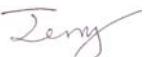


FCC PART 15 Subpart C  
EMI MEASUREMENT AND TEST REPORT  
For  
**GREAT WELL ELECTRONIC CO., LTD.**

The Third Industrial Area, Guanlan Town, Shenzhen City, China

**FCC ID: RR7UHF-008**

2004-01-14

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> FM Wireless Hands Free Kits
<b>Test Engineer:</b> Jerry Wang / 	
<b>Report No.:</b> R0307254(T)	
<b>Test Date:</b> December 1, 2003	
<b>Reviewed By:</b> Ling Zhang / 	
<b>Prepared By:</b> Bay Area Compliance Lab Corp. Suite C, 41-D Electronics Science & Technology Building, No. 2070 Shennanzhong Rd ShenZhen, Guandong 518031, P.R. China Tel: (755) 83296449 Fax: (755) 83273756	

**Note:** This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

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## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The *GREAT WELL ELECTRONIC CO., LTD.*'s product, model name: *GW-UHF-008*, or the "EUT" as referred to in this report is a FM Wireless Hands Free Kits. The EUT is a Transmitter, which measures approximately 2.00" L x 1.25" W x 1.25" H.

The EUT was fed by Matrix's battery: M/N: MP7-12, DC 12V battery, the battery was fresh charge before test.

*\* The test data gathered are from production sample, serial number: B120103, provided by the manufacturer.*

### Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2001.

The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, and 15.239.

### Related Submittal(s)/Grant(s)

No Related Submittals

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2001, 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.

### Test Facility

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

Test site at BACL 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 C63.4-2001.

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-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method – 47 CFR Part – Digital Devices, CISPER 22: 1997: Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment test methods.

### External I/O Cabling

Cable Description	Length (M)	From/Port	To
Unshielded Detachable Cable	50.0	DC Battery	EUT

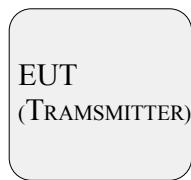
## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

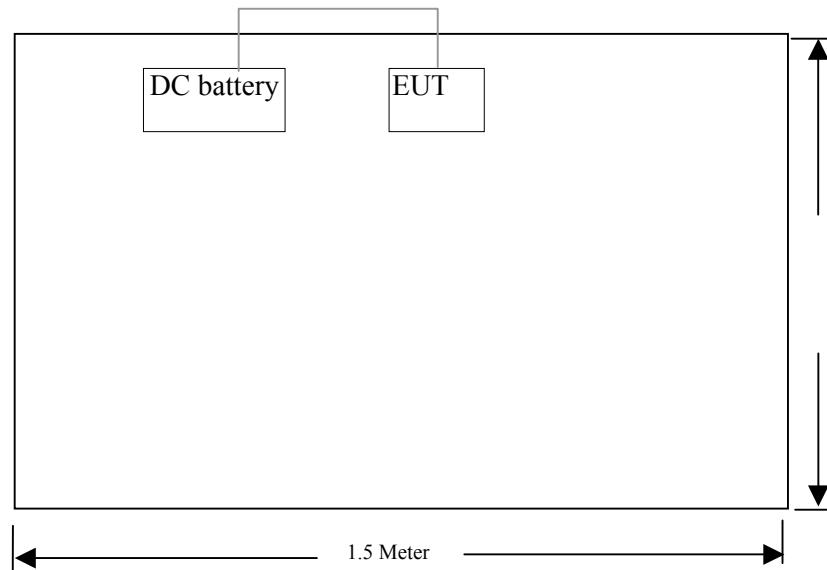
The host system was configured for testing according ANSI C63.4-2001.

The EUT was tested in the normal (native) operating mode to represent worst-case results during the final qualification test.

### Configuration of Test System



### Test Configuration Photos



### Equipment Modifications

No modifications were made to the EUT.

**SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203	Antenna requirement	Pass
§ 15.205	Restricted bands of operation	Pass
§ 15.207	Conduct requirement	Pass
§ 15.209, § 15.239	Radiated requirement	Pass
§ 15.239 (a)	Band Edges Testing	Pass

## **§15.203 - ANTENNA REQUIREMENT**

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### **Standard Applicable**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

### **Antenna Connected Construction**

The antenna permanent attached so the antenna of the EUT is fulfilled requirement of section 15.203, the test result passed.

