

# EMC TEST REPORT

According to FCC CFR47 Part 18 Subpart C

**JOB Number : LBE042017**

1. This test reports 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.*



**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 : A3LOTR7MTN  
2.2 Device Name : MICROWAVE OVEN  
2.3 Trade Name : GENERAL Electronics Co.,Ltd.  
2.4 Model Number : RVM1625BD  
Variant Model :  
2.5 RF Output Power : **1000W** ( by IEC 705 method )

**3. Test Procedure and Items**

3.1 FCC/OST MP-5 : 1986

**4. Issued Date :** Jan 4, 2005

**Tested by:**

Jay Yong, PARK / Test Engineer

Handwritten signature of J. Y. Park in black ink.

**Reviewed by:**

No Cheon, PARK / Manager of EMC Lab.

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**Authorised by:**

Kyu Baek, CHUNG / Chief of EMC Lab.

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## 1. Product Description

The equipment under test is a microwave oven sold for consumer use.

Model : RVM1625BD is a 1000W microwave oven with digital controls.

- a. Used Magnetron : **OM-75P** by Samsung
- b. Installation Type : Over-the-range
- c. Electrical Ratings :
  - 1) Power Supply : 120 V ac, 60 Hz
  - 2) Operating Frequency : 2450 +/- 50 MHz
  - 3) Power Input : 1580 W
  - 4) RF Power Output : 1000 W (by IEC 705 method)
- d. Clock Frequency : 8.0 MHz

## 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 accredited 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.

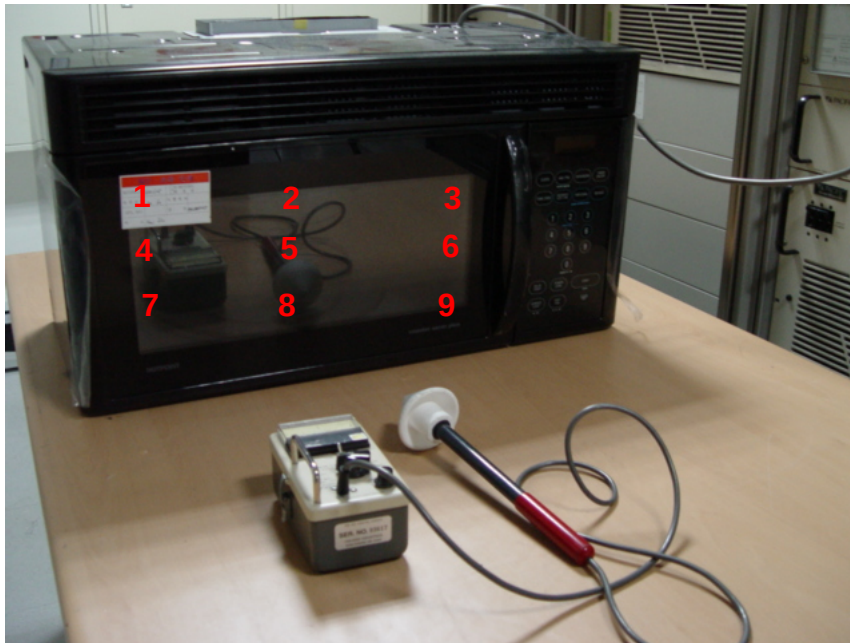
## 4. Radio Noise Emission Measurement Procedures/Results

### 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.



The results of this test are as follows.

| Probe Location | Maximum Leakage [mW/Cm2] | Limit [mW/Cm2] |
|----------------|--------------------------|----------------|
| 2              | 0.25                     | 1.0            |
| 5              | 0.10                     | 1.0            |
| 6              | 0.10                     | 1.0            |
| All others     | 0.05                     | 1.0            |

## 4.2 Input Power Measurement

Input power and current were measured using a Power Analyzer.

A 700ml 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<br>[Vac] | Input Current<br>[amps] | Measured Input power<br>[watts] | EUT Spec. Input power<br>[watts] |
|------------------------|-------------------------|---------------------------------|----------------------------------|
| <b>120</b>             | <b>13.1</b>             | <b>1571</b>                     | <b>1580</b>                      |

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 1000-ml water load was measured. The water load was placed in the center of the oven. The oven was operated at maximum output power for 120 seconds. Then the temperature of the water re-measured.



**Fig.3 Test Setup for RF output power**

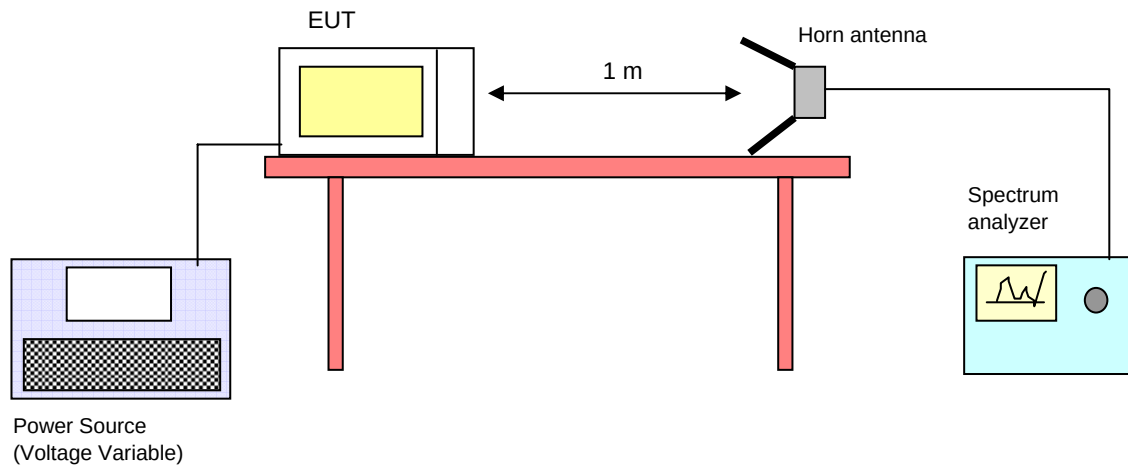
| Quantity of water [ml]              | Starting Temperature [centigrade] | Final Temperature [centigrade] | Elapsed Time [seconds] | RF Power [watts] |
|-------------------------------------|-----------------------------------|--------------------------------|------------------------|------------------|
| 1000                                | 10                                | <b>34.1</b>                    | 120                    | 840.9            |
| 1000                                | 10                                | <b>33.8</b>                    | 120                    | 830.4            |
| 1000                                | 10                                | <b>33.4</b>                    | 120                    | 816.5            |
| <b>Average RF Power of 3 Trials</b> |                                   |                                |                        | <b>829.3</b>     |

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

The measured output was found to be **ABOVE 500Watts**. Therefore, in accordance with section 18.305 of Subpart C, the measured out-of-band emissions were compared to the  $25 \times \sqrt{\text{power}/500} [\text{uV/m}] @ 300\text{M}$  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 96Vac to 150Vac.

