

FCC PART 18
EMI MEASUREMENT AND TEST REPORT

For

Guangdong Galanz Enterprises Co., Ltd.

25 Ronggui Nan.Rd., Shunde, Foshan, Guangdong, China.

FCC ID: UHWJES737WM

August 15, 2006

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Microwave Oven
Test Engineer: William Chan <i>William Chan</i>	
Report Number: RSZ06072552	
Test Date: July 28-29, 2006	
Reviewed By: Boni Baniqued <i>Boni Baniqued</i>	
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or endorsement by NVLAP, NIST or any agency of the US Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Guangdong Galanz Enterprises Co., Ltd.*'s FCC ID: UHWJES737WM or the "EUT" as referred to in this report is a microwave oven which measures approximately 46.5cmL x 32.0cmW x 28.0cmH, rated input voltage: AC 120 V/60 Hz.

The series products, model name: JES737WM, JES737WM01, only model name is different, we select JES737WM to test.

* *The test data gathered are from production sample, serial number: SO26WXXXX, provided by the manufacturer.*

Objective

The following test report is prepared on behalf of *Guangdong Galanz Enterprises Co., Ltd.* in accordance with Part 2, Subpart J, and Part 18, Subparts A, B and C of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC Part 18 limits

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All measurements contained in this report were conducted with MP-5, FCC Methods of Measurements of Radio Noise Emissions from ISM Equipment, February 1986. All measurement was performed at Bay Area Compliance Laboratory Corporation. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Lab Corp. (ShenZhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China.

Test site at Bay Area Compliance Lab Corp. (ShenZhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Lab Corp. (ShenZhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm>.

External Cable List and Details

Cable Description	Length (M)	From/Port	To
Unshielded Undetachable AC Power Line	1.0	EUT	AC Power

OPERATING CONDITION/TEST CONFIGURATION

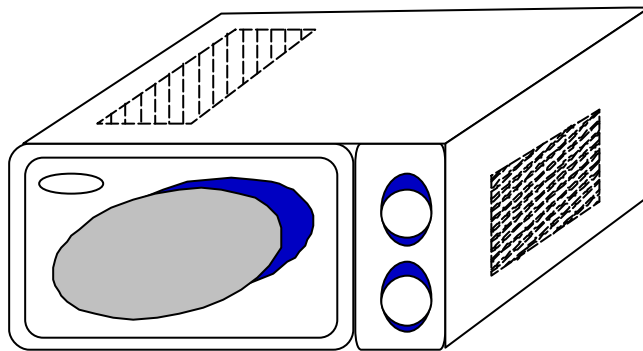
Justification

The EUT was provided for tests as a stand-alone device. It was prepared for testing in accordance with the manufacturer's instructions. The EUT was operated at maximum (continuous) RF output power. The loads consisted of water in a glass beaker in the amounts specified in the test procedure.

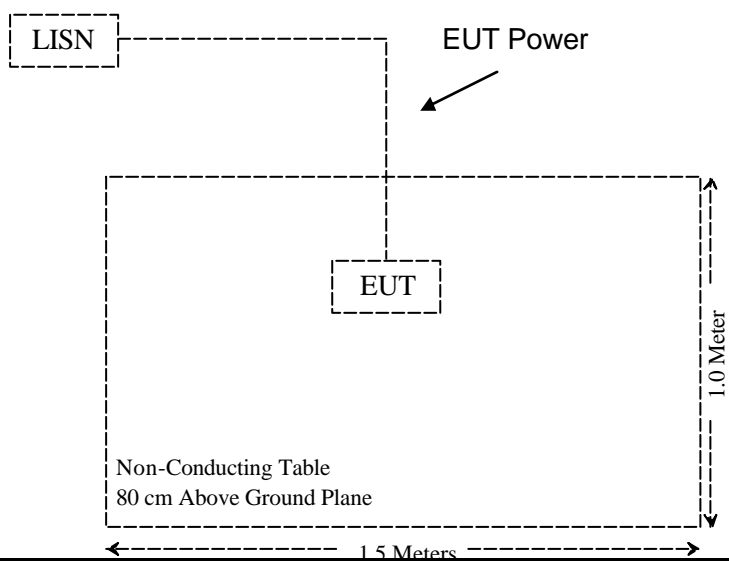
Equipment Modifications

Bay Area Compliance Lab Corp. (ShenZhen) has not done any modification on the EUT.

