



motorola  
a Google company

## Portable Cellular Phone SAR Test Report

**Tests Requested By:** Motorola Mobility, LLC  
600 N. US Highway 45  
Libertyville, IL 60048

**Test Report #:** 25510-1F  
**Date of Report:** August 16, 2013  
**Date of Test:** July 26 – August 13, 2013  
**FCC ID #:** IHDT56PF3  
**IC ID #:** N/A  
**Generic Name:** N/A

**Test Laboratory:** Motorola Mobility, LLC - ADR Test Service Laboratory  
600 N. US Highway 45  
Libertyville, IL 60048

**Report Author:** Steve Hauswirth  
Distinguished Member of the Technical Staff

This laboratory is accredited to ISO/IEC 17025-2005 to perform the following tests:

**Accreditation:**



Tests:  
Electromagnetic Specific Absorption Rate

Procedures:  
IEC 62209-1  
RSS-102  
IEEE 1528 - 2003  
FCC OET Bulletin 65 (*including Supplement C*)  
Australian Communications Authority Radio  
Communications (Electromagnetic Radiation –  
Human Exposure) Standard 2003  
CENELEC EN 50360  
ARIB Std. T-56 (2002)

**Statement of  
Compliance:**

On the following products or types of products:

Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular, Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

Motorola declares under its sole responsibility that the portable cellular telephone model to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines (FCC 47 CFR §2.1093) as well as with CENELEC en50360:2001 and ANSI / IEEE C95.1. It also declares that the product was tested in accordance with IEEE 1528 / CENELEC EN62209-1 (2006), along with other published guidance indicated in the references at the end of this report, as well as other appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

©Motorola Mobility, LLC 2013

This test report shall not be reproduced except in full, without written approval of the laboratory. The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report. Motorola encourages all feedback, both positive and negative, on this test report.

## Table of Contents

|       |                                                                                    |    |
|-------|------------------------------------------------------------------------------------|----|
| 1     | Introduction.....                                                                  | 3  |
| 2     | Details of the Device Under Test.....                                              | 4  |
| 2.1   | Sample Information.....                                                            | 4  |
| 2.2   | Antenna Description.....                                                           | 4  |
| 2.3   | Transmission Band Summary .....                                                    | 4  |
| 2.4   | Device Test Setup, Operating Configurations, and Conducted Power Measurements..... | 5  |
| 2.4.1 | CDMA .....                                                                         | 5  |
| 2.4.2 | Wi-Fi 802.11.....                                                                  | 6  |
| 2.4.3 | Bluetooth .....                                                                    | 7  |
| 2.5   | Transmitter power reduction conditions and modes .....                             | 8  |
| 2.6   | Accessories for the Device Under Test .....                                        | 8  |
| 2.6.1 | Batteries .....                                                                    | 8  |
| 2.6.2 | Body-Worn Carry Accessories .....                                                  | 8  |
| 3     | Test Equipment Used.....                                                           | 9  |
| 3.1   | Dosimetric Measurement System.....                                                 | 9  |
| 3.2   | Test System Validations.....                                                       | 10 |
| 3.3   | Test System Verifications (System Performance Checks).....                         | 11 |
| 3.4   | Simulated Tissue Dielectric Properties .....                                       | 12 |
| 4     | Test Setup Information, SAR Measurement Results, and Analysis.....                 | 14 |
| 4.1   | Overview of Test Setup and Results .....                                           | 14 |
| 4.2   | Head-Adjacent Exposure Results.....                                                | 15 |
| 4.3   | Body-Worn Accessory Exposure Results .....                                         | 16 |
| 4.4   | Mobile Hotspot Exposure Results .....                                              | 17 |
| 4.5   | Measurement Variability Analysis.....                                              | 18 |
| 4.6   | Description and Evaluation of Simultaneous Transmitters .....                      | 19 |
| 5     | References to Test Standards and Guidance .....                                    | 22 |

Appendix 1: SAR Distribution Plots for Test System Verification

Appendix 2: SAR Distribution Plots for Head-Adjacent Test Results

Appendix 3: SAR Distribution Plots for Body-Worn Accessory Test Results

Appendix 4: SAR Distribution Plots for Mobile Hotspot Test Results

Appendix 5: Measurement Uncertainty Budget

Appendix 6: Probe Calibration Certificates

Appendix 7: Dipole Characterization Certificates

## Revision History

| Revision Version | Date        | Notes                  |
|------------------|-------------|------------------------|
| Rev. 0           | Aug-16-2013 | Initial report release |
| Rev. A           | Aug-27-2013 | Updated references     |

## 1 Introduction

The Motorola Mobility ADR Test Services Laboratory has performed measurements of the maximum potential exposure to the user of the portable cellular phone covered by this test report. The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was tested in accordance with [1], [5], [9], and per FCC KDB 941225 D06 for mobile hotspot operation. The SAR values measured for the portable cellular phone are below the maximum recommended levels of 1.6 W/kg in a 1 g average set in [3] and 2.0 W/kg in a 10 g average set in [2].

For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are given in the table below. These measurements were performed using a DASY52™ system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

| Transmit Band   | Head<br>SAR (1 g <sup>W</sup> /kg) | Body-Worn Accessory<br>SAR (1 g <sup>W</sup> /kg) | Mobile Hotspot<br>SAR (1 g <sup>W</sup> /kg) |
|-----------------|------------------------------------|---------------------------------------------------|----------------------------------------------|
| CDMA 800 (BC0)  | 0.52                               | 1.01                                              | 0.44                                         |
| CDMA 820 (BC10) | 0.23                               | 0.54                                              | 0.39                                         |
| CDMA 1900 (BC1) | 0.79                               | 1.24                                              | 0.79                                         |
| Wi-Fi 2.45 GHz  | 0.36                               | 0.24                                              | 0.46                                         |
| Bluetooth       | N/A                                |                                                   |                                              |

## 2 Details of the Device Under Test

### 2.1 Sample Information

|                                                                       |                                                                                                                 |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Serial Number(s)<br/>(Functional Use)</b>                          | LDXZ230042 All CDMA 800 and CDMA 1900 testing<br>LDXZ230059 All CDMA 820 testing<br>LDXU220303 All WLAN testing |
| <b>Production Unit or<br/>Identical Prototype<br/>(47 CFR §2.908)</b> | Identical Prototype                                                                                             |
| <b>Device Category</b>                                                | Portable (Mobile Station Class B)                                                                               |
| <b>RF Exposure<br/>Limits</b>                                         | General Population / Uncontrolled                                                                               |

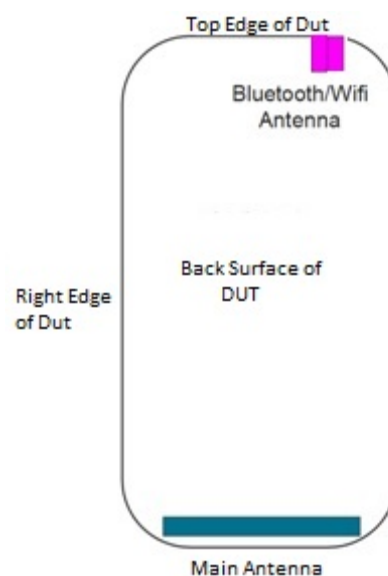
### 2.2 Antenna Description

Main (850/1900 MHz) Antenna

|                   |                       |         |
|-------------------|-----------------------|---------|
| <b>Type</b>       | Internal              |         |
| <b>Location</b>   | Bottom of Transceiver |         |
| <b>Dimensions</b> | Width                 | 5.6 mm  |
|                   | Length                | 55.0 mm |

Bluetooth/Wi-Fi 2.45 GHz Antenna

|                   |                               |          |
|-------------------|-------------------------------|----------|
| <b>Type</b>       | Internal                      |          |
| <b>Location</b>   | Left-Side Rear of Transceiver |          |
| <b>Dimensions</b> | Width                         | 9.00 mm  |
|                   | Length                        | 10.00 mm |



### 2.3 Transmission Band Summary

| Mode(s) of Operation | Modulation Mode(s) | Target Output Power Setting | Tune-Up Tolerance | Duty Cycle | Transmitting Frequency Range(s) |
|----------------------|--------------------|-----------------------------|-------------------|------------|---------------------------------|
| CDMA 800 BC0         | QPSK               | 24.0 dBm                    | 25.0 dBm          | 1:1        | 824.70 - 848.31 MHz             |
| CDMA 820 BC10        | QPSK               | 24.0 dBm                    | 25.0 dBm          | 1:1        | 817.90 - 823.10 MHz             |
| CDMA 1900 BC1        | QPSK               | 24.0 dBm                    | 25.0 dBm          | 1:1        | 1851.20 - 1908.75 MHz           |
| Wi-Fi 802.11b/g/n    | BPSK               | 18.1 dBm                    |                   | 1:1        | 2412.0 - 2462.0 MHz             |
| Bluetooth            | GFSK               | 12.1 dBm                    |                   | 1:1        | 2402.0 - 2480.0 MHz             |

## 2.4 Device Test Setup, Operating Configurations, and Conducted Power Measurements

### 2.4.1 CDMA

#### Technical Description

The phone under test contains CDMA2000 1x and CDMA2000 1xEV-DO (Rel. A) transmitters that support both voice (circuit-switched) and data (packet-switched) capabilities.

#### Exposure Conditions and Test Exclusions

| Mode                | Type  | Head-Adjacent | Body-Worn Accessory |
|---------------------|-------|---------------|---------------------|
| RC3 SO55 Loopback   | Voice | Tested (1)    | Excluded (2)        |
| RC1 SO55 Loopback   | Voice | Excluded (2)  | Excluded (2)        |
| TDSO SO32 FCH       | Data  | Excluded (2)  | Excluded (2)        |
| TDSO SO32 FCH+SCH   | Data  | Excluded (2)  | Excluded (2)        |
| EVDO Rel. 0 (RTAP)  | Data  | Excluded (2)  | Excluded (2)        |
| EVDO Rel. A (RETAP) | Data  | Tested (3)    | Tested (1)          |

#### Notes:

- (1) RC3 SO55 is tested as the default mode for Head SAR measurements, EVDO Rel. A (RETAP) is tested as the default mode for Body SAR measurements, and EVDO Rel. A (RETAP) is tested as the default mode in the Mobile Hotspot SAR exposure condition as a EVDO Data Device.
- (2) Per FCC KDB 941225 D01, the noted modes were excluded from testing as each exhibited measured output power not higher than that found in the default modes for each exposure condition.
- (3) EVDO Rel. A (RETAP), as a data-only mode, was tested against the Head to support evaluation for 3<sup>rd</sup> Party VOIP applications potentially installed and used by the end-user.

#### Device Test Setup

For CDMA modes, the test sample was operated using transmission to a base station simulator. The base station simulator was set up for the proper channel and transmit mode of operation on the phone's uplink. The transmitter power level and power control were set to "All Up Bits" for RC3 operation, and "Alternating Bits" for TDSO SO32 operation.

#### Conducted Power Measurements

Power measurements were executed per FCC KDB 941225 D01:

| Measured Conducted Power (dBm) for CDMA modes |         |          |          |               |                   |             |                 |
|-----------------------------------------------|---------|----------|----------|---------------|-------------------|-------------|-----------------|
|                                               |         | Loopback |          | Data          |                   | EVDO Rel. 0 | EVDO Rel. A     |
| Band                                          | Channel | RC3 SO55 | RC1 SO55 | TDSO SO32 FCH | TDSO SO32 FCH+SCH | RTAP 153.6k | Subtype 2 RETAP |
| CDMA 800 BC0                                  | 1013    | 24.13    | 24.15    | 24.14         | 24.12             | 24.13       | 24.11           |
|                                               | 384     | 24.14    | 24.16    | 24.17         | 24.16             | 24.16       | 24.16           |
|                                               | 777     | 24.09    | 24.12    | 24.12         | 24.12             | 24.11       | 24.10           |
| CDMA 820 BC10                                 | 564     | 24.15    | 23.99    | 23.99         | 24.02             | 23.94       | 23.92           |
| CDMA 1900 BC1                                 | 25      | 24.12    | 24.13    | 24.13         | 24.14             | 24.15       | 24.09           |
|                                               | 600     | 24.16    | 24.17    | 24.17         | 24.16             | 24.18       | 24.10           |
|                                               | 1175    | 24.01    | 24.00    | 23.99         | 23.97             | 23.98       | 23.92           |

## 2.4.2 Wi-Fi 802.11

### Technical Description

The phone under test contains a Wi-Fi 802.11b/g/n transmitter capable of data transmission in the 2.45 GHz ISM band.

### Exposure Conditions and Test Exclusions

| Mode              | Type | Head-Adjacent | Body-Worn Accessory | Mobile Hotspot |
|-------------------|------|---------------|---------------------|----------------|
| 802.11b           | Data | Tested (1)    | Tested (1)          | Tested (1)     |
| 802.11g / 802.11n | Data | Excluded (1)  | Excluded (1)        | Excluded (1)   |

#### Notes:

- (1) Per FCC KDB 248227 D01 and the April 2010 FCC/TCB Meeting Notes, the highest average output power channel for the lowest data rate for 802.11b was selected for SAR evaluation. Other 802.11 modes (including 802.11g and 802.11n) were not investigated because the average output powers over all channels and data rates were not more than ¼ dB higher than the tested channel in the lowest data rate of the 802.11b mode. The **bolded** data rate and channel in the following conducted power tables was used for SAR testing.

### Device Test Setup

For Wi-Fi 802.11 modes, the test sample was operated using manufacturer test mode software per guidance provided in FCC KDB 248227. The test software was set up for the proper channel, transmitter power level and transmit modes of operation on the phone's uplink.

### Conducted Power Measurements

| Band     | Channel | Average Conducted Power (dBm) for 802.11b Mode Data Rates |        |          |         |
|----------|---------|-----------------------------------------------------------|--------|----------|---------|
|          |         | 1 Mbps                                                    | 2 Mbps | 5.5 Mbps | 11 Mbps |
| 2450 MHz | 1       | <b>18.17</b>                                              | 18.20  | 18.23    | 18.21   |
|          | 6       | 18.05                                                     | 18.04  | 18.03    | 18.03   |
|          | 11      | 17.87                                                     | 17.89  | 17.86    | 17.86   |

| Band     | Channel | Average Conducted Power (dBm) for 802.11g Mode Data Rates |        |         |         |         |         |         |         |
|----------|---------|-----------------------------------------------------------|--------|---------|---------|---------|---------|---------|---------|
|          |         | 6 Mbps                                                    | 9 Mbps | 12 Mbps | 18 Mbps | 24 Mbps | 36 Mbps | 48 Mbps | 54 Mbps |
| 2450 MHz | 1       | 16.34                                                     | 16.34  | 16.34   | 16.34   | 15.38   | 15.35   | 15.37   | 14.39   |
|          | 6       | 16.21                                                     | 16.22  | 16.24   | 16.25   | 15.23   | 15.18   | 15.20   | 14.22   |
|          | 11      | 16.01                                                     | 16.07  | 16.03   | 16.04   | 14.93   | 14.92   | 14.89   | 13.82   |

| Band     | Channel | Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval) |         |           |         |         |         |           |         |
|----------|---------|---------------------------------------------------------------------------------------------------|---------|-----------|---------|---------|---------|-----------|---------|
|          |         | 6.5 Mbps                                                                                          | 13 Mbps | 19.5 Mbps | 26 Mbps | 39 Mbps | 52 Mbps | 58.5 Mbps | 65 Mbps |
| 2450 MHz | 1       | 16.33                                                                                             | 16.36   | 16.34     | 15.36   | 15.36   | 14.39   | 13.37     | 12.43   |
|          | 6       | 16.22                                                                                             | 16.24   | 16.22     | 15.29   | 15.27   | 14.26   | 13.30     | 12.25   |
|          | 11      | 16.07                                                                                             | 16.09   | 16.09     | 15.01   | 14.98   | 13.87   | 12.87     | 11.81   |

| Band     | Channel | Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 400 ns Guard Interval) |           |           |           |           |           |         |           |
|----------|---------|---------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|---------|-----------|
|          |         | 7.2 Mbps                                                                                          | 14.4 Mbps | 21.6 Mbps | 28.8 Mbps | 43.3 Mbps | 57.7 Mbps | 65 Mbps | 72.2 Mbps |
| 2450 MHz | 1       | 16.33                                                                                             | 16.35     | 16.38     | 15.41     | 15.41     | 14.40     | 13.43   | 12.42     |
|          | 6       | 16.37                                                                                             | 16.22     | 16.26     | 15.23     | 15.26     | 14.27     | 13.31   | 12.27     |
|          | 11      | 16.03                                                                                             | 16.03     | 16.04     | 14.96     | 14.94     | 13.88     | 12.93   | 11.82     |

## 2.4.3 Bluetooth

### Technical Description

The phone under test contains a Bluetooth transmitter capable of data transmission in the 2.45 GHz ISM band.

