




# TEST REPORT

Report No. .... : CHTEW19070076 Report verification: 

Project No. .... : SHT1906060502EW

FCC ID ..... : ZSW-30-089

Applicant's name ..... : b mobile HK Limited

Address ..... : Flat 18; 14/F Block 1; Golden Industrial Building; 16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong.

Manufacturer ..... : b mobile HK Limited

Address ..... : Flat 18; 14/F Block 1; Golden Industrial Building; 16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong.

Test item description ..... : Mobile Phone

Trade Mark ..... : Bmobile

Model/Type reference ..... : AX688

Listed Model(s) ..... : -

Standard ..... : FCC 47 CFR Part 2.1093  
IEEE Std C95.1, 1999 Edition  
IEEE 1528: 2013

Date of receipt of test sample ..... : Jun 24, 2019

Date of testing ..... : Jun 25, 2019- Jul 17, 2019

Date of issue ..... : Jul 18, 2019

Result ..... : PASS

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*The test report merely correspond to the test sample.*

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## 1. Test Standards and Report version

### 1.1. Test Standards

The tests were performed according to following standards:

[FCC 47 Part 2.1093](#): Radiofrequency radiation exposure evaluation: portable devices.

[IEEE Std C95.1, 1999 Edition](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

[IEEE Std 1528™-2013](#): IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

FCC published RF exposure KDB procedures:

[865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04](#): SAR Measurement Requirements for 100 MHz to 6 GHz

[865664 D02 RF Exposure Reporting v01r02](#): RF Exposure Compliance Reporting and Documentation Considerations

[447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

[248227 D01 802.11 Wi-Fi SAR v02r02](#): SAR Measurement Procedures for 802.11 a/b/g Transmitters

[648474 D04 Handset SAR v01r03](#): SAR Evaluation Considerations for Wireless Handsets

[941225 D01 3G SAR Procedures v03r01](#): SAR Measurement Procedures for 3G Devices

[941225 D06 Hotspot Mode v02r01](#): SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

[TCB workshop](#) April, 2019; Page 19, Tissue Simulating Liquids (TSL)

### 1.2. Report version

| Revision No. | Date of issue | Description |
|--------------|---------------|-------------|
| N/A          | 2019-07-18    | Original    |
|              |               |             |
|              |               |             |
|              |               |             |
|              |               |             |

## 2. Summary

### 2.1. Client Information

|               |  |
|---------------|--|
| Applicant:    | b mobile HK Limited  |
| Address:      | Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong. |
| Manufacturer: | b mobile HK Limited  |
| Address:      | Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong. |

### 2.2. Product Description

|                           |  |            |            |                 |
|---------------------------|--|------------|------------|-----------------|
| Name of EUT:              | Mobile Phone   |            |            |                 |
| Trade Mark:               | Bmobile  |            |            |                 |
| Model No.:                | AX688  |            |            |                 |
| Listed Model(s):          | -  |            |            |                 |
| Power supply:             | DC 3.7V  |            |            |                 |
| Device Category:          | Portable   |            |            |                 |
| Product stage:            | Production unit                                      |            |            |                 |
| RF Exposure Environment:  | General Population/Uncontrolled                      |            |            |                 |
| IMEI:                     | 362523432630229                                      |            |            |                 |
| Hardware version:         | Bmobile_AX688_HW__V1.0                               |            |            |                 |
| Software version:         | Bmobile_AX688_OM_LTM_V001                            |            |            |                 |
| Device Dimension:         | Overall (Length x Width x Thickness): 127x 66 x 11mm |            |            |                 |
| Maximum SAR Value         |  |            |            |                 |
| Separation Distance:      | Body-worn:   | 10mm       |            |                 |
|                           | Hotspot:   | 10mm       |            |                 |
| Max Report SAR Value(1g): | Test location:                                       | PCE        | DTS        | Simultaneous Tx |
|                           | Head:  | 1.018 W/kg | 0.112 W/kg | 1.130 W/kg      |
|                           | Body-worn:   | 1.290 W/kg | 0.181 W/kg | 1.471 W/kg      |
|                           | Hotspot:   | 1.290 W/kg | 0.181 W/kg | 1.471 W/kg      |
| GSM                       |  |            |            |                 |
| Operation Band:           | GSM850<br>PCS1900                                    |            |            |                 |
| Support Network:          | GSM,GPRS   |            |            |                 |
| Operating Mode:           | GSM:GMSK<br>GPRS:GMSK                                |            |            |                 |
| GPRS Multi-Slot Class:    | 12   |            |            |                 |
| Antenna Type:             | PIFA   |            |            |                 |

| <b>WCDMA</b>  |   |
|---|---|
| Operation Band:   | FDD Band II<br>FDD Band V                     |
| Power Class:  | Class 3                                       |
| Operating Mode:   | UMTS Rel. 99 (Voice & Data)<br>HSDPA<br>HSUPA |
| Antenna Type:   | PIFA  |
| <b>WiFi 2.4G</b>  |   |
| Operating Mode:   | 802.11b<br>802.11g<br>802.11n(HT20)           |
| Antenna Type:   | PIFA  |
| <b>Bluetooth</b>  |   |
| Version:  | BT2.1+EDR                                     |
| Operating Mode:   | GFSK<br>$\pi/4$ DQPSK<br>8DPSK                |
| Antenna Type:   | PIFA  |
| <b>Bluetooth</b>  |   |
| Version:  | BT4.2+BLE                                     |
| Operating Mode:   | GFSK  |
| Antenna Type:   | PIFA  |
| <b>Remark:</b><br>1. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power.<br>2. The Test EUT support two SIM card(SIM1,SIM2),so all the tests are performed at each SIM card (SIM1,SIM2) mode, the datum recorded is the worst case for all the mode at SIM1 Card mode. |   |

### **3. Test Environment**

#### **3.1. Test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

#### **3.2. Test Facility**

##### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

##### **A2LA-Lab Cert. No.: 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **FCC-Registration No.: 762235**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 762235.

##### **IC-Registration No.: 5377A**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A.

##### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

#### **3.3. Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

|                     |                |
|---------------------|----------------|
| Ambient temperature | 18 °C to 25 °C |
| Ambient humidity    | 30%RH to 70%RH |
| Air Pressure        | 950-1050mbar   |

#### 4. Equipments Used during the Test

| Used                                   | Test Equipment                       | Manufacturer  | Model No.     | Serial No. | Cal. date (YY-MM-DD) | Due date (YY-MM-DD) |
|--|--------------------------------------|---------------|---------------|------------|----------------------|---------------------|
| ●                                      | Data Acquisition Electronics DAEx    | SPEAG         | DAE4          | 1549       | 2019/03/19           | 2020/03/18          |
| ●                                      | E-field Probe                        | SPEAG         | EX3DV4        | 7494       | 2019/03/25           | 2020/03/24          |
| ●                                      | Universal Radio Communication Tester | R&S           | CMW500        | 137681     | 2019/06/27           | 2020/06/26          |
| ● Tissue-equivalent liquids Validation |                                      |               |               |            |                      |                     |
| ●                                      | Dielectric Assessment Kit            | SPEAG         | DAK-3.5       | 1267       | N/A                  | N/A                 |
| ○                                      | Dielectric Assessment Kit            | SPEAG         | DAK-12        | 1130       | N/A                  | N/A                 |
| ●                                      | Network analyzer                     | Keysight      | E5071C        | MY46733048 | 2018/09/19           | 2019/09/18          |
| ● System Validation                    |                                      |               |               |            |                      |                     |
| ○                                      | System Validation Antenna            | SPEAG         | CLA-150       | 4024       | 2018/02/21           | 2021/02/20          |
| ○                                      | System Validation Dipole             | SPEAG         | D450V3        | 1102       | 2018/02/23           | 2021/02/22          |
| ○                                      | System Validation Dipole             | SPEAG         | D750V3        | 1180       | 2018/02/07           | 2021/02/06          |
| ●                                      | System Validation Dipole             | SPEAG         | D835V2        | 4d238      | 2018/02/19           | 2021/02/18          |
| ○                                      | System Validation Dipole             | SPEAG         | D1750V2       | 1164       | 2018/02/06           | 2021/02/05          |
| ●                                      | System Validation Dipole             | SPEAG         | D1900V2       | 5d226      | 2018/02/22           | 2021/02/21          |
| ●                                      | System Validation Dipole             | SPEAG         | D2450V2       | 1009       | 2018/02/05           | 2021/02/04          |
| ○                                      | System Validation Dipole             | SPEAG         | D2600V2       | 1150       | 2018/02/05           | 2021/02/04          |
| ○                                      | System Validation Dipole             | SPEAG         | D5GHzV2       | 1273       | 2018/02/21           | 2021/02/20          |
| ●                                      | Signal Generator                     | R&S           | SMB100A       | 114360     | 2018/08/21           | 2019/08/20          |
| ●                                      | Power Viewer for Windows             | R&S           | N/A           | N/A        | N/A                  | N/A                 |
| ●                                      | Power sensor                         | R&S           | NRP18A        | 101010     | 2018/08/21           | 2019/08/20          |
| ●                                      | Power sensor                         | R&S           | NRP18A        | 101011     | 2018/08/21           | 2019/08/20          |
| ●                                      | Power Amplifier                      | BONN          | BLWA 0160-2M  | 1811887    | 2018/11/15           | 2019/11/14          |
| ●                                      | Dual Directional Coupler             | Mini-Circuits | ZHDC-10-62-S+ | F975001814 | 2018/11/15           | 2019/11/14          |
| ●                                      | Attenuator                           | Mini-Circuits | VAT-3W2+      | 1819       | 2018/11/15           | 2019/11/14          |
| ●                                      | Attenuator                           | Mini-Circuits | VAT-10W2+     | 1741       | 2018/11/15           | 2019/11/14          |

Note:

1. The Probe, Dipole and DAE calibration reference to the Appendix B and C.
2. Referring to KDB865664 D01, the dipole calibration interval can be extended to 3 years with justification. The dipole are also not physically damaged or repaired during the interval.

## **5. Measurement Uncertainty**

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , for a confidence interval of  $k = 2$ . If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

## 6. SAR Measurements System Configuration

### 6.1. SAR Measurement Set-up

The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).

A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

A unit to operate the optical surface detector which is connected to the EOC.

The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.

The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003.

DASY5 software and SEMCAD data evaluation software.

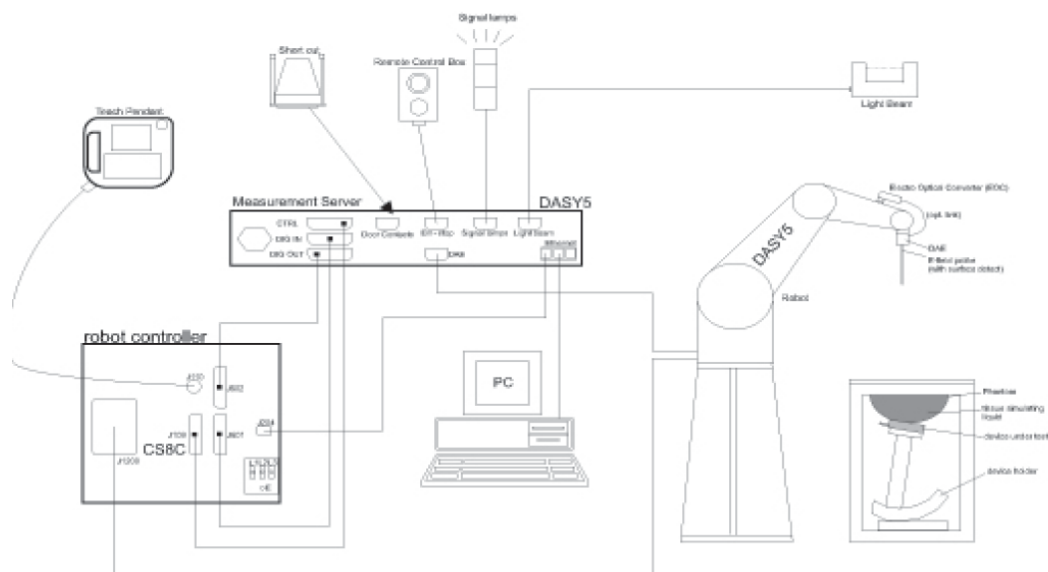
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

The generic twin phantom enabling the testing of left-hand and right-hand usage.

