



MOTOROLA

Portable Cellular Phone SAR Test Report

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

Test Report #: 25360-1F Supplemental
Date of Report: 02-May-2013
Date of Test: 21-Mar-2013 to 30-Apr-2013
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Test Laboratory: Motorola Mobility, LLC - ADR Test Services Laboratory
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This laboratory is accredited to ISO/IEC 17025-2005 to perform the following tests:

Accreditation:



| | |
|---|---|
| <p><u>Tests:</u> Electromagnetic Specific Absorption Rate</p> | <p><u>Procedures:</u> IEC 62209-1 RSS-102 IEEE 1528 - 2003 FCC OET Bulletin 65 (<i>including Supplement C</i>) Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 2003 CENELEC EN 50360 ARIB Std. T-56 (2002)</p> |
|---|---|

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 | 02-May-2013 | Initial report release |

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], [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].

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

| | | |
|---|-----------------------------------|--|
| Serial Number(s) (Functional Use) | LXVE110043 | (LTE Band 4/13 conducted power measurements, LTE 4/13 SAR testing) |
| | LXVE110035 | (CDMA conducted power measurements, CDMA SAR testing) |
| | LXVE110025 | (GSM/WCDMA conducted power measurements, GSM/WCDMA SAR testing) |
| | LXVE110019 | (Wi-Fi SAR testing) |
| | LXVE110010 | (2.4 GHz Wi-Fi conducted power measurements, Bluetooth conducted power measurements) |
| Production Unit or Identical Prototype (47 CFR §2.908) | Identical Prototype | |
| Device Category | Portable (Mobile Station Class B) | |
| RF Exposure Limits | General Population / Uncontrolled | |

For a complete description of the device under test, see the Exhibit 11 SAR test report 25360-1F 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.

For the Wi-Fi transmitter, reduced power limits are enforced when the Wi-Fi transmitter is operating simultaneously with any other transmitter(s). 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) | 19.18 | 20.13 |
| Reduced Maximum Output Power Target (dBm) | 15 | 15 |

While operating in a mobile hotspot session, a further reduced maximum power limit is enforced on the Wi-Fi 5.8 GHz transmitter. A table of the reduced limits used for testing is given below.

| Mode(s) of Operation | Wi-Fi 5.8 GHz |
|---|---------------|
| Channel Ranges | 149-165 |
| Maximum Output Power (dBm) | 20.13 |
| Reduced Maximum Output Power Target (dBm) | 11 |

The DUT supports Simultaneous Voice and LTE (SVLTE), allowing a 1x CDMA voice call while simultaneously providing an LTE link for data transport on the cellular network. While operating in SVLTE, *if the power on the 1x CDMA transmitter for voice is operating above 18 dBm*, a reduced maximum LTE transmit power limit is enforced to ensure SAR exposure compliance is maintained. When the power of the 1x CDMA transmitter is operating at or below 18 dBm or this combination of transmitters is not in use, the LTE transmitter operates up to its maximum power limit. Note that both conditions (1x CDMA above 18 dBm and LTE at reduced power, or 1x CDMA at or below 18 dBm with LTE at full power) are demonstrated for SAR compliance in section 6. A table of the reduced limits used for testing is given below.

| Mode(s) of Operation | LTE Band 4 | | | | | |
|--|---|------|------|-------|------|------|
| Test Channel | Applicable to all channels/channel bandwidths | | | | | |
| Modulation | QPSK | | | 16QAM | | |
| RB Allocation | 1 RB | 50% | 100% | 1 RB | 50% | 100% |
| Maximum Output Power Setting (dBm) | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Output Power with MPR (dBm) | 24.0 | 23.0 | 23.0 | 23.0 | 22.0 | 22.0 |
| Reduced Maximum Output Power Setting (dBm) | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 |

| Mode(s) of Operation | LTE Band 13 | | | | | |
|------------------------------------|---|------|------|-------|------|------|
| Test Channel | Applicable to all channels/channel bandwidths | | | | | |
| Modulation | QPSK | | | 16QAM | | |
| RB Allocation | 1 RB | 50% | 100% | 1 RB | 50% | 100% |
| Maximum Output Power (dBm) | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Output Power with MPR (dBm) | 24.0 | 23.0 | 23.0 | 23.0 | 22.0 | 22.0 |
| Reduced Maximum Output Power (dBm) | 20.5 | 20.5 | 20.5 | 20.5 | 20.5 | 20.5 |