Initial load : 1000 ml water in the glass beaker

#### (1) Frequency vs Line Voltage Variation Test

[ Room Temperature : 24 °C ]

| Line Voltage Variation (V) | Frequency (MHz) | Allowed Tolerance for the ISM Band (2450MHz) |
|----------------------------|-----------------|----------------------------------------------|
| 150 (125%)                 | Lower : 2459    | Lower: 2400 MHz<br>Upper : 2500 MHz          |
|                            | upper : 2464    |                                              |
| 132(110%)                  | Lower : 2459    |                                              |
|                            | upper : 2465    |                                              |
| 120 (Nominal)              | Lower : 2458    |                                              |
|                            | upper : 2475    |                                              |
| 108 (90%)                  | Lower : 2458    |                                              |
|                            | upper : 2468    |                                              |
| 96 (80%)                   | Lower : 2457    |                                              |
|                            | upper : 2465    |                                              |

**Result :** PASSED



## (2) Frequency vs Load Variation Test

Initial load : 1000 ml water in the glass beaker

[ Room Temperature : 24 °C ]

| Volume of Water<br>(cc) | Frequency<br>(MHz) | Allowed Tolerance<br>for the ISM Band<br>(2450MHz) |
|-------------------------|--------------------|----------------------------------------------------|
| 1000                    | Lower : 2458       | Lower: 2400 MHz<br>Upper : 2500 MHz                |
|                         | upper : 2475       |                                                    |
| 800                     | Lower : 2459       |                                                    |
|                         | upper : 2464       |                                                    |
| 600                     | Lower : 2452       |                                                    |
|                         | upper : 2469       |                                                    |
| 400                     | Lower : 2449       |                                                    |
|                         | upper : 2455       |                                                    |
| 200                     | Lower : 2467       |                                                    |
|                         | upper : 2471       |                                                    |

Note : Frequency was measured by using nominal voltage (AC120V )

**Result :** PASSED

## 4.5 Conducted Emission Measurement

### 4.5.1 Conducted Emission Measurement Procedure

Configure the EUT System in accordance with ANSI C63.4-2003

Connect the EUT's AC line cord to the EUT port of LISN.

All input terminals are terminated in the proper impedance.

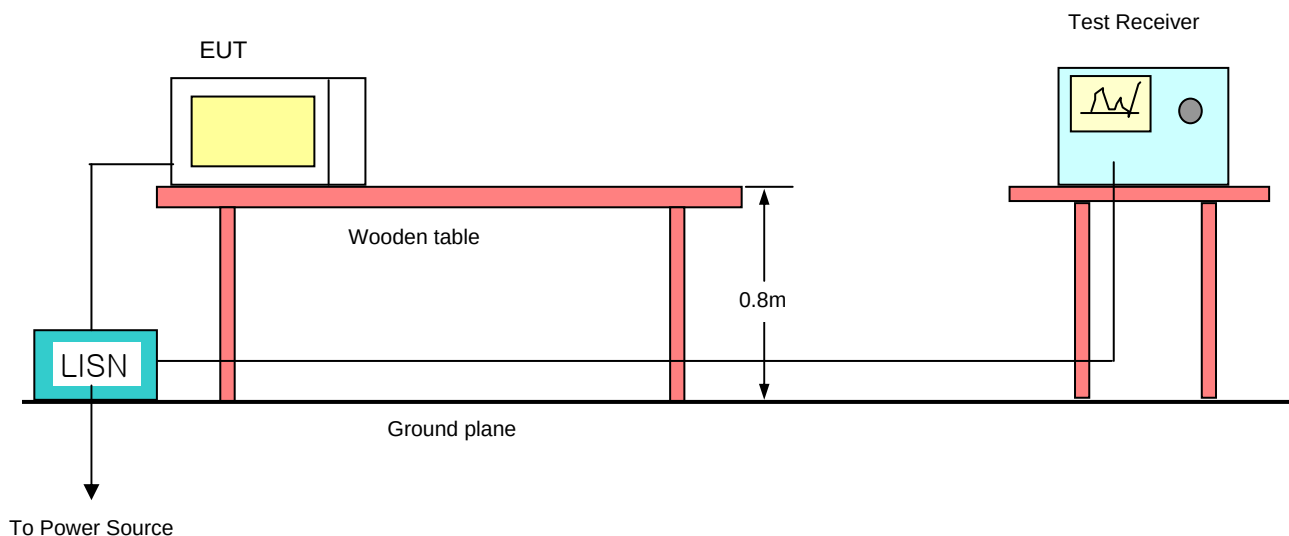
The output ports are connected to the cable provided with the device and the ending port are terminated in the proper impedance.

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.

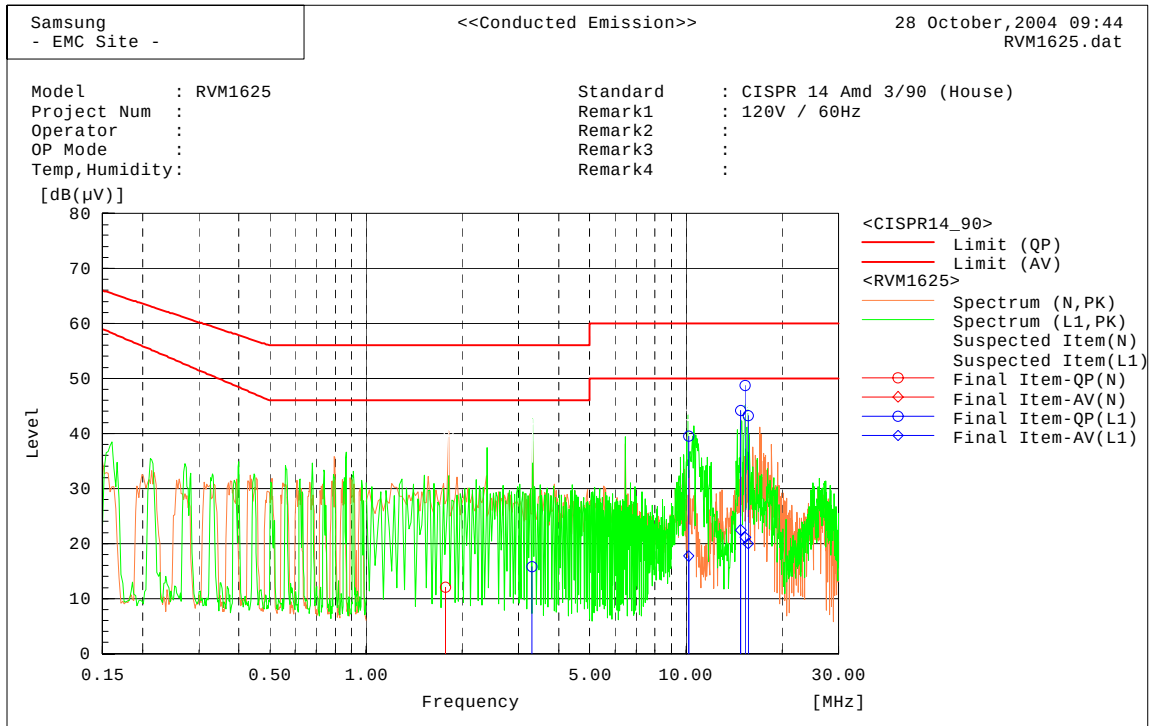
Then, the emission are scanned from 0.15MHz to 30MHz relative to the limit are recorded.

