TCT 通测检测 TESTING CENTRE TECHNOLOGY

SAR TEST REPORT

FCC ID.................................:	2A6VF-AC01	
Test Report No.....................:	TCT220915E033	
Date of issue.........................:	Sept. 15, 2022	
Testing laboratory...............:	SHENZHEN TONGCE TESTING LAB	
Testing location/ address ....:	2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China	
Applicant's name ....:	Averia Electronics Inc.	
Address ....:	142W 57th Street, Floor 11, New York, NY 10019	
Manufacturer's name ....:	Averia Electronics Inc.	
Address ....:	142W 57th Street, Floor 11, New York, NY 10019	
Product Name.......................:	Averia Collar	
Trade Mark ....:	Averia	
Model/Type reference ....:	AC01	
SAR Max. Values..............:	**0.792 W/Kg (1g) for body-worn**	
Date of receipt of test item .:	Sept. 8, 2022	
Date (s) of performance of test ....:	Sept. 12, 2022 - Sept. 14, 2022	
Tested by (+signature) ....:	Karl WANG	Karl Wang
Check by (+signature) ....:	Beryl Zhao	Beryl Zhao
Approved by (+signature) ..:	Tomsin	Tomsin

SHENZHEN TONGCE TESTING LAB TCT

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1. General Product Information

1.1. EUT description

Product Name:	Averia Collar
Model :	AC01
Trade Mark:	Averia
Power Supply:	Rechargeable Battery Rated Voltage3.6-4.2V
2G	
Operation Band:	GSM850, GSM1900
Supported type:	GPRS/EGPRS
Power Class:	GPRS850:Power Class 4; GPRS1900:Power Class 4
Modulation Type:	GMSK for GPRS; EGPRS for 8PSK
GSM Release Version:	R99
GPRS Multislot Class:	4
EGPRS Multislot Class:	2
LTE	
Operation Band:	LTE eMTC Band 2 & Band 4 & Band 5 & Band 12 & Band 13
Power Class:	Power Class 3
Modulation Type:	QPSK &16-QAM for LTE
Wi-Fi 2.4G	
Supported type:	802.11b/802.11g/802.11n
Modulation:	802.11b: DSSS 802.11g/802.11n:OFDM
Operation frequency:	802.11b/802.11g/802.11n(HT20):2412MHz~2462MHz;
Channel number:	802.11b/802.11g/802.11n(HT20):11
Channel separation:	5MHz
Bluetooth	
Bluetooth Version:	Supported 4.2
Modulation:	GFSK(1Mbps) , π/4-DQPSK(2Mbps) , 8-DPSK(3Mbps)
Operation frequency:	2402MHz~2480MHz
Channel number:	79/40
Channel separation:	1MHz/2MHz

1.2. Model(s) list

No.	Model No.	Tested with
1	AC01	☒
Other models	AC02	☐

Note: AC01 is tested model, other models are derivative models. The models are identical in circuit and PCB layout, only different on the model names and Silicone holder designs. So the test data of AC01 can represent the remaining models.

2. Test standards

The tests were performed according to following standards:

FCC 47 CFR §2.1093

IEEE1528-2013:Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB447498 D01:General RF Exposure Guidance v06
KDB865664 D01:SAR measurement 100MHz to 6GHz v01r04
KDB865664 D02:RF Exposure Reporting v01r02.
KDB941225 D01:3G SAR Procedures v03r01
KDB248227 D01:802.11 Wi-fi SAR v02r02
KDB941225 D05:SAR for LTE devices v02r05
KDB690783 D01:SAR Listings on Grant v01r03

3. Facilities and Accreditations

3.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

  Shenzhen Tongce Testing Lab

  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1

  The 3m Semi-anechoic chamber of Shenzhen Tongce Testing Lab.. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

3.2. Location

SHENZHEN TONGCE TESTING LAB.

Address: 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China

3.3. Environment Condition:

Temperature:	18°C ~25°C
Humidity:	35%~75% RH
Atmospheric Pressure:	1011 mbar

4. Test Result Summary

The maximum results of Specific Absorption Rate (SAR) found during test as bellows:
<Highest Reported standalone SAR Summary>

Exposure Position	Frequency Band	Reported SAR (W/kg)	Equipment Class	Highest Reported SAR (W/kg)
Body-worn 1-g SAR (0 mm Gap)	GSM 850	**0.792**	PCE	0.792
	GSM 1900	0.322		
	LTE Band 2	0.541		
	LTE Band 4	0.773		
	LTE Band 5	0.355		
	LTE Band 12	0.419		
	LTE Band 13	0.423		
	WLAN 2.4 GHz	0.227	DTS	

<Highest Reported simultaneous SAR Summary>

Exposure Position	Frequency Band	Highest Reported Simultaneous Transmission SAR (W/kg)
Body-worn 1-g SAR (0 mm Gap)	GSM850 + WIFI 2.4G + BT	1.112

Note:

1. The highest simultaneous transmission is scalar summation of Reported standalone SAR per FCC KDB 690783 D01 v01r03, and scalar SAR summation of all possible simultaneous transmission scenarios are < 1.6W/kg.
2. This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.

5. RF Exposure Limit

Type Exposure	SAR (W/kg) Uncontrolled Exposure Limit
Spatial Peak SAR (averaged over any 1 g of tissue)	1.60
Spatial Peak SAR (hands/wrists/feet/ankles averaged over 10g)	4.00
Spatial Peak SAR (averaged over the whole body)	0.08

Note:

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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6. SAR Measurement System Configuration

6.1. SAR Measurement Set-up

The OPENSAR system for performing compliance tests consist of the following items:

A standard high precision 6-axis robot (KUKA) with controller and software.

KUKA Control Panel (KCP)

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with a Video Positioning System (VPS).

The stress sensor is composed with mechanical and electronic when the electronic part detects a change on the electro-mechanical switch; it sends an "Emergency signal" to the robot controller that to stop robot's moves A computer operating Windows XP.

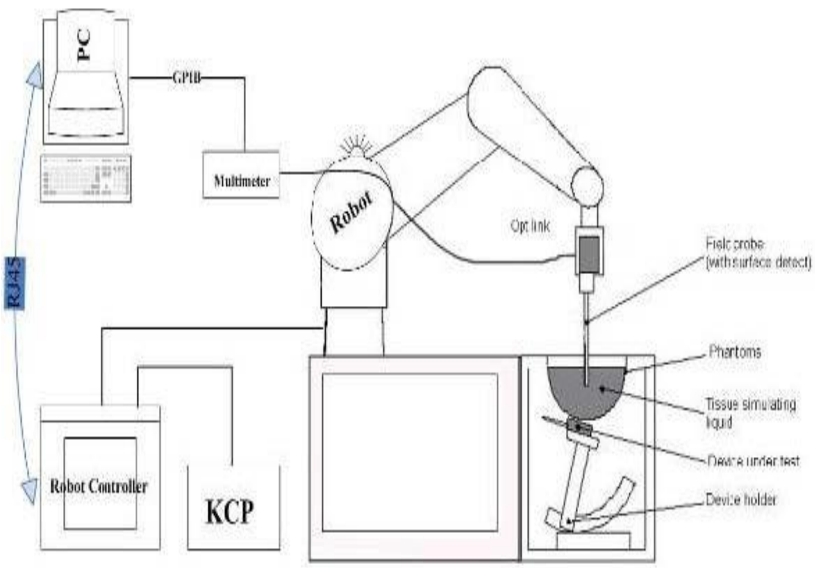
OPENSAR software Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.

The SAM phantom enabling testing left-hand right-hand and body usage.

The Position device for handheld EUT

Tissue simulating liquid mixed according to the given recipes.

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



KUKA SAR Test Sysytem Configuration

6.2. E-field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by MVG).
The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.
This probe has a built in optical surface detection system to prevent from collision with phantom.

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.

Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 36/20 EPGO346
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1:R1=0.217MΩ Dipole 2:R3=0.245MΩ Dipole 3:R3=0.219MΩ

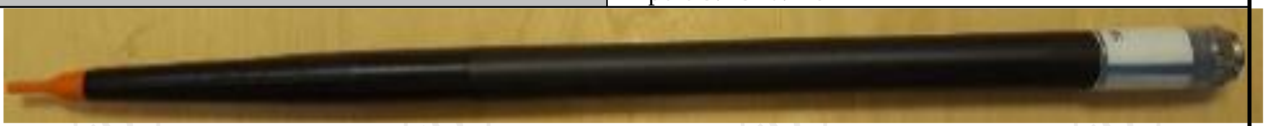
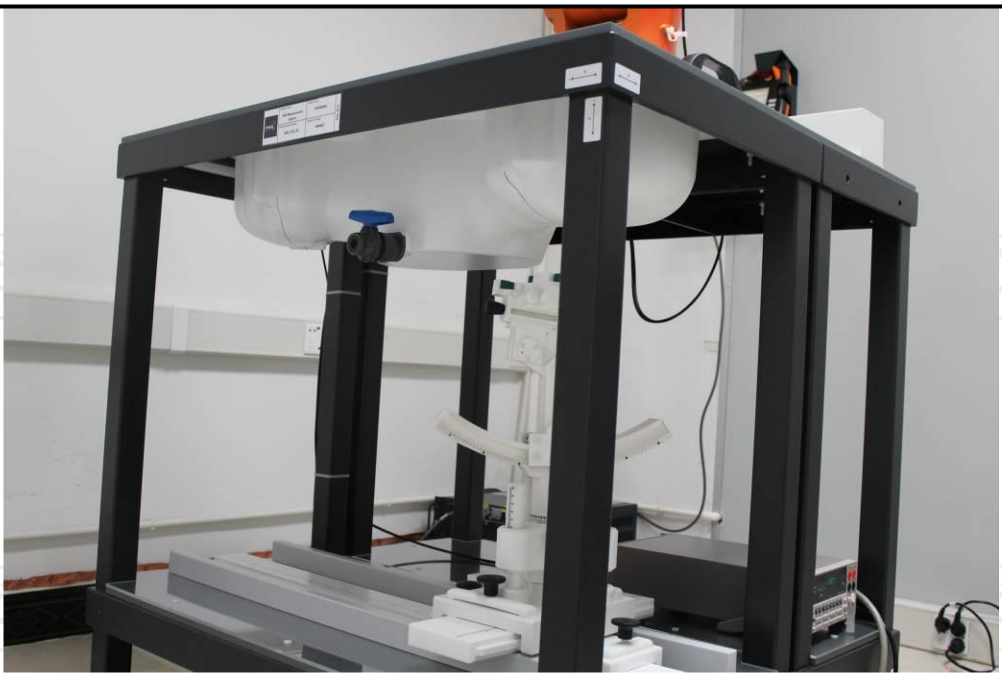


Photo of E-Field Probe

6.3. Phantom

The SAM Phantom SAM120 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is in compliance with the specification set in IEEE P1528 and CENELEC IEC 62209-1,
IEC 62209-2:2010.
The phantom enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region.
A cover prevents the evaporation of the liquid.
Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot
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.

Name: COMOSAR IEEE SAM PHANTOM
S/N: SN 19/15 SAM 120
Manufacture: MVG

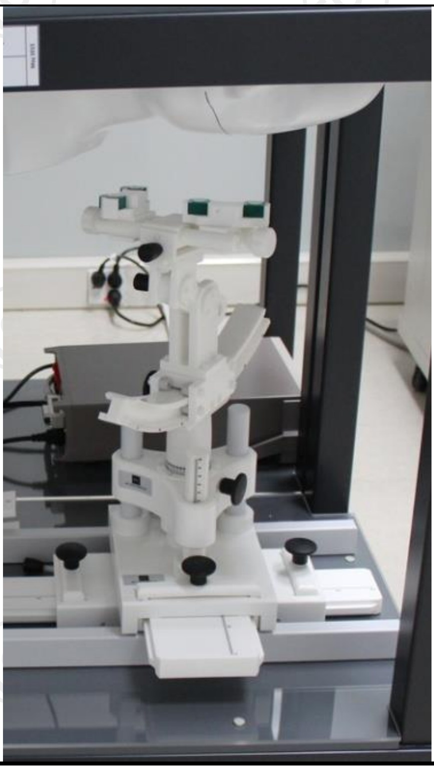


SAM Twin Phantom

6.4. Device Holder

In combination with the Generic Twin Phantom SAM120, the Mounting Device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening.
The devices can be easily, accurately, and repeatedly positioned according to the FCC and CENELEC specifications.
The device holder can be locked at different phantom locations (left head, right head, flat phantom).

COMOSAR Mobile phone positioning system



6.5. Data Storage and Evaluation

Data Storage

The OPENSAR software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. 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], [℃], [mW/g], [mW/cm ³], [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 OPENSAR 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 OPENSAR components. In the direct measuring mode of the millimeter 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:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With
- V_i = compensated signal of channel i (i = x, y, z)
- U_i = input signal of channel i (i = x, y, z)
- cf = crest factor of exciting field (MVG parameter)
- dcp_i = diode compression point (MVG parameter)

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

E-field probes: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$

With
- V_i = compensated signal of channel i (i = x, y, z)
- $Norm_i$ = sensor sensitivity of channel i (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):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

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

$$SAR = (Etot)^2 \cdot \sigma / (\rho \cdot 1000)$$

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

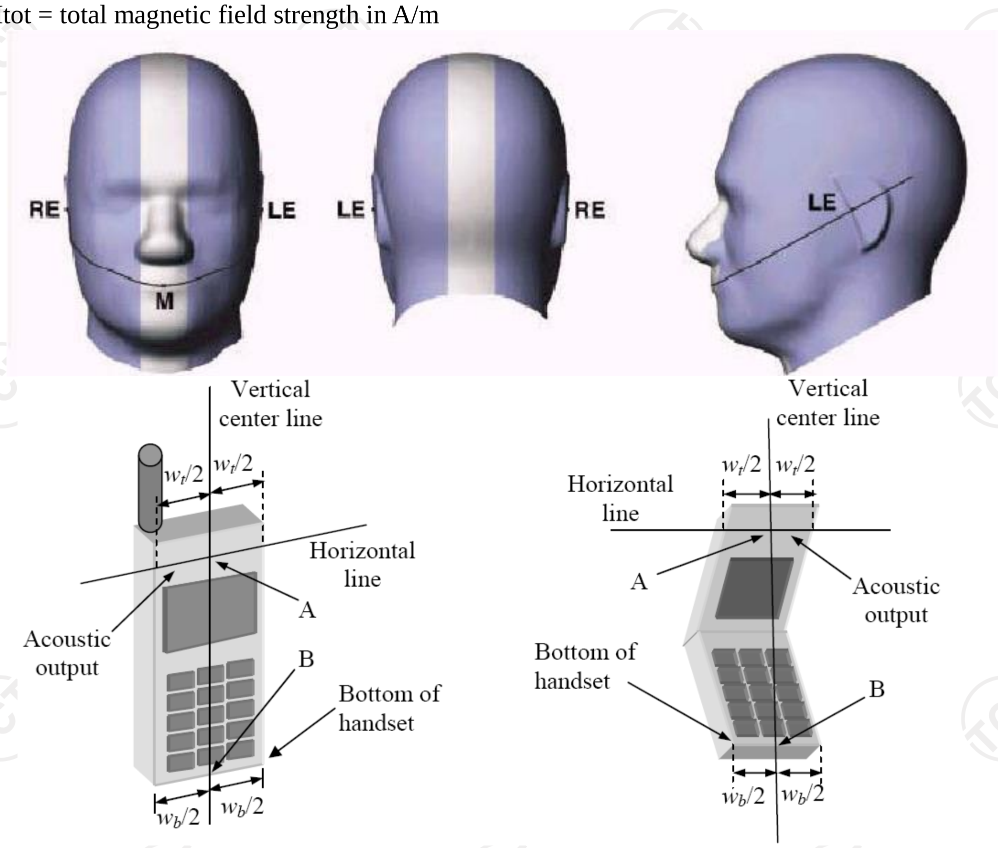
Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

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

Handset Reference Points

$$Ppwe = Etot^2 / 3770 \text{ or } Ppwe = Htot^2 \cdot 37.7$$

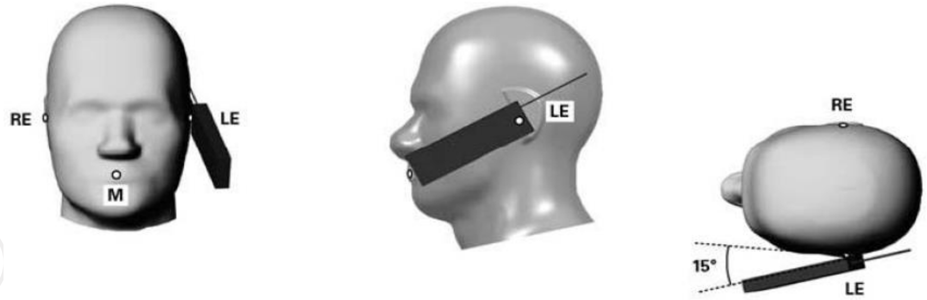
With Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m



Wt Width of the handset at the level of the acoustic
Wb Width of the bottom of the handset
A Midpoint of the width wt of the handset at the level of the acoustic output
B Midpoint of the width wb of the bottom of the handset

Positioning for Cheek / Touch

Positioning for Ear / 15 ºTilt



Body Worn Accessory Configurations
To position the device parallel to the phantom surface with either keypad up or down.
To adjust the device parallel to the flat phantom.
To adjust the distance between the device surface and the flat phantom to 15mm or holster surface and the flat phantom to 0 mm.

