

Nemko Korea Co., Ltd.

155, 153 and 159, Osan-ro, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 16885 Republic of Korea
TEL : + 82 31 330 1700 FAX : + 82 31 322 2332

FCC EVALUATION REPORT FOR CERTIFICATION**Applicant :**

WINIADAEWOO Co., Ltd.

509, Dunchon-daero, Jungwon-gu, Seongnam-si,

Gyeonggi-do, Korea, Republic of

Attn : Mr. Youjin Choi

Dates of Issue : August 19, 2019

Test Report No. : NK-19-E-0577

Test Site : Nemko Korea Co., Ltd.

EMC site, Korea

FCC ID

Trade Mark

Contact Person

C5F7NF1JMO100N**DAEWOO, KENMORE**

WINIADAEWOO Co., Ltd.

509, Dunchon-daero, Jungwon-gu,
Seongnam-si, Gyeonggi-do, Korea, Republic of

Mr. Youjin Choi

Telephone No. : + 82 31 639 7754

Applied Standard :

Classification :

EUT Type :

FCC Part 18 & Part 2

Consumer ISM equipment

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.



August 19, 2019

Tested By : Doseung Shin
Engineer



Aug 19, 2019

Reviewed By : Taegyun Kim
Technical Manager

TABLE OF CONTENTS

SCOPE	3
INTRODUCTION (Site Description)	4
EUT INFORMATION	5
DESCRIPTION OF TESTS (Radiation Hazard)	6
DESCRIPTION OF TESTS (Input Power Measurement)	6
DESCRIPTION OF TESTS (Output Power Measurement)	6
DESCRIPTION OF TESTS (Frequency Measurements)	6
DESCRIPTION OF TESTS (Conducted Emissions)	7
DESCRIPTION OF TESTS (Radiated Emissions)	8
TEST DATA (Radiation Hazard)	9
TEST DATA (Input Power Measurement)	9
TEST DATA (RF Output Power Measurement)	9
TEST DATA (Frequency Measurements)	10
TEST DATA (Conducted Emissions)	12
TEST DATA (Radiated Emissions)	15
PLOT OF EMISSIONS (Frequency Measurements)	22
ACCURACY OF MEASUREMENT	42
LIST OF TEST EQUIPMENT	45
APPENDIX A - SAMPLE LABEL	46
APPENDIX B - PHOTOGRAPHS OF TEST SET-UP	47
APPENDIX C - EUT PHOTOGRAPHS	52
APPENDIX D - SCHEMATIC DIAGRAM	77
APPENDIX E - USER'S MANUAL	78
APPENDIX F - BLOCK DIAGRAM	79

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 : WINIADAEWOO Co., Ltd.

Contact Person : Mr. Youjin Choi
Tel No.: + 82 31 639 7754

Manufacturer : WINIADAEWOO Co., Ltd.
509, Dunchon-daero, Jungwon-gu,
Seongnam-si, Gyeonggi-do, Korea, Republic of

- FCC ID: C5F7NF1JMO100N
- Model: KOT-1J*U9
- Variant Model: 111.8353291*, 111.8353991*, 111.8353391*, 111.8353791*

Note) The asterisk "*" can be any alphanumeric character (A-Z or 0-9) to denote enclosure design.

- Trade Mark: DAEWOO, KENMORE
- EUT Type: Microwave Oven
- Applied Standard: FCC Part 18 & Part 2
- Test Procedure(s): MP-5:1986
- Dates of Test: July 25, 2019 to August 07, 2019
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK-19-E-0577

*** The model KOT-1J0U9 was tested for the representative model.**

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 **WINIADAEWOO Co., Ltd.**

FCC ID : **C5F7NF1JMO100N, Microwave Oven.**

These measurement tests were conducted at **Nemko Korea Co., Ltd. EMC Laboratory.**

The site address is 155, 153 and 159, Osan-ro, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 16885 Republic of Korea

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, 153 and 159, Osan-ro, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 16885 Republic of Korea
Tel) + 82 31 330 1700
Fax) + 82 31 322 2332

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	Microwave Oven
Model	KOT-1J0U9
Rated voltage & frequency	a.c. 120 V, 60 Hz Single Phase
Rated power output	1 000 W
Rated power consumption(MW)	1 600 W
Magnetron	RM269 (DAEWOO)

Component List

Item	Model	Manufacturer	Serial Number
Magnetron	RM269	DAEWOO	N/A
Thermally Protected L. Air Over	OBB-22102X1	OH SUNG	N/A
Synchronous Motor	49TYD-16A1	YUYAO JING CHENG HIGH & NEW TECHNOLOGY CO.,LTD	N/A
FAN MOTOR	OEM-15DWX1-B07	OH SUNG	N/A
Diode H.V.	CL01-12	GAOXING	N/A
Trans H.V	DLAS11A0-1JA	QINGDAO YUNLU ENERGY TECHNOLOGY CO., LTD	N/A
H.V. CAPACITOR	2100VAC 0.91uF	BICAI	N/A
Noise Filter	DWLF-M30	YUNLU	N/A
Main Board	M381	DAEWOO	N/A
AC Motor Capacitor	DMF-251006.SH	DAEDONG	N/A

DESCRIPTION OF TESTS

Radiation Hazard

A 700 $\text{m}\ell$ 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 $\text{m}\ell$ water load was placed in the center of the oven and the oven set to maximum power. A 700 $\text{m}\ell$ 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 $\text{m}\ell$ 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) are 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 kHz to 30 MHz with 20 ms 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 & CISPR average mode.

The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.

Each EME reported was calibrated using the R&S signal generator.

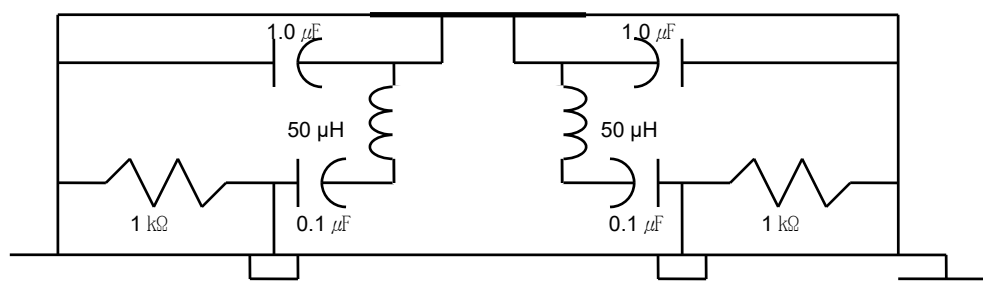


Fig. 2. LISN Schematic Diagram

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 MHz to 30 MHz using Loop Antenna

(ROHDE & SCHWARZ/HFH2-Z2)

and from 30 MHz to 1000 MHz using TRILOG Broadband Test Antenna (Schwarzbeck, VULB 9163).

Above 1 GHz, 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 MHz with RBW 9 kHz and

made indoor at 10 m using TRILOG Broadband Test Antenna (Schwarzbeck, VULB 9163) for measurement from 30 MHz to 1000 MHz with RBW 120 kHz and made indoors at 3 m using Double Ridged Broadband Horn antenna (Schwarzbeck, HF907) for measurement from 1 GHz to 18 GHz with RBW 1 MHz.

The detector function were set to quasi peak mode and the bandwidth of the receiver were set to 9 kHz, 120 kHz and peak mode 1 MHz 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.

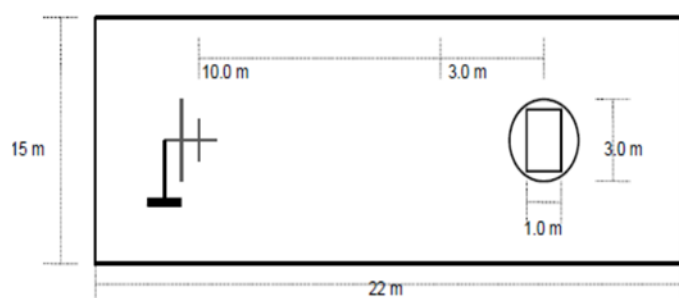


Fig. 3. Dimensions of 10 semi anechoic chamber

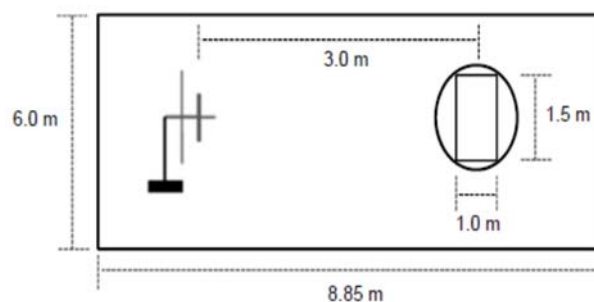


Fig. 4. Dimensions of 3 m full anechoic chamber

TEST DATA

Radiation Hazard

Probe Location	Maximum Leakage [mW/Cm2]	Limit [mW/Cm2]
A	0.2	1.00
B	0.15	1.00
Other	0.1	1.00

Input Power Measurement

Operation mode	P rated (W)	P (W)	dP (%)	Required dP (%)
Power Input	1 600	1 605	0.31	+ 15 %

Output Power Measurement

Quantity of Water [ml]	Mass of the container [g]	Ambient temperature [°C]	Initial temperature [°C]	Final temperature [°C]	Heating time [s]	Power output [W]
1 000	400	20.0	10.0	20.0	42	1000

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 (°C)

T_0 is the initial temperature of the water (°C)

T_1 is the final temperature of the water (°C)

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



Tested by : **Doseung Shin**

TEST DATA

Frequency measurements

► Frequency vs Line Voltage Variation Test

[Room Temperature : 22.0 ± 1.0 °C]

Line Voltage Variation (a.c. V)	*Pole	Frequency [MHz]	Allowed Tolerance for the ISM Band
96 (80 %)	H	Lower : 2 406.7	Lower : 2 400 MHz Upper : 2 500 MHz
	H	Upper : 2 477.4	
	V	Lower : 2 411.5	
	V	Upper : 2 475.4	
108 (90 %)	H	Lower : 2 415.3	
	H	Upper : 2 476.9	
	V	Lower : 2 417.3	
	V	Upper : 2 474.5	
120 (100 %)	H	Lower : 2 430.7	
	H	Upper : 2 475.9	
	V	Lower : 2 406.2	
	V	Upper : 2 479.3	
132 (110 %)	H	Lower : 2 414.4	
	H	Upper : 2 476.9	
	V	Lower : 2 412.9	
	V	Upper : 2 475.9	
150 (125 %)	H	Lower : 2 414.4	
	H	Upper : 2 478.8	
	V	Lower : 2 410.5	
	V	Upper : 2 479.3	

NOTE :

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

RESULT : Pass


Tested by : **Doseung Shin**

TEST DATA

► Frequency vs Load Variation Test

[Room Temperature : 22.0 ± 1.0 °C]

Volume of water (ml)	*)Pole	Frequency [MHz]	Allowed Tolerance for the ISM Band
200	H	Lower : 2 421.1	Lower : 2 400 MHz Upper : 2 500 MHz
	H	Upper : 2 476.4	
	V	Lower : 2 415.3	
	V	Upper : 2 475.0	
400	H	Lower : 2 428.8	
	H	Upper : 2 467.7	
	V	Lower : 2 430.2	
	V	Upper : 2 475.0	
600	H	Lower : 2 415.8	
	H	Upper : 2 472.1	
	V	Lower : 2 417.7	
	V	Upper : 2 474.0	
800	H	Lower : 2 428.8	
	H	Upper : 2 476.9	
	V	Lower : 2 433.1	
	V	Upper : 2 475.9	
1000	H	Lower : 2 409.6	
	H	Upper : 2 479.3	
	V	Lower : 2 431.7	
	V	Upper : 2 476.4	

NOTE :

1. *Pol. H = Horizontal, V = Vertical
2. The water load was varied between 200 ml to 1 000 ml.
3. Frequency was measured by using nominal voltage (a.c. 120 V).
4. ISM Frequency : 2 450 MHz, Tolerance : ± 50 MHz

RESULT : Pass

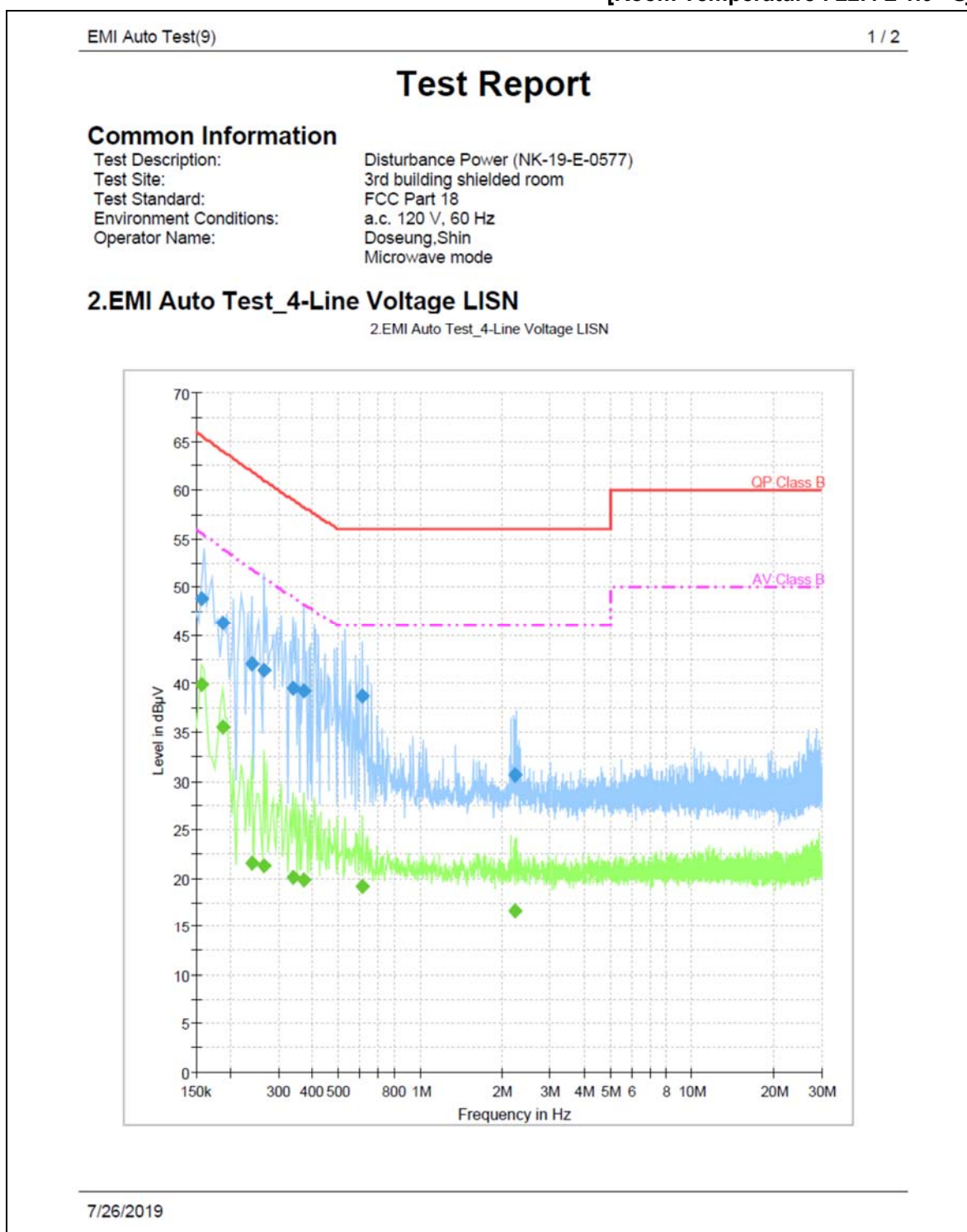

Tested by : Doseung Shin

TEST DATA

Conducted Emissions

FCC ID : C5F7NF1JMO100N

[Room Temperature : 22.4 ± 1.0 °C]



EMI Auto Test(9)

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.157462	48.8	15000.0	9.000	GND	L1	10.5	16.8	65.6	
0.187312	46.3	15000.0	9.000	GND	L1	10.4	17.7	64.0	
0.239550	42.1	15000.0	9.000	GND	N	10.5	19.8	61.9	
0.265669	41.3	15000.0	9.000	GND	N	10.5	19.7	61.0	
0.340294	39.5	15000.0	9.000	GND	N	10.5	19.5	59.0	
0.373875	39.3	15000.0	9.000	GND	N	10.5	19.0	58.3	
0.612675	38.8	15000.0	9.000	GND	N	10.5	17.2	56.0	
2.232038	30.6	15000.0	9.000	GND	N	10.5	25.4	56.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.157462	39.9	15000.0	9.000	GND	L1	10.5	15.7	55.6	
0.187312	35.5	15000.0	9.000	GND	N	10.5	18.5	54.0	
0.239550	21.6	15000.0	9.000	GND	N	10.5	30.3	51.9	
0.265669	21.3	15000.0	9.000	GND	N	10.5	29.7	51.0	
0.340294	20.1	15000.0	9.000	GND	N	10.5	28.8	49.0	
0.373875	19.8	15000.0	9.000	GND	N	10.5	28.5	48.2	
0.612675	19.1	15000.0	9.000	GND	N	10.5	26.9	46.0	
2.232038	16.6	15000.0	9.000	GND	N	10.5	29.4	46.0	

7/26/2019

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).**

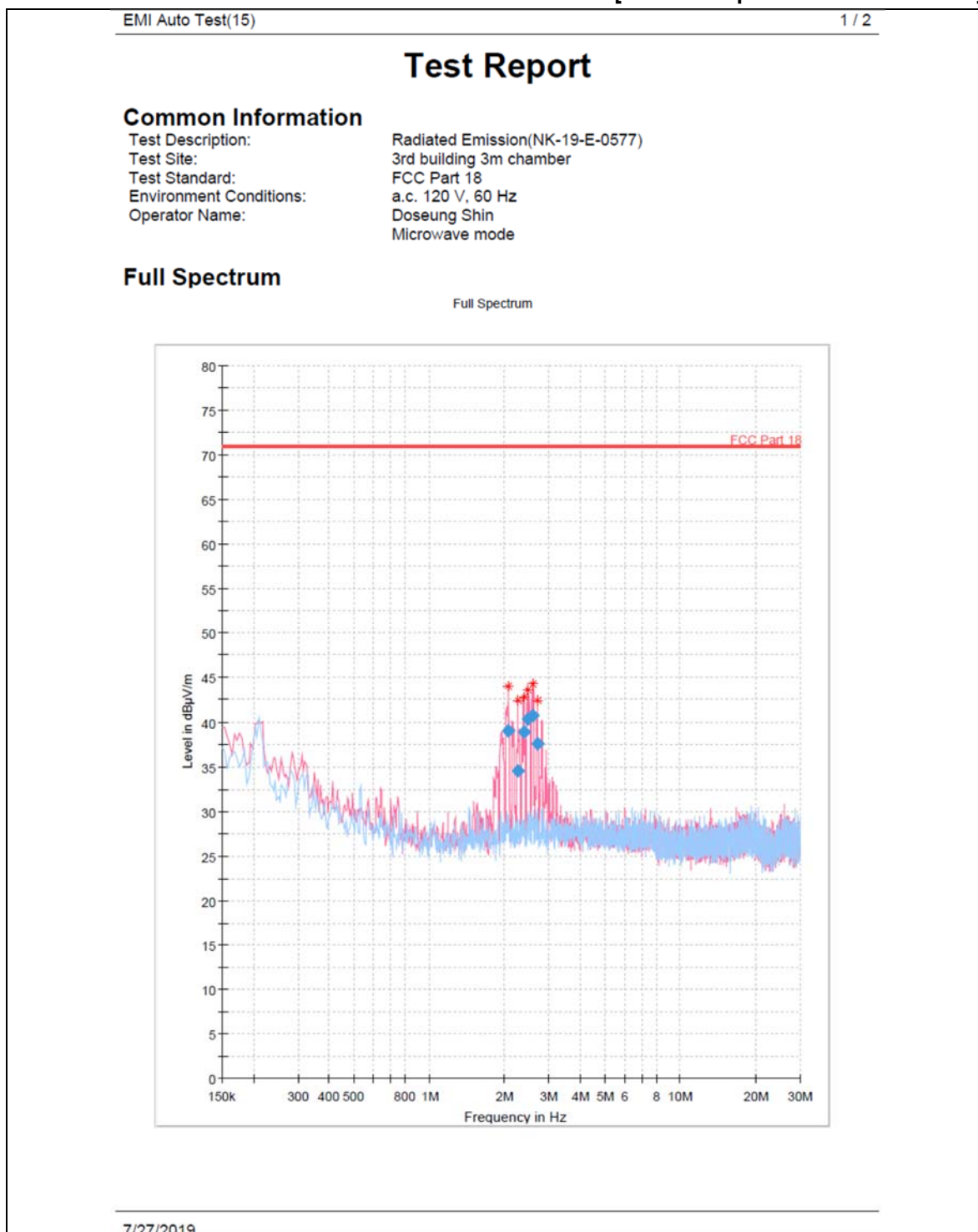
A handwritten signature in blue ink, appearing to read 'Doseung Shin', is positioned above a horizontal line.

