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FCC SAR TEST REPORT

Report No.: STS2111106H01

Issued for

HUNAN GREATWALL COMPUTER SYSTEM CO., LTD

HUNAN GREATWALL INDUSTRIAL PARK, TIANYI
SCIENCE AND TECHNOLOGY CITY, XIANGYUN MIDDLE
ROAD, TIANYUAN DISTRICT, ZHUZHOU, HUNAN
PROVINCE

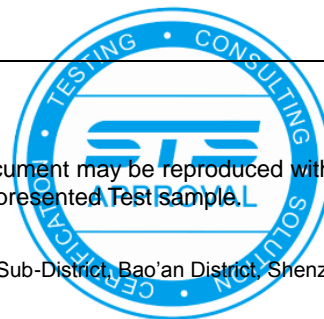
Product Name:	10.1"Android Tablet
Brand Name:	onn.
Model Name:	TBGRY100071485
Series Model:	TBPRP100071485, TBBLU100071485, TBYLW100071485, TBPRP100071486, TBBLU100071486, TBYLW100071486, TBGRY100071486
Test Standard:	ANSI/IEEE Std. C95.1
	FCC 47 CFR Part 2 (2.1093)
	IEEE 1528: 2013
Max. Report SAR (1g):	Body: 1.191 W/kg

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Test Report Certification

Applicant's name : HUNAN GREATWALL COMPUTER SYSTEM CO., LTD
Address..... : HUNAN GREATWALL INDUSTRIAL PARK, TIANYI SCIENCE
AND TECHNOLOGY CITY, XIANGYUN MIDDLE ROAD,
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Manufacture's Name : HUNAN GREATWALL COMPUTER SYSTEM CO., LTD
Address..... : HUNAN GREATWALL INDUSTRIAL PARK, TIANYI SCIENCE
AND TECHNOLOGY CITY, XIANGYUN MIDDLE ROAD,
TIANYUAN DISTRICT, ZHUZHOU, HUNAN PROVINCE

Product description

Product name..... : 10.1"Android Tablet

Brand name : onn.

Model name : TBGRY100071485

Series Model..... : TBPRP100071485, TBBLU100071485, TBYLW100071485,
TBPRP100071486, TBBLU100071486, TBYLW100071486,
TBGRY100071486

Standards : ANSI/IEEE Std. C95.1-1992
FCC 47 CFR Part 2 (2.1093)
IEEE 1528: 2013

The device was tested by Shenzhen STS Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of Test

Date (s) of performance of tests..... : 22 Nov. 2021 ~ 26 Nov. 2021

Date of Issue : 03 Dec. 2021

Test Result..... : **Pass**

Testing Engineer :

(Shifan. Long)

Technical Manager :

(Sean she)

Authorized Signatory :

(Vita Li)





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**Revision History**

Rev.	Issue Date	Report No.	Effect Page	Contents
00	03 Dec. 2021	STS2111106H01	ALL	Initial Issue





1. General Information

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

1.1 EUT Description

Product Name	10.1"Android Tablet	
Brand Name	onn.	
Model Name	TBGRY100071485	
Series Model	TBPRP100071485, TBBLU100071485, TBYLW100071485, TBPRP100071486, TBBLU100071486, TBYLW100071486, TBGRY100071486	
Model Difference	Only the color is different	
Battery	Rated Voltage:3.8V ChargeLimitVoltage:4.35V Capacity: 7500mAh	
Device Category	Portable	
Product stage	Production unit	
RF Exposure Environment	General Population / Uncontrolled	
Hardware Version	N/A	
Software Version	N/A	
Frequency Range	WLAN802.11b/g/n(HT20)/n(HT40): 2412~2462MHz 2.4G WLAN 802.11b/g/n20/n40: 2412 to 2462 MHz 5.2G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5150 to 5250 MHz 5.3G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5250 to 5350 MHz 5.6G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5470 to 5725 MHz 5.8G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5725 to 5875 MHz Bluetooth: 2402 to 2480 MHz	
Max. Reported SAR(1g): (Limit:1.6W/kg)	Mode	Body worn (W/kg)
	2.4GHz WLAN	0.960
	5.2GHz WLAN	0.962
	5.3GHz WLAN	1.191
FCC Equipment Class	Part 15 Spread Spectrum Transmitter (DSS) Unlicensed National Information Infrastructure TX (NII) Digital Transmission System (DTS)	
Operating Mode	WLAN: 802.11 a/b/g/n20/n40/ac20/ac40/ac80 Bluetooth: 4.0EDR (GFSK + π /4DQPSK+8DPSK) BLE: GFSK	
Antenna Specification	PIFA Antenna	
Hotspot Mode	Not Support	
DTM Mode	Not Support	
Note: 1. Estimated exemption for Bluetooth, 5.6GHz WLAN and 5.8GHz WLAN 2. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power 3. The Bluetooth and WLAN can't simultaneous transmission at the same time.		



1.2 Test Environment

Ambient conditions in the SAR laboratory:

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

1.3 Test Factory

ShenZhen STS Test Services Co.,Ltd.

A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration No.: 625569

IC Registration No.: 12108A

A2LA Certificate No.: 4338.01





2. Test Standards and Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
7	FCC KDB 648474 D04 v01r03	SAR Evaluation Considerations for Wireless Handsets
8	FCC KDB 248227 D01 Wi-Fi SAR v02r02	SAR Considerations for 802.11 Devices

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

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

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

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

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

Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments:

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

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE

PARTIAL BODY LIMIT

1.6 W/kg

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

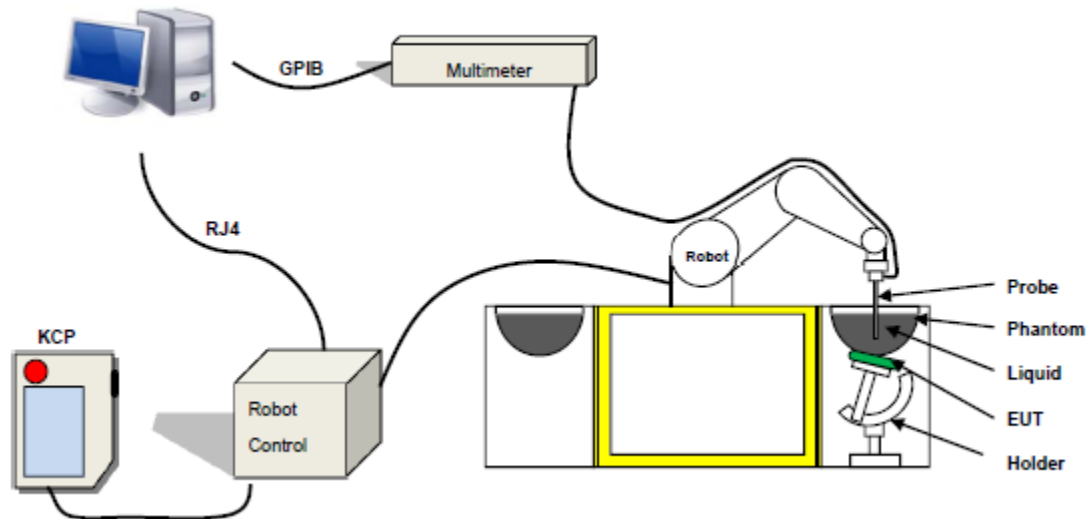
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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

3.2 SAR System

MVG SAR System Diagram:



COMOSAR is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The COMOSAR system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.



The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The Open SAR software computes the results to give a SAR value in a 1g or 10g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 07/21 EPG0352 with following specifications is used

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



Figure 1-MVG COMOSAR Dosimetric E field Dipole

3.2.2 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

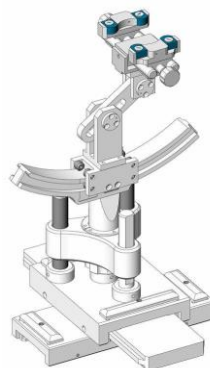


Figure-SN 32/14 SAM115



Figure-SN 32/14 SAM116

3.2.3 Device Holder



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



4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Head Tissue

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

Body Tissue

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

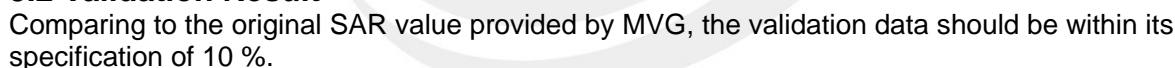
Tissue dielectric parameters for head and body phantoms				
Frequency	ϵ_r		σ	
	S/m			
	Head	Body	Head	Body
300	45.3	58.2	0.87	0.92
450	43.5	56.7	0.87	0.94
900	41.5	55.0	0.97	1.05
1450	40.5	54.0	1.20	1.30
1800	40.0	53.3	1.40	1.52
2450	39.2	52.7	1.80	1.95
3000	38.5	52.0	2.40	2.73
5800	35.3	48.2	5.27	6.00

**LIQUID MEASUREMENT RESULTS**

Date	Ambient		Simulating Liquid		Parameters	Target	Measured	Deviation %	Limited %
	Temp. [°C]	Humidity %	Frequency	Temp. [°C]					
2021/11/22	20.8	39	2412 MHz	20.6	Permittivity	39.26	39.69	1.10	±5
					Conductivity	1.77	1.79	1.13	±5
2021/11/22	20.8	40	2437MHz	20.6	Permittivity	39.2	39.87	1.66	±5
					Conductivity	1.8	1.84	2.79	±5
2021/11/22	20.9	42	2450 MHz	20.7	Permittivity	39.2	38.73	-1.20	±5
					Conductivity	1.8	1.80	0.00	±5
2021/11/22	20.9	42	2462 MHz	20.7	Permittivity	39.18	39.01	-0.43	±5
					Conductivity	1.81	1.75	-3.31	±5
2021/11/22	21	44	5180 MHz	20.8	Permittivity	36.02	35.93	-0.25	±5
					Conductivity	4.64	4.69	1.08	±5
2021/11/22	21.1	44	5200 MHz	20.9	Permittivity	36	36.71	1.97	±5
					Conductivity	4.66	4.69	0.64	±5
2021/11/22	21	45	5240 MHz	20.8	Permittivity	35.96	35.66	-0.83	±5
					Conductivity	4.7	4.70	0.00	±5
2021/11/22	21.2	47	5260 MHz	21.0	Permittivity	35.94	35.75	-0.53	±5
					Conductivity	4.72	4.85	2.75	±5
2021/11/22	21.1	46	5300 MHz	20.9	Permittivity	35.9	37.19	3.59	±5
					Conductivity	4.76	4.63	-2.73	±5
2021/11/22	21.3	48	5320 MHz	21.2	Permittivity	35.88	36.42	1.51	±5
					Conductivity	4.78	4.89	2.30	±5



