

FCC Part 15 Subpart C

EMI TEST REPORT

of

E.U.T. : Wireless Handsfree

FCC ID. : QJGAROMA40B

MODEL : AROMA 40

Working Frequency : 40.674MHz

for

APPLICANT : YIH TAY TECH. CO., LTD

ADDRESS : 3F No.651-3 Chung Cheng Rd. Hsin Chuang,
Taipei 242 Taiwan.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 8, LANE 29, WEN-MING RD.,
LO-SHAN TSUN, KUI-SHAN HSIANG,
TAOYUAN HSIEN 333, TAIWAN, R.O.C.

Tel: (03) 3276170-3276174

Fax: (03) 3276188

Report Number: ET91S-09-107-01

TEST REPORT CERTIFICATION

Applicant : YIH TAY TECH. CO., LTD
3F No.651-3 Chung Cheng Rd. Hsin Chuang, Taipei 242 Taiwan.

Manufacturer : SINOCA ENTERPRISES CO., LTD.
NO. 2, CHUNG HO RD., KEELUNG TAIWAN, R. O. C.

Description of EUT :
a) Type of EUT : Wireless Handsfree
b) Trade Name : AROMA
c) Model No. : AROMA 40
d) FCC ID : QJGAROMA40B
e) Working Frequency : 40.674MHz
f) Power Supply : DC 3.6V
Charger: DVE/DVR-0610-3508
I/P: 120V, 60Hz, 60mA
O/P: DC 6V, 100mA

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (2001)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Issued Date : Sep. 25, 2002

Test Engineer : Rick Hu

Approve & Authorized Signer : Win-Po Tsai
Win-Po Tsai, Manager, NVLAP Signatory
EMC Dept. of ELECTRONICS
TESTING CENTER, TAIWAN

<i>Table of Contents</i>	<i>Page</i>
1. GENERAL INFORMATION	1
1.1 PRODUCT DESCRIPTION.....	1
1.2 CHARACTERISTICS OF DEVICE:.....	1
1.3 TEST METHODOLOGY	1
1.4 TEST FACILITY.....	1
2. DEFINITION AND LIMITS.....	2
2.1 DEFINITION	2
2.2 RESTRICTED BANDS OF OPERATION.....	2
2.3 LIMITATION	2
2.4 LABELING REQUIREMENT	4
2.5 USER INFORMATION	4
3. RADIATED EMISSION MEASUREMENT.....	5
3.1 APPLICABLE STANDARD.....	5
3.2 MEASUREMENT PROCEDURE	5
3.3 TEST DATA.....	7
3.4 FIELD STRENGTH CALCULATION.....	8
3.5 RADIATED TEST EQUIPMENT.....	8
3.6 MEASURING INSTRUMENT SETUP	8
3.7 RADIATED MEASUREMENT PHOTOS.....	9
4 CONDUCTED EMISSION MEASUREMENT.....	10
4.1 STANDARD APPLICABLE.....	10
4.2 MEASUREMENT PROCEDURE	10
4.3 CONDUCTED EMISSION DATA.....	11
4.4 RESULT DATA CALCULATION.....	11
4.5 CONDUCTED MEASUREMENT EQUIPMENT	11
4.6 PHOTOS OF CONDUCTION MEASURING SETUP	12
5 ANTENNA REQUIREMENT.....	13
5.1 STANDARD APPLICABLE.....	13
5.2 ANTENNA CONSTRUCTION	13
6 THE FREQUENCY TOLERANCE OF THE CARRIER SIGNAL MEASUREMENT	14
6.1 STANDARD APPLICABLE.....	14
6.2 MEASUREMENT PROCEDURE	14
6.3 MEASUREMENT INSTRUMENT	15
6.4 MEASUREMENT DATA.....	16
APPENDIX 1 : PLOTTED DATA FOR CONDUCTED EMISSION	17

1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	: Wireless Handsfree
b) Trade Name	: AROMA
c) Model No.	: AROMA 40
d) FCC ID	: QJGAROMA40B
e) Working Frequency	: 40.674MHz
f) Power Supply	: DC 3.6V Charger: DVE/DVR-0610-3508 I/P: 120V, 60Hz, 60mA O/P: DC 6V, 100mA

1.2 Characteristics of Device:

Wireless handsfree for cell phone, operate frequency 40.674 MHz.

1.3 Test Methodology

Radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4. The Wireless Handsfree (Baseunit) under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, rewiring in the circuit was done by the manufacturer so as to affect its intended operation.

The receiving antenna was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the Wireless Handsfree (Baseunit) under test. The ear phone devices rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relatives to the limit.

1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.

