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 : January 18, 2016
Test Report No. : NK-15-E-0793
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

FCC ID	***C5F7NF1BMO1ØØN***
Trade Mark	***DAEWOO, Magic Chef***
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 completeness of these measurements and vouch for the qualifications of all persons taking them.

January 18, 2016

Tested By : Doseung Shin
Engineer

Jan. 18, 2016

Reviewed By : Changsoo Choi
Technical Manager

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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
Factory :	Dongbu Daewoo Microwave ovens (Tianjin) Co., Ltd. NO. 34, CHANGHWA STREET, DAGANG DEVELOPMENT AREA BINHAI NEW DISTRICT, TIANJIN, 300270 CHINA

- FCC ID: C5F7NF1BMO1ØØN
- Model: 1) KOR-1B**
  Note 1) First "*" : 0~9 or A~Z (Enclosure design difference)
  Note 2) Second "*" : 0~9 (Mechanical type) or A~Z (Electronic type)
- Variant Model: 2) MCD1310ST, 2) MCD1311ST
- Trade Mark: 1) DAEWOO, 2) Magic Chef
- EUT Type: Microwave oven
- Applied Standard: FCC Part 18 & Part 2
- Test Procedure(s): MP-5:1986
- Dates of Test: December 15, 2015 to January 15, 2015
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK-15-E-0793

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 : **C5F7NF1BMO1ØØN, 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.
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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 Hz Single Phase
Rated power output	1 000 W
Rated power consumption	1 500 W
Magnetron	RM259 (DAEWOO)

Component List

Item	Model	Manufacturer	Serial Number
Diode H.V.	CL01-12	GAOXING	N/A
Fan Motor	OEM-15DWX1-C07	OH SUNG	N/A
H.V. CAPACITOR	2100V	NINGBO	N/A
Noise Filter	DWLF-M30	N/A	N/A
Magnetron	RM259	DAEWOO	151217CD JF
Main Board	M158	DAEWOO	3514315410-6 (3514334920)
SYNCHRONOUS MOTOR	49TYD-16A1	Yuyao Yahua Mechanical&Electrical Co.,Ltd	N/A
Trans H.V.	DJAS10A0-1BA	SHANDONG JUNFENG ELECTRONIC	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.

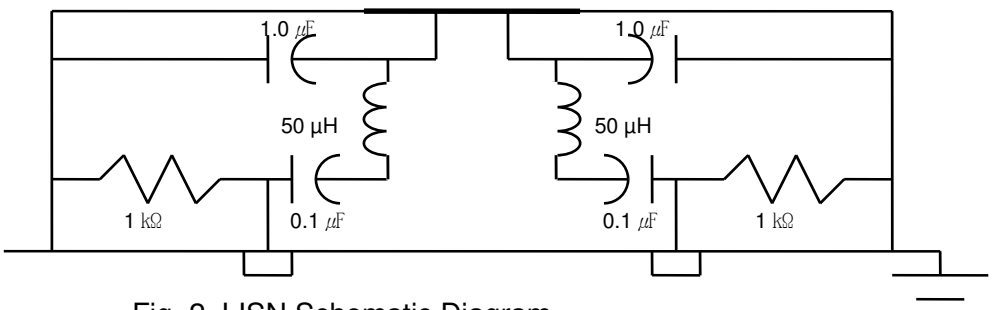


Fig. 2. LISN Schematic Diagram

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 MHz to 30 MHz using Loop Antenna (R&S/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, BBHA 9120 D) was used.
Final Measurements were made indoors at 3 m using Loop Antenna (R&S/HFH2-Z2) for measurement from 0.15 to 30 MHz with RBW 9 kHz & VBW 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 100 kHz & VBW 100 kHz and made indoors at 3 m using Double Ridged Broadband Horn antenna (Schwarzbeck, BBHA 9120 D) for measurement from 1 GHz to 18 GHz with RBW 1 MHz & VBW 10 Hz.
The detector function were set to quasi peak mode and the bandwidth of the receiver were set to 9 kHz, 100 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.

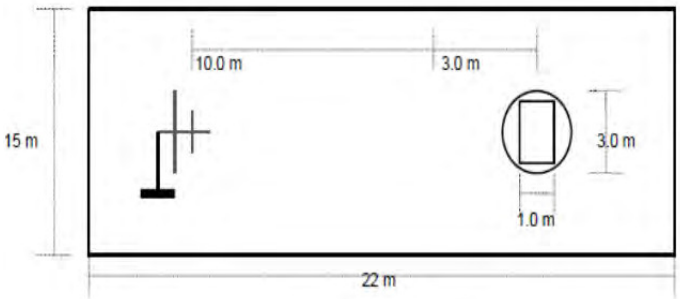


Fig. 3. Dimensions of 10 semi anechoic chamber

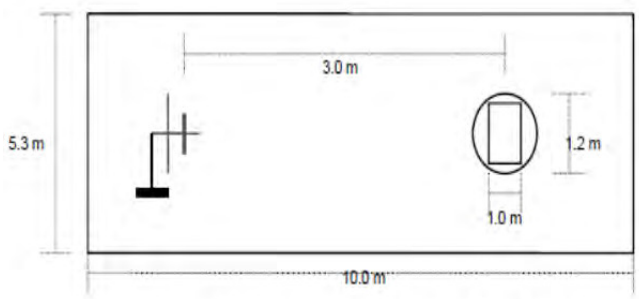


Fig. 4. Dimensions of 3 m full anechoic chamber

TEST DATA

Radiation Hazard

Probe Location	Maximum Leakage [mW/Cm2]	Limit [mW/Cm2]
A	0.3	1.00
B	0.2	1.00
C	0.2	1.00
All others	0.1	1.00

Input Power Measurement

Operation mode	P rated (W)	P (W)	dP (%)	Required dP (%)
Power Input	1 500	1 560	4	+ 15 %

RF Output Power Measurement

Quantity of Water [ml]	Starting Temperature [Centigrade]	Final Temperature [Centigrade]	Temp. Rise	Elapsed Time [seconds]	RF Power [watts]
1 000	10	19.9	9.9	42	987

$$\text{RF Power} = \frac{(4.187\ \text{Joules/Cal}) \times (\text{Volume in ml}) \times (\text{Temp. Rise})}{\text{Time in seconds}}$$

Tested by : **Doseung Shin**

TEST DATA

Operating Frequency measurements

▶**Frequency vs Line Voltage Variation Test**

[Room Temperature : 18.9 ℃]

Line Voltage Variation (a.c. V)	*)Pole	Frequency [㎒]	Allowed Tolerance for the ISM Band
96	H	Lower : 2 427.2	Lower : 2 400 ㎒ Upper : 2 500 ㎒
	H	Upper : 2 471.0	
	V	Lower : 2 429.0	
	V	Upper : 2 471.0	
108	H	Lower : 2 432.0	
	H	Upper : 2 468.6	
	V	Lower : 2 431.4	
	V	Upper : 2 469.8	
120	H	Lower : 2 426.6	
	H	Upper : 2 471.0	
	V	Lower : 2 430.2	
	V	Upper : 2 471.0	
132	H	Lower : 2 420.6	
	H	Upper : 2 474.6	
	V	Lower : 2 426.6	
	V	Upper : 2 474.6	
150	H	Lower : 2 441.6	
	H	Upper : 2 466.2	
	V	Lower : 2 447.0	
	V	Upper : 2 468.0	

NOTE :

1. ***Pol. H = Horizontal V = Vertical***
2. ***Initial load : 1 000 ㎖ of water in the beaker.***
3. ***Line voltage varied from a.c. 96 V to a.c. 150 V.***
4. ***ISM Frequency : 2 450 ㎒, Tolerance : ± 50 ㎒***

RESULT : Pass

Tested by : ***Doseung Shin***

TEST DATA

▶**Frequency vs Load Variation Test**

[Room Temperature : 19.3 ℃]

Volume of water (㎖)	*)Pole	Frequency [㎒]	Allowed Tolerance for the ISM Band
200	H	Lower : 2 433.8	Lower : 2 400 ㎒ Upper : 2 500 ㎒
	H	Upper : 2 475.8	
	V	Lower : 2 421.8	
	V	Upper : 2 477.0	
400	H	Lower : 2 436.2	
	H	Upper : 2 477.6	
	V	Lower : 2 438.6	
	V	Upper : 2 474.0	
600	H	Lower : 2 427.2	
	H	Upper : 2 475.2	
	V	Lower : 2 420.6	
	V	Upper : 2 475.8	
800	H	Lower : 2 433.8	
	H	Upper : 2 469.2	
	V	Lower : 2 435.6	
	V	Upper : 2 466.2	
1000	H	Lower : 2 424.8	
	H	Upper : 2 467.4	
	V	Lower : 2 419.4	
	V	Upper : 2 471.0	

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 : ***Doseung Shin***

TEST DATA

Conducted Emissions

FCC ID : C5F7NF1BMO1ØØN

[Room Temperature : 15.4 ℃]

EMI Auto Test(1) 1 / 2

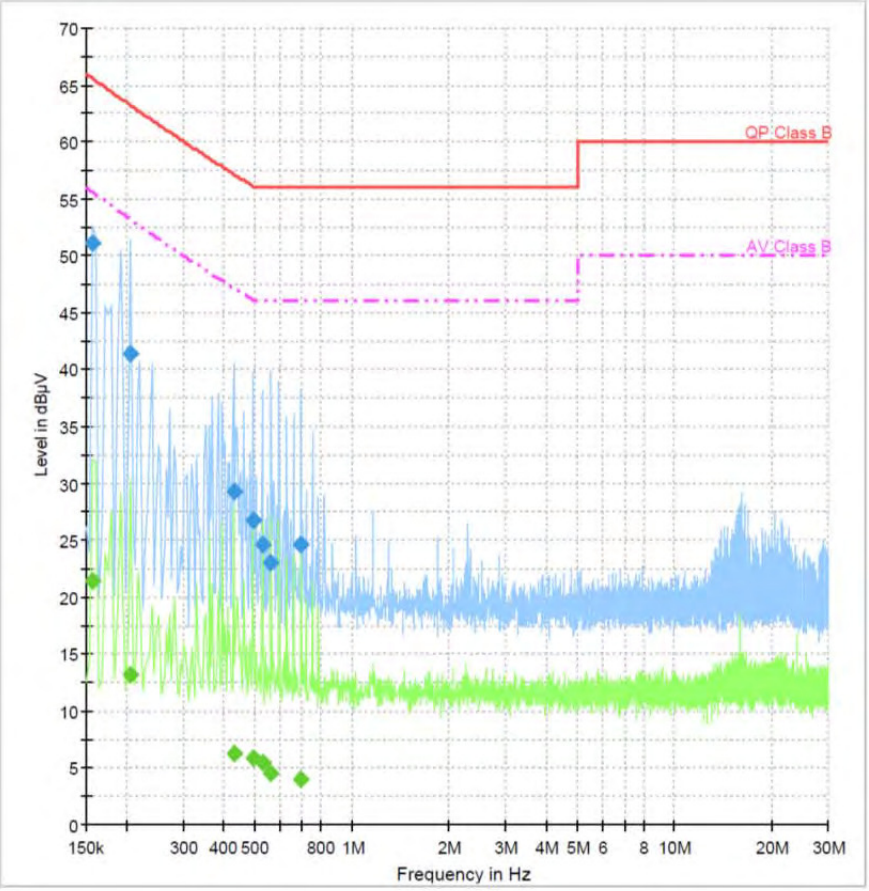
Test Report

Common Information

Test Site:	Nemko Korea(NK-15-E-0793)
Test Description:	Conducted emission
Test Standard:	FCC Part 18
Environment Conditions:	a.c. 120 V, 60 Hz
Operator Name:	Doseung,Shin
	Microwave mode

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
0.157462	51.1	15000.0	9.000	GND	N	10.4	14.5	65.6	
0.205969	41.4	15000.0	9.000	GND	N	10.4	21.8	63.2	
0.429844	29.3	15000.0	9.000	GND	L1	10.4	27.8	57.2	
0.493275	26.8	15000.0	9.000	GND	N	10.4	29.3	56.1	
0.526856	24.6	15000.0	9.000	GND	L1	10.4	31.4	56.0	
0.560438	23.1	15000.0	9.000	GND	L1	10.4	32.9	56.0	
0.694762	24.7	15000.0	9.000	GND	L1	10.4	31.3	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	21.4	15000.0	9.000	GND	N	10.4	34.2	55.6	
0.205969	13.2	15000.0	9.000	GND	L1	10.4	39.9	53.2	
0.429844	6.2	15000.0	9.000	GND	L1	10.4	40.9	47.2	
0.493275	5.9	15000.0	9.000	GND	L1	10.4	40.2	46.1	
0.526856	5.5	15000.0	9.000	GND	N	10.4	40.5	46.0	
0.560438	4.6	15000.0	9.000	GND	N	10.4	41.4	46.0	
0.694762	4.0	15000.0	9.000	GND	N	10.4	42.0	46.0	

12/29/2015

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 : **Doseung Shin**

TEST DATA

Radiated Emissions (150 ㎑ to 30 ㎒)

FCC ID : C5F7NF1BMO1ØØN

[Room Temperature : 16.8 ℃]

Test 1 / 2

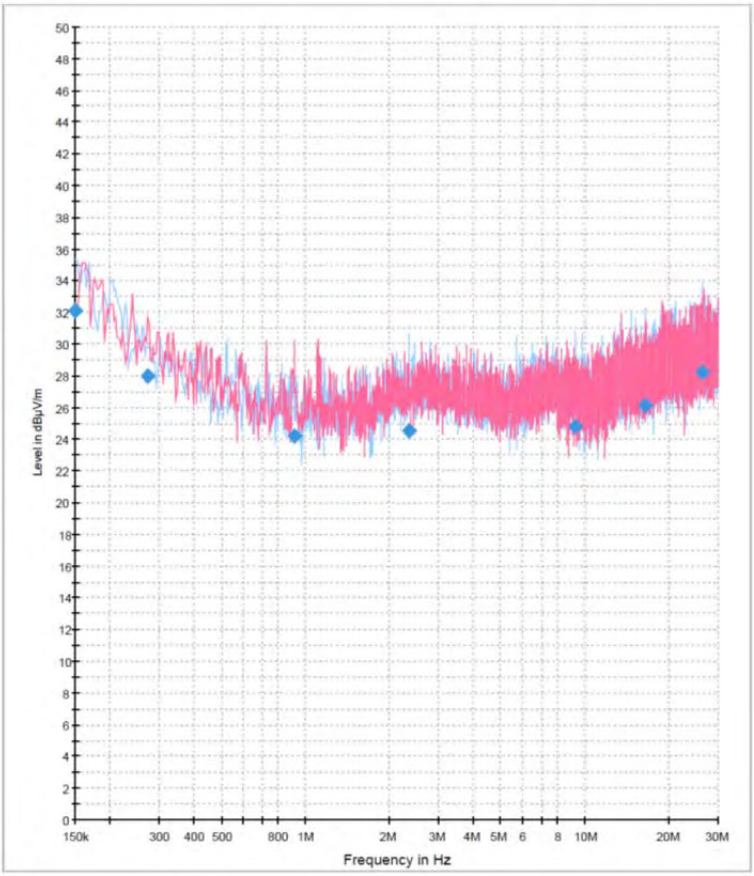
Test Report

Common Information

Test Description :	Radiated Emission(NK-15-E-0793)
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



12/25/2015

Test 2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
0.150000	32.1	15000.0	9.000	H	123.0	-23.4	
0.272385	28.0	15000.0	9.000	V	182.0	-23.7	
0.914160	24.2	15000.0	9.000	V	345.0	-23.9	
2.343975	24.5	15000.0	9.000	H	352.0	-23.5	
9.293055	24.8	15000.0	9.000	H	296.0	-23.2	
16.573470	26.1	15000.0	9.000	H	151.0	-19.4	
26.441880	28.2	15000.0	9.000	H	352.0	-13.3	

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<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 : **Doseung Shin**

TEST DATA

Radiated Emissions (30 ㎒ to 1 ㎓)

FCC ID : C5F7NF1BMO1ØØN

[Room Temperature : 19.2 ℃]

Test 1 / 2

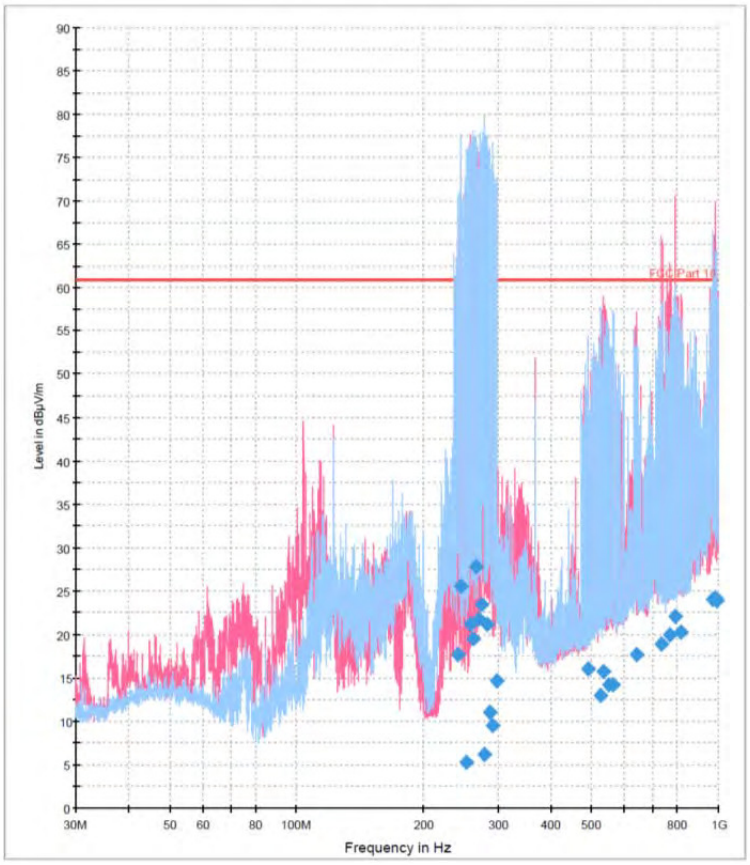
Test Report

Common Information

Test Description :	Radiated Emission(NK-15-E-0793)
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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Test 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)
241.411500	17.7	15000.0	120.000	370.0	H	299.0	-21.7	42.7	60.4
245.340000	25.5	15000.0	120.000	370.0	H	178.0	-21.5	34.9	60.4
253.488000	5.3	15000.0	120.000	286.0	H	95.0	-21.0	55.1	60.4
258.483500	21.1	15000.0	120.000	100.0	V	313.0	-20.9	39.3	60.4
261.781500	19.6	15000.0	120.000	186.0	H	-30.0	-20.7	40.8	60.4
266.389000	27.9	15000.0	120.000	330.0	H	43.0	-20.6	32.5	60.4
270.414500	21.7	15000.0	120.000	370.0	V	276.0	-20.4	38.7	60.4
275.507000	23.5	15000.0	120.000	300.0	H	75.0	-20.2	36.9	60.4
279.096000	6.2	15000.0	120.000	186.0	H	355.0	-20.1	54.2	60.4
282.491000	21.1	15000.0	120.000	270.0	H	-30.0	-20.0	39.3	60.4
287.244000	11.1	15000.0	120.000	370.0	H	196.0	-19.9	49.3	60.4
292.045500	9.5	15000.0	120.000	270.0	H	-9.0	-19.7	50.9	60.4
299.272000	14.6	15000.0	120.000	370.0	H	320.0	-19.4	45.8	60.4
490.992500	16.0	15000.0	120.000	209.0	H	1.0	-13.6	44.4	60.4
527.610000	13.0	15000.0	120.000	170.0	H	232.0	-12.6	47.4	60.4
535.030500	15.8	15000.0	120.000	370.0	V	52.0	-12.4	44.6	60.4
552.005500	14.2	15000.0	120.000	370.0	H	159.0	-11.9	46.2	60.4
564.227500	14.2	15000.0	120.000	222.0	H	176.0	-11.6	46.2	60.4
638.093000	17.7	15000.0	120.000	370.0	V	262.0	-10.2	42.7	60.4
736.305500	18.9	15000.0	120.000	100.0	V	81.0	-8.9	41.5	60.4
767.879000	20.0	15000.0	120.000	270.0	V	250.0	-8.5	40.4	60.4
789.461500	22.0	15000.0	120.000	209.0	V	262.0	-8.2	38.4	60.4
818.464500	20.3	15000.0	120.000	270.0	V	256.0	-7.8	40.1	60.4
967.553500	24.1	15000.0	120.000	100.0	H	240.0	-6.5	36.3	60.4
982.443000	24.1	15000.0	120.000	130.0	V	333.0	-6.3	36.3	60.4
995.780500	23.9	15000.0	120.000	100.0	H	204.0	-6.1	36.5	60.4

