## 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**

**Product Name: GSM Mobile Phone**

**Brand Name: unnecto ™**

**Model No.: U-370-2**

**Series Model: N/A**

**Test Report Number:**
**KS111223A01-SF**

**Issued for**

**Ambitio LLC, The Owner of unnecto ™**

**1315 N.W 98th ct Suite 13 United States**

**Issued by**

**Compliance Certification Services Inc.**

**Kun shan Laboratory**

**No.10 Weiye Rd., Innovation park, Eco&Tec,**
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ACCREDITED
TESTING CERT #2541.01

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# 1. CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

| | |
|---|---|
| **Product Name:** | GSM Mobile Phone |
| **Trade Name:** | unnecto ™ |
| **Model Name.:** | U-370-2 |
| **Series Model:** | N/A |
| **Applicant Discrepancy:** | Initial |
| **Devices supporting GPRS:** | Class B |
| **Description Test Modes(worst case ):** | SIM 1 and SIM2 is a chipset unit and tested as single chipset |
| **Device Category:** | PORTABLE DEVICES |
| **Exposure Category:** | GENERAL POPULATION/UNCONTROLLED EXPOSURE |
| **Date of Test:** | January 12, 2012 |
| **Applicant:** | **Ambitio LLC, The Owner of unnecto ™**<br>1315 N.W 98th ct Suite 13 United States |
| **Manufacturer:** | **QINGBANG ELEC(SZ)CO.,LTD.**<br>No.2, Qimin Rd, North District, High-Tech Industrial Park, Nanshan, Shenzhen, China |
| **Application Type:** | Certification |

| APPLICABLE STANDARDS AND TEST PROCEDURES | |
|---|---|
| **STANDARDS AND TEST PROCEDURES** | **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:***

Hadiif Hoo
RF Manager
Compliance Certification Services Inc.

***Tested by:***

Luck.Fu
Test Engineer
Compliance Certification Services Inc.

## 2. EUT DESCRIPTION

| | | |
|---|---|---|
| **Product Name:** | GSM Mobile Phone | |
| **Model Name:** | U-370-2 | |
| **Series Model:** | N/A | |
| **Model Discrepancy:** | N/A | |
| **Brand Name:** | unnecto ™ | |
| **FCC ID:** | ZU3UNNECTOCURVE | |
| **GPRS Level:** | Multi-Class 12 | |
| **Multi-slot Class:** | 4 Up +1 Down | |
| **Power reduction:** | NO | |
| **DTM Description:** | N/A | |
| **Frequency Range:** | GSM: 850: 824.2 ~ 848.8 MHz<br>GSM: 1900: 1850.2 ~ 1910.0 MHz<br>Bluetooth: 2402 ~ 2480 MHz | |
| **Transmit Power(Average):** | GSM 850 Band:<br>GSM 850: 32.19 dBm<br>GPRS 850: 27.74 dBm<br>GSM 1900 Band:<br>GSM 1900: 30.17dBm<br>GPRS 1900: 25.83 dBm | Bluetooth:-0.15 dBm |
| **Max. SAR:** | GSM 850<br>Head: 0.621W/kg<br>Body: 0.602 W/kg<br>GSM 1900<br>Head: 0.593W/kg<br>Body: 0.598W/kg | GPRS 850: 0.459 W/kg<br>GPRS 1900: 0.538 W/kg |
| **Modulation Technique:** | GSM / GPRS : GMSK<br>Bluetooth:FHSS (GFSK) | |
| **Accessories:** | Power supply and ADP（rating）：<br>Brand Name: unnecto ™<br>Model No.: CU-370<br>Input: AC100-240V, 0.15 A, 50/60 Hz<br>Output: DC5V, 500m A<br>Battery（rating）：<br>Brand Name: unnecto ™<br>Model No.: BU-370<br>Capacitance: 900mAH<br>Rated Voltage: 3.7V<br>Charge Limit: 4.2V | |
| **Antenna Specification:** | GSM: PIFA antenna<br>Bluetooth : PIFA antenna | |
| **Operating Mode:** | Maximum continuous output | |

# 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. TEST METHODOLOGY

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

■ 47 CFR Part 2 ( 2.1093)
■ IEEE C95.1-1999
☐ KDB 941225 D01 SAR test for 3G devices
☐ KDB 248227 D01 SAR measurement procedures for 802.11 a/b/g transmitters
■ KDB 648474 D01 SAR evaluation considerations for handsets with multiple transmitters and antennas
■ OET Bulletin 65 Supplement C (Edition 01-01)
☐ Preliminary Guidance for Reviewing Applications for Certification of 3G Device. May 2006.

# 5. TEST CONFIGURATION

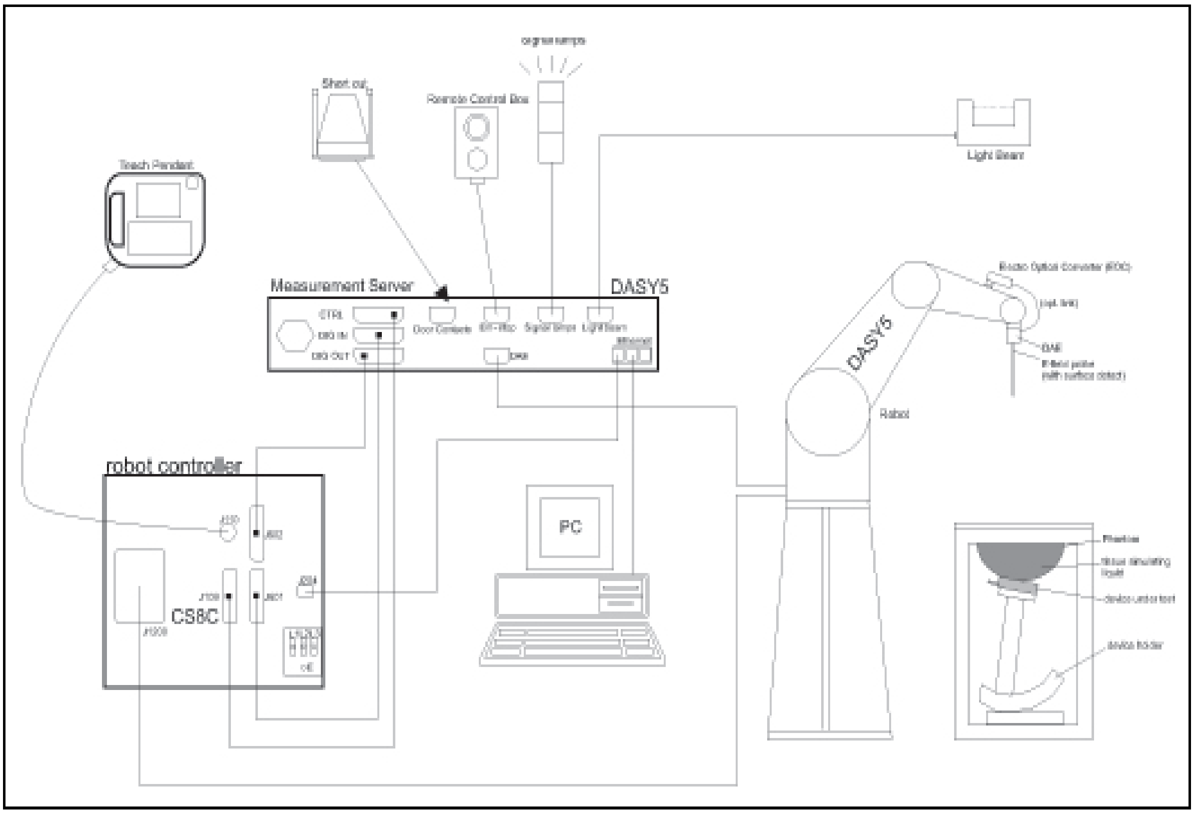
The device was controlled by using a base station emulator R&S CMU200. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 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 GSM/GPRS link mode. In GSM link mode, its crest factor is 8, In GPRS link mode, its crest factor is 2, because EUT is set in GPRS multi-slot class 12 with 4 uplink slots.

