

## ***FCC TEST REPORT***

Under  
FCC 15 Subpart C, Paragraph 15.239

Prepared For :  
**GUANGZHOU GRGLAMKO MOLD  
MANUFACTURING CO., LTD.**

680 XiaGang Street, Guangzhou Economic & Technological Development District, P.R.China

**FCC ID: RWNCZ100**

**EUT: HandFree Car Kit**

**Model: CZ-100**

Mach 15, 2004

**Report Type:** Original Report

**Test Engineer:** Peter Lin

**Test Date:** February 29, 2004

  
**Review By:** Apollo Liu / Manager

## TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>1. General Information .....</b>             | <b>3</b>  |
| 1. 1 Notes.....                                 | 3         |
| 1. 2 Testing Laboratory.....                    | 3         |
| 1. 3 Details of Applicant.....                  | 3         |
| 1. 4 Application Details .....                  | 3         |
| 1. 5 Test Item .....                            | 3         |
| 1. 6 Test Standards.....                        | 4         |
| <b>2. Technical Test.....</b>                   | <b>5</b>  |
| 2. 1 Summary of Test Results .....              | 5         |
| <b>3. EUT Modifications .....</b>               | <b>6</b>  |
| <b>4. Conducted Power Line Test .....</b>       | <b>7</b>  |
| 4. 1 Test Equipment .....                       | 7         |
| 4. 2 Test Procedure .....                       | 7         |
| 4. 3 Test Setup .....                           | 7         |
| 4. 4 Configuration of The EUT.....              | 8         |
| 4. 5 EUT Operating Condition.....               | 9         |
| 4. 6 Conducted Power Line Emission Limits ..... | 9         |
| 4. 7 Conducted Power Line Test Result.....      | 10        |
| <b>5. Radiated Emission Test .....</b>          | <b>11</b> |
| 5. 1 Test Equipment .....                       | 11        |
| 5. 2 Test Procedure .....                       | 11        |
| 5. 3 Radiated Test Setup .....                  | 11        |
| 5. 4 Configuration of The EUT.....              | 12        |
| 5. 5 EUT Operating Condition.....               | 12        |
| 5. 6 Radiated Emission Limit .....              | 12        |
| 5. 7 Radiated Emission Test Result.....         | 13        |
| <b>6. Band Edge .....</b>                       | <b>15</b> |
| 6. 1 Test Equipment .....                       | 15        |
| 6. 2 Test Procedure .....                       | 15        |
| 6. 3 Radiated Test Setup .....                  | 15        |
| 6. 4 Configuration of The EUT.....              | 16        |
| 6. 5 EUT Operating Condition.....               | 16        |
| 6. 6 Band Edge FCC 15.239 Limit .....           | 16        |
| 6. 7 Band Edge Test Result.....                 | 16        |
| <b>7. Photos of Testing.....</b>                | <b>18</b> |
| 7. 1 EUT Test Photographs .....                 | 18        |
| 7. 2 EUT Detailed Photographs .....             | 19        |
| <b>8. FCC ID Label.....</b>                     | <b>22</b> |
| <b>9. Test Equipment .....</b>                  | <b>23</b> |

## 1. General Information

### 1.1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

### 1.2 Testing Laboratory

#### **Ke Mei Ou Laboratory Co., Ltd.**

7A, Jiaxiangge, Jiahuixincheng, No.3027, Shennan Rd., Futian, Shenzhen, Guangdong, P.R.China.

Tel: +86 755 83642690 Fax: +86 755 83297077

Email: [kmo@kmlab.com](mailto:kmo@kmlab.com)

Internet: [www.kmlab.com](http://www.kmlab.com)

### 1.3 Details of Applicant

**Name** : GUANGZHOU GRGLAMKO MOLD MANUFACTURING CO., LTD.  
**Address** : 680 XiaGang Street, Guangzhou Economic & Technological Development District, P.R.China  
**Contact** : Jiawen Zhang / Engineer  
**Tel** : + 86 20 82210879  
**Fax** : + 86 20 82221480

### 1.4 Application Details

Date of Receipt of Application : February 6, 2004  
Date of Receipt of Test Item : February 26, 2004  
Date of Test : February 29, 2004

### 1.5 Test Item

Manufacturer : See Applicant  
Model No. : CZ-100  
Description : HandFree Car Kit

### Additional Information

Frequency : 88.7~107.9MHz  
Transmission Range : 3 meters  
Number of Channels : 3  
Power Supply : DC 9~24V / 80mA  
Extreme Temp. Tolerance : N/A

## 1. 6 Test Standards

|                                    |
|------------------------------------|
| FCC 15 Subpart C, Paragraph 15.239 |
|------------------------------------|

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

## 2. Technical Test

### 2.1 Summary of Test Results

The EUT has been tested according to the following specifications:

| Standard   | Test Type                     | Result | Notes   |
|--|-------------------------------|--------|---|
| FCC Part 15, Paragraph 15.207                                    | Conducted Test                | N/A    | Owing to the DC operation of EUT, this test item is not performed.                |
| FCC Part 15 Subpart C Paragraph 15.239 Limit                     | Field Strength of Fundamental | PASS   | Minimum passing margin is -13.36 / -2.16 dB at 107.896 MHz Horizontal             |
| FCC Part 15, Subpart C Paragraph 15.239 Limit & Paragraph 15.209 | Radiated Test                 | PASS   | Meets Class B Limit<br>Minimum passing margin is -4.2 dB at 81.000 MHz Horizontal |
| FCC Part 15 Subpart C Paragraph 15.239 Limit                     | Measured Bandwidth            | PASS   | Complies.   |

### **3. EUT Modifications**

No modification by Ke Mei Ou Laboratory Co., Ltd.

