

**FCC PART 15 Subpart C**  
**EMI MEASUREMENT AND TEST REPORT**

For

**Lionda Technology Co., Ltd.**

Block 2 Laodong 2<sup>nd</sup> Industrial Area, Xixiang, Baoan,  
Shenzhen, Guangdong, P.R.China 518102

**FCC ID: O63GH9457LD02**

January 22, 2002

|  |   |
|--|---|
| <b>This Report Concerns:</b><br><input checked="checked" type="checkbox"/> Original Report   | <b>Equipment Type:</b><br>Cordless Telephone w/ CID<br>and Call Waiting |
| <b>Test Engineer:</b> <u>Jeff Lee</u>  |   |
| <b>Test Date:</b> <u>January 15, 2001</u>  |   |
| <b>Reviewed By:</b> _____<br>John Y. Chan – Engineering Manager  |   |
| <b>Prepared By:</b> Bay Area Compliance Laboratory Corporation<br>230 Commercial Street<br>Sunnyvale, CA 94085<br>Tel (408) 732-9162<br>Fax (408) 732-9164 |   |

**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.

**TABLE OF CONTENTS**

|  |                                     |
|--|-------------------------------------|
| <b>1 - GENERAL INFORMATION.....</b>                          | <b>4</b>                            |
| 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) ..... | 4                                   |
| 1.2 OBJECTIVE .....  | 4                                   |
| 1.3 RELATED SUBMITTAL(S)/GRANT(S) .....                      | 4                                   |
| 1.4 TEST METHODOLOGY .....                                   | 4                                   |
| 1.5 TEST FACILITY .....                                      | 5                                   |
| 1.6 TEST EQUIPMENT LIST .....                                | 5                                   |
| 1.7 LOCAL SUPPORT EQUIPMENT LIST AND DETAILS .....           | 6                                   |
| 1.8 EXTERNAL I/O CABLING LIST AND DETAILS .....              | 6                                   |
| <b>2 - SYSTEM TEST CONFIGURATION .....</b>                   | <b>7</b>                            |
| 2.1 DESCRIPTION OF TEST CONFIGURATION .....                  | 7                                   |
| 2.2 EQUIPMENT MODIFICATIONS .....                            | 7                                   |
| 2.3 CONFIGURATION OF TEST SYSTEM (BASE) .....                | 8                                   |
| 2.4 TEST SETUP BLOCK DIAGRAM .....                           | 8                                   |
| <b>3 - CONDUCTED EMISSIONS TEST DATA .....</b>               | <b>9</b>                            |
| 3.1 MEASUREMENT UNCERTAINTY .....                            | 9                                   |
| 3.2 EUT SETUP .....  | 9                                   |
| 3.3 SPECTRUM ANALYZER SETUP .....                            | 9                                   |
| 3.4 TEST PROCEDURE.....                                      | 10                                  |
| 3.5 SUMMARY OF TEST RESULTS .....                            | 10                                  |
| 3.6 CONDUCTED EMISSIONS TEST DATA .....                      | 10                                  |
| 3.7 PLOT OF CONDUCTED EMISSIONS TEST DATA .....              | 10                                  |
| <b>4 - RADIATED EMISSION DATA .....</b>                      | <b>12</b>                           |
| 4.1 MEASUREMENT UNCERTAINTY .....                            | 12                                  |
| 4.2 EUT SETUP .....  | 12                                  |
| 4.3 SPECTRUM ANALYZER SETUP .....                            | 12                                  |
| 4.4 TEST PROCEDURE.....                                      | 13                                  |
| 4.5 CORRECTED AMPLITUDE & MARGIN CALCULATION .....           | 13                                  |
| 4.6 SUMMARY OF TEST RESULTS .....                            | 13                                  |
| 4.7 RADIATED EMISSIONS TEST RESULT DATA .....                | 14                                  |
| <b>5 - BAND EDGES TESTING .....</b>                          | <b>17</b>                           |
| 5.1 TEST PROCEDURE.....                                      | 17                                  |
| 5.2 TEST EQUIPMENT .....                                     | 17                                  |
| 5.3 TEST RESULTS.....  | 17                                  |
| <b>6 – FCC PRODUCT LABELING AND WARNING STATEMENT .....</b>  | <b>ERROR! BOOKMARK NOT DEFINED.</b> |
| 6.1 FCC ID LABEL .....                                       | ERROR! BOOKMARK NOT DEFINED.        |
| 6.2 PROPOSED LABEL LOCATION ON EUT .....                     | ERROR! BOOKMARK NOT DEFINED.        |
| 6.3 FCC WARNING STATEMENT .....                              | ERROR! BOOKMARK NOT DEFINED.        |
| <b>7 - CONDUCTED AND RADIATED SETUP PHOTOGRAPHS .....</b>    | <b>ERROR! BOOKMARK NOT DEFINED.</b> |
| 7.1 BASE CONDUCTED EMISSION PHOTOGRAPH - FRONT VIEW .....    | ERROR! BOOKMARK NOT DEFINED.        |
| 7.2 BASE CONDUCTED EMISSION PHOTOGRAPH - REAR VIEW .....     | ERROR! BOOKMARK NOT DEFINED.        |
| 7.3 BASE RADIATED EMISSION PHOTOGRAPH - FRONT VIEW.....      | ERROR! BOOKMARK NOT DEFINED.        |
| 7.4 BASE RADIATED EMISSION PHOTOGRAPH – REAR VIEW .....      | ERROR! BOOKMARK NOT DEFINED.        |
| 7.5 HANDSET RADIATED EMISSION PHOTOGRAPH - FRONT VIEW.....   | ERROR! BOOKMARK NOT DEFINED.        |
| 7.6 HANDSET RADIATED EMISSION PHOTOGRAPH - REAR VIEW .....   | ERROR! BOOKMARK NOT DEFINED.        |
| <b>8 - EUT PHOTOGRAPHS.....</b>                              | <b>ERROR! BOOKMARK NOT DEFINED.</b> |
| 8.1 HANDSET - TOP VIEW .....                                 | ERROR! BOOKMARK NOT DEFINED.        |
| 8.2 HANDSET - BOTTOM VIEW .....                              | ERROR! BOOKMARK NOT DEFINED.        |
| 8.3 HANDSET - COMPONENT VIEW .....                           | ERROR! BOOKMARK NOT DEFINED.        |
| 8.4 HANDSET - SOLDER VIEW .....                              | ERROR! BOOKMARK NOT DEFINED.        |
| 8.5 BASE - TOP VIEW .....                                    | ERROR! BOOKMARK NOT DEFINED.        |
| 8.6 BASE - BACK VIEW .....                                   | ERROR! BOOKMARK NOT DEFINED.        |

