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TEST REPORT

Report No. ..... :	**CHTEW19070085**
Project No. ..... :	**SHT1906074402EW**
FCC ID ..... :	**QRP-SP-010**
Applicant's name ..... :	**Azumi S.A**
Address.....:	Avenida Aquilino de la Guardia con Calle 47, PH Ocean Plaza, Piso 16 of. 16-01, Marbella, Ciudad de Panama, Panama
Manufacturer.....:	AZUMI HK LTD
Address.....:	FLAT/RM 18 BLK 1 14/F GOLDEN INDUSTRIAL BUILDING 16-26 KWAI TAK STREET KWAI CHUNG,HK
Test item description ..... :	**Mobile Phone**
Trade Mark .....:	AZUMI
Model/Type reference.....:	M5
Listed Model(s) .....:	-
Standard ..... :	**FCC 47 CFR Part2.1093** **IEEE Std C95.1, 1999 Edition** **IEEE 1528: 2013**
Date of receipt of test sample…….:	Jun.28, 2019
Date of testing……...:	Jun.28, 2019- Jul.17, 2019
Date of issue…….:	Jul.18, 2019
Result..... ……...:	**PASS**

Report verificaiton:

Compiled by (position+printedname+signature)...:	File administrators: Fanghui Zhu	Fanghui Zhu
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Approved by (position+printedname+signature)...:	Manager: Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
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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 Proceduresfor802.11 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:	Azumi S.A
Address:	Avenida Aquilino de la Guardia con Calle 47, PH Ocean Plaza, Piso 16 of. 16-01, Marbella, Ciudad de Panama, Panama
Manufacturer:	AZUMI HK LTD
Address:	FLAT/RM 18 BLK 1 14/F GOLDEN INDUSTRIAL BUILDING 16-26 KWAI TAK STREET KWAI CHUNG,HK

2.2. Product Description

Name of EUT:	Mobile Phone			
Trade Mark:	AZUMI			
Model No.:	M5			
Listed Model(s):	-			
Power supply:	DC 3.8V			
Device Category:	Portable			
Product stage:	Production unit			
RF Exposure Environment:	General Population/Uncontrolled			
IMEI:	357665063588155			
Hardware version:	B55C_V1.0K			
Software version:	AZUMI_M5_OPEN_V001			
Device Dimension:	Overall (Length x Width x Thickness): 142 x 72 x 9mm			
Maximum SAR Value				
Separation Distance:	Body-worn:	10mm		
	Hotspot:	10mm		
Max Report SAR Value(1g):	Test location:	PCE	DTS	Simultaneous Tx
	Head:	0.727 W/kg	0.369 W/kg	1.096 W/kg
	Body-worn:	0.785 W/kg	0.144 W/kg	0.929 W/kg
	Hotspot:	0.785 W/kg	0.144 W/kg	0.929 W/kg
GSM				
Operation Band:	GSM850 PCS1900			
Support Network:	GSM,GPRS			
Operating Mode:	GSM:GMSK GPRS:GMSK EGPRS:8PSK			
GPRS Multi-Slot Class:	12			
EGPRS Multi-Slot Class:	12			
Antenna Type:	PIFA			

WCDMA	
Operation Band:	FDD Band II FDD Band V
Power Class:	Class 3
Operating Mode:	UMTS Rel. 99 (Voice & Data) HSDPA HSUPA
Antenna Type:	PIFA
WiFi 2.4G	
Operating Mode:	802.11b 802.11g 802.11n(HT20)
Antenna Type:	PIFA
Bluetooth	
Version:	BT4.2+EDR
Operating Mode:	GFSK π/4DQPSK 8DPSK
Antenna Type:	PIFA
Bluetooth	
Version:	BT4.2+BLE
Operating Mode:	GFSK
Antenna Type:	PIFA

Remark:

1. *The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power.*
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 justifcatio. 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 ⩽ 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.

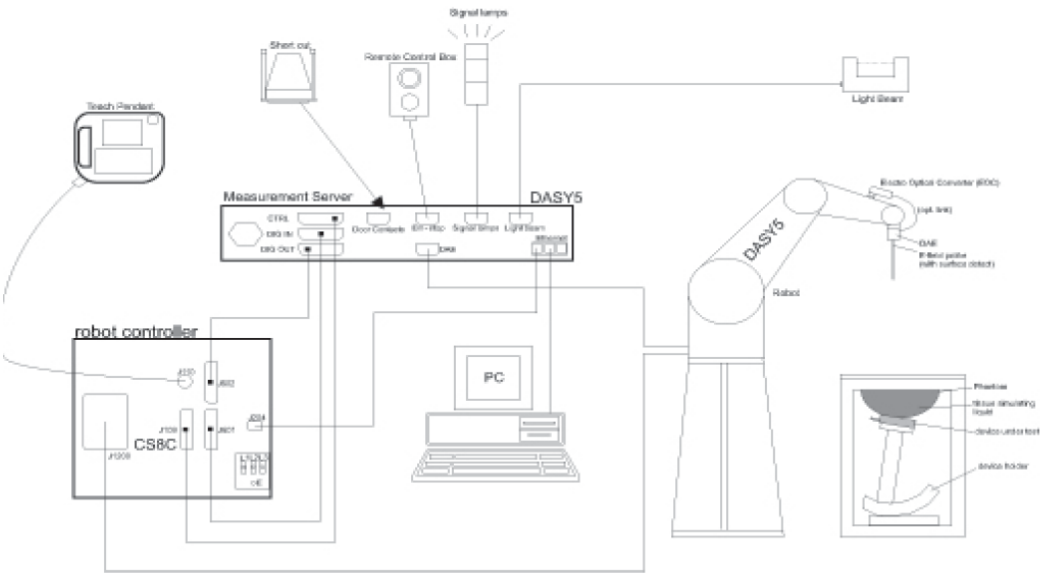
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

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.

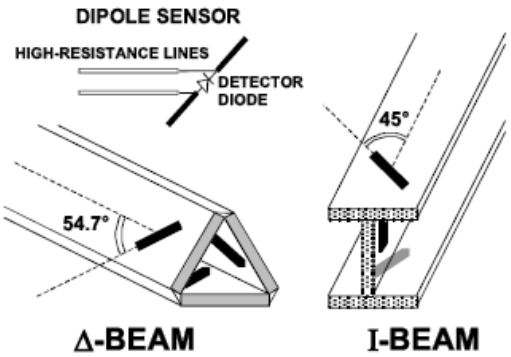
- **Probe Specification**

Construction	Symmetrical design with triangular core 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 µW/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.