Tested by : Doseung Shin

TEST DATA

Radiated Emissions (150 kHz to 30 MHz)

FCC ID : C5F7NF1JMO100N

[Room Temperature : 22.6 ± 1.0 °C]


EMI Auto Test(15)

2 / 2

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2.064131	39.04	70.90	31.86	15000.0	9.000	200.0	V	237.0	-23.4
2.258156	34.51	70.90	36.39	15000.0	9.000	200.0	V	7.0	-23.3
2.377556	38.91	70.90	31.99	15000.0	9.000	200.0	V	46.0	-23.3
2.470838	40.28	70.90	30.62	15000.0	9.000	200.0	V	24.0	-23.3
2.582775	40.72	70.90	30.18	15000.0	9.000	200.0	V	121.0	-23.3
2.694713	37.60	70.90	33.30	15000.0	9.000	200.0	V	359.0	-23.3

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

Frequency (MHz)	Comment
2.064131	
2.258156	
2.377556	
2.470838	
2.582775	
2.694713	

7/27/2019

<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 : $20 * \log (300 / 3) = 40 \text{ dBuV/m}$
4. The limit at 300 meters is $20 * \log (25 * \text{SQRT} (\text{RF Power} / 500))$
5. All other emissions were measured while a 700 $\text{m}\ell$ load was placed in the center of the oven.
6. The limit for consumer device is on the FCC Part section 18.305.

A handwritten signature in blue ink, appearing to read 'Doseung Shin'.

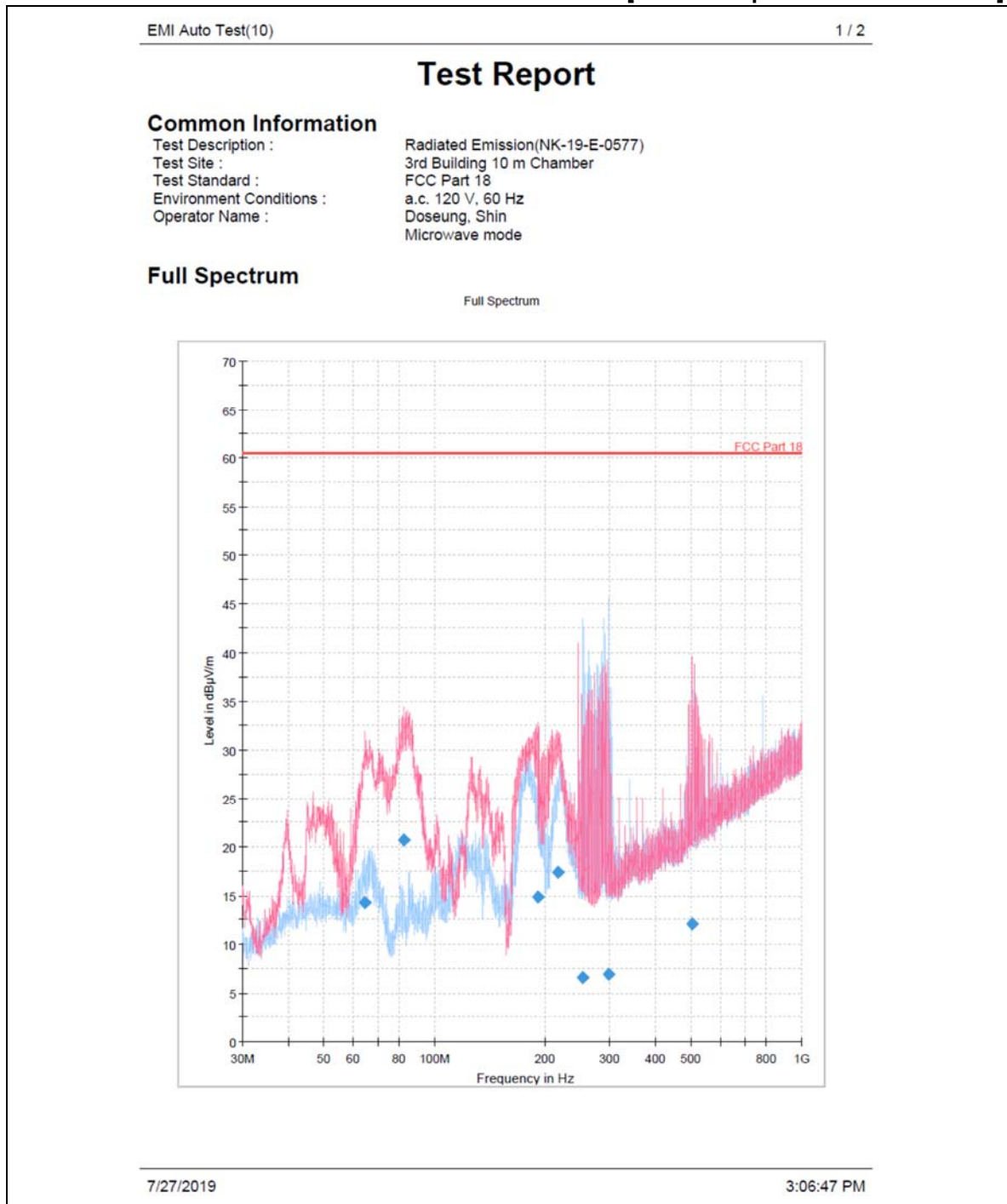
Tested by : **Doseung Shin**

TEST DATA

Radiated Emissions (30 MHz to 1 GHz)

FCC ID : C5F7NF1JMO100N

[Room Temperature : 22.7 ± 1.0 °C]



EMI Auto Test(10)

2 / 2

Final Result

Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
64.758333	14.22	60.50	46.28	15000.0	120.000	230.0	V	304.0	-22.9
82.509333	20.73	60.50	39.77	15000.0	120.000	107.0	V	281.0	-26.2
191.375667	14.87	60.50	45.63	15000.0	120.000	100.0	V	327.0	-21.3
216.498667	17.39	60.50	43.11	15000.0	120.000	100.0	V	340.0	-20.7
253.908333	6.60	60.50	53.90	15000.0	120.000	370.0	H	280.0	-18.4
297.946333	6.93	60.50	53.57	15000.0	120.000	214.0	H	327.0	-17.0
504.168333	12.02	60.50	48.48	15000.0	120.000	276.0	V	172.0	-10.2

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

Frequency (MHz)	Comment
64.758333	
82.509333	
191.375667	
216.498667	
253.908333	
297.946333	
504.168333	

7/27/2019

3:06:47 PM

<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 : $20 * \log (300/10) \doteq 29.5 \text{ dB } \mu\text{N/m}$
4. The limit at 300 meters is $20 * \log (25 * \text{SQRT} (\text{RF Power}/500))$
5. All other emissions were measured while a 700 $\text{m}\ell$ load was placed in the center of the oven.
6. The limit for consumer device is on the FCC Part section 18.305.

A handwritten signature in blue ink, appearing to read 'Doseung Shin', is positioned above a horizontal line.

Tested by : **Doseung Shin**

TEST DATA

Radiated Emissions (Above 1 GHz)

FCC ID : C5F7NF1JMO100N

[Room Temperature : 22.5 ± 1.0 °C]

Frequency (MHz)	Pol* (H/V)	Antenna Heights (cm)	Turntable Angles (°)	Reading Level (dBμV)	Total Loss** (dB)	Result at 3 m		K	Results at 300 m	Limits at 300 m
						(dBμV/m)	(μV/m)		(μV/m)	(μV/m)
2187.94	H	300	-10	42	-12.6	29.43	29.6	0.005	0.15	35.3
2728.29	V	99.9	88	38.6	-10.6	28.03	25.2	0.006	0.15	35.3
4927.77	V	99.9	36	55.2	-3.4	51.84	390.8	0.01	3.91	35.3
7118.58	H	200	344	32.9	1	33.9	49.5	0.01	0.50	35.3
7363.39	H	300	22	57.7	0.6	58.28	820.4	0.01	8.20	35.3
8465.95	H	200	87	31.8	1.8	33.56	47.6	0.01	0.48	35.3
9891.64	H	300	30	49.2	3.8	53.02	447.7	0.01	4.48	35.3
10089.48	H	99.9	291	35.1	4	39.11	90.3	0.01	0.90	35.3
12313.25	H	99.9	-2	50.2	5.6	55.8	616.6	0.01	6.17	35.3
13269.32	H	200	322	32.3	7.3	39.6	95.5	0.01	0.96	35.3
14774.28	V	99.9	32	50.1	9.9	59.95	994.3	0.01	9.94	35.3
15074.62	V	200	336	30.5	10.3	40.79	109.5	0.01	1.10	35.3
17298.76	H	300	-3	35.6	25.6	61.19	1146.8	0.01	11.47	35.3

<Radiated Measurements at 3 meters>

NOTES:

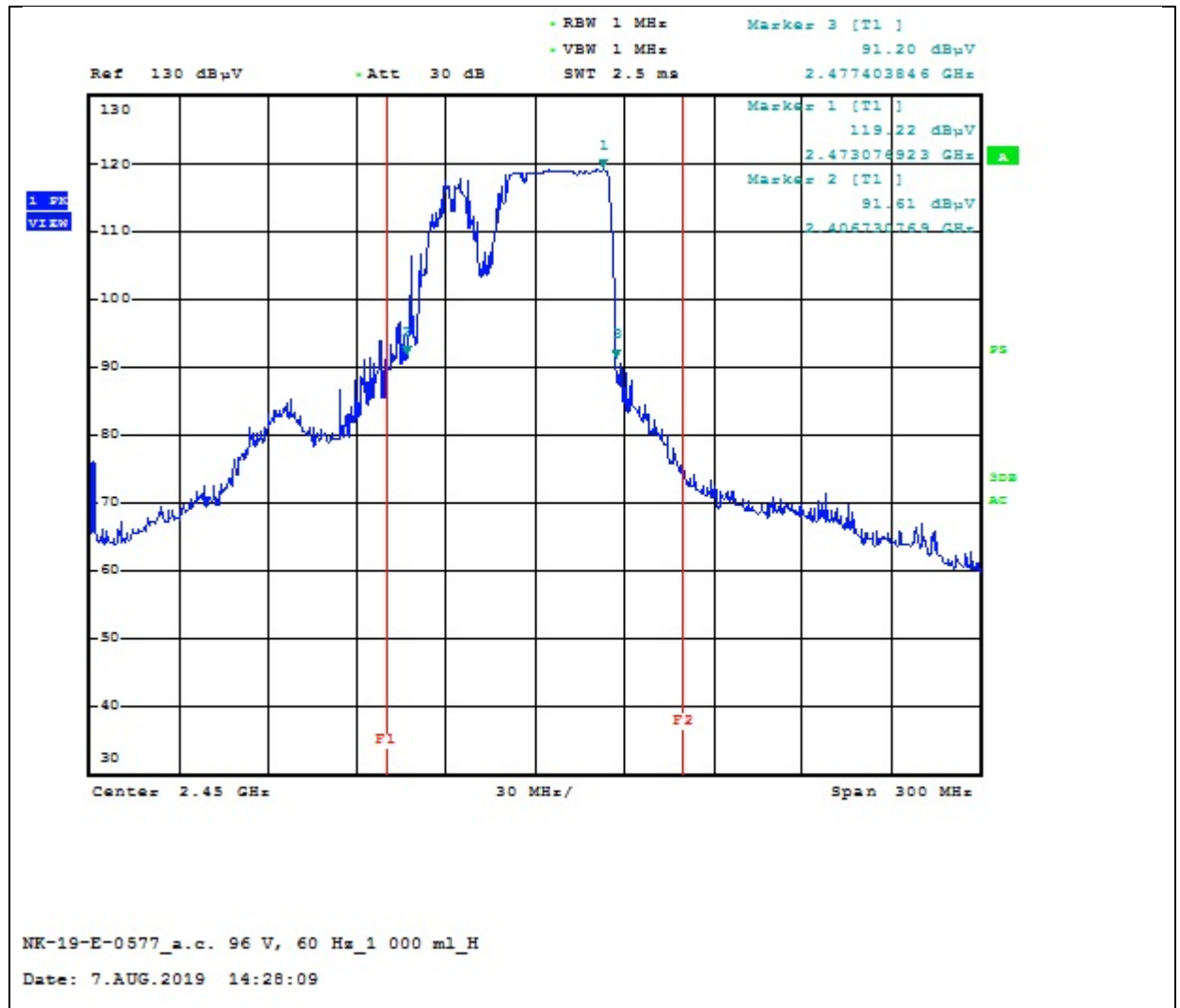
- * Pol. H =Horizontal V=Vertical
- ** Total Loss = Antenna Factor + Cables Loss + Amplifier + HPF (High Pass Filter)
- Field Strength (at 300 m) (μV/m) = $K * 10^{[Fieldstrength\ at\ 3\ m\ (dB\ \mu V/m) / 20]}$
- The limit at 300 meters is $25 * \sqrt{RF\ Power/500}$
- Load for measurement of radiation on second and third harmonic : Two loads, one of 700 ml and the other of 300 ml, 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.
- The test was performed at peak detector mode with average.
- The limit for consumer device is on the FCC Part section 18.305.



Tested by : Doseung Shin

PLOTS OF EMISSIONS

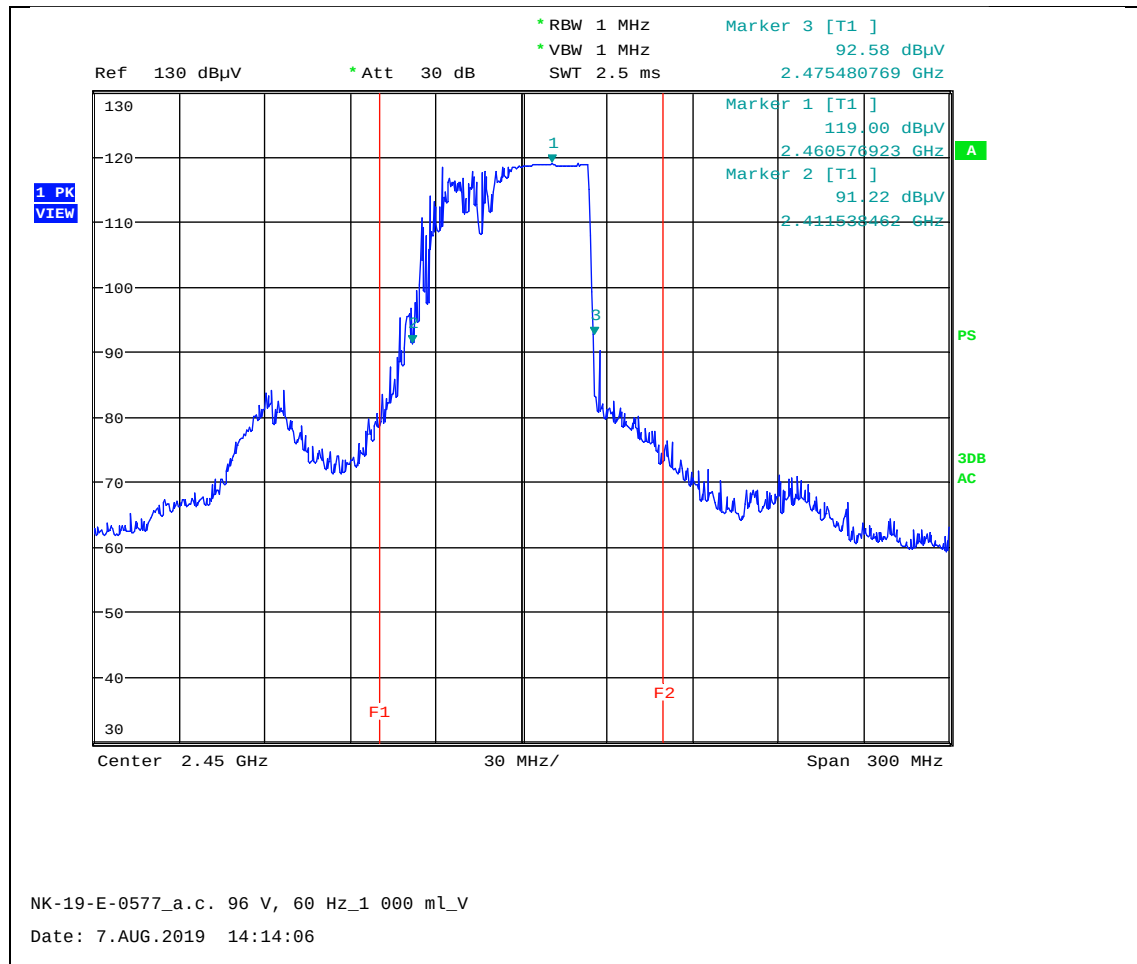
- Frequency vs Line Voltage Variation Test



Horizontal (96 V, 1000 mV)

