TEST REPORT

Reference No.	:	WTX23X11234291W005
FCC ID	:	ZVS-LWT6
Applicant	:	invoxia
Address	:	8 ESPLANADE DE LA MANUFACTURE, 92130 Issy- Les-Moulineaux France
Manufacturer		INVOXIA SAS
Address		8 ESPLANADE DE LA MANUFACTURE, 92130 ISSY LES MOULINEAUX
Product Name	:	LWT6
Model No.	:	LWT6
Standards	:	FCC Part 2.1093 IEEE Std C95.1: 2019 IEEE Std C95.3: 2002 + Rev. 2008 IEC/IEEE 62209-1528 Ed. 1.0 (2020-10)
Date of Receipt sample	:	2023-11-02
Date of Test	:	2023-11-02 to 2023-11-15
Date of Issue	:	2023-11-16
Test Report Form No.	:	WTX_IEEE_1528W
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 approver.

Prepared By:

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Rev.00	2023-11-16	Original
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1. General Information

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT:	
Product Name:	LWT6
Brand Name:	/
Model No.:	LWT6
Adding Model(s):	/
Rated Voltage:	DC3.8V
Battery:	/
Software Version:	/
Hardware Version:	/
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT:	
LTE-M1	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 2, 4, 12, 13
Uplink Frequency:	FDD-LTE Band 2: Tx: 1850-1910MHz, FDD-LTE Band 4: Tx: 1710-1755MHz, FDD-LTE Band 12: Tx: 699-716MHz, FDD-LTE Band 13: Tx: 777-787MHz
Downlink Frequency:	FDD-LTE Band 2: Rx: 1930-1990MHz, FDD-LTE Band 4: Rx: 2110-2155MHz, FDD-LTE Band 12: Rx: 729-746MHz, FDD-LTE Band 13: Rx: 746-756MHz
RF Output Power:	FDD-LTE Band 2: 22.82dBm, FDD-LTE Band 4: 23.75dBm, FDD-LTE Band 12: 23.05dBm, FDD-LTE Band 13: 24.29dBm,
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 2: 1.1dBi, FDD-LTE Band 4:-1.3dBi, FDD-LTE Band 12: -5.3dBi, FDD-LTE Band 13: -4dBi,
WIFI	
Support Standards:	802.11b
Frequency Range:	2412-2462MHz for 802.11b
RF Output Power:	15.15dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Quantity of Channels:	11 for 802.11b
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	1.6dBi
Bluetooth	
Bluetooth Version:	V4.2 (BLE mode)
Frequency Range:	2402-2480MHz
RF Output Power:	1.50dBm (Conducted)
Data Rate:	1Mbps
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	1.6dBi
Note: The Antenna Gain is provided by the customer and can affect the validity of results.	

1.2 Test Standards

The following report is accordance with FCC 47 CFR Part 2.1093, IEEE Std C95.1: 2019, IEEE Std C95.3: 2002 + Rev. 2008, IEC/IEEE 62209-1528 Ed. 1.0 (2020-10), 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 is 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 SAR (0mm Gap)	SAR_{1g} Limit (W/kg)
	Maximum SAR_{1g} (W/kg)	
LTE	1.056	1.6
WIFI	0.092	1.6
Simultaneous Transmission	**1.135**	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 IEEE Std C95.1: 2019 and had been tested in accordance with the measurement methods and procedure specified in IEC/IEEE 62209-1528 Ed. 1.0 (2020-10) 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 techniques 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

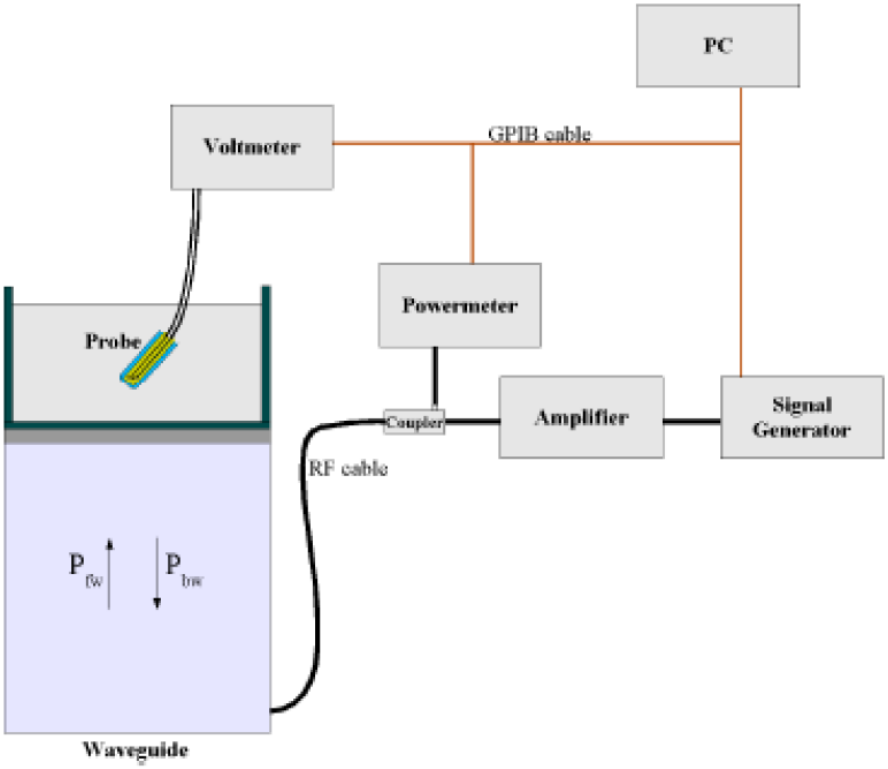
The following figure shows the system.

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 18/21 EPGO356, and refer to the calibration report for probe parameters.

Probe calibration is realized, in compliance with EN 62209-1 and IEC/IEEE 62209-1528 Ed. 1.0 (2020-10) STD, with CALISAR, Antenna proprietary calibration system. The calibration is performed with the EN 62209-1 annexes 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.

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

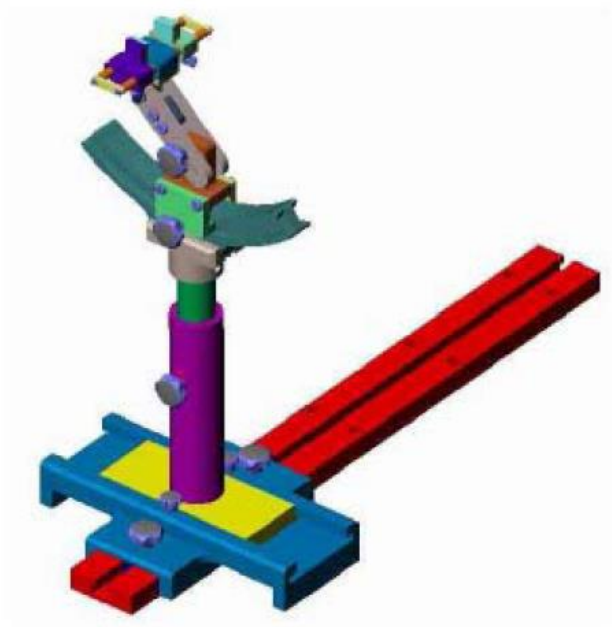
Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

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

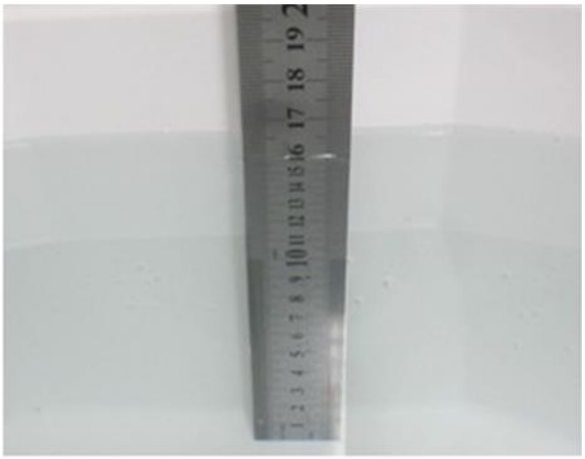
4.6 Test Equipment List

Fixed asset Number	Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
WTXE1053A1006	E-Field Probe	MVG	SSE2	SN 18/21 EPGO356	2023-07-07	2024-07-06
WTXE1053A1001-001	750MHz Dipole	MVG	SID750	SN 47/12 DIP 0G750-203	2023-08-20	2026-08-19
WTXE1053A1001-004	1800MHz Dipole	MVG	SID1800	SN 47/12 DIP 1G800-206	2023-08-20	2026-08-19
WTXE1053A1001-007	2450MHz Dipole	MVG	SID2450	SN 13/15 DIP 2G450-364	2023-08-20	2026-08-19
WTXE1053A1001-010	Dielectric Probe	SATIMO	SCLMP	SN 47/12 OCPG49	2023-02-25	2024-02-24
WTXE1075A1003	Power meter	Keithley	3500	1232959	2023-02-25	2024-02-24
WTXE1075A1001	Power meter	Keithley	3500	1162591	2023-02-25	2024-02-24
WTXE1104A1003	EXG Analog Signal Generator	KEYSIGHT	N5173B	MY61252892	2023-02-25	2024-02-24
WTXE1022A1002	GSM Tester	Rohde & Schwarz	CMU200	114403	2023-02-25	2024-02-24
WTXE1041A1002	Communications Tester	Rohde & Schwarz	CMW500	148650	2023-02-25	2024-02-24
WTXE1036A1001	Network Analyzer	HP	85047A	2901A00831	2023-02-25	2024-02-24

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/Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	1,2-Propanediol (%)	HEC (%)	Preventol (%)	DGBE (%)
Head/Body						
750	41.1	1.4	57.0	0.2	0.3	0
835	40.3	1.4	57.9	0.2	0.2	0
900	40.3	1.4	57.9	0.2	0.2	0
1800-2000	55.2	0.3	0	0	0	44.5
2450	55.0	0.1	0	0	0	44.9

5.2 Tissue Dielectric Parameters for Head and Body Phantoms

According to FCC KDBs, IEC/IEEE 62209-1528 Ed. 1.0 (2020-10) and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

Target Frequency (MHz)	Head		Body	
	Conductivity (σ)	Permittivity (ε_r)	Conductivity (σ)	Permittivity (ε_r)
150	0.76	52.3	0.80	61.9
300	0.87	45.3	0.92	58.2
450	0.87	43.5	0.94	56.7
750	**0.89**	**41.9**	**0.96**	**55.5**
835	0.90	41.5	0.97	55.2
900	0.97	41.5	1.05	55.0
915	0.98	41.5	1.06	55.0
1450	1.20	40.5	1.30	54.0
1610	1.29	40.3	1.40	53.8
1800-2000	**1.40**	**40.0**	**1.52**	**53.3**
2300	1.67	39.5	1.81	52.9
2450	**1.80**	**39.2**	**1.95**	**52.7**
2600	1.96	39.0	2.16	52.5
3000	2.40	38.5	2.73	52.0
5200	4.66	36.0	5.30	49.0
5400	4.86	35.8	5.53	48.7
5600	5.07	35.5	5.77	48.5
5800	5.27	35.3	6.00	48.2

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 (ε r)	Target (ε r)	Delta (%)		
750	22.5	0.91	0.89	2.25	42.52	41.90	1.48	±5	2023-11-08
1800	22.5	1.38	1.40	-1.43	41.42	40.00	3.55	±5	2023-11-09
2450	22.4	1.76	1.80	-2.22	40.53	39.20	3.39	±5	2023-11-10

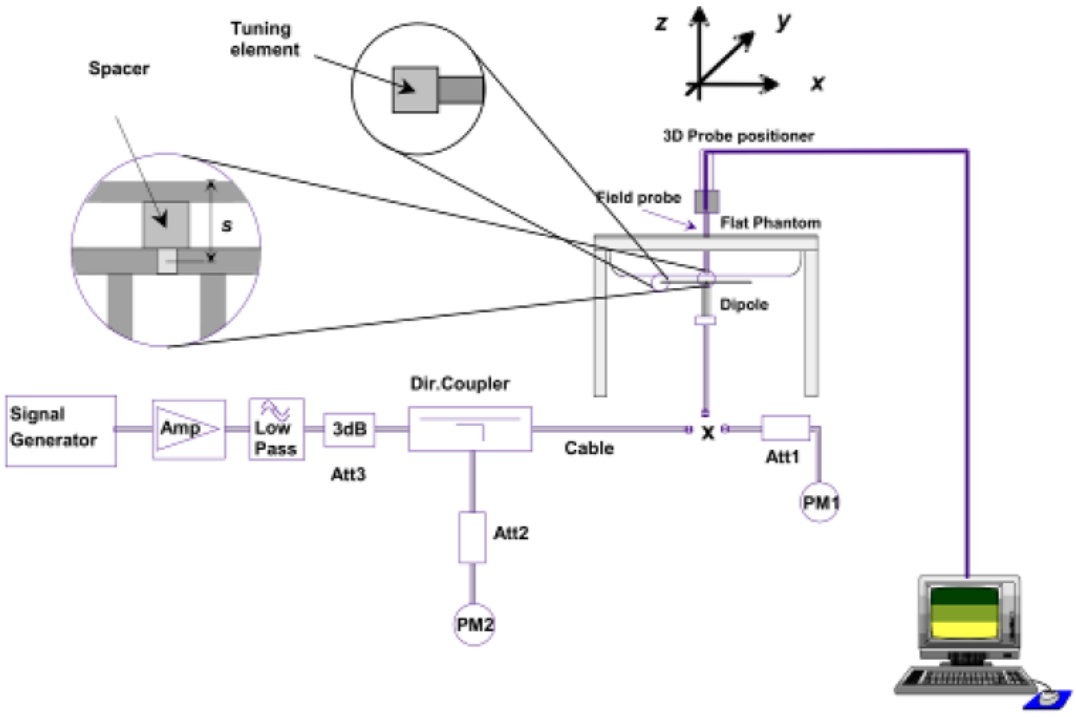
6. SAR Measurement Evaluation

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 750MHz, 1800MHz, and 2450MHz. 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.

