



**MOTOROLA**

## Portable Cellular Phone SAR Test Report v2

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(none)

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## 1. Introduction

The Motorola Mobile Devices Business Product Safety 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 1g average set in [3] and 2.0W/kg in a 10g average set in [2].

For ICNIRP (10g), the final SAR reading for this phone is 1.05 W/kg for head adjacent use and 0.73 W/kg for body worn use. For ANSI / IEEE C95.1 (1g), the final SAR reading for this phone is 1.52 W/kg for head adjacent use and 1.04 W/kg for body worn use. 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 Antenna description

|                      |                           |          |
|----------------------|---------------------------|----------|
| <b>Type</b>          | Internal                  |          |
| <b>Location</b>      | Bottom of the transceiver |          |
| <b>Dimensions</b>    | Length                    | 34.18 mm |
|                      | Width                     | 7.8 mm   |
| <b>Configuration</b> | FJA                       |          |

### 2.2 Device description

|   |                                   |                      |                       |                   |
|---|-----------------------------------|----------------------|-----------------------|-------------------|
| <b>Serial Number</b>  | 80C9004E and A0000002CB048A       |                      |                       |                   |
| <b>Mode(s) of Operation</b>                                   | 800 CDMA                          | CDMA 1700            | CDMA 1900             | Bluetooth         |
| <b>Modulation Mode(s)</b>                                     | QPSK                              | QPSK                 | QPSK                  | GFSK              |
| <b>Maximum Output Power Setting</b>                           | 25.00 dBm                         | 25.00 dBm            | 25.00 dBm             | 4.00 dBm          |
| <b>Duty Cycle</b>   | 1:1                               | 1:1                  | 1:1                   | 1:1               |
| <b>Transmitting Frequency Range(s)</b>                        | 824.70 - 848.31 MHz               | 1711.2 – 1753.75 MHz | 1851.25 – 1908.75 MHz | 2400 – 2483.5 MHz |
| <b>Production Unit or Identical Prototype (47 CFR §2.908)</b> | Identical Prototype               |                      |                       |                   |
| <b>Device Category</b>  | Portable                          |                      |                       |                   |
| <b>RF Exposure Limits</b>                                     | General Population / Uncontrolled |                      |                       |                   |

### 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 10g RSS uncertainty of the measurement system is  $\pm 10.8\%$  (K=1) with an expanded uncertainty of  $\pm 21.6\%$  (K=2). The overall 1g 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 0.4W/kg to 10W/kg.

The list of calibrated equipment used for the measurements is shown in the following table.

| Description                               | Serial Number | Cal Due Date |
|---|---------------|--------------|
| DASY4™ DAE V3                             | 365           | 08/21/2010   |
| DASY4™ DAE V3                             | 703           | 09/29/2010   |
| E-Field Probe ESDV3                       | 3191          | 11/07/2009   |
| E-Field Probe ES3V3                       | 3178          | 08/17/2010   |
| E-Field Probe ES3DV3                      | 3037          | 10/01/2010   |
| S.A.M. Phantom used for 800/900MHz        | TP-1129       |              |
| S.A.M. Phantom used for 800/900MHz        | TP-1005       |              |
| S.A.M. Phantom used for 1800/1900/2450MHz | TP-1134       |              |
| Dipole Validation Kit, DV835V2            | 417tr         | 04/01/2010   |
| Dipole Validation Kit, DV900V2            | 97            | 04/01/2010   |
| Dipole Validation Kit, DV1800V2           | 277tr         | 04/01/2010   |
| Dipole Validation Kit, DV2450V2           | 767           | 04/01/2010   |

#### 3.2 Additional Equipment

Equipment used for testing on: 10/23/2009 – 11/12/2009

| Description                   | Serial Number | Cal Due Date |
|-------------------------------|---------------|--------------|
| Signal Generator HP8648C      | 3847A04840    | 01/21/2010   |
| Power Meter E4419B            | GB39511085    | 01/21/2010   |
| Power Sensor #1 - 8481A       | MY41095450    | 01/21/2010   |
| Power Sensor #2 - 8481A       | 2702A82671    | 01/21/2010   |
| Network Analyzer HP8753ES     | US39172714    | 01/21/2010   |
| Dielectric Probe Kit HP85070B | US99360207    |              |

Equipment used for testing on: 01/17/2010

| Description                   | Serial Number | Cal Due Date |
|-------------------------------|---------------|--------------|
| Signal Generator HP8648C      | 3847A04844    | Jan-29-2010  |
| Power Meter E4419B            | GB39511086    | Jun-12-2010  |
| Power Sensor #1 - E9301A      | US39210934    | Apr-23-2010  |
| Power Sensor #2 - E9301A      | US39211006    | Apr-22-2010  |
| Network Analyzer HP8753ES     | US39172529    | Jun-11-2010  |
| 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].

| f (MHz)              | Tissue type          | Limits / Measured    | Dielectric Parameters |                |           |
|----------------------|----------------------|----------------------|-----------------------|----------------|-----------|
|                      |                      |                      | $\epsilon_r$          | $\sigma$ (S/m) | Temp (°C) |
| 835                  | Head                 | Measured, 10/23/2009 | 41.2                  | 0.91           | 21.0      |
|                      |                      | Recommended Limits   | 41.5 ±5%              | 0.90 ±5%       | 18-25     |
|                      | Body                 | Measured, 10/29/2009 | 55.5                  | 0.98           | 21.5      |
|                      |                      | Measured, 01/17/2010 | 53.9                  | 0.99           | 21.0      |
| 1730                 | Head                 | Recommended Limits   | 55.2 ±5%              | 0.97 ±5%       | 18-25     |
|                      |                      | Measured, 11/04/2009 | 39.6                  | 1.39           | 21.8      |
|                      |                      | Measured, 11/10/2009 | 38.6                  | 1.39           | 21.5      |
|                      | Recommended Limits   | 40.1 ±5%             | 1.36 ±5%              | 18-25          |           |
| Body                 | Measured, 11/03/2009 | 51.5                 | 1.54                  | 20.9           |           |
|                      | Recommended Limits   | 53.5 ±5%             | 1.48 ±5%              | 18-25          |           |
|                      | Head                 | Measured, 10/30/2009 | 38.2                  | 1.45           | 21.0      |
| Measured, 11/02/2009 |                      | 38.1                 | 1.44                  | 21.6           |           |
| Recommended Limits   |                      | 40.0 ±5%             | 1.40 ±5%              | 18-25          |           |
| 1880                 | Body                 | Measured, 11/09/2009 | 51                    | 1.58           | 21.5      |
|                      |                      | Recommended Limits   | 53.3 ±5%              | 1.52 ±5%       | 18-25     |
|                      | 2450                 | Body                 | Measured, 11/12/2009  | 48.9           | 1.98      |
| Recommended Limits   |                      |                      | 52.7 ±10%             | 1.95 ±5%       | 18-25     |

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

| Ingredient | 835MHz / 900 MHz Head | 835MHz / 900 MHz Body | 1800MHz / 1900 MHz Head | 1800 MHz / 1900 MHz Body | 2450MHz 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 6. 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 1W 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). The tissue stimulant depth was verified to be 15.0cm  $\pm 0.5$ cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

| f<br>(MHz) | Description          | SAR (W/kg),<br>1gram | Dielectric Parameters |                | Ambient<br>Temp (°C) | Tissue<br>Temp (°C) |
|------------|----------------------|----------------------|-----------------------|----------------|----------------------|---------------------|
|            |                      |                      | $\epsilon_r$          | $\sigma$ (S/m) |                      |                     |
| 835        | Measured, 01/17/2010 | 9.70                 | 41.5                  | 0.92           | 20.4                 | 20.0                |
|            | Recommended Limits   | 9.69                 | 41.5 $\pm 5\%$        | 0.90 $\pm 5\%$ | 18-25                | 18-25               |
| 900        | Measured, 10/23/2009 | 11.88                | 40.5                  | 0.97           | 22.2                 | 21.5                |
|            | Measured, 10/29/2009 | 11.83                | 41.2                  | 0.99           | 22                   | 21.3                |
|            | Recommended Limits   | 11.19                | 41.5 $\pm 5\%$        | 0.97 $\pm 5\%$ | 18-25                | 18-25               |
| 1800       | Measured, 10/30/2009 | 38.8                 | 38.4                  | 1.36           | 21.7                 | 21.5                |
|            | Measured, 11/02/2009 | 39.63                | 38.7                  | 1.37           | 21.2                 | 21.4                |
|            | Measured, 11/03/2009 | 38.88                | 38                    | 1.34           | 22.1                 | 23                  |
|            | Measured, 11/04/2009 | 40.95                | 39.3                  | 1.46           | 22.3                 | 22                  |
|            | Measured, 11/09/2009 | 37.55                | 39.2                  | 1.38           | 20.9                 | 21.1                |
|            | Measured, 11/10/2009 | 39.6                 | 38.3                  | 1.46           | 21                   | 21.5                |
|            | Recommended Limits   | 37.91                | 40.0 $\pm 5\%$        | 1.4 $\pm 5\%$  | 18-25                | 18-25               |
| 2450       | Measured, 11/12/2009 | 51.25                | 36.3                  | 1.81           | 22.4                 | 23.5                |
|            | Recommended Limits   | 56.68                | 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 pg # |
|----------------------|---------------|------------|-------------------|---------------|
| E-Field Probe ES3DV3 | SN3037        | 835        | 6.25              | 8 of 9        |
| E-Field Probe ES3DV3 | SN3191        | 900        | 6.03              | 8 of 9        |
|                      |               | 1800       | 5.19              | 8 of 9        |
|                      |               | 2450       | 4.57              | 8 of 9        |
| E-Field Probe ES3DV3 | SN3178        | 900        | 5.56              | 8 of 9        |
|                      |               | 1800       | 4.73              | 8 of 9        |
|                      |               | 2450       | 4.09              | 8 of 9        |

## 6. Test Results

The test sample was operated using an actual transmission through a base station simulator. The base station simulator was setup to the proper channel, transmitter power level and transmit mode 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 measured dielectric constant of the material used for the device holder is less than 2.9 and the loss tangent is less than 0.02 ( $\pm 30\%$ ) at 850MHz. The default settings for the “coarse” and “cube” scans were chosen and used for measurements. The grid spacing of the course scan was set to 15 mm as shown in the SAR plots included in Appendix 2 and 3. 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:

SNN5845A 900 mAH Battery  
 SNN5819B 1130 mAH Battery

The battery used to do most of the SAR testing was SNN5845A. The phone was placed in the SAR measurement system with a fully charged battery. The configuration that resulted in the highest SAR values were tested using the other batteries listed above.

Per the “SAR Measurement Procedures for 3G Devices” 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 |         |       |       |       |       |  |
|--------------------------------------|---------|-------|-------|-------|-------|--|
|                                      | Channel | RC1   |       | RC3   |       | RC3 (FCH + SCH)  |
|                                      |         | SO2   | SO55  | SO2   | SO55  |  |
| CDMA 800                             | 1013    | 25.14 | 25.16 | 24.89 | 25.07 | 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     | 25.03 | 25.03 | 24.99 | 24.93 |  |
|                                      | 777     | 24.93 | 24.96 | 24.97 | 24.87 |  |
| CDMA 1700                            | 25      | 25.32 | 25.28 | 25.16 | 25.10 |  |
|                                      | 450     | 25.25 | 25.22 | 25.18 | 25.15 |  |
|                                      | 875     | 25.09 | 25.09 | 25.12 | 25.11 |  |
| CDMA 1900                            | 25      | 25.07 | 24.99 | 25.00 | 25.14 |  |
|                                      | 600     | 25.03 | 24.96 | 24.96 | 25.04 |  |
|                                      | 1175    | 25.04 | 24.99 | 25.01 | 25.06 |  |

| Conducted power (dBm) for EVDO modes |         |             |             |           |
|--------------------------------------|---------|-------------|-------------|-----------|
|                                      | Channel | Rev 0       |             | Rev A     |
|                                      |         | FTAP 307.2k | RTAP 153.6k | Subtype 2 |
| CDMA 800                             | 1013    | 25.01       | 25.06       | N/A       |
|                                      | 384     | 25.09       | 25.19       | N/A       |
|                                      | 777     | 25.03       | 25.06       | N/A       |
| CDMA 1900                            | 25      | 25.22       | 25.18       | N/A       |
|                                      | 450     | 25.2        | 25.36       | N/A       |
|                                      | 875     | 25.03       | 25.02       | N/A       |
| CDMA 1700                            | 25      | 24.97       | 24.93       | N/A       |
|                                      | 600     | 24.81       | 24.87       | N/A       |
|                                      | 1175    | 24.91       | 25.1        | N/A       |

### 6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 6 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 for the CDMA RC3/SO55 mode, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $New\ SAR = Old\ SAR * 10^{(-drift/10)}$ . 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. Note that 800MHz digital mode SAR measurements were performed in accordance with [4].

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 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 to be 15.0cm ±0.5cm.

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

| Description          | Serial Number | f (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ES3DV3 | SN3191        | 900     | 6.03              | 8 of 9        |
|                      |               | 1810    | 5.19              | 8 of 9        |
| E-Field Probe ES3DV3 | SN3178        | 900     | 5.56              | 8 of 9        |
|                      |               | 1810    | 4.73              | 8 of 9        |

| Left Head Cheek Position |              |                              |             |               |                 |                     |                 |                     |
|--------------------------|--------------|------------------------------|-------------|---------------|-----------------|---------------------|-----------------|---------------------|
| f (MHz)                  | Description  | Conducted Output Power (dBm) | Temp (°C)   | Drift (dB)    | 10g SAR value   |                     | 1g SAR value    |                     |
|                          |              |                              |             |               | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |
| CDMA 800 MHz             | Channel 1013 | 25.00                        | 21.4        | 0.0342        | 0.905           | 0.91                | 1.26            | 1.26                |
|                          | Channel 384  | 25.08                        | 21.6        | -0.124        | 0.975           | 1.00                | 1.36            | 1.40                |
|                          | Channel 777  | 24.99                        | 21.2        | -0.0977       | 1.0             | 1.02                | 1.42            | 1.45                |
| CDMA 1700MHz             | Channel 25   | 25.09                        | 22          | 0.0753        | 0.765           | 0.77                | 1.23            | 1.23                |
|                          | Channel 450  | 25.12                        | 21.6        | -0.124        | 0.807           | 0.83                | 1.28            | 1.32                |
|                          | Channel 875  | <b>25.06</b>                 | <b>21.8</b> | <b>0.0234</b> | <b>0.876</b>    | <b>0.88</b>         | <b>1.4</b>      | <b>1.40</b>         |
| CDMA 1900MHz             | Channel 25   | 24.80                        | 21          | 0.104         | 0.854           | 0.85                | 1.38            | 1.38                |
|                          | Channel 600  | 24.81                        | 21.3        | 0.037         | 0.671           | 0.67                | 1.12            | 1.12                |
|                          | Channel 1175 | 24.97                        | 21.1        | -0.0732       | 0.832           | 0.85                | 1.44            | 1.46                |

**Table 1: 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 |              |                              |             |                |                 |                     |                 |                     |
|---------------------------|--------------|------------------------------|-------------|----------------|-----------------|---------------------|-----------------|---------------------|
| <i>f</i><br>(MHz)         | Description  | Conducted Output Power (dBm) | Temp (°C)   | Drift (dB)     | 10g SAR value   |                     | 1g SAR value    |                     |
|                           |              |                              |             |                | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |
| CDMA 800 MHz              | Channel 1013 | 25.00                        | 21.3        | 0.0481         | 1.01            | 1.01                | 1.47            | 1.47                |
|                           | Channel 384  | <b>25.08</b>                 | <b>20.9</b> | <b>-0.0864</b> | <b>1.03</b>     | <b>1.05</b>         | <b>1.46</b>     | <b>1.49</b>         |
|                           | Channel 777  | 24.99                        | 21.1        | 0.156          | 1.01            | 1.01                | 1.43            | 1.43                |
| CDMA 1700MHz              | Channel 25   | 25.09                        | 21.4        | 0.183          | 0.504           | 0.50                | 0.803           | 0.80                |
|                           | Channel 450  | 25.12                        | 21.6        | 0.09           | 0.541           | 0.54                | 0.858           | 0.86                |
|                           | Channel 875  | 25.06                        | 21.5        | 0.0153         | 0.597           | 0.60                | 0.956           | 0.96                |
| CDMA 1900MHz              | Channel 25   | <b>24.80</b>                 | <b>20.9</b> | <b>0.0224</b>  | <b>0.969</b>    | <b>0.97</b>         | <b>1.52</b>     | <b>1.52</b>         |
|                           | Channel 600  | 24.81                        | 20.9        | -0.0035        | 0.701           | 0.70                | 1.1             | 1.10                |
|                           | Channel 1175 | 24.97                        | 21          | -0.118         | 0.844           | 0.87                | 1.39            | 1.43                |

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

| The noted Highest Head Cheek Position with SNN5819B Battery |              |                              |           |            |                 |                     |                 |                     |
|---|--------------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|
| <i>f</i><br>(MHz)   | Description  | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10g SAR value   |                     | 1g SAR value    |                     |
|   |              |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |
| CDMA 800 MHz<br><i>Right</i>                                | Channel 1013 | 25.00                        |           |            |                 |                     |                 |                     |
|   | Channel 384  | 25.08                        | 21.6      | -0.165     | 0.809           | 0.84                | 1.15            | 1.19                |
|   | Channel 777  | 24.99                        |           |            |                 |                     |                 |                     |
| CDMA 1700MHz<br><i>Left</i>                                 | Channel 25   | 25.09                        |           |            |                 |                     |                 |                     |
|   | Channel 450  | 25.12                        |           |            |                 |                     |                 |                     |
|   | Channel 875  | 25.06                        | 21.3      | -0.0189    | 0.764           | 0.77                | 1.22            | 1.23                |
| CDMA 1900MHz<br><i>Left</i>                                 | Channel 25   | 24.80                        | 21.4      | 0.00296    | 0.931           | 0.93                | 1.47            | 1.47                |
|   | Channel 600  | 24.81                        |           |            |                 |                     |                 |                     |
|   | Channel 1175 | 24.97                        |           |            |                 |                     |                 |                     |

Table 3: 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 |              |                              |             |               |                 |                     |                 |                     |
|-----------------------------|--------------|------------------------------|-------------|---------------|-----------------|---------------------|-----------------|---------------------|
| f (MHz)                     | Description  | Conducted Output Power (dBm) | Temp (°C)   | Drift (dB)    | 10g SAR value   |                     | 1g SAR value    |                     |
|                             |              |                              |             |               | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |
| CDMA 800 MHz                | Channel 1013 | 25.00                        |             |               |                 |                     |                 |                     |
|                             | Channel 384  | <b>25.08</b>                 | <b>21</b>   | <b>0.123</b>  | <b>0.478</b>    | <b>0.48</b>         | <b>0.644</b>    | <b>0.64</b>         |
|                             | Channel 777  | 24.99                        |             |               |                 |                     |                 |                     |
| CDMA 1700MHz                | Channel 25   | 25.09                        | 21.4        | 0.183         | 0.504           | 0.50                | 0.803           | 0.80                |
|                             | Channel 450  | 25.12                        | 21.6        | 0.09          | 0.541           | 0.54                | 0.858           | 0.86                |
|                             | Channel 875  | <b>25.06</b>                 | <b>21.5</b> | <b>0.0153</b> | <b>0.597</b>    | <b>0.60</b>         | <b>0.956</b>    | <b>0.96</b>         |
| CDMA 1900MHz                | Channel 25   | 24.80                        |             |               |                 |                     |                 |                     |
|                             | Channel 600  | 24.81                        | 21          | -0.0846       | 0.369           | 0.38                | 0.602           | 0.61                |
|                             | Channel 1175 | 24.97                        |             |               |                 |                     |                 |                     |

**Table 4: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.**

| Right Head 15° Tilt Position |              |                              |           |            |                 |                     |                 |                     |
|------------------------------|--------------|------------------------------|-----------|------------|-----------------|---------------------|-----------------|---------------------|
| f (MHz)                      | Description  | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | 10g SAR value   |                     | 1g SAR value    |                     |
|                              |              |                              |           |            | Measured (W/kg) | Extrapolated (W/kg) | Measured (W/kg) | Extrapolated (W/kg) |
| CDMA 800 MHz                 | Channel 1013 | 25.00                        |           |            |                 |                     |                 |                     |
|                              | Channel 384  | 25.08                        | 21        | -0.0434    | 0.468           | 0.47                | 0.637           | 0.64                |
|                              | Channel 777  | 24.99                        |           |            |                 |                     |                 |                     |
| CDMA 1700MHz                 | Channel 25   | 25.09                        |           |            |                 |                     |                 |                     |
|                              | Channel 450  | 25.12                        | 20.8      | -0.0329    | 0.498           | 0.50                | 0.768           | 0.77                |
|                              | Channel 875  | 25.06                        |           |            |                 |                     |                 |                     |
| CDMA 1900MHz                 | Channel 25   | 24.80                        |           |            |                 |                     |                 |                     |
|                              | Channel 600  | 24.81                        | 21.1      | 0.0638     | 0.339           | 0.34                | 0.534           | 0.53                |
|                              | Channel 1175 | 24.97                        |           |            |                 |                     |                 |                     |

**Table 5: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.**

| <i>The Noted Highest Head 15° Tilt Position with SNN5819B Battery</i> |                     |                              |             |               |                      |                     |                     |                     |
|---|---------------------|------------------------------|-------------|---------------|----------------------|---------------------|---------------------|---------------------|
| <i>f</i><br>(MHz)   | Description         | Conducted Output Power (dBm) | Temp (°C)   | Drift (dB)    | <i>10g SAR value</i> |                     | <i>1g SAR value</i> |                     |
|   |                     |                              |             |               | Measured (W/kg)      | Extrapolated (W/kg) | Measured (W/kg)     | Extrapolated (W/kg) |
| <b>CDMA 800 MHz</b><br><i>Left</i>                                    | <b>Channel 1013</b> | 25.00                        |             |               |                      |                     |                     |                     |
|   | <b>Channel 384</b>  | 25.08                        | 21.3        | 0.06          | 0.362                | 0.36                | 0.486               | 0.49                |
|   | <b>Channel 777</b>  | 24.99                        |             |               |                      |                     |                     |                     |
| <b>CDMA 1700MHz</b><br><i>Left</i>                                    | <b>Channel 25</b>   | 25.09                        |             |               |                      |                     |                     |                     |
|   | <b>Channel 450</b>  | 25.12                        |             |               |                      |                     |                     |                     |
|   | <b>Channel 875</b>  | 25.06                        | 21.1        | -0.0257       | 0.51                 | 0.51                | 0.821               | 0.83                |
| <b>CDMA 1900MHz</b><br><i>Left</i>                                    | <b>Channel 25</b>   | 24.80                        |             |               |                      |                     |                     |                     |
|   | <b>Channel 600</b>  | <b>24.81</b>                 | <b>21.6</b> | <b>-0.105</b> | <b>0.434</b>         | <b>0.44</b>         | <b>0.714</b>        | <b>0.73</b>         |
|   | <b>Channel 1175</b> | 24.97                        |             |               |                      |                     |                     |                     |

**Table 6: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.**

## 6.2 Body Worn Test Results

The SAR results shown in tables 7 through 13 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 for the CDMA RC3/SO55 mode and 1x EVDO Release 0 R-TAP modes, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $New\ SAR = Old\ SAR * 10^{(-drift/10)}$ . 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. Note that 800MHz digital mode SAR measurements were performed in accordance with [4].

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.

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 2.0mm. It measures 52.7cm(long) x 26.7cm(wide) x 21.2cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 all the way up to 2.184GHz.

The tissue stimulant depth was verified to be 15.0cm ±0.5cm. 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 hence the device was tested per the supplement C testing guidelines for devices that do not have body worn accessories. A separation distance of 15mm between the device and the flat phantom was used for testing body-worn SAR. The device was tested with the front and back of the device facing the phantom.

