

EMC TEST REPORT

According to FCC CFR47 Part 18 Subpart C

JOB Number : LBE050461

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 complied and these results met the specifications requirement.

*This laboratory is registered by the NIST/NVLAP, U.S.A.
The test reported herein has 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 : A3LSMH19CN
2.2 Device Name : MICROWAVE OVEN
2.3 Trade Name : Samsung
2.4 Model Number : SMH7195WE
Variant Model :
2.5 RF Output Power : **1100** W (by IEC 705 method)

3. Test Procedure and Items

3.1 FCC/OST MP-5 : 1986

4. Issued Date : Mar 24, 2005

Tested by:

Hyeok Je, KWON / Test Engineer

Reviewed by:

No Cheon, PARK / Manager of EMC Lab.

Authorised by:

Seung Kyu, CHA / Chief of EMC Lab.

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5. Measurement Equipment List

1. Product Description

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

Model : SMH7195WE is a 1100 W microwave oven with digital controls.

Installation Type: Counter Top

Clock Frequency : 8.0MHz

< Magnetron >

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

< Electrical Ratings >

- 1) Power Supply : 120 V ac, 60 Hz
- 2) Operating Frequency : 2450 +/- 50 MHz
- 3) Power Input : 1550 W
- 4) RF Power Output : 1100 W (by IEC 705 method)

2. Test Facility

The Semi-anechoic chamber and conducted measurement facilities used to collect the radiated and conducted 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.

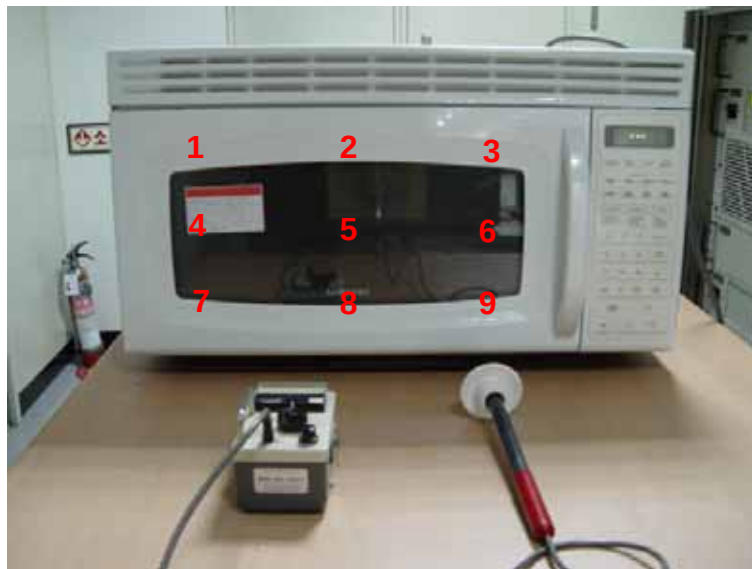
4. Radio Noise Emission Measurement Procedures/Results

4.1 Radiation Hazard Measurement

A 700-ml water load was placed in the center of the oven.

The power of MWO 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]
1	0.10	1.0
5	0.10	1.0
7	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 was set to maximum power. 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 power [watts]
120	14.34	1680	1650

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 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	33.5	120	820.0
1000	10	33.2	120	809.5
1000	10	33.4	120	816.5
Average RF Power of 3 Trials				815.3

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

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 $25 \times \text{SQRT}(\text{power}/500) [\text{uV/m}]$ @ 300M limit.

4.4 Operation Frequency Measurement

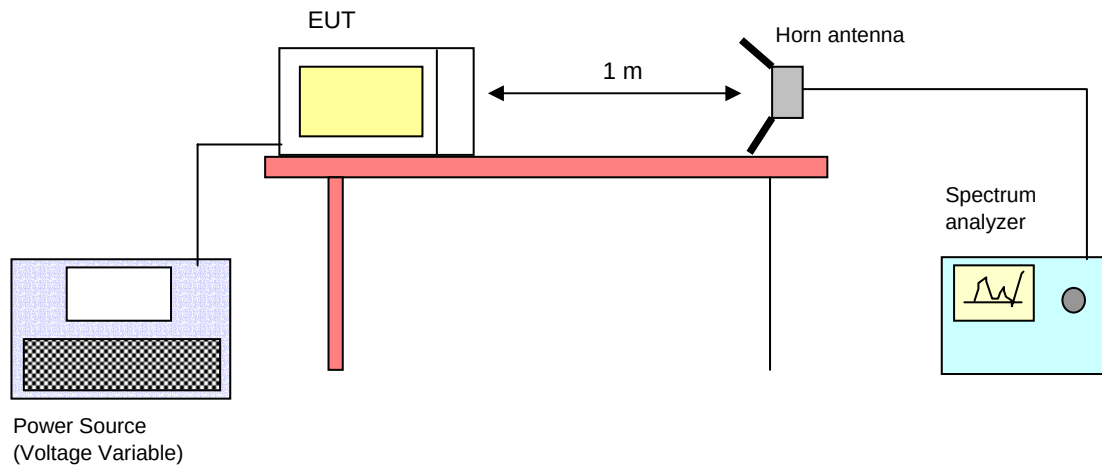


Fig. 4 Operating Frequency Measurements Configuration



4.4.1 Frequency Measurement

Following the above test, after operating the oven long enough to assure that stable operating temperature the results 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 : 24.0 °C]

Line Voltage Variation (V)	Frequency (MHz)	Allowed Tolerance for the ISM Band (2450MHz)
150 (125%)	Lower : 2450	Lower: 2400 MHz Upper : 2500 MHz
	upper : 2466	
132(110%)	Lower : 2443	
	upper : 2461	
120 (Nominal)	Lower : 2441	
	upper : 2461	
108 (90%)	Lower : 2447	
	upper : 2459	
96 (80%)	Lower : 2442	
	upper : 2458	

Result : PASSED

(2) Frequency vs Load Variation Test

Initial load : 1000 ml water in the glass beaker

[Room Temperature : 24 °C]

Volume of Water (cc)	Frequency (MHz)	Allowed Tolerance for the ISM Band (2450MHz)
1000	Lower : 2441	Lower: 2400 MHz Upper : 2500 MHz
	upper : 2461	
800	Lower : 2449	
	upper : 2464	
600	Lower : 2446	
	upper : 2456	
400	Lower : 2450	
	upper : 2468	
200	Lower : 2446	
	upper : 2465	

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

Result : PASSED

4.5 Conducted Emission Measurement

4.5.1 Conducted Emission Measurement Procedure

Configured the EUT System in accordance with ANSI C63.4-2003 section 6 and 7.

