



MOTOROLA

Exhibit 11: SAR Test Report IHDT6FW1

Date of test: August 23, 2005 – August 24, 2005
Date of Report: Sept 13, 2005

Laboratory: Motorola Mobile Devices Business Product Safety & Compliance Laboratory
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Room: MW113
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Accreditation: This laboratory is accredited to ISO/IEC 17025-1999 to perform the following tests:



| | |
|---|---|
| <u>Tests:</u> Electromagnetic Specific Absorption Rate | <u>Procedures:</u> ANSI/IEEE C95.1-1992, 1999 (SAR) IEEE C95.3-1991 IEEE 1528, IEC 62209-1 FCC OET Bulletin 65 (<i>including Supplements A, B, C</i>) Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 1999 CENELEC EN 50361 (2001) APP-0247 DOI-0876, 0900, 0902, 0904, 0915 |
| Simulated Tissue Preparation RF Power Measurement | |

On the following products or types of products:
Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular, Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

A2LA certificate #1651-01

Statement of Compliance: Motorola declares under its sole responsibility that portable cellular telephone FCC ID IHDT6FW1 to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines (FCC 47 CFR §2.1093). It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

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This test report shall not be reproduced except in full, without written approval of the laboratory.

The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

Motorola encourages all feedback, both positive and negative, on this test report.

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1 Introduction

The Motorola Mobile Devices Business Product Safety Laboratory has performed measurements of the maximum potential exposure to the user of portable cellular phone (FCC ID IHDT6FW1). The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was tested in accordance with FCC OET Bulletin 65 Supplement C 01-01.

2 Description of the Device Under Test

2.1 Antenna description

| | | |
|----------------------|---------------------------|-------|
| Type | Internal Antenna | |
| Location | Bottom of the transceiver | |
| Dimensions | Length | 36 mm |
| | Width | 1 mm |
| Configuration | FJA | |

2.2 Device description

| | | | | | | | |
|---|-----------------------------------|-------------------|-----------------------|-----------------|-------------------|-----------------------|-------------------|
| FCC ID Number | IHDT6FW1 | | | | | | |
| Serial number | G0LT0101MK | | | | | | |
| Mode(s) of Operation | GSM 900 | GSM 1800 | GSM 1900 | GPRS 900 | GPRS 1800 | GPRS 1900 | Blue Tooth |
| Modulation Mode(s) | GSM | GSM | GSM | GSM | GSM | GSM | Blue Tooth |
| Maximum Output Power Setting | 32.50 dBm | 30.00 dBm | 29.50 dBm | 32.50 dBm | 30.00 dBm | 29.50 dBm | 4.00 dBm |
| Duty Cycle | 1:8 | 1:8 | 1:8 | 2:8 | 2:8 | 2:8 | 1:1 |
| Transmitting Frequency Rang(s) | 880.2-914.8 MHz | 1710.2-1784.8 MHz | 1850.20 – 1909.80 MHz | 880.2-914.8 MHz | 1710.2-1784.8 MHz | 1850.20 – 1909.80 MHz | 2400 - 2483.5 MHz |
| Production Unit or Identical Prototype (47 CFR §2.908) | Identical Prototype | | | | | | |
| Device Category | Portable | | | | | | |
| RF Exposure Limits | 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™ v4.5) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 6. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg. The list of calibrated equipment used for the measurements is shown below.

| Description | Serial Number | Cal Due Date |
|---------------------------------|---------------|--------------|
| DASY3 DAE V1 | Sn434 | 3/16/2006 |
| E-Field Probe ET3DV6R | SN1397 | 4/22/2006 |
| Dipole Validation Kit, D1800V2 | 251TR | |
| S.A.M. Phantom used for 1900MHz | TP-1159 | |

3.2 Additional Equipment

| Description | Serial Number | Cal Due Date |
|-------------------------------|---------------|--------------|
| Signal Generator HP8648C | 3847A04845 | 8/22/2006 |
| Power Meter E4419B | GB39511087 | 12/28/2005 |
| Power Sensor #1 - E9301A | US39210931 | 9/16/2005 |
| Power Sensor #2 - E9301A | US39210932 | 9/16/2005 |
| Network Analyzer HP8753ES | US39172529 | 2/21/2006 |
| Dielectric Probe Kit HP85070C | US99360074 | N/A |

4 Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ϵ_r , and the conductivity, σ , of the tissue simulating liquids were measured with the HP85070 Dielectric Probe Kit. These values, along with the temperature of the tissue simulate are shown in the table below. The recommended limits for maximum permittivity and minimum conductivity are also shown. These come from the Federal Communication Commission, OET Bulletin 65 Supplement C 01-01. It is seen that the measured parameters are satisfactory for compliance testing.

| f (MHz) | Tissue type | Limits / Measured | Dielectric Parameters | | |
|---------|-------------|---------------------|-----------------------|----------------|-----------|
| | | | ϵ_r | σ (S/m) | Temp (°C) |
| 1880 | Head | Measured, 8/23/2005 | 38.4 | 1.47 | 20.5 |
| | | Recommended Limits | 40.0 ±5% | 1.40 ±5% | 18-25 |
| | Body | Measured, 8/24/2005 | 51.2 | 1.58 | 20 |
| | | Recommended Limits | 53.3 ±5% | 1.52 ±5% | 18-25 |

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

| Ingredient | 800MHz Head | 800MHz Body | 1900MHz Head | 1900MHz Body |
|------------|-------------|-------------|--------------|--------------|
| Sugar | 57.0 | 44.9 | -- | -- |
| DGBE | -- | -- | 47.0 | 30.80 |
| Water | 40.45 | 53.06 | 52.8 | 68.91 |
| Salt | 1.45 | 0.94 | 0.2 | 0.29 |
| HEC | 1.0 | 1.0 | -- | -- |
| Bact. | 0.1 | 0.1 | -- | -- |

5 System Accuracy Verification

A system accuracy verification of the DASY4 v4.5 was performed using the measurement equipment listed in Section 3.1. The daily system accuracy verification occurs within center section of the SAM phantom.

A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR indicated in Section 8.3.7 Reference SAR Values in IEEE 1528. These tests were done at 900MHz and/or 1800MHz. These frequencies are within 100MHz of the mid-band frequency of the test device. This is within the allowable window given in Supplement C 01-01 *Appendix D System Verification* section item #5. The test was conducted on the same days as the measurement of the DUT. Recommended limits for maximum permittivity, minimum conductivity are shown in the table below. These come from the Federal Communication Commission, OET Bulletin 65 Supplement C 01-01. The obtained results from the system accuracy verification are displayed in the table below. 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 ±0.5cm. Z-axis scans showing the SAR penetration are also included in Appendix 1. SAR values are normalized to 1W forward power delivered to the dipole.

| f (MHz) | Description | SAR (W/kg), 1gram | Dielectric Parameters | | Ambient Temp (°C) | Tissue Temp (°C) |
|---------|---------------------|-------------------|-----------------------|----------------|-------------------|------------------|
| | | | ϵ_r | σ (S/m) | | |
| 1800 | Measured, 8/23/2005 | 38.28 | 38.8 | 1.39 | 22 | 19.9 |
| | Measured, 8/24/2005 | 37.85 | 38.6 | 1.37 | 21 | 19.8 |
| | Recommended Limits | 38.1 | 40.0 ±5% | 1.4 ±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 (MHz) | Conversion Factor | Cal Cert pg # |
|----------------------|---------------|---------|-------------------|---------------|
| E-Field Probe ET3DV6 | SN1397 | 1810 | 5.17 | 8 of 9 |

6 Test Results

The test sample was operated in a test mode that allows control of the transmitter without the need to place actual phone calls. For the purposes of this test the unit is commanded to test mode and manually set to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in OET Bulletin 65 Supplement C 01-01. Motorola also followed the requirements in Supplement. C / Appendix D: SAR Measurement Procedures, section titled "*Devices Operating Next To A Person's Ear*". These directions state "The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s)."

The DASY4 v4.5 SAR measurement system specified in section 3.1 was utilized within the intended operations as set by the SPEAG™ setup. The phone was positioned into the measurement configurations using the positioner supplied with the DASY4 v4.5 SAR measurement system. The measured dielectric constant of the material used for the positioner 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 use for measurements. The grid spacing of the course scan was set to 15cm as shown in the SAR plots included in appendix 2 and 3. Please refer to the DASY manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone (FCC ID IHDT6FW1) has the following battery options:

Model #1 – SNN5768A - 820 mAH Battery

Model #2 – SNN5779A - 700 mAH Battery

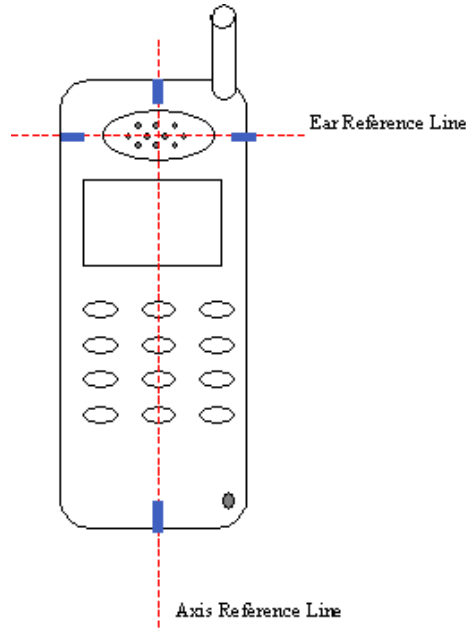
The battery with the highest capacity is the SNN5768A. This battery was used to do most of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery. The configuration that resulted in the highest SAR values were tested using the other batteries listed above.

6.1 Head Adjacent Test Results

To aid in positioning repeatability, the ear reference line of the device and the axis reference line of the device have been physically added using a non-metallic marker.

- Per Figure 1, the "Ear Reference Line" is centered vertically through the center of the listening area (as defined by the speaker holes in the housing).
- The "Axis Reference Line" bisects the front surface of the device at its top and bottom edges.
- The intersection of these two lines defines the location of the "Ear Reference Point".

The lines drawn on the device extended to the outside edges, as shown in blue in the figure below, & wrap around the sides of the device.