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

Frequency (MHz)	Comment
241.411500	
245.340000	
253.488000	
258.483500	
261.781500	
266.389000	
270.414500	
275.507000	
279.096000	
282.491000	
287.244000	
292.045500	
299.272000	
490.992500	
527.610000	
535.030500	
552.005500	
564.227500	
638.093000	
736.305500	
767.879000	
789.461500	
818.464500	
967.553500	
982.443000	
995.780500	

12/24/2015

<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 μN/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 : **Doseung Shin**

TEST DATA

Radiated Emissions (Above 1 ㎓)

FCC ID : C5F7NF1BMO1ØØN

[Room Temperature : (17.5 ± 1.8) ℃**]**

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)
2137.66	H	160	0	16.0	31.3	47.3	231.7	0.005	1.2	35.1
2193.87	V	130	315	17.0	31.5	48.5	266.1	0.005	1.3	35.1
2406.81	H	130	270	18.7	32.3	51.0	354.8	0.006	2.1	35.1
2512.99	V	190	315	12.9	32.7	45.6	190.5	0.006	1.1	35.1
4201.78	H	130	315	36.1	5.0	41.1	113.5	0.009	1.0	35.1
4918.19	V	130	45	47.4	7.5	54.9	555.9	0.01	5.6	35.1
7082.93	H	130	225	39.6	13.2	52.8	436.5	0.01	4.4	35.1
8363.66	V	160	45	37.0	15.2	52.2	407.4	0.01	4.1	35.1
10135.61	H	160	225	33.2	17.5	50.7	342.8	0.01	3.4	35.1
14808.37	H	190	0	32.0	23.9	55.9	623.7	0.01	6.2	35.1

<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.

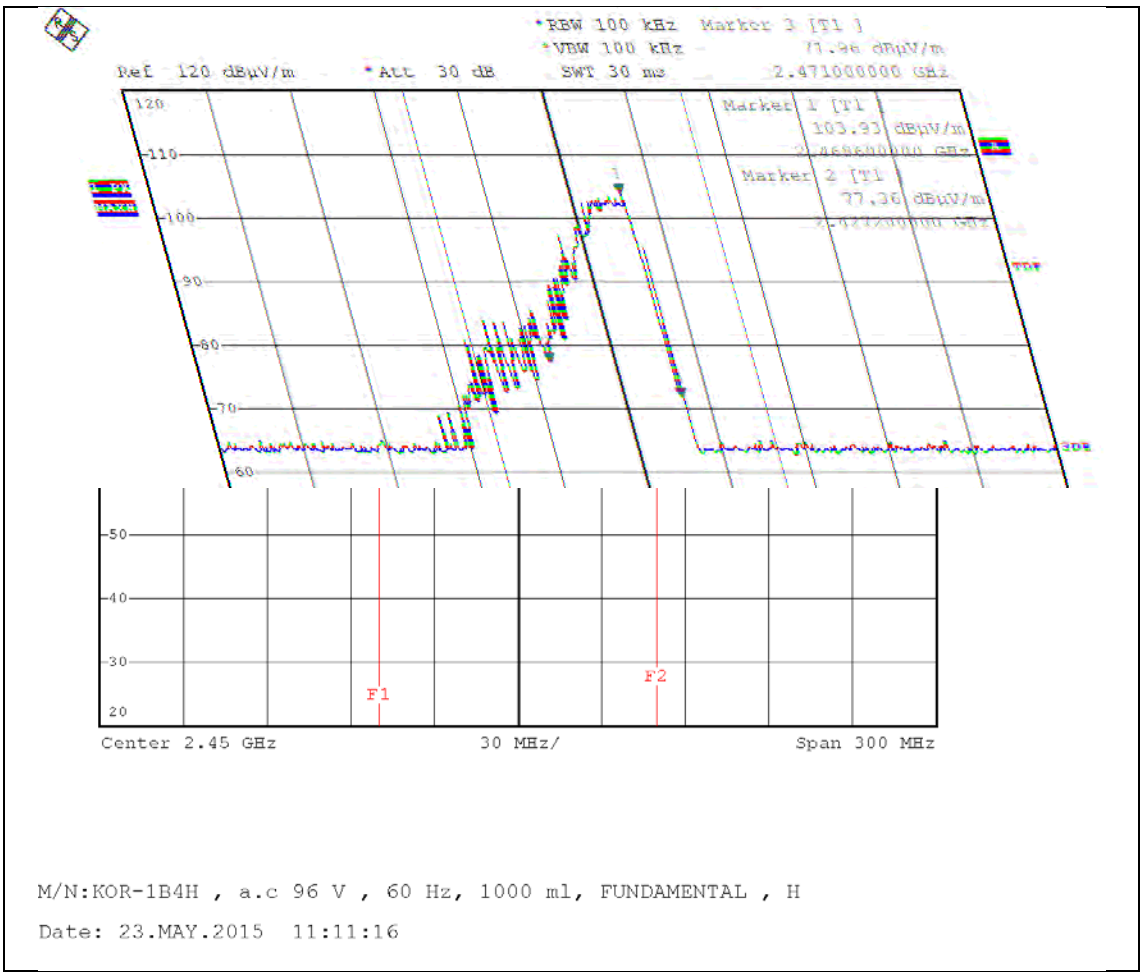
6. The test was performed at peak detector mode with average.

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

Tested by : **Doseung Shin**

PLOTS OF EMISSIONS

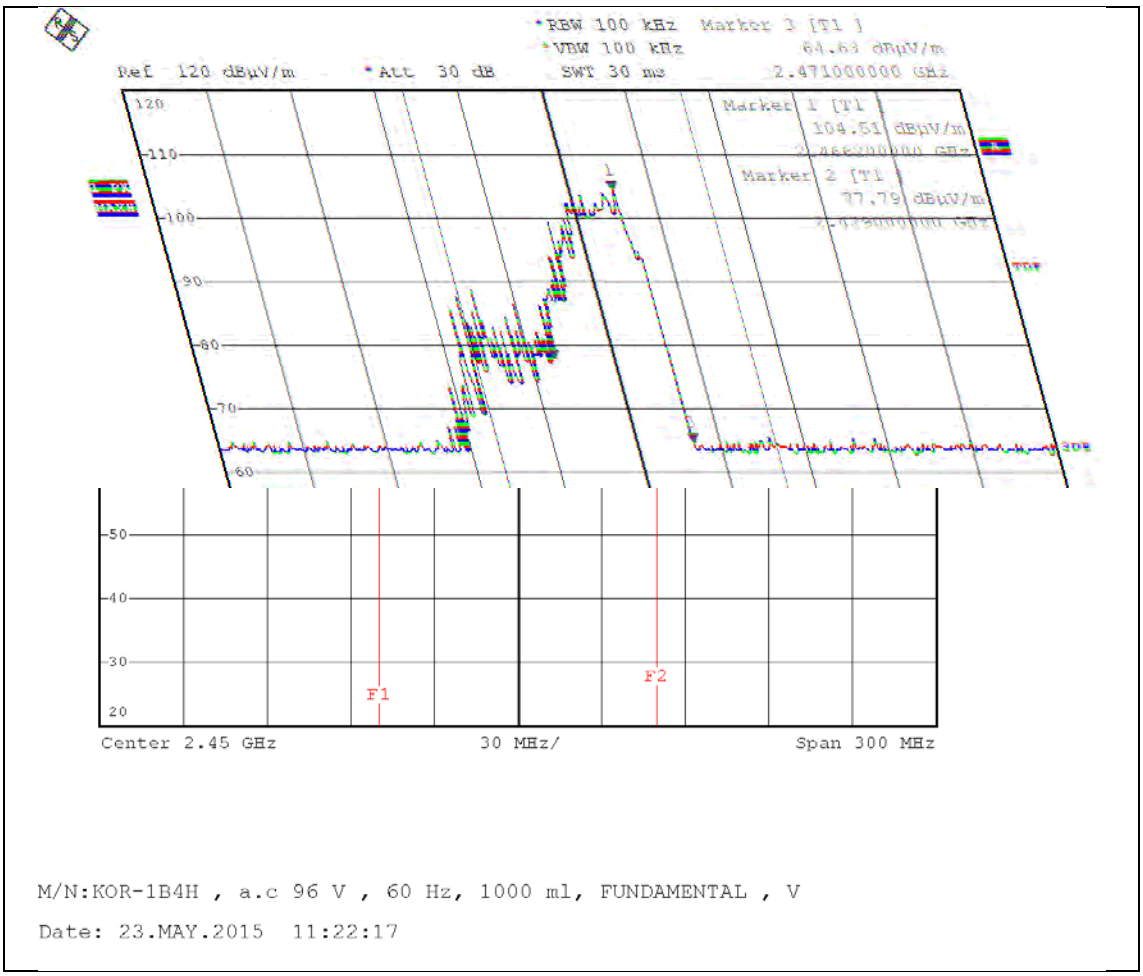
- ***Frequency vs Line Voltage Variation Test***



Horizontal (96 V, 1000 ㎖)

PLOTS OF EMISSIONS

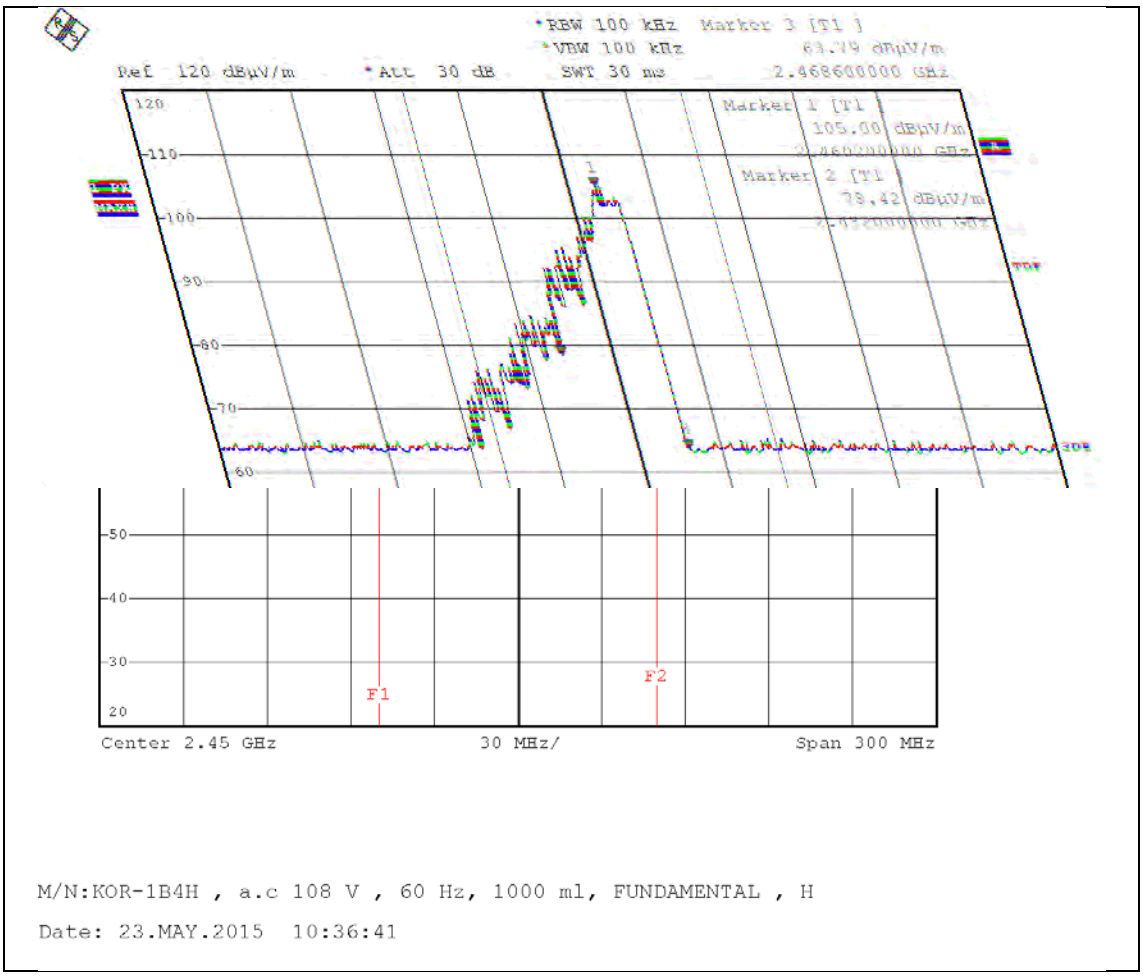
- ***Frequency vs Line Voltage Variation Test***



Vertical (96 V, 1000 ㎖)

PLOTS OF EMISSIONS

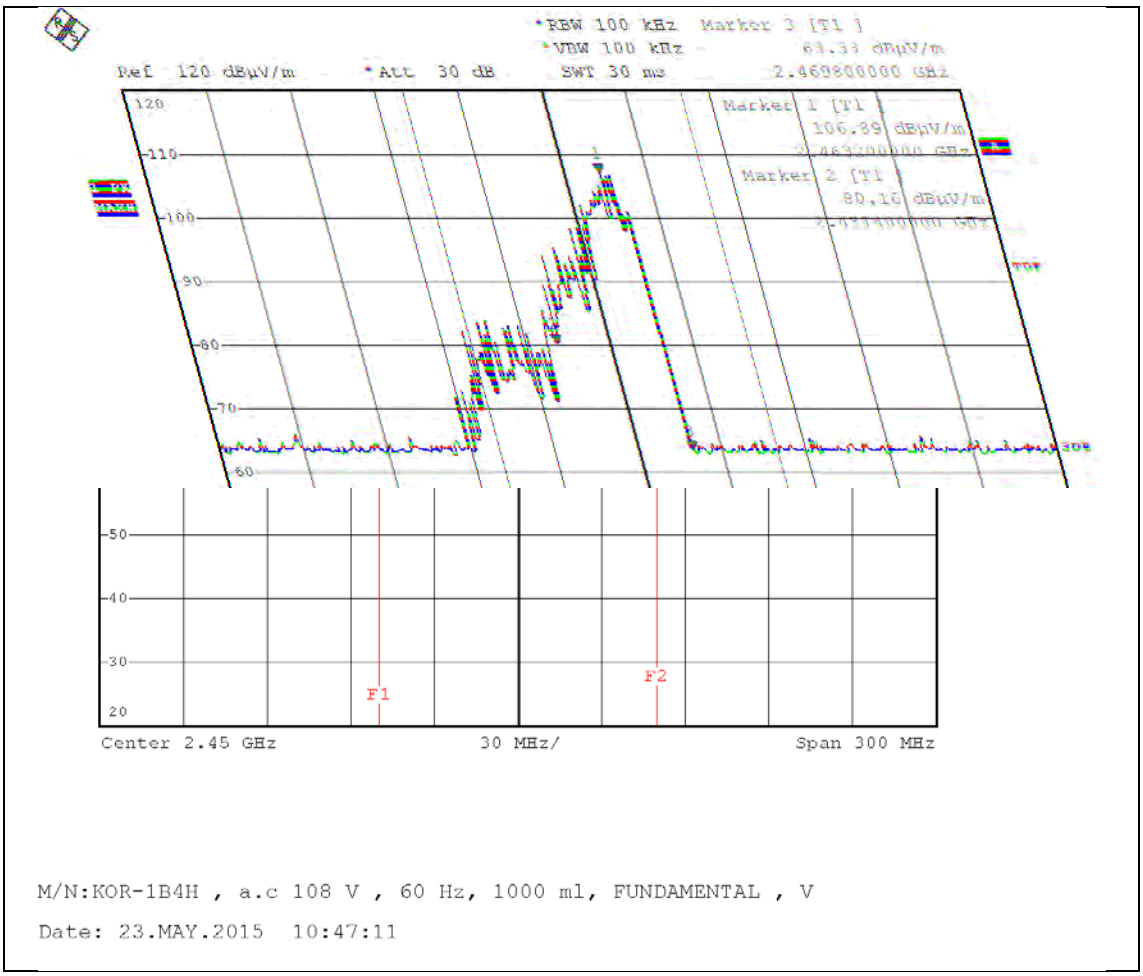
- ***Frequency vs Line Voltage Variation Test***



Horizontal (108 V, 1000 ㎖)

