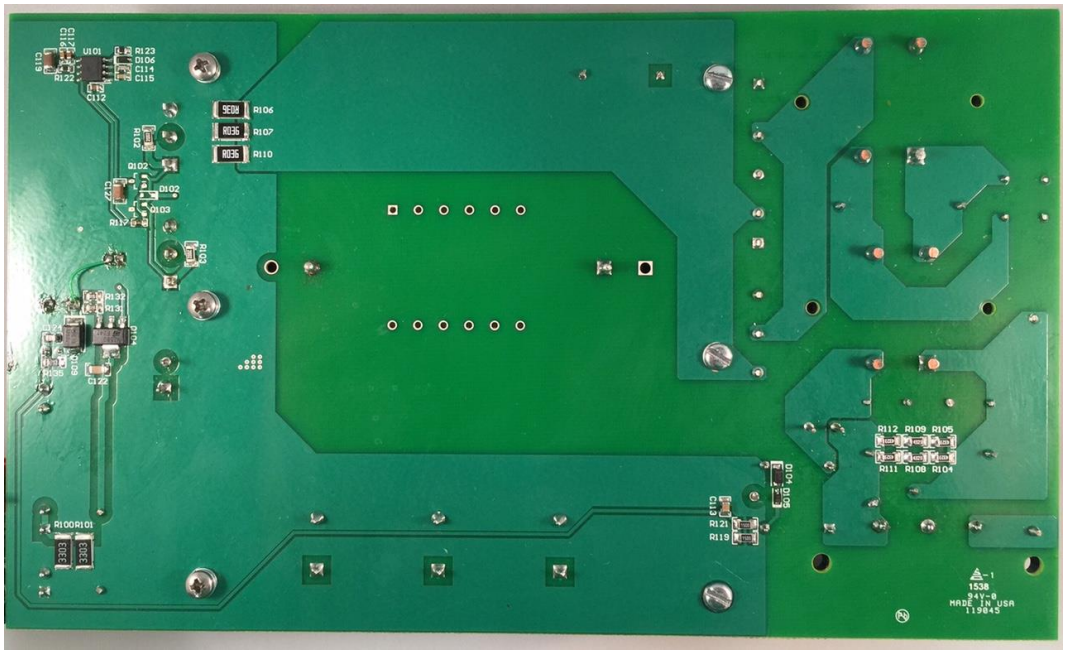
1 Photo

The photographs below show the top and bottom views of the PMP11211 Rev A board, which is built on PMP11062 Rev A PCB.

Top Side

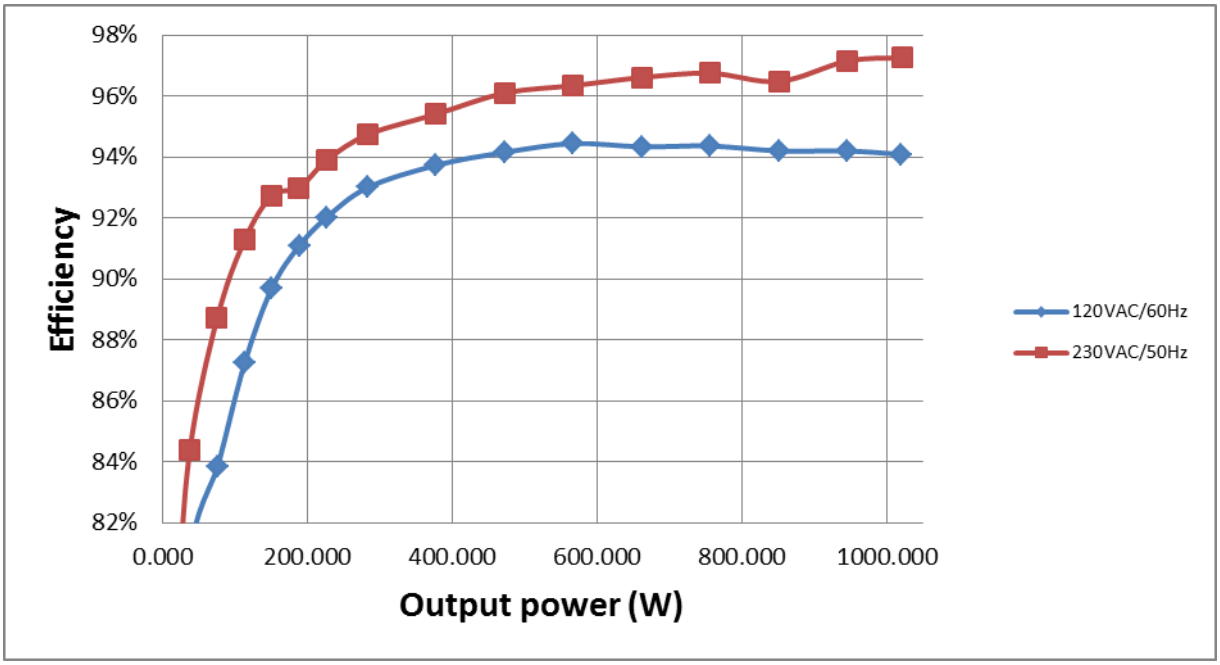
Bottom Side



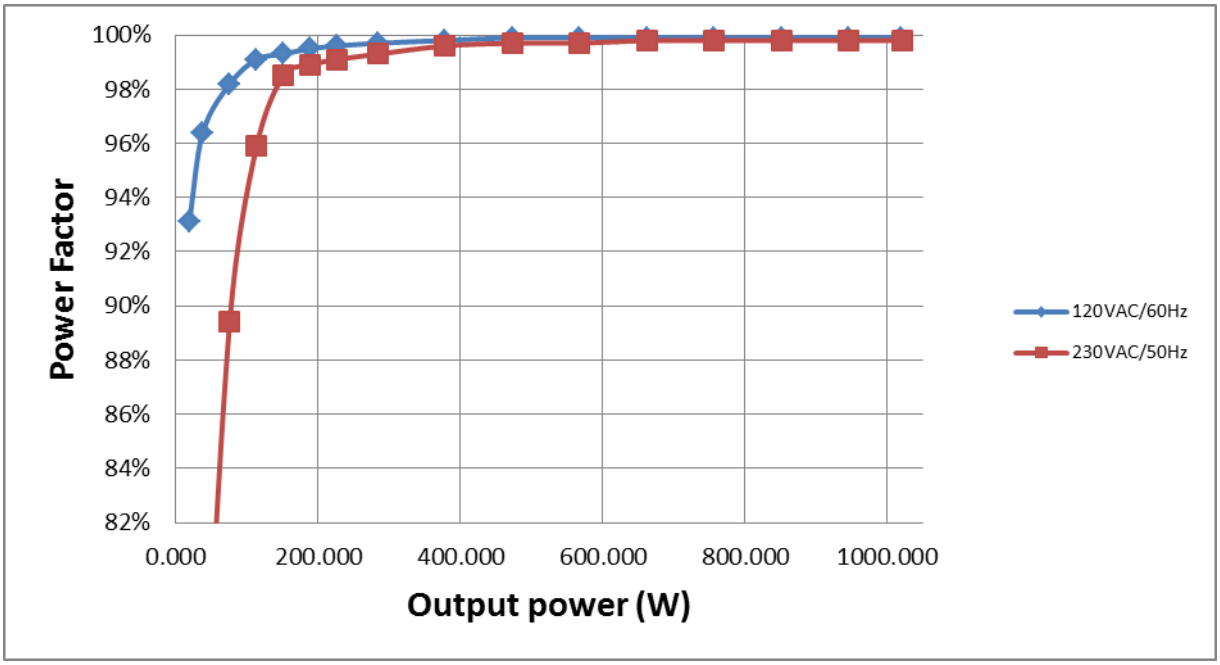
2 Efficiency and Power Factor

The efficiency curves of total supply are shown in the tables and graph below. Efficiency tests are performed with forced air (~300FPM).

2.1 Efficiency with G154015LF-ENG1 (Megaflux core) on L100:



2.2 Power factor with G154015LF-ENG1 (Megaflux core) on L100:



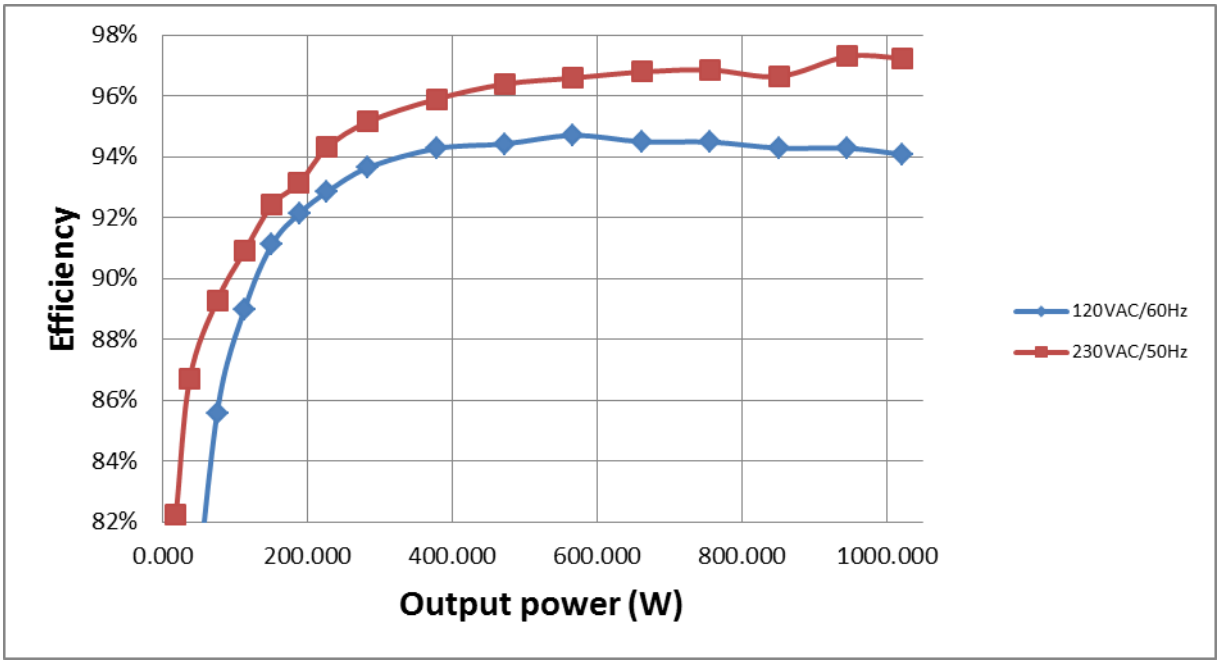
120V_{AC}/60Hz

Vin,rms(V)	Iin,rms(A)	Pin(W)	P.F.	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff. (%)
120.18	9.039	1084.00	0.999	378.3	2.696	1019.897	64.1032	94.09%
120.19	8.365	1004.00	0.999	378.3	2.500	945.750	58.2500	94.20%
120.18	7.535	904.00	0.999	378.3	2.251	851.553	52.4467	94.20%
120.1	6.685	801.60	0.999	378.2	2.000	756.400	45.2000	94.36%
119.86	5.863	701.60	0.999	378.2	1.750	661.850	39.7500	94.33%
120.12	5.009	600.70	0.999	378.2	1.500	567.300	33.4000	94.44%
119.86	4.192	501.70	0.999	378.2	1.249	472.372	29.3282	94.15%
120.16	3.364	403.50	0.998	378.2	1.000	378.200	25.3000	93.73%
119.99	2.550	305.00	0.997	378.2	0.750	283.650	21.3500	93.00%
120.02	2.063	246.60	0.996	378.2	0.600	226.920	19.6800	92.02%
120.01	1.739	207.60	0.995	378.2	0.500	189.100	18.5000	91.09%
120	1.415	168.61	0.993	378.1	0.400	151.240	17.3700	89.70%
120.09	1.093	130.04	0.991	378.1	0.300	113.430	16.6100	87.23%
120.08	0.769	90.67	0.982	378.1	0.201	75.998	14.6719	83.82%
120.09	0.404	46.81	0.964	378.2	0.100	37.820	8.9900	80.79%
120.03	0.255	28.47	0.931	378.2	0.050	18.910	9.5600	66.42%