The SAR results shown in tables 1 through 4 are maximum SAR values averaged over 1 gram of phantom tissue. Also shown are the measured conducted output powers, 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 DASY™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. The test conditions indicated as bold numbers in the following table are included in Appendix 2

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since same phantoms and tissue simulate are used for the system accuracy verification as the device SAR measurements, the Z-axis scans included in within Appendix 1 are applicable for verification of tissue simulate depth to be 15.0cm ±0.5cm. All other test conditions measured lower SAR values than those included in Appendix 2.

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 ET3DV6 | SN1397 | 1810 | 5.17 | 8 of 9 |

| f (MHz) | Description | Conducted Output Power (dBm) | Cheek / Touch Position | | | | | | | |
|-----------------|-------------|------------------------------|------------------------|--------------|---------------------|--------------------|-----------------|------------|---------------------|--------------------|
| | | | Left Head | | | | Right Head | | | |
| | | | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) |
| Digital 1900MHz | Channel 512 | 29.49 | 1.29 | -0.05 | 1.30 | 20 | 0.894 | 0.04 | 0.89 | 19.9 |
| | Channel 661 | 29.50 | 1.41 | -0.09 | 1.44 | 20 | 0.904 | -0.02 | 0.91 | 19.9 |
| | Channel 810 | 29.47 | 1.47 | 0.033 | 1.47 | 20 | 1.03 | -0.01 | 1.03 | 19.9 |

Table 1: SAR measurement results for the portable cellular telephone FCC ID IHDT6FW1 at highest possible output power. Measured against the head in the Cheek/Touch Position.

| f (MHz) | Description | Conducted Output Power (dBm) | 15° Tilt Position | | | | | | | |
|-----------------|-------------|------------------------------|-------------------|--------------|---------------------|--------------------|-----------------|------------|---------------------|--------------------|
| | | | Left Head | | | | Right Head | | | |
| | | | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) |
| Digital 1900MHz | Channel 512 | 29.49 | | | | | | | | |
| | Channel 661 | 29.50 | 0.267 | 0.042 | 0.27 | 20 | 0.251 | -0.03 | 0.25 | 20 |
| | Channel 810 | 29.47 | | | | | | | | |

Table 2: SAR measurement results for the portable cellular telephone FCC ID IHDT6FW1 at highest possible output power. Measured against the head in the 15° Tilt Position.

| f (MHz) | Description | Conducted Output Power (dBm) | Cheek / Touch Position | | | |
|-----------------|-------------|------------------------------|---------------------------------|---------------|---------------------|--------------------|
| | | | Left Head with SNN5779A battery | | | |
| | | | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) |
| Digital 1900MHz | Channel 512 | 29.49 | | | | |
| | Channel 661 | 29.50 | | | | |
| | Channel 810 | 29.47 | 1.54 | -0.011 | 1.54 | 20 |

Table 3: SAR measurement results for the portable cellular telephone FCC ID IHDT6FW1 at highest possible output power. Measured against the head in the Cheek/Touch Position.

| f (MHz) | Description | Conducted Output Power (dBm) | 15° Tilt Position | | | |
|-----------------|-------------|------------------------------|---------------------------------|---------------|---------------------|--------------------|
| | | | Left Head with SNN5779A battery | | | |
| | | | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) |
| Digital 1900MHz | Channel 512 | 29.49 | | | | |
| | Channel 661 | 29.50 | 0.338 | -0.059 | 0.34 | 20.5 |
| | Channel 810 | 29.47 | | | | |

Table 4: SAR measurement results for the portable cellular telephone FCC ID IHDT6FW1 at highest possible output power. Measured against the head in the 15° Tilt Position.

6.2 Body Worn Test Results

The SAR results shown in table 5 are the maximum SAR values averaged over 1 gram of phantom tissue. Also shown are the measured conducted output powers, 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 DASYS™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. The test conditions indicated as bold numbers in the following table 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.

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 ET3DV6 | SN1397 | 1810 | 4.77 | 8 of 9 |

| f (MHz) | Description | Conducted Output Power (dBm) | Body Worn | | | | | | | |
|-----------------|-------------|------------------------------|--|---------------|---------------------|--------------------|---------------------------------------|--------------|---------------------|--------------------|
| | | | Front of phone 15 mm away from phantom | | | | Back of phone 15 mm away from phantom | | | |
| | | | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) |
| Digital 1900MHz | Channel 512 | 29.49 | | | | | | | | |
| | Channel 661 | 29.50 | 0.368 | -0.046 | 0.37 | 20 | 0.244 | -0.01 | 0.24 | 20 |
| | Channel 810 | 29.47 | | | | | | | | |

Table 5: SAR measurement results for the portable cellular telephone FCC ID IHDT6FW1 at highest possible output power. Measured against the body.

| f (MHz) | Description | Conducted Output Power (dBm) | Body Worn | | | | | | | |
|-----------------|-------------|------------------------------|--|------------|---------------------|--------------------|--|------------|---------------------|--------------------|
| | | | Front of phone 15 mm away from phantom (GSM & Bluetooth enabled) | | | | Front of phone 25 mm away from phantom (GPRS Class 10) | | | |
| | | | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) |
| Digital 1900MHz | Channel 512 | 29.49 | | | | | | | | |
| | Channel 661 | 29.50 | 0.450 | 0 | 0.45 | 20 | 0.224 | 0 | 0.22 | 20 |
| | Channel 810 | 29.47 | | | | | | | | |

Table 6: SAR measurement results for the portable cellular telephone FCC ID IHDT6FW1 at highest possible output power. Measured against the body.

| f (MHz) | Description | Conducted Output Power (dBm) | Body Worn | | | |
|-----------------|-------------|------------------------------|--|--------------|---------------------|--------------------|
| | | | Front of phone 15 mm away from phantom (GSM & Bluetooth enabled) with SNN5779A battery | | | |
| | | | Measured (W/kg) | Drift (dB) | Extrapolated (W/kg) | Simulate Temp (°C) |
| Digital 1900MHz | Channel 512 | 29.49 | | | | |
| | Channel 661 | 29.50 | 0.35 | -0.06 | 0.35 | 20 |
| | Channel 810 | 29.47 | | | | |

Table 7: SAR measurement results for the portable cellular telephone FCC ID IHDT6FW1 at highest possible output power. Measured against the body.

Appendix 1

SAR distribution comparison for the system accuracy verification

Test Laboratory: Motorola

082305 1800MHz GOOD 0.5%

Dipole 1800 MHz; Type: D1800V2

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 251tr; PM1 Power = 200 mW;
Sim.Temp@ meas = 20.5°C; Sim.Temp@ SPC = 19.9°C; Room Temp@ SPC = 22°C

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

Medium: VALIDATION Only; Medium parameters used: $\sigma = 1.39$ mho/m, $\epsilon_r = 38.8$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

Daily SPC Check/Dipole Area Scan (9x4x1):

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 7.18 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Reference Value = 83.6 V/m; Power Drift = -0.037dB

Peak SAR (extrapolated) = 13.4 W/kg; **SAR(1 g) = 7.84 mW/g; SAR(10 g) = 4.21 mW/g**

Maximum value of SAR (measured) = 8.74 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Reference Value = 83.6 V/m; Power Drift = -0.037dB

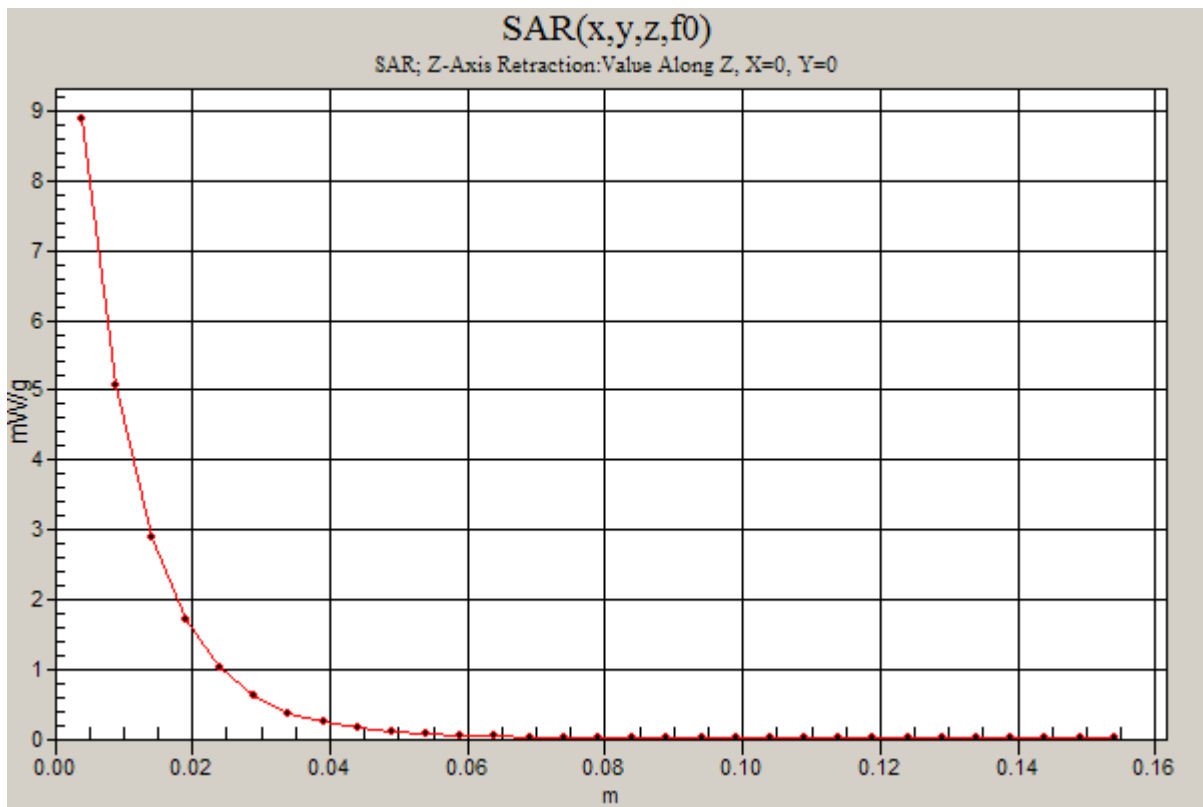
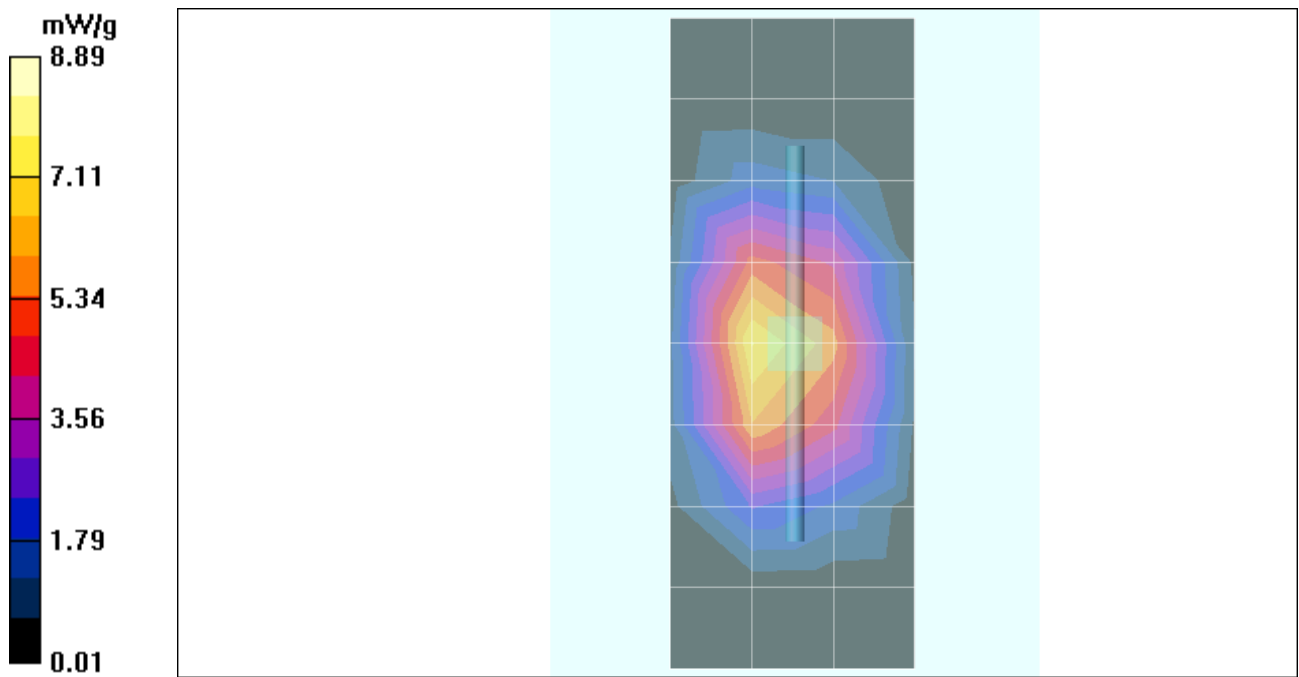
Peak SAR (extrapolated) = 12.9 W/kg; **SAR(1 g) = 7.47 mW/g; SAR(10 g) = 4 mW/g**

