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***CLASS II PERMISSIVE CHANGE CERTIFICATION OF COMPLIANCE***

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**Date of Issue: April 22, 2003**

**Test Report No: 03-LAE-M114**

**Test Site: LG Electronics Changwon EMC Center**

This class II permissive change certification of compliance is to use alternate magnetron type 2M248J by Toshiba on the previous granted model MS-164ZF, FCC ID: BEJS174ZH dated 03/04/2002

|                  |                                               |
|------------------|-----------------------------------------------|
| Applicant:       | LG Electronics Inc.                           |
| Regulation:      | FCC Part 18 – ISM Consumer Device             |
| Test Procedure:  | MP-5: 1985                                    |
| Equipment Class: | Industrial, Scientific, and Medical equipment |
| EUT Type:        | Microwave oven                                |
| Magnetron Type:  | 2M248J (Toshiba Hokuto Electronics Corp.)     |
| Brand Name(s):   | Goldstar or LG                                |
| Model No.:       | MS-177ZK                                      |
| FCC ID:          | BEJS174ZH                                     |

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



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Kwan Y. Sung / Chief Research Engineer  
Digital Appliance Company, EMC Center  
LG Electronics Inc.

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**CLASS II PERMISSIVE CHANGE REPORT FOR A MICROWAVE OVEN**

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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

|                        |                                 |
|------------------------|---------------------------------|
| <b>EUT Type:</b>       | Microwave oven                  |
| <b>Model No.:</b>      | MS-177ZK                        |
| <b>FCC ID:</b>         | BEJS174ZH                       |
| <b>Rule Part:</b>      | FCC Part 18                     |
| <b>Test Procedure:</b> | MP-5: 1985                      |
| <b>Date of Test:</b>   | April 21, 2003 - April 22, 2003 |
| <b>Date of Issue :</b> | April 22, 2003                  |
| <b>Test Result:</b>    | Pass                            |

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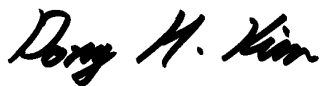
*EMC Center reports apply only to the specific sample(s) tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production unit of this model are manufactured with identical electrical and mechanical components.*

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*This report must not be used by the client to claim product endorsement by any agency of the U.S. Government.*

*The EMC Center facilities has been placed on file and the name of our organization added to the FCC's list for the FCC Part 15 and 18 of the Commission's Rules under Registration Number 93197.*

Tested by:



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Dong H. Kim / Research Engineer  
Digital Appliance Company, EMC Center  
LG Electronics Inc.

Reviewed by:



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Kwan Y. Sung / Chief Research Engineer  
Digital Appliance Company, EMC Center  
LG Electronics Inc.

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## **CONTENTS**

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|                                                                       | Page      |
|-----------------------------------------------------------------------|-----------|
| <b>1. CLIENT INFORMATION.....</b>                                     | <b>3</b>  |
| <b>2. EQUIPMENT UNDER TEST (EUT).....</b>                             | <b>3</b>  |
| <b>3. TEST SITE.....</b>                                              | <b>4</b>  |
| <b>4. CALIBRATIONS OF MEASURING INSTRUMENT .....</b>                  | <b>4</b>  |
| <b>5. DESCRIPTION OF TEST CONDITION .....</b>                         | <b>4</b>  |
| 5.1 RADIATED EMISSIONS MEASUREMENT .....                              | 4         |
| <b>6. MEASURING INSTRUMENT.....</b>                                   | <b>8</b>  |
| <b>7. TEST DATA.....</b>                                              | <b>9</b>  |
| 7.1 INPUT POWER.....                                                  | 9         |
| 7.2 RF POWER OUTPUT MEASUREMENT .....                                 | 9         |
| 7-3. FREQUENCY MEASUREMENTS.....                                      | 10        |
| 7-4. POWER DENSITY SAFETY CHECK.....                                  | 11        |
| 7-5. RADIATED EMISSIONS (SECTION 18.305).....                         | 12        |
| <b>APPENDIX A. TEST PLOT .....</b>                                    | <b>13</b> |
| <b>APPENDIX B. LABELING REQUIREMENTS.....</b>                         | <b>16</b> |
| <b>APPENDIX C. BLOCK DIAGRAM / SCHEMATICS .....</b>                   | <b>17</b> |
| <b>APPENDIX D. TEST PHOTOS .....</b>                                  | <b>18</b> |
| <b>APPENDIX E. EUT PHOTOS .....</b>                                   | <b>20</b> |
| <b>APPENDIX F. OWNER'S MANUAL WITH REGARD TO FCC INSTRUCTION.....</b> | <b>24</b> |

## 1. CLIENT INFORMATION

The EUT has been tested by request of:

Company: 1. LG Electronics Inc. Cooking Appliances Division  
(Manufacturer) 391-2, Ga Eum Jeong - Dong, Changwon City, Gyeong Nam,  
641-711, Korea  
2. LG Electronics Tianjin Appliance Co., Ltd.  
Xing Dian Road, Bei Chen Distr., Tianjin 300402,  
People's Republic of China  
Name of contact: Gyu Sik Cho  
Telephone: +82-551-260-3463  
Fax: +82-551-260-3223

## 2. EQUIPMENT UNDER TEST (EUT)

EUT is the LG Electronics Inc. Microwave Oven as followings:

Equipment: Microwave oven  
Model: MS-177ZK  
Brand name: GoldStar or LG  
Serial number: N/A  
Magnetron: 2M248J by Toshiba Hokuto Electronics Corp.  
RF Frequency: 2,450 MHz  
RF Power Output (IEC 705): 1,200 W  
Power Consumption  
Microwave Mode: 1,650 W  
Rated Input Voltage: 120 V~, 60 Hz  
Rated Input Current  
Microwave Mode: 13.8 A  
Cavity Volume: 1.7 Cu.ft  
Oven Type: Countertop / Household  
Mode Stirrer: Turntable  
Power Cord: Unshielded  
Outer Dimensions (inch) 22.59 (W) \* 13.53 (H) \* 17.31 (D)

EMI suppression device(s) installed in production: See schematics (Appendix C)  
EMI suppression device(s) added and/or modified during test: None

**This class II permissive change certification of compliance is to use alternate magnetron type 2M248J by Toshiba on the previous granted model MS-164ZF, FCC ID: BEJS174ZH dated 03/04/2002**

### 3. TEST SITE

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 March 24, 2003.

### 4. CALIBRATIONS OF MEASURING INSTRUMENT

All measurement was 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.

### 5. DESCRIPTION OF TEST CONDITION

#### 5.1 Radiated emissions measurement

##### 5.1.1 Test site

Measurement was made in semi-anechoic chamber as described at Clause 3 in this report.

##### 5.1.2 Detector function selection and bandwidth

In radiated emissions measurement, field strength meter that has CISPR quasi-peak and average detector was used. The bandwidth of the detector of instrument is 120 kHz for frequency range of 30 MHz – 1,000 MHz, and 1 MHz for frequency range of 1 GHz to 10 GHz. Emissions to be measured are detected in average mode.

##### 5.1.3 Unit of measurement

Test results of radiated emissions measurement are reported in microvolts per meter at the specific distance. Using the unit of dBµV on the test instrument, the indication unit was converted to field strength unit of µV/m as following method;

$$F / S = 10^{\{(R+AF+CF)/20\}} (\mu V/m)$$

here,

F / S: Field Strength in µV/m,

R: Meter Reading Level in dB(µV),

AF: Antenna Factor in dB/m

CF: Conversion Factor

\* 30 MHz ~ 1 GHz : CF = CL

\* Above 1 GHz :CF = CL – PG + FL + AL

CL: Cable Loss (dB)

FL: Filter Loss (dB)

PG: Preamplifier Gain (dB)

AL: Attenuator Loss (dB)

#### 5.1.4 Antennas

Measurements were made using calibrated biconical antenna in range of 30 MHz to 300 MHz, log-periodic antenna in range of 300 MHz to 1,000 MHz and horn antenna in range of 1 to 10 GHz 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 for horn antenna and 10 meters for biconical and log-periodic antenna.

#### 5.1.5 Frequency range to be scanned

For radiated emissions measurements, the spectrum in the range of 30 to 1,000 MHz and above, if found, was investigated.

#### 5.1.6 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 1 m high non-metallic table. The turntable containing the system was rotated and the antenna height was varied 4 m to find the maximum RF energy detected 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.

#### 5.1.7 Measurement uncertainty

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

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

For calculated uncertainty of each item, refer the next page.

