SAR Test Report

Report No.: AGC03709230501FH01

FCC ID	:	2AI62-X7
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Rugged tablet
BRAND NAME	:	HUGEROCK
MODEL NAME	:	X7, X6, X60, X70, X71, X8, X80, X101
APPLICANT	:	SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED
DATE OF ISSUE	:	Jan. 29, 2024
STANDARD(S)	:	IEEE Std. 1528:2013 FCC 47 CFR Part 2§2.1093 IEEE Std C95.1 ™-2005
REPORT VERSION	:	V1.0

Attestation of Global Compliance(Shenzhen) Co., Ltd.

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan. 29, 2024	Valid	Initial Release

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Test Report

Applicant Name	SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED
Applicant Address	FLAT/RM A10 9/F SILVERCORP INTERNATIONAL TOWER 707-713 NATHAN ROAD MONGKOK KL HONG KONG
Manufacturer Name	Shenzhen SOTEN Technology Co., Ltd
Manufacturer Address	10th Floor, 2nd Building, BaiWang Research and development building, No. 5308 Shahe west road, Xili, Nanshan district, ShenZhen, China
Factory Name	Shenzhen SOTEN Technology Co., Ltd
Factory Address	10th Floor, 2nd Building, BaiWang Research and development building, No. 5308 Shahe west road, Xili, Nanshan district, ShenZhen, China
Product Designation	Rugged tablet
Brand Name	HUGEROCK
Model Name	X7
Series models	X6, X60, X70, X71, X8, X80, X101
Different Description	Just the model name is different
EUT Voltage	DC3.7V by battery
Applicable Standard	IEEE Std. 1528:2013 FCC 47 CFR Part 2§2.1093 IEEE Std C95.1 ™-2005
Date of receipt of test item	Jun. 02, 2023
Test Date	Dec. 28, 2023 to Jan. 26, 2024
Report Template	AGCRT-US-4G/SAR (2021-04-20)

Note: The results of testing in this report apply to the product/system which was tested only.

Prepared By

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Jan. 29, 2024

Reviewed By

Calvin Liu (Reviewer)
Jan. 29, 2024

Approved By

Max Zhang (Authorized Officer)
Jan. 29, 2024

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1. SUMMARY OF MAXIMUM SAR VALUE

The maximum results of Specific Absorption Rate (SAR) found during testing for EUT are as follows:

Frequency Band	Highest Reported 1g-SAR(W/kg)		SAR Test Limit (W/kg)
	Body-worn(with 0mm separation)	Hotspot(with 0mm separation)	
GSM 850	0.380	0.380	1.6
PCS 1900	0.697	0.697	
UMTS Band II	1.379	1.379	
UMTS Band V	0.768	0.768	
LTE Band 2	1.391	1.391	
LTE Band 4	0.472	0.472	
LTE Band 5	0.773	0.773	
LTE Band 7	0.536	0.536	
WIFI 2.4G	0.301	0.301	
Simultaneous Reported SAR	1.594		
SAR Test Result	PASS		

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/kg) specified in IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and the following specific FCC Test Procedures:

- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 648474 D04 Handset SAR v01r03
- KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r04
- KDB 941225 D01 3G SAR Procedures v03r01
- KDB 941225 D06 Hotspot Mode v02r01
- KDB 248227 D01 802 11 Wi-Fi SAR v02r02
- KDB 941225 D05 SAR for LTE Devices v02r05

