SAR Test Report

For

Applicant Name:	**ShenZhenShiTengBaoDianZiShangWuYouXianGongSi**
Address:	B408, Comprehensive Building, No. 4088, Banxuegang Avenue, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen, Guangdong, 518129 China
EUT Name:	Walkie Talkies
Model Number:	DE-WK01

Issued By

Company Name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Report Number:	BTF250529R00501
Test Standards:	47 CFR Part 2.1093 IEEE Std. 1528-2013 IEEE C95.1-2019
FCC ID:	2BP83-DE-WK01
Test Conclusion:	Pass
Test Date:	2025-07-01
Date of Issue:	2025-07-02
Tested By:	Jim Yin / Tester
Date:	2025-07-02
Prepared By:	Amenda Zhong / Project Engineer
Date:	2025-07-02
Approved By:	Ryan.CJ / EMC Manager
Date:	2025-07-02

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2025-07-02	Original
Note:	*Once the revision has been made, then previous versions reports are invalid.*	

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1. Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

1.2 Identification of the Responsible Testing Location

Test Location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Description:	All measurement facilities used to collect the measurement data are located at 101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
FCC Registration Number	518915
Designation Number	CN1409

1.3 Laboratory Condition

Ambient Temperature:	21℃ to 25℃
Ambient Relative Humidity:	48% to 59%
Ambient Pressure:	100 kPa to 102 kPa

1.4 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2. Product Information

2.1 Application Information

Company Name:	ShenZhenShiTengBaoDianZiShangWuYouXianGongSi
Address:	B408, Comprehensive Building, No. 4088, Banxuegang Avenue, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen, Guangdong, 518129 China

2.2 Manufacturer Information

Company Name:	ShenZhenShiTengBaoDianZiShangWuYouXianGongSi
Address:	B408, Comprehensive Building, No. 4088, Banxuegang Avenue, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen, Guangdong, 518129 China

2.3 Factory Information

Company Name:	ShenZhenShiTengBaoDianZiShangWuYouXianGongSi
Address:	B408, Comprehensive Building, No. 4088, Banxuegang Avenue, Xiangjiaotang Community, Bantian Street, Longgang District, Shenzhen, Guangdong, 518129 China

2.4 General Description of Equipment under Test (EUT)

EUT Name	Walkie Talkies
Under Test Model Name	DE-WK01
Sample No.	BTFSN250529009

2.5 Equipment under Test Ancillary Equipment

Ancillary Equipment 1	Rechargeable Battery	
	Capacity	1500mAh
	Rated Voltage	3.7V

2.6 Technical Information

Network and Wireless connectivity	PTT_FM

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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	PTT_FM	
Frequency Range	PTT_FM	CH 1-7：462.5625- 462.7125MHz CH 8-14：467.5625- 467.7125 MHz CH15-22：462.5500- 462.72500 MHz
Antenna Type	Spring Antenna	
Antenna gain:	-2.0 dBi (declare by Applicant)	
Channel Separation	12.5kHz	
Modulation Type	FM	
Hotspot Function	Not Support	
Power Reduction	Not Support	
Exposure Category	General Population/Uncontrolled Exposure	
EUT Stage	Portable Device	
Product	Type	
	☒ Production unit	☐ Identical prototype

3. Summary of Test Results

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1093	Radiofrequency radiation exposure evaluation: portable devices
2	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
3	IEEE C95.1-2019	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
4	KDB 447498 D01	General RF Exposure Guidance v06
5	KDB 865664 D01	SAR measurement 100MHz to 6GHz v01r04
6	KDB 643646 D01	SAR Test for PTT Radios v01r03

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3.2 Device Category and SAR Limit

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for occupational/controlled Exposure should be applied for this device, it is 0.4 W/kg&8.0 W/kg as averaged over any 1 gram of tissue.

Body Position	SAR Value (W/Kg)	
	General Population/ Uncontrolled Exposure	Occupational/ Controlled Exposure
Whole-Body SAR (averaged over the entire body)	0.08	0.4
Partial-Body SAR (averaged over any 1 gram of tissue)	1.60	8.0
SAR for hands, wrists, feet and ankles (averaged over any 10 grams of tissue)	4.0	20.0

NOTE:
General Population/Uncontrolled Exposure: Locations where there is the exposure of individuals who have no knowledge or control of their exposure. General population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment- related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.
Occupational/Controlled Exposure: Locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

3.3 Test Result Summary

The maximum results of Specific Absorption Rate (SAR) found during test as bellows:

<Highest Reported standalone SAR Summary>

Frequency Band		Maximum Reported SAR (W/kg) -1g	
		Front-of-face SAR (25mm gap)	Body SAR (0mm gap)
PTT	462.6375MHz	**0.381**	**0.600**
Limits (W/kg)		1.6	1.6
Test Verdict		Pass	Pass

This device is in compliance with Specific Absorption Rate (SAR) for occupational/controlled exposure Limits (0.4 W/kg&8.0 W/kg) specified in FCC47 CFR part 2(2.1093) and ANSI/IEEE C95.1-2019, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std. 1528-2013.