The device holder for handheld Mobile Phones.

Tissue simulating liquid mixed according to the given recipes.

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



## 6.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

### ● Probe Specification

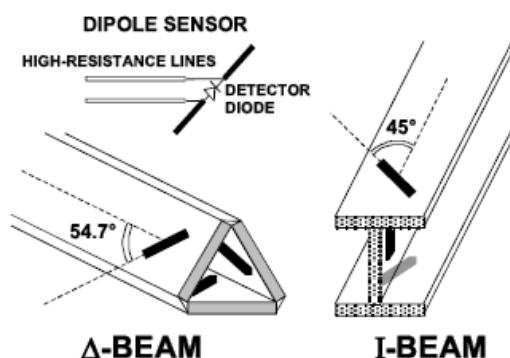
|               |  |
|---------------|--|
| Construction  | Symmetrical design with triangular core<br>Interleaved sensors<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration   | ISO/IEC 17025 calibration service available.   |
| Frequency     | 4 MHz to 10 GHz;<br>Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)  |
| Directivity   | $\pm 0.3$ dB in HSL (rotation around probe axis)<br>$\pm 0.5$ dB in tissue material (rotation normal to probe axis)  |
| Dynamic Range | 10 $\mu$ W/g to > 100 W/kg;<br>Linearity: $\pm 0.2$ dB   |
| Dimensions    | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 1.0 mm   |
| Application   | General dosimetry up to 6 GHz<br>Dosimetry in strong gradient fields<br>Compliance tests of Mobile Phones  |
| Compatibility | DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI   |



### ◆ Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



### 6.3. Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with standard and all known tissuesimulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.



SAM-Twin Phantom



ELI Phantom

### 6.4. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



Device holder supplied by SPEAG

## 7. **SAR Test Procedure**

### 7.1. **Scanning Procedure**

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max.  $\pm 5\%$ .

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above  $\pm 0.1\text{mm}$ ). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe (It does not depend on the surface reflectivity or the probe angle to the surface within  $\pm 30^\circ$ .)

#### **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

#### **Zoom Scan**

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

#### **Spatial Peak Detection**

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

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

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

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

**Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04**

|   |   |   | $\leq 3$ GHz   | $> 3$ GHz   |
|---|---|---|--|---|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface  |   |   | 5 mm $\pm$ 1 mm  | $\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm $\pm$ 0.5 mm                       |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location   |   |   | $30^{\circ} \pm 1^{\circ}$   | $20^{\circ} \pm 1^{\circ}$  |
| Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$  |   |   | $\leq 2$ GHz: $\leq 15$ mm<br>2 – 3 GHz: $\leq 12$ mm  | 3 – 4 GHz: $\leq 12$ mm<br>4 – 6 GHz: $\leq 10$ mm                            |
|   |   |   | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device. |   |
| Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$  |   |   | $\leq 2$ GHz: $\leq 8$ mm<br>2 – 3 GHz: $\leq 5$ mm*   | 3 – 4 GHz: $\leq 5$ mm*<br>4 – 6 GHz: $\leq 4$ mm*                            |
| Maximum zoom scan spatial resolution, normal to phantom surface   | uniform grid: $\Delta z_{\text{Zoom}}(n)$ |   | $\leq 5$ mm  | 3 – 4 GHz: $\leq 4$ mm<br>4 – 5 GHz: $\leq 3$ mm<br>5 – 6 GHz: $\leq 2$ mm    |
|   | graded grid                               | $\Delta z_{\text{Zoom}}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface | $\leq 4$ mm  | 3 – 4 GHz: $\leq 3$ mm<br>4 – 5 GHz: $\leq 2.5$ mm<br>5 – 6 GHz: $\leq 2$ mm  |
|   |   | $\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points                                   | $\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$ mm  |   |
| Minimum zoom scan volume  | x, y, z                                   |   | $\geq 30$ mm   | 3 – 4 GHz: $\geq 28$ mm<br>4 – 5 GHz: $\geq 25$ mm<br>5 – 6 GHz: $\geq 22$ mm |
| Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.   |   |   |  |   |
| * When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB Publication 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz. |   |   |  |   |

## 7.2. Data Storage and Evaluation

### Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors),s together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DA4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [W/kg], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### Data Evaluation

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

|                    |                          |                      |
|--------------------|--------------------------|----------------------|
| Probe parameters:  | Sensitivity:             | Normi, ai0, ai1, ai2 |
|                    | Conversion factor:       | ConvFi               |
|                    | Diode compression point: | Dcpi                 |
| Device parameters: | Frequency:               | f                    |
|                    | Crest factor:            | cf                   |
| Media parameters:  | Conductivity:            | σ                    |
|                    | Density:                 | ρ                    |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

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

|                    |   |
|--------------------|---|
| Vi:                | compensated signal of channel ( i = x, y, z )   |
| Ui:                | input signal of channel ( i = x, y, z )         |
| cf:                | crest factor of exciting field (DASY parameter) |
| dcp <sub>i</sub> : | diode compression point (DASY parameter)        |

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

$$E - \text{fieldprobes : } E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$H - \text{fieldprobes : } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

|        |  |
|--------|--|
| Vi:    | compensated signal of channel ( i = x, y, z )                                    |
| Normi: | sensor sensitivity of channel ( i = x, y, z ),<br>[mV/(V/m)²] for E-field Probes |
| ConvF: | sensitivity enhancement in solution  |
| aij:   | sensor sensitivity factors for H-field probes                                    |
| f:     | carrier frequency [GHz]  |
| Ei:    | electric field strength of channel i in V/m                                      |
| Hi:    | magnetic field strength of channel i in A/m                                      |

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

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

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

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR: local specific absorption rate in W/kg  
Etot: total field strength in V/m  
 $\sigma$ : conductivity in [mho/m] or [Siemens/m]  
 $\rho$ : equivalent tissue density in g/cm3

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

## 8. Position of the wireless device in relation to the phantom

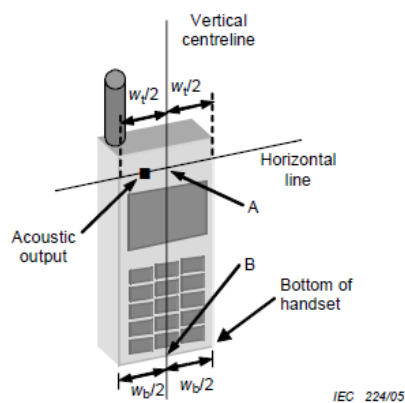
### 8.1. Head Position

The wireless device define two imaginary lines on the handset, the vertical centreline and the horizontal line, for the handset in vertical orientation as shown in Figures 5a and 5b.

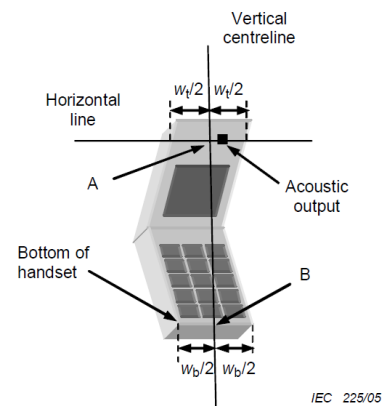
**The vertical centreline** passes through two points on the front side of the handset: the midpoint of the width  $W_t$  of the handset at the level of the acoustic output (point A in Figures 5a and 5b), and the midpoint of the width  $W_b$  of the bottom of the handset (point B).

**The horizontal line** is perpendicular to the vertical centreline and passes through the centre of the acoustic output (see Figures 5a and 5b). The two lines intersect at point A.

Note that for many handsets, point A coincides with the centre of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset (see Figure 5b), especially for clam-shell handsets, handsets with flip cover pieces, and other irregularly shaped handsets.



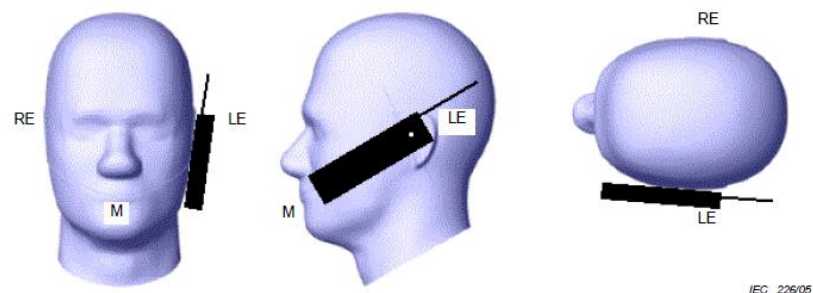
Figures 5a



Figures 5b

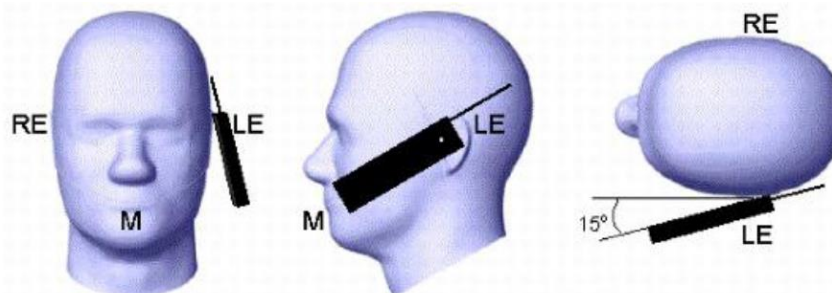
|       |  |
|-------|--|
| $W_t$ | Width of the handset at the level of the acoustic                              |
| $W_b$ | Width of the bottom of the handset   |
| A     | Midpoint of the width $w_t$ of the handset at the level of the acoustic output |
| B     | Midpoint of the width $w_b$ of the bottom of the handset                       |

### Cheek position



Picture 2 Cheek position of the wireless device on the left side of SAM

### Tilt position

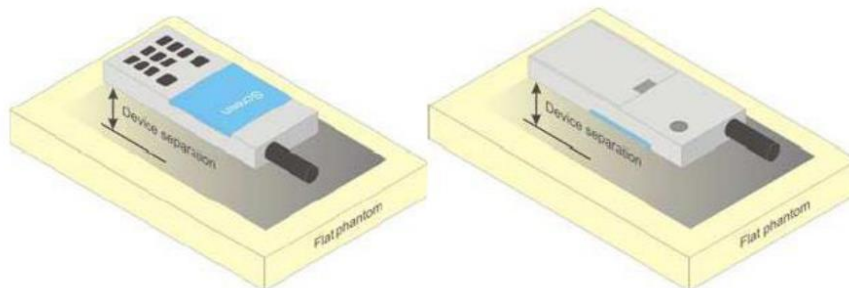


Picture 3 Tilt position of the wireless device on the left side of SAM

## 8.2. Body Position

Devices that support transmission while used with body-worn accessories must be tested for body-worn accessory SAR compliance, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.

