



TEST REPORT

For SAR



Report No. : **CHTEW23080053** Report verification:

Project No...... : **SHT2308003904EW**

FCC ID..... : **2ASWW-A18408TL**

Applicant's name..... : **XINCHUANGXIN INTERNATIONAL CO.,LTD**

Address..... : **ROOM 605 6/F, FA YUEN COMMERCIAL BUILDING, 75-77 FA YUEN STREET MONGKOK KL**

Test item description : **mobile phone**

Trade Mark : **CORN**

Model/Type reference..... : **RS10**

Listed Model(s) : **-**

Standard : **FCC 47 CFR Part2.1093**
IEEE Std C95.1: 1999 Edition
IEEE Std 1528: 2013

Date of receipt of test sample..... : **Aug. 03, 2023**

Date of testing..... : **Aug. 04, 2023- Aug. 21, 2023**

Date of issue..... : **Aug. 22, 2023**

Result..... : **PASS**

Compiled by
 (position+printedname+signature).... : File administrators Xiaodong Zhao *Xiaodong Zhao*

Supervised by
 (position+printedname+signature).... : Project Engineer Xiaodong Zhao *Xiaodong Zhao*

Approved by
 (position+printedname+signature).... : Manager Xu Yang *Xu Yang*

Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd**

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

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The test report merely correspond to the test sample.

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1. Statement of Compliance

| Maximum Reported SAR (W/kg @1g) | | |
|---------------------------------|--------------|-------|
| Type | Test setting | PCE |
| Head | Cheek | 0.895 |
| Body-worn | Dist.= 15mm | 0.631 |

Note:

1. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg@1g) specified in FCC 47 CFR part 2 (2.1093) and IEEE Std C95.1.
2. This device had been tested in accordance with the measurement methods and procedures specified in IEEE 1528 and FCC KDB publications.

2. Test Standards and Report version

2.1. 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 D04 Interim General RF Exposure Guidance v01](#): Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

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

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

[941225 D05 SAR for LTE Devices v02r05](#): SAR Evaluation Considerations for LTE Devices

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

2.2. Report version

| Revision No. | Date of issue | Description |
|--------------|---------------|-------------|
| N/A | 2023-08-22 | Original |
| | | |
| | | |
| | | |
| | | |

3. Summary

3.1. Client Information

| | |
|---------------|--|
| Applicant: | XINCHUANGXIN INTERNATIONAL CO.,LTD |
| Address: | ROOM 605 6/F, FA YUEN COMMERCIAL BUILDING, 75-77 FA YUEN STREET MONGKOK KL |
| Manufacturer: | Luzhou chiteng technology and co., LTD |
| Address: | Block No. 16, The Smart Terminal industrial park of National High Tech Zone,Luzhou,China |

3.2. Product Description

| Main unit | |
|------------------------------|--|
| Name of EUT: | mobile phone |
| Trade Mark: | CORN |
| Model No.: | RS10 |
| Listed Model(s): | - |
| Power supply: | DC 3.7V from Battery |
| Hardware version: | ZS583TL_MB_V1.0 |
| Software version: | ZS583TL_128160_A18408TL_RS10_CORN_EnFrPoSp_V03 |
| Device Dimension: | Length x Width x Thickness (mm): 116 x 50 x 15 |
| Device Category: | Portable |
| Product stage: | Production unit |
| RF Exposure Environment: | General Population/Uncontrolled |
| HTW test sample No.: | YPHT23080039002 |
| Support SIM card quantity:#1 | <input type="checkbox"/> Single card <input checked="" type="checkbox"/> Double card |
| Ancillary unit | |
| Battery information: #2 | BL-5C Voltage: 3.7V Capacity:1000mAh 3.7V Li-ion BATTERY 3.7 Wh |

Note:

#1: The Test EUT support two SIM card, so all the tests are performed at each SIM card mode, the datum recorded is the worst case for all the mode at SIM1 Card mode.

#2: The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power.

3.3. RF Specification Description

| GSM | |
|--|---|
| Operation Band: | <input checked="" type="checkbox"/> GSM850 <input checked="" type="checkbox"/> PCS1900 |
| Support type: | <input checked="" type="checkbox"/> GSM <input checked="" type="checkbox"/> GPRS <input type="checkbox"/> EGPRS |
| Modulation type: | <input checked="" type="checkbox"/> GMSK <input type="checkbox"/> 8PSK |
| Power Class: | <input checked="" type="checkbox"/> GSM850: Class 4 <input checked="" type="checkbox"/> PCS1900: Class 1 |
| Device Class: | B |
| GPRS Multi-Slot Class: | 12 |
| <i>Note:</i> <i>This device doesn't support DTM (Dual Transfer Mode).</i> | |
| WCDMA | |
| Operation Band: | <input checked="" type="checkbox"/> Band II <input type="checkbox"/> Band IV <input checked="" type="checkbox"/> Band V |
| Support type: | <input checked="" type="checkbox"/> UMTS Rel. 99 (Voice & Data) <input checked="" type="checkbox"/> HSDPA <input checked="" type="checkbox"/> HSUPA |
| Modulation type: | <input checked="" type="checkbox"/> QPSK |
| Power Class: | Class 3 |
| LTE | |
| Operation Band: | <input checked="" type="checkbox"/> Band 2 <input checked="" type="checkbox"/> Band 4 <input checked="" type="checkbox"/> Band 5 <input checked="" type="checkbox"/> Band 7 |
| | <input type="checkbox"/> Band 12 <input type="checkbox"/> Band 13 <input checked="" type="checkbox"/> Band 17 <input type="checkbox"/> Band 25 |
| | <input type="checkbox"/> Band 26 <input type="checkbox"/> Band 30 <input type="checkbox"/> Band 66 <input type="checkbox"/> Band 71 |
| | <input type="checkbox"/> Band 38 <input type="checkbox"/> Band 41 |
| Support type: | <input checked="" type="checkbox"/> Single Carrier <input type="checkbox"/> CA-UL <input type="checkbox"/> CA-DL <input type="checkbox"/> MIMO-UL |
| Modulation type: | <input checked="" type="checkbox"/> QPSK <input checked="" type="checkbox"/> 16QAM |
| Power Class: | <input checked="" type="checkbox"/> Class 3 <input type="checkbox"/> Class 2 |
| <i>Note:</i> <i>This device doesn't support SV-LTE (1xRTT-LTE).</i> | |