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3.4 Test Uncertainty

3.4.1 Measurement uncertainly evaluation for SAR test (300MHz to 6GHz)

Uncertainty Budget of 1g/10gpsSAR for DUT with COMOSAR											
Ambiente temperature: 18-25°C & ΔT≤2°C Humedity: 30-70% Frequency range: 150MHz-7500MHz											
Symbol	Input quantity Xi (source of uncertainty)	PDF_i	Unc. $a(x_i)$ [±%]	Div. c_i	$u(x_i)=a(xi)/ci$	c_i 1g	c_i 10 g	$u(y)=c_i*u(xi)$ 1g [± %]	$u(y)=c_i*u(xi)$ 10g [± %]	v_i	Frequency range [MHz]
Measurement System errors											
CF	Probe calibration	N (k=2)	11.00	2.00	5.50	1.00	1.00	5.50	5.50	∞	150-450
			14.00	2.00	7.00	1.00	1.00	7.00	7.00	∞	600-7500
CF_{drift}	Probe calibration drift	R	2.30	1.73	1.33	1.00	1.00	1.33	1.33	∞	150-450
			4.00	1.73	2.31	1.00	1.00	2.31	2.31	∞	600-7500
LIN	Probe linearity	R	4.70	1.73	2.71	1.00	1.00	2.71	2.71	∞	150-7500
	Detection limit	R	1.00	1.73	0.58	1.00	1.00	0.58	0.58	∞	
BBS	Broadband signal	R	0.00	1.73	0.00	1.00	1.00	0.00	0.00	∞	
ISO	Axial Isotropy	R	3.50	1.73	2.02	0.71	0.71	1.43	1.43	∞	
	Hemispherical Isotropy	R	5.90	1.73	3.41	0.71	0.71	2.41	2.41	∞	
DAE	Boundary effect	R	1.00	1.73	0.58	1.00	1.00	0.58	0.58	∞	
	Integration time	R	1.40	1.73	0.81	1.00	1.00	0.81	0.81	∞	
	Response time	R	0.00	1.73	0.00	1.00	1.00	0.00	0.00	∞	
	Readout electronics	N	0.50	1.00	0.50	1.00	1.00	0.50	0.50	∞	
AMB	Noise	R	3.00	1.73	1.73	1.00	1.00	1.73	1.73	∞	
	Reflections	R	3.00	1.73	1.73	1.00	1.00	1.73	1.73	∞	
Δ_{xyz}	Positioner Mechanical Tolerance	R	1.40	1.73	0.81	0.14	0.14	0.12	0.12	∞	≥150 & ≤3000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>3000 & ≤6000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>6000 & ≤7500
	Positioning with respect to Phantom Shell	R	1.40	1.73	0.81	0.14	0.14	0.12	0.12	∞	≥150 & ≤3000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>3000 & ≤6000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>6000 & ≤7500
DAT	Data processing errors	R	2.30	1.73	1.33	1.00	1.00	1.33	1.33	∞	150-7500
Phanom and DUT erros											
LIQ(σ,ε)	Conductivity measurement	N	4.07	1.00	4.07	0.79	0.77	3.22	3.13	9	150-7500
	Permitivity measurement	N	5.06	1.00	5.06	0.23	0.26	1.16	1.32	9	
$LIQ(T_c)$	Liquid Conductivity - Temperature Uncertainty	R	2.50	1.73	1.44	0.79	0.77	1.14	1.11	∞	
	Liquid Permittivity - Temperature Uncertainty	R	2.50	1.73	1.44	0.23	0.26	0.33	0.38	∞	
EPS	Shell permittivity	R	2.90	1.73	1.67	0.00	0.00	0.00	0.00	∞	≥150 & ≤3000
			2.90	1.73	1.67	0.25	0.25	0.42	0.42	∞	>3000 & ≤6000
			2.90	1.73	1.67	0.50	0.50	0.84	0.84	∞	>6000 & ≤7500
DIS	Distance between the radiating element of the DUT and the phantom medium	N	2.70	1.00	2.70	2.00	2.00	5.40	5.40	∞	≥150 & ≤3000
			2.70	1.00	2.70	2.00	2.00	5.40	5.40	∞	>3000 & ≤6000
			3.20	1.00	3.20	2.00	2.00	6.40	6.40	∞	>6000 & ≤7500
D_{xyz}	Repeatability of positioning the DUT or source against the phantom	N	2.60	1.00	2.60	1.00	1.00	2.60	2.60	13	150-7500
H	Device holder effects	N	3.00	1.00	3.00	1.00	1.00	3.00	3.00	23	
MOD	Effect of operating mode on probe sensitivity	R	8.20	1.73	4.73	1.00	1.00	4.73	4.73	∞	
RF_{drift}	Variation in SAR due to drift in output of DUT	R	5.00	1.73	2.89	1.00	1.00	2.89	2.89		
Corrections to the SAR result											
C(ε',σ)	Phantom deviation from target (ε',σ)	N	1.90	1.00	1.90	1.00	1.00	1.90	1.90		150-7500
C(R)	SAR scaling	R	5.00	1.73	2.89	1.00	1.00	2.89	2.89		
u(ΔSAR)	Combined uncertainty							12.54	12.53		150-450
								13.40	13.40		≥600 & ≤3000
								13.44	13.43		>3000 & ≤6000
								13.89	13.88		>6000 & ≤7500
U	Expanded uncertainty (95% confidence interval)							**25.08**	**25.07**		**150-450**
								26.80	**26.79**		**≥600 & ≤3000**
								26.87	**26.86**		**>3000 & ≤6000**
								27.77	**27.76**		**>6000 & ≤7500**

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3.4.2 Measurement uncertainly evaluation for system check

Uncertainty Budget of 1g/10g psSAR for System Validation/Check COMOSAR											
Ambiente temperature: 18-25°C & ΔT≤2°C Humedity: 30-70% Frequency range: 150MHz-7500MHz											
Symbol	Input quantity Xi (source of uncertainty)	PDF$_i$	Unc. a(x_i) [±%]	Div. q_i	u(x_i)= a(xi)/qi	c_i 1g	c_i 10 g	u(y)= c_i*u(xi) 1g [± %]	u(y)= c_i*u(xi) 10g [± %]	v_i	Frequency range [MHz]
Measurement System errors											
CF	Probe calibration	N (k=2)	11.00	2.00	5.50	1.00	1.00	5.50	5.50	∞	150-450
			14.00	2.00	7.00	1.00	1.00	7.00	7.00	∞	600-7500
CF_{drift}	Probe calibration drift	R	2.30	1.73	1.33	1.00	1.00	1.33	1.33	∞	150-450
			4.00	1.73	2.31	1.00	1.00	2.31	2.31	∞	600-7500
LIN	Probe linearity	R	4.70	1.73	2.71	1.00	1.00	2.71	2.71	∞	150-7500
	Detection limit	R	1.00	1.73	0.58	1.00	1.00	0.58	0.58	∞	
ISO	Axial Isotropy	R	3.50	1.73	2.02	0.71	0.71	1.43	1.43	∞	
	Hemispherical Isotropy	R	5.90	1.73	3.41	0.71	0.71	2.41	2.41	∞	
DAE	Boundary effect	R	1.00	1.73	0.58	1.00	1.00	0.58	0.58	∞	
	Integration time	R	1.40	1.73	0.81	1.00	1.00	0.81	0.81	∞	
	Response time	R	0.00	1.73	0.00	1.00	1.00	0.00	0.00	∞	
	Readout electronics	N	0.50	1.00	0.50	1.00	1.00	0.50	0.50	∞	
AMB	Noise	R	3.00	1.73	1.73	1.00	1.00	1.73	1.73	∞	
	Reflections	R	3.00	1.73	1.73	1.00	1.00	1.73	1.73	∞	
Δ_{xyz}	Positioner Mechanical Tolerance	R	1.40	1.73	0.81	0.14	0.14	0.12	0.12	∞	≥150 & ≤3000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>3000 & ≤6000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>6000 & ≤10000
	Positioning with respect to Phantom Shell	R	1.40	1.73	0.81	0.14	0.14	0.12	0.12	∞	≥150 & ≤3000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>3000 & ≤6000
			3.28	1.73	1.89	0.33	0.33	0.62	0.62	∞	>6000 & ≤10000
DAT	Data processing errors	R	2.30	1.73	1.33	1.00	1.00	1.33	1.33	∞	150-7500
Phanom and Dipoles erros											
LIQ(σ,ε)	Conductivity measurement	N	4.07	1.00	4.07	0.79	0.77	3.22	3.13	9	150-7500
	Permitivity measurement	N	5.06	1.00	5.06	0.23	0.26	1.16	1.32	9	
LIQ(T_c)	Liquid Conductivity - Temperature Uncertainty	R	2.50	1.73	1.44	0.79	0.77	1.14	1.11	∞	
	Liquid Permittivity - Temperature Uncertainty	R	2.50	1.73	1.44	0.23	0.26	0.33	0.38	∞	
EPS	Shell permittivity	R	2.90	1.73	1.67	0.00	0.00	0.00	0.00	∞	≥150 & ≤3000
			2.90	1.73	1.67	0.25	0.25	0.42	0.42	∞	>3000 & ≤6000
			2.90	1.73	1.67	0.50	0.50	0.84	0.84	∞	>6000 & ≤10000
DIS	Distance between the radiating element of the DUT and the phantom medium	N	2.70	1.00	2.70	2.00	2.00	5.40	5.40	∞	≥150 & ≤3000
			2.70	1.00	2.70	2.00	2.00	5.40	5.40	∞	>3000 & ≤6000
			3.20	1.00	3.20	2.00	2.00	6.40	6.40	∞	>6000 & ≤10000
VAL	Deviation of experimental antennas	N	4.50	1.73	2.60	1.00	1.00	2.60	2.60		150-7500
	Other uncertainty contributions	R	2.00	1.00	2.00	1.00	1.00	2.00	2.00		
P_{in}	Uncertainty in accepted power	R	3.00	1.73	1.73	1.00	1.00	1.73	1.73		
Corrections to the SAR result											
C(ε',σ)	Phantom deviation from target (ε',σ)	N	1.90	1.00	1.90	1.00	1.00	1.90	1.90		150-7500
u(ΔSAR)	Combined uncertainty							10.78	10.77		150-450
								11.77	11.76		≥600 & ≤3000
								11.81	11.80		>3000 & ≤6000
								12.32	12.31		>6000 & ≤7500
U	Expanded uncertainty (95% confidence interval)							**21.56**	**21.54**		**150-450**
								23.54	**23.52**		**≥600 & ≤3000**
								23.62	**23.60**		**>3000 & ≤6000**
								24.64	**24.62**		**>6000 & ≤7500**

