Report No.: SZ12110149S01

TESTING
CNAS L3572

# SAR TEST REPORT

*Issued to*

**Verykool USA Inc**

*For*

**Android phone**

| | | |
|---|---|---|
| Model Name | : | S758 |
| Trade Name | : | Verykool |
| Brand Name | : | Verykool |
| FCC ID | : | WA6S758 |
| Standard | : | FCC Oet65 Supplement C Jun.2001<br>47CFR 2.1093<br>ANSI C95.1-1999<br>IEEE 1528-2003 |
| MAX SAR | : | Head: 0.294 W/kg<br>Body: 0.550 W/kg |
| Test date | : | 2012-11-26 |
| Issue date | : | 2012-12-11 |

**Shenzhen MORLAB Communication Technology Co., Ltd.**

| | | | | | |
|---|---|---|---|---|---|
| *Tested by* | Zhu Zhan | *Approved by* | Wu Xuewen | *Review by* | Samuel. Peng |
| | Zhu Zhan | | Wu Xuewen | | Samuel. Peng |
| *Date* | 2012.12.11 | *Date* | 2012.12.11 | *Date* | 2012.12.11 |



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# DIRECTORY

| Change History | | |
|---|---|---|
| Issue | Date | Reason for change |
| 1.0 | Nov. 30, 2012 | First edition |
| 2.0 | Dec. 11, 2012 | Add scaled SAR and test notes of Hotspot Evaluation |

# 1. Testing Laboratory

## 1.1. Identification of the Responsible Testing Laboratory

| | |
|---|---|
| Company Name: | Shenzhen Morlab Communications Technology Co., Ltd. |
| Department: | Morlab Laboratory |
| Address: | 3/F, Electronic Testing Building, Shahe Road, Nanshan District, Shenzhen, 518055 P. R. China |
| Responsible Test Lab Manager: | Mr. Shu Luan |
| Telephone: | +86 755 86130268 |
| Facsimile: | +86 755 86130218 |

## 1.2. Identification of the Responsible Testing Location

| | |
|---|---|
| Name: | Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory |
| Address: | 3/F, Electronic Testing Building, Shahe Road, Nanshan District, Shenzhen, 518055 P. R. China |

## 1.3. Accreditation Certificate

| | |
|---|---|
| Accredited Testing Laboratory: | No. CNAS L3572 |

## 1.4. List of Test Equipments

| No. | Instrument | Type | Cal. Date | Cal. Due |
|---|---|---|---|---|
| 1 | PC | Dell (Pentium IV 2.4GHz, SN:X10-23533) | (n.a) | (n.a) |
| 2 | Network Emulator | Rohde&Schwarz (CMU200, SN:105894) | 2012-9-26 | 1year |
| 3 | Network Analyzer | Agilent(E5071B ,SN:MY42404762 ) | 2012-9-26 | 1year |
| 4 | Voltmeter | Keithley (2000, SN:1000572) | 2012-9-24 | 1year |
| 5 | Signal Generator | Rohde&Schwarz (SMP_02 ) | 2012-9-24 | 1year |
| 6 | Power Amplifier | PRANA (Ap32 SV125AZ) | 2012-9-24 | 1year |
| 7 | Power Meter | Agilent (E4416A, SN:MY45102093) | 2012-5-07 | 1year |
| 8 | Power Sensor | Agilent (N8482A, SN:MY41091706) | 2012-5-07 | 1year |
| 9 | Directional coupler | Giga-tronics(SN:1829112) | 2012-9-24 | 1year |
| 10 | Probe | Satimo (SN:SN_3708_EP80) | 2012-10-04 | 1year |
| 11 | DAE | Satimo (SN 35/08 SUPR31) | 2012-9-24 | 1year |
| 12 | Dielectric Probe Kit | Agilent (85033E ) | 2012-9-24 | 1year |
| 13 | Phantom | Satimo (SN:SN_36_08_SAM62) | 2012-9-24 | 1year |
| 14 | Liquid | Satimo(Last Calibration: 2012-11-26) | N/A | N/A |
| 15 | Dipole 835MHz | Satimo (SN 36/08 DIPC 99) | 2012-10-05 | 1year |
| 16 | Dipole 1800MHz | Satimo (SN 36/08 DIPF101) | 2012-10-05 | 1year |
| 17 | Dipole 1900MHz | Satimo (SN 36/08 DIPF 102) | 2012-10-05 | 1year |
| 18 | Dipole 2450MHz | Satimo (SN 36/08 DIPJ 103) | 2012-10-05 | 1year |

# 2. Technical Information

Note: the following data is based on the information by the applicant.

## 2.1. Identification of Applicant

| | |
|---|---|
| Company Name: | Verykool USA Inc |
| Address: | 3636 Nobel Drive, Suite 325 San Diego, CA 92122 |

## 2.2. Identification of Manufacturer

| | |
|---|---|
| Company Name: | FUKDA TECHNOLOGY CO., LTD |
| Address: | East Unit, 4th Floor, No.2 Building, Zhenhua Laobing Industrial Park, No.44 Tiezai Road, Xixiang Town, Bao'an District, Shenzhen, China |

## 2.3. Equipment Under Test (EUT)

| | |
|---|---|
| Model Name: | S758 |
| Trade Name: | Verykool |
| Brand Name: | Verykool |
| Hardware Version: | N/A |
| Software Version: | N/A |
| Frequency Bands: | GSM 850MHz / PCS 1900MHz;<br>WCDMA 850MHZ/ 1700MHz1900MHz; (Band II, IV, V)<br>Bluetooth; Wifi802.11B/G/N |
| Modulation Mode: | GSM/GPRS: GMSK; EDGE:8PSK;<br>WCDMA/HSDPA/HSUPA: QPSK;<br>WIFI802.11B: DSSS; WIFI802.11G: OFDM<br>WIFI 802.11N: OFDM; BT: GFSK/Π/8-DPSK |
| Multislot Class: | GPRS:Class 12;  EDGE:Class 12 |
| GPRS Class: | Class B |
| DTM: | Not support |
| Antenna type: | Fixed Internal Antenna |
| Development Stage: | Identical prototype |
| Battery Model: | N/A |
| Battery specification: | N/A |
| 3GPP Version: | Release 6 |
| Hotspot function: | Support |

### 2.3.1. Photographs of the EUT

Please see for photographs of the EUT.

### 2.3.2. Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

| EUT Identity | Hardware Version | Software Version |
|---|---|---|
| 1# | N/A | N/A |

## 2.4. Applied Reference Documents

Leading reference documents for testing:

| No. | Identity | Document Title |
|---|---|---|
| 1 | **47 CFR§2.1O93** | Radiofrequency Radiation Exposure Evaluation: Portable Devices |
| 2 | **FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)** | Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields |
| 3 | **ANSI C95.1-1999** | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz |
| 4 | **IEEE 1528-2003** | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques. |
| 5 | **KDB 648474 D1** | SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas |
| 6 | **KDB 248227 D1** | SAR Measurement Procedures for 802.11 a/b/g Transmitters |
| 7 | **KDB 450824 D1** | SAR Probe Calibration and System Verification Considerations for Measurements at 150MHz-3GHz |
| 8 | **KDB 941225 D1** | SAR Measurement Procedures for 3G Devices |

## 2.5. Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

## 2.6. Test Environment/Conditions

| | |
|---|---|
| Normal Temperature (NT): | 20 ... 25 °C |
| Relative Humidity: | 30 ... 75 % |
| Air Pressure: | 980 ... 1020 hPa |
| Test frequency: | GSM 850MHz /PCS 1900MHz;<br>WCDMA 850MHz/1700MHz/WCDMA 1900MHz;<br>802.11B |
| Operation mode: | Call established |
| Power Level: | GSM 850 MHz Maximum output power(level 5)<br>PCS 1900 MHz Maximum output power(level 0)<br>WCDMA 850MHz Maximum output power(All up bits)<br>WCDMA 1700MHz Maximum output power(All up bits)<br>WCDMA 1900MHz Maximum output power(All up bits)<br>802.11B Maximum output power |

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established.
The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 125, 190 and 251 respectively in the case of GSM 850 MHz, or to 512, 661 and 810 respectively in the case of PCS 1900 MHz, or to 9262, 9400 and 9538 respectively in the case of WCDMA 1900, or to 4132, 4182 and 4233 respectively in the case of WCDMA 850MHz, or to 1312, 1412 and 1513 respectively in the case of WCDMA 1700MHz, or to 1, 6, 11 respectively in the case of 802.11B. The EUT is commanded to operate at maximum transmitting power.
The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset.
The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 35 dB.

# 3. Specific Absorption Rate (SAR)

## 3.1. Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

## 3.2. SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density. ρ ). The equation description is as below:

$$\mathrm{SAR} = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

$$\mathrm{SAR} = C\frac{\delta T}{\delta t}$$

, where C is the specific head capacity, δ T is the temperature rise and δ t the exposure duration, or related to the electrical field in the tissue by

$$\mathrm{SAR} = \frac{\sigma |E|^2}{\rho}$$

, where σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the rms electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

