TEST REPORT

Reference No.....................	:	WTX21X03024173W
FCC ID................................	:	2ACRJ-ZT-28E
Applicant	:	ZillionSource Technologies (Shanghai) Co., Ltd.
Address.............................	:	Suit 2D-18,1building,HuaShen RoadNO.198, Shanghai Free Trade Zone, Shanghai, China
Product Name	:	Environmental variable collector for logistics
Test Model.	:	ZT-28E
Standards	:	FCC Part 2.1093 ANSI / IEEE C95.1 : 2005+A1:2010 ANSI / IEEE C95.3 : 2002(R2008) IEEE 1528 :2013
Date of Receipt sample	:	Mar.24, 2021
Date of Test........................	:	Mar.24, 2021 to Apr.15, 2021
Date of Issue	:	Apr.16, 2021
Test Result.........................	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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1. General Information

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: ZillionSource Technologies (Shanghai) Co., Ltd.
Address of applicant: Suit 2D-18,1building,HuaShen RoadNO.198, Shanghai Free Trade Zone, Shanghai, China

Manufacturer: ZillionSource Technologies (Shanghai) Co., Ltd.
Address of manufacturer: Suit 2D-18,1building,HuaShen RoadNO.198, Shanghai Free Trade Zone, Shanghai, China

General Description of EUT:	
Product Name:	Environmental variable collector for logistics
Brand Name:	ZillionTrace
Model No.:	ZT-28E
Adding Model(s):	ZT-28, ZT-28X, ZT-28L, ZT-28S, ZT-50, ZT-50E, ZT-50S, ZT-50X
Rated Voltage:	DC3.7V by Battery
Battery:	3000mAh
Software Version:	V1.1.0
Hardware Version:	V1.0.4
Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model ZT-28E, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT:	
2G	
Support Networks:	GPRS, EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GPRS/EDGE 850: 824~849MHz GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency:	GPRS/EDGE 850: 869~894MHz GPRS/EDGE 1900: 1930~1990MHz
RF Output Power:	GPRS850: 33.22dBm, GPRS1900: 29.20dBm EDGE850: 27.54dBm, EDGE1900: 25.55dBm
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GPRS850: -0.5dBi; GPRS1900: 1dBi
GPRS/EDGE Class:	Class 12
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 4, 5
Uplink Frequency:	FDD-LTE Band 4: Tx: 1710-1755MHz, FDD-LTE Band 5: Tx: 824-849MHz,
Downlink Frequency:	FDD-LTE Band 4: Rx: 2110-2155MHz, FDD-LTE Band 5: Rx: 869-894MHz,
RF Output Power:	FDD-LTE Band 4: 20.06dBm, FDD-LTE Band 5: 21.22dBm,
Type of Emission:	FDD-LTE Band 4: 17M9G7D, 17M9W7D FDD-LTE Band 5: 8M96G7D, 8M93W7D
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 4: 1.5dBi FDD-LTE Band 5: -0.5dBi
WIFI	
Support Standards:	802.11b, 802.11g, 802.11n (Only Receiving)
Frequency Range:	2412-2462MHz for 11b/g/n(HT20)
RF Output Power:	/
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Quantity of Channels:	11 for 802.11b/g/n-HT20
Channel Separation:	5MHz
Antenna Type:	Integral Antenna
Antenna Gain:	5.0dBi

1.2 Test Standards

ANSI/IEEE C95.1-2005, ANSI / IEEE C95.3 :2002, IEEE 1528-2013, KDB 447498 D01 v06, KDB 648474 D04 v01r03, KDB 248227 D01 v02r02, KDB 941225 D01 v03r01, KDB 941225 D05 v02r05 , and KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02.

The objective is to determine compliance with FCC Part 2.1093 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02. The public notice KDB 447498 D01 v06 for Mobile and Portable Devices RF Exposure Procedure also.

1.4 Test Facility

Address of the test laboratory
Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.
Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990
Waltek Testing Group (Shenzhen) 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. The Designation Number is CN5010.Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

2. Summary of Test Results

The maximum results of Specific Absorption Rate (SAR) have found during testing are as follows:

Frequency Band	Body (10mm Gap) Maximum SAR_{1g} (W/kg)	SAR_{1g} Limit (W/kg)
GSM	**1.241**	1.6
LTE	0.084	1.6

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2.1093 and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2013 and KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02

3. Specific Absorption Rate (SAR)

3.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techiques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

3.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

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

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δ T is the temperature rise and δ t is the exposure duration, or related to the
electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

4. SAR Measurement System

4.1 The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

4.2 Probe

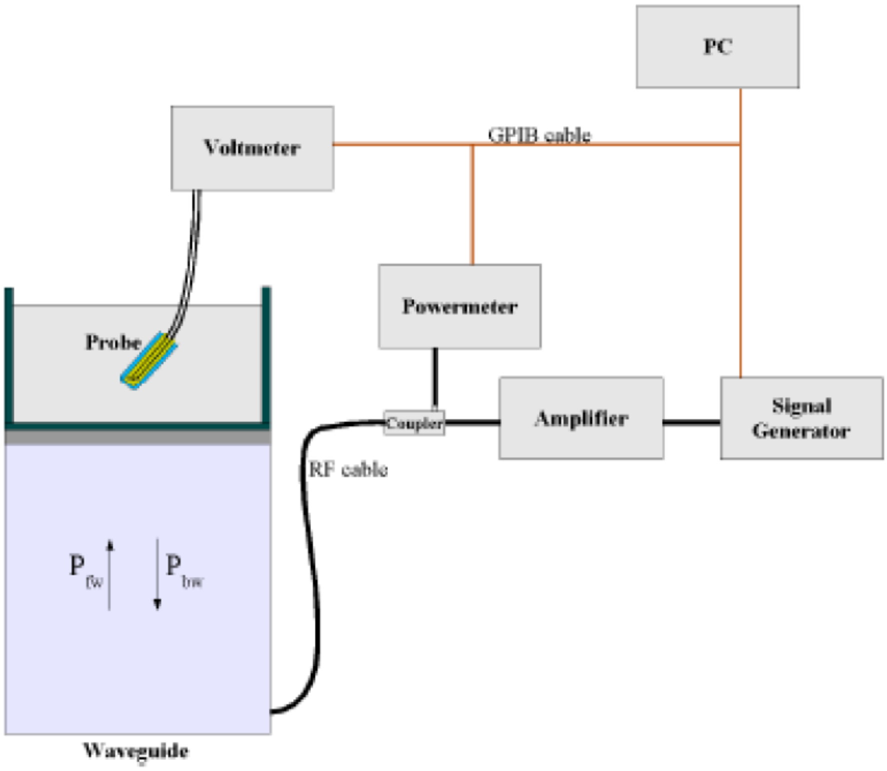
For the measurements the Specific Dosimetric E-Field Probe SSE2 SN 45/15 EPGO280 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Probe Length: 330 mm
- Length of Individual Dipoles: 4.5 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter : 5 mm

- Distance between dipoles / probe extremity: 2.7mm
- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.50 dB
- Calibration range: 700 to 3000MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and suface normal line:1ess than 30°

Probe calibration is realized, in compliance with EN 62209-1 and IEEE 1528 STD, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1 annexe technique using reference guide at the five frequencies.



$$SAR = \frac{4\left(P_{fw} - P_{bw}\right)}{ab\delta} \cos^2\left(\pi \frac{y}{a}\right) e^{(2z/\delta)}$$

Where :

Pfw = Forward Power

Pbw = Backward Power

a and b =Waveguide dimensions

I = Skin depth

Keithley configuration:

Rate = Medium; Filter = ON; RDGS = 10; Filter type = Moving Average; Range auto after each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N) (N=1,2,3)

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N)) (N=1,2,3)

where DCP is the diode compression point in mV.

4.3 Probe Calibration Process

Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an with CALISAR, Antenna proprietary calibration system.

Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm2.

Temperature Assessment Procedure

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

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

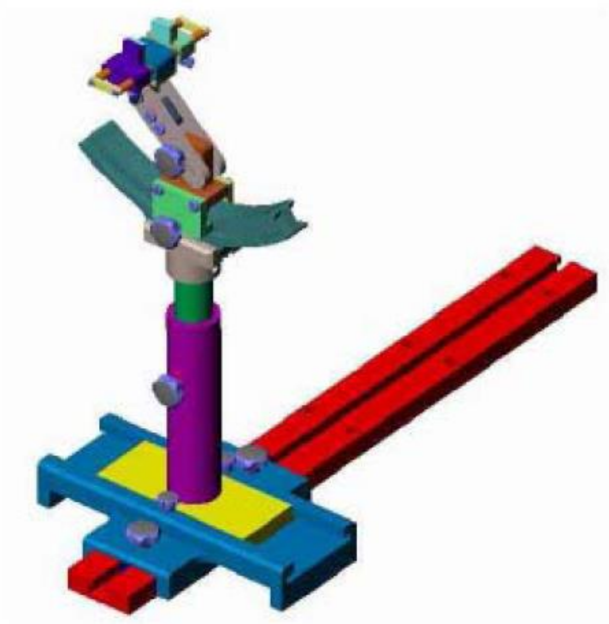
Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

4.4 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

4.5 Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 °.



System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

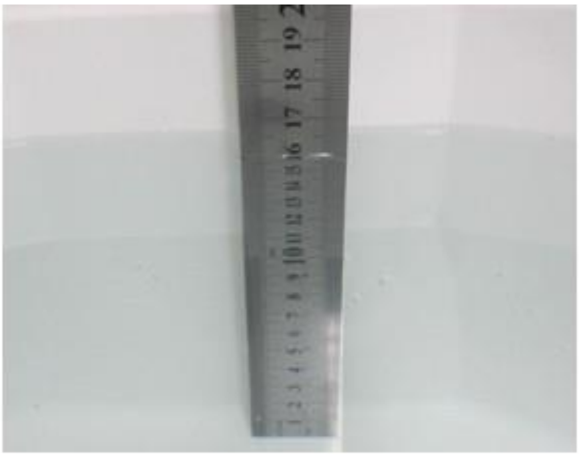
4.6 Test Equipment List

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
E-Field Probe	MVG	SSE5	SN 09/13 EP168	2020-05-22	2022-05-21
835MHz Dipole	MVG	SID835	SN 47/12 DIP 0G835-204	2020-03-11	2022-03-10
1800MHz Dipole	MVG	SID1800	SN 47/12 DIP 1G800-206	2020-03-11	2022-03-10
Dielectric Probe	SATIMO	SCLMP	SN 47/12 OCPG49	2020-03-11	2022-03-10
SAM Phantom	SATIMO	SAM	SN/ 47/12 SAM95	N/A	N/A
Multi Meter	Keithley	Keithley 2000	4006367	2020-04-28	2021-04-27
Power meter	Keithley	3500	JC-2017-09-001	2020-04-28	2021-04-27
Power meter	Keithley	3500	JC-2017-09-001	2020-04-28	2021-04-27
Power Sensor	Agilent	11636B	JC-2017-10-002	2020-04-28	2021-04-27
Signal Generator	Rohde & Schwarz	SMR20	100047	2020-04-28	2021-04-27
Universal Tester	Rohde & Schwarz	CMU200	112315	2020-04-28	2021-04-27
Communications Tester	Rohde & Schwarz	CMW500	148650	2020-04-28	2021-04-27
Network Analyzer	HP	8753C	SEMT-1064	2020-04-28	2021-04-27
Directional Couplers	Agilent	778D	20160	2020-04-28	2021-04-27

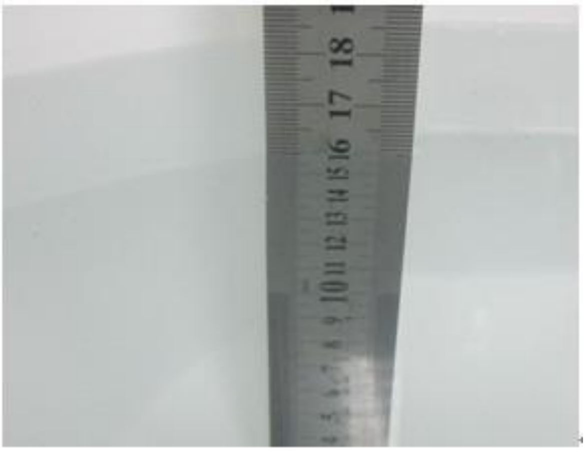
5. Tissue Simulating Liquids

5.1 Composition of Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with SMTIMO, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. Please see the following photos for the liquid height.