# 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 EN 62209.
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 DASY5 system for performing compliance tests consists of the following items:**

- A standard high precision 6-axis robot (St¨aubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- 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.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing validating the proper functioning of the system.

## 6.2 SYSTEM COMPONENTS


The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV celeron, 128MB chip-disk and 128 MB RAM. The necessary circuits for communication with either the DAE4(or DAE3) electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY5 I/O-board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation.


The PC-operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with two expansion slots which are reserved for future applications. Please note that the expansion slots do not have a standardized pinout and therefore only the expansion cards provided by SPEAG can be inserted. Expansion cards from any other supplier could seriously damage the measurement server. Calibration: No calibration required.

**Data Acquisition Electronics (DAE)**

The data acquisition electronics (DAE4) 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 measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE4 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

**EX3DV4 Isotropic E-Field Probe for Dosimetric Measurements**

**Construction:** Symmetrical design with triangular core
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

**Calibration:** Basic Broad Band Calibration in air: 10-3000 MHz.
Conversion Factors (CF) for HSL 900 and HSL 1800
CF-Calibration for other liquids and frequencies upon request.

**Frequency:** 10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)

**Directivity:** ± 0.3 dB in HSL (rotation around probe axis)
± 0.5 dB in HSL (rotation normal to probe axis)

**Dynamic Range:** 10 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
(noise: typically < 1 μW/g)

**Dimensions:** Overall length: 337 mm (Tip: 9 mm)
Tip diameter: 2.5 mm (Body: 10 mm)
Distance from probe tip to dipole centers: 1 mm

**Application:** High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.


Interior of probe

**SAM Twin Phantom(V4.0)**

**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. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

**Shell Thickness:** 2 ±0.2 mm

**Filling Volume:** Approx. 25 liters

**Dimensions:** Height: 850mm; Length: 1000mm; Width: 750mm

**SAM Phantom (ELI4)**
**Description Construction:**

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209 Part II and all known tissue simulating liquids. ELI4 has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is supported by software version DASY4/DASY5.5 and higher and is compatible with all SPEAG dosimetric probes and dipoles

**Shell Thickness:** 2.0 ± 0.2 mm (sagging: <1%)

**Filling Volume:** Approx. 25 liters
**Dimensions:** Major ellipse axis: 600 mm
**Minor axis:** 400 mm 500mm

**Device Holder for SAM Twin Phantom**

**Construction:** In combination with the Twin SAM Phantom, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, and flat phantom).

**System Validation Kits for SAM Twin Phantom**

**onstruction:** Symmetrical dipole with l/4 balun Enables measurement of feedpoint impedance with NWA Matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor.

**Frequency:** 900,1800,2450,5800 MHz

**Return loss:** > 20 dB at specified validation position

**Power capability:** > 100 W (f < 1GHz); > 40 W (f > 1GHz)

**nsions:** D835V2: dipole length: 161 mm; overall height: 340 mm
D1800V2: dipole length: 72.5 mm; overall height: 300 mm
D1900V2: dipole length: 67.7 mm; overall height: 300 mm
D2450V2: dipole length: 51.5 mm; overall height: 290 mm
D5GHzV2: dipole length: 20.6 mm; overall height: 300 mm

**System Validation Kits for ELI4 phantom**

**Construction:** Symmetrical dipole with l/4 balun Enables measurement of feedpoint impedance with NWA Matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor.

**Frequency:** 900, 1800, 2450, 5800 MHz

**Return loss:** > 20 dB at specified validation position

**Power capability:** > 100 W (f < 1GHz); > 40 W (f > 1GHz)

**Dimensions:** D835V2: dipole length: 161 mm; overall height: 340 mm
D1800V2: dipole length: 72.5 mm; overall height: 300 mm
D1900V2: dipole length: 67.7 mm; overall height: 300 mm
D2450V2: dipole length: 51.5 mm; overall height: 290 mm
D5GHzV2: dipole length: 20.6 mm; overall height: 300 mm

# 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 | $\sigma$ |
| | - Density | $\rho$ |

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
$\sigma$ = conductivity in [mho/m] or [Siemens/m]
$\rho$ = 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 ($a \ll \lambda$), 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 BUDGE ACCORDING TO IEEE P1528 | | | | | | |
|---|---|---|---|---|---|---|
| **Error Description** | **Uncertainty Value ±%** | **Probability distribution** | **Divisor** | **$C_1$ 1g** | **Standard unc.(1g/10g) ±%** | **$V_1$ or $V_{eff}$** |
| **Measurement System** | | | | | | |
| Probe calibration | ±5.5 | normal | 1 | 1 | ±5.5 | ∞ |
| Axial isotropy of probe | ±4.7 | rectangular | √3 | $(1\text{-}Cp)^{1/2}$ | ±1.9 | ∞ |
| Sph. Isotropy of probe | ±9.6 | rectangular | √3 | $(Cp)^{1/2}$ | ±3.9 | ∞ |
| Probe linearity | ±4.7 | rectangular | √3 | 1 | ±2.7 | ∞ |
| Detection Limit | ±1.0 | rectangular | √3 | 1 | ±0.6 | ∞ |
| Boundary effects | ±1.0 | rectangular | √3 | 1 | ±0.6 | ∞ |
| Readoutelectronics | ±0.3 | normal | 1 | 1 | ±0.3 | ∞ |
| Response time | ±0.8 | rectangular | √3 | 1 | ±0.5 | ∞ |
| Integration time | ±2.6 | rectangular | √3 | 1 | ±1.5 | ∞ |
| Probe positioning | ±0.4 | rectangular | √3 | 1 | ±0.2 | ∞ |
| Extrap. And integration | ±4.0 | rectangular | √3 | 1 | ±2.3 | ∞ |
| RF ambient conditiona | ±3.0 | rectangular | √3 | 1 | ±1.7 | ∞ |
| RF ambient conditiona | ±3.0 | rectangular | √3 | 1 | ±1.7 | ∞ |
| **Test Sample Related** | | | | | | |
| Device positioning | ±2.9 | normal | 1 | 1 | ±2.9 | 145 |
| Device holder uncertainty | ±3.6 | normal | 1 | 1 | ±3.6 | 5 |
| Power drift | ±5.0 | rectangular | √3 | 1 | ±2.9 | ∞ |
| **Phantom and Set up** | | | | | | |
| Phantom uncertainty | ±4.0 | rectangular | √3 | 1 | ±2.3 | ∞ |
| Liquid conductivity | ±5.0 | rectangular | √3 | 0.6 | ±1.8/1.2 | ∞ |
| Liquid conductivity | ±1.5 | rectangular | √3 | 0.6 | ±0.6 | ∞ |
| Liquid permittivity | ±5.0 | rectangular | √3 | 0.6 | ±1.7/1.4 | ∞ |
| Liquid permittivity | ±1.0 | rectangular | √3 | 0.6 | ±0.4 | ∞ |
| **Combined Standard Uncertainty** | | | | | ±10.375/±10.112 | |
| **Coverage Factor for 95%** | | kp=2 | | | | |
| **Expanded Standard Uncertainty** | | | | | ±20.75/±19.23 | |

Table: Worst-case uncertainty for DASY5 assessed according to IEEE P1528.
The budge is valid for the frequency range 300 MHz to 6G Hz and represents a worst-case analysis.