## 4. Conducted Power Line Test

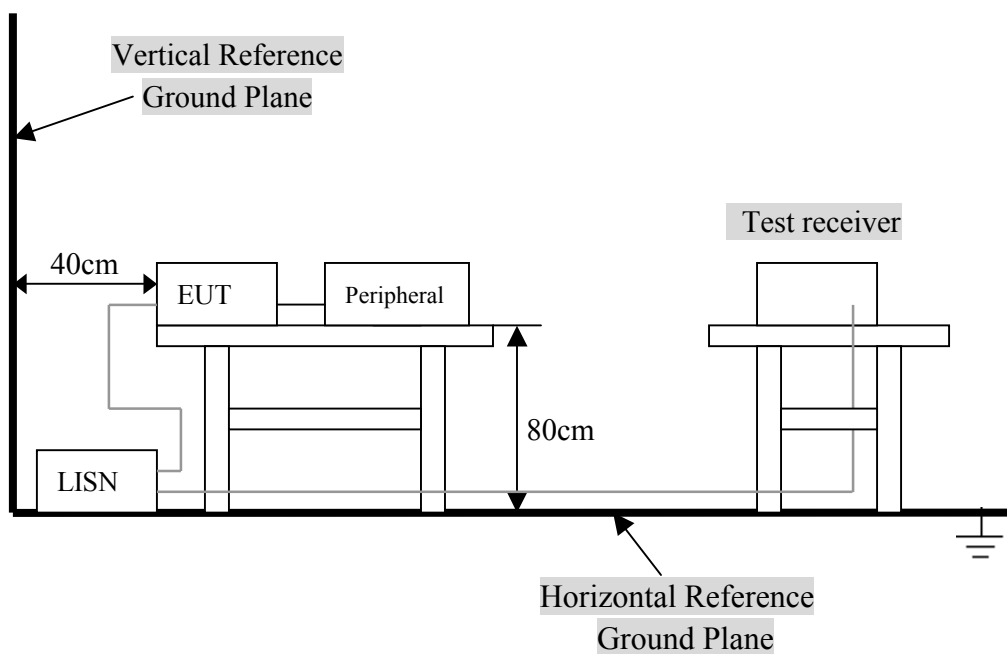
### 4.1 Test Equipment

Please refer to Section 9 this report.

### 4.2 Test Procedure

The EUT was tested according to ANSI C63.4 - 2001. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 uHenry as specified by section 5.1 of ANSI C63.4 - 2001. cables and peripherals were moved to find the maximum emission levels for each frequency.

### 4.3 Test Setup



For the actual test configuration, Please refer to the related items – Photos of Testing.

#### 4.4 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2001. EUT is the transmitter part of a FM transmitter. According to the specifications of the manufacturer, The EUT has been tested as an independent unit together with other necessary accessories or support units.

Three channels were provided to this EUT.

| Channel | Frequency (MHz) |
|---------|-----------------|
| 1       | 88.7            |
| 2       | 106.5           |
| 3       | 107.9           |

Note: The channel 1, 2, 3 were pre-tested, The channel 3, worst case one, was chosen for radiated emission test.

The following support units or accessories were used to form a representative test configuration during the tests.

##### A. EUT

| Device           | Manufacturer   | Model # | FCC ID   |
|------------------|--|---------|----------|
| HandFree Car Kit | GUANGZHOU GRGLAMKO<br>MOLD MANUFACTURER<br>CO., LTD. | CZ-100  | RWNCZ100 |

##### B. Internal Devices

| Device | Manufacturer | Model # | FCCID / DoC |
|--------|--------------|---------|-------------|
| N/A    |              |         |             |
|        |              |         |             |
|        |              |         |             |
|        |              |         |             |
|        |              |         |             |
|        |              |         |             |

##### C. Peripherals

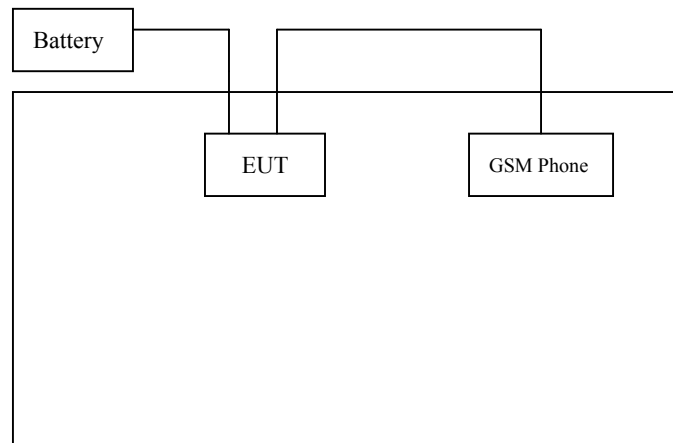
| Device    | Manufacturer | Model #<br>Serial # | FCC ID/<br>DoC | Cable |
|-----------|--------------|---------------------|----------------|-------|
| GSM Phone | Samsung      | SGH-T408            | N/A            | N/A   |
|           |              |                     |                |       |
|           |              |                     |                |       |



