FCC PART 74

EMI MEASUREMENT AND TEST REPORT

FOR

GUANGZHOU BAI YUN NEW CENTURY ELECTRONICS FACTORY

Yong Tai Industrial Area
Bai Yun, Guangzhou, China

Model: WM-2000

October 26, 2000

This Report Concerns: ☒ Original Report	**Equipment Type:** Wireless Microphone – Household Appliances
Test Engineer:	Victor Liu
Test Date:	October 3, 2000
Reviewed By:	John Y. Chan – Engineering Manager
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street, Suite 2 Sunnyvale, CA 94086 Tel: (408) 732-9162 Fax: (408) 732-9164

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The Guangzhou Bai Yun New Century Electronics Factory, FCC ID PDMWM-2000 or *the* "EUT" as referred to in this report is a microphone which measures 9.25”L with diameter of 1.5”.

1.2 Objective

This type approval report is prepared on behalf of *Guangzhou Bai Yun New Century Electronics Factory* in accordance with Part 74 Subpart H of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for peak output power, modulation characteristics, occupied bandwidth of emission, spurious emission, field strength of spurious radiation, frequency stability and line conduction.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Suite 2, Sunnyvale, California, USA.

Test sites at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-674 and R-657. The test sites has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1993, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Data
HP	Spectrum Analyzer	8566B	2610A02165	12/6/01
HP	Spectrum Analyzer	8593B	2919A00242	12/20/01
HP	Amplifier	8349B	2644A02662	12/20/01
HP	Quasi-Peak Adapter	85650A	917059	12/6/01
HP	Amplifier	8447E	1937A01046	12/6/01
A.H. System	Horn Antenna	SAS0200/571	261	12/27/01
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/01
Com-Power	Biconical Antenna	AB-100	14012	11/2/01
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/001
Com-Power	LISN	LI-200	12208	12/20/01
Com-Power	LISN	LI-200	12005	12/20/01
BACL	Data Entry Software	DES1	0001	12/20/01
Rohde & Schwarz	Signal Generator	SMIQ03B	1125.5555.03	7/10/2002
Rohde & Schwarz	I/Q Modulation Generator	AMIQ	1110.2003.02	8/10/2002

1.7 Equipment Under Test (EUT)

Manufacturer	Description	Model	Serial Number	FCC ID
Guangzhou Bai Yun New Century Electronics Factory	Microphone	WM-2000	None	PDMWM-2000

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

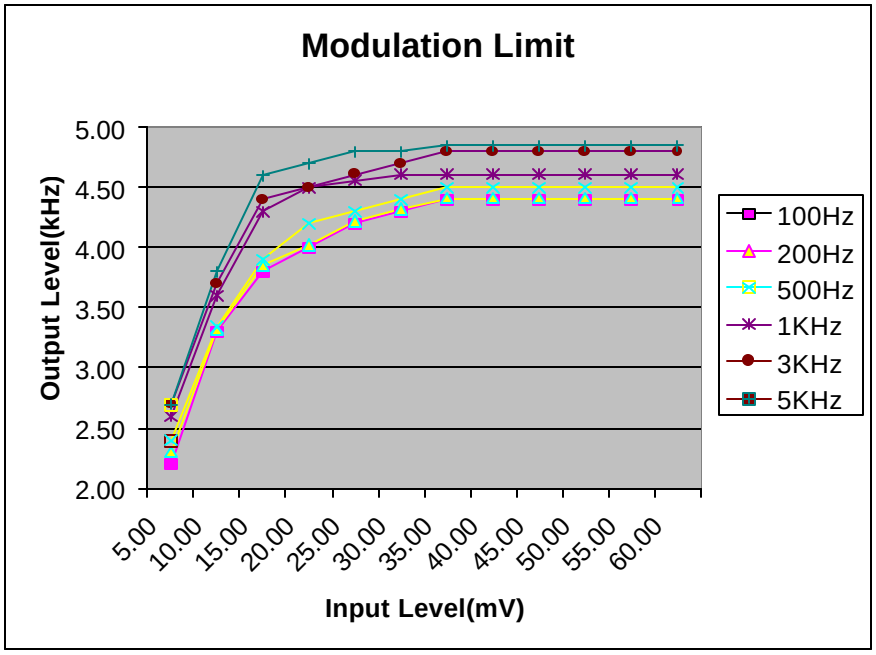
The EUT was configured for testing in a typical fashion (as normally used in a typical application).

The final qualification test was performed with the EUT operating at normal mode.

2.2 Block Diagram

Appendix A contains a copy of the EUT's block diagram as reference.

2.3 Test Setup Block Diagram



2.4 Equipment Modifications

No modifications were necessary for the EUT to comply.

