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.

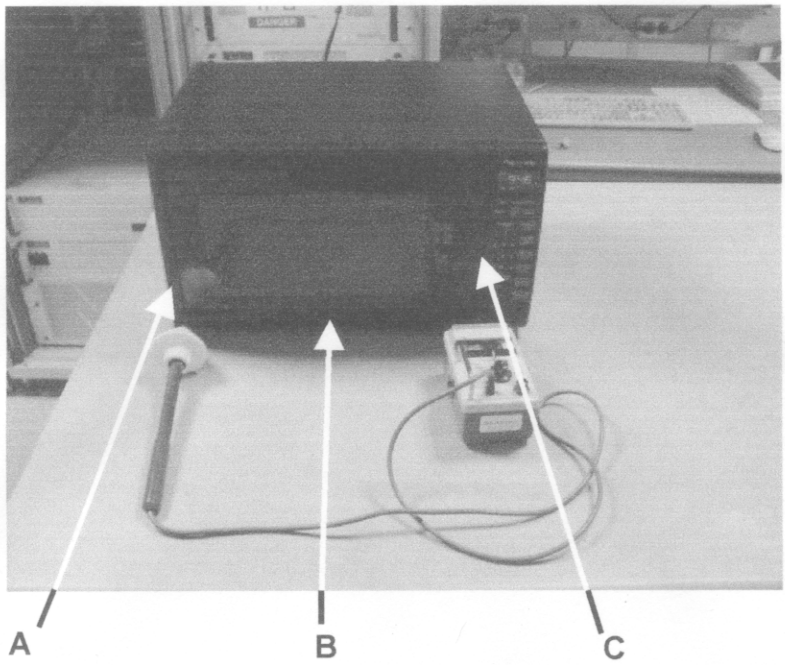

Fig. 1 Test Setup and the locations of maximum leakage

The results of this test are as follows.

Probe Location	Maximum Leakage [mW/Cm2]	Limit [mW/Cm2]
A	0.10	1.0
B	0.00	1.0
C	0.00	1.0
All others	0.05	1.0

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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. The results of this test are as follows.

Fig. 2 Test Setup for Input power

Input Voltage [Vac]	Input Current [amps]	Measured Input power [watts]	EUT Spec. Input power [watts]
120	**16.29**	**1946**	**2040**

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

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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 emperatur centigrade	Final Temperature [centigrade]	Elapsed Time [seconds]	RF Power [watts]
1000	10	40.2	120	1053.7
Average RF Power of 3 Trials				1053.728333

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

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 25xSQRT(power/500)[uV/m] @ 300M limit.

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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**		
39.90	30.6	13.1	43.7	71.20	V	-27.48	132	110
155.50	37.3	11.1	48.4	71.20	H	-22.79	364	100
247.10	52.5	13.8	66.3	71.20	V	-4.90	350	111
493.00	23.1	20.8	43.9	71.20	H	-27.25	127	115
547.00	26.0	22.7	48.7	71.20	H	-22.50	100	110
548.00	33.3	22.6	55.9	71.20	V	-15.26	100	105
739.00	18.8	24.6	43.4	71.20	V	-27.80	100	100
739.5	17.9	24.6	42.5	71.20	V	-28.70	100	100

[NOTE]

** fo = 2450MHz*

** Test distance : 3m*

** 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* 31.20 *dBuV/m.*
Add 40dB 31.20 *dBuV/m gives a* 71.20 *dBuV/m @ 3 meters.*

** Spectrum analyzer setting*
Peak(Pk) : Resolution Bandwidth(1MHz), Video Bandwidth(1MHz)

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4.5.4 Radiated Emission Measurement Data(1 - 25GHz)

Test distance : 3m

Tested Frequency [MHz]	Meter Reading [dBuV]	Total Loss [dB]	AMP [dB]	HPF [dB]	k Factor	Results [A+B] [uV/m]	Limits at 300m [uV/m]	ANT Pol.	Margin [uV/m]
1020	17.0	45.0		0	0.0011	1.4	36.29	V	-34.88
2250	33.0	29.4		0	0.0058	7.71	36.29	V	-28.58
2455	62.7	29.7		0	0.0063	262.63	-		-
2720	34.4	30.0		0	0.0070	11.54	36.29	V	-24.75
4600	20.2	34.4		1	0.01	6.03	36.29	V	-30.26
4904	25.0	35.8		1	0.01	12.30	36.29	V	-23.99
4926	23.4	35.8		1	0.01	10.23	36.29	V	-26.06
6346	27.9	36.5		1	0.01	18.62	36.29	V	-17.67
11645	19.7	43.5		1	0.01	16.22	36.29	V	-20.07

** **f**o = 2450MHz*

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

** **AMP** : Pre-amplifier*

** The limit at 300 meters is 25 * √RF Power/500*

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

** 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.*
2. *In the frequency range of the 3rd harmonics to 10th harmonics, emission from the EUT at 3m distance was measured and the level was lower than the floor noise level of 10dB μV/m.*

** k : Conversion Factor*

*K = 0.0137 * logF - 0.0401 (if F < 4575 MHz)*

K = 0.01 (if F ≥ 4575 MHz)

F = Meter Reading Frequency

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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 water load was maintained at 200 ml for the duration of the test.

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

Initial load : 1000 ml
Load at completion of test : 200 ml

(1) Frequence vs Line Voltage Variation Test

Maximum frequency variation:

2452.7-2466.5㎒ (96V~150V / 1000cc Load)

(2) Frequence vs Load Variation Test

Maximum frequency variation:

2450.3-2459.3㎒ (1000cc~200cc / 120V)

Results: Passed

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4.5 Radiated Emission Measurement

4.5.1 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 discorvered.

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