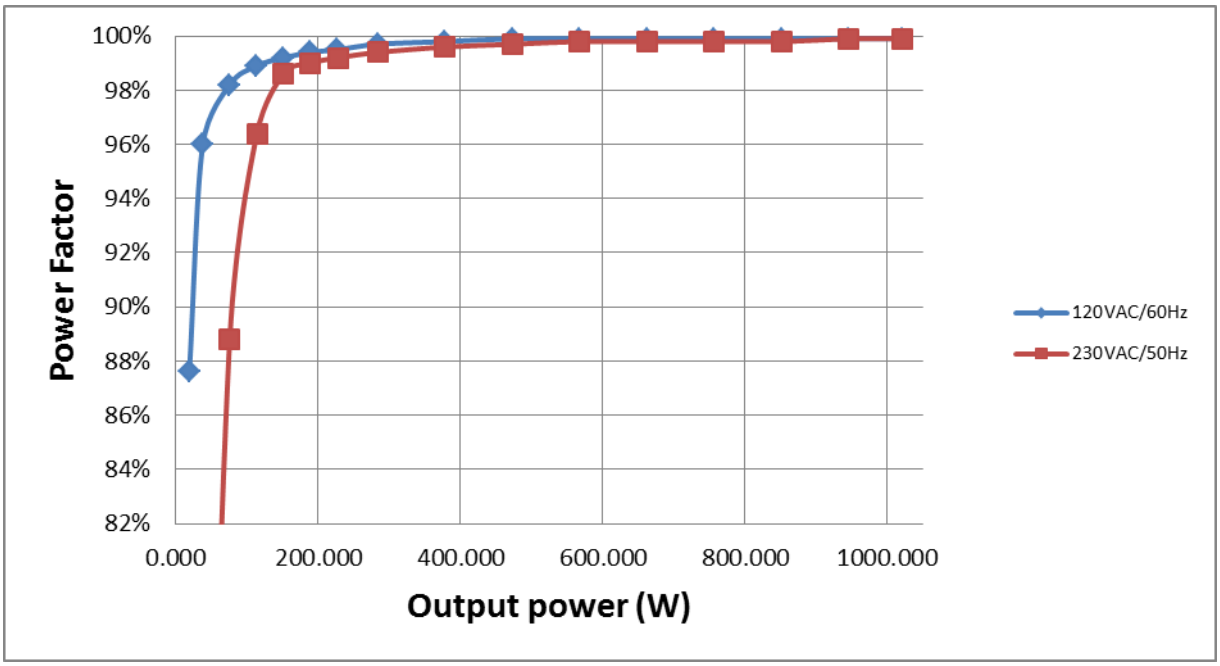
230V_{AC}/50Hz

Vin,rms(V)	Iin,rms(A)	Pin(W)	P.F.	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff. (%)
230	4.575	1050.00	0.998	378.1	2.701	1021.248	28.7519	97.26%
230	4.236	973.00	0.998	378.1	2.500	945.250	27.7500	97.15%
230.1	3.840	882.00	0.998	378.2	2.250	850.950	31.0500	96.48%
230	3.406	782.00	0.998	378.1	2.001	756.578	25.4219	96.75%
230	2.986	684.90	0.998	378.1	1.750	661.675	23.2250	96.61%
230	2.565	588.30	0.997	378.1	1.499	566.772	21.5281	96.34%
230	2.147	492.20	0.997	378.1	1.251	473.003	19.1969	96.10%
230	1.731	396.40	0.996	378.2	1.000	378.200	18.2000	95.41%
230	1.312	299.80	0.993	378.2	0.751	284.028	15.7718	94.74%
230	1.060	241.60	0.991	378.1	0.600	226.860	14.7400	93.90%
230	0.892	202.90	0.989	378.1	0.499	188.672	14.2281	92.99%
230	0.720	163.10	0.985	378.1	0.400	151.240	11.8600	92.73%
230	0.564	124.31	0.959	378.2	0.300	113.460	10.8500	91.27%
230	0.415	85.25	0.894	378.1	0.200	75.620	9.6300	88.70%
230	0.272	44.83	0.718	378.2	0.100	37.820	7.0100	84.36%
230	0.197	24.00	0.529	378.1	0.050	18.905	5.0950	78.77%

2.3 Efficiency with G154015LF (Sendust core) on L100:



2.4 Power factor with G154015LF (Sendust core) on L100:



120V_{AC}/60Hz

Vin,rms(V)	Iin,rms(A)	Pin(W)	P.F.	Vout(V)	Iout(A)	Pout(W)	Losses(W)	Eff. (%)
120	9.066	1086.00	0.999	378.4	2.700	1021.680	64.3200	94.08%
120.03	8.369	1003.00	0.999	378.4	2.499	945.622	57.3784	94.28%
119.99	7.539	903.00	0.999	378.4	2.250	851.400	51.6000	94.29%
119.94	6.687	801.00	0.999	378.4	2.000	756.800	44.2000	94.48%
120.02	5.848	700.80	0.999	378.4	1.750	662.200	38.6000	94.49%
120	5.001	599.20	0.999	378.3	1.500	567.450	31.7500	94.70%
119.94	4.183	500.80	0.999	378.3	1.250	472.875	27.9250	94.42%
120.05	3.351	401.30	0.998	378.3	1.000	378.300	23.0000	94.27%
120	2.534	303.00	0.997	378.3	0.750	283.725	19.2750	93.64%
120.06	2.047	244.50	0.995	378.3	0.600	226.980	17.5200	92.83%
120.05	1.721	205.30	0.994	378.3	0.500	189.150	16.1500	92.13%
120.04	1.395	166.08	0.992	378.3	0.400	151.320	14.7600	91.11%
120.04	1.075	127.53	0.989	378.3	0.300	113.490	14.0400	88.99%
120.04	0.750	88.41	0.982	378.3	0.200	75.660	12.7500	85.58%
120.14	0.428	49.33	0.960	378.3	0.100	37.830	11.5000	76.69%
120.2	0.364	27.69	0.876	378.3	0.050	18.915	8.7750	68.31%

230V_{AC}/50Hz

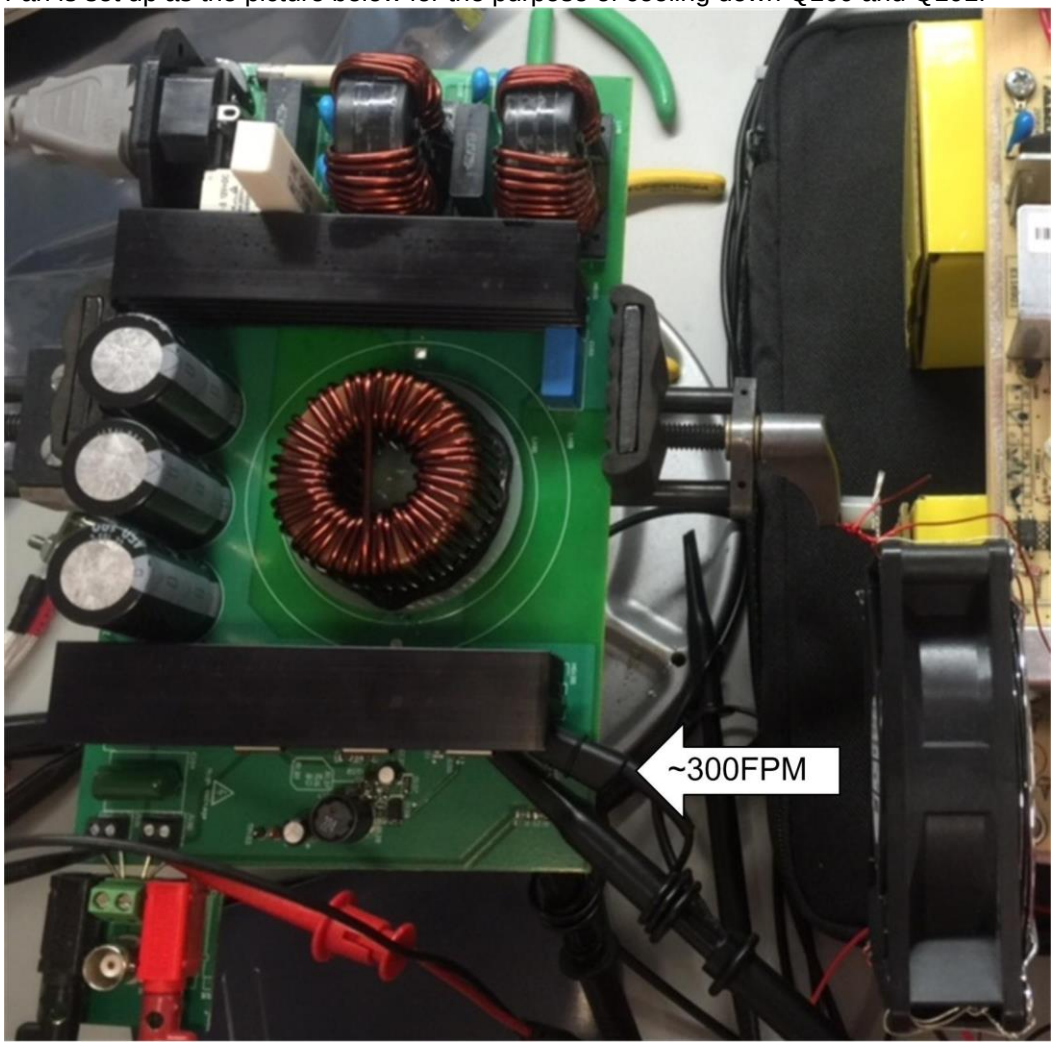
Vin,rms(V)	Iin,rms(A)	Pin(W)	P.F.	Vout(V)	Iout(A)	Pout(W)		Eff. (%)
229.8	4.573	1050.00	0.999	378.3	2.699	1021.032	28.9683	97.24%
230	4.236	972.00	0.999	378.3	2.500	945.750	26.2500	97.30%
230.1	3.837	881.00	0.998	378.4	2.250	851.400	29.6000	96.64%
230	3.400	780.80	0.998	378.3	1.999	756.222	24.5783	96.85%
230	2.980	684.00	0.998	378.3	1.750	662.025	21.9750	96.79%
229.9	2.562	587.50	0.998	378.3	1.500	567.450	20.0500	96.59%
230	2.139	490.60	0.997	378.3	1.250	472.875	17.7250	96.39%
230	1.722	394.50	0.996	378.3	1.000	378.300	16.2000	95.89%
230	1.305	298.60	0.994	378.3	0.751	284.103	14.4967	95.15%
230.1	1.056	241.10	0.992	378.3	0.601	227.358	13.7417	94.30%
230.1	0.890	202.70	0.990	378.3	0.499	188.772	13.9283	93.13%
230	0.722	163.74	0.986	378.3	0.400	151.320	12.4200	92.41%
230	0.565	125.25	0.964	378.3	0.301	113.868	11.3817	90.91%
230.1	0.415	84.75	0.888	378.3	0.200	75.660	9.0900	89.27%
230.1	0.316	43.63	0.601	378.3	0.100	37.830	5.8000	86.71%
230.1	0.253	23.00	0.396	378.3	0.050	18.915	4.0850	82.24%