PLOTS OF EMISSIONS

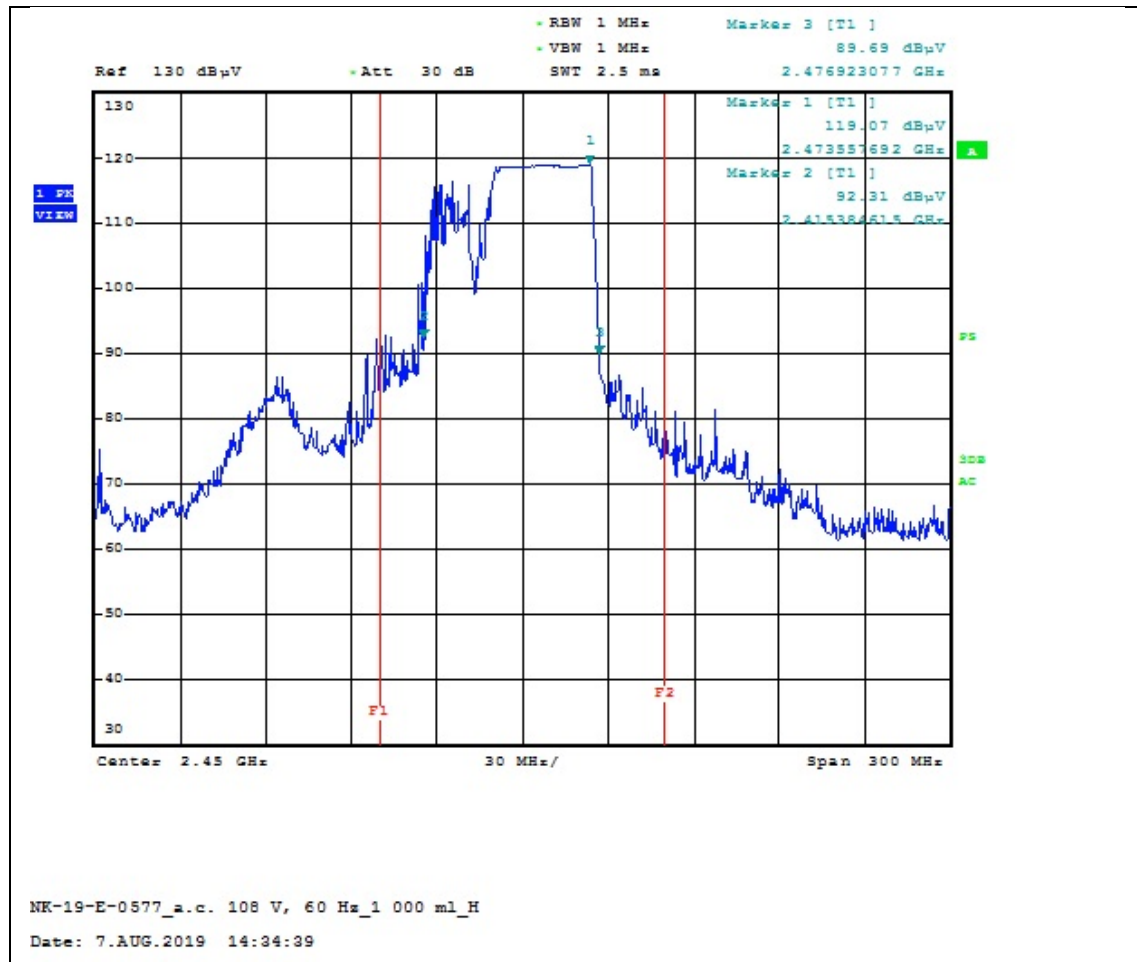
● Frequency vs Line Voltage Variation Test



Vertical (96 V, 1000 mV)

PLOTS OF EMISSIONS

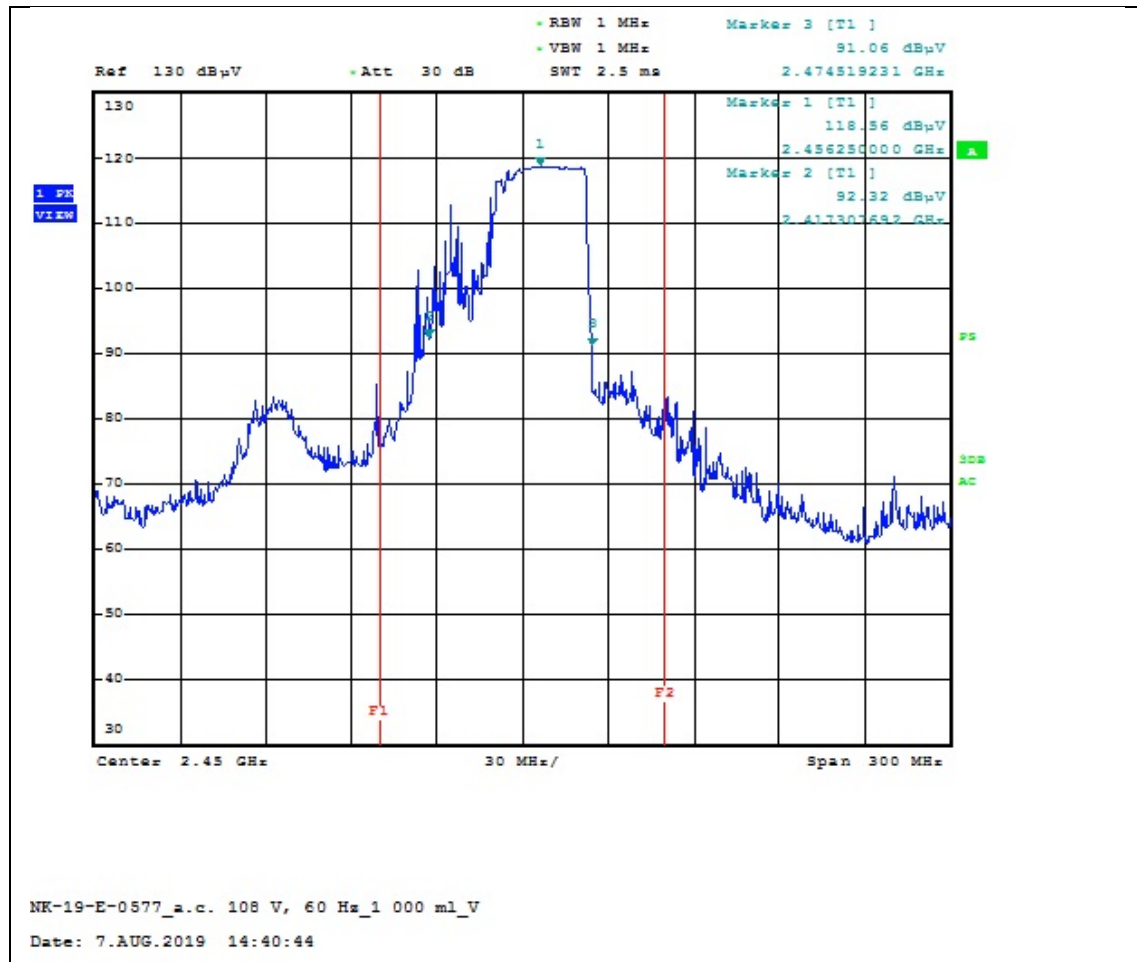
- Frequency vs Line Voltage Variation Test



Horizontal (108 V, 1000 mℓ)

PLOTS OF EMISSIONS

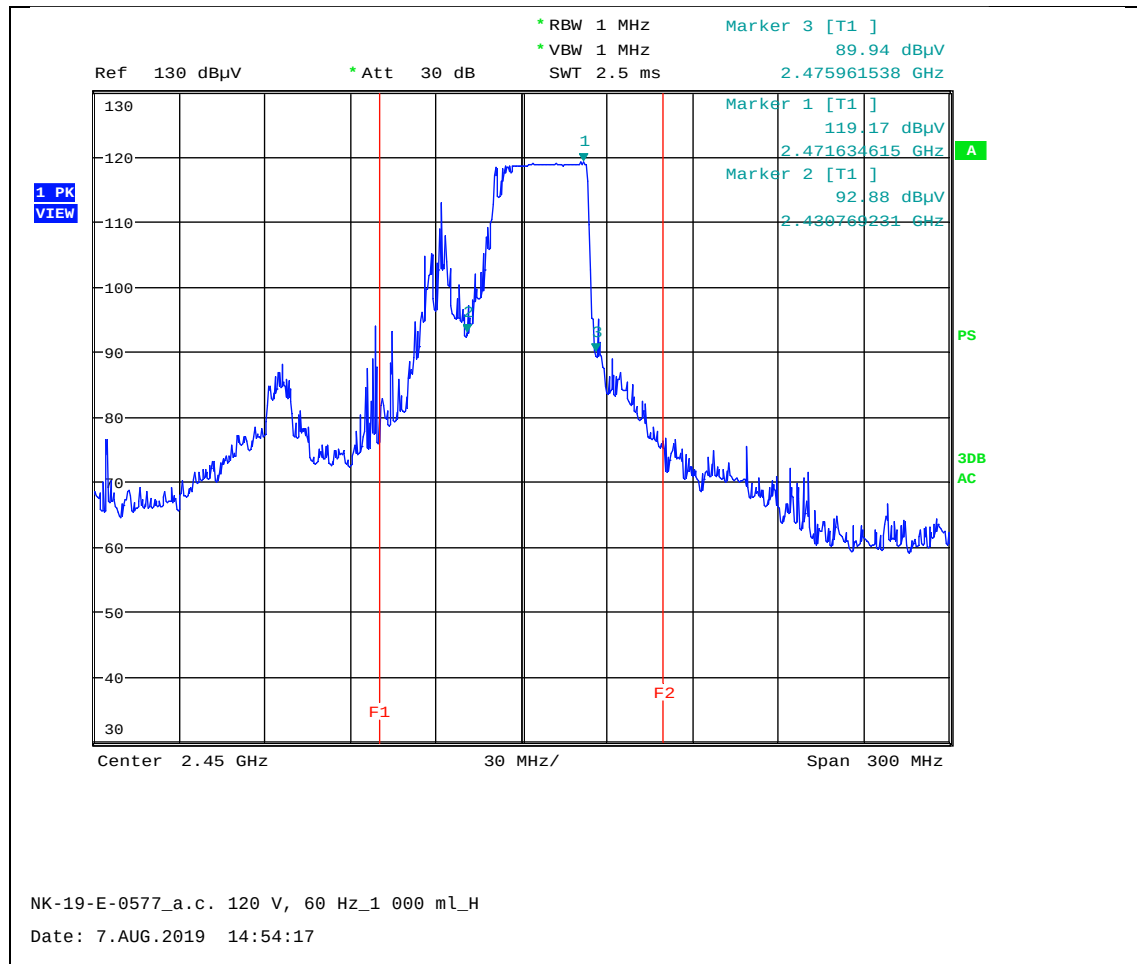
- Frequency vs Line Voltage Variation Test



Vertical (108 V, 1000 mV)

PLOTS OF EMISSIONS

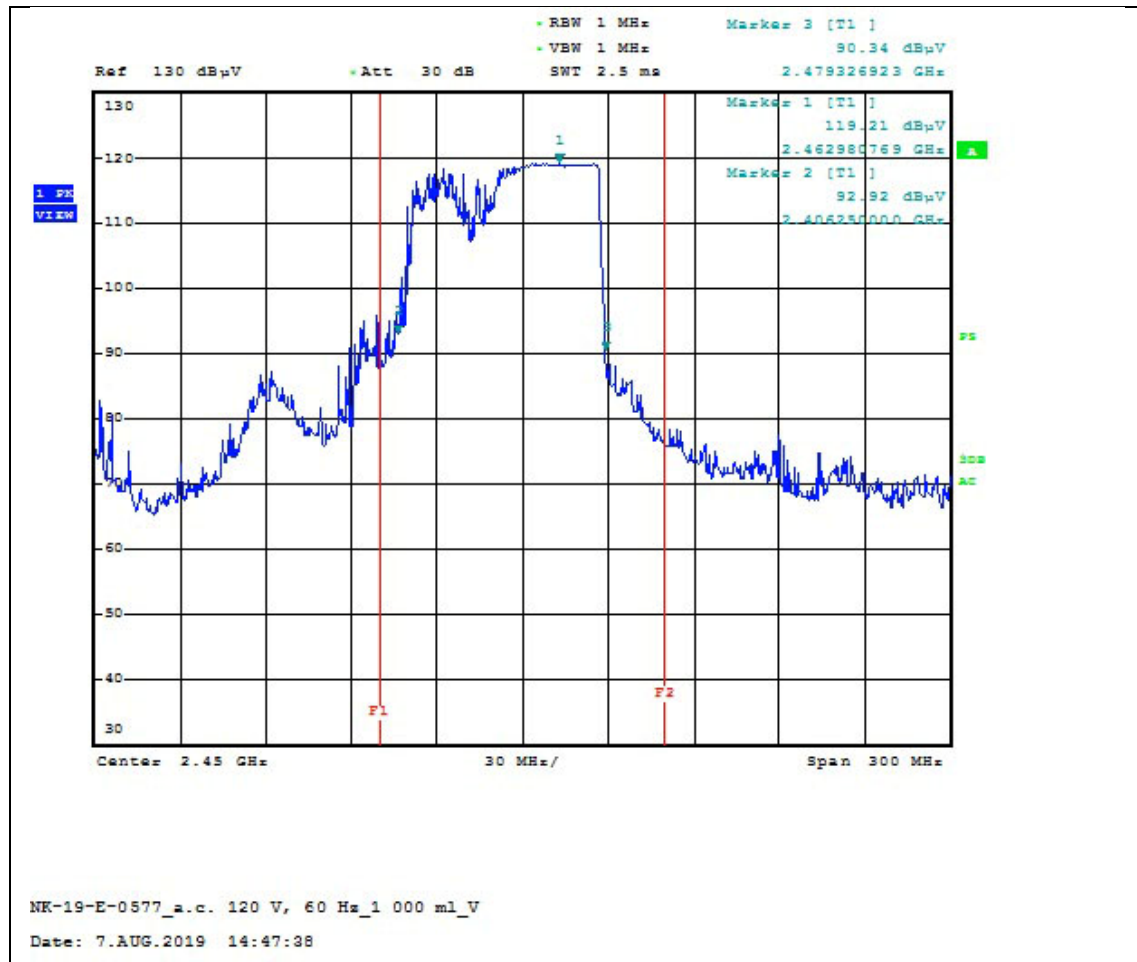
● Frequency vs Line Voltage Variation Test



Horizontal (120 V, 1000 mℓ)

PLOTS OF EMISSIONS

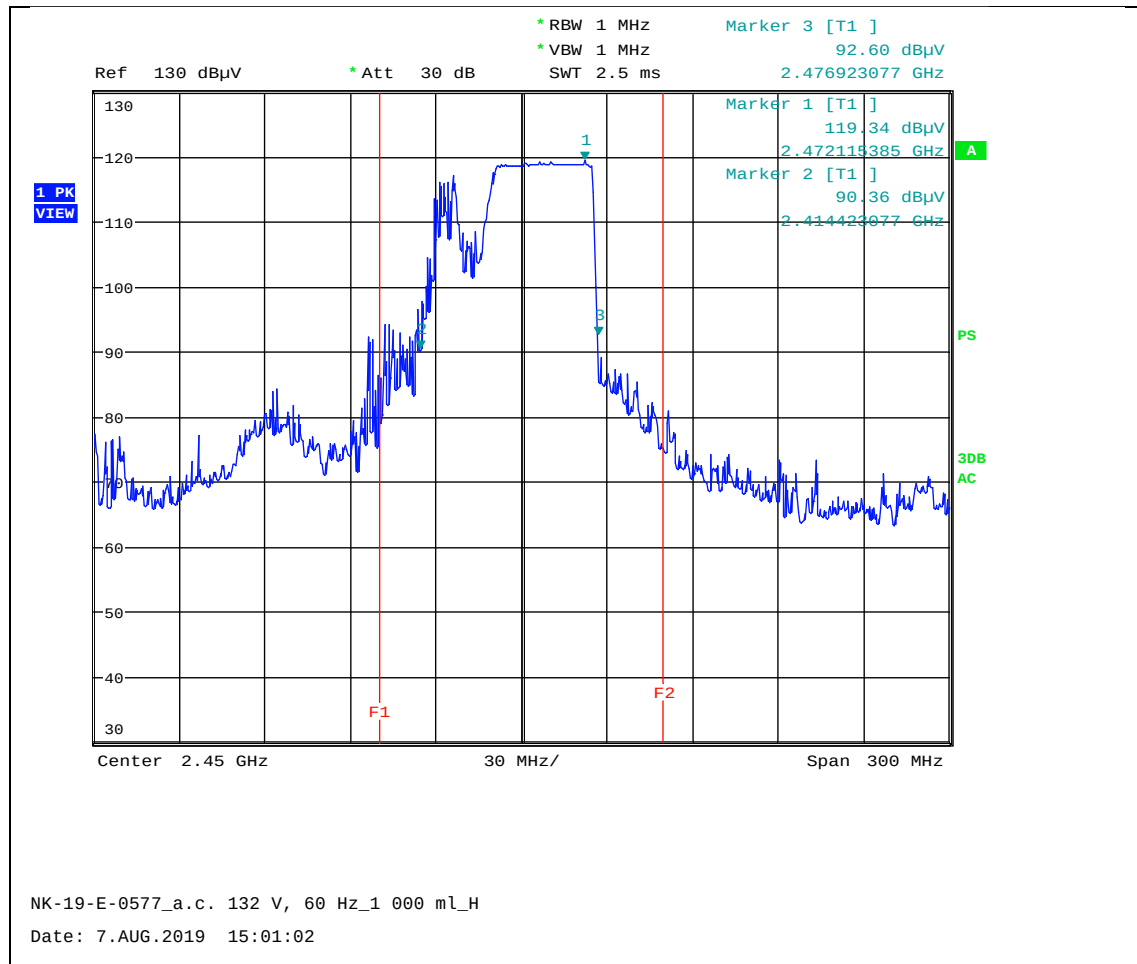
- Frequency vs Line Voltage Variation Test



Vertical (120 V, 1000 ml)

PLOTS OF EMISSIONS

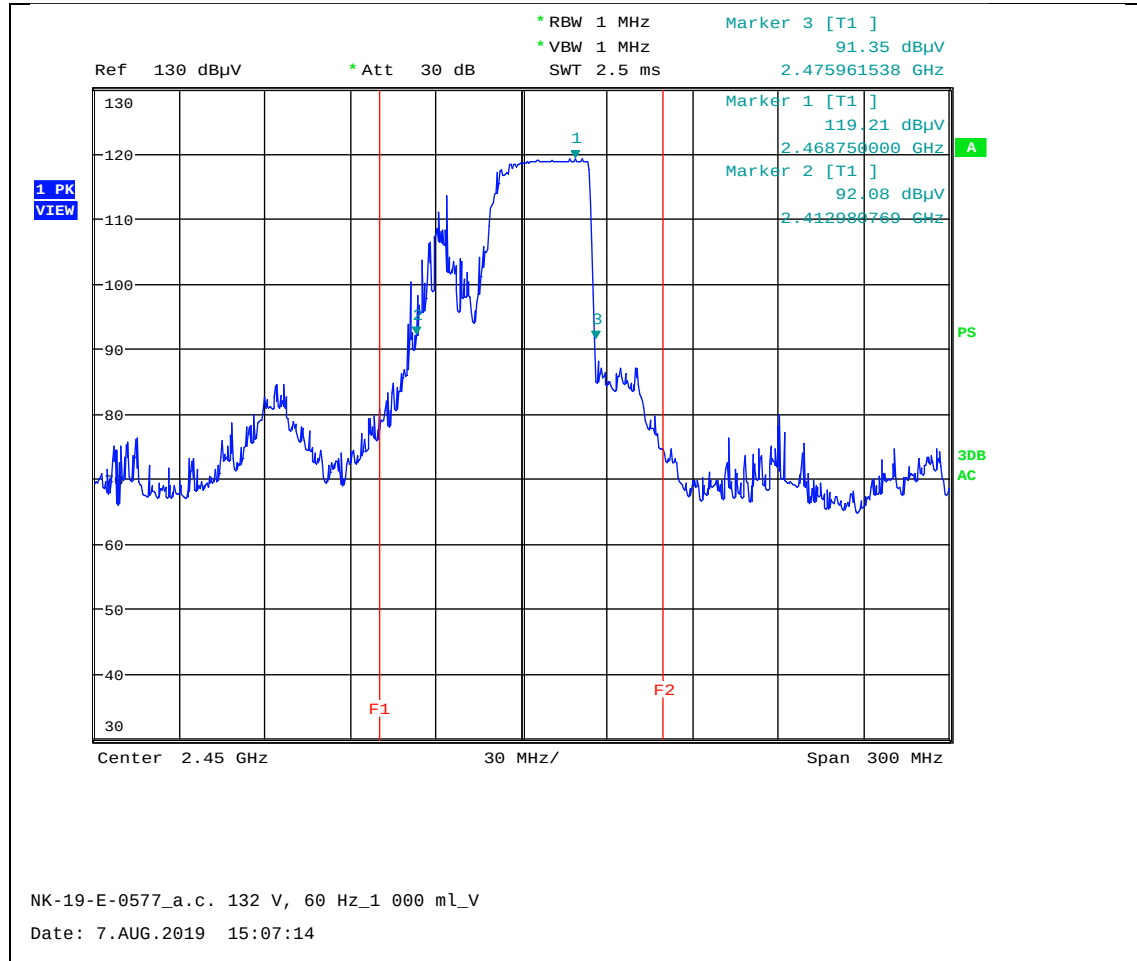
● Frequency vs Line Voltage Variation Test