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4. Measurement System

4.1 Specific Absorption Rate (SAR) Definition

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:

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

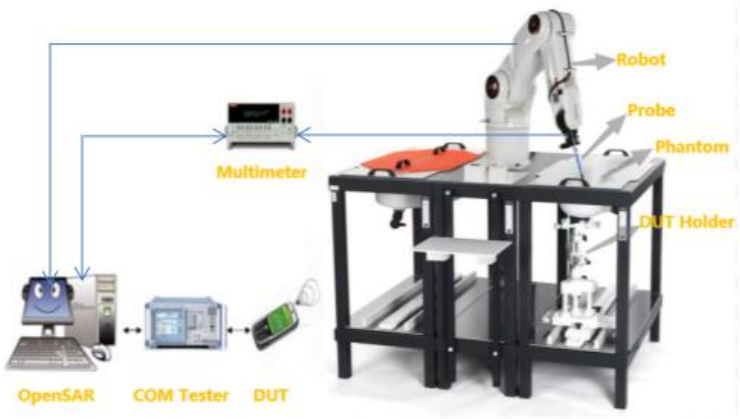
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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

4.2 MVG SAR System

4.2.1 SAR system diagram



4.2.2 Robot

A standard high precision 6-axis robot (Denso) with teaches pendant with Scanning System
· It must be able to scan all the volume of the phantom to evaluate the tridimensional distribution of SAR.
· Must be able to set the probe orthogonal of the surface of the phantom (±30°).
· Detects stresses on the probe and stop itself if necessary to keep the integrity of the probe.

4.2.3 E-Field Probe

For the measurements, the Specific Dosimetric SSE2 E-Field Probe with following specifications is used:

- Dynamic range: 0.01-100 W/kg
- Tip diameter: 2mm for SSE2
- Distance between probe tip and sensor centre: 1mm for SSE2
- Distance between sensor centre and the inner phantom surface: 2mm for f>=4GHz.
- Probe linearity: <0.25dB.
- Axial Isotropy: <0.25dB.
- Spherical Isotropy: <0.50dB.
- Calibration range: 150 to 6000 MHz for head & body simulating liquid
- Angle between probe axis (evaluation axis) and surface normal line: less than 20°.

4.2.4 Phantoms

SAM Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The probe scanning of the E-Field is done in the 2 halves of the normalized head. The normalized shape of the phantom corresponds to the dimensions of 90% of an adult head size. It enables the dosimetric evaluation of left and right-hand phone usage and includes an additional flat phantom part for the simplified body performance check.The phantom set-up includes a cover, which prevents the evaporation of the liquid.

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The thickness of the phantom amounts to 2 mm±0.2 mm. The materials for the phantom do not affect the radiation of the device under test (DUT) : εr' <5
The head is filled with tissue simulating liquid. The hand do not have to be modeled.

SAM Phantom

TWIN SAM phantom			
	Mechanical	Electrical	
Overall thickness	2±0.2 mm(except ear area)	Relative permittivity	3.4
Dimensions	1000 mm(L) x 500 mm(W) x 200 mm(H)	Loss tangent	0.02
Maximum volume	27 L		
Material	Fiberglass based		

ELLIPTICAL Phantom

The phantom is for Body performance check filled with tissue-equivalent liquid to a depth of at least 150 mm, whose shell material is resistant to damage or reaction with tissue-equivalent liquid chemicals.

The shape of the phantom is an ellipse with length 600mm±5mm and width 400mm±5mm.
The phantom shell is made of low-loss and low-permittivity material, having loss tangent tanδ ≤ 0.05 and relative permittivity:
εr' ≤ 5 for f ≤ 3 GHz
3 ≤εr' ≤ 5 for f > 3 GHz
The thickness of the bottom-wall of the flat phantom is 2.0 mm with a tolerance of ± 0.2 mm.

ELLI Phantom

Technical & mechanical characteristics	
Shell thickness	2 mm ± 0.2 mm
Filling volume	25 L
Dimensions	600 mm x 400 mm x 200mm
Permittivity	4.4
Loss tangent	0.017

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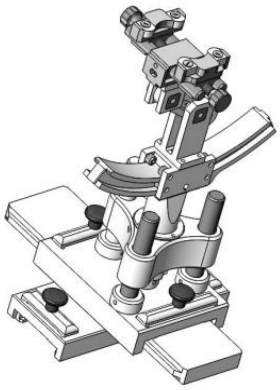
4.2.5 Device Holder



System Material	Permittivity	Loss tangent
Delrin	3.7	0.005

(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
PMMA	2.9	0.028

4.2.6 Simulating Liquid

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. 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. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5%.

Head Liquid Depth	Body Liquid Depth
	

The following table gives the recipes for tissue simulating liquid and the theoretical Conductivity/Permittivity.

Head (Reference IEEE1528)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity σ (S/m)	Permittivity ε
450	48.53	55.6	0.2	1.4	0.2	0	0.91	42.8
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.4	40.0
2450	55.0	0	0	0.1	0	44.9	1.80	39.2
2600	54.9	0	0	0.1	0	45.0	1.96	39.0
Frequency (MHz)	Water (%)	Hexyl Carbitol (%)			Triton X-100 (%)		Conductivity σ (S/m)	Permittivity ε
5200	62.52	17.24			17.24		4.66	36.0
5800	62.52	17.24			17.24		5.27	35.3
Body (From instrument manufacturer)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity σ (S/m)	Permittivity ε
450	53.1	45.1	0	0.9	0.1	0	0.081	57.2
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0.1	0	31.3	1.95	52.7
2600	68.2	0	0	0.1	0	31.7	2.16	52.5
Frequency(MHz)	Water	DGBE (%)			Salt (%)		Conductivity σ (S/m)	Permittivity ε
5200	78.60	21.40			/		5.30	49.00
5800	78.50	21.40			0.1		6.00	48.20

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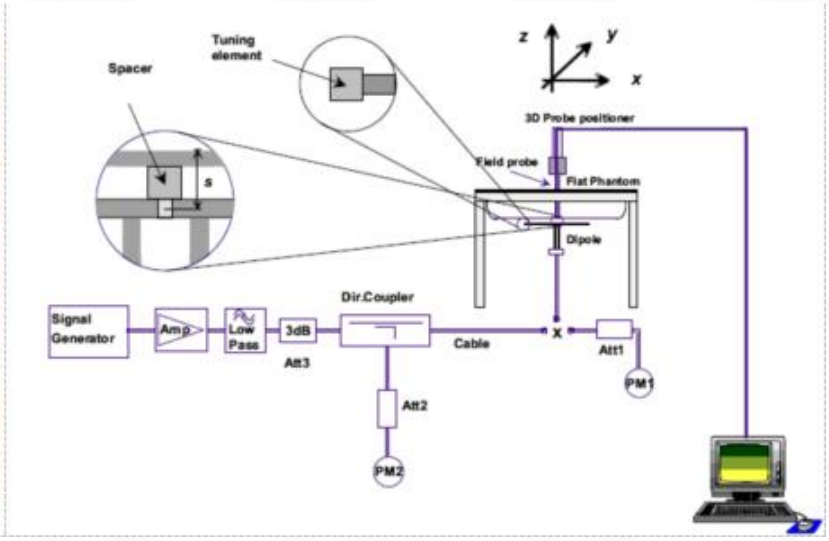
5. System Verification

5.1 Purpose of System 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. The 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.