# 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 10 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)

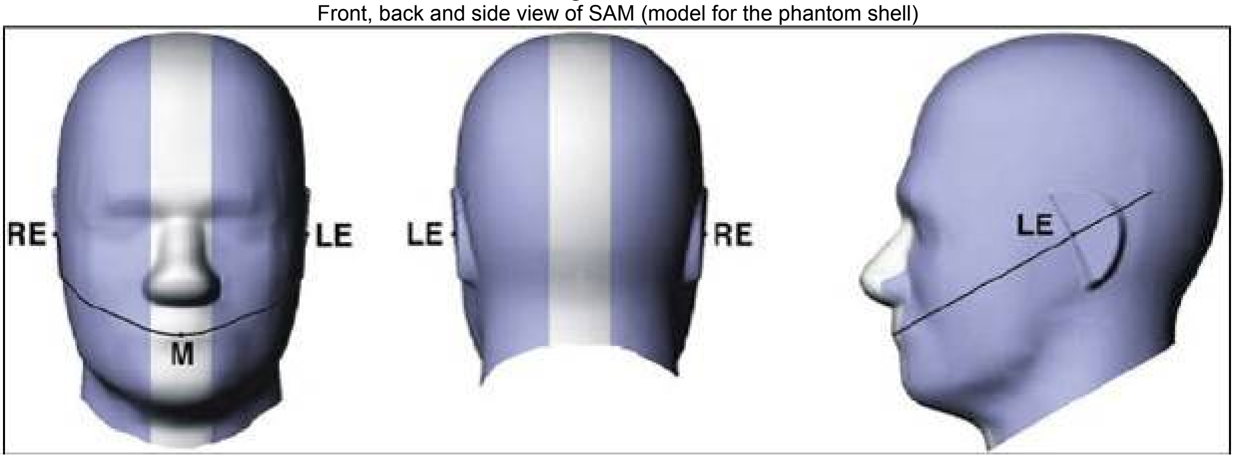
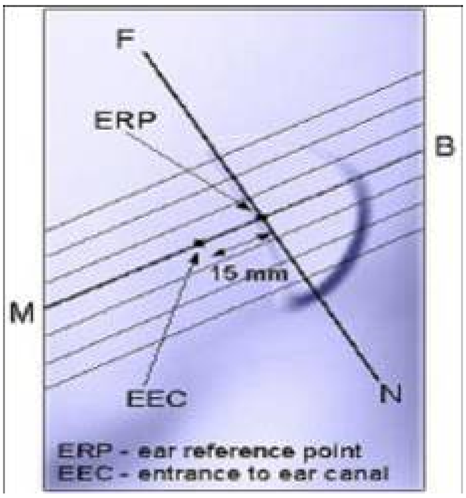



Figure 7-1b
Close up side view of phantom showing the ear region

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



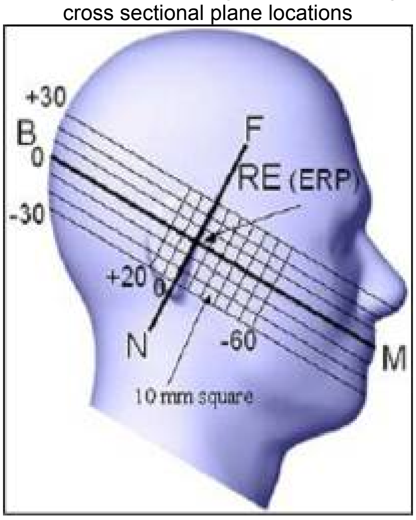




Figure 7-1b
Close up side view of phantom showing the ear region

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.

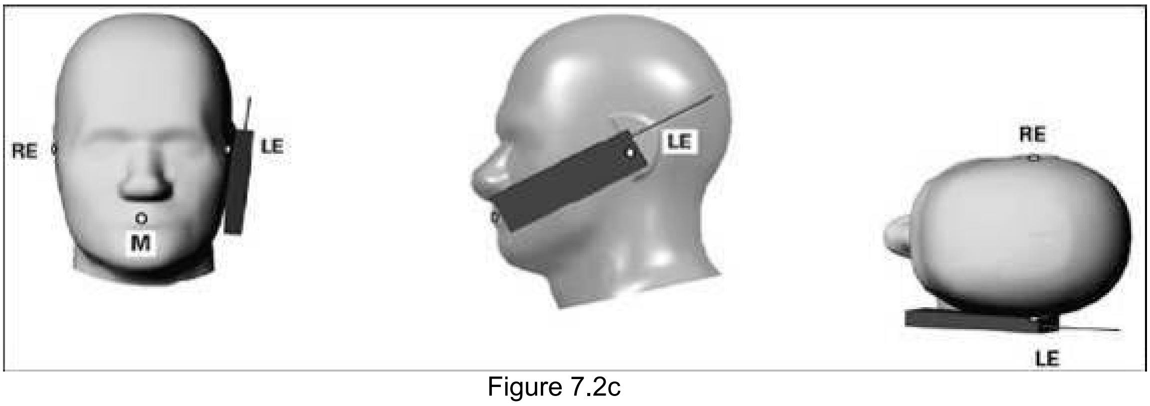



Figure 7.2c
Phone "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for handset positioning, are indicated.