3 Thermal Images

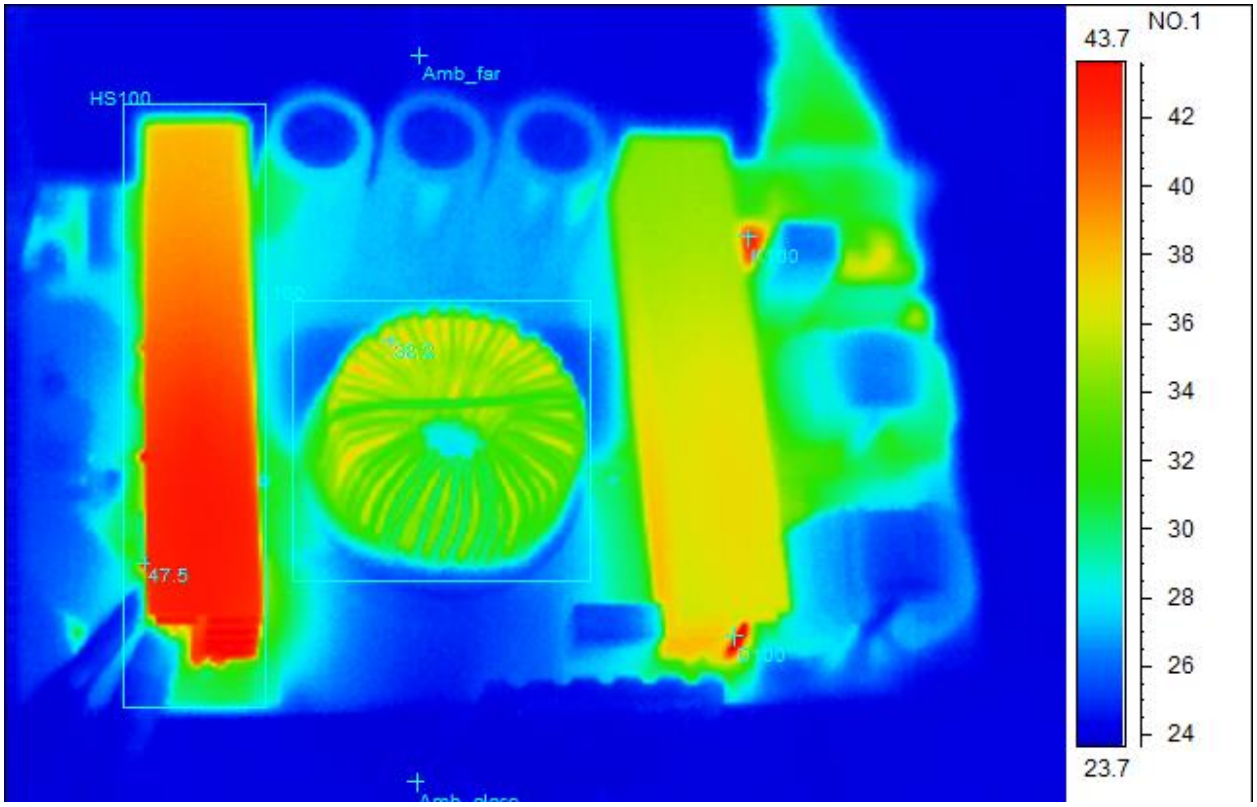
The thermal images below show top views of the board. The board is placed horizontally during the test. The ambient temperature was 25ºC. The output was loaded with 378V/2.7A.

3.1 Thermal test with forced air flow and G154015LF-ENG1 (Megaflux core) on L100:

Fan is set up as the picture below for the purpose of cooling down Q100 and Q101.

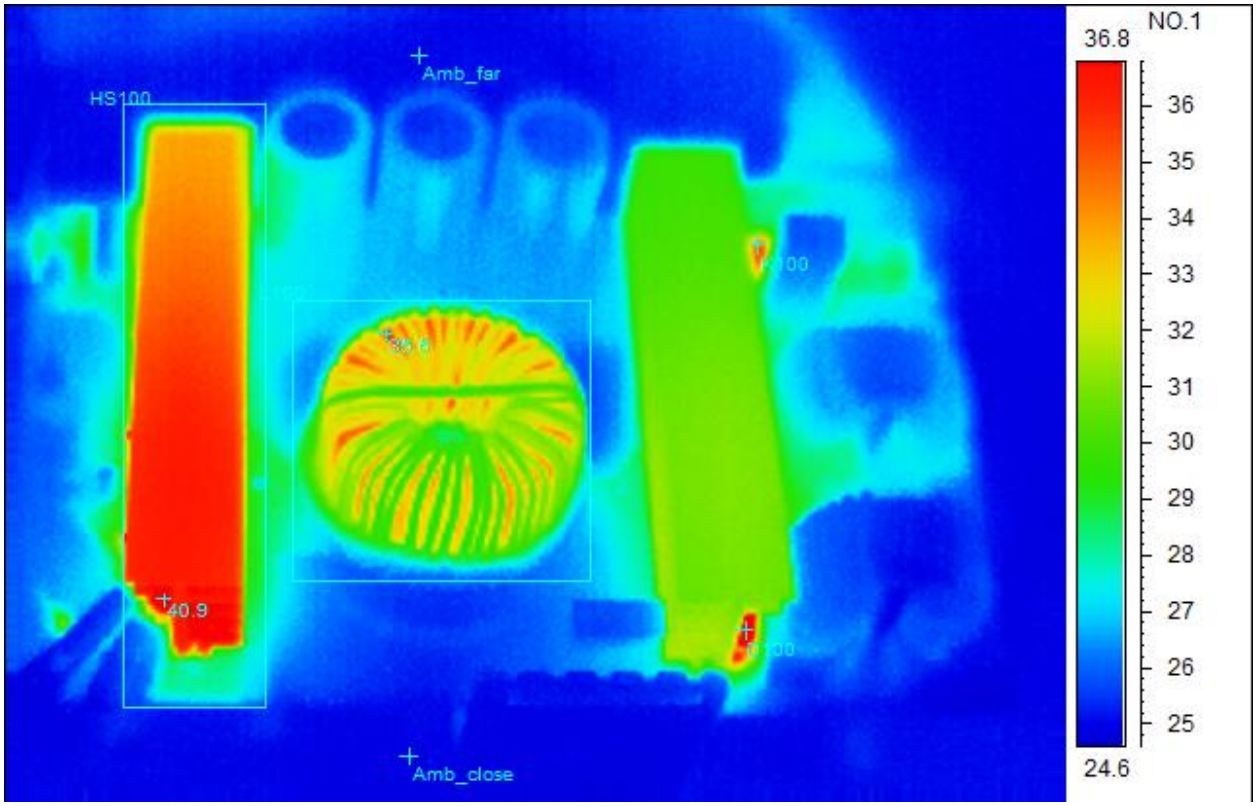


3.1.1 120V_{AC}/60Hz



Spot analysis	Value
Amb_closeTemperature	24.0°C
Amb_farTemperature	24.3°C
K100Temperature	41.8°C
D100 Temperature	44.5°C
Area analysis	**Value**
HS100Max	47.5°C
L100Max	38.2°C

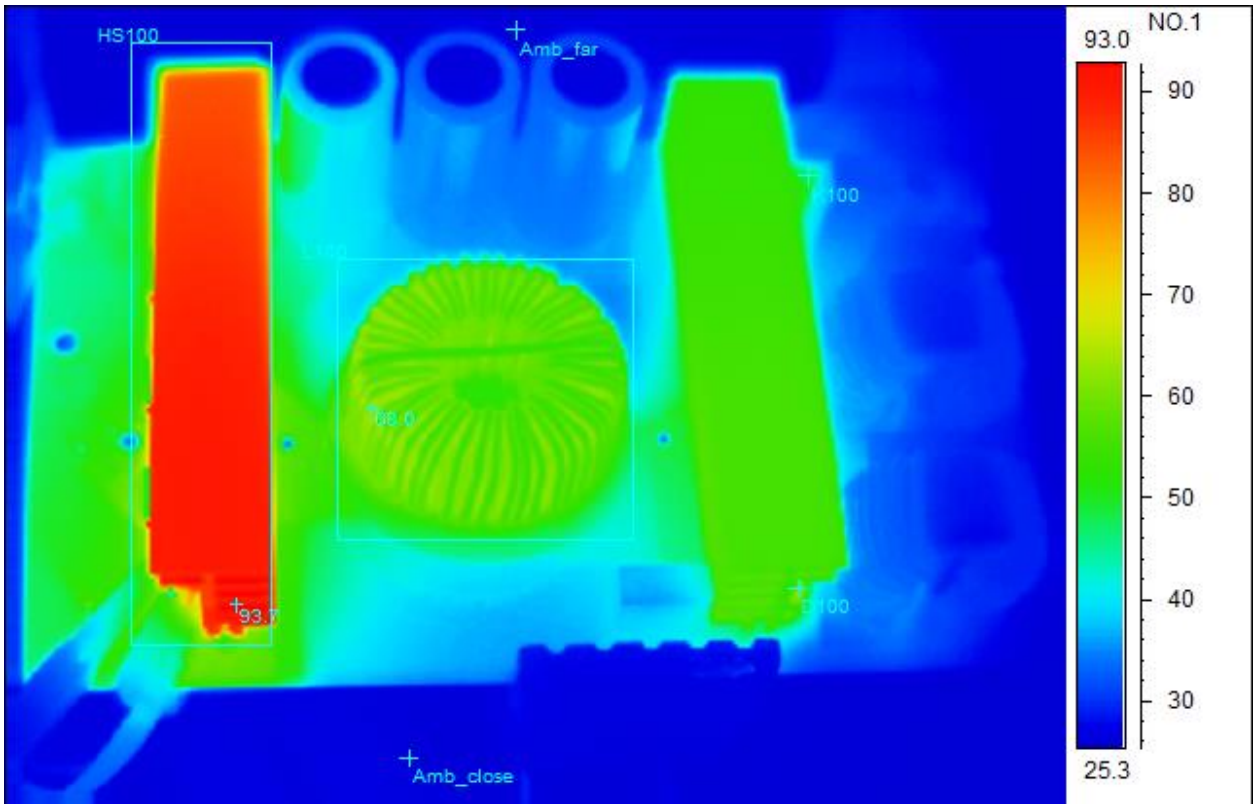
3.1.2 230V_{AC}/50Hz



Spot analysis	Value
Amb_closeTemperature	25.0°C
Amb_farTemperature	25.2°C
K100Temperature	34.7°C
D100 Temperature	38.8°C
Area analysis	**Value**
HS100Max	40.9°C
L100Max	35.5°C

3.2 Thermal test with natural air flow and G154015LF-ENG1 (Megaflux core) on L100:

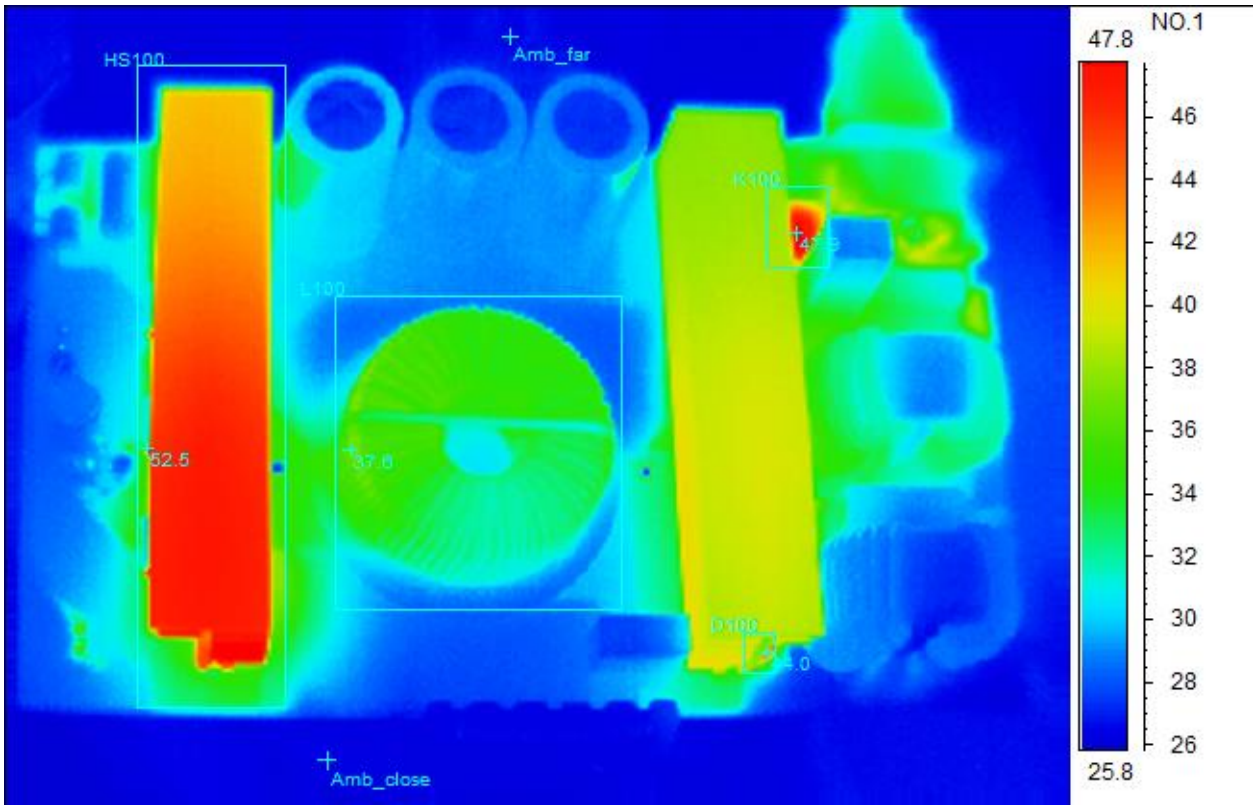
3.2.1 $230V_{AC}$/50Hz



Spot analysis	Value
Amb_closeTemperature	26.3°C
Amb_farTemperature	26.3°C
K100Temperature	51.2°C
D100 Temperature	65.1°C
Area analysis	**Value**
HS100Max	93.7°C
L100Max	68.0°C