Connected 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 calibrated coaxial cables, 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

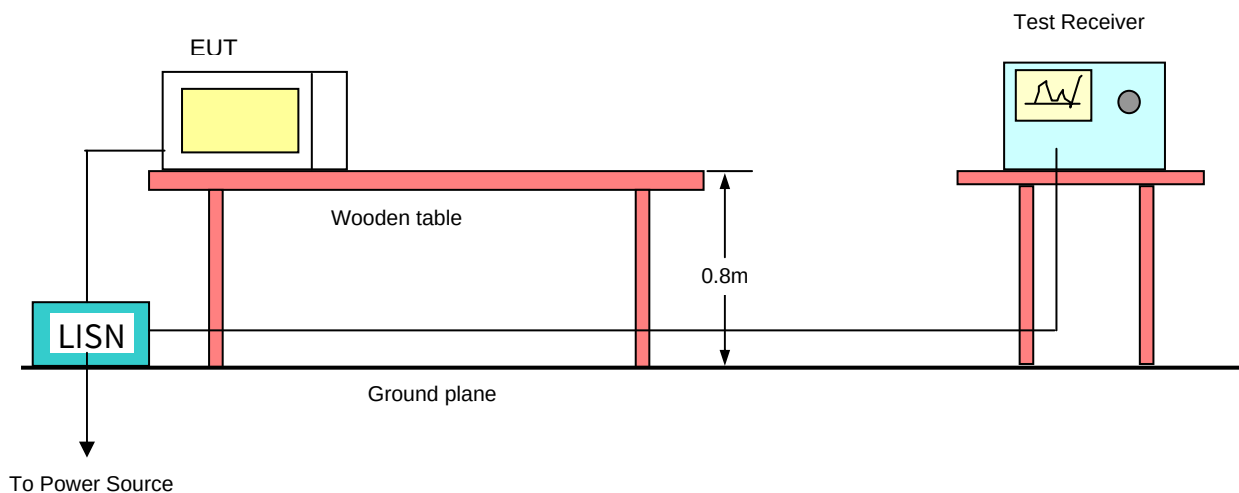
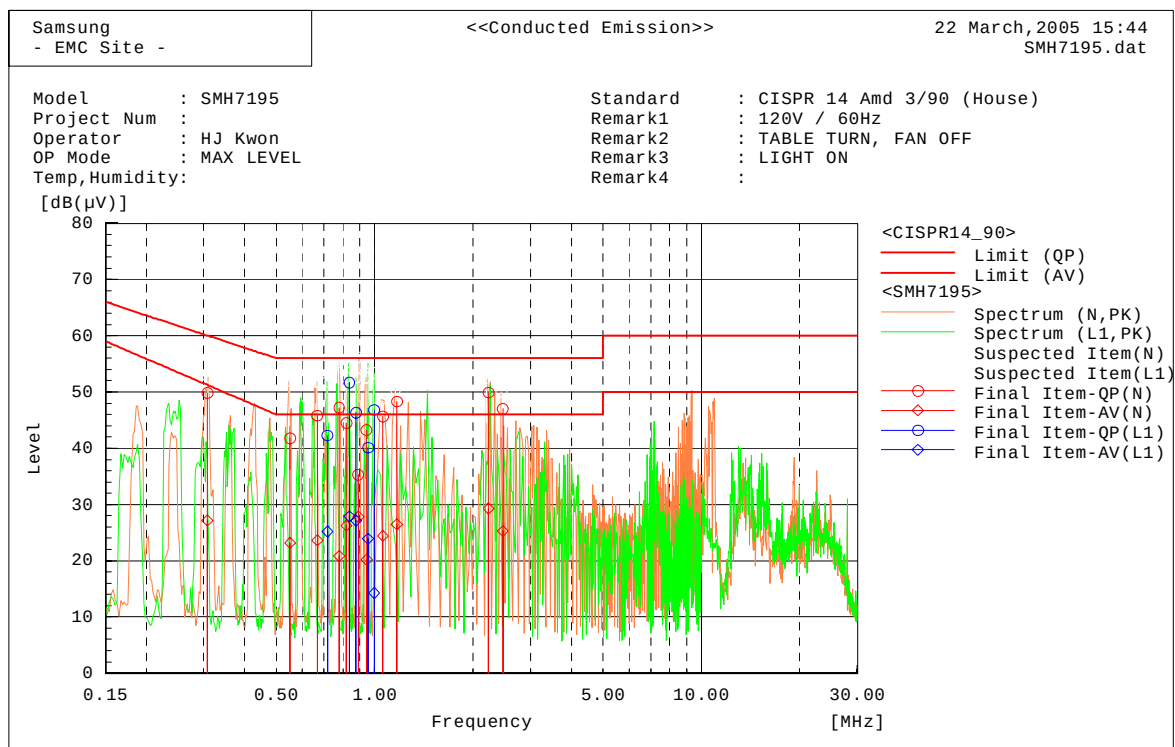


Fig. 5 Conducted Emission Configuration(0.15 - 30MHz)

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	0.55116	41.6	23.0	0.2	41.8	23.2	56.0	46.0	14.2	22.8
2	0.66801	45.6	23.4	0.2	45.8	23.6	56.0	46.0	10.2	22.4
3	0.77813	47.0	20.6	0.2	47.2	20.8	56.0	46.0	8.8	25.2
4	0.81974	44.3	26.1	0.2	44.5	26.3	56.0	46.0	11.5	19.8
5	0.8905	35.1	27.6	0.2	35.3	27.8	56.0	46.0	20.7	18.2
6	0.94486	43.0	20.0	0.2	43.2	20.2	56.0	46.0	12.8	25.8
7	2.2335	49.8	29.2	0.1	49.9	29.3	56.0	46.0	6.1	16.7
8	0.30787	49.6	27.0	0.2	49.8	27.2	60.0	51.2	10.2	24.1
9	2.4672	46.9	25.2	0.1	47.0	25.3	56.0	46.0	9.0	20.7
10	1.1699	48.2	26.4	0.1	48.3	26.5	56.0	46.0	7.7	19.5
11	1.061	45.4	24.2	0.2	45.6	24.4	56.0	46.0	10.4	21.6