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI isfully compatible with standard and all known tissuesimulating liquids. ELI has been optimized regarding its performance and can beintegrated into our standard phantom tables. A cover prevents evaporation ofthe liquid. Reference markings on the phantom allow installation of thecomplete setup, including all predefined phantom positions and measurementgrids, by teaching three points. The phantom is compatible with all SPEAGdosimetric 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. ± 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 ± 0.1mm). 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 ± 30°.)

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

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·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.	
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 1st 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	≤ 1.5·$\Delta z_{Zoom}(n-1)$ 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

Note: δ 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 *reported* SAR from the *area scan based 1-g SAR estimation* 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.

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)
dcpi: diode compression point (DASY parameter)

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

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

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

Vi: compensated signal of channel (i = x, y, z)
Normi: sensor sensitivity of channel (i = x, y, z), [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.

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

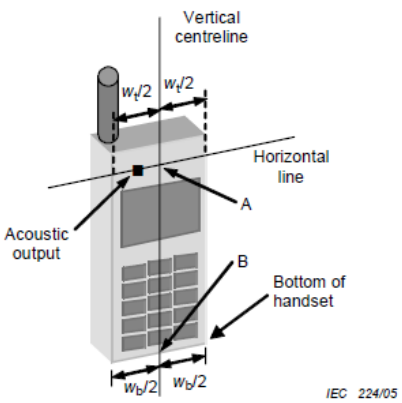
SAR: local specific absorption rate in W/kg
Etot: total field strength in V/m
σ: conductivity in [mho/m] or [Siemens/m]
ρ: equivalent tissue density in g/cm3

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.

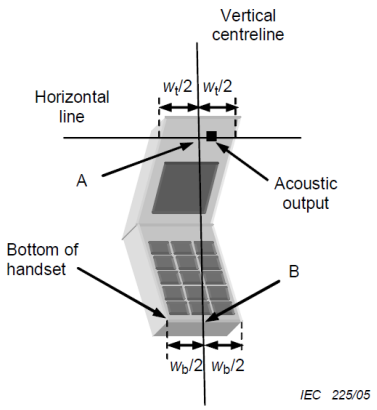
8. Position of the wireless device in relation to the phantom

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.



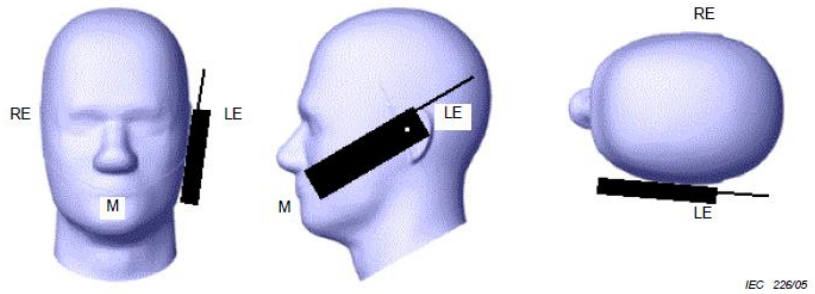
Figures 5a



Figures 5b

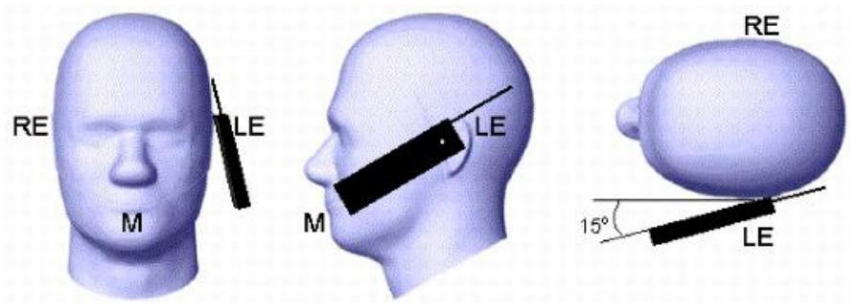
W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the widthwt of the handset at the level of the acoustic output
B	Midpoint of the width wb of the bottom of the handset

Cheek position



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

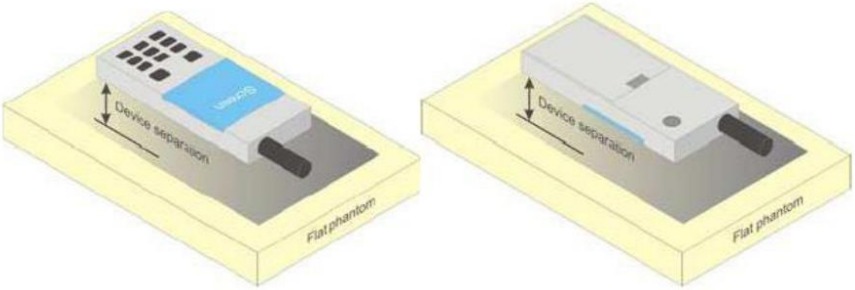
Tilt position



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

8.2. Body Position

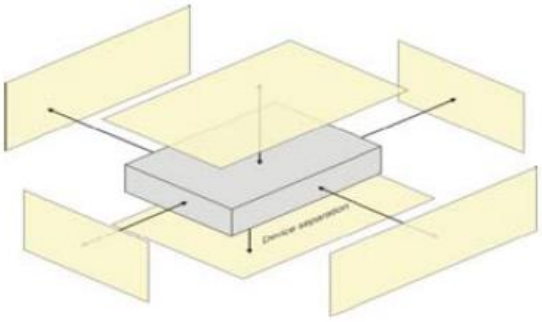
Devices that support transmission while used with body-worn accessories must be tested for body-worn accessory SAR compliance, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.
Devices that 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 ≤ 5mm 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 cm x 5 cm. For smaller devices with dimensions ≤ 9 cm x 5 cm because of a greater potential for next to body use a test separation of ≤ 5 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℃ to 25℃ and within ± 2℃ 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 ± 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 ε_r and σ may be relaxed to ± 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 and Body				
Target Frequency (MHz)	Head		Body	
	ε_r	σ(S/m)	ε_r	σ(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:

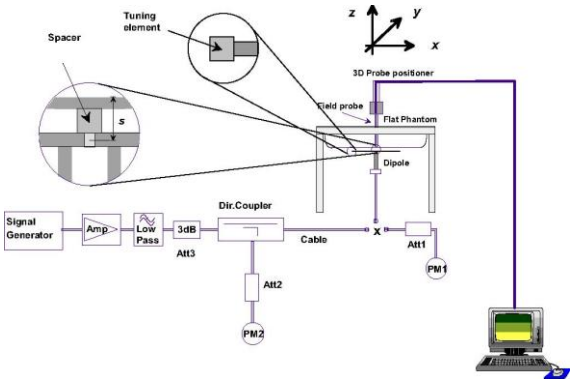
Dielectric performance of Head tissue simulating liquid									
Frequency (MHz)	ε_r		σ(S/m)		Delta (ε_r)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
835	41.50	42.50	0.90	0.93	2.41%	3.56%	±5%	22.5	2019/7/4
1900	40.00	41.67	1.40	1.47	4.16%	4.71%	±5%	22.5	2019/7/5
2450	39.20	40.96	1.80	1.84	4.48%	2.11%	±5%	22.5	2019/7/11

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

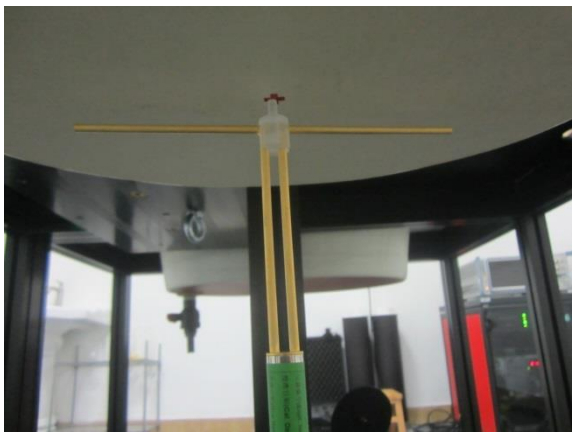


Photo of Dipole Setup

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 ±10% of the manufacturer calibrated dipole SAR target.

Head											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (℃)	Date
	Target 1W	Normalize to 1W	Measured 250mW	Target 1W	Normalize to 1W	Measured 250mW					
835	9.51	9.92	2.48	6.15	6.52	1.63	4.31%	6.02%	±10%	22.5	2019/7/4
1900	40.30	41.60	10.40	21.10	21.68	5.42	3.23%	2.75%	±10%	22.5	2019/7/5
2450	51.50	50.40	12.60	24.10	23.44	5.86	-2.14%	-2.74%	±10%	22.5	2019/7/11

Plots of System Performance Check

System Performance Check-Head 835MHz

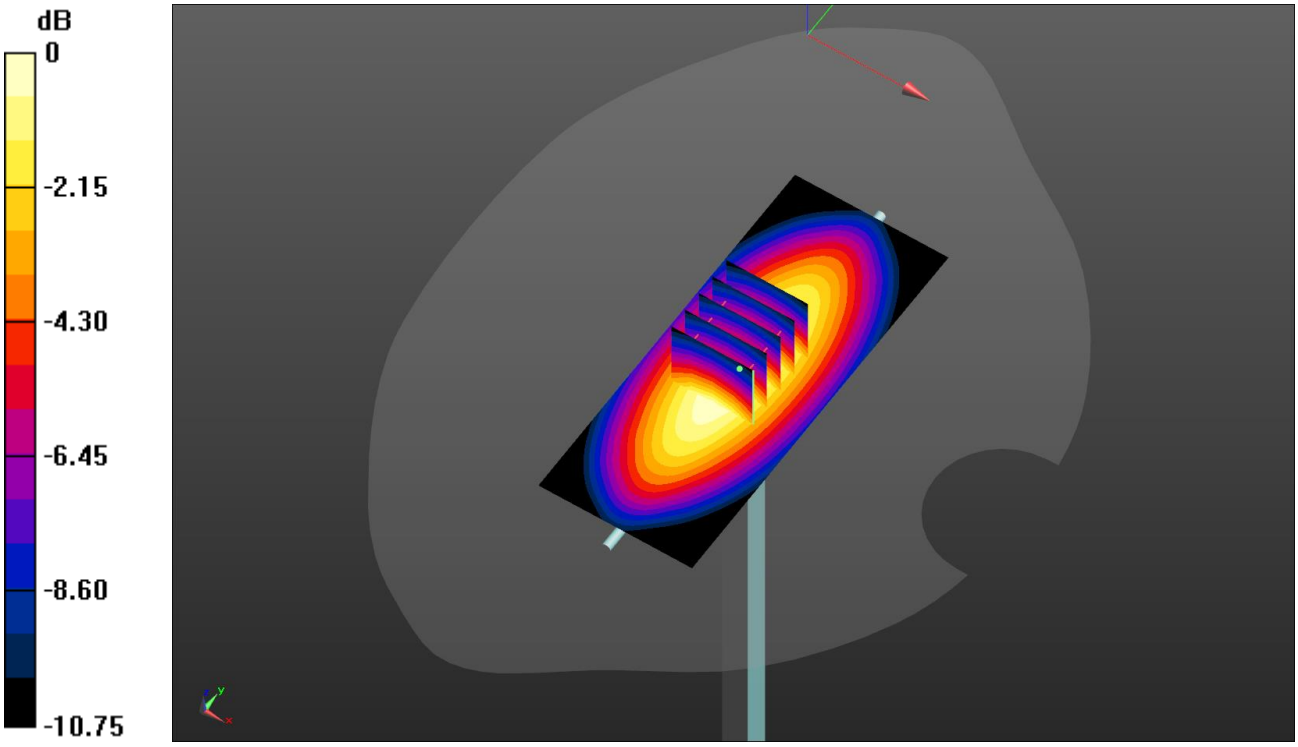
DUT: D835V2; Type: D835V2; Serial: 4d238
Date: 2019-07-04
Communication System: UID 0, CW (0); Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.932 S/m; ε_r = 42.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

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=8mm, dy=8mm, dz=5mm
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

