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 :

Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677
Korea, Republic of
Attn : Mr. Gilryeong Koh

Dates of Issue : March 13, 2017
Test Report No. : NK-17-E-0155
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

FCC ID	***A3LMW8000M***
Trade Mark	***SAMSUNG***
Contact Person	**Samsung Electronics Co., Ltd.** **129, Samsung-ro, Yeongtong-gu, Suwon-si,** **Gyeonggi-do, 16677 Korea, Republic of** **Mr. Gilryeong Koh** **Telephone No. : 82-10-4193-2598**

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 completeness of these measurements and vouch for the qualifications of all persons taking them.

Mar 13, 2017
Tested By : Dosheung Shin
Engineer

Mar. 13. 2017
Reviewed By : Changsoo Choi
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 : **Contact Person :**	Samsung Electronics Co., Ltd. Mr. Gilryeong Koh Tel No.: 82-10-4193-2598
Manufacturer :	Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677 Korea, Republic of

- FCC ID: A3LMW8000M
- Model: MS19M8000AS
- Trade Mark: SAMSUNG
- EUT Type: Microwave Oven
- Applied Standard: FCC Part 18 & Part 2
- Test Procedure(s): MP-5:1986
- Dates of Test: February 15, 2017 to March 10, 2017
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK-17-E-0155

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 **Samsung Electronics Co., Ltd..**
FCC ID : **A3LMW8000M, 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
16885 KOREA, REPUBLIC OF
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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	Built-in
Rated voltage & frequency	a.c. 120 V, 60 ㎐
Rated power Input	1 650 W
RF Power Output	950 W
Magnetron	OM75P(31)ESGN

Component List

Item	Model	Manufacturer	Serial Number
Diode H.V.	CL04-12A	N/A	N/A
Fan Motor	SMF-U1530A	N/A	K1609051
H.V. CAPACITOR	CH85 21095	BiCai	2501-001016
Noise Filter	N/A	N/A	N/A
Magnetron	OM75P(31)ESGN	N/A	J4W37WQH9006 Q35P
Board	SMS3GL	N/A	N/A
SYNCHRONOUS MOTOR	SSM-16HR	SP ELEMECH	61501271
Trans H.V.	SHV-UT1136B	DIGITAL POWER COMMUNICATIONS CO., LTD.	N/A

DESCRIPTION OF TESTS

Radiation Hazard

A 700 ㎖ 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 ㎖ water load was placed in the center of the oven and the oven set to maximum power. A 700 ㎖ 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 ㎖ 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 R&S signal generator.

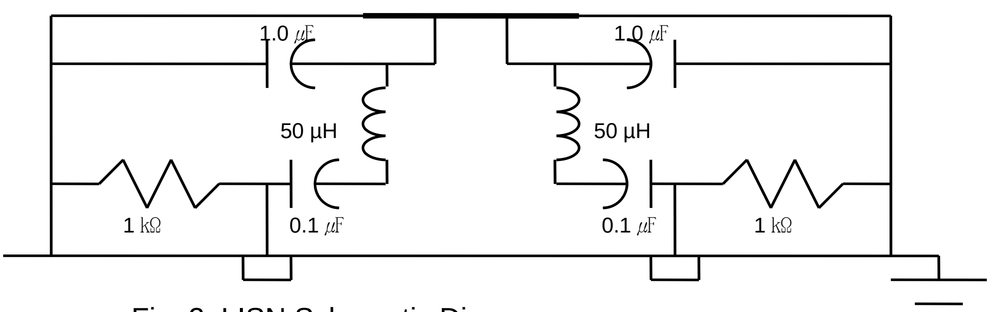


Fig. 2. LISN Schematic Diagram

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 (R&S/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 (R&S/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.

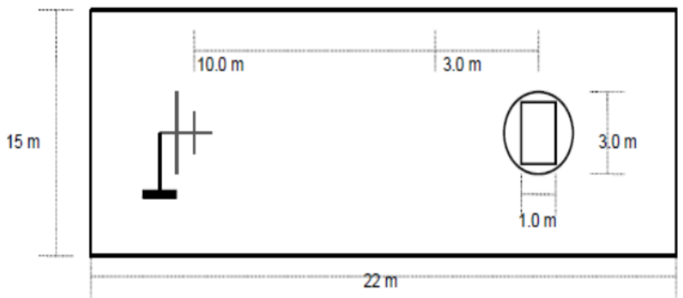


Fig. 3. Dimensions of 10 semi anechoic chamber

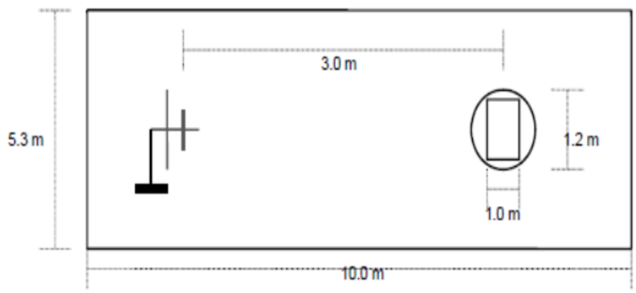


Fig. 4. Dimensions of 3 m full anechoic chamber

TEST DATA

Radiation Hazard

Probe Location	Maximum Leakage [mW/Cm2]	Limit [mW/Cm2]
A	0.1	1.00
B	0.1	1.00
C	0.1	1.00
D	0.1	1.00
All others	0.1	1.00

Input Power Measurement

Operation mode	P rated (W)	P (W)	dP (%)	Required dP (%)
Power Input	1 650	1 606	-2.6	+ 15 %

Output Power Measurement

[Test 1]

Mass of the water [g]	Mass of the container [g]	Ambient temperature [℃]	Initial temperature [℃]	Final temperature [℃]	Heating time [s]	Power output [W]
1000	405	23.5	10	20.3	44	964

[Test 2]

Mass of the water [g]	Mass of the container [g]	Ambient temperature [℃]	Initial temperature [℃]	Final temperature [℃]	Heating time [s]	Power output [W]
1000	405	24.0	10	20.2	44	951

[Test 3]

Mass of the water [g]	Mass of the container [g]	Ambient temperature [℃]	Initial temperature [℃]	Final temperature [℃]	Heating time [s]	Power output [W]
1000	405	22.0	10	20.2	44	962

Power output of mean value	959 W

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 : 17.9 ℃]

Line Voltage Variation (a.c. V)	*)Pole	Frequency [㎒]	Allowed Tolerance for the ISM Band
96 (80 %)	H	Lower : 2 417.6	Lower : 2 400 ㎒ Upper : 2 500 ㎒
	H	Upper : 2 487.2	
	V	Lower : 2 402.6	
	V	Upper : 2 488.4	
108 (90 %)	H	Lower : 2 405.0	
	H	Upper : 2 486.6	
	V	Lower : 2 405.0	
	V	Upper : 2 487.2	
120 (100 %)	H	Lower : 2 406.2	
	H	Upper : 2 485.4	
	V	Lower : 2 402.6	
	V	Upper : 2 483.0	
132 (110 %)	H	Lower : 2 418.2	
	H	Upper : 2 484.2	
	V	Lower : 2 416.4	
	V	Upper : 2 486.0	
150 (125 %)	H	Lower : 2 418.8	
	H	Upper : 2 481.8	
	V	Lower : 2 407.4	
	V	Upper : 2 480.0	

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 : 17.9 ℃]

Volume of water (㎖)	*)Pole	Frequency [㎒]	Allowed Tolerance for the ISM Band
200	H	Lower : 2 407.4	
	H	Upper : 2 482.4	
	V	Lower : 2 401.4	
	V	Upper : 2 483.0	
400	H	Lower : 2 411.6	
	H	Upper : 2 484.2	
	V	Lower : 2 402.0	
	V	Upper : 2 486.6	
600	H	Lower : 2 465.6	
	H	Upper : 2 484.8	Lower : 2 400 ㎒ Upper : 2 500 ㎒
	V	Lower : 2 402.0	
	V	Upper : 2 485.4	
800	H	Lower : 2 402.0	
	H	Upper : 2 483.0	
	V	Lower : 2 400.2	
	V	Upper : 2 483.0	
1000	H	Lower : 2 406.6	
	H	Upper : 2 481.2	
	V	Lower : 2 403.8	
	V	Upper : 2 482.4	

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 : A3LMW8000M

[Room Temperature : 16.7 ℃]

EMI Auto Test(1) 1 / 2

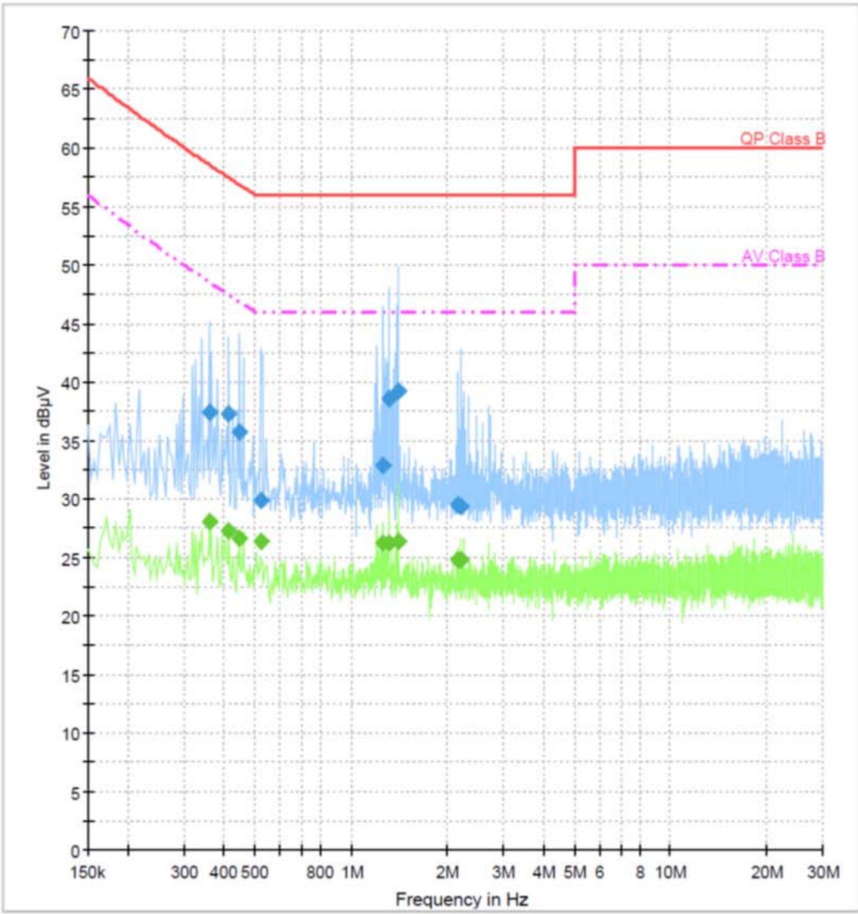
Test Report

Common Information

Test Site:	Nemko Korea(NK-17-E-0155)
Test Description:	Conducted emission
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
0.358950	37.4	15000.0	9.000	GND	N	10.3	21.2	58.6	
0.414919	37.3	15000.0	9.000	GND	N	10.3	20.2	57.4	
0.448500	35.7	15000.0	9.000	GND	N	10.3	21.1	56.8	
0.523125	29.8	15000.0	9.000	GND	N	10.3	26.2	56.0	
1.261912	32.8	15000.0	9.000	GND	N	10.3	23.2	56.0	
1.314150	38.6	15000.0	9.000	GND	N	10.3	17.4	56.0	
1.403700	39.2	15000.0	9.000	GND	N	10.4	16.8	56.0	
2.164875	29.5	15000.0	9.000	GND	N	10.4	26.5	56.0	
2.198456	29.3	15000.0	9.000	GND	N	10.4	26.7	56.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.358950	28.0	15000.0	9.000	GND	N	10.3	20.5	48.6	
0.414919	27.3	15000.0	9.000	GND	N	10.3	20.2	47.4	
0.448500	26.6	15000.0	9.000	GND	N	10.3	20.2	46.8	
0.523125	26.4	15000.0	9.000	GND	N	10.3	19.6	46.0	
1.261912	26.2	15000.0	9.000	GND	N	10.3	19.8	46.0	
1.314150	26.3	15000.0	9.000	GND	N	10.3	19.7	46.0	
1.403700	26.3	15000.0	9.000	GND	N	10.4	19.7	46.0	
2.164875	24.8	15000.0	9.000	GND	N	10.4	21.2	46.0	
2.198456	24.8	15000.0	9.000	GND	N	10.4	21.2	46.0	