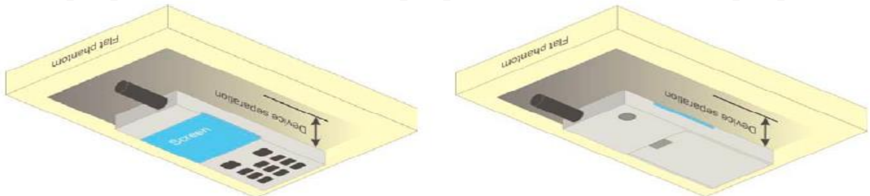


Illustration for Body Worn Position

Wireless Router（Hotspot）Configurations
Some battery-operated handsets have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

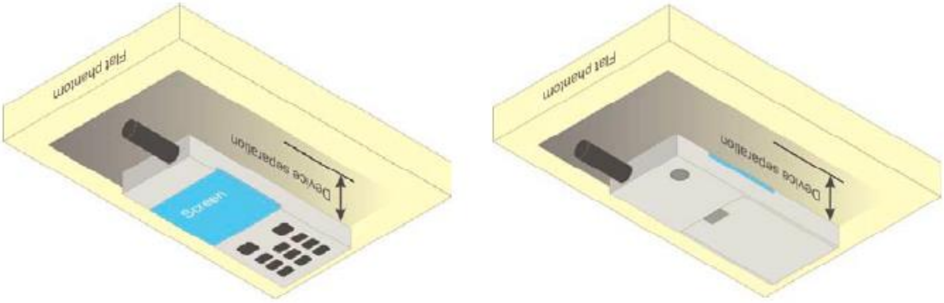
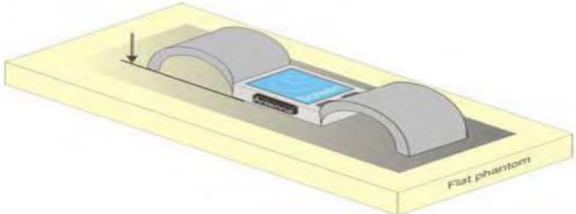


Illustration for Hotspot Position

Limb-worn device

A limb-worn device is a unit whose intended use includes being strapped to the arm or leg of the user while transmitting (except in idle mode). It is similar to a body-worn device. Therefore, the test positions of 6.1.4.4 also apply. The strap shall be opened so that it is divided into two parts as shown in Figure 9. The device shall be positioned directly against the phantom surface with the strap straightened as much as possible and the back of the device towards the phantom.

If the strap cannot normally be opened to allow placing in direct contact with the phantom surface, it may be necessary to break the strap of the device but ensuring to not damage the antenna.



Test position for limb-worn devices

6.7. Tissue Dielectric Parameters

The liquid used for the frequency range of 100MHz-6G consisted of water, sugar, salt and Cellulose. The liquid has been previously proven to be suited for worst-case. The following Table shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.
The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the determine of the dielectric parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ±5% of the target values.
The following materials are used for producing the tissue-equivalent materials

Targets for tissue simulating liquid

Frequency (MHz)	Liquid Type	Liquid Type (σ)	± 5% Range	Permittivity (ε)	± 5% Range
300	Head	0.87	0.83~0.91	45.3	43.04~47.57
450	Head	0.87	0.83~0.91	43.5	41.33~45.68
750	Head	0.93	0.88~0.98	40.8	38.76~42.84
835	Head	0.90	0.86~0.95	41.5	39.43~43.58
900	Head	0.97	0.92~1.02	41.5	39.43~43.58
1800-2000	Head	1.40	1.33~1.47	40.0	38.00~42.00
2450	Head	1.80	1.71~1.89	39.2	37.24~41.16
2600	Head	1.96	1.86~2.06	39.0	37.05~40.95
3000	Head	2.40	2.28~2.52	38.5	36.58~40.43
5800	Head	5.27	5.01~5.53	35.3	33.54~37.07
300	Body	0.92	0.87~0.97	58.2	55.29~61.11
450	Body	0.94	0.89~0.99	56.7	53.87~59.54
750	Body	0.96	0.91~1.01	55.5	52.73~58.28
835	Body	0.97	0.92~1.02	55.2	52.44~57.96
900	Body	1.05	1.00~1.10	55.0	52.25~57.75
1800-2000	Body	1.52	1.44~1.60	53.3	50.64~55.97
2450	Body	1.95	1.85~2.05	52.7	50.07~55.34
2600	Body	2.16	2.05~2.27	52.5	49.88~55.13
3000	Body	2.73	2.60~2.87	52.0	49.40~54.60
5800	Body	6.00	5.70~6.30	48.2	45.79~50.61

(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

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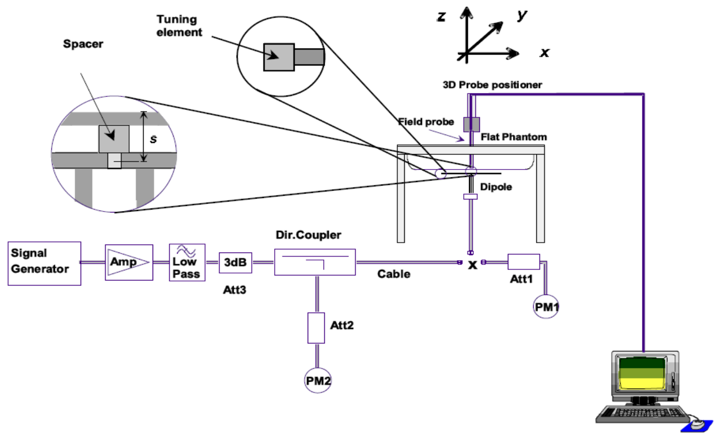
6.8. Tissue-equivalent Liquid Properties

Test Date dd/mm/yy	Temp ℃	Tissue Type	Measured Frequency (MHz)	εr	σ(s/m)	Dev εr(%)	Dev σ(%)
09/12/2022	22℃	750B	750	55.50	0.96	0.00	0.00
09/12/2022	22℃	835B	825	55.26	0.93	0.11	-4.12
			835	55.24	0.94	0.07	-3.09
			850	55.21	0.97	0.02	0.00
09/12/2022	22℃	1800B	1710	53.34	1.49	0.08	-1.97
			1720	53.32	1.50	0.04	-1.32
			1750	53.31	1.51	0.02	-0.66
			1800	53.29	1.53	-0.02	0.66
09/12/2022	22℃	1900B	1850	53.34	1.49	0.08	-1.97
			1880	53.32	1.50	0.04	-1.32
			1900	53.31	1.51	0.02	-0.66
			1910	53.29	1.53	-0.02	0.66
09/12/2022	22℃	2450B	2410	54.65	1.97	3.70	1.03
			2435	54.63	1.98	3.66	1.54
			2450	54.62	2.01	3.64	3.08
			2460	54.59	2.03	3.59	4.10

6.9. System Check

The SAR system must be validated against its performance specifications before it is deployed. When SAR probe and system component or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such component. Reference dipoles are used with the required tissue-equivalent media for system validation. System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).
System check is performed regularly on all frequency bands where tests are performed with the OPENSAR system.



System Check Set-up

Verification Results

Frequency (MHz)	Liquid Type	Measured Value in 100mW (W/kg)		Normalized to 1W (W/kg)		Target Value (W/kg)		Deviation (%)	
		1 g Average	10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average	10 g Average
750	Body	0.87	0.60	8.70	6.00	8.46	5.81	2.84	3.27
835	Body	0.95	0.63	9.50	6.30	9.62	6.44	-1.25	-2.17
1800	Body	3.78	2.05	37.79	20.46	37.69	20.57	0.27	-0.54
1900	Body	3.77	1.99	37.70	19.90	38.71	20.53	-2.61	-3.07
2450	Body	5.07	2.42	50.70	24.16	50.63	23.40	0.14	3.25

Comparing to the original SAR value provided by MVG, the verification data should be within its specification of 10%. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table as below indicates the system performance check can meet the variation criterion and the plots can be referred to Section 10 of this report.

7. Measurement Procedure

Conducted power measurement

For WWAN power measurement, use base station simulator to configure EUT WWAN transition in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
Read the WWAN RF power level from the base station simulator.
For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
Connect EUT RF port through RF cable to the power meter or spectrum analyser, and measure WLAN/BT output power.

Conducted power measurement

Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
Place the EUT in positions as Appendix B demonstrates.
Set scan area, grid size and other setting on the MVG software.
Measure SAR results for the highest power channel on each testing position.
Find out the largest SAR result on these testing positions of each band.
Measure SAR results for other channels in worst SAR testing position if the Reported SAR or highest power channel is larger than 0.8 W/kg.

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

Power reference measurement
Area scan
Zoom scan
Power drift measurement

Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The MVG software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a “cube” measurement. The measured volume must include the 1g and 10 g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
Extraction of the measured data (grid and values) from the Zoom Scan.

Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).

Generation of a high-resolution mesh within the measured volume.

Interpolation of all measured values form the measurement grid to the high-resolution grid

Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface

Calculation of the averaged SAR within masses of 1g and 10g.

Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties

Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r03 quoted below.

			≤ 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.	
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.				

Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD post-processor scan combine and subsequently superpose these measurement data to calculating the multiband SAR.

SAR Averaged Methods

In MVG, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

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. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1g and 10g cubes, the extrapolation distance should not be larger than 5 mm.

Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In MVG measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

Power Drift measurement

The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same settings. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for

Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100KHz to 6GHz ,when the highest measurement 1-g SAR within a frequency band is <1.5W/kg, the extensive SAR measurement uncertainty analysis described IEEE Std 1528-2013 is not required in SAR report submitted for equipment approval.

8. Conducted Output Power

Band: GSM 850	Measured Power (dBm)			Calculation (dB)	Averaged Power (dBm)		
Channel	128	190	251		128	190	251
Frequency	824.2	836.6	848.8		824.2	836.6	848.8
GPRS (GMSK, 1-slot)	33.12	33.61	33.47	-9.03	24.09	24.58	24.44
GPRS (GMSK, 2-slot)	32.84	33.50	33.36	-6.02	26.82	**27.48**	27.34
GPRS (GMSK, 3-slot)	28.46	28.45	28.24	-4.26	24.20	24.19	23.98
GPRS (GMSK, 4-slot)	26.53	26.55	26.35	-3.01	23.52	23.54	23.34
EGPRS (1-slot)	26.97	27.00	26.83	-9.03	17.94	17.97	17.80
EGPRS (2-slot)	26.75	26.69	26.55	-6.02	20.73	20.67	20.53
EGPRS (3-slot)	26.05	25.99	25.97	-4.26	21.79	21.73	21.71
EGPRS (4-slot)	24.79	24.76	24.66	-3.01	21.78	21.75	21.65

Note:

1. Division Factors
   To average the power, the division factor is as follows:
   1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB
   2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB
   3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB
   4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB
2. According to the conducted power as above, the body measurements are performed with 2Tx slots for 850MHz for GPRS.

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Band: GSM 1900	Measured Power (dBm)			Calculation (dB)	Averaged Power (dBm)		
Channel	512	661	810		512	661	810
Frequency	1850.2	1880.0	1909.8		1850.2	1880.0	1909.8
GPRS (GMSK, 1-slot)	29.46	29.94	29.80	-9.03	20.43	20.91	20.77
GPRS (GMSK, 2-slot)	29.17	28.81	29.68	-6.02	23.15	22.79	23.66
GPRS (GMSK, 3-slot)	28.82	28.50	29.35	-4.26	24.56	24.24	**25.09**
GPRS (GMSK, 4-slot)	27.15	28.09	27.95	-3.01	24.14	25.08	24.94
EGPRS (1-slot)	25.72	25.55	25.91	-9.03	16.69	16.52	16.88
EGPRS (2-slot)	25.47	25.28	25.68	-6.02	19.45	19.26	19.66
EGPRS (3-slot)	24.85	24.71	25.00	-4.26	20.59	20.45	20.74
EGPRS (4-slot)	23.62	23.47	23.92	-3.01	20.61	20.46	20.91

Note:

1. Division Factors
   To average the power, the division factor is as follows:
   1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB
   2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB
   3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB
   4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB
2. According to the conducted power as above, the body measurements are performed with 3Tx slots for 1900MHz for GPRS.

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WLAN 2.4G						
Mode	802.11b			802.11g		
Channel	1	6	11	1	6	11
Frequency	2412	2437	2462	2412	2437	2462
Average Power (dBm)	**10.23**	8.76	8.54	14.00	13.53	13.30
Mode	802.11n(HT20)					
Channel	1	6	11			
Frequency	2412	2437	2462			
Average Power (dBm)	14.07	13.62	13.34			

Note

1. Per KDB 248227 D01 v02r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. The output power of all data rate were prescan, just the worst case (the lowest data rate) of all mode were shown in report

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Bluetooth			
Mode	BLE		
Channel	1	40	79
Frequency	2402	2440	2480
Average Power (dBm)	**3.27**	1.94	1.64

Channel	Frequency (GHz)	Max. Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	Exclusion thresholds for 1-g SAR	Exclusion thresholds for 10-g SAR
1	2.402	3.50	2.24	5	0.7	3.0	7.5

Note

1. Per KDB 447498 D01v06, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm 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, where
   ·f(GHz) is the RF channel transmit frequency in GHz
   ·Power and distance are rounded to the nearest mW and mm before calculation
   ·The result is rounded to one decimal place for comparison
2. Base on the result of note1, RF exposure evaluation of BT is not required.
3. Per KDB 248227 D01 v02r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
4. The output power of all data rate were prescan, just the worst case (the lowest data rate) of all mode were shown in report.

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LTE Band 2

Conducted Power of LTE Band 2						
Bandwidth	Modulation	RB size	RB offset	Channel 18607	Channel 18900	Channel 19193
1.4MHz	QPSK	1	0	24.01	23.66	24.15
			5	23.06	23.66	24.13
		3	0	23.00	23.18	22.96
			3	22.77	22.94	22.72
		6	0	21.17	21.60	21.98
	16QAM	1	0	23.91	22.80	23.27
			5	22.18	22.71	23.24
		3	0	22.41	22.58	22.37
			3	22.18	22.35	22.14
		6	0	21.15	21.57	21.92
Bandwidth	Modulation	RB size	RB offset	Channel 18615	Channel 18900	Channel 19185
3MHz	QPSK	1	0	23.22	23.52	23.78
			5	23.09	23.41	23.95
		3	0	23.03	23.20	22.98
			3	22.79	22.96	22.74
		6	0	20.98	21.30	21.75
	16QAM	1	0	22.14	22.36	23.10
			5	21.93	22.17	22.89
		3	0	22.43	22.60	22.39
			3	22.20	22.37	22.16
		6	0	20.91	21.30	21.77
Bandwidth	Modulation	RB size	RB offset	Channel 18625	Channel 18900	Channel 19175
5MHz	QPSK	1	0	23.74	23.54	24.11
			5	23.40	23.40	24.11
		3	0	23.04	23.21	22.99
			3	22.80	22.97	22.75
		6	0	21.95	22.33	22.95
	16QAM	1	0	23.70	23.85	23.64
			5	23.28	23.54	23.58
		3	0	22.45	22.62	22.40
			3	22.22	22.39	22.17
		6	0	21.93	22.33	22.66

Conducted Power of LTE Band 2						
Bandwidth	Modulation	RB size	RB offset	Channel 18650	Channel 18900	Channel 19150
10MHz	QPSK	1	0	23.38	23.90	24.41
			5	23.33	23.69	24.28
		3	0	23.05	23.22	23.00
			3	22.81	22.99	22.76
		6	0	22.03	22.56	23.05
	16QAM	1	0	23.47	24.03	24.41
			5	23.14	23.90	24.25
		3	0	22.46	22.63	22.41
			3	22.23	22.40	22.18
		6	0	21.96	22.55	23.04
Bandwidth	Modulation	RB size	RB offset	Channel 18675	Channel 18900	Channel 19150
15MHz	QPSK	1	0	23.73	23.48	23.61
			5	23.54	23.42	23.38
		3	0	23.01	23.18	22.96
			3	22.77	22.95	22.73
		6	0	22.97	23.40	22.92
	16QAM	1	0	23.79	23.75	23.54
			5	23.28	23.65	23.07
		3	0	22.42	22.59	22.37
			3	22.19	22.36	22.14
		6	0	22.93	23.38	23.02
Bandwidth	Modulation	RB size	RB offset	Channel 18700	Channel 18900	Channel 19100
20MHz	QPSK	1	0	23.53	23.69	23.50
			5	23.70	**23.75**	23.51
		3	0	23.08	**23.26**	23.03
			3	22.84	23.02	22.79
		6	0	23.33	23.51	23.07
	16QAM	1	0	23.82	24.00	23.77
			5	23.83	23.88	23.45
		3	0	22.49	22.66	22.44
			3	22.26	22.43	22.21
		6	0	23.33	23.38	23.12