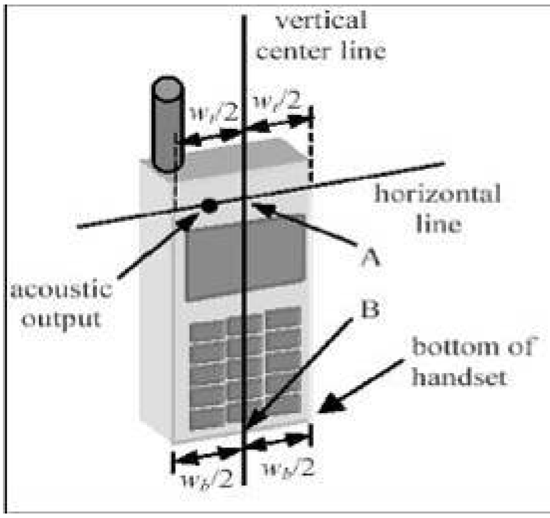



Figure 7.2a

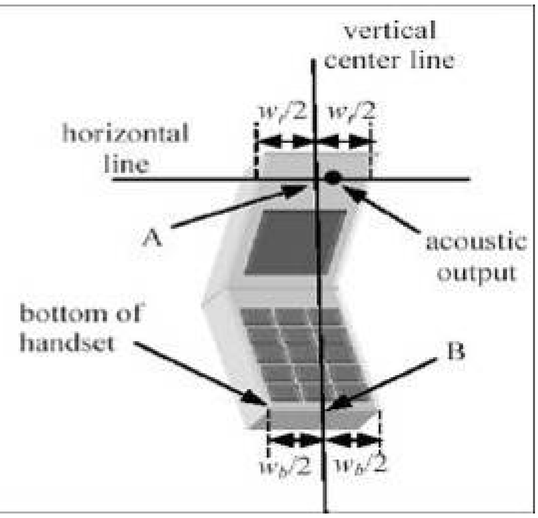



Figure 7.2b

## 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).

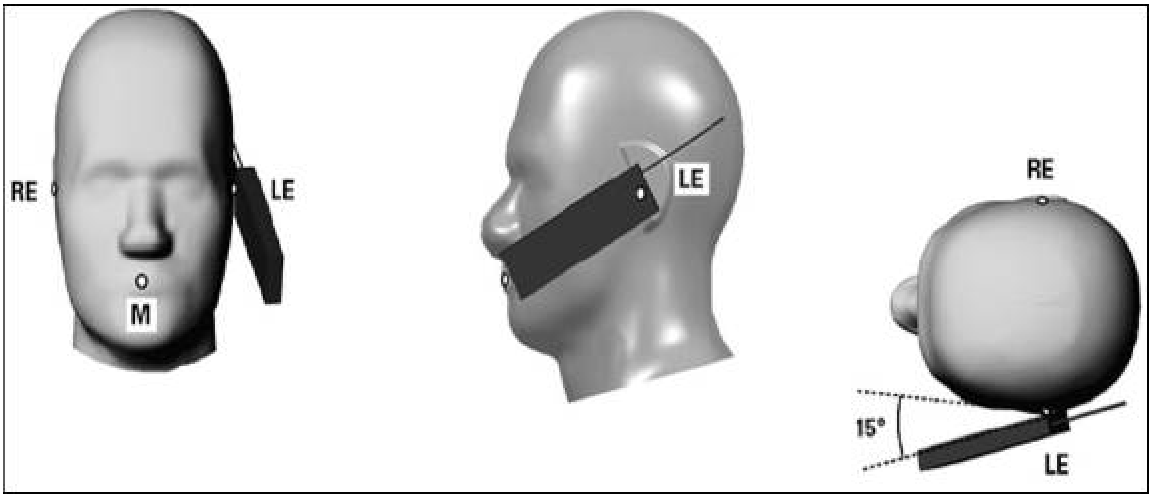



Figure 7-3
Phone "tilted" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for handset positioning, are indicated.

# 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 | |
|---|---|---|---|---|
| | $\varepsilon_r$ | σ (S/m) | $\varepsilon_r$ | 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 |

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

## 11.2 LIQUID MEASUREMENT RESULTS

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

| Liquid Type | Frequency | Temp. [°C] | Depth [cm] | Parameters | Target | Measured | Deviation[%] | Limited[%] | Measured Date |
|---|---|---|---|---|---|---|---|---|---|
| Head850 | 850 MHz | 21 | 15 | Permitivity | 41.50 | 41.51 | 0.02 | ± 5 | Sep 4,2011 |
| | | 21 | 15 | Conductivity | 0.90 | 0.91 | 1.11 | ± 5 | Sep 4,2011 |
| Body850 | 850 MHz | 21 | 15 | Permitivity | 55.20 | 55.22 | 0.04 | ± 5 | Sep 4,2011 |
| | | 21 | 15 | Conductivity | 0.97 | 0.98 | 1.03 | ± 5 | Sep 4,2011 |
| Head1900 | 1900 MHz | 21 | 15 | Permitivity | 40.00 | 40.14 | 0.35 | ± 5 | Sep 4,2011 |
| | | 21 | 15 | Conductivity | 1.40 | 1.41 | 0.71 | ± 5 | Sep 4,2011 |
| Body1900 | 1900 MHz | 21 | 15 | Permitivity | 53.30 | 54.21 | 1.71 | ± 5 | Sep 4,2011 |
| | | 21 | 15 | Conductivity | 1.52 | 1.53 | 0.66 | ± 5 | Sep 4,2011 |

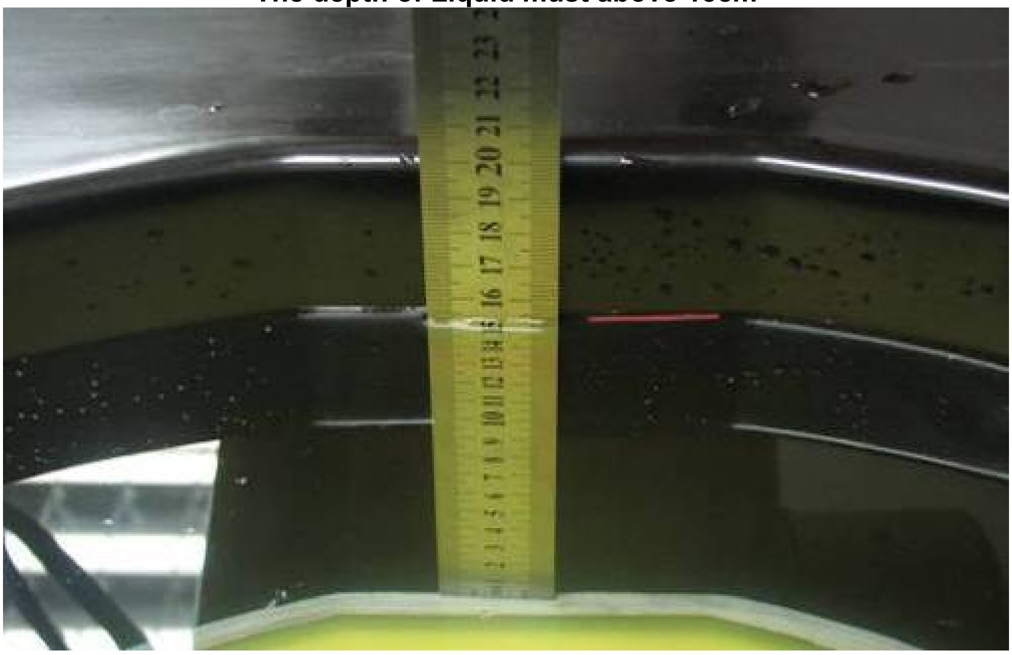
## 11.3 SYSTEM PERFORMANCE CHECK

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.

### SYSTEM PERFORMANCE CHECK MEASUREMENT CONDITIONS

- The measurements were performed in the flat section of the SAM twin phantom filled with head and body simulating liquid of the following parameters.
- The OPENSAR system withan E-fileld probe EX3DV4 SN: 3755 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15 mm (below 1 GHz) and 10 mm (above 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 10mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube integration (dx= 5 mm, dy= 5 mm, dz= 5 mm).
- Distance between probe sensors and phantom surface was set to 2.5 mm.
- The dipole input power was 1W±3%.
- The results are normalized to 1 W input power.

**The depth of Liquid must above 15cm**



### Reference SAR values

The reference SAR values were using measurement results indicated in the dipole calibration document (see table below)

| Frequency (MHz) | 1g SAR | 10g SAR | Local SAR at Surface (Above Feed Point) | Local SAR at Surface (y = 2cm offset from feed point) |
|---|---|---|---|---|
| 850 Head | 9.52 | 6.20 | 14.1 | 4.9 |
| 850 Body | 10.12 | 6.64 | | |
| 1900 Head | 41.20 | 21.32 | 67.6 | 6.6 |
| 1900 Body | 40.40 | 21.24 | | |

### SYSTEM PERFORMANCE CHECK RESULTS

**Ambient conduction**

Temperature: 21 °C Relative humidity: 58%

**System Validation Dipole:** D835V2-SN:4d114 **Date**: January 12, 2012

| Head Simulatinf Liquid | | | Parameters | Target | Measured | Deviation[%] | Limited[%] |
|---|---|---|---|---|---|---|---|
| Frequency | Temp. [°C] | Depth [cm] | | | | | |
| 850 MHz | 20.30 | 15.00 | 1g SAR | 9.52 | 9.84 | 3.36 | ±10 |
| | | | 10g SAR | 6.20 | 6.32 | 1.94 | ±10 |