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 | SN3037        | 835     | 6.17              | 8 of 9        |
| E-Field Probe ES3DV3 | SN3191        | 900     | 6.01              | 8 of 9        |
|                      |               | 1800    | 4.85              | 8 of 9        |
|                      |               | 2450    | 4.08              | 8 of 9        |
| E-Field Probe ES3DV3 | SN3178        | 900     | 5.42              | 8 of 9        |
|                      |               | 1800    | 4.50              | 8 of 9        |
|                      |               | 2450    | 4.02              | 8 of 9        |

| Body-Worn; Front of Phone noted away from Phantom |              |                              |           |            |                      |                     |                     |                     |
|---|--------------|------------------------------|-----------|------------|----------------------|---------------------|---------------------|---------------------|
| <i>f</i><br>(MHz)                                 | Description  | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | <i>10g SAR value</i> |                     | <i>1g SAR value</i> |                     |
|   |              |                              |           |            | Measured (W/kg)      | Extrapolated (W/kg) | Measured (W/kg)     | Extrapolated (W/kg) |
| CDMA<br>800 MHz<br>15mm                           | Channel 1013 | 25.00                        |           |            |                      |                     |                     |                     |
|   | Channel 384  | 25.08                        | 21.6      | -0.193     | 0.368                | 0.38                | 0.518               | 0.54                |
|   | Channel 777  | 24.99                        |           |            |                      |                     |                     |                     |
| CDMA<br>1700MHz<br>25mm                           | Channel 25   | 25.09                        |           |            |                      |                     |                     |                     |
|   | Channel 450  | 25.12                        | 21.3      | 0.205      | 0.122                | 0.12                | 0.186               | 0.19                |
|   | Channel 875  | 25.06                        |           |            |                      |                     |                     |                     |
| CDMA<br>1900MHz<br>15mm                           | Channel 25   | 24.80                        |           |            |                      |                     |                     |                     |
|   | Channel 600  | 24.81                        | 21.3      | 0.118      | 0.212                | 0.21                | 0.322               | 0.32                |
|   | Channel 1175 | 24.97                        |           |            |                      |                     |                     |                     |

Table 7: 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 noted away from Phantom |              |                              |             |               |                      |                     |                     |                     |
|--|--------------|------------------------------|-------------|---------------|----------------------|---------------------|---------------------|---------------------|
| <i>f</i><br>(MHz)                                | Description  | Conducted Output Power (dBm) | Temp (°C)   | Drift (dB)    | <i>10g SAR value</i> |                     | <i>1g SAR value</i> |                     |
|  |              |                              |             |               | Measured (W/kg)      | Extrapolated (W/kg) | Measured (W/kg)     | Extrapolated (W/kg) |
| CDMA<br>800 MHz<br>15mm                          | Channel 1013 | <b>25.00</b>                 | <b>21.5</b> | <b>0.127</b>  | <b>0.73</b>          | <b>0.73</b>         | <b>1.03</b>         | <b>1.03</b>         |
|  | Channel 384  | 25.08                        | 21.5        | -0.103        | 0.552                | 0.57                | 0.795               | 0.81                |
|  | Channel 777  | 24.99                        | 21.3        | -0.106        | 0.657                | 0.67                | 0.958               | 0.98                |
| CDMA<br>1700MHz<br>25mm                          | Channel 25   | 25.09                        |             |               |                      |                     |                     |                     |
|  | Channel 450  | 25.12                        | 21.4        | -0.216        | 0.361                | 0.38                | 0.595               | 0.63                |
|  | Channel 875  | 25.06                        |             |               |                      |                     |                     |                     |
| CDMA<br>1900MHz<br>15mm                          | Channel 25   | 24.80                        |             |               |                      |                     |                     |                     |
|  | Channel 600  | <b>24.81</b>                 | <b>21.5</b> | <b>-0.025</b> | <b>0.452</b>         | <b>0.45</b>         | <b>0.698</b>        | <b>0.70</b>         |
|  | Channel 1175 | 24.97                        |             |               |                      |                     |                     |                     |

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

| <i>The Noted Highest Body-Worn Position with SNN5819B Battery</i> |                     |                              |             |               |                      |                     |                     |                     |
|---|---------------------|------------------------------|-------------|---------------|----------------------|---------------------|---------------------|---------------------|
| <i>f</i><br>(MHz)   | Description         | Conducted Output Power (dBm) | Temp (°C)   | Drift (dB)    | <i>10g SAR value</i> |                     | <i>1g SAR value</i> |                     |
|   |                     |                              |             |               | Measured (W/kg)      | Extrapolated (W/kg) | Measured (W/kg)     | Extrapolated (W/kg) |
| <b>CDMA 800 MHz</b><br>Back, 15mm                                 | <b>Channel 1013</b> | <b>25.00</b>                 | 21.2        | 0.157         | 0.553                | 0.55                | 0.786               | 0.79                |
|   | <b>Channel 384</b>  | 25.08                        |             |               |                      |                     |                     |                     |
|   | <b>Channel 777</b>  | 24.99                        |             |               |                      |                     |                     |                     |
| <b>CDMA 1700MHz</b><br>Back, 25mm                                 | <b>Channel 25</b>   | 25.09                        |             |               |                      |                     |                     |                     |
|   | <b>Channel 450</b>  | <b>25.12</b>                 | <b>21.3</b> | <b>-0.174</b> | <b>0.516</b>         | <b>0.54</b>         | <b>0.857</b>        | <b>0.89</b>         |
|   | <b>Channel 875</b>  | 25.06                        |             |               |                      |                     |                     |                     |
| <b>CDMA 1900MHz</b><br>Back, 15mm                                 | <b>Channel 25</b>   | 24.80                        |             |               |                      |                     |                     |                     |
|   | <b>Channel 600</b>  | 24.81                        | 21.5        | 0.154         | 0.421                | 0.42                | 0.65                | 0.65                |
|   | <b>Channel 1175</b> | 24.97                        |             |               |                      |                     |                     |                     |

**Table 9: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.**

| <b>EV-DO (Rev. O) RTAP Mode</b><br><b>Body-Worn; Back of Phone 25 mm from Phantom</b> |                     |                              |           |            |                      |                     |                     |                     |
|---|---------------------|------------------------------|-----------|------------|----------------------|---------------------|---------------------|---------------------|
| <i>f</i><br>(MHz)   | Description         | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | <i>10g SAR value</i> |                     | <i>1g SAR value</i> |                     |
|   |                     |                              |           |            | Measured (W/kg)      | Extrapolated (W/kg) | Measured (W/kg)     | Extrapolated (W/kg) |
| <b>EVDO 800</b>   | <b>Channel 1013</b> | 25.06                        | 19.5      | 0.00519    | 0.217                | 0.22                | 0.30                | 0.30                |
|   | <b>Channel 384</b>  | 25.19                        | 19.5      | -0.205     | 0.408                | 0.43                | 0.578               | 0.61                |
|   | <b>Channel 777</b>  | 25.06                        |           |            |                      |                     |                     |                     |

**Table 10: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.**

| <b>Bluetooth; Noted Highest Body-Worn position and battery</b> |                   |                              |           |            |                      |                     |                     |                     |
|--|-------------------|------------------------------|-----------|------------|----------------------|---------------------|---------------------|---------------------|
| <i>f</i><br>(MHz)  | Description       | Conducted Output Power (dBm) | Temp (°C) | Drift (dB) | <i>10g SAR value</i> |                     | <i>1g SAR value</i> |                     |
|  |                   |                              |           |            | Measured (W/kg)      | Extrapolated (W/kg) | Measured (W/kg)     | Extrapolated (W/kg) |
| <b>Bluetooth 2450 MHz</b><br>Back 15mm<br>SNN5854A             | <b>Channel 0</b>  |                              |           |            |                      |                     |                     |                     |
|  | <b>Channel 39</b> |                              | 22.7      | 0.317      | 0.00                 | 0.00                | 0.01                | 0.01                |
|  | <b>Channel 78</b> |                              |           |            |                      |                     |                     |                     |
| <b>Bluetooth 2450 MHz</b><br>Back 25mm<br>SNN5819B             | <b>Channel 0</b>  |                              |           |            |                      |                     |                     |                     |
|  | <b>Channel 39</b> |                              | 22.5      | -0.0496    | 0.00                 | 0.00                | 0.00                | 0.00                |
|  | <b>Channel 78</b> |                              |           |            |                      |                     |                     |                     |

**Table 11: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.**

The below SAR results were corrected for the tissue permittivity that was measured above the nominal target. Corrections were performed using the data provided in FCC KDB 450824. No correction was made for conductivity, since the measured tissue value already represents a conservative result in the measured SAR.

| <i>The noted Body-worn position, Corrected SAR for Tissue Dielectric Parameter</i> |              |                          |                                       |                                    |                                       |                                    |
|--|--------------|--------------------------|---------------------------------------|------------------------------------|---------------------------------------|------------------------------------|
| <i>f</i><br>(MHz)  | Description  | Measured<br>$\epsilon_r$ | <i>10g SAR value</i>                  |                                    | <i>1g SAR value</i>                   |                                    |
|  |              |                          | Extrapolated<br>Measurement<br>(W/kg) | Corrected<br>Measurement<br>(W/kg) | Extrapolated<br>Measurement<br>(W/kg) | Corrected<br>Measurement<br>(W/kg) |
| CDMA<br>800 MHz<br>Back 15mm<br>SNN5854A   | Channel 1013 | 55.5                     | 0.73                                  | 0.73                               | 1.03                                  | 1.03                               |
|  | Channel 384  |                          |                                       |                                    |                                       |                                    |
|  | Channel 777  |                          |                                       |                                    |                                       |                                    |

**Table 12: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.**

| <b>Highest Extrapolated SAR Values (including Bluetooth summation)</b> |   |                                   |                                    |                     |                                       |  |                     |
|--|---|-----------------------------------|------------------------------------|---------------------|---------------------------------------|--|---------------------|
| <i>f</i><br>(MHz)  | Description   | <i>10g SAR value</i>              |                                    |                     | <i>1g SAR value</i>                   |  |                     |
|  |   | Original<br>Measurement<br>(W/kg) | Bluetooth<br>Measurement<br>(W/kg) | Summation<br>(W/kg) | Original<br>Measuremen<br>t<br>(W/kg) | Bluetooth<br>Measuremen<br>t<br>(W/kg) | Summation<br>(W/kg) |
| CDMA<br>800 MHz  | Back of phone 15mm from Phantom with SNN5845A Battery | 0.73                              | 0.00                               | 0.73                | 1.03                                  | 0.01                                   | 1.04                |
| CDMA<br>1700 MHz   | Back of phone 25mm from Phantom with SNN5819B Battery | 0.54                              | 0.00                               | 0.54                | 0.89                                  | 0.00                                   | 0.89                |
| CDMA<br>1900 MHz   | Back of phone 15mm from Phantom with SNN5845A Battery | 0.45                              | 0.00                               | 0.45                | 0.70                                  | 0.01                                   | 0.71                |

**Table 13: SAR measurement results at the highest possible output power, calculated for the 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 (300MHz – 3GHz)”.
- [3] ANSI / IEEE, C95.1 1999 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz”
- [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 - Jan-17-2010 835 MHz

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 417TR;**

Procedure Notes: 835MHz System Performance Check; Dipole Sn# 417TR; Input Power = 200 mW

Sim.Temp@meas = 20.0\*; Sim.Temp@SPC = 20.0\*; Room Temp @ SPC = 20.4\*

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

Medium: VALIDATION Only

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 41.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.25, 6.25, 6.25); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1005;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Daily SPC Check/Dipole Area Scan (4x9x1):

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.01 mW/g

### Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 48.6 V/m; Power Drift = -0.012 dB; Peak SAR (extrapolated) = 2.88 W/kg

**SAR(1 g) = 1.97 mW/g; SAR(10 g) = 1.29 mW/g;** Maximum value of SAR (measured) = 2.14 mW/g

### Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

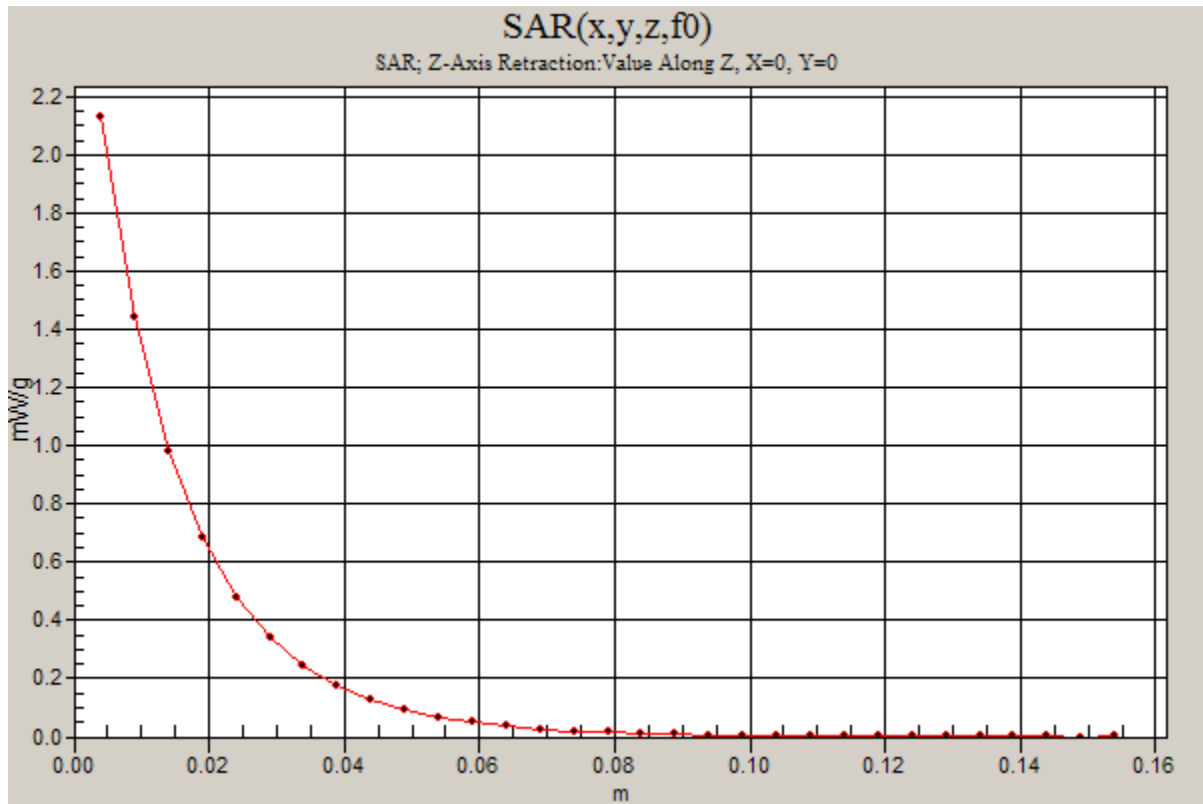
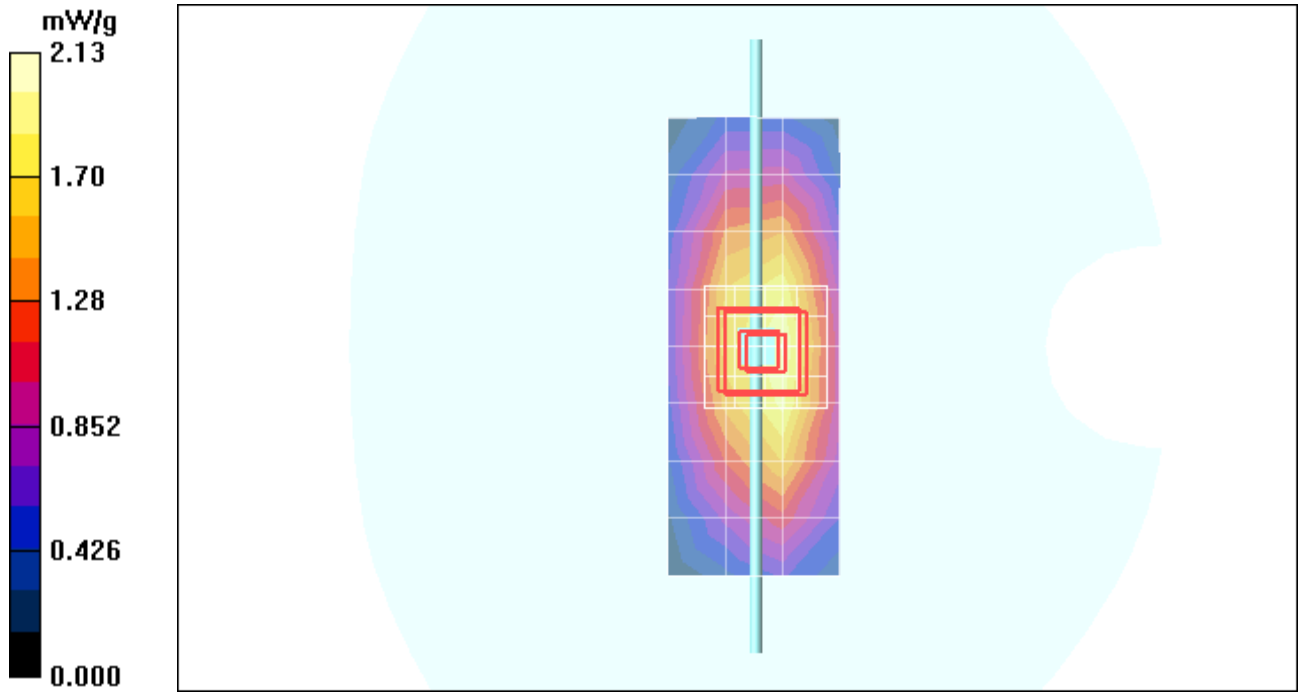
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 48.6 V/m; Power Drift = -0.012 dB; Peak SAR (extrapolated) = 2.80 W/kg

**SAR(1 g) = 1.91 mW/g; SAR(10 g) = 1.25 mW/g;** Maximum value of SAR (measured) = 2.06 mW/g

### Daily SPC Check/Z-Axis Retraction (1x1x31):

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 2.13 mW/g



## Test Laboratory: Motorola 1023'2009\_900MHz\_Good +6.1%

Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 097 PM1 Power = 200 mW Sim.Temp@meas = 21.8C Sim.Temp@SPC = 21.5C Room Temp @ SPC = 22.2C Communication System: CW - Dipole; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(6.03, 6.03, 6.03); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Daily SPC Check/Dipole Area Scan (4x9x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.37 mW/g

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

Reference Value = 54.0 V/m; Power Drift = -0.131 dB

Peak SAR (extrapolated) = 3.60 W/kg

**SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.55 mW/g**

Maximum value of SAR (measured) = 2.63 mW/g

### Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.0 V/m; Power Drift = -0.131 dB

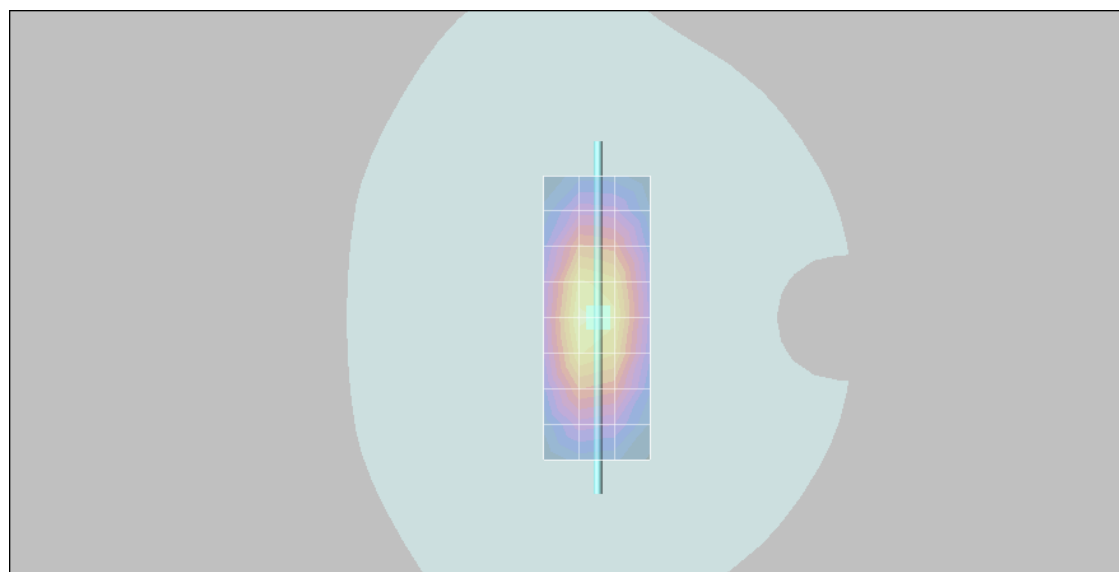
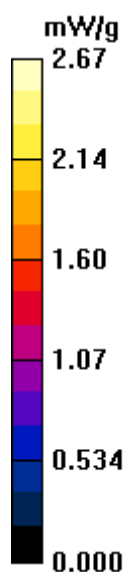
Peak SAR (extrapolated) = 3.44 W/kg

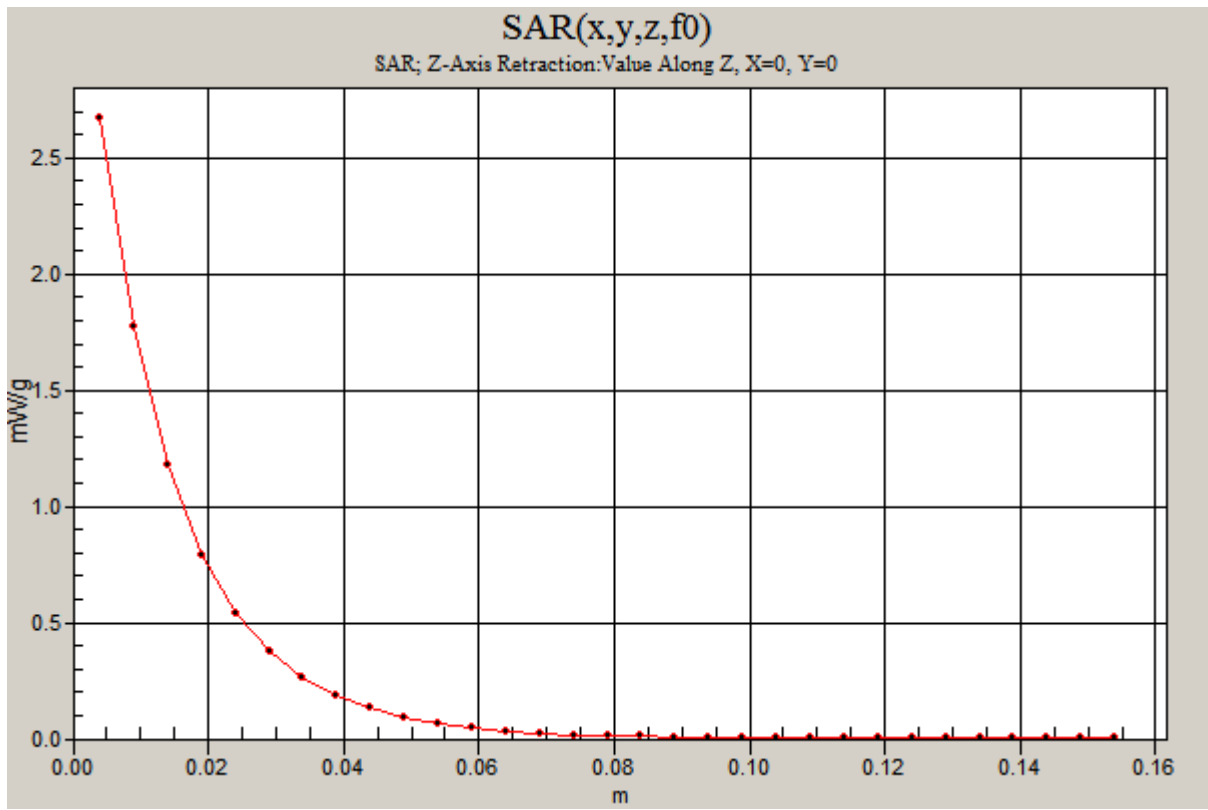
**SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.49 mW/g**

Maximum value of SAR (measured) = 2.52 mW/g

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

Maximum value of SAR (measured) = 2.67 mW/g





## Test Laboratory: Motorola 1029'2009\_900MHz\_Good +5.7%

Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 097 PM1 Power = 200 mW Sim.Temp@meas = 21.8C Sim.Temp@SPC = 21.3C Room Temp @ SPC = 22C Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(6.03, 6.03, 6.03); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 2.38 mW/g

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

Reference Value = 52.4 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 3.67 W/kg

**SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.55 mW/g**

Maximum value of SAR (measured) = 2.63 mW/g

**Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

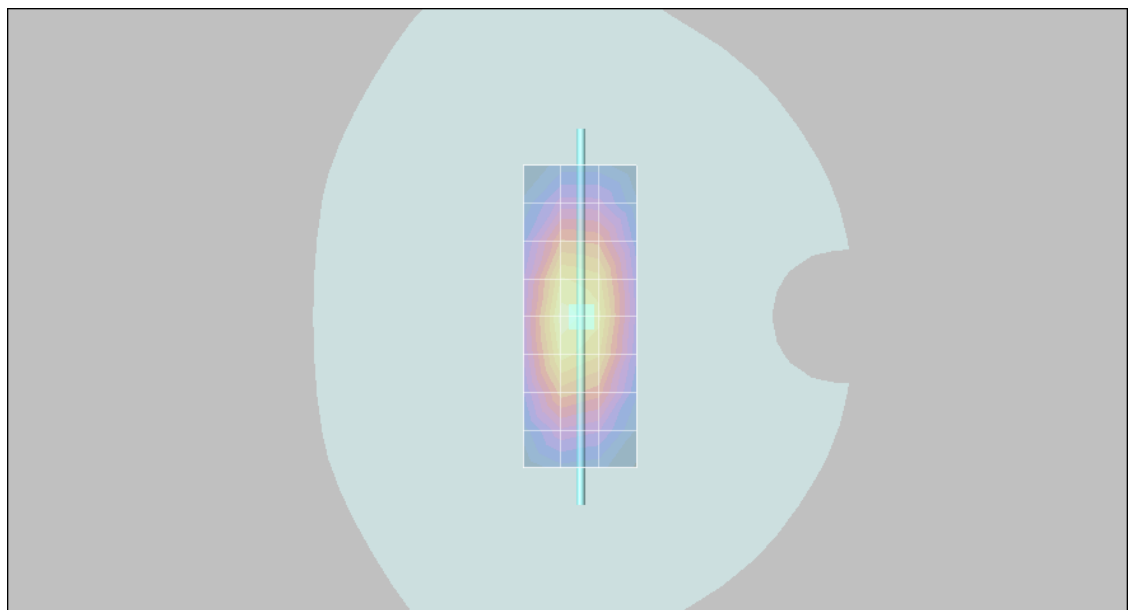
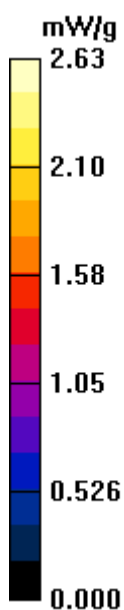
Reference Value = 52.4 V/m; Power Drift = -0.037 dB

