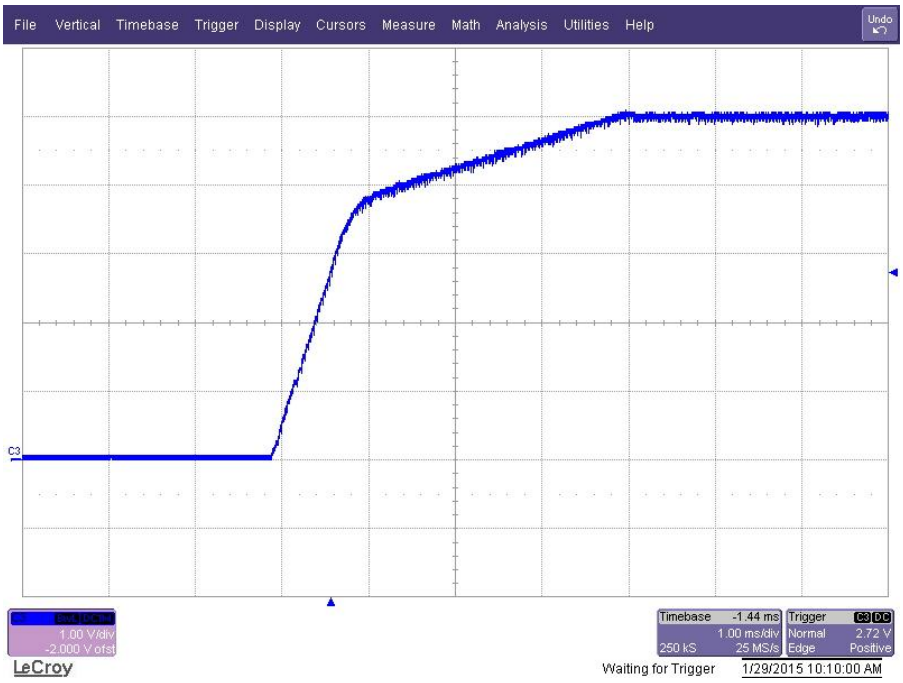


Spot analysis	Value
AmbTemperature	24.2°C
Area analysis	**Value**
Q1Max	106.0°C
R4Max	108.0°C
D3Max	87.2°C
D4Max	94.9°C
U2 Max	88.4°C

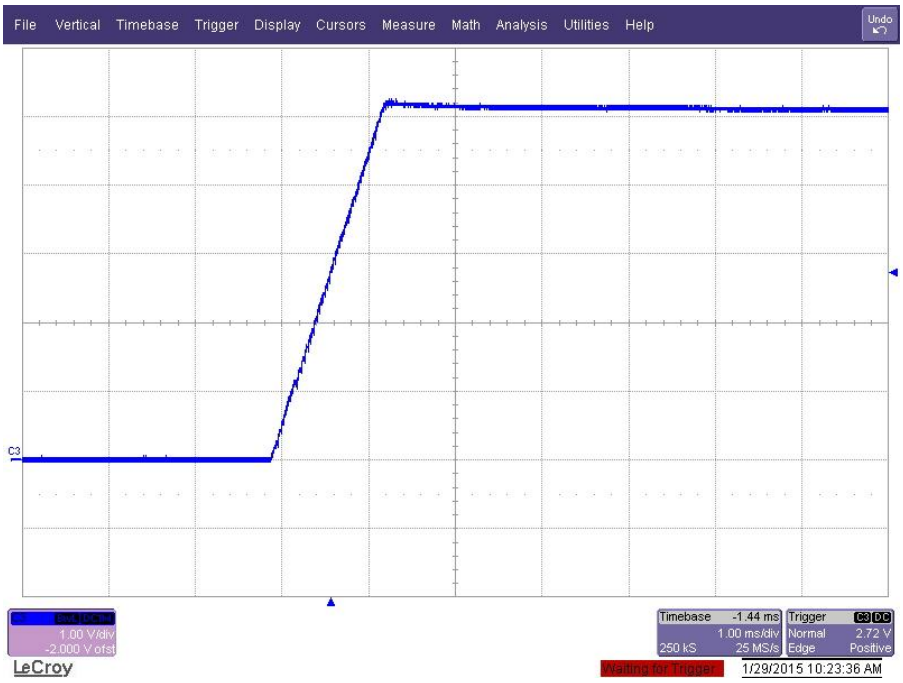
7 Startup

The output voltages at startup are shown in the images below.