# 4. SAR Measurement Setup

## 4.1. The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

## 4.2. Probe

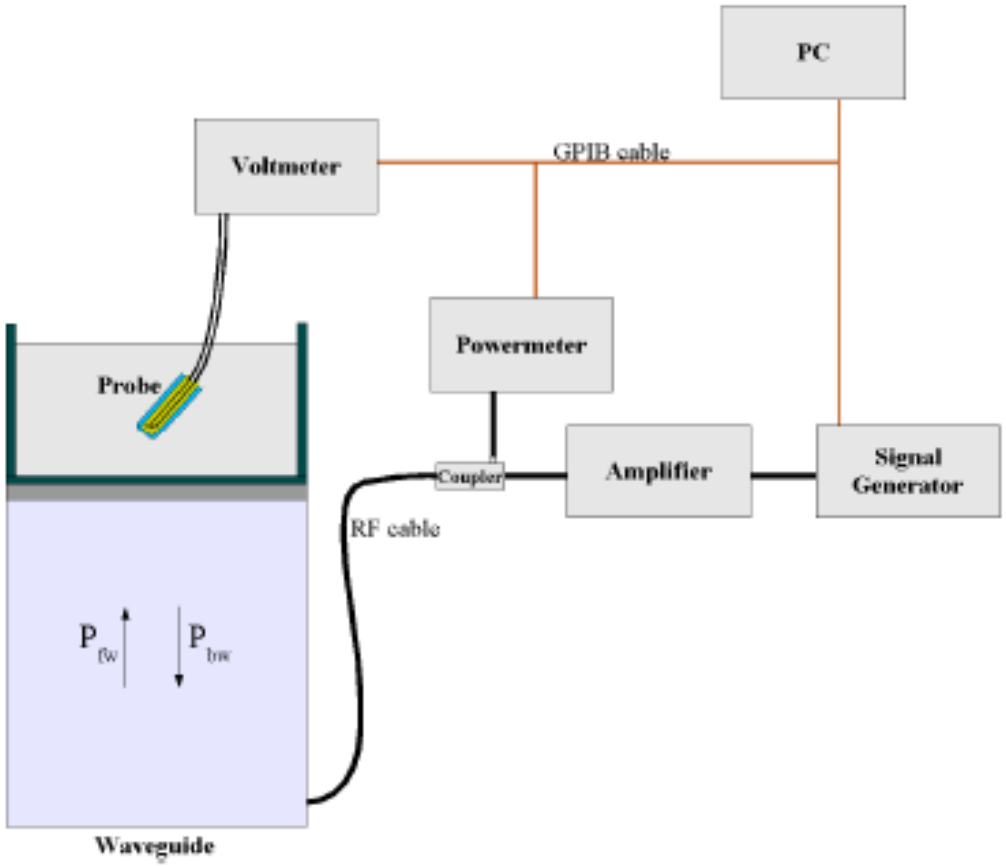
For the measurements the Specific Dosimetric E-Field Probe SN 37/08 EP80 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 6.5 mm
- Distance between probe tip and sensor center: 2.5mm
- Distance between sensor center and the inner phantom surface: 4 mm
  (repeatability better than +/- 1mm)

- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.25 dB
- Calibration range: 835to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and suface normal line:1ess than 30°

Probe calibration is realized, in compliance with CENELEC EN 62209 and IEEE 1528 std, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 622091 annexe technique using reference guide at the five frequencies.




$$SAR = \frac{4\,(P_{fw} - P_{bw})}{ab\delta} \cos^2\left(\pi \frac{y}{a}\right) e^{-(2z/\delta)}$$

Where :
Pfw = Forward Power
Pbw = Backward Power
a and b = Waveguide dimensions
ı = Skin depth
Keithley configuration:

Rate = Medium; Filter =ON; RDGS=10; FILTER TYPE =MOVING AVERAGE; RANGE AUTO
After each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N) (N=1,2,3)

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N)) (N=1,2,3)

where DCP is the diode compression point in mV.

## 4.3. Probe Calibration Process

### 4.3.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an with CALISAR, Antenna proprietary calibration system.

### 4.3.2 Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies 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 rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm2.

### 4.3.2 Temperature Assessment Procedure

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

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δ t = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

Δ T = temperature increase due to RF exposure.

SAR is proportional to Δ T/ Δ t, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

$$SAR = \frac{|E|^2 \cdot \sigma}{\rho}$$

Where:

σ = simulated tissue conductivity,

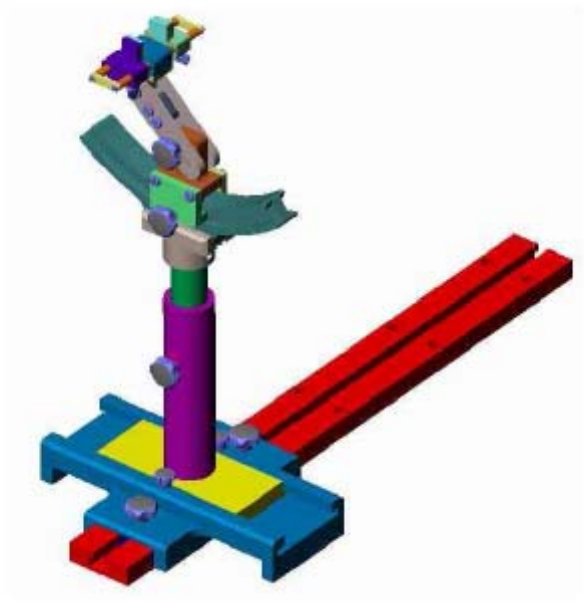
ρ = Tissue density (1.25 g/cm3 for brain tissue)

## 4.4. Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

## 4.5. Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1°.



Device holder

| System Material | Permittivity | Loss Tangent |
|---|---|---|
| Delrin | 3.7 | 0.005 |

## 5. Tissue Simulating Liquids

Simulant liquids used for testing at frequencies of 835MHz, 1900MHz and 2450MHz, are made mainly of sugar, salt and water solutions may be left in the phantoms. Approximately 20litres are needed for an upright head compared to about 25 litres for a horizontal bath phantom. The liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is or from the flat phantom to the liquid top surface is 15cm.
Following are the recipes for head and body tissue simulating liquid for frequency band 835 MHz , 1900 MHz and 2450MHz .

| Ingredients (% by weight ) | Frequency Band 835MHz | | Frequency Band 1900MHz | | Frequency Band 2450MHz | |
|---|---|---|---|---|---|---|
| Tissue Type | Head | Body | Head | Body | Head | Body |
| Water | 41.45 | 52.4 | 54.9 | 40.4 | 62.7 | 73.2 |
| Salt(NaCl) | 1.45 | 1.4 | 0.18 | 0.5 | 0.5 | 0.04 |
| Sugar | 56.0 | 45.0 | 0.0 | 58.0 | 0.0 | 0.0 |
| HEC | 1.0 | 1.0 | 0.0 | 1.0 | 0.0 | 0.0 |
| Bactericide | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| Triton | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| DGBE | 0.0 | 0.0 | 44.92 | 0.0 | 36.8 | 0.0 |
| Acticide SPX | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 26.7 |
| Dielectric Constant | 42.45 | 56.1 | 39.9 | 54.0 | 39.8 | 52.5 |
| Conductivity (S/m) | 0.91 | 0.95 | 1.42 | 1.45 | 1.88 | 1.97 |

Recipes for Tissue Simulating Liquid

**Table 1: Dielectric Performance of Head Tissue Simulating Liquid**

| **Temperature: 22.0~23.8°C, humidity: 54~60%.** | | | |
|---|---|---|---|
| **Frequency** | **Description** | **Permittivity ε** | **Conductivity σ (S/m)** |
| 835 MHz | **Reference result per OET65**<br>**±5% window** | 41.5<br>39.425 to 43.575 | 0.90<br>0.855 to 0.945 |
| | **Reference result per probe calibration**<br>**±5% window** | 41.5<br>39.425 to 43.575 | 0.90<br>0.855 to 0.945 |
| | **Validation value**<br>**(Nov. 26)** | 41.254173 | 0.903135 |
| 1800 MHz | **Reference result per OET65**<br>**±5% window** | 40<br>38 to 42 | 1.40<br>1.33 to 1.47 |
| | **Reference result per probe calibration**<br>**±5% window** | 42<br>39.9 to 44.1 | 1.40<br>1.33 to 1.47 |
| | **Validation value**<br>**(Nov. 26)** | 40.169997 | 1.449217 |

| | | | |
|---|---|---|---|
| 1900 MHz | **Reference result per OET65 ±5% window** | 40<br>38 to 42 | 1.40<br>1.33 to 1.47 |
| | **Reference result per probe calibration ±5% window** | 42<br>39.9 to 44.1 | 1.40<br>1.33 to 1.47 |
| | **Validation value (Nov. 26)** | 41.163616 | 1.428963 |
| 2450 MHz | **Reference result per OET65 ±5% window** | 39.2<br>37.24 to 41.16 | 1.80<br>1.71 to 1.89 |
| | **Reference result per probe calibration ±5% window** | 39.2<br>37.24 to 41.16 | 1.80<br>1.71 to 1.89 |
| | **Validation value (Nov. 26)** | 40.153896 | 1.816317 |

**Table 2: Dielectric Performance of Body Tissue Simulating Liquid**

| **Temperature: 22.0~23.8°C, humidity: 54~60%.** | | | |
|---|---|---|---|
| **Frequency** | **Description** | **Permittivity ε** | **Conductivity σ (S/m)** |
| 835 MHz | **Reference result per OET65 ±5% window** | 55.2<br>52.44 to 57.96 | 0.97<br>0.9215 to 1.0185 |
| | **Reference result per probe calibration ±5% window** | 56.1<br>53.295 to 58.905 | 0.95<br>0.905 to 0.998 |
| | **Validation value (Nov. 26)** | 54.283123 | 0.932714 |
| 1800 MHz | **Reference result per OET65 ±5% window** | 53.3<br>50.635 to 55.965 | 1.52<br>1.444 to 1.596 |
| | **Reference result per probe calibration ±5% window** | 54<br>51.3 to 56.7 | 1.45<br>1.378 to 1.523 |
| | **Validation value (Nov. 26)** | 52.419854 | 1.502654 |
| 1900 MHz | **Reference result per OET65 ±5% window** | 53.3<br>50.635 to 55.965 | 1.52<br>1.444 to 1.596 |
| | **Reference result per probe calibration ±5% window** | 54<br>51.3 to 56.7 | 1.45<br>1.378 to 1.523 |
| | **Validation value (Nov. 26)** | 52.123732 | 1.476213 |

| | | | |
|---|---|---|---|
| 2450 MHz | **Reference result per OET65 ±5% window** | 52.7<br>50.635 to 55.965 | 1.95<br>1.853 to 2.048 |
| | **Reference result per probe calibration ±5% window** | 52.5<br><br>49.875 to 55.125 | 1.78<br><br>1.691 to 1.869 |
| | **Validation value (Nov. 26)** | 52.578063 | 1.862317 |

Note:1.The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85033E Dielectric Probe Kit and an Agilent Network Analyzer.

2.For body-worn measurements, the device was tested against flat phantom representing the user body. Under measurement phone was put on in the phone holder.

3.Per KDB 450824 D01, tissue used during test are within 5% tolerances of probe calibration report, and also within 5% of the target dielectric parameters for OET65.
"when the actual tissue dielectric parameters are recorded for the probe calibration, the differences for ε and σ between probe calibration and routine measurements should each be ≤ 5% while satisfying the required ±5% tolerances in target dielectric parameters. "(KDB 450824 D01)

# 6. Uncertainty Assessment

The following table includes the uncertainty table of the IEEE 1528. The values are determined by Antennessa.