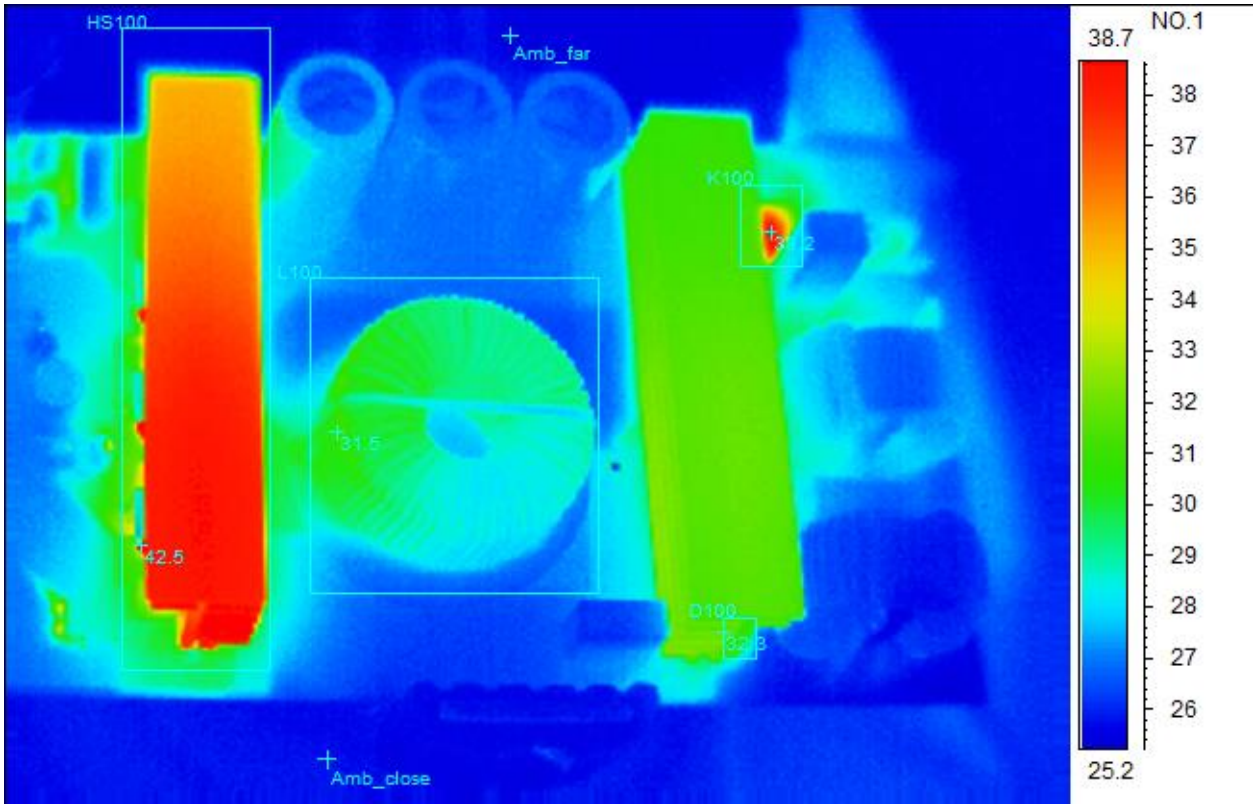
3.3 Thermal test with forced air flow (~300FPM) and G154015LF (Sendust core) on L100:

3.3.1 120V_{AC}/60Hz



Spot analysis	Value
Amb_closeTemperature	26.4°C
Amb_far Temperature	26.5°C
Area analysis	**Value**
K100Max	47.9°C
D100Max	44.0°C
L100Max	37.6°C
HS100Max	52.5°C

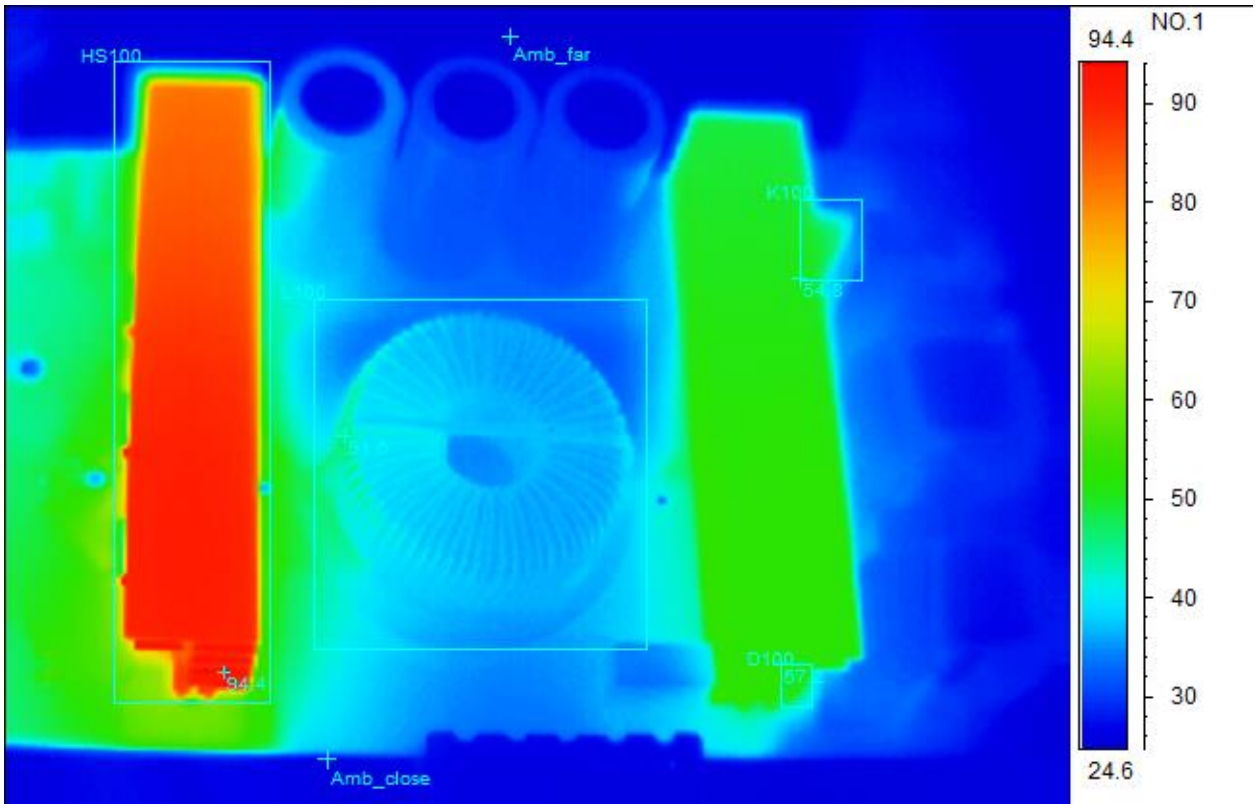
3.3.2 230V_{AC}/50Hz



Spot analysis	Value
Amb_closeTemperature	25.8°C
Amb_far Temperature	25.5°C
Area analysis	**Value**
K100Max	38.2°C
D100Max	32.3°C
L100Max	31.5°C
HS100Max	42.5°C

3.4 Thermal test with natural air flow and G154015LF (Sendust core) on L100:

3.4.1 230V_{AC}/50Hz



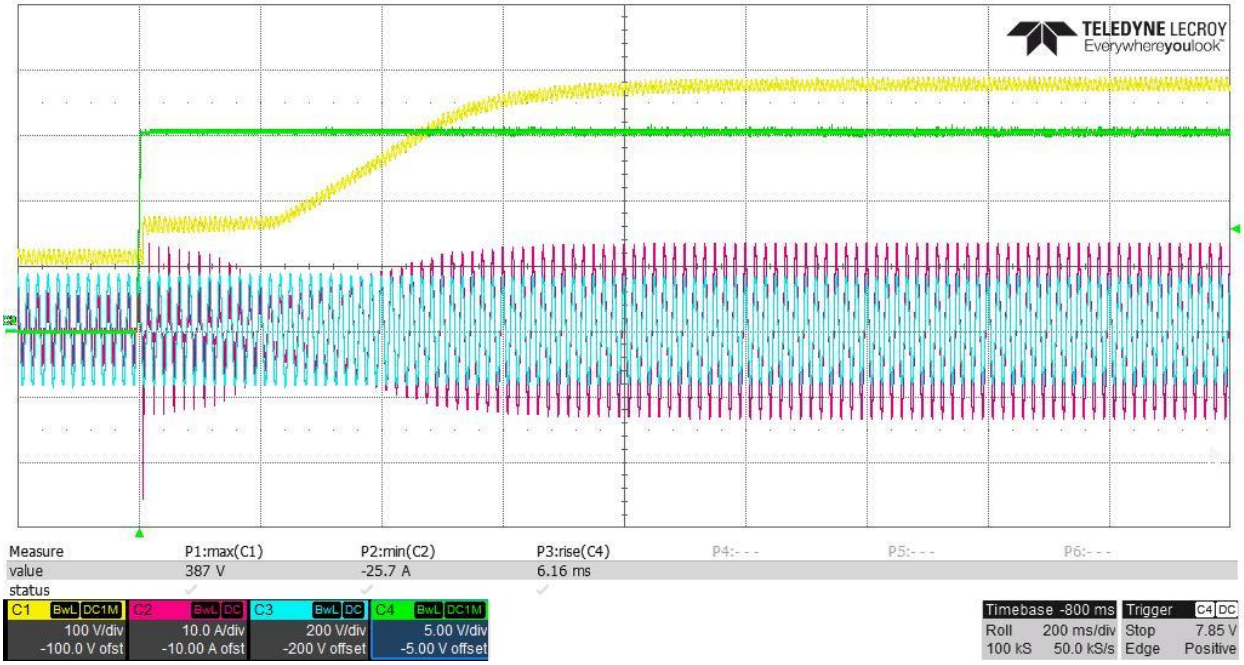
Spot analysis	Value
Amb_closeTemperature	28.2°C
Amb_far Temperature	25.2°C
Area analysis	**Value**
K100Max	54.8°C
D100Max	57.2°C
L100Max	51.6°C
HS100Max	94.4°C

4 Startup

The voltages at startup are shown in the images below. Startup tests are done with G154015LF-ENG1 (Megaflux core) on L100.

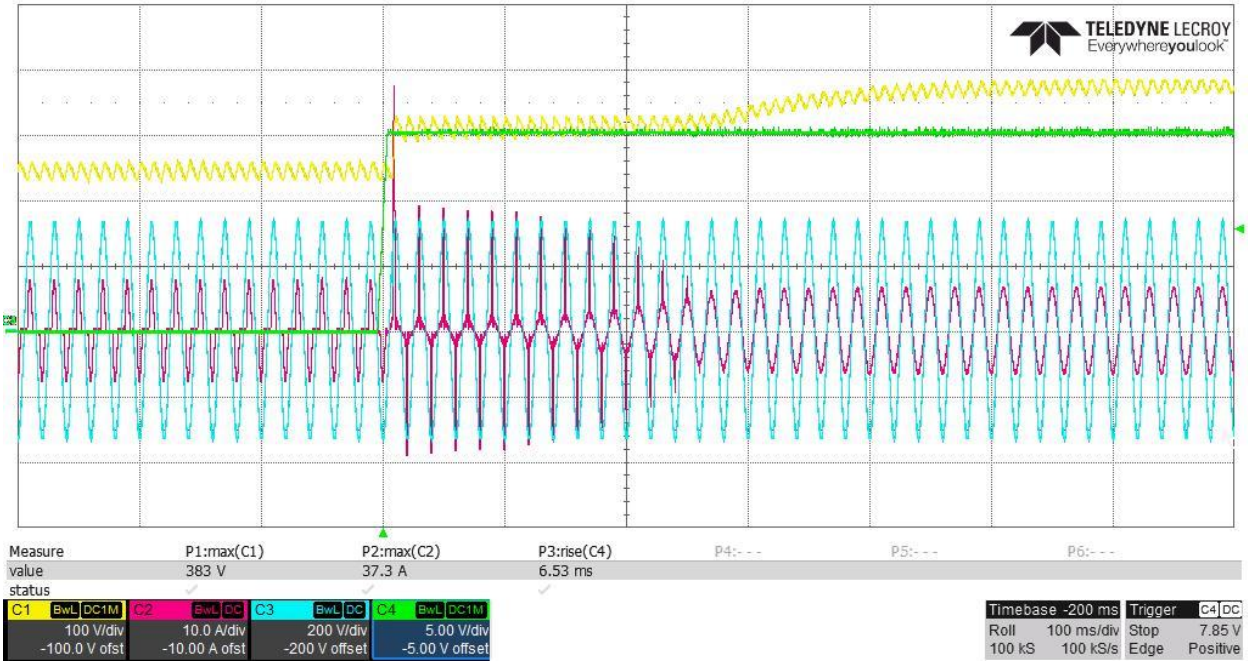
4.1 120V_{AC}/60Hz – 1000W full load on J100

CH1: V(C104) CH2: Iin, CH3: Vin, and CH4: V(C123).