Configuration of Test Setup



Block Diagram of Test Setup



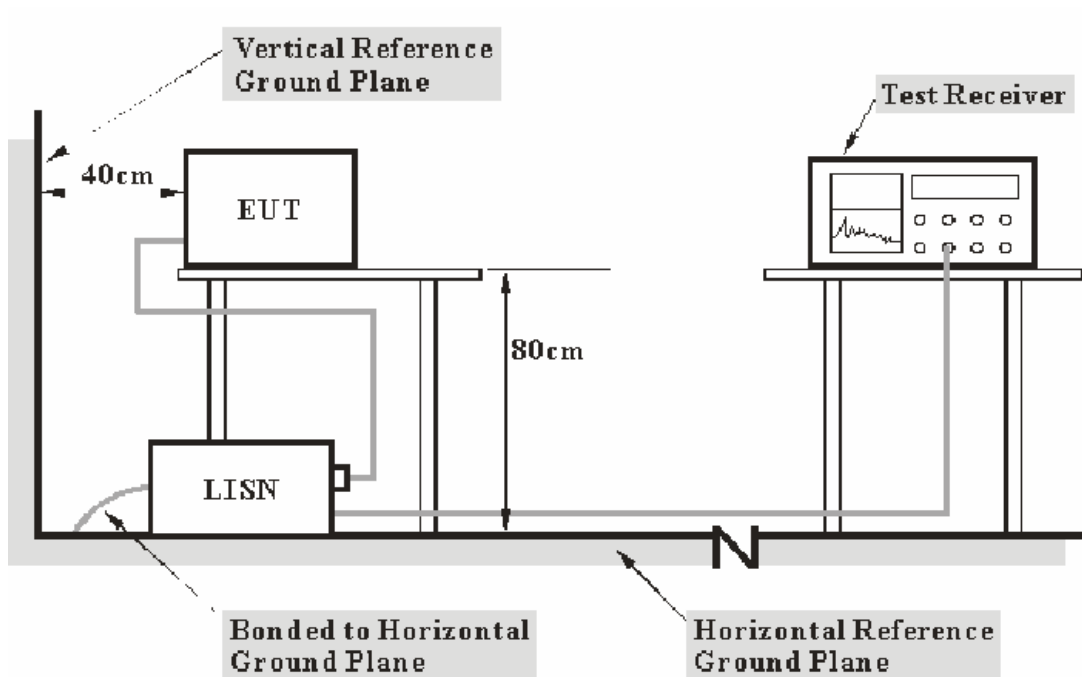
CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Lab Corp. (ShenZhen) is ± 2.4 dB.

EUT Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per MP-5: 1986 measurement procedure. Specification used was with the FCC Part 18.

The EUT was connected to a 120 VAC/ 60Hz power source.

Test Receiver Setup

The test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the test receiver was set with the following configurations:

Frequency Range	IFBW
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Com-Power	L.I.S.N.	LI-200	12005	N/A	N/A
Com-Power	L.I.S.N.	LI-200	12008	N/A	N/A
Rohde & Schwarz	EMI Test Receiver	ESCS30	DE25330 or 830245/006	2006-1-26	2007-1-26
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2006-3-1	2007-3-1

* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

During the conducted emission test, the EUT power cord was connected to the outlet of the LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC PART 18, with the worst margin reading of:

-9.87 dB at 0.285 MHz in the **Neutral** conductor mode.

Test Data**Environmental Conditions**

Temperature:	25°C
Relative Humidity:	56%
ATM Pressure:	1002mbar

The testing was performed by William Chan on 2006-7-28.

Test Mode: Max Power

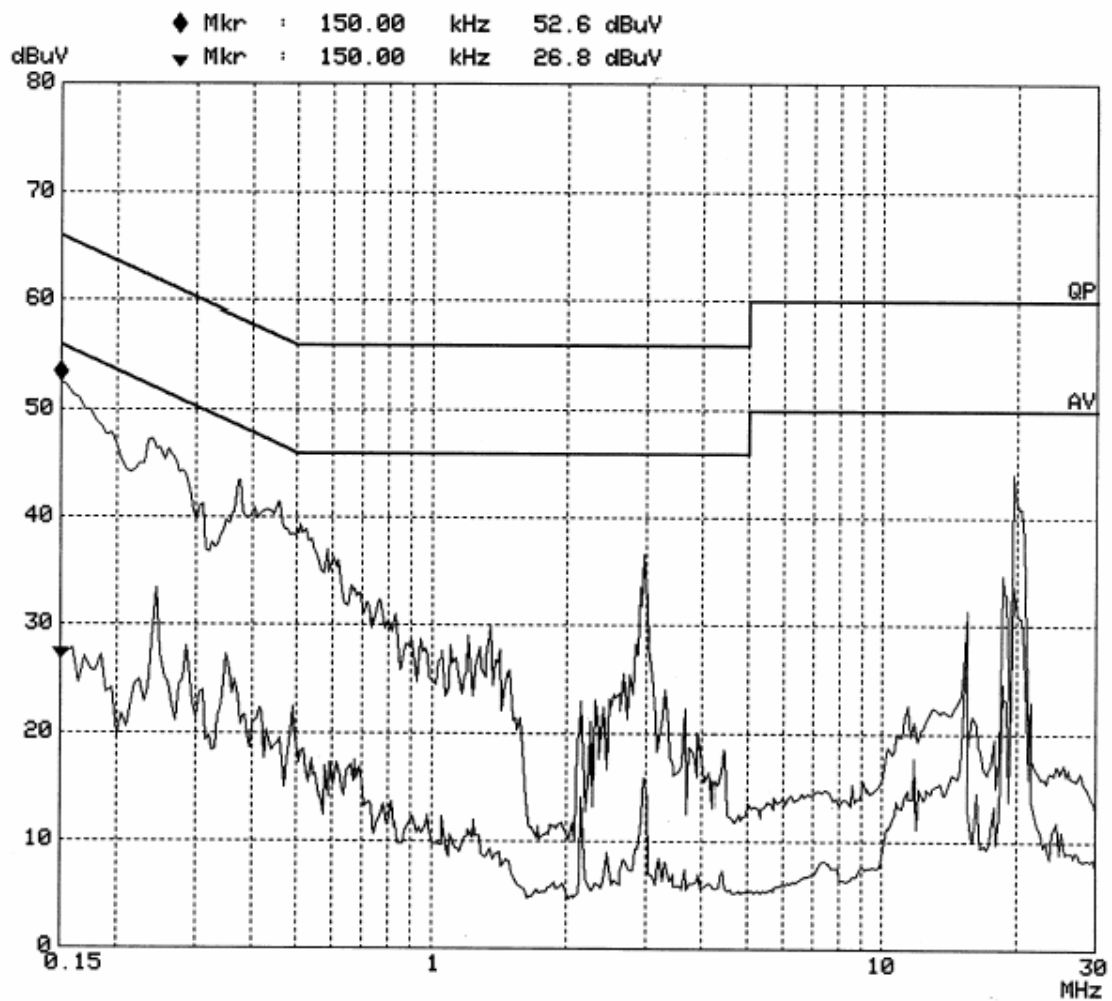
Frequency MHz	LINE CONDUCTED EMISSIONS			FCC PART 18	
	Amplitude DB μ V	Detector QP/AV	Phase Line/Neutral	Limit dB μ V	Margin dB
0.285	50.80	QP	Neutral	60.67	-9.87
0.245	50.50	QP	Neutral	61.92	-11.42
0.350	47.30	QP	Neutral	58.96	-11.66
0.150	52.60	QP	Live	66.00	-13.40
0.430	43.40	QP	Neutral	57.25	-13.85
0.385	42.80	QP	Neutral	58.17	-15.37
0.245	46.30	QP	Live	61.92	-15.62
0.155	49.90	QP	Neutral	65.73	-15.83
19.645	44.00	QP	Live	60.00	-16.00
19.645	33.70	AV	Live	50.00	-16.30
0.285	43.90	QP	Live	60.67	-16.77
0.245	34.30	AV	Neutral	51.92	-17.62
0.245	33.50	AV	Live	51.92	-18.42
0.350	39.70	QP	Live	58.96	-19.26
15.440	30.20	AV	Live	50.00	-19.80
0.285	30.00	AV	Neutral	50.67	-20.67
0.350	28.10	AV	Neutral	48.96	-20.86
0.350	27.30	AV	Live	48.96	-21.66
0.285	28.10	AV	Live	50.67	-22.57
0.430	21.70	AV	Neutral	47.25	-25.55
0.385	20.60	AV	Neutral	48.17	-27.57
15.440	31.50	QP	Live	60.00	-28.50
0.150	26.80	AV	Live	56.00	-29.20
0.155	25.70	AV	Neutral	55.73	-30.03

Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

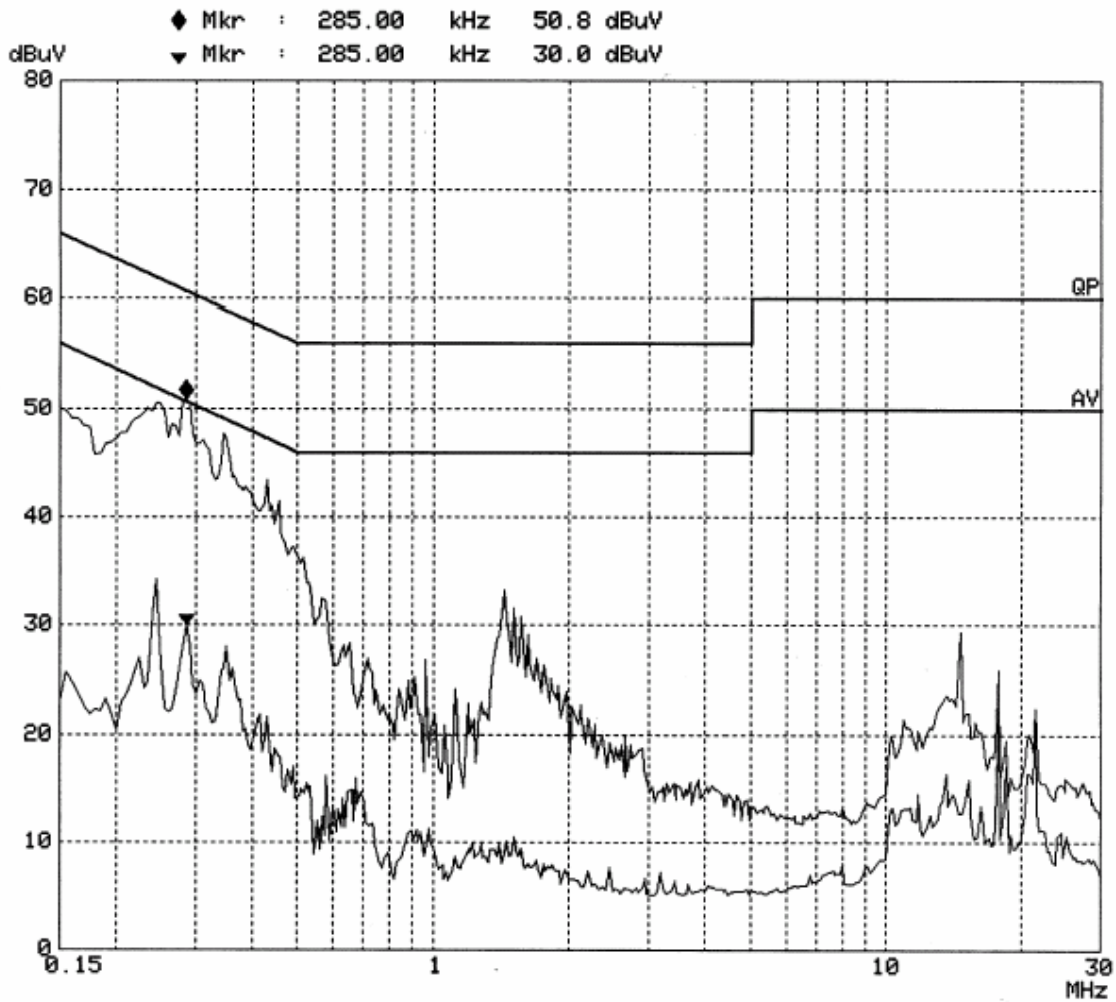
Conducted Emission Test FCC Part 18

EUT: Microwave oven
Manuf: Galanz
Op Cond: Max power
Operator: William
Test Spec: AC 120V/60Hz L
Comment: Temp.:25 Humi.:56%
Date: 28. Jul 06 18:16