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2. GENERAL INFORMATION

2.1. EUT Description

General Information	
Product Designation	Rugged tablet
Test Model	X7
Sample ID	230531007
Hardware Version	X7V1-MainBoard_P4
Software Version	X7_2021_PAD_EN_20240105_13_GMS
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
GSM and GPRS& EGPRS	
Support Band	☒GSM 850 ☒PCS 1900 (U.S. band) ☒GSM 900 ☒DCS 1800 (none U.S. band)
GPRS & EGPRS Type	Class B
GPRS & EGPRS Class	Class 12(1Tx+4Rx, 2Tx+3Rx, 3Tx+2Rx, 4Tx+1Rx)
TX Frequency Range	GSM 850 : 820-850MHz; PCS 1900: 1850-1910MHz;
RX Frequency Range	GSM 850 : 869~894MHz; PCS 1900: 1930~1990MHz
Release Version	R99
Type of modulation	GMSK for GSM/GPRS; GMSK & 8-PSK for EGPRS
Antenna Gain	GSM850: -1.41dBi; PCS1900: 2.26dBi
Max. Average Power	GSM850: 33.16dBm; PCS1900: 29.98 dBm
WCDMA	
Support Band	☒UMTS FDD Band II ☒UMTS FDD Band V (U.S. band) ☒UMTS FDD Band I ☒UMTS FDD Band VIII (none U.S. band)
HS Type	HSPA(HSUPA/HSDPA)
TX Frequency Range	FDD Band II: 1850-1910MHz; FDD Band V: 824-849MHz
RX Frequency Range	FDD Band II: 1930-1990MHz; FDD Band V: 869-894MHz
Release Version	Release 6 and later
Type of modulation	HSDPA:QPSK/16QAM; HSUPA:BPSK; WCDMA:QPSK
Antenna Gain	Band II:2.26dBi; Band V: -1.41dBi
Max. Average Power	Band II: 19.78dBm; Band V: 21.50 dBm
Bluetooth	
Bluetooth Version	V5.0
Operation Frequency	2402~2480MHz
Type of modulation	☒GFSK ☒Π/4-DQPSK ☒8-DPSK
Peak Power	3.227dBm
Antenna Gain	2.22dBi
WIFI	
WIFI Specification	☐802.11a ☒802.11b ☒802.11g ☒802.11n(20) ☒802.11n(40)
Operation Frequency	2412~2462MHz
Avg. Burst Power	11b: 14.75dBm,11g: 18.38dBm,11n(20): 12.39dBm,11n(40): 12.57dBm
Antenna Gain	2.22dBi

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EUT Description(Continue)

LTE	
Support Band	☒FDD Band 2 ☒FDD Band 4 ☒FDD Band 5 ☒FDD Band 7 ☐FDD Band 12 ☐FDD Band 13 ☐FDD Band 17 ☐FDD Band 25 ☐FDD Band 26 ☐TDD Band 38 ☐TDD Band 40 ☐TDD Band 41 ☐FDD Band 66 ☐FDD Band 71 (U.S. Bands)
TX Frequency Range	Band 2:1850-1910MHz; Band 4:1710-1755MHz;Band 5:824-849MHz; Band 7:2500-2570MHz;
RX Frequency Range	Band 2:1930-1990MHz; Band 4:2110-2155MHz; Band 5:869-894MHz; Band 7:2620-2690MHz;
Type of modulation	QPSK, 16QAM
Antenna Gain	Band 2: 2.26dBi; Band 4: 0.94dBi; Band 5: -1.41dBi; Band 7: -1.28dBi;
Max. Average Power	Band 2: 21.93 dBm; Band 4: 21.34dBm; Band 5: 22.15dBm; Band 7: 21.19dBm;
Accessories	
Battery	Brand name: N/A Model No. : 608297P Voltage and Capacitance: 3.7 V & 7000mAh

Note:1.CMU200 can measure the average power and Peak power at the same time
2.The sample used for testing is end product.
3. The test sample has no any deviation to the test method of standard mentioned in page 1.