## 6.1. UNCERTAINTY EVALUATION FOR EUT SAR TEST

| a | b | c | d | e= f(d,k) | f | g | h= c*f/e | i= c*g/ e | k |
|---|---|---|---|---|---|---|---|---|---|
| Uncertainty Component | Sec. | Tol (+- %) | Prob. Dist. | Div. | Ci (1g) | Ci (10g) | 1g Ui (+-%) | 10g Ui (+- %) | Vi |
| **Measurement System** | | | | | | | | | |
| Probe calibration | E.2.1 | 4.76 | N | 1 | 1 | 1 | 4.76 | 4.76 | ∞ |
| Axial Isotropy | E.2.2 | 2.5 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.01 | 1.01 | ∞ |
| Hemispherical Isotropy | E.2.2 | 4.0 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.62 | 1.62 | ∞ |
| Boundary effect | E.2.3 | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.58 | 0.58 | ∞ |
| Linearity | E.2.4 | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.89 | 2.89 | ∞ |
| System detection limits | E.2.5 | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.58 | 0.58 | ∞ |
| Readout Electronics | E.2.6 | 0.02 | N | 1 | 1 | 1 | 0.02 | 0.02 | ∞ |
| Reponse Time | E.2.7 | 3.0 | R | $\sqrt{3}$ | 1 | 1 | 1.73 | 1.73 | ∞ |
| Integration Time | E.2.8 | 2.0 | R | $\sqrt{3}$ | 1 | 1 | 1.15 | 1.15 | ∞ |
| RF ambient Conditions | E.6.1 | 3.0 | R | $\sqrt{3}$ | 1 | 1 | 1.73 | 1.73 | ∞ |
| Probe positioner Mechanical Tolerance | E.6.2 | 2.0 | R | $\sqrt{3}$ | 1 | 1 | 1.15 | 1.15 | ∞ |
| Probe positioning with respect to Phantom Shell | E.6.3 | 0.05 | R | $\sqrt{3}$ | 1 | 1 | 0.03 | 0.03 | ∞ |
| Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation | E.5.2 | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.89 | 2.89 | ∞ |
| **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 | 5.00 | N | 1 | 1 | 1 | 5.00 | 5.00 | N-1 |
| Output power Power drift - SAR drift measurement | 6.6.2 | 4.04 | R | $\sqrt{3}$ | 1 | 1 | 2.33 | 2.33 | ∞ |
| **Phantom and Tissue Parameters** | | | | | | | | | |
| Phantom Uncertainty (Shape and thickness tolerances) | E.3.1 | 0.05 | R | $\sqrt{3}$ | 1 | 1 | 0.03 | 0.03 | ∞ |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Liquid conductivity - deviation from target value | E.3.2 | 4.57 | R | $\sqrt{3}$ | 0.64 | 0.43 | 1.69 | 1.13 | ∞ |
| Liquid conductivity - measurement uncertainty | E.3.3 | 5.00 | N | 1 | 0.64 | 0.43 | 3.20 | 2.15 | M |
| Liquid permittivity - deviation from target value | E.3.2 | 3.69 | R | $\sqrt{3}$ | 0.6 | 0.49 | 1.28 | 1.04 | ∞ |
| Liquid permittivity - measurement uncertainty | E.3.3 | 10.00 | N | 1 | 0.6 | 0.49 | 6.00 | 4.90 | M |
| Combined Standard Uncertainty | | | RSS | | | | 11.55 | 10.67 | |
| Expanded Uncertainty (95% Confidence interval) | | | K=2 | | | | 23.11 | 21.33 | |

## 6.2. UNCERTAINTY FOR SYSTEM PERFORMANCE CHECK

| a | b | c | d | e= f(d,k) | f | g | h= c*f/e | i= c*g/e | k |
|---|---|---|---|---|---|---|---|---|---|
| Uncertainty Component | Sec. | Tol (+-%) | Prob. Dist. | Div. | Ci (1g) | Ci (10g) | 1g Ui (+-%) | 10g Ui (+-%) | Vi |
| **Measurement System** | | | | | | | | | |
| Probe calibration | E.2.1 | 4.76 | N | 1 | 1 | 1 | 4.76 | 4.76 | ∞ |
| Axial Isotropy | E.2.2 | 2.5 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.01 | 1.01 | ∞ |
| Hemispherical Isotropy | E.2.2 | 4.0 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.62 | 1.62 | ∞ |
| Boundary effect | E.2.3 | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.58 | 0.58 | ∞ |
| Linearity | E.2.4 | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.89 | 2.89 | ∞ |
| System detection limits | E.2.5 | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.58 | 0.58 | ∞ |
| Readout Electronics | E.2.6 | 0.02 | N | 1 | 1 | 1 | 0.02 | 0.02 | ∞ |
| Reponse Time | E.2.7 | 3.0 | R | $\sqrt{3}$ | 1 | 1 | 1.73 | 1.73 | ∞ |
| Integration Time | E.2.8 | 2.0 | R | $\sqrt{3}$ | 1 | 1 | 1.15 | 1.15 | ∞ |
| RF ambient Conditions | E.6.1 | 3.0 | R | $\sqrt{3}$ | 1 | 1 | 1.73 | 1.73 | ∞ |
| Probe positioner Mechanical Tolerance | E.6.2 | 2.0 | R | $\sqrt{3}$ | 1 | 1 | 1.15 | 1.15 | ∞ |
| Probe positioning with respect to Phantom Shell | E.6.3 | 0.05 | R | $\sqrt{3}$ | 1 | 1 | 0.03 | 0.03 | ∞ |
| Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation | E.5.2 | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.89 | 2.89 | ∞ |
| **Dipole** | | | | | | | | | |
| Dipole axis to liquid Distance | 8,E.4.2 | 1.00 | N | $\sqrt{3}$ | 1 | 1 | 0.58 | 0.58 | ∞ |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Input power and SAR drift measurement | 8,6.6.2 | 4.04 | R | $\sqrt{3}$ | 1 | 1 | 2.33 | 2.33 | ∞ |
| **Phantom and Tissue Parameters** | | | | | | | | | |
| Phantom Uncertainty (Shape and thickness tolerances) | E.3.1 | 0.05 | R | $\sqrt{3}$ | 1 | 1 | 0.03 | 0.03 | ∞ |
| Liquid conductivity - deviation from target value | E.3.2 | 4.57 | R | $\sqrt{3}$ | 0.64 | 0.43 | 1.69 | 1.13 | ∞ |
| Liquid conductivity - measurement uncertainty | E.3.3 | 5.00 | N | $\sqrt{3}$ | 0.64 | 0.43 | 1.85 | 1.24 | M |
| Liquid permittivity - deviation from target value | E.3.2 | 3.69 | R | $\sqrt{3}$ | 0.6 | 0.49 | 1.28 | 1.04 | ∞ |
| Liquid permittivity - measurement uncertainty | E.3.3 | 10.00 | N | $\sqrt{3}$ | 0.6 | 0.49 | 3.46 | 2.83 | M |
| Combined Standard Uncertainty | | | RSS | | | | 8.83 | 8.37 | |
| Expanded Uncertainty (95% Confidence interval) | | | K=2 | | | | 17.66 | 16.73 | |

# 7. SAR Measurement Evaluation

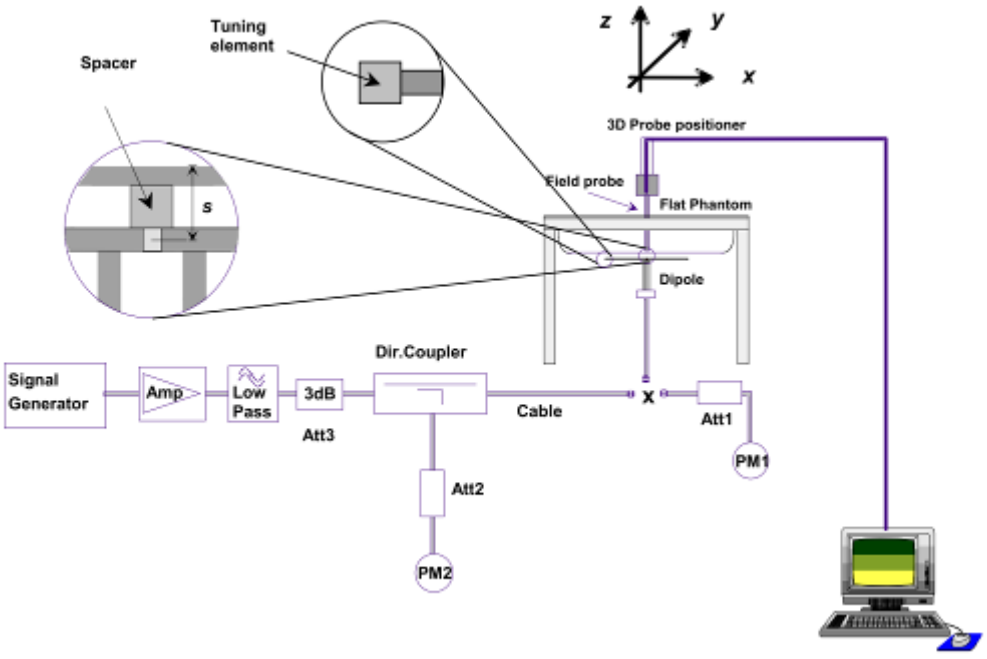
## 7.1. System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 835 MHz , 1800MHz, 1900 MHz and 2450MHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long
side of the phantom.