### Exposure Conditions and Test Exclusions

| Mode      | Type | Head-Adjacent | Body-Worn Accessory | Mobile Hotspot  |
|-----------|------|---------------|---------------------|-----------------|
| All Modes | Data | Excluded (2)  | Excluded (1)(2)     | Excluded (1)(2) |

#### Notes:

- (1) Per FCC KDB 447498 D01, standalone SAR measurements of the Bluetooth transmitter in this phone were not required based on the maximum conducted power and the Bluetooth antenna-to-user separation distance. As detailed by the KDB publication, the SAR exclusion threshold for distances < 50 mm is defined by the following equation:

$$\frac{[maximum\ power\ of\ channel,\ including\ tune - up\ tolerance]_{(mW)}}{[minimum\ test\ separation\ distance]_{(mm)}} \times \sqrt{f_{(GHz)}} \leq 3.0$$

Based on the maximum conducted power of Bluetooth and the most conservative antenna-to-user separation distance used in testing, standalone SAR measurements for Bluetooth were not required.

$$\frac{[12.1]_{(mW)}}{[10]_{(mm)}} \times \sqrt{2.44_{(GHz)}} = 1.9 \leq 3.0$$

Note that simultaneous SAR evaluations include estimations for Bluetooth SAR, as detailed in section 4.6 below.

- (2) Per IC RSS-102 section 2.5.1, routine SAR evaluation of the Bluetooth transmitter in this phone was not required as the maximum conducted power of this transmitter is below 20 mW for a device operating between 2.2 GHz and 3 GHz.

### Conducted Power Measurements

| Frequency [MHz] | Data Rate [Mbps] | Channel Number | Conducted Power [mW] |
|-----------------|------------------|----------------|----------------------|
| 2402            | 1.0              | 0              | 11.566               |
| 2441            | 1.0              | 39             | 10.782               |
| 2480            | 1.0              | 78             | 10.046               |
| 2402            | 2.0              | 0              | 11.717               |
| 2441            | 2.0              | 39             | 10.937               |
| 2480            | 2.0              | 78             | 10.228               |
| 2402            | 3.0              | 0              | 12.112               |
| 2441            | 3.0              | 39             | 11.306               |
| 2480            | 3.0              | 78             | 10.524               |

| Frequency [MHz] | Mode | Channel Number | Conducted Power [mW] |
|-----------------|------|----------------|----------------------|
| 2402            | LE   | 0              | 1.613                |
| 2441            | LE   | 39             | 1.535                |
| 2480            | LE   | 78             | 1.364                |

## 2.5 Transmitter power reduction conditions and modes

The phone utilizes reduced limits for the maximum transmit power for its transmitters when operating under the following noted conditions to ensure SAR exposure compliance is maintained. Tables of the reduced limits used for testing are given below. A complete description of this functionality is provided in the “Operational Description” contained within Exhibit 12. The implementation to trigger the reduction in power requires the device to be radiating, which prevents conducted power measurements of this functionality without modification to the unit.

While operating in body-adjacent exposure configurations during a mobile hotspot session, a reduced maximum power limit is enforced for the GSM and WCDMA modes. Tables of the reduced limits used for testing are given below.

| Mode(s) of Operation                       | CDMA 800 BC0 | CDMA 820 BC10 | CDMA 1900 BC1 |
|--------------------------------------------|--------------|---------------|---------------|
| Channel Ranges                             | 1013 - 777   | 476 - 684     | 25 - 1175     |
| Maximum Output Power Setting (dBm)         | 25.0 dBm     | 25.0 dBm      | 25.0 dBm      |
| Reduced Maximum Output Power Setting (dBm) | 21.0 dBm     | 21.0 dBm      | 18.0 dBm      |

See section 6.4 for tables detailing the complete interoperation of this power limit reduction schema.

## 2.6 Accessories for the Device Under Test

### 2.6.1 Batteries

The phone tested was an internal battery, part number: Model SNN5932A

This battery was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

### 2.6.2 Body-Worn Carry Accessories

There are no body-worn accessories available for this phone at the time of testing thus the device was tested per the Supplement C testing guidelines for devices that do not have body-worn accessories. A separation distance of 15 mm between the device and the flat phantom was used for testing body-worn accessory SAR. The chosen separation distance of 15 mm is utilized in order to support any case or holder accessories offered or to be offered by Motorola for this product. The device was tested with the front and back of the device facing the phantom. Both sides of the device were tested for Body SAR for the purpose of including the SAR evaluation for body-worn accessories that support the device with either side facing the user.



### 3 Test Equipment Used

#### 3.1 Dosimetric Measurement System

The Motorola Mobility ADR Test Services Laboratory utilizes a DASY52™ Dosimetric Assessment System manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is  $\pm 11\%$  (K=1) with an expanded uncertainty of  $\pm 22\%$  (K=2). The overall 1 g RSS uncertainty of the measurement system is  $\pm 11\%$  (K=1) with an expanded uncertainty of  $\pm 22\%$  (K=2). The measurement uncertainty budget is given in Appendix 5. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg.

The list of calibrated equipment used for the measurements is shown in the following table. All equipment was brought into service and used only during its noted calibration period, except where indicated. Equipment without a calibration period was in service for the entirety of the test period.

| Description                            | Serial Number | Cal Date    | Cal Due Date | Service Notes                    |
|----------------------------------------|---------------|-------------|--------------|----------------------------------|
| DASY™ DAE V1                           | 661           | May-21-2013 | May-21-2014  | Measurement System 1             |
| E-Field Probe ES3DV3                   | 3180          | Feb-11-2013 | Feb-11-2014  | Measurement System 1             |
| Twin SAM Phantom V4.0                  | TP-1156       |             |              | Measurement System 1             |
| Twin SAM Phantom V4.0                  | TP-1319       |             |              | Measurement System 1             |
| MFP V5.1 C Triple Modular Flat Phantom | 1101          |             |              | Measurement System 1             |
| DASY™ DAE V1                           | 703           | Sep-11-2012 | Sep-11-2013  | Measurement System 4             |
| E-Field Probe ES3DV3                   | 3037          | Aug 24-2012 | Aug 24-2013  | Measurement System 4             |
| Twin SAM Phantom V4.0                  | TP-1132       |             |              | Measurement System 4             |
| MFP V5.1 C Triple Modular Flat Phantom | 1104          |             |              | Measurement System 4             |
| DASY™ DAE V1                           | 784           | Mar-6-2013  | Mar-6-2014   | Measurement System 3             |
| E-Field Probe EX3DV4                   | 3730          | Aug-24-2012 | Aug-24-2013  | Measurement System 3             |
| Twin SAM Phantom V4.0                  | TP-1106       |             |              | Measurement System 3             |
| Twin SAM Phantom V4.0                  | TP-1153       |             |              | Measurement System 3             |
| MFP V5.1 C Triple Modular Flat Phantom | 1103          |             |              | Measurement System 3             |
| Dipole Validation Kit, DV835V2         | 422TR         | Mar-18-2011 | Mar-18-2012  | Calibration extension, see note. |
| Dipole Validation Kit, DV835V2         | 423TR         | Sep-12-2012 | Sep-12-2013  | Calibration extension, see note. |
| Dipole Validation Kit, DV1800V2        | 2D191         | Jan-5-2012  | Jan-5-2013   | Calibration extension, see note. |
| Dipole Validation Kit, DV1800V2        | 259TR         | Oct-20-2011 | Oct-20-2012  | Calibration extension, see note. |
| Dipole Validation Kit, DV2450V2        | 740           | Feb-7-2012  | Feb-7-2013   | Calibration extension, see note. |

Note: Per FCC KDB 865664 D01 v01r01, Section 3.2.2, evaluation for the extension of the dipole calibration was carried out. Results are provided in Appendix 7 in addition to the original calibration certificate.

### 3.2 Test System Validations

Per [5] and FCC KDB 865664 D01, each SAR system (including probes, system components, and software) used for device testing was validated against its performance specifications prior to deployment. These validation measurements are taken to ensure the accuracy of device test results. Validation measurements utilize reference dipoles and the required tissue-equivalent media, and include assessments of system sensitivity, probe linearity, and probe isotropy. Per FCC KDB 865664 D02, a tabulated summary of the validation results for each SAR system used in testing is given below.

| <b>DASY52™ Measurement System 1</b>   |             |         |                |                         |                       |        |                       |           |                         |                       |                               |                            |
|---------------------------------------|-------------|---------|----------------|-------------------------|-----------------------|--------|-----------------------|-----------|-------------------------|-----------------------|-------------------------------|----------------------------|
| <b>System Validation Measurements</b> |             |         |                |                         |                       |        |                       |           |                         |                       |                               |                            |
| Probe                                 | Tissue Type | f (MHz) | CW Validations |                         |                       |        | Modulated Validations |           |                         |                       |                               |                            |
|                                       |             |         | Date           | Dielectric Parameters   |                       | Result | Date                  | Mod. Type | Dielectric Parameters   |                       | Duty Factor Linearity Results | High PAR Linearity Results |
|                                       |             |         |                | Measured $\sigma$ (S/m) | Measured $\epsilon_r$ |        |                       |           | Measured $\sigma$ (S/m) | Measured $\epsilon_r$ |                               |                            |
| 3180                                  | Head        | 750     | 21-Feb-13      | 0.8599                  | 41.52                 | pass   |                       |           |                         |                       |                               |                            |
| 3180                                  | Head        | 835     | 21-Feb-13      | 0.941                   | 41.98                 | pass   | 3/7/2013              | GMSK      | 0.912                   | 39.6                  | PASS                          | N/A                        |
| 3180                                  | Head        | 1800    | 21-Feb-13      | 1.37                    | 39.23                 | pass   | 3/7/2013              | GMSK      | 1.384                   | 38.24                 | PASS                          | N/A                        |
| 3180                                  | Head        | 1900    | 21-Feb-13      | 1.476                   | 38.79                 | pass   |                       |           |                         |                       |                               |                            |
| 3180                                  | Head        | 2450    | 25-Feb-13      | 1.75                    | 36.59                 | pass   | 3/14/2013             | OFDM      | 1.807                   | 37.8                  | N/A                           | PASS                       |
| 3180                                  | Head        | 2600    | 25-Feb-13      | 1.897                   | 36.17                 | pass   |                       |           |                         |                       |                               |                            |
| 3180                                  | Body        | 750     | 21-Feb-13      | 0.9525                  | 54.36                 | pass   |                       |           |                         |                       |                               |                            |
| 3180                                  | Body        | 835     | 21-Feb-13      | 1                       | 55.04                 | pass   | 3/7/2013              | GMSK      | 0.996                   | 54.068                | PASS                          | N/A                        |
| 3180                                  | Body        | 1800    | 21-Feb-13      | 1.445                   | 49.43                 | pass   | 3/7/2013              | GMSK      | 1.582                   | 49.18                 | PASS                          | N/A                        |
| 3180                                  | Body        | 1900    | 21-Feb-13      | 1.561                   | 49.05                 | pass   |                       |           |                         |                       |                               |                            |
| 3180                                  | Body        | 2450    | 25-Feb-13      | 1.926                   | 49.22                 | pass   | 3/12/2013             | OFDM      | 1.999                   | 50.5                  | N/A                           | PASS                       |
| 3180                                  | Body        | 2600    | 25-Feb-13      | 2.097                   | 48.83                 | pass   |                       |           |                         |                       |                               |                            |

| <b>DASY52™ Measurement System 3</b>   |             |         |                |                         |                       |        |                       |           |                         |                       |                               |                            |
|---------------------------------------|-------------|---------|----------------|-------------------------|-----------------------|--------|-----------------------|-----------|-------------------------|-----------------------|-------------------------------|----------------------------|
| <b>System Validation Measurements</b> |             |         |                |                         |                       |        |                       |           |                         |                       |                               |                            |
| Probe                                 | Tissue Type | f (MHz) | CW Validations |                         |                       |        | Modulated Validations |           |                         |                       |                               |                            |
|                                       |             |         | Date           | Dielectric Parameters   |                       | Result | Date                  | Mod. Type | Dielectric Parameters   |                       | Duty Factor Linearity Results | High PAR Linearity Results |
|                                       |             |         |                | Measured $\sigma$ (S/m) | Measured $\epsilon_r$ |        |                       |           | Measured $\sigma$ (S/m) | Measured $\epsilon_r$ |                               |                            |
| 3730                                  | Head        | 2450    | 1/16/2013      | 1.812                   | 39.28                 | PASS   | 3/12/2013             | OFDM      | 1.795                   | 37.65                 | N/A                           | PASS                       |
| 3730                                  | Head        | 2600    | 1/16/2013      | 1.972                   | 38.77                 | PASS   |                       |           |                         |                       |                               |                            |
| 3730                                  | Head        | 5200    | 1/15/2013      | 4.547                   | 35.00                 | PASS   | 3/18/2013             | OFDM      | 4.562                   | 35.362                | N/A                           | PASS                       |
| 3730                                  | Head        | 5300    | 1/15/2013      | 4.663                   | 34.79                 | PASS   | 3/18/2013             | OFDM      | 4.679                   | 35.123                | N/A                           | PASS                       |
| 3730                                  | Head        | 5600    | 1/15/2013      | 4.981                   | 34.10                 | PASS   | 3/18/2013             | OFDM      | 5.014                   | 34.448                | N/A                           | PASS                       |
| 3730                                  | Head        | 5800    | 1/14/2013      | 5.204                   | 33.67                 | PASS   | 3/19/2013             | OFDM      | 5.243                   | 34.016                | N/A                           | PASS                       |
| 3730                                  | Body        | 2450    | 1/16/2013      | 1.992                   | 50.89                 | PASS   | 3/12/2013             | OFDM      | 1.999                   | 50.5                  | N/A                           | PASS                       |
| 3730                                  | Body        | 2600    | 1/16/2013      | 2.179                   | 50.40                 | PASS   |                       |           |                         |                       |                               |                            |
| 3730                                  | Body        | 5200    | 1/14/2013      | 5.204                   | 46.23                 | PASS   | 3/18/2013             | OFDM      | 5.233                   | 47.237                | N/A                           | PASS                       |
| 3730                                  | Body        | 5300    | 1/14/2013      | 5.353                   | 46.00                 | PASS   | 3/18/2013             | OFDM      | 5.386                   | 46.995                | N/A                           | PASS                       |
| 3730                                  | Body        | 5600    | 1/14/2013      | 5.766                   | 45.24                 | PASS   | 3/18/2013             | OFDM      | 5.815                   | 46.248                | N/A                           | PASS                       |
| 3730                                  | Body        | 5800    | 1/14/2013      | 6.061                   | 44.77                 | PASS   | 3/19/2013             | OFDM      | 6.114                   | 45.753                | N/A                           | PASS                       |

|       | DASY52™ Measurement System 4<br>System Validation Measurements |         |                |                       |                         |        |           |                       |                       |                         |                               |                            |  |
|-------|----------------------------------------------------------------|---------|----------------|-----------------------|-------------------------|--------|-----------|-----------------------|-----------------------|-------------------------|-------------------------------|----------------------------|--|
| Probe | Tissue Type                                                    | f (MHz) | CW Validations |                       |                         |        |           | Modulated Validations |                       |                         |                               |                            |  |
|       |                                                                |         | Date           | Dielectric Parameters |                         |        | Date      | Mod. Type             | Dielectric Parameters |                         | Duty Factor Linearity Results | High PAR Linearity Results |  |
|       |                                                                |         |                | Measured σ (S/m)      | Measured ε <sub>r</sub> | Result |           |                       | Measured σ (S/m)      | Measured ε <sub>r</sub> |                               |                            |  |
| 3037  | Head                                                           | 750     | 8-Jan-13       | 0.861                 | 43.20                   | pass   |           |                       |                       |                         |                               |                            |  |
| 3037  | Head                                                           | 835     | 7-Jan-13       | 0.936                 | 42.10                   | pass   | 1/10/2013 | GMSK                  | 0.936                 | 41.632                  | PASS                          | N/A                        |  |
| 3037  | Head                                                           | 1800    | 7-Jan-13       | 1.352                 | 38.58                   | pass   | 1/8/2013  | GMSK                  | 1.345                 | 38.568                  | PASS                          | N/A                        |  |
| 3037  | Head                                                           | 1900    | 7-Jan-13       | 1.459                 | 38.05                   | pass   |           |                       |                       |                         |                               |                            |  |
| 3037  | Head                                                           | 2450    | 8-Jan-13       | 1.822                 | 37.87                   | pass   | 3/12/2013 | OFDM                  | 1.795                 | 37.65                   | N/A                           | PASS                       |  |
| 3037  | Head                                                           | 2600    | 8-Jan-13       | 1.974                 | 37.32                   | pass   |           |                       |                       |                         |                               |                            |  |
| 3037  | Body                                                           | 750     | 8-Jan-13       | 0.911                 | 54.83                   | pass   |           |                       |                       |                         |                               |                            |  |
| 3037  | Body                                                           | 835     | 7-Jan-13       | 0.997                 | 53.94                   | pass   | 1/8/2013  | GMSK                  | 1.00                  | 54.83                   | PASS                          | N/A                        |  |
| 3037  | Body                                                           | 1800    | 7-Jan-13       | 1.443                 | 52.70                   | pass   | 1/8/2013  | GMSK                  | 1.43                  | 52.459                  | PASS                          | N/A                        |  |
| 3037  | Body                                                           | 1900    | 7-Jan-13       | 1.567                 | 52.25                   | pass   |           |                       |                       |                         |                               |                            |  |
| 3037  | Body                                                           | 2450    | 8-Jan-13       | 1.999                 | 51.31                   | pass   | 3/12/2013 | OFDM                  | 1.999                 | 50.5                    | N/A                           | PASS                       |  |
| 3037  | Body                                                           | 2600    | 8-Jan-13       | 2.177                 | 50.77                   | pass   |           |                       |                       |                         |                               |                            |  |

### 3.3 Test System Verifications (System Performance Checks)

System accuracy verifications of the DASY52™ were performed using the measurement equipment listed in Section 3.1. The daily system performance check occurs within the flat section of the SAM phantom.