--- 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	0.71663	42.1	25.0	0.2	42.3	25.2	56.0	46.0	13.7	20.8
2	0.83669	51.5	27.7	0.2	51.7	27.9	56.0	46.0	4.3	18.2
3	0.87713	46.2	26.9	0.2	46.4	27.1	56.0	46.0	9.7	18.9
4	0.9554	39.9	23.7	0.2	40.1	23.9	56.0	46.0	15.9	22.1
5	0.99726	46.6	14.1	0.2	46.8	14.3	56.0	46.0	9.2	31.8

4.6 Radiated Emission Measurement

4.6.1 Radiated Emission Measurement Procedure

Radiated emission was 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 was supported for 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 3 meters for measurement from 1 - 25GHz, respectively, for the device under test.

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, 700-ml water load was 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 detecting mode of the test receiver was set to average 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

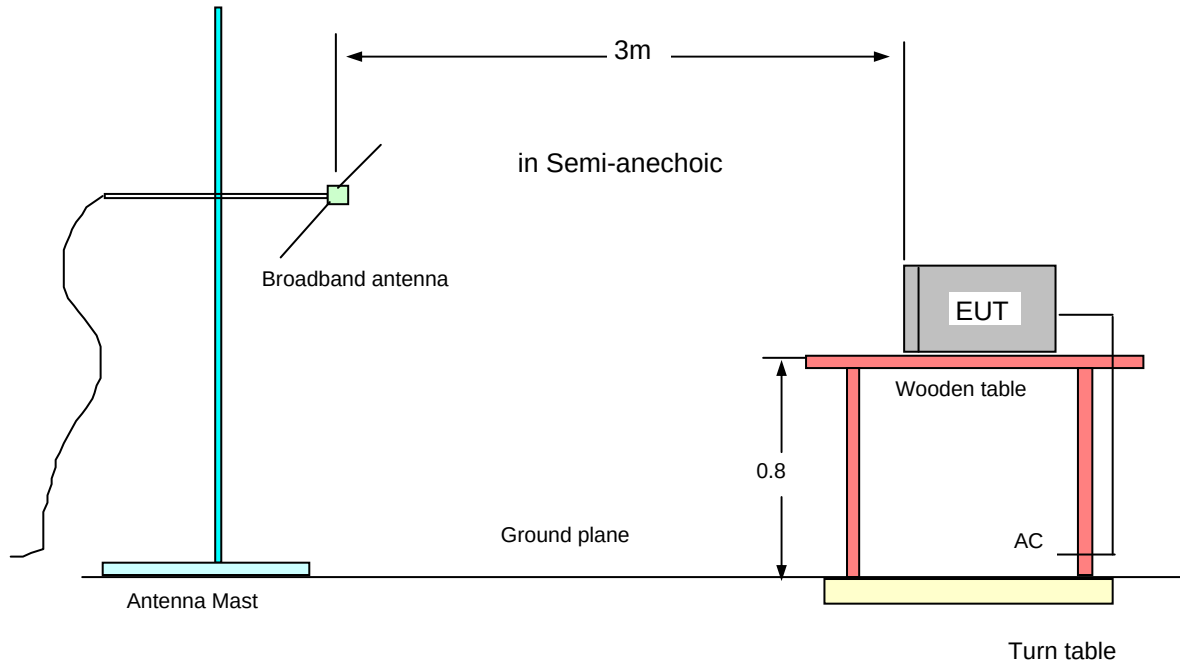


Fig. 6 Radiated Emission Configuration(30 - 1000MHz)

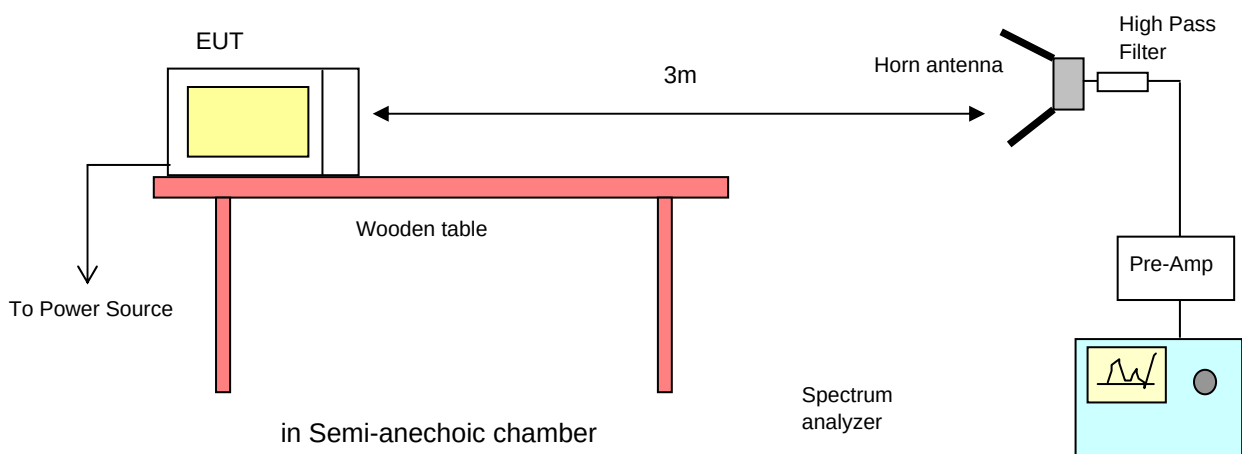


Fig. 7 Radiated Emission Configuration(1 - 25GHz)

4.6.3 Radiated Emission Measurement Data(30 - 1000MHz)

Test distance : 3m

Tested Frequency [MHz]	Meter Reading [A] [dBuV]	Total Loss [B] [dB]	Results [A+B] [dBuV/m]	Limits at 300m [dBuV/m]	ANT Pol.	Margin (Result-Limit) [dB]	Antenna Height [Cm]	Turn table Degree [Deg]
	Pk		Pk			Pk		
106.4	82.5	-13.4	69.1	70.08	V	-0.98	199	351
139.1	62.9	-13.5	49.4	70.08	V	-20.68	199	124
243.4	71.3	-10.7	60.6	70.08	V	-9.48	101	44
319.4	65.1	-7.7	57.4	70.08	H	-12.68	101	283
938.1	61.3	3.6	64.9	70.08	V	-5.18	150	32
941.6	52.4	3.6	56.0	70.08	V	-14.08	150	32
971.7	65.2	4.4	69.6	70.08	H	-0.48	101	205
973.4	61.0	4.4	65.4	70.08	V	-4.68	199	11

[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 30.08 dBuV/m.

