LG Electronics Inc.

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CERTIFICATION OF COMPLIANCE

Date of Issue: April 03, 2016 **Test Report No: 16-EMUS-0070**

Test Site: LG Electronics Changwon EMC Center

This class II permissive change is to use the alternative component PCB Assembly on the previous granted model MS-2042XC, FCC ID: BEJS205 ZM (Test Report No.: 13-LTE-M026) dated on 23/05/2013.

Applicant:	LG Electronics Inc.
Regulation:	FCC Part 18 – ISM Consumer Device
Test Procedure:	MP-5: 1986
Equipment Class:	Industrial, Scientific, and Medical equipment
EUT Type:	Microwave oven
Magnetron Type:	2M246(LG)
Brand Name(s):	LG or GE
Model No.:	MS2040ARSE (Buyer model No.: LCRT2010##, LSRM2010##, LSRM205##, JES2051DN###, JES2051SN###) * From 0 to 9 or A to Z for inventroy control.
FCC ID:	BEJS205ZM

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: 1986.
I assure full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Kim Dae Woong / Principal Research Engineer
Changwon EMC Center
LG Electronics Inc.

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

EUT Type:	Microwave oven MS2040ARSE
Model No.:	(Buyer model No.: LCRT2010##, LSRM2010##, LSRM205##, JES2051DN###, JES2051SN###) * From 0 to 9 or A to Z for inventroy control.
FCC ID:	BEJS205ZM
Rule Part:	FCC Part 18
Test Procedure:	MP-5: 1986
Date of Test:	Mar. 30, 2016 – Apr. 03, 2016
Date of Issue:	March 30, 2016
Test Result:	Pass

Tested by:

Hyeon Soo Jung / Senior Research Engineer.
Changwon EMC Center
LG Electronics Inc.

Reviewed by:

Son Kwang Mu / Chief Research Engineer
Changwon EMC Center
LG Electronics Inc.

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1. CLIENT INFORMATION

The EUT has been tested by request of:

Company:	1. LG Electronics Inc. Kitchen Package Division
(Manufacturer)	170, Sungsanpaechongro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, 642-711, Korea
Name of contact:	Mi Ran Park
Telephone:	+82-55-260-3463
Fax:	+82-55-268-4783

2. EQUIPMENT UNDER TEST (EUT)

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

Equipment:	Microwave oven
Model:	MS2040ARSE (Buyer model No.: LCRT2010##, LSRM2010##, LSRM205##, JES2051DN###, JES2051SN###) * From 0 to 9 or A to Z for inventroy control.
Brand name:	LG or GE
Serial number:	N/A
Magnetron:	2M246 by LG
RF Frequency:	2,450 ± 50 MHz
RF Power Output:	1200 W
Power Consumption	
Microwave Mode:	1650 W
Rated Input Voltage:	120 V~, 60 Hz
Rated Input Current	
Microwave Mode:	14.0 A
Cavity Volume:	2.0 Cu.ft
Oven Type:	Household
Mode Stirrer:	Turntable
Power Cord:	UnShielded
Outer Dimensions (inch)	23 7/8" (W) * 13 9/16" (H) * 19 1/2" (D)

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

This class II permissive change certification of compliance is to use alternative PCB on the model MS2040ARSE.
Model MS2040ARSE is the same tool with previous granted model MS-2042XC, FCC ID: BEJS205ZM (Test Report No.: 13-LTE-M026) dated on 23/05/2013.

*** Reason: Control PCB is change for supply voltage stabilization and display . (LVT → SMPS , VFD → LED)**

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 C63.4-2009.

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 C63.4-2009. 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 Power line conducted emission measurements

Power line conducted emission measurements were based on the std. CISPR 11:2009+A1:2010.

5.1.1 Shielded enclosure

The measurement for power-line emissions from EUT was made in shielded enclosure that provides sufficient shielding effectiveness enough not to affect test results.

5.1.2 Detector function selection and bandwidth

During conducted emission measurement, a radio noise meter that has a CISPR quasi-peak detector with 10 kHz IF bandwidth of 6 dB was utilized.

5.1.3 Frequency range to be scanned

For conducted emissions measurement, frequency range of 150 kHz to 30 MHz included was investigated.

5.1.4 Unit of measurement

Test results for conducted emissions are reported in micro-volt.

5.1.5 Line impedance stabilization network (LISN)

A LISN with characteristics that conform to the requirements of ANSI C63.4-2009 was used for the measurement of conducted power-line radio noise; (50 micro-henries / 50 ohms). Chassis and earth-points for grounding of the LISN were earth-grounded.

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 enumeration of emissions from EUT.

The EUT has designed to use the public AC lines with rated AC voltage as specified in owner's manual and Installation's manual of EUT and filtered to meet the requirement.