Product	Type	
	☒ Production unit	☐ Identical Prototype

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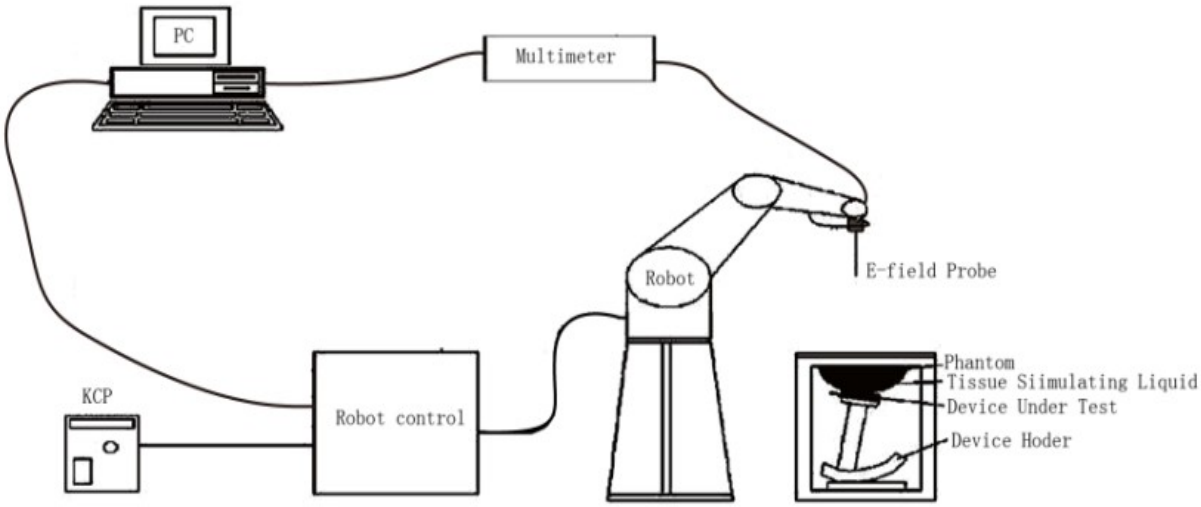
3. SAR MEASUREMENT SYSTEM

3.1. The SATIMO system used for performing compliance tests consists of following items



The COMOSAR system for performing compliance tests consists of the following items:

- The PC. It controls most of the bench devices and stores measurement data.A computer running WinXP and the Opensar software.
- The E-Field probe. The probe is a 3-axis system made of 3 distinct dipoles. Each dipole returns a voltage in function of the ambient electric field.
- The Keithley multimeter measures each probe dipole voltages.
- The SAM phantom simulates a human head. The measurement of the electric field is made inside the phantom.
- The liquids simulate the dielectric properties of the human head tissues.
- The network emulator controls the mobile phone under test.
- The validation dipoles are used to measure a reference SAR. They are used to periodically check the bench to make sure that there is no drift of the system characteristics over time.
- The phantom, the device holder and other accessories according to the targeted measurement.

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3.2. COMOSAR E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SATIMO. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SATIMO conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528 and relevant KDB files.) The calibration data are in Appendix D.

Isotropic E-Field Probe Specification

Model	SSE2	
Manufacture	MVG	
Identification No.	2023-EPGO-414	
Frequency	0.15GHz-7.5GHz Linearity:±0.09dB(0.15GHz-7.5GHz)	
Dynamic Range	0.01W/kg-100W/kg Linearity:±0.09dB	
Dimensions	Overall length:330mm Length of individual dipoles:24.5mm Maximum external diameter:8mm Probe Tip external diameter:2.55mm Distance between dipoles/ probe extremity:12.7mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precisin of better 30%.	

3.3. Robot

The COMOSAR system uses the KUKA robot from SATIMO SA (France).For the 6-axis controller COMOSAR system, the KUKA robot controller version from SATIMO is used. The XL 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	

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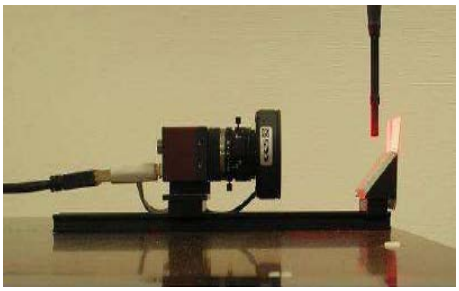
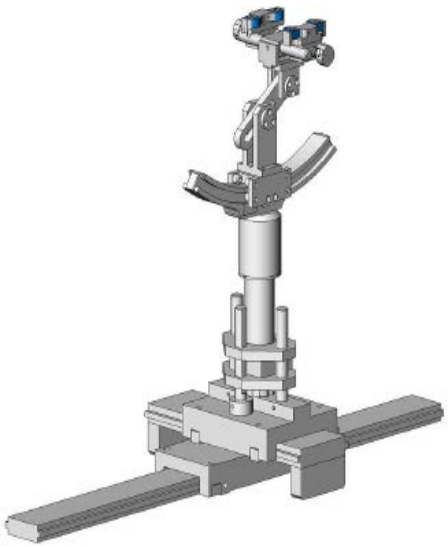
3.4. Video Positioning System

The video positioning system is used in OpenSAR to check the probe. Which is composed of a camera, LED, mirror and mechanical parts.The camera is piloted by the main computer with 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. During probe rotations, the probe tip will keep its actual position.	