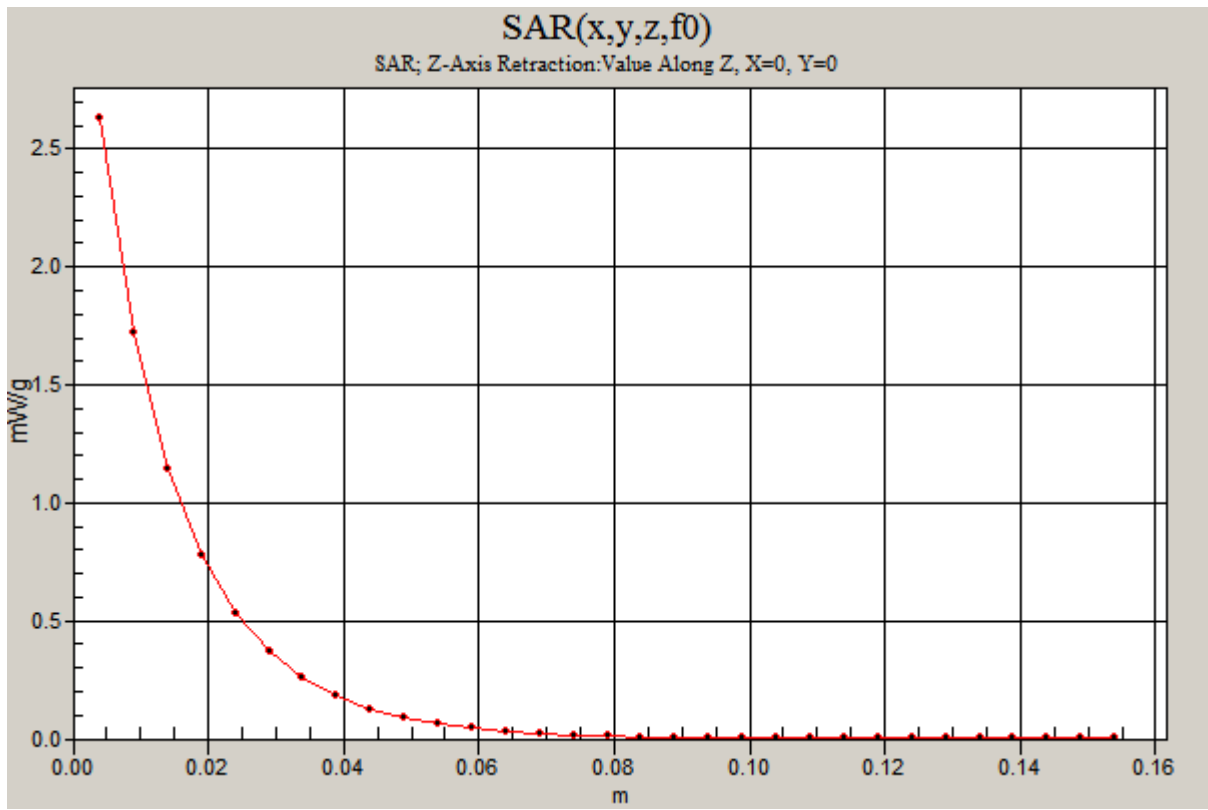
Peak SAR (extrapolated) = 3.51 W/kg

**SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.47 mW/g**

Maximum value of SAR (measured) = 2.51 mW/g

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





## Test Laboratory: Motorola 1030'2009\_1800MHz\_Good +2.3%

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 277tr PM1 Power = 200 mW  
 Sim.Temp@meas = 21.8C Sim.Temp@SPC = 21.5C Room Temp @ SPC = 21.7C Communication System: CW -  
 Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 6.64 mW/g

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

Reference Value = 81.4 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 14.5 W/kg

**SAR(1 g) = 7.9 mW/g; SAR(10 g) = 4.13 mW/g**

Maximum value of SAR (measured) = 8.80 mW/g

**Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.4 V/m; Power Drift = 0.090 dB

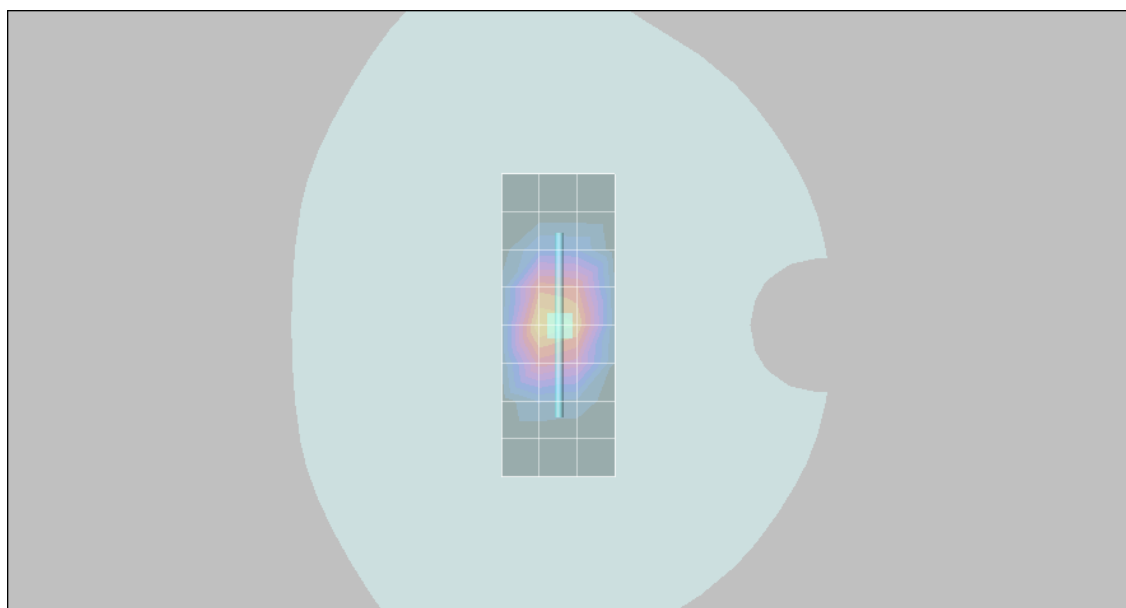
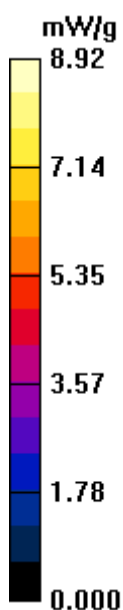
Peak SAR (extrapolated) = 14.1 W/kg

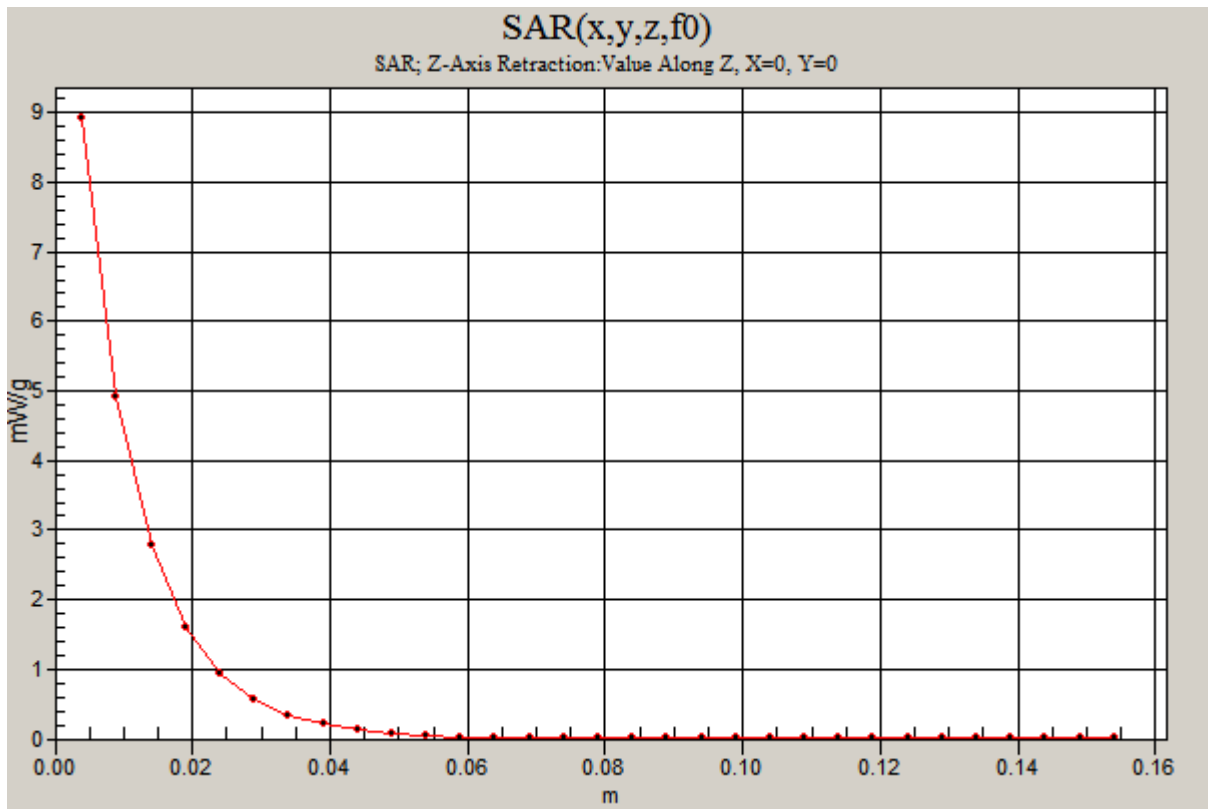
**SAR(1 g) = 7.62 mW/g; SAR(10 g) = 3.97 mW/g**

Maximum value of SAR (measured) = 8.47 mW/g

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

Maximum value of SAR (measured) = 8.92 mW/g





## Test Laboratory: Motorola 1102'2009\_1800MHz\_Good +4.5%

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 277tr PM1 Power = 200 mW  
 Sim.Temp@meas = 22C Sim.Temp@SPC = 21.4C Room Temp @ SPC = 21.2C Communication System: CW -  
 Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1  
 Medium: VALIDATION Only; Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 6.82 mW/g

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

Reference Value = 81.4 V/m; Power Drift = 0.091 dB

Peak SAR (extrapolated) = 14.8 W/kg

**SAR(1 g) = 8.06 mW/g; SAR(10 g) = 4.21 mW/g**

Maximum value of SAR (measured) = 9.02 mW/g

### Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.4 V/m; Power Drift = 0.091 dB

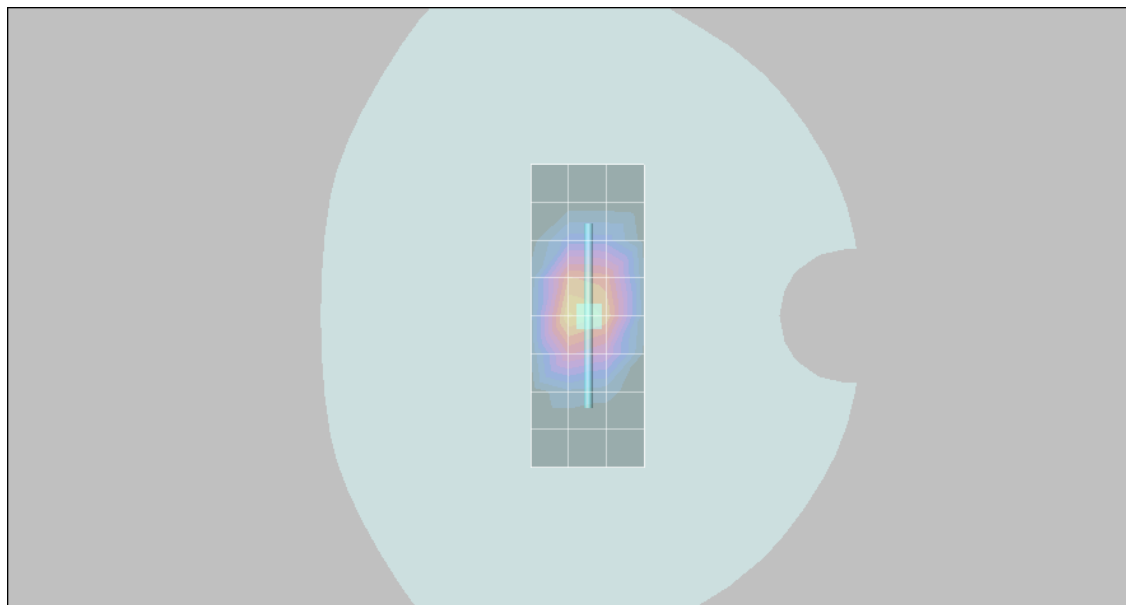
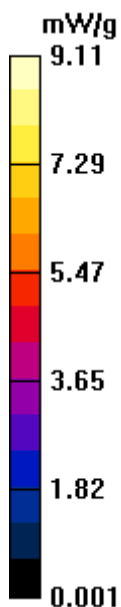
Peak SAR (extrapolated) = 14.5 W/kg

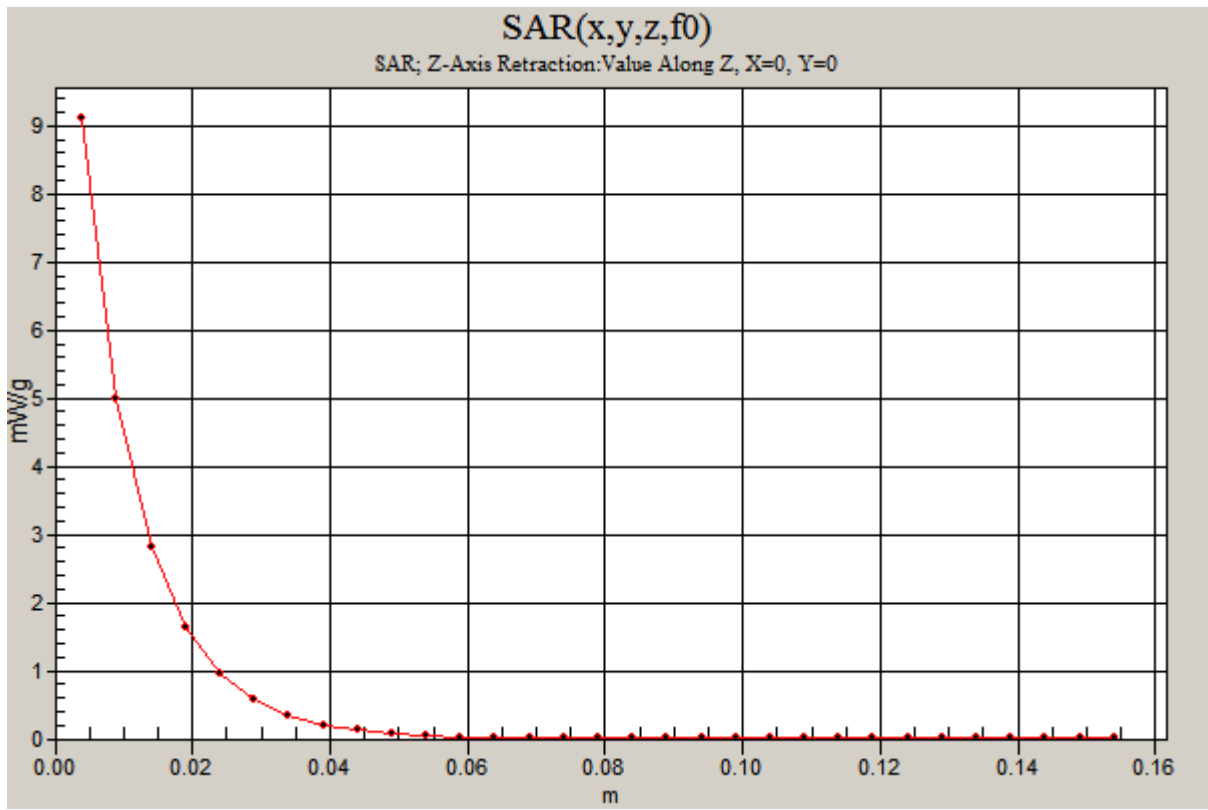
**SAR(1 g) = 7.79 mW/g; SAR(10 g) = 4.05 mW/g**

Maximum value of SAR (measured) = 8.76 mW/g

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

Maximum value of SAR (measured) = 9.11 mW/g





## Test Laboratory: Motorola 1103'2009\_1800MHz\_Good +2.5%

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 277tr PM1 Power = 200 mW  
 Sim.Temp@meas = 23C Sim.Temp@SPC = 23C Room Temp @ SPC = 22.1C Communication System: CW -  
 Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1  
 Medium: VALIDATION Only; Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.34$  mho/m;  $\epsilon_r = 38$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 6.35 mW/g

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

Reference Value = 82.4 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 14.4 W/kg

**SAR(1 g) = 7.95 mW/g; SAR(10 g) = 4.2 mW/g**

Maximum value of SAR (measured) = 8.90 mW/g

### Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 82.4 V/m; Power Drift = 0.030 dB

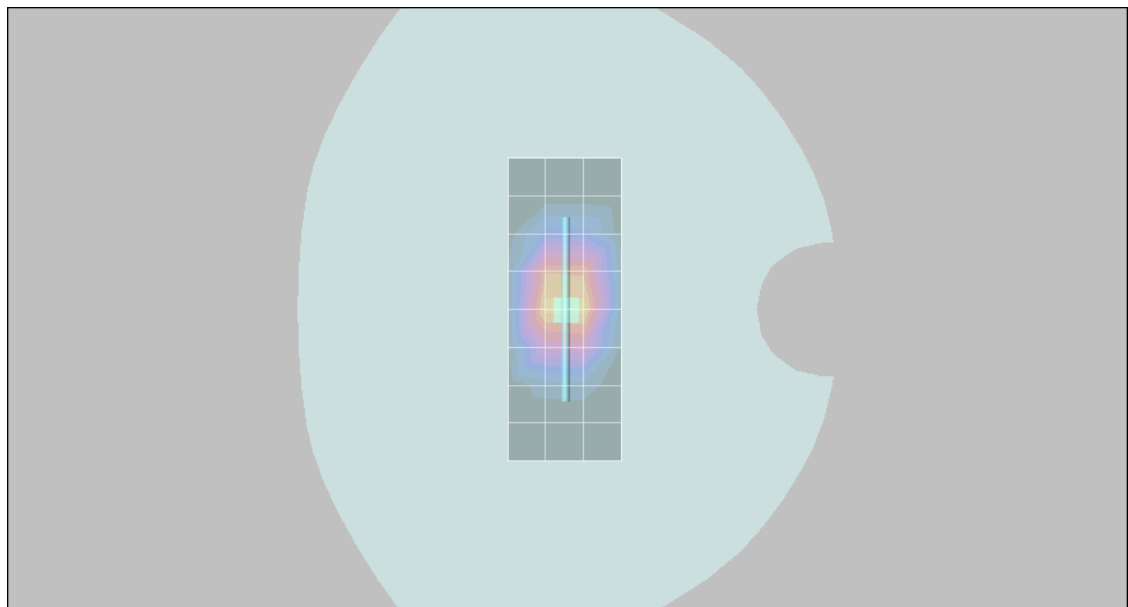
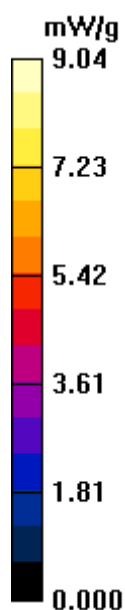
Peak SAR (extrapolated) = 13.9 W/kg

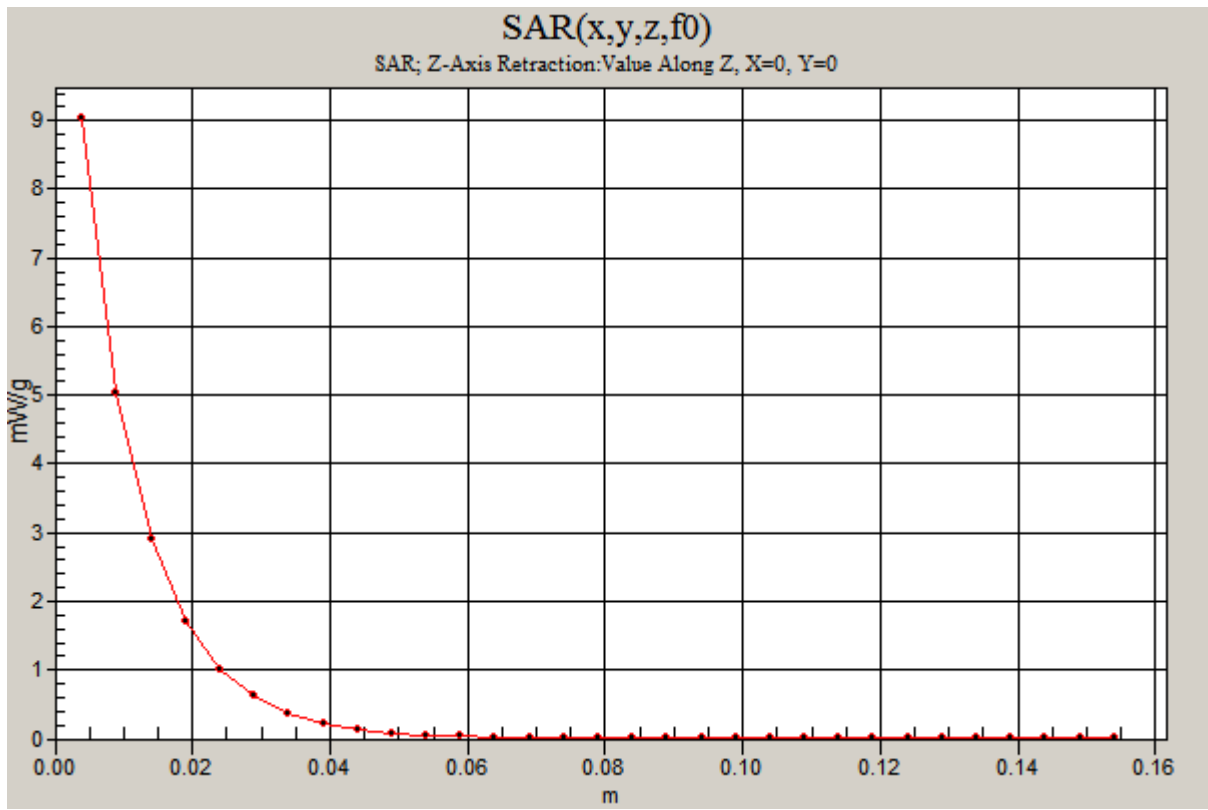
**SAR(1 g) = 7.6 mW/g; SAR(10 g) = 4 mW/g**

Maximum value of SAR (measured) = 8.51 mW/g

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

Maximum value of SAR (measured) = 9.04 mW/g





## Test Laboratory: Motorola 1104'2009\_1800MHz\_Good +8.0%

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 277tr PM1 Power = 200 mW  
 Sim.Temp@meas = 22.2C Sim.Temp@SPC = 22C Room Temp @ SPC = 22.3C Communication System: CW -  
 Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1  
 Medium: VALIDATION Only; Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 6.92 mW/g

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

Reference Value = 80.6 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 15.6 W/kg

**SAR(1 g) = 8.33 mW/g; SAR(10 g) = 4.31 mW/g**

Maximum value of SAR (measured) = 9.35 mW/g

### Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 80.6 V/m; Power Drift = 0.022 dB

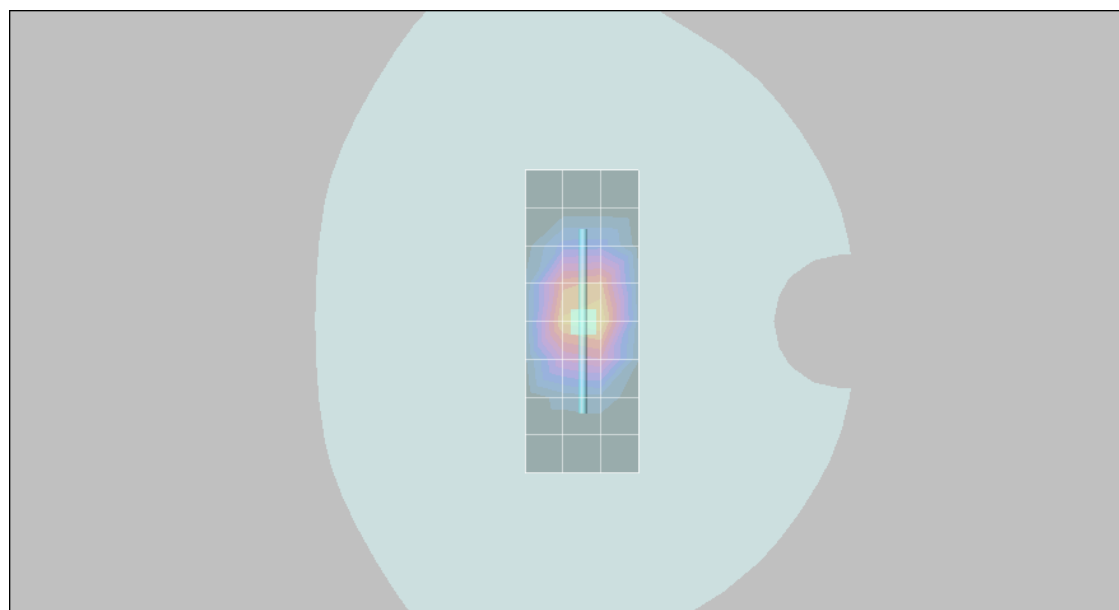
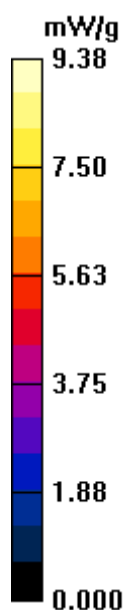
Peak SAR (extrapolated) = 15.3 W/kg