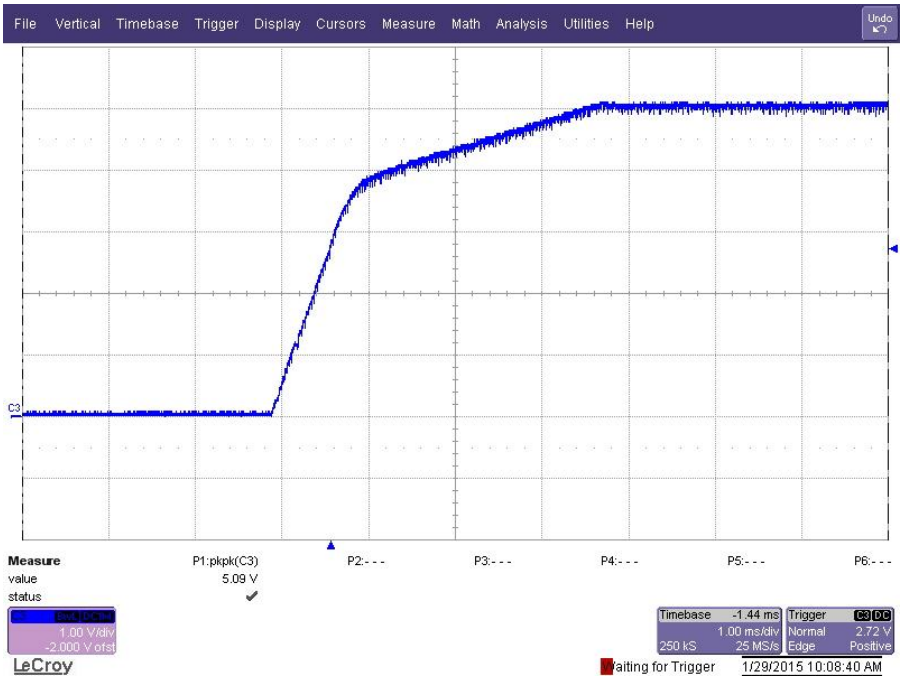
7.1 Start Up @ 120V_{AC}: 5V/10A.



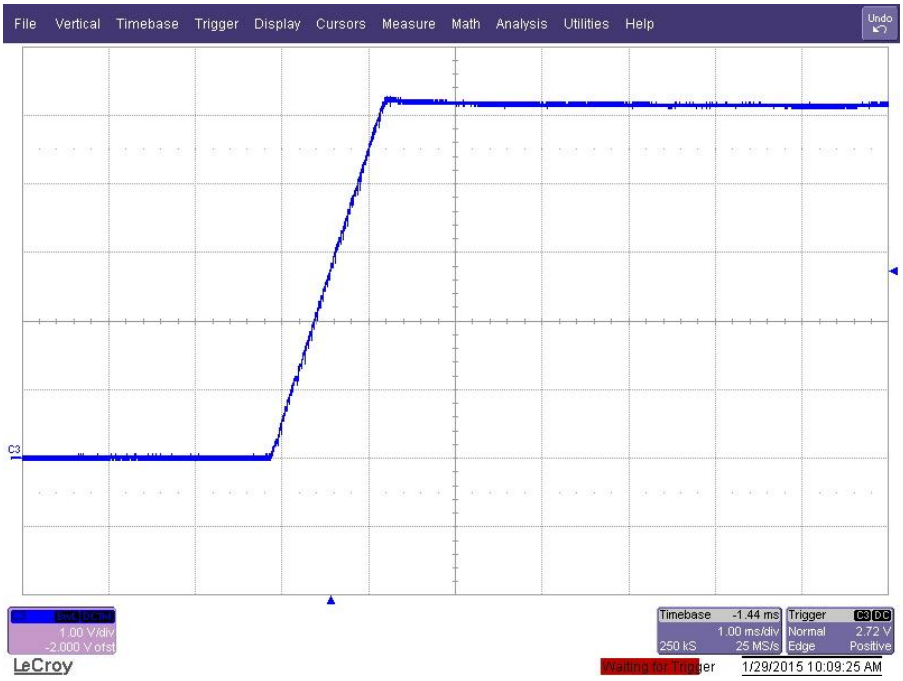
7.2 Start Up @ 120V_{AC}: no load.



