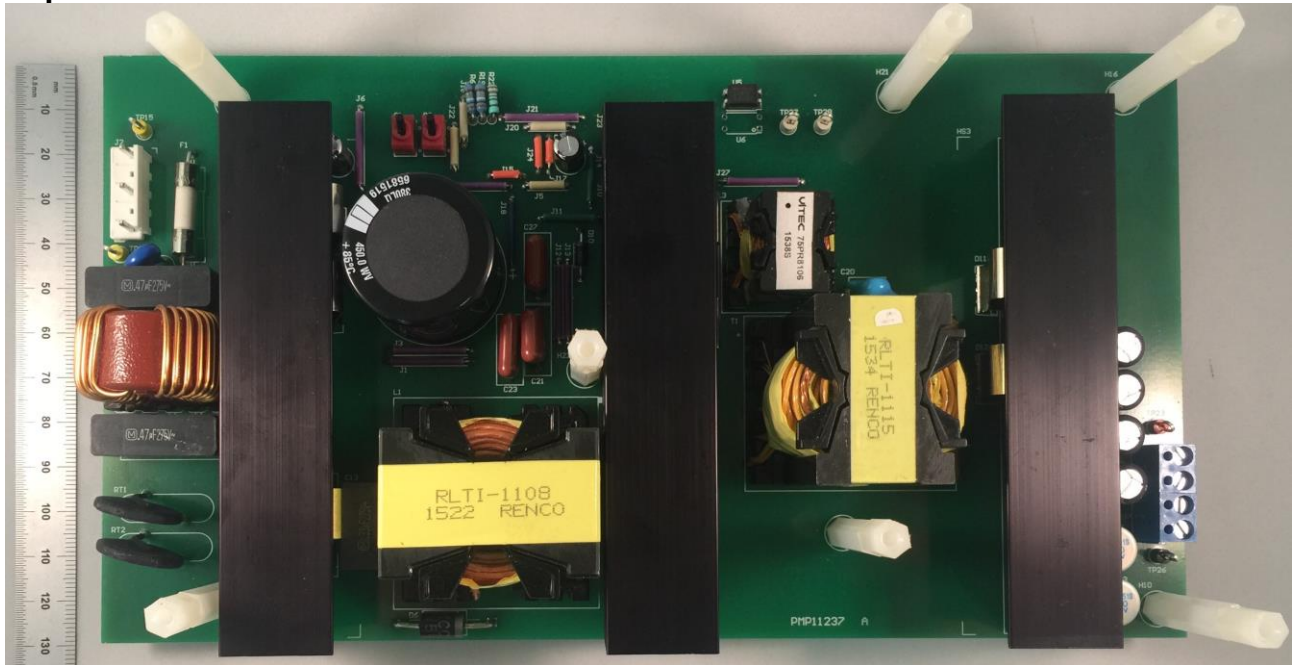


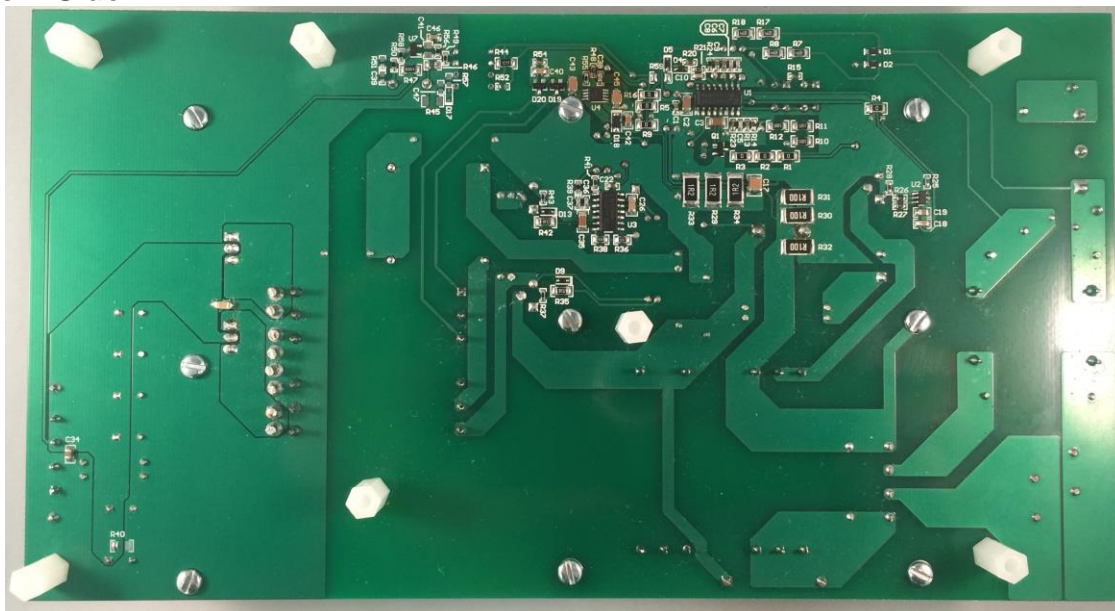
1 Photo

The photographs below show the top and bottom views of the PMP11237 Rev A board, which is built on PMP11237 Rev A PCB.

Top Side

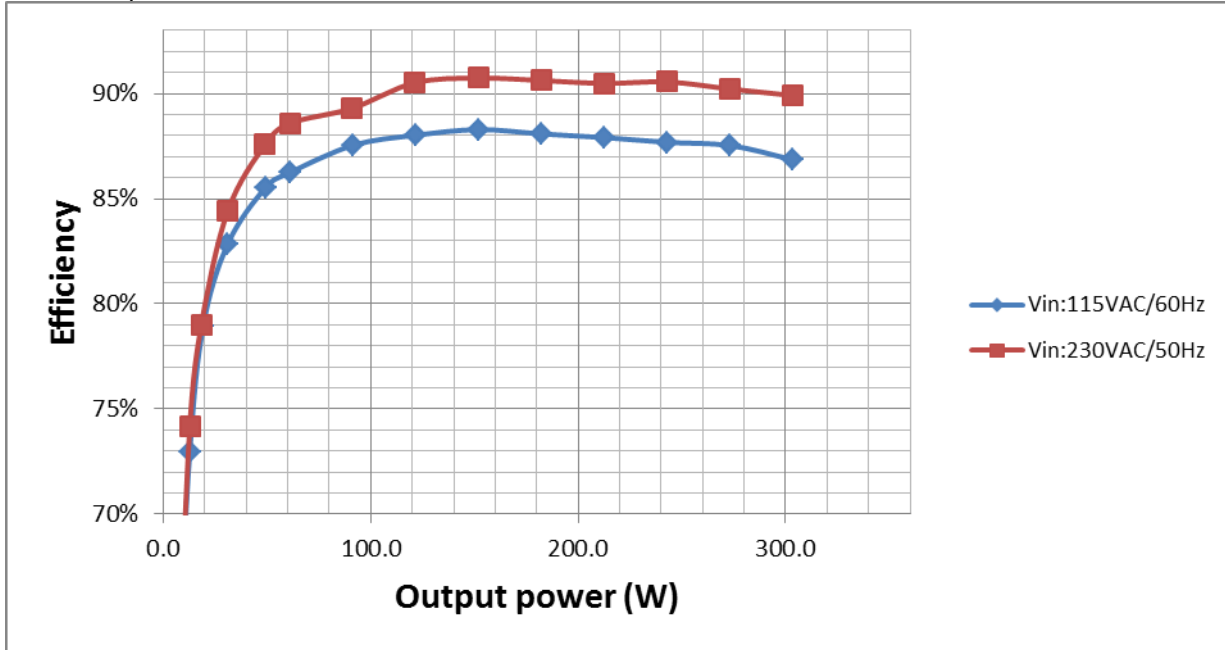


Bottom Side



2 Efficiency

The efficiency curves of total supply are shown in the tables and graph below. S2 is turned on to enable PFC and LLC operation



115VAC/60Hz

Vin(AC)	Iin(A)	Pin(W)	PF	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff. (%)
115.0	3.04	349.20	0.997	12.12	25.03	303.3	45.87	86.86%
115.8	2.70	312.10	0.998	12.12	22.54	273.2	38.90	87.54%
115.0	2.42	277.30	0.998	12.12	20.06	243.2	34.15	87.69%
115.1	2.11	241.90	0.998	12.12	17.55	212.7	29.24	87.91%
115.0	1.80	206.80	0.997	12.12	15.03	182.2	24.64	88.09%
115.0	1.50	172.23	0.996	12.12	12.55	152.1	20.16	88.29%
115.0	1.21	138.06	0.995	12.12	10.03	121.5	16.53	88.02%
115.1	0.92	104.50	0.992	12.12	7.55	91.5	13.01	87.55%
115.0	0.63	71.13	0.984	12.12	5.06	61.4	9.77	86.26%
115.1	0.51	57.50	0.978	12.12	4.06	49.2	8.32	85.53%
115.1	0.33	37.31	0.973	12.12	2.55	30.9	6.40	82.84%
115.0	0.22	24.19	0.968	12.12	1.58	19.1	5.10	78.91%
115.0	0.16	17.44	0.952	12.12	1.05	12.7	4.71	72.97%
115.0	0.10	10.40	0.894	12.12	0.53	6.4	3.99	61.62%
115.0	0.04	0.40	0.085	11.87	0.00	0	0.40	0.00%

