

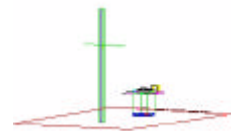


PCTEST Engineering Laboratory, Inc.

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CERTIFICATE OF COMPLIANCE

LG Electronics Inc. – Cooking Appliance
391-2, Ga Eum Jeong-Dong, Changwon,
Gyeong Nam, 641-711, KOREA
Attention: Mr. Bo-Hoon Kim, Engineer

Date(s) of Tests: February 23, 1999
Test Report S/N: 18.990325209.BEJ
Test Site: PCTEST Lab., MD U.S.A.

FCC ID

BEJS100XE

APPLICANT

LG ELECTRONICS INC.

Rule Part(s):	FCC Part 18
Equipment Class:	8CC (Part 18 Consumer Device)
EUT Type:	Microwave Oven
RF Frequency:	2.450 GHz
RF Power Output:	1000 Watts
Magnetron(s):	LG 2M246 or Toshiba 2M248J
Trade Name(s):	GoldStar®
Model(s):	MS-104XP

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified MP-5.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a)

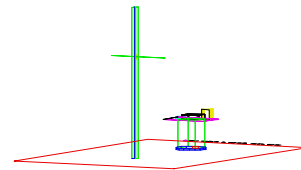
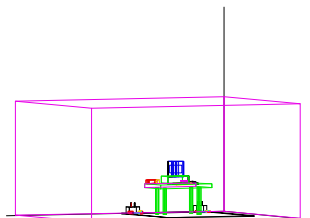

Randy Ortanez
President & Chief Engineer



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FCC Part 18 MEASUREMENT REPORT



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.

Manufacturer:	LG ELECTRONICS INC. - Changwon Plant
Address:	391-2, Ga Eum Jeong-Dong, Changwon-City, Gyeong Nam, 641-110, KOREA
Contact Person:	Mr. Bo Hoon Kim - Senior Engineer
Importer:	LG ELECTRONICS INC. (Chicago Office)
Address:	1000 Sylvan Avenue Englewood Cliffs, NJ 07632
Attention:	Mr. K. S. Kim - General Manager

- FCC ID: **BEJS100XE**
- Equipment Type: Microwave Oven
- Magnetron(s): LG 2M246 or Toshiba 2M248J
- RF Frequency: 2.450 GHz
- RF Power Output: 1000 Watts
- Trade Name(s): **GoldStar®**
- Model: **MS-104XP**
- Power Cord: Unshielded
- Rule Part(s): FCC Part 18 - ISM Consumer Device
- Test Procedure: MP-5
- Date(s) of Tests: February 23, 1999
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 18.990325209.BEJ

Introduction

The measurement procedure described in MP-5 entitled "FCC Methods of Measurements of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment" was used in determining frequency measurement, power output measurement, and field strength measurement emanating from **LG Electronics Inc. (GoldStar Model: MS-104XP) Microwave Oven FCC ID: BEJS100XE**.

These measurement tests were conducted at **PCTEST Engineering Laboratory** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39°11'15" N latitude and 76°49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

