Nemko Korea Co., Ltd.

155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 16885 KOREA, REPUBLIC OF
TEL : + 82 31 330 1700 FAX : + 82 31 322 2332

FCC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Dongbu Daewoo Electronics Corporation
(Cheongcheon-dong), 12, Bupyeongbuk-ro
236 beon-gil, Bupyeong-gu, Incheon,
Korea, Republic of
Attn : Mr. Byung-Seok, Kim

Dates of Issue : December 14, 2017
Test Report No. : NK-17-E-0733
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

FCC ID	***C5F7NF1DMO110N***
Trade Mark	***DAEWOO***
Contact Person	**Dongbu Daewoo Electronics Corporation** **(Cheongcheon-dong), 12, Bupyeongbuk-ro** **236 beon-gil, Bupyeong-gu, Incheon, Korea, Republic of** **Mr. Byung-Seok, Kim** **Telephone No. : + 82 32 510 7919**

Applied Standard :	FCC Part 18 & Part 2
Classification :	Consumer ISM equipment
EUT Type :	Microwave Oven

The device bearing the Trade Mark and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in MP-5:1986.
I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completen ess of these measurements and vouch for the qualific ations of all persons taking them.

Dec 14, 2017

Tested By : Dosheung Shin
Engineer

Dec 14, 2017

Reviewed By : Sangkyu Lee
Technical Manager

TABLE OF CONTENTS

SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 18.

Responsible Party :	Dongbu Daewoo Electronics Corporation
Contact Person :	Mr. Byung-Seok, Kim Tel No.: + 82 32 510 7919
Manufacturer :	Dongbu Daewoo Electronics Corporation (Cheongcheon-dong), 12, Bupyeongbuk-ro 236 beon-gil, Bupyeong-gu, Incheon, Korea, Republic of

- FCC ID: C5F7NF1DMO110N
- Model: KOR-1D**
  Note 1) First "*" : 0 ~ 9 or A ~ Z (Enclosure design difference)
  Note 2) Second "*" : 0 ~ 9 (Mechanical type) or A ~ Z (Electronic type)
- Trade Mark: DAEWOO
- EUT Type: Microwave Oven
- Applied Standard: FCC Part 18 & Part 2
- Test Procedure(s): MP-5:1986
- Dates of Test: October 24, 2017 to December 10, 2017
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK-17-E-0733

INTRODUCTION

The measurement procedure described in MP5:1986 for Methods of Measurement of radiated, powerline conducted radio noise, frequency and power output was used in determining emissions emanating from **Dongbu Daewoo Electronics Corporation.**
FCC ID : **C5F7NF1DMO110N, Microwave Oven.**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory***.
The site address is 155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 16885 KOREA, REPUBLIC OF
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18 miles) south-southeast from central Seoul.

The Nemko Korea Co., Ltd. has been accredited as a Conformity Assessment Body (CAB).

Nemko Korea Co., Ltd.
155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do
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Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab and Incheon Airport.

EUT INFORMATION

EUT Information

Intended use	Household
Type of appliance	Counter-top Type
Rated voltage & frequency	a.c. 120 V, 60 ㎐ Single Phase
Rated power output	1 100 W
Rated power consumption	1 600 W
Magnetron	RM269 (DAEWOO)

Component List

Item	Model	Manufacturer	Serial Number
Diode H.V.	CL01-12	GAOXING	N/A
Fan Motor	OEM-10DWX1-A07	OH SUNG	N/A
H.V. CAPACITOR	2100VAC 1.10uF	BICAI	N/A
Noise Filter	DWLF-M17	N/A	N/A
Magnetron	RM269	DAEWOO	171031CN
Board	M372-1	DAEWOO	40303-0110200-00
SYNCHRONOUS MOTOR	49TYD-16A1	YUYAO JING CHENG HIGH & NEW TECHNOLOGY CO.,LTD	N/A
Trans H.V.	DLAS11A0-1DA	QINGDAO YUNLU ENERGY TECHNOLOCY CO., LTD	N/A

DESCRIPTION OF TESTS

Radiation Hazard

A 700 mℓ water load was placed in the center of the oven.
The power setting was set to maximum power.
While the oven was operating, the Microwave Survey Meter probe was moved slowly around the door seams to check for leakage.

Input Power Measurement

A 700 mℓ water load was placed in the center of the oven and the oven set to maximum power. A 700 mℓ water load was chosen for its compatibility.
Input power and current were measured using a Power Analyzer.
Manufacturers to determine their input ratings commonly use this procedure.

Output Power Measurement

The Caloric Method was used to determine maximum output power.
The initial temperature of a 1000 mℓ water load was measured. The water load was placed in the center of the oven. The oven was operated at maximum output power for 47 seconds. Then the temperature of the water re-measured.

Frequency Measurements

Following the above test, after operating the oven long enough to assure that stable operating temperature were obtained, the operating frequency was monitored as the input voltage was varied between 80 percent to 125 percent of the nominal rating.
And the load quantity was reduced by evaporation to approximately 20 % of the original quantity with nominal rating.

DESCRIPTION OF TESTS

Conducted Emissions

The Line conducted emission test facility is located inside a 4 x 7 x 2.5 m shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 0.5 m away from the side of wall of the shielded room Rohde & Schwarz (ESH2-Z5) of the 50 ohm / 50 uH Line Impedance Stabilization Network(LISN) is bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz (ESH2-Z5) LISN.
Power to the LISN s are filtered by high-current high insertion loss power line filters.
The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1 / 2 ”.
If d.c. power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs,
All interconnecting cables more than 1 m were shortened by non-inductive bundling (serpentine fashion) to a 1 m length.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 150 ㎑ to 30 ㎒ with 20 ㎳ sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCI).
The detector functions were set to quasi-peak mode & average mode.
The bandwidth of receiver was set to 9 ㎑. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux a.c. outlet, if applicable; whichever determined the worst case emission.
Each EME reported was calibrated using the ROHDE & SCHWARZ signal generator.

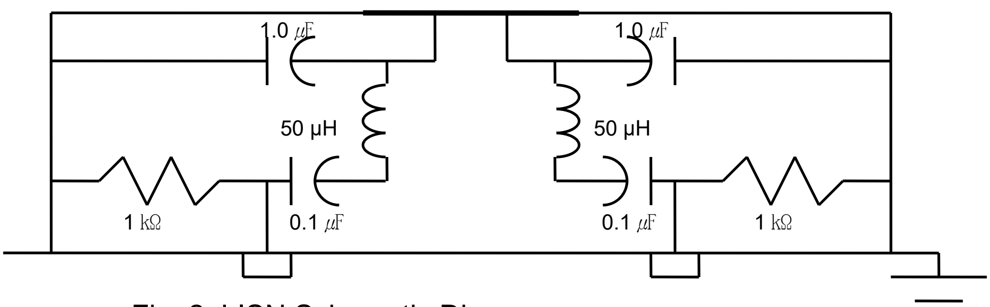


Fig. 2. LISN Schematic Diagram

DESCRIPTION OF TESTS

Radiated Emissions

Measurement were made indoors at 10 m & 3 m using antenna, signal conditioning unit and EMI test receiver to determine the frequency producing the maximum EME.
Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found.
The spectrum was scanned from 0.15 ㎒ to 30 ㎒ using Loop Antenna (ROHDE & SCHWARZ/HFH2-Z2)
and from 30 ㎒ to 1000 ㎒ using TRILOG Broadband Test Antenna (Schwarzbeck, VULB 9163).
Above 1 ㎓, Double Ridged Broadband Horn antenna (Schwarzbeck, HF907) was used.
Final Measurements were made indoors at 3 m using Loop Antenna (ROHDE & SCHWARZ/HFH2-Z2) for measurement from 0.15 to 30 ㎒ with RBW 9 ㎑ and made indoor at 10 m using TRILOG Broadband Test Antenna (Schwarzbeck, VULB 9163) for measurement from 30 ㎒ to 1000 ㎒ with RBW 100 ㎑ and made indoors at 3 m using Double Ridged Broadband Horn antenna (Schwarzbeck, HF907) for measurement from 1 ㎓ to 18 ㎓ with RBW 1 ㎒.
The detector function were set to quasi peak mode and the bandwidth of the receiver were set to 9 ㎑, 100 ㎑ and peak mode 1 ㎒ depending on the frequency or type of signal.
The Double Ridged Broadband Horn antenna was tuned to the frequency found during preliminary radiated measurements.
The EUT support equipment and interconnecting cables were re-configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non- metallic 1.0 X 1.5 meter table.
The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.
The EUT is rotated about its vertical axis on the turntable, and the polarization and height of the receiving antenna are varied to obtain the highest field strength on the particular frequency under observation.
Each EME reported was calibrated using the R/S signal generator.

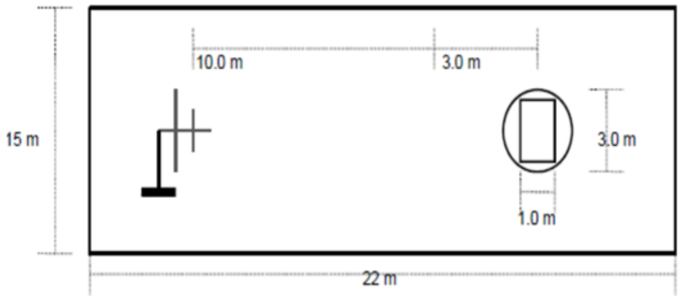


Fig. 3. Dimensions of 10 semi anechoic chamber

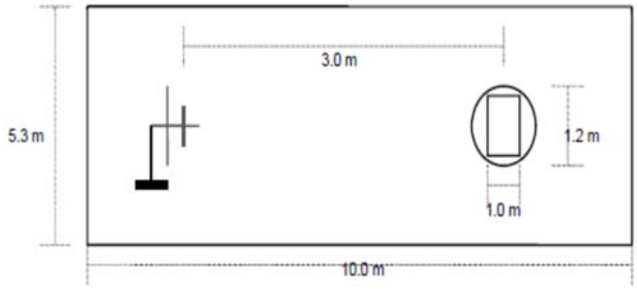


Fig. 4. Dimensions of 3 m full anechoic chamber

TEST DATA

Radiation Hazard

Probe Location	Maximum Leakage [mW/Cm2]	Limit [mW/Cm2]
A	0.05	1.00
B	0.02	1.00
All others	0.01	1.00

Input Power Measurement

Operation mode	P rated (W)	P (W)	dP (%)	Required dP (%)
Power Input	1 600	1 613	0.8	+ 15 %

Output Power Measurement

Quantity of Water [ml]	Mass of the container [g]	Ambient temperature [℃]	Initial temperature [℃]	Final temperature [℃]	Heating time [s]	Power output [W]
1 000	400	20.0	10	19.6	38	1 055

Formula :

$$P = \frac{4.187 \times m_w \times (T_1 - T_0) + 0.55 \times m_c \times (T_1 - T_A)}{t}$$

NOTE :

P is the microwave power output (W)

m_w is the mass of the water (g)

m_c is the mass of the container (g)

T_A is the ambient temperature (℃)

T_0 is the initial temperature of the water (℃)

T_1 is the final temperature of the water (℃)

t is the heating time (s), excluding the magnetron filament heating-up time.

Tested by : ***Dosheung Shin***

TEST DATA

Frequency measurements

▶Frequency vs Line Voltage Variation Test

[Room Temperature : 19.3 ± 1.0 ℃]

Line Voltage Variation (a.c. V)	*)Pole	Frequency [㎒]	Allowed Tolerance for the ISM Band
96 (80 %)	H	Lower : 2 413.4	Lower : 2 400 ㎒ Upper : 2 500 ㎒
	H	Upper : 2 478.8	
	V	Lower : 2 405.2	
	V	Upper : 2 469.7	
108 (90 %)	H	Lower : 2 401.4	
	H	Upper : 2 472.5	
	V	Lower : 2 415.3	
	V	Upper : 2 471.1	
120 (100 %)	H	Lower : 2 408.6	
	H	Upper : 2 468.7	
	V	Lower : 2 409.1	
	V	Upper : 2 470.6	
132 (110 %)	H	Lower : 2 411.5	
	H	Upper : 2 470.6	
	V	Lower : 2 401.9	
	V	Upper : 2 468.7	
150 (125 %)	H	Lower : 2 418.2	
	H	Upper : 2 465.3	
	V	Lower : 2 409.1	
	V	Upper : 2 469.7	

NOTE :

1. **Pol. H = Horizontal V = Vertical*
2. *Initial load : 1 000 ㎖ of water in the beaker.*
3. *Line voltage varied from 80 % to 125 %.*
4. *ISM Frequency : 2 450 ㎒, Tolerance : ± 50 ㎒*

RESULT : Pass

Tested by : ***Dosheung Shin***

TEST DATA

▶**Frequency vs Load Variation Test**

[Room Temperature : 16.9 ± 1.0 ℃]

Volume of water (㎖)	*)Pole	Frequency [㎒]	Allowed Tolerance for the ISM Band
200	H	Lower : 2 413.9	Lower : 2 400 ㎒ Upper : 2 500 ㎒
	H	Upper : 2 471.1	
	V	Lower : 2 414.4	
	V	Upper : 2 470.6	
400	H	Lower : 2 411.0	
	H	Upper : 2 471.1	
	V	Lower : 2 418.2	
	V	Upper : 2 468.7	
600	H	Lower : 2 408.1	
	H	Upper : 2 472.1	
	V	Lower : 2 417.7	
	V	Upper : 2 472.5	
800	H	Lower : 2 406.7	
	H	Upper : 2 470.6	
	V	Lower : 2 404.8	
	V	Upper : 2 471.1	
1000	H	Lower : 2 413.4	
	H	Upper : 2 467.7	
	V	Lower : 2 404.3	
	V	Upper : 2 469.2	

NOTE :

