NVLAP LAB CODE 200707-0

FCC PART 18
EMI MEASUREMENT AND TEST REPORT

For

Foshan Shunde Midea Microwave and Electrical Appliances Manufacturing Co., Ltd.

No.18 Huanzhen West Road, Beijiao,

Shunde, Foshan, Guangdong, China.528311

FCC ID: VG8XM031MYY

Report Type:	Product Type:
Original Report	Microwave Oven

Test Engineer:	Thomas Zhang
Report No.:	RSZ09122952
Report Date:	2010-01-26
Reviewed By:	William Chen EMC Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong,China Tel: +86-755-33320018 Fax: +86-755-33320008

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Foshan Shunde Midea Microwave and Electrical Appliances Manufacturing Co., Ltd.*'s model: *EM031MZN (FCC ID: VG8XM031MYY)* or the "EUT" as referred to in this report is a *Microwave Oven* which measures approximately 51.0cm L x 39.3cm W x 30.2cm H, rated input voltage: AC 120 V/60 Hz.

***Note:** The series products, model XM031M##, more detail description as follows:

1. where ## is alphabetic characters. ##: Suffix could be from 0 to 9 or from A to Z (Cosmetic Design).
2. X=E or A, E: Touch Pad type, A: Encoder type.

we select *EM031MZN* to test, there is no electrical change has been made to the equipment, which was explained in the attached Declaration Letter.

** All measurement and test data in this report was gathered from production sample serial number: 0912156 (Assigned by BACL, Shenzhen). The EUT was received on 2009-12-29.*

Objective

The following test report is prepared on behalf of *Foshan Shunde Midea Microwave and Electrical Appliances Manufacturing Co., Ltd.* in accordance with Part 2, Subpart J, and Part 18, Subparts A, B and C of the Federal Communication Commissions rules and regulations.

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 measurements were 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 Laboratories 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, China.

Test site at Bay Area Compliance Laboratories 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 21, 2007. 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 Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).

NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2007070.htm

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.

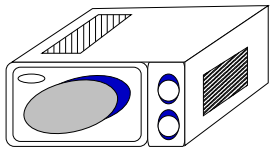
Equipment Modifications

No modifications were made to the unit tested.

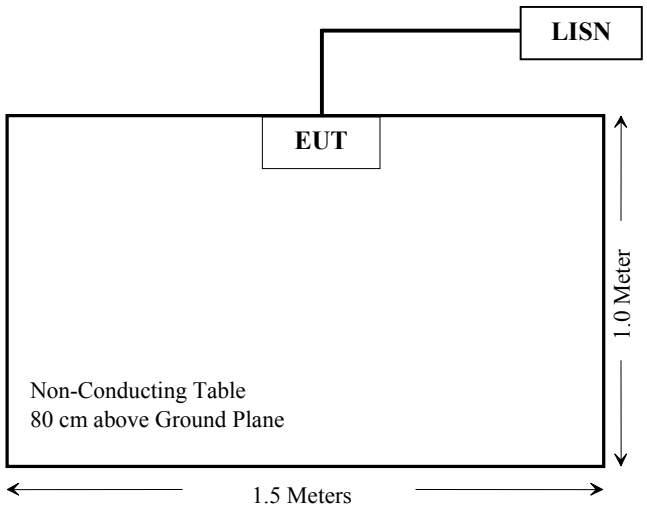
External Cable List and Details

Cable Description	Length (m)	From/Port	To
Unshield Undetachable AC Power Cable	1.03	EUT	LISN