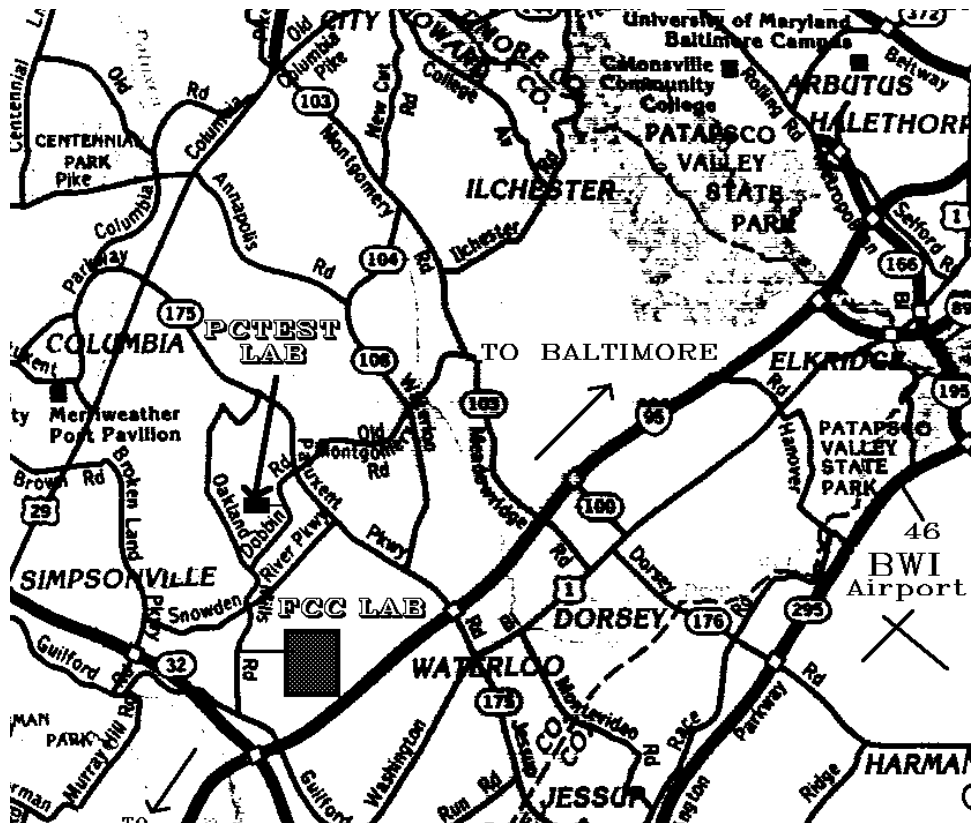


Fig. 1. The map above shows the Columbia vicinity area.
The map also shows PCTest Lab, FCC Lab and BWI airport. (Scale 1"=2miles)

Product Information

Equipment Description:

The Equipment Under Test (EUT) is the **LG Electronics Inc. (GoldStar Model: MS-104XP) Microwave Oven FCC ID: BEJS100XE**.

Magnetron(s):	LG 2M246 or Toshiba 2M248J
RF Frequency:	2.450 GHz
RF Power Output:	1000 Watts
Power Consumption:	1500 Watts
Power Supply:	120V AC, 13.3 A
Cavity Volume:	1.0 Cubic ft.
Mode Stirrer:	Turntable
Power Cord:	Unshielded
Outer Dimensions:	20 7/8 x 12 3/8 x 15 1/2 inches

EMI suppression device(s) added and/or modified during testing:

* none

Test Data (LG Magnetron Model: 2M246)

A. Input Power

The input power was measured using a RMS wattmeter. A 275ml. water load in a polypropylene beaker is placed in the center of the oven. The 275ml. of water was chosen for its compatibility with UL procedure to determine input ratings. The oven was operated at full output power for 6 minutes. The reading was taken after 6 minutes at full power.

Voltage (VAC)	Current (Amps)	Power Consumption (Watts)	Manufacturers Rating (Amps)
108.5	14.08	1467	13.3

B. Power Output

The calorimetric method was used in determining the maximum output power. The test method described in MP-5 and IEC Publication 705/1988. A 1000ml. of water in a beaker was placed in the center of the oven. The oven was operated at full power.

$$P(W) = \frac{4.187 \times Q \times \Delta T}{t}$$

[ΔT = Temperature Rise in $^{\circ}C$]
[Q = Quantity of Water in ml]
[t = Operation Time in sec.]

Quantity of Water Q = 1000ml. = 1 liter
Starting Temp. = $20^{\circ}C$
Time = 120 sec.
Final Temp. = 30.6 $^{\circ}C$

$$\text{Power (W)} = \frac{4.187 \times 1000 \times 30.6}{120}$$

$$\text{Power (W)} = \underline{1067.7} \text{ Watts}$$

Test Data (Toshiba Magnetron Model: 2M248J)

A. Input Power

The input power was measured using a RMS wattmeter. A 275ml. water load in a polypropylene beaker is placed in the center of the oven. The 275ml. of water was chosen for its compatibility with UL procedure to determine input ratings. The oven was operated at full output power for 6 minutes. The reading was taken after 6 minutes at full power.