Horizontal (132 V, 1000 mℓ)

PLOTS OF EMISSIONS

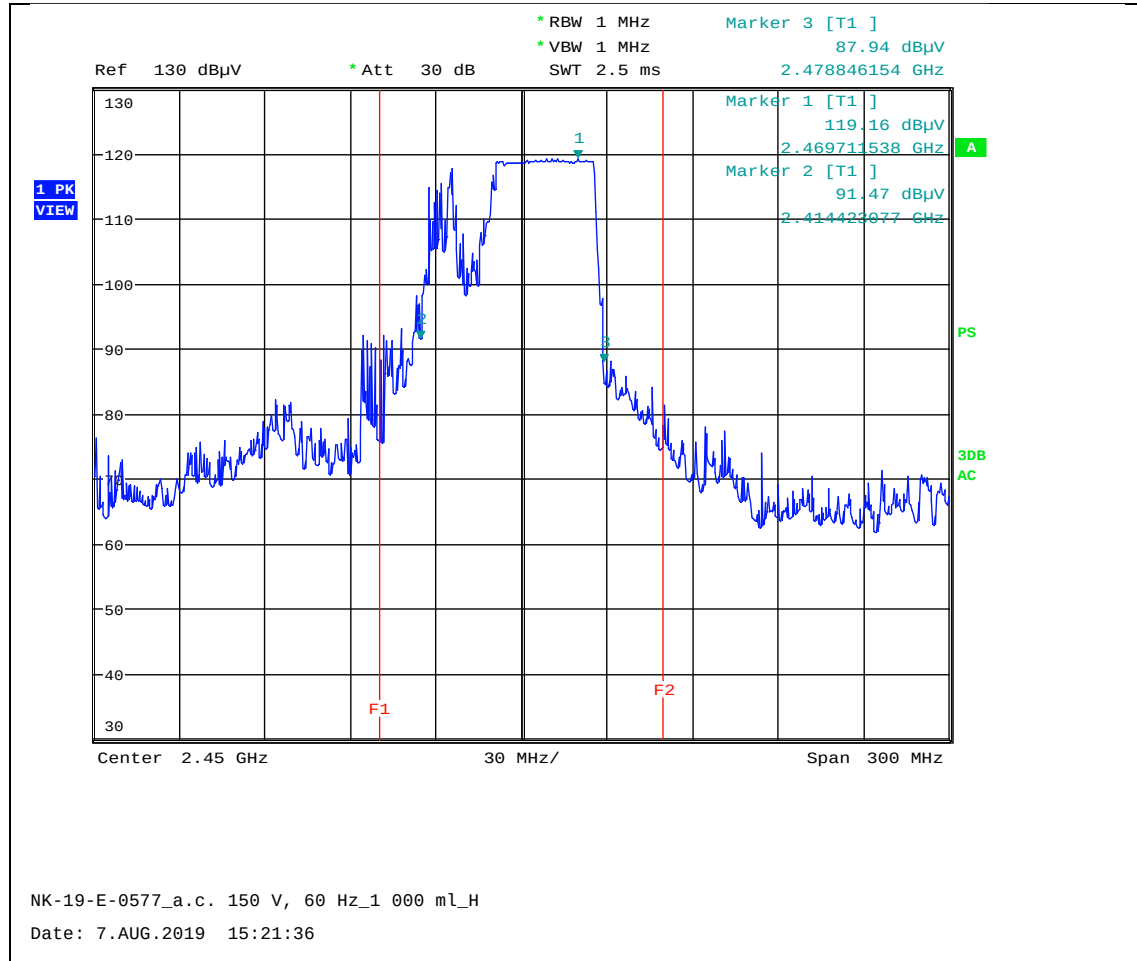
● Frequency vs Line Voltage Variation Test



Vertical (132 V, 1000 mV)

PLOTS OF EMISSIONS

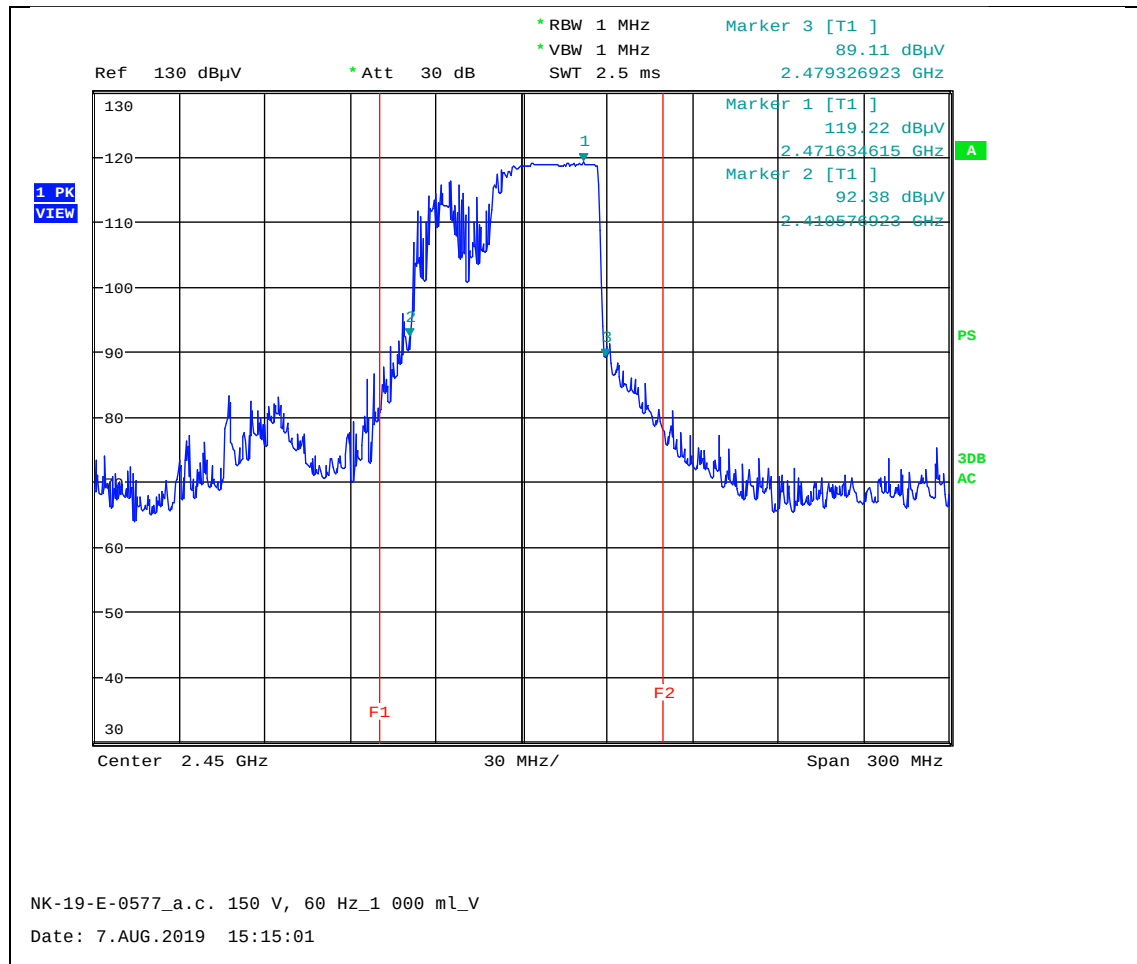
● Frequency vs Line Voltage Variation Test



Horizontal (150 V, 1000 mℓ)

PLOTS OF EMISSIONS

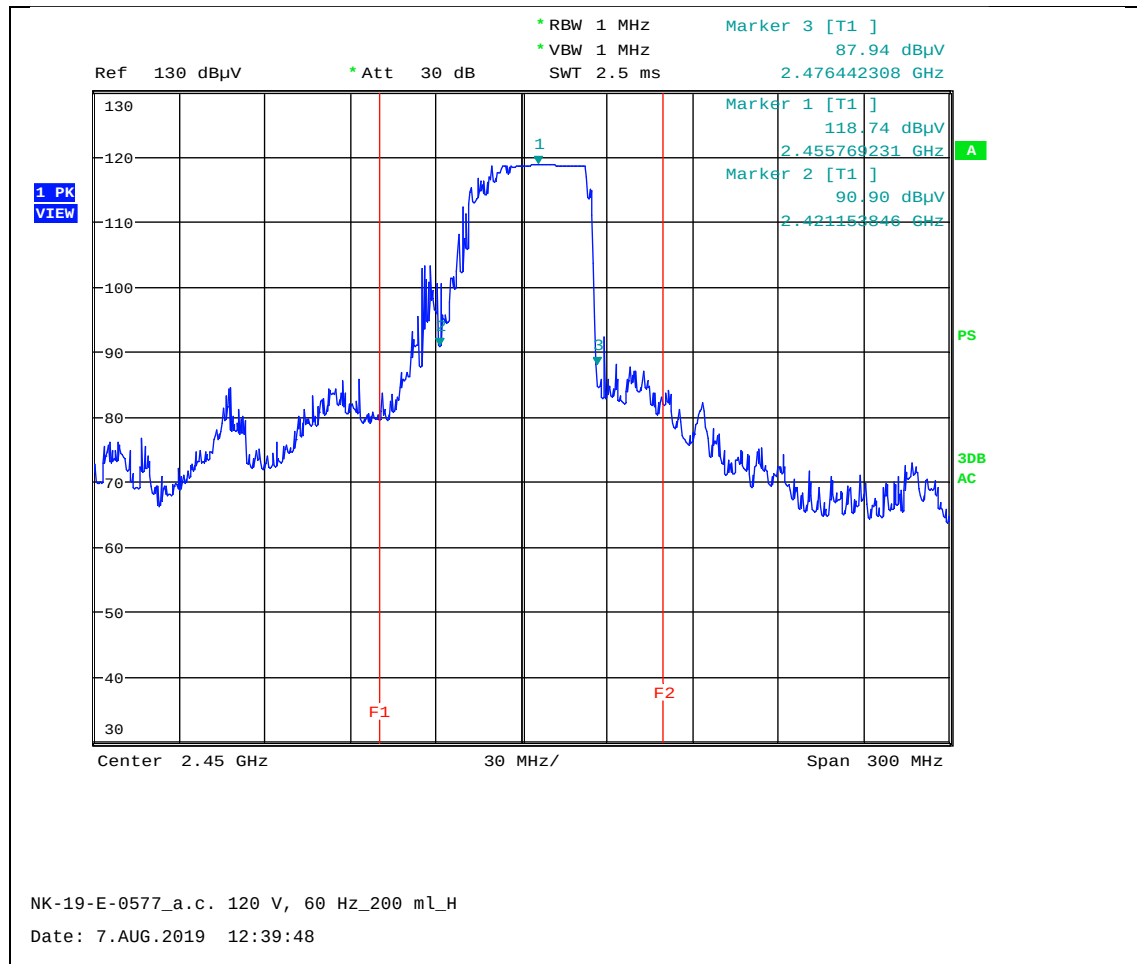
● Frequency vs Line Voltage Variation Test



Vertical (150 V, 1000 mV)

PLOTS OF EMISSIONS

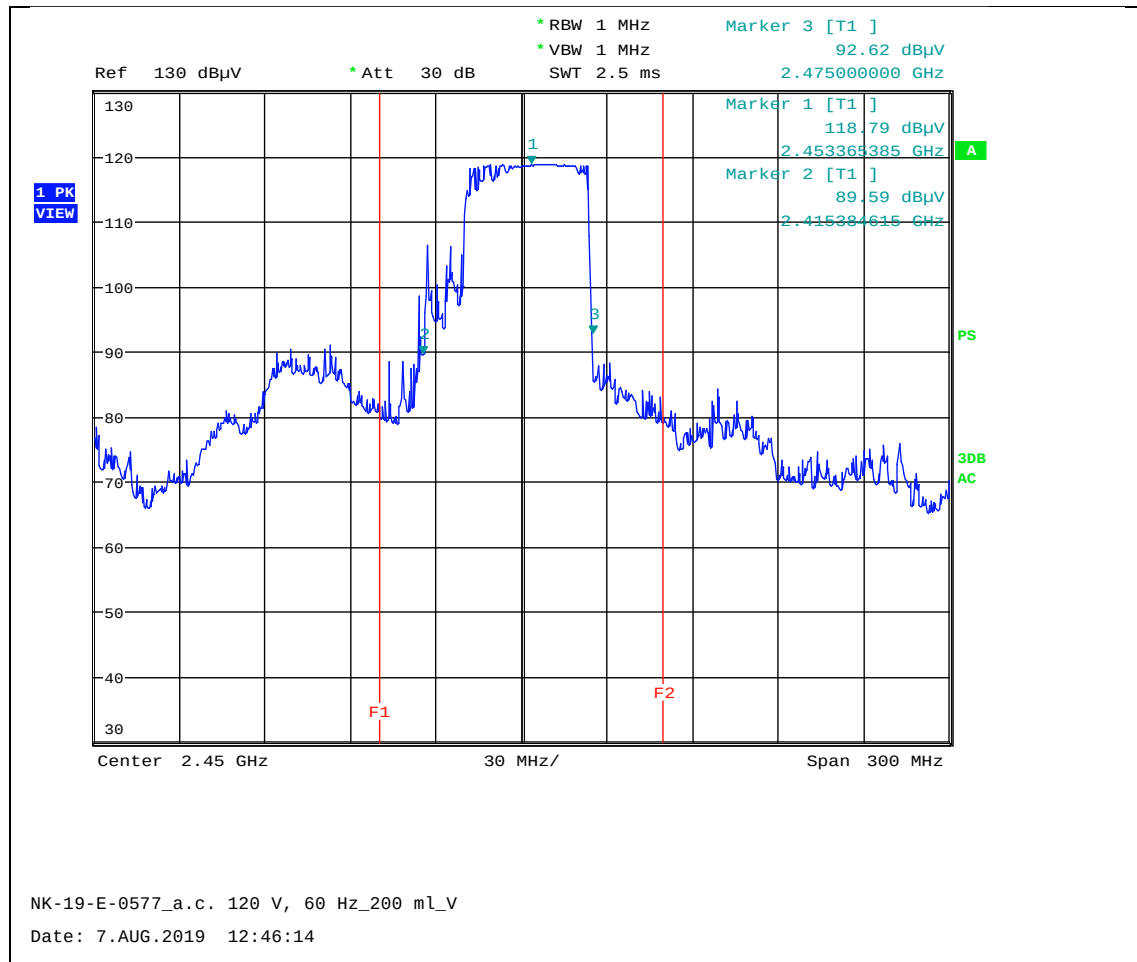
● Frequency vs Load Variation Test



Horizontal (120 V, 200 mℓ)

PLOTS OF EMISSIONS

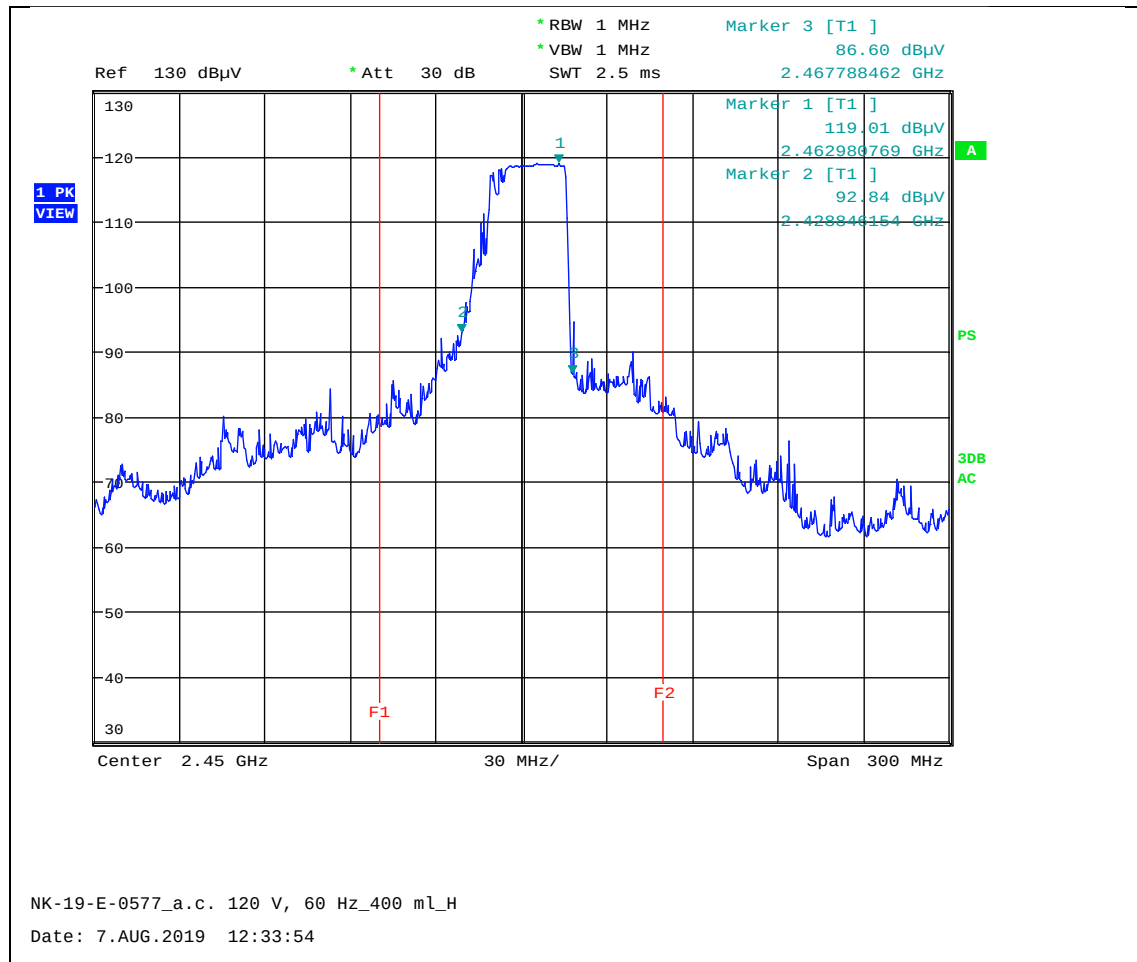
● Frequency vs Load Variation Test



Vertical (120 V, 200 mV)