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

< Fundamental Frequency Uncertainty (2,450 MHz) >

| Symbol         | Contribution                                                                                                                                             | Value (dB)           |      | Probability Distribution | Divisor | Standard Uncertainty              | Standard Uncertainty Squared |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------|--------------------------|---------|-----------------------------------|------------------------------|
|                |                                                                                                                                                          |                      |      |                          |         | Horn Antenna<br>(Value / Divisor) |                              |
|                |                                                                                                                                                          |                      | 3 m  |                          |         | 3 m                               |                              |
| V <sub>1</sub> | Ambient signals                                                                                                                                          |                      |      |                          | 1       | 0.00                              | 0.0                          |
| V <sub>2</sub> | Antenna factor calibration                                                                                                                               | Expanded Uncertainty | 0.5  | normal (k = 2)           | 2       | 0.25                              | 0.1                          |
| V <sub>3</sub> | Cable loss calibration                                                                                                                                   | Expanded Uncertainty | 0.5  | normal (k = 2)           | 2       | 0.25                              | 0.1                          |
| V <sub>4</sub> | Receiver specification                                                                                                                                   | Tolerance            | 1.0  | rectangular              | 1.732   | 0.58                              | 0.3                          |
| V <sub>5</sub> | Measurement distance variation                                                                                                                           | Tolerance            | 0.6  | rectangular              | 1.732   | 0.35                              | 0.1                          |
| V <sub>6</sub> | Site imperfections                                                                                                                                       | Tolerance            | 2.0  | rectangular              | 1.732   | 1.15                              | 1.3                          |
| V <sub>7</sub> | Mismatch<br><br>Receiver VRC: ? <sub>i</sub> = 0.33<br>Antenna VRC: ? <sub>g</sub> = 0.20<br>Uncertainty limits 20Log(1± ? <sub>i</sub> ? <sub>g</sub> ) |                      |      |                          |         |                                   |                              |
|                |                                                                                                                                                          | Tolerance            | 0.6  | U-shaped                 | 1.414   | 0.42                              | 0.2                          |
| V <sub>8</sub> | System repeatability (previous assessment of s(q <sub>i</sub> ) from 5 repeats, 1 reading on EUT Repeatability of EUT*                                   |                      | 0.5  | Std Deviation            | 1       | 0.50                              | 0.3                          |
|                | Combined standard uncertainty u <sub>c</sub> (y)                                                                                                         |                      | 1.53 | normal                   |         |                                   |                              |
|                | Expanded uncertainty U                                                                                                                                   |                      | 3.06 | normal (k = 2)           |         |                                   |                              |

$$u_c(y) = \sqrt{\left(\frac{0.0}{1}\right)^2 + \left(\frac{0.5}{2}\right)^2 + \left(\frac{0.5}{2}\right)^2 + \frac{1.0^2 + 0.6^2 + 2.0^2}{3} + \frac{0.6^2}{2} + 0.5^2}$$

The level of confidence will be approximately 95%. (The coverage factor: k=2)

$$U = 2 u_c(y) = 2 \times 1.53 = \pm 3.1 \text{ dB}$$

< Radiated Emission Uncertainty (Above 1 GHz) >

| Symbol          | Contribution                                                                                                                                                                  | Value (dB)           |                 | Probability Distribution    | Divisor | Standard Uncertainty              | Standard Uncertainty Squared |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------|-----------------------------|---------|-----------------------------------|------------------------------|
|                 |                                                                                                                                                                               |                      |                 |                             |         | Horn Antenna<br>(Value / Divisor) |                              |
|                 |                                                                                                                                                                               | 3 m                  | 3 m             |                             |         |                                   |                              |
| V <sub>1</sub>  | Ambient signals                                                                                                                                                               |                      |                 | -                           | 1       | 0.00                              | 0.0                          |
| V <sub>2</sub>  | Antenna factor calibration #1                                                                                                                                                 | Expanded Uncertainty | 0.5             | normal (k = 2)              | 2       | 0.25                              | 0.1                          |
| V <sub>3</sub>  | Antenna factor calibration #2                                                                                                                                                 | Expanded Uncertainty | 0.5             | normal (k = 2)              | 2       | 0.25                              | 0.1                          |
| V <sub>4</sub>  | Cable loss calibration                                                                                                                                                        | Expanded Uncertainty | 0.5             | normal (k = 2)              | 2       | 0.25                              | 0.1                          |
| V <sub>5</sub>  | Receiver specification                                                                                                                                                        | Tolerance            | 1.0             | rectangular                 | 1.732   | 0.58                              | 0.3                          |
| V <sub>6</sub>  | Highpass filter                                                                                                                                                               | Tolerance            | 1.0             | rectangular                 | 1.732   | 0.58                              | 0.3                          |
| V <sub>7</sub>  | Measurement distance variation                                                                                                                                                | Tolerance            | 0.6             | rectangular                 | 1.732   | 0.35                              | 0.1                          |
| V <sub>8</sub>  | Site imperfections                                                                                                                                                            | Tolerance            | 2.0             | rectangular                 | 1.732   | 1.15                              | 1.3                          |
| V <sub>9</sub>  | Mismatch<br>Receiver VRC: ? <sub>i</sub> = 0.33<br>Antenna VRC: ? <sub>g</sub> = 0.2<br>Uncertainty limits 20Log(1± ? <sub>i</sub> ? <sub>g</sub> )                           | Tolerance            | 0.6             | U-shaped                    | 1.414   | 0.42                              | 0.2                          |
| V <sub>10</sub> | System repeatability (previous assessment of s(q <sub>k</sub> ) from 5 repeats, 1 reading on EUT<br>Repeatability of EUT*<br>Combined standard uncertainty u <sub>c</sub> (y) |                      | 0.5<br><br>1.65 | Std Deviation<br><br>normal | 1       | 0.50                              | 0.3                          |
|                 | Expanded uncertainty U                                                                                                                                                        |                      | 3.31            | normal (k = 2)              |         |                                   |                              |

$$u_c(y) = \sqrt{\left(\frac{0.0}{1}\right)^2 + \left(\frac{0.5}{2}\right)^2 + \left(\frac{0.5}{2}\right)^2 + \left(\frac{0.5}{2}\right)^2 + \frac{1.0^2 + 1.0^2 + 0.6^2 + 2.0^2}{3} + \frac{0.6^2}{2} + 0.5^2}$$

The level of confidence will be approximately 95%. (The coverage factor: k=2)

$$U = 2 u_c(y) = 2 \times 1.65 = \pm 3.4 \text{ dB}$$

< Electric Field Strength Uncertainty (30 MHz – 1 GHz) >

| Symbol          | Contribution                                                                                                                                         | Value (dB)           |      | Probability Distribution | Divisor | Standard Uncertainty                  | Standard Uncertainty Squared |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------|--------------------------|---------|---------------------------------------|------------------------------|
|                 |                                                                                                                                                      |                      |      |                          |         | UltraLog Antenna<br>(Value / Divisor) |                              |
| V <sub>1</sub>  | Ambient signals                                                                                                                                      |                      | 10 m | Std Deviation            | 1       | 10 m                                  | 10 m                         |
| V <sub>2</sub>  | Antenna factor calibration                                                                                                                           | Tolerance            | 1.0  | rectangular              | 1.732   | 0.58                                  | 0.3                          |
| V <sub>3</sub>  | Cable loss calibration                                                                                                                               | Expanded Uncertainty | 0.5  | normal (k = 2)           | 2       | 0.25                                  | 0.1                          |
| V <sub>4</sub>  | Receiver specification                                                                                                                               | Tolerance            | 1.0  | rectangular              | 1.732   | 0.58                                  | 0.3                          |
| V <sub>5</sub>  | Antenna directivity                                                                                                                                  | Tolerance            | 3.0  | rectangular              | 1.732   | 1.73                                  | 3.0                          |
| V <sub>6</sub>  | Antenna factor variation with height                                                                                                                 | Tolerance            | 0.5  | rectangular              | 1.732   | 0.29                                  | 0.1                          |
| V <sub>7</sub>  | Antenna phase center variation                                                                                                                       | Tolerance            | 0.2  | rectangular              | 1.732   | 0.1                                   | 0.0                          |
| V <sub>8</sub>  | Antenna factor frequency interpolation                                                                                                               | Tolerance            | 0.25 | rectangular              | 1.732   | 0.14                                  | 0.0                          |
| V <sub>9</sub>  | Measurement distance variation                                                                                                                       | Tolerance            | 0.4  | rectangular              | 1.732   | 0.23                                  | 0.1                          |
| V <sub>10</sub> | Site imperfections                                                                                                                                   | Tolerance            | 2.0  | rectangular              | 1.732   | 1.15                                  | 1.3                          |
| V <sub>11</sub> | Mismatch<br>Receiver VRC: ? <sub>i</sub> = 0.09<br>Antenna VRC: ? <sub>g</sub> = 0.33<br>Uncertainty limits 20Log(1+ ? <sub>i</sub> ? <sub>g</sub> ) | Tolerance            | 0.3  | U-shaped                 | 1.414   | 0.21                                  | 0.0                          |
| V <sub>12</sub> | System repeatability (previous assessment of s(q <sub>k</sub> ) from 5 repeats, 1 reading on EUT Repeatability of EUT*)                              |                      | 0.5  | Std Deviation            | 1       | 0.50                                  | 0.3                          |
|                 | Combined standard uncertainty u <sub>c</sub> (y)                                                                                                     |                      | 2.35 | normal                   | 2       |                                       |                              |
|                 | Expanded uncertainty U                                                                                                                               |                      | 4.70 | normal (k = 2)           | 2       |                                       |                              |