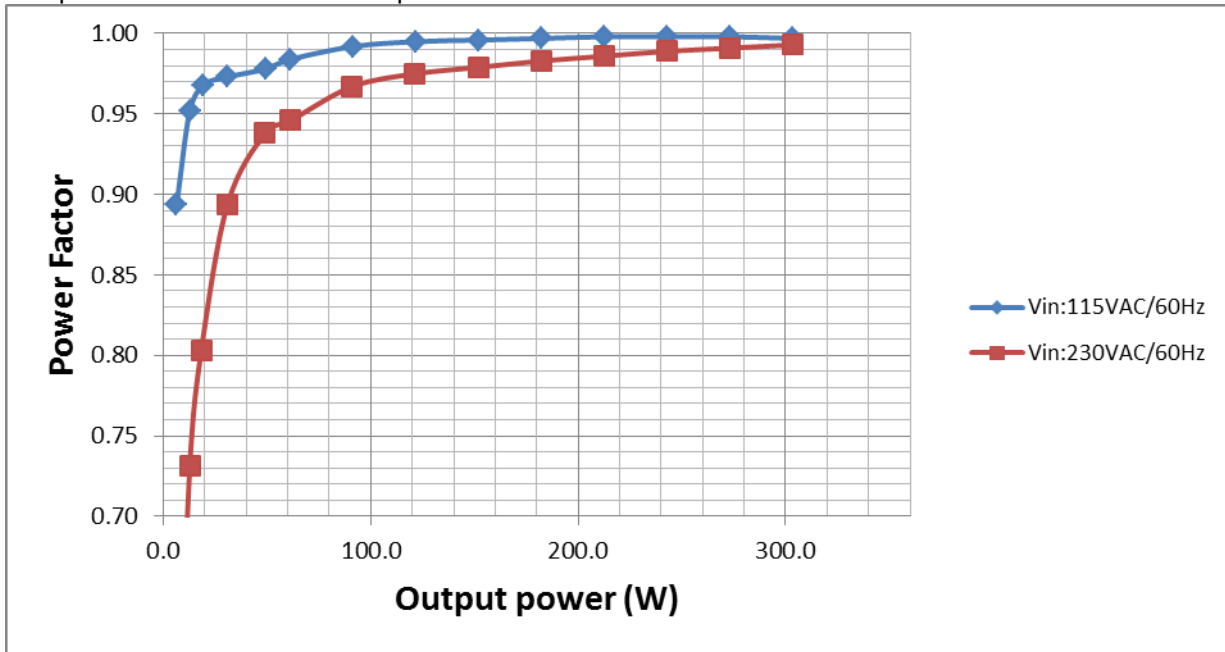
230VAC/50Hz

Vin(AC)	Iin(A)	Pin(W)	PF	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff. (%)
230	1.477	337.3	0.993	12.12	25.023	303.2788	34.02124	89.91%
230	1.329	302.8	0.991	12.12	22.541	273.1969	29.60308	90.22%
230	1.18	268.5	0.989	12.12	20.062	243.1514	25.34856	90.56%
230	1.036	235	0.986	12.12	17.546	212.6575	22.34248	90.49%
230	0.89	201	0.983	12.12	15.03	182.1636	18.8364	90.63%
230	0.744	167.53	0.979	12.12	12.543	152.0212	15.50884	90.74%
230	0.5972	133.89	0.975	12.12	10	121.2	12.69	90.52%
230	0.4577	101.79	0.967	12.12	7.5	90.9	10.89	89.30%
230	0.3183	69.3	0.946	12.12	5.0662	61.40234	7.897656	88.60%
230	0.2599	56.09	0.938	12.12	4.0537	49.13084	6.959156	87.59%
230	0.17807	36.62	0.894	12.12	2.55	30.906	5.714	84.40%
230	0.12515	23.13	0.803	12.12	1.5075	18.2709	4.8591	78.99%
230	0.10208	17.154	0.731	12.12	1.05	12.726	4.428	74.19%
230	0.08553	10.067	0.512	12.12	0.495	5.9994	4.0676	59.59%
230	0.06129	0.7326	0.048	12.06	0	0	0.7326	0.00%

115VAC/60Hz		230VAC/50Hz	
PF@ 25% load	0.973	PF@ 50% load	0.979
10% efficiency	82.84%	10% efficiency	84.40%
20% efficiency	86.26%	20% efficiency	88.60%
50% efficiency	88.29%	50% efficiency	90.74%
100% efficiency	86.86%	100% efficiency	89.91%

3 Power Factor

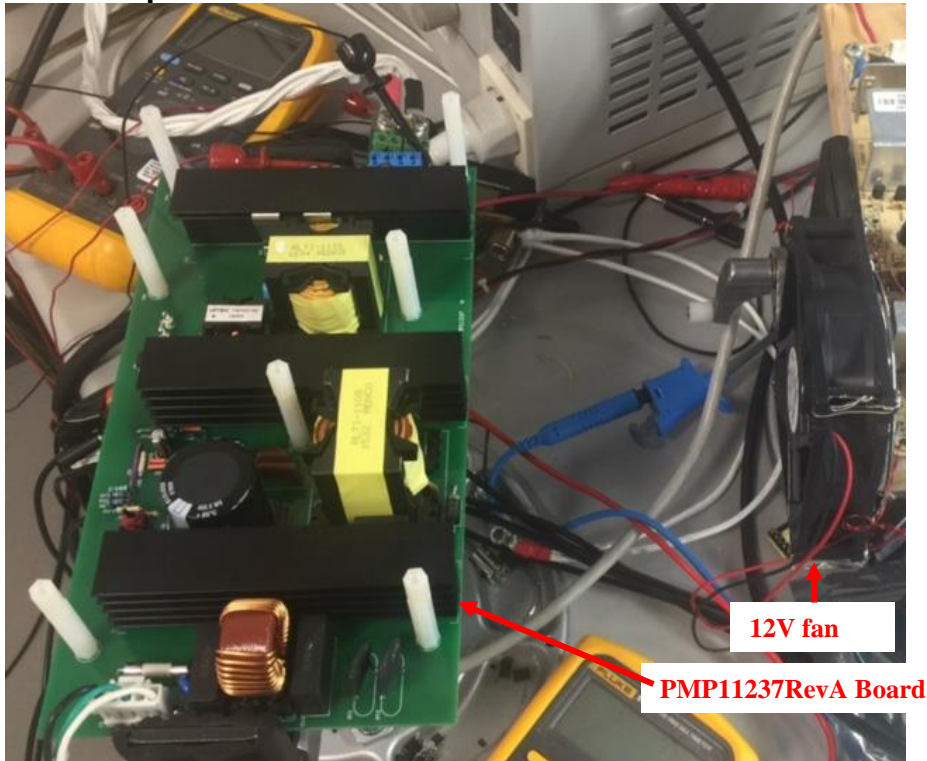
The power factor is shown in the plot below.



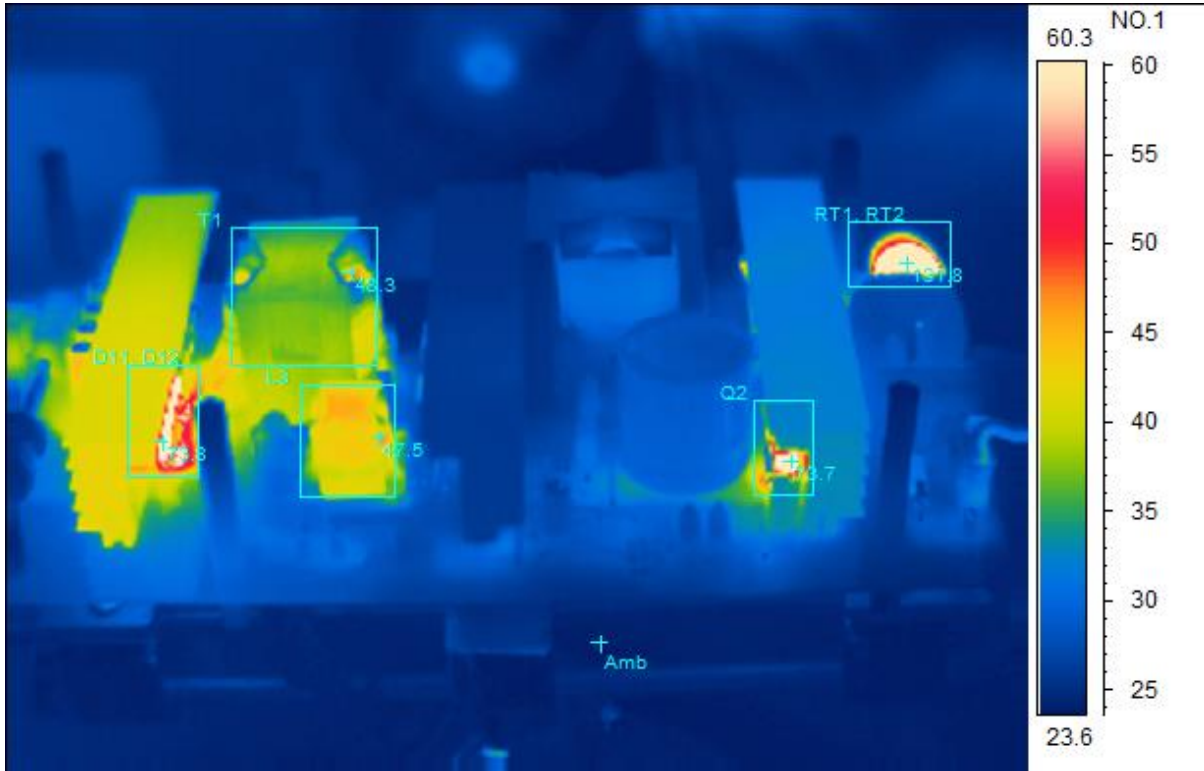
4 Thermal Images

The thermal images below show a top view and bottom view of the board. The board is placed vertically during the test, where the input and output connectors are at the bottom side. The ambient temperature was 25°C with forced air flow (With 12V NMB fan model #: 3610VL-04W-B50-B00 from 12cm away). The output was loaded with 12V/25A.

