# PCTEST:

### PCTEST ENGINEERING LABORATORY, INC.

6660-B Dobbin Road, Columbia, MD 21045 USA Tel. 410.290.6652 / Fax 410.290.6554 http://www.pctestlab.com



### **CERTIFICATE OF COMPLIANCE**

Applicant Name: LG Electronics USA 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: February 07, 2007 Test Site/Location: PCTEST Lab, Columbia, MD, USA Test Report Serial No.: 0702010059.BEJ

FCC ID: BEJLX570

APPLICANT: LG Electronics USA

**EUT Type:** Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter

FCC Rule Part(s): FCC Part 15 Subpart B

**FCC Classification:** FCC Class B Digital Device (JBP)

Test Procedure: ANSI C63.4-2003

The device bearing the FCC Identifier specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 (See Test Report). These measurements were performed with no deviation from the standards.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

NVLAP accreditation does not constitute any product endorsement by NVLAP or any agency of the United States Government. PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.







| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | ① LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |      | Page 1 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |      | Faye 1 01 22                    |

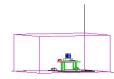


# TABLE OF CONTENTS

| FCC C | lass B  | MEASUREMENT REPORT                                | .3 |
|-------|---------|---|----|
| 1.0   | INTR    | ODUCTION  | 4  |
|       | 1.1     | EVALUATION PROCEDURE                              | 4  |
|       | 1.2     | SCOPE   | 4  |
|       | 1.3     | PCTEST TEST LOCATION                              | 4  |
| 2.0   | PRO     | DUCT INFORMATION                                  | 5  |
|       | 2.1     | EQUIPMENT DESCRIPTION                             | 5  |
|       | 2.2     | OPERATION MODE                                    | 5  |
|       | 2.3     | EMI SUPPRESSION DEVICE(S)/MODIFICATIONS           | .5 |
| 3.0   | DES     | CRIPTION OF TEST                                  | 6  |
|       | 3.1     | CONDUCTED EMISSIONS                               |    |
|       | 3.2     | RADIATED EMISSIONS                                | 7  |
| 4.0   | SAM     | PLE CALCULATIONS                                  | 8  |
|       | 4.1     | CONDUCTED EMISSION MEASUREMENT SAMPLE CALCULATION | 8  |
|       | 4.2     | RADIATED EMISSION MEASUREMENT SAMPLE CALCULATION  | 8  |
| 5.0   | TES     | T EQUIPMENT CALIBRATION DATA                      | 9  |
| 6.0   | ENV     | IRONMENTAL CONDITIONS1                            | 0  |
| 7.0   | TES     | T DATA1   | 1  |
|       | 7.1     | TEST SUPPORT EQUIPMENT1                           | 1  |
|       | 7.2     | RADIATED MEASUREMENT DATA1                        | 2  |
|       | 7.3     | LINE CONDUCTED MEASUREMENT DATA1                  |    |
| 8.0   | CON     | CLUSION1  | 5  |
| EXHIB | BIT A - | - LABELING REQUIREMENTS1                          | 6  |
| EXHIB | IT B -  | - TEST SETUP PHOTOGRAPHS1                         | 7  |
| EXHIB | BIT C - | - INTERNAL PHOTOGRAPHS1                           | 8  |
| EXHIB | BIT D - | - EXTERNAL PHOTOGRAPHS1                           | 9  |
| EXHIB | BIT E - | - BLOCK(S) / SCHEMATIC(S) DIAGRAM2                | 20 |
|       |         | OPERATIONAL DESCRIPTION2                          |    |
| EXHIB | SIT G - | - USER'S MANUAL2                                  | 22 |
|       |         |   |    |

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         |  | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|--|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |  | Page 2 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |  | Faye 2 01 22                    |









## FCC Part 15B - Unintentional Radiators

### A. § 2.1033 General Information

APPLICANT: LG Electronics USA

APPLICANT ADDRESS: 1000 Sylvan Avenue

Englewood Cliffs, NJ 07632

**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC. **TEST SITE ADDRESS:** 6660-B Dobbin Road, Columbia, MD 21045 USA