$$u_c(y) = \sqrt{\left(\frac{0.0}{1}\right)^2 + \left(\frac{0.5}{2}\right)^2 + \frac{1.0^2 + 1.0^2 + 3.0^2 + 0.5^2 + 0.2^2 + 0.25^2 + 0.4^2 + 2.0^2}{3} + \frac{0.30^2}{2} + 0.5^2}$$

The level of confidence will be approximately 95%. (The coverage factor: k=2)

$$U = 2 u_c(y) = 2 \times 2.35 = \pm 4.7 \text{ dB}$$

< Line Conducted Uncertainty >

| Symbol         | Contribution                                                                                                                                     | Value (dB)           |      | Probability Distribution | Divisor | Standard Uncertainty (dB)             | Standard Uncertainty Squared |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------|--------------------------|---------|---------------------------------------|------------------------------|
|                |                                                                                                                                                  |                      |      |                          |         | 150 kHz - 30 MHz<br>(Value / Divisor) |                              |
| V <sub>1</sub> | Receiver specification                                                                                                                           | Tolerance            | 1.0  | rectangular              | 1.732   | 0.58                                  | 0.3                          |
| V <sub>2</sub> | LISN coupling specification                                                                                                                      | Tolerance            | 1.0  | rectangular              | 1.732   | 0.58                                  | 0.3                          |
| V <sub>3</sub> | Cable and input attenuator calibration                                                                                                           | Expanded Uncertainty | 0.5  | normal (k = 2)           | 2       | 0.25                                  | 0.1                          |
| V <sub>4</sub> | Mismatch<br>Receiver VRC: ? <sub>i</sub> = 0.09<br>LISN VRC: ? <sub>g</sub> = 0.8<br>Uncertainty limits 20Log(1± ? <sub>i</sub> ? <sub>g</sub> ) | Tolerance            | 0.6  | U-shaped                 | 1.414   | 0.42                                  | 0.180                        |
| V <sub>5</sub> | System repeatability (previous assessment of s(q <sub>k</sub> ) from 10 repeats, 1 reading on EUT)                                               |                      | 0.35 | standard deviation       | 1       | 0.35                                  | 0.12                         |
|                | Combined standard uncertainty u <sub>c</sub> (y)                                                                                                 |                      | 1.02 | normal                   |         |                                       |                              |
|                | Expanded uncertainty U                                                                                                                           |                      | 2.03 | normal (k = 2)           |         |                                       |                              |

$$u_c(y) = \sqrt{\frac{1.0^2 + 1.0^2}{3} + \left(\frac{0.5}{2}\right)^2 + \frac{0.6^2}{2} + 0.35^2} = \text{dB}$$

The level of confidence will be approximately 95%. (The coverage factor: k=2)

$$U = 2 u_c(y) = 2 \times 1.02 = \pm 2.1 \text{ dB}$$

## 6. MEASURING INSTRUMENT

| Instrument                  | Model                        | Cal. Due date | Serial No.  | Control No. |
|-----------------------------|------------------------------|---------------|-------------|-------------|
| Microwave Spectrum Analyzer | HP8566B                      | 10/26/2003    | 3340A08173  | 99-IRE-05   |
| RF Preselector              | HP85685A                     | 10/26/2003    | 3221A01441  | 99-IRE-04   |
| Qusi-Peak Adapter           | HP85650A                     | 10/26/2003    | 3303A01732  | 99-TRE-01   |
| R/B Spectrum Display        | HP462                        | 10/26/2003    | 3340A21397  | 99-IRE-02   |
| Attenuator Switch Driver    | HP11713A                     | 10/26/2003    | 3334A11152  | 99-IRE-03   |
| Preamplifier                | HP8449B OPT H02              | 10/26/2003    | 3008A00525  | 99-IRE-06   |
| Power Meter                 | HP436A                       | 10/11/2003    | 2604A24567  | 99-IRE-12   |
| Power Sensor                | HP8481A                      | 10/24/2003    | 2552A50829  | 99-IRE-14   |
| Power Sensor                | HP8482A                      | 10/24/2003    | 2607A11242  | 99-IRE-15   |
| Accessory Kit               | -                            | -             | 7044/45-002 | 99-IRE-16   |
| Horn Antenna                | RGA-180<br>(Electro Metrics) | 07/03/2003    | 2517        | 99-IRE-22   |
|                             | RGA-60<br>(Electro Metrics)  | 05/22/2004    | 6104        | 99-IRE-21   |
| Antenna Master              | 2070-2 (EMKO)                | -             | 9903-2231   | 99-IRE-23   |
| Ultra Log Antenna           | HL562 (Chase)                | 05/19/2003    | 830547/007  | 99-IRE-27   |
| High Pass Filter            | 11SH10-<br>2500/X1800-010    | 06/06/2003    | 2           | 99-IRE-07   |
| EMI Receiver                | ESI26 (R&S)                  | 10/26/2003    | 835336/008  | 00-IRE-30   |
| LISN                        | ESH2-Z5 (R&S)                | 05/15/2003    | 825640/003  | 99-ICE-02   |
| Microwave Cable             | Sucoflex 104                 | -             | 125484/4    | -           |
| Microwave Cable             | Sucoflex 106                 | -             | 13417/6     | -           |
| Microwave Cable             | Sucoflex 106                 | -             | 13419/6     | -           |
| Microwave Cable             | Sucoflex 106                 | -             | 13418/6     | -           |
| Microwave Cable             | Sucoflex 104                 | -             | 125483/4    | -           |
| Microwave Cable             | Sucoflex 104                 | -             | 12548/4     | -           |
| Microwave Cable             | Sucoflex 106                 | -             | 13416/6     | -           |
| Microwave Cable             | Sucoflex 106                 | -             | 13416/6     | -           |
| Semi Anechoic Chamber       | YES INC.                     | -             | -           | 99-CFA-01   |
| Shield Screen Room          | YES INC.                     | -             | -           | 99-CFA-02   |
| Microwave Survey Meter      | Holaday<br>HI-1710/HI-2623   | 09/21/2003    | 93083       | FJZ431HA    |

## 7. TEST DATA

### 7.1 Input Power

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

| <u>Mode</u> | <u>Input Voltage</u> | <u>Current [A]</u> | <u>Power Consumption</u><br><u>[W]</u> | <u>Manufacturer</u><br><u>Rating [A]</u> |
|-------------|----------------------|--------------------|----------------------------------------|------------------------------------------|
| Microwave   | 120 Vac, 60 Hz       | 14.7               | 1,659                                  | 13.8                                     |

### 7.2 RF Power Output Measurement

The Calorimetric Method was used to determine maximum output power. A 1,000 ml water load was placed in the center of the oven. A mercury thermometer was used to measure temperature rise. The test method described in MP-5 and IEC Publication 705/1998.