3.0 Summary of Test Results

3.1.0 Peak Output Power

Requirements: According to FCC 74.861(e)(1)(i), the output power shall not exceed 50 milliwatts.

FCC RULE	DESCRIPTION OF TEST	RESULT
74.861(e)(1) (i)	Peak Output Power	Pass
2.1047(a)	Modulation Characteristics	Pass
2.1049 (c) (1)	Occupied Bandwidth of Emission	Pass
2.1051, 74.861(e)(6)	Spurious Emission	Pass
2.1053, 74.861(e)(6)	Field Strength of Spurious Radiation	Pass
2.1055(a)(1) 74.861(e)(4)	Frequency Stability	Pass
15.207(a)	Line Conduction	Not Applicable

3.1.1 Test Procedure

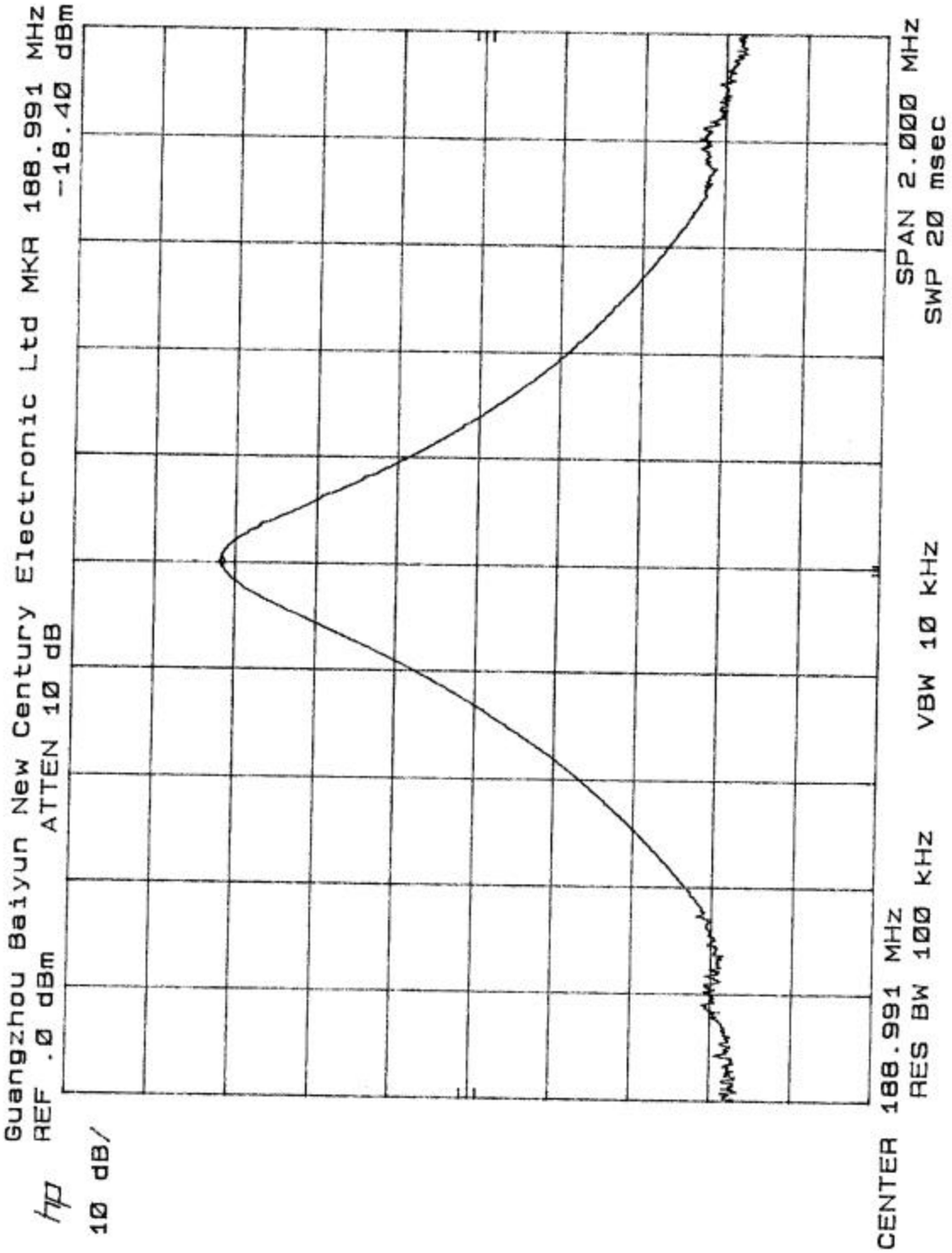
The maximum peak output power was measured with a spectrum analyzer connected to the antenna terminal (conducted measurement) while EUT was operating in normal situation. Set RBW of spectrum analyzer to 100 kHz and VBW to 100 kHz.