PLOTS OF EMISSIONS

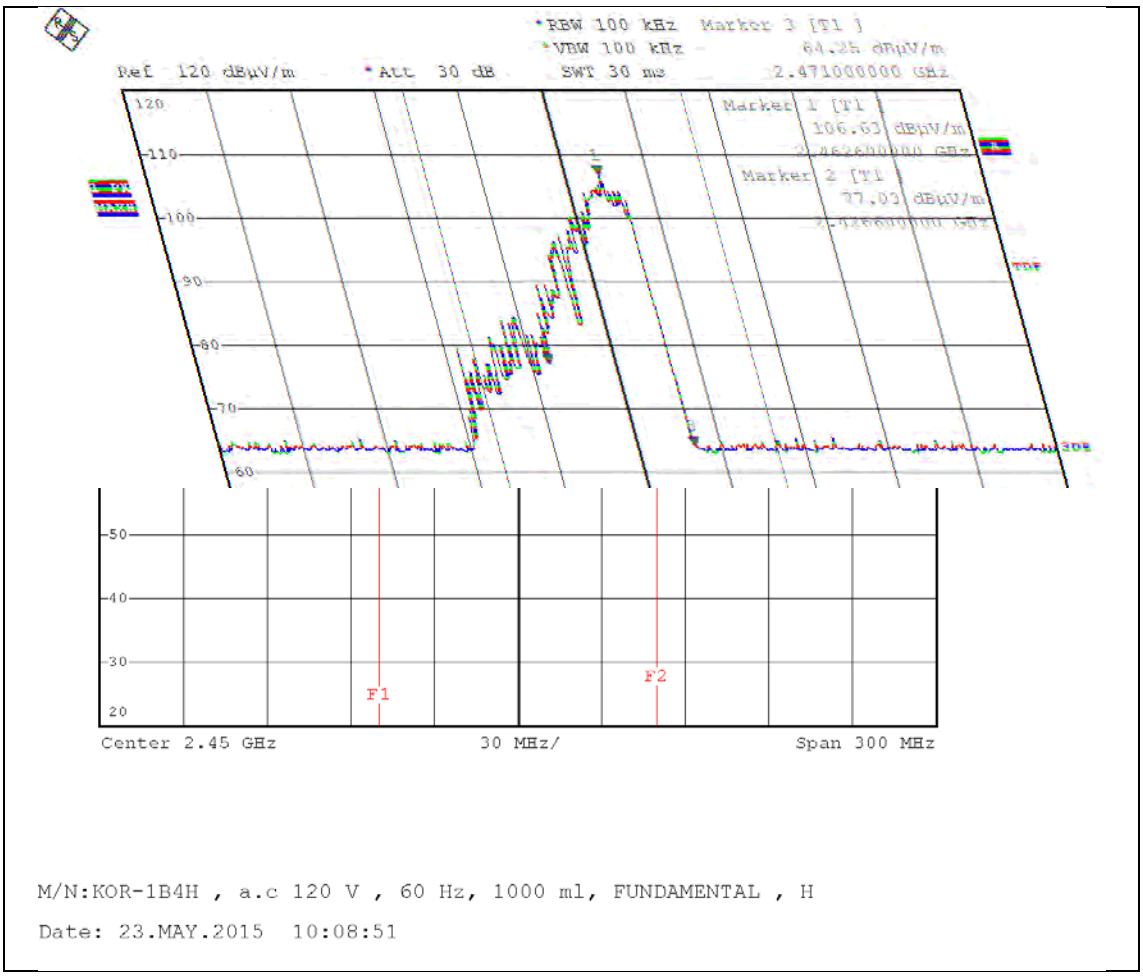
- ***Frequency vs Line Voltage Variation Test***



Vertical (108 V, 1000 ㎖)

PLOTS OF EMISSIONS

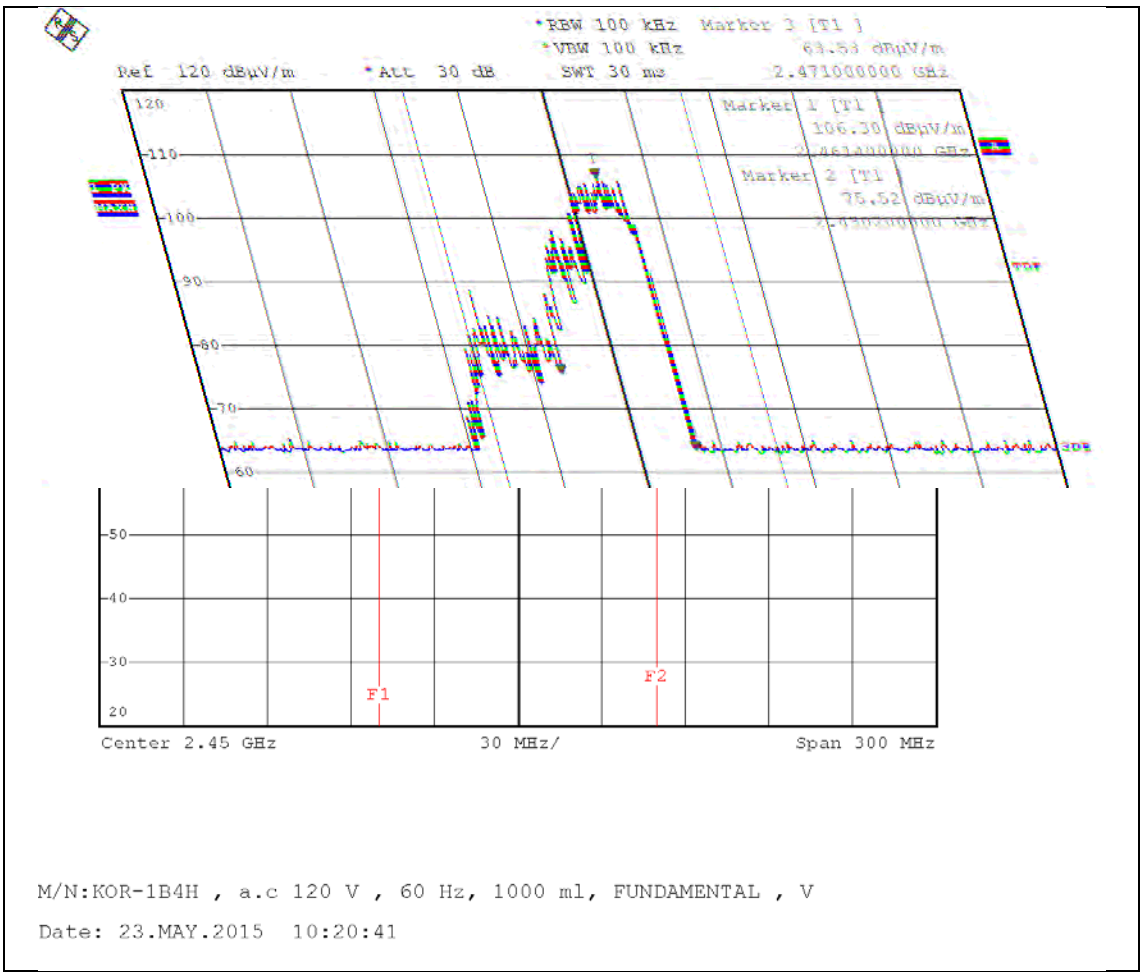
- ***Frequency vs Line Voltage Variation Test***



Horizontal (120 V, 1000 ㎖)

PLOTS OF EMISSIONS

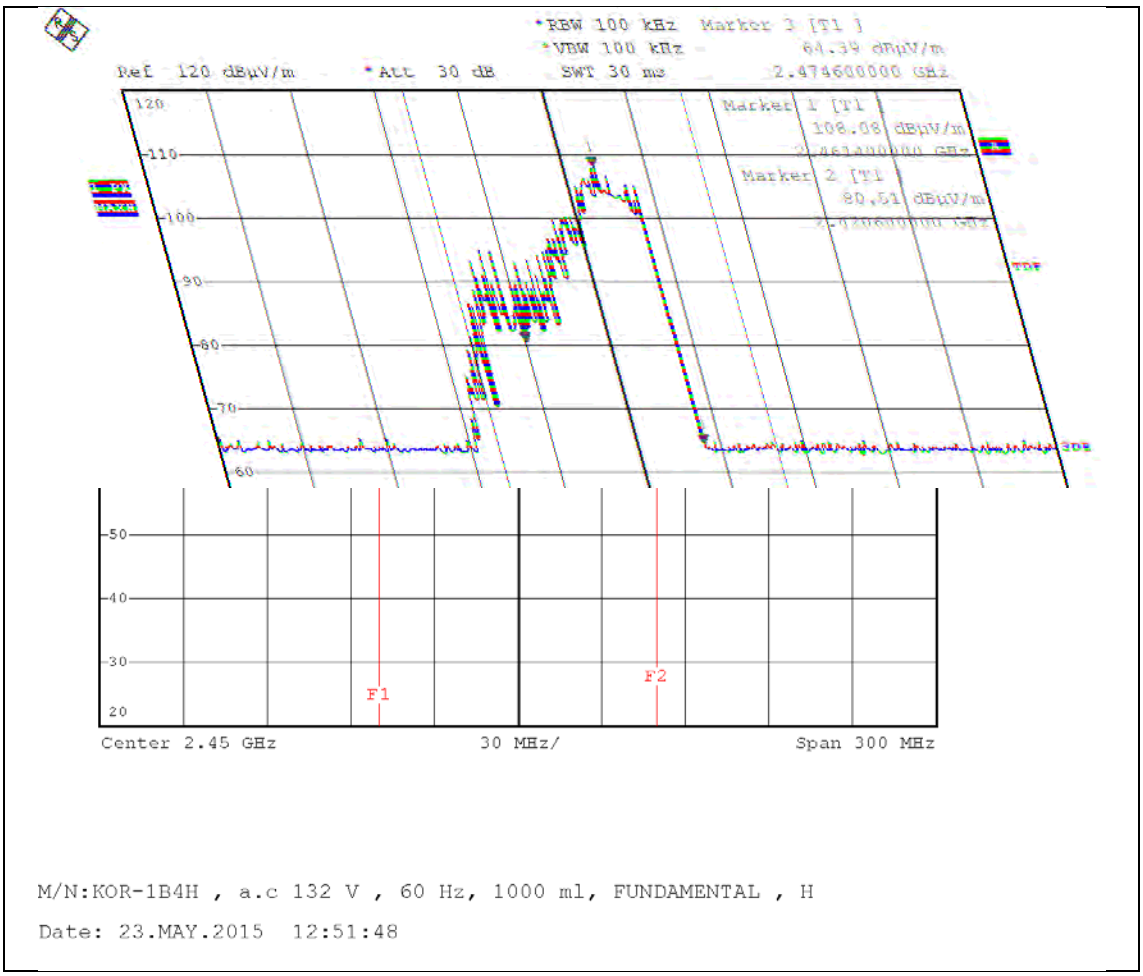
- ***Frequency vs Line Voltage Variation Test***



Vertical (120 V, 1000 ㎖)

PLOTS OF EMISSIONS

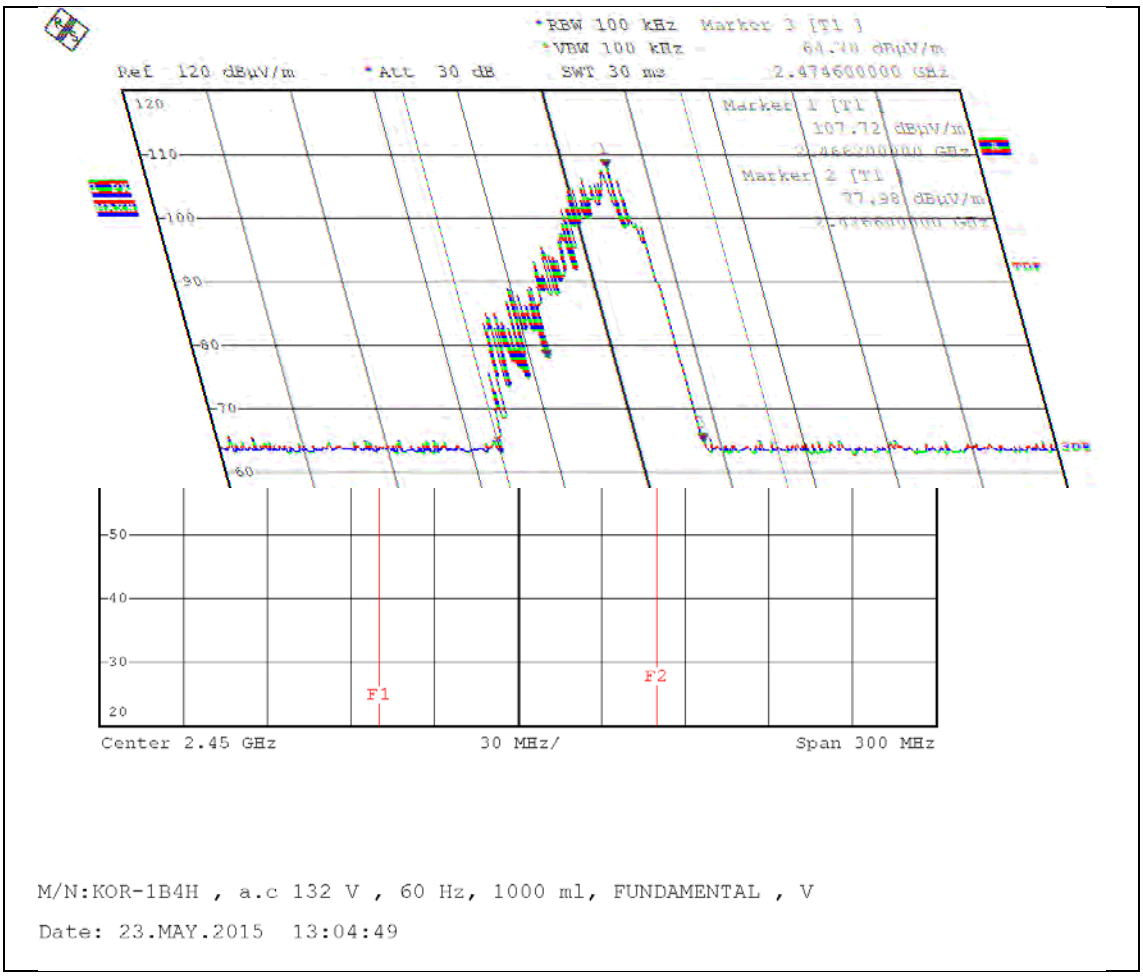
- ***Frequency vs Line Voltage Variation Test***



Horizontal (132 V, 1000 ㎖)

PLOTS OF EMISSIONS

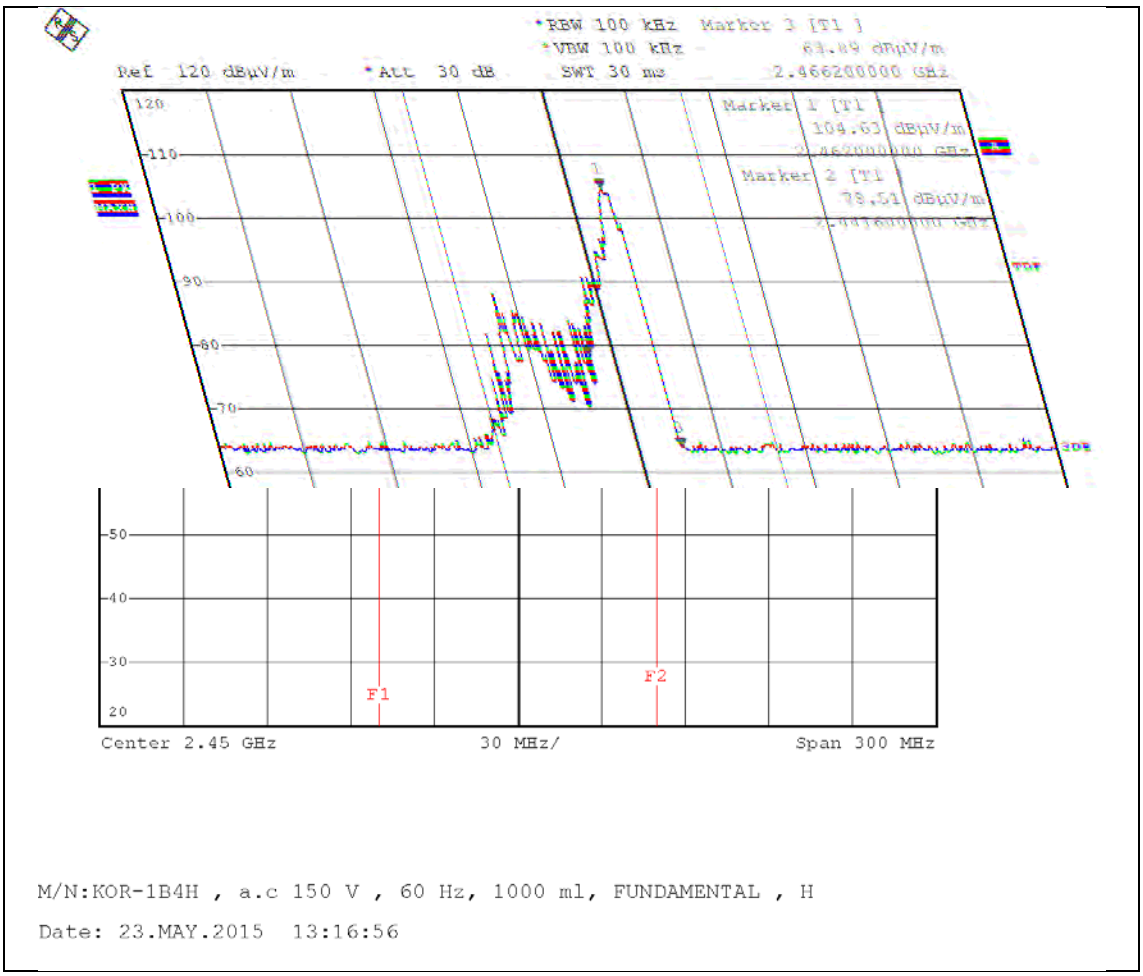
- ***Frequency vs Line Voltage Variation Test***



Vertical (132 V, 1000 ㎖)

PLOTS OF EMISSIONS

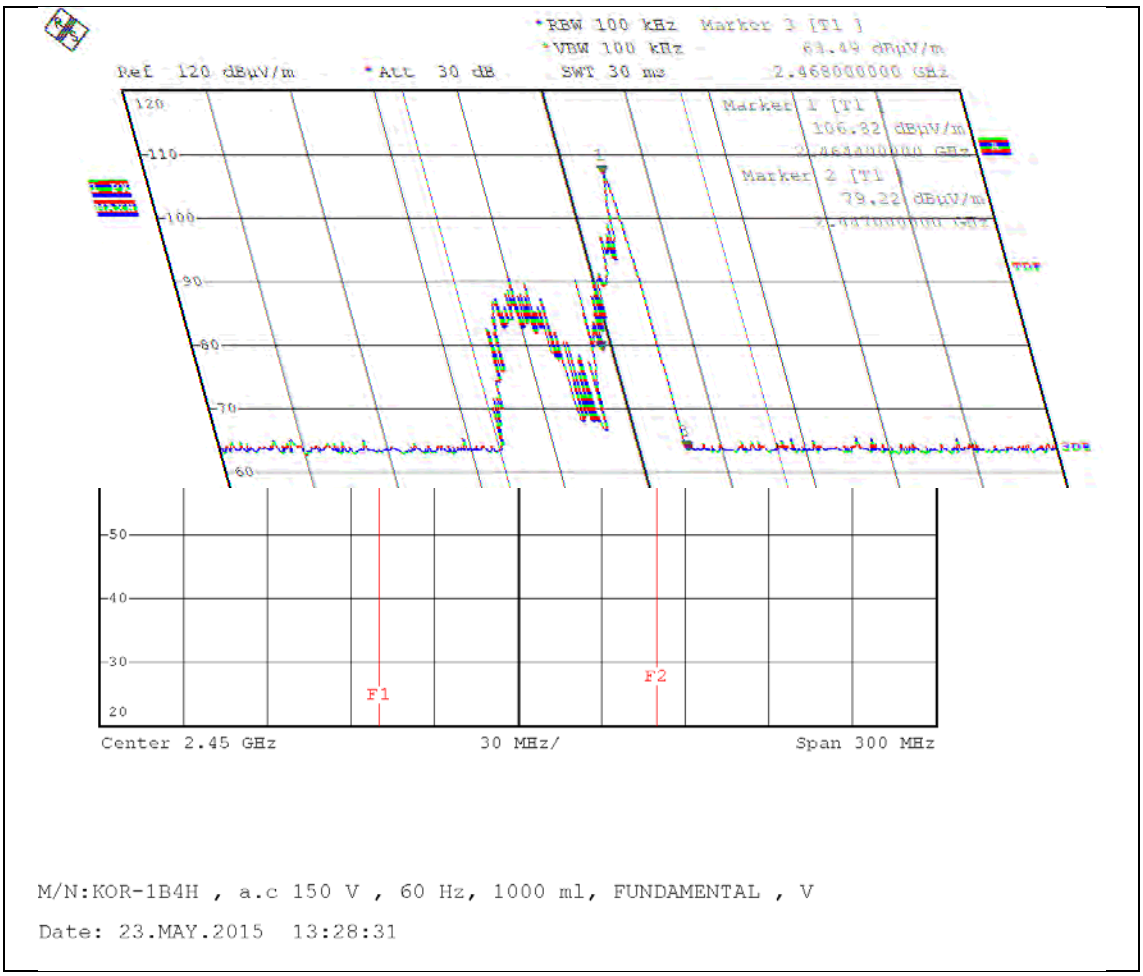
- ***Frequency vs Line Voltage Variation Test***