FCC RULE PART(S): FCC Part 15 Subpart B

FCC ID: BEJLX570

**Test Device Serial No.:** A00000033271AE ☐ Production ☐ Production ☐ Engineering

FCC CLASSIFICATION: FCC Class B Digital Device (JBP)

**DATE(S) OF TEST:** February 07, 2007

### A.1 Test Methodology

Both conducted and radiated measurements were taken using the methods and procedures described in ANSI C63.4-2003. Radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### A.2 Test Facility / NVLAP Accreditation

Conducted and radiated tests were performed at PCTEST Engineering Lab in Columbia, MD 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC 2451).
- PCTEST Lab is accredited by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) in EMC, Telecommunication, and FCC for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. (NVLAP Lab code: 100431-0).
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | ① LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |      | Page 3 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |      | Faye 3 01 22                    |
| O COOR DOTEOT F  |                   |   |      | DEV. 4.400T                     |



### 1.0 INTRODUCTION

#### 1.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in the measurement of **LG Dual-Band CDMA Phone with Ev-DO**, **Bluetooth and FM Transmitter FCC ID: BEJLX570**.

Deviation from measurement procedure......None

#### **1.2** Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

### 1.3 PCTEST Test Location

The map at the right shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity are, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (see Figure 1.3-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 27, 2006 and Industry Canada.

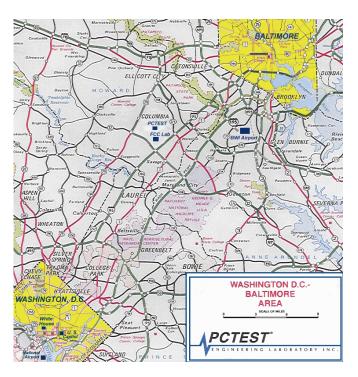


Figure 1.3-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|----|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |    | Page 4 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |    | Fage 4 01 22                    |



## 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Dual-Band CDMA Phone with Ev-DO**, **Bluetooth and FM Transmitter FCC ID**: **BEJLX570**.

### 2.2 Operation Mode

The LG Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter FCC ID: BEJLX570 was tested with a NOTEBOOK connected via USB interface port. Please see Section 7 for more information on the test setup and Exhibit B for test setup photographs.

### 2.3 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing.

None

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | ① LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |      | Page 5 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |      | Fage 3 01 22                    |



### 3.0 DESCRIPTION OF TEST

#### 3.1 Conducted Emissions

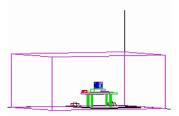


Figure 3.1-1. Shielded
Enclosure Line-Conducted Test
Facility

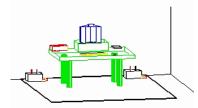


Figure 3.1-2. Line Conducted Emission Test Set-Up

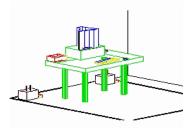


Figure 3.1-3. Wooden Table & Bonded LISNs

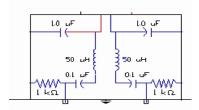


Figure 3.1-4. LISN Schematic Diagram

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (see Figure 3.1-1). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (see Figure 3.1-2). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz)  $50\Omega/50\mu H$  Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (See Figure 3.1-3). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (See Figure 3.1-4). All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.

The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Exhibit B. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator.