#### 4.5 EUT Operating Condition

Operating condition is according to ANSI C63.4 - 2001.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



#### 4.6 Conducted Power Line Emission Limits

| FCC Part 15 Paragraph 15.207 (dBuV) |               |               |
|-------------------------------------|---------------|---------------|
| Frequency Range (MHz)               | Class A QP/AV | Class B QP/AV |
| 0.15 – 0.5                          | 79/66         | 66-56/56-46   |
| 0.5 – 5.0                           | 73/60         | 56/46         |
| 5.0 - 30                            | 73/60         | 60/50         |

**NOTE** : In the above table, the tighter limit applies at the band edges.

#### **4.7 Conducted Power Line Test Result**

Owing to the DC operation of EUT, this test item is not performed.

## 5. Radiated Emission Test

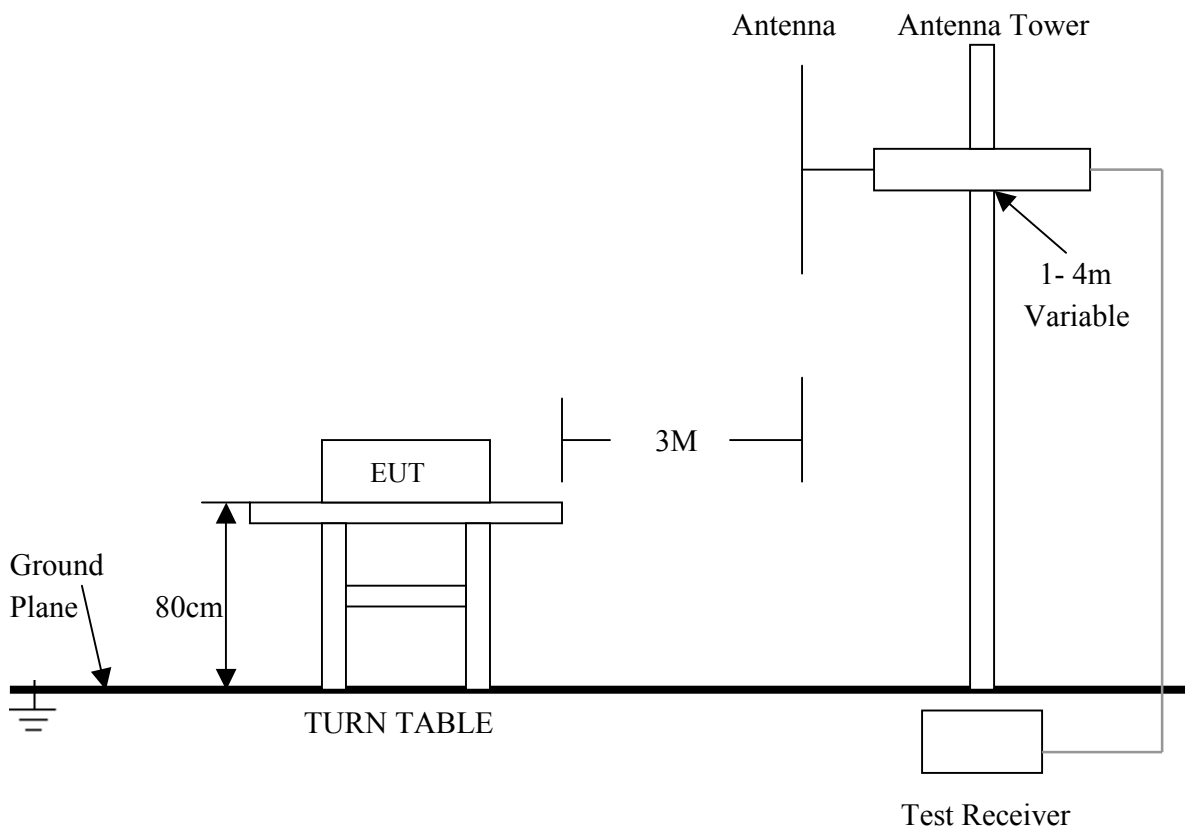
### 5.1 Test Equipment

Please refer to Section 9 this report.

### 5.2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 2001. The radiated test was performed at Ke Mei Ou Laboratory. This site is on file with the FCC laboratory division, Registration No. 125782.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2001.
3. The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
5. 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.
6. The antenna polarization : Vertical polarization and Horizontal polarization.

### 5.3 Radiated Test Setup



For the actual test configuration , please refer to the related items – Photos of Testing.

## 5.4 Configuration of The EUT

Same as section 4 . 4 of this report

## 5.5 EUT Operating Condition

Same as section 4 . 5 of this report.

