ANSI/IEEE Std. C95.1-1992

In accordance with the requirements of
FCC Report and Order: ET Docket 93-62, and OET Bulletin 65 Supplement C

FCC SAR TEST REPORT

For
Mobile phone

Model No.: G10

Trade Name: Zonda

Test Report Number:
KS100315B01

Prepared for

TeleEpoch Limited.

2/F, R2-A North Gate, Shenzhen High-Tech Industria Nanshan District,
Shenzhen,Guang Dong, China

Issued by

Compliance Certification Services (Kunshan) Inc.
No.10, Weiye Rd., Innovation Park, Eco & Tec. Development Part,
Kunshan City, Jiangsu Province, PRC.
TEL: 86-512-57355888
FAX: 86-512-57370818
http://www.ccsrf.com

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Testing Laboratory
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1. CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

Applicant:	TeleEpoch Limited.
Address:	2/F, R2-A North Gate, Shenzhen High-Tech Industria Nanshan District, Shenzhen,Guang Dong, China
Equipment Under Test:	Mobile Phone
Trade Name:	Zonda
Model Number:	G10
Date of Test:	March 16, 2010
Report Number:	KS100315B01
Device Category:	PORTABLE DEVICES
Exposure Category:	GENERAL POPULATION/UNCONTROLLED EXPOSURE

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

The 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:

Miro Chueh
EMC Manager
Compliance Certification Services Inc.

Reviewed by:

Lin Zhang
EMC Section Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Mobile phone
Model Number	G10
Trade Name	Zonda
Model Discrepancy	N/A
Frequency Range	GSM / GPRS / EGPRS 850: 824.2 ~ 848.8 MHz WCDMA / HSDPA band V: 826.4 ~ 846.6 MHz
Transmit Power(Average)	GSM850 Band: GSM 850: 32.89 dBm GPRS 850: 32.88 dBm EDGE850:32.89.76 dBm WCDMA Band V: WCDMA band V: 24.53 dBm HSDPA band V: 22.49 dBm
Max. SAR :	GSM 850: 0.901 W/kg WCDMA band V: 0.897 W/kg
Modulation Technique	GSM/GPRS :GMSK; EDGE:8PSK; WCDMA:QPSK; HSDPA:QPSK/16QAM;
Accessories	Battery: model number: Ion de Litio 3.7Vcc 800mAh

3. 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.

4. APPLIED STANDARDS

The Specific Absorption Rate (SAR) testing specification, method and procedure for this device is in accordance with the following standards:

- 47 CFR Part 2 (2.1093)
- IEEE C95.1-1999
- KDB 941225 D01 v02
- KDB 447498 D02 v01
- OET Bulletin 65 Supplement C (Edition 01-01)
- Preliminary Guidance for Reviewing Applications for Certification of 3G Device. May 2006.

5. TEST CONFIGURATION

The device was controlled by using a base station emulator R&S CMU200. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of DUT. The DUT was set from the emulator to radiate maximum output power during all tests.

Measurements were performed on the lowest, middle, and highest channel for each testing position.

For SAR testing, EUT is in GPRS/EDGE or WCDMA/HSDPA link mode. In GPRS/EDGE link mode, its crest factor is 2, because EUT is set in GPRS/EDGE multi-slot class 12 with 4 uplink slots. In WCDMA/HSDPA link mode, its crest factor is 1.