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LTE Band 4

Conducted Power of LTE Band 4						
Bandwidth	Modulation	RB size	RB offset	Channel 19957	Channel 20175	Channel 20393
1.4MHz	QPSK	1	0	23.62	23.70	23.66
			5	23.62	23.43	23.37
		3	0	23.21	22.78	23.06
			3	22.97	22.55	22.82
		6	0	21.28	21.17	21.26
	16QAM	1	0	22.62	22.62	22.58
			5	22.56	22.40	22.34
		3	0	22.61	22.20	22.47
			3	22.38	21.97	22.24
		6	0	21.24	21.03	21.17
Bandwidth	Modulation	RB size	RB offset	Channel 19965	Channel 20175	Channel 20385
3MHz	QPSK	1	0	23.66	23.40	23.57
			5	23.49	23.32	23.60
		3	0	23.23	22.80	23.08
			3	22.99	22.57	22.84
		6	0	21.25	21.10	21.19
	16QAM	1	0	22.69	22.29	22.31
			5	22.41	22.23	22.28
		3	0	22.63	22.22	22.49
			3	22.40	21.99	22.26
		6	0	21.21	20.97	21.18
Bandwidth	Modulation	RB size	RB offset	Channel 19975	Channel 20175	Channel 20375
5MHz	QPSK	1	0	23.99	23.44	23.65
			5	23.74	23.33	23.53
		3	0	23.24	22.82	23.10
			3	23.00	22.58	22.86
		6	0	22.34	22.02	22.35
	16QAM	1	0	24.28	23.69	23.59
			5	23.81	23.45	23.76
		3	0	22.65	22.23	22.51
			3	22.41	22.00	22.27
		6	0	22.22	22.02	22.38

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Conducted Power of LTE Band 4						
Bandwidth	Modulation	RB size	RB offset	Channel 20000	Channel 20175	Channel 20350
10MHz	QPSK	1	0	23.90	23.67	23.71
			5	23.57	23.22	23.63
		3	0	23.25	22.83	23.11
			3	23.01	22.59	22.87
		6	0	22.37	21.86	22.30
	16QAM	1	0	24.04	23.53	23.98
			5	23.73	23.48	23.55
		3	0	22.66	22.24	22.52
			3	22.42	22.01	22.28
		6	0	22.24	21.95	22.16
Bandwidth	Modulation	RB size	RB offset	Channel 20025	Channel 20175	Channel 20325
15MHz	QPSK	1	0	24.01	23.52	23.76
			5	23.69	23.38	23.66
		3	0	23.21	22.79	23.07
			3	22.97	22.55	22.83
		6	0	23.35	23.16	23.39
	16QAM	1	0	24.17	23.75	23.85
			5	23.65	23.44	23.77
		3	0	22.62	22.20	22.48
			3	22.39	21.98	22.25
		6	0	23.24	23.16	23.34
Bandwidth	Modulation	RB size	RB offset	Channel 20050	Channel 20175	Channel 20300
20MHz	QPSK	1	0	**24.03**	23.59	23.88
			5	23.68	23.31	23.57
		3	0	**23.28**	22.86	23.14
			3	23.04	22.62	22.90
		6	0	23.43	23.21	23.41
	16QAM	1	0	24.13	23.67	23.64
			5	23.78	23.52	23.78
		3	0	22.69	22.27	22.55
			3	22.45	22.04	22.31
		6	0	23.41	23.20	23.36

LTE Band 5

Conducted Power of LTE Band 5						
Bandwidth	Modulation	RB size	RB offset	Channel 20407	Channel 20525	Channel 20643
1.4MHz	QPSK	1	0	23.28	22.59	24.27
			5	23.26	22.59	23.21
		3	0	22.23	22.24	22.86
			3	22.00	22.01	22.62
		6	0	20.65	20.51	20.96
	16QAM	1	0	22.10	22.08	22.39
			5	21.84	21.80	22.14
		3	0	21.66	21.67	22.27
			3	21.44	21.45	22.04
		6	0	20.41	20.43	20.83
Bandwidth	Modulation	RB size	RB offset	Channel 20415	Channel 20525	Channel 20635
3MHz	QPSK	1	0	23.10	22.48	23.65
			5	22.98	22.57	23.34
		3	0	22.25	22.26	22.88
			3	22.02	22.03	22.64
		6	0	20.55	20.50	20.92
	16QAM	1	0	21.81	22.06	22.37
			5	21.72	21.97	22.01
		3	0	21.68	21.69	22.29
			3	21.46	21.47	22.06
		6	0	20.45	20.42	20.70
Bandwidth	Modulation	RB size	RB offset	Channel 20425	Channel 20525	Channel 20625
5MHz	QPSK	1	0	23.02	22.87	23.57
			5	23.12	22.84	23.19
		3	0	22.27	22.28	22.89
			3	22.04	22.05	22.66
		6	0	21.63	21.32	21.84
	16QAM	1	0	23.32	23.16	23.66
			5	23.29	22.98	23.28
		3	0	21.70	21.70	22.31
			3	21.47	21.48	22.08
		6	0	21.35	21.24	21.81

Conducted Power of LTE Band 5						
Bandwidth	Modulation	RB size	RB offset	Channel 20450	Channel 20525	Channel 20600
10MHz	QPSK	1	0	23.02	23.03	**23.67**
			5	23.00	22.63	23.35
		3	0	22.28	22.29	**22.91**
			3	22.05	22.06	22.67
		6	0	21.67	20.83	21.94
	16QAM	1	0	23.17	23.01	23.45
			5	23.28	22.74	23.39
		3	0	21.71	21.71	22.32
			3	21.48	21.49	22.09
		6	0	21.39	20.62	21.85

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LTE Band 12

Conducted Power of LTE Band 12						
Bandwidth	Modulation	RB size	RB offset	Channel 23017	Channel 23095	Channel 23173
1.4MHz	QPSK	1	0	24.61	24.47	25.12
			5	23.81	24.41	24.60
		3	0	22.95	22.51	23.52
			3	22.71	22.28	23.27
		6	0	21.35	21.88	21.09
	16QAM	1	0	22.78	23.18	23.80
			5	22.67	23.22	22.77
		3	0	22.36	21.93	22.91
			3	22.13	21.71	22.68
		6	0	21.17	21.63	20.47
Bandwidth	Modulation	RB size	RB offset	Channel 23025	Channel 23095	Channel 23165
3MHz	QPSK	1	0	22.44	24.25	23.83
			5	23.44	24.13	23.69
		3	0	22.97	22.53	23.54
			3	22.73	22.30	23.29
		6	0	21.44	21.53	21.54
	16QAM	1	0	22.59	23.01	22.92
			5	22.60	22.75	22.85
		3	0	22.38	21.95	22.93
			3	22.15	21.73	22.70
		6	0	21.36	21.61	21.30
Bandwidth	Modulation	RB size	RB offset	Channel 23035	Channel 23095	Channel 23155
5MHz	QPSK	1	0	22.77	23.69	23.29
			5	23.80	22.93	22.64
		3	0	22.98	22.55	23.55
			3	22.74	22.31	23.31
		6	0	22.23	21.87	21.21
	16QAM	1	0	23.99	23.94	23.01
			5	23.77	23.66	22.67
		3	0	22.39	21.97	22.95
			3	22.16	21.74	22.71
		6	0	22.00	21.90	20.92

Conducted Power of LTE Band 12						
Bandwidth	Modulation	RB size	RB offset	Channel 23060	Channel 23095	Channel 23130
10MHz	QPSK	1	0	23.76	23.31	24.35
			5	22.43	24.03	**24.42**
		3	0	22.99	22.56	**23.56**
			3	22.76	22.32	23.32
		6	0	21.26	22.75	23.15
	16QAM	1	0	23.66	24.26	24.60
			5	22.88	24.25	24.41
		3	0	22.40	21.98	22.96
			3	22.17	21.75	22.72
		6	0	21.43	22.58	23.06

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LTE Band 13

Conducted Power of LTE Band 13						
Bandwidth	Modulation	RB size	RB offset	Channel 23205	Channel 23230	Channel 23255
5MHz	QPSK	1	0	24.52	25.15	25.18
			5	24.92	25.18	24.82
		3	0	23.19	23.47	23.75
			3	22.95	23.22	23.50
		6	0	23.21	23.77	23.24
	16QAM	1	0	24.94	25.27	24.93
			5	25.15	25.18	24.37
		3	0	22.60	22.86	23.14
			3	22.37	22.63	22.90
		6	0	22.86	23.61	23.23
Bandwidth	Modulation	RB size	RB offset	Channel 23230		
10MHz	QPSK	1	0	**24.26**		
			5	23.18		
		3	0	**23.48**		
			3	23.23		
		6	0	23.69		
	16QAM	1	0	23.59		
			5	25.14		
		3	0	22.87		
			3	22.64		
		6	0	23.61		

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9. Exposure Position Consideration

9.1. EUT Antenna Location

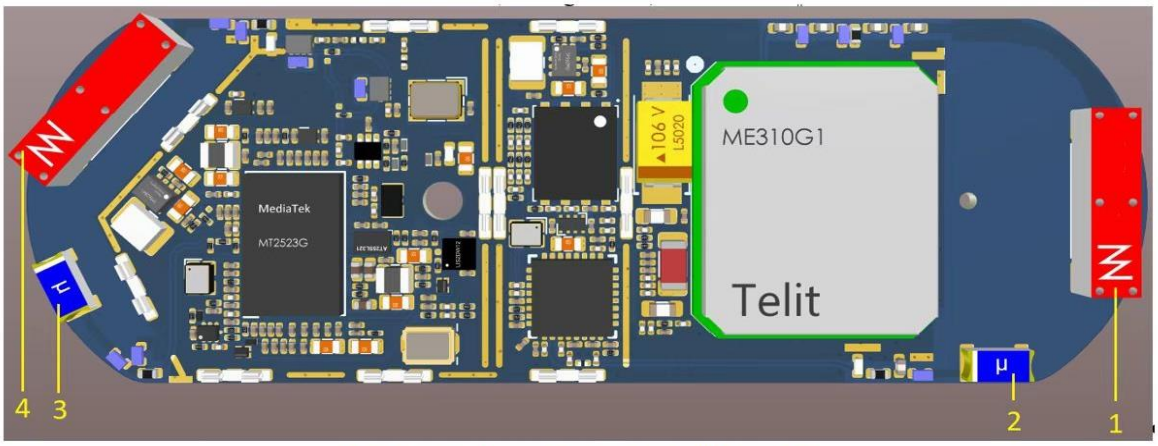

Fig. a The position of antennas on the main circuit board of Averia Collar:
1 - GSM/LTE; 2 - Wi-Fi; 3 - Bluetooth; 4 - GNSS

9.2. Test Position Consideration

Test Positions	
Mode	**Back**
GSM/LTE	Yes
WIFI	Yes

Note: Per KDB 447498, the device belongs to body-worn accessory exposure condition, and it is worn on your pets' neck, so the most conservative dist. is 0mm.

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10. SAR Test Results Summary

10.1. Body-Worn 1g SAR Data

Band	Mode	Test Position with 0mm	CH.	Freq. (MHz)	Ave. Power (dBm)	Tune-Up Limit (dBm)	Power Drift (%)	Meas. SAR1g (W/kg)	Scaling Factor	Reported SAR1g (W/kg)	Limit (W/Kg)
GSM850	GPRS 2 slots	Back	190	836.6	33.50	34.00	-1.640	0.706	1.122	0.792	**1.6**
GSM1900	GPRS 3 slots	Back	810	1909.8	29.35	29.50	-1.620	0.311	1.035	0.322	
2.4G	802.11b	Back	1	2412	10.23	10.50	-3.920	0.208	1.064	0.221	

Band	Mode	Test Position with 0mm	CH.	Freq. (MHz)	RB allocation	RB offset	Ave. Power (dBm)	Tune-Up Limit (dBm)	Power Drift (%)	Meas. SAR1g (W/kg)	Scaling Factor	Reported SAR1g (W/kg)	Limit (W/Kg)
LTE Band 2	QPSK (20MHz)	Back	18900	1880.0	1	5	23.75	24.00	-0.950	0.511	1.059	0.541	**1.6**
		Back	18900	1880.0	50%	0	23.26	23.50	-0.220	0.488	1.057	0.516	
LTE Band 4	QPSK (20MHz)	Back	20050	1720.0	1	0	24.03	24.50	-4.350	0.694	1.114	0.773	
		Back	20050	1720.0	50%	0	23.28	23.50	3.051	0.579	1.052	0.609	
LTE Band 5	QPSK (10MHz)	Back	20600	844.0	1	0	23.67	24.00	-2.240	0.329	1.079	0.355	
		Back	20600	844.0	50%	0	22.91	23.00	2.014	0.285	1.021	0.291	
LTE Band 12	QPSK (10MHz)	Back	23130	711.0	1	5	24.42	24.50	-3.970	0.411	1.019	0.419	
		Back	23130	711.0	50%	0	23.56	24.00	0.221	0.377	1.107	0.417	
LTE Band 13	QPSK (10MHz)	Back	23230	782.0	1	0	24.26	24.50	-3.480	0.400	1.057	0.423	
		Back	23230	782.0	50%	0	23.48	23.50	0.125	0.359	1.005	0.361	

Note:

1. Per KDB 447498 D01 v06, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
2. Per KDB 447498 D01 v06, body-worn use is evaluated with the device positioned at 0 mm from a flat phantom filled with body tissue-equivalent medium.
3. Per KDB 447498 D01 v06, the report SAR is measured SAR value adjusted for maximum tune-up tolerance. Scaling Factor=10^[(tune-up limit power(dBm) - Ave.power power (dBm))/10], where tune-up limit is the maximum rated power among all production units.
   Reported SAR(W/kg)=Measured SAR (W/kg)*Scaling Factor.
4. Per KDB865664D01 v01r04, Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. According to our test result, the highest Reported SAR is < 0.8 W/Kg, so we don't need to test repeatedly.

10.2. Simultaneous Transmission Conclusion

Multi-Band Simultaneous Transmission Considerations

According to FCC KDB Publication 447498 D01v05r02, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the EUT are shown in below Figure and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Simultaneous Transmission Paths

Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05r02, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6 W/kg. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v05r02 4.3.2.2), the following equation must be used to estimate the standalone 1g SAR and 10g extremity SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(GHz)}}{7.5(18.75)} \cdot \frac{\text{Max. power of channel, mW}}{\text{Min. Separation Distance, mm}}$$

Mode	Max. tune-up Power (dBm)	Exposure Position	Head	Body-worn
		Test Distance (mm)	5	5
BT	3.50	Estimated SAR (W/kg)	/	0.093

Note:

1. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according is applied to determine estimated SAR.
2. (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm; where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
3. body-worn exposure requires 1-g SAR.

Simultaneous Transmission Possibilities

The Simultaneous Transmission Possibilities of this device are as below:

NO.	Configuration	Head	Body-Worn	Hotspot
1	GPRS/EGPRS 850/1900(DATA) + WIFI(2.4)	NO	YES	NO
2	LTE + WIFI(2.4)	NO	YES	NO
3	GPRS/EGPRS 850/1900(DATA)+BT	NO	YES	NO
4	LTE+BT	NO	YES	NO
5	GPRS/EGPRS 850/1900(DATA) + WIFI(2.4) + BT	NO	YES	NO
6	LTE + WIFI(2.4) + BT	NO	YES	NO

10.3. SAR Simultaneous Transmission Analysis

Band	Test Position	Scaled			Σmax SAR (W/kg)	SPLSR	Remark
		body-worn	WIFI 2.4G	BT			
GSM850 (GPRS 2slot)	Back	0.792	0.227	0.093	**1.112**	N/A	N/A
GSM1900 (GPRS 3slot)	Back	0.322	0.227	0.093	0.642	N/A	N/A

Band	Test Position	RB allocation	Scaled			Σmax SAR (W/kg)	SPLSR	Remark
			body-worn	WIFI 2.4G	BT			
LTE Band 2 QPSK (20MHz)	Back	1	0.541	0.227	0.093	0.861	N/A	N/A
	Back	50%	0.516	0.227	0.093	0.836	N/A	N/A
LTE Band 4 QPSK (20MHz)	Back	1	0.773	0.227	0.093	1.093	N/A	N/A
	Back	50%	0.609	0.227	0.093	0.929	N/A	N/A
LTE Band 5 QPSK (10MHz)	Back	1	0.355	0.227	0.093	0.675	N/A	N/A
	Back	50%	0.291	0.227	0.093	0.611	N/A	N/A
LTE Band 12 QPSK (10MHz)	Back	1	0.419	0.227	0.093	0.739	N/A	N/A
	Back	50%	0.417	0.227	0.093	0.737	N/A	N/A
LTE Band 13 QPSK (10MHz)	Back	1	0.423	0.227	0.093	0.743	N/A	N/A
	Back	50%	0.361	0.227	0.093	0.681	N/A	N/A

Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore measured volumetric simultaneous SAR summation is not required per FCC KDB Publication 447498 D01v05r02.

