SAR Test Report

Report No:STS2308302H01

Issued for

Buddi Limited

Talbot House, 17 Church Street, Rickmansworth, WD3 1DE, Hertfordshire, UK

Product Name:	Alco Tag
Brand Name:	Buddi Limited
Model Name:	A2-BUD-A-TENX-B-TEEU-L
Series Model(s):	4000002
FCC ID:	ZDLST8
Test Standards:	ANSI/IEEE Std. C95.1-1992 FCC 47 CFR Part 2 (2.1093) IEEE 1528: 2013
Max. SAR (10g)	Limbs : 1.647W/kg

TEST REPORT

Applicant's Name ..... :	Buddi Limited
Address..... :	Talbot House, 17 Church Street, Rickmansworth, WD3 1DE, Hertfordshire, UK
Manufacturer's Name ..... :	Buddi Limited
Address..... :	Talbot House, 17 Church Street, Rickmansworth, WD3 1DE, Hertfordshire, UK

Product Description

Product Name ..... :	Alco Tag
Brand Name ..... :	Buddi Limited
Model Name ..... :	A2-BUD-A-TENX-B-TEEU-L
Series Model(s) : ..... :	4000002
Test Standards : ..... :	ANSI/IEEE Std. C95.1-1992 FCC 47 CFR Part 2 (2.1093) IEEE 1528: 2013

Date of Test

Date (s) of performance of tests ..... :	08 Sep. 2023 ~ 02 Aug. 2023
Date of Issue ..... :	11 Sep. 2023
Test Result ..... :	**Pass**

Testing Engineer : Shi fan. long

(Shifan. Long)

Technical Manager : Sean She

(Sean she)

Authorized Signatory : Bovey Yang

(Bovey Yang)

SHENZHEN STS TEST SERVICES CO.,LTD. TESTING APPROVAL

Table of Contents

Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	11 Sep. 2023	STS2308302H01	ALL	Initial Issue

1. General Information

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

1.1 EUT Description

Product Name	Alco Tag		
Brand Name	Buddi Limited		
Model Name	A2-BUD-A-TENX-B-TEEU-L		
Series Model	4000002		
Model Difference	The difference only in the model name.		
Battery	Rated Voltage: 3.7V Charge Limit Voltage: 4.2V Capacity: 1200mAh		
Device Category	Portable		
Product stage	Production unit		
RF Exposure Environment	General Population / Uncontrolled		
Hardware Version	V1.1		
Software Version	1.40.20		
Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900:1850MHz ~ 1910 MHz WCDMA Band II:1850MHz ~ 1910 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850MHz ~ 1910 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12:699 MHz ~ 711 MHz 2.4G WLAN: 802.11b/g/n 20: 2412~2462 MHz ISM: 914.5MHz (low), 917.5MHz (mid), 921.00MHz (high)		
Max. Reported SAR:	Band	Mode	Limbs Front Side (W/Kg)
	PCT	GSM850	1.554
	PCT	GSM1900	1.647
	PCT	WCDMA Band II	1.458
	PCT	WCDMA Band V	0.800
	PCT	LTE Band 2	0.488
	PCT	LTE Band 5	1.138
	PCT	LTE Band 12	0.946
	DTS	2.4G WLAN	0.392
	DTS	ISM [Note]	0.175
	Limit		4.0W/kg(10g)
FCC Equipment Class	Digital Transmission System (DTS) PCS Licensed Transmitter worn on body (PCT)		
Operating Mode	2.4G WLAN: 802.11 b/g/n20/n40 GSM: GPRS Class 12 WCDMA: RMC, HSDPA, HSUPA Release 6 LTE: QPSK, 16QAM ISM: ASK		

Antenna Specification	GSM/WCDMA/LTE: SMD Antenna WLAN: SMD Ceramic Antenna ISM: SMD Antenna
SIM Card	Built-in single SIM Card.
Hotspot Mode	Not Support
DTM Mode	Not Support
Note: 1. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power	

1.2 Test Environment

Ambient conditions in the SAR laboratory:

Items	Required
Temperature (℃)	18-25
Humidity (%RH)	30-70

1.3 Test Factory

ShenZhen STS Test Services Co.,Ltd.

101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC Registration No.: 625569

A2LA Certificate No.: 4338.01

IC Registration No.: 12108A

2. Test Standards and Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D04 v01	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
7	FCC KDB 648474 D04 v01r03	SAR Evaluation Considerations for Wireless Handsets
8	FCC KDB 248227 D01 Wi-Fi SAR v02r02	SAR Considerations for 802.11 Devices
9	FCC KDB 941225 D01 v03r01	SAR Measurement Procedures for 3G Devices
10	FCC KDB 941225 D05 v02r05	SAR for LTE Devices

(A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

(B). Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Population/Uncontrolled Environments:
Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments:
Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE

PARTIAL Limbs LIMIT

4.0 W/kg

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

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.
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:

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

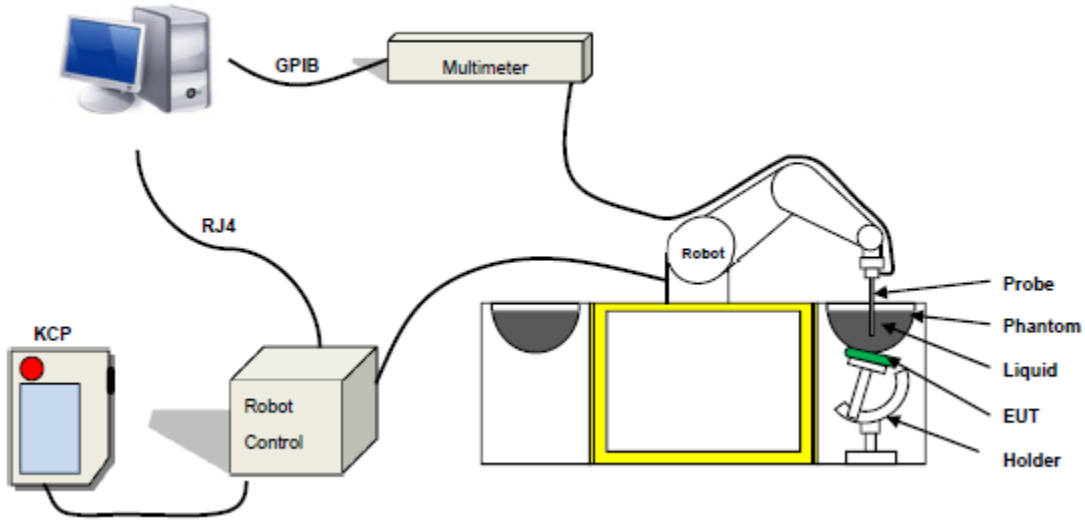
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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

3.2 SAR System

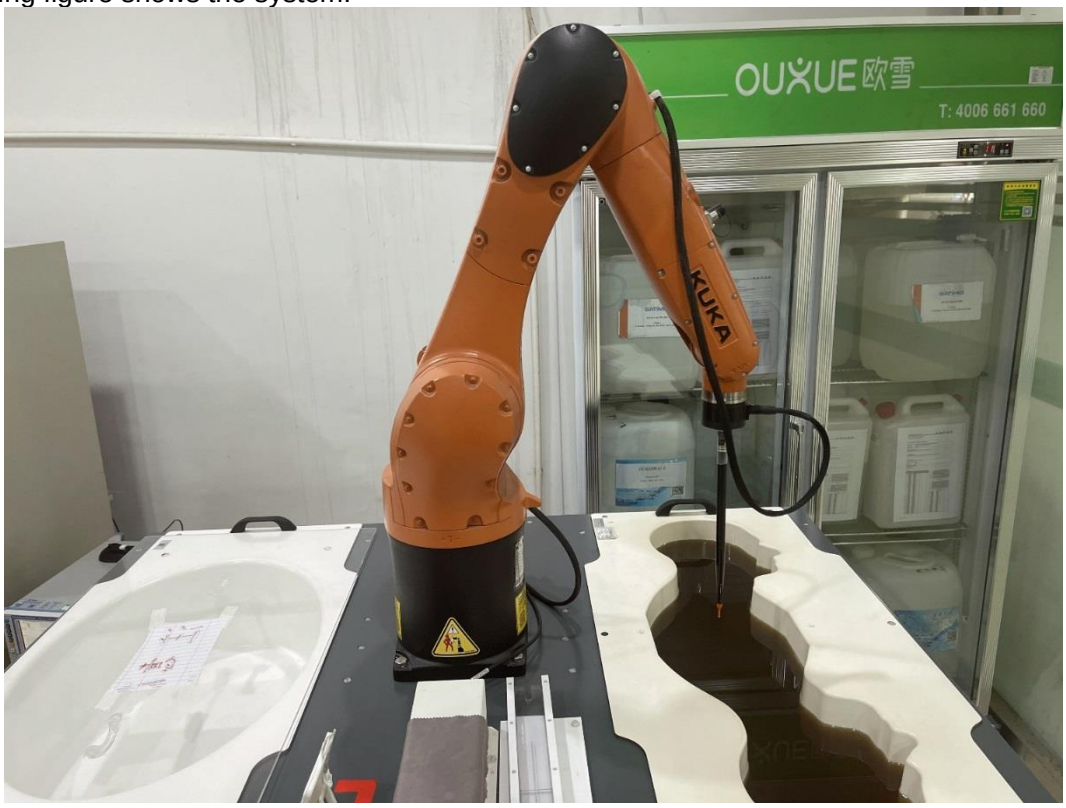
MVG SAR System Diagram:



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 Open SAR software computes the results to give a SAR value in a 1g or 10g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 07/21 EPGO352 with following specifications is used

- Probe Length: 330 mm
- Length of Individual Dipoles: 2 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter: 2.5 mm
- Distance between dipole/probe extremity: 1 mm
- Dynamic range: 0.01-100 W/kg
- Probe linearity: 3%
- Axial Isotropy: < 0.10 dB
- Spherical Isotropy: < 0.10 dB
- Calibration range: 150 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Figure 1-MVG COMOSAR Dosimetric E field Dipole

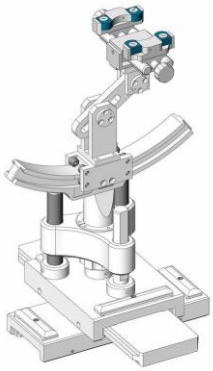
3.2.2 Phantom

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.

Figure-SN 32/14 SAM115

Figure-SN 21/21 ELLI48

3.2.3 Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

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.

Head Tissue

Frequency (MHz)	cellulose	DGBE	HEC	NaCl	Preventol	Sugar	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	0.2	/	/	1.4	0.2	57.0	/	41.1	0.89	41.9
835	0.2	/	/	1.4	0.2	57.9	/	40.3	0.90	41.5
900	0.2	/	/	1.4	0.2	57.9	/	40.3	0.97	41.5
1800	/	44.5	/	0.3	/	/	30.45	55.2	1.4	40.0
1900	/	44.5	/	0.3	/	/	30.45	55.2	1.4	40.0
2000	/	44.5	/	0.3	/	/	/	55.2	1.4	40.0
2450	/	44.9	/	0.1	/	/	/	55.0	1.80	39.2
2600	/	45.0	/	0.1	/	/	/	54.9	1.96	39.0

Body Tissue

Frequency (MHz)	cellulose	DGBE	HEC	NaCl	Preventol	Sugar	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	0.2	/	/	0.9	0.1	47.2	/	51.7	0.96	55.5
835	0.2	/	/	0.9	0.1	48.2	/	50.8	0.97	55.2
900	0.2	/	/	0.9	0.1	48.2	/	50.8	1.05	55.0
1800	/	29.4	/	0.4	/	/	30.45	70.2	1.52	53.3
1900	/	29.4	/	0.4	/	/	30.45	70.2	1.52	53.3
2000	/	29.4	/	0.4	/	/	/	70.2	1.52	53.3
2450	/	31.3	/	0.1	/	/	/	68.6	1.95	52.7
2600	/	31.7	/	0.1	/	/	/	68.2	2.16	52.3

Tissue dielectric parameters for head and body phantoms				
Frequency	εr		σ S/m	
	Head	Body	Head	Body
300	45.3	58.2	0.87	0.92
450	43.5	56.7	0.87	0.94
900	41.5	55.0	0.97	1.05
1450	40.5	54.0	1.20	1.30
1800	40.0	53.3	1.40	1.52
2450	39.2	52.7	1.80	1.95
3000	38.5	52.0	2.40	2.73
5800	35.3	48.2	5.27	6.00

LIQUID MEASUREMENT RESULTS

Date	Ambient		Simulating Liquid		Parameters	Target	Measured	Deviation %	Limited %
	Temp. [°C]	Humidity %	Frequency (MHz)	Temp. [°C]					
2023-08-02	23.6	59	711	23.3	Permittivity	42.11	42.39	0.67	±5
					Conductivity	0.89	0.87	-1.96	±5
2023-08-02	23.7	59	750	23.4	Permittivity	41.90	42.76	2.05	±5
					Conductivity	0.89	0.92	3.37	±5
2023-08-02	22.6	53	826.4	22.3	Permittivity	41.54	41.41	-0.31	±5
					Conductivity	0.90	0.89	-1.00	±5
2023-08-02	22.6	53	829	22.4	Permittivity	41.53	41.77	0.58	±5
					Conductivity	0.90	0.86	-4.37	±5
2023-08-02	22.7	54	835	22.4	Permittivity	41.50	41.44	-0.14	±5
					Conductivity	0.90	0.88	-2.22	±5
2023-08-02	22.7	54	836.5	22.4	Permittivity	41.49	41.59	0.23	±5
					Conductivity	0.90	0.89	-1.13	±5
2023-08-02	22.7	54	844	22.4	Permittivity	41.46	41.11	-0.84	±5
					Conductivity	0.90	0.89	-1.23	±5
2023-08-02	22.7	54	848.8	22.4	Permittivity	41.44	41.59	0.37	±5
					Conductivity	0.90	0.87	-3.51	±5
2023-08-04	22.9	49	1720	22.7	Permittivity	40.11	40.94	2.06	±5
					Conductivity	1.35	1.31	-3.27	±5
2023-08-04	22.9	49	1747.5	22.6	Permittivity	40.08	40.55	1.19	±5
					Conductivity	1.37	1.36	-0.73	±5
2023-08-04	23.0	50	1800	22.7	Permittivity	40.00	40.47	1.18	±5
					Conductivity	1.40	1.38	-1.43	±5
2023-08-04	21.7	55	1850.2	21.4	Permittivity	40.00	41.00	2.50	±5
					Conductivity	1.40	1.45	3.57	±5
2023-08-04	23.0	49	1852.4	22.7	Permittivity	40.00	40.52	1.30	±5
					Conductivity	1.40	1.43	2.14	±5
2023-08-04	23.1	49	1880	22.8	Permittivity	40.00	40.72	1.80	±5
					Conductivity	1.40	1.37	-2.14	±5
2023-08-04	21.8	55	1900	21.5	Permittivity	40.00	40.39	0.98	±5
					Conductivity	1.40	1.35	-3.57	±5
2023-08-04	21.8	56	1909.8	21.4	Permittivity	40.00	40.73	1.82	±5
					Conductivity	1.40	1.42	1.43	±5

