



# PCTEST ENGINEERING LABORATORY, INC.

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



## SAR COMPLIANCE EVALUATION REPORT

**Applicant Name:**  
LG Electronics USA  
1000 Sylvan Avenue  
Englewood Cliffs, NJ 07632  
United States

**Date of Testing:**  
09/20/10 – 09/27/10  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1009161579-R2.BEJ

**FCC ID:** BEJVL600

**APPLICANT:** LG ELECTRONICS USA

**EUT Type:** Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem  
**Application Type:** Class II Permissive Change  
**FCC Rule Part(s):** CFR §2.1093; FCC/OET Bulletin 65 Supplement C [June 2001]  
**FCC Classification:** PCS Licensed Transmitter (PCB)  
**Model(s):** VL600  
**Tx Frequency:** 824.70 - 848.31 MHz (Cellular CDMA)  
1851.25 - 1908.75 MHz (PCS CDMA)  
782 MHz (LTE)  
**Conducted Power:** 23.84 dBm Cell. CDMA  
23.50 dBm PCS CDMA  
25.51 dBm LTE  
**Max. SAR Measurement:** 0.64 W/kg Cell. CDMA Body SAR  
0.95 W/kg PCS CDMA Body SAR  
1.12 W/kg LTE Body SAR  
**Test Device Serial No.:** Pre-Production [S/N: SAR#1]  
**Class II Permissive Changes:** See FCC Change Document  
**Date of Original Grant:** 07/16/2010

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

**Note: This revised Test Report (S/N: 0Y1009161579-R2.BEJ) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report and dispose of it accordingly.**

I 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. Test results reported herein relate only to the item(s) tested.

*PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.*

  
Randy Ortanez  
President



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| <b>FCC ID:</b> BEJVL600                 |  | <b>SAR COMPLIANCE REPORT</b>                                         |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                           | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 1 of 37                           |

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# 1 INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.[1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz[3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

## 1.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 1-1).

$$SAR = \frac{d}{dt} \left( \frac{dU}{dm} \right) = \frac{d}{dt} \left( \frac{dU}{\rho dV} \right)$$

Figure 1-1  
SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m<sup>3</sup>)
- E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

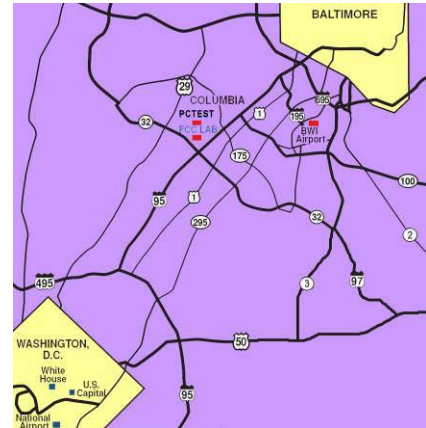
|                                         |                                                                                                                                   |                                                                      |                                                                                                 |                                        |
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| FCC ID: BEJVL600                        |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                         |  <b>LG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                                                                         | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                                 | Page 3 of 37                           |

## 2 TEST SITE LOCATION

### 2.1 INTRODUCTION

The map at the right shows the location of the PCTEST LABORATORY in Columbia, Maryland. It is in proximity to the FCC Laboratory, the Baltimore-Washington International (BWI) airport, the city of Baltimore and Washington, DC.

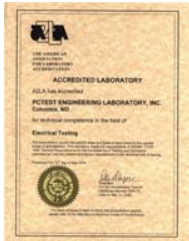
These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site 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 on January 27, 2006 and Industry Canada.



**Figure 2-1**  
Map of the Greater Baltimore and Metropolitan Washington, D.C. area

### 2.2 Test Facility / Accreditations:

Measurements were performed at an independent accredited PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.



- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing-Aid Compatibility (HAC), CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- 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 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 all Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS and CDMA, and EvDO mobile phones.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO Data, CDMA 1xRTT Data

|                                         |                                                                                     |                                                                      |                                                                                       |                                        |
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## 3 SAR MEASUREMENT SETUP

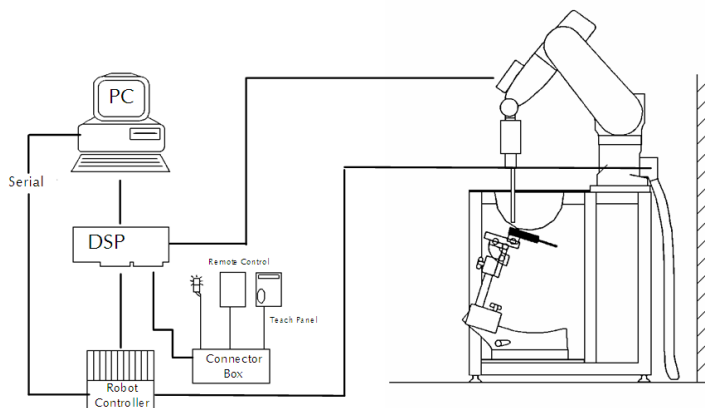
### 3.1 Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure 3-1).

### 3.1 System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, A/D conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal from the DAE and transfers data to the PC card.

### 3.2 System Electronics



**Figure 3-1**  
**SAR Measurement System Setup**

The DAE consists of a highly sensitive electrometer-grade auto-zeroing preamplifier, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

|                                         |                                                                                                                                   |                                                                      |                                                                                                 |                                        |
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### 3.3 Automated Test System Specifications

Test Software: SPEAG Dasy 4.7 Measurement System  
Robot: Stäubli Unimation Corp. Robot RX60L  
Repeatability: 0.02 mm  
No. of Axes: 6

#### Data Acquisition Electronic System (DAE)

##### Data Converter

Features: Signal Amplifier, multiplexer, A/D converter & control logic  
Software: DASY4, SEMCAD software  
Connecting Lines: Optical Downlink for data and status info  
Optical upload for commands and clock

##### PC Interface Card

Function: Link to DAE  
16-bit A/D converter for surface detection system  
Two Serial & Ethernet link to robotics  
Direct emergency stop output for robot

##### Phantom

Type: SAM Twin Phantom (V4.0)  
Shell Material: Composite  
Thickness:  $2.0 \pm 0.2$  mm



**Figure 3-2**  
**SAR Measurement System**

|                                         |                                                                                     |                                                                      |                                                                                       |                                        |
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## 4 DASY E-FIELD PROBE SYSTEM

### 4.1 Probe Measurement System



Figure 4-1  
SAR System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration (see Figure 4-3) and optimized for dosimetric evaluation [9]. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the

maximum using a 2nd order curve fitting (see Figure 5-1). The approach is stopped at reaching the maximum.

### 4.1 Probe Specifications

|                          |                                                                                                   |
|--------------------------|---------------------------------------------------------------------------------------------------|
| <b>Model:</b>            | ES3DV3, EX3DV4                                                                                    |
| <b>Frequency Range:</b>  | 10 MHz – 6.0 GHz (EX3DV4)<br>10 MHz – 4 GHz (ES3DV3)                                              |
| <b>Calibration:</b>      | In head and body simulating tissue at<br>Frequencies from 835 up to 5800MHz                       |
| <b>Linearity:</b>        | ± 0.2 dB (30 MHz to 6 GHz) for EX3DV4<br>± 0.2 dB (30 MHz to 4 GHz) for ES3DV3                    |
| <b>Dynamic Range:</b>    | 10 mW/kg – 100 W/kg                                                                               |
| <b>Probe Length:</b>     | 330 mm                                                                                            |
| <b>Probe Tip Length:</b> | 20 mm                                                                                             |
| <b>Body Diameter:</b>    | 12 mm                                                                                             |
| <b>Tip Diameter:</b>     | 2.5 mm (3.9mm for ES3DV3)                                                                         |
| <b>Tip-Center:</b>       | 1 mm (2.0 mm for ES3DV3)                                                                          |
| <b>Application:</b>      | SAR Dosimetry Testing<br>Compliance tests of mobile phones<br>Dosimetry in strong gradient fields |



Figure 4-2  
Near-Field Probe



Figure 4-3  
Triangular Probe  
Configuration

|                                         |                                                                                     |                                                                      |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
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## 5 PROBE CALIBRATION PROCESS

### 5.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm<sup>2</sup>) using an RF Signal generator, TEM cell, and RF Power Meter.

### 5.2 Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm<sup>2</sup>.

### 5.3 Temperature Assessment

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C \frac{\Delta T}{\Delta t}$$

where:

$\Delta t$  = exposure time (30 seconds),  
 $C$  = heat capacity of tissue (brain or muscle),  
 $\Delta T$  = temperature increase due to RF exposure.

$$SAR = \frac{|E|^2 \cdot \sigma}{\rho}$$

where:

$\sigma$  = simulated tissue conductivity,  
 $\rho$  = Tissue density (1.25 g/cm<sup>3</sup> for brain tissue)

SAR is proportional to  $\Delta T/\Delta t$ , the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

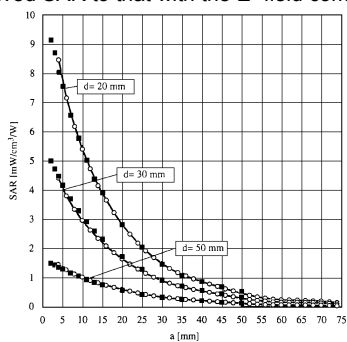


Figure 5-1 E-Field and Temperature measurements at 900MHz [7]

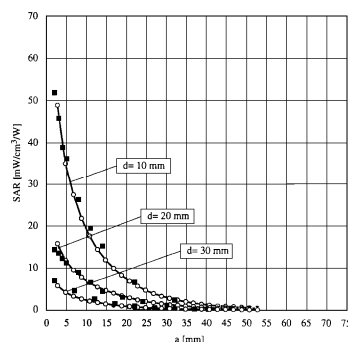


Figure 5-2 E-Field and temperature measurements at 1.9GHz [7]

|                                  |                                                                                                                            |                                                               |                                                                                          |                                 |
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## 6 PHANTOM AND EQUIVALENT TISSUES

### 6.1 SAM Phantoms



**Figure 6-1  
SAM Phantoms**

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90<sup>th</sup> percentile of the population [12][13]. The phantom enables the dosimetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

### 6.2 Head & Body Simulating Mixture Characterization



**Figure 6-2  
SAM Phantom with  
Simulating Tissue**

The mixture is characterized to obtain proper dielectric constant (permittivity) and conductivity of the tissue of interest. The head tissue dielectric parameters recommended in IEEE 1528 and IEC 62209 have been used as targets for the compositions, and are to match within 5%, per the FCC recommendations.