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10.4. Measurement Uncertainty (450MHz-3GHz)

UNCERTAINTY EVALUATION FOR HEADSET SAR									
Uncertainty Component	Description	Uncertainty Value(%)	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. 1g(%)	Std. Unc. 10g(%)	v
Measurement system									
Probe calibration	7.2.1	5.8	N	1	1	1	5.8	5.8	∞
Axial isotropy	7.2.1.1	3.5	R	$\sqrt{3}$	$(1-C_p)^{1/2}$	$(1-C_p)^{1/2}$	1.43	1.43	∞
Hemispherical isotropy	7.2.1.1	5.9	R	$\sqrt{3}$	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
Boundary Effects	7.2.1.4	1.00	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	7.2.1.2	4.70	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System detection limits	7.2.1.2	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation Response	7.2.1.3	3	N	1	1	1	3.00	3.00	∞
Readout Electronics	7.2.1.5	0.5	N	1	1	1	0.50	0.50	∞
Response Time	7.2.1.6	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	7.2.1.7	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF Ambient Conditions-Noise	7.2.3.7	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF Ambient Conditions-Reflection	7.2.3.7	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioned mechanical Tolerance	7.2.2.1	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	7.2.2.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation interpolation and integration algorithms for Max.SAR evaluation	7.2.4	2.3	R	1	1	1	1.33	1.33	∞
Test sample related									
Test sample positioning	7.2.2.4.4	2.6	N	1	1	1	2.60	2.60	∞
Device holder uncertainty	7.2.2.4.2 7.2.2.4.3	3	N	1	1	1	3.00	3.00	∞
output power variation-SAR drift measurement	7.2.3.6	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	7.2.5	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters									
Phantom uncertainty (shape and thickness tolerances)	7.2.2.2	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
uncertainty in SAR correction for deviation (in permittivity and conductivity)	7.2.6	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity (temperature uncertainty)	7.2.3.5	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid conductivity -measurement uncertainty	7.2.3.3	4	N	1	0.23	0.26	0.92	1.04	∞
Liquid permittivity (temperature uncertainty)	7.2.3.5	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid permittivity measurement uncertainty	7.2.3.4	5	N	1	0.23	0.26	1.15	1.30	∞
Combined standard uncertainty			RSS				10.83	10.54	
Expanded uncertainty (95%CONFIDENCEINTERVAL			k				21.26	21.08	

UNCERTAINTY FOR PERFORMANCE CHECK									
Uncertainty Component	Description	Uncertainty Value(%)	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. 1g(%)	Std. Unc. 10g(%)	v
Measurement system									
Probe calibration	7.2.1	5.8	N	1	1	1	5.8	5.8	∞
Axial isotropy	7.2.1.1	3.5	R	$\sqrt{3}$	$(1-C_p)^{1/2}$	$(1-C_p)^{1/2}$	1.43	1.43	∞
Hemispherical isotropy	7.2.1.1	5.9	R	$\sqrt{3}$	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
Boundary Effects	7.2.1.4	1.00	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	7.2.1.2	4.70	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System detection limits	7.2.1.2	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation Response	7.2.1.3	3	N	1	1	1	0.00	0.00	∞
Readout Electronics	7.2.1.5	0.5	N	1	1	1	0.50	0.50	∞
Response Time	7.2.1.6	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	7.2.1.7	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF Ambient Conditions-Noise	7.2.3.7	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF Ambient Conditions-Reflection	7.2.3.7	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioned mechanical Tolerance	7.2.2.1	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	7.2.2.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation interpolation and integration algorithms for Max.SAR evaluation	7.2.4	2.3	R	1	1	1	1.33	1.33	∞
Dipole									
Deviation of experimental source from numerical source		4	N	1	1	1	4.00	4.00	∞
Input power and SAR drift measurement	7.2.3.6	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance		2	R	$\sqrt{3}$	1	1			∞
Phantom and tissue parameters									
Phantom uncertainty (shape and thickness tolerances)	7.2.2.2	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
uncertainty in SAR correction for deviation (in permittivity and conductivity)	7.2.6	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity (temperature uncertainty)	7.2.3.5	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid conductivity -measurement uncertainty	7.2.3.3	4	N	1	0.23	0.26	0.92	1.04	∞
Liquid permittivity (temperature uncertainty)	7.2.3.5	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid permittivity measurement uncertainty	7.2.3.4	5	N	1	0.23	0.26	1.15	1.30	∞
Combined standard uncertainty			RSS				10.15	10.05	
Expanded uncertainty (95%CONFIDENCEINTERVAL			k				20.29	20.10	

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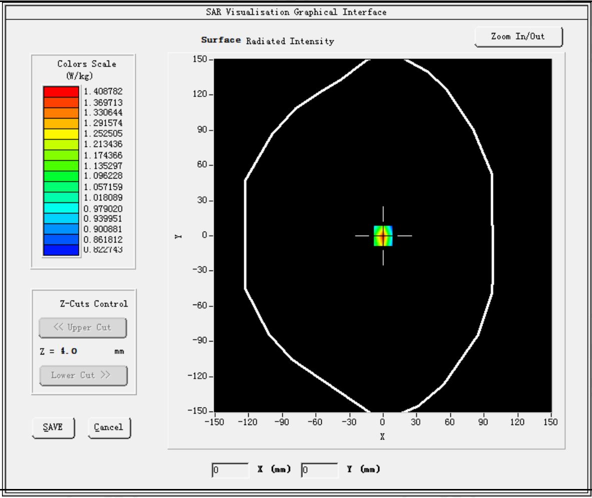
10.5. Test Equipment List

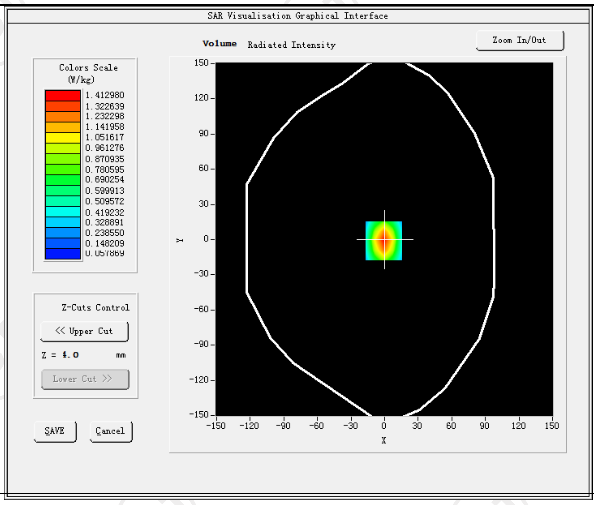
Test Equipment	Manufacturer	Model	Serial Number	Calibration	
				Calibration Date (D.M.Y)	Calibration Due (D.M.Y)
PC	Lenovo	H3050	N/A	N/A	N/A
Signal Generator	Angilent	N5182A	MY47070282	Jun. 08, 2022	Jun. 07, 2023
Multimeter	Keithley	Multimeter 2000	4078275	Jun. 08, 2022	Jun. 07, 2023
Network Analyzer	Agilent	8753E	US38432457	Jun. 08, 2022	Jun. 07, 2023
Wireless Communication Test Set	R & S	CMU200	111382	Jun. 08, 2022	Jun. 07, 2023
Wideband Radio Communication Tester	R&S	CMW500	114220	Jun. 08, 2022	Jun. 07, 2023
Power Meter	Agilent	E4418B	GB43312526	Jun. 08, 2022	Jun. 07, 2023
Power Meter	Agilent	E4416A	MY45101555	Jun. 08, 2022	Jun. 07, 2023
Power Meter	Agilent	N1912A	MY50001018	Jun. 08, 2022	Jun. 07, 2023
Power Sensor	Agilent	E9301A	MY41497725	Jun. 08, 2022	Jun. 07, 2023
Power Sensor	Agilent	E9327A	MY44421198	Jun. 08, 2022	Jun. 07, 2023
Power Sensor	Agilent	E9323A	MY53070005	Jun. 08, 2022	Jun. 07, 2023
Power Amplifier	PE	PE15A4019	112342	N/A	N/A
Directional Coupler	Agilent	722D	MY52180104	N/A	N/A
Attenuator	Chensheng	FF779	134251	N/A	N/A
E-Field PROBE	MVG	SSE2	SN 36/20 EPGO346	Oct. 08, 2021	Oct. 07, 2022
DIPOLE 750	MVG	SID750	SN 16/15 DIP 0G750-368	Jun. 05, 2021	Jun. 04, 2024
DIPOLE 835	MVG	SID835	SN 16/15 DIP 0G835-369	Jun. 05, 2021	Jun. 04, 2024
DIPOLE 1800	MVG	SID 1800	SN 16/15 DIP 1G800-371	Jun. 05, 2021	Jun. 04, 2024
DIPOLE 1900	MVG	SID1900	SN 16/15 DIP 1G900-372	Jun. 05, 2021	Jun. 04, 2024
DIPOLE 2450	MVG	SID 2450	SN 16/15 DIP 2G450-374	Jun. 05, 2021	Jun. 04, 2024
DIPOLE 2600	MVG	SID 2600	SN 16/15 DIP 2G600-375	Jun. 05, 2021	Jun. 04, 2024
Limesar Dielectric Probe	MVG	SCLMP	SN 19/15 OCPG71	Jun. 05, 2021	Jun. 04, 2024
Communication Antenna	MVG	ANTA59	SN 39/14 ANTA59	N/A	N/A
Mobile Phone Position Device	MVG	MSH101	SN 19/15 MSH101	N/A	N/A
Dummy Probe	MVG	DP66	SN 13/15 DP66	N/A	N/A
SAM PHANTOM	MVG	SAM120	SN 19/15 SAM120	N/A	N/A
PHANTOM TABLE	MVG	TABP101	SN 19/15 TABP101	N/A	N/A
Robot TABLE	MVG	TABP61	SN 19/15 TABP61	N/A	N/A
6 AXIS ROBOT	KUKA	KR6-R900	501822	N/A	N/A

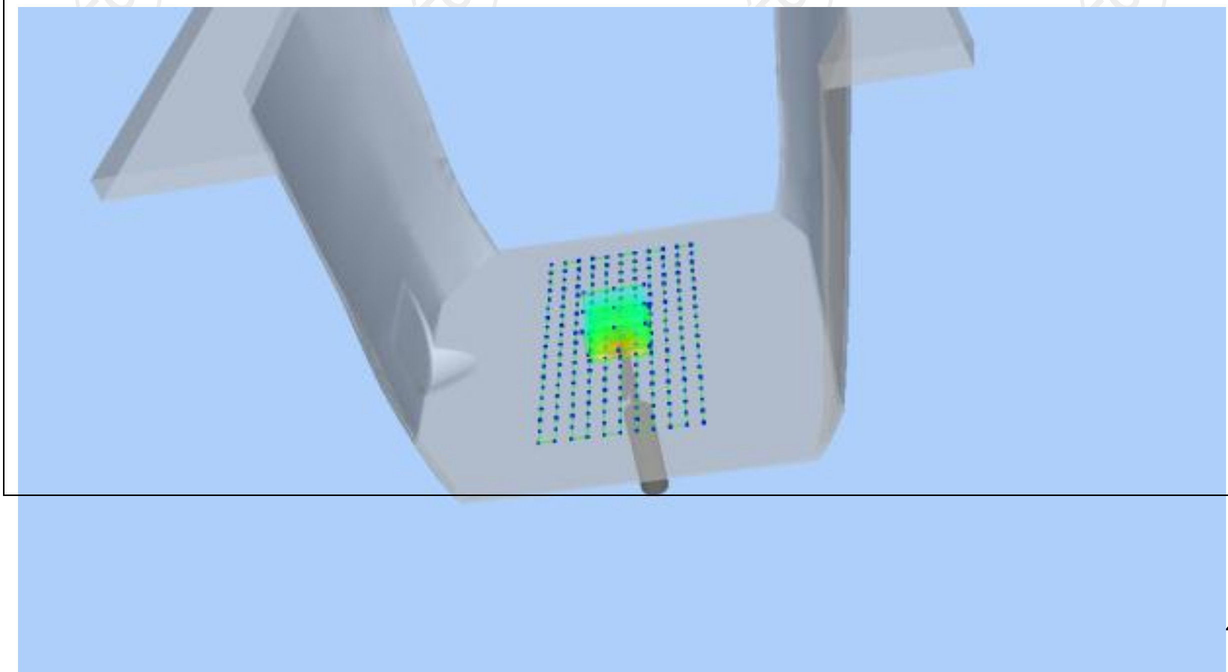
Note:*1.N/A means this equipment no need to calibrate*
2.Each Time means this device need to calibrate every use time
3. The dipole was not damaged properly repaired.
4. The measured SAR deviates from the calibrated SAR value by less than 10%
5. The most recent return-loss result meets the required 20 dB minimum return-loss requirement
6. The most recent measurement of the real or imaginary parts of the impedance deviates by less than 5 Ω from the previous measurement.

11. System Check Results

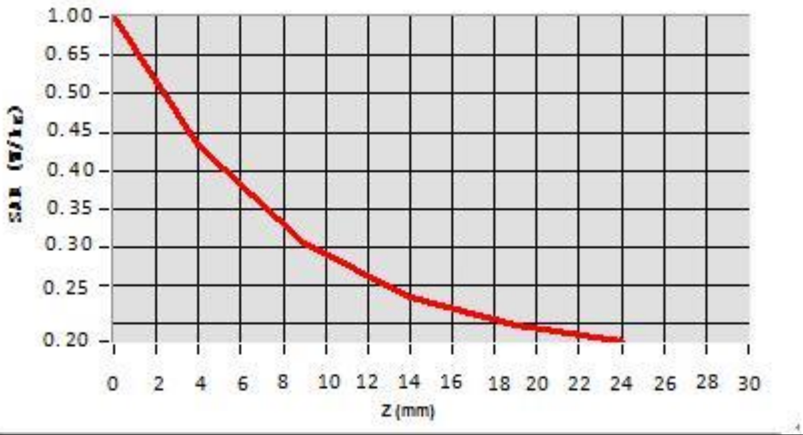
Date of measurement: 09/12/2022 Test mode: 750 (Body) Product Description: Validation Dipole Model: SID750 E-Field Probe: SSE2 (SN 36/20 EPGO346)	
Phantom	Validation plane
Input Power	100mW
Crest Factor	1.0
Probe Conversion factor	1.78
Frequency (MHz)	750.000000
Relative permittivity (real part)	55.501166
Relative permittivity (imaginary part)	20.148160
Conductivity (S/m)	0.961243
Variation (%)	-0.150000
SAR 10g (W/Kg)	**0.562014**
SAR 1g (W/Kg)	**0.832441**
SURFACE SAR	**VOLUME SAR**







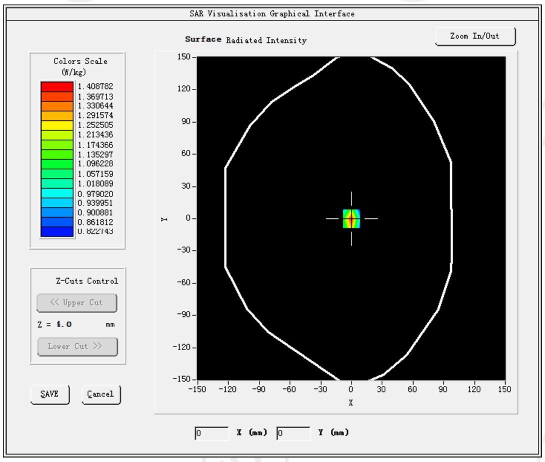
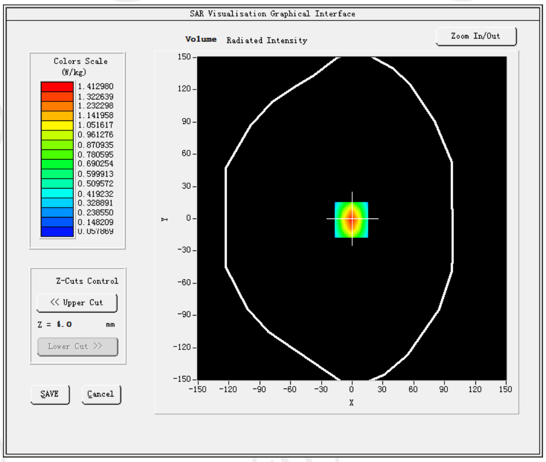
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.014	0.4420	0.3029	0.2419	0.2240