4.2 230V_{AC}/50Hz – 1000W full load on J100

CH1: V(C104) CH2: Iin, CH3: Vin, and CH4: V(C123).

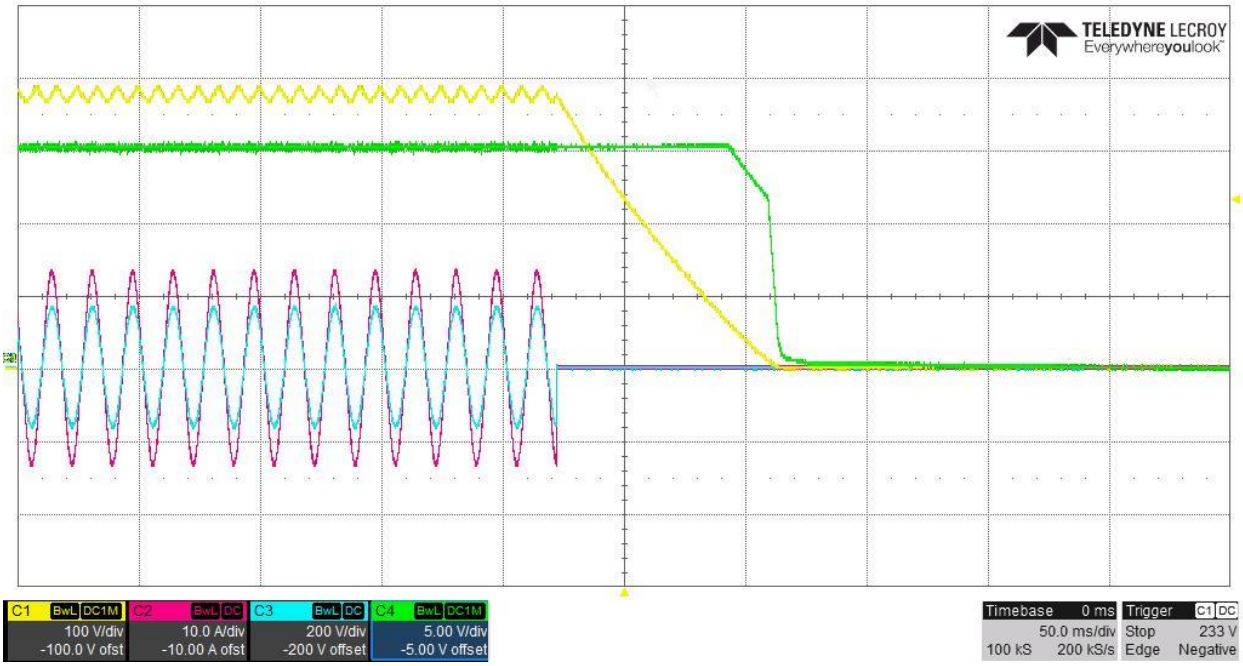


5 Turn-off

The voltages at turn-off are shown in the images below. Turn-off tests are done with G154015LF-ENG1 (Megaflux core) on L100.

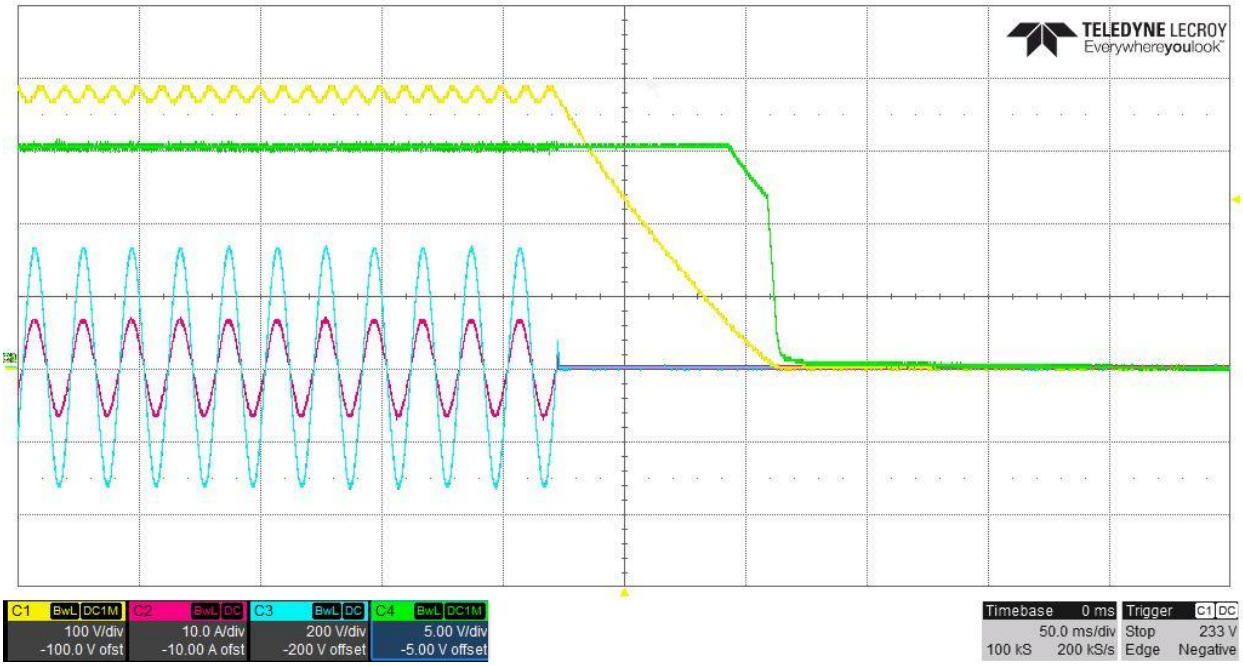
5.1 $120V_{AC}$/60Hz – 1000W full load on J100

CH1: V(C104) CH2: Iin, CH3: Vin, and CH4: V(C123).



5.2 $230V_{AC}$/50Hz – 1000W full load on J100

CH1: V(C104) CH2: Iin, CH3: Vin, and CH4: V(C123).

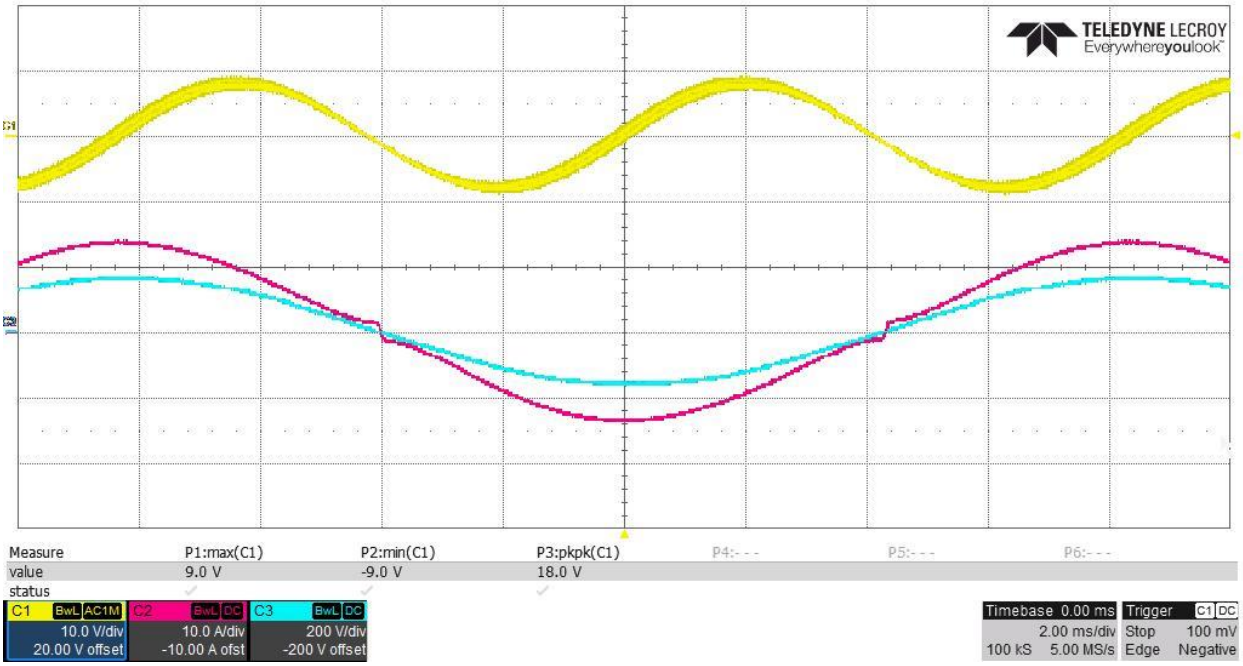


6 Output Ripple Voltage

The output ripple voltage (in AC level) during 1000W full load is shown in the plots below.

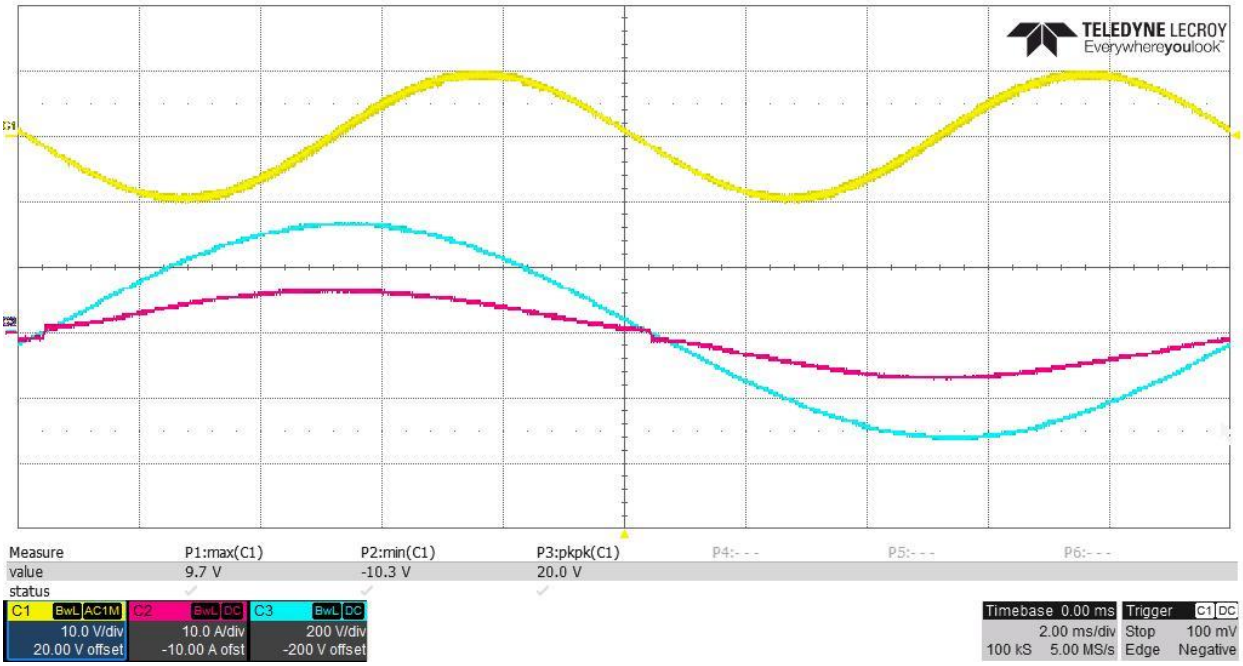
6.1 $120V_{AC}$/60Hz

CH1: V(C104) CH2: Iin, and CH3: Vin.