3.4. Testing Laboratory Information

| | | |
|----------------------|---|----------------------|
| Laboratory Name | Shenzhen Huatongwei International Inspection Co., Ltd. | |
| Laboratory Location | 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China | |
| Contact information: | Tel: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn | |
| Qualifications | Type | Accreditation Number |
| | FCC | 762235 |

3.5. 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 | Equipment No. | Model No. | Serial No. | Cal. date (YY-MM-DD) | Due date (YY-MM-DD) |
|---|--------------------------------------|---------------|---------------|---------------|------------|----------------------|---------------------|
| ● | Data Acquisition Electronics DAEx | SPEAG | HTWE0313-05 | DAE4 | 1549 | 2023/03/27 | 2024/03/26 |
| ● | E-field Probe | SPEAG | HTWE0313-06 | EX3DV4 | 7494 | 2023/04/17 | 2024/04/16 |
| ● | Universal Radio Communication Tester | R&S | HTWE0323 | CMW500 | 137681 | 2023/05/04 | 2024/05/03 |
| Tissue-equivalent liquids Validation | | | | | | | |
| ● | Dielectric Assessment Kit | SPEAG | HTWE0315-02 | DAK-3.5 | 1267 | N/A | N/A |
| ● | Network analyzer | Keysight | HTWE0331 | E5071C | MY46733048 | 2022/08/29 | 2023/08/28 |
| System Validation | | | | | | | |
| ● | System Validation Dipole | SPEAG | HTWE0314-03 | D750V3 | 1180 | 2021/01/22 | 2024/01/21 |
| ● | System Validation Dipole | SPEAG | HTWE0314-04 | D835V2 | 4d238 | 2021/01/22 | 2024/01/21 |
| ● | System Validation Dipole | SPEAG | HTWE0314-05 | D1750V2 | 1164 | 2021/01/22 | 2024/01/21 |
| ● | System Validation Dipole | SPEAG | HTWE0314-06 | D1900V2 | 5d226 | 2021/01/22 | 2024/01/21 |
| ● | System Validation Dipole | SPEAG | HTWE0314-08 | D2600V2 | 1150 | 2021/01/25 | 2024/01/24 |
| ● | Signal Generator | R&S | HTWE0276 | SMB100A | 114360 | 2023/05/23 | 2024/05/22 |
| ● | Power Viewer for Windows | R&S | | N/A | N/A | N/A | N/A |
| ● | Power sensor | R&S | HTWE0278 | NRP18A | 101010 | 2023/05/23 | 2024/05/22 |
| ● | Power sensor | R&S | HTWE0389 | NRP18A | 101386 | 2023/03/29 | 2024/03/28 |
| ● | Power Amplifier | BONN | HTWE0336 | BLWA 0160-2M | 1811887 | 2022/11/10 | 2023/11/09 |
| ● | Dual Directional Coupler | Mini-Circuits | HTWE0335 | ZHDC-10-62-S+ | F975001814 | 2022/11/10 | 2023/11/09 |
| ● | Attenuator | Mini-Circuits | HTWE0333 | VAT-3W2+ | 1819 | 2022/11/10 | 2023/11/09 |
| ● | Attenuator | Mini-Circuits | HTWE0334 | VAT-10W2+ | 1741 | 2022/11/10 | 2023/11/09 |

Note:

1. The Probe, Dipole and DAE calibration reference to the Appendix E and F.
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 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. SAR Measurement 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.

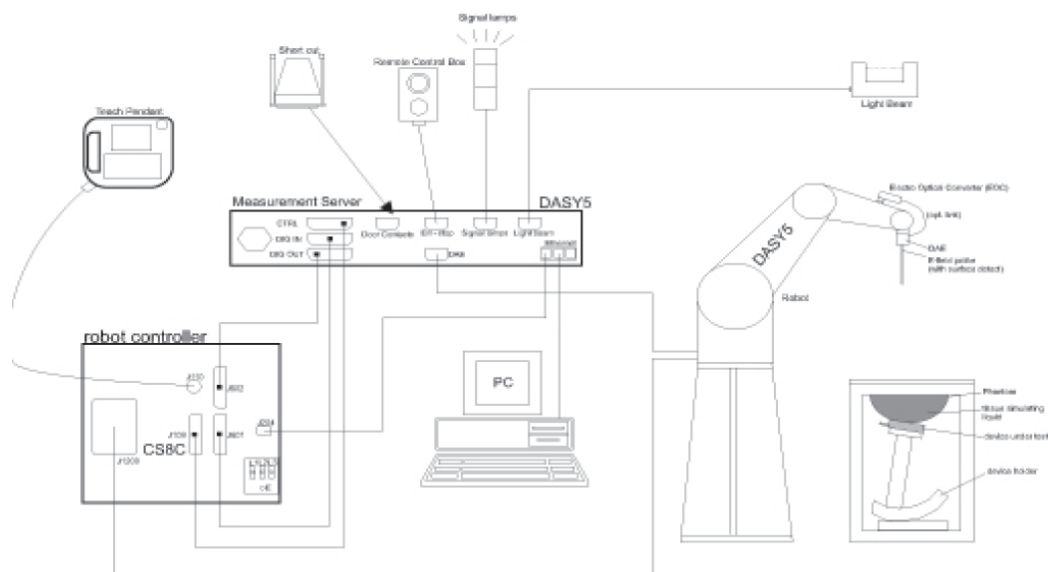
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

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.