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	Power	Targeted SAR_{1g}	Measured SAR_{1g}	Normalized SAR_{1g}	Tolerance	Date
MHz	(mw)	(W/kg)	(W/kg)	(W/kg)	(%)	
Head						
750	250	8.78	2.051	8.204	-6.56	2023-11-08
1800	250	38.76	10.223	40.892	5.50	2023-11-09
2450	250	50.33	12.126	48.504	-3.63	2023-11-10

Remark: Referring to IEC/IEEE 62209-1528 Ed. 1.0 (2020-10), 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 0mm.

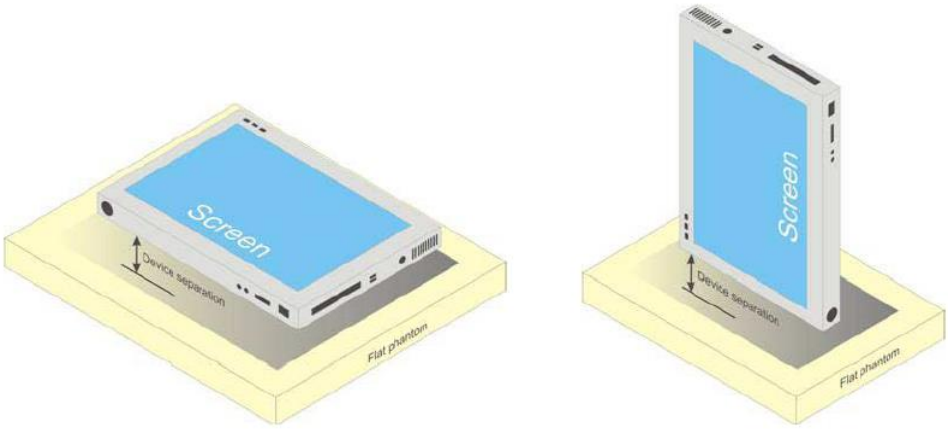
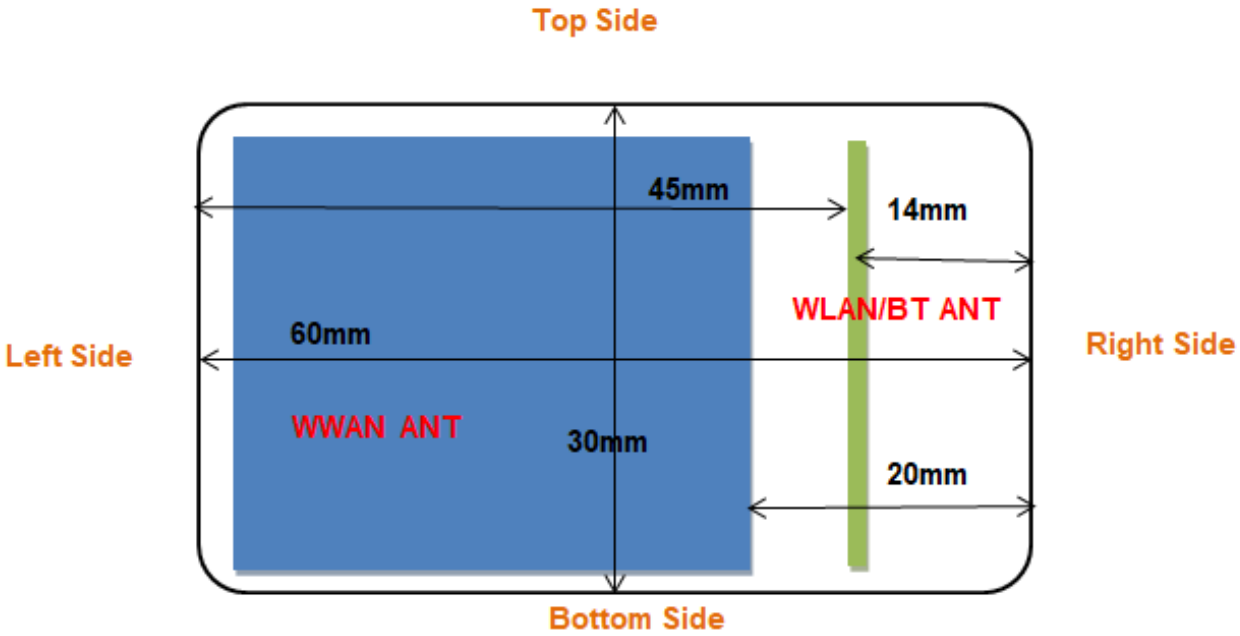


Illustration for Body Position

7.2 EUT Antenna Position



<EUT Front View>

EUT Sizes: Long 60mm; width:30mm; height:25mm

Block Diagram for EUT Antenna Position

Distance of EUT antenna-to-edge/surface(mm), Test distance:0mm						
Antennas	Back side	Front side	Left Edge	Right Edge	Top Edge	Bottom Edge
WWAN	<25	<25	<25	<25	<25	<25
WLAN(2.4GHz)	<25	<25	45	<25	<25	<25

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: 0mm						
Antennas	**Front**	**Back**	**Right Side**	**Left Side**	**Top Side**	**Bottom Side**
WWAN	Yes	Yes	Yes	Yes	Yes	Yes
WLAN(2.4GHz)	Yes	Yes	Yes	No	Yes	Yes

Remark:

1. Referring to KDB 447498 D01 v06, this device is tested in direct contact (no gap) with flat phantom. 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

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Conducted Power(dBm)	Verdict
Band2	5MHz	18625	QPSK	1	0	Low	21.81	PASS
Band2	5MHz	18625	QPSK	1	5	Low	21.80	PASS
Band2	5MHz	18625	QPSK	6	0	Low	21.81	PASS
Band2	5MHz	18900	QPSK	1	0	Low	22.06	PASS
Band2	5MHz	18900	QPSK	1	5	Low	22.10	PASS
Band2	5MHz	18900	QPSK	6	0	Low	21.18	PASS
Band2	5MHz	19175	QPSK	1	0	High	21.13	PASS
Band2	5MHz	19175	QPSK	1	5	High	21.86	PASS
Band2	5MHz	19175	QPSK	6	0	High	21.60	PASS
Band2	5MHz	18625	16QAM	1	0	Low	21.81	PASS
Band2	5MHz	18625	16QAM	1	5	Low	21.81	PASS
Band2	5MHz	18625	16QAM	6	0	Low	21.81	PASS
Band2	5MHz	18900	16QAM	1	0	Low	21.90	PASS
Band2	5MHz	18900	16QAM	1	5	Low	21.98	PASS
Band2	5MHz	18900	16QAM	6	0	Low	21.16	PASS
Band2	5MHz	19175	16QAM	1	0	High	21.83	PASS
Band2	5MHz	19175	16QAM	1	5	High	21.49	PASS
Band2	5MHz	19175	16QAM	6	0	High	21.65	PASS
Band2	10MHz	18650	QPSK	1	0	Low	21.65	PASS
Band2	10MHz	18650	QPSK	1	5	Low	21.25	PASS
Band2	10MHz	18650	QPSK	6	0	Low	21.21	PASS
Band2	10MHz	18900	QPSK	1	0	Low	21.65	PASS
Band2	10MHz	18900	QPSK	1	5	Low	21.61	PASS
Band2	10MHz	18900	QPSK	6	0	Low	21.86	PASS
Band2	10MHz	19150	QPSK	1	0	High	21.81	PASS
Band2	10MHz	19150	QPSK	1	5	High	21.80	PASS
Band2	10MHz	19150	QPSK	6	0	High	21.08	PASS
Band2	10MHz	18650	16QAM	1	0	Low	21.59	PASS
Band2	10MHz	18650	16QAM	1	5	Low	21.01	PASS
Band2	10MHz	18650	16QAM	6	0	Low	21.22	PASS
Band2	10MHz	18900	16QAM	1	0	Low	21.33	PASS
Band2	10MHz	18900	16QAM	1	5	Low	21.29	PASS
Band2	10MHz	18900	16QAM	6	0	Low	21.85	PASS
Band2	10MHz	19150	16QAM	1	0	High	21.68	PASS
Band2	10MHz	19150	16QAM	1	5	High	21.62	PASS
Band2	10MHz	19150	16QAM	6	0	High	21.08	PASS

Band2	15MHz	18675	QPSK	1	0	Low	21.55	PASS
Band2	15MHz	18675	QPSK	1	5	Low	22.12	PASS
Band2	15MHz	18675	QPSK	6	0	Low	21.86	PASS
Band2	15MHz	18900	QPSK	1	0	Low	22.12	PASS
Band2	15MHz	18900	QPSK	1	5	Low	22.06	PASS
Band2	15MHz	18900	QPSK	6	0	Low	22.03	PASS
Band2	15MHz	19125	QPSK	1	0	High	21.30	PASS
Band2	15MHz	19125	QPSK	1	5	High	21.20	PASS
Band2	15MHz	19125	QPSK	6	0	High	21.18	PASS
Band2	15MHz	18675	16QAM	1	0	Low	21.29	PASS
Band2	15MHz	18675	16QAM	1	5	Low	21.83	PASS
Band2	15MHz	18675	16QAM	6	0	Low	21.86	PASS
Band2	15MHz	18900	16QAM	1	0	Low	21.84	PASS
Band2	15MHz	18900	16QAM	1	5	Low	21.73	PASS
Band2	15MHz	18900	16QAM	6	0	Low	22.07	PASS
Band2	15MHz	19125	16QAM	1	0	High	21.06	PASS
Band2	15MHz	19125	16QAM	1	5	High	20.98	PASS
Band2	15MHz	19125	16QAM	6	0	High	21.17	PASS
Band2	20MHz	18700	QPSK	1	0	Low	22.80	PASS
Band2	20MHz	18700	QPSK	1	5	Low	**22.82**	PASS
Band2	20MHz	18700	QPSK	6	0	Low	22.75	PASS
Band2	20MHz	18900	QPSK	1	0	Low	22.72	PASS
Band2	20MHz	18900	QPSK	1	5	Low	22.68	PASS
Band2	20MHz	18900	QPSK	6	0	Low	22.67	PASS
Band2	20MHz	19100	QPSK	1	0	High	21.96	PASS
Band2	20MHz	19100	QPSK	1	5	High	21.89	PASS
Band2	20MHz	19100	QPSK	6	0	High	21.86	PASS
Band2	20MHz	18700	16QAM	1	0	Low	22.47	PASS
Band2	20MHz	18700	16QAM	1	5	Low	22.37	PASS
Band2	20MHz	18700	16QAM	6	0	Low	22.82	PASS
Band2	20MHz	18900	16QAM	1	0	Low	22.37	PASS
Band2	20MHz	18900	16QAM	1	5	Low	22.33	PASS
Band2	20MHz	18900	16QAM	6	0	Low	22.66	PASS
Band2	20MHz	19100	16QAM	1	0	High	21.74	PASS
Band2	20MHz	19100	16QAM	1	5	High	21.72	PASS
Band2	20MHz	19100	16QAM	6	0	High	21.86	PASS

