



**Telecommunications & Telematics
for Transports Lab.**

TEST REPORT

Ref. No. ARSF00068

Date: 2007-01-03

Measurements performed in accordance with:



**FCC Rules : Code of Federal Regulations (CFR) no. 47 -
PART 18 – RADIO FREQUENCY DEVICES**

PRODUCT	: ELECTRIC AND MICROWAVE OVEN
TESTED MODEL	: GMC275PDB07
FCC ID	: TBKCOMBOJBL00
APPLICANT	: WHIRLPOOL EUROPE S.r.l. – Via Aldo Moro,1 – I-21024 Biandronno
MANUFACTURER	: WHIRLPOOL EUROPE S.r.l. – Via Aldo Moro,1 – I-21024 Biandronno
TRADEMARK	: WHIRLPOOL
SERIES	: WPL COMBO
OTHER INFORMATION	<p>Testing dates : 2005-05-09 ÷ 2006-09-26</p> <p>Tested samples No. : 2</p> <p>Testing Laboratory : IMQ S.p.A. Via Quintiliano, 43 I-20138 MILANO</p> <p>Testing Site : Via Quintiliano, 43 I-20138 MILANO</p>

Tested by R. Colombo

Checked by: Eng. C. Cantaluppi
(EMC & R&TTE Lab Head)

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2005-07-06	Test Results and Evaluation Report
Rev. 1	2006-11-22	Limit Lines modification
Rev. 2	2007-01-03	Insertion of FCC/OST MP-5 measurement test and FCC ID Number

NOTICE : The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself. This report shall not be reproduced partially or in its entirety without the written approval of IMQ S.p.A.

IMQ S.p.A. - Via Quintiliano, 43 – I-20138 MILANO

CONTENTS

1 GENERAL DESCRIPTION OF EQUIPMENT UNDER TEST	1-3
1.1 APPLICANT.....	1-3
1.2 MANUFACTURER.....	1-3
1.3 EQUIPMENT CLASSIFICATION	1-3
1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	1-4
1.5 FEATURE OF EQUIPMENT UNDER TEST	1-4
1.6 MODEL AND VARIANTS	1-4
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	2-5
2.1 ENVIRONMENTAL CONDITIONS	2-5
2.2 DESCRIPTION OF SUPPORT EQUIPMENT.....	2-5
2.3 INTERFACE IDENTIFICATION AND CONNECTION DIAGRAM OF TEST SYSTEM.....	2-6
3 TESTS IDENTIFICATION AND RESULTS.....	3-7
3.1 TEST SPECIFICATIONS, METHODS & PROCEDURES OF MEASUREMENT	3-7
3.2 FREQUENCY RANGE INVESTIGATED	3-7
3.3 SUMMARY OF TESTS	3-7
4 MEASUREMENTS AND TESTS DATA.....	4-8
5 ADDITIONAL TECHNICAL INFORMATION.....	5-18
5.1 ELECTROMAGNETICALLY RELEVANT COMPONENTS:	5-18
6 TECHNICAL DOCUMENTATION	6-19
7 PHOTOGRAPHIC DOCUMENTATION	7-20
7.1 EUT IDENTIFICATION	7-20
7.2 RADIATED TEST SET-UP	7-21
7.3 CONDUCTED TEST SET-UP	7-22
8 MEASUREMENT AND TEST EQUIPMENT INSTRUMENTATION	8-23

1 GENERAL DESCRIPTION OF EQUIPMENT UNDER TEST

1.1 APPLICANT

NAME	WHIRLPOOL EUROPE S.r.l.
ADDRESS	Via Aldo Moro,1 Biandronno
COUNTRY	ITALY

1.2 MANUFACTURER

NAME	WHIRLPOOL EUROPE S.r.l.
ADDRESS	Via Aldo Moro,1 Biandronno
COUNTRY	ITALY

1.3 EQUIPMENT CLASSIFICATION

According to the definition 18.107 (g) EUT is a ISM equipment used or intended to be used by the general public in a residential environment (domestic microwave oven).