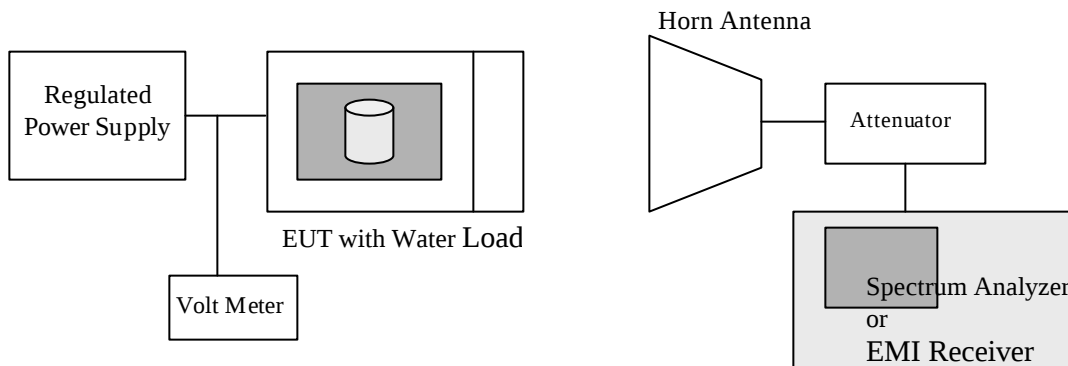
$$\text{Power [W]} = \frac{(4.187 \text{ Joules/Cal}) * (\text{Volume in ml}) * (\text{Temperature Rise})}{\text{Time in Seconds}}$$

| <u>Quantity of Water</u> | <u>Starting Temperature</u> | <u>Final Temperature</u> | <u>Elapsed Time</u> |
|--------------------------|-----------------------------|--------------------------|---------------------|
| 1,000 ml                 | 19.3 ?C                     | 42.6 ?C                  | 120 Sec             |

$$\text{Power [W]} = \frac{4.187 * 1,000 * 23.3}{120}$$

$$\text{Power [W]} = 812.9 \text{ Watts}$$

### 7-3. Frequency measurements



#### (1) Frequency vs Line Voltage Variation Test

Variation of line voltage from 80 % (96 V) to 125 % (150 V)

Load: 1,000 ml

Fundamental Frequency: 2,450 MHz

Limit:  $2.4 \text{ GHz} < f < 2.5 \text{ GHz}$

Maximum Frequency Observed: 2,471 MHz

Minimum Frequency Observed: 2,467 MHz

**Result:** Pass

#### (2) Frequency vs Load Variation Test

*Frequency was measured at the rated input voltage (AC 120 V).*

Initial Load: 1,000 ml

Final Load: 200 ml

Fundamental Frequency: 2,450 MHz

Limit:  $2.4 \text{ GHz} < f < 2.5 \text{ GHz}$

Maximum Frequency Observed: 2,471 MHz

Minimum Frequency Observed: 2,459 MHz

**Result:** Pass

#### 7-4. Power Density Safety Check

The power density was checked to ensure that the power is not greater than  $1.0 \text{ mW/cm}^2$  at any location of the oven. The  $1.0 \text{ mW/cm}^2$  is in accordance with CDRH and UL923 standard.

*A microwave survey meter was placed on all sides, door and viewing, bottom, top and rear. No power greater than  $0.14 \text{ mW/cm}^2$  was observed and did not exceed the specified limits.*

Maximum Leakage Microwave Observed: 0.14  $\text{mW/cm}^2$

**Result:** Pass

## 7-5. Radiated emissions (Section 18.305)

Radiated emission was measured at a frequency range 30 MHz to 10 GHz. The EUT was supported by a 1 m high wood table, measurement above 1 GHz and below 1 GHz.

Preliminary measurements were made inside an anechoic chamber at 3 m to determine to emission characteristics of EUT. The EUT is configured and operated in a manner, which produces the maximum emission in a typical configuration. Final measurements were made outdoor in control room at 3-meter test method.

*Test distance: 3 m*

| Freq.<br>(MHz) | Ant.<br>Factor<br>[dB] | Cable<br>Loss<br>[dB] | Load<br>[ml] | Load<br>Location | Meter<br>Reading<br>[dB?V] | Field<br>Strength<br>@ 3 m<br>[dB? V/m] | Field<br>Strength<br>@ 3 m<br>[? V/m] | Field<br>Strength<br>@ 300 m<br>[? V/m] | FCC<br>Limit<br>@ 300 m<br>[? V/m] |
|----------------|------------------------|-----------------------|--------------|------------------|----------------------------|-----------------------------------------|---------------------------------------|-----------------------------------------|------------------------------------|
| 2,399          | 28.5                   | 4.3                   | 700          | Center           | 22.3                       | 55.1                                    | 568.9                                 | 5.7                                     | 31.9                               |
| 2,518          | 28.8                   | 4.3                   | 700          | Center           | 16.4                       | 49.5                                    | 298.5                                 | 3.0                                     | 31.9                               |
| 4,921          | 33.0                   | 6.3                   | 700          | Center           | 23.9                       | 63.2                                    | 1445.4                                | 14.5                                    | 31.9                               |
| 4,922          | 33.0                   | 6.3                   | 700          | Rt. Front        | 18.7                       | 58.0                                    | 794.3                                 | 7.9                                     | 31.9                               |
| 4,925          | 33.0                   | 6.3                   | 300          | Center           | 23.6                       | 62.9                                    | 1396.4                                | 14.0                                    | 31.9                               |
| 4,921          | 33.0                   | 6.3                   | 300          | Rt. Front        | 20.7                       | 60.0                                    | 1000.0                                | 10.0                                    | 31.9                               |
| 7,374          | 36.7                   | 8.9                   | 700          | Center           | 6.4                        | 52.0                                    | 398.1                                 | 4.0                                     | 31.9                               |
| 7,392          | 36.7                   | 8.9                   | 700          | Rt. Front        | 6.4                        | 52.0                                    | 398.1                                 | 4.0                                     | 31.9                               |
| 7,374          | 36.7                   | 8.9                   | 300          | Center           | 9.4                        | 55.0                                    | 562.3                                 | 5.6                                     | 31.9                               |
| 7,389          | 36.7                   | 8.9                   | 300          | Rt. Front        | 6.6                        | 52.2                                    | 407.4                                 | 4.1                                     | 31.9                               |
| 9,861          | 38.7                   | 9.7                   | 700          | Center           | 7.2                        | 55.6                                    | 602.6                                 | 6.0                                     | 31.9                               |

For measurement of 30 MHz – 1000 MHz, refer to APPENDIX A (Test Plot).

### Result: Pass

$$* \text{Limit (at 300m)} = 25 * (\text{RF Power}/500)^{1/2} \text{ (? V/m)}$$

$$* \text{Field Strength below 1,000 MHz (at 300m) (? V/m)} = 10^{[(\text{Field strength at 10m(dBuV/m)-29.5})/20]}$$

$$* \text{Field Strength above 1,000 MHz (at 300m) (? V/m)} = K * 10^{[(\text{Field strength at 3m(dBuV/m)/20})]}$$

### NOTES:

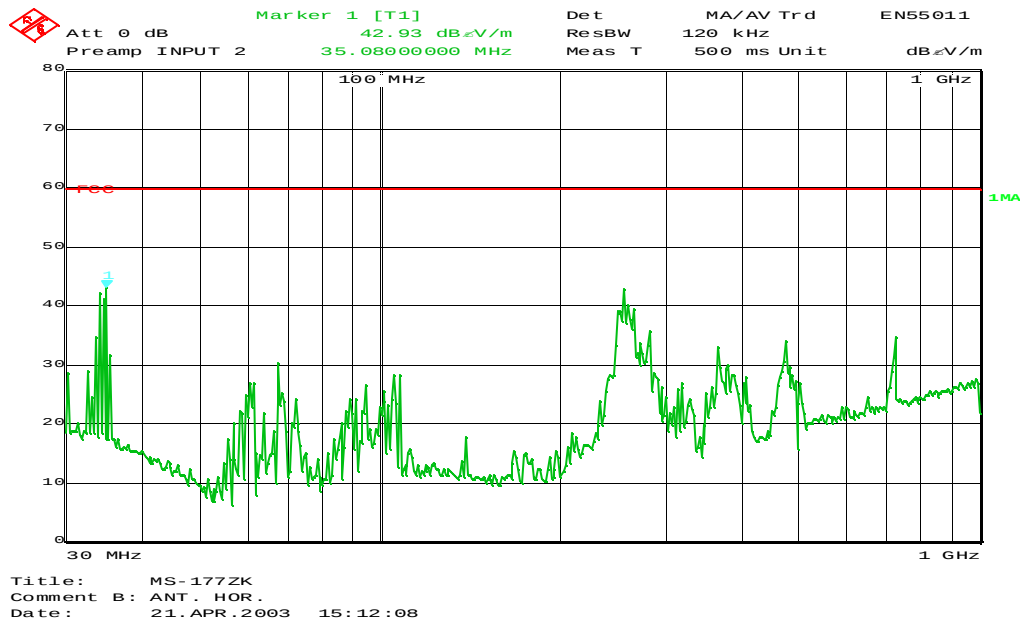
- Two representative modes (full power and defrost) of operation were investigated.
- A glass beaker was used as the container and the test was made with a shelf in its initial normal position.
- Load for measurement of radiation on second and third harmonic: Two loads, one of 700 and the other of 300 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 corner.
- Load for all other measurements: 700 ml of water, with the beaker located in the center of the oven
- All other emissions are non-significant.
- The tests were made with average detector for frequency range of 30 MHz to 10 GHz.