5.2 System Check Setup



6. TEST POSITION CONFIGURATIONS

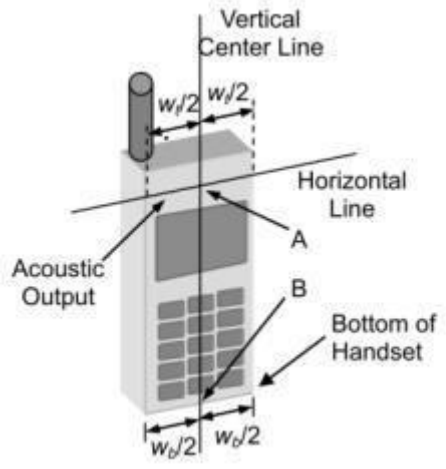
According to KDB 648474 D04 Handset, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

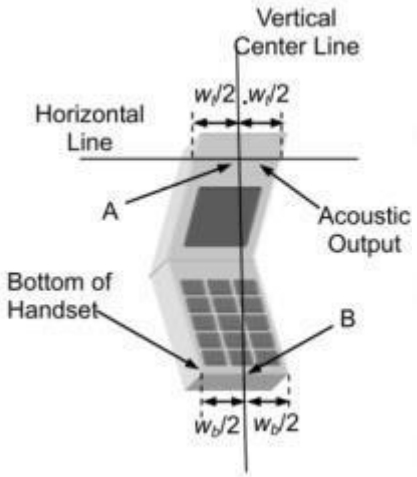
6.1 Head Exposure Conditions

Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2013 using the SAM phantom illustrated as below.

6.1.1 Two Imaginary Lines on the Handset

(a) The vertical center line passes through two points on the front side of the handset - the midpoint of the width w t of the handset at the level of the acoustic output, and the midpoint of the width w b of the bottom of the handset.
(b) The horizontal line is perpendicular to the vertical center line and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical center line is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

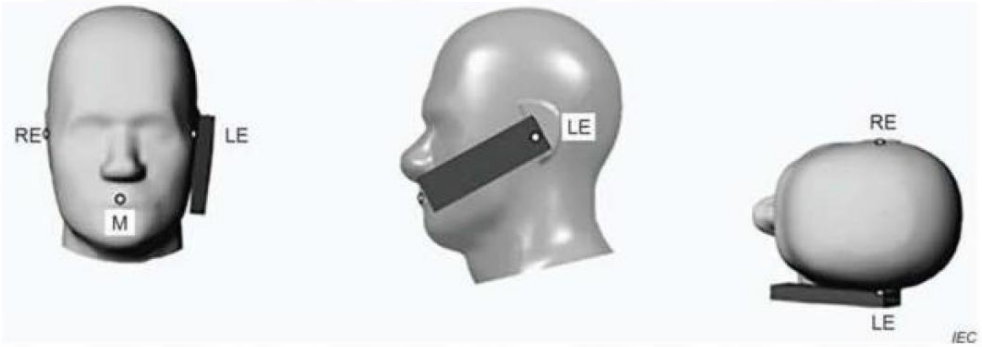




6.1.2 Two Imaginary Lines on the Handset

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

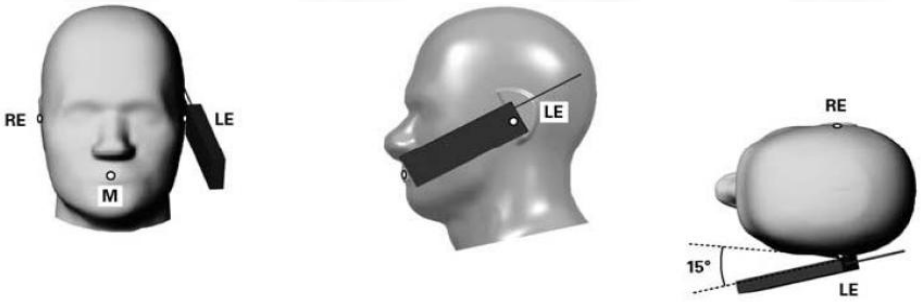
(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.



6.1.3 Titled Position

(a) To position the device in the “cheek” position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.



6.2 Devices used with body-worn accessories

A device within the scope of this document intended for use with a body-worn accessory approved or specified by the device manufacturer shall be assessed according to the following requirements.
a) If the user instructions provided by the manufacturer specify the intended use with a carry accessory (belt-clip, holster, carry-case or similar), the device shall be placed in that carry accessory and positioned in the intended use conditions against the flat phantom.

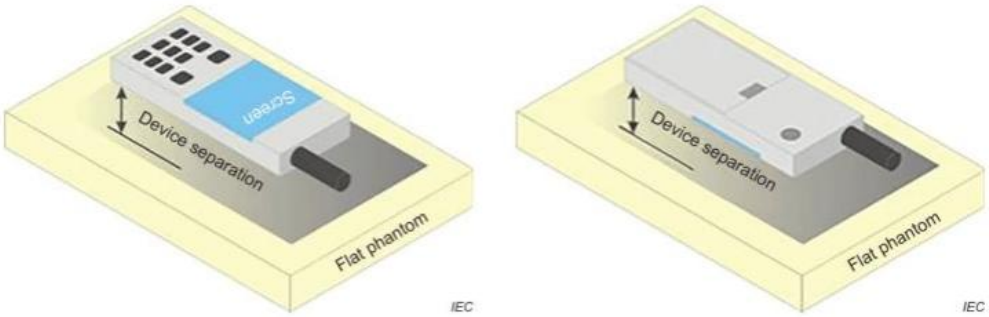
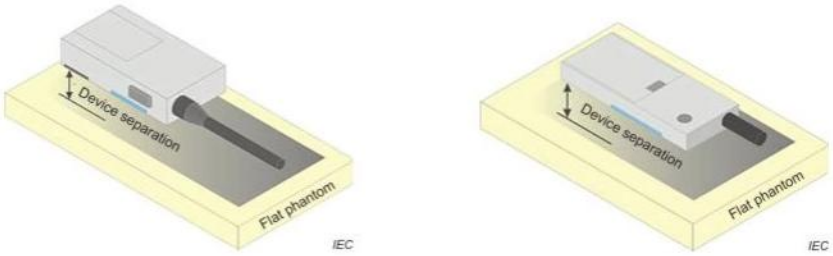


Figure 6 – Test positions for body-worn devices

6.3 Front-of-face device

A typical example of a front-of-face device is a two-way radio that is held at a close distance from the face of the user while transmitting.
To assess this type of device, the following apply:
The DUT shall be positioned at a test separation distance to the phantom surface in accordance with the conditions of 7.2.4.1.2 DUT-to-phantom separation distance.

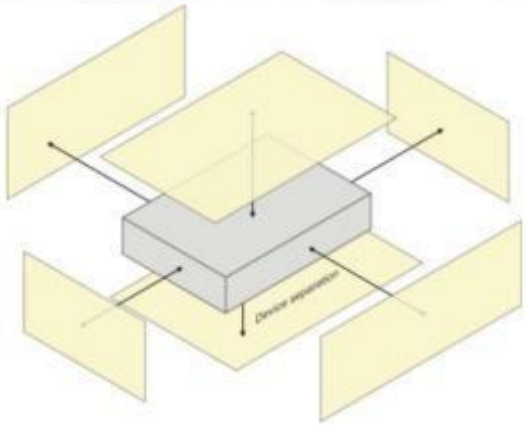


b) Two-way radios

Figure 10 – Test positions for front-of-face devices

6.4 Hotspot Mode Exposure Position Conditions

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing functions, the relevant hand and body exposure conditions are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge. When the form factor of a handset is smaller than 9 cm x 5 cm, a test separation distance of 5 mm (instead of 10 mm) is required for testing hotspot mode. When the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).



