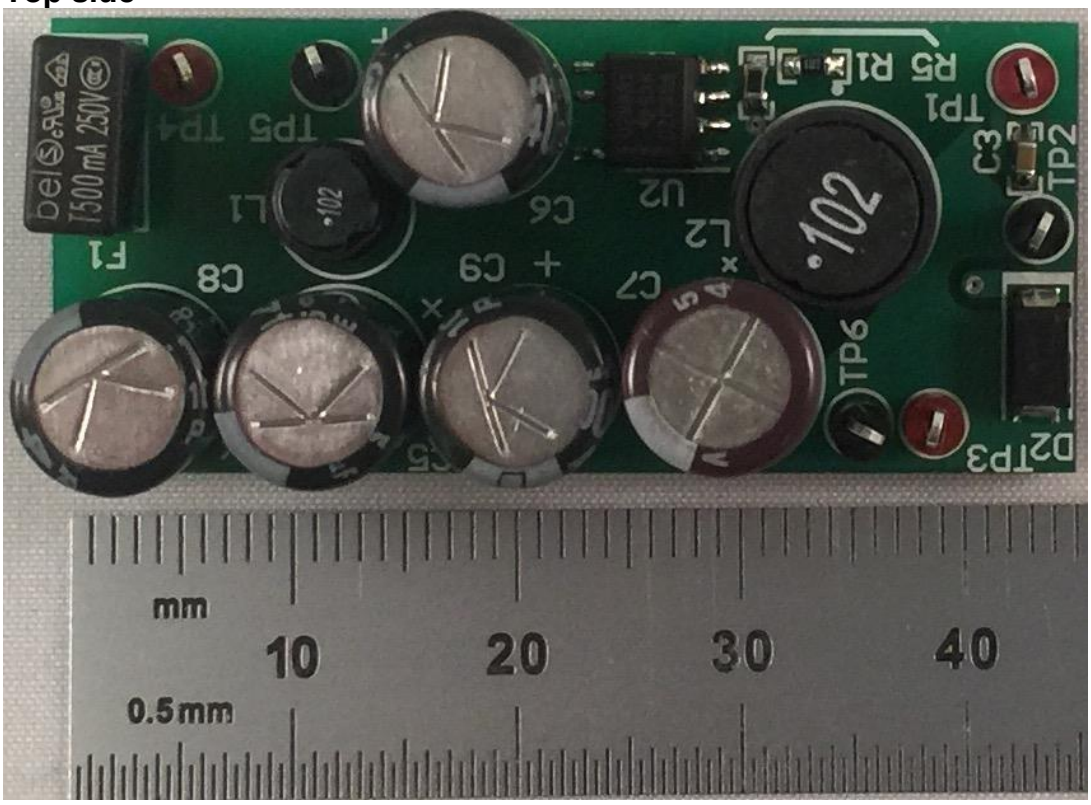
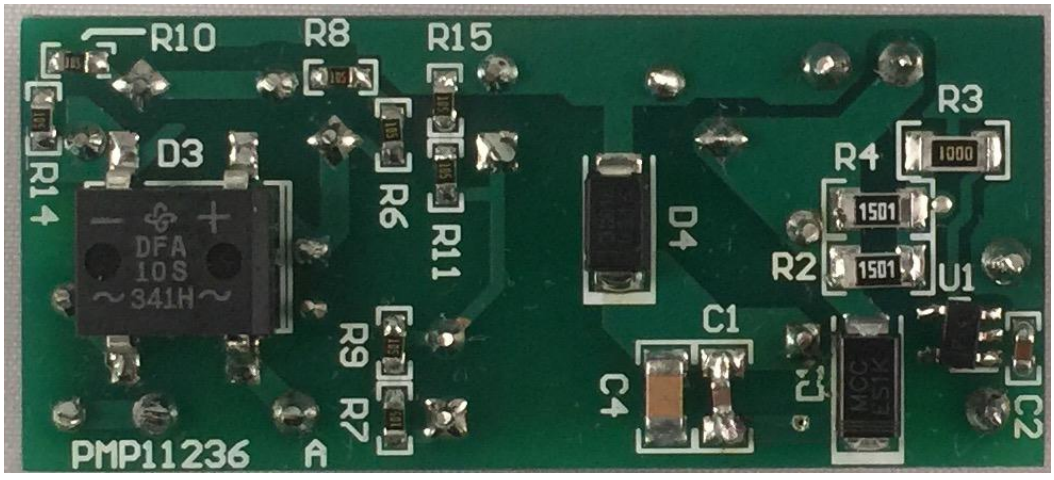
1 Photo

The photographs below show the PMP11236 Rev B assembly. This circuit was built on a PMP11236 Rev B PCB.

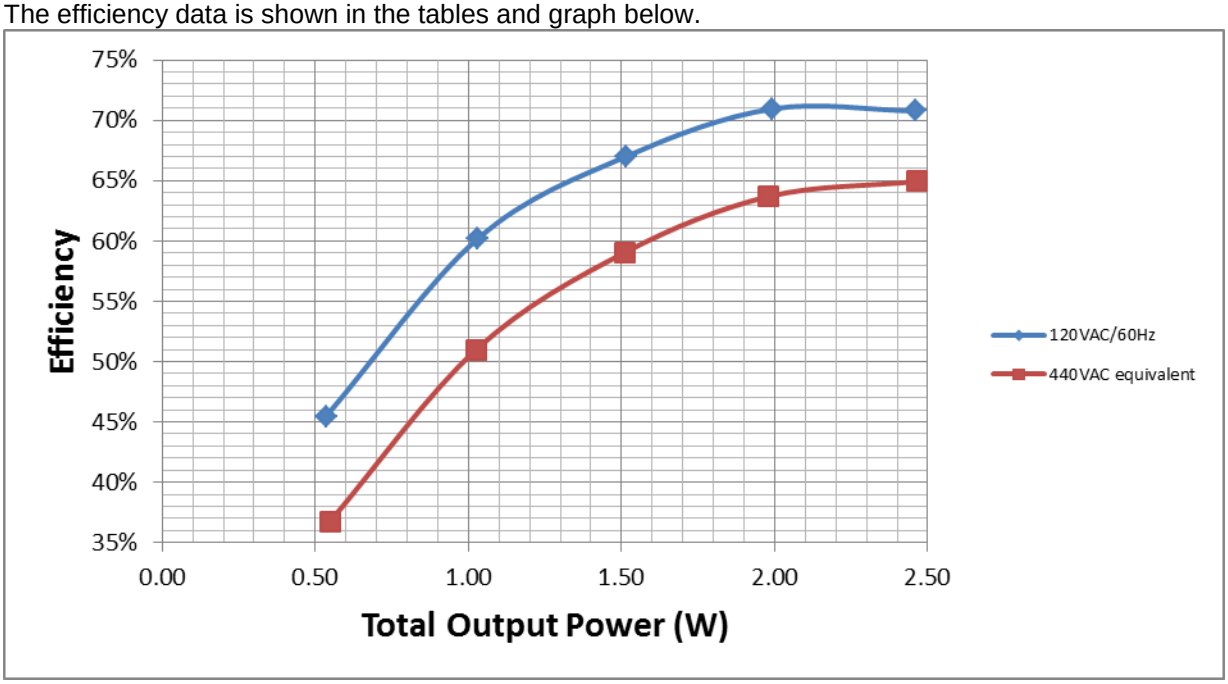
Top side





2 Converter Efficiency

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



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

Vin(V)	Iin(mA)	Pin(W)	Vo1(V)	Io1(A)	Vo2(V)	Io2(A)	Pout(W)	Losses(W)	Efficiency (%)
120.04	59.44	3.48	23.63	0.100	4.96	0.020	2.46	1.02	70.77%
120.06	50.22	2.81	23.92	0.080	4.97	0.016	1.99	0.82	70.95%
120.08	42.35	2.26	24.27	0.060	4.97	0.012	1.51	0.75	67.00%
120.10	34.14	1.71	24.74	0.040	4.97	0.008	1.03	0.68	60.22%
120.10	25.58	1.18	25.43	0.020	4.98	0.004	0.53	0.64	45.46%
120.11	15.62	0.64	26.79	0.000	4.99	0.000	0.00	0.64	0.00%

Vin=622V_{DC} (622V_{DC} is generated by an AC source with a voltage doubler circuit)