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Parameters	Value
Type of equipment	▪ Electric and Microwave oven
Model	▪ GMC275PDB07
Trade Name	▪ WHIRLPOOL
Power supply type	▪ AC Mains
AC power input cable	▪ /

1.5 FEATURE OF EQUIPMENT UNDER TEST

Power specification	▪ 2/N/PE AC 120 V
Operating frequency:	▪ 60 Hz
RF frequency:	▪ 2450 MHz
Maximum RF output power:	▪ 900 W (declared by the manufacturer's)

1.6 MODEL AND VARIANTS

Basic Model Tested	GMC275PDB07
Derived models:	
1) GMC275P****	2) GMC305P****
Remark:	**** Model designation may be followed by up to four suffix letters and numbers to indicate aesthetic and colour changes. See "TBKCOMBOJBL00 - models covered" document for detailed information

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST

2.1 ENVIRONMENTAL CONDITIONS

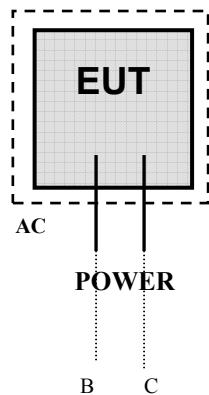
TEST CONDITIONS	MEASURED
Ambient Temperature	20 ÷ 25 °C
Relative Humidity	50 ÷ 60 %
Atmospheric Pressure	900 ÷ 1000 mbar

2.2 DESCRIPTION OF SUPPORT EQUIPMENT

Here following the details concerning equipment needed for correct operation or loading of the EUT, but not considered as part of Equipment under Test :

- None.

2.3 INTERFACE IDENTIFICATION AND CONNECTION DIAGRAM OF TEST SYSTEM



#	Interface	Description	Maximum length	Ref. Document
1	Enclosure	Metallic surface	/	/
2	AC mains power input/output port	AC input power port	> 3m	/

3 TESTS IDENTIFICATION AND RESULTS

3.1 TEST SPECIFICATIONS, METHODS & PROCEDURES OF MEASUREMENT

All compliance measurements have been carried out according to the test specification required in and CFR47 Part 18 – Subpart C and:

Standard	Date	Title
FCC/OST MP-5	1986	FCC Methods of measurements of radio noise emissions from industrial scientific, and medical equipment

3.2 FREQUENCY RANGE INVESTIGATED

- a) Conducted emission tests : from 150 kHz to 30 MHz.
- b) Radiated emission tests : from 30 MHz to Highest detectable emission.

3.3 SUMMARY OF TESTS

CFR47 Part 18 Section	Title	Result	Test data
18.305	Conducted Emission	Comply	1
18.307	Radiated Emission	Comply	2
FCC/OST MP-5 Section	Title	Result	Test data
3.1	Radiation hazard test	Comply	3
3.2	Frequency measurements	Comply	4
4.3	RF Output power measurements	Comply	5

4 MEASUREMENTS AND TESTS DATA

TEST No. 1	Title “Conducted emission”	47CFR Part 18 Ref. Section
		18.307
Test setup	ANSI C63.4 / MP-5	
Test facility	Shielded chamber	
Limits of mains terminal disturbance voltage	18.307 (b)	
Frequency range	150 kHz – 30 MHz	
IF bandwidth	9 kHz	
EMC class	B	

TEST DATA	PORT UNDER TEST	OPERATING CONDITION	RESULT
AC main	Continuous operating of microwave oven using a dummy load.		Complies
Note: In search of max noise (phase(s) and neutral). The measurements with Quasi-Peak detector are performed only for frequencies for which the Peak values are \geq (Q.P. limit - 6 dB).			

Modification during the test:

- None

Tested samples

SAMPLE
1

MEASUREMENTS RESULTS**CONDUCTED DISTURBANCE AT AC MAINS POWER PORT**

(The Plot shows the worst measurement performed on L1, L2 and N line)

Quasi-Peak detector (X marked points)

