



# MOTOROLA

## Portable Cellular Phone SAR Test Report

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

**Test Report #:** 24285-1 Rev. C  
**Date of Report:** 4 Feb, 2011 (revised on 17 Mar, 2011)  
**Date of Test:** 9 Dec, 2010 – 17 Jan 2011  
**FCC ID #:** IHDT56MA1  
**Generic Name:** MCT6-1411A11

**Test Laboratory:** Motorola Mobility, Inc. - Product Safety & Compliance Laboratory  
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This laboratory is accredited to ISO/IEC 17025-2005 to perform the following tests:

**Accreditation:**



2404

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)

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), as well as other appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

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## 1. Introduction

The Motorola Mobility Product Safety & Compliance 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] and [5]. 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 ICNIRP (10g), the final SAR reading for this phone is 0.71 W/kg for head adjacent use and 0.40 W/kg for body worn use. For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are 1.31 W/kg for head-adjacent use, 0.57 W/kg for body-worn use, and 1.26 W/kg in mobile hotspot mode. These measurements were performed using a Dasy4™ v4.7 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

## 2. Description of the Device Under Test

### 2.1 Device description<sup>1</sup>

|  |  |
|--|--|
| Serial Number(s)<br>(Functional Use)                         | 354711040002267 (CDMA SAR testing)<br>354711040005211 (GSM 1900 MHz WiFi Hotspot function SAR testing)<br>354711040003158 (GSM 1900 MHz Head Adjacent and Body Worn SAR testing)<br>354711040002457 (GSM 900/1800 & Wi-Fi SAR testing) |
| Production Unit or<br>Identical Prototype<br>(47 CFR §2.908) | Identical Prototype  |
| Device Category  | Portable   |
| RF Exposure Limits   | General Population / Uncontrolled  |

| Mode(s) of Operation            | GSM 900           | GSM 1800            | GSM 1900            | CDMA 800          | Wi-Fi 802.11b/g/n   | Bluetooth           |
|---------------------------------|-------------------|---------------------|---------------------|-------------------|---------------------|---------------------|
| Modulation Mode(s)              | GMSK              | GMSK                | GMSK                | QPSK              | BPSK                | GFSK                |
| Maximum Output Power Setting    | 33.5 dBm          | 30.5 dBm            | 30.5 dBm            | 25.0 dBm          | 20.0 dBm            | 10 dBm              |
| Duty Cycle                      | 1:8               | 1:8                 | 1:8                 | 1:1               | 1:1                 | 1:1                 |
| Transmitting Frequency Range(s) | 880.2 - 914.8 MHz | 1710.2 - 1784.8 MHz | 1850.2 - 1909.8 MHz | 826.4 - 846.6 MHz | 2412.0 - 2462.5 MHz | 2402.0 - 2483.5 MHz |

| Mode(s) of Operation               | GPRS 900          |             |      |      | GPRS 1800           |             |      |      | GPRS 1900           |             |      |      |
|------------------------------------|-------------------|-------------|------|------|---------------------|-------------|------|------|---------------------|-------------|------|------|
| Modulation                         | GMSK              |             |      |      | GMSK                |             |      |      | GMSK                |             |      |      |
| Maximum Output Power Setting (dBm) | 33.5              | <b>31.5</b> | 29.5 | 27.5 | 30.5                | <b>30.0</b> | 28.0 | 26.0 | 30.5                | <b>30.0</b> | 28.0 | 26.0 |
| Duty Cycle                         | 1:8               | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  |
| Transmitting Frequency Range(s)    | 880.2 - 914.8 MHz |             |      |      | 1710.2 - 1784.8 MHz |             |      |      | 1850.2 - 1909.8 MHz |             |      |      |

<sup>1</sup> **Bolded** entries indicate data mode configurations of highest time-average power output per band and data mode type, and thus were utilized for SAR testing in this report.

| Mode(s) of Operation               | EDGE 900          |             |      |      | EDGE 1800           |             |      |      | EDGE 1900           |             |      |      |
|------------------------------------|-------------------|-------------|------|------|---------------------|-------------|------|------|---------------------|-------------|------|------|
| Modulation                         | 8PSK              |             |      |      | 8PSK                |             |      |      | 8PSK                |             |      |      |
| Maximum Output Power Setting (dBm) | 27.5              | <b>26.0</b> | 24.0 | 22.0 | 26.5                | <b>26.0</b> | 24.0 | 22.0 | 26.5                | <b>26.0</b> | 24.0 | 22.0 |
| Duty Cycle                         | 1:8               | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  |
| Transmitting Frequency Range(s)    | 880.2 - 914.8 MHz |             |      |      | 1710.2 - 1784.8 MHz |             |      |      | 1850.2 - 1909.8 MHz |             |      |      |

## 2.2 Evaluation of CDMA modes

Per the “SAR Measurement Procedures for 3G Devices” (FCC KDB 941225) released in October, 2007, RC1, RC3 and RC3 (FCH + SCH) CDMA modes, EVDO Rev O, EVDO Rev A were considered. The conducted power measurements (per steps 3, 4 & 10 of section 4.4.5.2 of 3GPP2 C.5.011 / TIA -98-E) for each mode are shown in the table below.

| Conducted power (dBm) for CDMA modes |         |       |       |       |       |   |
|--------------------------------------|---------|-------|-------|-------|-------|---|
| Band                                 | Channel | RC1   |       | RC3   |       | RC3 (FCH + SCH)   |
|                                      |         | SO2   | SO55  | SO2   | SO55  |   |
| CDMA 800                             | 1013    | 25.14 | 25.22 | 25.18 | 25.16 | Per Motorola designs the maximum power, when in a mode that allows supplemental channels, will always be less than the RC3/RC1 maximum conducted power limit. |
|                                      | 384     | 24.71 | 24.73 | 24.75 | 24.72 |   |
|                                      | 777     | 25.01 | 25.09 | 25.09 | 25.02 |   |

| Conducted power (dBm) for EVDO modes |         |             |             |                 |                 |
|--------------------------------------|---------|-------------|-------------|-----------------|-----------------|
| Band                                 | Channel | Rev 0       |             | Rev A           |                 |
|                                      |         | FTAP 307.2k | RTAP 153.6k | Subtest 2 FETAP | Subtest 2 RETAP |
| CDMA 800                             | 1013    | 24.99       | 25.01       | 25.16           | 25.2            |
|                                      | 384     | 24.56       | 24.57       | 24.82           | 24.85           |
|                                      | 777     | 24.85       | 24.87       | 25.14           | 25.14           |

### 2.3 Evaluation of Wi-Fi 802.11 modes

Per “SAR Measurement Procedures for 802.11 a/b/g Transmitters” (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The conducted power measurements for each mode are shown in the table below. SAR testing for 802.11 modes was performed with the transmitter mode and data rate set to the configurations highlighted in bold below.

| Band                 | Channel | Conducted Power (dBm) for 802.11b Mode Data Rates |        |          |         |
|----------------------|---------|---|--------|----------|---------|
|                      |         | 1 Mbps  | 2 Mbps | 5.5 Mbps | 11 Mbps |
| Wi-Fi<br>2450<br>MHz | 1       | 19.01   | 19.56  | 19.34    | 19.57   |
|                      | 6       | 18.67   | 19.01  | 19.17    | 18.99   |
|                      | 11      | 18.84   | 19.42  | 19.16    | 19.04   |

| Band                 | Channel | 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 |
| Wi-Fi<br>2450<br>MHz | 1       | 15.36   | 15.27  | 15.32   | 15.05   | 14.42   | 14.2    | 13.92   | 13.93   |
|                      | 6       | 14.91   | 15.01  | 14.96   | 14.55   | 14.37   | 13.96   | 13.65   | 13.64   |
|                      | 11      | 15.13   | 15.14  | 15.15   | 14.89   | 14.32   | 14.08   | 13.85   | 13.68   |

| Band                 | Channel | Conducted Power (dBm) for 802.11n Mode Data Rates<br>(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 |
| Wi-Fi<br>2450<br>MHz | 1       | 13.5   | 14.63   | 13.76     | 13.92   | 13.77   | 13.72   | 13.47     | 13.15   |
|                      | 6       | 14.32  | 14.34   | 13.84     | 13.65   | 13.44   | 13.17   | 13.1      | 12.86   |
|                      | 11      | 14.49  | 14.44   | 14.03     | 13.65   | 13.62   | 13.25   | 13.37     | 12.77   |

## 2.4 Evaluation of Bluetooth

Per "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas" (FCC KDB 648474), the necessity of stand-alone and simultaneous SAR testing was evaluated for the Bluetooth transmitter of the device under test.

The conditions under which the device under test can be excluded from stand-alone and simultaneous SAR testing, per FCC KDB 648474, are summarized as follows:

Table 1 – Output Power Thresholds for Unlicensed Transmitters

|                  | 2.45 | 5.15 - 5.35 | 5.47 - 5.85 | GHz |
|------------------|------|-------------|-------------|-----|
| $P_{\text{ref}}$ | 12   | 6           | 5           | mW  |

Device output power should be rounded to the nearest mW to compare with values specified in this table.

Table 2 – Summary of SAR Evaluation Requirements for a Cell Phone with Multiple Transmitters

|                                | Individual Transmitter  | Simultaneous Transmission  |
|--------------------------------|---|--|
| <b>Licensed Transmitters</b>   | Routine evaluation required   | SAR not required:<br>Unlicensed only   |
|                                | When there is no simultaneous transmission –<br>o output $\leq 60$ f SAR not required<br>o output $> 60$ f stand-alone SAR required   | o when stand-alone 1-g SAR is not required and antenna is $\geq 5$ cm from other antennas  |
|                                | When there is simultaneous transmission –<br>Stand-alone SAR not required when<br>o output $\leq 2 P_{\text{ref}}$ and antenna is $\geq 5.0$ cm from other antennas   | Licensed & Unlicensed<br>o when the sum of the 1-g SAR is $< 1.6$ W/kg for all simultaneous transmitting antennas  |
| <b>Unlicensed Transmitters</b> | o output $\leq P_{\text{ref}}$ and antenna is $\geq 2.5$ cm from other antennas<br>o output $\leq P_{\text{ref}}$ and antenna is $< 2.5$ cm from other antennas, each with either output power $\leq P_{\text{ref}}$ or 1-g SAR $< 1.2$ W/kg<br>Otherwise stand-alone SAR is required<br>When stand-alone SAR is required<br>o test SAR on highest output channel for each wireless mode and exposure condition<br>o if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures | o when SAR to peak location separation ratio of simultaneous transmitting antenna pair is $< 0.3$<br>SAR required:<br>Licensed & Unlicensed<br>antenna pairs with SAR to peak location separation ratio $\geq 0.3$ ; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition<br>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply |

Per the highlighted criteria:

1. The highest output conducted power measured for Bluetooth on the device under test is 7.36 mW [ $< 24$  mW]
2. The separation distance between the Bluetooth antenna and the main GSM antenna is 5.77 cm [ $> 5.0$  cm]
3. The separation distance between the Bluetooth antenna and the main CDMA antenna is 1.88 cm [ BT power  $< 24$  mW and CDMA SAR  $< 1.2$  W/kg]

Based on the output power of the Bluetooth transmitter and its antenna separation distance from the primary antenna, neither stand-alone nor simultaneous SAR measurements are required for the device under test. Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d.

### 3. Test Equipment Used

#### 3.1 Dosimetric System

The Motorola Mobile Devices Business Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.7) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is  $\pm 10.8\%$  (K=1) with an expanded uncertainty of  $\pm 21.6\%$  (K=2). The overall 1 g RSS uncertainty of the measurement system is  $\pm 11.1\%$  (K=1) with an expanded uncertainty of  $\pm 22.2\%$  (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.

| Description                                | Serial Number | Cal Date       | Cal Due Date   |
|--|---------------|----------------|----------------|
| DASY4™ DAE V1                              | 719           | 22 Mar, 2010   | 22 Mar, 2011   |
| E-Field Probe ES3DV3                       | 3180          | 20 May, 2010   | 20 May, 2011   |
| S.A.M. Phantom used for 800/900 MHz        | TP-1407       |                |                |
| S.A.M. Phantom used for 1800/1900/2450 MHz | TP-1160       |                |                |
| Dipole Validation Kit, D835V2              | 432TR         | 17 March, 2010 | 17 March, 2011 |
| Dipole Validation Kit, D835V2              | 421TR         | 18 Nov, 2010   | 18 Nov, 2012   |
| Dipole Validation Kit, D1800V1             | 283TR         | 10 Nov, 2010   | 10 Nov, 2012   |
| Dipole Validation Kit, D2450V1             | 788           | 11 Nov, 2010   | 11 Nov, 2012   |

#### 3.2 Additional Equipment

| Description                   | Serial Number | Cal Date    | Cal Due Date |
|-------------------------------|---------------|-------------|--------------|
| Signal Generator HP8648C      | 3847A04822    | Apr-22-2009 | Apr-22-2011  |
| Power Meter E4419B            | GB39511082    | Apr-24-2009 | Apr-24-2011  |
| Power Sensor #1 - E9301A      | US39210918    | Oct-25-2010 | Oct-25-2011  |
| Power Sensor #2 - E9301A      | US39210917    | Oct-25-2010 | Oct-25-2011  |
| Signal Generator HP8648C      | 3847A04810    | Oct-30-2009 | Oct-30-2011  |
| Power Meter E4419B            | GB39511087    | Dec-22-2009 | Dec-22-2011  |
| Power Sensor #1 - E9301A      | US39211006    | Oct-25-2010 | Oct-25-2011  |
| Power Sensor #2 - E9301A      | US39210934    | Oct-25-2010 | Oct-25-2011  |
| Signal Generator HP8648C      | 3429A00286    | Nov-23-2009 | Nov-23-2011  |
| Power Meter E4419B            | US39250622    | Dec-22-2009 | Dec-22-2011  |
| Power Sensor #1 - E9301A      | US39210931    | Oct-25-2010 | Oct-25-2011  |
| Power Sensor #2 - E9301A      | US39210932    | Oct-25-2010 | Oct-25-2011  |
| Network Analyzer HP8753ES     | US39172529    | Jun-04-2001 | Jun-04-2011  |
| Dielectric Probe Kit HP85070C | US99360070    |             |              |

#### 4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity,  $\epsilon_r$ , and the conductivity,  $\sigma$ , of the tissue simulating liquids were measured with a HP85070 Dielectric Probe Kit. These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of  $\rho = 1 \text{ g/cm}^3$  was entered into the system in all the cases. It can be seen that the measured parameters are within tolerance of the recommended limits specified in [1] and [5].

E-field probes calibrated at 1810 MHz were used for "1900 MHz" band (1850 MHz - 1910 MHz) SAR measurements. FCC KDB 450824 provides additional requirements on page 3 of 6 for SAR testing that is performed with probe calibration points that are more than 50 MHz removed from the measured bands. The KDB requires; "(2) When nominal tissue dielectric parameters are specified in the probe calibration data, the tissue dielectric parameters measured for routine measurements should be less than the target  $\epsilon_r$  and higher than the target Sigma values to minimize SAR underestimations". The 1900 MHz simulated tissues listed below meet this criteria.

| f (MHz) | Tissue type | Limits / Measured      | Dielectric Parameters |                |                             |
|---------|-------------|------------------------|-----------------------|----------------|-----------------------------|
|         |             |                        | $\epsilon_r$          | $\sigma$ (S/m) | Temp ( $^{\circ}\text{C}$ ) |
| 835     | Head        | Measured, 22 Dec, 2010 | 40.9                  | 0.91           | 19.9                        |
|         |             | Measured, 23 Dec, 2010 | 40.8                  | 0.97           | 20.0                        |
|         |             | Recommended Limits     | 41.5 $\pm$ 5%         | 0.90 $\pm$ 5%  | 18-25                       |
|         | Body        | Measured, 23 Dec, 2010 | 53.6                  | 0.97           | 21.3                        |
|         |             | Measured, 21 Jan, 2011 | 54.4                  | 0.98           | 19.2                        |
|         |             | Recommended Limits     | 55.2 $\pm$ 5%         | 0.97 $\pm$ 5%  | 18-25                       |
| 1880    | Head        | Measured, 28 Dec, 2010 | 38.6                  | 1.47           | 19.3                        |
|         |             | Recommended Limits     | 40.0 $\pm$ 5%         | 1.40 $\pm$ 5%  | 18-25                       |
|         | Body        | Measured, 28 Dec, 2010 | 50.8                  | 1.57           | 21.3                        |
|         |             | Measured, 17 Jan, 2011 | 50.7                  | 1.58           | 19.2                        |
|         |             | Recommended Limits     | 53.3 $\pm$ 5%         | 1.52 $\pm$ 5%  | 18-25                       |
| 2450    | Head        | Measured, 20 Dec, 2010 | 39.1                  | 1.83           | 19.4                        |
|         |             | Measured, 21 Dec, 2010 | 38.9                  | 1.84           | 19.3                        |
|         |             | Recommended Limits     | 39.2 $\pm$ 10%        | 1.80 $\pm$ 5%  | 18-25                       |
|         | Body        | Measured, 21 Dec, 2010 | 53.4                  | 1.88           | 19.6                        |
|         |             | Measured, 22 Dec, 2010 | 53.0                  | 1.90           | 19.1                        |
|         |             | Recommended Limits     | 52.7 $\pm$ 10%        | 1.95 $\pm$ 5%  | 18-25                       |

The list of ingredients and the percent composition used for the simulated tissues are indicated in the table below.

| Ingredient | 835 MHz / 900 MHz Head | 835 MHz / 900 MHz Body | 1800 MHz / 1900 MHz Head | 1800 MHz / 1900 MHz Body | 2450 MHz Head | 2450 MHz Body |
|------------|------------------------|------------------------|--------------------------|--------------------------|---------------|---------------|
| Sugar      | 57                     | 44.9                   | --                       | --                       | --            | --            |
| DGBE       | --                     | --                     | 47                       | 30.8                     | --            | 30            |
| Diacetin   | --                     | --                     | --                       | --                       | 51            | --            |
| Water      | 40.45                  | 53.06                  | 52.62                    | 68.8                     | 48.75         | 70            |
| Salt       | 1.45                   | 0.94                   | 0.38                     | 0.4                      | 0.15          | --            |
| HEC        | 1                      | 1                      | --                       | --                       | --            | --            |
| Bact.      | 0.1                    | 0.1                    | --                       | --                       | 0.1           | --            |

## 5. System Accuracy Verification

A system accuracy verification of the DASY4™ was performed using the measurement equipment listed in Section 3.1. The daily system accuracy verification 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 7. These frequencies are within  $\pm 10\%$  of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. 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  $15.0 \text{ cm} \pm 0.5 \text{ cm}$ . For frequencies above 3 GHz, the simulated tissue depth was verified to be  $10 \text{ cm} \pm 0.5 \text{ cm}$ . Z-axis scans showing the SAR penetration are also included in Appendix 1.

| f<br>(MHz) | Description            | SAR (W/kg),<br>1 gram | Dielectric Parameters |                | Ambient<br>Temp (°C) | Tissue<br>Temp (°C) |
|------------|------------------------|-----------------------|-----------------------|----------------|----------------------|---------------------|
|            |                        |                       | $\epsilon_r$          | $\sigma$ (S/m) |                      |                     |
| 835        | Measured, 9 Dec, 2010  | 10.35                 | 40.8                  | 0.89           | 19.9                 | 21.2                |
|            | Measured, 10 Dec, 2010 | 9.35                  | 40.5                  | 0.91           | 21.4                 | 20.0                |
|            | Recommended Limits     | 9.59                  | 41.5 $\pm 5\%$        | 0.90 $\pm 5\%$ | 18-25                | 18-25               |
|            | Measured, 22 Dec, 2010 | 9.90                  | 40.9                  | 0.91           | 22.3                 | 20.4                |
|            | Measured, 23 Dec, 2010 | 9.65                  | 40.8                  | 0.91           | 22.6                 | 20.0                |
|            | Measured, 20 Jan, 2011 | 10.1                  | 40.3                  | 0.91           | 20.0                 | 19.6                |
|            | Measured, 24 Jan, 2011 | 9.90                  | 40.9                  | 0.90           | 20.3                 | 19.8                |
|            | Recommended Limits     | 9.32                  | 41.5 $\pm 5\%$        | 0.90 $\pm 5\%$ | 18-25                | 18-25               |
| 1800       | Measured, 13 Dec, 2010 | 38.55                 | 38.7                  | 1.37           | 21.5                 | 20.3                |
|            | Measured, 14 Dec, 2010 | 37.20                 | 38.9                  | 1.39           | 21.5                 | 20.0                |
|            | Measured, 28 Dec, 2010 | 36.95                 | 39.0                  | 1.39           | 22.9                 | 20.3                |
|            | Measured, 30 Dec, 2010 | 35.90                 | 38.3                  | 1.36           | 22.4                 | 20.3                |
|            | Measured, 17 Jan, 2011 | 38.05                 | 38.3                  | 1.38           | 21.4                 | 20.2                |
|            | Recommended Limits     | 38.30                 | 40.0 $\pm 5\%$        | 1.40 $\pm 5\%$ | 18-25                | 18-25               |
| 2450       | Measured, 20 Dec, 2010 | 57.0                  | 39.1                  | 1.83           | 22.3                 | 20.5                |
|            | Measured, 21 Dec, 2010 | 58.0                  | 38.9                  | 1.84           | 21.6                 | 20.3                |
|            | Measured, 22 Dec, 2010 | 58.0                  | 38.7                  | 1.84           | 22.6                 | 20.3                |
|            | Recommended Limits     | 53.4                  | 39.2 $\pm 10\%$       | 1.80 $\pm 5\%$ | 18-25                | 18-25               |

The following probe conversion factors were used on the E-Field probe(s) used for the system accuracy verification measurements:

| Description             | Serial Number | f<br>(MHz) | Conversion Factor | Cal Cert<br>pg # |
|-------------------------|---------------|------------|-------------------|------------------|
| E-Field Probe<br>ES3DV3 | 3180          | 835        | 6.01              | 5 of 11          |
|                         |               | 1810       | 5.03              | 5 of 11          |
|                         |               | 2450       | 4.42              | 5 of 11          |

## 6. Test Results

For GSM and WCDMA modes, the test sample was operated using an actual transmission through a base station simulator. Wi-Fi testing was conducted using manufacturer test mode software, per guidance given in FCC KDB 248227. The base station simulator or test software was set up for the proper channels, transmitter power levels and transmit modes of operation.

The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system. The default settings for the “coarse” and “cube” scans were chosen and used for measurements. The grid spacing of the coarse scan was set to 15 mm or less as shown in the SAR plots included in Appendix 2, 3, and 4. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone model covered by this report has the following battery options:  
Model SNN5879A - 1880 mAH Battery

The battery SNN5879A was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

### 6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 12 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 the [6]. Also shown are the measured conducted output power levels, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{(-\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4™ 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.

The left head and right head SAR contour distributions are similar. Because of this similarity, the cheek/touch and 15° tilt test conditions with the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 2. All other test conditions measured lower SAR values than those included in Appendix 2.

The guidelines provided in “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas” (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the sum of the 1 g SAR measured for the individual simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Evaluations for the simultaneous SAR sums are presented in the tables below.

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth.

The following probe conversion factors were used on the E-Field probe(s) used for head-adjacent measurements:

| Description          | Serial Number | f (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ES3DV3 | 3180          | 835     | 6.01              | 5 of 11       |
|                      |               | 1810    | 5.03              | 5 of 11       |
|                      |               | 2450    | 4.42              | 5 of 11       |

| Left Head Cheek Position, GSM/CDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                  | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                 | 512     | 30.63                        | 19.3      | -0.0536    | 0.532           | 0.54                | 1.02            | 1.03                | 28 Dec, 10   |
|  | 661     | 30.54                        | 19.5      | -0.0467    | 0.434           | 0.44                | 0.846           | 0.86                | 28 Dec, 10   |
|  | 810     | 30.61                        | 19.3      | -0.0696    | 0.289           | 0.29                | 0.573           | 0.58                | 28 Dec, 10   |
| CDMA 800                                 | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|  | 384     | 24.73                        | 20.0      | -0.482     | 0.335           | 0.37                | 0.446           | 0.50                | 23 Dec, 10   |
|  | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 1: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Left Head Cheek Position, Wi-Fi Modes |                   |         |           |            |                 |                     |                 |                     |              |
|---------------------------------------|-------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                               | Mode / Data Rate  | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|                                       |                   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                  | 802.11b, 1 Mbps   | 1       | 19.5      | -0.00575   | 0.0965          | 0.10                | 0.223           | 0.22                | 20 Dec, 10   |
|                                       |                   | 6       | 19.3      | 0.148      | 0.104           | 0.10                | 0.227           | 0.23                | 20 Dec, 10   |
|                                       |                   | 11      | 19.3      | 0.0867     | 0.107           | 0.11                | 0.244           | 0.24                | 20 Dec, 10   |
|                                       | 802.11b, 2 Mbps   | 1       | 19.6      | 0.22       | 0.113           | 0.11                | 0.253           | 0.25                | 21 Dec, 10   |
|                                       |                   | 6       | 19.4      | -0.0799    | 0.0834          | 0.08                | 0.189           | 0.19                | 20 Dec, 10   |
|                                       |                   | 11      | 19.5      | 0.016      | 0.103           | 0.10                | 0.236           | 0.24                | 20 Dec, 10   |
|                                       | 802.11b, 5.5 Mbps | 1       | 19.3      | 0.0467     | 0.119           | 0.12                | 0.271           | 0.27                | 21 Dec, 10   |
|                                       |                   | 6       | 19.4      | -0.132     | 0.0978          | 0.10                | 0.222           | 0.23                | 21 Dec, 10   |
|                                       |                   | 11      | 19.3      | -0.01      | 0.140           | 0.14                | 0.322           | 0.32                | 21 Dec, 10   |
|                                       | 802.11b, 11 Mbps  | 1       | 20.0      | 0.201      | 0.099           | 0.10                | 0.219           | 0.22                | 20 Dec, 10   |
|                                       |                   | 6       | 19.3      | -0.0225    | 0.103           | 0.10                | 0.235           | 0.24                | 21 Dec, 10   |
|                                       |                   | 11      | 19.3      | 0.0198     | 0.113           | 0.11                | 0.267           | 0.27                | 21 Dec, 10   |

Table 2: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Left Head Cheek Position<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|--|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900   | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.54                                | 0.14                             | 0.68                           | 1.03                               | 0.32                            | 1.35                          |
| CDMA 850   |                              | 0.37                                | 0.14                             | 0.51                           | 0.50                               | 0.32                            | 0.82                          |

Table 3: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head Cheek Position, GSM/CDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                   | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                  | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|   | 661     | 30.54                        | 19.2      | 0.00922    | 0.312           | 0.31                | 0.593           | 0.59                | 28 Dec, 10   |
|   | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |
| CDMA 800                                  | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.73                        | 20.2      | -0.179     | 0.29            | 0.30                | 0.391           | 0.41                | 22 Dec, 10   |
|   | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 4: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head Cheek Position, Wi-Fi Modes |                  |         |           |            |                 |                     |                 |                     |              |
|--|------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                | Mode / Data Rate | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |                  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                   | 802.11b, 1 Mbps  | 1       | 19.4      | -0.224     | 0.043           | 0.05                | 0.0813          | 0.09                | 20 Dec, 10   |
|  |                  | 6       |           |            |                 |                     |                 |                     |              |
|  |                  | 11      |           |            |                 |                     |                 |                     |              |

Table 5: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Right Head Cheek Position<br>Summation of Highest SAR Values |                 |                                     |                                  |                                |                                    |                                 |                               |
|---|-----------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode   | Wi-Fi Mode      | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900  | Wi-Fi 2450      | 0.31                                | 0.05                             | 0.36                           | 0.59                               | 0.09                            | 0.68                          |
| CDMA 850  | 802.11b, 1 Mbps | 0.30                                | 0.05                             | 0.35                           | 0.41                               | 0.09                            | 0.50                          |

Table 6: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Left Head 15° Tilt Position, GSM/WCDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                      | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                     | 512     | 30.63                        | 19.3      | -0.140     | 0.691           | 0.71                | 1.27            | 1.31                | 28 Dec, 10   |
|  | 661     | 30.54                        | 19.5      | -0.0945    | 0.52            | 0.53                | 0.976           | 1.00                | 28 Dec, 10   |
|  | 810     | 30.61                        | 19.3      | -0.0696    | 0.36            | 0.37                | 0.68            | 0.69                | 28 Dec, 10   |
| CDMA 800                                     | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|  | 384     | 24.73                        | 19.5      | -0.107     | 0.198           | 0.20                | 0.263           | 0.27                | 23 Dec, 10   |
|  | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 7: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Left Head 15° Tilt Position, Wi-Fi Modes |                  |         |           |            |                 |                     |                 |                     |              |
|--|------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                  | Mode / Data Rate | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |                  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                     | 802.11b, 1 Mbps  | 1       | 19.5      | 0.11       | 0.0341          | 0.03                | 0.0636          | 0.06                | 20 Dec, 10   |
|  |                  | 6       |           |            |                 |                     |                 |                     |              |
|  |                  | 11      |           |            |                 |                     |                 |                     |              |

Table 8: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Left Head 15° Tilt Position<br>Summation of Highest SAR Values |                 |                                     |                                  |                                |                                    |                                 |                               |
|---|-----------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode   | Wi-Fi Mode      | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900  | Wi-Fi 2450      | 0.71                                | 0.03                             | 0.74                           | 1.31                               | 0.06                            | 1.37                          |
| CDMA 850  | 802.11b, 1 Mbps | 0.20                                | 0.03                             | 0.23                           | 0.27                               | 0.06                            | 0.33                          |

Table 9: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head 15° Tilt Position, GSM/WCDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                       | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                      | 512     | 30.63                        | 19.0      | -0.113     | 0.579           | 0.59                | 1.04            | 1.07                | 28 Dec, 10   |
|   | 661     | 30.54                        | 19.0      | -0.099     | 0.431           | 0.44                | 0.792           | 0.81                | 28 Dec, 10   |
|   | 810     | 30.61                        | 19.1      | -0.117     | 0.29            | 0.30                | 0.542           | 0.56                | 28 Dec, 10   |
| CDMA 800                                      | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.73                        | 19.9      | -0.0535    | 0.21            | 0.21                | 0.281           | 0.28                | 22 Dec, 10   |
|   | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 10: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head 15° Tilt Position, Wi-Fi Modes |                  |         |           |            |                 |                     |                 |                     |              |
|---|------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                   | Mode / Data Rate | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |                  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                      | 802.11b, 1 Mbps  | 1       | 19.4      | 0.18       | 0.0423          | 0.04                | 0.0801          | 0.08                | 20 Dec, 10   |
|   |                  | 6       |           |            |                 |                     |                 |                     |              |
|   |                  | 11      |           |            |                 |                     |                 |                     |              |

Table 11: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Right Head 15° Tilt Position<br>Summation of Highest SAR Values |                 |                                     |                                  |                                |                                    |                                 |                               |
|--|-----------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode      | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900   | Wi-Fi 2450      | 0.59                                | 0.04                             | 0.63                           | 1.07                               | 0.08                            | 1.15                          |
| CDMA 850   | 802.11b, 1 Mbps | 0.21                                | 0.04                             | 0.25                           | 0.28                               | 0.08                            | 0.36                          |

Table 12: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

## 6.2 Body Worn Test Results

The SAR results shown in tables 13 through 19 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 measured conducted output power levels, the temperature of the test facility during the test, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{(-\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4™ 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.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 3. All other test conditions measured lower SAR values than those included in Appendix 3.

