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TEST REPORT ON SAR

Model Tested: SPH-A640
FCC ID (Requested): A3LSPHA640
Report No: FA-009-S1
Date issued: April 30, 2003

- Abstract -

This document reports on SAR Tests carried out in accordance with FCC/OET Bulletin 65, Supplement C(July 2001).

| | | | |
|---------------|---|------|-----------------------|
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1. GENERAL INFORMATION

Test Sample : Tri-Mode Dual-Band Analog / PCS Phone (AMPS/CDMA)
Model Number : SPH-A640
Serial Number : Identical prototype (S/N : # FA-009-F)
Manufacturer : SAMSUNG ELECTRONICS Co., Ltd.
Contact : SK. Park, Engineer
Phone : +82-31-279-6299
Fax : +82-31-279-6323
Test Standard : §2.1093; FCC/OET Bulletin 65, Supplement C(July 2001)
FCC Classification : Licensed Portable Transmitter Held to Ear (PCE)
Test Dates : April 23,2003 ~ April 25,2003
Tested for : FCC/TCB Certification

2. DESCRIPTION OF DEVICE

Tx Freq. Range : 824.04 –848.97 MHz (AMPS) / 824.70 –848.31 MHz (CDMA)
1851.25– 1908.75 MHz (PCS CDMA)
Rx Freq. Range : 869.04 –893.97 MHz (AMPS) / 869.70 –893.31 MHz (CDMA)
1931.25– 1988.75 MHz (PCS CDMA)
Max. RF Output Power : 0.406W ERP AMPS (26.083dBm)
0.357W ERP CDMA (25.523dBm)
0.323W EIRP PCS (25.081dBm)
Antenna Manufacturer : Filtronic LK
Model No.: SPH-A640
Antenna Dimensions : Intenna

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR Measurement Setup

Robotic System

Measurements are performed using the DASY3 automated dosimetric assessment system. Which is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Stäubli), robot controller, Pentium computer, near-field probe, probe alignment sensor, and the SAM twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Fig. 3.1).

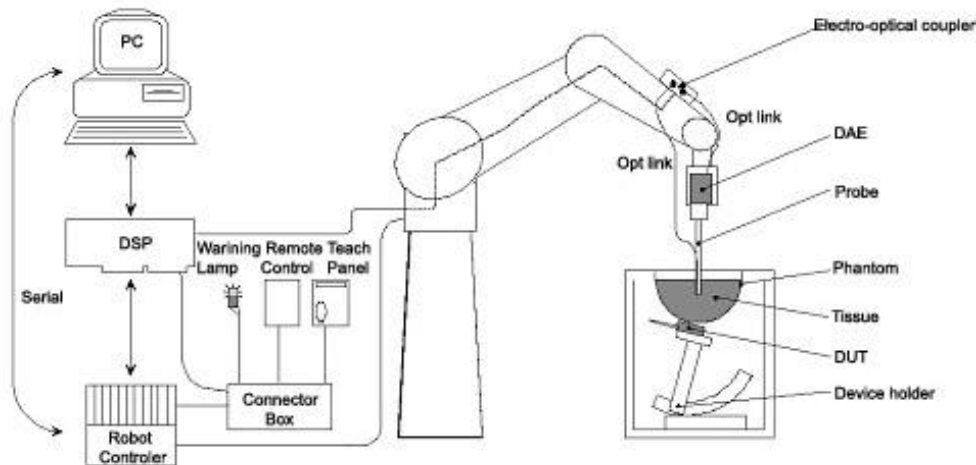


Figure 3.1 SAR Measurement System Setup

System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control is used to drive the robot motors. The PC consists of the Samsung Pentium 550MHz computer with Windows 2000 system and SAR Measurement Software DASY3, A/D interface card, LCD monitor, mouse and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

System Electronics

The DAE3 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain - switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

3.2 DASY3 E-field Probe



The SAR measurement were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration (see Fig.3.3) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip (see Fig.3.4). It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving

Figure 3.2 DAE System fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY3 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting (see Fig.3.2). The approach is stopped at reaching the maximum.

Probe Specifications

| | |
|--------------|---|
| Construction | Symmetrical design with triangular core |
| | Built-in optical fiber for surface detection system |
| | Built-in shielding against static charges |
| | PEEK enclosure material (resistant to organic solvents, e.g., glycoether) |



Calibration In air from 10 MHz to 2.5 GHz
 In brain and muscle simulating liquid at 835MHz and 1900MHz (accuracy $\pm 9.5\%$; $k=2$)

Frequency 10 MHz to 3 GHz; Linearity : ± 0.2 dB (30 MHz to 3 GHz)

Directivity ± 0.2 dB in HSL (rotation around probe axis)
 ± 0.4 dB in HSL (rotation normal to probe axis)

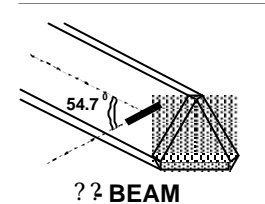


Figure 3.3 Triangular Probe Configuration

Dynamic Range $5\mu\text{W/g}$ to $> 100\text{mW/g}$; Linearity: $\pm 0.2\text{dB}$

Dimensions Overall length: 330mm
 Tip length: 16mm
 Body diameter: 12mm
 Tip diameter: 6.8mm
 Distance from probe tip to dipole centers: 2.7mm



Figure 3.4 Probe Thick-Film Technique

Application General dosimetry up to 3 GHz
 Compliance tests of mobile phones
 Fast automatic scanning in arbitrary phantoms

Optical Surface Detection ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces

3.3 SAM Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid.

Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. (See Figure 3.5)



Figure 3.5 SAM Twin Phantom

Phantom Specification

| | |
|-----------------|---|
| Construction | The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. |
| Shell Thickness | 2 ± 0.2 mm |
| Filling Volume | Approx. 25 liters |
| Dimensions | Height: 810 mm; Length: 1000 mm; Width: 500 mm |

3.4 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations.

