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## Portable Cellular Phone SAR Test Report

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

**Test Report #:** 25415-1F Supplemental  
**Date of Report:** 5-Nov-2013  
**Date of Test:** 21-Mar-2013 to 10-Oct-2013  
**FCC ID #:** IHDT56PA3  
**IC ID #:** N/A  
**Generic Name:** M0D9F

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

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

Tests:  
Electromagnetic Specific Absorption Rate

Procedures:  
IEC 62209-1  
IEC 62209-2  
RSS-102  
IEEE 1528 - 2003  
Australian Communications Authority Radio  
Communications (Electromagnetic Radiation –  
Human Exposure) Standard 2003  
CENELEC EN 50360  
ARIB Std. T-56 (2002)

### Accreditation:



3465.01

### 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

### Statement of Compliance:

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)

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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.

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### Revision History

| Revision Version | Date        | Notes                     |
|------------------|-------------|---------------------------|
| Rev. 0           | 16-Oct-2013 | Initial report release    |
| Rev. A           | 5-Nov-2013  | Revisions per TCB inquiry |
|                  |             |                           |

## 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], [4], [8], 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].

Per direction of the FCC, the following SAR test data is being provided to demonstrate the device's effective utilization of power reduction conditions specified in Exhibit 12 - Operational Description. The values in the tables in Section 6.0 are provided solely for the purpose of confirming compliant power reduction operation and do not represent maximum SAR values of the product. For maximum reported SAR compliance values, refer to the Exhibit 11 SAR test report.

## 2 Details of the Device Under Test

### 2.1 Sample Information

|   |                                   |   |
|---|-----------------------------------|---|
| <b>Serial Number(s)<br/>(Functional Use)</b>                          | LXRR1G0009                        | (GSM conducted power measurements, GSM SAR testing)     |
|   | LXRR1G0016                        | (WCDMA conducted power measurements, WCDMA SAR testing) |
|   | LXAA1W0032                        | (Wi-Fi SAR testing)                                     |
|   | LXAA1W0004                        | (Wi-Fi conducted power measurements)                    |
|   | LXAA1W0021                        | (Bluetooth conducted power measurements)                |
| <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 |   |

For a complete description of the device under test, see the Exhibit 11 SAR test report 25415-1F and the Exhibit 12 Operational Description for this device.

## 2.2 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 simultaneously with any other transmitters active, a reduced maximum power limit is enforced on the Wi-Fi transmitter. A table of the reduced limits used for testing is given below.

| Mode(s) of Operation                       | Wi-Fi 2.4 GHz | Wi-Fi 5.8 GHz |
|--|---------------|---------------|
| Channel Ranges                             | 1-11          | 149-165       |
| Maximum Output Power (dBm)                 | 19.35         | 20.13         |
| Reduced Maximum Output Power Setting (dBm) | 17            | 16            |

While operating in a mobile hotspot session, reduced power limits are enforced on the WCDMA 1900 transmitter. A table of the reduced limits used for testing is given below.

| Mode(s) of Operation                       | WCDMA 1900 |
|--|------------|
| Channel Ranges                             | 9262-9538  |
| Maximum Output Power Setting (dBm)         | 24.0       |
| Reduced Maximum Output Power Setting (dBm) | 19.0       |

While operating in a mobile hotspot session, reduced power limits are enforced on the GSM 1900 transmitter. A table of the reduced limits used for testing is given below.

| Mode(s) of Operation                            | GPRS 1900 |       |       |       | EDGE 1900 |       |       |       |
|---|-----------|-------|-------|-------|-----------|-------|-------|-------|
| Channel Range                                   | 975-124   |       |       |       | 975-124   |       |       |       |
| Modulation                                      | GMSK      |       |       |       | 8PSK      |       |       |       |
| Duty Cycle                                      | 1:8.3     | 2:8.3 | 3:8.3 | 4:8.3 | 1:8.3     | 2:8.3 | 3:8.3 | 4:8.3 |
| Maximum Output Power Setting (dBm)              | 30.50     | 28.00 | 25.75 | 25.00 | 27.00     | 24.50 | 22.75 | 21.50 |
| Time Average Output Power Setting (dBm)         | 21.31     | 21.82 | 21.33 | 21.83 | 17.81     | 18.32 | 18.38 | 18.33 |
| Reduced Maximum Output Power Setting (dBm)      | 30.00     | 27.50 | 25.25 | 24.50 | 26.50     | 24.00 | 22.25 | 21.00 |
| Reduced Time Average Output Power Setting (dBm) | 20.81     | 21.32 | 20.83 | 21.33 | 17.31     | 17.82 | 17.83 | 17.83 |

