FCC SAR EVALUATION REPORT

In accordance with the requirements of

FCC Report and Order: ET Docket 93-62,
and OET Bulletin 65 Supplement C
ANSI/IEEE Std. C95.1-1992

For

GSM/EDGE Dual SIM Mobile Phone

Model: DSTL1

Trade Name: GENERAL MOBILE

Prepared for

GENERAL MOBILE INC
4809 Ave. N Suite 359 Brooklyn, NY 11234

Prepared by

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ACCREDITED
TESTING CERT #2541.01

ilac-MRA

TAF
Testing Laboratory
0363

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1. EUT DESCRIPTION

Applicant:	GENERAL MOBILE INC 4809 Ave. N Suite 359 Brooklyn, NY 11234
Under Test:	GSM/EDGE Dual SIM Mobile Phone
Trade Name:	GENERAL MOBILE
Model:	DSTL1
Device Category:	PORTABLE DEVICES
Exposure Category:	GENERAL POPULATION/UNCONTROLLED EXPOSURE
Report Number:	KS090525A01
Date of Test:	June 2, 2009

Test Sample is a:	Production unit
Modulation Type:	GMSK
Operating Mode:	Maximum continuous output
Frequency Range:	1850MHZ~1910MHZ/
Max. O/P Power: (Conducted AVG)	28.48 dBm (1850MHz)
Max. SAR (1g):	**0.641**W/kg (1880MHz SIM II GSM Mode) (EUT Setup Configuration 2)
Application Type:	Certification

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC OET 65 Supplement C	No non-compliance noted
Deviation from Applicable Standard	
None	

The above wireless portable device was tested by Compliance Certification Services Inc. in accordance with the measurement methods and procedures specified in OET Bulletin 65 Supplement C(Edition 01-01). The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:	***Reviewed by:***
Miro Chueh EMC Manager Compliance Certification Service Inc.	Lin Zhang EMC Section Manager Compliance Certification Service Inc.

2. REQUIREMENTS FOR COMPLIANCE TESTING DEFINED BY THE FCC

The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992. According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

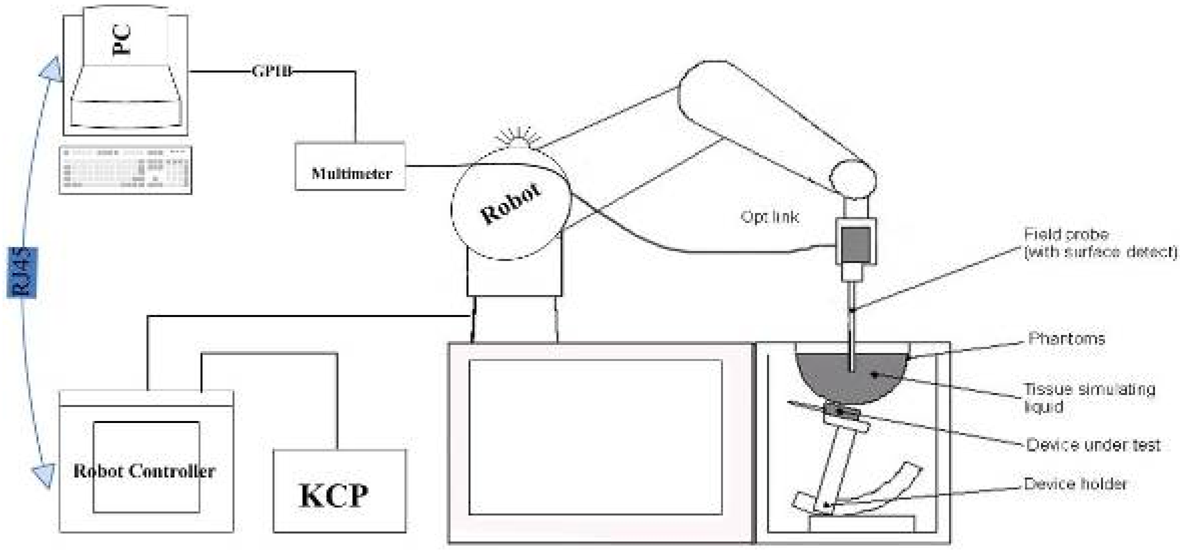
3. DOSIMETRIC ASSESSMENT SYSTEM

These measurements were performed with the automated near-field scanning system OPENSAR from ANTENNESSA.The system is based on a high precision robot (working range greater than 0.9 m), which positions the probes with a positional repeatability of better than ± 0.02 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit. The SAR measurements were conducted with the dosimetric probe EP100 SN1109 (manufactured by ANTENNESSA), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure described in [7] with accuracy of better than ±10%. The spherical isotropy was evaluated with the procedure described in [8] and found to be better than ±0.25 dB. The phantom used was the SAM Phantom as described in FCC supplement C, IEEE P1528 and CENELEC EN62209-1.

The Tissue simulation liquid used for each test is in according with the FCC OET65 supplement C as listed below.

Ingredients (% by weight)	**Frequency (MHz)**									
	450		**835**		**915**		**1900**		**2450**	
Tissue Type	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**
Water	**38.56**	**51.16**	**41.45**	**52.4**	**41.05**	**56.0**	**54.9**	**40.4**	**62.7**	**73.2**
Salt (NaCl)	**3.95**	**1.49**	**1.45**	**1.4**	**1.35**	**0.76**	**0.18**	**0.5**	**0.5**	**0.04**
Sugar	**56.32**	**46.78**	**56.0**	**45.0**	**56.5**	**41.76**	**0.0**	**58.0**	**0.0**	**0.0**
HEC	**0.98**	**0.52**	**1.0**	**1.0**	**1.0**	**1.21**	**0.0**	**1.0**	**0.0**	**0.0**
Bactericide	**0.19**	**0.05**	**0.1**	**0.1**	**0.1**	**0.27**	**0.0**	**0.1**	**0.0**	**0.0**
Triton X-100	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**36.8**	**0.0**
DGBE	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**44.92**	**0.0**	**0.0**	**26.7**
Dielectric Constant	**43.42**	**58.0**	**42.54**	**56.1**	**42.0**	**56.8**	**39.9**	**54.0**	**39.8**	**52.5**
Conductivity (S/m)	**0.85**	**0.83**	**0.91**	**0.95**	**1.0**	**1.07**	**1.42**	**1.45**	**1.88**	**1.78**

MEASUREMENT SYSTEM DIAGRAM

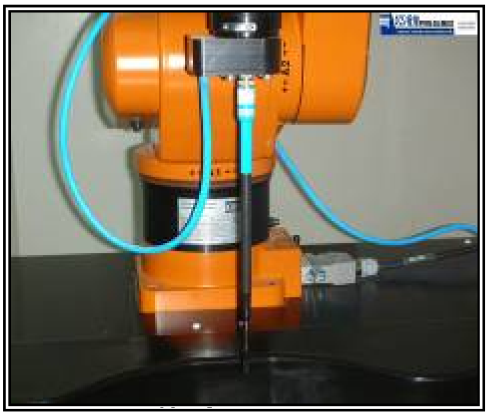


The OPENSAR system for performing compliance tests consist of the following items:

1. A standard high precision 6-axis robot (KUKA) with controller and software.
2. KUKA Control Panel (KCP).
3. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
4. The functions of the PC plug-in card are to perform the time critical task such as signal filtering, surveillance of the robot operation fast movement interrupts.
5. A computer operating Windows 95.
6. OPENSAR software.
7. Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.
8. The SAM phantom enabling testing left-hand right-hand and body usage.
9. The Position device for handheld EUT.
10. Tissue simulating liquid mixed according to the given recipes (see Application Note).
11. System validation dipoles to validate the proper functioning of the system.