Conducted Emission Test FCC Part 18

EUT: Microwave oven
Manuf: Galanz
Op Cond: Max power
Operator: William
Test Spec: AC 120V/60Hz N
Comment: Temp.:25 Humi.:56%
Date: 28. Jul 06 17:09



RADIATION HAZARD MEASUREMENT

Environmental Conditions

Temperature:	25°C
Relative Humidity:	50%
ATM Pressure:	1008mbar

The testing was performed by William Chan on 2006-7-30.

Test Mode: Max Power

Radiation Hazard Measurement

Radiation leakage was measured in the as-received condition with the oven door closed using a microwave leakage meter.

A 1000ml water load was placed in the center of the oven and the oven was operated at maximum output power.

There was no microwave leakage exceeding a power level of $0.69\text{mW}/\text{cm}^2$ observed at any point 5cm or more from the external surface of the oven.

A maximum of $1.0\text{mW}/\text{cm}^2$ is allowed in accordance with the applicable Federal Standards. Hence, microwave leakage in the as-received condition with the oven door closed was below the maximum allowed.

Input Power

Input power and current was measured using a power analyzer. A 1000ml water load was placed in the center of the oven and the oven was operated at maximum output power. A 1000ml water load was chosen for its compatibility with the procedure commonly used by manufacturers to determine their input ratings.

Input Voltage (Vac/Hz)	Input Current (amps)	Measured Input Power (watts)	Rated Input Power (watts)
120/60	9.85	1182	1200

Based on the measured input power, the EUT was found to be operating within the intended specifications.

Load for Microwave Ovens

For all measurements, the energy developed by the oven was absorbed by a dummy load consisting of a quantity of tap water in a beaker. If the oven was provided with a shelf or other utensil support, this support was in its initial normal position. For ovens rated at 1000 watts or less power output, the beaker contained quantities of water as listed in the following subparagraphs. For ovens rated at more than 1000watts output, each quantity was increased by 50% for each 500watts or fraction thereof in excess of 1000watts. Additional beakers were used if necessary.

? Load for power output measurement: 1000 milliliters of water in the beaker located in the center of the oven.

? Load for frequency measurement: 1000 milliliters of water in the beaker located in the center of the oven.

? Load for measurement of radiation on second and third harmonic: Two loads, one of 700 and the other of 300 milliliters, of water are used. Each load is tested both with the beaker located in the center of the oven and with it in the right front corner.

The RF output power is rated at 1000 W

Load used for power output measurement = 1000 milliliters of water
 Load used for frequency measurement = 1000 milliliters of water
 Load used for harmonic measurement = 700 & 300 milliliters of water
 Load used for other measurement = 700 milliliters of water

RF Output Power Measurement

The Caloric Method was used to determine maximum RF output power. The initial temperature of the water load was measured. The water load was placed in the center of the oven. The oven was operated at maximum output power for 63 seconds, the temperature of the water was re-measured.

Quality of Water (ml)	Starting Temperature (°C)	Final Temperature (°C)	Elapsed Time (Seconds)
1000	20	30.3	63

Power = (4.2 joules/calorie)(volume in milliliters)(temperature rise)/(time in seconds)

Power = 4.2 joules/calorie x 1000 x (30.3-20) / 63

Power = 687 watts

The measurement output power was found to be less than 500watts. Therefore, in accordance with Section 18.305 of Subpart-C, the measured out-of-band emissions were compared to the limit of 25µ V/meter at a 300-meter measurement distance.

- The measured output power was found to exceed 500watts. Therefore, in accordance with Section 18.305 of Subpart-C, the measured out-of-band emissions were compared with the limit calculated as following:

$$\text{LFS} = 25 * \text{SQRT} (\text{Power Output}/500)$$

$$\text{LFS} = 25 * \text{SQRT} (687/500)$$

$$\text{LFS} \approx 29.30$$

Where: LFS is the maximum allowable field strength for out-of-band emissions in $\mu\text{V}/\text{meter}$ at a 300-meter measurement distance. Power Output is the measured output power in watts.