## APPENDIX A. Test Plot

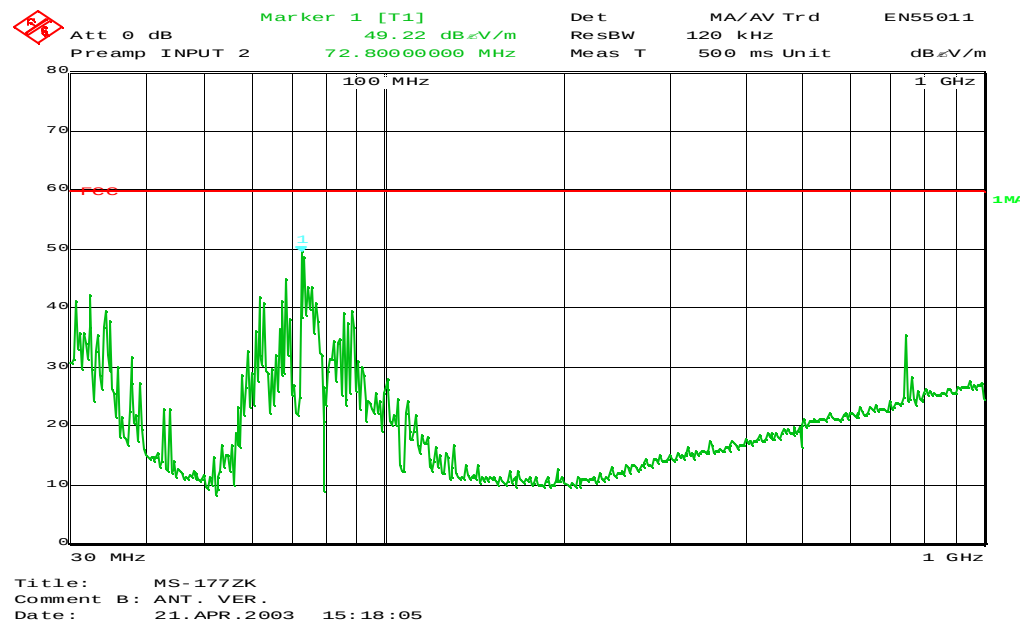
### ? 30 MHz ~ 1000 MHz (Magnetron type: 2M248J by Toshiba)

- Operating Mode: Maximum RF Power Output
- Detect Mode: Peak
- Measurement Distance: 10 meters

#### <Antenna Polarization: Horizontal>

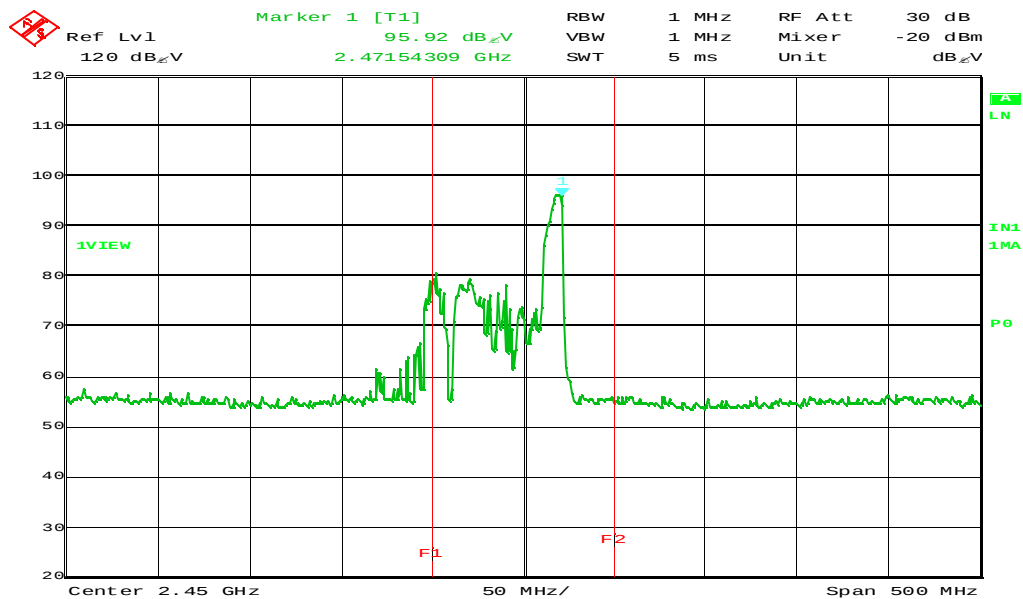


#### <Antenna Polarization: Vertical>



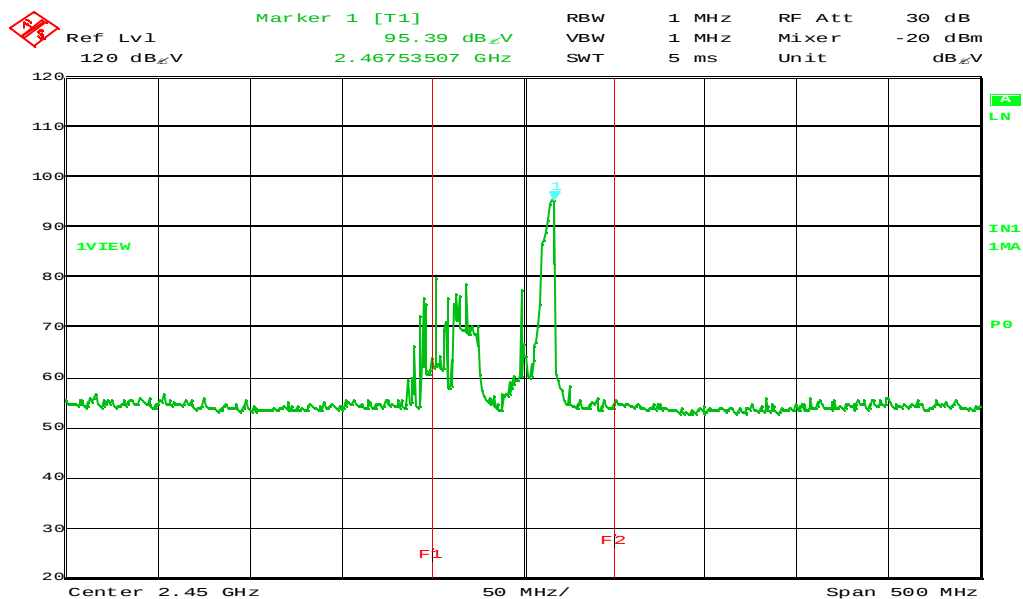
? Voltage Variation (Magnetron type: 2M248J by Toshiba)