### 4.5.2 Radiated Emission Measurement Configuration



**Fig. 5 Conducted Emission Configuration(0.15 - 30MHz)**

### 4.5.3 Conducted Emission Measurement Data(0.15 - 30MHz)



#### Final Result

| --- N Phase ---  |           |            |            |      |           |           |          |          |           |           |
|------------------|-----------|------------|------------|------|-----------|-----------|----------|----------|-----------|-----------|
| No.              | Frequency | Reading QP | Reading AV | c.f  | Result QP | Result AV | Limit QP | Limit AV | Margin QP | Margin AV |
|                  | [MHz]     | [dB(μV)]   | [dB(μV)]   | [dB] | [dB(μV)]  | [dB(μV)]  | [dB(μV)] | [dB(μV)] | [dB]      | [dB]      |
| 1                | 1.770     | 11.9       | -6.4       | 0.1  | 12.0      | -6.3      | 56.0     | 46.0     | 44.0      | 52.3      |
| --- L1 Phase --- |           |            |            |      |           |           |          |          |           |           |
| No.              | Frequency | Reading QP | Reading AV | c.f  | Result QP | Result AV | Limit QP | Limit AV | Margin QP | Margin AV |
|                  | [MHz]     | [dB(μV)]   | [dB(μV)]   | [dB] | [dB(μV)]  | [dB(μV)]  | [dB(μV)] | [dB(μV)] | [dB]      | [dB]      |
| 1                | 3.3045    | 15.7       | -5.5       | 0.1  | 15.8      | -5.4      | 56.0     | 46.0     | 40.2      | 51.4      |
| 2                | 10.1985   | 39.3       | 17.5       | 0.2  | 39.5      | 17.7      | 60.0     | 50.0     | 20.5      | 32.3      |
| 3                | 14.834    | 43.3       | 21.6       | 0.9  | 44.2      | 22.5      | 60.0     | 50.0     | 15.8      | 27.5      |
| 4                | 15.3145   | 47.8       | 20.1       | 1.0  | 48.8      | 21.1      | 60.0     | 50.0     | 11.3      | 28.9      |
| 5                | 15.647    | 42.2       | 19.0       | 1.0  | 43.2      | 20.0      | 60.0     | 50.0     | 16.8      | 30.0      |

## **4.6 Radiated Emission Measurement**

### **4.6.1 Radiated Emission Measurement Procedure**

Radiated emission were measured over an inclusive frequency range to 30MHz through the tenth harmonic of the operating frequency. For this test, a 0.8-meter high wooden 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 to 1,000MHz and 1 meter for measurement from 1 - 25GHz, 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.

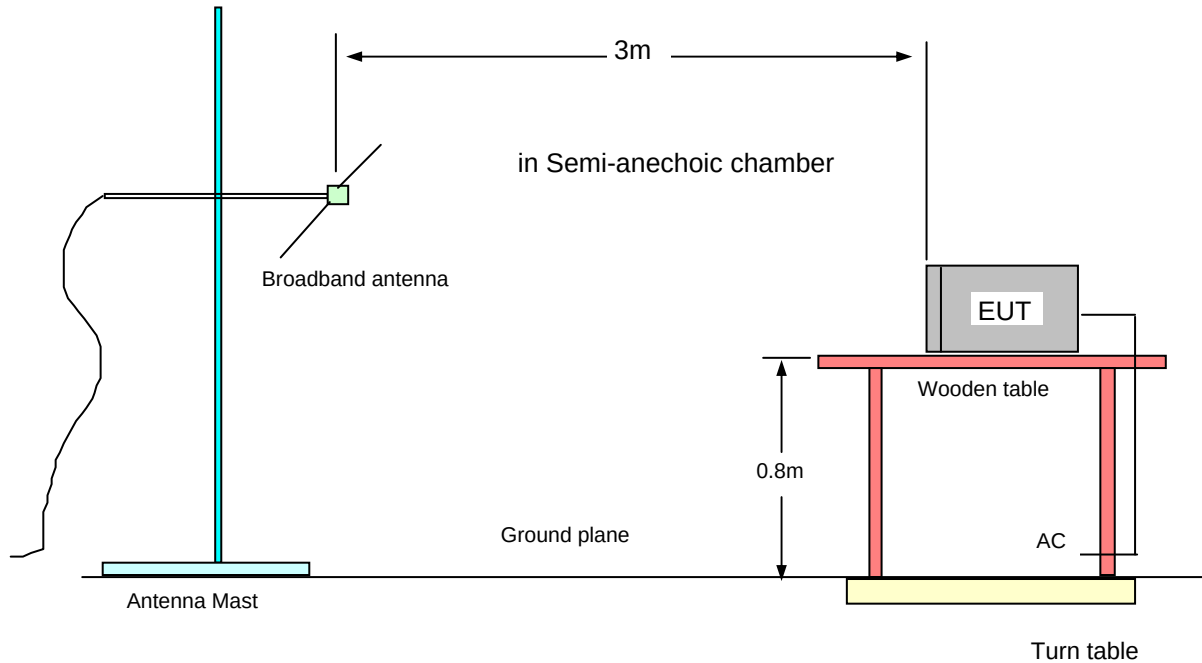
The data obtained during these tests is contained on this report.

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.

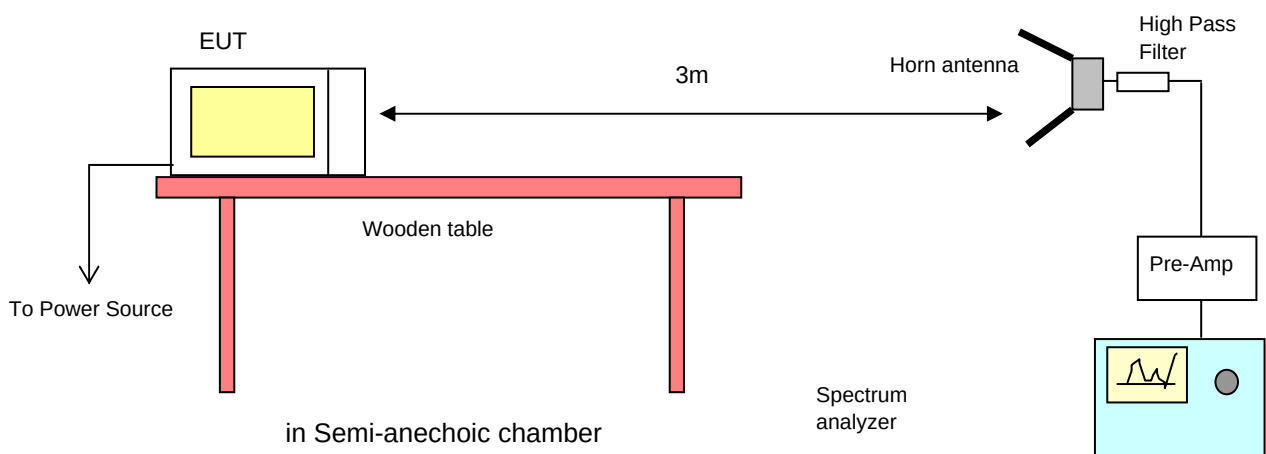
For frequencies above 1GHz, the test receiver detecting mode was set to average detection mode(Model no.:ESI , Rohde & Schwarz).