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Conducted Power(dBm)	Verdict
Band4	5MHz	19975	QPSK	1	0	Low	21.34	PASS
Band4	5MHz	19975	QPSK	1	5	Low	21.28	PASS
Band4	5MHz	19975	QPSK	6	0	Low	21.39	PASS
Band4	5MHz	20175	QPSK	1	0	Low	21.25	PASS
Band4	5MHz	20175	QPSK	1	5	Low	21.24	PASS
Band4	5MHz	20175	QPSK	6	0	Low	21.40	PASS
Band4	5MHz	20375	QPSK	1	0	High	21.91	PASS
Band4	5MHz	20375	QPSK	1	5	High	21.85	PASS
Band4	5MHz	20375	QPSK	6	0	High	22.95	PASS
Band4	5MHz	19975	16QAM	1	0	Low	21.33	PASS
Band4	5MHz	19975	16QAM	1	5	Low	21.29	PASS
Band4	5MHz	19975	16QAM	6	0	Low	21.44	PASS
Band4	5MHz	20175	16QAM	1	0	Low	21.09	PASS
Band4	5MHz	20175	16QAM	1	5	Low	21.09	PASS
Band4	5MHz	20175	16QAM	6	0	Low	21.38	PASS
Band4	5MHz	20375	16QAM	1	0	High	21.95	PASS
Band4	5MHz	20375	16QAM	1	5	High	21.87	PASS
Band4	5MHz	20375	16QAM	6	0	High	21.95	PASS
Band4	10MHz	20000	QPSK	1	0	Low	21.42	PASS
Band4	10MHz	20000	QPSK	1	5	Low	21.07	PASS
Band4	10MHz	20000	QPSK	6	0	Low	21.86	PASS
Band4	10MHz	20175	QPSK	1	0	Low	21.11	PASS
Band4	10MHz	20175	QPSK	1	5	Low	21.08	PASS
Band4	10MHz	20175	QPSK	6	0	Low	21.18	PASS
Band4	10MHz	20350	QPSK	1	0	High	21.94	PASS
Band4	10MHz	20350	QPSK	1	5	High	21.84	PASS
Band4	10MHz	20350	QPSK	6	0	High	21.97	PASS
Band4	10MHz	20000	16QAM	1	0	Low	21.47	PASS
Band4	10MHz	20000	16QAM	1	5	Low	21.03	PASS
Band4	10MHz	20000	16QAM	6	0	Low	21.85	PASS
Band4	10MHz	20175	16QAM	1	0	Low	21.13	PASS
Band4	10MHz	20175	16QAM	1	5	Low	21.02	PASS
Band4	10MHz	20175	16QAM	6	0	Low	21.17	PASS
Band4	10MHz	20350	16QAM	1	0	High	21.88	PASS
Band4	10MHz	20350	16QAM	1	5	High	21.92	PASS
Band4	10MHz	20350	16QAM	6	0	High	20.97	PASS
Band4	15MHz	20025	QPSK	1	0	Low	23.72	PASS
Band4	15MHz	20025	QPSK	1	5	Low	23.68	PASS
Band4	15MHz	20025	QPSK	6	0	Low	23.60	PASS
Band4	15MHz	20175	QPSK	1	0	Low	23.61	PASS

Band4	15MHz	20175	QPSK	1	5	Low	23.59	PASS
Band4	15MHz	20175	QPSK	6	0	Low	23.53	PASS
Band4	15MHz	20325	QPSK	1	0	High	23.73	PASS
Band4	15MHz	20325	QPSK	1	5	High	23.74	PASS
Band4	15MHz	20325	QPSK	6	0	High	23.71	PASS
Band4	15MHz	20025	16QAM	1	0	Low	23.37	PASS
Band4	15MHz	20025	16QAM	1	5	Low	23.39	PASS
Band4	15MHz	20025	16QAM	6	0	Low	23.62	PASS
Band4	15MHz	20175	16QAM	1	0	Low	23.34	PASS
Band4	15MHz	20175	16QAM	1	5	Low	23.33	PASS
Band4	15MHz	20175	16QAM	6	0	Low	23.55	PASS
Band4	15MHz	20325	16QAM	1	0	High	23.49	PASS
Band4	15MHz	20325	16QAM	1	5	High	23.43	PASS
Band4	15MHz	20325	16QAM	6	0	High	23.71	PASS
Band4	20MHz	20050	QPSK	1	0	Low	23.72	PASS
Band4	20MHz	20050	QPSK	1	5	Low	**23.75**	PASS
Band4	20MHz	20050	QPSK	6	0	Low	23.70	PASS
Band4	20MHz	20175	QPSK	1	0	Low	23.67	PASS
Band4	20MHz	20175	QPSK	1	5	Low	23.64	PASS
Band4	20MHz	20175	QPSK	6	0	Low	23.63	PASS
Band4	20MHz	20300	QPSK	1	0	High	23.66	PASS
Band4	20MHz	20300	QPSK	1	5	High	23.69	PASS
Band4	20MHz	20300	QPSK	6	0	High	23.65	PASS
Band4	20MHz	20050	16QAM	1	0	Low	23.53	PASS
Band4	20MHz	20050	16QAM	1	5	Low	23.47	PASS
Band4	20MHz	20050	16QAM	6	0	Low	23.69	PASS
Band4	20MHz	20175	16QAM	1	0	Low	23.59	PASS
Band4	20MHz	20175	16QAM	1	5	Low	23.50	PASS
Band4	20MHz	20175	16QAM	6	0	Low	23.63	PASS
Band4	20MHz	20300	16QAM	1	0	High	23.54	PASS
Band4	20MHz	20300	16QAM	1	5	High	23.45	PASS
Band4	20MHz	20300	16QAM	6	0	High	23.64	PASS

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Conducted Power(dBm)	Verdict
Band12	5MHz	23035	QPSK	1	0	Low	22.90	PASS
Band12	5MHz	23035	QPSK	1	5	Low	22.86	PASS
Band12	5MHz	23035	QPSK	6	0	Low	21.96	PASS
Band12	5MHz	23095	QPSK	1	0	Low	23.04	PASS
Band12	5MHz	23095	QPSK	1	5	Low	22.97	PASS
Band12	5MHz	23095	QPSK	6	0	Low	22.10	PASS
Band12	5MHz	23155	QPSK	1	0	High	23.03	PASS
Band12	5MHz	23155	QPSK	1	5	High	22.95	PASS
Band12	5MHz	23155	QPSK	6	0	High	22.03	PASS
Band12	5MHz	23035	16QAM	1	0	Low	22.56	PASS
Band12	5MHz	23035	16QAM	1	5	Low	22.47	PASS
Band12	5MHz	23035	16QAM	6	0	Low	21.95	PASS
Band12	5MHz	23095	16QAM	1	0	Low	23.04	PASS
Band12	5MHz	23095	16QAM	1	5	Low	22.93	PASS
Band12	5MHz	23095	16QAM	6	0	Low	22.10	PASS
Band12	5MHz	23155	16QAM	1	0	High	22.86	PASS
Band12	5MHz	23155	16QAM	1	5	High	22.83	PASS
Band12	5MHz	23155	16QAM	6	0	High	22.03	PASS
Band12	10MHz	23060	QPSK	1	0	Low	22.05	PASS
Band12	10MHz	23060	QPSK	1	5	Low	22.70	PASS
Band12	10MHz	23060	QPSK	6	0	Low	21.50	PASS
Band12	10MHz	23095	QPSK	1	0	Low	**23.05**	PASS
Band12	10MHz	23095	QPSK	1	5	Low	22.94	PASS
Band12	10MHz	23095	QPSK	6	0	Low	22.06	PASS
Band12	10MHz	23130	QPSK	1	0	High	23.01	PASS
Band12	10MHz	23130	QPSK	1	5	High	22.93	PASS
Band12	10MHz	23130	QPSK	6	0	High	22.02	PASS
Band12	10MHz	23060	16QAM	1	0	Low	21.83	PASS
Band12	10MHz	23060	16QAM	1	5	Low	22.54	PASS
Band12	10MHz	23060	16QAM	6	0	Low	21.49	PASS
Band12	10MHz	23095	16QAM	1	0	Low	22.80	PASS
Band12	10MHz	23095	16QAM	1	5	Low	22.87	PASS
Band12	10MHz	23095	16QAM	6	0	Low	22.05	PASS
Band12	10MHz	23130	16QAM	1	0	High	22.91	PASS
Band12	10MHz	23130	16QAM	1	5	High	22.64	PASS
Band12	10MHz	23130	16QAM	6	0	High	22.01	PASS

Band	Bandwidth	Modulation	Channel	RB Size	RB Start	NBIndex	Conducted Power(dBm)	Verdict
Band13	5MHz	23205	QPSK	1	0	Low	24.24	PASS
Band13	5MHz	23205	QPSK	1	5	Low	24.22	PASS
Band13	5MHz	23205	QPSK	6	0	Low	24.24	PASS
Band13	5MHz	23230	QPSK	1	0	Low	24.25	PASS
Band13	5MHz	23230	QPSK	1	5	Low	24.22	PASS
Band13	5MHz	23230	QPSK	6	0	Low	23.40	PASS
Band13	5MHz	23255	QPSK	1	0	High	24.27	PASS
Band13	5MHz	23255	QPSK	1	5	High	24.20	PASS
Band13	5MHz	23255	QPSK	6	0	High	23.15	PASS
Band13	5MHz	23205	16QAM	1	0	Low	24.21	PASS
Band13	5MHz	23205	16QAM	1	5	Low	24.24	PASS
Band13	5MHz	23205	16QAM	6	0	Low	24.20	PASS
Band13	5MHz	23230	16QAM	1	0	Low	23.97	PASS
Band13	5MHz	23230	16QAM	1	5	Low	23.90	PASS
Band13	5MHz	23230	16QAM	6	0	Low	23.39	PASS
Band13	5MHz	23255	16QAM	1	0	High	24.04	PASS
Band13	5MHz	23255	16QAM	1	5	High	24.02	PASS
Band13	5MHz	23255	16QAM	6	0	High	23.15	PASS
Band13	10MHz	23230	QPSK	1	0	Low	23.48	PASS
Band13	10MHz	23230	QPSK	1	5	Low	**24.29**	PASS
Band13	10MHz	23230	QPSK	6	0	Low	22.99	PASS
Band13	10MHz	23230	16QAM	1	0	Low	23.19	PASS
Band13	10MHz	23230	16QAM	1	5	Low	23.80	PASS
Band13	10MHz	23230	16QAM	6	0	Low	23.03	PASS

Remark:

1. Per KDB941225 D05 v02r05, Start with the largest channel bandwidth then measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle, and lower edge of each required test channel. When the reported SAR is≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. 6 When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2. Per KDB941225 D05 v02r05, the procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.
3. Per KDB941225 D05 v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations, and the highest reported SAR for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45

W/kg, the remaining required test channels must also be tested.
4. Per KDB941225 D05 v02r05, for each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in 5.2.1, 5.2.2, and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

WLAN(2.4GHz)					
Test Mode	**Data Rate**	**Channel**	**Frequency (MHz)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**
802.11b	11Mbps	CH 01	2412	**15.15**	15.5
		CH 06	2437	14.88	15.5
		CH 11	2462	14.68	15.5

Remark:
1. Per KDB 248227 D01 v02r02, for 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions.
2. Per KDB 248227 D01 v02r02, for 802.11b DSSS SAR measurements ,when the reported SAR of the highest measured maximum output power channel (see 3.1) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.
3 .For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is <= 1.2W/kg.
4. Per KDB 248227 D01 v02r02, when multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined by applying the following steps sequentially.
1) The largest channel bandwidth configuration is selected among the multiple configurations in a frequency band with the same specified maximum output power.
2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.

Bluetooth - Maximum Average Power					
Test Mode	**Data Rate**	**Channel**	**Frequency (MHz)**	**Conducted Power(dBm)**	**Tune-up power (dBm)**
BLE	1Mbps	CH 00	2402	**1.50**	2.0
		CH 19	2440	1.29	2.0
		CH 39	2480	1.20	2.0

Remark:

Bluetooth maximum output power is 1.50dBm and Maximum Tune-Up output power is 2.0dBm. Per KDB 447498 D01 V06, the 1-g and 10-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 and ≤ 7.5 for 10-g extremity SAR,16 where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation17
- The result is rounded to one decimal place for comparison

Bluetooth:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	Result	Limit
2.0	1.58	5	2.48	0.498	3

The exclusion threshold is 0.498< 3, therefore, the RF exposure evaluation is not required.