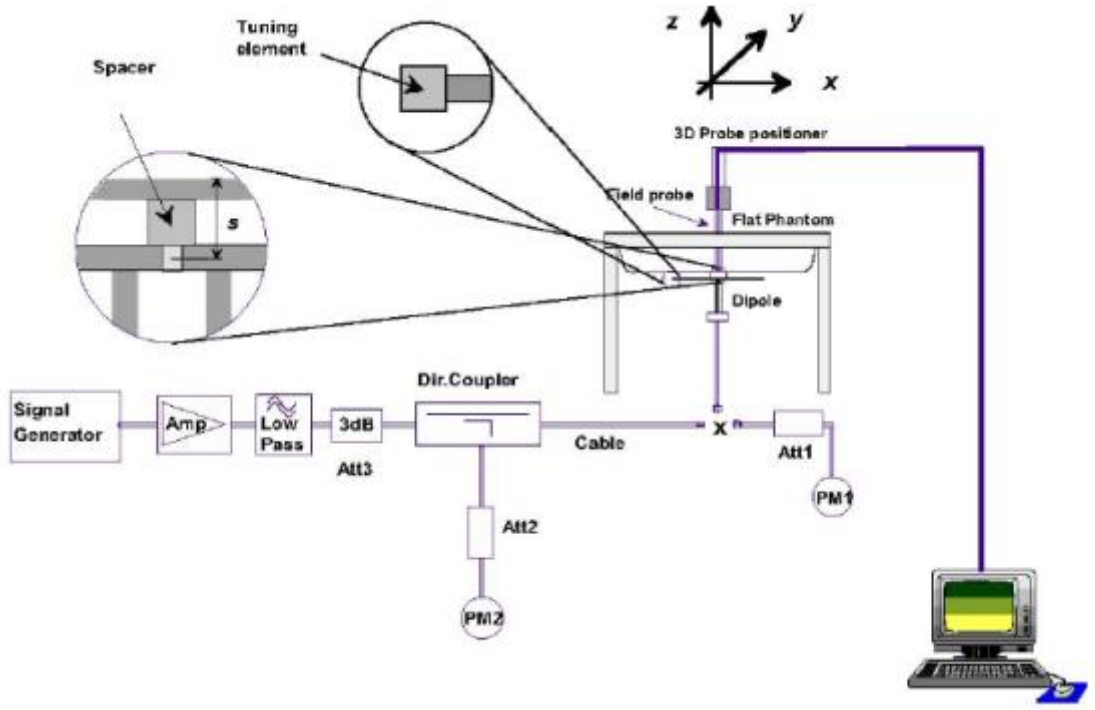
2023-09-08	22.7	45	2412	22.4	Permittivity	39.27	39.60	0.85	±5
					Conductivity	1.77	1.80	1.91	±5
2023-09-08	22.8	45	2437	22.4	Permittivity	39.22	40.14	2.34	±5
					Conductivity	1.79	1.80	0.65	±5
2023-09-08	22.9	46	2450	22.6	Permittivity	39.20	39.62	1.07	±5
					Conductivity	1.80	1.78	-1.11	±5
2023-09-08	23.0	46	2462	22.7	Permittivity	39.18	39.63	1.15	±5
					Conductivity	1.81	1.86	2.72	±5

5. SAR System Validation

5.1 Validation System

Each MVG system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the MVG software, enable the user to conduct the system performance check and system validation. System kit includes a dipole, and dipole device holder.

The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system validation setup is shown as below.



5.2 Validation Result

Comparing to the original SAR value provided by MVG, the validation data should be within its specification of 10 %.

Date	Freq.	Power	Tested Value	Normalized SAR	Target SAR	Tolerance	Limit
	(MHz)	(mW)	(W/Kg)	(W/kg)	10g(W/kg)	(%)	(%)
2023-08-02	750	100	0.823	8.23	8.49	-3.06	10
2023-08-02	835	100	0.957	9.57	9.63	-0.62	10
2023-08-04	1800	100	4.012	40.12	38.31	4.72	10
2023-08-04	1900	100	4.055	40.55	39.84	1.78	10
2023-09-08	2450	100	5.557	55.57	54.70	1.59	10

Note:

1. The tolerance limit of System validation ±10%.
2. The dipole input power (forward power) was 100 mW.
3. The results are normalized to 10 W input power.

6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:
The following steps are used for each test position
- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

Area Scan& Zoom Scan:

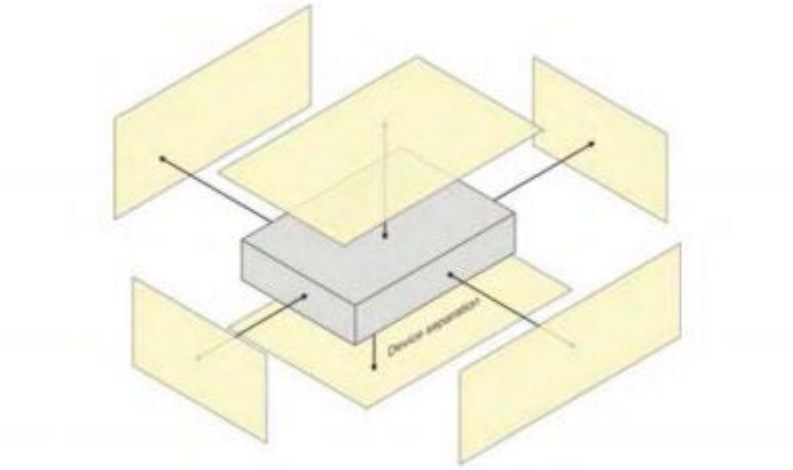
First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR -distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r01 quoted below.
When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

7. EUT Test Position

This EUT was tested in Back Side, Front Side.

7.1 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D04 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative *test separation distance* configuration may be used to support both SAR conditions. When the *reported* SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest *reported* SAR configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.



7.2 SAR Test Exclusions Applied

Standalone SAR test exclusion applies 447498 D04 Interim General Radio Frequency Exposure Guidelines v01. The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

Function	Fre. (GHz)	Separation distance (cm)	Max Turn up power (dBm)	Max Turn up power (mW)	Pth (mW)
ISM	0.91464	0.5	-0.5	0.89	8.14

Note: The Maximum power is less than the Pth, complies with the exemption requirements.

8. Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
Measurement System								
Probe calibration	5.72	N	1	1	1	5.72	5.72	∞
Axial Isotropy	0.18	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.07	0.07	∞
Hemispherical Isotropy	1.04	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.42	0.42	∞
Boundary effect	0.8	R	$\sqrt{3}$	1	1	0.46	0.46	∞
Linearity	1.25	R	$\sqrt{3}$	1	1	0.72	0.72	∞
System detection limits	1.20	R	$\sqrt{3}$	1	1	0.69	0.69	∞
Modulation response	3.42	R	$\sqrt{3}$	1	1	3.42	3.42	∞
Readout Electronics	0.26	N	1	1	1	0.26	0.26	∞
Response Time	0.17	R	$\sqrt{3}$	1	1	0.10	0.10	∞
Integration Time	1.43	R	$\sqrt{3}$	1	1	0.83	0.83	∞
RF ambient conditions-Noise	3.51	R	$\sqrt{3}$	1	1	2.03	2.03	∞
RF ambient conditions-reflections	3.15	R	$\sqrt{3}$	1	1	1.82	1.82	∞
Probe positioner mechanical tolerance	1.2	R	$\sqrt{3}$	1	1	0.69	0.69	∞
Probe positioning with respect to phantom shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Post-processing	2.1	R	$\sqrt{3}$	1	1	1.21	1.21	∞
Test sample Related								
Test sample positioning	3.1	N	1	1	1	3.10	3.10	∞
Device holder uncertainty	3.8	N	1	1	1	3.80	3.80	∞
SAR drift measurement	4.5	R	$\sqrt{3}$	1	1	2.60	2.60	∞
SAR scaling	1.8	R	$\sqrt{3}$	1	1	1.04	1.04	∞
Phantom and tissue parameters								
Phantom uncertainty (shape and thickness uncertainty)	3.7	R	$\sqrt{3}$	1	1	2.14	2.14	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	2.1	N	1	1	0.84	2.10	1.76	∞
Liquid conductivity (temperature uncertainty)	2.4	R	$\sqrt{3}$	0.78	0.71	1.87	1.70	∞
Liquid conductivity (measured)	4.1	N	1	0.78	0.71	0.94	1.07	M
Liquid permittivity (temperature uncertainty)	2.7	R	$\sqrt{3}$	0.23	0.26	2.11	1.92	∞
Liquid permittivity (measured)	4.8	N	1	0.23	0.26	1.10	1.25	M
Combined Standard Uncertainty		RSS				10.37	10.27	
Expanded Uncertainty (95% Confidence interval)		K=2				20.74	20.53	

9. Conducted Power Measurement

9.1 Test Result

GSM

Burst Average Power (dBm)						
Band	GSM 850			PCS 1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880	1909.8
GPRS (GMSK,1-Slot)	32.40	32.40	32.41	29.58	29.27	29.47
GPRS (GMSK, 2-Slot)	32.28	32.19	32.26	29.57	29.11	29.34
GPRS (GMSK, 3-Slot)	31.83	31.87	31.95	28.98	28.84	28.72
GPRS (GMSK, 4-Slot)	30.29	30.33	30.43	27.80	27.59	27.48
EGPRS(8PSK, 1-Slot)	26.89	27.01	26.71	25.78	25.52	25.36
EGPRS(8PSK, 2-Slot)	26.89	32.23	26.79	26.00	25.48	25.12
EGPRS(8PSK, 3-Slot)	26.10	26.19	25.85	25.50	24.51	24.75
EGPRS(8PSK, 4-Slot)	24.12	24.31	23.85	24.25	23.53	23.68

WCDMA

Band	WCDMA Band 2			WCDMA Band 5		
Channel	9262	9400	9538	4132	4183	4233
Frequency (MHz)	1852.4	1880	1907.6	826.4	836.6	846.6
AMR 12.2Kbps	22.16	21.73	21.90	22.79	22.73	22.69
RMC 12.2Kbps	22.20	21.76	21.95	22.84	22.81	22.70
HSDPA Subtest-1	20.81	20.96	19.72	21.94	21.76	20.56
HSDPA Subtest-2	19.85	20.70	20.50	20.86	21.80	21.50
HSDPA Subtest-3	19.41	19.53	20.75	20.56	20.72	21.82
HSDPA Subtest-4	20.67	19.67	19.68	21.43	20.32	20.42
HSUPA Subtest-1	20.19	21.05	20.43	21.07	21.43	21.10
HSUPA Subtest-2	21.15	20.45	19.68	21.96	21.13	20.92
HSUPA Subtest-3	20.60	19.98	20.69	21.77	20.90	21.89
HSUPA Subtest-4	20.05	19.93	20.75	21.10	20.79	21.63
HSUPA Subtest-5	20.23	20.82	20.28	21.09	21.74	21.04

According to 3GPP 25.101 sub-clause 6.2.2, the maximum output power is allowed to be reduced by following the table.

Table 6.1A: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for βc/βd=12/15, βhs/ βc=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensation for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

LTE Conducted Power

General Note:

1. Anritsu CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05, 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 are $\leqslant$ 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.
6. Per KDB 941225 D05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is $\leqslant$ 1.45 W/kg; Per KDB 941225 D05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is $\leqslant$ 1.45 W/kg; Per KDB 941225 D05, smaller bandwidth SAR testing is not required.