Equipments:

| name | Type and specification |
|---|---|
| Signal generator | Rohde&Schwarz (SMP_02 ) |
| Directional coupler | Giga-tronics(SN:1829112) |
| Amplifier | PRANA (Ap32 SV125AZ) |
| Reference dipole | 835MHz:SN 36/08 DIPC 99<br>1800MHz:SN 36/08 DIPF 101<br>1900MHz:SN 36/08 DIPF 102<br>2450MHz:SN 36/08 DIPJ 103 |

System Verification Setup Block Diagram



## 7.2. Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %.

| Frequency | 835MHz(Head) | 835MHz(Body) | 1800MHz(Head) | 1800MHz(Body) |
|---|---|---|---|---|
| Target value (1g) | 9.740 W/Kg | 9.880 W/Kg | 37.92 W/Kg | 38.77 W/Kg |
| 250 mW input power | 2.386 W/Kg | 2.380 W/Kg | 9.556 W/Kg | 9.340 W/Kg |
| Test value (1g) | 9.544 W/Kg | 9.520W/Kg | 38.224 W/Kg | 37.360 W/Kg |

| Frequency | 1900MHz(Head) | 1900MHz(Body) | 2450MHz(Head) | 2450MHz(Body) |
|---|---|---|---|---|
| Target value（1g） | 40.320 W/Kg | 38.530 W/Kg | 50.450 W/Kg | 53.590 W/Kg |
| 250 mW input power | 9.791 W/Kg | 9.746 W/Kg | 12.044 W/Kg | 12.789 W/Kg |
| Test value（1g） | 39.164 W/Kg | 38.984 W/Kg | 48.176 W/Kg | 51.156W/Kg |

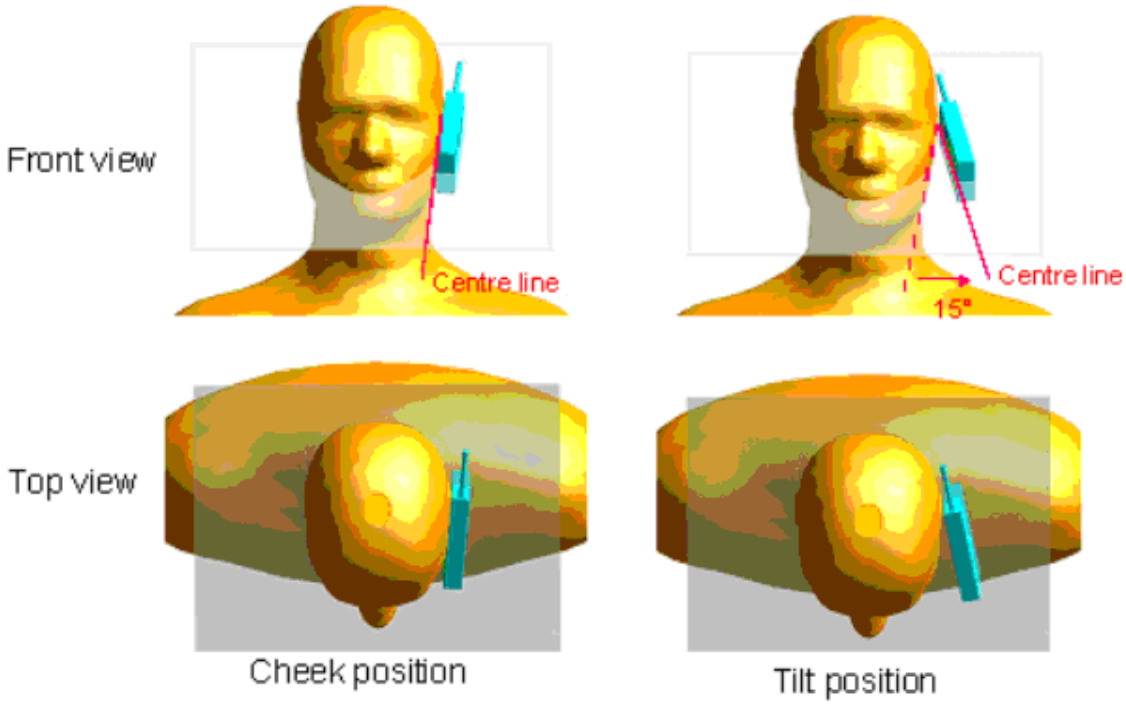
**Note**: System checks the specific test data please see page 162~177

# 8. Operational Conditions During Test

## 8.1. Informations on the testing

The mobile phone antenna and battery are those specified by the manufacturer. The battery is fully charged before each measurement. The output power and frequency are controlled using a base station simulator. The mobile phone is set to transmit at its highest output peak power level.

The mobile phone is test in the “cheek” and “tilted” positions on the left and right sides of the phantom. The mobile phone is placed with the vertical centre line of the body of the mobile phone and the horizontal line crossing the centre of the earpiece in a plane parallel to the sagittal plane of the phantom.




Description of the “cheek” position:
The mobile phone is well placed in the reference plane and the earpiece is in contact with the ear. Then the mobile phone is moved until any point on the front side get in contact with the cheek of the phantom or until contact with the ear is lost.

Description of the “tilted” position:
The mobile phone is well placed in the “cheek” position as described above. Then the mobile phone is moved outward away from the month by an angle of 15 degrees or until contact with the ear lost.

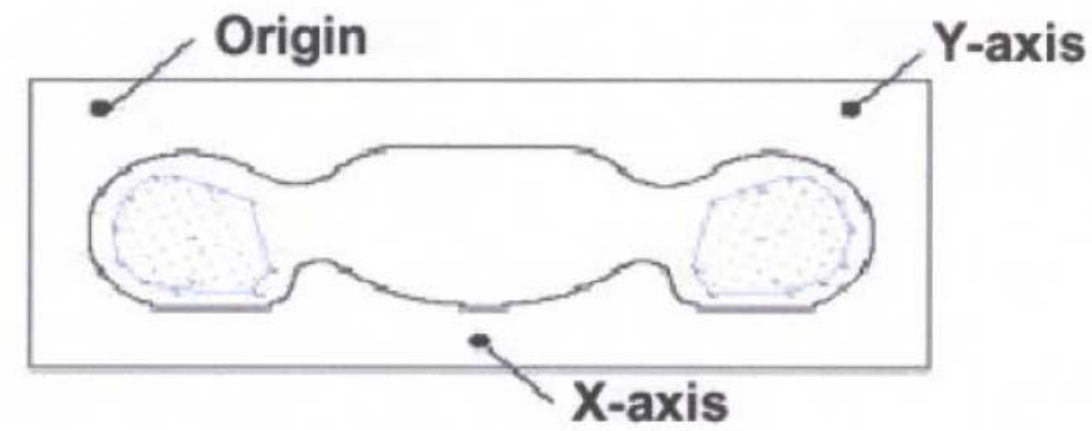
Remark: Please refer to Appendix B for the test setup photos.

## 8.2. Body-worn Configurations

The body-worn configurations shall be tested with the supplied accessories (belt-clips, holsters, etc.) attached to the device in normal use configuration.

The depth of the body tissue was 15.1cm. The distance between the back of the device and the bottom of the flat phantom is 1.5cm(taking into account of the IEEE 1528 and the place of the antenna)

For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.




SAR Measurement Points in Area Scan

## 8.3. Measurement procedure

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors can not directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

## 8.4. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

# 9. Measurement Of Conducted Peak output power

1. WCDMA Conducted peak output power

| Item | band | WCDMA 850 | | | WCDMA 1900 | | |
|---|---|---|---|---|---|---|---|
| | ARFCN | 4132 | 4175 | 4233 | 9262 | 9400 | 9538 |
| | subtest | dBm | | | dBm | | |
| 5.2(WCDMA) | non | 23.15 | 23.49 | 23.29 | 22.67 | 22.72 | 22.59 |
| HSDPA | 1 | 23.11 | 23.43 | 23.21 | 22.62 | 22.71 | 22.56 |
| | 2 | 23.09 | 23.42 | 23.23 | 22.64 | 22.67 | 22.55 |
| | 3 | 22.68 | 22.98 | 22.84 | 22.21 | 22.23 | 22.11 |
| | 4 | 22.62 | 23.04 | 22.86 | 22.24 | 22.26 | 22.09 |
| HSUPA | 1 | 22.93 | 23.37 | 23.15 | 22.66 | 22.68 | 22.54 |
| | 2 | 21.19 | 21.61 | 21.34 | 20.79 | 20.81 | 20.61 |
| | 3 | 22.18 | 22.63 | 22.31 | 21.71 | 21.75 | 21.59 |
| | 4 | 21.17 | 21.53 | 21.34 | 20.65 | 20.74 | 20.62 |
| | 5 | 23.15 | 23.44 | 23.24 | 22.62 | 22.69 | 22.57 |

| Item | band | WCDMA 1700 | | |
|---|---|---|---|---|
| | ARFCN | 1312 | 1412 | 1513 |
| | subtest | dBm | | |
| 5.2(WCDMA) | non | 22.54 | 22.85 | 22.70 |
| HSDPA | 1 | 22.51 | 22.83 | 22.68 |
| | 2 | 22.49 | 22.84 | 22.67 |
| | 3 | 22.05 | 22.39 | 22.21 |
| | 4 | 22.11 | 22.41 | 22.23 |
| HSUPA | 1 | 22.52 | 22.85 | 22.68 |
| | 2 | 20.56 | 20.89 | 20.72 |
| | 3 | 21.54 | 21.88 | 21.71 |
| | 4 | 20.59 | 20.87 | 20.69 |
| | 5 | 22.52 | 22.84 | 22.67 |

2. GSM Conducted peak output power

| Band | Channel | Frequency (MHz) | Output Power (dBm) |
|---|---|---|---|
| GSM 850 | 128 | 824.2 | 32.22 |
| | 190 | 836.6 | 32.17 |
| | 251 | 848.8 | 32.14 |
| PCS 1900 | 512 | 1850.2 | 29.01 |
| | 661 | 1880.0 | 29.06 |
| | 810 | 1909.8 | 29.16 |

3. GPRS Mode Conducted peak output power

| Band | Channel | Frequency (MHz) | Output Power(dBm) | | | |
|---|---|---|---|---|---|---|
| | | | Slot 1 | Slot 2 | Slot 3 | Slot 4 |
| GSM 850 | 128 | 824.2 | 32.85 | 31.77 | 30.67 | 29.15 |
| | 190 | 836.6 | 32.90 | 31.87 | 30.80 | 28.78 |
| | 251 | 848.8 | 32.60 | 31.57 | 30.25 | 28.70 |
| PCS 1900 | 512 | 1850.2 | 29.02 | 27.45 | 25.93 | 24.55 |
| | 661 | 1880.0 | 29.01 | 27.50 | 25.65 | 24.62 |
| | 810 | 1909.8 | 28.87 | 27.84 | 25.70 | 24.42 |

GPRS Time-based Average Power

| Band | Channel | Frequency (MHz) | Output Power(dBm) | | | |
|---|---|---|---|---|---|---|
| | | | Slot 1 | Slot 2 | Slot 3 | Slot 4 |
| GSM 850 | 128 | 824.2 | 23.85 | 25.75 | **26.41** | 26.14 |
| | 190 | 836.6 | 23.90 | 25.85 | **26.54** | 25.77 |
| | 251 | 848.8 | 23.60 | 25.55 | **25.99** | 25.69 |
| PCS 1900 | 512 | 1850.2 | 20.02 | 21.43 | **21.67** | 21.54 |
| | 661 | 1880.0 | 20.01 | 21.48 | 21.39 | **21.61** |
| | 810 | 1909.8 | 19.87 | **21.82** | 21.44 | 21.41 |