See section 4.6 of the Exhibit 11 FCC SAR Report 25415-1F for tables detailing the complete interoperation of this power limit reduction schema.

### **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). Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg.

For a complete tabulation of equipment used, system validation measurements, system verification measurements, and simulated tissue dielectric properties, see the Exhibit 11 SAR test report 25415-1F.

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

### 4.1 Overview of Test Setup and Results

Per direction of the FCC, the following SAR test data is being provided to demonstrate the device's effective utilization of power reduction conditions specified in Exhibit 12 - Operational Description. The values in the table(s) are provided solely for purposes of confirming compliant power reduction operation and do not represent maximum SAR values of the product. For maximum reported SAR compliance values, refer to the Exhibit 11 SAR test report 25415-1F.

Note this report does not include conditions and test results where both the maximum and reduced power SAR values are demonstrated in the Exhibit 11 SAR test report.

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 Appendix 1 of this report.

| GSM 1900 (GPRS Class 12) during a mobile hotspot session |         |              |  |                    |                     |   |                    |                     |                                   |
|--|---------|--------------|--|--------------------|---------------------|---|--------------------|---------------------|-----------------------------------|
| Configuration  | Channel | $f$<br>(MHz) | <i>1 g SAR value<br/>without Power Reduction</i> |                    |                     | <i>1 g SAR value<br/>with Power Reduction</i> |                    |                     | Measured SAR<br>Reduction<br>(dB) |
|  |         |              | Maximum<br>Power Limit<br>(dBm)                  | Measured<br>(W/kg) | Corrected<br>(W/kg) | Reduced<br>Power Limit<br>(dBm)               | Measured<br>(W/kg) | Corrected<br>(W/kg) |                                   |
| Bottom Edge of Phone<br>10 mm from Phantom               | 810     | 1909.8       | <b>25.0</b>                                      | <b>0.992</b>       | <b>1.41</b>         | <b>24.5</b>                                   | <b>0.904</b>       | <b>0.90</b>         | -1.9                              |

| WCDMA 1900 during a mobile hotspot session |         |              |  |                    |                     |   |                    |                     |                                   |
|--|---------|--------------|--|--------------------|---------------------|---|--------------------|---------------------|-----------------------------------|
| Configuration                              | Channel | $f$<br>(MHz) | <i>1 g SAR value<br/>without Power Reduction</i> |                    |                     | <i>1 g SAR value<br/>with Power Reduction</i> |                    |                     | Measured SAR<br>Reduction<br>(dB) |
|  |         |              | Maximum<br>Power Limit<br>(dBm)                  | Measured<br>(W/kg) | Corrected<br>(W/kg) | Reduced<br>Power Limit<br>(dBm)               | Measured<br>(W/kg) | Corrected<br>(W/kg) |                                   |
| Bottom Edge of Phone<br>10 mm from Phantom | 9400    | 1880.0       | <b>24.0</b>                                      | <b>2.57</b>        | <b>3.56</b>         | <b>19.0</b>                                   | <b>0.769</b>       | <b>0.77</b>         | -6.6                              |