The guidelines provided in “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas” (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the sum of the 1 g SAR measured for the individual simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Evaluations for the simultaneous SAR summations are presented in the tables below.

A “flat” phantom was used for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0 mm. It measures 52.7 cm(long) x 26.7 cm(wide) x 21.2 cm(tall).

The simulated tissue depth was verified to be 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 same device holder described in section 6 was used for positioning the phone. The functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories, testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

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 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 the front side facing the user.

The cellular phone was also tested in data mode operations. For these tests, a separation distance of 25 mm between the device and the flat phantom was used. The device was tested in the worst-case SAR position and channel configuration from the voice-mode body-worn testing.

The following probe conversion factors were used on the E-Field probe(s) used for the body-worn measurements:

| Description          | Serial Number | f (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ES3DV3 | 3180          | 835     | 6.01              | 6 of 11       |
|                      |               | 1810    | 4.71              | 6 of 11       |
|                      |               | 2450    | 4.22              | 6 of 11       |

| Body-Worn, Front of Phone 15 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                      | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                     | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|  | 661     | 30.54                        | 20.6      | -0.0993    | 0.066           | 0.06                | 0.0888          | 0.09                | 28 Dec, 10   |
|  | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |
| CDMA 800                                     | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|  | 384     | 24.73                        | 21.0      | -0.0865    | 0.204           | 0.21                | 0.281           | 0.29                | 23 Dec, 10   |
|  | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 13: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Back of Phone 15 mm from Phantom; GSM/CDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)   | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900  | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|   | 661     | 30.54                        | 20.5      | -0.727     | 0.192           | 0.20                | 0.347           | 0.35                | 28 Dec, 10   |
|   | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |
| CDMA 800  | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.73                        | 21.3      | 0.066      | 0.404           | 0.40                | 0.565           | 0.57                | 23 Dec, 10   |
|   | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 14: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| GPRS Class 10 (2 Uplink Timeslots) Mode<br>Body-Worn, Back of Phone 25 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)  | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GPRS CL10 1900 MHz   | 512     | 29.94                        |           |            |                 |                     |                 |                     |              |
|  | 661     | 30.05                        | 19.8      | -0.123     | 0.141           | 0.15                | 0.228           | 0.23                | 30 Dec, 10   |
|  | 810     | 29.75                        |           |            |                 |                     |                 |                     |              |

Table 15: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| EDGE Class 10 (2 Uplink Timeslots) Mode<br>Body-Worn, Back of Phone 25 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)  | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 8PSK 1900 MHz  | 512     | 26.07                        |           |            |                 |                     |                 |                     |              |
|  | 661     | 26.00                        | 20.2      | 0.0152     | 0.0698          | 0.07                | 0.113           | 0.11                | 28 Dec, 10   |
|  | 810     | 26.20                        |           |            |                 |                     |                 |                     |              |

Table 16: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit

| EVDO Rev A Mode                             |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| Body-Worn, Back of Phone 25 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
| f (MHz)                                     | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| EVDO 800 Rev A                              | 1013    | 25.16                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.82                        | 18.9      | 0.0208     | 0.325           | 0.33                | 0.449           | 0.45                | 24 Jan, 11   |
|   | 777     | 25.14                        |           |            |                 |                     |                 |                     |              |

Table 17: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit

| Body-Worn, Back of Phone 25 mm from Phantom; Wi-Fi Modes |                   |         |           |            |                 |                     |                 |                     |              |
|--|-------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)  | Mode / Data Rate  | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |                   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450   | 802.11b, 1 Mbps   | 1       | 19.9      | -0.0715    | 0.0286          | 0.03                | 0.0476          | 0.05                | 21 Dec, 10   |
|  |                   | 6       | 19.5      | 0.074      | 0.0215          | 0.02                | 0.0362          | 0.04                | 21 Dec, 10   |
|  |                   | 11      | 19.5      | -0.125     | 0.0188          | 0.02                | 0.0321          | 0.03                | 21 Dec, 10   |
|  | 802.11b, 2 Mbps   | 1       | 19.6      | 0.291      | 0.0305          | 0.03                | 0.0507          | 0.05                | 21 Dec, 10   |
|  |                   | 6       | 19.8      | 0.324      | 0.019           | 0.02                | 0.0317          | 0.03                | 21 Dec, 10   |
|  |                   | 11      | 19.6      | 0.473      | 0.0209          | 0.02                | 0.0349          | 0.03                | 21 Dec, 10   |
|  | 802.11b, 5.5 Mbps | 1       | 19.6      | 0.528      | 0.0327          | 0.03                | 0.0548          | 0.05                | 21 Dec, 10   |
|  |                   | 6       | 19.6      | 0.585      | 0.0216          | 0.02                | 0.0366          | 0.04                | 21 Dec, 10   |
|  |                   | 11      | 19.4      | 0.526      | 0.0208          | 0.02                | 0.0337          | 0.03                | 21 Dec, 10   |
|  | 802.11b, 11 Mbps  | 1       | 19.5      | 0.228      | 0.026           | 0.03                | 0.0434          | 0.04                | 21 Dec, 10   |
|  |                   | 6       | 19.6      | 0.624      | 0.021           | 0.02                | 0.0345          | 0.03                | 21 Dec, 10   |
|  |                   | 11      | 19.5      | -0.104     | 0.0197          | 0.02                | 0.033           | 0.03                | 21 Dec, 10   |

Table 18: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR             |                              |                                     |                                  |                                |                                    |                                 |                               |
|---|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Body-Worn, Back of Phone 25 mm from Phantom |                              |                                     |                                  |                                |                                    |                                 |                               |
| Summation of Highest SAR Values             |                              |                                     |                                  |                                |                                    |                                 |                               |
| Cellular Mode                               | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900 (GPRS Cl. 10)                      | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.15                                | 0.03                             | 0.18                           | 0.23                               | 0.05                            | 0.28                          |
| CDMA 800 (EVDO Rev A)                       |                              | 0.33                                | 0.03                             | 0.36                           | 0.45                               | 0.05                            | 0.50                          |

Table 19: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

### 6.3 Mobile Hotspot Test Results

The DUT is capable of functioning as a Wi-Fi to Cellular mobile hotspot. Additional SAR testing was performed according to the interim test guidelines provided at the October 2010 TCB Workshop. Testing was performed with a separation of 1 cm between the DUT and the “flat” phantom. The DUT was positioned for SAR tests with the front and back surfaces facing the phantom, and also with the edges facing the phantom in which the transmitting antenna is < 2.5 cm from the edge. Each transmit band was utilized for SAR testing, but only the “mode” within each band that exhibited the highest SAR results from section 6.2 was used.

The SAR results shown in tables 20 through 28 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 temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{-(\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4™ 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.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 4. All other test conditions measured lower SAR values than those included in Appendix 4.

The guidelines provided in “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas” (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the sum of the 1 g SAR measured for the individual simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR evaluation for simultaneous transmission is likewise not required. Evaluations for the simultaneous SAR sums are presented in the tables below.

A “flat” phantom was for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0 mm. It measures 52.7 cm(long) x 26.7 cm(wide) x 21.2 cm(tall).

The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies below 3 GHz. The same device holder described in section 6 was used for positioning the phone.

The following probe conversion factors were used on the E-Field probe(s) used for the body-worn mobile hotspot measurements:

| Description          | Serial Number | f (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ES3DV3 | 3180          | 835     | 6.01              | 6 of 11       |
|                      |               | 1810    | 4.71              | 6 of 11       |
|                      |               | 2450    | 4.22              | 6 of 11       |

| Body-Worn, Back of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |              |
|---|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                     | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GPRS 1900 Class 10                          | 512     | 19.2      | -0.0054    | 0.686           | 0.69                | 1.23            | 1.26                | 17 Jan, 11   |
|   | 661     | 19.3      | -0.0282    | 0.582           | 0.59                | 1.07            | 1.08                | 17 Jan, 11   |
|   | 810     | 19.2      | 0.024      | 0.446           | 0.45                | 0.841           | 0.84                | 17 Jan, 11   |
| EVDO 800 Rev A                              | 1013    | 18.9      | 0.0249     | 0.796           | 0.80                | 1.08            | 1.08                | 21 Jan, 11   |
|   | 384     | 19.0      | 0.155      | 0.759           | 0.76                | 1.05            | 1.05                | 21 Jan, 11   |
|   | 777     | 19.2      | -0.0743    | 0.843           | 0.86                | 1.16            | 1.18                | 21 Jan, 11   |
| 2450 802.11b, 5.5 Mbps                      | 1       | 19.1      | -0.189     | 0.165           | 0.17                | 0.303           | 0.32                | 22 Dec, 10   |
|   | 6       |           |            |                 |                     |                 |                     |              |
|   | 11      |           |            |                 |                     |                 |                     |              |

Table 20: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Body-Worn, Back of Phone 10 mm from Phantom<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|---|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode   | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GPRS 1900 Class 10  | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.69                                | 0.17                             | 0.86                           | 1.26                               | 0.32                            | 1.58                          |
| EVDO 800 Rev A  |                              | 0.86                                | 0.17                             | 1.03                           | 1.18                               | 0.32                            | 1.50                          |

Table 21: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Front of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|--|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)                                      | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                           | 512     |           |            |                 |                     |                 |                     |               |
|  | 661     | 20.1      | -0.004     | 0.21            | 0.21                | 0.332           | 0.33                | 17 Jan, 11    |
|  | 810     |           |            |                 |                     |                 |                     |               |
| EVDO 800 Rev A                               | 1013    |           |            |                 |                     |                 |                     |               |
|  | 384     | 19.9      | 0.031      | 0.377           | 0.38                | 0.521           | 0.52                | 24 Jan, 11    |
|  | 777     |           |            |                 |                     |                 |                     |               |
| 2450 802.11b, 5.5 Mbps                       | 1       | 19.2      | -0.247     | 0.0284          | 0.03                | 0.0499          | 0.05                | 22 Dec, 10    |
|  | 6       |           |            |                 |                     |                 |                     |               |
|  | 11      |           |            |                 |                     |                 |                     |               |

Table 22: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Body-Worn, Front of Phone 10 mm from Phantom<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|--|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GPRS 1900 Class 10   | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.21                                | 0.03                             | 0.24                           | 0.33                               | 0.05                            | 0.38                          |
| EVDO 800 Rev A   |                              | 0.38                                | 0.03                             | 0.41                           | 0.52                               | 0.05                            | 0.57                          |

Table 23: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Left Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|--|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)  | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                               | 512     |           |            |                 |                     |                 |                     |               |
|  | 661     | 20.0      | 0.143      | 0.0564          | 0.06                | 0.143           | 0.10                | 17 Jan, 11    |
|  | 810     |           |            |                 |                     |                 |                     |               |
| EVDO 800 Rev A                                   | 1013    |           |            |                 |                     |                 |                     |               |
|  | 384     | 19.5      | -0.143     | 0.473           | 0.49                | 0.697           | 0.72                | 24 Jan, 11    |
|  | 777     |           |            |                 |                     |                 |                     |               |
| 2450 802.11b, 5.5 Mbps                           | 1       | 19.1      | 0.00       | 0.189           | 0.19                | 0.394           | 0.39                | 22 Dec, 11    |
|  | 6       |           |            |                 |                     |                 |                     |               |
|  | 11      |           |            |                 |                     |                 |                     |               |

Table 24: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Body-Worn, Left Edge of Phone 10 mm from Phantom<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|--|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GPRS 1900 Class 10   | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.06                                | 0.19                             | 0.25                           | 0.10                               | 0.39                            | 0.49                          |
| EVDO 800 Rev A   |                              | 0.49                                | 0.19                             | 0.68                           | 0.72                               | 0.39                            | 1.11                          |

Table 25: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Right Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|---|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)   | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                                | 512     |           |            |                 |                     |                 |                     |               |
|   | 661     | 20.2      | 0.398      | 0.0908          | 0.09                | 0.15            | 0.15                | 17 Jan, 11    |
|   | 810     |           |            |                 |                     |                 |                     |               |
| EVDO 800 Rev A                                    | 1013    |           |            |                 |                     |                 |                     |               |
|   | 384     | 19.5      | 0.0826     | 0.372           | 0.37                | 0.536           | 0.54                | 24 Jan, 11    |
|   | 777     |           |            |                 |                     |                 |                     |               |

Table 26: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Top Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|---|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)   | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                              | 512     |           |            |                 |                     |                 |                     |               |
|   | 661     | 20.4      | -0.003     | 0.333           | 0.33                | 0.599           | 0.60                | 17 Jan, 11    |
|   | 810     |           |            |                 |                     |                 |                     |               |

Table 27: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Bottom Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|--|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)  | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| EVDO 800 Rev A                                     | 1013    |           |            |                 |                     |                 |                     |               |
|  | 384     | 19.4      | 0.16       | 0.0814          | 0.08                | 0.144           | 0.14                | 24 Jan, 11    |
|  | 777     |           |            |                 |                     |                 |                     |               |

Table 28: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

## References

- [1] CENELEC, en62209-1:2006 “Human Exposure to Radio Frequency Fields From Hand - Held and Body - Mounted Wireless Communication Devices – Human Models, Instrumentation, and Procedures”
- [2] CENELEC, en50360:2001 “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)”

## **Appendix 1**

### **SAR distribution comparison for the system accuracy verification**

## **Appendix 2**

### **SAR distribution plots for Phantom Head Adjacent Use**

## **Appendix 3**

### **SAR distribution plots for Body Worn Configuration**

## **Appendix 4**

### **SAR distribution plots for Mobile Hotspot Configuration**

## **Appendix 5**

### **Probe Calibration Certificate**

## **Appendix 6**

### **Measurement Uncertainty Budget**

| <i>a</i>   | <i>b</i>          | <i>c</i>        | <i>d</i>  | $e = f(d,k)$ | <i>f</i>    | <i>g</i>     | $h = c \times f / e$ | $i = c \times g / e$  | <i>k</i> |
|--|-------------------|-----------------|-----------|--------------|-------------|--------------|----------------------|-----------------------|----------|
| <b>Uncertainty Component</b>                       | IEEE 1528 section | Tol. ( $\pm$ %) | Prob Dist | Div.         | $c_i$ (1 g) | $c_i$ (10 g) | 1 g $u_i$ ( $\pm$ %) | 10 g $u_i$ ( $\pm$ %) | $v_i$    |
| <b>Measurement System</b>                          |                   |                 |           |              |             |              |                      |                       |          |
| Probe Calibration                                  | E.2.1             | 5.9             | N         | 1.00         | 1           | 1            | 5.9                  | 5.9                   | $\infty$ |
| Axial Isotropy                                     | E.2.2             | 4.7             | R         | 1.73         | 0.707       | 0.707        | 1.9                  | 1.9                   | $\infty$ |
| Hemispherical Isotropy                             | E.2.2             | 9.6             | R         | 1.73         | 0.707       | 0.707        | 3.9                  | 3.9                   | $\infty$ |
| Boundary Effect                                    | E.2.3             | 1.0             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| Linearity  | E.2.4             | 4.7             | R         | 1.73         | 1           | 1            | 2.7                  | 2.7                   | $\infty$ |
| System Detection Limits                            | E.2.5             | 1.0             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| Readout Electronics                                | E.2.6             | 0.3             | N         | 1.00         | 1           | 1            | 0.3                  | 0.3                   | $\infty$ |
| Response Time                                      | E.2.7             | 1.1             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| Integration Time                                   | E.2.8             | 1.1             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| RF Ambient Conditions - Noise                      | E.6.1             | 3.0             | R         | 1.73         | 1           | 1            | 1.7                  | 1.7                   | $\infty$ |
| RF Ambient Conditions - Reflections                | E.6.1             | 0.0             | R         | 1.73         | 1           | 1            | 0.0                  | 0.0                   | $\infty$ |
| Probe Positioner Mech. Tolerance                   | E.6.2             | 0.4             | R         | 1.73         | 1           | 1            | 0.2                  | 0.2                   | $\infty$ |
| Probe Positioning w.r.t Phantom                    | E.6.3             | 1.4             | R         | 1.73         | 1           | 1            | 0.8                  | 0.8                   | $\infty$ |
| Max. SAR Evaluation (ext., int., avg.)             | E.5               | 3.4             | R         | 1.73         | 1           | 1            | 2.0                  | 2.0                   | $\infty$ |
| <b>Test sample Related</b>                         |                   |                 |           |              |             |              |                      |                       |          |
| Test Sample Positioning                            | E.4.2             | 3.2             | N         | 1.00         | 1           | 1            | 3.2                  | 3.2                   | 29       |
| Device Holder Uncertainty                          | E.4.1             | 4.0             | N         | 1.00         | 1           | 1            | 4.0                  | 4.0                   | 8        |
| SAR drift  | 6.6.2             | 5.0             | R         | 1.73         | 1           | 1            | 2.9                  | 2.9                   | $\infty$ |
| <b>Phantom and Tissue Parameters</b>               |                   |                 |           |              |             |              |                      |                       |          |
| Phantom Uncertainty                                | E.3.1             | 4.0             | R         | 1.73         | 1           | 1            | 2.3                  | 2.3                   | $\infty$ |
| Liquid Conductivity (target)                       | E.3.2             | 5.0             | R         | 1.73         | 0.64        | 0.43         | 1.8                  | 1.2                   | $\infty$ |
| Liquid Conductivity (measurement)                  | E.3.3             | 3.3             | N         | 1.00         | 0.64        | 0.43         | 2.1                  | 1.4                   | $\infty$ |
| Liquid Permittivity (target)                       | E.3.2             | 5.0             | R         | 1.73         | 0.6         | 0.49         | 1.7                  | 1.4                   | $\infty$ |
| Liquid Permittivity (measurement)                  | E.3.3             | 1.9             | N         | 1.00         | 0.6         | 0.49         | 1.1                  | 0.9                   | $\infty$ |
| <b>Combined Standard Uncertainty</b>               |                   |                 | RSS       |              |             |              | 11.1                 | 10.8                  | 411      |
| <b>Expanded Uncertainty (95% CONFIDENCE LEVEL)</b> |                   |                 | $k=2$     |              |             |              | 22.2                 | 21.6                  |          |

## **Appendix 7**

### **Dipole Characterization Certificate**

**END OF REPORT**

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| <b>Appendix 6: Measurement Uncertainty Budget</b>                                   |           |
| <b>Appendix 7: Dipole Characterization Certificate</b>                              |           |

## 1. Introduction

The Motorola Mobility Product Safety & Compliance 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] and [5]. 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 ICNIRP (10g), the final SAR reading for this phone is 0.71 W/kg for head adjacent use and 0.40 W/kg for body worn use. For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are 1.31 W/kg for head-adjacent use, 0.57 W/kg for body-worn use, and 1.26 W/kg in mobile hotspot mode. These measurements were performed using a Dasy4™ v4.7 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

## 2. Description of the Device Under Test

### 2.1 Device description<sup>1</sup>

|   |  |
|---|--|
| Serial Number(s)<br>(Functional Use)                      | 354711040002267 (CDMA SAR testing)<br>354711040005211 (GSM 1900 MHz WiFi Hotspot function SAR testing)<br>354711040003158 (GSM 1900 MHz Head Adjacent and Body Worn SAR testing)<br>354711040002457 (GSM 900/1800 & Wi-Fi SAR testing) |
| Production Unit or Identical Prototype<br>(47 CFR §2.908) | Identical Prototype  |
| Device Category   | Portable   |
| RF Exposure Limits  | General Population / Uncontrolled  |

| Mode(s) of Operation            | GSM 900           | GSM 1800            | GSM 1900            | CDMA 800          | Wi-Fi 802.11b/g/n   | Bluetooth           |
|---------------------------------|-------------------|---------------------|---------------------|-------------------|---------------------|---------------------|
| Modulation Mode(s)              | GMSK              | GMSK                | GMSK                | QPSK              | BPSK                | GFSK                |
| Maximum Output Power Setting    | 33.5 dBm          | 30.5 dBm            | 30.5 dBm            | 25.0 dBm          | 20.0 dBm            | 10 dBm              |
| Duty Cycle                      | 1:8               | 1:8                 | 1:8                 | 1:1               | 1:1                 | 1:1                 |
| Transmitting Frequency Range(s) | 880.2 - 914.8 MHz | 1710.2 - 1784.8 MHz | 1850.2 - 1909.8 MHz | 826.4 - 846.6 MHz | 2412.0 - 2462.5 MHz | 2402.0 - 2483.5 MHz |

| Mode(s) of Operation               | GPRS 900          |             |      |      | GPRS 1800           |             |      |      | GPRS 1900           |             |      |      |
|------------------------------------|-------------------|-------------|------|------|---------------------|-------------|------|------|---------------------|-------------|------|------|
| Modulation                         | GMSK              |             |      |      | GMSK                |             |      |      | GMSK                |             |      |      |
| Maximum Output Power Setting (dBm) | 33.5              | <b>31.5</b> | 29.5 | 27.5 | 30.5                | <b>30.0</b> | 28.0 | 26.0 | 30.5                | <b>30.0</b> | 28.0 | 26.0 |
| Duty Cycle                         | 1:8               | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  |
| Transmitting Frequency Range(s)    | 880.2 - 914.8 MHz |             |      |      | 1710.2 - 1784.8 MHz |             |      |      | 1850.2 - 1909.8 MHz |             |      |      |

<sup>1</sup> **Bolded** entries indicate data mode configurations of highest time-average power output per band and data mode type, and thus were utilized for SAR testing in this report.

| Mode(s) of Operation               | EDGE 900          |             |      |      | EDGE 1800           |             |      |      | EDGE 1900           |             |      |      |
|------------------------------------|-------------------|-------------|------|------|---------------------|-------------|------|------|---------------------|-------------|------|------|
| Modulation                         | 8PSK              |             |      |      | 8PSK                |             |      |      | 8PSK                |             |      |      |
| Maximum Output Power Setting (dBm) | 27.5              | <b>26.0</b> | 24.0 | 22.0 | 26.5                | <b>26.0</b> | 24.0 | 22.0 | 26.5                | <b>26.0</b> | 24.0 | 22.0 |
| Duty Cycle                         | 1:8               | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  | 1:8                 | <b>2:8</b>  | 3:8  | 4:8  |
| Transmitting Frequency Range(s)    | 880.2 - 914.8 MHz |             |      |      | 1710.2 - 1784.8 MHz |             |      |      | 1850.2 - 1909.8 MHz |             |      |      |

## 2.2 Evaluation of CDMA modes

Per the “SAR Measurement Procedures for 3G Devices” (FCC KDB 941225) released in October, 2007, RC1, RC3 and RC3 (FCH + SCH) CDMA modes, EVDO Rev O, EVDO Rev A were considered. The conducted power measurements (per steps 3, 4 & 10 of section 4.4.5.2 of 3GPP2 C.5.011 / TIA -98-E) for each mode are shown in the table below.

| Conducted power (dBm) for CDMA modes |         |       |       |       |       |   |
|--------------------------------------|---------|-------|-------|-------|-------|---|
| Band                                 | Channel | RC1   |       | RC3   |       | RC3 (FCH + SCH)   |
|                                      |         | SO2   | SO55  | SO2   | SO55  |   |
| CDMA 800                             | 1013    | 25.14 | 25.22 | 25.18 | 25.16 | Per Motorola designs the maximum power, when in a mode that allows supplemental channels, will always be less than the RC3/RC1 maximum conducted power limit. |
|                                      | 384     | 24.71 | 24.73 | 24.75 | 24.72 |   |
|                                      | 777     | 25.01 | 25.09 | 25.09 | 25.02 |   |

| Conducted power (dBm) for EVDO modes |         |             |             |                 |                 |
|--------------------------------------|---------|-------------|-------------|-----------------|-----------------|
| Band                                 | Channel | Rev 0       |             | Rev A           |                 |
|                                      |         | FTAP 307.2k | RTAP 153.6k | Subtest 2 FETAP | Subtest 2 RETAP |
| CDMA 800                             | 1013    | 24.99       | 25.01       | 25.16           | 25.2            |
|                                      | 384     | 24.56       | 24.57       | 24.82           | 24.85           |
|                                      | 777     | 24.85       | 24.87       | 25.14           | 25.14           |

### 2.3 Evaluation of Wi-Fi 802.11 modes

Per “SAR Measurement Procedures for 802.11 a/b/g Transmitters” (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The conducted power measurements for each mode are shown in the table below. SAR testing for 802.11 modes was performed with the transmitter mode and data rate set to the configurations highlighted in bold below.

| Band                 | Channel | Conducted Power (dBm) for 802.11b Mode Data Rates |              |              |              |
|----------------------|---------|---|--------------|--------------|--------------|
|                      |         | 1 Mbps  | 2 Mbps       | 5.5 Mbps     | 11 Mbps      |
| Wi-Fi<br>2450<br>MHz | 1       | <b>19.01</b>                                      | <b>19.56</b> | <b>19.34</b> | <b>19.57</b> |
|                      | 6       | <b>18.67</b>                                      | <b>19.01</b> | <b>19.17</b> | <b>18.99</b> |
|                      | 11      | <b>18.84</b>                                      | <b>19.42</b> | <b>19.16</b> | <b>19.04</b> |

| Band                 | Channel | 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      |
| Wi-Fi<br>2450<br>MHz | 1       | <b>15.36</b>                                      | <b>15.27</b> | <b>15.32</b> | <b>15.05</b> | <b>14.42</b> | <b>14.2</b>  | <b>13.92</b> | <b>13.93</b> |
|                      | 6       | <b>14.91</b>                                      | <b>15.01</b> | <b>14.96</b> | <b>14.55</b> | <b>14.37</b> | <b>13.96</b> | <b>13.65</b> | <b>13.64</b> |
|                      | 11      | <b>15.13</b>                                      | <b>15.14</b> | <b>15.15</b> | <b>14.89</b> | <b>14.32</b> | <b>14.08</b> | <b>13.85</b> | <b>13.68</b> |

| Band                 | Channel | Conducted Power (dBm) for 802.11n Mode Data Rates<br>(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      |
| Wi-Fi<br>2450<br>MHz | 1       | <b>13.5</b>  | <b>14.63</b> | <b>13.76</b> | <b>13.92</b> | <b>13.77</b> | <b>13.72</b> | <b>13.47</b> | <b>13.15</b> |
|                      | 6       | <b>14.32</b>   | <b>14.34</b> | <b>13.84</b> | <b>13.65</b> | <b>13.44</b> | <b>13.17</b> | <b>13.1</b>  | <b>12.86</b> |
|                      | 11      | <b>14.49</b>   | <b>14.44</b> | <b>14.03</b> | <b>13.65</b> | <b>13.62</b> | <b>13.25</b> | <b>13.37</b> | <b>12.77</b> |

## 2.4 Evaluation of Bluetooth

Per "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas" (FCC KDB 648474), the necessity of stand-alone and simultaneous SAR testing was evaluated for the Bluetooth transmitter of the device under test.

The conditions under which the device under test can be excluded from stand-alone and simultaneous SAR testing, per FCC KDB 648474, are summarized as follows:

Table 1 – Output Power Thresholds for Unlicensed Transmitters

|                  | 2.45 | 5.15 - 5.35 | 5.47 - 5.85 | GHz |
|------------------|------|-------------|-------------|-----|
| $P_{\text{ref}}$ | 12   | 6           | 5           | mW  |

Device output power should be rounded to the nearest mW to compare with values specified in this table.

Table 2 – Summary of SAR Evaluation Requirements for a Cell Phone with Multiple Transmitters

|                                | Individual Transmitter  | Simultaneous Transmission  |
|--------------------------------|---|--|
| <b>Licensed Transmitters</b>   | Routine evaluation required   | SAR not required:<br>Unlicensed only   |
|                                | When there is no simultaneous transmission –<br>o output $\leq 60$ f SAR not required<br>o output $> 60$ f stand-alone SAR required   | o when stand-alone 1-g SAR is not required and antenna is $\geq 5$ cm from other antennas  |
|                                | When there is simultaneous transmission –<br>Stand-alone SAR not required when<br>o output $\leq 2 P_{\text{ref}}$ and antenna is $\geq 5.0$ cm from other antennas   | Licensed & Unlicensed<br>o when the sum of the 1-g SAR is $< 1.6$ W/kg for all simultaneous transmitting antennas  |
| <b>Unlicensed Transmitters</b> | o output $\leq P_{\text{ref}}$ and antenna is $\geq 2.5$ cm from other antennas<br>o output $\leq P_{\text{ref}}$ and antenna is $< 2.5$ cm from other antennas, each with either output power $\leq P_{\text{ref}}$ or 1-g SAR $< 1.2$ W/kg<br>Otherwise stand-alone SAR is required<br>When stand-alone SAR is required<br>o test SAR on highest output channel for each wireless mode and exposure condition<br>o if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures | o when SAR to peak location separation ratio of simultaneous transmitting antenna pair is $< 0.3$<br>SAR required:<br>Licensed & Unlicensed<br>antenna pairs with SAR to peak location separation ratio $\geq 0.3$ ; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition<br>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply |

Per the highlighted criteria:

1. The highest output conducted power measured for Bluetooth on the device under test is 7.36 mW [ $< 24$  mW]
2. The separation distance between the Bluetooth antenna and the main GSM antenna is 5.77 cm [ $> 5.0$  cm]
3. The separation distance between the Bluetooth antenna and the main CDMA antenna is 1.88 cm [ BT power  $< 24$  mW and CDMA SAR  $< 1.2$  W/kg]

Based on the output power of the Bluetooth transmitter and its antenna separation distance from the primary antenna, neither stand-alone nor simultaneous SAR measurements are required for the device under test. Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d.

