EMC TEST REPORT

According to FCC CFR47 Part 18 Subpart C

JOB Number : LBE061287

1. *This test report does not constitute an endorsement by NIST/NVLAP or U.S Government.*
2. *This test report is to certify that the tested device properly complies with the requirements of FCC Rules and Regulations Part 18 CFR47 Subpart C Intentional Radiators. All tests necessary to show compliance to the requirements were and these results met the specifications requirement.*

This laboratory is registered by the NIST/NVLAP, U.S.A. The test reported herein have been performed in accordance with its terms of registration.

NVLAP LAB CODE 200623-0

1. Applicant Name : SAMSUNG ELECTRONICS CO., LTD.
416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si,
Gyeonggi-Do, Korea, 443-742

2. Identification of tested device

2.1 FCC ID : A3LMMV20PGC
2.2 Device Name : MICROWAVE OVEN
2.3 Trade Name : Maytag, Jenn-Air
2.4 Model Number : MMV5207BCQ
Variant Model : MMV5207BCB/MMV5207BCS/JMV8208BCB/JMV8208BCW/JMV8208BCS
2.5 RF Output Power : **1 000** W (by IEC 705 method)

3. Test Procedure and Items

3.1 FCC/OST MP-5 : 1986

4. Issued Date : May 30, 2006

Tested by:

Sung Jin, SIM / Test Engineer

Authorised by:

No Cheon, PARK / Chief of EMC Lab.

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1. Product Description

The equipment under test is a microwave oven sold for commercial use.
Model : MMV5207BCQ is a 1 000 W microwave oven with digital controls.
Installation Type: UTC
Clock Frequency : 8 MHz

< Magnetron >
Model : OM-75P manufactured by Samsung Electronic Co., Ltd.

< Electrical Ratings >

1) Power Supply : 120 V ac, 60 Hz
2) Operating Frequency : 2 450 +/- 50 MHz
3) Power Input : 13 A
4) RF Power Output : 1 000 W (by IEC 705 method)

2. Test Facility

The Semi-anechoic chamber and Conducted measurement facilities used to collect the radiated data are located at 416, Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, Korea.
The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

3. Accreditation and Listing

The test facilities used to perform radiated and conducted emissions tests are accrediated by National Voluntary Laboratory Accreditation Program for the specific of accreditation under Lab Code: 200623-0 to perform Electromagnetic Interference tests according to FCC PART 15 and CISPR 22 requirements.
No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

4. Radio Noise Emission Measurement Procedures/Results

4.1 Radiation Hazard Measurement

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

Fig. 1 Test Setup for Radiation Hazard Measuerment

The results of this test are as follows.

Probe Location	Maximum Leakage [mW/Cm2]	Limit [mW/Cm2]
1	0.18	1.0
2	0.17	1.0
9	0.14	1.0
All others	0.10	1.0

4.2 Input Power Measurement

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

Fig. 2 Test Setup for Input power

The results of this test are as follows.

Input Voltage [Vac]	Input Current [amps]	Measured Input power [watts]	EUT Spec. Input current [amps]
120	**13.12**	**1 549**	**13**

Based on the measured input power, the EUT was found to be operating within the intended specifications.

4.3 RF Output Power Measurement

The Caloric Method was used to determine maximum output power.
The initial temperature of a 1 000 ml water load was measured. The water load was placed in the center of the oven. The oven was operated at maximum output power. Then the temperature of the water was 20 ℃, the test was finished.

Fig.3 Test Setup for RF output power

Quantity of water [ml]	Starting Temperature [centigrade]	Final Temperature [centigrade]	Heating Time [seconds]	RF Power [watts]
1 000	10	20.0	42	963.3
1 000	10	19.9	42	957.7
1 000	10	20.0	42	964.8
Average RF Power of 3 Trials				961.9

$$\text{Power [W]} = \frac{(4.187) * Lw * (Tf-Ti) + 0.55*Bi*(Tf- Tr)}{t}$$

Magnetron type: OM-75P

L_w : Mass of the water, in grams
B_i : Mass of the container, in grams
T_f : Final temperature of the water, in °C
T_i : Initial temperature of the water, in °C
T_r : Ambient temperature, in °C
t : Heating time in seconds, excluding the magnetron filament heat-up time.