Manufacturer	Model Number	LFS	dB($\mu\text{ V/M}$)	dB($\mu\text{ V/M}$)@3m
Guangdong Galanz Enterprises Co., Ltd.	JES737WM	29.30	29.34	69.34

Operating Frequency Measurement

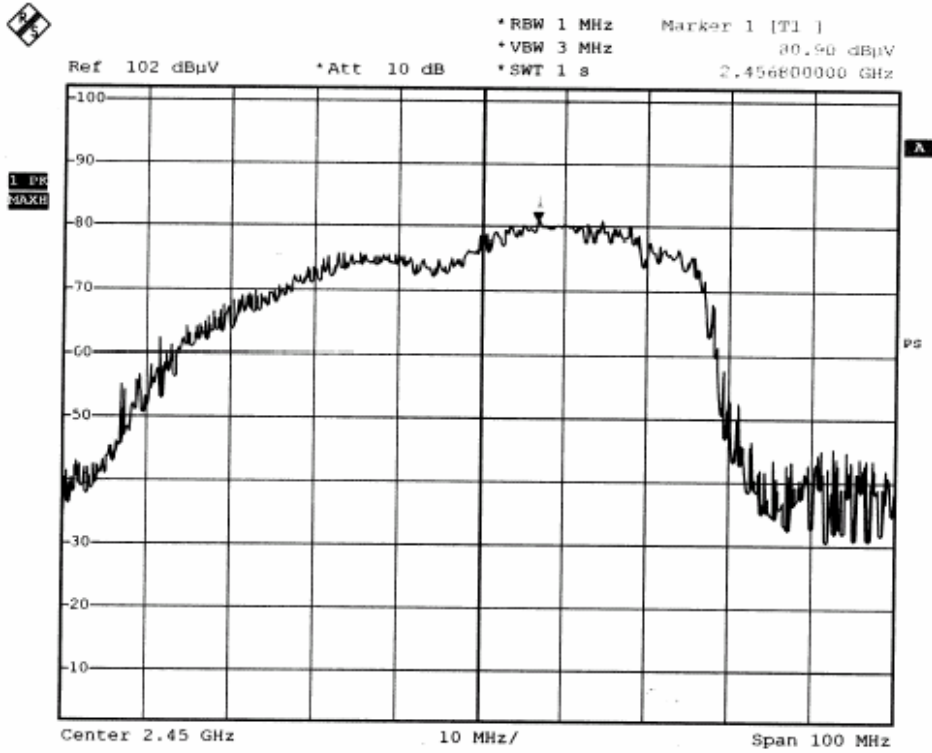
Variation in Operating Frequency with Time

The operating frequency was measured using a spectrum analyzer. Starting with the EUT at room temperature, a 1000ml water load was placed in the center of the oven and the oven was operated at maximum output power. The fundamental operating frequency was monitored until the water load was reduced to 20 percent of the original load.

The results of this test are as follows:

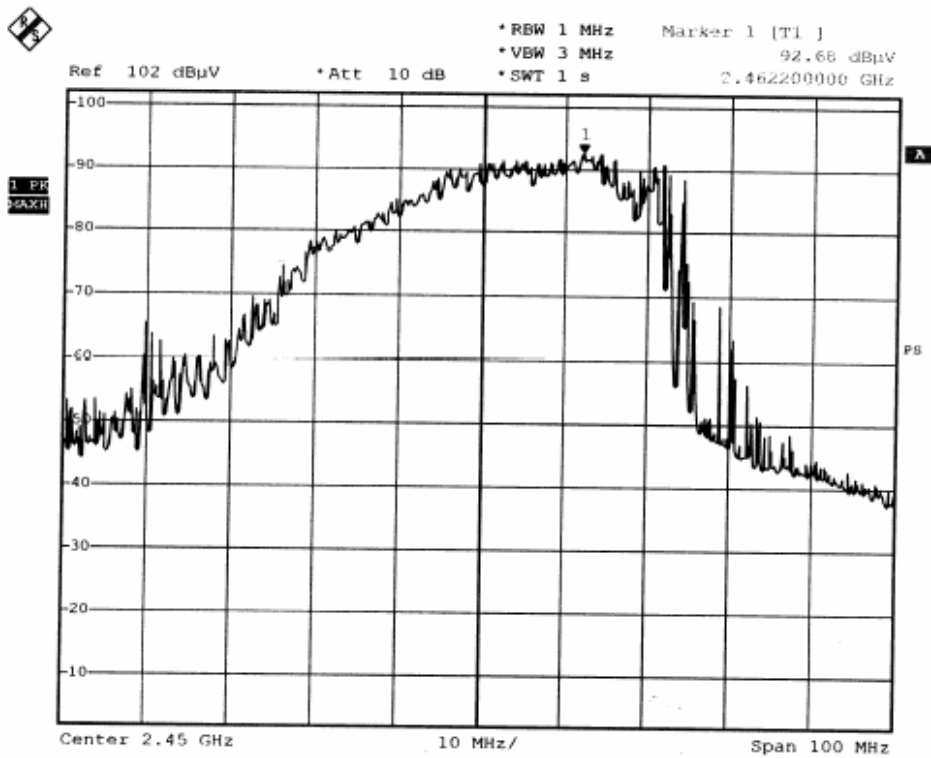
Manufacturer	Model Number	Minimum Frequency (MHz)	Maximum Frequency (MHz)
Guangdong Galanz Enterprises Co., Ltd.	JES737WM	2456.8	2462.2

Refer to data pages for details of the variation in operating frequency with time measurement.