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

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.89 mW/g



Test Laboratory: Motorola

082405 1800MHz GOOD -0.7%

DUT: Dipole 1800 MHz; Type: D1800V2;

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 251tr; PM1 Power = 200 mW;
Sim.Temp@ meas = 19.9°C; Sim.Temp@ SPC = 19.8°C; Room Temp@ SPC = 21°C

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

Medium: VALIDATION Only; Medium parameters used: $\sigma = 1.37$ mho/m, $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

Daily SPC Check/Dipole Area Scan (9x4x1):

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 7.86 mW/g

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

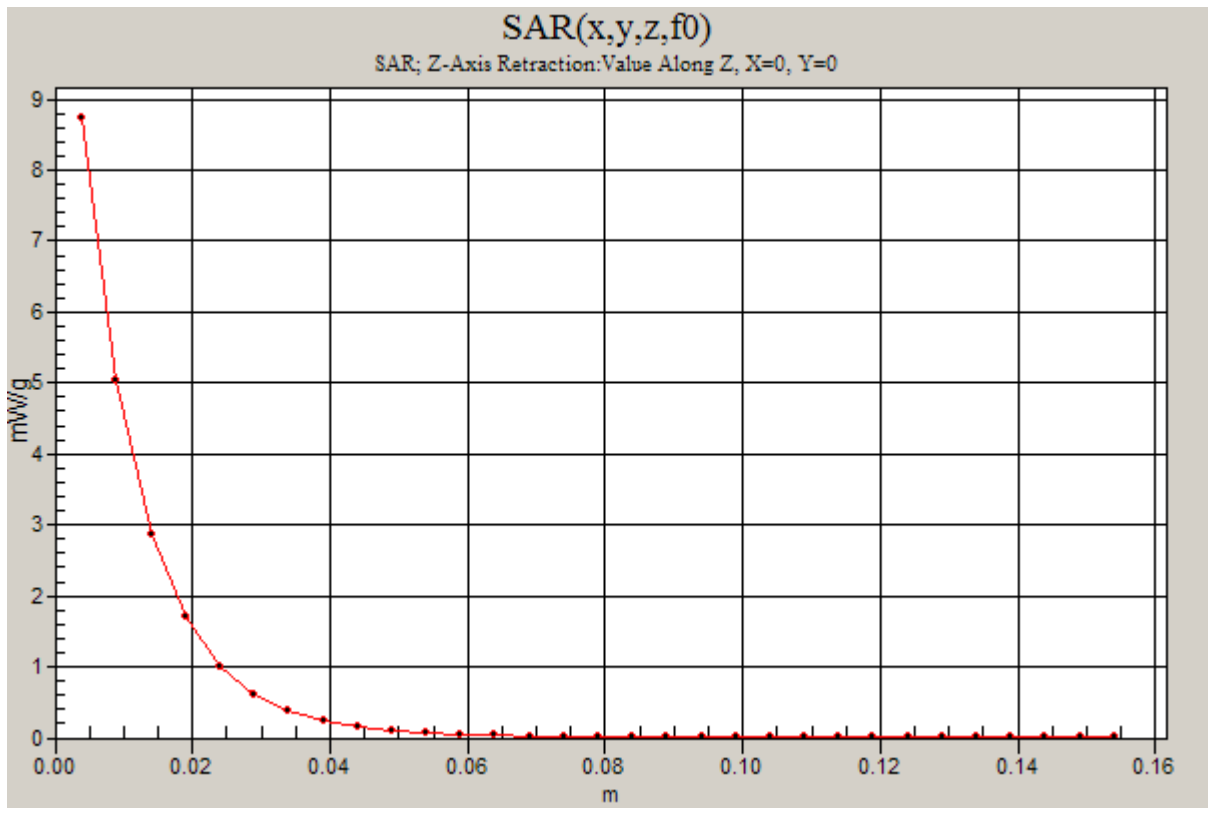
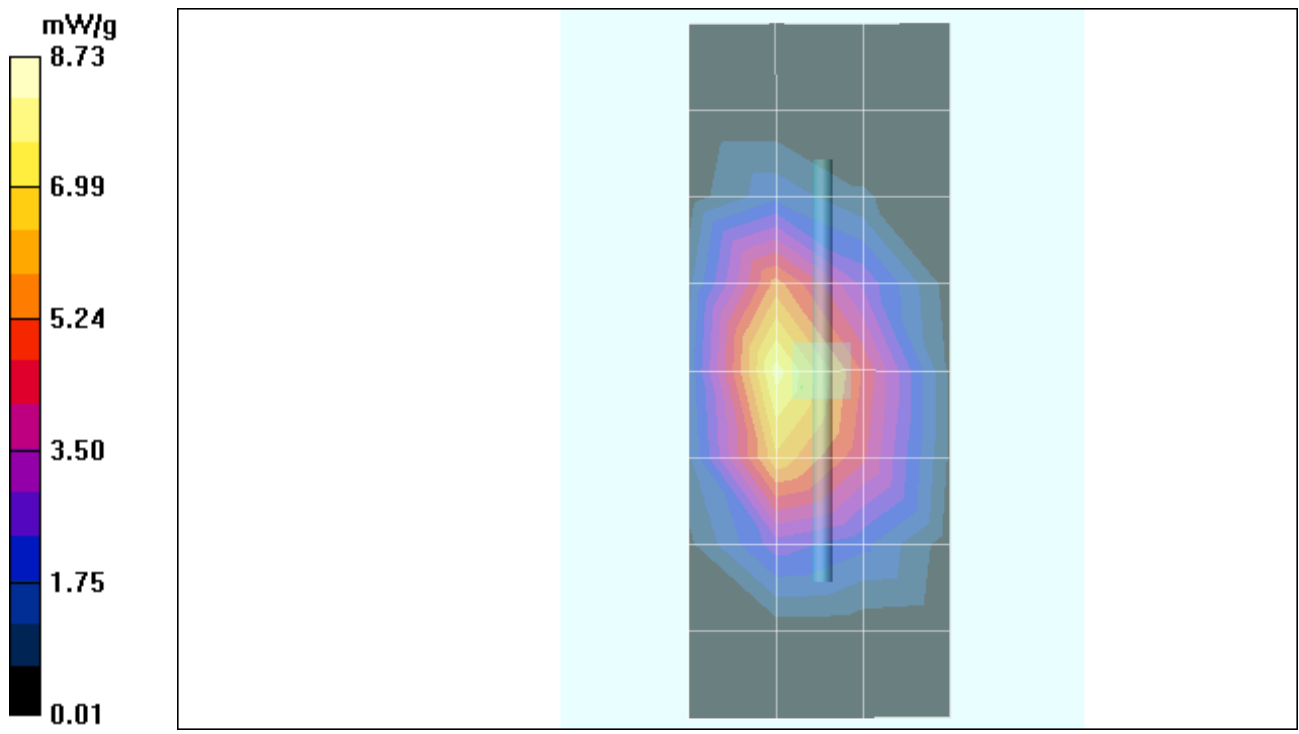
Measurement grid: dx=8mm, dy=8mm, dz=5mm; Reference Value = 80.4 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 13.1 W/kg; **SAR(1 g) = 7.73 mW/g; SAR(10 g) = 4.14 mW/g**
Maximum value of SAR (measured) = 8.57 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Reference Value = 80.4 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 12.7 W/kg; **SAR(1 g) = 7.41 mW/g; SAR(10 g) = 3.98 mW/g**
Maximum value of SAR (measured) = 8.25 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.73 mW/g



Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Accessory Model #: none; Battery Model #: SNN5768A; DEVICE POSITION: Cheek

Communication System: GSM 1900; Frequency: 1909.8 MHz; Communication System Channel Number: 810; Duty Cycle: 1:8;

Medium: Regular Glycol Head; Medium parameters used: $\sigma = 1.47$ mho/m, $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

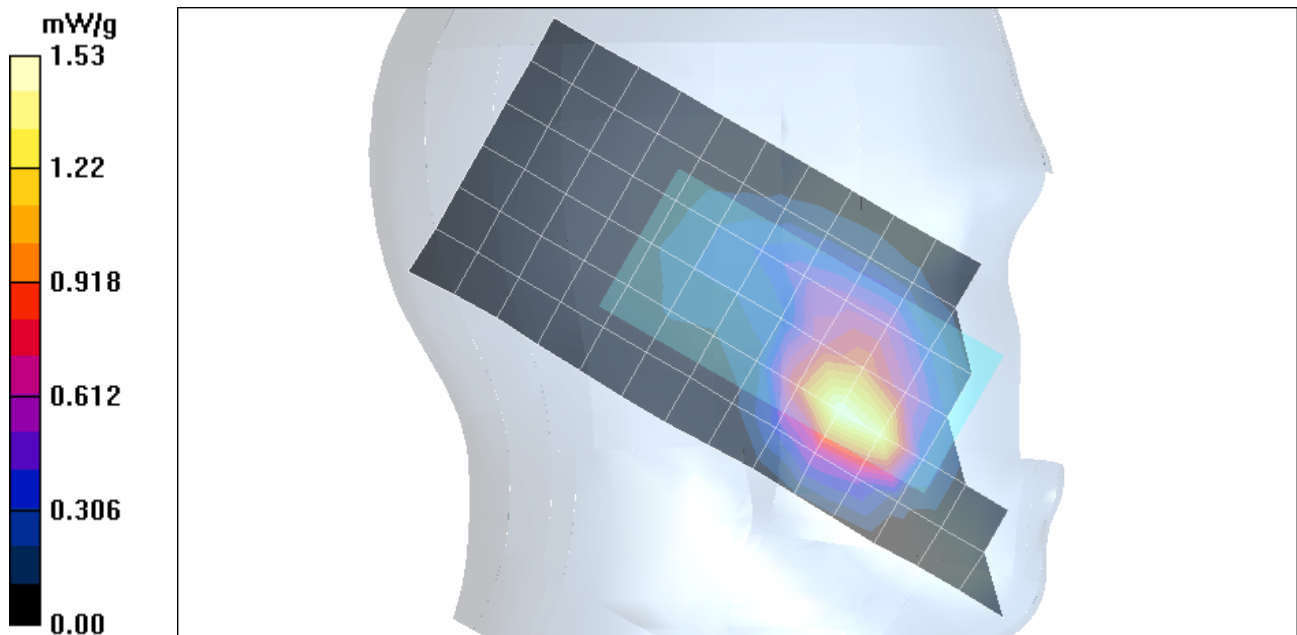
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.53 mW/g

Left Head Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 33.4 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 2.73 W/kg; **SAR(1 g) = 1.47 mW/g; SAR(10 g) = 0.774 mW/g**

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



Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Accessory Model #: none; Battery Model #: SNN5768A; DEVICE POSITION: Tilt

Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8

Medium: Regular Glycol Head; Medium parameters used: $\sigma = 1.47$ mho/m, $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

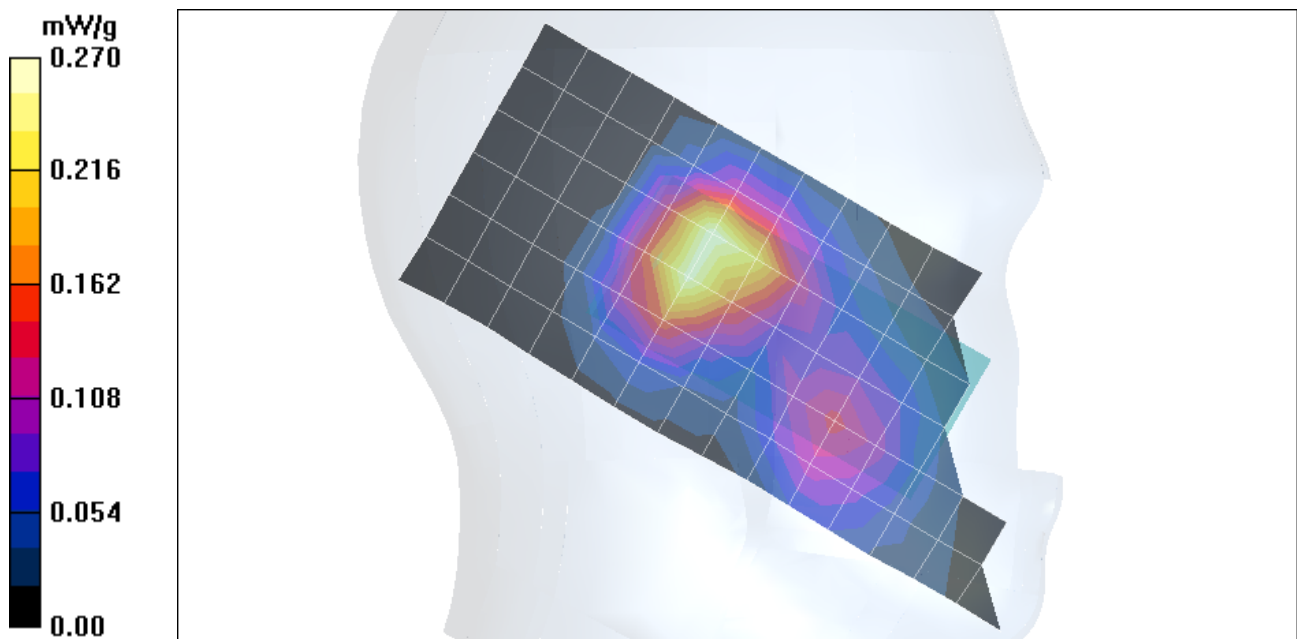
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.270 mW/g

Left Head Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 13.8 V/m; Power Drift = 0.042 dB

Peak SAR (extrapolated) = 0.381 W/kg; SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.166 mW/g

Maximum value of SAR (measured) = 0.291 mW/g



Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Accessory Model #: none; Battery Model #: SNN5779A; DEVICE POSITION: Cheek

Communication System: GSM 1900; Frequency: 1909.8 MHz; Communication System Channel Number: 810; Duty Cycle: 1:8

Medium: Regular Glycol Head; Medium parameters used: $\sigma = 1.47$ mho/m, $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

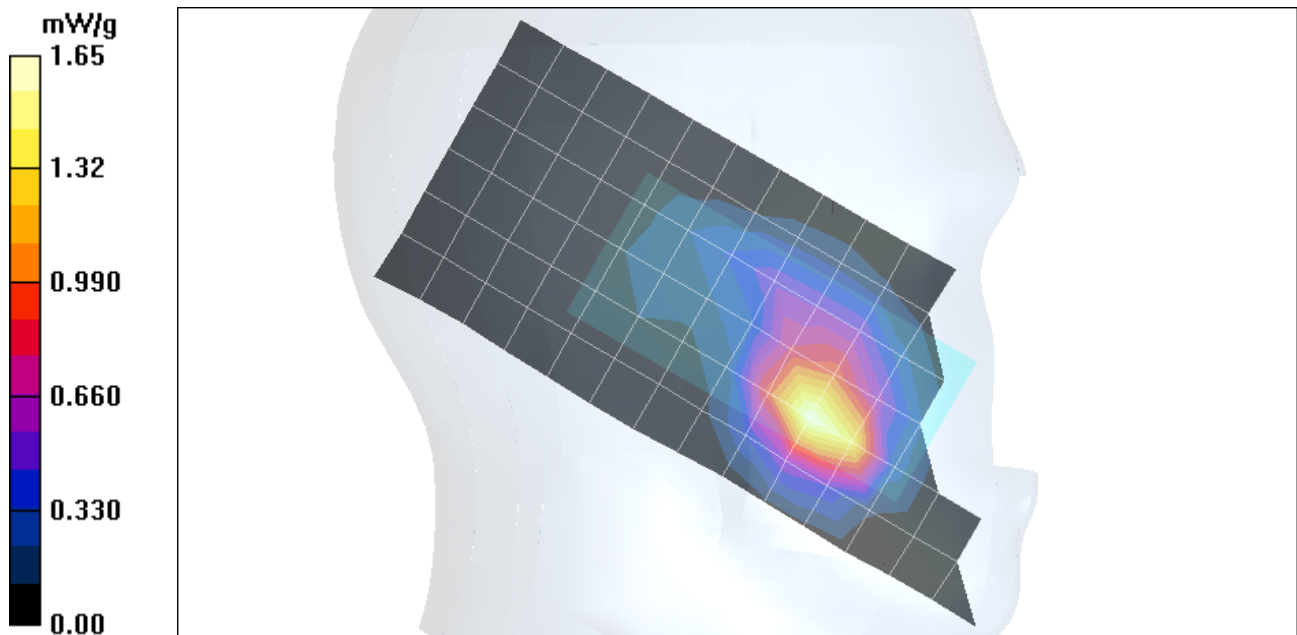
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.65 mW/g

Left Head Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 33.5 V/m; Power Drift = -0.011dB

Peak SAR (extrapolated) = 2.85 W/kg; **SAR(1 g) = 1.54 mW/g**; **SAR(10 g) = 0.807 mW/g**

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



Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Accessory Model #: none; Battery Model #: SNN5779A; DEVICE POSITIO: Tilt

Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8

Medium: Regular Glycol Head; Medium parameters used: $\sigma = 1.47$ mho/m, $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