This site has been accreditation as a FCC filing site.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

Remark “**” : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.3 Limitation

(1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency (MHz)	Emission (μ V)	Emission (dB μ V)
0.45 - 30.0	250	48.0

(2) Radiated Emission Limits :

According to 15.229 the field strength of emissions from intentional radiators operated under these frequency bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental μV/meter	dBμV/meter
40.66-40.70	1000	60

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209, as following table:

Other Frequencies (MHz)	Field Strength of Fundamental μV/meter	dBμV/meter
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

(3) Antenna Requirement :

For intentional device, according to §15.203, 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.

(4) Frequency Tolerance Of The Carrier Signal Limits :

According to 15.229(d), the frequency tolerance of the carrier singal shall be maintained within $\pm 0.01\%$ of the ooperating frequency over a temperature varitation of -20 degrees to +50 degree C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. RADIATED EMISSION MEASUREMENT

3.1 Applicable Standard

1. The field strength of any emission within this band shall not exceed 100 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.
2. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

3.2 Measurement Procedure

1. Setup the configuration per figure 1 for frequencies measured below 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, it is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions.
3. For emission frequencies measured below 1GHz, set the spectrum analyzer on a 120kHz and 1MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

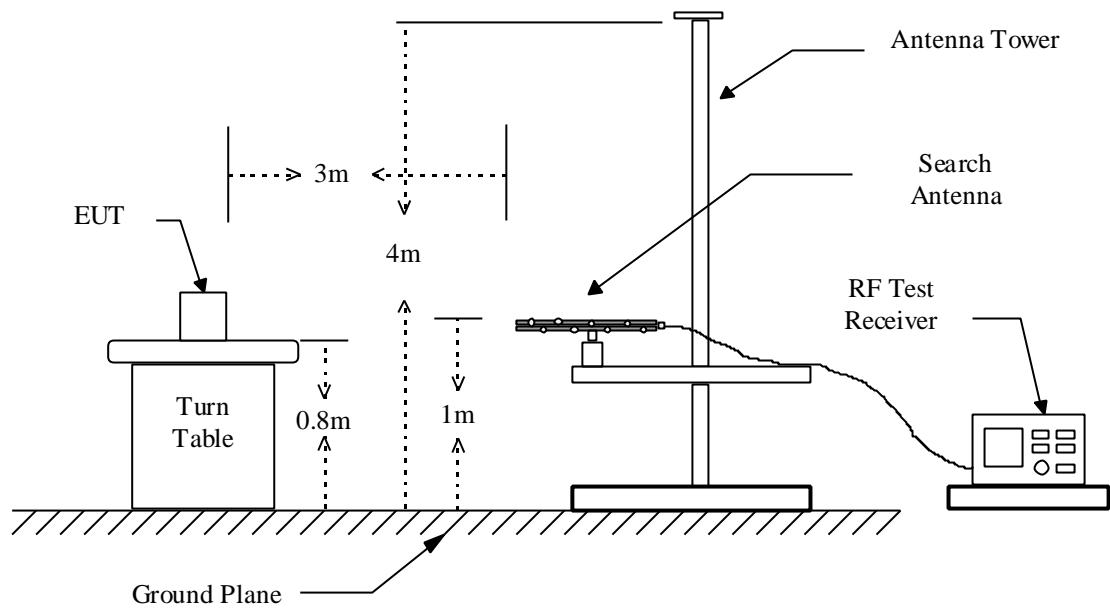
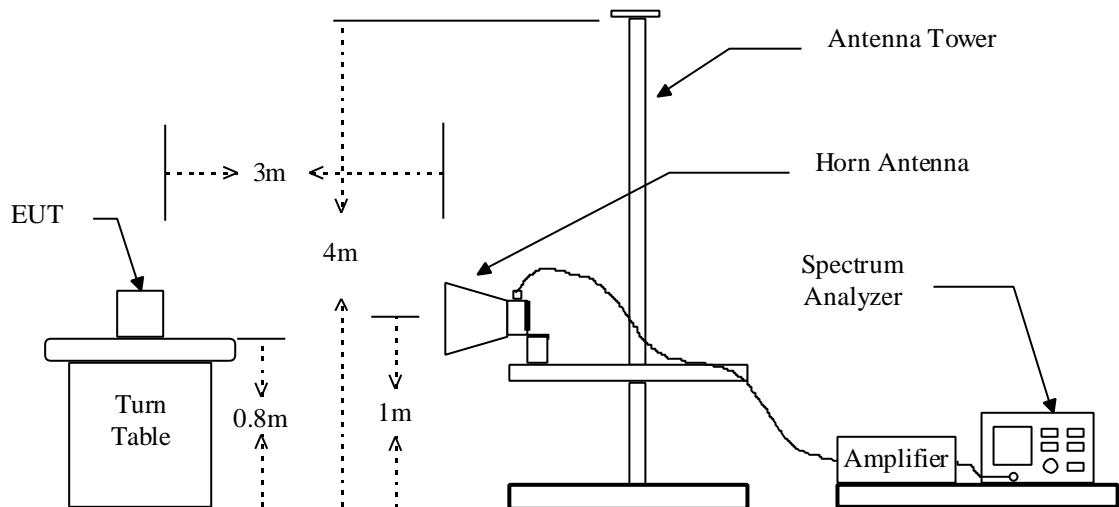