The measured output was found to be **ABOVE 500 Watts**. Therefore, in accordance with section 18.305 of Subpart C, the measured out-of-band emissions were compared to the 25xSQRT(power/500)[uV/m] @ 300 m limit.

4.4 Operation Frequency Measurement

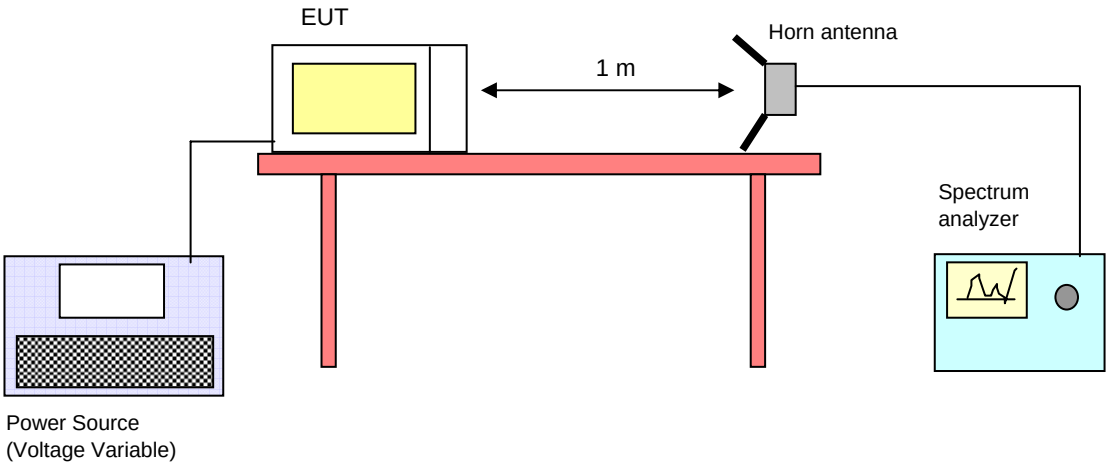


Fig. 4 Operating Frequency Measurements Configuration

4.4.1 Frequency Measurement

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 to 125 percent of the nominal rating.

The results of this test are as follows.
Line voltage varied from 96 Vac to 150 Vac.

Initial load : 1 000 ml water in the glass beaker

(1) Frequency vs Line Voltage Variation Test

[Room Temperature : 22.4 ℃]

Line Voltage Variation (V)	Frequency (MHz)		Allowed Tolerance for the ISM Band (2 450 MHz)
150 (125%)	Lower :	2 444	Lower: 2 400 MHz Upper: 2 500 MHz
	upper :	2 476	
132(110%)	Lower :	2 447	
	upper :	2 473	
120 (Nominal)	Lower :	2 448	
	upper :	2 478	
108 (90%)	Lower :	2 441	
	upper :	2 480	
96 (80%)	Lower :	2 436	
	upper :	2 478	

Result : **PASSED**

(2) Frequency vs Load Variation Test

Initial load : 1 000 ml water in the glass beaker

[Room Temperature : 22.4 ℃]

Volume of Water (cc)	Frequency (MHz)	Allowed Tolerance for the ISM Band (2 450 MHz)
1 000	Lower : 2 433	Lower: 2 400 MHz Upper : 2 500 MHz
	upper : 2 479	
800	Lower : 2 443	
	upper : 2 479	
600	Lower : 2 444	
	upper : 2 479	
400	Lower : 2 442	
	upper : 2 477	
200	Lower : 2 450	
	upper : 2 480	

Note : Frequency was measured by using nominal voltage (AC 120 V)

Result : **PASSED**

4.5 Conducted Emission Measurement

4.5.1 Conducted Emission Measurement Procedure

Configurate the EUT System in accordance with ANSI C63.4-2003 section 6 and 7.
Connect the EUT's AC line cord to the EUT port of LISN.
All input terminals are terminated in the proper impedance.
The output ports are connected to the cable provided with the device and the ending port are terminated in the proper impedance.