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
1.4	1	0	QPSK	22.47	21.94	22.11
1.4	1	2		22.59	22.05	22.18
1.4	1	5		22.53	21.96	21.89
1.4	3	0		22.46	22.18	22.15
1.4	3	1		22.45	22.37	22.11
1.4	3	2		22.34	22.35	22.12
1.4	6	0		21.39	21.27	21.24
1.4	1	0	16-QAM	21.01	20.94	20.92
1.4	1	2		20.9	21.17	20.95
1.4	1	5		20.79	21.17	20.8
1.4	3	0		21.35	20.79	20.92
1.4	3	1		21.51	20.81	20.9
1.4	3	2		21.39	20.67	20.81
1.4	6	0		20.52	20.02	20.16
3	1	0	QPSK	22.51	21.89	22.13
3	1	7		22.71	22.15	22.07
3	1	14		22.4	21.97	22.05
3	8	0		21.54	21.34	21.2
3	8	4		21.4	21.28	21.04
3	8	7		21.36	21.25	20.97
3	15	0		21.38	21.33	21.09
3	1	0	16-QAM	21.19	20.83	21.33
3	1	7		21.25	20.91	21.23
3	1	14		21.19	20.93	20.83
3	8	0		20.17	20.04	19.91
3	8	4		20.17	20.14	19.77
3	8	7		20.13	20.09	19.75
3	15	0		20.22	20.14	19.89

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
5	1	0	QPSK	22.3	21.61	21.97
5	1	12		22.36	21.67	21.85
5	1	24		22.43	21.69	21.96
5	12	0		21.39	21.1	21.2
5	12	6		21.42	21.13	21.05
5	12	11		21.33	21.21	20.96
5	25	0		21.25	21.2	21.18
5	1	0	16-QAM	21.35	20.64	20.74
5	1	12		21.48	20.82	20.77
5	1	24		21.18	20.74	20.54
5	12	0		20.32	19.88	20.21
5	12	6		20.36	19.93	19.98
5	12	11		20.19	19.92	19.88
5	25	0		20.26	19.93	19.99
10	1	0	QPSK	22.34	22.04	21.97
10	1	24		22.54	22.41	22.35
10	1	49		22.43	22.09	21.74
10	25	0		21.16	21	21.13
10	25	12		21.22	21.02	20.97
10	25	24		21.18	21.07	20.94
10	50	0		21.15	21.06	21.02

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
15	1	0	QPSK	22.2	21.74	22.02
15	1	37		22.67	22.19	23.01
15	1	74		22.34	21.76	21.84
15	36	0		21.17	21.07	21.06
15	36	18		21.23	21	21.18
15	36	39		21.34	21.1	20.92
15	75	0		21.13	21.07	21.02
20	1	0	QPSK	21.8	21.94	22.02
20	1	49		22.28	23.2	22.34
20	1	99		22.01	22.18	21.67
20	50	0		21.09	21.04	21.08
20	50	24		21.31	20.97	21.14
20	50	49		21.09	21.11	21.01
20	100	0		21.02	21.05	21.05

LTE Band 5 Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
1.4	1	0	QPSK	22.85	23.2	22.65
1.4	1	2		22.87	23.29	22.75
1.4	1	5		22.95	23.04	22.62
1.4	3	0		23.09	22.98	22.94
1.4	3	1		23.05	22.91	22.94
1.4	3	2		22.88	22.89	22.95
1.4	6	0		22.1	22	21.97
1.4	1	0	16-QAM	22.32	21.69	21.66
1.4	1	2		22.27	21.74	21.71
1.4	1	5		21.94	21.7	21.52
1.4	3	0		21.86	21.9	21.85
1.4	3	1		21.89	22.03	21.67
1.4	3	2		21.86	21.92	21.59
1.4	6	0		21.26	21.12	20.92
3	1	0	QPSK	23.1	22.78	23.02
3	1	7		23.07	23.02	23.31
3	1	14		22.96	22.75	22.94
3	8	0		22.09	22.17	21.98
3	8	4		22	22.09	22.01
3	8	7		21.91	22.06	21.96
3	15	0		21.97	22.11	21.95
3	1	0	16-QAM	21.8	21.74	22.2
3	1	7		21.73	21.85	22.5
3	1	14		21.55	22.12	22.14
3	8	0		20.91	20.86	20.96
3	8	4		20.92	20.8	21.01
3	8	7		20.92	20.85	20.95
3	15	0		20.94	20.85	21.03

LTE Band 5 Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
5	1	0	QPSK	22.93	22.62	22.8
5	1	12		23.15	22.9	23.14
5	1	24		22.93	22.48	22.99
5	12	0		21.87	22	22.01
5	12	6		21.94	22.01	22.06
5	12	11		21.77	22.05	22.04
5	25	0		21.76	22.01	21.91
5	1	0	16-QAM	21.9	21.65	21.49
5	1	12		22.13	21.83	21.94
5	1	24		21.54	21.45	21.48
5	12	0		20.54	21	20.84
5	12	6		20.55	20.92	21.12
5	12	11		20.74	20.75	21.15
5	25	0		20.93	20.83	20.72
10	1	0	QPSK	22.88	22.74	23.04
10	1	24		23.23	22.88	23.31
10	1	49		23.34	22.65	23.18
10	25	0		21.77	22.16	21.94
10	25	12		22.03	22.04	22.07
10	25	24		22.10	21.94	22.07
10	50	0		21.84	22.05	22.00

LTE Band 12 Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
1.4	1	0	QPSK	22.82	22.83	22.69
1.4	1	2		22.84	22.86	22.68
1.4	1	5		22.93	22.86	22.83
1.4	3	0		22.94	22.96	22.96
1.4	3	1		22.81	22.9	23.1
1.4	3	2		22.87	22.78	22.78
1.4	6	0		21.76	21.85	22.1
1.4	1	0	16-QAM	22.04	21.57	21.71
1.4	1	2		22.09	21.56	21.84
1.4	1	5		22.12	21.52	21.89
1.4	3	0		21.69	21.7	22.35
1.4	3	1		21.68	21.82	22.03
1.4	3	2		21.78	21.71	21.79
1.4	6	0		20.95	21.05	21.1
3	1	0	QPSK	22.85	22.49	22.89
3	1	7		23.2	22.69	23.01
3	1	14		23.01	22.5	22.82
3	8	0		21.78	21.94	22.13
3	8	4		22	21.84	22.06
3	8	7		21.98	21.85	21.85
3	15	0		21.66	21.97	22.06
3	1	0	16-QAM	21.63	21.52	22.2
3	1	7		22.4	22.08	22.34
3	1	14		22.36	21.65	21.73
3	8	0		20.7	20.75	20.89
3	8	4		20.87	20.73	20.83
3	8	7		20.94	20.78	20.81
3	15	0		20.52	20.76	21.17

LTE Band 12 Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
5	1	0	QPSK	22.51	22.41	22.62
5	1	12		22.86	22.53	23.5
5	1	24		22.63	22.63	22.76
5	12	0		21.81	21.72	21.84
5	12	6		21.81	21.71	21.93
5	12	11		21.75	21.62	21.78
5	25	0		21.58	21.78	21.8
5	1	0	16-QAM	21.66	21.32	21.29
5	1	12		21.98	21.47	21.91
5	1	24		21.86	21.44	21.36
5	12	0		20.81	20.61	20.96
5	12	6		20.85	20.55	21.01
5	12	11		20.82	20.5	21
5	25	0		20.58	20.68	20.64
10	1	0	QPSK	22.61	22.38	22.63
10	1	24		22.97	22.42	23.57
10	1	49		22.67	22.7	22.75
10	25	0		21.61	21.79	21.69
10	25	12		21.7	21.71	21.85
10	25	24		21.67	21.75	21.93
10	50	0		21.8	21.88	21.76

2.4G WLAN

2.4GWIFI				
Mode	Channel Number	Frequency (MHz)	Average Power (dBm)	Output Power (mW)
802.11b	1	2412	15.05	31.99
	6	2437	15.13	32.58
	11	2462	16.12	40.93
802.11g	1	2412	13.77	23.82
	6	2437	13.43	22.03
	11	2462	13.68	23.33
802.11 n-HT20	1	2412	13.26	21.18
	6	2437	13.92	24.66
	11	2462	13.99	25.06

ISM

ISM			
Mode	Frequency (MHz)	Result(dBuV/m)	Average Power (dBm)
ASK	914.64	93.51	-1.79
	917.55	93.03	-2.27
	921.43	93.10	-2.2