Operating Frequency VS Time1

Date: 30.JUL.2006 16:31:26



Operating Frequency VS Time2
Date: 30.JUL.2006 17:15:54

Variation in Operating Frequency with Line Voltage

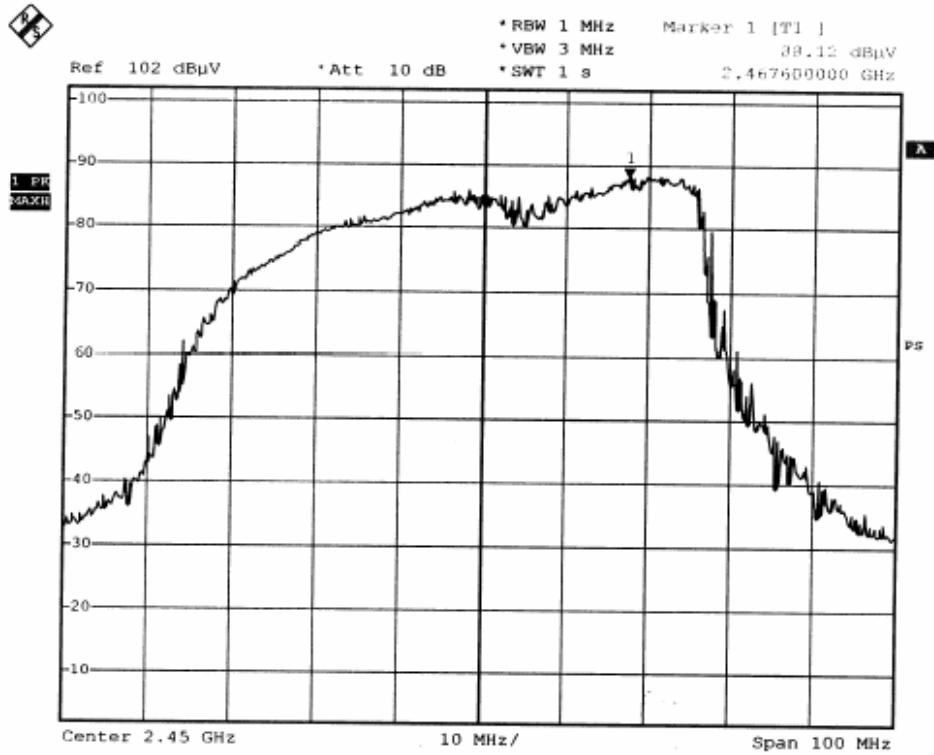
The EUT was operated / warmed by at least 10 minutes of use with a 1000ml water load at room temperature at the beginning of the test. Then the operating frequency was monitored as the input voltage was varied between 80 and 125 percent of the nominal rating.

The results of this test are as follows:

Line voltage varied from 96Vac to 150Vac.

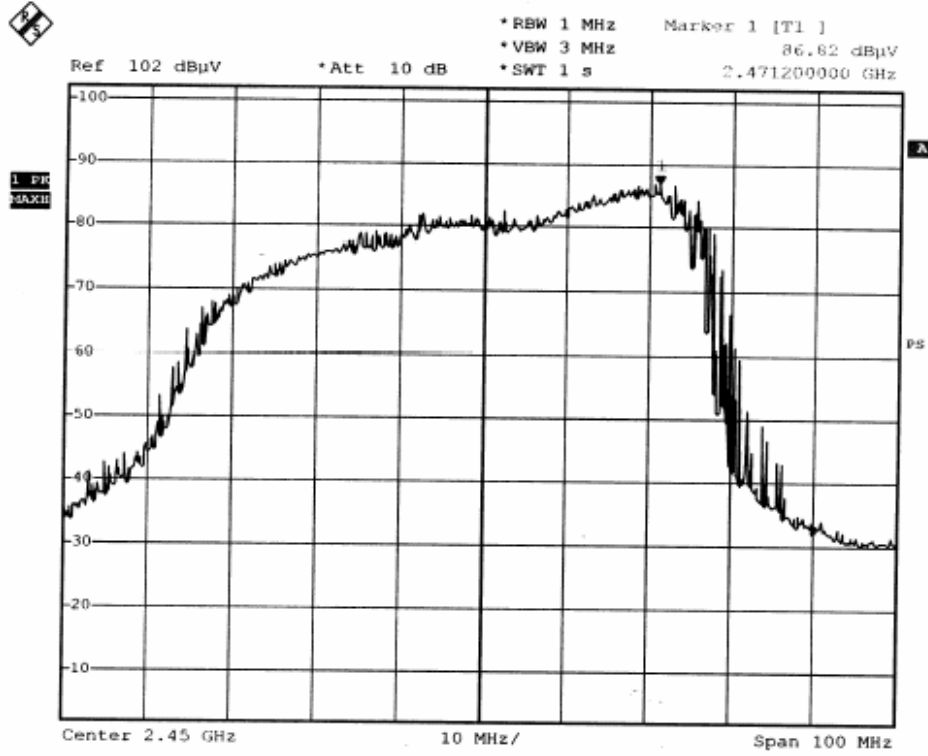
Manufacturer	Model Number	Minimum Frequency (MHz)	Maximum Frequency (MHz)
Guangdong Galanz Enterprises Co., Ltd.	JES737WM	2467.6	2471.2

Please refer to following pages for details of the variation in operating frequency with line voltage measurement.