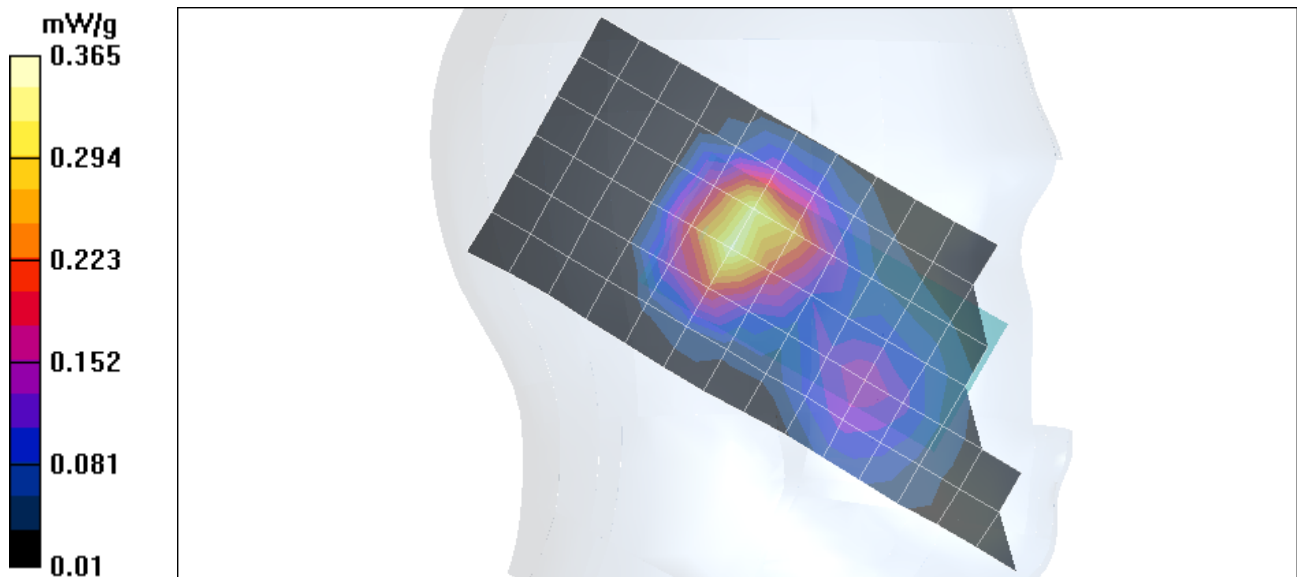
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.349 mW/g

Left Head Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 15.3 V/m; Power Drift = -0.059dB

Peak SAR (extrapolated) = 0.476 W/kg; **SAR(1 g) = 0.338 mW/g**; **SAR(10 g) = 0.209 mW/g**

Maximum value of SAR (measured) = 0.365 mW/g



Appendix 3

SAR distribution plots for Body Worn Configuration

Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Battery Model #: SNN5768A; Accessory Model #: none; DEVICE POSITION: Front of Phone 15mm from Phantom
Communication System: GSM 1900; Frequency: 1880 MHz;
Communication System Channel Number: 661; Duty Cycle: 1:8
Medium: Regular Glycol Body; Medium parameters used: $\sigma = 1.58$ mho/m, $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

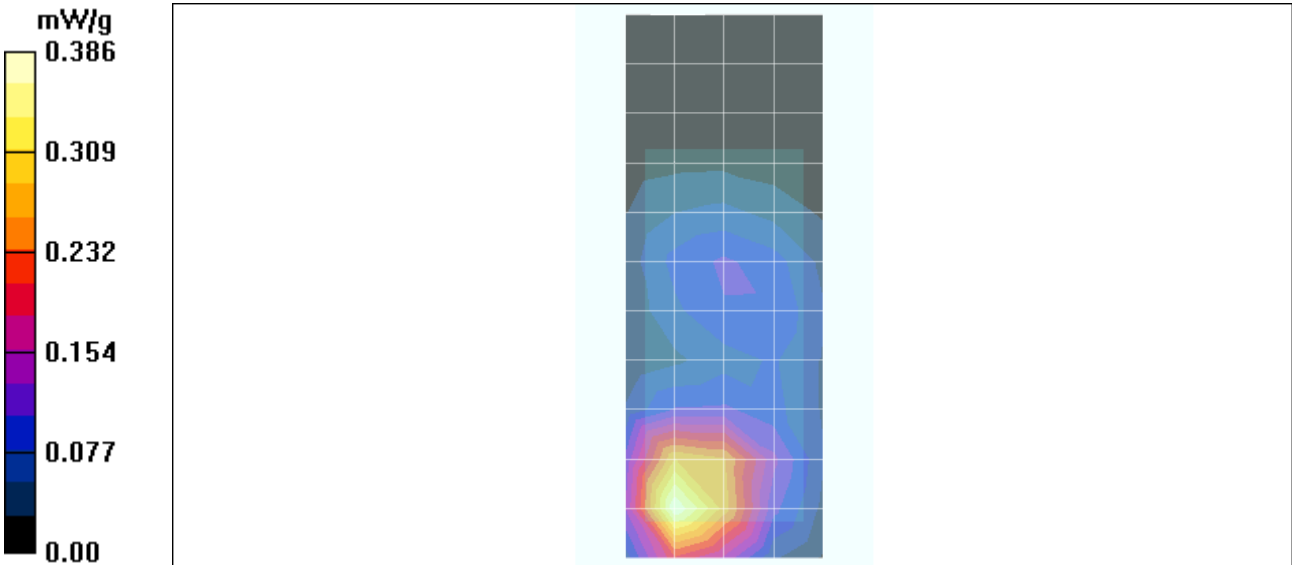
- Probe: ET3DV6R - SN1397; ConvF(4.77, 4.77, 4.77); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.386 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 14.7 V/m; Power Drift = -0.046dB
Peak SAR (extrapolated) = 0.615 W/kg; **SAR(1 g) = 0.368 mW/g; SAR(10 g) = 0.212 mW/g**
Maximum value of SAR (measured) = 0.405 mW/g



Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Battery Model #: SNN5768A; Accessory Model #: none; DEVICE POSITION: Back of Phone 15mm from Phantom

Communication System: GSM 1900; Frequency: 1880 MHz;

Communication System Channel Number: 661; Duty Cycle: 1:8

Medium: Regular Glycol Body; Medium parameters used: $\sigma = 1.58$ mho/m, $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(4.77, 4.77, 4.77); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

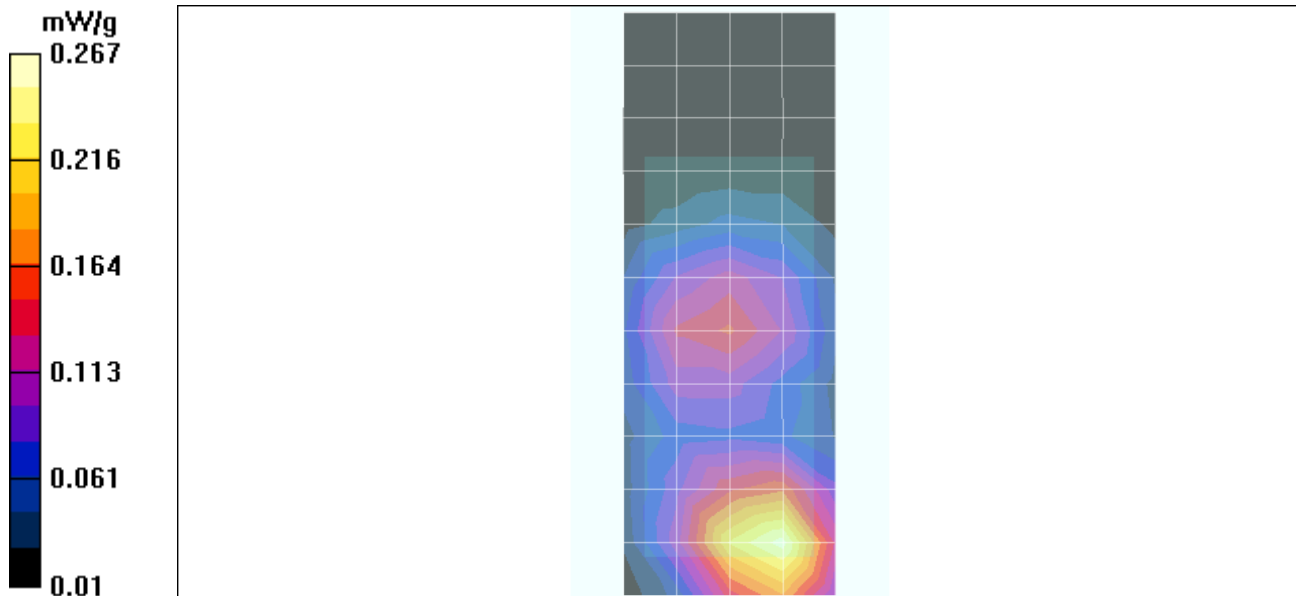
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.259 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 12.3 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.374 W/kg; **SAR(1 g) = 0.244 mW/g; SAR(10 g) = 0.149 mW/g**

Maximum value of SAR (measured) = 0.267 mW/g



Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Battery Model #: SNN5768A; Accessory Model #: none; DEVICE POSITION: Front of Phone 15mm from Phantom & Bluetooth Headset

Communication System: GSM 1900; Frequency: 1880 MHz;

Communication System Channel Number: 661; Duty Cycle: 1:8

Medium: Regular Glycol Body; Medium parameters used: $\sigma = 1.58$ mho/m, $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(4.77, 4.77, 4.77); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