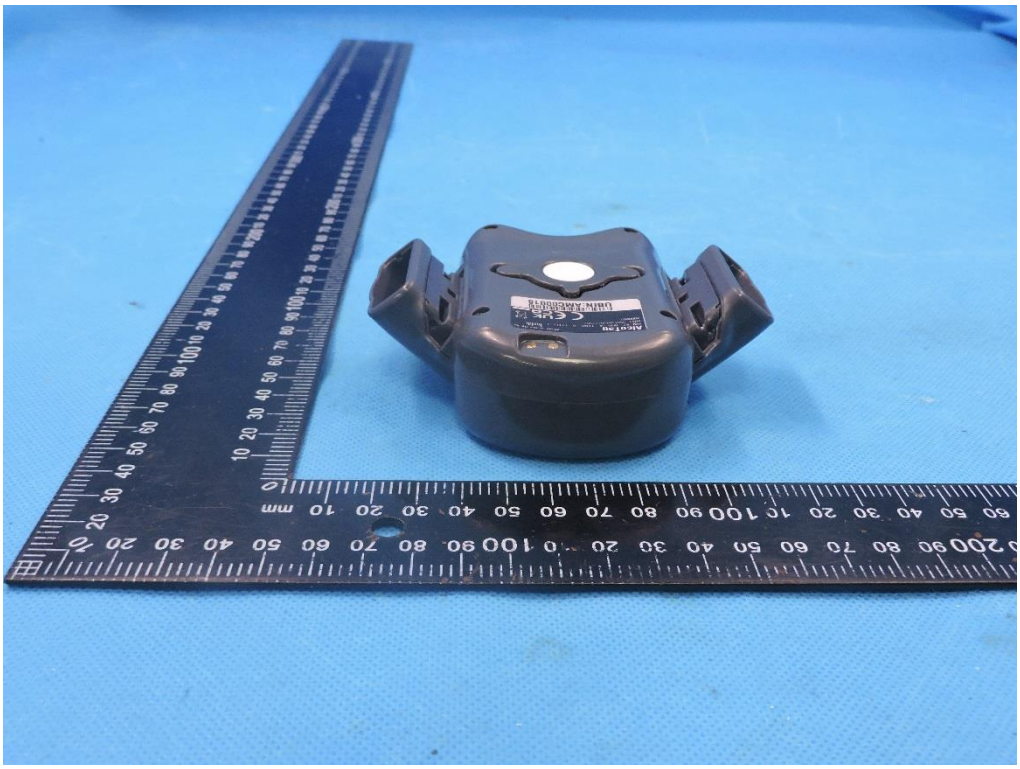
10. EUT And Test Setup Photo

10.1 EUT Photo

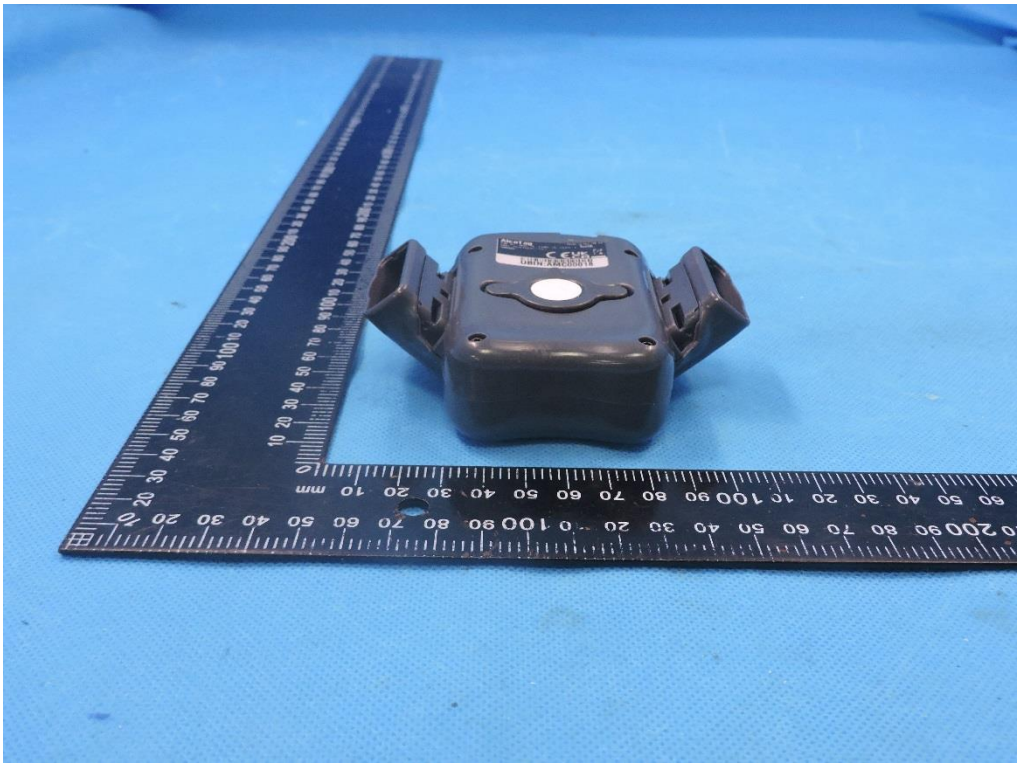
Front side

Back side

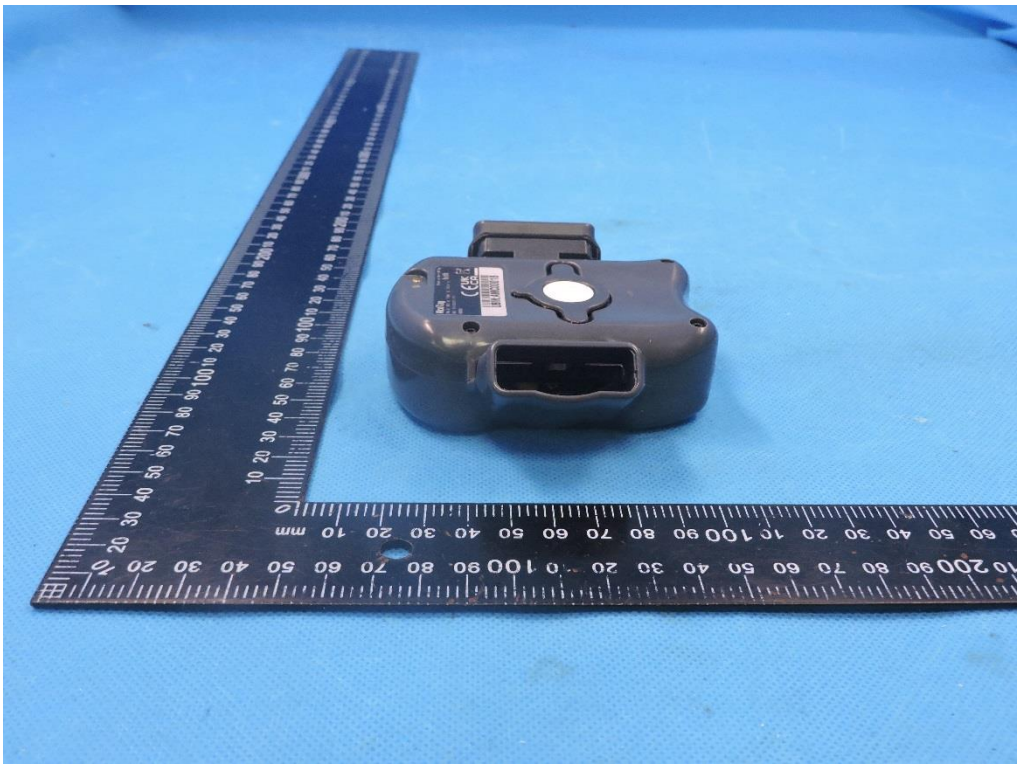
Top side



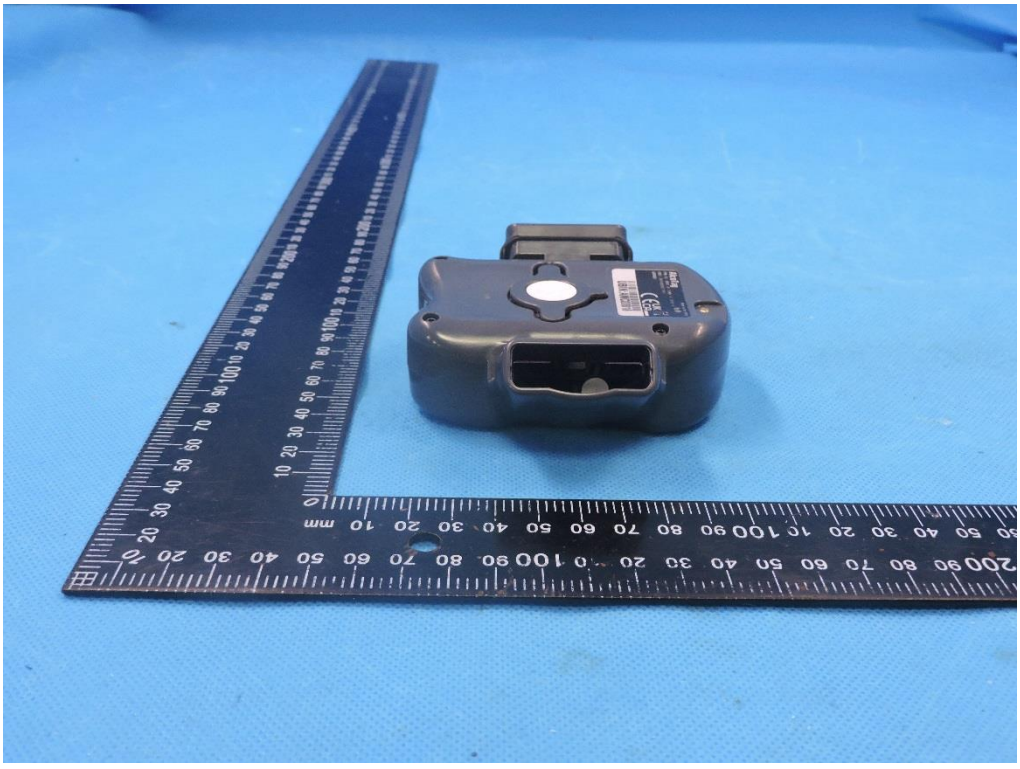
Bottom side



Left side

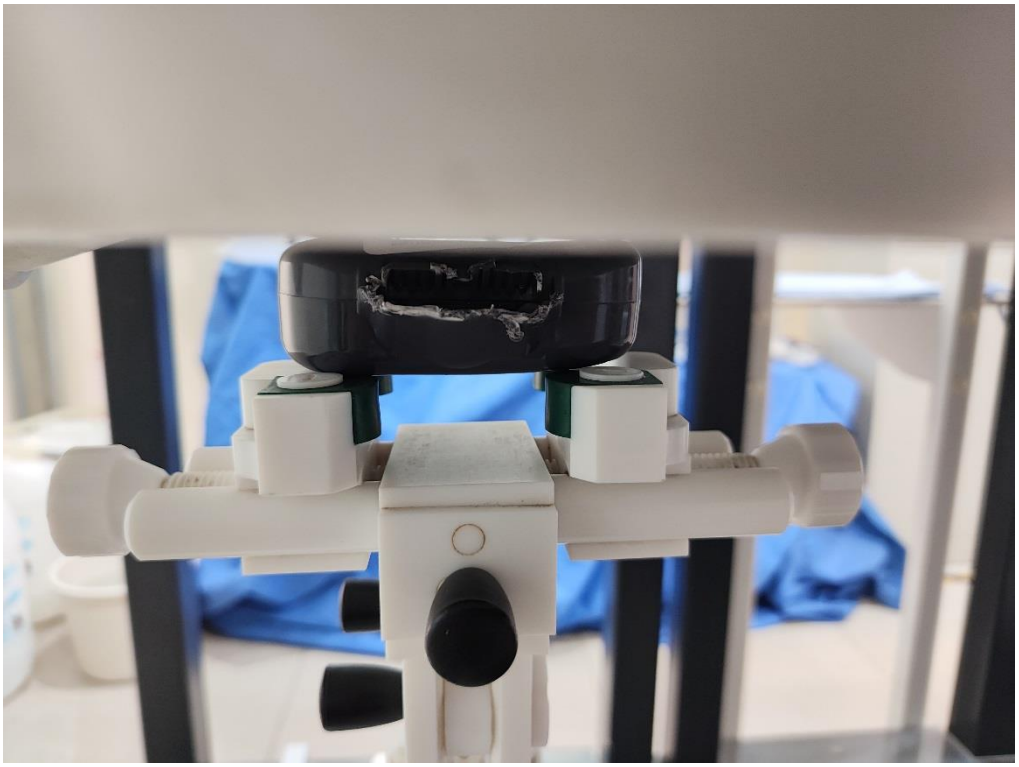


Right side

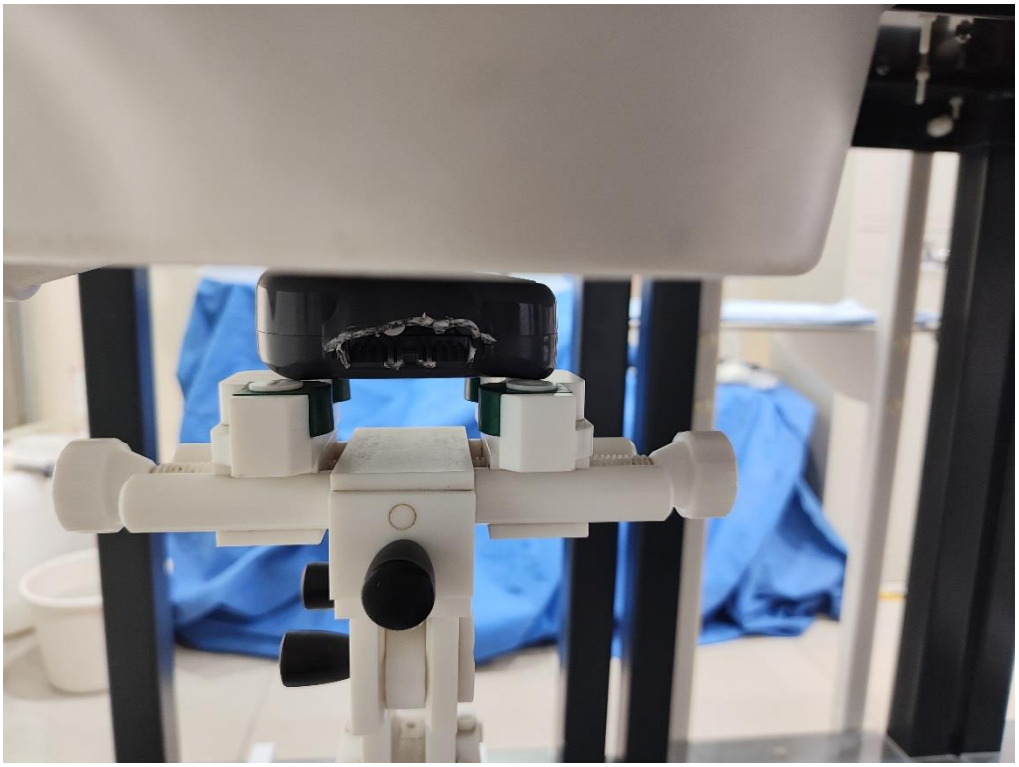


10.2 Setup Photo

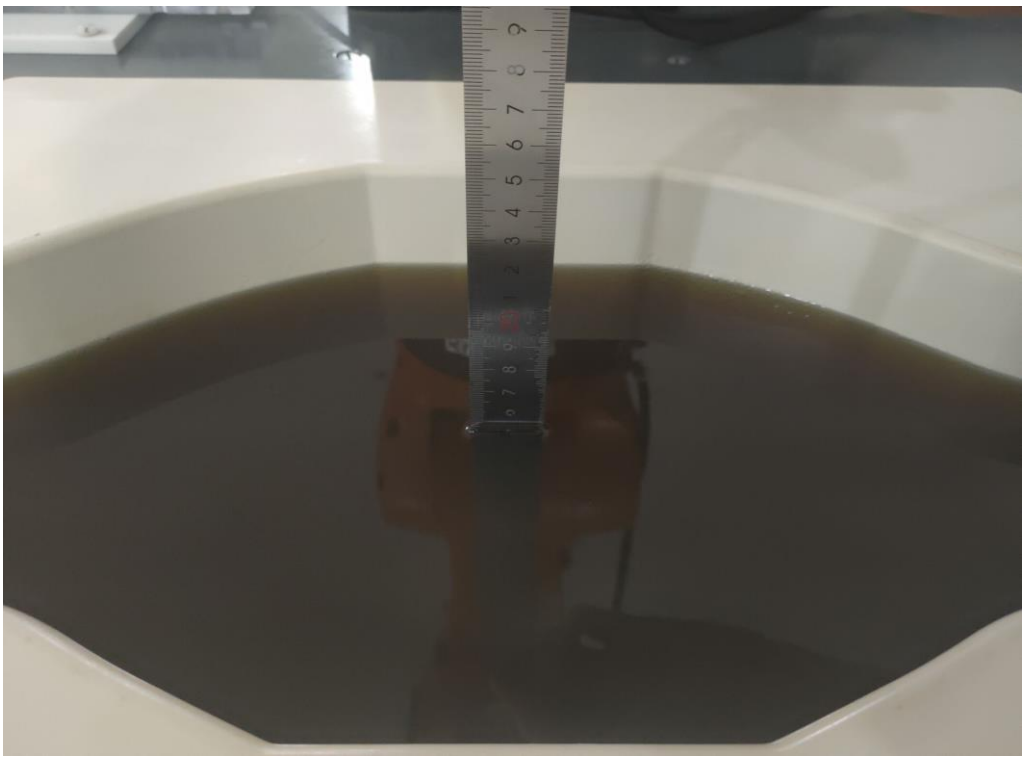
Back side(separation distance is 0mm)



Front side(separation distance is 0mm)



Liquid depth (15 cm)



11. SAR Result Summary

11.1 Limbs SAR

Band	Model	Test Position	Freq.	SAR (10g) (W/kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
GSM850	GPRS Data-3 Slot	Front Side	848.8	1.536	0.18	32.00	31.95	**1.554**	**1**
		Back Side	848.8	0.158	2.86	32.00	31.95	0.160	/
GSM1900	GPRS Data-4 Slot	Front Side	1850.2	1.573	3.72	28.00	27.80	**1.647**	**2**
		Front Side	1880	1.214	3.57	28.00	27.59	1.334	**/**
		Front Side	1909.8	1.329	3.78	28.00	27.48	1.498	**/**
		Back Side	1850.2	0.417	2.38	28.00	27.80	0.437	/
WCDMA Band II	RMC	Front Side	1852.4	1.361	1.10	22.50	22.20	**1.458**	**3**
		Back Side	1852.4	0.304	2.55	22.50	22.20	0.326	/
WCDMA Band V	RMC	Front Side	826.4	0.771	0.11	23.00	22.84	**0.800**	**4**
		Back Side	826.4	0.073	1.89	23.00	22.84	0.076	/

Model	Test Position	Freq.	SAR (10g) (W/kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
802.11b	Front Side	2412	0.269	3.20	16.50	15.05	0.376	/
	Front Side	2437	0.257	-3.00	16.50	15.13	0.352	/
	Front Side	2462	0.359	-0.74	16.50	16.12	**0.392**	**8**
	Back Side	2462	0.120	2.77	16.50	16.12	0.131	/

Band	BW (MHz)	Mod.	RB Size	RB offset	Test Position	Freq.	Result 10g (W/Kg)	Power Drift(%)	Max. Turn-up Power(dBm)	Meas. Output Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
LTE Band 2	20M	QPSK	1	0	Front side	1747.5	0.069	1.47	23.5	23.2	0.074	/
			50	0	Front side	1720	0.054	-3.38	21.5	21.31	0.056	/
			1	0	Back Side	1747.5	0.455	1.44	23.5	23.2	**0.488**	**5**
			50	0	Back Side	1720	0.356	-1.22	21.5	21.31	0.372	/
LTE Band 5	10M	QPSK	1	0	Front side	829	1.097	-3.81	23.5	23.34	**1.138**	**6**
			1	0	Front side	836.5	0.842	-3.63	23.5	22.82	0.985	/
			1	0	Front side	844	0.754	-3.20	23.5	23.31	0.788	/
			25	0	Front side	836.5	0.884	0.19	22.5	22.16	0.956	/
			1	0	Back Side	829	0.097	-2.60	23.5	23.34	0.101	**/**
			25	0	Back Side	836.5	0.054	-0.33	22.5	22.16	0.058	/
LTE Band 12	10M	QPSK	1	0	Front side	711	0.857	-0.64	24	23.57	**0.946**	**7**
			25	0	Front side	711	0.649	0.50	22	21.93	0.660	/
			1	0	Back Side	711	0.210	-1.61	24	23.57	0.232	/
			25	0	Back Side	711	0.154	-3.41	22	21.93	0.157	/

Note:

1. The test separation of all above table is 0mm.
2. The Bluetooth and WLAN can't simultaneous transmission at the same time.
3. Per KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
4. Per KDB 248227- When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is $\leqslant$ 1.2 W/kg. (The highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power was **0.008** W/Kg for Limbs)

11.2 Simultaneous Multi-band Transmission Evaluation:

Application Simultaneous Transmission information:

Position	Simultaneous State
Limbs	1. WCDMA + 2.4GHz WLAN
	2. GSM + 2.4GHz WLAN
	3. LTE + 2.4GHz WLAN
	4. WCDMA + ISM
	5. GSM + ISM
	6. LTE + ISM

NOTE:

1. For simultaneous transmission at body exposure position, transmitters simultaneous transmission was the worst state.
2. If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.
3. KDB 447498 Appendix E, 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:
   SAR_{est} =4.0· Pant / Pth [W/kg].
   P_{ant} is maximum time-averaged power or effective radiated power (ERP), whichever is greater, and P_{th} is defined in Formula KDB 447498 (B.2).