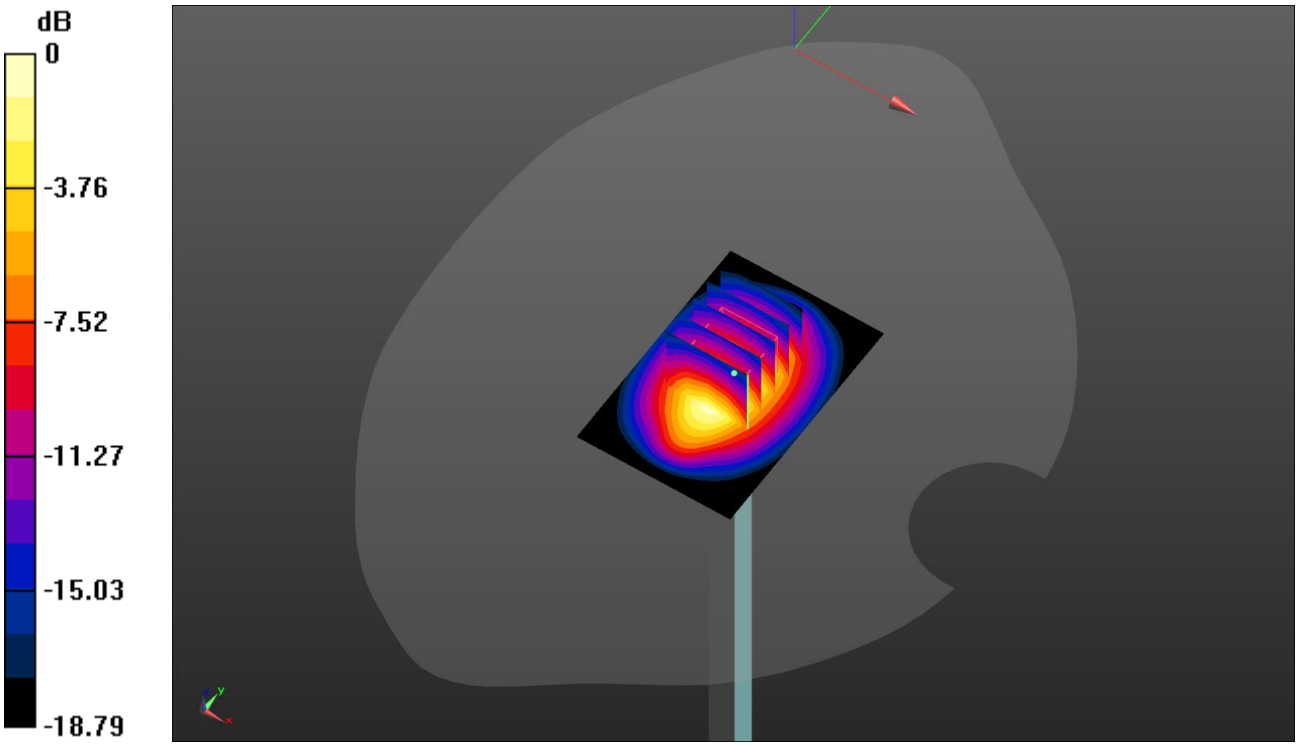
DUT: D1900V2; Type: D1900V2; Serial: 5d226
Date:2019-07-05
Communication System: UID 0, CW (0); Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.466 S/m; ε_r = 41.665; ρ = 1000 kg/m^3
Phantom section: Flat Section

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=8mm, dy=8mm, dz=5mm
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

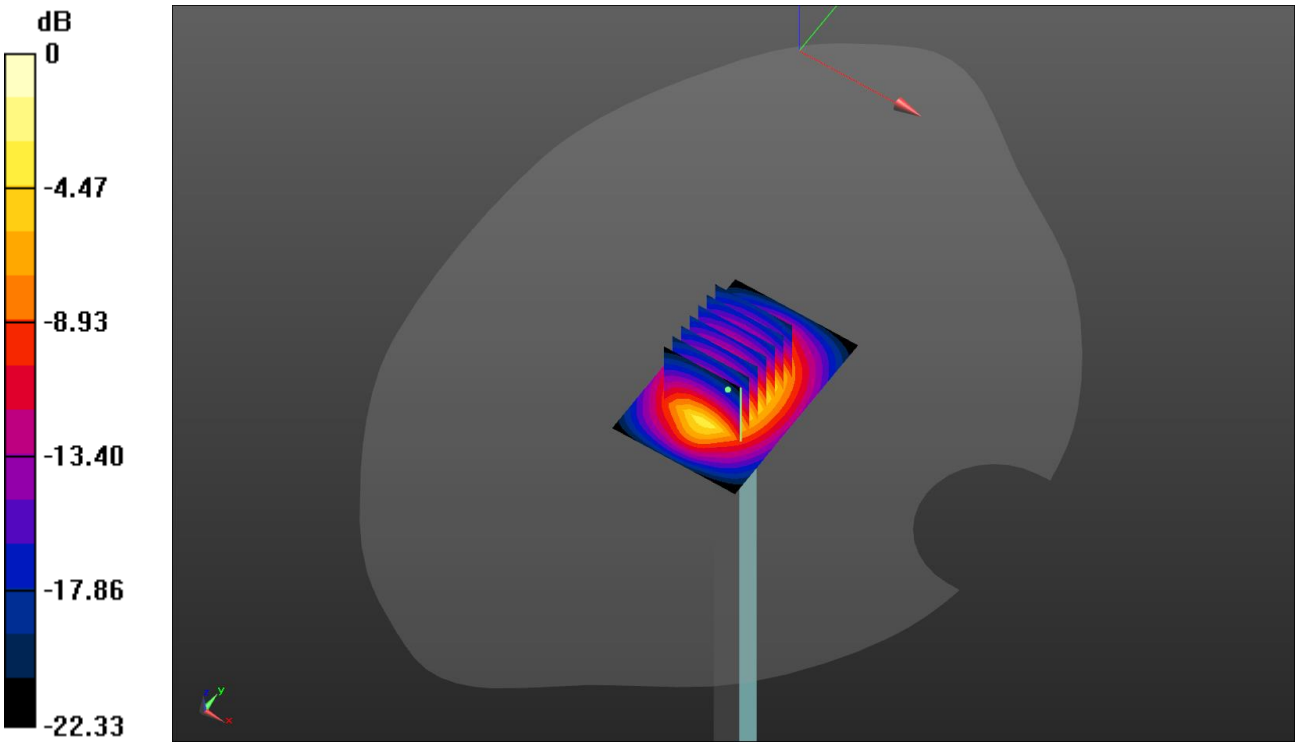
DUT: D2450V2; Type: D2450V2; Serial: 1009
Date:2019-07-11
Communication System: UID 0, CW (0); Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.838 S/m; ε_r = 40.956; ρ = 1000 kg/m^3
Phantom section: Flat Section