Figure 2 : Frequencies measured above 1 GHz configuration



3.3 Test Data

Operation Mode : TX/RX
 Temperature : 21
 Humidity : 60 %
 Test Date : Sep. 20, 2002

Frequency (MHz)	Meter Reading (dBuV)		Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
	H	V						
40.674	35.5	35.8	11.1	46.9	60.0	-13.1	110	1.00
81.348	---	---	10.1	---	40.0	---	---	---
122.022	---	---	9.4	---	43.5	---	---	---
162.696	---	---	11.6	---	43.5	---	---	---
203.370	---	---	12.7	---	43.5	---	---	---
244.044	---	---	14.5	---	46.0	---	---	---
284.718	---	---	16.5	---	46.0	---	---	---
325.392	---	---	19.0	---	46.0	---	---	---
366.066	---	---	19.0	---	46.0	---	---	---
406.740	---	---	20.6	---	46.0	---	---	---

Note :

1. Remark “---” means that the emission level is too low to be measured.

3.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

where

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain (if any)}$$

3.5 Radiated Test Equipment

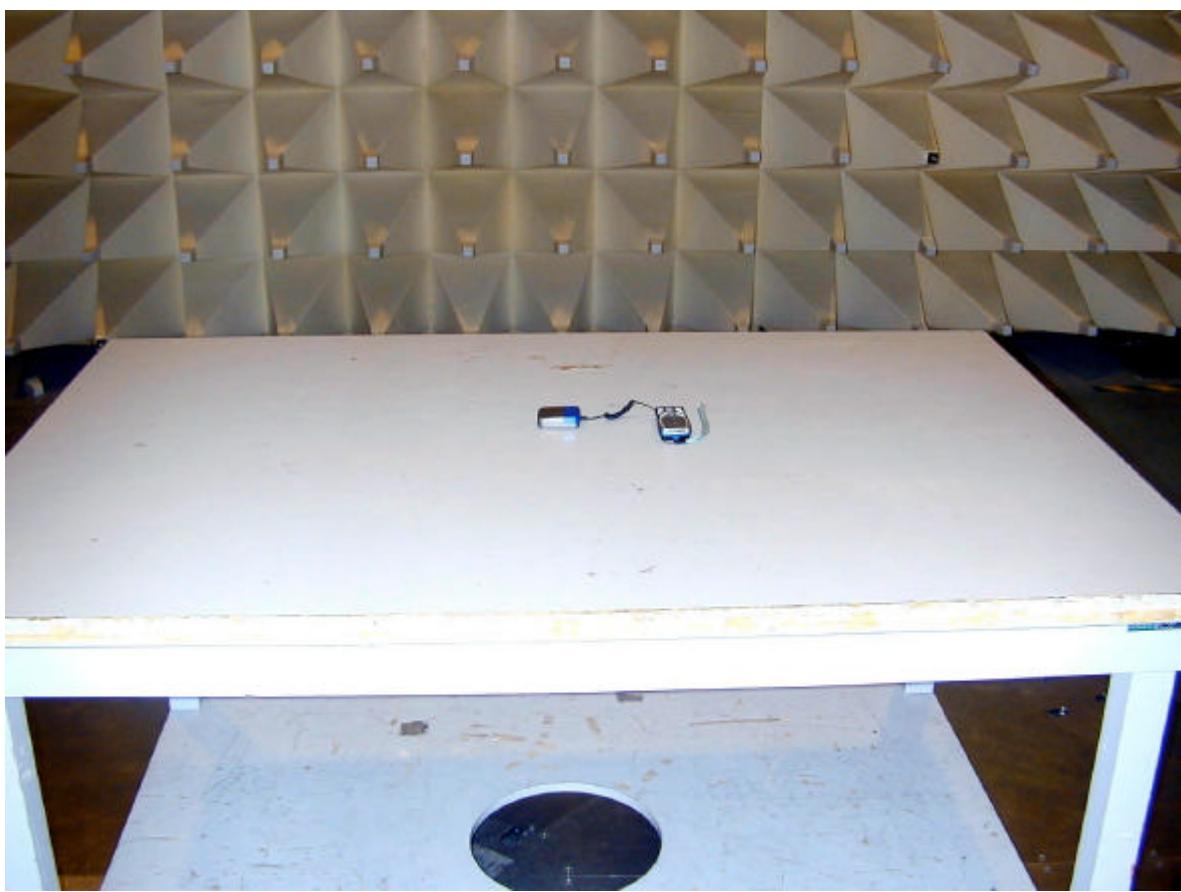
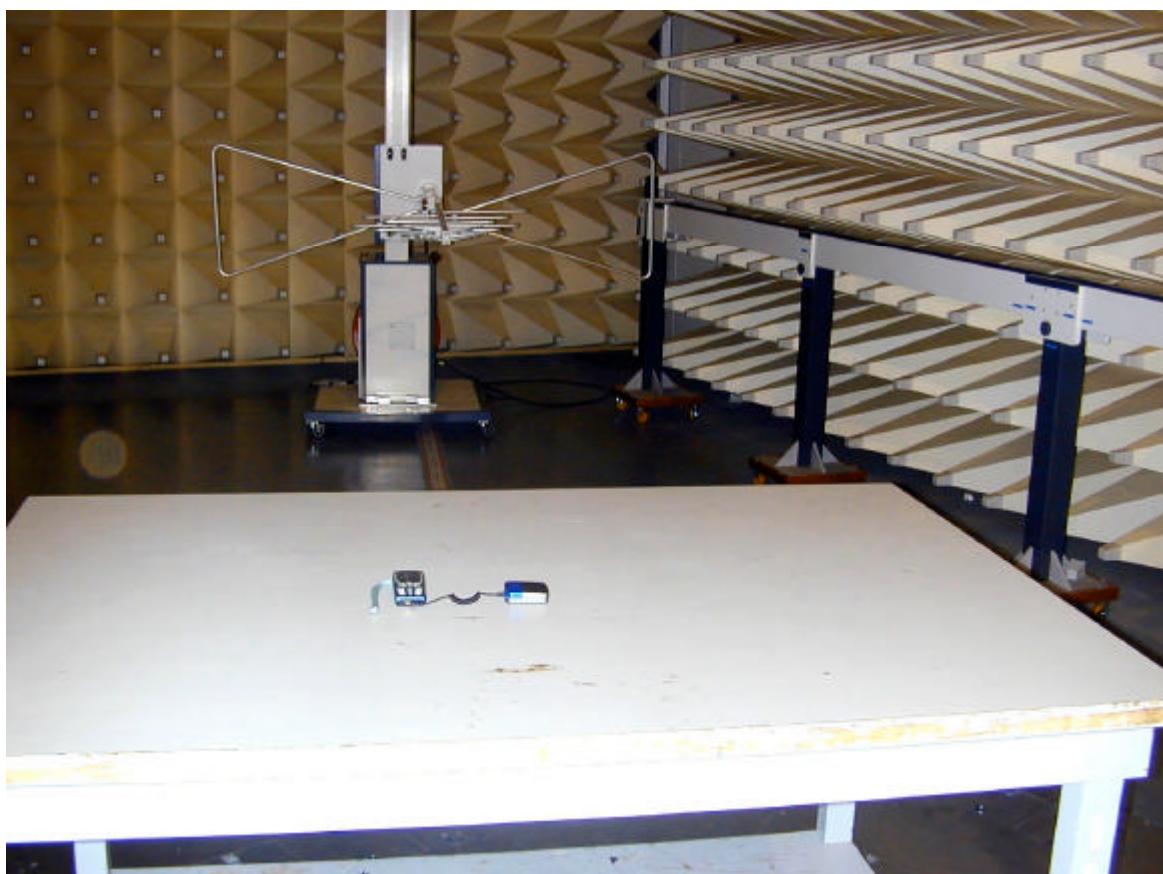
Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Test Receiver	Hewlett-Packard	8546A	13054404-001	Nov. 06, 2002
LogBicone Antenna	Schwarzbeck	VULB9160	13057310-001	Oct. 18, 2002

3.6 Measuring Instrument Setup

Explanation of measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	EMI Test Receiver	Quasi Peak	120 kHz	300 kHz
	EMI Test Receiver	Peak	120 kHz	300 kHz