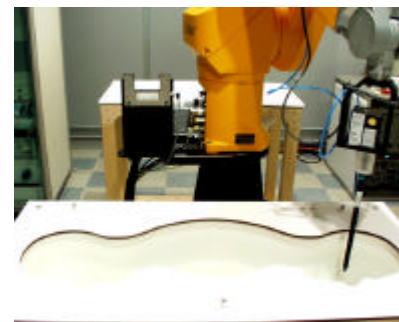


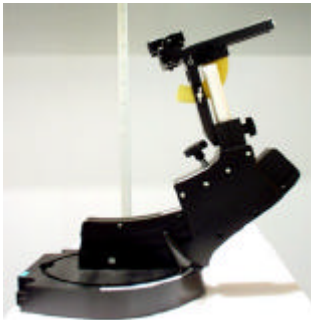
Figure 3.6 Simulated Tissue

Table 3.1 Composition of the Brain & Muscle Tissue Equivalent Matter

| INGREDIENTS | 835MHz Brain | 835MHz Muscle | 1900MHz Brain | 1900MHz Muscle |
|----------------------------|--------------|---------------|---------------|----------------|
| WATER | 51.07% | 65.45% | 54.88% | 69.91% |
| SUGAR | 47.31% | 34.31% | - | - |
| SALT | 1.150% | 0.620% | 0.210% | 0.130% |
| DGBE | - | - | 44.91% | 29.96% |
| BACTERIACIDE | 0.240% | 0.100% | - | - |
| HEC | 0.230% | - | - | - |
| Dielectric Constant Target | 41.50 | 55.20 | 40.00 | 53.30 |
| Conductivity Target (S/m) | 0.900 | 0.970 | 1.400 | 1.520 |

3.5 Device Holder for Transmitters

In combination with the Twin SAM Phantom V4.0, the Mounting Device (see Fig. 3.7) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear



opening. The devices can be easily, accurately and repeatedly be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

*Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configuration. To produce worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Figure 3.7 Device Holder

3.6 Validation Dipole

The reference dipole should have a return loss better than -20 dB (measured in the setup) at the resonant frequency to reduce the uncertainty in the power measurement.

| | |
|-------------|--|
| Frequency | 835, 1900 MHz |
| Return Loss | < -20 dB at specified validation position |
| Dimensions | D835V2: dipole length: 161 mm; overall height: 330 mm D1900V2: dipole length: 68 mm; overall height: 300 mm |



3.7 Equipment Calibration

Table 3.2 Test Equipment Calibration

| Type | Calibration Date | Serial Number |
|---------------------------------|------------------|---------------|
| Stäubli Robot RX90BL | Not Required | SWR-S001 |
| SPEAG DAE3 | 2002-10-03 | SWR-S025 |
| SPEAG E-Field Probe ET3DV6 | 2002-05-22 | SWR-S023 |
| SPEAG SAM Twin Phantom V4.0 | Not Required | SWR-S001-b |
| SPEAG SAM Twin Phantom V4.0 | Not Required | SWR-S001-c |
| SPEAG Validation Dipole D835V2 | 2002-01-10 | SWR-S026 |
| SPEAG Validation Dipole D1900V2 | 2002-01-10 | SWR-S029 |
| EPM-441 Power Meter | 2002-8-27 | SWR-S036 |
| E4419B Power Meter | 2002-11-25 | SWR-S037 |
| HP-8664A Signal Generator | 2002-08-24 | SWR-S035 |
| BBS3Q7ELU Power Amp. | 2002-11-20 | SWR-S012 |
| HP-8753ES Network Analyzer | 2002-06-05 | SWR-S006 |
| HP85070C Dielectric Probe Kit | Not Required | SWR-S040 |
| Dasy3 S/W (Ver 3.1d) | Not Required | SWR-S001-a |
| 8481A Power Sensor | 2003-01-02 | SWR-S042 |
| 8481A Power Sensor | 2003-01-02 | SWR-S043 |
| 8481A Power Sensor | 2003-01-02 | SWR-S044 |

NOTE:

The E-field probe was calibrated by SPEAG, by temperature measurement procedure. Dipole Validation measurement is performed by Samsung Lab. before each test. (see § 7.2) The brain simulating material is calibrated by Samsung using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material. (see § 7.1)



4. SAR MEASUREMENT PROCEDURE

The evaluation was performed using the following procedure.

STEP 1

The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.

STEP 2

The SAR distribution at the exposed side of the head was measured at a distance of 3.9mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20mm x 20mm. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

STEP 3

Around this point, a volume of 32mm x 32mm x 34mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the center of the dipoles is 2.7mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

STEP 4

The SAR value at the same location as in step 1 was again measured. (If the value changed by more than 5%, the evaluation is repeated.)

5. DESCRIPTION OF TEST POSITION

5.1 SAM Phantom Shape

Figure 5.1 shows the front, back and side views of SAM. The point “M” is the reference point for the center of mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERPs are 15 mm posterior to the entrance to ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5.2.



Figure 5.1 Front, back and side view of SAM

The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 5.3). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines should be marked on the external phantom shell to facilitate handset positioning. Posterior to the N-F line, the thickness of the phantom shell with the shape of an ear is a flat surface 6 mm thick at the ERPs.