---

|  |                                     |
|--|-------------------------------------|
| 8.7 BASE - COMPONENT VIEW .....                    | ERROR! BOOKMARK NOT DEFINED.        |
| 8.8 BASE - SOLDER VIEW.....                        | ERROR! BOOKMARK NOT DEFINED.        |
| 8.9 HANDSET TRANSMITTER - COMPONENT VIEW .....     | ERROR! BOOKMARK NOT DEFINED.        |
| 8.10 HANDSET TRANSMITTER - SOLDER VIEW .....       | ERROR! BOOKMARK NOT DEFINED.        |
| 8.11 BASE RECEIVER - COMPONENT VIEW .....          | ERROR! BOOKMARK NOT DEFINED.        |
| 8.12 BASE RECEIVER - SOLDER VIEW.....              | ERROR! BOOKMARK NOT DEFINED.        |
| 8.13 AC/DC POWER ADAPTER.....                      | ERROR! BOOKMARK NOT DEFINED.        |
| <b>APPENDIX A - BLOCK DIAGRAM /SCHEMATICS.....</b> | <b>ERROR! BOOKMARK NOT DEFINED.</b> |
| <b>APPENDIX B - TECHNICAL INFORMATION.....</b>     | <b>ERROR! BOOKMARK NOT DEFINED.</b> |
| <b>APPENDIX C - USERS MANUAL.....</b>              | <b>ERROR! BOOKMARK NOT DEFINED.</b> |

## 1 - GENERAL INFORMATION

---

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

The *Lionda Technology Co., Ltd.*'s O63GH9456LD02 or the "EUT" as referred to in this report is a 2.4GHz cordless telephone with caller ID and call waiting function. EUT was composed of two parts, one is a Handset which is measured approximately 6.5" L x 2.1" W x 1.5"H, and the other is a Base which measures about 5.5"L x 3.5"W x 3.25"H.

The EUT was supplied with Bell South AC/DC adapter, M/N: U090030D, S#: E124946.

For marketing purposes *Lionda Technology Co., Ltd.* would like to apply multiple model names for its product: GH9457, GH9458.

GH9457 and GH9458 are exactly same in electrical components and may vary in cosmetic design. There is no effect on emissions.

*\* The test data was good for test sample only. It may have deviation for other test samples.*

### 1.2 Objective

This document is a qualification 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 C63.6: 1992.

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 15.205, 15.207, and 15.249.