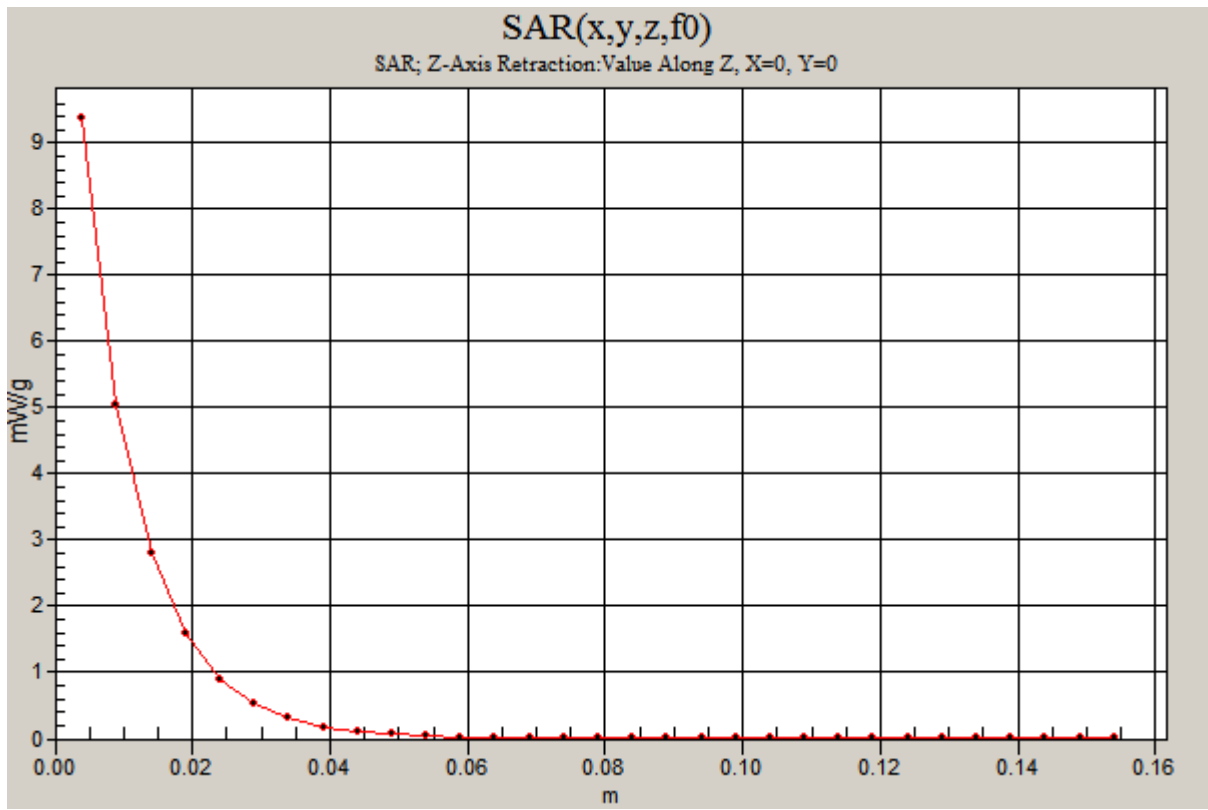
**SAR(1 g) = 8.05 mW/g; SAR(10 g) = 4.13 mW/g**

Maximum value of SAR (measured) = 9.03 mW/g

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

Maximum value of SAR (measured) = 9.38 mW/g





## Test Laboratory: Motorola 1109'2009\_1800MHz\_Good -0.9%

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 277tr PM1 Power = 200 mW PM2

Sim.Temp@meas = 21.3C Sim.Temp@SPC = 21.1C Room Temp @ SPC = 20.9C Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 39.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.73, 4.73, 4.73); Calibrated: 08/17/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 6.29 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 = 0.092 dB

Peak SAR (extrapolated) = 13.6 W/kg

**SAR(1 g) = 7.62 mW/g; SAR(10 g) = 4.02 mW/g**

Maximum value of SAR (measured) = 8.56 mW/g

**Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 79.6 V/m; Power Drift = 0.092 dB

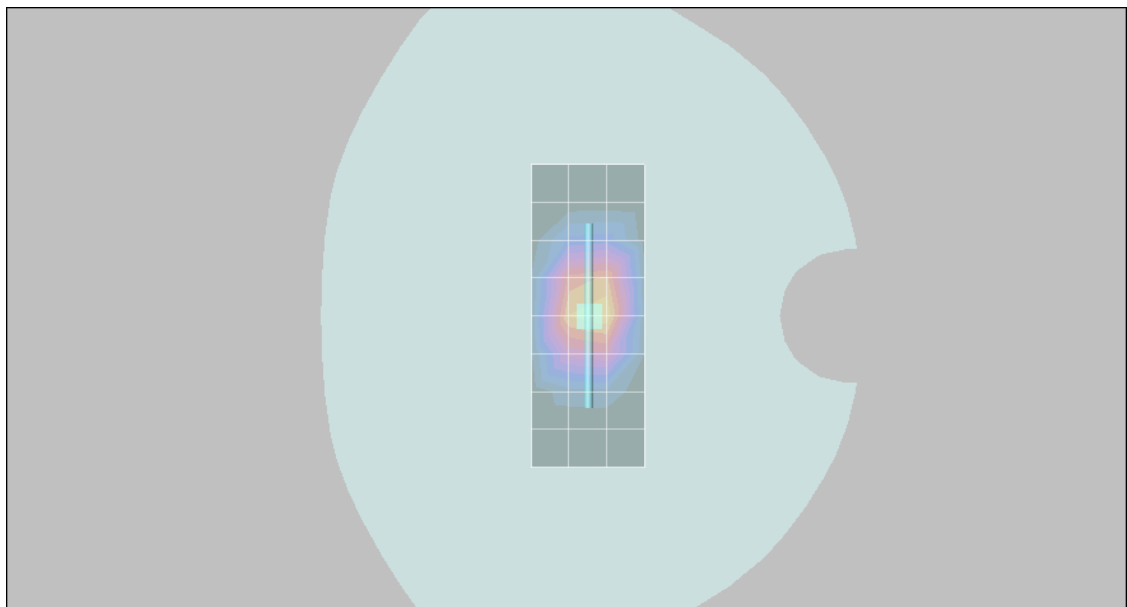
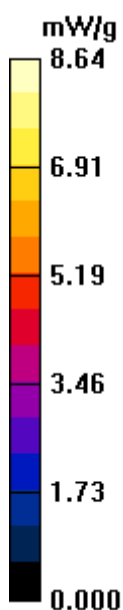
Peak SAR (extrapolated) = 13.2 W/kg

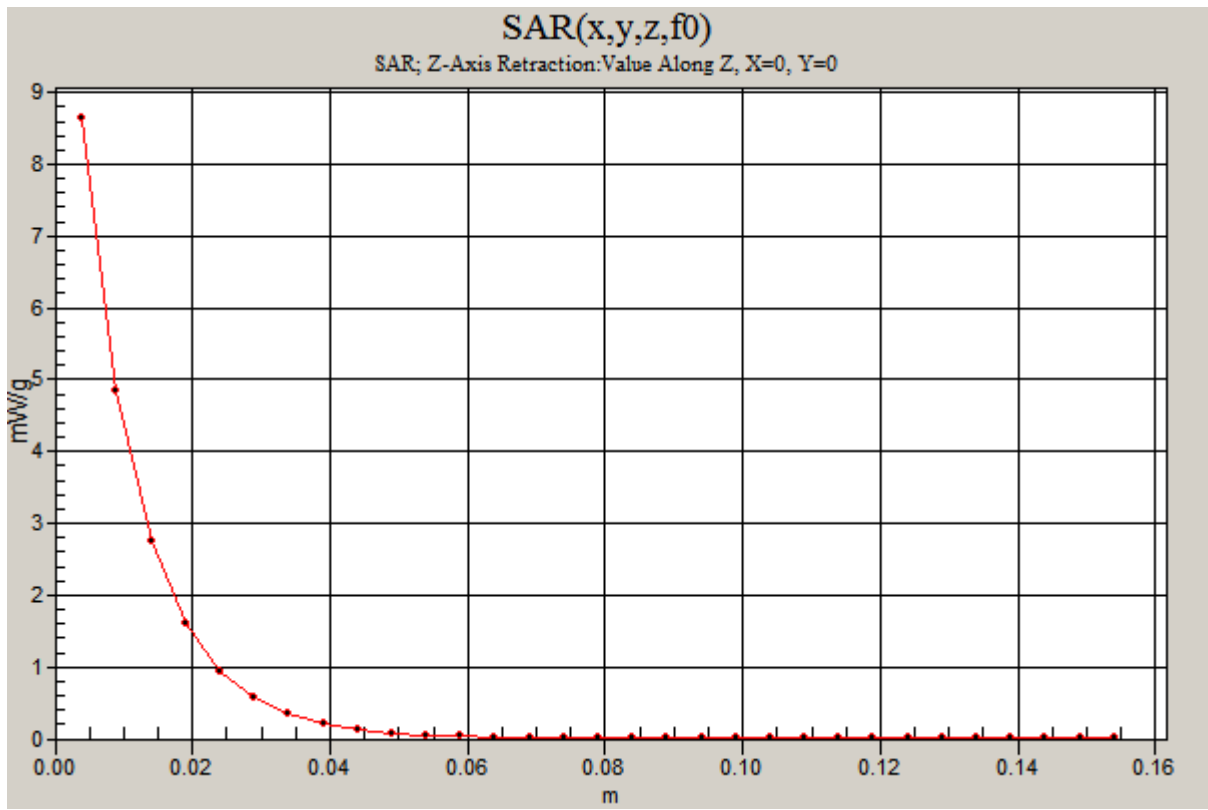
**SAR(1 g) = 7.4 mW/g; SAR(10 g) = 3.91 mW/g**

Maximum value of SAR (measured) = 8.16 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





## Test Laboratory: Motorola 1110'2009\_1800MHz\_Good +4.5%

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 277tr PM1 Power = 200 mW

Sim.Temp@meas = 21.7C Sim.Temp@SPC = 21.5C Room Temp @ SPC = 21C Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 38.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.73, 4.73, 4.73); Calibrated: 08/17/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 6.85 mW/g

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

Reference Value = 80.0 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 14.7 W/kg

**SAR(1 g) = 8.03 mW/g; SAR(10 g) = 4.17 mW/g**

Maximum value of SAR (measured) = 9.00 mW/g

**Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 80.0 V/m; Power Drift = 0.029 dB

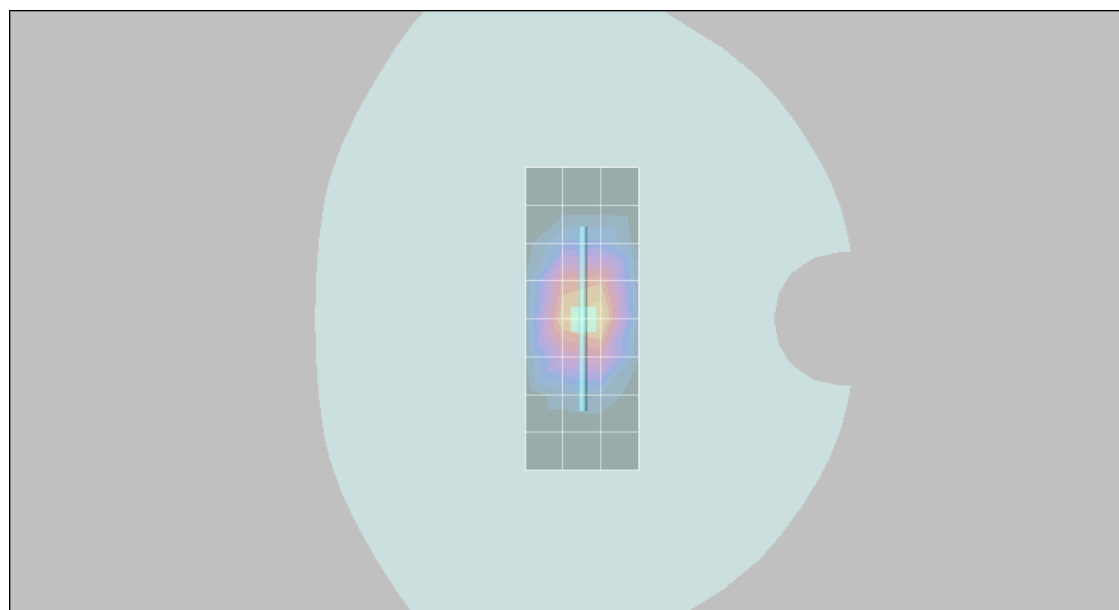
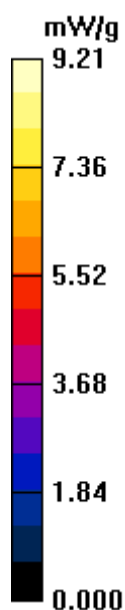
Peak SAR (extrapolated) = 14.3 W/kg

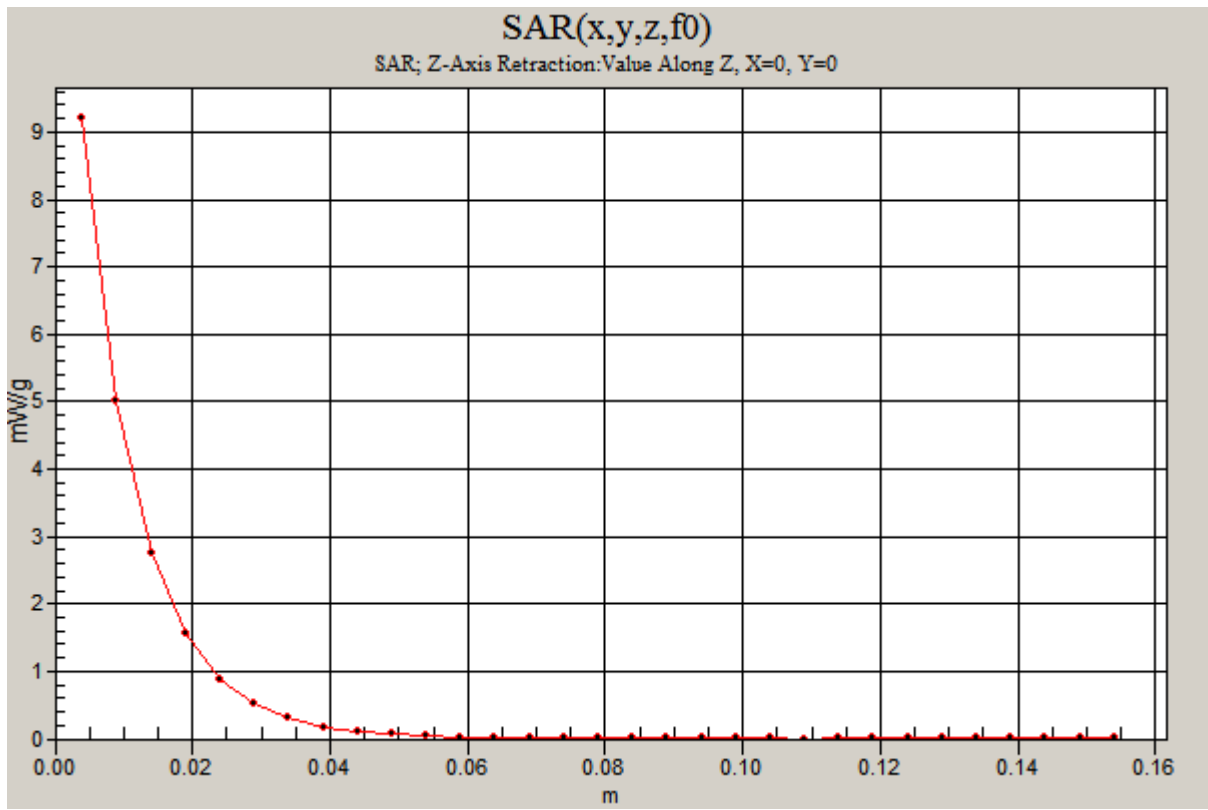
**SAR(1 g) = 7.81 mW/g; SAR(10 g) = 4.05 mW/g**

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

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

Maximum value of SAR (measured) = 9.21 mW/g





## Test Laboratory: Motorola 1112'2009\_2450MHz\_Good -9.6%

Procedure Notes: 2450 MHz System Performance Check / Dipole Sn# 767 PM1 Power = 200 mW Sim.Temp@meas = 23.7C Sim.Temp@SPC = 23.5C Room Temp @ SPC = 22.4C Communication System: CW - Dipole; Frequency: 2450 MHz; Channel Number: 11; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.81$  mho/m;  $\epsilon_r = 36.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.09, 4.09, 4.09); Calibrated: 08/17/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (measured) = 8.20 mW/g

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

Reference Value = 80.3 V/m; Power Drift = 0.118 dB

Peak SAR (extrapolated) = 23.9 W/kg

**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 4.58 mW/g**

Maximum value of SAR (measured) = 11.6 mW/g

**Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 80.3 V/m; Power Drift = 0.118 dB

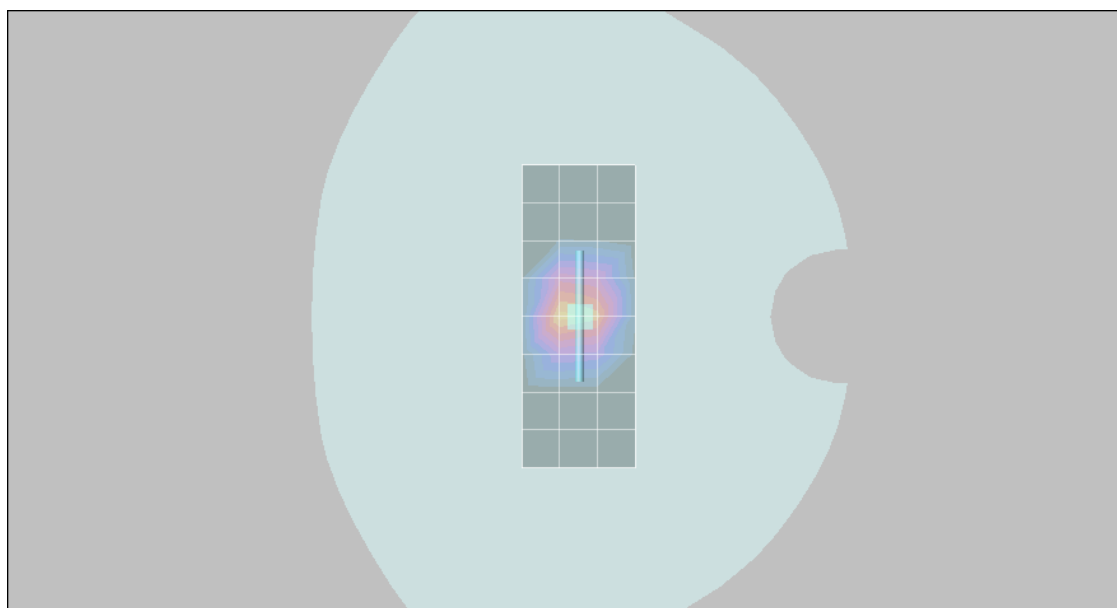
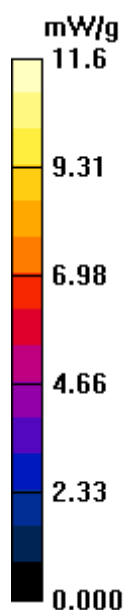
Peak SAR (extrapolated) = 23.5 W/kg

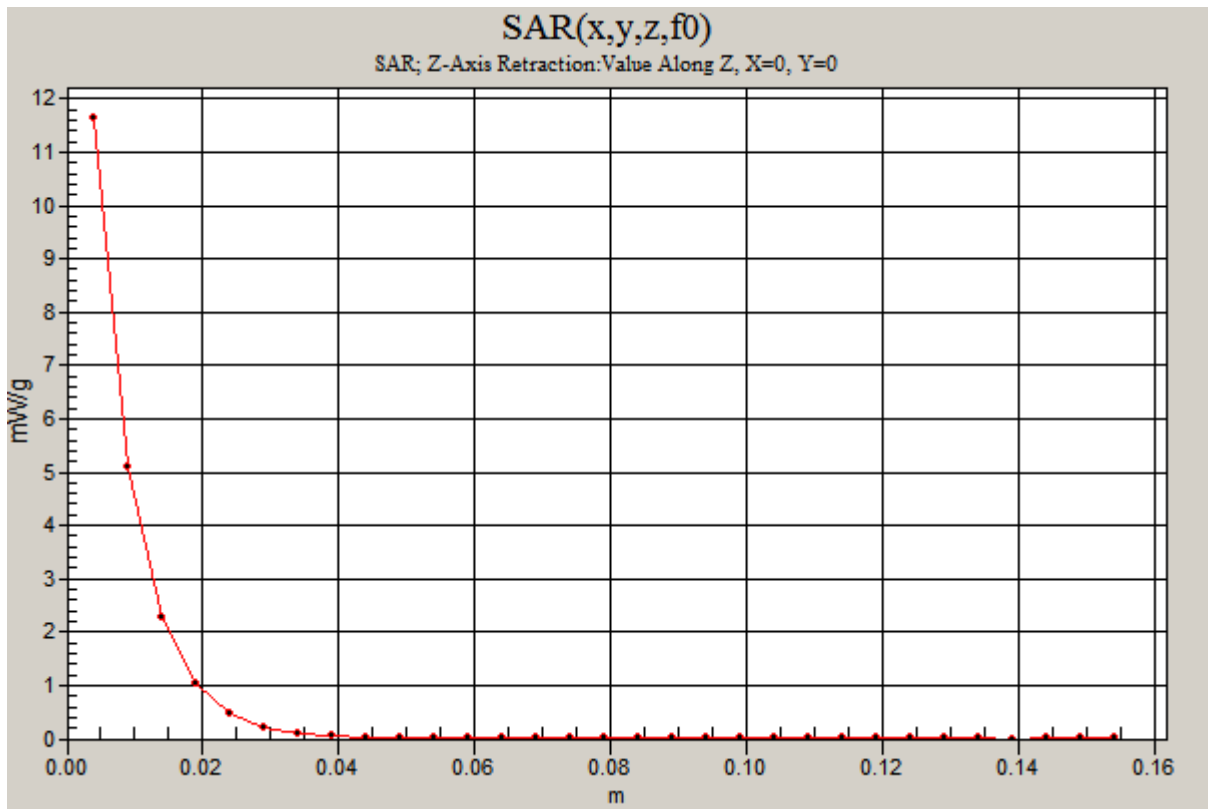
**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 4.45 mW/g**

Maximum value of SAR (measured) = 11.3 mW/g

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

Maximum value of SAR (measured) = 11.6 mW/g





## **Appendix 2**

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

## Test Laboratory: Motorola 800 Cheek

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: Internal

Battery Model #: SNN5845A DEVICE POSITION (cheek or rotated): Cheek

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

Medium: Low Freq Head; Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(6.03, 6.03, 6.03); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Right Head Template/Area Scan - Normal (10mm) (10x25x1):

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.56 mW/g

### Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm,

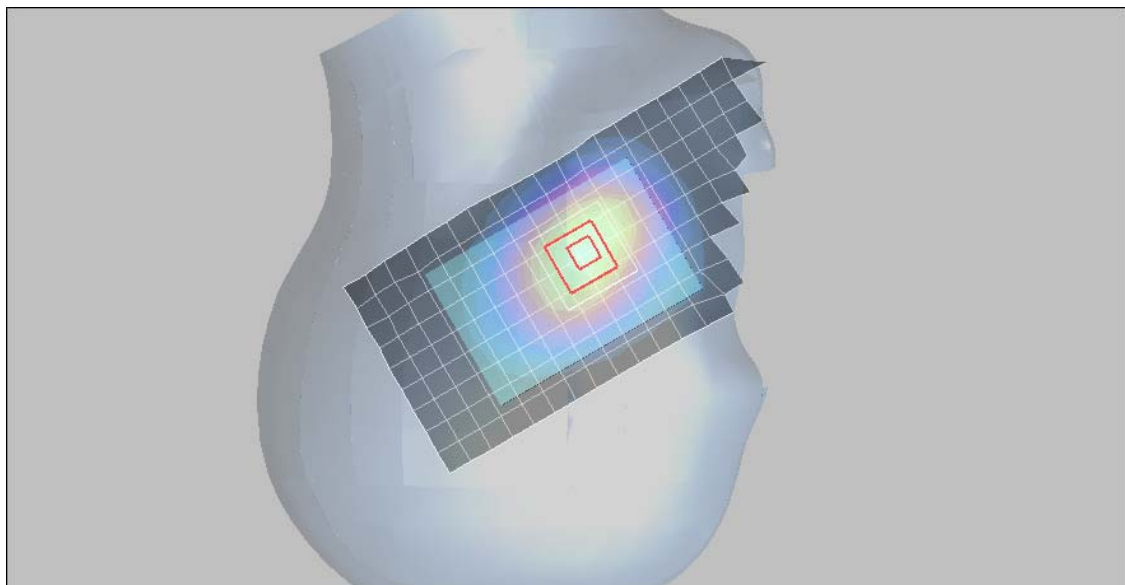
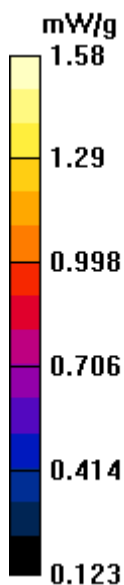
dy=8mm, dz=5mm

Reference Value = 41.4 V/m; Power Drift = -0.086 dB

Peak SAR (extrapolated) = 1.90 W/kg

**SAR(1 g) = 1.46 mW/g; SAR(10 g) = 1.03 mW/g**

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



## Test Laboratory: Motorola 800 Tilted

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: Internal Battery Model #: SNN5845A DEVICE POSITION (cheek or rotated): Rotated Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head; Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(6.03, 6.03, 6.03); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Left Head Template/Area Scan - Normal (15mm) (7x17x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 0.682 mW/g

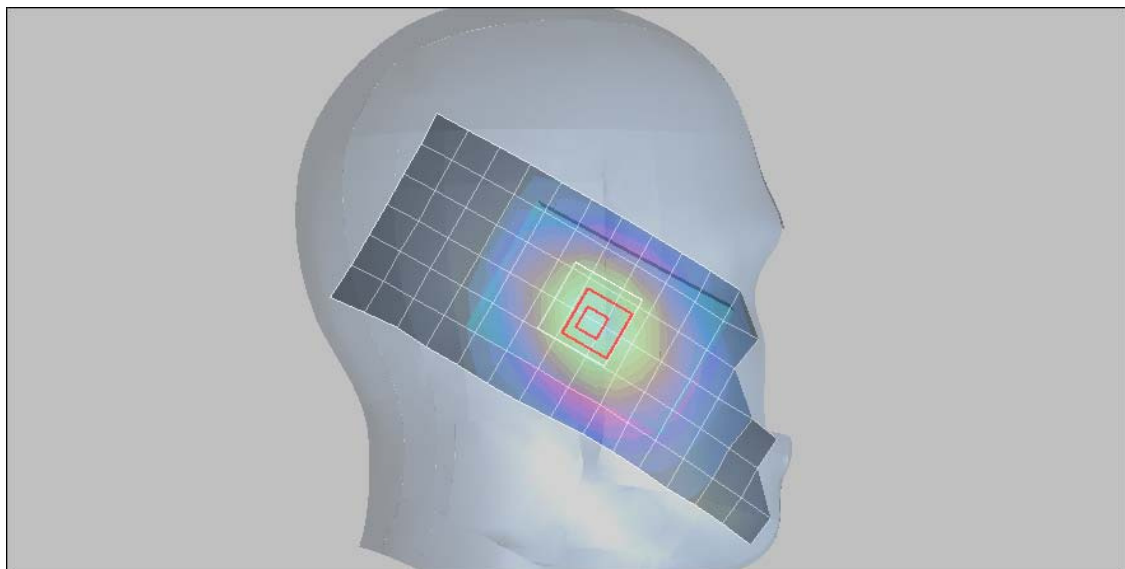
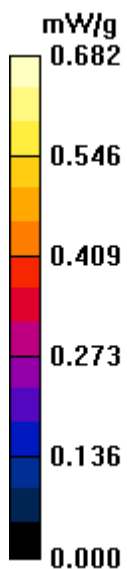
**Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.3 V/m; Power Drift = 0.123 dB