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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 : A3LMW8000M

[Room Temperature : 19.3 ℃]

EMI Auto Test(1) 1 / 2

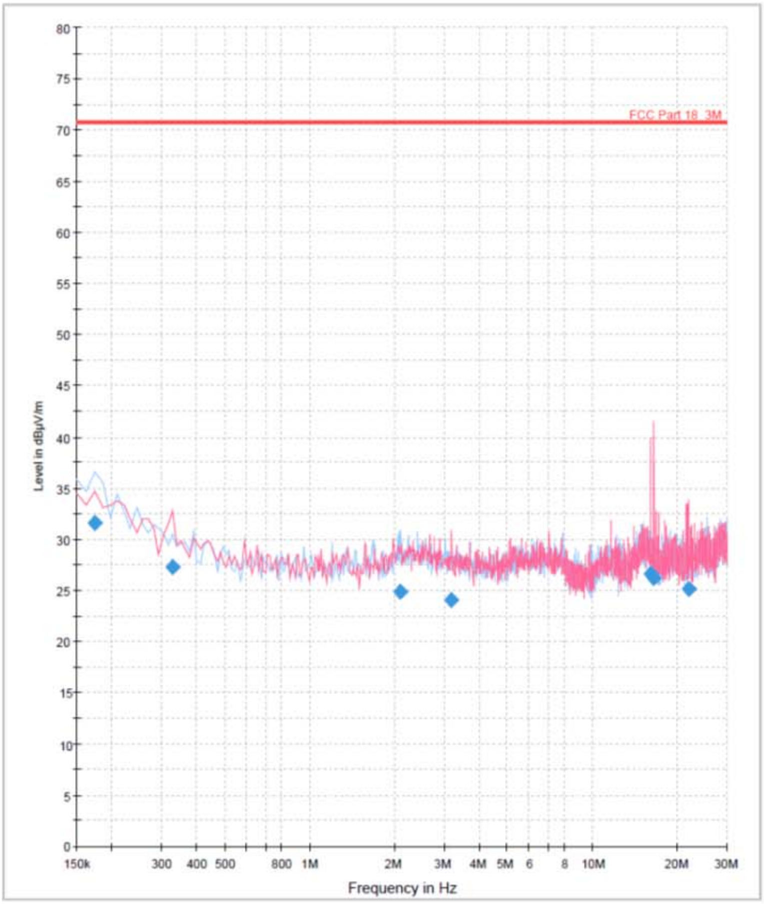
Test Report

Common Information

Test Description :	Radiated Emission(NK-17-E-0155)
Test Site :	Nemko 10 m Chamber
Test Standard :	FCC Part 18
Environment Conditions :	a.c. 120 V, 60 Hz
Operator Name :	Doseung Shin
	Microwave mode

LOOP-Microwave(150 kHz-30 MHz)_final

LOOP-Microwave(150 kHz-30 MHz)_final



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EMI Auto Test(1) 2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
0.173880	31.5	15000.0	9.000	H	219.0	-22.3	39.2	70.7
0.329100	27.3	15000.0	9.000	V	290.0	-22.6	43.4	70.7
2.108160	24.9	15000.0	9.000	H	318.0	-22.3	45.8	70.7
3.182760	24.1	15000.0	9.000	V	210.0	-22.6	46.6	70.7
16.149600	26.7	15000.0	9.000	V	222.0	-20.1	44.0	70.7
16.567500	26.2	15000.0	9.000	V	222.0	-20.0	44.5	70.7
22.083780	25.2	15000.0	9.000	V	222.0	-17.1	45.5	70.7

(continuation of the "Final Result 1" table from column 9 ...)

Frequency (MHz)	Comment
0.173880	
0.329100	
2.108160	
3.182760	
16.149600	
16.567500	
22.083780	

2/25/2017

<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 : A3LMW8000M

[Room Temperature : 18.9 ℃]

EMI Auto Test(1) 1 / 2

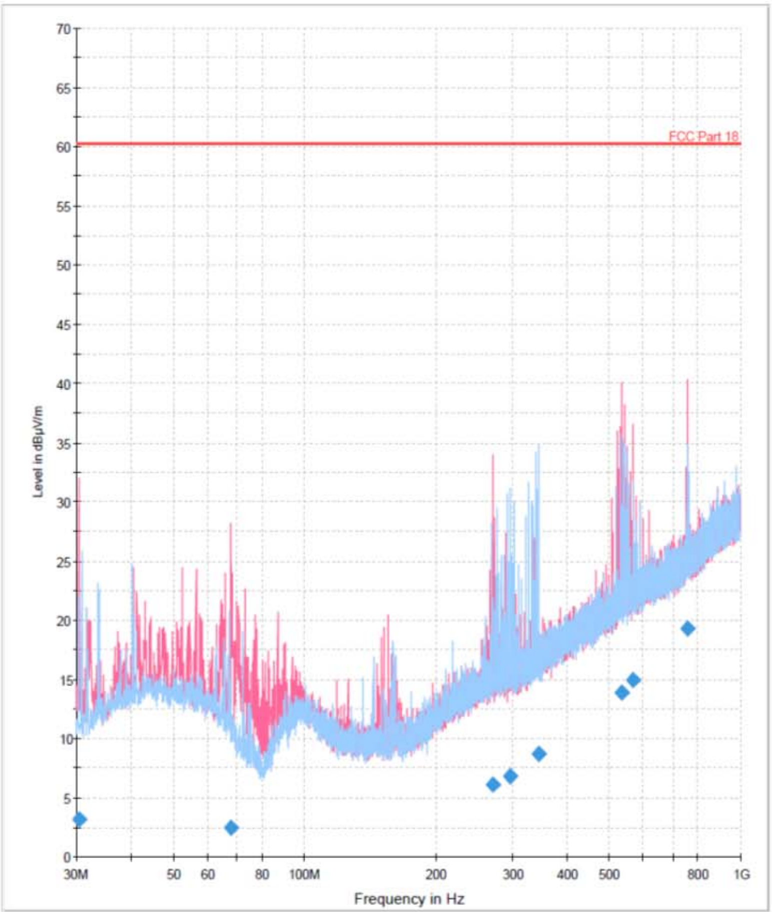
Test Report

Common Information

Test Description:	Radiated Emission(NK-17-E-0155)
Test Site:	Nemko 10 m Chamber
Test Standard:	FCC Part 18
Environment Conditions:	a.c. 120 V, 60 Hz
Operator Name:	Doseung Shin
	Microwave mode

1. Electric Field Strength (30M-1GHz)_final

1. Electric Field Strength (30M-1GHz)_final



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EMI Auto Test(1) 2 / 2

Final Result 1

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.388000	3.2	15000.0	120.000	370.0	V	290.0	-24.6	57.1	60.3
68.024000	2.5	15000.0	120.000	270.0	V	45.0	-25.0	57.8	60.3
269.638500	6.1	15000.0	120.000	130.0	V	241.0	-19.4	54.2	60.3
297.089500	6.9	15000.0	120.000	370.0	H	138.0	-18.6	53.4	60.3
345.492500	8.7	15000.0	120.000	370.0	H	-14.0	-16.7	51.6	60.3
532.993500	13.9	15000.0	120.000	330.0	V	75.0	-11.0	46.4	60.3
565.682500	14.9	15000.0	120.000	370.0	V	70.0	-10.2	45.4	60.3
757.160500	19.3	15000.0	120.000	330.0	V	12.0	-7.1	41.0	60.3

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
30.388000	
68.024000	
269.638500	
297.089500	
345.492500	
532.993500	
565.682500	
757.160500	

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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 : A3LMW8000M

[Room Temperature : 18.4 ℃]

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)	(μV/m)		(μV/m)	(μV/m)
2 177.35	H	130	300	12.8	32.5	45.3	184.1	0.0056	1.0	34.5
2 397.63	H	160	0	16.5	32.5	49.0	281.8	0.0061	1.7	34.5
4 592.78	H	160	270	38.6	7.2	45.8	195.0	0.0100	1.9	34.5
7 436.35	H	160	300	36.4	14.3	50.7	342.8	0.0100	3.4	34.5
9 896.53	H	160	330	33.4	18.0	51.4	371.5	0.0100	3.7	34.5
10 844.02	V	160	30	29.9	21.2	51.1	358.9	0.0100	3.6	34.5
12 357.20	H	190	300	34.4	21.4	55.8	616.6	0.0100	6.2	34.5
14 781.10	V	130	300	32.3	24.3	56.6	676.1	0.0100	6.8	34.5

<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 $^{[Fieldstrength\ at\ 3\ m\ (dBuV/m)\ /\ 20]}$

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.

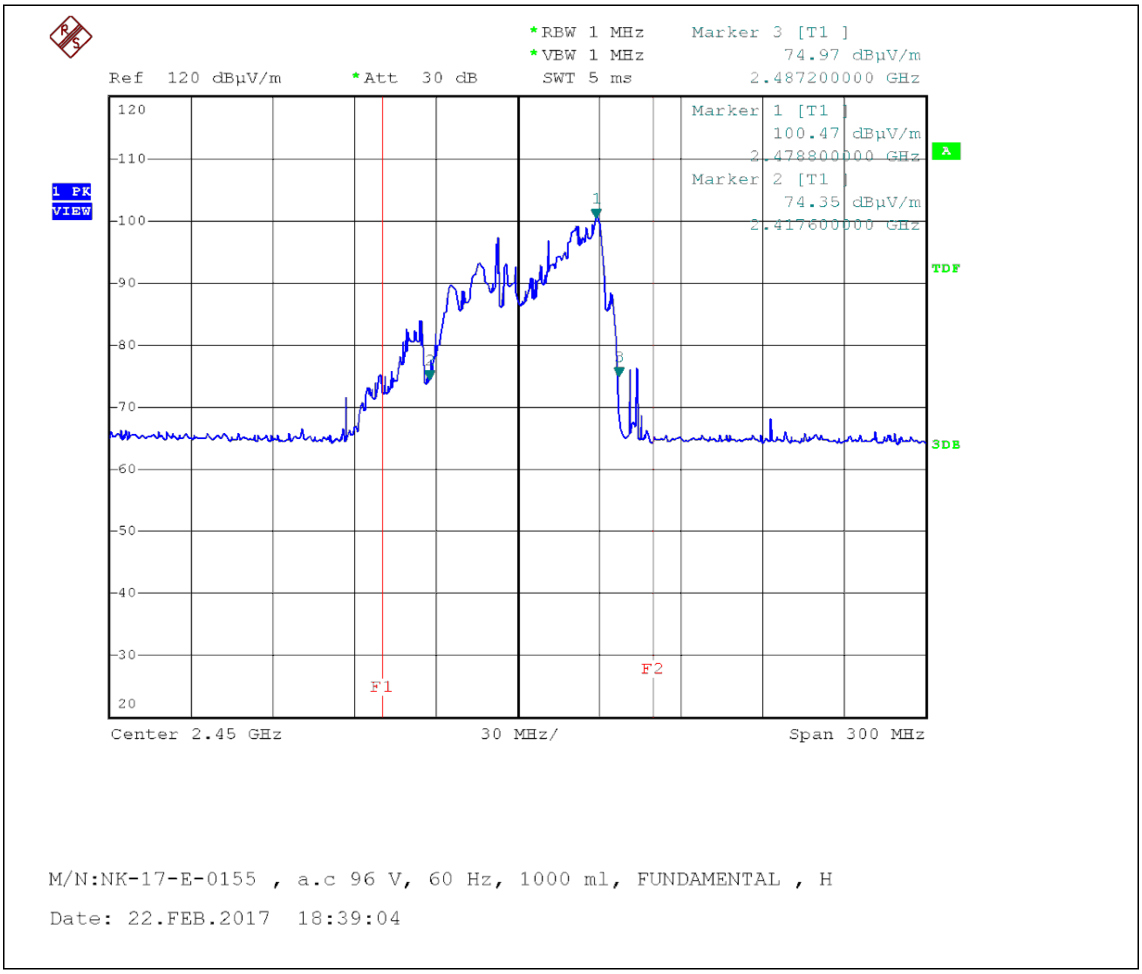
6. The test was performed at peak detector mode with average.