Using a calibrated coaxial cable, the TEST RECEIVER is connected to the measuring port of the LISN for EUT.
To find out the maximum emission, change the position of the cable, and the EUT operation mode under normal usage of the EUT.
Then, the emission are scanned from 0.15 MHz to 30 MHz relative to the limit are recorded.

4.5.2 Conducted Emission Measurement Configuration

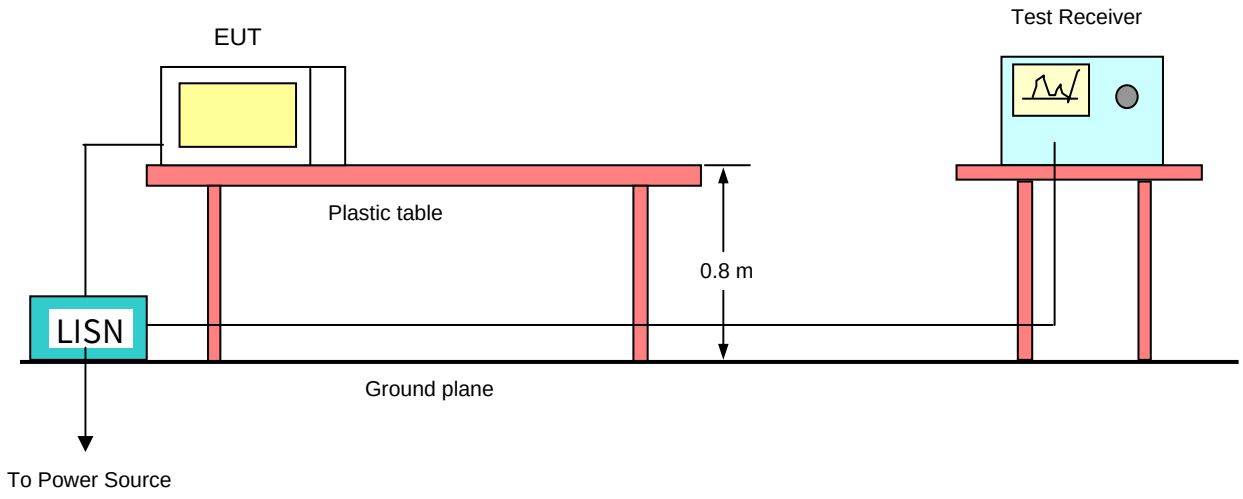
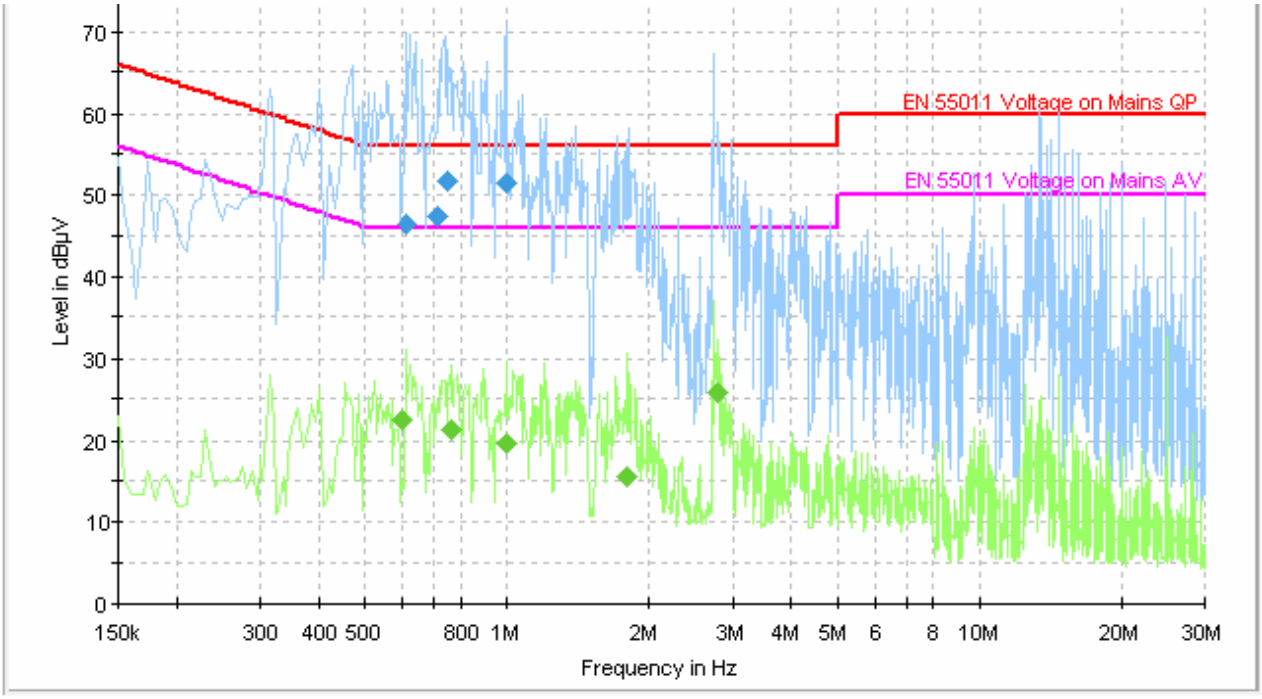