Horizontal (150 V, 1000 ㎖)

PLOTS OF EMISSIONS

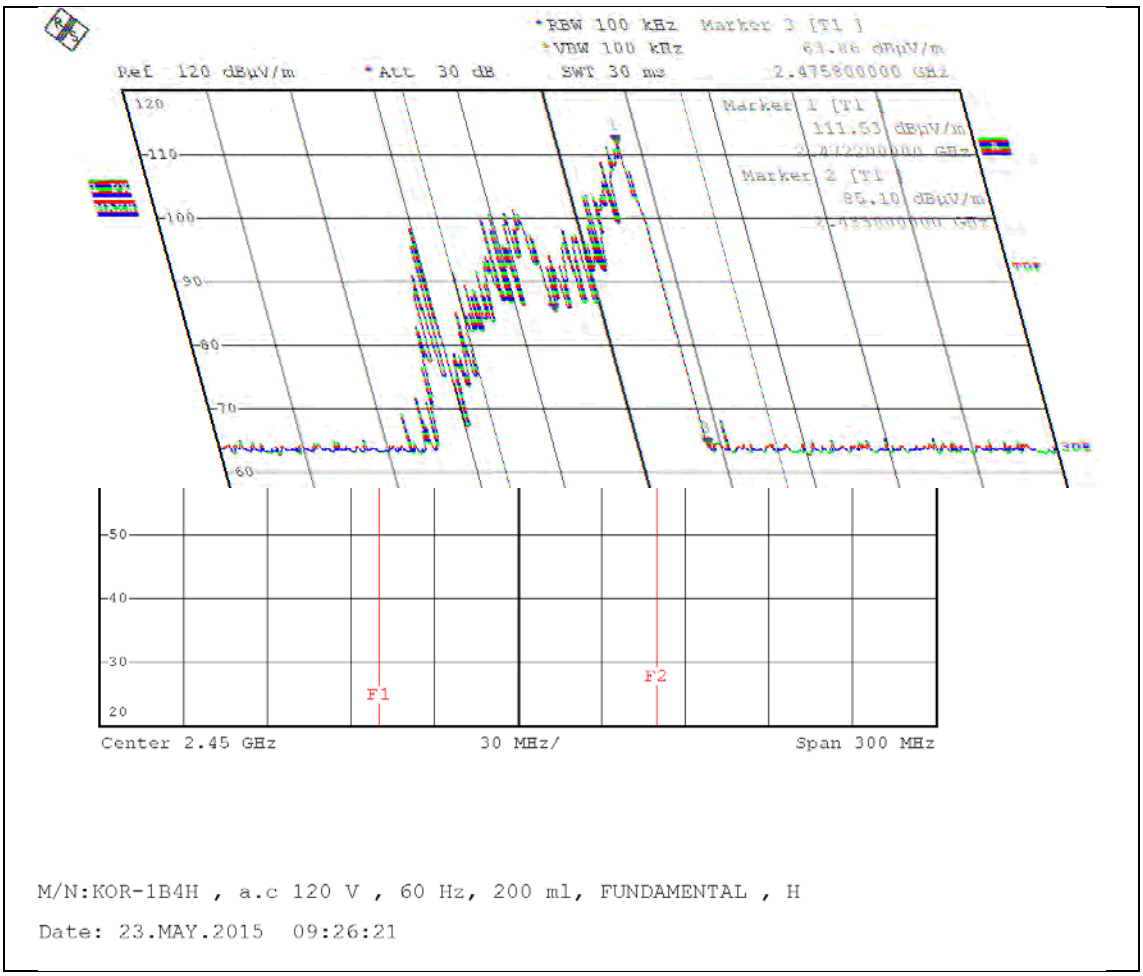
- ***Frequency vs Line Voltage Variation Test***



Vertical (150 V, 1000 ㎖)

PLOTS OF EMISSIONS

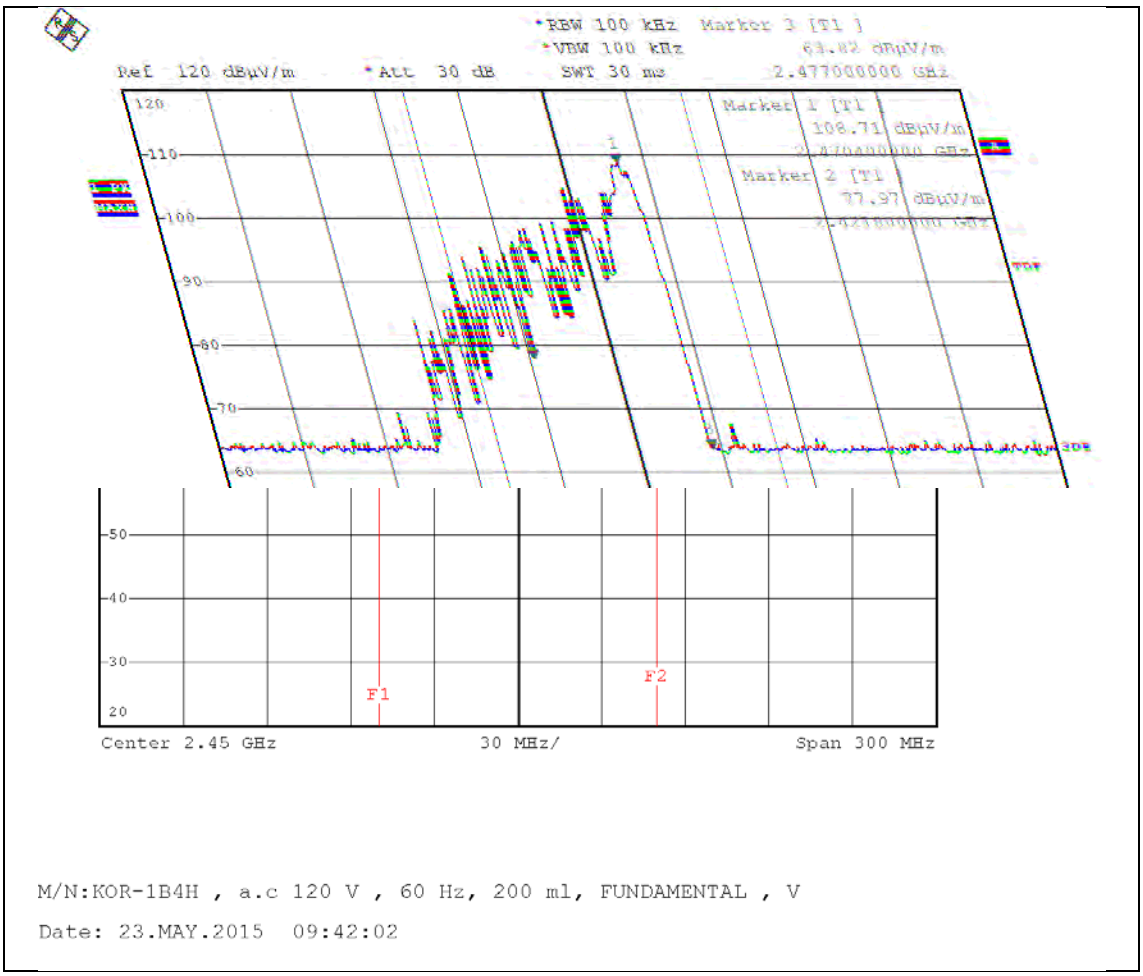
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 200 ㎖)

PLOTS OF EMISSIONS

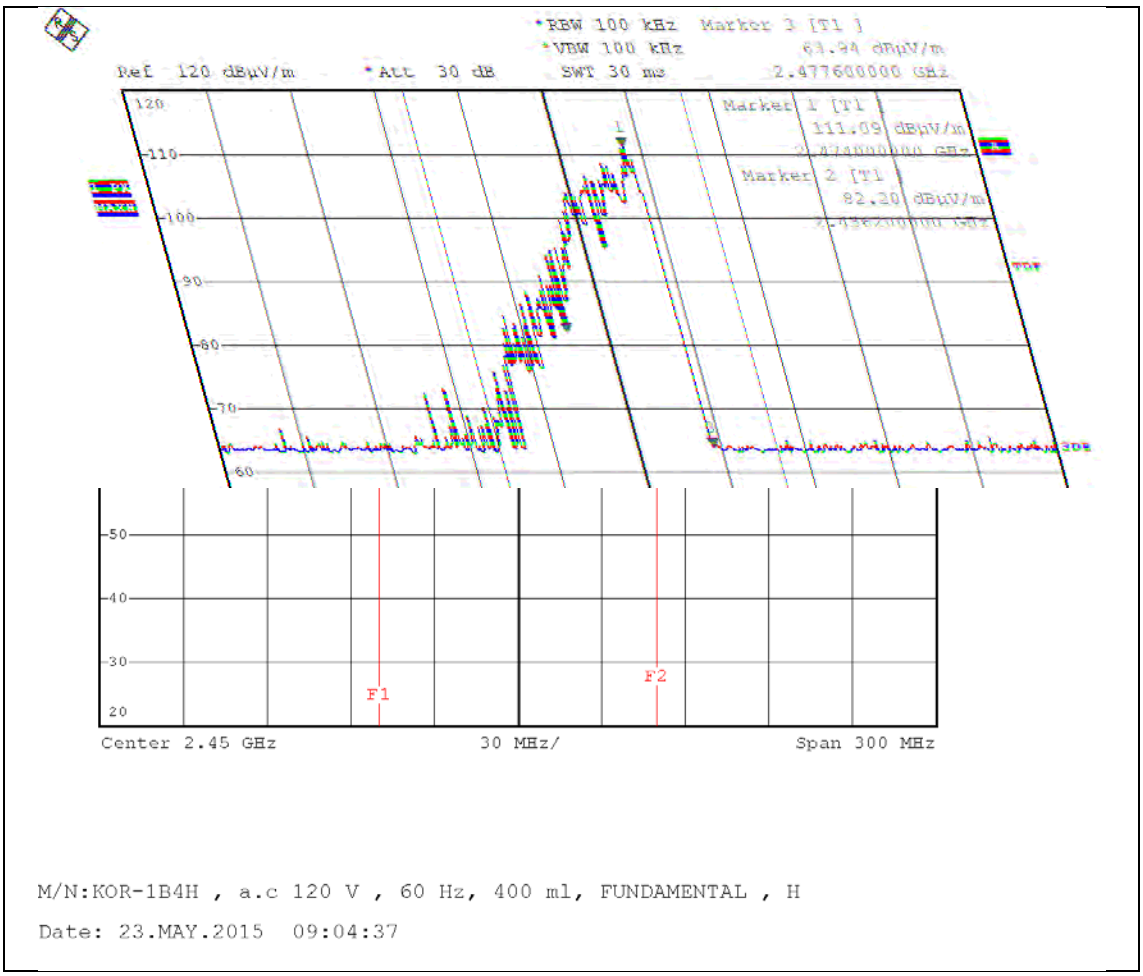
- ***Frequency vs Load Variation Test***



Vertical (120 V, 200 ㎖)

PLOTS OF EMISSIONS

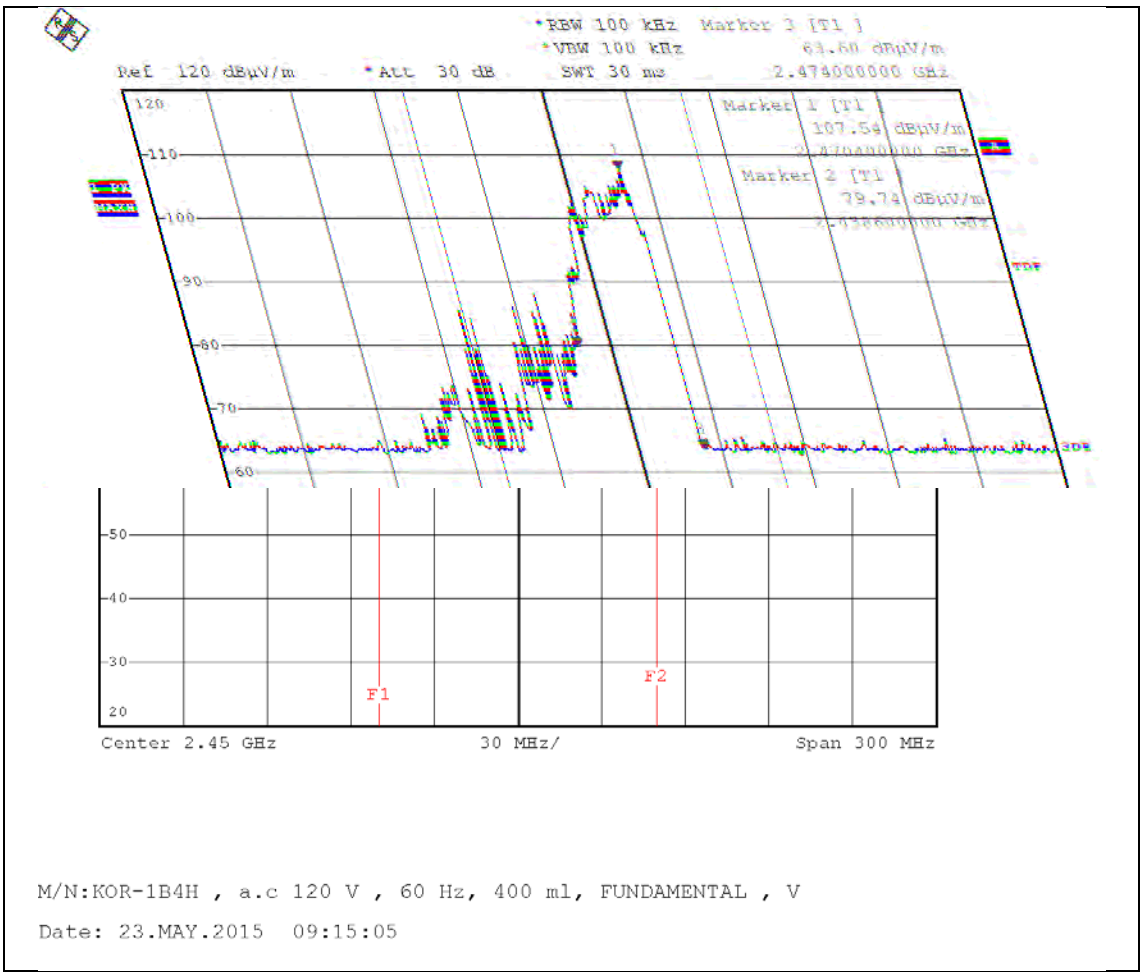
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 400 ㎖)

PLOTS OF EMISSIONS

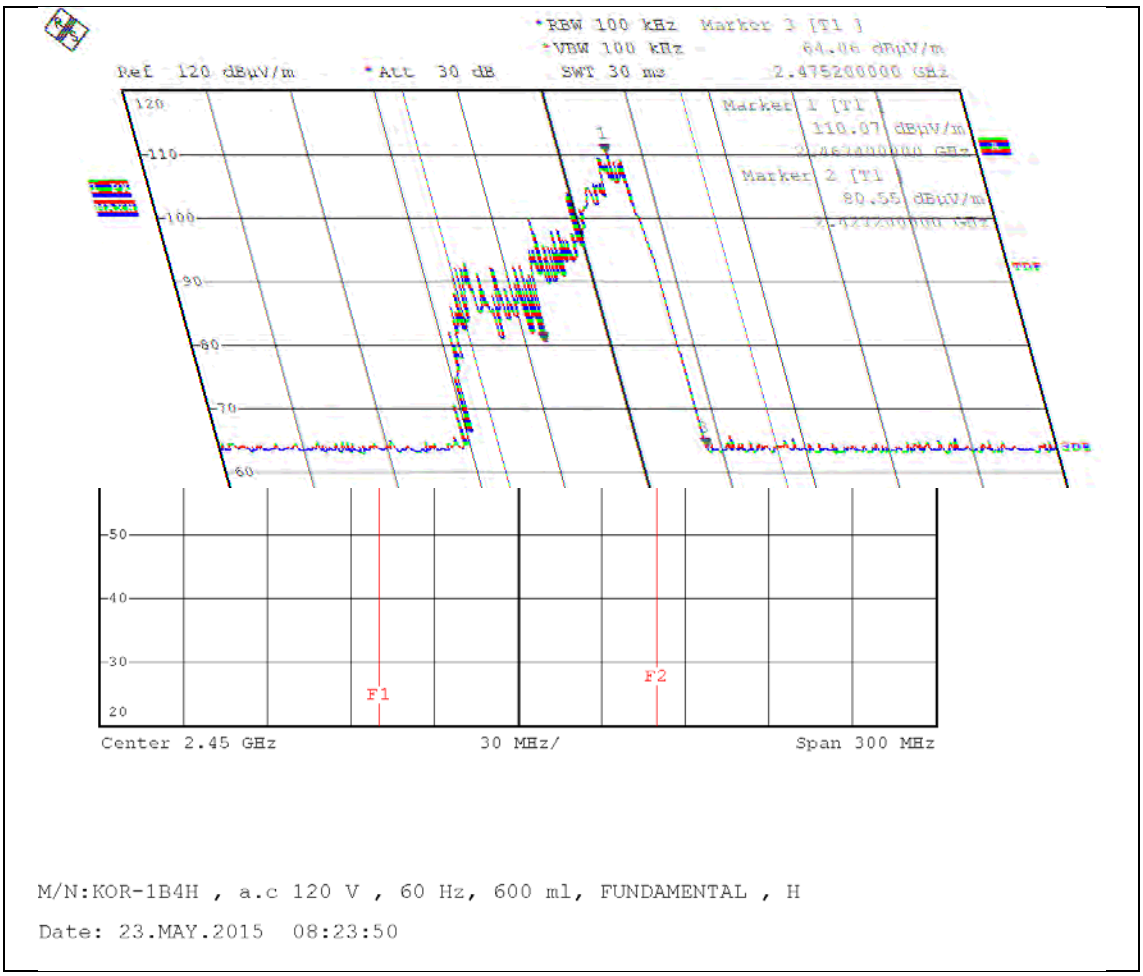
- ***Frequency vs Load Variation Test***



Vertical (120 V, 400 ㎖)