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## **§15.207 - CONDUCTED EMISSIONS TEST DATA**

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The EUT unit is battery powered so AC conducted emissions testing are not applicable.

## **§15.205, §15.209, §15.239 - 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 BACL is  $\pm 4.0$  dB.

### **EUT Setup**

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4 - 2001. The specification used was the FCC 15 Subpart C limits for transmitter.

The EUT was placed center of the test table.

### **Spectrum Analyzer Setup**

According to FCC Rules, 47 CFR, Section 15.33, the system was tested from 30 MHz to 1000 MHz.

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

<b><u>Frequency Range</u></b>	<b><u>RBW</u></b>	<b><u>Video B/W</u></b>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

### **Test Procedure**

For the radiated emissions test, since the EUT does not have AC power source, there was no connection to AC outlets.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "Qp" in the data table.

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-01-07
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11

\* **Statement of Traceability:** BACL Corp. certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## 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:

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

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB $\mu$ V means the emission is 7dB $\mu$ V below the maximum limit for applicable limits. The equation for margin calculation is as follows:

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

## Radiated Emissions Test Result Data

Date of Test :	2004-01-13	Temperature :	25°C
EUT :	FM Wireless Hands Free Kits	Humidity :	70%
M/N :	GW-UHF-008	Operating Mode :	Transmitting
S/N :	B120103	Test Engineer:	Jerry Wang

## Radiated Emissions Test, 3m Data

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C		
	Ampl. dB $\mu$ V/m	Direction Degree		Polar H/V	Antenna dB $\mu$ V/m	Cable Loss dB $\mu$ V/m	Amp. dB	Corr. Ampl. dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Mode
88.70	62.3	90	1.2	V	9.7	0.80	28.5	44.30	47.96	-3.66	Fund/AVE
88.70	59.6	90	1.5	H	9.7	0.80	28.5	41.60	47.96	-6.36	Fund/AVE
88.70	74.6	90	1.2	V	9.7	0.80	28.5	56.60	67.96	-11.36	Fund/Peak
88.70	72.8	90	1.5	H	9.7	0.80	28.5	54.80	67.96	-13.16	Fund/Peak
53.22	56.4	90	1.5	H	10.5	1.23	28.6	39.53	40.00	-0.47	
70.97	57.3	120	1.5	H	9.6	1.07	28.6	39.37	40.00	-0.63	
106.40	59.2	0	1.2	V	11.4	0.55	28.3	42.85	43.50	-0.65	
159.70	57.2	90	1.5	H	13.0	0.73	28.1	42.83	43.50	-0.67	
106.40	59.1	30	1.5	H	11.4	0.55	28.3	42.75	43.50	-0.75	
958.02	44.4	200	1.5	H	23.7	4.64	27.9	44.84	46.00	-1.16	
141.89	56.4	300	1.5	H	13.2	0.65	28.2	42.05	43.50	-1.45	
833.83	46.3	160	1.5	H	22.5	4.00	28.3	44.50	46.00	-1.50	
212.93	58.8	90	1.5	H	10.1	1.00	27.9	42.00	43.50	-1.50	
816.09	45.8	120	1.5	H	22.6	3.95	28.1	44.25	46.00	-1.75	
798.36	45.3	160	1.5	H	23.1	3.96	28.2	44.16	46.00	-1.84	
958.02	43.7	30	1.2	V	23.7	4.64	27.9	44.14	46.00	-1.86	
124.20	57.2	120	1.5	H	12.1	0.56	28.3	41.56	43.50	-1.94	
230.64	59.2	90	1.5	H	11.3	1.00	27.5	44.00	46.00	-2.00	
922.54	43.7	0	1.5	H	23.5	4.08	27.6	43.68	46.00	-2.32	
833.83	44.9	30	1.2	V	22.5	4.00	28.3	43.10	46.00	-2.90	
851.58	44.1	0	1.2	V	22.8	4.15	28	43.05	46.00	-2.95	
975.78	50.7	30	1.5	H	23.7	4.52	27.9	51.02	54.00	-2.98	
141.89	54.7	120	1.2	V	13.2	0.65	28.2	40.35	43.50	-3.15	
248.39	57.9	120	1.5	H	11.3	1.12	27.6	42.72	46.00	-3.28	
195.10	52.3	300	1.2	V	14.4	0.94	28	39.64	43.50	-3.86	
496.76	49.3	300	1.5	H	17.9	3.14	28.3	42.04	46.00	-3.96	
177.36	53.2	30	1.8	H	13.4	0.78	27.9	39.48	43.50	-4.02	
53.24	52.8	30	1.2	V	10.5	1.23	28.6	35.93	40.00	-4.07	
993.51	48.7	30	1.5	V	24.0	4.55	27.5	49.75	54.00	-4.25	
851.59	42.7	180	1.5	H	22.8	4.15	28	41.65	46.00	-4.35	
124.20	54.6	0	1.2	V	12.1	0.56	28.3	38.96	43.50	-4.54	
177.36	52.5	300	1.2	V	13.4	0.78	27.9	38.78	43.50	-4.72	
532.25	48.4	0	1.5	H	18.6	3.29	29.1	41.19	46.00	-4.81	
691.92	44.5	30	1.5	H	21.8	3.67	29.2	40.77	46.00	-5.23	
514.49	47.8	200	1.8	H	18.5	3.16	28.8	40.66	46.00	-5.34	
195.09	50.8	45	1.5	H	14.4	0.94	28	38.14	43.50	-5.36	
319.35	52.5	180	1.5	H	13.9	1.41	27.6	40.21	46.00	-5.79	