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

#### 4.6.2 Radiated Emission Measurement Configuration



**Fig. 6 Radiated Emission Configuration(30 - 1000MHz)**



**Fig. 7 Radiated Emission Configuration(1 - 25GHz)**

#### 4.6.3 Radiated Emission Measurement Data(30 - 1000MHz)

Test distance : 3m

| Tested Frequency<br>[MHz] | Meter Reading<br>[A]<br>[dBuV] | Total Loss<br>[B]<br>[dB] | Results<br>[A+B]<br>[dBuV/m] | Limits<br>at 3m<br>[dBuV/m] | ANT Pol. | Margin<br>(Limit-Result)<br>[dB] | Antenna Height<br>[Cm] | Turn table Degree<br>[Deg] |
|---------------------------|--------------------------------|---------------------------|------------------------------|-----------------------------|----------|----------------------------------|------------------------|----------------------------|
|                           | <b>Pk</b>                      |                           | <b>Pk</b>                    |                             |          | <b>Pk</b>                        |                        |                            |
| 119.991                   | 55.3                           | -13                       | 42.5                         | 70.16                       | H        | 27.66                            | 149                    | 164                        |
| 123.4                     | 47.1                           | -13                       | 34.3                         | 70.16                       | V        | 35.86                            | 101                    | 99                         |
| 360.095                   | 48.1                           | -6.8                      | 41.3                         | 70.16                       | H        | 28.86                            | 201                    | 232                        |
| 363.63                    | 52.1                           | -6.7                      | 45.4                         | 70.16                       | H        | 24.76                            | 101                    | 357                        |
| 372.468                   | 52.4                           | -6.5                      | 45.9                         | 70.16                       | V        | 24.26                            | 151                    | 350                        |
| 618.15                    | 47.8                           | -1.1                      | 46.7                         | 70.16                       | H        | 23.46                            | 150                    | 351                        |
| 913.323                   | 38.3                           | 3.2                       | 41.5                         | 70.16                       | V        | 28.66                            | 151                    | 357                        |
| 984.023                   | 37.6                           | 4.7                       | 42.3                         | 70.16                       | H        | 27.86                            | 201                    | 264                        |
|                           |                                |                           |                              |                             |          |                                  |                        |                            |
|                           |                                |                           |                              |                             |          |                                  |                        |                            |
|                           |                                |                           |                              |                             |          |                                  |                        |                            |
|                           |                                |                           |                              |                             |          |                                  |                        |                            |
|                           |                                |                           |                              |                             |          |                                  |                        |                            |

#### [NOTE]

\*  $f_0 = 2450\text{MHz}$

\* Test distance : 3m

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

\* Distance Correction factor :  $20 \times \log(d_1/d_2)$ [dBuV/m]

$$20 \times \log(300/3) = + 40\text{dBuV/m}$$

\* The limit at 300 meters is 30.16 dBuV/m.

Add 40dB 30.16 dBuV/m gives a 70.16 dBuV/m @ 3 meters.

\* Spectrum analyzer setting

Peak(Pk) : Resolution Bandwidth(1MHz), Video Bandwidth(1MHz)



#### 4.6.4 Radiated Emission Measurement Data(1 - 25GHz)

Test distance : 3m

| Tested Frequency<br>[MHz] | Meter Reading<br>[dBuV] | Total Loss<br>[dB] | AMP<br>[dB] | HPF<br>[dB] | k<br>Factor | Results<br>[dBuV/m] | Limits<br>at 3m<br>[dBuV/m] | ANT<br>Pol. | Margin<br>[dB] |
|---------------------------|-------------------------|--------------------|-------------|-------------|-------------|---------------------|-----------------------------|-------------|----------------|
| 2309                      | 41.0                    | 26.3               | 40.4        | 0           | 0.0060      | 0.13                | 30.16                       | V           | 30.03          |
| 2397                      | 39.1                    | 26.3               | 40.4        | 0           | 0.0062      | 0.11                | 30.16                       | V           | 30.05          |
| 2535                      | 37.8                    | 26.3               | 40.4        | 0           | 0.0065      | 0.10                | 30.16                       | V           | 30.06          |
| 4928                      | 44.1                    | 34.8               | 41.7        | 1           | 0.0105      | 0.86                | 30.16                       | V           | 29.30          |
| 7112                      | 36.6                    | 41.1               | 41.5        | 1           | 0.0127      | 0.92                | 30.16                       | V           | 29.24          |
| 7391                      | 38.1                    | 41.1               | 41.5        | 1           | 0.0129      | 1.11                | 30.16                       | V           | 29.05          |
| 8772                      | 42.2                    | 36.9               | 41.8        | 1           | 0.0139      | 1.14                | 30.16                       | V           | 29.01          |
| 9114                      | 34.7                    | 37.3               | 41.7        | 1           | 0.01        | 0.37                | 30.16                       | V           | 29.79          |
| 9857                      | 30.1                    | 37.3               | 41.7        | 1           | 0.01        | 0.22                | 30.16                       | V           | 29.94          |
| 11416                     | 31.3                    | 37.3               | 41.6        | 1           | 0.01        | 0.25                | 30.16                       | V           | 29.91          |
| 12261                     | 24.7                    | 41.2               | 40.7        | 1           | 0.01        | 0.20                | 30.16                       | V           | 29.95          |
| 14829                     | 29.0                    | 41.4               | 41.7        | 1           | 0.01        | 0.30                | 30.16                       | V           | 29.85          |
| 15335                     | 28.7                    | 42.1               | 42.5        | 1           | 0.01        | 0.29                | 30.16                       | V           | 29.86          |
|                           |                         |                    |             |             |             |                     |                             |             |                |

\*  $f_0 = 2450\text{MHz}$

\* **Total Loss** : Antenna Factor+ Cable Loss, **HPF** : High Pass Filter(4.5GHz)

\* **AMP** : Pre-amplifier

\* The limit at 300 meters is  $20 * \text{LOG} (25 * \text{RF Power}/500)$

\* Results : Field Strength above 1000MHz (at 300m)(uV/m) =  $K*10^{[\text{Field strength at 3m(dBuV/m)}/20]}$

\* Margin = Result-Limit

#### [NOTE]

1. Load for measurement of radiation on second and third harmonic : Two loads, one of 1000ml and the other of 450ml, 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.