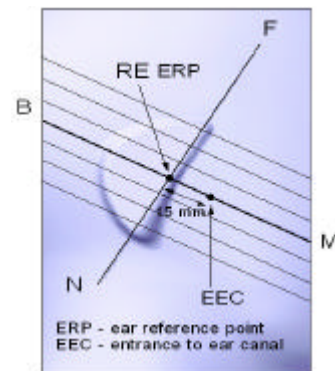


Figure 5.2 Close up side view

5.2 Cheek/Touch Position

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the “test device reference point” located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (see Fig. 5.4). The “test device reference point” was then located at the same level as the center of

the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its tip and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point

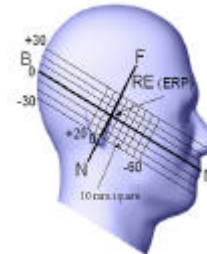


Figure 5.3 Side view of the phantom showing relevant markings

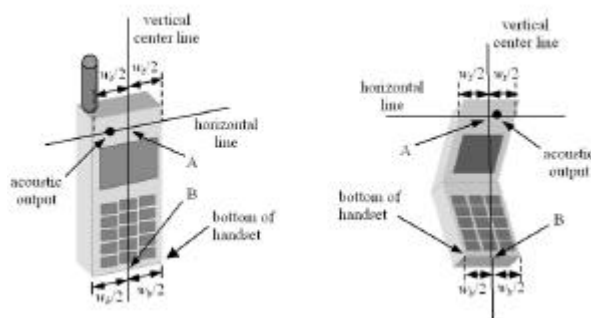


Figure 5.4 Handset vertical and horizontal reference lines

Step 1

The test device was positioned with the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 5.5), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom



Figure 5.5 Front, Side and Top View of Cheek/Touch Position

Step 2

The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.

Step 3

While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).

Step 4

Rotate the handset around the vertical centerline until the phone (horizontal line) was symmetrical with respect to the line NF.

Step 5

While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek). See Figure 5.2.

5.3 EAR/Tilt 15° Position

With the test device aligned in the “Cheek/Touch Position”:

Step 1

Repeat steps 1 to 5 of 5.2 to place the device in the “Cheek/Touch Position”



Figure 5.6 Front, side and Top View of Ear/Tilt 15° Position

Step 2

While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.

Step 3

The phone was then rotated around the horizontal line by 15 degree.

Step 4

While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head.

5.4 Body Holster/Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 5.7). A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.



Figure 5.7 Body Belt Clip and Holster Configurations

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are supplied with the device, the device is tested with each accessory that contains unique metallic component. If multiple accessory share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.



Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration where a separation distance between the back of the device and the flat phantom is used.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst-case positioning is then documented and used to perform Body SAR testing.

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements must be included in the user's manual.



6. MEASUREMENT UNCERTAINTY

Table 6.1 Uncertainty Budget

| Error Description | Uncertainty Value(±%) | Probability Distribution | Divisor | c _i | Standard uncertainty | v _i ² or v _{eff} |
|---|-----------------------|--------------------------|------------|-----------------|----------------------|---|
| Measurement System | | | | | | |
| Probe calibration | ±4.4 | normal | 1 | 1 | ±4.4% | |
| Axial isotropy of the probe | ±4.7 | rectangular | $\sqrt{3}$ | $(1-c_p)^{1/2}$ | ±1.9% | |
| Spherical isotropy of the probe | ±9.6 | rectangular | $\sqrt{3}$ | $(c_p)^{1/2}$ | ±3.9% | |
| Spatial resolution | ±0.0 | rectangular | $\sqrt{3}$ | 1 | ±0.0% | |
| Boundary effects | ±5.5 | rectangular | $\sqrt{3}$ | 1 | ±3.2% | |
| Probe linearity | ±4.7 | rectangular | $\sqrt{3}$ | 1 | ±2.7% | |
| Detection limit | ±1.0 | rectangular | $\sqrt{3}$ | 1 | ±0.6% | |
| Readout electronics | ±1.0 | normal | 1 | 1 | ±1.0% | |
| Response time | ±0.8 | rectangular | $\sqrt{3}$ | 1 | ±0.5% | |
| Integration time | ±1.4 | rectangular | $\sqrt{3}$ | 1 | ±0.8% | |
| RF ambient conditions | ±3.0 | rectangular | $\sqrt{3}$ | 1 | ±1.7% | |
| Mechanical constrains of robot | ±0.4 | rectangular | $\sqrt{3}$ | 1 | ±0.2% | |
| Probe positioning | ±2.9 | rectangular | $\sqrt{3}$ | 1 | ±1.7% | |
| Extrapolation and integration | ±3.9 | rectangular | $\sqrt{3}$ | 1 | ±2.3% | |
| Test Sample Related | | | | | | |
| Device positioning | ±6.0 | normal | 0.89 | 1 | ±6.7% | 12 |
| Device holder uncertainty | ±5.0 | normal | 0.84 | 1 | ±5.9% | 8 |
| Power Drift | ±5.0 | rectangular | $\sqrt{3}$ | 1 | ±2.9% | |
| Phantom and Setup | | | | | | |
| Phantom uncertainty | ±4.0 | rectangular | $\sqrt{3}$ | 1 | ±2.3% | |
| Liquid conductivity (deviation from target) | ±5.0 | rectangular | $\sqrt{3}$ | 0.6 | ±1.7% | |
| Liquid conductivity (measurement error) | ±10.0 | rectangular | $\sqrt{3}$ | 0.6 | ±3.5% | |
| Liquid permittivity (deviation from target) | ±5.0 | rectangular | $\sqrt{3}$ | 0.6 | ±1.7% | |
| Liquid permittivity (measurement error) | ±5.0 | rectangular | $\sqrt{3}$ | 0.6 | ±1.7% | |
| Combined Standard Uncertainty | | | | | ±13.6% | |
| Extended Standard Uncertainty(K=2) | | | | | ±27.1% | |

7. SYSTEM VERIFICATION

7.1 Tissue Verification

Table 7.1 MEASURED TISSUE PARAMETERS

| | 835MHz Brain | | 835MHz Muscle | | 1900MHz Brain | | 1900MHz Muscle | |
|------------------------|--------------|-------------|---------------|-------------|---------------|-------------|----------------|-------------|
| | Target | Measured | Target | Measured | Target | Measured | Target | Measured |
| Date | - | Apr.24,2003 | - | Apr.25,2003 | - | Apr.23,2003 | - | Apr.25,2003 |
| Liquid Temperature(°C) | - | 20.7 | - | 20.8 | - | 20.7 | - | 20.9 |
| Dielectric Constant: | 41.5 | 39.8 | 55.2 | 54.8 | 40.0 | 38.6 | 53.3 | 51.3 |
| Conductivity: ? | 0.90 | 0.87 | 0.97 | 0.95 | 1.40 | 1.41 | 1.52 | 1.56 |

The measured value must be within $\pm 5\%$ of the target value.