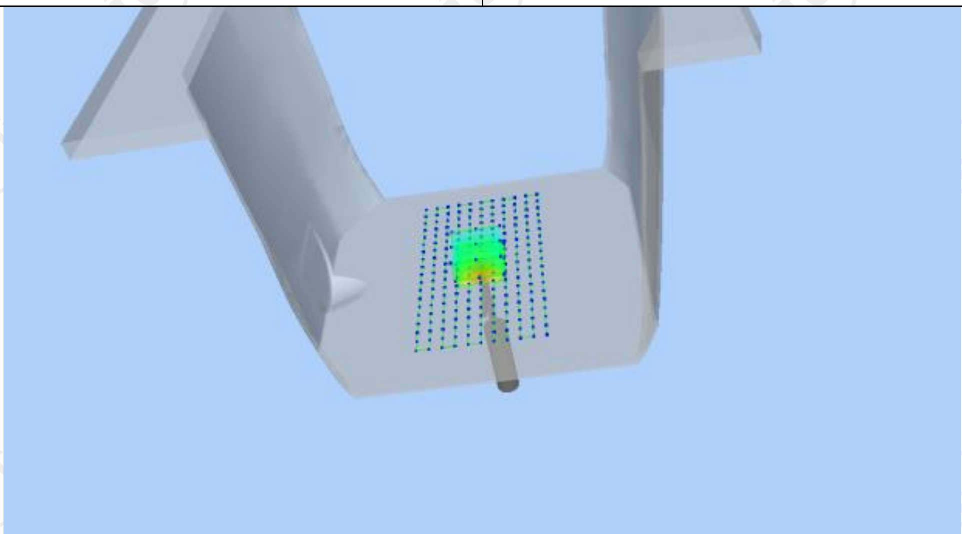


Hot spot position

Date of measurement: 09/12/2022 Test mode: 835 (Body)
Product Description: Validation
Dipole Model: SID835
E-Field Probe: SSE2 (SN 36/20 EPGO346)

Phantom	Validation plane
Input Power	100mW
Crest Factor	8.0
Probe Conversion factor	1.86
Frequency (MHz)	835.000000
Relative permittivity (real part)	55.242077
Relative permittivity (imaginary part)	21.378187
Conductivity (S/m)	0.938883
Variation (%)	-0.150000
SAR 10g (W/Kg)	**0.633123**
SAR 1g (W/Kg)	**0.949446**

SURFACE SAR	**VOLUME SAR**
	



Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.9625**	**0.6022**	**0.3594**	**0.2202**	**0.0725**

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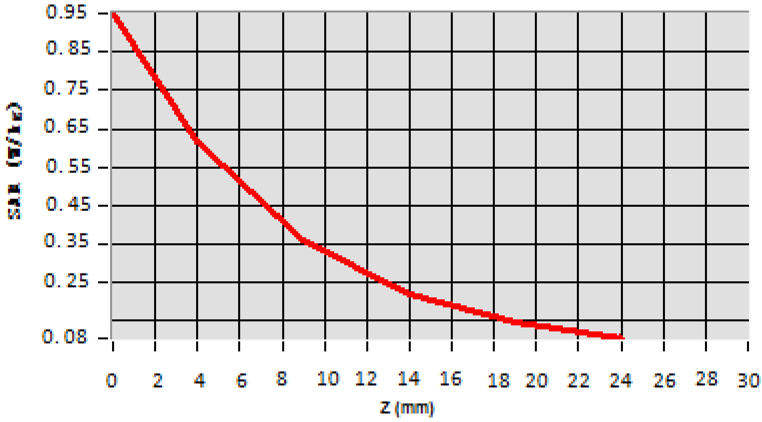
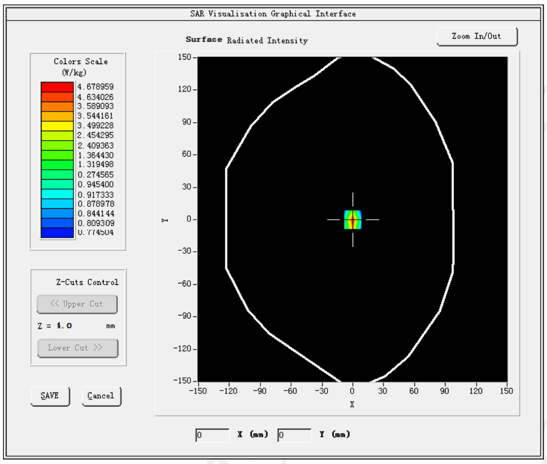
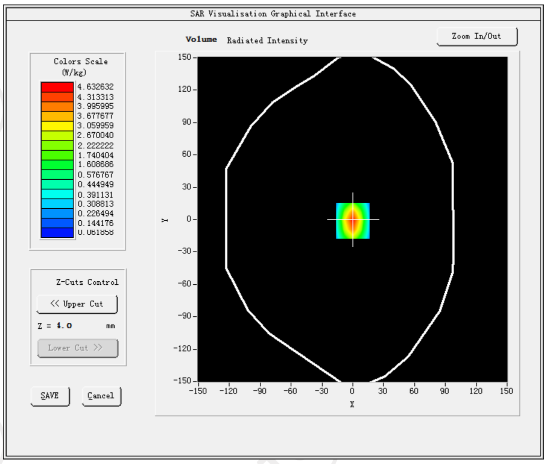
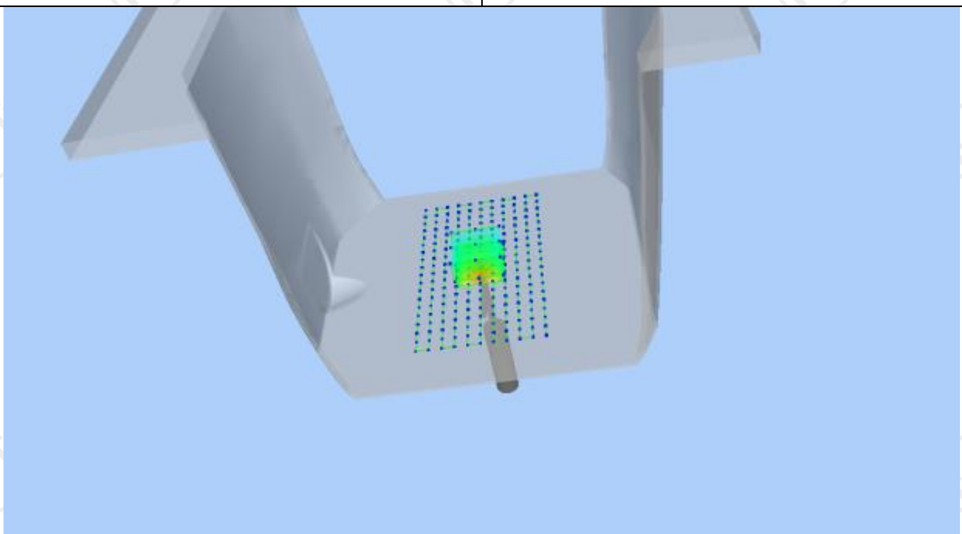


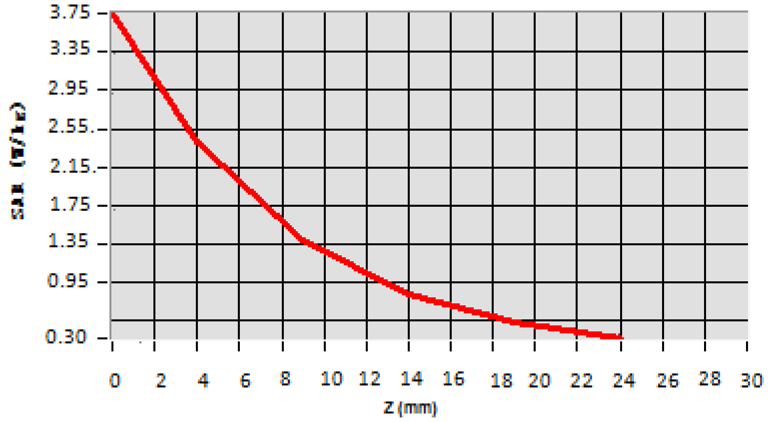
Hot spot position

Date of measurement: 09/12/2022 Test mode: 1800MHz (Body)
Product Description: Validation
Dipole Model: SID1800
E-Field Probe: SSE2 (SN 36/20 EPGO346)

Phantom	Validation plane
Input Power	100mW
Crest Factor	1.0
Probe Conversion factor	2.16
Frequency (MHz)	1800.000000
Relative permittivity (real part)	53.292699
Relative permittivity (imaginary part)	15.200000
Conductivity (S/m)	1.530000
Variation (%)	3.050000
SAR 10g (W/Kg)	**2.053687**
SAR 1g (W/Kg)	**3.782547**
SURFACE SAR	**VOLUME SAR**
	



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	3.7545	2.4524	1.3520	0.8214	0.5525

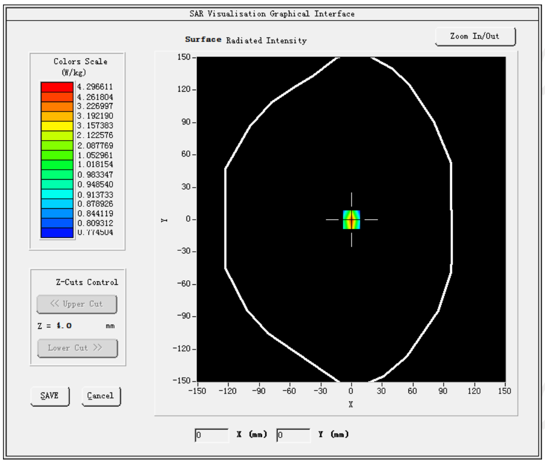
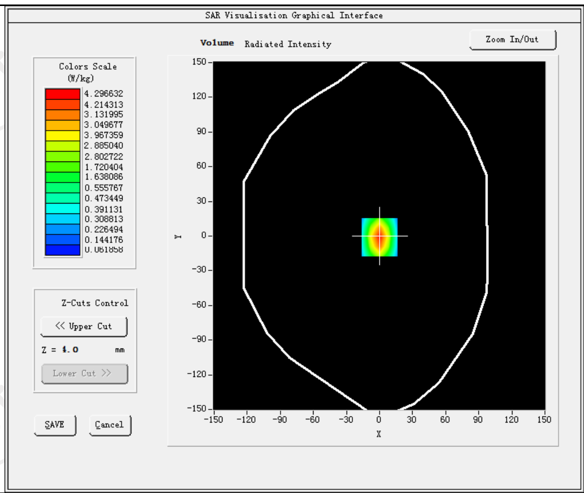


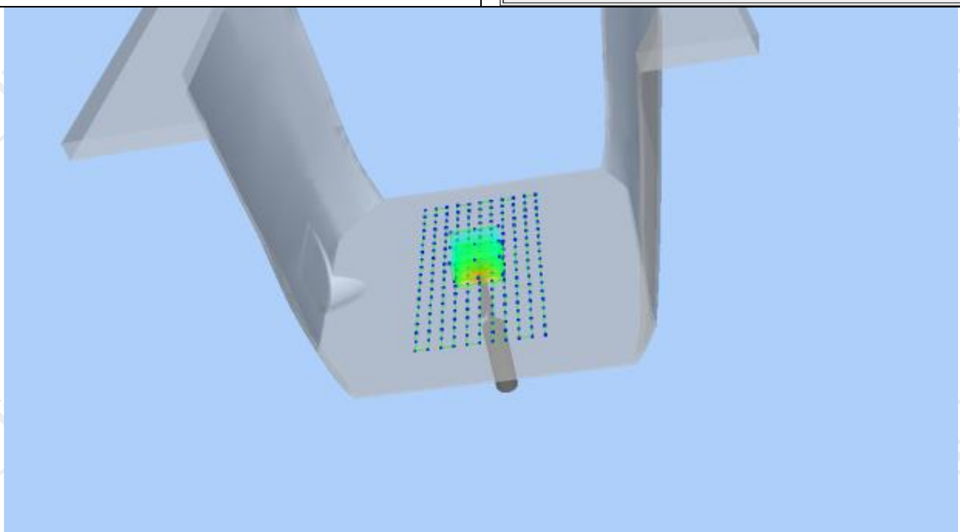
Hot spot position

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

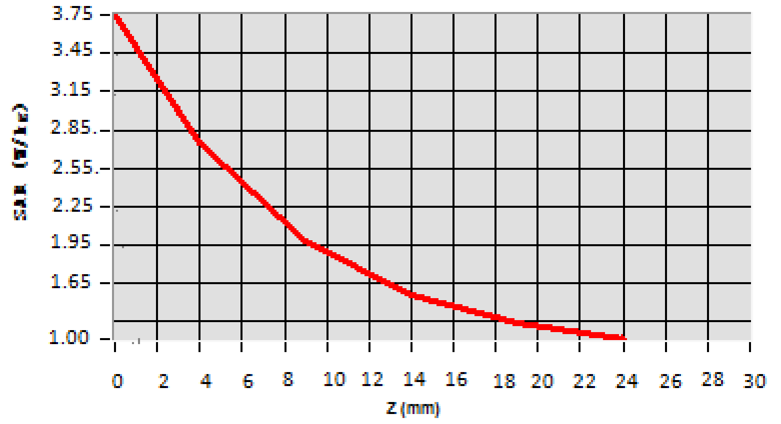
Date of measurement: 09/12/2022 Test mode: 1900MHz (Body)
Product Description: Validation
Dipole Model: SID1900
E-Field Probe: SSE2 (SN 36/20 EPGO346)

Phantom	Validation plane
Input Power	100mW
Crest Factor	8.0
Probe Conversion factor	2.32
Frequency (MHz)	1900.000000
Relative permittivity (real part)	53.309999
Relative permittivity (imaginary part)	14.329440
Conductivity (S/m)	1.510354
Variation (%)	1.250000
SAR 10g (W/Kg)	**1.994255**
SAR 1g (W/Kg)	**3.766112**

SURFACE SAR	**VOLUME SAR**
	



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	3.7752	2.7154	1.9525	1.5694	0.9014

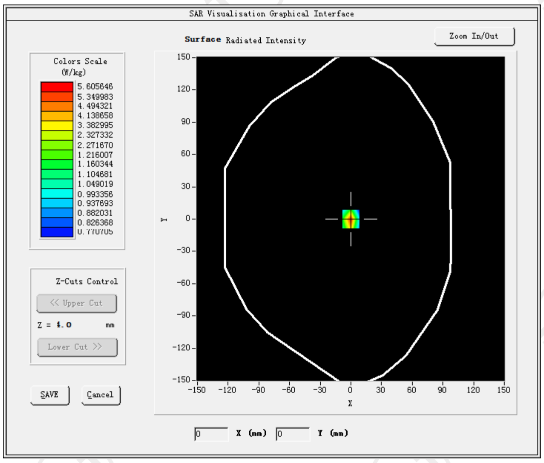
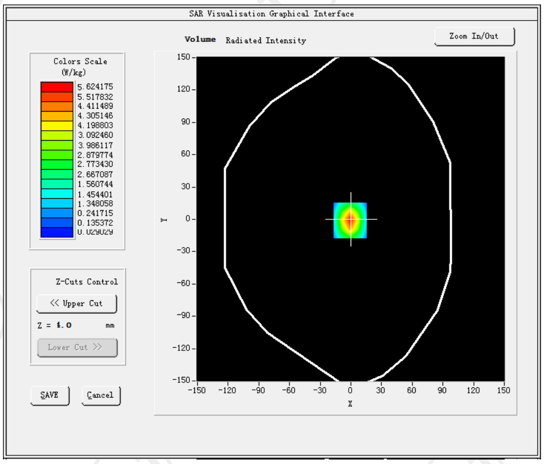


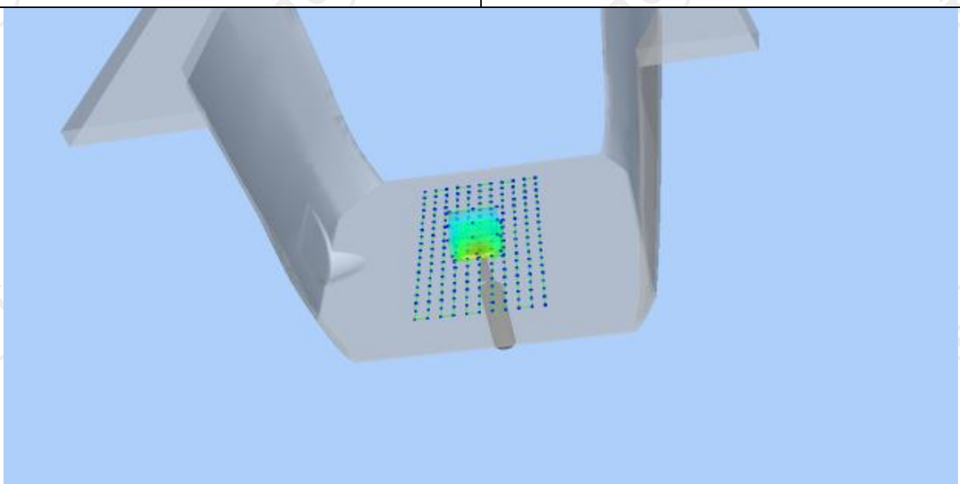
Hot spot position

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

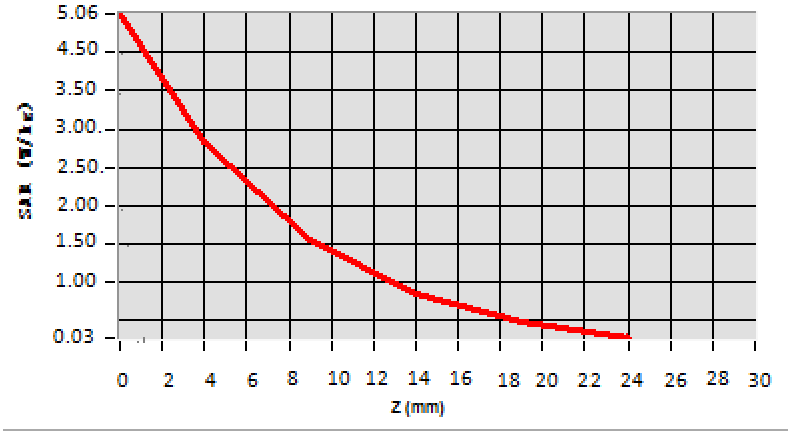
Date of measurement: 09/12/2022 Test mode: 2450MHz (Body)
Product Description: Validation
Dipole Model: SID2450
E-Field Probe: SSE2 (SN 36/20 EPGO346)