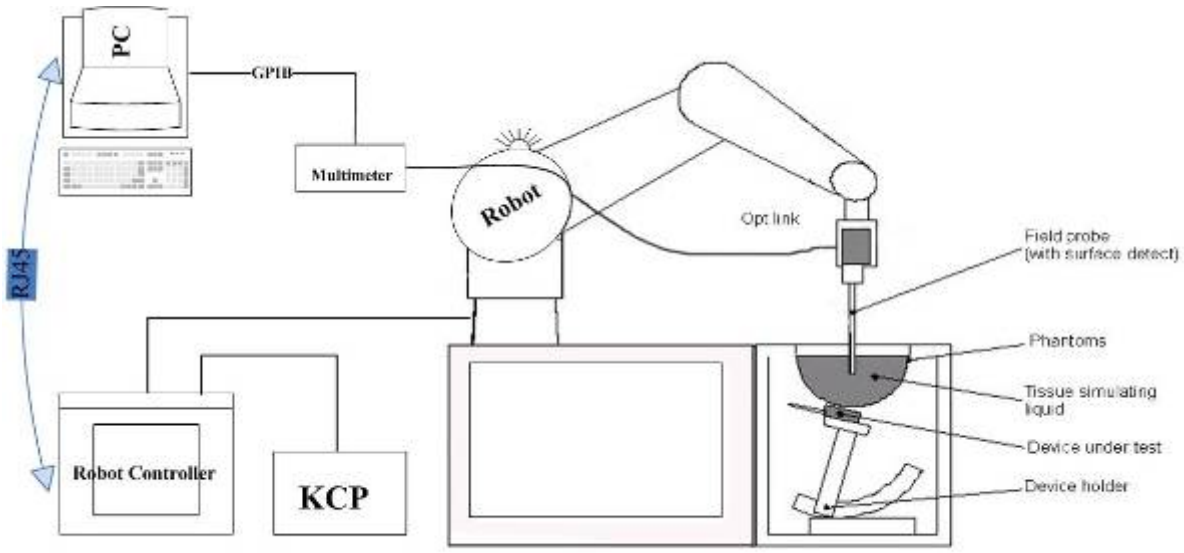
6. DOSIMETRIC ASSESSMENT SETUP

These measurements were performed with the automated near-field scanning system OPENSAR from ATTENNESSA. 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 1109 (manufactured by SATIMO), 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 Twin Phantom as described in FCC supplement C, IEE P1528 and CENELEC EN50361.

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***

6.1 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).

    System validation dipoles to validate the proper functioning of the system.

6.2 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 0.001W/kg to > 100 W/kg;

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

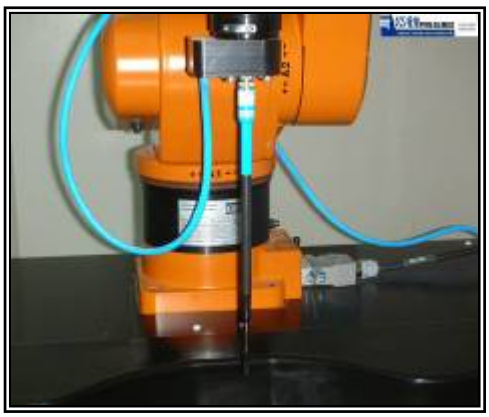
Tip diameter: 6.5 mm

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 Probe

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

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 EN62209-1. 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.

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.*

7. EVALUATION PROCEDURES

DATA EVALUATION

The OPENSAR4 post processing software automatically executes the following procedures 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_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can 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:

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

with 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 (OPENSAR parameter)
dcp_i = Diode compression point (OPENSAR parameter)

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

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

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

with 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
aij = Sensor sensitivity factors for H-field probes
f = Carrier frequency (GHz)
Ei = Electric field strength of channel i in V/m
Hi = 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.

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

with *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/cm^3

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.

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

with P_{pwe} = Equivalent power density of a plane wave in mW/cm^2
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 OPENSAR4 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 ($a << \lambda$), 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.

8. 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	$(1\text{-}c_p)^{1/2}$	$(1\text{-}c_p)^{1/2}$	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	

9. 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

10. EUT ARRANGEMENT

Please refer to IEEE P1528 illustration below.

10.1 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)

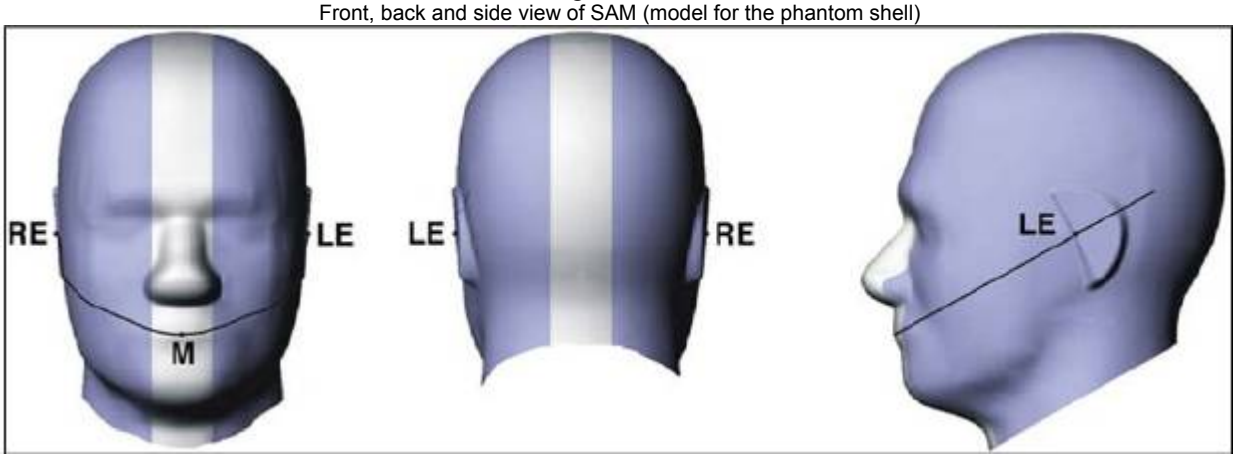


Figure 7-1b
Close up side view of phantom showing the ear region

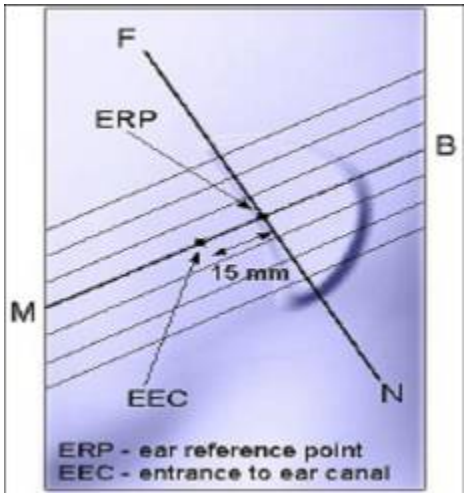


Figure 7-1c
Side view of the phantom showing relevant markings and the 7 cross sectional plane locations

