SAR Test Report

For

Applicant Name:	Guangdong Mentech Technology Co., Ltd
Address:	504, Building D1, TCL Science Park, No.1001 Zhongshan Garden Road, Shuguang Community, Xili, Street, Nanshan District, Shenzhen, Guangdong, China
EUT Name:	TD-LTE
Brand Name:	mentech
Model Number:	PowFi TT GLH

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:	BTF250421R00201
Test Standards:	47 CFR Part 2.1093 IEEE Std. 1528-2013 IEEE C95.1-2019 KDB447498 D04 KDB865664 D01 KDB941225 D05 KDB 248227 D01 KDB690783 D01
FCC ID:	2A95D-POWFITTGLH
Test Conclusion:	Pass
Test Date:	2025-05-09 to 2025-05-12
Date of Issue:	2025-05-13
Tested By:	Jim Yin Jim Yin / Tester
Date of Issue:	2025-05-13
Reviewed By:	Amenda Zhong Amenda Zhong / Project Engineer
Date:	2025-05-13
Approved By:	Ryan.CJ Ryan.CJ / EMC Manager
Date:	2025-05-13

BTF Testing Lab (Shenzhen) Co., Ltd.

Note: All the test results in this report only related to the testing samples. Which can be duplicated completely for the legal use with approval of applicant; it shall not be reproduced except in full without the written approval of BTF Testing Lab (Shenzhen) Co., Ltd., All the objections should be raised within thirty days from the date of issue. To validate the report, you can contact us.

Revision History		
Version	Issue Date	Revisions Content
R_V0	2025-05-13	Original
Note:	*Once the revision has been made, then previous versions reports are invalid.*	

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BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

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:	Guangdong Mentech Technology Co., Ltd
Address:	504, Building D1, TCL Science Park, No.1001 Zhongshan Garden Road, Shuguang Community, Xili, Street, Nanshan District, Shenzhen, Guangdong, China

2.2 Manufacturer Information

Company Name:	NRadio Technologies Co., Ltd
Address:	Room 408, Ziyun Building, No.211, Xin'an 2nd Rd., Bao'an District, Shenzhen, P.R.C.

2.3 Factory Information

Company Name:	Dongguan Mentech Optical & Magnetic Co., Ltd
Address:	Building No.157 Dongyuan Av, Shipai Town, 523330 Dongguan City, Guangdong Province,PEOPLE'S REPUBLIC OF CHINA

2.4 General Description of Equipment under Test (EUT)

EUT Name	TD-LTE
Under Test Model Name	PowFi TT GLH
Sample No.	BTFSN250421008

2.5 Equipment under Test Ancillary Equipment

Ancillary Equipment 1	Rechargeable Li-ion Battery	
	Capacity	10000 mAh
	Rated Voltage	Rechargeable Li-ion Battery DC 3.8V

2.6 Technical Information

Network and Wireless connectivity	4G Network FDD LTE Band 5/41 2.4G WIFI 802.11b, 802.11g, 802.11n(HT20/40)

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

Operating Mode	LTE, WLAN		
Frequency Range	LTE Band 5	TX: 824 MHz ~ 849 MHz	RX: 869 MHz ~ 894 MHz
	LTE Band 41	TX: 2535 MHz ~ 2675 MHz	RX: 2535 MHz ~ 2675 MHz
	802.11b/g/n(HT20)	2412 ~ 2462 MHz	
	802.11n(HT40)	2422 ~ 2452 MHz	
Antenna Type	WWAN: Internal Antenna WLAN: Internal Antenna		
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	KDB447498 D04	Interim General RF Exposure Guidance v01
5	KDB865664 D01	SAR measurement 100MHz to 6GHz v01r04
6	KDB941225 D05	SAR for LTE Devices v02r05
7	KDB 248227 D01	802.11 Wi-Fi SAR v02r02
8	KDB690783 D01	SAR Listings on Grant 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 General Population/Uncontrolled exposure should be applied for this device, it is 1.6 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>

Exposure Position	Frequency Band	Reported SAR (W/kg)	Equipment Class	Highest Reported SAR (W/kg)
Body 1-g SAR (0 mm Gap)	LTE Band 5	**1.052**	TNB	**1.052**
	LTE Band 41	0.462		
	WLAN 2.4 GHz	0.336	DTS	

This device is in compliance with Specific Absorption Rate(SAR) for general population/uncontrolled exposure limits (1.6/4.0 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.

<Highest Reported Simultaneous SAR>

Exposure Position	Simultaneous Configuration	Highest Reported Simultaneous Transmission SAR (W/kg)	Limit (W/kg)	Verdict
Body 1-g SAR (0 mm Gap)	LTE Band 5 + 2.4G WIFI	1.388	1.6	Pass

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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. 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	∞	
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 DUTerros											
$LIQ(\sigma,\varepsilon)$	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											
$C(\varepsilon',\sigma)$	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:

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

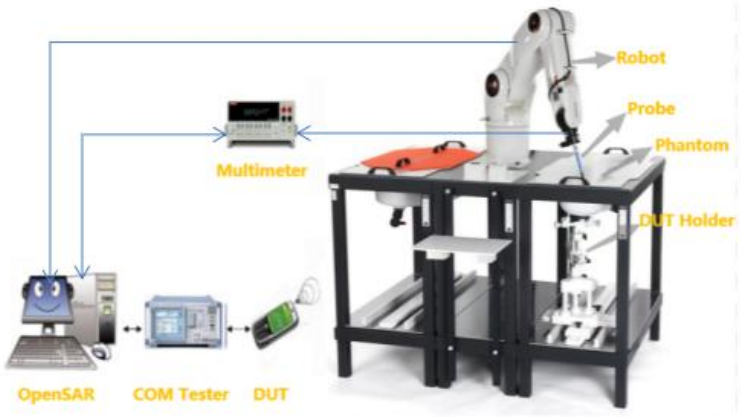
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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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SAM Phantom

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.

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.

ELLI Phantom

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.

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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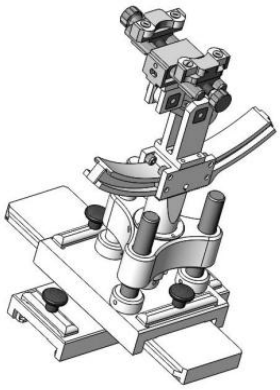
4.2.5 Device Holder



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
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
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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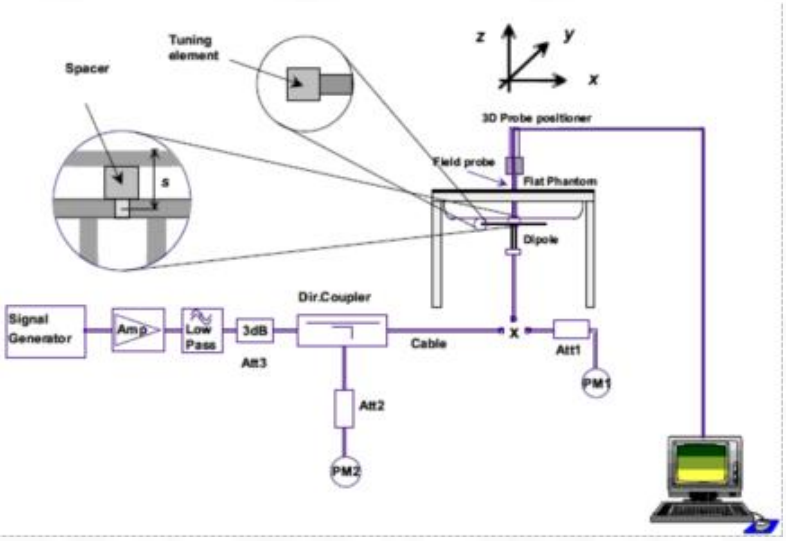
5. System Verification

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

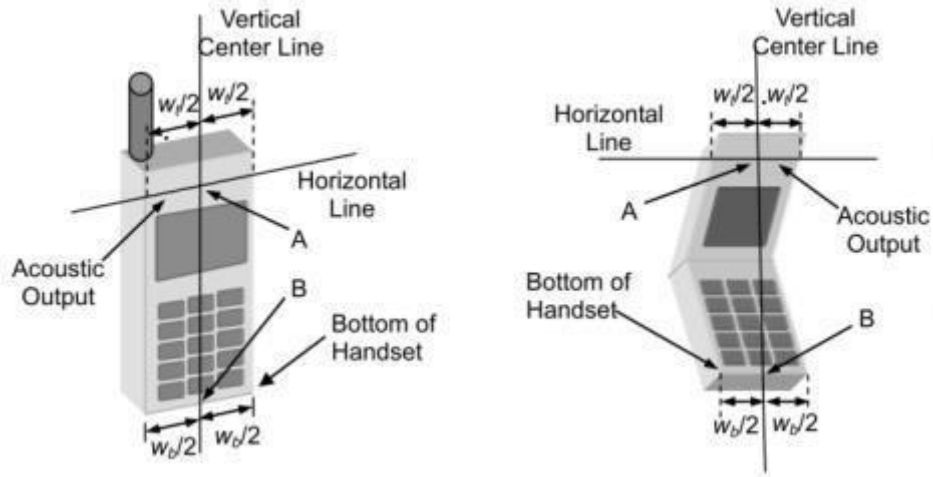
Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2013 using the SAM phantom illustrated as below.

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.