Peak SAR (extrapolated) = 0.819 W/kg

**SAR(1 g) = 0.644 mW/g; SAR(10 g) = 0.478 mW/g**

Maximum value of SAR (measured) = 0.676 mW/g



## Test Laboratory: Motorola CDMA1700 Cheek\_Max Peak

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: Internal Battery Model #: SNN5845A DEVICE  
POSITION (cheek or rotated): Cheek Communication System: CDMA 1700; Frequency: 1753.75 MHz; Channel  
Number: 875; Duty Cycle: 1:1

Medium: 1730 Glycol Head; Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Left Head Template/Area Scan - Normal (15mm) (7x17x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 1.47 mW/g

**Left Head Template/5x5x7 Zoom Scan (<=3GHz) - to correct max outside (5x5x7)/Cube 0:**

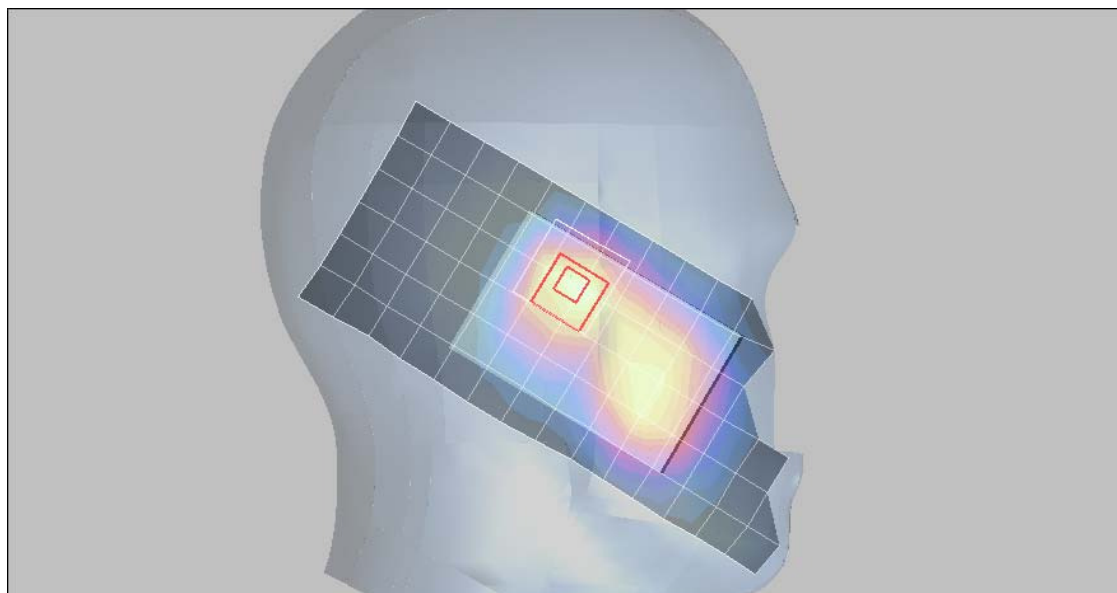
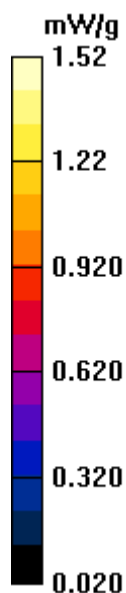
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 33.0 V/m; Power Drift = 0.023 dB

Peak SAR (extrapolated) = 2.19 W/kg

**SAR(1 g) = 1.4 mW/g; SAR(10 g) = 0.876 mW/g**

Maximum value of SAR (measured) = 1.52 mW/g



## Test Laboratory: Motorola CDMA1700 Cheek\_2nd Peak

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: Internal

Battery Model #: SNN5845A DEVICE POSITION (cheek or rotated): Cheek

Communication System: CDMA 1700; Frequency: 1753.75 MHz; Channel Number: 875; Duty Cycle: 1:1

Medium: 1730 Glycol Head; Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Left Head Template/Area Scan - Normal (15mm) (7x17x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.47 mW/g

### Left Head Template/5x5x7 Zoom Scan (<=3GHz) 2 (5x5x7)/Cube 0:

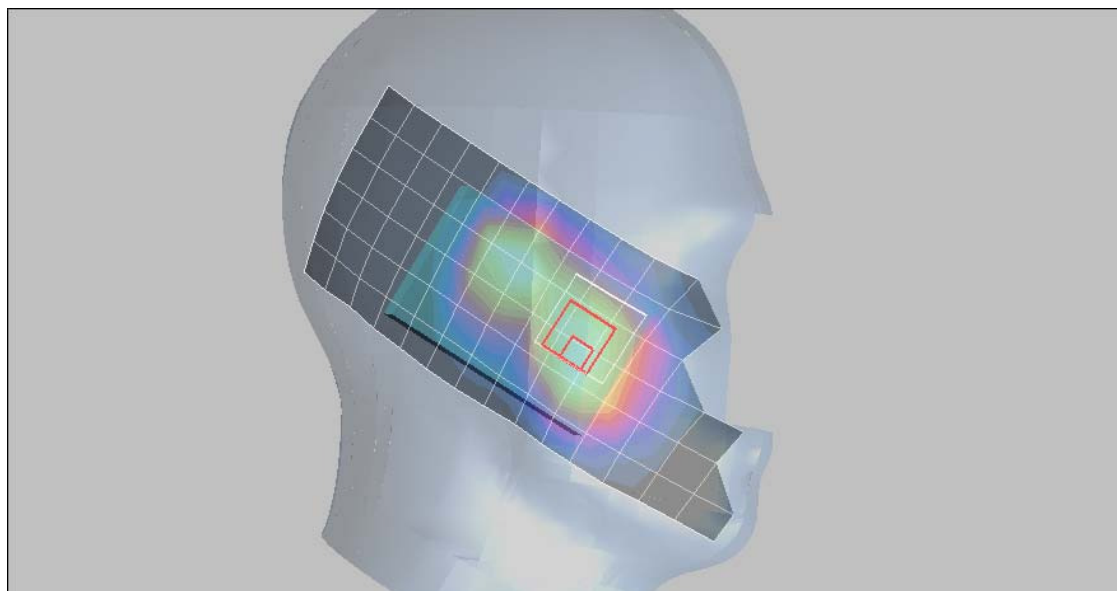
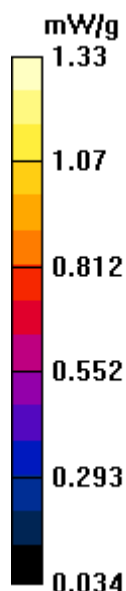
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 33.0 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 1.96 W/kg

**SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.804 mW/g**

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



## Test Laboratory: Motorola CDMA1700 Tilted

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: Internal

Battery Model #: SNN5845A DEVICE POSITION (cheek or rotated): Rotated

Communication System: CDMA 1700; Frequency: 1753.75 MHz; Channel Number: 875; Duty Cycle: 1:1

Medium: 1730 Glycol Head; Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 38.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.73, 4.73, 4.73); Calibrated: 08/17/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Left Head Template/Area Scan - Normal (15mm) (7x17x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.964 mW/g

### Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

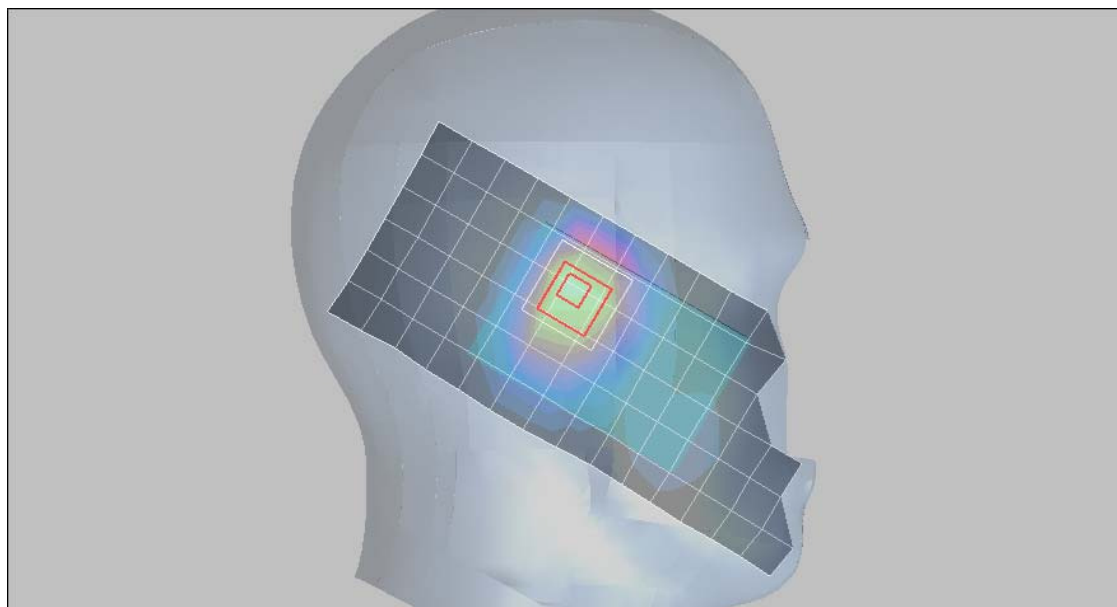
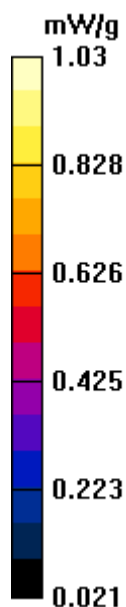
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.2 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.956 mW/g; SAR(10 g) = 0.597 mW/g**

Maximum value of SAR (measured) = 1.03 mW/g



## Test Laboratory: Motorola CDMA1900 Cheek

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: Internal

Battery Model #: SNN5845A DEVICE POSITION (cheek or rotated): Cheek

Communication System: CDMA 1900; Frequency: 1851.25 MHz; Channel Number: 25; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880; Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.45$  mho/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Right Head Template/Area Scan - Normal (15mm) (7x17x1):

Measurement grid: dx=15mm, dy=15mm

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

### Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

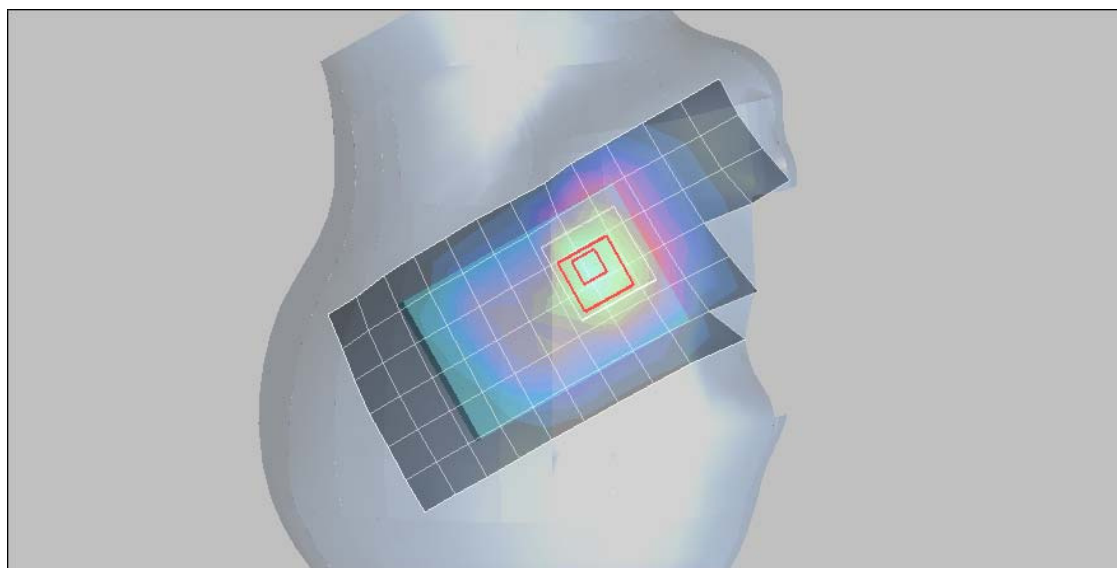
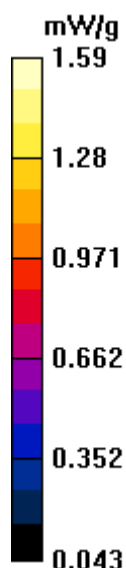
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 32.2 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 2.25 W/kg

**SAR(1 g) = 1.52 mW/g; SAR(10 g) = 0.969 mW/g**

Maximum value of SAR (measured) = 1.59 mW/g



## Test Laboratory: Motorola CDMA1900 Tilted

### A0000002CB0193E ;

Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: Internal

Battery Model #: SNN5819B DEVICE POSITION (cheek or rotated): Rotated

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880; Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 38.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

### DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(5.19, 5.19, 5.19); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: PCS-9\_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Left Head Template/Area Scan - Normal (15mm) (7x17x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.759 mW/g

### Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

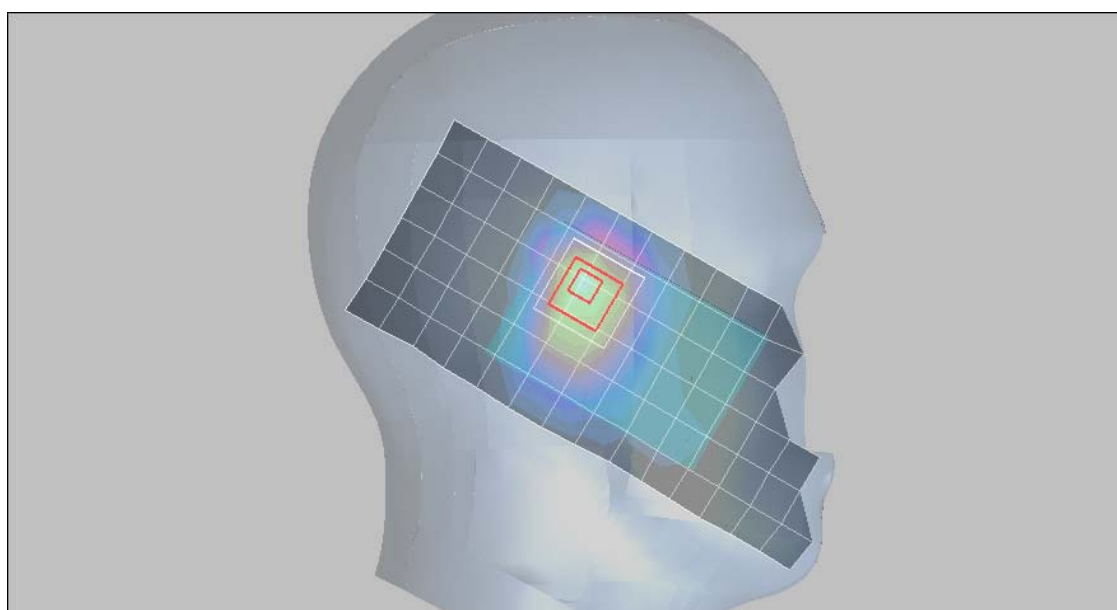
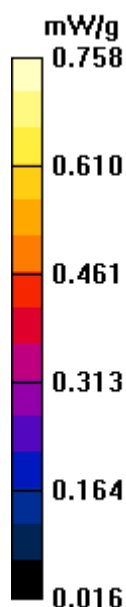
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.5 V/m; Power Drift = -0.105 dB

Peak SAR (extrapolated) = 1.12 W/kg

**SAR(1 g) = 0.714 mW/g; SAR(10 g) = 0.434 mW/g**

Maximum value of SAR (measured) = 0.758 mW/g



## **Appendix 3**

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

## Test Laboratory: Motorola CDMA800 BodyWorn

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal Battery Model #: SNN5845A;

Device Position: Back of phone 15mm away from flat phantom:

Communication System: CDMA 835; Frequency: 824.7 MHz; Channel Number: 1013; Duty Cycle: 1:1

Medium: Low Freq Body; Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 55.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(6.01, 6.01, 6.01); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: R#9\_Section 1, Amy Twin, Rev2 (23-June-04); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.10 mW/g

### Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

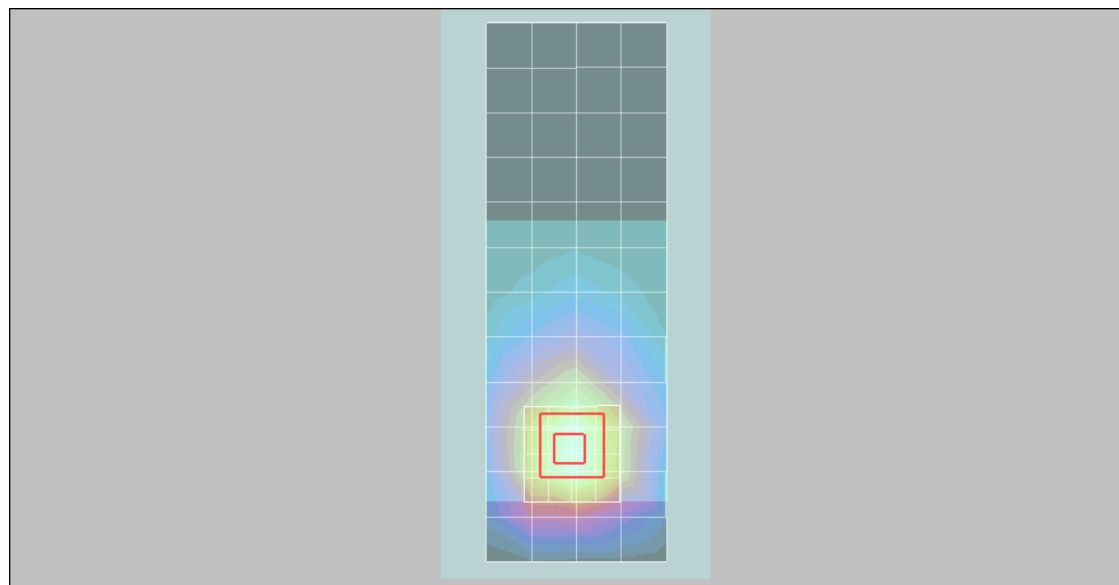
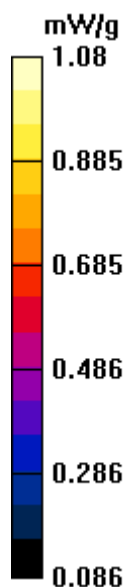
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 33.3 V/m; Power Drift = 0.127 dB

Peak SAR (extrapolated) = 1.32 W/kg

**SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.730 mW/g**

Maximum value of SAR (measured) = 1.08 mW/g



# Test Laboratory: Motorola - CDMA 800 Body Worn (EV-DO Mode)

Serial: A0000002CB048A;

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Battery Model #: SNN5845A

Device Position: Body Worn, Back of Phone 25mm from Phantom

Device Mode: EV-DO Rev. O RTAP

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

Medium: Low Freq Body

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.17, 6.17, 6.17); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1\_ Section 1, Amy Twin, Rev2 (23-June-04); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):

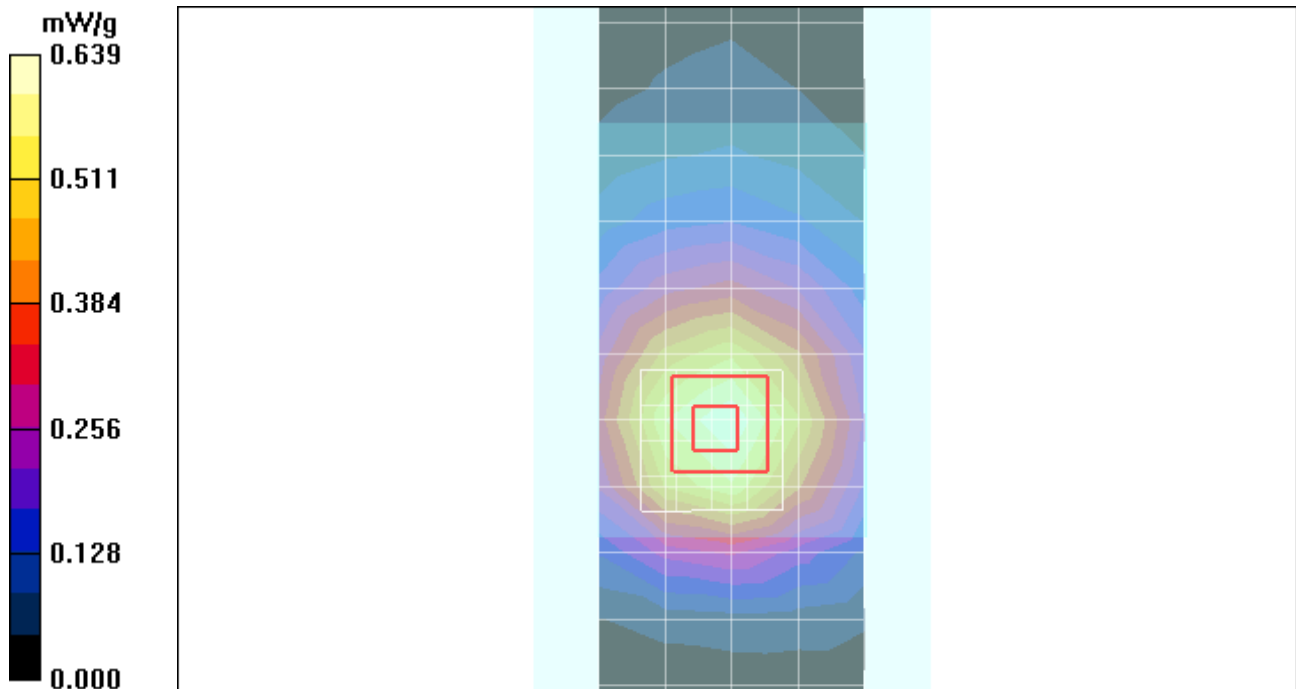
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.639 mW/g

## Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.8 V/m; Power Drift = -0.205 dB; Peak SAR (extrapolated) = 0.783 W/kg

SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.408 mW/g; Maximum value of SAR (measured) = 0.612 mW/g



## Test Laboratory: Motorola CDMA1700 BodyWorn

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal

Battery Model #: SNN5819B Device Position: Back of phone 25mm away from flat phantom;

Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1

Medium: 1730 Glycol Body; Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3191; ConvF(4.85, 4.85, 4.85); Calibrated: 11/07/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: R#9\_ Section 2, Amy Twin, Rev2 (23-June-04); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.877 mW/g

### Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

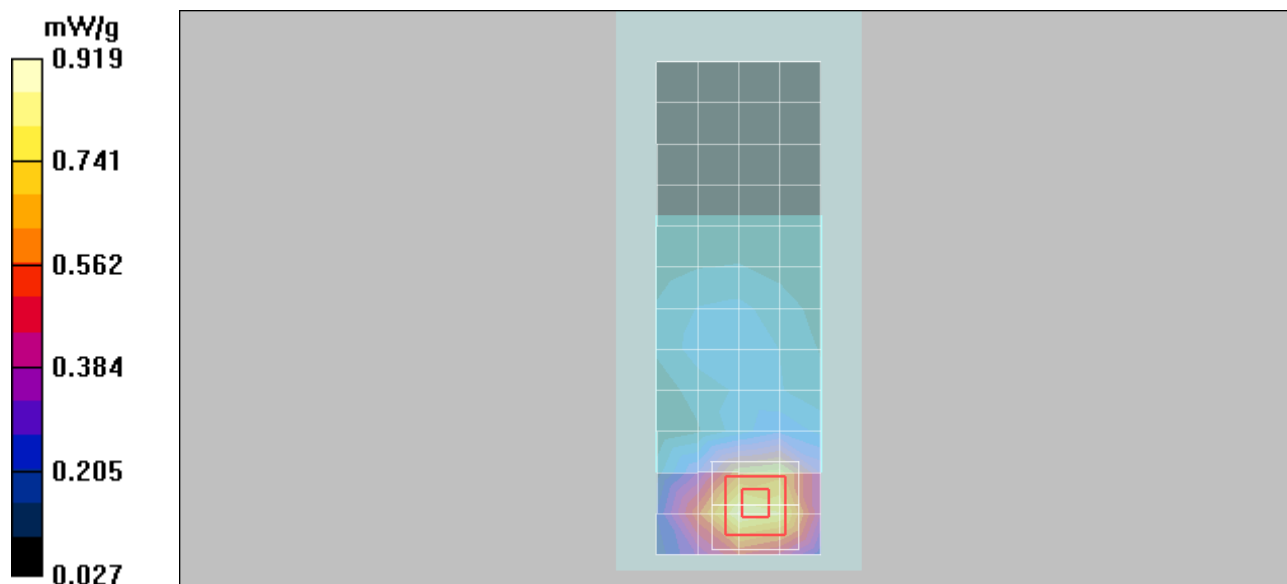
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.4 V/m; Power Drift = -0.174 dB

Peak SAR (extrapolated) = 1.38 W/kg

**SAR(1 g) = 0.857 mW/g; SAR(10 g) = 0.516 mW/g**

Maximum value of SAR (measured) = 0.919 mW/g



## Test Laboratory: Motorola CDMA1900 BodyWorn

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal

Battery Model #: SNN5845A Device Position: Back of phone 25mm away from flat phantom;