Voltage (VAC)	Current (Amps)	Power Consumption (Watts)	Manufacturers Rating (Amps)
107.9	14.15	1478	13.3

B. Power Output

The calorimetric method was used in determining the maximum output power. The test method described in MP-5 and IEC Publication 705/1988. A 1000ml. of water in a beaker was placed in the center of the oven. The oven was operated at full power.

$$P(W) = \frac{4.187 \times Q \times \Delta T}{t}$$

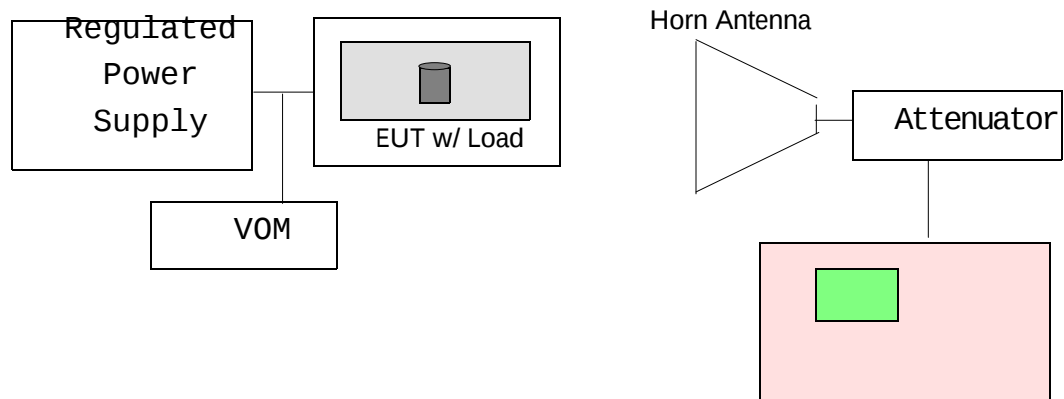
[ΔT = Temperature Rise in $^{\circ}C$]
[Q = Quantity of Water in ml]
[t = Operation Time in sec.]

Quantity of Water Q = 1000ml. = 1 liter
Starting Temp. = $20^{\circ}C$
Time = 120 sec.
Final Temp. = 30.9 $^{\circ}C$

$$\text{Power (W)} = \frac{4.187 \times 1000 \times 30.9}{120}$$

$$\text{Power (W)} = \underline{1078.2} \text{ Watts}$$

C. Frequency Measurements (LG 2M246 Magnetron)



(1) Frequency vs. Load variation test

Initial Load 1000ml Final Load 200ml
Fundamental Freq. 2.450 GHz
Limit 2.4GHz<2.5GHz

Minimum Frequency Observed: 2.408 GHz

Maximum Frequency Observed: 2.458 GHz

CONCLUSION: PASS

(2) Frequency vs. Line Voltage variation test

Variation of line voltage from 80% (96Volts) to 125% (150Volts)
Load 1000ml
Fundamental Freq. 2.450 GHz
Limit 2.4GHz<2.5GHz

Minimum Frequency Observed: 2.408 GHz

Maximum Frequency Observed: 2.466 GHz

CONCLUSION: PASS

C. Frequency Measurements (Toshiba 2M248J Magnetron)

(1) Frequency vs. Load variation test

Initial Load 1000ml Final Load 200ml
Fundamental Freq. 2.450 GHz
Limit 2.4GHz<2.5GHz

Minimum Frequency Observed: 2.404 GHz

Maximum Frequency Observed: 2.457 GHz

CONCLUSION: PASS

(2) Frequency vs. Line Voltage variation test

Variation of line voltage from 80% (96Volts) to 125% (150Volts)
Load 1000ml
Fundamental Freq. 2.450 GHz
Limit 2.4GHz<2.5GHz

Minimum Frequency Observed: 2.411 GHz

Maximum Frequency Observed: 2.464 GHz

CONCLUSION: PASS

D. Power Density Safety Check

The power density was checked to ensure that the power is not greater than 1.0mW/cm² at any location of the oven. The 1.0mW/cm² is in accordance with CDRH and UL 923 specifications.

*A microwave survey meter was placed on all sides, bottom, and top of the oven.
No power greater than 0.10mW/cm² was observed and did not exceed the specified limits.*

CONCLUSION: PASS

Test Data (LG Magnetron Model: 2M246)

E. Radiated Emissions

Preliminary measurements were made inside an anechoic chamber at 1 meter to determine the emission characteristics of the EUT. The EUT is configured and operated in a manner which produces the maximum emission in a typical configuration. Final measurements were made outdoors at our 3-meter test site.