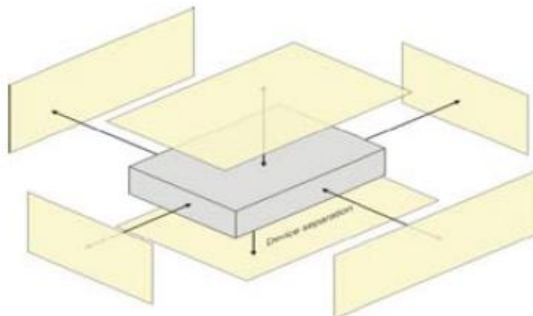
Devices that are designed to operate on the body of users using lanyards and straps or without requiring additional body-worn accessories must be tested for SAR compliance using a conservative minimum test separation distance  $\leq 5\text{mm}$  to support compliance.



Picture 4 Test positions for body-worn devices

## 8.3. Hotspot Mode Exposure conditions

The hotspot mode and body-worn accessory SAR test configurations may overlap for handsets. When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations. This typically applies to the back and front surfaces of a handset when SAR is required for both hotspot mode and body-worn accessory exposure conditions. Depending on the form factor and dimensions of a device, the test separation distance used for hotspot mode SAR measurement is either 10 mm or that used in the body-worn accessory configuration, whichever is less for devices with dimension  $> 9\text{ cm} \times 5\text{ cm}$ . For smaller devices with dimensions  $\leq 9\text{ cm} \times 5\text{ cm}$  because of a greater potential for next to body use a test separation of  $\leq 5\text{ mm}$  must be used.



Picture 5 Test positions for Hotspot Mode

## 9. Dielectric Property Measurements & System Check

### 9.1. Tissue Dielectric Parameters

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within  $\pm 2^\circ\text{C}$  of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3-4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

The dielectric constant ( $\epsilon_r$ ) and conductivity ( $\sigma$ ) of typical tissue-equivalent media recipes are expected to be within  $\pm 5\%$  of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for  $\epsilon_r$  and  $\sigma$  may be relaxed to  $\pm 10\%$ . This is limited to frequencies  $\leq 3$  GHz.

#### Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

| Tissue dielectric parameters for Head and Body |              |                      |              |                      |
|--|--------------|----------------------|--------------|----------------------|
| Target Frequency (MHz)                         | Head         |                      | Body         |                      |
|  | $\epsilon_r$ | $\sigma(\text{S/m})$ | $\epsilon_r$ | $\sigma(\text{S/m})$ |
| 835  | 41.5         | 0.90                 | 55.2         | 0.97                 |
| 1750   | 40.1         | 1.37                 | 53.4         | 1.49                 |
| 1800-2000                                      | 40.0         | 1.40                 | 53.3         | 1.52                 |
| 2450   | 39.2         | 1.80                 | 52.7         | 1.95                 |

#### IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

**Dielectric Property Measurements Results:**

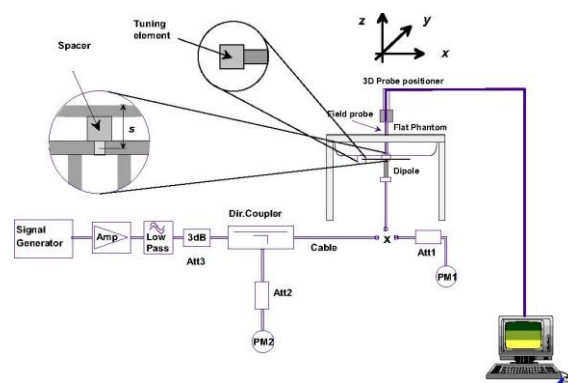
| Dielectric performance of Head tissue simulating liquid |              |          |                |          |                           |                       |       |              |          |
|---|--------------|----------|----------------|----------|---------------------------|-----------------------|-------|--------------|----------|
| Frequency<br>(MHz)                                      | $\epsilon_r$ |          | $\sigma$ (S/m) |          | Delta<br>( $\epsilon_r$ ) | Delta<br>( $\sigma$ ) | Limit | Temp<br>(°C) | Date     |
|   | Target       | Measured | Target         | Measured |                           |                       |       |              |          |
| 835   | 41.50        | 42.50    | 0.90           | 0.93     | 2.41%                     | 3.56%                 | ±5%   | 22.5         | 2019/7/3 |
| 1900  | 40.00        | 41.67    | 1.40           | 1.47     | 4.16%                     | 4.71%                 | ±5%   | 22.5         | 2019/7/4 |
| 2450  | 39.20        | 40.96    | 1.80           | 1.84     | 4.48%                     | 2.11%                 | ±5%   | 22.5         | 2019/7/5 |

## 9.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

### System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness:  $2.0 \pm 0.2$  mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be  $\geq 15.0$  cm for SAR measurements  $\leq 3$  GHz and  $\geq 10.0$  cm for measurements  $> 3$  GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.  
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- The results are normalized to 1 W input power.



System Performance Check Setup



Photo of Dipole Setup

**System Check Result:**

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within  $\pm 10\%$  of the manufacturer calibrated dipole SAR target.

| Head               |              |                    |                   |              |                    |                   |               |                |            |              |          |
|--------------------|--------------|--------------------|-------------------|--------------|--------------------|-------------------|---------------|----------------|------------|--------------|----------|
| Frequency<br>(MHz) | 1g SAR       |                    |                   | 10g SAR      |                    |                   | Delta<br>(1g) | Delta<br>(10g) | Limit      | Temp<br>(°C) | Date     |
|                    | Target<br>1W | Normalize<br>to 1W | Measured<br>250mW | Target<br>1W | Normalize<br>to 1W | Measured<br>250mW |               |                |            |              |          |
| 835                | 9.51         | 9.92               | 2.48              | 6.15         | 6.52               | 1.63              | 4.31%         | 6.02%          | $\pm 10\%$ | 22.5         | 2019/7/3 |
| 1900               | 40.30        | 41.60              | 10.40             | 21.10        | 21.68              | 5.42              | 3.23%         | 2.75%          | $\pm 10\%$ | 22.5         | 2019/7/4 |
| 2450               | 51.50        | 50.40              | 12.60             | 24.10        | 23.44              | 5.86              | -2.14%        | -2.74%         | $\pm 10\%$ | 22.5         | 2019/7/5 |

## Plots of System Performance Check

### System Performance Check-Head 835MHz

DUT: D835V2; Type: D835V2; Serial: 4d238

Date: 2019-07-03

Communication System: UID 0, CW (0); Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.932$  S/m;  $\epsilon_r = 42.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### DASY5 Configuration:

- Probe: EX3DV4 - SN7494; ConvF(10.41, 10.41, 10.41); Calibrated: 3/25/2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2018
- Phantom: Twin-SAM V8.0; Type: QD 000 P41 AA; Serial: 1947
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

**Head/d=15mm, Pin=250mW/Area Scan (41x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 3.51 W/kg

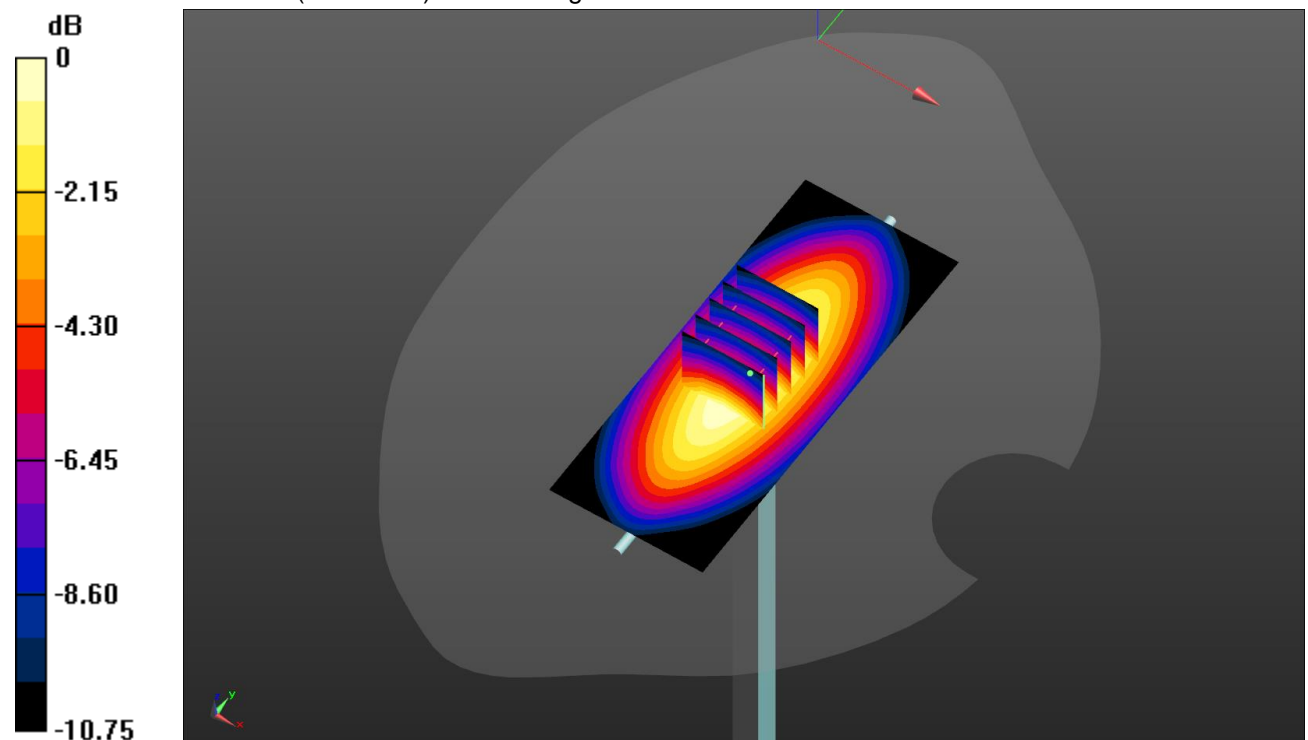
**Head/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 66.38 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 3.78 W/kg

**SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.63 W/kg**

Maximum value of SAR (measured) = 3.34 W/kg



**System Performance Check-Head 1900MHz**

DUT: D1900V2; Type: D1900V2; Serial: 5d226

Date:2019-07-04

Communication System: UID 0, CW (0); Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.466$  S/m;  $\epsilon_r = 41.665$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(8.57, 8.57, 8.57); Calibrated: 3/25/2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2018
- Phantom: Twin-SAM V8.0; Type: QD 000 P41 AA; Serial: 1947
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