Fig. 5 Conducted Emission Configuration(0.15 MHz ~ 30 MHz)

4.5.3 Conducted Emission Measurement Data(0.15 MHz ~ 30 MHz)



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµ V)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.612500	46.5	L1	9.6	9.5	56.0
0.716500	47.4	L1	9.6	8.6	56.0
0.742500	51.8	L1	9.6	4.2	56.0
1.000500	51.5	L1	9.6	4.5	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµ V)	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.602500	22.5	L1	9.6	23.5	46.0
0.760500	21.2	L1	9.6	24.8	46.0
0.996500	19.5	L1	9.6	26.5	46.0
1.804500	15.5	L1	9.6	30.5	46.0
2.774500	25.9	L1	9.6	20.1	46.0

4.6 Radiated Emission Measurement

4.6.1 Radiated Emission Measurement Procedure

Radiated emission were measured over an inclusive frequency range to 30 MHz through the tenth harmonic of the operating frequency. For this test, a 0.8 m high plastic table in a semi-anechoic chamber supported the device under test. The table was placed on a turntable.

The measurement antenna was placed 3 meters for measurement from 30 MHz to 1 000 MHz and 1 meter for measurement from 1 GHz ~ 25 GHz, respectively, for the device under test. The indicated frequency range was swept as device under test was rotated along its vertical axis in 90 degree increments.

During the preliminary tests, the load consisted of 700 ml tap water placed in the center of the oven. The emissions were observed while the device under test was operated at maximum output power.

The level of the emissions near the edge of the designated ISM frequency band was measured. For this test, the load consisted of 700 ml water load located in the center of the oven.

The level of the second and third harmonic were measured inclusively with a 300 ml and 700 ml water load alternately placed in the center and side(or right front corner) of the oven.
The data obtained during these tests is contained on this report.

All other out-of-band emissions were measured while a 700 ml load was placed in the center of the oven. Maximum readings were recorded after variations in antenna polarizations, height, device orientation, load position, and size.
For frequencies above 1 GHz, the test receiver detecting mode was set to average detection mode(Model no.:ESI , Rohde & Schwarz).

For all emissions the equivalent 300 meters intensity was calculated assuming linear decrease in the described, there were no over-limit emissions discorvered.

