

LG Electronics Inc. Quality & Reliability Center

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CERTIFICATION OF COMPLIANCE

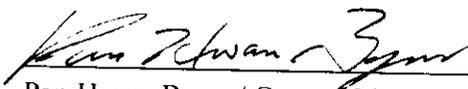
Date of Issue : July. 27, 1998

Test Report No : 00431-4521-F8085

Applicant :	Sharp
Regulation :	FCC Part 18
Test procedure :	MP-5 : 1985
Equipment Class :	Industrial, Scientific, and Medical equipment
EUT Type :	Microwave oven
Trade Name(s) :	Sharp
Model No. :	R-430BK

This device has been verified to comply with the applicable requirements in the FCC Part 18 and was tested in accordance with the measurement procedures specified in MP-5 : 1985.

I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.


Pan-Hwan, Byeon/ General Manger
Quality and Reliability Center

REPORT FOR A MICROWAVE OVEN

Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Applicant : LG Electronics Inc. MEG/Magnetron OBU
184, Kongdan-dong, Kumi-city, Kyongsangbuk-do,
730-030, Korea

Manufacturer : Sharp

EUT Type : Microwave oven

Trade Name : Sharp

Model No. : R-430BK

Rule Part : FCC Part 18

Test Procedure : MP-5 : 1985

Date of Test : July 24, 1998

Date of Receipt of EUT : July 23, 1998

Date of Issue : July 27, 1998

Test Report No. : 00431-4521-F8085

Test Result : Positive

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Quality and Reliability Center reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production unit of this model are manufactured with identical electrical and mechanical components.

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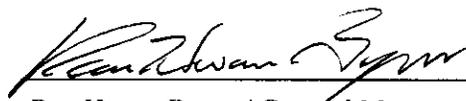
The Quality and Reliability Center was accredited by National Voluntary Laboratory Accreditation Program for the FCC Part15 : Digital device of accreditation under Lab Code : 200040-0.

Tested by :



Jae-Cheon, Lee/ Research Engineer
Quality and Reliability Center

Reviewed by :



Pan-Hwan, Byeon/ General Manger
Quality and Reliability Center

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1. TEST SITE

1.1 Semi-anechoic chamber

Measurement of radiated emissions from EUT was made at semi-anechoic chamber that has been in compliance with Federal Communications Commissions(FCC) requirements of clause 2.948 according to ANSI C63.4-1992 on April 21, 1998.

2. CALIBRATIONS OF MEASURING INSTRUMENTS

All measurements were made with instruments calibrated according to the recommendation by manufacturer. Measurement of radiated emissions and power line conducted emissions were made with instruments conforming to American National Standard Specification, ANSI C63.4-1992. The calibration of measuring instrument, including any accessories that may affect test results, was performed according to the recommendation by manufacturer.

3. DESCRIPTION OF TEST CONDITION

3.1 Radiated emissions measurements

3.1.1 Test site

Measurements were made in semi-anechoic chamber as described at 3.1 in this report.

3.1.2 Detector function selection and bandwidth

In radiated emissions measurement, field strength meters that have CISPR quasi-peak and average detector were used. The 6 dB bandwidth of the detector of instrument is 120 KHz over frequency range of 30 to 1000 MHz. Emissions to be scanned above 1000 MHz are detected in average mode.

3.1.3 Unit of measurement.

Test results of radiated emissions measurement are reported in microvolts per meter at the specific distance. Using the unit of $\text{dB}\mu\text{V}$ on the test instrument, the indication unit was converted to field strength unit of $\mu\text{V}/\text{m}$ as following method;

$$F (\mu\text{V}/\text{m}) = 10^{\frac{\{(R+CL+AF)/20\}}{20}} (\mu\text{V}/\text{m})$$

here,

F : Field Strength in $\mu\text{V}/\text{m}$,

R : Meter Reading Level in $\text{dB}(\mu\text{V})$,

CL : Cable Loss from antenna to meter in dB,

AF : Antenna Factor of receiving antenna in dB/m

3.1.4 Antennas

Measurements were made using calibrated biconical antenna in range of 30 to 300 MHz, log-periodic antenna in range of 300 to 1000 MHz and horn antenna in range of 1 to 18GHz to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization.

The horizontal distance between the receiving antenna and the closest periphery of the EUT was 3 meters.

3.1.5 Frequency range to be scanned

For radiated emissions measurements, the spectrum in the range of 30 to 1000 MHz and above, if found, was investigated.

3.1.6 Test conditions and configuration of EUT

The EUT was configured and operated in all modes of operation so as to find the maximum RF energy generated from EUT.

The power was furnished with rated (normal) AC 120 volts, as specified in the Owner's manual of EUT. The EUT was placed on a 80 Cm high non metallic 1m × 1.5 m table. The turn table containing the system was rotated and the antenna height was varied 4 m to find the maximum RF energy generated from EUT.