**Table 6-1**  
Composition of the Head & Body Tissue Equivalent Matter

| Frequency<br>(MHz)        | 835   | 1900  |
|---------------------------|-------|-------|
| Tissue                    | Body  | Body  |
| Ingredients (% by weight) |       |       |
| Bactericide               | 0.1   |       |
| DGBE                      |       | 29.44 |
| HEC                       | 1     |       |
| NaCl                      | 0.94  | 0.39  |
| Sucrose                   | 44.9  |       |
| Triton X-100              |       |       |
| Water                     | 53.06 | 70.16 |

Note: See next page for 750 MHz information

|                                         |                                                                                                                                   |                                                                      |                                                                                                 |                                        |
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**Table 6-2**  
Composition of the 750MHz Body Tissue Equivalent Matter

## 2 Composition / Information on ingredients

The Item is composed of the following ingredients:

|                        |                                                                                                                                                     |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| H <sub>2</sub> O       | Water, 35 – 58%                                                                                                                                     |
| Sucrose                | Sugar, white, refined, 40 – 60%                                                                                                                     |
| NaCl                   | Sodium Chloride, 0 – 8%                                                                                                                             |
| Hydroxyethyl-cellulose | Medium Viscosity (CAS# 9004-82-0), <0.3%                                                                                                            |
| Preventol-D7           | Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7% |
|                        | Relevant for safety; Refer to the respective Safety Data Sheet*.                                                                                    |

**Note:** 750MHz Body liquid recipe is proprietary SPEAG. The composition is approximate to the actual liquids utilized. Thus the manufacturer production sheet is provided below.

**Figure 6-1**  
750MHz Body Tissue Equivalent Matter

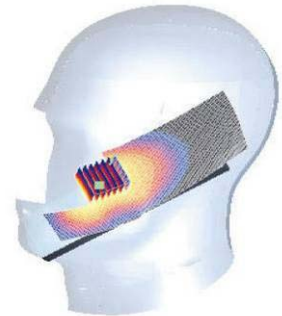
| f [MHz] | HP-e' | HP-e'' | sigma | P/N:      | SL AAM 075 | TARGET PARAMETERS |      |       |
|---------|-------|--------|-------|-----------|------------|-------------------|------|-------|
| 300     | 61.02 | 35.43  | 0.59  | Charge:   | 090224-1   | f [MHz]           | eps  | sigma |
| 350     | 60.21 | 32.13  | 0.63  | Mea Date: | 05-Mrz-09  | 700               | 55.7 | 0.96  |
| 400     | 59.50 | 29.71  | 0.66  | Temp [°C] | 22         | 750               | 55.5 | 0.96  |
| 450     | 58.79 | 28.00  | 0.70  |           |            | 800               | 55.3 | 0.97  |
| 500     | 58.16 | 26.60  | 0.74  |           |            |                   |      |       |
| 550     | 57.57 | 25.54  | 0.78  |           |            |                   |      |       |
| 600     | 56.99 | 24.68  | 0.82  |           |            |                   |      |       |
| 650     | 56.43 | 23.97  | 0.87  |           |            |                   |      |       |
| 700     | 55.88 | 23.46  | 0.91  |           |            |                   |      |       |
| 750     | 55.35 | 22.91  | 0.96  |           |            |                   |      |       |
| 800     | 55.02 | 22.56  | 1.00  |           |            |                   |      |       |
| 850     | 54.50 | 22.31  | 1.06  |           |            |                   |      |       |
| 900     | 54.02 | 22.08  | 1.11  |           |            |                   |      |       |
| 950     | 53.55 | 21.89  | 1.16  |           |            |                   |      |       |
| 1000    | 53.05 | 21.70  | 1.21  |           |            |                   |      |       |

|                                  |                                                                                     |                                                               |                                                                                       |                                 |
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### 7.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head was measured at a distance of 3.0mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during testing the 1 gram cube. This fixed point was measured and used as a reference value.
3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 30mm x 30mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 5 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual for more details):
  - a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
  - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
  - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete. If the value deviated by more than 5%, the evaluation was repeated.



**Figure 7-1**  
**Sample SAR Area Scan**

### 7.2 Specific Anthropomorphic Mannequin (SAM) Specifications

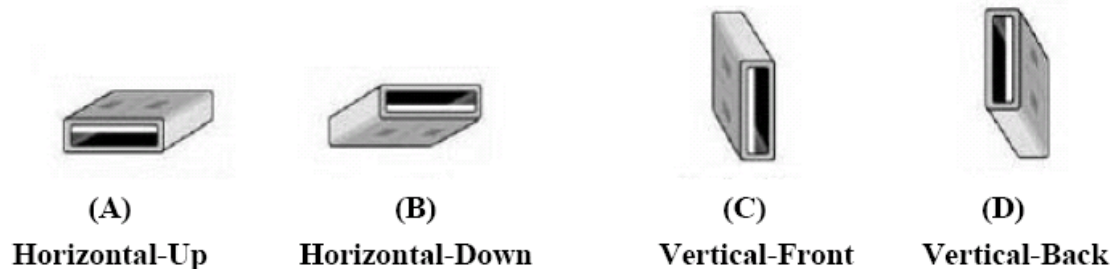
The phantom for handset SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Figure 7-2). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimize reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15 cm.



**Figure 7-2**  
**SAM Twin Phantom Shell**

|                                  |                                                                                                                                   |                                                               |                                                                                                 |                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                         |  <b>LG</b> | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                                                                | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                                 | Page 11 of 37                   |

### 8.1 SAR test procedure for USB Dongles

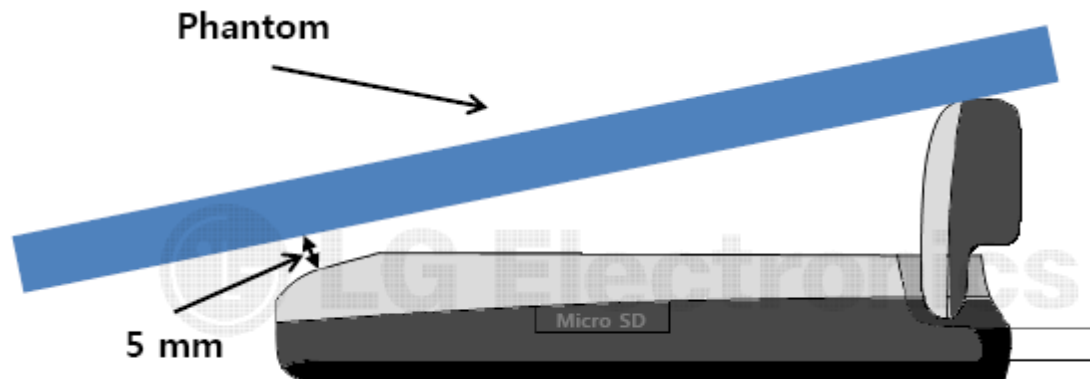


Note: these are USB connector orientations on laptop computers; USB dongles have the reverse configuration for plugging into the corresponding laptop computers.

**Figure 8-1**  
**USB Dongle Test Configurations**

FCC KDB Publication 447498. USB orientations (see Figure 8-1) with a device to phantom separation distance of 5 mm or less, according to FCC KDB Publication 447498 requirements. Current generation laptop computers should be used to ensure proper measurement distances. The same test separation distance should be used for all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of laptop computers, must be tested using an appropriate laptop computer. A laptop with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If laptop computers are not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a short and high quality USB cable (12 inches or less) may be used for testing these other orientations. It should be ensured that the USB cable does not affect device radiating characteristics and output power of the dongle.

For the Horizontal-Down (or Horizontal 2) position, the USB dongle was positioned in accordance with FCC KDB Inquiry 567894, as shown below. Since there were no changes to the mechanical operation of the EUT affecting its usable configurations, guidance from FCC Inquiry KDB 567894 was implemented for the configurations tested in terms of configuring dongle sides to be tested.