7.3 Start Up @ 230V_{AC}/50Hz: 5V/10A.



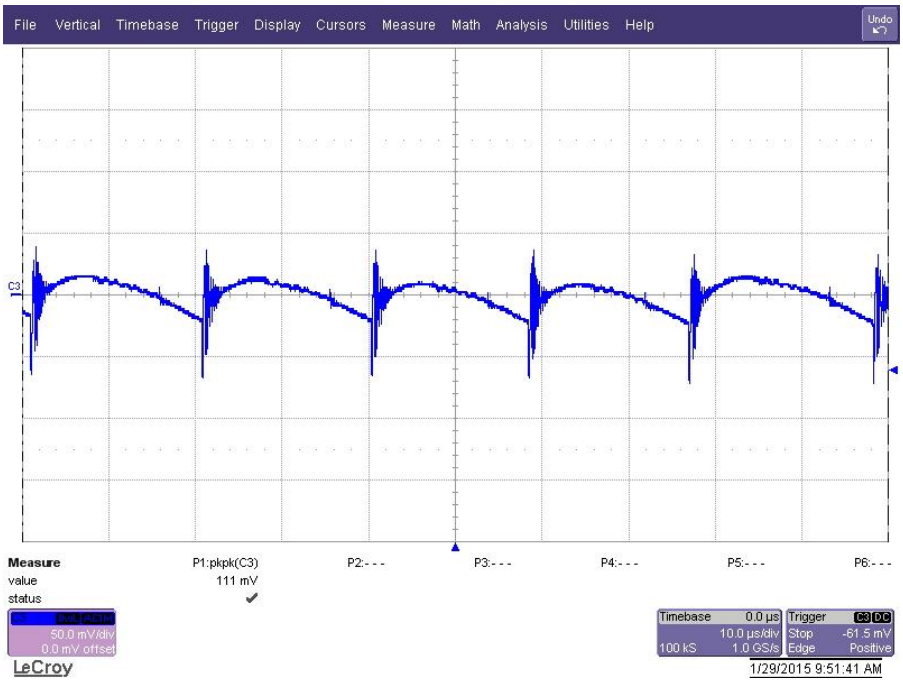
7.4 Start Up @ 230V_{AC}/50Hz: no load.