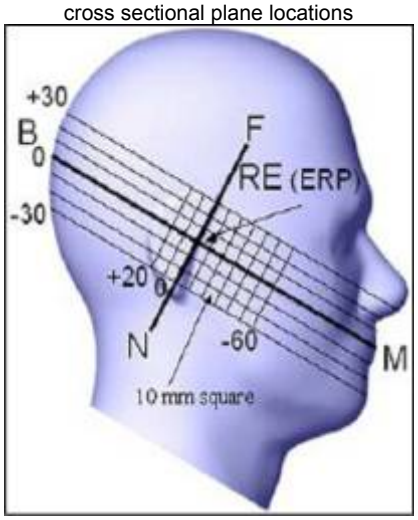


Figure 7-1b
Close up side view of phantom showing the ear region

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

10.2 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.

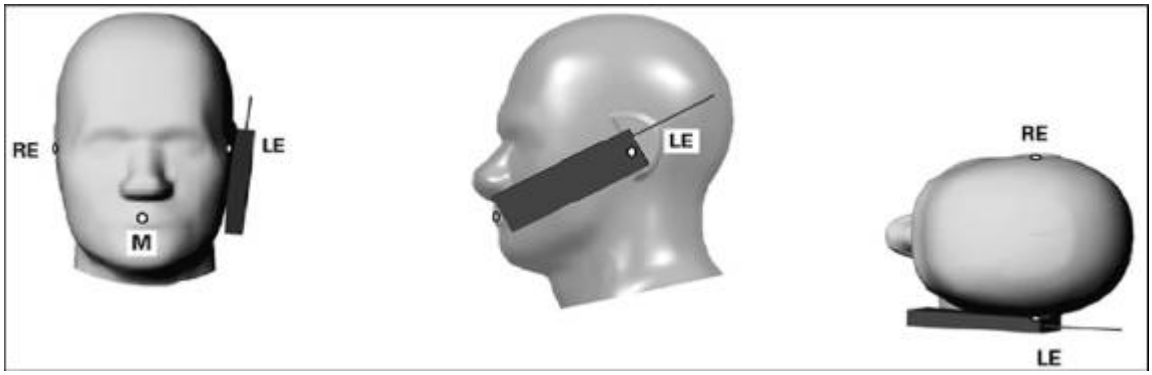


Figure 7.2c
Phone "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for handset positioning, are indicated.

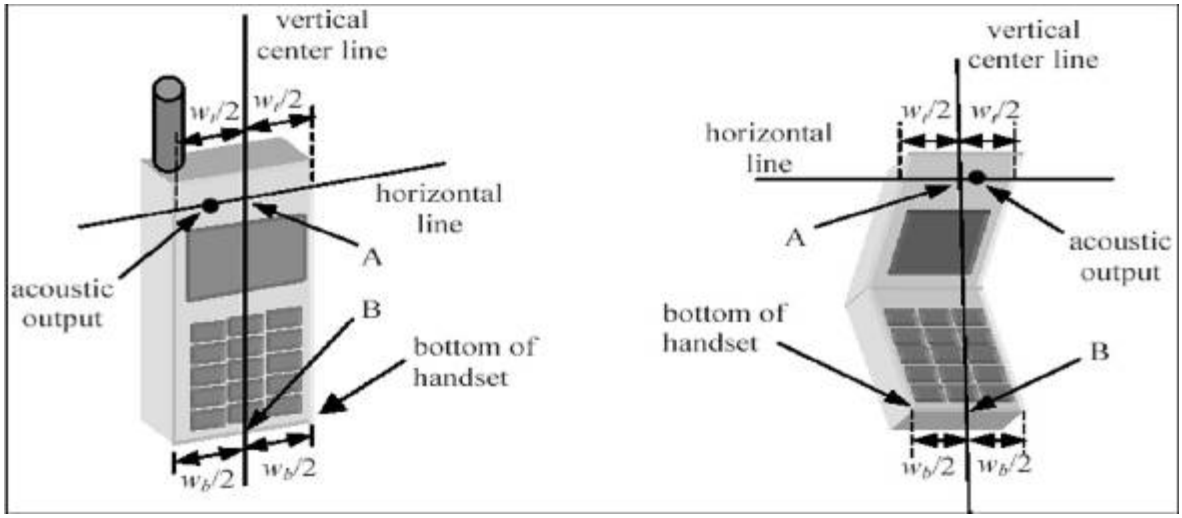


Figure 7.2a Figure 7.2b

10.3 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).