A SAR measurement was performed to verify the measured SAR was within  $\pm 10\%$  from the target SAR indicated in Appendix 6. These frequencies are within  $\pm 10\%$  of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted within 24 hours prior to the measurement of the phone. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1 W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). For frequencies below 3 GHz, the simulated tissue depth was verified to be  $15.0 \text{ cm} \pm 0.5 \text{ cm}$ . Z-axis scans showing the SAR penetration are also included in Appendix 1.

| <b>DASY52™ Measurement System 1</b>                               |                      |       |        |                             |                               |                         |                          |                       |                        |                   |                  |
|-------------------------------------------------------------------|----------------------|-------|--------|-----------------------------|-------------------------------|-------------------------|--------------------------|-----------------------|------------------------|-------------------|------------------|
| <b>System Verification Measurements for Head SAR Measurements</b> |                      |       |        |                             |                               |                         |                          |                       |                        |                   |                  |
| f (MHz)                                                           | Description          | Probe | Dipole | Measured SAR (W/kg), 1 gram | Normalized SAR (W/kg), 1 gram | Dielectric Parameters   |                          |                       |                        | Ambient Temp (°C) | Tissue Temp (°C) |
|                                                                   |                      |       |        |                             |                               | Measured $\sigma$ (S/m) | Deviation $\sigma$ (S/m) | Measured $\epsilon_r$ | Deviation $\epsilon_r$ |                   |                  |
| 835                                                               | Measured, Aug-7-2013 | 3180  | 422TR  | 1.82                        | 9.10                          | 0.91                    | 1.2%                     | 39.8                  | -4.1%                  | 20.3              | 21.0             |
|                                                                   | Recommended Limits   | 3180  | 422TR  |                             | 9.33                          | 0.90                    | $\pm 10\%$               | 41.5                  | $\pm 10\%$             | 18-25             | 18-25            |
| 1800                                                              | Measured, Aug-7-2013 | 3180  | 259TR  | 7.40                        | 37.00                         | 1.34                    | -4.3%                    | 38.4                  | -4.0%                  | 20.5              | 20.6             |
|                                                                   | Recommended Limits   | 3180  | 259TR  |                             | 38.10                         | 1.40                    | $\pm 10\%$               | 40.0                  | $\pm 10\%$             | 18-25             | 18-25            |

| <b>DASY52™ Measurement System 3</b>                               |                       |       |        |                             |                               |                         |                          |                       |                        |                   |                  |
|-------------------------------------------------------------------|-----------------------|-------|--------|-----------------------------|-------------------------------|-------------------------|--------------------------|-----------------------|------------------------|-------------------|------------------|
| <b>System Verification Measurements for Head SAR Measurements</b> |                       |       |        |                             |                               |                         |                          |                       |                        |                   |                  |
| f (MHz)                                                           | Description           | Probe | Dipole | Measured SAR (W/kg), 1 gram | Normalized SAR (W/kg), 1 gram | Dielectric Parameters   |                          |                       |                        | Ambient Temp (°C) | Tissue Temp (°C) |
|                                                                   |                       |       |        |                             |                               | Measured $\sigma$ (S/m) | Deviation $\sigma$ (S/m) | Measured $\epsilon_r$ | Deviation $\epsilon_r$ |                   |                  |
| 2450                                                              | Measured, Jul-27-2013 | 3730  | 740    | 5.26                        | 52.60                         | 1.76                    | -2.2%                    | 36.9                  | -5.9%                  | 20.4              | 20.6             |
|                                                                   | Recommended Limits    | 3730  | 740    |                             | 52.30                         | 1.80                    | $\pm 10\%$               | 39.2                  | $\pm 10\%$             | 18-25             | 18-25            |

| <b>DASY52™ Measurement System 4</b>                               |                       |       |        |                             |                               |                         |                          |                       |                        |                   |                  |
|-------------------------------------------------------------------|-----------------------|-------|--------|-----------------------------|-------------------------------|-------------------------|--------------------------|-----------------------|------------------------|-------------------|------------------|
| <b>System Verification Measurements for Head SAR Measurements</b> |                       |       |        |                             |                               |                         |                          |                       |                        |                   |                  |
| f (MHz)                                                           | Description           | Probe | Dipole | Measured SAR (W/kg), 1 gram | Normalized SAR (W/kg), 1 gram | Dielectric Parameters   |                          |                       |                        | Ambient Temp (°C) | Tissue Temp (°C) |
|                                                                   |                       |       |        |                             |                               | Measured $\sigma$ (S/m) | Deviation $\sigma$ (S/m) | Measured $\epsilon_r$ | Deviation $\epsilon_r$ |                   |                  |
| 835                                                               | Measured, Aug-12-2013 | 3037  | 423TR  | 1.87                        | 9.35                          | 0.92                    | 2.2%                     | 40.1                  | -3.4%                  | 20.1              | 21.3             |
|                                                                   | Recommended Limits    | 3037  | 423TR  |                             | 9.22                          | 0.90                    | $\pm 10\%$               | 41.5                  | $\pm 10\%$             | 18-25             | 18-25            |

| <b>DASY52™ Measurement System 1</b>                               |                             |              |               |                                    |                                      |                                           |                                            |                                         |                                          |                          |                         |
|-------------------------------------------------------------------|-----------------------------|--------------|---------------|------------------------------------|--------------------------------------|-------------------------------------------|--------------------------------------------|-----------------------------------------|------------------------------------------|--------------------------|-------------------------|
| <b>System Verification Measurements for Body SAR Measurements</b> |                             |              |               |                                    |                                      |                                           |                                            |                                         |                                          |                          |                         |
| <b>f<br/>(MHz)</b>                                                | <b>Description</b>          | <b>Probe</b> | <b>Dipole</b> | <b>Measured SAR (W/kg), 1 gram</b> | <b>Normalized SAR (W/kg), 1 gram</b> | <b>Dielectric Parameters</b>              |                                            |                                         |                                          | <b>Ambient Temp (°C)</b> | <b>Tissue Temp (°C)</b> |
|                                                                   |                             |              |               |                                    |                                      | <b>Measured <math>\sigma</math> (S/m)</b> | <b>Deviation <math>\sigma</math> (S/m)</b> | <b>Measured <math>\epsilon_r</math></b> | <b>Deviation <math>\epsilon_r</math></b> |                          |                         |
| <b>835</b>                                                        | <b>Measured, Aug-6-2013</b> | 3180         | 422TR         | 1.92                               | 9.60                                 | 1.00                                      | 3.1%                                       | 54.0                                    | -2.0%                                    | 20.5                     | 21.0                    |
|                                                                   | <b>Recommended Limits</b>   | 3180         | 422TR         |                                    | 9.77                                 | 0.97                                      | ±10%                                       | 55.2                                    | ±10%                                     | 18-25                    | 18-25                   |
| <b>1800</b>                                                       | <b>Measured, Aug-7-2013</b> | 3180         | 259TR         | 7.37                               | 36.85                                | 1.45                                      | -4.6%                                      | 52.7                                    | -1.1%                                    | 20.1                     | 20.6                    |
|                                                                   | <b>Recommended Limits</b>   | 3180         | 259TR         |                                    | 39.10                                | 1.52                                      | ±10%                                       | 53.3                                    | ±10%                                     | 18-25                    | 18-25                   |

| <b>DASY52™ Measurement System 3</b>                               |                              |              |               |                                    |                                      |                                           |                                            |                                         |                                          |                          |                         |
|-------------------------------------------------------------------|------------------------------|--------------|---------------|------------------------------------|--------------------------------------|-------------------------------------------|--------------------------------------------|-----------------------------------------|------------------------------------------|--------------------------|-------------------------|
| <b>System Verification Measurements for Body SAR Measurements</b> |                              |              |               |                                    |                                      |                                           |                                            |                                         |                                          |                          |                         |
| <b>f<br/>(MHz)</b>                                                | <b>Description</b>           | <b>Probe</b> | <b>Dipole</b> | <b>Measured SAR (W/kg), 1 gram</b> | <b>Normalized SAR (W/kg), 1 gram</b> | <b>Dielectric Parameters</b>              |                                            |                                         |                                          | <b>Ambient Temp (°C)</b> | <b>Tissue Temp (°C)</b> |
|                                                                   |                              |              |               |                                    |                                      | <b>Measured <math>\sigma</math> (S/m)</b> | <b>Deviation <math>\sigma</math> (S/m)</b> | <b>Measured <math>\epsilon_r</math></b> | <b>Deviation <math>\epsilon_r</math></b> |                          |                         |
| <b>2450</b>                                                       | <b>Measured, Jul-26-2013</b> | 3730         | 740           | 5.02                               | 50.20                                | 1.95                                      | 0.0%                                       | 49.9                                    | -5.3%                                    | 20.4                     | 20.8                    |
|                                                                   | <b>Recommended Limits</b>    | 3730         | 740           |                                    | 49.50                                | 1.95                                      | ±10%                                       | 52.7                                    | ±10%                                     | 18-25                    | 18-25                   |

| <b>DASY52™ Measurement System 4</b>                               |                              |              |               |                                    |                                      |                                           |                                            |                                         |                                          |                          |                         |
|-------------------------------------------------------------------|------------------------------|--------------|---------------|------------------------------------|--------------------------------------|-------------------------------------------|--------------------------------------------|-----------------------------------------|------------------------------------------|--------------------------|-------------------------|
| <b>System Verification Measurements for Body SAR Measurements</b> |                              |              |               |                                    |                                      |                                           |                                            |                                         |                                          |                          |                         |
| <b>f<br/>(MHz)</b>                                                | <b>Description</b>           | <b>Probe</b> | <b>Dipole</b> | <b>Measured SAR (W/kg), 1 gram</b> | <b>Normalized SAR (W/kg), 1 gram</b> | <b>Dielectric Parameters</b>              |                                            |                                         |                                          | <b>Ambient Temp (°C)</b> | <b>Tissue Temp (°C)</b> |
|                                                                   |                              |              |               |                                    |                                      | <b>Measured <math>\sigma</math> (S/m)</b> | <b>Deviation <math>\sigma</math> (S/m)</b> | <b>Measured <math>\epsilon_r</math></b> | <b>Deviation <math>\epsilon_r</math></b> |                          |                         |
| <b>835</b>                                                        | <b>Measured, Aug-12-2013</b> | 3037         | 423TR         | 1.92                               | 9.60                                 | 1.00                                      | 3.1%                                       | 54.3                                    | -1.6%                                    | 20.2                     | 20.7                    |
|                                                                   | <b>Recommended Limits</b>    | 3037         | 423TR         |                                    | 9.31                                 | 0.97                                      | ±10%                                       | 55.2                                    | ±10%                                     | 18-25                    | 18-25                   |
| <b>1800</b>                                                       | <b>Measured, Aug-13-2013</b> | 3037         | 2d191         | 7.65                               | 38.25                                | 1.43                                      | -5.9%                                      | 52.3                                    | -1.9%                                    | 20.3                     | 20.7                    |
|                                                                   | <b>Recommended Limits</b>    | 3037         | 2d191         |                                    | 37.80                                | 1.52                                      | ±10%                                       | 53.3                                    | ±10%                                     | 18-25                    | 18-25                   |

### 3.4 Simulated Tissue Dielectric Properties

Validation, System Performance Check, and device SAR measurements are performed using the DASY52™ system along with liquids specified to simulate head and body tissues subjected to electromagnetic exposure. The list of ingredients and the percent composition of the tissue-simulating liquids used for testing are indicated in the following table.

| <b>Ingredient</b>               | <b>782 / 835 / 900 MHz Head</b> | <b>782 / 835 / 900 MHz Body</b> | <b>1800 MHz / 1900 MHz Head</b> | <b>1800 MHz / 1900 MHz Body</b> | <b>2450 MHz Head</b> | <b>2450 MHz Body</b> | <b>5 GHz Head</b> | <b>5 GHz Body</b> |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------|----------------------|-------------------|-------------------|
| Sugar                           | 57.0                            | 44.9                            | --                              | --                              | --                   | --                   | --                | --                |
| DGBE                            | --                              | --                              | 47.0                            | 30.8                            | 6.89                 | 8.0                  | --                | --                |
| Water                           | 40.45                           | 53.06                           | 52.62                           | 68.8                            | 57.95                | 71.8                 | 65.52             | 78.66             |
| Salt                            | 1.45                            | 0.94                            | 0.38                            | 0.4                             | 0.15                 | 0.2                  | --                | --                |
| HEC                             | 1.0                             | 1.0                             | --                              | --                              | --                   | --                   | --                | --                |
| Bact.                           | 0.1                             | 0.1                             | --                              | --                              | --                   | --                   | --                | --                |
| Triton X-100                    | --                              | --                              | --                              | --                              | 35.02                | 20.0                 | 17.24             | 10.67             |
| Di(ethylene glycol) Hexyl Ether | --                              | --                              | --                              | --                              | --                   | --                   | 17.24             | 10.67             |

Prior to conducting SAR measurements, the relative permittivity,  $\epsilon_r$ , and conductivity,  $\sigma$ , of the tissue-simulating liquids were measured with a SPEAG™ DAK-3.5 Dielectric Assessment Kit across the frequency ranges of interest. These values, along with recommended targets, percent deviation from the targets, and the temperature of the simulated tissue are shown in the tables below.

For SAR measurements, the dielectric measurements from the DAK-3.5 are imported into the DASY software which performs interpolation to determine the dielectric parameters at the specific frequencies used for device testing. The DASY software also implements SAR error compensation algorithms to automatically correct the measured SAR results for deviations between the measured and target dielectric parameters. This error compensation has been verified by the lab to meet the requirements in FCC KDB 865664 D01. Therefore, where frequencies of test fall within  $\pm 50$  MHz of a calibration point of the probe used for test, the acceptable range of tissue variation is  $\pm 10\%$  per FCC KDB 865664 D01 section 2.4. For test frequencies outside of  $\pm 50$  MHz of a probe calibration point, the range of tissue variation is reduced per section 2.6 part 2 of the same KDB, to ensure that tissues used in testing are within the required specification regardless of device performance. A mass density of  $\rho = 1 \text{ g/cm}^3$  was entered into the system for all cases. It can be seen that the measured parameters are within tolerance of the recommended targets specified in [1] and [5].

| Head Simulated-Tissue Dielectric Parameters |               |           |                       |                     |                         |                        |                       |                            |           |
|---------------------------------------------|---------------|-----------|-----------------------|---------------------|-------------------------|------------------------|-----------------------|----------------------------|-----------|
| Index                                       | Date Measured | $f$ (MHz) | Target $\sigma$ (S/m) | Target $\epsilon_r$ | Measured $\sigma$ (S/m) | Deviation $\sigma$ (%) | Measured $\epsilon_r$ | Deviation $\epsilon_r$ (%) | Temp (°C) |
| 835                                         | Aug-7-2013    | 820.0     | $0.90 \pm 10\%$       | $41.58 \pm 10\%$    | 0.90                    | 0.2%                   | 40.0                  | -3.8%                      | 21.0      |
|                                             |               | 835.0     | $0.90 \pm 10\%$       | $41.50 \pm 10\%$    | 0.91                    | 1.2%                   | 39.8                  | -4.1%                      |           |
|                                             |               | 849.0     | $0.92 \pm 10\%$       | $41.50 \pm 10\%$    | 0.93                    | 1.7%                   | 39.6                  | -4.5%                      |           |
|                                             | Aug-12-2013   | 820.0     | $0.90 \pm 10\%$       | $41.58 \pm 10\%$    | 0.88                    | -2.1%                  | 39.3                  | -5.5%                      | 21.3      |
|                                             |               | 835.0     | $0.90 \pm 10\%$       | $41.50 \pm 10\%$    | 0.90                    | 0.0%                   | 39.1                  | -5.8%                      |           |
|                                             |               | 849.0     | $0.92 \pm 10\%$       | $41.50 \pm 10\%$    | 0.91                    | -0.6%                  | 39.0                  | -6.2%                      |           |
| 1880                                        | Aug-07-2013   | 1850.0    | $1.40 \pm 10\%$       | $40.00 \pm 10\%$    | 1.40                    | 0.0%                   | 38.2                  | -4.7%                      | 20.6      |
|                                             |               | 1880.0    | $1.40 -5\%/+10\%$     | $40.00 -10\%/+5\%$  | 1.43                    | 2.2%                   | 38.0                  | -5.0%                      |           |
|                                             |               | 1915.0    | $1.40 -5\%/+10\%$     | $40.00 -10\%/+5\%$  | 1.46                    | 4.3%                   | 37.9                  | -5.4%                      |           |
| 2450                                        | Jul-27-2013   | 2412.0    | $1.77 \pm 10\%$       | $39.27 \pm 10\%$    | 1.72                    | -2.7%                  | 36.9                  | -6.0%                      | 20.6      |
|                                             |               | 2450.0    | $1.80 \pm 10\%$       | $39.20 \pm 10\%$    | 1.76                    | -2.3%                  | 36.9                  | -6.0%                      |           |
|                                             |               | 2462.0    | $1.81 \pm 10\%$       | $39.18 \pm 10\%$    | 1.77                    | -2.4%                  | 36.8                  | -6.1%                      |           |