**Figure 8-2**  
**Horizontal-Down Configuration**

|                                  |                                                                                                                                   |                                                               |                                                                                                 |                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                         |  <b>LG</b> | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                                                                | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                                 | Page 12 of 37                   |

### 9.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

### 9.1 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

**Table 9-1**  
**SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6**

| HUMAN EXPOSURE LIMITS                           |                                                                           |                                                                   |
|-------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                 | UNCONTROLLED ENVIRONMENT<br><i>General Population</i><br>(W/kg) or (mW/g) | CONTROLLED ENVIRONMENT<br><i>Occupational</i><br>(W/kg) or (mW/g) |
| SPATIAL PEAK SAR<br>Brain                       | 1.6                                                                       | 8.0                                                               |
| SPATIAL AVERAGE SAR<br>Whole Body               | 0.08                                                                      | 0.4                                                               |
| SPATIAL PEAK SAR<br>Hands, Feet, Ankles, Wrists | 4.0                                                                       | 20                                                                |

The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

2 The Spatial Average value of the SAR averaged over the whole body.

3 The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

|                                         |                                                                                                                                   |                                                                      |                                                                                                 |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: BEJVL600                        |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                         |  <b>LG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                                                                         | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem | Page 13 of 37                                                                                   |                                        |

## 10 MEASUREMENT UNCERTAINTIES

Applicable for 700 - 2450 MHz.

| a                                                                             | b                    | c             | d              | e=<br>f(d,k) | f                     | g                        | h =<br>c x f/e                 | i =<br>c x g/e                   | k              |
|-------------------------------------------------------------------------------|----------------------|---------------|----------------|--------------|-----------------------|--------------------------|--------------------------------|----------------------------------|----------------|
| Uncertainty<br>Component                                                      | IEEE<br>1528<br>Sec. | Tol.<br>(± %) | Prob.<br>Dist. | Div.         | c <sub>i</sub><br>1gm | c <sub>i</sub><br>10 gms | 1gm<br>u <sub>i</sub><br>(± %) | 10gms<br>u <sub>i</sub><br>(± %) | v <sub>i</sub> |
| <b>Measurement System</b>                                                     |                      |               |                |              |                       |                          |                                |                                  |                |
| Probe Calibration                                                             | E.2.1                | 6.55          | N              | 1            | 1.0                   | 1.0                      | 6.6                            | 6.6                              | ∞              |
| Axial Isotropy                                                                | E.2.2                | 0.25          | N              | 1            | 0.7                   | 0.7                      | 0.2                            | 0.2                              | ∞              |
| Hemishperical Isotropy                                                        | E.2.2                | 1.3           | N              | 1            | 1.0                   | 1.0                      | 1.3                            | 1.3                              | ∞              |
| Boundary Effect                                                               | E.2.3                | 0.4           | N              | 1            | 1.0                   | 1.0                      | 0.4                            | 0.4                              | ∞              |
| Linearity                                                                     | E.2.4                | 0.3           | N              | 1            | 1.0                   | 1.0                      | 0.3                            | 0.3                              | ∞              |
| System Detection Limits                                                       | E.2.5                | 5.1           | N              | 1            | 1.0                   | 1.0                      | 5.1                            | 5.1                              | ∞              |
| Readout Electronics                                                           | E.2.6                | 1.0           | N              | 1            | 1.0                   | 1.0                      | 1.0                            | 1.0                              | ∞              |
| Response Time                                                                 | E.2.7                | 0.8           | R              | 1.73         | 1.0                   | 1.0                      | 0.5                            | 0.5                              | ∞              |
| Integration Time                                                              | E.2.8                | 2.6           | R              | 1.73         | 1.0                   | 1.0                      | 1.5                            | 1.5                              | ∞              |
| RF Ambient Conditions                                                         | E.6.1                | 3.0           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Probe Positioner Mechanical Tolerance                                         | E.6.2                | 0.4           | R              | 1.73         | 1.0                   | 1.0                      | 0.2                            | 0.2                              | ∞              |
| Probe Positioning w/ respect to Phantom                                       | E.6.3                | 2.9           | R              | 1.73         | 1.0                   | 1.0                      | 1.7                            | 1.7                              | ∞              |
| Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation | E.5                  | 1.0           | R              | 1.73         | 1.0                   | 1.0                      | 0.6                            | 0.6                              | ∞              |
| <b>Test Sample Related</b>                                                    |                      |               |                |              |                       |                          |                                |                                  |                |
| Test Sample Positioning                                                       | E.4.2                | 6.0           | N              | 1            | 1.0                   | 1.0                      | 6.0                            | 6.0                              | 287            |
| Device Holder Uncertainty                                                     | E.4.1                | 3.32          | R              | 1.73         | 1.0                   | 1.0                      | 1.9                            | 1.9                              | ∞              |
| Output Power Variation - SAR drift measurement                                | 6.6.2                | 5.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.9                            | 2.9                              | ∞              |
| <b>Phantom &amp; Tissue Parameters</b>                                        |                      |               |                |              |                       |                          |                                |                                  |                |
| Phantom Uncertainty (Shape & Thickness tolerances)                            | E.3.1                | 4.0           | R              | 1.73         | 1.0                   | 1.0                      | 2.3                            | 2.3                              | ∞              |
| Liquid Conductivity - deviation from target values                            | E.3.2                | 5.0           | R              | 1.73         | 0.64                  | 0.43                     | 1.8                            | 1.2                              | ∞              |
| Liquid Conductivity - measurement uncertainty                                 | E.3.3                | 3.8           | N              | 1            | 0.64                  | 0.43                     | 2.4                            | 1.6                              | 6              |
| Liquid Permittivity - deviation from target values                            | E.3.2                | 5.0           | R              | 1.73         | 0.60                  | 0.49                     | 1.7                            | 1.4                              | ∞              |
| Liquid Permittivity - measurement uncertainty                                 | E.3.3                | 4.5           | N              | 1            | 0.60                  | 0.49                     | 2.7                            | 2.2                              | 6              |
| <b>Combined Standard Uncertainty (k=1)</b>                                    |                      |               |                |              |                       |                          | RSS                            | 12.4                             | 12.0           |
| <b>Expanded Uncertainty</b><br>(95% CONFIDENCE LEVEL)                         |                      |               |                |              |                       |                          | k=2                            | 24.7                             | 24.0           |
|                                                                               |                      |               |                |              |                       |                          |                                |                                  | 299            |

The above measurement uncertainties are according to IEEE Std. 1528-2003

|                                  |                                                                                     |                                                               |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  | SAR COMPLIANCE REPORT                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                  | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 14 of 37                   |

# 11 SYSTEM VERIFICATION

## 11.1 Tissue Verification

Table 11-1  
Measured Tissue Properties

| Calibrated for Tests Performed on: | Tissue Type | Measured Frequency (MHz) | Measured Conductivity, $\sigma$ (S/m) | Measured Dielectric Constant, $\epsilon$ | TARGET Conductivity, $\sigma$ (S/m) | TARGET Dielectric Constant, $\epsilon$ | % dev $\sigma$ | % dev $\epsilon$ |
|------------------------------------|-------------|--------------------------|---------------------------------------|------------------------------------------|-------------------------------------|----------------------------------------|----------------|------------------|
| 09/23/2010                         | 835B        | 820                      | 0.981                                 | 53.45                                    | 0.969                               | 55.284                                 | 1.24%          | -3.32%           |
|                                    |             | 835                      | 1.011                                 | 53.14                                    | 0.970                               | 55.200                                 | 4.23%          | -3.73%           |
|                                    |             | 850                      | 1.032                                 | 52.90                                    | 0.988                               | 55.154                                 | 4.45%          | -4.09%           |
| 09/23/2010                         | 1900B       | 1850                     | 1.501                                 | 51.33                                    | 1.520                               | 53.300                                 | -1.25%         | -3.70%           |
|                                    |             | 1880                     | 1.536                                 | 51.22                                    | 1.520                               | 53.300                                 | 1.05%          | -3.90%           |
|                                    |             | 1910                     | 1.570                                 | 51.10                                    | 1.520                               | 53.300                                 | 3.26%          | -4.13%           |
| 09/20/2010                         | 750B        | 750                      | 0.921                                 | 53.10                                    | 0.962                               | 55.677                                 | -4.26%         | -4.63%           |
|                                    |             | 760                      | 0.930                                 | 53.04                                    | 0.963                               | 55.284                                 | -3.43%         | -4.06%           |
|                                    |             | 775                      | 0.943                                 | 52.85                                    | 0.964                               | 55.200                                 | -2.18%         | -4.26%           |
|                                    |             | 790                      | 0.958                                 | 52.74                                    | 0.966                               | 55.154                                 | -0.83%         | -4.38%           |
| 09/27/2010                         | 750B        | 750                      | 0.920                                 | 53.10                                    | 0.962                               | 55.677                                 | -4.37%         | -4.63%           |
|                                    |             | 760                      | 0.931                                 | 53.00                                    | 0.963                               | 55.284                                 | -3.32%         | -4.13%           |
|                                    |             | 775                      | 0.944                                 | 52.85                                    | 0.964                               | 55.200                                 | -2.07%         | -4.26%           |
|                                    |             | 790                      | 0.959                                 | 52.66                                    | 0.966                               | 55.154                                 | -0.72%         | -4.52%           |

Note: KDB Inquiry 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50 MHz of the DUT frequencies.

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

## 11.2 Measurement Procedure for Tissue verification

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity, for example from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively,  $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$ ,  $\omega$  is the angular frequency, and  $j = \sqrt{-1}$ .

|                                  |                                                                                                                            |                                                               |                                                                                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  PCTEST<br>Engineering Laboratory, Inc. | SAR COMPLIANCE REPORT                                         |  LG | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                                                         | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                          | Page 15 of 37                   |

### 11.3 Justification for Extended SAR Dipole Calibrations

Usage of SAR dipoles calibrated less than 2 years ago but more than 1 year ago were confirmed in maintaining return loss ( $< -20$  dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB 450824:

| D835V2 SN: 4d026    |                  |            |                        |                | D1900V2 SN:5d080    |                  |            |                        |                |
|---------------------|------------------|------------|------------------------|----------------|---------------------|------------------|------------|------------------------|----------------|
| Date of Measurement | Return Loss (dB) | $\Delta$ % | Impedance ( $\Omega$ ) | $\Delta\Omega$ | Date of Measurement | Return Loss (dB) | $\Delta$ % | Impedance ( $\Omega$ ) | $\Delta\Omega$ |
| 8/24/2009           | -22.5            |            | 51                     |                | 8/18/2009           | -24.3            |            | 50                     |                |
| 8/19/2010           | -21.4            | -5%        | 50.1                   | -0.9           | 8/19/2010           | -22.4            | -7.8%      | 51                     | 1.0            |

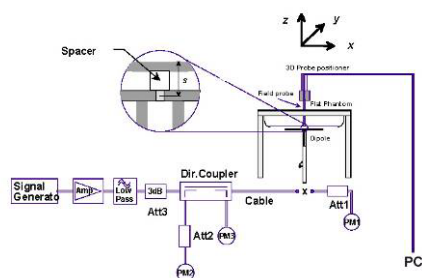
| D750V2 SN: 1003     |                  |            |                        |                |
|---------------------|------------------|------------|------------------------|----------------|
| Date of Measurement | Return Loss (dB) | $\Delta$ % | Impedance ( $\Omega$ ) | $\Delta\Omega$ |
| 2/19/2009           | -26              |            | 48.9                   |                |
| 8/29/2010           | -24.5            | -6%        | 49.9                   | 1.0            |

### 11.4 Test System Verification

Prior to assessment, the system is verified to  $\pm 10\%$  of the manufacturer SAR measurement on the reference dipole at the time of calibration.