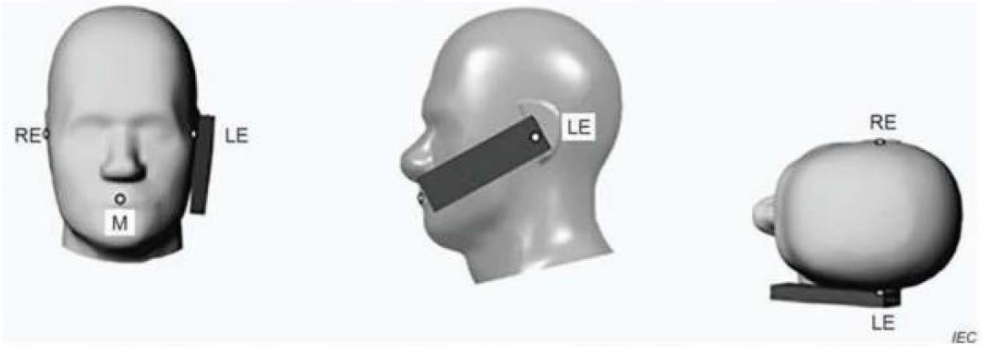
(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical center line is not necessarily parallel to the front face of the handset, 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.

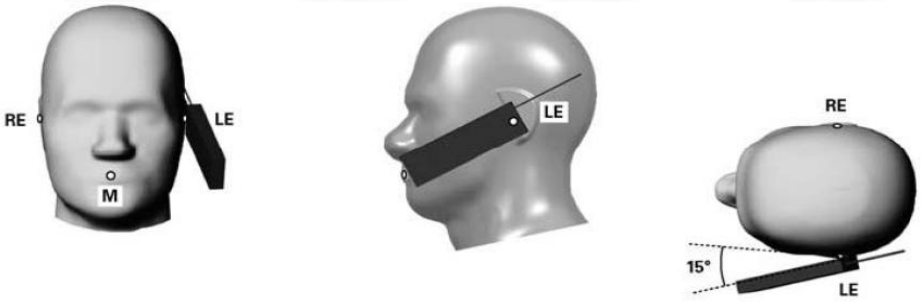
(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with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

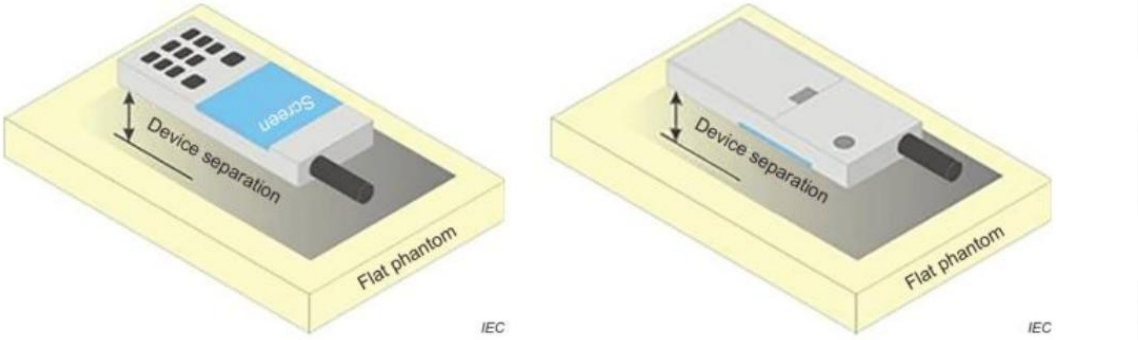


6.2 Body-worn Position Conditions

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 447498 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory.

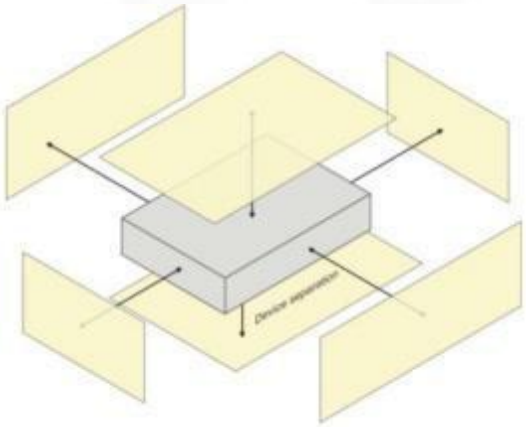
Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required. A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance <= 5 mm to support compliance.



6.3 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).



6.4 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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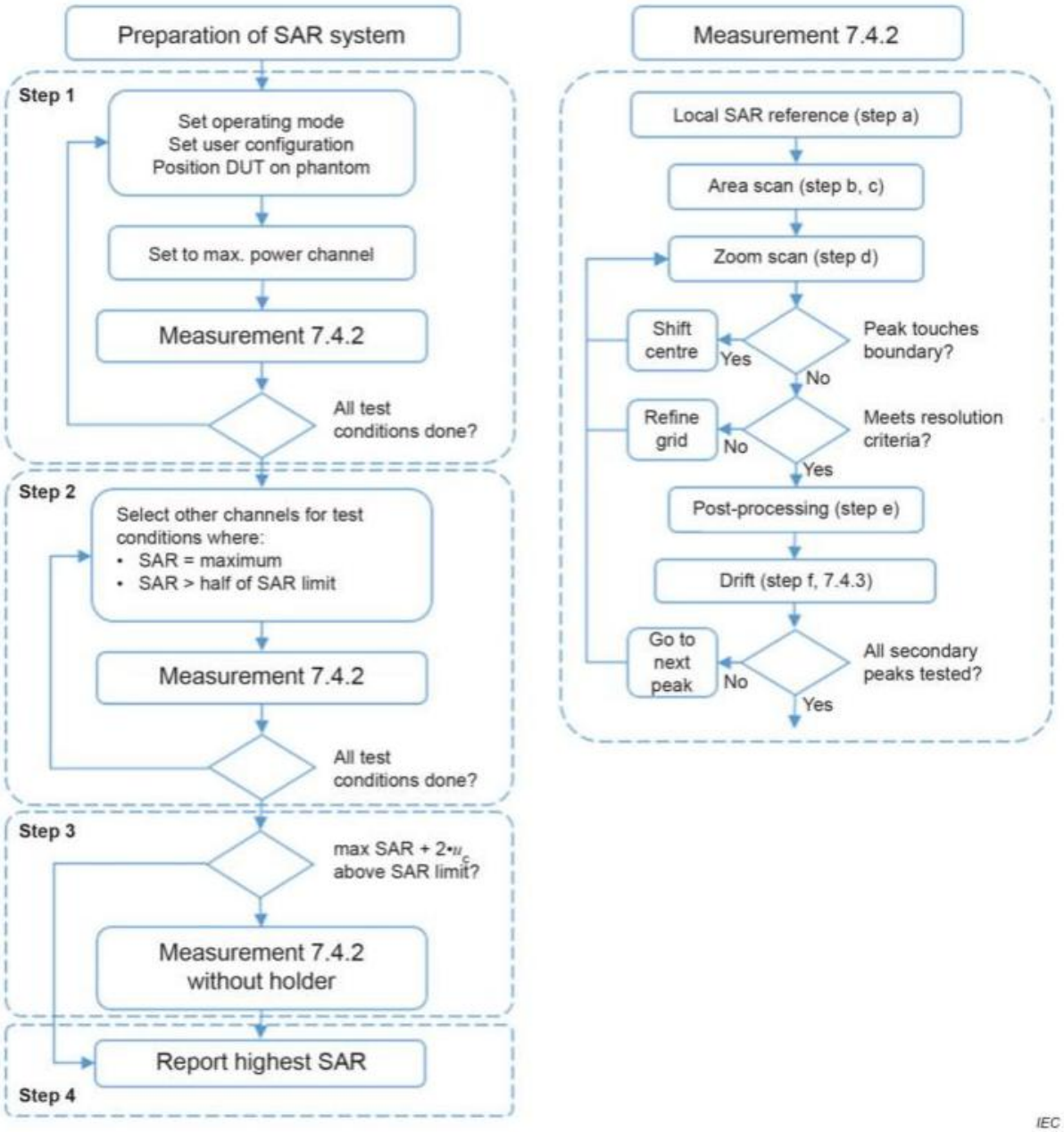
7. Measurement Procedure

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="3">uniform grid: Δz Zoom (n)</td><td rowspan="3">≤ 5 mm</td><td>3–4 GHz: ≤ 4 mm</td></tr>
<tr><td>4–5 GHz: ≤ 3 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 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>3–4 GHz: ≤ 3 mm</td></tr>
<tr><td>4–5 GHz: ≤ 2.5 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td>Δz Zoom (n>1): between subsequent points</td><td colspan="2">≤ 1.5·Δz Zoom (n-1)</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>

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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. Conducted RF Output Power