Liquid Height for Head SAR



Liquid Height for Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	Sugar (%)	HEC (%)	Preventol (%)	DGBE (%)
Head						
750	41.1	1.4	57.0	0.2	0.3	0
835	40.3	1.4	57.9	0.2	0.2	0
1700-1900	55.2	0.3	0	0	0	44.5

5.2 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Target Frequency (MHz)	**Head**	
	Conductivity (σ)	**Permittivity (ε_r)**
150	0.76	52.3
300	0.87	45.3
450	0.87	43.5
750	**0.89**	**41.9**
835	**0.90**	**41.5**
900	0.97	41.5
915	0.98	41.5
1450	1.20	40.5
1610	1.29	40.3
1750	**1.37**	**40.1**
1800-2000	**1.40**	**40.0**
2450	1.80	39.2
3000	2.40	38.5
5200	4.66	36.0
5800	5.27	35.3

5.3 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using COMOSAR Dielectric Probe Kit and an Agilent Network Analyzer.

Calibration Result for Dielectric Parameters of Tissue Simulating Liquid

Head Tissue Simulating Liquid									
Freq. MHz.	Temp. (℃)	Conductivity			Permittivity			Limit (%)	Date
		Reading (σ)	Target (σ)	Delta (%)	Reading (εr)	Target (εr)	Delta (%)		
835	22.0	0.88	0.90	-2.22	42.43	41.5	2.24	±5	2021-04-15
1800	21.8	1.38	1.40	-1.43	39.72	40.0	-0.70	±5	2021-04-13

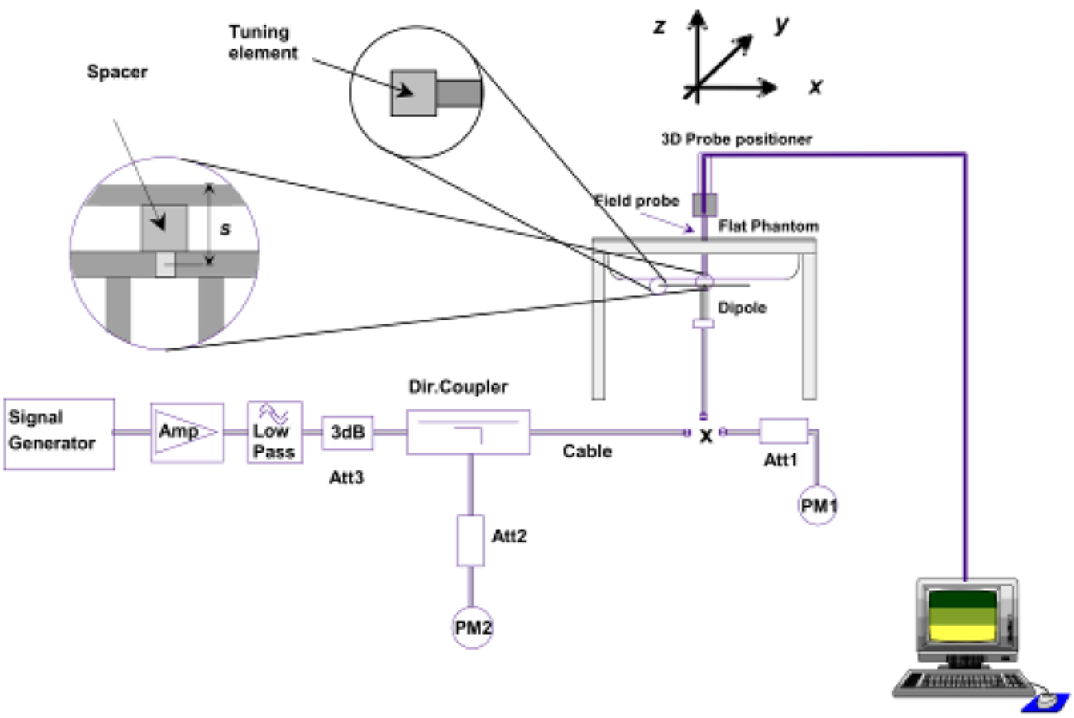
6. SAR Measurement Evaluation

6.1 Purpose of System Performance Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

6.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 835MHz ,1800MHz, 1900MHz 2450MHz,2600MHz,and 5GHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom.



System Verification Setup Block Diagram

Setup Photo of Dipole Antenna

The output power on dipole port must be calibrated to 24 dBm(250 mW) before dipole is connected.
The output power on 5 GHz Waveguide must be calibrated to 20 dBm (100mW) before 5 GHz Waveguide is connected.

6.3 Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %. Table 6.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion.

Frequency	**Liquid**	**Power (mw)**	**Targeted SAR1g**	**Measured SAR1g**	**Normalized SAR1g**	**Tolerance**	**Date**
835	Head	250	9.65	2.51	10.04	4.04	2021-04-15
1800	Head	250	38.49	9.72	38.88	1.01	2021-04-13

Remark: Referring to IEEE 1528-2013, Section 8.2, The system check shall be performed at a test frequency that is within ±10% or ±100 MHz of the compliance test mid-band frequency, so the 1750 MHz system verification is made of 1800MHz Dipole.

Targeted and Measurement SAR

Please refer to Annex A for the plots of system performance check.

7. EUT Testing Position

7.1 Body Position

(a) To position the device parallel to the phantom surface with each side.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device surface and the flat phantom to 10mm.

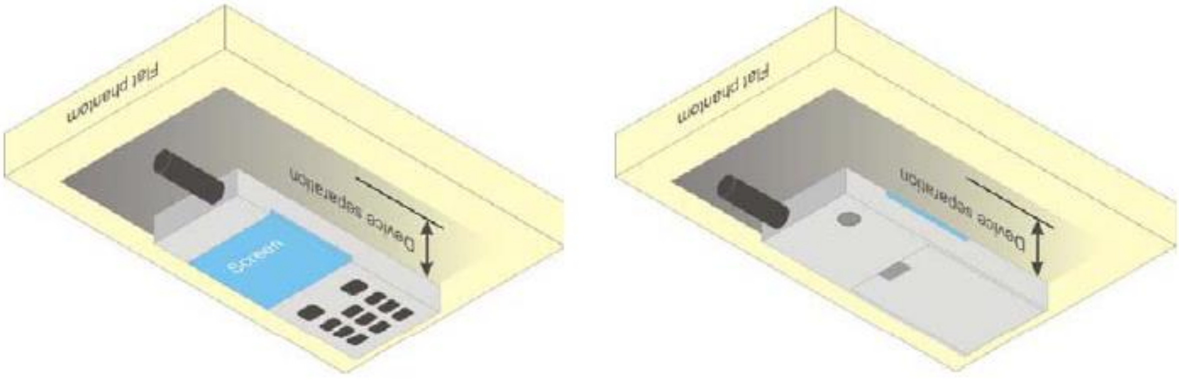
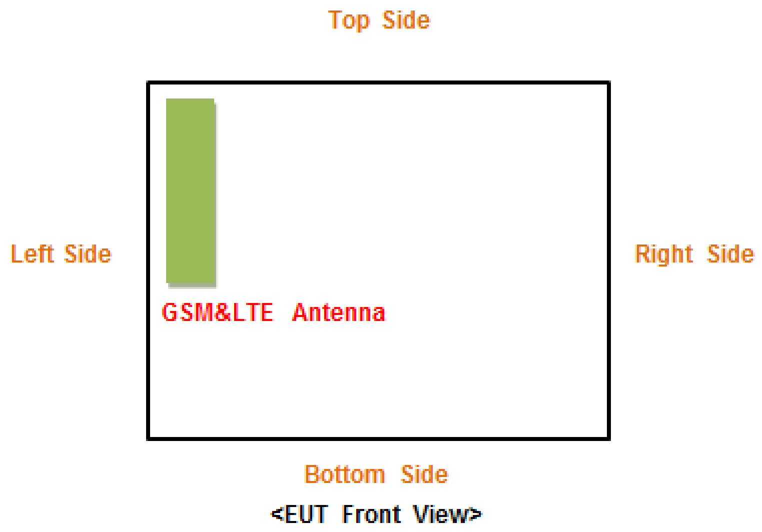


Illustration for Body Position

7.2 EUT Antenna Position



Block Diagram for EUT Antenna Position

Distance of EUT antenna-to-edge/surface(mm), Test distance:10mm						
Antennas	**Front**	**Back**	**Left Side**	**Right Side**	**Top Side**	**Bottom Side**
WWAN	<25	<25	<25	73	<25	32

7.3 EUT Testing Position

Body mode SAR assessments are required for this device. This EUT was tested in different positions for different SAR test modes, more information as below:

Body SAR tests, Test distance: 10mm						
Antennas	**Front**	**Back**	**Left Side**	**Right Side**	**Top Side**	**Bottom Side**
WWAN	Yes	Yes	Yes	NO	Yes	NO

Remark:

1. Referring to KDB 941225 D06, when the overall device length and width are >= 9cm*5cm, the test separation distances is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

Please refer to Annex D for the EUT test setup photos.

8. SAR Measurement Procedures

8.1 Measurement Procedures

The measurement procedures are as follows:
(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
(b) Keep EUT to radiate maximum output power or 100% factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the EUT in the positions as Annex D demonstrates.
(e) Set scan area, grid size and other setting on the SATIMO software.
(f) Measure SAR results for the highest power channel on each testing position.
(g) Find out the largest SAR result on these testing positions of each band
(h) Measure SAR results for other channels in worst SAR testing position if the SAR of 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:
(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

8.2 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 SATIMO 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 10g 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. The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

8.3 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 measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

8.4 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 (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.5 SAR Averaged Methods

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10g and 1 g requires a very fine resolution in the three dimensional scanned data array.

8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In SATIMO 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 drift more than 5%, the SAR will be retested.