## 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] 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”
- [5] ICNIRP Guidelines “Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”
- [6] IC RSS-102 “Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
- [7] IC Notice 2012-DRS1203 “RE: Applicability of Latest FCC RF Exposure KDB Procedures (Publication Date: October 24, 2012) and Other Procedures”
- [8] 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)”
- [9] FCC KDB Publication 248227 D01 v01r02 “SAR Measurement Procedures for 802.11 a/b/g Transmitters”
- [10] FCC KDB Publication 447498 D01 v05 “Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies”
- [11] FCC KDB Publication 648474 D04 v01r01 “SAR Evaluation Considerations for Wireless Handsets”
- [12] FCC KDB Publication 865664 D01 v01r01 “SAR Measurement Requirements for 100 MHz to 6 GHz”
- [13] FCC KDB Publication 865664 D02 v01r01 “RF Exposure Compliance Reporting and Documentation Considerations”
- [14] FCC KDB Publication 941225 D01 v02 “SAR Measurement Procedures for 3G Devices”
- [15] FCC KDB Publication 941225 D03 v01 “Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE”
- [16] FCC KDB Publication 941225 D05 v02r02 “SAR Evaluation Considerations for LTE Devices”
- [17] FCC KDB Publication 941225 D06 v01r01 “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”

# **Appendix 1**

## **SAR Distribution Plots**

Date/Time: 9/27/2013 4:38:46 PM

## Test Lab: Motorola Mobility – GSM 1900 Mobile Hotspot

### DUT Serial: LXRR1G0009

Procedure Notes: Power Step: 0; Antenna: Internal; Battery: SNN5923A;  
Test Position: Bottom Edge of Phone 10 mm from Phantom

### DASY Configuration:

- Probe: ES3DV3 - SN3284; ConvF(4.88,4.88,4.88); Calibrated: 7/26/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 7/24/2013
- 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: GPRS Cl. 12; Band: 1900; Frequency: 1910 MHz; Duty Cycle: 1:2.075

Medium Parameters used:  $f=1910$  MHz;  $\sigma = 1.572$ ;  $\epsilon_r = 51.25$  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

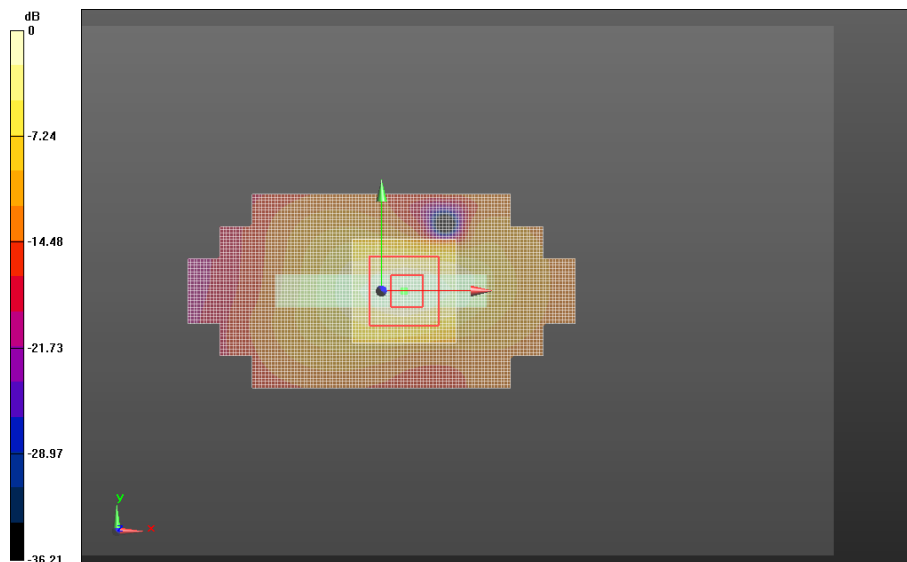
Fast SAR: SAR(1g) = 0.914 W/kg; SAR(10g) = 0.434 W/kg

### 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 = 24.935 V/m, Power Drift = 0.021 dB

Averaged SAR: SAR(1g) = 0.904 W/kg; SAR(10g) = 0.450 W/kg



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

Date/Time: 4/26/2013 12:15:41 PM

## Test Lab: Motorola Mobility – GSM 1900 Mobile Hotspot

### DUT Serial: LXRR1G0009

Procedure Notes: Power Step: 0; Antenna: Internal; Battery: SNN5923A;