**Radiated Emissions Test, 3m Data (Continued)**

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C		
	Ampl. dB $\mu$ V/m	Direction Degree		Polar H/V	Antenna dB $\mu$ V/m	Cable Loss dB $\mu$ V/m	Amp. dB	Corr. Ampl. dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Mode
904.80	40.8	30	1.2	V	23.5	4.09	28.2	40.19	46.00	-5.81	
496.75	47.2	120	1.2	V	17.9	3.14	28.3	39.94	46.00	-6.06	
283.88	53.2	90	1.5	H	12.6	1.28	27.5	39.58	46.00	-6.42	
479.02	48.7	330	1.5	H	16.4	3.11	28.8	39.41	46.00	-6.59	
35.49	47.6	90	1.5	H	13.3	1.07	28.6	33.37	40.00	-6.63	
656.44	43.2	0	1.5	H	20.8	3.51	28.2	39.31	46.00	-6.69	
479.02	48.3	90	1.2	V	16.4	3.11	28.8	39.01	46.00	-6.99	
514.50	45.6	90	1.2	V	18.5	3.16	28.8	38.46	46.00	-7.54	
301.62	49.8	120	1.5	H	13.9	1.33	27.3	37.73	46.00	-8.27	
337.08	47.4	30	1.5	H	15.4	1.37	27.8	36.37	46.00	-9.63	
461.28	44.7	120	1.2	V	17.1	3.00	28.9	35.90	46.00	-10.10	
212.92	49.8	30	1.2	V	10.1	1.00	27.9	33.00	43.50	-10.50	
248.38	50.2	120	1.2	V	11.3	1.12	27.6	35.02	46.00	-10.98	
230.65	49.5	90	1.2	V	11.3	1.00	27.5	34.30	46.00	-11.70	

Note: The EUT was tested in three directional planes.

**Test Result**

PASS

## § 15.239(a) – BAND-EDGE TESTING

Requirements: Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88–108 MHz.

### Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the band-edge testing:

Start Frequency .....	88 MHz
Stop Frequency .....	108 MHz
Sweep Speed .....	20 ms
Video Bandwidth .....	100 KHz
Resolution Bandwidth.....	100 KHz

### Test Data

According to the data, the EUT complied with the FCC Title 47, Part 15, Subpart C, section, and 15.239

Date of Test :	2004-01-13	Temperature :	13°C
EUT :	FM Wireless Hands Free Kits	Humidity :	70%
M/N :	GW-UHF-008	Operating Mode :	Transmitting
S/N :	B120103	Test Engineer:	Ming Jing

### Test Result

Please refer to the following plots.