3.7 Radiated Measurement Photos



4 CONDUCTED EMISSION MEASUREMENT

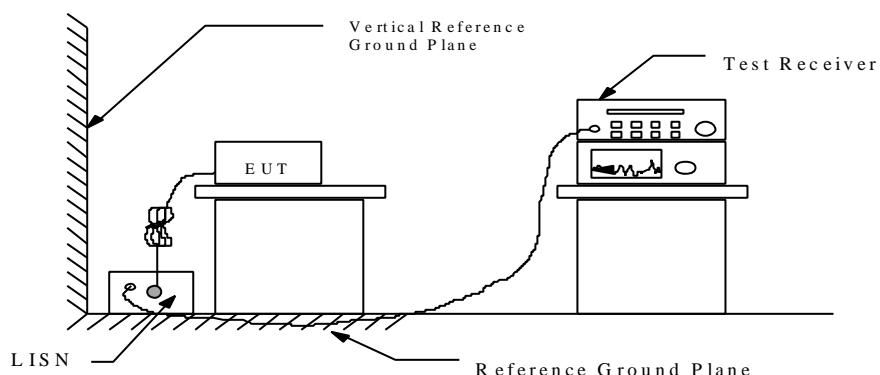
4.1 Standard Applicable

For intentional device, Line Conducted Emission Limits are in accordance to §15.207(a), any emissions level shall not exceed 48 dBuV.

4.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then records the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



4.3 Conducted Emission Data

Operation Mode : Charge

Test Date : Sep. 20, 2002

Temperature : 21

Humidity: 62 %

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	N	L1		N	L1		
0.466	---	17.0	0.1	---	17.1	48.0	-30.9
0.477	15.0	---	0.1	15.1	---	48.0	-32.9
0.493	---	16.5	0.1	---	16.6	48.0	-31.4
0.520	---	17.1	0.1	---	17.2	48.0	-30.8
0.575	---	16.7	0.1	---	16.8	48.0	-31.3
1.020	13.7	---	0.2	13.9	---	48.0	-34.1
1.066	---	15.2	0.2	---	15.4	48.0	-32.6
3.449	14.7	---	0.2	14.9	---	48.0	-33.1
6.707	16.4	---	0.2	16.6	---	48.0	-31.4
7.938	17.0	---	0.3	17.3	---	48.0	-30.7
17.301	---	17.9	0.4	---	18.3	48.0	-29.7
21.000	18.1	---	0.5	18.6	---	48.0	-29.4

Note :

1. Remark “---” means that the emission level is too low to be measured.
2. Please see appendix 1 for Plotted Data .

4.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{LISN FACTOR}$$

Assume a receiver reading of 22.5 dB μ V is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB μ V.