Add 40dB to 30.08 dBuV/m gives a 70.08 dBuV/m @ 3 meters.

4.6.4 Radiated Emission Measurement Data(1 - 25GHz)

Test distance : 3m

Tested Frequency [MHz]	Meter Reading [dBuV]	Total Loss [dB]	AMP [dB]	HPF [dB]	Results [dBuV/m]	Limits at 300m [dBuV/m]	ANT Pol.	Margin [dB]
2399	67.4	26.3	40.4	0	4.63	30.05	V	-25.42
4592	45.7	34.8	41.7	1	0.87	30.05	V	-29.18
4914	38.0	34.8	41.7	1	0.36	30.08	V	-29.72
6482	50.1	39.5	41.5	1	2.56	30.08	V	-27.52
7367	39.2	41.1	41.5	1	0.87	30.08	V	-29.21
9820	36.3	37.3	41.7	1	0.39	30.08	V	-29.69
11084	41.0	37.3	41.6	1	0.68	30.08	V	-29.40
12261	37.3	41.2	40.7	1	0.77	30.08	V	-29.31
14725	38.5	41.4	41.7	1	0.80	30.08	V	-29.28
17159	47.3	43.0	41.5	1	2.78	30.08	V	-27.31

* $f_0 = 2450\text{MHz}$

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

* **AMP** : Pre-amplifier

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

* $\text{Margin} = \text{Result-Limit}$

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.

* $\text{Field Strength (uV/meter at 300 meters)} = K \times 10^{\wedge} [(MR+TL-AMP) / 20]$

Where: K is the ratio of: $[\text{measurement distance} / \text{requirement distance}]$