### 3. Test Equipment Used

#### 3.1 Dosimetric System

The Motorola Mobile Devices Business Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.7) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is  $\pm 10.8\%$  (K=1) with an expanded uncertainty of  $\pm 21.6\%$  (K=2). The overall 1 g RSS uncertainty of the measurement system is  $\pm 11.1\%$  (K=1) with an expanded uncertainty of  $\pm 22.2\%$  (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.

| Description                                | Serial Number | Cal Date       | Cal Due Date   |
|--|---------------|----------------|----------------|
| DASY4™ DAE V1                              | 719           | 22 Mar, 2010   | 22 Mar, 2011   |
| E-Field Probe ES3DV3                       | 3180          | 20 May, 2010   | 20 May, 2011   |
| S.A.M. Phantom used for 800/900 MHz        | TP-1407       |                |                |
| S.A.M. Phantom used for 1800/1900/2450 MHz | TP-1160       |                |                |
| Dipole Validation Kit, D835V2              | 432TR         | 17 March, 2010 | 17 March, 2011 |
| Dipole Validation Kit, D835V2              | 421TR         | 18 Nov, 2010   | 18 Nov, 2012   |
| Dipole Validation Kit, D1800V1             | 283TR         | 10 Nov, 2010   | 10 Nov, 2012   |
| Dipole Validation Kit, D2450V1             | 788           | 11 Nov, 2010   | 11 Nov, 2012   |

#### 3.2 Additional Equipment

| Description                   | Serial Number | Cal Date    | Cal Due Date |
|-------------------------------|---------------|-------------|--------------|
| Signal Generator HP8648C      | 3847A04822    | Apr-22-2009 | Apr-22-2011  |
| Power Meter E4419B            | GB39511082    | Apr-24-2009 | Apr-24-2011  |
| Power Sensor #1 - E9301A      | US39210918    | Oct-25-2010 | Oct-25-2011  |
| Power Sensor #2 - E9301A      | US39210917    | Oct-25-2010 | Oct-25-2011  |
| Signal Generator HP8648C      | 3847A04810    | Oct-30-2009 | Oct-30-2011  |
| Power Meter E4419B            | GB39511087    | Dec-22-2009 | Dec-22-2011  |
| Power Sensor #1 - E9301A      | US39211006    | Oct-25-2010 | Oct-25-2011  |
| Power Sensor #2 - E9301A      | US39210934    | Oct-25-2010 | Oct-25-2011  |
| Signal Generator HP8648C      | 3429A00286    | Nov-23-2009 | Nov-23-2011  |
| Power Meter E4419B            | US39250622    | Dec-22-2009 | Dec-22-2011  |
| Power Sensor #1 - E9301A      | US39210931    | Oct-25-2010 | Oct-25-2011  |
| Power Sensor #2 - E9301A      | US39210932    | Oct-25-2010 | Oct-25-2011  |
| Network Analyzer HP8753ES     | US39172529    | Jun-04-2001 | Jun-04-2011  |
| Dielectric Probe Kit HP85070C | US99360070    |             |              |

#### 4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity,  $\epsilon_r$ , and the conductivity,  $\sigma$ , of the tissue simulating liquids were measured with a HP85070 Dielectric Probe Kit. These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of  $\rho = 1 \text{ g/cm}^3$  was entered into the system in all the cases. It can be seen that the measured parameters are within tolerance of the recommended limits specified in [1] and [5].

E-field probes calibrated at 1810 MHz were used for "1900 MHz" band (1850 MHz - 1910 MHz) SAR measurements. FCC KDB 450824 provides additional requirements on page 3 of 6 for SAR testing that is performed with probe calibration points that are more than 50 MHz removed from the measured bands. The KDB requires; "(2) When nominal tissue dielectric parameters are specified in the probe calibration data, the tissue dielectric parameters measured for routine measurements should be less than the target  $\epsilon_r$  and higher than the target Sigma values to minimize SAR underestimations". The 1900 MHz simulated tissues listed below meet this criteria.

| f (MHz) | Tissue type | Limits / Measured      | Dielectric Parameters |                |                             |
|---------|-------------|------------------------|-----------------------|----------------|-----------------------------|
|         |             |                        | $\epsilon_r$          | $\sigma$ (S/m) | Temp ( $^{\circ}\text{C}$ ) |
| 835     | Head        | Measured, 22 Dec, 2010 | 40.9                  | 0.91           | 19.9                        |
|         |             | Measured, 23 Dec, 2010 | 40.8                  | 0.97           | 20.0                        |
|         |             | Recommended Limits     | 41.5 $\pm$ 5%         | 0.90 $\pm$ 5%  | 18-25                       |
|         | Body        | Measured, 23 Dec, 2010 | 53.6                  | 0.97           | 21.3                        |
|         |             | Measured, 21 Jan, 2011 | 54.4                  | 0.98           | 19.2                        |
|         |             | Recommended Limits     | 55.2 $\pm$ 5%         | 0.97 $\pm$ 5%  | 18-25                       |
| 1880    | Head        | Measured, 28 Dec, 2010 | 38.6                  | 1.47           | 19.3                        |
|         |             | Recommended Limits     | 40.0 $\pm$ 5%         | 1.40 $\pm$ 5%  | 18-25                       |
|         | Body        | Measured, 28 Dec, 2010 | 50.8                  | 1.57           | 21.3                        |
|         |             | Measured, 17 Jan, 2011 | 50.7                  | 1.58           | 19.2                        |
|         |             | Recommended Limits     | 53.3 $\pm$ 5%         | 1.52 $\pm$ 5%  | 18-25                       |
| 2450    | Head        | Measured, 20 Dec, 2010 | 39.1                  | 1.83           | 19.4                        |
|         |             | Measured, 21 Dec, 2010 | 38.9                  | 1.84           | 19.3                        |
|         |             | Recommended Limits     | 39.2 $\pm$ 10%        | 1.80 $\pm$ 5%  | 18-25                       |
|         | Body        | Measured, 21 Dec, 2010 | 53.4                  | 1.88           | 19.6                        |
|         |             | Measured, 22 Dec, 2010 | 53.0                  | 1.90           | 19.1                        |
|         |             | Recommended Limits     | 52.7 $\pm$ 10%        | 1.95 $\pm$ 5%  | 18-25                       |

The list of ingredients and the percent composition used for the simulated tissues are indicated in the table below.

| Ingredient | 835 MHz / 900 MHz Head | 835 MHz / 900 MHz Body | 1800 MHz / 1900 MHz Head | 1800 MHz / 1900 MHz Body | 2450 MHz Head | 2450 MHz Body |
|------------|------------------------|------------------------|--------------------------|--------------------------|---------------|---------------|
| Sugar      | 57                     | 44.9                   | --                       | --                       | --            | --            |
| DGBE       | --                     | --                     | 47                       | 30.8                     | --            | 30            |
| Diacetin   | --                     | --                     | --                       | --                       | 51            | --            |
| Water      | 40.45                  | 53.06                  | 52.62                    | 68.8                     | 48.75         | 70            |
| Salt       | 1.45                   | 0.94                   | 0.38                     | 0.4                      | 0.15          | --            |
| HEC        | 1                      | 1                      | --                       | --                       | --            | --            |
| Bact.      | 0.1                    | 0.1                    | --                       | --                       | 0.1           | --            |

## 5. System Accuracy Verification

A system accuracy verification of the DASY4™ was performed using the measurement equipment listed in Section 3.1. The daily system accuracy verification 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 7. These frequencies are within  $\pm 10\%$  of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. 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  $15.0 \text{ cm} \pm 0.5 \text{ cm}$ . For frequencies above 3 GHz, the simulated tissue depth was verified to be  $10 \text{ cm} \pm 0.5 \text{ cm}$ . Z-axis scans showing the SAR penetration are also included in Appendix 1.

| f<br>(MHz) | Description            | SAR (W/kg),<br>1 gram | Dielectric Parameters |                | Ambient<br>Temp (°C) | Tissue<br>Temp (°C) |
|------------|------------------------|-----------------------|-----------------------|----------------|----------------------|---------------------|
|            |                        |                       | $\epsilon_r$          | $\sigma$ (S/m) |                      |                     |
| 835        | Measured, 9 Dec, 2010  | 10.35                 | 40.8                  | 0.89           | 19.9                 | 21.2                |
|            | Measured, 10 Dec, 2010 | 9.35                  | 40.5                  | 0.91           | 21.4                 | 20.0                |
|            | Recommended Limits     | 9.59                  | 41.5 $\pm 5\%$        | 0.90 $\pm 5\%$ | 18-25                | 18-25               |
|            | Measured, 22 Dec, 2010 | 9.90                  | 40.9                  | 0.91           | 22.3                 | 20.4                |
|            | Measured, 23 Dec, 2010 | 9.65                  | 40.8                  | 0.91           | 22.6                 | 20.0                |
|            | Measured, 20 Jan, 2011 | 10.1                  | 40.3                  | 0.91           | 20.0                 | 19.6                |
|            | Measured, 24 Jan, 2011 | 9.90                  | 40.9                  | 0.90           | 20.3                 | 19.8                |
|            | Recommended Limits     | 9.32                  | 41.5 $\pm 5\%$        | 0.90 $\pm 5\%$ | 18-25                | 18-25               |
| 1800       | Measured, 13 Dec, 2010 | 38.55                 | 38.7                  | 1.37           | 21.5                 | 20.3                |
|            | Measured, 14 Dec, 2010 | 37.20                 | 38.9                  | 1.39           | 21.5                 | 20.0                |
|            | Measured, 28 Dec, 2010 | 36.95                 | 39.0                  | 1.39           | 22.9                 | 20.3                |
|            | Measured, 30 Dec, 2010 | 35.90                 | 38.3                  | 1.36           | 22.4                 | 20.3                |
|            | Measured, 17 Jan, 2011 | 38.05                 | 38.3                  | 1.38           | 21.4                 | 20.2                |
|            | Recommended Limits     | 38.30                 | 40.0 $\pm 5\%$        | 1.40 $\pm 5\%$ | 18-25                | 18-25               |
| 2450       | Measured, 20 Dec, 2010 | 57.0                  | 39.1                  | 1.83           | 22.3                 | 20.5                |
|            | Measured, 21 Dec, 2010 | 58.0                  | 38.9                  | 1.84           | 21.6                 | 20.3                |
|            | Measured, 22 Dec, 2010 | 58.0                  | 38.7                  | 1.84           | 22.6                 | 20.3                |
|            | Recommended Limits     | 53.4                  | 39.2 $\pm 10\%$       | 1.80 $\pm 5\%$ | 18-25                | 18-25               |

The following probe conversion factors were used on the E-Field probe(s) used for the system accuracy verification measurements:

| Description             | Serial Number | f<br>(MHz) | Conversion Factor | Cal Cert<br>pg # |
|-------------------------|---------------|------------|-------------------|------------------|
| E-Field Probe<br>ES3DV3 | 3180          | 835        | 6.01              | 5 of 11          |
|                         |               | 1810       | 5.03              | 5 of 11          |
|                         |               | 2450       | 4.42              | 5 of 11          |

## 6. Test Results

For GSM and WCDMA modes, the test sample was operated using an actual transmission through a base station simulator. Wi-Fi testing was conducted using manufacturer test mode software, per guidance given in FCC KDB 248227. The base station simulator or test software was set up for the proper channels, transmitter power levels and transmit modes of operation.

The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system. The default settings for the “coarse” and “cube” scans were chosen and used for measurements. The grid spacing of the coarse scan was set to 15 mm or less as shown in the SAR plots included in Appendix 2, 3, and 4. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone model covered by this report has the following battery options:  
Model SNN5879A - 1880 mAH Battery

The battery SNN5879A was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

### 6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 12 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 the [6]. Also shown are the measured conducted output power levels, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{(-\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4™ 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.

The left head and right head SAR contour distributions are similar. Because of this similarity, the cheek/touch and 15° tilt test conditions with the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 2. All other test conditions measured lower SAR values than those included in Appendix 2.

The guidelines provided in “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas” (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the sum of the 1 g SAR measured for the individual simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Evaluations for the simultaneous SAR sums are presented in the tables below.

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth.

The following probe conversion factors were used on the E-Field probe(s) used for head-adjacent measurements:

| Description          | Serial Number | f (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ES3DV3 | 3180          | 835     | 6.01              | 5 of 11       |
|                      |               | 1810    | 5.03              | 5 of 11       |
|                      |               | 2450    | 4.42              | 5 of 11       |

| Left Head Cheek Position, GSM/CDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                  | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                 | 512     | 30.63                        | 19.3      | -0.0536    | 0.532           | 0.54                | 1.02            | 1.03                | 28 Dec, 10   |
|  | 661     | 30.54                        | 19.5      | -0.0467    | 0.434           | 0.44                | 0.846           | 0.86                | 28 Dec, 10   |
|  | 810     | 30.61                        | 19.3      | -0.0696    | 0.289           | 0.29                | 0.573           | 0.58                | 28 Dec, 10   |
| CDMA 800                                 | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|  | 384     | 24.73                        | 20.0      | -0.482     | 0.335           | 0.37                | 0.446           | 0.50                | 23 Dec, 10   |
|  | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 1: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Left Head Cheek Position, Wi-Fi Modes |                   |         |           |            |                 |                     |                 |                     |              |
|---------------------------------------|-------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                               | Mode / Data Rate  | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|                                       |                   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                  | 802.11b, 1 Mbps   | 1       | 19.5      | -0.00575   | 0.0965          | 0.10                | 0.223           | 0.22                | 20 Dec, 10   |
|                                       |                   | 6       | 19.3      | 0.148      | 0.104           | 0.10                | 0.227           | 0.23                | 20 Dec, 10   |
|                                       |                   | 11      | 19.3      | 0.0867     | 0.107           | 0.11                | 0.244           | 0.24                | 20 Dec, 10   |
|                                       | 802.11b, 2 Mbps   | 1       | 19.6      | 0.22       | 0.113           | 0.11                | 0.253           | 0.25                | 21 Dec, 10   |
|                                       |                   | 6       | 19.4      | -0.0799    | 0.0834          | 0.08                | 0.189           | 0.19                | 20 Dec, 10   |
|                                       |                   | 11      | 19.5      | 0.016      | 0.103           | 0.10                | 0.236           | 0.24                | 20 Dec, 10   |
|                                       | 802.11b, 5.5 Mbps | 1       | 19.3      | 0.0467     | 0.119           | 0.12                | 0.271           | 0.27                | 21 Dec, 10   |
|                                       |                   | 6       | 19.4      | -0.132     | 0.0978          | 0.10                | 0.222           | 0.23                | 21 Dec, 10   |
|                                       |                   | 11      | 19.3      | -0.01      | 0.140           | 0.14                | 0.322           | 0.32                | 21 Dec, 10   |
|                                       | 802.11b, 11 Mbps  | 1       | 20.0      | 0.201      | 0.099           | 0.10                | 0.219           | 0.22                | 20 Dec, 10   |
|                                       |                   | 6       | 19.3      | -0.0225    | 0.103           | 0.10                | 0.235           | 0.24                | 21 Dec, 10   |
|                                       |                   | 11      | 19.3      | 0.0198     | 0.113           | 0.11                | 0.267           | 0.27                | 21 Dec, 10   |

Table 2: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Left Head Cheek Position<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|--|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900   | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.54                                | 0.14                             | 0.68                           | 1.03                               | 0.32                            | 1.35                          |
| CDMA 850   |                              | 0.37                                | 0.14                             | 0.51                           | 0.50                               | 0.32                            | 0.82                          |

Table 3: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head Cheek Position, GSM/CDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                   | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                  | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|   | 661     | 30.54                        | 19.2      | 0.00922    | 0.312           | 0.31                | 0.593           | 0.59                | 28 Dec, 10   |
|   | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |
| CDMA 800                                  | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.73                        | 20.2      | -0.179     | 0.29            | 0.30                | 0.391           | 0.41                | 22 Dec, 10   |
|   | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 4: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head Cheek Position, Wi-Fi Modes |                  |         |           |            |                 |                     |                 |                     |              |
|--|------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                | Mode / Data Rate | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |                  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                   | 802.11b, 1 Mbps  | 1       | 19.4      | -0.224     | 0.043           | 0.05                | 0.0813          | 0.09                | 20 Dec, 10   |
|  |                  | 6       |           |            |                 |                     |                 |                     |              |
|  |                  | 11      |           |            |                 |                     |                 |                     |              |

Table 5: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Right Head Cheek Position<br>Summation of Highest SAR Values |                 |                                     |                                  |                                |                                    |                                 |                               |
|---|-----------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode   | Wi-Fi Mode      | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900  | Wi-Fi 2450      | 0.31                                | 0.05                             | 0.36                           | 0.59                               | 0.09                            | 0.68                          |
| CDMA 850  | 802.11b, 1 Mbps | 0.30                                | 0.05                             | 0.35                           | 0.41                               | 0.09                            | 0.50                          |

Table 6: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Left Head 15° Tilt Position, GSM/WCDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                      | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                     | 512     | 30.63                        | 19.3      | -0.140     | 0.691           | 0.71                | 1.27            | 1.31                | 28 Dec, 10   |
|  | 661     | 30.54                        | 19.5      | -0.0945    | 0.52            | 0.53                | 0.976           | 1.00                | 28 Dec, 10   |
|  | 810     | 30.61                        | 19.3      | -0.0696    | 0.36            | 0.37                | 0.68            | 0.69                | 28 Dec, 10   |
| CDMA 800                                     | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|  | 384     | 24.73                        | 19.5      | -0.107     | 0.198           | 0.20                | 0.263           | 0.27                | 23 Dec, 10   |
|  | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 7: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Left Head 15° Tilt Position, Wi-Fi Modes |                  |         |           |            |                 |                     |                 |                     |              |
|--|------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                  | Mode / Data Rate | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |                  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                     | 802.11b, 1 Mbps  | 1       | 19.5      | 0.11       | 0.0341          | 0.03                | 0.0636          | 0.06                | 20 Dec, 10   |
|  |                  | 6       |           |            |                 |                     |                 |                     |              |
|  |                  | 11      |           |            |                 |                     |                 |                     |              |

Table 8: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Left Head 15° Tilt Position<br>Summation of Highest SAR Values |                 |                                     |                                  |                                |                                    |                                 |                               |
|---|-----------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode   | Wi-Fi Mode      | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900  | Wi-Fi 2450      | 0.71                                | 0.03                             | 0.74                           | 1.31                               | 0.06                            | 1.37                          |
| CDMA 850  | 802.11b, 1 Mbps | 0.20                                | 0.03                             | 0.23                           | 0.27                               | 0.06                            | 0.33                          |

Table 9: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head 15° Tilt Position, GSM/WCDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                       | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                      | 512     | 30.63                        | 19.0      | -0.113     | 0.579           | 0.59                | 1.04            | 1.07                | 28 Dec, 10   |
|   | 661     | 30.54                        | 19.0      | -0.099     | 0.431           | 0.44                | 0.792           | 0.81                | 28 Dec, 10   |
|   | 810     | 30.61                        | 19.1      | -0.117     | 0.29            | 0.30                | 0.542           | 0.56                | 28 Dec, 10   |
| CDMA 800                                      | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.73                        | 19.9      | -0.0535    | 0.21            | 0.21                | 0.281           | 0.28                | 22 Dec, 10   |
|   | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 10: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Right Head 15° Tilt Position, Wi-Fi Modes |                  |         |           |            |                 |                     |                 |                     |              |
|---|------------------|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                   | Mode / Data Rate | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |                  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450                                      | 802.11b, 1 Mbps  | 1       | 19.4      | 0.18       | 0.0423          | 0.04                | 0.0801          | 0.08                | 20 Dec, 10   |
|   |                  | 6       |           |            |                 |                     |                 |                     |              |
|   |                  | 11      |           |            |                 |                     |                 |                     |              |

Table 11: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Right Head 15° Tilt Position<br>Summation of Highest SAR Values |                 |                                     |                                  |                                |                                    |                                 |                               |
|--|-----------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode      | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900   | Wi-Fi 2450      | 0.59                                | 0.04                             | 0.63                           | 1.07                               | 0.08                            | 1.15                          |
| CDMA 850   | 802.11b, 1 Mbps | 0.21                                | 0.04                             | 0.25                           | 0.28                               | 0.08                            | 0.36                          |

Table 12: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

## 6.2 Body Worn Test Results

The SAR results shown in tables 13 through 19 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 measured conducted output power levels, the temperature of the test facility during the test, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{(-\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4™ 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.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 3. All other test conditions measured lower SAR values than those included in Appendix 3.

The guidelines provided in “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas” (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the sum of the 1 g SAR measured for the individual simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Evaluations for the simultaneous SAR summations are presented in the tables below.

A “flat” phantom was for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0 mm. It measures 52.7 cm(long) x 26.7 cm(wide) x 21.2 cm(tall).

The simulated tissue depth was verified to be 15.0 cm  $\pm$  0.5 cm for frequencies less than 3 GHz, or 10.0 cm  $\pm$  0.5 cm for frequencies greater than 3 GHz. The same device holder described in section 6 was used for positioning the phone. The functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories, testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

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 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 the front side facing the user.

The cellular phone was also tested in data mode operations. For these tests, a separation distance of 25 mm between the device and the flat phantom was used. The device was tested in the worst-case SAR position and channel configuration from the voice-mode body-worn testing.

The following probe conversion factors were used on the E-Field probe(s) used for the body-worn measurements:

| Description          | Serial Number | f (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ES3DV3 | 3180          | 835     | 6.01              | 6 of 11       |
|                      |               | 1810    | 4.71              | 6 of 11       |
|                      |               | 2450    | 4.22              | 6 of 11       |

| Body-Worn, Front of Phone 15 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                      | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900                                     | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|  | 661     | 30.54                        | 20.6      | -0.0993    | 0.066           | 0.06                | 0.0888          | 0.09                | 28 Dec, 10   |
|  | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |
| CDMA 800                                     | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|  | 384     | 24.73                        | 21.0      | -0.0865    | 0.204           | 0.21                | 0.281           | 0.29                | 23 Dec, 10   |
|  | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 13: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Back of Phone 15 mm from Phantom; GSM/CDMA Modes |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)   | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900  | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|   | 661     | 30.54                        | 20.5      | -0.727     | 0.192           | 0.20                | 0.347           | 0.35                | 28 Dec, 10   |
|   | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |
| CDMA 800  | 1013    | 25.02                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.73                        | 21.3      | 0.066      | 0.404           | 0.40                | 0.565           | 0.57                | 23 Dec, 10   |
|   | 777     | 24.97                        |           |            |                 |                     |                 |                     |              |

Table 14: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| GPRS Class 10 (2 Uplink Timeslots) Mode<br>Body-Worn, Back of Phone 25 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)  | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900   | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|  | 661     | 30.54                        | 19.8      | -0.123     | 0.141           | 0.15                | 0.228           | 0.23                | 30 Dec, 10   |
|  | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |

Table 15: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| EDGE Class 10 (2 Uplink Timeslots) Mode<br>Body-Worn, Back of Phone 25 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
|--|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)  | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GSM 1900   | 512     | 30.63                        |           |            |                 |                     |                 |                     |              |
|  | 661     | 30.54                        | 20.2      | 0.0152     | 0.0698          | 0.07                | 0.113           | 0.11                | 28 Dec, 10   |
|  | 810     | 30.61                        |           |            |                 |                     |                 |                     |              |

Table 16: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit

| EVDO Rev A Mode                             |         |                              |           |            |                 |                     |                 |                     |              |
|---|---------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| Body-Worn, Back of Phone 25 mm from Phantom |         |                              |           |            |                 |                     |                 |                     |              |
| f (MHz)                                     | Channel | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| EVDO 800 Rev A                              | 1013    | 25.16                        |           |            |                 |                     |                 |                     |              |
|   | 384     | 24.82                        | 18.9      | 0.0208     | 0.325           | 0.33                | 0.449           | 0.45                | 24 Jan, 11   |
|   | 777     | 25.14                        |           |            |                 |                     |                 |                     |              |

Table 17: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit

| Body-Worn, Back of Phone 25 mm from Phantom; Wi-Fi Modes |                   |         |             |              |                 |                     |                 |                     |              |
|--|-------------------|---------|-------------|--------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)  | Mode / Data Rate  | Channel | Temp (°C)   | Drift (dB)   | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|  |                   |         |             |              | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| 2450   | 802.11b, 1 Mbps   | 1       | 19.9        | -0.0715      | 0.0286          | 0.03                | 0.0476          | 0.05                | 21 Dec, 10   |
|  |                   | 6       | 19.5        | 0.074        | 0.0215          | 0.02                | 0.0362          | 0.04                | 21 Dec, 10   |
|  |                   | 11      | 19.5        | -0.125       | 0.0188          | 0.02                | 0.0321          | 0.03                | 21 Dec, 10   |
|  | 802.11b, 2 Mbps   | 1       | 19.6        | 0.291        | 0.0305          | 0.03                | 0.0507          | 0.05                | 21 Dec, 10   |
|  |                   | 6       | 19.8        | 0.324        | 0.019           | 0.02                | 0.0317          | 0.03                | 21 Dec, 10   |
|  |                   | 11      | 19.6        | 0.473        | 0.0209          | 0.02                | 0.0349          | 0.03                | 21 Dec, 10   |
|  | 802.11b, 5.5 Mbps | 1       | <b>19.6</b> | <b>0.528</b> | <b>0.0327</b>   | <b>0.03</b>         | <b>0.0548</b>   | <b>0.05</b>         | 21 Dec, 10   |
|  |                   | 6       | 19.6        | 0.585        | 0.0216          | 0.02                | 0.0366          | 0.04                | 21 Dec, 10   |
|  |                   | 11      | 19.4        | 0.526        | 0.0208          | 0.02                | 0.0337          | 0.03                | 21 Dec, 10   |
|  | 802.11b, 11 Mbps  | 1       | 19.5        | 0.228        | 0.026           | 0.03                | 0.0434          | 0.04                | 21 Dec, 10   |
|  |                   | 6       | 19.6        | 0.624        | 0.021           | 0.02                | 0.0345          | 0.03                | 21 Dec, 10   |
|  |                   | 11      | 19.5        | -0.104       | 0.0197          | 0.02                | 0.033           | 0.03                | 21 Dec, 10   |

Table 18: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR             |                              |                                     |                                  |                                |                                    |                                 |                               |
|---|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Body-Worn, Back of Phone 25 mm from Phantom |                              |                                     |                                  |                                |                                    |                                 |                               |
| Summation of Highest SAR Values             |                              |                                     |                                  |                                |                                    |                                 |                               |
| Cellular Mode                               | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GSM 1900 (GPRS Cl. 10)                      | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.15                                | 0.03                             | 0.18                           | 0.23                               | 0.05                            | 0.28                          |
| CDMA 800 (EVDO Rev A)                       |                              | 0.33                                | 0.03                             | 0.36                           | 0.45                               | 0.05                            | 0.50                          |

Table 19: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

### 6.3 Mobile Hotspot Test Results

The DUT is capable of functioning as a Wi-Fi to Cellular mobile hotspot. Additional SAR testing was performed according to the interim test guidelines provided at the October 2010 TCB Workshop. Testing was performed with a separation of 1 cm between the DUT and the “flat” phantom. The DUT was positioned for SAR tests with the front and back surfaces facing the phantom, and also with the edges facing the phantom in which the transmitting antenna is < 2.5 cm from the edge. Each transmit band was utilized for SAR testing, but only the “mode” within each band that exhibited the highest SAR results from section 6.2 was used.

The SAR results shown in tables 20 through 28 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 temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{-(\text{drift}/10)}$ . The SAR reported at the end of the measurement process by the DASY4™ 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.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 4. All other test conditions measured lower SAR values than those included in Appendix 4.

The guidelines provided in “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas” (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the sum of the 1 g SAR measured for the individual simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR evaluation for simultaneous transmission is likewise not required. Evaluations for the simultaneous SAR sums are presented in the tables below.

A “flat” phantom was for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0 mm. It measures 52.7 cm(long) x 26.7 cm(wide) x 21.2 cm(tall).

The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies below 3 GHz. The same device holder described in section 6 was used for positioning the phone.