Phantom	Validation plane
Input Power	100mW
Crest Factor	1.0
Probe Conversion factor	2.37
Frequency (MHz)	2450.000000
Relative permittivity (real part)	54.616199
Relative permittivity (imaginary part)	14.930150
Conductivity (S/m)	2.012159
Variation (%)	-0.230000
SAR 10g (W/Kg)	**2.416669**
SAR 1g (W/Kg)	**5.066368**

SURFACE SAR	**VOLUME SAR**
	



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	5.0622	2.7984	1.5251	0.8352	0.4200



Hot spot position

12. SAR Test Data

GSM850

SAR Measurement at GPRS850 (Body, Validation Plane)

Date of measurement: 09/13/2022

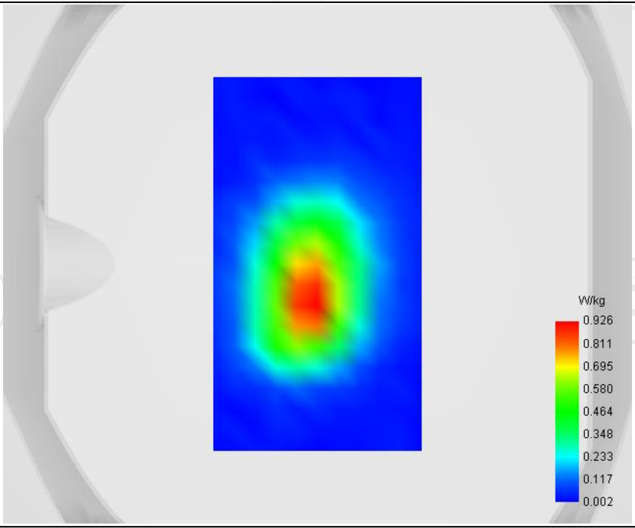
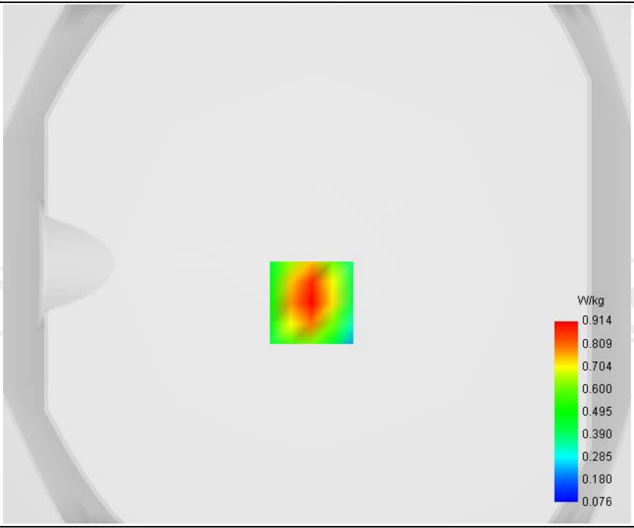
A. Experimental conditions.

Probe	SSE2 (SN 36/20 EPGO346)
ConvF	1.78
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GPRS850
Channels	Middle (190)
Signal	TDMA (GPRS)
Modulation	GMSK (CS-1)
TX-slots	2

B. Permittivity

Frequency (MHz)	836.600
Relative permittivity (real part)	55.242
Relative permittivity (imaginary part)	21.378
Conductivity (S/m)	0.942

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

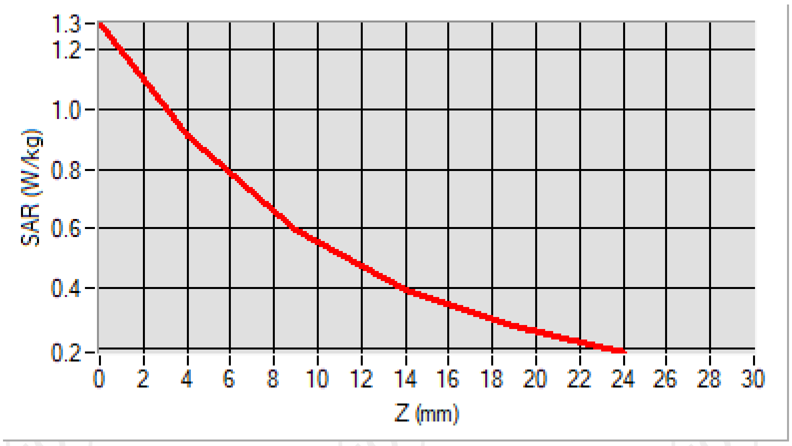
Maximum location: X=-2.00, Y=-15.00 ; SAR Peak: 1.29 W/kg

D. SAR 1g & 10g

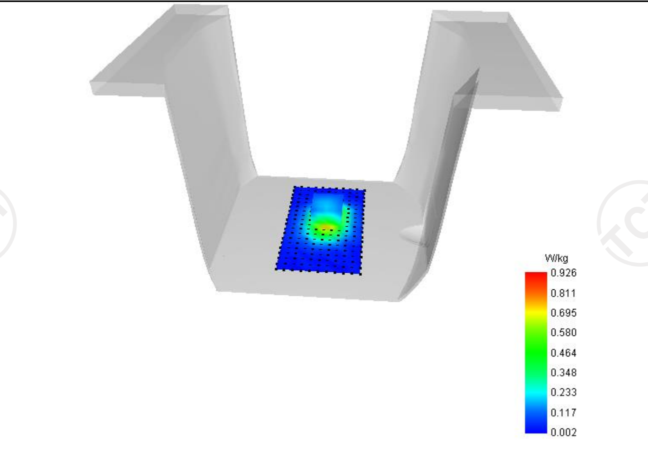
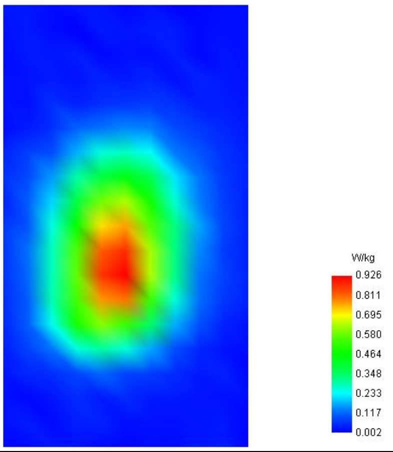
SAR 10g (W/Kg)	0.415
SAR 1g (W/Kg)	0.706
Variation (%)	-1.640
Horizontal validation criteria : minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.289	0.914	0.593	0.392	0.269



F. 3D Image

3D screen shot	Hot spot position
	

GSM 1900

SAR Measurement at GPRS1900 (Body, Validation Plane)

Date of measurement: 09/13/2022

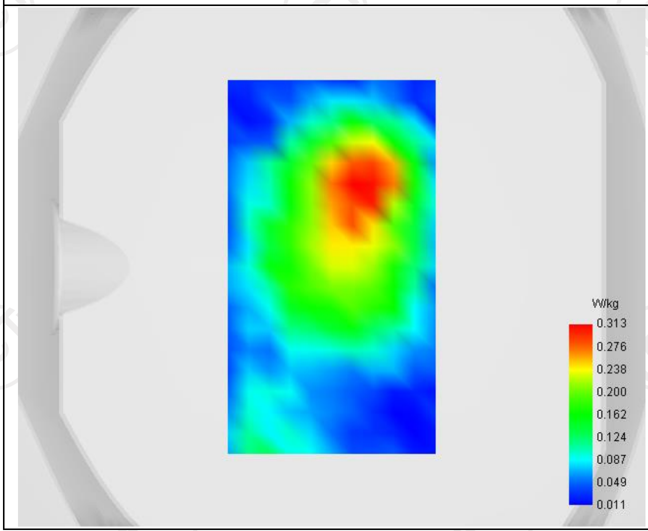
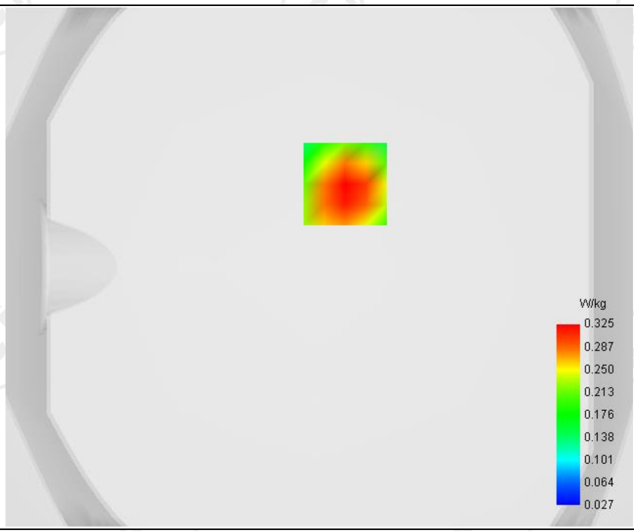
A. Experimental conditions.

Probe	SSE2 (SN 36/20 EPGO346)
ConvF	2.16
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GPRS1900
Channels	Higher (810)
Signal	TDMA (GPRS)
Modulation	GMSK (CS-1)
TX-slots	3

B. Permittivity

Frequency (MHz)	1909.800
Relative permittivity (real part)	53.291
Relative permittivity (imaginary part)	14.329
Conductivity (S/m)	1.532

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

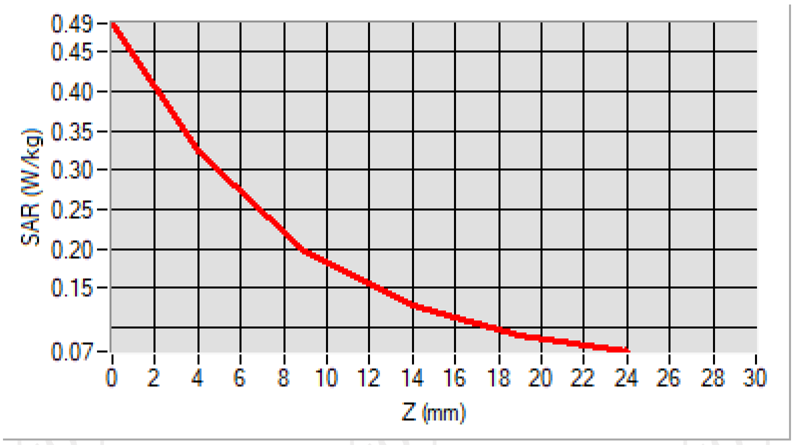
Maximum location: X=10.00, Y=32.00 ; SAR Peak: 0.49 W/kg

D. SAR 1g & 10g

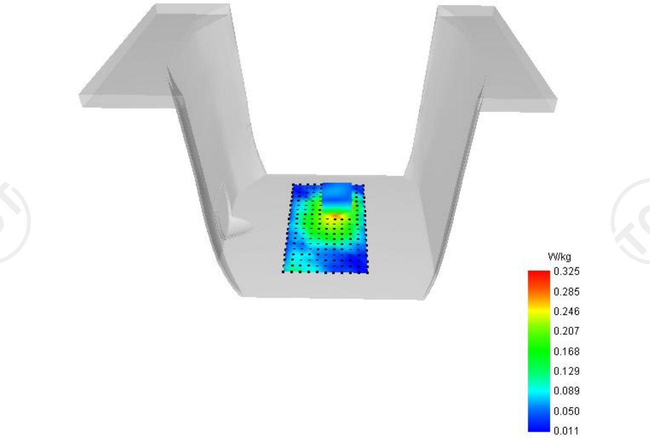
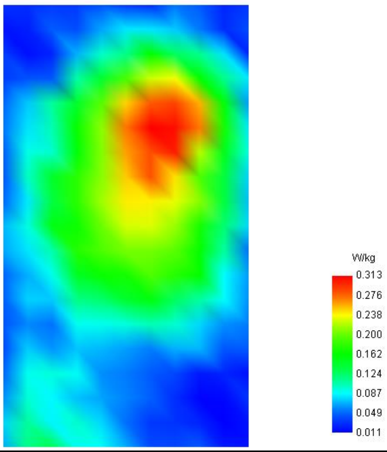
SAR 10g (W/Kg)	0.190
SAR 1g (W/Kg)	0.311
Variation (%)	-1.620
Horizontal validation criteria : minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.486	0.325	0.197	0.127	0.091



F. 3D Image

3D screen shot	Hot spot position
	

LTE Band 2

SAR Measurement at LTE band 2 (Body, Validation Plane)

Date of measurement: 09/13/2022

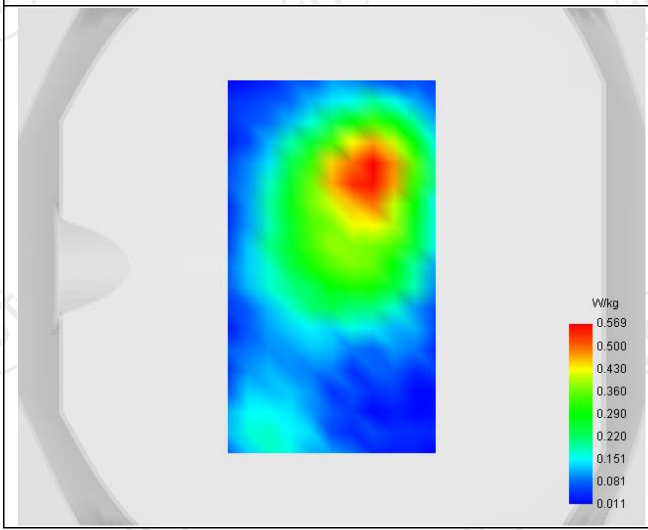
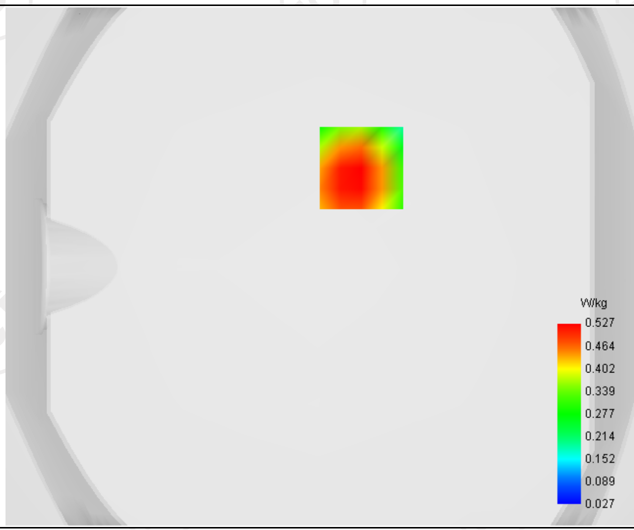
A. Experimental conditions.