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Body 1750/1880; Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 51$ ;  $\rho =$

$1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.5, 4.5, 4.5); Calibrated: 08/17/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: R#9\_ Section 2, Amy Twin, Rev2 (23-June-04); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.728 mW/g

### Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

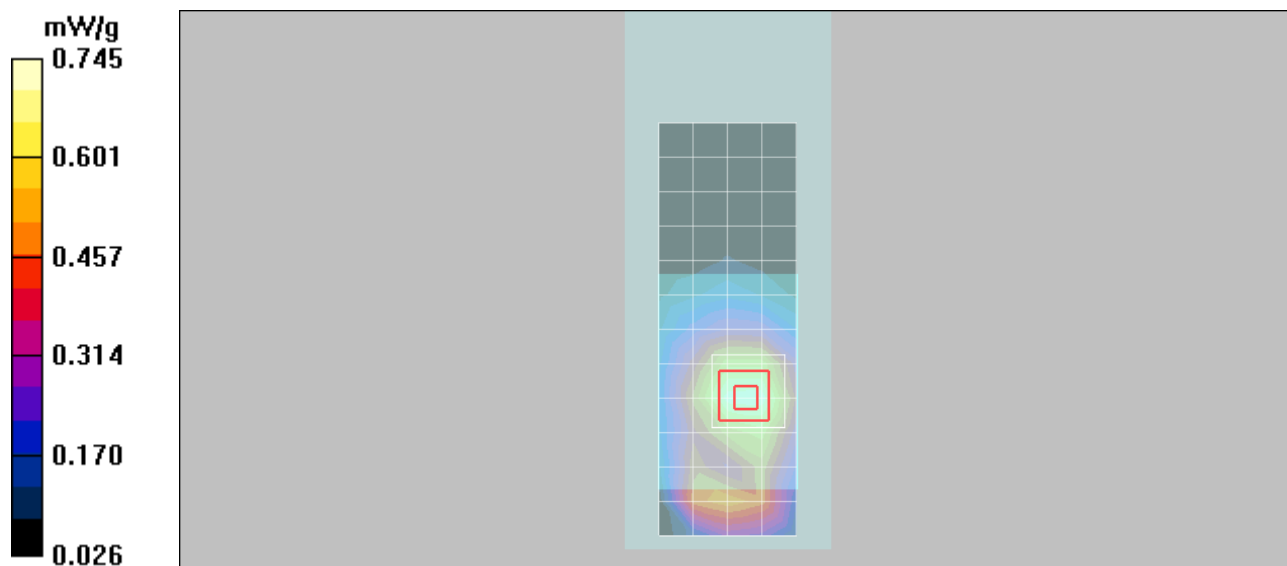
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.9 V/m; Power Drift = -0.025 dB

Peak SAR (extrapolated) = 1.01 W/kg

**SAR(1 g) = 0.698 mW/g; SAR(10 g) = 0.452 mW/g**

Maximum value of SAR (measured) = 0.745 mW/g



## Test Laboratory: Motorola Bluetooth 2450

**A0000002CB0193E ;**

Procedure Notes: Pwr Step: Testmode(OTA) Antenna Position: Internal

Battery Model #: SNN5845A Device Position: Back of phone 15mm away from flat phantom

Communication System: Bluetooth; Frequency: 2441 MHz; Channel Number: 39; Duty Cycle: 1:1

Medium: 2450 Glycol Body; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.98$  mho/m;  $\epsilon_r = 48.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.02, 4.02, 4.02); Calibrated: 08/17/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 08/21/2009
- Phantom: R#9\_ Section 2, Amy Twin, Rev2 (23-June-04); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### **Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):**

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.008 mW/g

### **Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz), - to correct max out (5x5x7)/Cube 0:**

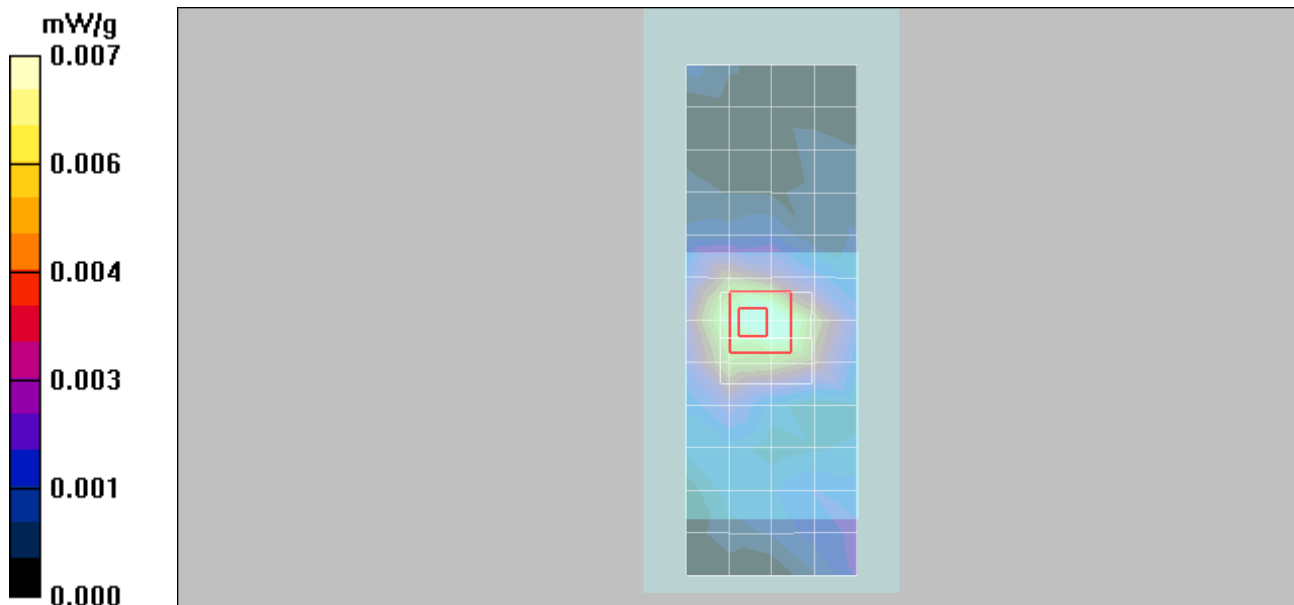
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.90 V/m; Power Drift = 0.317 dB

Peak SAR (extrapolated) = 0.015 W/kg

**SAR(1 g) = 0.00673 mW/g; SAR(10 g) = 0.00385 mW/g**

Maximum value of SAR (measured) = 0.007 mW/g



**Appendix 4**  
**Probe Calibration Certificate**



Accredited by the Swiss Accreditation Service (SAS)  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola Korea**

Certificate No.: **ES3-3191-Nov08**

**CALIBRATION CERTIFICATE**

Object **ES3DV3 - SN:3191**

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

Calibration date: **November 7, 2008**


Condition of the calibrated item **In Tolerance**


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 ± 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-08 (No. 217-00788)          | Apr-09                 |
| Power sensor E4412A        | MY41495277      | 1-Apr-08 (No. 217-00788)          | Apr-09                 |
| Power sensor E4412A        | MY41498087      | 1-Apr-08 (No. 217-00788)          | Apr-09                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 1-Jul-08 (No. 217-00865)          | Jul-09                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-08 (No. 217-00787)         | Apr-09                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 1-Jul-08 (No. 217-00866)          | Jul-09                 |
| Reference Probe ES3DV2     | SN: 3013        | 2-Jan-08 (No. ES3-3013_Jan08)     | Jan-09                 |
| DAE4                       | SN: 660         | 9-Sep-08 (No. DAE4-660_Sep08)     | Sep-09                 |
| Secondary Standards        | ID #            | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-07)  | In house check: Oct-09 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |

Calibrated by: **Katal Pokovic** (Name) **Technical Manager** (Function)  (Signature)

Approved by: **Niels Kuster** (Name) **Quality Manager** (Function)  (Signature)

Issued: November 11, 2008

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Multilateral Agreement for the recognition of calibration certificates

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  |
| 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), 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 (no uncertainty required). DCP does not depend on frequency nor media.
- 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:3191

|               |                  |
|---------------|------------------|
| Manufactured: | June 16, 2008    |
| Calibrated:   | November 7, 2008 |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

**DASY - Parameters of Probe: ES3DV3 SN:3191****Sensitivity in Free Space<sup>A</sup>****Diode Compression<sup>B</sup>**

|       |              |                                     |       |       |
|-------|--------------|-------------------------------------|-------|-------|
| NormX | 1.25 ± 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP X | 83 mV |
| NormY | 1.34 ± 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP Y | 84 mV |
| NormZ | 1.32 ± 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP Z | 81 mV |

**Sensitivity in Tissue Simulating Liquid (Conversion Factors)**

Please see Page 8.

**Boundary Effect**

**TSL**                      **900 MHz**      **Typical SAR gradient: 5 % per mm**

|   |                              |               |               |
|---|------------------------------|---------------|---------------|
| Sensor Center to Phantom Surface Distance |                              | <b>3.0 mm</b> | <b>4.0 mm</b> |
| SAR <sub>be</sub> [%]                     | Without Correction Algorithm | 12.0          | 7.5           |
| SAR <sub>be</sub> [%]                     | With Correction Algorithm    | 0.7           | 0.3           |

**TSL**                      **1810 MHz**      **Typical SAR gradient: 10 % per mm**

|   |                              |               |               |
|---|------------------------------|---------------|---------------|
| Sensor Center to Phantom Surface Distance |                              | <b>3.0 mm</b> | <b>4.0 mm</b> |
| SAR <sub>be</sub> [%]                     | Without Correction Algorithm | 9.4           | 6.0           |
| SAR <sub>be</sub> [%]                     | With Correction Algorithm    | 0.8           | 0.3           |

**Sensor Offset**

Probe Tip to Sensor Center                      **2.0 mm**

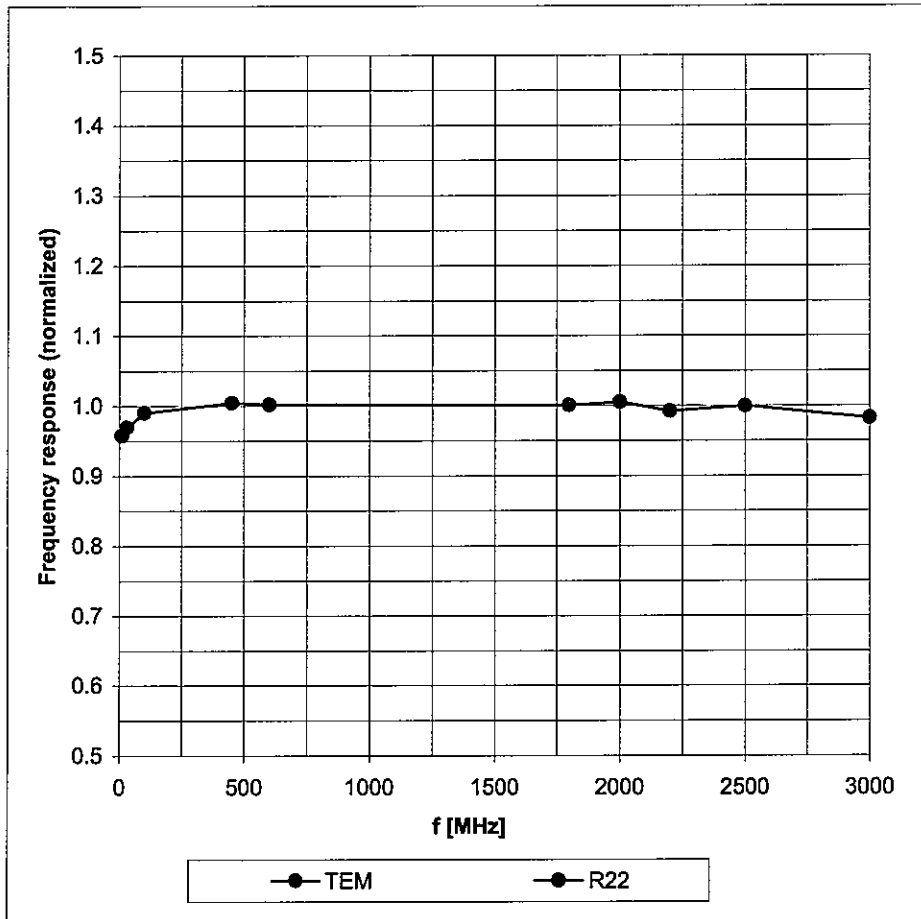
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

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

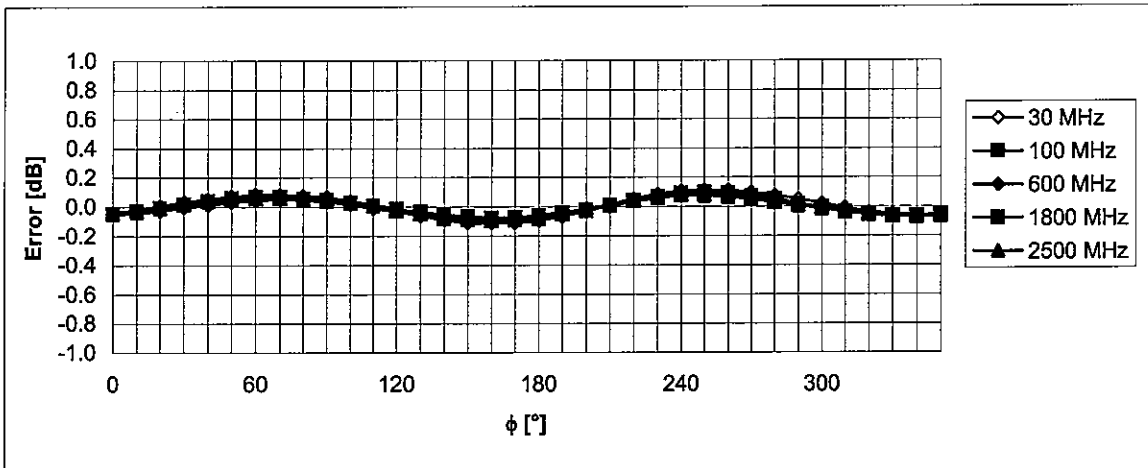
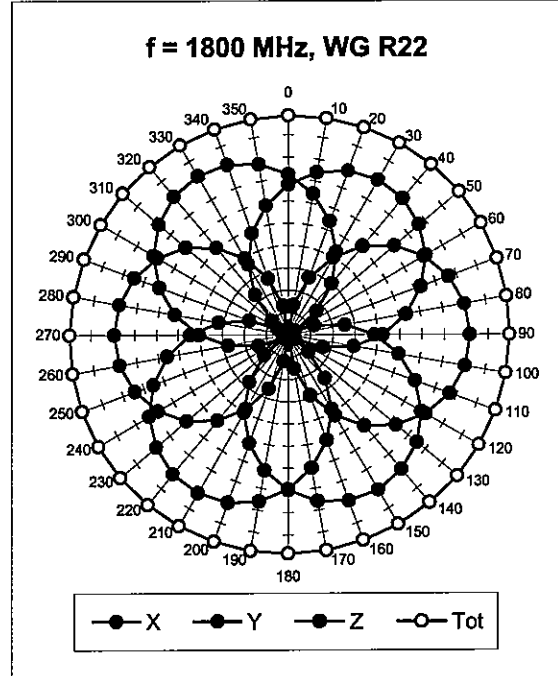
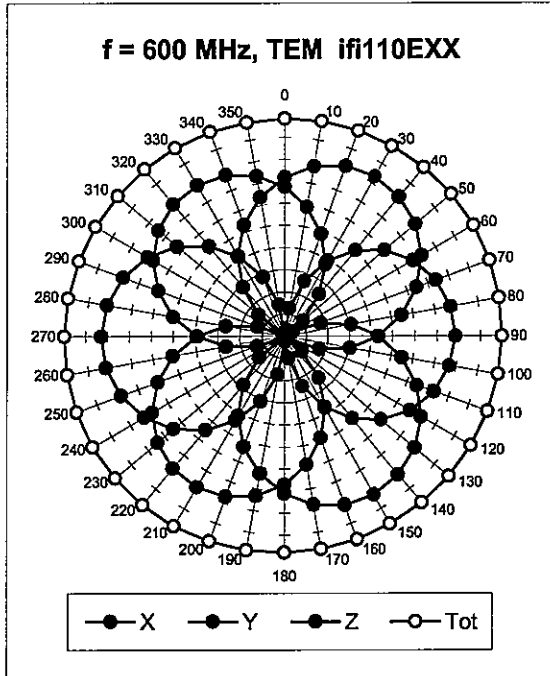
# Frequency Response of E-Field

(TEM-Cell:ifl110 EXX, Waveguide: R22)



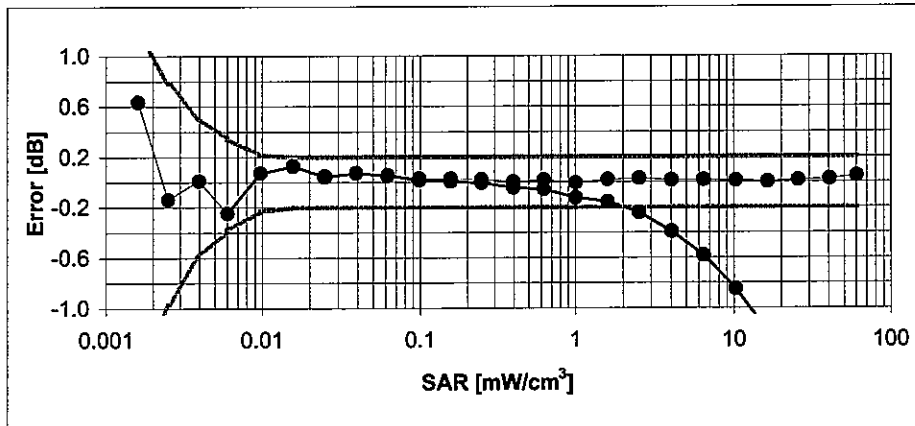
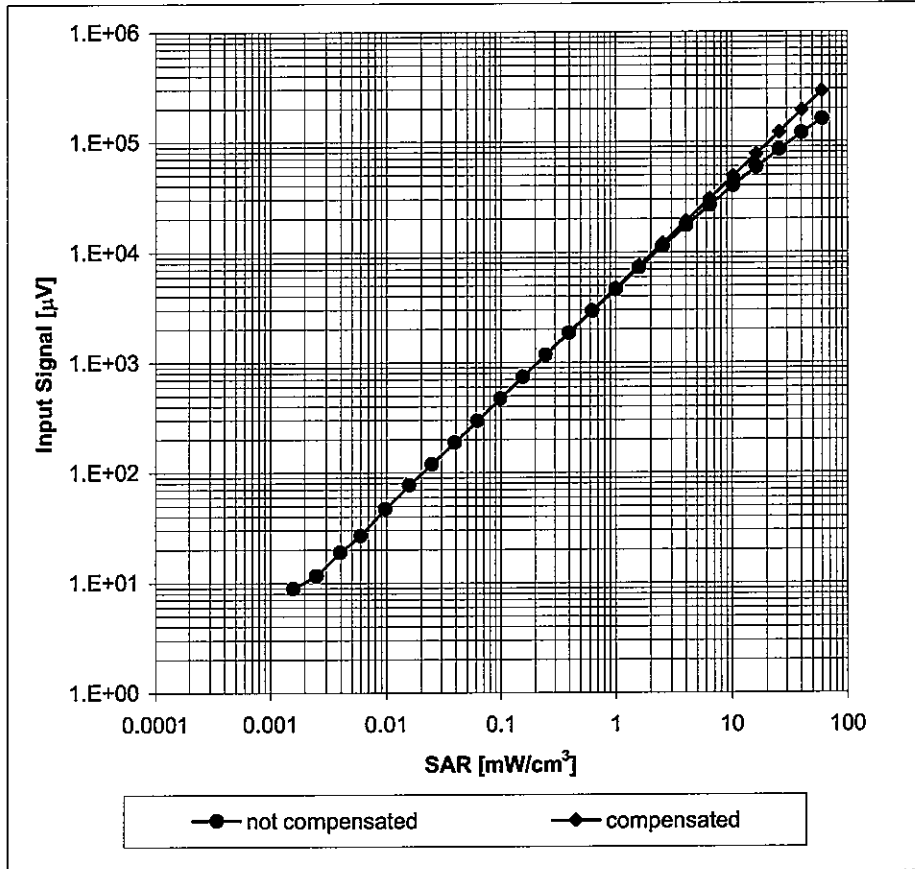
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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



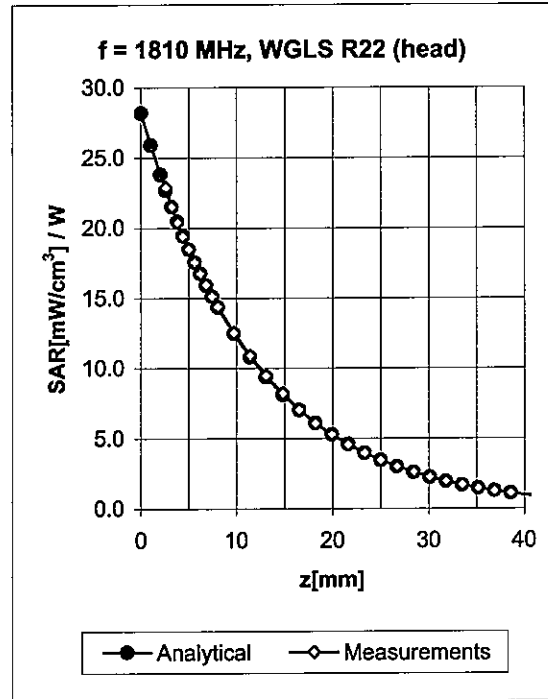
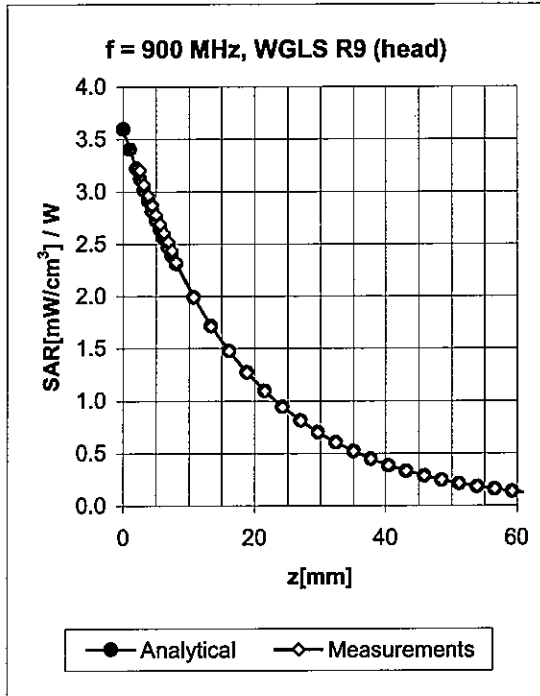
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

### 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

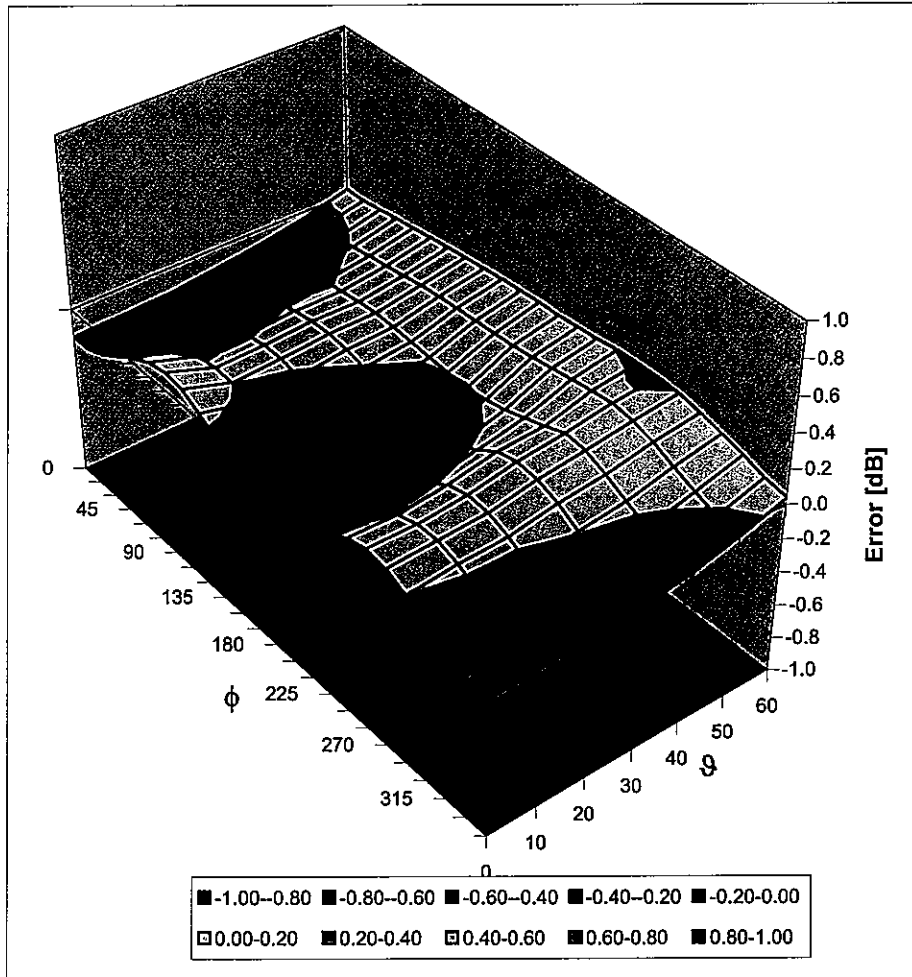


| f [MHz] | Validity [MHz] <sup>c</sup> | TSL  | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty  |
|---------|-----------------------------|------|--------------|--------------|-------|-------|--------------------|
| 900     | ± 50 / ± 100                | Head | 41.5 ± 5%    | 0.97 ± 5%    | 0.46  | 1.50  | 6.03 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Head | 40.0 ± 5%    | 1.40 ± 5%    | 0.70  | 1.33  | 5.19 ± 11.0% (k=2) |
| 1950    | ± 50 / ± 100                | Head | 40.0 ± 5%    | 1.40 ± 5%    | 0.63  | 1.43  | 4.97 ± 11.0% (k=2) |
| 2450    | ± 50 / ± 100                | Head | 39.2 ± 5%    | 1.80 ± 5%    | 0.61  | 1.55  | 4.57 ± 11.0% (k=2) |
|         |                             |      |              |              |       |       |                    |
| 900     | ± 50 / ± 100                | Body | 55.0 ± 5%    | 1.05 ± 5%    | 0.88  | 1.25  | 6.01 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Body | 53.3 ± 5%    | 1.52 ± 5%    | 0.32  | 2.12  | 4.85 ± 11.0% (k=2) |
| 1950    | ± 50 / ± 100                | Body | 53.3 ± 5%    | 1.52 ± 5%    | 0.30  | 2.41  | 4.77 ± 11.0% (k=2) |
| 2450    | ± 50 / ± 100                | Body | 52.7 ± 5%    | 1.95 ± 5%    | 0.49  | 1.66  | 4.08 ± 11.0% (k=2) |

<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.