3.1.2 Test equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

3.1.3 Test Results

Refer to the attached plot.


Guangzhou Baiyun New Century Electronic Ltd MKR 188.991 MHz
-18.40 dBm
REF .0 dBm
ATTEN 10 dB
10 dB/
SPAN 2.000 MHz
SWP 20 msec
VBW 10 kHz
CENTER 188.991 MHz
RES BW 100 kHz

3.2.0 Modulation Characteristics

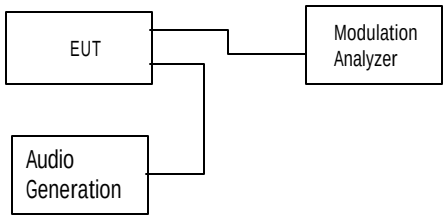
Requirement: According to FCC 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100Hz to 5000Hz shall be measured.

3.2.1 Test Procedure

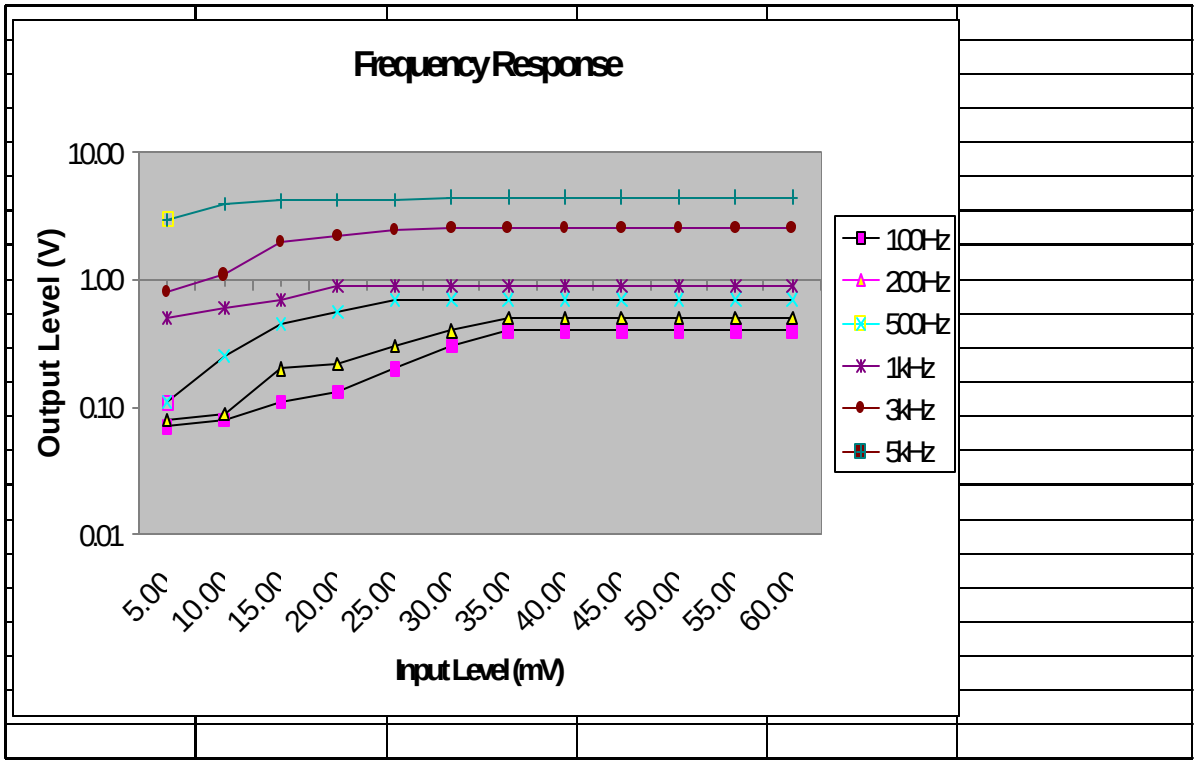
3.2.1.a Frequency response of audio circuits