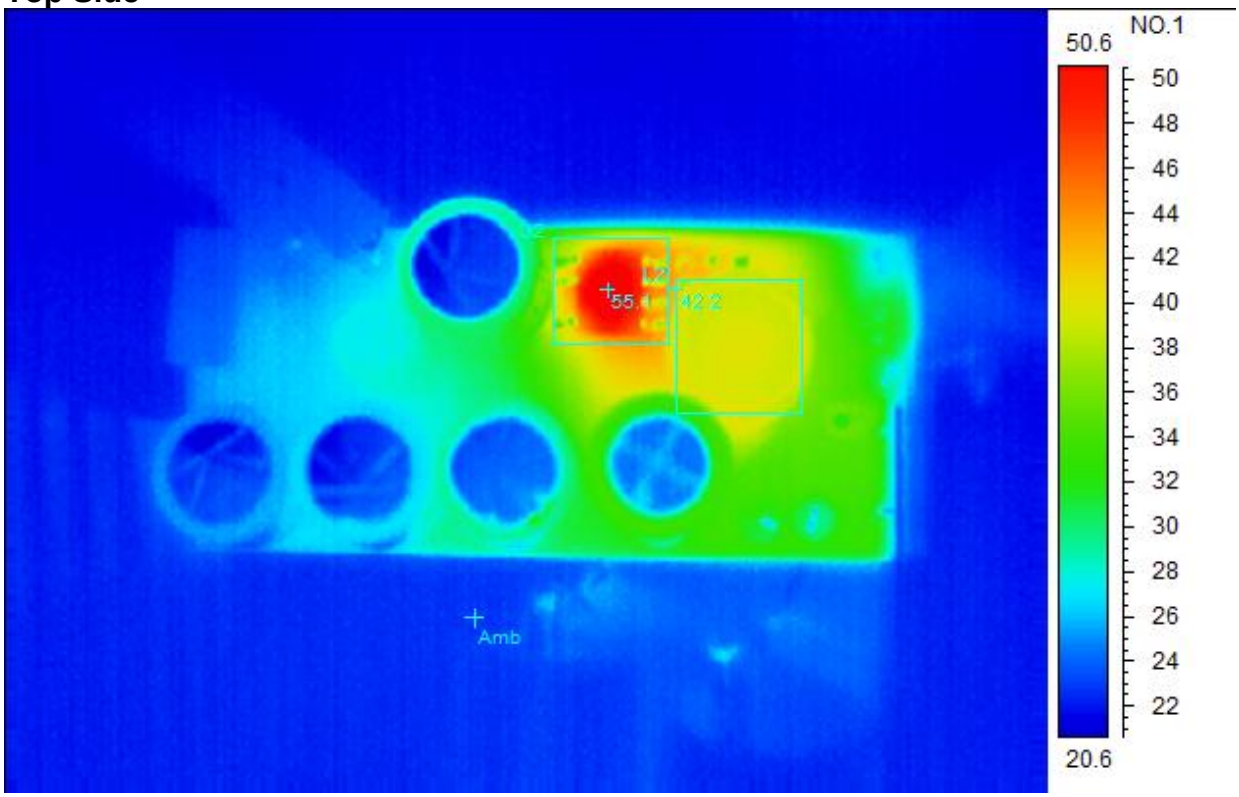
Vin(V)	Iin(mA)	Pin(W)	Vo1(V)	Io1(A)	Vo2(V)	Io2(A)	Pout(W)	Losses(W)	Efficiency (%)
221.60	47.20	3.79	23.50	0.101	4.96	0.020	2.46	1.33	64.94%
221.60	39.69	3.11	23.87	0.080	4.96	0.016	1.98	1.13	63.69%
221.60	33.49	2.56	24.28	0.060	4.97	0.012	1.51	1.05	59.04%
221.60	27.20	2.01	24.82	0.040	4.97	0.008	1.03	0.98	51.00%
221.60	20.93	1.49	25.58	0.021	4.98	0.004	0.55	0.94	36.74%
221.60	13.94	0.93	27.08	0.000	4.99	0.000	0.00	0.93	0.00%

3 Thermal Images

The thermal images below show a top view and bottom view of the board under 120V_{AC}/60Hz and 622V_{DC} input conditions. The ambient temperature was 20ºC with no forced air flow. The output was at full load: 24V/100mA and 5V/20mA.

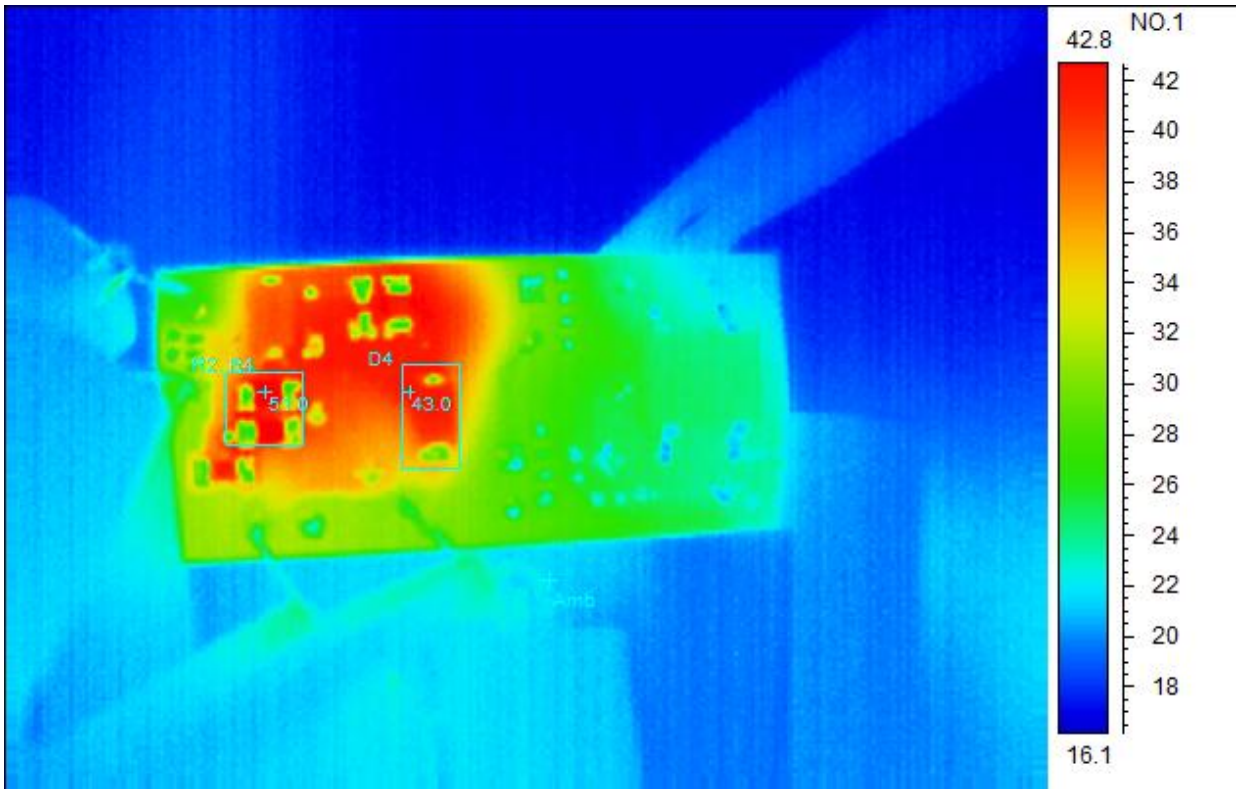
V_{in}=120V_{AC}/60Hz

Top Side



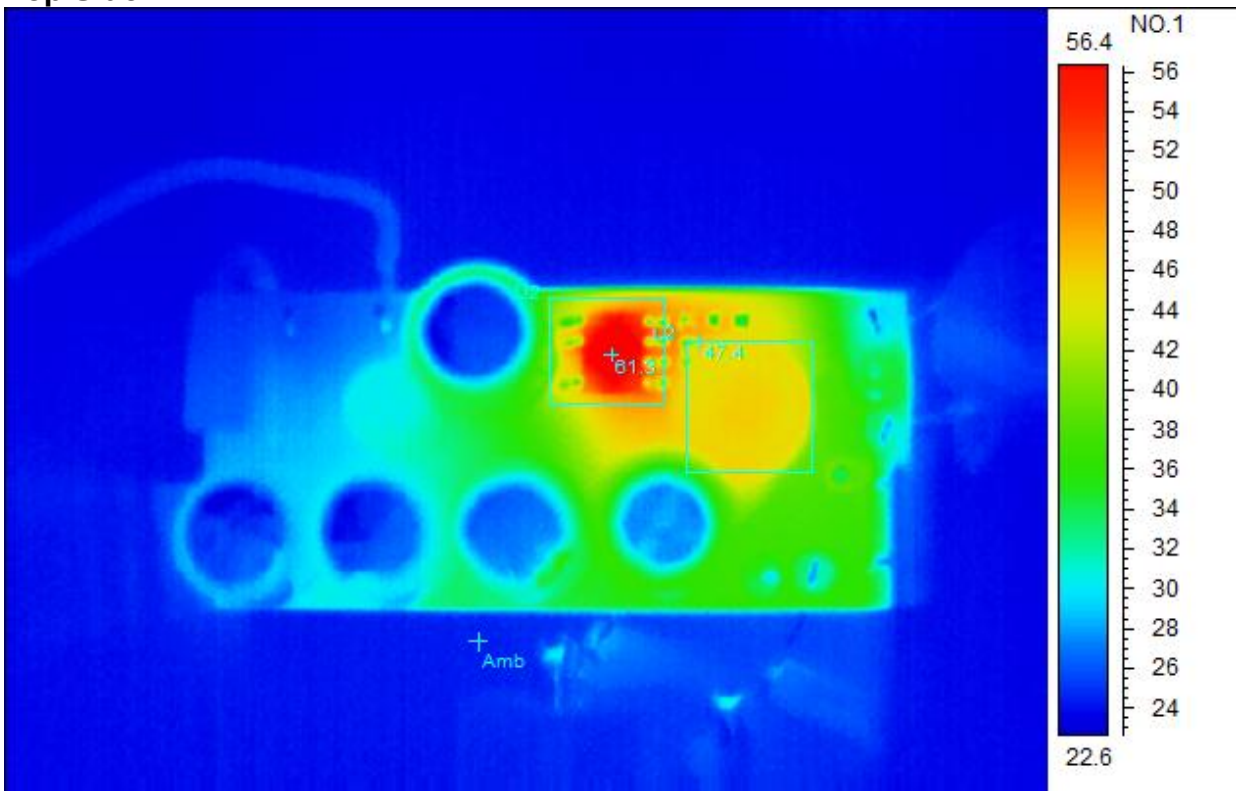
Spot analysis	Value
Amb Temperature	23.1°C
Area analysis	**Value**
U2Max	55.1°C
L2Max	42.2°C