8.1 LTE

Band 5

LTE-FDD Band 5				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB allocation	RB offset		20407	20525	20643
					824.7MHz	836.5MHz	848.3MHz
1.4MHz	QPSK	1	0	22.00	21.67	21.73	21.55
			2	22.00	21.65	21.71	21.55
			5	22.00	21.69	21.71	21.58
		3	0	22.00	21.80	21.87	21.70
			2	22.00	21.80	21.85	21.68
			3	22.00	21.82	21.85	21.70
		6	0	21.00	20.84	20.89	20.73
	16QAM	1	0	21.50	21.05	21.11	20.87
			2	21.50	21.03	21.12	20.87
			5	21.50	20.98	21.12	20.80
		3	0	21.00	20.87	20.95	20.78
			2	21.00	20.88	20.86	20.71
			3	21.00	20.87	20.94	20.76
		6	0	21.00	20.94	20.97	20.82
Bandwidth	Modulation	RB allocation	RB offset	Maximum Tune-up(dBm)	20415	20525	20635
					825.5MHz	836.5MHz	847.5MHz
3MHz	QPSK	1	0	22.00	21.87	21.94	21.73
			7	22.00	21.80	21.85	21.66
			14	22.00	21.84	21.90	21.70
		8	0	21.00	20.92	20.98	20.80
			4	21.00	20.89	20.96	20.78
			7	21.00	20.88	20.96	20.78
		15	0	21.00	20.89	20.99	20.82
	16QAM	1	0	21.50	21.15	21.28	21.02
			7	21.50	21.03	21.13	20.85
			14	21.50	21.10	21.12	20.90
		8	0	21.00	20.98	20.00	20.82
			4	21.00	20.95	20.01	20.84
			7	21.00	20.95	20.98	20.78
		15	0	21.00	20.92	20.96	20.80

LTE-FDD Band 5				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB allocation	RB offset		20425	20525	20625
					826.5MHz	836.5MHz	846.5MHz
5MHz	QPSK	1	0	22.00	21.82	21.85	21.68
			13	22.00	21.78	21.84	21.66
			24	22.00	21.78	21.77	21.66
		12	0	21.00	20.85	20.87	20.73
			6	21.00	20.85	20.92	20.77
			13	21.00	20.80	20.88	20.75
		25	0	21.00	20.83	20.89	20.75
	16QAM	1	0	21.50	21.03	21.10	20.95
			13	21.50	21.10	21.19	20.95
			24	21.50	21.08	21.12	20.91
		12	0	21.00	20.87	20.88	20.72
			6	21.00	20.84	20.89	20.78
			13	21.00	20.84	20.86	20.71
		25	0	21.00	20.82	20.86	20.72

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Bandwidth	Modulation	RB allocation	RB offset	Maximum Tune-up(dBm)	20450	20525	20600
					829.0MHz	836.5MHz	844.0MHz
10MHz	QPSK	1	0	**22.00**	21.83	**21.87**	21.79
			25	22.00	21.83	21.85	21.69
			49	22.00	21.86	21.79	21.68
		25	0	21.00	20.91	**20.93**	20.85
			13	21.00	20.87	20.88	20.77
			25	21.00	20.90	20.79	20.75
		50	0	21.00	20.92	20.87	20.81
	16QAM	1	0	21.50	21.16	21.17	21.07
			25	21.50	21.08	21.07	20.97
			49	21.50	21.18	21.13	20.94
		25	0	21.00	20.93	20.89	20.85
			13	21.00	20.89	20.88	20.77
			25	21.00	20.91	20.80	20.70
		50	0	21.00	20.91	20.85	20.80

Band 41

LTE-TDD Band 41				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB allocation	RB offset		39675	40620	41565
					2498.5MHz	2593.0MHz	2687.5MHz
5MHz	QPSK	1	0	25.50	24.77	25.27	24.30
			13	25.50	25.19	25.18	24.69
			24	25.00	24.70	24.97	24.38
		12	0	24.00	23.74	23.80	23.63
			6	24.00	23.64	23.73	23.61
			13	24.00	23.63	23.71	23.52
		25	0	24.00	23.67	23.73	23.49
	16QAM	1	0	23.50	23.45	23.45	23.35
			13	23.50	23.38	23.38	23.32
			24	23.50	23.20	23.34	23.26
		12	0	23.00	22.68	22.80	22.51
			6	23.00	22.74	22.88	22.50
			13	23.00	22.65	22.80	22.56
		25	0	23.00	22.83	22.97	22.86
Bandwidth	Modulation	RB allocation	RB offset	Maximum Tune-up(dBm)	39700	40620	41540
					2501.0MHz	2593.0MHz	2685.0MHz
10MHz	QPSK	1	0	25.50	24.87	25.24	24.22
			25	25.50	25.09	25.27	24.50
			49	25.50	25.31	25.35	24.82
		25	0	24.00	23.74	23.92	23.66
			13	24.00	23.83	23.86	23.50
			25	24.00	23.85	23.97	23.42
		50	0	24.00	23.71	23.87	23.53
	16QAM	1	0	24.00	23.66	23.67	23.37
			25	23.50	23.43	23.41	23.14
			49	23.50	23.45	23.28	23.37
		25	0	23.50	22.92	23.09	22.76
			13	23.50	23.02	23.04	22.71
			25	23.50	23.03	23.07	22.80
		50	0	23.00	22.80	22.91	22.63

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LTE-TDD Band 41				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB allocation	RB offset		39725	40620	41515
					2503.5MHz	2593.0MHz	2682.5MHz
15MHz	QPSK	1	0	25.50	24.96	25.35	24.32
			38	25.50	25.00	25.27	24.37
			74	25.50	25.06	25.26	24.52
		36	0	24.50	24.07	23.82	23.50
			18	24.00	23.78	23.70	23.52
			39	24.00	23.88	23.72	23.56
		75	0	24.00	23.85	23.77	23.47
	16QAM	1	0	23.50	23.44	23.35	23.48
			38	24.00	23.34	23.64	23.29
			74	24.00	23.44	23.54	23.32
		36	0	23.00	22.90	22.75	22.67
			18	23.00	22.81	22.84	22.63
			39	23.00	22.92	22.85	22.63
		75	0	23.00	22.93	22.94	22.59
Bandwidth	Modulation	RB allocation	RB offset	Maximum Tune-up(dBm)	39750	40620	41490
					2506.0MHz	2593.0MHz	2680.0MHz
20MHz	QPSK	1	0	**25.50**	24.95	**25.35**	24.47
			50	25.50	24.93	25.31	24.21
			99	25.50	25.45	25.30	24.77
		50	0	24.00	23.74	**23.96**	23.69
			25	24.00	23.75	23.81	23.54
			50	24.00	23.67	23.90	23.57
		100	0	24.00	23.73	23.76	23.46
	16QAM	1	0	24.00	23.42	23.73	23.41
			50	24.00	23.26	23.57	23.25
			99	24.00	23.55	23.61	23.26
		50	0	23.50	22.93	23.04	22.70
			25	23.00	22.86	22.87	22.66
			50	23.00	22.86	22.88	22.66
		100	0	23.00	22.95	22.94	22.75

8.2 Wi-Fi

Band (GHz)	Mode	Channel	Freq. (MHz)	Average Power (dBm)	Maximum Tune-up(dBm)	SAR Test Require.
2.4g Wifi (2.4~2.4835)	802.11b	1	2412	15.44	15.50	No
		6	2437	15.13	15.50	No
		11	2462	**16.10**	**16.50**	Yes
	802.11g	1	2412	11.78	12.00	No
		6	2437	11.62	12.00	No
		11	2462	12.09	12.50	No
	802.11n(HT20)	1	2412	11.72	12.00	No
		6	2437	11.67	12.00	No
		11	2462	12.16	12.50	No
Note: SAR is not required for the following 2.4 GHz OFDM conditions as the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2W/kg.						

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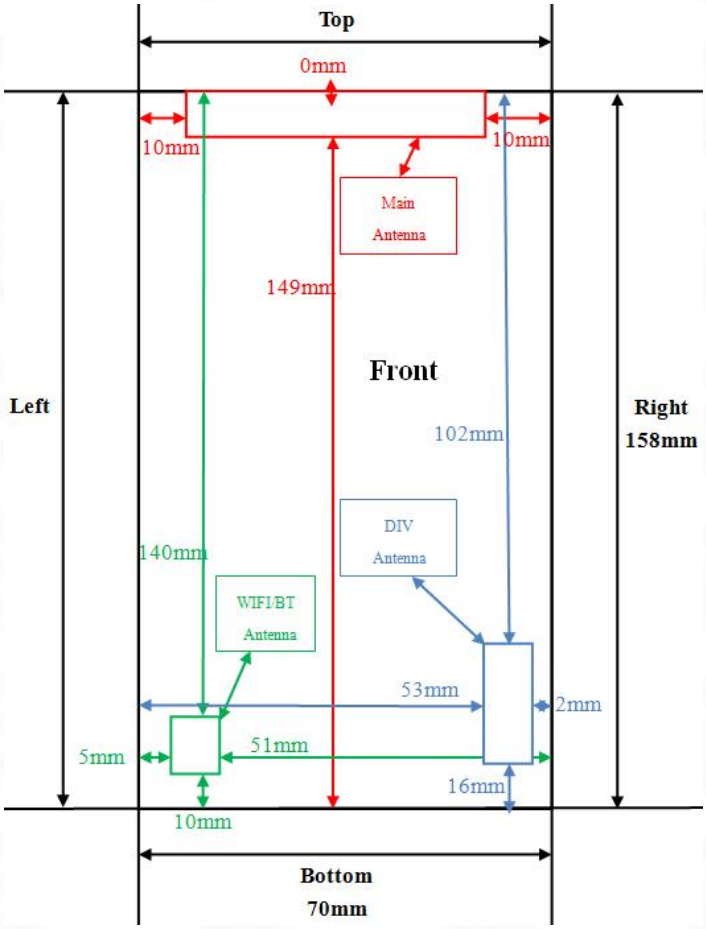
9. Test Exclusion Consideration

Antenna information:



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)
LTE	<25	<25	<25	<25	<25	149
Wifi	<25	<25	<25	51	140	<25

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10. Test Result

LTE

Body-worn(0mm Gap)													
Mode	Channel Type	Position	Ch.	Freq. (MHz)	Power Drift (%)	1g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	1g Reported SAR (W/kg)	Meas. No.
Band 5 (BW: 10MHz)	1RB	Front	20525	836.5	-1.26	0.711	100.00	1.000	21.87	22.00	1.030	0.733	/
		Back	20450	829.0	-1.52	0.951	100.00	1.000	21.86	22.00	1.033	0.982	/
			20525	836.5	2.36	1.021	100.00	1.000	21.87	22.00	1.030	**1.052**	1#
			20525	836.5	3.14	1.015	100.00	1.000	21.87	22.00	1.030	1.045	/
			20600	844.0	-0.12	0.842	100.00	1.000	21.79	22.00	1.050	0.884	/
		Left	20525	836.5	-1.58	0.284	100.00	1.000	21.87	22.00	1.030	0.293	/
		Right	20525	836.5	1.62	0.230	100.00	1.000	21.87	22.00	1.030	0.237	/
		Bottom	20525	836.5	-2.60	0.075	100.00	1.000	21.87	22.00	1.030	0.077	/
		Top	20525	836.5	0.15	0.459	100.00	1.000	21.87	22.00	1.030	0.473	/
	25%RB	Front	20525	836.5	0.51	0.571	100.00	1.000	20.93	21.00	1.016	0.580	/
		Back	20450	829.0	-2.15	0.822	100.00	1.000	20.91	21.00	1.021	0.839	/
			20525	836.5	-1.59	0.891	100.00	1.000	20.93	21.00	1.016	0.905	/
			20600	844.0	-1.59	0.852	100.00	1.000	20.85	21.00	1.035	0.882	/
		Left	20525	836.5	-0.15	0.201	100.00	1.000	20.93	21.00	1.016	0.204	/
		Right	20525	836.5	1.32	0.167	100.00	1.000	20.93	21.00	1.016	0.170	/
		Bottom	20525	836.5	-2.15	0.042	100.00	1.000	20.93	21.00	1.016	0.043	/
		Top	20525	836.5	0.12	0.261	100.00	1.000	20.93	21.00	1.016	0.265	/

Body-worn(0mm Gap)													
Mode	Channel Type	Position	Ch.	Freq. (MHz)	Power Drift (%)	1g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	1g Reported SAR (W/kg)	Meas. No.
Band 41 (BW: 20MHz)	1RB	Front	40620	2593.0	-1.25	0.284	100.00	1.000	25.35	25.50	1.035	0.294	/
		Back	40620	2593.0	-4.86	0.446	100.00	1.000	25.35	25.50	1.035	**0.462**	2#
		Left	40620	2593.0	-2.15	0.105	100.00	1.000	25.35	25.50	1.035	0.109	/
		Right	40620	2593.0	1.62	0.115	100.00	1.000	25.35	25.50	1.035	0.119	/
		Bottom	40620	2593.0	0.15	0.021	100.00	1.000	25.35	25.50	1.035	0.022	/
		Top	40620	2593.0	-1.59	0.264	100.00	1.000	25.35	25.50	1.035	0.273	/
	50%RB	Front	40620	2593.0	-1.58	0.182	100.00	1.000	23.96	24.00	1.009	0.184	/
		Back	40620	2593.0	-1.05	0.305	100.00	1.000	23.96	24.00	1.009	0.308	/
		Left	40620	2593.0	1.06	0.084	100.00	1.000	23.96	24.00	1.009	0.085	/
		Right	40620	2593.0	-1.25	0.102	100.00	1.000	23.96	24.00	1.009	0.103	/
		Bottom	40620	2593.0	0.61	0.018	100.00	1.000	23.96	24.00	1.009	0.018	/
		Top	40620	2593.0	0.12	0.152	100.00	1.000	23.96	24.00	1.009	0.153	/

WIFI

Body-worn(0mm Gap)												
Mode	Position	Ch.	Freq. (MHz)	Power Drift (%)	1g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	1g Reported SAR (W/kg)	Meas. No.
2.4g WIFI 802.11b	Front	11	2462	-1.59	0.184	100.00	1.000	16.10	16.50	1.096	0.202	/
	Back	11	2462	2.83	0.306	100.00	1.000	16.10	16.50	1.096	**0.336**	3#
	Left	11	2462	-1.26	0.102	100.00	1.000	16.10	16.50	1.096	0.112	/
	Right	11	2462	0.15	0.087	100.00	1.000	16.10	16.50	1.096	0.095	/
	Bottom	11	2462	0.51	0.024	100.00	1.000	16.10	16.50	1.096	0.026	/
	Top	11	2462	-1.28	0.137	100.00	1.000	16.10	16.50	1.096	0.150	/

Note:
1. The maximum SAR Value of each test band is marked bold.
2. SAR plot is provided only for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
3. Per KDB 447498 D04 v01, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
4. Per KDB 447498 D04 v01, next-to-mouth/wrist-worn use is evaluated with the device positioned at 10/0mm from a flat phantom respectively filled with head tissue-equivalent medium.
5. Per KDB 447498 D04 v01, 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.

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11. SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue- equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.
10g factor

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is >= 0.80 W/kg, repeat that measurement once.
3. If the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20, or when the original or repeated measurement is >= 1.45 W/kg, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20, and the original, first or second repeated measurement is >= 1.5 W/kg, perform a third repeated measurement.

Note: For 1g SAR, the highest measured 1g SAR is 1.052 > 0.80 W/kg, repeated measurement is as below.

Mode	Position	Ch.	Freq. (MHz)	1g Meas SAR (W/kg)	the ratio of largest to smallest SAR for the original and first repeated measurements
LTE Band 5 (BW: 10MHz)	Back	20525	836.5	1.021	1.006
	Back-Repeated	20525	836.5	1.015	

According to the above ratio result, we don’t need to perform a second repeated measurement for these bands.

12. 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/SAR 10g 4.0 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 10g 4.0 W/kg), SAR test exclusion is determined by the SAR to Peak Location Ratio (SPLSR)

12.1 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 2 Tx antennas, WWAN main antenna, Wi-Fi Ant. supporting 2.4G Wi-Fi, 2x antennas can always transmit simultaneously. The work mode combination is showed as below table.

Simultaneous Transmission information:

NO.	Configuration	Body
1	WWAN+WIFI(2.4g)	Yes

12.2 Sum SAR of Simultaneous Transmission

Body

Band	Test Position	RB allocation	Scaled SAR		Σ SAR (W/kg) WWAN + WIFI 2.4G	SPLSR	Remark
			WWAN	WIFI 2.4G			
LTE Band 5 QPSK (10MHz)	Front	1RB	0.733	0.202	0.935	N/A	N/A
	Back		**1.052**	0.336	**1.388**	N/A	N/A
	Left		0.293	0.112	0.405	N/A	N/A
	Right		0.237	0.095	0.332	N/A	N/A
	Bottom		0.077	0.026	0.103	N/A	N/A
	Top		0.473	0.150	0.623	N/A	N/A
	Front	25%RB	0.580	0.202	0.782	N/A	N/A
	Back		0.905	0.336	1.241	N/A	N/A
	Left		0.204	0.112	0.316	N/A	N/A
	Right		0.170	0.095	0.265	N/A	N/A
	Bottom		0.043	0.026	0.069	N/A	N/A
	Top		0.265	0.150	0.415	N/A	N/A

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13. 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
MXA Signal Analyzer	KEYSIGHT	N9020A	MY54410409	2024/10/25	2025/10/24
Broadband Preamplifier	Schwarzbeck	BBV9718D	00008	2024/09/24	2025/09/23
3dB Attenuator	MIDWEST MICROWAVE	SMA-JK6G-3DB	N/A	2025/04/02	2026/04/01
Coupler	MERRIMAC	CWM-10R-10.8G	LOT-83391	2024/09/24	2025/09/24
835MHz Validation Dipole	MVG	SID835	07/22 DIP 0G835-655	2023/02/06	2026/02/05
1800MHz Validation Dipole	MVG	SID1800	07/22 DIP 1G800-657	2023/02/06	2026/02/05
2450MHz Validation Dipole	MVG	SID2450	07/22 DIP 2G450-662	2023/02/06	2026/02/05
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					
835	41.50	42.05	0.90	0.91	1.33%	1.11%	±5%	22.3	11/5/2025
836.5	41.50	42.03	0.90	0.91	1.28%	1.11%	±5%	22.3	11/5/2025
2450	39.20	39.52	1.80	1.79	0.82%	-0.56%	±5%	21.8	12/5/2025
2462	39.20	39.43	1.80	1.77	0.59%	-1.67%	±5%	21.8	12/5/2025
2593	39.00	39.04	1.96	1.93	0.10%	-1.53%	±5%	21.8	12/5/2025
2600	39.00	39.06	1.96	1.93	0.15%	-1.53%	±5%	21.8	12/5/2025
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
835	100	0.565	1.025	5.65	10.25	6.17	9.79	-8.43%	4.70%
2450	100	2.469	5.394	24.69	53.94	23.86	54.40	3.48%	-0.85%
2600	100	2.438	5.313	24.38	53.13	24.48	57.14	-0.41%	-7.02%

ANNEX C SAR Dipole Calibrations

Justification for Extended SAR Dipole Calibrations

Referring to KDB 865664D01V01r04, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration)and in impedance (within 5 ohm of prior calibration). the annual calibration is not necessary and the calibrationinterval can be extended.While calibration intervals not exceed 3 years.