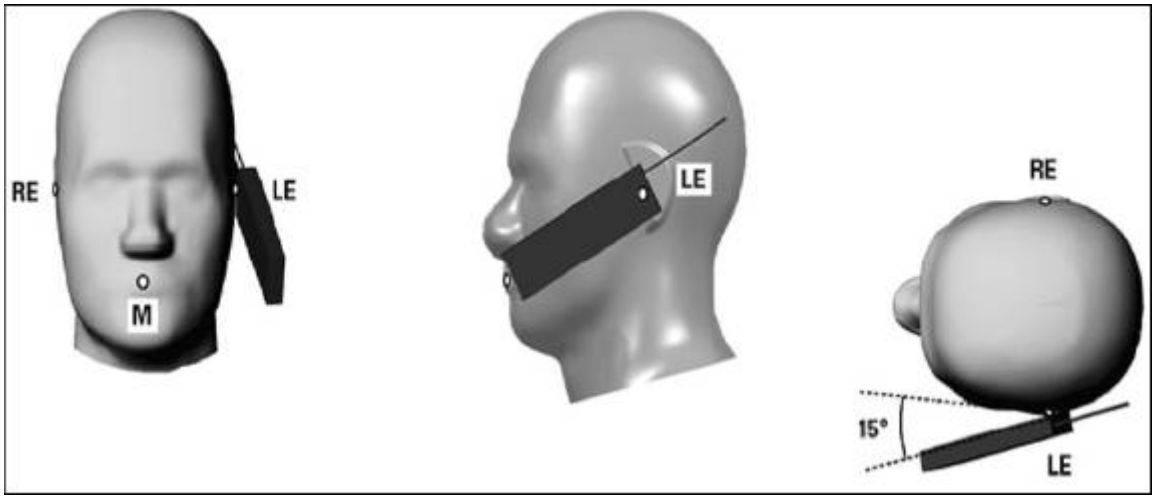


Figure 7-3
Phone "tilted" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for handset positioning, are indicated.

11. MEASUREMENT RESULTS

11.1 TEST LIQUIDS 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 (MHz)	Head		Body	
	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	45.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

LIQUID MEASUREMENT RESULTS

Ambient condition:

Temperature: 21 °C Relative humidity: 58%

Date: March 16, 2010

Head Simulatinf Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]	Depth [cm]					
835 MHz	23.50	15.00	Permitivity:	41.5	41.047	1.09	± 5
			Conductivity:	0.9	0.901	-0.11	± 5

Ambient condition:

Temperature: 21 °C Relative humidity: 58%

Date: March 16, 2010

Body Simulatinf Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]	Depth [cm]					
835 MHz	23.50	15.00	Permitivity:	55.2	54.021	2.13	± 5
			Conductivity:	0.97	0.938	3.4	± 5

11.2 SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of ±10%. The system performance check results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

IEEE P1528 Recommended Reference Value

Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (Above feed point)	Local SAR at surface (y=2cm offset from feed point)
300	3.0	2.0	4.4	2.1
450	4.9	3.3	7.2	3.2
835	9.5	6.2	14.1	4.9
900	10.8	6.9	16.4	5.4
1450	29.0	16.0	50.2	6.5
1800	38.1	19.8	69.5	6.8
1900	38.8	20.4	67.6	6.6
2000	41.1	21.1	74.6	6.5
2450	52.4	24.0	104.2	7.7
3000	63.8	25.7	140.2	9.5

SYSTEM PERFORMANCE CHECK RESULTS

Dipole: DIPOLE850 SN:SN 48/05 DIPC32

Date: March 16, 2010

Ambient condition: Temperature: 21 °C Relative humidity: 58%

Head Simulatinf Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]	Depth [cm]					
835 MHz	20.00	15.00	Permitivity:	41.5	41.047	1.09	± 5
			Conductivity:	0.9	0.901	-0.11	± 5
			1g SAR:	9.41	9.201	2.22	± 10

Dipole: DIPOLE850 SN:SN 48/05 DIPC32

Date: March 16, 2010

Ambient condition: Temperature: 21 °C Relative humidity: 58%

Body Simulatinf Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]	Depth [cm]					
835.00	20.00	15.00	Permitivity:	55.2	54.021	2.13	± 5
			Conductivity:	0.97	0.938	3.4	± 5
			1g SAR:	9.79	9.745	0.46	± 10