| Body Simulated-Tissue Dielectric Parameters |               |           |                       |                     |                         |                        |                       |                            |           |
|---------------------------------------------|---------------|-----------|-----------------------|---------------------|-------------------------|------------------------|-----------------------|----------------------------|-----------|
| Index                                       | Date Measured | $f$ (MHz) | Target $\sigma$ (S/m) | Target $\epsilon_r$ | Measured $\sigma$ (S/m) | Deviation $\sigma$ (%) | Measured $\epsilon_r$ | Deviation $\epsilon_r$ (%) | Temp (°C) |
| 835                                         | Aug-7-2013    | 820.0     | $0.97 \pm 10\%$       | $55.26 \pm 10\%$    | 0.98                    | 1.2%                   | 54.3                  | -1.8%                      | 21.0      |
|                                             |               | 835.0     | $0.97 \pm 10\%$       | $55.20 \pm 10\%$    | 1.00                    | 3.1%                   | 54.1                  | -2.0%                      |           |
|                                             |               | 849.0     | $0.99 \pm 10\%$       | $55.16 \pm 10\%$    | 1.01                    | 2.4%                   | 54.0                  | -2.2%                      |           |
|                                             | Aug-13-2013   | 820.0     | $0.97 \pm 10\%$       | $55.26 \pm 10\%$    | 0.98                    | 1.2%                   | 54.1                  | -2.2%                      | 20.7      |
|                                             |               | 835.0     | $0.97 \pm 10\%$       | $55.20 \pm 10\%$    | 0.99                    | 2.1%                   | 53.9                  | -2.3%                      |           |
|                                             |               | 849.0     | $0.99 \pm 10\%$       | $55.16 \pm 10\%$    | 1.01                    | 2.4%                   | 53.8                  | -2.5%                      |           |
| 1880                                        | Aug-7-2013    | 1850.0    | $1.52 \pm 10\%$       | $53.30 \pm 10\%$    | 1.51                    | -0.7%                  | 52.1                  | -2.3%                      | 20.6      |
|                                             |               | 1880.0    | $1.52 -5\%/+10\%$     | $53.30 -10\%/+5\%$  | 1.55                    | 2.0%                   | 52.0                  | -2.5%                      |           |
|                                             |               | 1915.0    | $1.52 -5\%/+10\%$     | $53.30 -10\%/+5\%$  | 1.59                    | 4.7%                   | 51.9                  | -2.8%                      |           |
|                                             | Aug-13-2013   | 1850.0    | $1.52 \pm 10\%$       | $53.30 \pm 10\%$    | 1.49                    | -2.0%                  | 52.1                  | -2.2%                      | 20.7      |
|                                             |               | 1880.0    | $1.52 -5\%/+10\%$     | $53.30 -10\%/+5\%$  | 1.53                    | 0.7%                   | 52.1                  | -2.4%                      |           |
|                                             |               | 1915.0    | $1.52 -5\%/+10\%$     | $53.30 -10\%/+5\%$  | 1.57                    | 3.3%                   | 51.9                  | -2.6%                      |           |
| 2450                                        | Jul-26-2013   | 2412.0    | $1.91 \pm 10\%$       | $52.75 \pm 10\%$    | 1.91                    | -0.3%                  | 50.0                  | -5.3%                      | 20.8      |
|                                             |               | 2450.0    | $1.95 \pm 10\%$       | $52.70 \pm 10\%$    | 1.96                    | 0.6%                   | 49.9                  | -5.4%                      |           |
|                                             |               | 2462.0    | $1.97 \pm 10\%$       | $52.68 \pm 10\%$    | 1.97                    | 0.2%                   | 49.9                  | -5.4%                      |           |

## 4 Test Setup Information, SAR Measurement Results, and Analysis

### 4.1 Overview of Test Setup and Results

The phone was tested in the exposure configurations stipulated in [1], [5], [9], and per FCC KDB 941225 D06 for mobile hotspot operation. The phone was positioned into these configurations using the device holder supplied with the DASY52™ SAR measurement system. The default settings for the SAR scans are set in accordance with FCC KDB 865664 D01 for all area scan resolutions, zoom scan resolutions and volumes, and probe positioning. Please refer to the DASY52™ manual for additional information on SAR scanning procedures and algorithms used.

The SAR measurements were performed using the SAM and Flat phantoms listed in section 3.1. The same phantoms and simulated tissues were used for the system performance checks and the device SAR measurements. Consequently the Z-axis scans included in Appendix 1 are applicable for verification of the required simulated tissue depths of 15.0 cm ± 0.5 cm for frequencies less than 3 GHz, or 10.0 cm ± 0.5 cm for frequencies greater than 3 GHz.

The SAR results shown in following tables are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the maximum device power, measured device power, temperature of the simulated tissue after the test, the measured drift and the scaled SAR. The exact method of scaling is:

$$\text{Scaled SAR} = (\text{Measured SAR}) * 10^{\left(\frac{(\text{Maximum Power}) - (\text{Measured Power})}{10}\right)} * 10^{\left(\frac{(-\text{Drift})}{10}\right)}$$

The SAR reported at the end of the measurement process by the DASY52™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. Note that measured SAR is scaled only in the manner which results in a more conservative scaled value, i.e. to a higher SAR value as a consequence of measured power being below the maximum allowed power, or for negative drift values.

Per FCC KDB 447498 D01, area-scan based 1 g SAR estimation was used for initial testing in all combinations of device modes and exposure conditions. The highest SAR measurements for each combination of device mode and exposure condition, and all conditions where the area scan estimation reported values greater than 1.2 W/kg, were further evaluated with a zoom scan. When operating conditions for the SAR system verifications did not demonstrate that the verification area scan 1 g SAR estimation resulted in values within 3% of zoom scan 1 g SAR, zoom scans were executed for all SAR tests.

The test conditions that produced the highest SAR values for each combination of DUT mode and exposure condition are indicated as **bold** numbers in the following tables. Plots of these tests are included in Appendices 2 through 4.

## 4.2 Head-Adjacent Exposure Results

| Left Cheek-Touch Position |                       |         |            |                  |                   |              |               |                    |                     |                    |                     |           |
|---------------------------|-----------------------|---------|------------|------------------|-------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                      | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                   | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                           |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm) |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| CDMA 800, RC3 SO55        | SNN5932A              | 384     | 836.52     | 25.00            | 24.14             | 20.0         | -0.20         | 0.317              | 0.40                | 0.408              | 0.52                |           |
| CDMA 820, RC3 SO55        | SNN5932A              | 564     | 820.1      | 25.00            | 24.15             | 20.6         | 0.04          | 0.138              | 0.14                | 0.18               | 0.22                |           |
| CDMA 1900, RC3 SO55       | SNN5932A              | 600     | 1880       | 25.00            | 24.16             | 20.5         | 0.05          | 0.378              | 0.46                | 0.638              | 0.77                |           |
| EV-DO 1900 Rev. 0         | SNN5932A              | 600     | 1880       | 25.00            | 24.18             | 20.3         | 0.05          | 0.38               | 0.47                | 0.639              | 0.79                |           |
| 802.11b, 1 Mbps           | SNN5932A              | 1       | 2412       |                  | 18.17             | 20.6         | -0.33         | 0.0888             | 0.10                | 0.182              | 0.20                |           |

Table 4-1: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

| Right Cheek-Touch Position |                       |         |            |                  |                   |              |               |                    |                     |                    |                     |           |
|----------------------------|-----------------------|---------|------------|------------------|-------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                       | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                   | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                            |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm) |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| CDMA 800, RC3 SO55         | SNN5932A              | 384     | 836.52     | 25.00            | 24.13             | 21.0         | 0.05          | 0.327              | 0.40                | 0.428              | 0.52                |           |
| EV-DO 800 Rev. 0           | SNN5932A              | 384     | 836.52     | 25.00            | 24.13             | 21.0         | -0.02         | 0.292              | 0.36                | 0.378              | 0.46                |           |
| CDMA 820, RC3 SO55         | SNN5932A              | 564     | 820.1      | 25.00            | 24.15             | 20.6         | 0.08          | 0.144              | 0.14                | 0.191              | 0.23                |           |
| EV-DO 820 Rev. 0           | SNN5932A              | 564     | 820.1      | 25.00            | 23.92             | 20.6         | -0.04         | 0.145              | 0.15                | 0.192              | 0.25                |           |
| CDMA 1900, RC3 SO55        | SNN5932A              | 600     | 1880       | 25.00            | 24.16             | 20.5         | 0.01          | 0.183              | 0.22                | 0.301              | 0.37                |           |
| 802.11b, 1 Mbps            | SNN5932A              | 1       | 2412       |                  | 18.17             | 20.6         | 0.06          | 0.139              | 0.14                | 0.289              | 0.29                |           |

Table 4-2: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

| Left 15° Tilt Position |                       |         |            |                  |                   |              |               |                    |                     |                    |                     |           |
|------------------------|-----------------------|---------|------------|------------------|-------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                   | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                   | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                        |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm) |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| CDMA 800, RC3 SO55     | SNN5932A              | 384     | 836.52     | 25.00            | 24.14             | 21.0         | 0.05          | 0.21               | 0.26                | 0.275              | 0.34                |           |
| CDMA 820, RC3 SO55     | SNN5932A              | 564     | 820.1      | 25.00            | 24.15             | 20.6         | 0.03          | 0.106              | 0.11                | 0.138              | 0.17                |           |
| CDMA 1900, RC3 SO55    | SNN5932A              | 600     | 1880       | 25.00            | 24.16             | 20.5         | 0.0           | 0.128              | 0.15                | 0.223              | 0.27                |           |
| 802.11b, 1 Mbps        | SNN5932A              | 1       | 2412       |                  | 18.17             | 20.6         | -0.11         | 0.113              | 0.12                | 0.232              | 0.24                |           |

Table 4-3: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

| Right 15° Tilt Position |                       |         |            |                  |                   |              |               |                    |                     |                    |                     |           |
|-------------------------|-----------------------|---------|------------|------------------|-------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                    | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                   | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                         |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm) |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| CDMA 800, RC3 SO55      | SNN5932A              | 384     | 836.52     | 25.00            | 24.14             | 21.0         | -0.02         | 0.245              | 0.30                | 0.322              | 0.39                |           |
| CDMA 820, RC3 SO55      | SNN5932A              | 564     | 820.1      | 25.00            | 24.15             | 20.6         | -0.02         | 0.101              | 0.10                | 0.132              | 0.16                |           |
| CDMA 1900, RC3 SO55     | SNN5932A              | 600     | 1880       | 25.00            | 24.16             | 20.5         | -0.02         | 0.125              | 0.15                | 0.214              | 0.26                |           |
| 802.11b, 1 Mbps         | SNN5932A              | 1       | 2412       |                  | 18.17             | 20.6         | -0.01         | 0.163              | 0.16                | 0.361              | 0.36                |           |

Table 4-4: SAR measurement results in a head-adjacent position against the ICNIRP and ANSI SAR Limit.

### 4.3 Body-Worn Accessory Exposure Results

| Body-Worn Accessory Position, Front of Phone 15 mm from Phantom |                       |         |            |                  |                   |              |               |                    |                     |                    |                     |           |
|-----------------------------------------------------------------|-----------------------|---------|------------|------------------|-------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                            | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                   | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                                 |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm) |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| EV-DO 800 Rev. A                                                | SNN5932A              | 384     | 836.52     | 25.00            | 24.16             | 21.2         | 0.0           | 0.50               | 0.61                | 0.649              | 0.79                |           |
| EV-DO 820 Rev. A                                                | SNN5932A              | 564     | 820.1      | 25.00            | 23.92             | 20.6         | -0.37         | 0.244              | 0.27                | 0.317              | 0.44                |           |
| EV-DO 1900 Rev. A                                               | SNN5932A              | 600     | 1880       | 25.00            | 24.18             | 20.2         | -0.1          | 0.298              | 0.38                | 0.528              | 0.66                |           |
| 802.11b, 1 Mbps                                                 | SNN5932A              | 1       | 2412       |                  | 18.17             | 19.8         | -0.04         | 0.0766             | 0.08                | 0.137              | 0.14                |           |

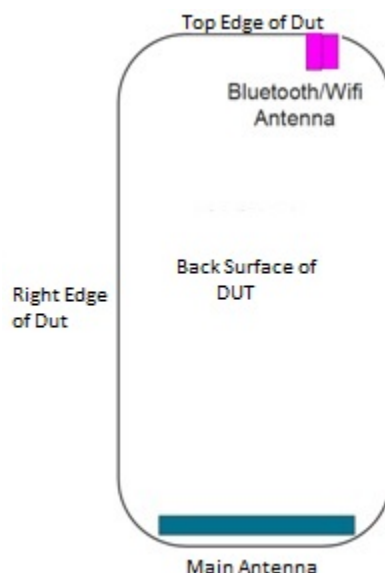
Table 4-5: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

| Body-Worn Accessory Position, Back of Phone 15 mm from Phantom |                       |         |            |                  |                   |              |               |                    |                     |                    |                     |           |
|----------------------------------------------------------------|-----------------------|---------|------------|------------------|-------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                           | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                   | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                                |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm) |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| EV-DO 800 Rev. A                                               | SNN5932A              | 1013    | 824.7      | 25.00            | 24.13             | 21.2         | -0.02         | 0.461              | 0.57                | 0.61               | 0.75                |           |
| EV-DO 800 Rev. A                                               | SNN5932A              | 384     | 836.52     | 25.00            | 24.16             | 21.2         | -0.05         | 0.567              | 0.70                | 0.812              | 1.00                |           |
| EV-DO 800 Rev. A                                               | SNN5932A              | 777     | 848.31     | 25.00            | 24.11             | 21.2         | 0.05          | 0.618              | 0.76                | 0.821              | 1.01                |           |
| EV-DO 820 Rev. A                                               | SNN5932A              | 564     | 820.1      | 25.00            | 23.92             | 20.3         | -0.07         | 0.317              | 0.32                | 0.418              | 0.54                |           |
| EV-DO 1900 Rev. A                                              | SNN5932A              | 25      | 1851.25    | 25.00            | 24.15             | 20.2         | -0.15         | 0.534              | 0.68                | 0.947              | 1.21                |           |
| EV-DO 1900 Rev. A                                              | SNN5932A              | 600     | 1880.09    | 25.00            | 24.18             | 20.2         | -0.11         | 0.50               | 0.63                | 0.885              | 1.12                |           |
| EV-DO 1900 Rev. A                                              | SNN5932A              | 1175    | 1908.75    | 25.00            | 23.98             | 20.2         | -0.14         | 0.527              | 0.70                | 0.935              | 1.24                |           |
| 802.11b, 1 Mbps                                                | SNN5932A              | 1       | 2412       |                  | 18.17             | 19.8         | 0.32          | 0.133              | 0.13                | 0.243              | 0.24                |           |

Table 4-6: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.



#### 4.4 Mobile Hotspot Exposure Results



| Mobile Hotspot Surfaces/Edges for SAR testing |       |      |      |       |     |        |
|-----------------------------------------------|-------|------|------|-------|-----|--------|
| Mode                                          | Front | Back | Left | Right | Top | Bottom |
| CDMA                                          | Yes   | Yes  | Yes  | Yes   | No  | Yes    |
| Wi-Fi                                         | Yes   | Yes  | Yes  | No    | Yes | No     |

| Mobile Hotspot Position, Front of Phone 10 mm from Phantom |                       |         |            |                  |                     |              |               |                    |                     |                    |                     |           |
|------------------------------------------------------------|-----------------------|---------|------------|------------------|---------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                       | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                     | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                            |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm)   |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| EV-DO 800 Rev. A                                           | SNN5932A              | 384     | 836.52     | 21.0             | See<br>Supplemental | 20.5         | 0.02          | 0.231              | 0.23                | 0.326              | 0.33                |           |
| EV-DO 820 Rev. A                                           | SNN5932A              | 564     | 820.1      | 21.0             | See<br>Supplemental | 20.4         | 0.03          | 0.194              | 0.19                | 0.275              | 0.28                |           |
| EV-DO 1900 Rev. A                                          | SNN5932A              | 600     | 1880       | 18.0             | See<br>Supplemental | 20.3         | -0.1          | 0.154              | 0.19                | 0.28               | 0.35                |           |
| 802.11b, 1 Mbps                                            | SNN5932A              | 1       | 2412       |                  | 18.17               | 19.8         | -0.03         | 0.126              | 0.13                | 0.236              | 0.24                |           |

Table 4-7: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

| Body-Worn Accessory Position, Back of Phone 10 mm from Phantom |                       |         |            |                  |                     |              |               |                    |                     |                    |                     |           |
|----------------------------------------------------------------|-----------------------|---------|------------|------------------|---------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                           | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                     | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                                |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm)   |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| EV-DO 800 Rev. A                                               | SNN5932A              | 384     | 836.52     | 21.0             | See<br>Supplemental | 20.4         | 0.01          | 0.308              | 0.31                | 0.44               | 0.44                |           |
| EV-DO 820 Rev. A                                               | SNN5932A              | 564     | 820.1      | 21.0             | See<br>Supplemental | 20.5         | -0.03         | 0.271              | 0.27                | 0.387              | 0.39                |           |
| EV-DO 1900 Rev. A                                              | SNN5932A              | 600     | 1880       | 18.0             | See<br>Supplemental | 20.2         | -0.12         | 0.248              | 0.25                | 0.488              | 0.50                |           |
| 802.11b, 1 Mbps                                                | SNN5932A              | 1       | 2412       |                  | 18.17               | 19.8         | 0.33          | 0.238              | 0.24                | 0.462              | 0.46                |           |