Test setup:

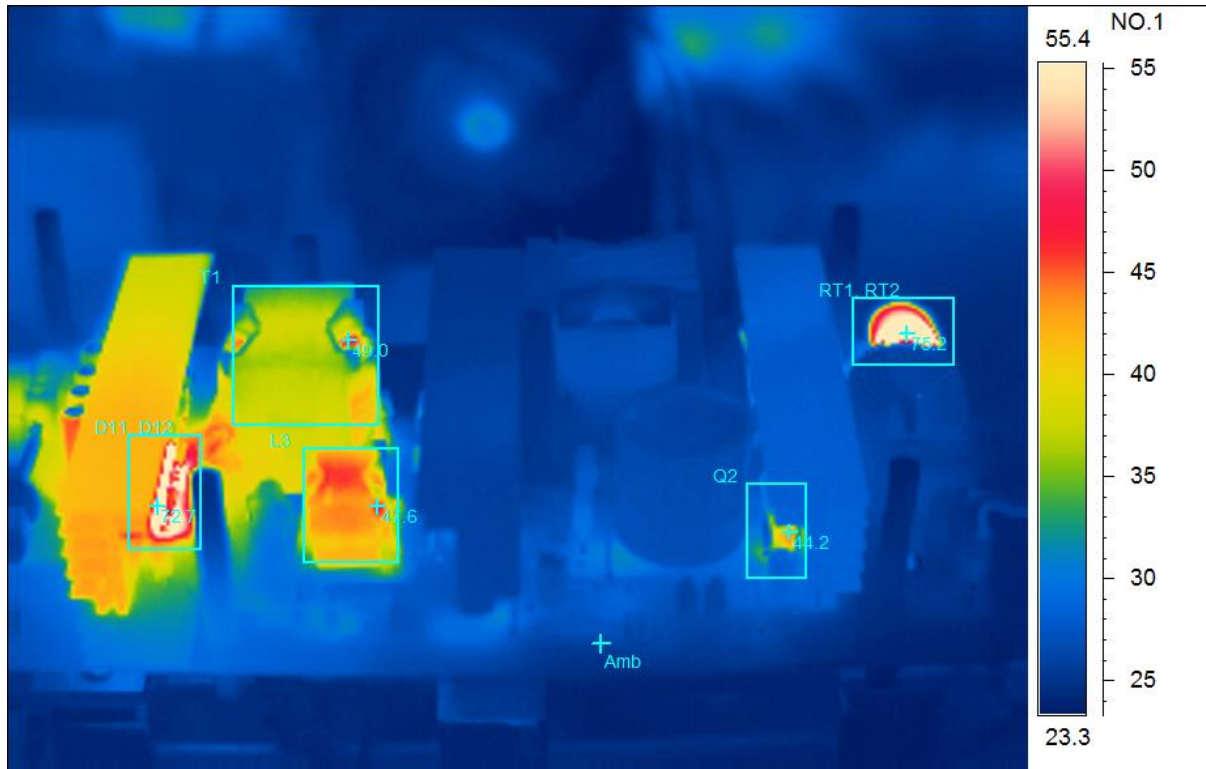


4.1 115V/60Hz



Spot analysis	Value
AmbTemperature	24.1°C
Area analysis	Value
RT1, RT2 Max	131.8°C
Q2Max	73.7°C
D11, D12Max	73.8°C
L3Max	47.5°C
T1Max	48.3°C

4.2 230V/50Hz

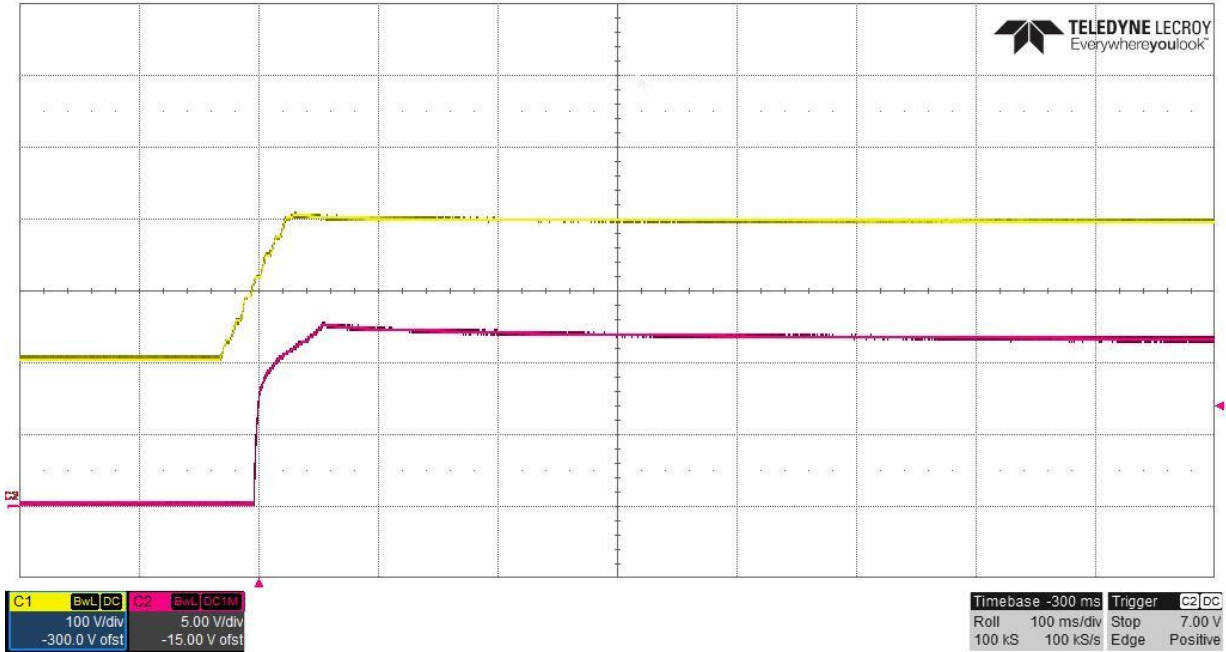


Spot analysis	Value
AmbTemperature	26.0°C
Area analysis	Value
RT1, RT2 Max	75.2°C
Q2Max	44.2°C
D11, D12Max	72.7°C
L3Max	47.6°C
T1Max	49.0°C

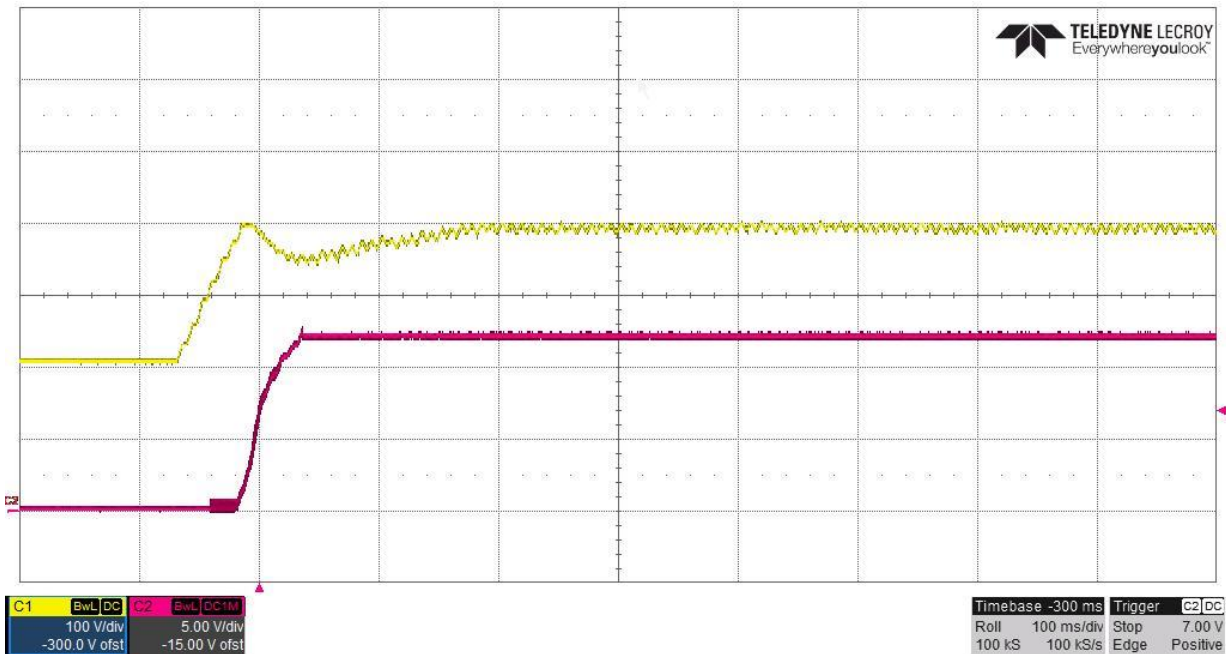
5 Startup

The voltages at startup are shown in the images below, where CH1: V(C14) and CH2: 12V_{out}.