Probe	SSE2 (SN 36/20 EPGO346)
ConvF	2.16
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Channels	Middle (18900)
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM – QPSK
RB offset	5
RB size	1

B. Permittivity

Frequency (MHz)	1880.000
Relative permittivity (real part)	53.324
Relative permittivity (imaginary part)	14.226
Conductivity (S/m)	1.502

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

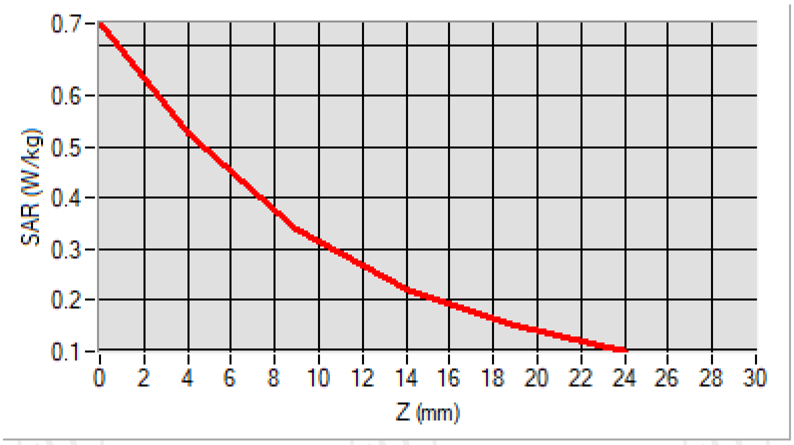
Maximum location: X=16.00, Y=38.00 ; SAR Peak: 0.76 W/kg

D. SAR 1g & 10g

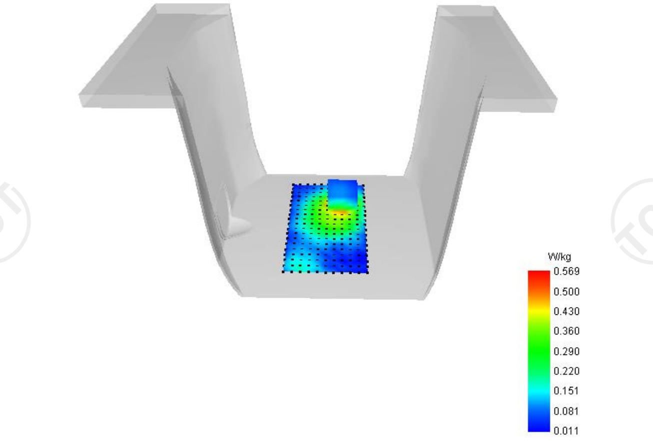
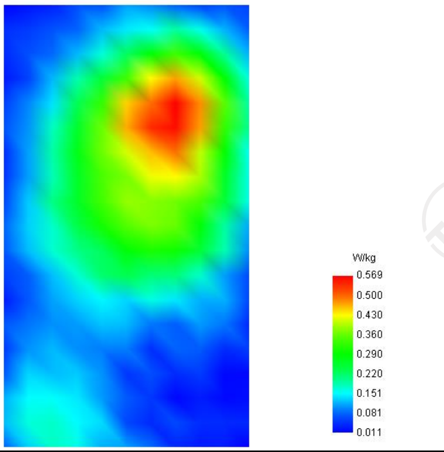
SAR 10g (W/Kg)	0.322
SAR 1g (W/Kg)	0.511
Variation (%)	-0.950
Horizontal validation criteria : minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.743	0.527	0.339	0.221	0.148



F. 3D Image

3D screen shot	Hot spot position
	

LTE Band 4

SAR Measurement at LTE band 4 (Body, Validation Plane)

Date of measurement: 09/13/2022

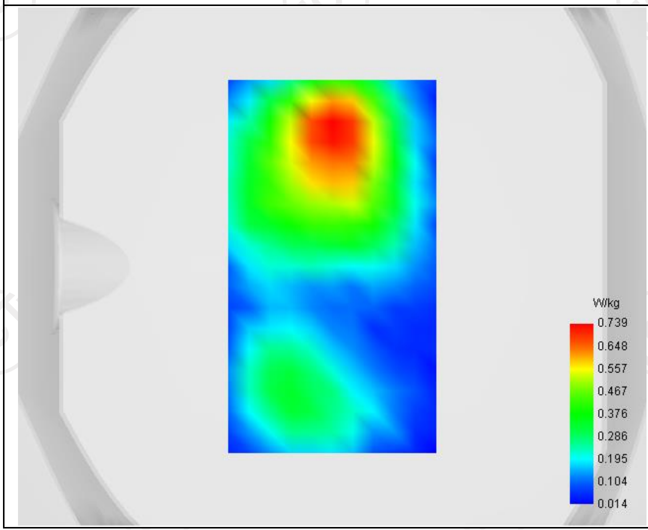
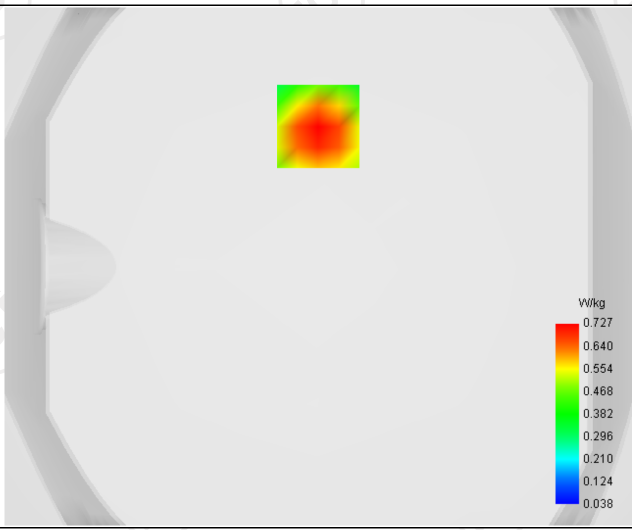
A. Experimental conditions.

Probe	SSE2 (SN 36/20 EPGO346)
ConvF	2.16
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 4
Channels	Lower (20050)
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	0
RB size	1

B. Permittivity

Frequency (MHz)	1711.090
Relative permittivity (real part)	53.344
Relative permittivity (imaginary part)	12.436
Conductivity (S/m)	1.494

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

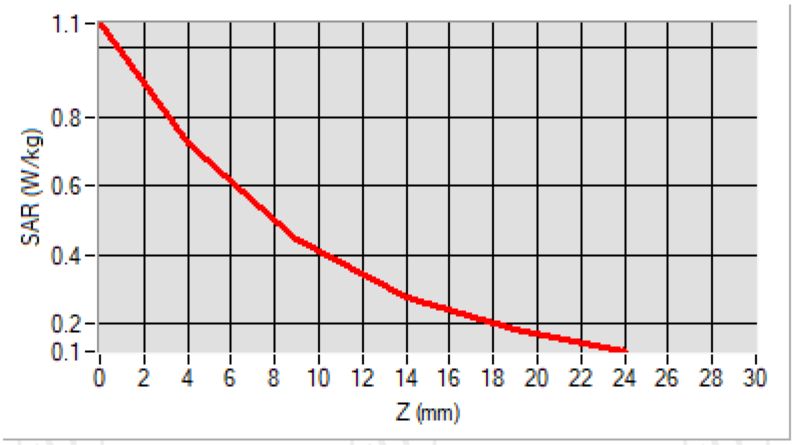
Maximum location: X=0.00, Y=54.00 ; SAR Peak: 1.07 W/kg

D. SAR 1g & 10g

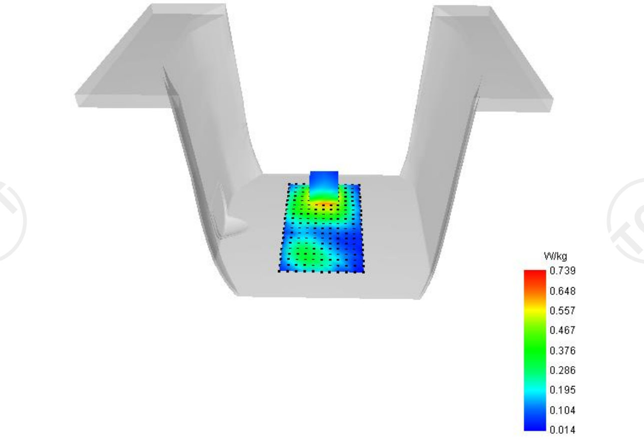
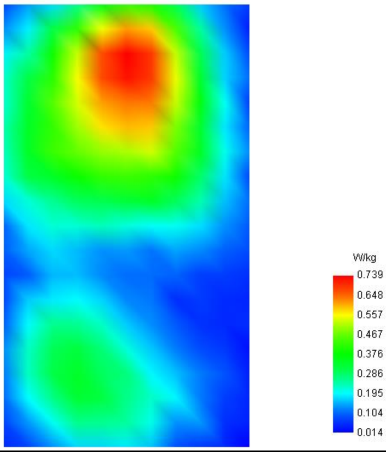
SAR 10g (W/Kg)	0.428
SAR 1g (W/Kg)	0.694
Variation (%)	-4.350
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.072	0.727	0.443	0.277	0.182



F. 3D Image

3D screen shot	Hot spot position
	

LTE Band 5

SAR Measurement at LTE band 5 (Body, Validation Plane)

Date of measurement: 09/14/2022

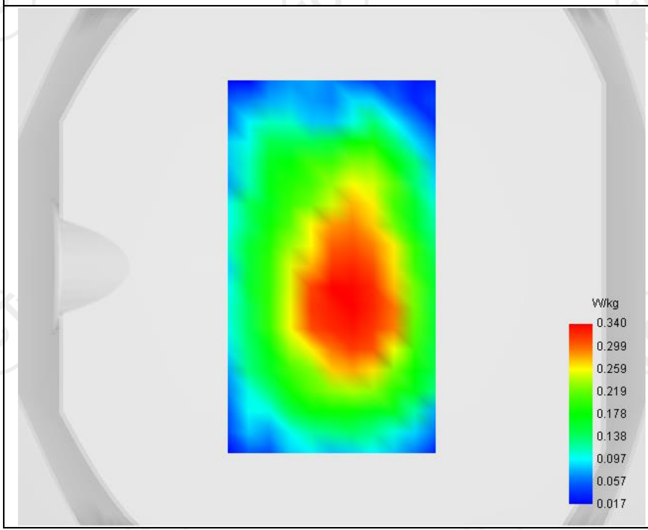
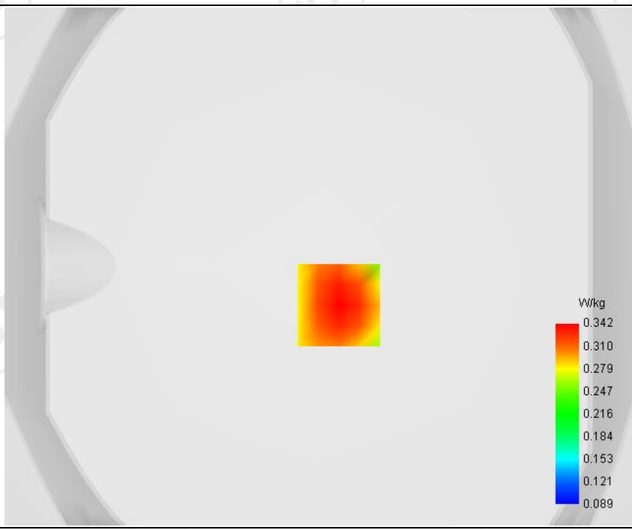
A. Experimental conditions.

Probe	SSE2 (SN 36/20 EPGO346)
ConvF	1.78
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Channels	Higher (20600)
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM – QPSK
RB offset	0
RB size	1

B. Permittivity

Frequency (MHz)	848.410
Relative permittivity (real part)	55.211
Relative permittivity (imaginary part)	12.499
Conductivity (S/m)	0.972

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

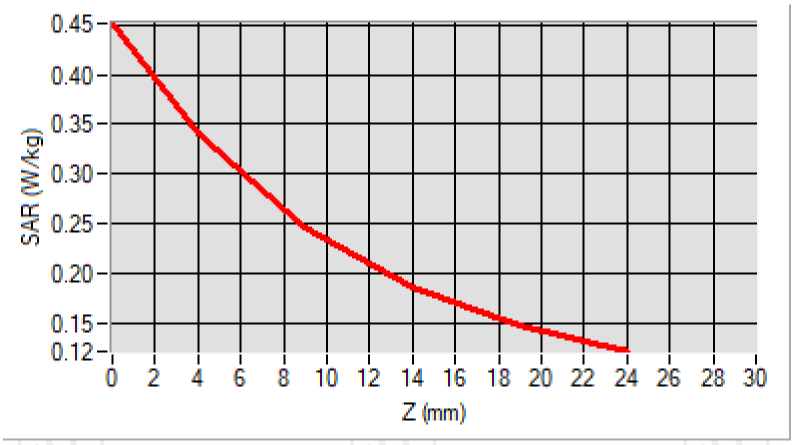
Maximum location: X=8.00, Y=-15.00 ; SAR Peak: 0.45 W/kg

D. SAR 1g & 10g

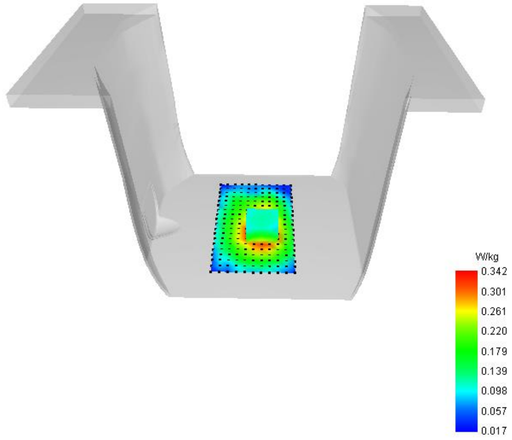
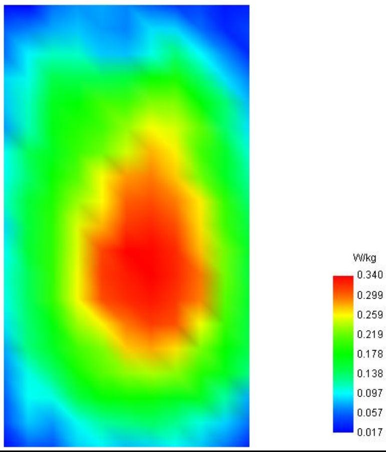
SAR 10g (W/Kg)	0.237
SAR 1g (W/Kg)	0.329
Variation (%)	-2.240
Horizontal validation criteria : minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.452	0.342	0.245	0.184	0.147



F. 3D Image

3D screen shot	Hot spot position
	

LTE Band 12

SAR Measurement at LTE band 12 (Body, Validation Plane)

Date of measurement: 09/13/2022

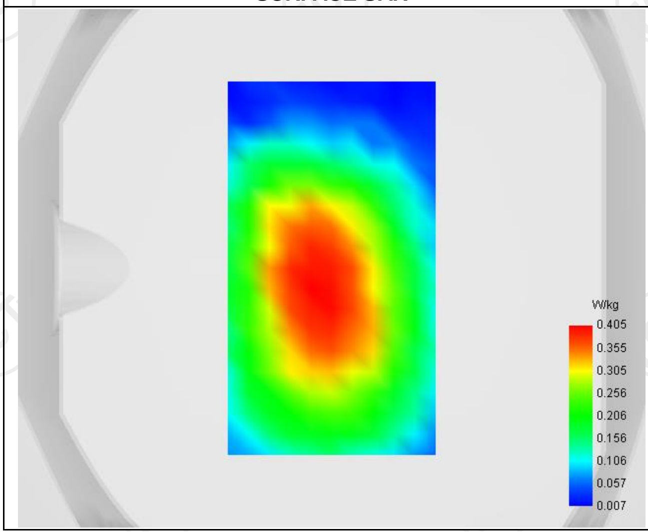
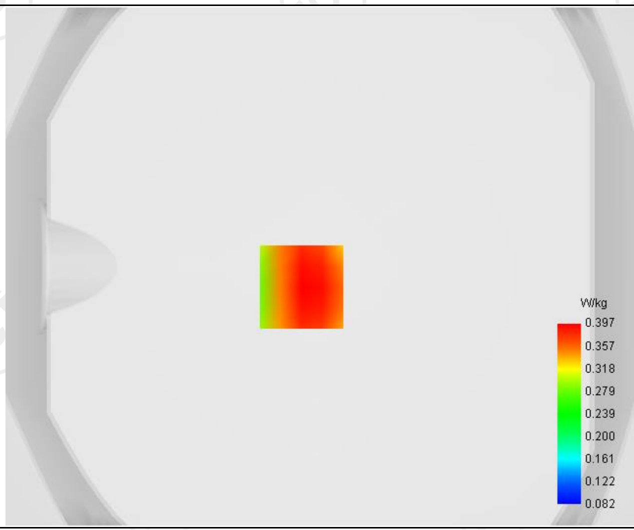
A. Experimental conditions.