6.5 Product Specific 10g Exposure Consideration

According with FCC KDB 648474 D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, unless it is confirmed otherwise through KDB inquiries, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance;

The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

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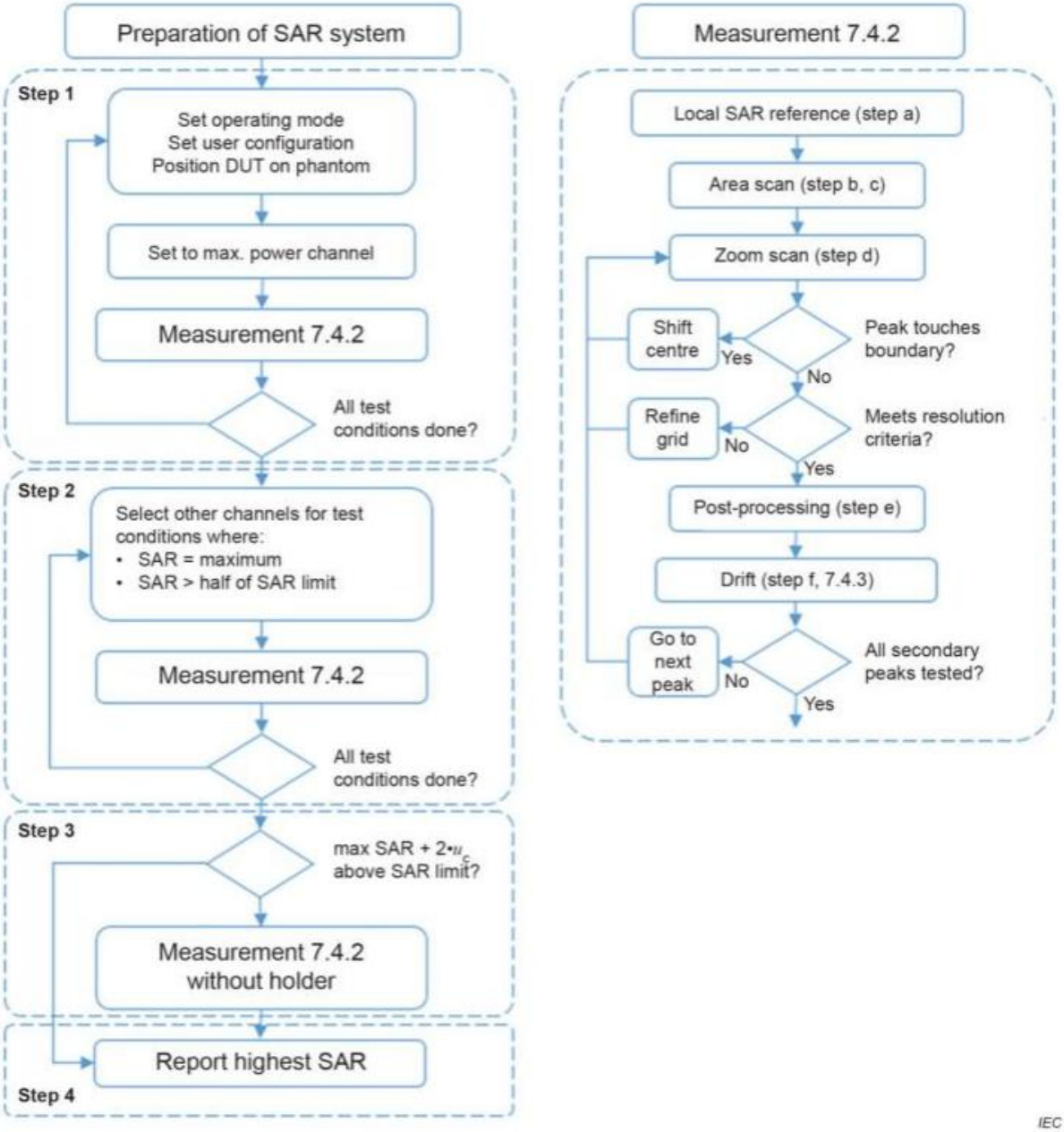
7. Measurement Procedure

7.1 Measurement Process Diagram

Body SAR



7.2 SAR Scan General Requirement

Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1 g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013.

<table>
<tr><th colspan="3"></th><th>≤3GHz</th><th>>3GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5±1 mm</td><td>½·δ·ln(2)±0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30°±1°</td><td>20°±1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx Area , Δy Area</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3–4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx Zoom , Δy Zoom</td><td>≤ 2 GHz: ≤ 8 mm
2 –3 GHz: ≤ 5 mm*</td><td>3–4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="5">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2" rowspan="2">uniform grid: Δz Zoom (n)</td><td rowspan="2">≤ 5 mm</td><td>3–4 GHz: ≤ 4 mm</td></tr>
<tr><td>4–5 GHz: ≤ 3 mm</td></tr>
<tr><td rowspan="3">graded grid</td><td rowspan="2">Δz Zoom (1): between 1st two points closest to phantom surface</td><td rowspan="2">≤ 4 mm</td><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td>3–4 GHz: ≤ 3 mm</td></tr>
<tr><td>4–5 GHz: ≤ 2.5 mm</td></tr>
<tr><td></td><td>Δz Zoom (n>1): between subsequent points</td><td colspan="2">≤ 1.5·Δz Zoom (n-1)</td><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="3">Minimum zoom scan volume</td><td colspan="2" rowspan="3">x, y, z</td><td rowspan="3">≥30 mm</td><td>3–4 GHz: ≥ 28 mm</td></tr>
<tr><td>4–5 GHz: ≥ 25 mm</td></tr>
<tr><td>5–6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note:
1. δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528- 2011 for details.
2. * When zoom scan is required and the reported SAR from the area scan based 1 g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

7.3 Measurement Procedure

The following steps are used for each test position

a. 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

b. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.

c. 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.

d. 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.

7.4 Area & Zoom Scan Procedure

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 D01v01r04 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.

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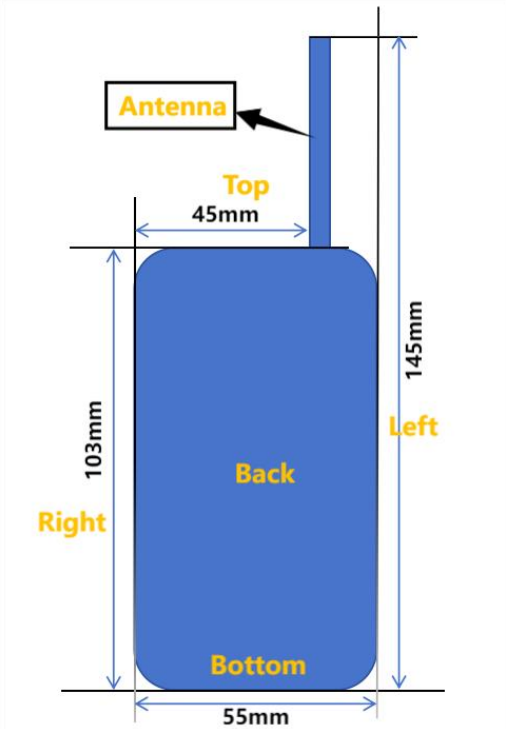
8. Power

Teat Mode	Ch.	Frequency(MHz)	ERP(dBm)	Maximum Tune-up(dBm)
FM	4	462.6375	**26.51**	**27.00**
	22	462.7250	26.11	26.50
	14	467.7125	25.96	26.00

9. Test Exclusion Consideration

Antenna information:



Back View

Distance of The Antenna to the EUT surface and edge (mm)						
Antenna	Front Side (mm)	Back Side (mm)	Left Edge (mm)	Right Edge (mm)	Top Edge (mm)	Bottom Edge (mm)
ANT	<25	<25	<25	45	<25	103
Note: Per KDB 447498 the EUT is a civil walkie-talkie, with an external antenna, the test is considered to use the mouth, the maximum test separation distance is 25mm in front of the face, and worn on the body, the maximum test separation distance is 0mm.						