*1. *Pol. H = Horizontal, V = Vertical*

2. The water load was varied between 200 ㎖ to 1 000 ㎖.

3. Frequency was measured by using nominal voltage (a.c. 120 V).

4. ISM Frequency : 2 450 ㎒, Tolerance : ± 50 ㎒

RESULT : ***Pass***

Tested by : ***Dosheung Shin***

TEST DATA

Conducted Emissions

FCC ID : C5F7NF1DMO110N

[Room Temperature : 20.5 ± 1.0 ℃]

EMI Auto Test(1) 1 / 2

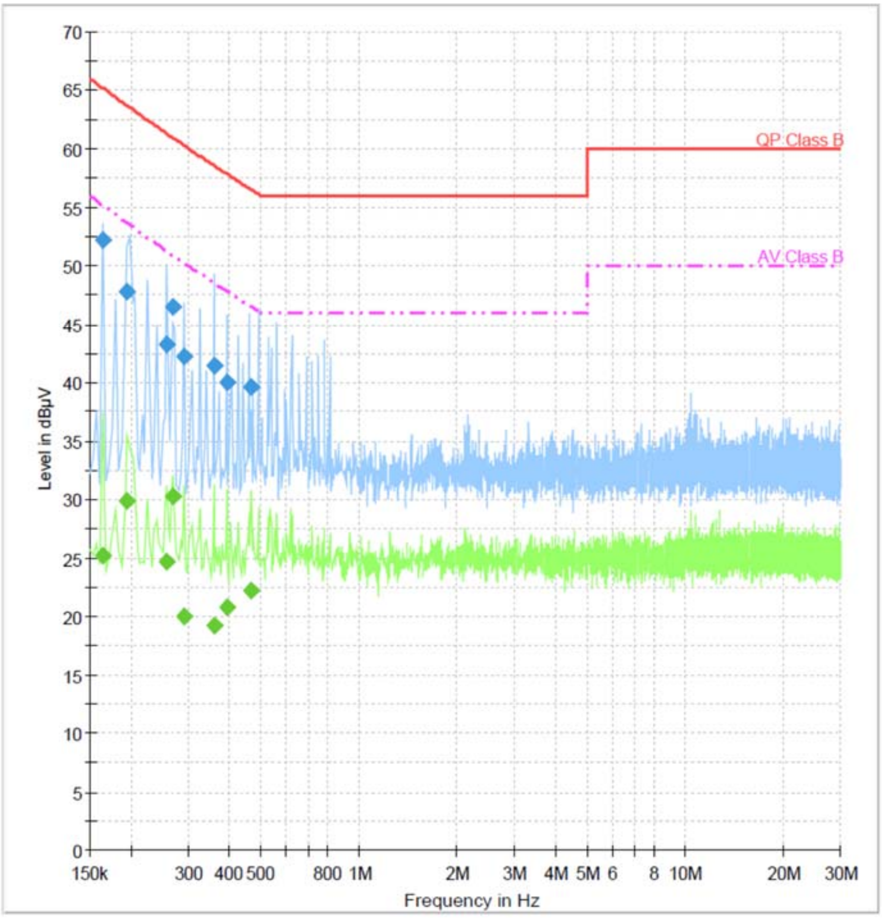
Test Report

Common Information

Test Description:	Conducted emission (NK-17-E-0733)
Test Site:	3rd building shielded room
Test Standard:	FCC Part 18
Environment Conditions:	a.c. 120 V, 60 Hz
Operator Name:	Doseung,Shin

2.EMI Auto Test_4-Line Voltage LISN

2.EMI Auto Test_4-Line Voltage LISN



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EMI Auto Test(1) 2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.164925	52.2	15000.0	9.000	GND	N	10.2	12.9	65.2	
0.194775	47.8	15000.0	9.000	GND	N	10.2	15.9	63.7	
0.258206	43.2	15000.0	9.000	GND	N	10.3	18.1	61.3	
0.269400	46.5	15000.0	9.000	GND	N	10.3	14.4	60.9	
0.291788	42.2	15000.0	9.000	GND	N	10.3	18.0	60.3	
0.358950	41.5	15000.0	9.000	GND	N	10.3	17.1	58.6	
0.392531	40.0	15000.0	9.000	GND	N	10.3	17.9	57.9	
0.467156	39.6	15000.0	9.000	GND	N	10.3	16.9	56.5	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.164925	25.2	15000.0	9.000	GND	N	10.2	29.9	55.1	
0.194775	29.8	15000.0	9.000	GND	N	10.2	23.8	53.7	
0.258206	24.7	15000.0	9.000	GND	N	10.3	26.6	51.2	
0.269400	30.3	15000.0	9.000	GND	N	10.3	20.6	50.9	
0.291788	20.0	15000.0	9.000	GND	N	10.3	30.2	50.2	
0.358950	19.2	15000.0	9.000	GND	N	10.3	29.4	48.6	
0.392531	20.8	15000.0	9.000	GND	N	10.3	27.0	47.9	
0.467156	22.2	15000.0	9.000	GND	N	10.3	24.3	46.5	

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NOTES:

1. Measurements using quasi-peak mode & average mode.
2. If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.
3. Line : L = Line , N = Neutral
4. The limit for consumer device is on the FCC Part section 18.307(b).

Tested by : ***Dosheung Shin***

TEST DATA

Radiated Emissions (150 ㎑ to 30 ㎒)

FCC ID : C5F7NF1DMO110N

[Room Temperature : 19.1 ± 1.0 ℃]

EMI Auto Test(1) 1 / 2

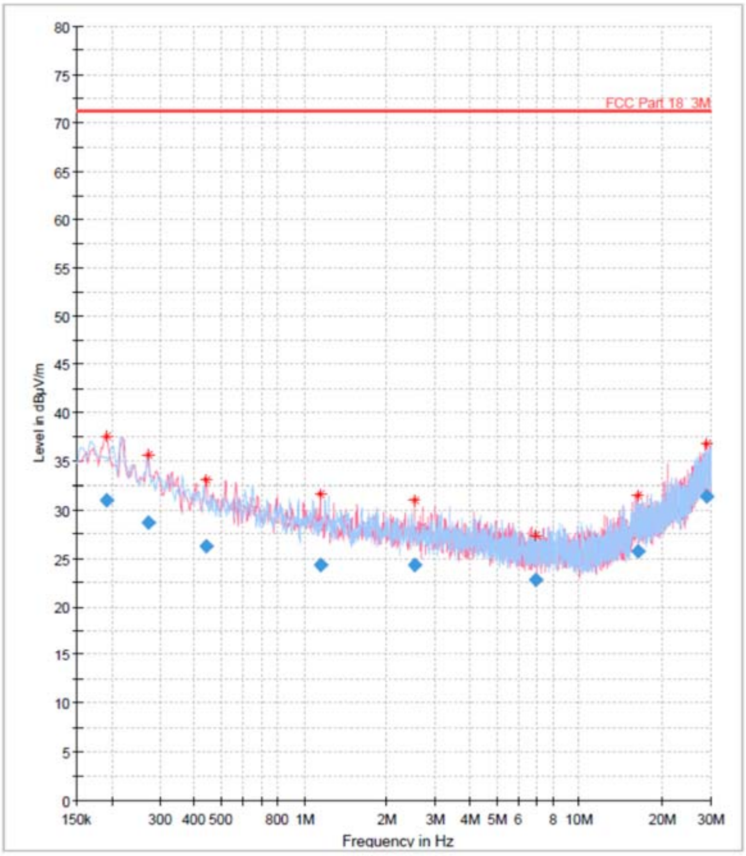
Test Report

Common Information

Test Description :	Radiated Emission(NK-17-E-0733)
Test Site :	3rd Building 10 m Chamber
Test Standard :	FCC Part 18
Environment Conditions :	a.c. 120 V, 60 Hz
Operator Name :	Doseung Shin

Full Spectrum

Full Spectrum



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EMI Auto Test(1) 2 / 2

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB)
0.191790	30.97	71.20	40.23	15000.0	9.000	V	7.0	-22.4
0.272385	28.69	71.20	42.51	15000.0	9.000	H	99.0	-22.5
0.442530	26.22	71.20	44.98	15000.0	9.000	V	59.0	-22.7
1.146990	24.31	71.20	46.89	15000.0	9.000	V	49.0	-22.6
2.532030	24.25	71.20	46.95	15000.0	9.000	V	284.0	-22.6
6.922965	22.79	71.20	48.41	15000.0	9.000	H	329.0	-22.8
16.409295	25.76	71.20	45.44	15000.0	9.000	V	126.0	-20.1
28.841820	31.35	71.20	39.85	15000.0	9.000	V	170.0	-13.4

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Comment
0.191790	5:50:14 PM - 12/10/2017
0.272385	5:47:20 PM - 12/10/2017
0.442530	5:51:04 PM - 12/10/2017
1.146990	5:50:41 PM - 12/10/2017
2.532030	5:52:39 PM - 12/10/2017
6.922965	5:48:12 PM - 12/10/2017
16.409295	5:51:34 PM - 12/10/2017
28.841820	5:52:01 PM - 12/10/2017

12/10/2017

<Radiated Measurements at 3 meters >

NOTES:

1. *Pol. H = Horizontal V = Vertical

2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Distance Correction factor : 20 * log (300 / 3) = 40 dBuV/m

4. The limit at 300 meters is 20 * log (25 * SQRT (RF Power / 500))

5. All other emissions were measured while a 700 ㎖ load was placed in the center of the oven.

6. The limit for consumer device is on the FCC Part section 18.305.

Tested by : ***Dosheung Shin***

TEST DATA

Radiated Emissions (30 ㎒ to 1 ㎓)

FCC ID : C5F7NF1DMO110N

[Room Temperature : 18.6 ± 1.0 ℃]

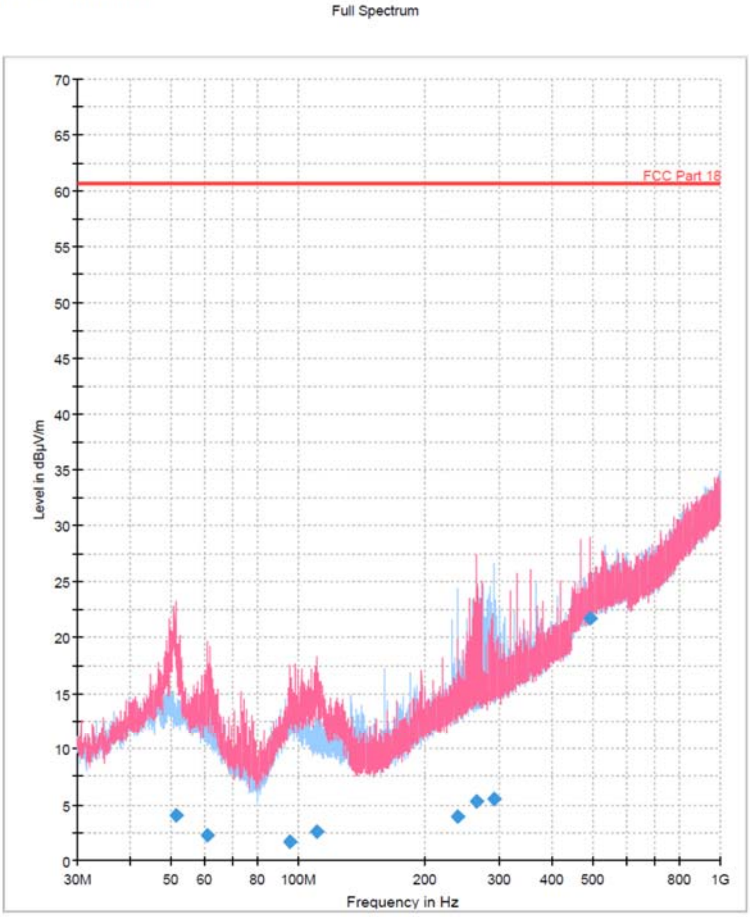
EMI Auto Test(1) 1 / 2

Test Report

Common Information

Test Description :	Radiated Emission(NK-17-E-0733)
Test Site :	Nemko 10 m Chamber
Test Standard :	FCC Part 18
Environment Conditions :	a.c. 120 V, 60 Hz
Operator Name :	Doseung Shin

Full Spectrum



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EMI Auto Test(1) 2 / 2

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
51.340000	4.04	60.70	56.66	15000.0	120.000	130.0	V	278.0	-21.4
60.813667	2.24	60.70	58.46	15000.0	120.000	302.0	V	-30.0	-22.9
95.701333	1.70	60.70	59.00	15000.0	120.000	130.0	V	47.0	-23.0
110.445333	2.55	60.70	58.15	15000.0	120.000	202.0	V	32.0	-24.0
239.002667	3.93	60.70	56.77	15000.0	120.000	370.0	H	113.0	-19.9
265.710000	5.28	60.70	55.42	15000.0	120.000	106.0	V	9.0	-18.7
292.417333	5.49	60.70	55.21	15000.0	120.000	276.0	H	32.0	-17.8
490.879333	21.76	60.70	38.94	15000.0	120.000	100.0	V	336.0	-10.7

(continuation of the "Final_Result" table from column 16 ...)