### Deviation from Isotropy in HSL

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



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



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Accreditation No.: **SCS 108**

Client **Motorola Korea**

Certificate No: **ES3-3178\_Aug09**

**CALIBRATION CERTIFICATE**

Object **ES3DV3 - SN:3178**

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: **August 17, 2009**

Condition of the calibrated item **In Tolerance**

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 ± 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-09 (No. 217-01030)          | Apr-10                 |
| Power sensor E4412A        | MY41495277      | 1-Apr-09 (No. 217-01030)          | Apr-10                 |
| Power sensor E4412A        | MY41498087      | 1-Apr-09 (No. 217-01030)          | Apr-10                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 31-Mar-09 (No. 217-01026)         | Mar-10                 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-09 (No. 217-01028)         | Mar-10                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 31-Mar-09 (No. 217-01027)         | Mar-10                 |
| Reference Probe ES3DV2     | SN: 3013        | 2-Jan-09 (No. ES3-3013_Jan09)     | Jan-10                 |
| DAE4                       | SN: 660         | 9-Sep-08 (No. DAE4-660_Sep08)     | Sep-09                 |
| Secondary Standards        | ID #            | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Oct-07)  | In house check: Oct-09 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |

Calibrated by: **Claudio Leubler**      **Laboratory Technician**      *[Signature]*

Approved by: **Katja Pokovic**      **Technical Manager**      *[Signature]*

Issued: August 17, 2009

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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  |
| Polarization $\phi$      | $\phi$ rotation around probe axis  |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), 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<sup>2</sup>-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 (no uncertainty required). DCP does not depend on frequency nor media.
- 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:3178

|                  |                  |
|------------------|------------------|
| Manufactured:    | January 23, 2008 |
| Last calibrated: | July 14, 2008    |
| Recalibrated:    | August 17, 2009  |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

## DASY - Parameters of Probe: ES3DV3 SN:3178

### Sensitivity in Free Space<sup>A</sup>

### Diode Compression<sup>B</sup>

|       |              |                                     |       |       |
|-------|--------------|-------------------------------------|-------|-------|
| NormX | 1.32 ± 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP X | 92 mV |
| NormY | 1.24 ± 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP Y | 87 mV |
| NormZ | 1.41 ± 10.1% | $\mu\text{V}/(\text{V}/\text{m})^2$ | DCP Z | 92 mV |

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

### Boundary Effect

**TSL                      900 MHz      Typical SAR gradient: 5 % per mm**

|   |                              |               |               |
|---|------------------------------|---------------|---------------|
| Sensor Center to Phantom Surface Distance |                              | <b>3.0 mm</b> | <b>4.0 mm</b> |
| SAR <sub>be</sub> [%]                     | Without Correction Algorithm | 9.5           | 6.0           |
| SAR <sub>be</sub> [%]                     | With Correction Algorithm    | 0.8           | 0.5           |

**TSL                      1810 MHz      Typical SAR gradient: 10 % per mm**

|   |                              |               |               |
|---|------------------------------|---------------|---------------|
| Sensor Center to Phantom Surface Distance |                              | <b>3.0 mm</b> | <b>4.0 mm</b> |
| SAR <sub>be</sub> [%]                     | Without Correction Algorithm | 9.9           | 5.6           |
| SAR <sub>be</sub> [%]                     | With Correction Algorithm    | 0.9           | 0.8           |

### Sensor Offset

Probe Tip to Sensor Center                      **2.0 mm**

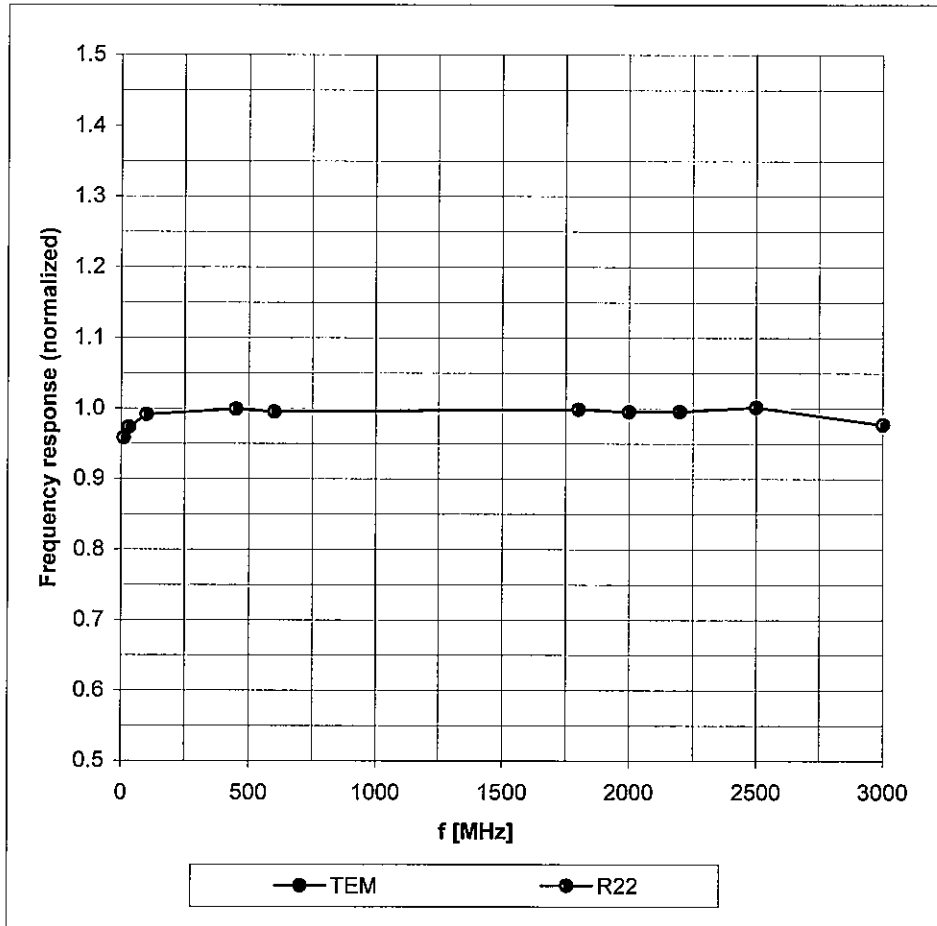
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

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

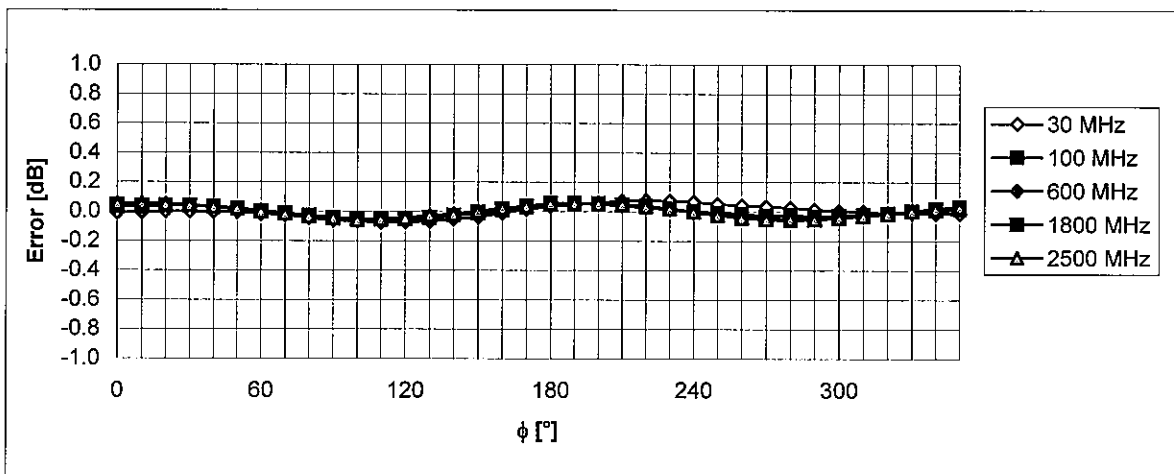
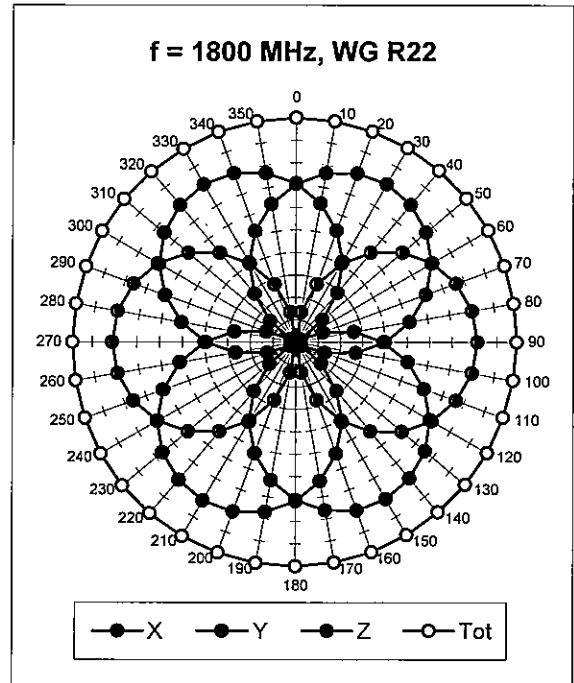
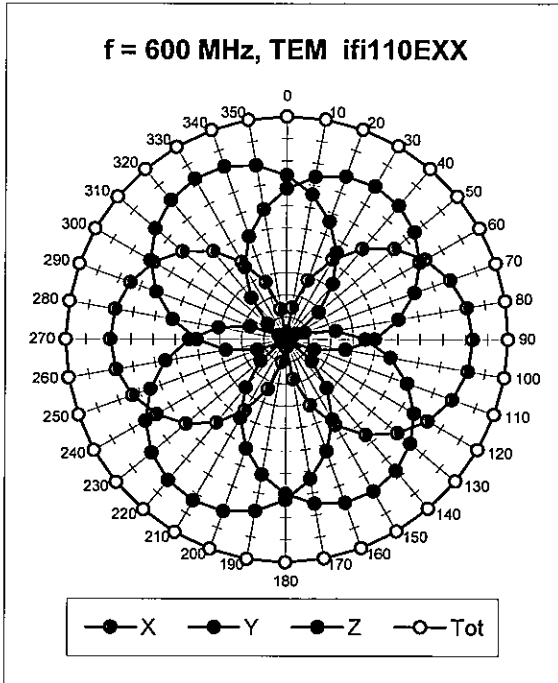
# Frequency Response of E-Field

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



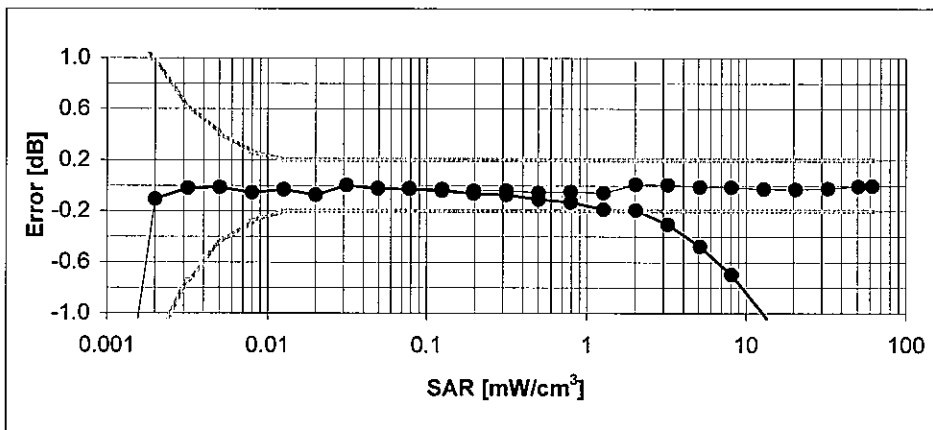
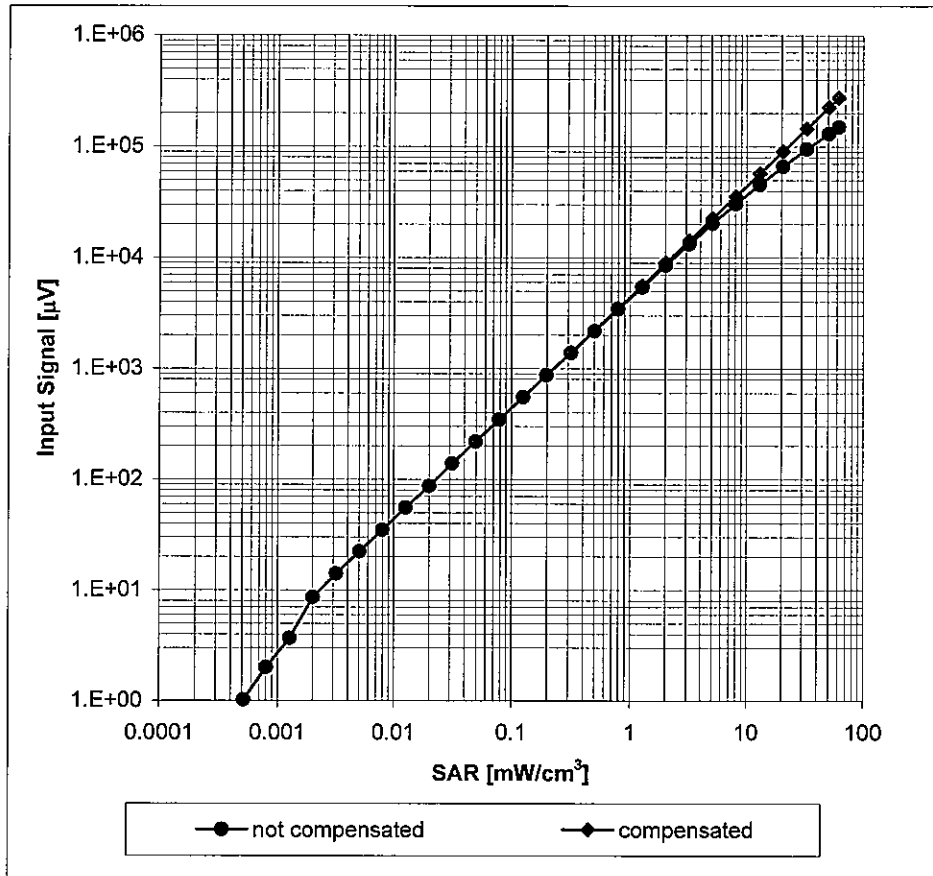
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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



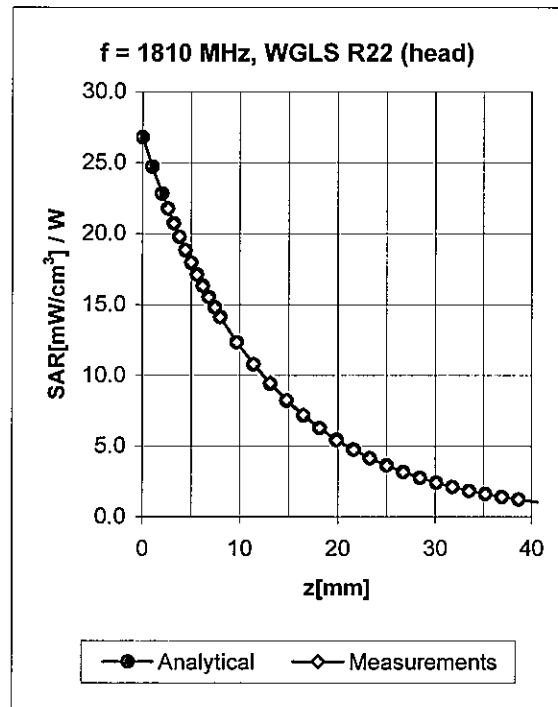
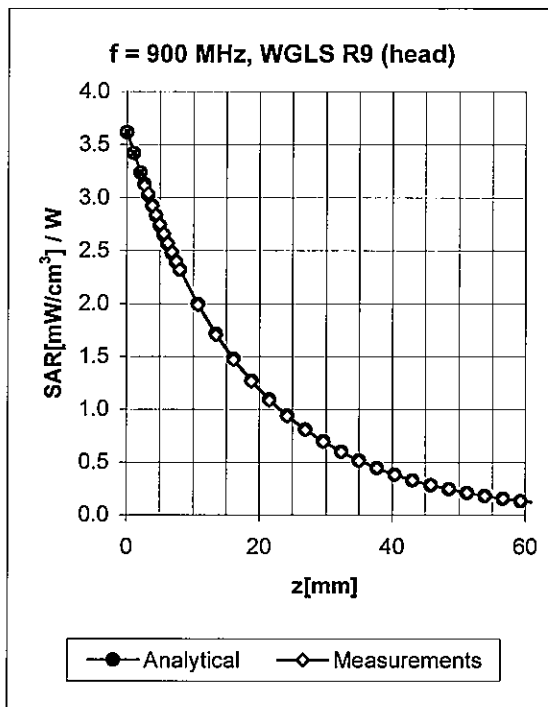
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

### 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

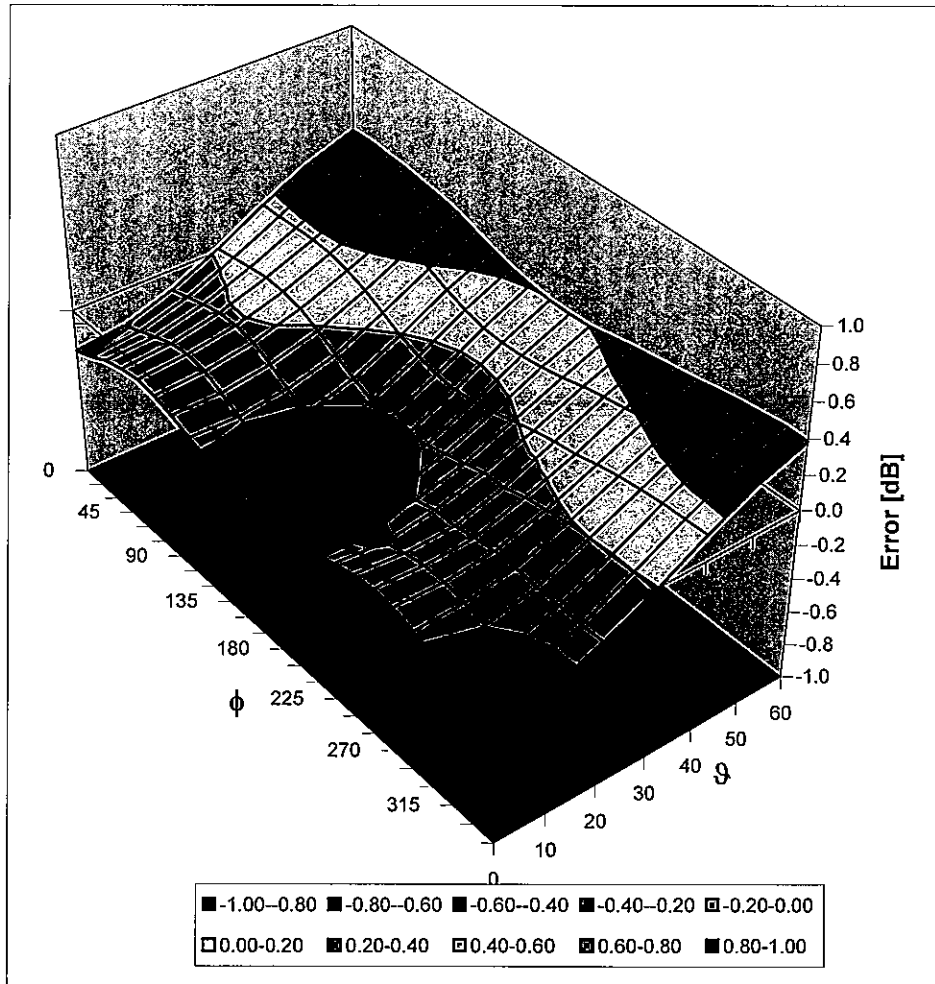


| f [MHz] | Validity [MHz] <sup>c</sup> | TSL  | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty  |
|---------|-----------------------------|------|--------------|--------------|-------|-------|--------------------|
| 900     | ± 50 / ± 100                | Head | 41.5 ± 5%    | 0.97 ± 5%    | 0.99  | 1.09  | 5.56 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Head | 40.0 ± 5%    | 1.40 ± 5%    | 0.25  | 2.40  | 4.73 ± 11.0% (k=2) |
| 1950    | ± 50 / ± 100                | Head | 40.0 ± 5%    | 1.40 ± 5%    | 0.25  | 2.20  | 4.54 ± 11.0% (k=2) |
| 2450    | ± 50 / ± 100                | Head | 39.2 ± 5%    | 1.80 ± 5%    | 0.90  | 1.30  | 4.09 ± 11.0% (k=2) |
| 900     | ± 50 / ± 100                | Body | 55.0 ± 5%    | 1.05 ± 5%    | 0.92  | 1.10  | 5.42 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Body | 53.3 ± 5%    | 1.52 ± 5%    | 0.35  | 2.26  | 4.50 ± 11.0% (k=2) |
| 1950    | ± 50 / ± 100                | Body | 53.3 ± 5%    | 1.52 ± 5%    | 0.38  | 2.20  | 4.48 ± 11.0% (k=2) |
| 2450    | ± 50 / ± 100                | Body | 52.7 ± 5%    | 1.95 ± 5%    | 0.99  | 1.14  | 4.02 ± 11.0% (k=2) |

<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.