4. EDGE Mode Conducted peak output power

| Band | Channel | Frequency (MHz) | Output Power(dBm) | | | |
|---|---|---|---|---|---|---|
| | | | Slot 1 | Slot 2 | Slot 3 | Slot 4 |
| GSM 850 | 128 | 824.2 | 26.55 | 25.49 | 24.35 | 24.07 |
| | 190 | 836.6 | 25.16 | 24.38 | 24.40 | 24.10 |
| | 251 | 848.8 | 26.05 | 25.32 | 24.33 | 24.06 |
| PCS 1900 | 512 | 1850.2 | 25.97 | 24.87 | 24.23 | 24.01 |
| | 661 | 1880.0 | 25.13 | 24.55 | 24.25 | 24.05 |
| | 810 | 1909.8 | 25.17 | 24.57 | 24.26 | 24.07 |

EDGE Time-based Average Power

| Band | Channel | Frequency (MHz) | Output Power(dBm) | | | |
|---|---|---|---|---|---|---|
| | | | Slot 1 | Slot 2 | Slot 3 | Slot 4 |
| GSM 850 | 128 | 824.2 | 17.55 | 19.47 | 20.09 | **21.06** |
| | 190 | 836.6 | 16.16 | 18.36 | 20.14 | **21.09** |
| | 251 | 848.8 | 17.05 | 19.30 | 20.07 | **21.05** |
| PCS 1900 | 512 | 1850.2 | 16.97 | 18.85 | 19.97 | **21.00** |
| | 661 | 1880.0 | 16.13 | 18.53 | 19.99 | **21.04** |
| | 810 | 1909.8 | 16.17 | 18.55 | 20.00 | **21.06** |

Timeslot consignations:

| No. Of Slots | Slot 1 | Slot 2 | Slot 3 | Slot 4 |
|---|---|---|---|---|
| Slot Consignation | 1Up4Down | 2Up2Down | 3Up2Down | 4Up1Down |
| Duty Cycle | 1:8 | 1:4 | 1:2.67 | 1:2 |
| Correct Factor | -9.00dB | -6.02dB | -4.26dB | -3.01dB |

5. Wifi peak output power

| Band | Channel | Frequency (MHz) | Output Power(dBm) | | |
|---|---|---|---|---|---|
| | | | 802.11B (DSSS) | 802.11G (OFDM) | 802.11N20 (OFDM) |
| WiFi | 1 | 2412 | 14.38 | 12.95 | 13.51 |
| | 6 | 2437 | 14.90 | 12.41 | 13.20 |
| | 11 | 2462 | 14.88 | 12.03 | 13.16 |

| Band | Channel | Frequency (MHz) | Output Power(dBm) |
|---|---|---|---|
| | | | 802.11N40 (OFDM) |
| WiFi | 3 | 2422 | 11.20 |
| | 6 | 2437 | 11.30 |
| | 9 | 2452 | 11.40 |

6. Bluetooth peak output power

| Band | Channel | Frequency (MHz) | Output Power(dBm) | |
|---|---|---|---|---|
| | | | GFSK | 8-DPSK |
| BT | 0 | 2402 | -0.016 | -1.527 |
| | 38 | 2441 | -1.222 | -2.640 |
| | 79 | 2480 | -2.014 | -3.435 |

## 11. Test Results List

Summary of Measurement Results (GSM 850MHz Band)

| Temperature: 21.0~23.8°C, humidity: 54~60%. | | | | | | |
|---|---|---|---|---|---|---|
| Phantom Configurations | | Device Test Positions | Device Test channel | SAR(W/Kg), 1g Peak | Scaling Factor | Scaled SAR (W/Kg), 1g |
| Right Side Of Head | | Cheek/Touch | 128 | 0.235 | 1.067 | 0.251 |
| | | Ear/Tilt | | 0.160 | | 0.171 |
| Left Side Of Head | | Cheek/Touch | | 0.211 | | 0.225 |
| | | Ear/Tilt | | 0.160 | | 0.171 |
| Body (10mm Separation) | GSM | Back upward | | 0.342 | | 0.365 |
| | | Face Upward | | 0.239 | | 0.255 |
| | GPRS | Back upward | 190 | 0.493 | 1.047 | 0.516 |
| | | Face Upward | | 0.305 | | 0.319 |
| | | Edge A | | 0.185 | | 0.194 |
| | | Edge B | | 0.270 | | 0.283 |
| | | Edge C | | 0.282 | | 0.295 |
| | EDGE | Back upward | | 0.479 | 1.148 | 0.550 |

Summary of Measurement Results (GSM 1900MHz Band)

| Temperature: 21.0~23.8°C, humidity: 54~60%. | | | | | | |
|---|---|---|---|---|---|---|
| Phantom Configurations | | Device Test Positions | Device Test channel | SAR(W/Kg), 1g Peak | Scaling Factor | Scaled SAR (W/Kg), 1g |
| Right Side Of Head | | Cheek/Touch | 810 | 0.238 | 1.081 | 0.257 |
| | | Ear/Tilt | | 0.176 | | 0.190 |
| Left Side Of Head | | Cheek/Touch | | 0.213 | | 0.230 |
| | | Ear/Tilt | | 0.168 | | 0.182 |
| Body (10mm Separation) | GSM | Back upward | | 0.342 | | 0.370 |
| | | Face Upward | | 0.229 | | 0.248 |
| | GPRS | Back upward | | 0.305 | 1.038 | 0.317 |
| | | Face Upward | | 0.276 | | 0.286 |
| | | Edge A | | 0.196 | | 0.203 |
| | | Edge B | | 0.155 | | 0.161 |
| | | Edge C | | 0.127 | | 0.132 |
| | EDGE | Back upward | | 0.366 | 1.104 | 0.404 |

Note:

1.The SAR test shall be performed at the high, middle and low frequency channels of each operating mode, when the SAR of highest power channel of each configurations is less than 0.8 W/kg, refer to KDB 648474, testing for the other channels is not required.

2. GPRS/EDGE test Scenario(Based on the Max. Time-based Average Power)

| Band | Channel | Slots | Power level | Duty Cycle |
|---|---|---|---|---|
| **GPRS850** | Middle | 3 | 5 | 3:8 |
| **EDGE850** | Middle | 3 | 5 | 3:8 |
| **GPRS1900** | High | 2 | 0 | 2:8 |
| **EDGE1900** | High | 4 | 0 | 4:8 |

Summary of Measurement Results (WCDMA 850MHz Band)

| Temperature: 21.0~23.8°C, humidity: 54~60%. | | | | | |
|---|---|---|---|---|---|
| Phantom Configurations | Device Test Positions | Device Test channel | SAR(W/Kg), 1g Peak | Scaling Factor | Scaled SAR (W/Kg), 1g |
| Right Side Of Head | Cheek/Touch | 4175 | 0.262 | 1.124 | 0.294 |
| | Ear/Tilt | | 0.190 | | 0.214 |
| Left Side Of Head | Cheek/Touch | | 0.215 | | 0.242 |
| | Ear/Tilt | | 0.182 | | 0.205 |
| Body (10mm Separation) | Back upward | | 0.374 | | 0.420 |
| | Face Upward | | 0.227 | | 0.255 |
| | Edge A | | 0.144 | | 0.162 |
| | Edge B | | 0.068 | | 0.076 |
| | Edge C | | 0.036 | | 0.040 |

Note:

1. Maximum SAR for 12.2kbps RMC is 0.262 W/Kg≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSDPA active is less than 1/4 dB higher than that measured without HSDPA using 12.2kbps RMC, according to KDB 941225D01v02, SAR is not required for this handset with HSPA capabilities.

Summary of Measurement Results (WCDMA 1700MHz Band)

| Temperature: 21.0~23.8°C, humidity: 54~60%. | | | | | |
|---|---|---|---|---|---|
| Phantom Configurations | Device Test Positions | Device Test channel | SAR(W/Kg), 1g Peak | Scaling Factor | Scaled SAR (W/Kg), 1g |
| Right Side Of Head | Cheek/Touch | 1412 | 0.175 | 1.035 | 0.181 |
| | Ear/Tilt | | 0.048 | | 0.050 |
| Left Side Of Head | Cheek/Touch | | 0.133 | | 0.138 |
| | Ear/Tilt | | 0.072 | | 0.075 |
| Body (10mm Separation) | Back upward | | 0.163 | | 0.169 |
| | Face Upward | | 0.124 | | 0.128 |
| | Edge A | | 0.154 | | 0.159 |
| | Edge B | | 0.091 | | 0.094 |
| | Edge C | | 0.106 | | 0.110 |

Note:

1. Maximum SAR for 12.2kbps RMC is 0.175 W/Kg≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSDPA active is less than 1/4 dB higher than that measured without HSDPA using 12.2kbps RMC, according to KDB 941225D01v02, SAR is not required for this handset with HSPA capabilities.

Summary of Measurement Results (WCDMA 1900MHz Band)

| Temperature: 21.0~23.8°C, humidity: 54~60%. | | | | | |
|---|---|---|---|---|---|
| Phantom Configurations | Device Test Positions | Device Test channel | SAR(W/Kg), 1g Peak | Scaling Factor | Scaled SAR (W/Kg), 1g |
| Right Side Of Head | Cheek/Touch | 9400 | 0.088 | 1.067 | 0.094 |
| | Ear/Tilt | | 0.077 | | 0.082 |
| Left Side Of Head | Cheek/Touch | | 0.087 | | 0.093 |
| | Ear/Tilt | | 0.077 | | 0.082 |
| Body (10mm Separation) | Back upward | | 0.135 | | 0.144 |
| | Face Upward | | 0.076 | | 0.081 |
| | Edge A | | 0.136 | | 0.145 |
| | Edge B | | 0.095 | | 0.101 |
| | Edge C | | 0.039 | | 0.042 |

Note

1.Maximum SAR for 12.2kbps RMC is 0.136 W/Kg≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSUPA/HSDPA active is less than 1/4 dB higher than that measured without HSDPA using 12.2kbps RMC, according to KDB 941225D01v02, SAR is not required for this handset with HSPA capabilities.