Each type of accessory provided by manufacturer or typically used and support equipment were connected to the EUT during measurement to the typical usage and applicable as nearly as practicable.

3.1.7 Measurement uncertainty

Radiated emissions measurements, biconical antenna : ± 4.4dB

Radiated emissions measurements, log-periodic antenna : ± 5.0dB

Radiated emissions measurements, horn antenna : ± 5.0dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurement uncertainty was calculated in accordance with NAMAS NIS 81 : The treatment of uncertainty in EMC measurement.”

The measurement uncertainty was given with a confidence of 95%.

4. MEASURING INSTRUMENTS AND SET-UP

4.1 Radiated emissions

4.1.1 Test receiver

a) Rohde & Schwarz, Model ESVP (20 MHz to 1300 MHz)

Detector function : Average

IF Bandwidth : 120 KHz

b) Rohde & Schwarz, Model ESMI (1 GHz to 18 GHz)

Detector function : Average

IF Bandwidth : 1 MHz

4.1.2 Receiving Antennas

a) Schwarzbeck, Model VHA9103 : Biconical antenna (30 to 300 MHz)

b) Schwarzbeck, Model UHAL9107 : Log-periodic antenna (300 to 1000MHz)

c) EMCO, Model 3115 : Horn antenna (1 GHz to 18GHz)

4.1.3 Preamplicifier

a) H/P, Model 8449B : 1 GHz to 26.5GHz

4.2 Frequency measurements

4.2.1 Test receiver

- a) Rohde & Schwarz, Model ESMI (1 GHz to 18 GHz)
Detector function : Average
IF Bandwidth : 1 MHz

4.2.2 Receiving Antennas

- a) EMCO, Model 3115 : Horn antenna (1 GHz to 18GHz)

5. TEST DATA

5-1. Radiated emissions (§ 18.305)

Product : Microwave oven
 Model : R-430BK (with 2M246-010DF)
 Serial No. : N/A
 Test Date : July 25, 1998

Test distance : 3m

Freq. (MHz)	Reading at 3m (dBuV/m)	AF (dB/m)	CL (dB)	Pol.	K-Factor	F/S at 300m (uV/m)	Limit at 300m (uV/m)
4903.0	61.2	34.2	2.8	V	0.01	11.5	37.1
4941.0	58.0	34.2	2.8	V	0.01	7.9	37.1
4955.0	62.0	34.2	2.8	V	0.01	12.6	37.1
4962.0	58.8	34.2	2.8	V	0.01	8.7	37.1
7432.0	45.5	37.2	3.3	V	0.01	1.9	37.1

- RF Power : 1100W
- Limit : $25 \times (\text{RF Power}/500)^{1/2} = 25 \times (1100/500)^{1/2} = 37.1 \text{ uV/m}$

Result : Positive

* Field Strength below 1000 MHz @ 300m ($\mu\text{V}/\text{m}$) = 10 [(Field strength at 3m(dBuV/m)-40)/20]

* Field Strength above 1000 MHz @ 300m ($\mu\text{V}/\text{m}$) = K * 10 [Field strength at 3m(dBuV/m)/20]

NOTES:

1. Two representative modes(Full power and defrost) of operation were investigated.
2. A glass beaker was used as the container and the test was made with a shelf in its initial normal position.
3. Load for measurement of radiation on second and third harmonic : Two loads, one of 770 and the other of 330 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 right front corner.
4. Load for all other measurements : 770ml of water, with the beaker located in the center of the oven
5. All other emissions are non-significant.
6. AF = Antenna factor CL = Cable loss F/S = Field Strength
7. The tests were made with average detector.

5-2. Frequency measurements

Product : Microwave oven
 Model : R-430BK (with 2M246-010DF)
 Serial No. : N/A
 Test Date : July 24, 1998

(1) Frequency vs Line Voltage Variation Test

[Room Temperature : 23 °C]

Line Voltage Variation(V)	Frequency (MHz)	Deviation for ISM Frequency (MHz)
150(125%)	2483	33
135(112.5%)	2484	34
120(Nominal)	2481	31
108(90%)	2484	34
96(80%)	2481	31

Note : Load was used 1100 cc water in the 1.2 liter glass beaker.

Result : Positive

(2) Frequency vs Load Variation Test

[Room Temperature : 23 °C]

Volume of Water (cc)	Frequency (MHz)	Deviation for ISM Frequency (MHz)
1100	2481	31
880	2486	36
660	2484	34
440	2484	34
220	2478	28