Frequency (MHz)	Return loss(dB)		Impedance(Ω)				error range（%）		Results	Date
	measurement	target	measurement		target		Return loss(±20%)	Impedance(±5 Ω)	(P/F)	
			real part	imaginary part	real part	Imaginary part				
CW835	-29.88	-26.27	52.8	-1.7	52.5	-4.2	13.74%	2.8	P	5/2/2024
CW835	-25.81	-26.27	53.12	-2.2	52.5	-4.2	-1.75%	-2.6	P	5/2/2025
CW2450	-24.37	-21.23	48.3	5.7	49.4	+8.6	14.79%	4.0	P	5/2/2024
CW2450	-23.25	-21.23	48.27	6.3	49.4	+8.6	9.51%	3.4	P	5/2/2025
CW2600	-20.56	-23.05	57.3	5.7	54.3	+5.5	-10.80%	3.2	P	5/2/2024
CW2600	-21.05	-23.05	57.15	5.7	54.3	+5.5	-8.68%	-3.1	P	5/2/2025

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System Performance Check Data (835 MHz)

System check at 835 MHz

Date of measurement: 11/5/2025

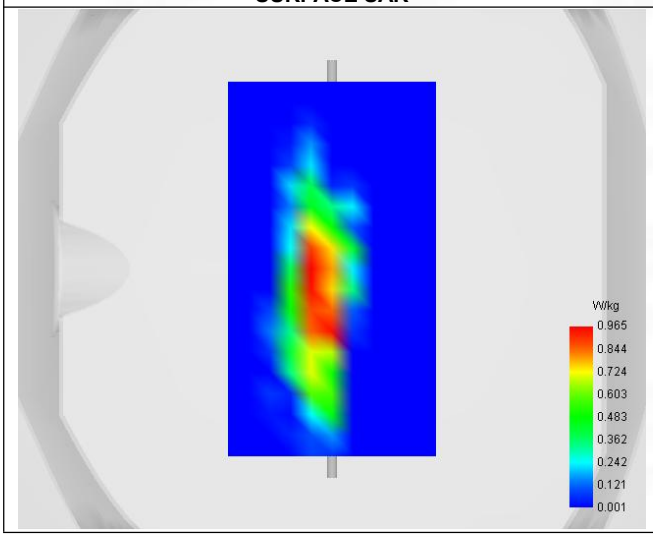
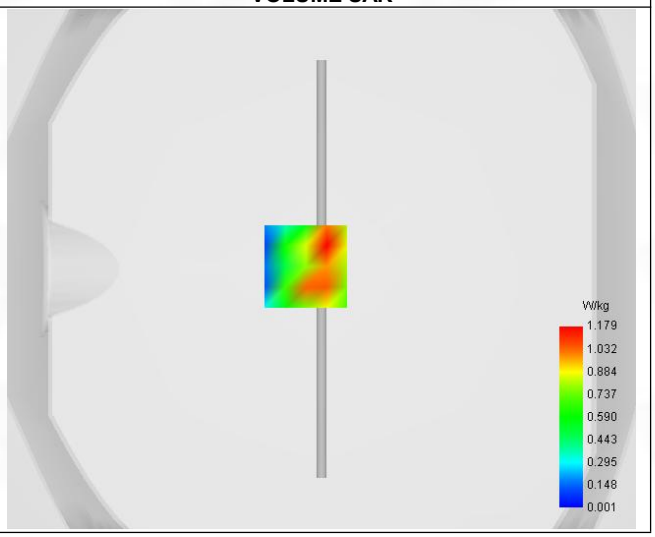
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.15
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	835.000
Relative permitivity (real part)	42.050
Relative permitivity (imaginary part)	19.716
Conductivity (S/m)	0.910

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-6.00, Y=1.00 ; SAR Peak: 1.86 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.565
SAR 1g (W/Kg)	1.025
Variation (%)	-2.580
Horizontal validation criteria: minimum distance (mm)	11.314
Vertical validation criteria: SAR ratio M2/M1 (%)	31.89%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.291	1.179	0.376	0.315	0.001

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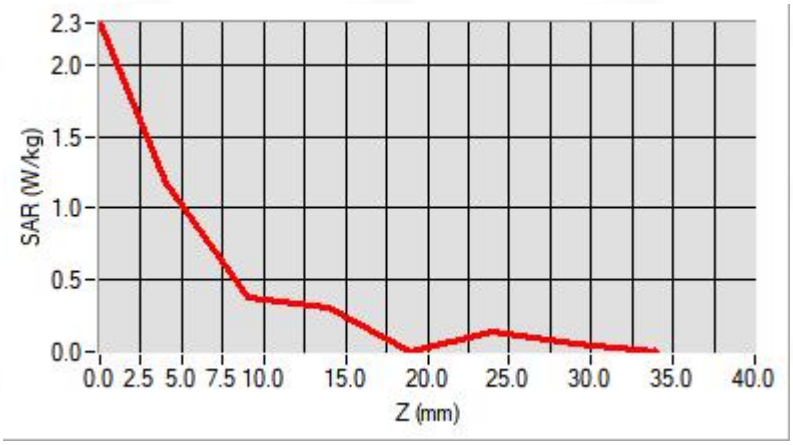
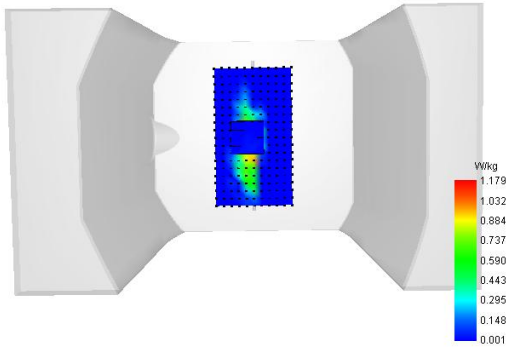
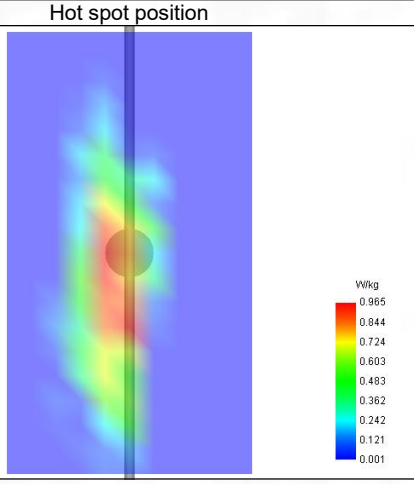


F. 3D Image

3D screen shot	Hot spot position
	

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System Performance Check Data (2450 MHz)

System check at 2450 MHz

Date of measurement: 12/5/2025

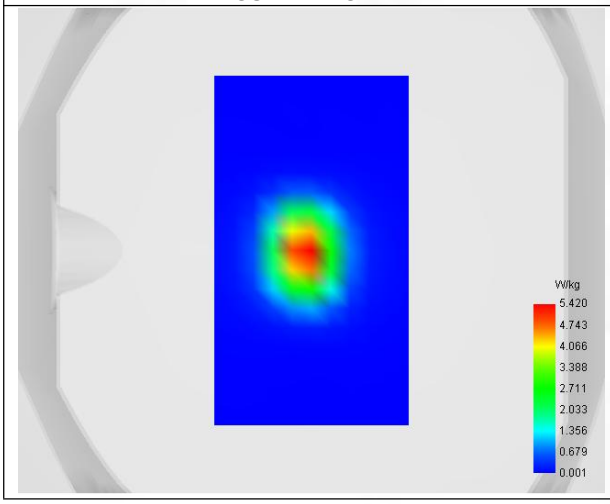
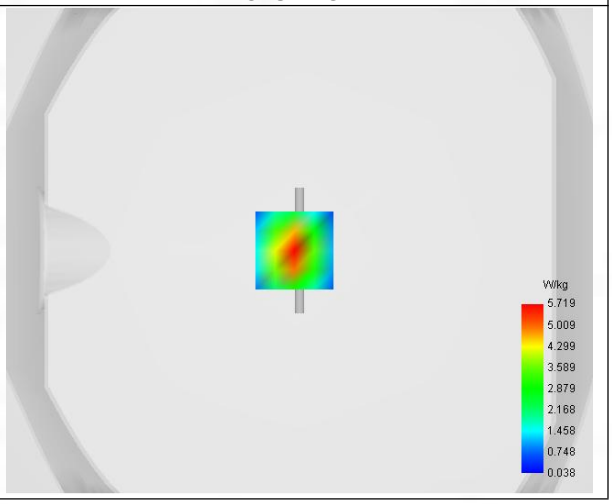
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.40
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	CW2450
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	2450.000
Relative permitivity (real part)	39.520
Relative permitivity (imaginary part)	13.142
Conductivity (S/m)	1.790

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-2.00, Y=0.00 ; SAR Peak: 9.39 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	2.469
SAR 1g (W/Kg)	5.394
Variation (%)	-0.190
Horizontal validation criteria: minimum distance (mm)	11.314
Vertical validation criteria: SAR ratio M2/M1 (%)	51.23%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	9.429	5.719	2.930	1.545	0.818