V_{in}=120V_{AC}/60Hz
Bottom Side



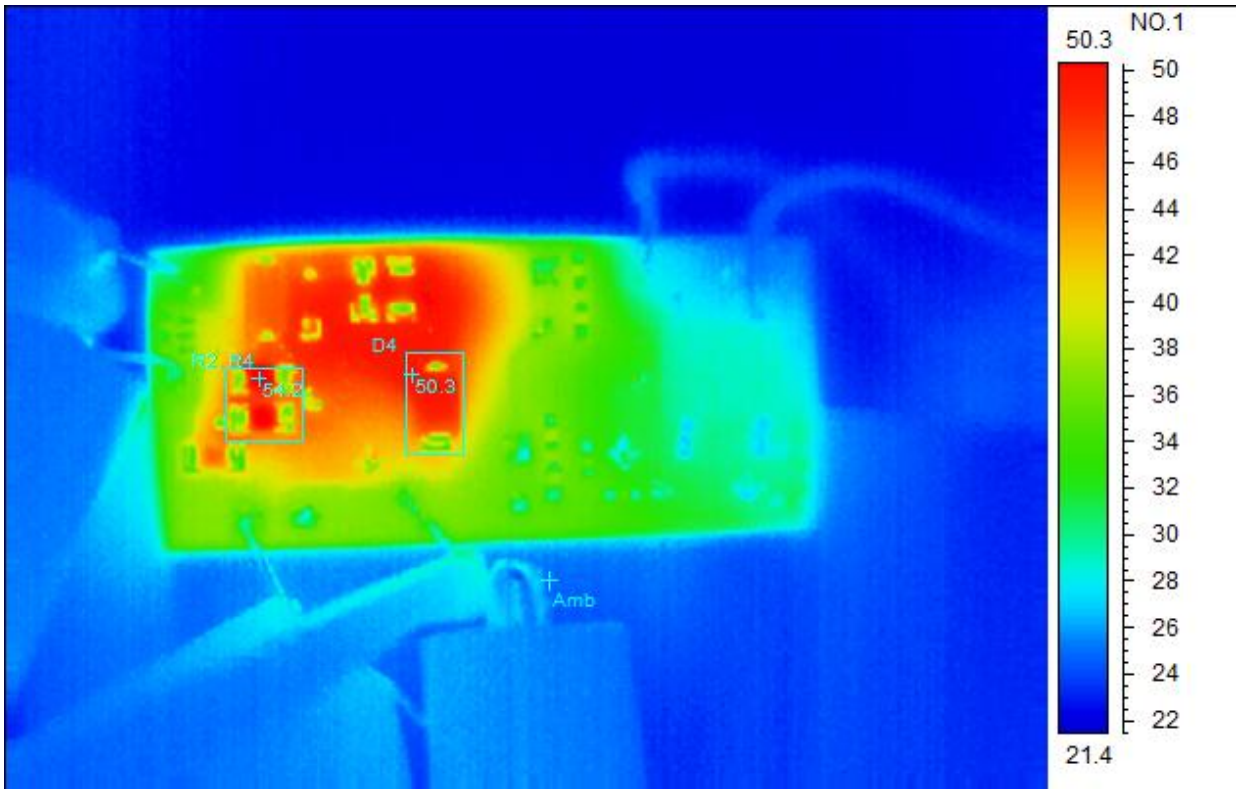
Spot analysis	Value
Amb Temperature	21.9°C
Area analysis	**Value**
D4Max	43.0°C
R2, R4Max	51.0°C

V_{in}=622V_{DC} (622V_{DC} is generated by an AC source with a voltage doubler circuit) Top Side



Spot analysis	Value
Amb Temperature	24.4°C
Area analysis	**Value**
U2Max	61.3°C
L2Max	47.4°C

V_{in}=622V_{DC} (622V_{DC} is generated by an AC source with a voltage doubler circuit) Bottom Side

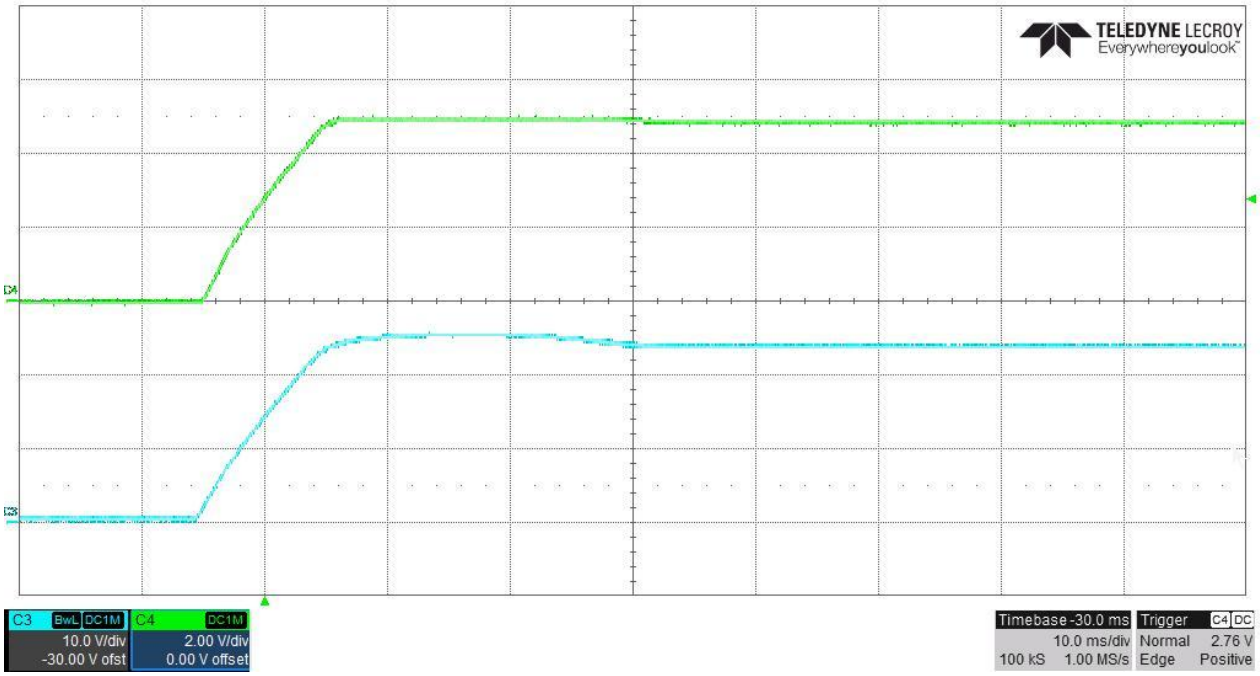


Spot analysis	Value
Amb Temperature	25.3°C
Area analysis	**Value**
D4Max	50.3°C
R2, R4Max	54.2°C

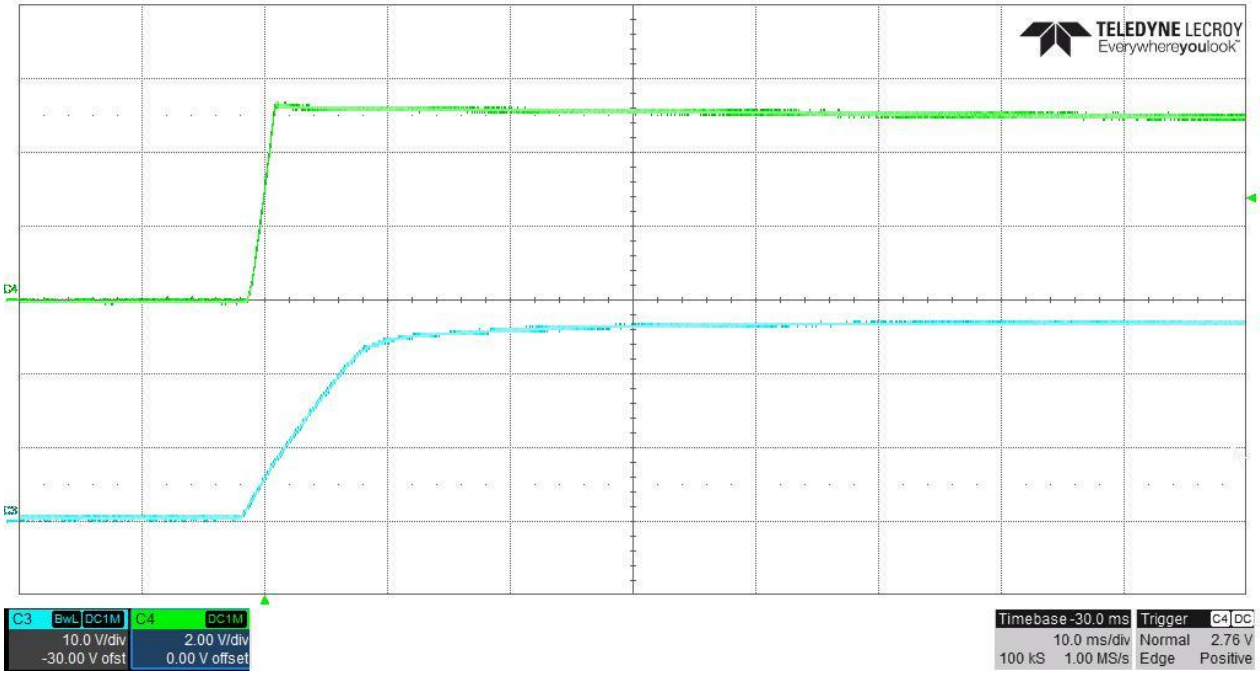
4 Startup Waveforms

The output voltages at startup are shown in the images below. CH3: Voltage after input rectifier, CH4: Vout