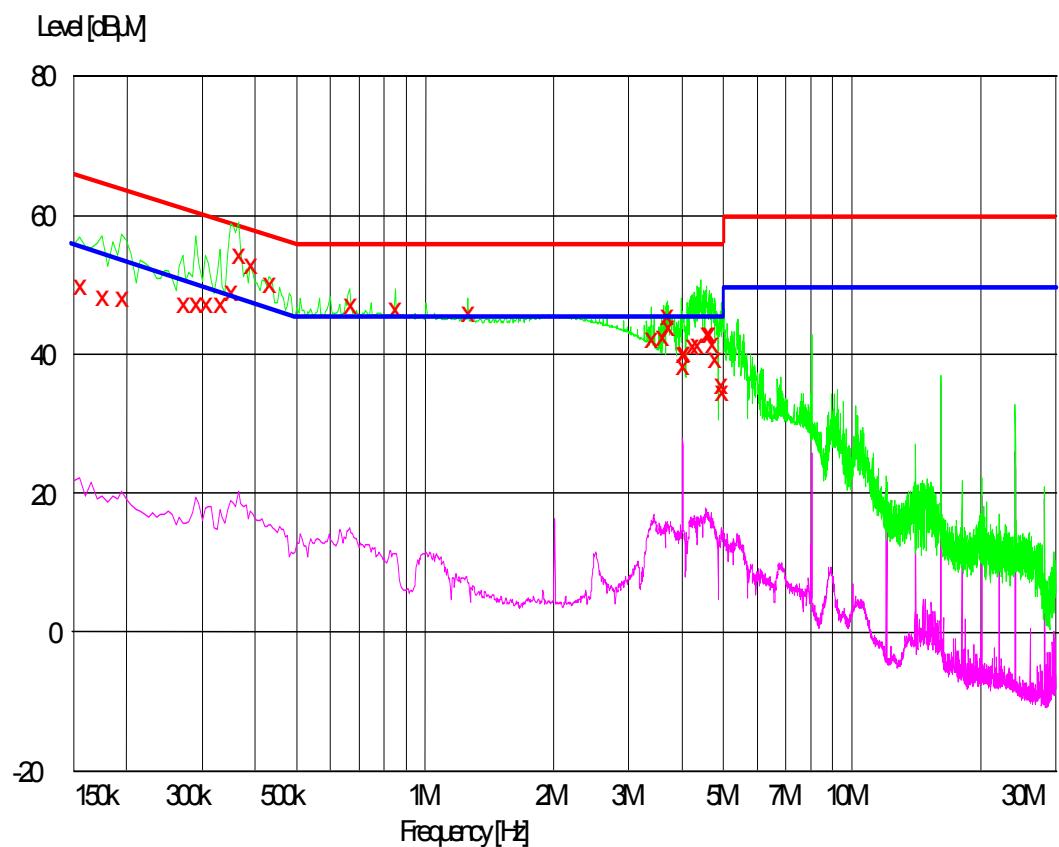
[X]

Average detector

[X]

Peak detector

[X]



TEST No. 2	Title "Radiated disturbances"	47CFR Part 18 Ref. Section
		18.305
Test setup		ANSI C63.4 / MP-5
Test facility		Semi-anechoic chamber
Test distance		3 m
Limits for radiated disturbances		18.305
Frequency range		30 MHz – 24,5 GHz
IF bandwidth (below 1000 MHz)		100 kHz
IF bandwidth (above 1000 MHz)		1 MHz
EMC class		B

Field strength limit			
Operating frequency	Measured RF power (W)	Field strength limit @ 300 m (μ V/m)	Field strength limit @ 3 m (dB μ V/m)
ISM frequency	773,40	31,09	69,85
Non-ISM frequency	773,40	18,66	65,42

TEST DATA	PORT UNDER TEST	OPERATING CONDITION	RESULT
	Enclosure	Continuous operating of microwave oven using a dummy load.	Complies
Note: In search of max noise (EUT rotation: from 0° to 360°; receiving antenna height: from 1 m to 4 m; receiving antenna polarization: horizontal and vertical). The measurements with Quasi-Peak detector are performed only for frequencies for which the Peak values are \geq (Q.P. limit - 6 dB).			