Table 4-8: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

| Mobile Hotspot Position, Left Edge of Phone 10 mm from Phantom |                       |         |            |                  |                     |              |               |                    |                     |                    |                     |           |
|----------------------------------------------------------------|-----------------------|---------|------------|------------------|---------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                           | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                     | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                                |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm)   |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| EV-DO 800 Rev. A                                               | SNN5932A              | 384     | 836.52     | 21.0             | See<br>Supplemental | 20.4         | 0.05          | 0.201              | 0.20                | 0.297              | 0.30                |           |
| EV-DO 820 Rev. A                                               | SNN5932A              | 564     | 820.1      | 21.0             | See<br>Supplemental | 20.5         | -0.06         | 0.166              | 0.17                | 0.247              | 0.25                |           |
| EV-DO 1900 Rev. A                                              | SNN5932A              | 600     | 1880       | 18.0             | See<br>Supplemental | 20.3         | 0.04          | 0.0435             | 0.04                | 0.0746             | 0.07                |           |
| 802.11b, 1 Mbps                                                | SNN5932A              | 1       | 2412       |                  | 18.17               | 19.7         | 0.05          | 0.0389             | 0.04                | 0.0694             | 0.07                |           |

Table 4-9: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

| Body-Worn Accessory Position, Right Edge of Phone 10 mm from Phantom |                       |         |            |                  |                     |              |               |                    |                     |                    |                     |           |
|----------------------------------------------------------------------|-----------------------|---------|------------|------------------|---------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                                 | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                     | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                                      |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm)   |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| EV-DO 800 Rev. A                                                     | SNN5932A              | 384     | 836.52     | 21.0             | See<br>Supplemental | 20.5         | 0.00          | 0.236              | 0.24                | 0.352              | 0.35                |           |
| EV-DO 820 Rev. A                                                     | SNN5932A              | 564     | 820.1      | 21.0             | See<br>Supplemental | 20.4         | -0.01         | 0.16               | 0.16                | 0.236              | 0.24                |           |
| EV-DO 1900 Rev. A                                                    | SNN5932A              | 600     | 1880       | 18.0             | See<br>Supplemental | 20.2         | -0.13         | 0.00844            | 0.01                | 0.0146             | 0.02                |           |

Table 4-10: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

| Mobile Hotspot Position, Top Edge of Phone 10 mm from Phantom |                       |         |            |                  |                   |              |               |                    |                     |                    |                     |           |
|---------------------------------------------------------------|-----------------------|---------|------------|------------------|-------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                          | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                   | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                               |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm) |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| 802.11b, 1 Mbps                                               | SNN5932A              | 1       | 2412       |                  | 18.17             | 19.7         | 0.00          | 0.0765             | 0.08                | 0.147              | 0.15                |           |

Table 4-11: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

| Body-Worn Accessory Position, Bottom Edge of Phone 10 mm from Phantom |                       |         |            |                  |                     |              |               |                    |                     |                    |                     |           |
|-----------------------------------------------------------------------|-----------------------|---------|------------|------------------|---------------------|--------------|---------------|--------------------|---------------------|--------------------|---------------------|-----------|
| Mode                                                                  | Battery/<br>Accessory | Channel | f<br>(MHz) | DUT Power        |                     | Temp<br>(°C) | Drift<br>(dB) | 10 g SAR value     |                     | 1 g SAR value      |                     | Plot Page |
|                                                                       |                       |         |            | Maximum<br>(dBm) | Measured<br>(dBm)   |              |               | Measured<br>(W/kg) | Corrected<br>(W/kg) | Measured<br>(W/kg) | Corrected<br>(W/kg) |           |
| EV-DO 800 Rev. A                                                      | SNN5932A              | 384     | 836.52     | 21.0             | See<br>Supplemental | 20.5         | 0.07          | 0.0132             | 0.01                | 0.0211             | 0.02                |           |
| EV-DO 820 Rev. A                                                      | SNN5932A              | 564     | 820.1      | 21.0             | See<br>Supplemental | 20.5         | 0.10          | 0.0118             | 0.01                | 0.0195             | 0.02                |           |
| EV-DO 1900 Rev. A                                                     | SNN5932A              | 600     | 1880       | 18.0             | See<br>Supplemental | 20.3         | -0.08         | 0.382              | 0.49                | 0.771              | 0.79                |           |

Table 4-12: SAR measurement results in a body-adjacent position against the ICNIRP and ANSI SAR Limit.

## 4.5 Measurement Variability Analysis

Per FCC KDB 865664 D01, SAR measurement variability was assessed for each frequency band as determined by the SAR probe calibration points and tissue-equivalent mediums used for the device measurements. These additional measurements are executed after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The phone was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for these measurements, to minimize any unexpected variations in the repeated results.

SAR measurement variability was assessed using the following procedures for each frequency band:

1. If the original highest measured SAR is  $< 0.8 \text{ W/kg}$ , the following steps do not apply and no repeat measurements were executed.
2. If the original highest measured SAR is  $\geq 0.8 \text{ W/kg}$ , that measurement was repeated once.
3. If the ratio of the largest to smallest SAR for the original and first repeated measurement was  $> 1.2$ , or if the original or first repeated measurement was  $\geq 1.45 \text{ W/kg}$ , the measurement was repeated a second time.
4. If the ratio of the largest to smallest SAR for the original, first repeated, or second repeated measurement was  $> 1.2$ , and one of those measurements was  $\geq 1.5 \text{ W/kg}$ , the measurement was repeated a third time.

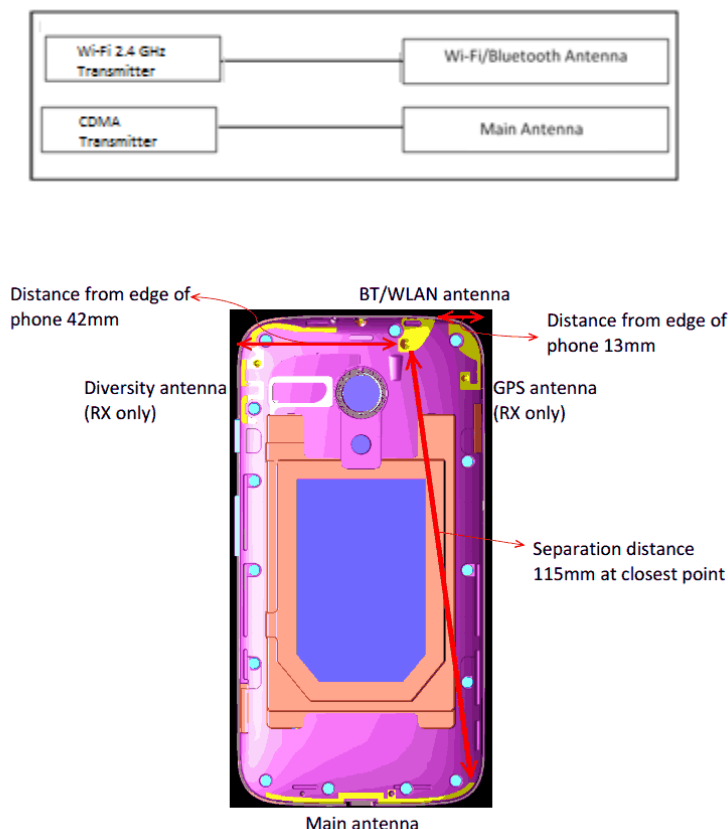
| SAR Measurement Variability Results |                                                                   |         |            |                                       |                                  |       |                                  |       |                                  |       |
|-------------------------------------|-------------------------------------------------------------------|---------|------------|---------------------------------------|----------------------------------|-------|----------------------------------|-------|----------------------------------|-------|
| Mode                                | Exposure Condition                                                | Channel | f<br>(MHz) | Original<br>Measured<br>SAR<br>(W/kg) | 1st<br>Repeated<br>SAR<br>(W/kg) | Ratio | 2nd<br>Repeated<br>SAR<br>(W/kg) | Ratio | 3rd<br>Repeated<br>SAR<br>(W/kg) | Ratio |
| EV-DO 800 Rev. 0                    | Body-Worn Accessory Position, Back of<br>Phone 15 mm from Phantom | 777     | 848.31     | 0.821                                 | 0.783                            | 0.95  | N/A                              | N/A   | N/A                              | N/A   |
| EV-DO 1900 Rev. 0                   | Body-Worn Accessory Position, Back of<br>Phone 15 mm from Phantom | 1175    | 1908.75    | 0.935                                 | 1.02                             | 1.09  | N/A                              | N/A   | N/A                              | N/A   |

Table 4-13: SAR measurement results for Variability Analysis

## 4.6 Description and Evaluation of Simultaneous Transmitters

Per FCC KDB 447498 D01, the necessity of simultaneous SAR testing was evaluated for the licensed and unlicensed transmitters of the phone under test.

By design some or all of the transmitters built into the phone may operate simultaneously, as described in the tables on the following pages. A simplified model of the transmit paths and a diagram of the separation distances between the transmitting antennas are provided below.



When standalone SAR test exclusion applies to a mode and antenna that transmits simultaneously with other modes and antennas, the KDB directs that the standalone SAR of that mode must be estimated for evaluation in the SAR summations.

For simultaneous SAR evaluation, Bluetooth SAR was estimated and included in all applicable SAR summations. For Body-Worn Accessory simultaneous SAR evaluation, the value used for inclusion in these summations was found to be:

$$\frac{[10]_{(mW)}}{[25]_{(mm)}} \times \frac{\sqrt{2.44_{(GHz)}}}{7.5} = 0.1 W/kg_{(estimated)}$$

For Mobile Hotspot simultaneous SAR evaluation, the value used for inclusion in these summations was found to be:

$$\frac{[10]_{(mW)}}{[10]_{(mm)}} \times \frac{\sqrt{2.44_{(GHz)}}}{7.5} = 0.2 W/kg_{(estimated)}$$

Note Bluetooth and Wi-Fi share the same transmit path, and cannot transmit simultaneously.

A description of the power conditions or reduced limits for simultaneous transmit modes is provided in section 2.5 and in expanded detail in Exhibit 12. The notation used in the “Exposure Condition” tables is as follows for the PWR column:

- *N/A* indicates the transmitter in this case has no reduced power limit enforced and may operate up to its maximum power, and no conditions are contingent on this transmitter’s operation.
- *Values other than “N/A”* indicate an enforced power limit, at the value stated in dBm, on the noted transmitter for this simultaneous transmit case.

Per FCC KDB 447498 D01 section 4.3.2, when the sum of the 1 g SAR values of all simultaneously transmitting antennas and device modes in an exposure condition is within the SAR limit, that simultaneous transmission configuration may be excluded from SAR measurements. Simultaneous SAR summations for the head-adjacent, dispatch/push-to-talk, body-worn accessory, and mobile hotspot exposure conditions with the worst-case SAR transmitter configurations are presented in the following tables.

| Head Exposure Conditions;<br>Simultaneous Transmit Configurations, including Power |                           |     |                           |     |                         |
|------------------------------------------------------------------------------------|---------------------------|-----|---------------------------|-----|-------------------------|
| Case                                                                               | Transmitter #1            |     | Transmitter #2            |     | Notes                   |
|                                                                                    | Transmitter Configuration | PWR | Transmitter Configuration | PWR |                         |
| H1                                                                                 | CDMA 800 BC0              | N/A | Wi-Fi 2.4 GHz             | N/A | Voice + Background Data |
| H2                                                                                 | EVDO 800 BC0              | N/A | Wi-Fi 2.4 GHz             | N/A | VoIP + Mobile Hotspot   |
| H3                                                                                 | CDMA 820 BC10             | N/A | Wi-Fi 2.4 GHz             | N/A | Voice + Background Data |
| H4                                                                                 | EVDO 820 BC10             | N/A | Wi-Fi 2.4 GHz             | N/A | VoIP + Mobile Hotspot   |
| H5                                                                                 | CDMA 1900 BC1             | N/A | Wi-Fi 2.4 GHz             | N/A | Voice + Background Data |
| H6                                                                                 | EVDO 1900 BC1             | N/A | Wi-Fi 2.4 GHz             | N/A | VoIP + Mobile Hotspot   |

|                                  |                     | Transmitter Stand-Alone 1 g SAR Values (W/kg) |          |           |               | 1 g SAR Summations (W/kg)      |                                |                                 |
|----------------------------------|---------------------|-----------------------------------------------|----------|-----------|---------------|--------------------------------|--------------------------------|---------------------------------|
|                                  |                     |                                               |          |           |               | Case H1                        | Case H2                        | Case H3                         |
| Band                             |                     | CDMA 800                                      | CDMA 820 | CDMA 1900 | Wi-Fi 2.4 GHz | CDMA 800<br>+<br>Wi-Fi 2.4 GHz | CDMA 820<br>+<br>Wi-Fi 2.4 GHz | CDMA 1900<br>+<br>Wi-Fi 2.4 GHz |
| Power Condition or Reduced Limit |                     | N/A                                           | N/A      | N/A       | N/A           |                                |                                |                                 |
| Position                         | Left Head Cheek     | 0.52                                          | 0.22     | 0.77      | 0.20          | 0.72                           | 0.42                           | 0.97                            |
|                                  | Left Head 15° Tilt  | 0.34                                          | 0.17     | 0.27      | 0.24          | 0.58                           | 0.41                           | 0.51                            |
|                                  | Right Head Cheek    | 0.52                                          | 0.23     | 0.37      | 0.29          | 0.81                           | 0.52                           | 0.66                            |
|                                  | Right Head 15° Tilt | 0.39                                          | 0.16     | 0.26      | 0.36          | 0.75                           | 0.52                           | 0.62                            |

Table 4-14: SAR summations for simultaneous evaluation – CDMA in Head Positions

|                                  |                     | Transmitter Stand-Alone 1 g SAR Values (W/kg) |          |           |               | 1 g SAR Summations (W/kg)      |                                |                                 |
|----------------------------------|---------------------|-----------------------------------------------|----------|-----------|---------------|--------------------------------|--------------------------------|---------------------------------|
|                                  |                     |                                               |          |           |               | Case H4                        | Case H5                        | Case H6                         |
| Band                             |                     | EVDO 800                                      | EVDO 820 | EVDO 1900 | Wi-Fi 2.4 GHz | EVDO 800<br>+<br>Wi-Fi 2.4 GHz | EVDO 820<br>+<br>Wi-Fi 2.4 GHz | EVDO 1900<br>+<br>Wi-Fi 2.4 GHz |
| Power Condition or Reduced Limit |                     | N/A                                           | N/A      | N/A       | N/A           |                                |                                |                                 |
| Position                         | Left Head Cheek     | N/A                                           | N/A      | 0.79      | 0.20          | N/A                            | N/A                            | 0.99                            |
|                                  | Left Head 15° Tilt  | N/A                                           | N/A      | N/A       | 0.24          | N/A                            | N/A                            | N/A                             |
|                                  | Right Head Cheek    | 0.46                                          | 0.25     | N/A       | 0.29          | 0.75                           | 0.54                           | N/A                             |
|                                  | Right Head 15° Tilt | N/A                                           | N/A      | N/A       | 0.36          | N/A                            | N/A                            | N/A                             |

Table 4-15: SAR summations for simultaneous evaluation – EVDO in Head Positions

| Body-Worn Accessory Exposure Conditions;<br>Simultaneous Transmit Configurations, including Power Conditions |                           |     |                           |     |                         |
|--------------------------------------------------------------------------------------------------------------|---------------------------|-----|---------------------------|-----|-------------------------|
| Case                                                                                                         | Transmitter #1            |     | Transmitter #2            |     | Notes                   |
|                                                                                                              | Transmitter Configuration | PWR | Transmitter Configuration | PWR |                         |
| B1                                                                                                           | CDMA 800 BC0              | N/A | Wi-Fi 2.4 GHz             | N/A | Voice + Background Data |
| B2                                                                                                           | CDMA 820 BC10             | N/A | Wi-Fi 2.4 GHz             | N/A | Voice + Background Data |
| B3                                                                                                           | CDMA 1900 BC1             | N/A | Wi-Fi 2.4 GHz             | N/A | Voice + Background Data |
| B4                                                                                                           | CDMA 800 BC0              | N/A | Bluetooth                 | N/A | Voice + BT (Estimated)  |
| B5                                                                                                           | CDMA 820 BC10             | N/A | Bluetooth                 | N/A | Voice + BT (Estimated)  |
| B6                                                                                                           | CDMA 1900 BC1             | N/A | Bluetooth                 | N/A | Voice + BT (Estimated)  |

|                                  |                                              | Transmitter Stand-Alone 1 g SAR Values (W/kg) |          |           |               | 1 g SAR Summations (W/kg) |                          |                           |
|----------------------------------|----------------------------------------------|-----------------------------------------------|----------|-----------|---------------|---------------------------|--------------------------|---------------------------|
| Band                             |                                              | CDMA 800                                      | CDMA 820 | CDMA 1900 | Wi-Fi 2.4 GHz | Case B1                   | Case B2                  | Case B3                   |
| Power Condition or Reduced Limit |                                              | N/A                                           | N/A      | N/A       | N/A           | CDMA 800 + Wi-Fi 2.4 GHz  | CDMA 820 + Wi-Fi 2.4 GHz | CDMA 1900 + Wi-Fi 2.4 GHz |
| Position                         | Body Worn, Front of Phone 15 mm from Phantom | 0.79                                          | 0.44     | 0.66      | 0.14          | 0.93                      | 0.58                     | 0.80                      |
|                                  | Body Worn, Back of Phone 15 mm from Phantom  | 1.01                                          | 0.54     | 1.24      | 0.24          | 1.25                      | 0.78                     | 1.48                      |