Estimated SAR		Antenna to user(cm)	Pant	Pth	Stand Alone SAR(1g) [W/kg]
ISM	Limbs	≤0.5	0.89	8.14	0.175

Simultaneous Mode	Position	Mode	Max. 10-g SAR (W/kg)	10-g Sum SAR (W/kg)
GSM + 2.4G WLAN	Limbs	GSM	1.647	2.039
		2.4G WLAN	0.392	
WCDMA + 2.4G WLAN	Limbs	WCDMA	1.458	1.850
		2.4G WLAN	0.392	
LTE + 2.4G WLAN	Limbs	LTE	1.138	1.530
		2.4G WLAN	0.392	
GSM + ISM	Limbs	GSM	1.647	1.822
		ISM	0.175	
WCDMA + ISM	Limbs	WCDMA	1.458	1.633
		ISM	0.175	
LTE + ISM	Limbs	LTE	1.138	1.313
		ISM	0.175	

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.

When the sum of SAR 1g of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR-1g 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR 1g is greater than the SAR limit (SAR-1g 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

12. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
750MHz Dipole	MVG	SID750	SN 30/14 DIP0G750-331	2023.07.04	2026.07.03
835MHz Dipole	MVG	SID835	SN 30/14 DIP0G835-332	2023.07.04	2026.07.03
1800MHz Dipole	MVG	SID1800	SN 30/14 DIP1G800-329	2023.07.04	2026.07.03
1900MHz Dipole	MVG	SID1900	SN 30/14 DIP1G900-333	2023.07.04	2026.07.03
2450MHzDipole	MVG	SID2450	SN 30/14 DIP2G450-335	2023.07.04	2026.07.03
Waveguide	SATIMO	SWG5500	SN 13/14 WGA32	2023.07.04	2026.07.03
E-Field Probe	MVG	SSE2	SN 07/21 EPGO352	2023.02.24	2024.02.23
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2022.11.15	2023.11.14
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	N/A	N/A
Phantom3	MVG	SAM	SN 21/21 ELLI48	N/A	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	N/A	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	N/A	N/A
Attenuator	Agilent	99899	DC-18GHz	N/A	N/A
Directional coupler	Narda	4226-20	3305	N/A	N/A
Network Analyzer	Agilent	8753ES	US38432810	2022.09.28	2023.09.27
Multi Meter	Keithley	Multi Meter 2000	4050073	2022.09.29	2023.09.28
Signal Generator	Agilent	N5182A	MY50140530	2022.09.28	2023.09.27
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2022.09.28	2023.09.27
Wireless Communication Test Set	R&S	CMW500	156324	2022.09.29	2023.09.28
Power Amplifier	DESAY	ZHL-42W	9638	2022.10.08	2023.10.07
Power Meter	R&S	NRP	100510	2022.09.28	2023.09.27
Power Sensor	R&S	NRP-Z11	101919	2022.09.28	2023.09.27
Power Sensor	Keysight	U2021XA	MY56280002	2022.09.29	2023.09.28
Temperature hygrometer	SuWei	SW-108	N/A	2022.09.30	2023.09.29
Thermograph	Elitech	RC-4	S/N EF7176501537	2022.09.30	2023.09.29

Note:
Per KDB 865664 D01, Dipole SAR Validation Verification, STS LAB has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:
1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value
Return-loss in within 20% of calibrated measurement

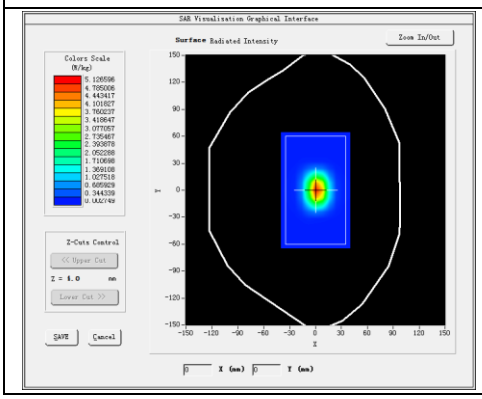
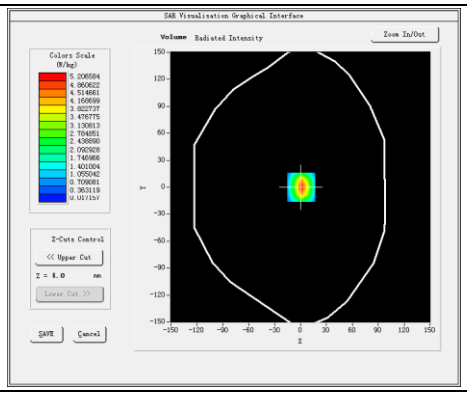
Appendix A. System Validation Plots

System Performance Check Data (750MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2023-08-02

Experimental conditions.

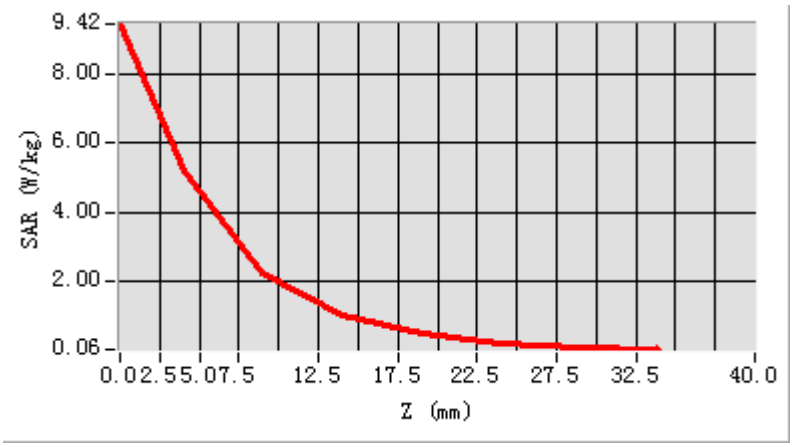
Device Position	Validation plane
Band	750 MHz
Channels	-
Signal	CW
Frequency (MHz)	750
Relative permittivity	42.76
Conductivity (S/m)	0.92
Probe	SN 07/21 EPGO352
ConvF	1.58
Crest factor:	1:1

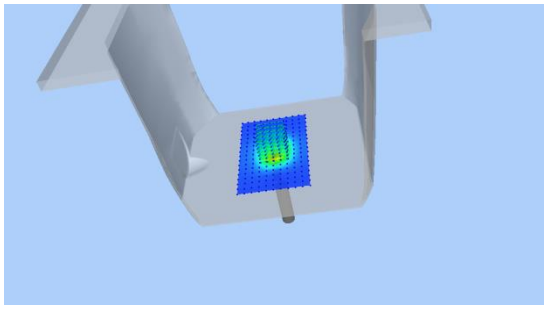
SURFACE SAR	VOLUME SAR
	

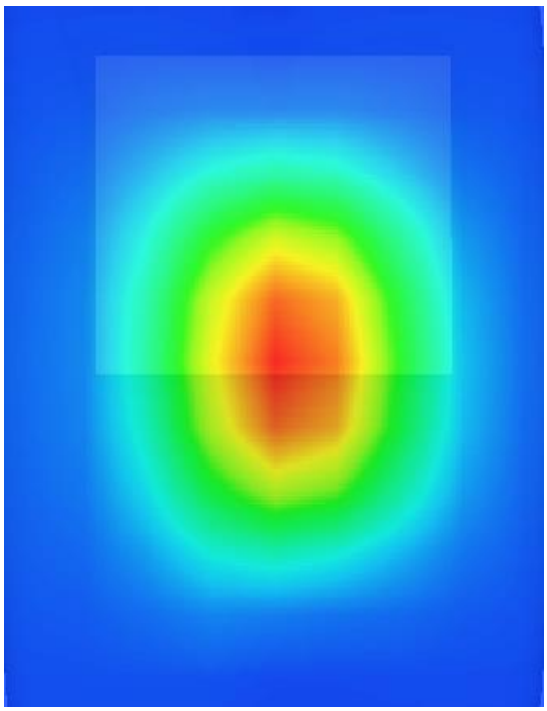
Maximum location: X=1.00, Y=0.00

SAR 10g (W/Kg)	0.566136
SAR 1g (W/Kg)	0.822876

Z Axis Scan


9.42
8.00
6.00
4.00
2.00
0.06
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)



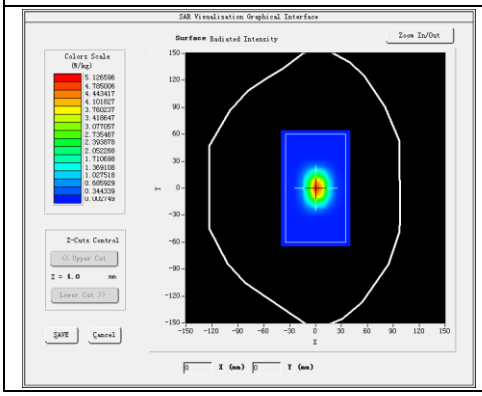
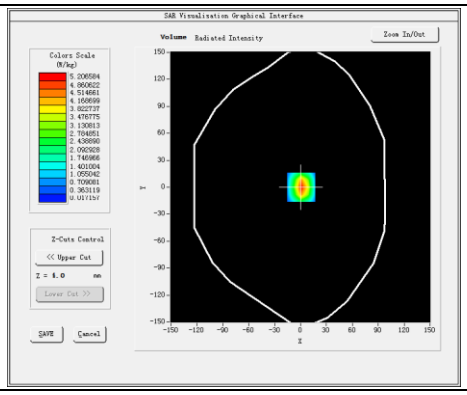


System Performance Check Data (835MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2023-08-02

Experimental conditions.

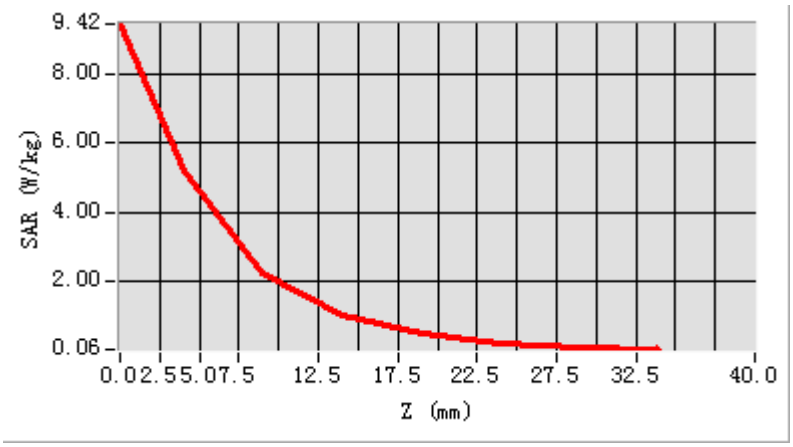
Device Position	Validation plane
Band	835 MHz
Channels	-
Signal	CW
Frequency (MHz)	835
Relative permittivity	41.44
Conductivity (S/m)	0.88
Probe	SN 07/21 EPGO352
ConvF	1.57
Crest factor:	1:1

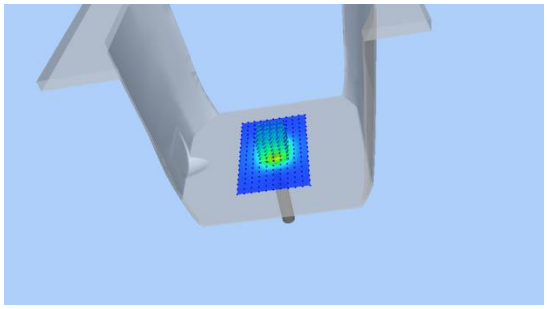
SURFACE SAR	VOLUME SAR
	

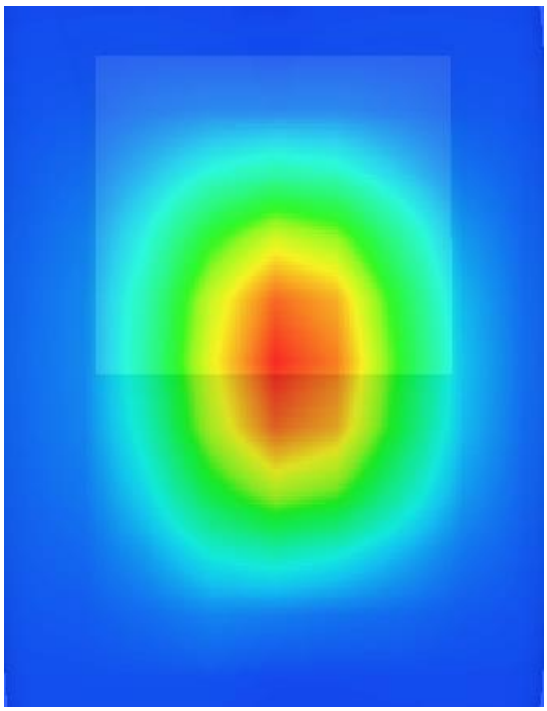
Maximum location: X=1.00, Y=0.00

SAR 10g (W/Kg)	0.685662
SAR 1g (W/Kg)	0.957377

Z Axis Scan


9.42
8.00
6.00
4.00
2.00
0.06
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)



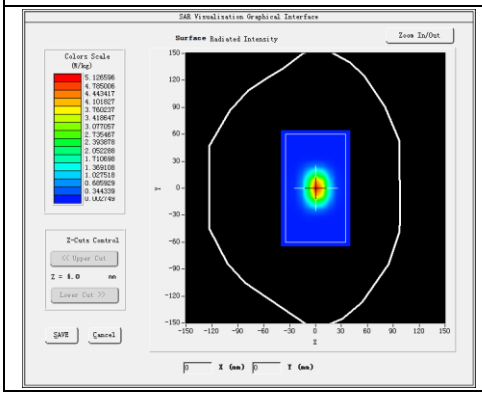
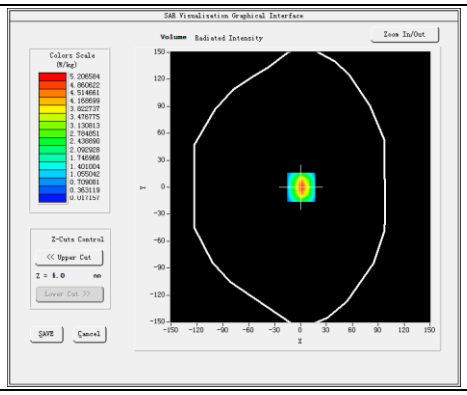


System Performance Check Data (1800MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2023-08-04

Experimental conditions.