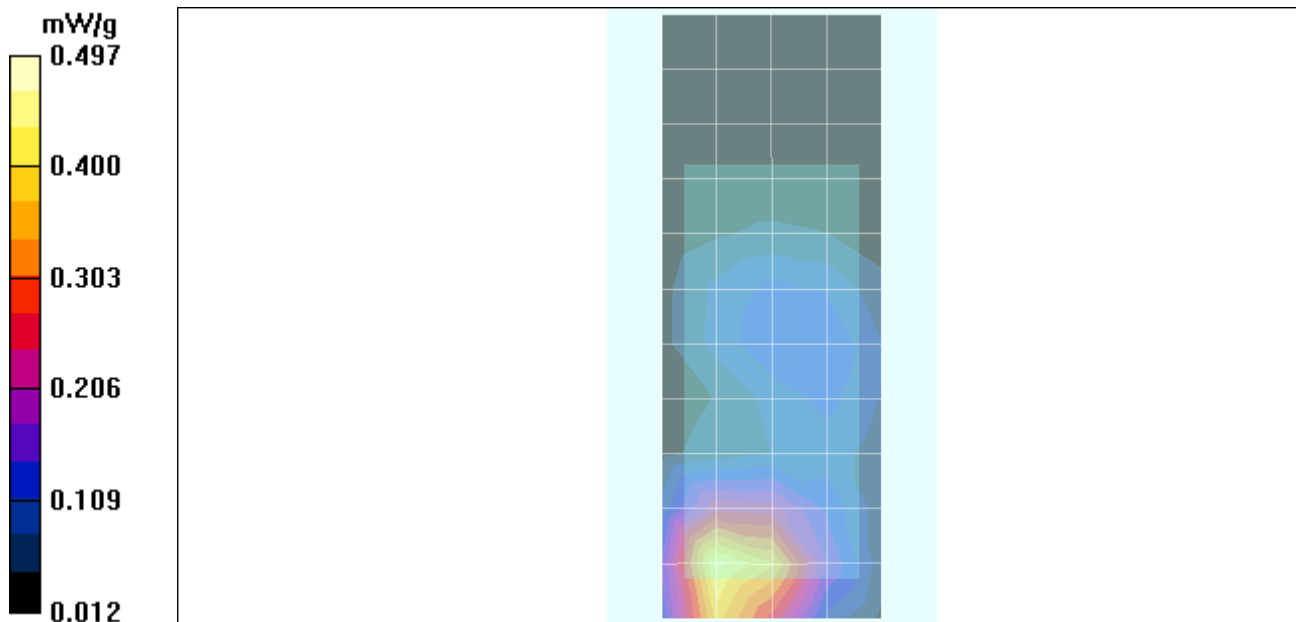
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.444 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 16.0 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 0.757 W/kg; **SAR(1 g) = 0.450 mW/g**; **SAR(10 g) = 0.259 mW/g**

Maximum value of SAR (measured) = 0.497 mW/g



Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Battery Model #: SNN5768A; Accessory Model #: none; DEVICE POSITION: Front of Phone 25mm from Phantom

Communication System: GPRS 1900 - Class 10; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:4

Medium: Regular Glycol Body; Medium parameters used: $\sigma = 1.58$ mho/m, $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(4.77, 4.77, 4.77); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

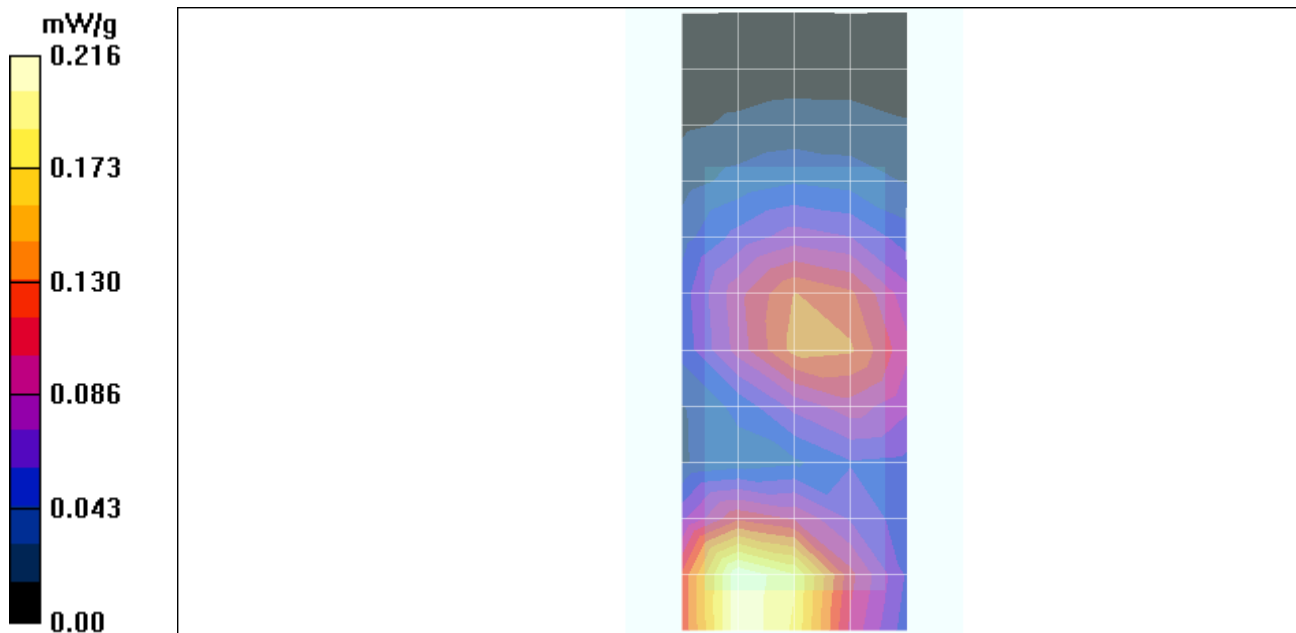
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.216 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 11.0 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 0.356 W/kg; **SAR(1 g) = 0.224 mW/g; SAR(10 g) = 0.138 mW/g**

Maximum value of SAR (measured) = 0.243 mW/g



Test Laboratory: Motorola

Serial: G0LT0101MK

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Battery Model #: SNN5779A; Accessory Model #: none; DEVICE POSITION: Front of Phone 15mm from Phantom & Bluetooth Headset
Communication System: GSM 1900; Frequency: 1880 MHz;
Communication System Channel Number: 661; Duty Cycle: 1:8
Medium: Regular Glycol Body; Medium parameters used: $\sigma = 1.58$ mho/m, $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

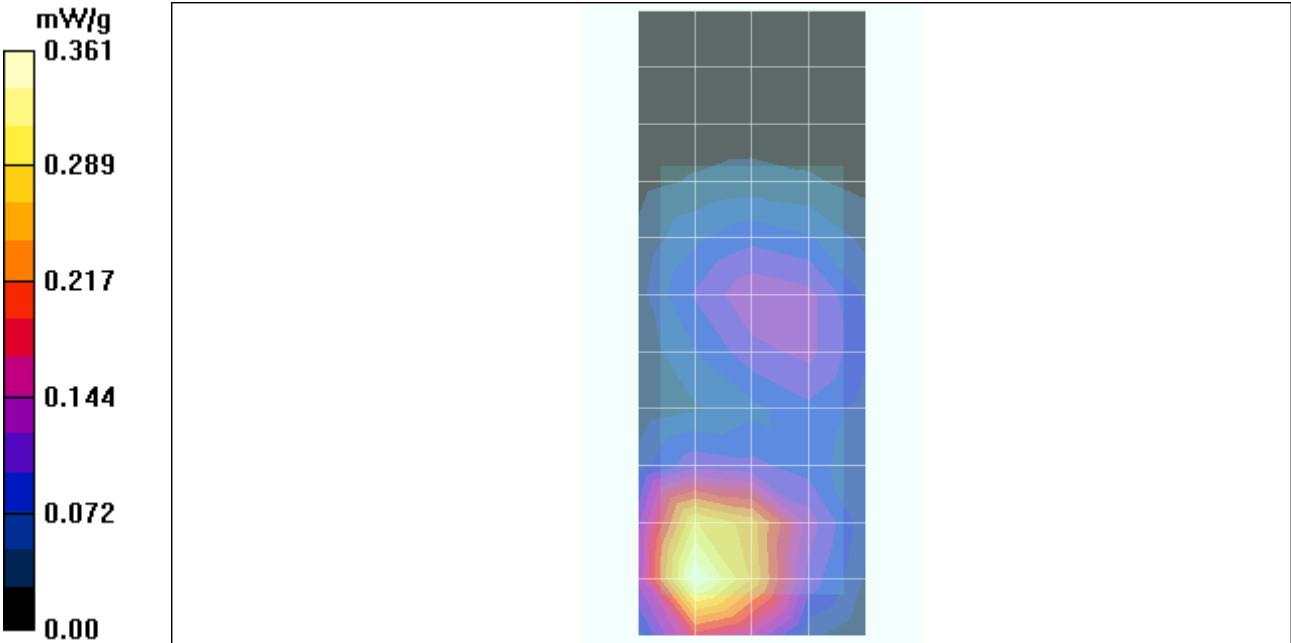
- Probe: ET3DV6R - SN1397; ConvF(4.77, 4.77, 4.77); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 3/16/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 147

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.361 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm; Reference Value = 14.4 V/m; Power Drift = -0.056dB
Peak SAR (extrapolated) = 0.576 W/kg; **SAR(1 g) = 0.350 mW/g; SAR(10 g) = 0.203 mW/g**
Maximum value of SAR (measured) = 0.381 mW/g



Appendix 4
Probe Calibration Certificate



Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No. **ET3-1397_Apr05**

CALIBRATION CERTIFICATE

Object **ET3DV6R SN:1397**

Calibration procedure(s) **QA-CAL-01 v5
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 22, 2005**

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|----------------------------|-----------------|---|------------------------|
| Power meter E4419B | GB41293874 | 5-May-04 (METAS, No. 251-00388) | May-05 |
| Power sensor E4412A | MY41495277 | 5-May-04 (METAS, No. 251-00388) | May-05 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 10-Aug-04 (METAS, No. 251-00403) | Aug-05 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 3-May-04 (METAS, No. 251-00389) | May-05 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 10-Aug-04 (METAS, No. 251-00404) | Aug-05 |
| Reference Probe ES3DV2 | SN: 3013 | 7-Jan-05 (SPEAG, No. ES3-3013_Jan05) | Jan-06 |
| DAE4 | SN: 617 | 19-Jan-05 (SPEAG, No. DAE4-617_Jan05) | Jan-06 |
| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
| Power sensor HP 8481A | MY41092180 | 18-Sep-02 (SPEAG, in house check Oct-03) | In house check: Oct 05 |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (SPEAG, in house check Dec-03) | In house check: Dec-05 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (SPEAG, in house check Nov-04) | In house check: Nov 05 |

| | Name | Function | Signature |
|----------------|---------------|-----------------------|-----------|
| Calibrated by: | Nico Vetterli | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: April 25, 2005

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



Accredited by the Swiss Federal Office of Metrology and Accreditation
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 _{x,y,z} | sensitivity in free space |
| ConF | sensitivity in TSL / NORM _{x,y,z} |
| DCP | diode compression point |
| Polarization ϕ | ϕ rotation around probe axis |
| Polarization ϑ | ϑ 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *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_{x,y,z}**: 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_{x,y,z} * *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 ± 50 MHz to ± 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 ET3DV6R