10. Test Result

Front-of-face(25mm gap)											
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	1g Meas. SAR (W/kg)	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	50% Duty Factor SAR (W/kg)	Meas. No.
FM 12.5kHz	Front	25	16	462.5750	-1.110	0.681	26.51	27.00	1.119	**0.381**	1#
Body(0mm gap)											
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	1g Meas. SAR (W/kg)	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	50% Duty Factor SAR (W/kg)	Meas. No.
FM 12.5kHz	Back	0	16	462.5750	-2.670	1.072	26.51	27.00	1.119	**0.600**	2#

Note:
1. The device testing Body-Worn process involves the use of accessories, back clips, and headphones.
2. The maximum SAR Value of each test band is marked bold.
3. SAR plot is provided only for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
4. Per KDB 447498 D01 v06, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
5. Per KDB 447498 D01 v06, body-supported use is evaluated with the device positioned at 0mm from a flat phantom filled with body tissue-equivalent medium.
6. Per KDB 447498 D01 v06, the report SAR is measured SAR value adjusted for maximum tune-up tolerance. Scaling Factor=10^[(tune-up limit power(dBm) - Ave.power power (dBm))/10], where tune-up limit is the maximum rated power among all production units.
   Reported SAR(W/kg)=Measured SAR (W/kg)*Scaling Factor.

11. Simultaneous Transmission

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 SAR to Peak Location Ratio (SPLSR).

11.1 Simultaneous Transmission Mode Considerations

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. The device has 1 Tx antennas, so we do not need to condiser simultaneous transmission.

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12. Test Equipment List

Description	Manufacturer	Model	Serial No./Version	Cal. Date	Cal. Due
E-Field Probe	MVG	SSE2	0125-EPGO-445	2025/02/01	2026/01/31
6 1/2 Digital Multimeter	Keithley	DMM6500	4527164	2024/10/25	2025/10/24
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	161997	2024/10/25	2025/10/24
MXG Vector Signal Generator	Agilent	N5182A	MY46240163	2024/10/25	2025/10/24
E-Series Avg. Power Sensor	KEYSIGHT	E9300A	MY55050017	2025/04/02	2026/04/01
EPM Series Power Meter	KEYSIGHT	E4418B	MY41293435	2025/04/02	2026/04/01
3dB Attenuator	MIDWEST MICROWAVE	263-10dB	N/A	2025/04/02	2026/04/01
Coupler	MERRIMAC	CWM-10R-10.8G	LOT-83391	2025/04/02	2026/04/01
450MHz Validation Dipole	MVG	SID450	07/22 DIP 0G450-654	2025/05/26	2028/05/25
LIMESAR Dielectric Probe	MVG	SCLMP	06/22 OCPG88	2025/02/05	2026/02/04
ENA Series Network Analyzer	Agilent	E5071B	MY42301221	2024/10/25	2025/10/24
Thermometer	Riters	DT-232	21A11	2025/04/03	2026/04/02
Antenna network emulator	MVG	ANTA 74	07/22 ANTA 74	N/A	N/A
SAM Phantom	MVG	SAM	07/22 SAM149	N/A	N/A
Mobile Phone Positioning System	MVG	MSH 118	07/22 MSH 118	N/A	N/A
Mechanical Calibration Kit	PNA	N/A	N/A	2024/10/25	2025/10/24
Open SAR test software	MVG	N/A	V5.3.5	N/A	N/A

Note: For dipole antennas, BTF has adopted 3 years as calibration intervals, and 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;
3. Return-loss in within 20% of calibrated measurement.
4. Impedance (real or imaginary parts) in within 5 Ohms of calibrated measurement.

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ANNEX A Simulating Liquid Verification Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an SCLMP Dielectric Probe Kit.

Dielectric performance of tissue simulating liquid									
Frequency (MHz)	εr		σ(s/m)		Delta (εr)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
450	43.50	43.19	0.87	0.86	-0.71%	-1.15%	±5%	21.6	1/7/2025
462	43.50	43.18	0.87	0.87	-0.74%	0.00%	±5%	21.6	1/7/2025
467	43.50	43.17	0.87	0.87	-0.76%	0.00%	±5%	21.6	1/7/2025
NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 ℃ of the conditions expected during the SAR evaluation to satisfy protocol requirements.									

ANNEX B System Check Result

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

Frequency (MHz)	Input Power (mW)	10g SAR (W/Kg)	1g SAR (W/Kg)	10g SAR 1W input power normalized (W/Kg)	1g SAR 1W input power normalized (W/Kg)	10g SAR Standard target (1W) (W/Kg)	1g SAR Standard target (1W) (W/Kg)	10g SAR Deviation	1g SAR Deviation
450	100	0.285	0.493	2.85	4.93	3.00	4.52	-5.00%	9.07%
Note: Since our source output signal does not reach 30dbm, we use a 20dbm signal and compare it by converting it to 1W.									

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System Performance Check Data (450 MHz)

System check at 450 MHz

Date of measurement: 1/7/2025

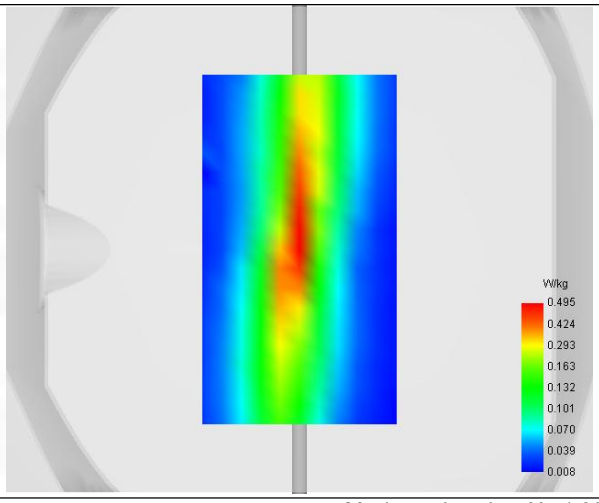
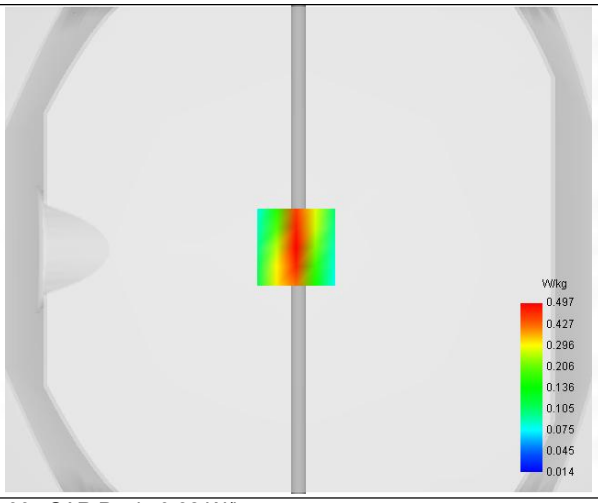
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.15
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW450
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	450.000
Relative permitivity (real part)	43.192
Relative permitivity (imaginary part)	21.146
Conductivity (S/m)	0.864