1) Position the EUT as shown in figure 2

Figure 2: Modulation Characteristic
Measurement Configuration

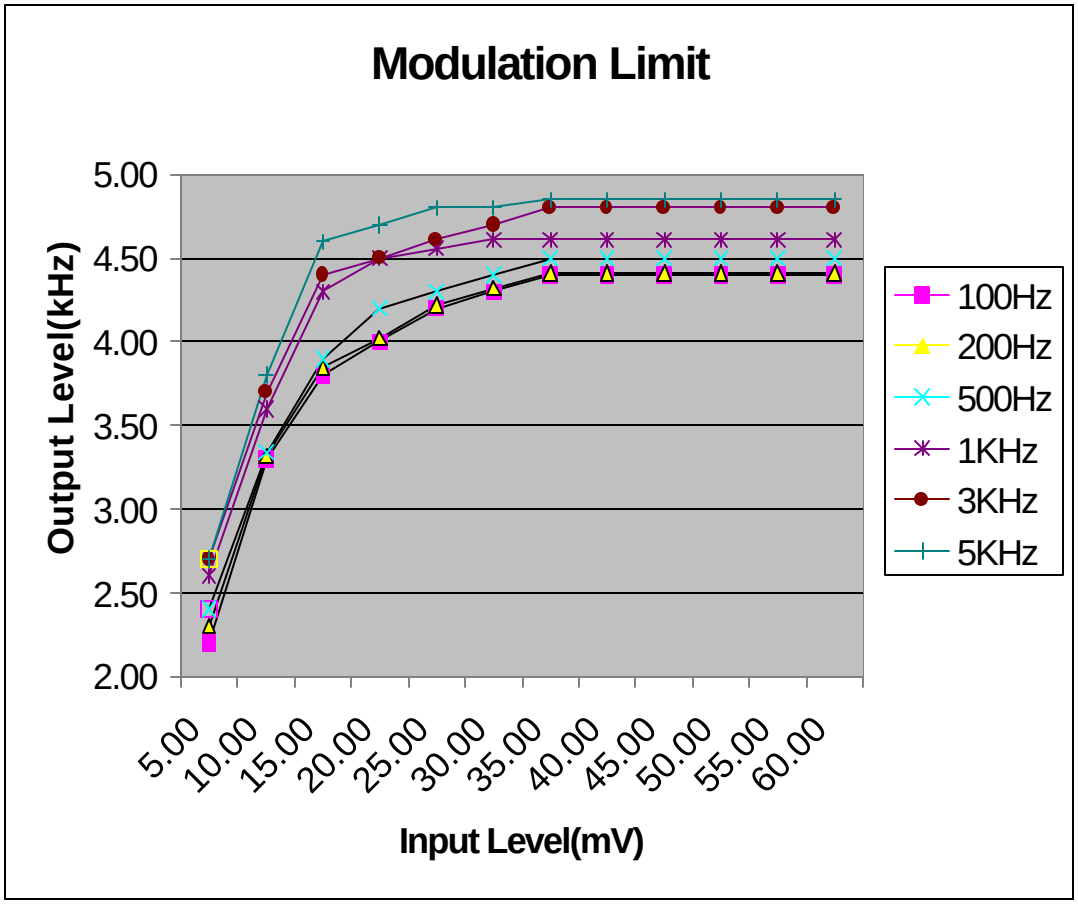


2) Vary the modulating frequency from 100Hz to 5000Hz with varying the input voltage from 0V to maximum permitted input voltage, and observe the change in output.