Summary of Measurement Results (WLAN 802.11B Band)

| Temperature: 21.0~23.8°C, humidity: 54~60%. | | | | | |
|---|---|---|---|---|---|
| Phantom Configurations | Device Test Positions | Device Test channel | SAR(W/Kg), 1g Peak | Scaling Factor | Scaled SAR (W/Kg), 1g |
| Right Side Of Head | Cheek/Touch | 6 | 0.071 | 1.023 | 0.073 |
| | Ear/Tilt | | 0.060 | | 0.061 |
| Left Side Of Head | Cheek/Touch | | 0.072 | | 0.074 |
| | Ear/Tilt | | 0.075 | | 0.077 |
| Body (10mm Separation) | Back upward | | 0.108 | | 0.110 |
| | Face Upward | | 0.098 | | 0.100 |
| | Edge B | | 0.035 | | 0.036 |
| | Edge D | | 0.049 | | 0.050 |

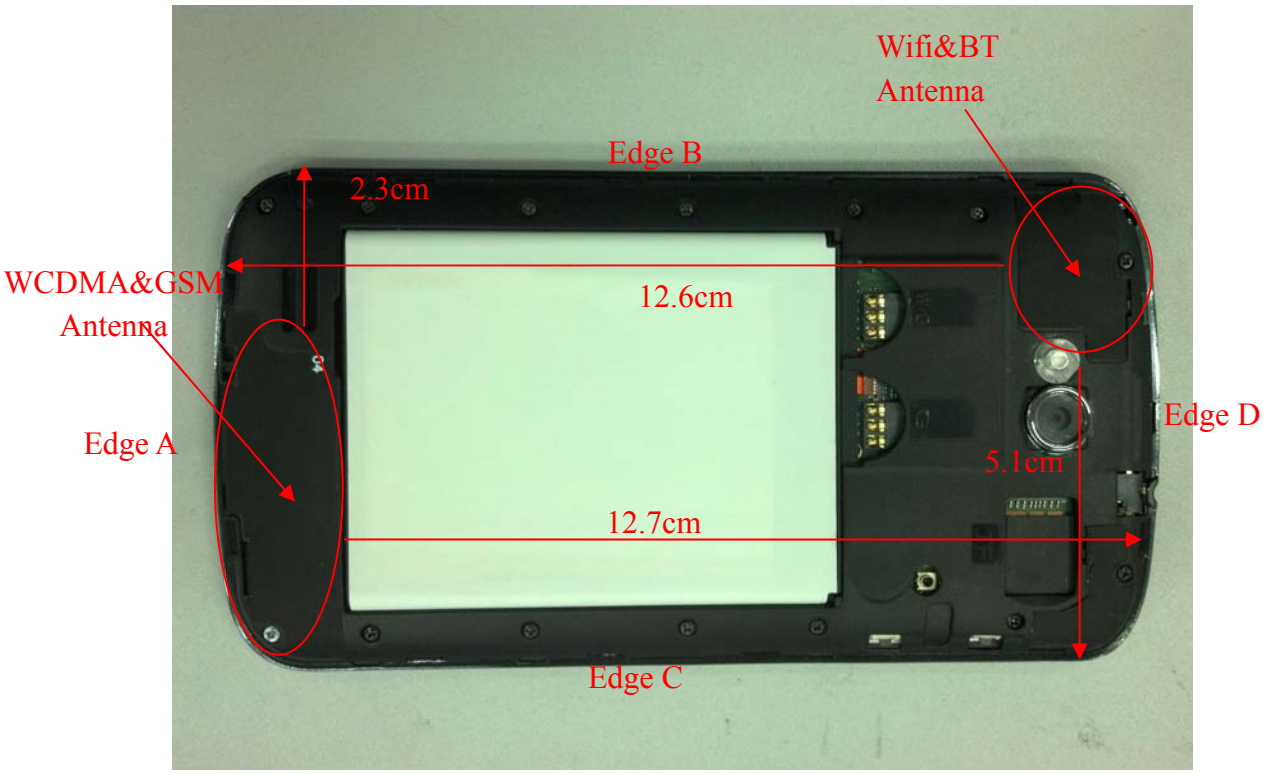
4. Scaling Factor calculation

| Band | Tune-up power tolerance (dBm) | SAR test channel Power (dBm) | Scaling Factor |
|---|---|---|---|
| GSM 850 | PCL = 5, PWR = 32+-0.5 | 32.22 | 1.067 |
| GPRS 850 | PCL = 5, PWR =30.5+-0.5(3 slots) | 30.80 | 1.047 |
| EDGE 850 | PCL = 5, PWR =24.5+-0.5 (3 slots) | 24.40 | 1.148 |
| PCS 1900 | PCL = 0, PWR = 29+-0.5 | 29.16 | 1.081 |
| GPRS 1900 | PCL=0,PWR= 27.5+-0.5(2 slots) | 27.84 | 1.038 |
| EDGE 1900 | PCL=0,PWR=24+-0.5(4 slots) | 24.07 | 1.104 |
| WCDMA 850 | Max output power =23(+1/-2) | 23.49 | 1.124 |
| WCDMA 1700 | Max output power =22(+1/-2) | 22.85 | 1.035 |
| WCDMA 1900 | Max output power =22.5 (+0.5/-2) | 22.72 | 1.067 |
| 802.11B | Max output power =14.5 (+0.5/-3.5) | 14.90 | 1.023 |

## 12. Hotspot Mode Evaluation Procedure

The SAR evaluation procedures for Portable Devices with Wireless Router function is according to KDB 941225 D06 Hot Spot SAR v01.

1. SAR must be tested for all surfaces and edges (side) with a transmitting antenna with in 2.5 cm from that surface or edge, at a test separation distance of 10 mm, in the wireless modes that support wireless routing.
2. Edge configurations:



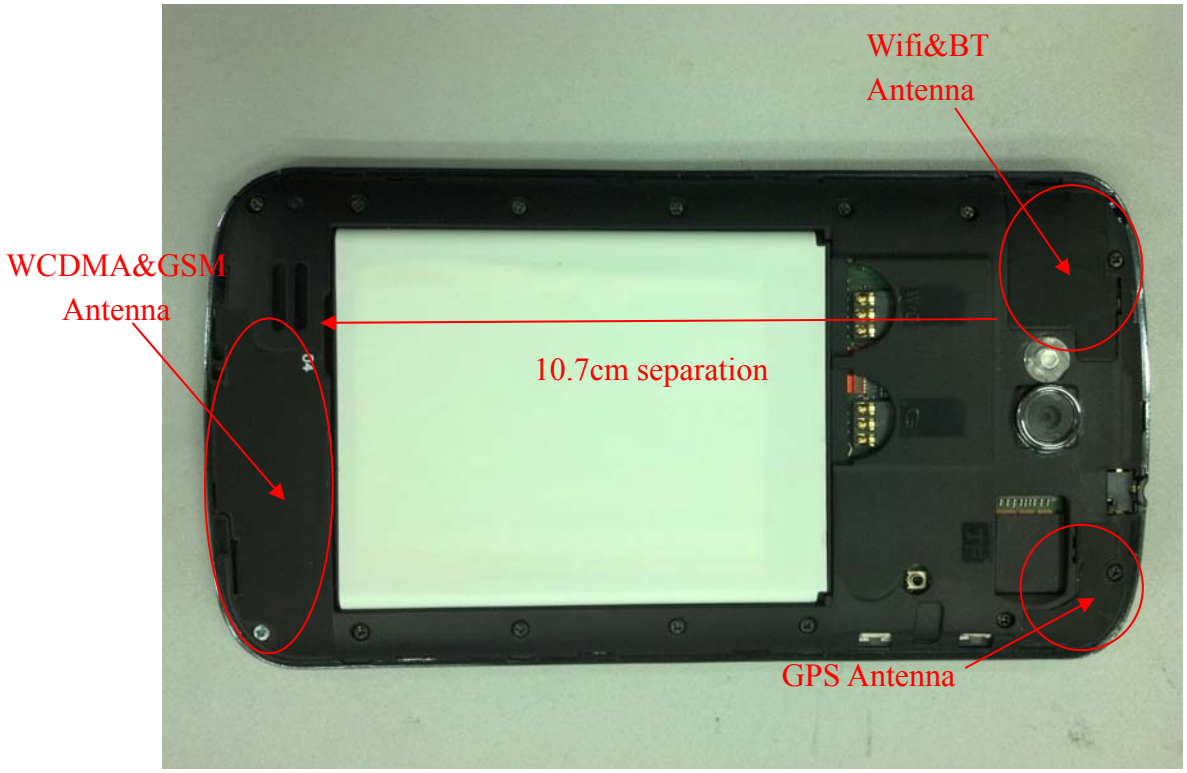

3. WCDMA&GSM antenna is located at edge A, according to KDB941225 D06 and the discription in the picture, the SAR measurement of Edge A&B&C are required, and Edge D of WCDMA and GSM is not required.

4. Wifi antenna is located at edge D, according to KDB941225 D06 and the discription in the picture, the SAR measurement of Edge B&D are required, Edge A&C are not required.

| **Assessment** | **Hotspot side for SAR** | | | | | **Test distance: 10mm** |
|---|---|---|---|---|---|---|
| **Antennas** | **Back** | **Front** | **Edge A** | **Edge B** | **Edge C** | **Edge D** |
| **WCDMA/GSM** | Yes | Yes | Yes | Yes | Yes | No |
| **WLAN&BT** | Yes | Yes | No | Yes | No | Yes |

## 13. Multiple Transmitters Evaluation

The are three transmitters build in EUT, As followed:




**Stand-alone SAR**

The output power of Wifi transmitter is 31mW > 2*Pref (Pref= 12mW), stand-alone SAR evaluation is required for Wifi.

The BT Max. Peak output power is 1mW < Pref (Pref= 12mW),and the distance between BT antenna and main antenna is 10.7cm > 2.5cm, standalone SAR evaluation is not required for Bluetooth .