**Head/d=10mm,Pin=250mW/Area Scan (41x61x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 17.1 W/kg

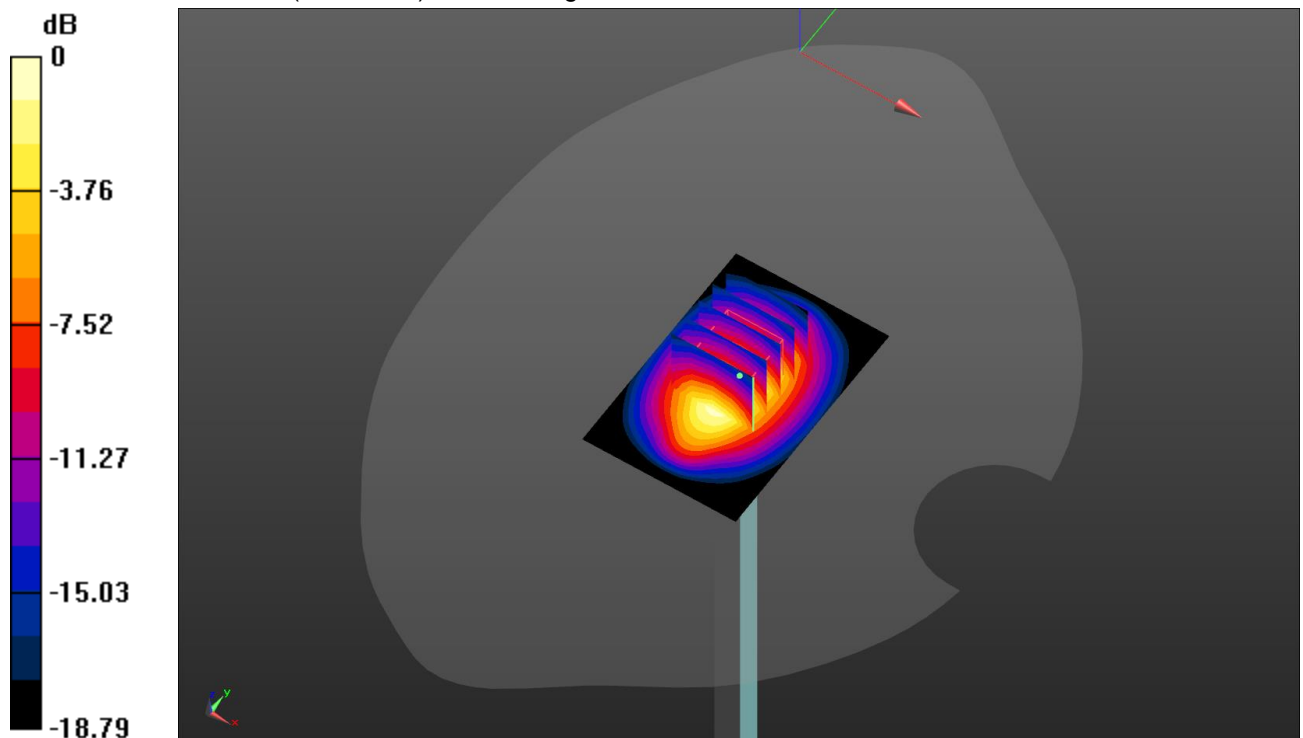
**Head/d=10mm,Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 112.4 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 19.5 W/kg

**SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.42 W/kg**

Maximum value of SAR (measured) = 16.1 W/kg



**SystemPerformanceCheck-Head 2450MHz**

DUT: D2450V2; Type: D2450V2; Serial: 1009

Date:2019-07-05

Communication System: UID 0, CW (0); Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.838$  S/m;  $\epsilon_r = 40.956$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(7.90, 7.90, 7.90); Calibrated: 3/25/2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2018
- Phantom: Twin-SAM V8.0; Type: QD 000 P41 AA; Serial: 1947
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

**Head/d=10mm,Pin=250mW/Area Scan (41x61x1):** Interpolated grid:  $dx=1.200$  mm,  $dy=1.200$  mm

Maximum value of SAR (interpolated) = 21.1 W/kg

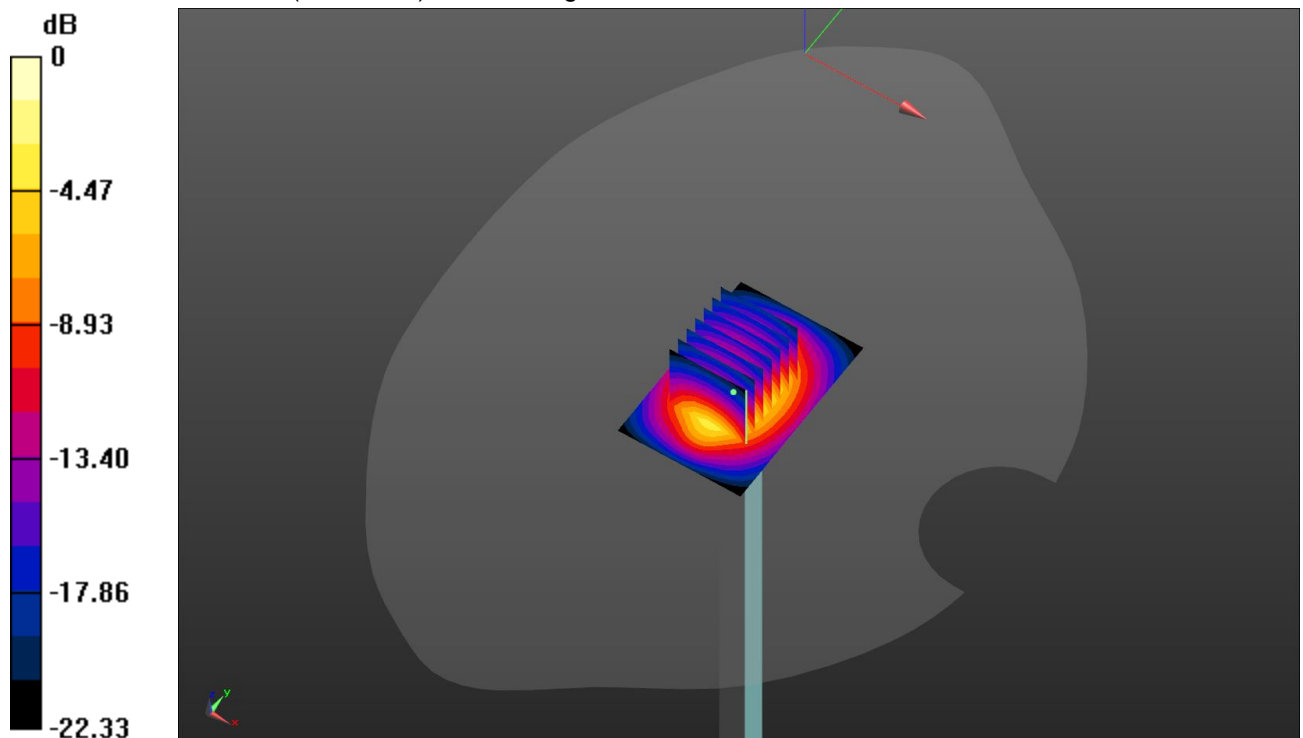
**Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 110.0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 26.2 W/kg

**SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.86 W/kg**

Maximum value of SAR (measured) = 20.8 W/kg



## 10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47 CFR § 2.1093.

| Type Exposure   | Limit (W/kg)   |  |
|---|--|--|
|   | General Population/<br>Uncontrolled Exposure Environment | Occupational/<br>Controlled Exposure Environment |
| Spatial Average SAR<br>(whole body)                     | 0.08   | 0.4  |
| Spatial Peak SAR<br>(1g cube tissue for head and trunk) | 1.6  | 8.0  |
| Spatial Peak SAR<br>(10g for limb)                      | 4.0  | 20.0   |

Population/Uncontrolled Environments: are defined as locations where there is the exposure of individual 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).

## 11. Conducted Power Measurement Results

### 11.1. GSM

1. Per KDB 447498 D01, the maximum output power channel is used for SAR testing and further SAR test reduction.
2. Per KDB 941225 D01, considering the possibility of e.g. 3rd party VoIP operation for Head and Body-worn SAR test reduction for GSM and GPRS modes is determined by the source-base time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.
3. Per KDB941225 D01, for hotspot SAR test reduction for GPRS modes is determined by the source-based time-averaged output power including tune-up tolerance, For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

| Mode: GSM850  |          | Burst Average Power (dBm) |          |           | Division Factors | Frame-Average Power (dBm) |          |           |
|---------------|----------|---------------------------|----------|-----------|------------------|---------------------------|----------|-----------|
|               |          | CH128                     | CH190    | CH251     |                  | CH128                     | CH190    | CH251     |
|               |          | 824.2MHz                  | 836.6MHz | 848.8MHz  |                  | 824.2MHz                  | 836.6MHz | 848.8MHz  |
| GSM Voice     |          | 33.03                     | 32.95    | 32.97     | -9.03            | 24.00                     | 23.92    | 23.94     |
| GPRS (GMSK)   | 1TXslot  | 33.07                     | 33.01    | 33.01     | -9.03            | 24.04                     | 23.98    | 23.98     |
|               | 2TXslots | 31.88                     | 32.00    | 31.85     | -6.02            | 25.86                     | 25.98    | 25.83     |
|               | 3TXslots | 30.37                     | 30.33    | 30.35     | -4.26            | 26.11                     | 26.07    | 26.09     |
|               | 4TXslots | 28.39                     | 28.35    | 28.38     | -3.01            | 25.38                     | 25.34    | 25.37     |
| Mode: PCS1900 |          | Burst Average Power (dBm) |          |           | Division Factors | Frame-Average Power (dBm) |          |           |
|               |          | CH512                     | CH661    | CH810     |                  | CH512                     | CH661    | CH810     |
|               |          | 1850.2MHz                 | 1880MHz  | 1909.8MHz |                  | 1850.2MHz                 | 1880MHz  | 1909.8MHz |
| GSM Voice     |          | 30.10                     | 30.50    | 30.70     | -9.03            | 21.07                     | 21.47    | 21.67     |
| GPRS (GMSK)   | 1TXslot  | 30.18                     | 30.49    | 30.47     | -9.03            | 21.15                     | 21.46    | 21.44     |
|               | 2TXslots | 28.44                     | 29.17    | 29.52     | -6.02            | 22.42                     | 23.15    | 23.50     |
|               | 3TXslots | 27.17                     | 27.51    | 27.81     | -4.26            | 22.91                     | 23.25    | 23.55     |
|               | 4TXslots | 25.08                     | 25.62    | 25.95     | -3.01            | 22.07                     | 22.61    | 22.94     |

Note:

#### 1) Division Factors

To Frame-Average Power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> Burst Average Power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> Burst Average Power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> Burst Average Power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> Burst Average Power divided by (8/4) => -3.01dB

## 11.2. WCDMA

1. The following tests were conducted according to the test requirements outlines in 3GPP TS34.121 specification.
2. The procedures in KDB 941225 D01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode to determine SAR test exclusion

A summary of these settings are illustrated below:

### HSDPA Setup Configuration:

- a) The EUT was connected to base station RS CMU200 referred to the setup configuration
- b) The RF path losses were compensated into the measurements
- c) A call was established between EUT and base station with following setting:
  - i. Set Gain Factors ( $\beta_c$  and  $\beta_d$ ) and parameters were set according to each specific sub-test in the following table, C10.1.4, Quoted from the TS 34.121
  - ii. Set RMC 12.2Kbps + HSDPA mode
  - iii. Set Cell Power=-86dBm
  - iv. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
  - v. Select HSDPA uplink parameters
  - vi. Set Delta ACK, Delta NACK and Delta CQI=8
  - vii. Set Ack-Nack repetition Factor to 3
  - viii. Set CQI Feedback Cycle (K) to 4ms
  - ix. Set CQI repetition factor to 2
  - x. Power ctrl mode= all up bits
- d) The transmitter maximum output power was recorded.

**Table C.10.1.4:  $\beta$  values for transmitter characteristics tests with HS-DPCCH**

| Sub-test | $\beta_c$         | $\beta_d$         | $\beta_d$<br>(SF) | $\beta_c/\beta_d$ | $\beta_{hs}$<br>(Note 1,<br>Note 2) | CM (dB)<br>(Note 3) | MPR (dB)<br>(Note 3) |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------------------------|---------------------|----------------------|
| 1        | 2/15              | 15/15             | 64                | 2/15              | 4/15                                | 0.0                 | 0.0                  |
| 2        | 12/15<br>(Note 4) | 15/15<br>(Note 4) | 64                | 12/15<br>(Note 4) | 24/15                               | 1.0                 | 0.0                  |
| 3        | 15/15             | 8/15              | 64                | 15/8              | 30/15                               | 1.5                 | 0.5                  |
| 4        | 15/15             | 4/15              | 64                | 15/4              | 30/15                               | 1.5                 | 0.5                  |

Note 1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{hs} = 30/15 * \beta_c$ .