<Maximum Frequency Observed: 2,471 MHz>



Title: MS-177ZK  
Comment A: Fundament Freq.(132V)  
Date: 21.APR.2003 15:56:43

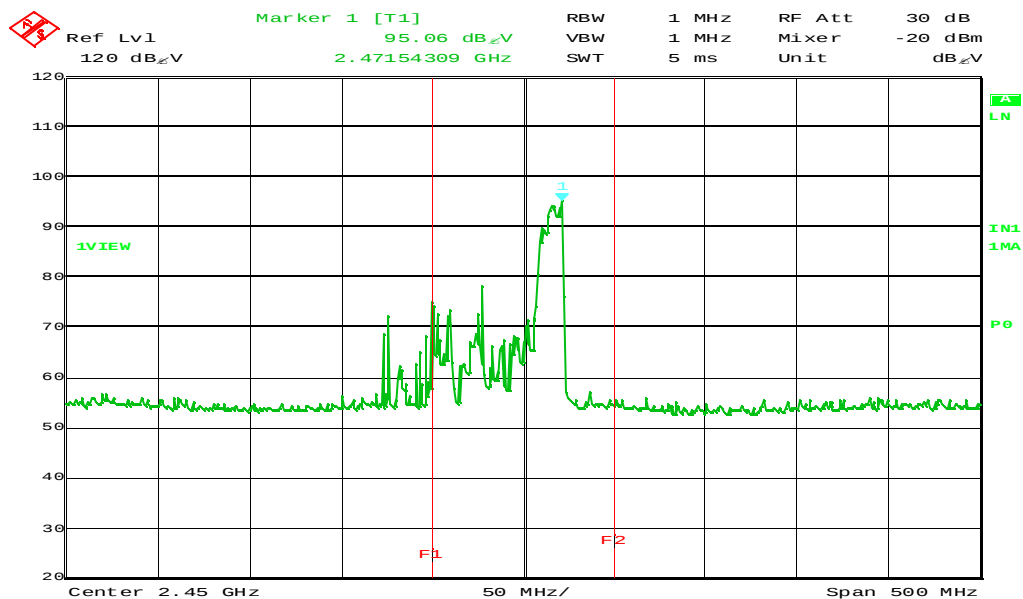
<Minimum Frequency Observed: 2,467 MHz>



Title: MS-177ZK  
Comment A: Fundament Freq.(150V)  
Date: 21.APR.2003 16:00:18

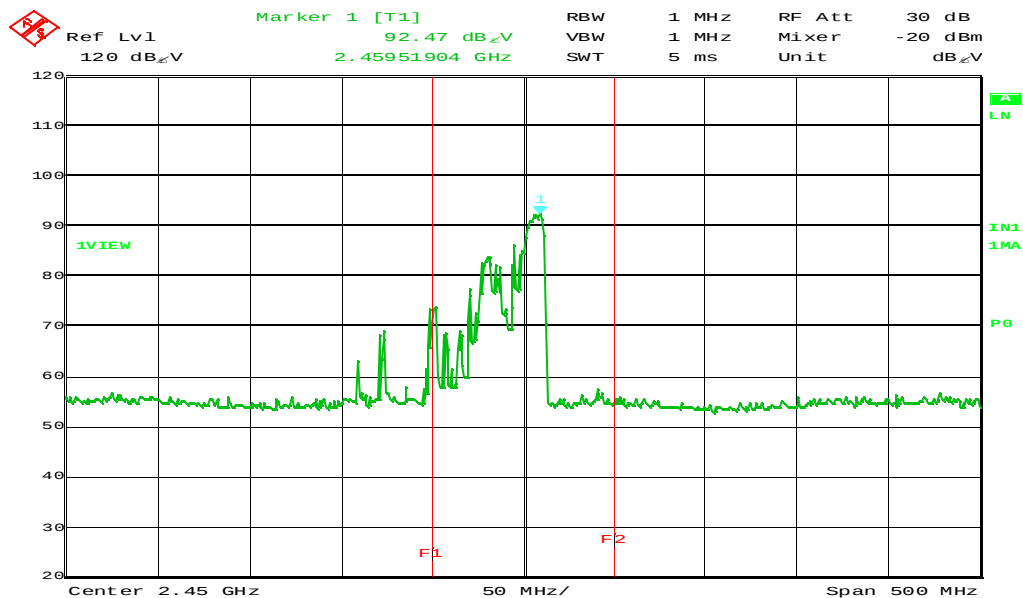
? Load Variation (Magnetron type: 2M248J by Toshiba)

<Maximum Frequency Observed: 2,471 MHz >



Title: MS-177ZK  
Comment A: Fundamental Freq.(800ml)  
Date: 21.APR.2003 16:19:58

< Minimum Frequency Observed: 2,459 MHz >



Title: MS-177ZK  
Comment A: Fundamental Freq.(200ml)  
Date: 21.APR.2003 16:47:43

## APPENDIX B. Labeling Requirements

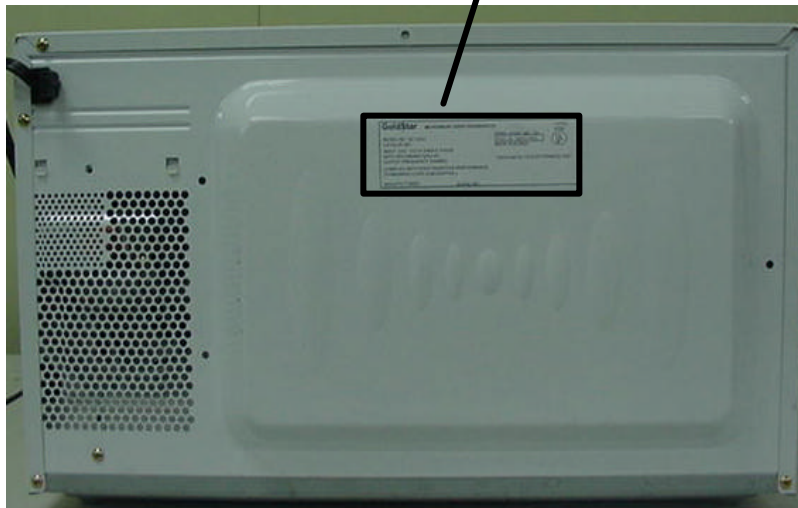
Labeling requirements per Section 2.925 and 15.19.

The label shown shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time purchase.

|                                                                           |                                    |                                                                                                       |
|---------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>GoldStar</b>                                                           | <b>MICROWAVE OVEN (HOUSEHOLD)</b>  | LISTED<br>57B5<br> |
| MODEL NO. MS-177ZK                                                        | DHHS CODE NO.: LT                  |                                                                                                       |
| CATALOG NO.                                                               | FCC ID: BEJS174ZH                  |                                                                                                       |
| INPUT 120V 13.8 A SINGLE PHASE<br>WITH GROUNDING 60Hz AC                  | ASSEMBLED IN CHINA                 |                                                                                                       |
| OUTPUT FREQUENCY 2450MHz                                                  | Distributed by LG ELECTRONICS Inc. |                                                                                                       |
| COMPLIES WITH DHHS RADIATION PERFORMANCE<br>STANDARDS 21CFR SUBCHAPTER J. |                                    |                                                                                                       |
| MANUFACTURED:                                                             | SERIAL NO:                         |                                                                                                       |

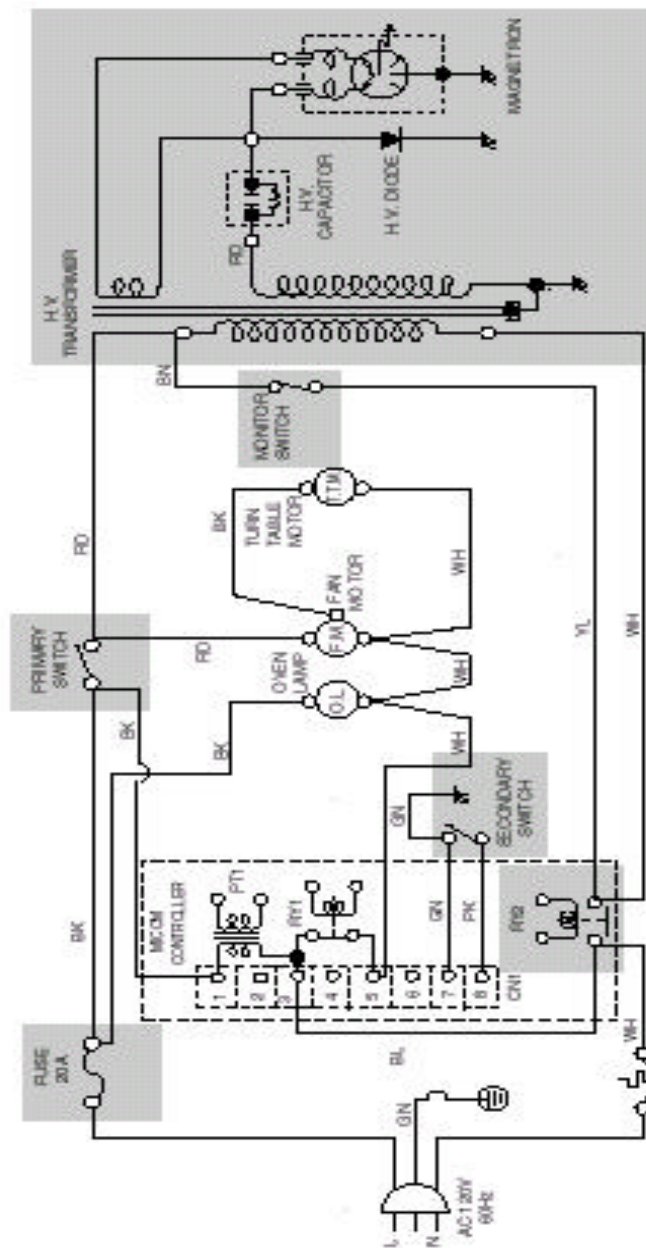
<Fig. 1. Sample Label of Nameplate>

\* Alternate location:  
The nameplate may be  
alternatively affixed on  
the front surface of oven  
cavity, left side of control  
panel or internal  
surface of oven cavity