### 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, Sunnyvale, California, USA.

Test site 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-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, 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: 1998, 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    | 8564E            | 08303         | 12/6/2002     |
| HP                | Spectrum Analyzer    | 8593B            | 2919A00242    | 12/20/2002    |
| HP                | Amplifier            | 8349B            | 2644A02662    | 12/20/2002    |
| HP                | Quasi-Peak Adapter   | 85650A           | 917059        | 12/6/2002     |
| HP                | Amplifier            | 8447E            | 1937A01046    | 12/6/2002     |
| A.H. System       | Horn Antenna         | SAS0200/571      | 261           | 12/27/2002    |
| Com-Power         | Log Periodic Antenna | AL-100           | 16005         | 11/2/2002     |
| Com-Power         | Biconical Antenna    | AB-100           | 14012         | 11/2/2002     |
| Solar Electronics | LISN                 | 8012-50-R-24-BNC | 968447        | 12/28/2002    |
| Com-Power         | LISN                 | LI-200           | 12208         | 12/20/2002    |
| Com-Power         | LISN                 | LI-200           | 12005         | 12/20/2002    |
| BACL              | Data Entry Software  | DES1             | 0001          | 12/20/2002    |

**\*Statement of Traceability: Bay Area Compliance Laboratory Corp.** Certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY.

**1.7 Local Support Equipment List and Details**

| Manufacturer  | Description | Model     | Serial Number | FCC ID            |
|---------------|-------------|-----------|---------------|-------------------|
| TELTONE CORP. | Simulator   | TLS-3B-01 | 80071         | DOC               |
| PANASONIC     | Telephone   | KX-T3175  | 6IBTB142741   | ACJMLA-75986-MT-E |

**1.8 External I/O Cabling List and Details**

| Cable Description                | Length (M) | Port/From            | To        |
|----------------------------------|------------|----------------------|-----------|
| Unshielded RJ 11 telephone cable | 2.0        | Simulator RJ 11 Port | EUT       |
| Unshielded RJ 11 telephone cable | 2.0        | Simulator RJ 11 Port | Telephone |

---

## **2 - SYSTEM TEST CONFIGURATION**

---

### **2.1 Description of Test Configuration**

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

Handset being tested: The Handset unit was placed on the wooden table and tested in three orthogonal axis. The handset was connected to the headset via its headset port. The Low, middle, and high channels were tested. The handset was transmitting to and receiving from the Base unit. The EUT was investigated for emissions while off hook. The radiated data was taken in this mode of operation. All initial and final investigations were performed with the EMI receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the 2.5.

Base being tested: The Base unit was placed on the wooden table. The Low, middle, and high channels were tested. The base was connected to the line simulator and an AC adapter via its Tel Line and power ports, respectively. The base was transmitting and receiving from the Handset. The conducted as well as radiated data was taken in this mode of operation. All initial and final investigations were performed with the EMI receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the 2.4.

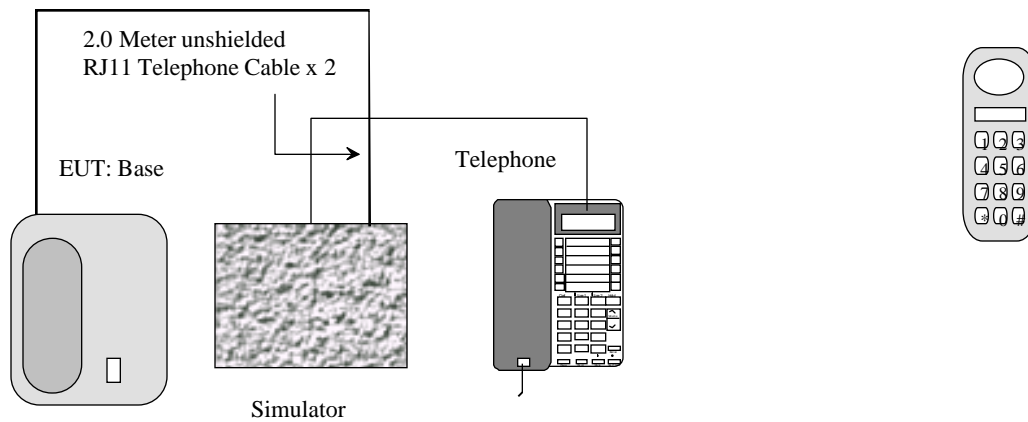
### **2.2 Equipment Modifications**

No modification(s) to the EUT were made by BACL to comply with the applicable limits.