7.2 Test System Validation

Prior to assessment, the system is verified to the $\pm 10\%$ of the specification at 835MHz and 1900MHz by using the system validation kit(s). (see Appendix F, Graphic Plot Attached)

Table 7.2 System Validation Results

| System Validation Kit | Tissue | Targeted SAR _g (mW/g) | Measured SAR _g (mW/g) | Deviation (%) | Date | Liquid Temperature(°C) |
|-----------------------|---------------|----------------------------------|----------------------------------|---------------|-------------|------------------------|
| D-835V2 S/N: 451 | 835MHz Brain | 2.375 | 2.45 | 2.9 | Apr.24,2003 | 20.9 |
| D-1900V2 S/N: 548 | 1900MHz Brain | 9.925 | 10.4 | 4.73 | Apr.25,2003 | 20.8 |
| | | | | | | |
| | | | | | | |

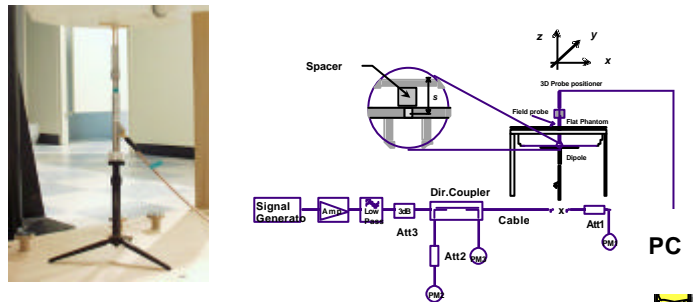


Figure 7.1 Dipole Validation Test Setup

8. SAR MEASUREMENT RESULTS

Procedures Used To Establish Test Signal

The handset was placed into simulated call mode (AMPS, Cellular CDMA & PCS CDMA modes) using manufacturers test codes. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. When test modes are not available or inappropriate for testing a handset, the actual transmission is activated through a base station simulator or similar equipment. See data pages for actual procedure used in measurement.

Device Test Conditions

The handset is battery operated. Each SAR measurement was taken with a fully charged battery. In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power. If a conducted power deviation of more than 5% occurred, the test was repeated.

EUT Handset Reference Points

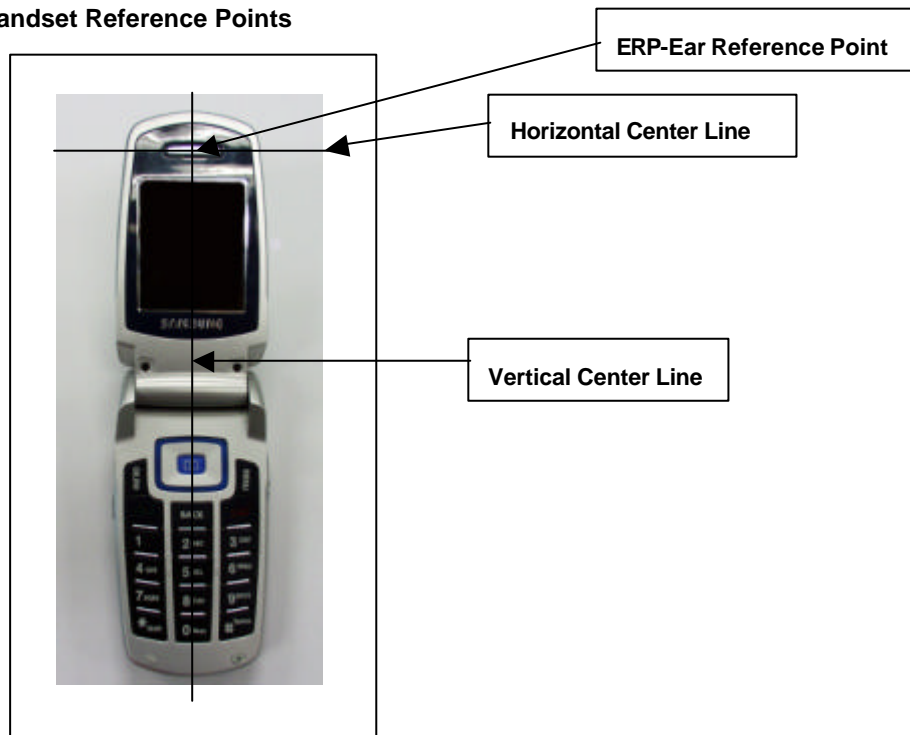


Figure 8.1 Handset Reference Points



8.1 MEASUREMENT RESULTS (AMPS Right Head SAR – Touch)

| | | | |
|----------------------|--------------|----------------------|---------|
| Date of Test : | Apr 24,2003 | | |
| Mixture Type: | 835MHz Brain | Tissue Depth: | 15.2 cm |
| Dielectric Constant: | 39.8 | Liquid Tissue Temp.: | 20.9 |
| Conductivity: | 0.87 | Ambient Temp: | 22.1 |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.04 | 0991 | AMPS | 26.0 | 26.0 | Standard | Cheek / Touch | Intenna | 1.28 |
| 836.49 | 0383 | AMPS | 26.0 | 26.0 | Standard | Cheek / Touch | Intenna | 0.974 |
| 848.97 | 0799 | AMPS | 26.0 | 26.0 | Standard | Cheek / Touch | Intenna | 1.04 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Battery is fully charged for all readings.
 - *Power Measured ☞ Conducted
- SAR Measurement System ☞ DASY3
- Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
- SAR Configuration ☞ Head ☞ Body ☞ Hand
- Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
- Battery Option ☞ Standard ☞ Extended ☞ Slim