Frequency (MHz)	Comment
51.340000	
60.813667	
95.701333	
110.445333	
239.002667	
265.710000	
292.417333	
490.879333	

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<Radiated Measurements at 10 meters>

NOTES:

1. *Pol. H = Horizontal   V = Vertical

2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Distance Correction factor : 20 * log (300/10) ≒ 29.5 dB ㎶/m

4. The limit at 300 meters is 20 * log (25 * SQRT (RF Power/500))

5. All other emissions were measured while a 700 ㎖ load was placed in the center of the oven.

6. The limit for consumer device is on the FCC Part section 18.305.

Tested by : ***Dosheung Shin***

TEST DATA

Radiated Emissions (Above 1 ㎓)

FCC ID : C5F7NF1DMO110N

[Room Temperature : 16.9 ± 1.0 ℃]

Frequency	Pol*	Antenna Heights	Turntable Angles	Reading Level	Total Loss**	Result at 3 m		K	Results at 300 m	Limits at 300 m
(MHz)	(H/V)	(cm)	(˚)	(dBμV)	(dB)	(dBμV/m)	(㎶/m)		(㎶/m)	(㎶/m)
2 207.65	H	200.0	339	47.5	-5.1	42.4	132.3	0.005	0.7	36.3
2 346.81	H	200.0	326	66.2	-4.6	61.6	1198.1	0.005	6.0	36.3
4 928.14	V	300.0	233	46.5	-1.8	44.7	172.0	0.01	1.7	36.3
7 393.04	V	99.9	175	49.1	-0.9	48.2	256.2	0.01	2.6	36.3
9 874.61	V	400.1	18	34.4	2.5	36.9	70.3	0.01	0.7	36.3
12 311.12	H	200.0	48	40.5	4.5	45.0	178.6	0.01	1.8	36.3
14 771.75	H	99.9	358	34.7	8.5	43.2	144.7	0.01	1.4	36.3

<Radiated Measurements at 3 meters>

NOTES:

1. * Pol. H =Horizontal V=Vertical

2. ** Total Loss = Antenna Factor + Cables Loss + Amplifier + HPF (High Pass Filter)

3. Field Strength (at 300 m) (uV/m) = K * 10 $^{[\text{Fieldstrength at 3 m (dBuV/m) / 20}]}$

4. The limit at 300 meters is 25 * SQRT (RF Power/500)

5. Load for measurement of radiation on second and third harmonic : Two loads, one of 700 ㎖ and the other of 300 ㎖, of water were used. Each load was tested both with the beaker located in the center of the oven and with it in the corner.

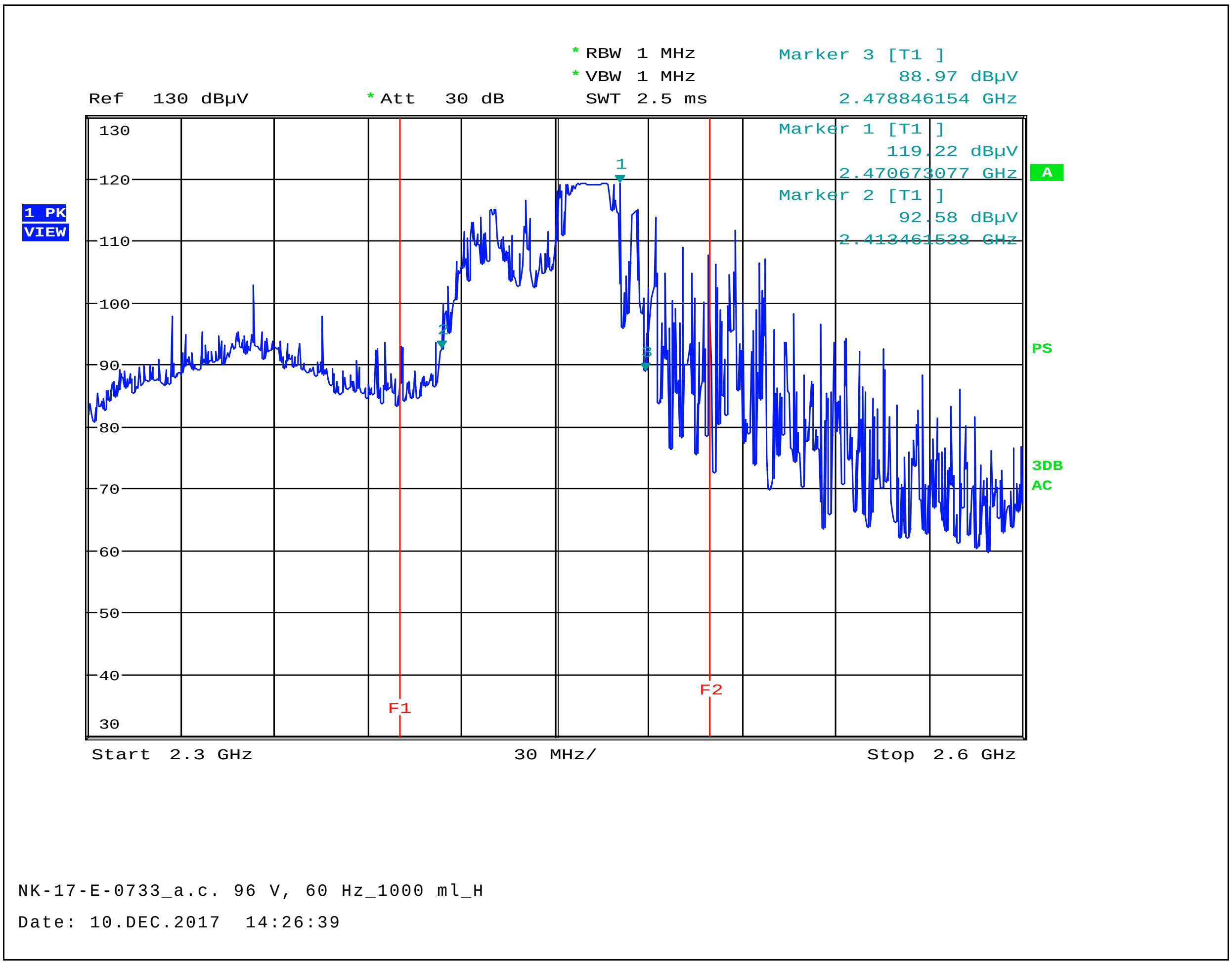
6. The test was performed at peak detector mode with average.

7. The limit for consumer device is on the FCC Part section 18.305.

Tested by : **Dosheung Shin**

PLOTS OF EMISSIONS

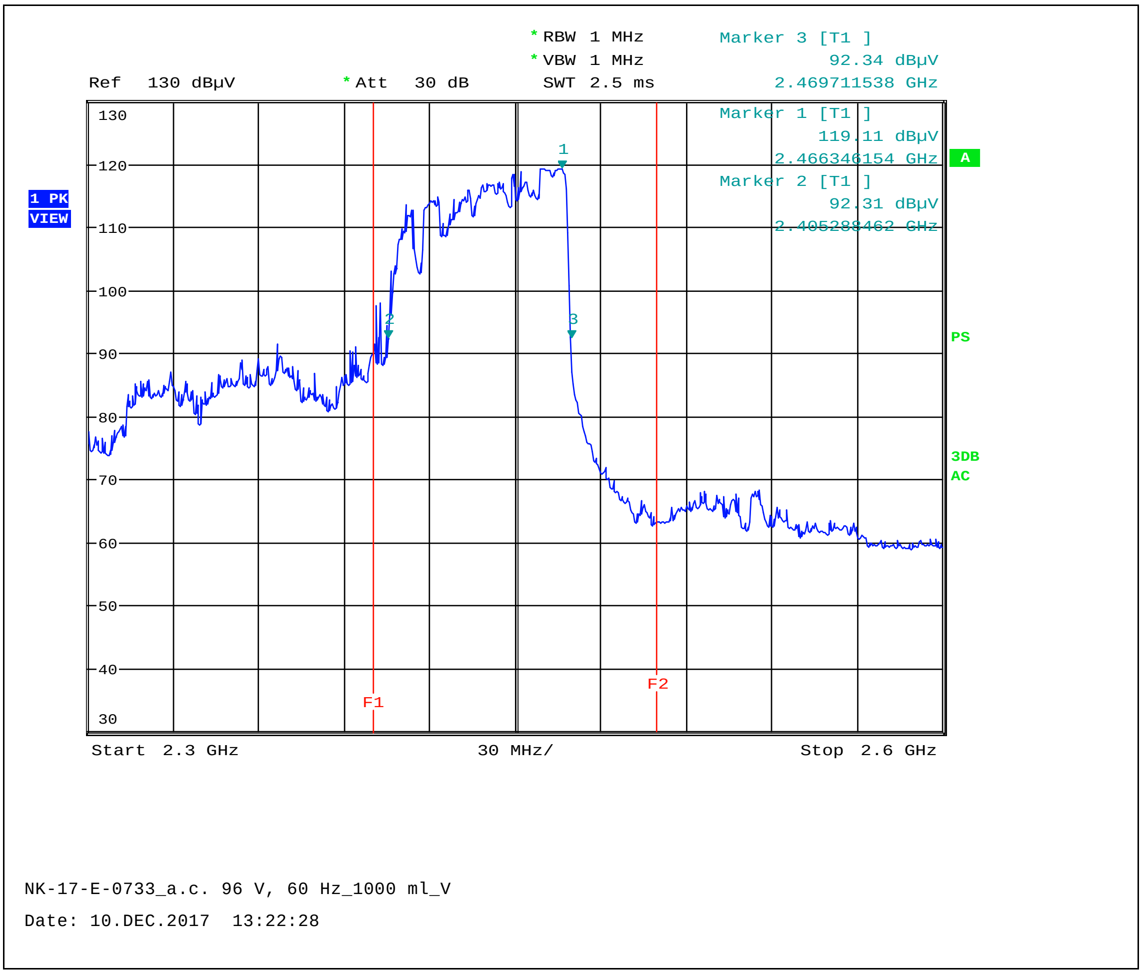
- ***Frequency vs Line Voltage Variation Test***



Horizontal (96 V, 1000 ㎖)

PLOTS OF EMISSIONS

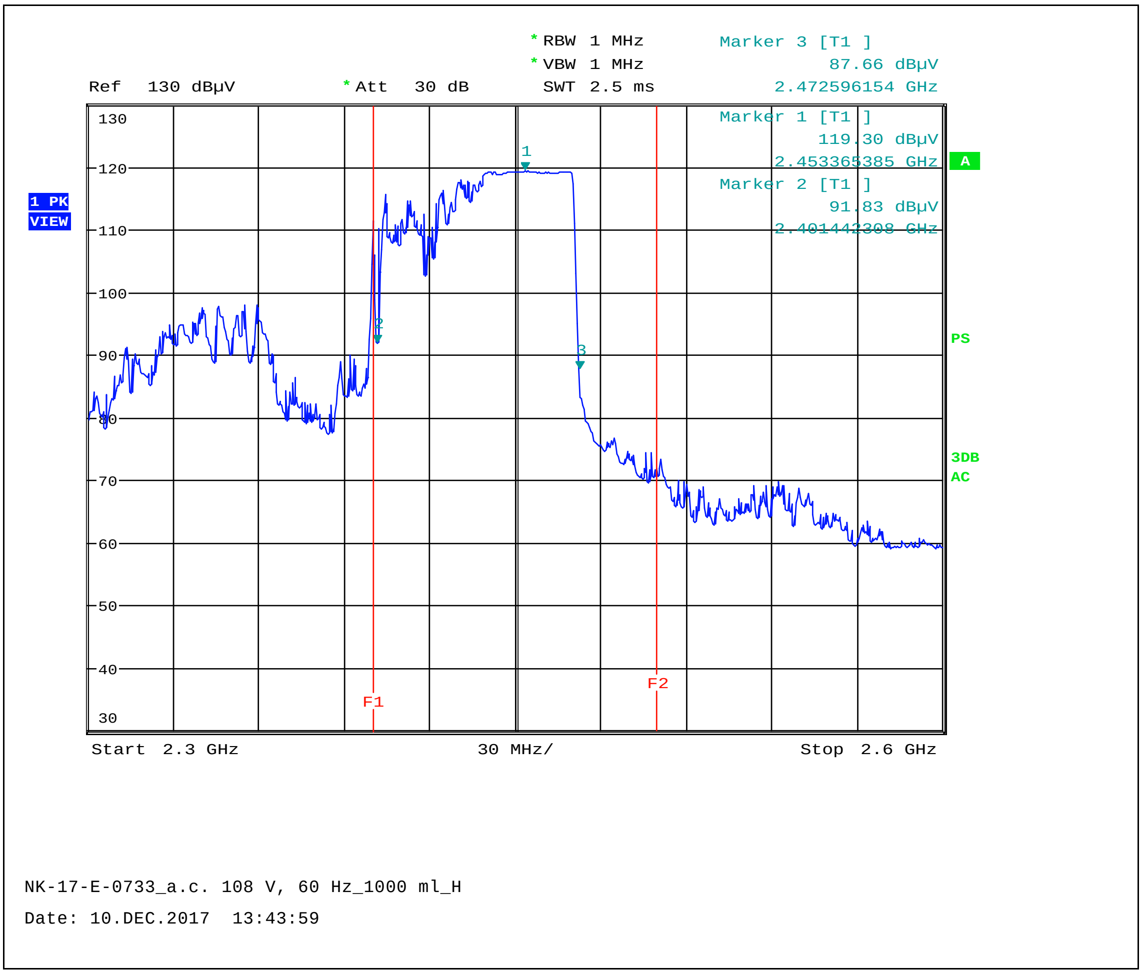
- ***Frequency vs Line Voltage Variation Test***



Vertical (96 V, 1000 ㎖)

