

# FCC SAR TEST REPORT

Report No: STS1705134H01

Issued for

Ningbo Keqiang Battery Co., Ltd.

Dajiahe Industrial zone, ninghai, ningbo, China

|                               |                             |
|-------------------------------|-----------------------------|
| <b>Product Name:</b>          | Smart watch phone           |
| <b>Brand Name:</b>            | KETRON                      |
| <b>Model Name:</b>            | KQ-H002                     |
| <b>Series Model:</b>          | N/A                         |
| <b>FCC ID:</b>                | 2AMYUKQ-H002                |
| <b>Test Standard:</b>         | ANSI/IEEE Std. C95.1        |
|                               | FCC 47 CFR Part 2 ( 2.1093) |
|                               | IEEE 1528: 2013             |
| <b>Max. Report SAR (1g):</b>  | Front to mouth: 0.290 W/kg  |
| <b>Max. Report SAR (10g):</b> | Wrist: 0.608 W/kg           |

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## Test Report Certification

**Applicant's name** ..... : Ningbo Keqiang Battery Co., Ltd.

**Address** ..... : Dajiahe Industrial zone, ninghai, ningbo, China

**Manufacture's Name** ..... : Ningbo Keqiang Battery Co., Ltd.

**Address** ..... : Dajiahe Industrial zone, ninghai, ningbo, China

### Product description

**Product name** ..... : Smart watch phone

**Trademark** ..... : KETRON

**Model and/or type reference** : KQ-H002

**Series Model** ..... : N/A

**Standards** ..... : ANSI/IEEE Std. C95.1-1992  
FCC 47 CFR Part 2 ( 2.1093)  
IEEE 1528: 2013

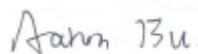
The device was tested by Shenzhen BZT Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Date (s) of performance of tests** ..... : 05 Jul. 2017

**Date of Issue** ..... : 07 Jul. 2017

**Test Result** ..... : **Pass**

Testing Engineer :



( Aaron Bu)

Technical Manager :



(John Zou)

Authorized Signatory :



(Vita Li)

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## 1. General Information

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

### 1.1 EUT Description

|                                                                                                                       |                                                                    |          |                          |                  |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------|--------------------------|------------------|
| Equipment                                                                                                             | Smart watch phone                                                  |          |                          |                  |
| Brand Name                                                                                                            | KETRON                                                             |          |                          |                  |
| Model No.                                                                                                             | KQ-H002                                                            |          |                          |                  |
| Series Model                                                                                                          | N/A                                                                |          |                          |                  |
| FCC ID                                                                                                                | 2AMYUKQ-H002                                                       |          |                          |                  |
| Model Difference                                                                                                      | N/A                                                                |          |                          |                  |
| Battery                                                                                                               | Rated Voltage: 3.7V<br>Charge Limit: 4.25±0.1V<br>Capacity: 450mAh |          |                          |                  |
| Device Category                                                                                                       | Portable                                                           |          |                          |                  |
| Product stage                                                                                                         | Production unit                                                    |          |                          |                  |
| Exposure Environment                                                                                                  | General Population / Uncontrolled                                  |          |                          |                  |
| Hardware Version                                                                                                      | N/A                                                                |          |                          |                  |
| Software Version                                                                                                      | N/A                                                                |          |                          |                  |
| Frequency Range                                                                                                       | GSM 850:824.2~848.8MHz<br>PCS1900:1850.2~1909.8MHz                 |          |                          |                  |
| Max. Reported SAR                                                                                                     | Band                                                               | Mode     | Front to mouth-1g (W/kg) | Wrist-10g (W/kg) |
|                                                                                                                       | PCT                                                                | GSM 850  | 0.290                    | 0.608            |
|                                                                                                                       | PCT                                                                | GSM 1900 | 0.211                    | 0.381            |
| Limit                                                                                                                 |                                                                    |          | 1.6                      | 4.0              |
| FCC Equipment Class                                                                                                   | PCS Licensed Transmitter worn on body (PCT)                        |          |                          |                  |
| Operating Mode                                                                                                        | GSM: GSM Voice; GPRS Class 12;                                     |          |                          |                  |
| Antenna Specification                                                                                                 | GSM: PIFA Antenna                                                  |          |                          |                  |
| SIM Card                                                                                                              | Support single card                                                |          |                          |                  |
| Note:<br>1. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power |                                                                    |          |                          |                  |

## 1.2 Test Environment

Ambient conditions in the SAR laboratory:

| Items            | Required |
|------------------|----------|
| Temperature (°C) | 18-25    |
| Humidity (%RH)   | 30-70    |

## 1.3 Test Factory

BZT Testing Technology Co., Ltd

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Shenzhen, Guangdong, China

FCC Registration No.: 701733

## 2. Test Standards And Limits

| No. | Identity                  | Document Title                                                                                                                                                              |
|-----|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | 47 CFR Part 2             | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations                                                                                               |
| 2   | ANSI/IEEE Std. C95.1-1992 | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz                                                  |
| 3   | IEEE Std. 1528-2013       | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| 4   | FCC KDB 447498 D01 v06    | Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies                                                                                      |
| 5   | FCC KDB 865664 D01 v01r04 | SAR Measurement 100 MHz to 6 GHz                                                                                                                                            |
| 6   | FCC KDB 865664 D02 v01r02 | RF Exposure Reporting                                                                                                                                                       |

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

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

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

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

Note: Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 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).

### 3. SAR Measurement System

#### 3.1 Definition Of Specific Absorption Rate (SAR)

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.

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 ( $\rho$ ). The equation description is as below:

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

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

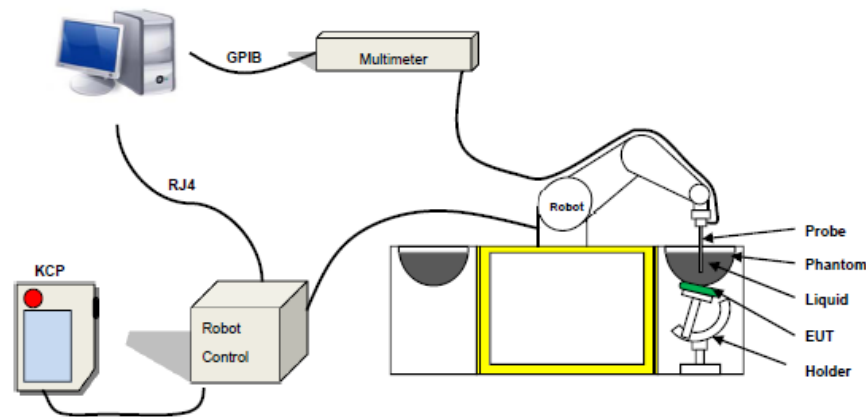
$$SAR = \frac{\sigma E^2}{\rho}$$

Where:  $\sigma$  is the conductivity of the tissue;

$\rho$  is the mass density of the tissue and E is the RMS electrical field strength.

#### 3.2 SAR System

SATIMO SAR System Diagram:



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.

### 3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 14/16 EP309 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter: 5 mm
- Length of Individual Dipoles: 4.5 mm
- Maximum external diameter: 8 mm
- Distance between dipole/probe extremity: 8 mm (repeatability better than +/- 2.7mm)
- Probe linearity:  $0 \pm 2.27\%$  ( $\pm 0.10\text{dB}$ )
- Axial Isotropy:  $< 0.10\text{ dB}$
- Spherical Isotropy:  $< 0.10\text{ dB}$
- Calibration range: 400 MHz to 3 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than  $30^\circ$



Figure 1-MVG COMOSAR Dosimetric E field Dipole

### 3.2.2 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.

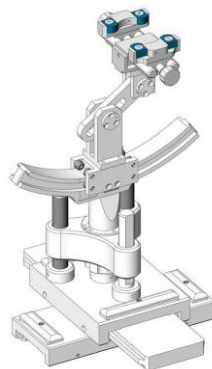
SN 32/14 SAM115



SN 32/14 SAM116



### 3.2.3 Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of  $\pm 0.5$  mm would produce a SAR uncertainty of  $\pm 20$  %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

## 4. Tissue Simulating Liquids

### 4.1 Simulating Liquids Parameter Check

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 described in Reference [12] and extrapolated according to the head parameters specified in P1528.

| Frequency<br>(MHz) | Bactericide | DGBE  | HEC | NaCl | Sucrose | 1,2-Propanediol | X100  | Water | Conductivity | Permittivity |
|--------------------|-------------|-------|-----|------|---------|-----------------|-------|-------|--------------|--------------|
|                    | %           | %     | %   | %    | %       | %               | %     | %     | $\sigma$     | $\epsilon_r$ |
| 750                | /           | /     | /   | 0.79 | /       | 64.81           | /     | 34.40 | 0.97         | 41.8         |
| 835                | /           | /     | /   | 0.79 | /       | 64.81           | /     | 34.40 | 0.97         | 41.8         |
| 900                | /           | /     | /   | 0.79 | /       | 64.81           | /     | 34.40 | 0.97         | 41.8         |
| 1800               | /           | 13.84 | /   | 0.35 | /       | /               | 30.45 | 55.36 | 1.38         | 41.0         |
| 1900               | /           | 13.84 | /   | 0.35 | /       | /               | 30.45 | 55.36 | 1.38         | 41.0         |
| 2000               | /           | 7.99  | /   | 0.16 | /       | /               | 19.97 | 71.88 | 1.55         | 41.1         |
| 2450               | /           | 7.99  | /   | 0.16 | /       | /               | 19.97 | 71.88 | 1.88         | 40.3         |
| 2600               | /           | 7.99  | /   | 0.16 | /       | /               | 19.97 | 71.88 | 1.88         | 40.3         |

| Tissue dielectric parameters for head and body phantoms |              |      |                 |      |
|---------------------------------------------------------|--------------|------|-----------------|------|
| Frequency                                               | $\epsilon_r$ |      | $\sigma$<br>S/m |      |
|                                                         | Head         | Body | Head            | Body |
| 300                                                     | 45.3         | 58.2 | 0.87            | 0.92 |
| 450                                                     | 43.5         | 58.7 | 0.87            | 0.94 |
| 900                                                     | 41.5         | 55.0 | 0.97            | 1.05 |
| 1450                                                    | 40.5         | 54.0 | 1.20            | 1.30 |
| 1800                                                    | 40.0         | 53.3 | 1.40            | 1.52 |
| 2450                                                    | 39.2         | 52.7 | 1.80            | 1.95 |
| 3000                                                    | 38.5         | 52.0 | 2.40            | 2.73 |
| 5800                                                    | 35.3         | 48.2 | 5.27            | 6.00 |