**Table 11-2**  
**System Verification Results**

| System Verification<br>TARGET & MEASURED |                |                  |                 |                        |           |             |                                   |                                     |                                         |               |
|------------------------------------------|----------------|------------------|-----------------|------------------------|-----------|-------------|-----------------------------------|-------------------------------------|-----------------------------------------|---------------|
| Date:                                    | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Tissue Frequency (MHz) | Dipole SN | Tissue Type | Measured SAR <sub>1g</sub> (W/kg) | 1 W Target SAR <sub>1g</sub> (W/kg) | 1 W Normalized SAR <sub>1g</sub> (W/kg) | Deviation (%) |
| 09/20/2010                               | 23.8           | 22.1             | 0.075           | 750                    | 1003      | Body        | 0.673                             | 8.880                               | 8.97                                    | 1.05%         |
| 09/23/2010                               | 24.4           | 22.8             | 0.100           | 835                    | 4d026     | Body        | 0.99                              | 9.780                               | 9.90                                    | 1.23%         |
| 09/23/2010                               | 24.1           | 22.6             | 0.040           | 1900                   | 5d080     | Body        | 1.71                              | 40.500                              | 42.75                                   | 5.56%         |
| 09/27/2010                               | 23.5           | 22.3             | 0.075           | 750                    | 1003      | Body        | 0.677                             | 8.880                               | 9.03                                    | 1.65%         |



**Figure 11-1**  
**System Verification Setup Diagram**



**Figure 11-2**  
**System Verification Setup Photo**

|                                  |                                        |                                                               |               |                                 |
|----------------------------------|----------------------------------------|---------------------------------------------------------------|---------------|---------------------------------|
| FCC ID: BEJVL600                 | PCTEST<br>ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                         | LG            | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10     | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem | Page 16 of 37 |                                 |

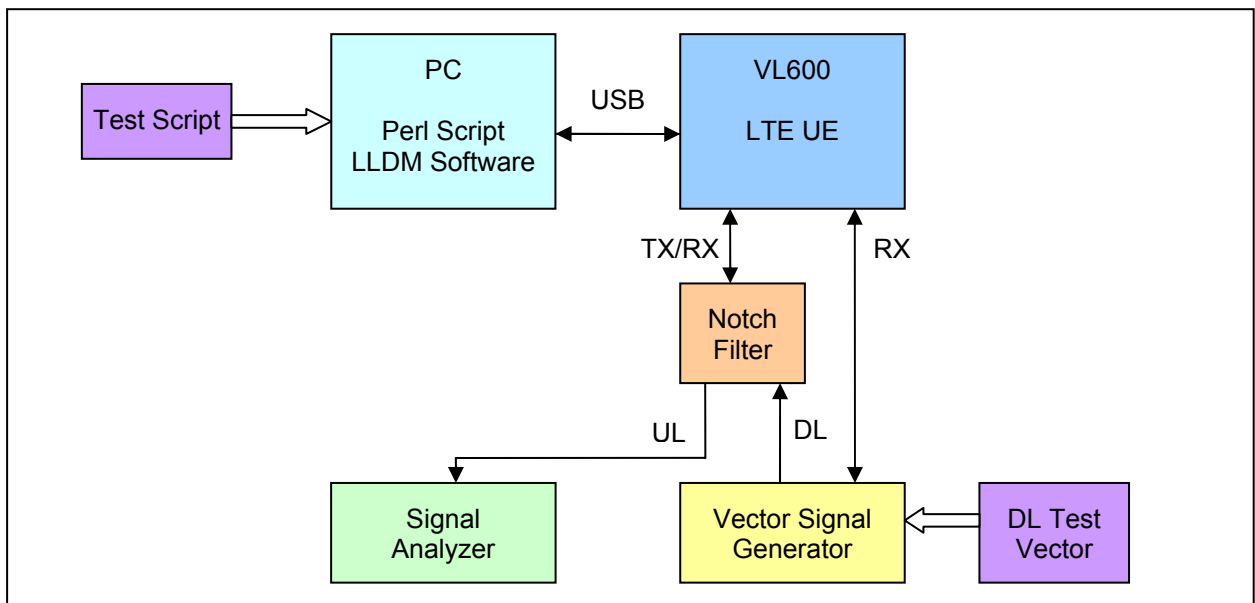
## 12 4G LTE TEST CONFIGURATION

### 12.1 Frequency of Operation per 27.5

Per FCC Rule 27.5(b)(3): “(3) Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands.”

### 12.2 Test Conditions

Testing was performed using a SMU200 and programmed UL synchronization signal from the device necessary to establish a live connection. Test software was used to set the device into test configurations.



**Figure 12-1**  
**LTE Set-up Diagram**

Note: MPR, A-MPR was disabled for all tests.

|                                         |                                                                                     |                                                                      |                                                                                       |                                        |
|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> BEJVL600                 |  | <b>SAR COMPLIANCE REPORT</b>                                         |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                           | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 17 of 37                          |

## 12.3 LTE Measured Maximum RF Output Conducted Powers

Table 12-1  
Measured LTE RF Output Powers

|                        | Frequency (MHz) | Mod.  | Resource Block Offset | Maximum Average Power [dBm] |
|------------------------|-----------------|-------|-----------------------|-----------------------------|
| Resource Block Size 1  | 782             | QPSK  | 0                     | 25.51                       |
|                        | 782             | 16QAM | 0                     | 25.43                       |
|                        | 782             | QPSK  | 49                    | 24.68                       |
|                        | 782             | 16QAM | 49                    | 24.58                       |
| Resource Block Size 25 | 782             | QPSK  | 12                    | 23.31                       |
|                        | 782             | 16QAM | 12                    | 23.34                       |
| Resource Block Size 50 | 782             | QPSK  | 0                     | 23.39                       |
|                        | 782             | 16QAM | 0                     | 23.43                       |

## 12.4 RB Implementation Spectrum Analyzer Plots

The following plots show bandwidth plots varying RB sizes. There is only 10 MHz Bandwidth available in this device. Please note, that the plots were not representative of maximum output.

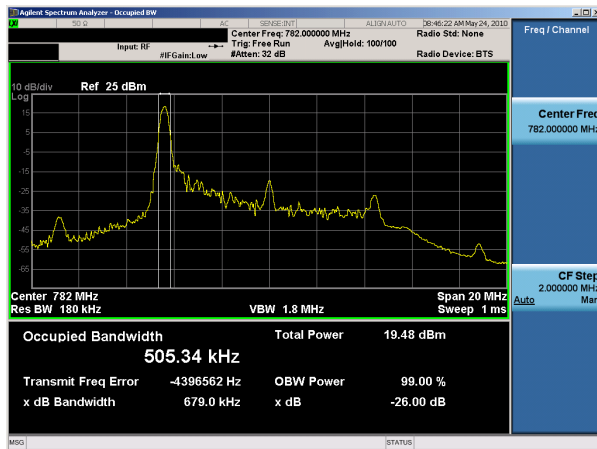


Figure 12-2  
RB 1, Offset 0, QPSK Plot

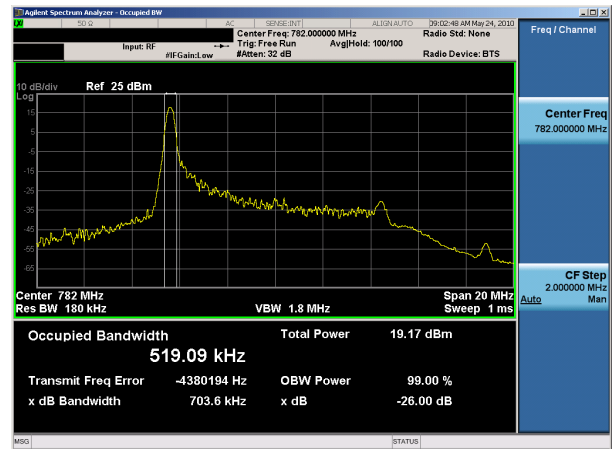
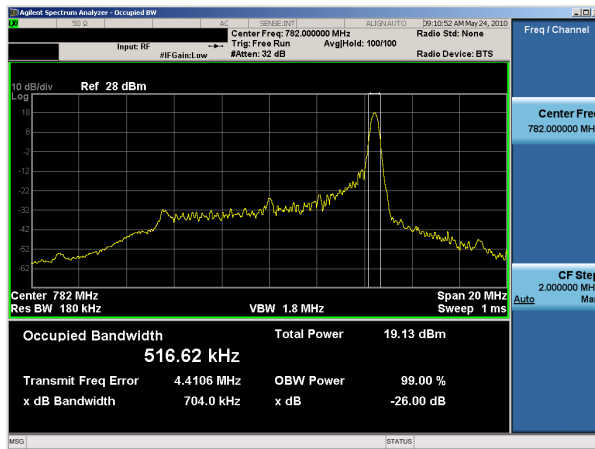
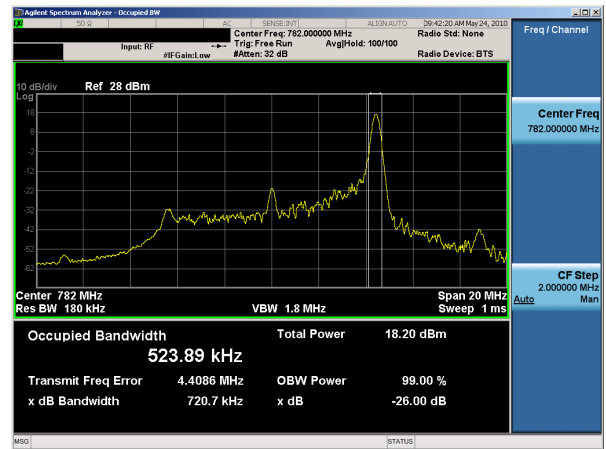