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=1.00 ; SAR Peak: 0.82 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.285
SAR 1g (W/Kg)	0.493
Variation (%)	-3.970
Horizontal validation criteria: minimum distance (mm)	11.313
Vertical validation criteria: SAR ratio M2/M1 (%)	50.947

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.874	0.528	0.269	0.141	0.075

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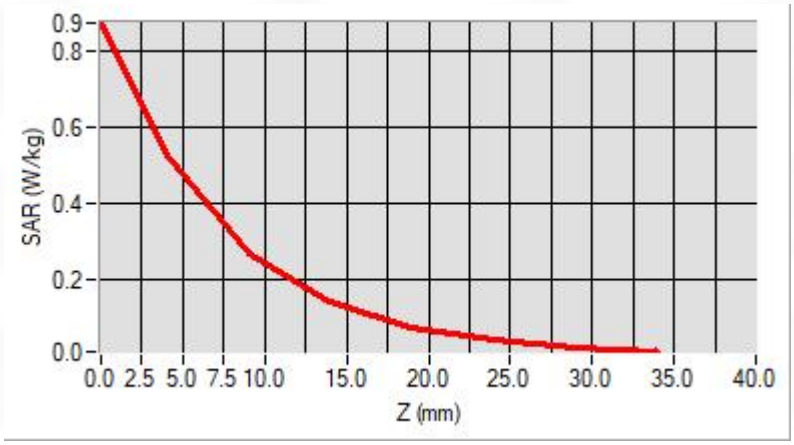
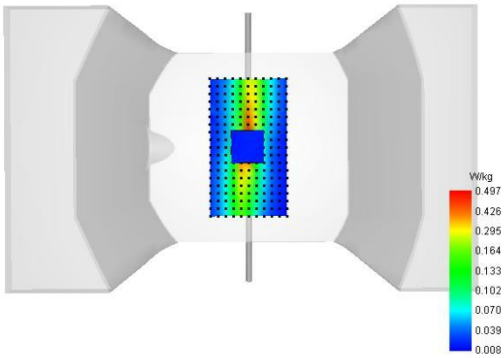
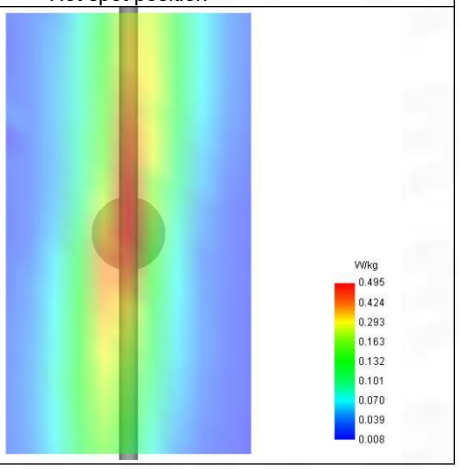


F. 3D Image

3D screen shot	Hot spot position
	

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ANNEX D Test Data

1-Front-of-face with front position in dist. 25mm on Channel L in PTT

SAR Measurement at CUSTOM (New_CustomBand_1) (Push-to-Talk, Validation Plane)

Date of measurement: 1/7/2025

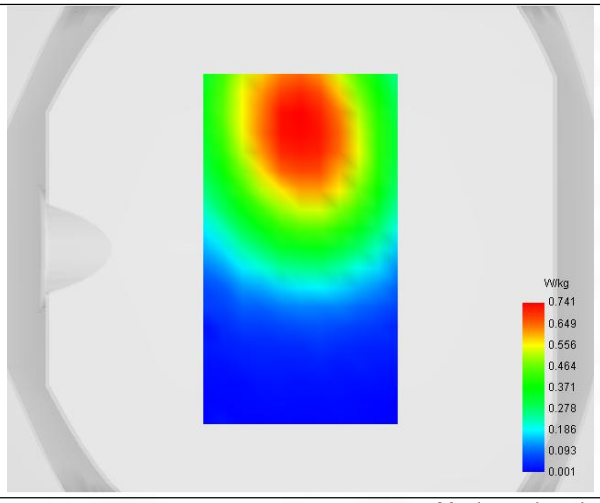
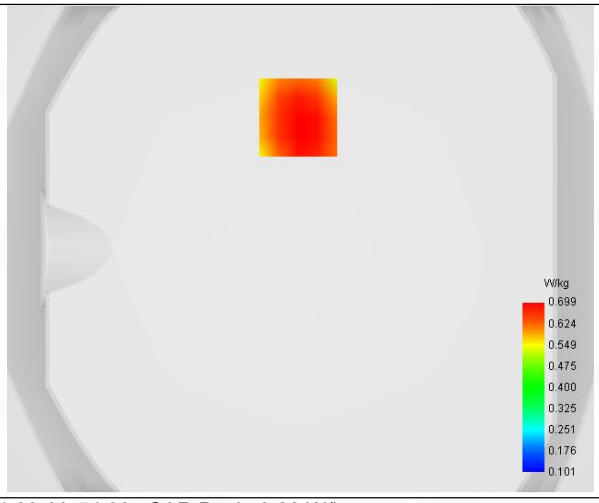
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.15
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Pust-to-Talk
Band	New_CustomBand_1
Channels	Lower
Signal	Custom

B. Permitivity

Frequency (MHz)	462.6375
Relative permitivity (real part)	43.183
Relative permitivity (imaginary part)	26.756
Conductivity (S/m)	0.866

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=54.00 ; SAR Peak: 0.88 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.500
SAR 1g (W/Kg)	0.681
Variation (%)	-1.110
Horizontal validation criteria: minimum distance (mm)	16.000
Vertical validation criteria: SAR ratio M2/M1 (%)	73.963

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.918	0.699	0.517	0.408	0.304	0.236	0.163

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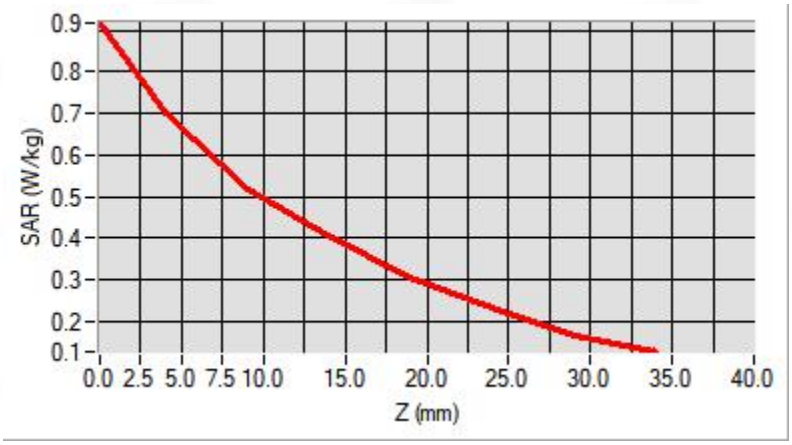
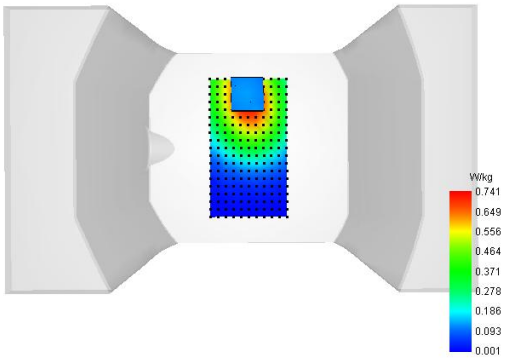
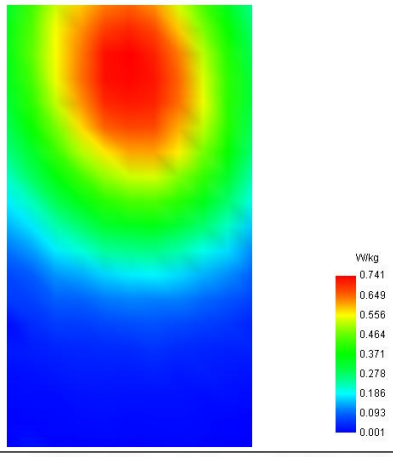