The LTE transmitter may also operate as the data transport to the network during a mobile hotspot session. For operation in this state, the noted reduced power limit is strictly enforced regardless of other transmit conditions.

While operating in a mobile hotspot session, either as data transport to the network or voice transport for SVLTE during a mobile hotspot session, a reduced maximum power limit is enforced on the CDMA transmitter to ensure SAR exposure compliance is maintained. A table of the reduced limits used for testing is given below.

| Mode(s) of Operation | CDMA 800 | CDMA 1900 |
|---|-----------------|------------------|
| Channel Ranges | 1013-777 | 25-1175 |
| Maximum Output Power Setting (dBm) | 25.0 | 25.0 |
| Reduced Maximum Output Power Setting (dBm) | 23.0 | 21.0 |

See section 6.4 of the Exhibit 11 SAR test report 25360-1F 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 25360-1F.

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 25360-1F.

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.

| CDMA 800 during a mobile hotspot session | | | | | | | | | |
|--|---------|--------------|--|--------------------|---------------------|---------------------------------------|--------------------|---------------------|-----------------------------------|
| Configuration | Channel | f (MHz) | 1 g SAR value without Power Reduction | | | 1 g SAR value with Power Reduction | | | Measured SAR Reduction (dB) |
| | | | Maximum Power Limit (dBm) | Measured (W/kg) | Corrected (W/kg) | Reduced Power Limit (dBm) | Measured (W/kg) | Corrected (W/kg) | |
| Back of Phone 10 mm from Phantom | 384 | 836.5 | 25.0 | 0.619 | 0.69 | 23.0 | 0.442 | 0.44 | -1.9 |

| CDMA 1900 during a mobile hotspot session | | | | | | | | | |
|---|---------|--------------|--|--------------------|---------------------|---------------------------------------|--------------------|---------------------|-----------------------------------|
| Configuration | Channel | f (MHz) | 1 g SAR value without Power Reduction | | | 1 g SAR value with Power Reduction | | | Measured SAR Reduction (dB) |
| | | | Maximum Power Limit (dBm) | Measured (W/kg) | Corrected (W/kg) | Reduced Power Limit (dBm) | Measured (W/kg) | Corrected (W/kg) | |
| Front of Phone 10 mm from Phantom | 600 | 1880.0 | 25.0 | 1.72 | 1.76 | 21.0 | 0.733 | 0.73 | -3.8 |

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] FCC OET Bulletin 65 Supplement C 01-01
- [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 v05 “Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies”
- [12] FCC KDB Publication 648474 D04 v01 “SAR Evaluation Considerations for Wireless Handsets”
- [13] FCC KDB Publication 865664 D01 v01 “SAR Measurement Requirements for 100 MHz to 6 GHz”
- [14] FCC KDB Publication 865664 D02 v01 “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 v02r01 “SAR Evaluation Considerations for LTE Devices”
- [18] FCC KDB Publication 941225 D06 v01 “SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities”

Appendix 1

SAR Distribution Plots

Test Laboratory: Motorola Mobility - CDMA 800 Mobile Hotspot Exposure

DUT Serial: LXVE110035; FCC ID: IHDT56PB1

Procedure Notes: Power Step: All Up Bits; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5923A; Device Position: Back of Phone 10 mm from Phantom

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.02,6.02,6.02); 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: CDMA 800; Frequency: 836.5 MHz; Channel: 384; Duty Cycle: 1:1.000