Figure 12-3  
RB 1, Offset 0, 16QAM Plot

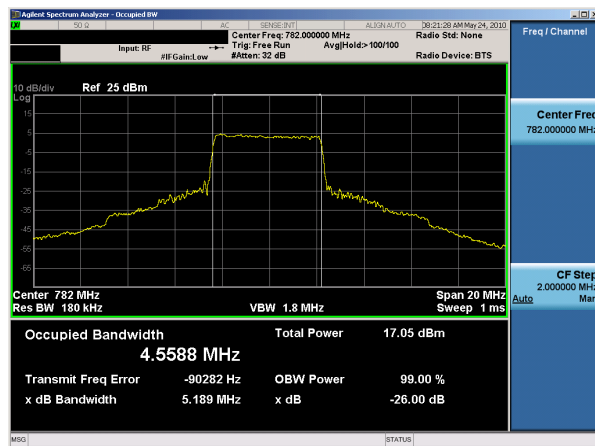
|                                  |                                        |                                                               |    |                                 |
|----------------------------------|----------------------------------------|---------------------------------------------------------------|----|---------------------------------|
| FCC ID: BEJVL600                 | PCTEST<br>Engineering Laboratory, Inc. | SAR COMPLIANCE REPORT                                         | LG | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10     | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |    | Page 18 of 37                   |



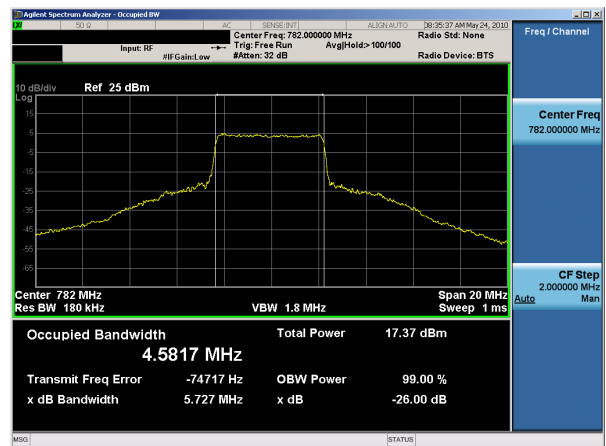
**Figure 12-4**  
**RB 1, Offset 49, QPSK Plot**



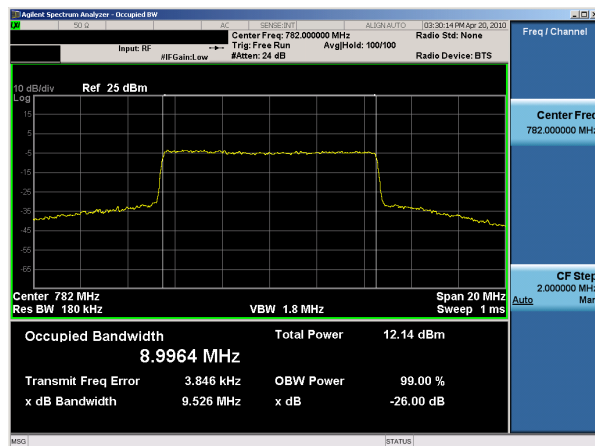
**Figure 12-5**  
**RB 1, Offset 49, 16QAM Plot**



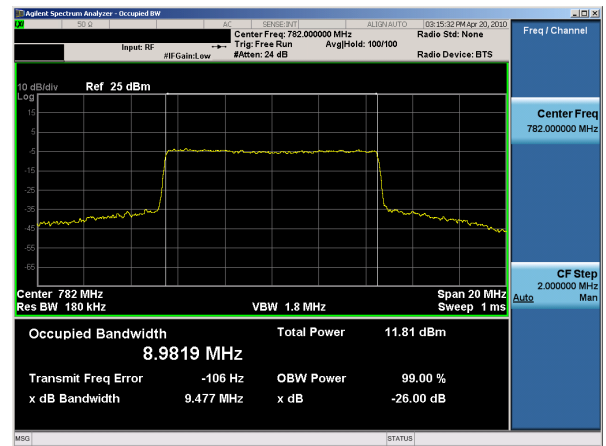
**Figure 12-6**  
**RB 25, Offset 12, QPSK Plot**



**Figure 12-7**  
**RB 25, Offset 12, 16QAM Plot**



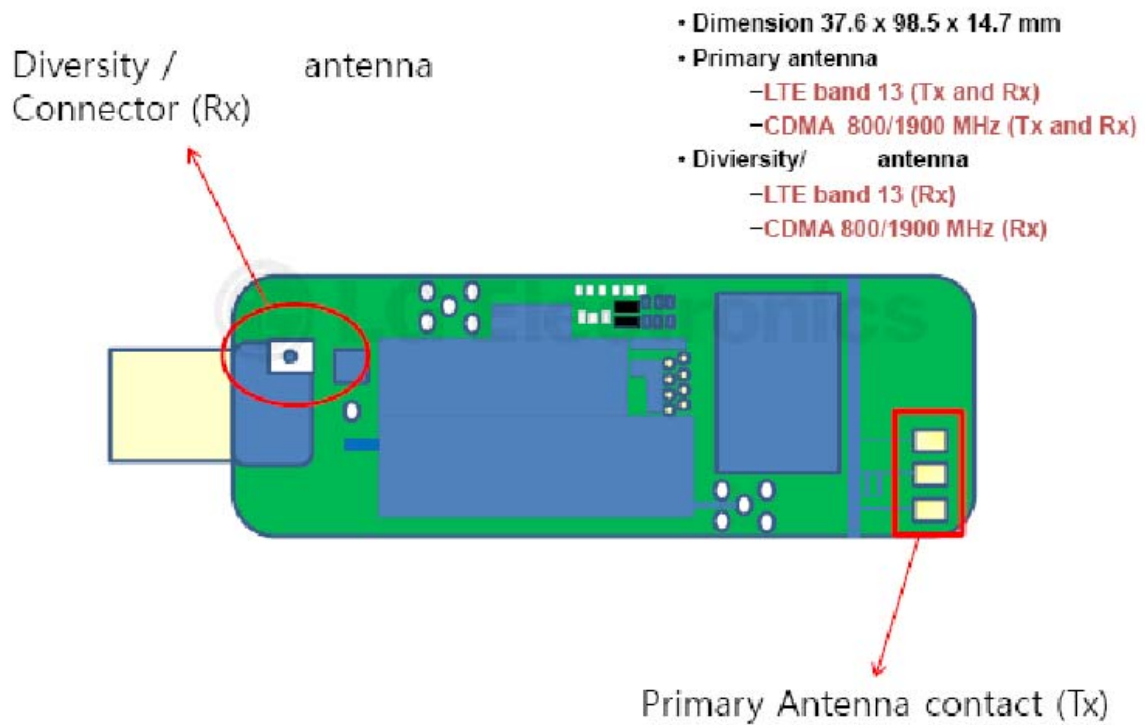
**Figure 12-8**  
**RB 50, Offset 0, QPSK Plot**



**Figure 12-9**  
**RB 50, Offset 0, 16QAM Plot**

|                                  |                                                                                     |                                                               |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  | SAR COMPLIANCE REPORT                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>OY1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                  | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 19 of 37                   |

## 12.5 BEJVL600 Antenna Location



## 12.6 BEJVL600 Simultaneous Transmission

CDMA radio cannot transmit simultaneously with the LTE radio. Thus, simultaneous transmission considerations are not required.

|                                  |                                                                                                                            |                                                               |                                                                                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  PCTEST<br>ENGINEERING LABORATORY, INC. | SAR COMPLIANCE REPORT                                         |  LG | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                                                         | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                          | Page 20 of 37                   |

## 13 4G SAR PROBE LINEARITY ANALYSIS

Probe linearity was analyzed after SAR test scans were completed. The EUT device was placed in the test configuration that resulted in the highest SAR value and the probe was moved to the location of maximum SAR. The EUT RF output power was set to a minimum value and incrementally increased up to the maximum output power. The resulting SAR vs. RF Output Power plot shows the probe linearity at maximum EUT output power.

Linearity for 700 MHz LTE at 10 MHz BW, QPSK

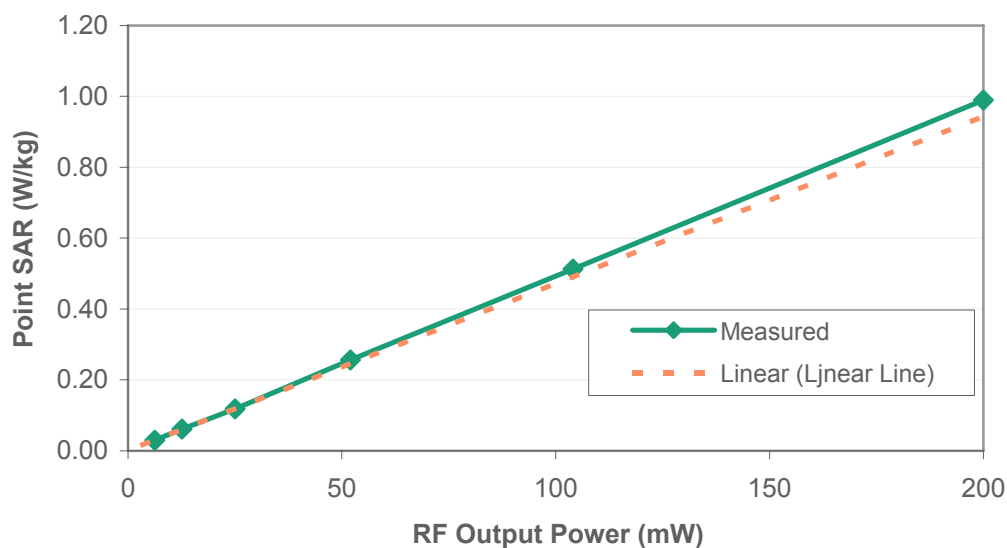


Figure 13-1  
QPSK Probe Linearity Plot

| SAR (W/kg) | Zone        | LTE    |        |        |        |        |        |
|------------|-------------|--------|--------|--------|--------|--------|--------|
|            | Modulation  | QPSK   |        |        |        |        |        |
|            | Power (mW)  | 6.3    | 12.6   | 25     | 52     | 104    | 200    |
| 10 MHz     | point SAR   | 0.0297 | 0.0610 | 0.1180 | 0.2560 | 0.5130 | 0.9900 |
|            | linear line | 0.0297 | 0.0594 | 0.1179 | 0.2451 | 0.4903 | 0.9429 |
|            | $\epsilon$  | 0.0%   | 2.6%   | 0.1%   | 4.2%   | 4.4%   | 4.8%   |