9.2 Test Results for Standalone SAR Test

Body SAR

LTE Band 2–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR 1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
	QPSK 20MHz 1RB	Back Face	1860	22.82	25.0	1.652	0.606	1.001
1	QPSK 20MHz 1RB	Front Face	1860	22.82	25.0	1.652	0.639	**1.056**
	QPSK 20MHz 1RB	Right Side	1860	22.82	25.0	1.652	0.361	0.596
	QPSK 20MHz 1RB	Left Side	1860	22.82	25.0	1.652	0.514	0.849
	QPSK 20MHz 1RB	Top Side	1860	22.82	25.0	1.652	0.455	0.752
	QPSK 20MHz 1RB	Bottom Side	1860	22.82	25.0	1.652	0.463	0.765
	QPSK 20MHz 1RB	Back Face	1880	22.72	25.0	1.690	0.571	0.965
	QPSK 20MHz 1RB	Back Face	1900	21.96	25.0	2.014	0.492	0.991
	QPSK 20MHz 1RB	Front Face	1880	22.72	25.0	1.690	0.583	0.986
	QPSK 20MHz 1RB	Front Face	1900	21.96	25.0	2.014	0.512	1.031
	QPSK 20MHz 50%RB	Back Face	1860	22.82	25.0	1.652	0.561	0.927
	QPSK 20MHz 50%RB	Front Face	1860	22.82	25.0	1.652	0.629	1.039
	QPSK 20MHz 50%RB	Right Side	1860	22.82	25.0	1.652	0.347	0.573
	QPSK 20MHz 50%RB	Left Side	1860	22.82	25.0	1.652	0.474	0.783
	QPSK 20MHz 50%RB	Top Side	1860	22.82	25.0	1.652	0.414	0.684
	QPSK 20MHz 50%RB	Bottom Side	1860	22.82	25.0	1.652	0.406	0.671
	QPSK 20MHz 50%RB	Back Face	1880	22.72	25.0	1.690	0.553	0.935
	QPSK 20MHz 50%RB	Back Face	1900	21.96	25.0	2.014	0.468	0.942
	QPSK 20MHz 50%RB	Front Face	1880	22.72	25.0	1.690	0.566	0.957
	QPSK 20MHz 50%RB	Front Face	1900	21.96	25.0	2.014	0.521	1.049

LTE Band 4–Body SAR Test (Gap: 0mm)								
Plot No.	**Mode**	**Test Position**	**Frequency**	**Output Power (dBm)**	**Rated Limit (dBm)**	**Scaling Factor**	**SAR 1g (W/kg)**	**Scaled SAR1g (W/kg)**
	Modulation, Bandwidth, RB		**MHz**					
	QPSK 20MHz 1RB	Back Face	1720	23.75	25.0	1.334	0.483	0.644
2	QPSK 20MHz 1RB	Front Face	1720	23.75	25.0	1.334	0.582	**0.776**
	QPSK 20MHz 1RB	Right Side	1720	23.75	25.0	1.334	0.452	0.603
	QPSK 20MHz 1RB	Left Side	1720	23.75	25.0	1.334	0.472	0.629
	QPSK 20MHz 1RB	Top Side	1720	23.75	25.0	1.334	0.385	0.513
	QPSK 20MHz 1RB	Bottom Side	1720	23.75	25.0	1.334	0.396	0.528
	QPSK 20MHz 50%RB	Back Face	1720	23.75	25.0	1.334	0.469	0.625
	QPSK 20MHz 50%RB	Front Face	1720	23.75	25.0	1.334	0.539	0.719
	QPSK 20MHz 50%RB	Right Side	1720	23.75	25.0	1.334	0.373	0.497
	QPSK 20MHz 50%RB	Left Side	1720	23.75	25.0	1.334	0.421	0.561
	QPSK 20MHz 50%RB	Top Side	1720	23.75	25.0	1.334	0.368	0.491
	QPSK 20MHz 50%RB	Bottom Side	1720	23.75	25.0	1.334	0.355	0.473

LTE Band 12–Body SAR Test (Gap: 0mm)								
Plot No.	**Mode**	**Test Position**	**Frequency**	**Output Power (dBm)**	**Rated Limit (dBm)**	**Scaling Factor**	**SAR 1g (W/kg)**	**Scaled SAR1g (W/kg)**
	Modulation, Bandwidth, RB		**MHz**					
	QPSK 10MHz 1RB	Back Face	707.5	23.05	25.0	1.567	0.429	0.672
3	QPSK 10MHz 1RB	Front Face	707.5	23.05	25.0	1.567	0.440	**0.689**
	QPSK 10MHz 1RB	Right Side	707.5	23.05	25.0	1.567	0.373	0.584
	QPSK 10MHz 1RB	Left Side	707.5	23.05	25.0	1.567	0.410	0.642
	QPSK 10MHz 1RB	Top Side	707.5	23.05	25.0	1.567	0.347	0.544
	QPSK 10MHz 1RB	Bottom Side	707.5	23.05	25.0	1.567	0.356	0.558
	QPSK 10MHz 50%RB	Back Face	707.5	23.05	25.0	1.567	0.349	0.547
	QPSK 10MHz 50%RB	Front Face	707.5	23.05	25.0	1.567	0.419	0.656
	QPSK 10MHz 50%RB	Right Side	707.5	23.05	25.0	1.567	0.364	0.570
	QPSK 10MHz 50%RB	Left Side	707.5	23.05	25.0	1.567	0.368	0.577
	QPSK 10MHz 50%RB	Top Side	707.5	23.05	25.0	1.567	0.305	0.478
	QPSK 10MHz 50%RB	Bottom Side	707.5	23.05	25.0	1.567	0.323	0.506

LTE Band 13–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR 1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
	QPSK 10MHz 1RB	Back Face	782	24.29	25.0	1.178	0.446	0.525
4	QPSK 10MHz 1RB	Front Face	782	24.29	25.0	1.178	0.460	**0.542**
	QPSK 10MHz 1RB	Right Side	782	24.29	25.0	1.178	0.379	0.446
	QPSK 10MHz 1RB	Left Side	782	24.29	25.0	1.178	0.385	0.453
	QPSK 10MHz 1RB	Top Side	782	24.29	25.0	1.178	0.328	0.386
	QPSK 10MHz 1RB	Bottom Side	782	24.29	25.0	1.178	0.330	0.389
	QPSK 10MHz 50%RB	Back Face	782	24.29	25.0	1.178	0.419	0.493
	QPSK 10MHz 50%RB	Front Face	782	24.29	25.0	1.178	0.437	0.515
	QPSK 10MHz 50%RB	Right Side	782	24.29	25.0	1.178	0.328	0.386
	QPSK 10MHz 50%RB	Left Side	782	24.29	25.0	1.178	0.355	0.418
	QPSK 10MHz 50%RB	Top Side	782	24.29	25.0	1.178	0.298	0.351
	QPSK 10MHz 50%RB	Bottom Side	782	24.29	25.0	1.178	0.219	0.258

WLAN 2.4GHz–Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Position	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
	802.11b	Back Face	01	2412	15.15	15.5	1.084	0.038	0.041
	802.11b	Front Face	01	2412	15.15	15.5	1.084	0.073	0.079
5.	802.11b	Right Side	01	2412	15.15	15.5	1.084	0.085	**0.092**
	802.11b	Top Side	01	2412	15.15	15.5	1.084	0.059	0.064
	802.11b	Bottom Side	01	2412	15.15	15.5	1.084	0.051	0.055

Remark: Per KDB 447498 D01 v06, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

9.3 Simultaneous Multi-band Transmission SAR Analysis

List of Mode for Simultaneous Multi-band Transmission

No.	Configurations	Body SAR
1	**LTE(Data) + WLAN(2.4GHz)(Data)**	Yes
2	**LTE(Data) + Bluetooth(Data)**	Yes

Remark:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.

2. According to the KDB 447498 D01 v06, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(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.

For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 v06 as below:

Bluetooth:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g) 5mm
2.0	1.58	5/10	2.402	7.5	0.066

3. The maximum SAR summation is calculated based on the same configuration and test position.

Body SAR

WWAN and WLAN

	WWAN		WLAN(2.4GHz)	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back	LTE	1.001	0.041	1.042
Front	LTE	**1.056**	0.079	**1.135**
Right side	LTE	0.603	**0.092**	0.695
Left side	LTE	0.849	--	0.849
Top side	LTE	0.752	0.064	0.816
Bottom side	LTE	0.765	0.055	0.820

WWAN and Bluetooth

	WWAN		Bluetooth	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back	LTE	1.001	0.066	1.067
Front	LTE	**1.056**	0.066	**1.122**
Right side	LTE	0.603	0.066	0.669
Left side	LTE	0.849	0.066	0.915
Top side	LTE	0.752	0.066	0.818
Bottom side	LTE	0.765	0.066	0.831

10. Measurement Uncertainty

10.1 Uncertainty for 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	0	R	√3	1	1	1.73	1.73	∝
RF ambient Conditions - Reflections	E.6.1	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	0	R	√3	0	0.43	0	0	∝
Liquid conductivity - measurement uncertainty	E.3.3	4.00	N	1	0.64	0.43	1.10	1.10	∝
Liquid permittivity - deviation from target value	E.3.2	0	R	√3	0	0.49	0	0	∝
Liquid permittivity - measurement uncertainty	E.3.3	5.00	N	1	0.6	0.49	1.47	1.47	∝
Combined Standard Uncertainty			RSS				10.20	10.00	
Expanded Uncertainty (95% Confidence interval)			K=2				20.40	20.00	

Annex A. Plots of System Performance Check

MEASUREMENT 1

Type: Validation measurement (Fast, 75.00 %)
Date of measurement: 2023-11-08
Measurement duration: 7 minutes 21 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 1.67; Calibrated: 2023-07-07

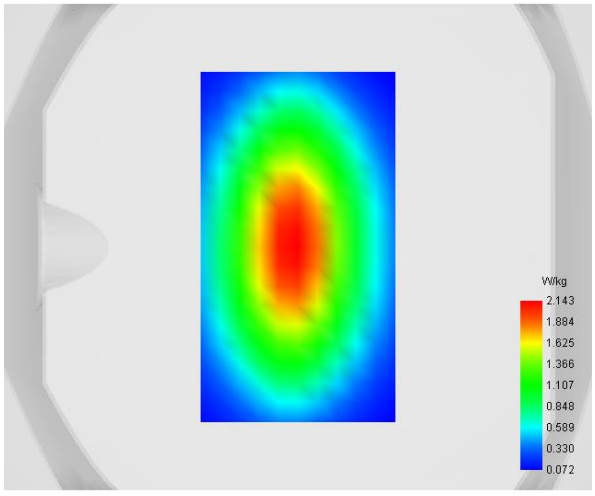
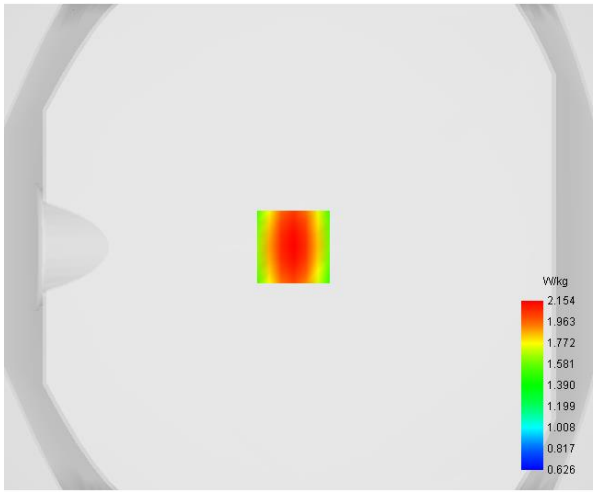
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	750.000000
Relative Permittivity (real part)	42.522457
Conductivity (S/m)	0.912347
Power Variation (%)	1.178100
Ambient Temperature	22.5
Liquid Temperature	22.5

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

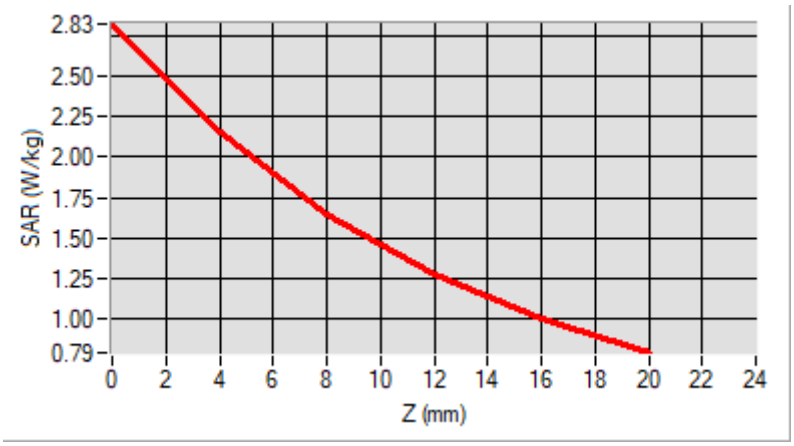
Maximum location: X=-2.00, Y=0.00

D. SAR 1g & 10g

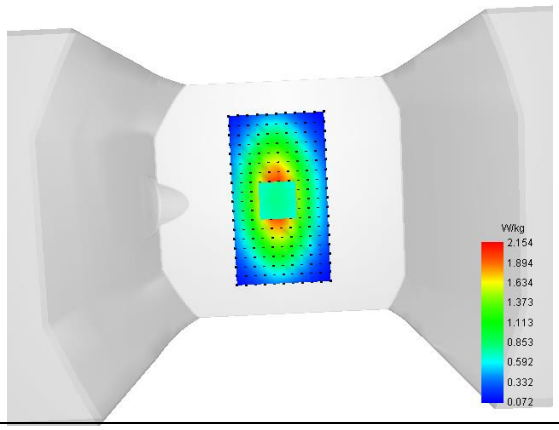
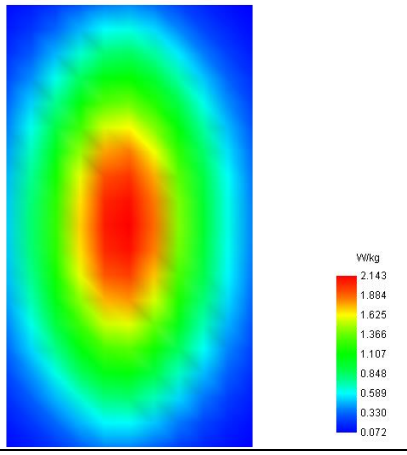
SAR 10g (W/Kg)	**1.430855**
SAR 1g (W/Kg)	**2.051374**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**2.8268**	**2.1542**	**1.6473**	**1.2759**	**1.0033**