**LIQUID MEASUREMENT RESULTS****Date:** 05 Jul. 2017 **Ambient condition:** Temperature 23.7°C **Relative humidity:** 59%

| Head Simulating Liquid |            | Parameters    | Target | Measured | Deviation[%] | Limited[%] |
|------------------------|------------|---------------|--------|----------|--------------|------------|
| Frequency              | Temp. [°C] |               |        |          |              |            |
| 835 MHz                | 23.30      | Permittivity: | 41.5   | 40.45    | -2.54        | ±5         |
|                        |            | Conductivity: | 0.9    | 0.89     | -1.16        | ± 5        |
| 1900 MHz               | 23.30      | Permittivity: | 40     | 40.23    | 0.57         | ± 5        |
|                        |            | Conductivity: | 1.4    | 1.40     | -0.34        | ± 5        |

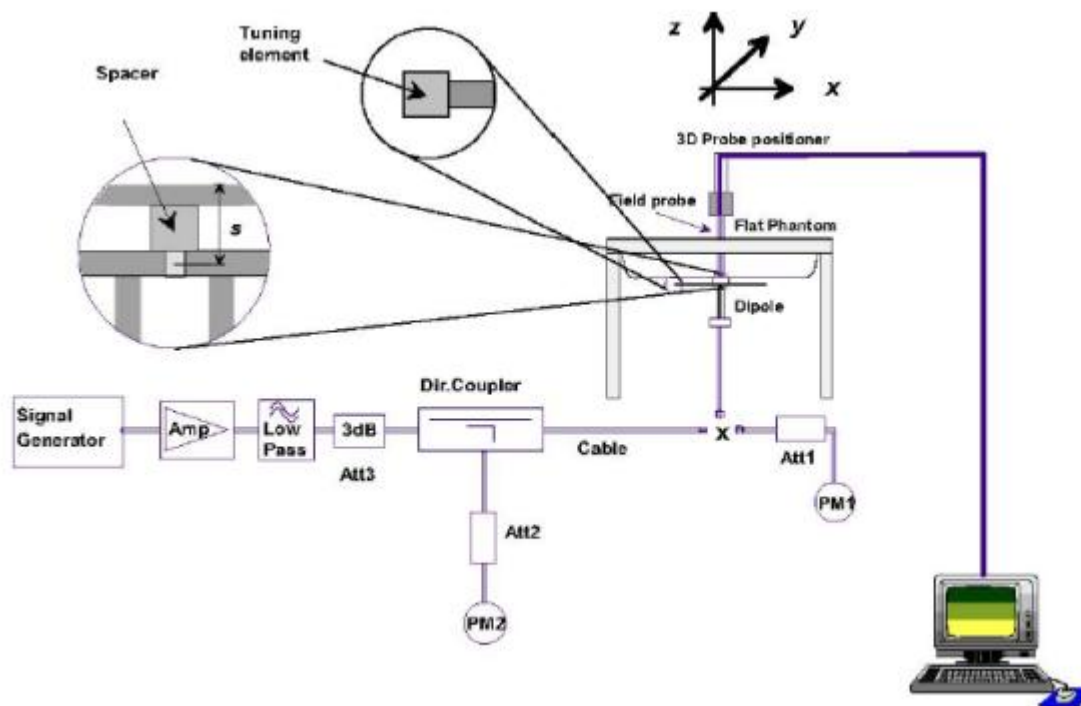
| Body Simulating Liquid |            | Parameters    | Target | Measured | Deviation[%] | Limited[%] |
|------------------------|------------|---------------|--------|----------|--------------|------------|
| Frequency              | Temp. [°C] |               |        |          |              |            |
| 835 MHz                | 23.30      | Permittivity: | 55.2   | 56.48    | 2.32         | ± 5        |
|                        |            | Conductivity: | 0.97   | 0.97     | 0.42         | ± 5        |
| 1900 MHz               | 23.30      | Permittivity: | 53.3   | 52.42    | -1.64        | ± 5        |
|                        |            | Conductivity: | 1.52   | 1.55     | 1.88         | ± 5        |

## 5. SAR System Validation

### 5.1 Validation System

Each SATIMO system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system performance check and system validation. System kit includes a dipole, and dipole device holder.

The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system validation setup is shown as below.



### 5.2 Validation Result

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

**Ambient condition:** Temperature 23.7°C **Relative humidity:** 59%

| Freq.(MHz) | Power(mW) | Tested Value (W/Kg) | Normalized SAR (W/kg) | Target(W/Kg) | Tolerance(%) | Date       |
|------------|-----------|---------------------|-----------------------|--------------|--------------|------------|
| 835 Head   | 100       | 0.953               | 9.530                 | 9.56         | -0.32        | 2017-07-05 |
| 835 Body   | 100       | 0.910               | 9.101                 | 9.56         | -4.80        | 2017-07-05 |
| 1900 Head  | 100       | 4.052               | 40.522                | 39.7         | 2.07         | 2017-07-05 |
| 1900 Body  | 100       | 3.795               | 37.954                | 39.7         | -4.40        | 2017-07-05 |

Note: The tolerance limit of System validation  $\pm 10\%$ .

## 6. SAR Evaluation Procedures

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

- 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 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot 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.

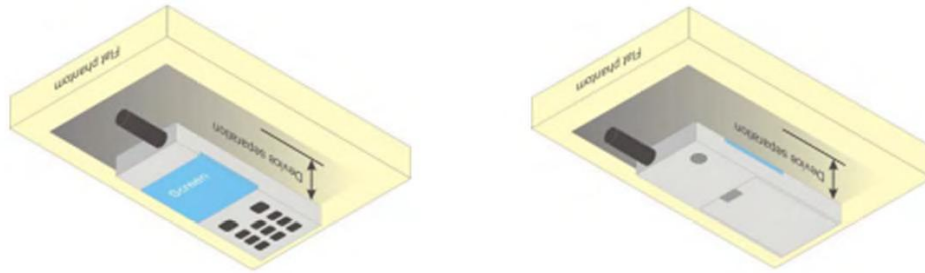
Area Scan& Zoom Scan:

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR -distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r01 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

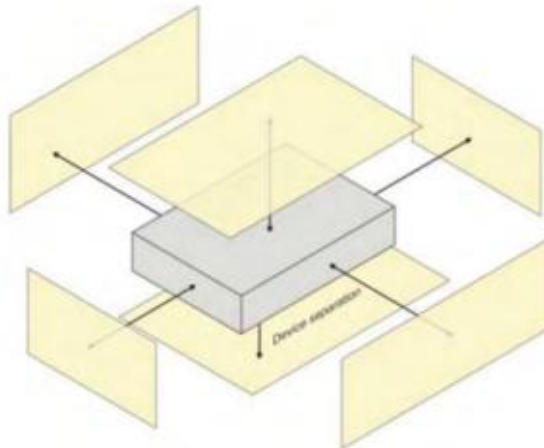
## 7. EUT Test Position

This EUT was tested in Front Face and Rear Face.



### 7.1 Hotspot mode exposure position condition

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing function, the relevant hand and body exposure condition are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surface and edges with a transmitting antenna located within 25mm from that surface or edge. When form factor of a handset is smaller than 9cm x 5cm, a test separation distance of 5mm (instead of 10mm) is required for testing hotspot mode. When the separate distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration(surface).