9. SAR Test Result

9.1 Conducted RF Output Power

GSM - Burst Average Power (dBm)								
Band	GSM850			Tune-up power (dBm)	PCS1900			Tune-up power (dBm)
Channel	128	190	251		512	661	810	
Frequency (MHz)	824.2	836.6	848.8		1850.2	1880	1909.8	
GSM	/	/	/	/	/	/	/	/
GPRS (1 slot)	32.81	32.84	33.22	33.5	29.20	29.01	28.50	29.5
GPRS (2 slots)	32.67	32.64	32.13	33.0	28.59	28.45	27.92	29.0
GPRS (3 slots)	30.49	30.37	29.79	30.5	26.99	26.98	26.43	27.0
GPRS (4 slots)	29.06	28.94	28.58	29.5	26.42	26.44	25.94	26.5
EDGE (1 slot)	27.16	27.00	27.54	28.0	25.55	25.52	25.34	26.0
EDGE (2 slots)	27.00	26.92	26.35	27.5	24.44	24.57	24.53	25.0
EDGE (3 slots)	24.98	24.89	24.37	25.0	22.54	22.50	22.69	23.0
EDGE (4 slots)	23.55	23.67	23.07	24.0	21.14	21.13	21.38	21.5

GSM - Source-Based Time-Average Power (dBm)								
Band	GSM850			Tune-up power (dBm)	PCS1900			Tune-up power (dBm)
Channel	128	190	251		512	661	810	
Frequency (MHz)	824.2	836.6	848.8		1850.2	1880	1909.8	
GSM	/	/	/	/	/	/	/	/
GPRS (1 slot)	23.81	23.84	24.22	24.5	20.20	20.01	19.50	20.5
GPRS (2 slots)	26.67	26.64	26.13	27.0	22.59	22.45	21.92	23.0
GPRS (3 slots)	26.24	26.12	25.54	26.5	22.74	22.73	22.18	23.0
GPRS (4 slots)	26.06	25.94	25.58	26.5	23.42	23.44	22.94	23.5
EDGE (1 slot)	18.16	18.00	18.54	19.0	16.55	16.52	16.34	17.0
EDGE (2 slots)	21.00	20.92	20.35	21.5	18.44	18.57	18.53	19.0
EDGE (3 slots)	20.73	20.64	20.12	21.0	18.29	18.25	18.44	18.5
EDGE (4 slots)	20.55	20.67	20.07	21.0	18.14	18.13	18.38	18.5
Note: The source-based time-averaged power is linearly scaled the maximum burst averaged power based on time slots. The calculated method are shown as below: Source based time-average power = Burst averaged power - Duty cycle factor in dB Duty cycle factor = 9 dB for 1 Tx slot, 6 dB for 2 Tx slots, 4.25 dB for 3 Tx slots, 3 dB for 4 Tx slots								

Remark:

1. For Head SAR testing, GSM should be evaluated, therefore the EUT was set in GSM for GSM850 and GSM1900 due to its highest source-based time-average power.
2. For Body SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS (2TX slots) for GSM850 and

GPRS (4TX slots) for GSM1900 due to its highest source-based time-average power.

3. Per KDB 447498 D01 v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.

4. The DUT do not support DTM function.

5. The DUT do not support Hotspot function.

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	Result(dBm)	Verdict
Band4	1.4MHz	19957	QPSK	1	0	19.82	PASS
Band4	1.4MHz	19957	QPSK	1	5	19.54	PASS
Band4	1.4MHz	19957	QPSK	6	0	17.69	PASS
Band4	1.4MHz	20175	QPSK	1	0	19.57	PASS
Band4	1.4MHz	20175	QPSK	1	5	19.46	PASS
Band4	1.4MHz	20175	QPSK	6	0	17.53	PASS
Band4	1.4MHz	20393	QPSK	1	0	19.88	PASS
Band4	1.4MHz	20393	QPSK	1	5	19.66	PASS
Band4	1.4MHz	20393	QPSK	6	0	17.80	PASS
Band4	1.4MHz	19957	16QAM	1	0	18.61	PASS
Band4	1.4MHz	19957	16QAM	1	5	18.56	PASS
Band4	1.4MHz	19957	16QAM	6	0	17.59	PASS
Band4	1.4MHz	20175	16QAM	1	0	18.66	PASS
Band4	1.4MHz	20175	16QAM	1	5	18.56	PASS
Band4	1.4MHz	20175	16QAM	6	0	17.54	PASS
Band4	1.4MHz	20393	16QAM	1	0	18.81	PASS
Band4	1.4MHz	20393	16QAM	1	5	18.74	PASS
Band4	1.4MHz	20393	16QAM	6	0	17.79	PASS
Band4	3MHz	19965	QPSK	1	0	19.70	PASS
Band4	3MHz	19965	QPSK	1	14	19.52	PASS
Band4	3MHz	19965	QPSK	15	0	17.52	PASS
Band4	3MHz	20175	QPSK	1	0	19.50	PASS
Band4	3MHz	20175	QPSK	1	14	19.41	PASS
Band4	3MHz	20175	QPSK	15	0	17.39	PASS
Band4	3MHz	20385	QPSK	1	0	20.04	PASS
Band4	3MHz	20385	QPSK	1	14	19.76	PASS
Band4	3MHz	20385	QPSK	15	0	17.97	PASS
Band4	3MHz	19965	16QAM	1	0	18.67	PASS
Band4	3MHz	19965	16QAM	1	14	18.37	PASS
Band4	3MHz	19965	16QAM	15	0	17.58	PASS
Band4	3MHz	20175	16QAM	1	0	18.43	PASS
Band4	3MHz	20175	16QAM	1	14	18.23	PASS
Band4	3MHz	20175	16QAM	15	0	17.40	PASS

Band4	3MHz	20385	16QAM	1	0	19.05	PASS
Band4	3MHz	20385	16QAM	1	14	18.75	PASS
Band4	3MHz	20385	16QAM	15	0	17.88	PASS
Band4	5MHz	19975	QPSK	1	0	19.87	PASS
Band4	5MHz	19975	QPSK	1	24	19.72	PASS
Band4	5MHz	19975	QPSK	25	0	18.58	PASS
Band4	5MHz	20175	QPSK	1	0	19.62	PASS
Band4	5MHz	20175	QPSK	1	24	19.48	PASS
Band4	5MHz	20175	QPSK	25	0	18.54	PASS
Band4	5MHz	20375	QPSK	1	0	19.97	PASS
Band4	5MHz	20375	QPSK	1	24	19.83	PASS
Band4	5MHz	20375	QPSK	25	0	18.79	PASS
Band4	5MHz	19975	16QAM	1	0	19.82	PASS
Band4	5MHz	19975	16QAM	1	24	19.74	PASS
Band4	5MHz	19975	16QAM	25	0	18.58	PASS
Band4	5MHz	20175	16QAM	1	0	19.73	PASS
Band4	5MHz	20175	16QAM	1	24	19.51	PASS
Band4	5MHz	20175	16QAM	25	0	18.39	PASS
Band4	5MHz	20375	16QAM	1	0	19.89	PASS
Band4	5MHz	20375	16QAM	1	24	19.70	PASS
Band4	5MHz	20375	16QAM	25	0	18.79	PASS
Band4	10MHz	20000	QPSK	1	0	19.82	PASS
Band4	10MHz	20000	QPSK	1	49	19.62	PASS
Band4	10MHz	20000	QPSK	50	0	18.55	PASS
Band4	10MHz	20175	QPSK	1	0	19.60	PASS
Band4	10MHz	20175	QPSK	1	49	19.43	PASS
Band4	10MHz	20175	QPSK	50	0	18.49	PASS
Band4	10MHz	20350	QPSK	1	0	19.88	PASS
Band4	10MHz	20350	QPSK	1	49	19.80	PASS
Band4	10MHz	20350	QPSK	50	0	18.79	PASS
Band4	10MHz	20000	16QAM	1	0	19.91	PASS
Band4	10MHz	20000	16QAM	1	49	19.68	PASS
Band4	10MHz	20000	16QAM	50	0	18.55	PASS
Band4	10MHz	20175	16QAM	1	0	19.69	PASS
Band4	10MHz	20175	16QAM	1	49	19.44	PASS
Band4	10MHz	20175	16QAM	50	0	18.42	PASS
Band4	10MHz	20350	16QAM	1	0	19.86	PASS
Band4	10MHz	20350	16QAM	1	49	19.68	PASS
Band4	10MHz	20350	16QAM	50	0	18.78	PASS
Band4	15MHz	20025	QPSK	1	0	19.74	PASS
Band4	15MHz	20025	QPSK	1	74	19.59	PASS
Band4	15MHz	20025	QPSK	75	0	19.62	PASS

Band4	15MHz	20175	QPSK	1	0	19.54	PASS
Band4	15MHz	20175	QPSK	1	74	19.32	PASS
Band4	15MHz	20175	QPSK	75	0	19.45	PASS
Band4	15MHz	20325	QPSK	1	0	19.90	PASS
Band4	15MHz	20325	QPSK	1	74	19.79	PASS
Band4	15MHz	20325	QPSK	75	0	19.73	PASS
Band4	15MHz	20025	16QAM	1	0	19.81	PASS
Band4	15MHz	20025	16QAM	1	74	19.60	PASS
Band4	15MHz	20025	16QAM	75	0	19.67	PASS
Band4	15MHz	20175	16QAM	1	0	19.63	PASS
Band4	15MHz	20175	16QAM	1	74	19.45	PASS
Band4	15MHz	20175	16QAM	75	0	19.49	PASS
Band4	15MHz	20325	16QAM	1	0	19.88	PASS
Band4	15MHz	20325	16QAM	1	74	19.58	PASS
Band4	15MHz	20325	16QAM	75	0	19.79	PASS
Band4	20MHz	20050	QPSK	1	0	20.06	PASS
Band4	20MHz	20050	QPSK	1	99	19.67	PASS
Band4	20MHz	20050	QPSK	100	0	19.65	PASS
Band4	20MHz	20175	QPSK	1	0	19.56	PASS
Band4	20MHz	20175	QPSK	1	99	19.38	PASS
Band4	20MHz	20175	QPSK	100	0	19.42	PASS
Band4	20MHz	20300	QPSK	1	0	19.85	PASS
Band4	20MHz	20300	QPSK	1	99	19.71	PASS
Band4	20MHz	20300	QPSK	100	0	19.79	PASS
Band4	20MHz	20050	16QAM	1	0	19.81	PASS
Band4	20MHz	20050	16QAM	1	99	19.64	PASS
Band4	20MHz	20050	16QAM	100	0	19.64	PASS
Band4	20MHz	20175	16QAM	1	0	19.74	PASS
Band4	20MHz	20175	16QAM	1	99	19.38	PASS
Band4	20MHz	20175	16QAM	100	0	19.49	PASS
Band4	20MHz	20300	16QAM	1	0	19.80	PASS
Band4	20MHz	20300	16QAM	1	99	19.71	PASS
Band4	20MHz	20300	16QAM	100	0	19.79	PASS