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

Result : Positive

6. LIST OF INSTRUMENTS USED

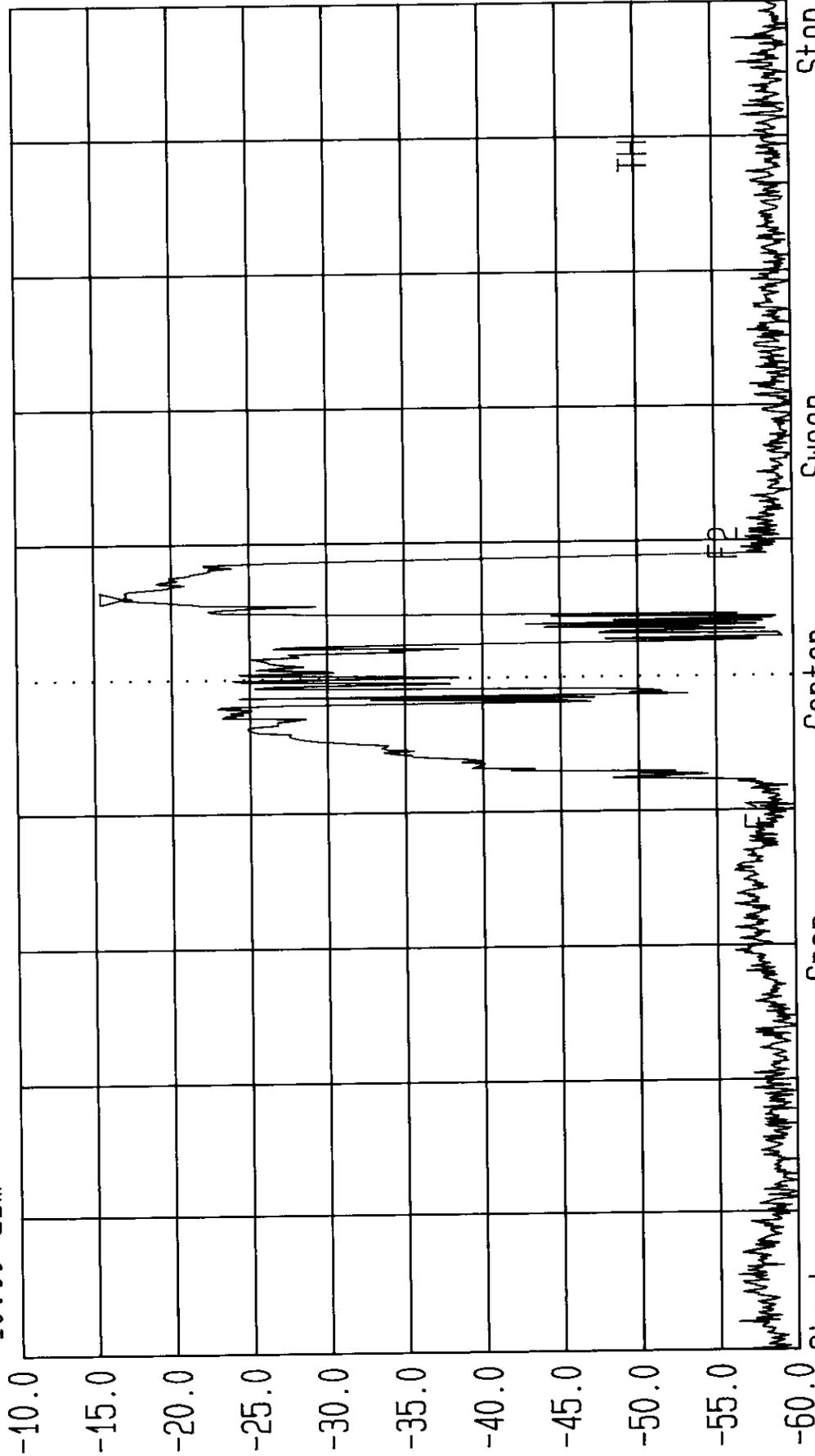
Type	Maker	Model	Cal.Date	N Date	Control No.
Test receiver	R&S	ESVP	05/08/98	05/08/99	F0000194AAZL
Test receiver	R&S	ESMI	02/06/98	02/06/99	F0034898AAZL
Pre amplifier	H/P	8449B	07/06/98	07/06/99	F0000239AAZL
Biconical antenna	S/B	VHA9103	05/08/98	05/08/99	F0000401AAZB
Log-periodic antenna	S/B	UHAL9107	05/08/98	05/08/99	F0000404AAZB
Horn antenna	EMCO	3115	02/11/98	02/11/00	F0000392AAZB

Note : H/P : Hewlett-packard
R&S : Rohde & Schwarz
S/B : Schwarzbeck
Cal.Date : Calibration date
N Date : Next calibration date



Date 24. Jul. '98 Time 17:02:48
Ref. Lvl1 Marker -16.83 dBm
-10.00 dBm 2.4805 GHz

Res. Bw 1.0 MHz [3dB]
TG. Lvl1 off
CF. Stp 50.000 MHz
Thresh -50.00 dBm
Vid. Bw 1 MHz
RF. Att 20 dB
Unit [dBm]



Start 2.2 GHz Center 2.45 GHz Stop 2.7 GHz
Span 500 MHz Sweep 20 ms
Load Variation 120V 1100 mI (100%)

Freq. Measurement LG Electronics Inc.
EUT: R-430BK Q&R Center / J.C.Lee