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



Date	Freq.	Power	Tested Value	Normalized SAR	Target SAR	Tolerance	Limit
	(MHz)	(mW)	(W/Kg)	(W/kg)	1g(W/kg)	(%)	(%)
2021-11-22	2450	100	5.242	52.42	52.40	0.04	10
2021-11-22	5200	100	15.775	157.75	159.00	-0.79	10
2021-11-22	5300	100	16.523	165.23	166.40	-0.70	10

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



6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:

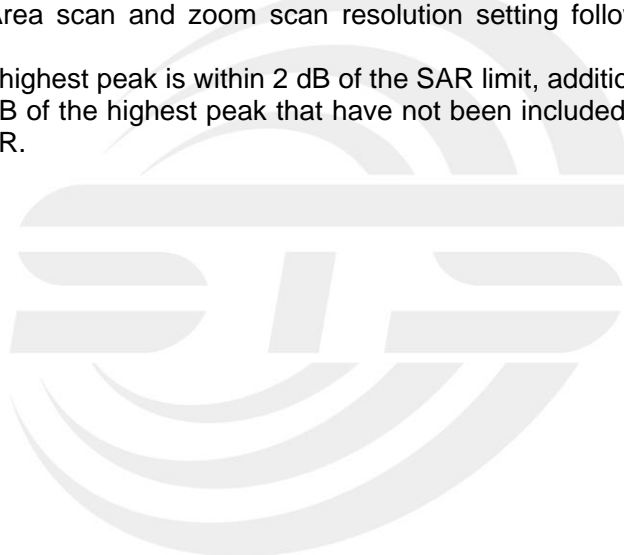
The following steps are used for each test position

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

Area Scan& Zoom Scan:

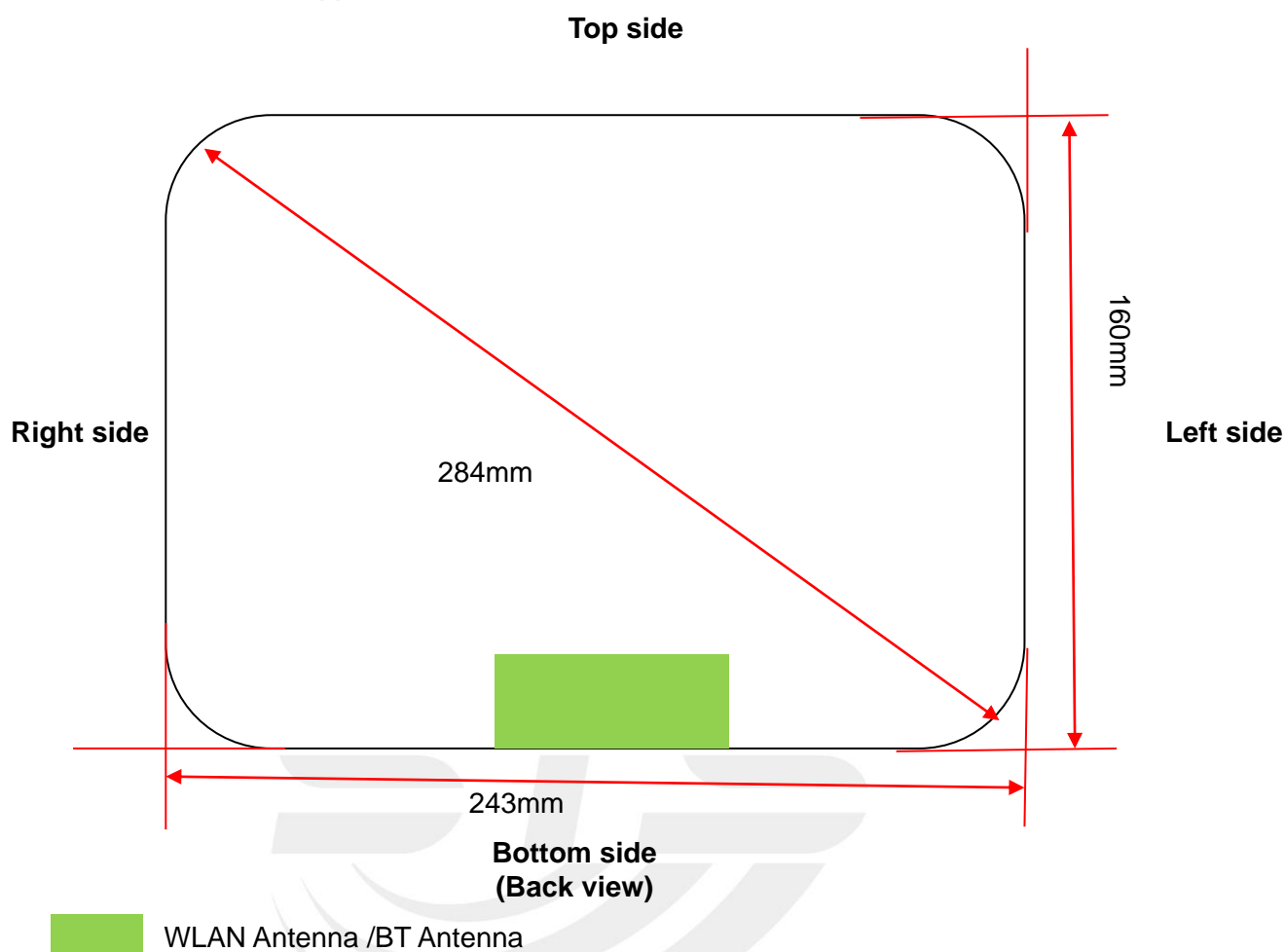
First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR -distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r01 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.



7. EUT Antenna Location Sketch

It is a 10.1"Android Tablet, support BT/WLAN mode.



ANT	Transmitting antenna located(mm)			
	Top	Left	Bottom	Right
WLAN Antenna /BT Antenna	142	95	≤5	100

Note 1: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.



7.1 SAR test exclusion consider table

The WLAN/BT SAR evaluation of Maximum power (dBm) summing tolerance.

Exposure Position	Wireless Interface	BT	2.4G WLAN 802.11b	5.2G WLAN 802.11a	5.3G WLAN 802.11a	5.6G WLAN 802.11ac80	5.8G WLAN 802.11a
	Calculated Frequency	2441	2437	5240	5320	5530	5745
	Maximum Turn-up power (dBm)	3.5	12.5	10	10	6.5	6.5
	Maximum rated power(mW)	2.24	17.78	10.00	10.00	4.47	4.47
Back Side	Separation distance (mm)	≤5	≤5	≤5	≤5	≤5	≤5
	exclusion threshold(mW)	9.60	9.61	6.55	6.50	6.38	6.26
	Testing required?	NO	YES	YES	YES	NO	NO
Left Edge	Separation distance (mm)	95	95	95	95	95	95
	exclusion threshold(mW)	546.01	546.09	515.53	515.03	513.79	512.58
	Testing required?	NO	NO	NO	NO	NO	NO
Right Edge	Separation distance (mm)	100	100	100	100	100	100
	exclusion threshold(mW)	596.01	596.09	565.53	565.03	563.79	562.58
	Testing required?	NO	NO	NO	NO	NO	NO
Top Edge	Separation distance (mm)	142	142	142	142	142	142
	exclusion threshold(mW)	1016.01	1016.09	985.53	985.03	983.79	982.58
	Testing required?	NO	NO	NO	NO	NO	NO
Bottom Edge	Separation distance (mm)	≤5	≤5	≤5	≤5	≤5	≤5
	exclusion threshold(mW)	9.60	9.61	6.55	6.50	6.38	6.26
	Testing required?	NO	YES	YES	YES	NO	NO

**Note:**

1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. per KDB 447498 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <25mm, 25mm is user to determine SAR exclusion threshold
4. per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distance $\leq 50\text{mm}$ are determined by:
$$[(\text{max.power of channel, including tune-up tolerance, Mw})/(\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$
$$f(\text{GHz}) \text{ is the RF channel transmit frequency in GHz. Power and distance are rounded to the nearest mW and mm before calculation. The result is rounded to one decimal place for comparison}$$

For <50mm distance, we just calculate mW of the exclusion threshold value(3.0) to do compare
5. per KDB 447498 D01, at 100 MHz to 6GHz and for test separation distances >50mm, the SAR test exclusion threshold is determined according to the following
 - a) [threshold at 50mm in step 1] + (test separation distance - 50mm) * (f (MHz)/150) mW, at 100 MHz to 1500 MHz
 - b) [threshold at 50mm in step 1] + (test separation distance - 50mm) * 10 mW at > 1500 MHz and $\leq 6\text{GHz}$
6. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion 8. for each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of each of these configurations is less than 1/4db higher than those measured at the lower data rate than 11b mode, thus the SAR can be excluded.
7. Per KDB 616217 D04, SAR evaluation for the front surface of tablet display screens are generally not necessary.

8. EUT Test Position

This EUT was tested in Front Face and Rear Face.

8.1 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative *test separation distance* configuration may be used to support both SAR conditions. When the *reported SAR* for a body-worn accessory, measured without a headset connected to the handset, is $> 1.2 \text{ W/kg}$, the highest *reported SAR* configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.