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | ① LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |      | Page 6 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |      | rage 0 01 22                    |



#### 3.2 Radiated Emissions

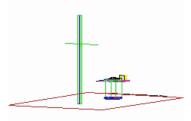


Figure 3.2-1. 3-Meter Test Site

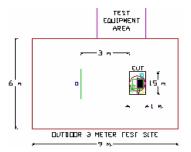


Figure 3.2-2. Dimensions of Outdoor Test Site

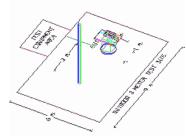


Figure 3.2-3. Turntable and System Setup

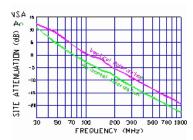


Figure 3.2-4. Normalized Site Attenuation Curves (H&V)

Preliminary measurements were made indoors at 1-meter using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, and turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using a bi-conical antenna and from 200 to 1000 MHz using a log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts<sup>TM</sup> Dipole antennas or horn antennas (*see Figure 3.2-1*). The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m area adjacent to the measurement area (*see Figure 3.2-2*). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. Above 1GHz the detector function was set to average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 3.2-3). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Exhibit B. Each EME reported was calibrated using the Agilent E8257D (250kHz - 20GHz) PSG Signal Generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3.2-4.

| FCC ID: BEJLX570 | PCTEST:           | FCC Pt. 15B CERTIFICATION TEST REPORT                         | LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|----|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |    | Dogo 7 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |    | Page 7 of 22                    |

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## 4.0 SAMPLE CALCULATIONS

## 4.1 Conducted Emission Measurement Sample Calculation

#### @ 20.3 MHz

Class B limit =  $60.0 \text{ dB}_{\mu}\text{V}$  (Quasi-peak limit)

Reading = - 57.8 dBm (calibrated quasi-peak level)

Convert to  $db\mu V = -57.8 + 107 = 49.2 dB\mu V$ 

Margin =  $49.2 - 60.0 = -10.8 \, dB$ 

= 10.8 dB below limit

## 4.2 Radiated Emission Measurement Sample Calculation

@ 66.7 MHz

Class B limit =  $100 \mu V/m = 40.0 dB\mu V/m$ 

Reading = - 76.0 dBm (calibrated level)

Convert to  $db\mu V = -76.0 + 107 = 31.0 dB\mu V$ 

Antenna Factor + Cable Loss = 5.8 dB/m

Total =  $36.8 \text{ dB}_{\mu}\text{V/m}$ 

Margin =  $36.8 - 40.0 = -3.2 \, dB$ 

= 3.2 dB below limit

#### Note:

Level [dB $\mu$ V] = 20 log <sub>10</sub> (Level [ $\mu$ V/m])

Level [dB $\mu$ V] = Level [dBm] + 107

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|----|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |    | Page 8 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |    | rage o oi 22                    |



# 5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

| Manufacturer      | Model / Equipment                         | Calibration<br>Date | Cal<br>Interval | Calibration<br>Due | Serial No.       |
|-------------------|---|---------------------|-----------------|--------------------|------------------|
| Agilent           | E4404B/E4407B ESA Spectrum Analyzer       | 04/20/06            | Annual          | 04/20/07           | US39210313       |
| Agilent           | HP 8566B (100Hz-22GHz)                    | 12/21/06            | Annual          | 12/21/07           | 3638A08713       |
| Agilent           | HP 8591A (9kHz-1.8GHz)                    | 09/20/06            | Annual          | 09/20/07           | 3144A02458       |
| Ailtech/Eaton     | NM 37/57A (30MHz-1GHz)                    | 06/07/06            | Annual          | 06/07/07           | 0805-03334       |
| Agilent           | HP 85650A Quasi-Peak Adapter              | 12/21/06            | Annual          | 12/21/07           | 2043A00301       |
| Agilent           | HP 8449B (1-26.5GHz) Pre-Amplifier        | 12/12/06            | Annual          | 12/12/07           | 3008A00985       |
| Agilent           | HP 11713A Attenuation/Switch Driver       | 12/12/06            | Annual          | 12/12/07           | N/A              |
| Agilent           | HP 85685A (20Hz-2GHz) Preselector         | 12/12/06            | Annual          | 12/12/07           | N/A              |
| Agilent           | HP 8566B Opt. 462 Impulse Bandwidth       | 12/12/06            | Annual          | 12/12/07           | 3701A22204       |
| Compliance Design | A100 Roberts Dipoles                      | 08/31/05            | Biennial        | 08/31/07           | 5118             |
| EMCO              | Dipole Pair                               | 09/21/06            | Biennial        | 09/20/08           | 23951            |
| SOLAR             | 8012-50 LISN (2)                          | 11/18/05            | Biennial        | 11/18/07           | 0313233, 0310234 |
| Pasternack        | PE7000-6 6 dB Attenuator                  | N/A                 |                 | N/A                | N/A              |
| -                 | No.165 (30MHz - 1000MHz) RG58 Coax Cable  | N/A                 |                 | N/A                | N/A              |
| -                 | No.166 (1000-26500MHz) Microwave RF Cable | N/A                 |                 | N/A                | N/A              |
| -                 | No.167 (100kHz - 100MHz) RG58 Coax Cable  | N/A                 |                 | N/A                | N/A              |