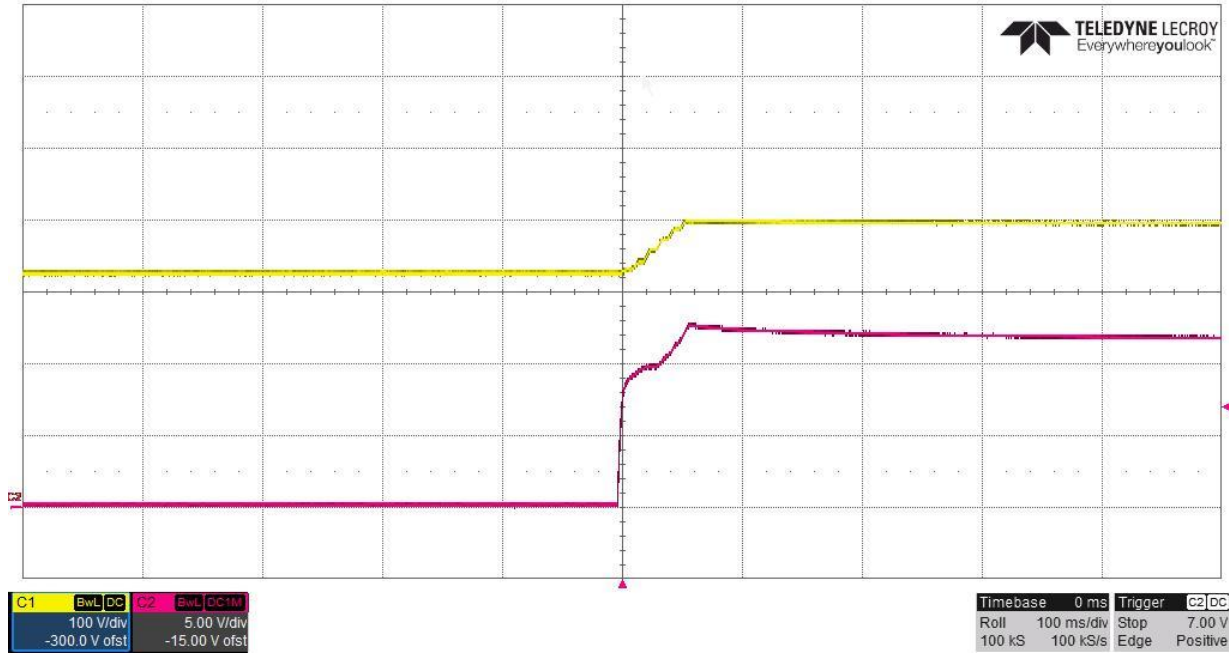
5.1 115V_{AC}/60Hz – 12V no load



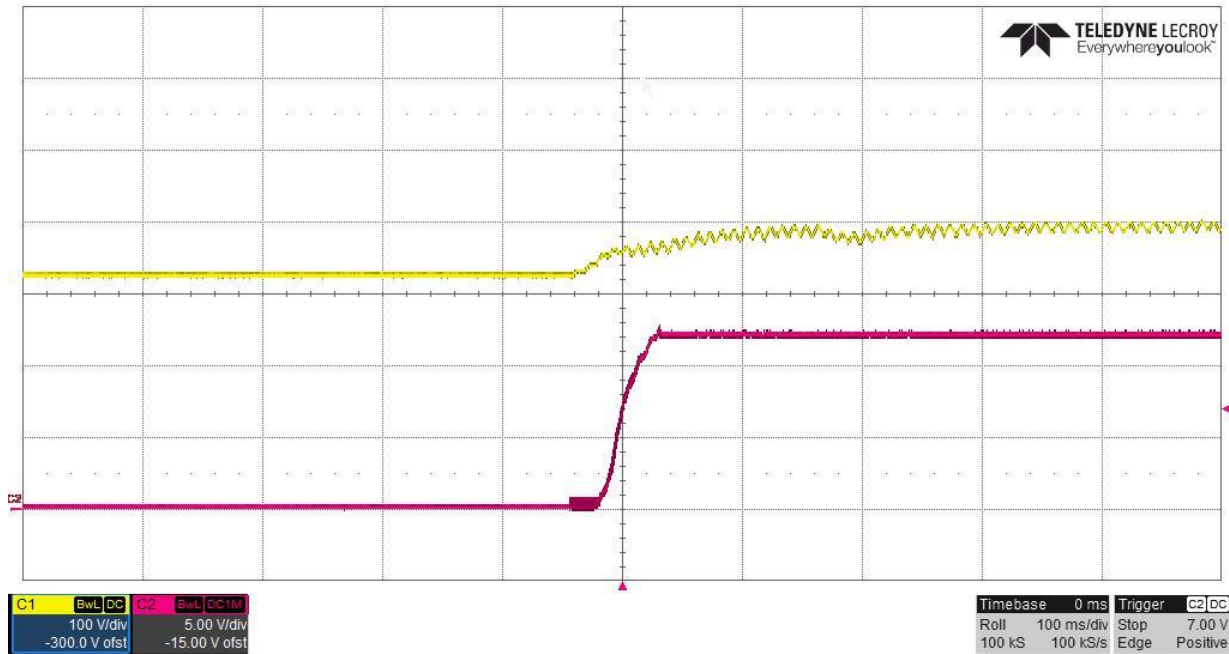
5.2 115V_{AC}/60Hz – 12V/25A



5.3 230V_{AC}/50Hz – 12V no load



5.4 230V_{AC}/50Hz – 12V/25A



6 Turn-off

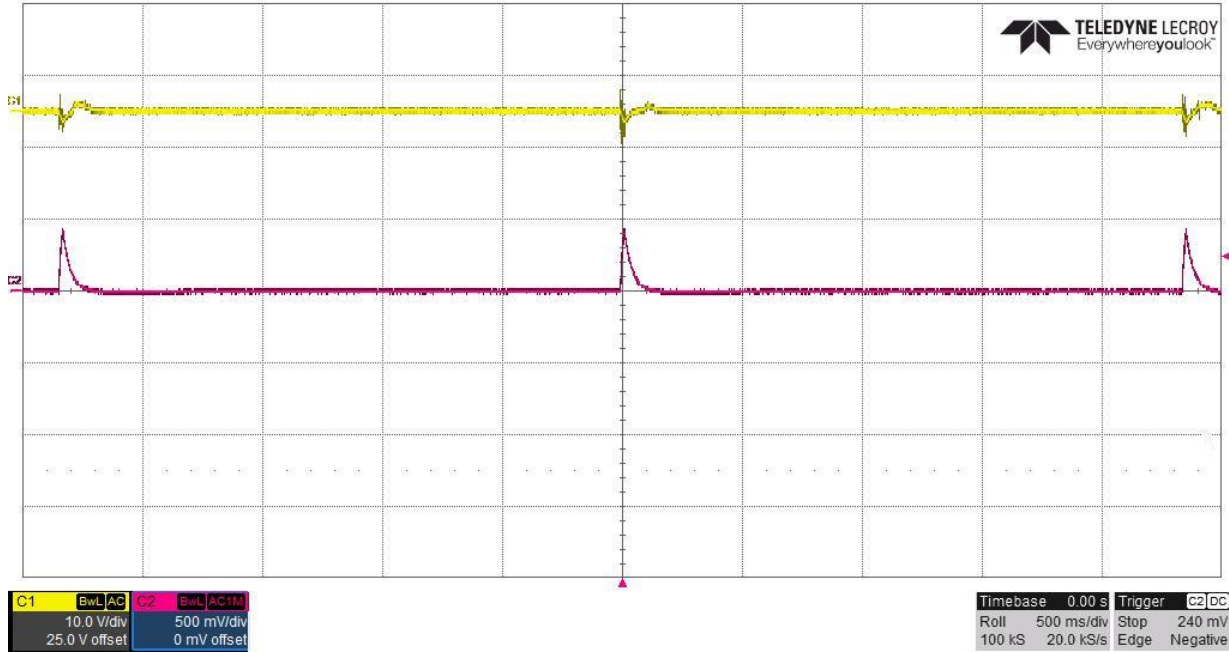
The voltages at turn-off are shown in the images below, where CH1 is the voltage across C14 and CH2 is $12V_{out}$. The input/output condition during the turn-off test is $115V_{AC}/60Hz$ and $12V/25A$ load.



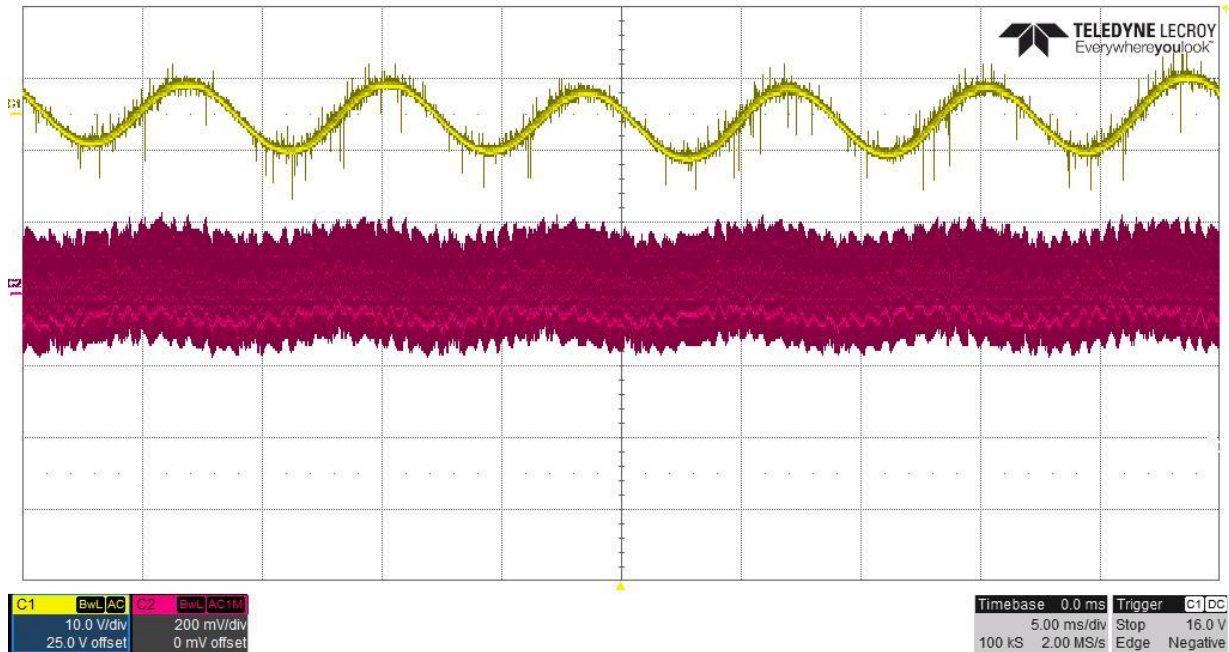
7 Output Ripple Voltage

The output ripple voltages (in AC level) are shown in the plots below, where CH1: PFC output ripple at C14 and CH2: 12V_{out} ripple.