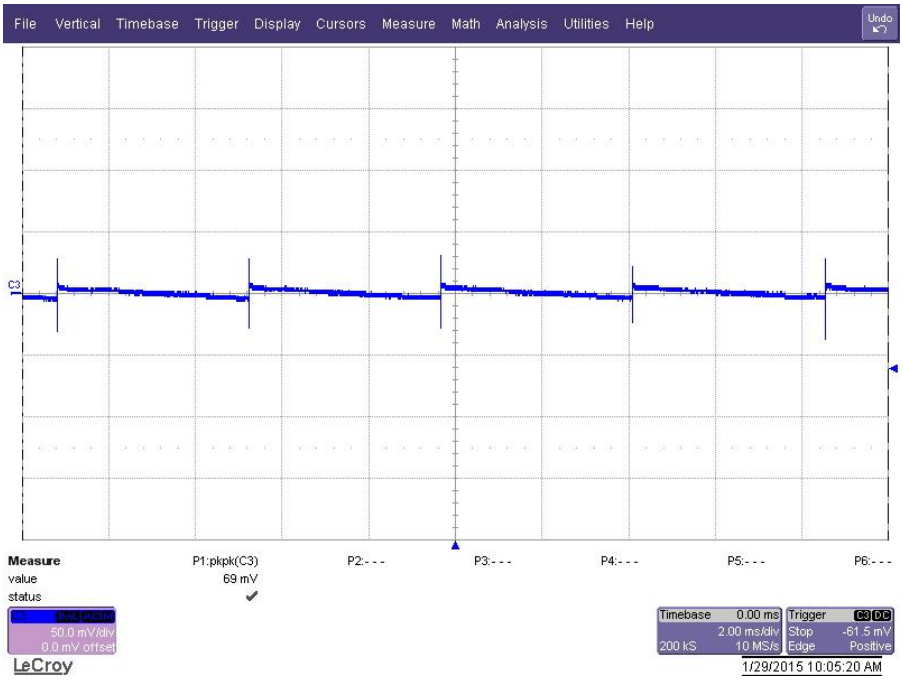
8 Output Ripple Voltages

The output ripple voltage is shown in the plots below.

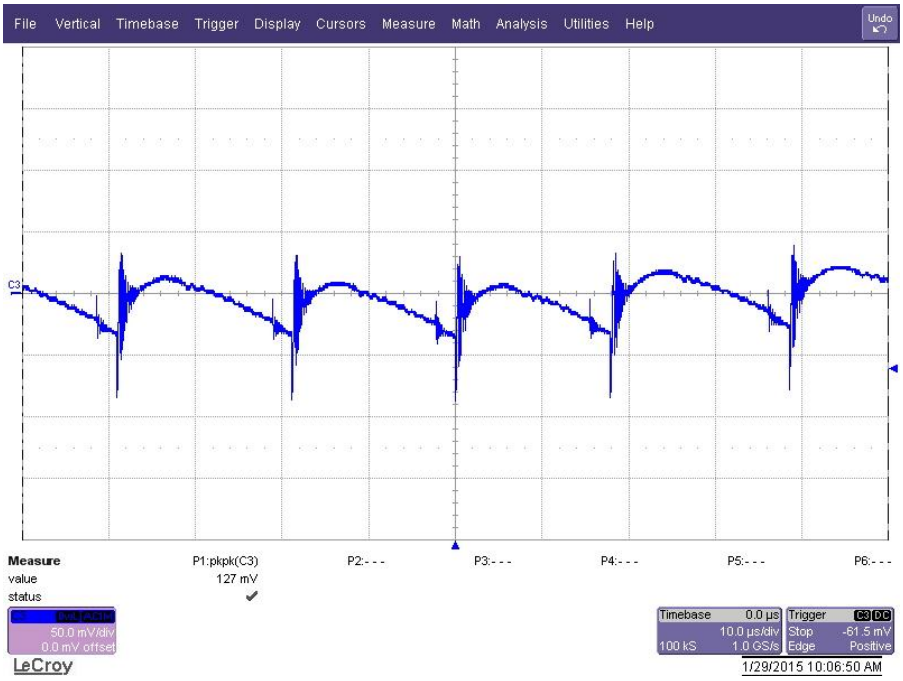
8.1 120V_{AC}/60Hz input and 5V/10A Load.



