FCC SAR Compliance Test Report

For

TECNO MOBILE LIMITED

FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET

FOTAN NT HONGKONG

Model: T14RA

Test Engineer:	Zeng Longhao
Report Number:	WSCT-ANAB-R&E240900045A-SAR
Report Date:	07 February 2025
FCC ID:	2ADYY-T14RA-1
Check By:	Wei Liangmei
Approved By:	Li Huaibi
Prepared By:	World Standardization Certification & Testing Group (Shenzhen) Co., Ltd. Building A-B,Baoli'an Industrial Park,No.58 and 60,Tangtou Avenue, Shiyan Street, Bao'an District, Shenzhen City, Guangdong Province, China Tel: +86-755-26996192 Fax: +86-755-86376605

Table of contents

Modified History

REV.	Modification Description	Issued Date	Remark
REV.1.0	Initial Test Report Relesse	07 February 2025	Li Huaibi

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. QTC Certification & Testing Co., Ltd. does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report is not to be reproduced or published in full without the prior written permission.

1.2 Application details

Date of receipt of test item: 2024-09-20
Start of test: 2024-09-29
End of test: 2025-01-10

1.3 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for T14RA is as below:

Band	Position	MAX ReportedSAR_{1g}(W/kg)	Limit (W/kg)
2.4G WIFI	Body-Worn 0mm	0.834	1.6
5.2G WIFI	Body-Worn 0mm	0.706	
5.4G WIFI	Body-Worn 0mm	0.651	
5.6G WIFI	Body-Worn 0mm	0.832	
5.8G WIFI	Body-Worn 0mm	0.715	
WIFI6E	Body-Worn 0mm	0.100	
BT	Body-Worn 0mm	0.086	
Max.Simultaneous Transmission SAR(W/kg)			
Items	Body SAR (Gap 0mm)		1.6
Sum SAR	0.920		

The device is in compliance with Specific Absorption Rate（SAR）for general population/uncontraolled exposure limits of 1.6W/Kg as averaged over any 1g tissue according to the FCC rule§2.1093,the ANSI/IEEEC95.1:2005,the NCRP Report Number 86 forun controlled environment,according to the Industry Canada Radio Standards Specification RSS-102 for General Population/ Uncontrolled exposure, and had been tested in accord ance with the measurement methods and proceduresspecified in IEEE Std1528-2013.

1.4 EUT Information

Device Information：			
Product Type:	Laptop Computer		
Model:	T14RA		
Brand Name:	TECNO		
Device Type:	Portable device		
Exposure Category:	uncontrolled environment / general population		
Production Unit or Identical Prototype：	Production Unit		
Antenna Type :	Integral Antenna		
Antenna Gain:	BT: 1.86dBi 2.4GWIFI: MAIN ANT: 1.86dBi /AUX ANT: 1.70 dBi 5GWIFI: MAIN ANT: 2.94dBi /AUX ANT: 2.75 dBi WIFI6E: MAIN ANT:2.98dBi /AUX ANT: 2.98 dBi		
Device Operating Configurations:			
Supporting Mode(s) :	Wi-Fi , BT		
Modulation:	DSSS, OFDM/OFDMA GFSK/π/4-DQPSK/ 8-DPSK, GFSK		
Device Class :	Class B, No DTM Mode		
Operating Frequency Range(s):	Band	TX(MHz)	RX(MHz)
	Wi-Fi	2412~2462	
	Wi-Fi (5G)	Band 1: 5180-5240 MHz Band 2: 5260-5320 MHz Band 3: 5500-5700 MHz Band 4: 5745-5825 MHz	
	Wi-Fi6E	U-NII-5: 5925-6425MHz U-NII-6: 6425-6525MHz U-NII-7: 6525-6875MHz U-NII-8: 6875-7125MHz	
	BT	2402~2480	2402~2480
Power Source:	Rechargeable Li-ion Polymer Battery: 528282-3S1P Nominal Voltage: 11.61V Rated Capacity:6460mAh/75Wh Typical Capacity: 6550mAh/76.04Wh Limited Charge Voltage: 13.35V		

Note:

1.The test results of this test report relate exclusively to the test item specified in this test report. World Standardization Certification & Testing Group (Shenzhen) Co.,Ltd does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report is not to be reproduced or published in full without the prior written permission.

2. Per KDB 616217 D04 SAR for laptop and tablets, The standalone and simultaneous transmission SAR tests required for tablets are more conservative than the hotspot mode use configurations;therefore, additional testing for hotspot SAR is not required.

2 Testing laboratory

Test Site	World Standardization Certification & Testing Group (Shenzhen) Co., Ltd.
Test Location	Building A-B,Baoli'an Industrial Park,No.58 and 60,Tangtou Avenue, Shiyan Street, Bao'an District, Shenzhen City, Guangdong Province, China
Telephone	+86-755-26996192
Fax	+86-755-86376605

3 ACCREDITATIONS

ANAB - Certificate Number: AT-3951

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (ANAB).Certification Number: AT-3951

4 Test Environment

	Required	Actual
Ambient temperature:	18 – 25 °C	22 ± 2 °C
Tissue Simulating liquid:	22 ± 2 °C	22 ± 2 °C
Relative humidity content:	30 – 70 %	30 – 70 %

5 Applicant and Manufacturer

Applicant/Client Name:	TECNO MOBILE LIMITED
Applicant Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG
Manufacturer Name:	TECNO MOBILE LIMITED
Manufacturer Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG

6 Test standard/s:

IEC/IEEE 62209-1528	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Head from Wireless Communications Devices:Measurement Techniques
RSS-102	Radio Frequency Exposure Compliance of Radio communication Apparatus (All Frequency Bands(Issue 5 March 2015)
KDB447498 D01	General RF Exposure Guidance v06
KDB616217 D04	SAR for laptop and tabletsv01r03
KDB248227D01	SARmeas for 802.11a/b/g v02r02
KDB865664D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB865664D02	RF Exposure Reporting v01r02

6.1 RF exposure limits

HumanExposure	UncontrolledEnvironment GeneralPopulation	ControlledEnvironment Occupational
SpatialPeakSAR* (Brain/Body/Arms/Legs)	**1.60mW/g**	8.00mW/g
SpatialAverageSAR** (WholeBody)	0.08mW/g	0.40mW/g
SpatialPeakSAR*** (Heads/Feet/Ankle/Wrist)	4.00mW/g	20.00mW/g

The limit applied in this test report is shown in bold letters

Notes:

* TheSpatial PeakvalueoftheSAR averagedover any1gram oftissue(definedasatissue volumeintheshapeofacube) andovertheappropriateaveragingtime.

** TheSpatial AveragevalueoftheSARaveragedoverthewholebody.

*** TheSpatial PeakvalueoftheSAR averagedover any10gramsoftissue(definedasatissue volumeintheshapeofacube) andovertheappropriateaveragingtime.

UncontrolledEnvironmentsaredefinedaslocationswherethereistheexposureofindividuals whohavenoknowledgeor control oftheir exposure.

ControlledEnvironmentsaredefinedaslocationswherethereisexposurethatmaybeincurred bypersonswhoareawareofthepotential for exposure,(i.e.asaresultofemploymentor occupation.

6.2 SAR Definition

Specific Absorption Rate is defined as 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).

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

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

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

where:

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m^3)

E = rms electric field strength (V/m)

7 SAR Measurement System

7.1 The Measurement System

ComosarisasystemthatisabletodeterminetheSARdistributioninsideaphantomofhumanbeing accordingtodifferentstandards.The Comosarsystem consistsof thefollowing items:

-Maincomputerto control allthesystem
-6 axisrobot
- Dataacquisitionsystem
-Miniature E-fieldprobe
-Device holder
- Head simulatingtissue

The followingfigure shows thesystem.

TheEUT undertestoperatingatthemaximumpowerlevelisplacedinthephoneholder,underthe phantom,whichisfilledwithheadsimulatingliquid. TheE-Fieldprobemeasurestheelectricfield insidethephantom. TheOpenSARsoftwarecomputestheresultstogiveaSARvalueina1gor10g mass.

7.2 Robot

The COMOSAR system uses the high precision robots KR 6 R900 sixx type out of the newer series from Satimo SA (France).Forthe 6-axis controller COMOSAR system, the KUKA robot controller version from Satimo is used.The KR 6 R900 sixx robot series have many features that are important for
our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

7.3 Probe

For themeasurementsthe Specific DosimetricE-FieldProbeSSE 5withfollowing specificationsisused

Figure 1 – MVG COMOSAR Dosimetric E field Dipole

- Dynamicrange:0.01-100W/kg

Probe Length	330 mm
Lengthof Individual Dipoles	4.5 mm
Maximum externaldiameter	8 mm
ProbeTip ExternalDiameter	5 mm
Distance betweendipoles/ probeextremity	2.7 mm

-Calibration range: 300MHzto 3GHzfor head&body simulating liquid.

Anglebetween probeaxis(evaluation axis) andsuface normal line:less than30°

Figure 2 – MVG COMOSAR Dosimetric E field Dipole

Dynamicrange:0.01-100W/kg

Probe Length	330 mm
Lengthof Individual Dipoles	2 mm
Maximum externaldiameter	8 mm
ProbeTip ExternalDiameter	2.5 mm
Distance betweendipoles/ probeextremity	1 mm

-Calibration range: 0.15GHz to 7.5GHz for head & body simulating liquid.

Angle between probe axis(evaluation axis) and suface normal line:less than30°

7.4 Measurement procedure

The following steps are used for each test position

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

7.5 Description of interpolation/extrapolation scheme

- The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body.The probe tip must not be in contact with the phantom surface in order to minimise measurements errors,but the highest local SAR will occur at the surface of the phantom.
- An extrapolation is using to determinate this highest local SAR values.
  The extrapolation is based on afourth-order least-square polynomial fit of measured data.The local SAR value is then extrapolated from the liquid surface with a 1 mm step.
- The measurements have to be performed over a limited time(due to the duration of the battery) so the step of measurement is high.It could vary between 5 and 8 mm.To obtain an accurate assessment of the maximum SAR average over 10 grams and 1gram requires a very fine resolution in the three dimensional scanned data array.

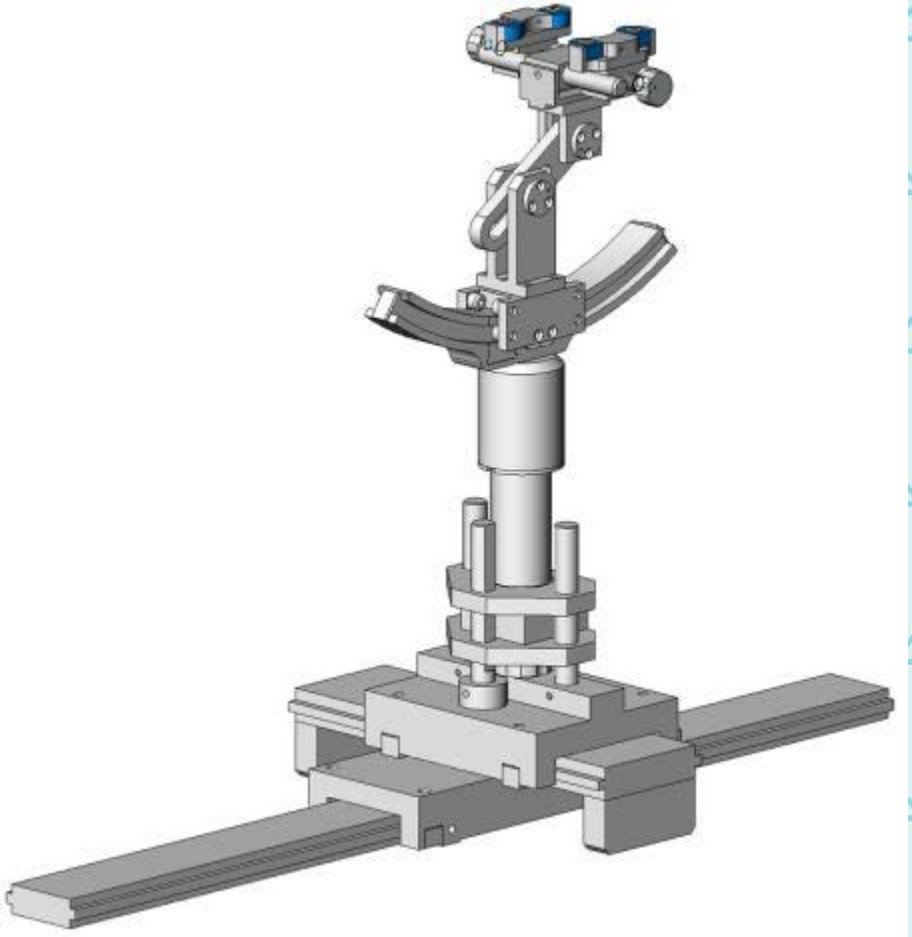
7.6 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2groupisused. Thephantomisapolyurethaneshellintegratedinawoodentable. The thickness ofthe phantomamounts to2mm +/- 0.2mm.It enables thedosimetricevaluation of leftand rightphoneusageandincludesanadditionalflatphantompartforthesimplified performancecheck. The phantomset-upincludes acover,whichprevents theevaporation of theliquid.

SystemMaterial	Permittivity	LossTangent
Delrin	3.7	0.005

7.7 Device Holder

The positioning systemallows obtaining cheekand tilting position witha verygood accuracy.In compliancewithCENELEC,thetiltangle uncertaintyislower than1°.



Deviceholder

SystemMaterial	Permittivity	LossTangent
Delrin	3.7	0.005

7.8 Video Positioning System

- The video positioning system is used in OpenSAR to check theprobe. Which is composed of a camera, LED, mirror andmechanical parts. The camera is piloted by the main computerwith firewire link.
- During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.
- The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. Duringprobe rotations, the probe tip will keep its actual position.

7.9 Tissue simulating liquids: dielectric properties

The following materials are used for producing the tissue-equivalent materials.
(Liquids used for testsare marked with☒):

Ingredients(% ofweight)	**Frequency (MHz)**				
frequency band	☐450	☐ 835	☐ 1800	☐1900	☐ 2450
Tissue Type	Head	Head	Head	Head	Head
Water	38.56	41.45	52.64	55.242	62.7
Salt (NaCl)	3.95	1.45	0.36	0.306	0.5
Sugar	56.32	56.0	0.0	0.0	0.0
HEC	0.98	1.0	0.0	0.0	0.0
Bactericide	0.19	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	36.8
DGBE	0.0	0.0	47.0	44.542	0.0
Ingredients(% ofweight)	**Frequency (MHz)**				
frequency band	☐450	☐ 835	☐ 1800	☐1900	☒ 2450
Tissue Type	Body	Body	Body	Body	Body
Water	51.16	52.4	69.91	69.91	73.2
Salt (NaCl)	1.49	1.40	0.13	0.13	0.04
Sugar	46.78	45.0	0.0	0.0	0.0
HEC	0.52	1.0	0.0	0.0	0.0
Bactericide	0.05	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	29.96	29.96	26.7

Salt: 99+% Pure Sodium Chloride
Sugar: 98+% Pure Sucrose
Water: De-ionized, 16MΩ+ resistivity
HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

☐Simulating Head Liquid for 5G(HBBL3500-5800MHz), Manufactured by SPEAG:

Ingredients	**(% by weight)**
Water	50-65%
Mineral oil	10-30%
Emulsifiers	8-25%
Sodium salt	0-1.5%

☒Simulating Body Liquid for 5G(MBBL3500-5800MHz),Manufactured by SPEAG:

Ingredients	**(% by weight)**
Water	60-80%
Esters,Emulsifiers,Inhibitors	20-40%
Sodium salt	0-1.5%

7.10 Tissue simulating liquids: parameters

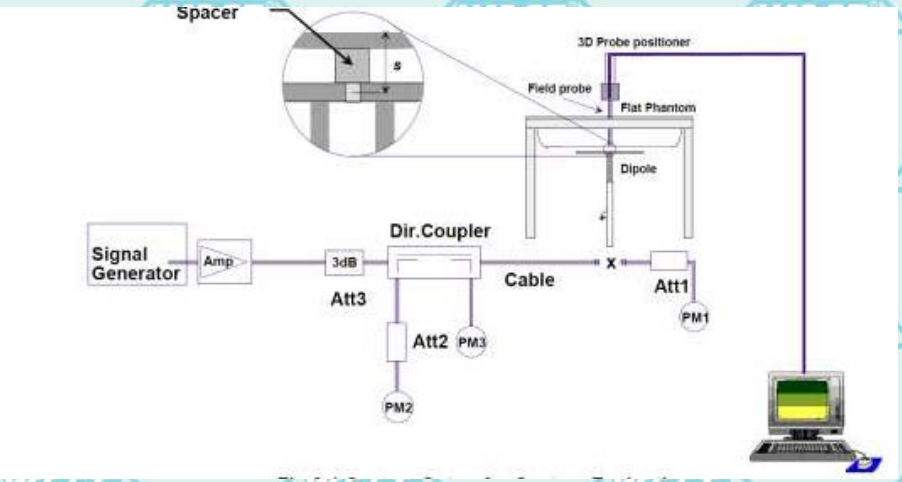
Used Target Frequency	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
	ε_r (+/-5%)	σ (S/m) (+/-5%)	ε_r	σ (S/m)		
2450MHz Head	39.20 (37.24~41.16)	1.80 (1.71~1.89)	40.27	1.82	21.6°C	2024-09-23
5200MHz Head	36.00 (34.20~37.80)	4.66 (4.43~4.89)	35.62	4.52	21.6°C	2024-09-26
5500MHz Head	35.60 (33.82~37.38)	4.96 (4.71~5.20)	36.11	5.02	21.6°C	2024-09-26
5800MHz Head	35.30 (33.54~37.06)	5.27 (5.01~5.53)	34.63	5.16	21.6°C	2024-09-26
6500MHz Head	34.50 (32.78~36.22)	6.07 (5.77~6.37)	34.00	6.08	21.6°C	2024-12-21
ε_r= Relative permittivity, σ= Conductivity						

8 System Check

8.1 System check procedure

The System check is performed by using a System check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the System check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



8.2 System check results

The system Check is performed for verifying the accuracy of the complete measurement system and performance of the software.The following table shows System check results for all frequency bands and tissue liquids used during the tests (plot(s) see annex A).