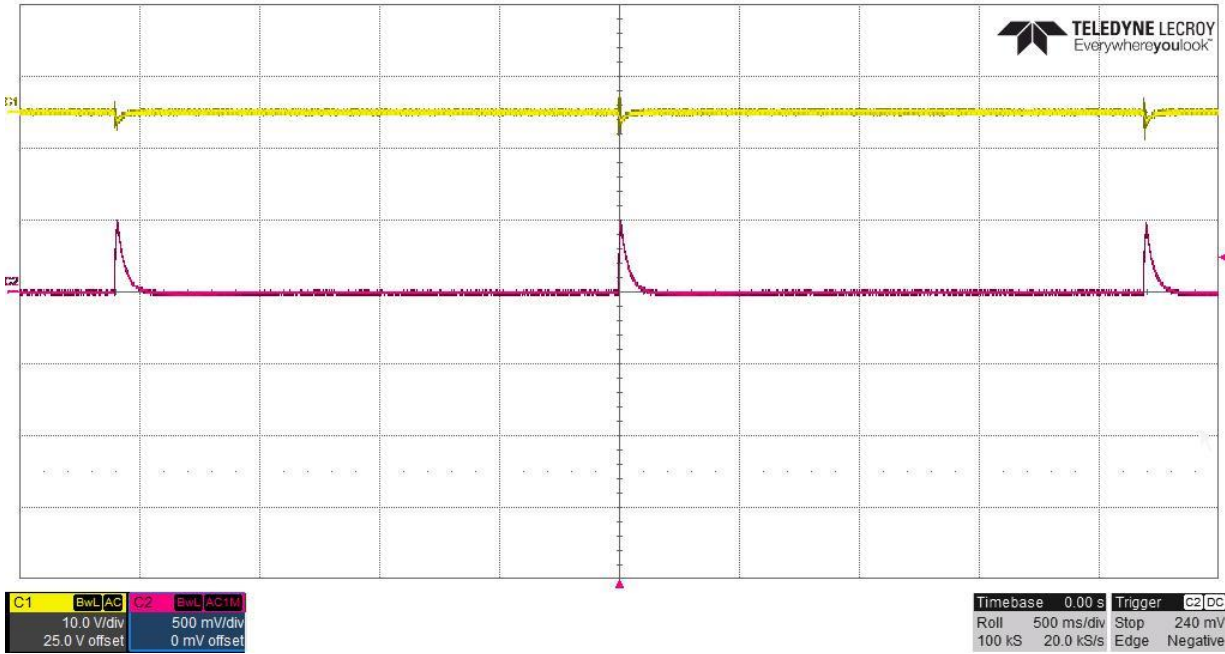
7.1 115V_{AC}/60Hz – 12V no load



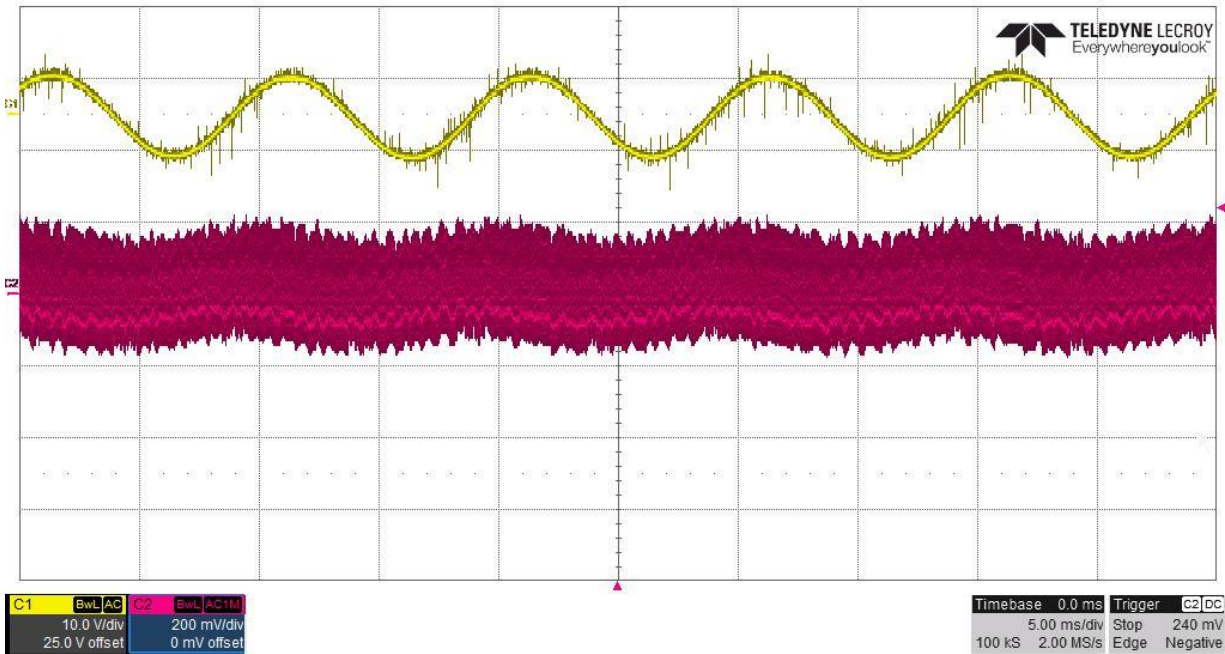
7.2 115V_{AC}/60Hz – 12V/25A



7.3 230V_{AC}/50Hz – 12V no load



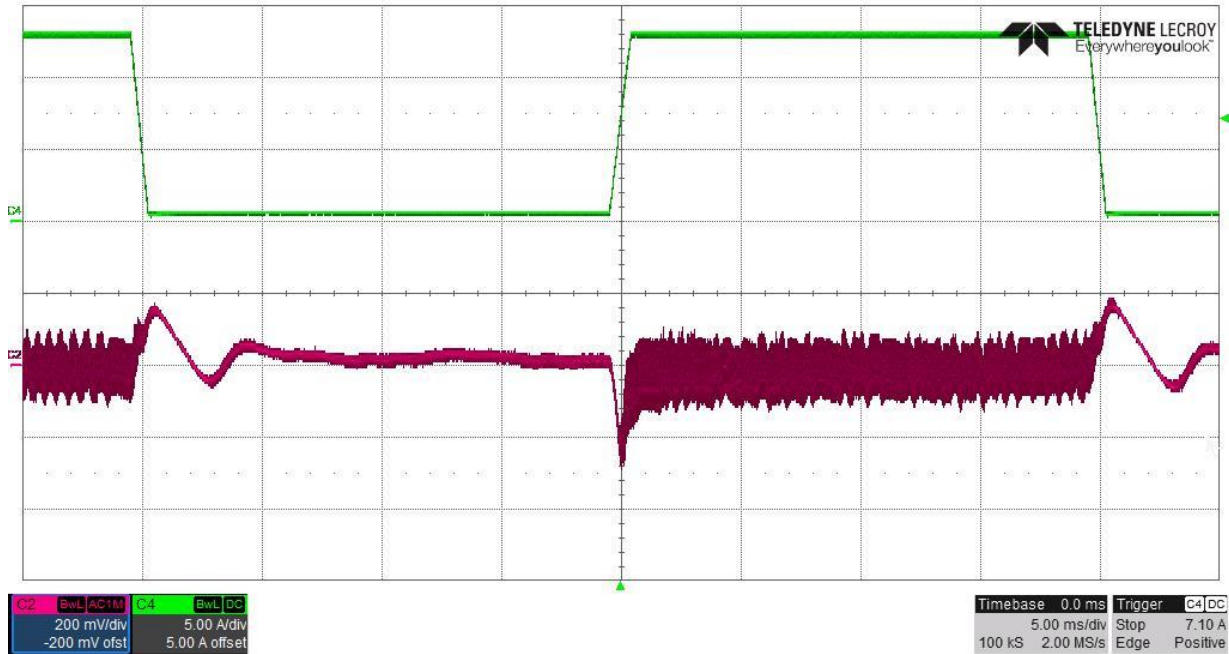
7.4 230V_{AC}/50Hz – 12V/25A



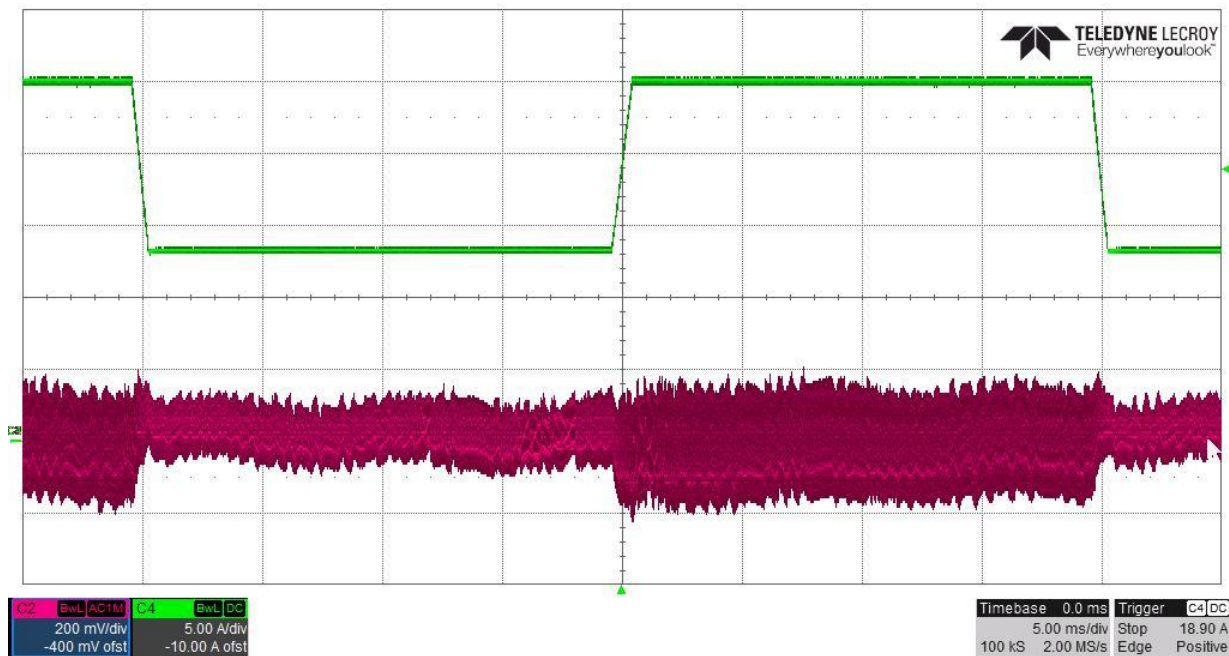
8 Transient Response

Transient responses are shown in the plots below. Input condition is 115V_{AC}/60Hz.