AC power was supplied to the EUT through LISN with characteristics described in 5.1.5 of part I of this report.
The EUT was placed on a 1 m×1.5 m×40 cm high wooden table which is placed on the earth-grounded conducting surface larger than 2 square meter. The vertical conducting surface was replaced with horizontal ground plane. Length of the power lead in excess of 80 cm horizontally separating the EUT from LISN was folded back-and-forth form at the center of the power cord not exceeding 40 cm in length.
The EUT was operated with a load of 1000 ml water initially at 20 ± 5 °C placed at the center of the load-carrying surface.
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 the above-mentioned 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%.

5.2 Radiated emissions measurement

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

5.2.2 Detector function selection and bandwidth
In radiated emissions measurement, field strength meter that has 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 26 GHz. Emissions be measured are detected in average mode.

5.2.3 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)

5.2.4 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 26 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.

5.2.5 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.

5.2.6 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.

5.2.7 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%.

5.3 Uncertainty of Radiated Electric Field Strength (30 MHz ~ 1000 MHz)

The Expanded Uncertainty (U) shall be less than or equal to the uncertainty limit **5.3 dB** of CISPR 16-4-2 (2014) requirement. If the expanded uncertainty is greater than U_{CISPR}, and then it is deemed to comply in case no measured disturbance, increased by U- U_{CISPR}, exceeds the disturbance limit.

Input quantity (불확도 요소)	Symbol (기호)	Estimated Uncertainty dB (추정불확도)	Probability Distribution function (확률분포)	Standard Uncertainty dB (표준불확도)	Reference (참고문헌)
1. Receiver reading	V_r	± 0.25	Std.Deviation (k=1)	± 0.25	Standard Deviation (10 times)
2. Attenuation: Antenna-Receiver	a_c	± 0.00	Std.Deviation (k=1)	± 0.00	Standard Deviation (10 times)
3. Antenna factor	F_a	± 0.69	k=2	± 0.35	Calibration certificates
4. Receiver corrections:					
4.1. Sine wave voltage	δV_{SW}	± 0.17	k=2	± 0.09	Calibration certificates
4.2. Pulse amplitude response	δV_{pa}	± 0.54	Retangular	± 0.31	Calibration certificates
4.3. Pulse repetition rate response	δV_{pr}	± 0.54	Retangular	± 0.31	Calibration certificates
4.4. Noise Floor Proximity	δV_{nf}	± 1.10	Retangular	± 0.64	CISPR16-4-2 (2014)
5. Mismatch of Antenna & Receiver (안테나, 수신기 부정합)	δM	+ 2.29 - 3.12	U-Shaped	+ 1.62 - 2.20	Equipment Manual
6. Antenna corrections					
6.1. AF Frequency interpolation	δF_{af}	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
6.2. AF variation with height	δF_{ah}	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
6.3. Directivity difference at 10 m	δF_{adir}	± 0.25	Retangular	± 0.14	CISPR16-4-2 (2014)
6.4. Phase centre variation at 10 m	δF_{aph}	± 0.3	Retangular	± 0.17	CISPR16-4-2 (2014)
6.5. Cross-polarization	δF_{acp}	± 0.9	Retangular	± 0.52	CISPR16-4-2 (2014)
6.6. Balance	δF_{abal}	± 0.3	Retangular	± 0.17	CISPR16-4-2 (2014)
7. Site corrections					
7.1. Site imperfactions	δA_N	± 3.80	Triangular	± 1.55	NSA Report
7.2. Separation distance at 10 m	δd	± 0.10	Retangular	± 0.06	CISPR16-4-2 (2014)
7.3. Effect of setup table material	δA_{NT}	± 0.5	Retangular	± 0.29	CISPR16-4-2 (2014)
7.4. Table height at 10 m	δh	± 0.1	k=2	± 0.05	CISPR16-4-2 (2014)
Combined standard uncertainty (합성표준불확도)				+ 2.36 - 2.61	
Expended measurement uncertainty (95.4 %, Confidence level, k = 2) (dB) (확장불확도)			**Normal (k = 2)**	+ 4.72 - 5.22	

Lab's Expended measurement uncertainty : 5.2 dB

5.4 Uncertainty of Radiated Electric Field Strength (1 GHz ~ 4.5 GHz)

The Expanded Uncertainty (U) shall be less than or equal to the uncertainty limit **5.2 dB** of CISPR 16-4-2 (2014) requirement. If the expanded uncertainty is greater than U_{CISPR}, and then it is deemed to comply in case no measured disturbance, increased by U- U_{CISPR}, exceeds the disturbance limit.