Test Position: Bottom Edge of Phone 10 mm from Phantom

**\*\*\*Unit Operating at Non-Reduced Power for Verification of Power Reduction Conditions\*\*\***

### DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.76,4.76,4.76); Calibrated: 8/20/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/3/2012
- Phantom: R#2 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: GPRS Cl. 12; Band: 1900; Frequency: 1910 MHz; Duty Cycle: 1:2.075

Medium Parameters used:  $f=1910$  MHz;  $\sigma = 1.574$ ;  $\epsilon_r = 48.78$  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**

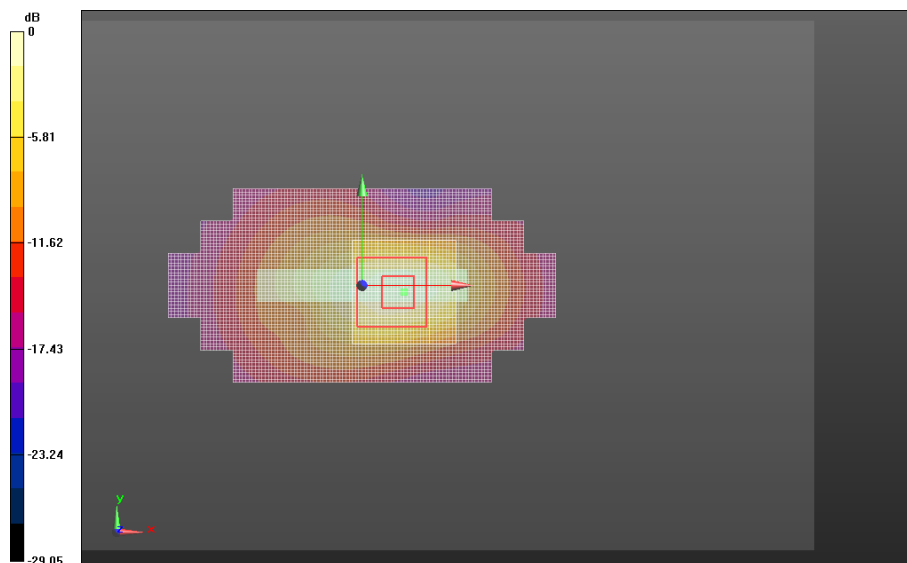
Fast SAR: SAR(1g) = 1.01 W/kg; SAR(10g) = 0.495 W/kg

### 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 = 26.803 V/m, Power Drift = 0.00476 dB

Averaged SAR: SAR(1g) = 0.992 W/kg; SAR(10g) = 0.496 W/kg



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

Date/Time: 9/26/2013 4:44:03 PM

## Test Lab: Motorola Mobility – WCDMA 1900 Mobile Hotspot

### DUT Serial: LXRR1G0016

Procedure Notes: Power Step: All Up Bits; Antenna: Internal; Battery: SNN5923A;  
Test Position: Bottom Edge of Phone 10 mm from Phantom

### DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.05,5.05,5.05); Calibrated: 5/30/2013;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 5/28/2013
- Phantom: R#2 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: WCDMA; Band: 1900; Frequency: 1880 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=1880$  MHz;  $\sigma = 1.556$ ;  $\epsilon_r = 50.89$  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