The following probe conversion factors were used on the E-Field probe(s) used for the body-worn mobile hotspot measurements:

| Description          | Serial Number | f (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ES3DV3 | 3180          | 835     | 6.01              | 6 of 11       |
|                      |               | 1810    | 4.71              | 6 of 11       |
|                      |               | 2450    | 4.22              | 6 of 11       |

| Body-Worn, Back of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |              |
|---|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|--------------|
| f (MHz)                                     | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Test |
|   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |              |
| GPRS 1900 Class 10                          | 512     | 19.2      | -0.0054    | 0.686           | 0.69                | 1.23            | 1.26                | 17 Jan, 11   |
|   | 661     | 19.3      | -0.0282    | 0.582           | 0.59                | 1.07            | 1.08                | 17 Jan, 11   |
|   | 810     | 19.2      | 0.024      | 0.446           | 0.45                | 0.841           | 0.84                | 17 Jan, 11   |
| EVDO 800 Rev A                              | 1013    | 18.9      | 0.0249     | 0.796           | 0.80                | 1.08            | 1.08                | 21 Jan, 11   |
|   | 384     | 19.0      | 0.155      | 0.759           | 0.76                | 1.05            | 1.05                | 21 Jan, 11   |
|   | 777     | 19.2      | -0.0743    | 0.843           | 0.86                | 1.16            | 1.18                | 21 Jan, 11   |
| 2450 802.11b, 5.5 Mbps                      | 1       | 19.1      | -0.189     | 0.165           | 0.17                | 0.303           | 0.32                | 22 Dec, 10   |
|   | 6       |           |            |                 |                     |                 |                     |              |
|   | 11      |           |            |                 |                     |                 |                     |              |

Table 20: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Body-Worn, Back of Phone 10 mm from Phantom<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|---|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode   | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GPRS 1900 Class 10  | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.69                                | 0.17                             | 0.86                           | 1.26                               | 0.32                            | 1.58                          |
| EVDO 800 Rev A  |                              | 0.86                                | 0.17                             | 1.03                           | 1.18                               | 0.32                            | 1.50                          |

Table 21: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Front of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|--|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)                                      | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                           | 512     |           |            |                 |                     |                 |                     |               |
|  | 661     | 20.1      | -0.004     | 0.21            | 0.21                | 0.332           | 0.33                | 17 Jan, 11    |
|  | 810     |           |            |                 |                     |                 |                     |               |
| EVDO 800 Rev A                               | 1013    |           |            |                 |                     |                 |                     |               |
|  | 384     | 19.9      | 0.031      | 0.377           | 0.38                | 0.521           | 0.52                | 24 Jan, 11    |
|  | 777     |           |            |                 |                     |                 |                     |               |
| 2450 802.11b, 5.5 Mbps                       | 1       | 19.2      | -0.247     | 0.0284          | 0.03                | 0.0499          | 0.05                | 22 Dec, 10    |
|  | 6       |           |            |                 |                     |                 |                     |               |
|  | 11      |           |            |                 |                     |                 |                     |               |

Table 22: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Body-Worn, Front of Phone 10 mm from Phantom<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|--|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GPRS 1900 Class 10   | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.21                                | 0.03                             | 0.24                           | 0.33                               | 0.05                            | 0.38                          |
| EVDO 800 Rev A   |                              | 0.38                                | 0.03                             | 0.41                           | 0.52                               | 0.05                            | 0.57                          |

Table 23: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Left Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|--|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)  | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                               | 512     |           |            |                 |                     |                 |                     |               |
|  | 661     | 20.0      | 0.143      | 0.0564          | 0.06                | 0.143           | 0.10                | 17 Jan, 11    |
|  | 810     |           |            |                 |                     |                 |                     |               |
| EVDO 800 Rev A                                   | 1013    |           |            |                 |                     |                 |                     |               |
|  | 384     | 19.5      | -0.143     | 0.473           | 0.49                | 0.697           | 0.72                | 24 Jan, 11    |
|  | 777     |           |            |                 |                     |                 |                     |               |
| 2450 802.11b, 5.5 Mbps                           | 1       | 19.1      | 0.00       | 0.189           | 0.19                | 0.394           | 0.39                | 22 Dec, 11    |
|  | 6       |           |            |                 |                     |                 |                     |               |
|  | 11      |           |            |                 |                     |                 |                     |               |

Table 24: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Evaluation for Simultaneous SAR<br>Body-Worn, Left Edge of Phone 10 mm from Phantom<br>Summation of Highest SAR Values |                              |                                     |                                  |                                |                                    |                                 |                               |
|--|------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------------------|---------------------------------|-------------------------------|
| Cellular Mode  | Wi-Fi Mode                   | Cellular Mode 10 g SAR Value (W/kg) | Wi-Fi Mode 10 g SAR Value (W/kg) | Combined 10 g SAR Value (W/kg) | Cellular Mode 1 g SAR Value (W/kg) | Wi-Fi Mode 1 g SAR Value (W/kg) | Combined 1 g SAR Value (W/kg) |
| GPRS 1900 Class 10   | Wi-Fi 2450 802.11b, 5.5 Mbps | 0.06                                | 0.19                             | 0.25                           | 0.10                               | 0.39                            | 0.49                          |
| EVDO 800 Rev A   |                              | 0.49                                | 0.19                             | 0.68                           | 0.72                               | 0.39                            | 1.11                          |

Table 25: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Right Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|---|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)   | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                                | 512     |           |            |                 |                     |                 |                     |               |
|   | 661     | 20.2      | 0.398      | 0.0908          | 0.09                | 0.15            | 0.15                | 17 Jan, 11    |
|   | 810     |           |            |                 |                     |                 |                     |               |
| EVDO 800 Rev A                                    | 1013    |           |            |                 |                     |                 |                     |               |
|   | 384     | 19.5      | 0.0826     | 0.372           | 0.37                | 0.536           | 0.54                | 24 Jan, 11    |
|   | 777     |           |            |                 |                     |                 |                     |               |

Table 26: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Top Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|---|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)   | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|   |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| GPRS 1900 Class 10                              | 512     |           |            |                 |                     |                 |                     |               |
|   | 661     | 20.4      | -0.003     | 0.333           | 0.33                | 0.599           | 0.60                | 17 Jan, 11    |
|   | 810     |           |            |                 |                     |                 |                     |               |

Table 27: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

| Body-Worn, Bottom Edge of Phone 10 mm from Phantom |         |           |            |                 |                     |                 |                     |               |
|--|---------|-----------|------------|-----------------|---------------------|-----------------|---------------------|---------------|
| f (MHz)  | Channel | Temp (°C) | Drift (dB) | 10 g SAR value  |                     | 1 g SAR value   |                     | Date of Tests |
|  |         |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |               |
| EVDO 800 Rev A                                     | 1013    |           |            |                 |                     |                 |                     |               |
|  | 384     | 19.4      | 0.16       | 0.0814          | 0.08                | 0.144           | 0.14                | 24 Jan, 11    |
|  | 777     |           |            |                 |                     |                 |                     |               |

Table 28: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

## References

- [1] CENELEC, en62209-1:2006 “Human Exposure to Radio Frequency Fields From Hand - Held and Body - Mounted Wireless Communication Devices – Human Models, Instrumentation, and Procedures”
- [2] CENELEC, en50360:2001 “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)”

## **Appendix 1**

### **SAR distribution comparison for the system accuracy verification**

## Test Laboratory: MOTOROLA 835 MHz System Performance Check

**Type: D835V2; Serial: D835V2 - SN:432tr;**

Procedure Notes: PM2 Power = 201 mW Refl.Pwr PM3 = - 29.2dB [Sim.Temp@SPC](#) = 19.9 Room Temp @ SPC = 21.2

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 0.89$  mho/m,  $\epsilon_r = 40.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.86 mW/g

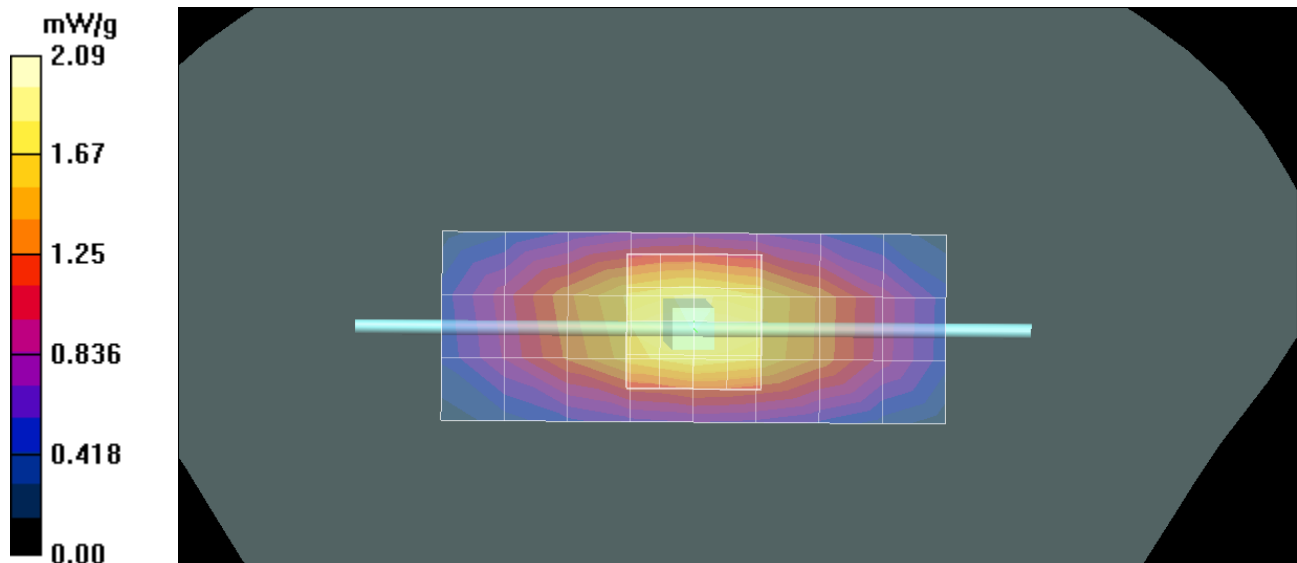
**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 49.4 V/m; Power Drift = -0.075 dB

Maximum value of SAR (measured) = 2.07 mW/g

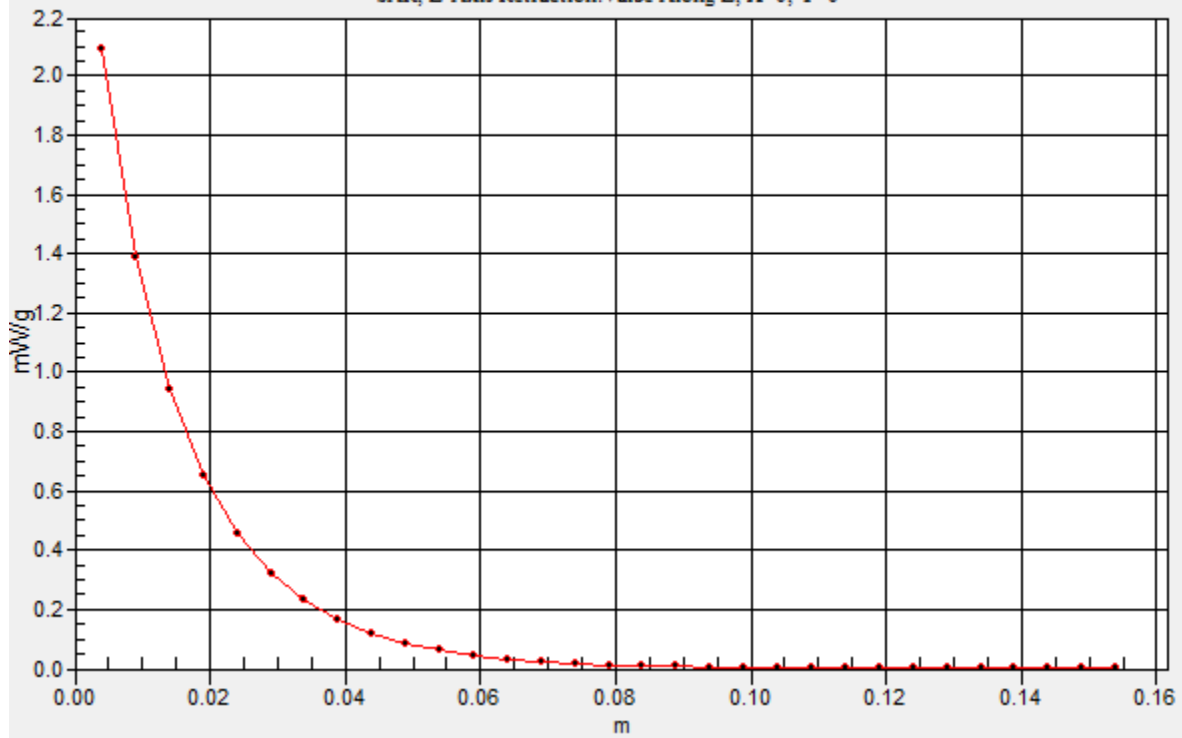
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 2.09 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 835 MHz System Performance Check

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:432tr;**

Procedure Notes: PM2 Power = 201 mW Refl.Pwr PM3 = - 28.9dB Sim.Temp@SPC = 20 Room Temp @ SPC = 21.4

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 0.91$  mho/m,  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.87 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 49.0 V/m; Power Drift = -0.016 dB

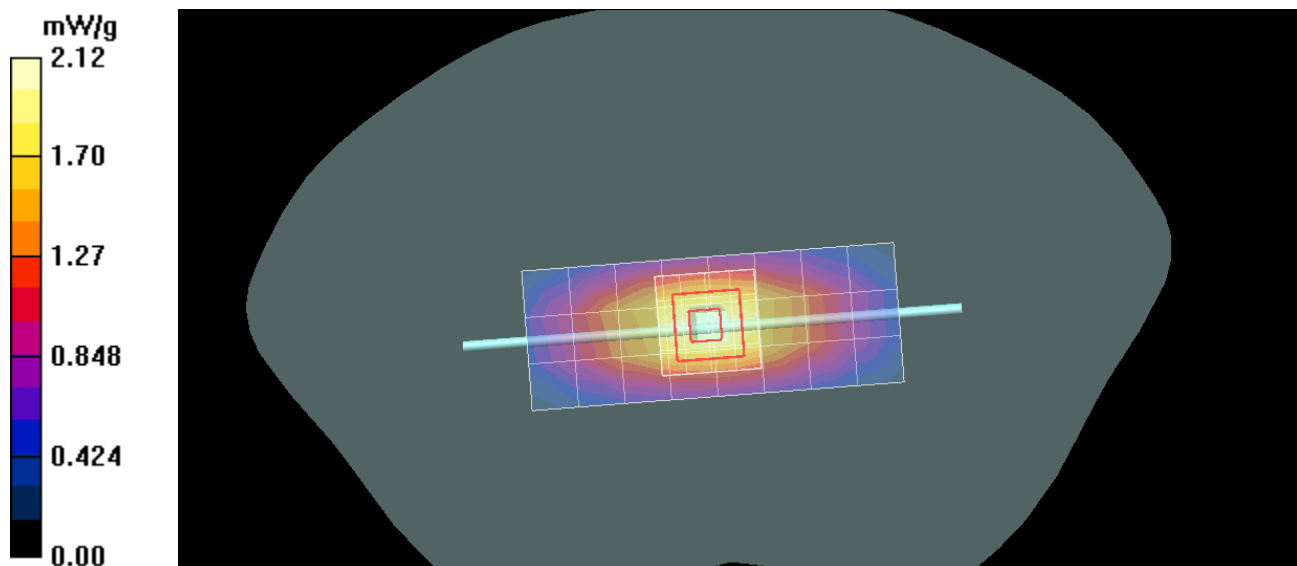
Peak SAR (extrapolated) = 2.93 W/kg

**SAR(1 g) = 1.96 mW/g; SAR(10 g) = 1.27 mW/g**

Maximum value of SAR (measured) = 2.10 mW/g

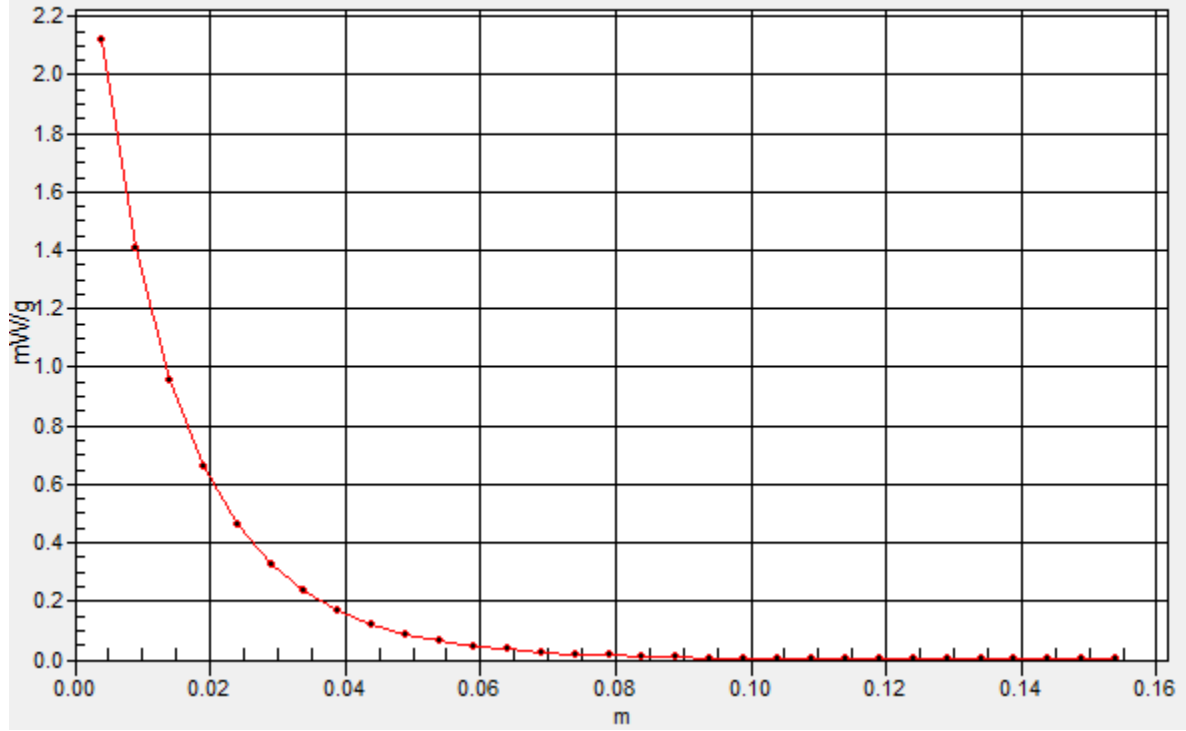
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 2.12 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 835 MHz System Performance Check

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:421tr;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -25.44dB [Sim.Temp@SPC](#) = 20.4 Room Temp @ SPC = 22.3

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 0.91$  mho/m,  $\epsilon_r = 40.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.83 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 49.4 V/m; Power Drift = 0.112 dB

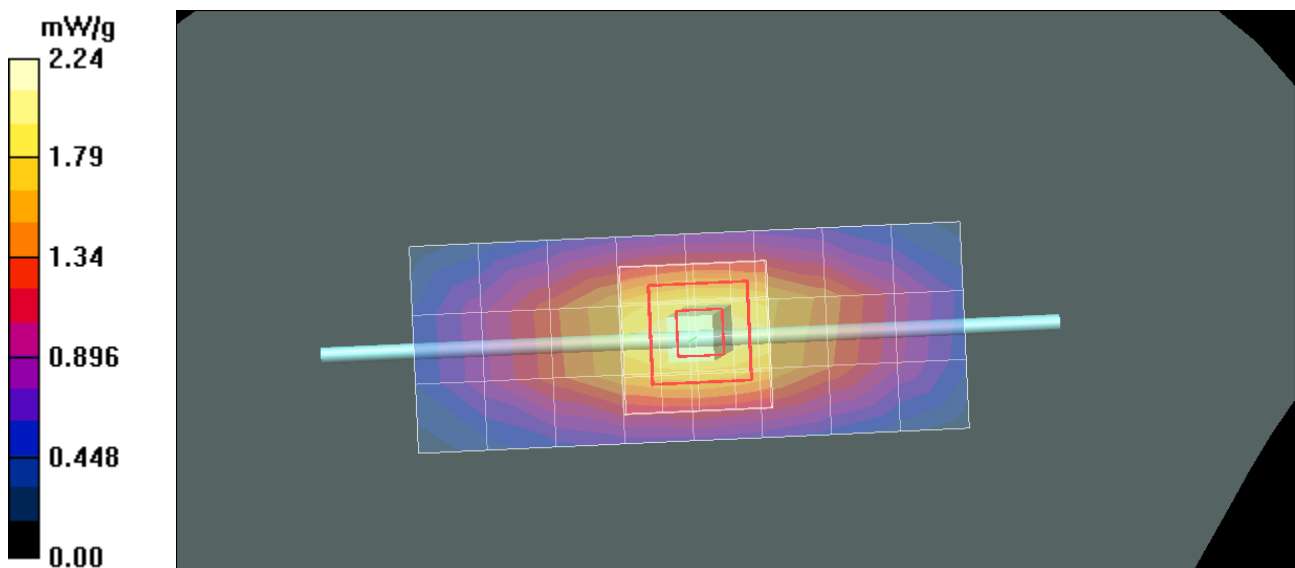
Peak SAR (extrapolated) = 3.00 W/kg

**SAR(1 g) = 1.98 mW/g; SAR(10 g) = 1.28 mW/g**

Maximum value of SAR (measured) = 2.14 mW/g

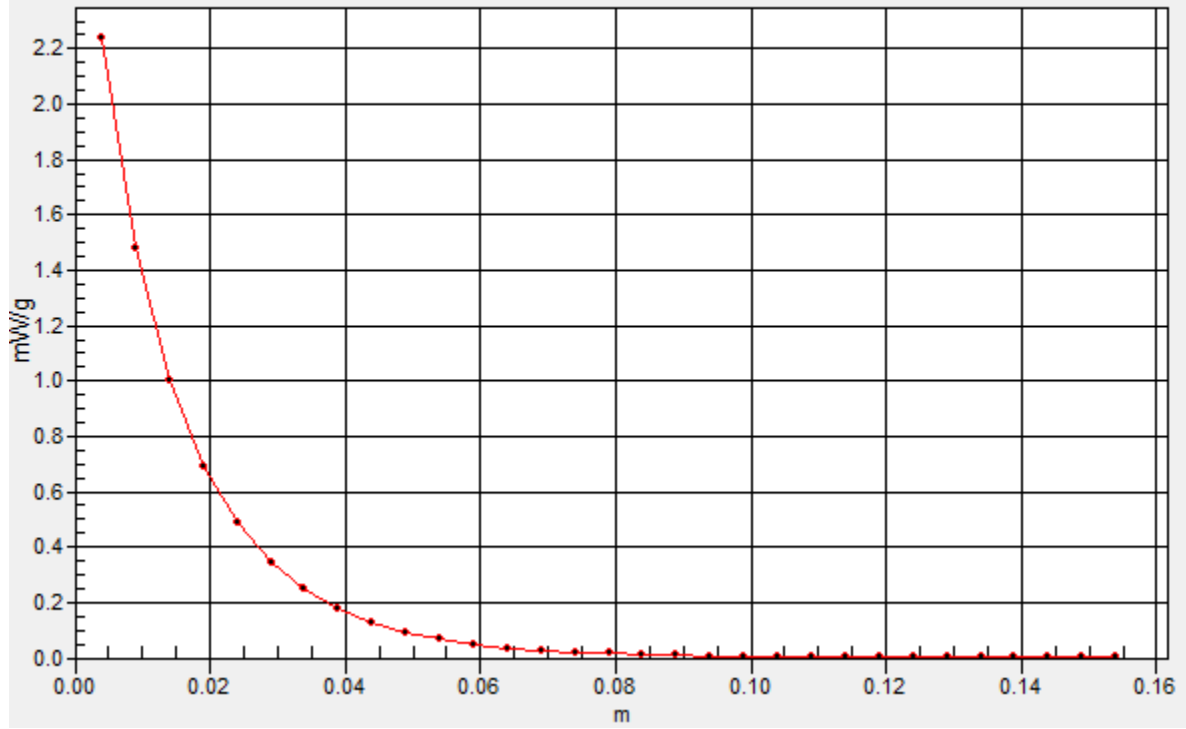
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 2.24 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 835 MHz System Performance Check

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:421tr;**

Procedure Notes: Power = 201 mW Refl.Pwr PM3 = -26.7 dB [Sim.Temp@SPC](#) = 20 Room Temp @ SPC = 22.6

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 0.91$  mho/m,  $\epsilon_r = 40.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.85 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 48.9 V/m; Power Drift = -0.098 dB

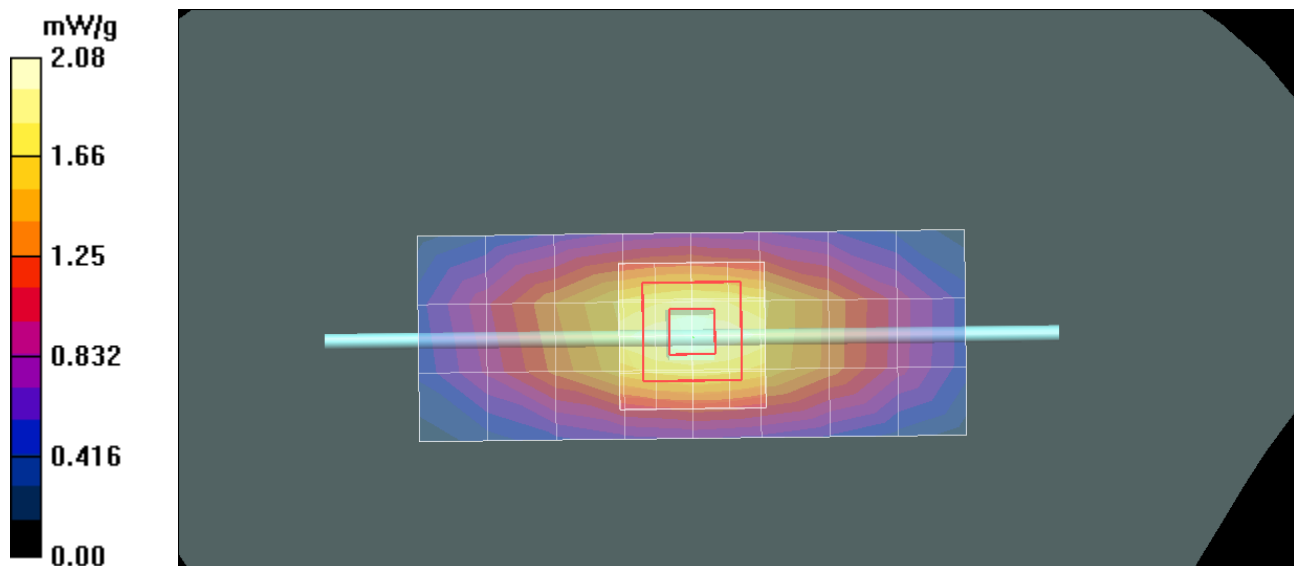
Peak SAR (extrapolated) = 2.92 W/kg

**SAR(1 g) = 1.93 mW/g; SAR(10 g) = 1.25 mW/g**

Maximum value of SAR (measured) = 2.09 mW/g

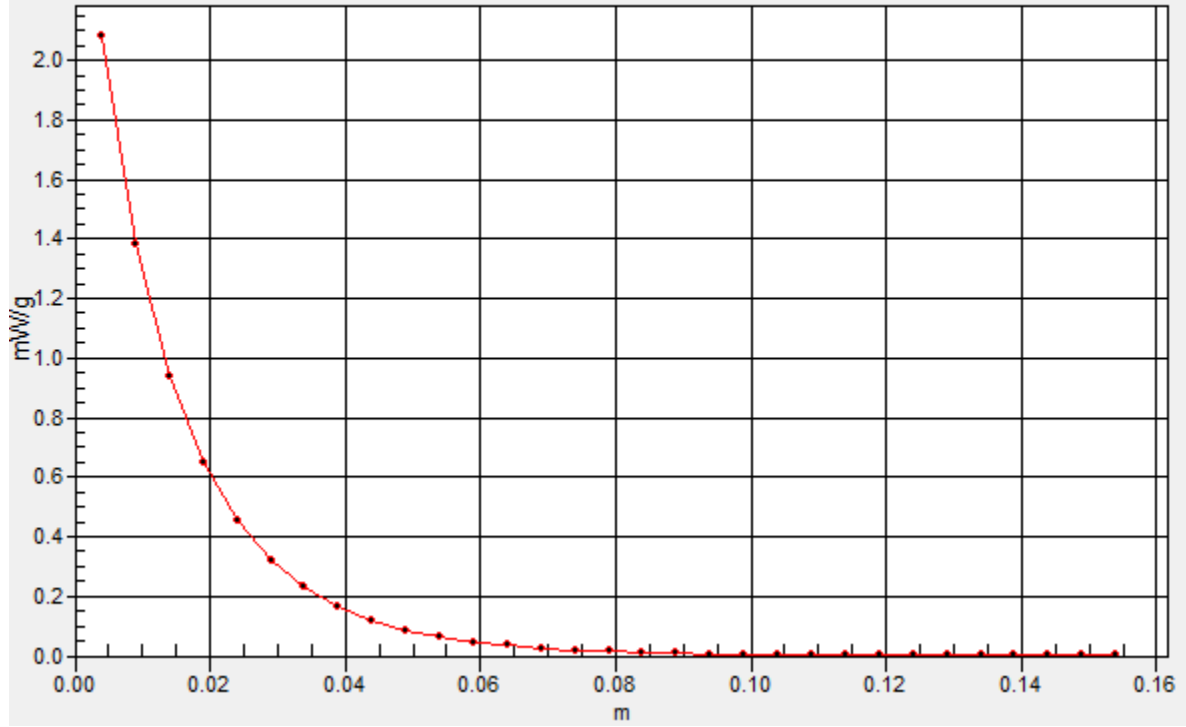
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 2.08 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



# Test Laboratory: MOTOROLA PCS-11 835 MHz System Performance Check

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:421tr;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = - 25.6dB [Sim.Temp@SPC](#) = 19.6 Room Temp @ SPC = 20

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 0.91$  mho/m,  $\epsilon_r = 40.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.94 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.3 V/m; Power Drift = -0.016 dB

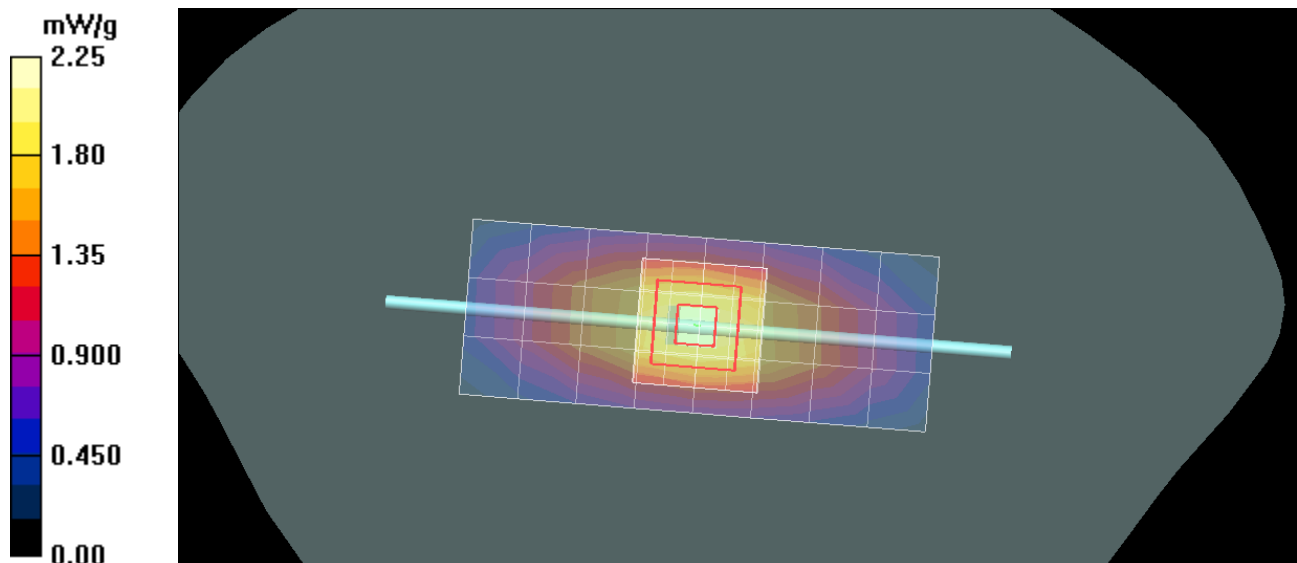
Peak SAR (extrapolated) = 3.06 W/kg

**SAR(1 g) = 2.02 mW/g; SAR(10 g) = 1.32 mW/g**

Maximum value of SAR (measured) = 2.19 mW/g

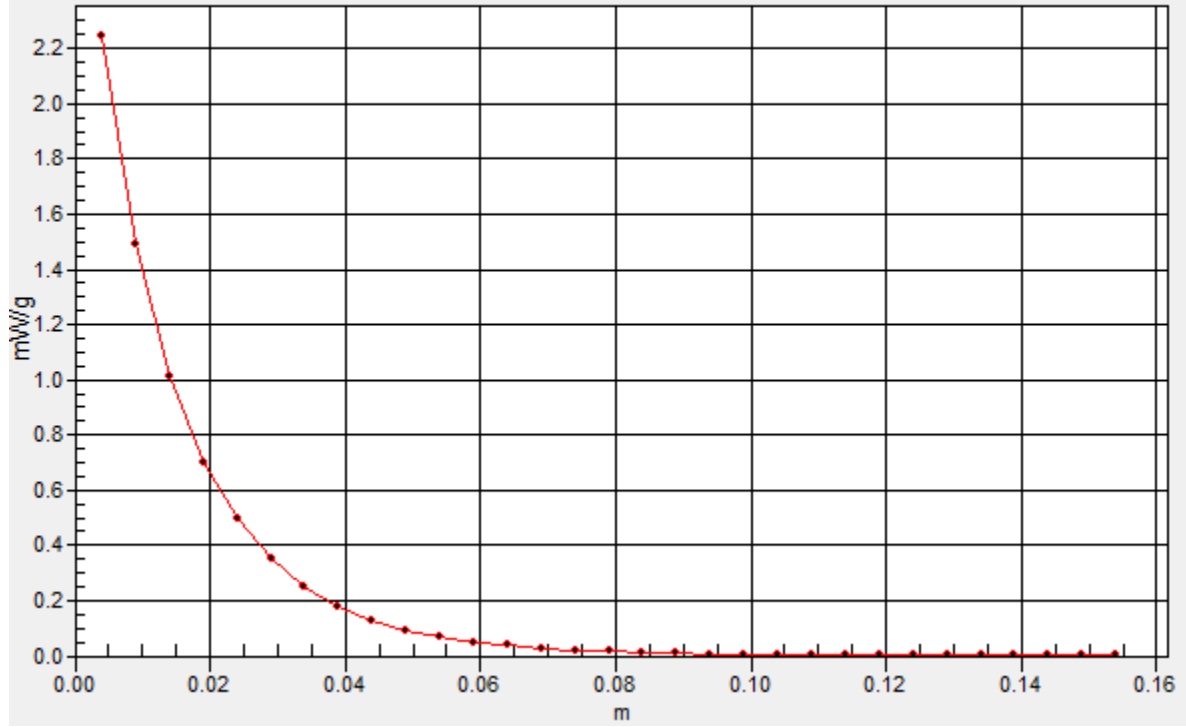
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 2.25 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 835 MHz System Performance Check