PLOTS OF EMISSIONS

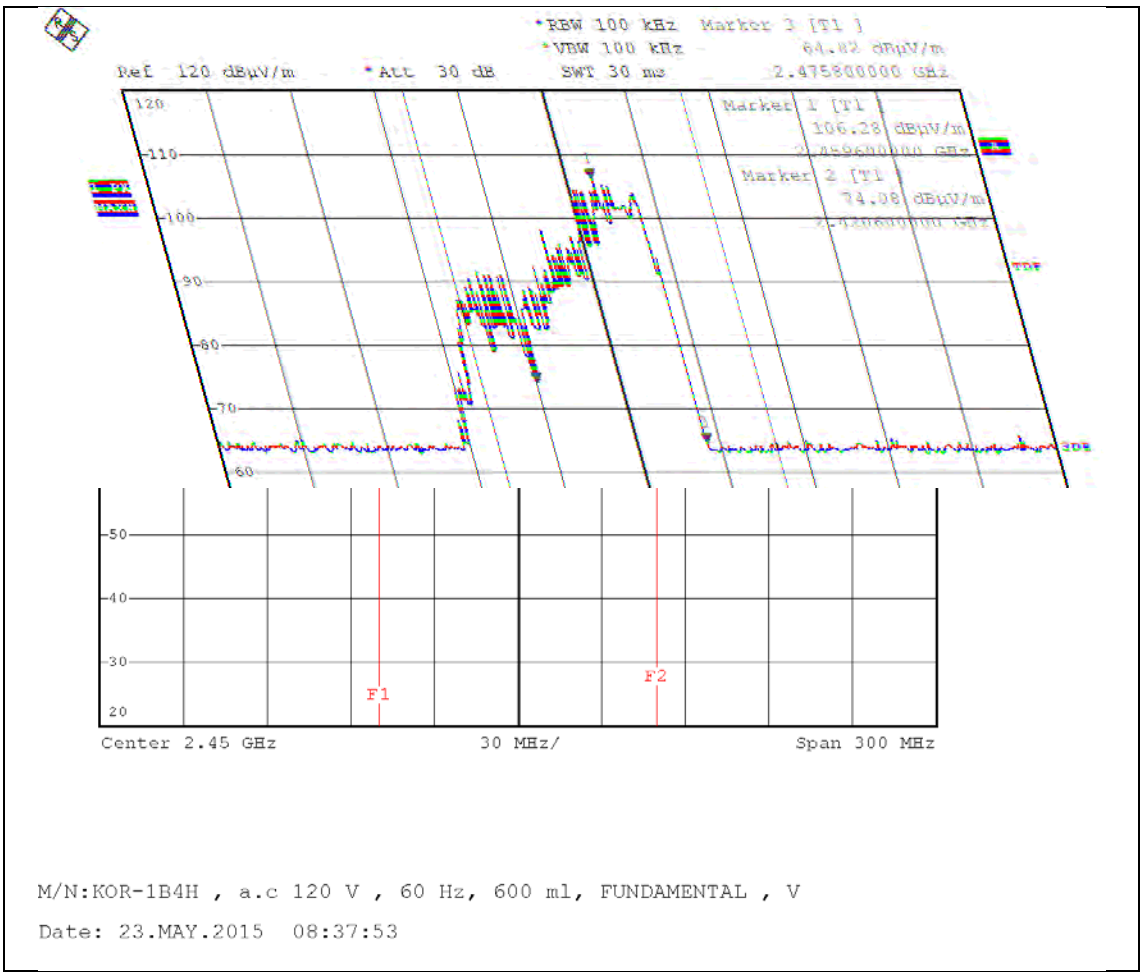
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 600 ㎖)

PLOTS OF EMISSIONS

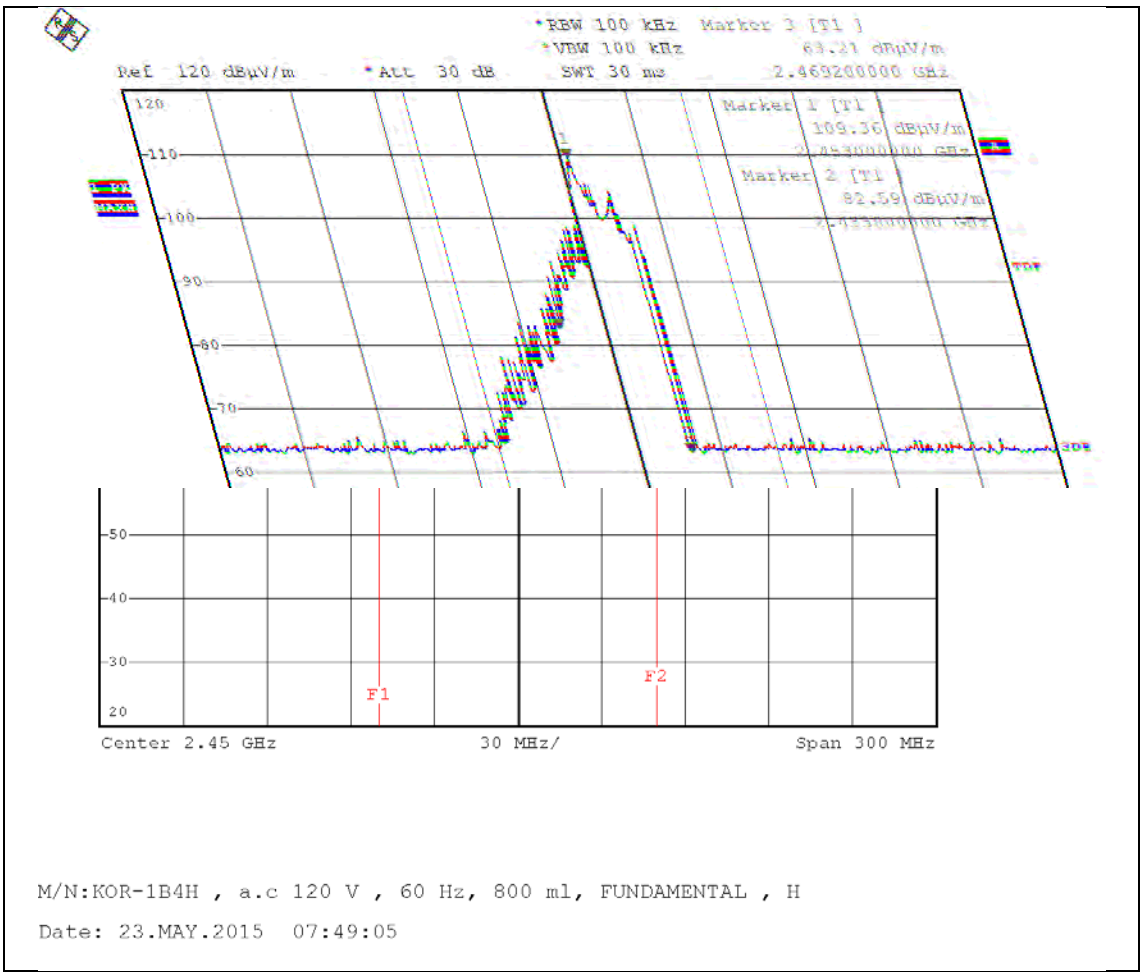
- ***Frequency vs Load Variation Test***



Vertical (120 V, 600 mℓ)

PLOTS OF EMISSIONS

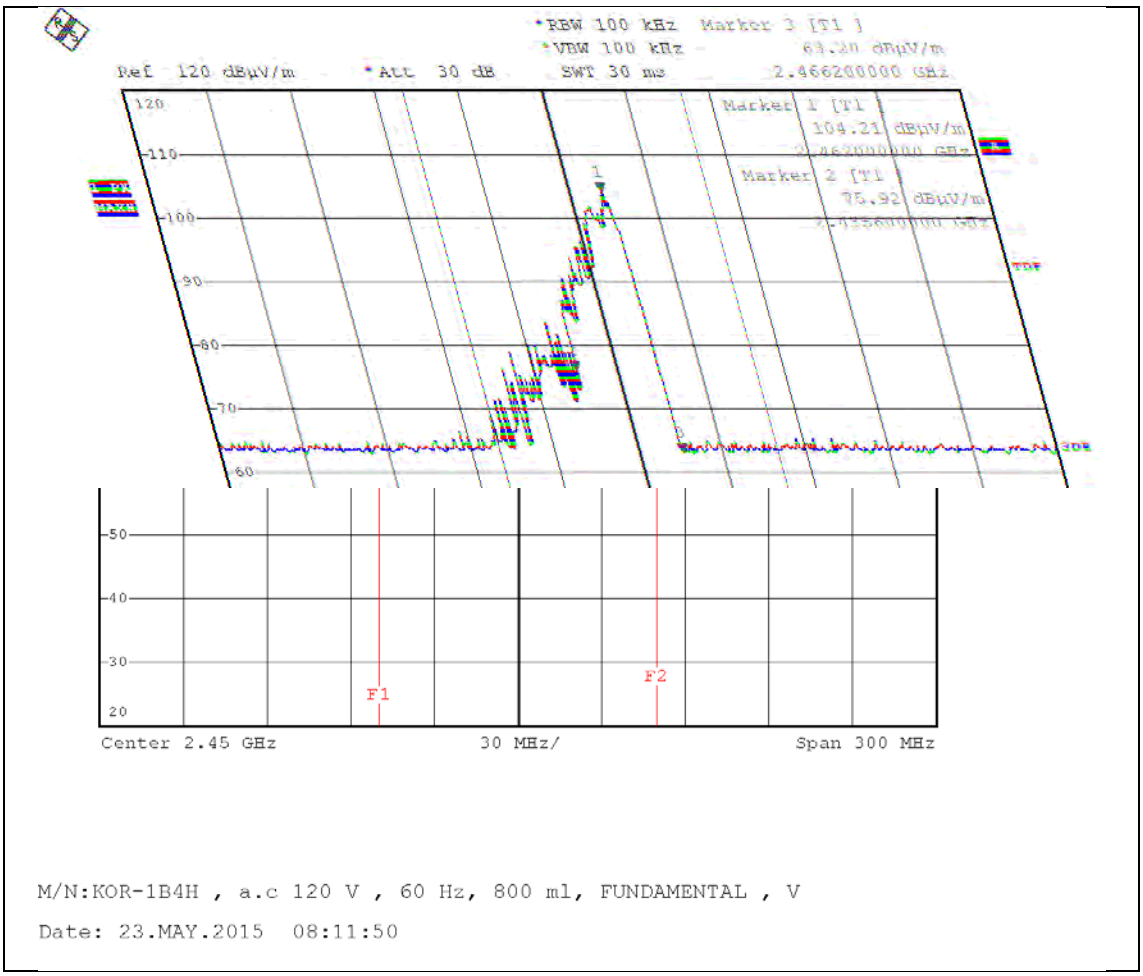
- ***Frequency vs Load Variation Test***



Horizontal (120 V, 800 ㎖)

PLOTS OF EMISSIONS

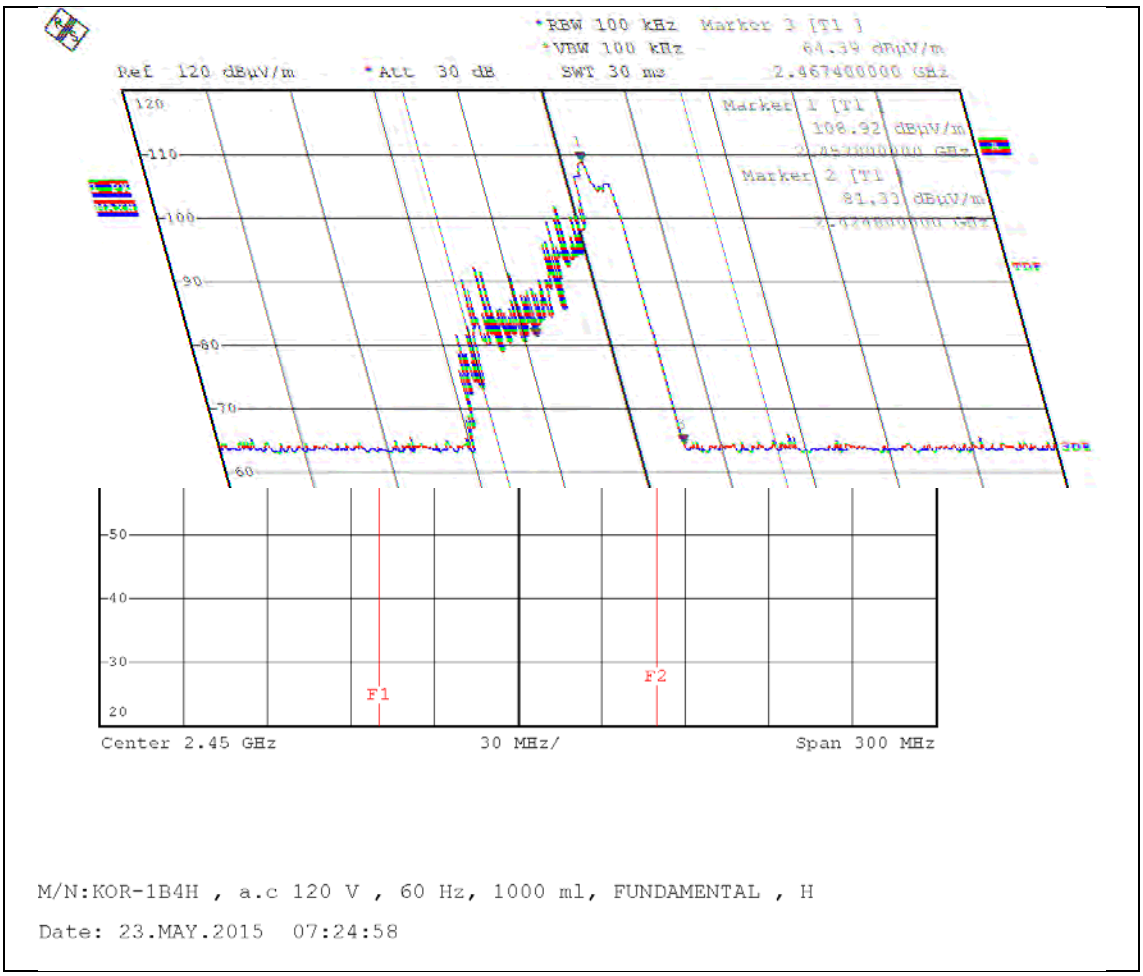
- ***Frequency vs Load Variation Test***



Vertical (120 V, 800 mℓ)

PLOTS OF EMISSIONS

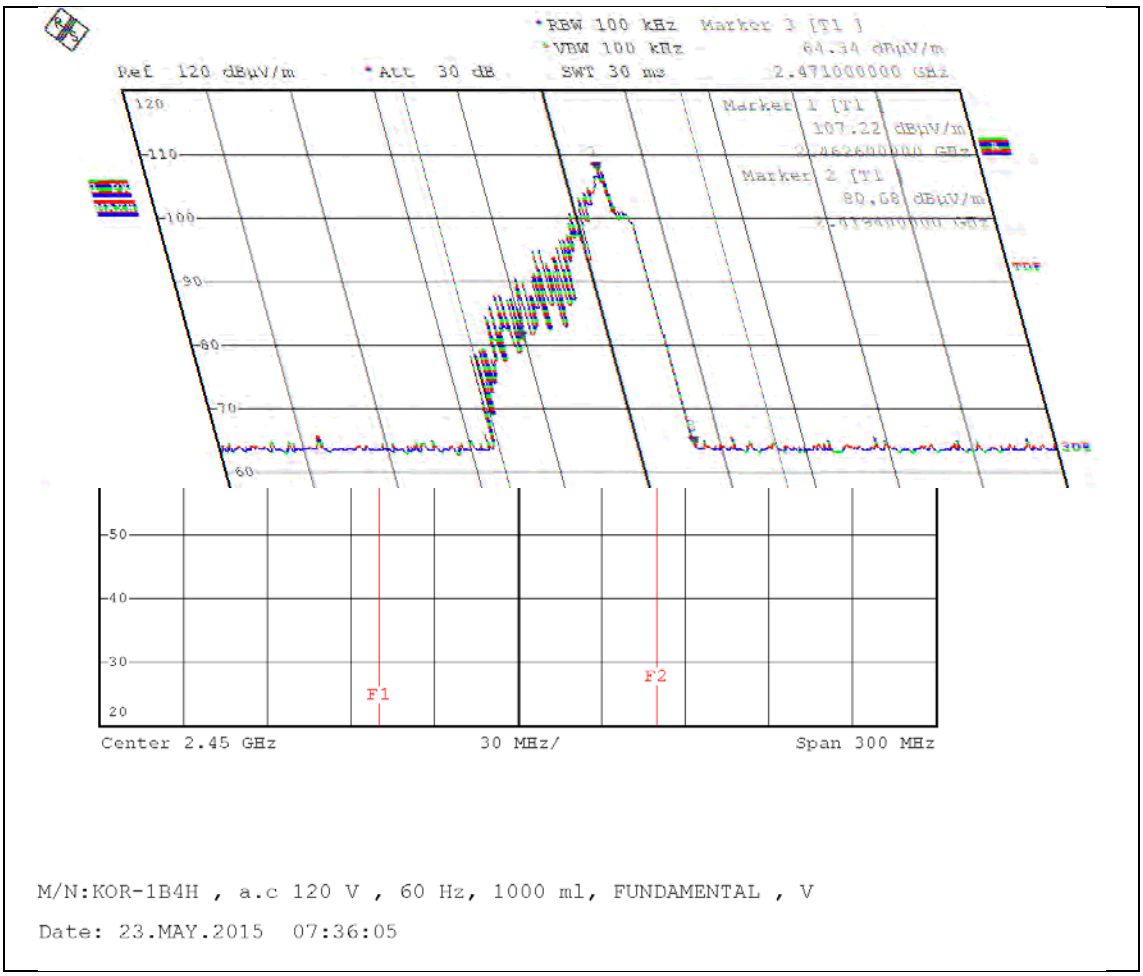
- ***Frequency vs Load Variation Test***



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	0.07	normal 1	1.00	0.07	1	0.07
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*	+ 0.80 − 0.89	U-Shaped	$\sqrt{3}$	0.60	1	0.60
Remark	Using 50 Ω / 50 uH AMN						
Combined Standard Uncertainty	Normal			*uc* = 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	0.64	normal 1	1.00	0.64	1	0.64
Receiver Reading	Ri	± 0.02	normal 2	2	0.01	1	0.01
Attenuation (antenna-receiver)	ac	± 0.40	normal 2	2	0.20	1	0.20
Preamplifier gain	Gp	± 0.11	normal 2	2	0.06	1	0.06
Receiver Sine Wave	dVsw	± 0.12	normal 2	2	0.06	1	0.06
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	± 1.50	normal 2	2	0.75	1	0.75
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* = 3.24 dB			
Expended Uncertainty U	Normal (*k* = 2)			*U* = 6.5 dB (CL is 95 %)			