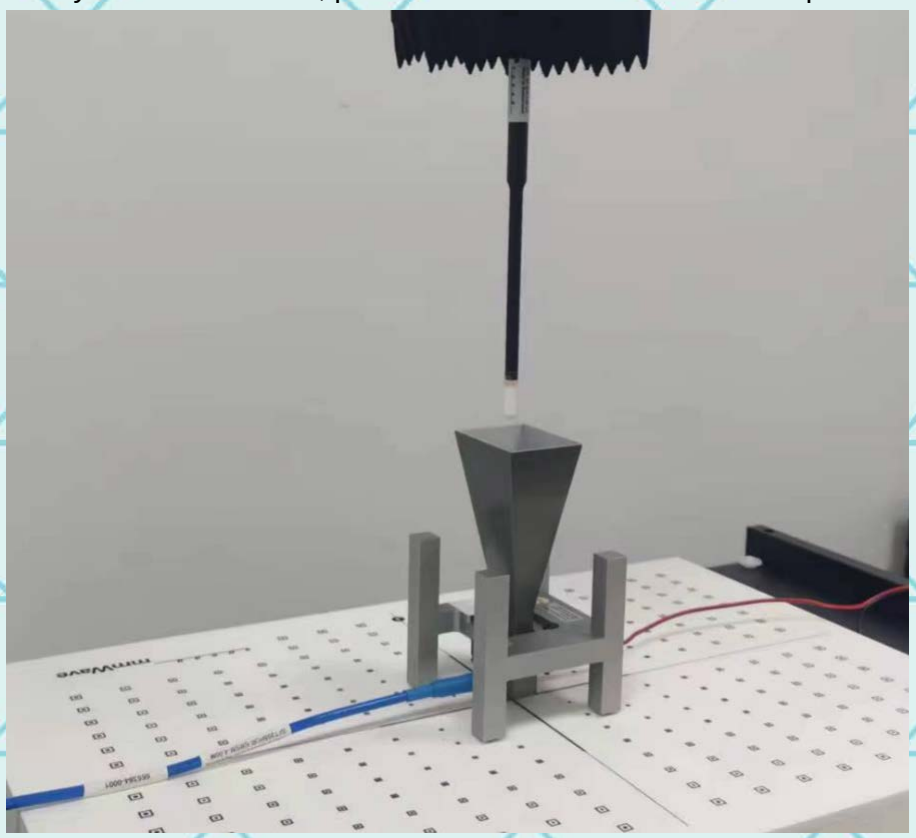
System Check	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
D2450V2 Body	52.40 (47.16~57.64)	24.00 (21.60~26.40)	54.33	23.33	21.6°C	2024-09-23
D5200V2 Body	76.50 (68.85~84.15)	21.60 (19.44~23.76)	77.18	22.64	21.6°C	2024-09-26
D5500V2 Body	83.30 (74.97~91.63)	23.40 (21.06~25.74)	83.37	22.82	21.6°C	2024-09-26
D5800V2 Body	78.00 (70.20~85.50)	21.90 (19.71~24.09)	79.66	20.80	21.6°C	2024-09-26
D6.5GHzV2 Body	289.00 (260.10~317.90)	53.40 (48.06~58.74)	297.00	55.80	21.6°C	2024-12-21

Note:
1.All SAR values are normalized to 1W forward power.
2. The forward power of Dipole antenna is actually 20db (100mw), so the actual measured value differs from the table data by 10 times

8.3 Power Density Test System Verification

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check.

The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes



System Verification Setup Photo

Frequency (GHz)	5G Verification Source	Test Date	Distance (mm)	Measured 4cm² (W/m²)	Targeted 4cm² (W/m²)	Deviation (dB)
10	10GHz-	2024/12/21	10	51.6	50	0.03

Detailed System Check Results Please see the annex D.

9 SAR Test Test Configuration

9.1 Wi-Fi Test Configuration

For the 802.11b/g SAR tests, a communication link is set up with the test mode software for Wi-Fi mode test. The Absolute Radio Frequency Channel Number(ARFCN) is allocated to 1 ,6 and 11 respectively in the case of 2450 MHz.During the test,at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. 802.11b/g operating modes are tested independently according to the service requirements in each frquency band. 802.11b/g modes are tested on channel 1, 6, 11; however,if output power reduction is necessary for channels 1 and/or 11 to meet restricted band requirements the highest output channel closest to each of these channels must be tested instead.

SAR is not required for 802.11g/n channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels.

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	2412	1#	√	△
		2437	6	√	△
		2462	11#	√	△

Notes:

√ = "default test channels"

△= possible 802.11g channels with maximum average output ¼ dB the "default test channels"

= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

802.11 Test Channels per FCC Requirements

9.2 WiFi 5G SAR Test Procedures

A)U-NII-1 and U-NII-2A Bands

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following：

1)When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.

2)When different maximum output power is specified for the bands, begin SAR measurement in theband with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.

3)The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

B)U-NII-2C and U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

C)OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

1)The largest channel bandwidth configuration is selected among the multiple configurations with thesame specified maximum output power.

2)If multiple configurations have the same specified maximum output power and largest channelbandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.

3)If multiple configurations have the same specified maximum output power, largest channel bandwidthand lowest order modulation, the lowest data rate configuration among these configurations is selected.

4)When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power,largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n. After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.

1)The channel closest to mid-band frequency is selected for SAR measurement.

2)For channels with equal separation from mid-band frequency; for example, high and low channels ortwo mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

D)SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

9.3 RF Exposure Limits for Frequencies Above 6 GHz

Per §1.1310 (d)(3),the MPE limits are applied for frequencies above 6 GHz. Power Density isexpressed in unitsof W/m² or mW/cm².

Peak Spatially Averaged Power Density was evaluated over a circular area of 4 cm²per interim FCC Guidance fornear-field power density evaluations per October 2018 TCB Workshop notes.

Human Exposure Limits Specified in FCC 47 CFR §1.1310

Human Exposure to Radiofrequency (RF) Radiation Limits		
Frequency Range [MHz]	**Power Density** [mW/cm²]	**Average Time** [Minutes]
(A) Limits For Occupational / Controlled Environments		
1,500 – 100,000	5.0	6
(B) Limits For General Population / Uncontrolled Environments		
1,500 – 100,000	1.0	30

Note: 1.0 mW/cm² is 10 W/m²

9.4 Miscellaneous Testing Considerations

Per FCC guidance,SAR was performed using 6.5 GHz SAR probe calibration factors.FCC KDB 648474 andFCC KDB 248227 were followed for test positions, distances, and modes.Per TCB workshop October 2020notes, 5 channels were tested.Absorbed power density (APD) using a 4cm² averagingarea is reported based onSAR measurements. Incident power density is evaluated at 2mm ensuring that the resolution is sufficient suchthat integrated power density (iPD) between d=2mm and d=15mmvaries by < 1dB per equipment manufacturerguidance.Power density results are scaled up foruncertainty above 30%.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimensionis greater than 160mm and less than200mm.Therefore, phablet SAR tests are required when wireless routermode does not apply or if wireless router 1g SAR> 1.2 W/kg.

6 GHz WIFI SAR results are used for simultaneous transmission analysis with the other transmitters and totalexposure ratio(TER).Analysis can be found in SAR report and Near Field PD Report.

10 Detailed Test Results

10.1 Conducted Power measurements

The measuring conducted average power (Uni t:dBm) is shown as below.

10.1.1 Conducted Power of Wi-Fi 2.4G

MAIN ANT1

Mode	802.11b		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	16.04	16.80	16.78
Mode	802.11g		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	19.69	19.93	19.91
Mode	802.11n(HT20)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	18.88	19.03	18.92
Mode	802.11n(HT40)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	18.59	18.72	18.45
Mode	802.11ax 20		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	18.48	18.77	18.69
Mode	802.11ax 40		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	19.02	19.23	19.02

AUX ANT2

Mode	802.11b		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	18.55	18.66	18.57
Mode	802.11g		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	21.61	21.83	21.84
Mode	802.11n(HT20)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	20.86	20.94	20.87
Mode	802.11n(HT40)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	21.09	21.35	21.11
Mode	802.11ax 20		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	20.57	20.80	20.47
Mode	802.11ax 40		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	21.07	21.05	20.99

MIMO Mode

Mode	802.11n(HT20)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBM)	22.99	23.10	23.01
Mode	802.11n(HT40)		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	23.03	**23.24**	22.99
Mode	802.11ax 20		
Channel/Frequency(MHz)	1(2412)	6(2437)	11(2462)
Average Power(dBm)	22.66	22.91	22.68
Mode	802.11ax 40		
Channel/Frequency(MHz)	3(2422)	6(2437)	9(2452)
Average Power(dBm)	23.18	23.24	23.13

<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

(1) For handsets operating next to ear, hotspot mode or mini-tablet configurations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When the reported SAR of initial test position is <= 0.4 W/kg, SAR testing for remaining test positions is not required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is <= 0.8 W/kg or all test positions are measured.

(2) For Wi-Fi 2.4 GHz, the highest measured maximum output power channel for DSSS was selected for SAR measurement. When the reported SAR is <= 0.8 W/kg, no further SAR testing is required. Otherwise, SAR is evaluated at the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel. For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is <= 1.2 W/kg.

10.1.2 Conducted Power of Wi-Fi 5G

Ant 1						
Band	Mode	Channel	Frequency(MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-1 (5150-5250)	802.11a	36	5180	20.50±1.0	20.00	No
		48	5240	21.00±1.0	**20.60**	Yes
	802.11n-HT20	36	5180	19.50±1.0	19.01	No
		48	5240	20.00±1.0	19.50	No
	802.11n-HT40	38	5190	21.00±1.0	20.54	No
		46	5230	20.50±1.0	20.35	No
	802.11ac-VHT20	36	5180	19.50±1.0	19.39	No
		48	5240	19.50±1.0	19.50	No
	802.11ac-VHT40	38	5190	20.50±1.0	20.36	No
		46	5230	20.50±1.0	20.22	No
	802.11ac-VHT80	42	5210	19.00±1.0	18.59	No
	802.11ax-HT20	36	5180	15.00±1.0	14.94	No
		48	5240	15.00±1.0	14.90	No
	802.11ax-HT40	38	5190	16.00±1.0	15.83	No
		46	5230	16.00±1.0	15.93	No
	802.11ax-HT80	42	5210	16.50±1.0	16.22	No
	802.11ax- HT160	50	5250	15.50±1.0	15.31	No

Ant 2						
Band	Mode	Channel	Frequency(MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-1 (5150-5250)	802.11a	36	5180	17.00±1.0	16.95	No
		48	5240	17.50±1.0	**17.14**	Yes
	802.11n-HT20	36	5180	16.50±1.0	16.48	No
		48	5240	17.00±1.0	16.67	No
	802.11n-HT40	38	5190	17.00±1.0	16.77	No
		46	5230	17.00±1.0	16.50	No
	802.11ac-VHT20	36	5180	15.50±1.0	15.48	No
		48	5240	15.50±1.0	15.26	No
	802.11ac-VHT40	38	5190	14.50±1.0	14.47	No
		46	5230	15.50±1.0	15.16	No
	802.11ac-VHT80	42	5210	13.00±1.0	12.82	No
	802.11ax-HT20	36	5180	13.00±1.0	12.66	No
		48	5240	13.00±1.0	12.64	No
	802.11ax-HT40	38	5190	13.50±1.0	13.42	No
		46	5230	13.50±1.0	13.38	No
	802.11ax-HT80	42	5210	13.50±1.0	13.12	No
	802.11ax- HT160	50	5250	12.00±1.0	11.64	No

MIMO						
Band	Mode	Channel	Frequency(MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-1 (5150-5250)	802.11n-HT20	36	5180	21.00±1.0	20.94	No
		48	5240	21.50±1.0	21.32	No
	802.11n-HT40	38	5190	22.50±1.0	**22.06**	Yes
		46	5230	22.00±1.0	21.85	No
	802.11ac-VHT20	36	5180	21.00±1.0	20.87	No
		48	5240	21.00±1.0	20.89	No
	802.11ac-VHT40	38	5190	21.50±1.0	21.36	No
		46	5230	21.50±1.0	21.40	No
	802.11ac-VHT80	42	5210	20.00±1.0	19.61	No
	802.11ax-HT20	36	5180	17.00±1.0	16.96	No
		48	5240	17.00±1.0	16.93	No
	802.11ax-HT40	38	5190	18.00±1.0	17.80	No
		46	5230	18.00±1.0	17.85	No
	802.11ax-HT80	42	5210	18.00±1.0	17.95	No
	802.11ax- HT160	50	5250	17.00±1.0	16.86	No

Ant 1						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2a (5250-5350)	802.11a	52	5260	20.50±1.0	20.05	No
		64	5320	20.00±1.0	19.84	No
	802.11n-HT20	52	5260	19.50±1.0	19.50	No
		64	5320	19.00±1.0	18.66	No
	802.11n-HT40	54	5270	20.50±1.0	**20.39**	Yes
		62	5310	20.00±1.0	19.89	No
	802.11ac-VHT20	52	5260	20.00±1.0	19.59	No
		64	5320	19.00±1.0	18.59	No
	802.11ac-VHT40	54	5270	12.50±1.0	12.31	No
		62	5310	20.00±1.0	19.86	No
	802.11ac-VHT80	58	5290	18.50±1.0	18.44	No
	802.11ax-HT20	52	5260	15.50±1.0	15.05	No
		64	5320	14.50±1.0	14.18	No
	802.11ax-HT40	54	5270	16.00±1.0	15.85	No
		62	5310	15.50±1.0	15.16	No
	802.11ax-HT80	58	5290	15.50±1.0	15.48	No

Ant 2						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2a (5250-5350)	802.11a	52	5260	18.00±1.0	**17.65**	Yes
		64	5320	17.00±1.0	16.81	No
	802.11n-HT20	52	5260	16.50±1.0	16.43	No
		64	5320	16.00±1.0	15.91	No
	802.11n-HT40	54	5270	16.50±1.0	16.05	No
		62	5310	15.50±1.0	15.35	No
	802.11ac-VHT20	52	5260	16.00±1.0	15.69	No
		64	5320	15.00±1.0	14.84	No
	802.11ac-VHT40	54	5270	14.50±1.0	14.50	No
		62	5310	14.50±1.0	14.36	No
	802.11ac-VHT80	58	5290	12.50±1.0	12.24	No
	802.11ax-HT20	52	5260	13.00±1.0	12.74	No
		64	5320	12.50±1.0	12.11	No
	802.11ax-HT40	54	5270	13.50±1.0	13.19	No
		62	5310	13.50±1.0	13.31	No
	802.11ax-HT80	58	5290	13.00±1.0	12.94	No