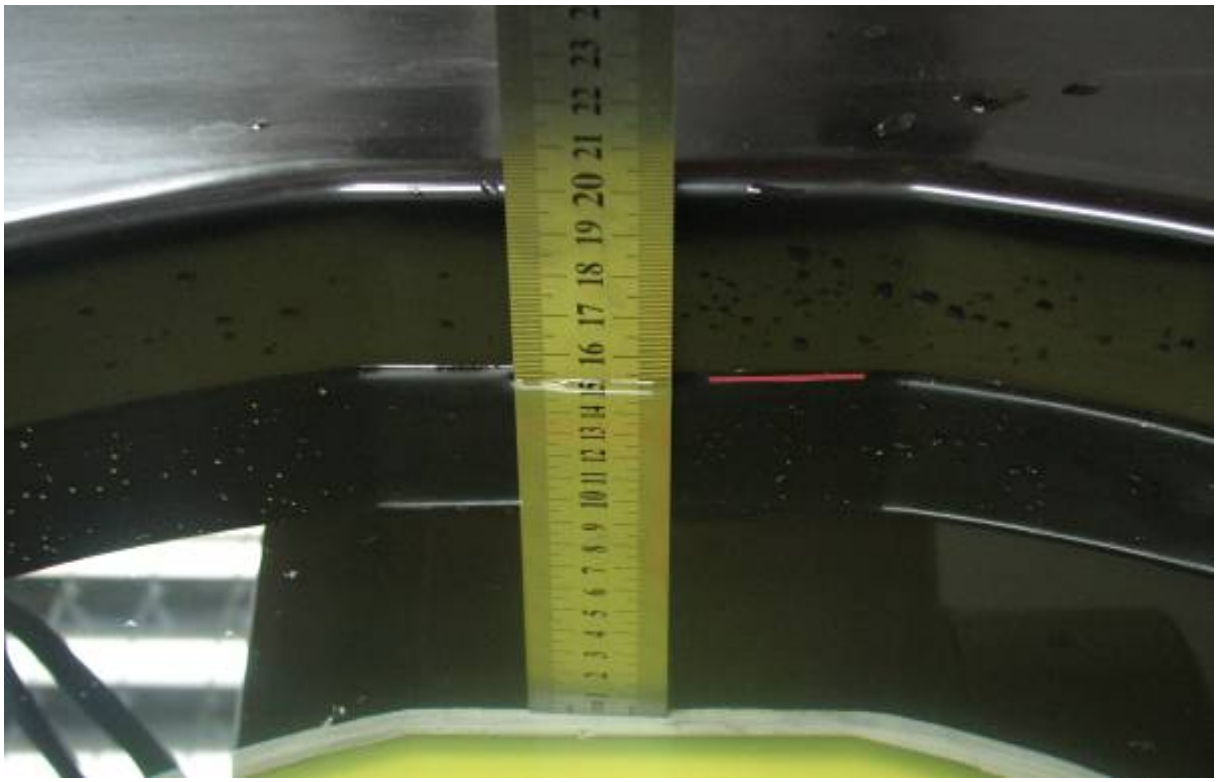
ps. 1g SAR is equal 4x10.2(250mW forward power SAR value)

11.3 EUT TUNE-UP PROCEDURES AND TEST MODE

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

- o The client supplied a special driver to program the EUT, allowing it to continually transmit the specified maximum power and change the channel frequency.
- o The conducted power was measured at the high, middle and low channel frequency before and after the SAR measurement.
- o During SAR test, the highest output channel per band measured first.

  GSM 850 / GPRS 850 / EDGE 850
  Network Support: *GSM only / GPRS/EDGE*
  Main Service: *Circuit Switched / Packet data / Packet data*
  Power Setting: *33dBm / 33dBm / 33dBm*
  Class: B
  Class: 12 (4 Up / 1 Down)
  WCDMA Band V/ HSDPA
  Network Support: WCDMA / HSDPA
- o the depth of Liquid must above 15cm.



Output powers are measured as below:

11.4 RF POWER OUTPUT FOR UMTS REL99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 V8.5.0 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7) 12.2kps RMC is used for this testing. Power control set to All bits up. A summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

REL 99

Band	UL Ch	DL Ch	Frequency	Conducted output power (dBm)
				Average
UMTS850 (Band V)	4132	4357	826.4	24.53
	4183	4407	836.4	23.57
	4233	4458	846.6	23.96

11.5 RF POWER OUTPUT FOR UMTS REL 5 HSDPA

The following Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V8.5.0 specification. All TX RMS and Peak power requirements for Power Class 3 were met according to table 5.2AA.5 and achieved through the outlined test procedure in section 5.2AA.4.2. A summary of these settings are illustrated below:

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βec	-	-	-	-
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	βed	Not Applicable			
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs = βhs/βc	30/15			

Result

REL 5 HSDPA only

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)
					Average
UMTS850 (Band V)	1	4132	4357	826.4	22.49
		4183	4407	836.4	22.47
		4233	4458	846.6	22.43
	2	4132	4357	826.4	22.35
		4183	4407	836.4	22.38
		4233	4458	846.6	22.34
	3	4132	4357	826.4	21.92
		4183	4407	836.4	21.88
		4233	4458	846.6	21.85
	4	4132	4357	826.4	21.87
		4183	4407	836.4	21.86
		4233	4458	846.6	21.82

The respectively maximum output powers of each RF modes are as below:

Conducted output power (Average)(dBm)