3.5. Device Holder

The COMOSAR device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles. The COMOSAR device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity εr =3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.	

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3.6. SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas: □ Left head □ Right head □ Flat phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

ELLI39 Phantom

The Flat phantom is a fiberglass shellphantom with 2mm+/- 0.2 mm shell thickness. It has only one measurement area for Flat phantom	

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4. SAR MEASUREMENT PROCEDURE

4.1. Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in 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 occupational/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 given mass density (ρ). The equation description is as below:

$$\mathrm{SAR} = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{\mathrm{d}W}{\mathrm{d}m}\right) = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{\mathrm{d}W}{\rho \mathrm{d}V}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR can be obtained using either of the following equations:

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

$$\mathrm{SAR} = c_h \left.\frac{\mathrm{d}T}{\mathrm{d}t}\right|_{t=0}$$

Where

SAR	is the specific absorption rate in watts per kilogram;
E	is the r.m.s. value of the electric field strength in the tissue in volts per meter;
σ	is the conductivity of the tissue in siemens per metre;
ρ	is the density of the tissue in kilograms per cubic metre;
c_h	is the heat capacity of the tissue in joules per kilogram and Kelvin;
$\frac{\mathrm{dT}}{\mathrm{dt}} \mid \mathrm{t} = 0$	is the initial time derivative of temperature in the tissue in kelvins per second

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4.2. SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface is 2.7mm This distance cannot be smaller than the distance os sensor calibration points to probe tip as `defined in the probe properties,

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in SATIMO software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in db) is specified in the standards for compliance testing. For example, a 2db range is required in IEEE Standard 1528 standards, whereby 3db is a requirement when compliance is assessed in accordance with the ARIB standard (Japan) If one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximum are detected, the number of Zoom Scan has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100MHz to 6GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

Zoom Scan are used to assess the peak spatial SAR value within a cubic average volume containing 1g abd 10g of simulated tissue. The Zoom Scan measures points(refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1g and 10g and displays these values next to the job's label.

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Zoom Scan Parameters extracted from KDB865664 d01 SAR Measurement 100MHz to 6GHz

Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the same settings. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

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4.3. RF Exposure Conditions

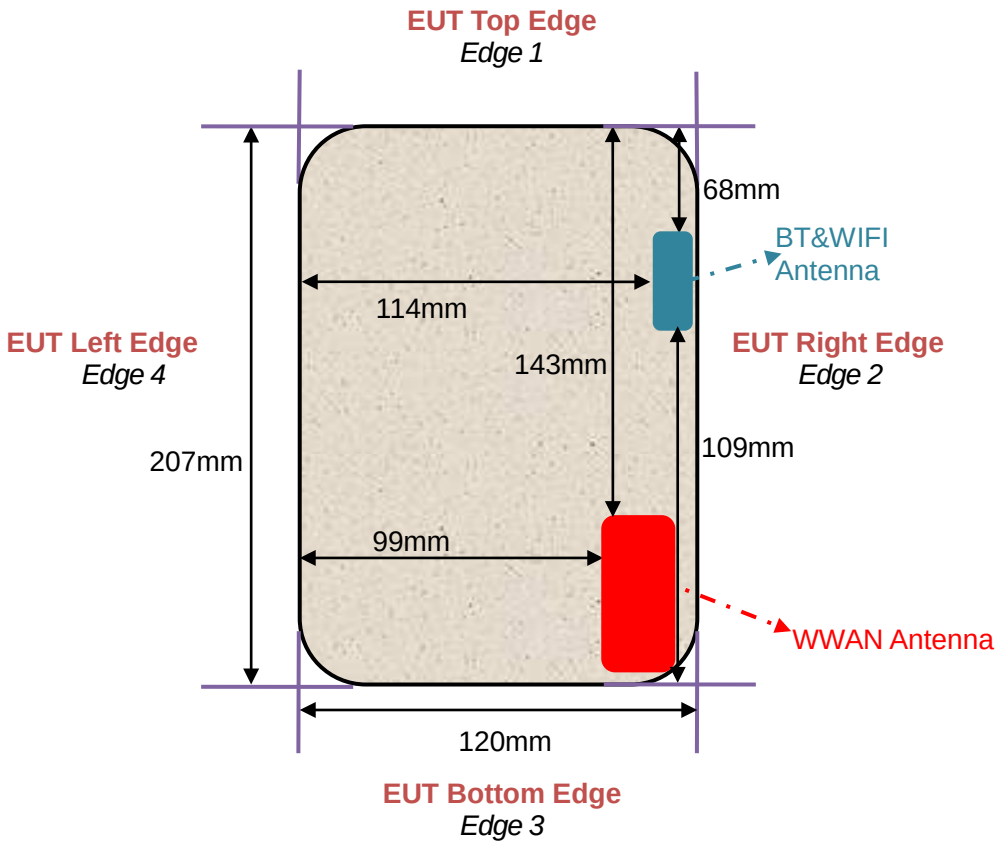
Test Configuration and setting:

The EUT is a model of GSM Portable Mobile Station (MS). It supports GSM/GPRS/EGPRS, WCDMA/HSPA, LTE, BT, WIFI, and support hot spot mode.

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator were established by air link. The distance between the EUT and the antenna is larger than 50cm, and the output power radiated from the emulator antenna is at least 30db smaller than the output power of EUT.

For WLAN testing, the EUT is configured with the WLAN continuous TX tool through engineering command.

Antenna Location: (the front view)



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SAR Test Exclusion Consideration for Adjacent Edges

Per KDB 447498 D01 cl. 4.3.1:

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determine d by the following:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] • [√f(GHz)] ≤ 3.0 for1-g SAR, and ≤ 7.5 for 10-g extremity SAR.

b) For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determine d by the following:

1) {[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)•(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz

2) {[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)•10]} mW, for > 1500 MHz an d ≤ 6 GHz

1-g SAR test exclusion thresholds for WWAN					
Test Mode	Test position	Edge 1 (143mm)	Edge 2 (6mm)	Edge 3 (14mm)	Edge 4 (99mm)
GSM850	SAR test exclusion thresholds(mW)	676.23	19.83	46.26	434.46
	SAR Max. Avg. Burst Power(mW)	308.32	308.32	308.32	308.32
	SAR required (Yes/No)	NO	YES	YES	NO
PCS1900	SAR test exclusion thresholds(mW)	1040.28	13.23	30.88	600.28
	SAR Max. Avg. Burst Power(mW)	154.17	154.17	154.17	154.17
	SAR required (Yes/No)	NO	YES	YES	NO
WCDMA Band II	SAR test exclusion thresholds(mW)	1040.21	13.23	30.86	600.21
	SAR Max. Avg. Burst Power(mW)	95.06	95.06	95.06	95.06
	SAR required (Yes/No)	NO	YES	YES	NO
WCDMA Band V	SAR test exclusion thresholds(mW)	677.37	19.80	46.20	434.96
	SAR Max. Avg. Burst Power(mW)	141.25	141.25	141.25	141.25
	SAR required (Yes/No)	NO	YES	YES	NO
LTE Band 2	SAR test exclusion thresholds(mW)	1039.40	13.13	30.63	599.40
	SAR Max. Avg. Burst Power(mW)	155.96	155.96	155.96	155.96
	SAR required (Yes/No)	NO	YES	YES	NO
LTE Band 4	SAR test exclusion thresholds(mW)	1027.85	11.74	27.40	587.85
	SAR Max. Avg. Burst Power(mW)	136.14	136.14	136.14	136.14
	SAR required (Yes/No)	NO	YES	YES	NO
LTE Band 5	SAR test exclusion thresholds(mW)	1026.68	11.60	27.07	586.68
	SAR Max. Avg. Burst Power(mW)	164.06	164.06	164.06	164.06
	SAR required (Yes/No)	NO	YES	YES	NO
LTE Band 7	SAR test exclusion thresholds(mW)	1020.05	10.81	25.21	580.05
	SAR Max. Avg. Burst Power(mW)	131.52	131.52	131.52	131.52
	SAR required (Yes/No)	NO	YES	YES	NO