Configuration of Test Setup



Block Diagram of Test Setup



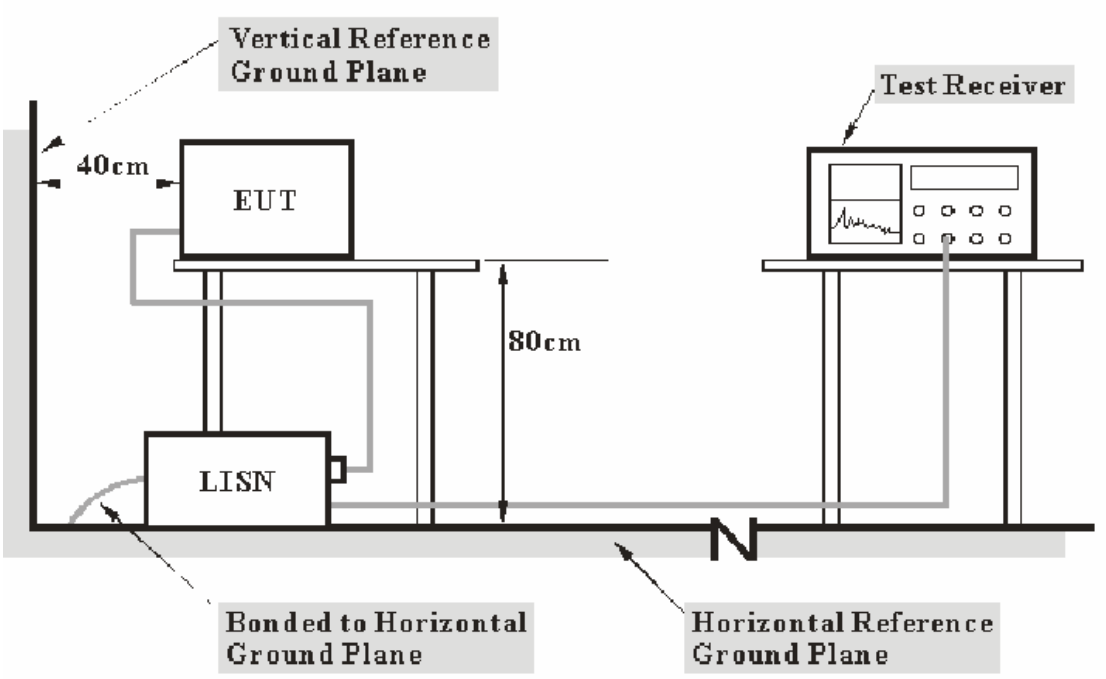
CONDUCTED EMISSIONS

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 Laboratories 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 18.307.

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

EMI Test Receiver Setup

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

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

Frequency Range	***IF B/W***
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2009-04-28	2010-04-27
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2009-04-28	2010-04-27

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

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

Maximizing procedure was 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:

3.05 dB at **0.540 MHz** in the **Line** conductor mode
8.13 dB at **28.560 MHz** in the **Neutral** conductor mode

Test Data

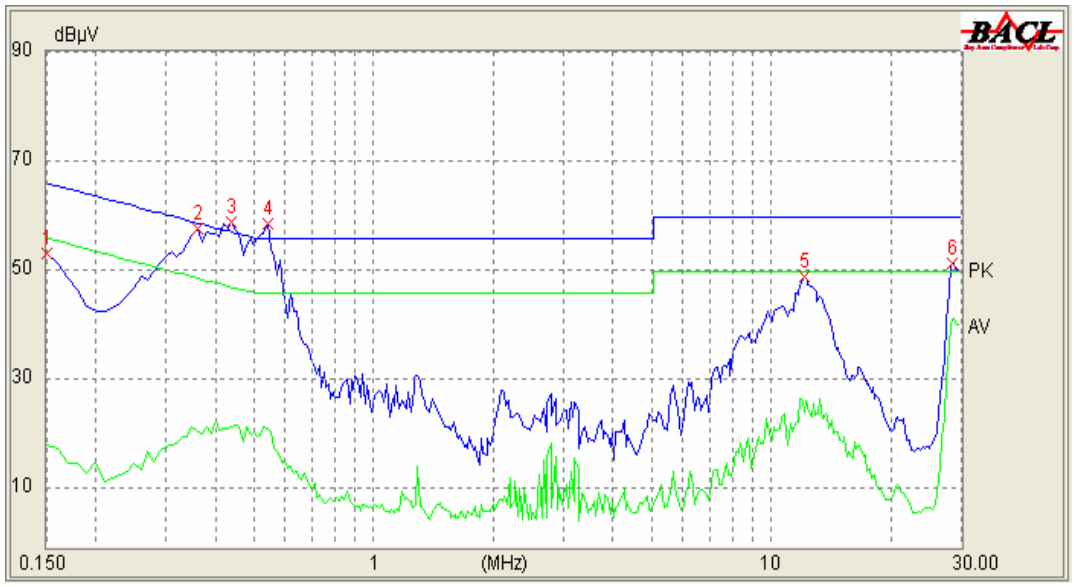
Environmental Conditions

Temperature:	25° C
Relative Humidity:	48%
ATM Pressure:	100.2kPa

The testing was performed by Thomas Zhang on 2010-01-16.