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=5mm, dy=5mm, dz=5mm
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/ 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

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		33.04	32.93	32.98	-9.03	24.01	23.90	23.95
GPRS (GMSK)	1TXslot	33.12	33.55	33.30	-9.03	24.09	24.52	24.27
	2TXslots	31.54	31.55	31.27	-6.02	25.52	25.53	25.25
	3TXslots	29.79	29.56	29.30	-4.26	25.53	25.30	25.04
	4TXslots	27.79	27.54	27.26	-3.01	24.78	24.53	24.25
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		28.70	29.44	29.36	-9.03	19.67	20.41	20.33
GPRS (GMSK)	1TXslot	28.68	29.35	29.26	-9.03	19.65	20.32	20.23
	2TXslots	27.91	28.62	28.69	-6.02	21.89	22.60	22.67
	3TXslots	26.84	27.65	27.81	-4.26	22.58	23.39	23.55
	4TXslots	25.17	26.02	26.32	-3.01	22.16	23.01	23.31

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 thest setting are illustrated belowe:

HSDPA Setup Configureation:

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 (βc and βd) 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 waw 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} *(Note1, 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 Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_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 Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c , and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c .

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_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 β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configureation:

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 (βc and βd) 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 waw 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} (Note1)	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	209/225	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	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 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 Δ_{CQI} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_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 β_c = 10/15 and β_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 β_c = 14/15 and β_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.

Setup Configuration

General Note:

1. Per KDB 941225 D01, SAR for Head / Hotsport / Body-worn Exposure is measured using a 12.2Kbps RMC with TPC bit ocnfigured to all 1s
2. 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 ≦1/4dB 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.

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		22.14	22.68	22.44	23.05	23.33	23.20
RMC 12.2K		22.17	22.71	22.47	23.08	23.37	23.23
HSDPA	Subtest-1	21.80	21.37	20.43	23.91	21.61	22.93
	Subtest-2	21.46	21.06	20.37	23.83	21.85	22.99
	Subtest-3	21.21	20.83	20.10	23.10	21.05	22.26
	Subtest-4	20.89	20.61	19.80	23.06	21.06	22.24
HSUPA	Subtest-1	18.40	18.53	17.72	20.18	18.05	19.57
	Subtest-2	18.62	18.69	17.75	20.29	18.29	19.71
	Subtest-3	18.36	18.55	17.68	20.52	18.40	19.95
	Subtest-4	18.77	18.75	17.93	20.48	18.29	19.87
	Subtest-5	21.75	21.85	21.21	23.90	22.04	23.27

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 ≤ 1.2 W/kg.

WiFi 2.4G				
Mode	Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Average Power (dBm)
802.11b	1	2412	13.59	11.70
	6	2437	13.89	11.49
	11	2462	13.84	12.05
802.11g	1	2412	16.38	12.45
	6	2437	17.13	12.48
	11	2462	15.90	12.82
802.11n (HT20)	1	2412	16.12	12.51
	6	2437	16.16	12.53
	11	2462	15.49	12.91

11.4. Bluetooth

Bluetooth				
Mode	Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Average Power (dBm)
GFSK	0	2402	4.59	4.55
	39	2441	3.82	3.75
	78	2480	3.19	3.12
π/4QPSK	0	2402	5.46	3.58
	39	2441	4.44	2.75
	78	2480	4.02	2.60
8DPSK	0	2402	5.57	3.99
	39	2441	4.35	2.39
	78	2480	3.91	2.27
GFSK(BLE)	0	2402	-	-3.61
	19	2440	-	-3.40
	39	2480	-	-5.38

12. Maximum Tune-up Limit

GSM		
Mode	Maximum Tune-up (dBm)	
	GSM850	PCS1900
GSM (GMSK, 1Tx Slot)	33.50	29.50
GPRS (GMSK, 1Tx Slot)	34.00	29.50
GPRS (GMSK, 2Tx Slots)	32.00	29.00
GPRS (GMSK, 3Tx Slots)	30.00	28.00
GPRS (GMSK, 4Tx Slots)	28.00	26.50

WCDMA		
Mode	Maximum Tune-up (dBm)	
	FDD Band II	FDD Band V
AMR 12.2Kbps	23.00	23.50
RMC 12.2Kbps	23.00	23.50
HSDPA Subtest-1	22.00	24.00
HSDPA Subtest-2	21.50	24.00
HSDPA Subtest-3	21.50	23.50
HSDPA Subtest-4	21.00	23.50
HSUPA Subtest-1	19.00	20.50
HSUPA Subtest-2	19.00	20.50
HSUPA Subtest-3	19.00	21.00
HSUPA Subtest-4	19.00	20.50
HSUPA Subtest-5	22.00	24.00

WiFi 2.4G	
Mode	Maximum Tune-up (dBm) Conducted Average Power
802.11b	12.50
802.11g	13.00
802.11n(HT20)	13.00

Bluetooth	
Mode	Maximum Tune-up (dBm) Conducted Average Power
GFSK	5.00
π/4QPSK	4.00
8DPSK	4.00
GFSK(BLE)	-3.0