SYSTEM COMPONENTS

SN11/09 EP100 Probe Specification



Construction Symmetrical design with triangular core

Built-in optical fiber for surface detection System

Built-in shielding against static charges

Calibration in air from 100 MHz to 2.5 GHz

In brain and muscle simulating tissue at frequencies of 835 MHz, 897MHz ,1747 MHz,1880 MHz,1950 MHz and 1.8 GHz (accuracy of ± 8%)

Frequency 100 MHz to > 30GHz; Linearity: ± 0.25 dB (100 MHz to 30 GHz)

Directivity ± 0.25 dB in brain tissue (rotation around probe axis)

± 0.5 dB in brain tissue (rotation normal probe axis)

Dynamic 5 mW/g to > 100 mW/g;

Range Linearity: ± 0.25 dB

Surface ± 0.2 mm repeatability in air and clear liquids

Detection over diffuse reflecting surfaces

Dimensions Overall length: 330 mm

Tip length: 16 mm

Body diameter: 8 mm

Tip diameter: 6.5 mm

Distance from probe tip to dipole centers: <2.7 mm

Application General dosimetric up to 3 GHz

Compliance tests of mobile phones

Fast automatic scanning in arbitrary phantoms

Inside View of SN11/09 EP100 E-field

The SAR measurements were conducted with the dosimetric probe SN11/09 EP100designed in the classical triangular configuration 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 multi-fiber line ending at the front of the probe tip. It is connected to the KRC 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 fibers. This reflection increases first during the approach, reaches 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 OPENSAR software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped when reaching the maximum.

E-Field Probe Calibration Process

Each probe is calibrated according to a dosimetric assessment procedure described in [6] with accuracy better than +/- 10%. The spherical isotropy was evaluated with the procedure described in [7] and found to be better than +/-0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

SAM Phantom

The SAM Phantom SAM29 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is in compliance with the specification set in IEEE P1528 and CENELEC EN562209-1. The phantom 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.

SAM Phantom

Shell Thickness: 2 ± 0.2 mm

Filling Volume: Approx. 25 liters

Dimensions (H x L x W): 810 x 1000 x 500 mm

Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device 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 positioned according to the FCC and CENELEC 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 configurations [10]. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.*

4. EVALUATION PROCEDURE

DATA EVALUATION

The OPENSAR software automatically executes the following procedure to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i10}, a_{i11}, a_{i12}
	- Conversion factor	ConvFi
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can either be found in the component documents or be imported into the software from the configuration files issued for the OPENSAR components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

Where V_i = *Compensated signal of channel i (i = x, y, z)*
U_i = *Input signal of channel i (i = x, y, z)*
cf = *Crest factor of exciting field (DASY parameter)*
dcp_i = *Diode compression point(DASY parameter)*

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

H-field probes: $$H_i = \sqrt{Vi} \cdot \frac{a_{i10} + a_{i11} f + a_{i12} f^2}{f}$$

Where V_i = *Compensated signal of channel i (i = x, y, z)*
$Norm_i$ = *Sensor sensitivity of channel i (i = x, y, z)*
$\mu V/(V/m)2$ for E0field Probes
$ConvF$ = *Sensitivity enhancement in solution*
a_{ij} = *Sensor sensitivity factors for H-field probes*

f = *Carrier frequency (GHz)*

E_i = *Electric field strength of channel i in V/m*

H_i = *Magnetic field strength of channel i in A/m*

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

where *SAR* = *local specific absorption rate in mW/g*

E_{tot} = *total field strength in V/m*

σ = *conductivity in [mho/m] or [siemens/m]*

ρ = *equivalent tissue density in g/cm3*

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

The power flow density is calculated assuming the excitation field as a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad or \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

where P_{pwe} = *Equivalent power density of a plane wave in mW/cm2*

E_{tot} = *total electric field strength in V/m*

H_{tot} = *total magnetic field strength in A/m*

SAR EVALUATION PROCEDURES

The procedure for assessing the peak spatial-average SAR value consists of the following steps:

- **Power Reference Measurement**

  The reference and drift jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

- **Area Scan**

  The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in OPENSAR software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought-up, grid was at to 15 mm by 15 mm and can be edited by a user.

- **Zoom Scan**

  Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default zoom scan measures 5 x 5 x 7 points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more then one maximum, the number of Zoom Scans has to be enlarged accordingly (The default number inserted is 1).

- **Power Drift measurement**

  The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same settings. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under test within a batch process. In the properties of the Drift job, the user can specify a limit for the drift and have OPENSAR software stop the measurements if this limit is exceeded.

SPATIAL PEAK SAR EVALUATION

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1529 standard. It can be conducted for 1 g and 10 g.

The OPENSAR system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maximum searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.

Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Cube Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 5x5x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1 g and 10 g cubes.

Boundary effect

For measurements in the immediate vicinity of a phantom surface, the field coupling effects between the probe and the boundary influence the probe characteristics. Boundary effect errors of different dosimetric probe types have been analyzed by measurements and using a numerical probe model. As expected, both methods showed an enhanced sensitivity in the immediate vicinity of the boundary. The effect strongly depends on the probe dimensions and disappears with increasing distance from the boundary. The sensitivity can be approximately given as:

$$S \approx S_o + S_b exp(-\frac{z}{a}) cos(\pi \frac{z}{\lambda})$$

Since the decay of the boundary effect dominates for small probes (a<<λ), the cos-term can be omitted. Factors *Sb* (parameter Alpha in the OPENSAR software) and *a* (parameter Delta in the OPENSAR software) are assessed during probe calibration and used for numerical compensation of the boundary effect. Several simulations and measurements have confirmed that the compensation is valid for different field and boundary configurations.

This simple compensation procedure can largely reduce the probe uncertainty near boundaries. It works well as long as:

- the boundary curvature is small
- the probe axis is angled less than 30_ to the boundary normal
- the distance between probe and boundary is larger than 25% of the probe diameter
- the probe is symmetric (all sensors have the same offset from the probe tip)

Since all of these requirements are fulfilled in a OPENSAR system, the correction of the probe boundary effect in the vicinity of the phantom surface is performed in a fully automated manner via the measurement data extraction during post processing.