## 8. Uncertainty

### 8.1 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

| NO                           | Source                                          | Tol(%)           | Prob. Dist. | Div. k                                  | ci (1g)       | ci (10g)      | 1gUi   | 10gUi  | Veff |
|------------------------------|-------------------------------------------------|------------------|-------------|-----------------------------------------|---------------|---------------|--------|--------|------|
| Measurement System□          |                                                 |                  |             |                                         |               |               |        |        |      |
| 1                            | Probe calibration                               | 5.8              | N           | 1                                       | 1             | 1             | 5.8    | 5.8    | ∞    |
| 2                            | Axial isotropy                                  | 3.5              | R           | √3                                      | (1-cp)1/<br>2 | (1-cp)1/<br>2 | 1.43   | 1.43   | ∞    |
| 3                            | Hemispherical isotropy                          | 5.9              | R           | √3                                      | √Cp           | √Cp           | 2.41   | 2.41   | ∞    |
| 4                            | Boundary effect                                 | 1.0              | R           | √3                                      | 1             | 1             | 0.58   | 0.58   | ∞    |
| 5                            | Linearity                                       | 4.7              | R           | √3                                      | 1             | 1             | 2.71   | 2.71   | ∞    |
| 6                            | System Detection limits                         | 1.0              | R           | √3                                      | 1             | 1             | 0.58   | 0.58   | ∞    |
| 7                            | Readout electronics                             | 0.5              | N           | 1                                       | 1             | 1             | 0.50   | 0.50   | ∞    |
| 8                            | Response time                                   | 0                | R           | √3                                      | 1             | 1             | 0      | 0      | ∞    |
| 9                            | Integration time                                | 1.4              | R           | √3                                      | 1             | 1             | 0.81   | 0.81   | ∞    |
| 10                           | Ambient noise                                   | 3.0              | R           | √3                                      | 1             | 1             | 1.73   | 1.73   | ∞    |
| 11                           | Ambient reflections                             | 3.0              | R           | √3                                      | 1             | 1             | 1.73   | 1.73   | ∞    |
| 12                           | Probe positioner mech. restrictions             | 1.4              | R           | √3                                      | 1             | 1             | 0.81   | 0.81   | ∞    |
| 13                           | Probe positioning with respect to phantom shell | 1.4              | R           | √3                                      | 1             | 1             | 0.81   | 0.81   | ∞    |
| 14                           | Max.SAR evaluation                              | 1.0              | R           | √3                                      | 1             | 1             | 0.6    | 0.6    | ∞    |
| Test sample related          |                                                 |                  |             |                                         |               |               |        |        |      |
| 15                           | Device positioning                              | 2.6              | N           | 1                                       | 1             | 1             | 2.6    | 2.6    | 11   |
| 16                           | Device holder                                   | 3                | N           | 1                                       | 1             | 1             | 3.0    | 3.0    | 7    |
| 17                           | Drift of output power                           | 5.0              | R           | √3                                      | 1             | 1             | 2.89   | 2.89   | ∞    |
| Phantom and set-up           |                                                 |                  |             |                                         |               |               |        |        |      |
| 18                           | Phantom uncertainty                             | 4.0              | R           | √3                                      | 1             | 1             | 2.31   | 2.31   | ∞    |
| 19                           | Liquid conductivity (target)                    | 2.5              | N           | 1                                       | 0.78          | 0.71          | 1.95   | 1.78   | 5    |
| 20                           | Liquid conductivity (meas)                      | 4                | N           | 1                                       | 0.23          | 0.26          | 0.92   | 1.04   | 5    |
| 21                           | Liquid Permittivity (target)                    | 2.5              | N           | 1                                       | 0.78          | 0.71          | 1.95   | 1.78   | ∞    |
| 22                           | Liquid Permittivity (meas)                      | 5.0              | N           | 1                                       | 0.23          | 0.26          | 1.15   | 1.30   | ∞    |
| Combined standard            |                                                 |                  | RSS         | $U_c = \sqrt{\sum_{i=1}^n C_i^2 U_i^2}$ |               |               | 10.63% | 10.54% |      |
| Expanded uncertainty (P=95%) |                                                 | $U = k U_c, k=2$ |             |                                         |               |               | 21.26% | 21.08% |      |

## 8.2 System validation Uncertainty

| NO                           | Source                                          | Tol(%)            | Prob. Dist. | Div. k                          | ci (1g)   | ci (10g)  | 1gUi   | 10gUi  | Veff |
|------------------------------|-------------------------------------------------|-------------------|-------------|---------------------------------|-----------|-----------|--------|--------|------|
| Measurement System□          |                                                 |                   |             |                                 |           |           |        |        |      |
| 1                            | Probe calibration                               | 5.8               | N           | 1                               | 1         | 1         | 5.8    | 5.8    | ∞    |
| 2                            | Axial isotropy                                  | 3.5               | R           | √3                              | (1-cp)1/2 | (1-cp)1/2 | 1.43   | 1.43   | ∞    |
| 3                            | Hemispherical isotropy                          | 5.9               | R           | √3                              | √Cp       | √Cp       | 2.41   | 2.41   | ∞    |
| 4                            | Boundary effect                                 | 1.0               | R           | √3                              | 1         | 1         | 0.58   | 0.58   | ∞    |
| 5                            | Linearity                                       | 4.7               | R           | √3                              | 1         | 1         | 2.71   | 2.71   | ∞    |
| 6                            | System Detection limits                         | 1.0               | R           | √3                              | 1         | 1         | 0.58   | 0.58   | ∞    |
| 7                            | Modulation response                             | 0                 | N           | 1                               | 1         | 1         | 0      | 0      | ∞    |
| 8                            | Readout electronics                             | 0.5               | N           | 1                               | 1         | 1         | 0.50   | 0.50   | ∞    |
| 9                            | Response time                                   | 0                 | R           | √3                              | 1         | 1         | 0      | 0      | ∞    |
| 10                           | Integration time                                | 1.4               | R           | √3                              | 1         | 1         | 0.81   | 0.81   | ∞    |
| 11                           | Ambient noise                                   | 3.0               | R           | √3                              | 1         | 1         | 1.73   | 1.73   | ∞    |
| 12                           | Ambient reflections                             | 3.0               | R           | √3                              | 1         | 1         | 1.73   | 1.73   | ∞    |
| 13                           | Probe positioner mech. restrictions             | 1.4               | R           | √3                              | 1         | 1         | 0.81   | 0.81   | ∞    |
| 14                           | Probe positioning with respect to phantom shell | 1.4               | R           | √3                              | 1         | 1         | 0.81   | 0.81   | ∞    |
| 15                           | Max.SAR evaluation                              | 1.0               | R           | √3                              | 1         | 1         | 0.6    | 0.6    | ∞    |
| Dipole                       |                                                 |                   |             |                                 |           |           |        |        |      |
| 16                           | Deviation of experimental source from           | 4                 | N           | 1                               | 1         | 1         | 4.00   | 4.00   | ∞    |
| 17                           | Input power and SAR drift mea.                  | 5                 | R           | √3                              | 1         | 1         | 2.89   | 2.89   | ∞    |
| 18                           | Dipole Axis to liquid Distance                  | 2                 | R           | √3                              | 1         | 1         |        |        | ∞    |
| Phantom and set-up           |                                                 |                   |             |                                 |           |           |        |        |      |
| 19                           | Phantom uncertainty                             | 4.0               | R           | √3                              | 1         | 1         | 2.31   | 2.31   | ∞    |
| 20                           | Uncertainty in SAR correction for deviation(in  | 2.0               | N           | 1                               | 1         | 0.84      | 2      | 1.68   | ∞    |
| 21                           | Liquid conductivity (target)                    | 2                 | N           | 1                               | 1         | 0.84      | 2.00   | 1.68   | ∞    |
| 22                           | Liquid conductivity (temperature uncertainty)   | 2.5               | N           | 1                               | 0.78      | 0.71      | 1.95   | 1.78   | 5    |
| 23                           | Liquid conductivity (meas)                      | 4                 | N           | 1                               | 0.23      | 0.26      | 0.92   | 1.04   | 5    |
| 24                           | Liquid Permittivity (target)                    | 2.5               | N           | 1                               | 0.78      | 0.71      | 1.95   | 1.78   | ∞    |
| 25                           | Liquid Permittivity (temperature uncertainty)   | 2.5               | N           | 1                               | 0.78      | 0.71      | 1.95   | 1.78   | 5    |
| 26                           | Liquid Permittivity (meas)                      | 5.0               | N           | 1                               | 0.23      | 0.26      | 1.15   | 1.30   | ∞    |
| Combined standard            |                                                 |                   | RSS         | $U_c = \sqrt{\sum C_i^2 U_i^2}$ |           |           | 10.15% | 10.05% |      |
| Expanded uncertainty (P=95%) |                                                 | $U = k U_{c,k=2}$ |             |                                 |           |           | 20.29% | 20.10% |      |

## 9. Conducted Power Measurement

### 9.1 Test Result

| Burst Average Power (dBm)                                                                                                                                                                                                                                        |         |       |       |          |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|-------|----------|--------|--------|
| Band                                                                                                                                                                                                                                                             | GSM 850 |       |       | PCS 1900 |        |        |
| Channel                                                                                                                                                                                                                                                          | 128     | 190   | 251   | 512      | 661    | 810    |
| Frequency (MHz)                                                                                                                                                                                                                                                  | 824.2   | 836.6 | 848.8 | 1850.2   | 1880.0 | 1909.8 |
| GSM(GMSK, 1-Slot)                                                                                                                                                                                                                                                | 32.42   | 32.39 | 32.56 | 29.65    | 29.59  | 29.55  |
| GPRS (GMSK, 1-Slot)                                                                                                                                                                                                                                              | 32.38   | 32.45 | 32.39 | 29.09    | 28.34  | 28.86  |
| GPRS (GMSK, 2-Slot)                                                                                                                                                                                                                                              | 31.41   | 31.63 | 31.26 | 27.92    | 27.92  | 27.53  |
| GPRS (GMSK, 3-Slot)                                                                                                                                                                                                                                              | 29.35   | 29.48 | 29.44 | 26.54    | 26.36  | 26.26  |
| GPRS (GMSK, 4-Slot)                                                                                                                                                                                                                                              | 27.50   | 27.57 | 27.39 | 24.37    | 24.47  | 24.72  |
| Remark: GPRS, CS4 coding scheme.<br>Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link<br>Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link<br>Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link |         |       |       |          |        |        |

| Fram- Average Power(dBm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |       |       |          |        |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|-------|----------|--------|--------|
| Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | GSM 850 |       |       | PCS 1900 |        |        |
| Channel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 128     | 190   | 251   | 512      | 661    | 810    |
| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 824.2   | 836.6 | 848.8 | 1850.2   | 1880.0 | 1909.8 |
| GSM(GMSK, 1-Slot)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 23.39   | 23.36 | 23.53 | 20.62    | 20.56  | 20.52  |
| GPRS (GMSK, 1-Slot)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 23.35   | 23.42 | 23.36 | 20.06    | 19.31  | 19.83  |
| GPRS (GMSK, 2-Slot)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 25.39   | 25.61 | 25.24 | 21.90    | 21.90  | 21.51  |
| GPRS (GMSK, 3-Slot)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 25.09   | 25.22 | 25.18 | 22.28    | 22.10  | 22.00  |
| GPRS (GMSK, 4-Slot)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 24.49   | 24.56 | 24.38 | 21.36    | 21.46  | 21.71  |
| Remark :<br>1. SAR testing was performed on the maximum frame-averaged power mode.<br>2. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:<br>Frame-averaged power = Burst averaged power (1 Tx Slot) – 9.03 dB<br>Frame-averaged power = Burst averaged power (2 Tx Slots) – 6.02 dB<br>Frame-averaged power = Burst averaged power (3 Tx Slots) - 4.26 dB<br>Frame-averaged power = Burst averaged power (4 Tx Slots) – 3.01 dB |         |       |       |          |        |        |