< Fig. 2. Photo of the physical location of the label>

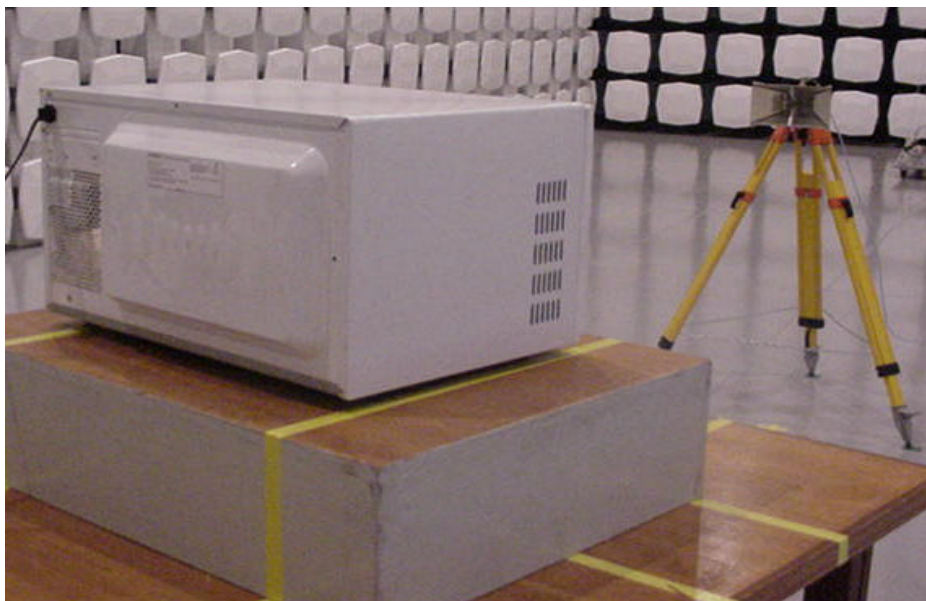
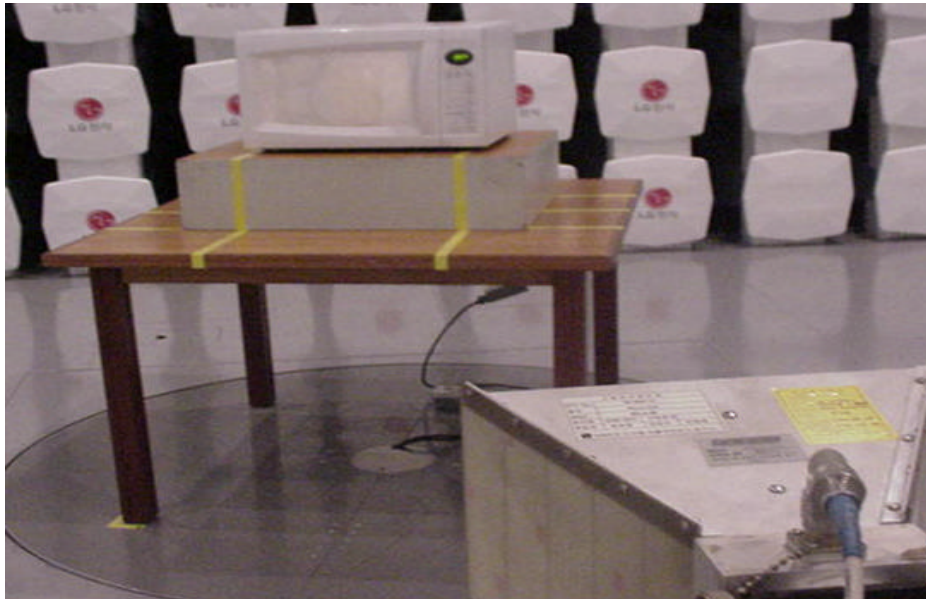
## APPENDIX C. Block Diagram / Schematics

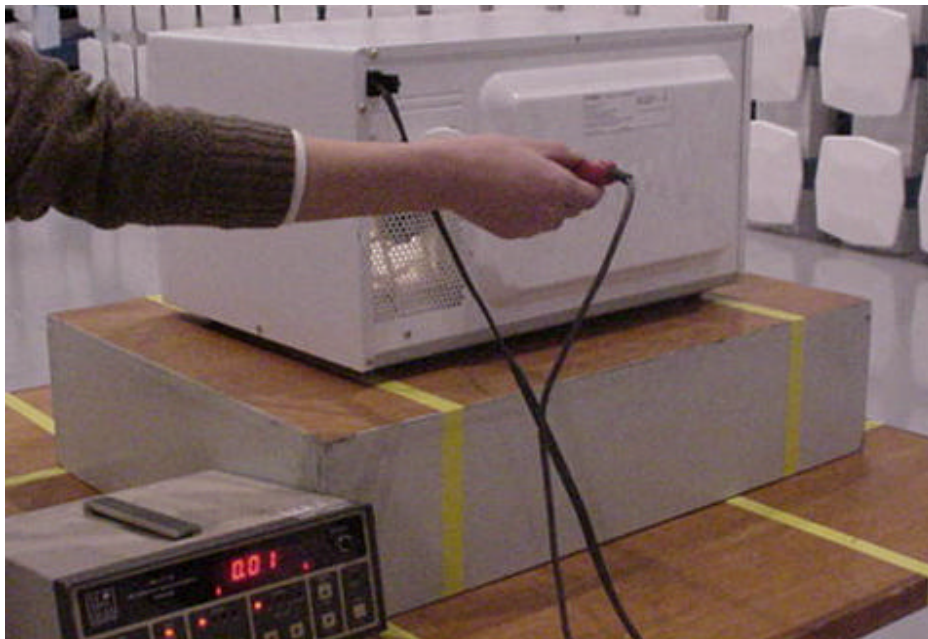
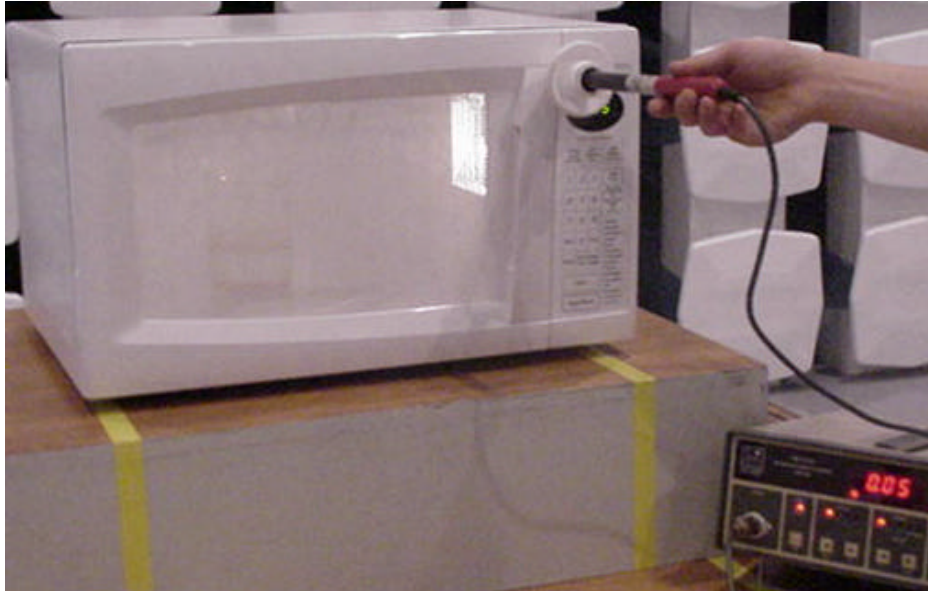


<Fig. 3. Schematic Diagram>

## APPENDIX D. Test Photos

Test photos show the worst case configuration and cable placement with a minimum margin to the specifications.