MR: Meter Reading

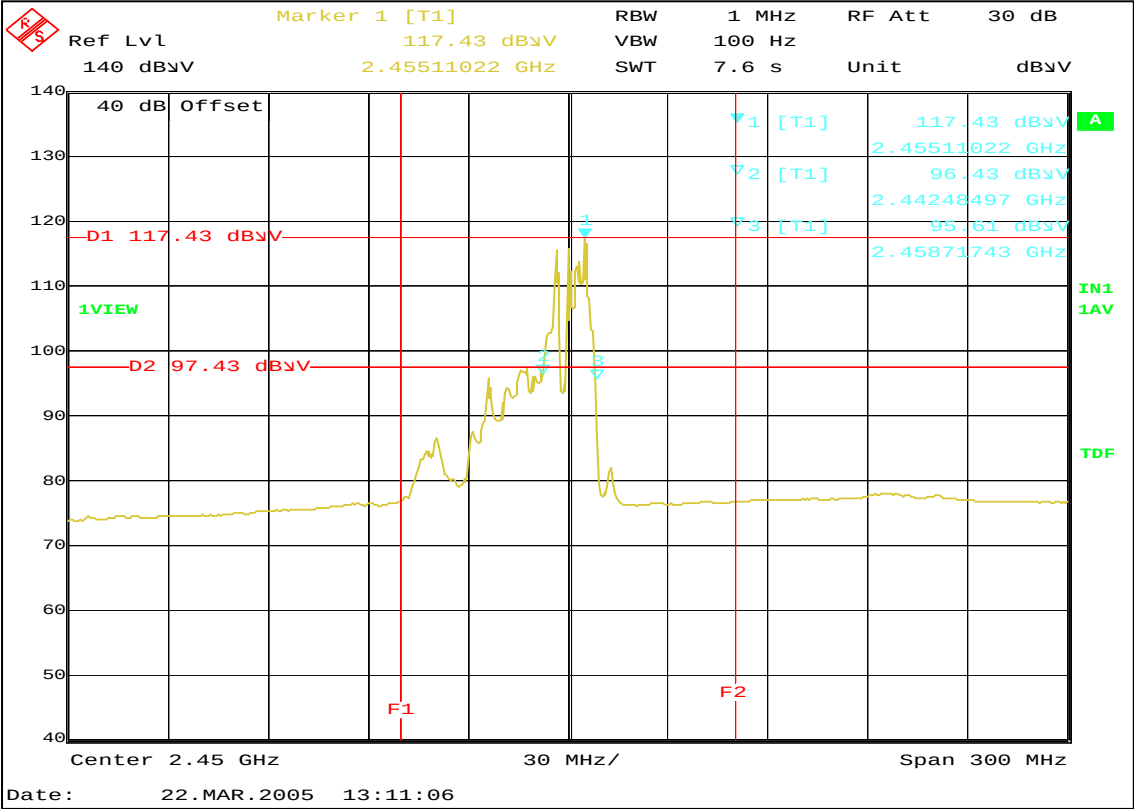
TL: Total Loss

5. Measurement Equipment List

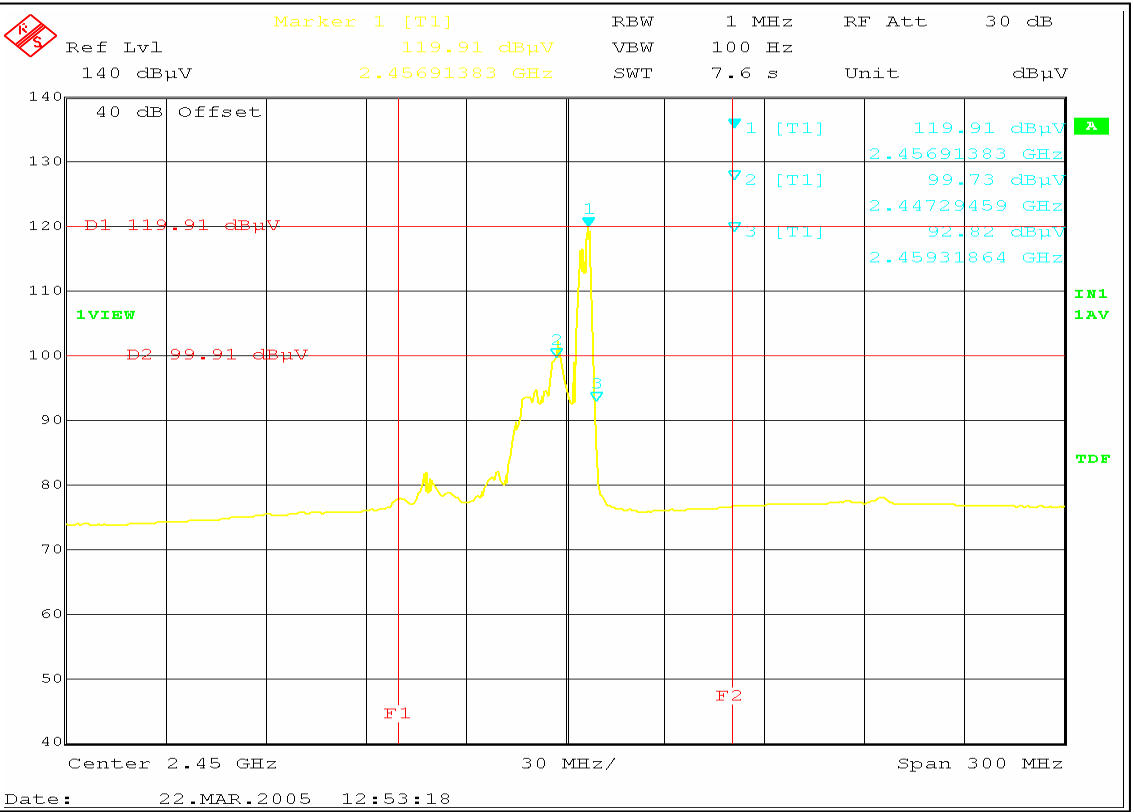
Equipment	Model No.	Serial No.	Makers	Latest calibration and Interval
Field strength meter	ESS30	844861/005	R & S	05/01/11, 12Months
	ESI26	100067	R & S	05/02/18, 12Months
Measurement Software	EP5RE	-	TOYO	N/A
Pre-Amplifier	8449B	3008A00705	H.P	04/07/20, 12Months
Double Ridged Guide Antenna	3115	9505-4441	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	US41110272	Agilent	05/01/20, 12Months
Field strength meter	ESS30	844861/005	R&S	05/01/11, 12Months
L.I.S.N	ESH3-Z5	100261	R&S	04/07/23, 12Months
Measurement Software	EP5CE	-	TOYO	N/A

Frequency vs Line Voltage Variation Test

96V(80%)

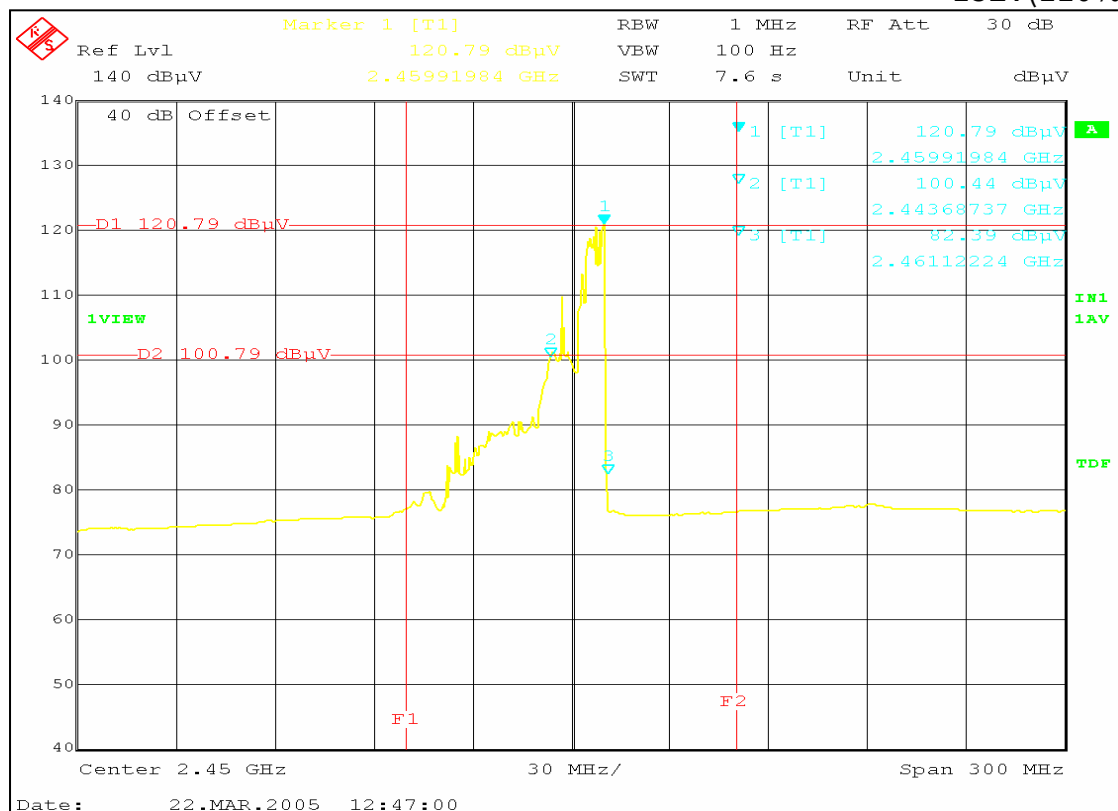


108V(90%)