Tested samples

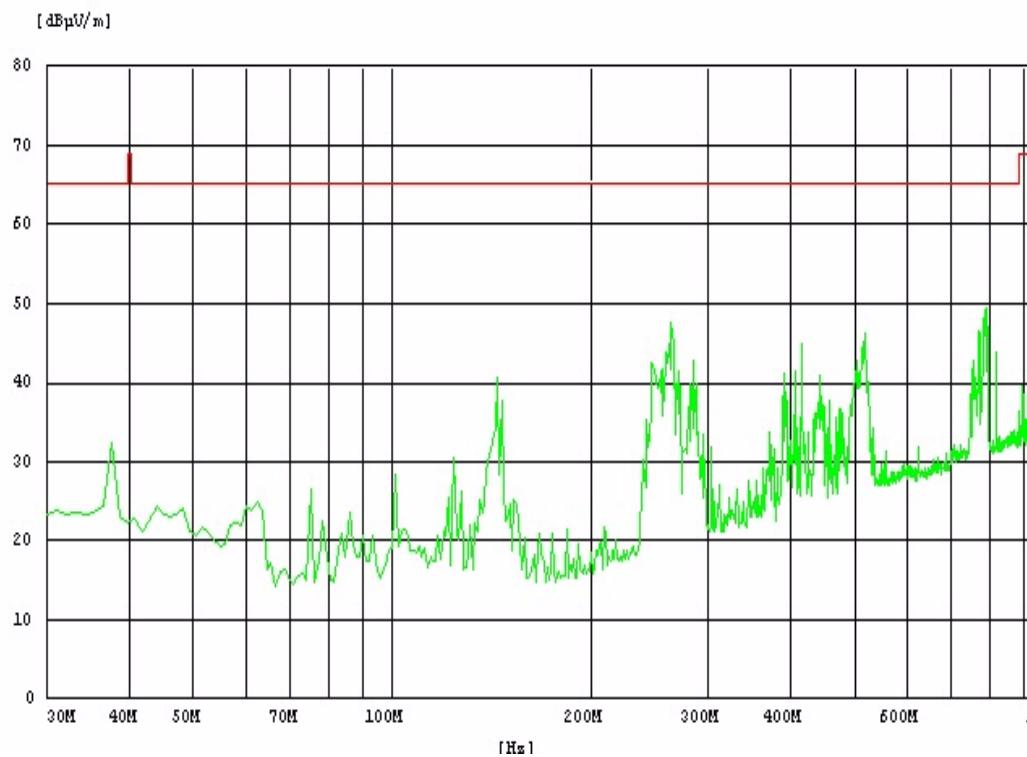
SAMPLE
1

MEASUREMENTS RESULTS**MEASUREMENTS RESULTS (below 1000 MHz)**

Quasi-Peak detector (X marked points) []

Average detector []

Peak detector [X]



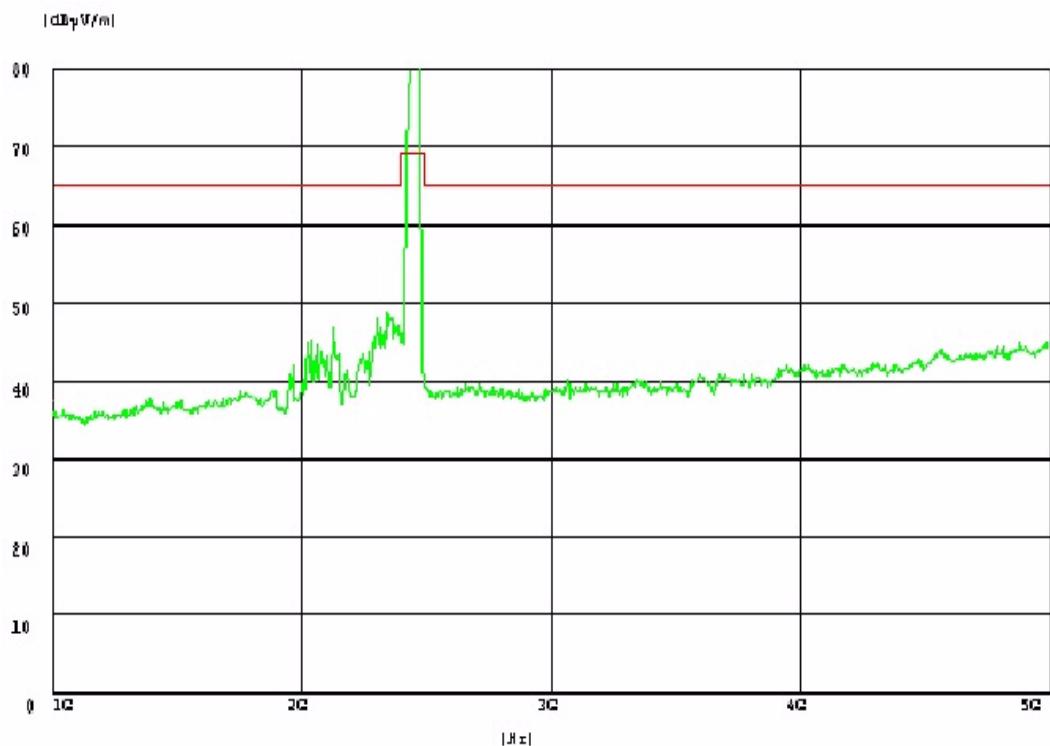
MEASUREMENTS RESULTS

MEASUREMENTS RESULTS (1 GHz ÷ 5 GHz)