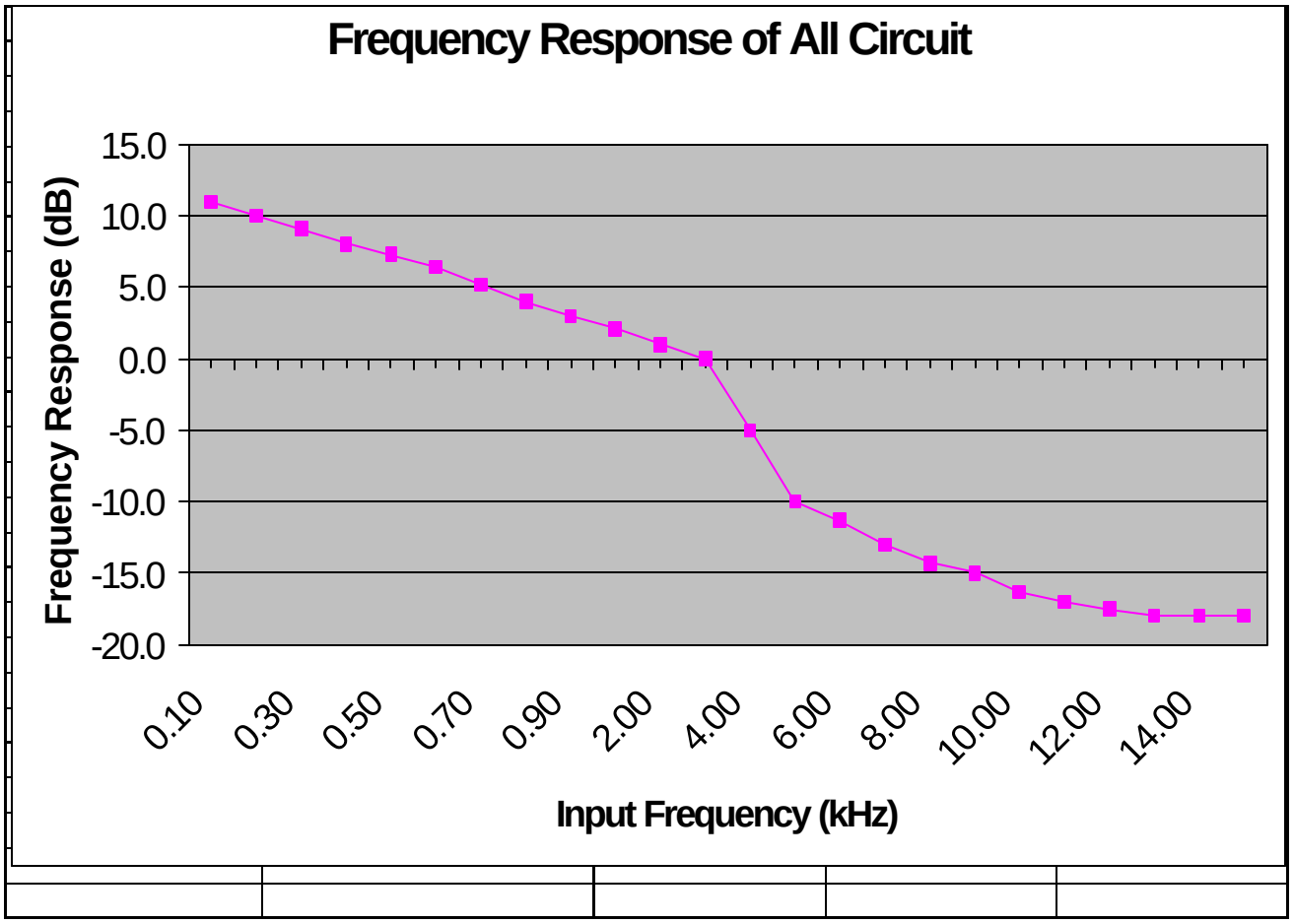
3.2.1.b Modulation Limit

Position the EUT as shown in figure 2, adjust the audio input frequency for 100, 200, 500, 1000, 3000 and 5000Hz in sequence and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.



3.2.1.c Frequency response of all circuits

1) Position the EUT as shown in figure 2.
2) Vary the modulating frequency from 100Hz to 15000Hz with constant input voltage, and observe the change in output.



3.2.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Hewlett Packard HP8901A Modulation Analyzer
Lecroy 9350A Oscillscope

3.2.3 Test Results:

Refer to the attached plots.

3.3.0 Occupied Bandwidth of Emission

Requirements: According to FCC 2.1049 (c) (1), for radiotelephone transmitter, other than single sideband or independent sideband transmitter, when modulated by a 2.5 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

According to FCC 74.861 (e)(5), the frequency emission bandwidth shall not exceed 200 kHz.