Table 4-16: SAR summations for simultaneous evaluation – CDMA in Body-Worn Accessory Positions w/WiFi

|                                  |                                              | Transmitter Stand-Alone 1 g SAR Values (W/kg) |          |           |           | 1 g SAR Summations (W/kg) |                      |                       |
|----------------------------------|----------------------------------------------|-----------------------------------------------|----------|-----------|-----------|---------------------------|----------------------|-----------------------|
| Band                             |                                              | CDMA 800                                      | CDMA 820 | CDMA 1900 | Bluetooth | Case B4                   | Case B5              | Case B6               |
| Power Condition or Reduced Limit |                                              | N/A                                           | N/A      | N/A       | N/A       | CDMA 800 + Bluetooth      | CDMA 820 + Bluetooth | CDMA 1900 + Bluetooth |
| Position                         | Body Worn, Front of Phone 15 mm from Phantom | 0.79                                          | 0.44     | 0.66      | 0.10      | 0.89                      | 0.54                 | 0.76                  |
|                                  | Body Worn, Back of Phone 15 mm from Phantom  | 1.01                                          | 0.54     | 1.24      | 0.10      | 1.11                      | 0.64                 | 1.34                  |

Table 4-17: SAR summations for simultaneous evaluation – CDMA in Body-Worn Accessory Positions w/BT

| Mobile Hotspot Exposure Conditions;<br>Simultaneous Transmit Configurations, including Reduced Power Limits |                           |      |                           |     |                        |
|-------------------------------------------------------------------------------------------------------------|---------------------------|------|---------------------------|-----|------------------------|
| Case                                                                                                        | Transmitter #1            |      | Transmitter #2            |     | Notes                  |
|                                                                                                             | Transmitter Configuration | PWR  | Transmitter Configuration | PWR |                        |
| M1                                                                                                          | EV-DO 800 Rev. 0          | 26.5 | Wi-Fi 2.4 GHz             | N/A | Mobile Hotspot session |
| M2                                                                                                          | EV-DO 820 Rev. 0          | 23.5 | Wi-Fi 2.4 GHz             | N/A | Mobile Hotspot session |
| M5                                                                                                          | EV-DO 1900 Rev. 0         | 19.0 | Wi-Fi 2.4 GHz             | N/A | Mobile Hotspot session |

|                                  |                                         | Transmitter Stand-Alone 1 g SAR Values (W/kg) |          |           |               | 1 g SAR Summations (W/kg) |                          |                           |
|----------------------------------|-----------------------------------------|-----------------------------------------------|----------|-----------|---------------|---------------------------|--------------------------|---------------------------|
| Band                             |                                         | EVDO 800                                      | EVDO 820 | EVDO 1900 | Wi-Fi 2.4 GHz | Case M1                   | Case M2                  | Case M3                   |
| Power Condition or Reduced Limit |                                         | 26.5                                          | 23.5     | 22.0      | N/A           | EVDO 800 + Wi-Fi 2.4 GHz  | EVDO 820 + Wi-Fi 2.4 GHz | EVDO 1900 + Wi-Fi 2.4 GHz |
| Position                         | Front of Phone 10 mm from Phantom       | 0.33                                          | 0.35     | 0.35      | 0.24          | 0.57                      | 0.59                     | 0.59                      |
|                                  | Back of Phone 10 mm from Phantom        | 0.44                                          | 0.39     | 0.50      | 0.46          | 0.90                      | 0.85                     | 0.96                      |
|                                  | Left Edge of Phone 10 mm from Phantom   | 0.30                                          | 0.25     | 0.07      | 0.07          | 0.37                      | 0.32                     | 0.14                      |
|                                  | Right Edge of Phone 10 mm from Phantom  | 0.35                                          | 0.24     | 0.02      | N/A           | N/A                       | N/A                      | N/A                       |
|                                  | Top Edge of Phone 10 mm from Phantom    | N/A                                           | N/A      | N/A       | 0.15          | N/A                       | N/A                      | N/A                       |
|                                  | Bottom Edge of Phone 10 mm from Phantom | 0.02                                          | 0.02     | 0.79      | N/A           | N/A                       | N/A                      | N/A                       |

Table 4-18: SAR summations for simultaneous evaluation – Positions during a Mobile Hotspot session w/ WiFi

### Simultaneous Evaluation Conclusion

As no summation of transmitter SAR values results in a value greater than the compliance limit, no measurements for simultaneous SAR are required.

## 5 References to Test Standards and Guidance

- [1] CENELEC, EN 62209-1:2006 “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)”
- [2] CENELEC, EN 50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)”.
- [3] ANSI / IEEE, C95.1 1992 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”
- [4] Removed
- [5] IEEE 1528 2003 Edition “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”
- [6] ICNIRP Guidelines “Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”
- [7] IC RSS-102 “Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)”
- [8] IC Notice 2012-DRS1203 “RE: Applicability of Latest FCC RF Exposure KDB Procedures (Publication Date: October 24, 2012) and Other Procedures”
- [9] CENELEC, EN 62209-2:2010 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)”
- [10] FCC KDB Publication 248227 D01 v01r02 “SAR Measurement Procedures for 802.11 a/b/g Transmitters”
- [11] FCC KDB Publication 447498 D01 v05r01 “Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies”
- [12] FCC KDB Publication 648474 D04 v01r01 “SAR Evaluation Considerations for Wireless Handsets”
- [13] FCC KDB Publication 865664 D01 v01r01 “SAR Measurement Requirements for 100 MHz to 6 GHz”
- [14] FCC KDB Publication 865664 D02 v01r01 “RF Exposure Compliance Reporting and Documentation Considerations”
- [15] FCC KDB Publication 941225 D01 v02 “SAR Measurement Procedures for 3G Devices”
- [16] FCC KDB Publication 941225 D03 v01 “Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE”
- [17] FCC KDB Publication 941225 D05 v02r02 “SAR Evaluation Considerations for LTE Devices”
- [18] FCC KDB Publication 941225 D06 v01r01 “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”

## **Appendix 1**

### **SAR Distribution Plots for Test System Verification**

## **System Accuracy Verification Measurements for Head SAR Measurements**



Date/Time: 8/7/2013 7:36:42 AM

**Test Lab: Motorola Mobility - CW System Verification for SAR using Dipoles****DUT Serial: D835V2 - SN:422tr****DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(6.23,6.23,6.23); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: CW for SAR Dipoles; Frequency: 835.0 MHz; Duty Cycle: 1:1.000  
Medium Parameters used:  $f=835$  MHz;  $\sigma = 0.9124$ ;  $\epsilon_r = 39.81$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

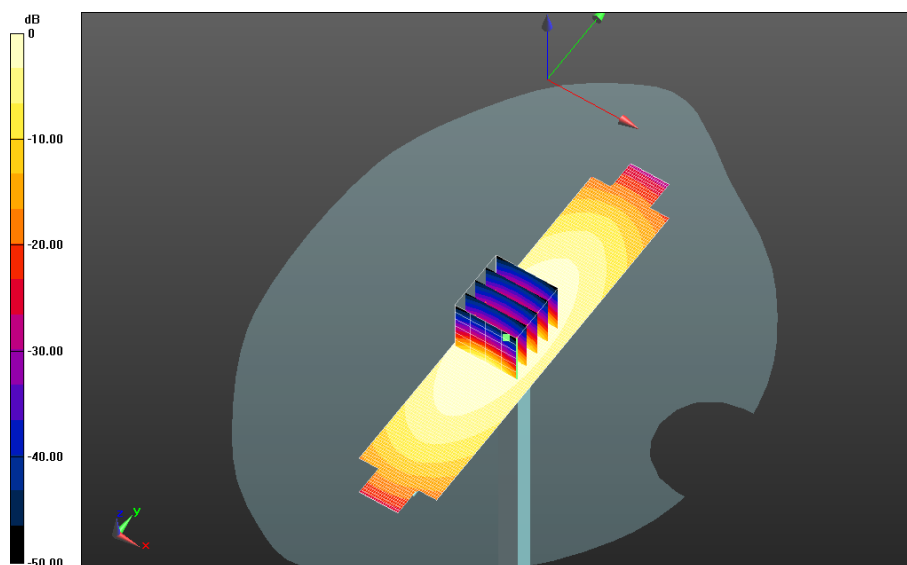
**<2 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1):****Interpolated grid: dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 1.83 W/kg; SAR(10g) = 1.22 W/kg

**<2 GHz, SAM Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 47.022 V/m, Power Drift = 0.014 dB

Averaged SAR: SAR(1g) = 1.82 W/kg; SAR(10g) = 1.20 W/kg

**Daily SPC Check**

Date/Time: 8/12/2013 8:31:38 AM

**Test Lab: Motorola Mobility - CW System Verification for SAR using Dipoles****DUT Serial: D835V2 - SN:423tr****DASY Configuration:**

- Probe: ES3DV3 - SN3037; ConvF(6.23,6.23,6.23); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1132
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: CW for SAR Dipoles; Frequency: 835.0 MHz; Duty Cycle: 1:1.000  
Medium Parameters used:  $f=835$  MHz;  $\sigma = 0.9188$ ;  $\epsilon_r = 40.13$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

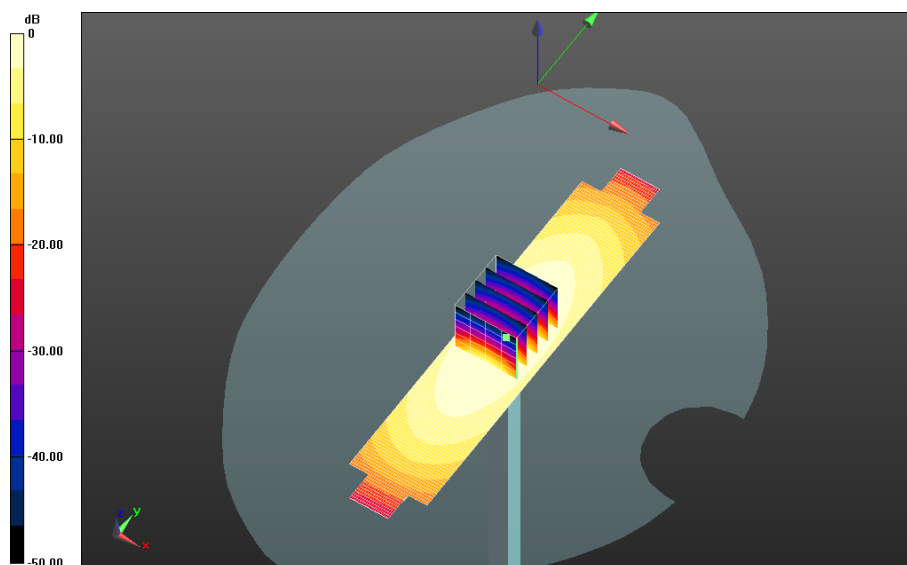
**<2 GHz, SAM Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1):****Interpolated grid: dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 1.87 W/kg; SAR(10g) = 1.25 W/kg

**<2 GHz, SAM Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 47.675 V/m, Power Drift = -0.00916 dB

Averaged SAR: SAR(1g) = 1.87 W/kg; SAR(10g) = 1.23 W/kg

**Daily SPC Check**

Date/Time: 8/7/2013 7:05:42 AM

**Test Lab: Motorola Mobility - CW System Verification for SAR using Dipoles****DUT Serial: D1800V2 - SN:259tr****DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: CW for SAR Dipoles; Frequency: 1800 MHz; Duty Cycle: 1:1.000  
Medium Parameters used:  $f=1800$  MHz;  $\sigma = 1.342$ ;  $\epsilon_r = 38.43$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

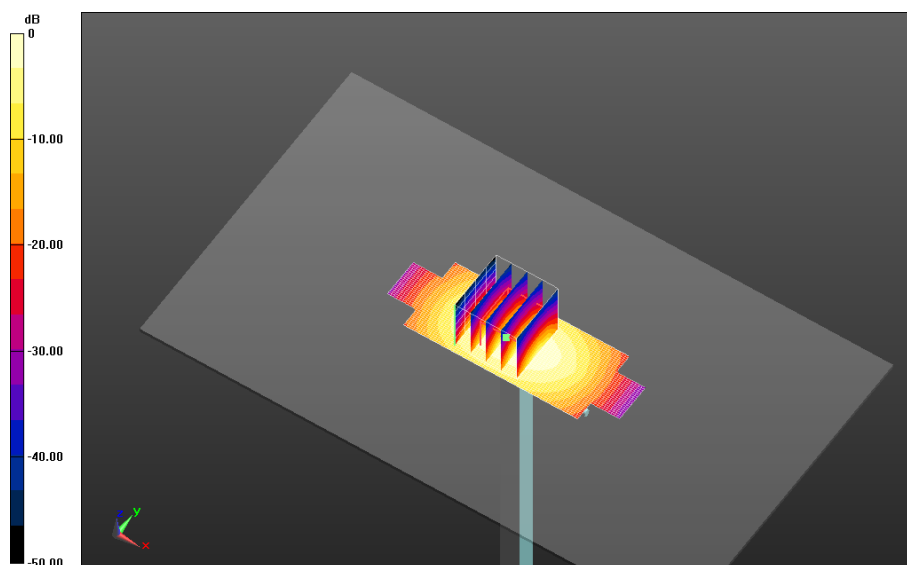
**< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1):****Interpolated grid: dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 7.46 W/kg; SAR(10g) = 4.04 W/kg

**< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 79.548 V/m, Power Drift = 0.024 dB

Averaged SAR: SAR(1g) = 7.40 W/kg; SAR(10g) = 3.91 W/kg

**Daily SPC Check**

## **System Accuracy Verification Measurements for Body SAR Measurements**

Date/Time: 8/6/2013 9:41:38 PM

**Test Lab: Motorola Mobility - CW System Verification for SAR using Dipoles****DUT Serial: D835V2 - SN:422tr****DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(6.05,6.05,6.05); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: CW for SAR Dipoles; Frequency: 835.0 MHz; Duty Cycle: 1:1.000  
Medium Parameters used:  $f=835$  MHz;  $\sigma = 0.9978$ ;  $\epsilon_r = 54.04$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

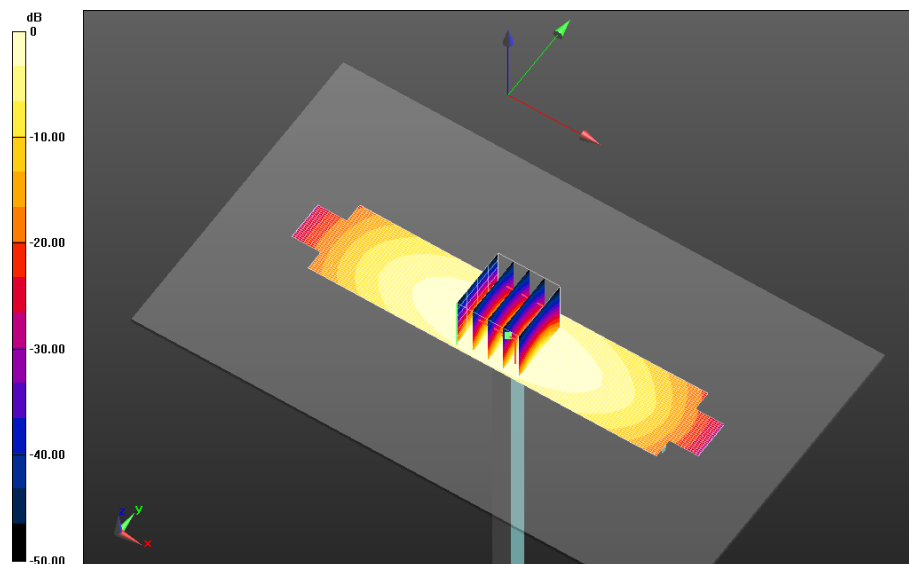
**< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1):****Interpolated grid: dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 1.91 W/kg; SAR(10g) = 1.27 W/kg

**< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 46.662 V/m, Power Drift = 0.043 dB

Averaged SAR: SAR(1g) = 1.92 W/kg; SAR(10g) = 1.28 W/kg

**Daily SPC Check**

Date/Time: 8/12/2013 4:25:38 PM

**Test Lab: Motorola Mobility - CW System Verification for SAR using Dipoles****DUT Serial: D835V2 - SN:423tr****DASY Configuration:**

- Probe: ES3DV3 - SN3037; ConvF(6.16,6.16,6.16); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: CW for SAR Dipoles; Frequency: 835.0 MHz; Duty Cycle: 1:1.000  
Medium Parameters used:  $f=835$  MHz;  $\sigma = 1.002$ ;  $\epsilon_r = 54.26$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