5. MEASUREMENT UNCERTAINTY

UNCERTAINTY EVALUATION FOR HANDSET SAR TEST									
a	b	c	d	e= f(d,k)	f	g	h= cxf/e	i= cxg/e	k
Uncertainty Component	Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i (1 g)	c_i (10 g)	1 g u_i (± %)	10 g u_i (± %)	v_i
Measurement System									
Probe Calibration	E.2.1.	7	N	1	1	1	7	7	∞
Axial Isotropy	E.2.2.	2,5	R	√3	$(1-c_p)^{1/2}$	$(1-c_p)^{1/2}$	1,02062	1,02062	∞
Hemispherical Isotropy	E.2.2.	4	R	√3	$\sqrt{C_p}$	$\sqrt{C_p}$	1,63299	1,63299	∞
Boundary Effect	E.2.3.	1	R	√3	1	1	0,57735	0,57735	∞
Linearity	E.2.4.	5	R	√3	1	1	2,88675	2,88675	∞
System Detection Limits	E.2.5.	1	R	√3	1	1	0,57735	0,57735	∞
Readout Electronics	E.2.6.	0,02	N	1	1	1	0,02	0,02	∞
Response Time	E.2.7.	3	R	√3	1	1	1,73205	1,73205	∞
Integration Time	E.2.8.	2	R	√3	1	1	1,1547	1,1547	∞
RF Ambient Conditions	E.6.1.	3	R	√3	1	1	1,73205	1,73205	∞
Probe Positioner Mechanical Tolerance	E.6.2.	2	R	√3	1	1	1,1547	1,1547	∞
Probe Positioning with respect to Phantom Shell	E.6.3.	0,05	R	√3	1	1	0,02887	0,02887	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5.2.	5	R	√3	1	1	2,88675	2,88675	∞
Test sample Related									
Test Sample Positioning	E.4.2.1.	0,03	N	1	1	1	0,03	0,03	N-1
Device Holder Uncertainty	E.4.1.1.	5	N	1	1	1	5	5	N-1
Output Power Variation - SAR drift measurement	6.6.2.	3	R	√3	1	1	1,73205	1,73205	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1.	0,05	R	√3	1	1	0,02887	0,02887	∞
Liquid Conductivity - deviation from target values	E.3.2.	5	R	√3	0,64	0,43	1,84752	1,2413	∞
Liquid Conductivity - measurement uncertainty	E.3.3.	5	N	1	0,64	0,43	3,2	2,15	M
Liquid Permittivity - deviation from target values	E.3.2.	3	R	√3	0,6	0,49	1,03923	0,8487	∞
Liquid Permittivity - measurement uncertainty	E.3.3.	10	N	1	0,6	0,49	6	4,9	M
Combined Standard Uncertainty			RSS				11,1265	10,5799	
Expanded Uncertainty (95% CONFIDENCE INTERVAL)			k=2				21,8079	20,7366	

6. EXPOSURE LIMIT

(A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

(B). Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

Note: Whole-Body SAR *is averaged over the entire body,* ***partial-body SAR*** *is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube.* ***SAR for hands, wrists, feet and ankles*** *is averaged over any 1 grams of tissue defined as a tissue volume in the shape of a cube.*

Population/Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE
PARTIAL BODY LIMIT

1.6 W/kg

7. EUT ARRANGEMENT

Please refer to IEEE P1528 illustration below.

7.1 ANTHROPOMORPHIC HEAD PHANTOM

Figure 7-1a 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 7-1b. The plane passing through the two ear reference points 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 7-1c). 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. Anterior to the N-F line, the ear is truncated as illustrated in Figure 7-1b. The ear truncation is introduced to avoid the handset from touching the ear lobe, which can cause unstable handset positioning at the cheek.

Figure 7-1a
Front, back and side view of SAM (model for the phantom shell)

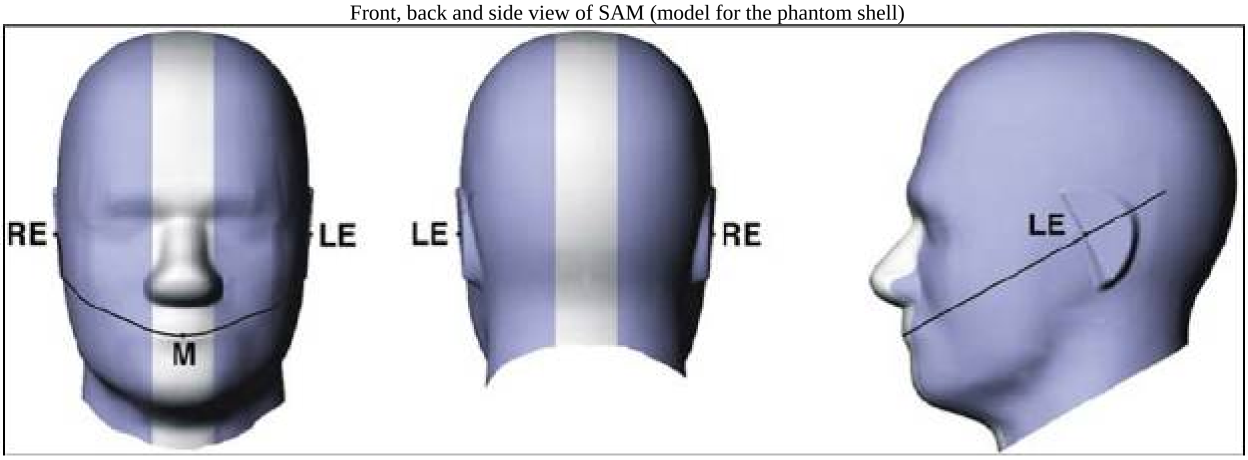
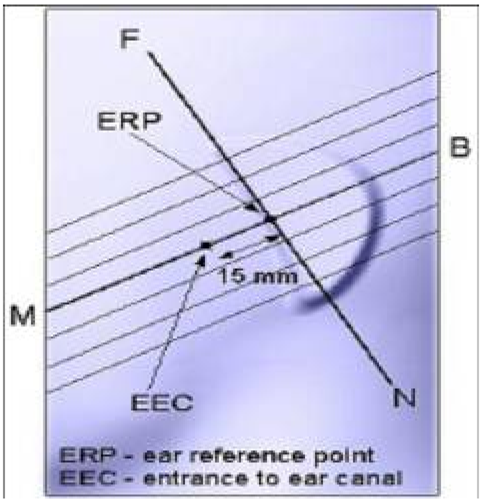


Figure 7-1b
Close up side view of phantom showing the ear region

Figure 7-1c
Side view of the phantom showing relevant markings and the 7 cross sectional plane locations