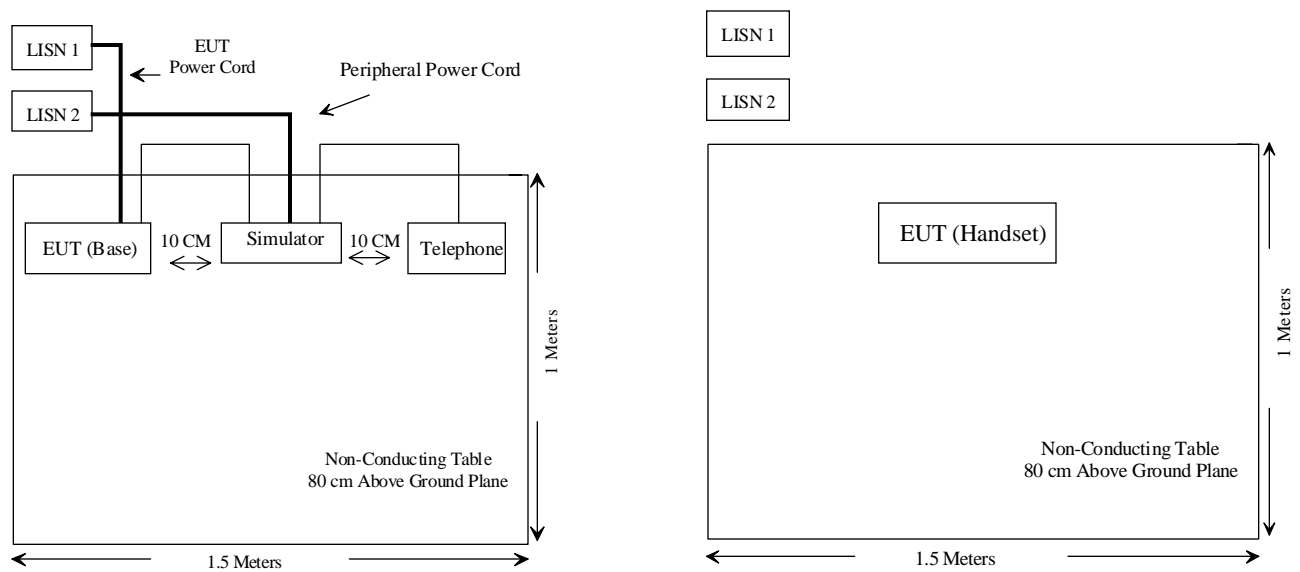
## 2.3 Configuration of Test System (Base)

Base

Handset



## 2.4 Test Setup Block Diagram





### 3 - CONDUCTED EMISSIONS TEST DATA

---

#### 3.1 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 BACL is  $\pm 2.4$  dB.

#### 3.2 EUT Setup

The measurement was performed at the **Open Area Test Site**, using the same setup per ANSI C63.4 - 1992 measurement procedure. Specification used was with the FCC Class B limits.

The Base unit of EUT was connected to a 110 VAC / 60 Hz power source and it was placed center and the back edge of the test table. The simulator was placed on one side of the EUT base, and the telephone was placed on the other side the EUT base. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.

The spacing between the peripherals was 10 centimeters.

External Input / Output cables were draped over edge of the test table and bundle when necessary.

#### 3.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conducted emission test:

|                                   |         |
|-----------------------------------|---------|
| Start Frequency .....             | 450 kHz |
| Stop Frequency .....              | 30 MHz  |
| Sweep Speed.....                  | Auto    |
| IF Bandwidth.....                 | 10 kHz  |
| Video Bandwidth.....              | 10 kHz  |
| Quasi-Peak Adapter Bandwidth..... | 9 kHz   |
| Quasi-Peak Adapter Mode.....      | Normal  |

### 3.4 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first LISN with all support equipment power cords connected to the second.

The EUT was tested with the *BELL PHONES* (U090030D) power adapter to represent worst case results for the final qualification test. Therefore, these results were used for final test data recorded in the table listed under section 3.6 of this report.

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

### 3.5 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Conducted margin for a Class B device and these test results is deemed satisfactory evidence of compliance with RSS-210 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