**Figure 8.2 Right Head SAR Test Setup
--Cheek/Touch Position--**



8.2 MEASUREMENT RESULTS (AMPS Right Head SAR – Tilt)

| | | | |
|----------------------|---------------------|----------------------|----------------|
| Date of Test : | <u>Apr 24,2003</u> | | |
| Mixture Type: | <u>835MHz Brain</u> | Tissue Depth: | <u>15.2 cm</u> |
| Dielectric Constant: | <u>39.8</u> | Liquid Tissue Temp.: | <u>20.9</u> |
| Conductivity: | <u>0.87</u> | Ambient Temp: | <u>22.1</u> |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.04 | 0991 | AMPS | 26.0 | 26.0 | Standard | Ear/Tilt 15° | Intenna | 0.419 |
| 836.49 | 0383 | AMPS | 26.0 | 26.0 | Standard | Ear/Tilt 15° | Intenna | 0.321 |
| 848.97 | 0799 | AMPS | 26.0 | 26.0 | Standard | Ear/Tilt 15° | Intenna | 0.318 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
 2. All modes of operation were investigated, and the worst-case results are reported.
 3. Battery is fully charged for all readings.
- | | | | | |
|---------------------------|---|------------------|---|---------------------------|
| *Power Measured | ☞ | Conducted | | |
| 4. SAR Measurement System | ☞ | DASY3 | | |
| 5. Phantom Configuration | ☞ | Left Head | ☞ | Flat Phantom ☞ Right Head |
| 6. SAR Configuration | ☞ | Head | ☞ | Body ☞ Hand |
| 7. Test Signal Call Mode | ☞ | Manu. Test Codes | ☞ | Base Station Simulator |
| 8. Battery Option | ☞ | Standard | ☞ | Extended ☞ Slim |



Figure 8.3 Right Head SAR Test Setup
-- Ear/Tilt 15° Position--



8.3 MEASUREMENT RESULTS (AMPS Left Head SAR – Touch)

| | | | |
|----------------------|---------------------|----------------------|----------------|
| Date of Test : | <u>Apr 24,2003</u> | Tissue Depth: | <u>15.2 cm</u> |
| Mixture Type: | <u>835MHz Brain</u> | Liquid Tissue Temp.: | <u>20.9</u> |
| Dielectric Constant: | <u>39.8</u> | Ambient Temp: | <u>22.1</u> |
| Conductivity: | <u>0.87</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.04 | 0991 | AMPS | 26.0 | 26.0 | Standard | Cheek / Touch | Intenna | 1.17 |
| 836.49 | 0383 | AMPS | 26.0 | 26.0 | Standard | Cheek / Touch | Intenna | 0.893 |
| 848.97 | 0799 | AMPS | 26.0 | 26.0 | Standard | Cheek / Touch | Intenna | 0.877 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
 2. All modes of operation were investigated, and the worst-case results are reported.
 3. Battery is fully charged for all readings.
- | | | | |
|---------------------------|---|------------------|-----------------------------|
| *Power Measured | ☞ | Conducted | |
| 4. SAR Measurement System | ☞ | DASY3 | |
| 5. Phantom Configuration | ☞ | Left Head | ☞ Flat Phantom ☞ Right Head |
| 6. SAR Configuration | ☞ | Head | ☞ Body ☞ Hand |
| 7. Test Signal Call Mode | ☞ | Manu. Test Codes | ☞ Base Station Simulator |
| 8. Battery Option | ☞ | Standard | ☞ Extended ☞ Slim |



**Figure 8.4 Left Head SAR Test Setup
-- Cheek / Touch Position--**



8.4 MEASUREMENT RESULTS (AMPS Left Head SAR – Tilt)

| | | | |
|----------------------|---------------------|----------------------|----------------|
| Date of Test : | <u>Apr 24,2003</u> | Tissue Depth: | <u>15.2 cm</u> |
| Mixture Type: | <u>835MHz Brain</u> | Liquid Tissue Temp.: | <u>20.9</u> |
| Dielectric Constant: | <u>39.8</u> | Ambient Temp: | <u>22.1</u> |
| Conductivity: | <u>0.87</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.04 | 0991 | AMPS | 26.0 | 26.0 | Standard | Ear/Tilt 15° | Intenna | 0.360 |
| 836.49 | 0383 | AMPS | 26.0 | 26.0 | Standard | Ear/Tilt 15° | Intenna | 0.280 |
| 848.97 | 0799 | AMPS | 26.0 | 26.0 | Standard | Ear/Tilt 15° | Intenna | 0.293 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
 2. All modes of operation were investigated, and the worst-case results are reported.
 3. Battery is fully charged for all readings.
- | | | | | |
|---------------------------|-----------------------|------------------|-----------------------|------------------------------------|
| *Power Measured | <input type="radio"/> | Conducted | | |
| 4. SAR Measurement System | <input type="radio"/> | DASY3 | | |
| 5. Phantom Configuration | <input type="radio"/> | Left Head | <input type="radio"/> | Flat Phantom <input type="radio"/> |
| 6. SAR Configuration | <input type="radio"/> | Head | <input type="radio"/> | Body <input type="radio"/> |
| 7. Test Signal Call Mode | <input type="radio"/> | Manu. Test Codes | <input type="radio"/> | Base Station Simulator |
| 8. Battery Option | <input type="radio"/> | Standard | <input type="radio"/> | Extended <input type="radio"/> |
| | | | <input type="radio"/> | Slim |