Input quantity (불확도 요소)	Symbol (기호)	Estimated Uncertainty dB (추정불확도)	Probability Distribution function (확률분포)	Standard Uncertainty dB (표준불확도)	Reference (참고문헌)
1. Receiver reading	V_r	± 0.04	Std.Deviation (k=1)	± 0.04	Equipment Manual (10 times)
2. Attenuation: Antenna-Receiver	a_c	± 0.01	Std.Deviation (k=1)	± 0.01	Equipment Manual (10 times)
3. Antenna factor	F_a	± 0.69	k=2	± 0.35	Calibration certificates
4. Receiver corrections:					
4.1. Sine wave voltage	δV_{SW}	± 0.27	k=2	± 0.14	Calibration certificates
4.2. Noise Floor Proximity	δV_{nf}	± 0.70	Retangular	± 0.40	CISPR16-4-2 (2014)
5. Mismatch of Antenna & Receiver (안테나, 수신기 부정합)	δM	+ 0.48 - 0.51	U-Shaped	+ 0.34 - 0.36	Equipment Manual
6. Antenna corrections					
6.1. AF Frequency interpolation	δF_{af}	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
6.3. Directivity difference	δF_{adir}	± 1.50	Retangular	± 0.87	CISPR16-4-2 (2014)
6.4. Phase centre location	δF_{aph}	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
6.5. Cross-polarization	δF_{acp}	± 0.90	Retangular	± 0.52	CISPR16-4-2 (2014)
7. Site corrections					
7.1. Site imperfactions	δS_{vswr}	± 3.91	Triangular	± 1.60	VSWR Report
7.2. Separation distance at 3 m	δd	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
7.3. Effect of setup table material	δA_{NT}	± 1.50	Retangular	± 0.87	CISPR16-4-2 (2014)
7.4. Table height	δh	± 0.00	k=2	± 0.00	CISPR16-4-2 (2014)
Combined standard uncertainty (합성표준불확도)				$\pm$ 2.20	
Expended measurement uncertainty (95.4 %, Confidence level, k = 2) (dB) (확장불확도)			**Normal (k = 2)**	$\pm$ 4.39	

Lab's Expended measurement uncertainty : 4.4 dB

5.5 Uncertainty of Radiated Electric Field Strength (4.5 GHz ~ 18 GHz)

The Expanded Uncertainty (U) shall be less than or equal to the uncertainty limit **5.5 dB** of CISPR 16-4-2 (2014) requirement. If the expanded uncertainty is greater than U_{CISPR}, and then it is deemed to comply in case no measured disturbance, increased by U- U_{CISPR}, exceeds the disturbance limit.

Input quantity (불확도 요소)	Symbol (기호)	Estimated Uncertainty dB (추정불확도)	Probability Distribution function (확률분포)	Standard Uncertainty dB (표준불확도)	Reference (참고문헌)
1. Receiver reading	V_r	± 0.05	Std.Deviation (k=1)	± 0.05	Standard Deviation (10 times)
2. Attenuation: Antenna-Receiver	a_c	± 0.01	Std.Deviation (k=1)	± 0.01	Standard Deviation (10 times)
3. Preamplifier gain	G_p	± 0.29	k=2	± 0.15	CISPR16-4-2 (2014)
3. Antenna factor	F_a	± 0.69	k=2	± 0.35	Calibration certificates
4. Receiver corrections:					
4.1. Sine wave voltage	δV_{SW}	± 0.27	k=2	± 0.14	Calibration certificates
4.2. Noise Floor Proximity	δV_{nf}	± 1.00	Retangular	± 0.58	CISPR16-4-2 (2014)
5. Mismatch of Antenna & preamplifier (안테나, 증폭기 부정합)	δM	+ 0.56 - 0.60	U-Shaped	+ 0.40 - 0.42	Equipment Manual
6. Mismatch of preamplifier & Receiver (증폭기, 수신기 부정합)	δM	+ 0.79 - 0.87	U-Shaped	+ 0.56 - 0.61	Equipment Manual
7. Antenna corrections					
7.1. AF Frequency interpolation	δF_{af}	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
7.2. Directivity difference	δF_{adir}	± 1.50	Retangular	± 0.87	CISPR16-4-2 (2014)
7.3. Phase centre location	δF_{aph}	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
7.4. Cross-polarization	δF_{acp}	± 0.90	Retangular	± 0.52	CISPR16-4-2 (2014)
8. Site corrections					
8.1. Site imperfactions	δS_{vswr}	± 4.88	Triangular	± 1.99	VSWR Report
8.2. Separation distance at 3 m	δd	± 0.30	Retangular	± 0.17	CISPR16-4-2 (2014)
8.3. Effect of setup table material	δA_{NT}	± 1.50	Retangular	± 0.87	CISPR16-4-2 (2014)
8.4. Table height	δh	± 0.00	k=2	± 0.00	CISPR16-4-2 (2014)
Combined standard uncertainty (합성표준불확도)				+ 2.61 - 2.62	
Expended measurement uncertainty (95.4 %, Confidence level, k = 2) (dB) (확장불확도)			**Normal (k = 2)**	+ 5.21 - 5.25	

Lab's Expended measurement uncertainty : 5.3 dB

5.6 Uncertainty of Conducted Disturbance using AMN (0.15 MHz ~ 30 MHz)

The Expanded Uncertainty (U) shall be less than or equal to the uncertainty limit **3.4 dB** of CISPR 16-4-2 (2014) requirement. If the expanded uncertainty is greater than U_{CISPR}, and then it is deemed to comply in case no measured disturbance, increased by $U - U_{CISPR}$, exceeds the disturbance limit.