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:421tr;**

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = - 25.6dB [Sim.Temp@SPC](#) = 19.8 Room Temp @ SPC = 20.3

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 0.9$  mho/m,  $\epsilon_r = 40.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.85 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 49.4 V/m; Power Drift = 0.180 dB

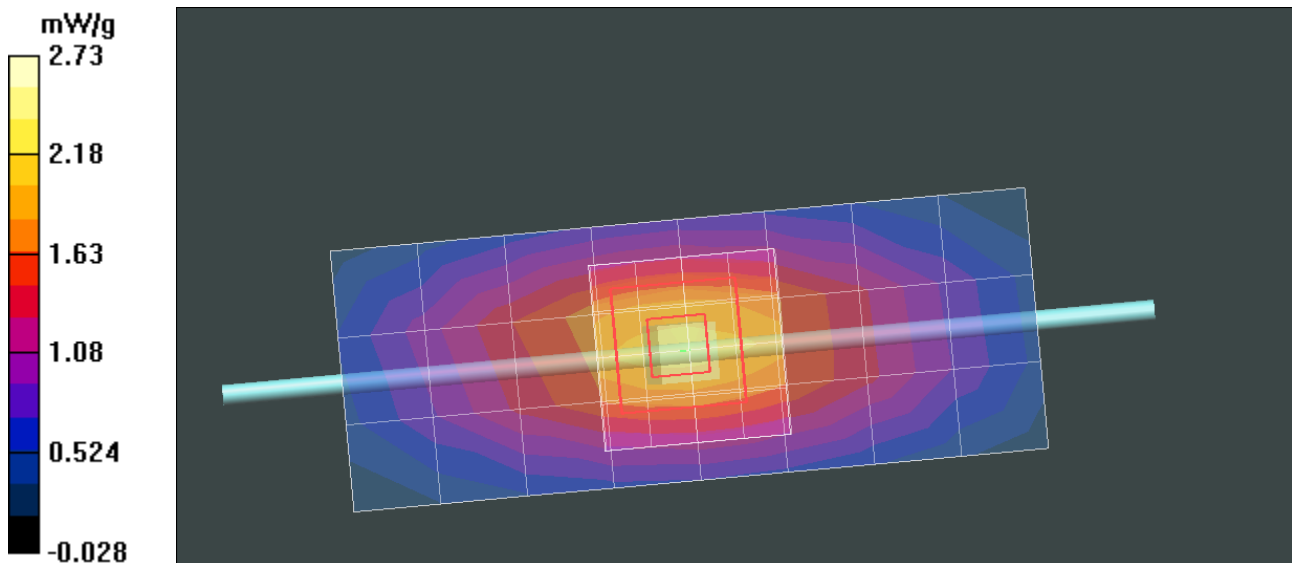
Peak SAR (extrapolated) = 2.99 W/kg

**SAR(1 g) = 1.98 mW/g; SAR(10 g) = 1.28 mW/g**

Maximum value of SAR (measured) = 2.13 mW/g

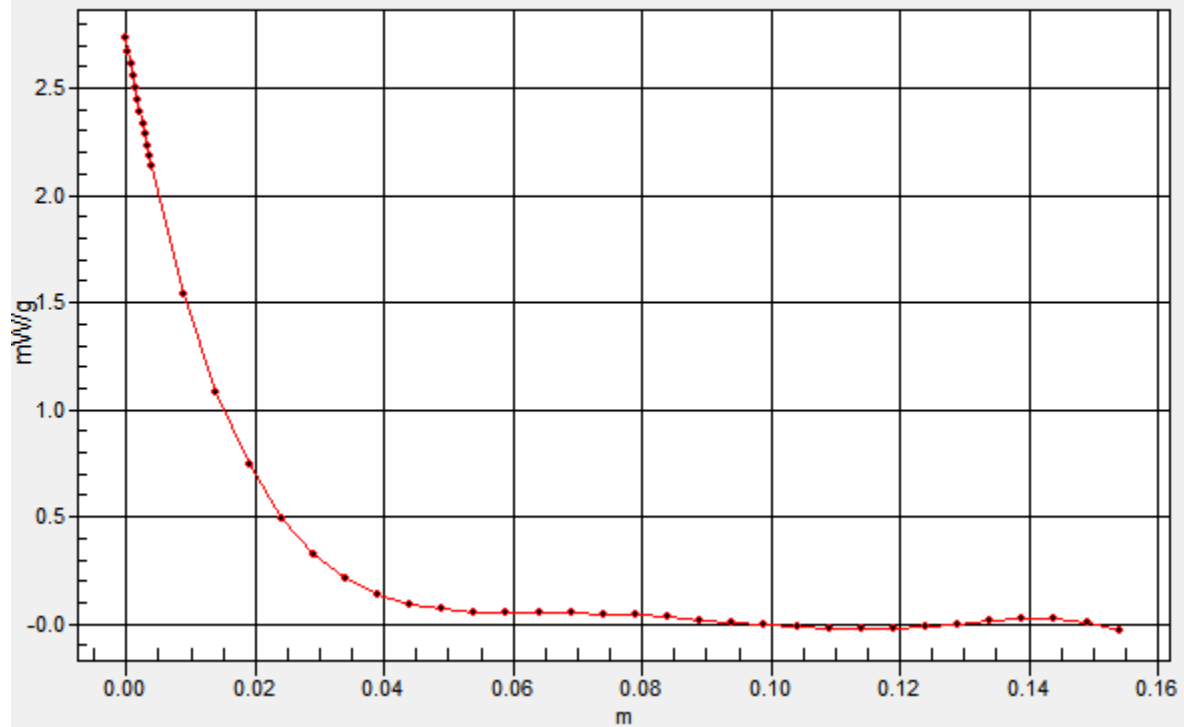
**Daily SPC Check/Z-Axis Retraction (1x1x42):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (interpolated) = 2.73 mW/g



# Interpolated SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 1800 MHz System Performance Check

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d128;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -26.25dB Sim.Temp@SPC = 20.3 Room Temp @ SPC = 21.5

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.37$  mho/m,  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 6.25 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 80.5 V/m; Power Drift = -0.074 dB

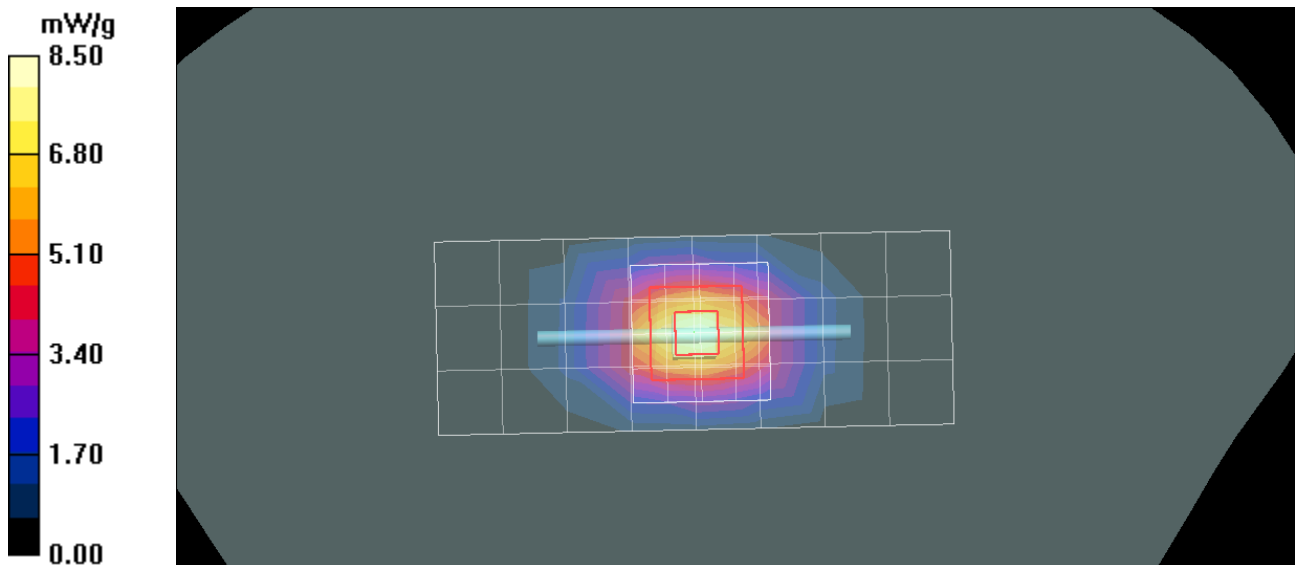
Peak SAR (extrapolated) = 14.3 W/kg

**SAR(1 g) = 7.71 mW/g; SAR(10 g) = 4.02 mW/g**

Maximum value of SAR (measured) = 8.67 mW/g

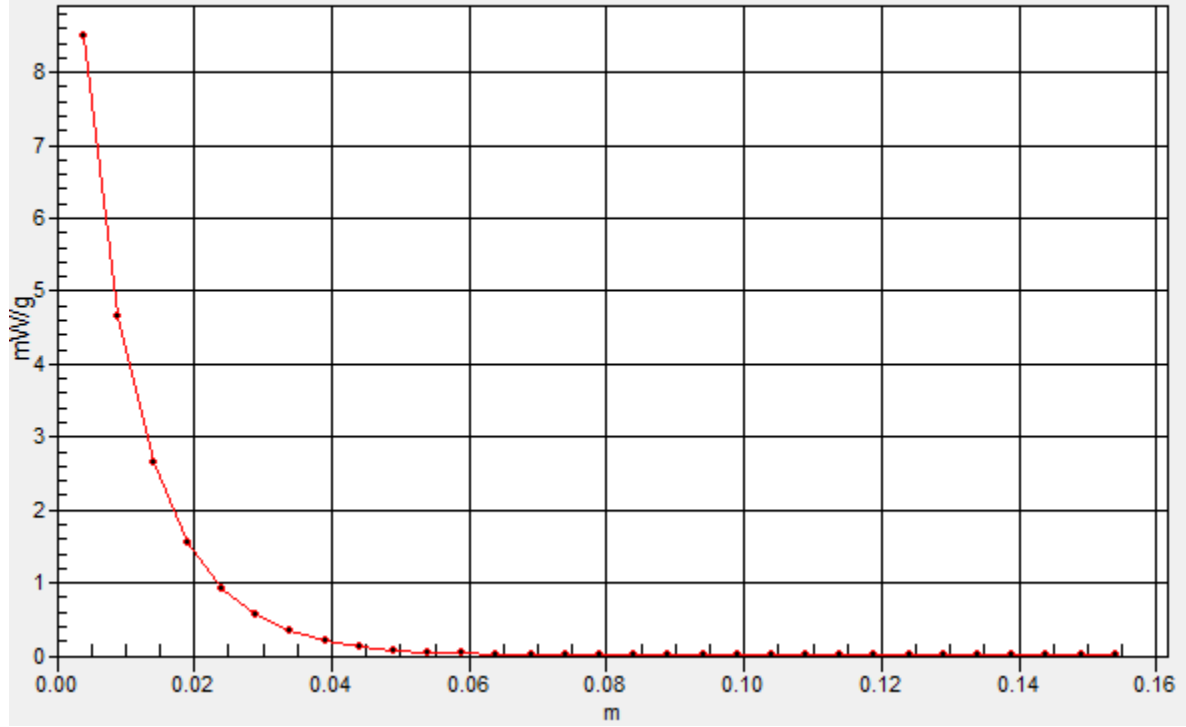
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.50 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 1800 MHz System Performance Check

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -29dB [Sim.Temp@SPC](#) = 20.0 Room Temp @ SPC = 21.5

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.39$  mho/m,  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 6.14 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 78.5 V/m; Power Drift = 0.011 dB

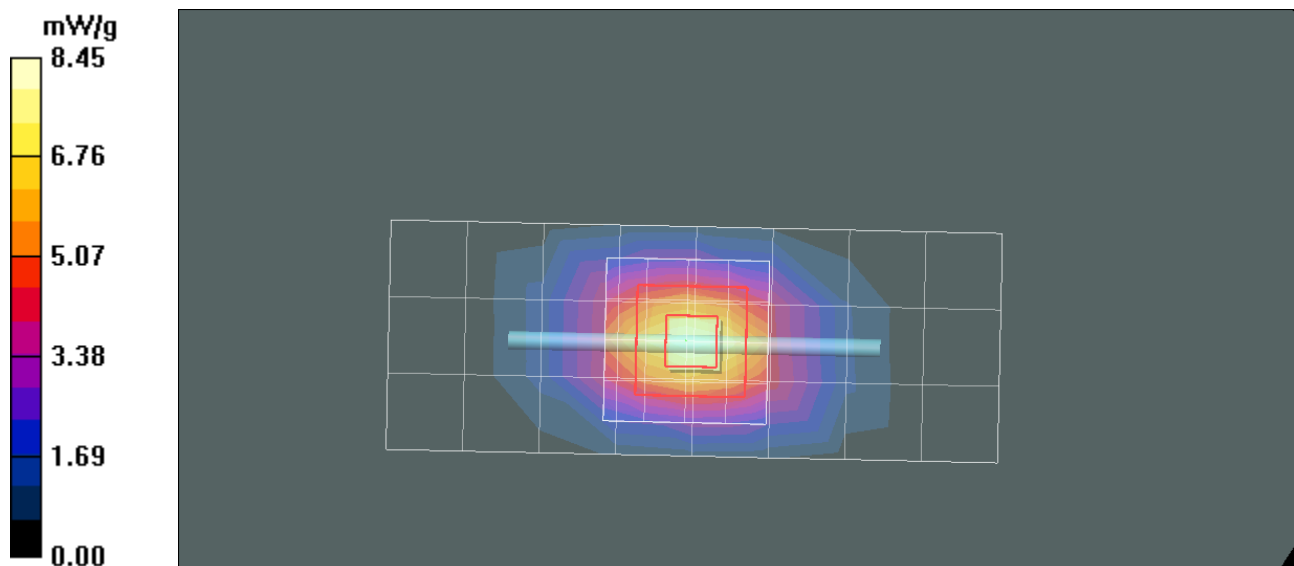
Peak SAR (extrapolated) = 13.9 W/kg

**SAR(1 g) = 7.44 mW/g; SAR(10 g) = 3.87 mW/g**

Maximum value of SAR (measured) = 8.38 mW/g

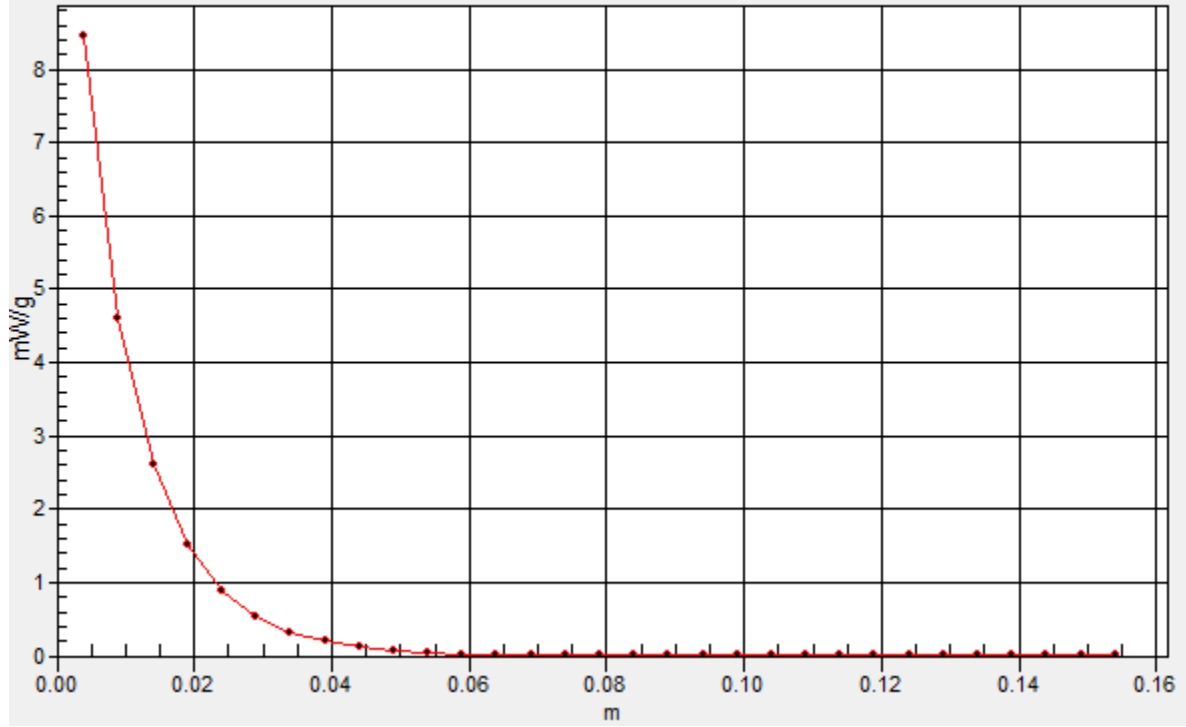
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.45 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 1800 MHz System Performance Check

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -31.3dB [Sim.Temp@SPC](#) = 20.3 Room Temp @ SPC = 22.9

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.39$  mho/m,  $\epsilon_r = 39$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 6.26 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 78.1 V/m; Power Drift = 0.062 dB

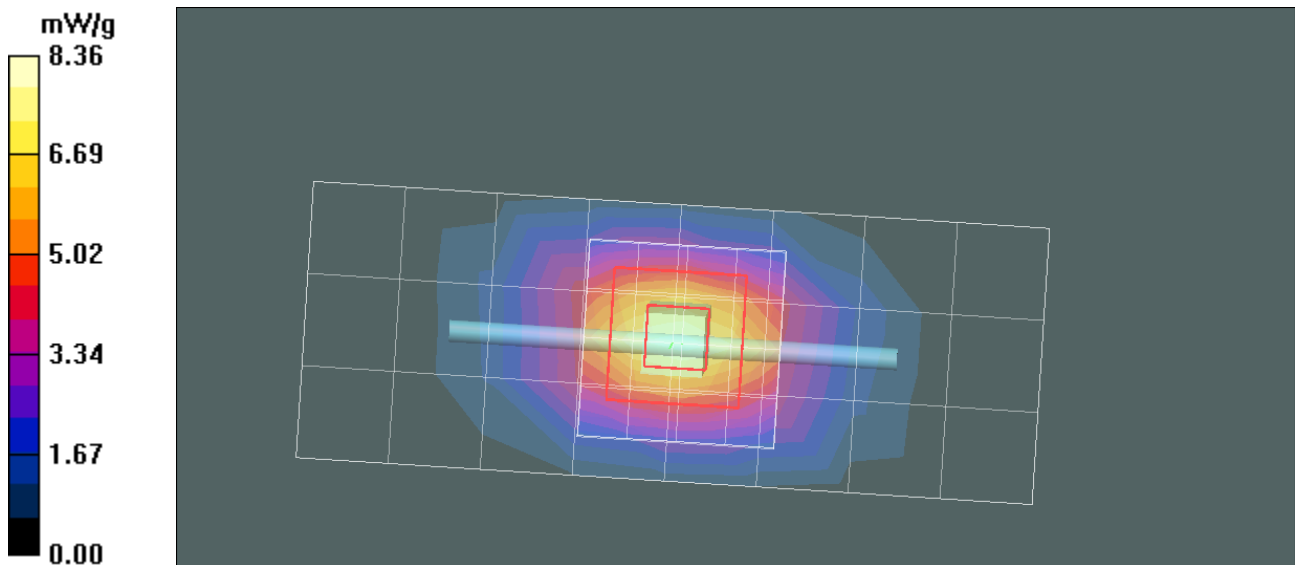
Peak SAR (extrapolated) = 13.7 W/kg

**SAR(1 g) = 7.39 mW/g; SAR(10 g) = 3.87 mW/g**

Maximum value of SAR (measured) = 8.26 mW/g

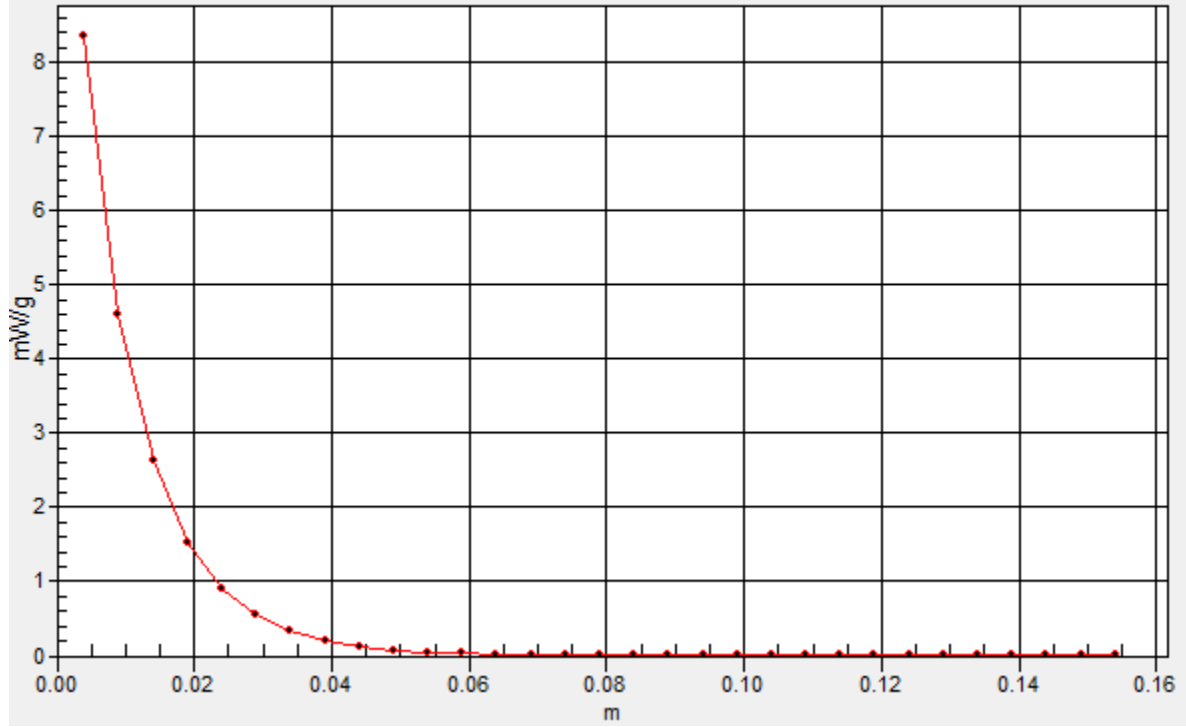
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.36 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 1800 MHz System Performance Check

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;**

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -28.7dB [Sim.Temp@SPC](#) = 20.3 Room Temp @ SPC = 22.4

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.36$  mho/m,  $\epsilon_r = 38.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 5.94 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 77.8 V/m; Power Drift = 0.051 dB

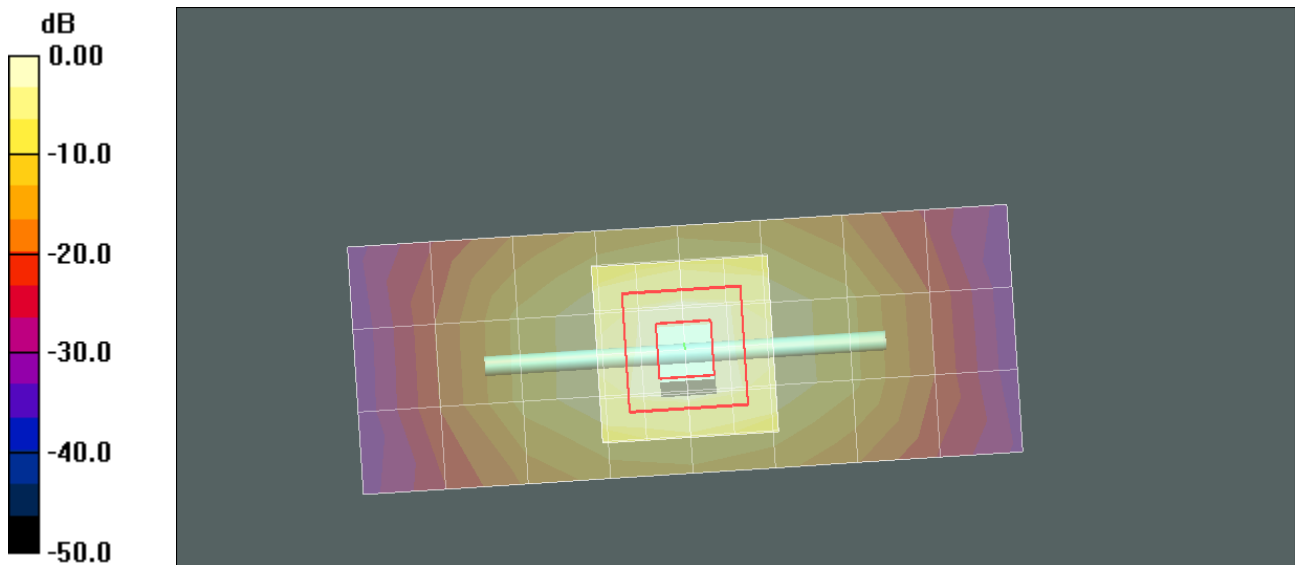
Peak SAR (extrapolated) = 13.3 W/kg

**SAR(1 g) = 7.18 mW/g; SAR(10 g) = 3.75 mW/g**

Maximum value of SAR (measured) = 8.07 mW/g

**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

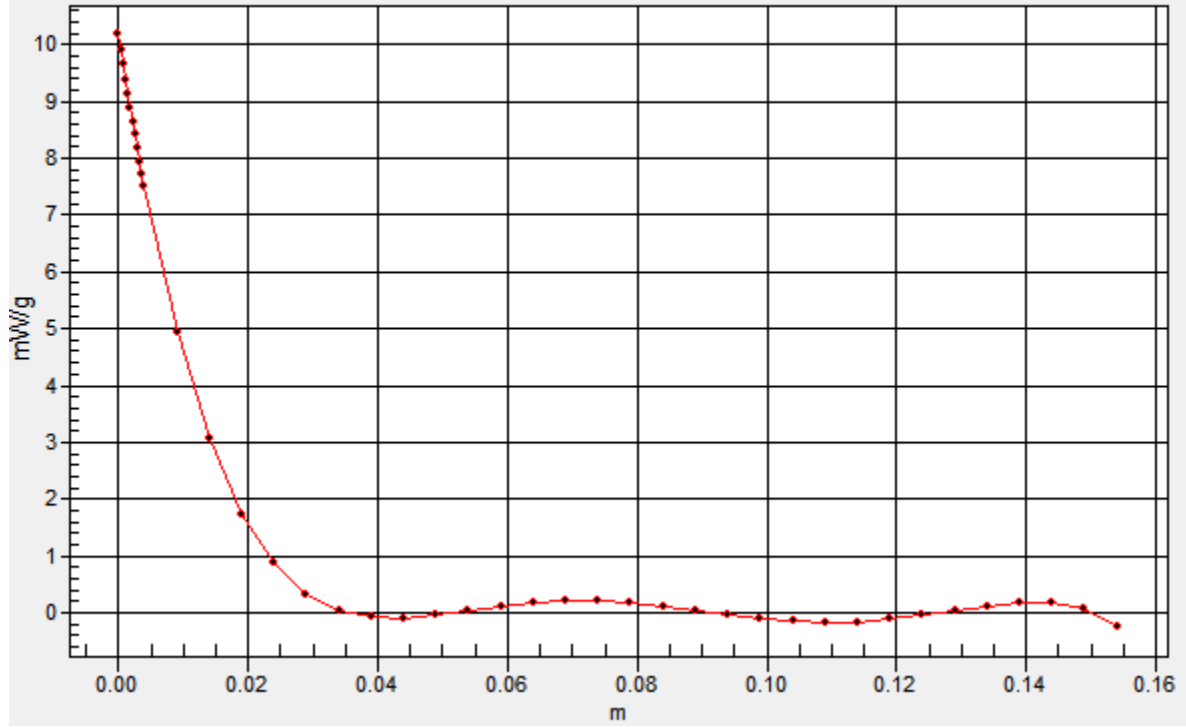
Maximum value of SAR (measured) = 8.12 mW/g



0 dB = 10.2mW/g

# Interpolated SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 1800 MHz System Performance Check

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -30.5dB [Sim.Temp@SPC](#) = 20.2 Room Temp @ SPC = 21.4

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.38$  mho/m,  $\epsilon_r = 38.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 6.26 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 79.6 V/m; Power Drift = 0.041 dB