$$\text{RESULT} = 22.5 + 0.1 = 22.6 \text{ dB } \mu \text{ V}$$

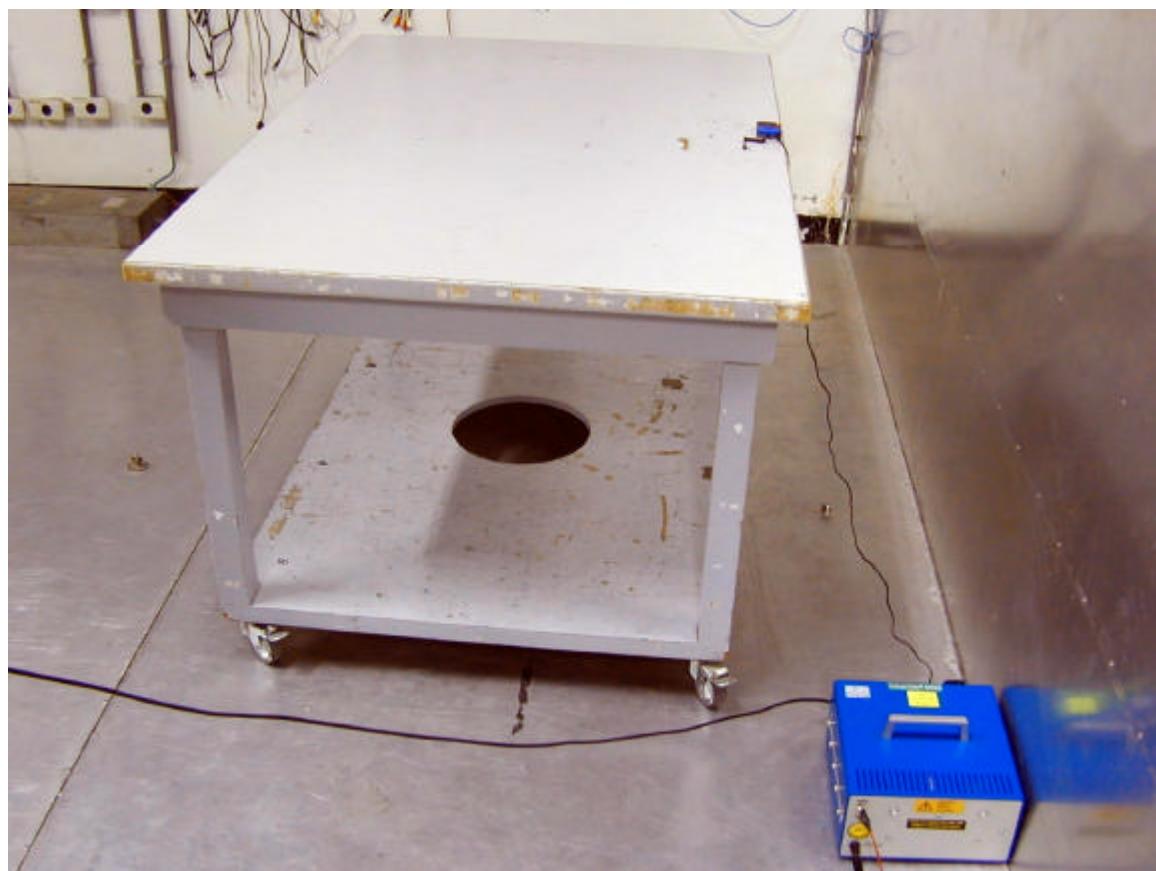
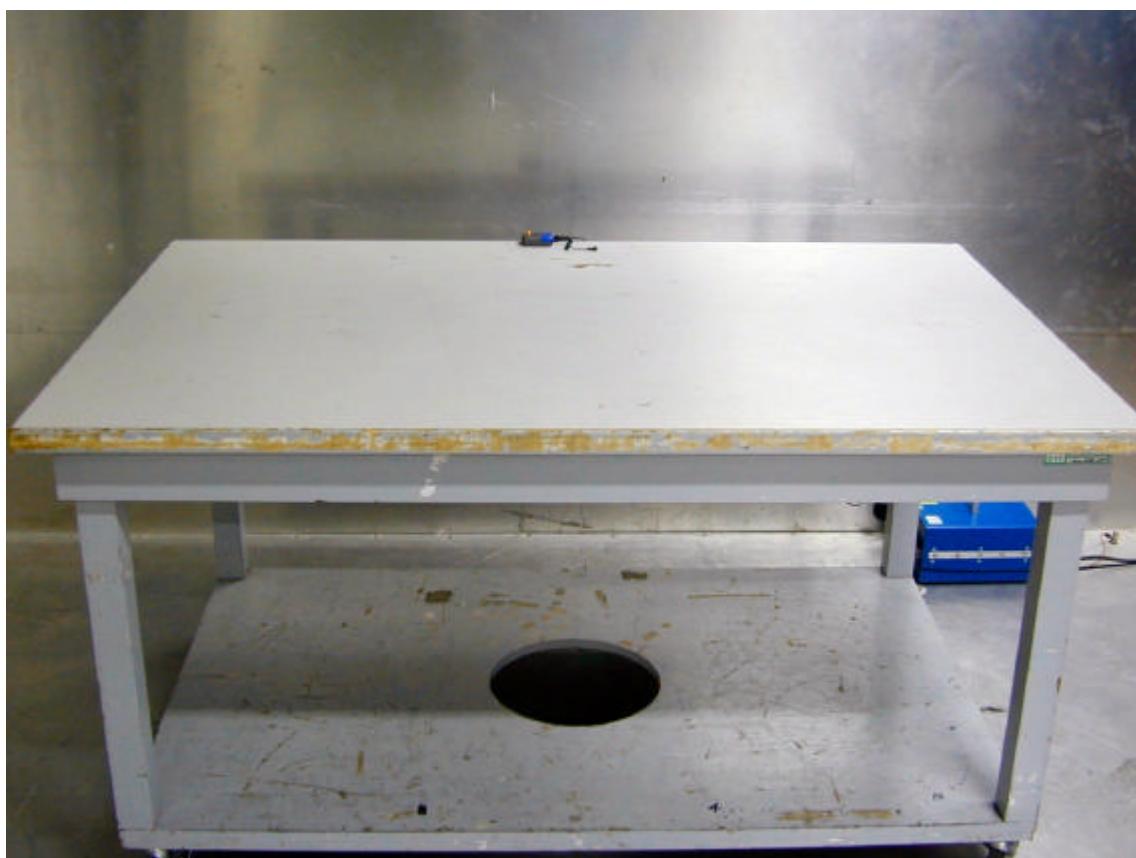
$$\begin{aligned} \text{Level in } \mu \text{ V} &= \text{Common Antilogarithm}[(22.6 \text{ dB } \mu \text{ V})/20] \\ &= 13.48 \text{ } \mu \text{ V} \end{aligned}$$

4.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Next Cal. Date
LISN	EMCO	3825	Oct. 27,2002
EMI Test Receiver	R&S	ESCS30	Sep. 18,2003

4.6 Photos of Conduction Measuring Setup



5 ANTENNA REQUIREMENT

5.1 Standard Applicable

According to §5.203, 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.