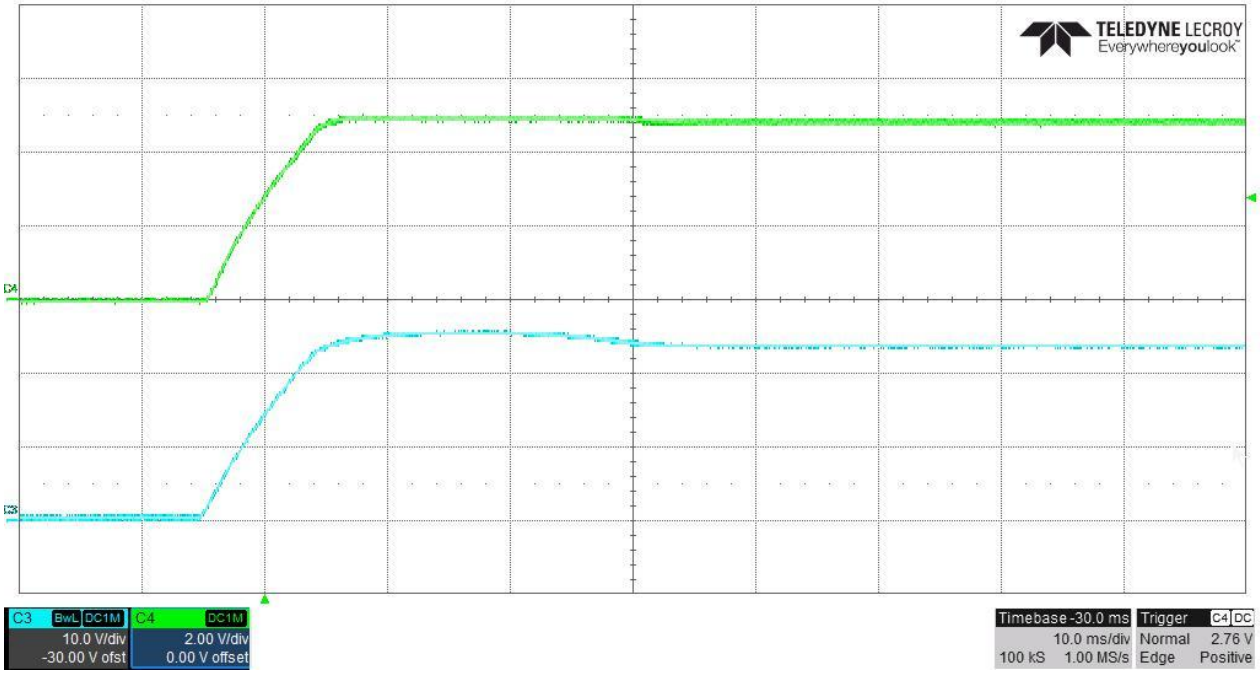
4.1 Start Up @ 120V_{AC}/60Hz input, 24V/100mA and 5V/20mA outputs.



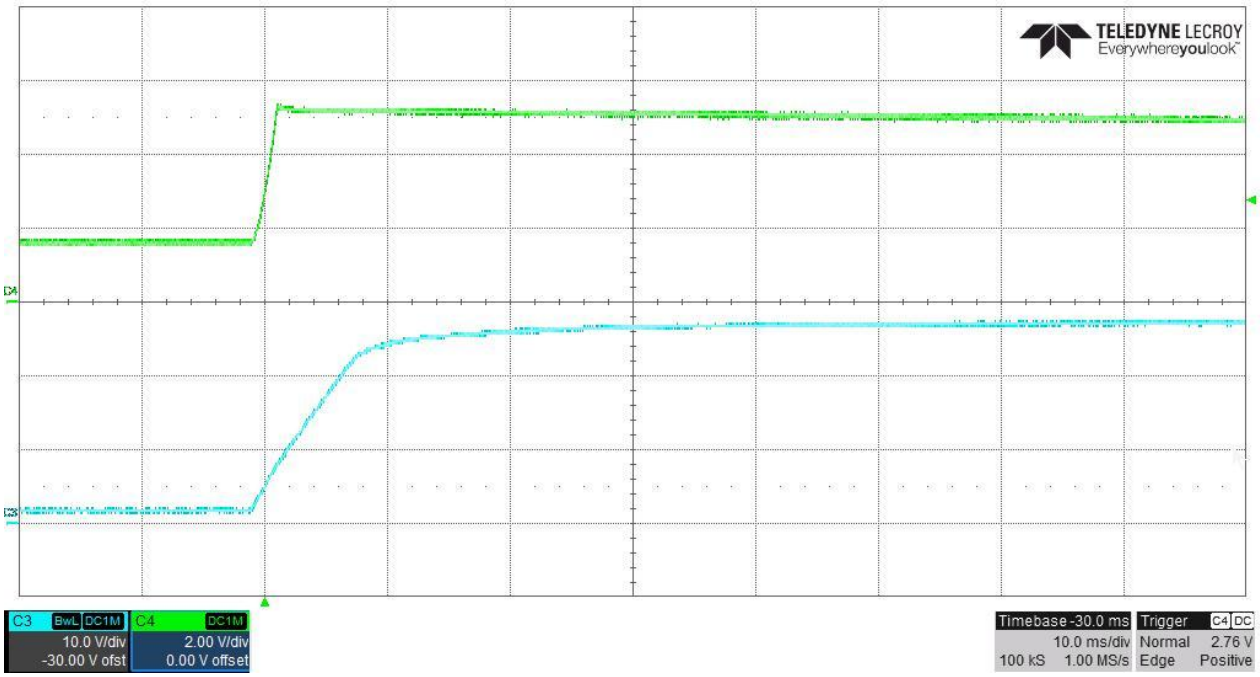
4.2 Start Up @ 120V_{AC}/60Hz input and no loads.



4.3 Start Up @ 622V_{DC} (622V_{DC} is generated by an AC source with a voltage doubler circuit) input, 24V/100mA and 5V/20mA outputs.