PLOTS OF EMISSIONS

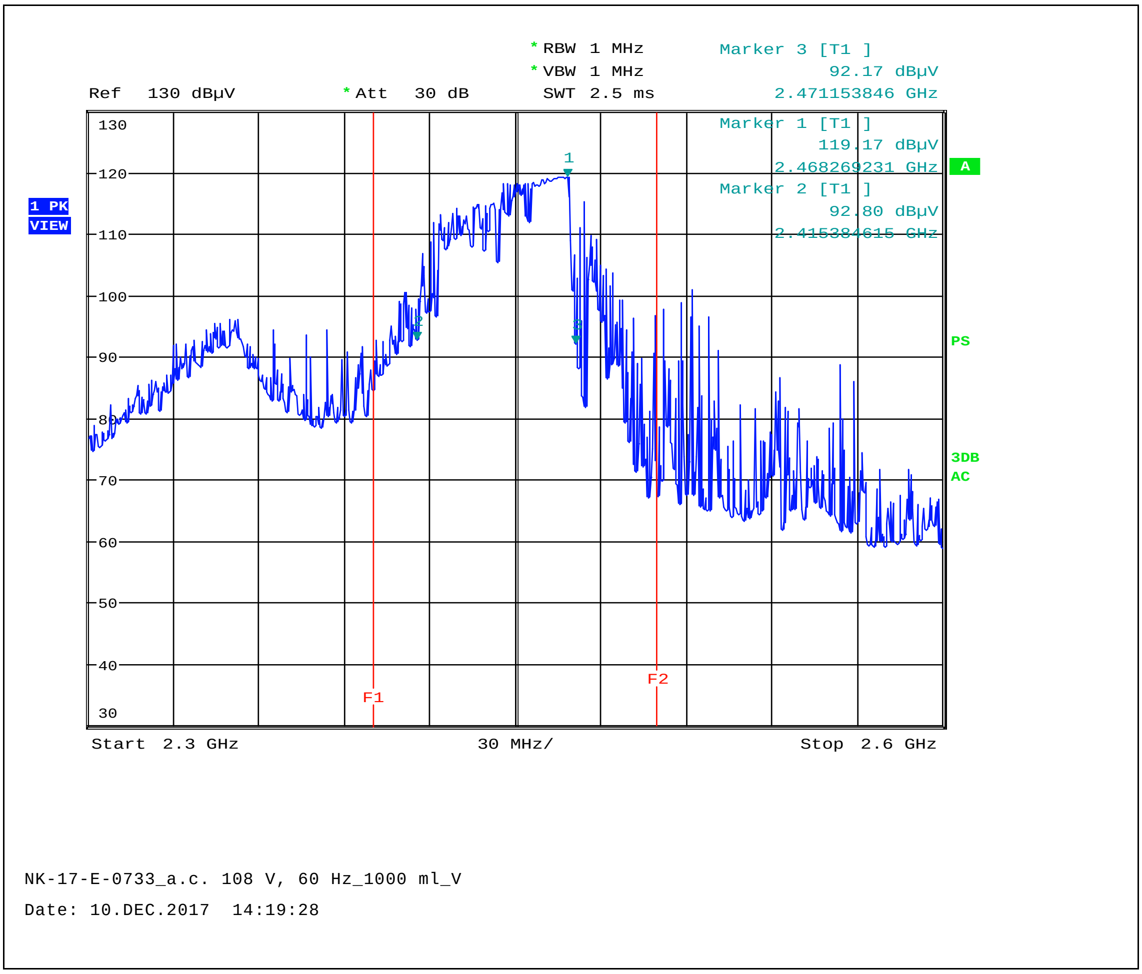
- ***Frequency vs Line Voltage Variation Test***



Horizontal (108 V, 1000 ㎖)

PLOTS OF EMISSIONS

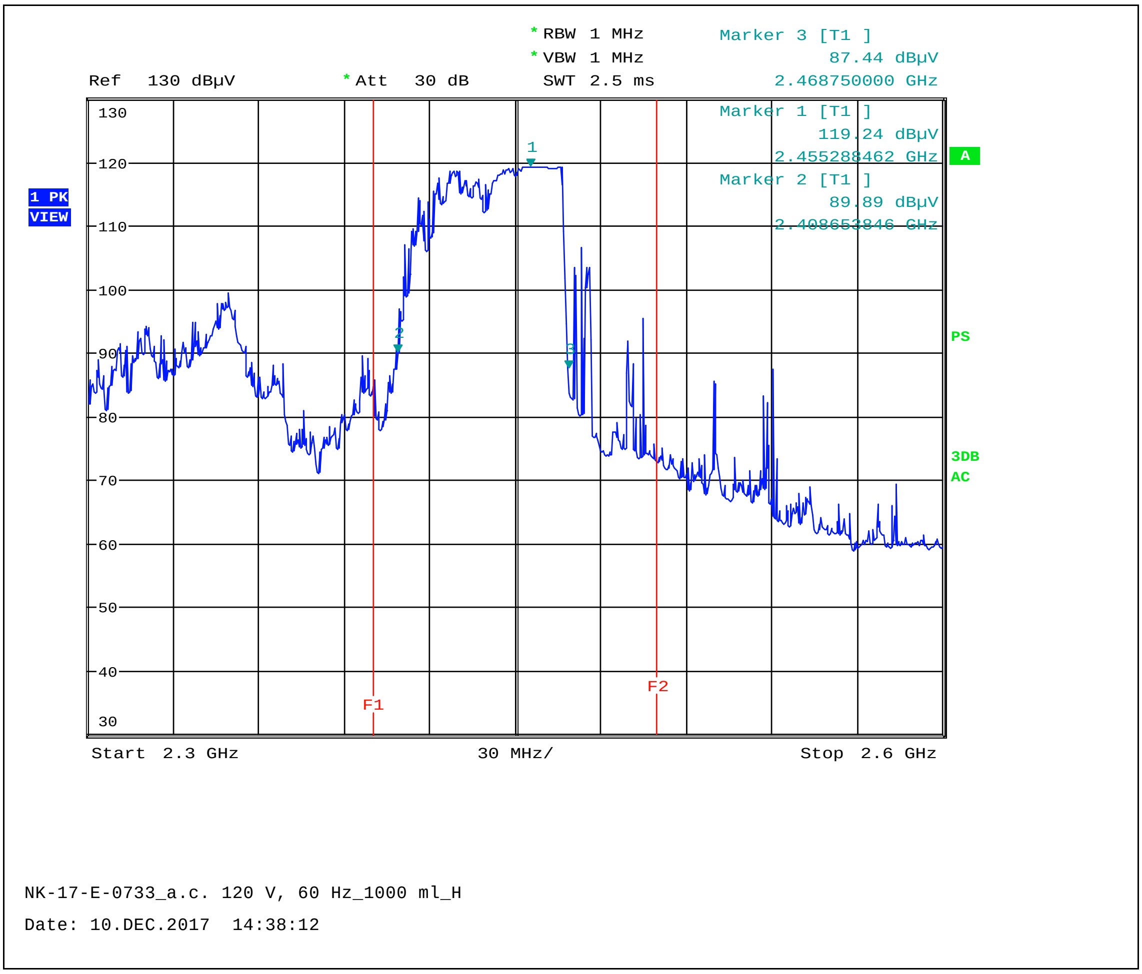
- ***Frequency vs Line Voltage Variation Test***



Vertical (108 V, 1000 mℓ)

PLOTS OF EMISSIONS

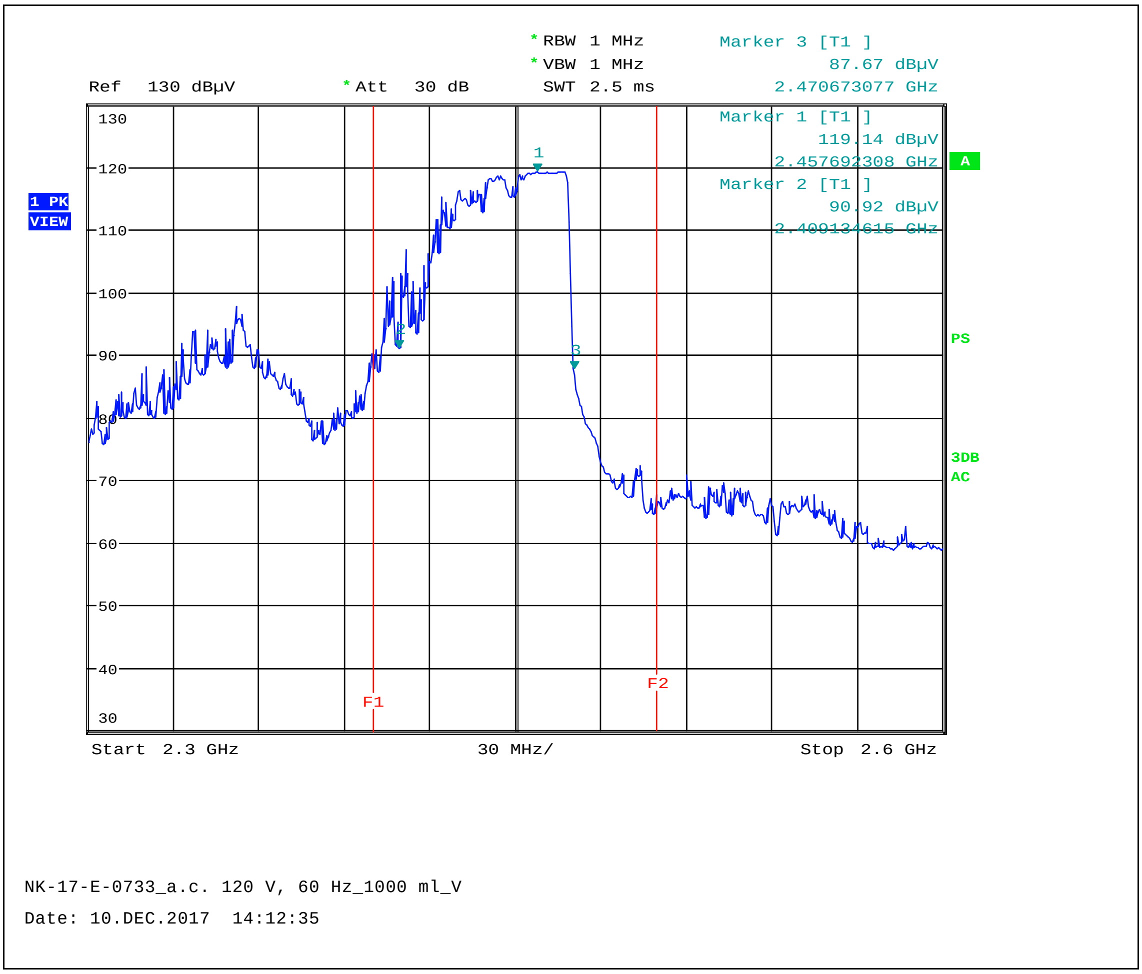
- ***Frequency vs Line Voltage Variation Test***



Horizontal (120 V, 1000 ㎖)

PLOTS OF EMISSIONS

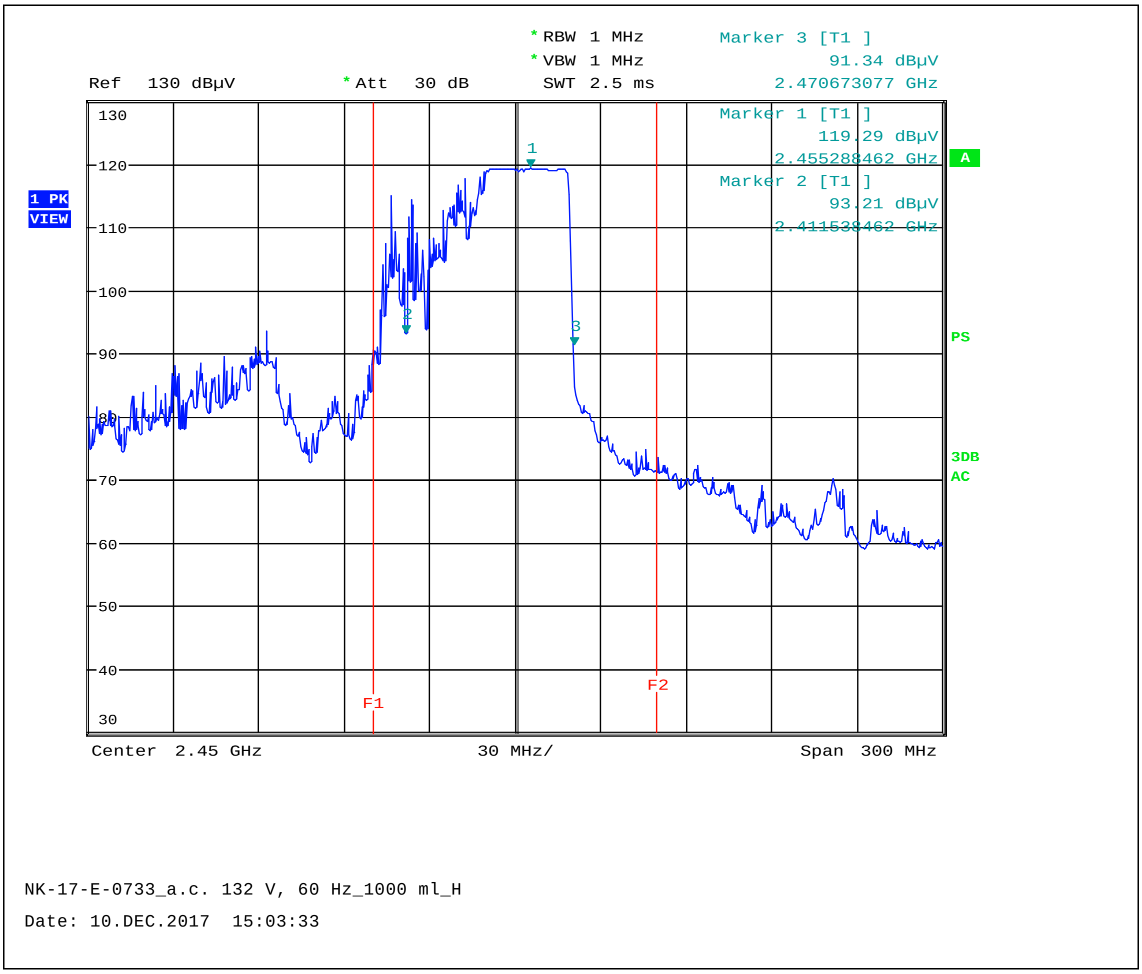
- ***Frequency vs Line Voltage Variation Test***



Vertical (120 V, 1000 mℓ)