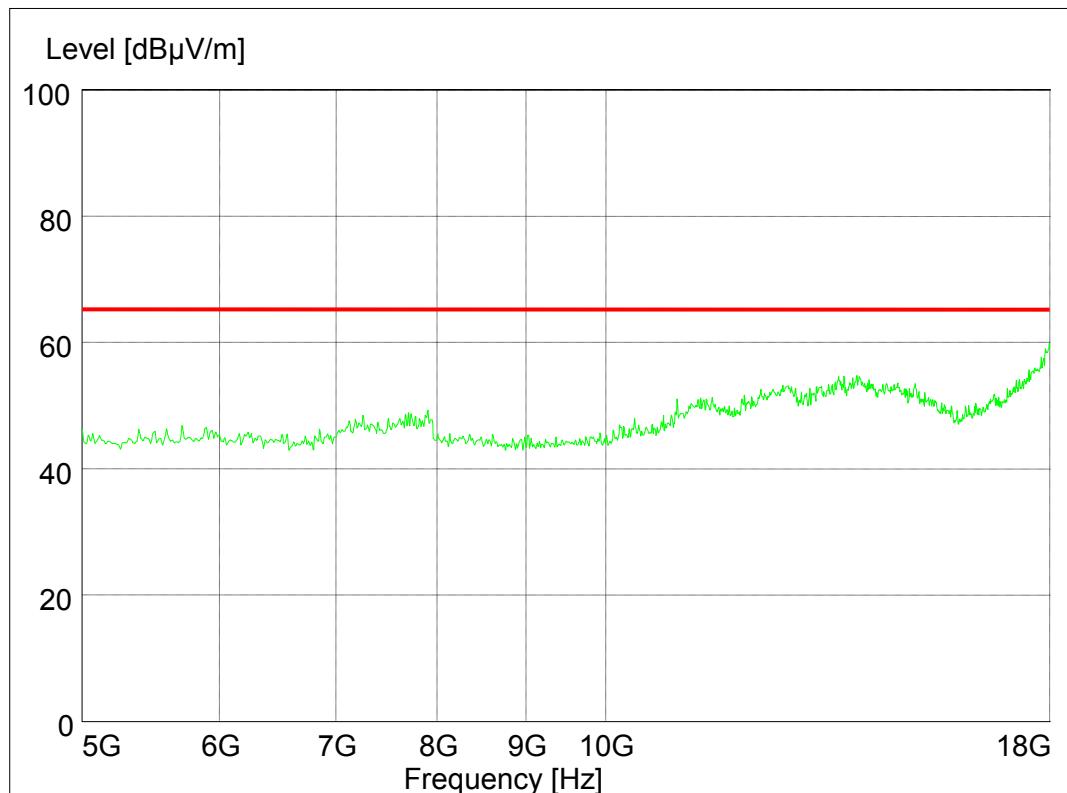
Quasi-Peak detector (X marked points)