FREQ. (GHz)	AFCL (dB)	Load (ml)	Load Location on Turntable	Meter Reading (dBμV)	F/S @ 3m. (dBμV)	F/S @ 3m. (μV/m)	FCC Limit @ 300m (μV/m)	F/S @ 300m (μV/m)
2.219	38.2	700	Center	29.9	68.1	2541.0	37.9	25.4
2.621	39.0	700	Center	27.7	66.7	2162.7	37.9	21.6
4.830	47.8	700	Center	17.6	65.4	1862.1	37.9	18.6
4.871	47.8	700	Perimeter	16.4	64.2	1621.8	37.9	16.2
4.919	47.8	300	Center	15.3	63.1	1428.9	37.9	14.3
4.951	47.8	300	Perimeter	15.7	63.5	1496.2	37.9	15.0
7.317	53.6	700	Center	9.3	62.9	1396.4	37.9	14.0
7.327	53.6	700	Perimeter	7.3	60.9	1109.2	37.9	11.1
7.348	53.6	300	Center	6.7	60.3	1035.1	37.9	10.4
7.375	53.6	300	Perimeter	6.8	60.4	1047.1	37.9	10.5
9.840	58.4	700	Center	1.4	59.8	977.2	37.9	9.8

NOTES:

1. Measurements using Average detector (RBW=1MHz VBW=10Hz)
2. AFCL = Antenna Factor and Cable Loss
3. F/S = Field Strength
4. Limit per §18.305 = $25^{\sqrt{\text{Power}/500}}$

Test Data (Toshiba Magnetron Model: 2M248J)

E. Radiated Emissions

Preliminary measurements were made inside an anechoic chamber at 1 meter to determine the emission characteristics of the EUT. The EUT is configured and operated in a manner which produces the maximum emission in a typical configuration. Final measurements were made outdoors at our 3-meter test site.

FREQ. (GHz)	AFCL (dB)	Load (ml)	Load Location on Turntable	Meter Reading (dBμV)	F/S @ 3m. (dBμV)	F/S @ 3m. (μV/m)	FCC Limit @ 300m (μV/m)	F/S @ 300m (μV/m)
2.230	38.2	700	Center	27.9	66.1	2018.4	37.9	20.2
2.551	39.0	700	Center	27.4	66.4	2089.3	37.9	20.9
4.917	47.8	700	Center	17.2	65.0	1778.3	37.9	17.8
4.938	47.8	700	Perimeter	16.2	64.0	1584.9	37.9	15.9
4.947	47.8	300	Center	15.4	63.2	1445.4	37.9	14.5
4.981	47.8	300	Perimeter	15.6	63.4	1479.1	37.9	14.8
7.318	53.6	700	Center	8.5	62.1	1273.5	37.9	12.7
7.330	53.6	700	Perimeter	7.9	61.5	1188.5	37.9	11.9
7.337	53.6	300	Center	7.5	61.1	1135.0	37.9	11.4
7.361	53.6	300	Perimeter	7.2	60.8	1096.5	37.9	11.0
9.826	58.4	700	Center	1.9	60.3	1035.1	37.9	10.4

NOTES:

1. Measurements using Average detector (RBW=1MHz VBW=10Hz)
2. AFCL = Antenna Factor and Cable Loss
3. F/S = Field Strength
4. Limit per §18.305 = $25^{\sqrt{\text{Power}/500}}$

Accuracy of Measurement

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

Contribution (Line Conducted)	Probability Distribution	Uncertainty (+/- dB)	
		9kHz-150MHz	150-30 MHz
Receiver specification	Rectangular	1.5	1.5
LISN coupling specification	Rectangular	1.5	1.5
Cable and input attenuator calibration	Normal (k=2)	0.3	0.5
Mismatch: Receiver VRC $\Gamma_1=0.03$ LISN VRC $\Gamma_R=0.8$ (9 kHz) 0.2 (30 MHz) Uncertainty limits $20\log(1 \pm \Gamma_1\Gamma_R)$	U-Shaped	0.2	0.35
System repeatability	Std. deviation	0.2	0.05
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	1.26	1.30
Expanded uncertainty	Normal (k=2)	2.5	2.6