SN:1397

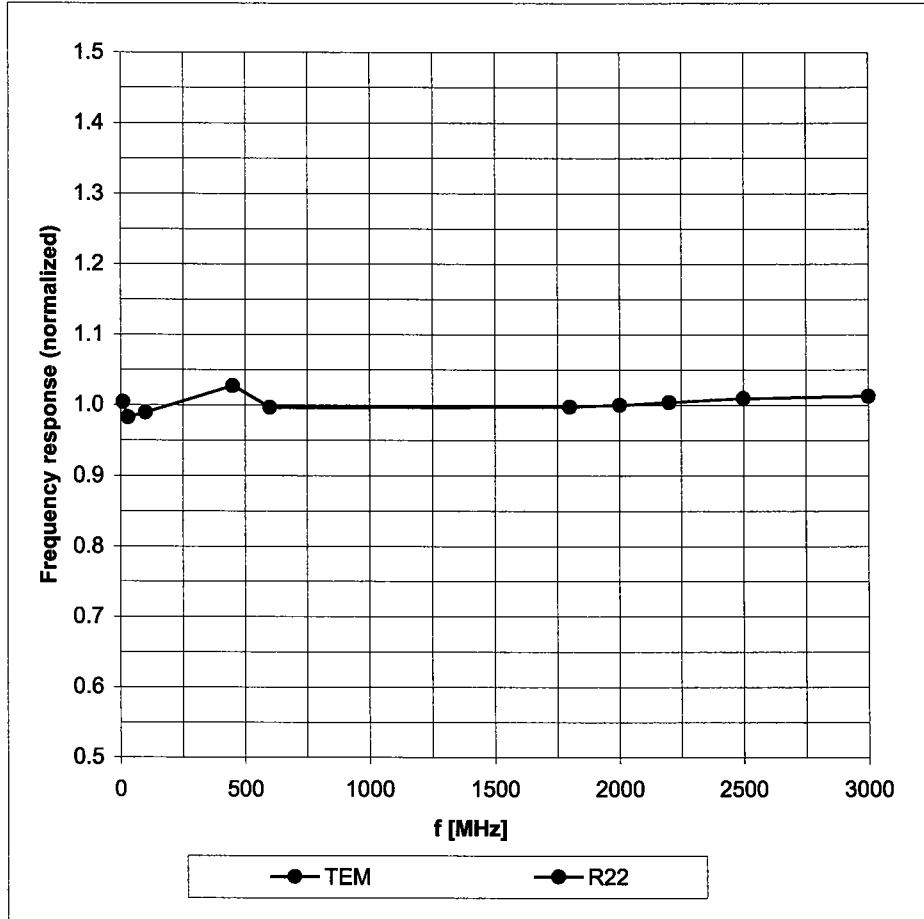
| | |
|------------------|------------------|
| Manufactured: | October 24, 1999 |
| Last calibrated: | May 21, 2004 |
| Recalibrated: | April 22, 2005 |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

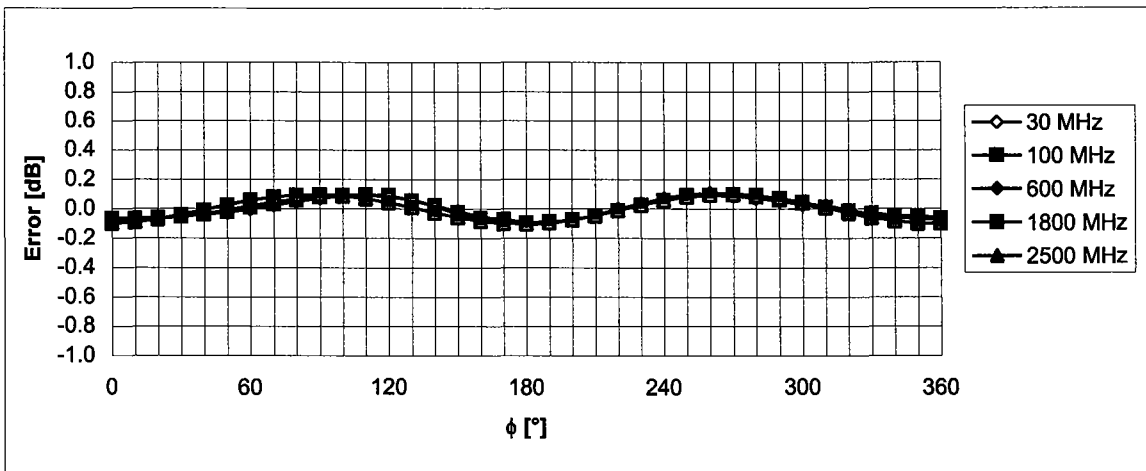
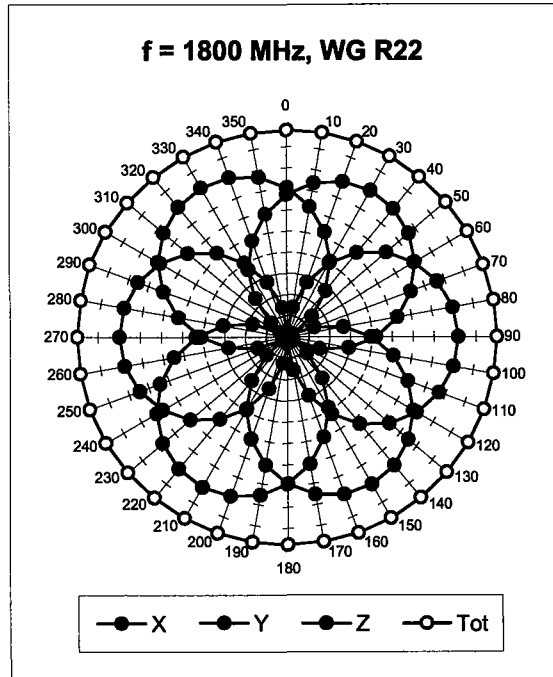
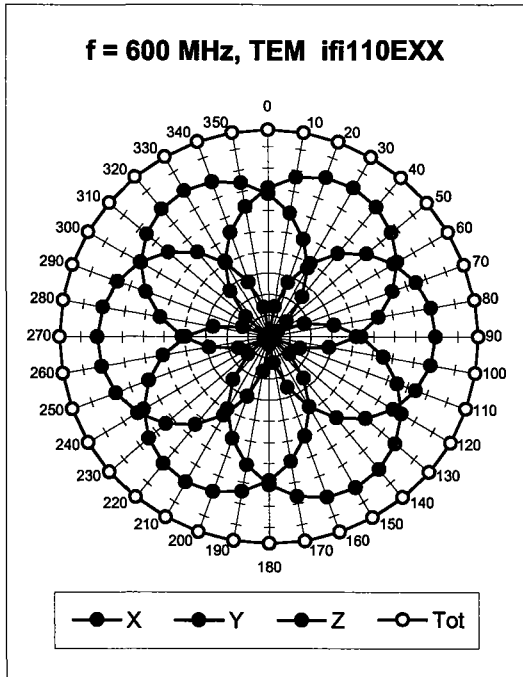
Frequency Response of E-Field

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



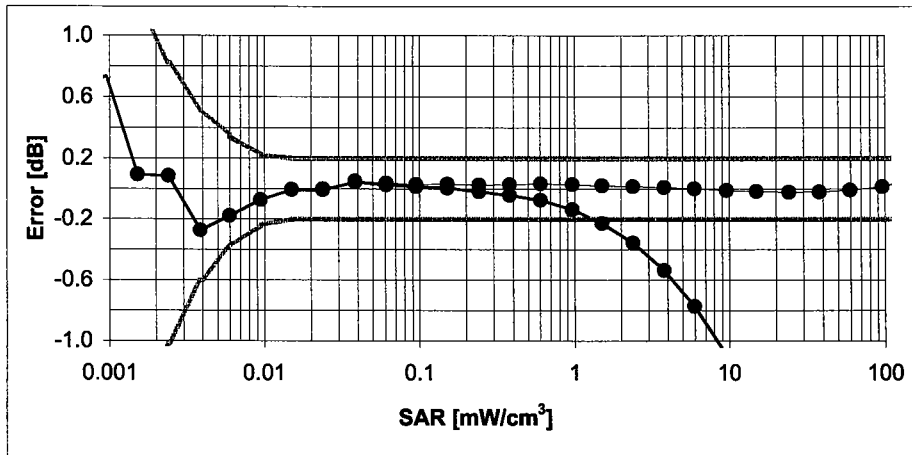
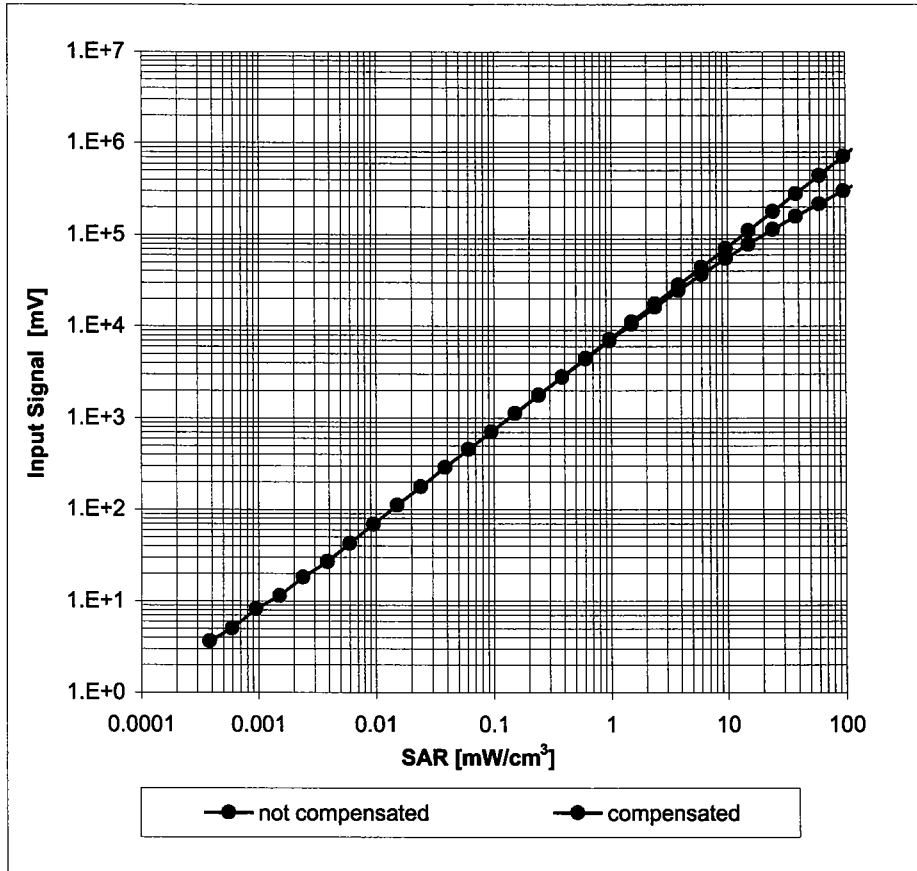
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