Temperature: 21 °C Relative humidity: 58%

**System Validation Dipole:** D835V2-SN:4d114 **Date**: January 12, 2012

| Body Simulatinf Liquid | | | Parameters | Target | Measured | Deviation[%] | Limited[%] |
|---|---|---|---|---|---|---|---|
| Frequency | Temp. [°C] | Depth [cm] | | | | | |
| 850 MHz | 20.30 | 15.00 | 1g SAR | 10.12 | 10.12 | 0.00 | ±10 |
| | | | 10g SAR | 6.64 | 6.56 | -1.20 | ±10 |

Temperature: 21 °C Relative humidity: 58%

**System Validation Dipole:** D1900V2-SN:5d136 **Date**: January 12, 2012

| Head Simulatinf Liquid | | | Parameters | Target | Measured | Deviation[%] | Limited[%] |
|---|---|---|---|---|---|---|---|
| Frequency | Temp. [°C] | Depth [cm] | | | | | |
| 1900 MHz | 20.30 | 15.00 | 1g SAR | 41.20 | 40.16 | -2.52 | ±10 |
| | | | 10g SAR | 21.32 | 21.12 | -0.94 | ±10 |

Temperature: 21 °C Relative humidity: 58%

**System Validation Dipole:** D1900V2-SN:5d136 **Date**: January 12, 2012

| Body Simulatinf Liquid | | | Parameters | Target | Measured | Deviation[%] | Limited[%] |
|---|---|---|---|---|---|---|---|
| Frequency | Temp. [°C] | Depth [cm] | | | | | |
| 1900 MHz | 20.30 | 15.00 | 1g SAR | 40.40 | 41.36 | 2.38 | ±10 |
| | | | 10g SAR | 21.24 | 20.64 | -2.82 | ±10 |

## 11.4 EUT TUNE-UP PROCEDURES AND TEST MODE

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

a. To setup the desire channel frequency and the maximum output power. A Radio Communication Tester "CMU200 " was used to program the EUT.

**GSM 850 / GPRS850:**

Network Support: GSM only / GPRS
Main Service: Circuit Switched / Packet data
Power Setting: 33dBm / 33dBm

**GSM 1900 / GPRS 1900:**

Network Support: GSM only / GPRS
Main Service: Circuit Switched / Packet data
Power Setting: 30dBm / 30dBm

**Bluetooth**

a. The client supplied a special driver to program the EUT, allowing it to continually transmit the specified maximum power and change the channel frequency.

b. Maximum conducted power was measured by replacing the antenna with an adapter for conductive measurement.

c. The conducted power was measured at the high, middle and low channel frequency before and after the SAR measurement.

d. During SAR test, the highest output channel per band measured first, and then if necessary, the other channels were measured according to the normal procedures.

## 11.5 CONDUCTED OUTPUT POWER

### Conducted output power (Average):

| GSM | Frequency | | GSM mode | |
|---|---|---|---|---|
| | Channel | MHz | before | after |
| GSM850 | 128 | 824.2 | **32.19** | 32.16 |
| | 190 | 836.6 | 32.17 | 32.12 |
| | 251 | 848.8 | 32.14 | 32.12 |
| GSM | Frequency | | GSM mode | |
| | Channel | MHz | before | after |
| GSM1900 | 512 | 1850.2 | **30.17** | 30.08 |
| | 661 | 1880.0 | 29.67 | 29.63 |
| | 810 | 1910.0 | 29.49 | 29.46 |

**It support GPRS Class 12:**

| System and Channel | Power values (dbm) | Average factor (db) | Time average (dbm) (before) | Time average (dbm) (after) |
|---|---|---|---|---|
| GSM850 CH128(1TS) | --- | --- | --- | --- |
| GPRS850 CH128 | | | | |
| 1TS | 31.59 | -9.03 | 22.56 | --- |
| 2TS | 31.34 | -6.02 | 25.32 | --- |
| 3TS | 30.63 | -4.26 | 26.37 | --- |
| **4TS** | **30.75** | **-3.01** | **27.74** | **27.71** |
| GSM1900 Ch 512(1TS) | --- | --- | --- | --- |
| GPRS1900 Ch 512 | | | | |
| 1TS | 29.65 | -9.03 | 20.62 | --- |
| 2TS | 28.86 | -6.02 | 22.84 | --- |
| 3TS | 28.53 | -4.26 | 24.27 | --- |
| **4TS** | **28.84** | **-3.01** | **25.83** | **25.80** |

NOTE: 1)For GSM ,complete set of tests are performed ,For GPRS ,only the modes with maximum time average power values need to be tested respectively, So GPRS 850 only 4timeslot mode and GPRS 1900 only 4timeslot mode are tested.
2)For GPRS ,the test modes are the worst case of GSM modes
3)GSM has 8 timeslot
Average factor: when 1TS : 10*LOG1/8=-9.03
2TS: 10*LOG2/8=-6.02
3TS: 10*LOG3/8=-4.26
4TS: 10*LOG4/8=-3.01
Time average power: when 1TS=Power value+ Average factor=31.59+(-9.03)=22.56dbm
2TS,3TS and 4TS in a similar way

**GSM Multi-slot classes supported by the devices:**

| Multislot Class | Max Slot Allocation | | | Allowable Configuration | Max Data Rate |
|---|---|---|---|---|---|
| | Downlink | Uplink | Active | | |
| 12 | 4 | 4 | 5 | 1 up; 4 down | 8-12K bps Send<br>32-48K bps Receive |
| | | | | 2 up; 3 down | 16-24K bps Send<br>24-36K bps Receive |
| | | | | 3 up; 2 down | 24-36K bps Send<br>16-24K bps Receive |
| | | | | 4 up; 1 down | 32-48K bps Send<br>8-12K bps Receive |

**Bluetooth output power (Average)(dBm)**

| Mode / Frequency | DATA1 1M |
|---|---|
| **2402 MHz** | -0.57 |
| **2441 MHz** | -0.15 |
| **2480 MHz** | -0.94 |

*Ps.*
-0.15dBm(=0.97mW) ≤PRef
(1)Antenna(BT) is ≤2.5 cm from other antennas(GSM), *so **BT stand-alone SAR is not required**.*
-0.15 dBm(=0.97mW) ≤PRef