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

Tested by : ***Dosheung Shin***

PLOTS OF EMISSIONS

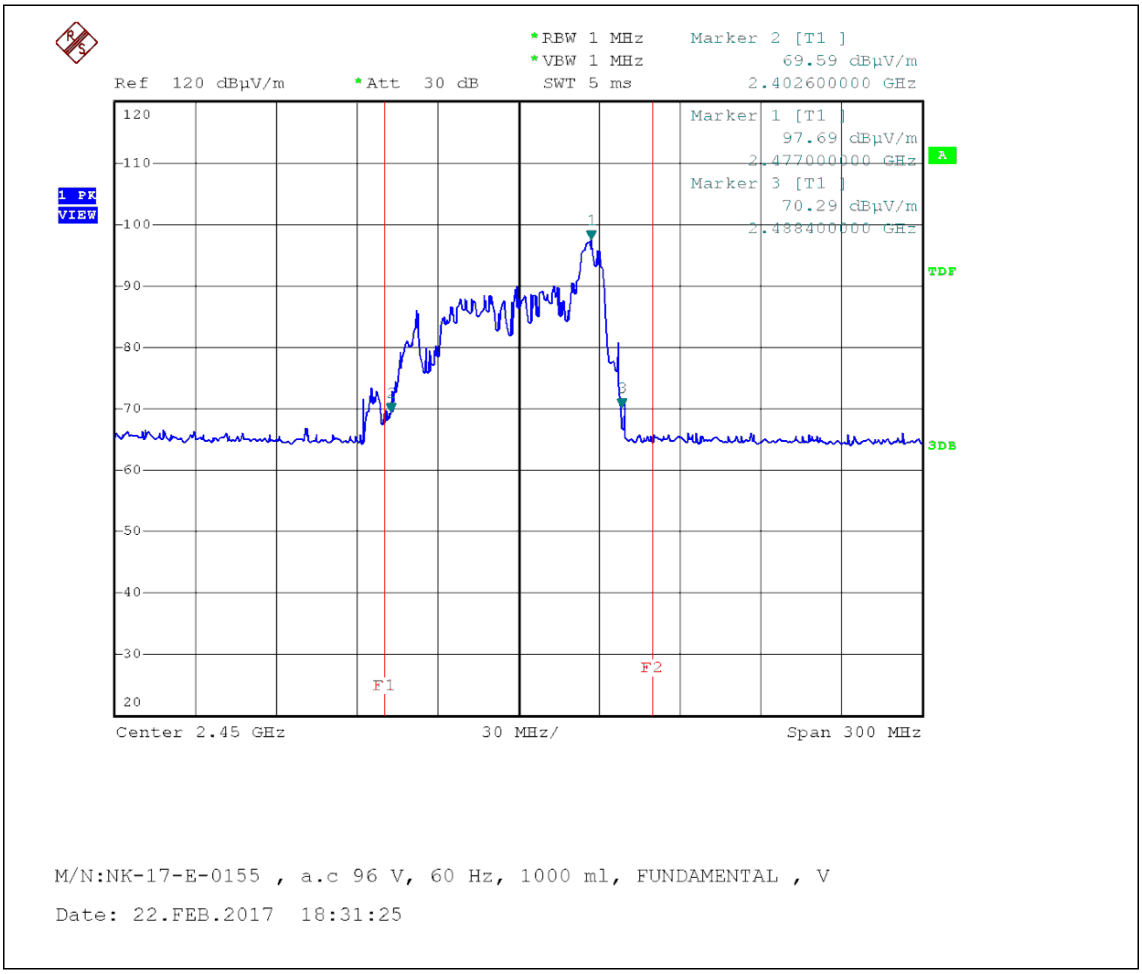
- ***Frequency vs Line Voltage Variation Test***



Horizontal (96 V, 1000 ㎖)

PLOTS OF EMISSIONS

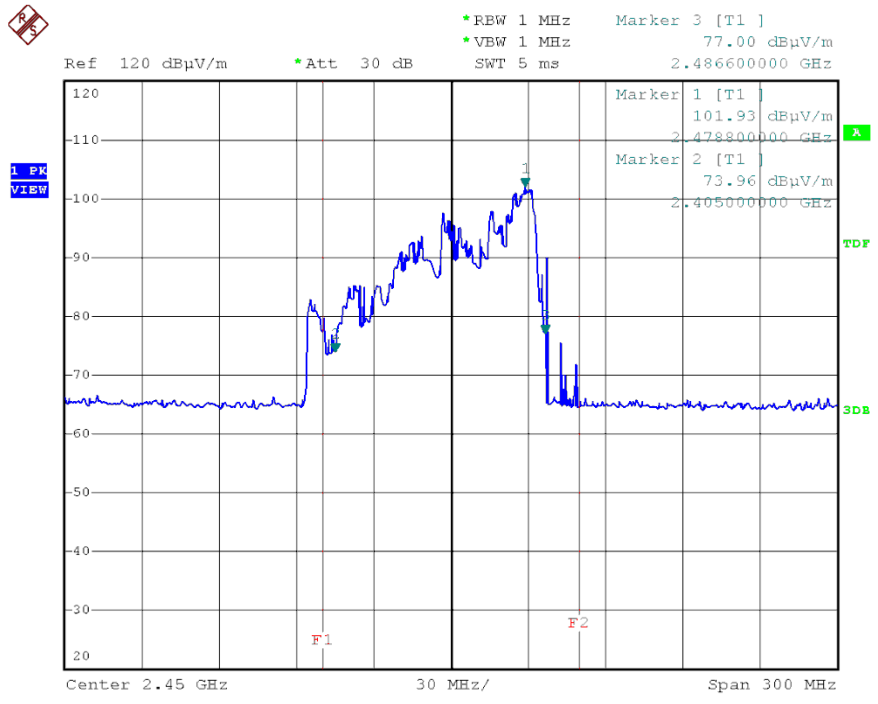
- ***Frequency vs Line Voltage Variation Test***



Vertical (96 V, 1000 ㎖)

PLOTS OF EMISSIONS

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

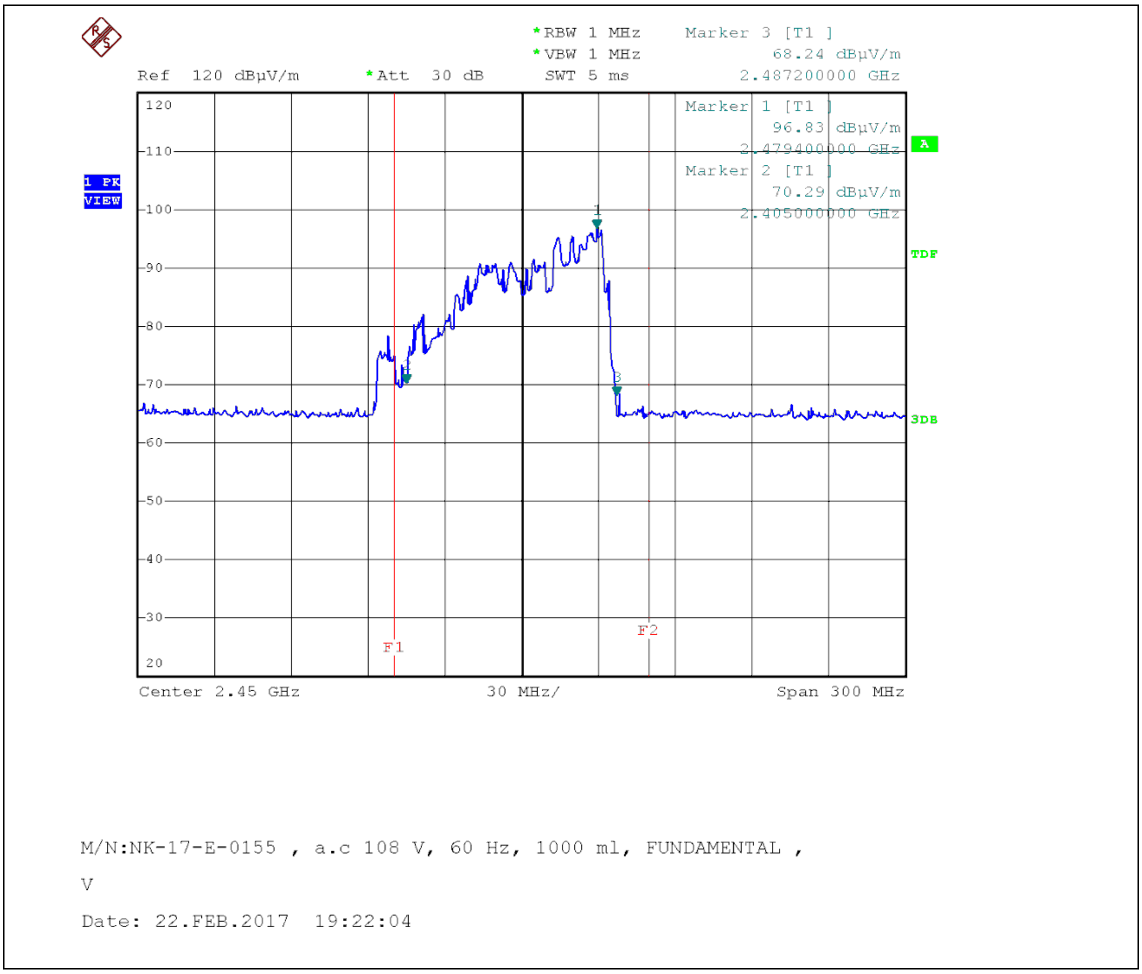


M/N:NK-17-E-0155 , a.c 108 V, 60 Hz, 1000 ml, FUNDAMENTAL ,
H
Date: 22.FEB.2017 19:09:02

Horizontal (108 V, 1000 ㎖)

PLOTS OF EMISSIONS

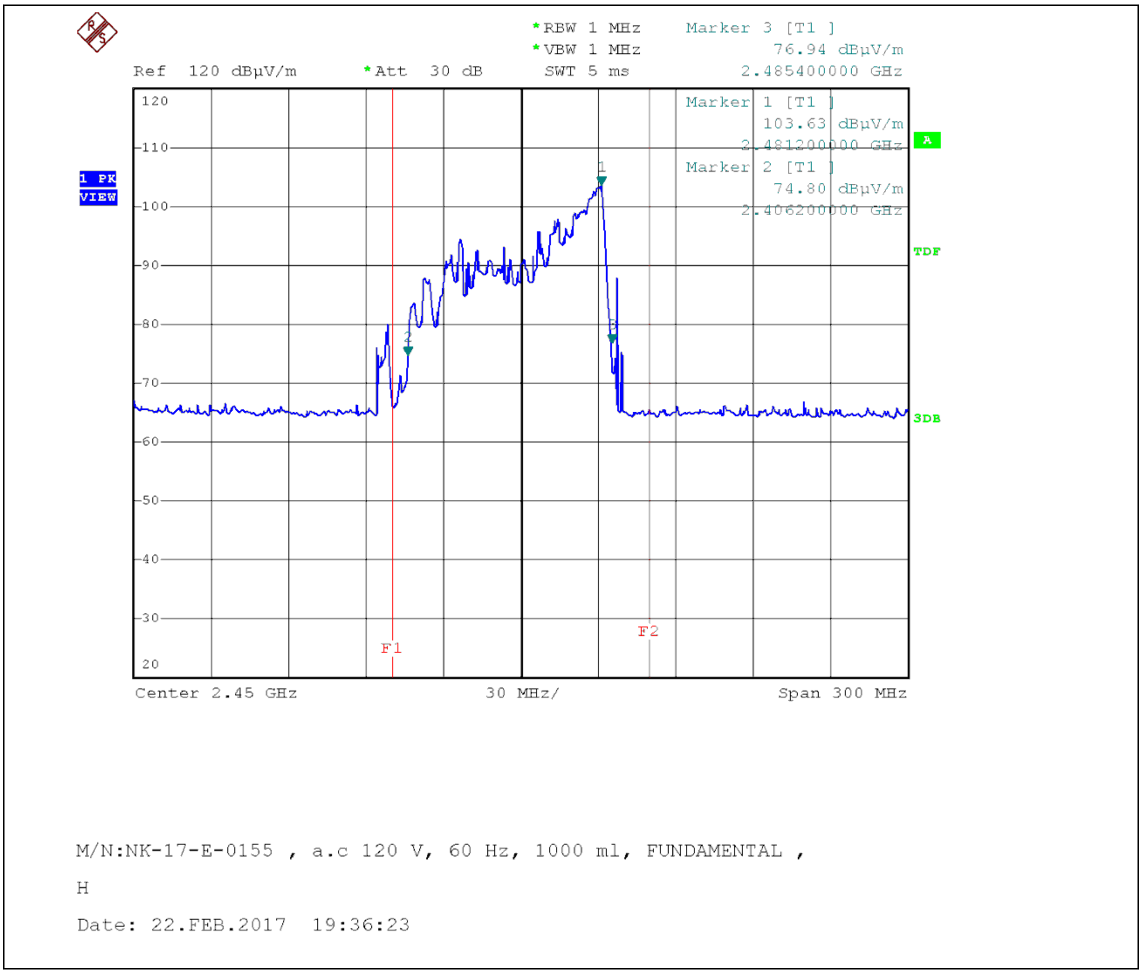
- ***Frequency vs Line Voltage Variation Test***