**-3.2 dBμV at 0.700 MHz in the Neutral mode for the *BELL PHONES*, Model U090030D power adapter.**

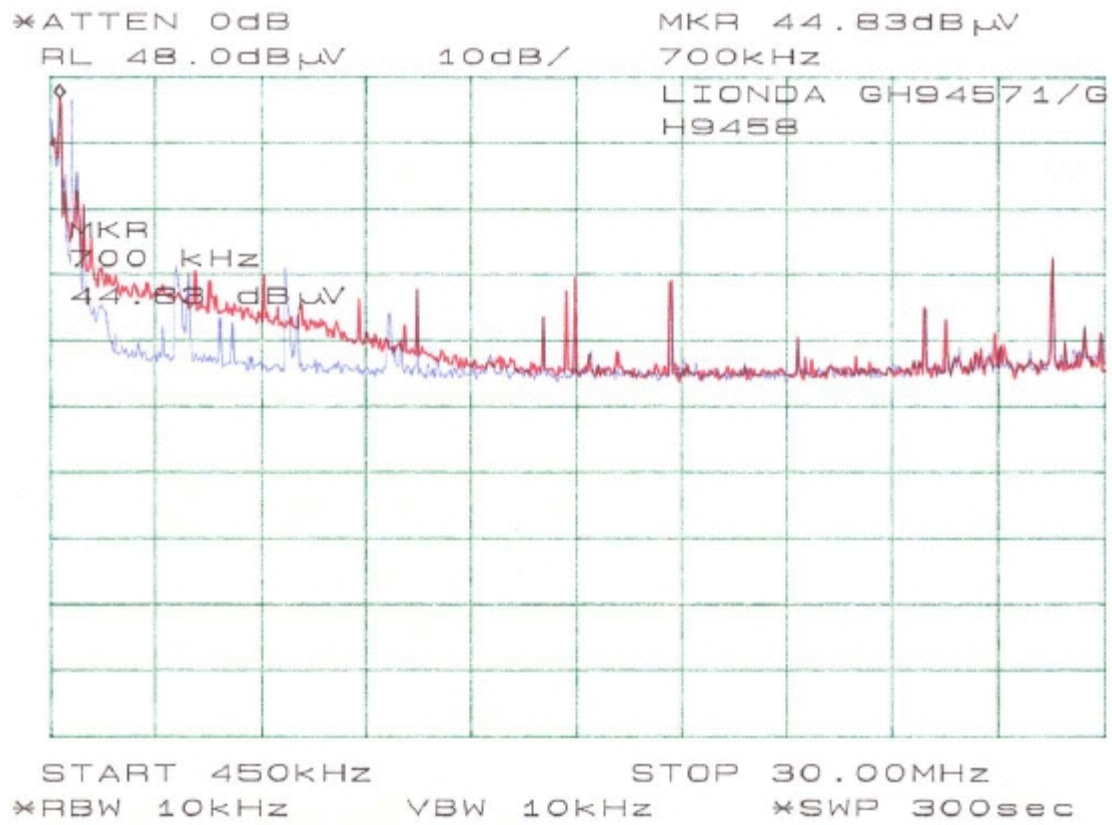
### 3.6 Conducted Emissions Test Data

#### 3.6.1 Test Data for *BELL PHONES*, model U090030D, 0.45 - 30 MHz.

| LINE CONDUCTED EMISSIONS |                   |                         |                       | FCC CLASS B   |              |
|--------------------------|-------------------|-------------------------|-----------------------|---------------|--------------|
| Frequency<br>MHz         | Amplitude<br>dBμV | Detector<br>Qp/Ave/Peak | Phase<br>Line/Neutral | Limit<br>dBμV | Margin<br>dB |
| 0.700                    | 44.8              | QP                      | Line                  | 48            | -3.2         |
| 1.040                    | 44.5              | QP                      | Neutral               | 48            | -3.5         |
| 0.700                    | 44.0              | QP                      | Neutral               | 48            | -4.0         |
| 1.190                    | 30.7              | QP                      | Line                  | 48            | -17.3        |
| 28.570                   | 20.8              | QP                      | Neutral               | 48            | -27.2        |
| 28.570                   | 20.3              | QP                      | Line                  | 48            | -27.7        |

### 3.7 Plot of Conducted Emissions Test Data

Plot of Conducted Emissions test data for the *BELL PHONES Power Adapter*, model U090030D is presented hereinafter as reference.



## 4 - RADIATED EMISSION DATA

---

### 4.1 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.

### 4.2 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 - 1992. The specification used was the FCC 15 Subpart C limits.

The Base of EUT was connected to a 110 VAC / 60 Hz power source and it was placed center and the back edge of the test table. The simulator was placed on one side of the EUT base, and the telephone was placed on the other side the EUT base. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.

The spacing between the peripherals was 10 centimeters.

The external Input / Output cables were draped over edge of the test table and bundle when necessary.