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA,  $\Delta_{ACK}$  and  $\Delta_{NACK} = 30/15$  with  $\beta_{hs} = 30/15 * \beta_c$ , and  $\Delta_{CQI} = 24/15$  with  $\beta_{hs} = 24/15 * \beta_c$ .

Note 3: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPCCH, DPCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$ .

### Setup Configuration

#### HSUPA Setup Configuration:

- a) The EUT was connected to base station RS CMU200 referred to the setup configuration
- b) The RF path losses were compensated into the measurements
- c) A call was established between EUT and base station with following setting:
  - i. Call configs = 5.2b, 5.9b, 5.10b, and 5.13.2B with QPSK
  - ii. Set Gain Factors ( $\beta_c$  and  $\beta_d$ ) and parameters (AG index) were set according to each specific sub-test in the following table, C11.1.3, Quoted from the TS 34.121
  - iii. Set Cell Power=-86dBm
  - iv. Set channel type= 12.2Kbps + HSPA mode
  - v. Set UE Target power
  - vi. Set Ctrl mode=Alternating bits
  - vii. Set and observe the E-TFCI
  - viii. Confirm that E-TFCI is equal the target E-TFCI of 75 for Sub-test 1, and other subtest's E-TFCI
- d) The transmitter maximum output power was recorded.

Table C.11.1.3:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH

| Sub-test | $\beta_c$         | $\beta_d$         | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{HS}$ (Note 1) | $\beta_{EC}$ | $\beta_{ED}$ (Note 5)<br>(Note 6)              | $\beta_{ED}$ (SF) | $\beta_{ED}$ (Codes) | CM (dB)<br>(Note 2) | MPR (dB)<br>(Note 2) | AG Index<br>(Note 6) | E-TFCI |
|----------|-------------------|-------------------|----------------|-------------------|-----------------------|--------------|--|-------------------|----------------------|---------------------|----------------------|----------------------|--------|
| 1        | 11/15<br>(Note 3) | 15/15<br>(Note 3) | 64             | 11/15<br>(Note 3) | 22/15                 | 209/25       | 1309/225                                       | 4                 | 1                    | 1.0                 | 0.0                  | 20                   | 75     |
| 2        | 6/15              | 15/15             | 64             | 6/15              | 12/15                 | 12/15        | 94/75  | 4                 | 1                    | 3.0                 | 2.0                  | 12                   | 67     |
| 3        | 15/15             | 9/15              | 64             | 15/9              | 30/15                 | 30/15        | $\beta_{ED1}$ : 47/15<br>$\beta_{ED2}$ : 47/15 | 4                 | 2                    | 2.0                 | 1.0                  | 15                   | 92     |
| 4        | 2/15              | 15/15             | 64             | 2/15              | 4/15                  | 2/15         | 56/75  | 4                 | 1                    | 3.0                 | 2.0                  | 17                   | 71     |
| 5        | 15/15<br>(Note 4) | 15/15<br>(Note 4) | 64             | 15/15<br>(Note 4) | 30/15                 | 24/15        | 134/15   | 4                 | 1                    | 1.0                 | 0.0                  | 21                   | 81     |

Note 1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{HS}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6:  $\beta_{ED}$  can not be set directly, it is set by Absolute Grant Value.

### Setup Configuration

#### General Note:

- Per KDB 941225 D01, SAR for Head / Hotspot / Body-worn Exposure is measured using a 12.2Kbps RMC with TPC bit configured to all 1s
- Per KDB 941225 D01 RMC12.2Kbps setting is used to evaluate SAR. If the maximum output power and Tune-up tolerance specified for production units in HSDPA/HSUPA is  $\leq 1/4$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC 12.2Kbps and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for HSDPA / HSUPA.

| Mode      |           | WCDMA Band II         |         |           | WCDMA Band V          |          |          |
|-----------|-----------|-----------------------|---------|-----------|-----------------------|----------|----------|
|           |           | Conducted Power (dBm) |         |           | Conducted Power (dBm) |          |          |
|           |           | CH9262                | CH9400  | CH9538    | CH4132                | CH4183   | CH4233   |
|           |           | 1852.4MHz             | 1880MHz | 1907.6MHz | 826.4MHz              | 836.6MHz | 846.6MHz |
| AMR 12.2K |           | 23.02                 | 22.87   | 22.80     | 22.66                 | 22.68    | 22.66    |
| RMC 12.2K |           | 23.05                 | 22.90   | 22.83     | 22.69                 | 22.71    | 22.69    |
| HSDPA     | Subtest-1 | 21.42                 | 21.32   | 21.40     | 21.05                 | 21.16    | 21.31    |
|           | Subtest-2 | 21.15                 | 21.01   | 21.04     | 21.37                 | 21.46    | 21.68    |
|           | Subtest-3 | 20.83                 | 20.69   | 20.74     | 20.53                 | 20.62    | 20.81    |
|           | Subtest-4 | 20.64                 | 20.51   | 20.61     | 20.52                 | 20.60    | 20.79    |
| HSUPA     | Subtest-1 | 18.51                 | 18.49   | 18.58     | 17.84                 | 17.92    | 17.92    |
|           | Subtest-2 | 18.71                 | 18.70   | 18.77     | 17.96                 | 18.02    | 18.06    |
|           | Subtest-3 | 18.42                 | 18.40   | 18.44     | 18.18                 | 18.23    | 18.31    |
|           | Subtest-4 | 18.82                 | 18.74   | 18.88     | 18.06                 | 18.16    | 18.26    |
|           | Subtest-5 | 21.83                 | 21.81   | 21.87     | 21.62                 | 21.72    | 21.87    |

### 11.3. WiFi

For 2.4GHz WiFi SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were for SAR evaluation.

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.

| WiFi 2.4G      |         |                 |                            |                               |
|----------------|---------|-----------------|----------------------------|-------------------------------|
| Mode           | Channel | Frequency (MHz) | Conducted Peak Power (dBm) | Conducted Average Power (dBm) |
| 802.11b        | 1       | 2412            | 13.68                      | 11.60                         |
|                | 6       | 2437            | 12.35                      | 11.61                         |
|                | 11      | 2462            | 11.96                      | 11.42                         |
| 802.11g        | 1       | 2412            | 15.35                      | 12.78                         |
|                | 6       | 2437            | 16.17                      | 13.69                         |
|                | 11      | 2462            | 15.69                      | 13.40                         |
| 802.11n (HT20) | 1       | 2412            | 16.00                      | 13.72                         |
|                | 6       | 2437            | 15.87                      | 13.76                         |
|                | 11      | 2462            | 15.12                      | 13.15                         |

### 11.4. Bluetooth

| Bluetooth    |         |                 |                            |                               |
|--------------|---------|-----------------|----------------------------|-------------------------------|
| Mode         | Channel | Frequency (MHz) | Conducted Peak Power (dBm) | Conducted Average Power (dBm) |
| GFSK         | 0       | 2402            | 3.15                       | 3.13                          |
|              | 39      | 2441            | 3.68                       | 3.65                          |
|              | 78      | 2480            | 1.85                       | 1.80                          |
| $\pi/4$ QPSK | 0       | 2402            | 3.58                       | 2.28                          |
|              | 39      | 2441            | 4.28                       | 2.63                          |
|              | 78      | 2480            | 2.33                       | 0.99                          |
| 8DPSK        | 0       | 2402            | 3.84                       | 2.31                          |
|              | 39      | 2441            | 4.90                       | 2.90                          |
|              | 78      | 2480            | 3.55                       | 1.88                          |
| GFSK(BLE)    | 0       | 2402            | -3.90                      | -3.92                         |
|              | 19      | 2440            | -3.84                      | -3.88                         |
|              | 39      | 2480            | -5.52                      | -5.57                         |

## 12. Maximum Tune-up Limit

| GSM                    |                       |         |
|------------------------|-----------------------|---------|
| Mode                   | Maximum Tune-up (dBm) |         |
|                        | GSM850                | PCS1900 |
| GSM (GMSK, 1Tx Slot)   | 33.50                 | 31.00   |
| GPRS (GMSK, 1Tx Slot)  | 33.50                 | 30.50   |
| GPRS (GMSK, 2Tx Slots) | 32.50                 | 30.00   |
| GPRS (GMSK, 3Tx Slots) | 30.50                 | 28.00   |
| GPRS (GMSK, 4Tx Slots) | 28.50                 | 26.00   |

| WCDMA           |                       |            |
|-----------------|-----------------------|------------|
| Mode            | Maximum Tune-up (dBm) |            |
|                 | FDD Band II           | FDD Band V |
| AMR 12.2Kbps    | 23.50                 | 23.00      |
| RMC 12.2Kbps    | 23.50                 | 23.00      |
| HSDPA Subtest-1 | 21.50                 | 21.50      |
| HSDPA Subtest-2 | 21.50                 | 22.00      |
| HSDPA Subtest-3 | 21.00                 | 21.00      |
| HSDPA Subtest-4 | 21.00                 | 21.00      |
| HSUPA Subtest-1 | 19.00                 | 18.00      |
| HSUPA Subtest-2 | 19.00                 | 18.50      |
| HSUPA Subtest-3 | 18.50                 | 18.50      |
| HSUPA Subtest-4 | 19.00                 | 18.50      |
| HSUPA Subtest-5 | 22.00                 | 22.00      |

| WiFi 2.4G     |  |
|---------------|--|
| Mode          | Maximum Tune-up (dBm)<br>Conducted Average Power |
| 802.11b       | 12.00  |
| 802.11g       | 14.00  |
| 802.11n(HT20) | 14.00  |

| Bluetooth    |  |
|--------------|--|
| Mode         | Maximum Tune-up (dBm)<br>Conducted Average Power |
| GFSK         | 4.00   |
| $\pi/4$ QPSK | 3.00   |
| 8DPSK        | 3.00   |
| GFSK(BLE)    | -3.50  |

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances  $\leq 50$ mm are determined by:

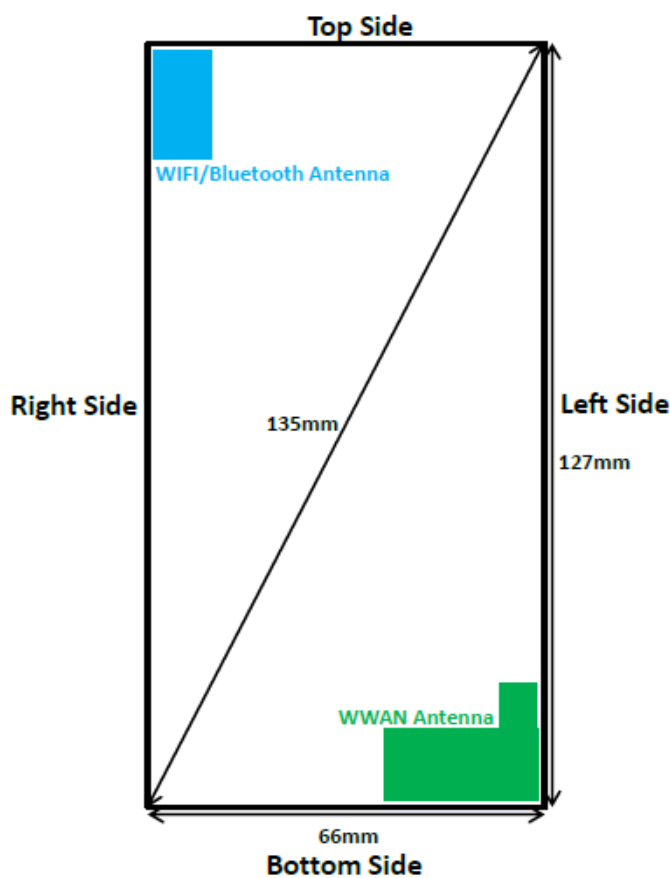
$[(\text{max. Power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR

| Band/Mode | F(GHz) | Position | Separation Distance (mm) | Exclusion Thresholds | SAR test exclusion |
|-----------|--------|----------|--------------------------|----------------------|--------------------|
| Bluetooth | 2.45   | Head     | 0                        | 0.8                  | Yes                |
|           |        | Body     | 10                       | 0.4                  | Yes                |

Per KDB 447498 D01, when the minimum test separation distance is  $< 5$ mm, a distance of 5mm is applied to determine SAR test exclusion.