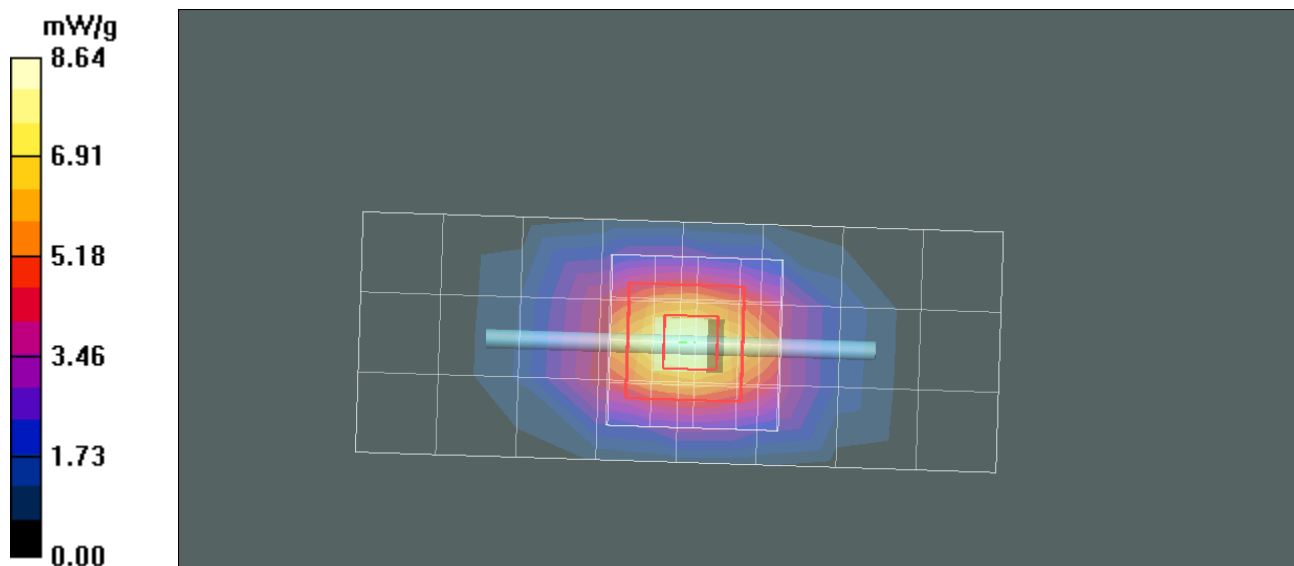
Peak SAR (extrapolated) = 14.2 W/kg

**SAR(1 g) = 7.61 mW/g; SAR(10 g) = 3.97 mW/g**

Maximum value of SAR (measured) = 8.54 mW/g

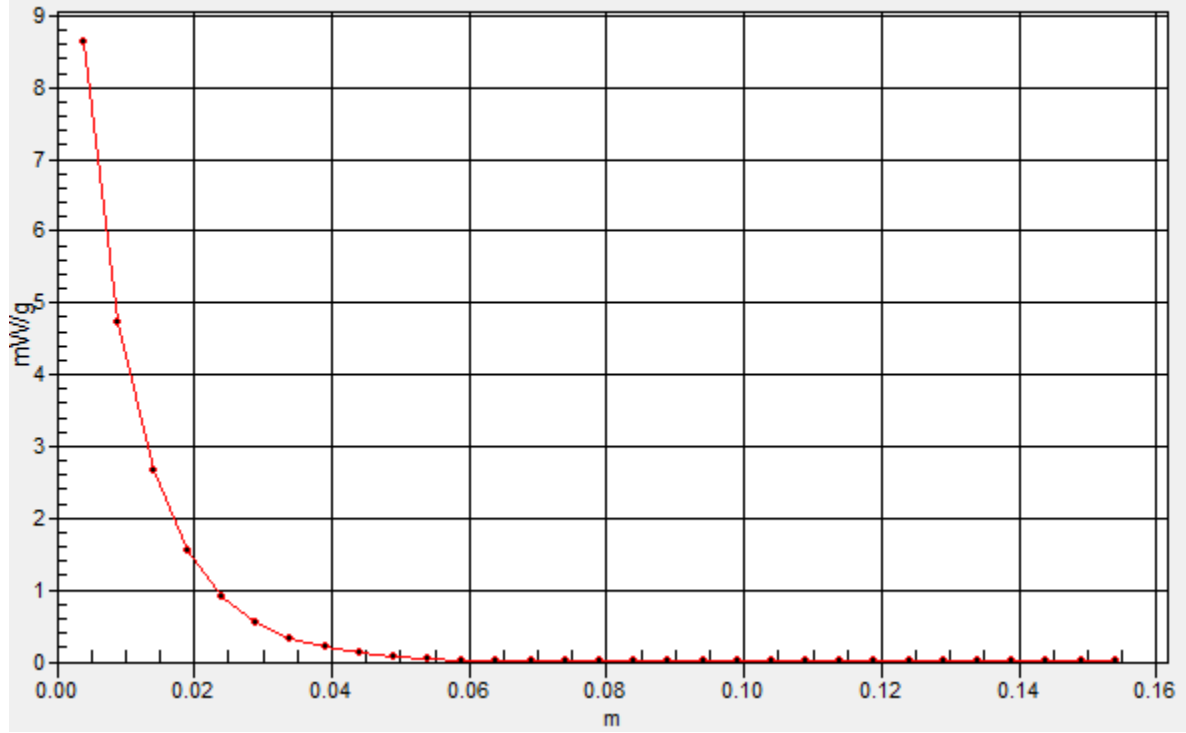
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.64 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 2450 MHz System Performance Check

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:788;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -25.27dB [Sim.Temp@SPC](#) =20.5 Room Temp @ SPC = 22.3

Communication System: CW - Dipole; Frequency: 2450 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.83$  mho/m,  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.42, 4.42, 4.42); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 8.81 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 85.3 V/m; Power Drift = -0.00 dB

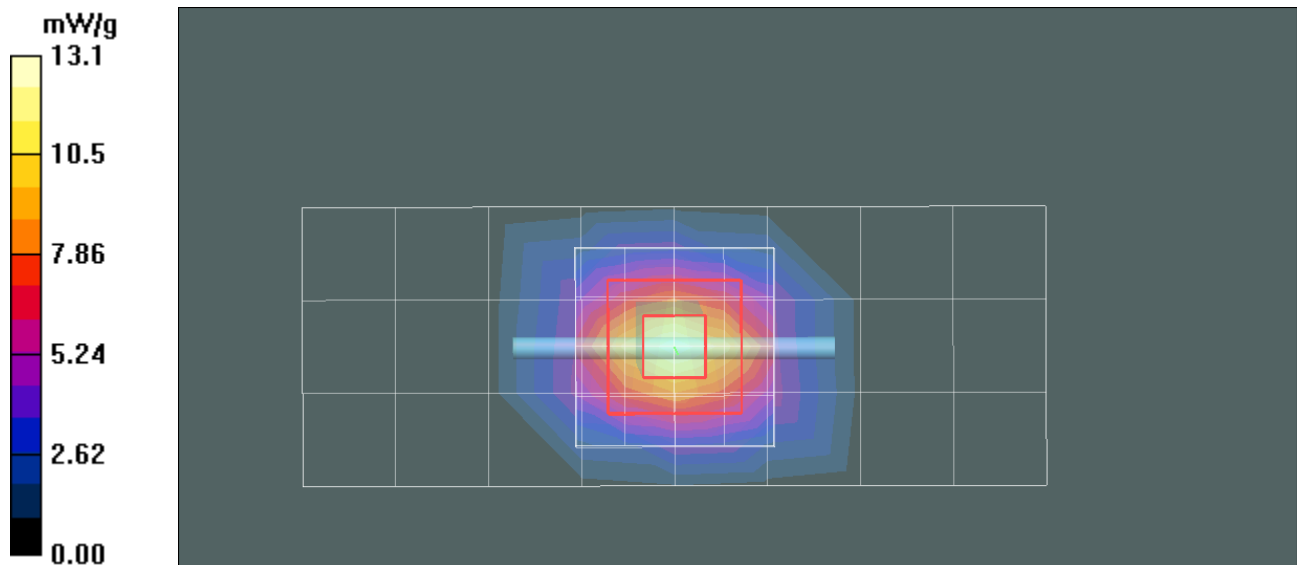
Peak SAR (extrapolated) = 23.7 W/kg

**SAR(1 g) = 11.4 mW/g; SAR(10 g) = 5.24 mW/g**

Maximum value of SAR (measured) = 13.0 mW/g

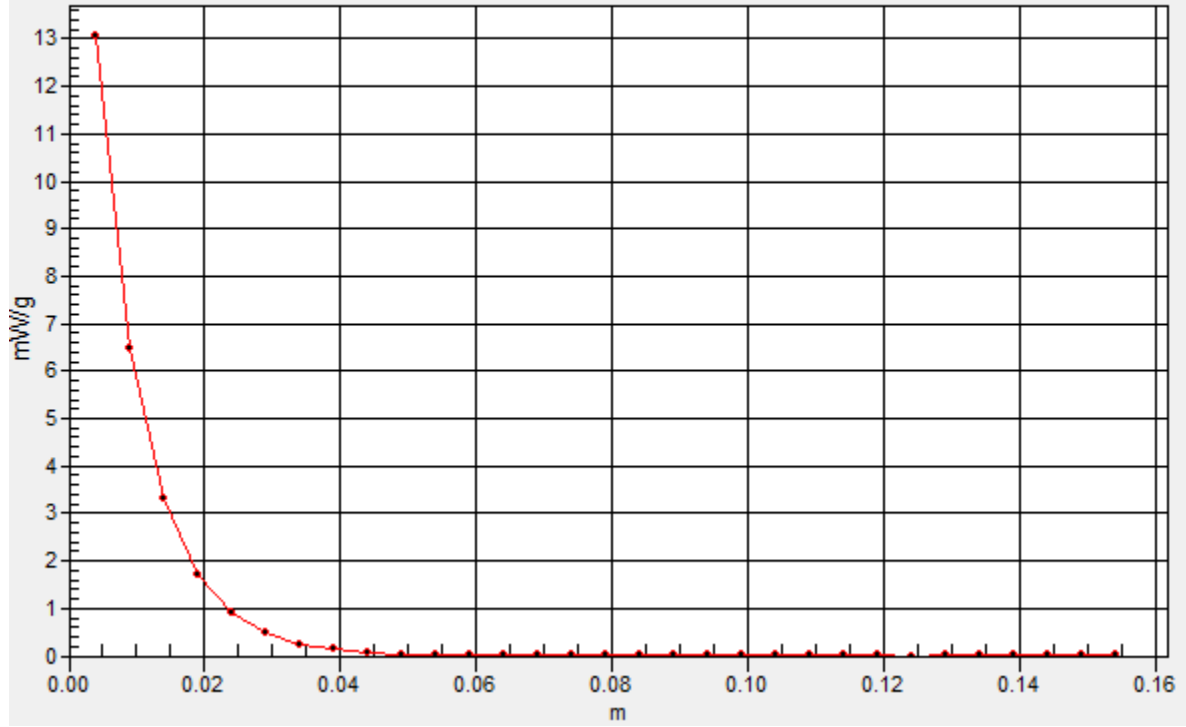
**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 13.1 mW/g



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## Test Laboratory: MOTOROLA 2450 MHz System Performance Check

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:788;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -25.54dB [Sim.Temp@SPC](#) = 20.3 Room Temp @ SPC = 21.6

Communication System: CW - Dipole; Frequency: 2450 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.84$  mho/m,  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.42, 4.42, 4.42); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 8.86 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

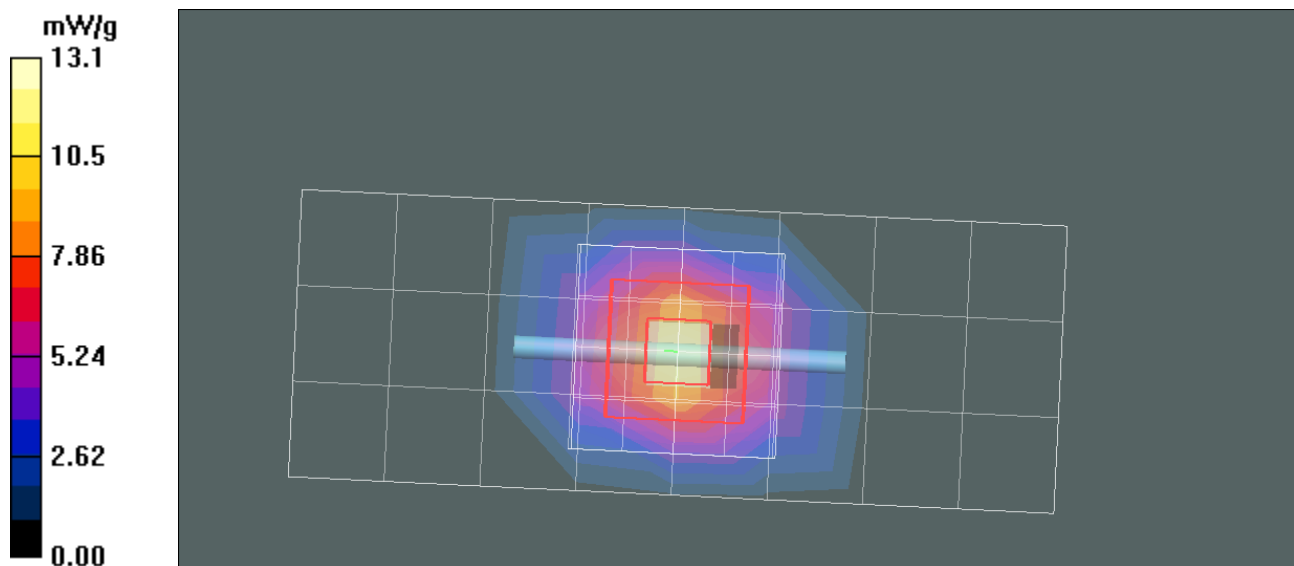
Reference Value = 86.0 V/m; Power Drift = 0.01 dB

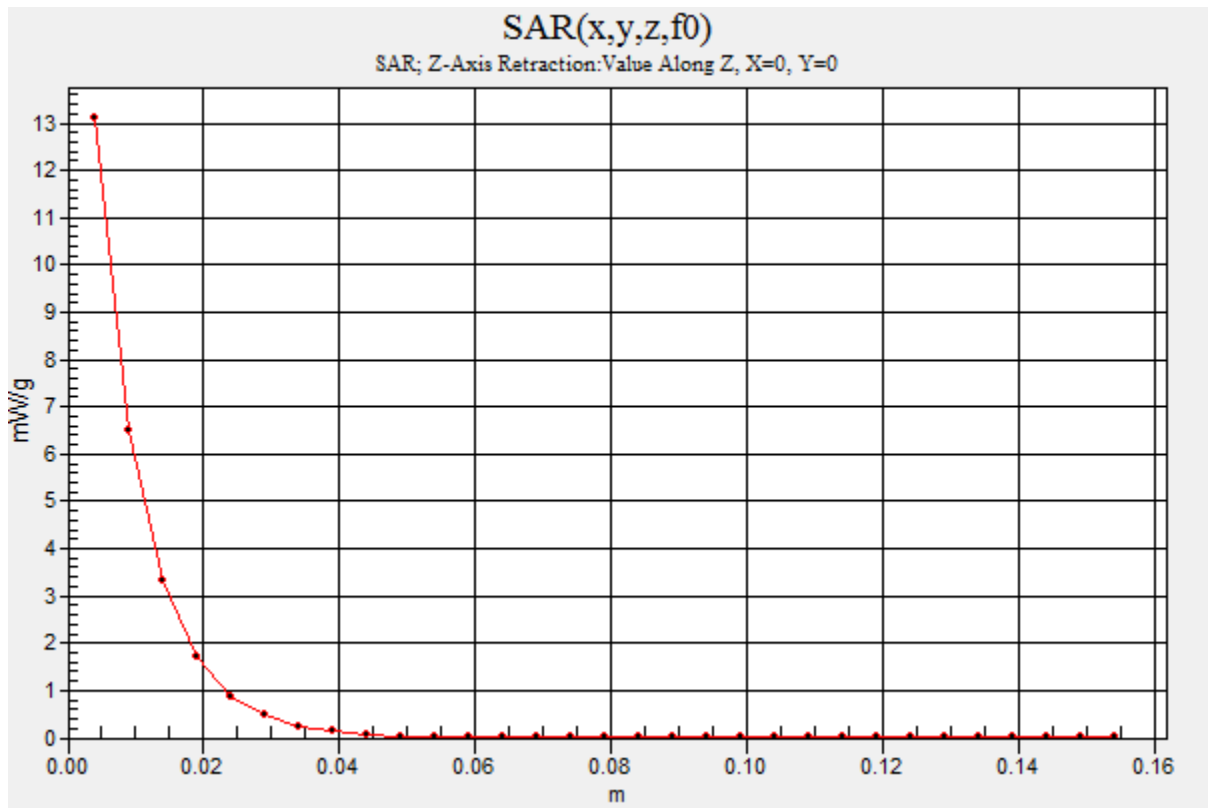
Peak SAR (extrapolated) = 24.1 W/kg

**SAR(1 g) = 11.6 mW/g; SAR(10 g) = 5.35 mW/g**

Maximum value of SAR (measured) = 13.1 mW/g

**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm





## Test Laboratory: MOTOROLA 2450 MHz System Performance Check

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:788;**

Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -25.7dB [Sim.Temp@SPC](#) = 20.3 Room Temp @ SPC = 22.6

Communication System: CW - Dipole; Frequency: 2450 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $\sigma = 1.84$  mho/m,  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.42, 4.42, 4.42); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Daily SPC Check/Dipole Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 8.83 mW/g

**Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

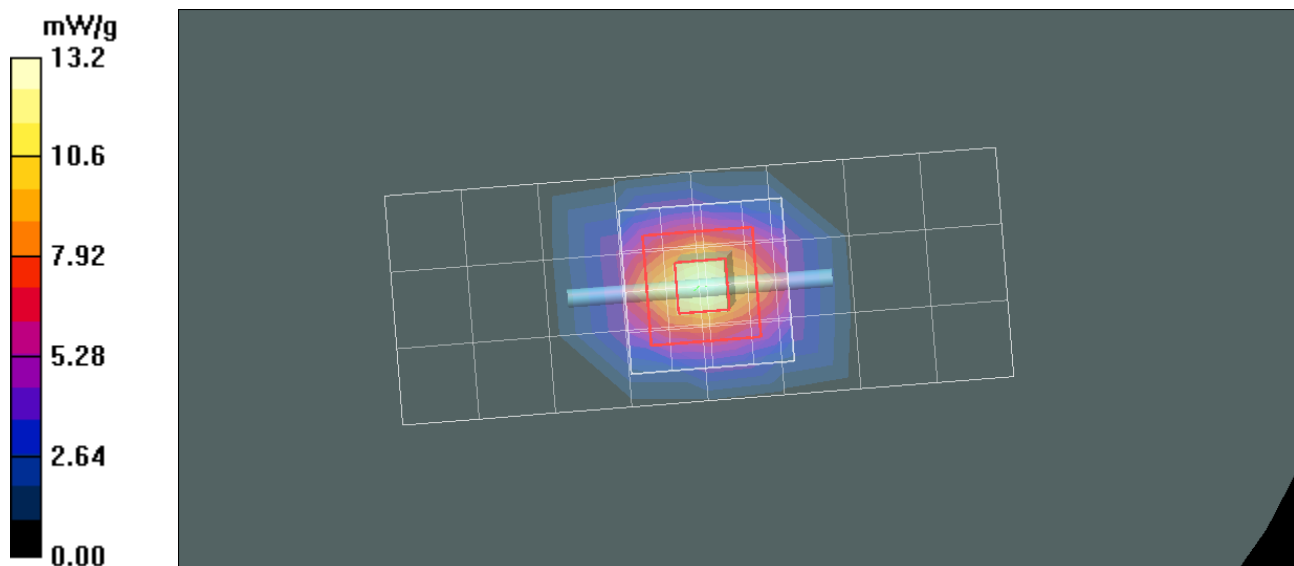
Reference Value = 85.7 V/m; Power Drift = 0.051 dB

Peak SAR (extrapolated) = 24.4 W/kg

**SAR(1 g) = 11.6 mW/g; SAR(10 g) = 5.35 mW/g**

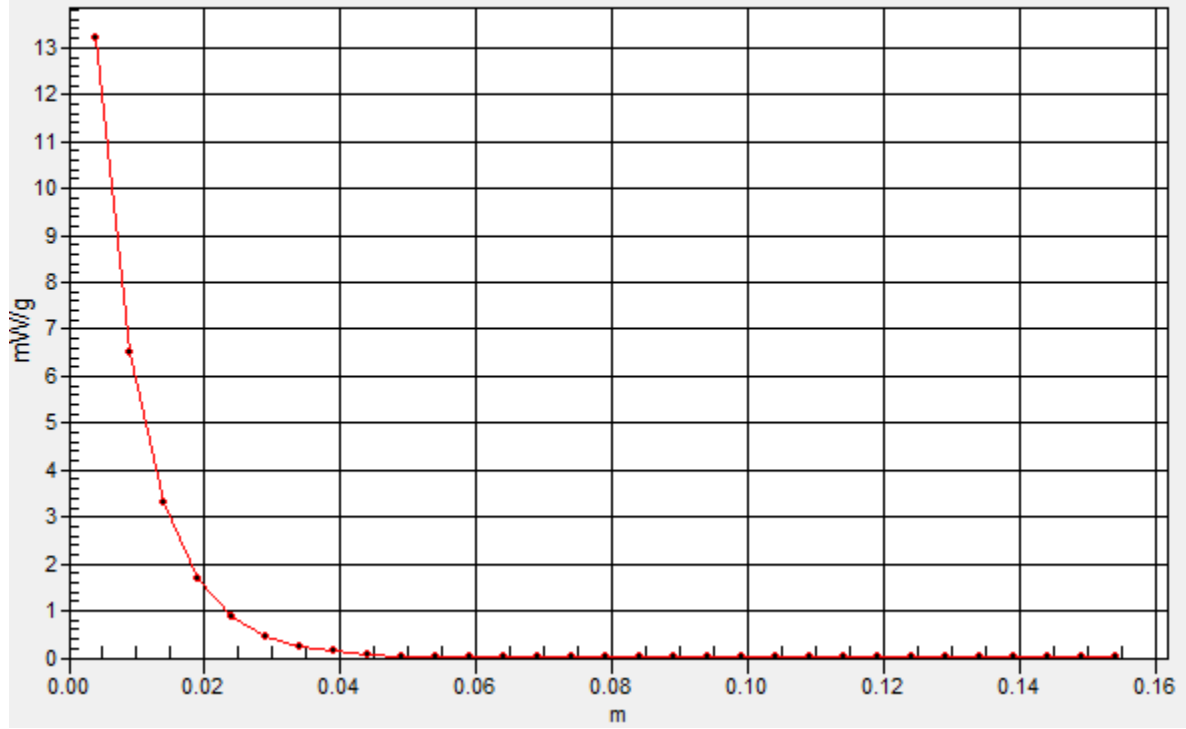
Maximum value of SAR (measured) = 13.2 mW/g

**Daily SPC Check/Z-Axis Retraction (1x1x31):** Measurement grid: dx=20mm, dy=20mm, dz=5mm



# SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



## **Appendix 2**

### **SAR distribution plots for Phantom Head Adjacent Use**

## Test Laboratory: MOTOROLA CDMA 800 Cheek Touch

**Serial: 354711040002267; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: All up Battery Model #: SNN5879A DEVICE POSITION (cheek or rotated): Cheek  
Communication System: CDMA 835; Frequency: 836.52 MHz; Communication System Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head; Medium parameters used:  $\sigma = 0.91$  mho/m,  $\epsilon_r = 40.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Left Head Template/Area Scan - Normal (15mm) (61x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.505 mW/g

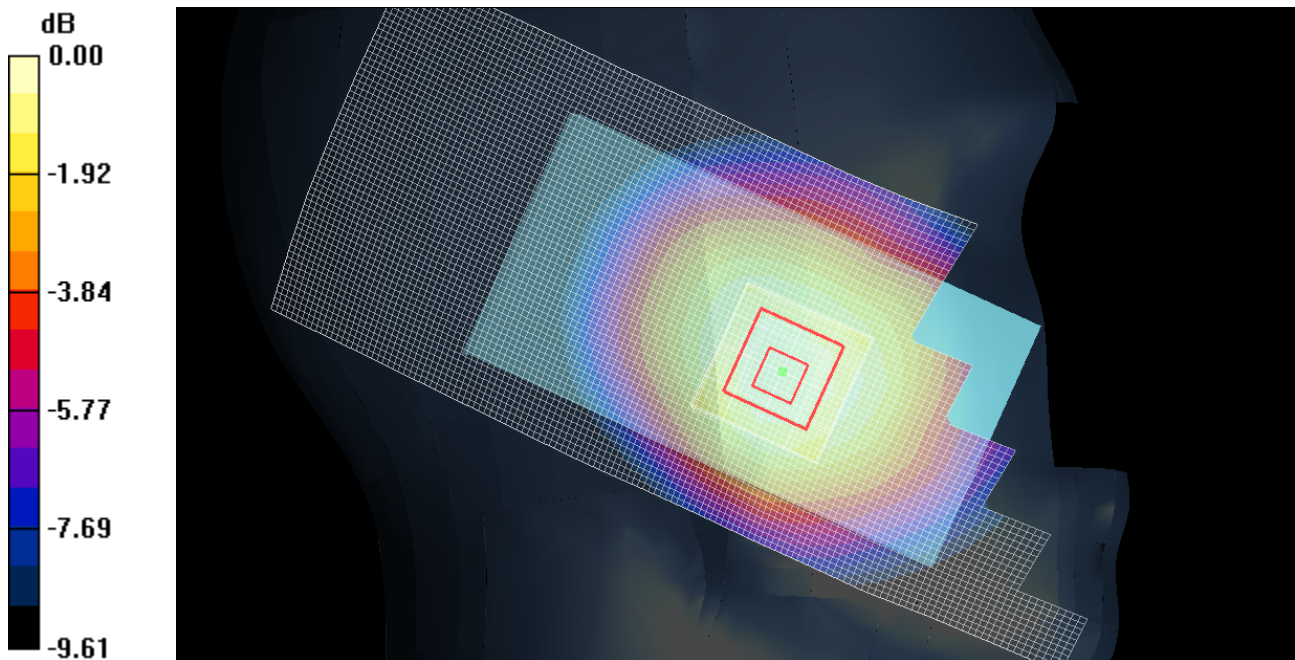
**Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.8 V/m; Power Drift = -0.482 dB

Peak SAR (extrapolated) = 0.552 W/kg

**SAR(1 g) = 0.446 mW/g; SAR(10 g) = 0.335 mW/g**

Maximum value of SAR (measured) = 0.472 mW/g



0 dB = 0.472mW/g

## Test Laboratory: MOTOROLA CDMA 800 15 Degree Tilt

**Serial: 354711040002267; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: All Up Battery Model #: SNN5879A DEVICE POSITION (check or rotated): 15 Degree Rotated

Communication System: CDMA 835; Frequency: 836.52 MHz; Communication System Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head; Medium parameters used:  $\sigma = 0.91$  mho/m,  $\epsilon_r = 40.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Right Head Template/Area Scan - Normal (15mm) (61x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.302 mW/g

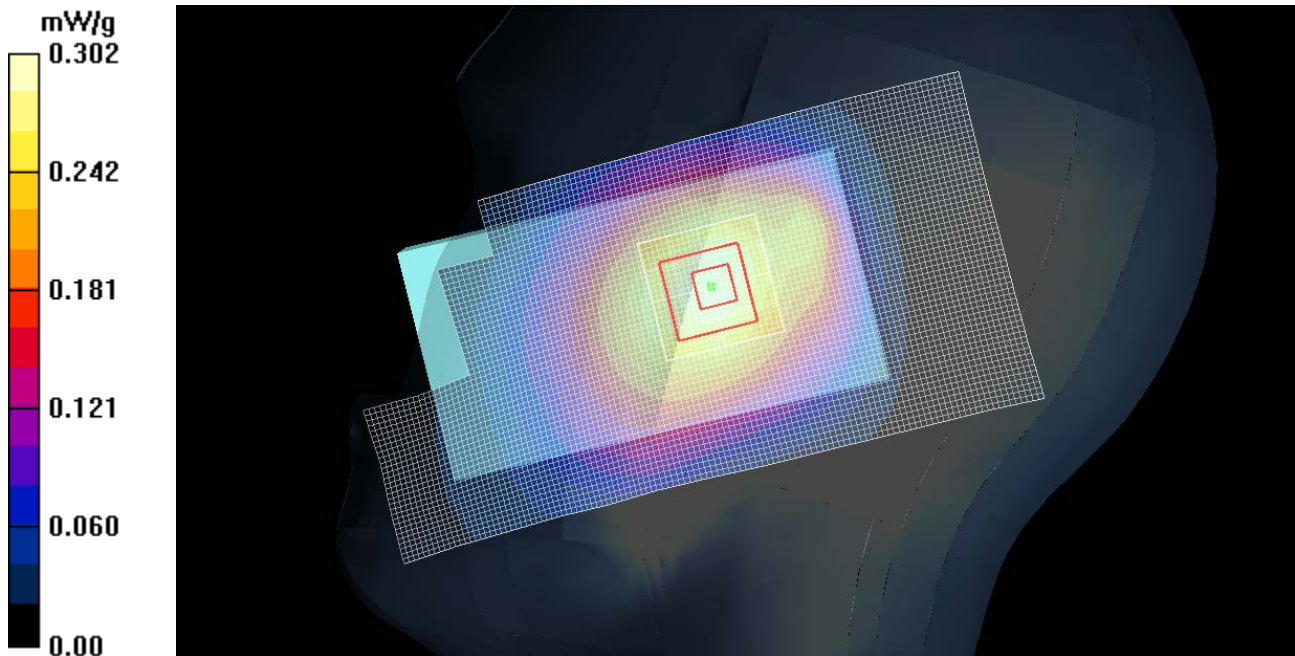
**Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.2 V/m; Power Drift = -0.053 dB

Peak SAR (extrapolated) = 0.355 W/kg

**SAR(1 g) = 0.281 mW/g; SAR(10 g) = 0.210 mW/g**

Maximum value of SAR (measured) = 0.301 mW/gs...