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

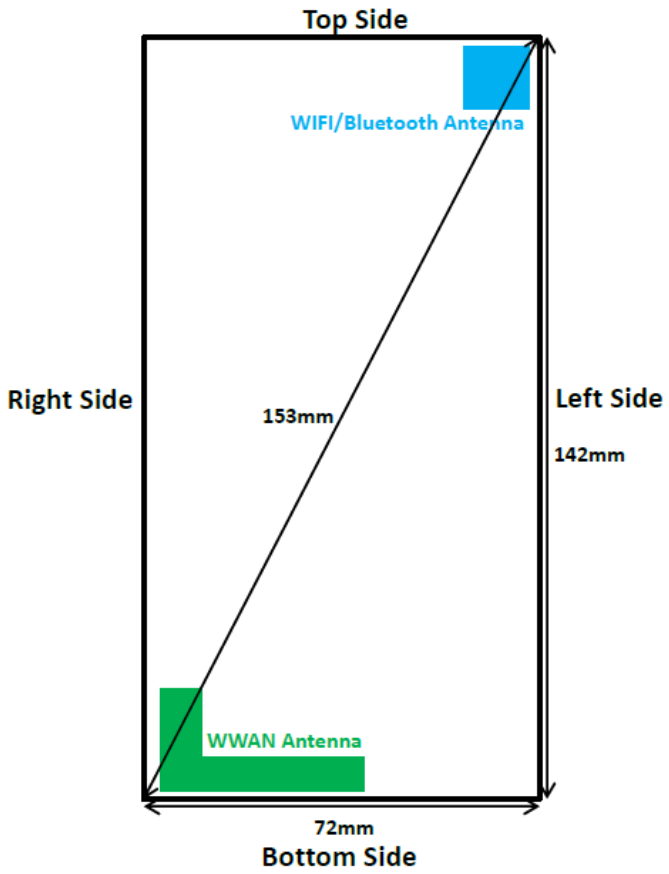
[(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≦3.0 for 1-g SAR

Band/Mode	F(GHz)	Position	Separation Distance (mm)	Exclusion Thresholds	SAR test exclusion
Bluetooth	2.45	Head	0	1.0	Yes
		Body	10	0.5	Yes

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

The test exclusion thereshold is ≦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	115	2	2	33
WiFi/BT	2	3	2	125	54	2

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

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:

- ≤ 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 ≤ ¼ 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 ≤ 1/4dB higher than GPRS/EDGE (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EDGE (GMSK) is ≤ 1.2W/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 ≤ 1.2 W/kg and secondary mode is ≤ ¼ 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:

- ≤ 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 ≤ 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 ≤ 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 ≤ 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 ≤ 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	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	0.18	0.418	0.464	-
		251	848.8	31.27	32.00	1.18	-	-	-	-
	Left Tilt	128	824.2	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	-0.10	0.320	0.355	-
		251	848.8	31.27	32.00	1.18	-	-	-	-
	Right Cheek	128	824.2	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	-0.16	0.438	0.486	1
		251	848.8	31.27	32.00	1.18	-	-	-	-
	Right Tilt	128	824.2	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	0.10	0.332	0.368	-
		251	848.8	31.27	32.00	1.18	-	-	-	-

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 (3Tx slots)	Left Cheek	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	-0.02	0.645	0.674	-
	Left Tilt	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	-0.01	0.519	0.542	-
	Right Cheek	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	0.04	0.696	0.727	2
	Right Tilt	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	0.01	0.547	0.571	-

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	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	-0.11	0.350	0.374	-
		9538	1907.6	22.47	23.00	1.13	-	-	-	-
	Left Tilt	9262	1852.4	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	0.16	0.288	0.308	-
		9538	1907.6	22.47	23.00	1.13	-	-	-	-
	Right Cheek	9262	1852.4	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	-0.15	0.660	0.706	3
		9538	1907.6	22.47	23.00	1.13	-	-	-	-
	Right Tilt	9262	1852.4	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	0.06	0.529	0.566	-
		9538	1907.6	22.47	23.00	1.13	-	-	-	-

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	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	0.13	0.255	0.263	-
		4233	846.6	23.23	23.50	1.06	-	-	-	-
	Left Tilt	4132	826.4	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	-0.14	0.195	0.201	-
		4233	846.6	23.23	23.50	1.06	-	-	-	-
	Right Cheek	4132	826.4	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	0.19	0.291	0.300	4
		4233	846.6	23.23	23.50	1.06	-	-	-	-
	Right Tilt	4132	826.4	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	0.08	0.220	0.227	-
		4233	846.6	23.23	23.50	1.06	-	-	-	-

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	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	-0.08	0.116	0.129	-
	Left Tilt	1	2412	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	0.13	0.098	0.109	-
	Right Cheek	1	2412	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	-0.13	0.333	0.369	5
	Right Tilt	1	2412	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	-0.06	0.280	0.310	-

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	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	0.02	0.388	0.430	-
		251	848.8	31.27	32.00	1.18	-	-	-	-
	Rear	128	824.2	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	-0.04	0.588	0.652	6
		251	848.8	31.27	32.00	1.18	-	-	-	-

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 (3Tx slots)	Front	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	-0.01	0.475	0.496	-
	Rear	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	0.02	0.751	0.785	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	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	-0.01	0.497	0.531	-
		9538	1907.6	22.47	23.00	1.13	-	-	-	-
	Rear	9262	1852.4	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	0.03	0.699	0.747	8
		9538	1907.6	22.47	23.00	1.13	-	-	-	-

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	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	-0.02	0.251	0.259	-
		4233	846.6	23.23	23.50	1.06	-	-	-	-
	Rear	4132	826.4	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	0.05	0.381	0.393	9
		4233	846.6	23.23	23.50	1.06	-	-	-	-

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	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	0.06	0.086	0.095	-
	Rear	1	2412	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	-0.12	0.130	0.144	10

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	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	0.02	0.388	0.430	-
		251	848.8	31.27	32.00	1.18	-	-	-	-
	Rear	128	824.2	31.54	32.00	1.11	-	-	-	-
		190	836.6	31.55	32.00	1.11	-0.04	0.588	0.652	6
		251	848.8	31.27	32.00	1.18	-	-	-	-
	Left	190	836.6	31.55	32.00	1.11	-	-	-	-
	Right	190	836.6	31.55	32.00	1.11	-0.01	0.346	0.384	-
	Top	190	836.6	31.55	32.00	1.11	-	-	-	-
	Bottom	190	836.6	31.55	32.00	1.11	-0.01	0.239	0.265	-

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 (3Tx slots)	Front	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	-0.01	0.475	0.496	-
	Rear	512	1850.2	26.84	28.00	1.31	-	-	-	-
		661	1880	27.65	28.00	1.08	-	-	-	-
		810	1909.8	27.81	28.00	1.04	0.02	0.751	0.785	7
	Left	810	1909.8	27.81	28.00	1.04	-	-	-	-
	Right	810	1909.8	27.81	28.00	1.04	0.01	0.442	0.462	-
	Top	810	1909.8	27.81	28.00	1.04	-	-	-	-
	Bottom	810	1909.8	27.81	28.00	1.04	0.01	0.586	0.612	-