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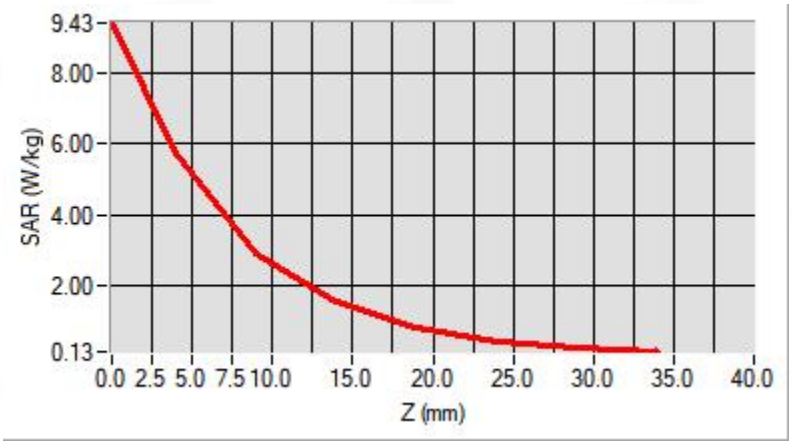
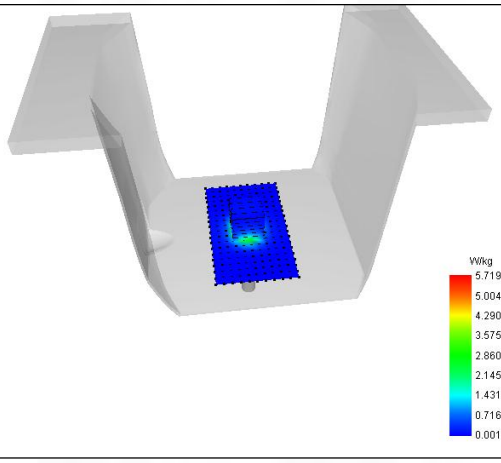
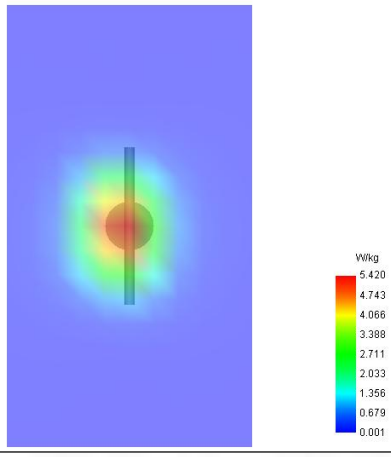


F. 3D Image

3D screen shot	Hot spot position
	

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System Performance Check Data (2600 MHz)

System check at 2600 MHz

Date of measurement: 12/5/2025

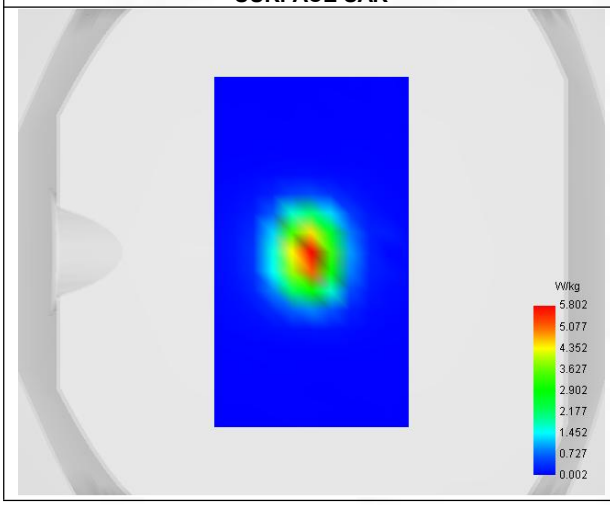
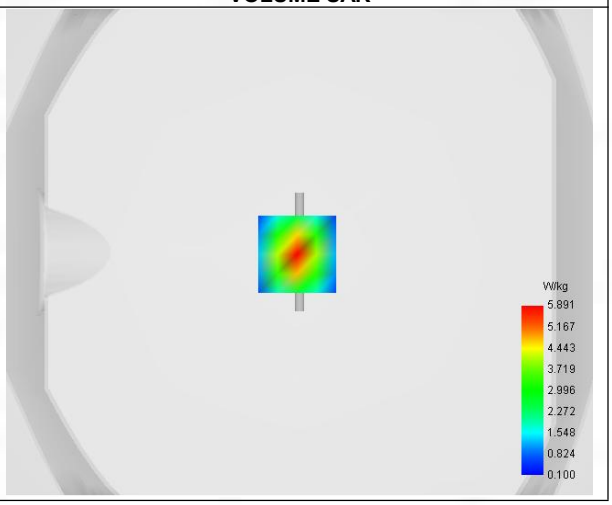
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.27
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	CW2600
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	2600.000
Relative permitivity (real part)	39.060
Relative permitivity (imaginary part)	12.746
Conductivity (S/m)	1.930

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=-1.00 ; SAR Peak: 9.92 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	2.438
SAR 1g (W/Kg)	5.313
Variation (%)	0.160
Horizontal validation criteria: minimum distance (mm)	16.000
Vertical validation criteria: SAR ratio M2/M1 (%)	49.65%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	9.936	5.891	2.925	1.447	0.765

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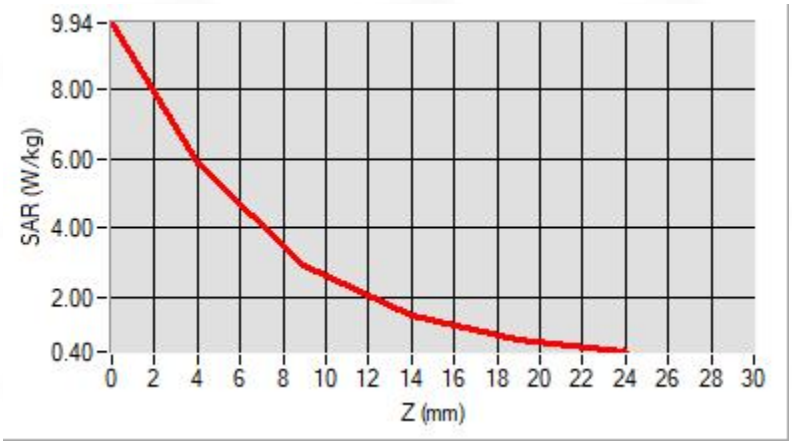
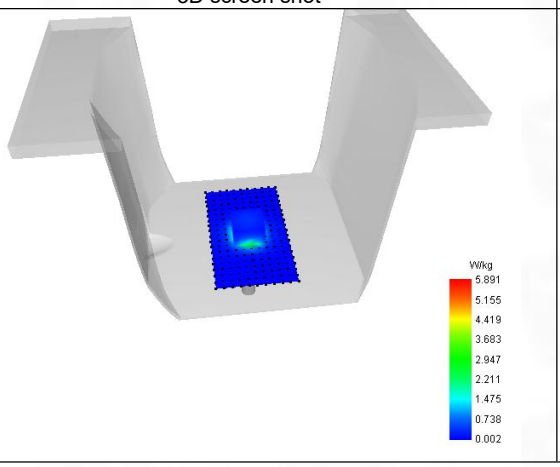
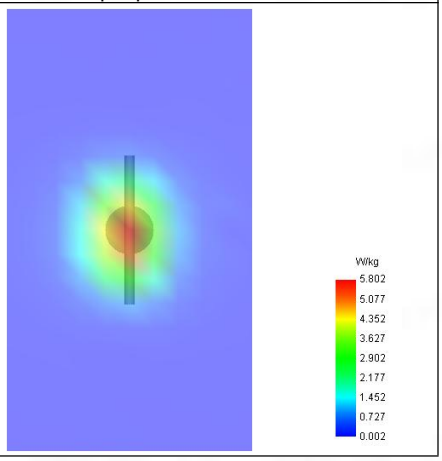


F. 3D Image

3D screen shot	Hot spot position
	

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ANNEX D Test Data

1-Body-worn: back position in dist. 0mm Channel 20525 in LTE Band 5

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

Date of measurement: 11/5/2025

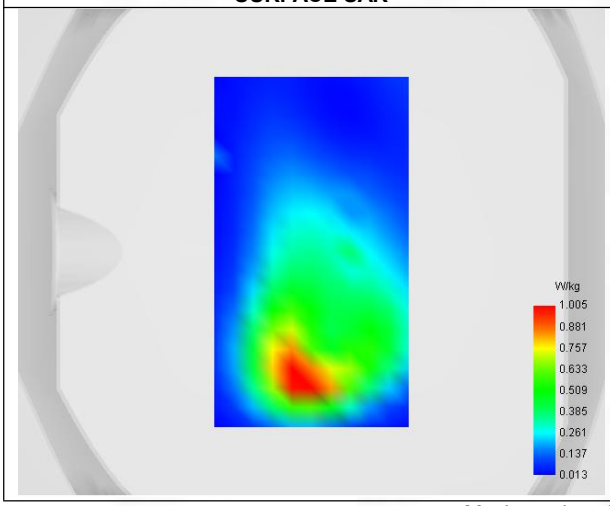
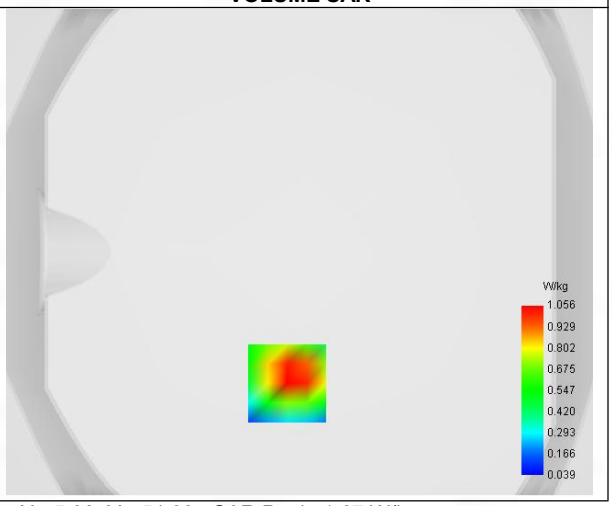
A. Experimental conditions.