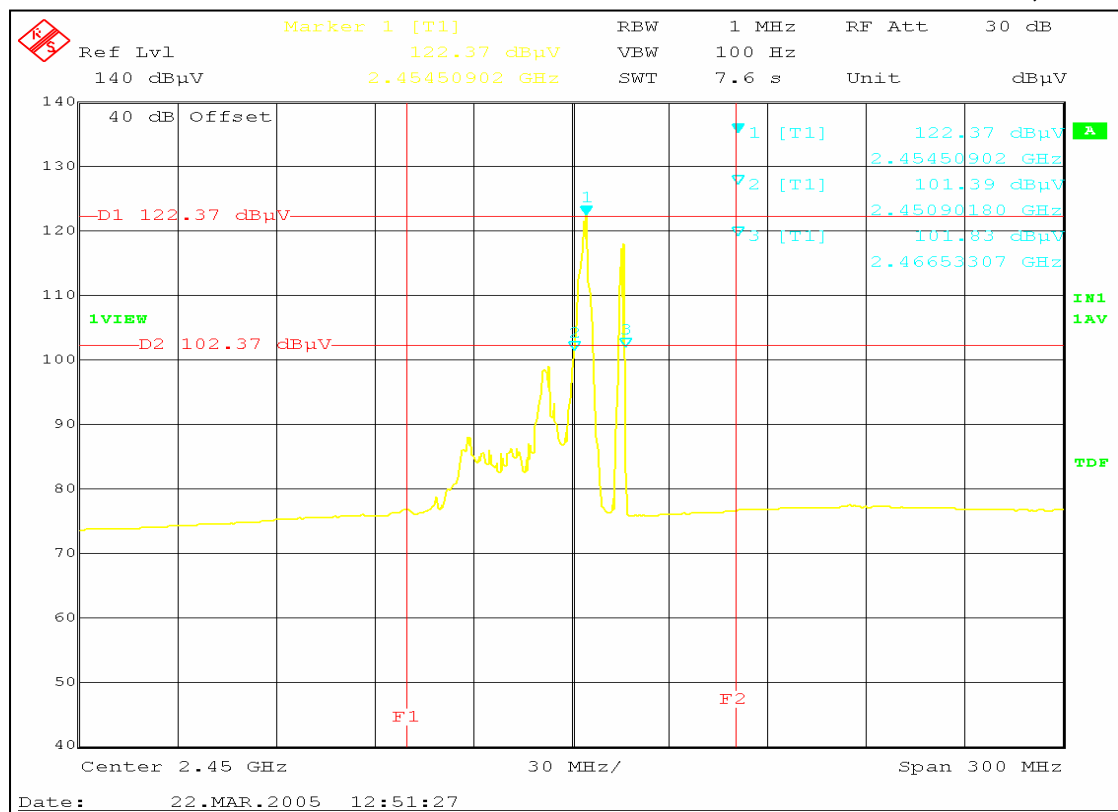


Frequency vs Line Voltage Variation Test

132V(110%)

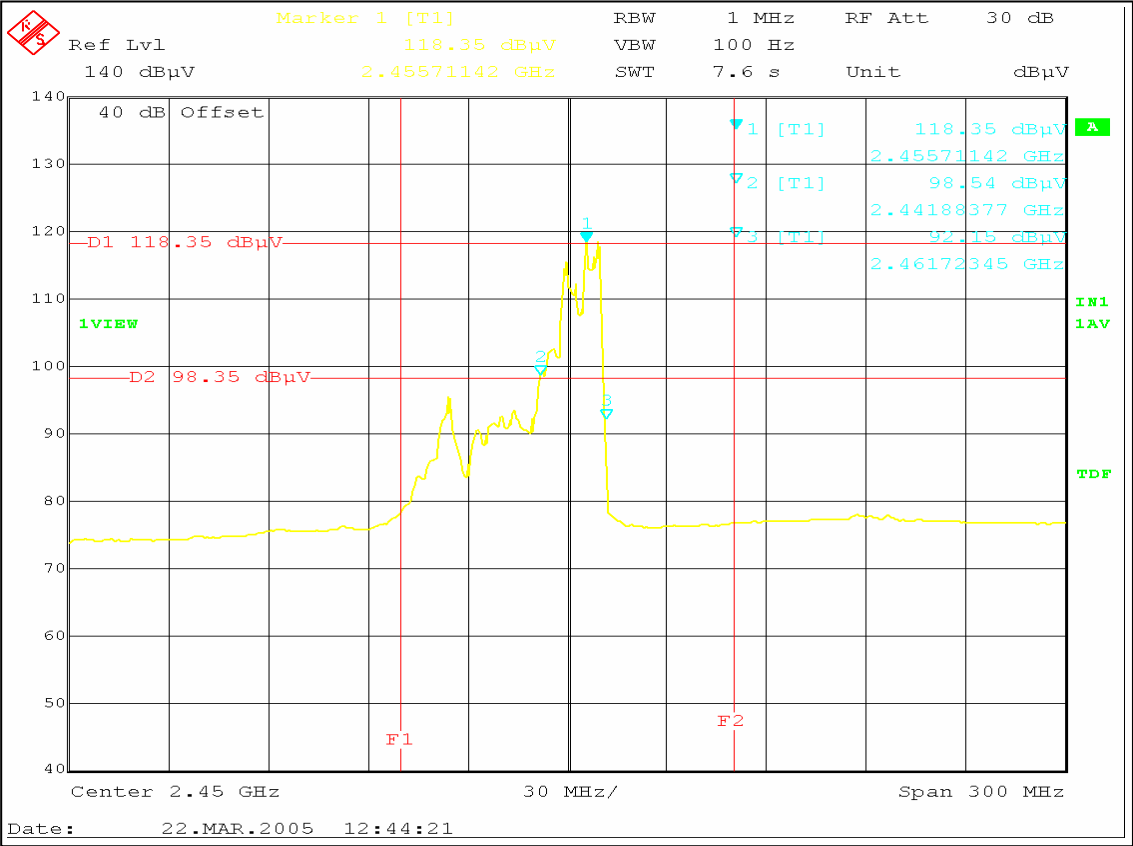


150V(125%)