Calculations for 150 kHz to 30 MHz:

$$u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)} = \pm \sqrt{\frac{1.5^2 + 1.5^2}{3} + \left(\frac{0.5}{2}\right)^2 + \frac{0.05^2}{2} + 0.35^2} = \pm 1.298 \text{ dB}$$

$$U = 2U_c(y) = \pm 2.6 \text{ dB}$$

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties (+/-dB)	
		3 m	10 m
Ambient Signals		-	-
Antenna factor Calibration	Normal (k=2)	+/- 1.0	+/- 1.0
Cable loss Calibration	Normal (k=2)	+/- 0.5	+/- 0.5
Receiver specification	Rectangular	+/- 1.5	+/- 1.5
Antenna directivity	Rectangular	+ 0.5/-0	+ 0.5

Test Equipment

Type	Model	Cal. Due Date	S/N
Microwave Spectrum Analyzer	HP8566B (100Hz-22GHz)	08/15/99	3638A08713
Microwave Spectrum Analyzer	HP8566B (100Hz-22GHz)	04/17/99	2542A11898
Spectrum Analyzer/Tracking Gen.	HP8591A (100Hz-1.8GHz)	08/10/99	3144A02458
Signal Generator *	HP8640B (500Hz-1GHz)	08/09/99	2232A19558
Signal Generator *	HP8640B (500Hz-1GHz)	08/09/99	1851A09816
Signal Generator *	Rohde & Schwarz (0.1-1000MHz)	09/11/99	894215/012
Ailtech/Eaton Receiver	NM37/57A-SL (30-1000MHz)	04/12/99	0792-03271
Ailtech/Eaton Receiver	NM37/57A (30-1000MHz)	03/11/00	0805-03334
Ailtech/Eaton Receiver	NM17/27A (0.1-32MHz)	09/17/99	0608-03241
Quasi-Peak Adapter	HP85650A	08/15/99	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/00	0194-04082
RG58 Coax Test Cable	No. 167		n/a
Harmonic/Flicker Test System	HP 6841A (IEC 555-2/3)		3531A00115
Broadband Amplifier (2)	HP8447D		1145A00470, 1937A03348
Broadband Amplifier	HP8447F		2443A03784
Transient Limiter	HP11947A (9kHz-200MHz)		2820A00300
Horn Antenna	EMCO Model 3115 (1-18GHz)		9704-5182
Horn Antenna	EMCO Model 3115 (1-18GHz)		9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)		9203-2178
Biconical Antenna (4)	Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design		1295, 1332, 0355
Log-Spiral Antenna (3)	Ailtech/Eaton 93490-1		0608, 1103, 1104
Roberts Dipoles	Compliance Design (1 set)		
Ailtech Dipoles	DM-105A (1 set)		33448-111
EMCO LISN	3816/2		1079
EMCO LISN	3816/2		1077
EMCO LISN	3725/2		2009
Microwave Preamplifier 40dB Gain	HP83017A (0.5-26.5GHz)		3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)		
Ailtech/Eaton Receiver	NM37/57A-SL		0792-03271
Spectrum Analyzer	HP8594A		3051A00187
Spectrum Analyzer (2)	HP8591A		3034A01395, 3108A02053
Modulation Analyzer	HP8901A		2432A03467
NTSC Pattern Generator	Leader 408		0377433
Noise Figure Meter	HP 8970B		3106A02189
Noise Figure Meter	Ailtech 7510		TE31700
Noise Generator	Ailtech 7010		1473
Microwave Survey Meter	Holaday Model 1501 (2.450GHz)		80931
Digital Thermometer	Extech Instruments 421305		426966
Attenuator	HP 8495A (0-70dB) DC-4GHz		
Bi-Directional Coax Coupler	Narda 3020A (50-1000MHz)		
Shielded Screen Room	RF Lindgren Model 26-2/2-0		6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81		R2437 (PCT278)
Environmental Chamber	Associated Systems Model 1025 (Temperature/Humidity)		PCT285

* Calibration traceable to the National Institute of Standards and Technology (NIST).

Recommendation/Conclusion

The data collected shows that the **LG Electronics Inc. (GoldStar Model: MS-104XP) Microwave Oven FCC ID: BEJS100XE** complies with Part 18 of the FCC Rules.