\*  $k$  : Conversion Factor

$$K = 0.0137 * \log F - 0.0401 \quad (\text{if } F < 4575 \text{ MHz})$$

$$K = 0.01 \quad (\text{if } F \geq 4575 \text{ MHz})$$

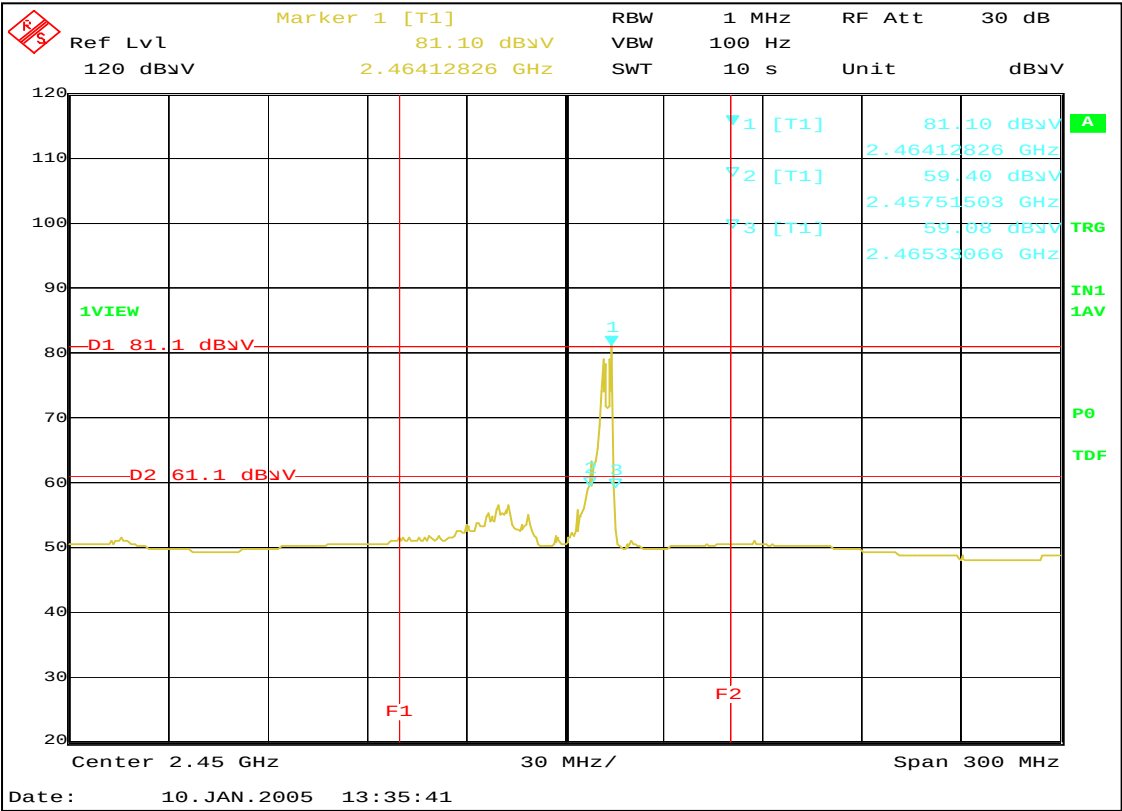
$F$  = Meter Reading Frequency

## 5. Measurement Equipment List

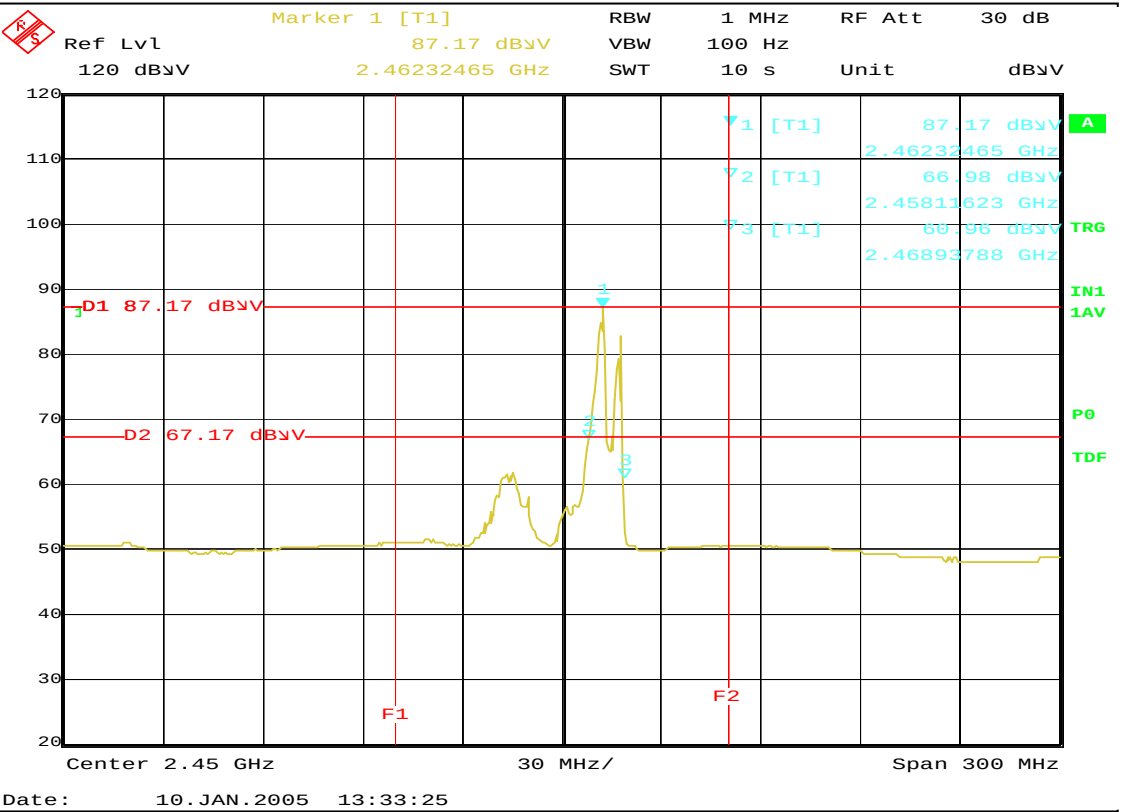
| Equipment                   | Model No. | Serial No. | Makers        | Latest calibration and Interval |
|-----------------------------|-----------|------------|---------------|---------------------------------|
| Field strength meter        | ESCS30    | 839809/002 | R & S         | 04/04/28, 12Months              |
|                             | ESI26     | 832692/002 | R & S         | 04/05/24, 12Months              |
| Measurement Software        | EP5RE     | -          | TOYO          | N/A                             |
| Pre-Amplifier               | 8449B     | 3008A00705 | H.P           | 04/07/20, 12Months              |
| Double Ridged Guide Antenna | 3115      | 9505-4441  | EMCO          | 04/05/23, 24Months              |
| Microwave Survey Meter      | HI-1501   | 93661      | H.I           | 04/10/02, 12Months              |
| High Pass Filter            | 3H10-4500 | 2          | K & L         | 04/11/11, 12Months              |
| Amplifier                   | DWT-18213 | 004-9942   | DSB Microwave | 04/11/10, 12Months              |
| Biconilog Antenna           | CBL6112B  | 2767       | SCHAFFNER     | 04/05/22, 12Months              |
| Spectrum Analyzer           | E7405A    | MY42000052 | Agilent       | 04/08/04, 12Months              |
| Field strength meter        | ESS       | 844661/005 | R&S           | 04/01/05, 12Months              |
| L.I.S.N                     | ESH3-Z5   | 100262     | R&S           | 04/02/11, 12Months              |
| Measurement Software        | EP5CE     | -          | TOYO          | N/A                             |

Frequency vs Line Voltage Variation Test

96V(80%)