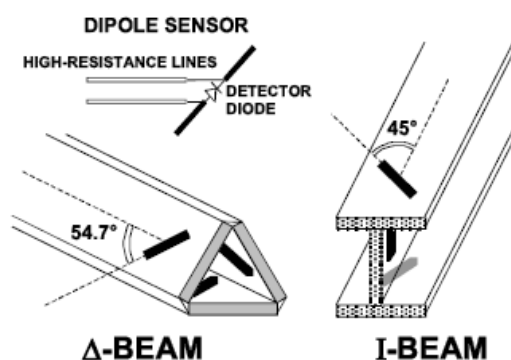
● Probe Specification

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



SAM-Twin 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

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. Measure the local SAR at a test point within 8 mm of the phantom inner surface that is closest to the DUT. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Resolutions per FCC KDB Publication 865664 D01v04

| | ≤ 3 GHz | > 3 GHz |
|--|---|---|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | 5 mm ± 1 mm | $\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm ± 0.5 mm |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location | 30° ± 1° | 20° ± 1° |
| Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area} | ≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm | 3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 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 ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device. | |

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1g and 10g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04

| | | | | |
|--|------------------------------------|--|---|--|
| Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom} | | ≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm* | 3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm* | |
| Maximum zoom scan spatial resolution, normal to phantom surface | uniform grid: $\Delta z_{Zoom}(n)$ | ≤ 5 mm | 3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm | |
| | graded grid | $\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface | ≤ 4 mm | 3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm |
| | | $\Delta z_{Zoom}(n>1)$: between subsequent points | $\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm | |
| Minimum zoom scan volume | x, y, z | ≥ 30 mm | 3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm | |
| <p>Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.</p> <p>* 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 ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 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.</p> | | | | |

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1. The SAR drift shall be kept within ± 5 %.

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 _i : | diode compression point (DASY parameter) |

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

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

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

| | |
|---------------------|---|
| Vi: | compensated signal of channel (i = x, y, z) |
| Norm _i : | sensor sensitivity of channel (i = x, y, z), [mV/(V/m) ²] for E-field Probes |
| ConvF: | sensitivity enhancement in solution |
| a _{ij} : | sensor sensitivity factors for H-field probes |
| f: | carrier frequency [GHz] |
| E _i : | electric field strength of channel i in V/m |
| H _i : | 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
 σ : conductivity in [mho/m] or [Siemens/m]
 ρ : 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.

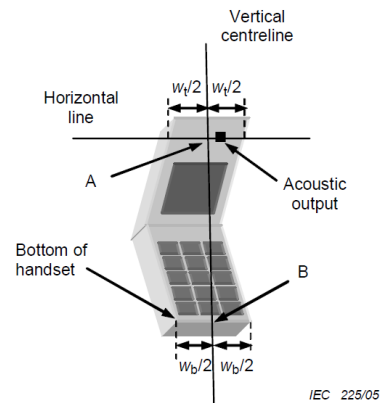
The vertical centreline passes through two points on the front side of the handset: the midpoint of the width W_t of the handset at the level of the acoustic output (point A in Figures 5a and 5b), and the midpoint of the width W_b of the bottom of the handset (point B).

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.



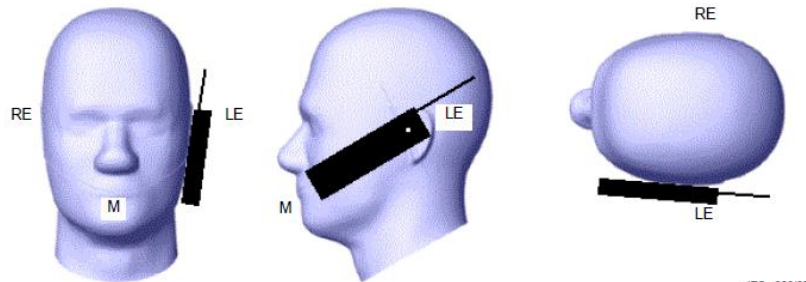
Figures 5a



Figures 5b

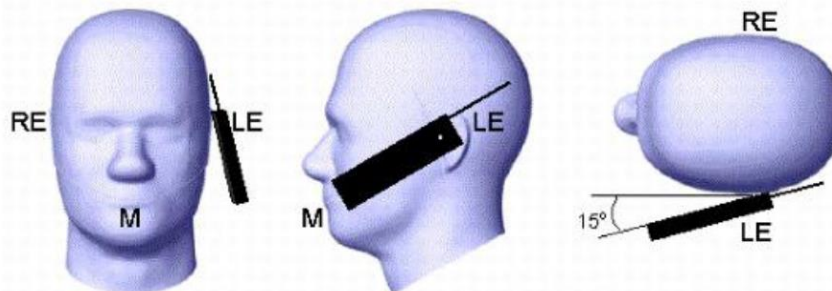
- W_t Width of the handset at the level of the acoustic
- W_b Width of the bottom of the handset
- A Midpoint of the width w_t of the handset at the level of the acoustic output
- B Midpoint of the width w_b of the bottom of the handset

Cheek position



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

Tilt position

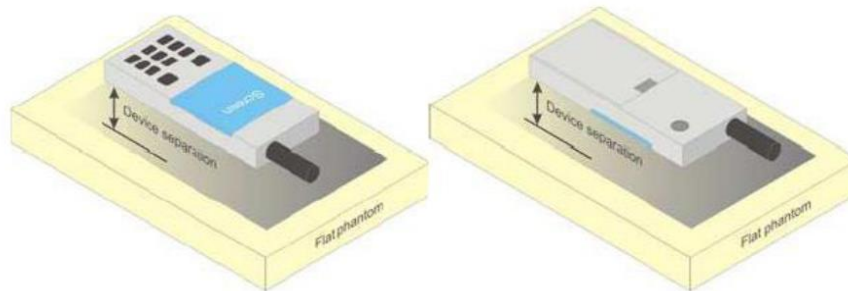


Picture 3 Tilt position of the wireless device on the left side of SAM

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

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 (ϵ_r) and conductivity (σ) 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, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for ϵ_r and σ may be relaxed to $\pm 10\%$. This is limited to frequencies ≤ 3 GHz.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

| Tissue dielectric parameters for Head | | |
|---------------------------------------|--------------|----------------------|
| Target Frequency (MHz) | Head | |
| | ϵ_r | $\sigma(\text{S/m})$ |
| 750 | 41.9 | 0.89 |
| 835 | 41.5 | 0.90 |
| 1750 | 40.1 | 1.37 |
| 1800-2000 | 40.0 | 1.40 |
| 2450 | 39.2 | 1.80 |
| 2600 | 39.0 | 1.96 |
| 5200 | 36.0 | 4.66 |
| 5300 | 35.9 | 4.76 |
| 5500 | 35.6 | 4.96 |
| 5600 | 35.5 | 5.07 |
| 5800 | 35.3 | 5.27 |

Measurement Results:

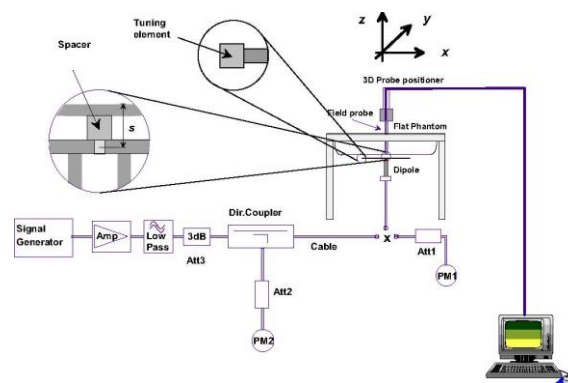
| Dielectric performance of Head tissue simulating liquid | | | | | | | | | |
|---|--------------|----------|----------------------|----------|------------------------|--------------------|-----------|---------------------------|-----------|
| Frequency (MHz) | ϵ_r | | $\sigma(\text{S/m})$ | | Delta (ϵ_r) | Delta (σ) | Limit | Temp ($^\circ\text{C}$) | Date |
| | Target | Measured | Target | Measured | | | | | |
| 750 | 41.90 | 40.42 | 0.890 | 0.869 | -3.53% | -2.36% | $\pm 5\%$ | 22.2 | 2023/8/18 |
| 835 | 41.50 | 40.12 | 0.900 | 0.894 | -3.33% | -0.72% | $\pm 5\%$ | 22.2 | 2023/8/18 |
| 1750 | 40.10 | 38.56 | 1.370 | 1.316 | -3.84% | -3.94% | $\pm 5\%$ | 22.2 | 2023/8/18 |
| 1900 | 40.00 | 38.39 | 1.400 | 1.344 | -4.03% | -4.00% | $\pm 5\%$ | 22.2 | 2023/8/21 |
| 2600 | 39.00 | 37.29 | 1.960 | 1.880 | -4.38% | -4.08% | $\pm 5\%$ | 22.2 | 2023/8/21 |

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 ± 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 ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 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

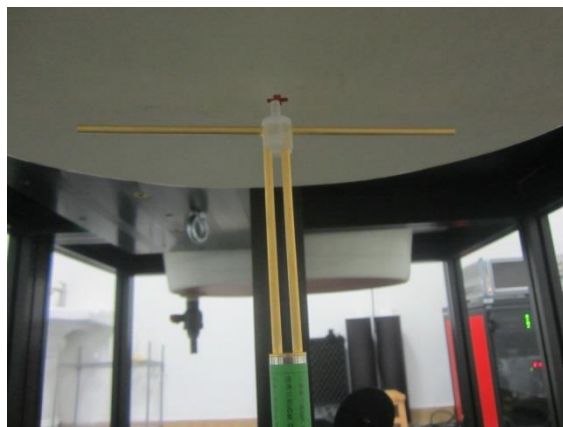


Photo of Dipole Setup

Measurement Results:

| Head | | | | | | | | | | | |
|-----------------|-----------|-----------------|----------------|-----------|-----------------|----------------|------------|-------------|-------|-----------|-----------|
| Frequency (MHz) | 1g SAR | | | 10g SAR | | | Delta (1g) | Delta (10g) | Limit | Temp (°C) | Date |
| | Target 1W | Normalize to 1W | Measured 250mW | Target 1W | Normalize to 1W | Measured 250mW | | | | | |
| 750 | 8.43 | 8.40 | 2.10 | 5.59 | 5.48 | 1.37 | -0.36% | -1.97% | ±10% | 22.4 | 2023/8/18 |
| 835 | 9.39 | 9.76 | 2.44 | 6.14 | 6.28 | 1.57 | 3.94% | 2.28% | ±10% | 22.4 | 2023/8/18 |
| 1750 | 36.40 | 35.68 | 8.92 | 19.20 | 18.96 | 4.74 | -1.98% | -1.25% | ±10% | 22.4 | 2023/8/18 |
| 1900 | 39.80 | 40.00 | 10.00 | 20.30 | 20.68 | 5.17 | 0.50% | 1.87% | ±10% | 22.4 | 2023/8/21 |
| 2600 | 56.50 | 54.80 | 13.70 | 25.00 | 24.60 | 6.15 | -3.01% | -1.60% | ±10% | 22.4 | 2023/8/21 |

Note:

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 ±10% of the manufacturer calibrated dipole SAR target.

Plots of System Performance Check**SystemPerformanceCheck-Head 750MHz**

Communication System: UID 0, A-CW (0); Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: $f = 750$ MHz; $\sigma = 0.869$ S/m; $\epsilon_r = 40.424$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Ambient Temperature:22.4°C;Liquid Temperature:22.2°C;

DASY Configuration:

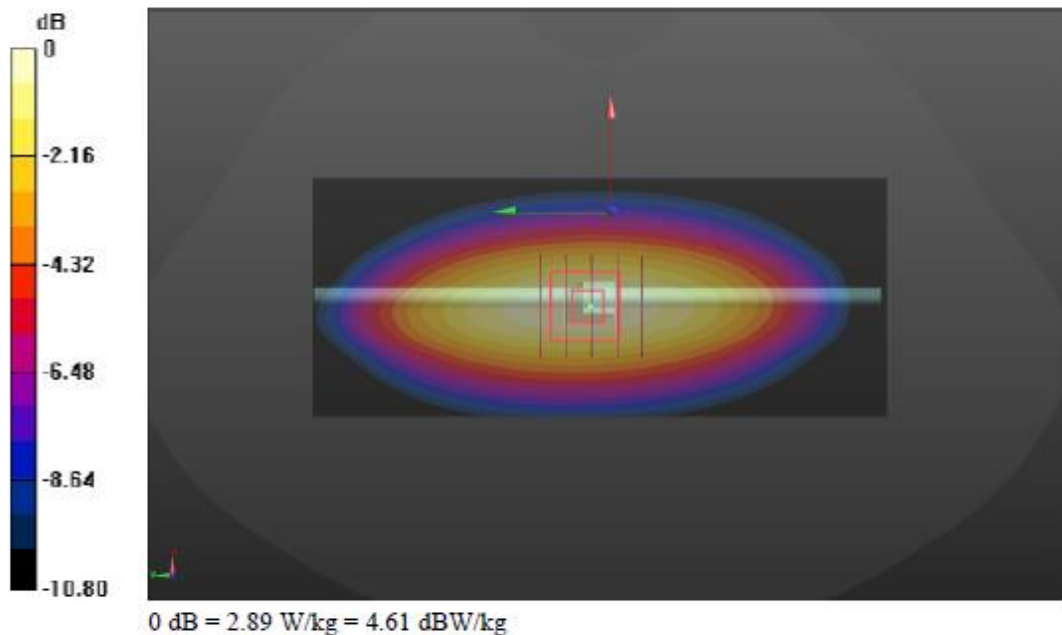
- Probe: EX3DV4 - SN7494; ConvF(10.8, 10.8, 10.8); Calibrated: 4/17/2023;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/27/2023
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Head/d=15mm, Pin=250mW, dist=1.4mm (EX-Probe)/Area Scan (51x121x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.87 W/kg