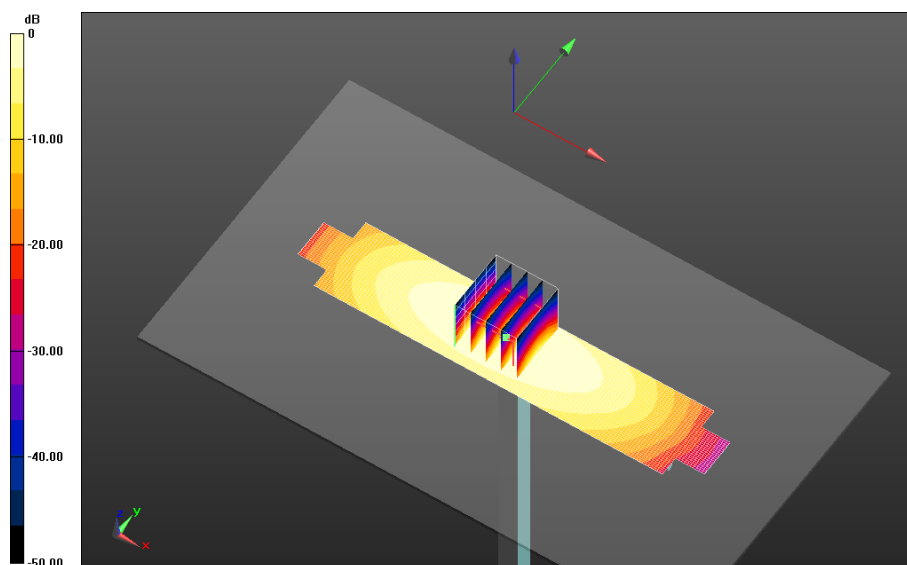
**< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1):****Interpolated grid: dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 1.92 W/kg; SAR(10g) = 1.28 W/kg

**< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 46.732 V/m, Power Drift = -0.013 dB

Averaged SAR: SAR(1g) = 1.92 W/kg; SAR(10g) = 1.28 W/kg

**Daily SPC Check**

Date/Time: 8/7/2013 12:56:22 AM

**Test Lab: Motorola Mobility - CW System Verification for SAR using Dipoles****DUT Serial: D1800V2 - SN:259tr****DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(4.78,4.78,4.78); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: CW for SAR Dipoles; Frequency: 1800 MHz; Duty Cycle: 1:1.000  
Medium Parameters used:  $f=1800$  MHz;  $\sigma = 1.451$ ;  $\epsilon_r = 52.74$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

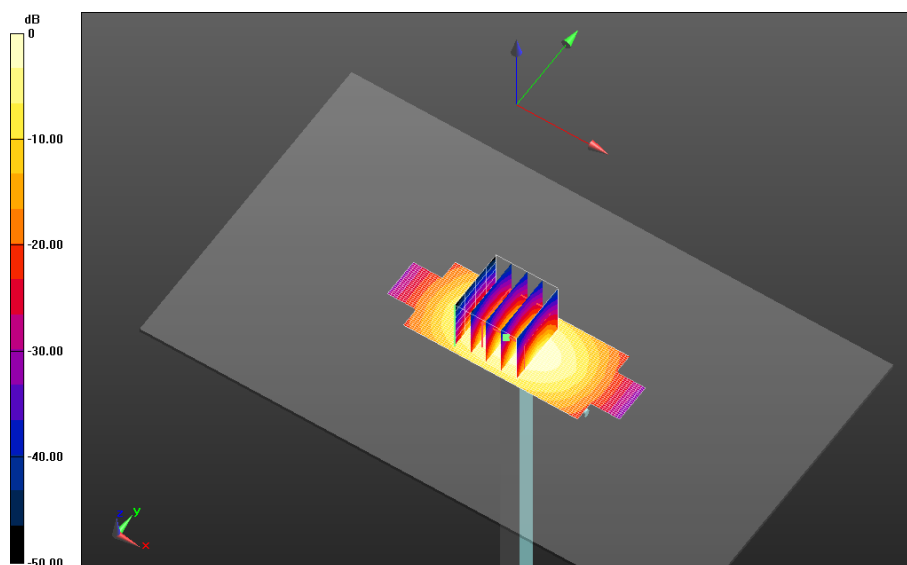
**< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1):****Interpolated grid: dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 7.44 W/kg; SAR(10g) = 3.95 W/kg

**< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 76.227 V/m, Power Drift = 0.011 dB

Averaged SAR: SAR(1g) = 7.37 W/kg; SAR(10g) = 3.93 W/kg

**Daily SPC Check**

Date/Time: 8/13/2013 7:20:33 AM

**Test Lab: Motorola Mobility - CW System Verification for SAR using Dipoles****DUT Serial: D1800V2 - SN:2d191****DASY Configuration:**

- Probe: ES3DV3 - SN3037; ConvF(4.83,4.83,4.83); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: CW for SAR Dipoles; Frequency: 1800 MHz; Duty Cycle: 1:1.000  
Medium Parameters used:  $f=1800$  MHz;  $\sigma = 1.432$ ;  $\epsilon_r = 52.33$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

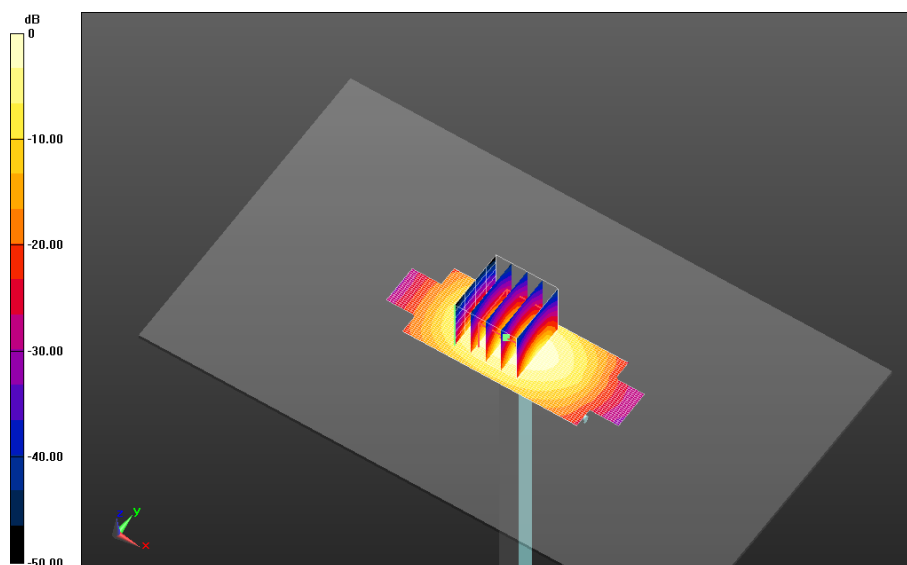
**< 2GHz, Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1):****Interpolated grid: dx=1.000 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 7.82 W/kg; SAR(10g) = 4.10 W/kg

**< 2GHz, Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 76.893 V/m, Power Drift = 0.00341 dB

Averaged SAR: SAR(1g) = 7.65 W/kg; SAR(10g) = 4.06 W/kg

**Daily SPC Check**



Date/Time: 8/6/2013 9:41:38 PM

## **Appendix 2**

### **SAR Distribution Plots for Head-Adjacent Test Results**

Date/Time: 8/7/2013 10:51:11 AM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230042 ; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Cheek](#)**DASY Configuration:**

- Probe: ES3DV3 - SN3180; ConvF(6.23,6.23,6.23); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 800; Frequency: 836.5 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=836.52$  MHz;  $\sigma = 0.9138$ ;  $\epsilon_r = 39.78$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

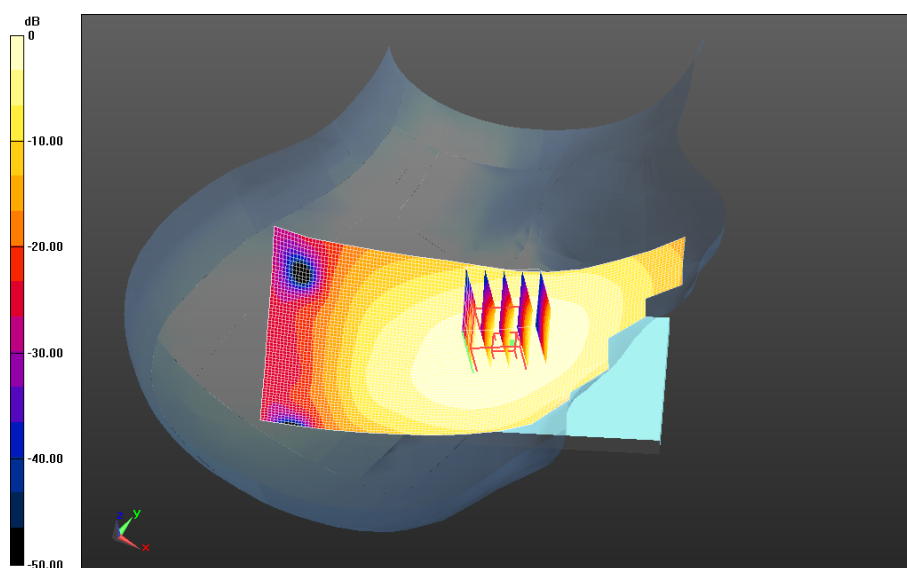
**0.6-2GHz Right Head Template/15mm, Area Scan (61x161x1):****Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.427 W/kg; SAR(10g) = 0.290 W/kg

**0.6-2GHz Right Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 21.874 V/m, Power Drift = 0.054 dB

Averaged SAR: SAR(1g) = 0.428 W/kg; SAR(10g) = 0.327 W/kg

**0.6-2GHz Right Head Template**

Date/Time: 8/12/2013 7:43:28 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230059; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Cheek](#)**DASY Configuration:**

- Probe: ES3DV3 - SN3037; ConvF(6.23,6.23,6.23); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1132
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 820 (Band Class 10);  
Frequency: 820.1 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=820.1$  MHz;  $\sigma = 0.9039$ ;  $\epsilon_r = 40.32$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

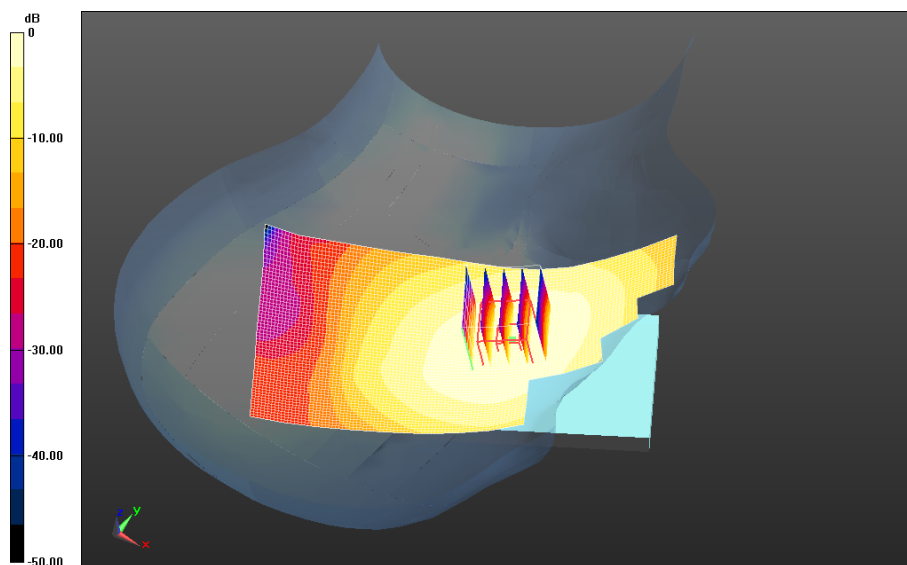
**0.6-2GHz Right Head Template/15mm, Area Scan (61x161x1):****Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.188 W/kg; SAR(10g) = 0.129 W/kg

**0.6-2GHz Right Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 14.949 V/m, Power Drift = 0.084 dB

Averaged SAR: SAR(1g) = 0.191 W/kg; SAR(10g) = 0.144 W/kg

**0.6-2GHz Right Head Template**

Date/Time: 8/7/2013 9:44:07 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230042; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Cheek](#)

### DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.01,5.01,5.01); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#1 - Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1319
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=1880$  MHz;  $\sigma = 1.427$ ;  $\epsilon_r = 38.02$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

### 0.6-2GHz, Left Head Template/15mm, Area Scan (61x161x1):

**Interpolated grid: dx=1.500 mm, dy=1.500 mm**

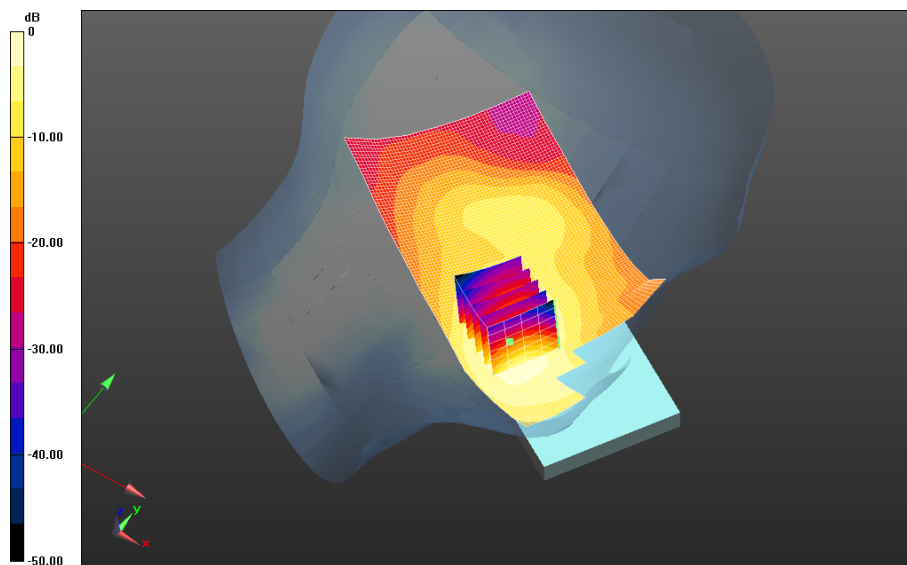
Fast SAR: SAR(1g) = 0.623 W/kg; SAR(10g) = 0.357 W/kg

### 0.6-2GHz, Left Head Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:

**Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 18.699 V/m, Power Drift = 0.048 dB

Averaged SAR: SAR(1g) = 0.639 W/kg; SAR(10g) = 0.380 W/kg



**0.6-2GHz, Left Head Template**

## **Appendix 3**

### **SAR Distribution Plots for Body-Worn Accessory Test Results**

Date/Time: 8/7/2013 3:39:09 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230042 ; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Body Worn](#), [Back of Phone](#) from [Phantom](#)

### DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.05,6.05,6.05); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 800; Frequency: 848.3 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=848.31$  MHz;  $\sigma = 1.011$ ;  $\epsilon_r = 53.90$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

### 0.6-2GHz Triple Flat Phone Template/Area Scan (10mm) (261x141x1):

**Interpolated grid: dx=1.000 mm, dy=1.000 mm**

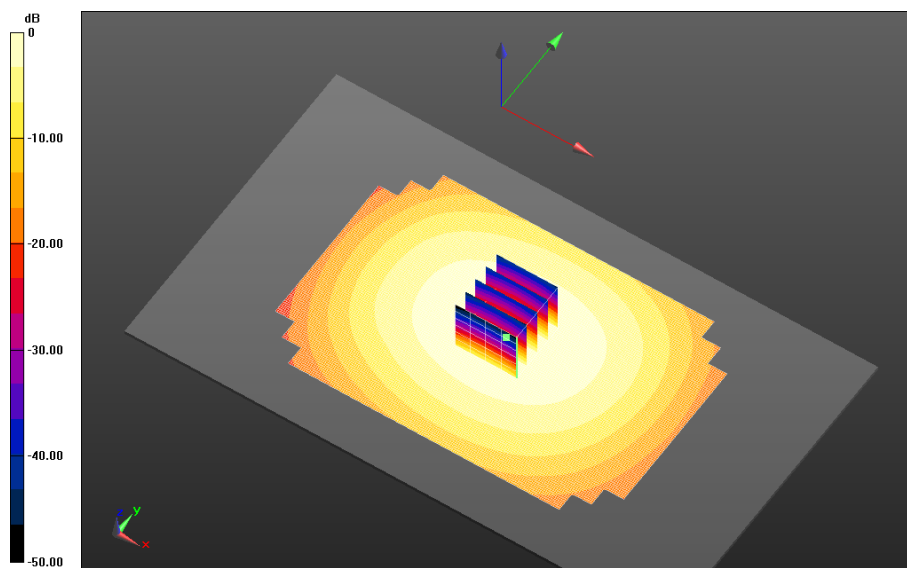
Fast SAR: SAR(1g) = 0.823 W/kg; SAR(10g) = 0.574 W/kg

### 0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:

**Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 28.284 V/m, Power Drift = 0.046 dB

Averaged SAR: SAR(1g) = 0.821 W/kg; SAR(10g) = 0.618 W/kg



**0.6-2GHz Triple Flat Phone Template**

Date/Time: 8/12/2013 6:31:07 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230059; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Body Worn](#), [Back of Phone from Phantom](#)

### DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.16,6.16,6.16); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 820 (Band Class 10);