PLOTS OF EMISSIONS

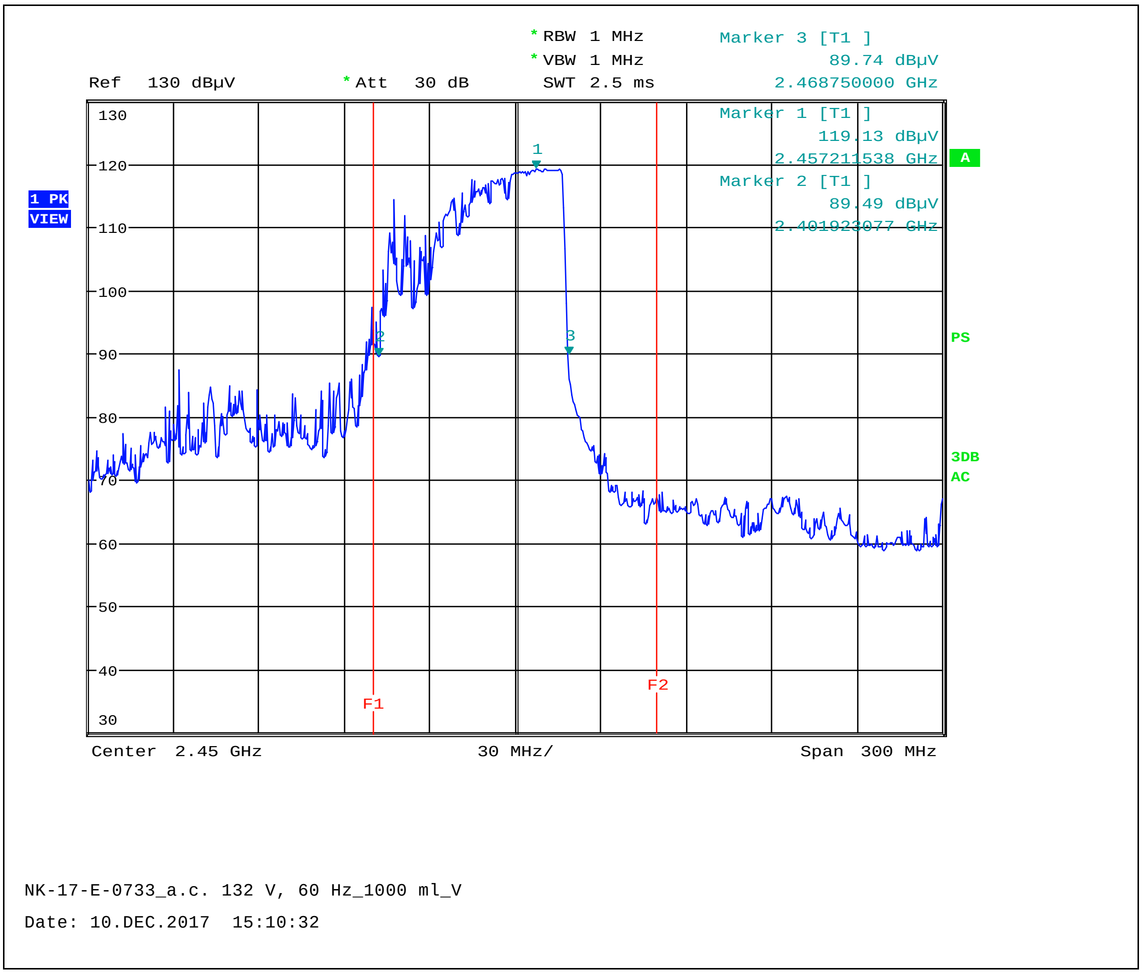
- ***Frequency vs Line Voltage Variation Test***



Horizontal (132 V, 1000 ㎖)

PLOTS OF EMISSIONS

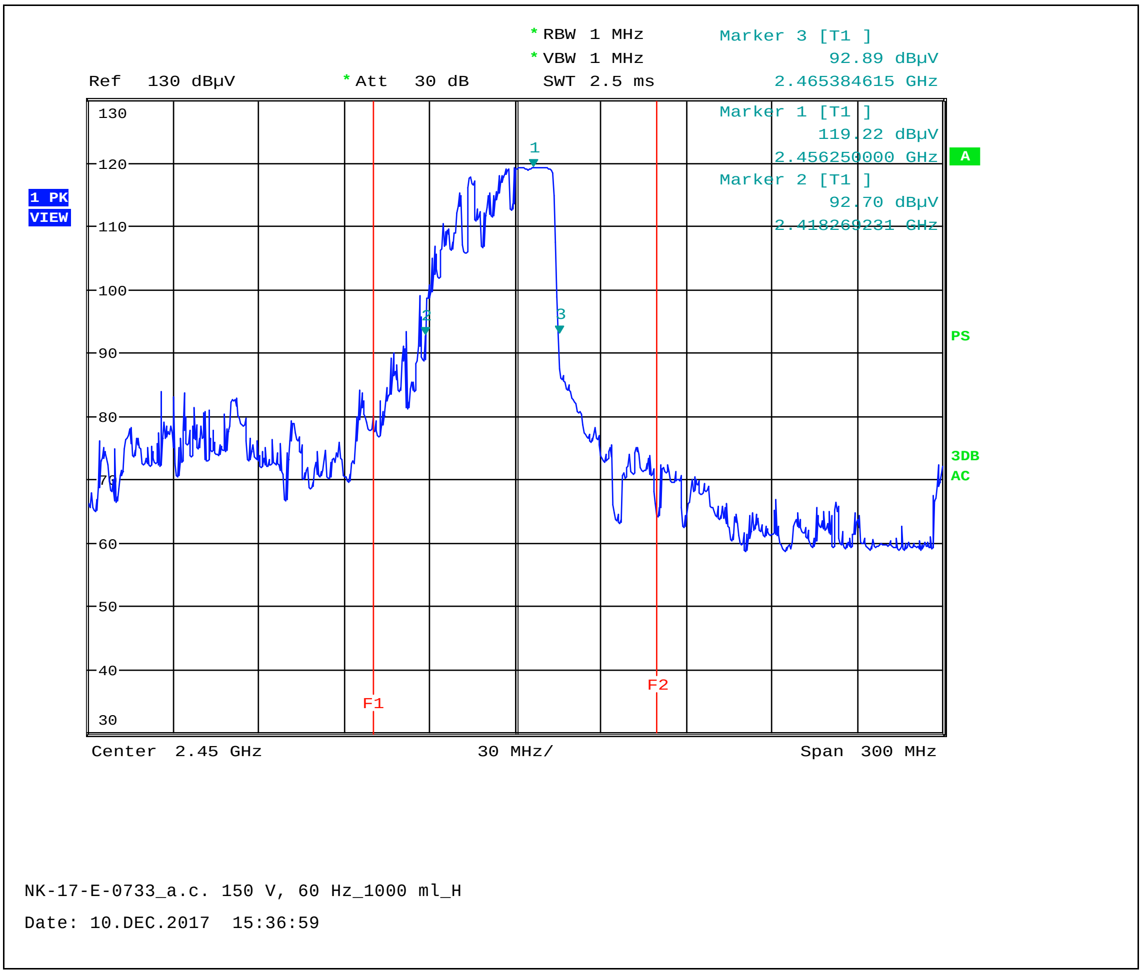
- ***Frequency vs Line Voltage Variation Test***



Vertical (132 V, 1000 ㎖)

PLOTS OF EMISSIONS

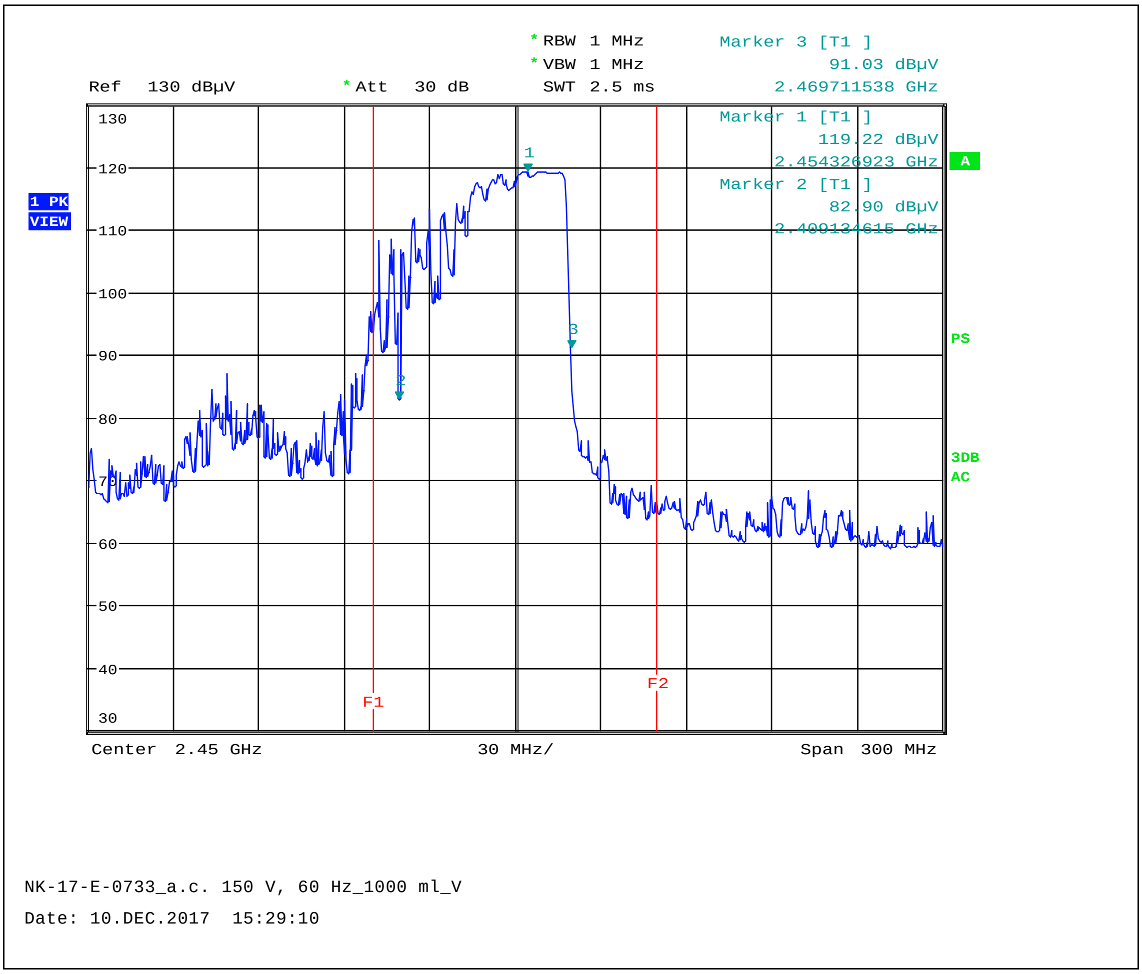
- ***Frequency vs Line Voltage Variation Test***



Horizontal (150 V, 1000 ㎖)

PLOTS OF EMISSIONS

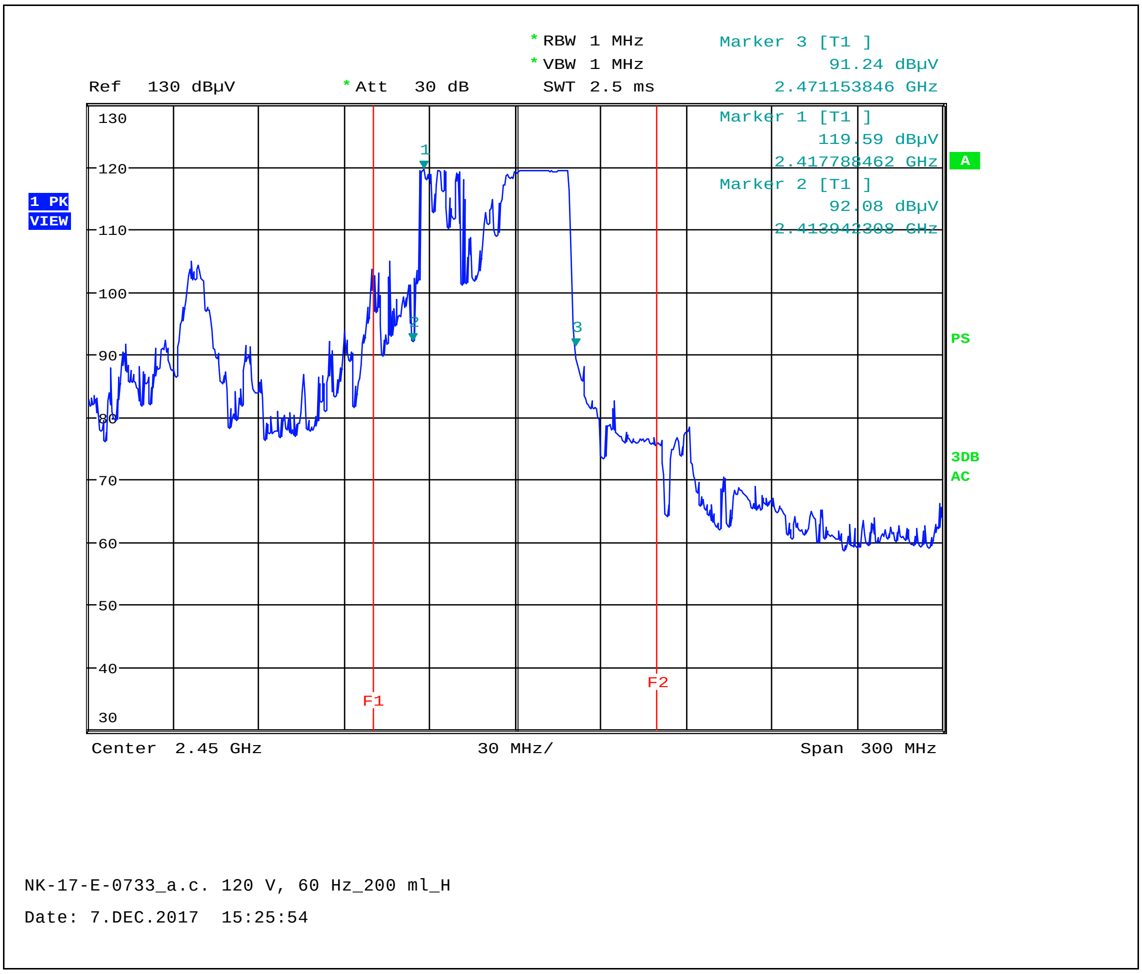
- ***Frequency vs Line Voltage Variation Test***