1-g SAR test exclusion thresholds for WWAN					
Test Mode	Test position	Edge 1 (68mm)	Edge 2 (6mm)	Edge 3 (109mm)	Edge 4 (114mm)
2.4G BT	SAR test exclusion thresholds(mW)	276.78	11.61	686.78	736.78
	SAR Max. Avg. Burst Power(mW)	2.10	2.10	2.10	2.10
	SAR required (Yes/No)	NO	NO	NO	NO
2.4G WIFI	SAR test exclusion thresholds(mW)	276.09	11.53	686.09	736.09
	SAR Max. Avg. Burst Power(mW)	68.87	68.87	68.87	68.87
	SAR required (Yes/No)	NO	YES	NO	NO

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5. TISSUE SIMULATING LIQUID

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm.The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 10% are listed in 6.2

5.1. The composition of the tissue simulating liquid

Ingredient (% Weight) / Frequency (MHz)	Water	Nacl	Polysorbate 20	DGBE	1,2 Propanediol	Triton X-100
835 Head	50.36	1.25	48.39	0.0	0.0	0.0
1750 Head	52.64	0.36	0.0	47	0.0	0.0
1900 Head	54.9	0.18	0.0	44.92	0.0	0.0
2450 Head	71.88	0.16	0.0	7.99	0.0	19.97
2600 Head	55.242	0.306	0	44.452	0	0

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5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head and body tissue dielectric parameters recommended by the IEEE Std. 1528 have been incorporated in the following table.

Target Frequency (MHz)	head		body	
	εr	σ (S/m)	εr	σ (S/m)
300	45.3	0.87	45.3	0.87
450	43.5	0.87	43.5	0.87
750	41.9	0.89	41.9	0.89
835	**41.5**	**0.90**	**41.5**	**0.90**
900	41.5	0.97	41.5	0.97
915	41.5	1.01	41.5	1.01
1450	40.5	1.20	40.5	1.20
1610	40.3	1.29	40.3	1.29
1750	**40.1**	**1.37**	**40.1**	**1.37**
1800 – 2000	**40.0**	**1.40**	**40.0**	**1.40**
2300	39.5	1.67	39.5	1.67
2450	**39.2**	**1.80**	**39.2**	**1.80**
2600	**39.0**	**1.96**	**39.0**	**1.96**
3000	38.5	2.40	38.5	2.40

(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m3

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5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using SATIMO Dielectric Probe Kit and R&S Network Analyzer ZVL6.

Tissue Stimulant Measurement for 835MHz					
Head	Fr. (MHz)	Dielectric Parameters (±10%)		Tissue Temp [°C]	Test time
		εr 41.5 (37.35-45.65)	δ[s/m] 0.90(0.81-0.99)		
	835	41.83	0.88	20.3	Dec. 28, 2023
	836.4	40.93	0.90		
	836.5	40.93	0.90		
	836.6	40.93	0.90		

Tissue Stimulant Measurement for 1750MHz					
Head	Fr. (MHz)	Dielectric Parameters (±10%)		Tissue Temp [°C]	Test time
		εr 40.1 (36.09-44.11)	δ[s/m]1.37(1.233-1.507)		
	1732.5	40.22	1.36	21.3	Jan. 26, 2024
	1750	39.72	1.38		

Tissue Stimulant Measurement for 1900MHz					
Head	Fr. (MHz)	Dielectric Parameters (±10%)		Tissue Temp [°C]	Test time
		εr40.00(36.00-44.00)	δ[s/m]1.40(1.26-1.54)		
	1852.4	43.26	1.34	20.9	Jan. 25, 2024
	1860	42.12	1.36		
	1880	41.39	1.39		
	1900	40.74	1.41		
	1907.6	39.60	1.43		

Tissue Stimulant Measurement for 2450MHz					
Head	Fr. (MHz)	Dielectric Parameters (±10%)		Tissue Temp [°C]	Test time
		εr39.2(35.28-43.12)	δ[s/m]1.80(1.62-1.98)		
	2437	39.61	1.75	21.2	Dec. 31, 2023
	2450	38.89	1.78		