Vertical (108 V, 1000 mℓ)

PLOTS OF EMISSIONS

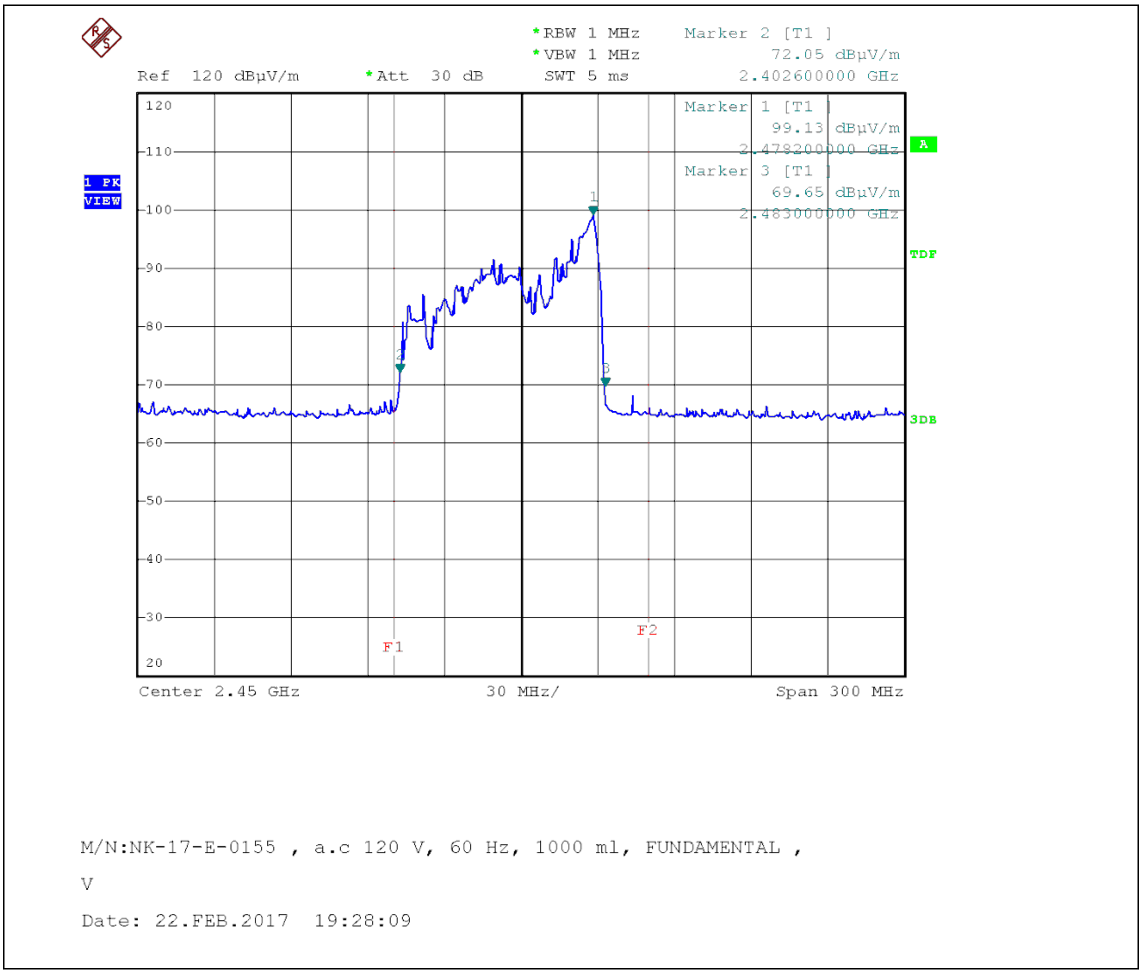
- ***Frequency vs Line Voltage Variation Test***



Horizontal (120 V, 1000 ㎖)

PLOTS OF EMISSIONS

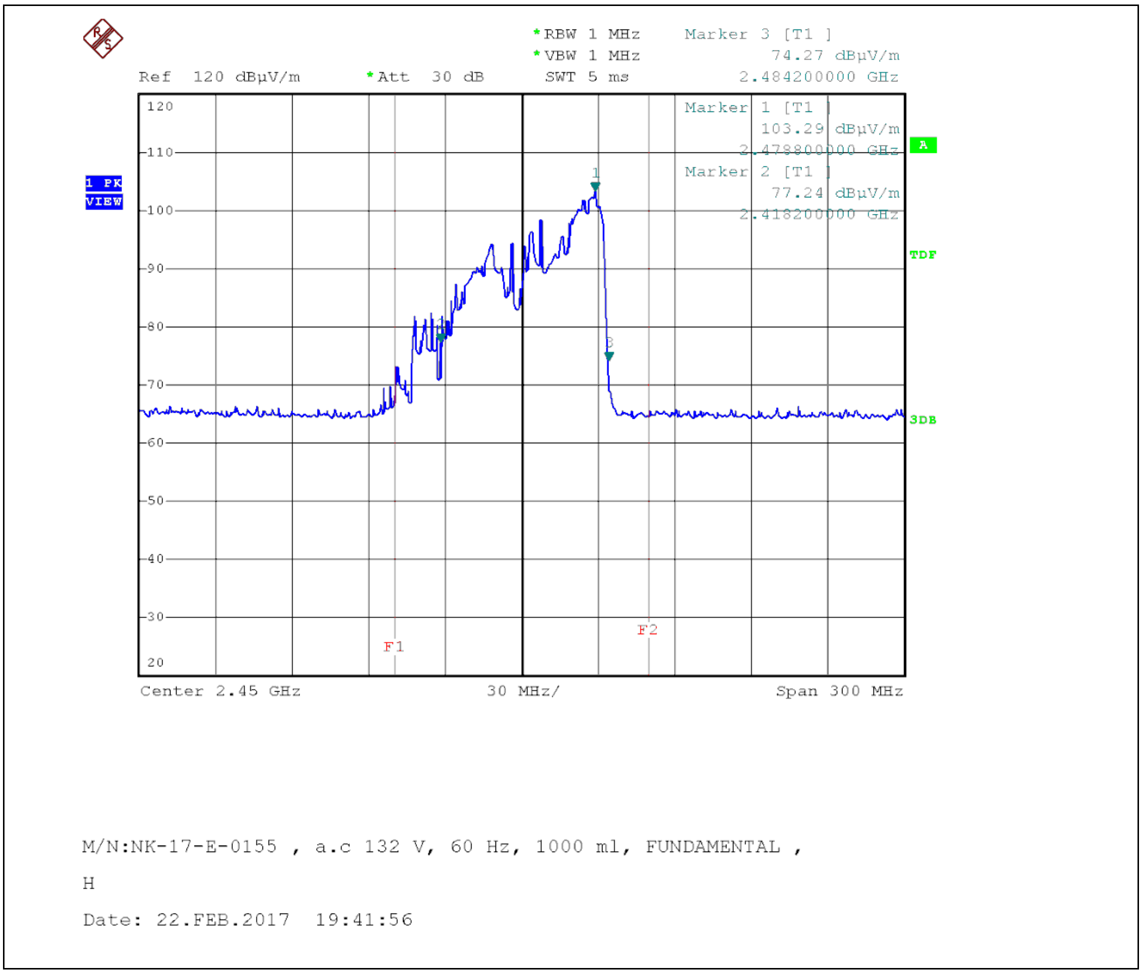
- ***Frequency vs Line Voltage Variation Test***



Vertical (120 V, 1000 ㎖)

PLOTS OF EMISSIONS

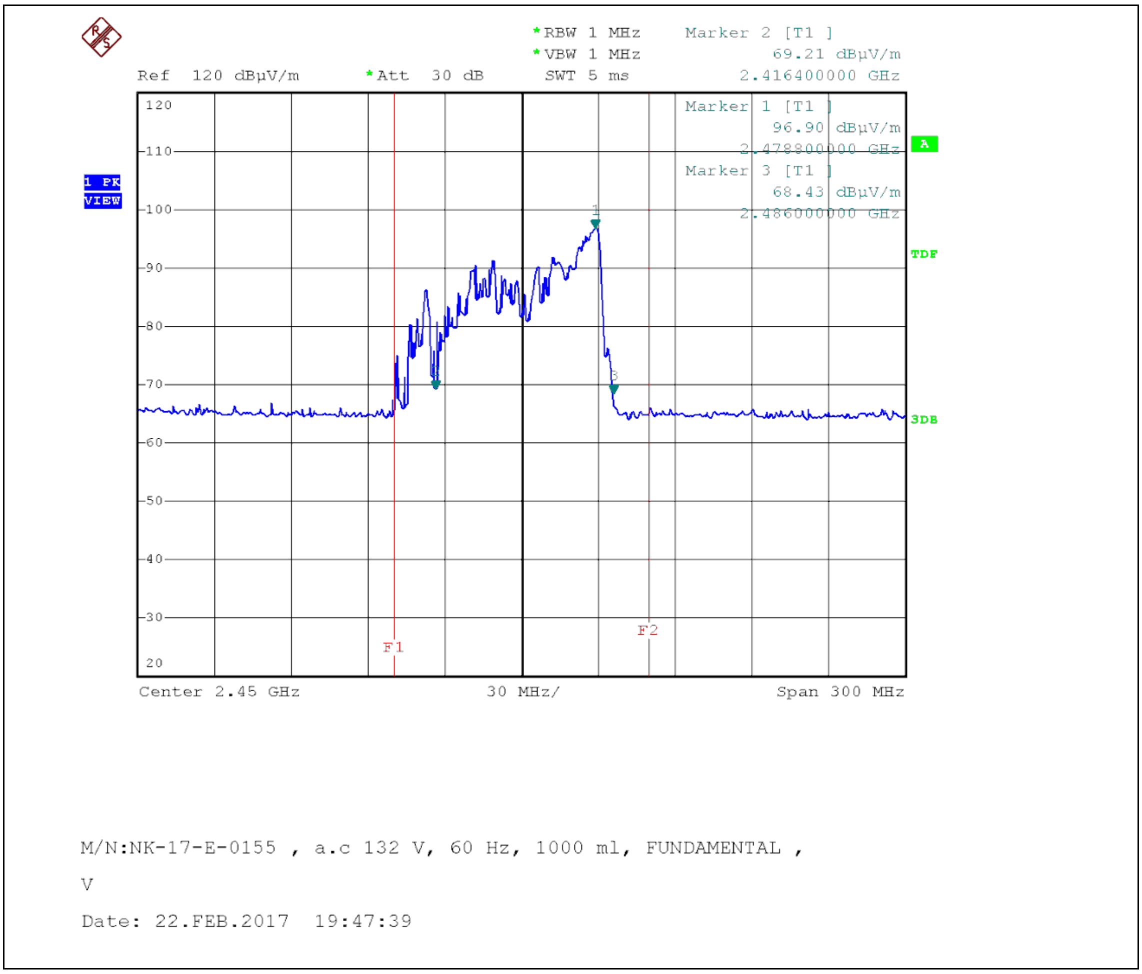
- ***Frequency vs Line Voltage Variation Test***



Horizontal (132 V, 1000 ㎖)