F. 3D Image

3D screen shot	**Hot spot position**
	

MEASUREMENT 2

Type: Validation measurement (Fast, 75.00 %)
Date of measurement: 2023-11-09
Measurement duration: 12 minutes 21 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 2.11; Calibrated: 2023-07-07

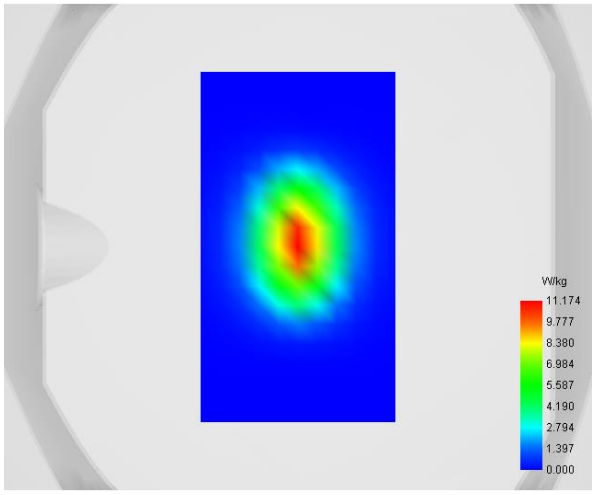
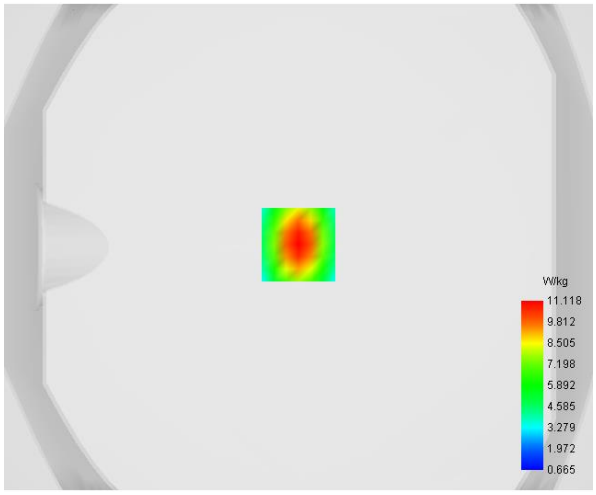
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
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)	41.424472
Conductivity (S/m)	1.381485
Power Variation (%)	1.425800
Ambient Temperature	22.5
Liquid Temperature	22.5

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

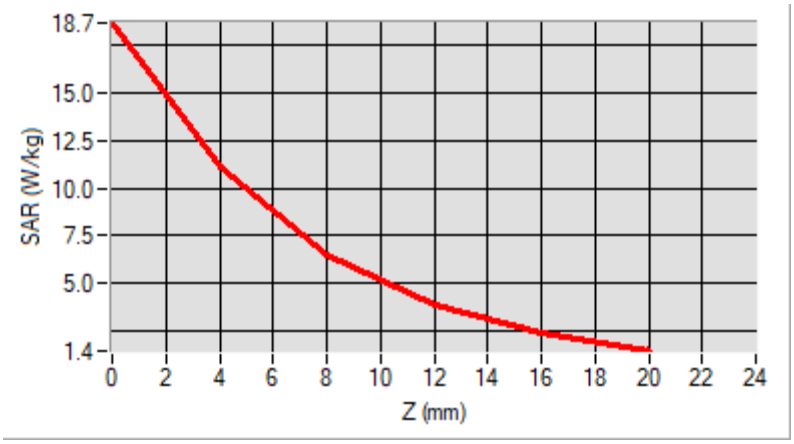
Maximum location: X=0.00, Y=1.00

D. SAR 1g & 10g

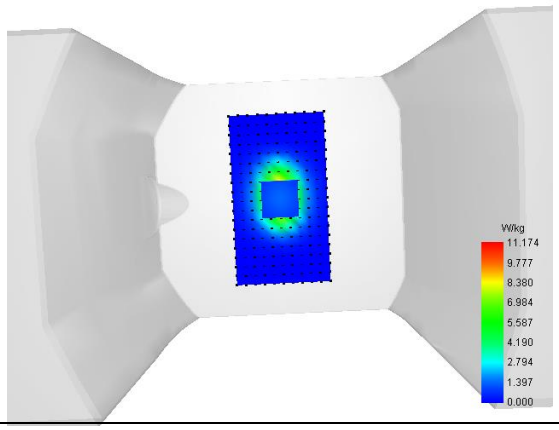
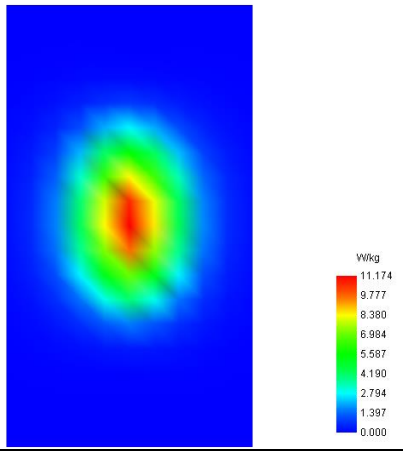
SAR 10g (W/Kg)	**5.260825**
SAR 1g (W/Kg)	**10.222516**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**18.6940**	**11.1182**	**6.4717**	**3.8103**	**2.3414**



F. 3D Image

3D screen shot	**Hot spot position**
	

MEASUREMENT 3

Type: Validation measurement (Fast, 75.00 %)
Date of measurement: 2023-11-10
Measurement duration: 12 minutes 21 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 2.29; Calibrated: 2023-07-07

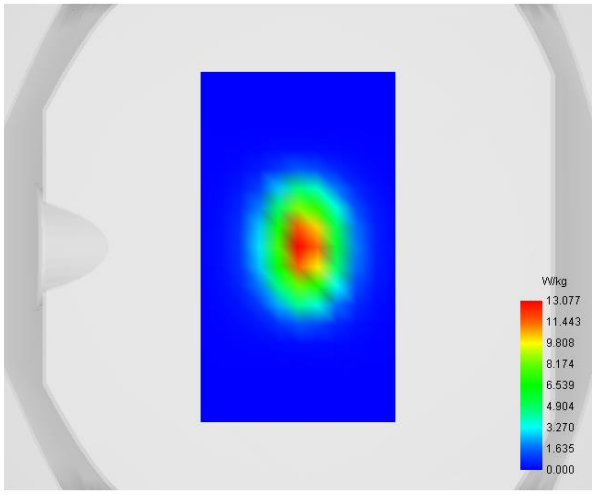
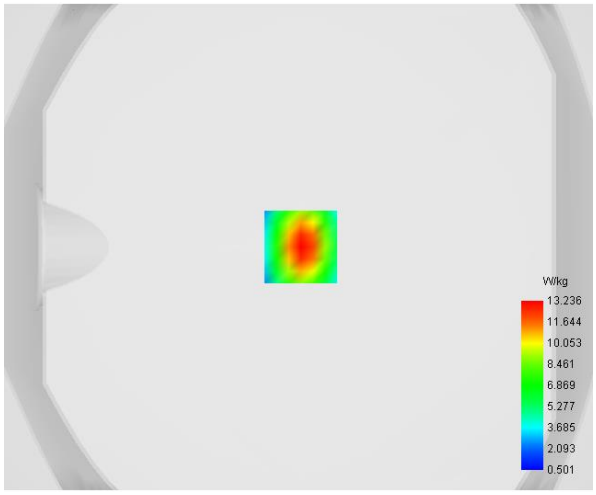
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	2450.000000
Relative Permittivity (real part)	40.532289
Conductivity (S/m)	1.761828
Power Variation (%)	1.475200
Ambient Temperature	22.4
Liquid Temperature	22.4

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

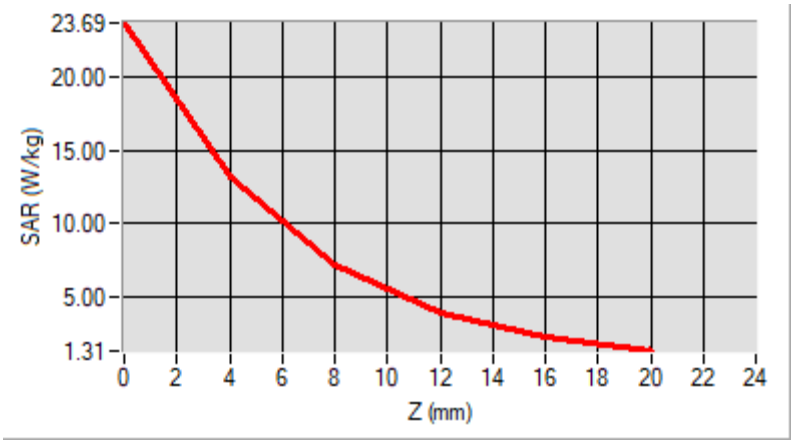
Maximum location: X=1.00, Y=0.00

D. SAR 1g & 10g

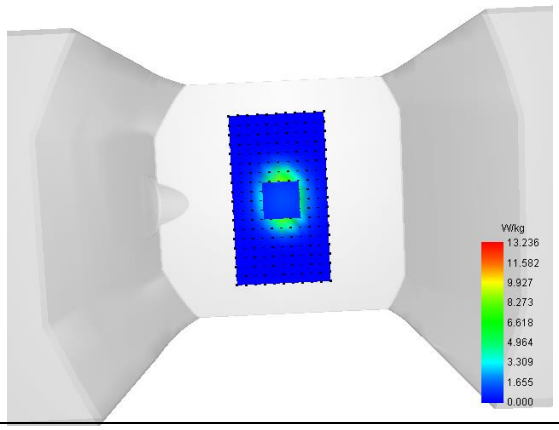
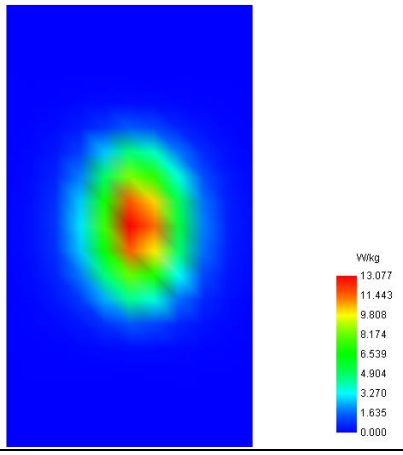
SAR 10g (W/Kg)	**5.846344**
SAR 1g (W/Kg)	**12.126085**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**23.6924**	**13.2363**	**7.1523**	**3.9032**	**2.2625**



F. 3D Image

3D screen shot	**Hot spot position**
	

Annex B. Plots of SAR Measurement

MEASUREMENT 1

Type: Measurement (Complete)
Date of measurement: 2023-11-09
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 2.11; Calibrated: 2023-07-07