LIST OF TEST EQUIPMENT

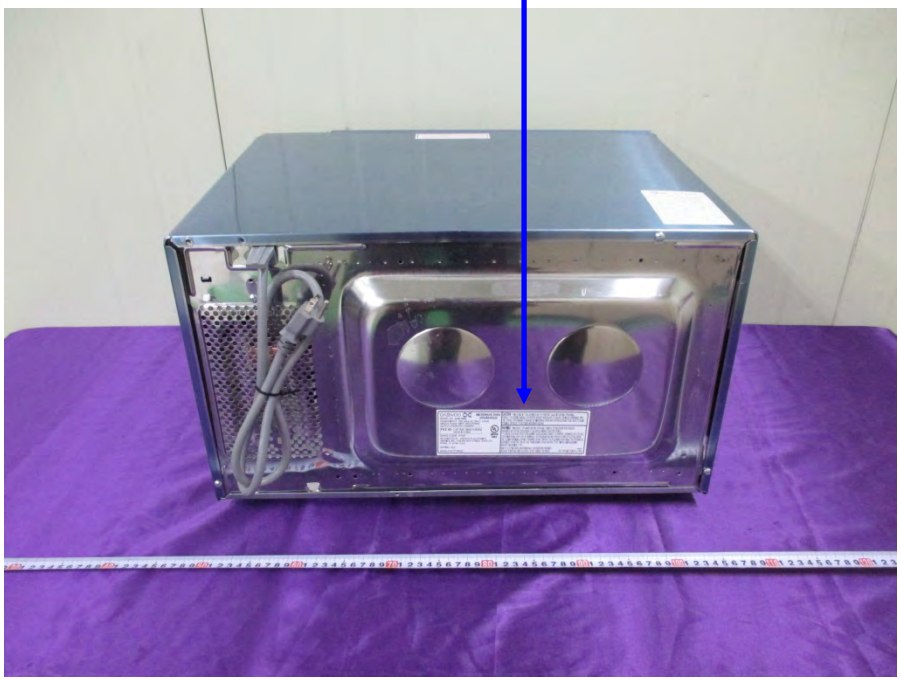
No.	Instrument	Manufacturer	Model	Serial No.	Due to Calibration	Calibration Interval
1	Microwave survey meter	ETS Lindgren	1501	00033549	Feb.15 2017	2 year
2	LOOP ANTENNA	R&S	HFH2-Z2	N/A	Feb. 13 2016	2 years
3	EMI Test Receiver	R&S	ESCI	101041	Apr. 01 2016	1 year
4	Software	R&S	EMC32	Version 8.53.0	-	-
5	Artificial Mains Network	R&S	ESH2-Z5	100273	Apr. 01 2016	1 year
6	ATTENUATOR	FAIRVIEW	SA3N5W-10	N/A	Apr. 01 2016	1 year
7	EMI Test Receiver	R&S	ESU 40	100202	Apr. 01 2016	1 year
8	Software	R&S	EMC32	Version 8.53.0	-	-
9	TRILOG Broadband Test Antenna	SCHWARZBECK	VULB 9163	9163-454	Feb. 11 2016	2 year
10	ATTENUATOR	FAIRVIEW	SA3N5W-06	N/A	Apr. 01 2016	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. 01 2016	1 year
16	SPECTRUM ANALYZER	Rohde & Schwarz	FSP40	100361	Jul. 16 2016	1 year
17	Signal Conditioning Unit	Rohde & Schwarz	SCU 18	10065	Apr. 01 2016	1 year
18	Double Ridged Broadband Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-474	Sep. 01 2016	2 year
19	Open Switch And Control Unit	R&S	OSP-120	100081	N/A	N/A
20	Turn Table	innco systems GmbH	DS 1200 S	N/A	N/A	N/A
21	Antenna Mast	R&S	MA 4000	N/A	N/A	N/A
22	DOUBLE RIDGED HORN ANTENNA	SCHWARZBECK	HF907	100197	Jun. 11 2017	2 year

APPENDIX A – SAMPLE LABEL

Labeling Requirements

The sample label shown shall be *permanently affixed* at a conspicuous location on the device and be readily visible to the user at the time of purchase.

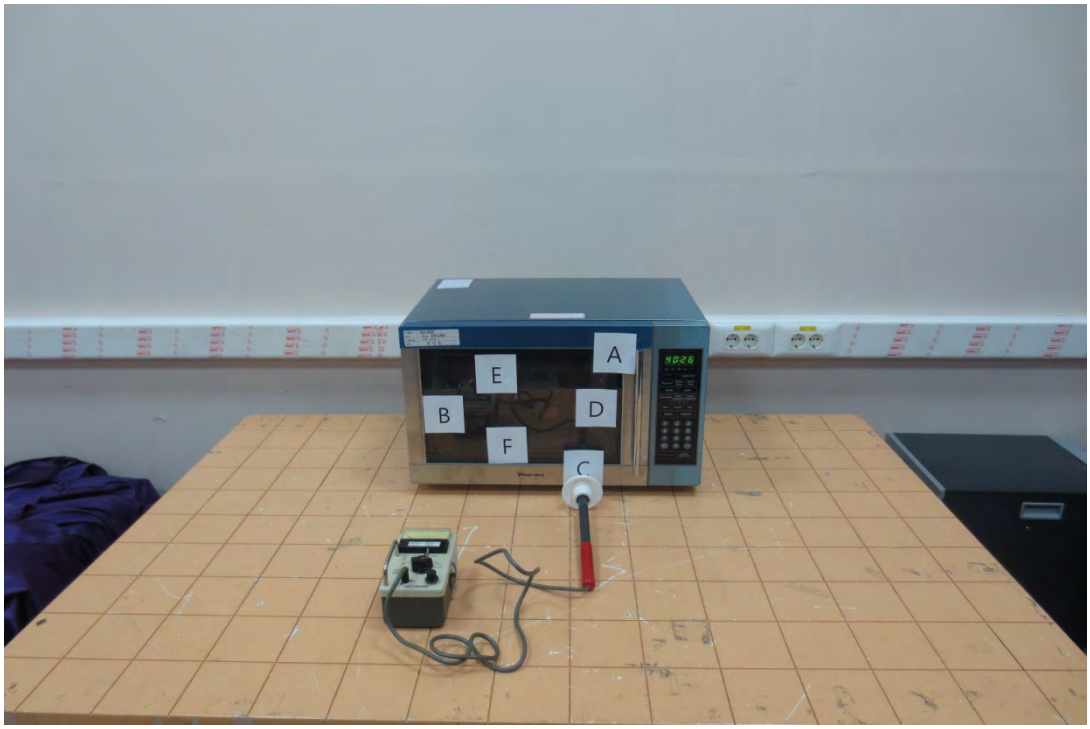
- **FCC ID Location of EUT**



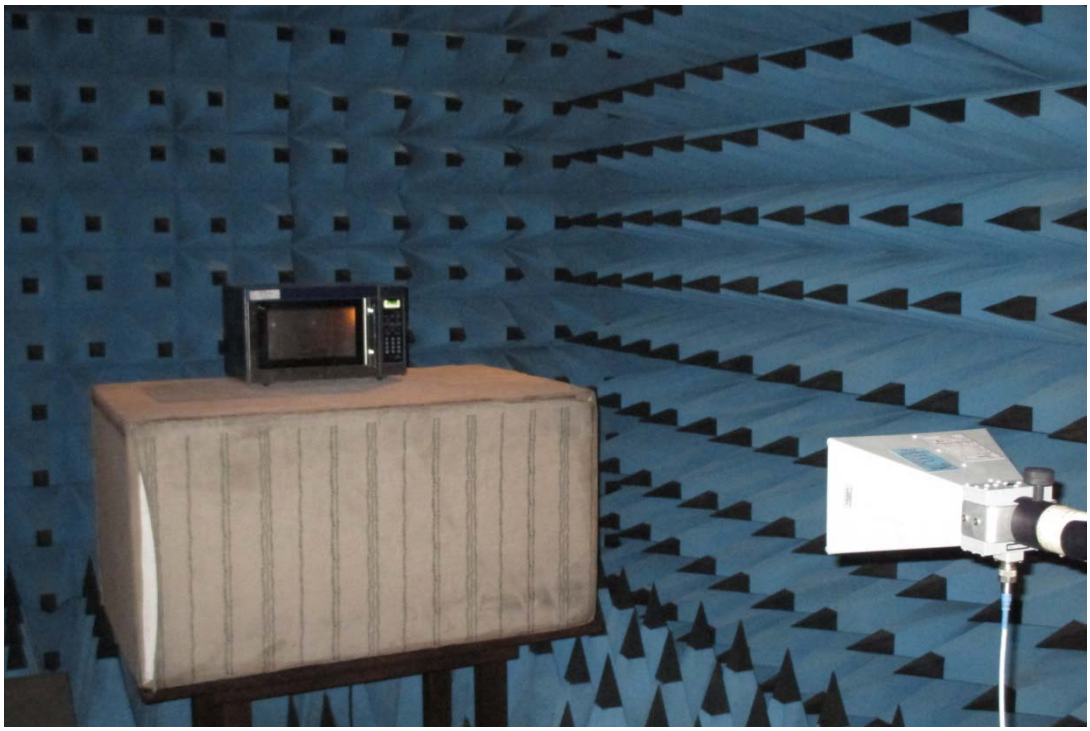
APPENDIX B – PHOTOGRAPHS OF TEST SET-UP

The **Conducted Test Picture** and **Radiated Test Picture** and show the worst-case configuration and cable placement.

- **Radiation hazard Test Picture**



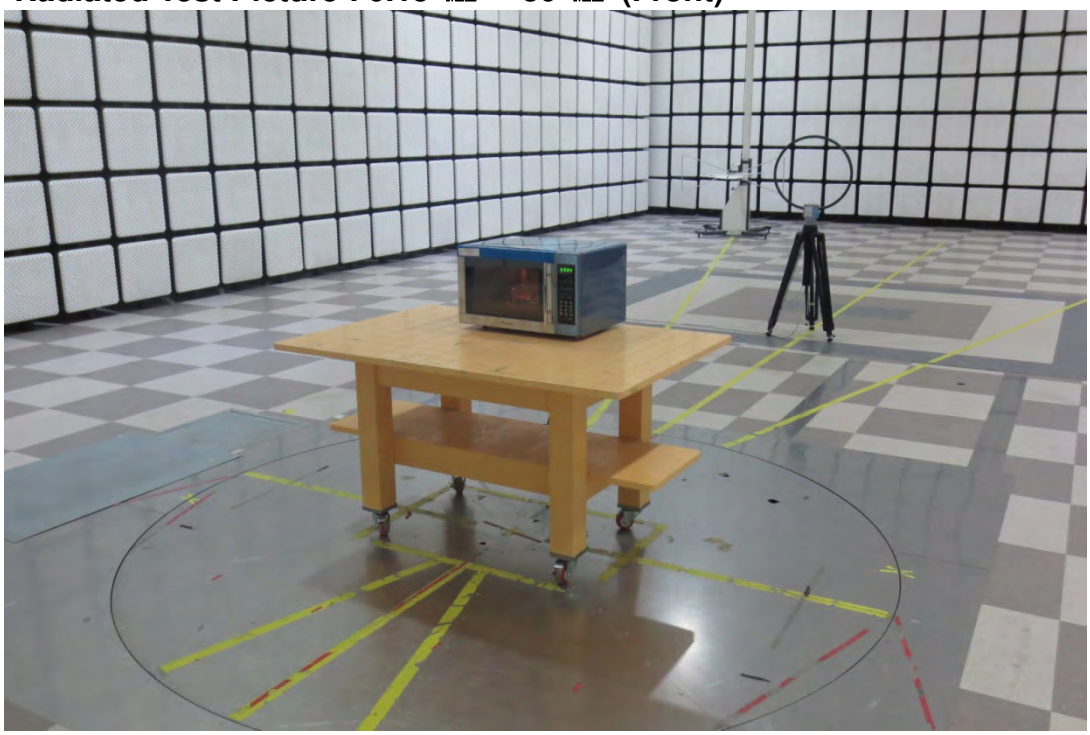
- **Radiation hazard Test Picture**



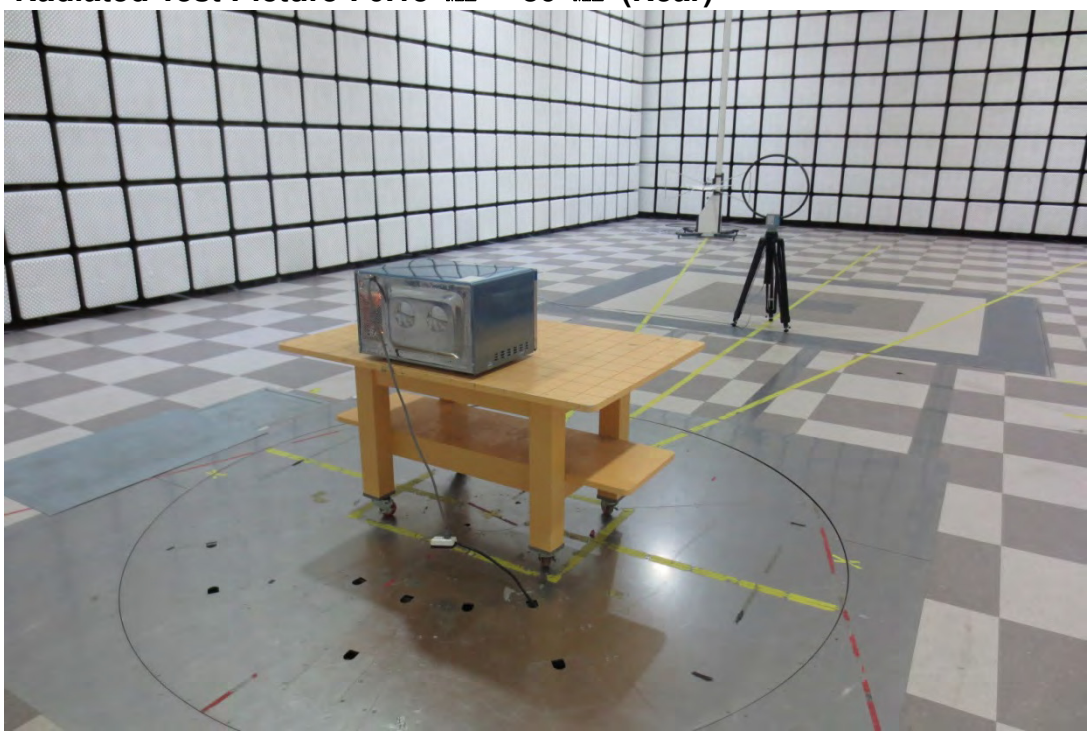
- **Conducted Test Picture (Front)**

- **Conducted Test Picture (Side)**

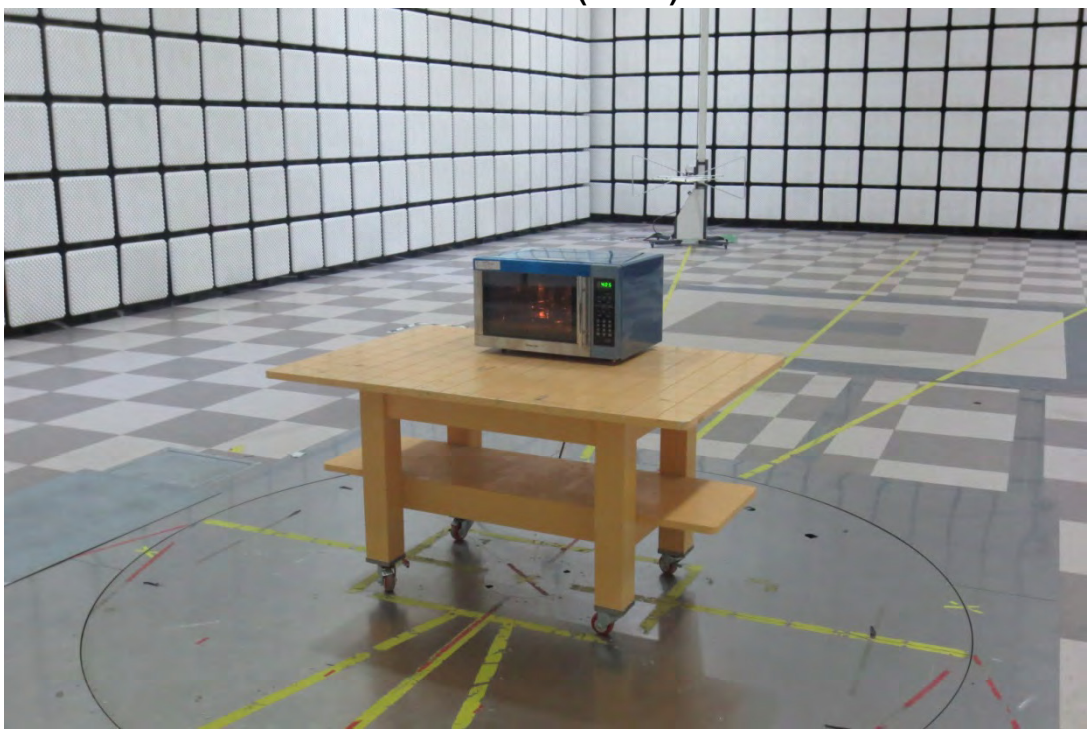
● **Radiated Test Picture : 0.15 ㎒ ~ 30 ㎒ (Front)**