Input quantity (불확도 요소)	Symbol (기호)	Estimated Uncertainty dB (추정불확도)	Probability Distribution function (확률분포)	Standard Uncertainty dB (표준불확도)	Reference (참고문헌)
1. Receiver reading	V_r	± 0.06	Std.Deviation (k=1)	± 0.06	Standard Deviation (10 times)
2. Attenuation: AMN-Receiver	a_c	± 0.00	Std.Deviation (k=1)	± 0.00	Standard Deviation (10 times)
3. AMN voltage division factor	F_{AMN}	± 0.15	k=2	± 0.08	Calibration certificates
4. Receiver corrections:					
4.1. Sine wave voltage	δV_{SW}	± 0.17	k=2	± 0.09	Calibration certificates
4.2. Pulse amplitude response	δV_{pa}	± 0.39	Retangular	± 0.23	Calibration certificates
4.3. Pulse repetition rate response	δV_{pr}	± 0.39	Retangular	± 0.23	Calibration certificates
4.4. Noise Floor Proximity	δV_{nf}	± 0.00	-	± 0.00	CISPR16-4-2 (2014)
5. AMN VDF frequency interpolation	δF_{AMNf}	± 0.50	Retangular	± 0.29	CISPR16-4-2 (2014)
6. Mismatch of LISN & Pulse Limiter (LISN, Pulse Limiter 부정합)	δM	± 0.14	U-Shaped	± 0.10	Equipment Manual
7. Mismatch of Pulse Limiter & Receiver (Pulse Limiter, 수신기 부정합)	δM	+ 0.92 - 1.02	U-Shaped	+ 0.65 - 0.72	Equipment Manual
8. AMN Impedance (의사결합망 임피던스)	δZ_{AMN}	± 3.2	Triangular	± 1.31	CISPR16-4-2 (2014)
9. Pulse Limiter Insertion loss	F_{PLT}	± 0.08	Normal (k = 2)	± 0.04	Calibration certificates
Combined standard uncertainty (합성표준불확도)				± 1.5	
Expended measurement uncertainty (95.4 %, Confidence level, k = 2) (dB) (확장불확도)			**Normal (k = 2)**	± 3.1	

Lab's Expended measurement uncertainty : 3.1 dB

6. MEASURING INSTRUMENT

Instrument	Model	Cal. Due date	Serial No.	Control No.
Accessory Kit	-	-	7044/45-002	99-IRE-16
Microwave Amp	8449B	10/06/2016	3008A01821	02-IRE-33
Horn Antenna	RGA-180 (Electro Metrics) RGA-60 (Electro Metrics) 3115-PA (ETS-LINDGREN)	10/07/2016 08/31/2016 08/31/2016	2517 6104 00114966	99-IRE-22 99-IRE-21 14-IRE-38
Antenna Master	2070-2 (EMKO)	-	9903-2231	99-IRE-23
Ultra Log Antenna	HL562 (Rohde-Schwarz) VULB9160 (TESEQ)	08/05/2017 07/01/2017	830547/007 9160-3388	99-IRE-26 15-IRE-42
High Pass Filter	11SH10-4500/ X1800-010	04/20/2016	3	00-IRE-29
EMI Receiver	ESI26 (R&S) ESU26 (R&S)	10/08/2016 10/06/2016	835336/008 100164	00-IRE-30 08-IRE-36
LISN	ESH2-Z5 (R&S)	04/20/2016	100452	14-ICE-18
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	-
Microwave Cable	Sucoflex 104PE	-	46894/4PE	-
Microwave Cable	Sucoflex 104PE	-	46895/PE	-
Semi Anechoic Chamber	YES INC.	-	-	99-CFA-01
Shield Screen Room	YES INC.	-	-	99-CFA-02
Digital Power Meter	WT110 (Yokogawa)	03/13/2016	12VB14689L	99-IAC-03
Microwave Survey Meter	Holaday	07/30/2016	-	FJZ394HA

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.

1) Magnetron type: 2M246 by LG

Mode	Input Voltage	Current [A]	Power Consumption [W]	Manufacturer Rating [A]
Microwave	120 Vac, 60 Hz	14.4	1673	14.0

7.2 RF Power Output Measurement according to MP-5.

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 was described in MP-5.