MIMO						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2a (5250-5350)	802.11n-HT20	52	5260	21.50±1.0	21.24	No
		64	5320	21.00±1.0	20.51	No
	802.11n-HT40	54	5270	22.00±1.0	**21.75**	Yes
		62	5310	21.50±1.0	21.20	No
	802.11ac-VHT20	52	5260	21.50±1.0	21.07	No
		64	5320	20.50±1.0	20.12	No
	802.11ac-VHT40	54	5270	17.00±1.0	16.55	No
		62	5310	21.00±1.0	20.94	No
	802.11ac-VHT80	58	5290	19.50±1.0	19.37	No
	802.11ax-HT20	52	5260	17.50±1.0	17.06	No
		64	5320	16.50±1.0	16.28	No
	802.11ax-HT40	54	5270	18.00±1.0	17.73	No
		62	5310	17.50±1.0	17.34	No
	802.11ax-HT80	58	5290	17.50±1.0	17.40	No

Ant 1						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2c (5470-5725)	802.11a	100	5500	19.50±1.0	19.31	No
		140	5700	20.00±1.0	19.75	Yes
	802.11n-HT20	100	5500	18.50±1.0	18.28	No
		140	5700	18.50±1.0	18.42	No
	802.11n-HT40	102	5510	12.00±1.0	11.94	No
		134	5670	20.00±1.0	19.74	No
	802.11ac-VHT20	100	5500	18.50±1.0	18.02	No
		140	5700	19.00±1.0	18.72	No
	802.11ac-VHT40	102	5510	19.00±1.0	18.80	No
		134	5670	19.50±1.0	19.47	No
	802.11ac-VHT80	106	5530	17.00±1.0	16.59	No
		122	5610	19.50±1.0	**19.31**	No
	802.11ax-HT20	100	5500	14.00±1.0	13.94	No
		140	5700	14.50±1.0	14.45	No
	802.11ax-HT40	102	5510	14.50±1.0	14.23	No
		134	5670	15.00±1.0	14.85	No
	802.11ax-HT80	106	5530	15.00±1.0	14.57	No
		122	5610	15.50±1.0	15.20	No
	802.11ax- HT160	114	5570	15.50±1.0	15.24	No

Ant 2						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2c (5470-5725)	802.11a	100	5500	16.50±1.0	16.34	No
		140	5700	17.50±1.0	17.25	Yes
	802.11n-HT20	100	5500	15.50±1.0	15.29	No
		140	5700	16.00±1.0	15.93	No
	802.11n-HT40	102	5510	15.00±1.0	14.64	No
		134	5670	15.50±1.0	15.24	No
	802.11ac-VHT20	100	5500	15.00±1.0	14.51	No
		140	5700	15.50±1.0	15.01	No
	802.11ac-VHT40	102	5510	14.00±1.0	13.77	No
		134	5670	14.00±1.0	13.94	No
	802.11ac-VHT80	106	5530	12.00±1.0	11.56	No
		122	5610	12.50±1.0	12.39	No
	802.11ax-HT20	100	5500	12.00±1.0	11.98	No
		140	5700	12.50±1.0	12.09	No
	802.11ax-HT40	102	5510	12.50±1.0	12.21	No
		134	5670	13.00±1.0	12.62	No
	802.11ax-HT80	106	5530	11.50±1.0	11.36	No
		122	5610	13.00±1.0	12.86	No
	802.11ax- HT160	114	5570	11.50±1.0	11.32	No

MIMO						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
U-NII-2c (5470-5725)	802.11n-HT20	100	5500	20.05±1.0	20.05	No
		140	5700	20.36±1.0	20.36	No
	802.11n-HT40	102	5510	16.51±1.0	16.51	No
		134	5670	21.06±1.0	21.06	Yes
	802.11ac-VHT20	100	5500	19.62±1.0	19.62	No
		140	5700	20.26±1.0	20.26	No
	802.11ac-VHT40	102	5510	19.99±1.0	19.99	No
		134	5670	20.54±1.0	20.54	No
	802.11ac-VHT80	106	5530	17.78±1.0	17.78	No
		122	5610	20.11±1.0	20.11	No
	802.11ax-HT20	100	5500	16.08±1.0	16.08	No
		140	5700	16.44±1.0	16.44	No
	802.11ax-HT40	102	5510	16.35±1.0	16.35	No
		134	5670	16.89±1.0	16.89	No
	802.11ax-HT80	106	5530	16.27±1.0	16.27	No
		122	5610	17.20±1.0	17.20	No
	802.11ax- HT160	114	5570	16.72±1.0	16.72	No

Ant 1						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Powe(dBm)	SAR Test (Yes/No)
U-NII-3 (5725-5825)	802.11a	149	5745	20.50±1.0	20.13	No
		165	5825	20.00±1.0	19.72	No
	802.11n-HT20	149	5745	19.00±1.0	18.74	No
		165	5825	18.50±1.0	18.12	No
	802.11n-HT40	151	5755	20.00±1.0	19.51	No
		159	5795	20.50±1.0	20.03	No
	802.11ac-VHT20	149	5745	19.00±1.0	18.62	No
		165	5825	18.50±1.0	18.34	No
	802.11ac-VHT40	151	5755	19.50±1.0	19.07	No
		159	5795	20.00±1.0	19.85	No
	802.11ac-VHT80	155	5775	22.00±1.0	21.81	Yes
	802.11ax-HT20	149	5745	14.50±1.0	14.26	No
		165	5825	14.50±1.0	14.06	No
	802.11ax-HT40	151	5755	15.00±1.0	14.52	No
		159	5795	15.50±1.0	15.08	No
	802.11ax-HT80	155	5775	15.50±1.0	15.43	No

Ant 2						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Powe(dBm)	SAR Test (Yes/No)
U-NII-3 (5725-5825)	802.11a	149	5745	17.00±1.0	**16.98**	Yes
		165	5825	17.00±1.0	16.65	No
	802.11n-HT20	149	5745	16.50±1.0	16.02	No
		165	5825	16.00±1.0	15.78	No
	802.11n-HT40	151	5755	15.50±1.0	15.37	No
		159	5795	16.50±1.0	16.03	No
	802.11ac-VHT20	149	5745	16.00±1.0	15.53	No
		165	5825	15.00±1.0	14.75	No
	802.11ac-VHT40	151	5755	14.50±1.0	14.08	No
		159	5795	15.00±1.0	14.54	No
	802.11ac-VHT80	155	5775	12.50±1.0	12.12	No
	802.11ax-HT20	149	5745	12.50±1.0	12.35	No
		165	5825	12.50±1.0	12.28	No
	802.11ax-HT40	151	5755	13.50±1.0	13.02	No
		159	5795	13.50±1.0	13.25	No
	802.11ax-HT80	155	5775	12.50±1.0	12.46	No

MIMO						
Band	Mode	Channel	Frequency (MHz)	Tune-up	Average Powe(dBm)	SAR Test (Yes/No)
U-NII-3 (5725-5825)	802.11n-HT20	149	5745	21.00±1.0	20.60	No
		165	5825	20.50±1.0	20.12	No
	802.11n-HT40	151	5755	21.00±1.0	20.93	No
		159	5795	21.50±1.0	21.49	No
	802.11ac-VHT20	149	5745	20.50±1.0	20.35	No
		165	5825	20.00±1.0	19.92	No
	802.11ac-VHT40	151	5755	20.50±1.0	20.27	No
		159	5795	21.00±1.0	20.97	No
	802.11ac-VHT80	155	5775	22.50±1.0	**22.25**	Yes
	802.11ax-HT20	149	5745	16.50±1.0	16.42	No
		165	5825	16.50±1.0	16.27	No
	802.11ax-HT40	151	5755	17.00±1.0	16.84	No
		159	5795	17.50±1.0	17.27	No
	802.11ax-HT80	155	5775	17.50±1.0	17.20	No

<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

For WLAN 5 GHz, the initial test configuration was selected according to the transmission mode with thehighest maximum output power. When the reported SAR of initial test configuration is > 0.8 W/kg, SAR is required for the subsequent highest measured output power channel until the reported SAR result is <= 1.2 W/kg or all required channels are measured. For other transmission modes, SAR is not required when the highest reported SAR for initial test configuration is adjusted by the ratio of subsequent test configuration to initial test configuration specified maximum output power and it is <= 1.2 W/kg.

10.1.3 Conducted Power of Wi-Fi 6E

KDB 447498 D01 at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

6GHz Wi-Fi U-NII-5 Ant1	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	1/5955	13.00	11.97
	45/6175	11.00	9.54
	93/6415	10.00	8.66
802.11ax-HE40	3/5965	10.00	8.97
	43/6165	8.00	6.89
	91/6405	10.00	8.84
802.11ax-HE80	7/5985	9.00	7.41
	39/6145	9.00	7.34
	87/6385	9.00	7.28
802.11ax-HE160	15/6025	8.00	6.09
	47/6185	8.00	6.69
	79/6345	8.00	6.42
Note. Initial test configuration is 802.11ax-HE20 mode.			

6GHz Wi-Fi U-NII-5 Ant2	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	1/5955	14.00	13.05
	45/6175	18.00	17.55
	93/6415	17.00	16.08
802.11ax-HE40	3/5965	10.50	9.72
	43/6165	18.50	18.12
	91/6405	17.50	16.67
802.11ax-HE80	7/5985	10.00	8.74
	39/6145	18.50	17.62
	87/6385	17.00	16.12
802.11ax-HE160	15/6025	17.00	15.29
	47/6185	17.00	15.48
	79/6345	15.00	13.32
Note. Initial test configuration is 802.11ax-HE80 mode.			

6GHz Wi-Fi U-NII-5 MIMO	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20(MCS0)	1/5955	17.00	15.55
	45/6175	19.00	18.19
	93/6415	18.00	16.80
802.11ax-HE40(MCS0)	3/5965	13.00	12.37
	43/6165	19.00	18.44
	91/6405	18.00	17.33
802.11ax-HE80(MCS0)	7/5985	12.00	11.14
	39/6145	19.00	18.01
	87/6385	18.00	16.65
802.11ax-HE160(MCS0)	15/6025	17.00	15.78
	47/6185	17.00	16.02
	79/6345	15.00	14.13
Note. Initial test configuration is 802.11ax-HE80 mode.			

6GHz Wi-Fi U-NII-6 Ant1	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	97/6435	10.00	8.62
	105/6475	10.00	9.51
	113/6515	10.00	9.67
802.11ax-HE40	99/6445	10.50	9.99
	107/6485	10.50	**10.13**
	115/6525	10.00	8.22
802.11ax-HE80	103/6465	9.00	7.82
	119/6545	10.00	8.80
802.11ax-HE160	111/6505	8.00	6.20
Note. Initial test configuration is 802.11ax-HE40 mode.			

6GHz Wi-Fi U-NII-6 Ant2	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	97/6435	14.00	12.48
	105/6475	14.00	12.67
	113/6515	18.00	16.83
802.11ax-HE40	99/6445	14.00	13.42
	107/6485	14.00	13.09
	115/6525	18.00	17.57
802.11ax-HE80	103/6465	14.00	12.90
	119/6545	18.50	**17.42**
802.11ax-HE160	111/6505	16.00	15.10
Note. Initial test configuration is 802.11ax-HE80 mode.			

6GHz Wi-Fi U-NII-6 MIMO	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20(MCS0)	97/6435	15.00	13.98
	105/6475	15.00	14.38
	113/6515	19.00	17.59
802.11ax-HE40(MCS0)	99/6445	16.00	15.05
	107/6485	16.00	14.87
	115/6525	19.00	18.05
802.11ax-HE80(MCS0)	103/6465	15.00	14.07
	119/6545	19.00	**17.98**
802.11ax-HE160(MCS0)	111/6505	17.00	15.63
Note. Initial test configuration is 802.11ax-HE80 mode.			

6GHz Wi-Fi U-NII-7 Ant1	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	117/6535	10.00	8.96
	149/6695	12.00	10.47
	185/6875	5.00	4.07
802.11ax-HE40	123/6565	11.50	10.08
	147/6685	11.50	10.96
	179/6845	11.00	9.39
	187/6885	11.00	9.76
802.11ax-HE80	135/6625	8.00	6.67
	151/6705	8.00	7.71
	183/6865	8.00	6.25
802.11ax-HE160	143/6665	8.00	6.50
	175/6825	8.00	5.90
Note. Initial test configuration is 802.11ax-HE40 mode.			

6GHz Wi-Fi U-NII-7 Ant2	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	117/6535	18.50	17.18
	149/6695	14.00	13.37
	185/6875	15.00	14.58
802.11ax-HE40	123/6565	18.50	**17.98**
	147/6685	15.00	13.21
	179/6845	15.00	13.63
	187/6885	15.00	13.88
802.11ax-HE80	135/6625	18.00	16.92
	151/6705	15.00	13.16
	183/6865	15.00	13.96
802.11ax-HE160	143/6665	17.00	15.36
	175/6825	17.00	15.75
Note. Initial test configuration is 802.11ax-HE40 mode.			

6GHz Wi-Fi U-NII-7 MIMO	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20(MCS0)	117/6535	19.00	17.79
	149/6695	16.00	15.17
	185/6875	16.00	14.95
802.11ax-HE40(MCS0)	123/6565	19.00	**18.63**
	147/6685	16.00	15.24
	179/6845	16.00	15.02
	187/6885	16.00	15.30
802.11ax-HE80(MCS0)	135/6625	18.50	17.31
	151/6705	16.00	14.25
	183/6865	16.00	14.64
802.11ax-HE160(MCS0)	143/6665	17.00	15.89
	175/6825	17.00	16.18
Note. Initial test configuration is 802.11ax-HE40 mode.			

6GHz Wi-Fi U-NII-8 Ant1	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	189/6895	10.00	9.43
	209/6995	10.00	8.80
	229/7095	8.00	6.89
802.11ax-HE40	203/6965	10.00	**9.20**
	227/7085	8.00	7.25
802.11ax-HE80	199/6945	8.00	6.49
	215/7025	8.00	6.75
802.11ax-HE160	207/6985	8.00	6.48
Note. Initial test configuration is 802.11ax-HE40 mode.			

6GHz Wi-Fi U-NII-8 Ant2	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20	189/6895	15.00	14.43
	209/6995	15.00	13.75
	229/7095	18.00	17.02
802.11ax-HE40	203/6965	18.00	**17.50**
	227/7085	18.00	16.96
802.11ax-HE80	199/6945	17.50	16.74
	215/7025	14.00	12.65
802.11ax-HE160	207/6985	17.00	16.33
Note. Initial test configuration is 802.11ax-HE40 mode.			

6GHz Wi-Fi U-NII-8 MIMO	Channel /Freq.(MHz)	Maximum Output Power (dBm)	
		Tune-up	Meas.
802.11ax-HE20(MCS0)	189/6895	17.00	15.62
	209/6995	16.00	14.96
	229/7095	19.00	17.42
802.11ax-HE40(MCS0)	203/6965	19.00	**18.10**
	227/7085	18.00	17.40
802.11ax-HE80(MCS0)	199/6945	18.00	17.13
	215/7025	15.00	13.64
802.11ax-HE160(MCS0)	207/6985	18.00	16.76
Note. Initial test configuration is 802.11ax-HE40 mode.			