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	Body
Band	LTE band 5
Channels/Frequency	Middle (20525)/ frequency 836.500 Mhz
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	0
RB size	1

B. Permitivity

Middle TX Frequency (MHz)	836.590
Relative permitivity (real part)	42.033
Relative permitivity (imaginary part)	19.698
Conductivity (S/m)	0.912

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-5.00, Y=-54.00 ; SAR Peak: 1.67 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.563
SAR 1g (W/Kg)	1.021
Variation (%)	2.360
Horizontal validation criteria: minimum distance (mm)	16.000
Vertical validation criteria: SAR ratio M2/M1 (%)	59.28%

E. Z Axis Scan

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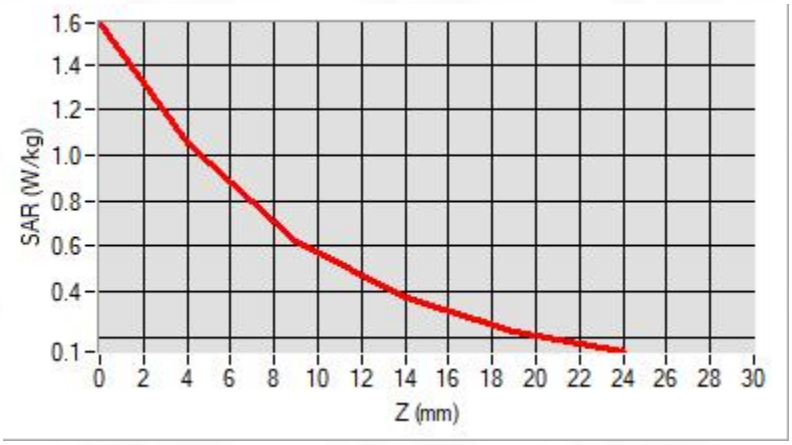
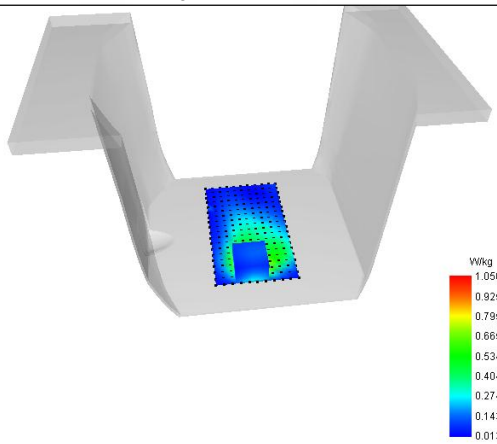
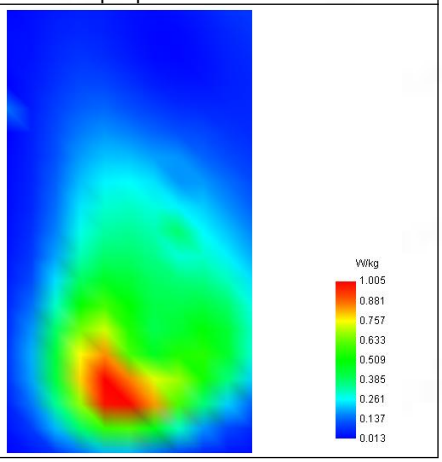
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.582	1.056	0.626	0.373	0.229



F. 3D Image

3D screen shot	Hot spot position
	

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2-Body-worn: back position in dist. 0mm Channel 40620 in LTE Band 41

SAR Measurement at LTE band 41 (Body, Validation Plane)

Date of measurement: 12/5/2025

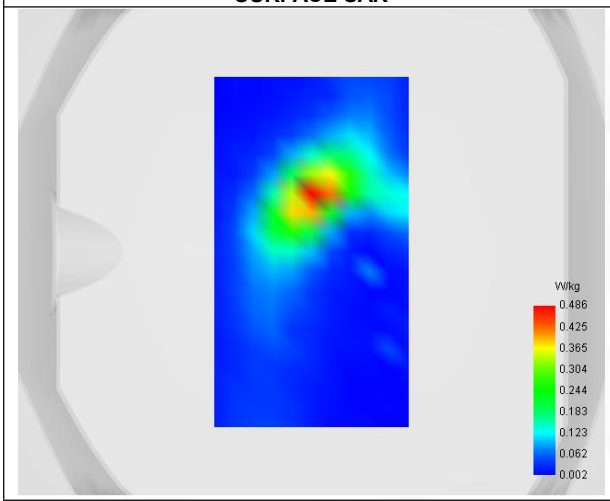
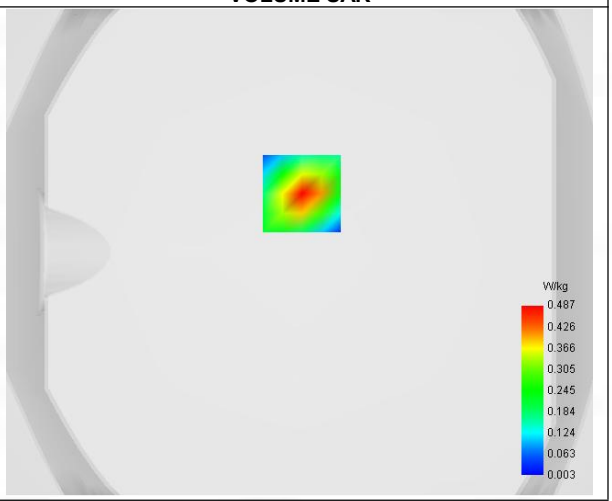
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.27
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 41
Channels/Frequency	Middle (40620)/ frequency 2593.000 Mhz
Signal	LTE TDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	0
RB size	1
Subframe configuration	0
Special subframe configuration	0
Cyclic prefix	Normal
Duty Cycle (%)	100

B. Permitivity

Middle TX Frequency (MHz)	2593.000
Relative permitivity (real part)	39.041
Relative permitivity (imaginary part)	12.764
Conductivity (S/m)	1.932

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=24.00 ; SAR Peak: 0.80 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.212
SAR 1g (W/Kg)	0.446
Variation (%)	-4.860
Horizontal validation criteria: minimum distance (mm)	16.000
Vertical validation criteria: SAR ratio M2/M1 (%)	51.54%

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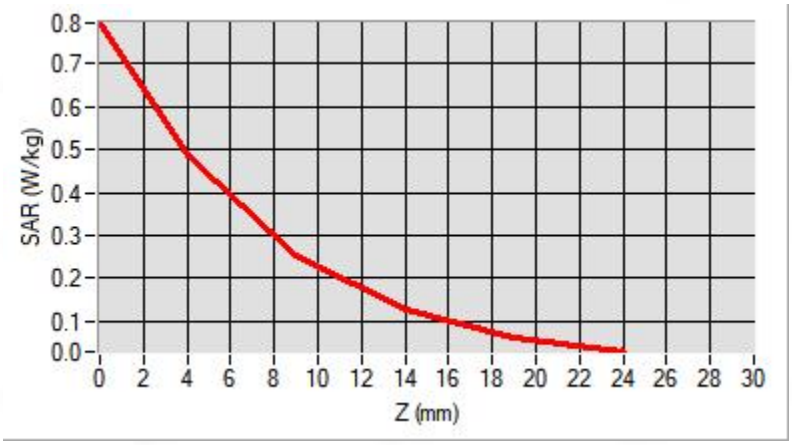
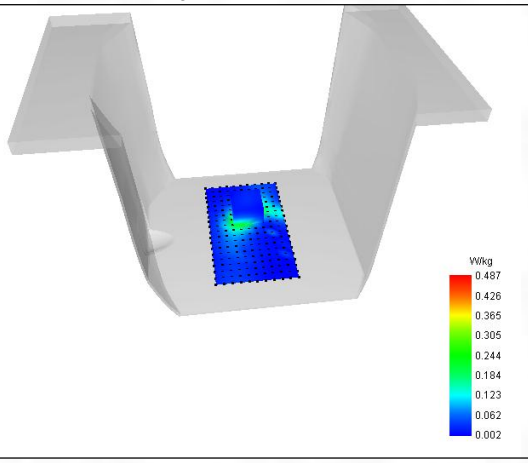
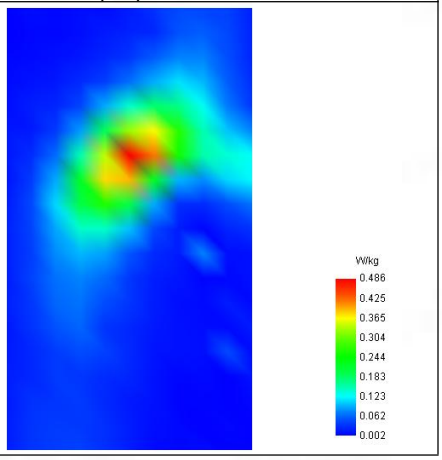
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.795	0.487	0.251	0.126	0.064