GSM		GSM mode		GPRS mode (GPRS 4Up)		EDGE mode (GPRS 4Up)	
		before	after	before	after	before	after
GSM850	Ch 128	32.89	32.87	32.88	32.87	32.89	32.87
	Ch 180	32.57	32.56	32.55	32.54	32.54	32.53
	Ch 251	31.47	31.45	31.45	31.44	31.43	31.42

Conducted output power (Average)(dBm)

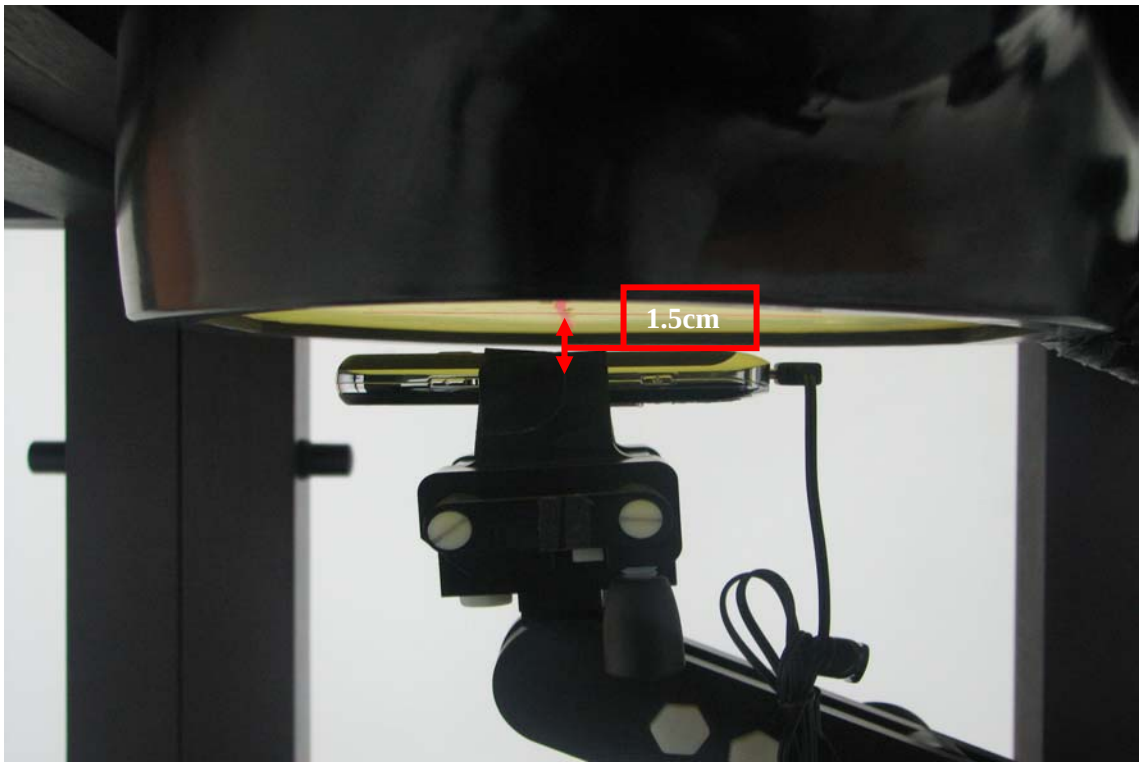
WCDMA		WCDMA mode		HSDPA mode	
		before	after	before	after
Band V	Ch 4132	24.53	24.49	22.49	22.45
	Ch 4183	23.57	23.53	22.47	22.43
	Ch 4233	23.96	23.92	22.43	22.40

Notice: Due to this EUT operates with 3GPP Release 5 function, according to the KDB 941225, we have to submit a Permit-But-Ask to FCC before we perform any SAR tests. According to the KDB Tracking Number 902030(for WCDMA/HSDPA/HSUPA), FCC administrator approves our PBA and SAR exclusion for HSPA in this EUT.