Average detector

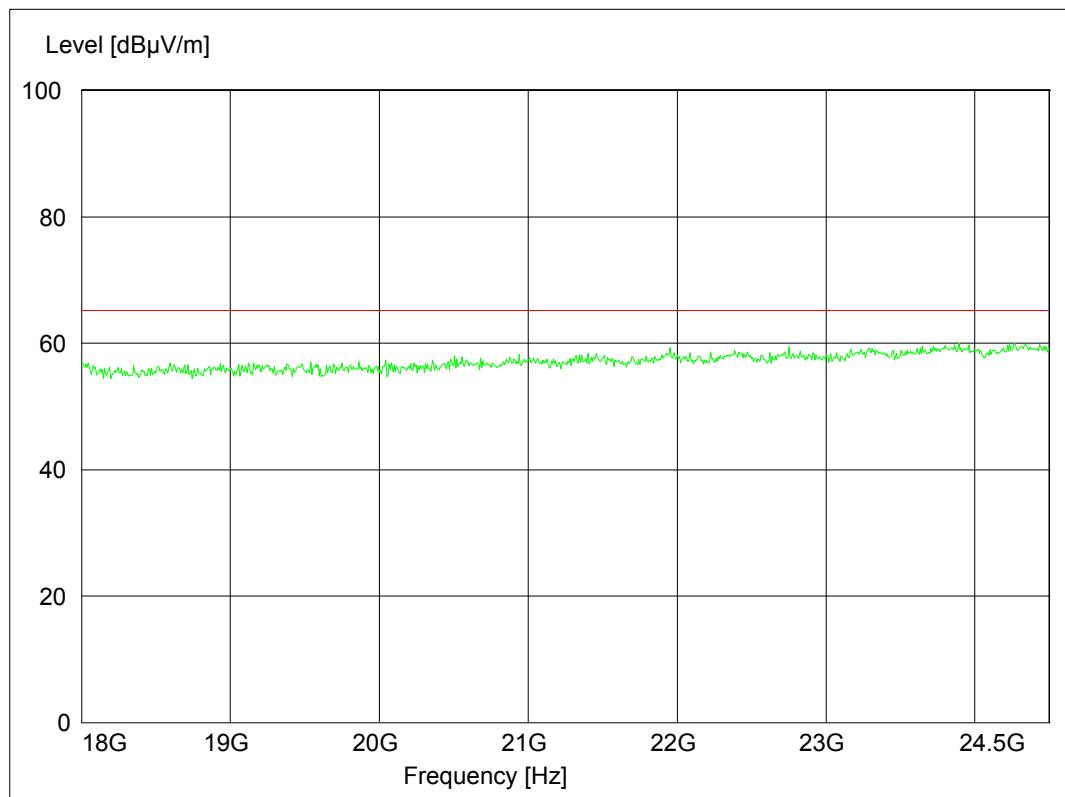
Peak detector



Remark: All the measured field strength levels above the permitted limits are inside the ISM assigned frequency band.

MEASUREMENTS RESULTS (5 GHz ÷ 18 GHz)Quasi-Peak detector (X marked points) Average detector Peak detector 

Remark: All the measured field strength levels are below the noise floor

MEASUREMENTS RESULTS (18 GHz ÷ 24.5 GHz)Quasi-Peak detector (X marked points) Average detector Peak detector 

Remark: All the measured field strength levels are below the noise floor

TEST No. 3	Title “Radiation hazard test”	47CFR Part 18
		Subpart C
TEST REQUIREMENTS	Test setup	FCC/OST MP-5
	Limits of mains terminal disturbance voltage	FCC Bulletin OST 56
	Frequency range	0.3 MHz ÷ 100 GHz
	EUT Power	Maximum power
	Load	According to clause 4.1: 1000 ml
	Measuring distance	25 cm

Modification during the test:

- None

MEASUREMENTS RESULTS

Maximum measured power density (mW/cm ²)	Minimum Limit (mW/cm ²)	Result
0.020	1.0	Comply

TEST No. 4	Title “Frequency measurements”	47CFR Part 18
		Subpart C
TEST REQUIREMENTS	Test setup	FCC/OST MP-5
	Limits of mains terminal disturbance voltage	According to clause 18. 301 of Part 18: ± 50 MHz
	Assigned fundamental operating ISM Frequency	2450 MHz
	EUT Power	Maximum power
	Initial Load	1000 ml
	Measuring distance	1 m
	Note	Measurement performed with a Spectrum analyzer

VARIATION OF FREQUENCY WITH TIME

Measured operating frequency with initial load: **2467.7 MHz**.

The operating frequency was continuously measured until the water load quantity was reduced to 20 % of the initial load.

Supply Voltage	Maximum observed frequency variation	Frequency limits	Result
AC 120 V	2468.9 MHz	2450 ± 50 MHz	Comply

VARIATION IN OPERATING FREQUENCY WITH VOLTAGE

Measured operating frequency with initial load: **2467.7 MHz**.

The operating frequency was continuously measured until the EUT warm time, and the voltage was varied between 80 to 125 % of nominal rating.