4.6.2 Radiated Emission Measurement Configuration

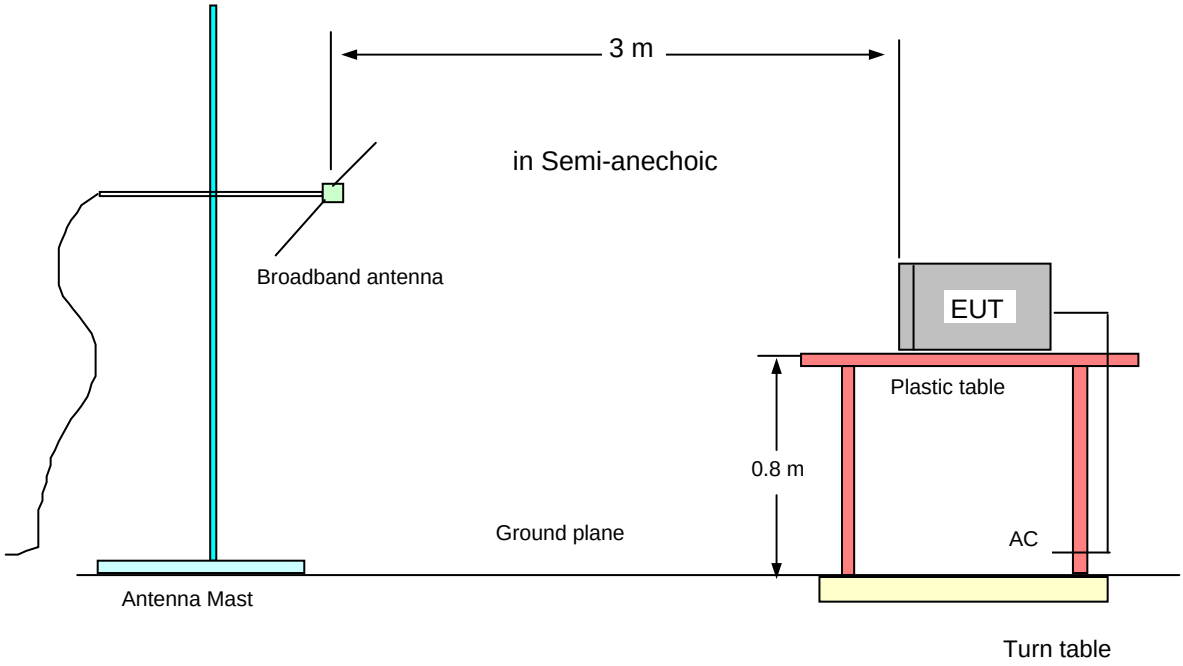


Fig. 6 Radiated Emission Configuration(30 MHz ~ 1 000 MHz)