Frequency: 820.1 MHz; Duty Cycle: 1:1.000

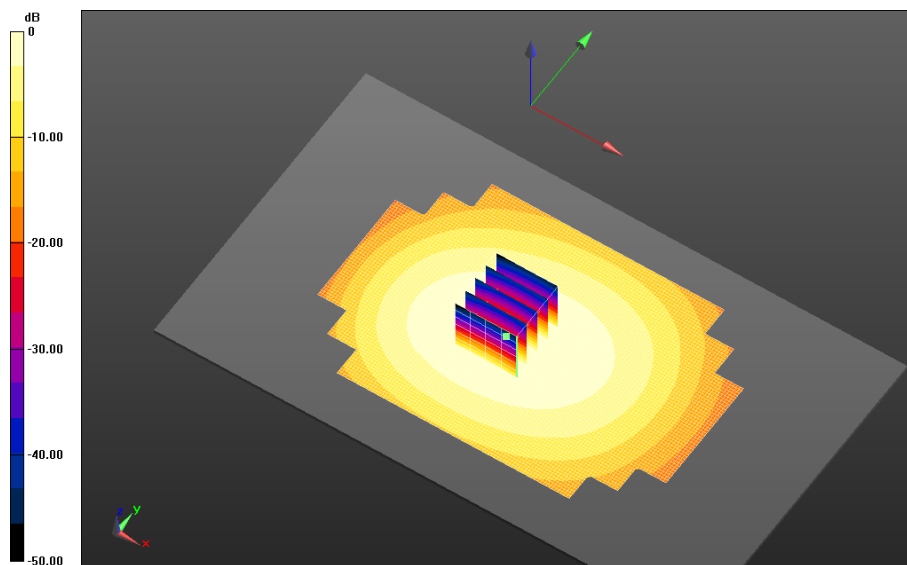
Medium Parameters used:  $f=820.1$  MHz;  $\sigma = 0.9873$ ;  $\epsilon_r = 54.43$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>**0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):****Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.418 W/kg; SAR(10g) = 0.293 W/kg

**0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 21.339 V/m, Power Drift = -0.073 dB

Averaged SAR: SAR(1g) = 0.418 W/kg; SAR(10g) = 0.317 W/kg



**0.6-2GHz Triple Flat Phone Template**

Date/Time: 8/7/2013 11:25:21 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230042; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: **Body Worn, Back of Phone from Phantom**

### DASY Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.78,4.78,4.78); Calibrated: 2/11/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 5/21/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 1900; Frequency: 1909 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=1908.75$  MHz;  $\sigma = 1.583$ ;  $\epsilon_r = 51.89$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

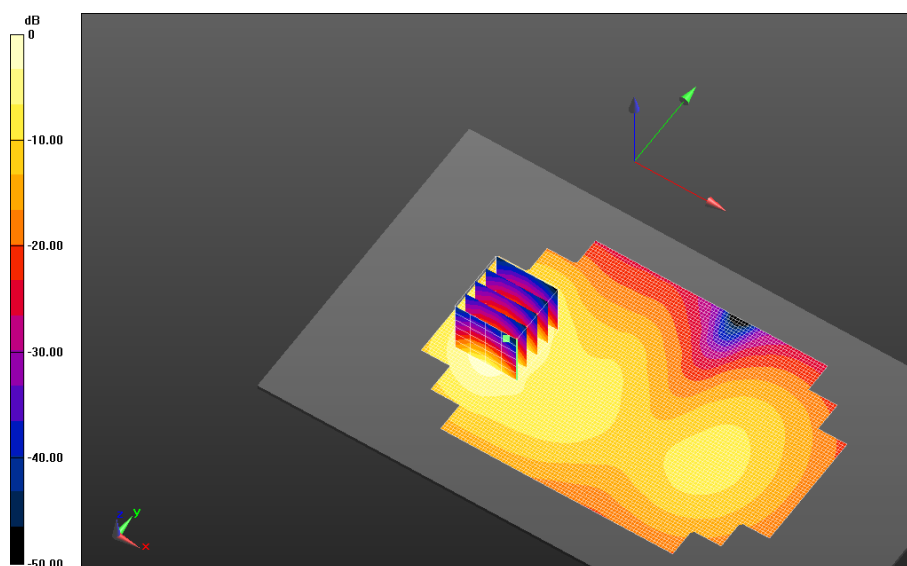
**0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):****Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.914 W/kg; SAR(10g) = 0.493 W/kg

**0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (21x21x36)/Cube 0:****Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm**

Reference Value = 18.664 V/m, Power Drift = -0.136 dB

Averaged SAR: SAR(1g) = 0.935 W/kg; SAR(10g) = 0.527 W/kg



**0.6-2GHz Triple Flat Phone Template**



## **Appendix 4**

### **SAR Distribution Plots for Mobile Hotspot Test Results**

Date/Time: 8/13/2013 6:11:32 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230042; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Back Edge of Phone 10 mm from Phantom](#)**DASY Configuration:**

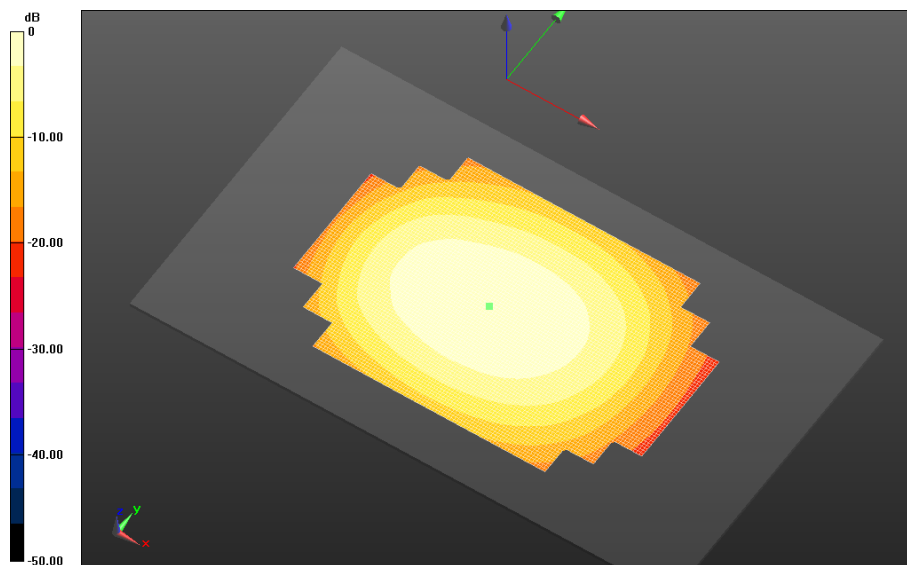
- Probe: ES3DV3 - SN3037; ConvF(6.16,6.16,6.16); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 800; Frequency: 836.5 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=836.52$  MHz;  $\sigma = 0.9959$ ;  $\epsilon_r = 53.92$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

**0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):****Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.440 W/kg; SAR(10g) = 0.308 W/kg

**0.6-2GHz Triple Flat Phone Template**

Date/Time: 8/13/2013 11:21:03 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230059; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Back Edge of Phone 10 mm from Phantom](#)

### DASY Configuration:

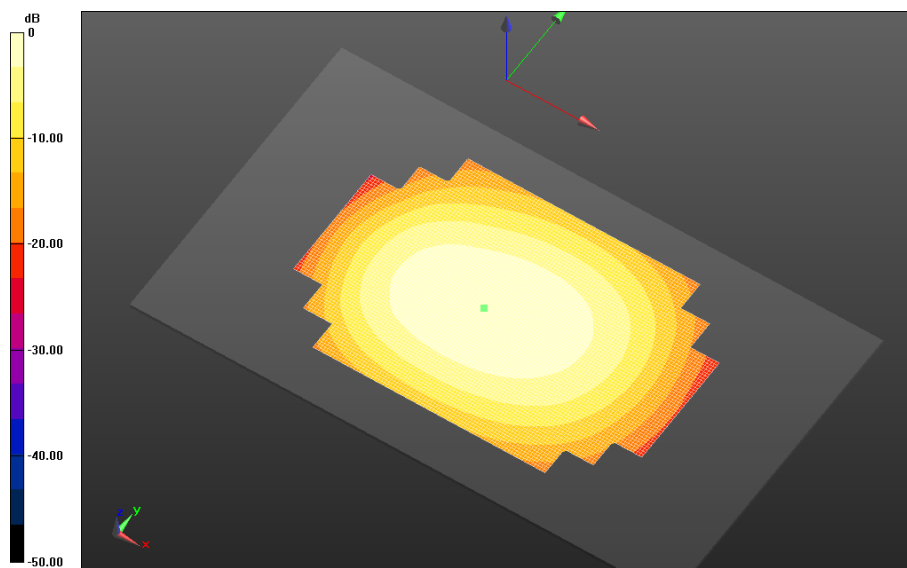
- Probe: ES3DV3 - SN3037; ConvF(6.16,6.16,6.16); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 820 (Band Class 10);  
Frequency: 820.1 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=820.1$  MHz;  $\sigma = 0.9765$ ;  $\epsilon_r = 54.09$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

**0.6-2GHz Triple Flat Phone Template/Area Scan (15mm), not for EDGES (181x101x1):****Interpolated grid: dx=1.500 mm, dy=1.500 mm**

Fast SAR: SAR(1g) = 0.387 W/kg; SAR(10g) = 0.271 W/kg



**0.6-2GHz Triple Flat Phone Template**

Date/Time: 8/13/2013 7:51:52 PM

## Test Lab: Motorola Mobility

**DUT Serial: LDXZ230042; FCC ID: IHDT56PF3;**

Antenna: Internal; Battery: SNN5932A;

Test Configuration: [Bottom Edge of Phone 10 mm from Phantom](#)**DASY Configuration:**

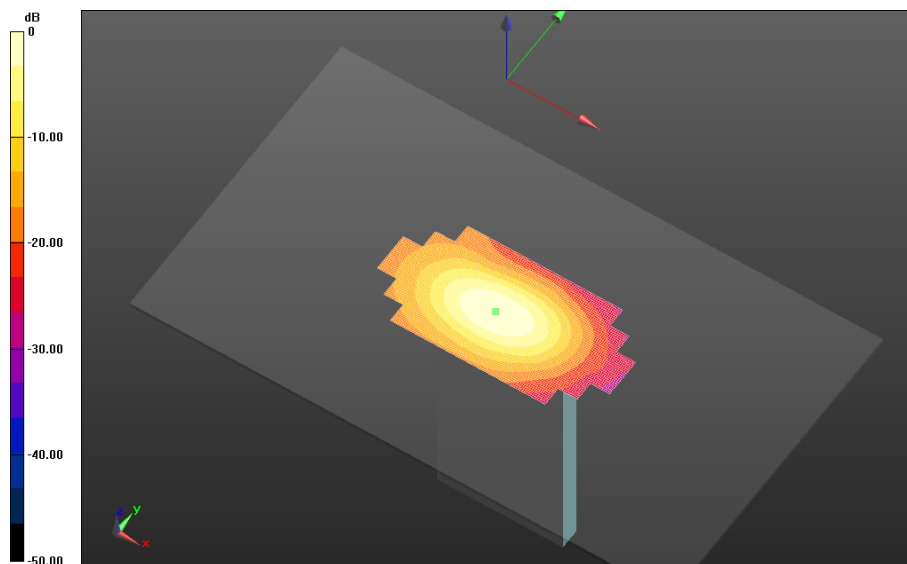
- Probe: ES3DV3 - SN3037; ConvF(4.83,4.83,4.83); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.8 (7028)

Communication System: \_CDMA (0); Communication System Band: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=1880$  MHz;  $\sigma = 1.528$ ;  $\epsilon_r = 52.07$  mho/m;  $\rho = 1.000$  kg/m<sup>3</sup>

**0.6-2GHz Triple Flat Phone Template/Area Scan (10mm) (261x141x1):****Interpolated grid: dx=1.000 mm, dy=1.000 mm**

Fast SAR: SAR(1g) = 0.771 W/kg; SAR(10g) = 0.382 W/kg

**0.6-2GHz Triple Flat Phone Template**

## **Appendix 5**

### **Measurement Uncertainty Budget**

## Uncertainty Budget for Device Under Test, for 735 MHz to 3 GHz

| <i>a</i>                                              | <i>b</i>                                              | <i>c</i>      | <i>d</i>     | <i>e = f(d,k)</i> | <i>f</i>                      | <i>g</i>                       | <i>h =<br/>c x f / e</i>            | <i>i =<br/>c x g / e</i>             | <i>k</i>             |
|-------------------------------------------------------|-------------------------------------------------------|---------------|--------------|-------------------|-------------------------------|--------------------------------|-------------------------------------|--------------------------------------|----------------------|
| Uncertainty Component                                 | Description<br>IEEE 1528(2003) /<br>IEC 62209-1(2005) | Tol.<br>(± %) | Prob<br>Dist | Div.              | <i>c<sub>i</sub></i><br>(1 g) | <i>c<sub>i</sub></i><br>(10 g) | 1 g<br><i>u<sub>i</sub></i><br>(±%) | 10 g<br><i>u<sub>i</sub></i><br>(±%) | <i>v<sub>i</sub></i> |
| <b>Measurement System</b>                             |                                                       |               |              |                   |                               |                                |                                     |                                      |                      |
| Probe Calibration [ES3DV3]                            | E.2.1 / 7.2.1                                         | 6.0           | N            | 1.00              | 1                             | 1                              | 6.0                                 | 6.0                                  | ∞                    |
| Axial Isotropy                                        | E.2.2 / 7.2.1.2                                       | 4.7           | R            | 1.73              | 0.707                         | 0.707                          | 1.9                                 | 1.9                                  | ∞                    |
| Hemispherical Isotropy                                | E.2.2 / 7.2.1.2                                       | 9.6           | R            | 1.73              | 0.707                         | 0.707                          | 3.9                                 | 3.9                                  | ∞                    |
| Boundary Effect                                       | E.2.3 / 7.2.1.5                                       | 1.0           | R            | 1.73              | 1                             | 1                              | 0.6                                 | 0.6                                  | ∞                    |
| Linearity                                             | E.2.4 / 7.2.1.3                                       | 4.7           | R            | 1.73              | 1                             | 1                              | 2.7                                 | 2.7                                  | ∞                    |
| System Detection Limits                               | E.2.5 / 7.2.1.4                                       | 1.0           | R            | 1.73              | 1                             | 1                              | 0.6                                 | 0.6                                  | ∞                    |
| Readout Electronics                                   | E.2.6 / 7.2.1.6                                       | 0.3           | N            | 1.00              | 1                             | 1                              | 0.3                                 | 0.3                                  | ∞                    |
| Response Time                                         | E.2.7 / 7.2.1.7                                       | 1.1           | R            | 1.73              | 1                             | 1                              | 0.6                                 | 0.6                                  | ∞                    |
| Integration Time                                      | E.2.8 / 7.2.1.8                                       | 1.1           | R            | 1.73              | 1                             | 1                              | 0.6                                 | 0.6                                  | ∞                    |
| RF Ambient Conditions - Noise                         | E.6.1 / 7.2.3.6                                       | 3.0           | R            | 1.73              | 1                             | 1                              | 1.7                                 | 1.7                                  | ∞                    |
| RF Ambient Conditions - Reflections                   | E.6.1 / 7.2.3.6                                       | 3.0           | R            | 1.73              | 1                             | 1                              | 1.7                                 | 1.7                                  | ∞                    |
| Probe Positioner Mech. Tolerance                      | E.6.2 / 7.2.2.1                                       | 0.4           | R            | 1.73              | 1                             | 1                              | 0.2                                 | 0.2                                  | ∞                    |
| Probe Positioning w.r.t Phantom                       | E.6.3 / 7.2.2.3                                       | 2.9           | R            | 1.73              | 1                             | 1                              | 1.7                                 | 1.7                                  | ∞                    |
| Max. SAR Evaluation (ext., int., avg.)                | E.5 / 7.2.4                                           | 3.4           | R            | 1.73              | 1                             | 1                              | 2.0                                 | 2.0                                  | ∞                    |
| <b>Test sample Related</b>                            |                                                       |               |              |                   |                               |                                |                                     |                                      |                      |
| Test Sample Positioning                               | E.4.2 / 7.2.2.4                                       | 3.4           | N            | 1.00              | 1                             | 1                              | 3.4                                 | 3.4                                  | 79                   |
| Device Holder Uncertainty                             | E.4.1 / 7.2.2.4.2                                     | 4.5           | N            | 1.00              | 1                             | 1                              | 4.5                                 | 4.5                                  | 11                   |
| SAR drift                                             | 6.6.2 / 7.2.3.5                                       | 0.0           | R            | 1.73              | 1                             | 1                              | 0.0                                 | 0.0                                  | ∞                    |
| <b>Phantom and Tissue Parameters</b>                  |                                                       |               |              |                   |                               |                                |                                     |                                      |                      |
| Phantom Uncertainty                                   | E.3.1 / 7.2.2.2                                       | 6.1           | R            | 1.73              | 1                             | 1                              | 3.5                                 | 3.5                                  | ∞                    |
| SAR Correction                                        |                                                       | 1.9           | R            | 1.73              | 1                             | 0.84                           | 1.1                                 | 0.9                                  | ∞                    |
| Liquid Conductivity (measurement)                     | E.3.3 / 7.2.3.3                                       | 1.3           | N            | 1.00              | 0.64                          | 0.43                           | 0.9                                 | 0.6                                  | 6                    |
| Liquid Permittivity (measurement)                     | E.3.2 / 7.2.3.4                                       | 0.7           | N            | 1.00              | 0.6                           | 0.49                           | 0.4                                 | 0.3                                  | 6                    |
| <b>Combined Standard Uncertainty</b>                  |                                                       |               | RSS          |                   |                               |                                | 11                                  | 11                                   | 390                  |
| <b>Expanded Uncertainty</b><br>(95% CONFIDENCE LEVEL) |                                                       |               | <i>k</i> =2  |                   |                               |                                | 22                                  | 22                                   |                      |