Head/d=15mm, Pin=250mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 58.62 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.36 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.89 W/kg



SystemPerformanceCheck-Head 835MHz

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 835$ MHz; $\sigma = 0.894$ S/m; $\epsilon_r = 40.123$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature:22.4°C;Liquid Temperature:22.2°C;

DASY Configuration:

- Probe: EX3DV4 - SN7494; ConvF(10.4, 10.4, 10.4); Calibrated: 4/17/2023;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/27/2023
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- 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) = 3.40 W/kg

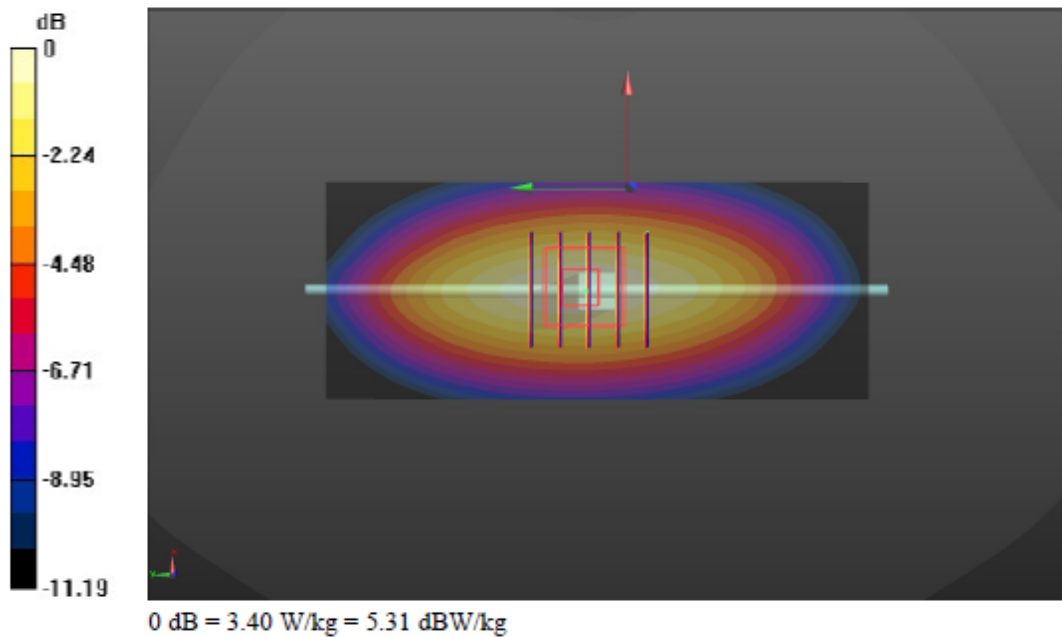
Head/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 63.28 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 3.97 W/kg

SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 3.40 W/kg



SystemPerformanceCheck-Head 1750MHz

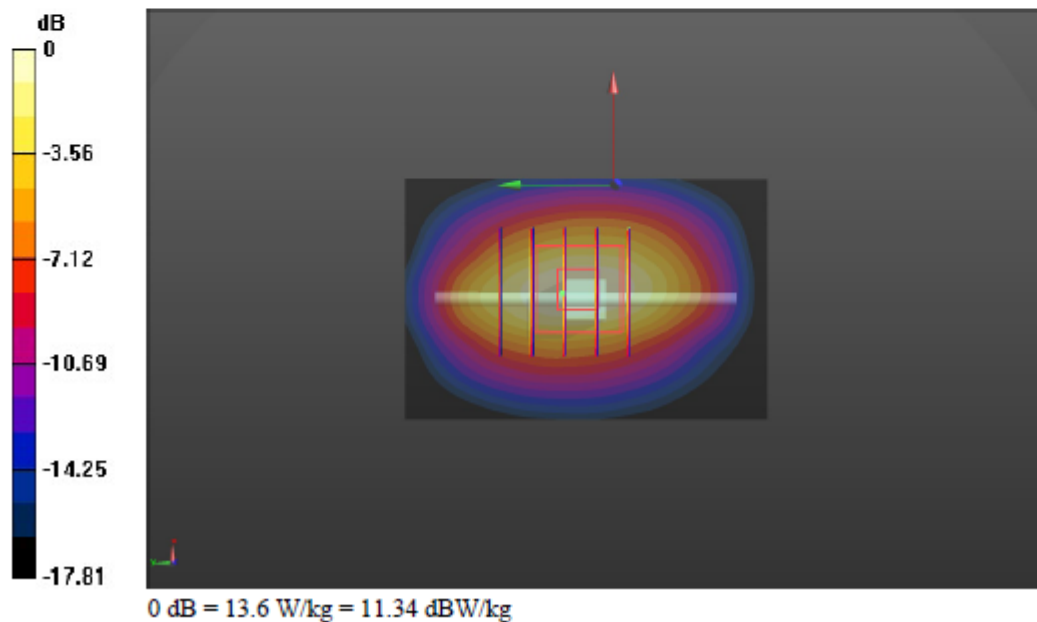
Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: $f = 1750$ MHz; $\sigma = 1.316$ S/m; $\epsilon_r = 38.564$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Ambient Temperature:22.4°C;Liquid Temperature:22.2°C;

DASY Configuration:

- Probe: EX3DV4 - SN7494; ConvF(8.99, 8.99, 8.99); Calibrated: 4/17/2023;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/27/2023
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- 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) = 14.1 W/kg

Head/d=10mm,Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,
dy=8mm, dz=5mm
Reference Value = 103.0 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 8.92 W/kg; SAR(10 g) = 4.74 W/kg
Maximum value of SAR (measured) = 13.6 W/kg