### 9.2 Tune-up Power

| Mode          | GSM850(AVG) | GSM1900(AVG) |
|---------------|-------------|--------------|
| GSM/PCS       | 32±1dBm     | 29±1dBm      |
| GPRS (1 Slot) | 32±1dBm     | 29±1dBm      |
| GPRS (2 Slot) | 31±1dBm     | 27±1dBm      |
| GPRS (3 Slot) | 29±1dBm     | 26±1dBm      |
| GPRS (4 Slot) | 27±1dBm     | 24±1dBm      |

## 10. EUT And Test Setup Photo

### 10.1 EUT Photo

Photo 1

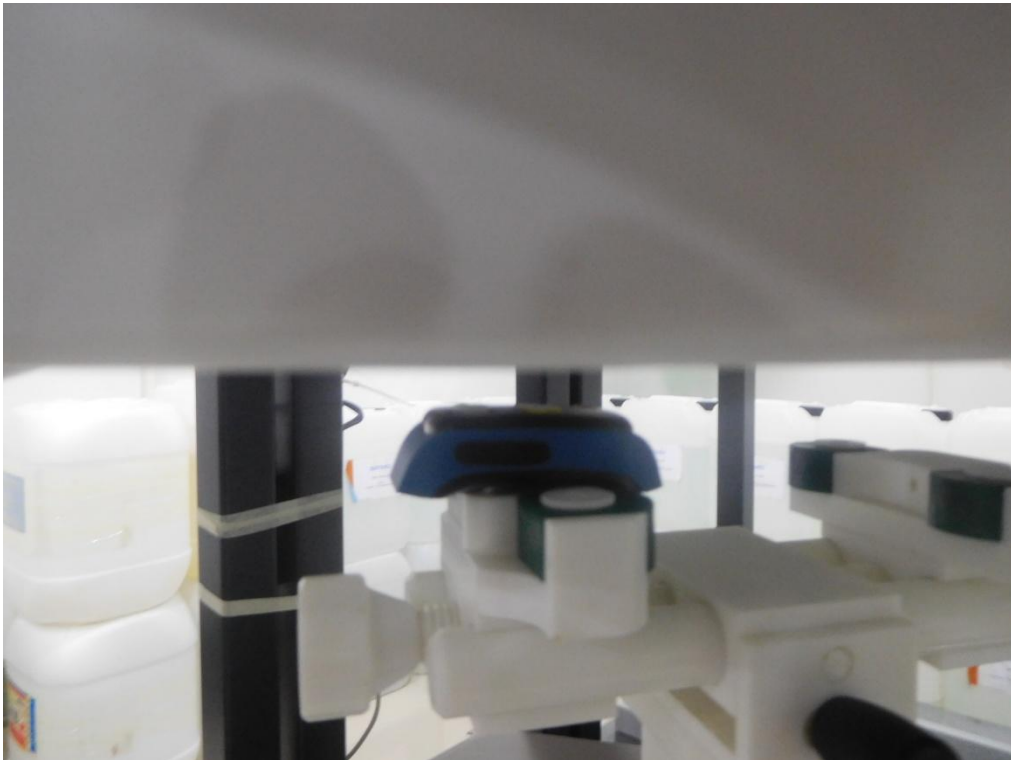


Photo 2



## 10.2 Setup Photo

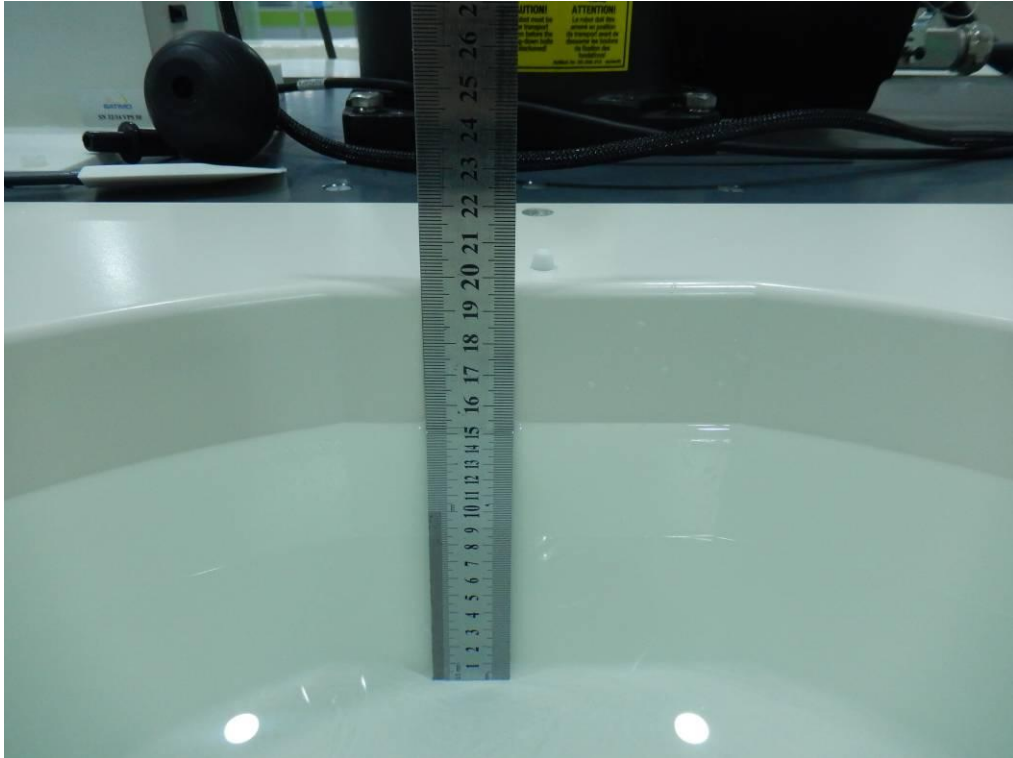
Front to mouth (separation distance is 10mm)



Wrist (separation distance is 0mm)



Liquid depth (15 cm)



## 11. SAR Result Summary

### 11.1 Front to mouth SAR

| Band    | Mode  | Test Position  | Ch. | Result 1g (W/Kg) | Power Drift(%) | Max.Turn-up Power(dBm) | Meas.Output Power(dBm) | Scaled SAR (W/Kg) | Meas. No. |
|---------|-------|----------------|-----|------------------|----------------|------------------------|------------------------|-------------------|-----------|
| GSM 850 | VOICE | Front to mouth | 251 | 0.262            | 1.42           | 33                     | 32.56                  | 0.290             | 1         |
| GSM1900 | VOICE | Front to mouth | 512 | 0.195            | 1.74           | 30                     | 29.65                  | 0.211             | 3         |

Note:

1. The test separation of all above table is 10mm.
2. Per KDB865664 D01, Repeated measurement is not required when the original highest measured SAR is <0.80 W/kg

### 11.2 Wrist SAR

| Band    | Mode             | Test Position | Ch. | Result 10g (W/Kg) | Power Drift(%) | Max.Turn-up Power(dBm) | Meas.Output Power(dBm) | Scaled SAR (W/Kg) | Meas. No. |
|---------|------------------|---------------|-----|-------------------|----------------|------------------------|------------------------|-------------------|-----------|
| GSM 850 | GPRS Data-2 Slot | Wrist         | 190 | 0.558             | -1.05          | 32                     | 31.63                  | 0.608             | 2         |
| GSM1900 | GPRS Data-3 Slot | Wrist         | 512 | 0.343             | -0.88          | 27                     | 26.54                  | 0.381             | 4         |

Note:

3. The test separation of all above table is 0mm.
4. Per KDB865664 D01, Repeated measurement is not required when the original highest measured SAR is <2.00 W/kg

## 12. Equipment List

| Kind of Equipment                     | Manufacturer | Type No.            | Serial No.               | Last Calibration | Calibrated Until |
|---------------------------------------|--------------|---------------------|--------------------------|------------------|------------------|
| 835MHz Dipole                         | SATIMO       | SID835              | SN 30/14<br>DIP0G835-332 | 2014.09.01       | 2017.08.31       |
| 1900MHz Dipole                        | SATIMO       | SID1900             | SN 30/14<br>DIP1G900-333 | 2014.09.01       | 2017.08.31       |
| E-Field Probe                         | SATIMO       | SSE5                | SN 14/16<br>EP309        | 2016.12.05       | 2017.12.04       |
| Dielectric Probe Kit                  | SATIMO       | SCLMP               | SN 32/14<br>OCPG67       | 2016.12.05       | 2017.12.04       |
| Antenna                               | SATIMO       | ANTA3               | SN 07/13<br>ZNTA52       | N/A              | N/A              |
| Phantom1                              | SATIMO       | SAM                 | SN 32/14<br>SAM115       | 2014.09.01       | N/A              |
| Phantom2                              | SATIMO       | SAM                 | SN 32/14<br>SAM116       | 2014.09.01       | N/A              |
| Phone holder                          | SATIMO       | N/A                 | SN 32/14<br>MSH97        | 2014.09.01       | N/A              |
| Laptop holder                         | SATIMO       | N/A                 | SN 32/14<br>LSH29        | 2014.09.01       | N/A              |
| Network Analyzer                      | Agilent      | 8753ES              | US38432810               | 2017.03.16       | 2018.03.15       |
| Multi Meter                           | Keithley     | Multi Meter<br>2000 | 4050073                  | 2016.10.23       | 2017.10.22       |
| Signal Generator                      | Agilent      | N5182A              | MY50140530               | 2016.10.23       | 2017.10.22       |
| Wireless<br>Communication<br>Test Set | Agilent      | 8960-E5515C         | MY48360751               | 2016.10.23       | 2017.10.22       |
| Power Amplifier                       | DESAY        | ZHL-42W             | 9638                     | 2016.10.23       | 2017.10.22       |
| Power Meter                           | R&S          | NRP                 | 100510                   | 2016.10.23       | 2017.10.22       |
| Power Meter                           | Agilent      | E4418B              | GB43312526               | 2016.10.23       | 2017.10.22       |
| Power Sensor                          | R&S          | NRP-Z11             | 101919                   | 2016.10.23       | 2017.10.22       |
| Power Sensor                          | Agilent      | E9301A              | MY41497725               | 2016.10.23       | 2017.10.22       |
| 9dB Attenuator                        | Agilent      | 99899               | DC-18GHz                 | 2017.05.10       | 2018.05.09       |
| 11dB Attenuator                       | Agilent      | 8494B               | DC-18GHz                 | 2017.05.10       | 2018.05.09       |
| 110dB Attenuator                      | Agilent      | 8494B               | DC-18GHz                 | 2017.05.10       | 2018.05.09       |
| Dual Directional<br>Coupler           | Agilent      | SHWPD1-<br>1080S    | N/A                      | 2017.05.09       | 2018.05.08       |
| Temperature &<br>Humidity             | MiEO         | HH660               | N/A                      | 2016.10.25       | 2017.10.24       |