## 5.6 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below :

### A. FCC Part 15 Subpart C Paragraph 15.239 Limit

According to 15.239 the field strength of emission from intentional radiators operated under these frequencies bands shall not exceed the following:

| Fundamental Frequency<br>(MHz) | Field Strength of Fundamental (3m) |                  |
|--------------------------------|------------------------------------|------------------|
|                                | Peak (dBuV/m)                      | Average (dBuV/m) |
| 88 to 108                      | 67.96                              | 47.96            |

### B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

| Frequency (MHz) | Distance (m) | Field Strength (microvolts/m) |
|-----------------|--------------|-------------------------------|
| 0.009 - 0.490   | 300          | 2400/F(kHz)                   |
| 0.490 - 1.705   | 30           | 24000/F(kHz)                  |
| 1.705 – 30.0    | 30           | 30                            |
| 30 - 88         | 3            | 100                           |
| 88 - 216        | 3            | 150                           |
| 216 - 960       | 3            | 200                           |
| ABOVE 960       | 3            | 500                           |

**Note:** 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.

## 5. 7 Radiated Emission Test Result

### A. Fundamental Radiated Emission Data

Product : HandFree Car Kit Test Mode : Channel 1  
 Test Item : Fundamental Radiated Emission Data Temperature : 25 °C  
 Test Voltage : DC 12V (Power by Battery) Humidity : 56%RH  
 Test Result : **PASS**

| Freq.<br>(MHz) | Emission PK/AV<br>(dBuV/m) | HORIZ /<br>VERT | Limits PK/AV<br>(dBuV/m) | Margin<br>(dB)  |
|----------------|----------------------------|-----------------|--------------------------|-----------------|
| 88.758         | 43.6 / 38.6                | HORIZ           | 67.96 / 47.96            | -24.36 / -9.36  |
| 88.758         | 42.3 / 36.9                | VERT            | 67.96 / 47.96            | -25.66 / -11.06 |

**Note:** (1) PK= Peak, AV=Average.  
 (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : HandFree Car Kit Test Mode : Channel 2  
 Test Item : Fundamental Radiated Emission Data Temperature : 25 °C  
 Test Voltage : DC 12V (Power by Battery) Humidity : 56%RH  
 Test Result : **PASS**

| Freq.<br>(MHz) | Emission PK/AV<br>(dBuV/m) | HORIZ /<br>VERT | Limits PK/AV<br>(dBuV/m) | Margin<br>(dB)  |
|----------------|----------------------------|-----------------|--------------------------|-----------------|
| 106.51         | 44.5 / 40.1                | HORIZ           | 67.96 / 47.96            | -23.46 / -7.86  |
| 106.51         | 43.7 / 37.6                | VERT            | 67.96 / 47.96            | -24.26 / -10.36 |

**Note:** (1) PK= Peak, AV=Average.  
 (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : HandFree Car Kit Test Mode : Channel 3  
 Test Item : Fundamental Radiated Emission Data Temperature : 25 °C  
 Test Voltage : DC 12V (Power by Battery) Humidity : 56%RH  
 Test Result : **PASS**

| Freq.<br>(MHz) | Emission PK/AV<br>(dBuV/m) | HORIZ /<br>VERT | Limits PK/AV<br>(dBuV/m) | Margin<br>(dB) |
|----------------|----------------------------|-----------------|--------------------------|----------------|
| 107.896        | 54.6 / 45.8                | HORIZ           | 67.96 / 47.96            | -13.36 / -2.16 |
| 107.896        | 53.4 / 44.9                | VERT            | 67.96 / 47.96            | -15.56 / -3.06 |

**Note:** (1) PK= Peak, AV=Average.  
 (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

**B. General Radiated Emission Data & Harmonics Radiated Emission Data**

|              |  |             |             |
|--------------|--|-------------|-------------|
| Product      | : HandFree Car Kit   | Test Mode   | : Channel 3 |
| Test Item    | : General Radiated Emission Data &<br>Harmonics Radiated Emission Data | Temperature | : 25 °C     |
| Test Voltage | : DC 12V (Power by Battery)  | Humidity    | : 56%RH     |
| Test Result  | : <b>PASS</b>  |             |             |

| Freq.<br>(MHz) | Emission<br>(dBuV/m) | HORIZ /<br>VERT | Limits<br>(dBuV/m) | Margin<br>(dB) |
|----------------|----------------------|-----------------|--------------------|----------------|
| 54.000         | 33.3                 | HORIZ           | 40.0               | -6.7           |
| 54.000         | 32.5                 | VERT            | 40.0               | -7.5           |
| 81.100         | 35.8                 | HORIZ           | 40.0               | -4.2           |
| 81.100         | 33.8                 | VERT            | 40.0               | -6.2           |
| 215.960        | 28.6                 | HORIZ           | 43.5               | -14.9          |
| 215.960        | 27.2                 | VERT            | 43.5               | -16.3          |
| 323.900        | 23.1                 | HORIZ           | 46.0               | -22.9          |
| 323.900        | 22.6                 | VERT            | 46.0               | -23.4          |
| 431.896        | 25.0                 | HORZ            | 46.0               | -21.0          |
| 431.896        | 24.3                 | VERT            | 46.0               | -21.7          |
| 540.010        | 29.1                 | HORIZ           | 46.0               | -16.9          |
| 540.010        | 28.6                 | VERT            | 46.0               | -17.4          |

**Note:**

- (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
- (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