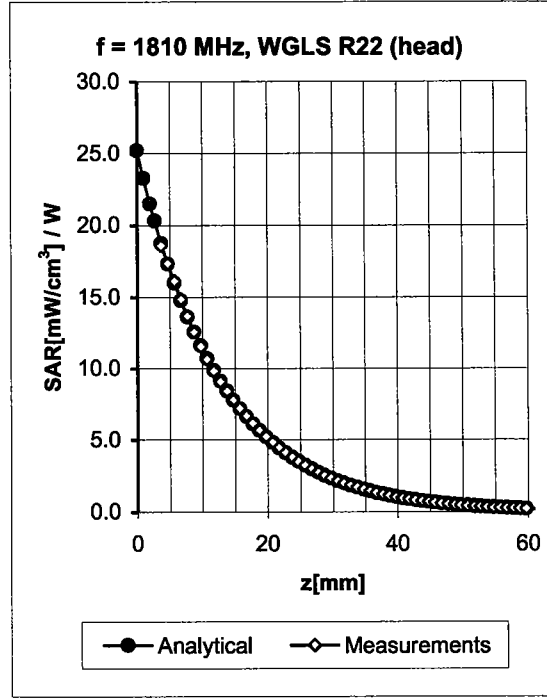
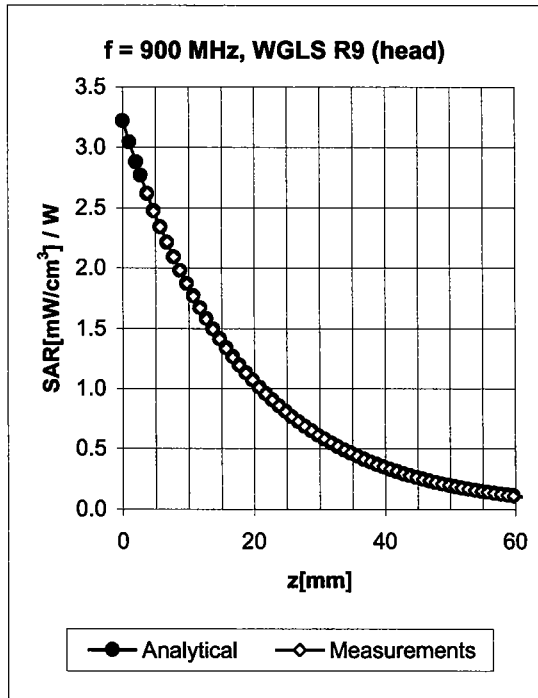
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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

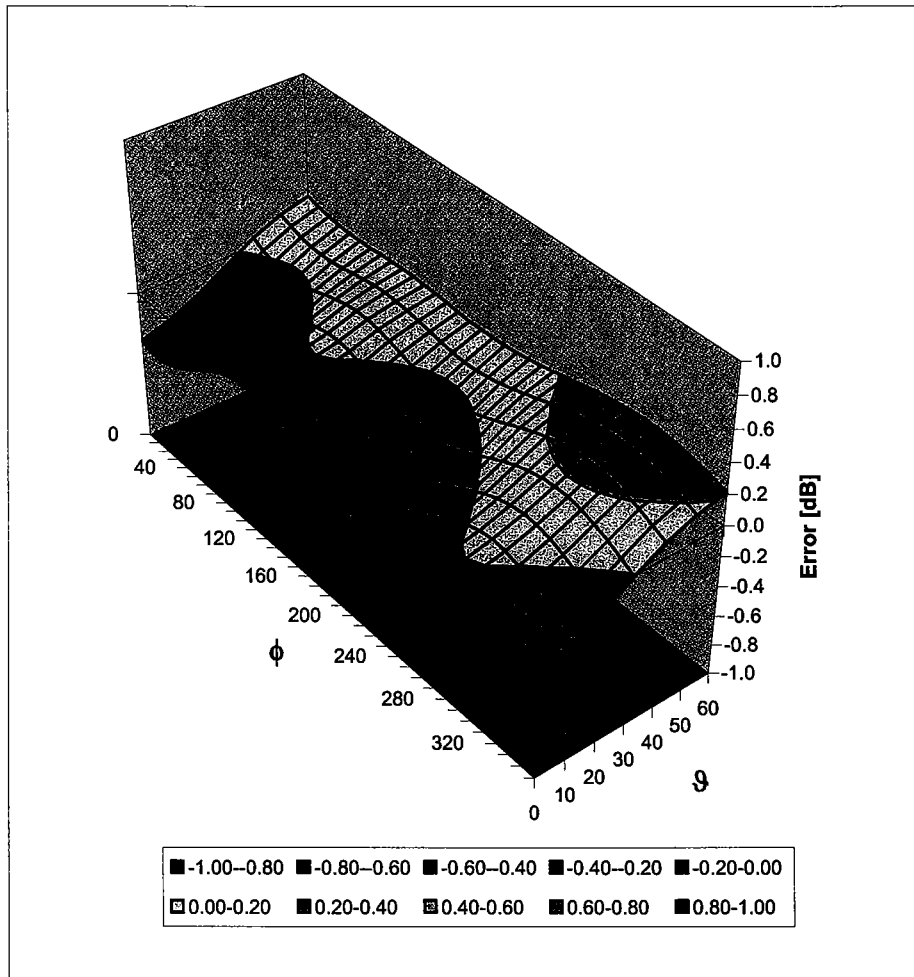


| f [MHz] | Validity [MHz] ^c | TSL | Permittivity | Conductivity | Alpha | Depth | ConvF Uncertainty |
|---------|-----------------------------|------|--------------|--------------|-------|-------|--------------------|
| 900 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.97 ± 5% | 0.71 | 1.73 | 6.38 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.60 | 2.37 | 5.17 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.59 | 2.49 | 4.90 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.58 | 2.00 | 6.22 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.57 | 2.75 | 4.77 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.60 | 2.53 | 4.44 ± 11.0% (k=2) |

^c 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 (ϕ, ϑ), $f = 900$ MHz



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

Appendix 5
Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test: 30 – 3000 MHz

| <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | <i>e = f(d,k)</i> | <i>f</i> | <i>g</i> | <i>h = c x f / e</i> | <i>i = c x g / e</i> | <i>k</i> |
|--|-------------------------|------------------|------------------|-----------------------|-------------------------------|-----------------------------------|---|--|----------------------|
| Uncertainty Component | IEEE 1528 section | Tol. (± %) | Prob Dist | Div. | <i>c_i</i> (1 g) | <i>c_i</i> (10 g) | 1 g <i>u_i</i> (±%) | 10 g <i>u_i</i> (±%) | <i>v_i</i> |
| Measurement System | | | | | | | | | |
| 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 | ∞ |
| Test sample Related | | | | | | | | | |
| 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 | ∞ |
| Phantom and Tissue Parameters | | | | | | | | | |
| 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 | ∞ |
| Combined Standard Uncertainty | | | RSS | | | | 11.1 | 10.8 | 411 |
| Expanded Uncertainty (95% CONFIDENCE LEVEL) | | | <i>k</i> =2 | | | | 22.2 | 21.6 | |

Uncertainty Budget for System Check: 30 – 3000 MHz

| <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | <i>e = f(d,k)</i> | <i>f</i> | <i>g</i> | <i>h = c x f / e</i> | <i>i = c x g / e</i> | <i>k</i> |
|---|-------------------------|------------------|----------------|-----------------------|----------------------------------|-----------------------------------|---|--|----------------------|
| Uncertainty Component | IEEE 1528 section | Tol. (± %) | Prob. Dist. | Div. | <i>c_i</i> (1 g) | <i>c_i</i> (10 g) | 1 g <i>u_i</i> (±%) | 10 g <i>u_i</i> (±%) | <i>v_i</i> |
| Measurement System | | | | | | | | | |
| 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 | 1 | 1 | 2.7 | 2.7 | ∞ |
| Spherical Isotropy | E.2.2 | 9.6 | R | 1.73 | 0 | 0 | 0.0 | 0.0 | ∞ |
| 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 | 0.0 | R | 1.73 | 1 | 1 | 0.0 | 0.0 | ∞ |
| 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 Mechanical 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 | ∞ |
| Dipole | | | | | | | | | |
| Dipole Axis to Liquid Distance | ⁸ , E.4.2 | 2.0 | R | 1.73 | 1 | 1 | 1.2 | 1.2 | ∞ |
| Input Power and SAR Drift Measurement | ⁸ , 6.6.2 | 5.0 | R | 1.73 | 1 | 1 | 2.9 | 2.9 | ∞ |
| Phantom and Tissue Parameters | | | | | | | | | |
| 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 | R | 1.73 | 0.64 | 0.43 | 1.2 | 0.8 | ∞ |
| 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 | R | 1.73 | 0.6 | 0.49 | 0.6 | 0.5 | ∞ |
| Combined Standard Uncertainty | | | RSS | | | | 9.0 | 8.8 | 9999 9 |
| Expanded Uncertainty (95% CONFIDENCE LEVEL) | | | <i>k</i> =2 | | | | 17.7 | 17.3 | |

Appendix 6

Photographs of the device under test



Figure 1. Front of Phone



Figure 2. Back of Phone



Figure 3. Phone Against the Head Phantom (Cheek Touch)



Figure 4. Phone Against the Head Phantom (15°Tilt)



Figure 5. Phone Against the Flat Phantom