Supply Voltage	Maximum observed frequency variation	Frequency limits	Result
AC 96 V	2470.6 MHz	2450 ± 50 MHz	Comply
AC 150 V	2469.3 MHz	2450 ± 50 MHz	Comply

TEST No. 5	Title "RF Output power measurements"	47CFR Part 18
		Subpart C
TEST REQUIREMENTS	Test setup	FCC/OST MP-5
	EUT Power	Maximum power
	Load	According to clause 4.1: 1000 ml
	Note	/

AC POWER INPUT MEASUREMENTS RESULT

Measured Input Voltage (V)	Measured Input Current (A)	Measured Input Power (W)	Result
120,0	14,7	1,680	Complies

RF OUTPUT POWER MEASUREMENTS RESULT

Calorimetric method was used to determine maximum output power, with the following procedure:

- Initial temperature of a 1000 ml water load was measured;
- The water load was placed in the centre of the oven;
- The water load temperature was re-measured after 120 seconds of continuous oven operation at maximum output power.

$$\text{Power} = \frac{(4,1868 \text{ [joules/cal]} \times (\text{Volume [ml]} \times (\text{Temp. rise [sec]})}{\text{Elapsed Time [sec]}}$$

Water Quantity (ml)	Starting Temperature (°C)	Final Temperature (°C)	Elapsed Time (sec.)	Calculated RF Power (W)
1000	18,0	41,0	120	802,47
1000	18,5	41,0	120	785,03
1000	22,0	43,0	120	732,69
Average RF Output Power :				773,40

5 ADDITIONAL TECHNICAL INFORMATION

5.1 ELECTROMAGNETICALLY RELEVANT COMPONENTS:

Components	Nº	Manufacturer	Type
Microwave Module	1	Whirlpool Sweden	AVM791 to AVM797
High Voltage Transformer	1	DPC	DW-20
High Voltage Diode	1	Sanken	HVR-72B062H2A
High Voltage Capacitor	1	Bicai	CH85
Turntable Motor	1	Nakagawa	GM-16-12F32
Megnatron	1	Panasonic	2M167B
Magnetron Thermostat	1	Kyung In	NT-101NA (5HX) K145-121
Cavity Thermostat	1	Therm-O-Disc	36TXE
Lampholder	1	Whirlpool	
Fuseholder	1	Bussmann	S8202
Interlocks (Primary, Secondary and Monitor)	1	Honeywell	V5P110CG3
FC Thermostat	1	Kyung In	NT-101NA (5HXV) K145-105
Fan Motor	1	MES	MU15
Electronic Control	1	Whirlpool Corp.	WPDOC-002
RFI Filter	1	Iskra	KPL3009

6 TECHNICAL DOCUMENTATION

DOCUMENT	REFERENCE
User manual	8303649 – WHIRLPOOL
Installation manual	4452615 – WHIRLPOOL
Schematic diagram	8303853 – WHIRLPOOL

7 PHOTOGRAPHIC DOCUMENTATION

7.1 EUT IDENTIFICATION



7.2 RADIATED TEST SET-UP



7.3 CONDUCTED TEST SET-UP



8 MEASUREMENT AND TEST EQUIPMENT INSTRUMENTATION

INSTRUMENTS	MANUFACTURER	MODEL	IMQ SERIAL NUMBER	Ref. TEST
Artificial Mains V-network	Rohde & Schwarz	ESH2-Z5	S02314	1
Pulse limiter	Rohde & Schwarz	ESH3-Z2	S02153	1
Selective Voltmeter	Rohde & Schwarz	ESHS10	S02121	1
Receiver/Spectrum analyzer	Rohde & Schwarz	ESMI	S-02350	2
Antenna BilogP	ARA	LPD-2513	S-02385	2
Antenna ridged horn	Schwarzbeck	BBHA9120D	S-03464	2
Antenna ridged horn	Schwarzbeck	BBHA9170	S-03724	2
Pre-amplifier	HP	HP 8439 B	S-03542	2
Semi-anechoic chamber	SIDT EUROPE	/	P-01709	2
Software for test automation	Rohde & Schwarz	MC32 / ESK1	/	2
Field Meter	Holiday	HI-4455	S-04281	3
Spectrum analyzer	LG	SA-7270	S-03038	4
Antenna ridged horn	Schwarzbeck	BBHA9120D	S-03464	4
Thermometer	/	/	S-02496	5