8.1 12V output current changes from 0.5A to 13A:

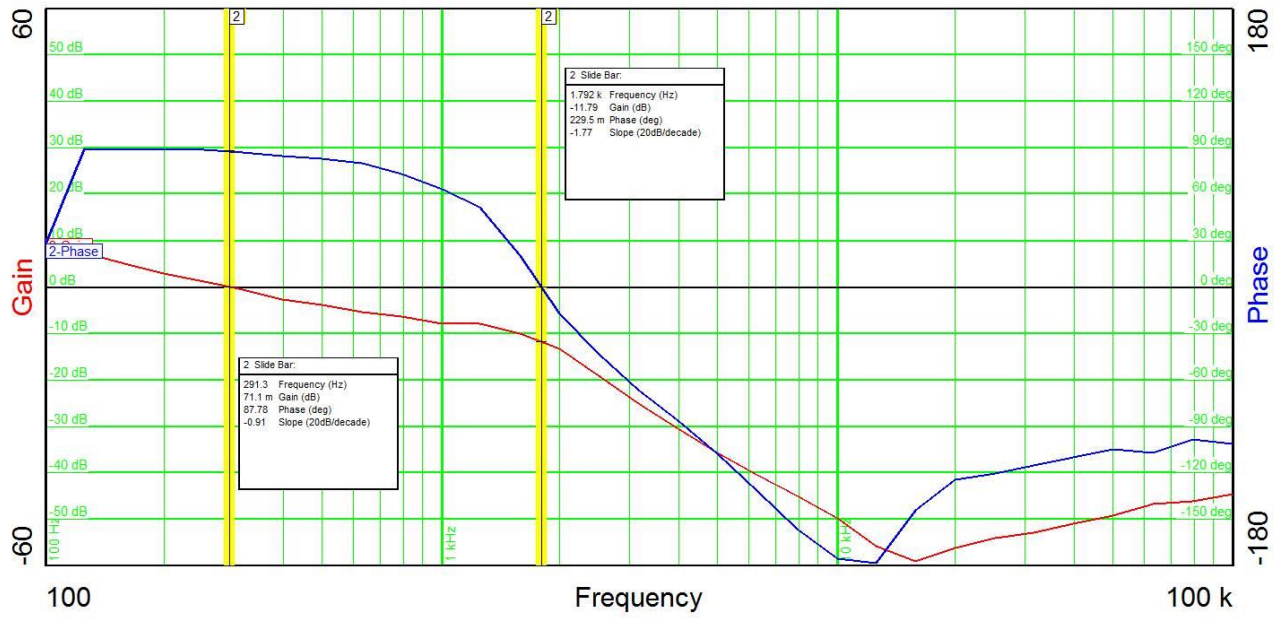


8.2 12V output current changes from 13A to 25A:



9 LLC Resonant Converter Frequency Response

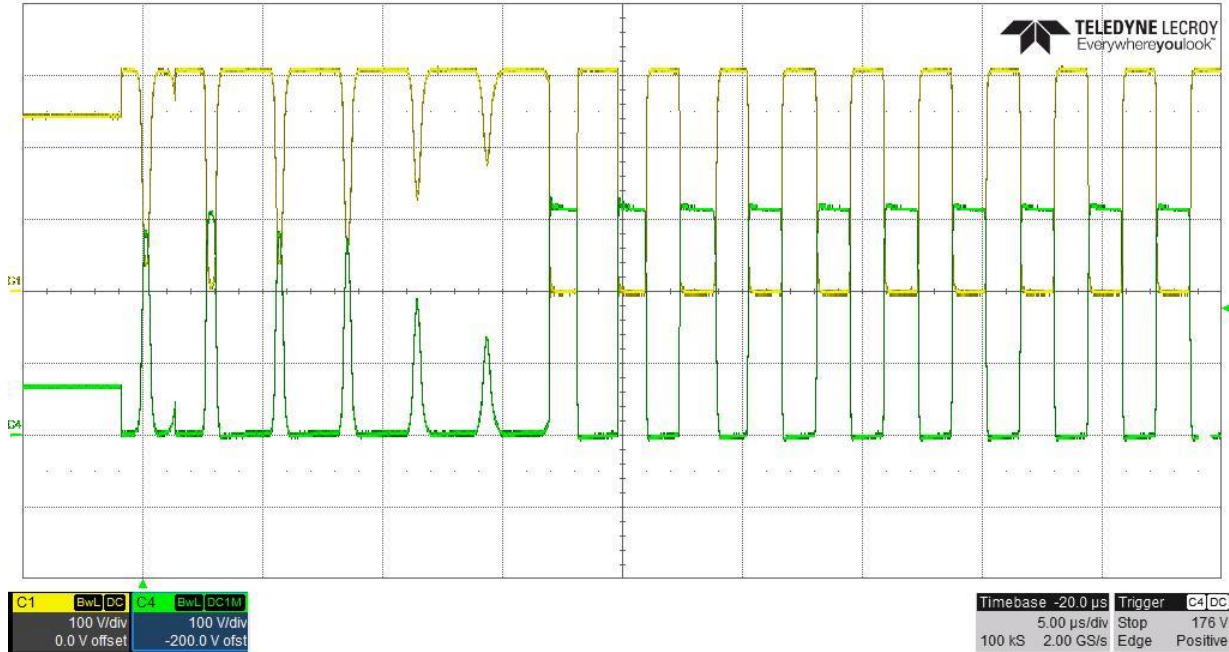
LLC resonant converter frequency response during full load operation (12V/25A) is shown in the plots below.



10 Key Waveforms

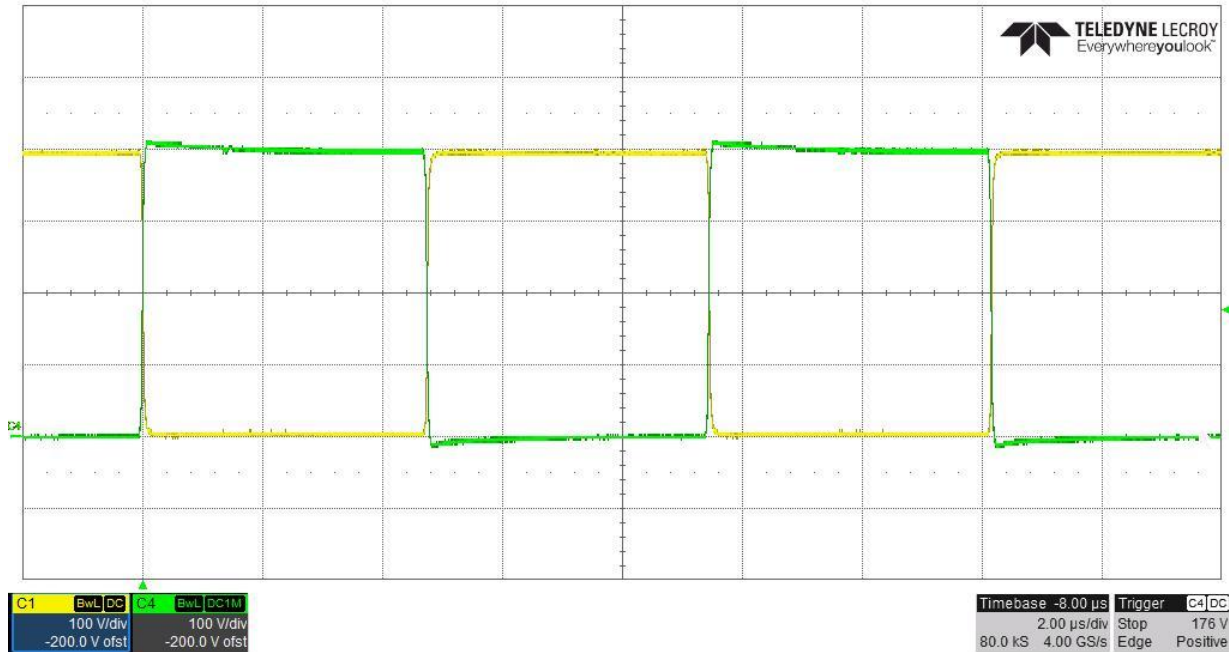
10.1 Q3 and Q4 @ 115V_{AC}/60Hz input, 12V/25A output startup transient

CH3: V_{DS}(Q3), and CH4: V_{DS}(Q4).



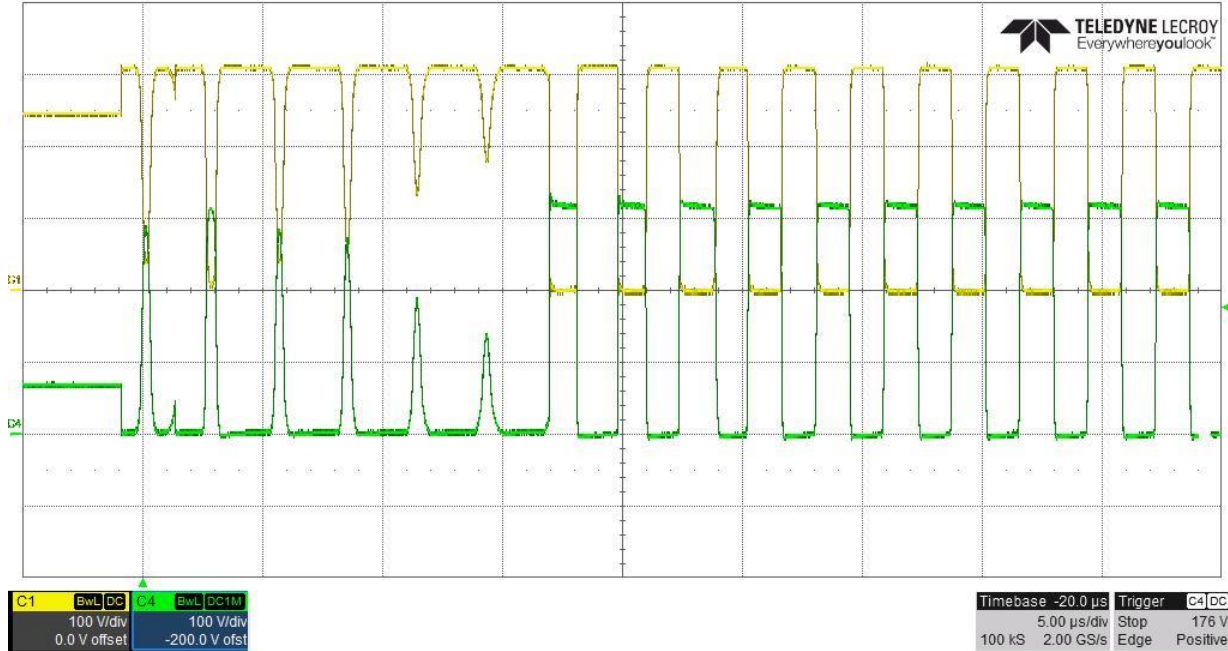
10.2 Q3 and Q4 @ 115V_{AC}/60Hz input, 12V/25A output normal operation

CH3: V_{DS}(Q3), and CH4: V_{DS}(Q4).