10.2 Conducted Power of BT

The maximum output power of BT is:

Mode	GFSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	9.89	9.86	9.54
Mode	Pi/4DQPSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	9.63	9.59	9.18
Mode	8DPSK mode		
Channel/Frequency(MHz)	0(2402)	39(2441)	78(2480)
Peak Power(dBm)	9.66	9.69	9.40

The maximum output power of BLE is:

Mode	1Mbps		
Channel/Frequency(MHz)	0(2402)	19(2440)	39(2480)
Peak Power(dBm)	-3.40	-4.14	-3.61
Mode	2Mbps		
Channel/Frequency(MHz)	0(2402)	19(2440)	39(2480)
Peak Power(dBm)	-3.94	-3.95	-3.37

10.3 Tune-up powertolerance

Band	Tune-up power tolerance(dBm)			
WIFI	2.4G (MAIN ANT1)		802.11b	Max output power =17.00±1.0dbm
			802.11g	Max output power =20.00±1.0dbm
			802.11n (HT20)	Max output power =19.50±1.0dbm
			802.11n (HT40)	Max output power =19.00±1.0dbm
			802.11ax20	Max output power =19.00±1.0dbm
			802.11ax40)	Max output power =19.50±1.0dbm
	2.4G (AUX ANT2)		802.11b	Max output power =19.00±1.0dbm
			802.11g	Max output power =22.00±1.0dbm
			802.11n (HT20)	Max output power =21.00±1.0dbm
			802.11n (HT40)	Max output power =21.50±1.0dbm
			802.11ax20	Max output power =21.00±1.0dbm
			802.11ax40)	Max output power =21.50±1.0dbm
	2.4G (MIMOMode)		802.11n (HT20)	Max output power =23.50±1.0dbm
			802.11n (HT40)	Max output power =23.50±1.0dbm
			802.11ax20	Max output power =23.00±1.0dbm
			802.11ax40)	Max output power =23.50±1.0dbm
	U-NII-1 (5150-5250)	Ant 1	802.11a	Max output power =21.00±1.0dbm
		Ant 2	802.11a	Max output power =17.50±1.0dbm
		MIMO	802.11n (HT40)	Max output power =22.50±1.0dbm
	U-NII-2 (5250-5350)	Ant 1	802.11n (HT40)	Max output power =20.50±1.0dbm
		Ant 2	802.11a	Max output power =18.00±1.0dbm
		MIMO	802.11n (HT40)	Max output power =22.00±1.0dbm
	U-NII-3 (5470-5725)	Ant 1	802.11a	Max output power =20.00±1.0dbm
		Ant 2	802.11a	Max output power =17.50±1.0dbm
		MIMO	802.11n (HT40)	Max output power =21.50±1.0dbm
	U-NII-4 (5725-5825)	Ant 1	802.11ac(VHT80)	Max output power =22.00±1.0dbm
		Ant 2	802.11a	Max output power =17.00±1.0dbm
		MIMO	802.11ac(VHT80)	Max output power =22.50±1.0dbm
WIFI 6E	U-NII-5 (5925-6425)	Ant 1	802.11ax-HE20	Max output power =13.00±1.0dbm
		Ant 2	802.11ax-HE80	Max output power =18.50±1.0dbm
		MIMO	802.11ax-HE80	Max output power =19.00±1.0dbm
	U-NII-6 (6425-6525)	Ant 1	802.11ax-HE40	Max output power =10.50±1.0dbm
		Ant 2	802.11ax-HE80	Max output power =18.50±1.0dbm
		MIMO	802.11ax-HE80	Max output power =19.00±1.0dbm
	U-NII-7 (6525-6875)	Ant 1	802.11ax-HE40	Max output power =11.50±1.0dbm
		Ant 2	802.11ax-HE40	Max output power =18.50±1.0dbm
		MIMO	802.11ax-HE40	Max output power =19.00±1.0dbm
	U-NII-8 (6875-7125)	Ant 1	802.11ax-HE40	Max output power =10.00±1.0dbm
		Ant 2	802.11ax-HE40	Max output power =18.00±1.0dbm
		MIMO	802.11ax-HE40	Max output power =19.00±1.0dbm
BT	GFSK mode			Max output power =10.00±1.0dbm
	Pi/4DQPSK mode			Max output power =10.00±1.0dbm
	8DPSK mode			Max output power =10.00±1.0dbm
BLE	1Mbps Power			Max output power =-3.00±1.0dbm
	2Mbps Power			Max output power =-3.00±1.0dbm

11 SAR test results

Notes:

1) Per KDB447498 D01v05 r02,the SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the scaled SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

2) Per KDB447498 D01v05r02, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

3)Per KDB447498 D01v06, All measurement SAR result is scaled-up to account for tune-up tolerance is compliant.

4) Per KDB648474 D04v01r03, body-worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn with headset SAR.

5)Per KDB248227 D01v02r02,the procedures required to establish specific device operating configurations for testing the SAR of 802.11 a/b/g transmitters.

6) Per KDB865664 D01v01r04,for each frequency band,repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤20%,and the measured SAR <1.45W/Kg,only one repeated measurement is required.

7) Per KDB865664 D02v01r02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing(Refer to appendix B for details).

8) Per KDB6162147 D04v01r02, the SAR requirements for laptop and tablet computers, and its to determine the minimum test separation distance .

11.1 Results overview of Wi-Fi

11.1.1 Results overview of Wi-Fi 2.4G

Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up Limit (dBm)	Scaled SAR1-g (W/kg)	Scaling Factor
			1-g	10-g					
WLAN2.4g(gap 0mm)									
802.11g MAIN ANT1	Front	6/2437	0.297	0.159	-2.730	19.93	20.00	0.302	1.016
	Back	6/2437	0.194	0.107	-2.890	19.93	20.00	0.197	1.016
	Top	6/2437	0.761	0.297	1.530	19.93	20.00	0.773	1.016
802.11g AUX ANT2	Front	11/2462	0.282	0.153	-1.820	21.84	22.00	0.293	1.038
	Back	11/2462	0.177	0.101	-3.550	21.84	22.00	0.184	1.038
	Top	11/2462	0.726	0.282	-2.130	21.84	22.00	0.753	1.038
802.11ax 40 MIMO	Front	6/2437	0.339	0.173	-2.250	23.24	23.50	0.360	1.062
	Back	6/2437	0.218	0.116	-4.170	23.24	23.50	0.231	1.062
	Top[	6/2437	0.786	0.310	4.830	23.24	23.50	0.834	1.062

11.1.2 Results overview of Wi-Fi 5G

Mode	Test Position of Body with 0mm	Test channel /Freq.(MHz)	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up Limit (dBm)	Scaled SAR1-g (W/kg)	Scaling Factor
			1-g	10-g					
WLAN5.2g(gap 0mm)									
802.11a ANT1	Front	48/5240	0.433	0.137	-3.990	20.60	21.00	0.475	1.096
	Back	48/5240	0.342	0.104	2.370	20.60	21.00	0.375	1.096
	Top	48/5240	0.601	0.206	-4.050	20.60	21.00	0.659	1.096
802.11a ANT2	Front	48/5240	0.372	0.109	1.430	17.14	17.50	0.404	1.086
	Back	48/5240	0.316	0.093	-4.870	17.14	17.50	0.343	1.086
	Top	48/5240	0.378	0.195	-1.390	17.14	17.50	0.411	1.086
802.11n-HT40 MIMO-ANT	Front	38/5190	0.471	0.154	-4.370	22.06	22.50	0.521	1.107
	Back	38/5190	0.358	0.110	-2.610	22.06	22.50	0.396	1.107
	Top	38/5190	0.638	0.221	-4.100	22.06	22.50	0.706	1.107
WLAN5.4g(gap 0mm)									
802.11n-HT40 ANT1	Front	54/5270	0.404	0.126	-4.440	20.39	20.50	0.414	1.026
	Back	54/5270	0.213	0.072	1.800	20.39	20.50	0.218	1.026
	Top	54/5270	0.564	0.183	-2.110	20.39	20.50	0.578	1.026
802.11a ANT2	Front	52/5260	0.373	0.115	2.910	17.65	18.00	0.404	1.084
	Back	52/5260	0.208	0.061	-2.710	17.65	18.00	0.225	1.084
	Top	52/5260	0.495	0.156	4.370	17.65	18.00	0.537	1.084
802.11n-HT40 MIMO-ANT	Front	54/5270	0.551	0.142	1.310	21.75	22.00	0.584	1.059
	Back	54/5270	0.229	0.086	0.300	21.75	22.00	0.243	1.059
	Top	54/5270	0.615	0.213	-0.830	21.75	22.00	0.651	1.059
WLAN5.6g(gap 0mm)									
802.11a ANT1	Front	140/5700	0.338	0.093	4.450	19.75	20.00	0.358	1.059
	Back	140/5700	0.129	0.042	1.070	19.75	20.00	0.137	1.059
	Top	140/5700	0.725	0.248	3.870	19.75	20.00	0.768	1.059
802.11a ANT2	Front	140/5700	0.226	0.082	2.040	17.25	17.50	0.239	1.059
	Back	140/5700	0.105	0.038	-1.550	17.25	17.50	0.111	1.059
	Top	140/5700	0.684	0.213	1.190	17.25	17.50	0.725	1.059
802.11n-HT40 MIMO-ANT	Front	134/5670	0.411	0.108	-0.210	21.06	21.50	0.455	1.107
	Back	134/5670	0.156	0.046	-2.830	21.06	21.50	0.173	1.107
	Top	134/5670	0.752	0.262	-2.460	21.06	21.50	0.832	1.107
WLAN5.8g(gap 0mm)									
802.11ac-VHT80-ANT1	Front	155/5775	0.215	0.075	2.000	21.81	22.00	0.225	1.045
	Back	155/5775	0.076	0.030	1.780	21.89	22.00	0.078	1.025
	Top	155/5775	0.645	0.214	-1.350	21.81	22.00	0.674	1.045
802.11a ANT2	Front	149/5745	0.207	0.069	-4.330	16.98	17.00	0.208	1.005
	Back	149/5745	0.070	0.028	2.350	16.98	17.00	0.070	1.005
	Top	149/5745	0.613	0.201	4.200	16.98	17.00	0.616	1.005
802.11ac-VHT80 MIMO-ANT	Front	155/5775	0.235	0.080	-4.350	22.25	22.50	0.249	1.059
	Back	155/5775	0.083	0.033	-4.980	22.25	22.50	0.088	1.059
	Top	155/5775	0.675	0.231	-4.290	22.25	22.50	0.715	1.059

11.1.3 Results overview of Wi-Fi6E & APD

Band	Antenna	Test Position with 0mm	Mode	Duty Cycle	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g (W/Kg)	Measured APD (W/m^2)	Power Drift (dB)	Scaling Factor	Report SAR1g (W/kg)	Report APD (W/m^2)
Wi-Fi	ANT1	Back Side	802.11ax-HE20	100.0%	45/6175	11.00	9.54	0.058	0.247	-0.044	1.40	0.081	0.346
U-NII-5	ANT2	Back Side	802.11ax-HE80	100.0%	39/6145	18.50	17.62	0.064	0.288	-0.126	1.22	0.078	0.353
Wi-Fi	ANT1	Back Side	802.11ax-HE40	100.0%	107/6485	10.50	10.13	0.072	0.260	0.045	1.09	0.078	0.283
U-NII-6	ANT2	Back Side	802.11ax-HE80	100.0%	119/6545	18.50	17.42	0.056	0.222	-0.120	1.28	0.072	0.285
Wi-Fi	ANT1	Back Side	802.11ax-HE40	100.0%	147/6685	11.50	10.96	0.069	0.349	-0.080	1.13	0.078	0.395
U-NII-7	ANT2	Back Side	802.11ax-HE40	100.0%	123/6565	18.50	17.98	0.066	0.256	-0.160	1.13	0.074	0.289
Wi-Fi	ANT1	Back Side	802.11ax-HE40	100.0%	203/6965	10.00	9.20	0.069	0.191	-0.058	1.20	0.083	0.230
U-NII-8	ANT2	Back Side	802.11ax-HE40	100.0%	203/6965	18.00	17.50	0.089	0.352	0.037	1.12	0.100	0.395

11.1.4 Results overview of PD

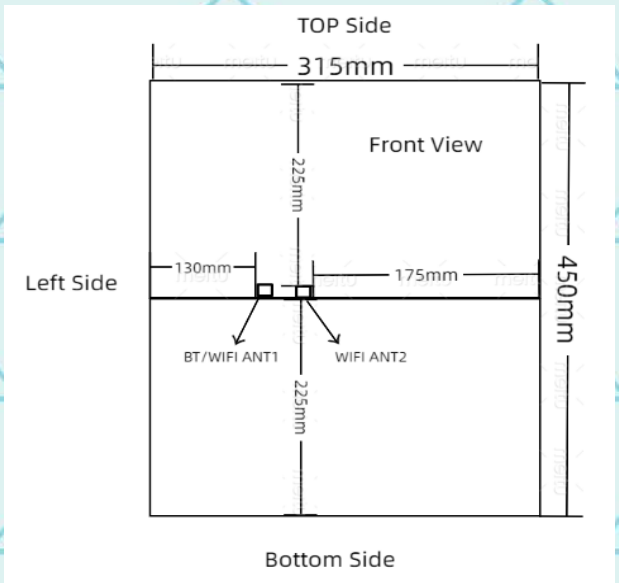
Band	Antenna	Test Position	Dist. (mm)	Mode	Duty Cycle	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Normal psPD (W/m^2)	Total psPD (W/m^2)	Power Drift [dB]	Measurement Uncertainty Scaling Factor	Tune up Scaling Factor	Scaled Normal psPD (W/m^2)	Scaled Total psPD (W/m^2)
U-NII-5	ANT 2	Back Side	2	802.11ax-HE80	100.0%	39/6145	18.50	17.62	0.650	1.330	0.100	1.280	1.22	1.019	2.085
	ANT 2	Back Side	9.7	802.11ax-HE80	100.0%	39/6145	18.50	17.62	0.325	0.629	0.025	1.280	1.22	0.509	0.986
U-NII-6	ANT 2	Back Side	2	802.11ax-HE80	100.0%	119/6545	18.50	17.42	0.638	1.280	0.010	1.280	1.28	1.047	2.101
	ANT 2	Back Side	9.1	802.11ax-HE80	100.0%	119/6545	18.50	17.42	0.304	0.586	0.026	1.280	1.28	0.499	0.962
U-NII-7	ANT 1	Back Side	2	802.11ax-HE40	100.0%	147/6685	11.50	10.96	0.726	1.460	0.191	1.280	1.13	1.052	2.116
	ANT 1	Back Side	8.9	802.11ax-HE40	100.0%	147/6685	11.50	10.96	0.341	0.550	0.054	1.280	1.13	0.494	0.797
U-NII-8	ANT 2	Back Side	2	802.11ax-HE40	100.0%	203/6965	18.00	17.50	0.709	1.250	0.117	1.280	1.12	1.018	1.795
	ANT 2	Back Side	8.6	802.11ax-HE40	100.0%	203/6965	18.00	17.50	0.392	0.645	0.019	1.280	1.12	0.563	0.926

11.2 Results overview of BT

Test Position of Body with 0mm	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up Limit(dBm)	Scaled SAR_{1-g} (W/kg)	Scalig factor
			1-g	10-g					
BTantenna to side									
Front side	0/2402	GFSK	0.049	0.023	-4.330	9.89	10.00	0.050	1.026
Rear side	0/2402	GFSK	0.030	0.014	3.580	9.89	10.00	0.031	1.026
Left side	0/2402	GFSK	0.002	0.001	-2.720	9.89	10.00	0.002	1.026
Top side	0/2402	GFSK	0.084	0.040	-4.640	9.89	10.00	0.086	1.026

12 Multiple Transmitter Information

The SAR measurement positions of each side are as below:



<Rear Side>

Side	Wi-Fi/BT antenna **(0 degree) to Side**
	SAR Consideration
Front Side	Yes
Rear Side	Yes
Left Side	Yes
Right Side	Yes
Top Side	Yes
Bottom Side	Yes

Note: According to section 6.1.4.5 device with swivel antennas, if the antennas can be rotated to two planes, an evaluation should be performed and documented on the report to decide the highest exposure conditions, and only that position need consideration.

In addition, in case of this antenna, the two representative positions 0degree and 90degree shall be evaluated independently for each required EUT edge. When evaluating the test surfaces, the nearest distance between the antenna and the edges is applicable.