SystemPerformanceCheck-Head 1900MHz

Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.344$ S/m; $\epsilon_r = 38.388$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient Temperature: 22.4°C; Liquid Temperature: 22.2°C;

DASY Configuration:

- Probe: EX3DV4 - SN7494; ConvF(8.64, 8.64, 8.64); Calibrated: 4/17/2023;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/27/2023
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- 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) = 15.8 W/kg

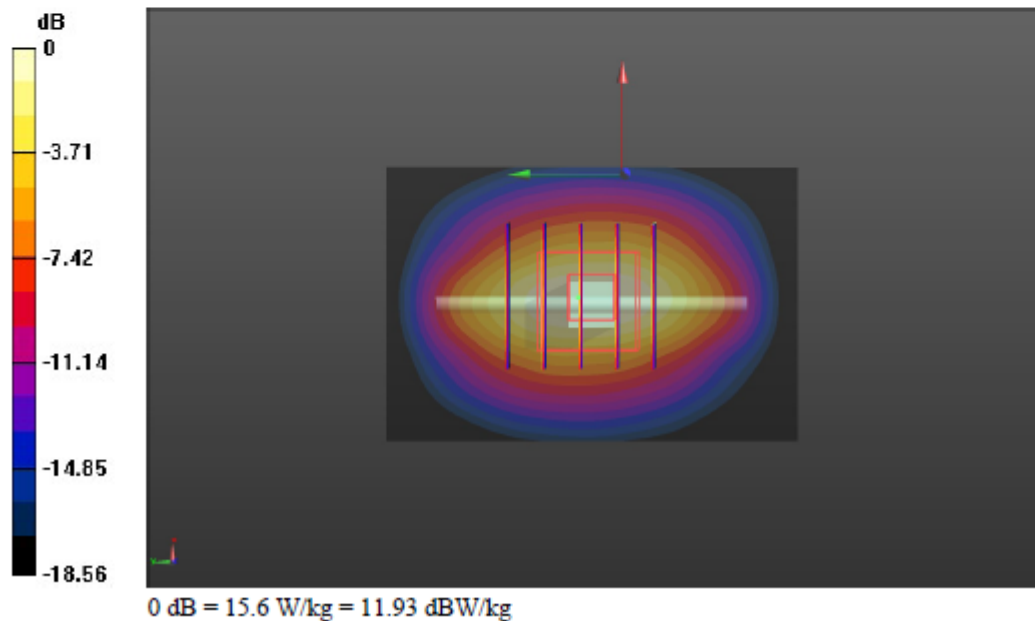
Head/d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 111.6 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 18.8 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.17 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



SystemPerformanceCheck-Head 2600MHz

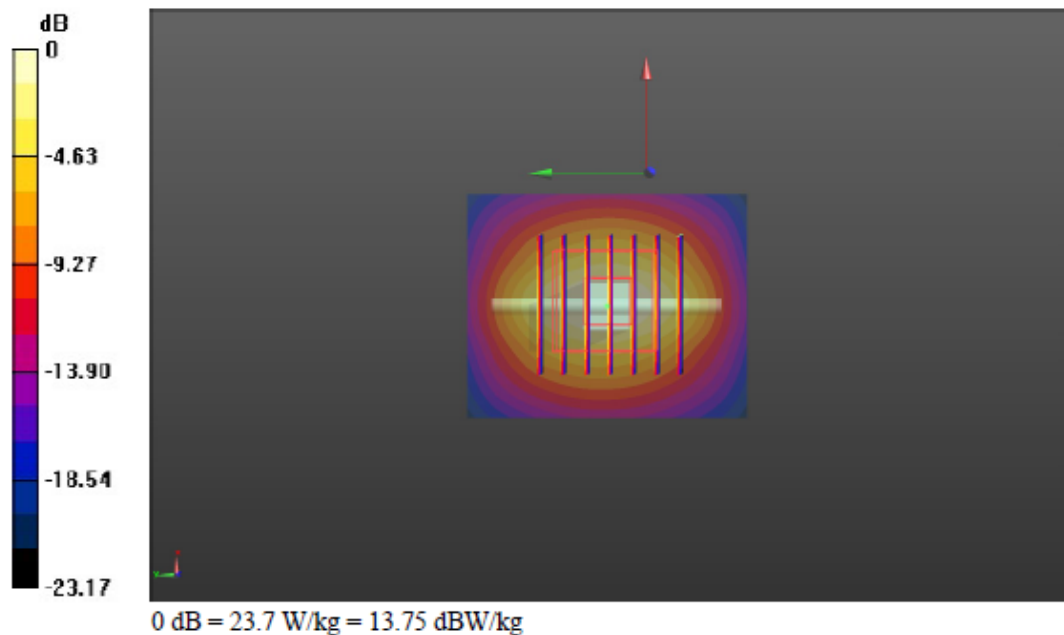
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: $f = 2600$ MHz; $\sigma = 1.88$ S/m; $\epsilon_r = 37.287$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Ambient Temperature:22.4°C;Liquid Temperature:22.2°C;

DASY Configuration:

- Probe: EX3DV4 - SN7494; ConvF(7.83, 7.83, 7.83); Calibrated: 4/17/2023;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/27/2023
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Head/d=10mm,Pin=250mW/Area Scan (41x51x1): Interpolated grid: dx=1.200 mm,
dy=1.200 mm
Maximum value of SAR (interpolated) = 25.0 W/kg

Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 117.0 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 29.7 W/kg
SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.15 W/kg
Maximum value of SAR (measured) = 23.7 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/ Uncontrolled Exposure Environment | Occupational/ Controlled Exposure Environment |
| Spatial Average SAR (whole body) | 0.08 | 0.4 |
| Spatial Peak SAR (1g cube tissue for head and trunk) | 1.6 | 8.0 |
| Spatial Peak SAR (10g for limb) | 4.0 | 20.0 |

Note:

- 1. Population/Uncontrolled Environments: are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.*
- 2. 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 and Tune-up

Please refer to appendix report

Note:

GSM

1. Per KDB 447498 D04, 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.

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 (β_c and β_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: β values for transmitter characteristics tests with HS-DPCCH

| Sub-test | β_c | β_d | β_d (SF) | β_c/β_d | β_{HS} (Note 1, Note 2) | CM (dB) (Note 3) | MPR (dB) (Note 3) |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------------------------|---------------------|----------------------|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0.0 |
| 2 | 12/15 (Note 4) | 15/15 (Note 4) | 64 | 12/15 (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: Δ_{ACK} , Δ_{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, Δ_{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 DPDCH, DPCCH 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 β_c/β_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 (β_c and β_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: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

| Sub-test | β_c | β_d | β_d (SF) | β_c/β_d | β_{HS} (Note 1) | β_{ec} | β_{ed} (Note 5) (Note 6) | β_{ed} (SF) | β_{ed} (Codes) | CM (dB) (Note 2) | MPR (dB) (Note 2) | AG Index (Note 6) | E-TFCI |
|----------|----------------|----------------|----------------|-------------------|-----------------------|--------------|--|-------------------|----------------------|------------------|-------------------|-------------------|--------|
| 1 | 11/15 (Note 3) | 15/15 (Note 3) | 64 | 11/15 (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 | β_{ed1} : 47/15 β_{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 (Note 4) | 15/15 (Note 4) | 64 | 15/15 (Note 4) | 30/15 | 24/15 | 134/15 | 4 | 1 | 1.0 | 0.0 | 21 | 81 |

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

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 β_c/β_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 β_c/β_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: β_{ed} can not be set directly, it is set by Absolute Grant Value.

LTE**General:**

1. CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel, bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.

LTE (TDD) Considerations

1. According to KDB 941225 D05 SAR for LTE Devices, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.
2. SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.
3. LTE TDD Bands support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplinkdownlink configurations and Table 4.2-1 for Special subframe configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

| Special subframe configuration | Normal cyclic prefix in downlink | | | Extended cyclic prefix in downlink | | |
|--------------------------------|----------------------------------|--------------------------------|----------------------------------|------------------------------------|--------------------------------|----------------------------------|
| | DwPTS | UpPTS | | DwPTS | UpPTS | |
| | | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink | | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink |
| 0 | $6592 \cdot T_s$ | $(1+X) \cdot 2192 \cdot T_s$ | $(1+X) \cdot 2560 \cdot T_s$ | $7680 \cdot T_s$ | $(1+X) \cdot 2192 \cdot T_s$ | $(1+X) \cdot 2560 \cdot T_s$ |
| 1 | $19760 \cdot T_s$ | | | $20480 \cdot T_s$ | | |
| 2 | $21952 \cdot T_s$ | | | $23040 \cdot T_s$ | | |
| 3 | $24144 \cdot T_s$ | | | $25600 \cdot T_s$ | | |
| 4 | $26336 \cdot T_s$ | | | $7680 \cdot T_s$ | | |
| 5 | $6592 \cdot T_s$ | $(2+X) \cdot 2192 \cdot T_s$ | $(2+X) \cdot 2560 \cdot T_s$ | $20480 \cdot T_s$ | $(2+X) \cdot 2192 \cdot T_s$ | $(2+X) \cdot 2560 \cdot T_s$ |
| 6 | $19760 \cdot T_s$ | | | $23040 \cdot T_s$ | | |
| 7 | $21952 \cdot T_s$ | | | $12800 \cdot T_s$ | | |
| 8 | $24144 \cdot T_s$ | | | - | | |
| 9 | $13168 \cdot T_s$ | | | - | | |
| 10 | $13168 \cdot T_s$ | $13152 \cdot T_s$ | $12800 \cdot T_s$ | - | - | - |

Table 4.2-2: Uplink-downlink configurations

| Uplink-downlink configuration | Downlink-to-Uplink Switch-point periodicity | Subframe number | | | | | | | | | |
|-------------------------------|---|-----------------|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 5 ms | D | S | U | U | U | D | S | U | U | U |
| 1 | 5 ms | D | S | U | U | D | D | S | U | U | D |
| 2 | 5 ms | D | S | U | D | D | D | S | U | D | D |
| 3 | 10 ms | D | S | U | U | U | D | D | D | D | D |
| 4 | 10 ms | D | S | U | U | D | D | D | D | D | D |
| 5 | 10 ms | D | S | U | D | D | D | D | D | D | D |
| 6 | 5 ms | D | S | U | U | U | D | S | U | U | D |

Calculated Duty Cycle = Extended cyclic prefix in uplink $\times (T_s) \times \#$ of S + $\#$ of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

Calculated Duty Cycle = $5120 \times [1/(15000 \times 2048)] \times 2 + 6 \text{ ms} = 63.33\%$

where

$T_s = 1/(15000 \times 2048)$ seconds

This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used-configuration 0 at 63.3% duty cycle.

12. Measured and Reported SAR Results

Measurement Results:

Please refer to appendix report

Measurement data plots:

Please refer to appendix D

Note:

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 D04 Interim General RF Exposure Guidance v01:

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:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 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
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 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 $\leq 1/4$ 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 ≤ 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 ≤ 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.

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 fo specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC 12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
- Testing for 16-QAM and 64-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

TDD LTE requirement:

For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9%) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix $63.3\%/62.9\% = 1.006$ is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg) * Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

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.

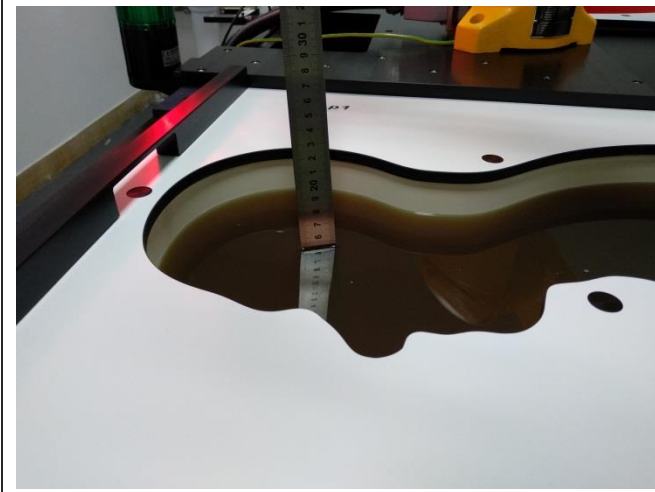
13. SAR Measurement Variability

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.