Table 5-1. Annual Test Equipment Calibration Schedule

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|----|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |    | Page 9 of 22                    |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |    | rage 9 01 22                    |



#### ENVIRONMENTAL CONDITIONS 6.0

The temperature is controlled within range of 15°C to 35°C.

The relative humidity is controlled within range of 10% to 75%.

The atmospheric pressure is controlled within the range 86-106kPa (860-1060mbar).

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|----|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |    | Page 10 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |    | Fage 10 01 22                   |



## 7.0 TEST DATA

# **Summary**

Test Date(s): February 07, 2007

Test Engineer:

| FCC Part 15 Section | Description         | Result |
|---------------------|---------------------|--------|
| 15.107              | Conducted Emissions | PASS   |
| 15.109              | Radiated Emissions  | PASS   |

Table 7-1. Summary of Test Results

# 7.1 Test Support Equipment

1 LG USB Data Cable 1.5m Shielded USB Data Cable

2 Panasonic Toughbook Model: CF-28 (DoC) S/N: T0838ZA w/ Panasonic AC Adapter Model: CF-AA1639A S/N: 020413255A

w/ Panasonic AC Adapter Model: CF-AA1639A S/N
1.9m Unshielded DC power cord with

ferrite bead on computer end

1.8m Unshielded AC power cord

3 H/P Thinkjet Printer FCC ID: DS16XU2225C S/N: 2604S10169

1.8m Unshielded AC power cord1.0m Shielded Parallel Data Cable

Note: See Exhibit B – Test Setup Photographs for actual system test setup.

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | ① LG          | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 11 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | rage 11 01 22 |                                 |



### 7.2 Radiated Measurement Data

| FREQ<br>(MHz) | Level<br>(dBm) | AFCL<br>(dB) | POL<br>(H/V) | Height<br>(m) | Azimuth (° angle) | F/S<br>(uV/M) | Margin<br>(dB) |
|---------------|----------------|--------------|--------------|---------------|-------------------|---------------|----------------|
| 134.48        | -87.95         | 12.56        | V            | 2.7           | 225               | 38.07         | -11.9          |
| 148.44        | -90.40         | 13.51        | V            | 2.6           | 270               | 32.04         | -13.4          |
| 166.25        | -88.47         | 14.68        | Н            | 2.4           | 225               | 45.76         | -10.3          |
| 258.4         | -91.50         | 19.10        | Н            | 1.8           | 315               | 53.75         | -11.4          |
| 333.8         | -93.01         | 21.82        | V            | 1.4           | 225               | 61.71         | -10.2          |
| 455.9         | -94.94         | 25.04        | Н            | 1.1           | 180               | 71.66         | -8.9           |

Table 7-2. Radiated Measurements at 3-meters

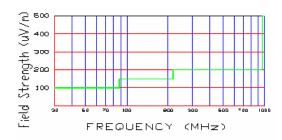


Figure 7-1. 3 Meter Limits

#### **NOTES:**

- 1. All modes of operation were investigated and the worst-case emissions are reported.
- 2. Radiated Emissions were measured from 30MHz 2000MHz.
- 3. The radiated limits are shown on Figure 7-1. Above 1GHz the limit is  $500\mu V/m.$