PLOTS OF EMISSIONS

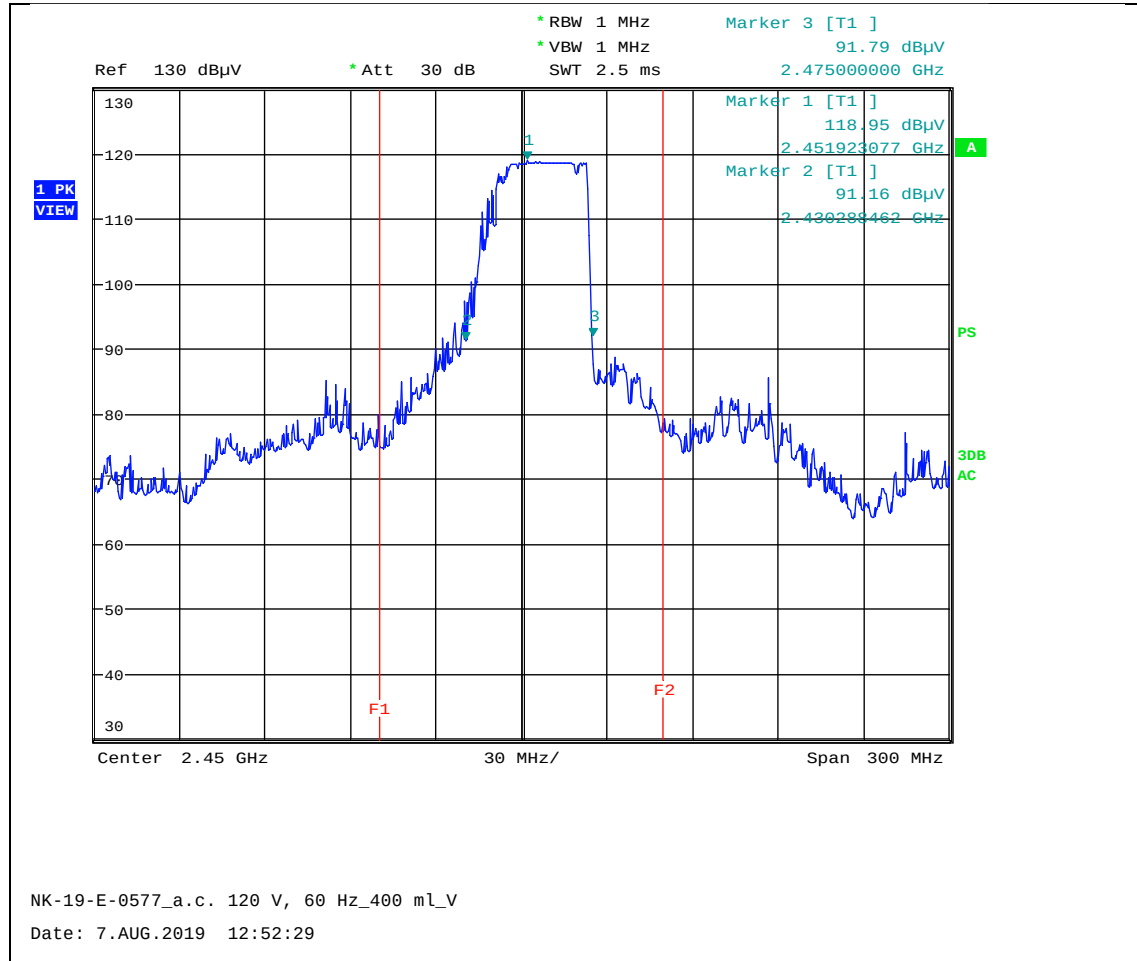
● Frequency vs Load Variation Test



Horizontal (120 V, 400 mℓ)

PLOTS OF EMISSIONS

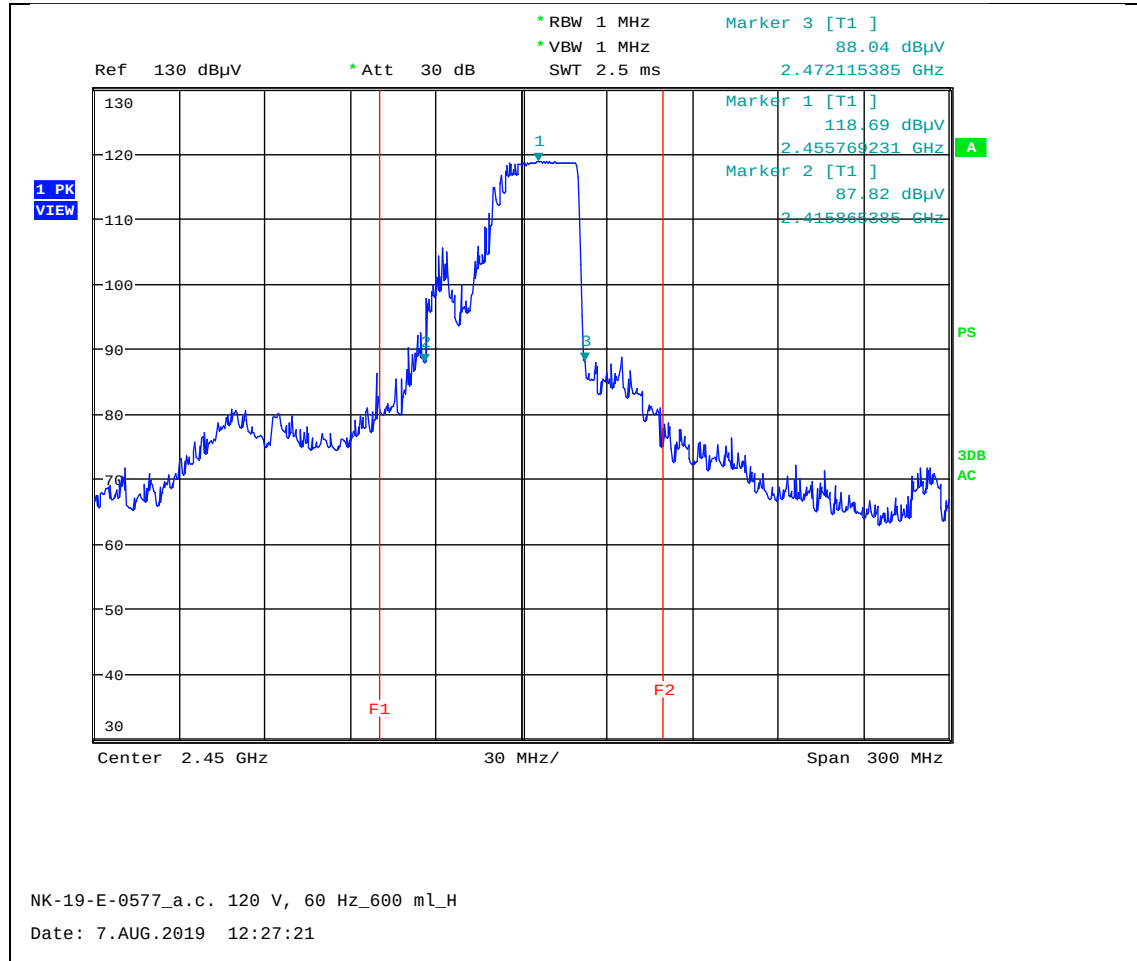
● Frequency vs Load Variation Test



Vertical (120 V, 400 mV)

PLOTS OF EMISSIONS

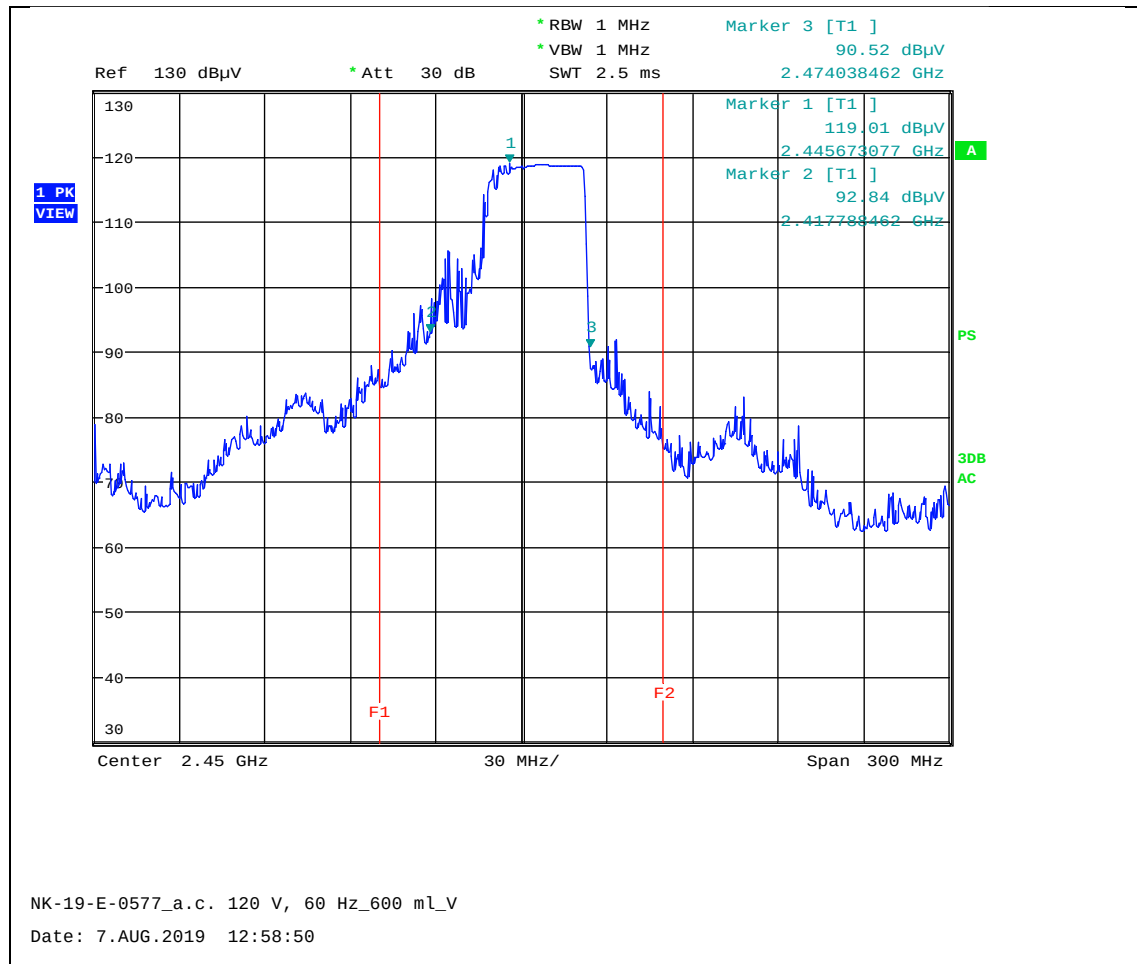
● Frequency vs Load Variation Test



Horizontal (120 V, 600 mℓ)

PLOTS OF EMISSIONS

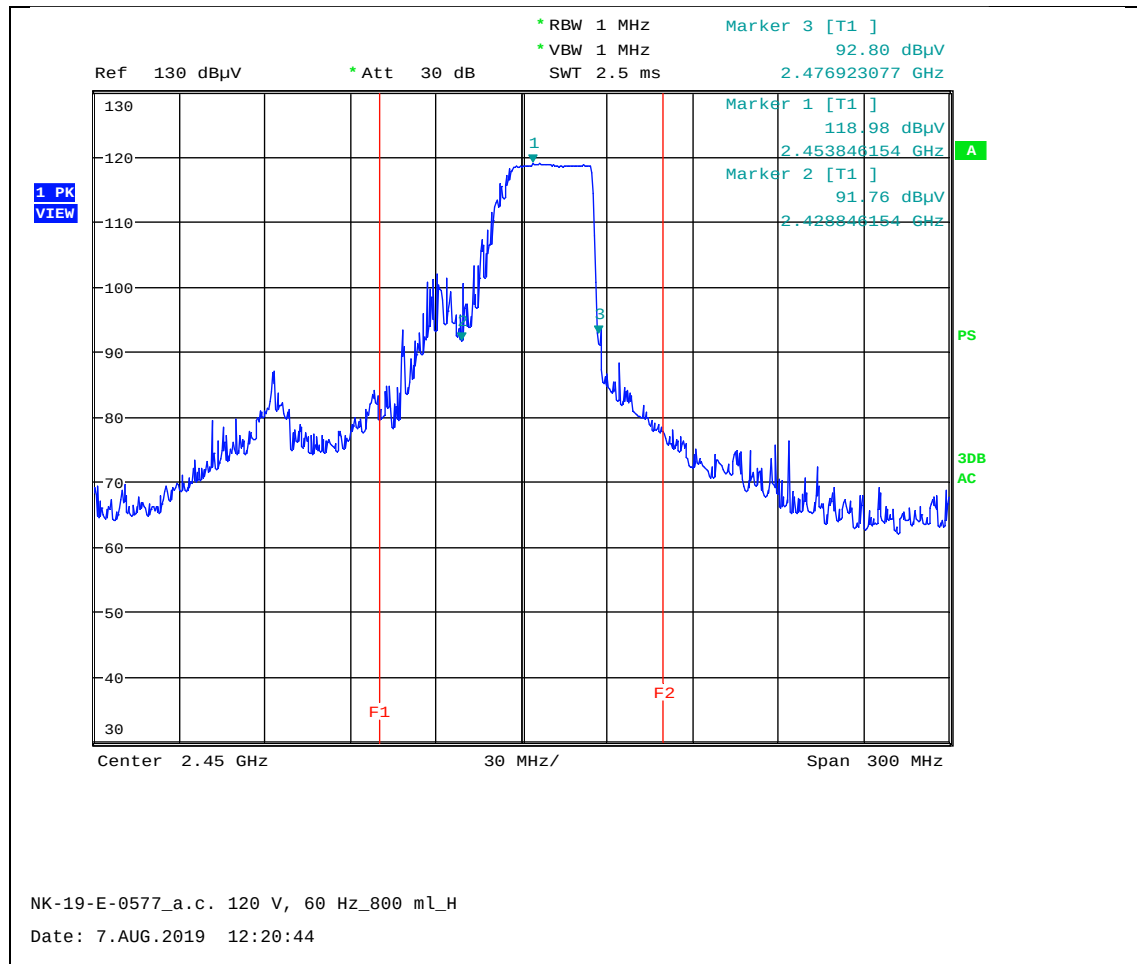
● Frequency vs Load Variation Test



Vertical (120 V, 600 mV)

PLOTS OF EMISSIONS

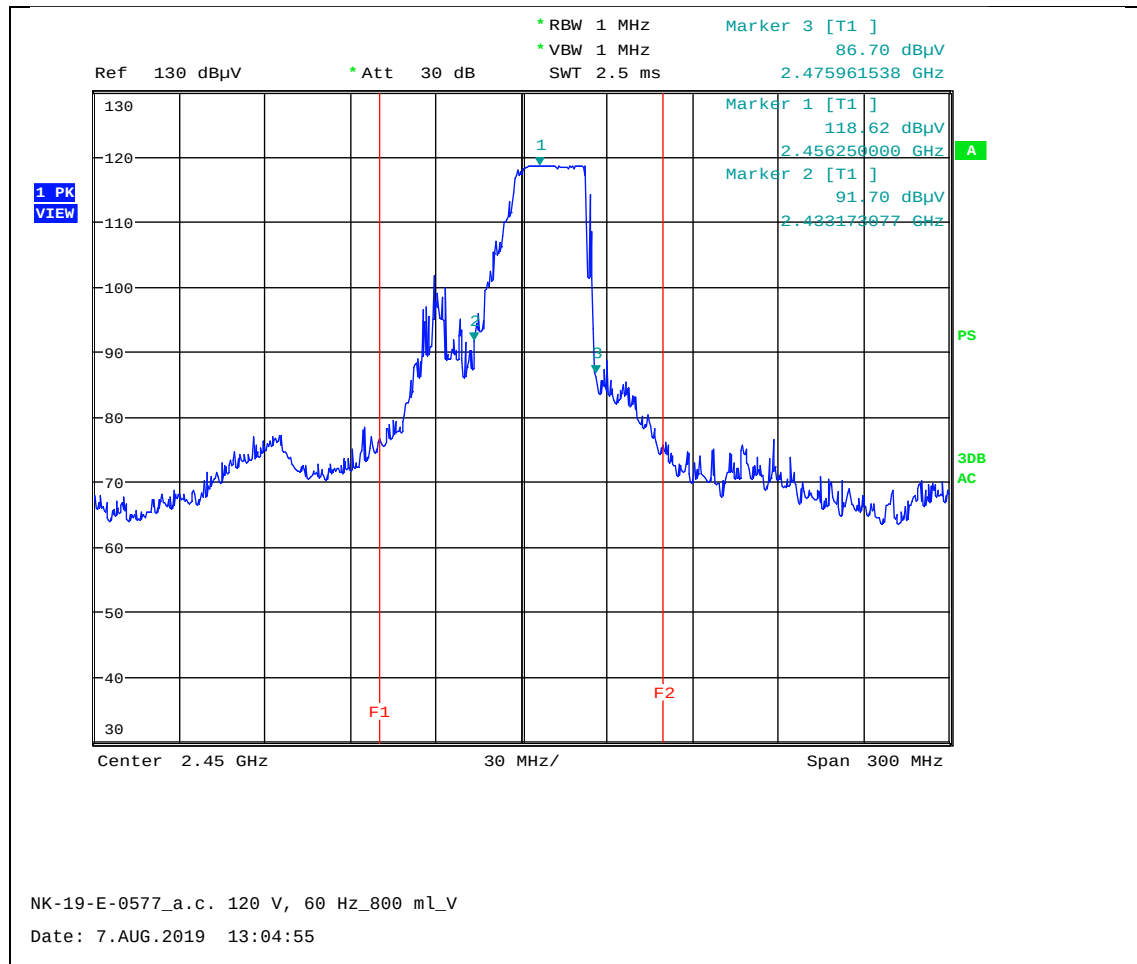
● Frequency vs Load Variation Test



Horizontal (120 V, 800 mℓ)

PLOTS OF EMISSIONS

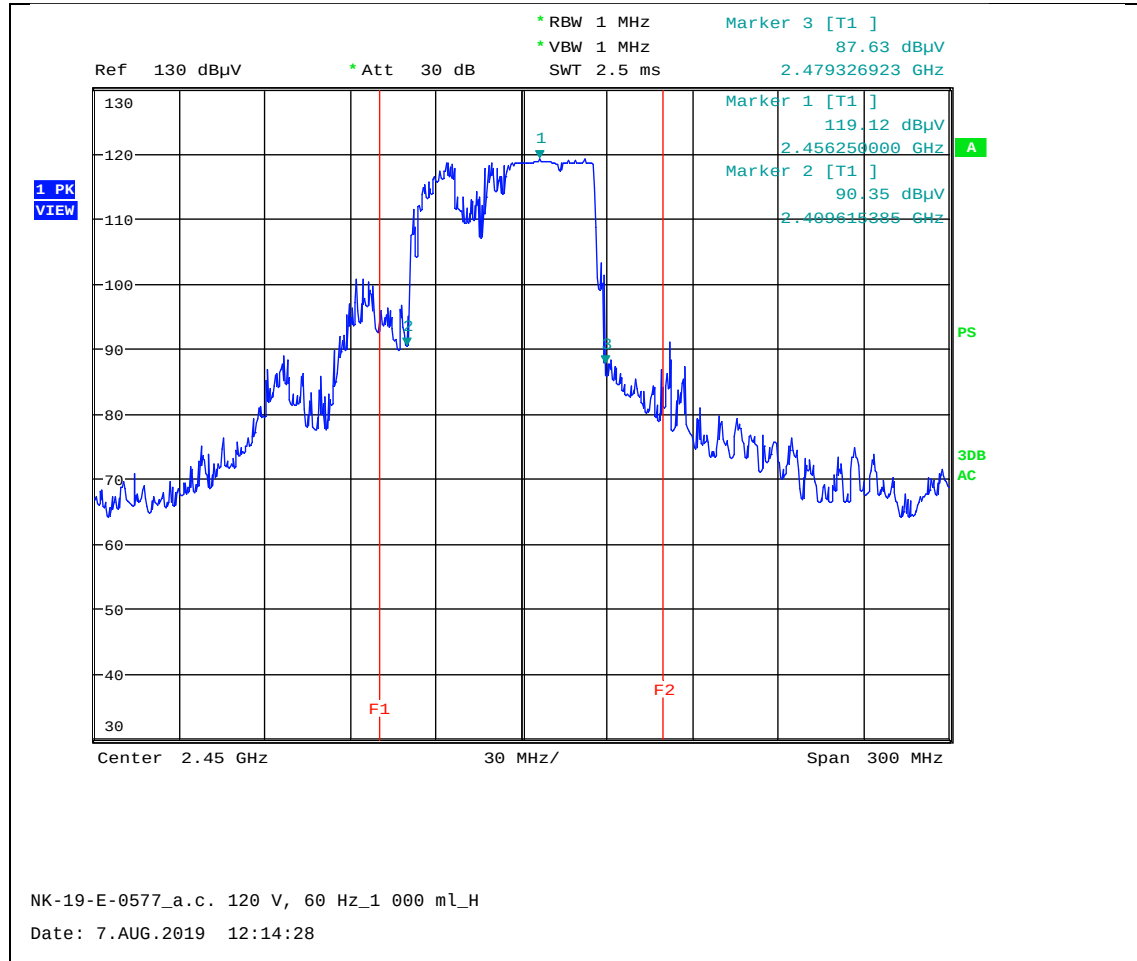
● Frequency vs Load Variation Test



Vertical (120 V, 800 mV)