PLOTS OF EMISSIONS

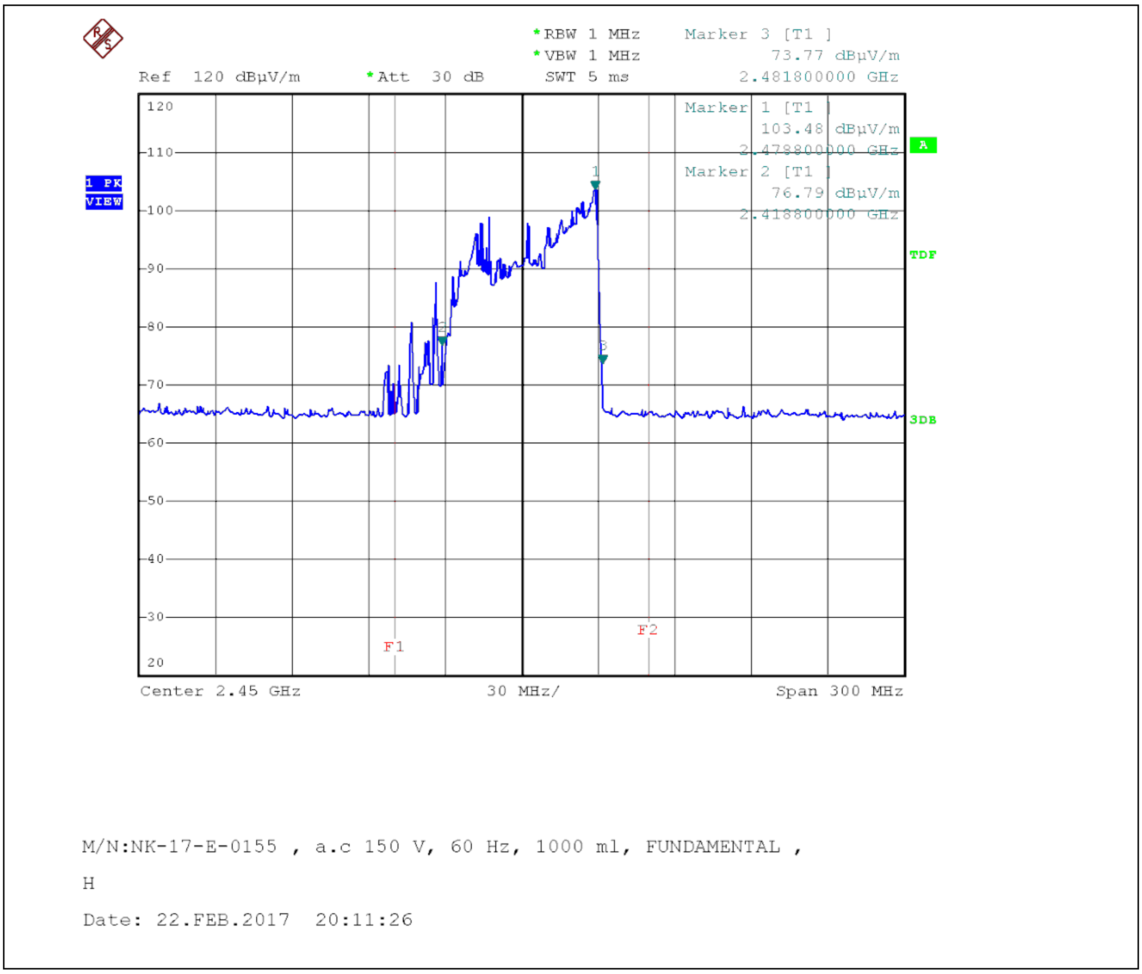
- ***Frequency vs Line Voltage Variation Test***



Vertical (132 V, 1000 mℓ)

PLOTS OF EMISSIONS

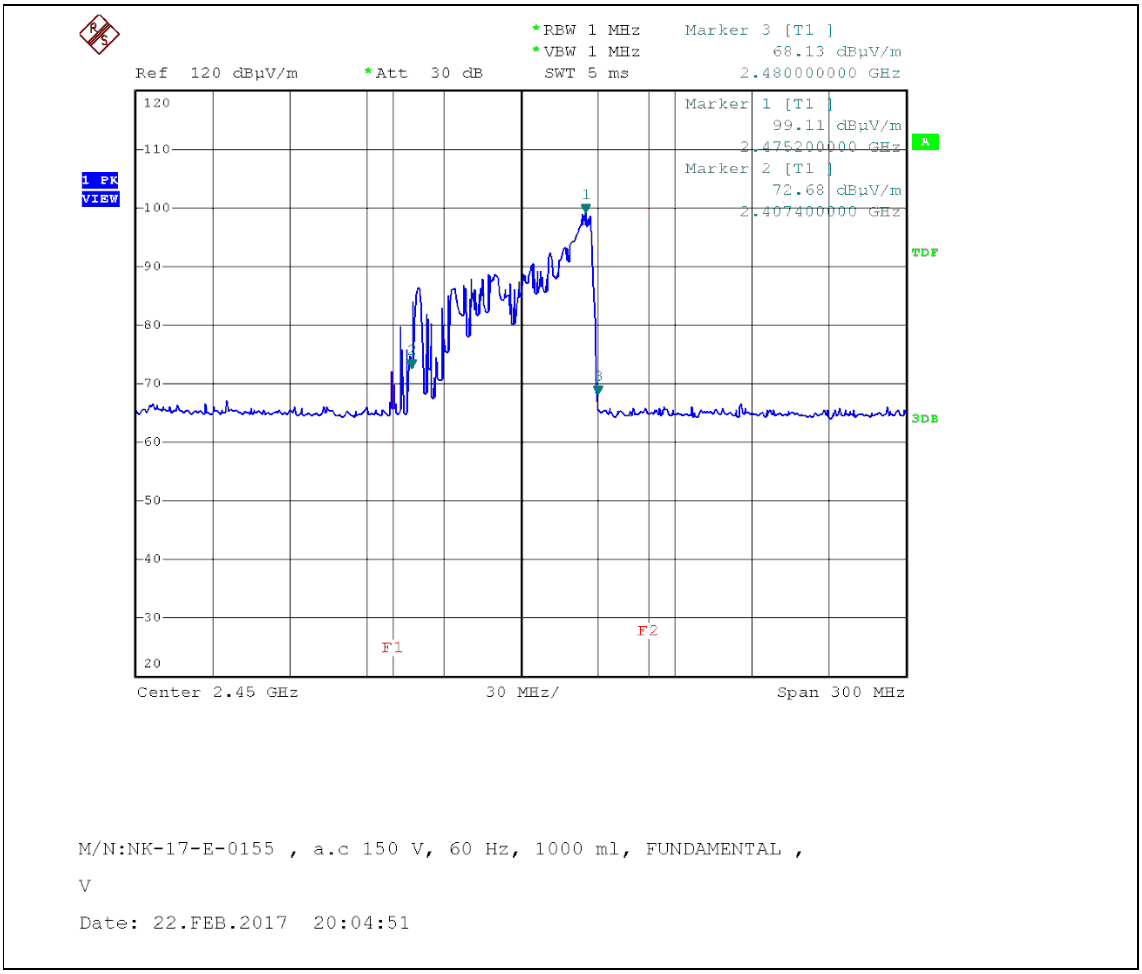
- ***Frequency vs Line Voltage Variation Test***



Horizontal (150 V, 1000 ㎖)

PLOTS OF EMISSIONS

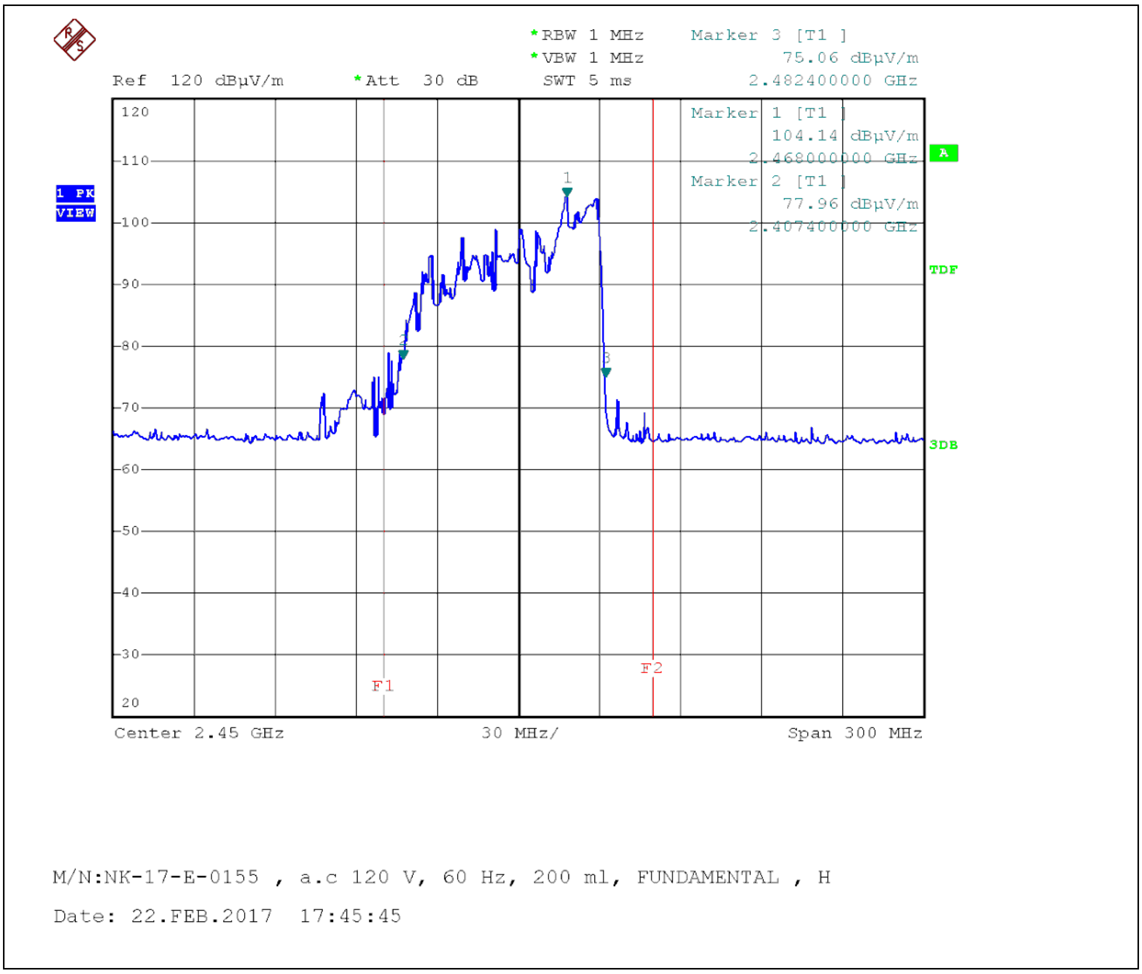
- ***Frequency vs Line Voltage Variation Test***



Vertical (150 V, 1000 ㎖)

PLOTS OF EMISSIONS

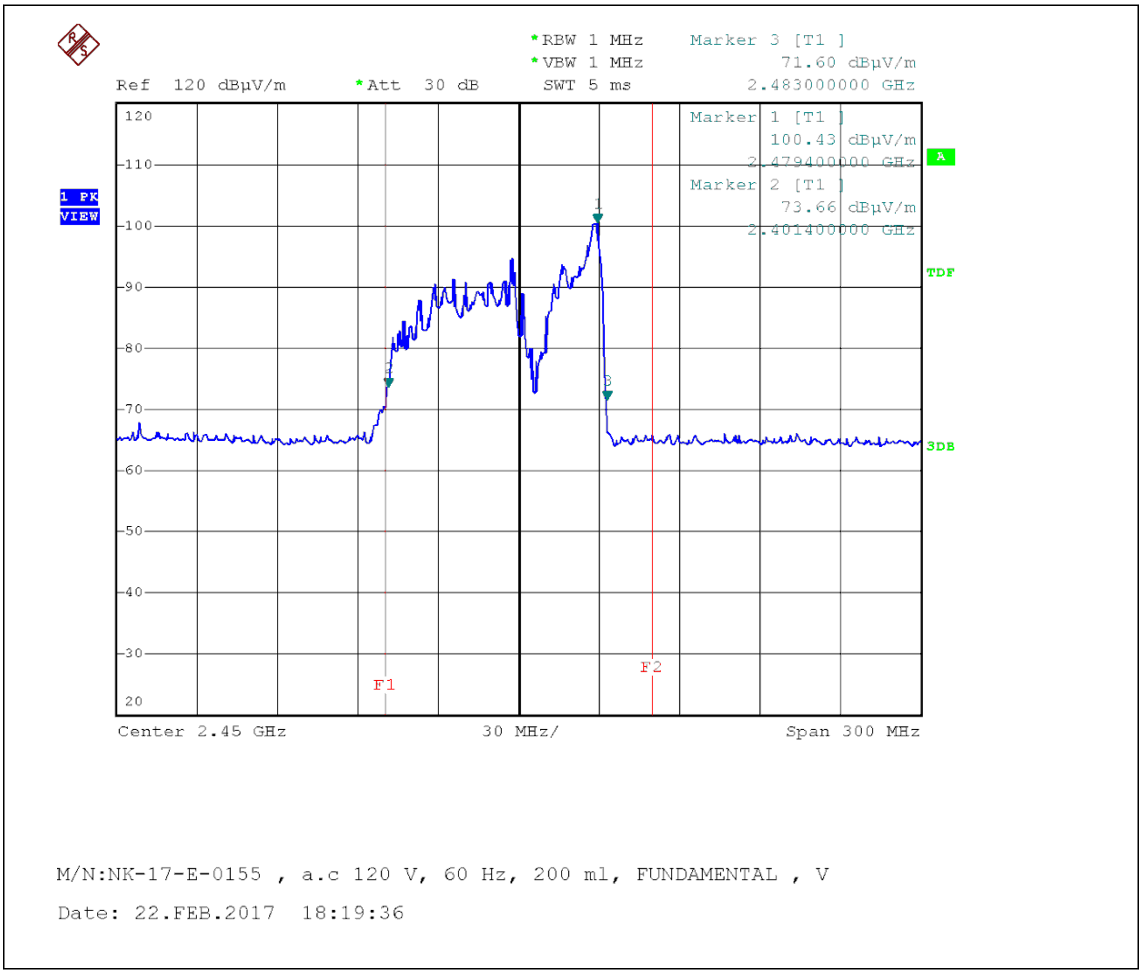
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 200 ㎖)