1) Magnetron type: 2M246 by LG

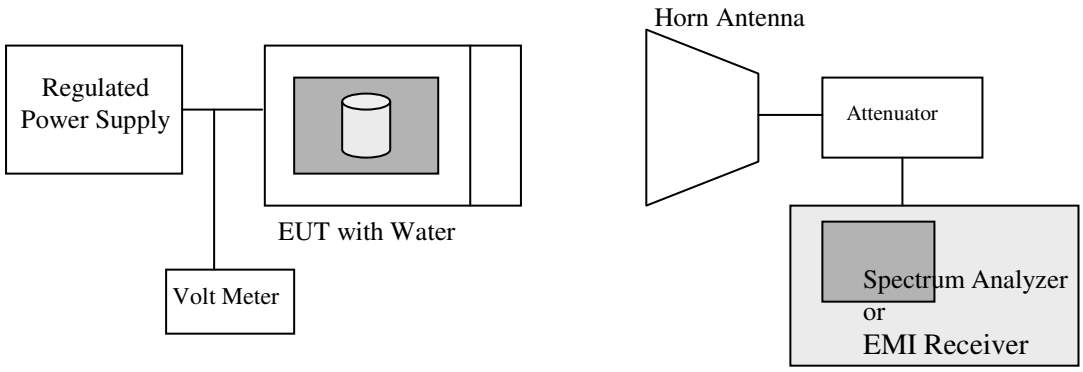
$$\text{Power [W]} = \frac{(4.187 \text{ Joules/Cal}) * (\text{Volume in ml}) * (\text{Temperature Rise})}{\text{Time in Seconds}}$$

Quantity of Water	Starting Temperature	Final Temperature	Elapsed Time
1,000 ml	10.0 °C	36.1°C	120 Sec

$$\text{Power [W]} = \frac{4.187 * 1{,}000 * 26.1}{120}$$

Power [W] = 910.7 Watts

7.3 Frequency measurements



1) Magnetron type: 2M246 by LG

(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 GHz < f < 2.5 GHz

Maximum Frequency Observed:	2,458 MHz
Minimum Frequency Observed:	2,457 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 GHz < f < 2.5 GHz

Maximum Frequency Observed:	2,458 MHz
Minimum Frequency Observed:	2,453 MHz
Result:	**Pass**

7.4 Power Density Safety Check

The power density was check to ensure that the power is not greater than 1.0 mW/㎠ at any location of the oven. The 1.0 mW/㎠ is in accordance with CDRH and UL923 standard.

A microwave survey meter was placed on all sides, door and viewing, bottom, top and rear. The leakage microwave and did not exceed the specified limits.

1) Magnetron type: 2M246 by LG

Maximum Leakage Microwave Observed: 0.63 ***mW/㎠***

Result: **Pass**

7.5 Conducted emissions (Section 18.307)

Conducted emission was measured at a frequency range 150 kHz to 30 MHz. The Power Line disturbance voltage was measured with the equipment under test (EUT) in a shielded room. The EUT was connected to a line impedance stabilization network (LISN) placed on the floor. The EUT was placed on a non-metallic table 0.4 m above the metallic, grounded floor. The distance to other metallic surfaces was at least 0.4 m.
The line conducted emission measurement procedure and test configuration is based on MP-5:1986.
Amplitude measurements were performed with a quasi-peak detector and, if required, with an average detector.

Below data are the highest levels in Microwave mode.
An overview sweep performed with peak detector is included in the APPENDIX A (Test Plot).

1) Magnetron type: 2M246 by LG

	Quasi-Peak			Average				
Frequency [MHz]	Disturbance Level [dBuV]	Permitted Limit [dBuV]	Margin [dB]	Disturbance Level [dBuV]	Permitted Limit [dBuV]	Margin [dB]	Result	Phase
0.210	51.6	63.2	-11.6	30.4	53.2	-22.8	PASS	N
0.219	55.3	62.9	-7.6	35.6	52.9	-17.3	PASS	L1
0.543	38.8	56.0	-17.2	23.6	46.0	-22.4	PASS	N
0.909	33.6	56.0	-22.4	22.1	46.0	-23.9	PASS	L1
15.133	19.8	60.0	-40.2	10.7	50.0	-39.3	PASS	N
17.042	22.8	60.0	-37.2	9.9	50.0	-40.1	PASS	L1

Remark: 1. "<<" means that disturbance level is lower than 20 dB below the limit.
2. The measured disturbance level includes all related factor. (LISN Insertion loss and Cable loss).

7.6 Radiated emissions (Section 18.305)

Radiated emission was measured at a frequency range 30 MHz to 26 GHz. The EUT was supported by a 1 m high wood table, measurement above 1 GHz and below 1 GHz.
Radiated emission measurement in frequency range 1 GHz to 26 GHz was 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.