### 4.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33 (a) (1), the system was tested to 5000 MHz.

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

|                                   |          |
|-----------------------------------|----------|
| Start Frequency .....             | 30 MHz   |
| Stop Frequency .....              | 5000 MHz |
| Sweep Speed.....                  | Auto     |
| IF Bandwidth .....                | 1 MHz    |
| Video Bandwidth.....              | 1 MHz    |
| Quasi-Peak Adapter Bandwidth..... | 120 kHz  |
| Quasi-Peak Adapter Mode.....      | Normal   |
| Resolution Bandwidth.....         | 1MHz     |

#### 4.4 Test Procedure

For the radiated emissions test, both the EUT and all support equipment power cords were connected to the AC floor outlet since the power supply (U090030D) used in the EUT did not provide an accessory power outlet.

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.

#### 4.5 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 -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

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

#### 4.6 Summary of Test Results

According to the data in section 4.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.249 after tested to 10<sup>th</sup> harmonics as required by FCC and had the worst margin of:

*Field Strength:*

**-4.2 dBμV at 66.82 MHz in the Vertical polarization, 30MHz to 1000 MHz, 3 meters**

*For Base:*

**-1.6 dBμV (Ave.) at 4801.16 MHz in the Vertical polarization at Low Frequency, 30 to 26GHz, 3 meters**

**-3.6 dBμV (Ave.) at 4806.00 MHz in the Vertical polarization at Middle Frequency, 30 to 26GHz, 3 meters**

**-4.7 dBμV (Ave.) at 4810.64 MHz in the Horizontal polarization at High Frequency, 30 to 26GHz, 3 meters**

*For Handset:*

**-2.6 dBμV (Ave.) at 4944.44 MHz in the Vertical polarization at Low Frequency, 30 to 26GHz, 3 meters**

**-2.1 dBμV (Ave.) at 4949.30 MHz in the Horizontal polarization at Middle Frequency, 30 to 26GHz, 3 meters**

**-2.8 dBμV (Ave.) at 4954.12 MHz in the Horizontal polarization at High Frequency, 30 to 26GHz, 3 meters**

**4.7 Radiated Emissions Test Result Data****4.7.1 Final Test Data, Base Unit, 30 MHz to 1000 MHz, 3 meters**

| INDICATED     |              | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. dBμV/m | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 751.76        | 39.8         | 45           | 1.3          | H          | 22.5              | 2.4      | 25.0    | 39.7                | 46               | -6.3      |
| 687.24        | 37.3         | 135          | 1.8          | H          | 22.2              | 3.2      | 25.0    | 37.7                | 46               | -8.3      |
| 57.25         | 44.3         | 315          | 1.5          | V          | 10.0              | 0.6      | 25.0    | 29.9                | 40               | -10.1     |
| 891.98        | 32.8         | 45           | 1.0          | H          | 24.8              | 2.7      | 25.0    | 35.3                | 46               | -10.7     |
| 601.38        | 35.8         | 180          | 2.1          | H          | 20.1              | 3.0      | 25.0    | 33.9                | 46               | -12.1     |
| 312.18        | 38.2         | 180          | 1.5          | H          | 15.9              | 3.7      | 25.0    | 32.8                | 46               | -13.2     |
| 501.14        | 33.5         | 135          | 2.0          | H          | 18.2              | 3.1      | 25.0    | 29.8                | 46               | -16.2     |
| 290.00        | 34.7         | 135          | 1.0          | H          | 14.9              | 5.1      | 25.0    | 29.7                | 46               | -16.3     |
| 121.92        | 37.5         | 270          | 1.2          | V          | 12.1              | 2.2      | 25.0    | 26.8                | 43.5             | -16.7     |
| 372.26        | 32.5         | 180          | 1.3          | H          | 15.8              | 5.3      | 25.0    | 28.6                | 46               | -17.4     |
| 118.11        | 37.0         | 315          | 1.4          | V          | 11.9              | 1.8      | 25.0    | 25.7                | 43.5             | -17.8     |
| 128.85        | 36.5         | 90           | 1.9          | V          | 12.3              | 1.8      | 25.0    | 25.6                | 43.5             | -17.9     |