5.2 Antenna Construction

The antenna is permanently mounted on PCB, no consideration of replacement.

6 THE FREQUENCY TOLERANCE OF THE CARRIER SIGNAL MEASUREMENT

6.1 Standard Applicable

According to 15.229(d), the frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degree C. For battery operated equipment, the equipment tests shall be performed using a new battery.

6.2 Measurement Procedure

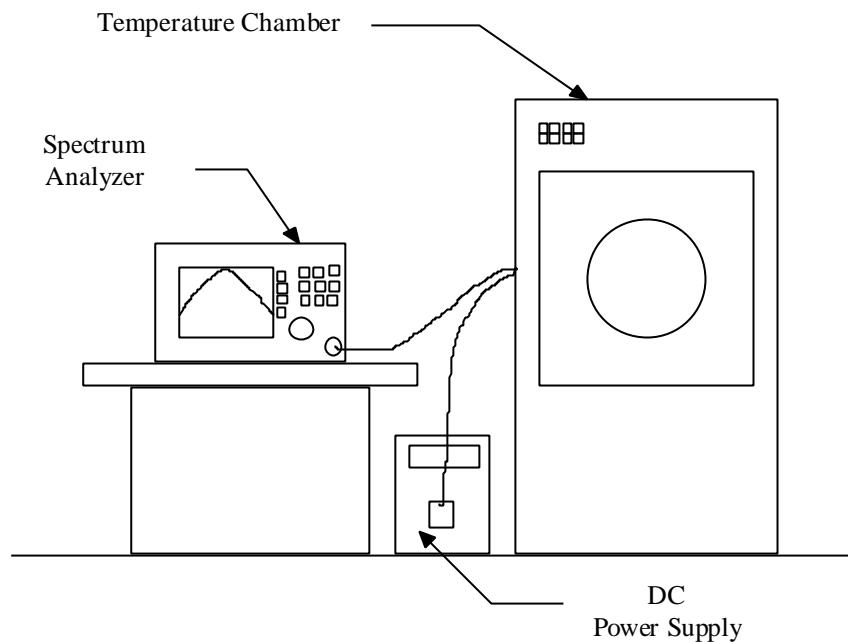
A) Frequency stability versus environmental temperature

1. Setup the configuration per figure 4 for frequencies measured at ambient temperature if it is within 15 to 25 . Otherwise, an environmental chamber set for a temperature of 20 shall be used. Install new batteries in the EUT.
2. Turn on EUT and set center frequency to the right frequency needs to be measured. Then set RBW to 10 kHz, VBW to 100kHz and frequency span to 100 kHz. Record this frequency to be a reference.
3. Set the temperature of chamber to 50 . Allow sufficient time (approximately 60 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 10 decreased per stage until the lowest temperature -20 is measured, record all measurement frequencies.

B) Frequency stability versus input voltage

1. Setup the configuration per figure 4 for frequencies measured at ambient temperature if it is within 15 to 25 . Otherwise, an environmental chamber set for a temperature of 20 shall be used. EUT connected to power supply.
2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 10 kHz, VBW to 100kHz and frequency span to 100 kHz. Record this frequency to be a reference.
3. For battery operated only device, supply the EUT primary voltage at the lowest battery operating 3.06V (3.6V*0.85), highest battery operating 4.14V(3.6V*1.15).

Figure 4 : Frequency stability measurement configuration



6.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
EMI Test Receiver	Hewlett-Packard	8546A	Jun. 18,2003
Temperature Chamber	Tabai	MC-710	Jun. 08,2003
Digital Multi-Meter	GW	YF-1069	Nov. 23,2002
Power Supply	GW	GPC-3030D	N/A

6.4 Measurement Data

A) Frequency stability versus environmental temperature

Reference Frequency: 40.67463MHz (20°C, 3.6V)							Limit: 0.01 (%)
Environment Temperature ()	Power Supplied (Vdc)	Frequency deviation measured with time elapse					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	New Battery	40.67432	-0.00076	40.67432	-0.00076	40.67444	-0.00047
40		40.67468	0.00012	40.67468	0.00012	40.67478	0.00027
30		40.67482	0.00047	40.67482	0.00047	40.67531	0.00167
20		40.67525	0.00152	40.67550	0.00152	40.67550	0.00214
10		40.67563	0.00246	40.67563	0.00246	40.67575	0.00275
0		40.67588	0.00307	40.67588	0.00307	40.67600	0.00337
-10		---	---	---	---	---	---
-20		---	---	---	---	---	---

Note :