## 6. Band Edge

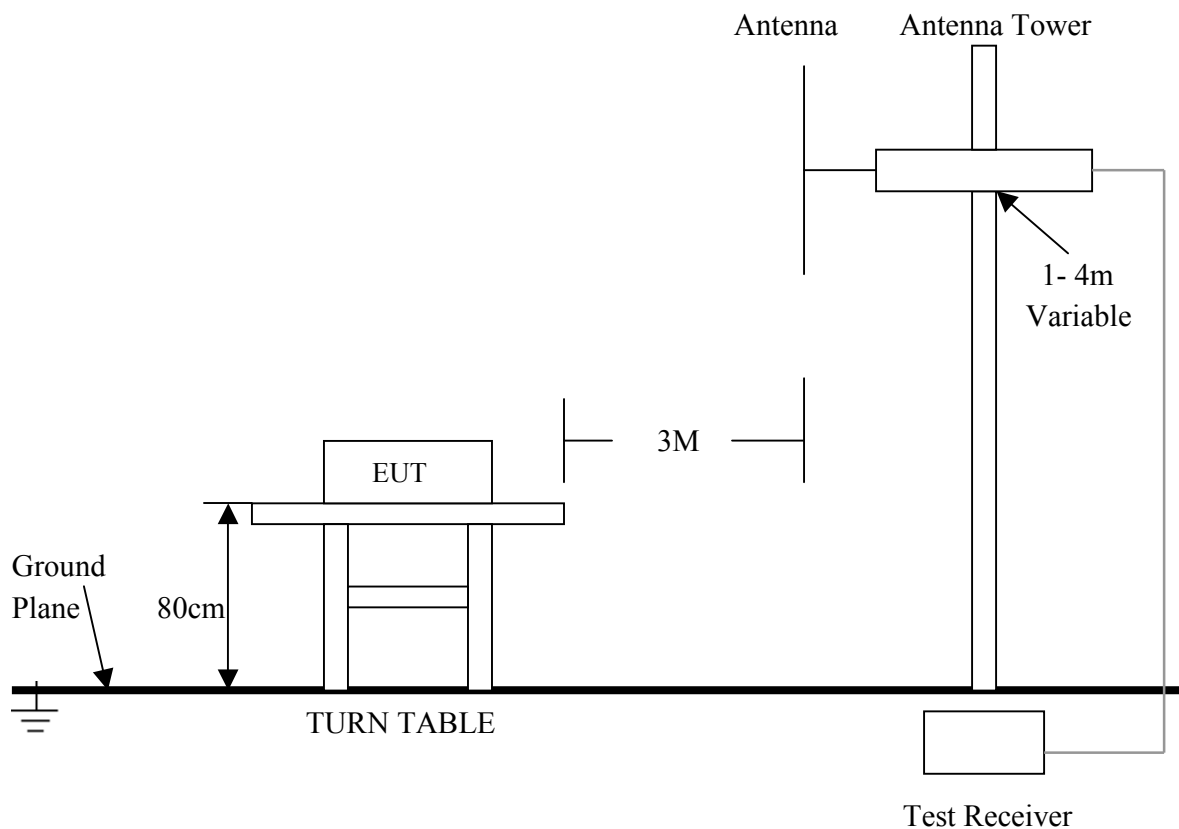
### 6.1 Test Equipment

Please refer to Section 9 this report.

### 6.2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 2001. The radiated test was performed at Ke Mei Ou Laboratory. This site is on file with the FCC laboratory division, Registration No. 125782.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2001.
3. The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The antenna high were varied from 1 m to 4 m high to find the maximum emission for each frequency.
5. The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement. The bandwidth below 30MHz setting on the field strength meter is 10 kHz, above 1GHz are 1 MHz.
6. Maximizing procedure was performed on the 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.
7. The antenna polarization : Vertical polarization and horizontal polarization.

### 6.3 Radiated Test Setup



For the actual test configuration , please refer to the related items – Photos of Testing

## 6.4 Configuration of The EUT

Same as section 4.4 of this report

## 6.5 EUT Operating Condition

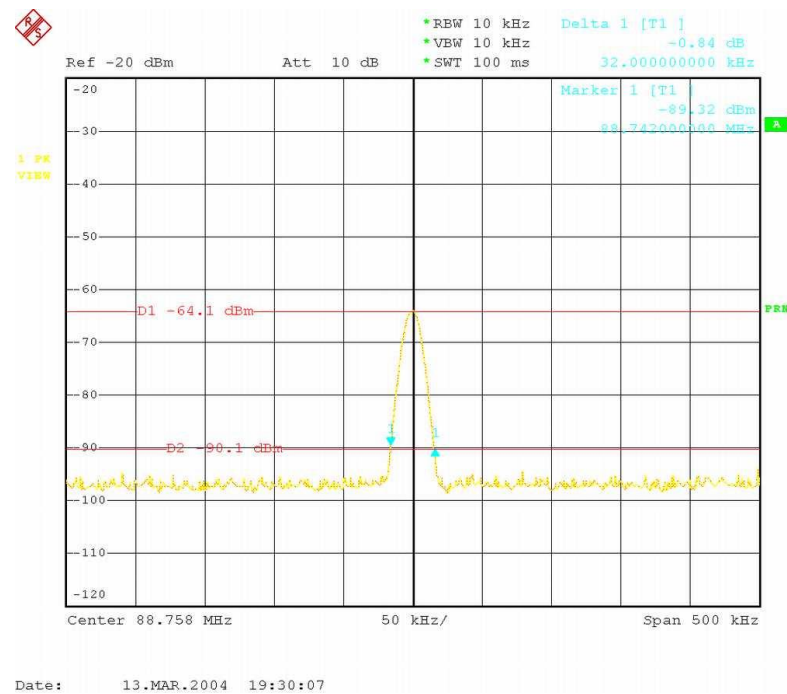
Same as section 4.5 of this report.