● **Radiated Test Picture : 0.15 ㎒ ~ 30 ㎒ (Rear)**

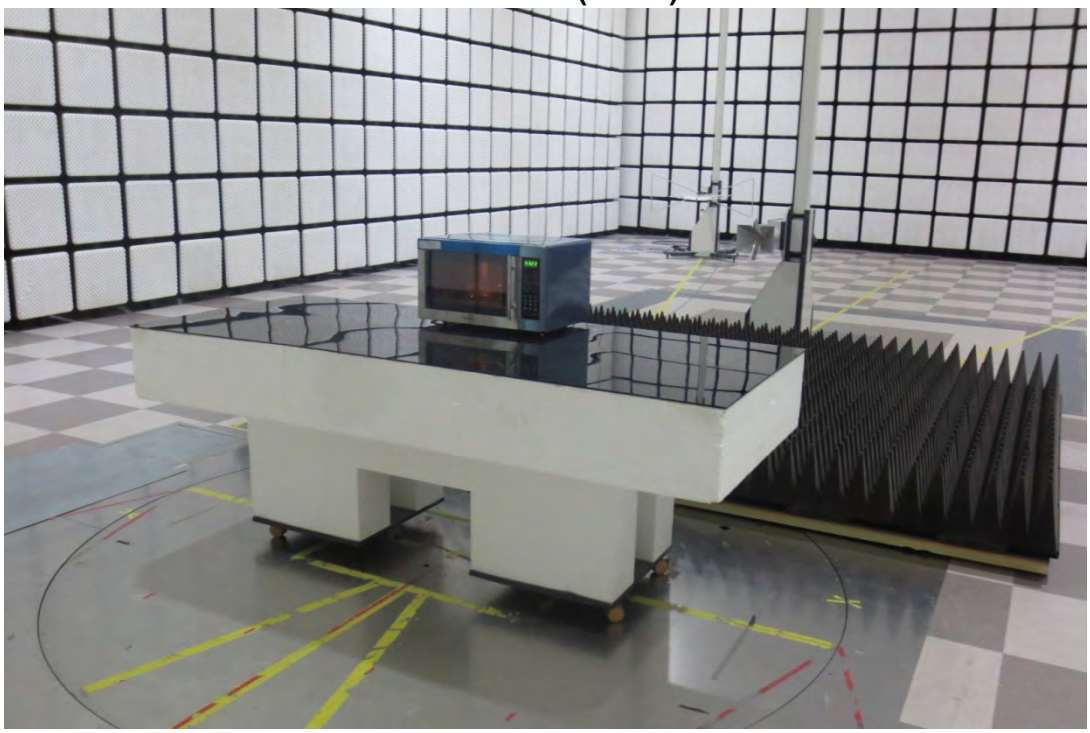


● **Radiated Test Picture : 30 ㎒ ~ 1 ㎓ (Front)**

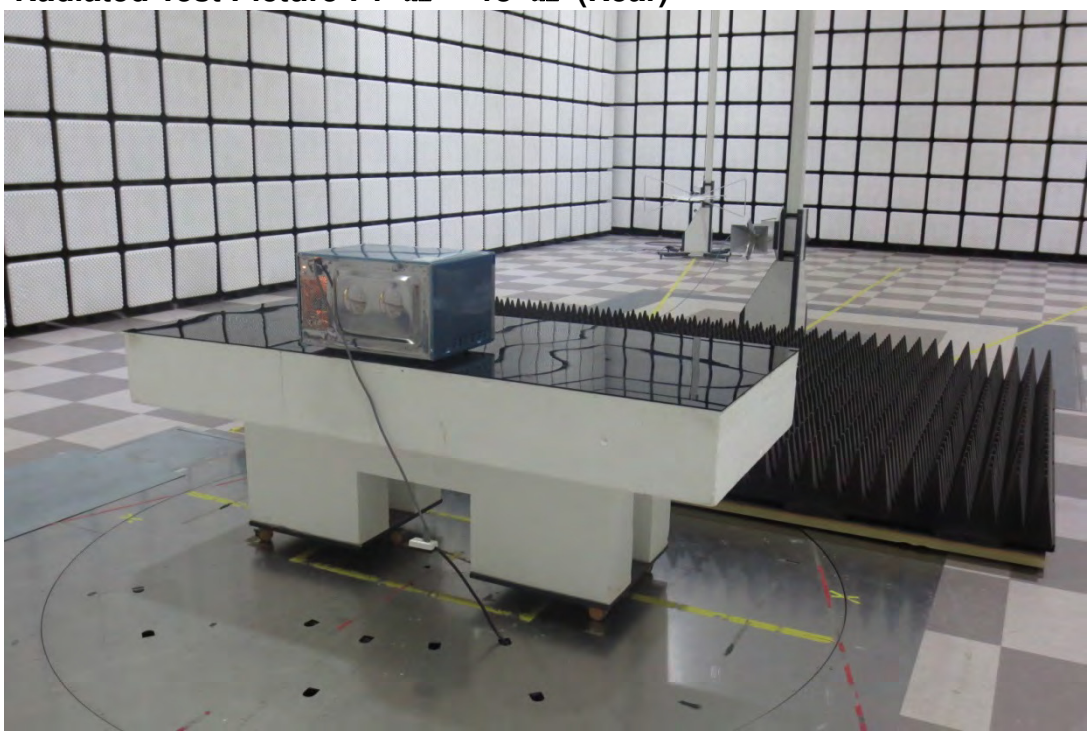


● **Radiated Test Picture : 30 ㎒ ~ 1 ㎓ (Rear)**

● **Radiated Test Picture : 1 ㎓ ~ 18 ㎓ (Front)**



● **Radiated Test Picture : 1 ㎓ ~ 18 ㎓ (Rear)**



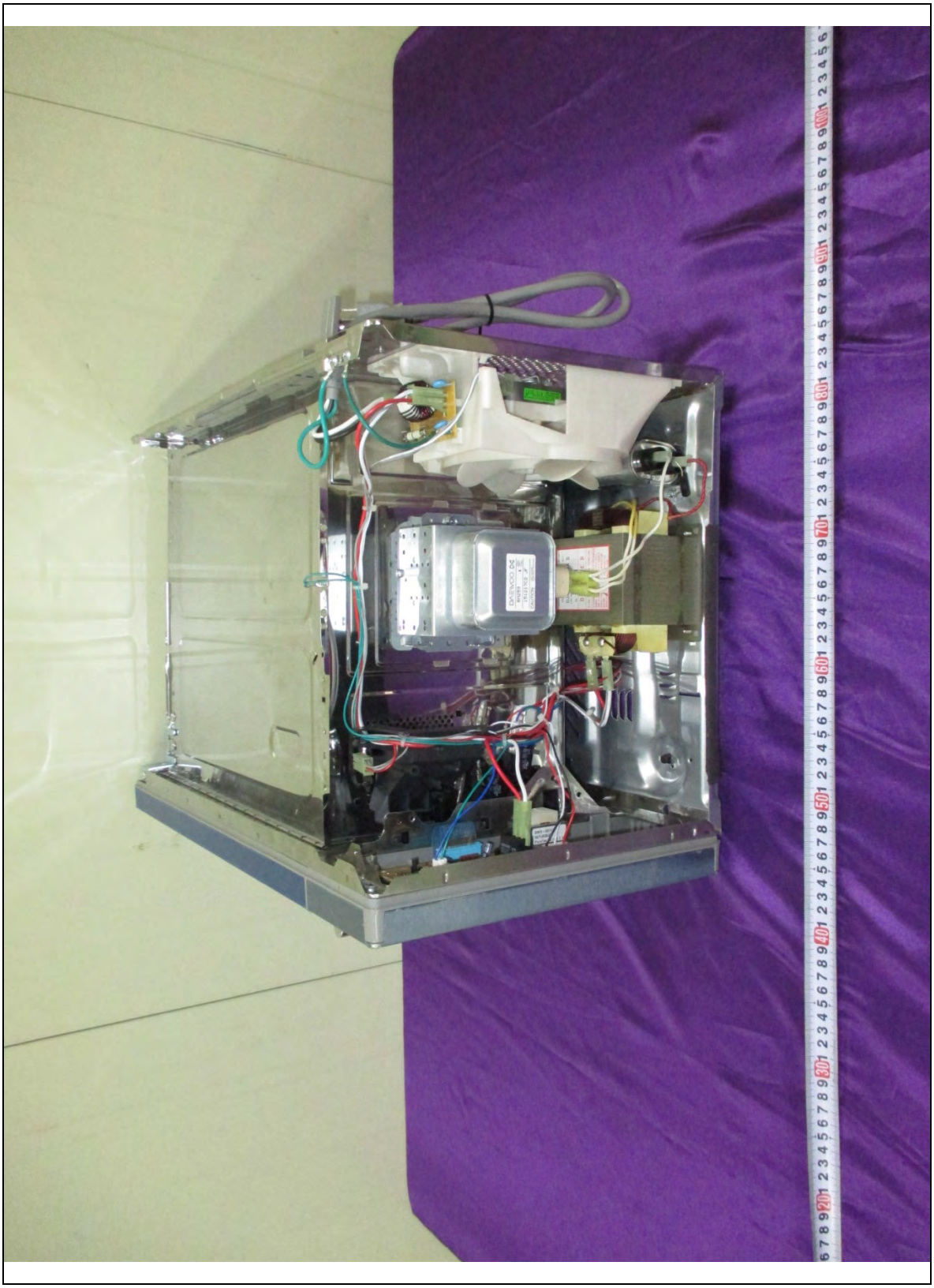
APPENDIX C – EUT PHOTOGRAPHS

- **Front View of EUT**

- **Rear View of EUT**

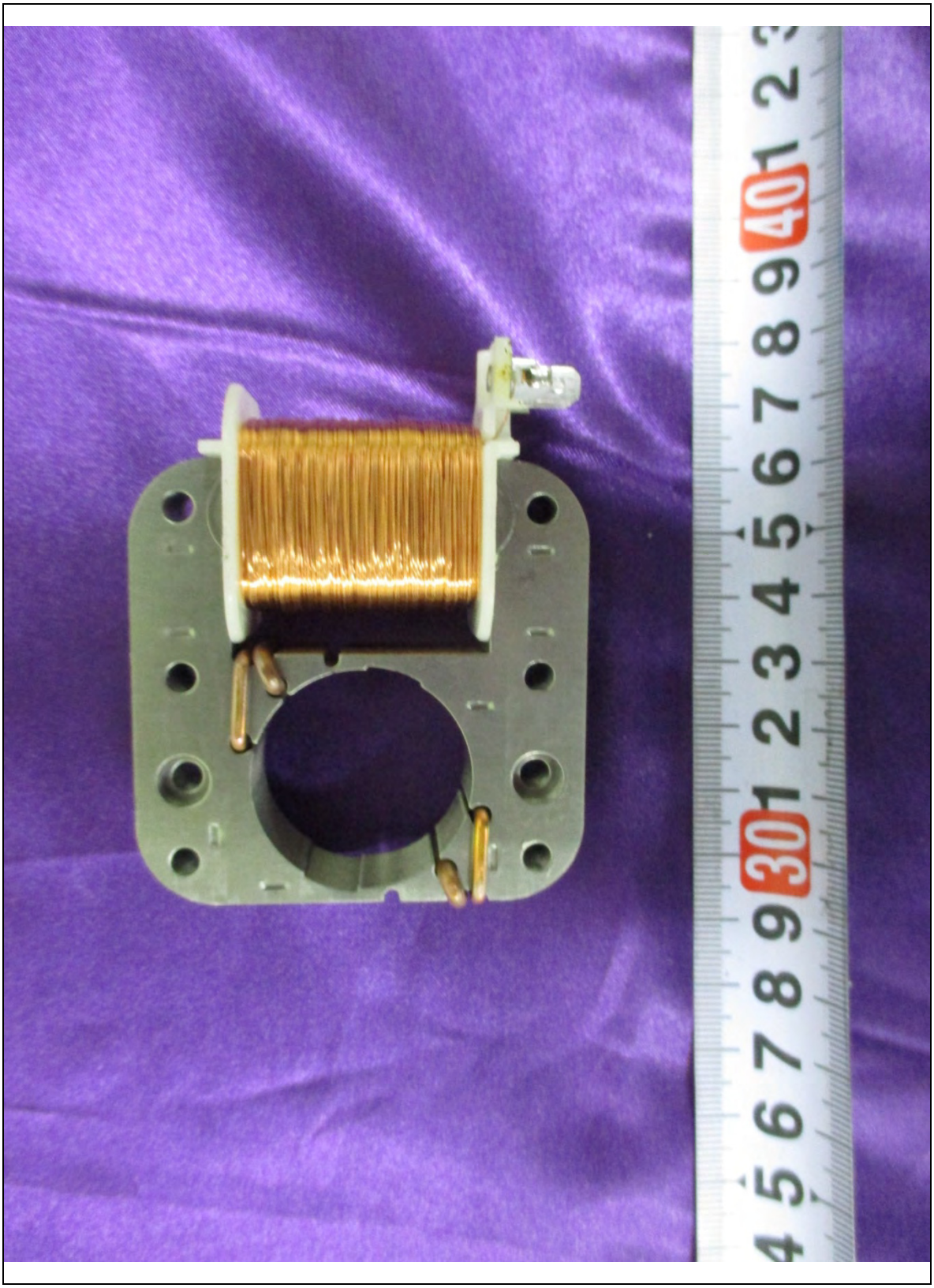
- **Door open View of EUT**

- **Inside View of EUT**

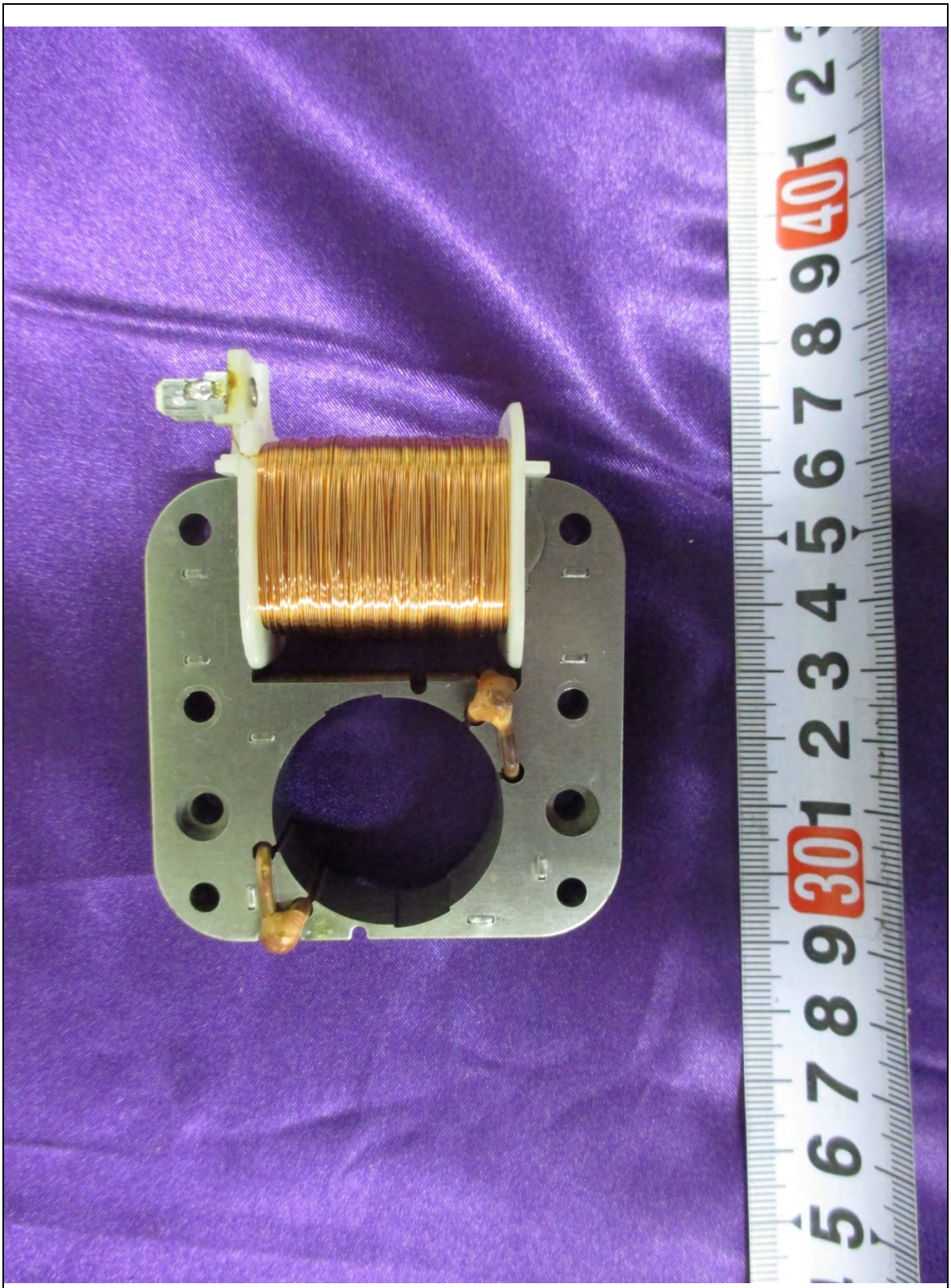


- **Front View of Diode H.V.**

- **Front View of Fan Motor**



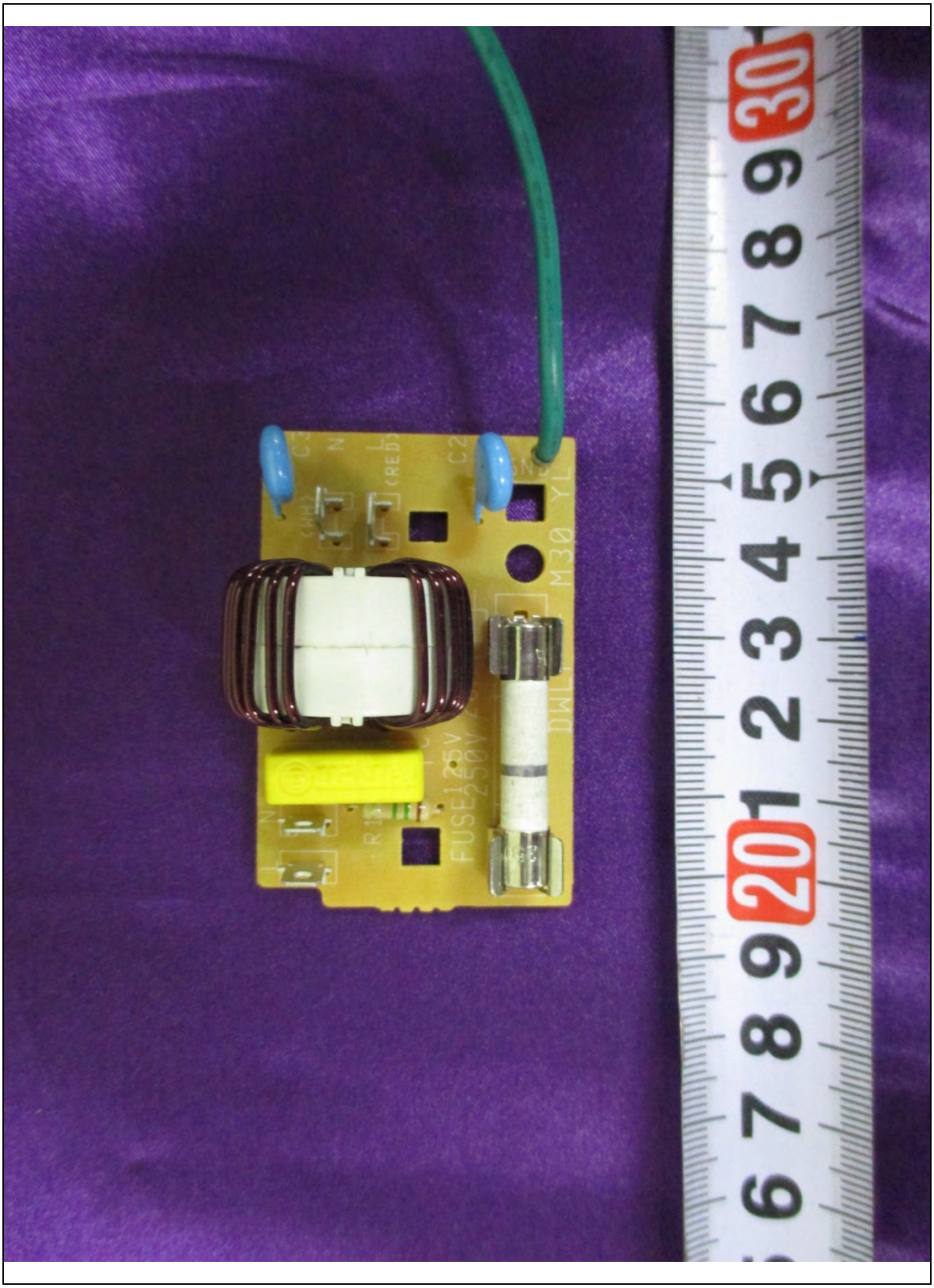