11.6 EUT SETUP PHOTOS

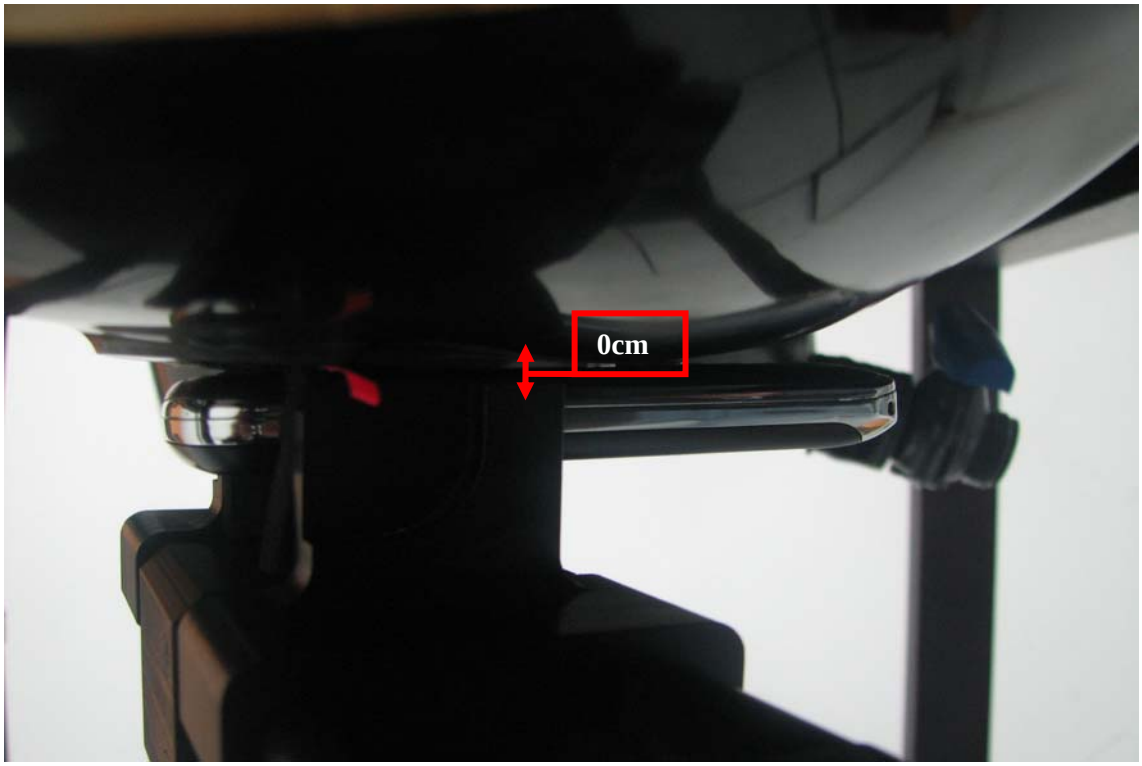
EUT Setup Configuration 1

the back side of the EUT in body position with GSM



EUT Setup Configuration 2

Cheek device with head phantom.

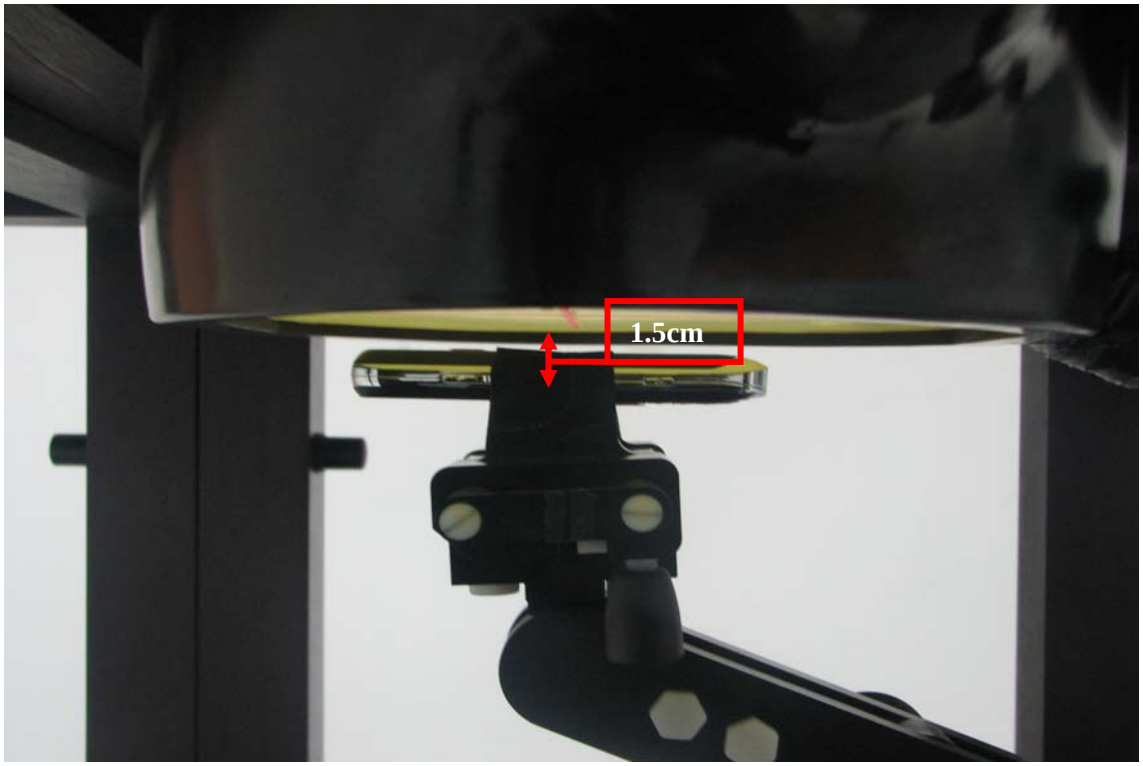


EUT Setup Configuration 3

Tilt device with head phantom.