PLOTS OF EMISSIONS

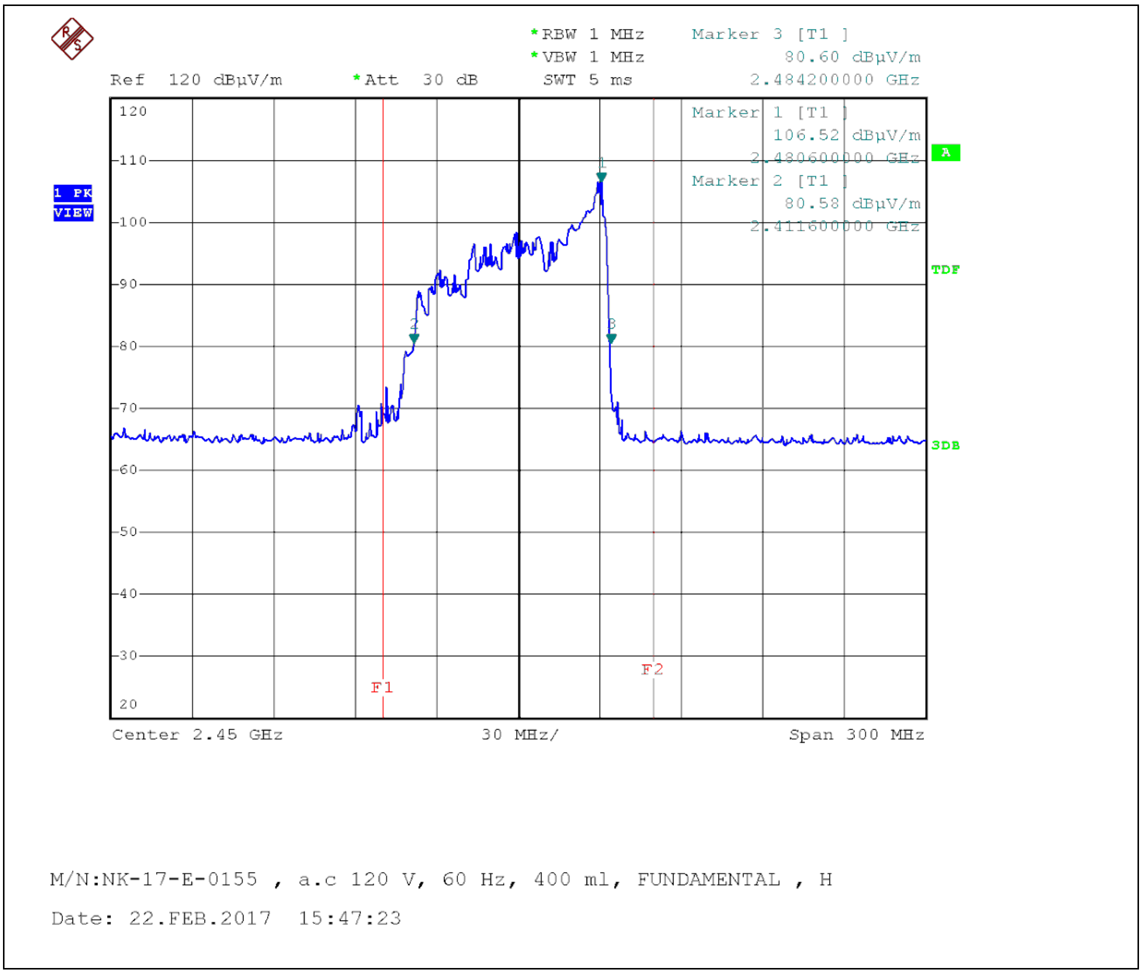
- ***Frequency vs Load Variation Test***



Vertical (120 V, 200 ㎖)

PLOTS OF EMISSIONS

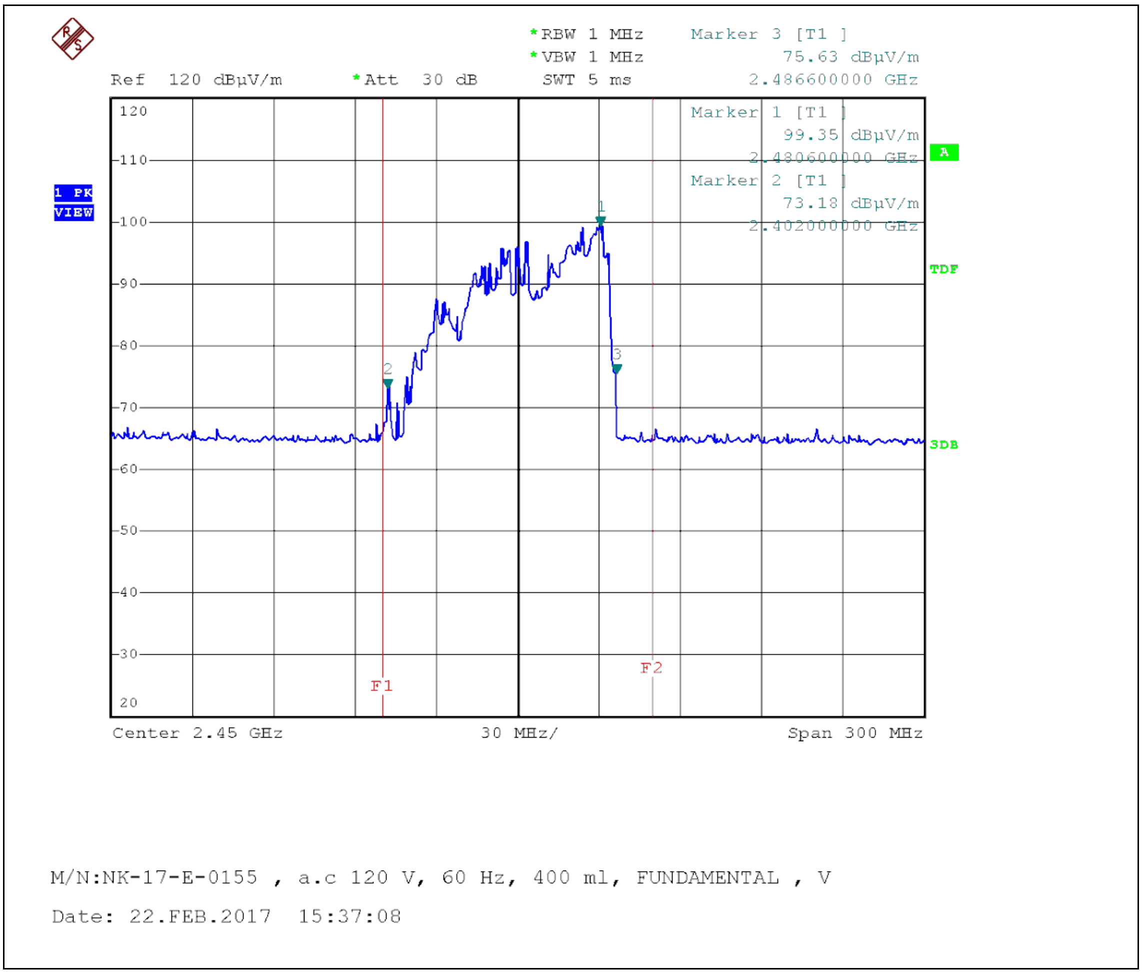
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 400 mℓ)

PLOTS OF EMISSIONS

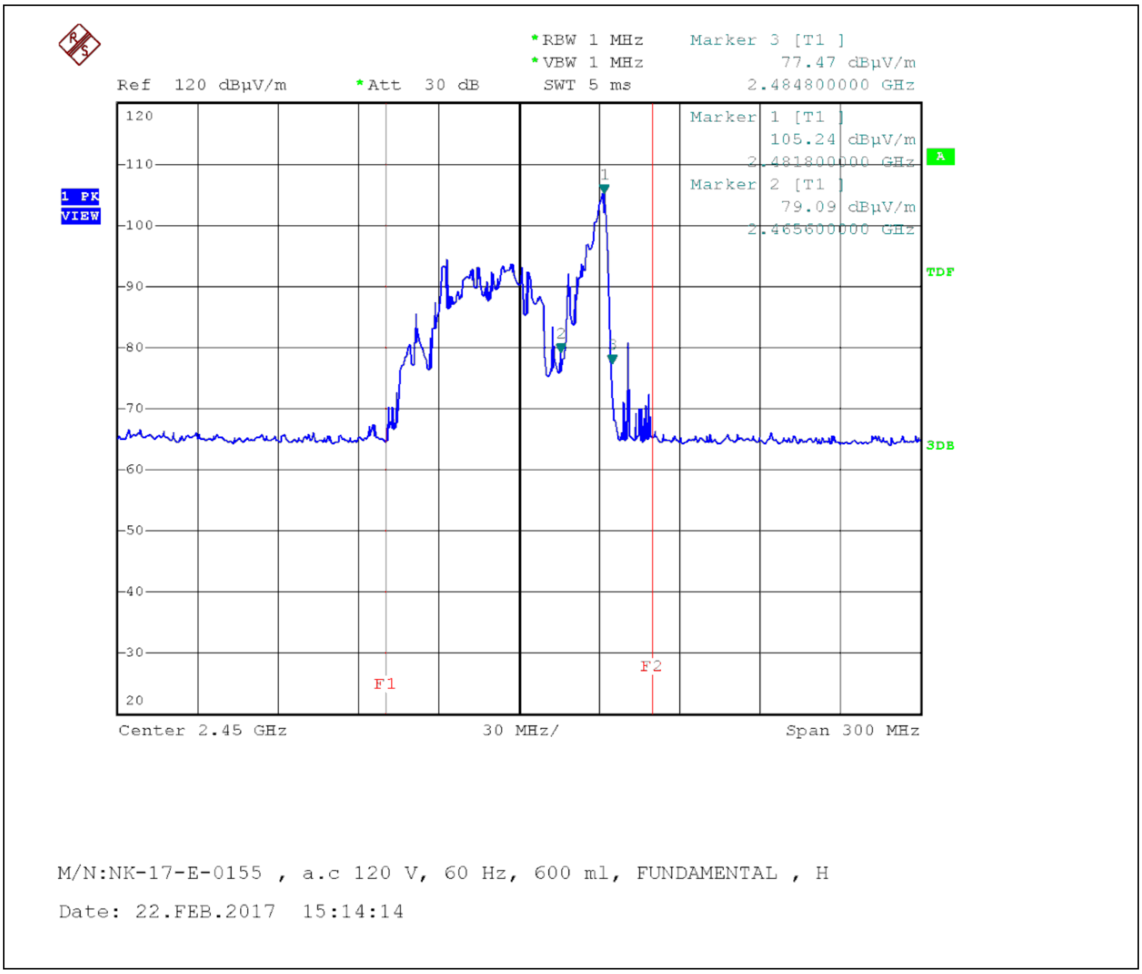
- ***Frequency vs Load Variation Test***