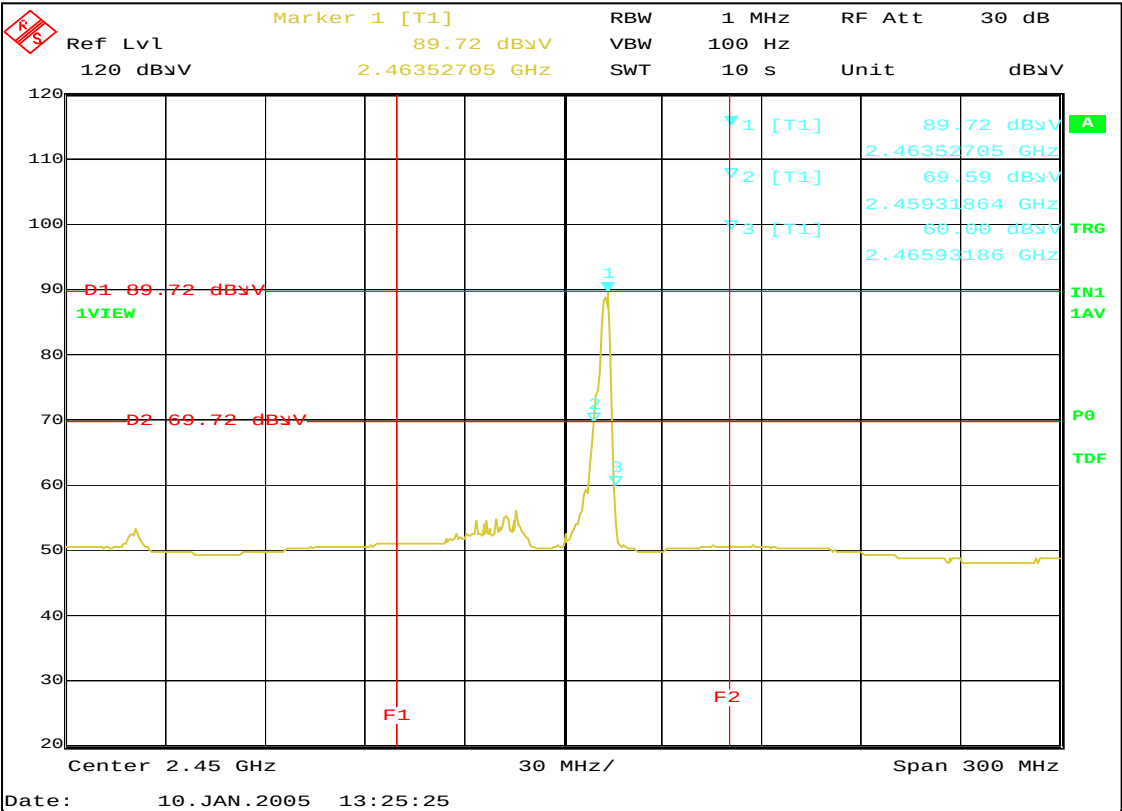


108V(90%)

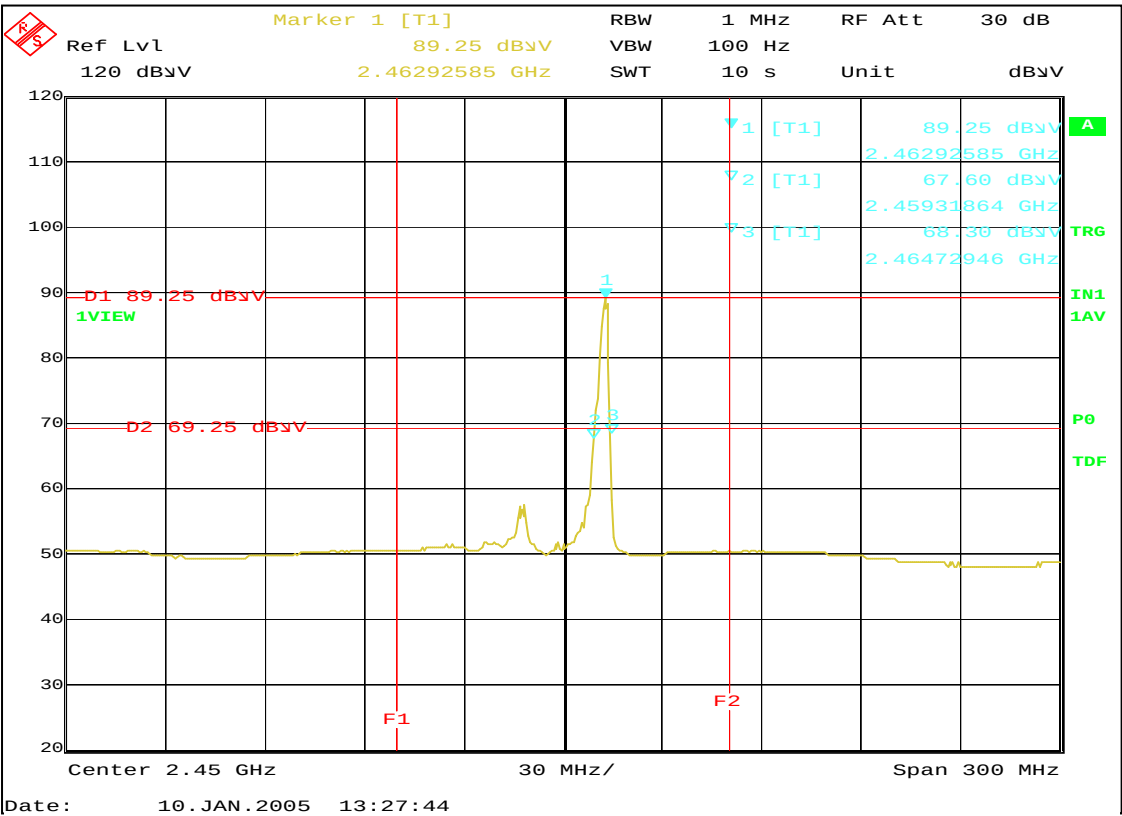


Frequency vs Line Voltage Variation Test

132V(110%)

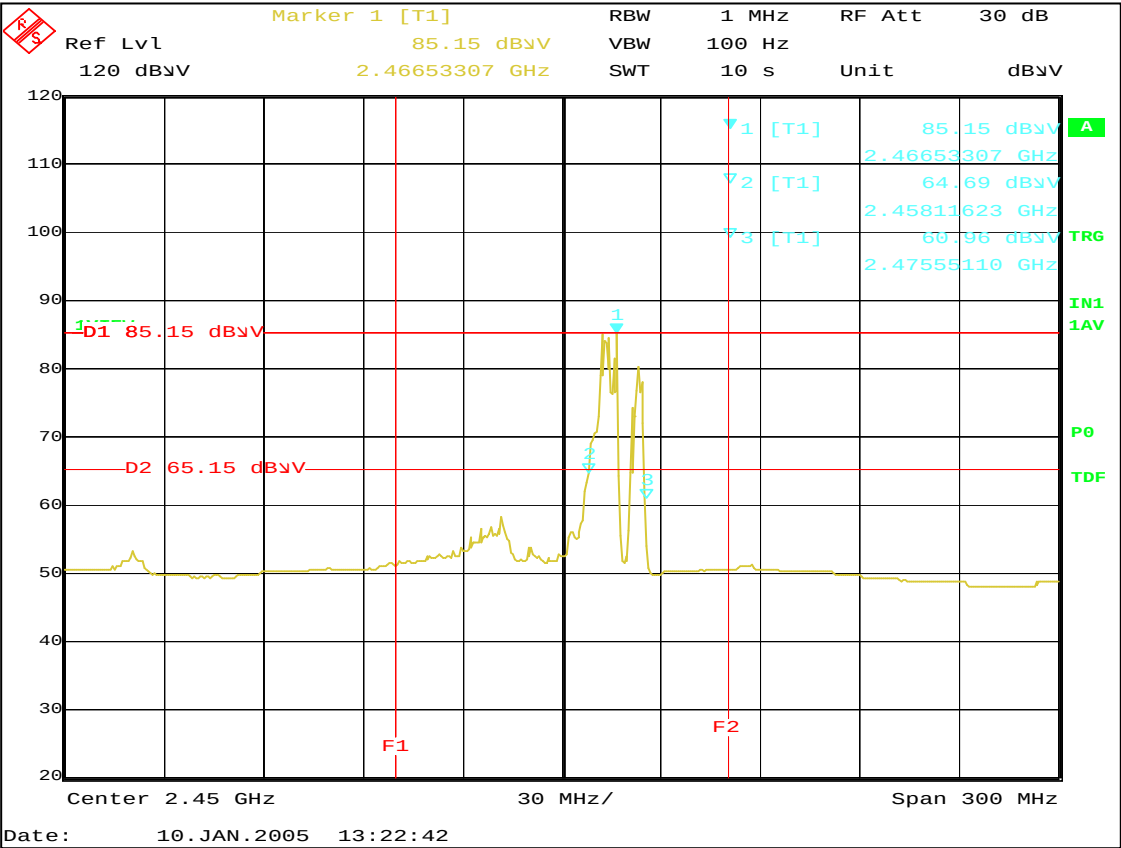


150V(125%)