<sup>3.</sup> Measurements made using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used with a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

| FCC ID: BEJLX570 | PCTEST:           | FCC Pt. 15B CERTIFICATION TEST REPORT             | ① LG          | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 12 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | rage 12 01 22 |                                 |

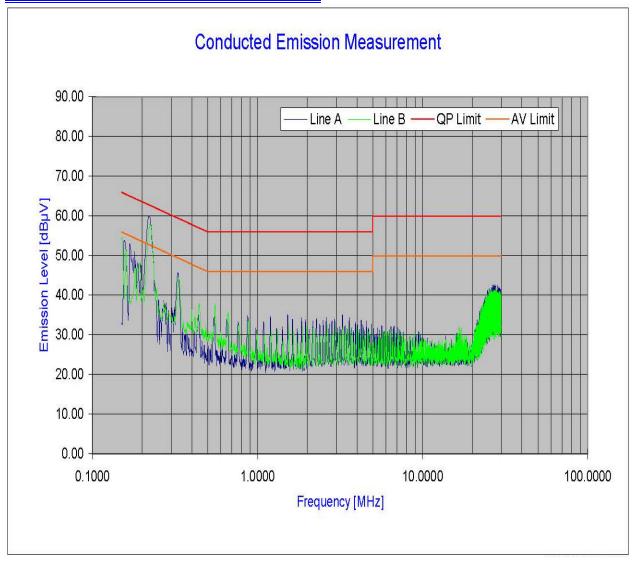
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All readings are calibrated by Agilent E8257D (250kHz – 20GHz) PSG Signal Generator with accuracy traceable to the National Institute of Standards and Technology (NIST).

<sup>2.</sup> AFCL = Antenna Factor (Roberts dipole) and Cable Loss (30 ft. RG58C/U).



## 7.3 Line Conducted Measurement Data



Plot 7-1. Line-Conducted Test Plot

#### Notes:

- 1. All Modes of operation were investigated and the worst-case emissions are reported.
- 2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.107 of the Title 47 CFR.
- 3. Line A = Phase; Line B = Neutral
- 4. Traces shown in plot are made using a peak detector.
- 5. Deviations to the Specifications: None.

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | ① LG          | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 13 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | Faye 13 01 22 |                                 |