**Simultaneous SAR**

| Description of Simultaneous Transmit Capabilities | | | | |
|---|---|---|---|---|
| **No.** | **Transmitter Combinations** | **Scenario Supported?** | **Supported for Mobile Hotspot?** | **Explanation** |
| 1 | GSM(Voice)+GSM(Data) | No | No | **Note 1** |
| 2 | WCDMA(Voice)+WCDMA(Data) | **Yes** | **Yes** | |
| 3 | GSM(Voice)+WCDMA(Data) | No | No | |
| 4 | WCDMA(Voice)+GSM(Data) | No | No | |
| 5 | GSM(Data)+WCDMA(Voice) | No | No | |
| 6 | GSM(Voice)+WCDMA(Voice) | No | No | |
| 7 | GSM(Voice)+WiFi (/ BT) | **Yes** | No | **Note 2** |
| 8 | WCDMA(Voice)+WiFi (/BT) | **Yes** | No | |
| 9 | WCDMA(Voice)+WCDMA(Data)+WiFi | **Yes** | **Yes** | **Note 3** |
| 10 | GSM(Data)+WiFi | **Yes** | **Yes** | |
| 11 | WCDMA(Data)+WiFi | **Yes** | **Yes** | |

| Not applicable | Applicable | Head | Body-worn | Hotspot |
|---|---|---|---|---|
| 1,3,4,5,6 | 2,7,8,9,10,11 | 2,7,8,9 | 2,7,8,9 | 9,10,11 |

Note:

1. EUT syetem architecture does not support simultanous voice and data(except on WCDMA), multiple voice channels, or multiple data channels during a single session on the celluar net work.
2. Supported for voice plus backgrond data.
3. Support for mobile hotspot operation.
4. When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WiFi transmitter and another licensed transmitter.Both transmitter often do not transmit at the same transmitting frenquency and thus cannot be evaluated for SAR under actual use conditions. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.
5. The hotspot SAR result may overlap with the body-worn accessory SAR requirements, per KDB 941225 D06, the more conserative configurations can be considered, thus excluding some unnecessary body-worn accessory SAR tests.
6. The WiFi and Bluetooth cannot transmit simultaneously. GSM supports voice and data transmission, though not simultaneously. WCDMA supports voice and data transmission simultaneously.
7. For Scenario **No.2**,**8**,**9**,**11**, WCDMA and WiFi is tested separately, the WCDMA mode is test with 12.2kbps RMC and TPC set to all "1", if maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSDPA/HSUPA active is less than 1/4 dB higher than that measured without HSDPA/HSUPA using 12.2kbps RMC, according to KDB 941225D01v02, SAR is not required for this handset with HSPA capabilities.
8. For Scenario **No.7**,**10**, GSM and WiFi is tested separately, the GSM mode do not supports voice and data transmission simultaneously, voice (GSM) and data (GPRS/EDGE) is tested separately.

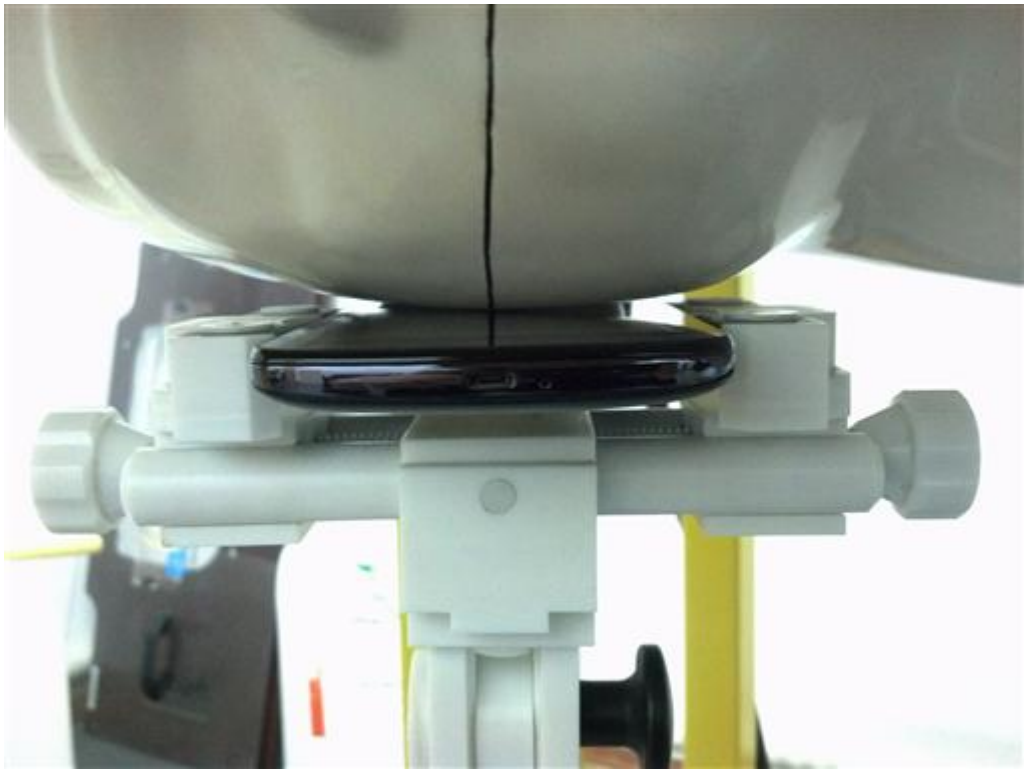
9. Applicable Multiple Scenario Evaluation

| Test Position | WCDMA&GSM SAR$_{Max}$ (W/Kg) | Bluetooth SAR(W/Kg) | WiFi SAR(W/Kg) | ∑1-g SAR$_{Max}$(W/Kg) | |
|---|---|---|---|---|---|
| | | | | BT&Main Ant | WiFi&Main Ant |
| Head SAR | 0.262 | 0 | 0.075 | 0.262 | 0.337 |
| Body SAR | 0.493 | 0 | 0.108 | 0.493 | 0.601 |

Simultaneous Transmission SAR evaluation is not required for Wifi and WCDMA&GSM, because the sum of 1g SAR$_{Max}$ is **0.601**W/Kg < 1.6W/Kg for Wifi and WCDMA&GSM.
Simultaneous Transmission SAR evaluation is not required for BT and WCDMA&GSM, because the sum of 1g SAR$_{Max}$ is **0.493**W/Kg < 1.6W/Kg for BT and WCDMA&GSM.