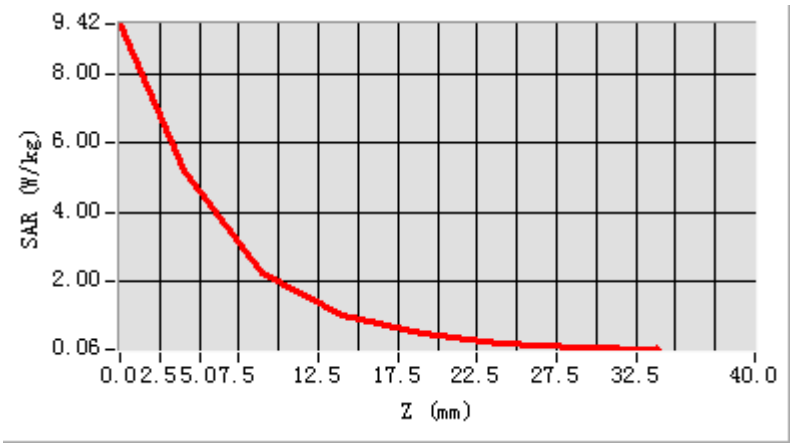
Device Position	Validation plane
Band	1800 MHz
Channels	-
Signal	CW
Frequency (MHz)	1800
Relative permittivity	40.47
Conductivity (S/m)	1.38
Probe	SN 07/21 EPGO352
ConvF	1.60
Crest factor:	1:1

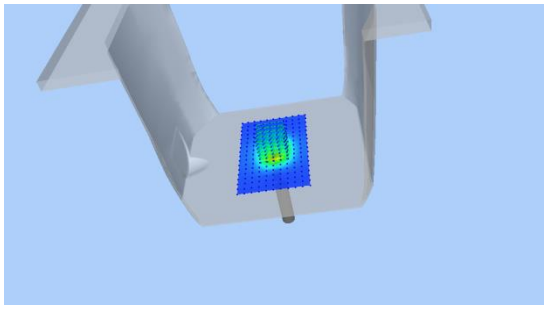
SURFACE SAR	VOLUME SAR
	

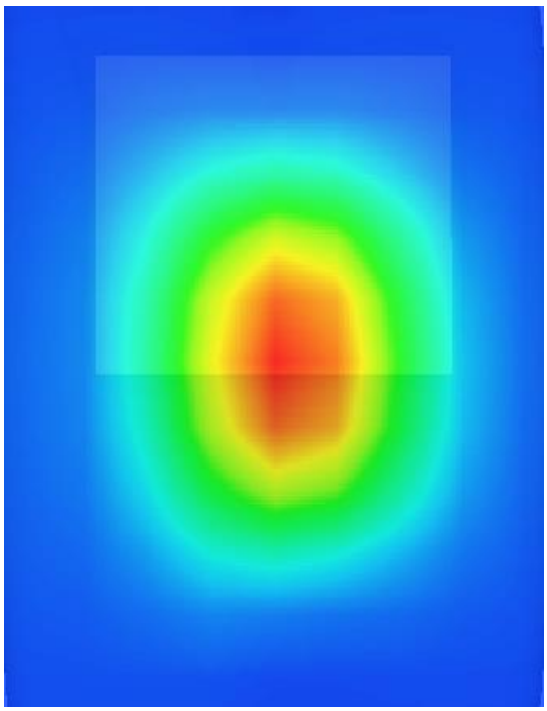
Maximum location: X=1.00, Y=0.00

SAR 10g (W/Kg)	1.999734
SAR 1g (W/Kg)	4.012164

Z Axis Scan


9.42
8.00
6.00
4.00
2.00
0.06
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)



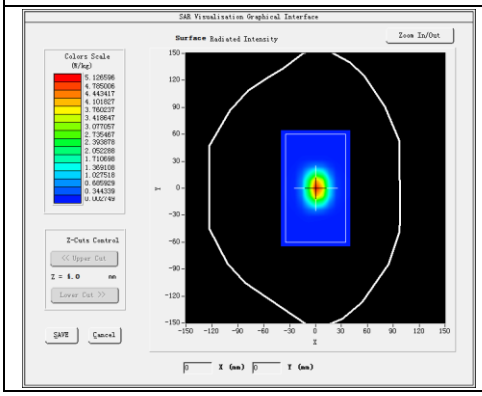
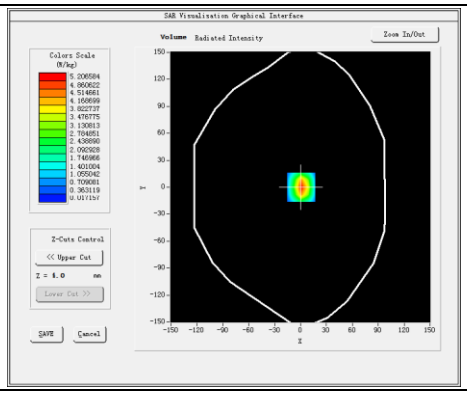


System Performance Check Data (1900MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2023-08-04

Experimental conditions.

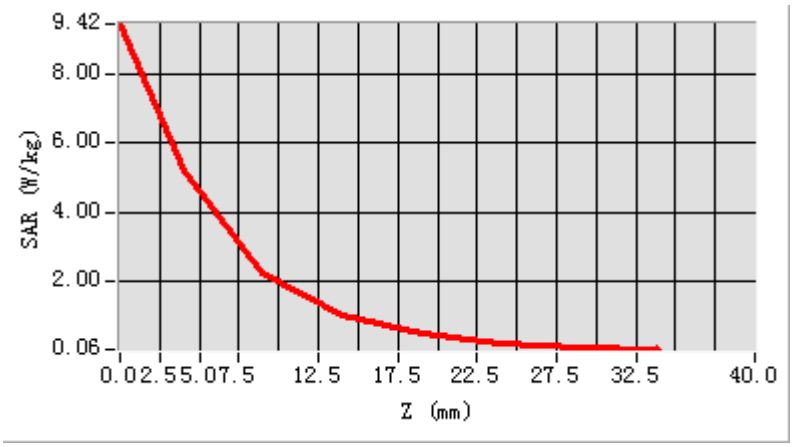
Device Position	Validation plane
Band	1900 MHz
Channels	-
Signal	CW
Frequency (MHz)	1900
Relative permittivity	40.39
Conductivity (S/m)	1.35
Probe	SN 07/21 EPGO352
ConvF	1.78
Crest factor:	1:1

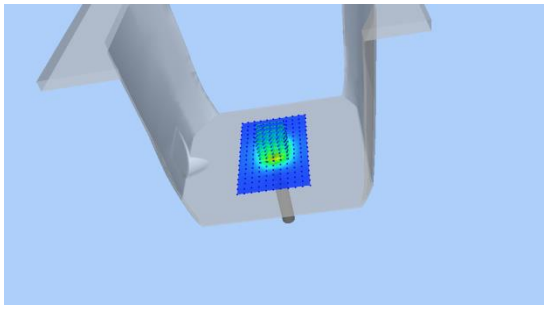
SURFACE SAR	VOLUME SAR
	

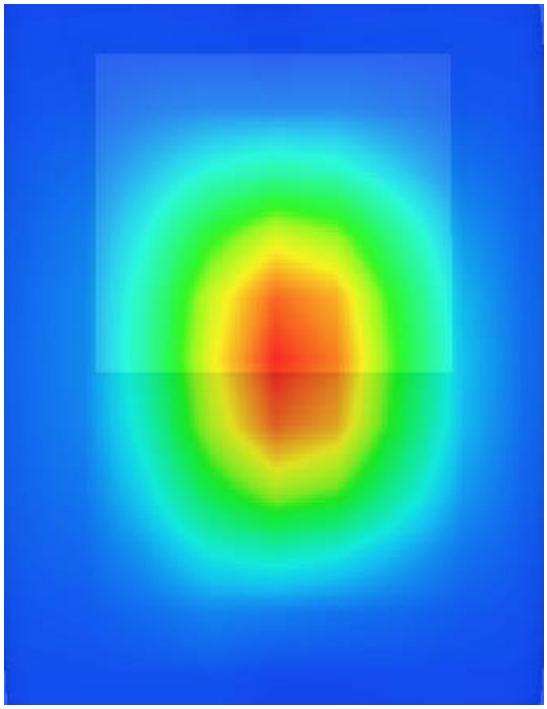
Maximum location: X=1.00, Y=0.00

SAR 10g (W/Kg)	2.000154
SAR 1g (W/Kg)	4.055162

Z Axis Scan


9.42
8.00
6.00
4.00
2.00
0.06
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)



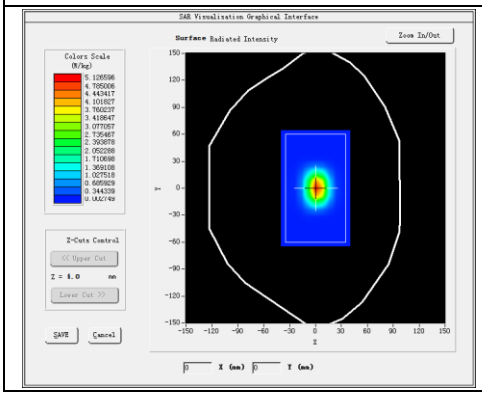
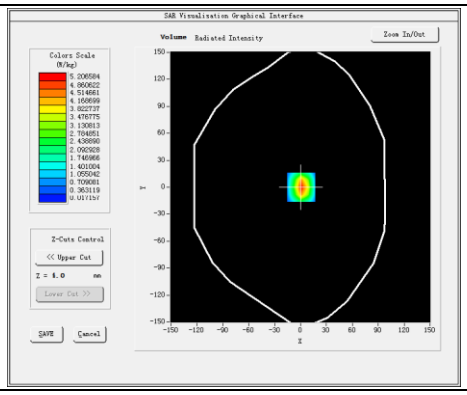


System Performance Check Data (2450MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2023-09-08

Experimental conditions.

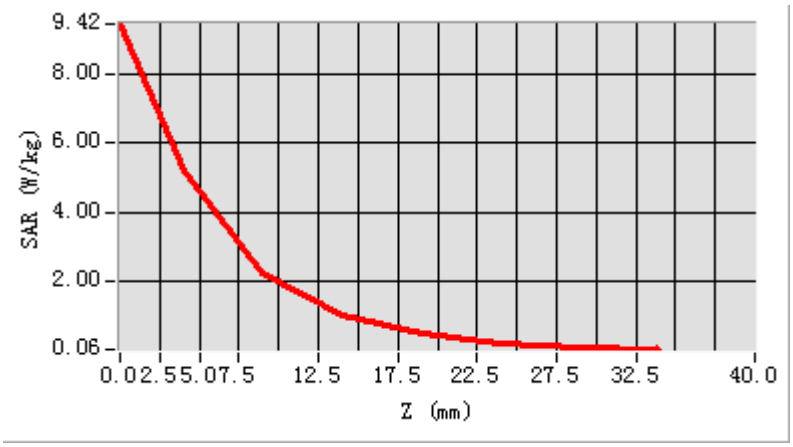
Device Position	Validation plane
Band	2450 MHz
Channels	-
Signal	CW
Frequency (MHz)	2450
Relative permittivity	39.62
Conductivity (S/m)	1.75
Probe	SN 07/21 EPGO352
ConvF	1.75
Crest factor:	1:1