Vertical (150 V, 1000 ㎖)

PLOTS OF EMISSIONS

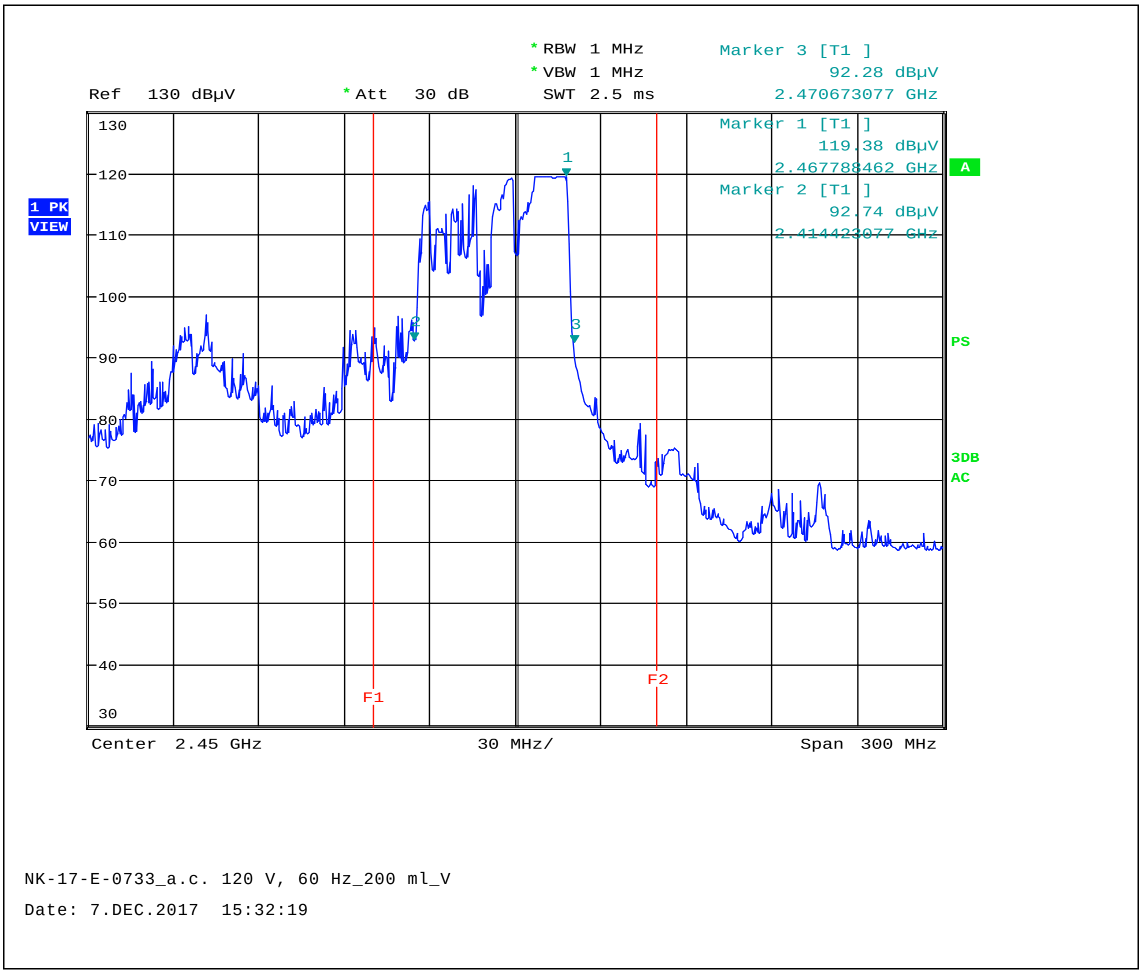
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 200 ㎖)

PLOTS OF EMISSIONS

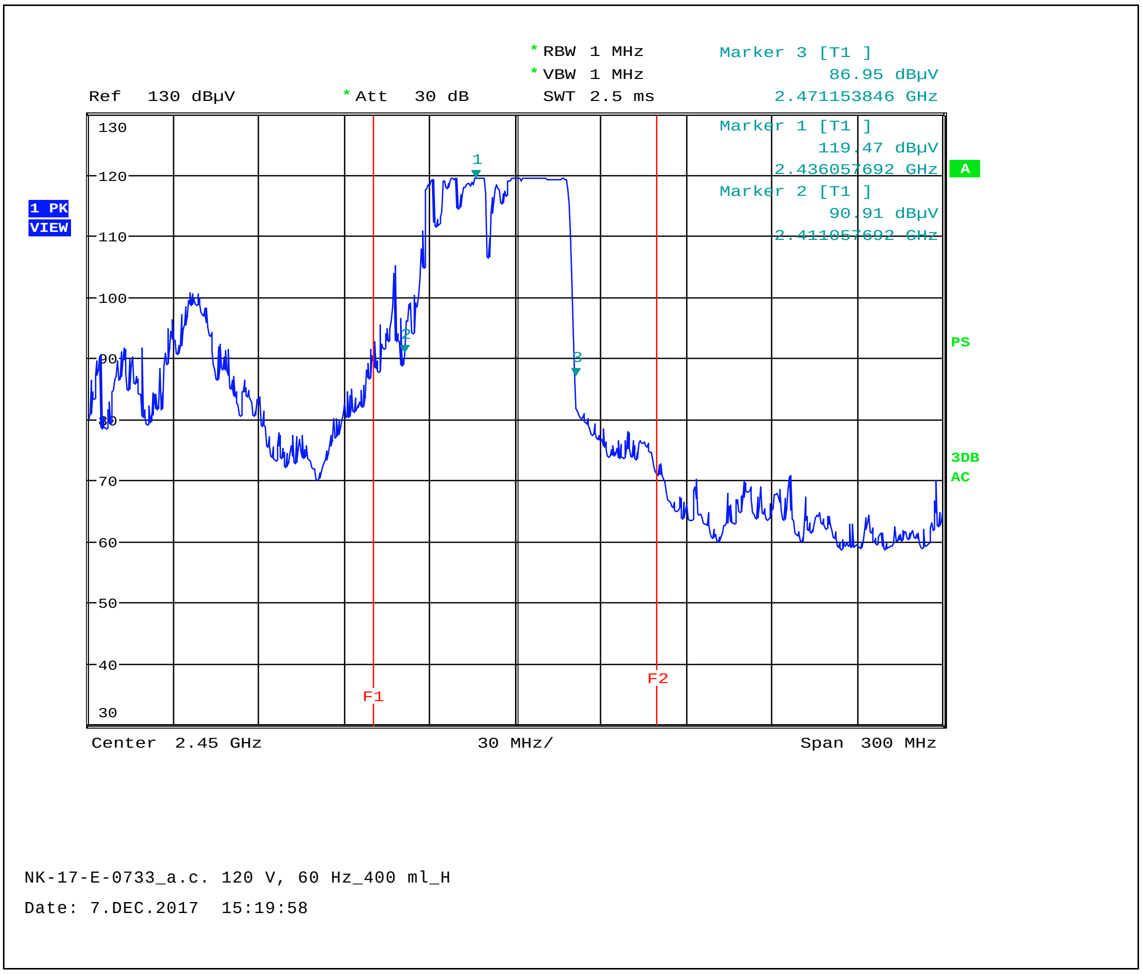
- ***Frequency vs Load Variation Test***



Vertical (120 V, 200 ㎖)

PLOTS OF EMISSIONS

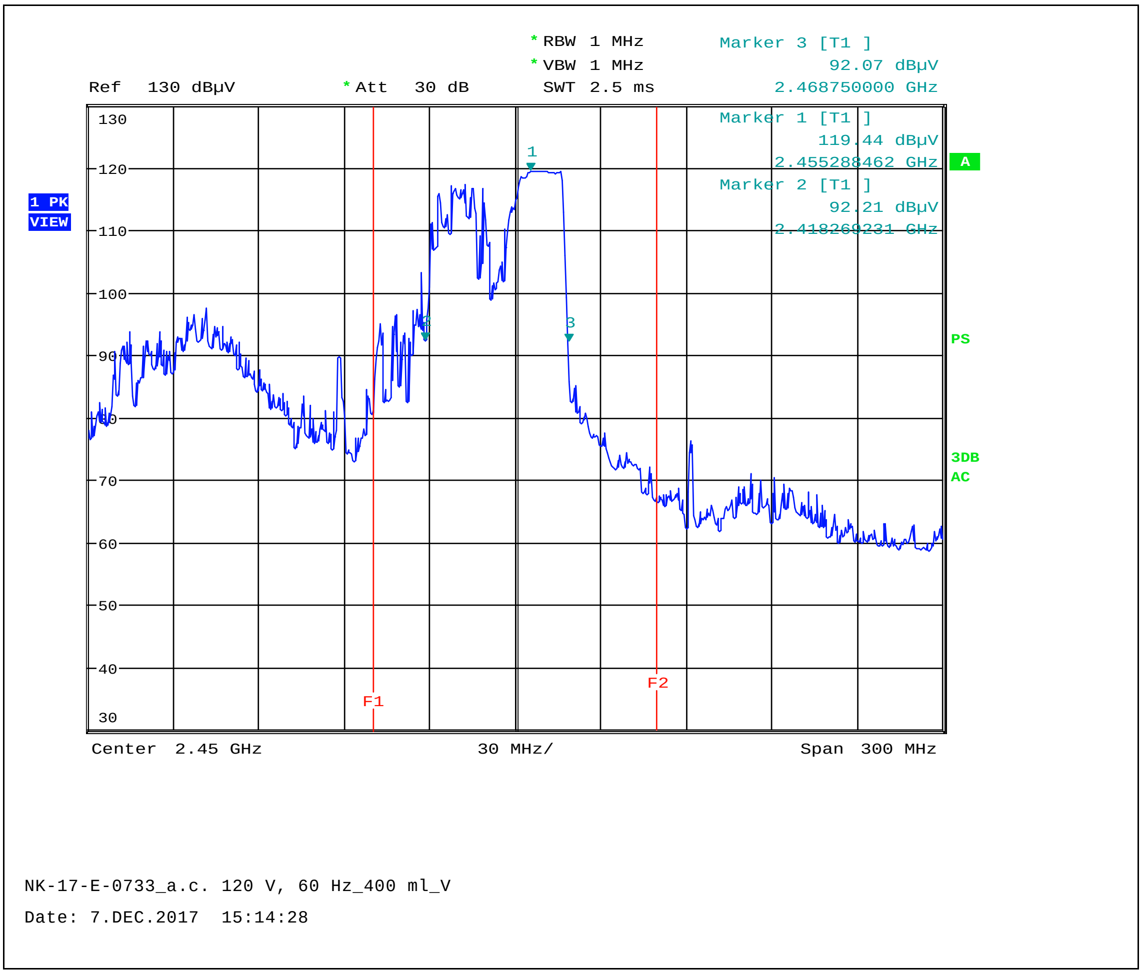
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 400 ㎖)

PLOTS OF EMISSIONS

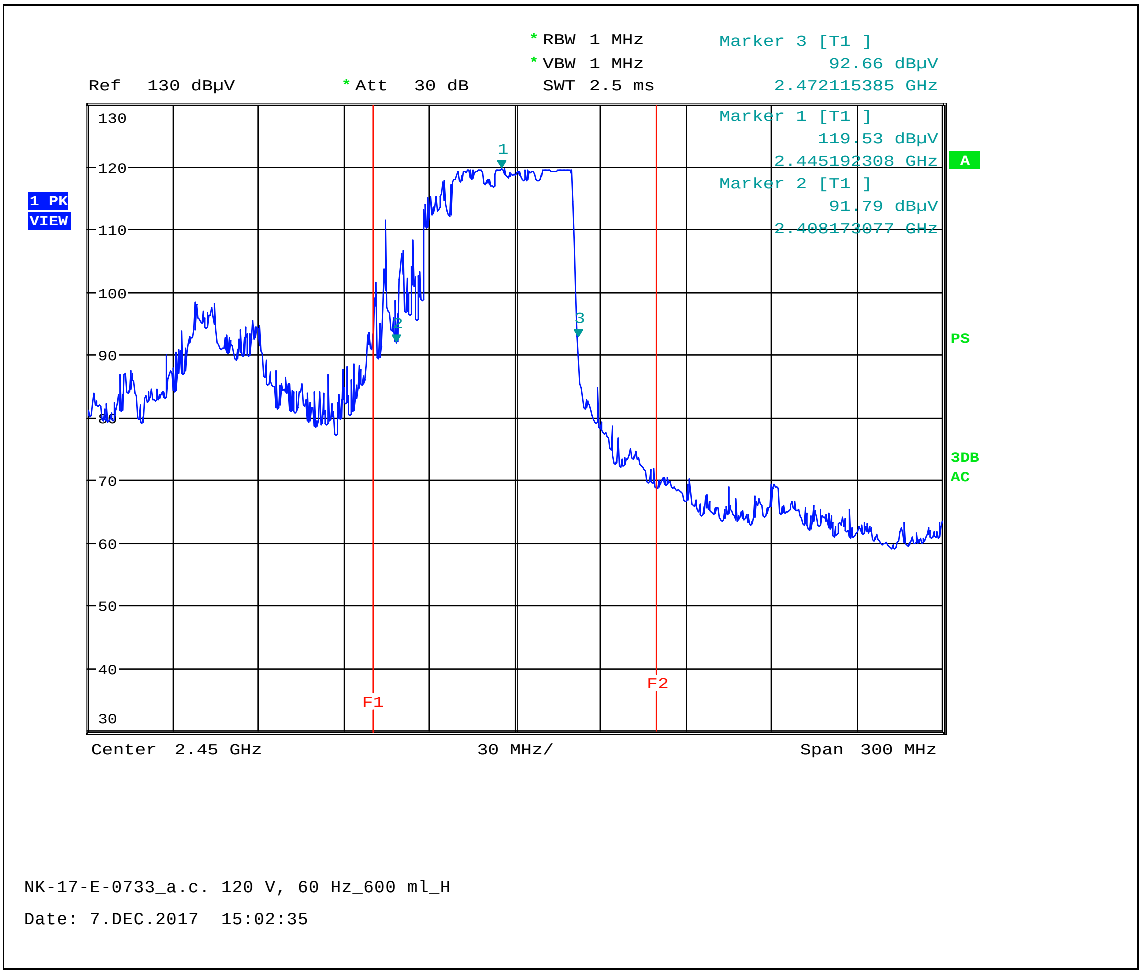
- ***Frequency vs Load Variation Test***