## 11.6 SAR HANDSETS MULTI XMITER ASSESSMENT

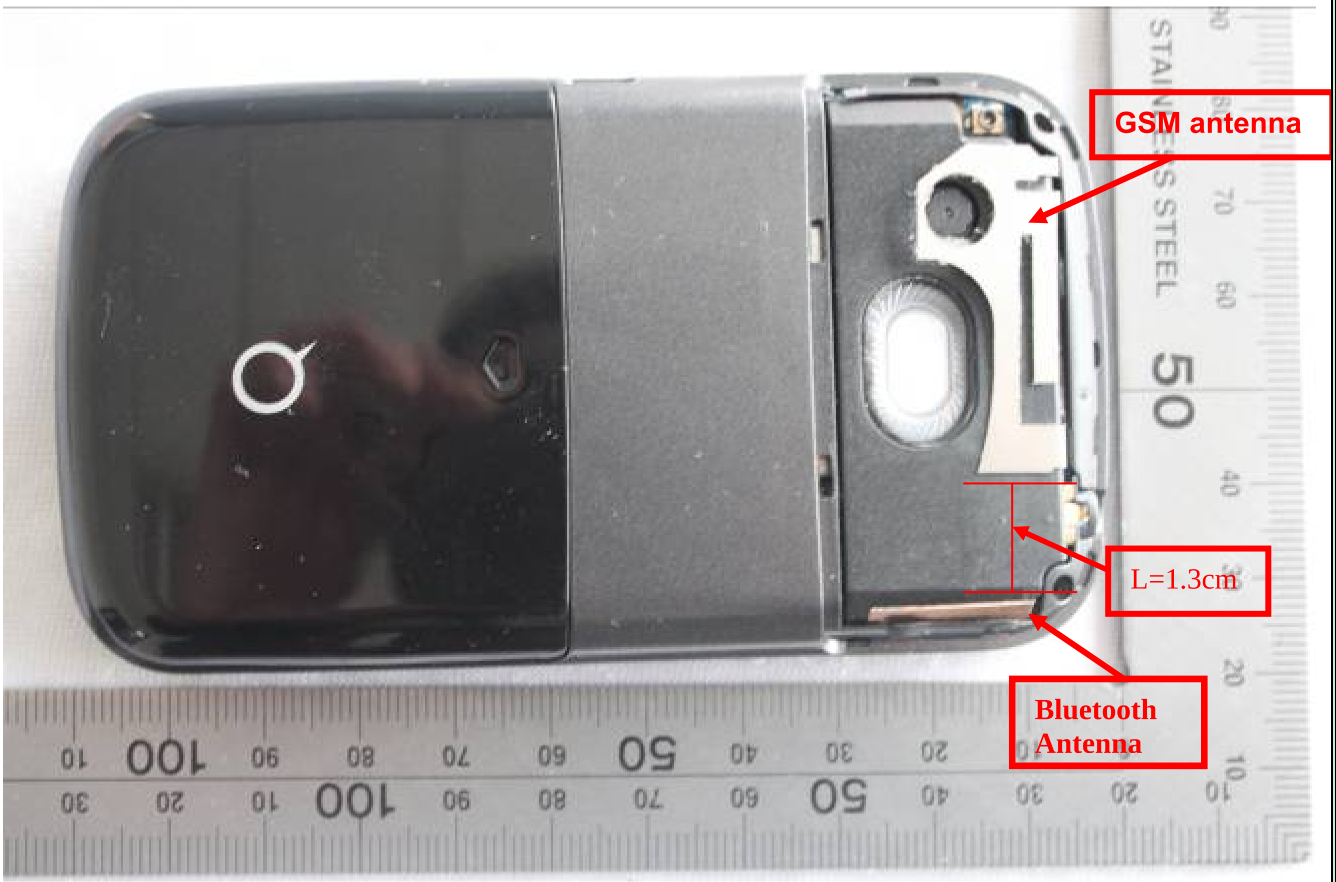
***KDB 648474 simultaneous SAR evaluation:***

**Antenna Location:**

| *antenna1* | *antenna2* | *GSM to Bluetooth antenna distance(cm)* | *remark* |
|---|---|---|---|
| *GSM* | *Bluetooth* | 1.3cm | *Please refer to page 24* |

| *Device mode, f* | *P, dBm* | *P, mW* | *stand-alone SAR(W/kg)* |
|---|---|---|---|
| GSM 850/1900 | *Please refer to page 22* | | ***Yes**, Please refer to page 26， 28* |
| GPRS 850/1900 | *Please refer to page 23* | | ***Yes**, Please refer to page 27，29* |
| Bluetooth, 2441 | *-0.15* | *0.97* | ***No**, Please refer to page 23* |

| *(x,y)* | *$d_{xy}$, cm* | *simultaneous Tx SAR* | *remarks* |
|---|---|---|---|
| *GSM to Bluetooth antenna distance(cm)* | 1.3 cm | ***No*** | GSM/BT , Antenna distance less than 2.5 , and GSM Max SAR is less than 1.2 W/kg. so no Simultaneous SAR needed. |

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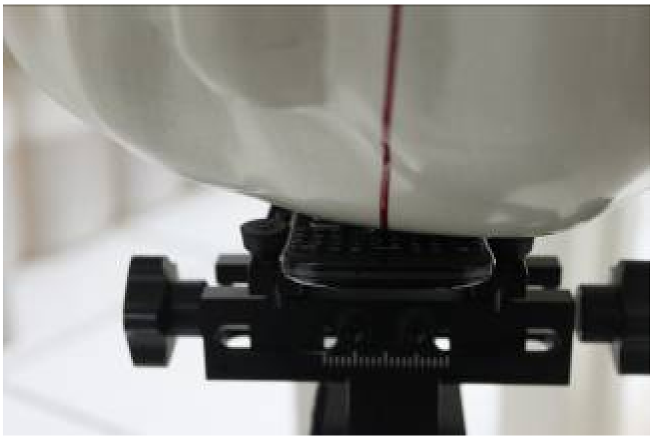
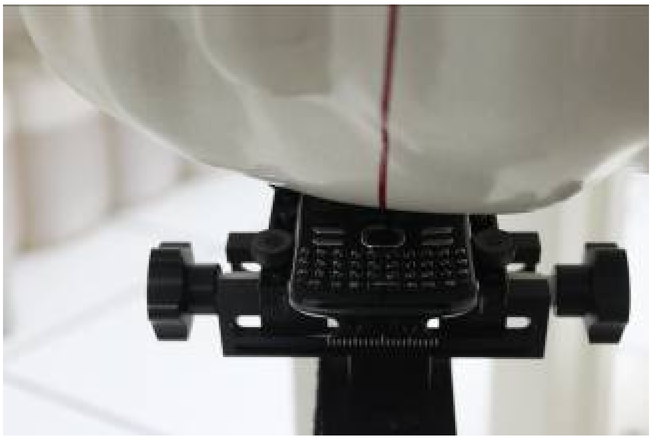
## 11.7 EUT SETUP PHOTOS

Cheek device with right head phantom.



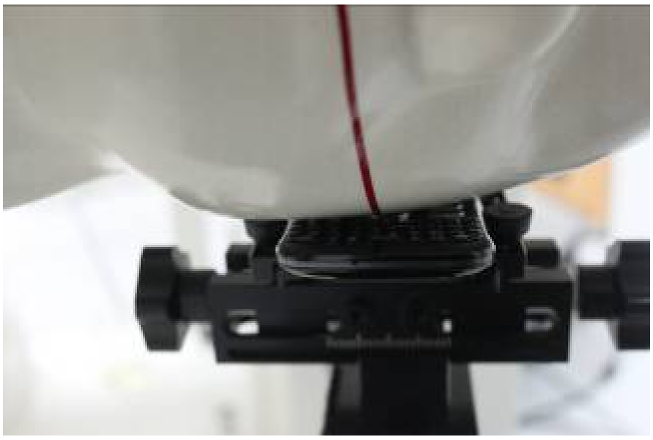
EUT Setup Configuration 1

Tilt device with right head phantom



EUT Setup Configuration 2

Cheek device with left head phantom.