12.1 Stand-alone SAR test exclusion

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,where

• f(GHz) is the RF channel transmit frequency in GHz

• Power and distance are rounded to the nearest mW and mm before calculation

• The result is rounded to one decimal place for comparison

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Body-Wornposition

Mode	Pmax(dBm)	Pmax(mW)	Distance(mm)	f(GHz)	Calculation Result	exclusion Threshold	SAR test exclusion
BT	9.89	9.75	5.00	2.45	7.50	0.407	Yes

12.1.1 Simultaneous Transmission SAR Summation Scenario

Mode	Position	Ant 1WIFI 1g(W/kg)	Ant 1 BT 1g(W/kg)	Ant 1 WIFI+ BT 1g(W/kg)
2.4Gwifi (MIMO)	Front	0.360	0.050	0.410
	Back	0.231	0.031	0.262
	Top	0.834	0.086	0.920
5.2Gwifi (MIMO)	Front	0.521	0.050	0.571
	Back	0.396	0.031	0.427
	Top	0.706	0.086	0.792
5.4Gwifi (MIMO)	Front	0.584	0.050	0.634
	Back	0.243	0.031	0.274
	Top	0.651	0.086	0.737
5.6Gwifi (MIMO)	Front	0.455	0.050	0.505
	Back	0.173	0.031	0.204
	Top	0.832	0.086	0.918
5.8Gwifi (MIMO)	Front	0.249	0.050	0.299
	Back	0.088	0.031	0.119
	Top	0.715	0.086	0.801
WIFI6E (U-NII-8 Ant 2)	Back	0.100	0.050	0.150

12.2 Measurement uncertainty evaluation for SAR test

The following table includes the uncertainty table of the IEEE 1528. The values are determined by Satimo.The breakdown of the individual uncertainties is as follows:

Measurement Uncertainty evaluation for SAR test								
Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g U_i (±%)	10g U_i (±%)	V_i
measurement system								
Probe Calibration	5.8	N	1	1	1	5.8	5.8	∞
Axial Isotropy	3.5	R	$\sqrt{3}$	$(1\text{-}C_p)^{1/2}$	$(1\text{-}C_p)^{1/2}$	1.43	1.43	∞
Hemispherical Isotropy	5.9	R	$\sqrt{3}$	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
Boundary Effect	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
system Detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	3	N	1	1	1	3.00	3.00	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF Ambient Conditions-Noise	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF Ambient Conditions-Reflections	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe Positioner Mechanical Tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and Integration Algorithms for Max.SAR Evaluation	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related								
Test Sample Positioning	2.6	N	1	1	1	2.60	2.60	11
Device Holder Uncertainty	3	N	1	1	1	3.00	3.00	7
Output Power Variation-SAR drift measurement	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞

Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity（meas.）	2.5	N	1	0.64	0.43	1.60	1.08	5
Liquid conductivity (target.)	5	R	$\sqrt{3}$	0.64	0.43	1.85	1.24	5
Liquid Permittivity（meas.）	2.5	N	1	0.60	0.49	1.50	1.23	∞
Liquid Permittivity (target.)	5	R	$\sqrt{3}$	0.60	0.49	1.73	1.42	∞
Combined Standard Uncertainly		Rss				10.63	10.54	
Expanded Uncertainty{95% CONFIDENCE INTERRVAL}		k				21.26	21.08	

12.3 Measurement uncertainty evaluation for system check

The following table includes the uncertainty table of the IEEE 1528. The values are determined by Satimo.The breakdown of the individual uncertainties is as follows:

Uncertainty For System Performance Check								
Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	C_i 1g	C_i 10g	1g U_i(±%)	10g U_i (±%)	V_i
measurement system								
Probe Calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	$\sqrt{3}$	$(1-C_p)^{1/2}$	$(1-C_p)^{1/2}$	1.43	1.43	∞
Hemispherical Isotropy	5.9	R	$\sqrt{3}$	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
Boundary Effect	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
system detection Limits	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	0	N	1	1	1	0.00	0.00	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient Conditions - Noise	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient Conditions – Reflections	3	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioned Mechanical Tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Dipole								
Deviation of experimental source from numerical source	4	N	1	1	1	4.00	4.00	∞
Input power and SAR drift measurement	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid Distance	2	R	$\sqrt{3}$	1	1	1.16	1.16	∞

Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity（meas.）	2.5	N	1	0.64	0.43	1.60	1.08	5
Liquid conductivity (target.)	5	R	$\sqrt{3}$	0.64	0.43	1.85	1.24	5
Liquid Permittivity（meas.）	2.5	N	1	0.60	0.49	1.50	1.23	∞
Liquid Permittivity (target.)	5	R	$\sqrt{3}$	0.60	0.49	1.73	1.41	∞
Combined Standard Uncertainty		Rss				10.28	9.98	
Expanded Uncertainty (95% Confidence interval)		k				20.57	19.95	

13 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

	Manufacturer	Device Type	Type(Model)	Serial number	calibration	
					Last Cal.	Due Date
☒	SATIMO	COMOSAR DOSIMETRIC E FIELD PROBE	SSE2	3523-EPGO-428	2024-06-18	2025-06-17
☒	SATIMO	COMOSAR 750 MHz REFERENCE DIPOLE	SID750	SN 48/16 DIP0G750-444	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 835 MHz REFERENCE DIPOLE	SID835	SN 14/13 DIP0G835-235	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 900 MHz REFERENCE DIPOLE	SID900	SN 14/13 DIP0G900-231	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 1800 MHz REFERENCE DIPOLE	SID1800	SN 14/13 DIP1G800-232	2023-06-25	2026-06-24
☐	SATIMO	COMOSAR 1900 MHz REFERENCE DIPOLE	SID1900	SN 14/13 DIP1G900-236	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 2000 MHz REFERENCE DIPOLE	SID2000	SN 14/13 DIP2G000-237	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 2450 MHz REFERENCE DIPOLE	SID2450	SN 14/13 DIP2G450-238	2023-06-25	2026-06-24
☒	SATIMO	COMOSAR 2600 MHz REFERENCE DIPOLE	SID2600	SN 28/14 DIP2G600-327	2023-06-25	2026-06-24
☒	SATIMO	Software	OPENSAR	N/A	N/A	N/A
☒	SATIMO	Phantom	COMOSAR IEEE SAM PHANTOM	SN 14/13 SAM99	N/A	N/A
☒	R & S	Universal Radio Communication Tester	CMU 200	119733	2024-10-21	2025-10-20
☒	R & S	Universal Radio Communication Tester	CMW500	144459	2024-10-21	2025-10-20
☒	R & S	Universal Radio Communication Tester	E7515B	MY60192341	2024-10-21	2025-10-20
☒	HP	Network Analyser	8753D	3410A08889	2024-10-21	2025-10-20
☒	HP	Signal Generator	E4421B	GB39340770	2024-10-28	2025-10-27
☒	Keithley	Multimeter	Keithley 2000	4014539	2024-10-28	2025-10-27
☒	SATIMO	Amplifier	Power Amplifier	MODU-023-A-0004	2024-10-21	2025-10-20
☒	Agilent	Power Meter	E4418B	GB43312909	2024-10-21	2025-10-20
☒	Agilent	Power Meter Sensor	E4412A	MY41500046	2024-10-21	2025-10-20

Annex A: System performance verification

(**Please See the SAR Measurement Plots of annex A.**)

Annex B: Measurement results

(**Please See the SAR Measurement Plots of annex B.**)

Annex C: Calibrationreports

(Please See the Calibration reports of annex C.)

Annex D: Attachment Report for WIFI6E

Annex E: Photographs

Annex A: System Check

Tested Model : T14RA

Report Number:

WSCT-ANAB-R&E240900045A-SAR

MEASUREMENT 1

BODY

Type: Validation measurement (Complete)

Date of measurement:23/9/2024

Measurement duration: 10 minutes 43 seconds

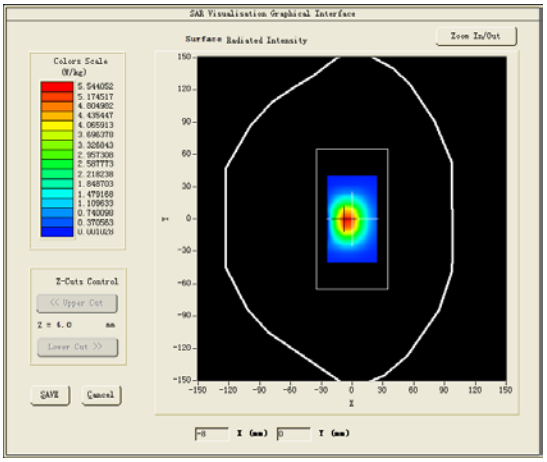
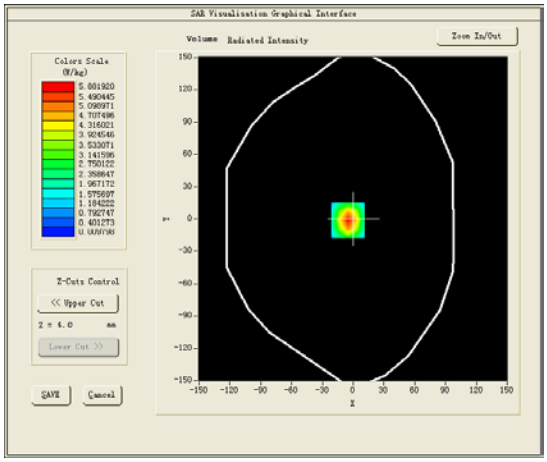
A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Middle Band SAR (Channel -1):

Frequency (MHz)	2450.000000
Relative permittivity (real part)	40.269142
Relative permittivity (imaginary part)	14.039240
Conductivity (S/m)	1.82349
Variation (%)	0.390000

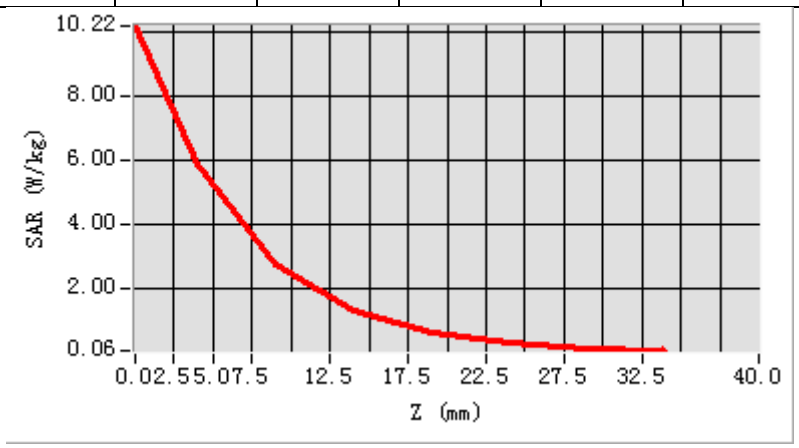
SURFACE SAR	VOLUME SAR
	

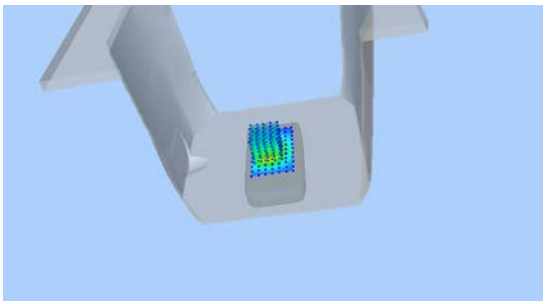
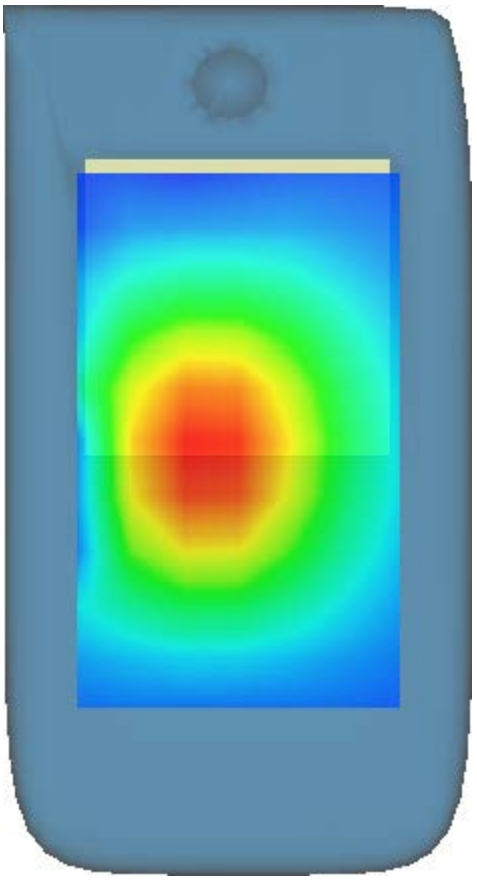
Maximum location: X=-5.00, Y=-1.00

SAR Peak: 10.96 W/kg

SAR 10g (W/Kg)	2.333453
SAR 1g (W/Kg)	5.433343

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	10.2188	5.8819	2.7478	1.3151	0.6266	0.2969	0.1341



3D screen shot	Hot spot position
	

MEASUREMENT 2

BODY

Type: Validation measurement (Complete)

Date of measurement: 26/9/2024

Measurement duration: 27 minutes 45 seconds

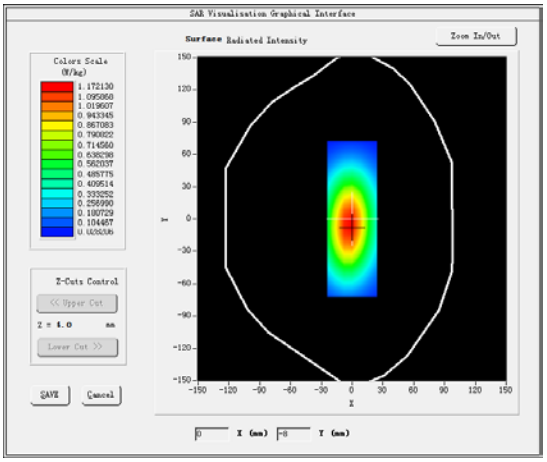
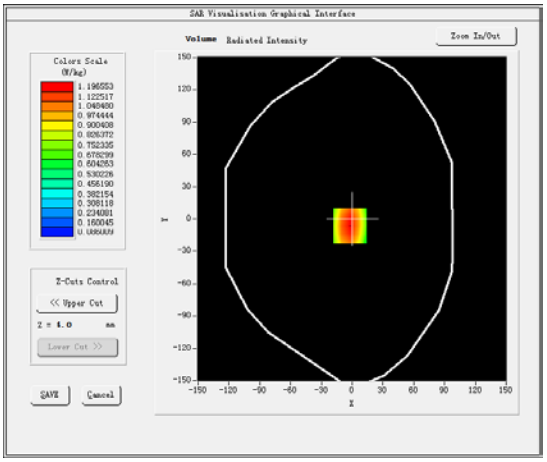
A. Experimental conditions.

Area Scan	dx=10mm dy=10mm
ZoomScan	8x8x7,dx=4mm dy=4mm dz=2mm,Complete
Phantom	Validation plane
Device Position	Waveguide
Band	CW5200
Channels	Middle
Signal	CW (Duty cycle:1:1)

B. SAR Measurement Results

Middle Band SAR (Channel -1):

Frequency (MHz)	5200.000000
Relative permittivity (real part)	35.622599
Relative permittivity (imaginary part)	18.202492
Conductivity (S/m)	4.524169
Variation (%)	0.270000

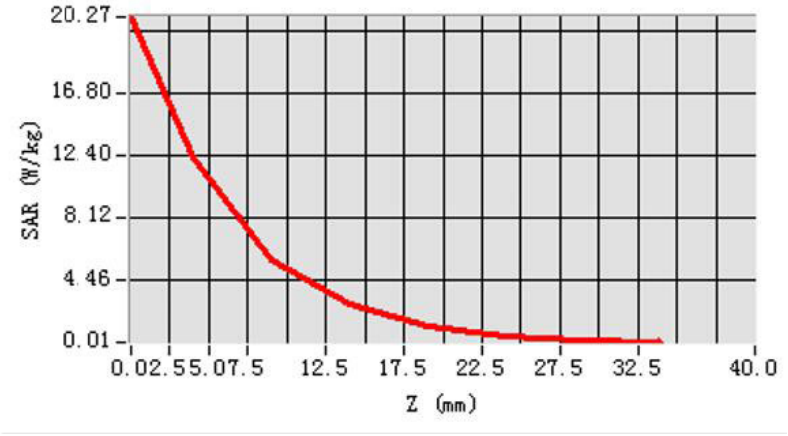
SURFACE SAR	VOLUME SAR
	

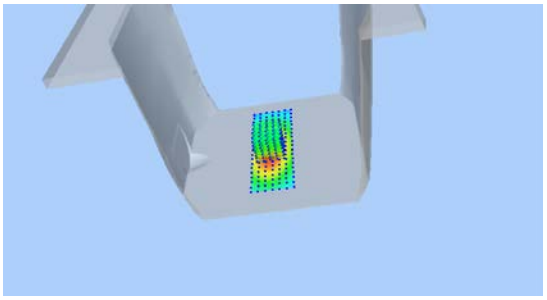
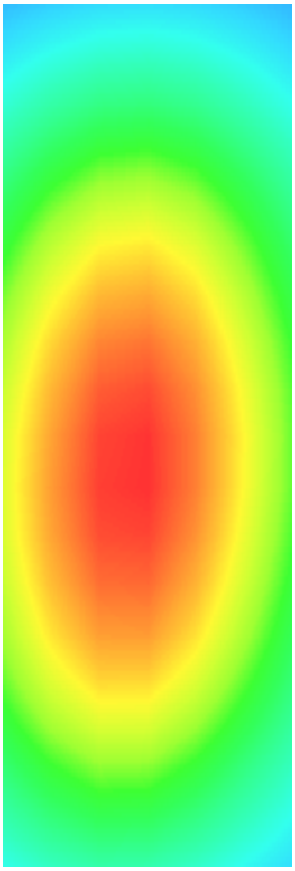
Maximum location: X=-2.00, Y=-1.00