Vertical (120 V, 400 ㎖)

PLOTS OF EMISSIONS

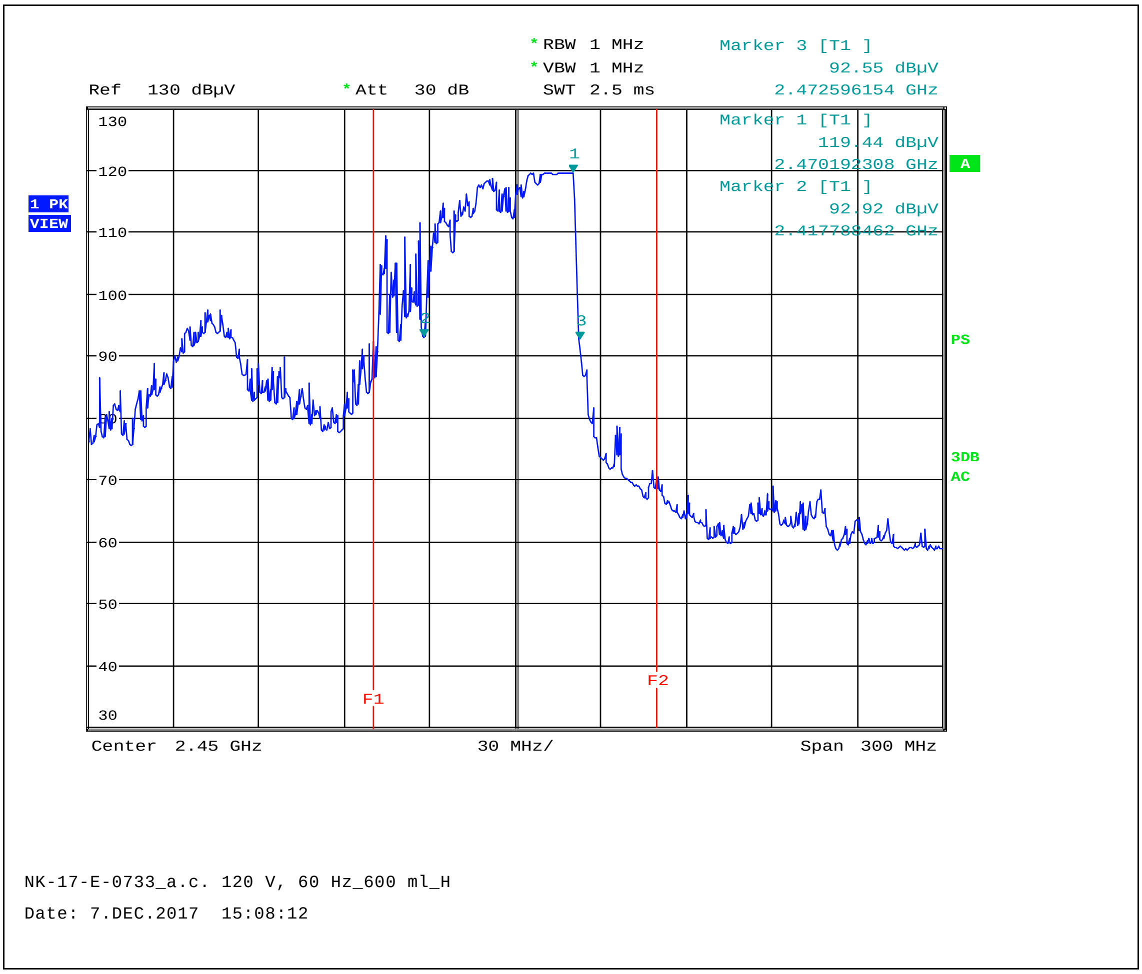
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 600 mℓ)

PLOTS OF EMISSIONS

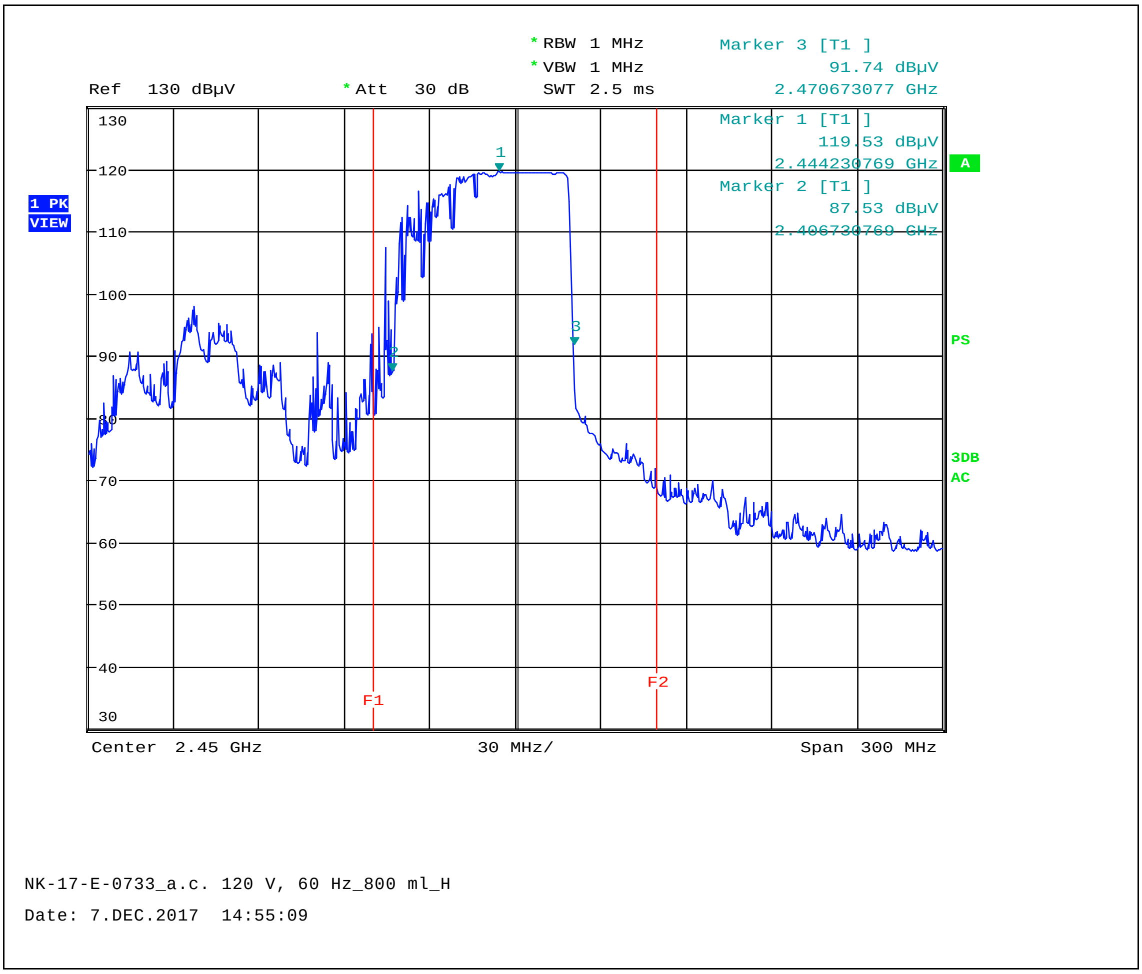
- ***Frequency vs Load Variation Test***



Vertical (120 V, 600 ㎖)

PLOTS OF EMISSIONS

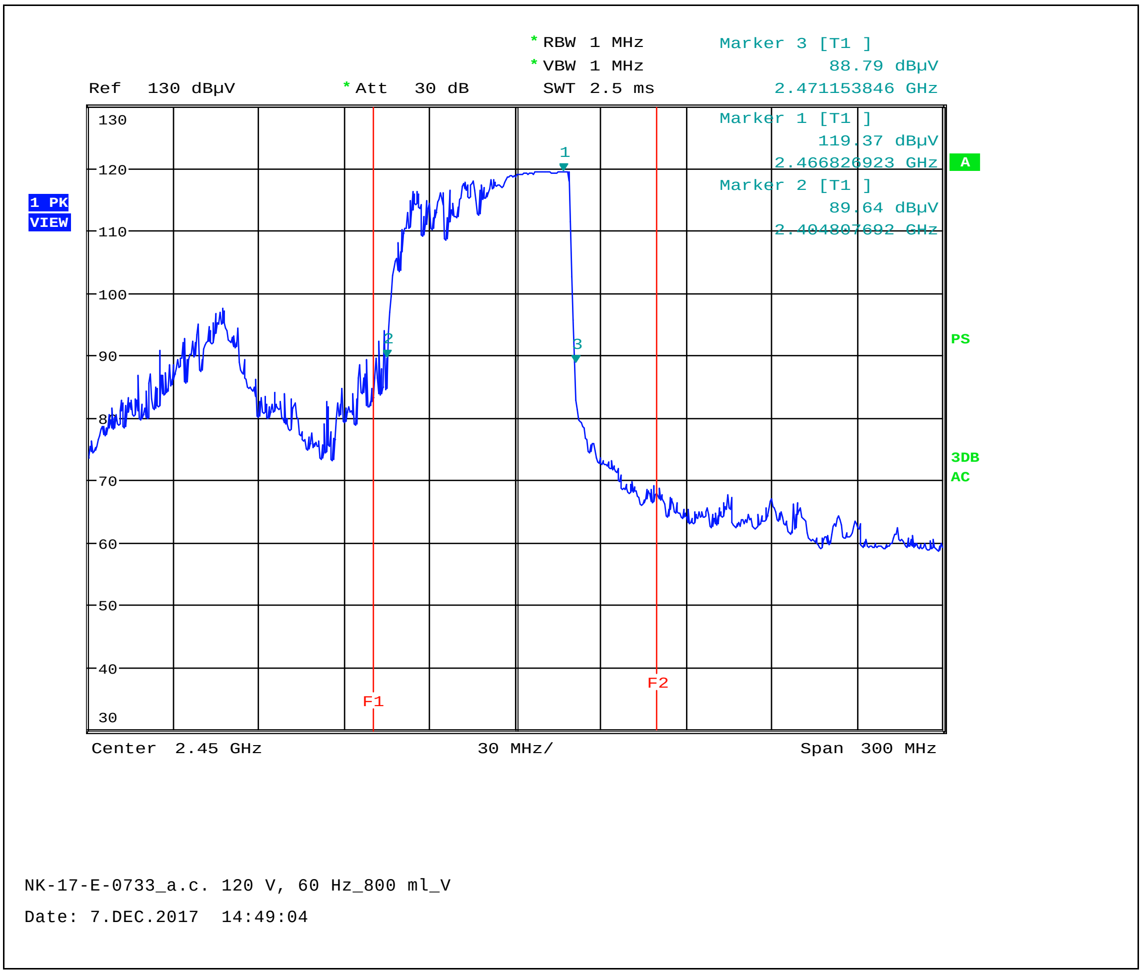
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 800 ㎖)

PLOTS OF EMISSIONS

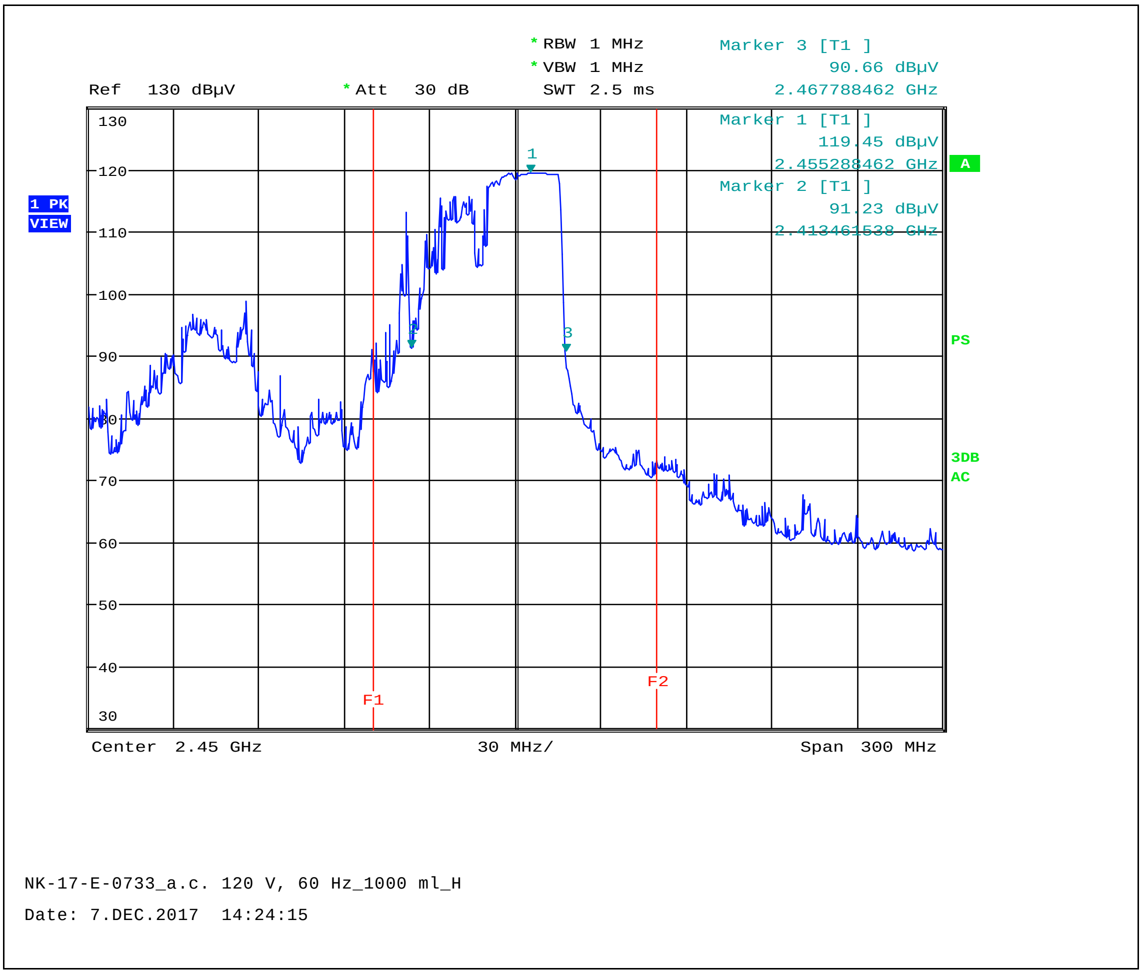
- ***Frequency vs Load Variation Test***