**4.7.2 Final Test Data, Handset Unit, 30 MHz to 1000 MHz, 3 meters**

| INDICATED     |              | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. dBμV/m | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 937.96        | 38.2         | 0            | 1.5          | H          | 24.6              | 3.7      | 25.0    | 41.5                | 46               | -4.5      |
| 149.78        | 41.8         | 225          | 1.9          | V          | 13.4              | 1.6      | 25.0    | 31.8                | 43.5             | -11.7     |
| 891.99        | 30.5         | 45           | 1.0          | H          | 24.8              | 2.7      | 25.0    | 33.0                | 46               | -13.0     |
| 663.25        | 32.3         | 135          | 1.5          | H          | 20.8              | 3.6      | 25.0    | 31.7                | 46               | -14.3     |
| 111.50        | 39.0         | 315          | 1.5          | V          | 11.7              | 1.3      | 25.0    | 27.0                | 43.5             | -16.5     |
| 144.95        | 37.2         | 180          | 1.4          | V          | 13.2              | 1.0      | 25.0    | 26.4                | 43.5             | -17.1     |
| 192.60        | 33.2         | 270          | 1.0          | V          | 14.4              | 2.7      | 25.0    | 25.3                | 43.5             | -18.2     |
| 171.20        | 34.3         | 270          | 1.2          | V          | 13.3              | 1.4      | 25.0    | 24.0                | 43.5             | -19.5     |
| 449.44        | 30.0         | 45           | 1.5          | H          | 17.4              | 2.7      | 25.0    | 25.1                | 46               | -20.9     |

**4.7.3 Final Test Data, Base Unit, Low Frequency, 30 MHz to 26GHz, 3 meters**

| INDICATED     |              |          | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|----------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. dBμV/m | Comments | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 2400.59       | 79.3         | Fund.    | 225          | 1.0          | H          | 28.1              | 3.4      | 30.0    | 80.8                |                  |           |
| 2400.59       | 76.0         | Fund.    | 180          | 1.5          | V          | 28.1              | 3.4      | 30.0    | 77.5                |                  |           |
| 7201.77       | 31.0         | Avg.     | 315          | 1.2          | H          | 35.1              | 5.6      | 30.0    | 41.7                | 54               | -12.3     |
| 7201.77       | 30.7         | Avg.     | 315          | 1.0          | V          | 35.1              | 5.6      | 30.0    | 41.4                | 54               | -12.6     |
| 4801.18       | 31.5         | Avg.     | 315          | 1.5          | V          | 32.5              | 4.9      | 30.0    | 38.9                | 54               | -15.1     |
| 4801.18       | 29.9         | Avg.     | 270          | 1.0          | H          | 32.5              | 4.9      | 30.0    | 37.3                | 54               | -16.7     |

**4.7.4 Final Test Data, Base Unit, Middle Frequency, 30MHz to 26GHz, 3 meters**

| INDICATED     |              |          | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|----------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. dBμV/m | Comments | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 2403.00       | 77.50        | Fund.    | 180.00       | 1.60         | V          | 28.1              | 3.4      | 30.0    | 79.0                |                  |           |
| 2403.00       | 75.9         | Fund.    | 270          | 1.3          | H          | 28.1              | 3.4      | 30.0    | 77.4                |                  |           |
| 7209.00       | 31.2         | Avg.     | 135          | 1.0          | H          | 35.1              | 5.6      | 30.0    | 41.9                | 54               | -12.1     |
| 7209.00       | 30.9         | Avg.     | 180          | 1.2          | V          | 35.1              | 5.6      | 30.0    | 41.6                | 54               | -12.4     |
| 4806.00       | 33.00        | Avg.     | 90           | 1.00         | V          | 32.5              | 4.9      | 30.0    | 40.4                | 54               | -13.6     |
| 4806.00       | 30.0         | Avg.     | 225          | 1.3          | H          | 32.5              | 4.9      | 30.0    | 37.4                | 54               | -16.6     |

**4.7.5 Final Test Data, Base Unit, High Frequency, 30MHz to 26GHz, 3 meters**

| INDICATED     |              |          | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|----------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. dBμV/m | Comments | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 2405.30       | 78.0         | Fund.    | 225          | 1.4          | H          | 28.1              | 3.4      | 30.0    | 79.5                |                  |           |
| 2405.30       | 74.5         | Fund.    | 45           | 2.0          | V          | 28.1              | 3.4      | 30.0    | 76.0                |                  |           |
| 7215.90       | 31.7         | Avg.     | 225          | 1.4          | V          | 35.1              | 5.6      | 30.0    | 42.4                | 54               | -11.6     |
| 7215.90       | 30.2         | Avg.     | 270          | 2.0          | H          | 35.1              | 5.6      | 30.0    | 40.9                | 54               | -13.1     |
| 4810.60       | 32.0         | Avg.     | 225          | 2.0          | V          | 32.5              | 4.9      | 30.0    | 39.4                | 54               | -14.6     |
| 4810.60       | 31.3         | Avg.     | 135          | 1.0          | H          | 32.5              | 4.9      | 30.0    | 38.7                | 54               | -15.3     |