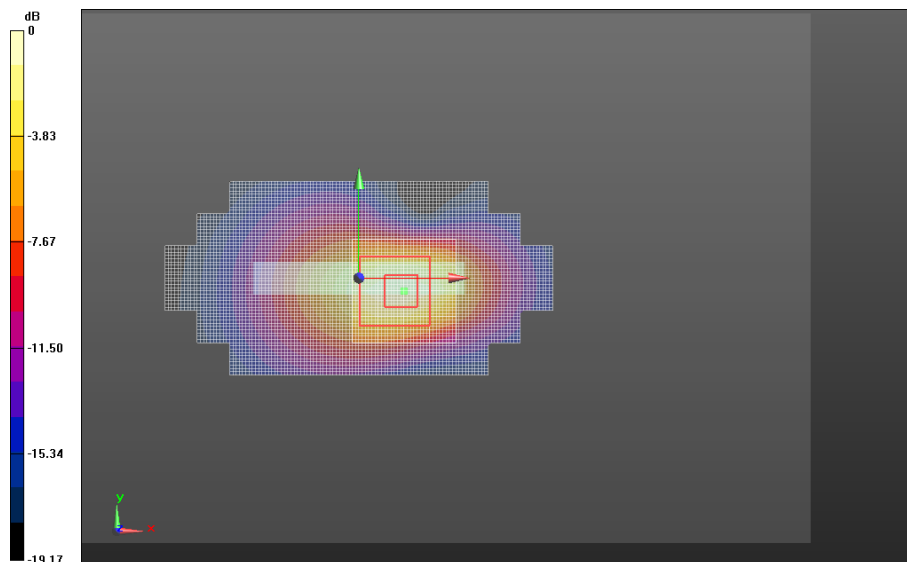
Fast SAR: SAR(1g) = 0.789 W/kg; SAR(10g) = 0.376 W/kg

### 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 = 22.694 V/m, Power Drift = 0.026 dB

Averaged SAR: SAR(1g) = 0.769 W/kg; SAR(10g) = 0.383 W/kg



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

Date/Time: 4/27/2013 8:13:52 PM

## Test Lab: Motorola Mobility – WCDMA 1900 Mobile Hotspot

### DUT Serial: LXRR1G0016

Procedure Notes: Power Step: All Up Bits; Antenna: Internal; Battery: SNN5923A;

Test Position: Bottom Edge of Phone 10 mm from Phantom

**\*\*\*Unit Operating at Non-Reduced Power for Verification of Power Reduction Conditions\*\*\***

### 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 Sn656; Calibrated: 2/7/2013
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: WCDMA; Band: 1900; Frequency: 1880 MHz; Duty Cycle: 1:1.000

Medium Parameters used:  $f=1880$  MHz;  $\sigma = 1.479$ ;  $\epsilon_r = 50.93$  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**

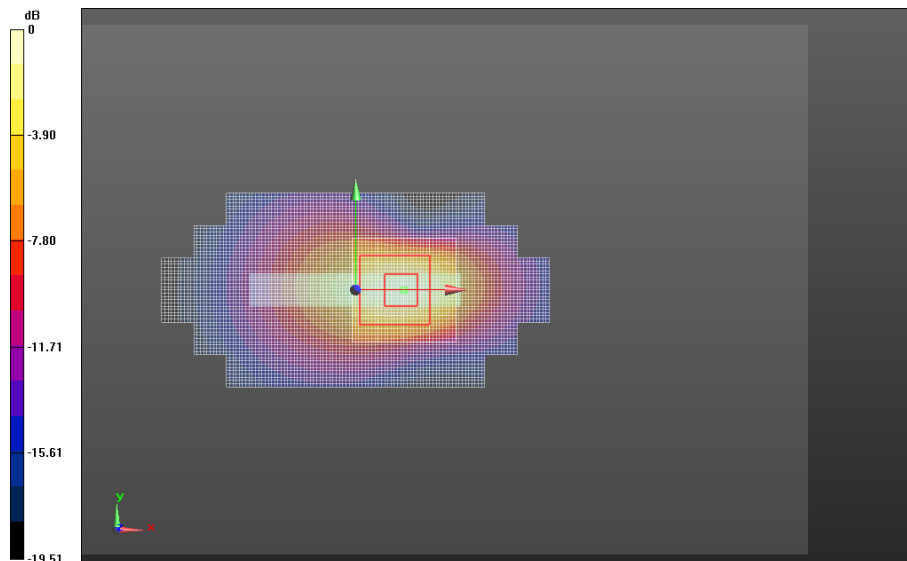
Fast SAR: SAR(1g) = 2.59 W/kg; SAR(10g) = 1.24 W/kg

### 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 = 45.613 V/m, Power Drift = -0.043 dB

Averaged SAR: SAR(1g) = 2.57 W/kg; SAR(10g) = 1.27 W/kg



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

**END OF REPORT**