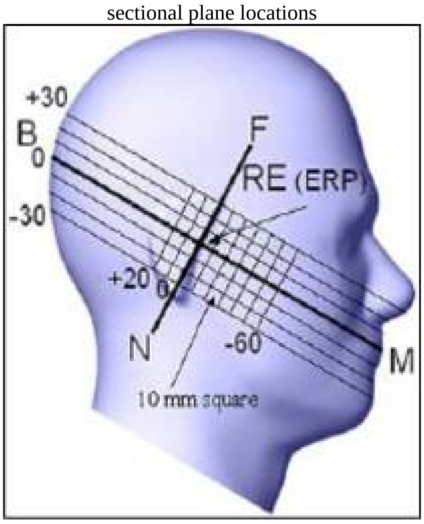


Figure 7-1b
Close up side view of phantom showing the ear region

Figure 7-1c
Side view of the phantom showing relevant markings and the 7 cross sectional plane locations

7.2 DEFINITION OF THE "CHEEK/TOUCH" POSITION

The "cheek" or "touch" position is defined as follows:

a. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece, open the cover. (If the handset can also be used with the cover closed both configurations must be tested.)

b. Define two imaginary lines on the handset: the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width wt of the handset at the level of the acoustic output (point A on Figures 7-2a and 7-2b), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 7-2a). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 7-2b), especially for clamshell handsets, handsets with flip pieces, and other irregularly-shaped handsets.

c. Position 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 7-2c), such that the plane defined by the vertical center line and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.

d. Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the pinna.

e. e) While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane).

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

g. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE and maintaining the handset contact with the pinna, rotate the handset about the line NF until any point on the handset is in contact with a phantom point below the pinna (cheek). See Figure 7-2c. The physical angles of rotation should be noted.

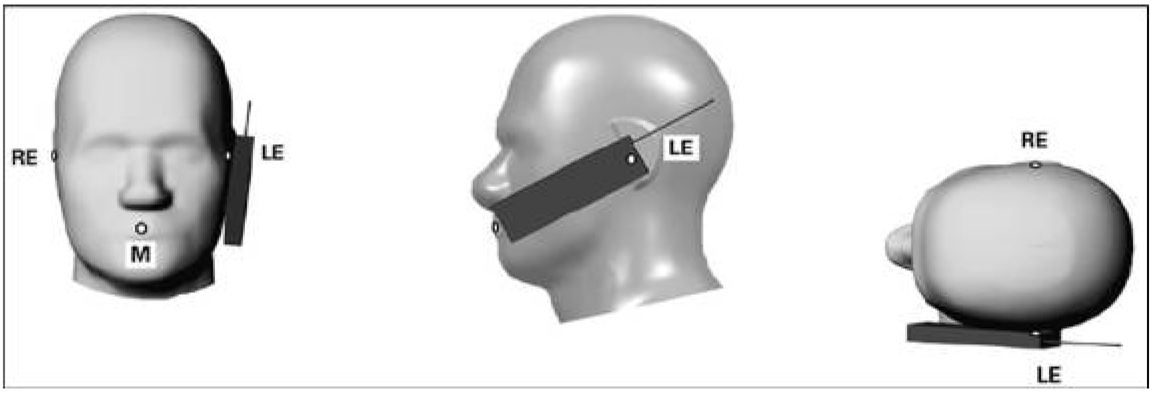


Figure 7.2c
Phone "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for handset positioning, are indicated.

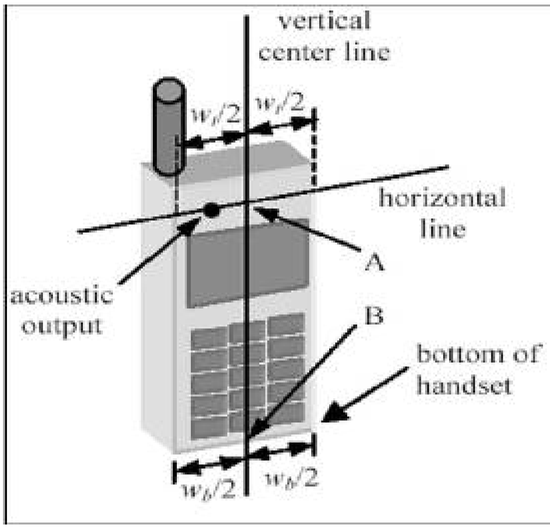


Figure 7.2a

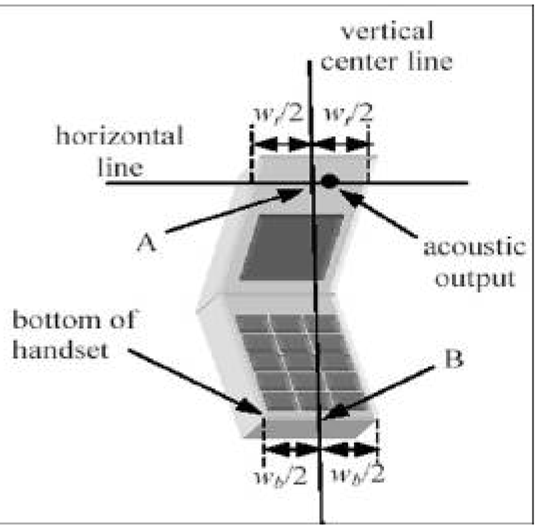


Figure 7.2b

7.3 DEFINITION OF THE "TILTED" POSITION

The "tilted" position is defined as follows:

a. Repeat steps (a) – (g) of 7.2 to place the device in the "cheek position."

b. While maintaining the orientation of the handset move the handset away from the pinna along the line passing through RE and LE in order to enable a rotation of the handset by 15 degrees.

c. Rotate the handset around the horizontal line by 15 degrees.

d. While maintaining the orientation of the handset, move the handset towards the phantom on a line passing through RE and LE until any part of the handset touches the ear. The tilted position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna (e.g., the antenna with the back of the phantom head), the angle of the handset should be reduced. In this case, the tilted position is obtained if any part of the handset is in contact with the pinna as well as a second part of the handset is contact with the phantom (e.g., the antenna with the back of the head).

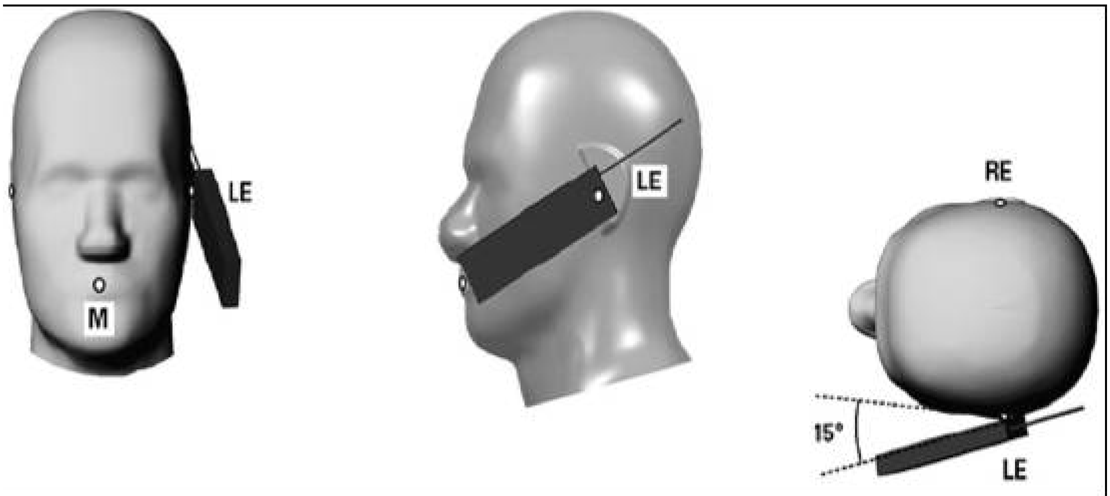


Figure 7-3
Phone "tilted" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for handset positioning, are indicated.