## 6.6 Band Edge FCC 15.239 Limit

Emission from the intentional radiator shall be confined within a bands 200kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88 to 108 MHz.

## 6.7 Band Edge Test Result

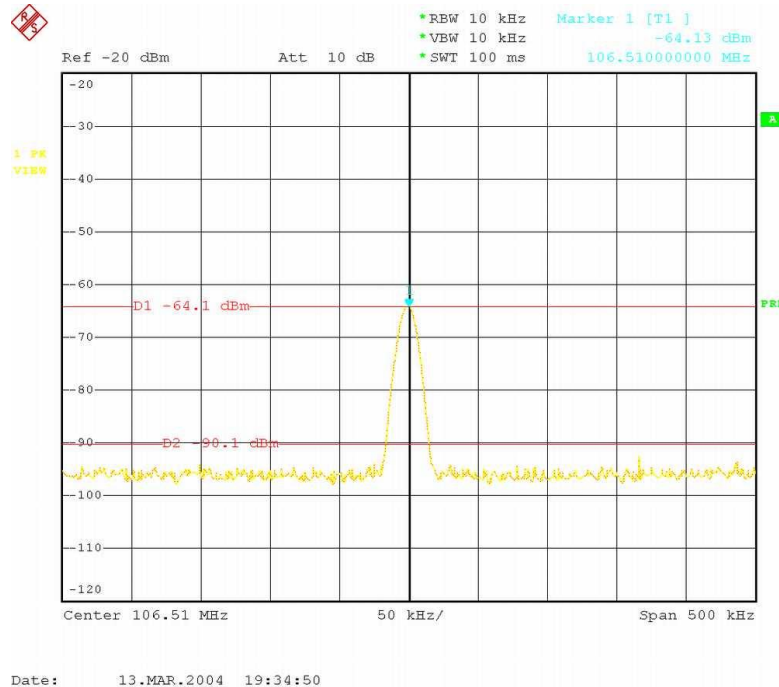
|              |                             |             |             |
|--------------|-----------------------------|-------------|-------------|
| Product      | : HandFree Car Kit          | Test Mode   | : Channel 1 |
| Test Item    | : Band Edge Data            | Temperature | : 25 °C     |
| Test Voltage | : DC 12V (Power by Battery) | Humidity    | : 56%RH     |
| Test Result  | : <b>PASS</b>               |             |             |





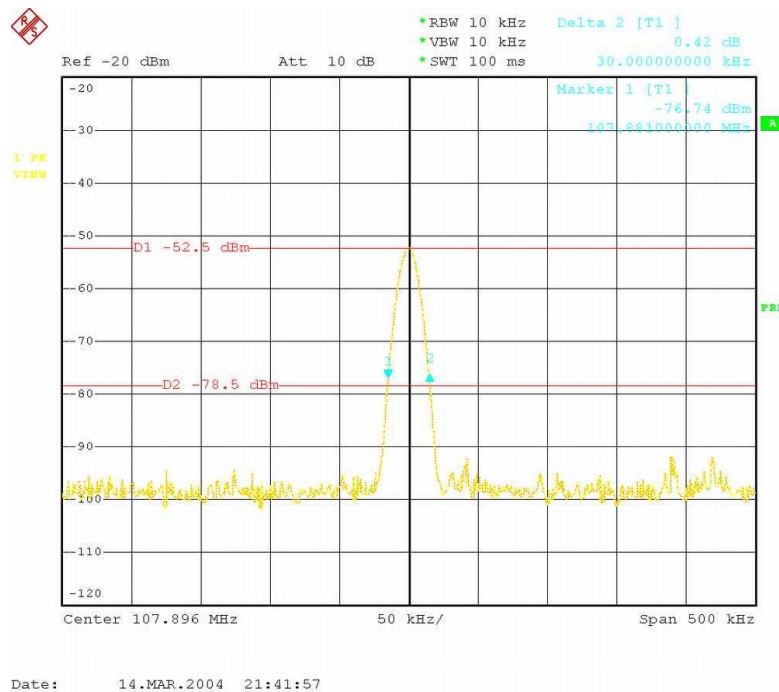
Product : HandFree Car Kit  
 Test Item : Band Edge Data  
 Test Voltage : DC 12V (Power by Battery)  
 Test Result : **PASS**

Test Mode : Channel 2  
 Temperature : 25 °C  
 Humidity : 56%RH



Product : HandFree Car Kit  
 Test Item : Band Edge Data  
 Test Voltage : DC 12V (Power by Battery)  
 Test Result : **PASS**