PLOTS OF EMISSIONS

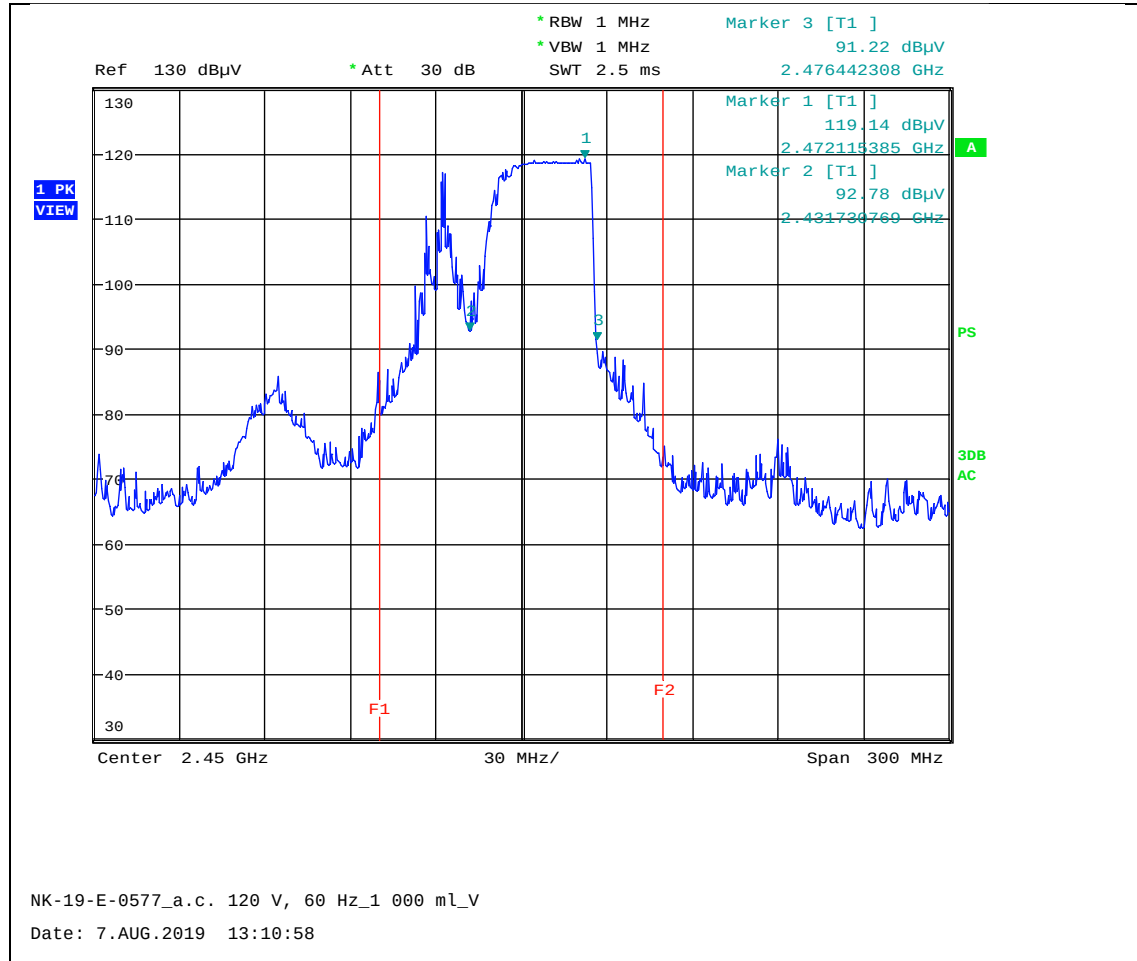
● Frequency vs Load Variation Test



Horizontal (120 V, 1000 ml)

PLOTS OF EMISSIONS

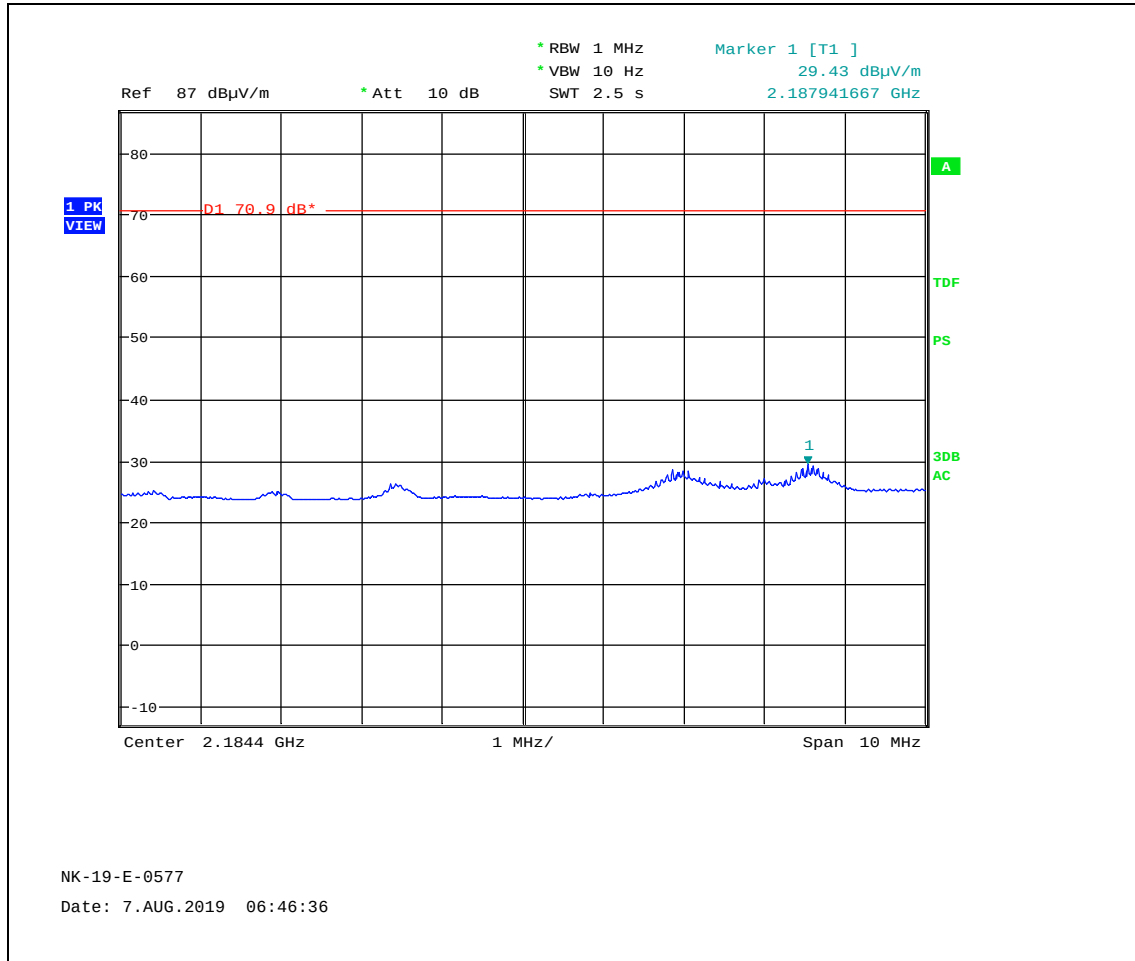
● Frequency vs Load Variation Test



Vertical (120 V, 1000 mV)

PLOTS OF EMISSIONS

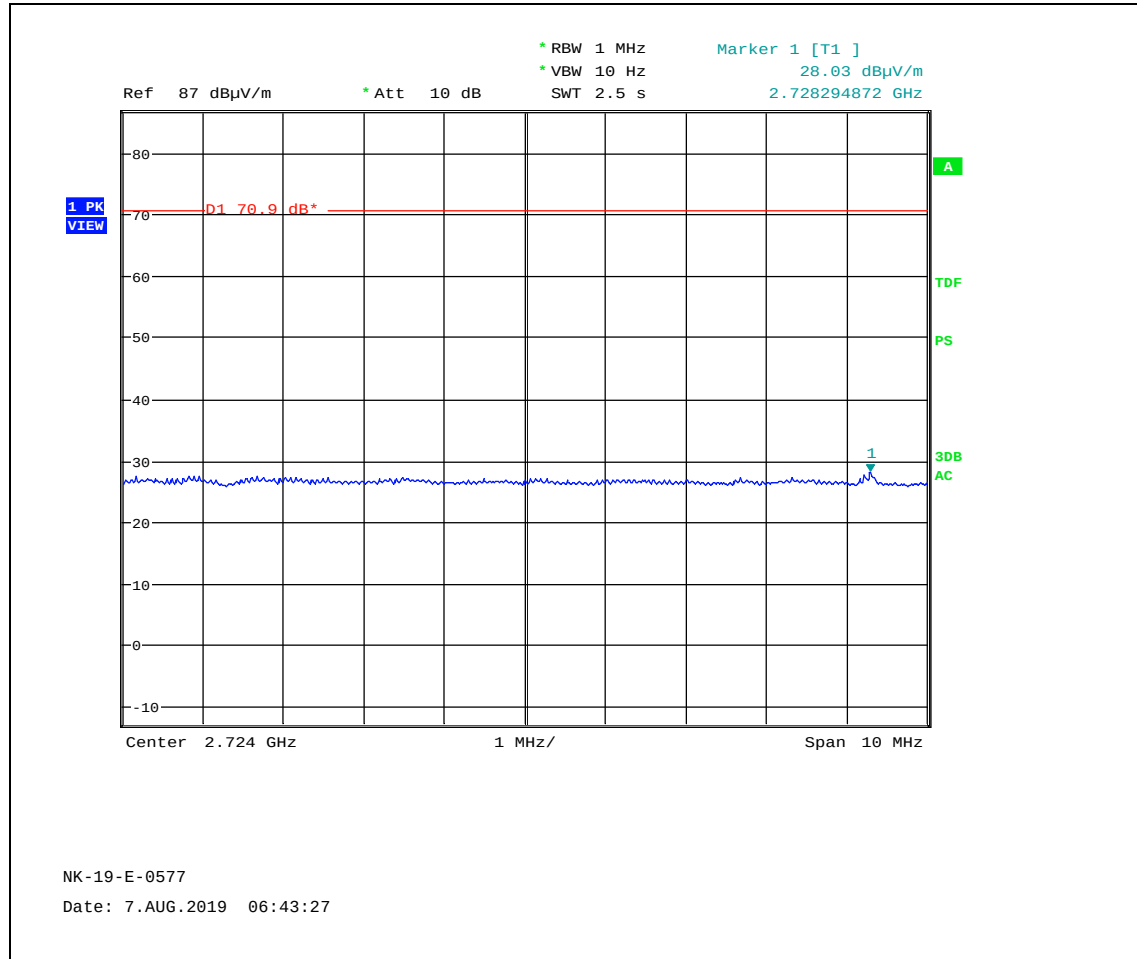
● Radiated Emissions (Above 1 GHz)