8. MEASUREMENT RESULTS

TEST LIQUID CONFIRMATION

Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the HP85070C dielectric probe kit. The dielectric parameters measured are reported in each correspondent section.

IEEE SCC-34/SC-2 P1528 recommended Tissue Dielectric Parameters

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in P1528

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

Note: *ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3*

Liquid Confirmation Results

Ambient conduction

Temperature: 21 °C Relative humidity: 58%

System Validation Dipole: DIPOLE1900 SN:DIPG35 01/06 **Date**: June 2, 2009

Medium			Parameter	Target	Measured	Deviation (%)	Limit (%)
Type	Temp (°C)	Depth (± 0.5 cm)					
Head 1900 MHz	20.00	15.00	Permittivity	38.34	39.768	-3.72	± 5
			Conductivity	1.45	1.405	3.10	± 5
			1g SAR	40.73	40.198	1.31	± 10

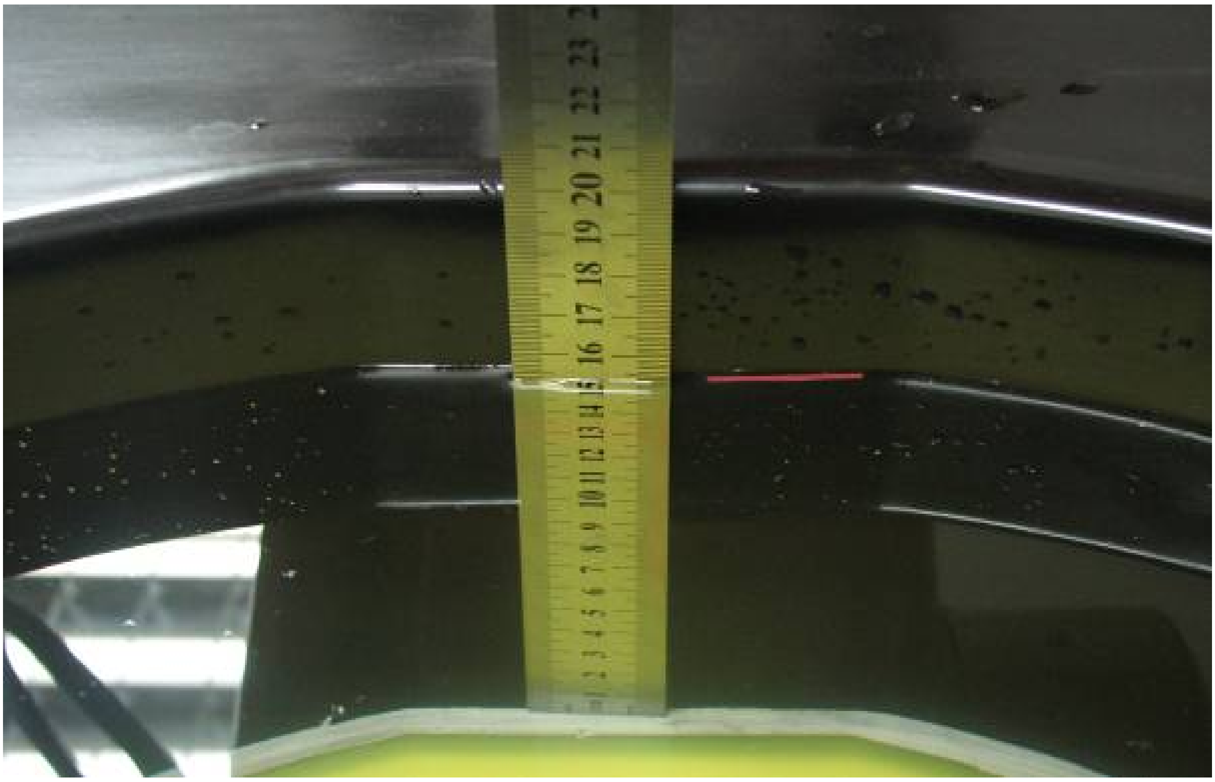
System Validation Dipole: DIPOLE1900 SN:DIPG35 01/06 **Date**: June 2, 2009

Medium			Parameter	Target	Measured	Deviation (%)	Limit (%)
Type	Temp (°C)	Depth (± 0.5 cm)					
Body 1900 MHz	20.00	15.00	Permittivity	52.13	53.112	-1.89	± 5
			Conductivity	1.5	1.431	4.60	± 5
			1g SAR	40.36	38.958	3.47	± 10

EUT TUNE-UP PROCEDURE

The following procedure had been used to prepare the EUT for the SAR test.

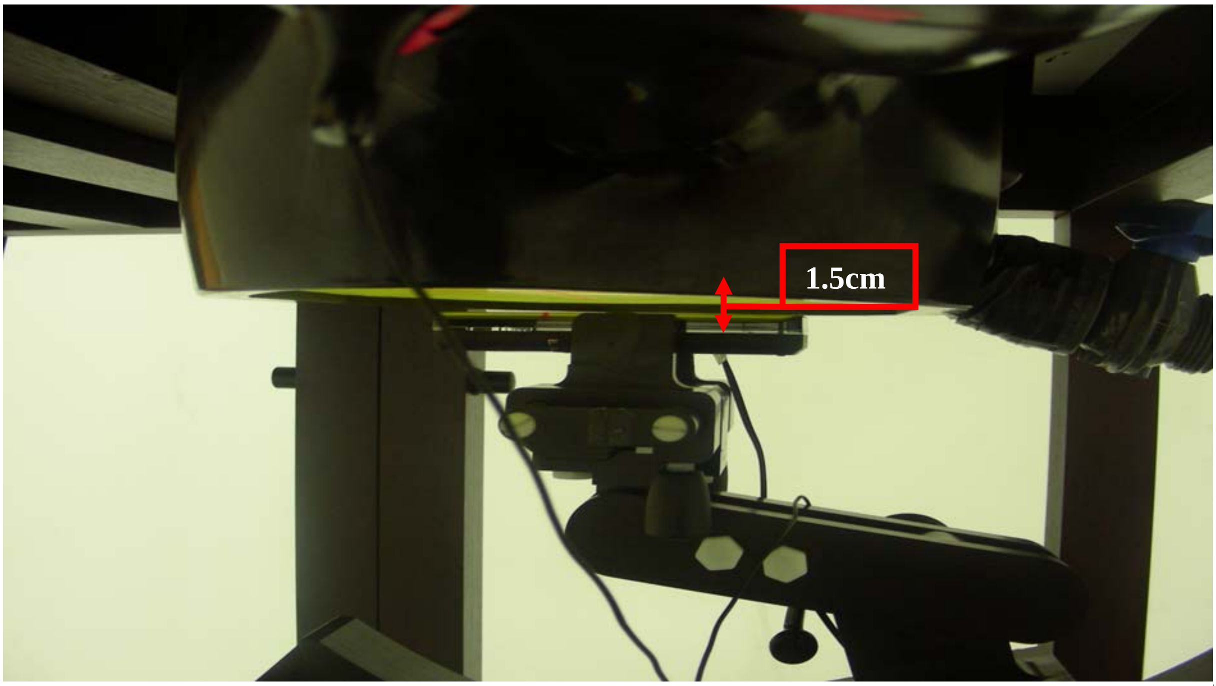
- The client supplied a special driver to program the EUT, allowing it to continually transmit the specified maximum power and change the channel frequency.
- The conducted power was measured at the high, middle and low channel frequency before and after the SAR measurement.
- the depth of Liquid must above 15cm.