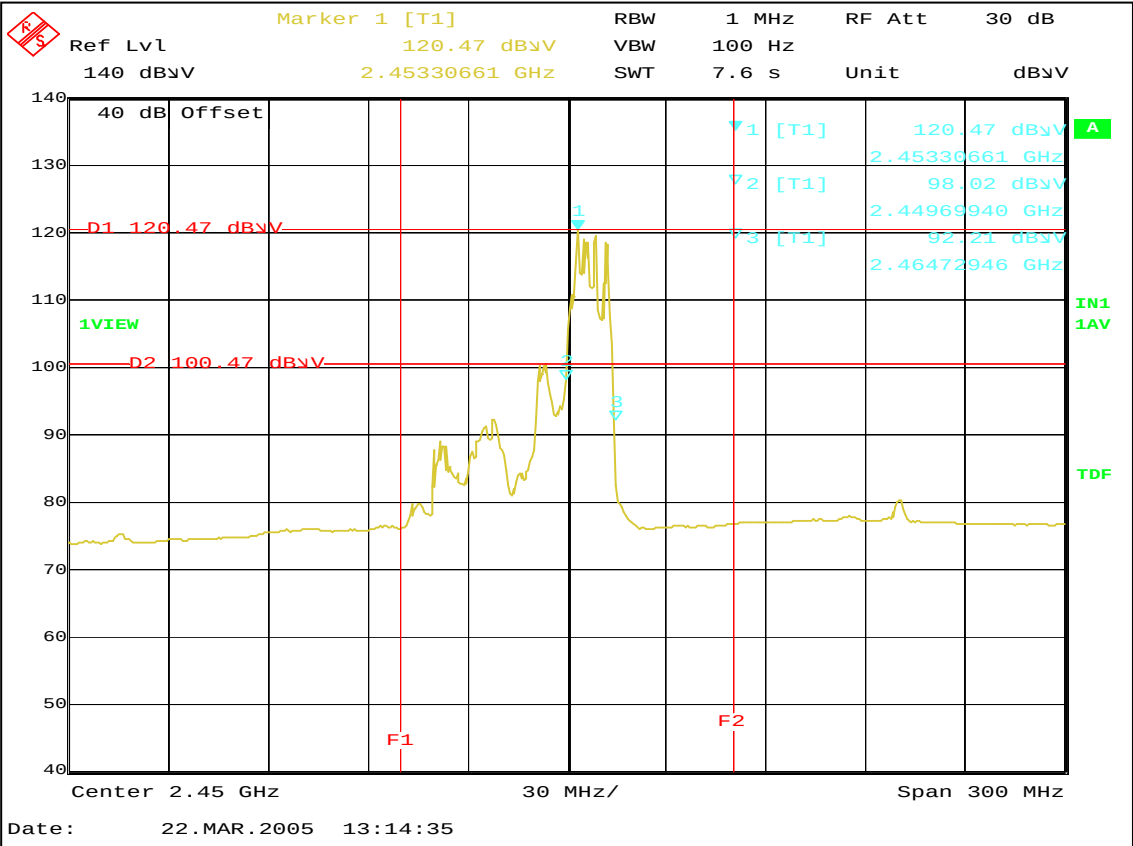


Frequency vs Load Variation Test

120V(1000ml)

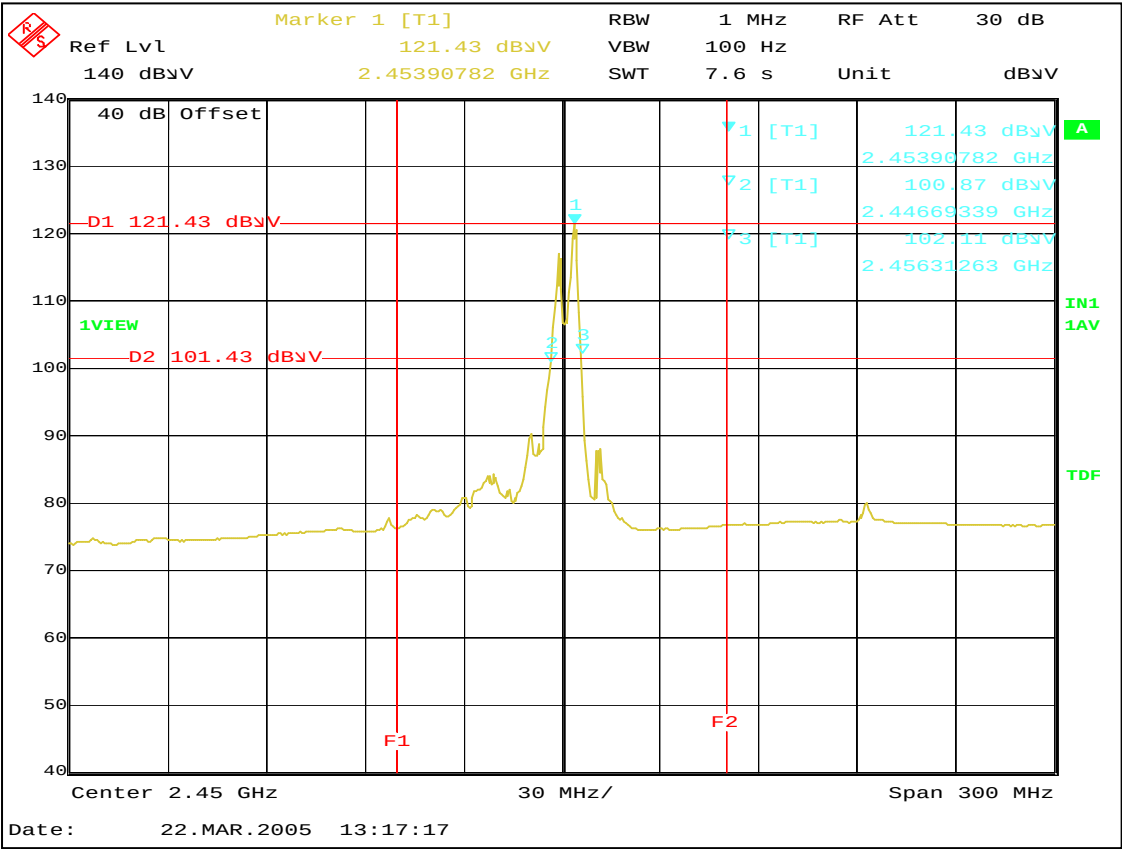


120V(800ml)