Medium Parameters used: $f=836.52$ MHz; $\sigma = 1.005$; $\epsilon_r = 53.86$ mho/m; $\rho = 1000$ kg/m³

0.6-2GHz Triple Flat Phone Template/Area Scan (15mm) (181x101x1):

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

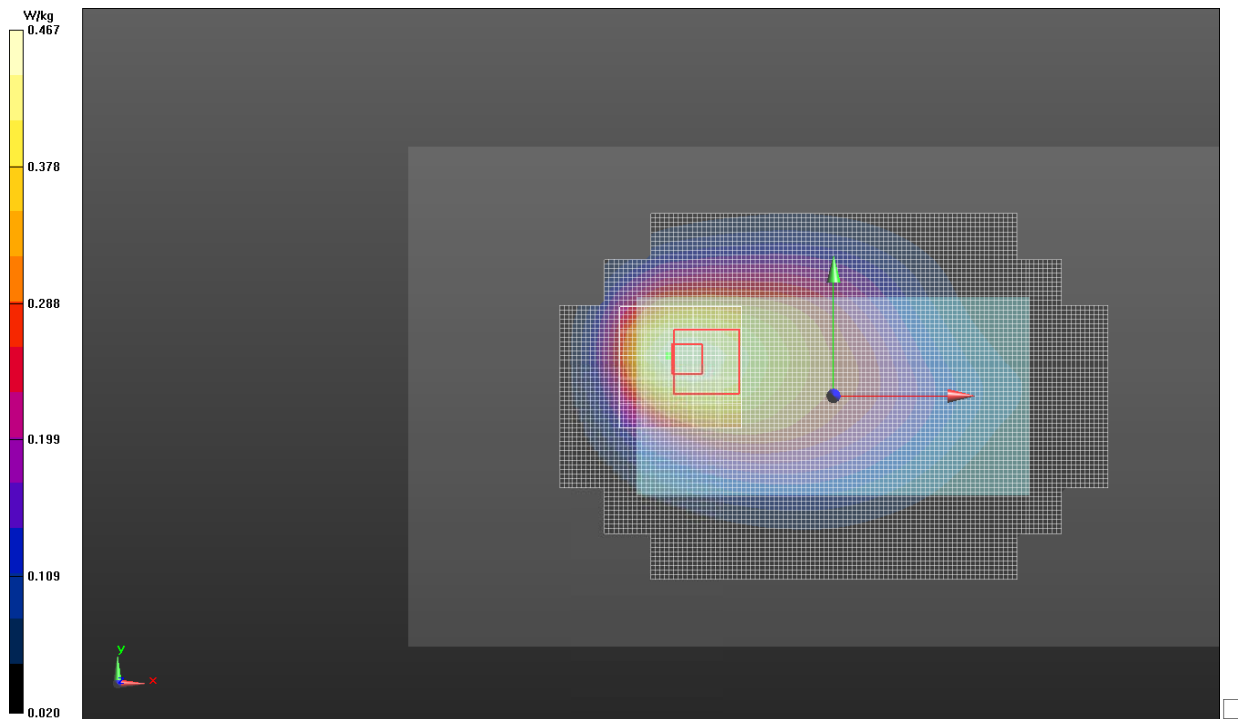
Fast SAR: SAR(1g) = 0.445 W/kg; SAR(10g) = 0.307 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (26x26x36)/Cube 0:

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

Reference Value = 20.475 V/m, Power Drift = -0.00344 dB

Averaged SAR: SAR(1g) = 0.442 W/kg; SAR(10g) = 0.312 W/kg



0.6-2GHz Triple Flat Phone Template

Test Laboratory: Motorola Mobility - CDMA 800 Mobile Hotspot Exposure

DUT Serial: LXVE110035; FCC ID: IHDT56PB1

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

Procedure Notes: Power Step: All Up Bits; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5923A; Device Position: Back of Phone 10 mm from Phantom

DASY Configuration:

- Probe: ES3DV3 - SN3124; ConvF(6.02,6.02,6.02); 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: CDMA 800; Frequency: 836.5 MHz; Channel: 384; Duty Cycle: 1:1.000

Medium Parameters used: $f=836.52$ MHz; $\sigma = 0.9949$; $\epsilon_r = 53.29$ mho/m; $\rho = 1000$ kg/m³

0.6-2GHz Triple Flat Phone Template/Area Scan (15mm) (181x101x1):

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

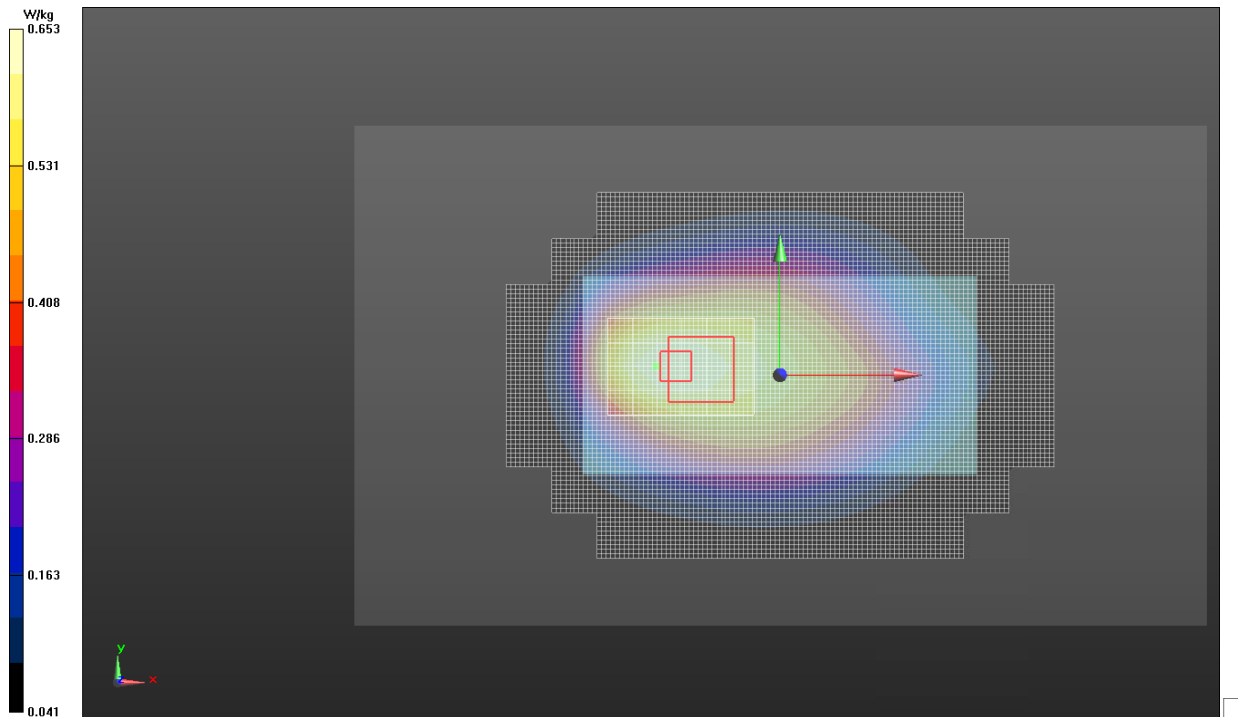
Fast SAR: SAR(1g) = 0.621 W/kg; SAR(10g) = 0.431 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (31x21x36)/Cube 0:

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

Reference Value = 25.592 V/m, Power Drift = -0.033 dB

Averaged SAR: SAR(1g) = 0.619 W/kg; SAR(10g) = 0.454 W/kg



0.6-2GHz Triple Flat Phone Template

Test Laboratory: Motorola Mobility - CDMA 1900 Mobile Hotspot Exposure

DUT Serial: LXVE110035; FCC ID: IHDT56PB1

Procedure Notes: Power Step: All Up Bits; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5923A; Device Position: Front of Phone 10 mm from Phantom