EUT SETUP PHOTOS

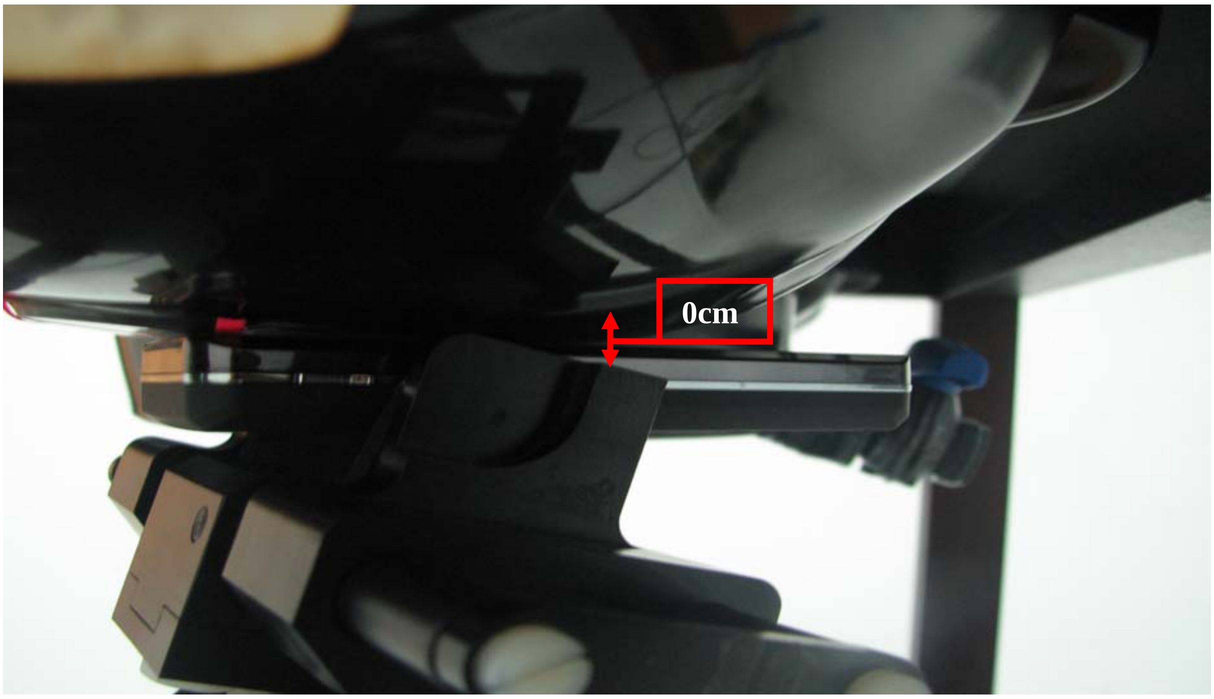
EUT Setup Configuration 1

1. Installation conditions between EUT and phantom – the back side of the EUT parallel to phantom.
2. Spacing between EUT and phantom - 1.5 cm



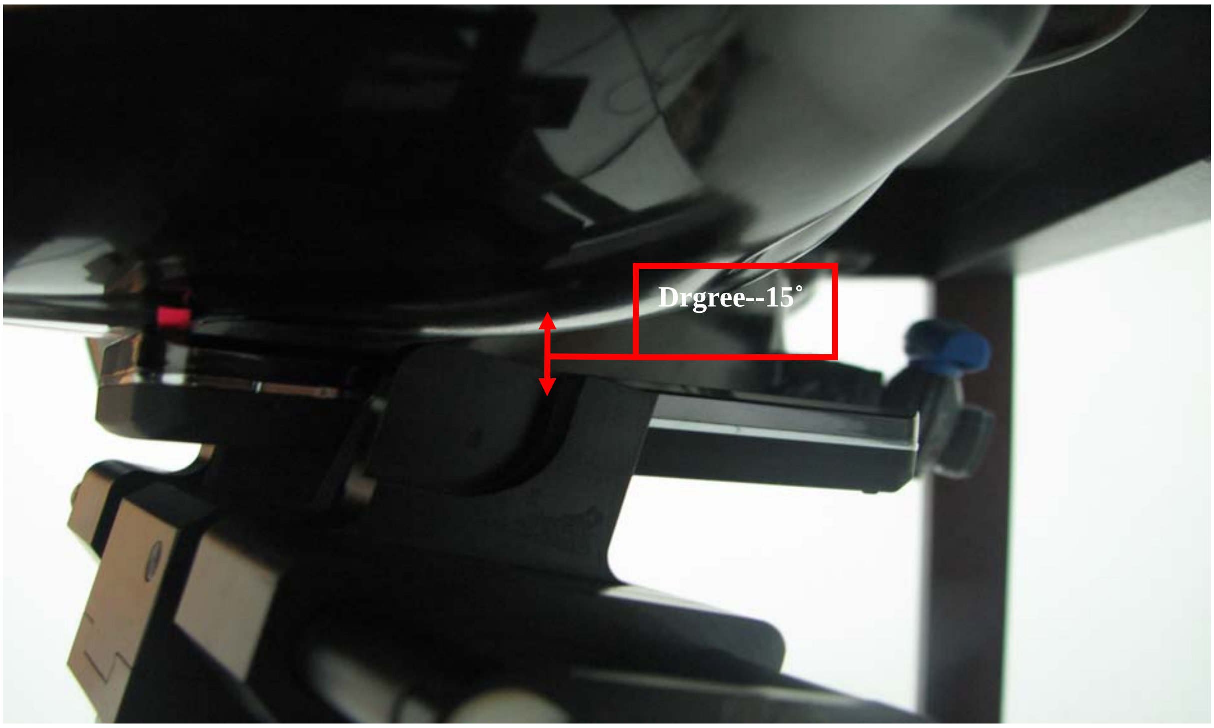
EUT Setup Configuration 2

1. Installation conditions between EUT and phantom - Cheek device with head phantom.
2. Spacing between EUT and phantom - In contact (0 cm).