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	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	-0.01	0.497	0.531	-
		9538	1907.6	22.47	23.00	1.13	-	-	-	-
	Rear	9262	1852.4	22.17	23.00	1.21	-	-	-	-
		9400	1880	22.71	23.00	1.07	0.03	0.699	0.747	8
		9538	1907.6	22.47	23.00	1.13	-	-	-	-
	Left	9400	1880.0	22.71	23.00	1.07	-	-	-	-
	Right	9400	1880.0	22.71	23.00	1.07	0.01	0.411	0.439	-
	Top	9400	1880.0	22.71	23.00	1.07	-	-	-	-
	Bottom	9400	1880.0	22.71	23.00	1.07	0.01	0.546	0.584	-

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	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	-0.02	0.251	0.259	-
		4233	846.6	23.23	23.50	1.06	-	-	-	-
	Rear	4132	826.4	23.08	23.50	1.10	-	-	-	-
		4183	836.6	23.37	23.50	1.03	0.05	0.381	0.393	9
		4233	846.6	23.23	23.50	1.06	-	-	-	-
	Left	4183	836.6	23.37	23.50	1.03	-	-	-	-
	Right	4183	836.6	23.37	23.50	1.03	0.02	0.224	0.231	-
	Top	4183	836.6	23.37	23.50	1.03	-	-	-	-
	Bottom	4183	836.6	23.37	23.50	1.03	0.02	0.155	0.160	-

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	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	0.060	0.086	0.095	-
	Rear	1	2412	11.70	12.50	1.20	100.00%	1.00	-	-	-	-
		6	2437	11.49	12.50	1.26	100.00%	1.00	-	-	-	-
		11	2462	12.05	12.50	1.11	100.00%	1.00	-0.120	0.130	0.144	10
	Left	11	2462	12.05	12.50	1.11	100.00%	1.00	0.07	0.080	0.089	-
	Right	11	2462	12.05	12.50	1.11	100.00%	1.00	-	-	-	-
	Top	11	2462	12.05	12.50	1.11	100.00%	1.00	-0.10	0.057	0.063	-
	Bottom	11	2462	12.05	12.50	1.11	100.00%	1.00	-	-	-	-

SAR Test Data Plots to the Appendix A.

15. 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) [(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)/x]W/kg for test separation distances ≦50mm; whetn x=7.5 for 1-g SAR, and x=18.75 for 10-g SAR.
   b) When the minimum separation distance is <5mm, 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 >50mm.

Bluetooth Max power	Exposure position	Head	Body-worn
	Test separation	0mm	10mm
5.00dBm	Estimated SAR (W/kg)	0.132	0.066

15.1. Head

WWAN+ WLAN DTS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WLAN DTS	(W/kg)
GSM	GSM850	Left Cheek	0.464	0.129	0.593
		Left Tilted	0.355	0.109	0.464
		Right Cheek	0.486	0.369	0.855
		Right Tilted	0.368	0.310	0.678
	PCS1900	Left Cheek	0.674	0.129	0.803
		Left Tilted	0.542	0.109	0.651
		Right Cheek	0.727	0.369	**1.096**
		Right Tilted	0.571	0.310	0.881
WCDMA	Band II	Left Cheek	0.374	0.129	0.503
		Left Tilted	0.308	0.109	0.417
		Right Cheek	0.706	0.369	1.075
		Right Tilted	0.566	0.310	0.876
	Band V	Left Cheek	0.263	0.129	0.392
		Left Tilted	0.201	0.109	0.310
		Right Cheek	0.300	0.369	0.669
		Right Tilted	0.227	0.310	0.537

WWAN+ Bluetooth					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	Bluetooth	(W/kg)
GSM	GSM850	Left Cheek	0.464	0.132	0.596
		Left Tilted	0.355	0.132	0.487
		Right Cheek	0.486	0.132	0.618
		Right Tilted	0.368	0.132	0.500
	PCS1900	Left Cheek	0.674	0.132	0.806
		Left Tilted	0.542	0.132	0.674
		Right Cheek	0.727	0.132	0.859
		Right Tilted	0.571	0.132	0.703
WCDMA	Band II	Left Cheek	0.374	0.132	0.506
		Left Tilted	0.308	0.132	0.440
		Right Cheek	0.706	0.132	0.838
		Right Tilted	0.566	0.132	0.698
	Band V	Left Cheek	0.263	0.132	0.395
		Left Tilted	0.201	0.132	0.333
		Right Cheek	0.300	0.132	0.432
		Right Tilted	0.227	0.132	0.359