# **Line Conducted Measurement Data (Cont'd)**

| No. | Line | Frequency | Factor | QP     | Limit  | Margin | Average | Limit  | Margin |
|-----|------|-----------|--------|--------|--------|--------|---------|--------|--------|
|     |      | [MHz]     | [dB]   | [dBµV] | [dBµV] | [dB]   | [dBµV]  | [dBµV] | [dB]   |
| 1   | Α    | 0.220     | 7.86   | 59.63  | 62.84  | -3.21  | 44.50   | 52.84  | -8.34  |
| 2   | Α    | 0.150     | 8.20   | 51.91  | 66.00  | -14.09 | 36.84   | 56.00  | -19.16 |
| 3   | Α    | 0.153     | 8.18   | 49.26  | 65.82  | -16.56 | 35.45   | 55.82  | -20.37 |
| 4   | Α    | 0.328     | 7.55   | 45.05  | 59.49  | -14.44 | 33.12   | 49.49  | -16.37 |
| 5   | Α    | 0.179     | 8.04   | 44.53  | 64.55  | -20.02 | 31.57   | 54.55  | -22.98 |
| 6   | Α    | 27.320    | 8.48   | 41.29  | 60.00  | -18.71 | 33.79   | 50.00  | -16.21 |
| 7   | Α    | 26.892    | 8.46   | 41.03  | 60.00  | -18.97 | 33.63   | 50.00  | -16.37 |
| 8   | Α    | 26.573    | 8.45   | 40.69  | 60.00  | -19.31 | 34.36   | 50.00  | -15.64 |
| 9   | Α    | 28.542    | 8.54   | 40.79  | 60.00  | -19.21 | 33.06   | 50.00  | -16.94 |
| 10  | A    | 27.025    | 8.47   | 41.42  | 60.00  | -18.58 | 33.61   | 50.00  | -16.39 |
| 11  | В    | 0.222     | 7.85   | 56.97  | 62.75  | -5.78  | 46.61   | 52.75  | -6.14  |
| 12  | В    | 0.150     | 8.20   | 54.80  | 66.00  | -11.20 | 48.84   | 56.00  | -7.16  |
| 13  | В    | 0.150     | 8.20   | 53.69  | 66.00  | -12.31 | 47.62   | 56.00  | -8.38  |
| 14  | В    | 0.332     | 7.54   | 43.64  | 59.40  | -15.76 | 35.67   | 49.40  | -13.73 |
| 15  | В    | 0.178     | 8.04   | 49.08  | 64.58  | -15.50 | 43.14   | 54.58  | -11.44 |
| 16  | В    | 0.164     | 8.12   | 50.78  | 65.27  | -14.49 | 44.55   | 55.27  | -10.72 |
| 17  | В    | 27.619    | 8.49   | 40.03  | 60.00  | -19.97 | 32.06   | 50.00  | -17.94 |
| 18  | В    | 0.552     | 7.41   | 36.05  | 56.00  | -19.95 | 33.57   | 46.00  | -12.43 |
| 19  | В    | 26.305    | 8.43   | 40.12  | 60.00  | -19.88 | 32.62   | 50.00  | -17.38 |
| 20  | В    | 24.988    | 8.37   | 39.61  | 60.00  | -20.39 | 32.56   | 50.00  | -17.44 |

Table 7-3. Line-Conducted Test Data

### Notes:

- 1. All Modes of operation were investigated and the worst-case emissions are reported.
- 2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.107 of the Title 47 CFR.
- 3. Line A = Phase; Line B = Neutral
- 4. Traces shown in plot are made using a peak detector.
- 5. Deviations to the Specifications: None.

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | LG            | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 14 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | Faye 14 01 22 |                                 |



# 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Dual-Band CDMA Phone with Ev-DO**, **Bluetooth and FM Transmitter FCC ID: BEJLX570** has been tested to comply with the requirements specified in §15.107 and §15.109 of the FCC Rules.

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | ① LG          | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 15 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | Faye 13 01 22 |                                 |



# **EXHIBIT A - LABELING REQUIREMENTS**

### Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   | Page 16 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter | rage 10 01 22                   |



# **EXHIBIT B - TEST SETUP PHOTOGRAPHS**

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | <b>(1)</b> LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 17 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | Transmitter   | Faye 17 01 22                   |



# EXHIBIT C - INTERNAL PHOTOGRAPHS

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | <b>(1)</b> LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 18 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | Transmitter   | Fage 10 01 22                   |



# EXHIBIT D - EXTERNAL PHOTOGRAPHS

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | ① LG          | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 19 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | Fage 19 01 22 |                                 |



# EXHIBIT E - BLOCK(S) / SCHEMATIC(S) DIAGRAM

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | <b>(</b> LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|-------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |             | Page 20 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |             | Faye 20 01 22                   |



# EXHIBIT F - OPERATIONAL DESCRIPTION

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT             | ① LG          | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 21 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM | Fage 21 01 22 |                                 |



# EXHIBIT G - USER'S MANUAL

| FCC ID: BEJLX570 | PCTEST            | FCC Pt. 15B CERTIFICATION TEST REPORT                         | <b>(1)</b> LG | Reviewed by:<br>Quality Manager |
|------------------|-------------------|---|---------------|---------------------------------|
| Test Report S/N: | Test Dates:       | EUT Type:   |               | Page 22 of 22                   |
| 0702010059.BEJ   | February 07, 2007 | Dual-Band CDMA Phone with Ev-DO, Bluetooth and FM Transmitter |               | Faye 22 01 22                   |