Table 13-1  
QPSK Linearity Tabulated Data for VL600

Linearity for 700 MHz LTE at 10 MHz BW, 16QAM

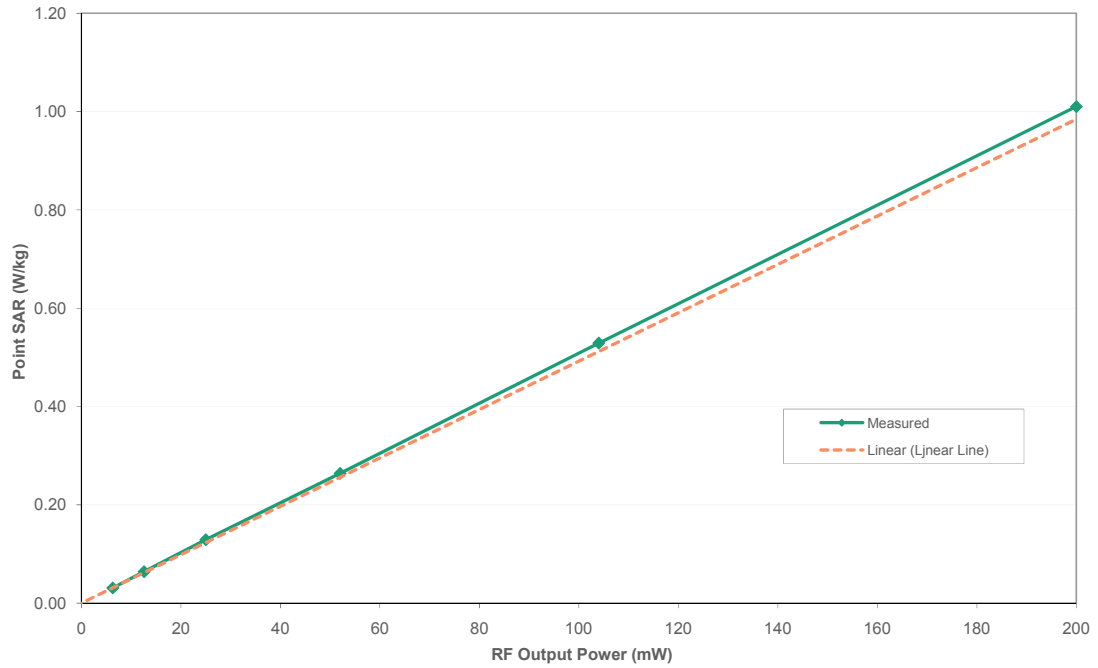


Figure 13-2  
16QAM Probe Linearity Plot

| SAR (W/kg) | Zone        | LTE    |        |        |        |        |        |
|------------|-------------|--------|--------|--------|--------|--------|--------|
|            | Modulation  | 16 QAM |        |        |        |        |        |
|            | Power (mW)  | 6.3    | 12.6   | 25     | 52     | 104    | 200    |
| 10 MHz     | point SAR   | 0.0310 | 0.0640 | 0.1290 | 0.2640 | 0.5290 | 1.0100 |
|            | linear line | 0.0310 | 0.0620 | 0.1230 | 0.2559 | 0.5117 | 0.9841 |
|            | $\epsilon$  | 0.0%   | 3.1%   | 4.6%   | 3.1%   | 3.3%   | 2.6%   |

Table 13-2  
16QAM Linearity Tabulated Data for VL600

|                                  |                                                                                     |                                                               |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  | SAR COMPLIANCE REPORT                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                  | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 22 of 37                   |

## 14 FCC 3G MEASUREMENT PROCEDURES

Power measurements were performed using a base station simulator under digital average power.

### 14.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If SAR deviations of more than 5% occurred, the tests were repeated.

### 14.2 SAR Measurement Conditions for EvDO Data Devices

Power measurements were performed using a base station simulator under digital average power.

### 14.3 SAR Measurement Conditions for CDMA2000

The following procedures were followed according to FCC "SAR Measurement Procedures for 3G Devices" v02, October 2007.

#### 14.3.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to procedures in section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rev. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A. For Rev. A, maximum output power for both Subtype 0/1 and Subtype 2 Physical Layer configurations was measured.

#### 14.3.2 Body SAR Measurements for EVDO Data devices

Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. SAR for Subtype 2 Physical layer configurations is not required for Rev. A when the maximum average output of each RF channels is less than that measured in Subtype 0/1 Physical layer configurations. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for the RF channels in Rev. 0.

The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations. Both FTAP and FETAP are configured with a Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. AT power control should be in "All Bits Up" conditions for TAP/ETAP.

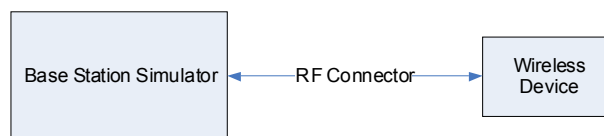
|                                  |                                                                                     |                                                               |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  | SAR COMPLIANCE REPORT                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                  | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 23 of 37                   |

## 14.4 RF Conducted Powers

### 14.4.1 CDMA Conducted Powers (Data Device)

|          |         | Data            |                 |                      |                      |
|----------|---------|-----------------|-----------------|----------------------|----------------------|
| Band     | Channel | TDSO SO32 [dBm] | TDSO SO32 [dBm] | 1x EvDO Rev. 0 [dBm] | 1x EvDO Rev. A [dBm] |
|          | F-RC    | FCH+SCH         | FCH             | (RTAP)               | (RETAP)              |
| Cellular | 1013    | 23.89           | 23.91           | 23.71                | 23.66                |
|          | 384     | 23.99           | 23.98           | 23.84                | 23.70                |
|          | 777     | 23.74           | 23.72           | 23.50                | 23.47                |
| PCS      | 25      | 23.70           | 23.73           | 23.50                | 23.42                |
|          | 600     | 23.45           | 23.44           | 23.30                | 23.22                |
|          | 1175    | 23.44           | 23.49           | 23.25                | 23.31                |

Note: RC1 is only applicable for IS-95 compatibility.



**Figure 14-1**  
**Power Measurement Setup**

|                                  |                                                                                     |                                                               |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  | SAR COMPLIANCE REPORT                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                  | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 24 of 37                   |

# 15 SAR DATA SUMMARY

**Table 15-1**  
**CDMA Body SAR Results**

| MEASUREMENT RESULTS                                                                               |      |            |         |              |       |                                                 |               |                         |          |
|---------------------------------------------------------------------------------------------------|------|------------|---------|--------------|-------|-------------------------------------------------|---------------|-------------------------|----------|
| FREQUENCY                                                                                         |      | Mode       | Service | C_Power[dBm] |       | Spacing                                         | Configuration | USB Side per KDB 447498 | SAR (1g) |
| MHz                                                                                               | Ch.  |            |         | Start        | End   |                                                 |               |                         | (W/kg)   |
| 836.52                                                                                            | 384  | Cell. CDMA | EVDO    | 23.84        | 23.75 | 0.5 cm                                          | Laptop        | Horizontal Up           | 0.637    |
| 836.52                                                                                            | 384  | Cell. CDMA | EVDO    | 23.84        | 23.90 | 0.5 cm                                          | USB Cable     | Horizontal Down         | 0.479    |
| 836.52                                                                                            | 384  | Cell. CDMA | EVDO    | 23.84        | 23.94 | 0.5 cm                                          | Laptop        | Vertical Front          | 0.486    |
| 836.52                                                                                            | 384  | Cell. CDMA | EVDO    | 23.84        | 23.84 | 0.5 cm                                          | Laptop        | Vertical Back           | 0.255    |
| 836.52                                                                                            | 384  | Cell. CDMA | EVDO    | 23.84        | 23.97 | 0.5 cm                                          | Laptop        | Tip                     | 0.145    |
| 1851.25                                                                                           | 25   | PCS CDMA   | EVDO    | 23.50        | 23.43 | 0.5 cm                                          | Laptop        | Horizontal Up           | 0.856    |
| 1880.00                                                                                           | 600  | PCS CDMA   | EVDO    | 23.30        | 23.27 | 0.5 cm                                          | Laptop        | Horizontal Up           | 0.857    |
| 1908.75                                                                                           | 1175 | PCS CDMA   | EVDO    | 23.25        | 23.30 | 0.5 cm                                          | Laptop        | Horizontal Up           | 0.945    |
| 1880.00                                                                                           | 600  | PCS CDMA   | EVDO    | 23.30        | 23.29 | 0.5 cm                                          | USB Cable     | Horizontal Down         | 0.409    |
| 1880.00                                                                                           | 600  | PCS CDMA   | EVDO    | 23.30        | 23.36 | 0.5 cm                                          | Laptop        | Vertical Front          | 0.783    |
| 1880.00                                                                                           | 600  | PCS CDMA   | EVDO    | 23.30        | 23.34 | 0.5 cm                                          | Laptop        | Vertical Back           | 0.667    |
| 1880.00                                                                                           | 600  | PCS CDMA   | EVDO    | 23.30        | 23.21 | 0.5 cm                                          | Laptop        | Tip                     | 0.402    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |      |            |         |              |       | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |               |                         |          |