Figure 8.5 Left Head SAR Test Setup
-- Ear / Tilt 15 ° Position--



8.5 MEASUREMENT RESULTS (CELLULAR CDMA Right Head SAR – Touch)

| | | | |
|----------------------|---------------------|----------------------|----------------|
| Date of Test : | <u>Apr 24,2003</u> | Tissue Depth: | <u>15.2 cm</u> |
| Mixture Type: | <u>835MHz Brain</u> | Liquid Tissue Temp.: | <u>20.9</u> |
| Dielectric Constant: | <u>39.8</u> | Ambient Temp: | <u>22.1</u> |
| Conductivity: | <u>0.87</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.70 | 1013 | CDMA | 25.5 | 25.5 | Standard | Cheek / Touch | Intenna | 1.10 |
| 835.89 | 0363 | CDMA | 25.5 | 25.5 | Standard | Cheek / Touch | Intenna | 0.993 |
| 848.31 | 0777 | CDMA | 25.5 | 25.5 | Standard | Cheek / Touch | Intenna | 1.16 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
 2. All modes of operation were investigated, and the worst-case results are reported.
 3. Battery is fully charged for all readings.
- *Power Measured ☞ Conducted
4. SAR Measurement System ☞ DASY3
 5. Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
 6. SAR Configuration ☞ Head ☞ Body ☞ Hand
 7. Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
 8. Battery Option ☞ Standard ☞ Extended ☞ Slim



**Figure 8.6 Right Head SAR Test Setup
-- Cheek / Touch Position--**



8.6 MEASUREMENT RESULTS (CELLULAR CDMA Right Head SAR – Tilt)

| | | | |
|----------------------|---------------------|----------------------|----------------|
| Date of Test : | <u>Apr 24,2003</u> | | |
| Mixture Type: | <u>835MHz Brain</u> | Tissue Depth: | <u>15.2 cm</u> |
| Dielectric Constant: | <u>39.8</u> | Liquid Tissue Temp.: | <u>20.9</u> |
| Conductivity: | <u>0.87</u> | Ambient Temp: | <u>22.1</u> |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.70 | 1013 | CDMA | 25.5 | 25.5 | Standard | Ear/Tilt 15° | Intenna | 0.358 |
| 835.89 | 0363 | CDMA | 25.5 | 25.5 | Standard | Ear/Tilt 15° | Intenna | 0.301 |
| 848.31 | 0777 | CDMA | 25.5 | 25.5 | Standard | Ear/Tilt 15° | Intenna | 0.338 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Battery is fully charged for all readings.
 - *Power Measured ☞ Conducted
4. SAR Measurement System ☞ DASY3
5. Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
6. SAR Configuration ☞ Head ☞ Body ☞ Hand
7. Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
8. Battery Option ☞ Standard ☞ Extended ☞ Slim



Figure 8.7 Right Head SAR Test Setup

-- Ear / Tilt 15 ° Position --



8.7 MEASUREMENT RESULTS (CELLULAR CDMA Left Head SAR – Touch)

| | | | |
|----------------------|---------------------|----------------------|----------------|
| Date of Test : | <u>Apr 24,2003</u> | | |
| Mixture Type: | <u>835MHz Brain</u> | Tissue Depth: | <u>15.2 cm</u> |
| Dielectric Constant: | <u>39.8</u> | Liquid Tissue Temp.: | <u>20.9</u> |
| Conductivity: | <u>0.87</u> | Ambient Temp: | <u>22.1</u> |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.70 | 1013 | CDMA | 25.5 | 25.5 | Standard | Cheek / Touch | Intenna | 0.946 |
| 835.89 | 0363 | CDMA | 25.5 | 25.5 | Standard | Cheek / Touch | Intenna | 0.760 |
| 848.31 | 0777 | CDMA | 25.5 | 25.5 | Standard | Cheek / Touch | Intenna | 0.969 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Battery is fully charged for all readings.
 - *Power Measured ☞ Conducted
4. SAR Measurement System ☞ DASY3
5. Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
6. SAR Configuration ☞ Head ☞ Body ☞ Hand
7. Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
8. Battery Option ☞ Standard ☞ Extended ☞ Slim



**Figure 8.8 Left Head SAR Test Setup
-- Cheek / Touch Position--**



8.8 MEASUREMENT RESULTS (CELLULAR CDMA Left Head SAR – Tilt)

| | | | |
|----------------------|---------------------|----------------------|----------------|
| Date of Test : | <u>Apr 24,2003</u> | | |
| Mixture Type: | <u>835MHz Brain</u> | Tissue Depth: | <u>15.2 cm</u> |
| Dielectric Constant: | <u>39.8</u> | Liquid Tissue Temp.: | <u>20.9</u> |
| Conductivity: | <u>0.87</u> | Ambient Temp: | <u>22.1</u> |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.70 | 1013 | CDMA | 25.5 | 25.5 | Standard | Ear/Tilt 15° | Intenna | 0.311 |
| 835.89 | 0363 | CDMA | 25.5 | 25.5 | Standard | Ear/Tilt 15° | Intenna | 0.222 |
| 848.31 | 0777 | CDMA | 25.5 | 25.5 | Standard | Ear/Tilt 15° | Intenna | 0.313 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Battery is fully charged for all readings.
 - *Power Measured ☞ Conducted
4. SAR Measurement System ☞ DASY3
5. Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
6. SAR Configuration ☞ Head ☞ Body ☞ Hand
7. Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
8. Battery Option ☞ Standard ☞ Extended ☞ Slim