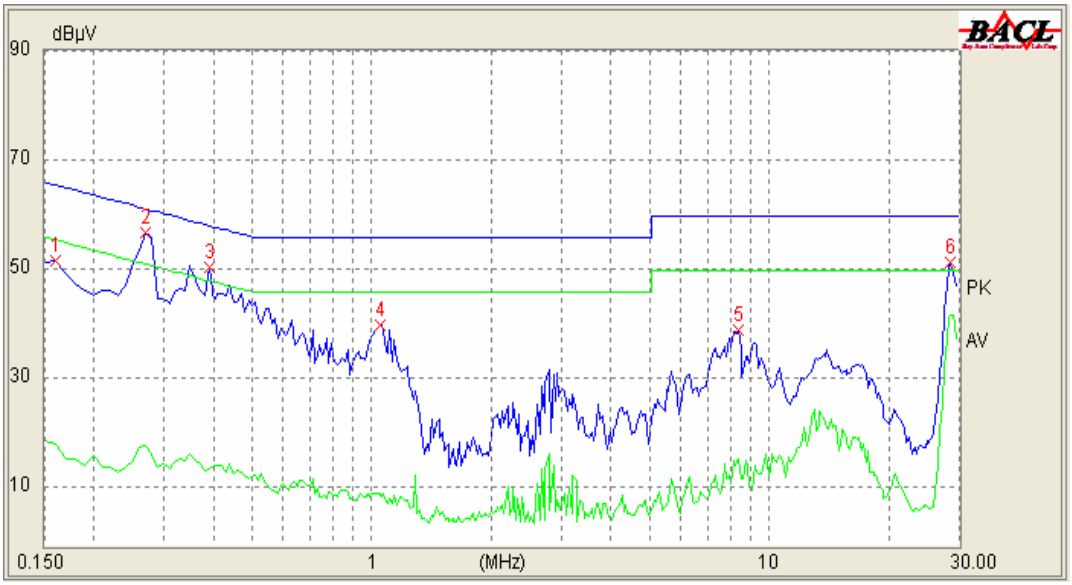
Test Mode: Running (Max Power)

120V/60Hz, Line:



Frequency (MHz)	Correction Factor (dB)	Cord. Result (dBµV)	Limit (dBµV)	Margin (dB)	Remark
0.540	10.10	52.95	56.00	3.05	QP
0.440	10.10	52.98	57.09	4.11	QP
0.360	10.10	52.90	58.74	5.84	QP
28.560	10.30	41.14	50.00	8.86	AV
28.640	10.30	48.06	60.00	11.94	QP
12.140	10.30	44.62	60.00	15.38	QP
0.150	10.10	50.51	66.00	15.49	QP
0.540	10.10	21.34	46.00	24.66	AV
0.440	10.10	21.83	47.09	25.26	AV
12.140	10.30	24.40	50.00	25.60	AV
0.360	10.10	20.78	48.74	27.96	AV
0.150	10.10	18.50	56.00	37.50	AV

120V/60Hz, Neutral:



Frequency (MHz)	Correction Factor (dB)	Cord. Result (dBµV)	Limit (dBµV)	Margin (dB)	Remark
28.560	10.30	41.87	50.00	8.13	AV
28.700	10.30	47.72	60.00	12.28	QP
0.390	10.10	45.39	58.08	12.69	QP
0.270	10.10	44.63	61.16	16.53	QP
0.160	10.10	43.36	65.56	22.20	QP
1.050	10.10	28.45	56.00	27.55	QP
8.340	10.20	31.59	60.00	28.41	QP
0.270	10.10	18.29	51.16	32.87	AV
0.390	10.10	13.99	48.08	34.09	AV
8.340	10.20	15.64	50.00	34.36	AV
1.050	10.10	9.36	46.00	36.64	AV
0.160	10.10	18.32	55.56	37.24	AV