## Appendix A. System Validation Plots

### System Performance Check Data (835MHz Head)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 2017-07-05

Measurement duration: 13 minutes 27 seconds

### Experimental conditions

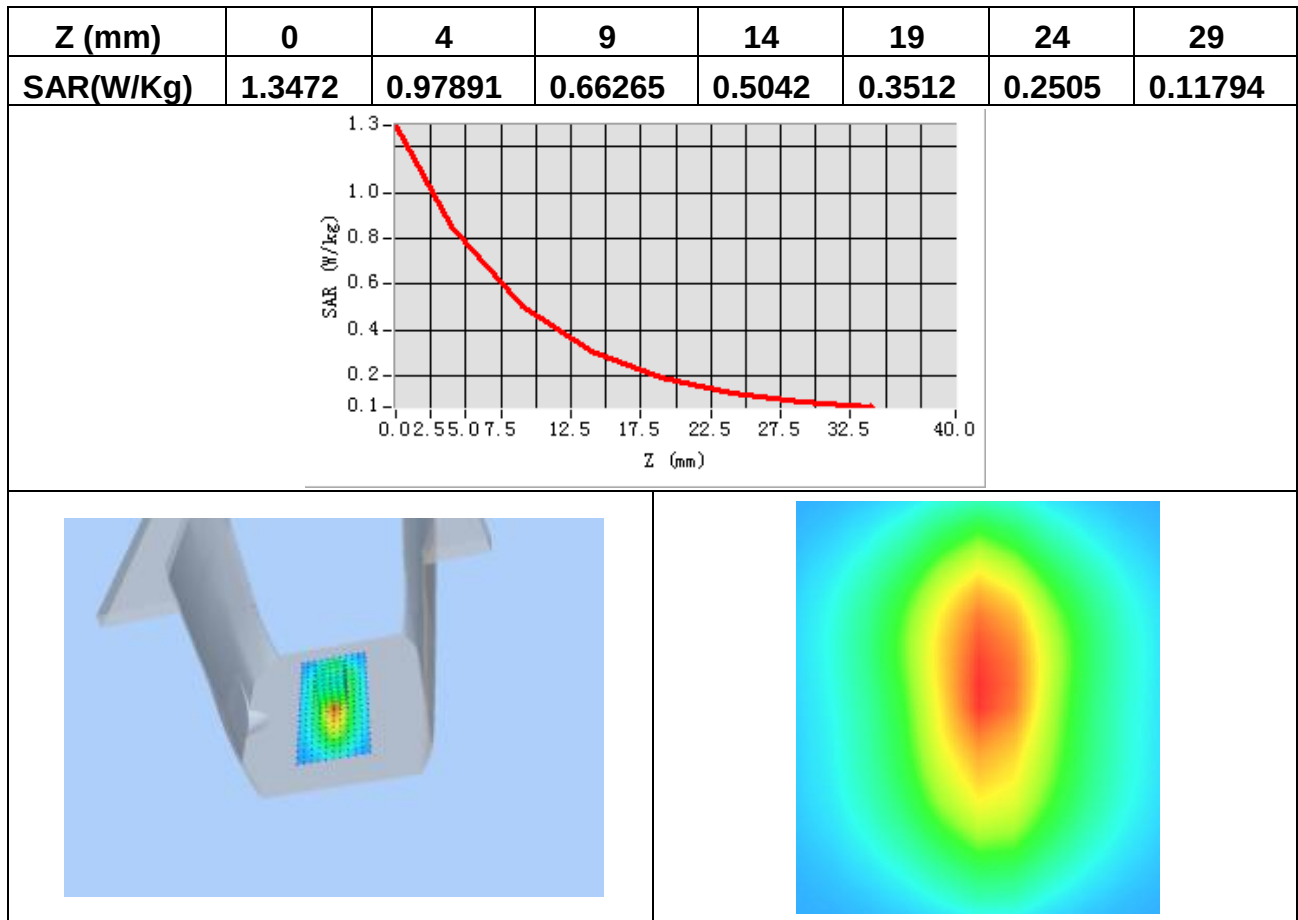
| Phantom               | Validation plane |
|-----------------------|------------------|
| Device Position       | -                |
| Band                  | 835MHz           |
| Channels              | -                |
| Signal                | CW               |
| Frequency (MHz)       | 835MHz           |
| Relative permittivity | 40.45            |
| Conductivity (S/m)    | 0.89             |
| Power drift (%)       | 0.45             |
| Probe                 | SN 14/16 EP309   |
| ConvF:                | 5.74             |
| Crest factor:         | 1:1              |

Maximum location: X=1.00, Y=0.00

SAR Peak: 1.40 W/kg

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 0.654265 |
| SAR 1g (W/Kg)  | 0.952984 |

## Z Axis Scan



**System Performance Check Data (835MHz Body)**

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 2017-07-05

Measurement duration: 14 minutes 13 seconds

**Experimental conditions.**

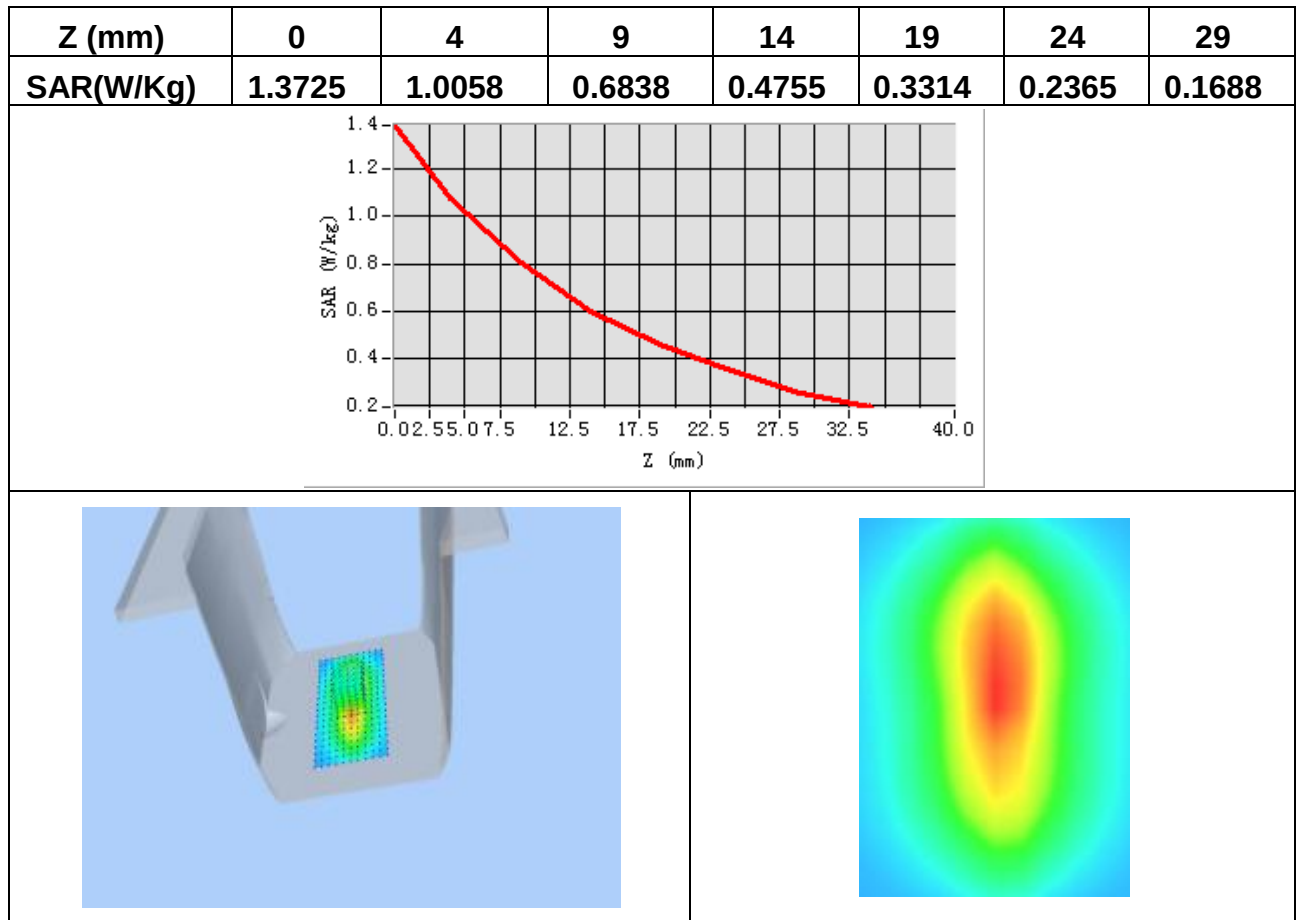
|                       |                  |
|-----------------------|------------------|
| Probe                 |                  |
| Phantom               | Validation plane |
| Device Position       | -                |
| Band                  | 835MHz           |
| Channels              | -                |
| Signal                | CW               |
| Frequency (MHz)       | 835MHz           |
| Relative permittivity | 56.48            |
| Conductivity (S/m)    | 0.97             |
| Power drift (%)       | 0.07             |
| Probe                 | SN 14/16 EP309   |
| ConvF:                | 5.90             |
| Crest factor:         | 1:1              |