9. Measurement Uncertainty

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

Uncertainty Component	Tol (+/- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+/-%)	10g Ui (+/-%)	v_i
Measurement System								
Probe calibration	5.86	N	1	1	1	5.86	5.86	∞
Axial Isotropy	0.16	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.07	0.07	∞
Hemispherical Isotropy	1.06	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.43	0.43	∞
Boundary effect	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	1.27	R	$\sqrt{3}$	1	1	0.73	0.73	∞
System detection limits	1.23	R	$\sqrt{3}$	1	1	0.71	0.71	∞
Modulation response	3.6	R	$\sqrt{3}$	1	1	3.60	3.60	∞
Readout Electronics	0.28	N	1	1	1	0.28	0.28	∞
Response Time	0.19	R	$\sqrt{3}$	1	1	0.11	0.11	∞
Integration Time	1.47	R	$\sqrt{3}$	1	1	0.85	0.85	∞
RF ambient conditions-Noise	3.5	R	$\sqrt{3}$	1	1	2.02	2.02	∞
RF ambient conditions-reflections	3.2	R	$\sqrt{3}$	1	1	1.85	1.85	∞
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	∞
Post-processing	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related								
Test sample positioning	3.1	N	1	1	1	3.10	3.10	∞
Device holder uncertainty	3.8	N	1	1	1	3.80	3.80	∞
SAR drift measurement	4.8	R	$\sqrt{3}$	1	1	2.77	2.77	∞
SAR scaling	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters								
Phantom uncertainty (shape and thickness uncertainty)	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity (temperature uncertainty)	2.5	R	$\sqrt{3}$	0.78	0.71	1.95	1.78	∞
Liquid conductivity (measured)	4	N	1	0.78	0.71	0.92	1.04	M
Liquid permittivity (temperature uncertainty)	2.5	R	$\sqrt{3}$	0.23	0.26	1.95	1.78	∞
Liquid permittivity (measured)	5	N	1	0.23	0.26	1.15	1.30	M
Combined Standard Uncertainty		RSS				10.60	10.51	
Expanded Uncertainty (95% Confidence interval)		K=2				21.21	21.03	



10. Conducted Power Measurement

10.1 Test Result

2.4G WLAN

2.4G WIFI			
Average Power (dBm)			
Mode	Low	Mid	High
802.11 b	11.979	12.271	11.314
802.11 g	10.884	12.111	11.190
802.11 n20	11.966	12.018	10.985
802.11 n40	11.912	12.147	11.654

BT

BT			
Average Power (dBm)			
Mode	Low	Mid	High
GFSK	0.37	3.46	2.35
8DPSK	-2.67	0.56	-0.43

BLE

BLE			
Average Power (dBm)			
Mode	Low	Mid	High
GFSK 1M	-8.06	-4.85	-5.99
GFSK 2M	-7.99	-4.84	-5.96



5G WLAN

5.2G WLAN			
Average Power (dBm)			
Mode	Low	Mid	High
802.11 a	9.000	9.147	9.748
802.11 n20	8.848	8.984	8.658
802.11 n40	9.024	N/A	9.631
802.11 ac20	8.938	9.097	9.551
802.11 ac40	8.906	N/A	9.606
802.11 ac80	N/A	9.505	N/A

5.3G WLAN			
Average Power (dBm)			
Mode	Low	Mid	High
802.11 a	9.157	8.616	9.802
802.11 n20	8.976	8.497	9.041
802.11 n40	8.263	N/A	8.103
802.11 ac20	9.142	7.970	8.456
802.11 ac40	8.809	N/A	8.752
802.11 ac80	N/A	8.994	N/A

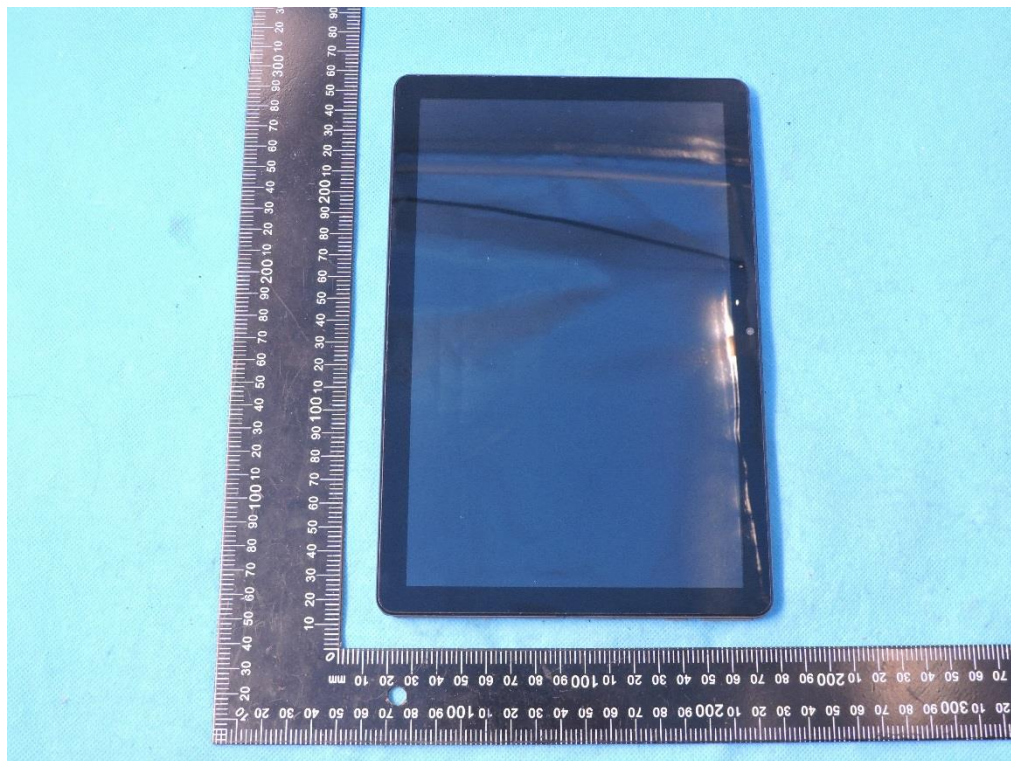
5.6G WLAN			
Average Power (dBm)			
Mode	Low	Mid	High
802.11 a	5.362	5.831	5.681
802.11 n20	5.194	5.718	5.568
802.11 n40	5.141	5.233	5.795
802.11 ac20	5.228	5.793	5.558
802.11 ac40	5.542	5.772	6.275
802.11 ac80	6.319	N/A	6.133

5.8G WLAN			
Average Power (dBm)			
Mode	Low	Mid	High
802.11 a	6.187	6.230	5.127
802.11 n20	6.122	5.213	4.965
802.11 n40	5.985	N/A	5.030
802.11 ac20	6.092	5.107	4.943
802.11 ac40	6.090	N/A	5.035
802.11 ac80	N/A	5.904	N/A