**Notes:**

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
6. Body SAR was tested under EVDO Rev. 0 per FCC 3G Guidance (See Section 14.4.2)
7. Lenovo ThinkPad notebooks were used as hosts for testing the modem configurations
8. A spacing of 0.5 cm was used for all sides of the modem per FCC Publication KDB 447498.
9. Since, in this c2pc application, there were no changes to the mechanical operation of the EUT affecting its usable configurations, guidance from FCC Inquiry KDB 567894 was implemented for the Horizontal Down position with USB cable.

|                                         |                                                                                                                                   |                                                                      |                                                                                       |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: BEJVL600                        |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                         |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                                                                         | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 25 of 37                          |

**Table 15-2**  
**LTE Body SAR Results**

| MEASUREMENT RESULTS                                                                               |       |      |              |       |                                                 |         |           |            |               |                        |          |
|---------------------------------------------------------------------------------------------------|-------|------|--------------|-------|-------------------------------------------------|---------|-----------|------------|---------------|------------------------|----------|
| FREQUENCY                                                                                         |       | Mode | C_Power[dBm] |       | Spacing                                         | RB Size | RB Offset | Modulation | Configuration | USB Side per KDB447498 | SAR (1g) |
| MHz                                                                                               | Ch.   |      | Start        | End   |                                                 |         |           |            |               |                        | (W/kg)   |
| 782.00                                                                                            | 23230 | LTE  | 23.31        | 23.15 | 0.5 cm                                          | 25      | 13        | QPSK       | Laptop        | Horizontal Up          | 0.750    |
| 782.00                                                                                            | 23230 | LTE  | 25.51        | 25.55 | 0.5 cm                                          | 1       | 0         | QPSK       | Laptop        | Horizontal Up          | 0.741    |
| 782.00                                                                                            | 23230 | LTE  | 24.68        | 24.65 | 0.5 cm                                          | 1       | 49        | QPSK       | Laptop        | Horizontal Up          | 0.848    |
| 782.00                                                                                            | 23230 | LTE  | 23.34        | 23.32 | 0.5 cm                                          | 25      | 13        | 16QAM      | Laptop        | Horizontal Up          | 0.875    |
| 782.00                                                                                            | 23230 | LTE  | 25.43        | 25.43 | 0.5 cm                                          | 1       | 0         | 16QAM      | Laptop        | Horizontal Up          | 0.711    |
| 782.00                                                                                            | 23230 | LTE  | 24.58        | 24.53 | 0.5 cm                                          | 1       | 49        | 16QAM      | Laptop        | Horizontal Up          | 1.070    |
| 782.00                                                                                            | 23230 | LTE  | 23.31        | 23.24 | 0.5 cm                                          | 25      | 13        | QPSK       | USB Cable     | Horizontal Down        | 0.398    |
| 782.00                                                                                            | 23230 | LTE  | 25.51        | 25.55 | 0.5 cm                                          | 1       | 0         | QPSK       | USB Cable     | Horizontal Down        | 0.529    |
| 782.00                                                                                            | 23230 | LTE  | 24.68        | 24.78 | 0.5 cm                                          | 1       | 49        | QPSK       | USB Cable     | Horizontal Down        | 0.368    |
| 782.00                                                                                            | 23230 | LTE  | 23.34        | 23.37 | 0.5 cm                                          | 25      | 13        | 16QAM      | USB Cable     | Horizontal Down        | 0.428    |
| 782.00                                                                                            | 23230 | LTE  | 25.43        | 25.39 | 0.5 cm                                          | 1       | 0         | 16QAM      | USB Cable     | Horizontal Down        | 0.489    |
| 782.00                                                                                            | 23230 | LTE  | 24.58        | 24.46 | 0.5 cm                                          | 1       | 49        | 16QAM      | USB Cable     | Horizontal Down        | 0.367    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |       |      |              |       | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |         |           |            |               |                        |          |

**Notes:**

- The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
- All modes of operation were investigated, and worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plots.
- Liquid tissue depth was at least 15.0 cm.
- Lenovo ThinkPad notebooks were used as hosts for testing the modem configurations
- A spacing of 0.5 cm was used for all sides of the modem per FCC Publication KDB 447498.
- Since, in this c2pc application, there were no changes to the mechanical operation of the EUT affecting its usable configurations, guidance from FCC Inquiry KDB 567894 was implemented for the Horizontal Down position with USB cable
- LTE Considerations
  - KDB inquiry 178562 was used since the LTE conducted power, BW's, modulations, bands, UE category did not change from the original application
  - LTE test configurations are determined according to KDB 178562. 1RB, 50% RB and Full RB allocations were tested in both QPSK and 16 QAM for all configurations. There is only 10 MHz bandwidth available for this device in the LTE mode.
  - The dongle does not support VOIP.
  - There is only one channel available for LTE.
  - Tests were performed per FCC Interim SAR procedures for LTE dated 7/28/2010

|                                         |                                                                                                                                   |                                                                      |                                                                                                 |                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: BEJVL600                        |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                         |  <b>LG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                                                                         | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem | Page 26 of 37                                                                                   |                                        |

**Table 15-3**  
**LTE Body SAR Results (Continued)**

| MEASUREMENT RESULTS                                                                               |       |      |              |       |                                                 |         |           |            |               |                         |          |
|---------------------------------------------------------------------------------------------------|-------|------|--------------|-------|-------------------------------------------------|---------|-----------|------------|---------------|-------------------------|----------|
| FREQUENCY                                                                                         |       | Mode | C_Power[dBm] |       | Spacing                                         | RB Size | RB Offset | Modulation | Configuration | USB Side per KDB 447498 | SAR (1g) |
| MHz                                                                                               | Ch.   |      | Start        | End   |                                                 |         |           |            |               |                         | (W/kg)   |
| 782.00                                                                                            | 23230 | LTE  | 23.31        | 23.23 | 0.5 cm                                          | 25      | 13        | QPSK       | Laptop        | Vertical Front          | 0.995    |
| 782.00                                                                                            | 23230 | LTE  | 25.51        | 25.61 | 0.5 cm                                          | 1       | 0         | QPSK       | Laptop        | Vertical Front          | 1.040    |
| 782.00                                                                                            | 23230 | LTE  | 24.68        | 24.80 | 0.5 cm                                          | 1       | 49        | QPSK       | Laptop        | Vertical Front          | 0.964    |
| 782.00                                                                                            | 23230 | LTE  | 23.34        | 23.36 | 0.5 cm                                          | 25      | 13        | 16QAM      | Laptop        | Vertical Front          | 1.020    |
| 782.00                                                                                            | 23230 | LTE  | 25.43        | 25.34 | 0.5 cm                                          | 1       | 0         | 16QAM      | Laptop        | Vertical Front          | 1.120    |
| 782.00                                                                                            | 23230 | LTE  | 24.58        | 24.68 | 0.5 cm                                          | 1       | 49        | 16QAM      | Laptop        | Vertical Front          | 1.020    |
| 782.00                                                                                            | 23230 | LTE  | 23.31        | 23.25 | 0.5 cm                                          | 25      | 13        | QPSK       | Laptop        | Vertical Back           | 0.394    |
| 782.00                                                                                            | 23230 | LTE  | 25.51        | 25.46 | 0.5 cm                                          | 1       | 0         | QPSK       | Laptop        | Vertical Back           | 0.455    |
| 782.00                                                                                            | 23230 | LTE  | 24.68        | 24.59 | 0.5 cm                                          | 1       | 49        | QPSK       | Laptop        | Vertical Back           | 0.450    |
| 782.00                                                                                            | 23230 | LTE  | 23.34        | 23.32 | 0.5 cm                                          | 25      | 13        | 16QAM      | Laptop        | Vertical Back           | 0.374    |
| 782.00                                                                                            | 23230 | LTE  | 25.43        | 25.43 | 0.5 cm                                          | 1       | 0         | 16QAM      | Laptop        | Vertical Back           | 0.448    |
| 782.00                                                                                            | 23230 | LTE  | 24.58        | 24.61 | 0.5 cm                                          | 1       | 49        | 16QAM      | Laptop        | Vertical Back           | 0.479    |
| 782.00                                                                                            | 23230 | LTE  | 23.31        | 23.40 | 0.5 cm                                          | 25      | 13        | QPSK       | Laptop        | Tip                     | 0.068    |
| 782.00                                                                                            | 23230 | LTE  | 25.51        | 25.59 | 0.5 cm                                          | 1       | 0         | QPSK       | Laptop        | Tip                     | 0.067    |
| 782.00                                                                                            | 23230 | LTE  | 24.68        | 24.87 | 0.5 cm                                          | 1       | 49        | QPSK       | Laptop        | Tip                     | 0.078    |
| 782.00                                                                                            | 23230 | LTE  | 23.34        | 23.48 | 0.5 cm                                          | 25      | 13        | 16QAM      | Laptop        | Tip                     | 0.066    |
| 782.00                                                                                            | 23230 | LTE  | 25.43        | 25.52 | 0.5 cm                                          | 1       | 0         | 16QAM      | Laptop        | Tip                     | 0.072    |
| 782.00                                                                                            | 23230 | LTE  | 24.58        | 24.61 | 0.5 cm                                          | 1       | 49        | 16QAM      | Laptop        | Tip                     | 0.073    |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population |       |      |              |       | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |         |           |            |               |                         |          |

Notes:

- The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
- All modes of operation were investigated, and worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plots.
- Liquid tissue depth was at least 15.0 cm.
- Lenovo ThinkPad notebooks were used as hosts for testing the modem configurations
- A spacing of 0.5 cm was used for all sides of the modem per FCC Publication KDB 447498.
- Since, in this c2pc application, there were no changes to the mechanical operation of the EUT affecting its usable configurations, guidance from FCC Inquiry KDB 567894 was implemented for the Horizontal Down position with USB cable
- LTE Considerations
  - KDB inquiry 178562 was used since the LTE conducted power, BW's, modulations, bands, UE category did not change from the original application
  - LTE test configurations are determined according to FCC Inquiry KDB 178562. 1RB, 50% RB and Full RB allocations were tested in both QPSK and 16 QAM for all configurations. There is only 10 MHz bandwidth available for this device in the LTE mode.
  - The dongle does not support VOIP.
  - There is only one channel available for LTE.
  - Tests were performed per FCC Interim SAR procedures for LTE dated 7/28/2010

|                                  |                                                                                                                                   |                                                               |                                                                                                 |                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: BEJVL600                 |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                  |  <b>LG</b> | Reviewed by:<br>Quality Manager |
| Filename:<br>0Y1009161579-R2.BEJ | Test Dates:<br>09/20/10 – 09/27/10                                                                                                | EUT Type:<br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                                 | Page 27 of 37                   |