Figure 8.9 Left Head SAR Test Setup
-- Ear / Tilt 15 ° Position --



8.9 MEASUREMENT RESULTS (PCS CDMA Right Head SAR – Touch)

| | | | |
|----------------------|----------------------|----------------------|---------------|
| Date of Test : | <u>Apr 23,2003</u> | Tissue Depth: | <u>15.5cm</u> |
| Mixture Type: | <u>1900MHz Brain</u> | Liquid Tissue Temp.: | <u>20.8</u> |
| Dielectric Constant: | <u>38.6</u> | Ambient Temp: | <u>22.0</u> |
| Conductivity: | <u>1.41</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 1851.25 | 0025 | CDMA | 24.5 | 24.5 | Standard | Cheek / Touch | Intenna | 0.717 |
| 1880.00 | 0600 | CDMA | 24.5 | 24.5 | Standard | Cheek / Touch | Intenna | 0.993 |
| 1908.75 | 1175 | CDMA | 24.5 | 24.5 | Standard | Cheek / Touch | Intenna | 0.802 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
 2. All modes of operation were investigated, and the worst-case results are reported.
 3. Battery is fully charged for all readings.
- | | | | | |
|---------------------------|---|------------------|---|---------------------------|
| *Power Measured | ☞ | Conducted | | |
| 4. SAR Measurement System | ☞ | DASY3 | | |
| 5. Phantom Configuration | ☞ | Left Head | ☞ | Flat Phantom ☞ Right Head |
| 6. SAR Configuration | ☞ | Head | ☞ | Body ☞ Hand |
| 7. Test Signal Call Mode | ☞ | Manu. Test Codes | ☞ | Base Station Simulator |
| 8. Battery Option | ☞ | Standard | ☞ | Extended ☞ Slim |



**Figure 8.10 Right Head SAR Test Setup
-- Cheek / Touch Position--**



8.10 MEASUREMENT RESULTS (PCS CDMA Right Head SAR – Tilt)

| | | | |
|----------------------|----------------------|----------------------|---------------|
| Date of Test : | <u>Apr 23,2003</u> | Tissue Depth: | <u>15.5cm</u> |
| Mixture Type: | <u>1900MHz Brain</u> | Liquid Tissue Temp.: | <u>20.8</u> |
| Dielectric Constant: | <u>38.6</u> | Ambient Temp: | <u>22.0</u> |
| Conductivity: | <u>1.41</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 1851.25 | 0025 | CDMA | 24.5 | 24.5 | Standard | Ear/Tilt 15° | Intenna | 0.0782 |
| 1880.00 | 0600 | CDMA | 24.5 | 24.5 | Standard | Ear/Tilt 15° | Intenna | 0.110 |
| 1908.75 | 1175 | CDMA | 24.5 | 24.5 | Standard | Ear/Tilt 15° | Intenna | 0.0661 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
 2. All modes of operation were investigated, and the worst-case results are reported.
 3. Battery is fully charged for all readings.
- | | | | | |
|---------------------------|---|------------------|---|---------------------------|
| *Power Measured | ☞ | Conducted | | |
| 4. SAR Measurement System | ☞ | DASY3 | | |
| 5. Phantom Configuration | ☞ | Left Head | ☞ | Flat Phantom ☞ Right Head |
| 6. SAR Configuration | ☞ | Head | ☞ | Body ☞ Hand |
| 7. Test Signal Call Mode | ☞ | Manu. Test Codes | ☞ | Base Station Simulator |
| 8. Battery Option | ☞ | Standard | ☞ | Extended ☞ Slim |



Figure 8.11 Right Head SAR Test Setup
-- Ear/Tilt 15° Position--



8.11 MEASUREMENT RESULTS (PCS CDMA Left Head SAR – Touch)

| | | | |
|----------------------|----------------------|----------------------|---------------|
| Date of Test : | <u>Apr 23,2003</u> | Tissue Depth: | <u>15.5cm</u> |
| Mixture Type: | <u>1900MHz Brain</u> | Liquid Tissue Temp.: | <u>20.8</u> |
| Dielectric Constant: | <u>38.6</u> | Ambient Temp: | <u>22.0</u> |
| Conductivity: | <u>1.41</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 1851.25 | 0025 | CDMA | 24.5 | 24.5 | Standard | Cheek / Touch | Intenna | 0.661 |
| 1880.00 | 0600 | CDMA | 24.5 | 24.5 | Standard | Cheek / Touch | Intenna | 0.945 |
| 1908.75 | 1175 | CDMA | 24.5 | 24.5 | Standard | Cheek / Touch | Intenna | 0.830 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
 2. All modes of operation were investigated, and the worst-case results are reported.
 3. Battery is fully charged for all readings.
- | | | | | |
|---------------------------|---|------------------|---|---------------------------|
| *Power Measured | ☞ | Conducted | | |
| 4. SAR Measurement System | ☞ | DASY3 | | |
| 5. Phantom Configuration | ☞ | Left Head | ☞ | Flat Phantom ☞ Right Head |
| 6. SAR Configuration | ☞ | Head | ☞ | Body ☞ Hand |
| 7. Test Signal Call Mode | ☞ | Manu. Test Codes | ☞ | Base Station Simulator |
| 8. Battery Option | ☞ | Standard | ☞ | Extended ☞ Slim |



**Figure 8.12 Left Head SAR Test Setup
-- Cheek / Touch Position--**



8.12 MEASUREMENT RESULTS (PCS CDMA Left Head SAR – Tilt)

| | | | |
|----------------------|----------------------|----------------------|---------------|
| Date of Test : | <u>Apr 25,2003</u> | Tissue Depth: | <u>15.5cm</u> |
| Mixture Type: | <u>1900MHz Brain</u> | Liquid Tissue Temp.: | <u>20.8</u> |
| Dielectric Constant: | <u>38.6</u> | Ambient Temp: | <u>22.0</u> |
| Conductivity: | <u>1.41</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|--|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 1851.25 | 0025 | CDMA | 24.5 | 24.5 | Standard | Ear/Tilt 15° | Intenna | 0.0592 |
| 1880.00 | 0600 | CDMA | 24.5 | 24.5 | Standard | Ear/Tilt 15° | Intenna | 0.0937 |
| 1908.75 | 1175 | CDMA | 24.5 | 24.5 | Standard | Ear/Tilt 15° | Intenna | 0.0770 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Brain 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Battery is fully charged for all readings.
 - *Power Measured ☞ Conducted
- SAR Measurement System ☞ DASY3
- Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
- SAR Configuration ☞ Head ☞ Body ☞ Hand
- Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
- Battery Option ☞ Standard ☞ Extended ☞ Slim