11. EUT And Test Setup Photo

11.1 EUT Photo

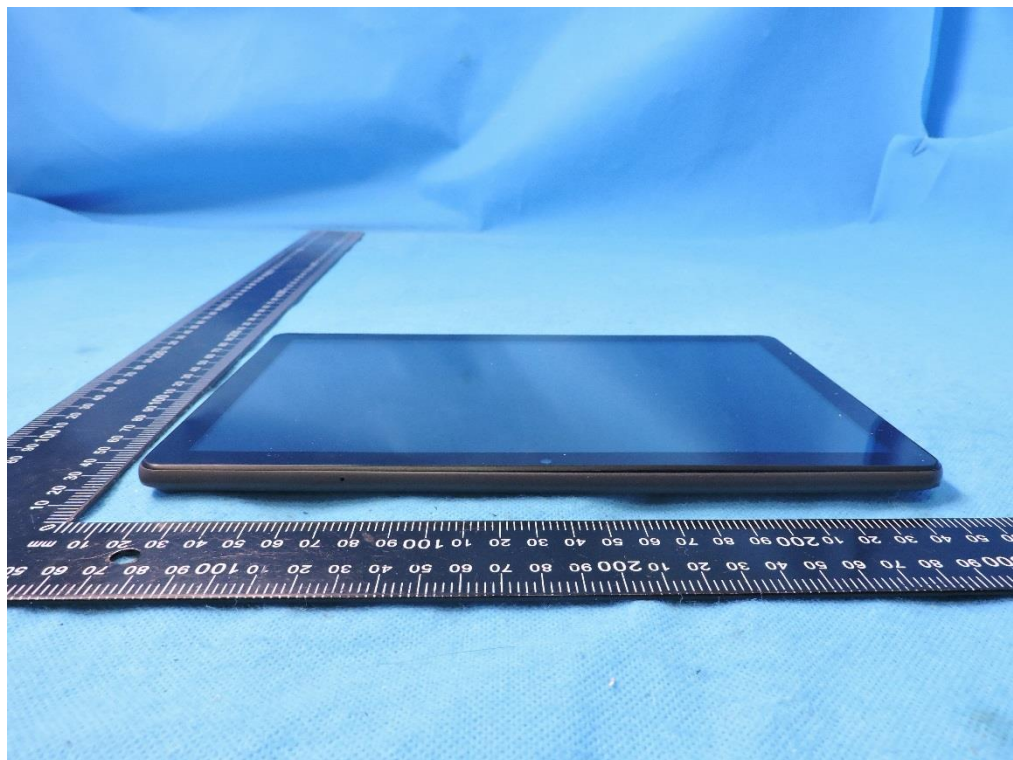
Front side



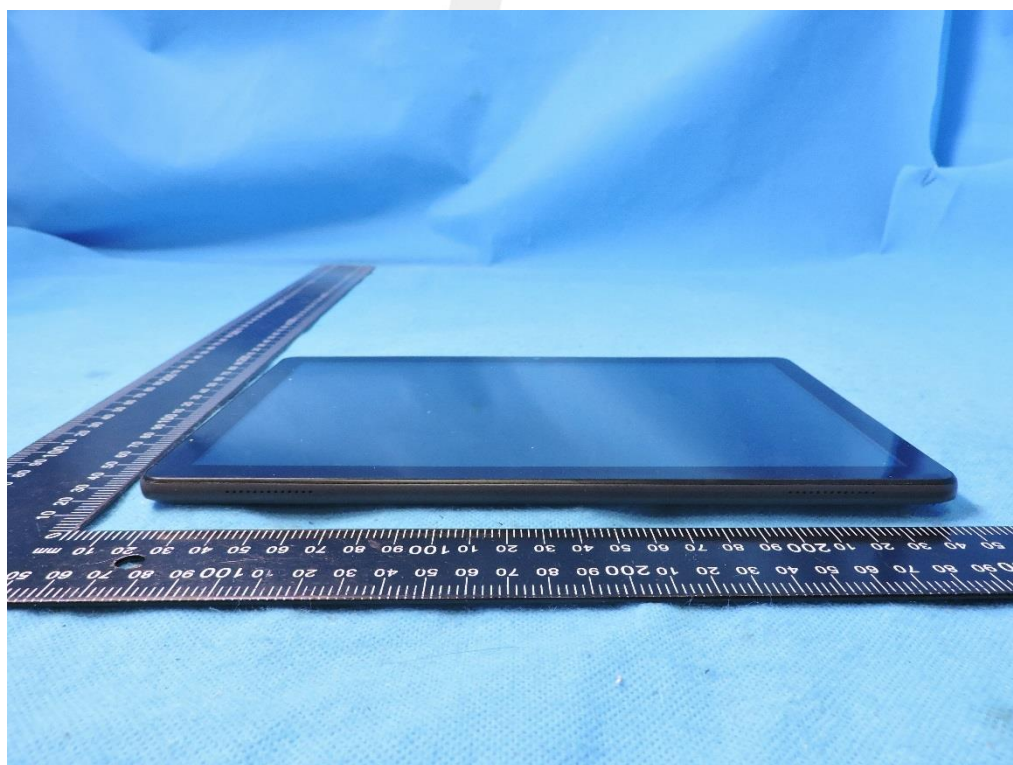
Back side



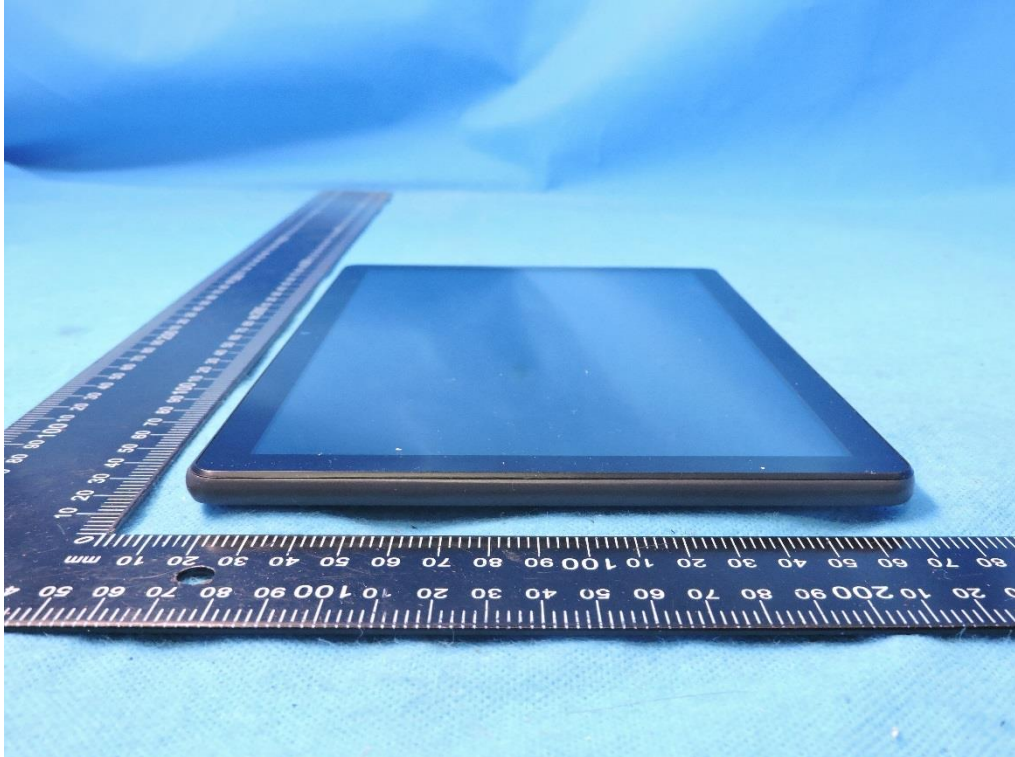
Top side



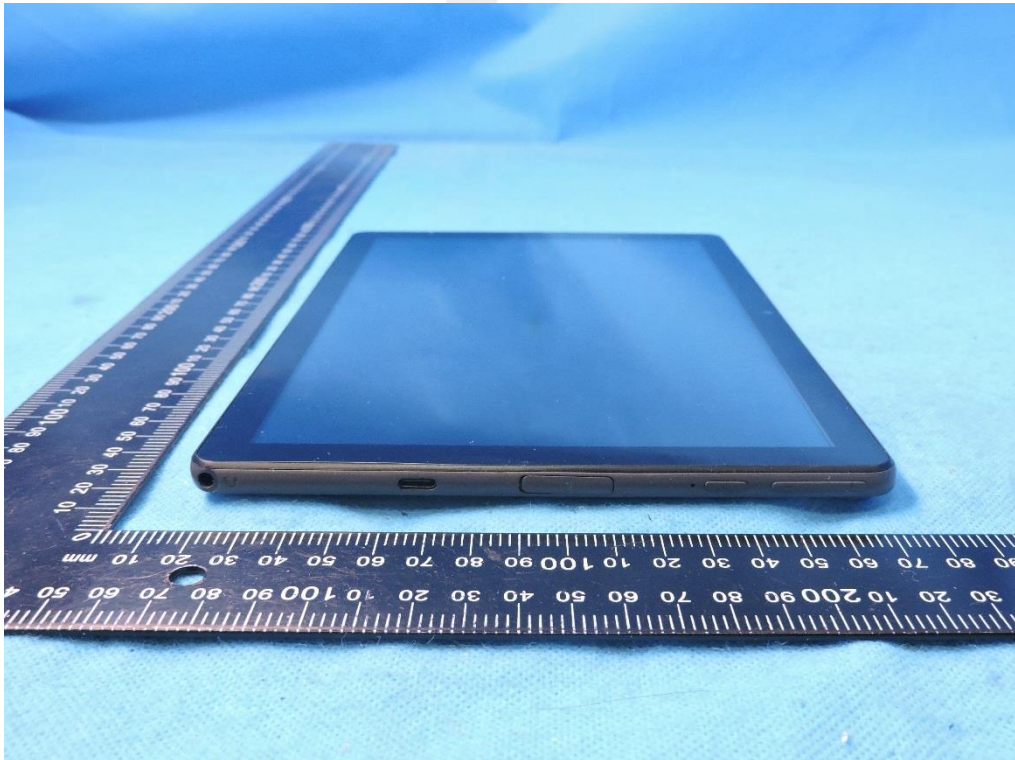
Bottom side



Left side

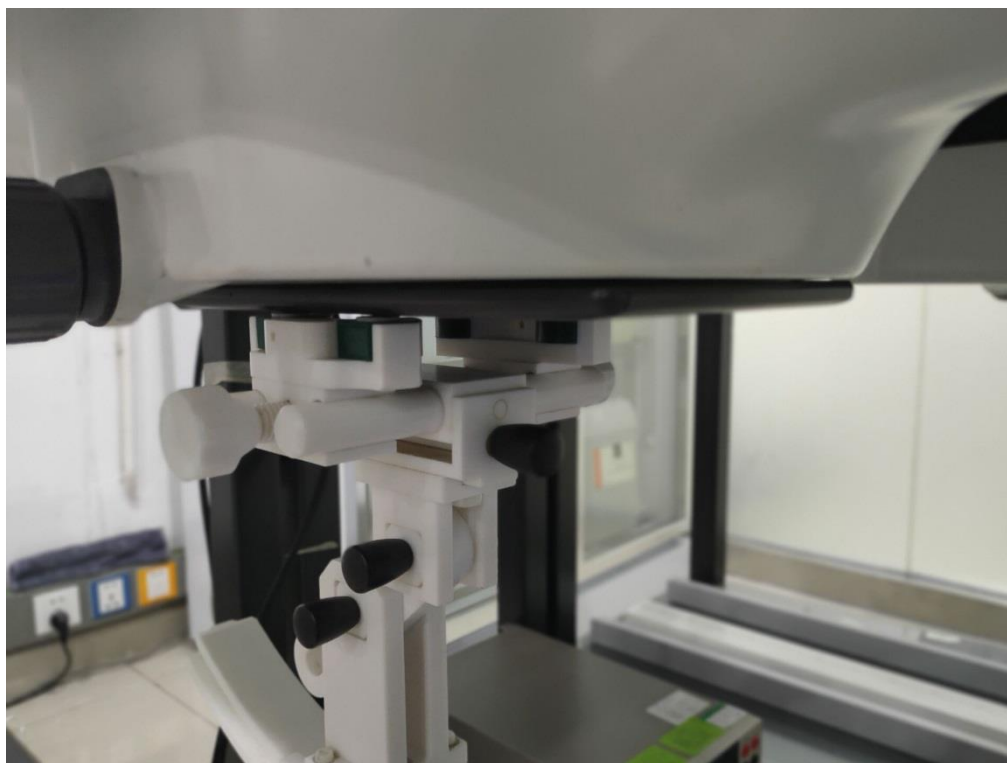


Right side

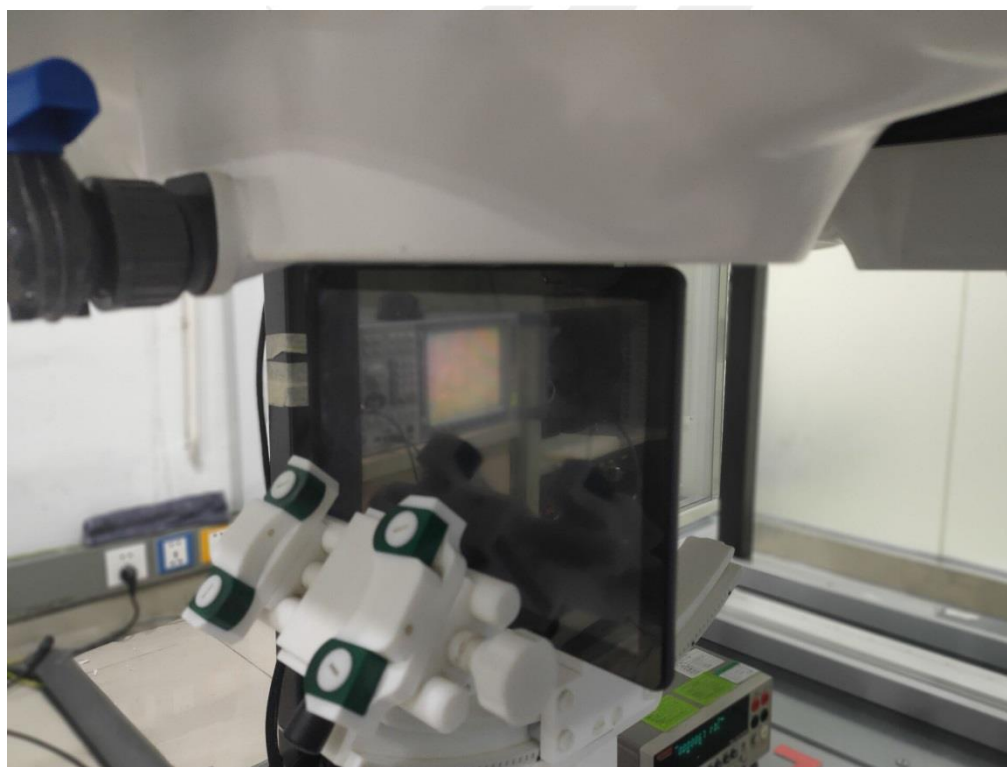


11.2 Setup Photo

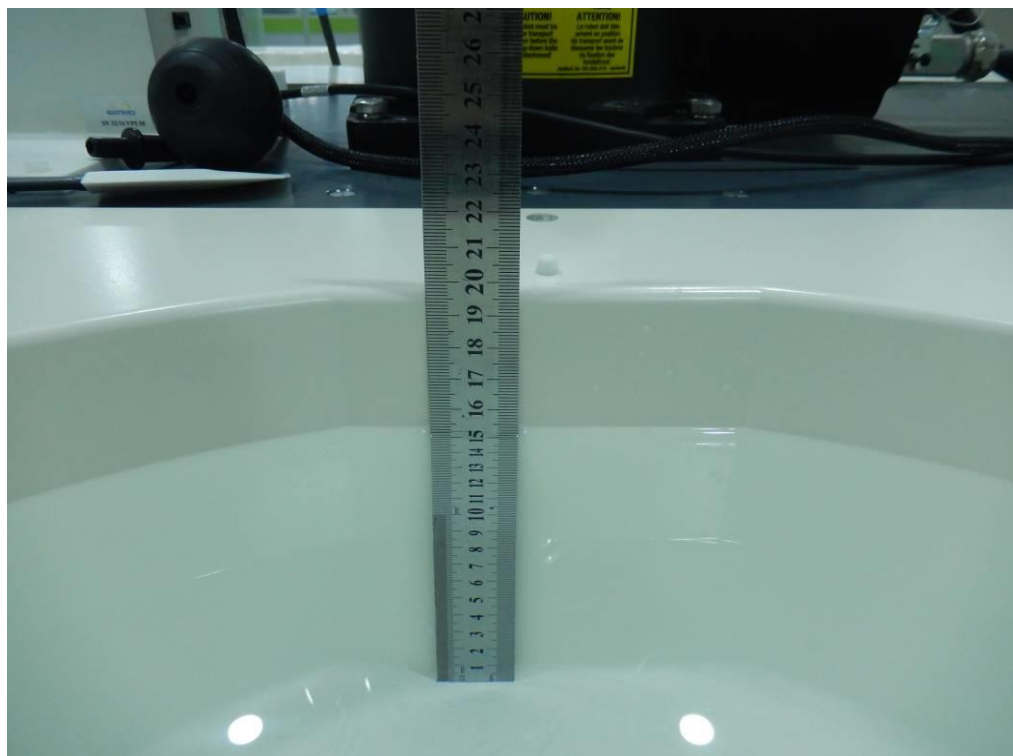
Body Back side(separation distance is 0mm)



Body Bottom Edge (separation distance is 0mm)



Liquid depth (15 cm)





12. SAR Result Summary

12.1 Body-worn SAR

Band	Model	Test Position	Frequency (MHz)	SAR (1g) (W/kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
2.4GHz WLAN	802.11b	Back Side	2412	0.829	-2.10	12.50	11.979	0.935	/
		Back Side	2437	0.911	-0.87	12.50	12.271	0.960	1
		Back Side	2462	0.723	1.97	12.50	11.314	0.950	/
		Bottom	2412	0.759	-0.47	12.50	11.979	0.856	/
		Bottom	2437	0.846	1.39	12.50	12.271	0.892	/
		Bottom	2462	0.642	-2.78	12.50	11.314	0.844	/
5.2GHz WLAN	802.11a	Back Side	5180	0.761	-0.07	10.00	9.000	0.958	/
		Back Side	5200	0.763	-2.56	10.00	9.147	0.929	/
		Back Side	5240	0.908	-3.06	10.00	9.748	0.962	2
		Bottom	5180	0.742	-3.67	10.00	9.000	0.934	/
		Bottom	5200	0.752	-0.29	10.00	9.147	0.915	/
		Bottom	5240	0.892	-2.03	10.00	9.748	0.945	/
5.3GHz WLAN	802.11a	Back Side	5260	0.975	3.10	10.00	9.157	1.184	/
		Back Side	5300	0.845	-2.89	10.00	8.616	1.162	/
		Back Side	5320	1.138	-1.40	10.00	9.802	1.191	3
		Bottom	5260	0.931	-2.03	10.00	9.157	1.130	/
		Bottom	5300	0.817	-0.38	10.00	8.616	1.124	/
		Bottom	5320	1.053	-0.89	10.00	9.802	1.102	/

Note:

- The test separation of all above table is 0mm.
- The Bluetooth and WLAN can't simultaneous transmission at the same time.
- Per KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - For WWAN: Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
- Per KDB 248227- When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg. (The highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power was **0.925** W/kg for Body)

**Repeated SAR**

Band	Mode	Test Position	Frequency (MHz)	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR(W/Kg)	Meas. No.
2.4GHz WLAN	802.11b	Back Side	2412	0.805	2.66	12.50	11.979	0.908	-
		Back Side	2437	0.897	-0.29	12.50	12.271	0.946	-