1) Magnetron type: 2M246 by LG

Test distance: 3 m

Freq. [GHz]	Ant. Factor [dB]	Amp. [dB]	Cable Loss [dB]	Load [ml]	Load Location	Meter Reading [dBuV]	Field Strength @ 3 m [dBuV/m]	Field Strength @ 3 [uV/m]	Field Strength @ 300 m [uV/m]	FCC Limit @ 300 m [uV/m]	Result
2.198	27.9	N/A	0.69	700	Center	22.7	51.3	367.3	3.7	33.7	PASS
2.397	28.5	N/A	0.75	700	Center	21.5	50.7	342.8	3.4	33.7	PASS
2.699	29.3	N/A	0.71	700	Center	21.5	51.6	380.2	3.8	33.7	PASS
2.743	29.5	N/A	0.69	700	Center	20.5	50.7	342.8	3.4	33.7	PASS
4.646	32.3	25.3	0.96	700	Center	15.1	23.1	14.3	0.1	33.7	PASS
4.648	32.3	25.3	0.96	300	Center	16.3	24.3	16.4	0.2	33.7	PASS
4.657	32.4	25.3	0.96	700	Rt. Front	15.6	23.7	15.3	0.2	33.7	PASS
4.929	33.0	25.5	0.94	300	Rt. Front	23.2	31.6	38.0	0.4	33.7	PASS
7.350	35.9	24.7	0.97	300	Rt. Front	25.6	37.7	76.7	0.8	33.7	PASS
7.357	35.9	24.7	0.97	700	Rt. Front	18.5	30.6	33.9	0.3	33.7	PASS
7.358	35.9	24.7	0.97	300	Center	19.0	31.1	35.9	0.4	33.7	PASS
7.955	36.2	24.8	1.14	700	Center	15.0	27.6	24.0	0.2	33.7	PASS
8.633	37.1	25.0	1.16	700	Center	25.3	38.6	85.1	0.9	33.7	PASS
9.574	37.1	24.9	1.25	700	Center	15.5	28.9	27.9	0.3	33.7	PASS
17.257	43.6	23.0	1.32	700	Center	9.1	31.0	35.5	0.4	33.7	PASS

Other frequencies: No detected.
For measurement of 30 MHz – 1,000 MHz, refer to APPENDIX A (Test Plot).

Result: Pass

* Limit (at 300 m) = 25 * (RF Power/500) $^{1/2}$ [μV/m]
* Field Strength below 1,000 MHz (at 300 m) [μV/m] = 10 $^{[(\text{Field strength at 10m(dBuV/m)}-29.5)/20]}$
* Field Strength above 1,000 MHz (at 300 m) [μV/m] = K * 10 $^{[\text{Field strength at 3m(dBuV/m)}/20]}$

NOTES:

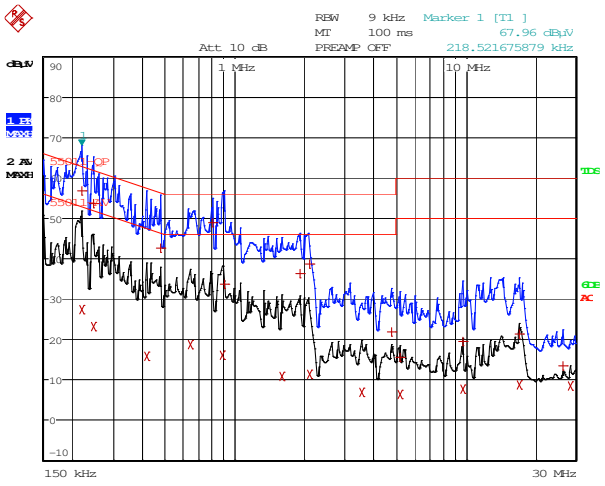
1. Two representative modes (full power and Cool down) of operation were investigated.
2. A Polypropylene -beaker was used as the container and the test was made with a shelf in its initial normal position.
3. Load for measurement of radiation on second and third harmonic: Two loads, one of 700 and the 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.
4. Load for all other measurements: 700 ml of water, with the beaker located in the center of the oven
5. All other emissions are non-significant.
6. The tests were made with average detector for frequency range of 30 MHz to 26 GHz.