6.2 $230V_{AC}$/50Hz

CH1: V(C104) CH2: Iin, and CH3: Vin.

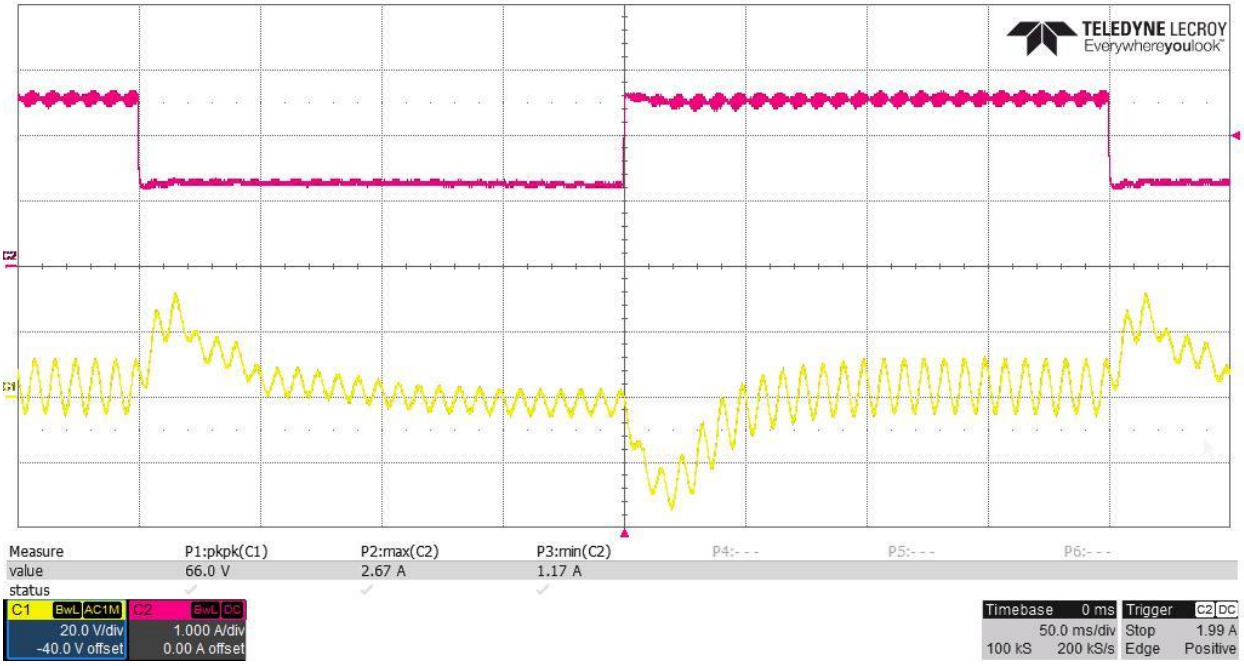


7 Transient Response

Transient responses are shown in the plots below. G154015LF-ENG1 (Megaflux core) is applied to L100

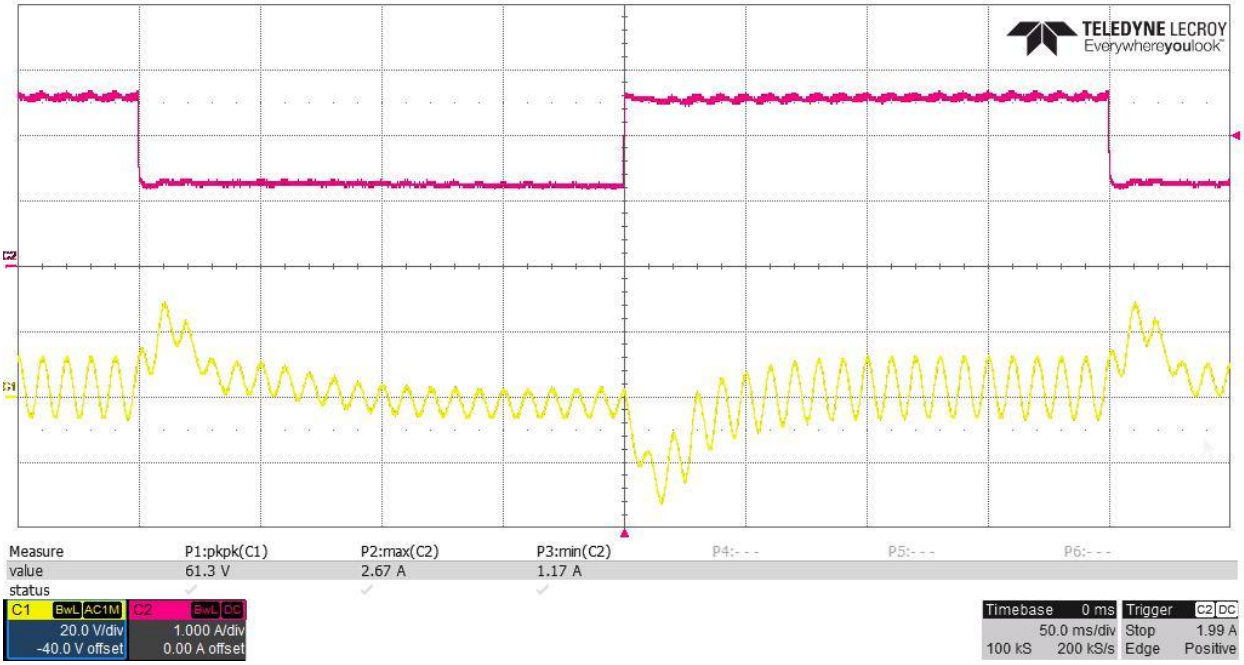
7.1 120V_{AC}/60Hz, load changes from 1.15A to 2.65A

CH1: V(C104) and CH2: Iout.



7.2 230V_{AC}/50Hz, load changes from 1.15A to 2.65A

CH1: V(C102) and CH2: Iout.

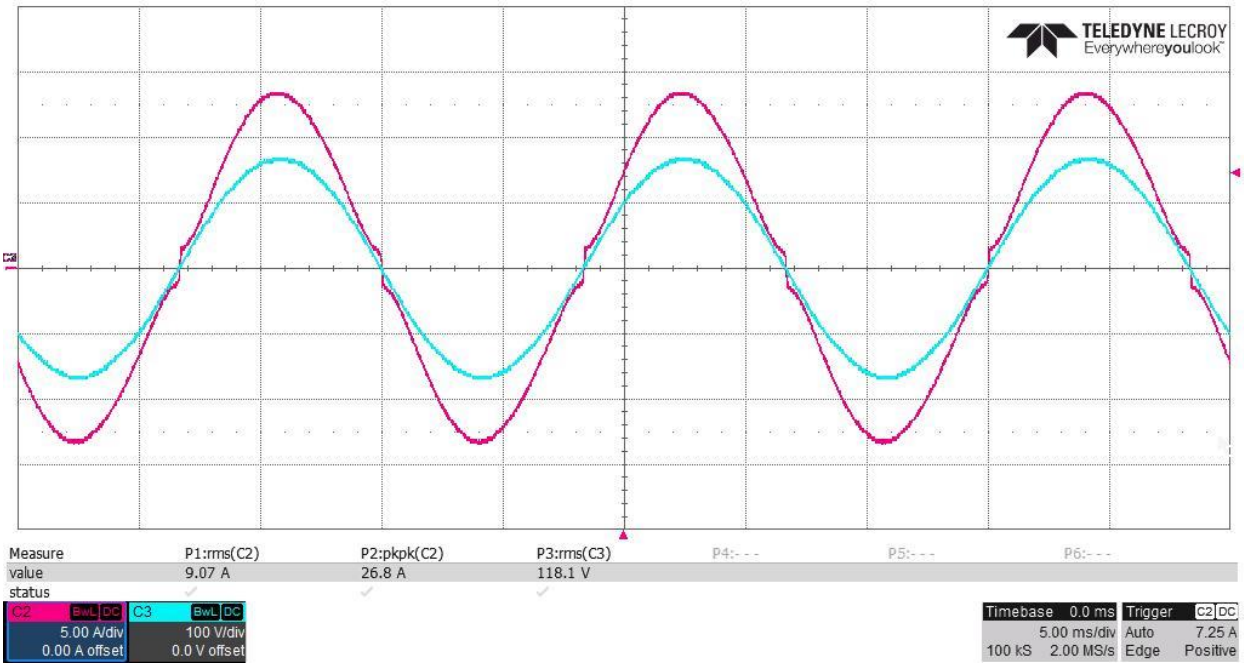


8 Key Waveforms

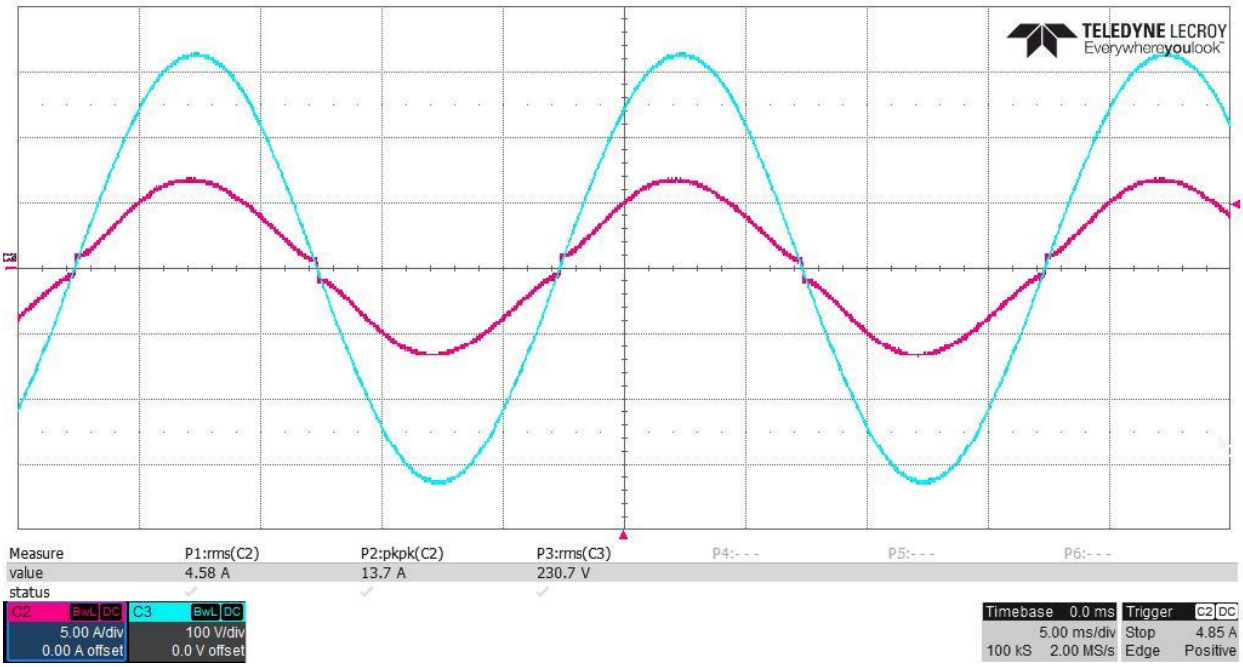
Key waveforms are measured with G154015LF-ENG1 (Megaflux core) on L100.

8.1 Input current and voltage waveforms

8.1.1 120V_{AC}/60Hz, 1000W.