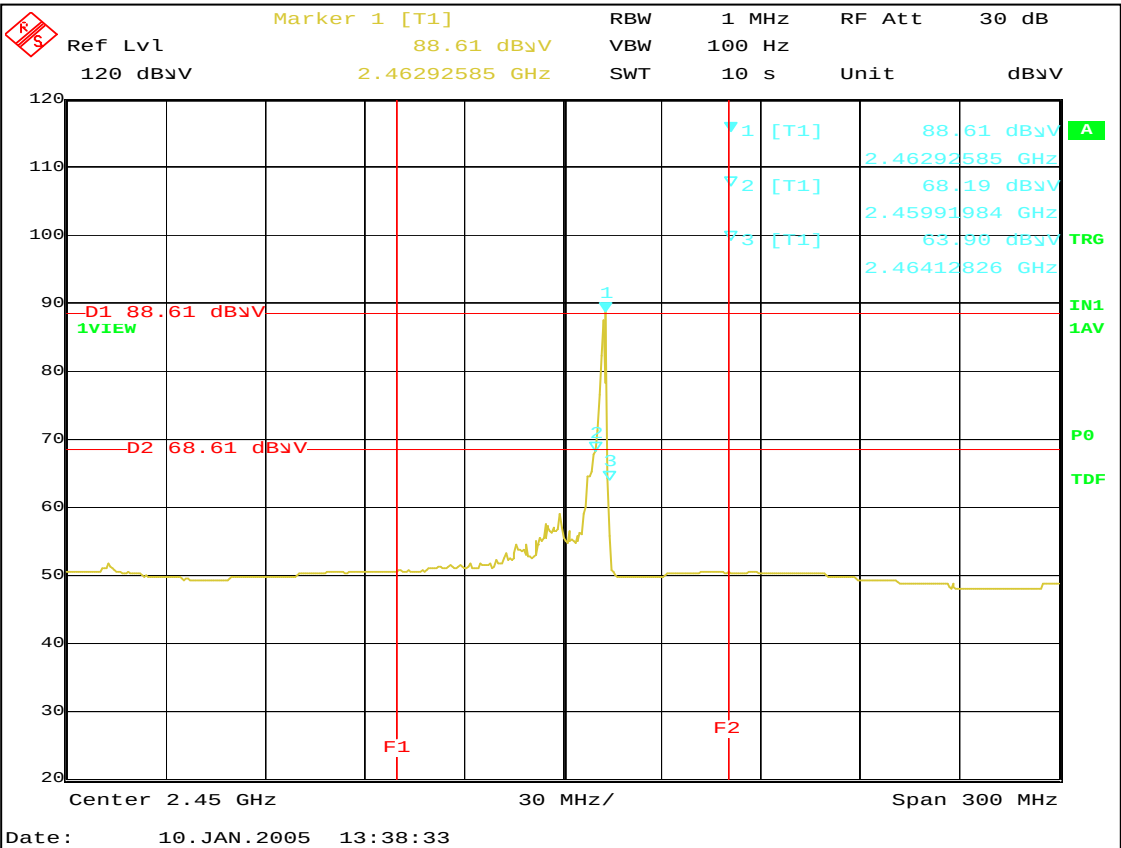


Frequency vs Load Variation Test

120V(1000ml)

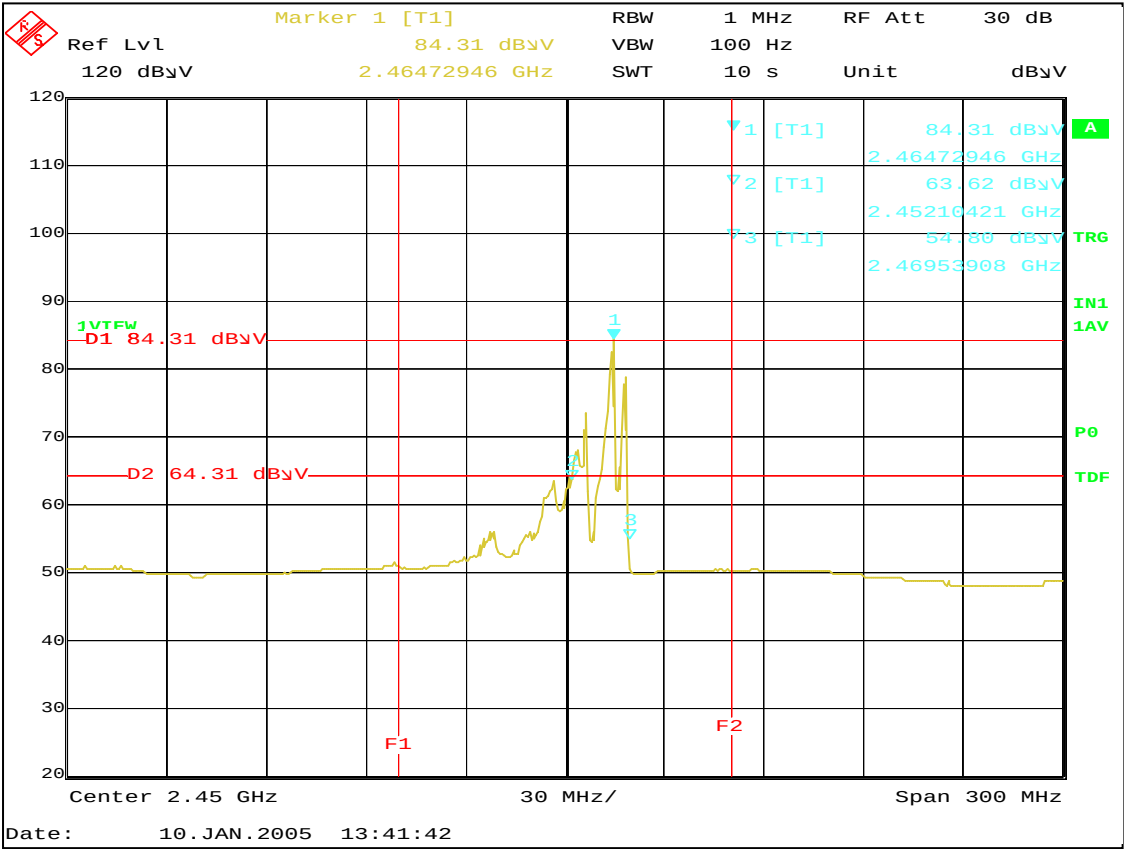


120V(800ml)