2187.94 MHz

PLOTS OF EMISSIONS

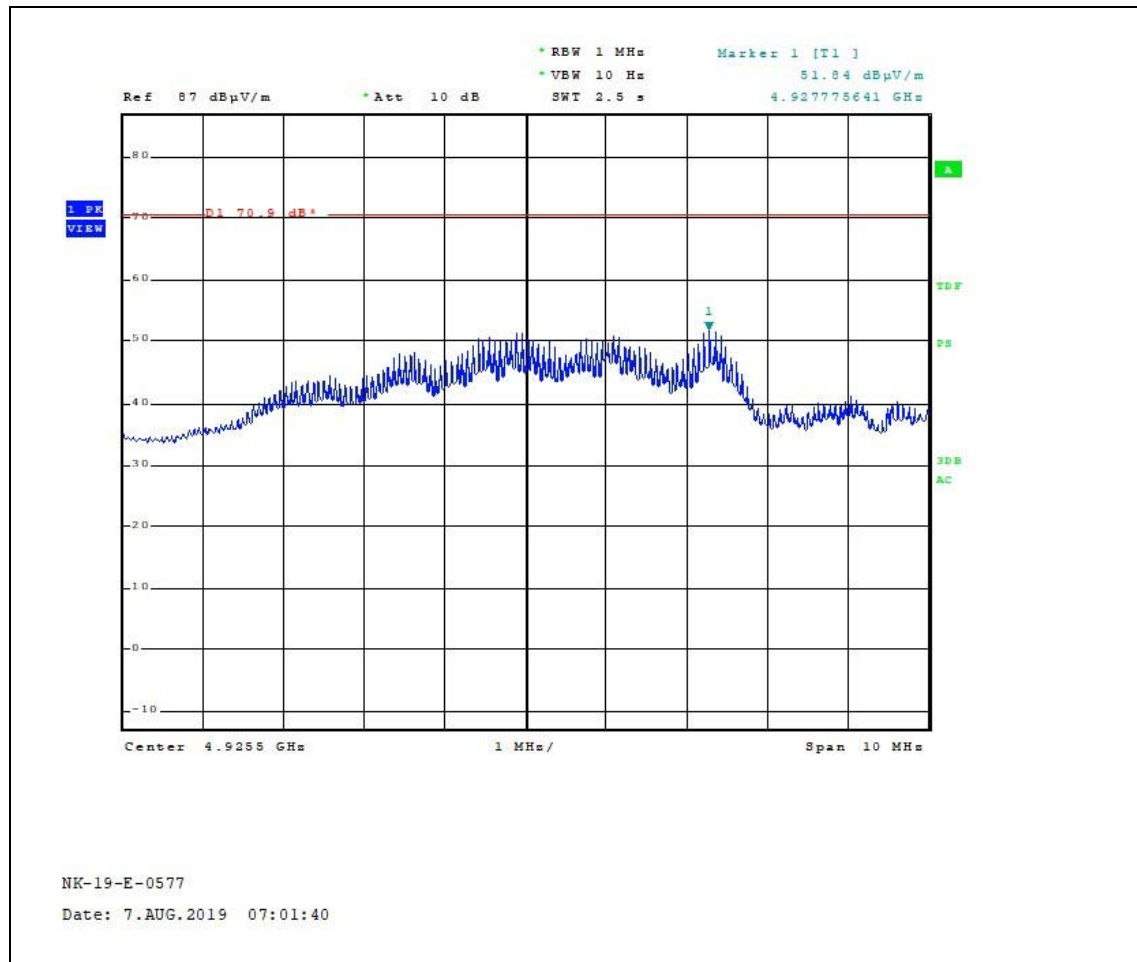
- Radiated Emissions (Above 1 GHz)**



2728.29 MHz

PLOTS OF EMISSIONS

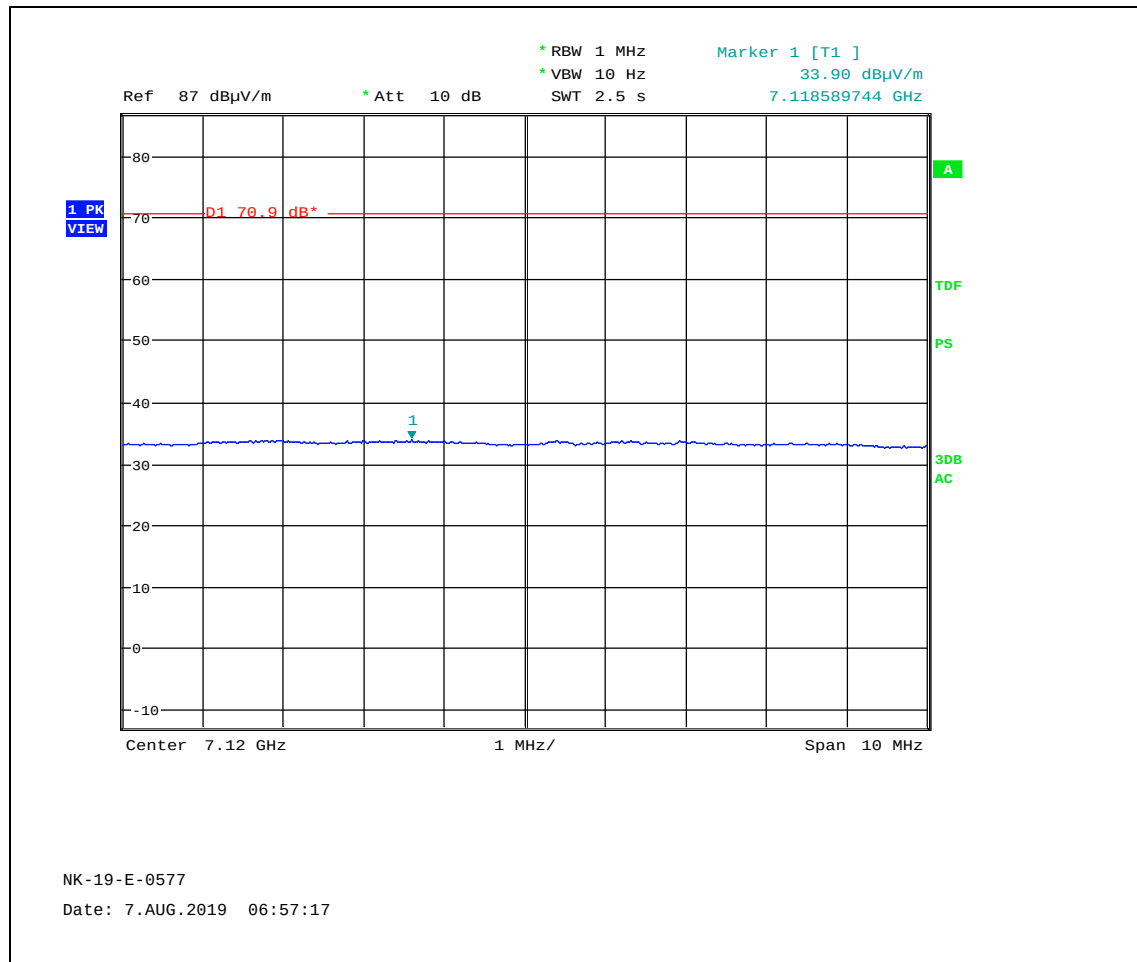
- Radiated Emissions (Above 1 GHz)**



4927.77 MHz

PLOTS OF EMISSIONS

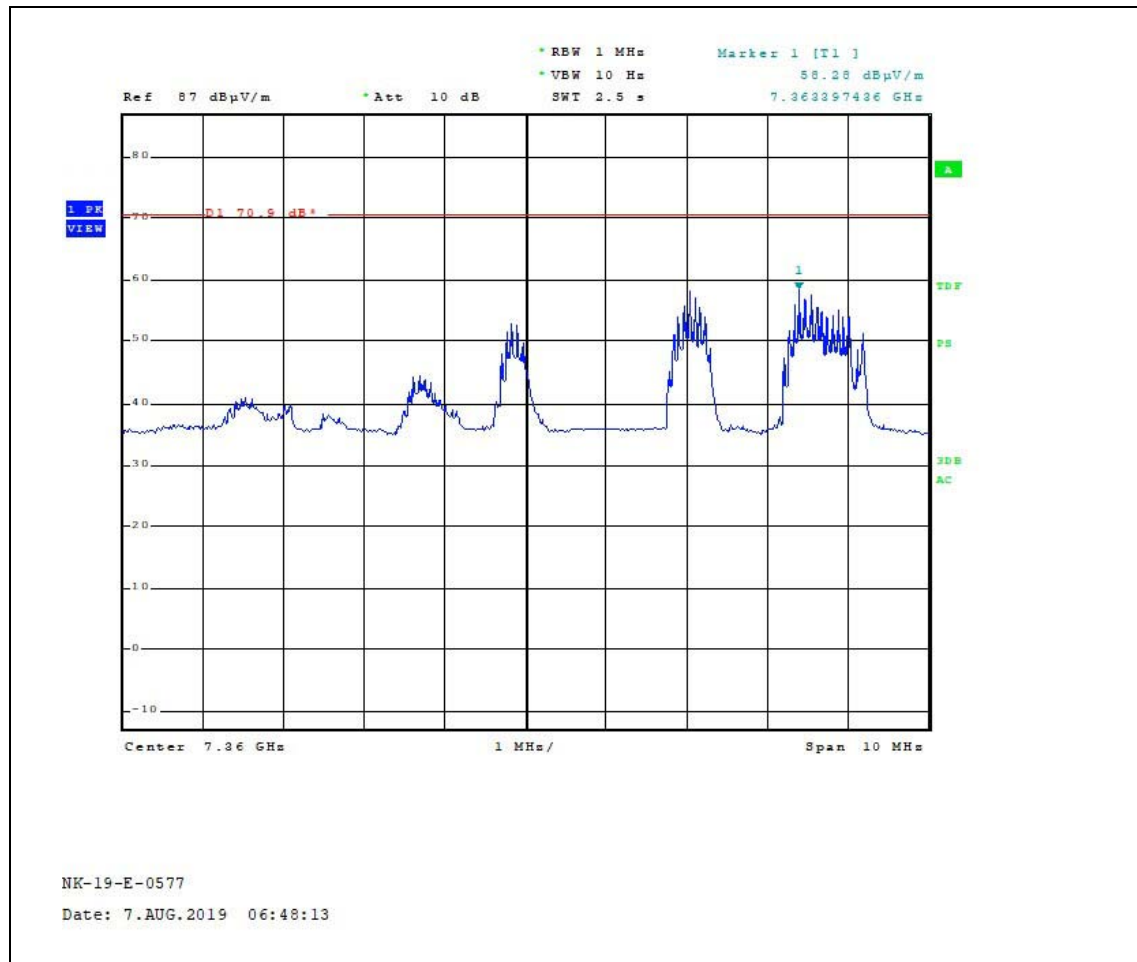
● Radiated Emissions (Above 1 GHz)



7118.58 MHz

PLOTS OF EMISSIONS

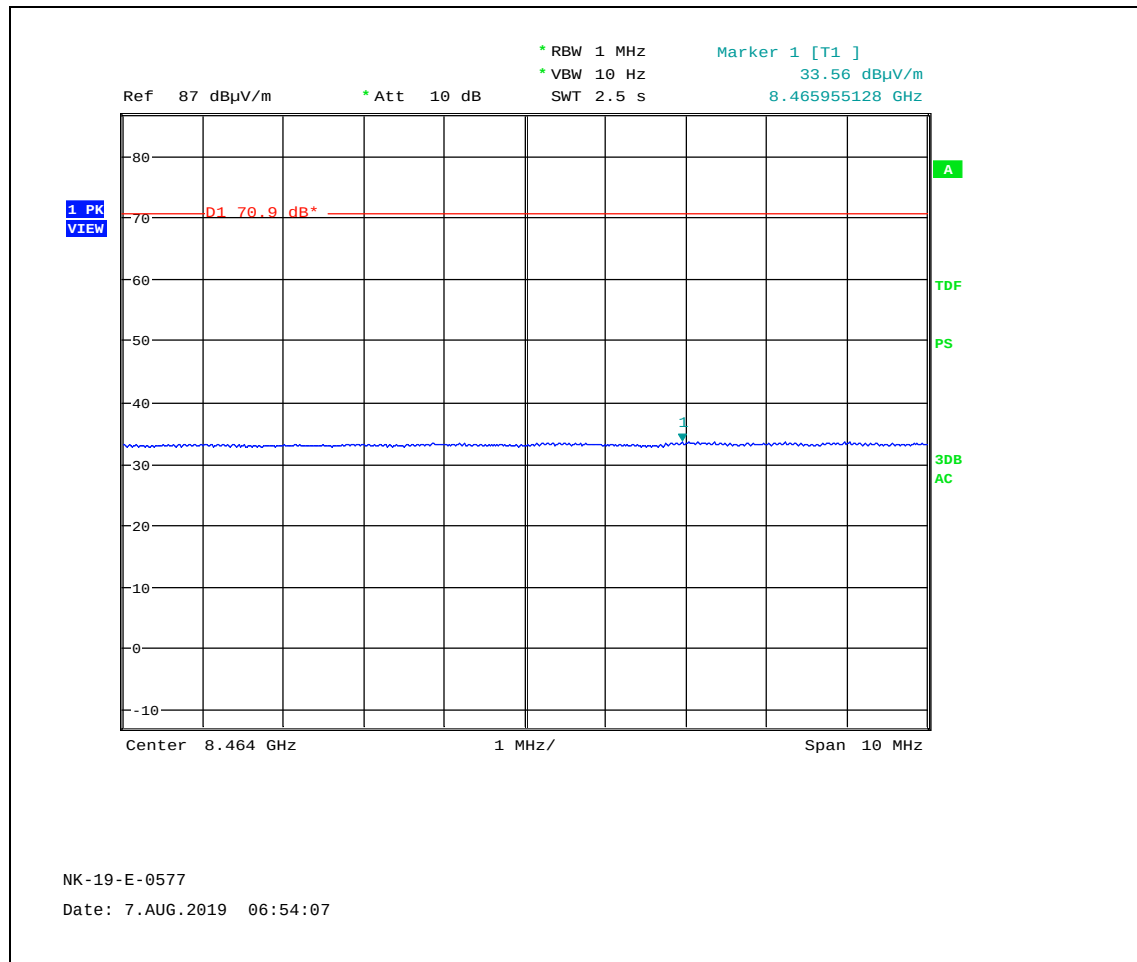
- Radiated Emissions (Above 1 GHz)**



7363.39 MHz

PLOTS OF EMISSIONS

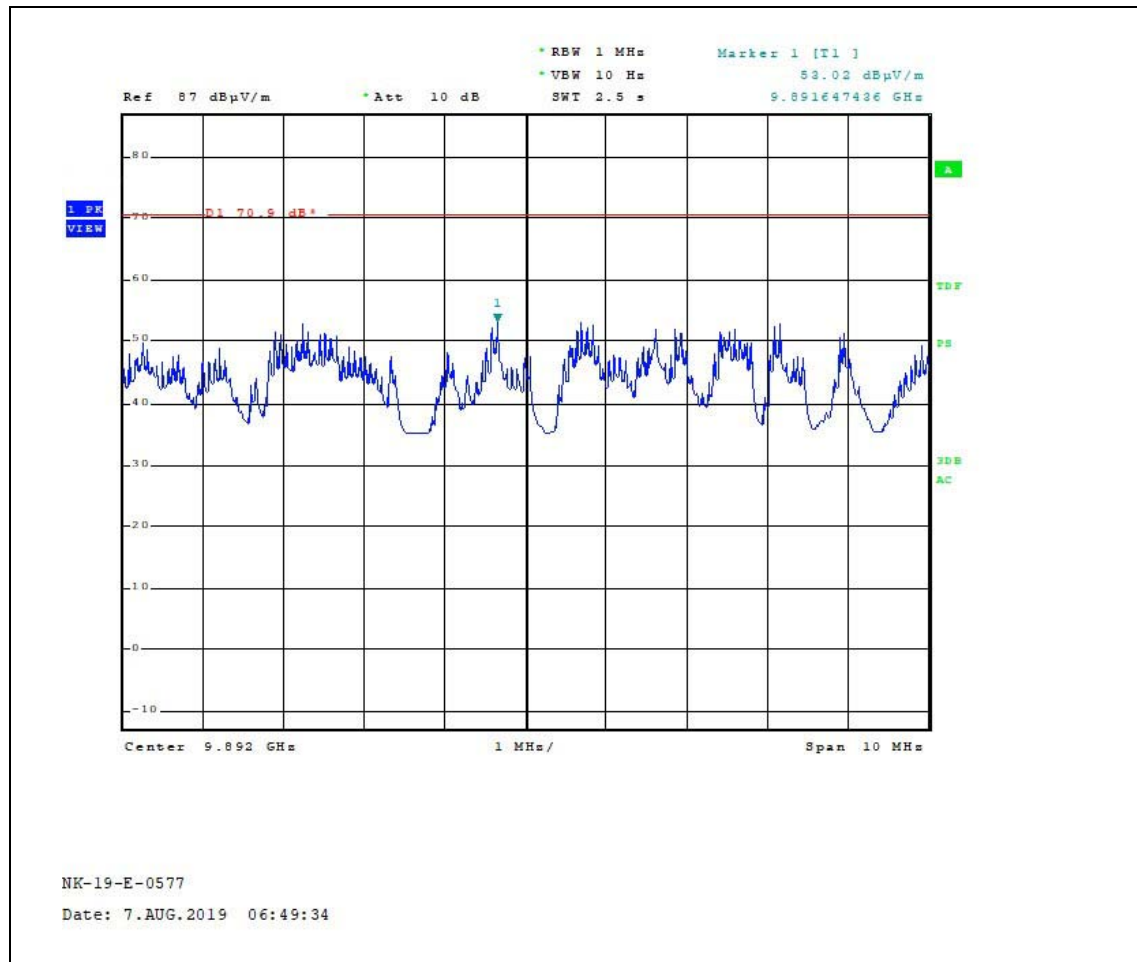
● Radiated Emissions (Above 1 GHz)



8465.95 MHz

PLOTS OF EMISSIONS

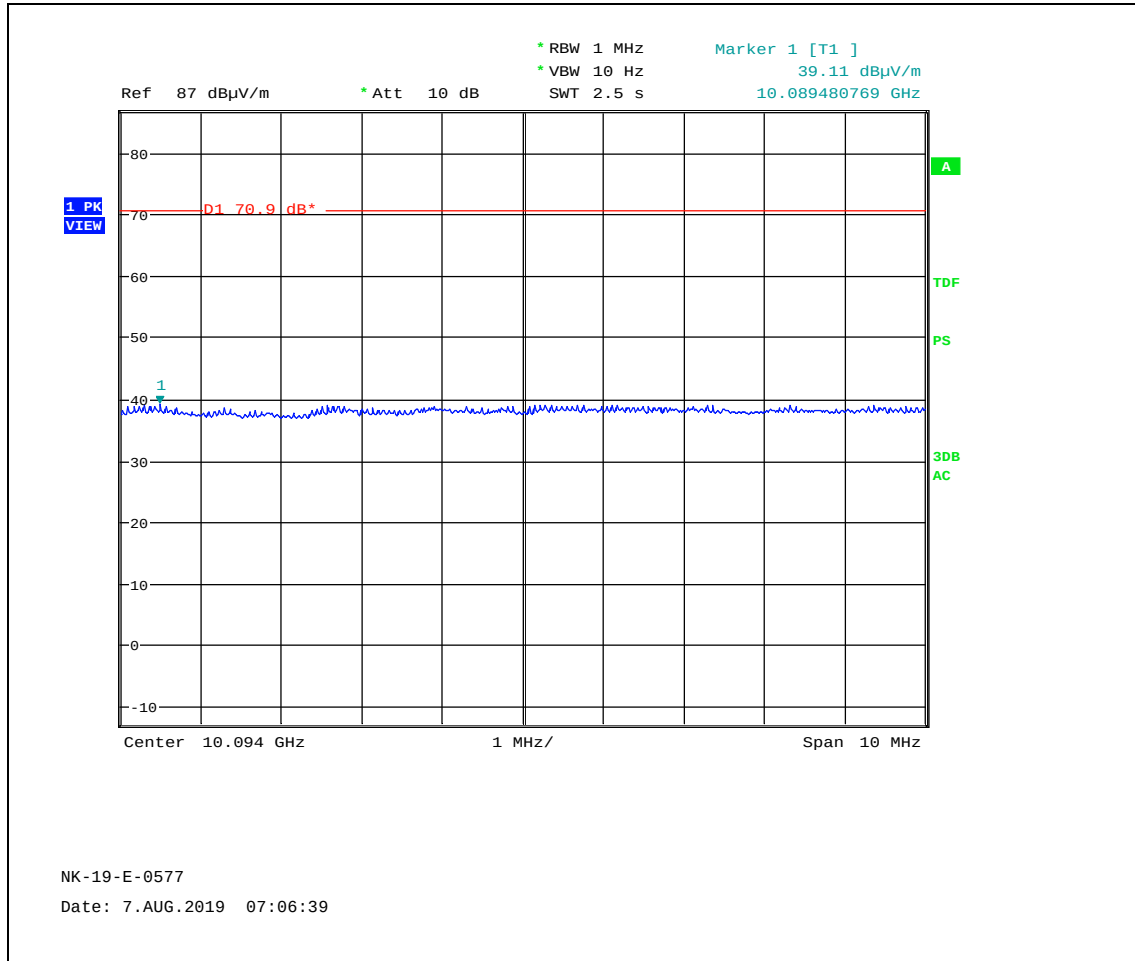
- Radiated Emissions (Above 1 GHz)**



9891.64 MHz

PLOTS OF EMISSIONS

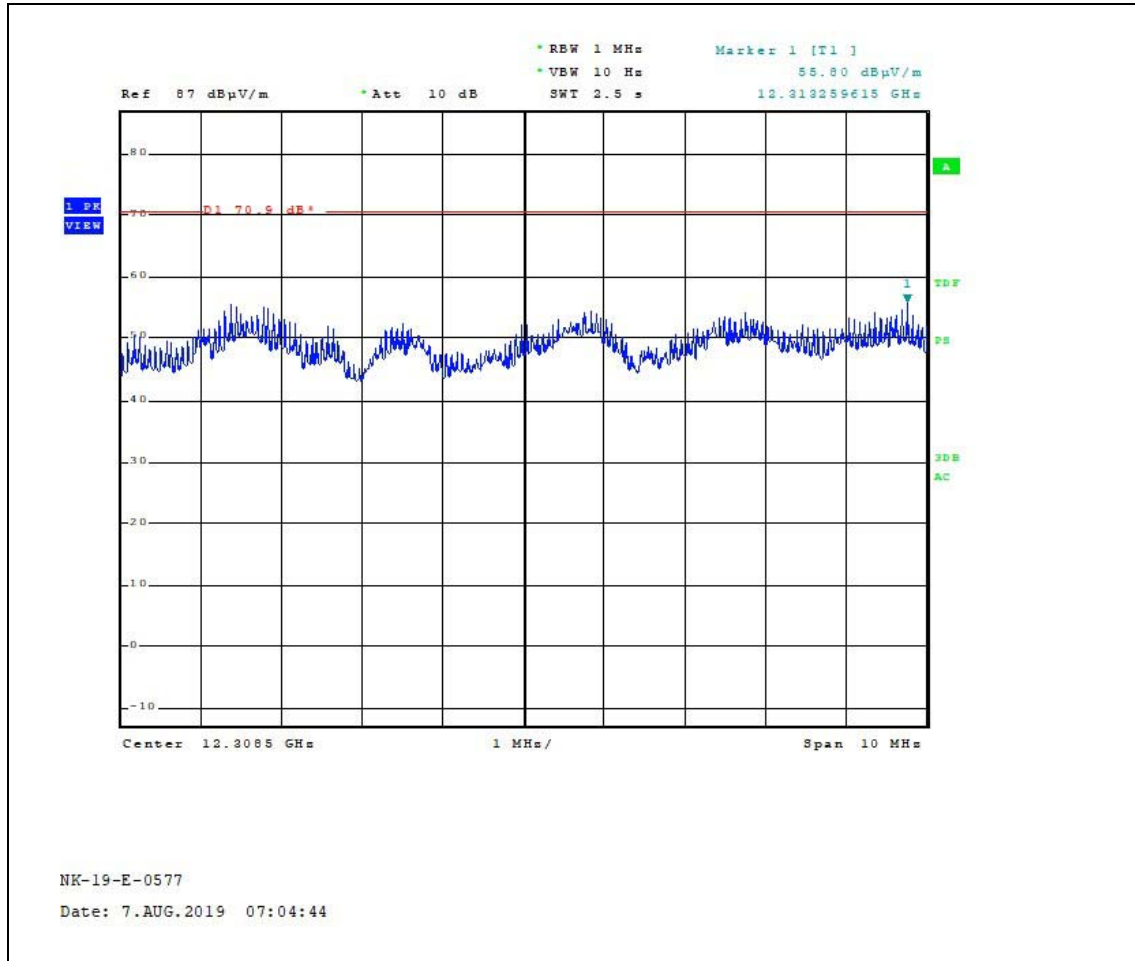
● Radiated Emissions (Above 1 GHz)