SAR Peak: 10.27 W/kg

SAR 10g (W/Kg)	2.264061
SAR 1g (W/Kg)	7.718314

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	20.2711	16.1966	12.7784	10.5196	8.1218	4.2403	1.1660



3D screen shot	Hot spot position
	

MEASUREMENT 3

BODY

Type: Validation measurement (Complete)

Date of measurement: 26/9/2024

Measurement duration: 29 minutes 31 seconds

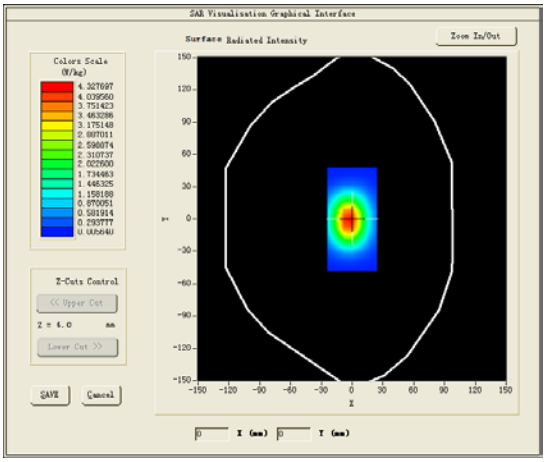
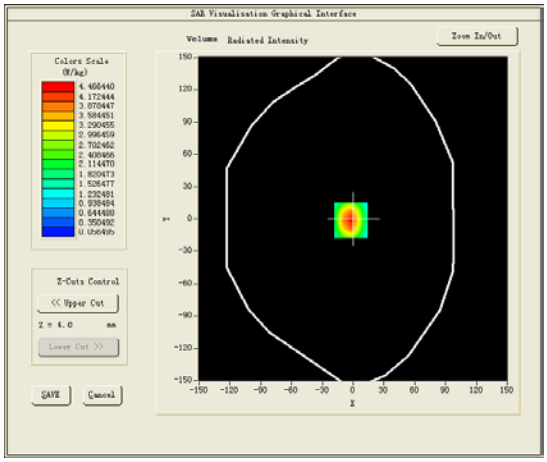
A. Experimental conditions.

Area Scan	dx=10mm dy=10mm
ZoomScan	8x8x7,dx=4mm dy=4mm dz=2mm,Complete
Phantom	Validation plane
Device Position	Waveguide
Band	CW5500
Channels	Middle
Signal	CW (Duty cycle:1:1)

B. SAR Measurement Results

Middle Band SAR (Channel -1):

Frequency (MHz)	5500.000000
Relative permittivity (real part)	36.114300
Relative permittivity (imaginary part)	18.167566
Conductivity (S/m)	5.024104
Variation (%)	-0.350000

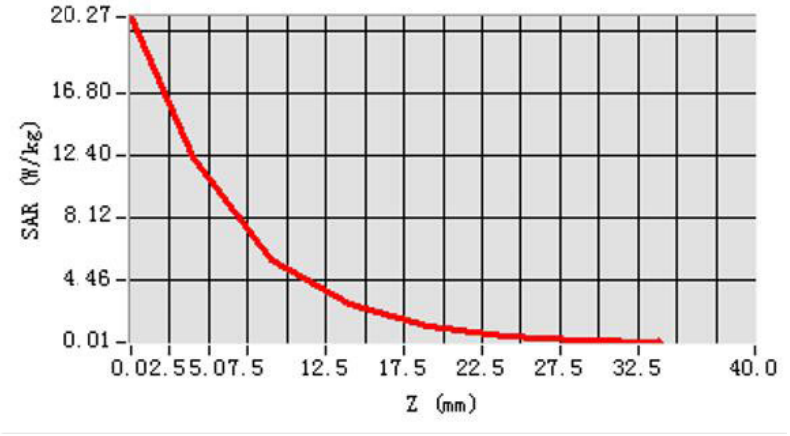
SURFACE SAR	VOLUME SAR
	

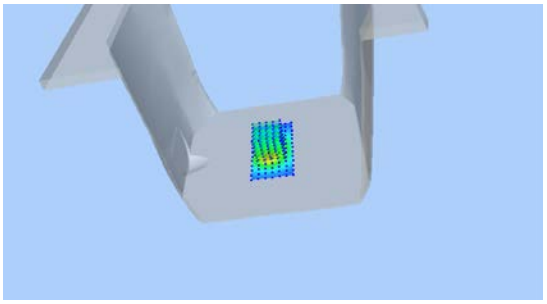
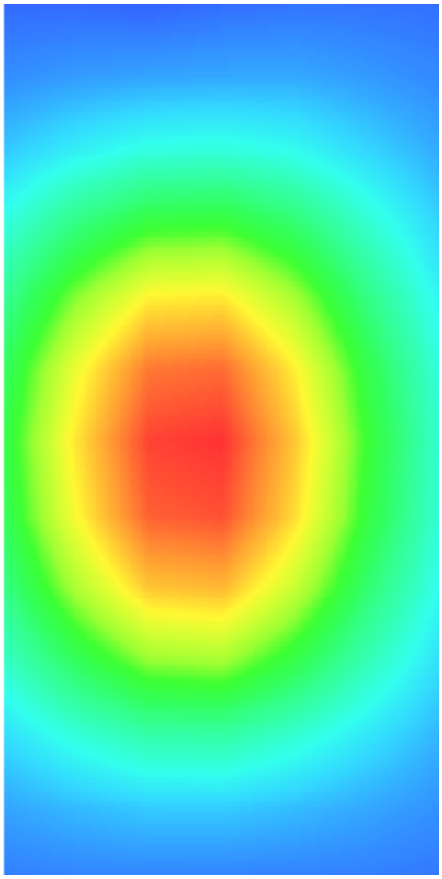
Maximum location: X=-2.00, Y=-1.00

SAR Peak: 10.87 W/kg

SAR 10g (W/Kg)	2.282155
SAR 1g (W/Kg)	8.337029

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	20.2697	16.4664	12.4603	10.3992	6.7963	4.4560	1.2601



3D screen shot	Hot spot position
	

MEASUREMENT 4

BODY

Type: Validation measurement (Complete)

Date of measurement: 26/9/2024

Measurement duration: 31 minutes 30 seconds

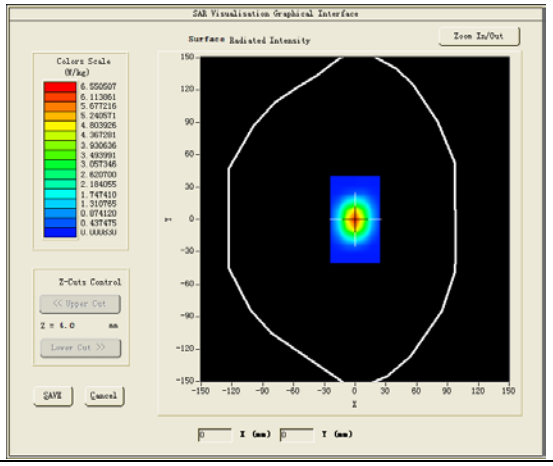
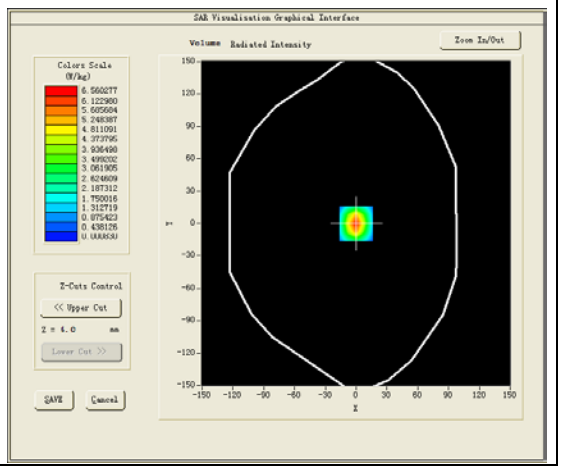
A. Experimental conditions.

Area Scan	dx=10mm dy=10mm
ZoomScan	8x8x7,dx=4mm dy=4mm dz=2mm,Complete
Phantom	Validation plane
Device Position	Waveguide
Band	CW5800
Channels	Middle
Signal	CW (Duty cycle:1:1)

B. SAR Measurement Results

Middle Band SAR (Channel -1):

Frequency (MHz)	5800.000000
Relative permittivity (real part)	34.633851
Relative permittivity (imaginary part)	19.038417
Conductivity (S/m)	5.163402
Variation (%)	0.010000

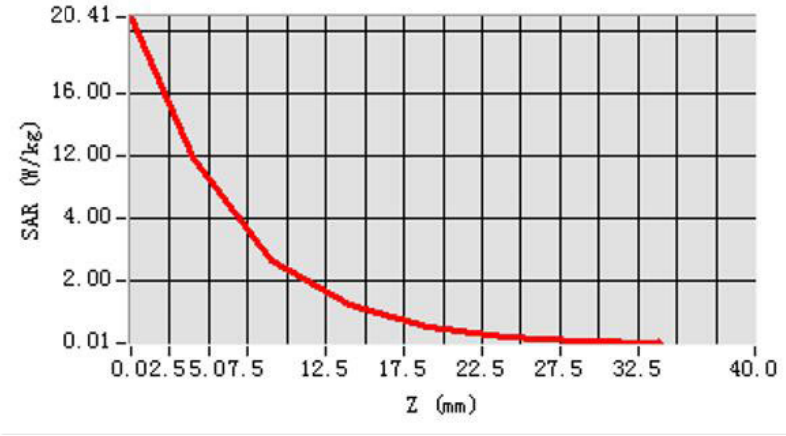
SURFACE SAR	VOLUME SAR
	

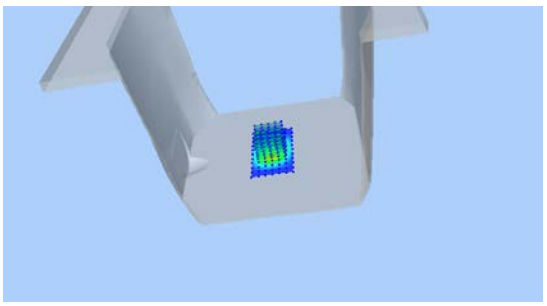
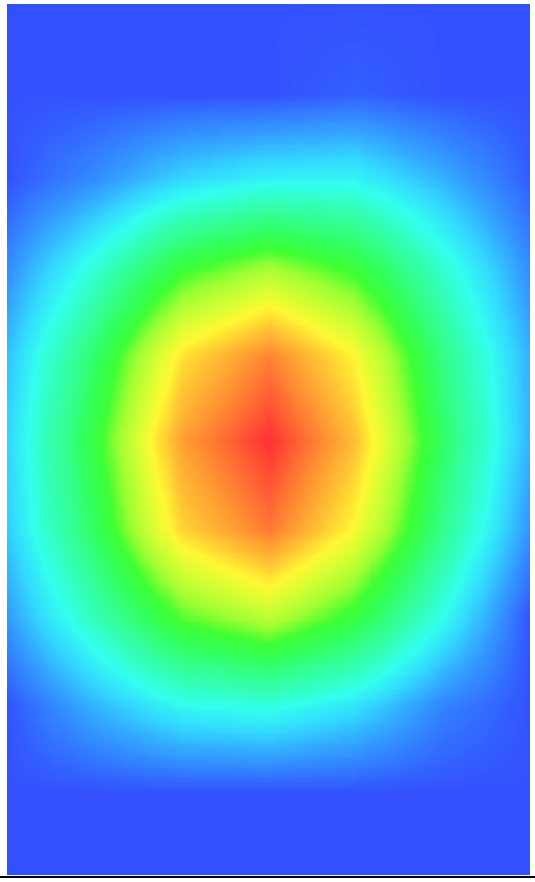
Maximum location: X=0.00, Y=0.00

SAR Peak: 9.41 W/kg

SAR 10g (W/Kg)	2.080196
SAR 1g (W/Kg)	7.965831

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	20.4140	16.5603	12.8797	8.2004	4.4226	2.1066	1.0008



3D screen shot	Hot spot position
	

Annex B: Measurement Results

Tested Model : T14RA

Report Number:

WSCT-ANAB-R&E240900045A-SAR

MEASUREMENT 1

Type: Phone measurement (Complete)

Date of measurement:23/9/2024

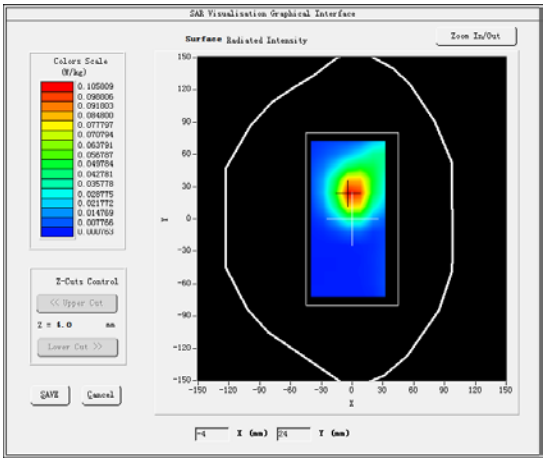
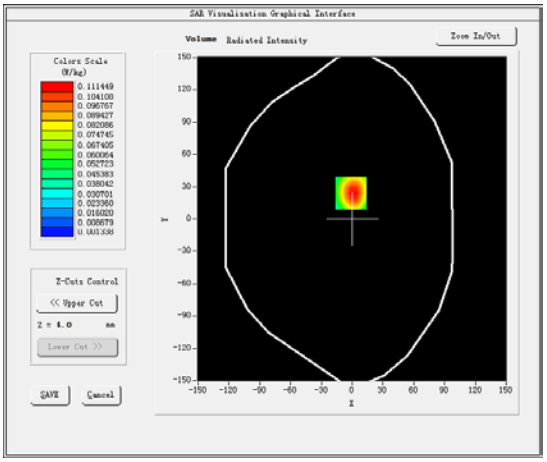
Measurement duration: 11 minutes 11 seconds

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	Middle
Signal	IEEE802.b (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	40.269142
Relative permittivity (imaginary part)	14.039240
Conductivity (S/m)	1.823490
Variation (%)	4.830000

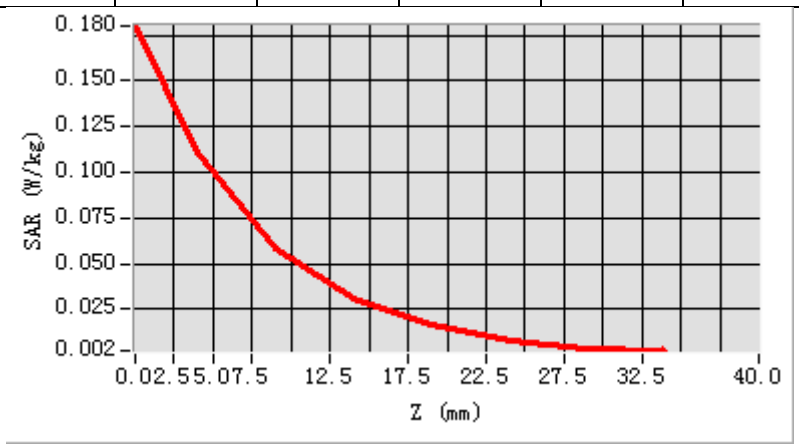
SURFACE SAR	VOLUME SAR
	

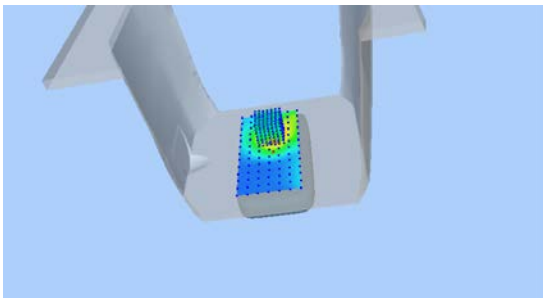
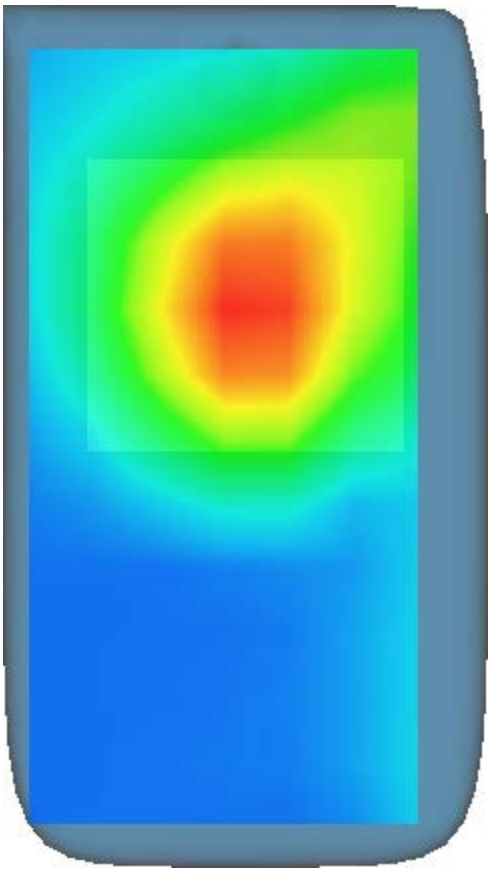
Maximum location: X=-1.00, Y=24.00