		Back Side	2462	0.719	-0.25	12.50	11.314	0.945	-
		Bottom Edge	2412	0.741	-1.35	12.50	11.979	0.835	-
		Bottom Edge	2437	0.837	-1.13	12.50	12.271	0.882	-
		Bottom Edge	2462	0.639	3.00	12.50	11.314	0.840	-
5.2GHz WLAN	802.11a	Back Side	5180	0.751	-0.73	10.00	9.000	0.945	-
		Back Side	5200	0.737	3.43	10.00	9.147	0.897	-
		Back Side	5240	0.868	-0.90	10.00	9.748	0.920	-
		Bottom Edge	5180	0.731	0.59	10.00	9.000	0.920	-
		Bottom Edge	5200	0.744	1.40	10.00	9.147	0.905	-
		Bottom Edge	5240	0.878	-2.15	10.00	9.748	0.930	-



5.3GHz WLAN	802.11a	Back Side	5260	0.923	-1.69	10.00	9.157	1.121	-
		Back Side	5300	0.836	0.51	10.00	8.616	1.150	-
		Back Side	5320	1.053	2.32	10.00	9.802	1.102	-
		Bottom Edge	5260	0.902	-0.62	10.00	9.157	1.095	-
		Bottom Edge	5300	0.708	3.50	10.00	8.616	0.974	-
		Bottom Edge	5320	0.926	2.10	10.00	9.802	0.969	-



**12.2 repeated SAR measurement**

Band	Mode	Test Position	Frequency (MHz)	Original Measured SAR 1g(W/kg)	1 st Repeated SAR 1g	Ratio	Original Measured SAR 1g(W/kg)	2nd Repeated SAR 1g	Ratio
2.4GHz WLAN	802.11b	Back Side	2412	0.829	0.805	1.030	-	-	-
		Back Side	2437	0.911	0.897	1.016	-	-	-
		Back Side	2462	0.723	0.719	1.006	-	-	-
		Bottom Edge	2412	0.759	0.741	1.024	-	-	-
		Bottom Edge	2437	0.846	0.837	1.011	-	-	-
		Bottom Edge	2462	0.642	0.639	1.005	-	-	-
5.2GHz WLAN	802.11a	Back Side	5180	0.761	0.751	1.013	-	-	-
		Back Side	5200	0.763	0.737	1.035	-	-	-
		Back Side	5240	0.908	0.868	1.046	-	-	-
		Bottom Edge	5180	0.742	0.731	1.015	-	-	-
		Bottom Edge	5200	0.752	0.744	1.011	-	-	-
		Bottom Edge	5240	0.892	0.878	1.016	-	-	-



5.3GHz WLAN	802.11a	Back Side	5260	0.975	0.923	1.056	-	-	-
		Back Side	5300	0.845	0.836	1.011	-	-	-
		Back Side	5320	1.138	1.053	1.081	-	-	-
		Bottom Edge	5260	0.931	0.902	1.032	-	-	-
		Bottom Edge	5300	0.817	0.708	1.154	-	-	-
		Bottom Edge	5320	1.053	0.926	1.137	-	-	-

Note:

1. Per KDB 865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is $\geq 0.8\text{W/Kg}$.
2. Per KDB 865664 D01, if the ratio of largest to smallest SAR for the original and first repeated measurement is ≤ 1.2 and the measured SAR $< 1.45\text{W/Kg}$, only one repeated measurement is required.
3. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is $\geq 1.45\text{W/Kg}$.
4. The ratio is the difference in percentage between original and repeated measured SAR.



13. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
2450MHzDipole	MVG	SID2450	SN 30/14 DIP2G450-335	2020.07.14	2023.07.13
Waveguide	SATIMO	SWG5500	SN 13/14 WGA32	2020.07.14	2023.07.13
E-Field Probe	MVG	SSE2	SN 07/21 EPG0352	2021.03.01	2022.02.28
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2021.11.23	2022.11.22
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	N/A	N/A
Phantom2	MVG	SAM	SN 32/14 SAM116	N/A	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	N/A	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	N/A	N/A
Attenuator	Agilent	99899	DC-18GHz	N/A	N/A
Directional coupler	Narda	4226-20	3305	N/A	N/A
Network Analyzer	Agilent	8753ES	US38432810	2021.09.29	2022.09.28
Multi Meter	Keithley	Multi Meter 2000	4050073	2021.10.08	2022.10.07
Signal Generator	Agilent	N5182A	MY50140530	2021.09.30	2022.09.29
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2021.09.30	2022.09.29
Wireless Communication Test Set	R&S	CMW500	117239	2021.09.30	2022.09.29
Power Amplifier	DESAY	ZHL-42W	9638	2021.10.09	2022.10.08
Power Meter	R&S	NRP	100510	2021.09.29	2022.09.28
Power Sensor	R&S	NRP-Z11	101919	2021.09.29	2022.09.28
Temperature hygrometer	SuWei	SW-108	N/A	2021.10.09	2022.10.08
Thermograph	Elitech	RC-4	S/N EF7176501537	2021.10.09	2022.10.08

Note:

Per KDB 865664 D01, Dipole SAR Validation Verification, STS LAB has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole
 2. System validation with specific dipole is within 10% of calibrated value
- Return-loss in within 20% of calibrated measurement



Appendix A. System Validation Plots

System Performance Check Data (2450MHz)

Type: Phone measurement (Complete)

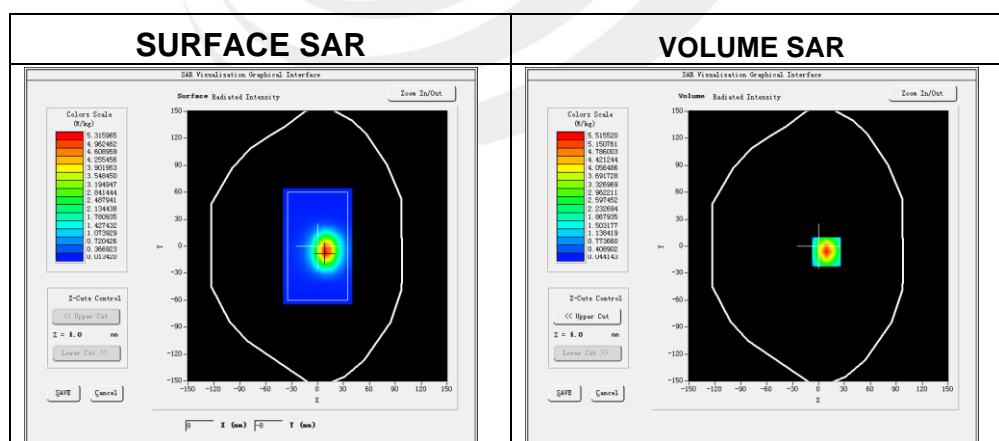
Area scan resolution: dx=8mm, dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 2021-11-22

Experimental conditions.

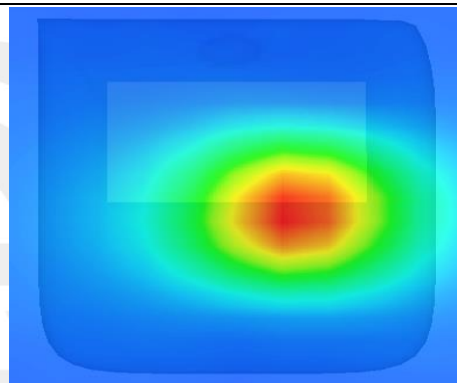
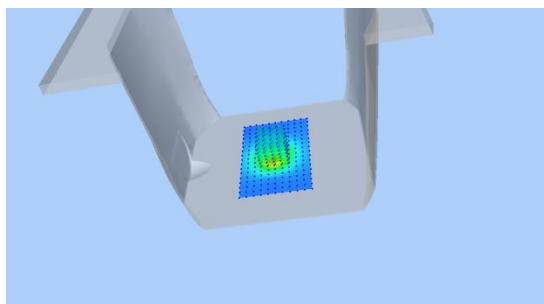
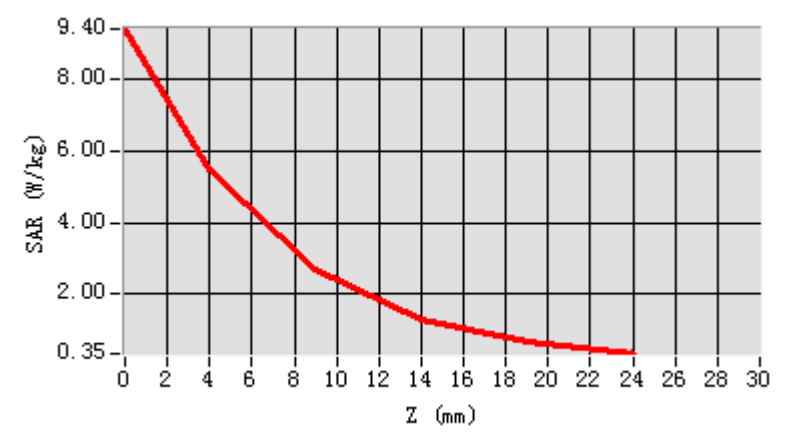
Device Position	Validation plane
Band	2450 MHz
Channels	-
Signal	CW
Frequency (MHz)	2450
Relative permittivity	38.73
Conductivity (S/m)	1.80
Probe	SN 07/21 EPGO352
ConvF	1.75
Crest factor	1:1



Maximum location: X=1.00, Y=0.00

SAR 10g (W/Kg)	2.372758
SAR 1g (W/Kg)	5.242517

Z Axis Scan





System Performance Check Data(5200MHz)

Type: Dipole measurement (Complete)

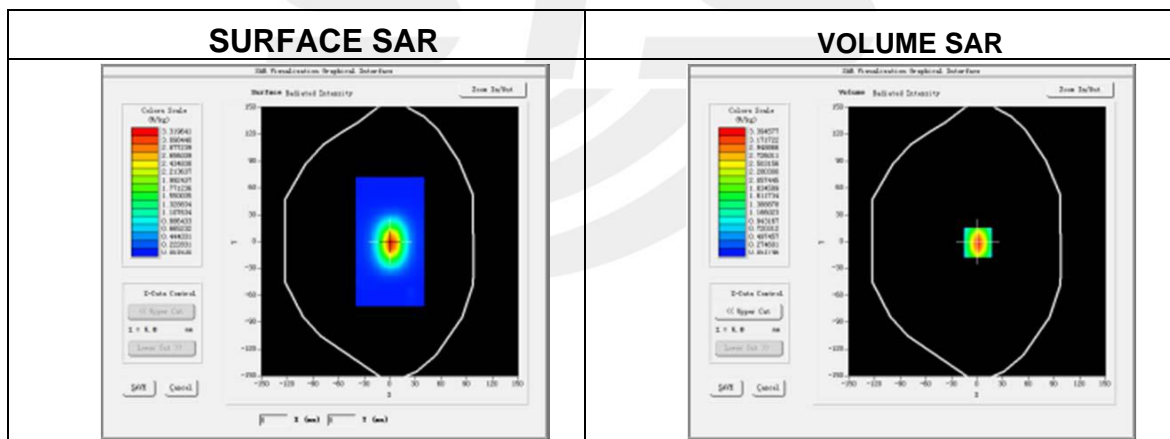
Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm

Date of measurement: 2021-11-22

Experimental conditions.