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	Result(dBm)	Verdict
Band5	1.4MHz	20407	QPSK	1	0	20.30	PASS
Band5	1.4MHz	20407	QPSK	1	5	20.16	PASS
Band5	1.4MHz	20407	QPSK	6	0	18.72	PASS
Band5	1.4MHz	20525	QPSK	1	0	20.84	PASS
Band5	1.4MHz	20525	QPSK	1	5	20.89	PASS
Band5	1.4MHz	20525	QPSK	6	0	19.29	PASS
Band5	1.4MHz	20643	QPSK	1	0	20.75	PASS
Band5	1.4MHz	20643	QPSK	1	5	20.62	PASS
Band5	1.4MHz	20643	QPSK	6	0	19.15	PASS
Band5	1.4MHz	20407	16QAM	1	0	19.59	PASS
Band5	1.4MHz	20407	16QAM	1	5	19.78	PASS
Band5	1.4MHz	20407	16QAM	6	0	18.47	PASS
Band5	1.4MHz	20525	16QAM	1	0	20.14	PASS
Band5	1.4MHz	20525	16QAM	1	5	20.08	PASS
Band5	1.4MHz	20525	16QAM	6	0	19.14	PASS
Band5	1.4MHz	20643	16QAM	1	0	19.81	PASS
Band5	1.4MHz	20643	16QAM	1	5	19.98	PASS
Band5	1.4MHz	20643	16QAM	6	0	18.90	PASS
Band5	3MHz	20415	QPSK	1	0	20.53	PASS
Band5	3MHz	20415	QPSK	1	14	20.45	PASS
Band5	3MHz	20415	QPSK	15	0	18.63	PASS
Band5	3MHz	20525	QPSK	1	0	21.07	PASS
Band5	3MHz	20525	QPSK	1	14	21.06	PASS
Band5	3MHz	20525	QPSK	15	0	19.15	PASS
Band5	3MHz	20635	QPSK	1	0	21.20	PASS
Band5	3MHz	20635	QPSK	1	14	20.90	PASS
Band5	3MHz	20635	QPSK	15	0	18.98	PASS
Band5	3MHz	20415	16QAM	1	0	19.59	PASS
Band5	3MHz	20415	16QAM	1	14	19.52	PASS
Band5	3MHz	20415	16QAM	15	0	18.48	PASS
Band5	3MHz	20525	16QAM	1	0	20.11	PASS
Band5	3MHz	20525	16QAM	1	14	19.97	PASS
Band5	3MHz	20525	16QAM	15	0	18.92	PASS
Band5	3MHz	20635	16QAM	1	0	20.10	PASS
Band5	3MHz	20635	16QAM	1	14	19.94	PASS
Band5	3MHz	20635	16QAM	15	0	18.83	PASS
Band5	5MHz	20425	QPSK	1	0	20.41	PASS
Band5	5MHz	20425	QPSK	1	24	20.15	PASS
Band5	5MHz	20425	QPSK	25	0	19.58	PASS

Band5	5MHz	20525	QPSK	1	0	20.72	PASS
Band5	5MHz	20525	QPSK	1	24	20.55	PASS
Band5	5MHz	20525	QPSK	25	0	20.09	PASS
Band5	5MHz	20625	QPSK	1	0	20.79	PASS
Band5	5MHz	20625	QPSK	1	24	20.32	PASS
Band5	5MHz	20625	QPSK	25	0	19.87	PASS
Band5	5MHz	20425	16QAM	1	0	20.60	PASS
Band5	5MHz	20425	16QAM	1	24	20.45	PASS
Band5	5MHz	20425	16QAM	25	0	19.59	PASS
Band5	5MHz	20525	16QAM	1	0	20.93	PASS
Band5	5MHz	20525	16QAM	1	24	20.80	PASS
Band5	5MHz	20525	16QAM	25	0	19.99	PASS
Band5	5MHz	20625	16QAM	1	0	21.00	PASS
Band5	5MHz	20625	16QAM	1	24	20.76	PASS
Band5	5MHz	20625	16QAM	25	0	19.99	PASS
Band5	10MHz	20450	QPSK	1	0	21.22	PASS
Band5	10MHz	20450	QPSK	1	49	20.39	PASS
Band5	10MHz	20450	QPSK	50	0	20.98	PASS
Band5	10MHz	20525	QPSK	1	0	19.74	PASS
Band5	10MHz	20525	QPSK	1	49	19.26	PASS
Band5	10MHz	20525	QPSK	50	0	18.35	PASS
Band5	10MHz	20600	QPSK	1	0	19.46	PASS
Band5	10MHz	20600	QPSK	1	49	19.29	PASS
Band5	10MHz	20600	QPSK	50	0	18.98	PASS
Band5	10MHz	20450	16QAM	1	0	19.78	PASS
Band5	10MHz	20450	16QAM	1	49	19.26	PASS
Band5	10MHz	20450	16QAM	50	0	18.31	PASS
Band5	10MHz	20525	16QAM	1	0	19.24	PASS
Band5	10MHz	20525	16QAM	1	49	19.42	PASS
Band5	10MHz	20525	16QAM	50	0	18.87	PASS
Band5	10MHz	20600	16QAM	1	0	19.10	PASS
Band5	10MHz	20600	16QAM	1	49	19.25	PASS
Band5	10MHz	20600	16QAM	50	0	18.69	PASS

9.2 Test Results for Standalone SAR Test

Body SAR

GSM850 – Body SAR Test (Gap: 10mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
	GPRS_2TX	Back Side	128	824.2	32.67	33.0	1.079	0.458	0.494
1	GPRS_2TX	Front Side	128	824.2	32.67	33.0	1.079	0.514	0.555
	GPRS_2TX	Left side	128	824.2	32.67	33.0	1.079	0.505	0.545
	GPRS_2TX	Top side	128	824.2	32.67	33.0	1.079	0.123	0.133

GSM1900 – Body SAR Test (Gap: 10mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
	GPRS_4TX	Back Side	661	1880.0	26.44	26.5	1.014	0.758	0.769
2	GPRS_4TX	Front Side	661	1880.0	26.44	26.5	1.014	1.224	1.241
	GPRS_4TX	**Front Side**	**661**	**1880.0**	**26.44**	**26.5**	**1.014**	**1.185**	**1.201**
	GPRS_4TX	Front Side	512	1850.2	26.42	26.5	1.019	1.154	1.175
	GPRS_4TX	Front Side	810	1909.8	25.94	26.5	1.138	1.023	1.164
	GPRS_4TX	Left side	661	1880.0	26.44	26.5	1.014	0.715	0.725
	GPRS_4TX	Top side	661	1880.0	26.44	26.5	1.014	0.283	0.287

LTE Band 4–Body SAR Test (Gap: 10mm)								
Plot No.	Mode	Test Position Body	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
	QPSK 20MHz 1RB	Back Side	1720.0	20.06	20.5	1.107	0.058	0.064
	QPSK 20MHz 1RB	Front Side	1720.0	20.06	20.5	1.107	0.074	0.082
3	QPSK 20MHz 1RB	Left side	1720.0	20.06	20.5	1.107	0.076	0.084
	QPSK 20MHz 1RB	Top side	1720.0	20.06	20.5	1.107	0.013	0.014
	QPSK 20MHz 50%RB	Back Side	1720.0	20.06	20.5	1.107	0.051	0.056
	QPSK 20MHz 50%RB	Front Side	1720.0	20.06	20.5	1.107	0.065	0.072
	QPSK 20MHz 50%RB	Left side	1720.0	20.06	20.5	1.107	0.062	0.069
	QPSK 20MHz 50%RB	Top side	1720.0	20.06	20.5	1.107	0.010	0.011

LTE Band 5–Body SAR Test (Gap: 10mm)								
Plot No.	Mode	Test Position	Frequency	Output Power	Rated Limit	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB	Body	MHz	(dBm)	(dBm)			
	QPSK 10MHz 1RB	Back Side	829	21.22	21.5	1.067	0.035	0.037
4	QPSK 10MHz 1RB	Front Side	829	21.22	21.5	1.067	0.047	0.050
	QPSK 10MHz 1RB	Left side	829	21.22	21.5	1.067	0.012	0.013
	QPSK 10MHz 1RB	Top side	829	21.22	21.5	1.067	0.011	0.012
	QPSK 10MHz 50%RB	Back Side	829	21.22	21.5	1.067	0.031	0.033
	QPSK 10MHz 50%RB	Front Side	829	21.22	21.5	1.067	0.039	0.042
	QPSK 10MHz 50%RB	Left side	829	21.22	21.5	1.067	0.008	0.009
	QPSK 10MHz 50%RB	Top side	829	21.22	21.5	1.067	0.006	0.006

Repeated SAR

Mode	Test Position	Frequency		SAR1g	Repeated SAR		Ratio	
	Body	CH.	MHz	(W/kg)	1	2	1	2
GPRS_4TX	Front Side	661	1880.0	1.224	1.185	/	1.033	/

Remark:

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

10. Measurement Uncertainty

10.1 Uncertainty for EUT SAR Test

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions – Noise	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
RF ambient Conditions - Reflections	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5	5.0	R	√3	1	1	2.89	2.89	∝
Test Sample Related									
Test sample positioning	E.4.2	0.03	N	1	1	1	0.03	0.03	N−1
Device Holder Uncertainty	E.4.1	5.00	N	1	1	1	5.00	5.00	
Output power Variation - SAR drift measurement	E.2.9	12.02	R	√3	1	1	6.94	6.94	∝
SAR scaling	E6.5	0.0	R	√3	1	1	0.0	0.0	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	1.9	R	√3	1	0.84	1.10	0.90	∝

Liquid conductivity - deviation from target value	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	∝
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	∝
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	∝
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	∝
Combined Standard Uncertainty			RSS				12.98	12.53	
Expanded Uncertainty (95% Confidence interval)			K=2				25.32	24.43	

10.2 Uncertainty for System Performance Check

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Modulation response	E.2.5	0	R	√3	0	0	0.0	0.0	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions – Noise	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
RF ambient Conditions - Reflections	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and	E.5.2	5.0	R	√3	1	1	2.89	2.89	∝

integration Algoritms for Max. SAR Evaluation									
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	√3	1	1	0.58	0.58	N−1
Input power and SAR drift measurement	8,6.6.2	12.02	R	√3	1	1	6.94	6.94	∝
Deviation of experimental dipole from numerical dipole	E.6.4	5.5	R	√3	1	1	3.20	3.20	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	2.0	R	√3	1	0.84	1.10	1.10	∝
Liquid conductivity - deviation from target value	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	M
Combined Standard Uncertainty			RSS				12.00	11.50	
Expanded Uncertainty (95% Confidence interval)			K=2				23.39	22.43	

Annex A. Plots of System Performance Check

MEASUREMENT 1

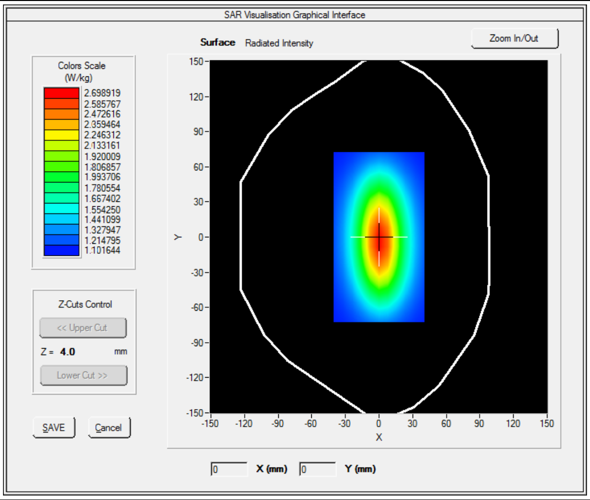
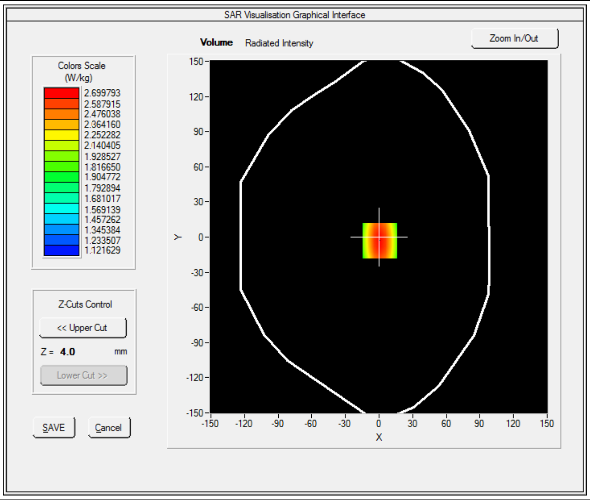
Type: Validation measurement (Fast, 75.00 %)
Measurement duration: 12 minutes 21 seconds
E-field Probe: SSE5- SN 09/13 EP168; ConvF: 6.93 Calibrated: 2020-05-22