Vertical (120 V, 800 ㎖)

PLOTS OF EMISSIONS

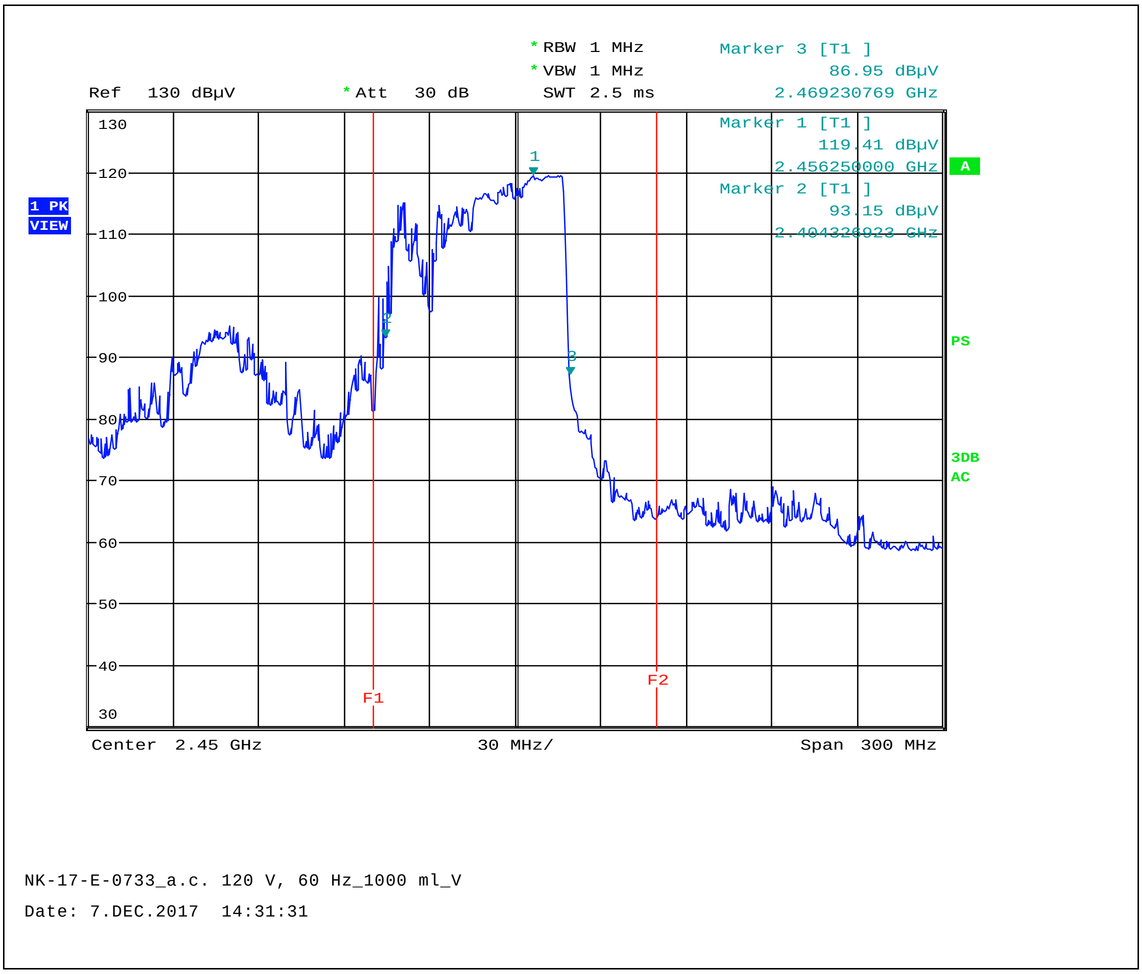
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 1000 ㎖)

PLOTS OF EMISSIONS

- ***Frequency vs Load Variation Test***



Vertical (120 V, 1000 mℓ)

ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95 %

1. Conducted Uncertainty Calculation

Source of Uncertainty	X_i	Uncertainty of X_i		Coverage factor k	$u(X_i)$ (dB)	C_i	$C_i u(X_i)$ (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability	R_S	0.10	normal 1	1.00	0.10	1	0.10
Receiver reading	R_i	± 0.02	normal 2	2.00	0.01	1	0.01
Attenuation AMN-Receiver	L_c	± 0.10	rectangular	$\sqrt{3}$	0.06	1	0.06
AMN Voltage division factor	L_{AMN}	± 0.09	normal 2	2.00	0.05	1	0.05
Sine wave voltage	dV_{SW}	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response	dV_{PA}	± 0.92	normal 2	2.00	0.50	1	0.50
Pulse repetition rate response	dV_{PR}	± 0.35	normal 2	2.00	0.18	1	0.18
Noise floor proximity	$dVNF$	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
AMN Impedance	dZ	± 2.00	normal 2	2.00	1.00	1	1.00
Mismatch	M	+ 0.81 − 0.89	U-Shaped	$\sqrt{3}$	0.60	1	0.60
Remark	Using 50 Ω / 50 uH AMN						
Combined Standard Uncertainty	Normal			u_c = 1.29 dB			
Expended Uncertainty U	Normal (k = 2)			U = 2.6 dB (CL is 95 %)			

2. Radiation Uncertainty Calculation (Below 1 GHz)

Source of Uncertainty	Xi	Uncertainty of Xi Value (dB)	Uncertainty of Xi Probability Distribution	Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
Measurement System Repeatability 1)	**R_s**	0.15	normal 1	1.00	0.15	1	0.15
Receiver reading 2)	**R_i**	± 0.02	normal 2	2.00	0.01	1	0.01
Sine wave voltage 3)	**dV_{sw}**	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response 4)	**dV_{pa}**	± 0.92	normal 2	2.00	0.46	1	0.46
Pulse repetition rate response 5)	**dV_{pr}**	± 0.35	normal 2	2.00	0.18	1	0.18
Noise floor proximity 6)	**dV_{nf}**	± 0.50	normal 2	2.00	0.25	1	0.25
Antenna Factor Calibration 7)	**A_F**	± 1.50	rectangular	$\sqrt{3}$	0.87	1	0.87
Cable Loss 8)	**C_L**	± 1.00	normal 2	2.00	0.50	1	0.50
Antenna Directivity 9)	**A_D**	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Antenna Factor Height Dependence 10)	**A_H**	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Antenna Phase Centre Variation 11)	**A_P**	± 0.20	rectangular	$\sqrt{3}$	0.12	1	0.12
Antenna Factor Frequency Interpolation 12)	**A_i**	± 0.25	rectangular	$\sqrt{3}$	0.14	1	0.14
Site Imperfections 13)	**S_i**	± 4.00	triangular	$\sqrt{6}$	1.63	1	1.63
Measurement Distance Variation 14)	**D_V**	± 0.60	rectangular	$\sqrt{3}$	0.35	1	0.35
Antenna Balance 15)	**D_{bal}**	± 0.90	rectangular	$\sqrt{3}$	0.52	1	0.52
Cross Polarisation 16)	**D_{Cross}**	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Mismatch 17)	**M**	+ 0.98 - 1.11	U-Shaped	$\sqrt{2}$	0.74	1	0.74
EUT Volume Diameter 18)	**Vd**	0.33	normal 1	1.00	0.33	1	0.11
Combined Standard Uncertainty	Normal			u_c = 2.53 dB			
Expended Uncertainty U	Normal (*k* = 2)			5.1 dB (CL is 95 %)			

3. Radiation Uncertainty Calculation (Above 1 ㎓)

Source of Uncertainty	Xi	Uncertainty of Xi Value (dB)	Uncertainty of Xi Probability Distribution	Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
Measurement System Repeatability 1)	R_S	0.25	normal 1	1.00	0.25	1	0.25
Receiver Reading 2)	R_i	± 0.27	normal 2	2	0.14	1	0.14
Attenuation (antenna-receiver) 3)	a_C	± 0.30	normal 2	2	0.15	1	0.15
Preamplifier gain 4)	G_p	± 0.23	normal 2	2	0.12	1	0.12
Receiver Sine Wave 5)	dV_{sw}	± 0.17	normal 2	2	0.08	1	0.08
Instability of preamp gain 6)	dG_p	± 1.2	rectangular	$\sqrt{3}$	0.70	1	0.70
Noise Floor Proximity 7)	dV_{nf}	± 0.70	rectangular	$\sqrt{3}$	0.40	1	0.40
Antenna Factor Calibration 8)	A_F	± 2.0	normal 2	2	1.00	1	1.00
Directivity difference 9)	DF_{adir}	± 1.00	rectangular	$\sqrt{3}$	0.58	1	0.58
Phase Centre location 10)	A_P	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Antenna Factor Frequency Interpolation 11)	A_i	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Site Imperfections 12)	S_i	± 3.00	triangular	$\sqrt{6}$	1.22	1	1.22
Effect of setup table material 13)	dA_{NT}	± 1.50	rectangular	$\sqrt{3}$	0.87	1	0.87
Separation distance 14)	d_D	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Cross Polarization 15)	D_{Cross}	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Table height 16)	d_h	± 0.00	normal 2	2	0.00	1	0.00
Mismatch (antenna-Preamplifier) 17)	M	+ 1.30 - 1.50	U-Shaped	$\sqrt{2}$	1.00	1	1.00
Mismatch (preamplifier-receiver) 18)	M	+ 1.20 - 1.40	U-Shaped	$\sqrt{2}$	0.92	1	0.92
Combined Standard Uncertainty	Normal			u_c = 2.51 dB			
Expended Uncertainty U	Normal (k = 2)			U = 5.0 dB (CL is 95 %)			

LIST OF TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Due to Calibration	Calibration Interval
1	LOOP ANTENNA	ROHDE & SCHWARZ	HFH2-Z2	100279	Feb. 13 2019	2 years
2	Microwave survey meter	ETS Lindgren	1501	00033549	Feb. 20 2018	2 year
3	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101041	Apr. 03 2018	1 year
4	Software	ROHDE & SCHWARZ	EMC32	Version 8.53.0	-	-
5	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5	100273	Apr. 04 2018	1 year
6	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW8	100994	Apr. 03 2018	1 year
7	ATTENUATOR	FAIRVIEW	SA3N5W-10	N/A	Apr. 03 2018	1 year
8	EMI Test Receiver	ROHDE & SCHWARZ	ESU 40	100202	Apr. 04 2018	1 year
9	Software	ROHDE & SCHWARZ	EMC32	Version 10.10.01	-	-
10	TRILOG Broadband Test Antenna	SCHWARZBECK	VULB 9163	9163-01027	Apr. 18 2019	2 year
11	ATTENUATOR	FAIRVIEW	SA3N5W-06	N/A	Jan. 09 2018	1 year
12	Controller	innco systems GmbH	CO2000-G	CO2000/562/ 23890210/L	N/A	N/A
13	Open Switch and Control Unit	ROHDE & SCHWARZ	OSP-120	100015	N/A	N/A
14	Antenna Mast (Left)	innco systems GmbH	MA4000-EP	N/A	N/A	N/A
15	Turn Table	innco systems GmbH	DT3000-3T	N/A	N/A	N/A
16	Signal Conditioning Unit	ROHDE & SCHWARZ	SCU 01	10030	Apr. 03 2018	1 year
17	Signal Conditioning Unit	Rohde & Schwarz	SCU 18	10065	May. 29 2018	1 year
18	ANTENNA MAST (RIGHT)	innco systems GmbH	MA4000-EP	N/A	N/A	N/A
19	DOUBLE RIDGED HORN ANTENNA	SCHWARZBECK	HF907	102585	Jan.18 2019	2 year
20	SWITCH AND POWER DETECTOR UNIT	ROHDE & SCHWARZ	OSP-120	101766	N/A	N/A
21	TILT ANTENNA MAST	innco systems GmbH	MA4640-XP-EP	N/A	N/A	N/A
22	CONTROLLER	innco systems GmbH	CO3000	CO3000/937/3 8330516/L	N/A	N/A
23	Turntable	innco systems GmbH	DT2000-2t	N/A	N/A	N/A
24	WiFi Filter Bank	ROHDE & SCHWARZ	U082	N/A	N/A	N/A
25	Band Reject	wainwright Instruments GmbH	RCJV8-2350-2400-2500-2550-40SS	2	N/A	N/A

APPENDIX D – SCHEMATIC DIAGRAM

APPENDIX E – USER'S MANUAL

APPENDIX F – BLOCK DIAGRAM