10089.48 MHz

PLOTS OF EMISSIONS

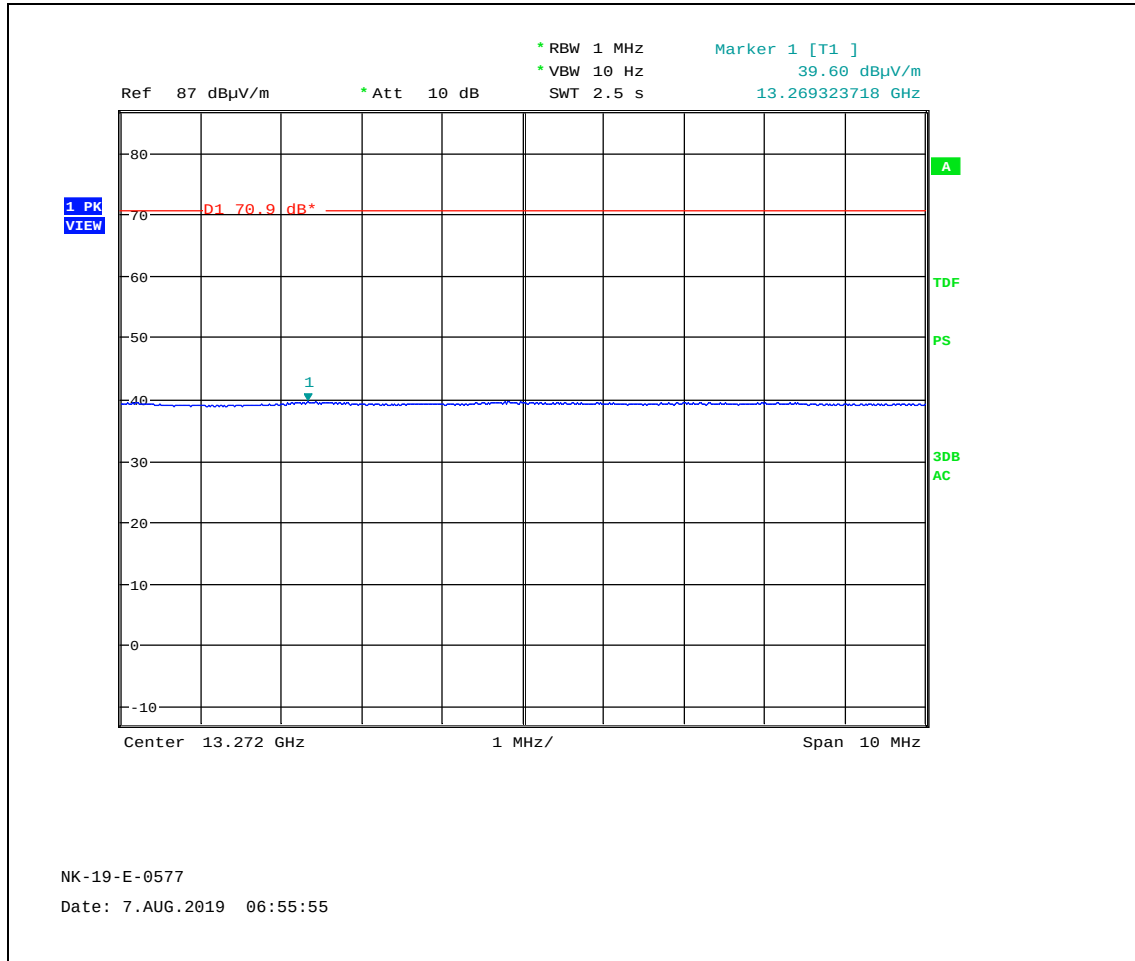
- Radiated Emissions (Above 1 GHz)**



12313.25 MHz

PLOTS OF EMISSIONS

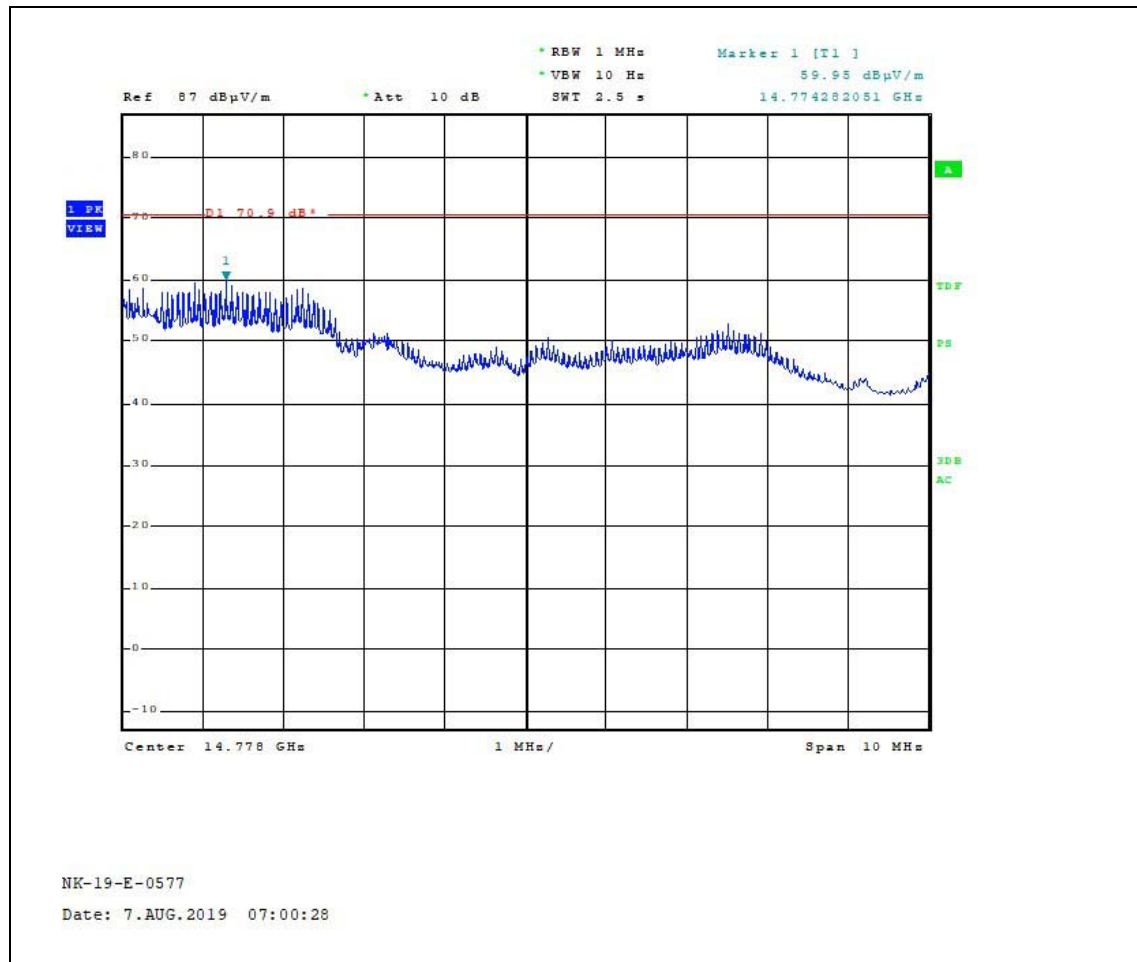
● Radiated Emissions (Above 1 GHz)



13269.32 MHz

PLOTS OF EMISSIONS

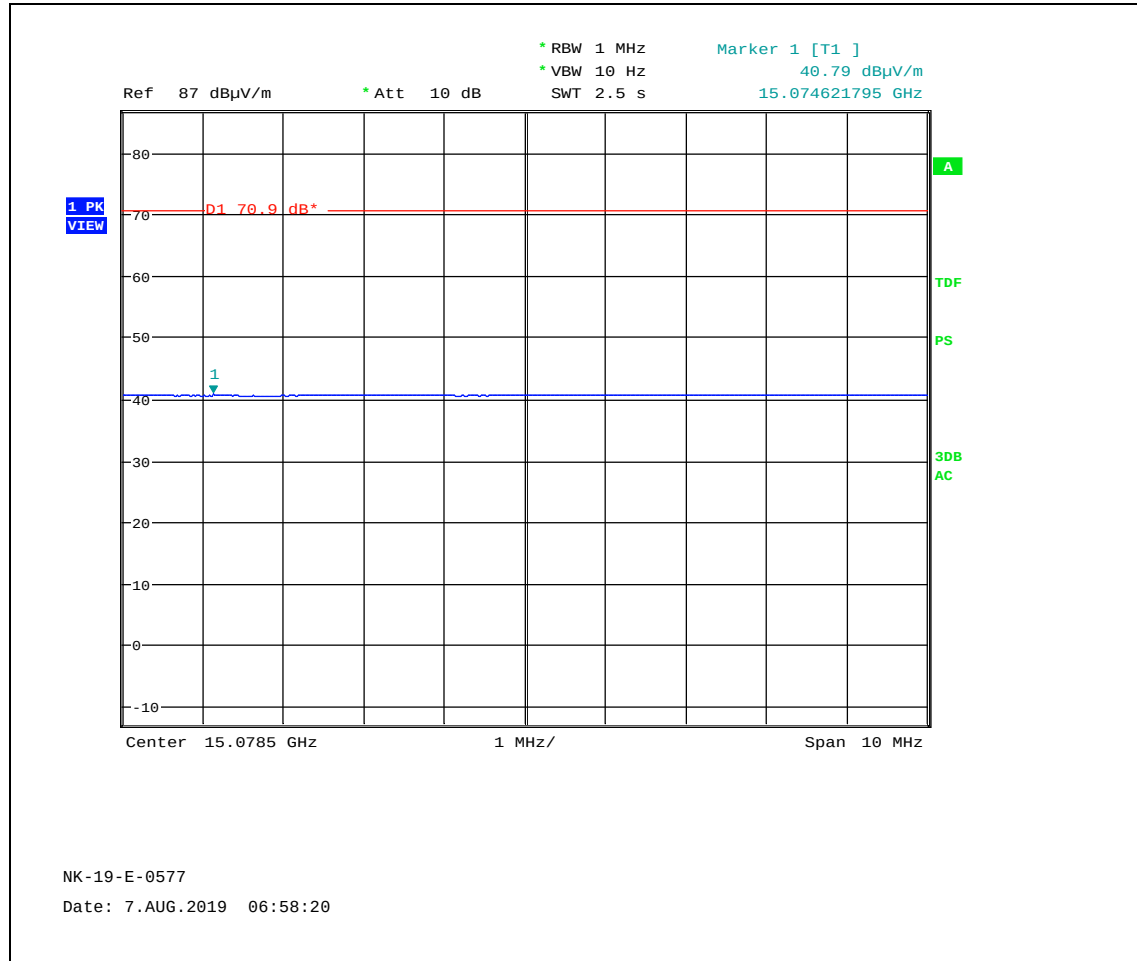
- Radiated Emissions (Above 1 GHz)**



14774.28 MHz

PLOTS OF EMISSIONS

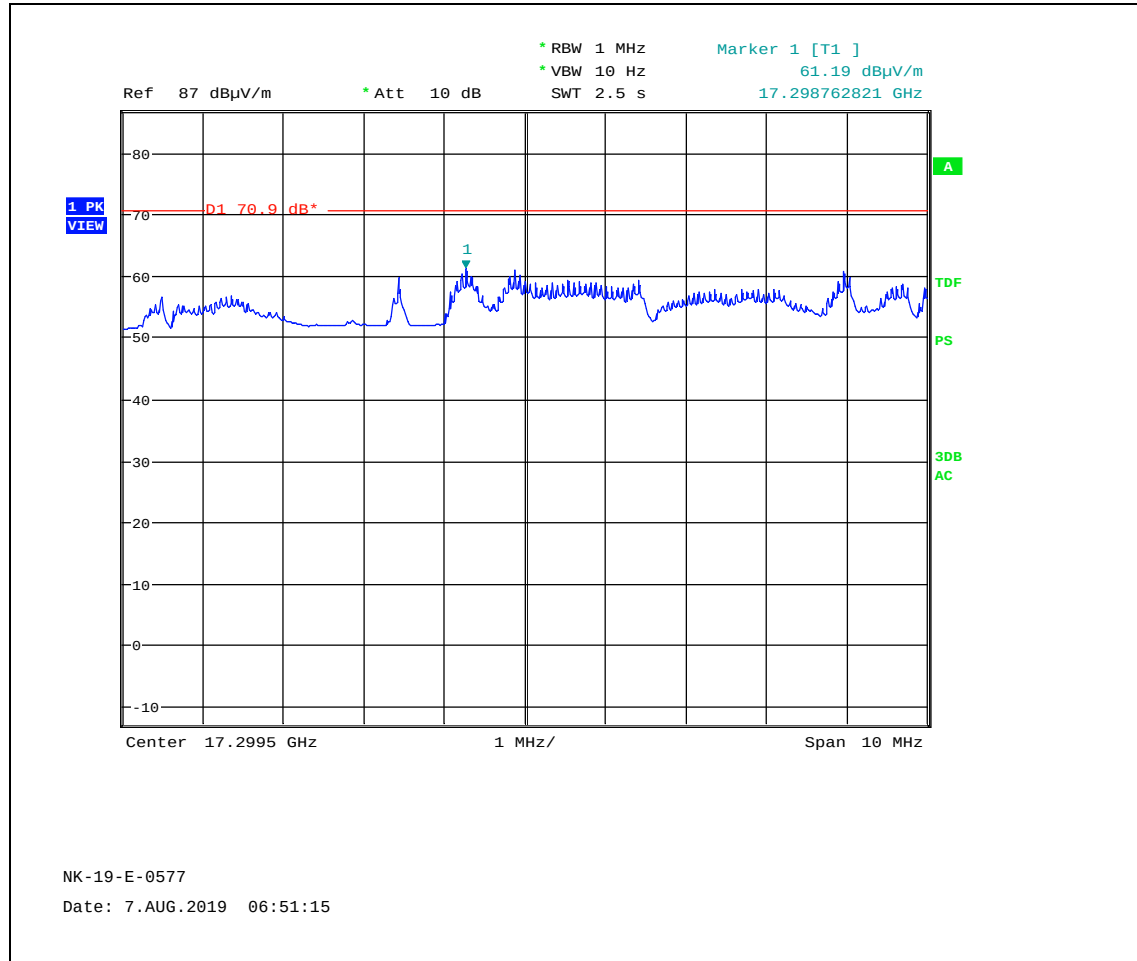
● Radiated Emissions (Above 1 GHz)



15074.62 MHz

PLOTS OF EMISSIONS

● Radiated Emissions (Above 1 GHz)



17298.76 MHz

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				
Receiver reading	R_S	± 2.38	normal 1	1.00	2.38	1	2.38
AMN Voltage division factor	L_{AMN}	± 0.15	normal 2	2.00	0.08	1	0.08
Sine wave voltage	dV_{SW}	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response	dV_{PA}	± 0.39	normal 2	2.00	0.20	1	0.20
Pulse repetition rate response	dV_{PR}	± 0.39	normal 2	2.00	0.20	1	0.20
Noise floor proximity	dV_{NF}	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
AMN VDF frequency interpolation	dV_{FI}	± 0.10	rectangular	$\sqrt{3}$	0.06	1	0.06
AMN Impedance	dZ	+ 2.60 - 2.70	Triangular	$\sqrt{6}$	1.10	1	1.10
Mismatch : AMN-Receiver	M	± 0.07	U-Shaped	$\sqrt{2}$	0.05	1	0.05
Remark	Using 50 Ω / 50 uH AMN						
Combined Standard Uncertainty	Normal			uc = 1.18 dB			
Expanded Uncertainty U	Normal (k = 2)			U = 2.4 dB (CL is 95 %)			

2. Radiation Uncertainty Calculation (Below 1 GHz)

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				
Receiver reading	R_i	± 0.15	normal 1	1.00	0.15	1	0.15
Sine wave voltage	dV_{sw}	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response	dV_{pa}	± 0.54	normal 2	2.00	0.27	1	0.27
Pulse repetition rate response	dV_{pr}	± 0.54	normal 2	2.00	0.27	1	0.27
Noise floor proximity	dV_{nf}	± 0.50	normal 2	2.00	0.29	1	0.29
Antenna Factor Calibration	A_F	± 1.50	rectangular	2.00	0.75	1	0.75
Antenna Directivity	A_D	± 0.50	rectangular	$\sqrt{3}$	0.29	1	0.29
Antenna Factor Height Dependence	A_H	± 0.50	rectangular	$\sqrt{3}$	0.29	1	0.29
Antenna Phase Centre Variation	A_P	± 0.20	rectangular	$\sqrt{3}$	0.12	1	0.12
Antenna Factor Frequency Interpolation	A_i	± 0.3	rectangular	$\sqrt{3}$	0.17	1	0.17
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	dB_{al}	± 1.00	rectangular	$\sqrt{3}$	0.58	1	0.58
Cross Polarization	D_{Cross}	± 0.90	rectangular	$\sqrt{3}$	0.52	1	0.52
Mismatch	M	+ 1.32 - 1.57	U-Shaped	$\sqrt{2}$	0.11	1	1.11
EUT Volume Diameter	V_d	0.33	Normal 1	1.00	0.33	1	0.33
Combined Standard Uncertainty	Normal			$u_c = 2.40$ dB			
Expanded Uncertainty U	Normal ($k = 2$)			$U = 4.8$ dB (CL is 95 %)			

3. Radiation Uncertainty Calculation (Above 1 GHz)

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				
Receiver Reading	R_i	0.25	normal 1	1.00	0.25	1	0.25
Preamplifier gain	G_p	± 0.23	normal 2	2	0.12	1	0.12
Receiver Sine Wave	dV_{sw}	± 0.27	normal 2	2	0.14	1	0.14
Instability of preamp gain	dG_{pw}	± 1.2	rectangular	$\sqrt{3}$	0.70	1	0.70
Noise Floor Proximity	dV_{nf}	± 0.70	rectangular	$\sqrt{3}$	0.40	1	0.40
Antenna Factor Calibration	AF	± 1.50	normal 2	2	0.75	1	0.75
Directivity difference	A_D	± 3.00	rectangular	$\sqrt{3}$	0.87	1	0.87
Phase Centre location	AP	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Antenna Factor Frequency Interpolation	A_i	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Site Imperfections	S_i	± 3.00	triangular	$\sqrt{6}$	1.22	1	1.22
Effect of setup table material	d_{ANT}	± 1.50	rectangular	$\sqrt{3}$	0.87	1	0.87
Separation distance	dD	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Cross Polarization	DC_{cross}	± 0.90	rectangular	$\sqrt{3}$	0.52	1	0.52
Mismatch (antenna-Preamplifier)	M	+ 1.30 - 1.50	U-Shaped	$\sqrt{2}$	1.06	1	1.06
Mismatch (preamplifier-receiver)	M	+ 1.20 - 1.40	U-Shaped	$\sqrt{2}$	0.99	1	0.99
Combined Standard Uncertainty	Normal			$uc = 2.86$ dB			
Expended Uncertainty U	Normal ($k = 2$)			$U = 5.8$ 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	Jan. 29 2021	2 year
2	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101041	Apr. 02 2020	1 year
3	Software	ROHDE & SCHWARZ	EMC32	Version 8.53.0	-	-
4	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5	100273	Apr. 02 2020	1 year
5	ATTENUATOR	FAIRVIEW	SA3N5W-10	N/A	Apr. 03 2020	1 year
6	LOOP ANTENNA	ROHDE & SCHWARZ	HFH2-Z2	100279	Feb. 13 2021	2 years
7	EMI Test Receiver	ROHDE & SCHWARZ	ESU 40	100202	Apr. 02 2020	1 year
8	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW8	100994	Apr. 03 2020	1 year
9	Software	ROHDE & SCHWARZ	EMC32	Version 10.10.01	-	-
10	Signal Conditioning Unit	ROHDE & SCHWARZ	SCU 01	10029	Apr. 02 2020	1 year
11	TRILOG Broadband Test Antenna	SCHWARZBECK	VULB 9163	9163-01027	Jan. 31 2020	2 year
12	ATTENUATOR	FAIRVIEW	SA3N5W-06	N/A	Jan. 08 2020	1 year
13	Controller	innco systems GmbH	CO2000-G	CO2000/562/23890210/L	N/A	N/A
14	Open Switch and Control Unit	ROHDE & SCHWARZ	OSP-120	100015	N/A	N/A
15	Antenna Mast (Left)	innco systems GmbH	MA4000-EP	N/A	N/A	N/A
16	Turn Table	innco systems GmbH	DT3000-3T	N/A	N/A	N/A
17	Signal Conditioning Unit	ROHDE & SCHWARZ	SCU 01	10030	Apr. 03 2020	1 year
18	Signal Conditioning Unit	Rohde & Schwarz	SCU 18	10065	Apr. 02 2020	1 year
19	DOUBLE RIDGED HORN ANTENNA	SCHWARZBECK	HF907	102585	Apr. 09 2021	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	CO3000/937/38330516/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

APPENDIX D – SCHEMATIC DIAGRAM

APPENDIX E – USER’S MANUAL

APPENDIX F – BLOCK DIAGRAM