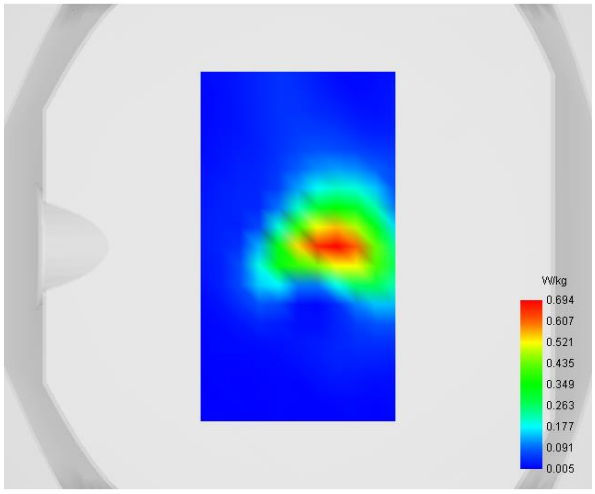
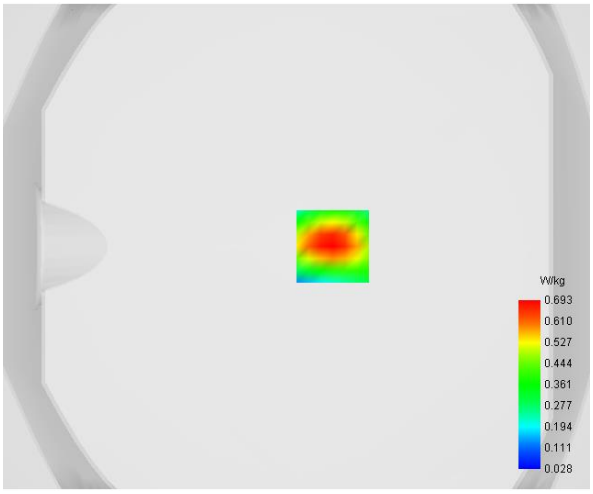
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
Phantom	Flat Plane
Device Position	Front
Band	LTE Band 2
Channels	QPSK, 20MHz, 1RB,Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1860.000000
Relative Permittivity (real part)	41.424524
Conductivity (S/m)	1.383699
Power Variation (%)	-1.345700
Ambient Temperature	22.5
Liquid Temperature	22.5

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

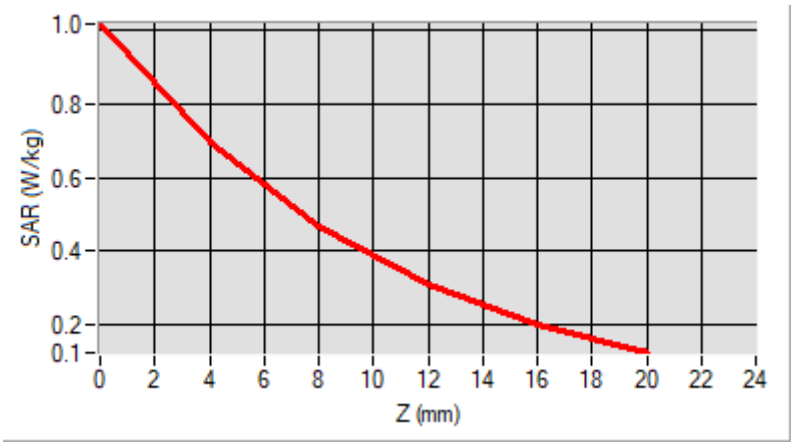
Maximum location: X=15.00, Y=0.00

D. SAR 1g & 10g

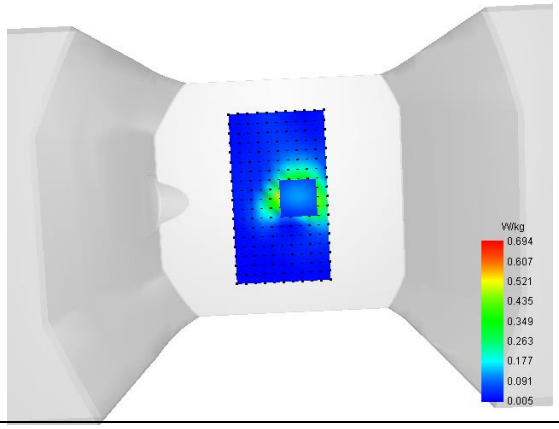
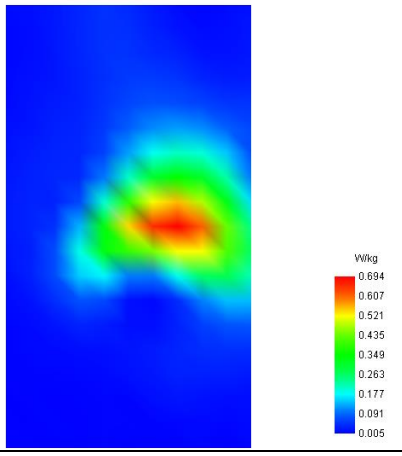
SAR 10g (W/Kg)	**0.349683**
SAR 1g (W/Kg)	**0.638851**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**1.0152**	**0.6931**	**0.4650**	**0.3084**	**0.2020**



F. 3D Image

3D screen shot	**Hot spot position**
	

MEASUREMENT 2

Type: Measurement (Complete)
Date of measurement: 2023-11-09
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 2.11; Calibrated: 2023-07-07

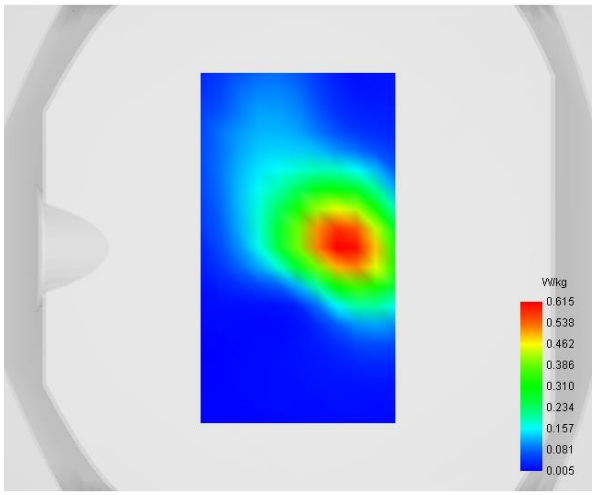
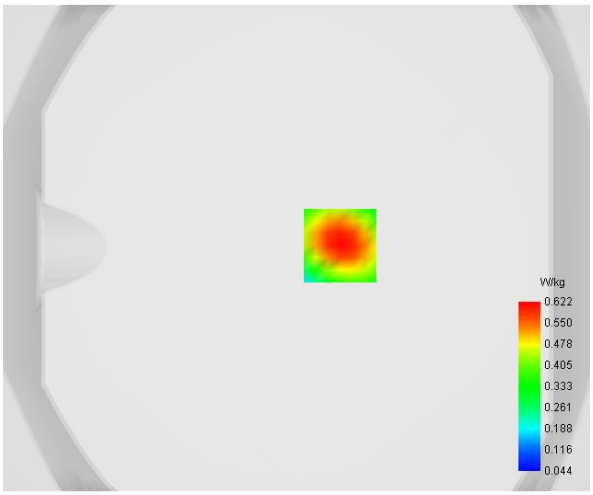
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
Phantom	Flat Plane
Device Position	Front
Band	LTE Band 4
Channels	QPSK 20MHz 50%RB,Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1720.000000
Relative Permittivity (real part)	41.422275
Conductivity (S/m)	1.380987
Power Variation (%)	0.084700
Ambient Temperature	22.5
Liquid Temperature	22.5

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

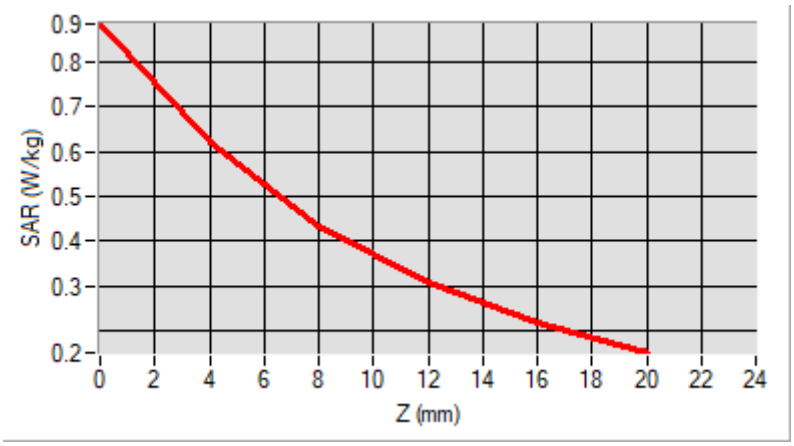
Maximum location: X=18.00, Y=1.00

D. SAR 1g & 10g

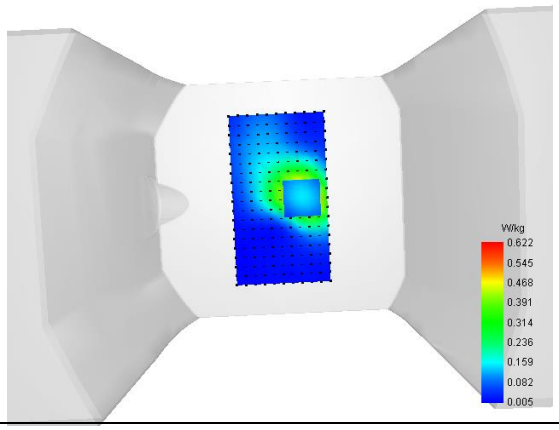
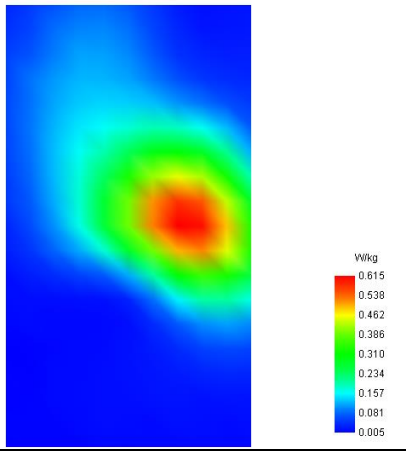
SAR 10g (W/Kg)	**0.350360**
SAR 1g (W/Kg)	**0.582000**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**0.8850**	**0.6222**	**0.4349**	**0.3057**	**0.2170**



F. 3D Image

3D screen shot	**Hot spot position**
	

MEASUREMENT 3

Type: Measurement (Complete)
Date of measurement: 2023-11-08
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 1.67; Calibrated: 2023-07-07

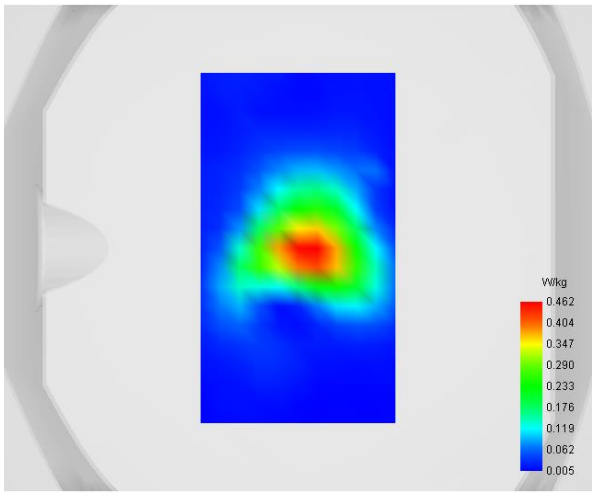
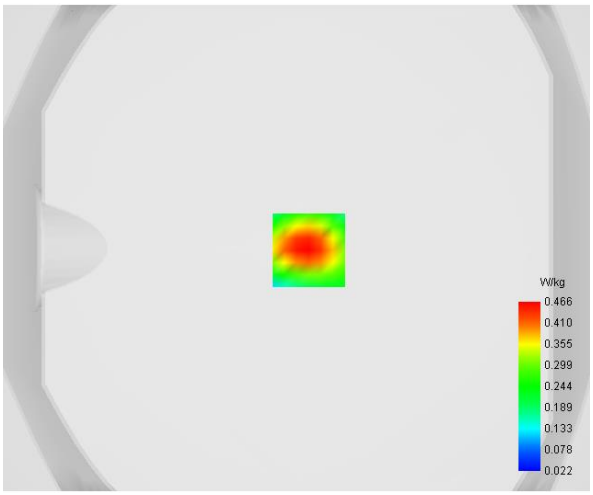
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
Phantom	Flat Plane
Device Position	Front
Band	LTE Band 12
Channels	QPSK, 10MHz, 1RB, Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	707.500000
Relative Permittivity (real part)	42.522668
Conductivity (S/m)	0.913696
Power Variation (%)	-1.057500
Ambient Temperature	22.5
Liquid Temperature	22.5