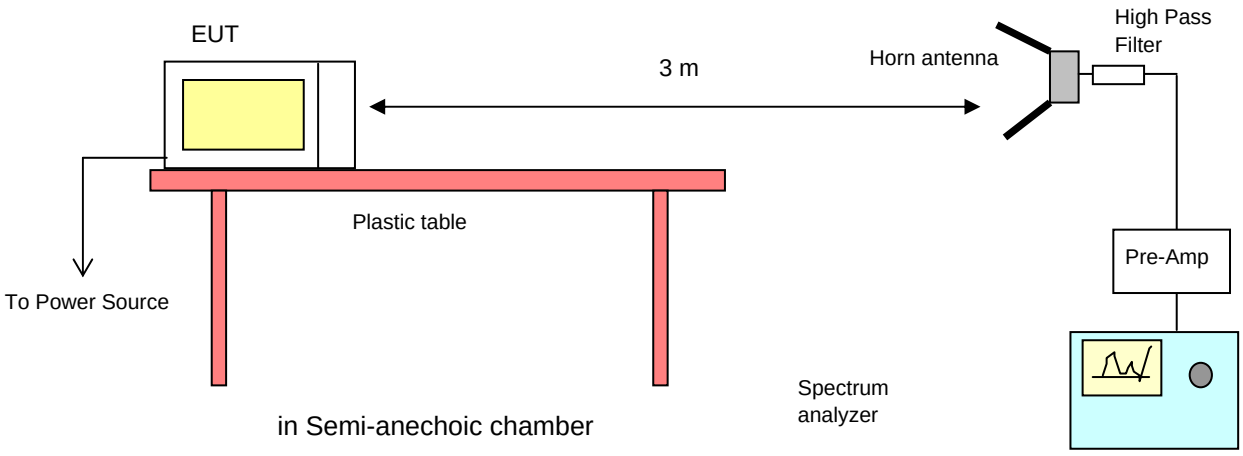


Fig. 7 Radiated Emission Configuration(1 GHz ~ 25 GHz)

4.6.3 Radiated Emission Measurement Data(30 MHz ~ 1 000 MHz)

Test distance : 3 m

Tested Frequency [MHz]	Meter Reading [A] [dBuV]	Total Loss [B] [dB]	Results [A+B] [dBuV/m]	Limits at 3m [dBuV/m]	ANT Pol.	Margin (Limit-Result) [dB]	Antenna Height [Cm]	Turn table Degree [Deg]
	Pk		**Pk**			**Pk**		
59.8	74.3	-20.3	54.0	70.80	H	16.80	100	88.8
66.3	67.9	-21.8	46.1	70.80	H	24.70	200	229.7
66.8	66.4	-21.9	44.5	70.80	V	26.30	200	0.3
929.9	52.8	-0.4	52.4	70.80	H	18.40	100	78.9
936.9	51.4	-0.1	51.3	70.80	H	19.50	200	26.2
950.9	49.9	0.4	50.3	70.80	H	20.50	200	63.8
971.9	62.8	0.8	63.6	70.80	H	7.20	100	16.8
974.8	53.1	0.9	54.0	70.80	V	16.80	300	267.4
979.0	48.3	1.0	49.3	70.80	H	21.50	100	33.1
986.0	48.1	1.1	49.2	70.80	V	21.60	200	84.1
991.6	49.4	1.2	50.6	70.80	V	20.20	100	237.1
991.6	49.1	1.2	50.3	70.80	H	20.50	200	335.8

[NOTE]

** fo = 2 450 MHz*

** Test distance : 3 m*

** Results = Meter Reading + Total Loss(Antenna factor + Cable loss)*

** Distance Correction factor : 20 x log(d1/d2)[dBuV/m]*

20 x log(300/3) = + 40dBuV/m

** The limit at 300 meters is* 30.80 *dBuV/m.*
Add 40 dB to 30.80 *dBuV/m gives a* 70.80 *dBuV/m @ 3 meters.*

4.6.4 Radiated Emission Measurement Data(1 GHz ~ 25 GHz)

Test distance : 3 m

Tested Frequency [MHz]	Meter Reading [dBuV]	Total Loss [dB]	AMP [dB]	HPF [dB]	Results at 300m [dBuV/m]	Limits at 300m [dBuV/m]	ANT Pol.	Margin [dB]
2169	14.4	28.9	0.0	0	1.46	30.80	H	29.34
2341	6.6	29.2	0.0	0	0.62	30.80	H	30.18
2533	3.9	29.8	0.0	0	0.48	30.80	V	30.32
2704	3.7	30.6	0.0	0	0.52	30.80	V	30.28
4926	72.1	35.0	39.5	1	24.13	30.80	V	6.67
4947	67.9	35.0	39.5	1	14.83	30.80	V	15.98
6387	64.3	37.9	39.2	1	14.01	30.80	V	16.79
6412	64.0	37.9	39.2	1	13.65	30.80	V	17.15
12869	53.2	45.5	39.3	1	9.33	30.80	V	21.47
17198	45.3	52.3	38.7	1	8.93	30.80	V	21.87

*** f** *o = 2 450 MHz*
* ***Total Loss*** *: Antenna Factor + Cable Loss,* ***HPF*** *: High Pass Filter(4.5 GHz)*
* ***AMP*** *: Pre-amplifier*
* *The limit at 300 meters is 20 * LOG (25 * RF Power/500)*
* *Margin = Limit-Result*

CALCULATIONS - Calculation of the equivalent 300 meter field strength was performed assuming a linear fall-off in the field strength with increased distance from the EUT.