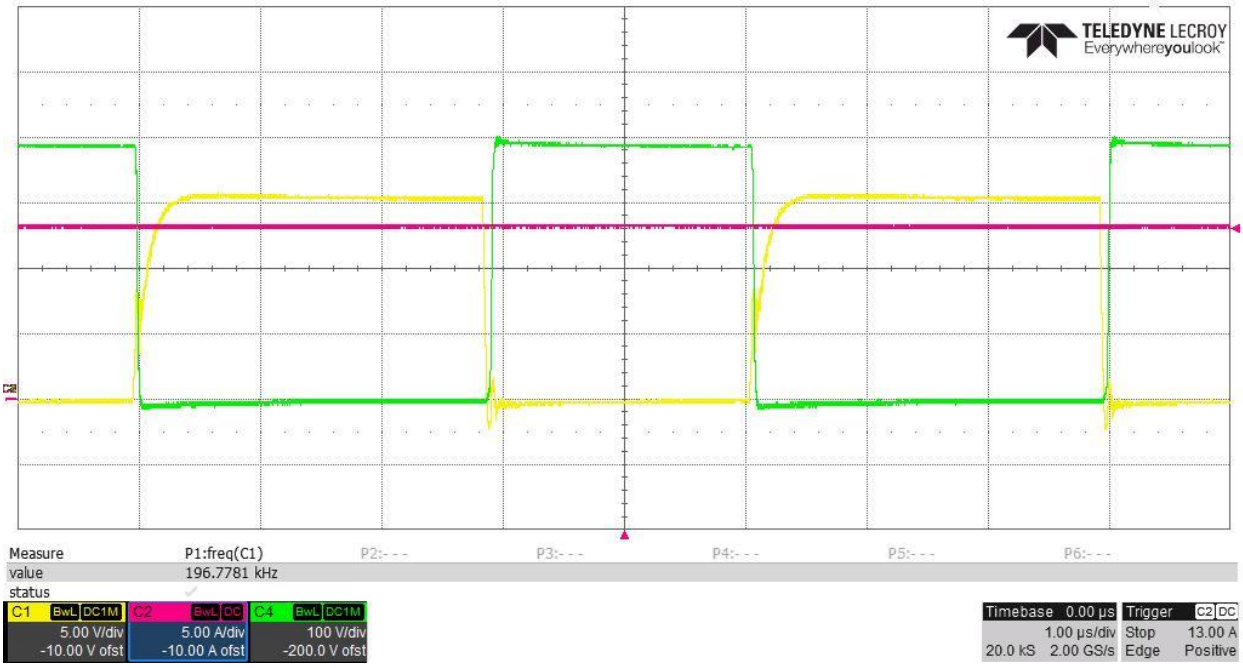


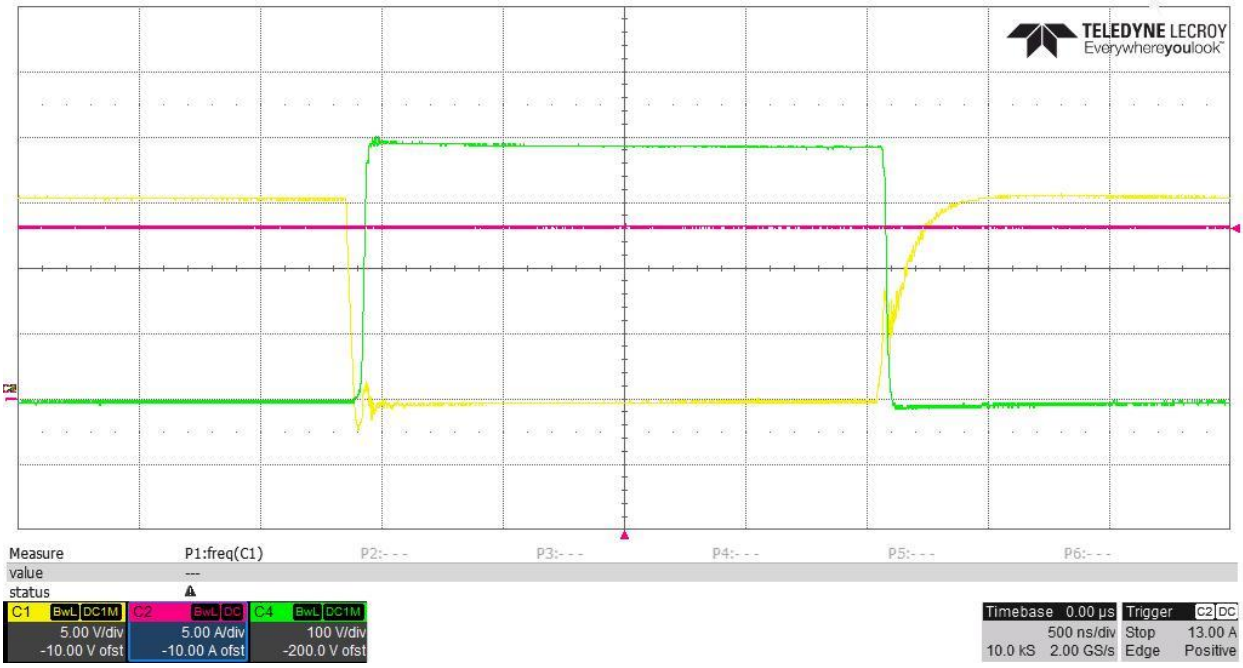
8.1.2 230V_{AC}/50Hz, 1000W.



8.2 Q100 @ 1000W output from J100 and 120V_{AC}/60Hz.

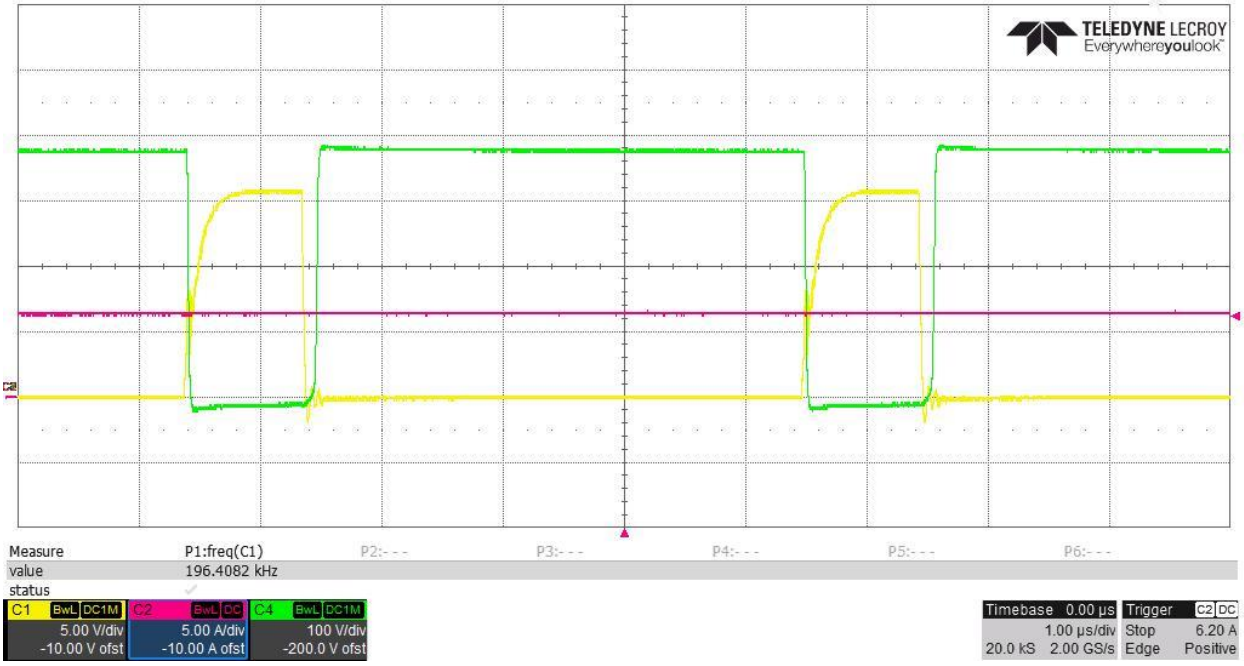
CH1: V_{GS}, CH2: Iin, and CH4: V_{DS}.

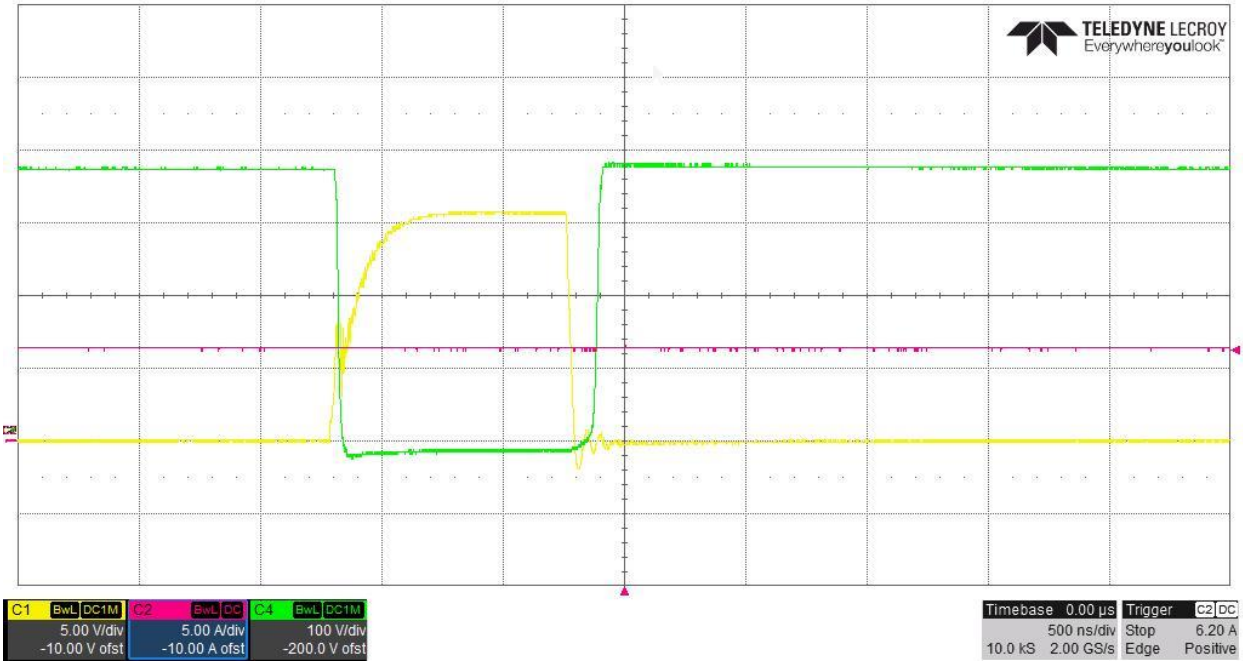




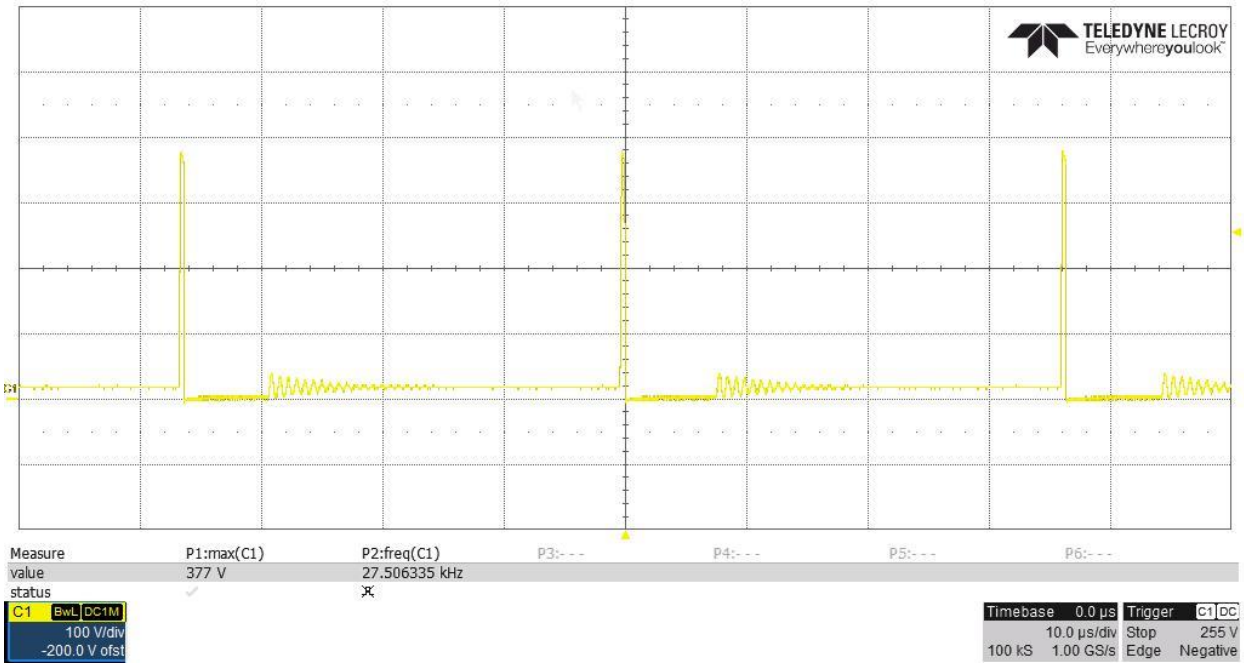
8.3 Q100 @ 1000W output from J100 and 230V_{AC}/50Hz.