APPENDIX A. Test Plot

♦ **150 kHz ~ 30 MHz (Magnetron type: 2M246 by LG)**

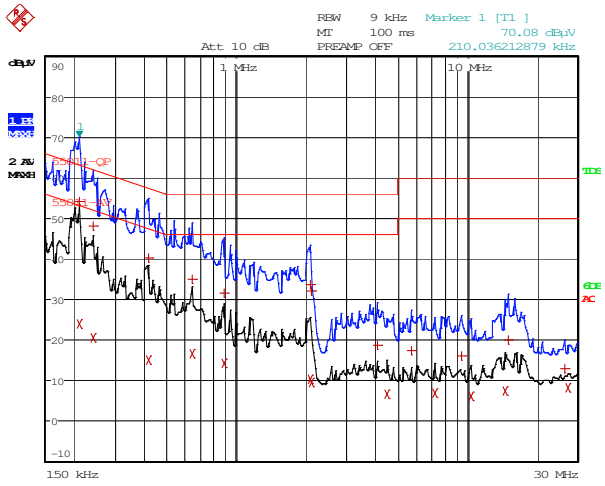
- Operating Mode: Maximum RF Power Output
- Detect Mode: Quasi-Peak(+)/Average(x), Scan Mode: Peak

<Phase: L1>



MS2040ARSE L
Date: 30.MAR.2016 08:22:15

<Phase: N>

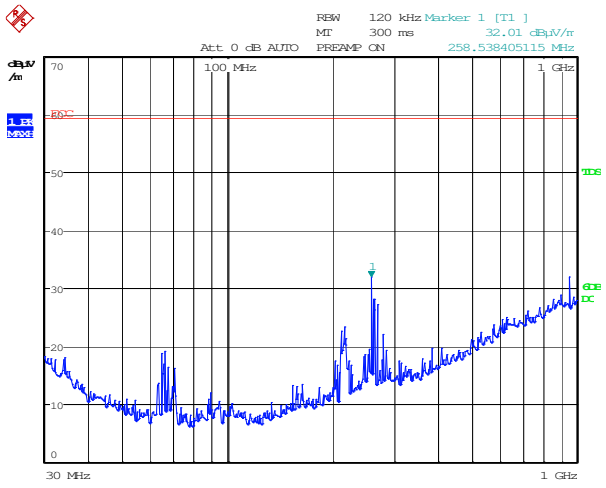


MS2040ARSE N
Date: 30.MAR.2016 08:13:40

♦ **30 MHz ~ 1000 MHz (Magnetron type: 2M246 by LG)**

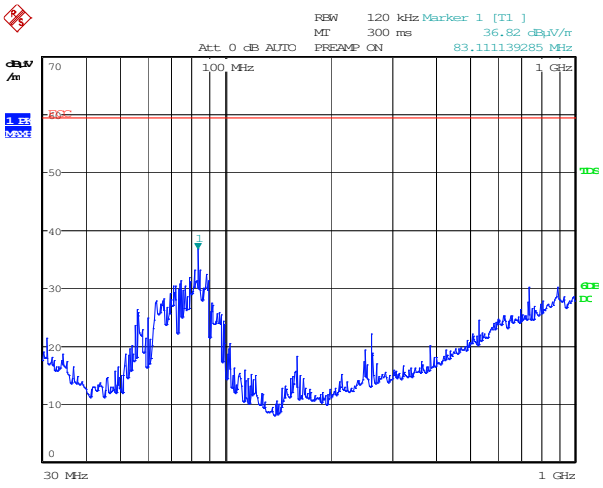
- Operating Mode: Maximum RF Power Output
- Detect Mode: Average, Scan Mode: Peak
- Measurement Distance: 10 meters