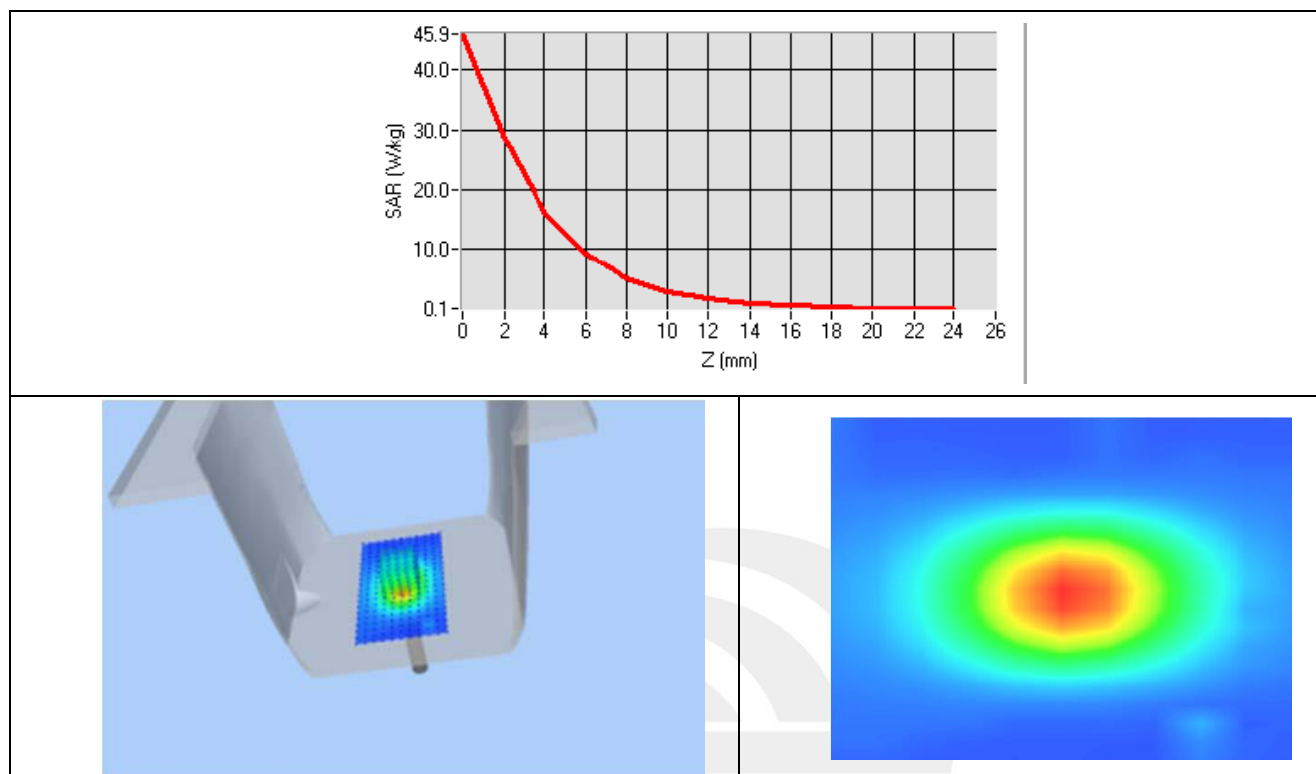
Device Position	Validation plane
Band	5200 MHz
Channels	-
Signal	CW
Frequency (MHz)	5200
Relative permittivity	36.71
Conductivity (S/m)	4.69
Probe	SN 07/21 EPGO352
ConvF	1.47
Crest factor:	1:1



Maximum location: X=7.00, Y=2.00

SAR 10g (W/Kg)	5.58584
SAR 1g (W/Kg)	15.775210

Z Axis Scan





System Performance Check Data(5300MHz)

Type: Dipole measurement (Complete)

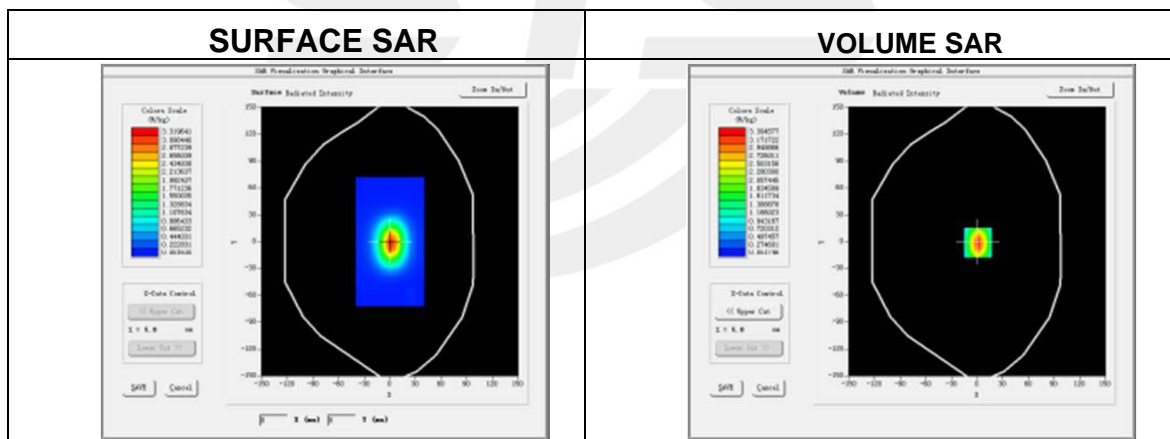
Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm

Date of measurement: 2021-11-22

Experimental conditions.

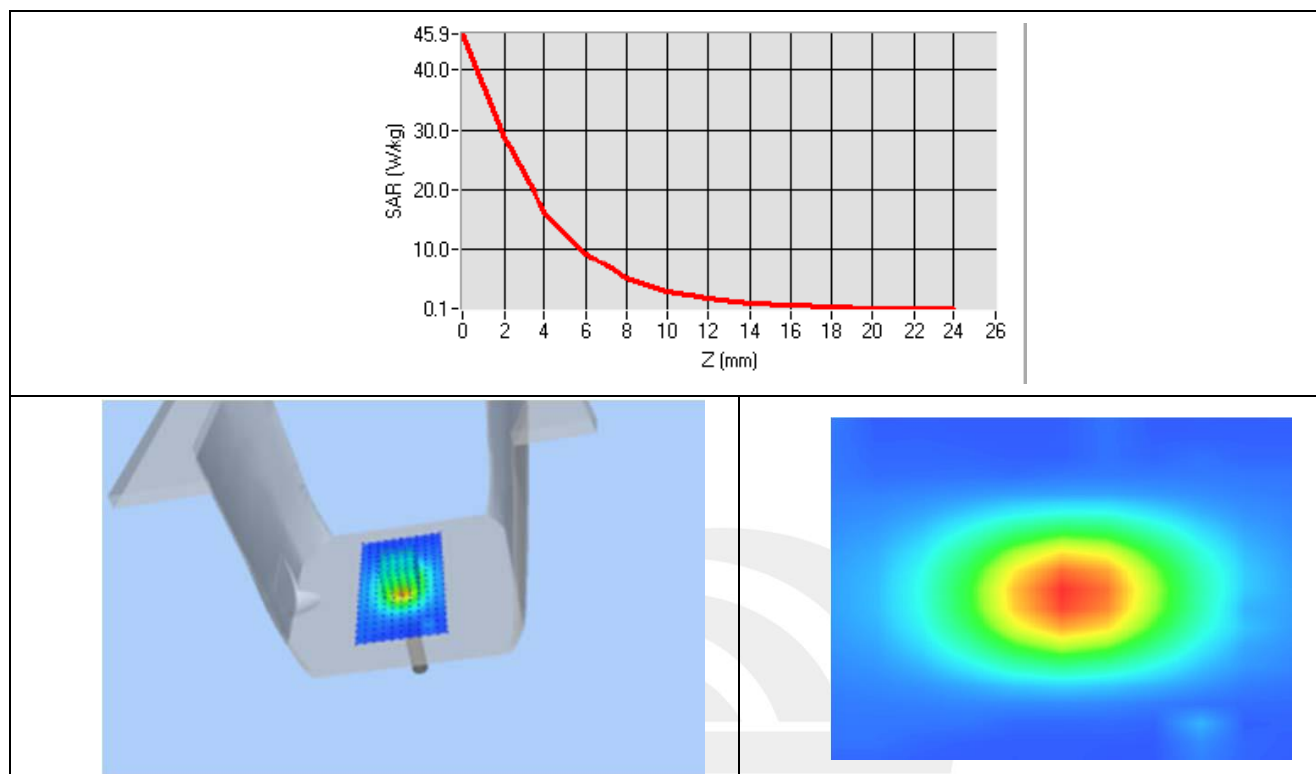
Device Position	Validation plane
Band	5300 MHz
Channels	-
Signal	CW
Frequency (MHz)	5300
Relative permittivity	37.19
Conductivity (S/m)	4.63
Probe	SN 07/21 EPGO352
ConvF	1.47
Crest factor:	1:1



Maximum location: X=7.00, Y=2.00

SAR 10g (W/Kg)	5.588854
SAR 1g (W/Kg)	16.523441

Z Axis Scan





Appendix B. SAR Test Plots

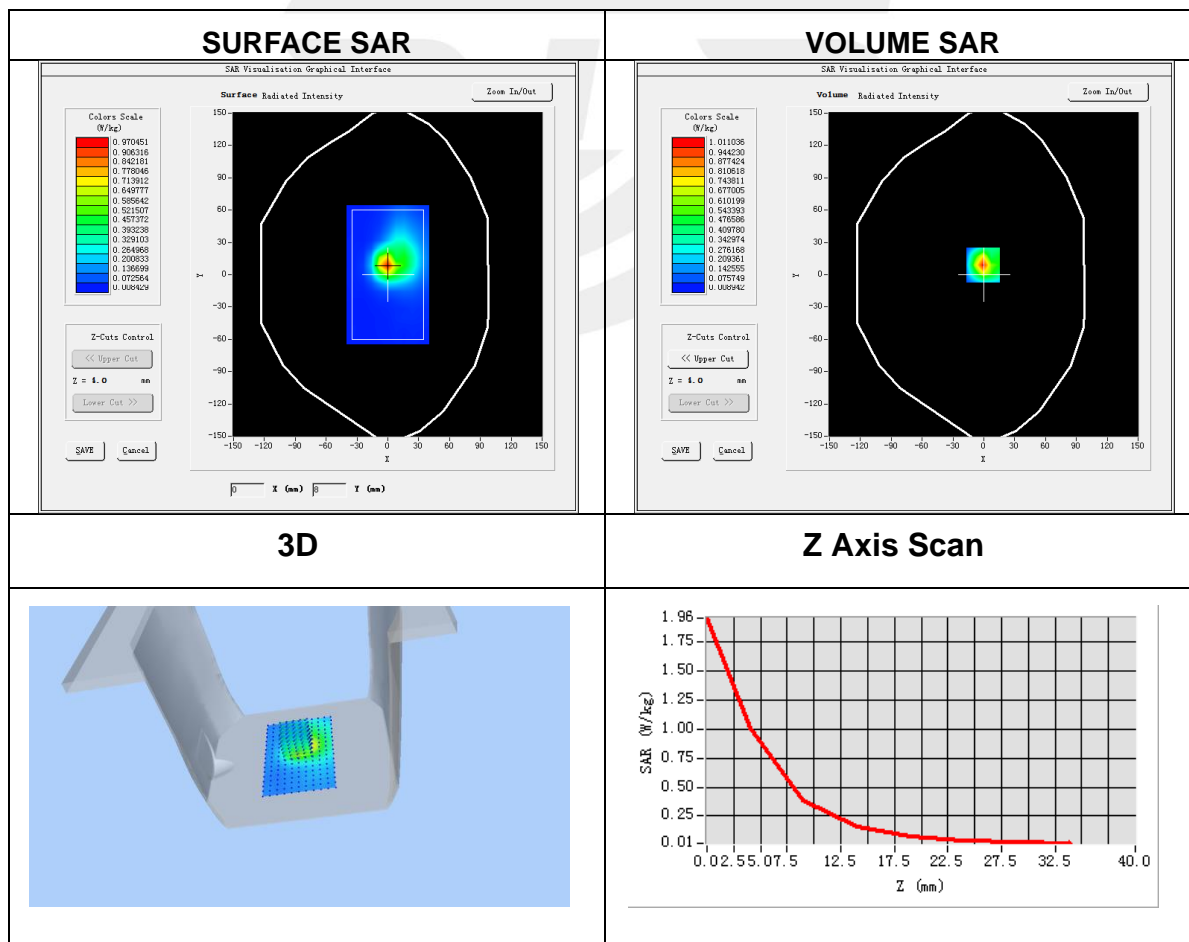
Plot 1: DUT: 10.1"Android Tablet; EUT Model: TBGRY100071485