SAR Peak: 0.16 W/kg

SAR 10g (W/Kg)	0.310295
SAR 1g (W/Kg)	0.785920

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1801	0.1114	0.0587	0.0309	0.0161	0.0083	0.0040



3D screen shot	Hot spot position
	

MEASUREMENT 2

Type: Phone measurement (Complete)

Date of measurement: 26/9/2024

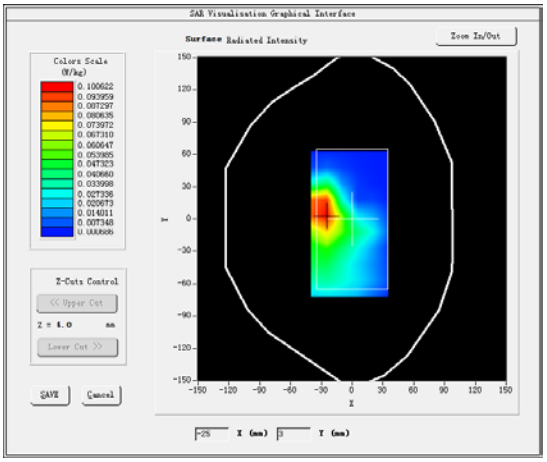
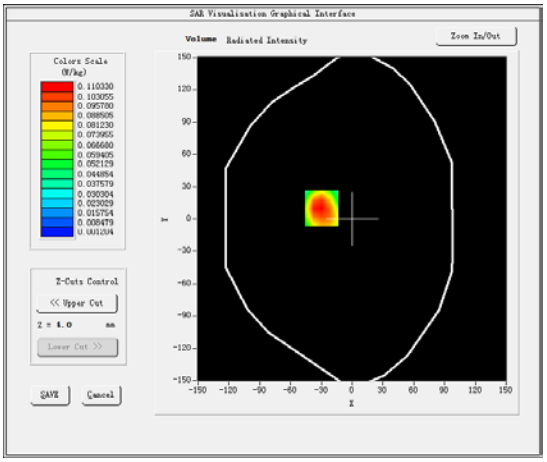
Measurement duration: 10 minutes 44 seconds

A. Experimental conditions.

Area Scan	dx=10mm dy=10mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11a U-NII-1
Channels	Middle
Signal	Duty cycle:1:1

B. SAR Measurement Results

Frequency (MHz)	5240.000000
Relative permittivity (real part)	35.622599
Relative permittivity (imaginary part)	18.202492
Conductivity (S/m)	4.524196
Variation (%)	-4.100000

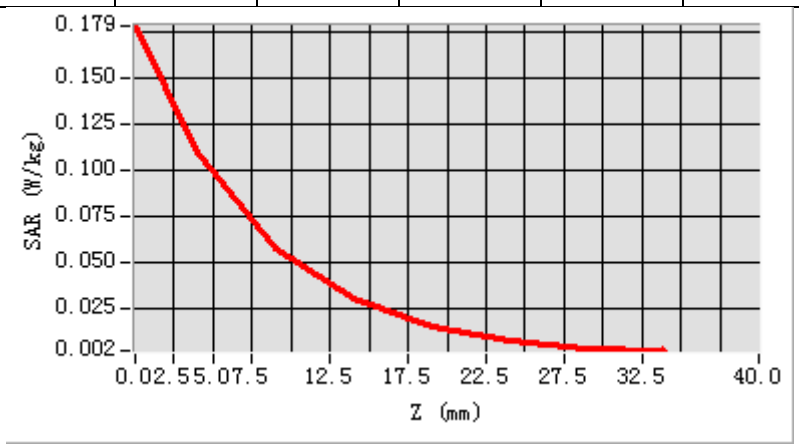
SURFACE SAR	VOLUME SAR
	

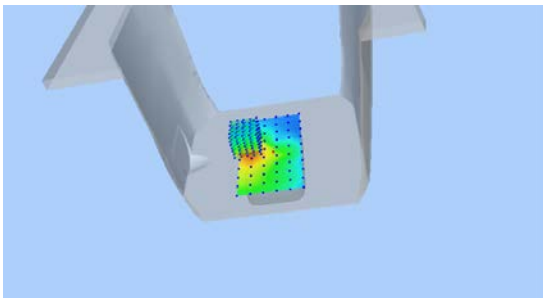
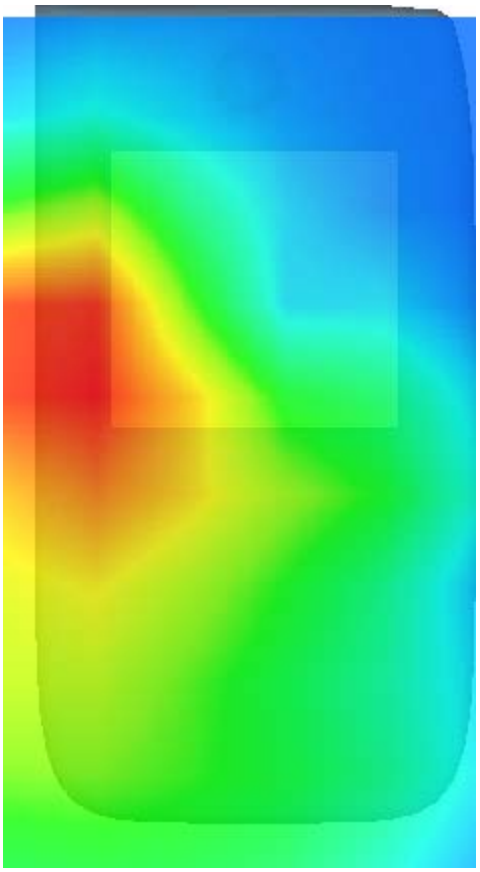
Maximum location: X=-30.00, Y=10.00

SAR Peak: 0.19 W/kg

SAR 10g (W/Kg)	0.221405
SAR 1g (W/Kg)	0.637814

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1788	0.1103	0.0576	0.0303	0.0156	0.0075	0.0040



3D screen shot	Hot spot position
	

MEASUREMENT 3

Type: Phone measurement (Complete)

Date of measurement: 26/9/2024

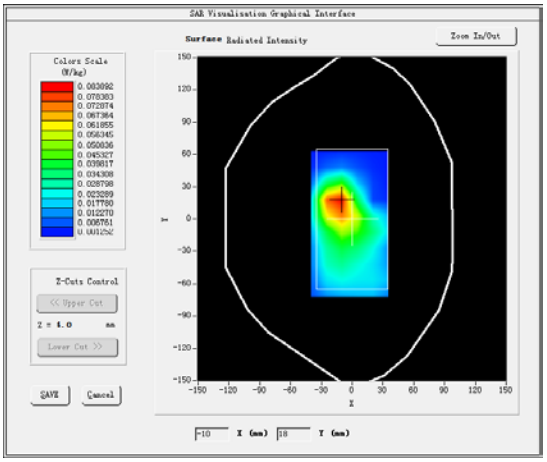
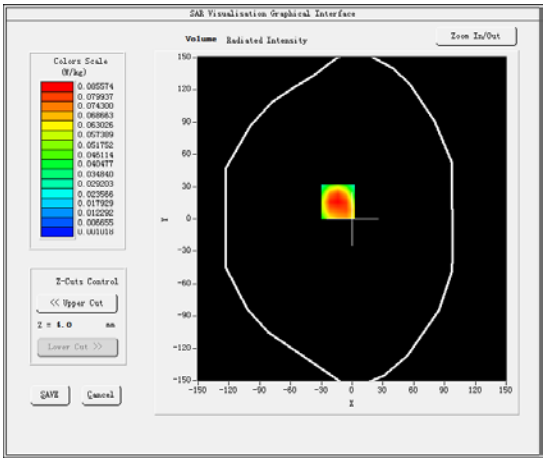
Measurement duration: 16 minutes 21 seconds

A. Experimental conditions.

Area Scan	dx=10mm dy=10mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11a U-NII-2a
Channels	Middle
Signal	Duty cycle:1:1

B. SAR Measurement Results

Frequency (MHz)	5260.000000
Relative permittivity (real part)	35.622599
Relative permittivity (imaginary part)	18.202492
Conductivity (S/m)	4.524169
Variation (%)	-0.830000

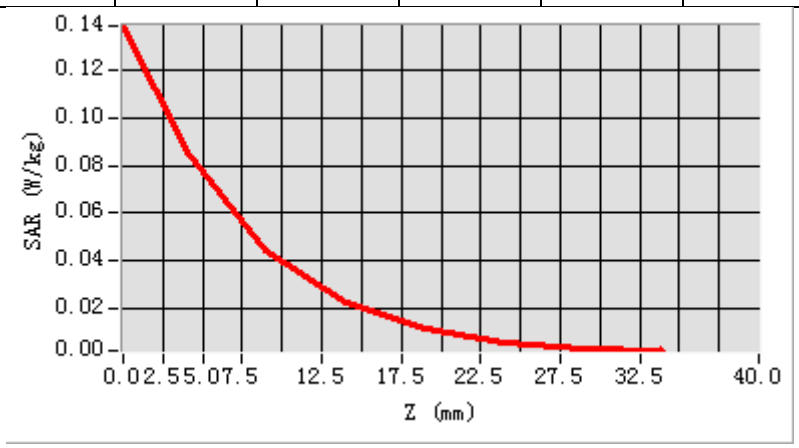
SURFACE SAR	VOLUME SAR
	

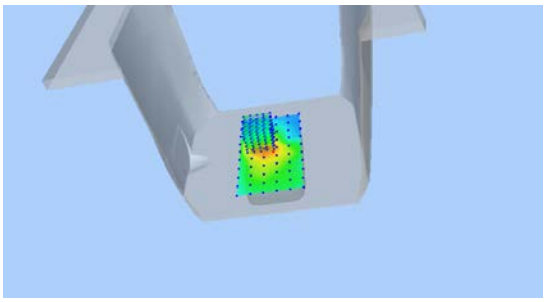
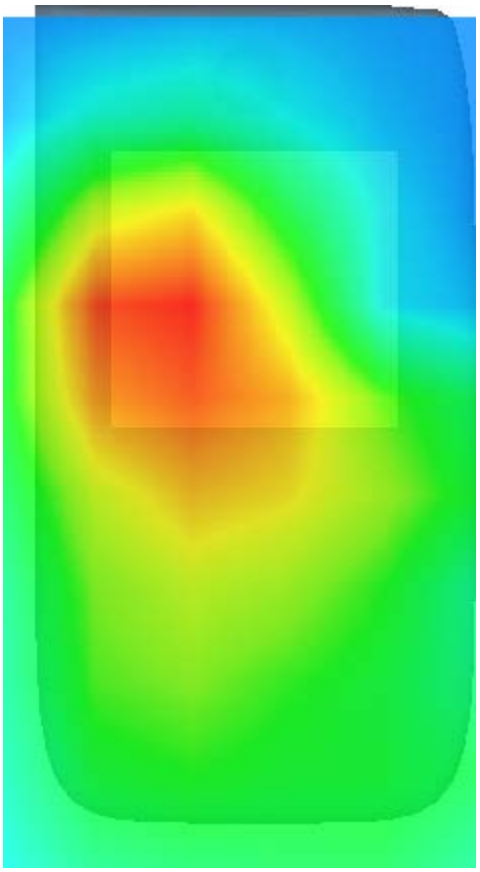
Maximum location: X=-14.00, Y=16.00

SAR Peak: 0.15 W/kg

SAR 10g (W/Kg)	0.213014
SAR 1g (W/Kg)	0.615402

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1388	0.0856	0.0441	0.0224	0.0109	0.0049	0.0027



3D screen shot	Hot spot position
	

MEASUREMENT 4

Type: Phone measurement (Complete)

Date of measurement: 26/9/2024

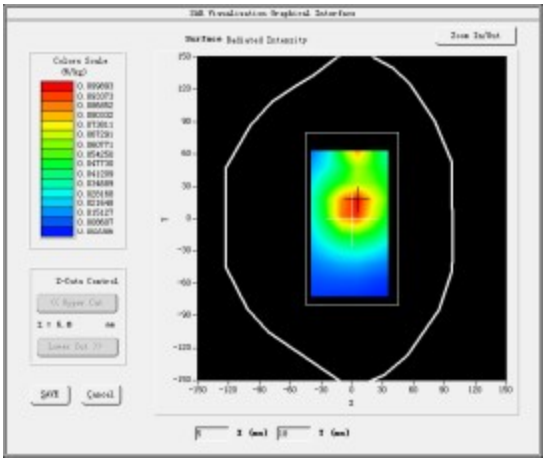
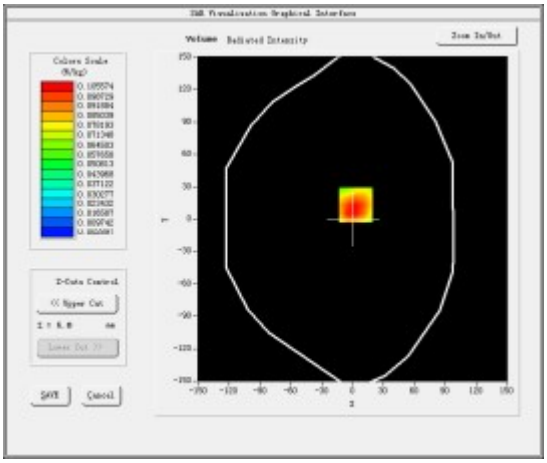
Measurement duration: 8 minutes 31 seconds

A. Experimental conditions.

Area Scan	dx=10mm dy=10mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11a U-NII-2c
Channels	Middle
Signal	Duty cycle:1:1

B. SAR Measurement Results

Frequency (MHz)	5700.000000
Relative permittivity (real part)	36.114300
Relative permittivity (imaginary part)	18.167566
Conductivity (S/m)	5.024104
Variation (%)	-2.460000