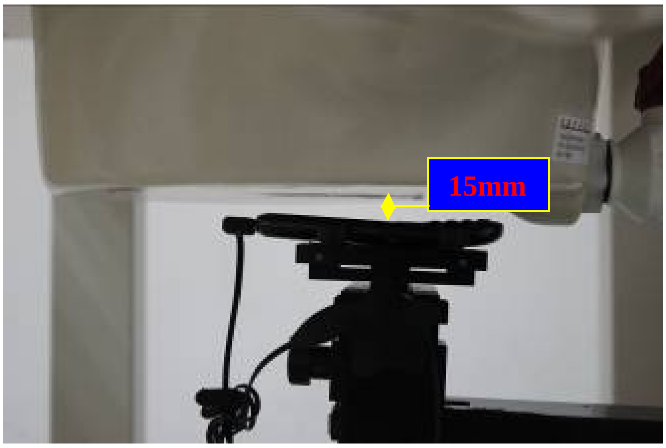


EUT Setup Configuration 3

Tilt device with left head phantom

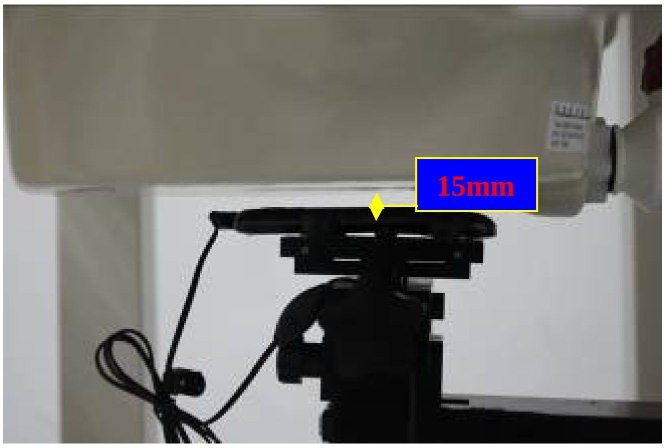
EUT Setup Configuration 4

Up in body position




EUT Setup Configuration 5

Down in body position




EUT Setup Configuration 6

### 11.8 SAR MEASUREMENT RESULTS

Date of Measurement: January 12, 2012

**SAR Measurement GSM 850**

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

**EUT Configuration 1&2**

| EUT Setup Condition | | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|---|
| Position | | Antenna | Channel | MHz | | | |
| Right | Cheek | Fixed | 128 | 824.2 | 20.0 | **0.621** | 1.6 |
| | | | 190 | 836.6 | 20.0 | 0.601 | |
| | | | 251 | 848.8 | 20.0 | 0.528 | |
| | Tilt | Fixed | 128 | 824.2 | 20.0 | 0.394 | |
| | | | 190 | 836.6 | 20.0 | 0.292 | |
| | | | 251 | 848.8 | 20.0 | 0.232 | |

**EUT Configuration 3&4**

| EUT Setup Condition | | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|---|
| Position | | Antenna | Channel | MHz | | | |
| Left | Cheek | Fixed | 128 | 824.2 | 20.0 | 0.374 | 1.6 |
| | | | 190 | 836.6 | 20.0 | 0.614 | |
| | | | 251 | 848.8 | 20.0 | 0.547 | |
| | Tilt | Fixed | 128 | 824.2 | 20.0 | 0.378 | |
| | | | 190 | 836.6 | 20.0 | 0.291 | |
| | | | 251 | 848.8 | 20.0 | 0.266 | |

**EUT Configuration 5:UP**

| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 128 | 824.2 | 20.0 | 0.186 | 1.6 |

**EUT Configuration 6:Down**

| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 128 | 824.2 | 20.0 | **0.602** | 1.6 |

Remarks: For SAR testing, EUT is in GSM link mode. In GSM850 link mode, its crest factor is 8. (Duty cycle: 1:8)

Date of Measurement: January 12, 2012

| **SAR Measurement GPRS 850 Class 12** | | | | | | |
|---|---|---|---|---|---|---|
| Crest Factor: 2 (Duty cycle: 50%) Depth of Liquid: 15.0 cm | | | | | | |
| **EUT Configuration 5:UP** | | | | | | |
| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 128 | 824.2 | 20.0 | 0.163 | 1.6 |

| **EUT Configuration 6:Down** | | | | | | |
|---|---|---|---|---|---|---|
| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 128 | 824.2 | 20.0 | **0.459** | 1.6 |

Remarks: For SAR testing, EUT is in GPRS link mode. In GPRS850 link mode, its crest factor is 2. (Duty cycle: 1:2)

Date of Measurement: January 12, 2012

**SAR Measurement GSM 1900**

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

**EUT Configuration 1&2**

| EUT Setup Condition | | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|---|
| Position | | Antenna | Channel | MHz | | | |
| **Right** | **Cheek** | Fixed | 512 | 1850.20 | 20.0 | 0.522 | 1.6 |
| | | | 661 | 1880.00 | 20.0 | 0.422 | |
| | | | 810 | 1910.00 | 20.0 | 0.453 | |
| | **Tilt** | Fixed | 512 | 1850.20 | 20.0 | 0.449 | |
| | | | 661 | 1880.00 | 20.0 | **0.593** | |
| | | | 810 | 1910.00 | 20.0 | 0.576 | |

**EUT Configuration 3&4**

| EUT Setup Condition | | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|---|
| Position | | Antenna | Channel | MHz | | | |
| **Left** | **Cheek** | Fixed | 512 | 1850.20 | 20.0 | 0.499 | 1.6 |
| | | | 661 | 1880.00 | 20.0 | 0.396 | |
| | | | 810 | 1910.00 | 20.0 | 0.443 | |
| | **Tilt** | Fixed | 512 | 1850.20 | 20.0 | 0.512 | |
| | | | 661 | 1880.00 | 20.0 | 0.486 | |
| | | | 810 | 1910.00 | 20.0 | 0.360 | |

**EUT Configuration 5:UP**

| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 512 | 1850.20 | 20.0 | 0.296 | 1.6 |

**EUT Configuration 6:Down**

| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
|---|---|---|---|---|---|---|
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 512 | 1850.20 | 20.0 | 0.598 | 1.6 |

Remarks: For SAR testing, EUT is in GSM link mode. In GSM1900 link mode, its crest factor is 8. (Duty cycle: 1:8)