F. 3D Image

3D screen shot	Hot spot position
	

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2-Body with back position in dist. 0mm on Channel L in PTT

SAR Measurement at CUSTOM (New_CustomBand_1) (Push-to-Talk, Validation Plane)

Date of measurement: 1/7/2025

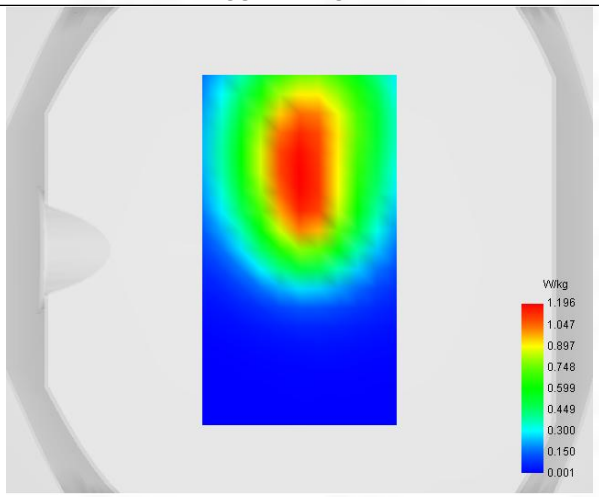
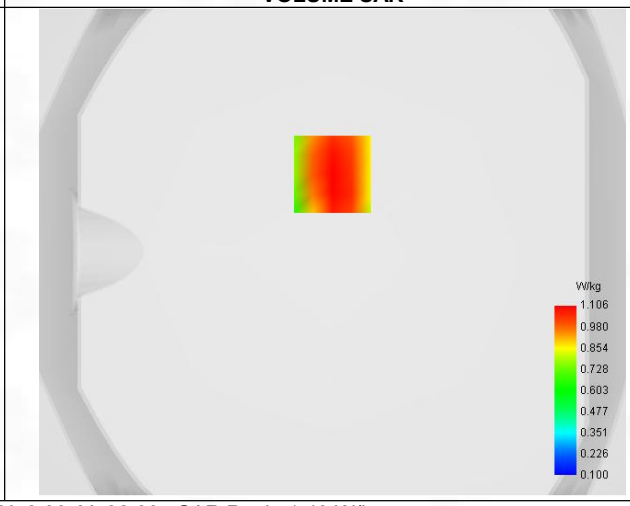
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.15
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Pust-to-Talk
Band	New_CustomBand_1
Channels	Lower
Signal	Custom

B. Permitivity

Frequency (MHz)	462.6375
Relative permitivity (real part)	43.183
Relative permitivity (imaginary part)	26.756
Conductivity (S/m)	0.866

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=32.00 ; SAR Peak: 1.49 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.703
SAR 1g (W/Kg)	1.072
Variation (%)	-2.670
Horizontal validation criteria: minimum distance (mm)	16.000
Vertical validation criteria: SAR ratio M2/M1 (%)	71.248

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.457	1.106	0.788	0.565	0.410	0.296	0.212

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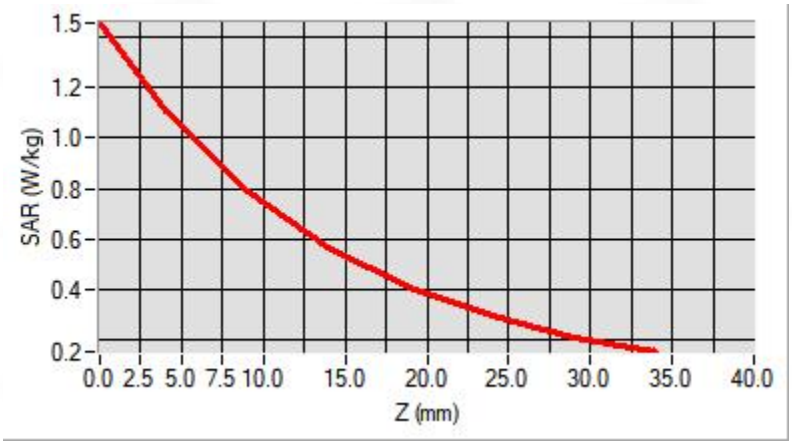
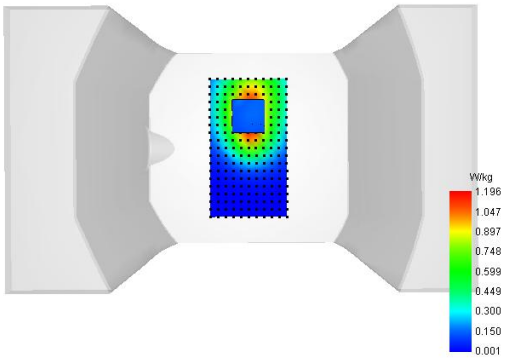
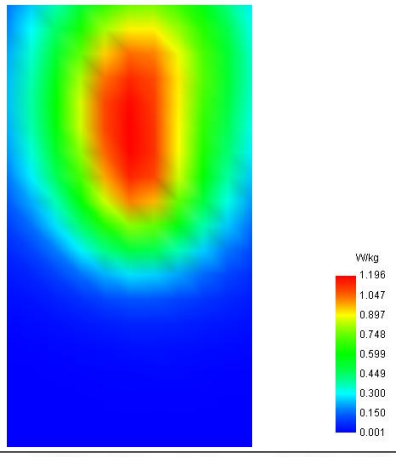


F. 3D Image

3D screen shot	Hot spot position
	

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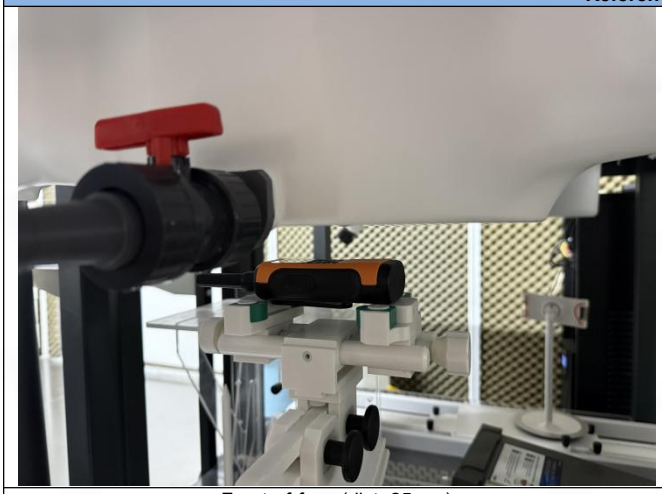
ANNEX E SAR Test Setup Photos

Reference Photo: simulation liquid depth 15.9cm


Reference Photos	
	
Front-of-face (dist. 25mm)	Back (dist. 0mm)The thickness of EUT is 6mm
	
Note: The headset is just for testing. This tested and electrically similar headsets may be used.	

ANNEX F EUT External and Internal Photos

Please refer to RF Report.

ANNEX G Calibration Information

Please refer to the document “Calibration.pdf”.

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--END OF REPORT--