## Test Laboratory: MOTOROLA GSM 1900 Cheek Touch

**DUT: Serial: 354711040003158; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: 00 (OTA) Battery Model #: SNN5879A DEVICE POSITION (cheek or rotated): Cheek  
Communication System: GSM 1900; Frequency: 1850.2 MHz; Communication System Channel Number: 512; Duty Cycle: 1:8.3

Medium: Regular Glycol Head 1750/1880; Medium parameters used:  $\sigma = 1.47$  mho/m,  $\epsilon_r = 38.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Left Head Template/Area Scan - Normal (15mm) (61x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.16 mW/g

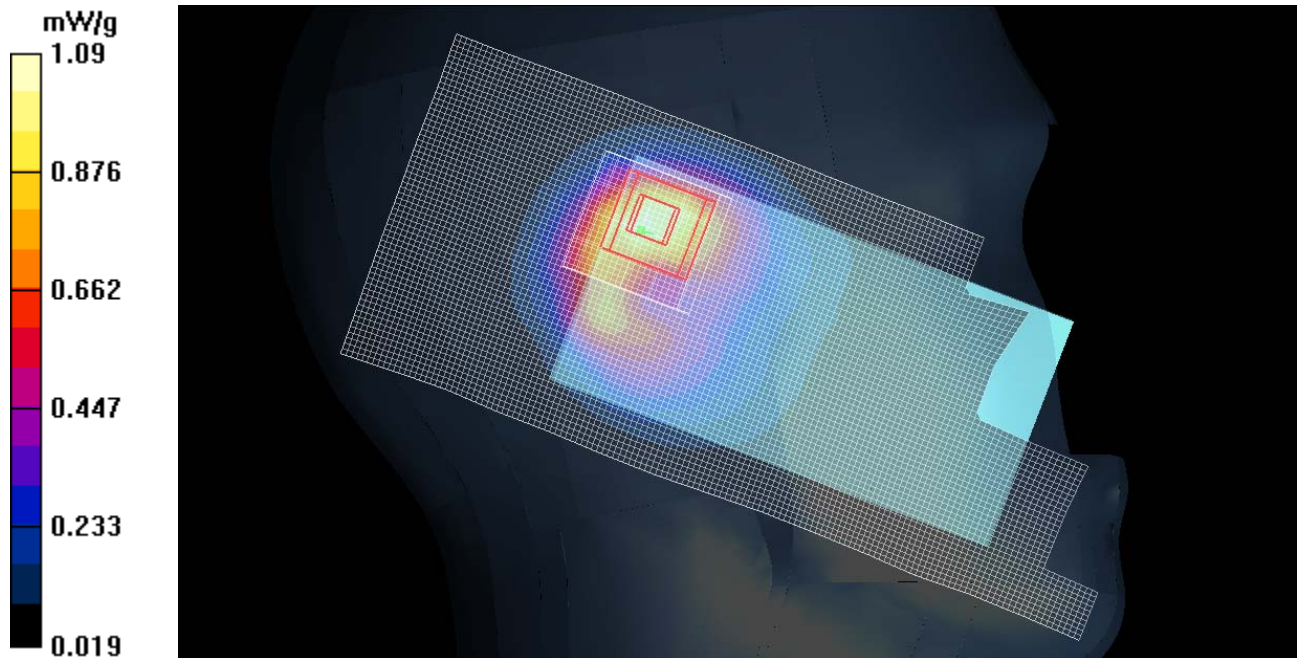
**Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.4 V/m; Power Drift = -0.054 dB

Peak SAR (extrapolated) = 1.90 W/kg

**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.532 mW/g**

Maximum value of SAR (measured) = 1.09 mW/g



## Test Laboratory: MOTOROLA GSM 1900 15 Degree Tilt

**Serial: 354711040003158; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: 00 (OTA) Battery Model #: SNN5879A DEVICE POSITION (cheek or rotated): 15 Degree Rotated

Communication System: GSM 1900; Frequency: 1850.2 MHz; Communication System Channel Number: 512; Duty Cycle: 1:8.3

Medium: Regular Glycol Head 1750/1880; Medium parameters used:  $\sigma = 1.47$  mho/m,  $\epsilon_r = 38.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Left Head Template/Area Scan - Normal (15mm) (61x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.64 mW/g

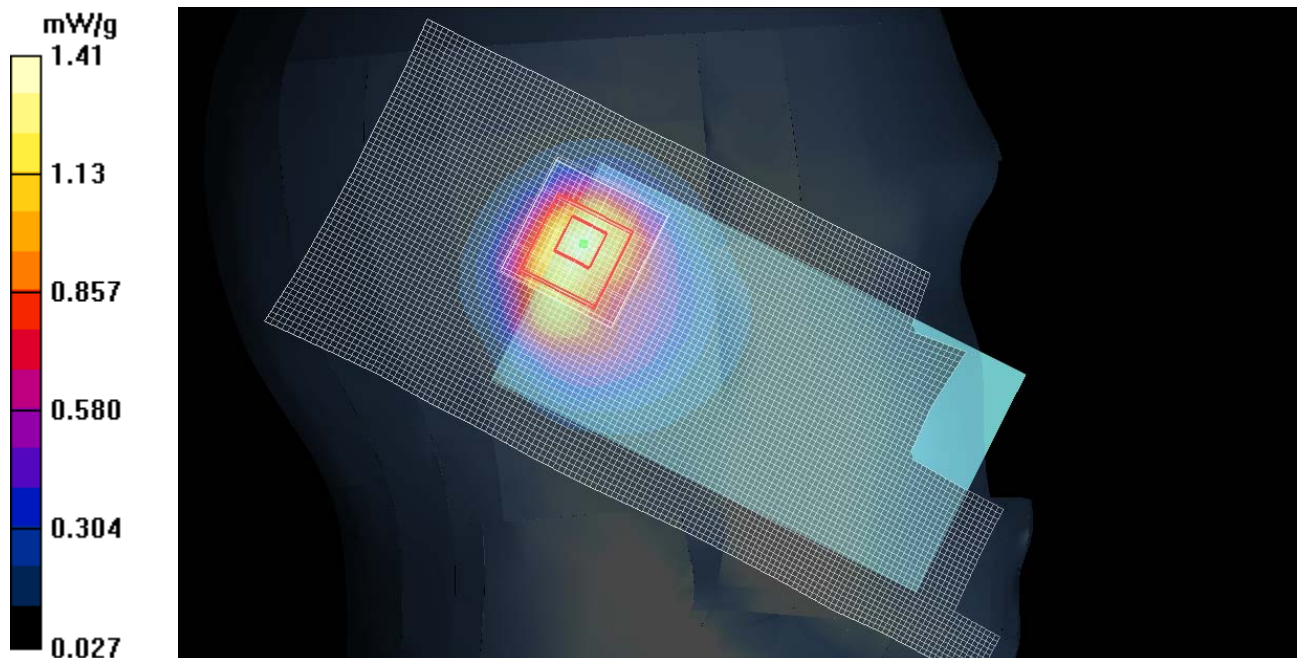
**Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.1 V/m; Power Drift = -0.140 dB

Peak SAR (extrapolated) = 2.31 W/kg

**SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.691 mW/g**

Maximum value of SAR (measured) = 1.41 mW/g



## Test Laboratory: MOTOROLA 2450 MHz WiFi Cheek Touch

**DUT: Serial: 354711040002457; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: 5.5Mbps 2450 MHz WiFi 802.11b Battery Model #: SNN5879A DEVICE POSITION (cheek or rotated): Cheek

Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1

Medium: 2450 Glycol Head; Medium parameters used:  $\sigma = 1.84$  mho/m,  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.42, 4.42, 4.42); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Left Head Template/Area Scan - Normal (15mm) (7x17x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 0.246 mW/g

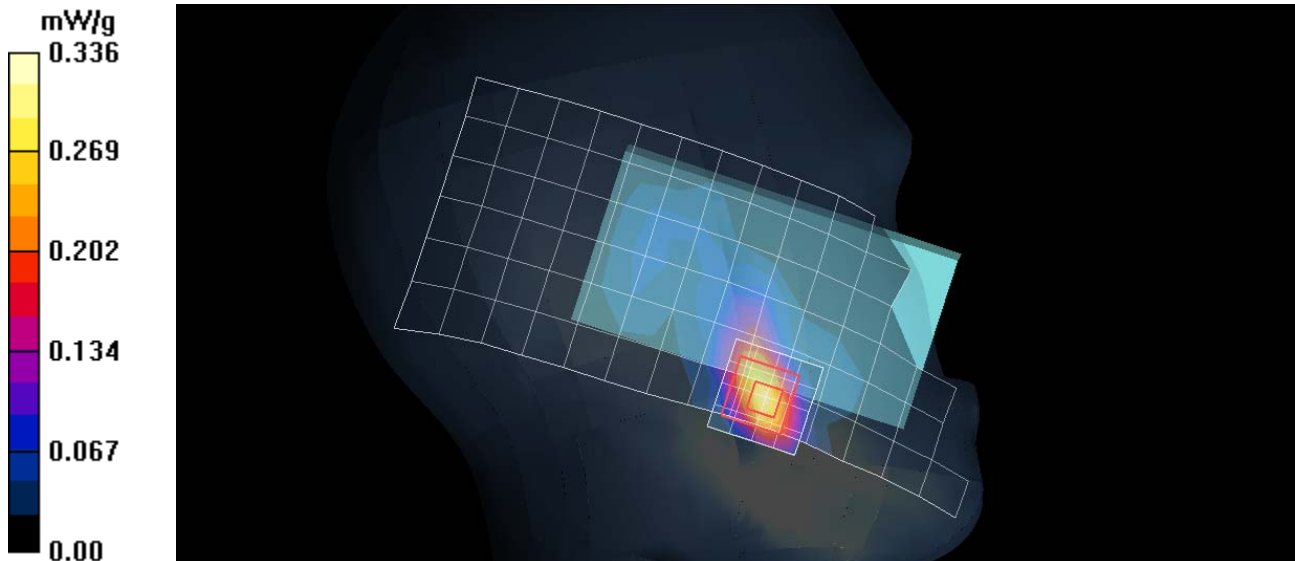
**Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.85 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.697 W/kg

**SAR(1 g) = 0.322 mW/g; SAR(10 g) = 0.140 mW/g**

Maximum value of SAR (measured) = 0.336 mW/g



## Test Laboratory: MOTOROLA 2450 MHz WiFi 15 Degree Tilt

**Serial: 354711040002457; FCC ID: IHDT56MA1**

Procedure Notes: 2450 MHz WiFi 1Mbps Battery Model #: SNN5879A DEVICE POSITION (cheek or rotated): 15 Degree Rotated

Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Communication System Channel Number: 1; Duty Cycle: 1:1

Medium: 2450 Glycol Head; Medium parameters used:  $\sigma = 1.83$  mho/m,  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.42, 4.42, 4.42); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

**Right Head Template/Area Scan - Normal (15mm) (7x17x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.067 mW/g

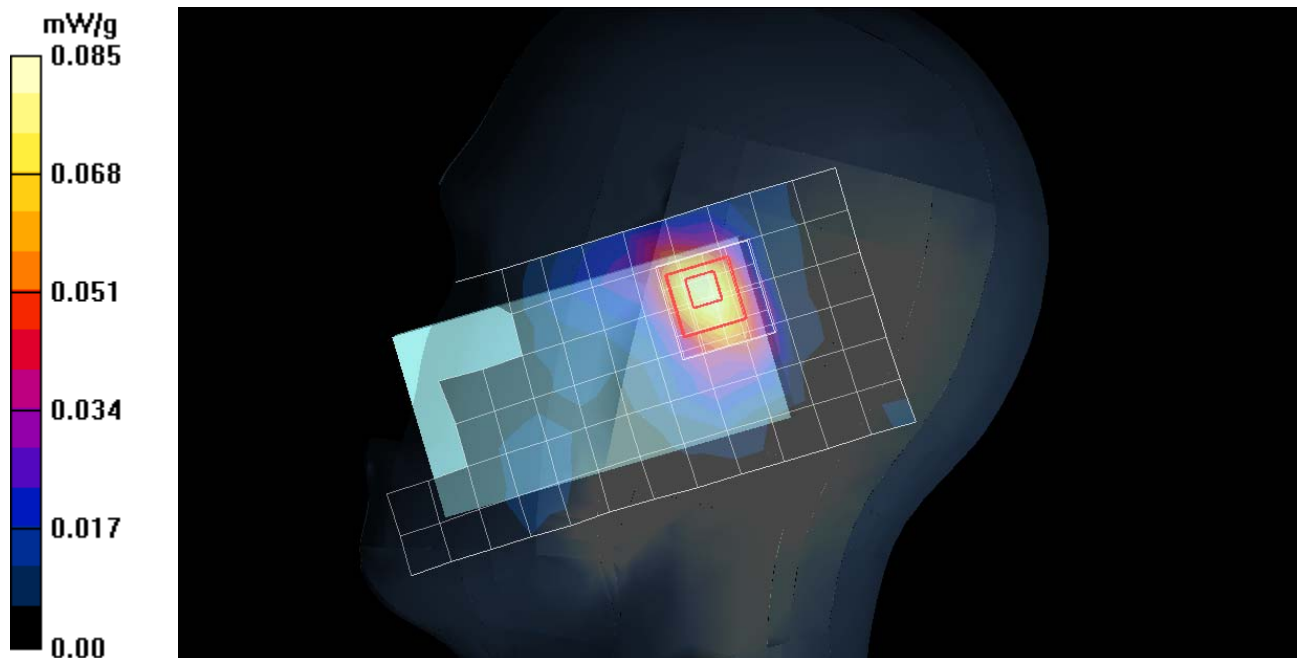
**Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.45 V/m; Power Drift = 0.180 dB

Peak SAR (extrapolated) = 0.147 W/kg

**SAR(1 g) = 0.080 mW/g; SAR(10 g) = 0.042 mW/g**

Maximum value of SAR (measured) = 0.085 mW/g



## **Appendix 3**

### **SAR distribution plots for Body Worn Configuration**

## Test Laboratory: Motorola CDMA 800 Body Worn

**DUT: Serial: 354711040002267; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: All Up Battery Model #: SNN5879A Accessory Model # = Back of phone 15mm from phantom

Communication System: CDMA 835; Frequency: 836.52 MHz; Communication System Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Body; Medium parameters used:  $\sigma = 0.97$  mho/m,  $\epsilon_r = 53.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_Section 1, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (151x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.584 mW/g

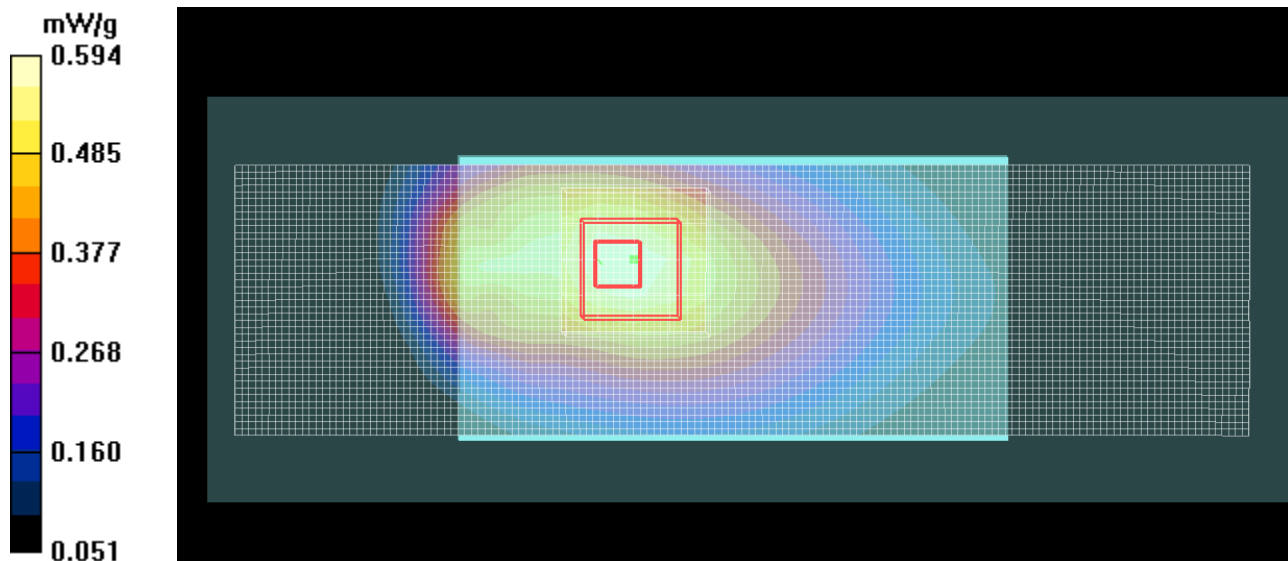
**Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.9 V/m; Power Drift = 0.066 dB

Peak SAR (extrapolated) = 0.763 W/kg

**SAR(1 g) = 0.565 mW/g; SAR(10 g) = 0.404 mW/g**

Maximum value of SAR (measured) = 0.594 mW/g



## Test Laboratory: Motorola GSM 1900 Body Worn

**Serial: 354711040003158; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: 00 Battery Model #: SNN5879A Accessory Model # = Back of phone 15mm from phantom

Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8.3

Medium: Regular Glycol Body 1750/1880; Medium parameters used:  $\sigma = 1.57$  mho/m,  $\epsilon_r = 50.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.71, 4.71, 4.71); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Section 2, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (151x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.377 mW/g

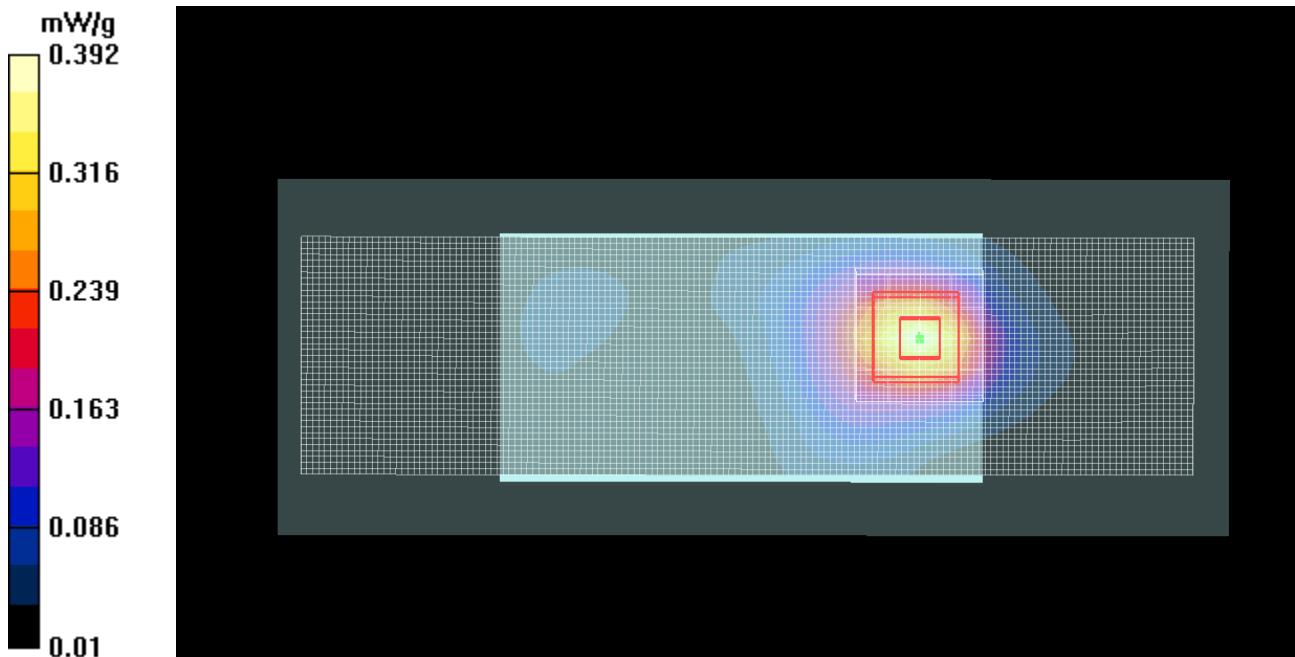
**Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.3 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 0.578 W/kg

**SAR(1 g) = 0.347 mW/g; SAR(10 g) = 0.192 mW/g**

Maximum value of SAR (measured) = 0.392 mW/g.



## Test Laboratory: Motorola 2450 MHz WiFi Body Worn

**Serial: 354711040002457; FCC ID: IHDT56MA1**

Procedure Notes: 5.5 Mbps 2450 MHz WiFi 802.11b Battery Model #: SNN5879A Accessory Model # =Back of phone 25mm from phantom

Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Communication System Channel Number: 1; Duty Cycle: 1:1

Medium: 2450 Glycol Body; Medium parameters used:  $\sigma = 1.88$  mho/m,  $\epsilon_r = 53.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.22, 4.22, 4.22); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Section 1, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (151x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.060 mW/g

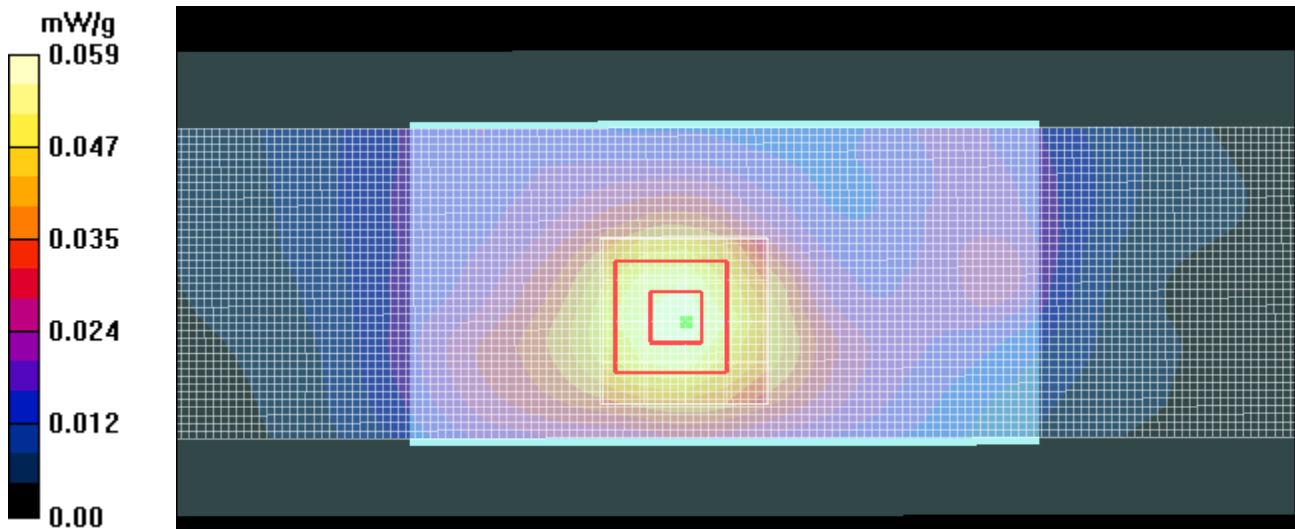
**Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.24 V/m; Power Drift = 0.528 dB

Peak SAR (extrapolated) = 0.092 W/kg

**SAR(1 g) = 0.055 mW/g; SAR(10 g) = 0.033 mW/g**

Maximum value of SAR (measured) = 0.059 mW/g



## **Appendix 4**

### **SAR distribution plots for Mobile Hotspot Configuration**

## Test Laboratory: Motorola CDMA 800 WiFi Hotspot Mode

**Serial: 354711040002267; FCC ID: IHDT56MA1**

Procedure Notes: Pwr Step: EV-DO REV. A Subtest 2 FETAP, All Up, Battery Model #: SNN5879A Accessory Model # Back of Phone 10mm from Phantom

Communication System: CDMA 835; Frequency: 848.31 MHz; Communication System Channel Number: 777; Duty Cycle: 1:1

Medium: Low Freq Body; Medium parameters used:  $\sigma = 0.98$  mho/m,  $\epsilon_r = 54.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Section 1, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (151x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.26 mW/g

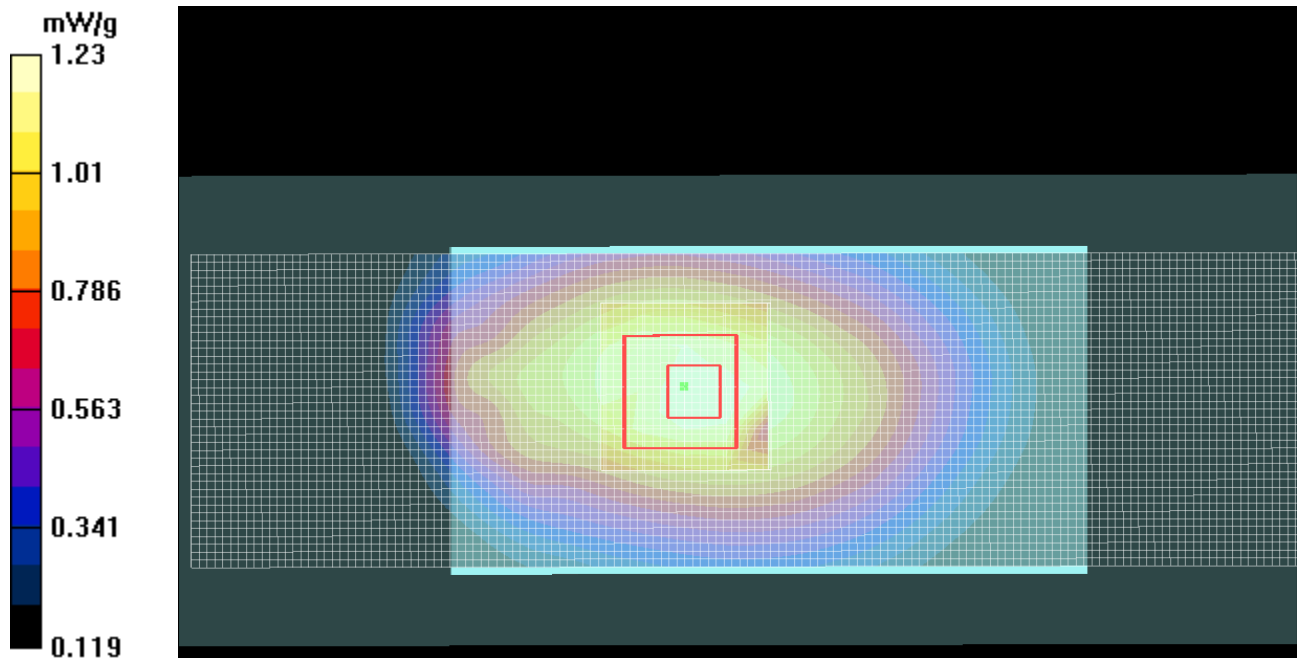
**Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 35.8 V/m; Power Drift = -0.074 dB

Peak SAR (extrapolated) = 1.53 W/kg

**SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.843 mW/g**

Maximum value of SAR (measured) = 1.23 mW/g



## Test Laboratory: Motorola GSM 1900 WiFi Hotspot Mode

**Serial: 354711040005211; FCC ID: IHDT56MA1**

Procedure Notes: GPRS Class 10 Body Worn, Battery Model #: SNN5879A Accessory Model # = Back of Phone  
10mm from Phantom

Communication System: GPRS 1900 - Class 10; Frequency: 1850.2 MHz; Communication System Channel Number:  
512; Duty Cycle: 1:4.15

Medium: Regular Glycol Body 1750/1880; Medium parameters used:  $\sigma = 1.58$  mho/m,  $\epsilon_r = 50.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.71, 4.71, 4.71); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Section 2, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (151x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.58 mW/g

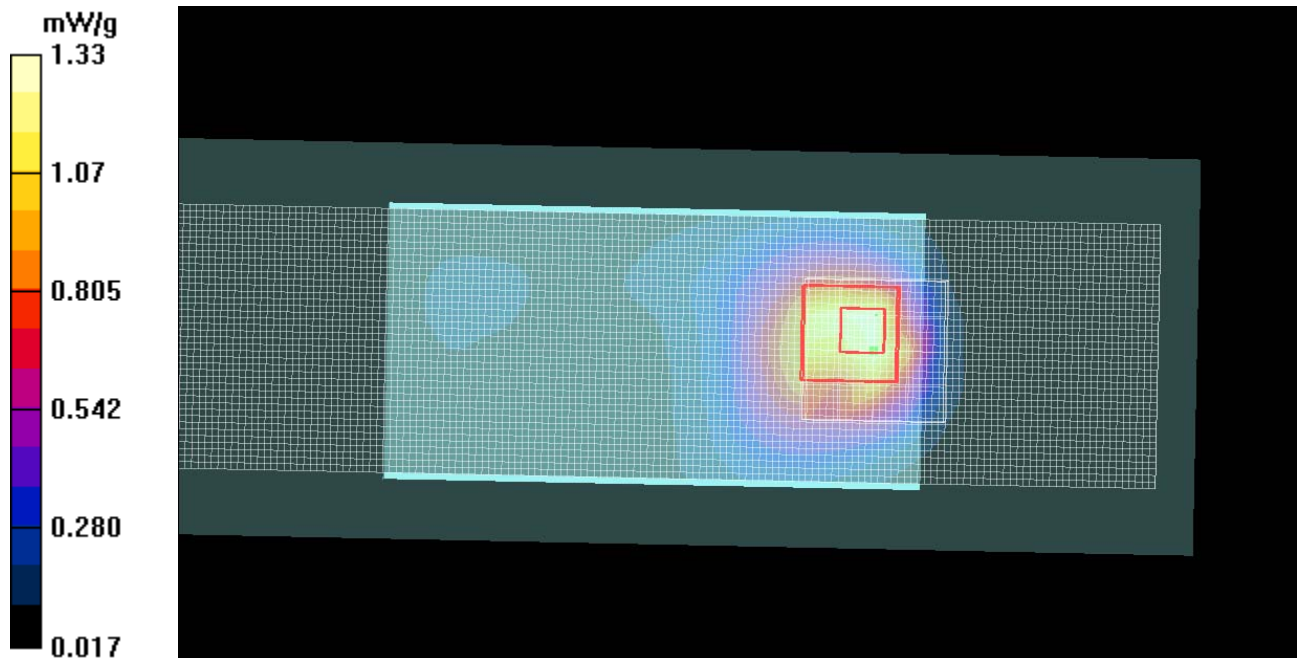
**Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.7 V/m; Power Drift = -0.054 dB

Peak SAR (extrapolated) = 2.04 W/kg

**SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.686 mW/g**

Maximum value of SAR (measured) = 1.33 mW/g



## Test Laboratory: Motorola 2450 MHz WiFi Hotspot Mode - Back of DUT

**Serial: 354711040002457; FCC ID: IHDT56MA1**

Procedure Notes: 5.5Mbps 2450 MHz WiFi 802.11b Battery Model #: SNN5879A Accessory Model # = back of phone 10mm from Phantom

Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Communication System Channel Number: 1; Duty Cycle: 1:1

Medium: 2450 Glycol Body; Medium parameters used:  $\sigma = 1.9$  mho/m,  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.22, 4.22, 4.22); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Section 1, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (151x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.313 mW/g