Test Mode : Channel 3  
 Temperature : 25 °C  
 Humidity : 56%RH

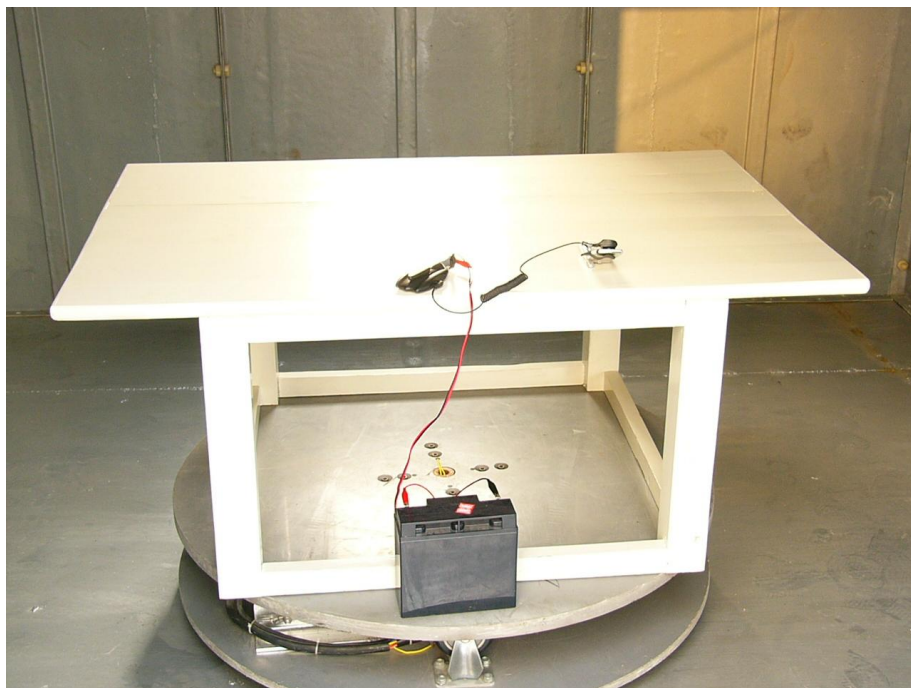


- Note:**
- (1) The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.
  - (2) The average measurement was not performed when the peak measured data under the limit of average detection.