RADIATION HAZARD MEASUREMENT

Environmental Conditions

Temperature:	25° C
Relative Humidity:	56%
ATM Pressure:	100.2kPa

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-24
Sunol Sciences	Horn Antenna	DRH-118	A052604	2009-05-05	2010-05-04
HP	Preamplifier	8449B	3008A00277	2009-09-12	2010-09-11
Ainuo	Digital Power Analyzer	8732B	028706117	2009-12-23	2010-12-23
HY	AC Power Source	9020117	GY053(1)	2009-08-21	2010-08-21
Holday	Leakage Meter	HI-1710	05/2731	2009-06-02	2010-06-02

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

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 0.71mW/cm^2 observed at any point 5cm or more from the external surface of the oven.

A maximum of 1.0mW/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	10.8	1296	1500

☒ 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 watts

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 200 seconds, the temperature of the water was re-measured.

Quality of Water (ml)	Starting Temperature (ºC)	Final Temperature (ºC)	Elapsed Time (s)
1000	21.3	64.6	200

Power = (4.2 joules/calorie) (volume in milliliters) (temperature rise)/ (time is seconds)
Power = 4.2 joules/calorie x 1000 x (64.6-21.3) / 200
Power = 909.3 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 25μV/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:

LFS = 25*SQRT (Power Output/500)
LFS = 25*SQRT (909.3/500)
LFS ≈ 33.71

Where: LFS is the maximum allowable field strength for out-of-band emissions in μV/meter at a 300-meter measurement distance. Power Output is the measured output power in watts.

Manufacturer	Model	LFS V/m@300m	LFS dBμV/m@300m	LFS dBμV/m@3m
Foshan Shunde Midea Microwave and Electrical Appliances Manufacturing Co., Ltd.	EM031MZN	33.71	30.56	70.56

Operating Frequency Measurement

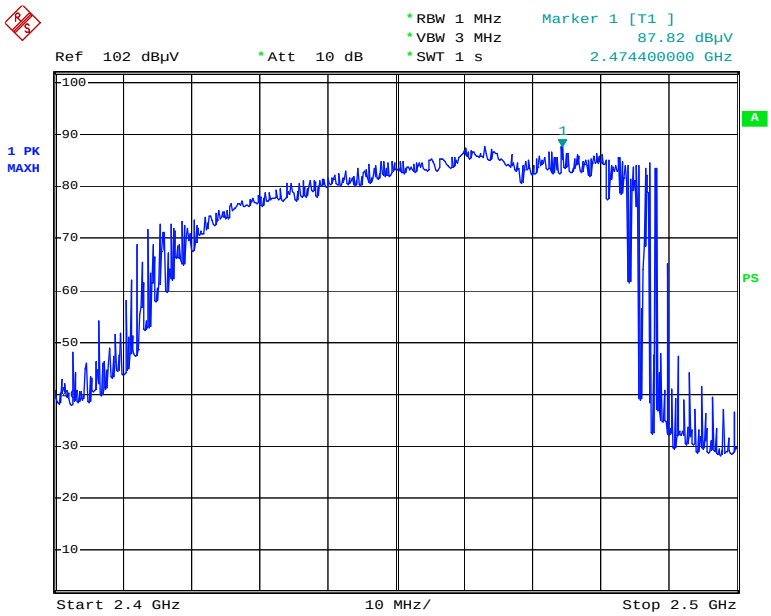
Variation in Operating Frequency with Time

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.