**Maximum location: X=1.00, Y=0.00**

**SAR Peak: 1.45 W/kg**

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 0.625496 |
| SAR 1g (W/Kg)  | 0.910133 |

## Z Axis Scan



## System Performance Check Data (1900MHz Head)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

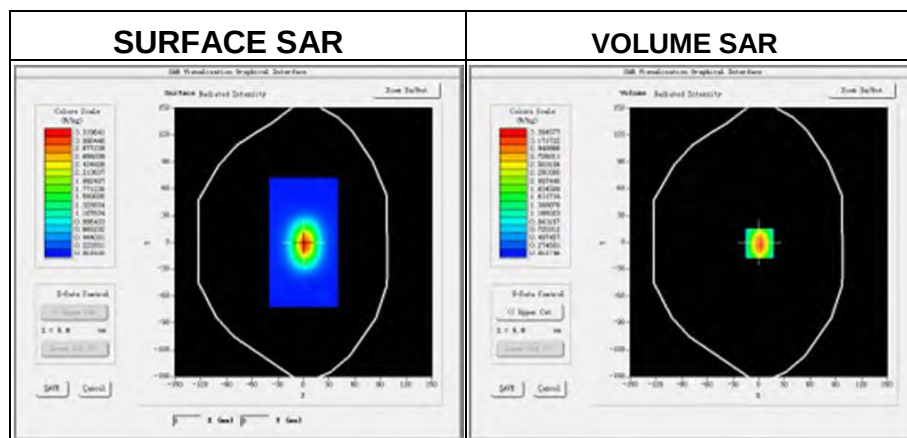
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 2017-07-05

Measurement duration: 14 minutes 12 seconds

### Experimental conditions.

|                       |                  |
|-----------------------|------------------|
| Phantom               | Validation plane |
| Device Position       | -                |
| Band                  | 1900MHz          |
| Channels              | -                |
| Signal                | CW               |
| Frequency (MHz)       | 1900MHz          |
| Relative permittivity | 40.23            |
| Conductivity (S/m)    | 1.40             |
| Power drift (%)       | 0.52             |
| Probe                 | SN 14/16 EP309   |
| ConvF:                | 5.46             |
| Crest factor:         | 1:1              |

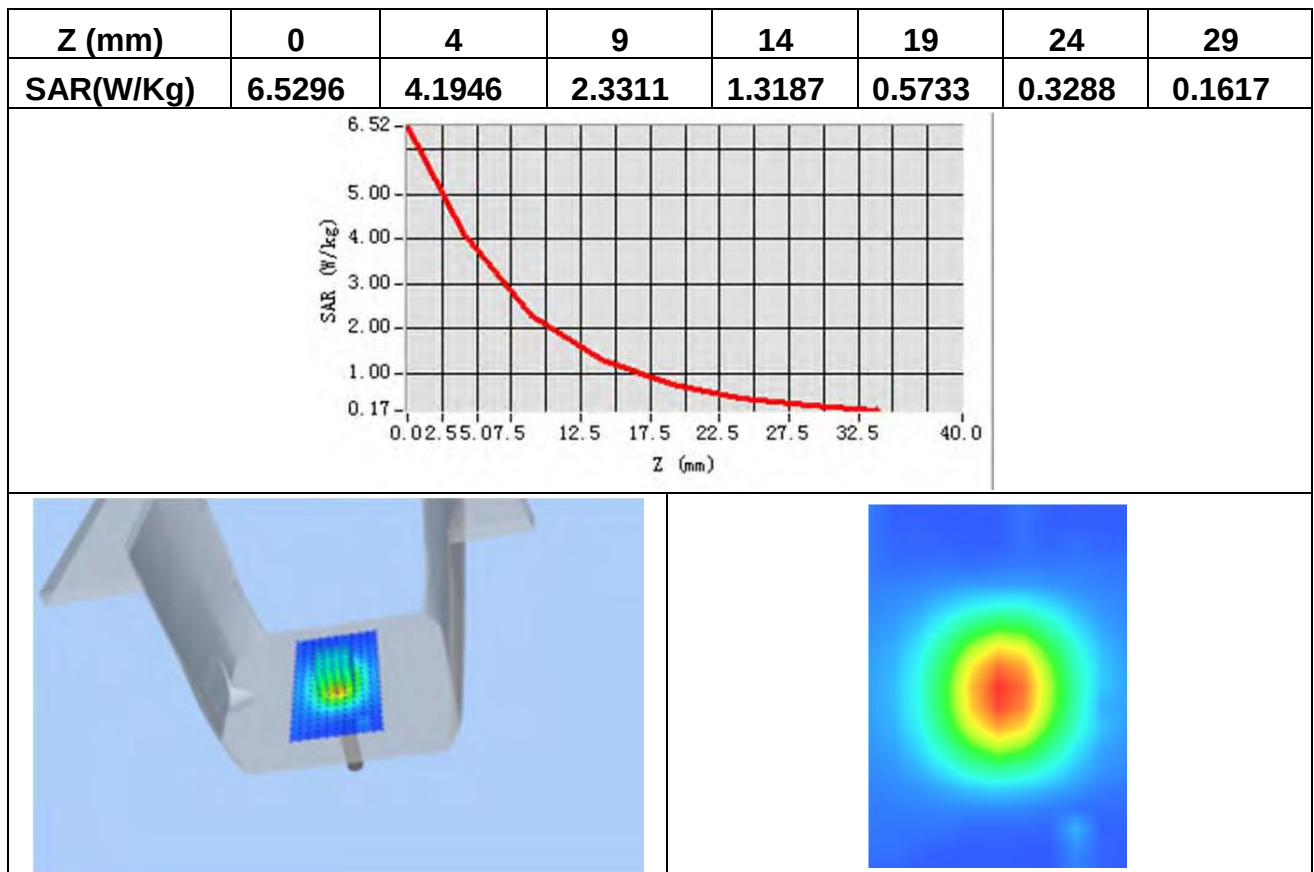


Maximum location: X=1.00, Y=0.00

SAR Peak: 5.80 W/kg

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 2.021595 |
| SAR 1g (W/Kg)  | 4.052235 |

### Z Axis Scan



## System Performance Check Data (1900MHz Body)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

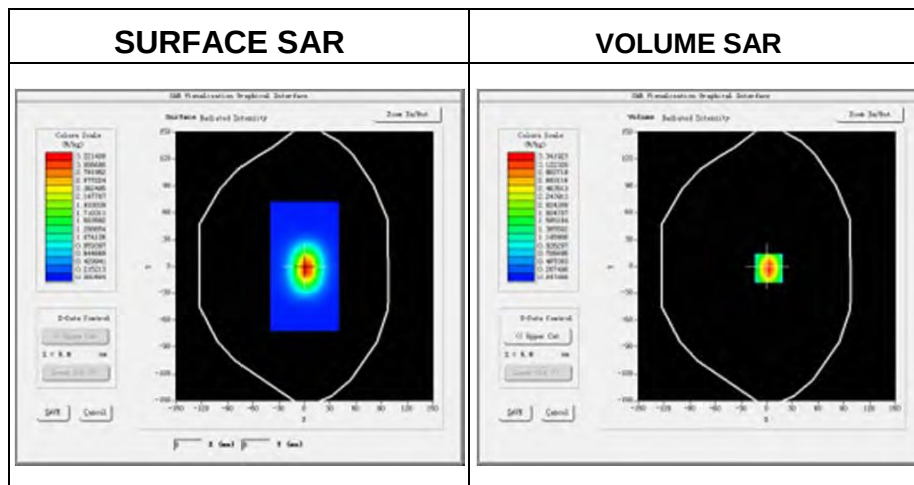
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 2017-07-05

Measurement duration: 14 minutes 46 seconds

### Experimental conditions.

|                       |                |
|-----------------------|----------------|
| Device Position       | -              |
| Band                  | 1900MHz        |
| Channels              | -              |
| Signal                | CW             |
| Frequency (MHz)       | 1900           |
| Relative permittivity | 52.42          |
| Conductivity (S/m)    | 1.55           |
| Power drift (%)       | 0.78           |
| Probe                 | SN 14/16 EP309 |
| ConvF:                | 5.67           |
| Crest factor:         | 1:1            |