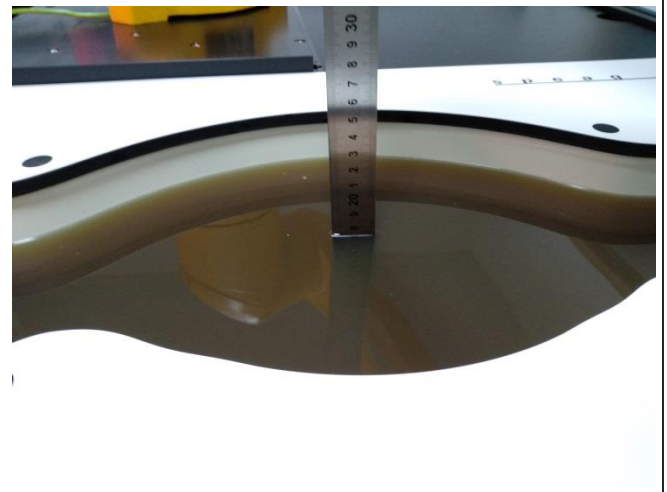
- 1) Repeated measurement is not required when the original highest measured SAR is <0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), repeat that measurement once.
- 3) Perform a second 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 ≥ 1.45 or 3.6 W/kg ($\sim 10\%$ 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 ≥ 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 3Tx slots | Left Touch | 190 | 836.6 | 0.855 | 0.848 | 0.008 | N/A | N/A |

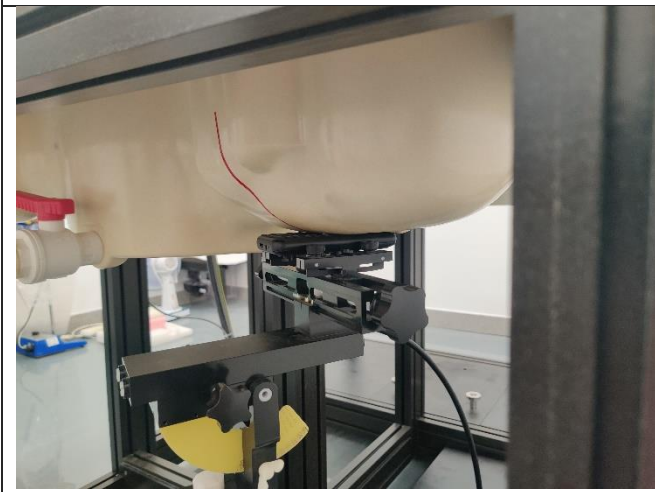
14. Test Setup Photos



Liquid depth in the Head phantom



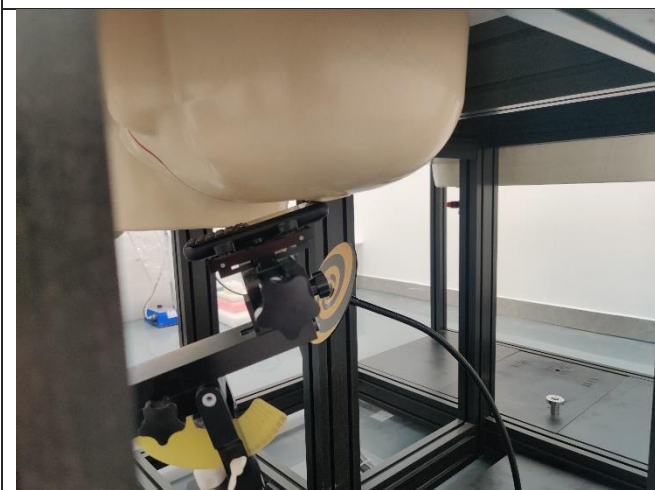
Liquid depth in the Body phantom



Left Head Touch



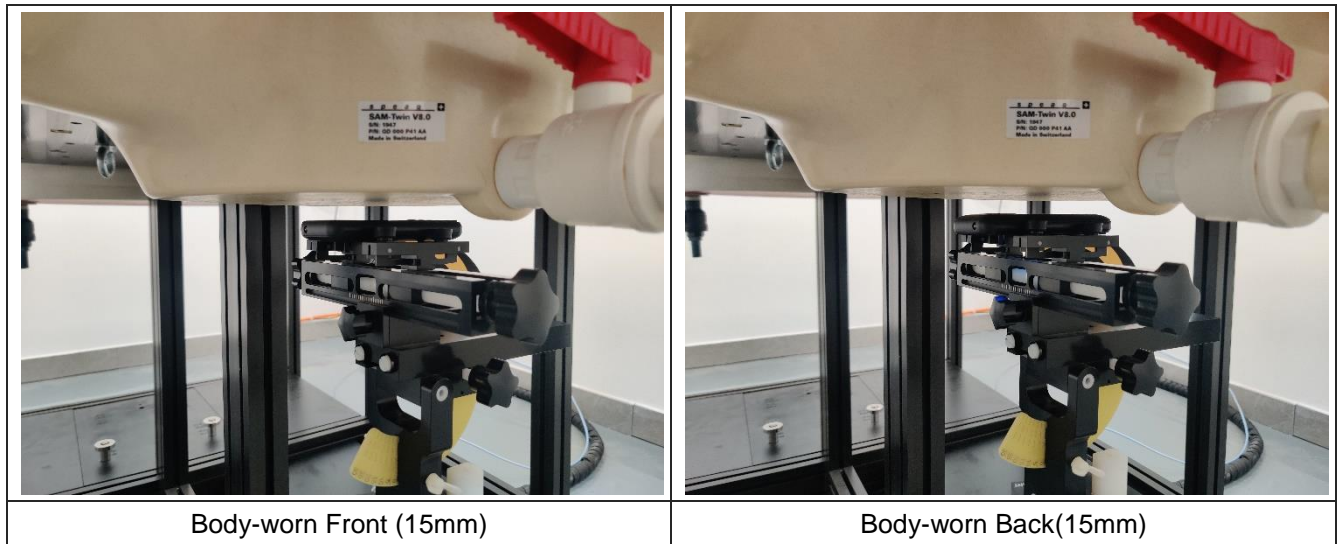
Right Head Touch



Left Head Tilt (15°)



Right Head Tilt (15°)



15. External and Internal Photos of the EUT

Please reference to the report No.: CHTEW23080049

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