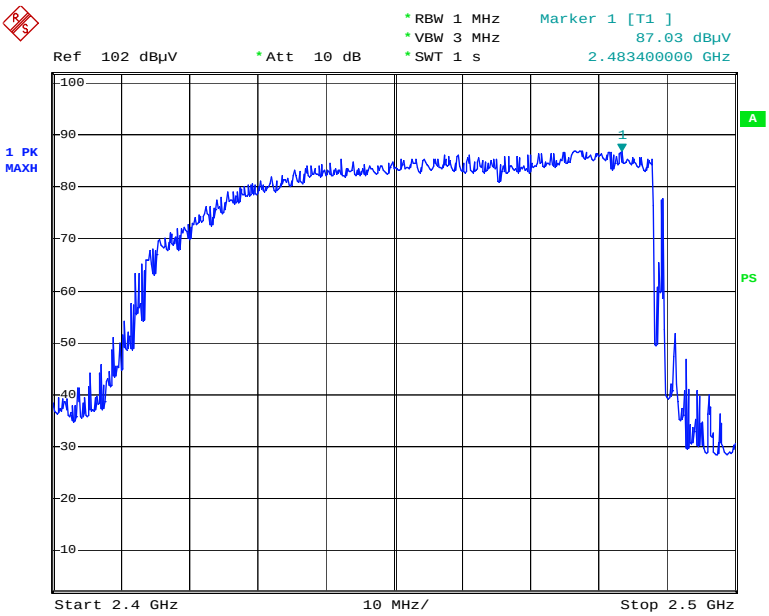
The results of this test are as follows:

Manufacturer	Model	Minimum Frequency (MHz)	Maximum Frequency (MHz)
Foshan Shunde Midea Microwave and Electrical Appliances Manufacturing Co., Ltd.	EM031MZN	2474.4	2483.4

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



Date: 20.JAN.2010 21:23:13



Date: 20.JAN.2010 21:51:23

Variation in Operating Frequency with Line Voltage

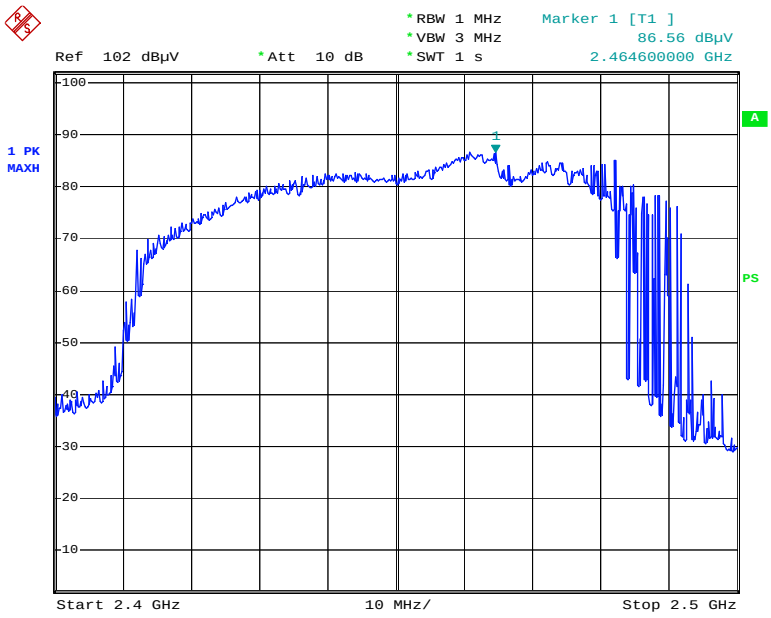
The EUT was operated / warmed by at least 10 minutes of use with a 1000ml water load at room temperature at the beginning of the test. Then the operating frequency was monitored as the input voltage was varied between 80 and 125 percent of the nominal rating.

The results of this test are as follows:

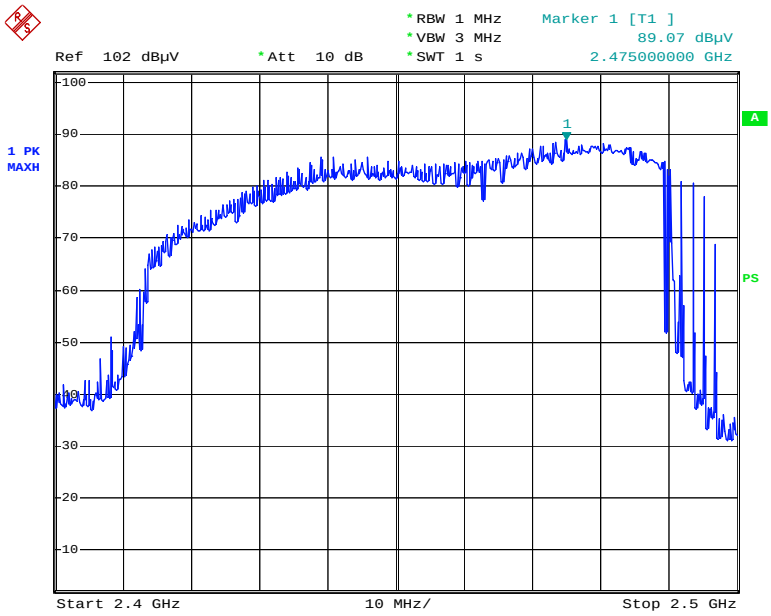
Line voltage varied from 96 Vac to 150 Vac.

Manufacturer	Model	Minimum Frequency (MHz)	Maximum Frequency (MHz)
Foshan Shunde Midea Microwave and Electrical Appliances Manufacturing Co., Ltd.	EM031MZN	2464.6	2475.0

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



Date: 20.JAN.2010 20:07:59



Date: 20.JAN.2010 19:16:59

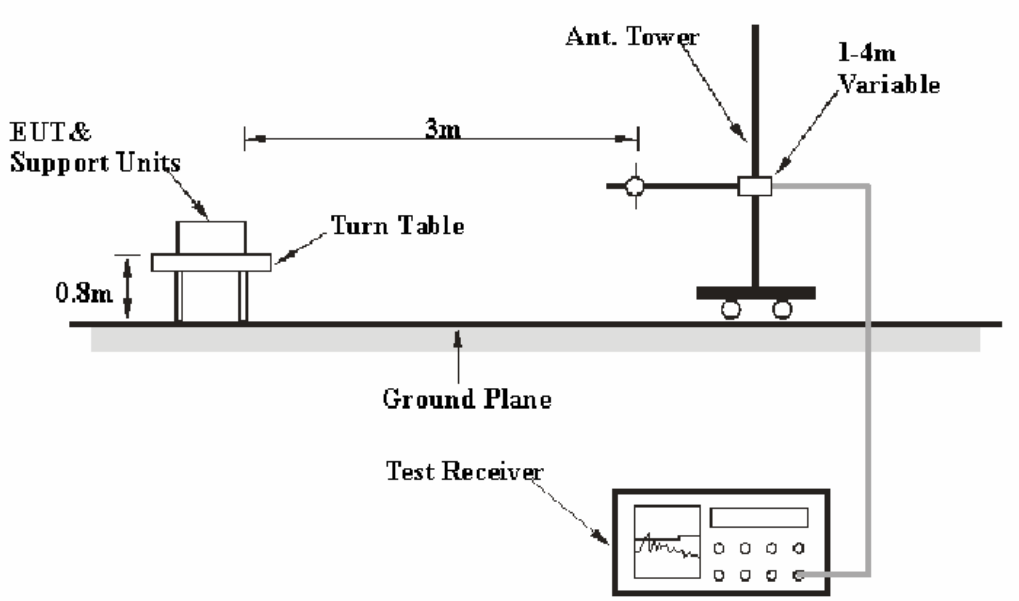
RADIATED EMISSIONS

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 Laboratories 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 limits.

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

EMI Test Receiver Setup and Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver and Spectrum Analyzer were set with the following configurations:

Frequency Range	***R B/W***	***Video B/W***	***IF B/W***
30 – 1000 MHz	100 kHz	300 kHz	120 kHz
Above 1GHz	1MHz	10Hz	

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2009-08-02	2010-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2009-03-11	2010-03-11
Sunol Sciences	System Controller	SC99V	041304-1	N/A	N/A
A.H. System	Horn Antenna	SAS-200/571	135	2009-05-17	2010-05-17
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2009-07-08	2010-07-08

*** Statement of Traceability:** Bay Area Compliance Laboratories 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.

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

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

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

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:

31.00 dB at **665.584250 MHz** in the **Vertical** polarization, below 1GHz
11.23 dB at **4900.0 MHz** in the **Horizontal** polarization, above 1GHz