4.4 Start Up @ 622V_{DC} (622V_{DC} is generated by an AC source with a voltage doubler circuit) input and no load.

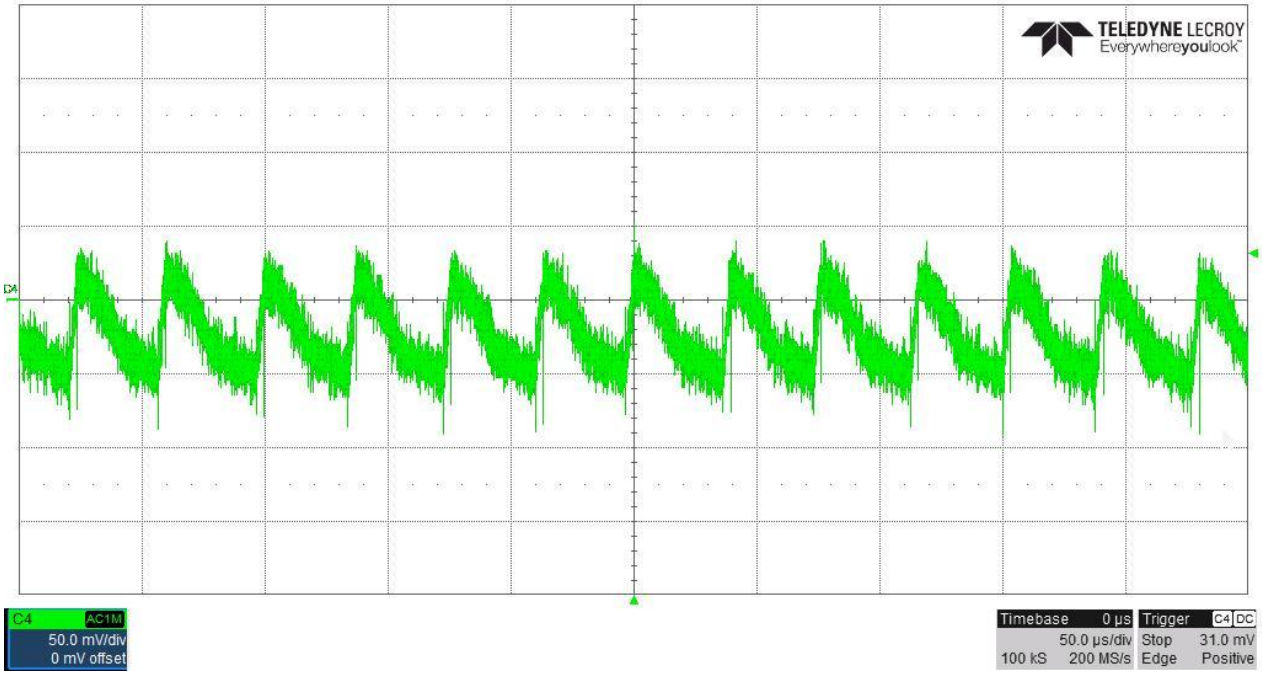


5 Output Ripple Voltages

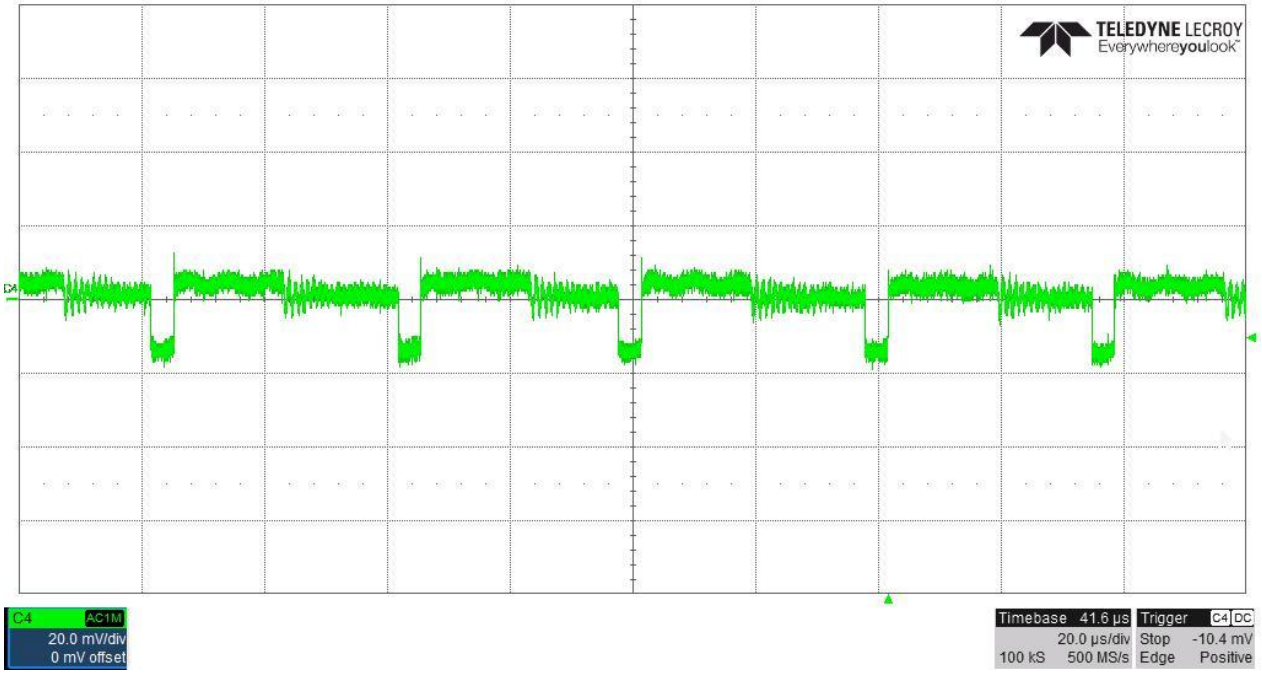
The output ripple voltages are shown in the plots below.

5.1 120V_{AC}/60Hz: 24V/100mA and 5V/20mA.

24V ripple:

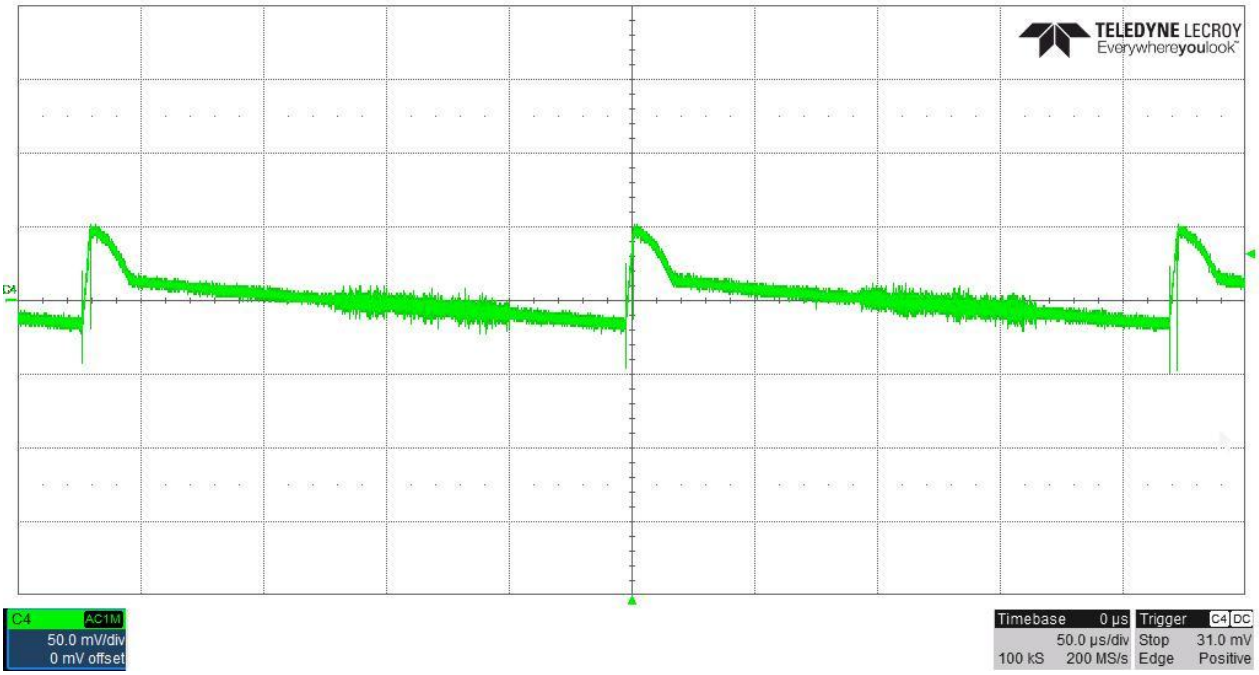


5V ripple:

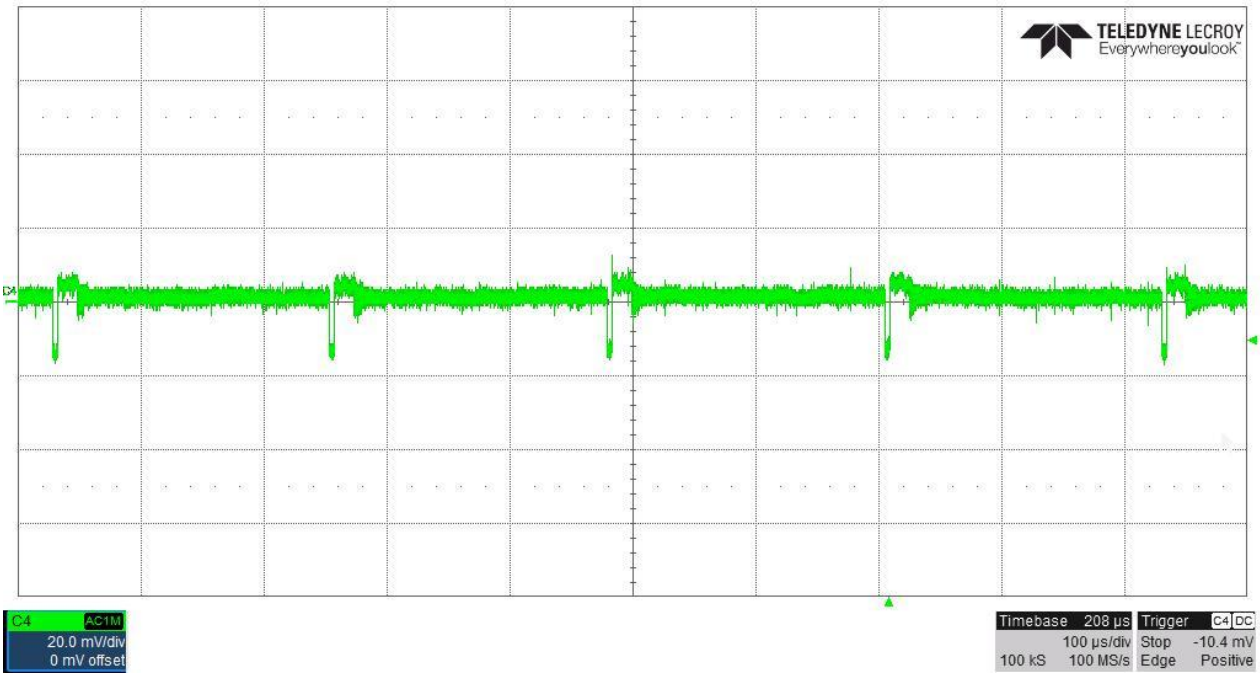


5.2 120V_{AC}/60Hz: no load applied to both 5V and 24V.