15.2. Body-worn

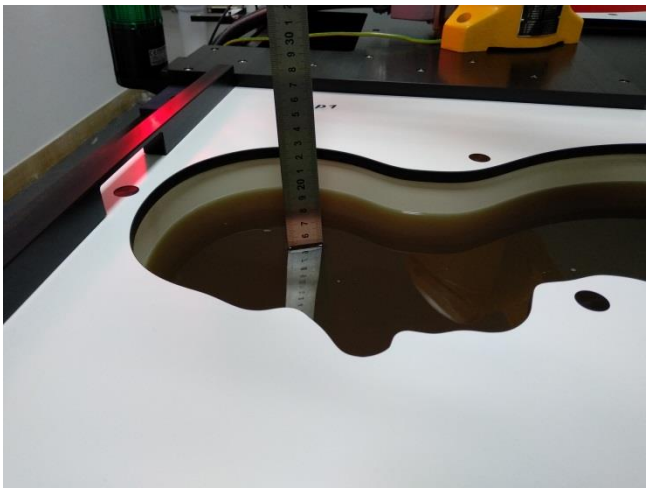
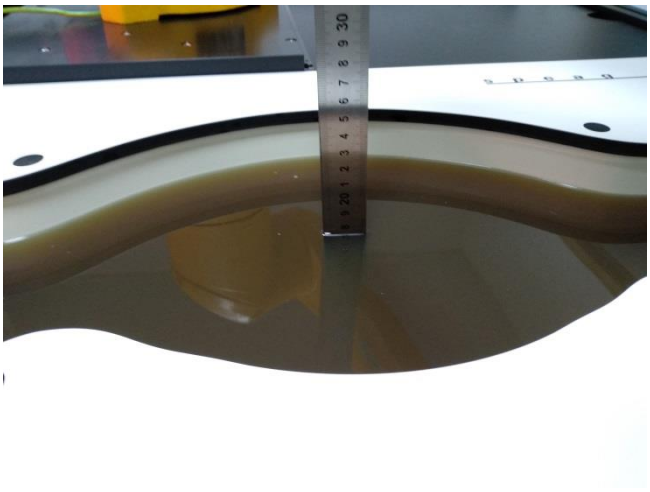
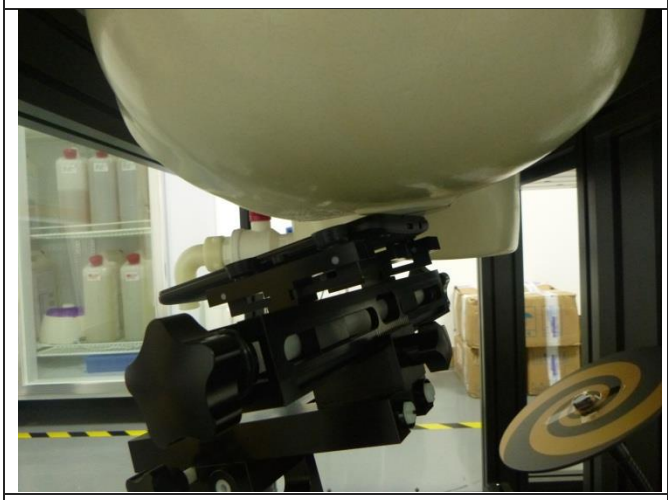
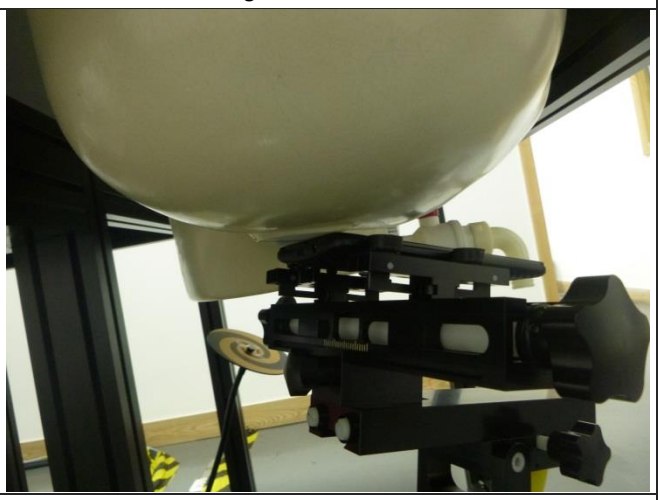
WWAN + WLAN DTS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WLAN DTS	(W/kg)
GSM	GSM850	Front	0.430	0.095	0.525
		Rear	0.652	0.144	0.796
	PCS1900	Front	0.496	0.095	0.591
		Rear	0.785	0.144	**0.929**
WCDMA	Band II	Front	0.531	0.095	0.626
		Rear	0.747	0.144	0.891
	Band V	Front	0.259	0.095	0.354
		Rear	0.393	0.144	0.537

WWAN + Bluetooth					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	Bluetooth	(W/kg)
GSM	GSM850	Front	0.430	0.066	0.496
		Rear	0.652	0.066	0.718
	PCS1900	Front	0.496	0.066	0.562
		Rear	0.785	0.066	0.851
WCDMA	Band II	Front	0.531	0.066	0.597
		Rear	0.747	0.066	0.813
	Band V	Front	0.259	0.066	0.325
		Rear	0.393	0.066	0.459

15.3. Hotspot

WWAN + WLAN DTS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN	WLAN DTS	(W/kg)
GSM	GSM850	Front	0.430	0.095	0.525
		Rear	0.652	0.144	0.796
		Left side	-	0.089	0.089
		Right side	0.384	-	0.384
		Top side	-	0.063	0.063
		Bottom side	0.265	-	0.265
	PCS1900	Front	0.496	0.095	0.591
		Rear	0.785	0.144	**0.929**
		Left side	-	0.089	0.089
		Right side	0.462	-	0.462
		Top side	-	0.063	0.063
		Bottom side	0.612	-	0.612
WCDMA	Band II	Front	0.531	0.095	0.626
		Rear	0.747	0.144	0.891
		Left side	-	0.089	0.089
		Right side	0.439	-	0.439
		Top side	-	0.063	0.063
		Bottom side	0.584	-	0.584
	Band V	Front	0.259	0.095	0.354
		Rear	0.393	0.144	0.537
		Left side	-	0.089	0.089
		Right side	0.231	-	0.231
		Top side	-	0.063	0.063
		Bottom side	0.160	-	0.160

16. 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°)

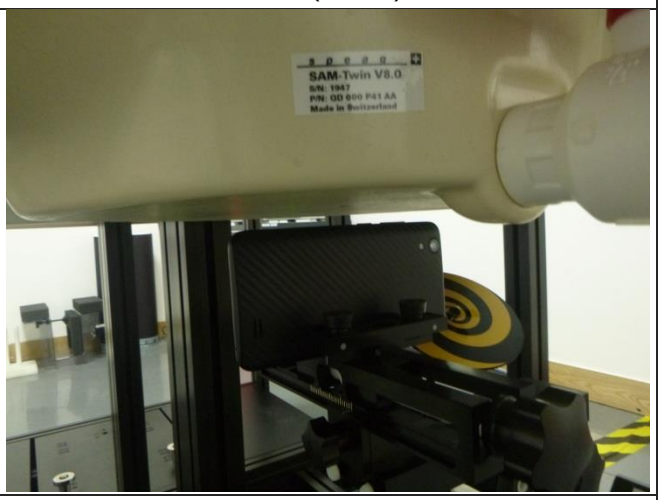
Body-worn Front (10mm)

Body-worn Rear(10mm)

Front (10mm)

Rear (10mm)

Left Side (10mm)



Right Side (10mm)

Top Side (10mm)	Bottom Side (10mm)

17. External and Internal Photos of the EUT

Please reference to the report No.: CHTEW19070148

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