1. Remark “---” means that the EUT is no function.

B) Frequency stability versus input voltage

Reference Frequency: 40.671 (MHz)							Limit: 0.01 (%)
Environment Temperature ()	Power Supplied (Vdc)	Frequency deviation measured with time elapse					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
20	3.06	40.67438	0.00061	40.67438	0.00061	40.67438	0.00061
20	4.14	40.67425	0.00093	40.67425	0.00093	40.67425	0.00093

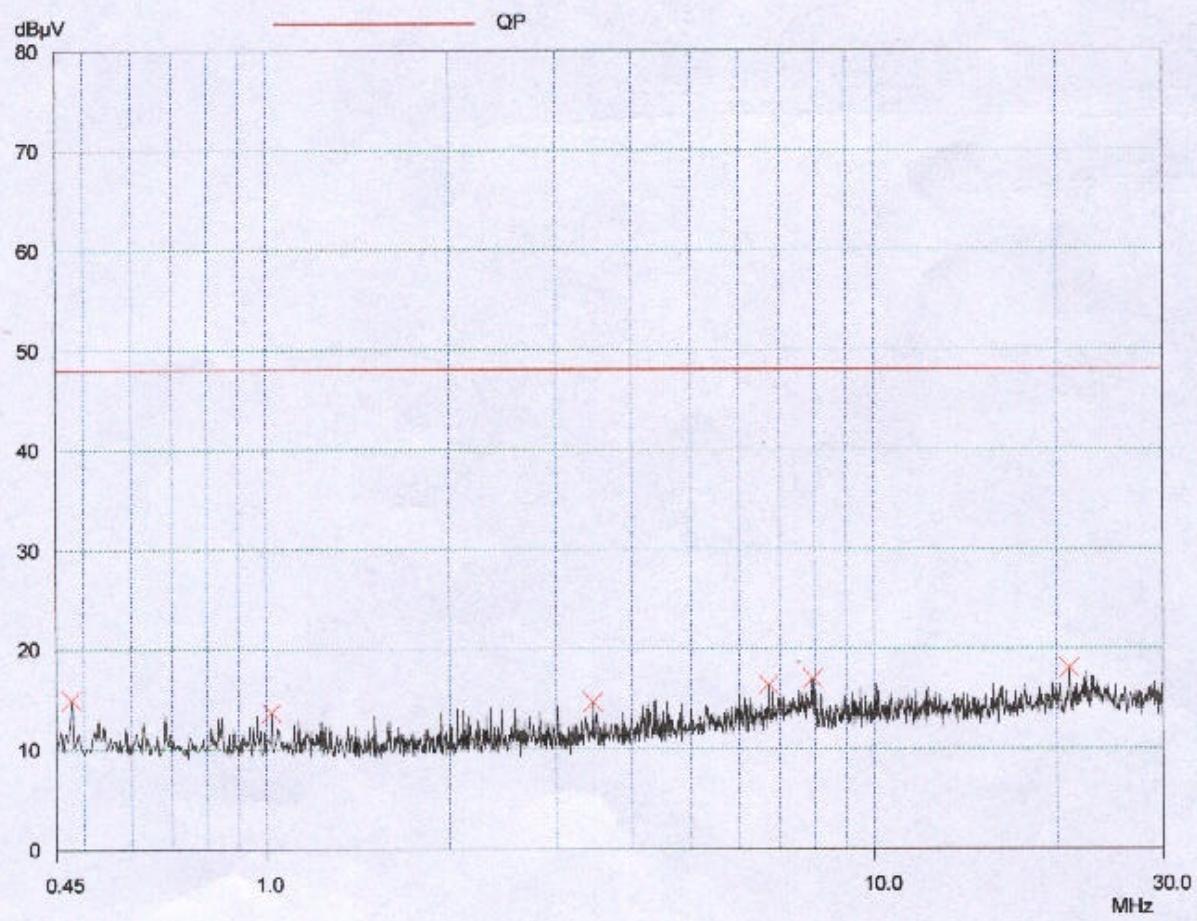
Appendix 1 : Plotted Data For Conducted Emission

Conducted Emission

Peak Value

EUT: Wireless Handfree
Manuf:
Op Cond: Charge (Baseunit)
Operator: Rick Hu
Test Spec: FCC Part 15 Class B
Comment: L1
Model : AROMA40

Prescan Measurement: Detector: X PK
Meas. Time: see scan settings
Peaks: 8
Acc Margin: 40 dB



Conducted Emission**Peak Value**

EUT: Wireless Handfree
Manuf:
Op Cond: Charge (Baseunit)
Operator: Rick Hu
Test Spec: FCC Part 15 Class B
Comment: L2
Model : AROMA40

Prescan Measurement: Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 40 dB