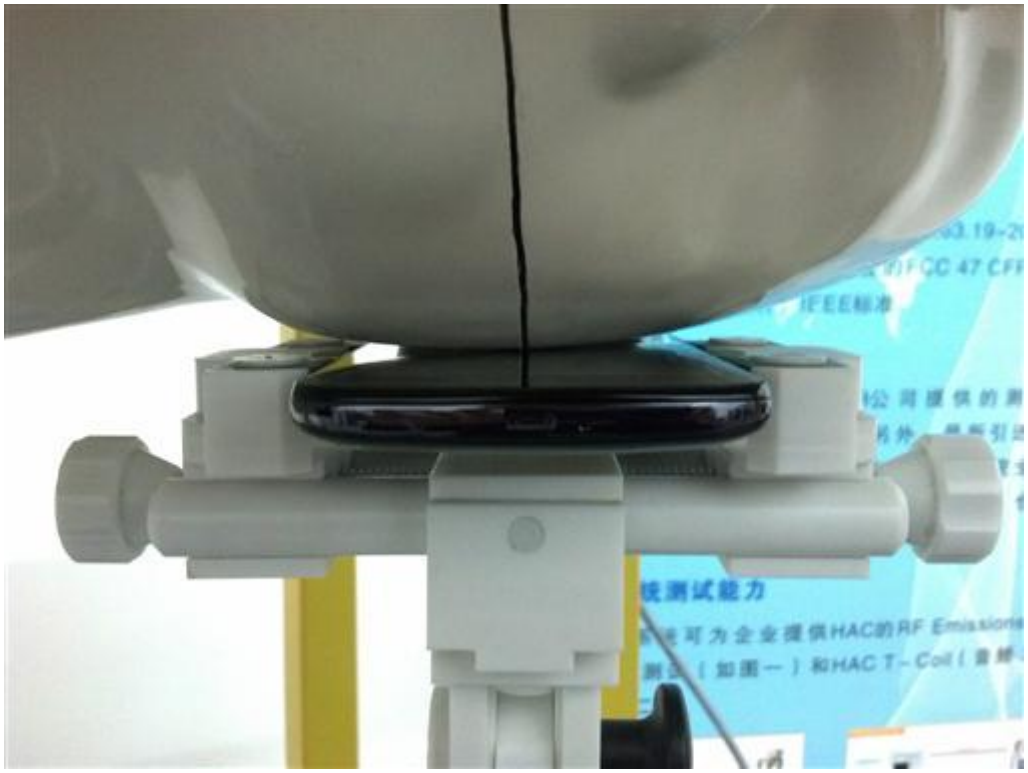
# Annex A EUT Setup Photos

1 EUT Right Head Touch Cheek Position

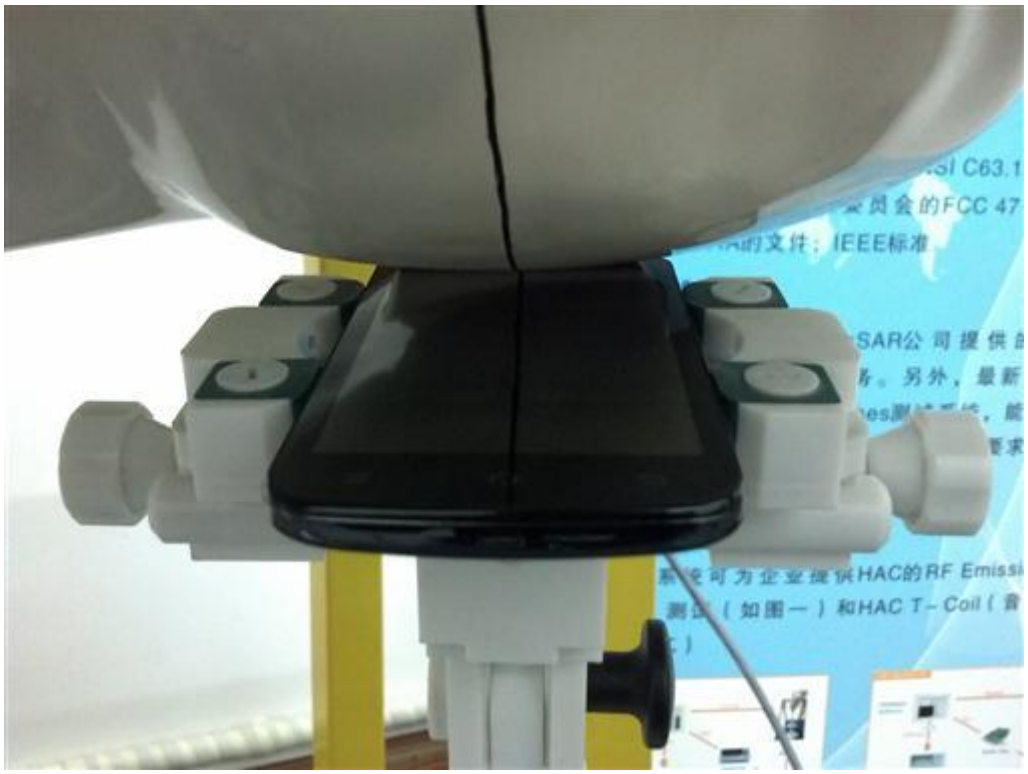


2 EUT Right Head Tilt15 Position

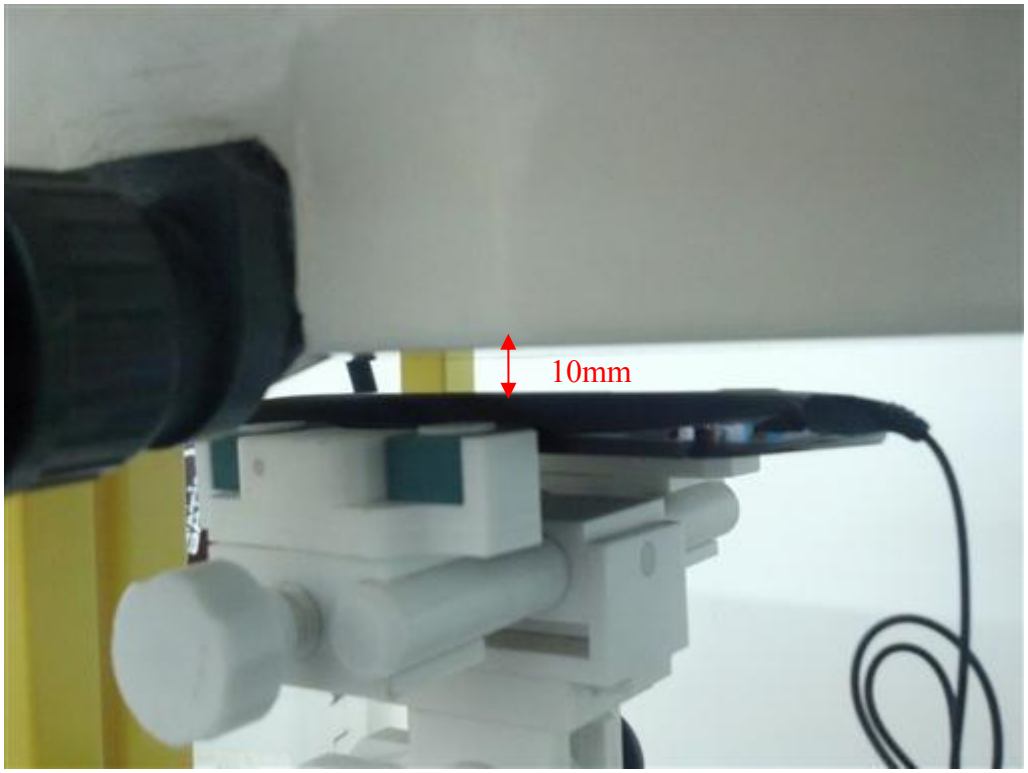
3 EUT Left Head Touch Cheek Position



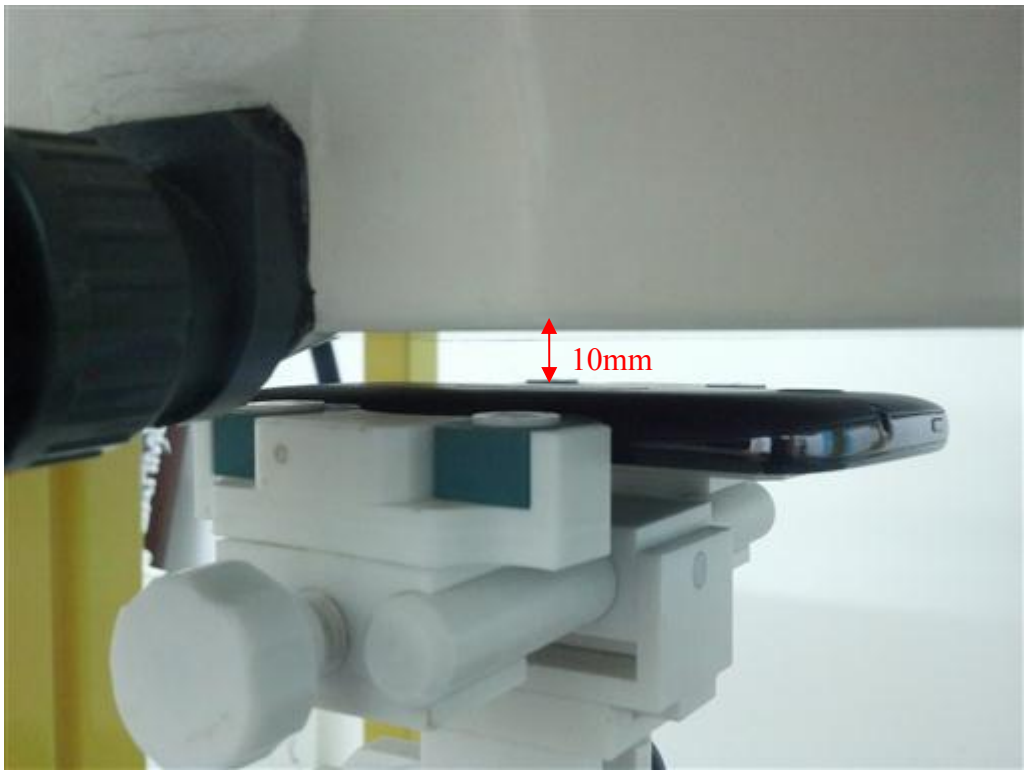
4 EUT Left Head Tilt15 Position



5 Side Position with earphone



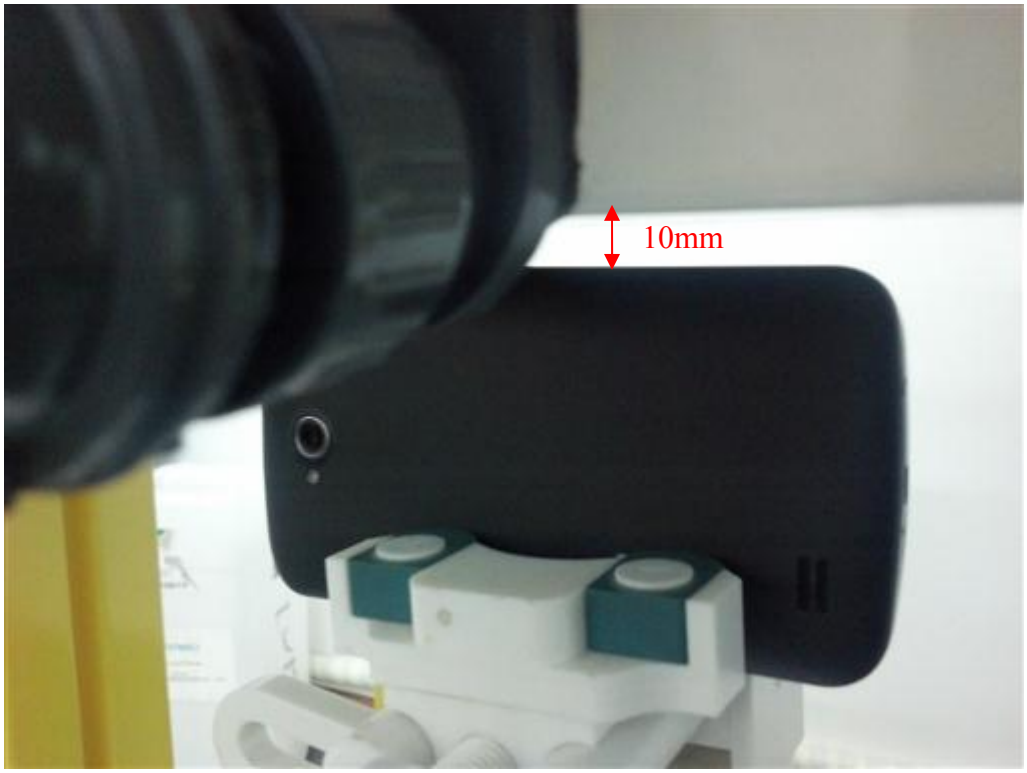

6 Side Position



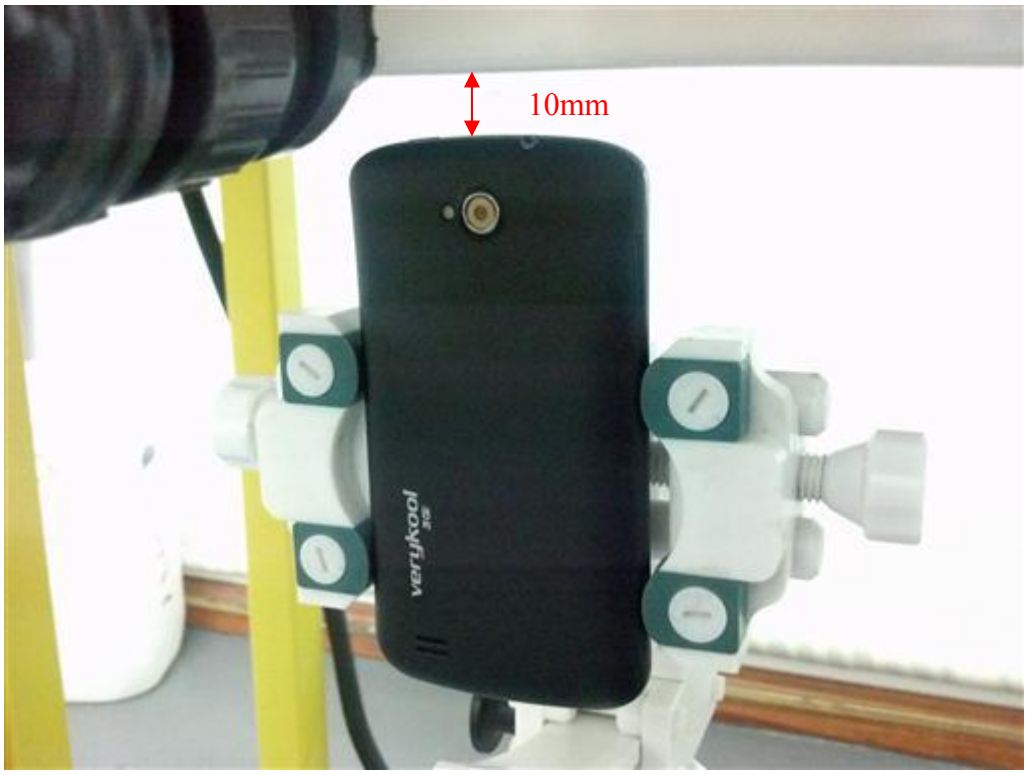
7. EDGE A


8. EDGE B

9. EDGE C




10. EDGE D



Liquid Level Photo

Liquid depth :15.5cm