Probe	SSE2 (SN 36/20 EPGO346)
ConvF	1.78
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 12
Channels	Higher (23130)
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	1

B. Permittivity

Frequency (MHz)	715.410
Relative permittivity (real part)	55.504
Relative permittivity (imaginary part)	12.466
Conductivity (S/m)	0.963

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-7.00, Y=-8.00 ; SAR Peak: 0.54 W/kg

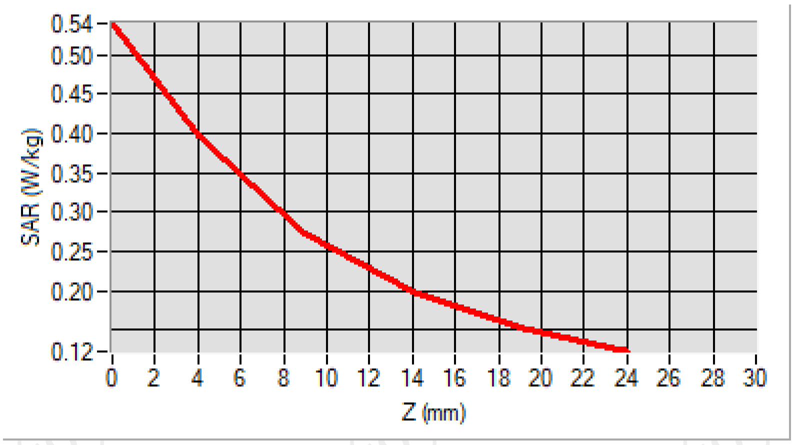
D. SAR 1g & 10g

SAR 10g (W/Kg)	0.293
SAR 1g (W/Kg)	0.411
Variation (%)	-3.970
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

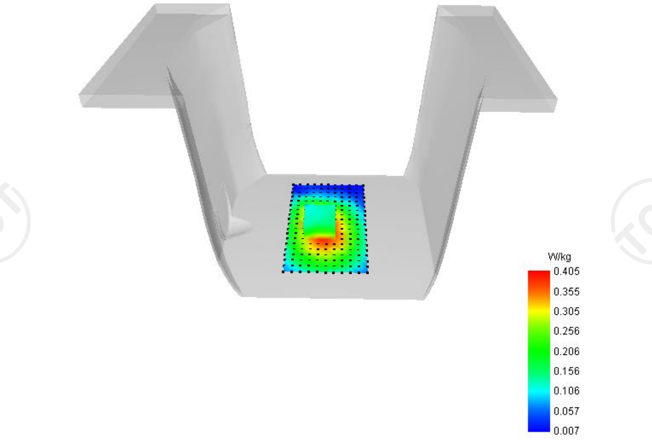
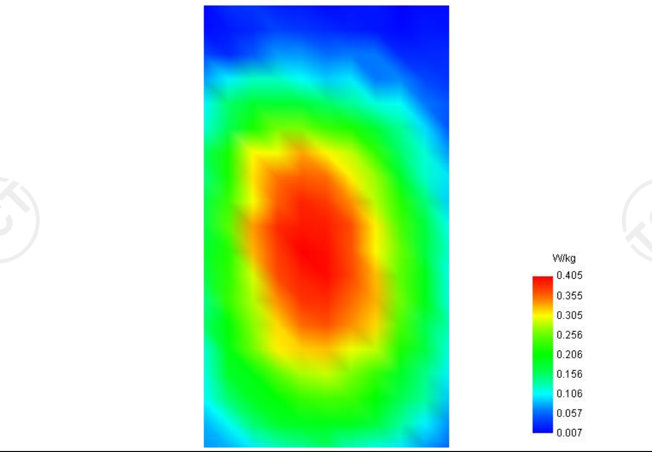
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.540	0.397	0.274	0.198	0.154

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com



F. 3D Image

3D screen shot	Hot spot position
	

LTE Band 13

SAR Measurement at LTE band 13 (Body, Validation Plane)

Date of measurement: 09/14/2022

A. Experimental conditions.

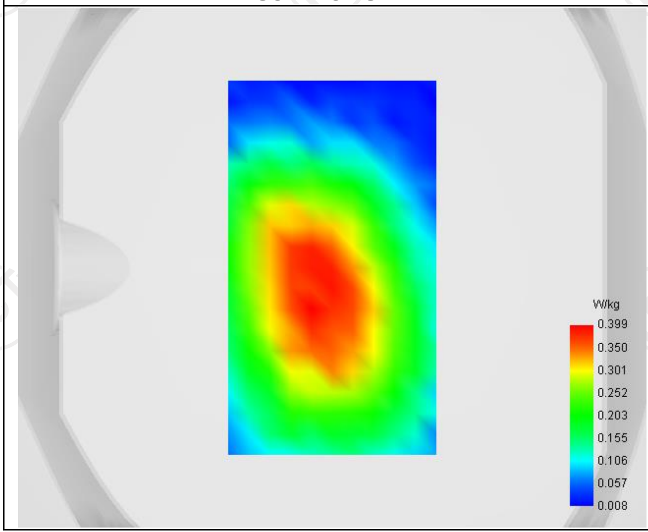
Probe	SSE2 (SN 36/20 EPGO346)
ConvF	1.78
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 13
Channels	Middle (23230)
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM – QPSK
RB offset	0
RB size	1

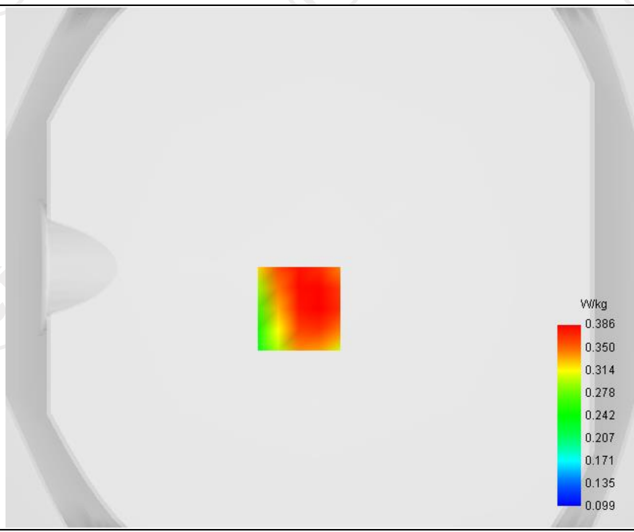
B. Permittivity

Frequency (MHz)	782.000
Relative permittivity (real part)	55.501
Relative permittivity (imaginary part)	12.469
Conductivity (S/m)	0.964

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR





Maximum location: X=-8.00, Y=-16.00 ; SAR Peak: 0.49 W/kg

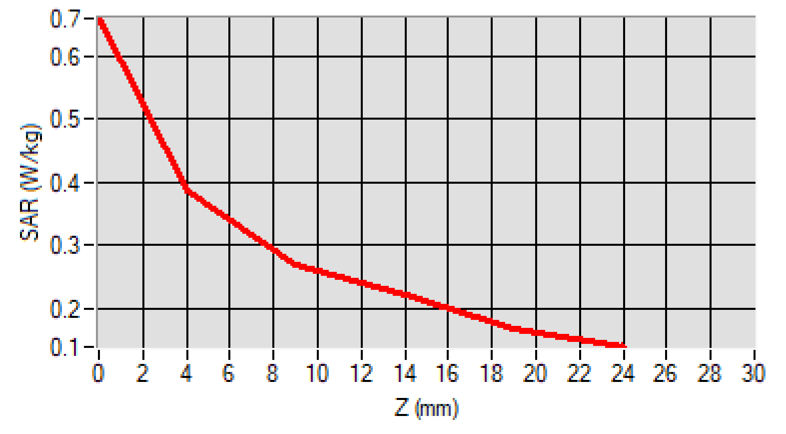
D. SAR 1g & 10g

SAR 10g (W/Kg)	0.294
SAR 1g (W/Kg)	0.400
Variation (%)	-3.480
Horizontal validation criteria : minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

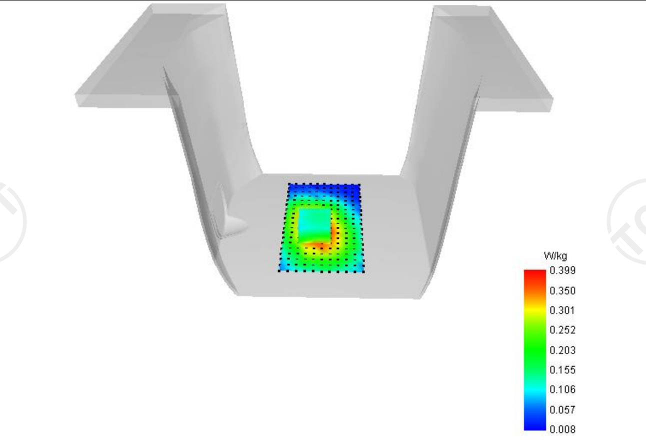
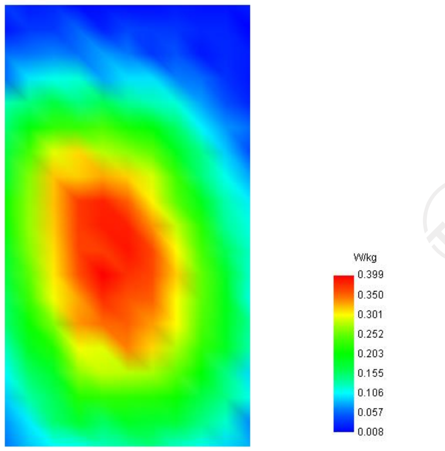
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.659	0.386	0.269	0.223	0.168

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com



F. 3D Image

3D screen shot	Hot spot position
	

WIFI 2.4G

SAR Measurement at IEEE 802.11b ISM (Body, Validation Plane)

Date of measurement: 09/14/2022

A. Experimental conditions.

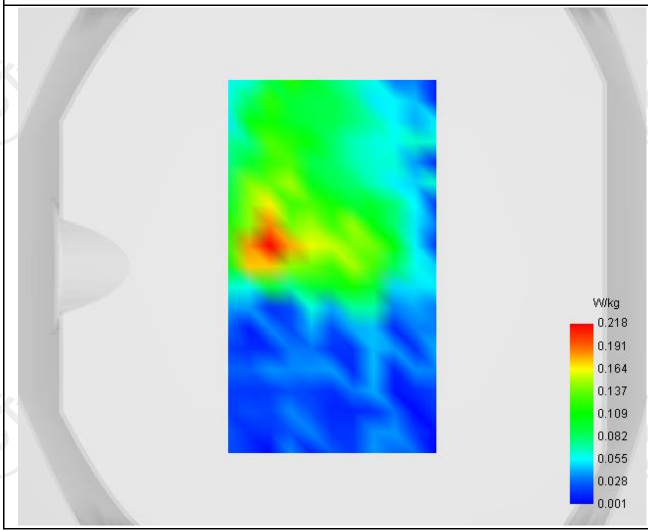
Probe	SSE2 (SN 36/20 EPGO346)
ConvF	2.37
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	Lower (1)
Signal	IEEE 802.11

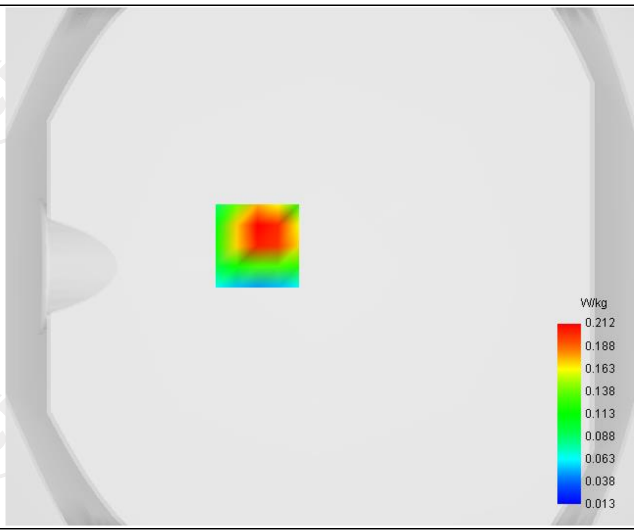
B. Permittivity

Frequency (MHz)	2412.000
Relative permittivity (real part)	54.651
Relative permittivity (imaginary part)	14.303
Conductivity (S/m)	1.972

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR





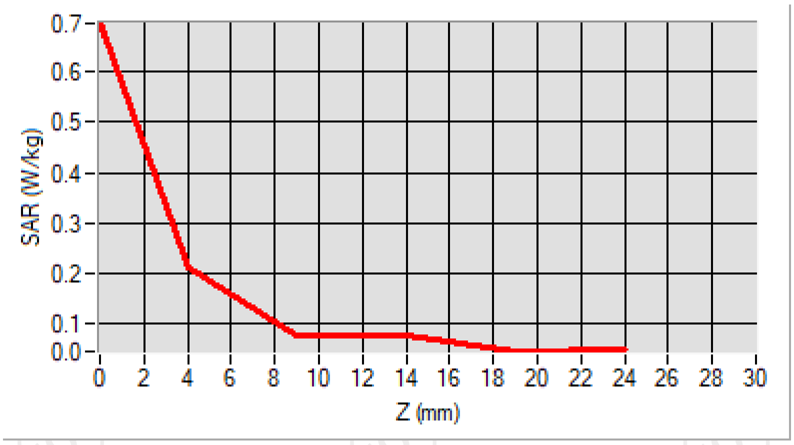
Maximum location: X=-24.00, Y=8.00 ; SAR Peak: 0.36 W/kg

D. SAR 1g & 10g

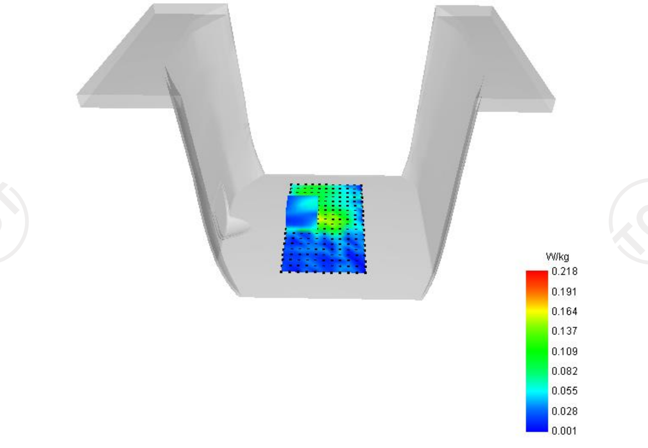
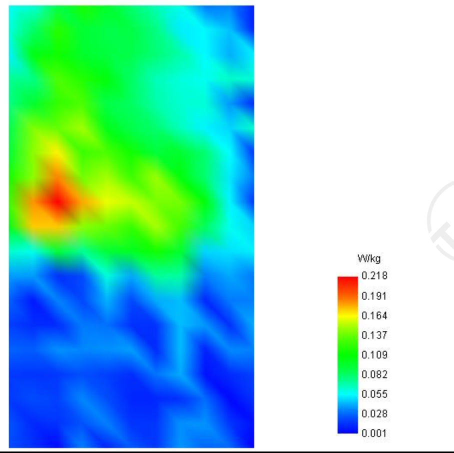
SAR 10g (W/Kg)	0.119
SAR 1g (W/Kg)	0.208
Variation (%)	-3.920
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.696	0.212	0.074	0.076	0.044



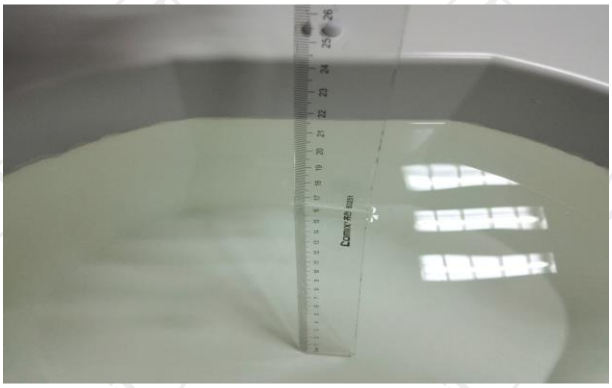
F. 3D Image

3D screen shot	Hot spot position
	

Appendix A: EUT Photos

Please refer to RF report.

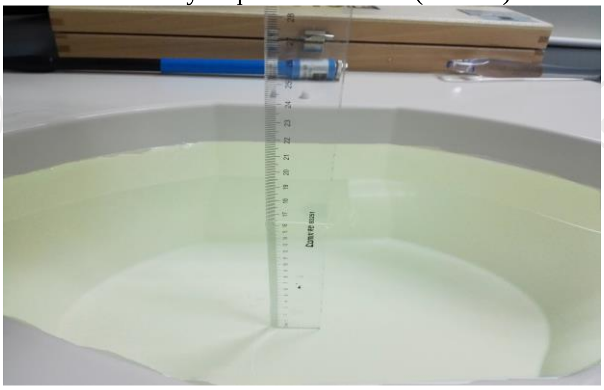
Liquid depth



The Body Liquid of 750MHz (16.5cm)

The Body Liquid of 835MHz (15.4cm)

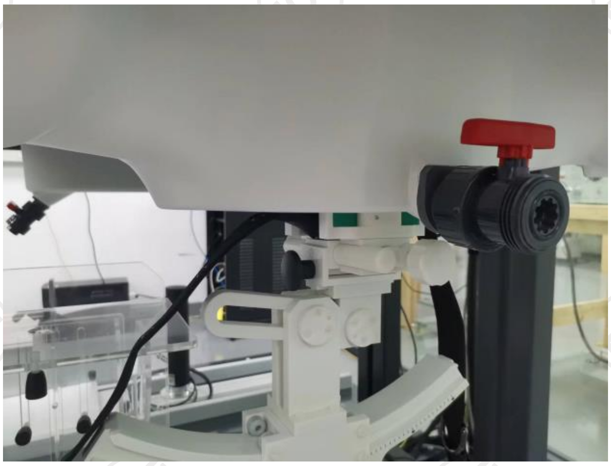
The Body Liquid of 1800MHz (15.2 cm)



The Body Liquid of 1900MHz (16.4 cm)

The Body Liquid of 2450MHz (15.3cm)

Appendix B: Test Setup Photos



Body-worn – Back (0mm)

Appendix C: Probe Calibration Certificate

COMOSAR E-FIELD Probe

COMOSAR E-Field Probe Calibration Report

Ref : ACR.297.1.20.MVGB.A

SHENZHEN TCT TESTING TECHNOLOGY CO., LTD

2101 2201, ZHENCHANG FACTORY, RENSHAN INDUSTRIAL ZONE, FUHAI SUBDISTRICT, BAOAN DISTRICT, SHENZHEN, GUANGDONG, 518103. PEOPLES REPUBLIC OF CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 36/20 EPGO346

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 10/08/2021

Accreditations #2-6789 and #2-6814

Scope available on www.cofrac.fr

Summary:

This document presents the method and results from an accredited COMOSAR E-Field Probe calibration performed at MVG, using the CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Technical Manager	10/08/2021	
Checked by :	Jérôme LUC	Technical Manager	10/08/2021	
Approved by :	Yann Toutain	Laboratory Director	10/11/2021	

	Customer Name
Distribution :	SHENHEN TCT TESTING TECHNOLOGY CO., LTD

Issue	Name	Date	Modifications
A	Jérôme LUC	10/11/2021	Initial release

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