- **Rear View of Fan Motor**



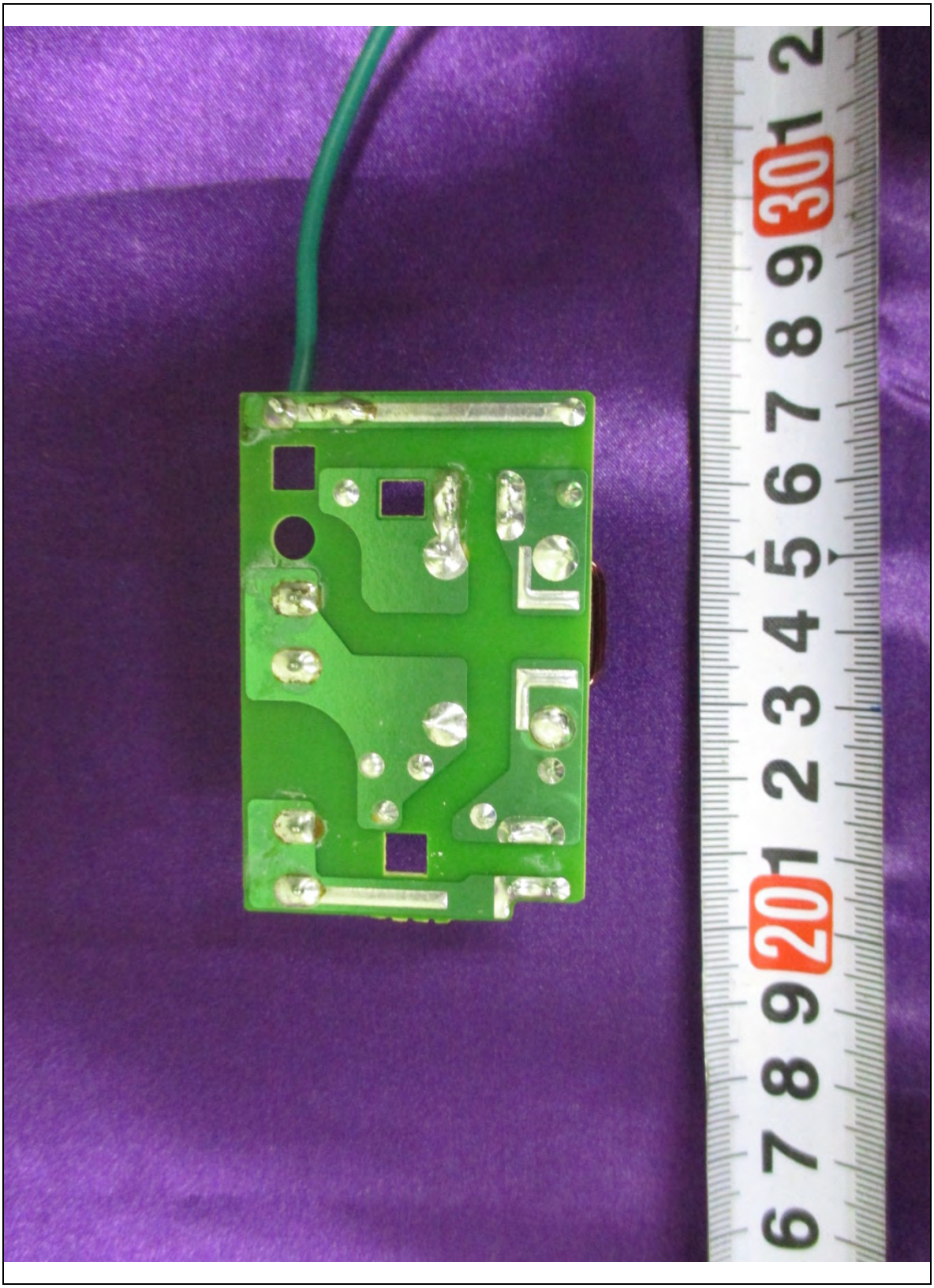
- **Front View of H.V. CAPACITOR**

- **Rear View of H.V. CAPACITOR**

- **Front View of Noise Filter**

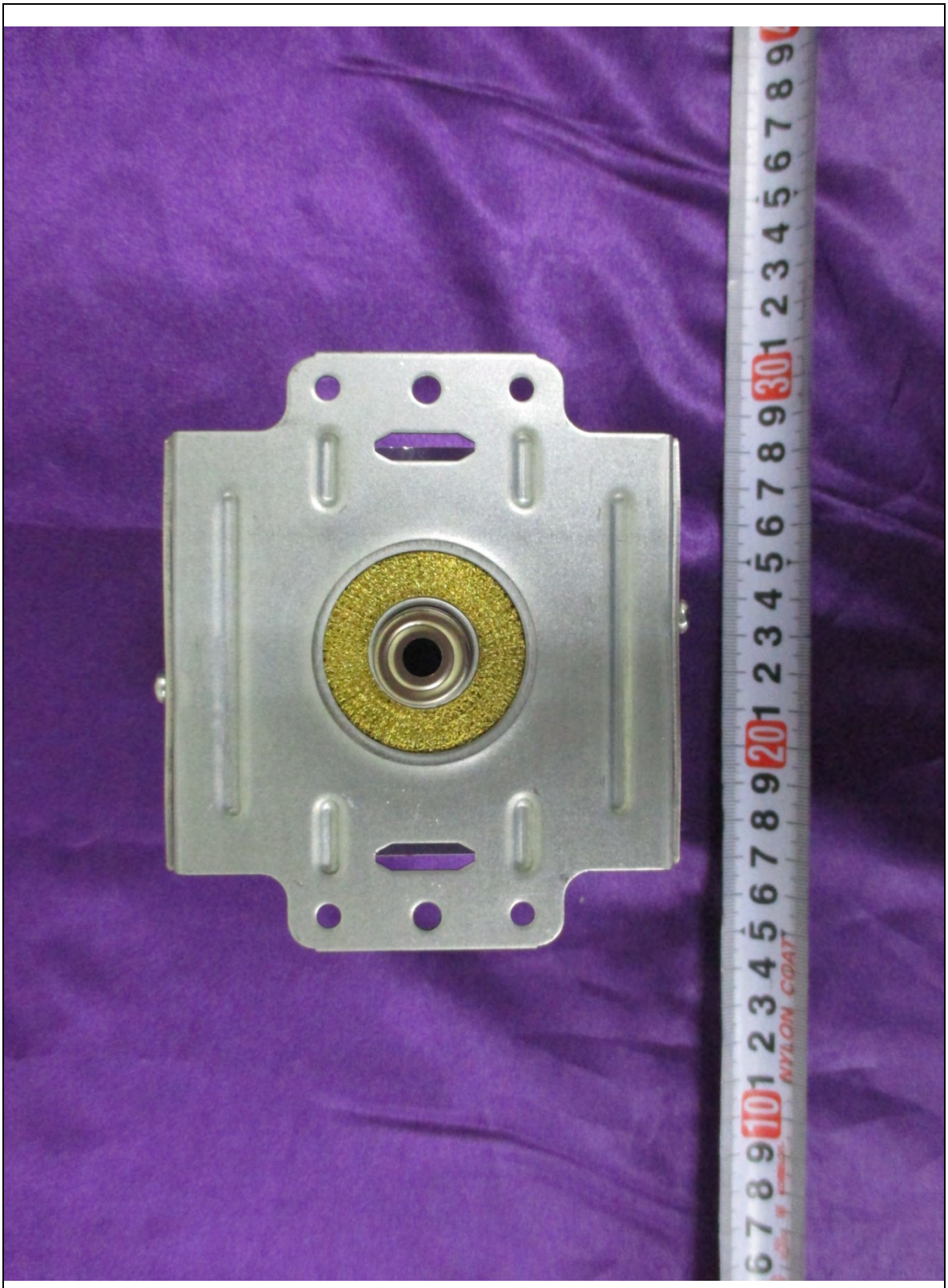


- **Rear View of Noise Filter**



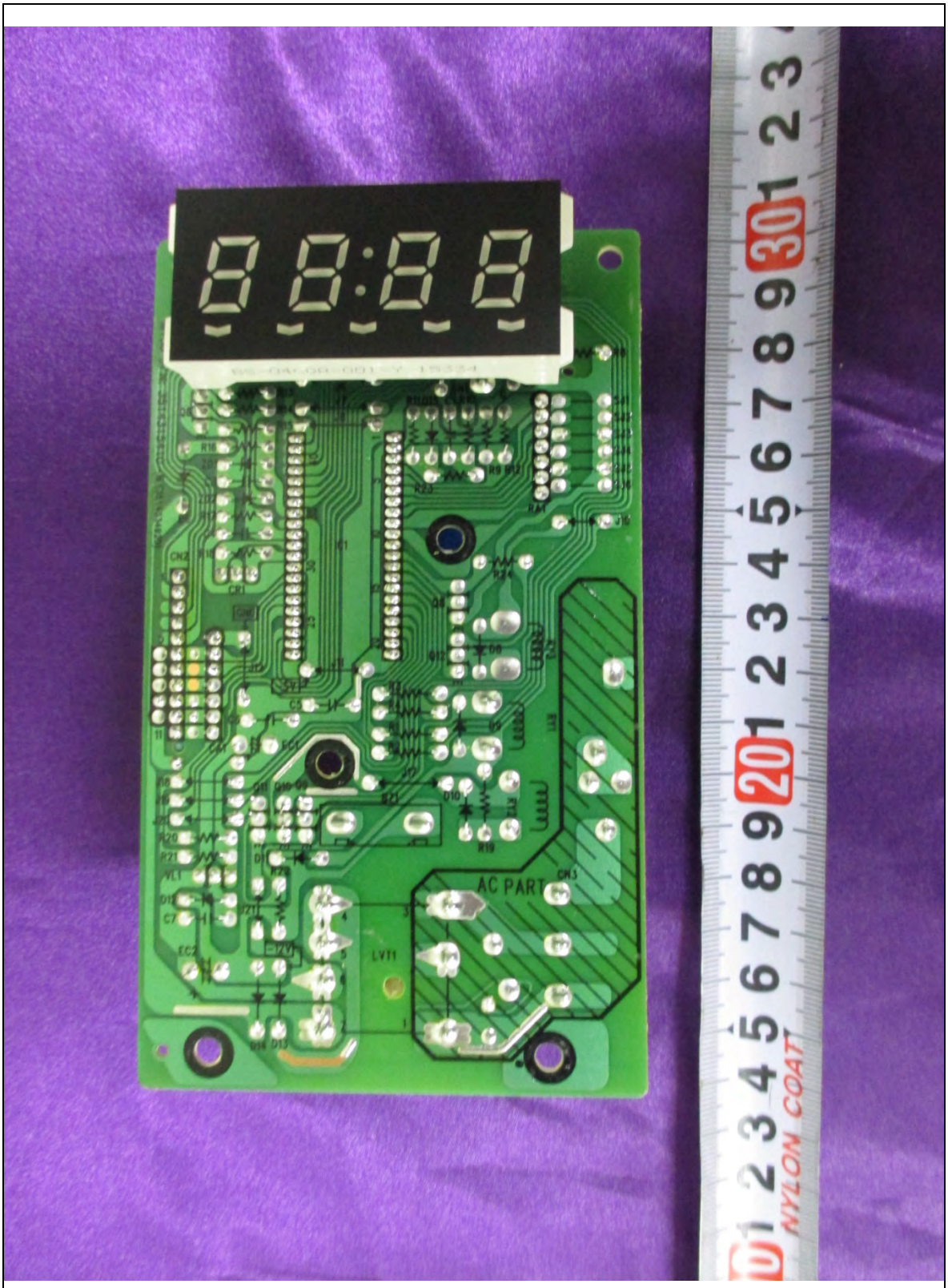
- **Front View of Magnetron**

- **Rear View of Magnetron**



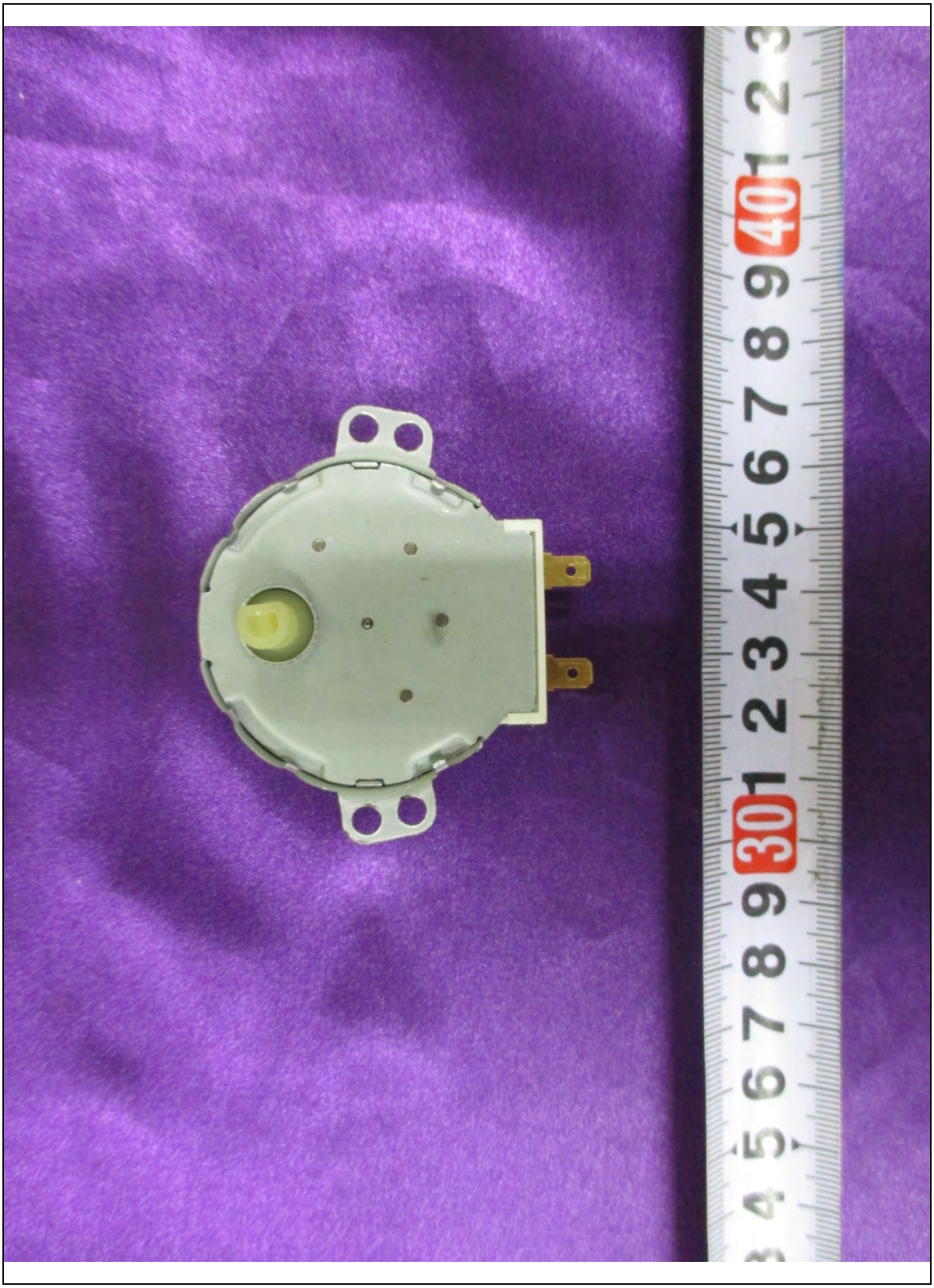
- **Front View of Main Board**

- **Rear View of Main Board**

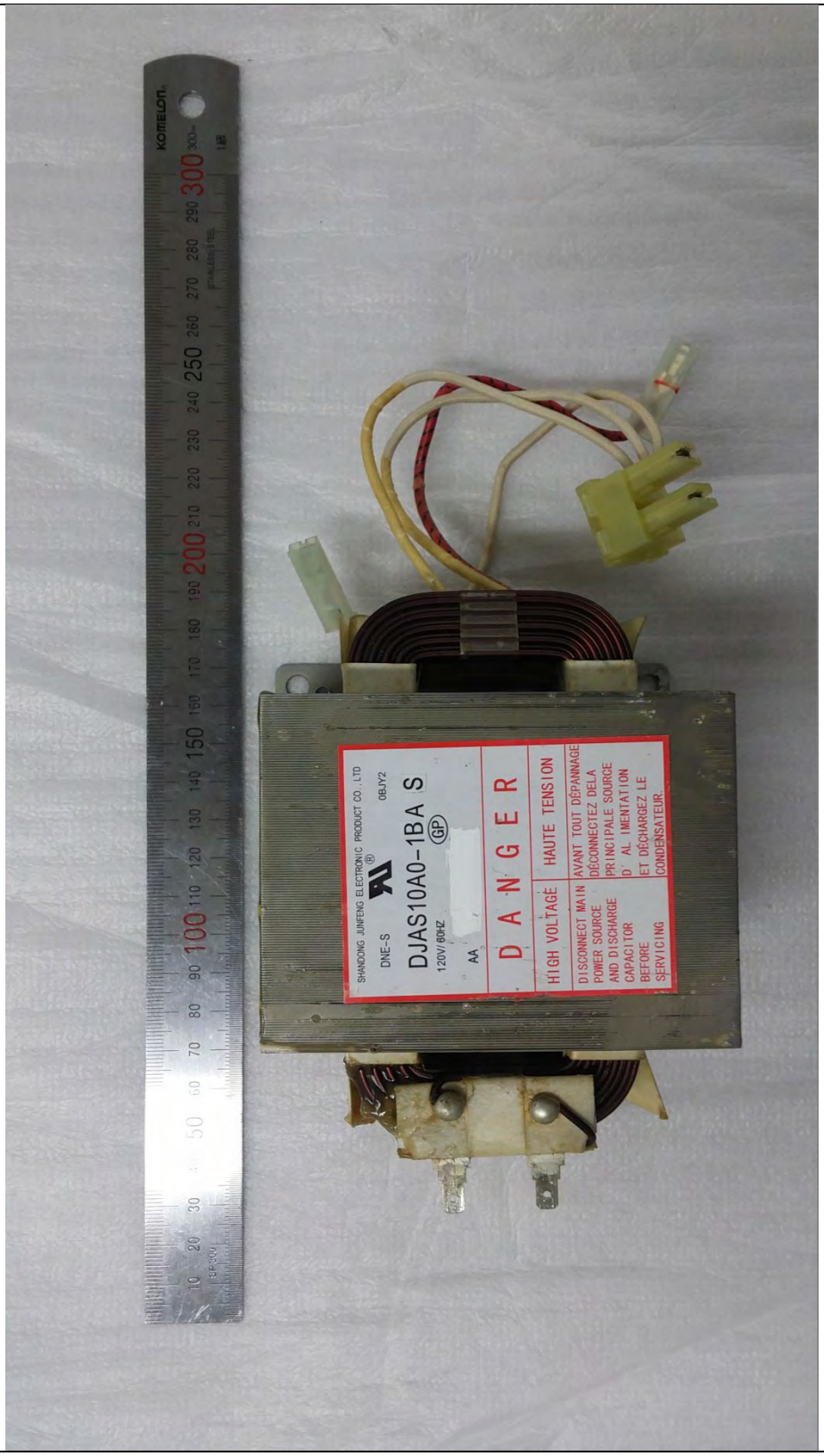


- **Front View of SYNCHRONOUS MOTOR**

- **Rear View of SYNCHRONOUS MOTOR**



- **Front View of Trans H.V.**



APPENDIX D – SCHEMATIC DIAGRAM

APPENDIX E – USER'S MANUAL

APPENDIX F – BLOCK DIAGRAM