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	835.000000
Relative Permittivity (real part)	42.430271
Conductivity (S/m)	0.876831
Power Variation (%)	1.810000
Ambient Temperature	22.0
Liquid Temperature	22.0

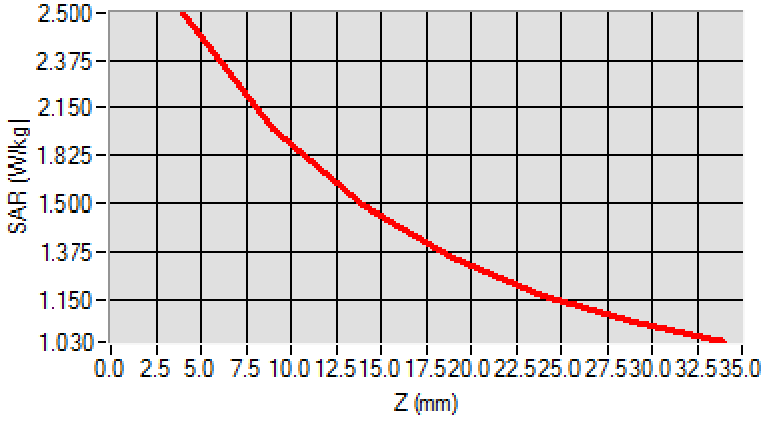
SURFACE SAR	VOLUME SAR
	

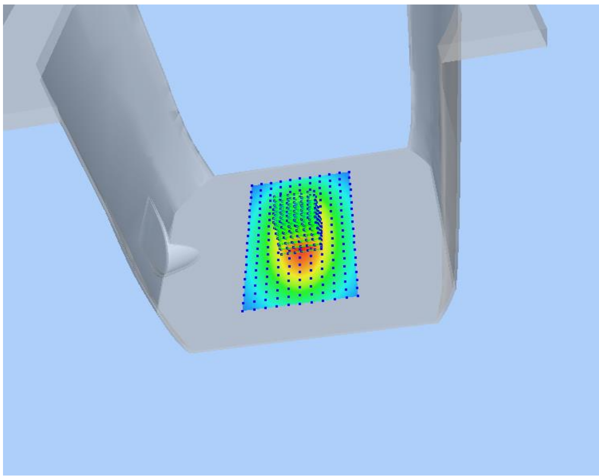
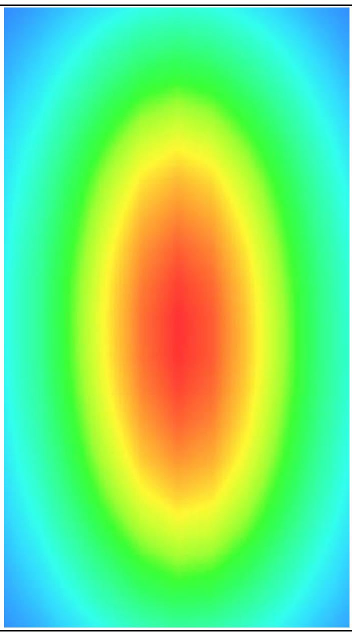
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.511263
SAR 1g (W/Kg)	2.508250

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.4900	1.8942	1.4811	1.3541	1.1123	1.0539



3D screen shot	Hot spot position
	

MEASUREMENT 2

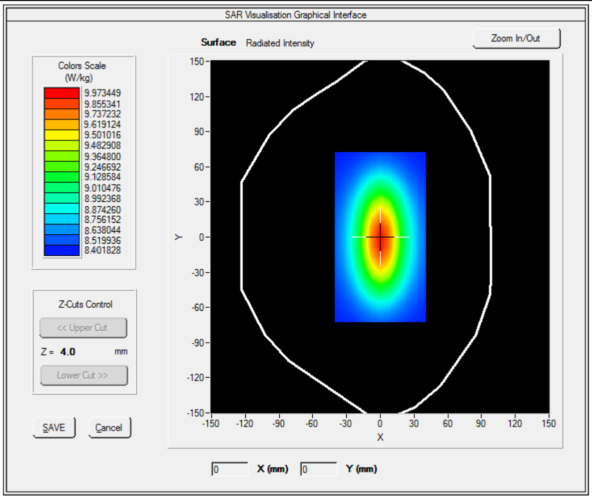
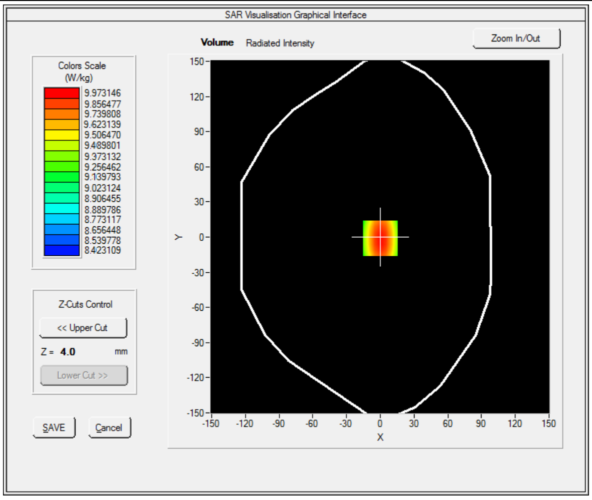
Type: Validation measurement (Fast, 75.00 %)
Measurement duration: 12 minutes 21 seconds
E-field Probe: SSE5- SN 09/13 EP168; ConvF: 5.84 Calibrated: 2020-05-22

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative Permittivity (real part)	39.720528
Conductivity (S/m)	1.383421
Power Variation (%)	1.400000
Ambient Temperature	21.8
Liquid Temperature	21.8

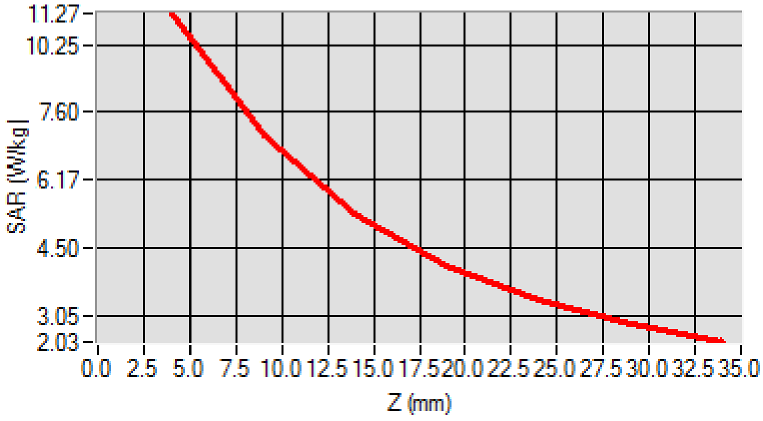
SURFACE SAR	**VOLUME SAR**
	

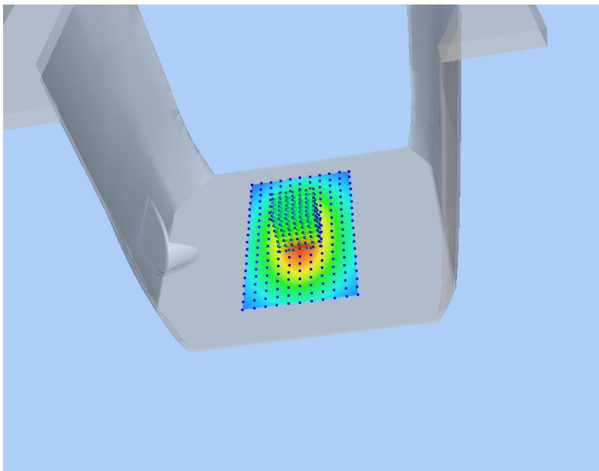
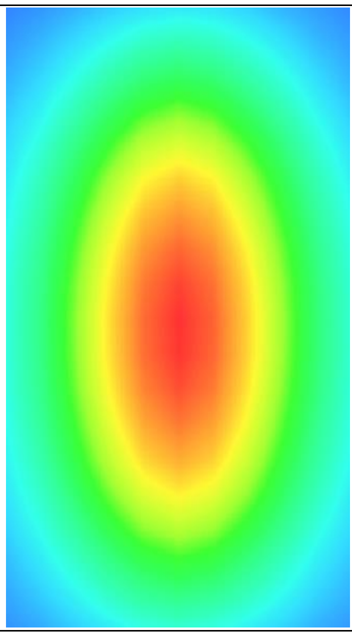
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	5.051252
SAR 1g (W/Kg)	9.718250

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.3455	7.1125	5.1026	3.425	3.0242	2.1125



3D screen shot	Hot spot position
	

Annex B. Plots of SAR Measurement

MEASUREMENT 1

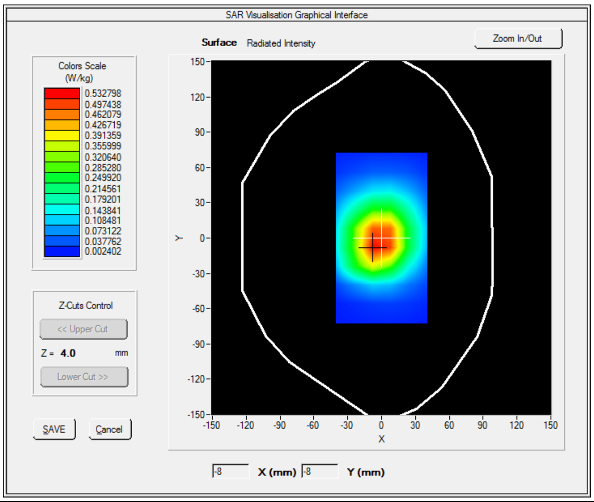
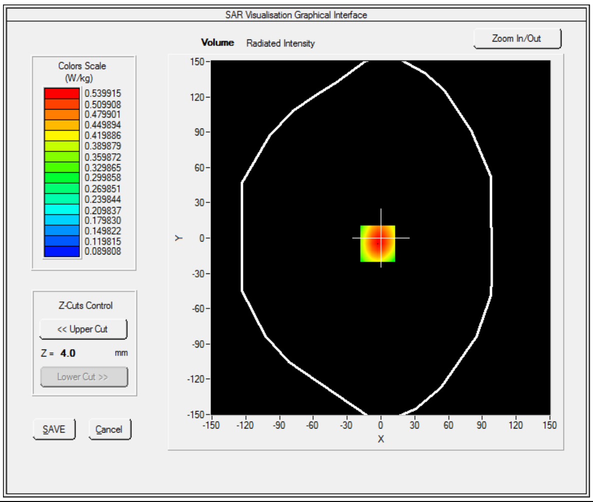
Date of measurement: 2021-04-15
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5- SN 09/13 EP168; ConvF: 6.93 Calibrated: 2020-05-22

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Phantom	Flat plane
Device Position	Front
Band	GPRS850_2TX
Channels	Low
Signal	Duty Cycle: 1:1

B. SAR Measurement Results

Frequency (MHz)	824.20000
Relative Permittivity (real part)	42.510328
Conductivity (S/m)	0.869154
Power Variation (%)	-1.890000
Ambient Temperature	22.0
Liquid Temperature	22.0