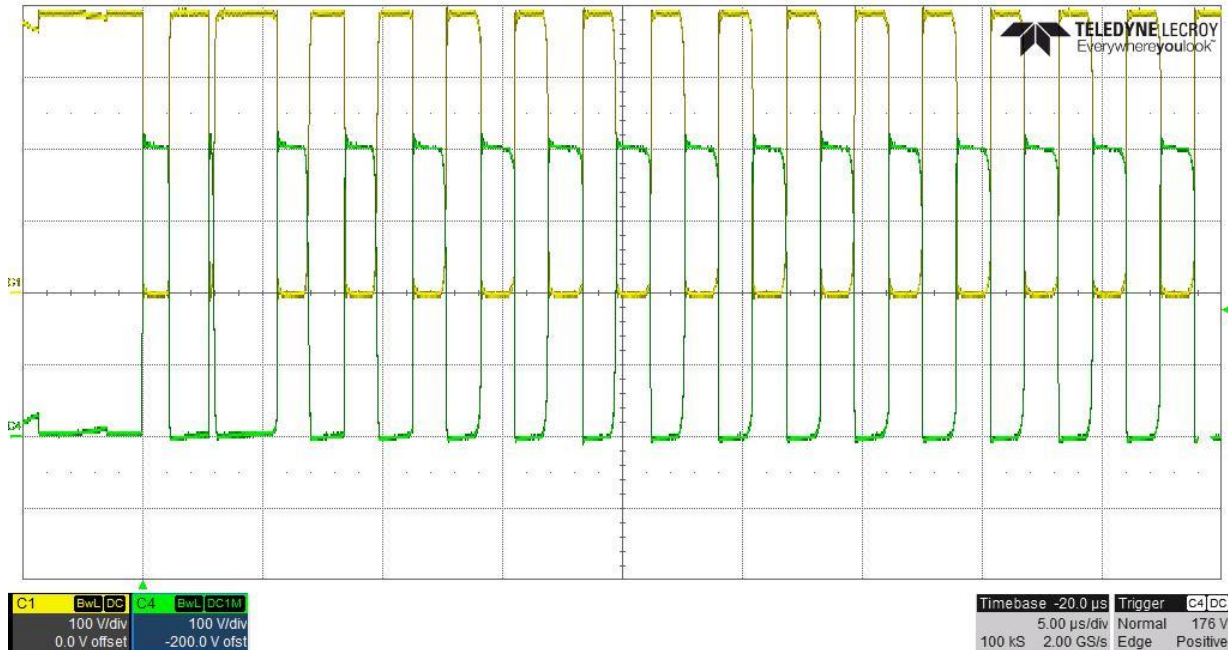
10.3 Q3 and Q4 @ 115V_{AC}/60Hz input, no load startup transient

CH3: V_{DS}(Q3), and CH4: V_{DS}(Q4).

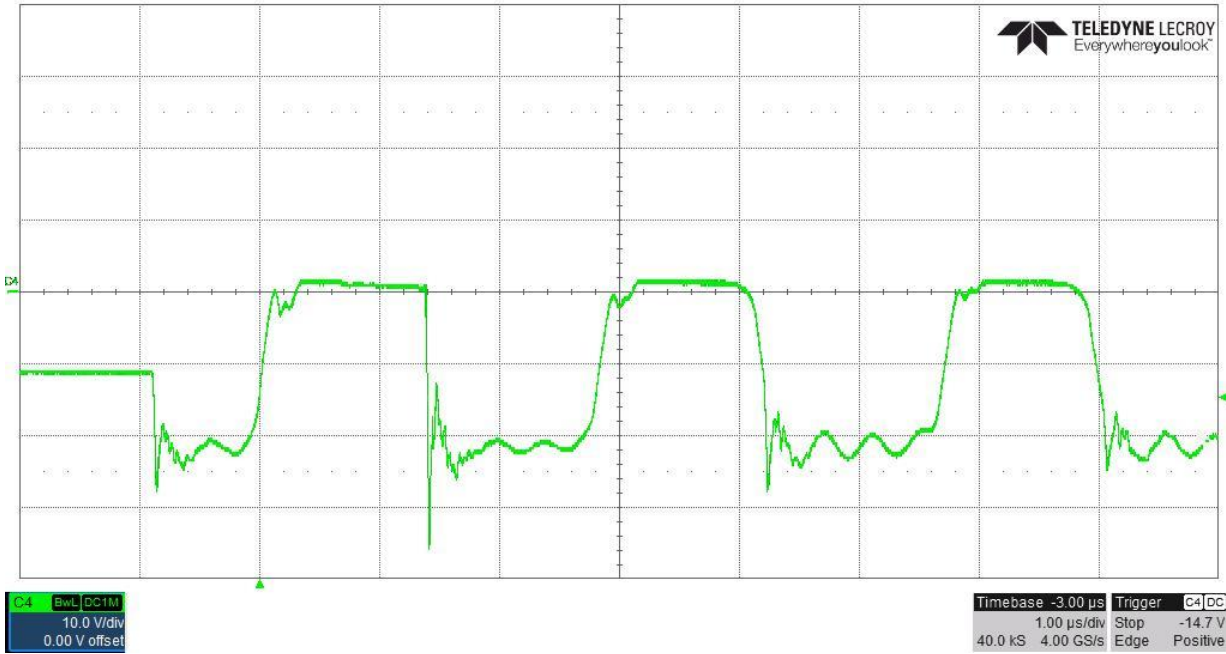


10.4 Q3 and Q4 @ 115V_{AC}/60Hz input, no load normal operation

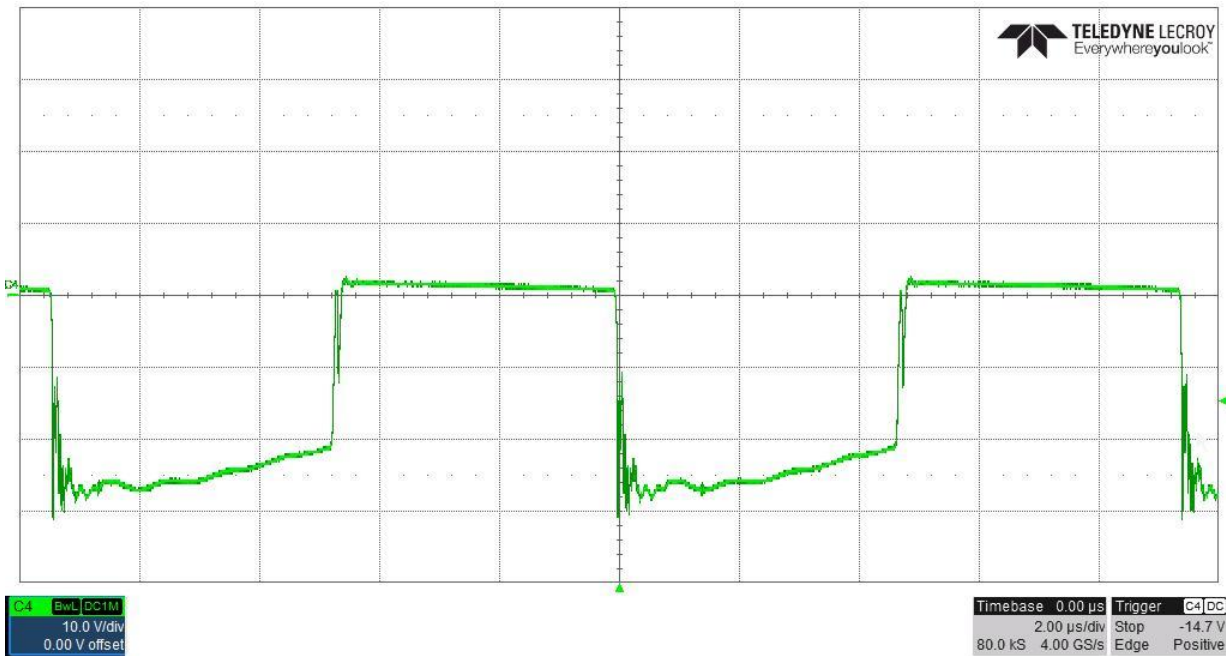
CH3: V_{DS}(Q3), and CH4: V_{DS}(Q4).



10.5 D11 and D12 @ 115V_{AC}/60Hz input, no load normal operation



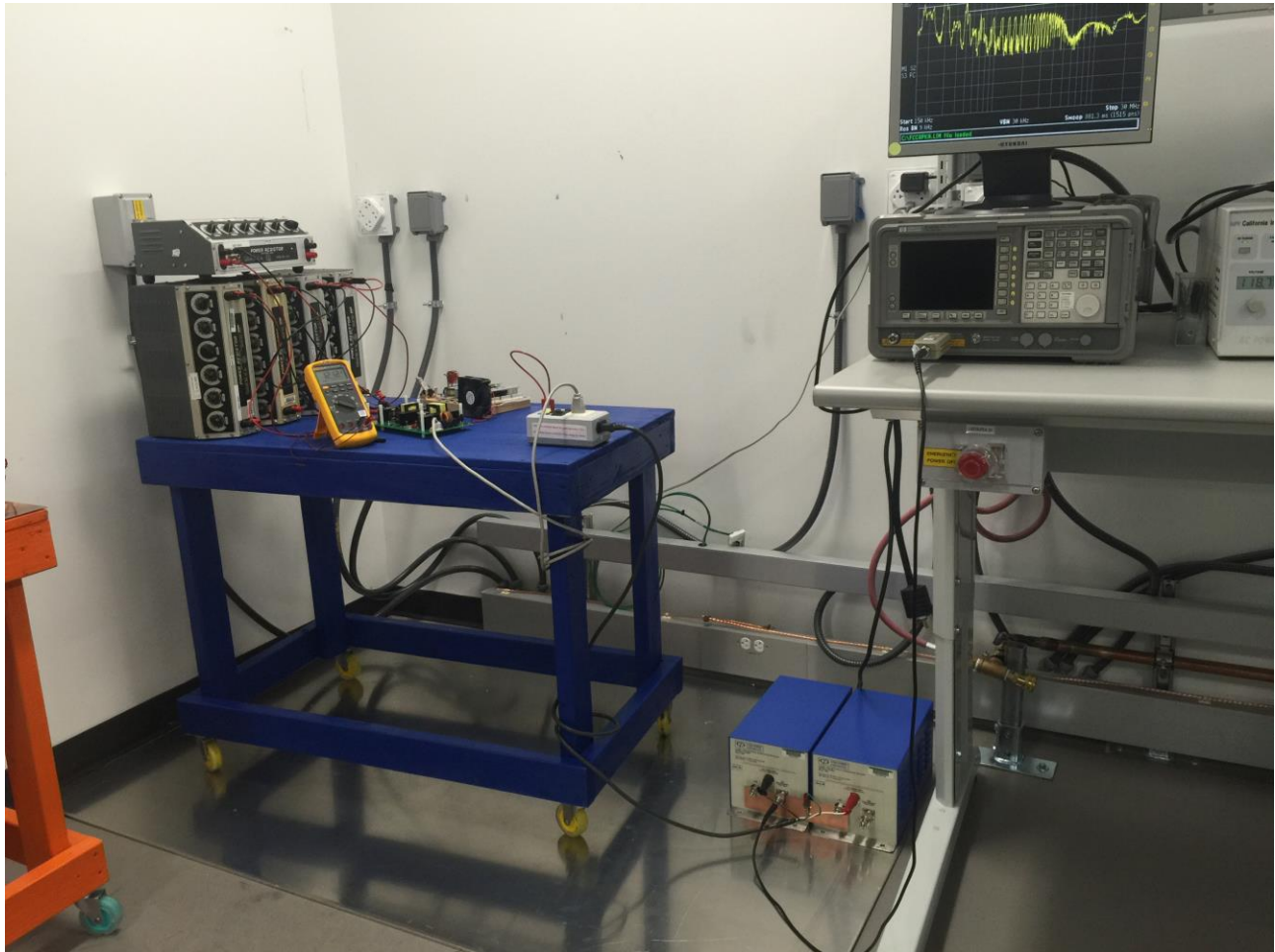
10.6 D11 and D12 @ 115V_{AC}/60Hz input, 12V/25A output normal operation