* *Field Strength (uV/meter at 300 meters) = K x 10 ^ [(MR+TL-AMP) / 20]*
Where: *K is the ratio of: [measurement distance / requirement distance]*
MR: Meter Reading
TL: Total Loss

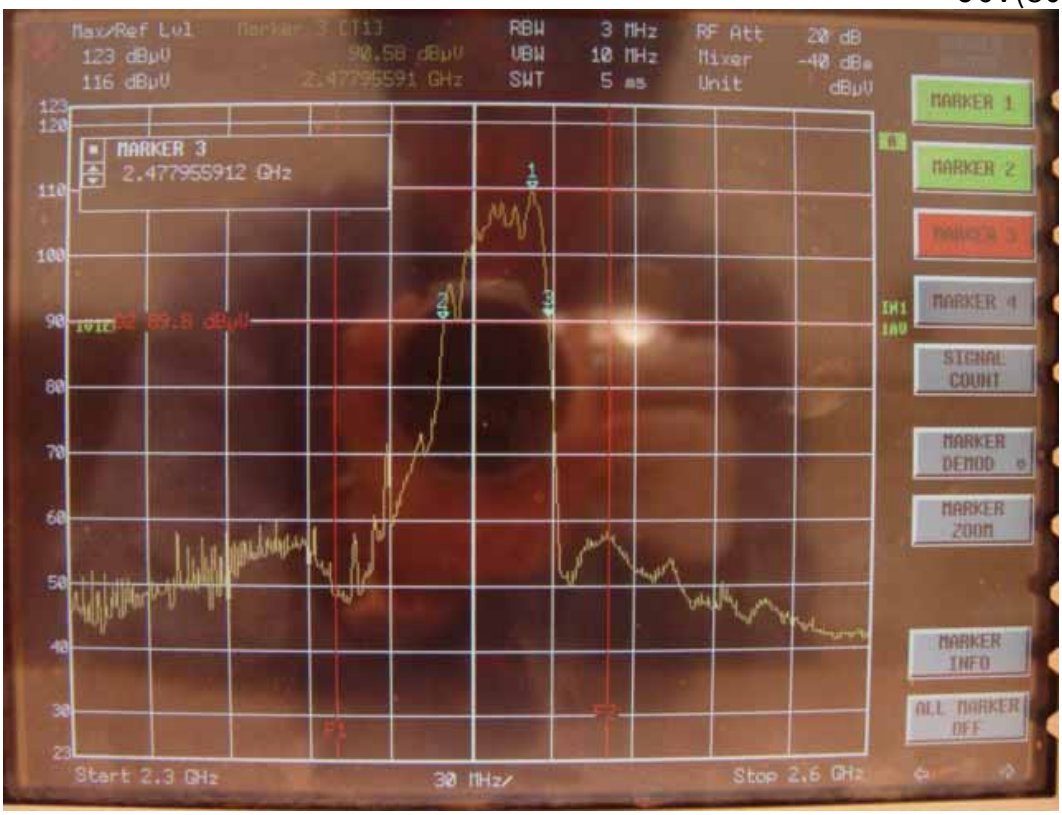
[NOTE]
1. Load for measurement of radiation on second and third harmonic : Two loads, one of 1000 ml and the other of 450 ml, of water were used. Each load was tested both with the beaker located in the center of the oven and with it in the corner.