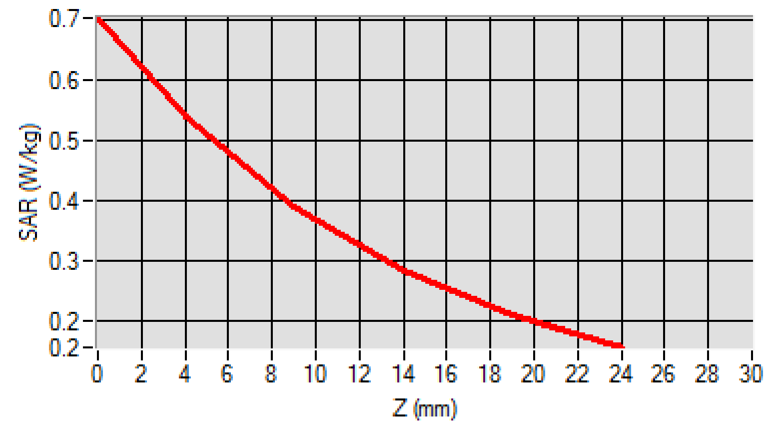
SURFACE SAR	VOLUME SAR
	

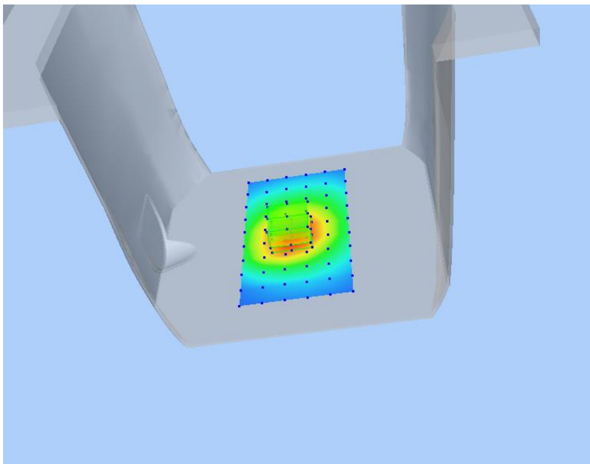
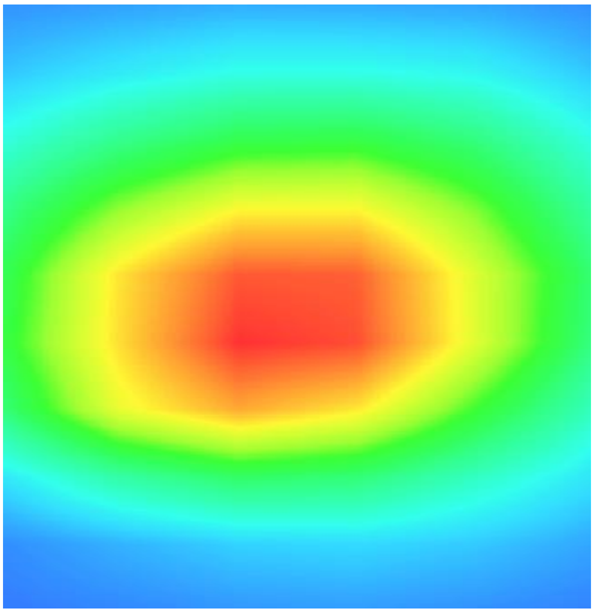
Maximum location: X=-3.00, Y=-5.00

SAR Peak: 0.70 W/kg

SAR 10g (W/Kg)	**0.354559**
SAR 1g (W/Kg)	**0.513814**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.7026**	**0.5399**	**0.3892**	**0.2848**	**0.2128**



3D screen shot	**Hot spot position**
	

MEASUREMENT 2

Date of measurement: 2021-04-13
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5- SN 09/13 EP168; ConvF: 6.35 Calibrated: 2020-05-22

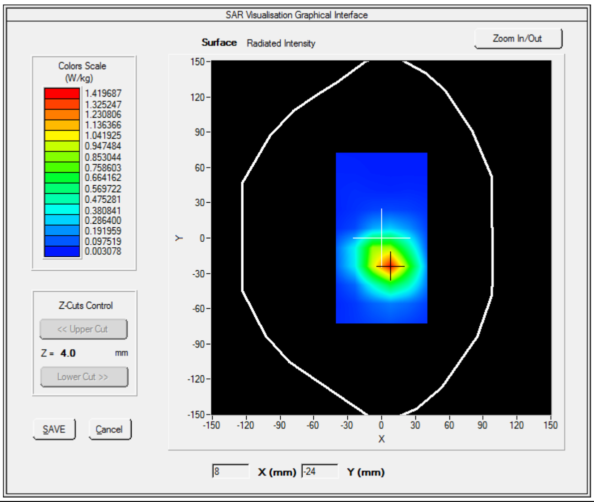
A. Experimental conditions

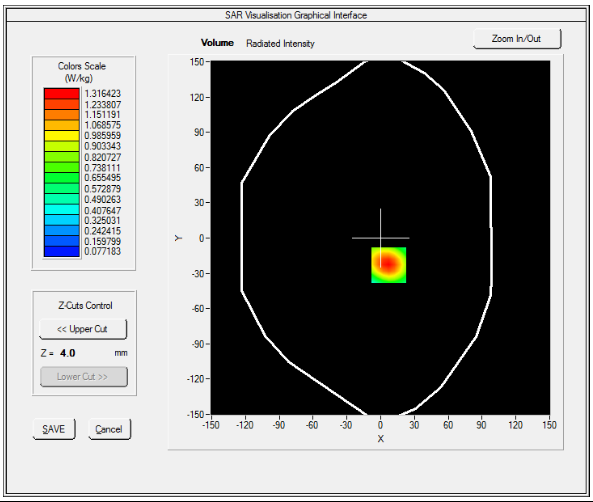
Area Scan	dx=8mm dy=8mm
Phantom	Flat plane
Device Position	Front
Band	GPRS1900_4TX
Channels	Middle
Signal	Duty Cycle: 1:4

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative Permittivity (real part)	39.508439
Conductivity (S/m)	1.395014
Power Variation (%)	-1.180000
Ambient Temperature	21.8
Liquid Temperature	21.8

SURFACE SAR	VOLUME SAR



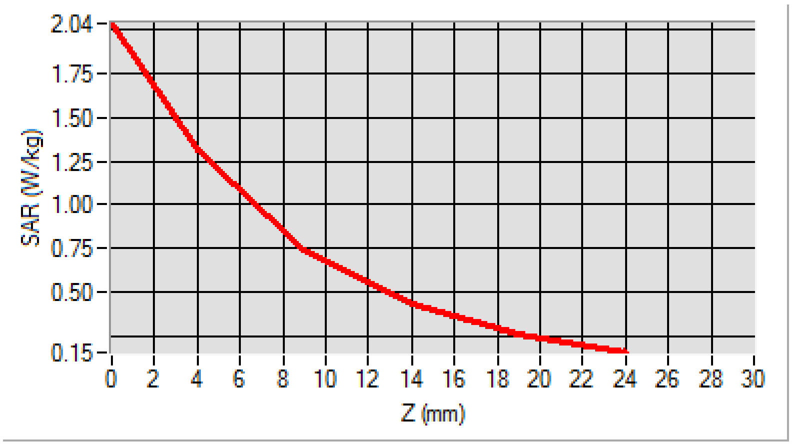


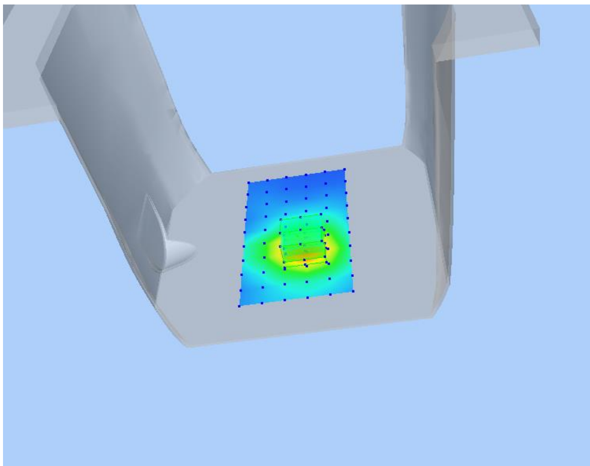
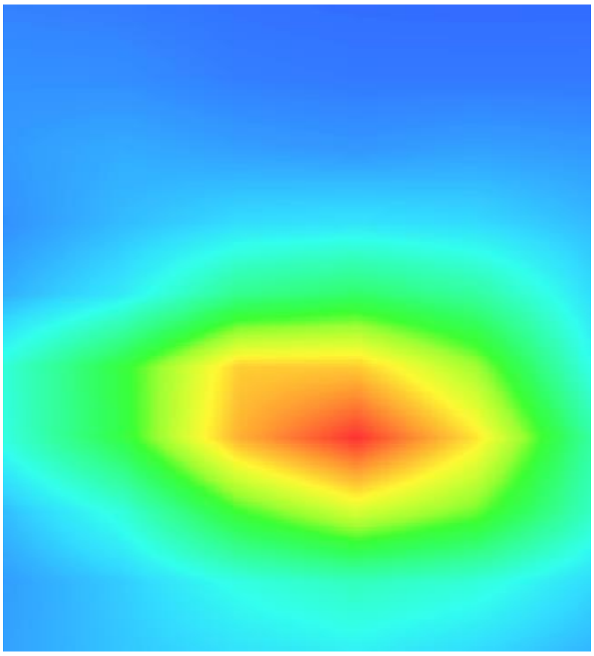
Maximum location: X=7.00, Y=-23.00

SAR Peak: 2.05 W/kg

SAR 10g (W/Kg)	**0.683775**
SAR 1g (W/Kg)	**1.224168**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**2.0394**	**1.3164**	**0.7456**	**0.4275**	**0.2578**



3D screen shot	**Hot spot position**
	

MEASUREMENT 3

Date of measurement: 2021-04-13
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5- SN 09/13 EP168; ConvF: 5.84 Calibrated: 2020-05-22

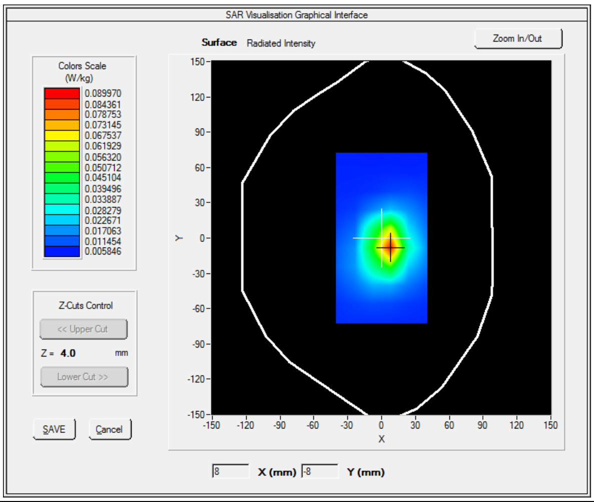
A. Experimental conditions

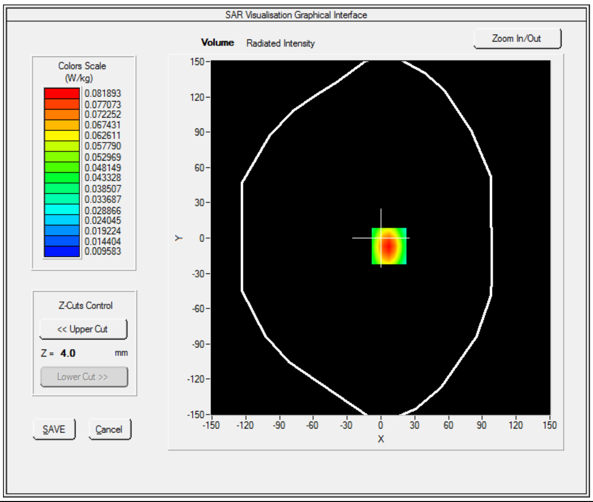
Area Scan	dx=8mm dy=8mm
Phantom	Flat Plane
Device Position	Left
Band	LTE Band 4
Channels	QPSK, 20MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1720.000000
Relative Permittivity (real part)	40.253491
Conductivity (S/m)	1.344013
Power Variation (%)	-1.180000
Ambient Temperature	21.8
Liquid Temperature	21.8