24V ripple:

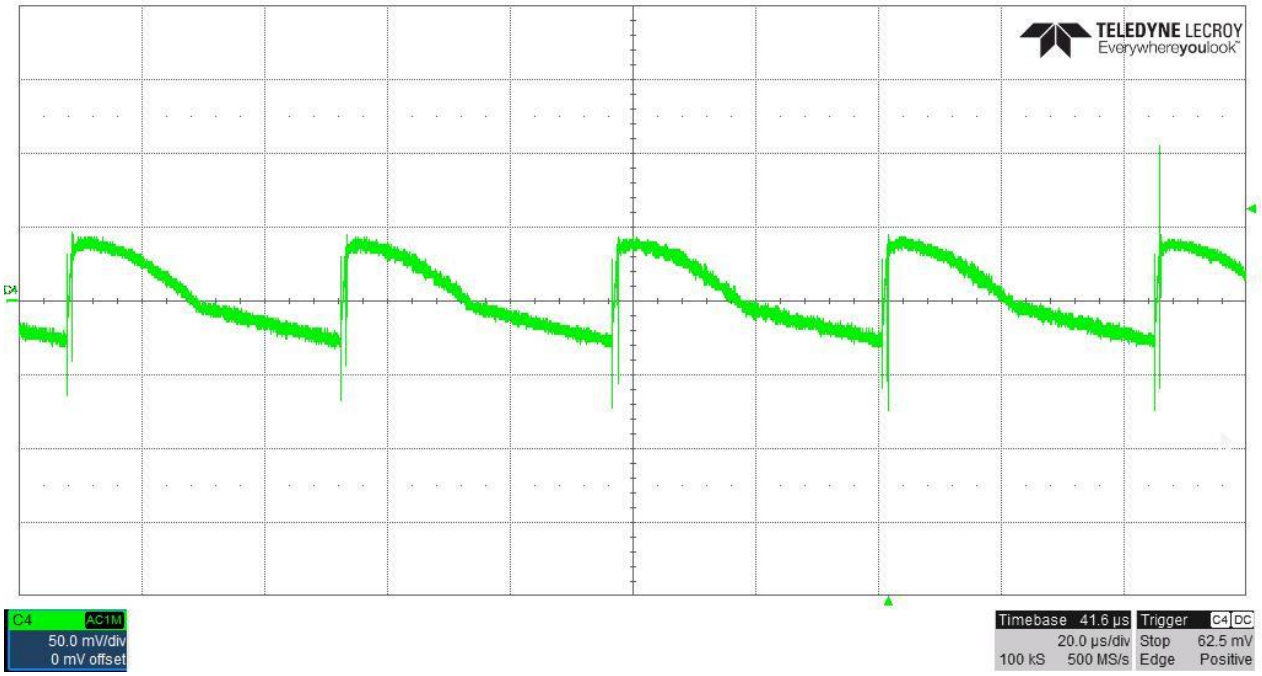


5V ripple:

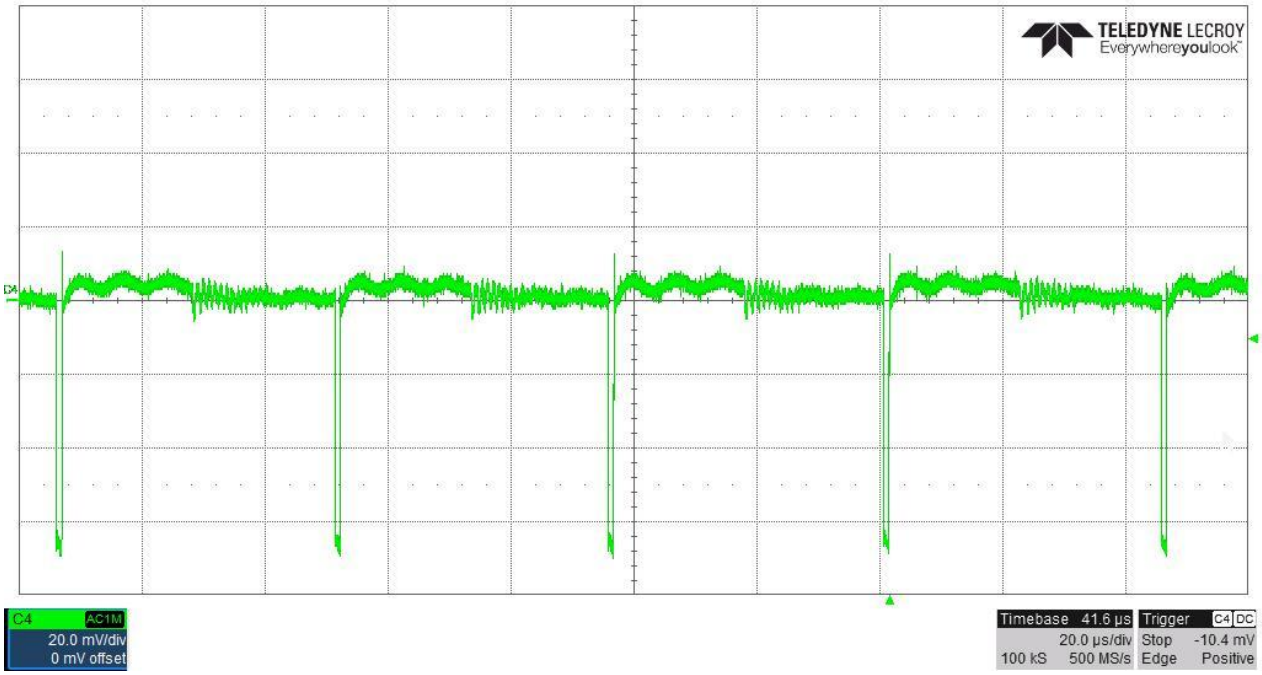


5.3 622V_{DC} (622V_{DC} is generated by an AC source with a voltage doubler circuit): 24V/100mA and 5V/20mA.

24V ripple:

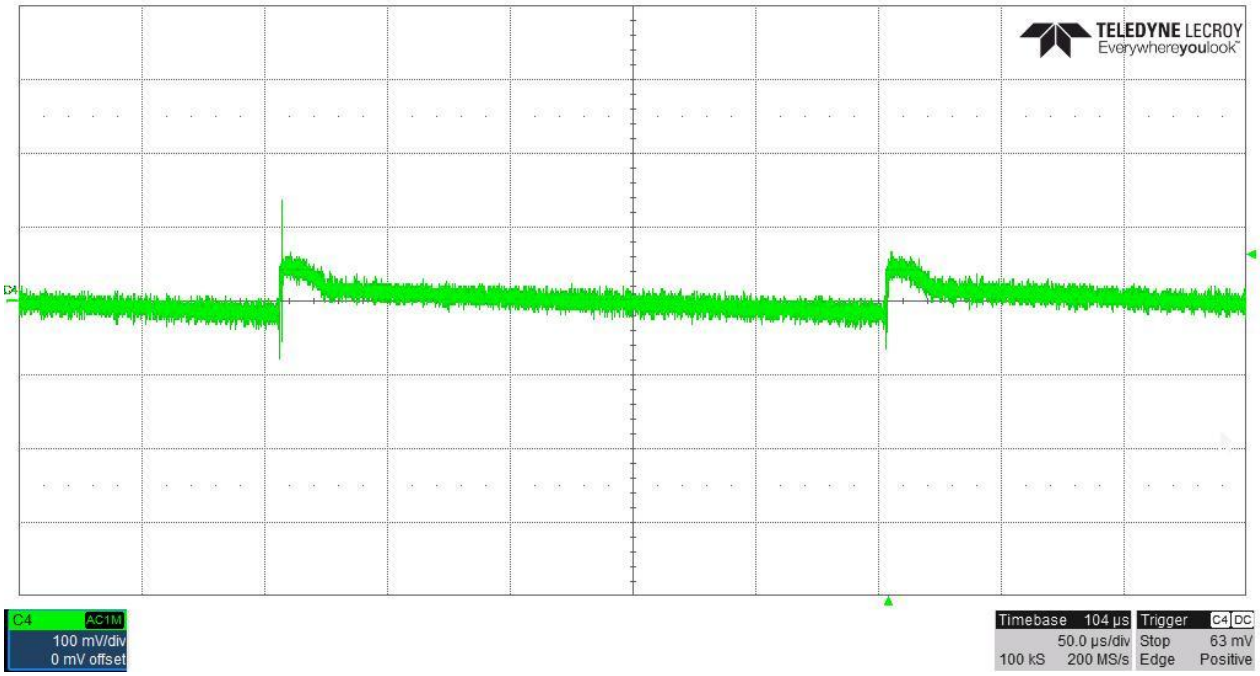


5V ripple:

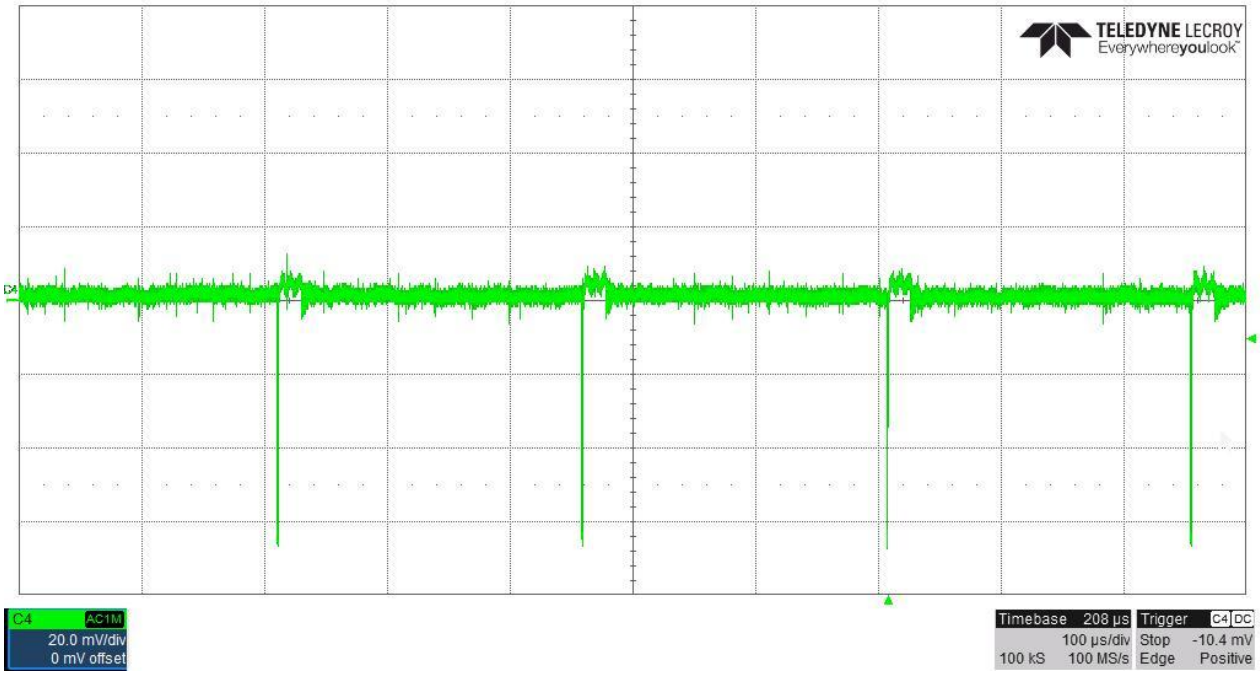


5.4 $622V_{DC}$ ($622V_{DC}$ is generated by an AC source with a voltage doubler circuit): no load applied to both 5V and 24V.

24V ripple:



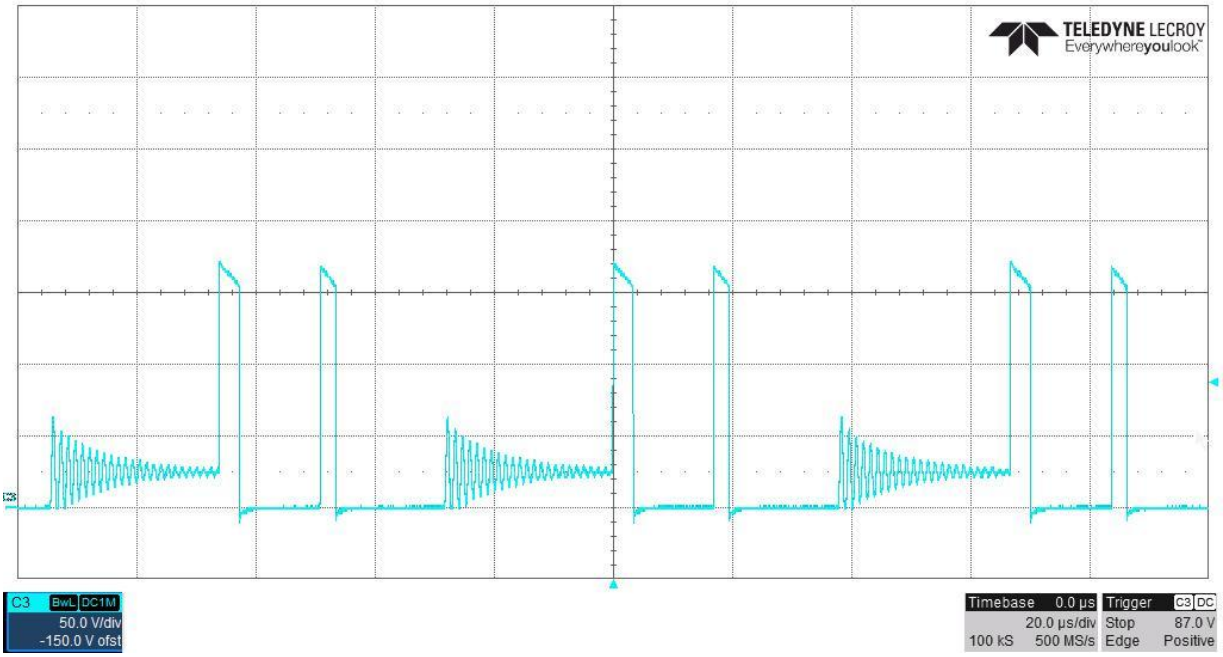
5V ripple:



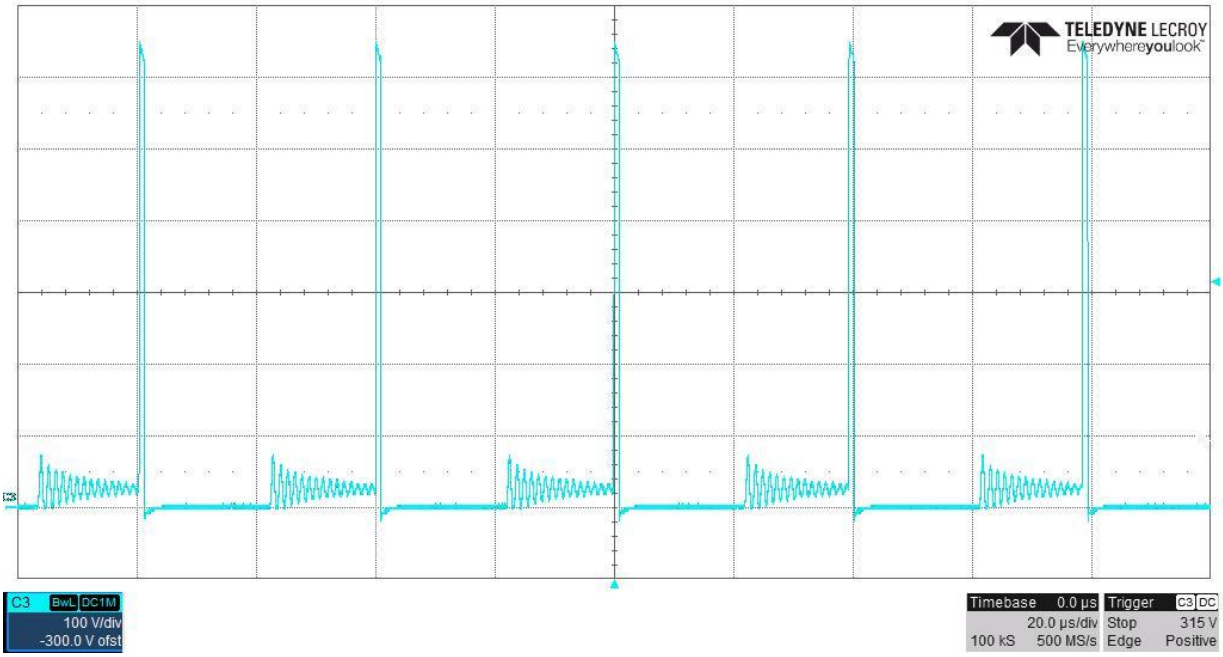
6 Switching Waveforms

The images below show key switching waveforms of PMP11236RevB. The waveforms are measured with 5V/0A and 24V/120mA.

6.1 Diode D4 @ 120V_{AC}/60Hz input



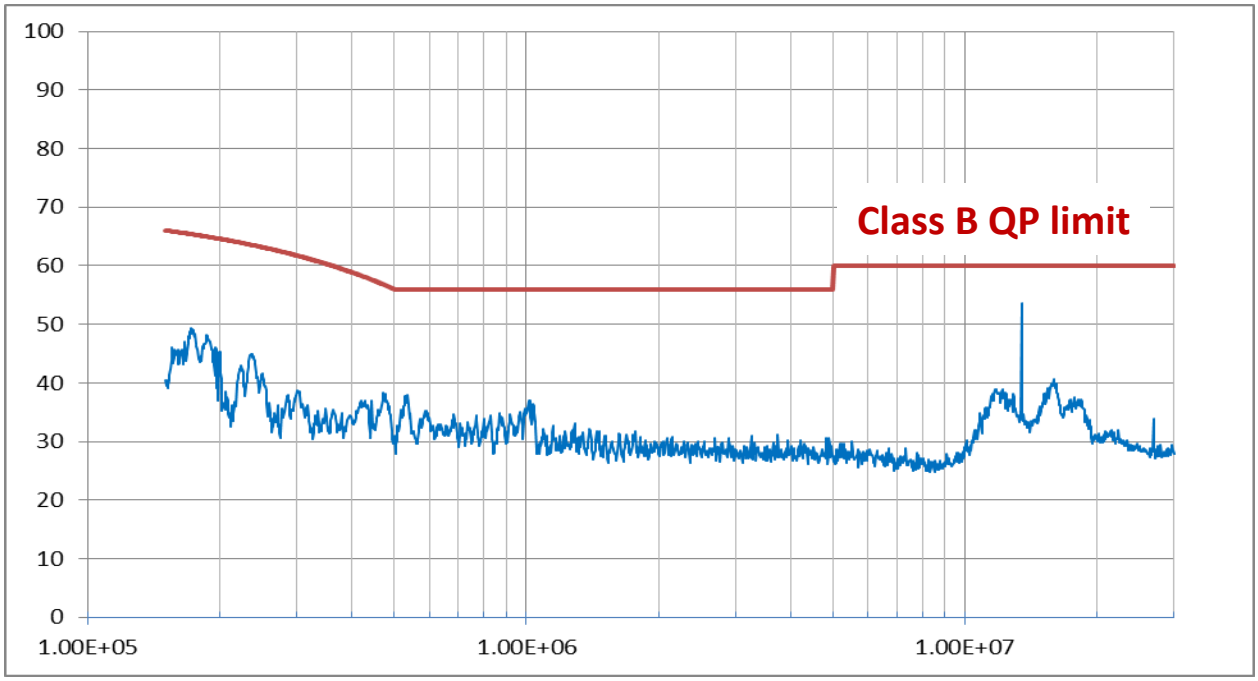
6.2 Diode D4 @ 622V_{DC} (622V_{DC} is generated by an AC source with a voltage doubler circuit) input