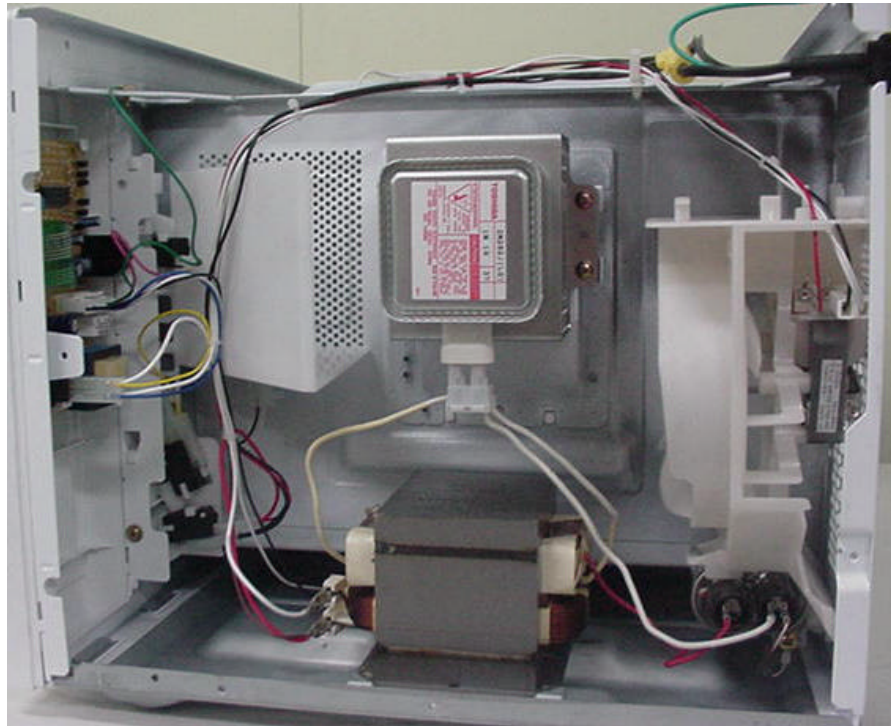


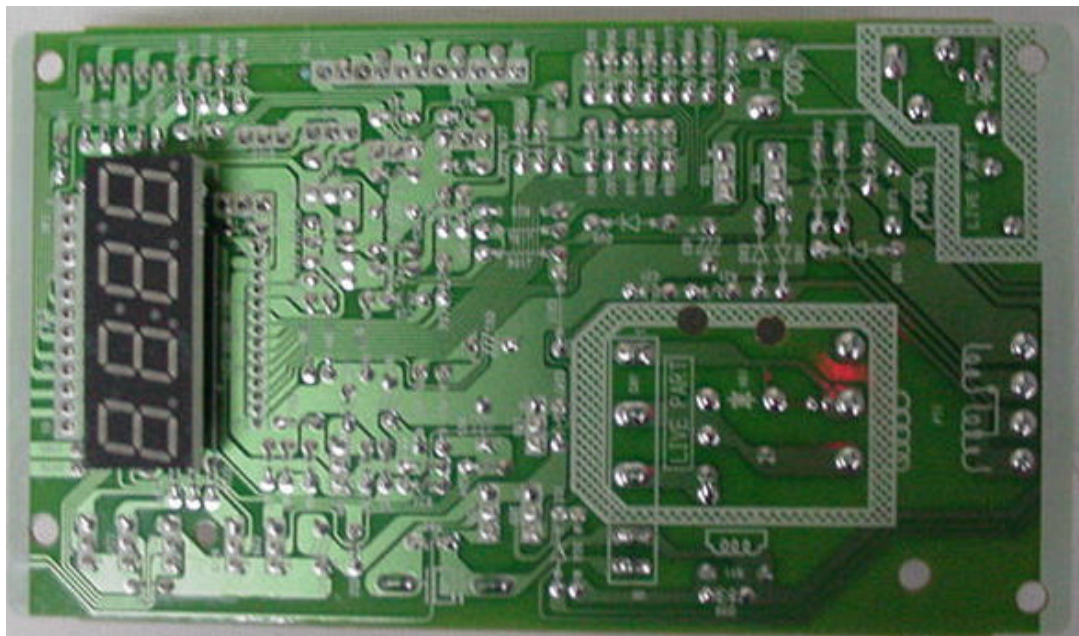
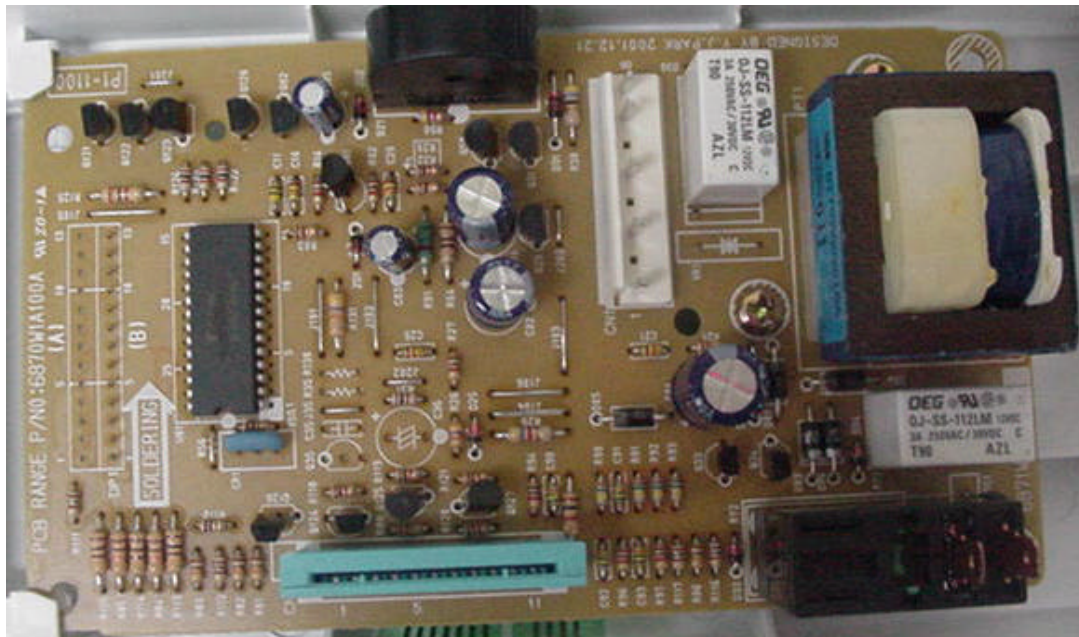


## APPENDIX E. EUT Photos









## APPENDIX F. Owner's Manual with regard to FCC Instruction

### SAFETY

- To avoid improperly cooking some foods.
  - Do not heat any types of baby bottles or baby food. Uneven heating may occur and possibly cause personal injury.
  - Do not heat small-necked containers, such as syrup bottles.
  - Do not deep-fat fry in your microwave oven.
  - Do not attempt home canning in your microwave oven.
  - Do not heat the following items in the microwave oven: whole eggs in the shell, water with oil or fat, sealed containers, or closed glass jars. These items may explode.
- Do not cover or block any openings in the oven.
- Use your oven only for the operations described in this manual.
- Do not run the oven empty, without food in it.
- Do not let cord hang over edge of table or counter.
- Preserve the oven floor:
  - Do not heat the oven floor excessively.
  - Do not allow the gray film on special microwave-cooking packages to touch the oven floor. Put the package on a microwavable dish.
  - Do not cook anything directly on the oven floor or turntable. Use a microwavable dish.
  - Keep a browning dish at least 3/16 inch above floor. Carefully read and follow the instructions for the browning dish. If you use a browning dish incorrectly, you could damage the oven floor.
- Install or locate this appliance only in accordance with the provided installation instructions.
- This appliance should be serviced only by qualified service personnel. Contact the nearest authorized service facility for examination, repair, or adjustment.

### SAVE THESE INSTRUCTIONS

#### FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT ( U.S.A. ONLY)

##### WARNING:

This equipment generates and uses ISM frequency energy and if not installed and used properly, that is in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with limits for ISM Equipment pursuant to part 18 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following:

- Reorient the receiving antenna of the radio or television.
- Relocate the Microwave Oven with respect to the receiver.
- Move the microwave oven away from the receiver.
- Plug the microwave oven into a different outlet so that the microwave oven and the receiver are on different branch circuits.

**The manufacturer** is not responsible for any radio or TV interference caused by **unauthorized modification** to this microwave oven. It is the responsibility of the user to correct such interference.