SURFACE SAR	**VOLUME SAR**



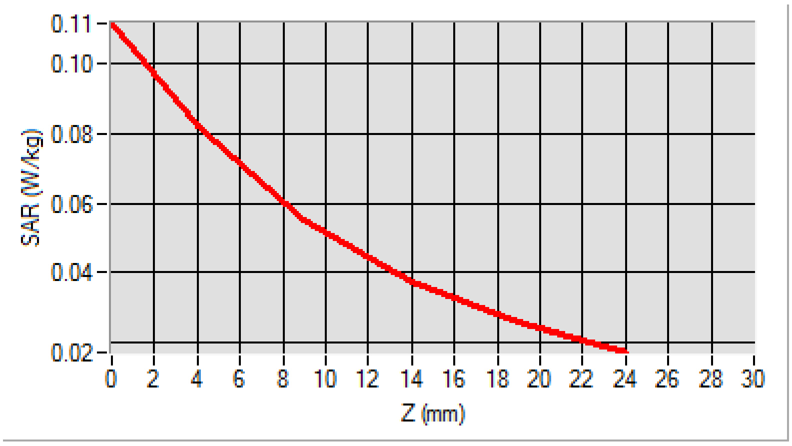


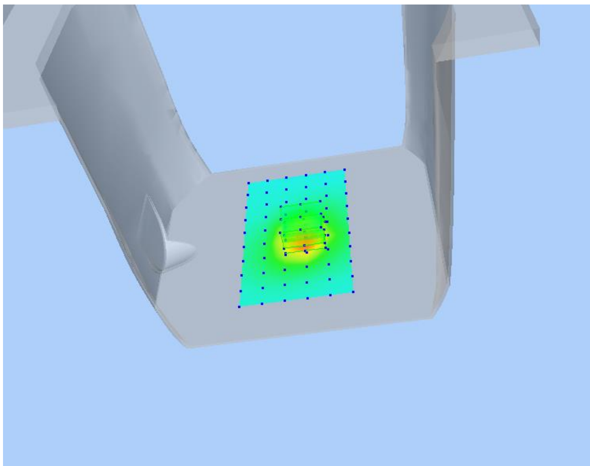
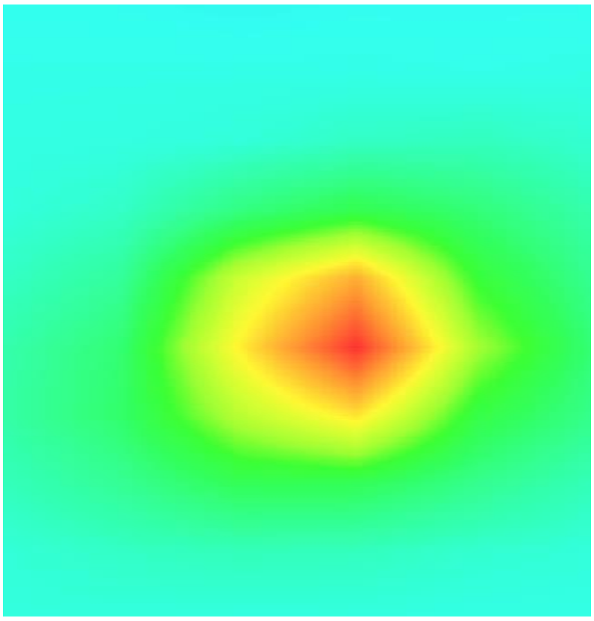
Maximum location: X=7.00, Y=-7.00

SAR Peak: 0.11 W/kg

SAR 10g (W/Kg)	0.046712
SAR 1g (W/Kg)	0.075813

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1114	0.0819	0.0553	0.0375	0.0257



3D screen shot	Hot spot position
	

MEASUREMENT 4

Date of measurement: 2021-04-15

Measurement duration: 12 minutes 3 seconds

E-field Probe: SSE5- SN 09/13 EP168; ConvF: 6.93 Calibrated: 2020-05-22

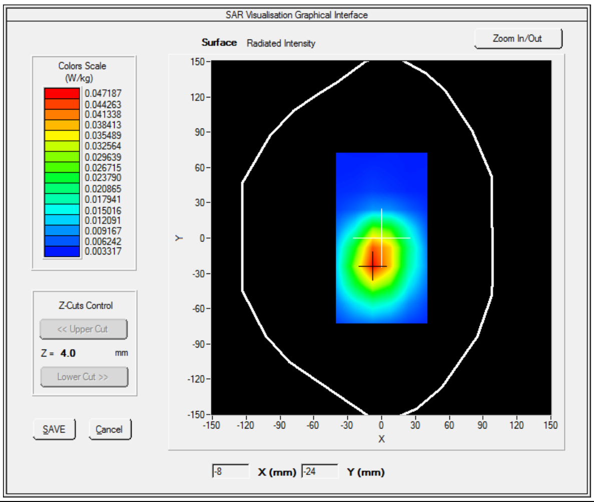
A. Experimental conditions

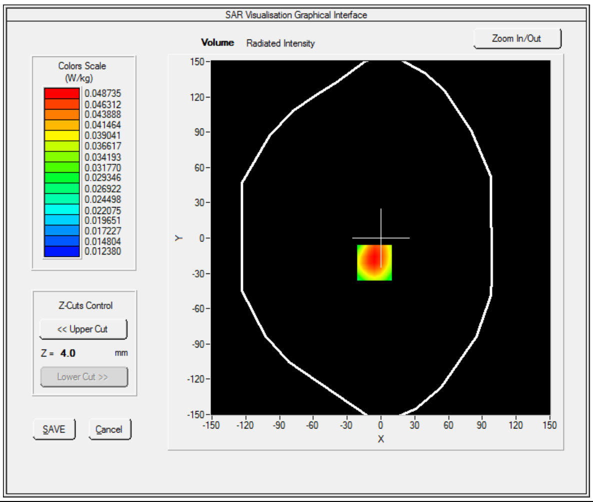
Area Scan	dx=8mm dy=8mm
Phantom	Flat Plane
Device Position	Front
Band	LTE Band 5
Channels	QPSK, 10MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	829.000000
Relative Permittivity (real part)	42.510328
Conductivity (S/m)	0.869154
Power Variation (%)	0.420000
Ambient Temperature	22.0
Liquid Temperature	22.0

SURFACE SAR	VOLUME SAR



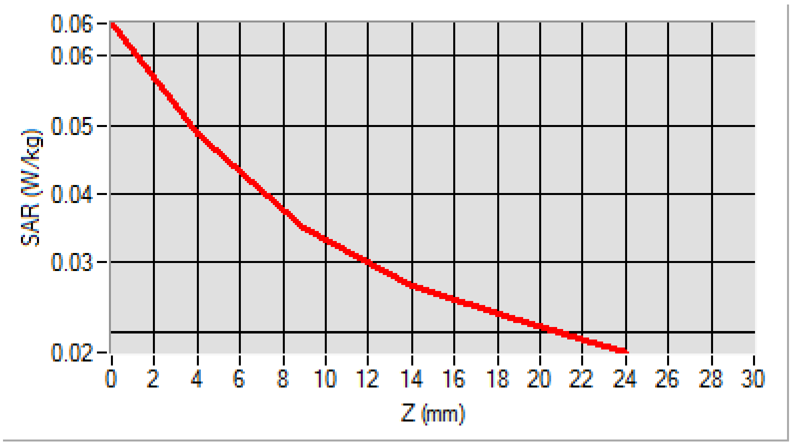


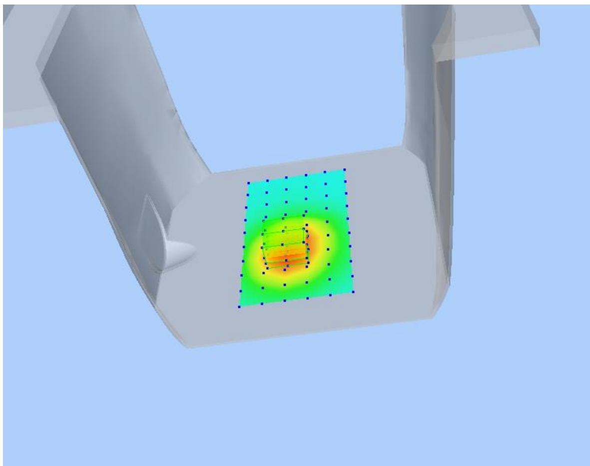
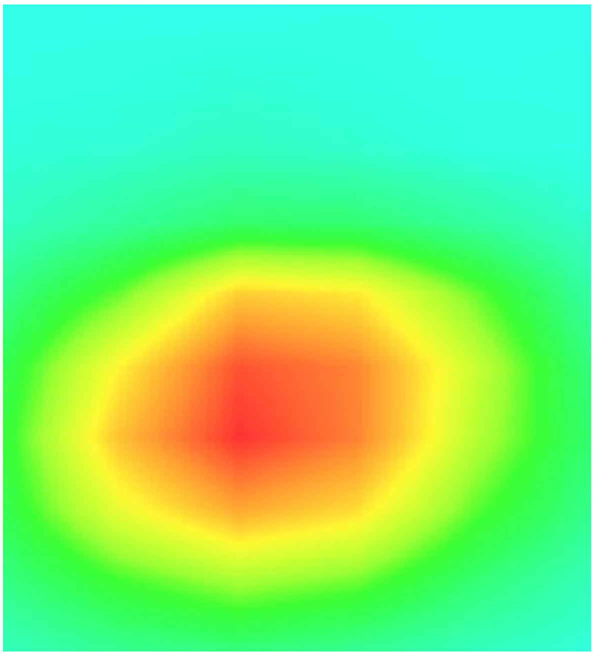
Maximum location: X=-6.00, Y=-21.00

SAR Peak: 0.06 W/kg

SAR 10g (W/Kg)	**0.033477**
SAR 1g (W/Kg)	**0.046742**

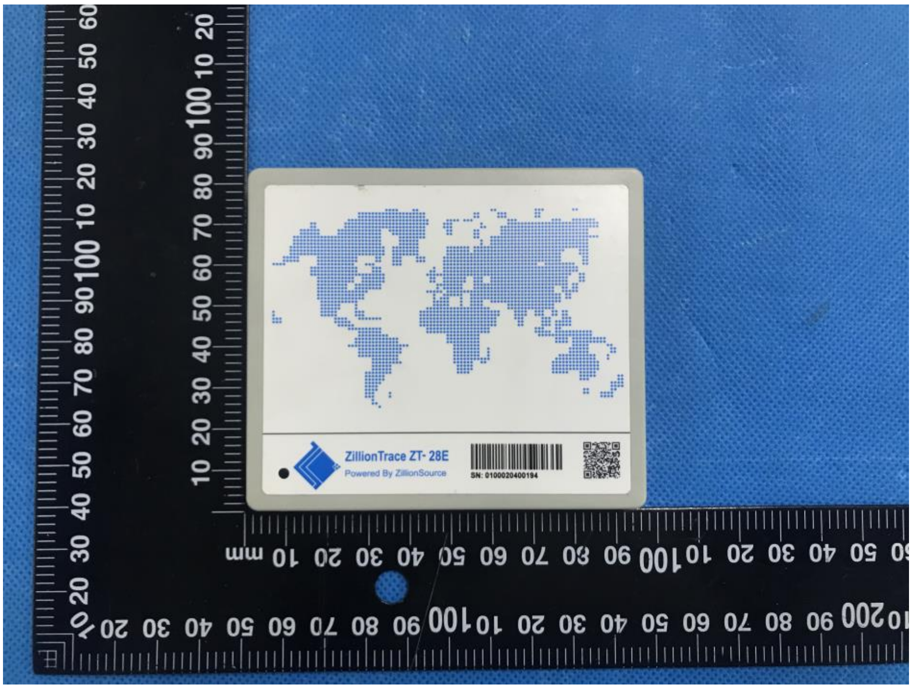
Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0648**	**0.0487**	**0.0350**	**0.0267**	**0.0217**