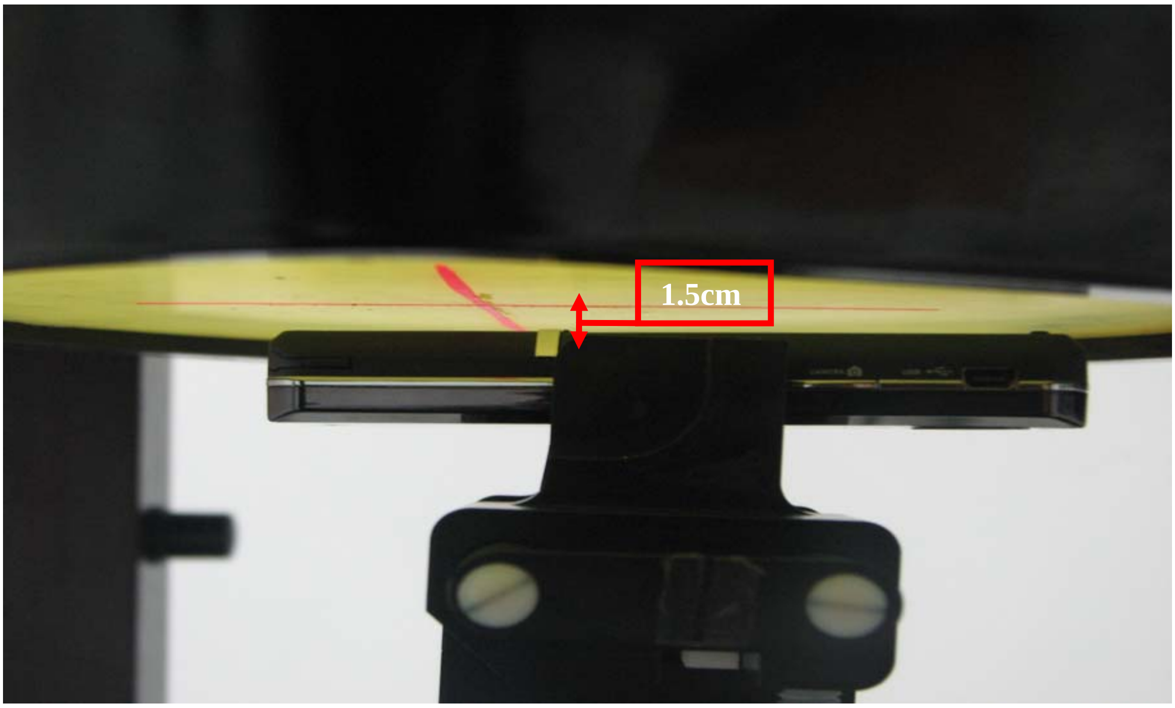
EUT Setup Configuration 3

1. Installation conditions between EUT and phantom - Tilt device with head phantom.
2. Spacing between EUT and phantom - Drgree--15°



EUT Setup Configuration 4

3. Installation conditions between EUT and phantom – the back side of the EUT parallel to phantom.
4. Spacing between EUT and phantom - 1.5 cm



SAR MEASUREMENT RESULT

Date of Measurement: June 2, 2009

SAR Measurement GSM 1900 SIM I

Crest Factor: 8 (Duty cycle: 12.5%) Depth of Liquid: 15.0 cm

EUT Configuration 1

EUT Setup Condition		Frequency		Conducted Power (dBm)		Liquid Temp [°C]	SAR(1g) (W/kg)	Limit (W/kg)
Position	Antenna	Channel	MHz	Before	After			
Flat (1.5cm)	Fixed	512	1850	28.48	28.46	20.0	0.328	1.6
		661	1880	28.18	28.15	20.0	0.340	
		810	1910	27.99	27.97	20.0	0.368	

EUT Configuration 2

EUT Setup Condition			Frequency		Conducted Power (dBm)		Liquid Temp [°C]	**SAR**(1g) (W/kg)	Limit (W/kg)
Position		Antenna	Channel	MHz	Before	After			
cheek	**Righthead**	Fixed	512	1850	28.48	28.46	20.0	0.487	1.6
			661	1880	28.18	28.15	20.0	0.540	
			810	1910	27.99	27.97	20.0	0.588	
	Left_head	Fixed	512	1850	28.48	28.46	20.0	0.374	
			661	1880	28.18	28.15	20.0	0.416	
			810	1910	27.99	27.97	20.0	0.466	

EUT Configuration 3

EUT Setup Condition			Frequency		Conducted Power (dBm)		Liquid Temp [°C]	**SAR**(1g) (W/kg)	Limit (W/kg)
Position		Antenna	Channel	MHz	Before	After			
tilt	**Righthead**	Fixed	512	1850	28.48	28.46	20.0	0.464	1.6
			661	1880	28.18	28.15	20.0	0.500	
			810	1910	27.99	27.97	20.0	0.557	
	Left_head	Fixed	512	1850	28.48	28.46	20.0	0.401	
			661	1880	28.18	28.15	20.0	0.456	
			810	1910	27.99	27.97	20.0	0.520	

Date of Measurement: June 2, 2009

SAR Measurement GSM 1900 SIM II

Crest Factor: 8 (Duty cycle: 12.5%) Depth of Liquid: 15.0 cm

EUT Configuration 1

EUT Setup Condition		Frequency		Conducted Power (dBm)		Liquid Temp [°C]	SAR(1g) (W/kg)	Limit (W/kg)
Position	Antenna	Channel	MHz	Before	After			
Flat (1.5cm)	Fixed	512	1850	28.29	28.28	20.0	0.527	1.6
		661	1880	28.08	28.07	20.0	0.541	
		810	1910	27.78	27.76	20.0	0.461	

EUT Configuration 2

EUT Setup Condition			Frequency		Conducted Power (dBm)		Liquid Temp [°C]	**SAR**(1g) (W/kg)	Limit (W/kg)
Position		Antenna	Channel	MHz	Before	After			
cheek	**Righthead**	Fixed	512	1850	28.29	28.28	20.0	0.581	1.6
			661	1880	28.08	28.07	20.0	**0.641**	
			810	1910	27.78	27.76	20.0	0.563	
	Left_head	Fixed	512	1850	28.29	28.28	20.0	0.475	
			661	1880	28.08	28.07	20.0	0.516	
			810	1910	27.78	27.76	20.0	0.464	

EUT Configuration 3

EUT Setup Condition			Frequency		Conducted Power (dBm)		Liquid Temp [°C]	**SAR**(1g) (W/kg)	Limit (W/kg)
Position		Antenna	Channel	MHz	Before	After			
tilt	**Righthead**	Fixed	512	1850	28.29	28.28	20.0	0.542	1.6
			661	1880	28.08	28.07	20.0	0.590	
			810	1910	27.78	27.76	20.0	0.521	
	Left_head	Fixed	512	1850	28.29	28.28	20.0	0.521	
			661	1880	28.08	28.07	20.0	0.580	
			810	1910	27.78	27.76	20.0	0.540	