# 16 EQUIPMENT LIST

| Manufacturer    | Model       | Description                       | Cal Date   | Cal Interval | Cal Due    | Serial Number |
|-----------------|-------------|-----------------------------------|------------|--------------|------------|---------------|
| Agilent         | 85070B      | Dielectric Probe Kit              | 8/22/2010  | Annual       | 8/22/2011  | US33020316    |
| Agilent         | 8648D       | (9kHz-4GHz) Signal Generator      | 9/19/2009  | Biennial     | 9/19/2011  | 3613A00315    |
| Agilent         | 8753E       | (30kHz-6GHz) Network Analyzer     | 3/31/2010  | Annual       | 3/31/2011  | JP38020182    |
| Agilent         | E8257D      | (250kHz-20GHz) Signal Generator   | 3/30/2010  | Annual       | 3/30/2011  | MY45470194    |
| Index SAR       | IXTL-010    | Dielectric Measurement Kit        | N/A        |              | N/A        | N/A           |
| Index SAR       | IXTL-030    | 30MM TEM line for 6 GHz           | N/A        |              | N/A        | N/A           |
| Rohde & Schwarz | CMU200      | Base Station Simulator            | 11/11/2009 | Annual       | 11/11/2010 | 836371/0079   |
| Rohde & Schwarz | CMU200      | Base Station Simulator            | 6/21/2010  | Annual       | 6/21/2011  | 833855/0010   |
| Rohde & Schwarz | CMU200      | Base Station Simulator            | 11/4/2009  | Annual       | 11/4/2010  | 109892        |
| Rohde & Schwarz | NRV-Z32     | Peak Power Sensor (100uW-2W)      | 12/5/2008  | Biennial     | 12/5/2010  | 100155        |
| Rohde & Schwarz | NRV-Z33     | Peak Power Sensor (1mW-20W)       | 12/5/2008  | Biennial     | 12/5/2010  | 100004        |
| SPEAG           | D1450V2     | 1450 MHz SAR Dipole               | 5/20/2009  | Biennial     | 5/20/2011  | 1025          |
| SPEAG           | D1765V2     | 1765 MHz SAR Dipole               | 5/19/2009  | Biennial     | 5/19/2011  | 1008          |
| SPEAG           | D1900V2     | 1900 MHz SAR Dipole               | 1/20/2009  | Biennial     | 1/20/2011  | 502           |
| SPEAG           | D1900V2     | 1900 MHz SAR Dipole               | 8/18/2009  | Biennial     | 8/18/2011  | 5d080         |
| SPEAG           | D2450V2     | 2450 MHz SAR Dipole               | 8/27/2009  | Biennial     | 8/27/2011  | 719           |
| SPEAG           | D2450V2     | 2450 MHz SAR Dipole               | 1/8/2009   | Biennial     | 1/8/2011   | 797           |
| SPEAG           | D2600V2     | 2600 MHz SAR Dipole               | 8/12/2009  | Biennial     | 8/12/2011  | 1004          |
| SPEAG           | D5GHzV2     | 5 GHz SAR Dipole                  | 8/19/2009  | Biennial     | 8/19/2011  | 1007          |
| SPEAG           | D5GHzV2     | 5 GHz SAR Dipole                  | 1/15/2009  | Biennial     | 1/15/2011  | 1057          |
| SPEAG           | D835V2      | 835 MHz SAR Dipole                | 1/19/2009  | Biennial     | 1/19/2011  | 4d047         |
| SPEAG           | D835V2      | 835 MHz SAR Dipole                | 8/24/2009  | Biennial     | 8/24/2011  | 4d026         |
| SPEAG           | DAE4        | Dasy Data Acquisition Electronics | 3/22/2010  | Annual       | 3/22/2011  | 704           |
| SPEAG           | DAE4        | Dasy Data Acquisition Electronics | 4/21/2010  | Annual       | 4/21/2011  | 665           |
| SPEAG           | DAE4        | Dasy Data Acquisition Electronics | 1/22/2010  | Annual       | 1/22/2011  | 649           |
| SPEAG           | ES3DV2      | SAR Probe                         | 9/21/2010  | Annual       | 9/21/2011  | 3022          |
| SPEAG           | EX3DV4      | SAR Probe                         | 8/19/2010  | Annual       | 8/19/2011  | 3561          |
| SPEAG           | EX3DV4      | SAR Probe                         | 1/26/2010  | Annual       | 1/26/2011  | 3550          |
| SPEAG           | DAE4        | Dasy Data Acquisition Electronics | 7/8/2010   | Annual       | 7/8/2011   | 859           |
| SPEAG           | D750V3      | 750 MHz Dipole                    | 8/19/2010  | Biennial     | 8/19/2012  | 1003          |
| SPEAG           | ES3DV3      | SAR Probe                         | 3/16/2010  | Annual       | 3/16/2011  | 3213          |
| SPEAG           | ES3DV3      | SAR Probe                         | 4/20/2010  | Annual       | 4/20/2011  | 3209          |
| Rohde & Schwarz | SMIQ03B     | Signal Generator                  | 4/1/2010   | Annual       | 4/1/2011   | DE27259       |
| SPEAG           | D1640V2     | 1640 MHz Dipole                   | 8/17/2010  | Biennial     | 8/17/2012  | 321           |
| Rohde & Schwarz | CMW500      | LTE Radio Communication Tester    | 8/30/2010  | Annual       | 8/30/2011  | 100976        |
| Anritsu         | MA2481A     | Power Sensor                      | 12/2/2009  | Annual       | 12/2/2010  | 5318          |
| Anritsu         | MA2481A     | Power Sensor                      | 12/3/2009  | Annual       | 12/3/2010  | 5442          |
| Anritsu         | ML2438A     | Power Meter                       | 12/3/2009  | Annual       | 12/3/2010  | 1190013       |
| Anritsu         | ML2438A     | Power Meter                       | 12/3/2009  | Annual       | 12/3/2010  | 98150041      |
| Agilent         | 8648D       | Signal Generator                  | 4/1/2010   | Annual       | 4/1/2011   | 3629U00687    |
| Anritsu         | ML2438A     | Power Meter                       | 12/3/2009  | Annual       | 12/3/2010  | 1070030       |
| Anritsu         | MA2481A     | Power Sensor                      | 12/2/2009  | Annual       | 12/2/2010  | 5821          |
| Anritsu         | MA2481A     | Power Sensor                      | 12/3/2009  | Annual       | 12/3/2010  | 8013          |
| Anritsu         | MA2481A     | Power Sensor                      | 12/3/2009  | Annual       | 12/3/2010  | 2400          |
| Apriel          | ALS-PR-DIEL | Dielectric Probe Kit              | N/A        |              | N/A        | 260-00959     |
| Agilent         | E5515C      | Wireless Communications Tester    | 4/14/2010  | Annual       | 4/14/2011  | US41140256    |
| SPEAG           | ES3DV3      | SAR Probe                         | 2/10/2010  | Annual       | 2/10/2011  | 3173          |

Justification for 2-year calibration cycle for SAR dipoles is found in Section 11.3.

|                                         |                                                                                                                                   |                                                                      |                                                                                                 |                                        |
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| FCC ID: BEJVL600                        |  <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | <b>SAR COMPLIANCE REPORT</b>                                         |  <b>LG</b> | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>OY1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                                                                         | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                                 | Page 28 of 37                          |

## 17 CONCLUSION

### 17.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

|                                         |                                                                                     |                                                                      |                                                                                       |                                        |
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| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                           | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 29 of 37                          |

## 18 REFERENCES

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.
- [2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, 2006.
- [3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, Sept. 1992.
- [4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.
- [5] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.
- [6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.
- [7] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.
- [8] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.
- [9] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.
- [10] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.
- [11] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [12] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.
- [13] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [14] G. Hartsgrrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.
- [15] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

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|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> BEJVL600                 |  | <b>SAR COMPLIANCE REPORT</b>                                         |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Filename:</b><br>0Y1009161579-R2.BEJ | <b>Test Dates:</b><br>09/20/10 – 09/27/10                                           | <b>EUT Type:</b><br>Cellular/PCS CDMA/EVDO and LTE 700 MHz USB Modem |                                                                                       | Page 30 of 37                          |

- [16] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.
- [17] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.
- [18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.
- [19] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.
- [20] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.
- [21] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hochschule Zürich, Dosimetric Evaluation of the Cellular Phone.
- [22] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.
- [23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.
- [24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009
- [25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002
- [26] FCC SAR Measurement Procedures for 3G Devices KDB 941225
- [27] SAR Measurement procedures for IEEE 802.11a/b/g KDB 248227
- [28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB 648474
- [29] FCC Application Note for SAR Probe Calibration and System Verification Consideration for Measurements at 150 MHz – 3 GHz, KDB 450824
- [30] FCC SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens, KDB 616217
- [31] FCC SAR Measurement Requirements for 3 – 6 GHz, KDB 865664
- [32] FCC Mobile Portable RF Exposure Procedure, KDB 447498
- [33] FCC SAR Procedures for Dongle Transmitters, KDB 447498
- [34] Anexo à Resolução No. 533, de 10 de Setembro de 2009.

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|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>FCC ID:</b> BEJVL600                 |  | <b>SAR COMPLIANCE REPORT</b>                                         |  | <b>Reviewed by:</b><br>Quality Manager |
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