## 7. Photos of Testing

### 7.1 EUT Test Photographs

Radiated emission test view



## 7.2 EUT Detailed Photographs

EUT top view

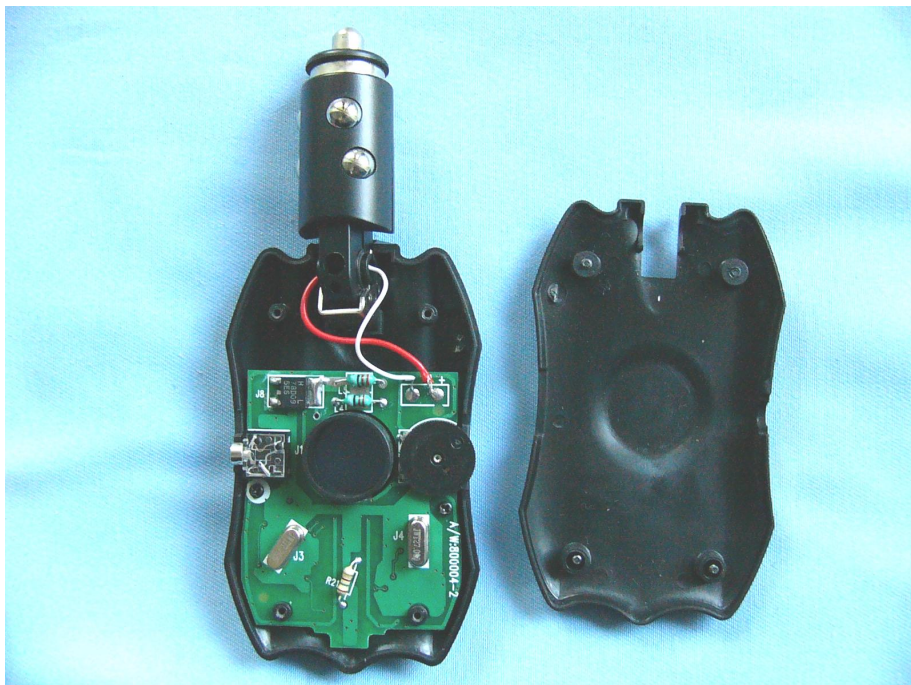




EUT bottom view

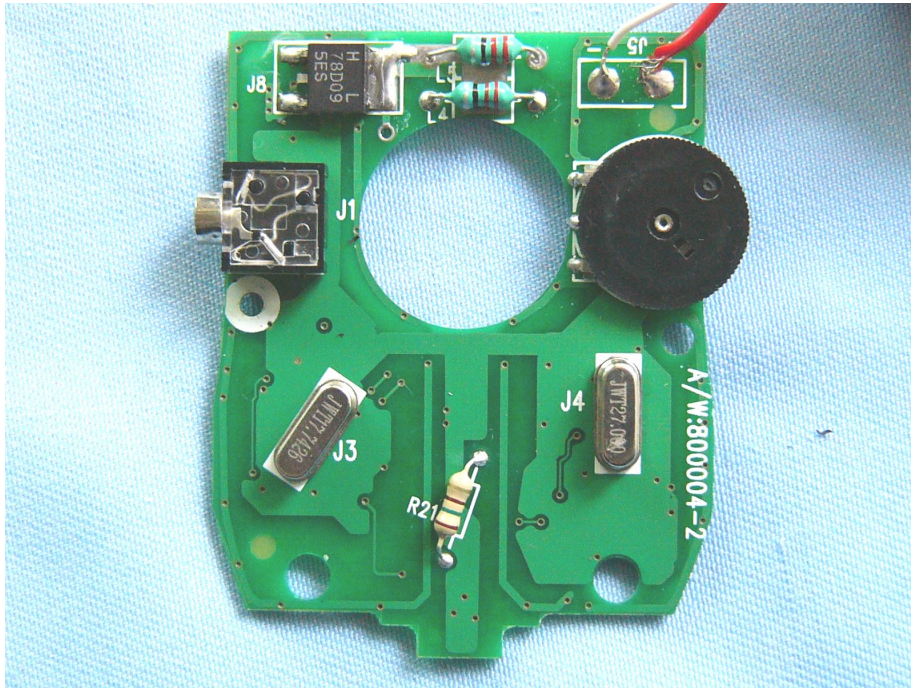


EUT inside whole view

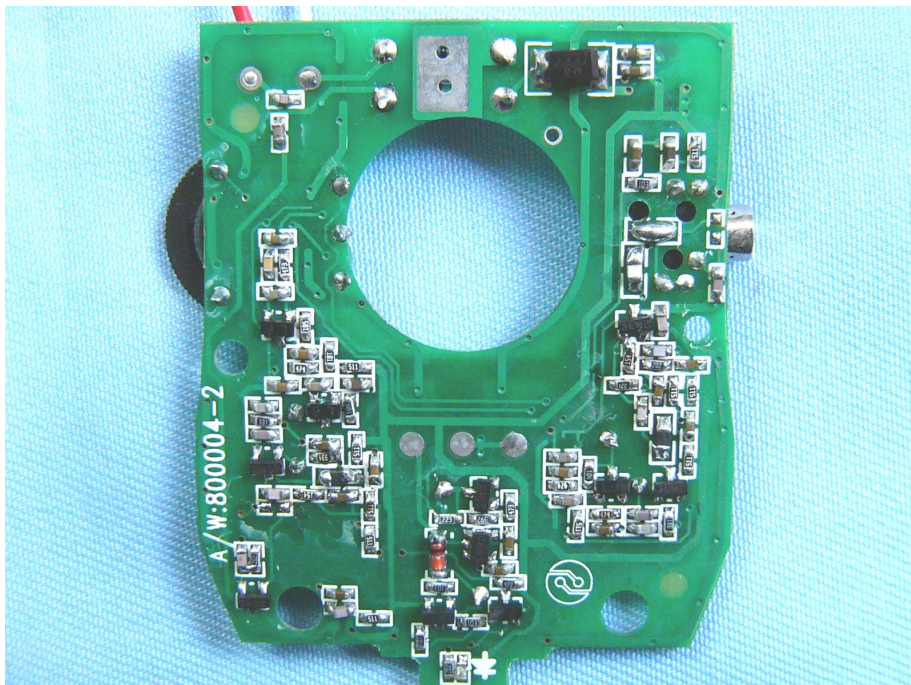




Main board component side



Main board solder side



## 8. FCC ID Label

**FCC ID: RWNCZ100**

**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.**

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

### Proposed Label Location on EUT

EUT Bottom View/Proposed FCC ID Label Location



## 9. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

| Equipment/<br>Facilities    | Manufacturer       | Model #    | Serial No. | Date of Cal.  | Due Date      |
|-----------------------------|--------------------|------------|------------|---------------|---------------|
| Turntable                   | KMO                | KSZ001T    | 200306     | NCR           | NCR           |
| Antenna Tower               | KMO                | KSZ002AT   | 200307     | NCR           | NCR           |
| OATS                        | KMO                | KSZSITE001 | N/A        | July 06, 2003 | July 06, 2004 |
| EMI Test Receiver           | Rohde & Schwarz    | ESPI3      | 100180     | Oct.18, 2003  | Oct.18, 2004  |
| Signal Generator            | Rohde & Schwarz    | SMT03      | 100059     | Feb.01, 2004  | Feb.01, 2005  |
| Bilog Antenna               | Chase              | CBL6111C   | 2576       | Feb.01, 2004  | Feb.01, 2005  |
| Ultra Broadband Antenna     | Rohde & Schwarz    | HL 562     | 100110     | June.05, 2003 | June.05, 2004 |
| AMN                         | Rohde & Schwarz    | ESH3-Z5    | 100196     | Oct. 23,2003  | Oct. 23, 2004 |
| AMN                         | Rohde & Schwarz    | ESH3-Z5    | 100197     | Oct. 23,2003  | Oct. 23, 2004 |
| Pulse Limiter               | Rohde & Schwarz    | ESH3-Z2    | N/A        | N/A           | N/A           |
| KMO Shielded Room           | KMO                | KMO-001    | N/A        | N/A           | N/A           |
| EMI Test Receiver           | Rohde & Schwarz    | ESCS30     | 100003     | Feb. 27, 2004 | Feb.27, 2005  |
| AMN                         | Rohde & Schwarz    | ESH3-Z5    | 100002     | Feb. 01, 2004 | Feb.01, 2005  |
| LISN                        | Kyoritsu           | KNW-407    | 8-1441-8   | Feb. 23, 2004 | Feb.23, 2005  |
| EMI Test Receiver           | Rohde & Schwarz    | ESI26      | 838786/013 | Feb. 01, 2004 | Feb.01, 2005  |
| Bilog Antenna               | Chase              | CBL6112B   | 2591       | Feb. 01, 2004 | Feb.01, 2005  |
| Horn Antenna                | Rohde & Schwarz    | HF906      | 100014     | Feb. 01, 2004 | Feb.01, 2005  |
| 3m Semi-Anechoic<br>Chamber | Albatross Projects | 9mX6mX6m   | N/A        | Feb. 01, 2004 | Feb.01, 2005  |