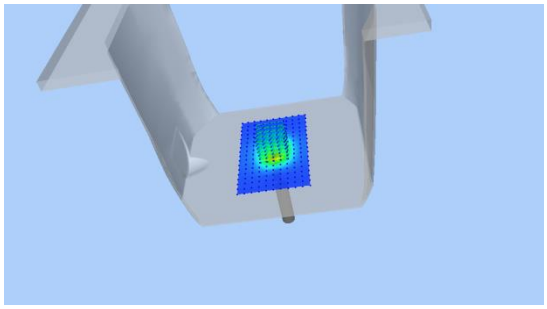
SURFACE SAR	VOLUME SAR
	

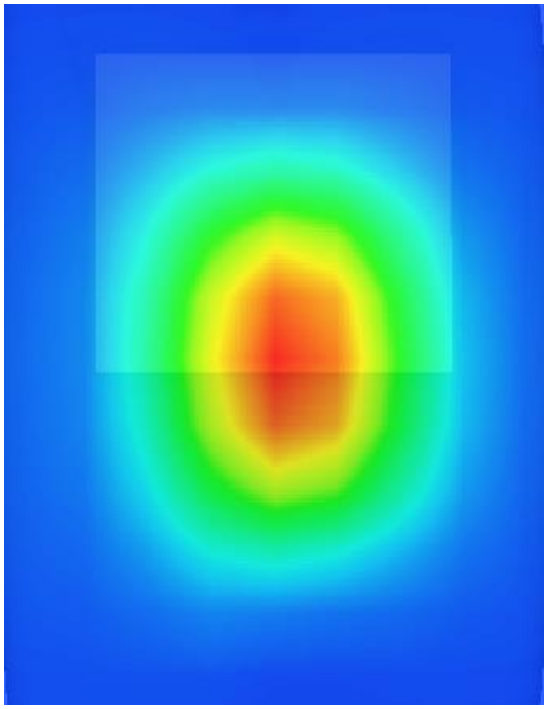
Maximum location: X=1.00, Y=0.00

SAR 10g (W/Kg)	2.576247
SAR 1g (W/Kg)	5.556961

Z Axis Scan


9.42
8.00
6.00
4.00
2.00
0.06
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)





Appendix B. SAR Test Plots

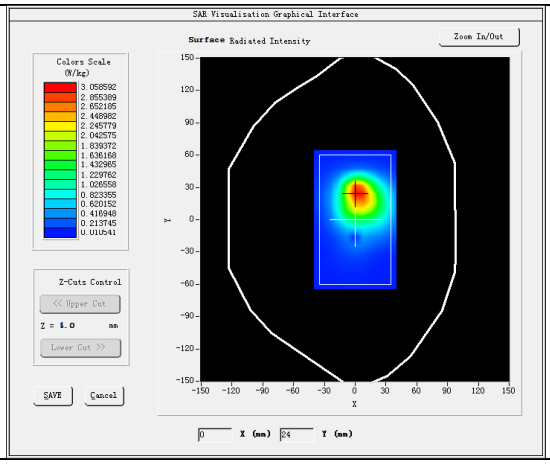
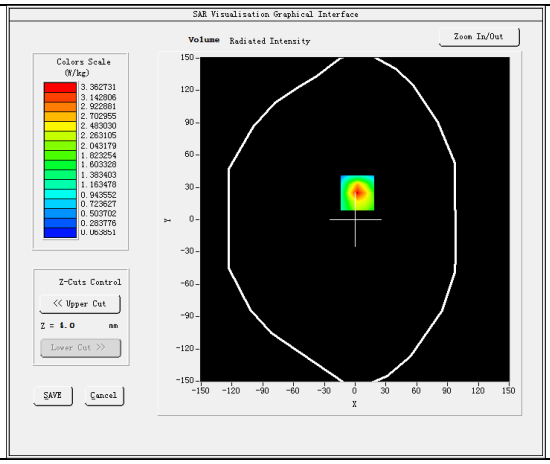
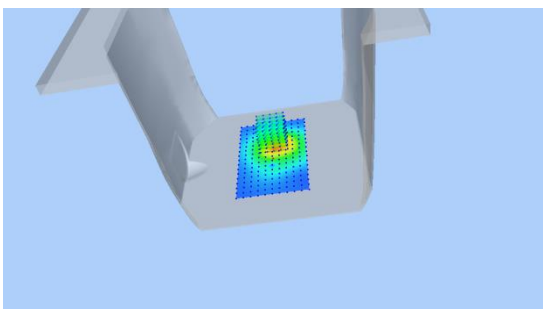
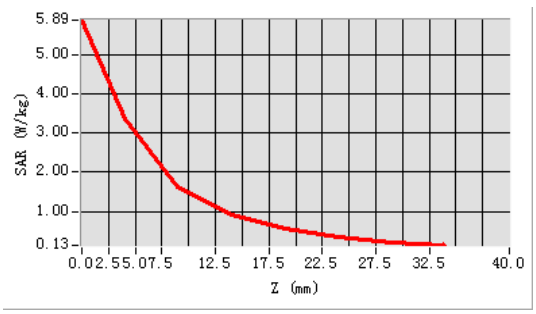
Plot 1:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-08-02
ConvF	1.57
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front Side
Band	GSM 850
Signal	Duty Cycle: 0.50 (Crest factor: 0.5)
Frequency (MHz)	848.8
Relative permittivity (real part)	41.59
Conductivity (S/m)	0.87

Maximum location: X=2.00, Y=25.00

SAR Peak: 5.92 W/kg

SAR 10g (W/Kg)	1.536356
SAR 1g (W/Kg)	3.155272

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

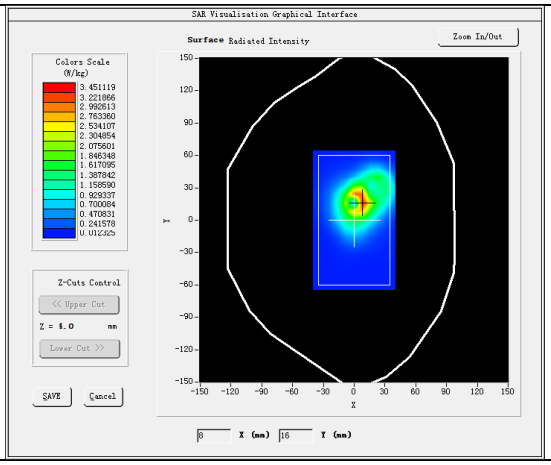
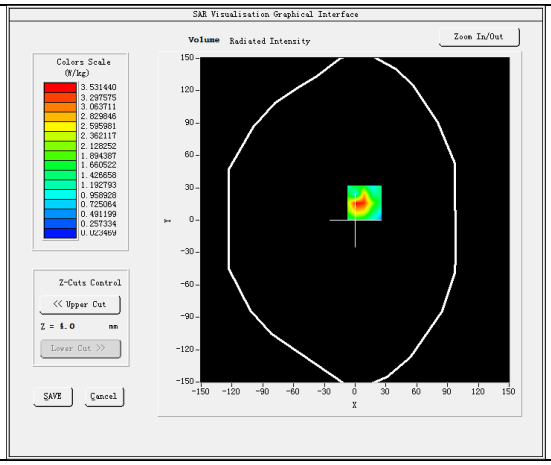
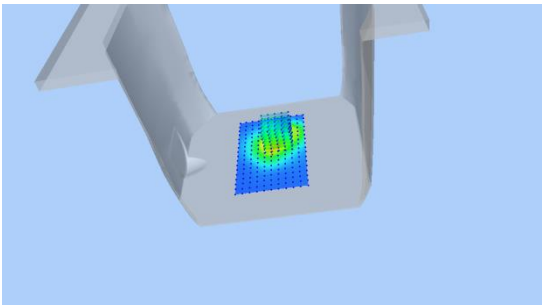
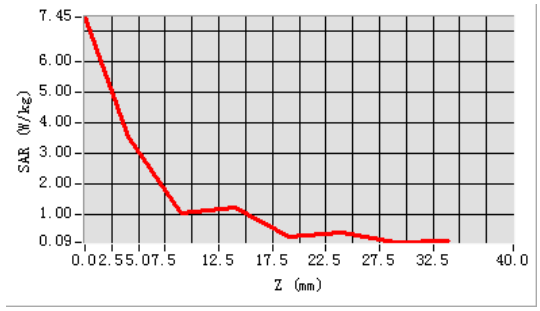
Plot 2:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-08-04
ConvF	1.78
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front Side
Band	GSM 1900
Signal	Duty Cycle: 0.50 (Crest factor: 0.5)
Frequency (MHz)	1850.2
Relative permittivity (real part)	41.00
Conductivity (S/m)	1.45

Maximum location: X=9.00, Y=16.00

SAR Peak: 6.08 W/kg

SAR 10g (W/Kg)	1.573399
SAR 1g (W/Kg)	3.294322

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

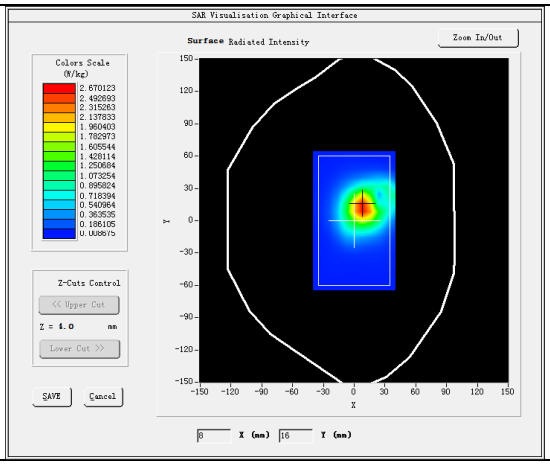
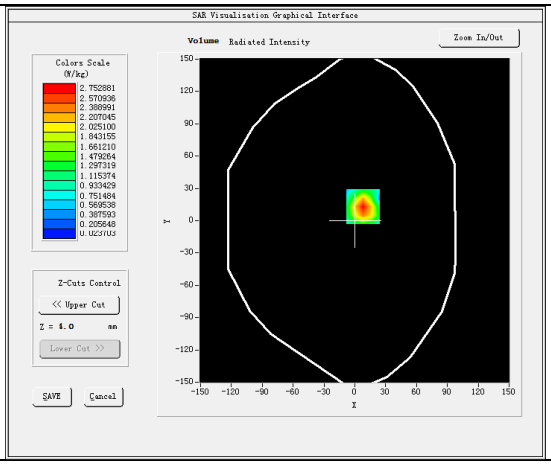
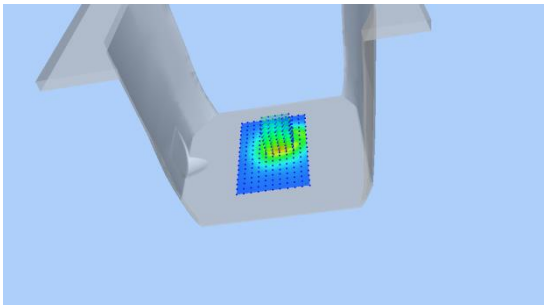
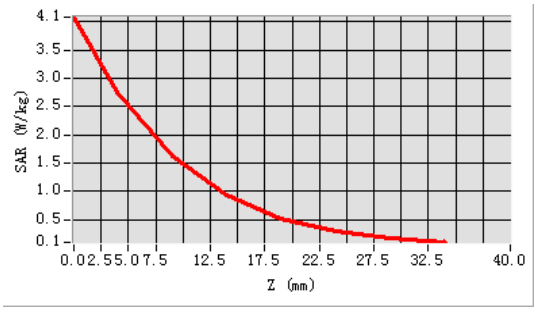
Plot 3:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-08-04
Probe	SN 07/21 EPGO352
ConvF	1.78
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front Side
Band	WCDMA Band II
Signal	WCDMA (Crest factor: 1.0)
Frequency (MHz)	1852.4
Relative permittivity (real part)	40.52
Conductivity (S/m)	1.43

Maximum location: X=8.00, Y=13.00

SAR Peak: 4.14 W/kg

SAR 10g (W/Kg)	1.360695
SAR 1g (W/Kg)	2.593403

SURFACE SAR	VOLUME SAR
	
3D	**Z AZxis Scan**
	

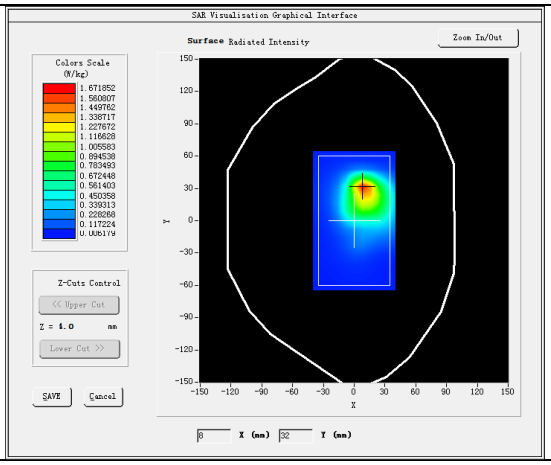
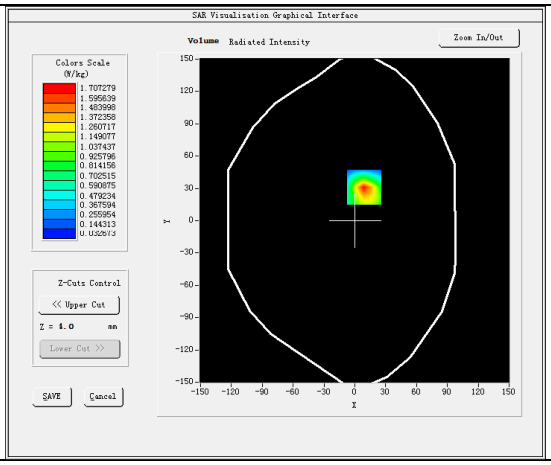
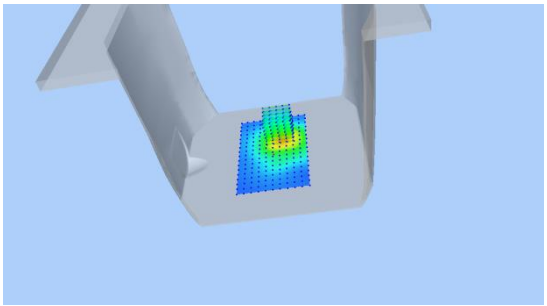
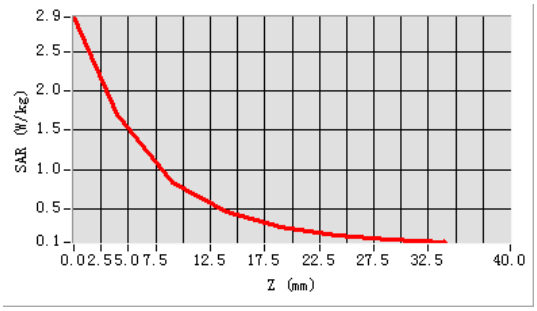
Plot 4:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-08-02
Probe	SN 07/21 EPGO352
ConvF	1.57
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front Side
Band	WCDMA Band V
Signal	WCDMA (Crest factor: 1.0)
Frequency (MHz)	826.4
Relative permittivity (real part)	41.41
Conductivity (S/m)	0.89