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: CDMA 1900; Frequency: 1880 MHz; Channel: 600; Duty Cycle: 1:1.000

Medium Parameters used: $f=1880$ MHz; $\sigma = 1.532$; $\epsilon_r = 49.15$ mho/m; $\rho = 1000$ kg/m³

0.6-2GHz Triple Flat Phone Template/Area Scan (15mm) (181x101x1):

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

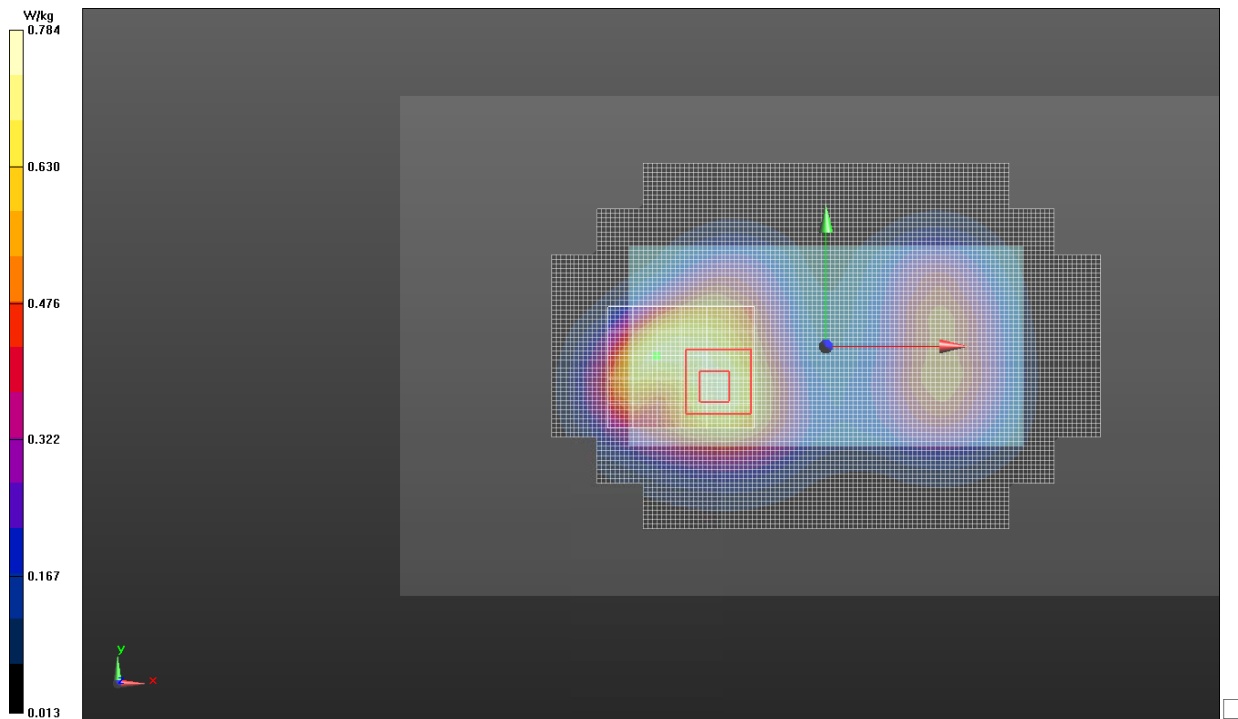
Fast SAR: SAR(1g) = 0.710 W/kg; SAR(10g) = 0.442 W/kg

0.6-2GHz Triple Flat Phone Template/5x5x7 Zoom Scan (0.6-2GHz) (31x26x36)/Cube 0:

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

Reference Value = 22.278 V/m, Power Drift = -0.00678 dB

Averaged SAR: SAR(1g) = 0.733 W/kg; SAR(10g) = 0.465 W/kg



0.6-2GHz Triple Flat Phone Template

Test Laboratory: Motorola Mobility - CDMA 1900 Mobile Hotspot Exposure

DUT Serial: LXVE110035; FCC ID: IHDT56PB1

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

Procedure Notes: Power Step: All Up Bits; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5923A; Device Position: Front of Phone 10 mm from Phantom