Test Data and Plots

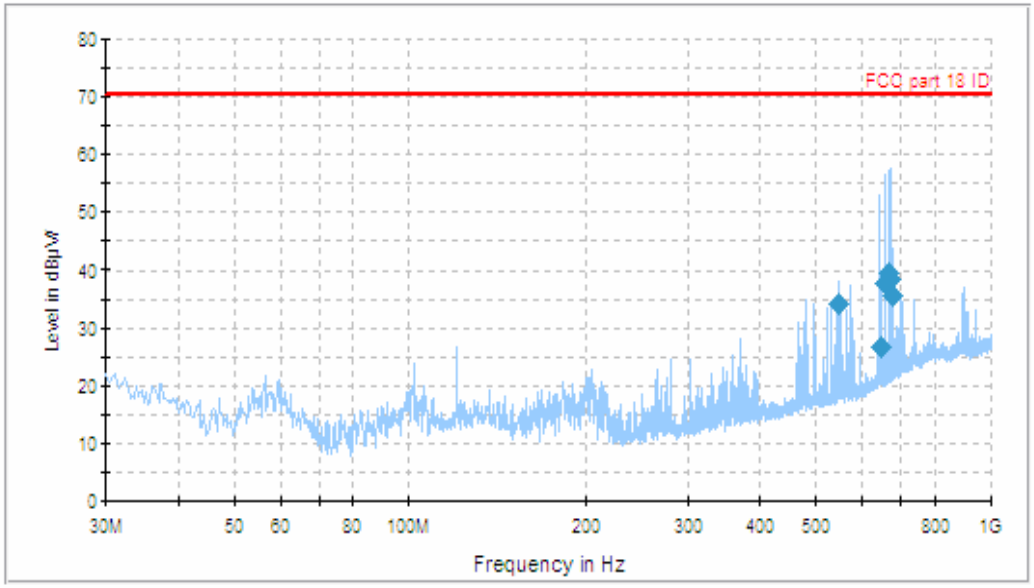
Environmental Conditions

Temperature:	25° C
Relative Humidity:	56%
ATM Pressure:	100.2kPa

The testing was performed by Thomas Zhang on 2010-01-07.

Test Mode: Running (Max Power)

Below 1 GHz:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
665.584250	39.6	168.0	V	280.0	-5.8	70.6	31.0
670.136000	38.6	169.0	V	251.0	-5.7	70.6	32.0
657.885250	37.9	377.0	V	139.0	-6.1	70.6	32.7
674.525250	35.8	193.0	V	99.0	-5.5	70.6	34.8
544.830000	34.4	172.0	V	210.0	-0.3	70.6	36.2
645.745500	26.9	101.0	V	274.0	-6.5	70.6	43.7

Above 1 GHz:

Frequency MHz	S.A. Reading (dBµV/m)	Detector (PK/QP/AV)	Direction (Degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC Part 18	
				Height (m)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
4900.0	48.97	AV	26	1.15	H	36.4	7.7	33.7	59.37	70.6	11.23
7350.0	41.95	AV	169	1.30	H	39.3	10.4	33.6	58.05	70.6	12.55
7350.0	39.30	AV	125	1.00	V	38.0	10.4	33.6	54.10	70.6	16.50
4900.0	44.42	AV	112	1.40	V	35.2	7.7	33.7	53.62	70.6	16.98
9800.0	32.21	AV	123	1.16	H	41.5	11.0	34.1	50.61	70.6	19.99
9800.0	31.35	AV	21	1.12	V	40.3	11.0	34.1	48.55	70.6	22.05
2366.5	41.28	AV	221	1.10	V	30.3	7.9	33.9	45.58	70.6	25.02
2579.5	35.67	AV	166	1.20	H	31.5	8.0	33.9	41.27	70.6	29.33
2565.5	33.87	AV	157	1.12	V	30.6	8.0	33.9	38.57	70.6	32.03
2395.0	33.50	AV	28	1.03	V	30.3	7.9	33.9	37.80	70.6	32.80

******* END OF REPORT *******