Operating Frequency VS Voltage

Date: 30.JUL.2006 17:26:05



Operating Frequency VS Voltage2

Date: 30.JUL.2006 17:37:22

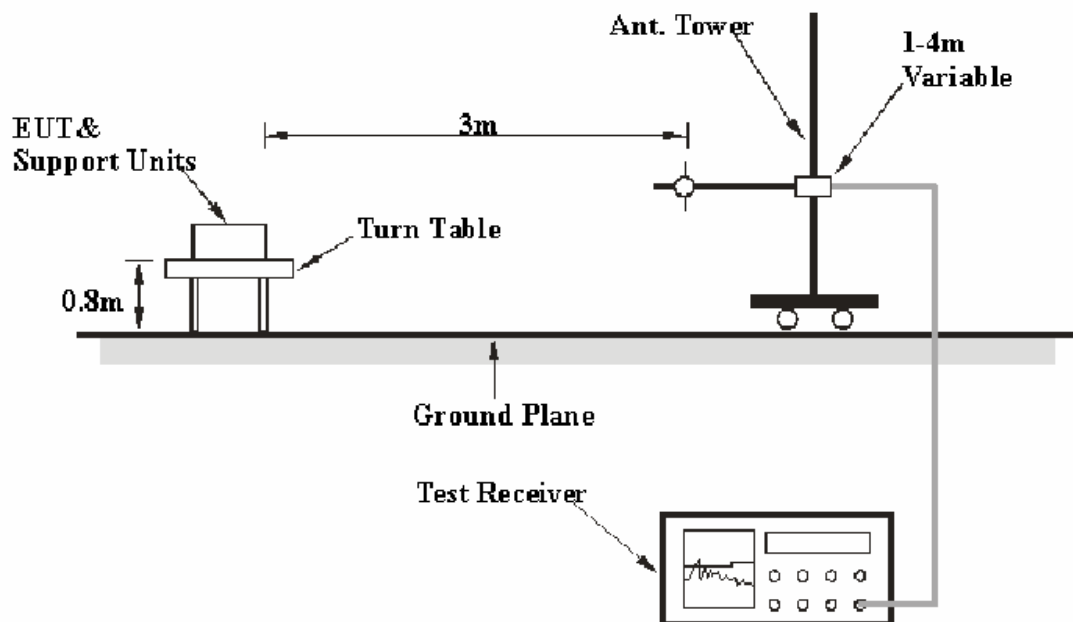
RADIATED EMISSION DATA

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Lab Corp. (ShenZhen) is ± 4.0 dB.

EUT Setup



The radiated emission tests were performed in the 3 meters chamber A test site, using the setup accordance with the FCC MP- 5. The specification used was the FCC part 18.

The EUT was connected to 120 VAC/60 Hz power source.

Test Receiver and Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
30 – 1000 MHz	100 kHz	300 kHz
Above 1000 MHz	1 MHz	3 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2005-8-17	2006-8-17
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2006-4-28	2007-4-28
Sunol Sciences	System Controller	SC99V	041304-1	N/A	N/A
A.H.System	Horn Antenna	SAS-200/571	135	2006-5-17	2007-5-17
Agilent	Spectrum Analyzer	8564E	3943A01781	2005-12-08	2006-12-08

* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

For the radiated emissions test, the EUT power cord was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode. from 30 MHz to 1000 MHz, and average detection mode above 1 GHz.

The EUT was in the normal (naïve) operating mode during the final qualification test to represent the worst results.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data table s indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 18, with the worst margin reading of:

30MHz to 1000MHz: **-11.9 dB** at **61.77 MHz** in the **Vertical** polarization.
Above 1 GHz: **-12.1 dB** at **4900 MHz** in the **Vertical** polarization.

Test Data

Environmental Conditions

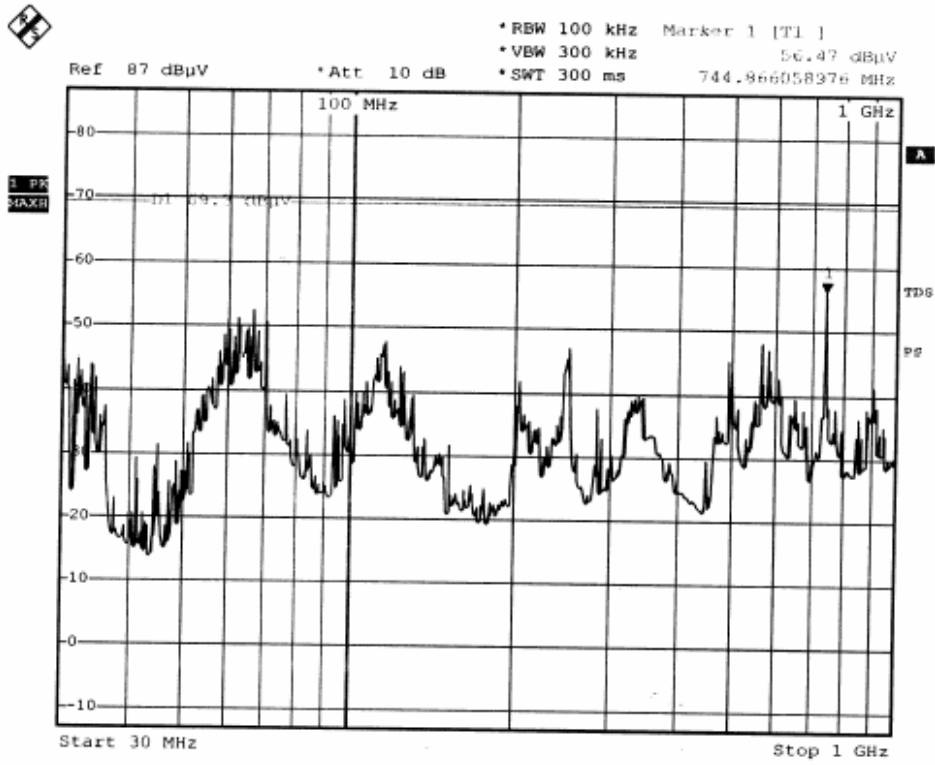
Temperature:	25°C
Relative Humidity:	50%
ATM Pressure:	940mbar

The testing was performed by William Chan on 2006-7-29.