F. 3D Image

3D screen shot	Hot spot position
	

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3-Body-worn: back position in dist. 0mm Channel 11 in IEEE 802.11b ISM

SAR Measurement at ISM (Body, Validation Plane)

Date of measurement: 12/5/2025

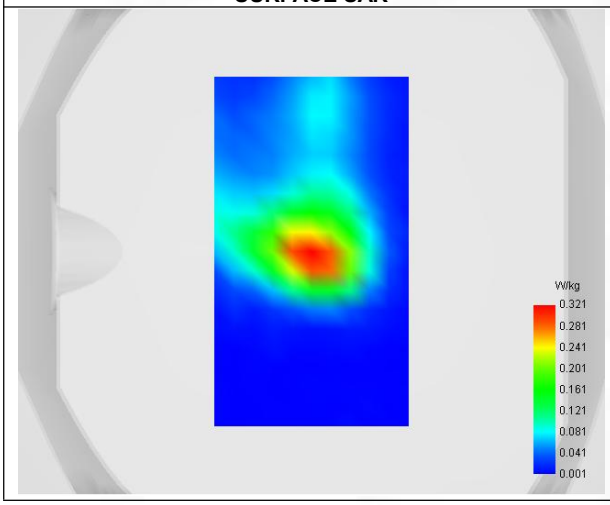
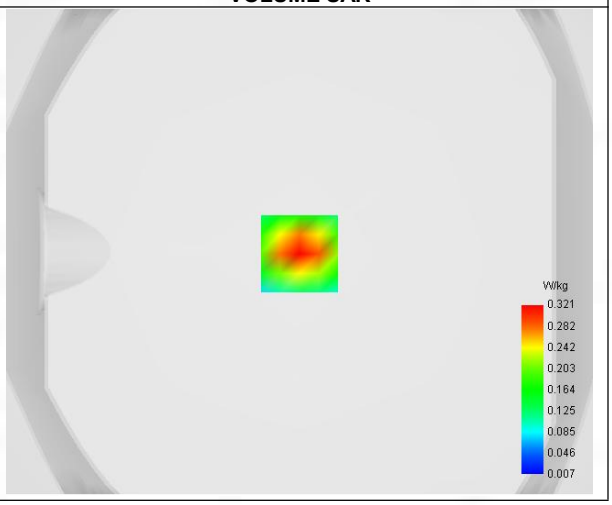
A. Experimental conditions.

Probe	0125-EPGO-445
ConvF	1.40
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Channels/Frequency	Higher (11)/ frequency 2462.000 Mhz
Signal	IEEE 802.11 b

B. Permitivity

Middle TX Frequency (MHz)	2462.000
Relative permitivity (real part)	39.433
Relative permitivity (imaginary part)	13.110
Conductivity (S/m)	1.771

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-1.00 ; SAR Peak: 0.53 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.156
SAR 1g (W/Kg)	0.306
Variation (%)	2.830
Horizontal validation criteria: minimum distance (mm)	16.000
Vertical validation criteria: SAR ratio M2/M1 (%)	52.02%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.525	0.321	0.167	0.087	0.048

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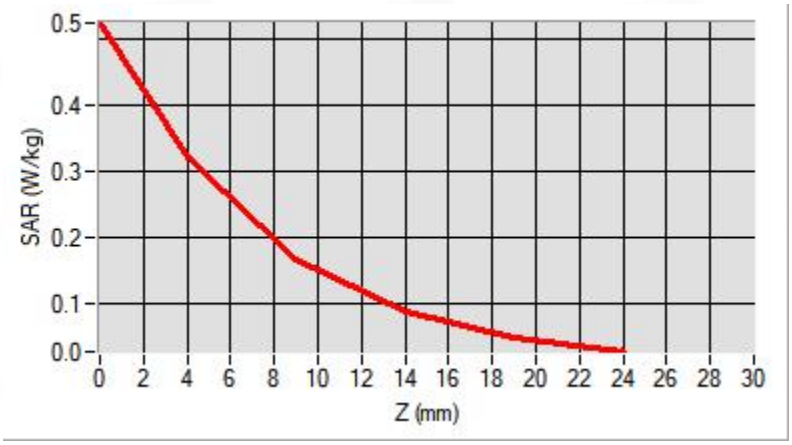
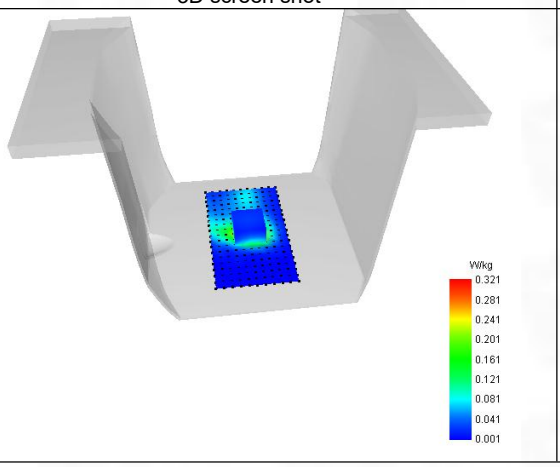
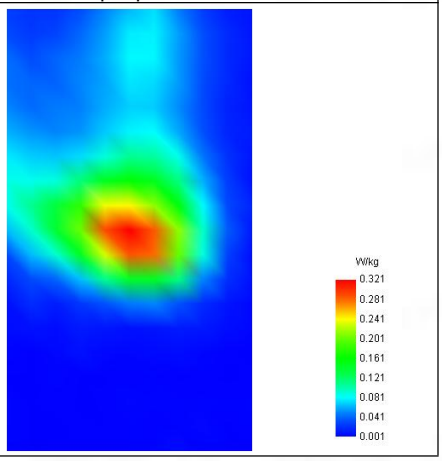
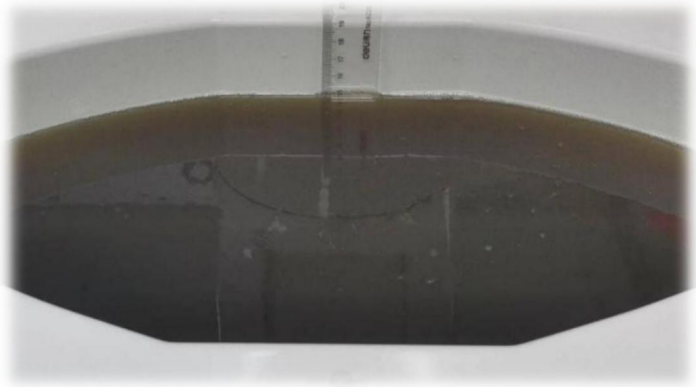
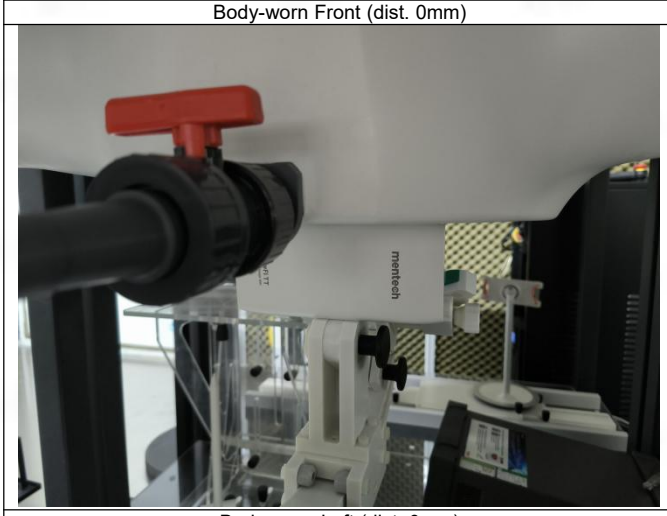
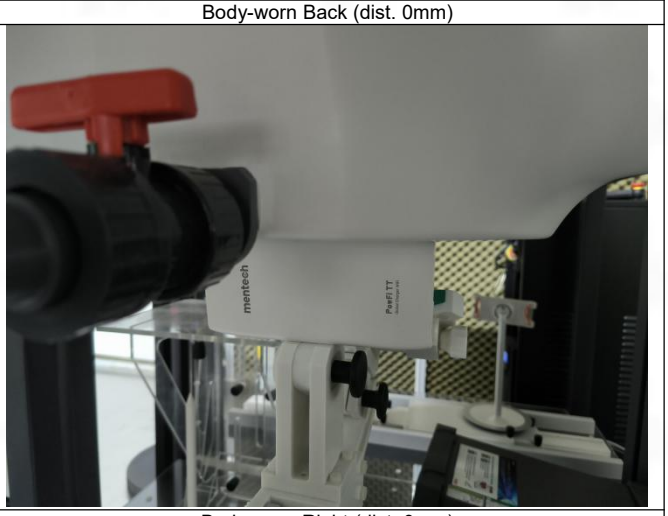


F. 3D Image

3D screen shot	Hot spot position
	

ANNEX E SAR Test Setup Photos

Reference Photo: simulation liquid depth 15cm


Reference Photos	
	
Body-worn Front (dist. 0mm)	Body-worn Back (dist. 0mm)
	
Body-worn Left (dist. 0mm)	Body-worn Right (dist. 0mm)

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Body-worn Top (dist. 0mm)	Body-worn Bottom (dist. 0mm)

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--