**Figure 8.13 Left Head SAR Test Setup
-- Ear/Tilt 15° Position--**



8.13 MEASUREMENT RESULTS (AMPS Body SAR w/o Holster)

| | | | |
|----------------------|----------------------|----------------------|--------------|
| Date of Test : | <u>Apr 25,2003</u> | Tissue Depth: | <u>15 cm</u> |
| Mixture Type: | <u>835MHz Muscle</u> | Liquid Tissue Temp.: | <u>20.8</u> |
| Dielectric Constant: | <u>54.8</u> | Ambient Temp: | <u>21.9</u> |
| Conductivity: | <u>0.95</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|---|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.04 | 0991 | AMPS | 26.0 | 26.0 | Standard | 1.5 [w/o Holster] | Intenna | 0.332 |
| 836.49 | 0383 | AMPS | 26.0 | 26.0 | Standard | 1.5 [w/o Holster] | Intenna | 0.250 |
| 848.97 | 0799 | AMPS | 26.0 | 26.0 | Standard | 1.5 [w/o Holster] | Intenna | 0.295 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Muscle 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Battery is fully charged for all readings.
 - *Power Measured ☞ Conducted
4. SAR Measurement System ☞ DASY3
5. Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
6. SAR Configuration ☞ Head ☞ Body ☞ Hand
7. Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
8. **Test Configuration ☞ With Holster ☞ Without Holster
9. Battery Option ☞ Standard ☞ Extended ☞ Slim
10. Both sides of the phone were tested and the worst-case side is reported.



**Figure 8.14 Body SAR Test Setup
– w/o Holster--**



8.14 MEASUREMENT RESULTS (CELLULAR CDMA Body SAR w/o Holster)

| | | | |
|----------------------|----------------------|----------------------|-------------|
| Date of Test : | <u>Apr 25,2003</u> | Tissue Depth: | <u>15cm</u> |
| Mixture Type: | <u>835MHz Muscle</u> | Liquid Tissue Temp.: | <u>20.8</u> |
| Dielectric Constant: | <u>54.8</u> | Ambient Temp: | <u>21.9</u> |
| Conductivity: | <u>0.95</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|---|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 824.70 | 1013 | CDMA | 25.5 | 25.5 | Standard | 1.5 [w/o Holster] | Intenna | 0.268 |
| 835.89 | 0363 | CDMA | 25.5 | 25.5 | Standard | 1.5 [w/o Holster] | Intenna | 0.255 |
| 848.31 | 777 | CDMA | 25.5 | 25.5 | Standard | 1.5 [w/o Holster] | Intenna | 0.307 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Muscle 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Battery is fully charged for all readings.
- *Power Measured ☞ Conducted
4. SAR Measurement System ☞ DASY3
5. Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
6. SAR Configuration ☞ Head ☞ Body ☞ Hand
7. Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
8. **Test Configuration ☞ With Holster ☞ Without Holster
9. Battery Option ☞ Standard ☞ Extended ☞ Slim
10. Both sides of the phone were tested and the worst-case side is reported.



**Figure 8.15 Body SAR Test Setup
-- w/o Holster--**



8.15 MEASUREMENT RESULTS (PCS CDMA Body SAR w/o Holster)

| | | | |
|----------------------|-----------------------|----------------------|-------------|
| Date of Test : | <u>Apr 25,2003</u> | Tissue Depth: | <u>15cm</u> |
| Mixture Type: | <u>1900MHz Muscle</u> | Liquid Tissue Temp.: | <u>20.8</u> |
| Dielectric Constant: | <u>51.3</u> | Ambient Temp: | <u>22.1</u> |
| Conductivity: | <u>1.56</u> | | |

| FREQUENCY | | Modulation | Begin/End POWER* | | | Device Test Position | Antenna Position | SAR (W/kg) |
|--|------|------------|------------------|------|----------|---|------------------|------------|
| MHz | Ch. | | (dBm) | | Battery | | | |
| 1851.25 | 0025 | CDMA | 24.5 | 24.5 | Standard | 1.5 [w/o Holster] | Intenna | 0.744 |
| 1880.00 | 0600 | CDMA | 24.5 | 24.5 | Standard | 1.5 [w/o Holster] | Intenna | 0.739 |
| 1908.75 | 1175 | CDMA | 24.5 | 24.5 | Standard | 1.5 [w/o Holster] | Intenna | 0.646 |
| ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population | | | | | | Muscle 1.6W/kg (mW/g) averaged over 1 gram | | |

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Battery is fully charged for all readings.
 - *Power Measured ☞ Conducted
4. SAR Measurement System ☞ DASY3
5. Phantom Configuration ☞ Left Head ☞ Flat Phantom ☞ Right Head
6. SAR Configuration ☞ Head ☞ Body ☞ Hand
7. Test Signal Call Mode ☞ Manu. Test Codes ☞ Base Station Simulator
8. **Test Configuration ☞ With Holster ☞ Without Holster
9. Battery Option ☞ Standard ☞ Extended ☞ Slim
10. Both sides of the phone were tested and the worst-case side is reported.



**Figure 8.16 Body SAR Test Setup
-- w/o Holster--**



9. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.



10. REFERENCES

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