5. Measurement Equipment List

Equipment	Model No.	Serial No.	Makers	Next calibration date and Interval
EMI TEST RECEIVER	ESCI	100086	R & S	07/03/28, 12Months
ARTIFICIAL MAINS NETWORK	ENV216	100116	R & S	06/09/08, 12Months
Measurement Software	EMC 32	Ver 4.40	R & S	N/A
EMI TEST RECEIVER	ESI26	100287	R & S	07/03/05, 12Months
Biconilog Antenna	CBL6141A	4268	SCHAFFNER	07/05/03, 12Months
Pre-Amplifier	310N	251674	SONOMA	07/03/14, 12Months
Double Ridged Guide Antenna	3115	9505-4441	EMCO	07/01/16, 12Months
Microwave Survey Meter	HI-1501	93661	H.I	06/10/02, 12Months
High Pass Filter	3H10-4500	2	K & L	06/11/30, 12Months
Amplifier	DWT-18213	004-9942	DSB Microwave	06/12/01, 12Months

Frequence vs Line Voltage Variation Test

96V(80%)



108V(90%)

Frequence vs Line Voltage Variation Test

132V(110%)

150V(125%)

Frequence vs Load Variation Test

120V(1000ml)

120V(800ml)

Frequence vs Load Variation Test

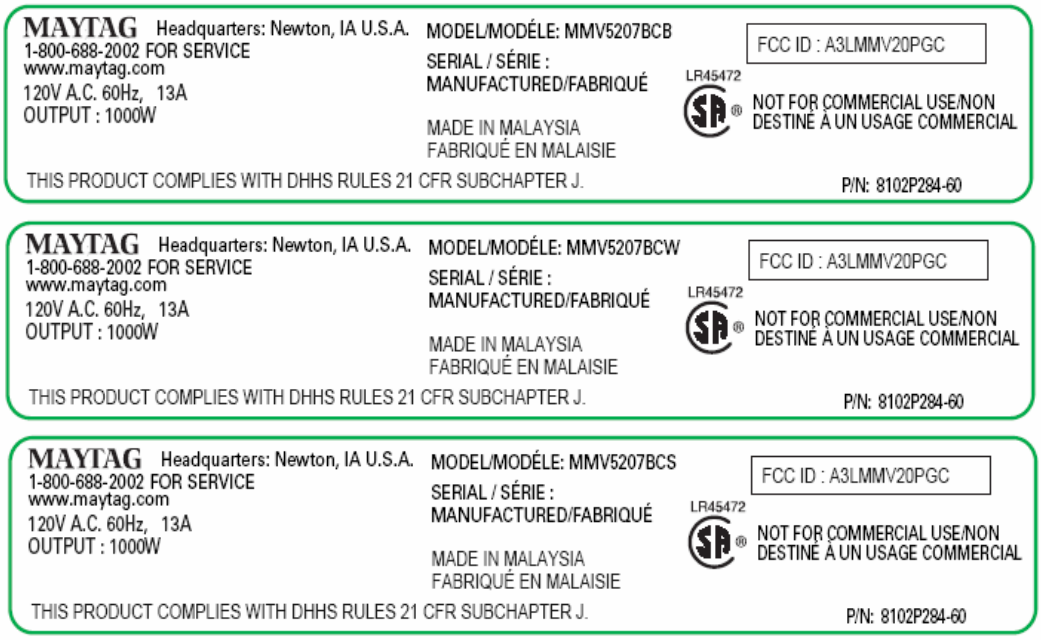
120V(600ml)

120V(400ml)

Frequence vs Load Variation Test

120V(200ml)

Label



EUT Photography

Front

Left

Right

Rear

Inside


H.V.CAPACITOR
HCH-2120B3C T85 S
2100VAC 50/60Hz
0.83 μF± 3% 10/085/21
NO PCB'S
DANGER H. V.
2501-001202
C5020


DANGER
HIGH VOLTAGE
DISCHARGE CAPACITOR BEFORE SERVICING
SAMSUNG
OBJY2
DPC-R
SHV-U4205B
120V 60Hz
F1223A
CC DPC-M
DIGITAL POWER COMMUNICATIONS CO.,LTD.