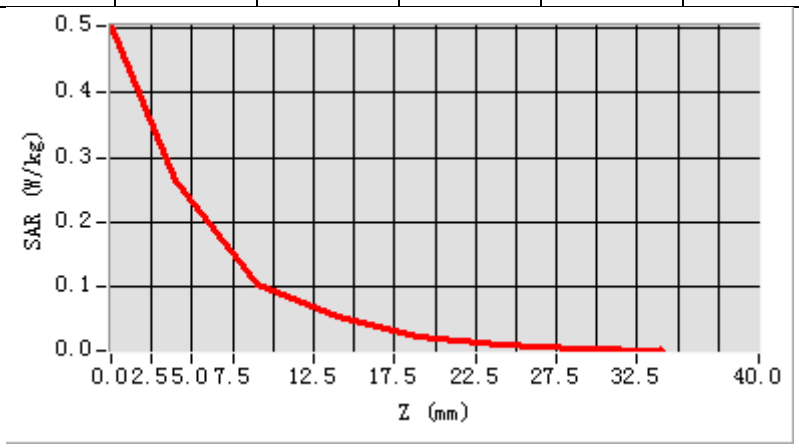
SURFACE SAR	VOLUME SAR
	

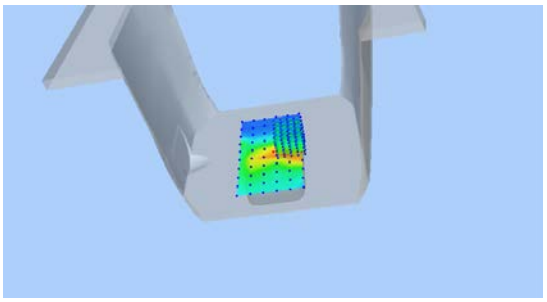
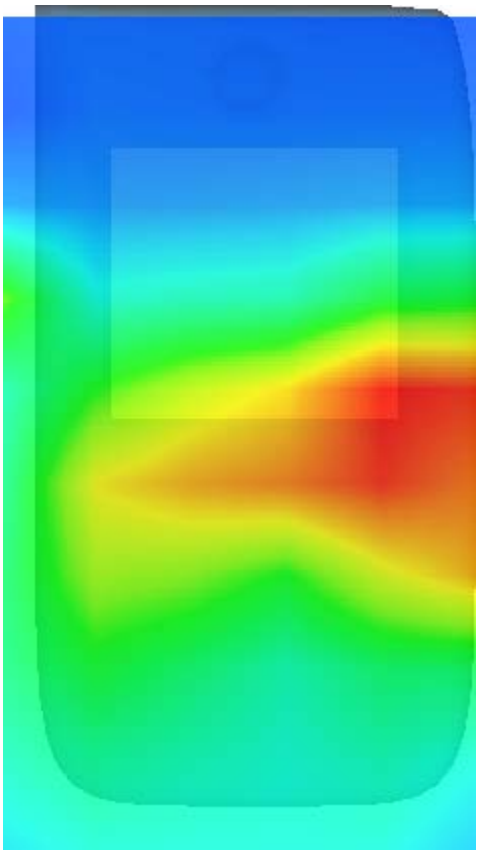
Maximum location: X=3.00, Y=13.00

SAR Peak: 0.17 W/kg

SAR 10g (W/Kg)	0.262159
SAR 1g (W/Kg)	0.751840

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.5035	0.2644	0.1036	0.0539	0.0226	0.0107	0.0050



3D screen shot	Hot spot position
	

MEASUREMENT 5

Type: Phone measurement (Complete)

Date of measurement: 26/9/2024

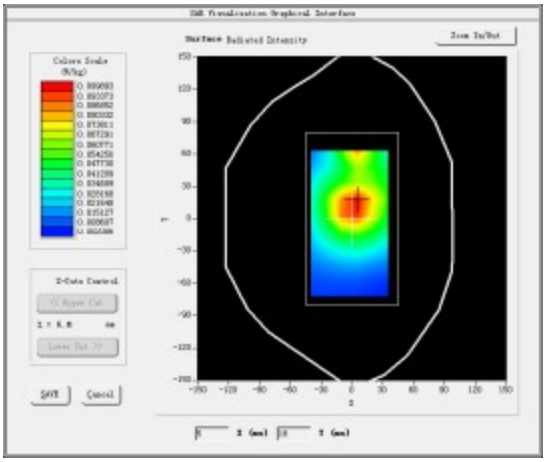
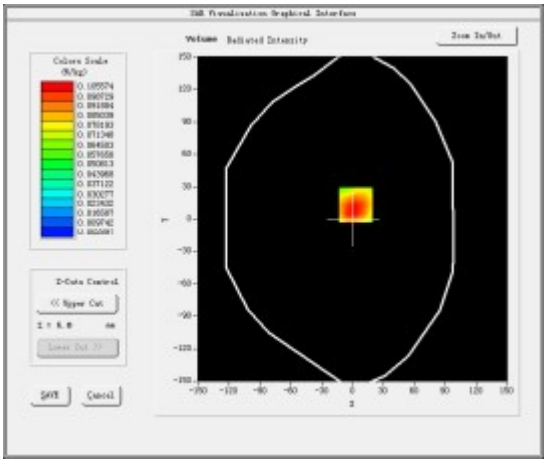
Measurement duration: 8 minutes 31 seconds

A. Experimental conditions.

Area Scan	dx=10mm dy=10mm
ZoomScan	7x7x12,dx=4mm dy=4mm dz=2mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11a U-NII-3
Channels	Middle
Signal	Duty cycle:1:1

B. SAR Measurement Results

Frequency (MHz)	5745.000000
Relative permittivity (real part)	34.633851
Relative permittivity (imaginary part)	19.038417
Conductivity (S/m)	5.163402
Variation (%)	-4.290000

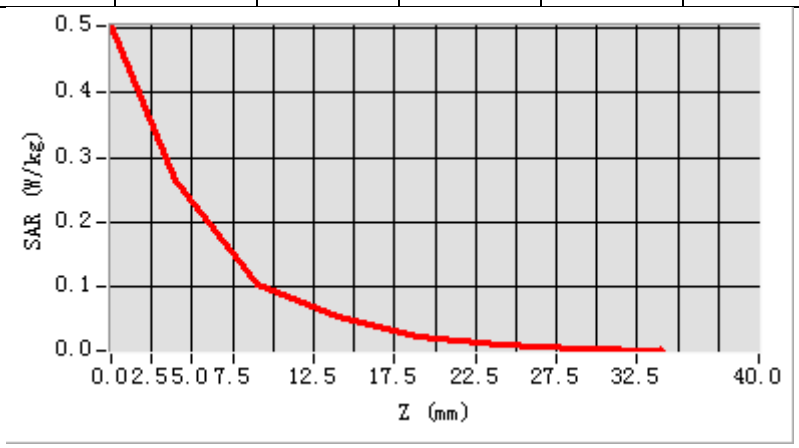
SURFACE SAR	VOLUME SAR
	

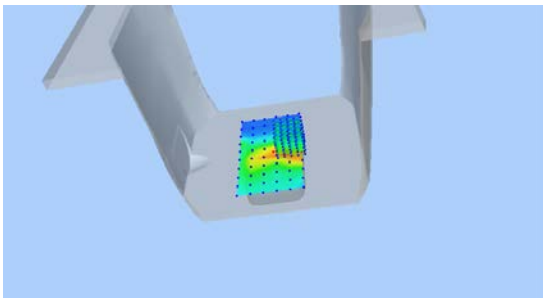
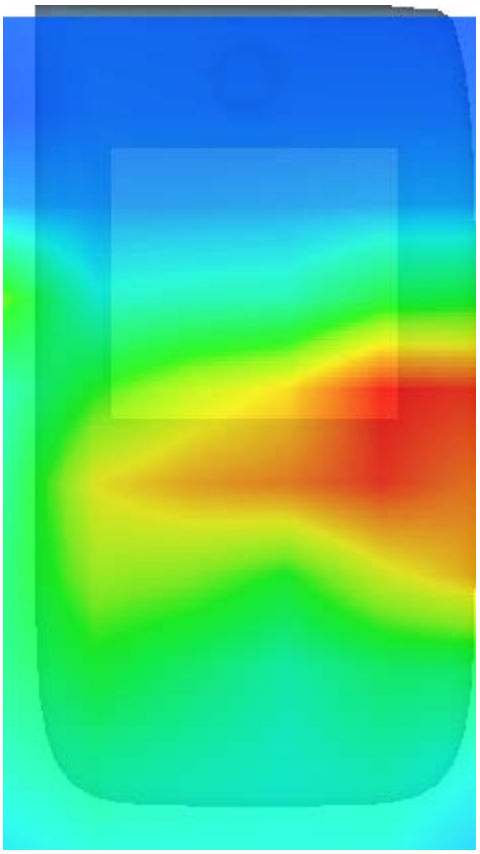
Maximum location: X=3.00, Y=13.00

SAR Peak: 0.17 W/kg

SAR 10g (W/Kg)	0.231054
SAR 1g (W/Kg)	0.675289

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.5035	0.2644	0.1036	0.0539	0.0226	0.0107	0.0050



3D screen shot	Hot spot position
	

MEASUREMENT 7

Type: Phone measurement (Complete)

Date of measurement:23/9/2024

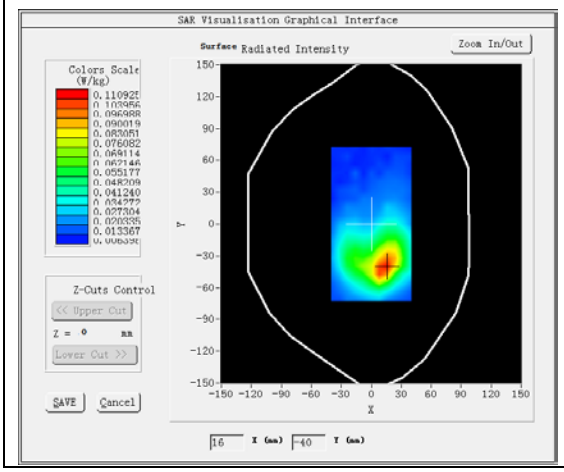
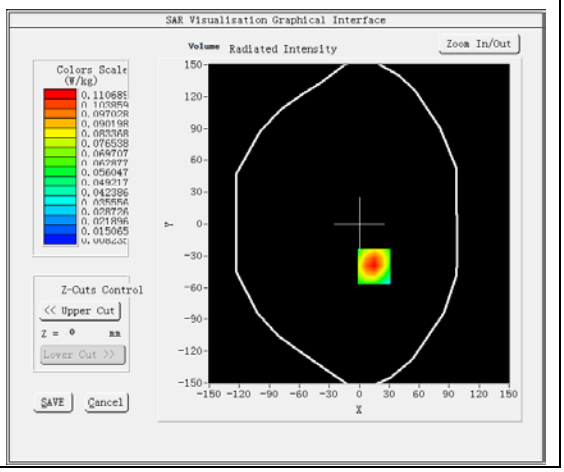
Measurement duration: 11 minutes 11 seconds

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Channels	Middle
Signal	Bluetooth (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	2402.000000
Relative permittivity (real part)	40.269142
Relative permittivity (imaginary part)	14.039240
Conductivity (S/m)	1.823490
Variation (%)	-4.640000

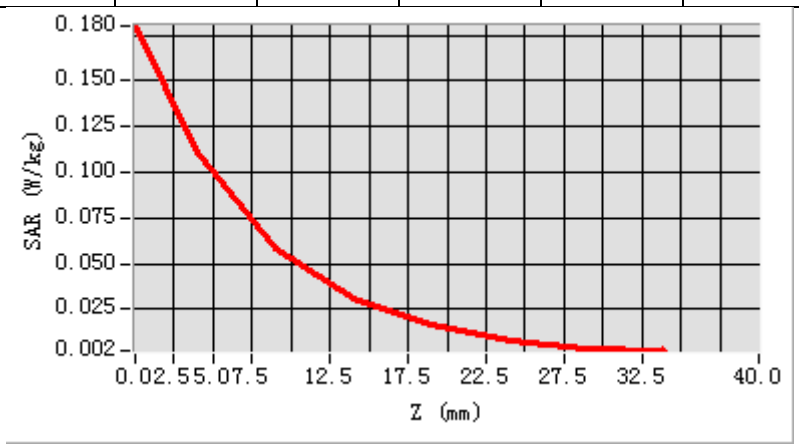
SURFACE SAR	VOLUME SAR
	

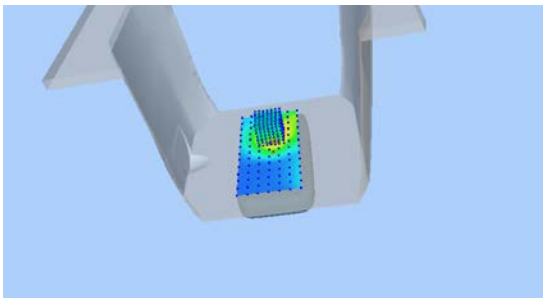
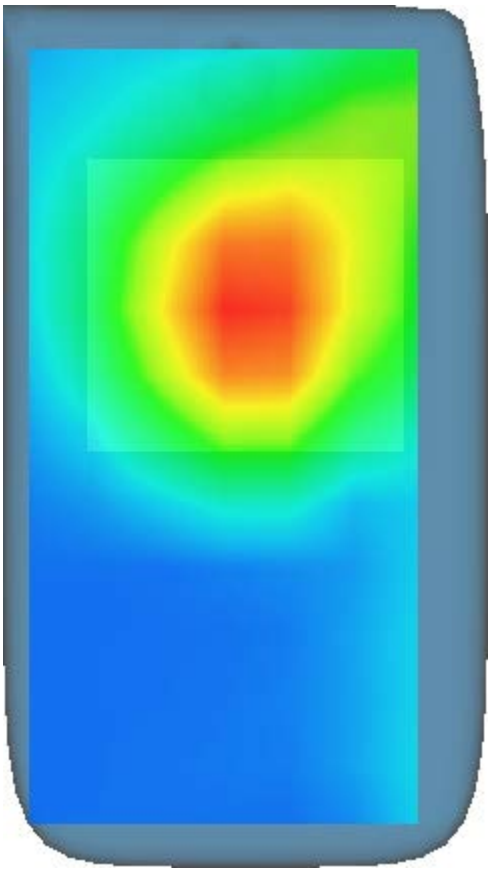
Maximum location: X=15.00, Y=-40.00

SAR Peak: 0.18 W/kg

SAR 10g (W/Kg)	0.040166
SAR 1g (W/Kg)	0.083740

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1801	0.1114	0.0587	0.0309	0.0161	0.0083	0.0040



3D screen shot	Hot spot position
	

	**Annex C: Calibration Reports**
	Tested Model : T14RA
	Report Number: **WSCT-ANAB-R&E240900045A-SAR**

SAR Reference Dipole Calibration Report

Ref : ACR.313.16.23.BES.A

WORLD STANDARDIZATION CERTIFICATION & TESTING GROUP CO .,LTD

BLOCK A, BAO SHI SCIENCE PARK,BAO SHI ROAD, BAO'AN DISTRICT

SHENZHEN 518108,P.R. CHINA

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 2450 MHZ

SERIAL NO.: 3723-DIP2G450-738

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 09/11/2023

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

The use of the Cofrac brand and the accreditation references is prohibited from any reproduction.

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

	Name	*Function*	*Date*	*Signature*
Prepared by :	Cyrille ONNEE	Measurement Responsible	11/9/2023	
Checked & approved by:	Jérôme Luc	Technical Manager	11/9/2023	
Authorized by:	Yann Toutain	Laboratory Director	11/9/2023	

Yann Toutain ID
Signature numérique de Yann Toutain ID
Date : 2023.11.09 16:44:40 +01'00'

	Customer Name
Distribution :	World Standardization Certification & Testing Group Co .,Ltd

Issue	*Name*	*Date*	*Modifications*
A	Cyrille ONNEE	11/9/2023	Initial release

Template_ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole vL
This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.

TABLE OF CONTENTS

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.

1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2450 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2450
Serial Number	3723-DIP2G450-738
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.

Figure 1 – *MVG COMOSAR Validation Dipole*

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.

4 MEASUREMENT METHOD

4.1 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.3 SAR REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore-mentioned standards.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/-0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/-0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty (k=2) in calibration for the S11 parameter in linear is +/-0.08 with respect to measurement conditions.

5.3 SAR

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

The estimated expanded uncertainty (k=2) in calibration for the 1g and 10g SAR measurement in W/kg is +/-19% with respect to measurement conditions.

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.

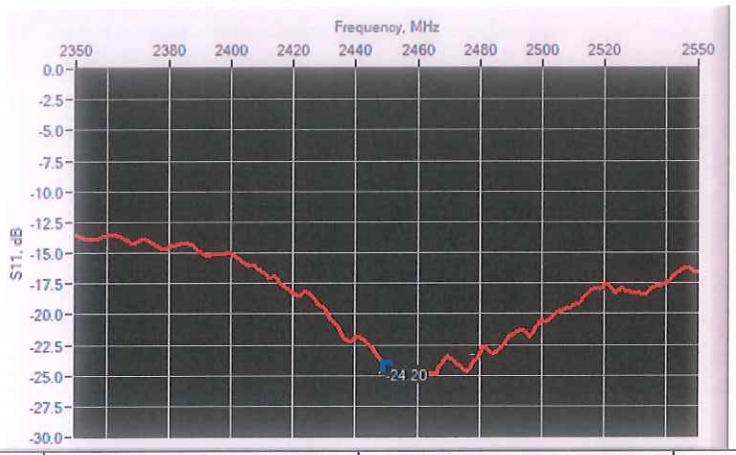
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
51.74	51.50 +/- 2%	30.50	30.40 +/- 2%	3.60	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2450	-24.20	-20	46.4Ω + 4.7jΩ

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.