<Antenna Polarization: Horizontal>



MS2040ARSE H1
Date: 30.MAR.2016 10:28:03

<Antenna Polarization: Vertical>

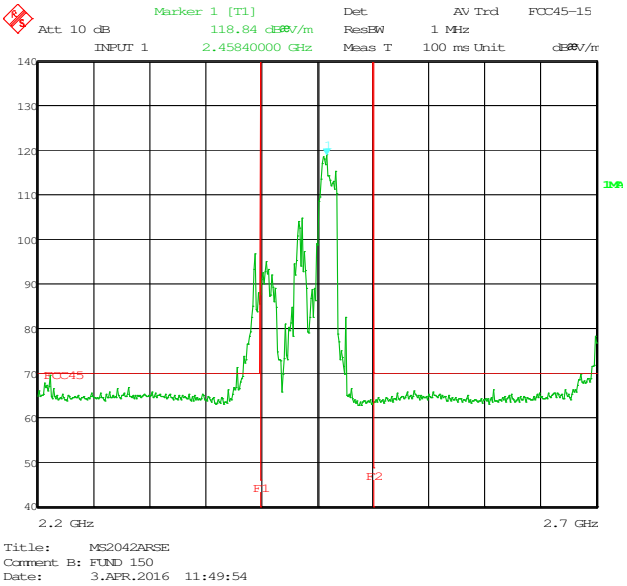


MS2040ARSE V1
Date: 30.MAR.2016 10:36:14

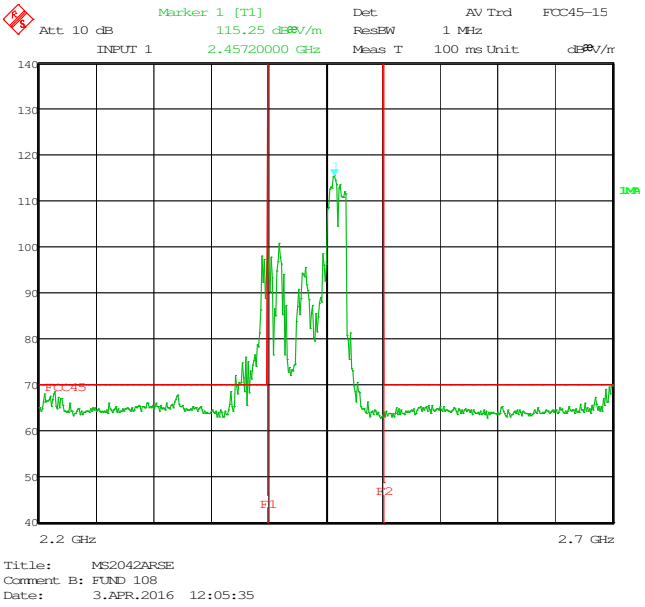
♦Voltage Variation (Magnetron type: 2M246 by LG)

- Detect Mode: Average, Scan Mode: Peak

<Maximum Frequency Observed: 2,458 MHz>



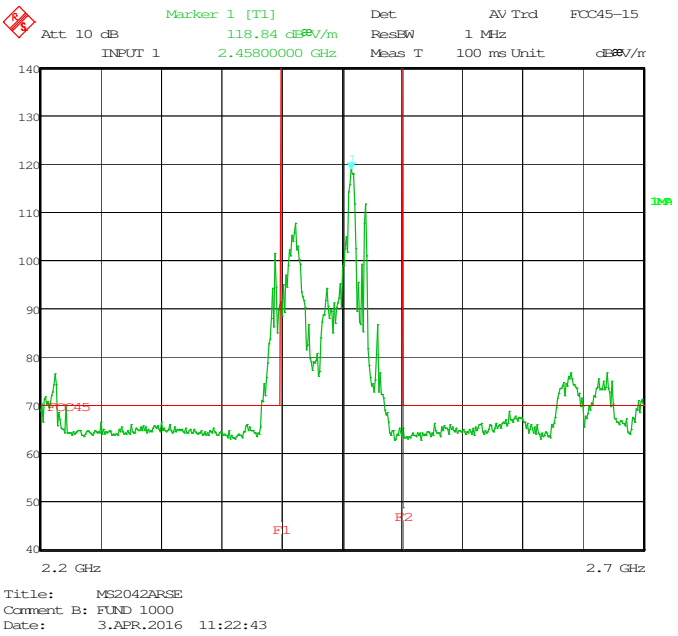
<Minimum Frequency Observed: 2,457 MHz>



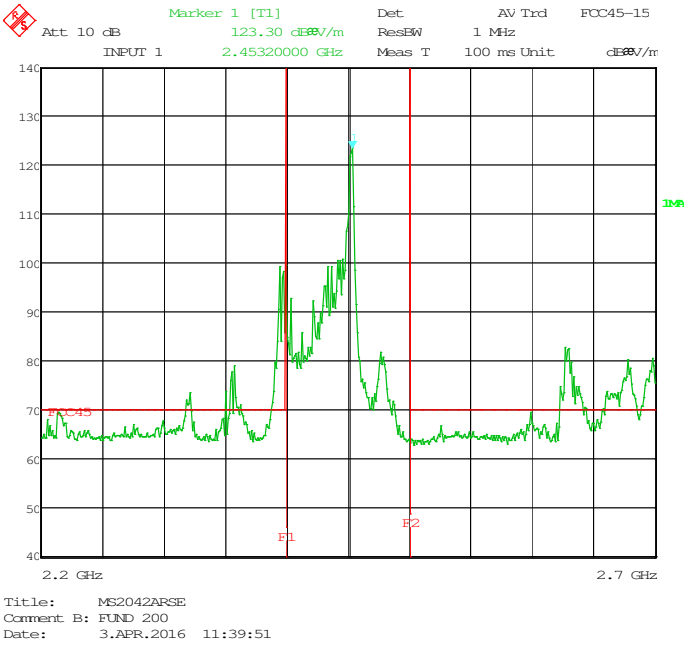
♦Load Variation (Magnetron type: 2M246 by LG)

- Detect Mode: Average, Scan Mode: Peak

<Maximum Frequency Observed: 2,458 MHz >



< Minimum Frequency Observed: 2,453 MHz >



APPENDIX B. Test Photos

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

- Conducted Emission

- Radiated Emission