3.3.1 Test Procedure

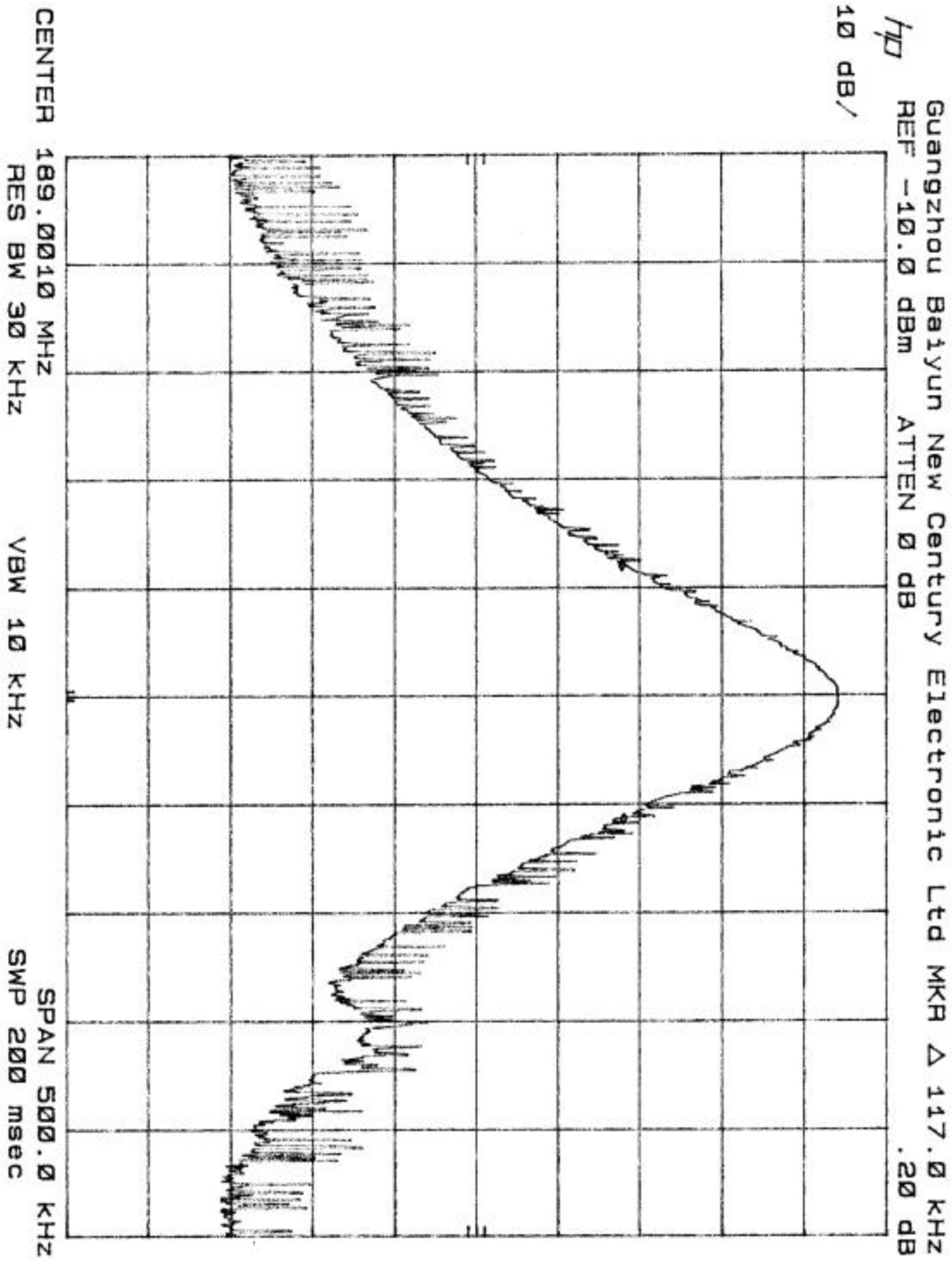
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Install new batteries in the EUT. Turn on the EUT and set it to any one convenient frequency within its operating range.

3.3.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

3.3.3 Test Results

Refer to the attached Plots


Guangzhou Baiyun New Century Electronic Ltd MKR Δ 117.0 kHz
REF -10.0 dBm ATTEN 0 dB .20 dB
10 dB/
CENTER 189.0010 MHz
RES BW 30 kHz VBW 10 kHz SPAN 500.0 kHz
SWP 200 msec

3.4.0 Spurious Emission

Requirements : FCC2.1051. The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

According to FCC74.861(e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedules:

1. on any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.

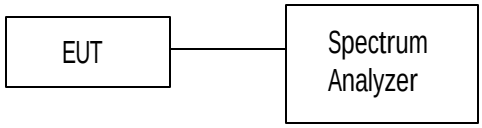
2. on any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.

3. on any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least 43 plus 10 Log (output power in watts)dB.

3.4.1 Test Procedure

Setup the configure per figure 4, adjusting the input voltage to produce the maximum power as measured in this chapter.

Figure 4: Conducted Spurious Emission
Measurement Configuration



Adjust the analyzer frequency span from 30MHz to 1 GHz, record any frequency attenuated less than 20 dB relative to the permitted emission and then adjust the analyzer frequency span from 1 GHz to 2GHz and record emissions frequency should be measured.