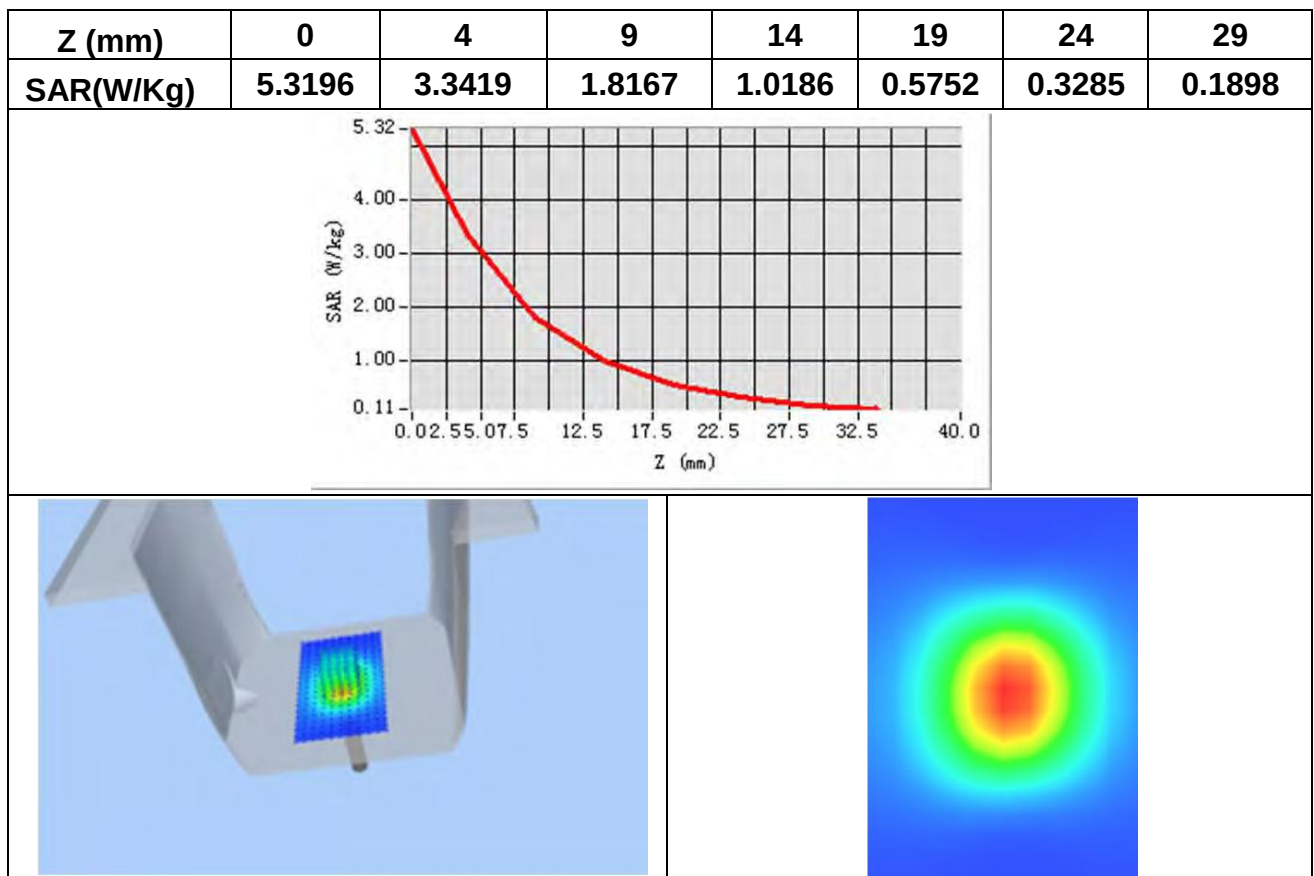


Maximum location: X=2.00, Y=2.00

SAR Peak: 5.30 W/kg

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 2.245628 |
| SAR 1g (W/Kg)  | 3.795356 |

### Z Axis Scan



## Appendix B. SAR Test Plots

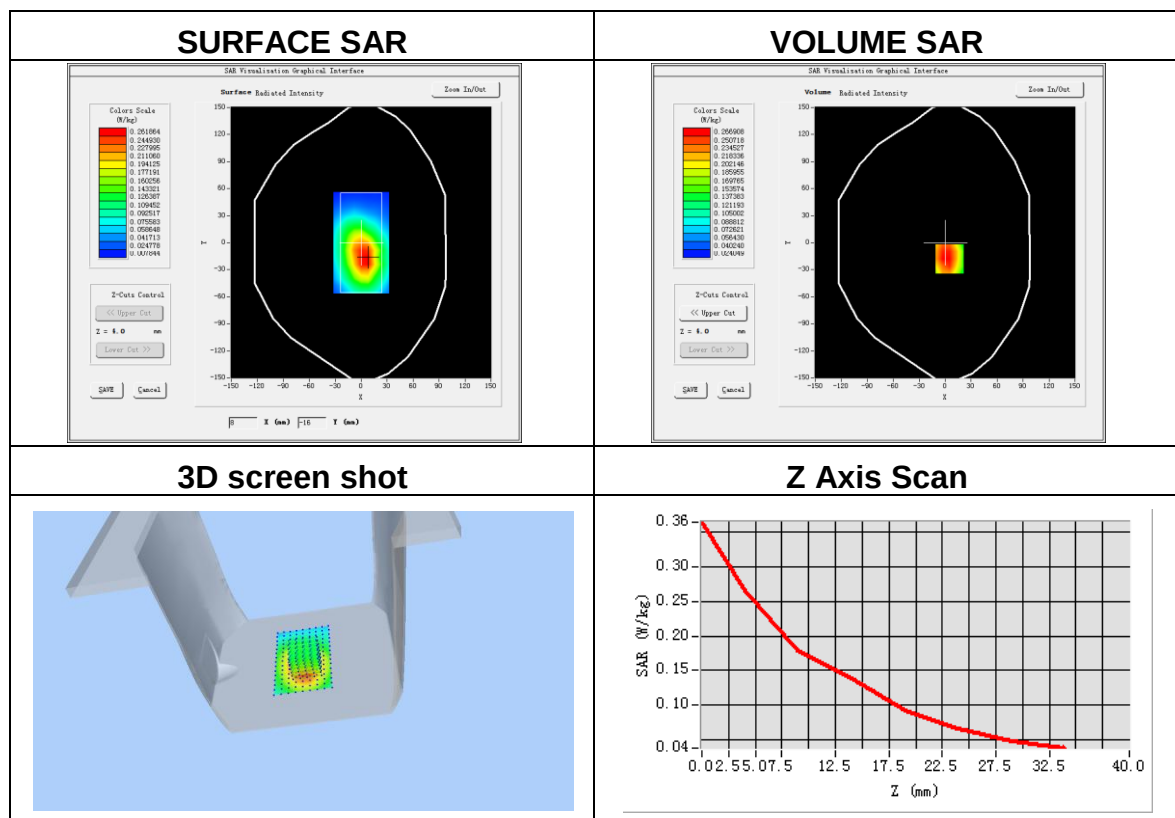
Plot 1: DUT: Smart watch phone; EUT Model: KQ-H002

|                                   |                                                                    |
|-----------------------------------|--------------------------------------------------------------------|
| Test Date                         | 2017-07-05                                                         |
| Probe                             | SN 14/16 EP309                                                     |
| ConvF                             | 5.74                                                               |
| Area Scan                         | dx=8mm dy=8mm, h= 5.00 mm                                          |
| ZoomScan                          | 5x5x7,dx=8mm dy=8mm dz=5mm,<br>Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom                           | Validation plane                                                   |
| Device Position                   | Front to mouth                                                     |
| Band                              | GSM850                                                             |
| Channels                          | High                                                               |
| Signal                            | TDMA (Crest factor: 8.32)                                          |
| Frequency (MHz)                   | 848.8                                                              |
| Relative permittivity (real part) | 41.5                                                               |
| Conductivity (S/m)                | 1.36                                                               |
| Variation (%)                     | 1.42                                                               |

Maximum location: X=5.00, Y=-18.00

SAR Peak: 0.37 W/kg

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 0.172004 |
| SAR 1g (W/Kg)  | 0.262236 |



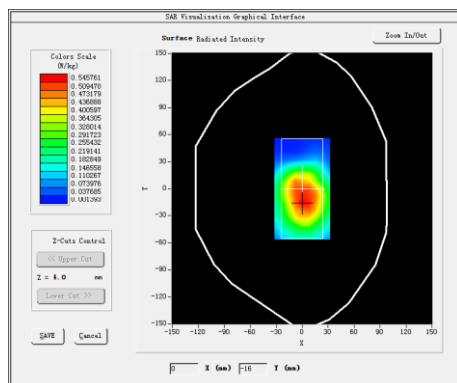
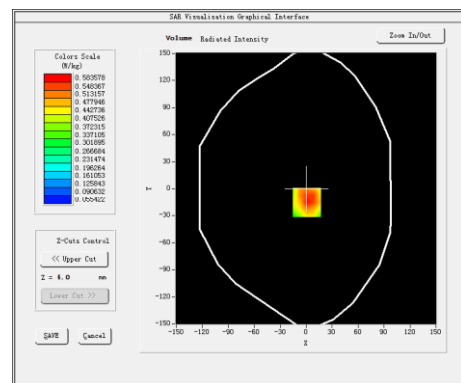
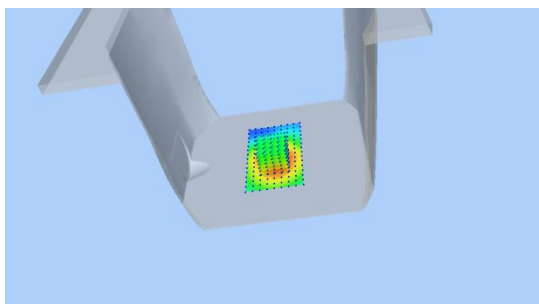
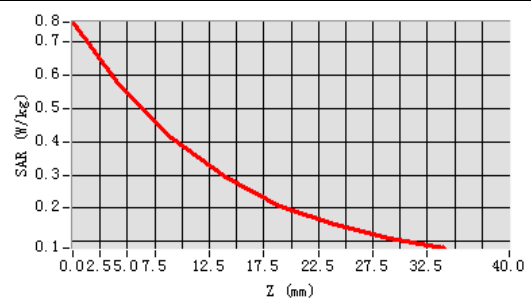
**Plot 2: DUT: Smart watch phone; EUT Model: KQ-H002**

|                                   |                                                                    |
|-----------------------------------|--------------------------------------------------------------------|
| Test Date                         | 2017-07-05                                                         |
| Probe                             | SN 14/16 EP309                                                     |
| ConvF                             | 5.90                                                               |
| Area Scan                         | dx=8mm dy=8mm, h= 5.00 mm                                          |
| ZoomScan                          | 5x5x7,dx=8mm dy=8mm dz=5mm,<br>Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom                           | Validation plane                                                   |
| Device Position                   | Wrist                                                              |
| Band                              | GPRS 850                                                           |
| Channels                          | Middle                                                             |
| Signal                            | Duty Cycle: 1:2.00 (Crest factor: 4.0)                             |
| Frequency (MHz)                   | 836.6                                                              |
| Relative permittivity (real part) | 55.20                                                              |
| Conductivity (S/m)                | 0.97                                                               |
| Variation (%)                     | -1.05                                                              |