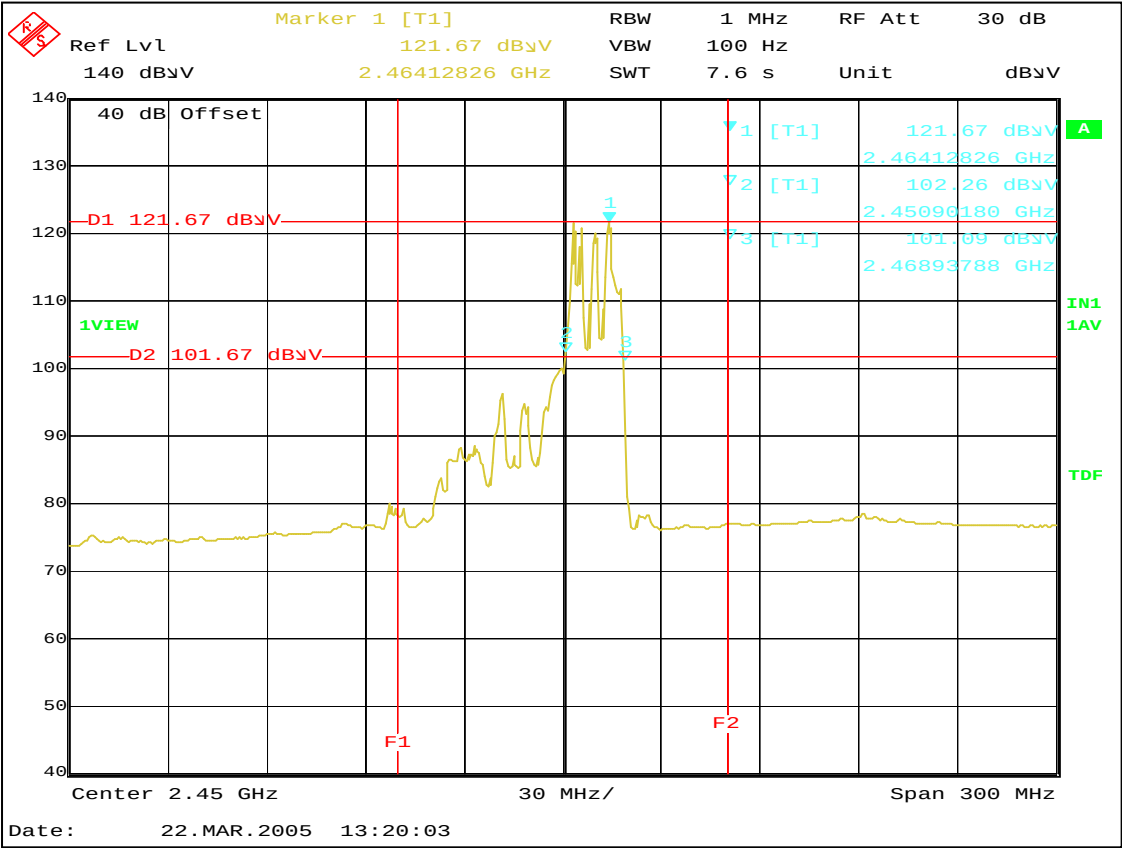


Frequency vs Load Variation Test

120V(600ml)

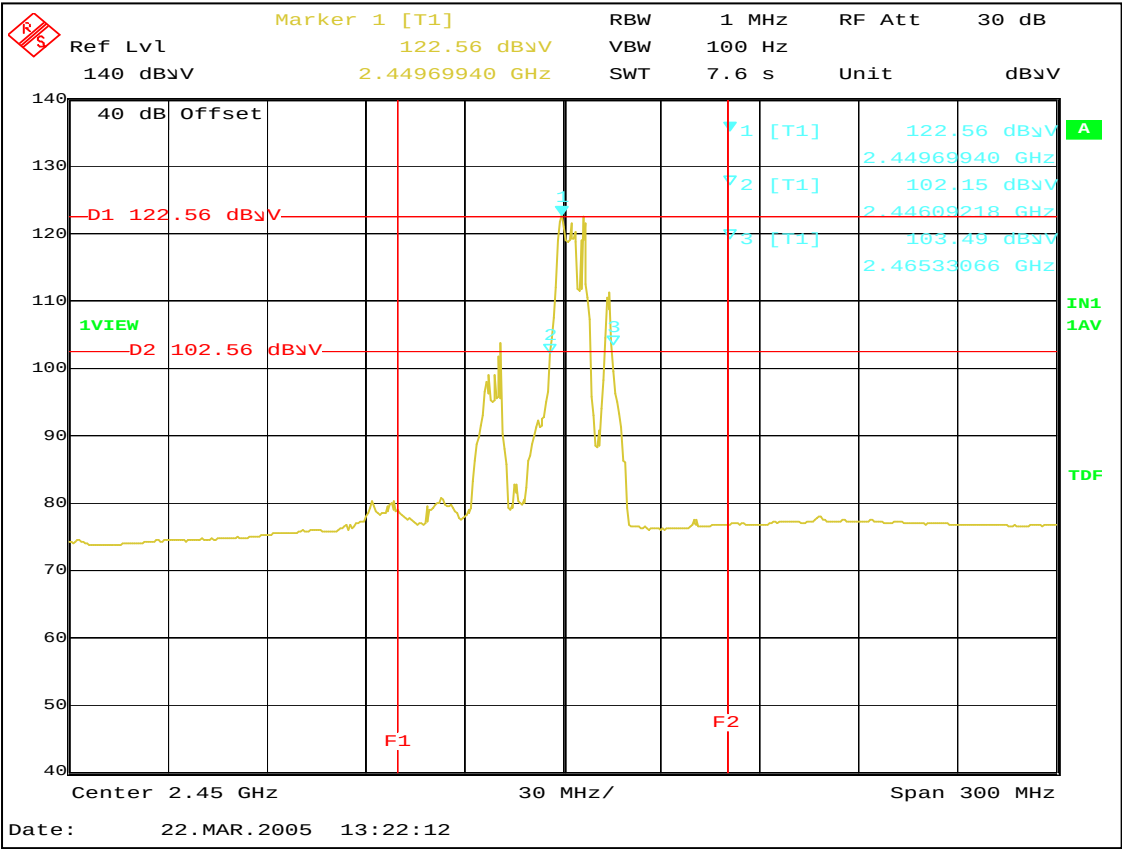


120V(400ml)



Frequency vs Load Variation Test

120V(200ml)



Label

SAMSUNG		HOUSEHOLD MICROWAVE OVEN 42000 PELABUHAN KLANG, SELANGOR, W. MALAYSIA		LISTED  725F	
MODEL No. SMH7195WE	SERIAL No. gplymnnnnn	120 Vac	60Hz	1.65 kW MICROWAVE	
MANUFACTURED : MAY-2005					
FCC ID : A3LSMH19CN		MADE IN MALAYSIA		SEMA	
THIS PRODUCT COMPLIES WITH DHHS RULES 21 CFR SUBCHAPTER J.					
fgplymnnnnnc					