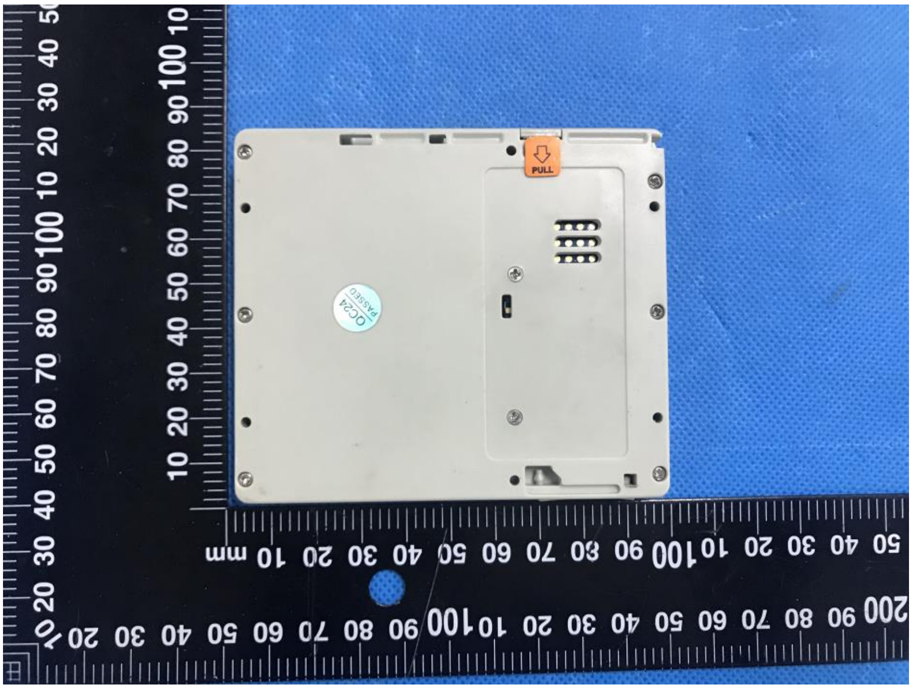
3D screen shot	**Hot spot position**
	

Annex C. EUT Photos

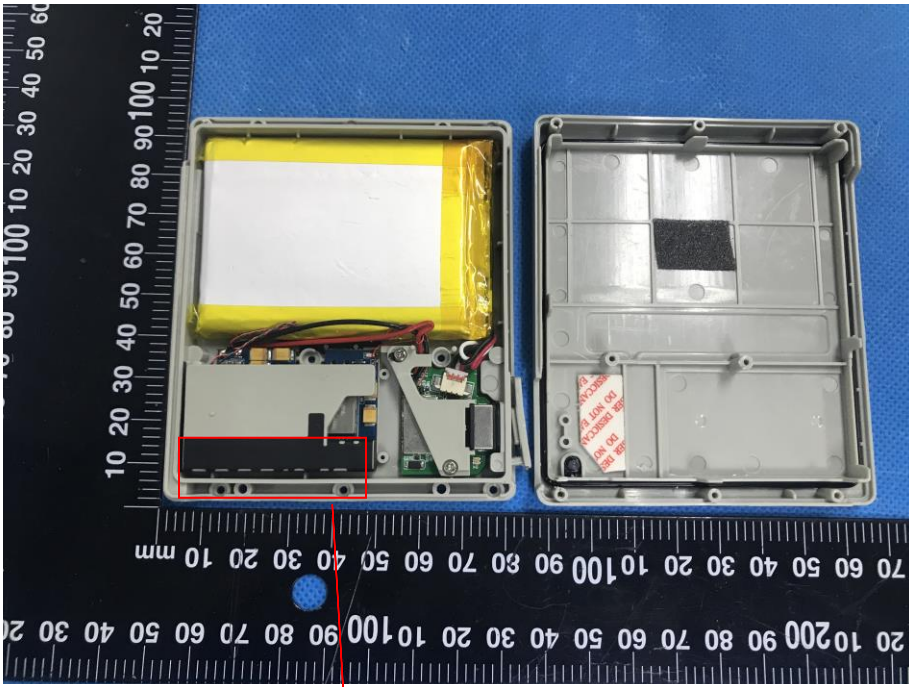
EUT View Front



EUT View Back



Antenna View



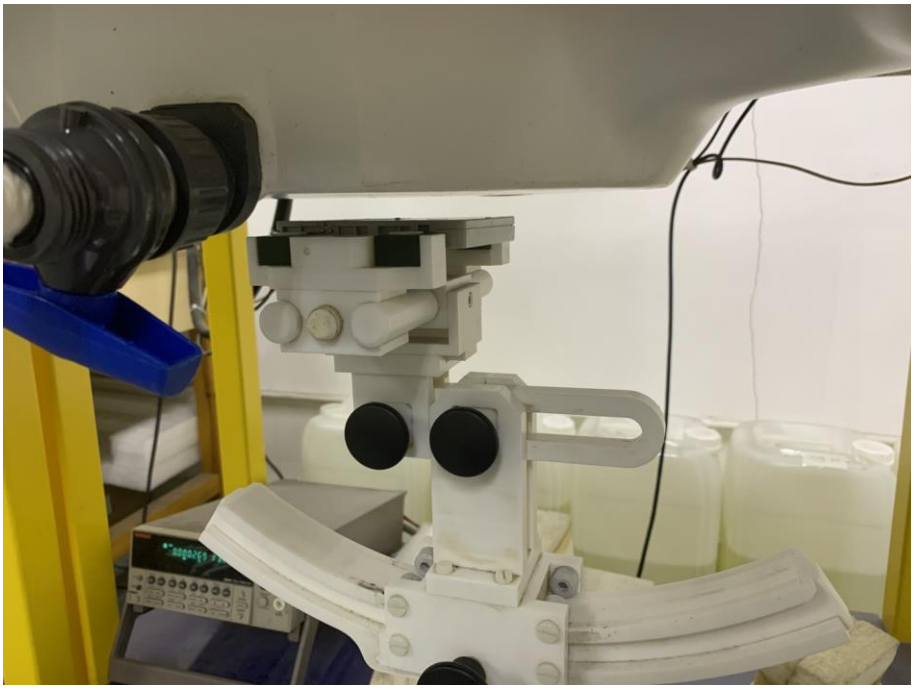
GPRS/ LTE Ant.

Annex D. Test Setup Photos

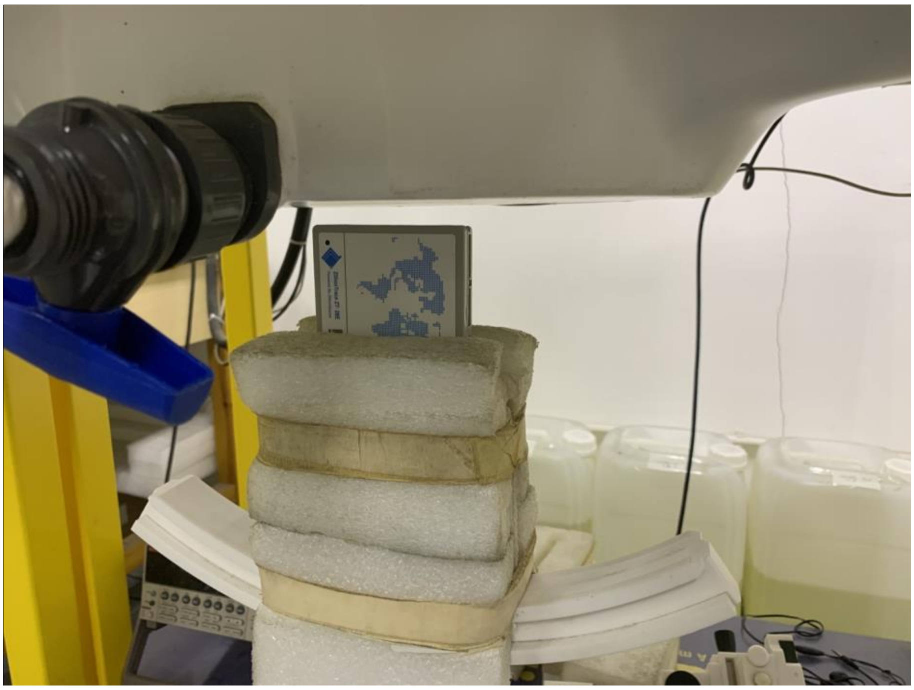
Body mode Exposure Conditions
Test distance: 10mm

Body Front

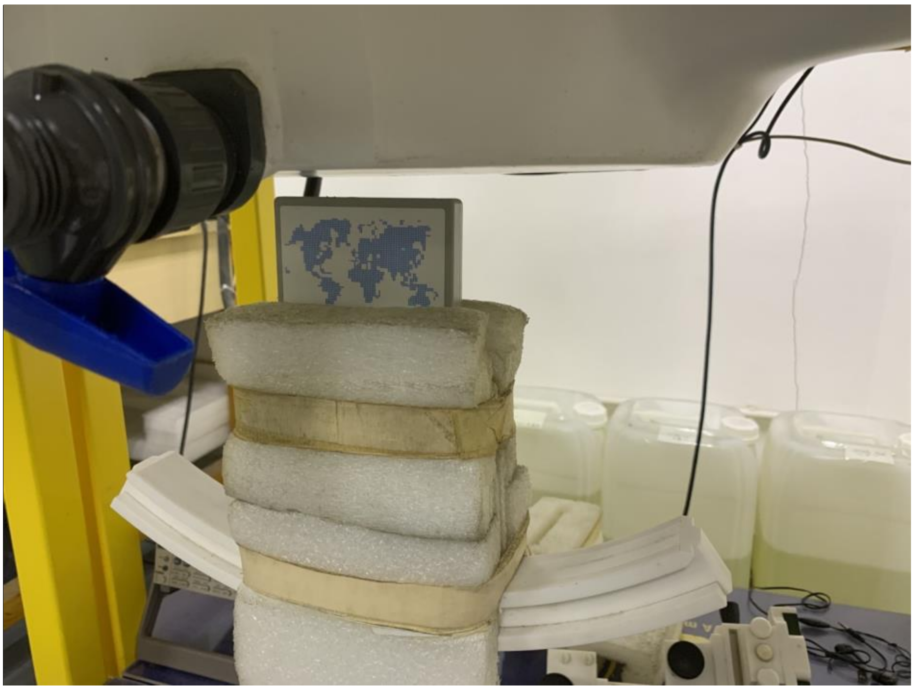
Body Back



Body Left



Body Top



Annex E. Calibration Certificate

Please refer to the exhibit for the calibration certificate

******* END OF REPORT *******