**4.7.6 Final Test Data, Handset Unit, Low Frequency, 30 MHz to 26GHz, 3 meters**

| INDICATED     |              |          | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|----------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. dBμV/m | Comments | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 2472.35       | 72.8         | Fund.    | 225          | 1.0          | H          | 28.1              | 3.4      | 30.0    | 74.3                |                  |           |
| 2472.35       | 72.3         | Fund.    | 180          | 1.5          | V          | 28.1              | 3.4      | 30.0    | 73.8                |                  |           |
| 7417.14       | 31.5         | Avg.     | 315          | 1.0          | V          | 35.1              | 5.6      | 30.0    | 42.2                | 54               | -11.8     |
| 7417.14       | 31.2         | Avg.     | 315          | 1.2          | H          | 35.1              | 5.6      | 30.0    | 41.9                | 54               | -12.1     |
| 4944.76       | 32.0         | Avg.     | 270          | 1.0          | H          | 32.5              | 4.9      | 30.0    | 39.4                | 54               | -14.6     |
| 4944.76       | 31.8         | Avg.     | 315          | 1.5          | V          | 32.5              | 4.9      | 30.0    | 39.2                | 54               | -14.8     |

**4.7.7 Final Test Data, Handset Unit, Middle Frequency, 30 MHz to 26GHz, 3 meters**

| INDICATED     |              |          | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|----------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. DBμV/m | Comments | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 2474.62       | 77.5         | Fund.    | 225          | 1.4          | H          | 28.1              | 3.4      | 30.0    | 79.0                |                  |           |
| 2474.62       | 72.7         | Fund.    | 45           | 2.0          | V          | 28.1              | 3.4      | 30.0    | 74.2                |                  |           |
| 7423.95       | 32.0         | Avg.     | 270          | 2.0          | H          | 35.1              | 5.6      | 30.0    | 42.7                | 54               | -11.3     |
| 7423.95       | 31.0         | Avg.     | 225          | 1.4          | V          | 35.1              | 5.6      | 30.0    | 41.7                | 54               | -12.3     |
| 4949.30       | 32.8         | Avg.     | 135          | 1.0          | H          | 32.5              | 4.9      | 30.0    | 40.2                | 54               | -13.8     |
| 4949.30       | 32.2         | Avg.     | 225          | 2.0          | V          | 32.5              | 4.9      | 30.0    | 39.6                | 54               | -14.4     |

**4.7.8 Final Test Data, Handset Unit, High Frequency, 30 MHz to 26GHz, 3 meters**

| INDICATED     |              |          | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC 15 Subpart C |           |
|---------------|--------------|----------|--------------|--------------|------------|-------------------|----------|---------|---------------------|------------------|-----------|
| Frequency MHz | Ampl. dBμV/m | Comments | Angle Degree | Height Meter | Polar H/ V | Antenna dBμV/m    | Cable dB | Amp. dB | Corr. Ampl. dBμV/m  | Limit dBμV/m     | Margin dB |
| 2477.05       | 75.7         | Fund.    | 270          | 1.3          | H          | 28.1              | 3.4      | 30.0    | 77.2                |                  |           |
| 2477.05       | 79.50        | Fund.    | 180.00       | 1.60         | V          | 28.1              | 3.4      | 30.0    | 81.0                |                  |           |
| 7431.15       | 31.2         | Avg.     | 180          | 1.2          | V          | 35.1              | 5.6      | 30.0    | 41.9                | 54               | -12.1     |
| 7431.15       | 31.0         | Avg.     | 135          | 1.0          | H          | 35.1              | 5.6      | 30.0    | 41.7                | 54               | -12.3     |
| 4954.10       | 32.0         | Avg.     | 225          | 1.3          | H          | 32.5              | 4.9      | 30.0    | 39.4                | 54               | -14.6     |
| 4954.10       | 31.80        | Avg.     | 90           | 1.00         | V          | 32.5              | 4.9      | 30.0    | 39.2                | 54               | -14.8     |

Note: No more apparent emission found after the third harmonics for base and handset unit.



---

## 5 - Band Edges Testing

---

Requirements: FCC 15.249 (c), the emission power at the START and STOP frequencies shall be at least 50 dB below the level of the fundamental or to the general radiated emission limits in FCC 15.209, whichever is the lesser attenuation.

### 5.1 Test Procedure

The antenna was removed and a low loss RF cable was connected to the transmitter output. The other end of cable was connected to a spectrum analyzer with the START and STOP frequencies set to the operation band. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter was determined by adding the value of the attenuator to the spectrum analyzer reading.

The test was performed for handset and the base respectively.

### 5.2 Test Equipment

HP 8566B Spectrum Analyzer  
HP 7470A Plotter

### 5.3 Test Results

Refer to the attached plots.

Base - Low Frequency  
Handset - High Frequency