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

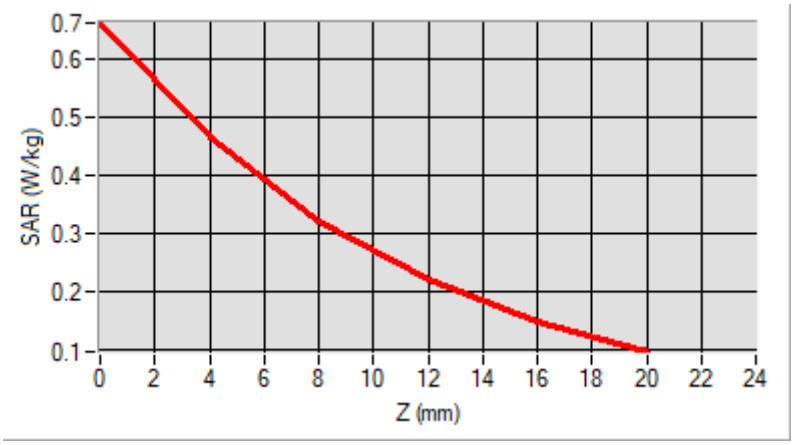
Maximum location: X=5.00, Y=-1.00

D. SAR 1g & 10g

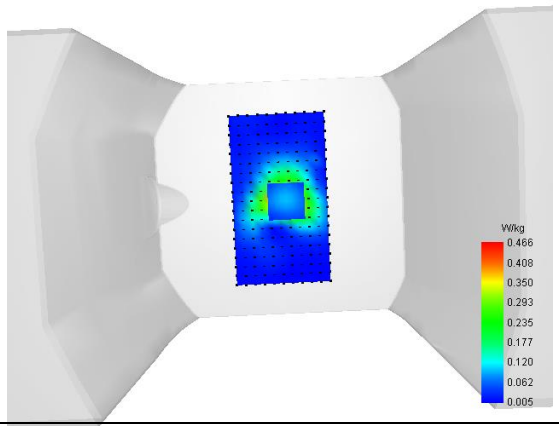
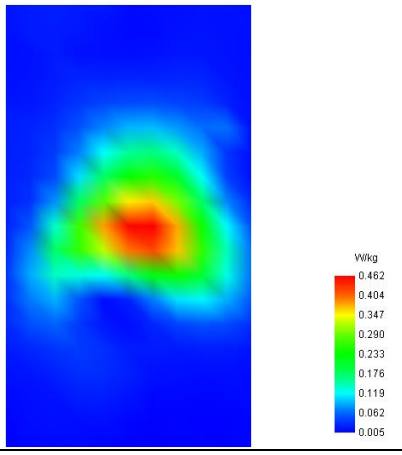
SAR 10g (W/Kg)	**0.249703**
SAR 1g (W/Kg)	**0.439832**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**0.6634**	**0.4657**	**0.3222**	**0.2208**	**0.1497**



F. 3D Image

3D screen shot	**Hot spot position**
	

MEASUREMENT 4

Type: Measurement (Complete)
Date of measurement: 2023-11-08
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 1.67; Calibrated: 2023-07-07

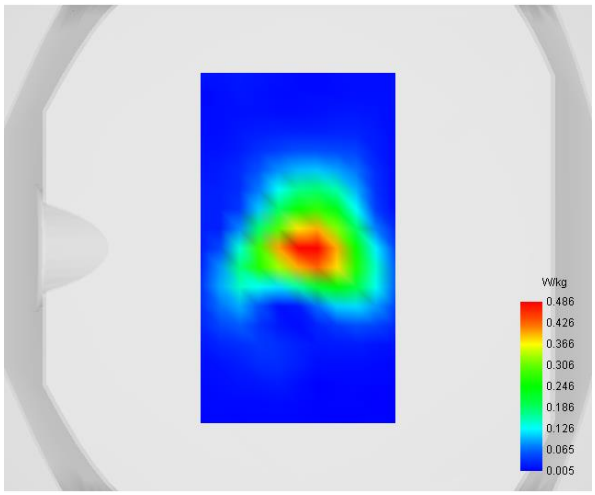
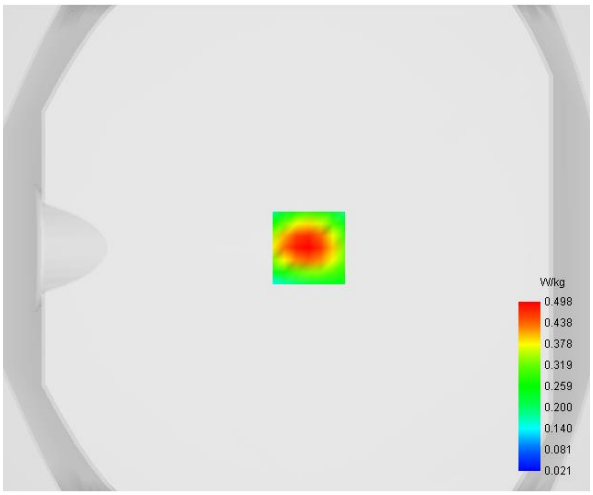
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
Phantom	Flat Plane
Device Position	Front
Band	LTE Band 13
Channels	QPSK, 10MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	782.000000
Relative Permittivity (real part)	42.522668
Conductivity (S/m)	0.913696
Power Variation (%)	1.055700
Ambient Temperature	22.5
Liquid Temperature	22.5

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

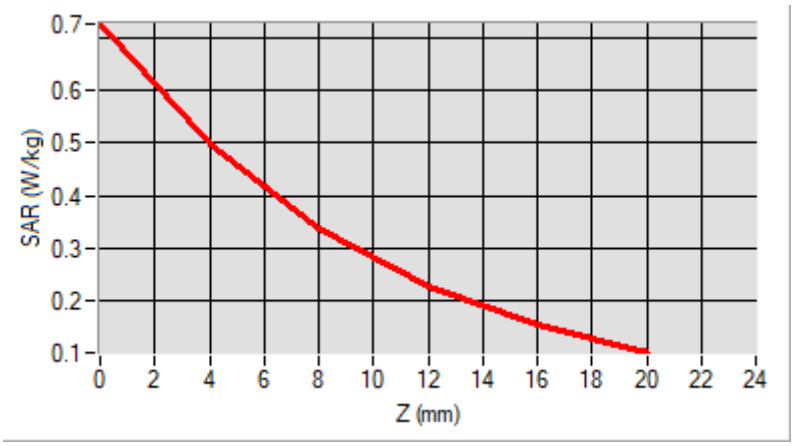
Maximum location: X=5.00, Y=0.00

D. SAR 1g & 10g

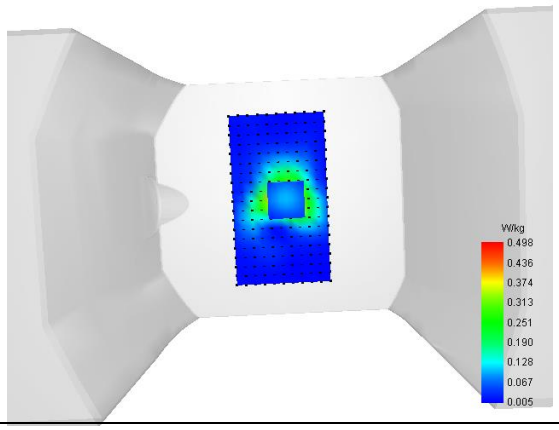
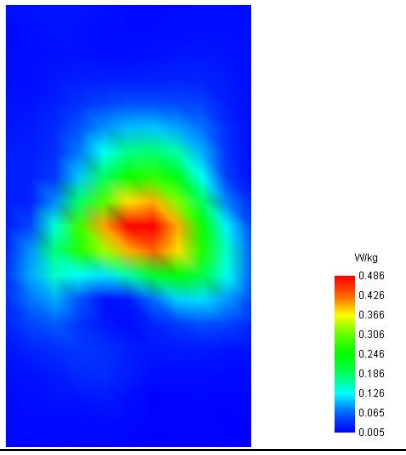
SAR 10g (W/Kg)	**0.259505**
SAR 1g (W/Kg)	**0.459708**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**0.7251**	**0.4975**	**0.3376**	**0.2290**	**0.1558**



F. 3D Image

3D screen shot	**Hot spot position**
	

MEASUREMENT 5

Type: Measurement (Complete)
Date of measurement: 2023-11-10
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE2 - SN 18/21 EPGO356; ConvF: 2.29; Calibrated: 2023-07-07

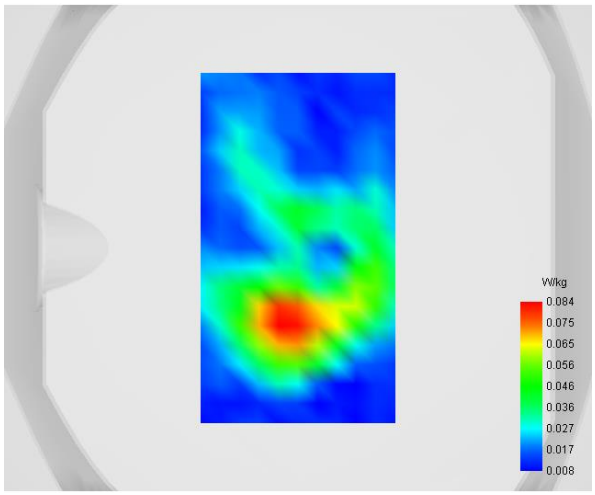
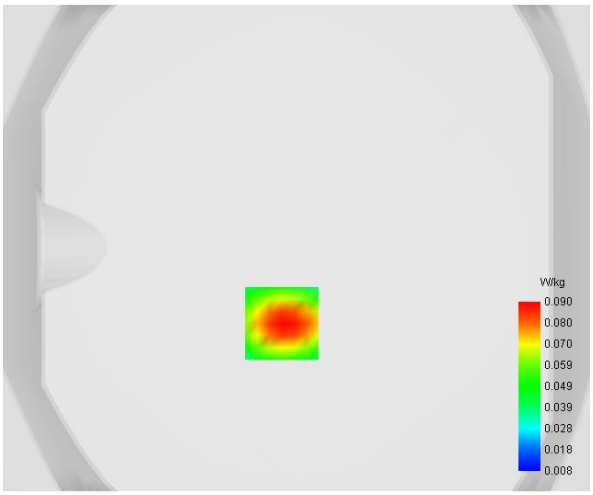
A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=5mm dy=5mm dz=4mm
Phantom	Flat Plane
Device Position	Right
Band	WiFi_802.11b
Channels	Low
Signal	Duty Cycle: 1:1

B. SAR Measurement Results

Frequency (MHz)	2412.000000
Relative Permittivity (real part)	40.532128
Conductivity (S/m)	1.761202
Power Variation (%)	0.568374
Ambient Temperature	22.4
Liquid Temperature	22.4

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

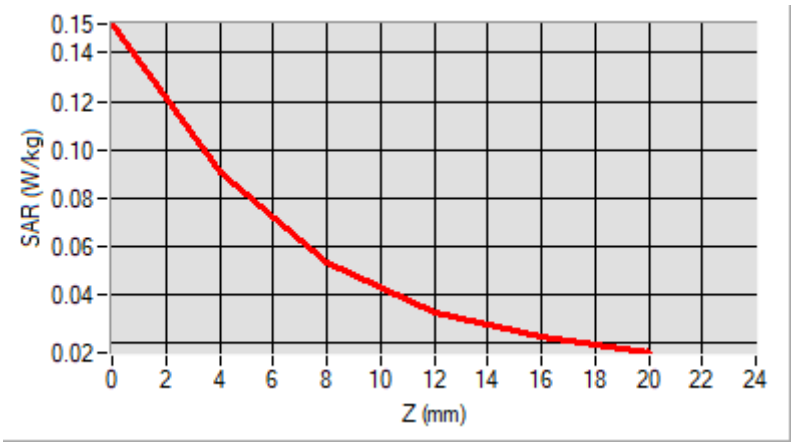
Maximum location: X=-6.00, Y=-31.00

D. SAR 1g & 10g

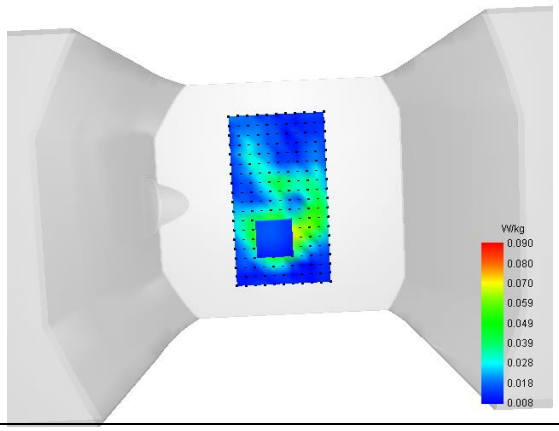
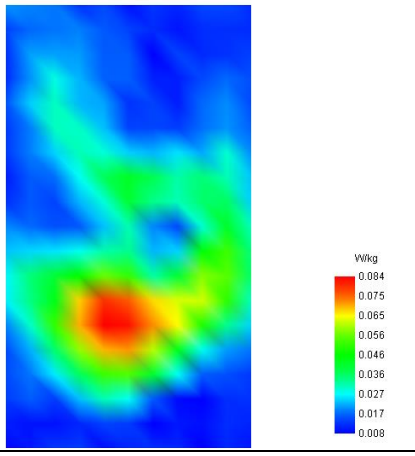
SAR 10g (W/Kg)	**0.046909**
SAR 1g (W/Kg)	**0.084565**

E. Z Axis Scan

Z (mm)	**0.00**	**4.00**	**8.00**	**12.00**	**16.00**
SAR (W/Kg)	**0.1519**	**0.0902**	**0.0534**	**0.0331**	**0.0226**