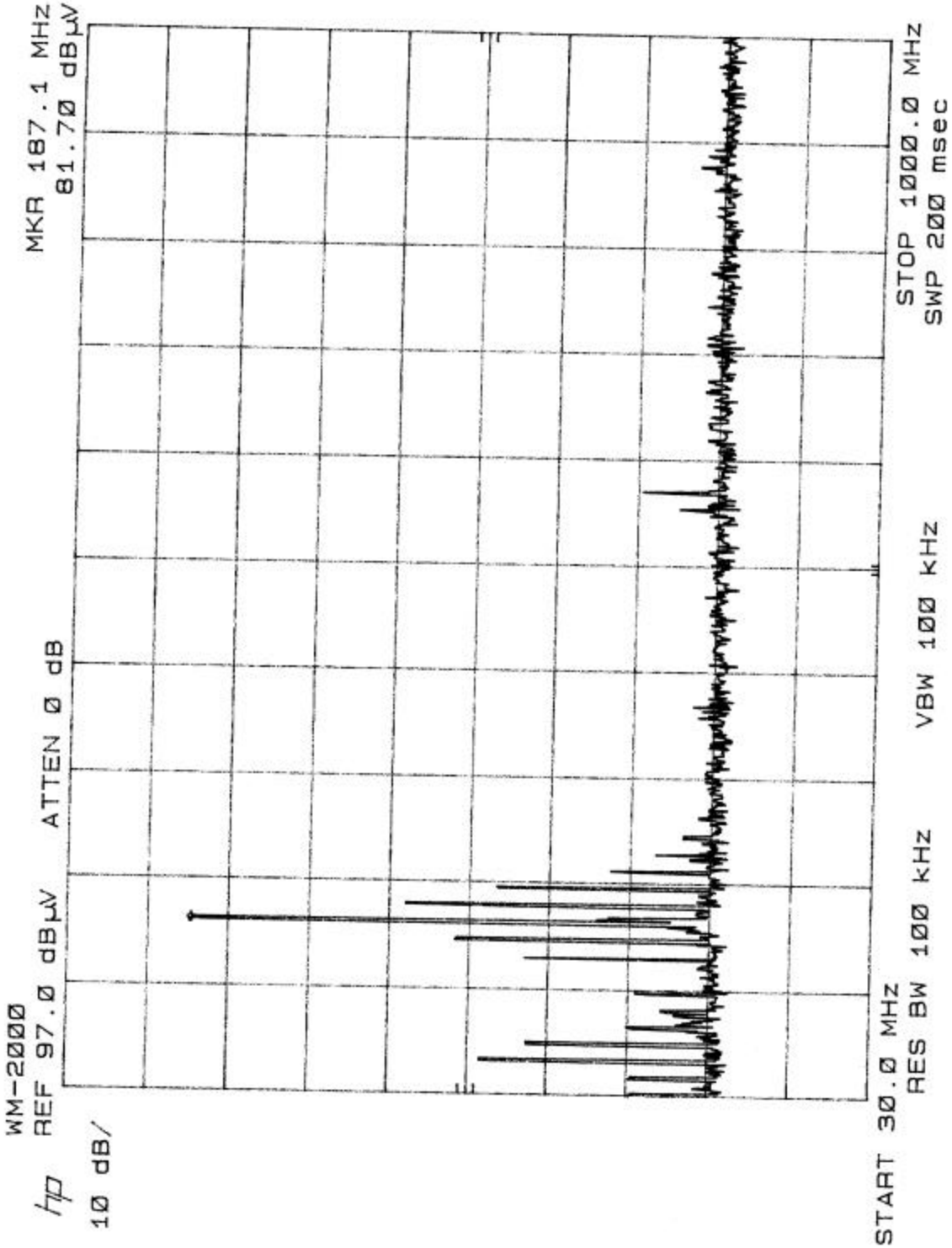
Adjust the analyzer for each frequency measured above on a 2MHz frequency span and 1MHz resolution bandwidth. Record the highest value on spectrum analyzer.

3.4.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

3.4.3 Test Results

Refer to the attached Spurious Emission plots.


MKR 187.1 MHz
81.70 dBµV
STOP 1000.0 MHz
SWP 200 msec
WM-2000
REF 97.0 dBµV
ATTEN 0 dB
VBW 100 kHz
10 dB/
START 30.0 MHz
RES BW 100 kHz

3.5.0 Field Strength of Emission

Requirements: FCC2.1053. Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediated circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

Requirements: FCC74.861 (e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

1. on any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.

2. on any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.

3. on any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least 43 plus 10 Log (output power in watts)dB.

3.5.1 Test Procedure

1. Setup the configuration per figure 5 and 6 for frequencies measured below and above 1GHz respectively, adjusting the input voltage to produce the maximum power as measured in chapter 3.

2. Adjust the analyzer for each frequency measured in chapter 6 on a 1MHz frequency span and 100kHz resolution bandwidth.

3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the height when the highest value is indicated on spectrum analyzer, the change the orientation of EEUT on test table over a range for 0º to 360º, and record the highest value indicated on spectrum analyzer as reference value.

4. Repeat step 3 until all frequencies need to be measured were completed.

5. Repeat step 4 with search antenna in vertical polarized orientations.

6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.

7. repeat step 6 until all frequencies need to be measured were completed.

8. repeat step 7 in vertical polarized orientations.