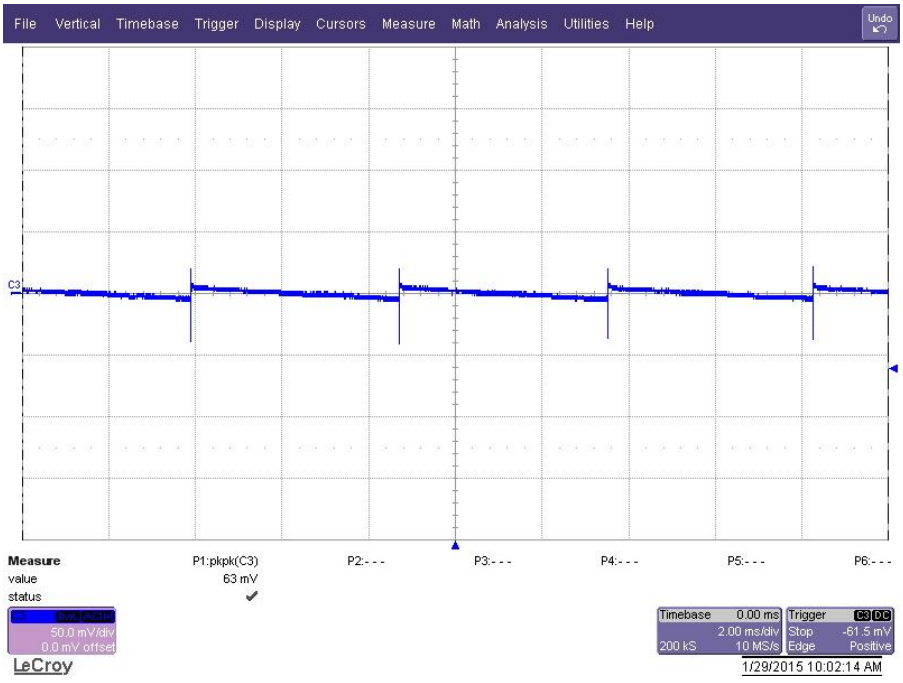
8.2 120V_{AC}/60Hz input and no Load.



8.3 230V_{AC}/50Hz input and 5V/10A Load.

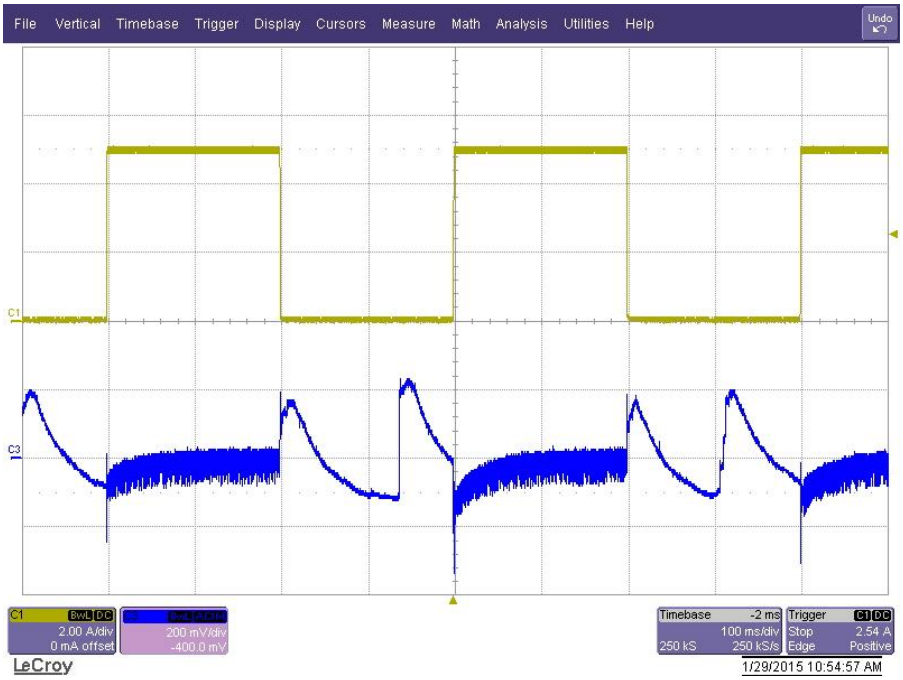


8.4 230V_{AC}/50Hz input and no Load.



9 Dynamic Load Response

Dynamic load response was tested at $230V_{AC}$/50Hz. Load steps from 0A to 5A.



10 Switching Waveforms

The images below show key switching waveforms of PMP10407 RevB. The waveforms are measured with 5V/10A load. CH1: $V_{DS}(Q_2)$, CH2: $V_{DS}(Q_1)$.

10.1 85V_{ac}/60Hz

10.2 264V_{ac}/50Hz

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