Test Date	2021-11-22
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back Side
Band	IEEE 802.11b
Channels	6
Signal	IEEE802.11b (Crest factor: 1.0)
Frequency (MHz)	2437
Relative permittivity (real part)	39.01
Conductivity (S/m)	1.75

Maximum location: X=-1.00, Y=9.00

SAR Peak: 1.93 W/kg

SAR 10g (W/Kg)	0.350508
SAR 1g (W/Kg)	0.911296



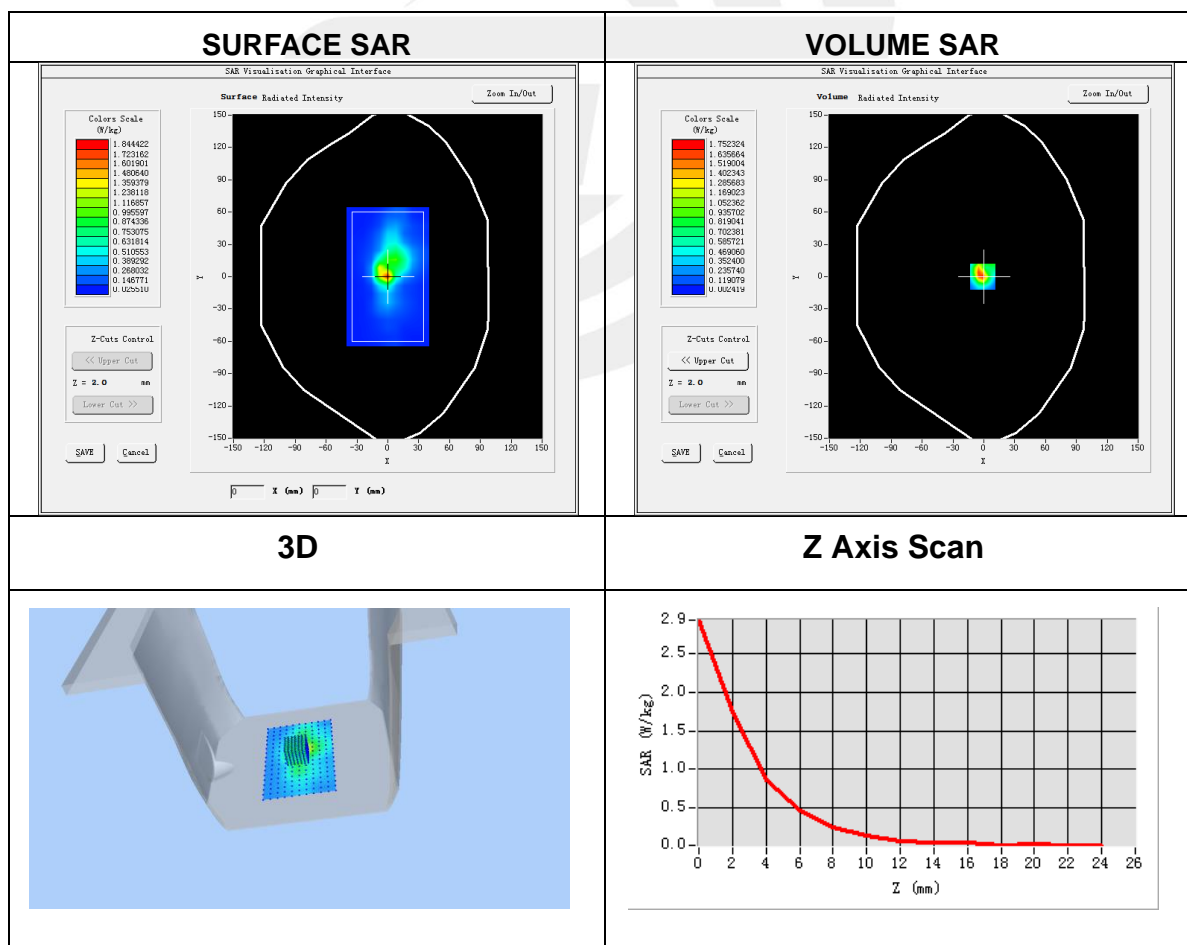

Plot 2: DUT: 10.1"Android Tablet; EUT Model: TBGRY100071485

Test Date	2021-11-22
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back Side
Band	IEEE 802.11a
Channels	48
Signal	IEEE802.11a (Crest factor: 1.0)
Frequency (MHz)	5240
Relative permittivity (real part)	35.66
Conductivity (S/m)	4.70

Maximum location: X=-1.00, Y=0.00

SAR Peak: 3.14 W/kg

SAR 10g (W/Kg)	0.282616
SAR 1g (W/Kg)	0.907904



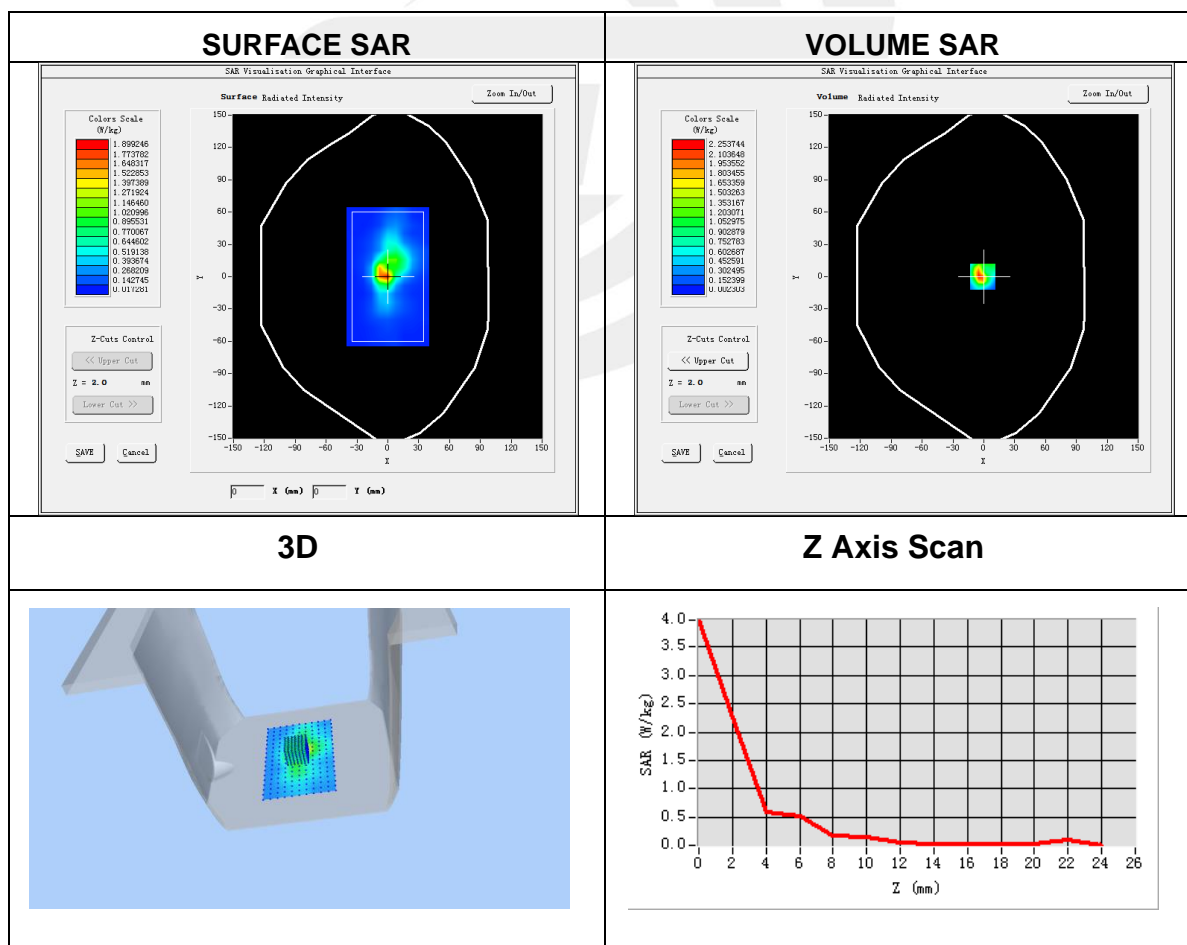

Plot 3: DUT: 10.1"Android Tablet; EUT Model: TBGRY100071485

Test Date	2021-11-22
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back Side
Band	IEEE 802.11a
Channels	64
Signal	IEEE802.11a (Crest factor: 1.0)
Frequency (MHz)	5320
Relative permittivity (real part)	35.75
Conductivity (S/m)	4.85

Maximum location: X=-1.00, Y=0.00

SAR Peak: 4.16 W/kg

SAR 10g (W/Kg)	0.351415
SAR 1g (W/Kg)	1.138264





Appendix C. Probe Calibration And Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※END OF THE REPORT※※※※