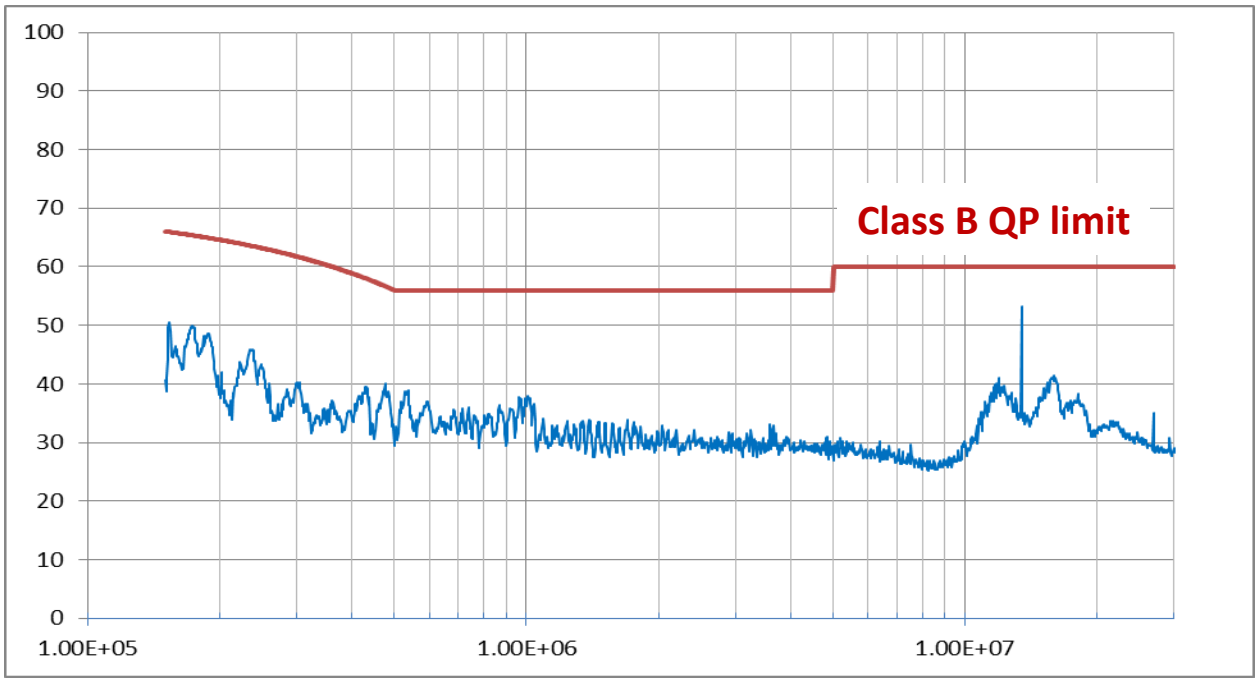
7 Conduction EMI

Scan is done with **peak detector** and **max hold**.
Load condition: 24V output with 200Ω load resistor.

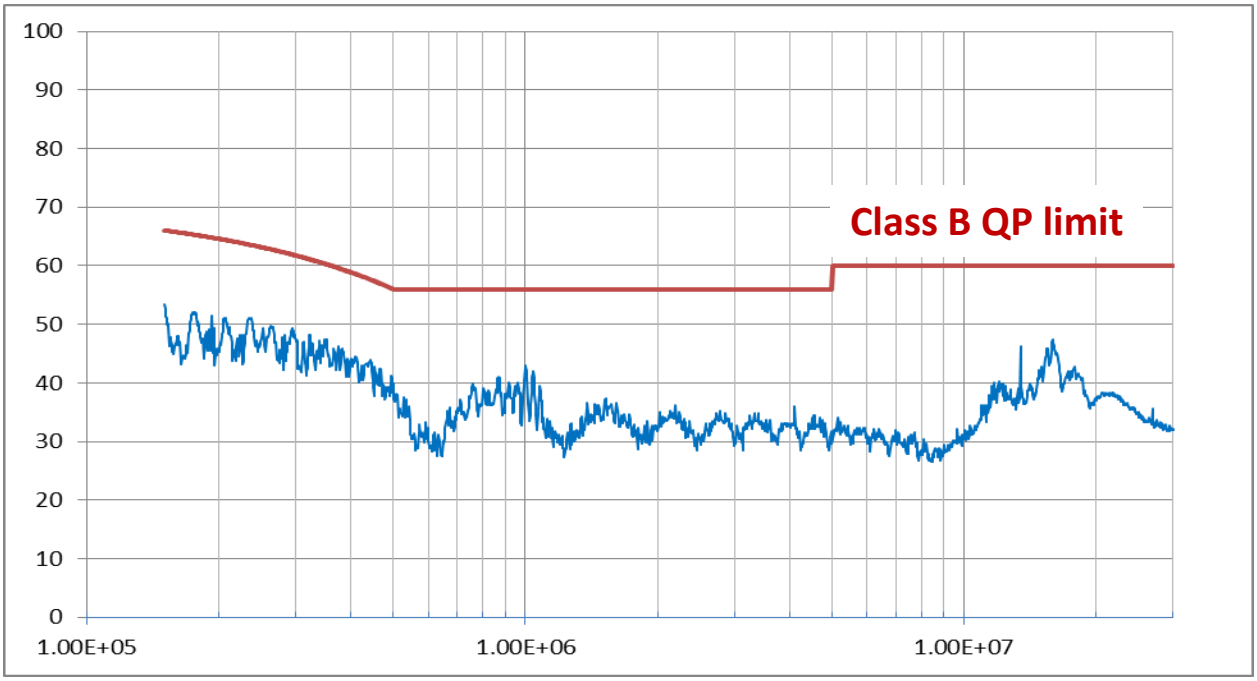
7.1 120V_{AC}/60Hz, Line 1:



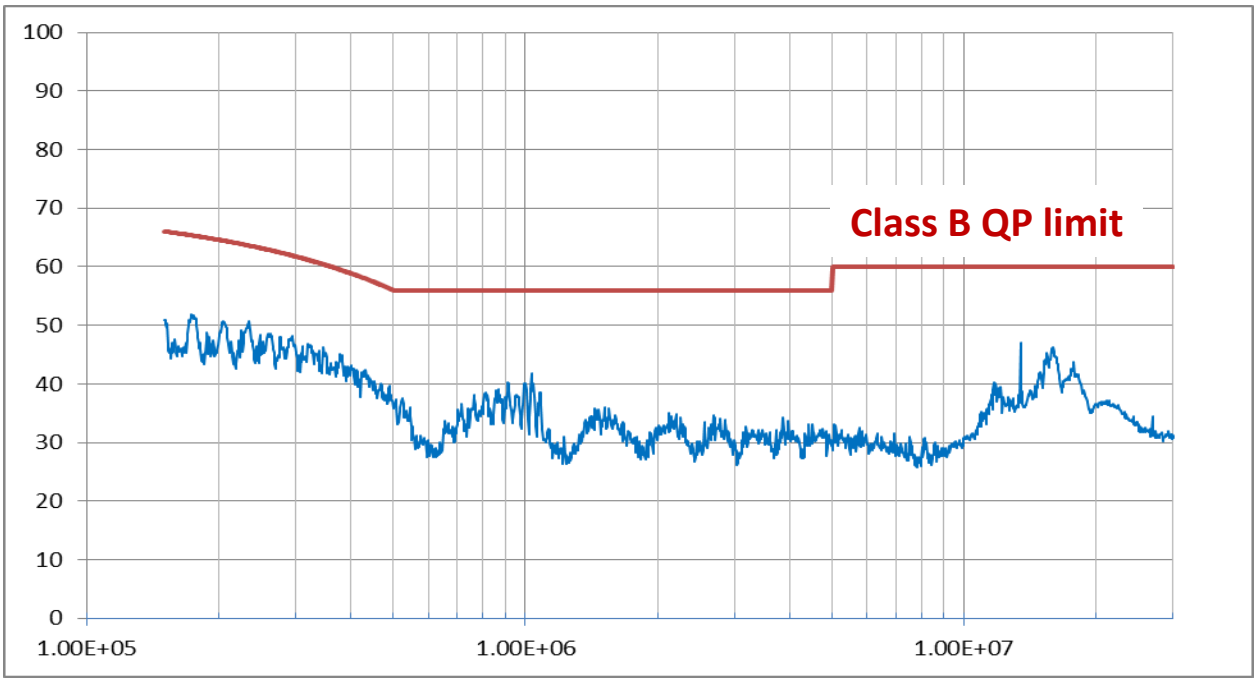
7.2 120V_{AC}/60Hz, Line 2:



7.3 230V_{AC}/50Hz, Line 1:



7.4 230V_{AC}/50Hz, Line 2:



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