Vertical (120 V, 400 mℓ)

PLOTS OF EMISSIONS

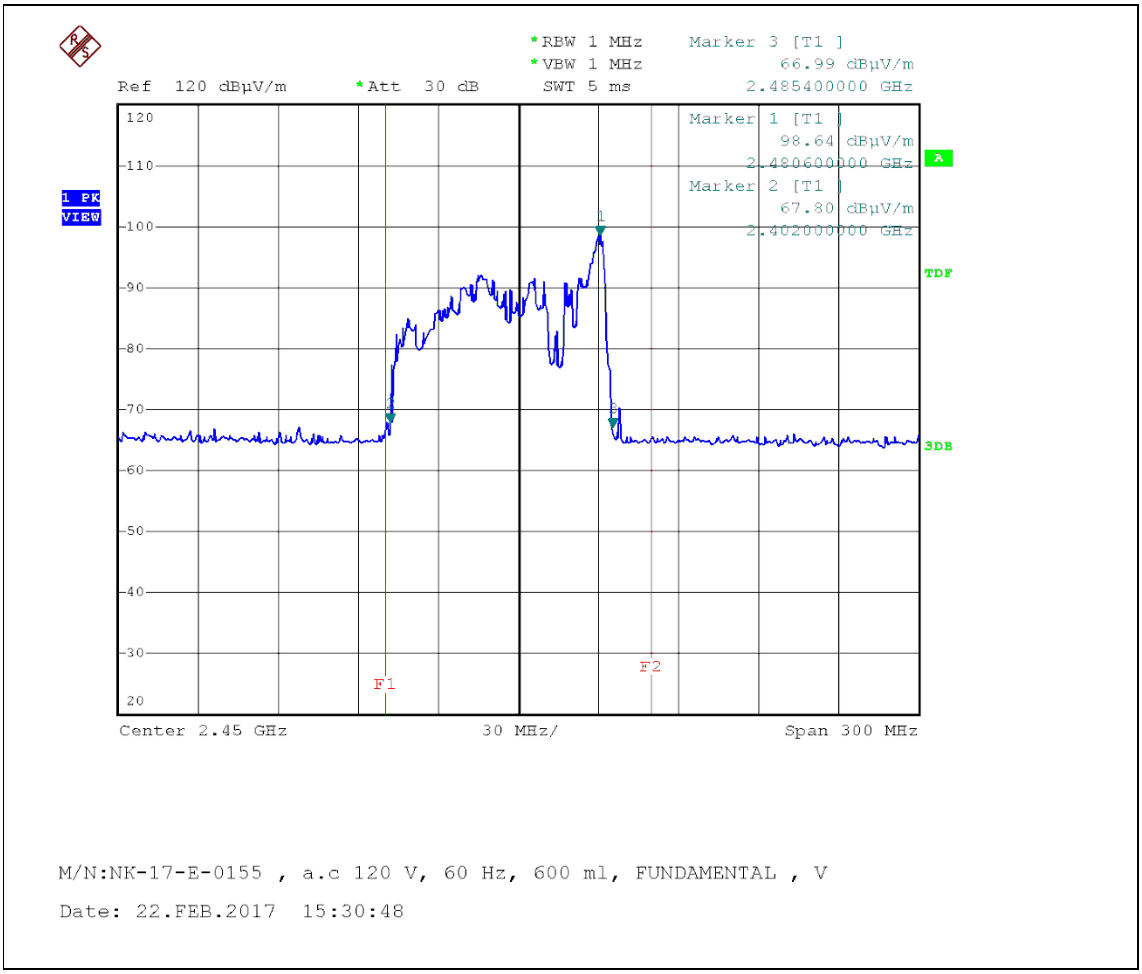
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 600 ㎖)

PLOTS OF EMISSIONS

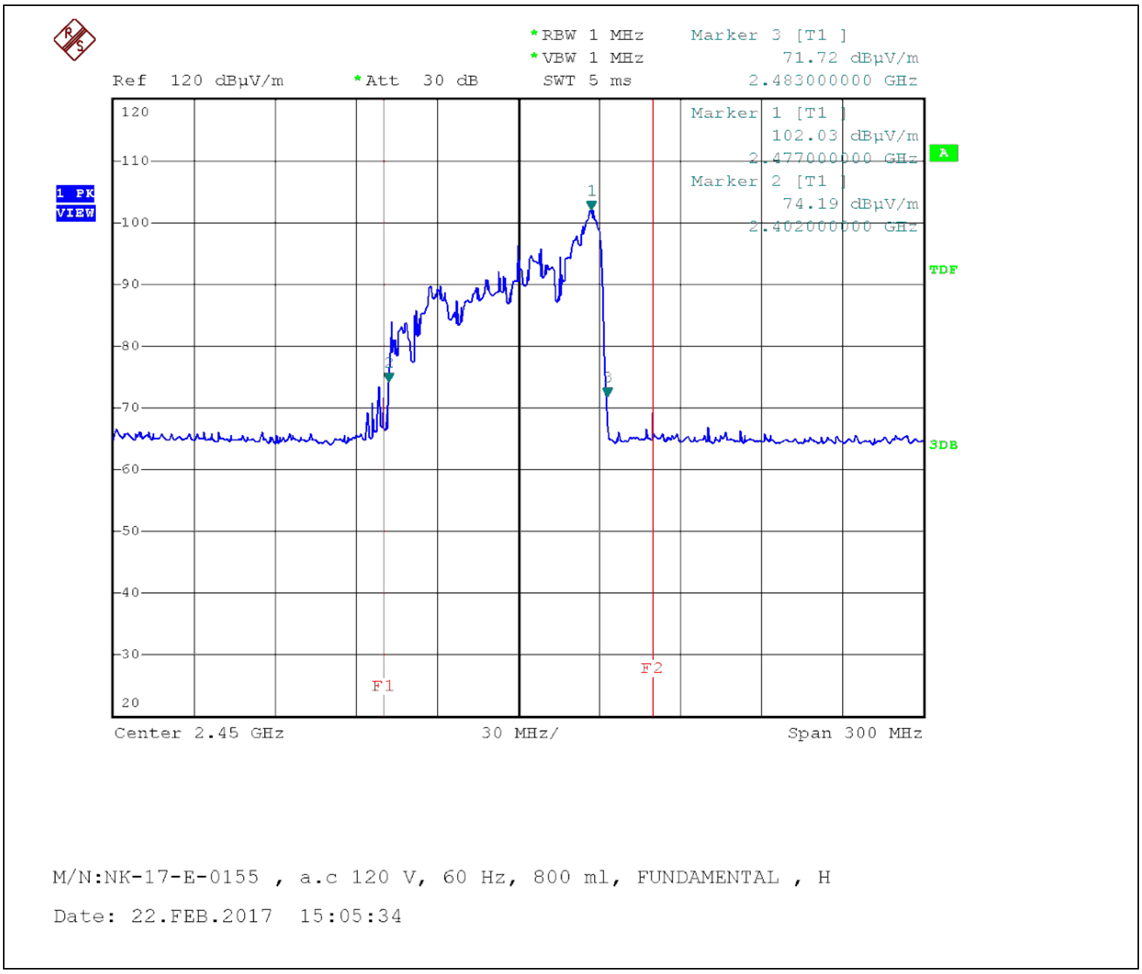
- ***Frequency vs Load Variation Test***



Vertical (120 V, 600 ㎖)

PLOTS OF EMISSIONS

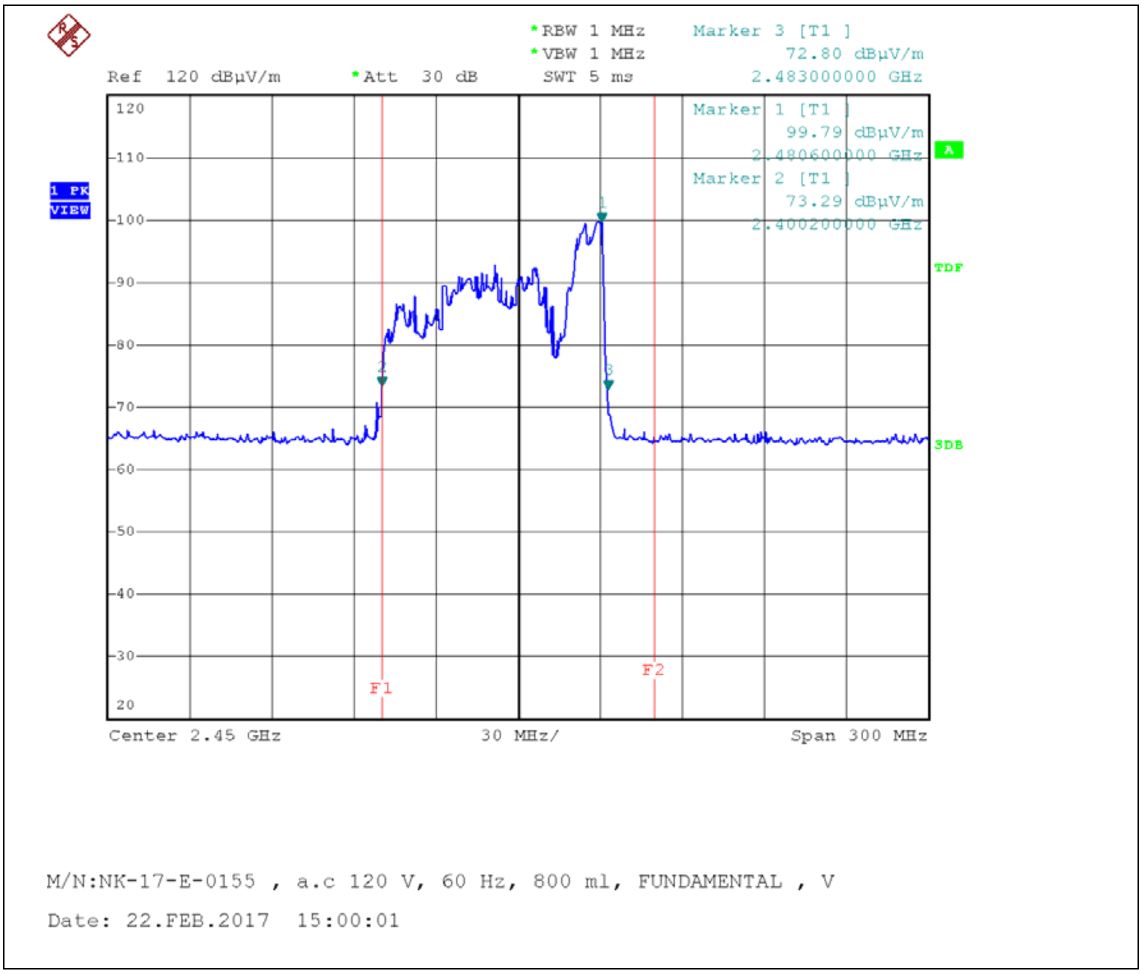
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 800 ㎖)