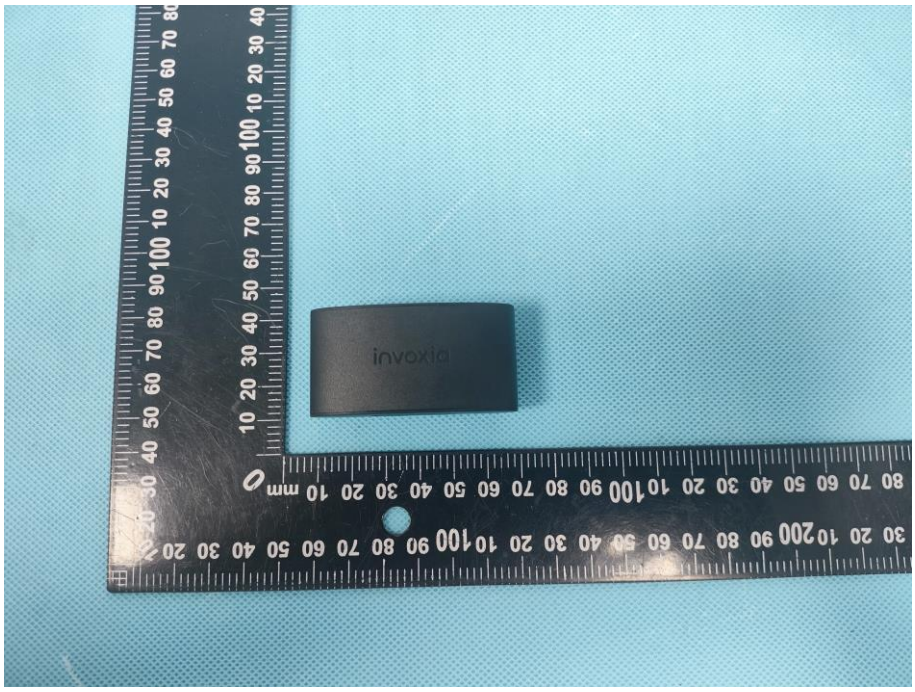


F. 3D Image

3D screen shot	**Hot spot position**
	

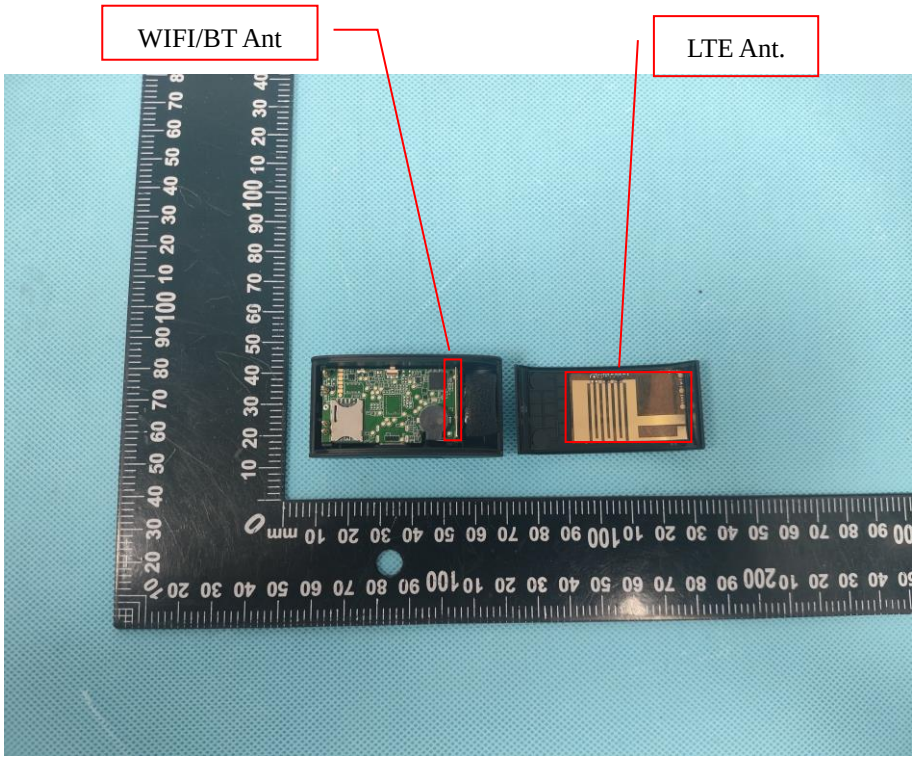
Annex C. EUT Photos

EUT View 1



EUT View 2

Antenna View

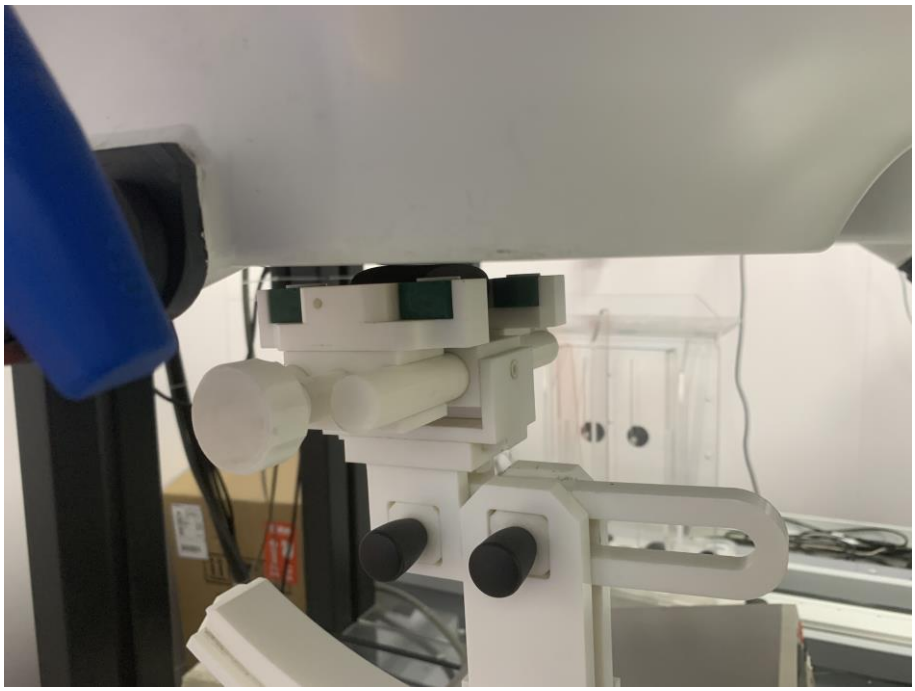


Annex D. Test Setup Photos

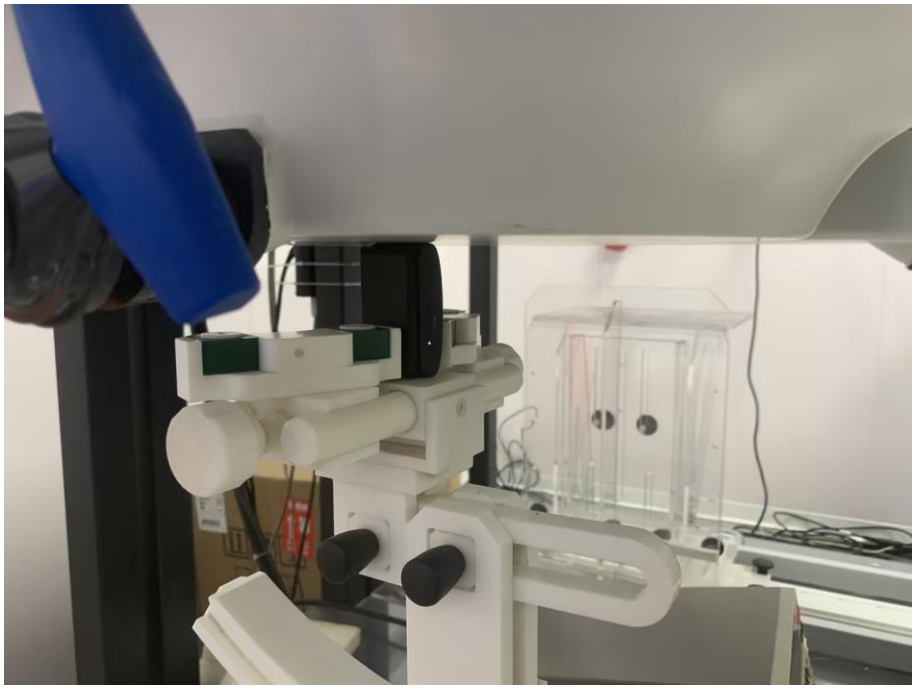
Body mode Exposure Conditions
Test distance: 0mm

Body Back

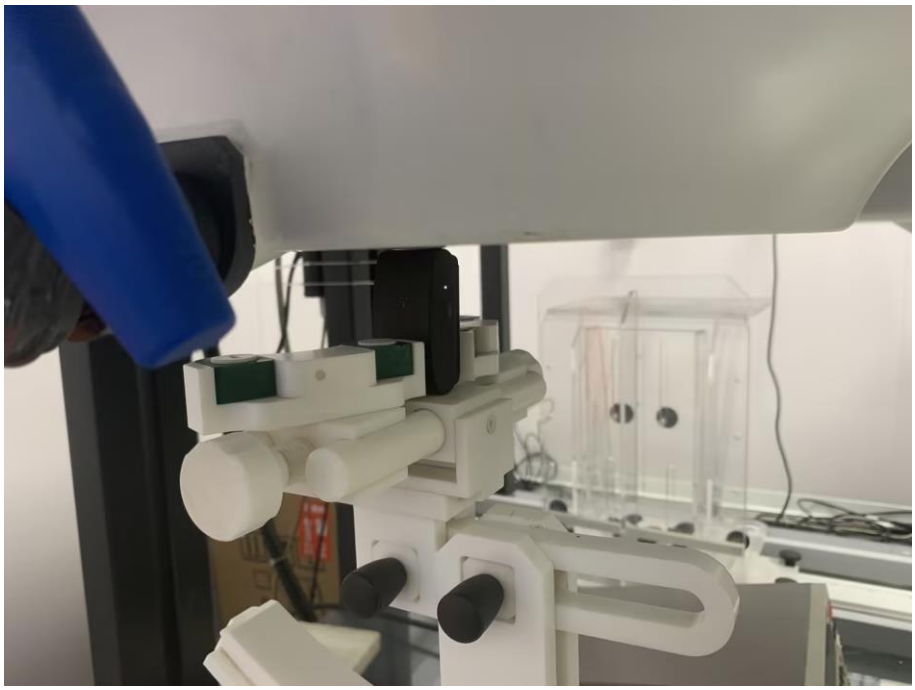
Body Front



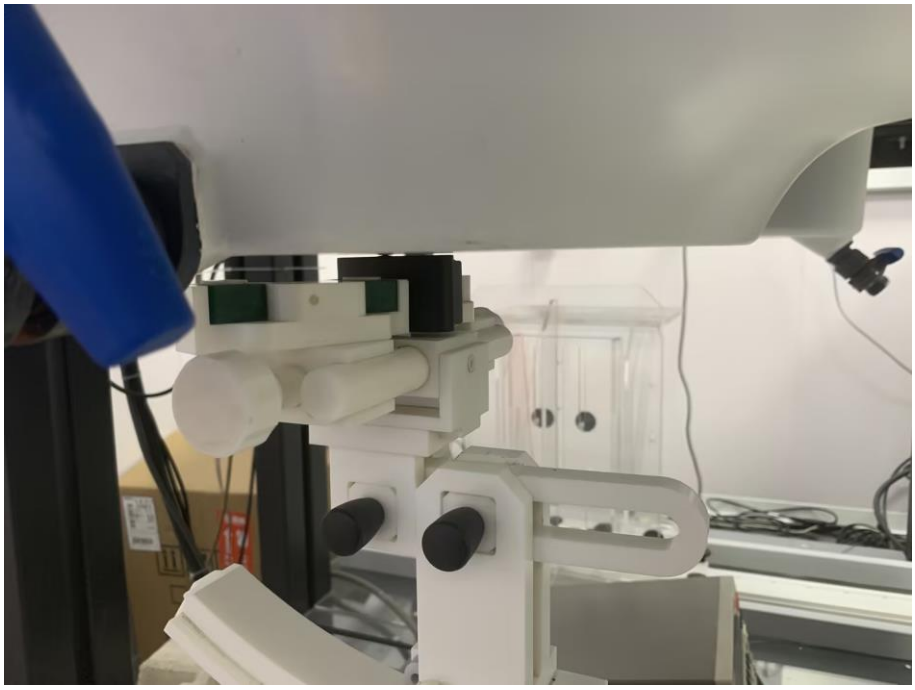
Body Right



Body Left



Body Top



Body Bottom

Annex E. Calibration Certificate

Please refer to the exhibit for the calibration certificate

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