EUT Setup Configuration 4

the back side of the EUT in body position with GPRS



11.7 SAR MEASUREMENT RESULTS

Date of Measurement: March 16, 2010

SAR Measurement GSM 850

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	128	824.2	**32.89**	32.87	20.0	0.254	1.6
		180	836.6	32.57	32.56	20.0	0.276	
		251	848.8	31.47	31.45	20.0	0.319	

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	128	824.2	32.89	32.87	20.0	0.827	1.6
			180	836.6	32.57	32.56	20.0	0.841	
			251	848.8	31.47	31.45	20.0	0.813	
	Left_head	Fixed	128	824.2	32.89	32.87	20.0	**0.901**	
			180	836.6	32.57	32.56	20.0	0.821	
			251	848.8	31.47	31.45	20.0	0.815	

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	128	824.2	32.89	32.87	20.0	0.572	1.6
			180	836.6	32.57	32.56	20.0	0.639	
			251	848.8	31.47	31.45	20.0	0.598	
	Left_head	Fixed	128	824.2	32.89	32.87	20.0	0.456	
			180	836.6	32.57	32.56	20.0	0.524	
			251	848.8	31.47	31.45	20.0	0.539	

Date of Measurement: March 16, 2010

SAR Measurement GPRS 850 Class 12								
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	128	824.2	32.88	32.87	20.0	0.287	1.6
		180	836.6	32.55	32.54	20.0	0.312	
		251	848.8	31.45	31.44	20.0	0.323	

SAR Measurement EDGE 850 Class 12								
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	128	824.2	32.89	32.87	20.0	0.285	1.6
		180	836.6	32.54	32.53	20.0	0.314	
		251	848.8	31.43	31.42	20.0	0.324	

SAR Measurement WCDMA band V

Crest Factor: 1 (Duty cycle: 100%) 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	4132	826.4	24.53	24.49	20.0	0.199	1.6
		4183	836.4	23.57	23.53	20.0	0.215	
		4233	846.6	23.96	23.92	20.0	0.246	

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	4132	826.4	24.53	24.49	20.0	0.826	1.6
			4183	836.4	23.57	23.53	20.0	0.842	
			4233	846.6	23.96	23.92	20.0	0.811	
	Left_head	Fixed	4132	826.4	24.53	24.49	20.0	**0.897**	
			4183	836.4	23.57	23.53	20.0	0.820	
			4233	846.6	23.96	23.92	20.0	0.813	

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	4132	826.4	24.53	24.49	20.0	0.571	1.6
			4183	836.4	23.57	23.53	20.0	0.637	
			4233	846.6	23.96	23.92	20.0	0.593	
	Left_head	Fixed	4132	826.4	24.53	24.49	20.0	0.455	
			4183	836.4	23.57	23.53	20.0	0.522	
			4233	846.6	23.96	23.92	20.0	0.538	

SAR Measurement HSDPA band V								
Crest Factor: 1 (Duty cycle: 100%)					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	4132	826.4	22.49	22.45	20.0	0.197	1.6
		4183	836.4	22.47	22.43	20.0	0.214	
		4233	846.6	22.43	22.40	20.0	0.245	

12. EUT PHOTO

3 def
6 mno
9 wxyz
2 abc
5 jkl
8 tuv
1
4 ghi
7 pqrs

1
4 ghi
7 pqrs
2 abc
5 jkl
8 tuv
3 def
6 mno
9 wxyz

1
2 abc
3 def
4 ghi
5 jkl
6 mno
7 pqrs
8 tuv
9 wxyz
0 +

ZONDA
Capacidad:
3,7Vcc- 800 mAh
Ion de Litio
BATERIA RECARGABLE
- NO DESENSAMBLAR
PRECAUCIÓN :
• USAR SOLO EL CARGADOR ORIGINAL
• NO PROVOCAR CORTO CIRCUITO
• DESECHAR EN LUGARES APROPIADOS
• NO EXPONER AL FUEGO
HECHO EN CHINA

13. EQUIPMENT LIST & CALIBRATION STATUS

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	12/11/2010
MultiMeter	Keithley	2000	1015843	05/01/2010
S-Parameter Network Analyzer	Agilent	E5071B	MY42301382	08/07/2010
Wireless Communication Test Set	R&S	CMU200	SN:B23-03291	06/17/2010
Power Meter	Agilent	E4416A	QB41292714	07/29/2010
E-field PROBE	ANTENNESSA	EP_100	SN1109	04/16/2010
DIPOLE 835	ANTENNESSA	DIPC32	SN 48/05	12/10/2010
DIPOLE 900	ANTENNESSA	DIPD33	SN 48/05	12/10/2010
DIPOLE 1800	ANTENNESSA	DIPF34	SN 48/05	12/10/2010
DIPOLE 1900	ANTENNESSA	DIPI36	SN 48/05	12/10/2010
DIPOLE 2450	ANTENNESSA	DIPJ37	SN 48/05	12/10/2010
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

14. 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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16. ATTACHMENTS

Exhibit	Content
1	System Validation Plots
2	SAR Test Plots
3	Dipole calibration report (850MHz/1900MHz)
4	E-field calibration report

END OF REPORT