CH1: V_{GS}, CH2: Iin, and CH4: V_{DS}.





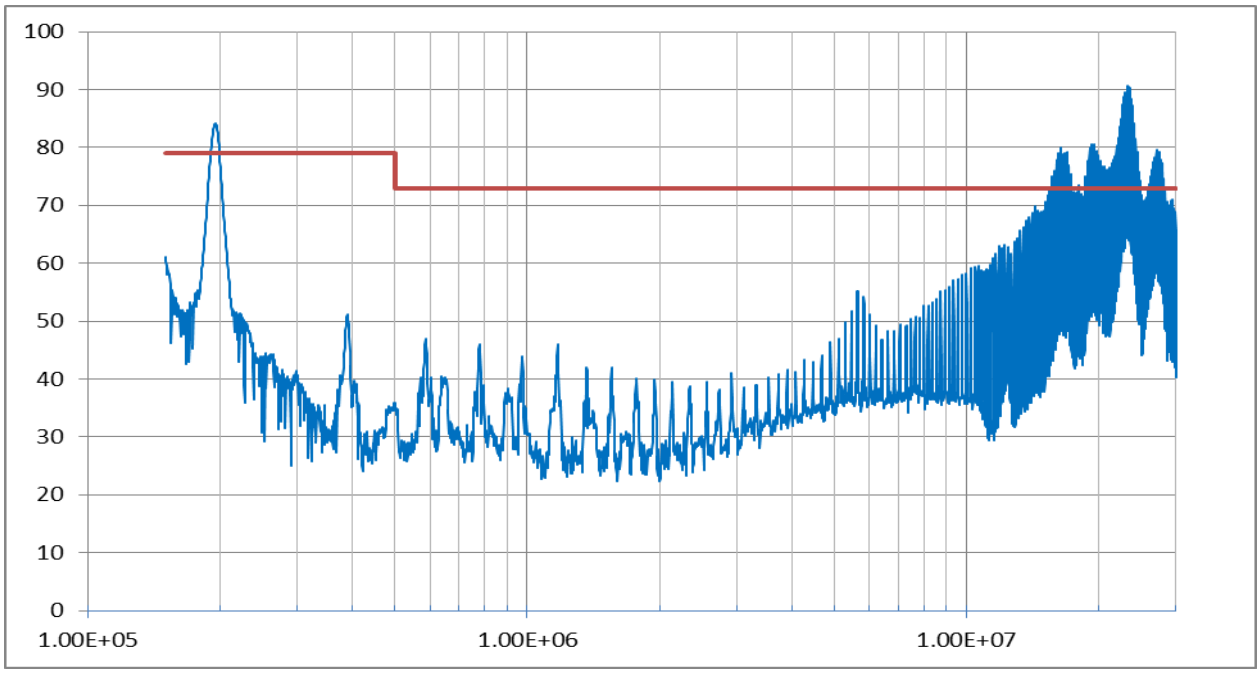
8.4 D109 @ 1000W output from J100.



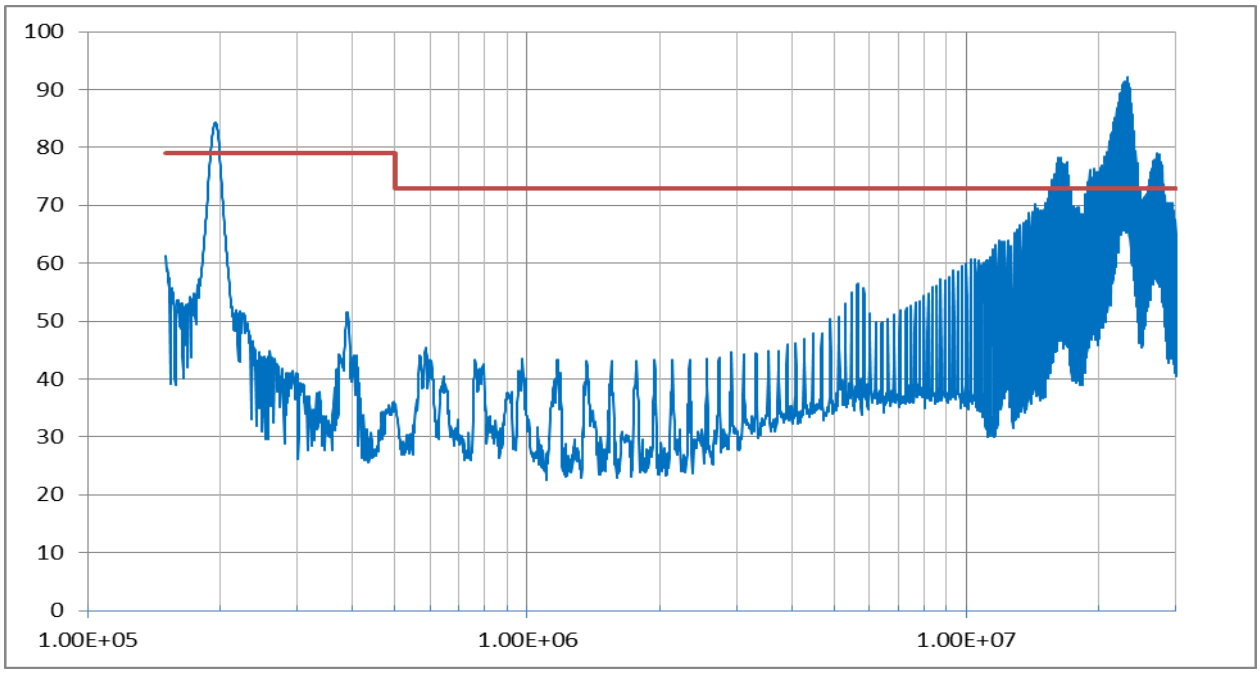
9 Conducted EMI:

The following curves show the **peak scan** results with **maximum hold** on PMP11211Rev A board. The board is loaded with 145Ω resistor.

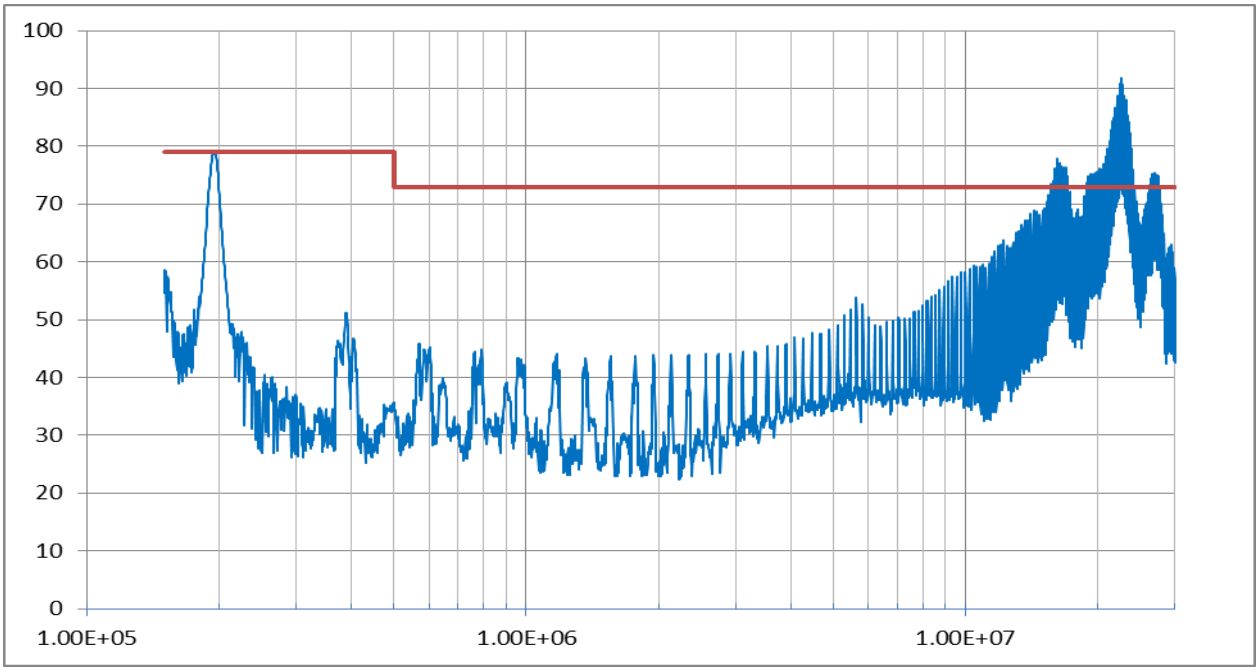
9.1 120V_{AC}/60Hz, I_{in}=8.53A with G154015LF (Sendust core) on L100: Line



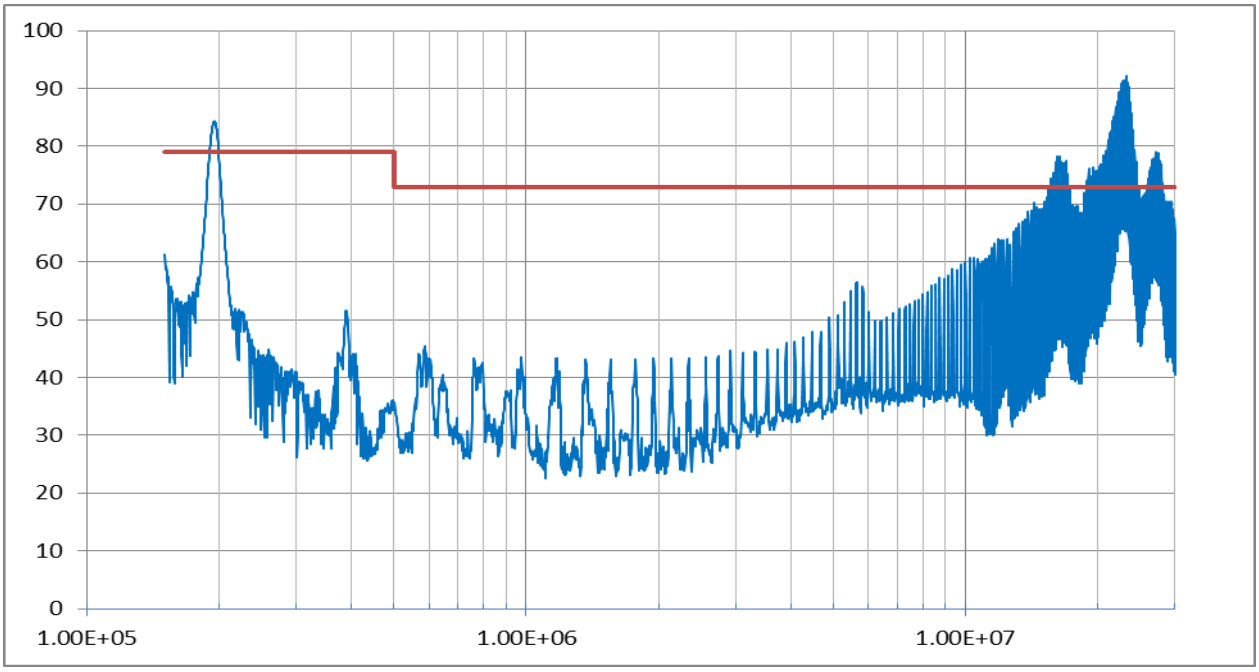
9.2 120V_{AC}/60Hz, I_{in}=8.53A with G154015LF (Sendust core) on L100: Neutral



9.3 230V_{AC}/50Hz, I_{in}=4.37A with G154015LF (Sendust core) on L100: Line



9.4 230V_{AC}/50Hz, I_{in}=4.37A with G154015LF (Sendust core) on L100: Neutral



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