The test exclusion threshold is  $\leq 3$ , SAR testing is not required.

### 13. Antenna Location



**Rear View**

| Distance of the Antenna to the EUT surface/edge(mm) |      |       |          |             |            |           |
|---|------|-------|----------|-------------|------------|-----------|
| Antenna   | Rear | Front | Top side | Bottom side | Right side | Left side |
| WWAN  | 2    | 3     | 99       | 2           | 30         | 2         |
| WiFi/BT   | 2    | 3     | 2        | 97          | 2          | 50        |

| Positions for SAR tests; Hotspot mode |      |       |          |             |            |           |
|---------------------------------------|------|-------|----------|-------------|------------|-----------|
| Antenna                               | Rear | Front | Top side | Bottom side | Right side | Left side |
| WWAN                                  | Yes  | Yes   | No       | Yes         | No         | Yes       |
| WiFi/BT                               | Yes  | Yes   | Yes      | No          | Yes        | No        |

General note:

Referring to KDB941225 D06, when the overall device length and width are >9cm\*5cm, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

## 14. Measured and Reported SAR Results

### **SAR Test Reduction criteria are as follows:**

- Reported SAR(W/kg) for WWAN = Measured SAR \*Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi and Bluetooth = Measured SAR \* Tune-up scaling factor \* Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

### **KDB 447498 D01 General RF Exposure Guidance:**

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- $\leq 0.8$  W/kg or  $2.0$  W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
- $\leq 0.6$  W/kg or  $1.5$  W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- $\leq 0.4$  W/kg or  $1.0$  W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz

### **KDB 648474 D04 Handset SAR:**

With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is  $> 1.2$  W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Additional 1-g SAR testing at 5 mm is not required when hotspot mode 10-g extremity SAR is not required for the surfaces and edges; since all 1-g reported SAR  $< 1.2$  W/kg.

### **KDB 941225 D01 SAR test for 3G SAR Test Reduction Procedure:**

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode.

### **GSM Guidance**

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Please refer to section 9. for GSM power verification.

SAR is not required for EDGE (8PSK) mode because the maximum output power and tune-up limit is  $\leq 1/4$ dB higher than GPRS/EDGE (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EDGE (GMSK) is  $\leq 1.2$ W/kg.

### **W-CDMA Guidance**

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC (Head) and other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC (Body-Worn Accessory) as the primary mode.

SAR measurement is not required for the HSDPA, HSUPA, DC-HSDPA and HSPA+. When primary mode and the adjusted SAR is  $\leq 1.2$  W/kg and secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode

**KDB 248227 D01 SAR meas for 802.11:**

When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the initial test position(s) by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The initial test position(s) is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the reported SAR for the initial test position is:

- $\leq 0.4$  W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- $> 0.4$  W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is  $\leq 0.8$  W/kg or all required test positions are tested.
  - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
  - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is  $> 0.8$  W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is  $\leq 1.2$  W/kg or all required test channels are considered.
  - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is  $\leq 1.2$  W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is  $\leq 1.2$  W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the initial test position, Area Scans were performed to determine the position with the Maximum Value of SAR (measured). The position that produced the highest Maximum Value of SAR is considered the worst case position; thus used as the initial test position.

**14.1. Head SAR**

| GSM850           |               |           |       |                       |                     |                        |                  |                         |                       |          |
|------------------|---------------|-----------|-------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode             | Test Position | Frequency |       | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|                  |               | CH        | MHz   |                       |                     |                        |                  |                         |                       |          |
| GPRS (2Tx slots) | Left Cheek    | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | 0.17             | 0.883                   | 1.018                 | 1        |
|                  |               | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.05             | 0.816                   | 0.916                 | -        |
|                  |               | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -0.12            | 0.825                   | 0.958                 | -        |
|                  | Left Tilt     | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | -                | -                       | -                     | -        |
|                  |               | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | -0.06            | 0.624                   | 0.700                 | -        |
|                  |               | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -                | -                       | -                     | -        |
|                  | Right Cheek   | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | -                | -                       | -                     | -        |
|                  |               | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | -0.02            | 0.675                   | 0.757                 | -        |
|                  |               | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -                | -                       | -                     | -        |
|                  | Right Tilt    | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | -                | -                       | -                     | -        |
|                  |               | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.03             | 0.511                   | 0.573                 | -        |
|                  |               | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -                | -                       | -                     | -        |

| PCS1900          |               |           |        |                       |                     |                        |                  |                         |                       |          |
|------------------|---------------|-----------|--------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode             | Test Position | Frequency |        | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|                  |               | CH        | MHz    |                       |                     |                        |                  |                         |                       |          |
| GPRS (2Tx slots) | Left Cheek    | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -                | -                       | -                     | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | -                | -                       | -                     | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | -0.19            | 0.696                   | 0.777                 | 2        |
|                  | Left Tilt     | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -                | -                       | -                     | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | -                | -                       | -                     | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | -0.14            | 0.560                   | 0.625                 | -        |
|                  | Right Cheek   | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -                | -                       | -                     | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | -                | -                       | -                     | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | 0.11             | 0.528                   | 0.590                 | -        |
|                  | Right Tilt    | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -                | -                       | -                     | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | -                | -                       | -                     | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | 0.12             | 0.415                   | 0.463                 | -        |

| WCDMA Band II |               |           |        |                       |                     |                        |                  |                         |                       |          |
|---------------|---------------|-----------|--------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode          | Test Position | Frequency |        | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|               |               | CH        | MHz    |                       |                     |                        |                  |                         |                       |          |
| RMC 12.2K     | Left Cheek    | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | -0.23            | 0.332                   | 0.368                 | -        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -                | -                       | -                     | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -                | -                       | -                     | -        |
|               | Left Tilt     | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.04             | 0.701                   | 0.778                 | 3        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -                | -                       | -                     | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -                | -                       | -                     | -        |
|               | Right Cheek   | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | -0.17            | 0.348                   | 0.386                 | -        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -                | -                       | -                     | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -                | -                       | -                     | -        |
|               | Right Tilt    | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.10             | 0.279                   | 0.309                 | -        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -                | -                       | -                     | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -                | -                       | -                     | -        |

| WCDMA Band V |               |           |       |                       |                     |                        |                  |                         |                       |          |
|--------------|---------------|-----------|-------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode         | Test Position | Frequency |       | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|              |               | CH        | MHz   |                       |                     |                        |                  |                         |                       |          |
| RMC 12.2K    | Left Cheek    | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | 0.09             | 0.689                   | 0.737                 | 4        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              | Left Tilt     | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | -0.10            | 0.527                   | 0.563                 | -        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              | Right Cheek   | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | 0.16             | 0.630                   | 0.674                 | -        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              | Right Tilt    | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | 0.05             | 0.477                   | 0.510                 | -        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |

| WiFi 2.4G |               |           |      |                       |                     |                        |            |                           |                  |                         |                       |          |
|-----------|---------------|-----------|------|-----------------------|---------------------|------------------------|------------|---------------------------|------------------|-------------------------|-----------------------|----------|
| Mode      | Test Position | Frequency |      | Conducted Power (dBm) | Tune-up limit (dBm) | Tune-up scaling factor | Duty Cycle | Duty Cycle Scaling Factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|           |               | CH        | MHz  |                       |                     |                        |            |                           |                  |                         |                       |          |
| 802.11b   | Left Cheek    | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | -0.19            | 0.102                   | 0.112                 | 5        |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           | Left Tilt     | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | 0.08             | 0.086                   | 0.095                 | -        |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           | Right Cheek   | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | 0.05             | 0.092                   | 0.101                 | -        |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           | Right Tilt    | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | -0.14            | 0.077                   | 0.085                 | -        |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |

## 14.2. Body SAR

| GSM850           |                     |           |       |                       |                     |                        |                  |                         |                       |          |
|------------------|---------------------|-----------|-------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode             | Test Position       | Frequency |       | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|                  |                     | CH        | MHz   |                       |                     |                        |                  |                         |                       |          |
| GPRS (2Tx slots) | Front               | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | -                | -                       | -                     | -        |
|                  |                     | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.00             | 0.655                   | 0.735                 | -        |
|                  |                     | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -                | -                       | -                     | -        |
|                  | Rear                | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | -0.07            | 1.050                   | 1.211                 | -        |
|                  |                     | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.00             | 1.150                   | 1.290                 | 6        |
|                  |                     | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -0.05            | 1.080                   | 1.254                 | -        |
|                  | Rear (with headset) | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.17             | 1.100                   | 1.234                 | -        |

| PCS1900          |               |           |        |                       |                     |                        |                  |                         |                       |          |
|------------------|---------------|-----------|--------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode             | Test Position | Frequency |        | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|                  |               | CH        | MHz    |                       |                     |                        |                  |                         |                       |          |
| GPRS (2Tx slots) | Front         | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -                | -                       | -                     | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | -                | -                       | -                     | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | -0.02            | 0.512                   | 0.572                 | -        |
|                  | Rear          | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -0.05            | 0.625                   | 0.895                 | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | 0.05             | 0.728                   | 0.881                 | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | 0.03             | 0.809                   | 0.904                 | 7        |

| WCDMA Band II |               |           |        |                       |                     |                        |                  |                         |                       |          |
|---------------|---------------|-----------|--------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode          | Test Position | Frequency |        | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|               |               | CH        | MHz    |                       |                     |                        |                  |                         |                       |          |
| RMC 12.2Kbps  | Front         | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.00             | 0.612                   | 0.679                 | -        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -                | -                       | -                     | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -                | -                       | -                     | -        |
|               | Rear          | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.05             | 0.779                   | 0.864                 | -        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -0.04            | 0.901                   | 1.034                 | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -0.02            | 0.935                   | 1.091                 | 8        |

| WCDMA Band V |               |           |       |                       |                     |                        |                  |                         |                       |          |
|--------------|---------------|-----------|-------|-----------------------|---------------------|------------------------|------------------|-------------------------|-----------------------|----------|
| Mode         | Test Position | Frequency |       | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|              |               | CH        | MHz   |                       |                     |                        |                  |                         |                       |          |
| RMC 12.2Kbps | Front         | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | 0.00             | 0.391                   | 0.418                 | -        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              | Rear          | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | -0.01            | 0.592                   | 0.633                 | 9        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -                | -                       | -                     | -        |

| WiFi 2.4G |               |           |      |                       |                     |                        |            |                           |                  |                         |                       |          |
|-----------|---------------|-----------|------|-----------------------|---------------------|------------------------|------------|---------------------------|------------------|-------------------------|-----------------------|----------|
| Mode      | Test Position | Frequency |      | Conducted Power (dBm) | Tune-up limit (dBm) | Tune-up scaling factor | Duty Cycle | Duty Cycle Scaling Factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|           |               | CH        | MHz  |                       |                     |                        |            |                           |                  |                         |                       |          |
| 802.11b   | Front         | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | 0.05             | 0.109                   | 0.119                 | -        |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           | Rear          | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | -0.10            | 0.165                   | 0.181                 | 10       |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |

### 14.3. Hotspot SAR

| GSM850           |               |           |       |                       |                     |                        |                 |                         |                       |          |
|------------------|---------------|-----------|-------|-----------------------|---------------------|------------------------|-----------------|-------------------------|-----------------------|----------|
| Mode             | Test Position | Frequency |       | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift(dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|                  |               | CH        | MHz   |                       |                     |                        |                 |                         |                       |          |
| GPRS (2Tx slots) | Front         | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | -               | -                       | -                     | -        |
|                  |               | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.00            | 0.655                   | 0.735                 | -        |
|                  |               | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -               | -                       | -                     | -        |
|                  | Rear          | 128       | 824.2 | 31.88                 | 32.50               | 1.15                   | -0.07           | 1.050                   | 1.211                 | -        |
|                  |               | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.00            | 1.150                   | 1.290                 | 6        |
|                  |               | 251       | 848.8 | 31.85                 | 32.50               | 1.16                   | -0.05           | 1.080                   | 1.254                 | -        |
|                  | Left          | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | -0.05           | 0.414                   | 0.465                 | -        |
|                  | Right         | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | -               | -                       | -                     | -        |
|                  | Top           | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | -               | -                       | -                     | -        |
|                  | Bottom        | 190       | 836.6 | 32.00                 | 32.50               | 1.12                   | 0.00            | 0.410                   | 0.460                 | -        |

| PCS1900          |               |           |        |                       |                     |                        |                 |                         |                       |          |
|------------------|---------------|-----------|--------|-----------------------|---------------------|------------------------|-----------------|-------------------------|-----------------------|----------|
| Mode             | Test Position | Frequency |        | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift(dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|                  |               | CH        | MHz    |                       |                     |                        |                 |                         |                       |          |
| GPRS (2Tx slots) | Front         | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -               | -                       | -                     | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | -               | -                       | -                     | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | -0.02           | 0.512                   | 0.572                 | -        |
|                  | Rear          | 512       | 1850.2 | 28.44                 | 30.00               | 1.43                   | -0.05           | 0.625                   | 0.895                 | -        |
|                  |               | 661       | 1880   | 29.17                 | 30.00               | 1.21                   | 0.05            | 0.728                   | 0.881                 | -        |
|                  |               | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | 0.03            | 0.809                   | 0.904                 | 7        |
|                  | Left          | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | -0.04           | 0.286                   | 0.319                 | -        |
|                  | Right         | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | -               | -                       | -                     | -        |
|                  | Top           | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | -               | -                       | -                     | -        |
|                  | Bottom        | 810       | 1909.8 | 29.52                 | 30.00               | 1.12                   | 0.01            | 0.259                   | 0.290                 | -        |

| WCDMA Band II |               |           |        |                       |                     |                        |                 |                         |                       |          |
|---------------|---------------|-----------|--------|-----------------------|---------------------|------------------------|-----------------|-------------------------|-----------------------|----------|
| Mode          | Test Position | Frequency |        | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift(dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|               |               | CH        | MHz    |                       |                     |                        |                 |                         |                       |          |
| RMC 12.2K     | Front         | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.00            | 0.612                   | 0.679                 | -        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -               | -                       | -                     | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -               | -                       | -                     | -        |
|               | Rear          | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.05            | 0.779                   | 0.864                 | -        |
|               |               | 9400      | 1880   | 22.90                 | 23.50               | 1.15                   | -0.04           | 0.901                   | 1.034                 | -        |
|               |               | 9538      | 1907.6 | 22.83                 | 23.50               | 1.17                   | -0.02           | 0.935                   | 1.091                 | 8        |
|               | Left          | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.11            | 0.563                   | 0.624                 | -        |
|               | Right         | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | -               | -                       | -                     | -        |
|               | Top           | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | -               | -                       | -                     | -        |
|               | Bottom        | 9262      | 1852.4 | 23.05                 | 23.50               | 1.11                   | 0.10            | 0.632                   | 0.701                 | -        |

| WCDMA Band V |               |           |       |                       |                     |                        |                 |                         |                       |          |
|--------------|---------------|-----------|-------|-----------------------|---------------------|------------------------|-----------------|-------------------------|-----------------------|----------|
| Mode         | Test Position | Frequency |       | Conducted Power (dBm) | Tune up limit (dBm) | Tune up scaling factor | Power Drift(dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|              |               | CH        | MHz   |                       |                     |                        |                 |                         |                       |          |
| RMC 12.2K    | Front         | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -               | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | 0.00            | 0.391                   | 0.418                 | -        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -               | -                       | -                     | -        |
|              | Rear          | 4132      | 826.4 | 22.69                 | 23.00               | 1.07                   | -               | -                       | -                     | -        |
|              |               | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | -0.01           | 0.592                   | 0.633                 | 9        |
|              |               | 4233      | 846.6 | 22.69                 | 23.00               | 1.07                   | -               | -                       | -                     | -        |
|              | Left          | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | 0.05            | 0.269                   | 0.288                 | -        |
|              | Right         | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | -               | -                       | -                     | -        |
|              | Top           | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | -               | -                       | -                     | -        |
|              | Bottom        | 4183      | 836.6 | 22.71                 | 23.00               | 1.07                   | 0.05            | 0.215                   | 0.230                 | -        |

| WiFi 2.4G |               |           |      |                       |                     |                        |            |                           |                  |                         |                       |          |
|-----------|---------------|-----------|------|-----------------------|---------------------|------------------------|------------|---------------------------|------------------|-------------------------|-----------------------|----------|
| Mode      | Test Position | Frequency |      | Conducted Power (dBm) | Tune-up limit (dBm) | Tune-up scaling factor | Duty Cycle | Duty Cycle Scaling Factor | Power Drift (dB) | Measured SAR(1g) (W/kg) | Report SAR(1g) (W/kg) | Plot No. |
|           |               | CH        | MHz  |                       |                     |                        |            |                           |                  |                         |                       |          |
| 802.11b   | Front         | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | 0.05             | 0.109                   | 0.119                 | -        |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           | Rear          | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           |               | 6         | 2437 | 11.61                 | 12.00               | 1.09                   | 100.00%    | 1.00                      | -0.10            | 0.165                   | 0.181                 | 10       |
|           |               | 11        | 2462 | 11.42                 | 12.00               | 1.14                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           | Left          | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |
|           | Right         | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | 0.06             | 0.070                   | 0.077                 | -        |
|           | Top           | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -0.01            | 0.083                   | 0.091                 | -        |
|           | Bottom        | 1         | 2412 | 11.60                 | 12.00               | 1.10                   | 100.00%    | 1.00                      | -                | -                       | -                     | -        |

SAR Test Data Plots to the Appendix A.

## 15. SAR Measurement Variability

In accordance with published RF Exposure KDB 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is  $<0.8$  or  $2$  W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.8$  or  $2$  W/kg (1-g or 10-g respectively), repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is  $> 1.20$  or when the original or repeated measurement is  $\geq 1.45$  or  $3.6$  W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
- 4) Perform a third repeated measurement only if the original, first, or second repeated measurement is  $\geq 1.5$  or  $3.75$  W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .

| Band                    | Test Position | Frequency |        | Highest Measured SAR (W/kg) | First Repeated     |                               | Second Repeated    |                               |
|-------------------------|---------------|-----------|--------|-----------------------------|--------------------|-------------------------------|--------------------|-------------------------------|
|                         |               | CH        | MHz    |                             | Measured SAR(W/kg) | Largest to Smallest SAR Ratio | Measured SAR(W/kg) | Largest to Smallest SAR Ratio |
| GPRS850 2Tx slots       | Left Cheek    | 128       | 824.2  | 0.883                       | 0.870              | 1.015                         | N/A                | N/A                           |
| GPRS850 2Tx slots       | Rear          | 190       | 836.6  | 1.15                        | 1.13               | 1.018                         | N/A                | N/A                           |
| GPRS1900 2Tx slots      | Rear          | 810       | 1909.8 | 0.809                       | 0.795              | 1.018                         | N/A                | N/A                           |
| WCDMA Band II RMC 12.2K | Rear          | 9538      | 1907.6 | 0.935                       | 0.920              | 1.016                         | N/A                | N/A                           |

## 16. Simultaneous Transmission analysis

| No. | Simultaneous Transmission Configurations | Head | Body-worn | Hotspot | Note |
|-----|--|------|-----------|---------|------|
| 1   | GSM(voice) + Bluetooth (data)            | Yes  | Yes       |         |      |
| 2   | GSM(voice) + WIFI (data)                 | Yes  | Yes       |         |      |
| 3   | WCDMA(voice) + Bluetooth (data)          | Yes  | Yes       |         |      |
| 4   | WCDMA(voice) + WIFI (data)               | Yes  | Yes       |         |      |
| 5   | GPRS (data) + Bluetooth (data)           | Yes  | Yes       | NA      |      |
| 6   | GPRS (data) + WIFI (data)                | Yes  | Yes       | Yes     |      |
| 7   | WCDMA (data) + Bluetooth (data)          | Yes  | Yes       | NA      |      |
| 8   | WCDMA (data) + WIFI (data)               | Yes  | Yes       | Yes     |      |

General note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either GSM or WCDMA according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. The reported SAR summation is calculated based on the same configuration and test position
4. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below
  - a)  $[(\text{max. Power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})} \cdot x] \text{W/kg}$  for test separation distances  $\leq 50\text{mm}$ ; when  $x=7.5$  for 1-g SAR, and  $x=18.75$  for 10-g SAR.
  - b) When the minimum separation distance is  $<5\text{mm}$ , the distance is used 5mm to determine SAR test exclusion
  - c) 0.4 W/kg for 1-g SAR and 1.0W/kg for 10-g SAR, when the test separation distances is  $>50\text{mm}$ .

| Bluetooth<br>Max power | Exposure position    | Head  | Body-worn |
|------------------------|----------------------|-------|-----------|
|                        | Test separation      | 0mm   | 10mm      |
| 4.00dBm                | Estimated SAR (W/kg) | 0.105 | 0.052     |