PLOTS OF EMISSIONS

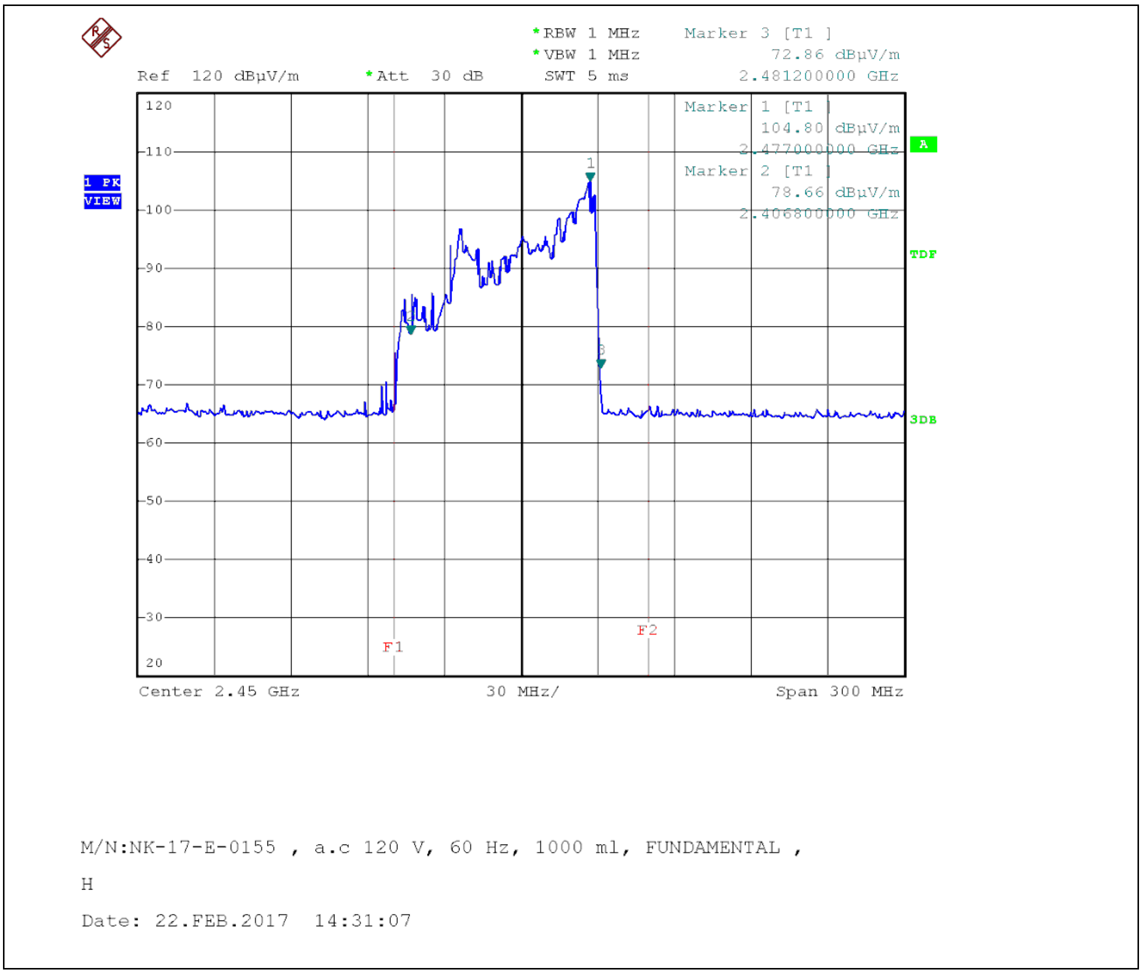
- ***Frequency vs Load Variation Test***



Vertical (120 V, 800 ㎖)

PLOTS OF EMISSIONS

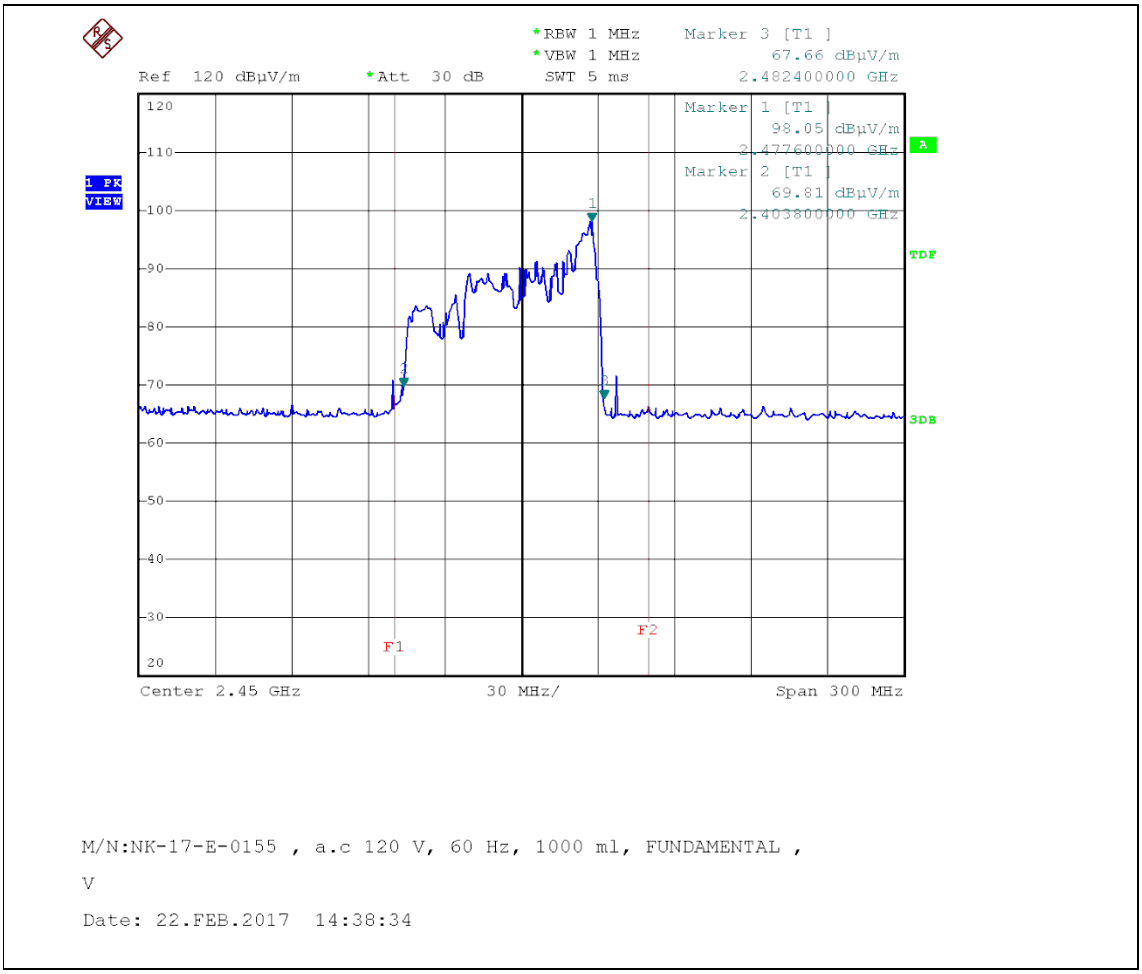
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 1000 ㎖)

PLOTS OF EMISSIONS

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



Vertical (120 V, 1000 ㎖)

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	*Xi*	Uncertainty of *Xi*		Coverage factor *k*	*u(Xi)* (dB)	*Ci*	*Ci u(Xi)* (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 ㎓)

Source of Uncertainty	*Xi*	Uncertainty of *Xi*		Coverage factor *k*	*u(Xi)* (dB)	*Ci*	*Ci u(Xi)* (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability	*RS*	0.67	normal 1	1.00	0.67	1	0.67
Receiver reading	*Ri*	± 0.02	normal 2	2.00	0.01	1	0.01
Sine wave voltage	*dVsw*	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response	*dVpa*	± 0.92	normal 2	2.00	0.46	1	0.46
Pulse repetition rate response	*dVpr*	± 0.35	normal 2	2.00	0.18	1	0.18
Noise floor proximity	*dVnf*	± 0.50	normal 2	2.00	0.25	1	0.25
Antenna Factor Calibration	A_F	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Cable Loss	C_L	± 1.00	normal 2	2.00	0.50	1	0.50
Antenna Directivity	A_D	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Antenna Factor Height Dependence	A_H	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Antenna Phase Centre Variation	A_P	± 0.20	rectangular	$\sqrt{3}$	0.12	1	0.12
Antenna Factor Frequency Interpolation	A_i	± 0.25	rectangular	$\sqrt{3}$	0.14	1	0.14
Site Imperfections	S_i	± 4.00	triangular	$\sqrt{6}$	1.63	1	1.63
Measurement Distance Variation	D_V	± 0.60	rectangular	$\sqrt{3}$	0.35	1	0.35
Antenna Balance	D_{bal}	± 0.90	rectangular	$\sqrt{3}$	0.52	1	0.52
Cross Polarization	D_{Cross}	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Mismatch	*M*	+ 0.98 − 1.11	U-Shaped	$\sqrt{2}$	0.74	1	0.74
EUT Volume Diameter	*Vd*	0.33	normal 1	1.00	0.33	1	0.11
Combined Standard Uncertainty	Normal			*uc* = 2.72 dB			
Expended Uncertainty U	Normal (*k* = 2)			5.4 dB (CL is 95 %)			

3. Radiation Uncertainty Calculation (Above 1 ㎓)

Source of Uncertainty	*Xi*	Uncertainty of *Xi*		Coverage factor *k*	*u(Xi)* (dB)	*Ci*	*Ci u(Xi)* (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability	*RS*	0.21	normal 1	1.00	0.21	1	0.21
Receiver Reading	*Ri*	± 0.02	normal 2	2	0.01	1	0.01
Attenuation (antenna-receiver)	a_c	± 0.30	normal 2	2	0.15	1	0.15
Preamplifier gain	*Gp*	± 0.21	normal 2	2	0.11	1	0.11
Receiver Sine Wave	*dVsw*	± 0.17	normal 2	2	0.09	1	0.09
Instability of preamp gain	*dGp*	± 1.2	rectangular	$\sqrt{3}$	0.70	1	0.70
Noise Floor Proximity	*dVnf*	± 0.70	rectangular	$\sqrt{3}$	0.40	1	0.40
Antenna Factor Calibration	*AF*	± 1.00	normal 2	2	0.50	1	0.50
Directivity difference	*DFadir*	± 1.00	rectangular	$\sqrt{3}$	0.58	1	0.58
Phase Centre location	*AP*	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Antenna Factor Frequency Interpolation	*Ai*	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Site Imperfections	*Si*	± 6.00	triangular	$\sqrt{6}$	2.45	1	2.45
Effect of setup table material	*dANT*	± 1.21	rectangular	$\sqrt{3}$	0.70	1	0.70
Separation distance	*dD*	± 0.50	rectangular	$\sqrt{3}$	0.29	1	0.29
Cross Polarization	*DCross*	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Table height	*dh*	± 0.00	normal 2	2	0.00	1	0.00
Mismatch (antenna-Preamplifier)	*M*	+ 1.30 - 1.50	U-Shaped	$\sqrt{2}$	1.00	1	1.00
Mismatch (preamplifier-antenna)	*M*	+ 1.20 - 1.40	U-Shaped	$\sqrt{2}$	0.92	1	0.92
Combined Standard Uncertainty	Normal			*uc* = 6.26 dB			
Expended Uncertainty U	Normal (*k* = 2)			*U* = 6.3 dB (CL is 95 %)			

LIST OF TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Due to Calibration	Calibration Interval
1	Microwave survey meter	ETS Lindgren	1501	00033549	Feb.20 2018	2 year
2	LOOP ANTENNA	R&S	HFH2-Z2	N/A	Feb. 22 2018	2 years
3	EMI Test Receiver	R&S	ESCI	101041	Apr. 04 2017	1 year
4	Software	R&S	EMC32	Version 8.53.0	-	-
5	Artificial Mains Network	R&S	ESH2-Z5	100273	Apr. 04 2017	1 year
6	ATTENUATOR	FAIRVIEW	SA3N5W-10	N/A	Apr. 04 2017	1 year
7	EMI Test Receiver	R&S	ESU 40	100202	Apr. 04 2017	1 year
8	Software	R&S	EMC32	Version 8.53.0	-	-
9	TRILOG Broadband Test Antenna	SCHWARZBECK	VULB 9163	9163-423	Nov. 04 2017	2 year
10	ATTENUATOR	FAIRVIEW	SA3N5W-06	N/A	Apr. 04 2017	1 year
11	Controller	innco systems GmbH	CO2000-G	CO2000/562/ 23890210/L	N/A	N/A
12	Open Switch and Control Unit	R&S	OSP-120	100015	N/A	N/A
13	Antenna Mast (Left)	innco systems GmbH	MA4000-EP	N/A	N/A	N/A
14	Turn Table	innco systems GmbH	DT3000-3T	N/A	N/A	N/A
15	Signal Conditioning Unit	R&S	SCU 01	10030	Apr. 04 2017	1 year
16	Signal Conditioning Unit	Rohde & Schwarz	SCU 18	10065	Apr. 04 2017	1 year
17	DOUBLE RIDGED HORN ANTENNA	SCHWARZBECK	HF907	100197	Jun. 11 2017	2 year
18	TILT ANTENNA MAST	innco systems GmbH	MA4640-XP-EP	N/A	N/A	N/A

APPENDIX D – SCHEMATIC DIAGRAM

APPENDIX E – USER'S MANUAL

APPENDIX F – BLOCK DIAGRAM