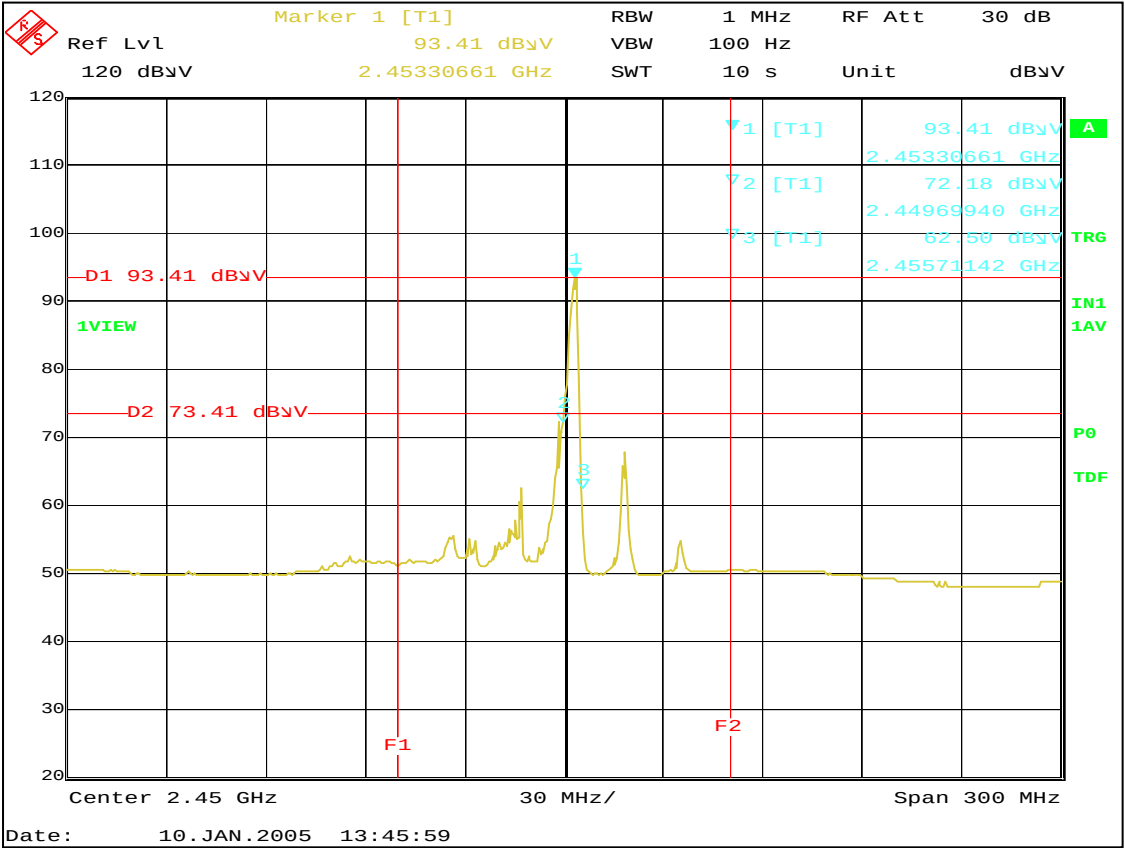


Frequency vs Load Variation Test

120V(600ml)

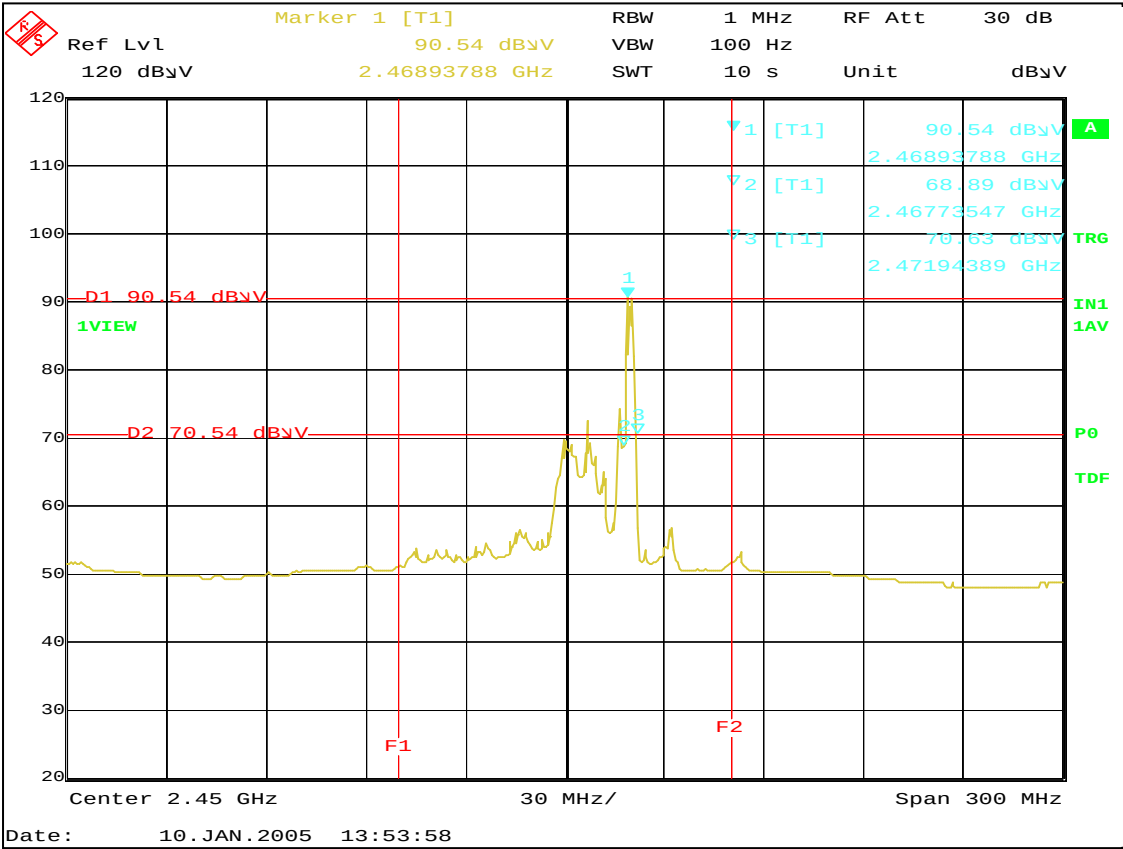


120V(400ml)



Frequency vs Load Variation Test

120V(200ml)



Label

**HOTPOINT**  
LOUISVILLE, KY. 40225  
HOUSEHOLD MICROWAVE OVEN [www.GEAppliances.com](http://www.GEAppliances.com)

 LISTED  
725F

|                                 |                           |                                      |
|---------------------------------|---------------------------|--------------------------------------|
| MODEL NO.<br><b>RVM1625BD01</b> | SERIAL NO.<br>gplymnnnnnn | MANUFACTURED<br><b>NOVEMBER-2004</b> |
| RF OUTPUT FREQUENCY : 2450MHz   |                           | FCC ID : A3LOTR7MTN                  |
| kW : 1.58<br>VAC/Hz : 120/60    | WARRANTY :<br>1 YEAR FULL | MADE IN MALAYSIA                     |

THIS PRODUCT COMPLIES WITH DHHS RULES 21 CFR SUBCHAPTER J