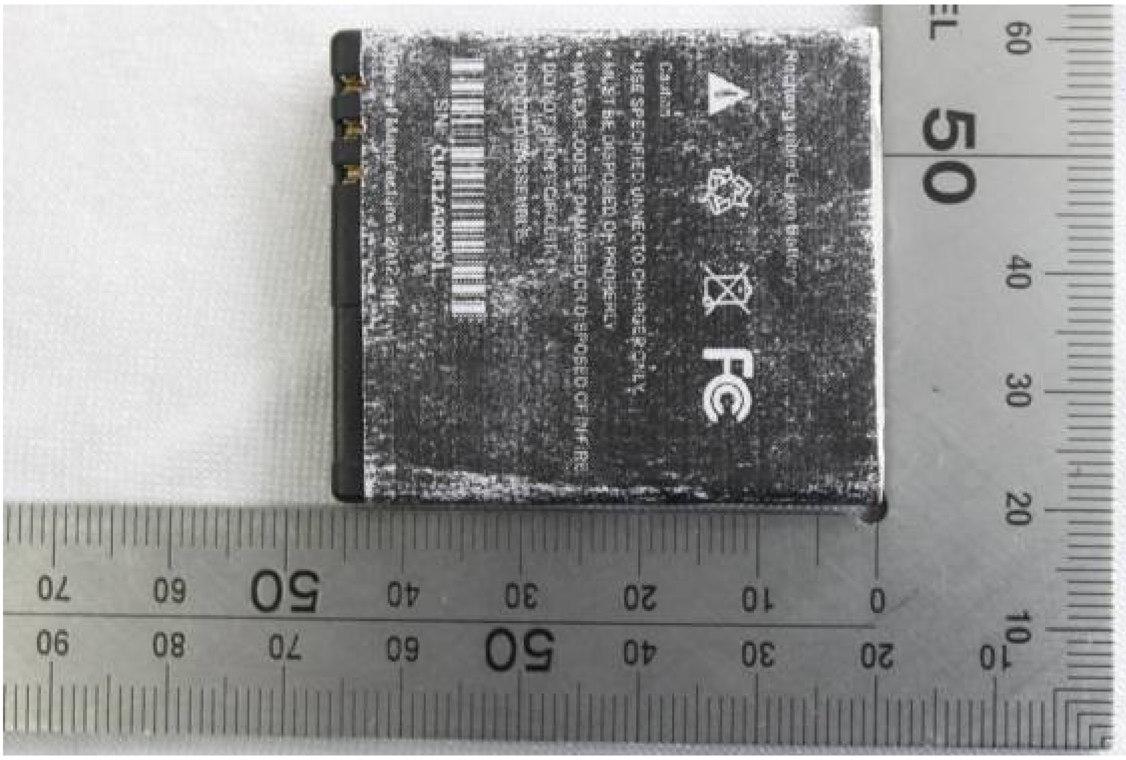
Date of Measurement: January 12, 2012

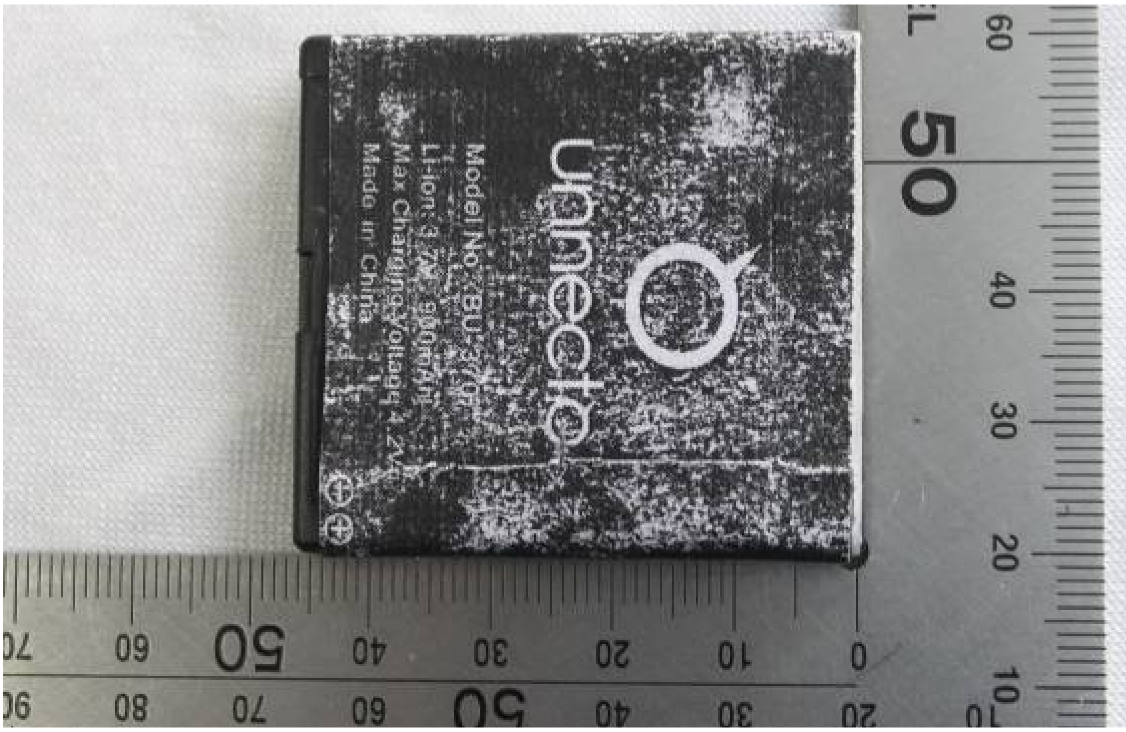
| **SAR Measurement GPRS 1900 Class 12** | | | | | | |
|---|---|---|---|---|---|---|
| Crest Factor: 2 (Duty cycle: 50%) Depth of Liquid: 15.0 cm | | | | | | |
| **EUT Configuration 5:UP** | | | | | | |
| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 512 | 1850.20 | 20.0 | 0.203 | 1.6 |

| **EUT Configuration 6:Down** | | | | | | |
|---|---|---|---|---|---|---|
| EUT Setup Condition | | Frequency | | Liquid Temp [°C] | SAR(1g) (W/kg) | Limit (W/kg) |
| Position | Antenna | Channel | MHz | | | |
| **Flat**(1.5cm) | Fixed | 512 | 1850.20 | 20.0 | **0.538** | 1.6 |

Remarks: For SAR testing, EUT is in GPRS link mode. In GPRS 1900 link mode, its crest factor is 2. (Duty cycle: 1:2)

## 12. EUT PHOTO





# 13. EQUIPMENT LIST & CALIBRATION STATUS

| Name of Equipment | Manufacturer | Type/Model | Serial Number | Calibration Due |
|---|---|---|---|---|
| P C | HP | Core(rm)3.16G | CZCO48171H | 2012-5-26 |
| Signal Generator | Agilent | E8257C | MY43321570 | 2012-3-16 |
| S-Parameter Network Analyzer | Agilent | E5071B | MY42301382 | 2012-5-26 |
| Wireless Communication Test Set | R&S | CMU200 | SN:B23-03291 | 2012-3-16 |
| Power Meter | Agilent | E4416A | QB41292714 | 2012-3-16 |
| Peak & Average sensor | Agilent | E9327A | CF0001 | 2012-1-20 |
| E-field PROBE | SPEAG | EX3DV4 | 3755 | 2012-1-20 |
| DIPOLE 835MHZ ANTENNA | SPEAG | D835V2 | 4d114 | 2012-1-26 |
| DIPOLE 1800MHZ ANTENNA | SPEAG | D1800V2 | 2d170 | 2013-1-5 |
| DIPOLE 1900MHZ ANTENNA | SPEAG | D1900V2 | 5d136 | 2012-1-26 |
| DIPOLE 2450MHZ ANTENNA | SPEAG | D2450V2 | 817 | 2012-1-12 |
| DIPOLE 2000MHZ ANTENNA | SPEAG | D2000V2 | 1041 | 2012-1-25 |
| DIPOLE 5000MHZ ANTENNA | SPEAG | D5GHzV2 | 1095 | 2012-12-15 |
| DUMMY PROBE | SPEAG | DP_2 | SPDP2001AA | N/A |
| SAM PHANTOM | SPEAG | SAM29 | SN 41_05 | N/A |
| PHANTON WOOD TABLE | SPEAG | 1609 | QD000P40CD | N/A |
| ROBOT | SPEAG | TX60 | F10/5E6AA1/A101 | N/A |
| ROBOT KRC | SPEAG | CS8C | F10/5E6AA1/C101 | N/A |
| LIQUID CALIBRATION KIT | ANTENNESSA | 41/05 OCP9 | 00425167 | 2013-1-11 |
| DAE | SD000D04BJ | DEA4 | 1245 | 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, China.

# 15. REFERENCES

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# 16. ATTACHMENTS

| Exhibit | Content |
|---|---|
| 1 | System Performance Check Plots |
| 2 | SAR Test Plots |
| 3 | Probe calibration report EX3DV4 SN3755 |
| 4 | Dipole calibration report D835V2 SN:4d114 |
| 5 | Dipole calibration report D1900V2-SN:5d136 |
| 6 | DAE calibration report DEA4 SD000D04BJ SN: 1245 |

**END OF REPORT**