3.5.2 Test Equipment

A.H. System Horn Antenna

High Pass Filter

Preamplifier

Hewlett Packard HP8566B Spectrum Analyzer

Hewlett Packard HP 7470A Plotter

3.5.3 Test Results – from 30MHz to 2GHz

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC CLASS B	
Frequency MHz	Ampl. dBmV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBmV/m	Cable dB	Amp. dB	Corr. Ampl. dBmV/m	Limit dBmV/m	Margin dB
188.99	92.6	0	1.2	V	13.8	3.9	22.1	88.2		
188.99	91.4	180	1.0	H	13.8	3.9	22.1	87.0		
352.01	42.7	200	1.0	V	15.5	4.3	21.8	40.7	46	-5.3
2209.95	39.0	340	1.2	H	28.1	3.4	22.0	48.5	54	-5.6
781.74	34.6	45	1.0	H	23.1	4.5	21.9	40.3	46	-5.7
448.00	42.0	225	1.0	H	17.4	2.7	22.4	39.7	46	-6.3
120.02	41.4	190	1.0	H	12.1	2.2	19.5	36.2	43.5	-7.3
215.97	41.1	200	1.2	V	12.5	4.7	22.4	35.9	43.5	-7.6
287.98	39.1	90	1.2	V	14.6	5.8	21.6	37.9	46	-8.1
81.85	41.8	270	1.2	H	9.6	1.4	20.9	31.9	40	-8.1
2046.33	36.0	270	1.0	H	28.1	3.4	22.0	45.5	54	-8.6
384.00	36.8	90	1.2	V	16.2	3.9	19.8	37.1	46	-8.9
223.99	42.5	350	1.0	H	12.1	3.9	22.7	35.8	46	-10.2
255.99	42.0	225	1.0	H	13.1	3.0	22.5	35.6	46	-10.4
215.97	36.5	180	1.6	V	12.5	4.7	22.4	31.3	43.5	-12.2
527.93	31.3	60	1.0	H	19.8	2.9	21.2	32.8	46	-13.2
159.98	35.1	0	1.6	V	13.0	2.0	20.4	29.7	43.5	-13.8
239.99	39.1	100	1.2	H	12.0	1.2	21.2	31.1	46	-14.9
415.98	32.7	45	1.2	H	16.8	3.2	21.9	30.8	46	-15.2
162.13	33.1	270	1.8	V	13.2	1.6	21.0	26.9	43.5	-16.6

3.6.0 Frequency Stability Measurement

Requirements: FCC 2.1055(a)(1), the frequency stability shall be measure with variation of ambient temperature from –30ºC to +50ºC, and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC 74.86(e)(4), the frequency tolerance of the transmitter shall be 0.005 percent.

3.6.1 Test Procedure

A) Frequency stability versus environmental temperature

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is with 15ºC to 25ºC. otherwise, an environmental chamber set for a temperature of 20ºC shall be used. Install new batteries in the EUT.

2. Turn on EUT and set SA center frequency to the right frequency needs to be measured, then set SA RBW to 30kHz., VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. Set the temperature of chamber to 50ºC. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

4. repeat step 2 with a 10ºC decreased per stage until the lowest temperature -30ºC is measured, record all measurement frequencies.

B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15ºC to 25ºC. otherwise, an environmental chamber set for a temperature of 20ºC shall be used. Install new batteries in the EUT.

2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. For battery operated only device, supply the EUT primary voltage at the battery operating end point which is specified by the manufactured and record the frequency.

3.6.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

3.6.3 Test Results

Reference Frequency: 188.991 MHz, Limit: 0.005%							
Environment Temperature (ºC)	Power Supplied (Vdc)	Frequency Measured with Time Elapsed					
		2 Minutes		5 Minutes		10 Minute	
		MHz	%	MHz	%	MHz	%
50	New Batt.	188.990	-0.00075	188.996	0.00258	188.995	0.00195
40	New Batt.	188.986	-0.00241	188.992	0.00057	188.984	-0.00361
30	New Batt.	188.992	0.00052	188.987	-0.00224	188.985	-0.00333
20	New Batt.	188.990	-0.00040	188.984	-0.00373	188.993	0.00080
10	New Batt.	188.995	0.00224	188.985	-0.00327	188.988	-0.00183
0	New Batt.	188.985	-0.00292	188.989	-0.00092	188.986	-0.00281
-10	New Batt.	188.991	-0.00011	188.990	-0.00040	188.995	0.00218
-20	New Batt.	188.989	-0.00103	188.985	-0.00321	188.996	0.00287

Appendix A – AUTHORIZATION LETTER

NEW CENTURY ELECTRONICS FTY.

July 22, 2000

FEDERAL COMMUNICATIONS COMMISSIONS
Authorization and Evaluation Division
7435 Oakland Mills Road0
Columbia, MD 21046

Subject: Agent Authorization

To whom it may concern:

NEW CENTURY ELECTRONICS FTY , hereby authorizes Bay Area Compliance Laboratory Corporation to act on its behalf in all maters relating to application for equipment authorization, including the signing of all documents relating to these matters. All acts carried out by Bay Area Compliance Laboratory Corporation on our behalf shall have the same effect as our own action.

Sincerely yours,

Xiaohua Chen(签名)