**16.1. Head**

| WWAN+ WLAN DTS |         |                   |                |          |            |
|----------------|---------|-------------------|----------------|----------|------------|
| WWAN Band      |         | Exposure Position | Max SAR (W/kg) |          | Summed SAR |
|                |         |                   | WWAN           | WLAN DTS | (W/kg)     |
| GSM            | GSM850  | Left Cheek        | 1.018          | 0.112    | 1.130      |
|                |         | Left Tilted       | 0.700          | 0.095    | 0.795      |
|                |         | Right Cheek       | 0.757          | 0.101    | 0.858      |
|                |         | Right Tilted      | 0.573          | 0.085    | 0.658      |
|                | PCS1900 | Left Cheek        | 0.777          | 0.112    | 0.889      |
|                |         | Left Tilted       | 0.625          | 0.095    | 0.720      |
|                |         | Right Cheek       | 0.590          | 0.101    | 0.691      |
|                |         | Right Tilted      | 0.463          | 0.085    | 0.548      |
| WCDMA          | Band II | Left Cheek        | 0.368          | 0.112    | 0.480      |
|                |         | Left Tilted       | 0.778          | 0.095    | 0.873      |
|                |         | Right Cheek       | 0.386          | 0.101    | 0.487      |
|                |         | Right Tilted      | 0.309          | 0.085    | 0.394      |
|                | Band V  | Left Cheek        | 0.737          | 0.112    | 0.849      |
|                |         | Left Tilted       | 0.563          | 0.095    | 0.658      |
|                |         | Right Cheek       | 0.674          | 0.101    | 0.775      |
|                |         | Right Tilted      | 0.510          | 0.085    | 0.595      |

| WWAN+ Bluetooth |         |                   |                |           |            |
|-----------------|---------|-------------------|----------------|-----------|------------|
| WWAN Band       |         | Exposure Position | Max SAR (W/kg) |           | Summed SAR |
|                 |         |                   | WWAN           | Bluetooth | (W/kg)     |
| GSM             | GSM850  | Left Cheek        | 1.018          | 0.105     | 1.123      |
|                 |         | Left Tilted       | 0.700          | 0.105     | 0.805      |
|                 |         | Right Cheek       | 0.757          | 0.105     | 0.862      |
|                 |         | Right Tilted      | 0.573          | 0.105     | 0.678      |
|                 | PCS1900 | Left Cheek        | 0.777          | 0.105     | 0.882      |
|                 |         | Left Tilted       | 0.625          | 0.105     | 0.730      |
|                 |         | Right Cheek       | 0.590          | 0.105     | 0.695      |
|                 |         | Right Tilted      | 0.463          | 0.105     | 0.568      |
| WCDMA           | Band II | Left Cheek        | 0.368          | 0.105     | 0.473      |
|                 |         | Left Tilted       | 0.778          | 0.105     | 0.882      |
|                 |         | Right Cheek       | 0.386          | 0.105     | 0.491      |
|                 |         | Right Tilted      | 0.309          | 0.105     | 0.414      |
|                 | Band V  | Left Cheek        | 0.737          | 0.105     | 0.841      |
|                 |         | Left Tilted       | 0.563          | 0.105     | 0.668      |
|                 |         | Right Cheek       | 0.674          | 0.105     | 0.778      |
|                 |         | Right Tilted      | 0.510          | 0.105     | 0.615      |

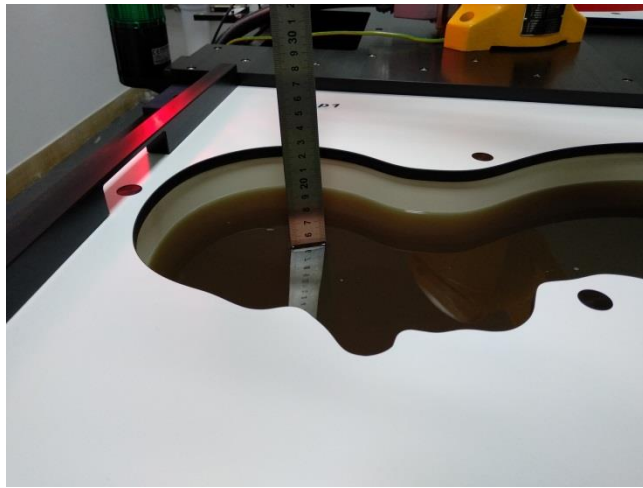
**16.2. Body-worn**

| WWAN + WLAN DTS |         |                   |                |          |            |
|-----------------|---------|-------------------|----------------|----------|------------|
| WWAN Band       |         | Exposure Position | Max SAR (W/kg) |          | Summed SAR |
|                 |         |                   | WWAN           | WLAN DTS | (W/kg)     |
| GSM             | GSM850  | Front             | 0.735          | 0.119    | 0.854      |
|                 |         | Rear              | 1.290          | 0.181    | 1.471      |
|                 | PCS1900 | Front             | 0.572          | 0.119    | 0.691      |
|                 |         | Rear              | 0.904          | 0.181    | 1.085      |
| WCDMA           | Band II | Front             | 0.679          | 0.119    | 0.798      |
|                 |         | Rear              | 1.091          | 0.181    | 1.272      |
|                 | Band V  | Front             | 0.418          | 0.119    | 0.537      |
|                 |         | Rear              | 0.633          | 0.181    | 0.814      |

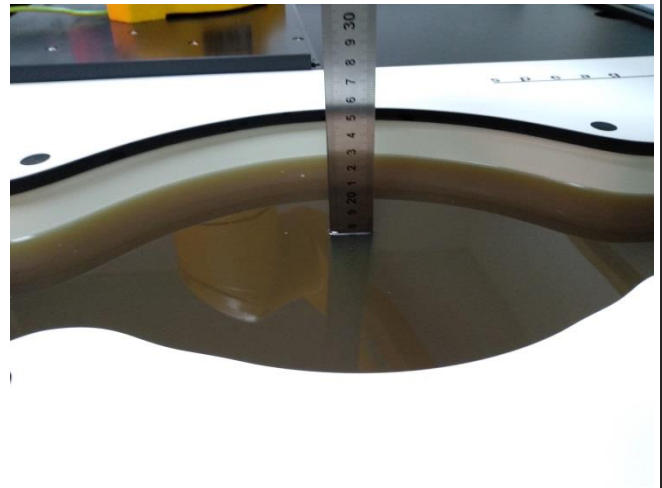
| WWAN + Bluetooth |         |                   |                |           |            |
|------------------|---------|-------------------|----------------|-----------|------------|
| WWAN Band        |         | Exposure Position | Max SAR (W/kg) |           | Summed SAR |
|                  |         |                   | WWAN           | Bluetooth | (W/kg)     |
| GSM              | GSM850  | Front             | 0.735          | 0.052     | 0.787      |
|                  |         | Rear              | 1.290          | 0.052     | 1.342      |
|                  | PCS1900 | Front             | 0.572          | 0.052     | 0.624      |
|                  |         | Rear              | 0.904          | 0.052     | 0.956      |
| WCDMA            | Band II | Front             | 0.679          | 0.052     | 0.731      |
|                  |         | Rear              | 1.091          | 0.052     | 1.143      |
|                  | Band V  | Front             | 0.418          | 0.052     | 0.470      |
|                  |         | Rear              | 0.633          | 0.052     | 0.685      |

**16.3. Hotspot**

| WWAN + WLAN DTS |         |                   |                |          |            |
|-----------------|---------|-------------------|----------------|----------|------------|
| WWAN Band       |         | Exposure Position | Max SAR (W/kg) |          | Summed SAR |
|                 |         |                   | WWAN           | WLAN DTS | (W/kg)     |
| GSM             | GSM850  | Front             | 0.735          | 0.119    | 0.854      |
|                 |         | Rear              | 1.290          | 0.181    | 1.471      |
|                 |         | Left side         | 0.465          | -        | 0.465      |
|                 |         | Right side        | -              | 0.077    | 0.077      |
|                 |         | Top side          | -              | 0.091    | 0.091      |
|                 |         | Bottom side       | 0.460          | -        | 0.460      |
|                 | PCS1900 | Front             | 0.572          | 0.119    | 0.691      |
|                 |         | Rear              | 0.904          | 0.181    | 1.085      |
|                 |         | Left side         | 0.319          | -        | 0.319      |
|                 |         | Right side        | -              | 0.077    | 0.077      |
|                 |         | Top side          | -              | 0.091    | 0.091      |
|                 |         | Bottom side       | 0.290          | -        | 0.290      |
| WCDMA           | Band II | Front             | 0.679          | 0.119    | 0.798      |
|                 |         | Rear              | 1.091          | 0.181    | 1.272      |
|                 |         | Left side         | 0.624          | -        | 0.624      |
|                 |         | Right side        | -              | 0.077    | 0.077      |
|                 |         | Top side          | -              | 0.091    | 0.091      |
|                 |         | Bottom side       | 0.701          | -        | 0.701      |
|                 | Band V  | Front             | 0.418          | 0.119    | 0.537      |
|                 |         | Rear              | 0.633          | 0.181    | 0.814      |
|                 |         | Left side         | 0.288          | -        | 0.288      |
|                 |         | Right side        | -              | 0.077    | 0.077      |
|                 |         | Top side          | -              | 0.091    | 0.091      |
|                 |         | Bottom side       | 0.230          | -        | 0.230      |

**17. TestSetup Photos**

Liquid depth in the Head phantom



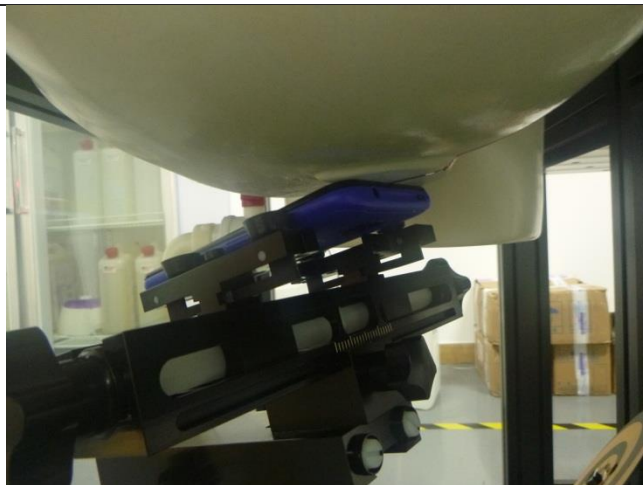
Liquid depth in the Body phantom



Left Head Touch



Right Head Touch



Left Head Tilt (15°)



Right Head Tilt (15°)



Body-worn Front (10mm)



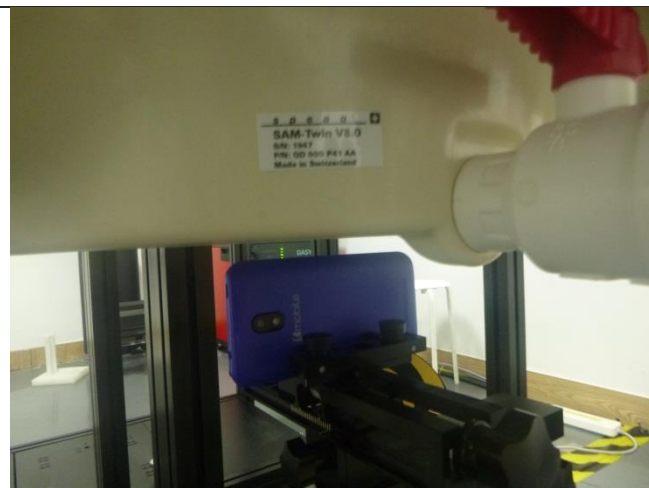
Body-worn Rear(10mm)



Front (10mm)





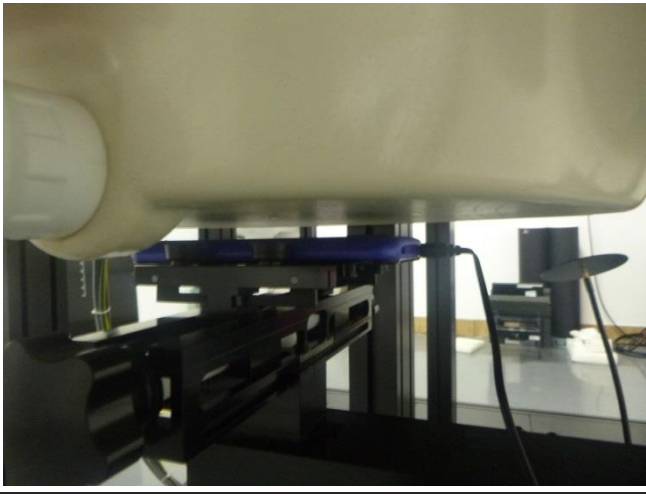
Rear (10mm)



Left Side (10mm)



Right Side (10mm)

|  |  |
|--|--|
|   |  |
| Top Side (10mm)  | Bottom Side (10mm)   |
|  |  |
| Body-worn Rear(10mm)-With headset  |  |

## 18. External and Internal Photos of the EUT

Please reference to the report No.: CHTEW19070023

**-----End of Report-----**