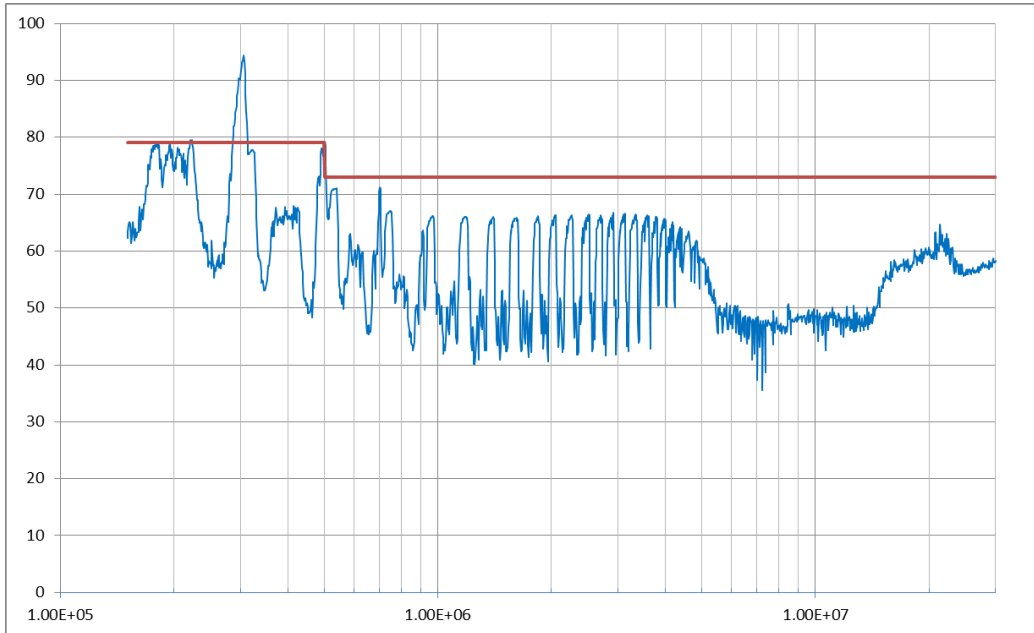
11 Conducted EMI:

The following curves show the **peak scan** results with **maximum hold** on PMP11237Rev A board. The board is loaded with 0.6Ω resistor.

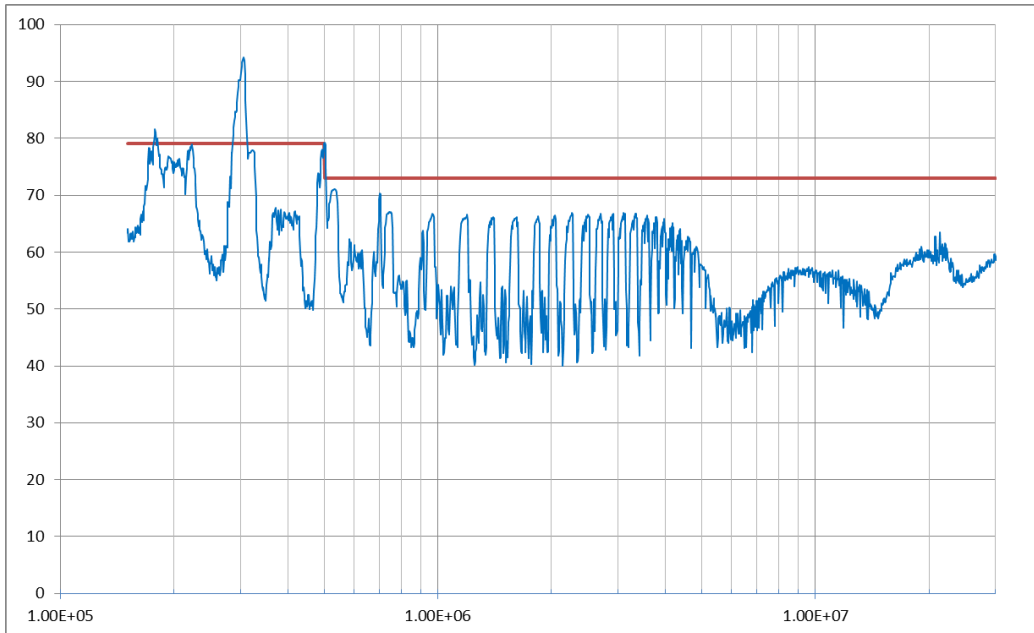
EMI Test Setup



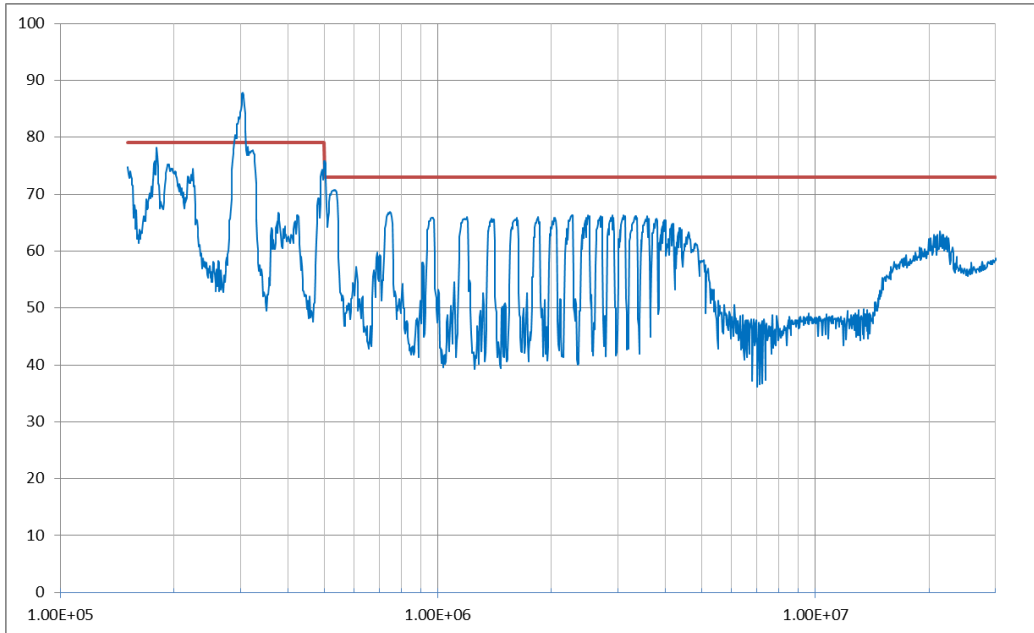
11.1 115V_{AC}/60Hz: Line



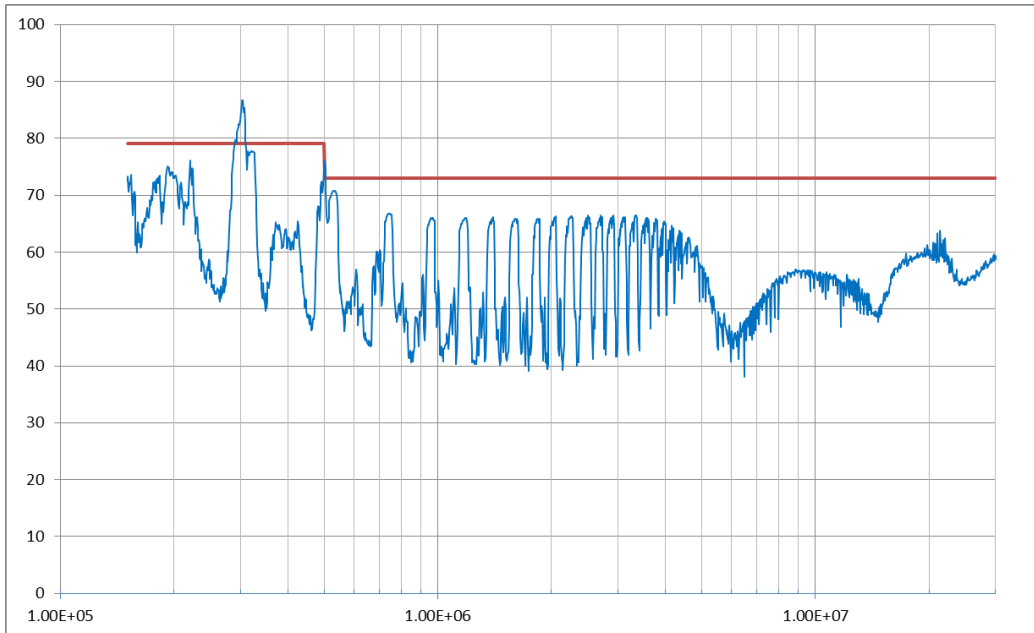
11.2 115V_{AC}/60Hz: Neutral



11.3 230V_{AC}/50Hz: Line



11.4 230V_{AC}/50Hz: Neutral



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