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: CDMA 1900; Frequency: 1880 MHz; Channel: 600; Duty Cycle: 1:1.000

Medium Parameters used: $f=1880$ MHz; $\sigma = 1.549$; $\epsilon_r = 48.68$ mho/m; $\rho = 1000$ kg/m³

0.6-2GHz Triple Flat Phone Template/Area Scan (15mm) (181x101x1):

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

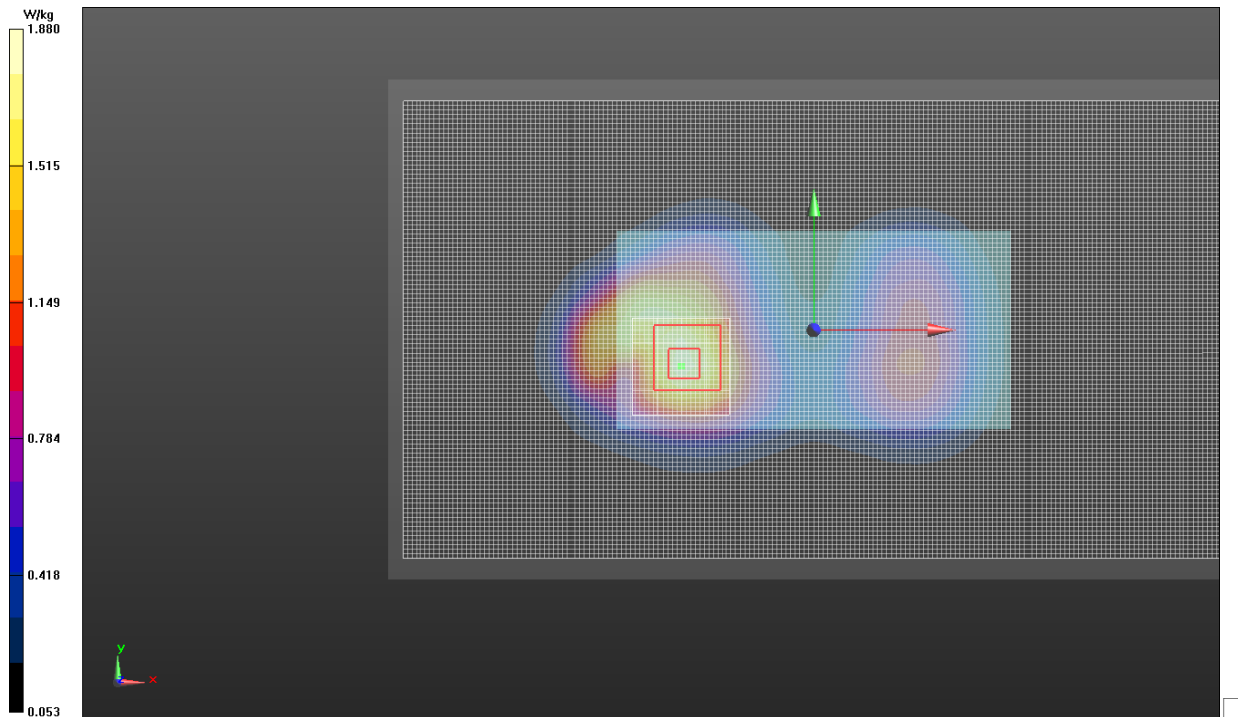
Fast SAR: SAR(1g) = 1.74 W/kg; SAR(10g) = 1.05 W/kg

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 = 34.433 V/m, Power Drift = -0.042 dB

Averaged SAR: SAR(1g) = 1.72 W/kg; SAR(10g) = 1.08 W/kg



0.6-2GHz Triple Flat Phone Template

END OF REPORT