Maximum location: X=9.00, Y=31.00

SAR Peak: 2.90 W/kg

SAR 10g (W/Kg)	0.771005
SAR 1g (W/Kg)	1.570371

SURFACE SAR	VOLUME SAR
	
3D	**Z AZxis Scan**
	

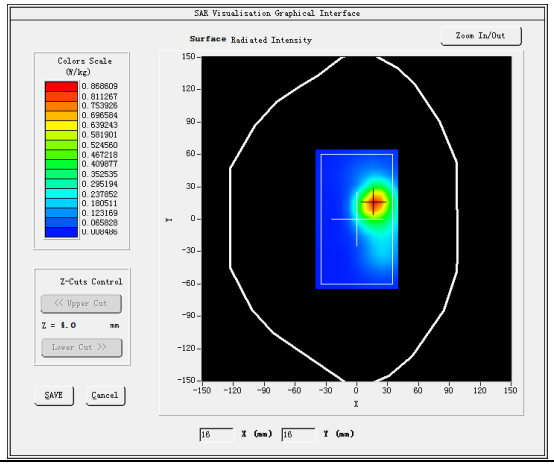
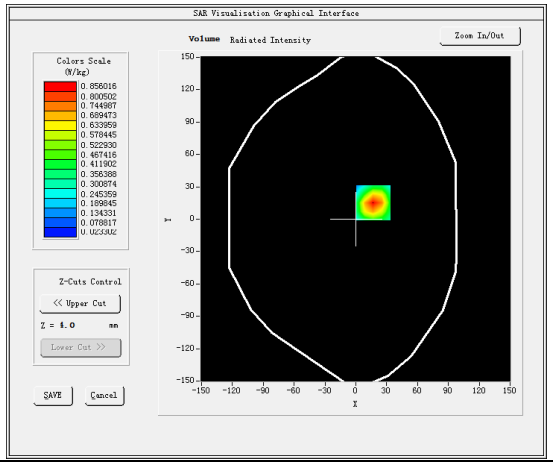
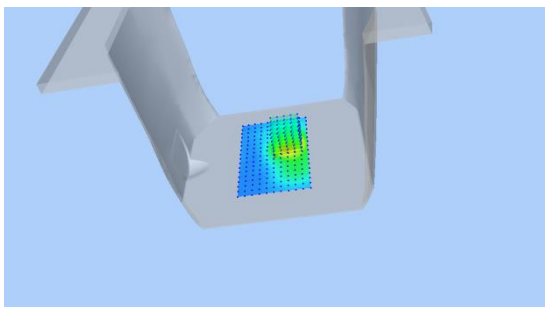
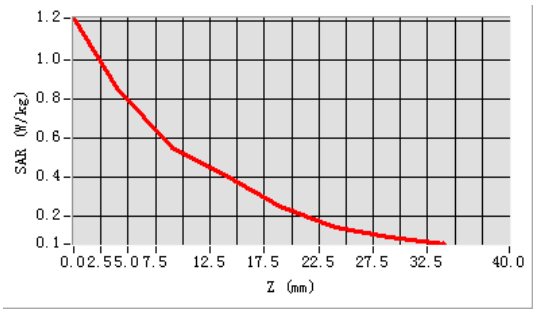
Plot 5:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-08-04
Probe	SN 07/21 EPGO352
ConvF	1.60
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back Side
Band	LTE Band 2(RB 1)
Signal	LTE (Crest factor: 1.0)
Frequency (MHz)	1747.5
Relative permittivity (real part)	40.55
Conductivity (S/m)	1.36

Maximum location: X=17.00, Y=15.00

SAR Peak: 1.21 W/kg

SAR 10g (W/Kg)	0.454585
SAR 1g (W/Kg)	0.805620

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

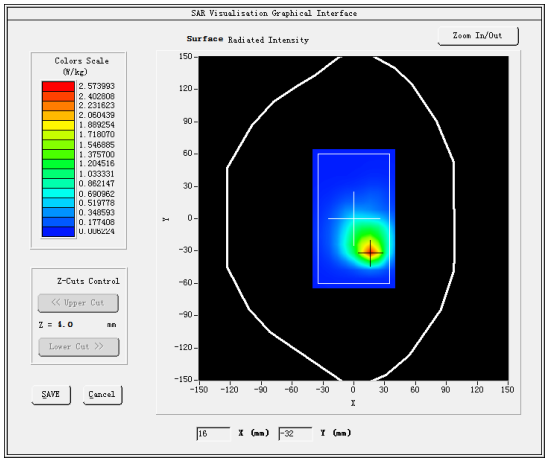
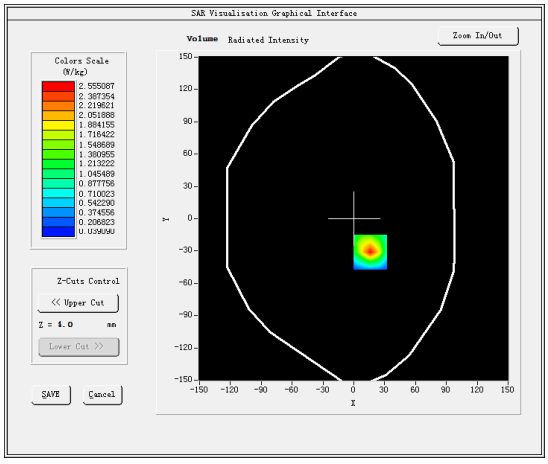
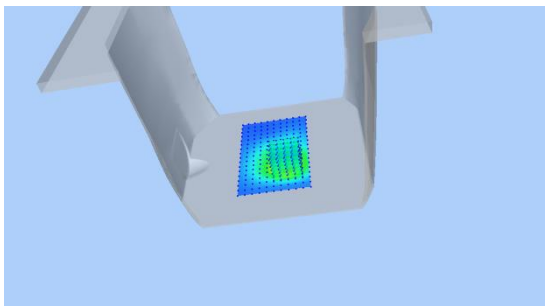
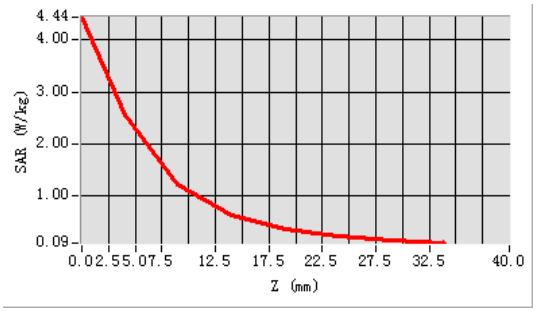
Plot 6:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-08-02
ConvF	1.57
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	LTE Band 5 (RB 1)
Signal	LTE (Crest factor: 1.0)
Frequency (MHz)	829
Relative permittivity (real part)	41.77
Conductivity (S/m)	0.86

Maximum location: X=16.00, Y=-31.00

SAR Peak: 4.39 W/kg

SAR 10g (W/Kg)	1.097245
SAR 1g (W/Kg)	2.348066

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

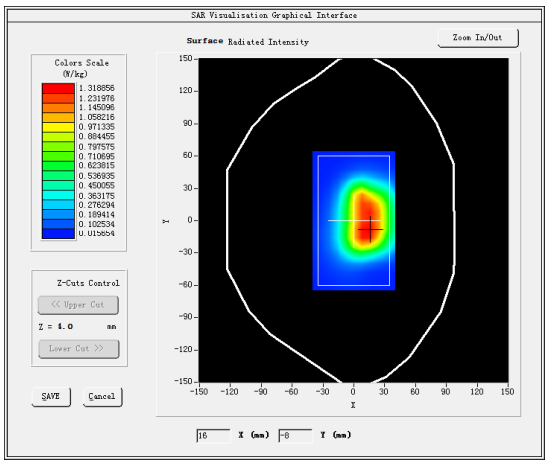
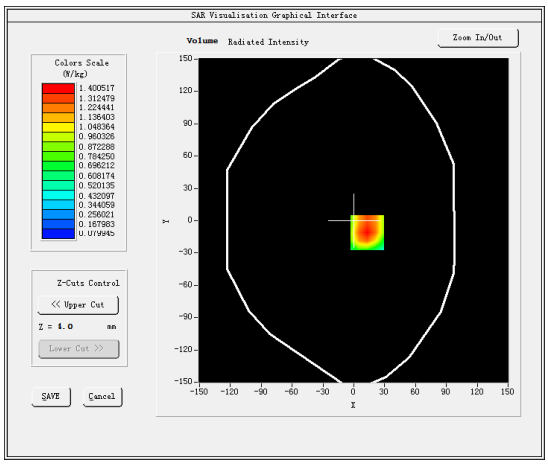
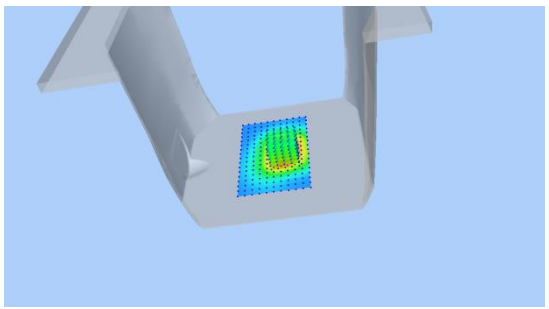
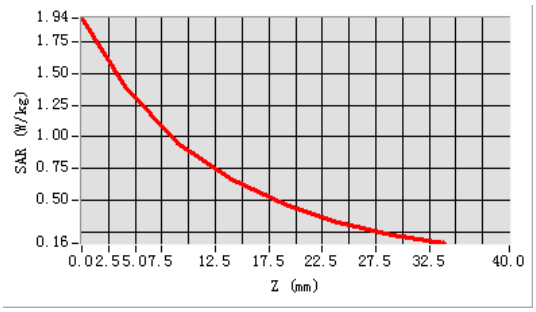
Plot 7:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-08-02
Convf	1.58
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front side
Band	LTE Band 12 (RB 1)
Signal	LTE (Crest factor: 1.0)
Frequency (MHz)	711
Relative permittivity (real part)	42.39
Conductivity (S/m)	0.87

Maximum location: X=13.00, Y=-11.00

SAR Peak: 1.98 W/kg

SAR 10g (W/Kg)	0.857204
SAR 1g (W/Kg)	1.351794

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

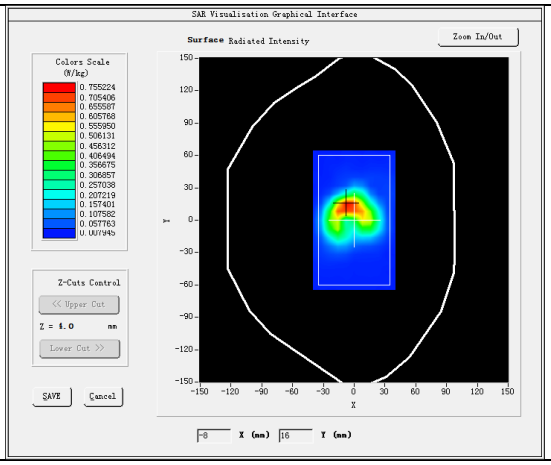
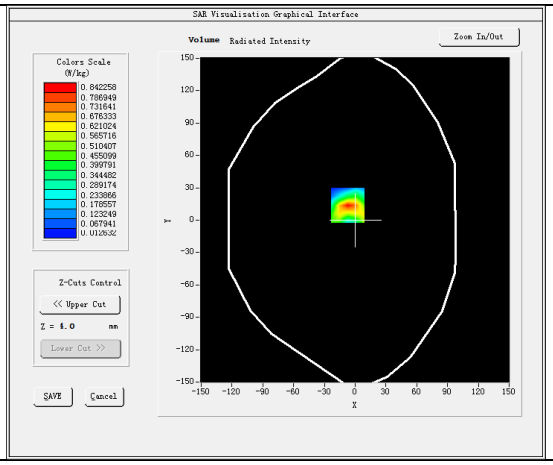
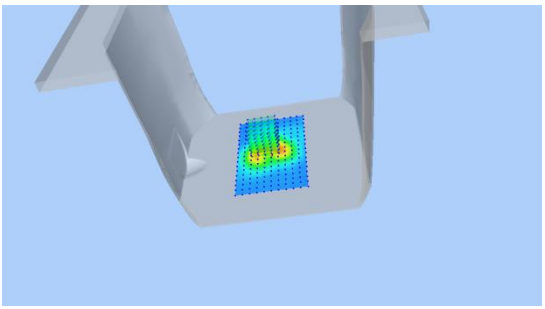
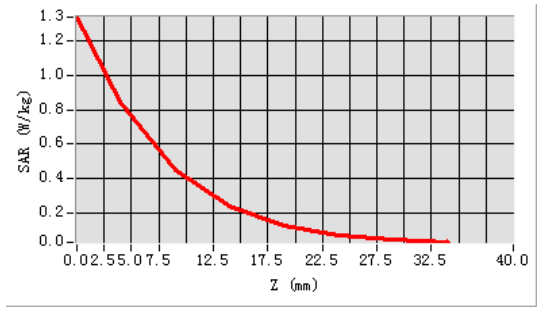
Plot 8:DUT: Alco Tag; EUT Model: A2-BUD-A-TENX-B-TEEU-L

Test Date	2023-09-08
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Front Side
Band	2.4G WLAN
Signal	IEEE802.b (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	39.63
Conductivity (S/m)	1.86

Maximum location: X=-7.00, Y=14.00

SAR Peak: 1.35 W/kg

SAR 10g (W/Kg)	0.359329
SAR 1g (W/Kg)	0.757026

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Appendix C. Probe Calibration And Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※