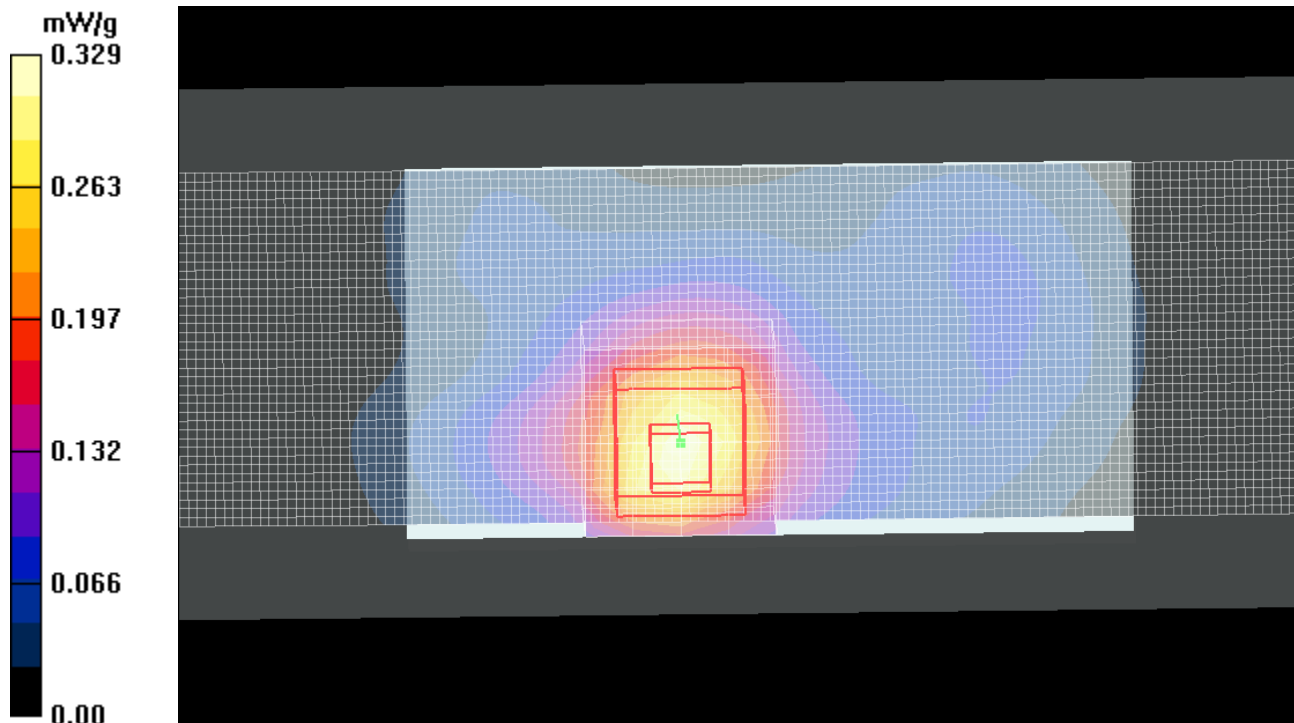
**Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.1 V/m; Power Drift = -0.189 dB

Peak SAR (extrapolated) = 0.565 W/kg

**SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.165 mW/g**

Maximum value of SAR (measured) = 0.329 mW/g



## Test Laboratory: Motorola 2450 MHz WiFi Hotspot Mode - Left Edge

**Serial: 354711040002457; FCC ID: IHDT56MA1**

Procedure Notes: 5.5Mbps 2450 MHz WiFi 802.11b Battery Model #: SNN5879A Accessory Model # =Left edge of phone 10mm from Phantom

Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Communication System Channel Number: 1; Duty Cycle: 1:1

Medium: 2450 Glycol Body; Medium parameters used:  $\sigma = 1.9$  mho/m,  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.22, 4.22, 4.22); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn719; Calibrated: 3/22/2010
- Phantom: R11\_ Section 1, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

**Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (151x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.379 mW/g

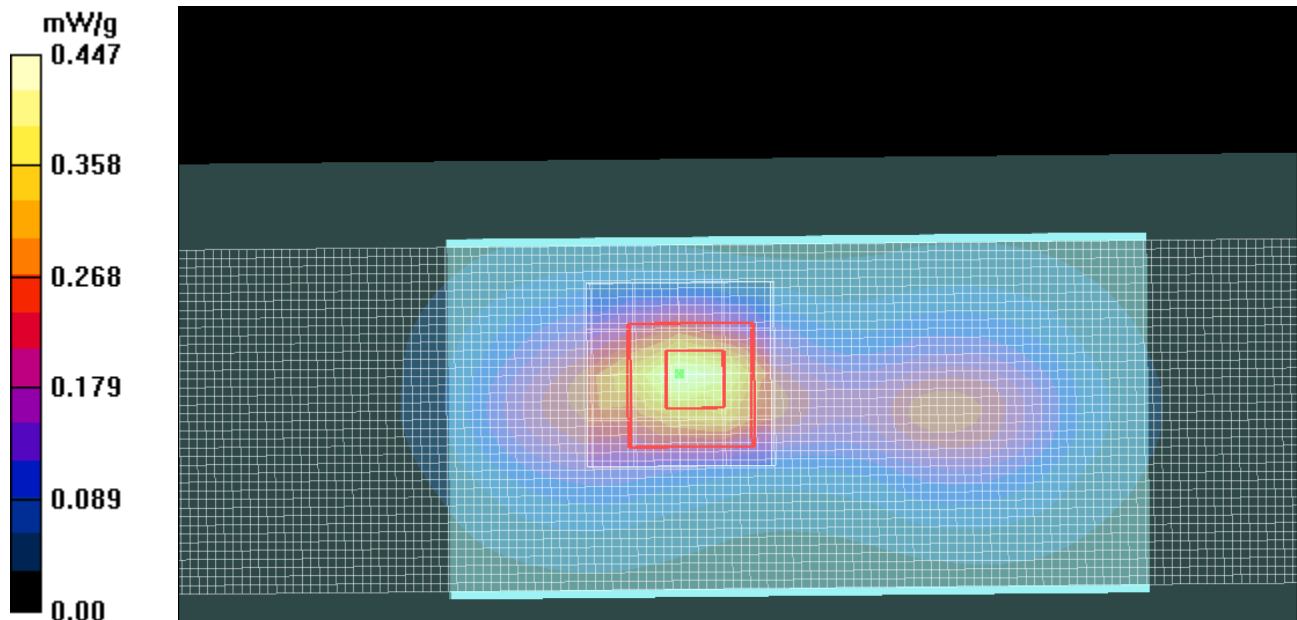
**Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.775 W/kg

**SAR(1 g) = 0.394 mW/g; SAR(10 g) = 0.189 mW/g**

Maximum value of SAR (measured) = 0.447 mW/g



## **Appendix 5**

### **Probe Calibration Certificate**



Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola Beijing**

Certificate No: **ES3-3180\_May10**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3180**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2  
Calibration procedure for dosimetric E-field probes**

Calibration date: **May 20, 2010**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID #            | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Power sensor E4412A        | MY41495277      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Power sensor E4412A        | MY41498087      | 1-Apr-10 (No. 217-01136)          | Apr-11                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 30-Mar-10 (No. 217-01159)         | Mar-11                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 30-Mar-10 (No. 217-01161)         | Mar-11                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 30-Mar-10 (No. 217-01160)         | Mar-11                 |
| Reference Probe ES3DV2     | SN: 3013        | 30-Dec-09 (No. ES3-3013_Dec09)    | Dec-10                 |
| DAE4                       | SN: 660         | 20-Apr-10 (No. DAE4-660_Apr10)    | Apr-11                 |
| Secondary Standards        | ID #            | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-09)  | In house check: Oct-11 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-09) | In house check: Oct10  |

|                |                               |  |               |
|----------------|-------------------------------|--|---------------|
| Calibrated by: | Name<br><b>Jeton Kastrati</b> | Function<br><b>Laboratory Technician</b> | Signature<br> |
| Approved by:   | Name<br><b>Katja Pokovic</b>  | Technical Manager                        |               |

Issued: May 22, 2010

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Accreditation No.: **SCS 108**

### Glossary:

|                          |   |
|--------------------------|---|
| TSL                      | tissue simulating liquid  |
| NORM <sub>x,y,z</sub>    | sensitivity in free space   |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>  |
| DCP                      | diode compression point   |
| CF                       | crest factor (1/duty_cycle) of the RF signal  |
| A, B, C                  | modulation dependent linearization parameters   |
| Polarization $\varphi$   | $\varphi$ rotation around probe axis  |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* *frequency\_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe ES3DV3

## SN:3180

|                  |                |
|------------------|----------------|
| Manufactured:    | March 25, 2008 |
| Last calibrated: | July 21, 2009  |
| Recalibrated:    | May 20, 2010   |

Calibrated for DASYS/EASY Systems

(Note: non-compatible with DASYS2 system!)

## DASY/EASY - Parameters of Probe: ES3DV3 SN:3180

### Basic Calibration Parameters

|   | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.22     | 1.06     | 1.04     | ± 10.1%   |
| DCP (mV) <sup>B</sup>                                     | 94.9     | 92.3     | 94.5     |           |

### Modulation Calibration Parameters

| UID   | Communication System Name | PAR  |   | A<br>dB | B<br>dBuV | C    | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-------|---------------------------|------|---|---------|-----------|------|----------|---------------------------|
| 10000 | CW                        | 0.00 | X | 0.00    | 0.00      | 1.00 | 300.0    | ± 1.5%                    |
|       |                           |      | Y | 0.00    | 0.00      | 1.00 | 300.0    |                           |
|       |                           |      | Z | 0.00    | 0.00      | 1.00 | 300.0    |                           |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: ES3DV3 SN:3180

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 835     | ± 50 / ± 100                | 41.5 ± 5%    | 0.90 ± 5%    | 6.01    | 6.01    | 6.01    | 0.63  | 1.21 ± 11.0%    |
| 1810    | ± 50 / ± 100                | 40.0 ± 5%    | 1.40 ± 5%    | 5.03    | 5.03    | 5.03    | 0.55  | 1.34 ± 11.0%    |
| 1950    | ± 50 / ± 100                | 40.0 ± 5%    | 1.40 ± 5%    | 4.81    | 4.81    | 4.81    | 0.41  | 1.57 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 39.2 ± 5%    | 1.80 ± 5%    | 4.42    | 4.42    | 4.42    | 0.41  | 1.72 ± 11.0%    |

<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

## DASY/EASY - Parameters of Probe: ES3DV3 SN:3180

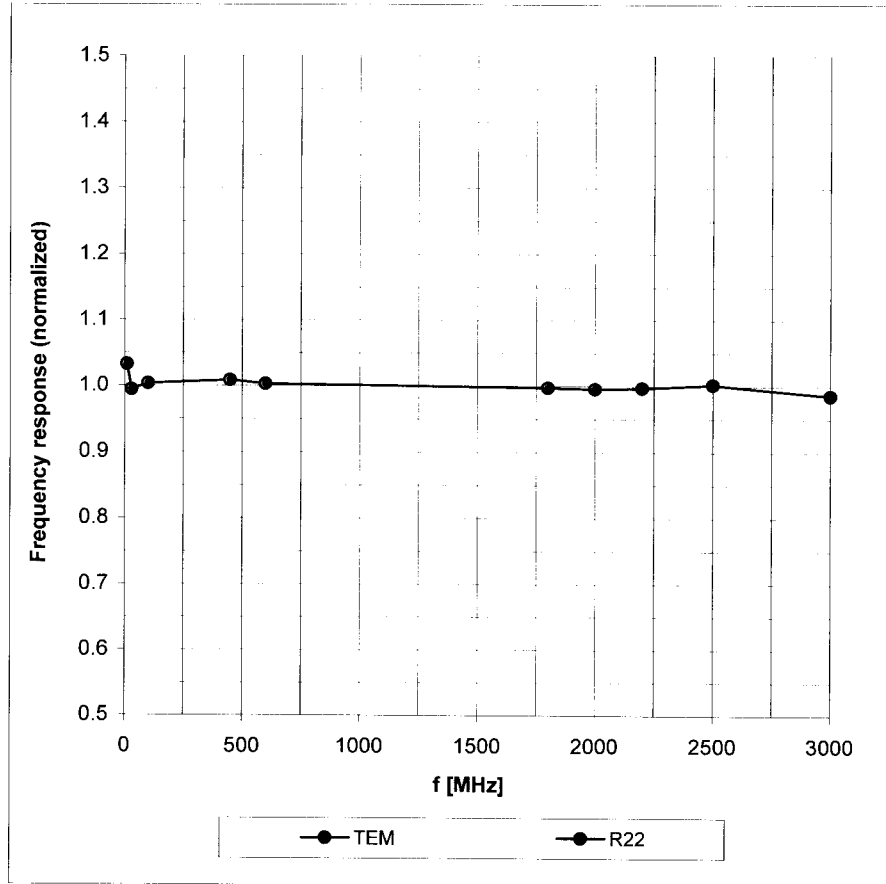
### Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz] | Validity [MHz] <sup>c</sup> | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 835     | ± 50 / ± 100                | 55.2 ± 5%    | 0.97 ± 5%    | 6.01    | 6.01    | 6.01    | 0.77  | 1.14 ± 11.0%    |
| 1810    | ± 50 / ± 100                | 53.3 ± 5%    | 1.52 ± 5%    | 4.71    | 4.71    | 4.71    | 0.31  | 2.14 ± 11.0%    |
| 1950    | ± 50 / ± 100                | 53.3 ± 5%    | 1.52 ± 5%    | 4.72    | 4.72    | 4.72    | 0.30  | 2.62 ± 11.0%    |
| 2450    | ± 50 / ± 100                | 52.7 ± 5%    | 1.95 ± 5%    | 4.22    | 4.22    | 4.22    | 0.67  | 1.29 ± 11.0%    |

<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

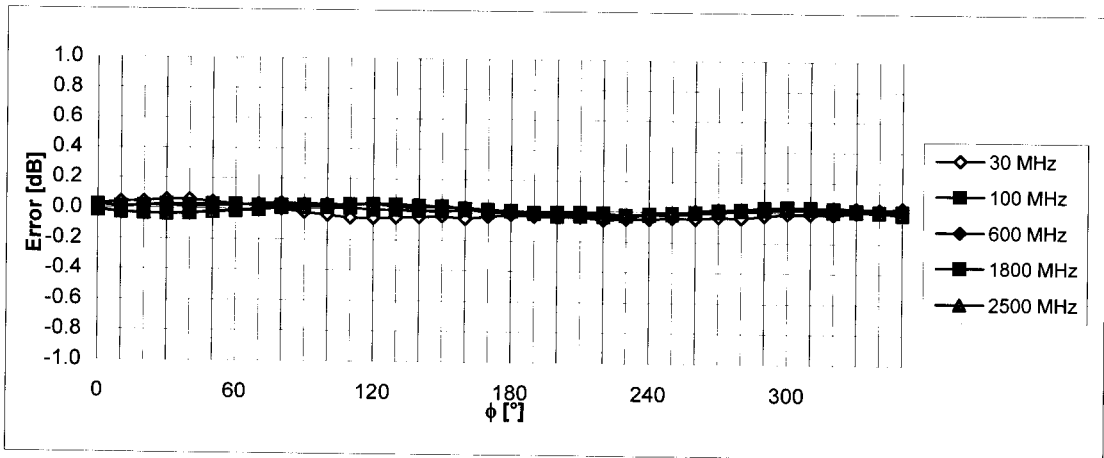
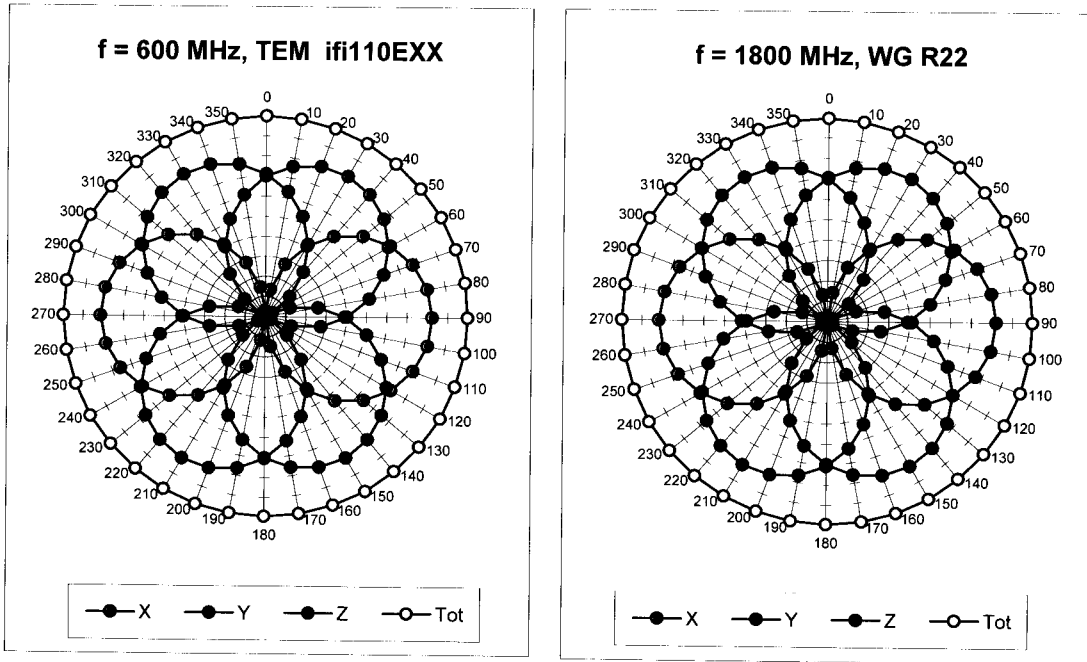
# Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



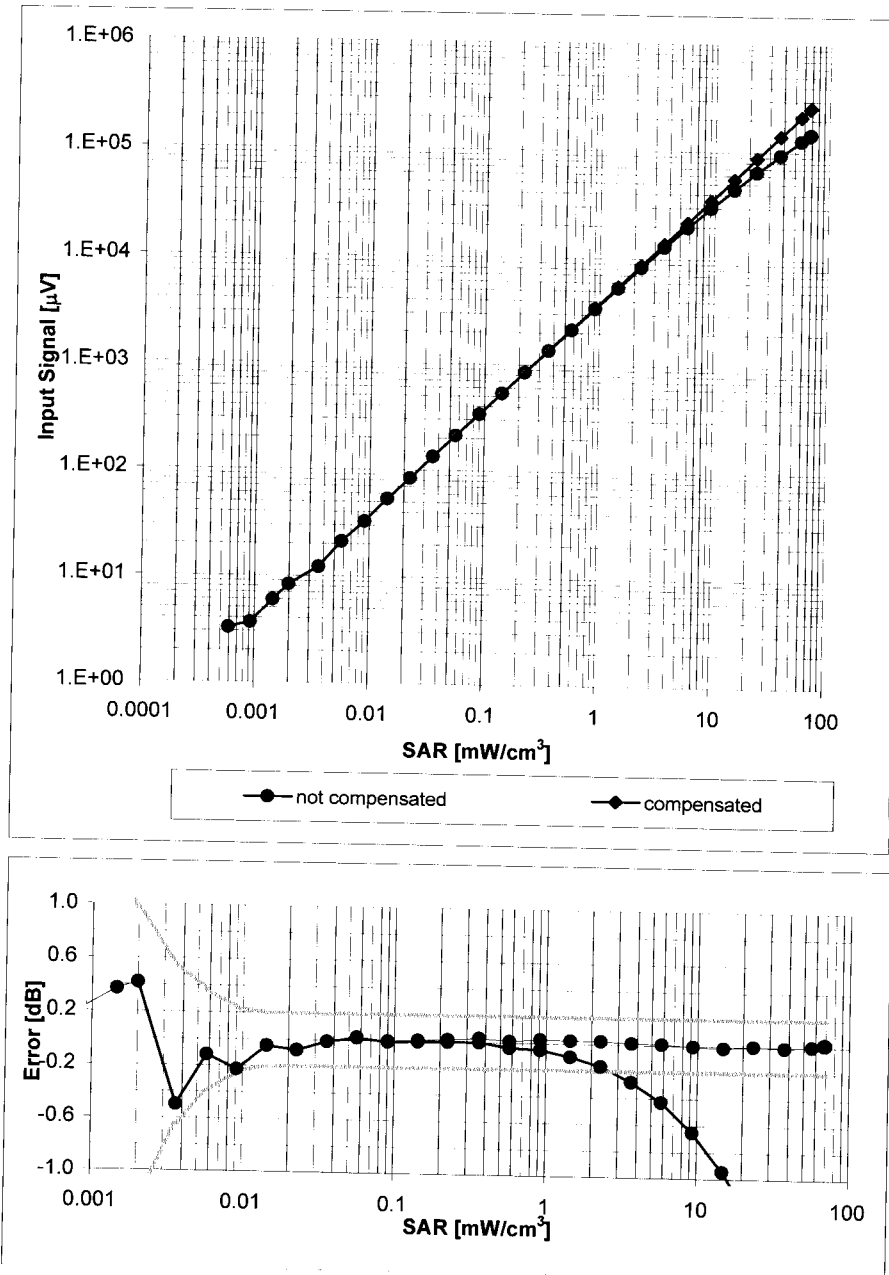
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

### Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



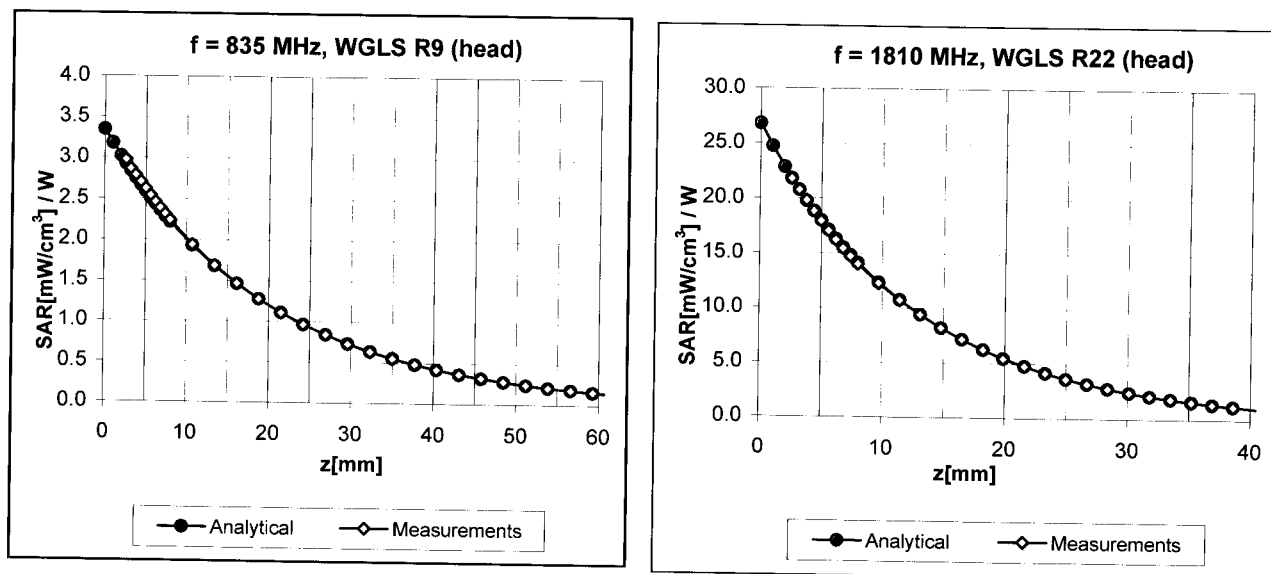
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

### Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$ )



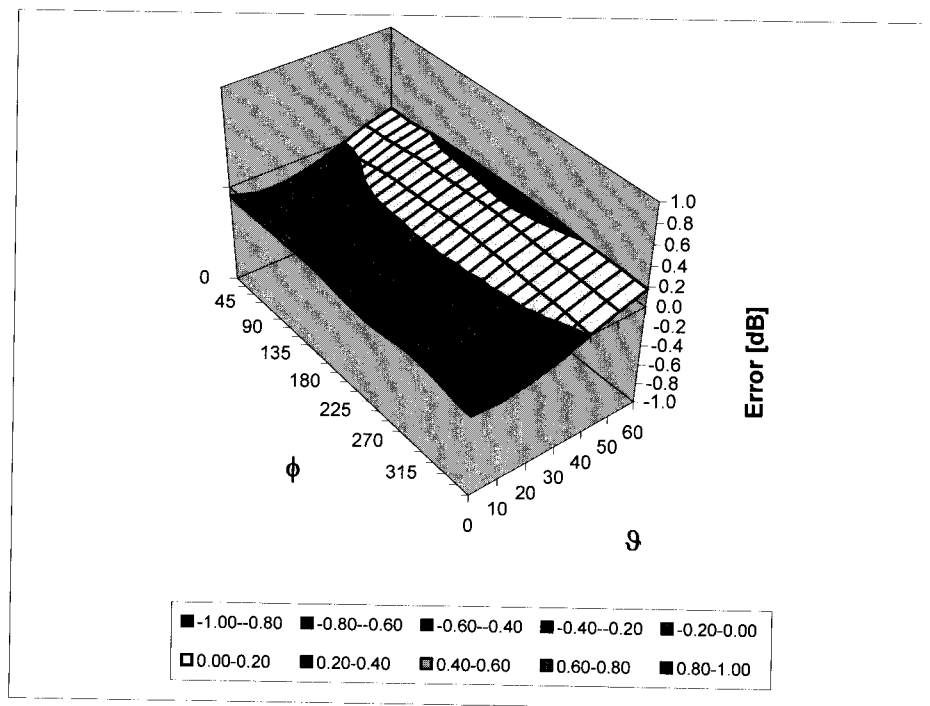
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

### Conversion Factor Assessment



### Deviation from Isotropy in HSL

Error ( $\phi, \vartheta$ ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  (k=2)

## Other Probe Parameters

|   |                |
|---|----------------|
| Sensor Arrangement                            | Triangular     |
| Connector Angle (°)                           | Not applicable |
| Mechanical Surface Detection Mode             | enabled        |
| Optical Surface Detection Mode                | disabled       |
| Probe Overall Length                          | 337 mm         |
| Probe Body Diameter                           | 10 mm          |
| Tip Length                                    | 10 mm          |
| Tip Diameter                                  | 4.0 mm         |
| Probe Tip to Sensor X Calibration Point       | 2 mm           |
| Probe Tip to Sensor Y Calibration Point       | 2 mm           |
| Probe Tip to Sensor Z Calibration Point       | 2 mm           |
| Recommended Measurement Distance from Surface | 3 mm           |

## **Appendix 6**

### **Measurement Uncertainty Budget**

| <i>a</i>   | <i>b</i>          | <i>c</i>        | <i>d</i>  | $e = f(d,k)$ | <i>f</i>    | <i>g</i>     | $h = c \times f / e$ | $i = c \times g / e$  | <i>k</i> |
|--|-------------------|-----------------|-----------|--------------|-------------|--------------|----------------------|-----------------------|----------|
| <b>Uncertainty Component</b>                       | IEEE 1528 section | Tol. ( $\pm$ %) | Prob Dist | Div.         | $c_i$ (1 g) | $c_i$ (10 g) | 1 g $u_i$ ( $\pm$ %) | 10 g $u_i$ ( $\pm$ %) | $v_i$    |
| <b>Measurement System</b>                          |                   |                 |           |              |             |              |                      |                       |          |
| Probe Calibration                                  | E.2.1             | 5.9             | N         | 1.00         | 1           | 1            | 5.9                  | 5.9                   | $\infty$ |
| Axial Isotropy                                     | E.2.2             | 4.7             | R         | 1.73         | 0.707       | 0.707        | 1.9                  | 1.9                   | $\infty$ |
| Hemispherical Isotropy                             | E.2.2             | 9.6             | R         | 1.73         | 0.707       | 0.707        | 3.9                  | 3.9                   | $\infty$ |
| Boundary Effect                                    | E.2.3             | 1.0             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| Linearity  | E.2.4             | 4.7             | R         | 1.73         | 1           | 1            | 2.7                  | 2.7                   | $\infty$ |
| System Detection Limits                            | E.2.5             | 1.0             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| Readout Electronics                                | E.2.6             | 0.3             | N         | 1.00         | 1           | 1            | 0.3                  | 0.3                   | $\infty$ |
| Response Time                                      | E.2.7             | 1.1             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| Integration Time                                   | E.2.8             | 1.1             | R         | 1.73         | 1           | 1            | 0.6                  | 0.6                   | $\infty$ |
| RF Ambient Conditions - Noise                      | E.6.1             | 3.0             | R         | 1.73         | 1           | 1            | 1.7                  | 1.7                   | $\infty$ |
| RF Ambient Conditions - Reflections                | E.6.1             | 0.0             | R         | 1.73         | 1           | 1            | 0.0                  | 0.0                   | $\infty$ |
| Probe Positioner Mech. Tolerance                   | E.6.2             | 0.4             | R         | 1.73         | 1           | 1            | 0.2                  | 0.2                   | $\infty$ |
| Probe Positioning w.r.t Phantom                    | E.6.3             | 1.4             | R         | 1.73         | 1           | 1            | 0.8                  | 0.8                   | $\infty$ |
| Max. SAR Evaluation (ext., int., avg.)             | E.5               | 3.4             | R         | 1.73         | 1           | 1            | 2.0                  | 2.0                   | $\infty$ |
| <b>Test sample Related</b>                         |                   |                 |           |              |             |              |                      |                       |          |
| Test Sample Positioning                            | E.4.2             | 3.2             | N         | 1.00         | 1           | 1            | 3.2                  | 3.2                   | 29       |
| Device Holder Uncertainty                          | E.4.1             | 4.0             | N         | 1.00         | 1           | 1            | 4.0                  | 4.0                   | 8        |
| SAR drift  | 6.6.2             | 5.0             | R         | 1.73         | 1           | 1            | 2.9                  | 2.9                   | $\infty$ |
| <b>Phantom and Tissue Parameters</b>               |                   |                 |           |              |             |              |                      |                       |          |
| Phantom Uncertainty                                | E.3.1             | 4.0             | R         | 1.73         | 1           | 1            | 2.3                  | 2.3                   | $\infty$ |
| Liquid Conductivity (target)                       | E.3.2             | 5.0             | R         | 1.73         | 0.64        | 0.43         | 1.8                  | 1.2                   | $\infty$ |
| Liquid Conductivity (measurement)                  | E.3.3             | 3.3             | N         | 1.00         | 0.64        | 0.43         | 2.1                  | 1.4                   | $\infty$ |
| Liquid Permittivity (target)                       | E.3.2             | 5.0             | R         | 1.73         | 0.6         | 0.49         | 1.7                  | 1.4                   | $\infty$ |
| Liquid Permittivity (measurement)                  | E.3.3             | 1.9             | N         | 1.00         | 0.6         | 0.49         | 1.1                  | 0.9                   | $\infty$ |
| <b>Combined Standard Uncertainty</b>               |                   |                 | RSS       |              |             |              | 11.1                 | 10.8                  | 411      |
| <b>Expanded Uncertainty (95% CONFIDENCE LEVEL)</b> |                   |                 | $k=2$     |              |             |              | 22.2                 | 21.6                  |          |