Date of Measurement: June 2, 2009

SAR Measurement GPRS 1900 Class 12 SIM I

Crest Factor: 2 (Duty cycle: 50%) Depth of Liquid: 15.0 cm

EUT Configuration 4

EUT Setup Condition		Frequency		Conducted Power (dBm)		Liquid Temp [°C]	SAR(1g) (W/kg)	Limit (W/kg)
Position	Antenna	Channel	MHz	Before	After			
Flat (1.5cm)	Fixed	512	1850	28.48	28.46	20.0	0.428	1.6
		661	1880	28.16	28.15	20.0	0.440	
		810	1910	27.97	27.96	20.0	0.468	

SAR Measurement EDGE 1900 SIM I

Crest Factor:2 (Duty cycle: 50%) Depth of Liquid: 15.0 cm

EUT Configuration 4

EUT Setup Condition		Frequency		Conducted Power (dBm)		Liquid Temp [°C]	SAR(1g) (W/kg)	Limit (W/kg)
Position	Antenna	Channel	MHz	Before	After			
Flat (1.5cm)	Fixed	512	1850	28.47	28.45	20.0	0.421	1.6
		661	1880	28.17	28.15	20.0	0.433	
		810	1910	27.98	27.97	20.0	0.456	

Date of Measurement: June 2, 2009

SAR Measurement GPRS 1900 Class 12 SIM II

Crest Factor: 2 (Duty cycle: 50%) Depth of Liquid: 15.0 cm

EUT Configuration 4

EUT Setup Condition		Frequency		Conducted Power (dBm)		Liquid Temp [°C]	SAR(1g) (W/kg)	Limit (W/kg)
Position	Antenna	Channel	MHz	Before	After			
Flat (1.5cm)	Fixed	512	1850	28.28	28.26	20.0	0.543	1.6
		661	1880	28.06	28.04	20.0	0.552	
		810	1910	27.77	27.75	20.0	0.473	

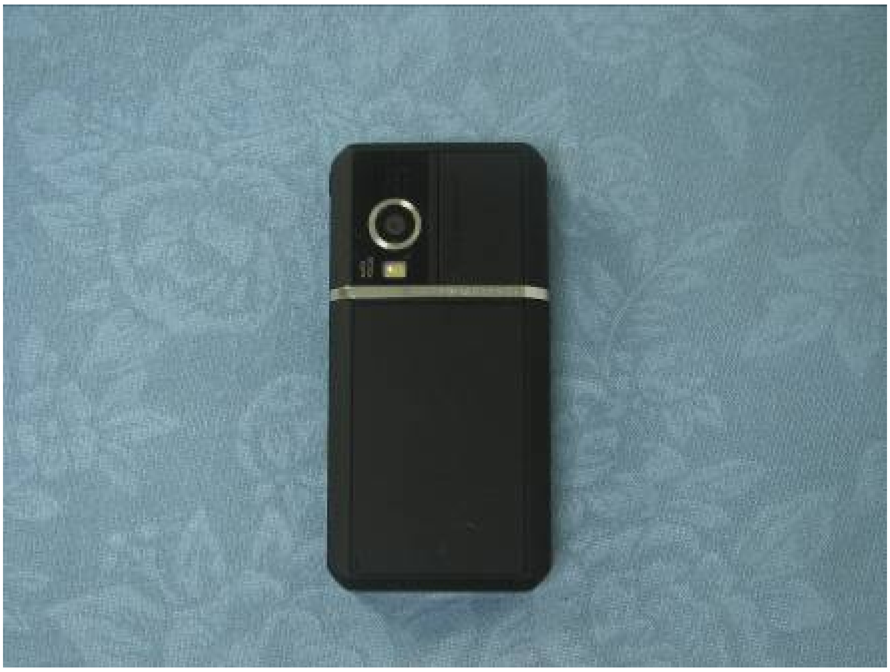
SAR Measurement EDGE 1900 SIM II

Crest Factor: 2 (Duty cycle: 50%) Depth of Liquid: 15.0 cm

EUT Configuration 4

EUT Setup Condition		Frequency		Conducted Power (dBm)		Liquid Temp [°C]	SAR(1g) (W/kg)	Limit (W/kg)
Position	Antenna	Channel	MHz	Before	After			
Flat (1.5cm)	Fixed	512	1850	28.27	28.26	20.0	0.540	1.6
		661	1880	28.05	28.04	20.0	0.549	
		810	1910	27.75	27.74	20.0	0.468	

8 EUT PHOTOS



9. EQUIPMENT LIST & CALIBRATION

Name of Equipment	**Manufacturer**	**Type/Model**	**Serial Number**	**Calibration Due**
P C	HP	PV 3.06GHz	375052-AA1	N/A
Signal Generator	Agilent	E8257C	MY43321570	12/11/2009
MultiMeter	Keithley	2000	1015843	05/01/2010
S-Parameter Network Analyzer	Agilent	E5071B	MY42301382	08/07/2009
Wireless Communication Test Set	R&S	CMU200	SN:B23-03291	06/17/2010
Power Meter	Agilent	E4416A	QB41292714	07/29/2009
E-field PROBE	ANTENNESSA	EP_100	SN1109	04/16/2010
DIPOLE 835	ANTENNESSA	DIPC32	SN 01_06	09/19/2010
DIPOLE 900	ANTENNESSA	DIPD33	SN 01_06	09/19/2010
DIPOLE 1800	ANTENNESSA	DIPF34	SN 01_06	09/19/2010
DIPOLE 1900	ANTENNESSA	DIPG35	SN 01_06	09/19/2010
DIPOLE 2000	ANTENNESSA	DIPI36	SN 01_06	09/19/2010
DIPOLE 2450	ANTENNESSA	DIPJ37	SN 01_06	09/19/2010
POSITIONING DEVICE	ANTENNESSA	MSH_14	SN 41_05	N/A
DUMMY PROBE	ANTENNESSA	DP_12	SN 39_05	N/A
SAM PHANTOM	ANTENNESSA	SAM29	SN 41_05	N/A
PHANTON WOOD TABLE	ANTENNESSA	N/A	N/A	N/A
6 AXIS ROBOT	KUKA	KR3	846428	N/A
ROBOT KRC	KUKA	KCP2	01436	N/A
CHANELS SCAN CARD	KEITHLEY	2000	2000-172-01B	N/A
PROBE/ROBOT POSITIONING DEVICE	ANTENNESSA	MSH14	SN 41_05	N/A
LIQUID CALIBRATION KIT	ANTENNESSA	41/05 OCP9	00425167	N/A

10. FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ No.10, Weiye Rd., Innovation Park, Eco & Tec. Development Part, Kunshan City, Jiangsu Province, PRC.

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12. ATTACHMENT

Exhibit	Content
1	System Validation Plots
2	SAR Test Plots
3	Dipole calibration report (900MHz/1800MHz/1900MHz/2450MHz)
4	E-field calibration report

End of Report