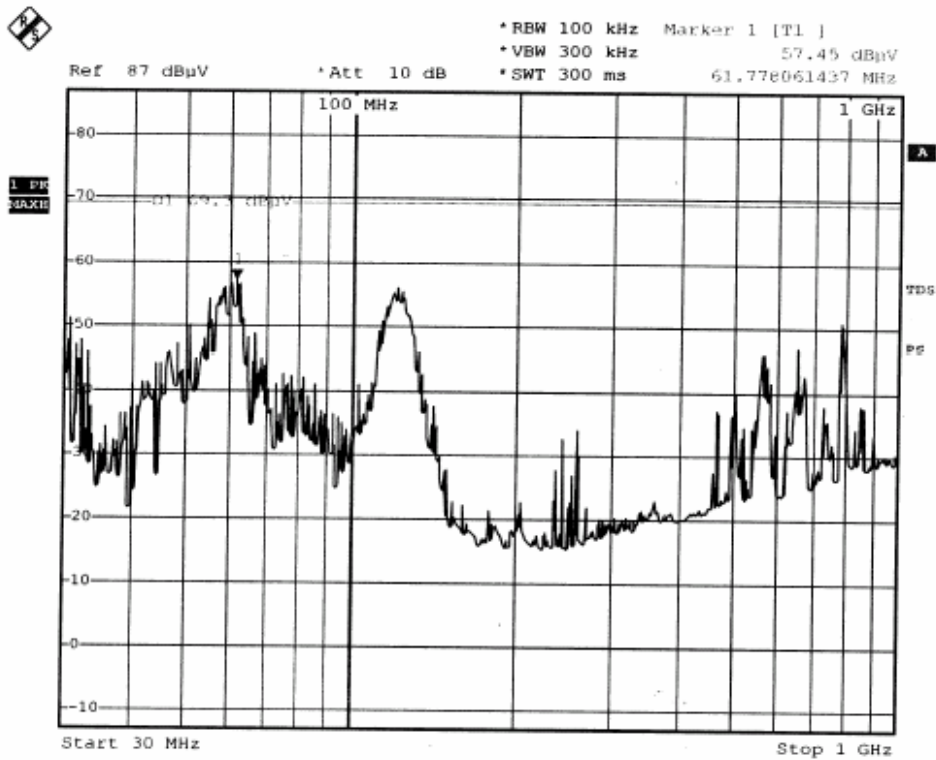
Test Mode: Max Power

INDICATED Frequency MHz	METER TABLE Reading d μ V/m	ANTENNA			CORRECTION FACTOR			CORRECTED AMPLITUDE Corr. Ampl. d μ V/m	FCC PART 18	
		Angle Degree	Height Meter	Polar H/ V	Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB		Limit d μ V/m	Margin dB
30 MHz to 1000 MHz										
61.77	77.30	270	1.0	V	8.1	0.8	28.7	57.5	69.34	-11.9
744.86	60.10	90	1.2	H	21.4	3.2	28.2	56.5	69.34	-12.9
121.12	69.60	60	1.2	V	14.0	1.1	28.5	56.2	69.34	-13.1
55.22	74.50	90	1.0	V	7.9	0.7	28.7	54.4	69.34	-14.9
66.73	71.80	180	1.2	H	8.5	0.8	28.7	52.4	69.34	-17.0
30.63	55.20	180	1.2	V	24.1	0.6	28.8	51.1	69.34	-18.2
62.65	70.90	45	1.0	H	8.1	0.8	28.7	51.1	69.34	-18.3
793.39	53.40	45	1.2	V	21.9	3.3	28.1	50.5	69.34	-18.9
130.83	61.80	180	1.0	V	14.5	1.1	28.5	48.9	69.34	-20.5
116.13	61.80	270	1.0	H	13.3	1.1	28.5	47.7	69.34	-21.6
252.94	60.90	275	1.2	H	12.3	1.3	27.6	46.9	69.34	-22.5
31.95	48.60	90	1.2	H	24.1	0.6	28.8	44.5	69.34	-24.8
Above 1 GHz										
2450	78.33	180	1.0	V	27.4	3.6	0	109.33		
2450	80.15	180	1.2	H	27.4	3.6	0	111.15		
4900	53.64	180	1.0	V	32.0	4.6	33.00	57.24	69.34	-12.1
7350	49.64	60	1.0	V	35.3	4.7	33.40	56.24	69.34	-13.1
4900	51.12	180	1.2	H	32.0	4.6	33.00	55.12	69.34	-14.22
9800	45.15	180	1.2	V	38.2	5.8	34.10	55.05	69.34	-14.29
9800	44.49	180	1.2	H	38.2	5.8	34.10	54.39	69.34	-14.95
7350	47.42	60	1.0	H	35.3	4.7	33.40	54.02	69.34	-15.32
14700	40.91	45	1.2	V	38.8	6.7	33.17	53.24	69.34	-16.10
14700	40.58	45	1.2	H	38.8	6.7	33.17	52.91	69.34	-16.43
12250	43.26	45	1.0	V	37.2	6.1	34.64	51.92	69.34	-17.42
12250	42.67	45	1.0	H	37.2	6.1	34.64	51.33	69.34	-18.01

Test Result: Pass



Galanz Microwave oven M/N : JES737WM Max power Radiation
test -- Horizontal
Date: 29.JUL.2006 10:09:53



Galanz Microwave oven M/N : JES737WM Max power Radiation
test -- Vertical
Date: 29.JUL.2006 10:33:29