Maximum location: X=1.00, Y=-15.00

SAR Peak: 0.79 W/kg

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 0.371186 |
| SAR 1g (W/Kg)  | 0.558490 |

**SURFACE SAR****VOLUME SAR****3D screen shot****Z Axis Scan**

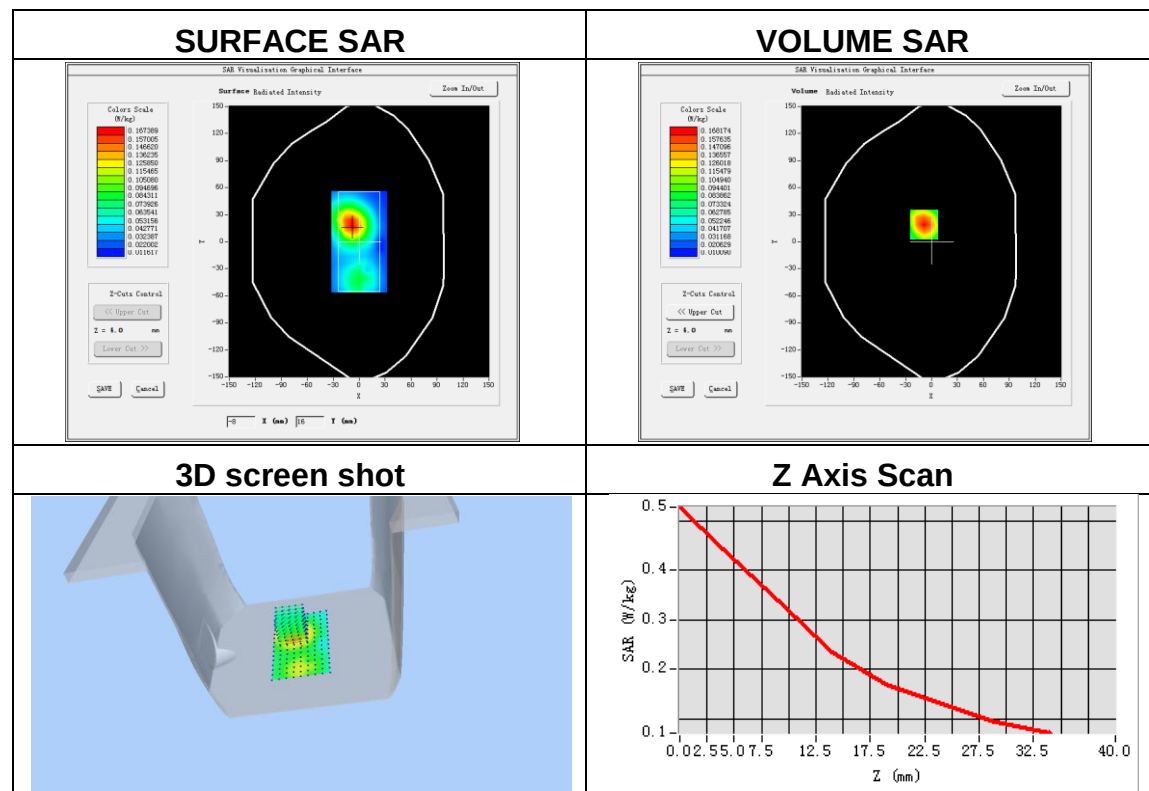
**Plot 3: DUT: Smart watch phone; EUT Model: KQ-H002**

|                                   |                                                                    |
|-----------------------------------|--------------------------------------------------------------------|
| Test Date                         | 2017-07-05                                                         |
| Probe                             | SN 14/16 EP309                                                     |
| ConvF                             | 5.46                                                               |
| Area Scan                         | dx=8mm dy=8mm, h= 5.00 mm                                          |
| ZoomScan                          | 5x5x7,dx=8mm dy=8mm dz=5mm,<br>Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom                           | Validation plane                                                   |
| Device Position                   | Front to mouth                                                     |
| Band                              | GSM1900                                                            |
| Channels                          | Low                                                                |
| Signal                            | TDMA (Crest factor: 8.32)                                          |
| Frequency (MHz)                   | 1850.2                                                             |
| Relative permittivity (real part) | 40.00                                                              |
| Conductivity (S/m)                | 1.40                                                               |
| Variation (%)                     | 1.74                                                               |

Maximum location: X=-9.00, Y=19.00

SAR Peak: 0.45 W/kg

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 0.089994 |
| SAR 1g (W/Kg)  | 0.195321 |



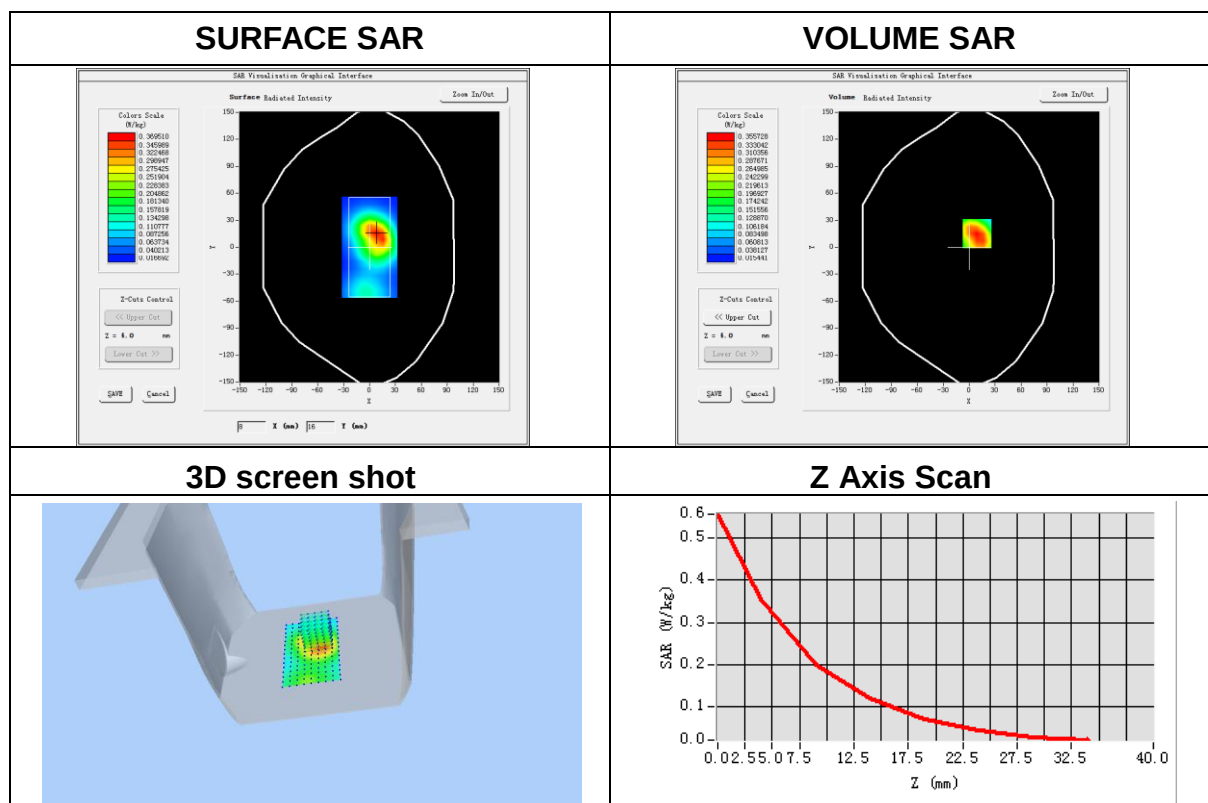
**Plot 4: DUT: Smart watch phone; EUT Model: KQ-H002**

|                                   |                                                                    |
|-----------------------------------|--------------------------------------------------------------------|
| Test Date                         | 2017-07-05                                                         |
| Probe                             | SN 14/16 EP309                                                     |
| ConvF                             | 5.67                                                               |
| Area Scan                         | dx=8mm dy=8mm, h= 5.00 mm                                          |
| ZoomScan                          | 5x5x7,dx=8mm dy=8mm dz=5mm,<br>Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom                           | Validation plane                                                   |
| Device Position                   | Wrist                                                              |
| Band                              | GPRS 1900                                                          |
| Channels                          | Low                                                                |
| Signal                            | Duty Cycle: 1:2.00 (Crest factor: 2.67)                            |
| Frequency (MHz)                   | 1850.2                                                             |
| Relative permittivity (real part) | 53.30                                                              |
| Conductivity (S/m)                | 1.52                                                               |
| Variation (%)                     | -0.88                                                              |

Maximum location: X=1.00, Y=-14.00

SAR Peak: 0.57 W/kg

|                |          |
|----------------|----------|
| SAR 10g (W/Kg) | 0.190630 |
| SAR 1g (W/Kg)  | 0.343211 |



## Appendix C. Probe Calibration And Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※