# Deviation from Isotropy in HSL

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



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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **ES3-3037\_Sep09**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3037**

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: **September 18, 2009**

Condition of the calibrated item **In Tolerance**

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 ± 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-09 (No. 217-01030)      | Apr-10                |
| Power sensor E4412A        | MY41495277      | 1-Apr-09 (No. 217-01030)      | Apr-10                |
| Power sensor E4412A        | MY41498087      | 1-Apr-09 (No. 217-01030)      | Apr-10                |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 31-Mar-09 (No. 217-01026)     | Mar-10                |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-09 (No. 217-01028)     | Mar-10                |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 31-Mar-09 (No. 217-01027)     | Mar-10                |
| Reference Probe ES3DV2     | SN: 3013        | 2-Jan-09 (No. ES3-3013_Jan09) | Jan-10                |
| DAE4                       | SN: 660         | 9-Sep-08 (No. DAE4-660_Sep08) | Sep-09                |

| Secondary Standards       | ID #         | Check Date (in house)             | Scheduled Check        |
|---------------------------|--------------|-----------------------------------|------------------------|
| RF generator HP 8648C     | US3642U01700 | 4-Aug-99 (in house check Oct-07)  | In house check: Oct-09 |
| Network Analyzer HP 8753E | US37390585   | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |

|                | Name           | Function              | Signature |
|----------------|----------------|-----------------------|-----------|
| Calibrated by: | Jeton Kastrati | Laboratory Technician |           |
| Approved by:   | Katja Pokovic  | Technical Manager     |           |

Issued: September 21, 2009

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



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**

### 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  |
| 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), 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<sup>2</sup>-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 (no uncertainty required). DCP does not depend on frequency nor media.
- 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:3037

|                  |                    |
|------------------|--------------------|
| Manufactured:    | August 21, 2003    |
| Last calibrated: | September 23, 2008 |
| Recalibrated:    | September 18, 2009 |

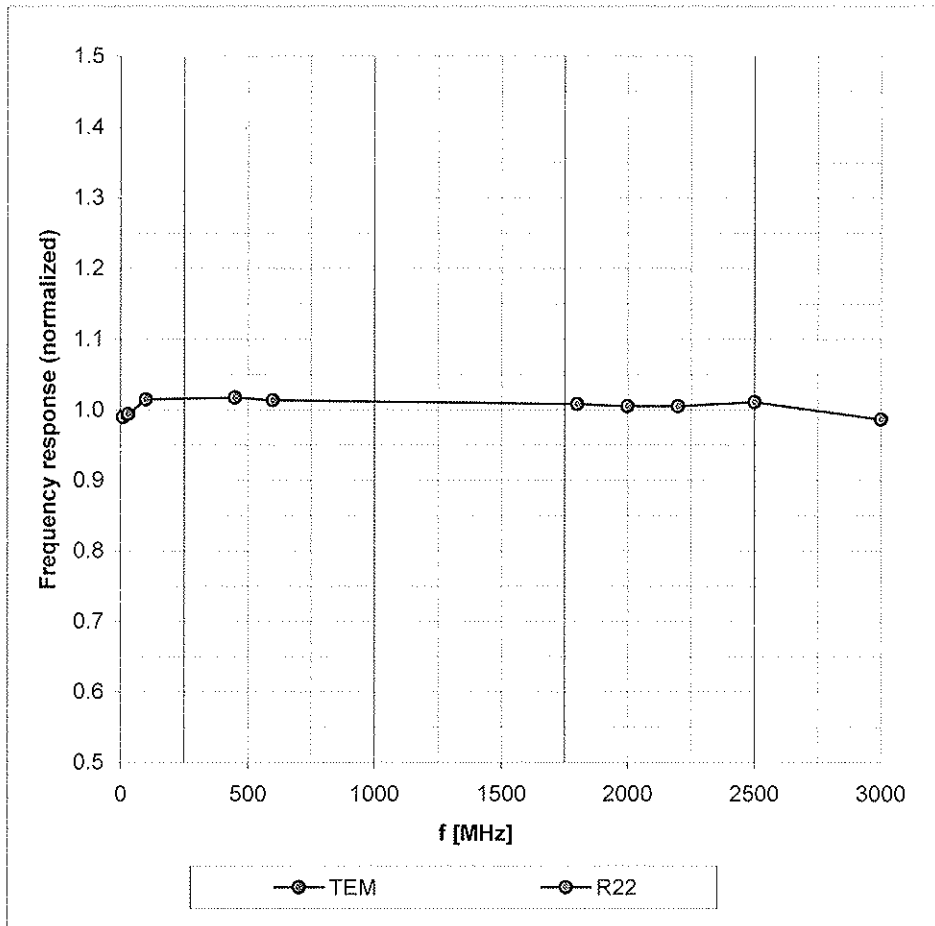
Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



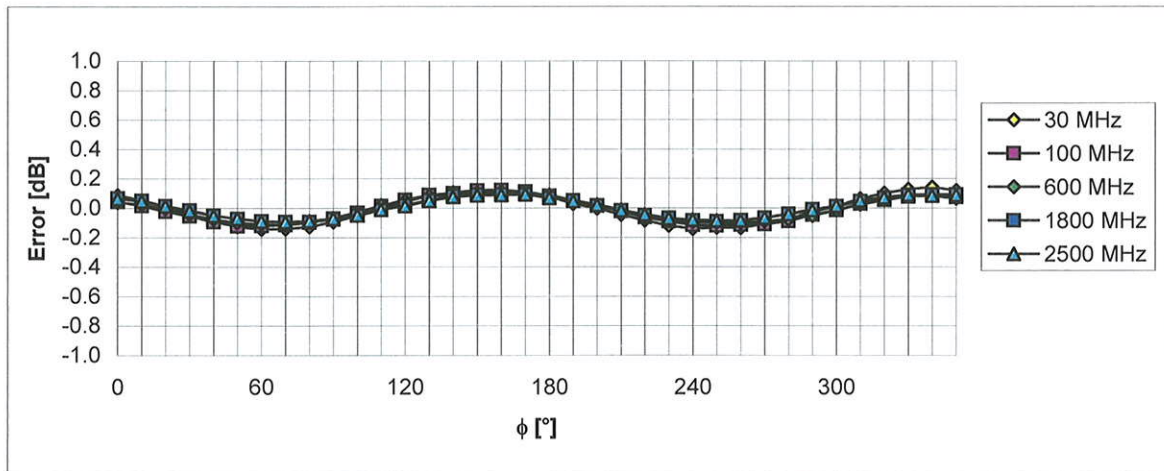
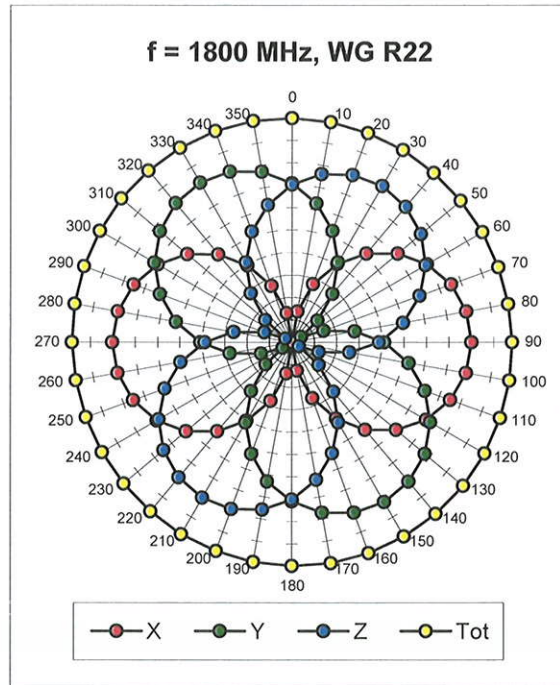
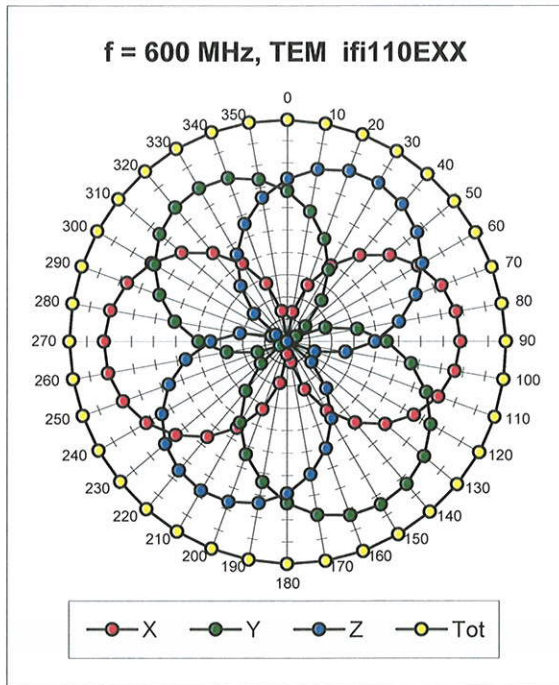
# Frequency Response of E-Field

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



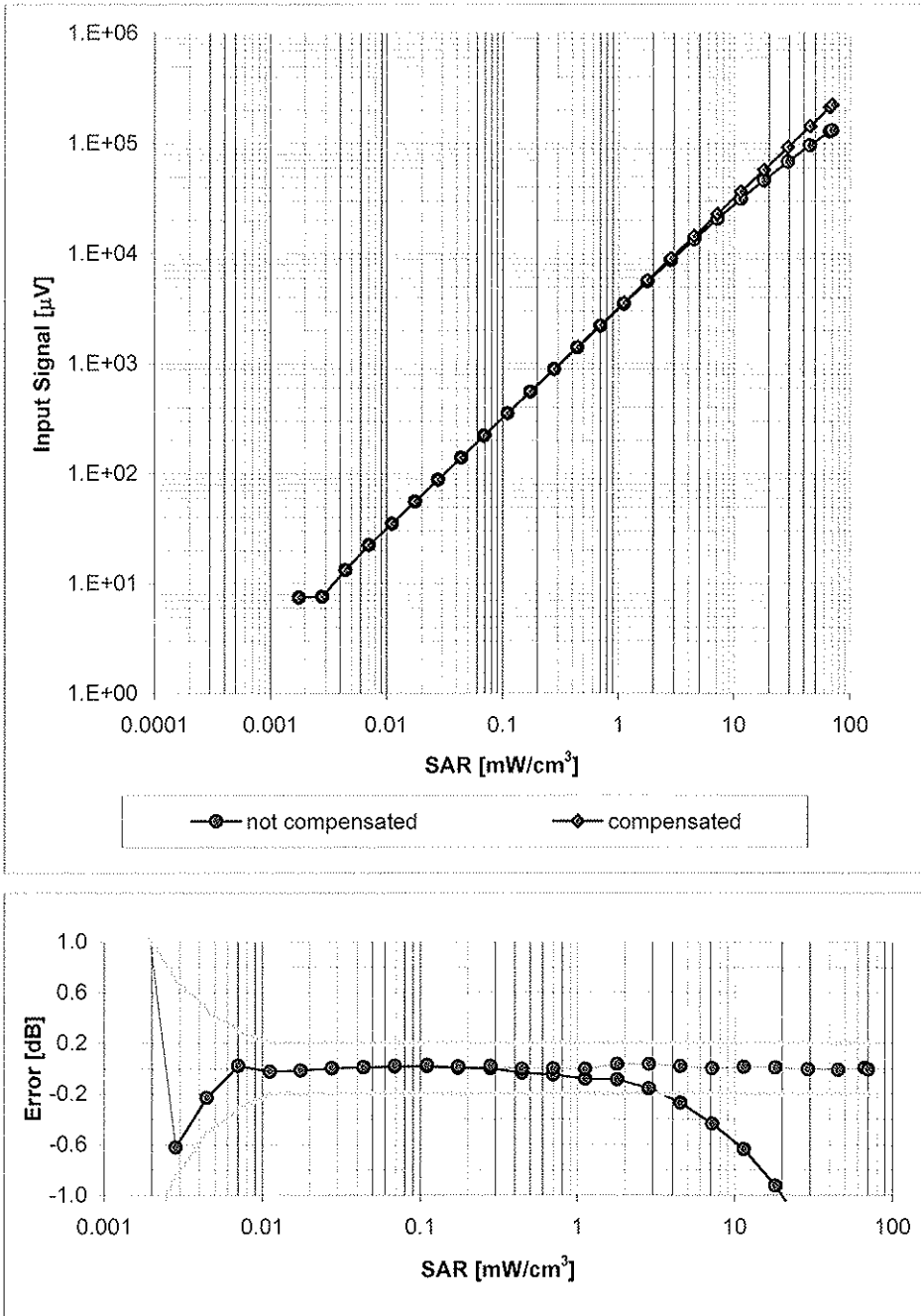
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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



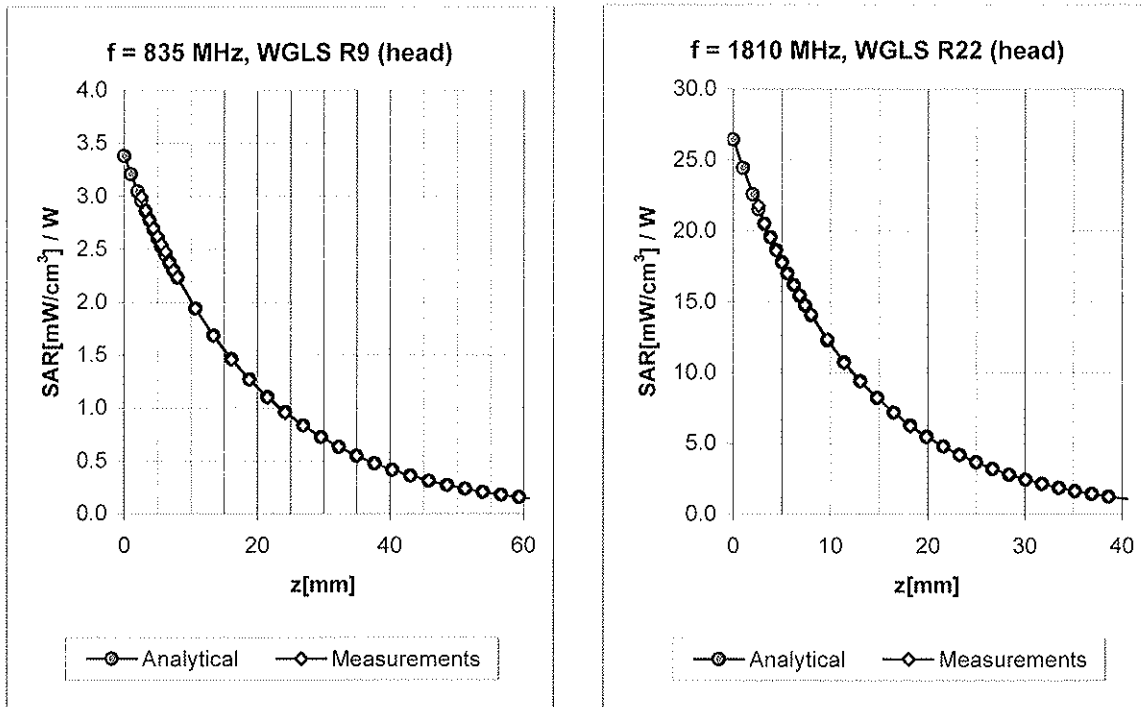
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

### Dynamic Range f(SAR<sub>head</sub>) (Waveguide R22, f = 1800 MHz)



Uncertainty of Linearity Assessment: ± 0.6% (k=2)

## Conversion Factor Assessment

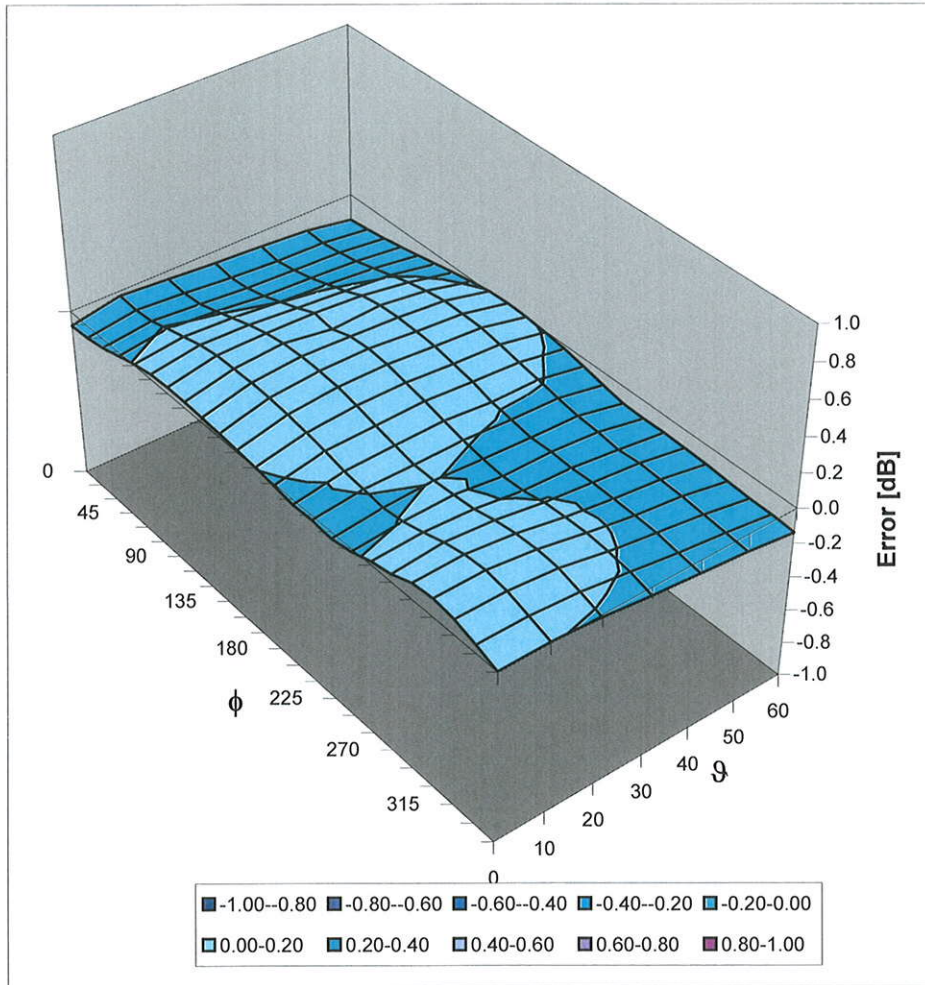


| f [MHz] | Validity [MHz] <sup>c</sup> | TSL  | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty  |
|---------|-----------------------------|------|--------------|--------------|-------|-------|--------------------|
| 835     | ± 50 / ± 100                | Head | 41.5 ± 5%    | 0.90 ± 5%    | 0.34  | 1.78  | 6.25 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Head | 40.0 ± 5%    | 1.40 ± 5%    | 0.37  | 1.74  | 5.05 ± 11.0% (k=2) |
| 1950    | ± 50 / ± 100                | Head | 40.0 ± 5%    | 1.40 ± 5%    | 0.40  | 1.62  | 4.87 ± 11.0% (k=2) |
| 2450    | ± 50 / ± 100                | Head | 39.2 ± 5%    | 1.80 ± 5%    | 0.35  | 1.96  | 4.41 ± 11.0% (k=2) |
| 835     | ± 50 / ± 100                | Body | 55.2 ± 5%    | 0.97 ± 5%    | 0.75  | 1.16  | 6.17 ± 11.0% (k=2) |
| 1810    | ± 50 / ± 100                | Body | 53.3 ± 5%    | 1.52 ± 5%    | 0.36  | 1.94  | 4.96 ± 11.0% (k=2) |
| 1950    | ± 50 / ± 100                | Body | 53.3 ± 5%    | 1.52 ± 5%    | 0.27  | 3.10  | 4.78 ± 11.0% (k=2) |
| 2450    | ± 50 / ± 100                | Body | 52.7 ± 5%    | 1.95 ± 5%    | 0.70  | 1.18  | 4.29 ± 11.0% (k=2) |

<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.

# Deviation from Isotropy in HSL

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



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

**Appendix 5**  
**Measurement Uncertainty Budget**

MOTOROLA, INC. Portable Cellular Phone SAR Test Report Number: **23444-1F**

| <i>a</i>   | <i>b</i>                | <i>c</i>      | <i>d</i> | <i>e =<br/>f(d,k)</i> | <i>f</i>             | <i>g</i>                          | <i>h =<br/>c x f<br/>/ e</i> | <i>i =<br/>c x g<br/>/ e</i> | <i>k</i>             |
|--|-------------------------|---------------|----------|-----------------------|----------------------|-----------------------------------|------------------------------|------------------------------|----------------------|
| Uncertainty Component                              | IEEE<br>1528<br>section | Tol.<br>(± %) | Prob     | Div.                  | <i>c<sub>i</sub></i> | <i>c<sub>i</sub></i><br>(10<br>g) | 1 g                          | 10 g                         | <i>v<sub>i</sub></i> |
|  |                         |               | Dist     |                       | (1 g)                | (10<br>g)                         | <i>u<sub>i</sub></i><br>(±%) | <i>u<sub>i</sub></i><br>(±%) |                      |
| <b>Measurement System</b>                          |                         |               |          |                       |                      |                                   |                              |                              |                      |
| Probe Calibration                                  | E.2.1                   | 5.9           | N        | 1.00                  | 1                    | 1                                 | 5.9                          | 5.9                          | ∞                    |
| Axial Isotropy                                     | E.2.2                   | 4.7           | R        | 1.73                  | 0.707                | 0.707                             | 1.9                          | 1.9                          | ∞                    |
| Hemispherical Isotropy                             | E.2.2                   | 9.6           | R        | 1.73                  | 0.707                | 0.707                             | 3.9                          | 3.9                          | ∞                    |
| Boundary Effect                                    | E.2.3                   | 1.0           | R        | 1.73                  | 1                    | 1                                 | 0.6                          | 0.6                          | ∞                    |
| Linearity  | E.2.4                   | 4.7           | R        | 1.73                  | 1                    | 1                                 | 2.7                          | 2.7                          | ∞                    |
| System Detection Limits                            | E.2.5                   | 1.0           | R        | 1.73                  | 1                    | 1                                 | 0.6                          | 0.6                          | ∞                    |
| Readout Electronics                                | E.2.6                   | 0.3           | N        | 1.00                  | 1                    | 1                                 | 0.3                          | 0.3                          | ∞                    |
| Response Time                                      | E.2.7                   | 1.1           | R        | 1.73                  | 1                    | 1                                 | 0.6                          | 0.6                          | ∞                    |
| Integration Time                                   | E.2.8                   | 1.1           | R        | 1.73                  | 1                    | 1                                 | 0.6                          | 0.6                          | ∞                    |
| RF Ambient Conditions - Noise                      | E.6.1                   | 3.0           | R        | 1.73                  | 1                    | 1                                 | 1.7                          | 1.7                          | ∞                    |
| RF Ambient Conditions - Reflections                | E.6.1                   | 0.0           | R        | 1.73                  | 1                    | 1                                 | 0.0                          | 0.0                          | ∞                    |
| Probe Positioner Mech. Tolerance                   | E.6.2                   | 0.4           | R        | 1.73                  | 1                    | 1                                 | 0.2                          | 0.2                          | ∞                    |
| Probe Positioning w.r.t Phantom                    | E.6.3                   | 1.4           | R        | 1.73                  | 1                    | 1                                 | 0.8                          | 0.8                          | ∞                    |
| Max. SAR Evaluation (ext., int., avg.)             | E.5                     | 3.4           | R        | 1.73                  | 1                    | 1                                 | 2.0                          | 2.0                          | ∞                    |
| <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                          | ∞                    |
| <b>Phantom and Tissue Parameters</b>               |                         |               |          |                       |                      |                                   |                              |                              |                      |
| Phantom Uncertainty                                | E.3.1                   | 4.0           | R        | 1.73                  | 1                    | 1                                 | 2.3                          | 2.3                          | ∞                    |
| Liquid Conductivity (target)                       | E.3.2                   | 5.0           | R        | 1.73                  | 0.64                 | 0.43                              | 1.8                          | 1.2                          | ∞                    |
| Liquid Conductivity (measurement)                  | E.3.3                   | 3.3           | N        | 1.00                  | 0.64                 | 0.43                              | 2.1                          | 1.4                          | ∞                    |
| Liquid Permittivity (target)                       | E.3.2                   | 5.0           | R        | 1.73                  | 0.6                  | 0.49                              | 1.7                          | 1.4                          | ∞                    |
| Liquid Permittivity (measurement)                  | E.3.3                   | 1.9           | N        | 1.00                  | 0.6                  | 0.49                              | 1.1                          | 0.9                          | ∞                    |
| <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 6**

### **Dipole Characterization Certificate**

# Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

| <b>835 MHz</b>  |                       |
|---|-----------------------|
| Reference Target:   | 9.56 (W/kg)           |
| Measurement Uncertainty (k=1):  | 9.0%                  |
| Measurement Period:   | 26-Aug-09 to 8-Oct-09 |
| # of tests performed:   | 48                    |
| Grand Average:  | 9.69 (W/kg)           |
| % Delta (Average - Reference Target)  | 1.4%                  |
| Is % Delta <= Expanded Measurement Uncertainty (k=2)?   | <b>Yes</b>            |
| Accept/Reject <u>Average</u> as new system performance check target?  | <b>ACCEPT</b>         |
| <u>Applies to Dipole SN's:</u><br>432tr, 417tr, 420tr, 422tr,<br>423tr, 424tr, 425tr, 431tr,<br>434tr, 421tr, 436tr |                       |

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

| Frequency      | SAR Target (W/kg) | Permittivity Target +/- % | Conductivity (S/m) Target +/- % |
|----------------|-------------------|---------------------------|---------------------------------|
| <b>835 MHz</b> | <b>9.69</b>       | 41.5 +/- 5%               | 0.90 +/- 5%                     |

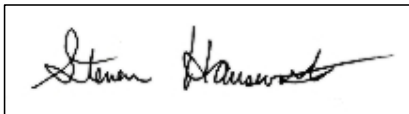
-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

# Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

| 900 MHz   |                       |
|---|-----------------------|
| Reference Target:   | 10.9 (W/kg)           |
| Measurement Uncertainty (k=1):  | 9.0%                  |
| Measurement Period:   | 15April08 - 26March09 |
| # of tests performed:   | 1,099                 |
| Grand Average:  | 11.19 (W/kg)          |
| % Delta (Average - Reference Target)  | 2.7%                  |
| Is % Delta <= Expanded Measurement Uncertainty (k=2)?   | Yes                   |
| Accept/Reject <u>Average</u> as new system performance check target?  | ACCEPT                |
| <b>Applies to Dipole SN's:</b><br>55, 69, 77, 78,<br>79, 80, 91, 92, 93,<br>94, 95, 96, 97,<br>1d034, 1d035 |                       |

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

| Frequency | SAR Target (W/kg) | Permittivity Target +/- % | Conductivity (S/m) Target +/- % |
|-----------|-------------------|---------------------------|---------------------------------|
| 900 MHz   | 11.19             | 41.5 +/- 5%               | 0.97 +/- 5%                     |

-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

# Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

| 1800 MHz  |                       |
|---|-----------------------|
| Reference Target:   | 38.4 (W/kg)           |
| Measurement Uncertainty (k=1):  | 9.0%                  |
| Measurement Period:   | 15April08 - 26March09 |
| # of tests performed:   | 929                   |
| Grand Average:  | 37.91 (W/kg)          |
| % Delta (Average - Reference Target)  | -1.3%                 |
| Is % Delta <= Expanded Measurement Uncertainty (k=2)?   | Yes                   |
| Accept/Reject <u>Average</u> as new system performance check target?  | ACCEPT                |
| <u>Applies to Dipole SN's:</u><br>246tr, 250tr, 251tr, 259tr,<br>263tr, 271tr, 272tr, 276tr,<br>277tr, 279tr, 280tr, 281tr,<br>283tr, 284tr, 2d128, 2d129 |                       |

**-New System Performance Check Targets-** per WI-0396

(based on analysis of historical data)

| Frequency | SAR Target (W/kg) | Permittivity Target +/- % | Conductivity (S/m) Target +/- % |
|-----------|-------------------|---------------------------|---------------------------------|
| 1800 MHz  | 37.91             | 40.0 +/- 5%               | 1.40 +/- 5%                     |


**-Approvals-**

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

# Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

| 2450 MHz   |                       |
|--|-----------------------|
| Reference Target:  | 52.4 (W/kg)           |
| Measurement Uncertainty (k=1):                                       | 9.0%                  |
| Measurement Period:  | 15April08 - 26March09 |
| # of tests performed:  | 150                   |
| Grand Average:   | 56.68 (W/kg)          |
| % Delta (Average - Reference Target)                                 | 8.2%                  |
| Is % Delta <= Expanded Measurement Uncertainty (k=2)?                | Yes                   |
| Accept/Reject <u>Average</u> as new system performance check target? | ACCEPT                |
| Applies to Dipole SN's:  |                       |
| 740, 766, 767, 788, 789  |                       |

**-New System Performance Check Targets-** per WI-0396

(based on analysis of historical data)

| Frequency | SAR Target (W/kg) | Permittivity Target +/- % | Conductivity (S/m) Target +/- % |
|-----------|-------------------|---------------------------|---------------------------------|
| 2450 MHz  | 56.68             | 39.2 +/- 10%              | 1.80 +/- 5%                     |


**-Approvals-**

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

MOTOROLA, INC. Portable Cellular Phone SAR Test Report Number: **23444-1F**

**END OF REPORT**