Tissue Stimulant Measurement for 2600MHz					
Head	Fr. (MHz)	Dielectric Parameters (±10%)		Tissue Temp [°C]	Test time
		εr39(35.1-42.9)	δ[s/m]1.96(1.764-2.156)		
	2535	39.16	1.86	20.1	Jan. 06, 2024
	2600	38.74	1.89		

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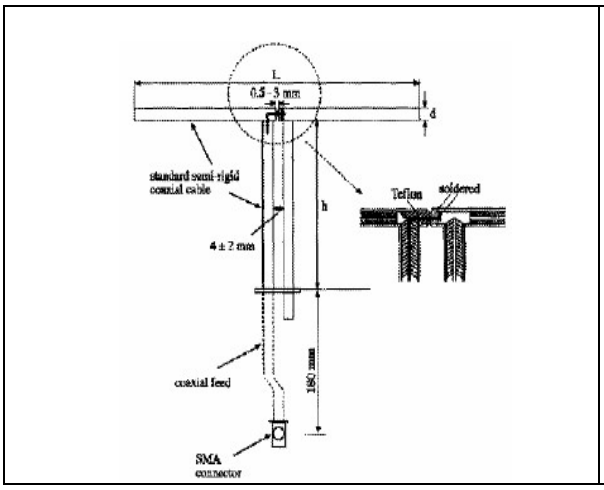
6. SAR SYSTEM CHECK PROCEDURE

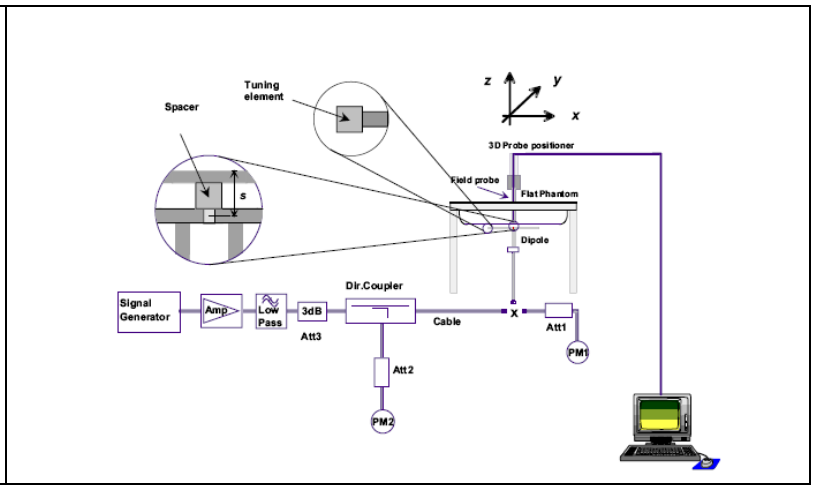
6.1. SAR System Check Procedures

SAR system check is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

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

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





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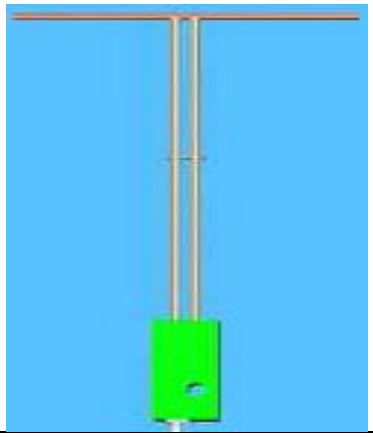
6.2. SAR System Check

6.2.1. Dipoles

	The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of IEEE. the table below provides details for the mechanical and electrical Specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
835MHz	161.0	89.8	3.6
1800MHz	71.6	41.7	3.6
1900MHz	68	39.5	3.6
2450MHz	51.5	30.4	3.6
2600MHz	48.5	28.8	3.6

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6.2.2. System Check Result

System Performance Check at 835MHz &1800MHz &1900MHz &2450MHz&2600MHz for Head								
Validation Kit: SN 15/16 DIP 0G835-399& SN 46/11 DIP 1G800-186& SN 29/15 DIP 1G900-389& SN 29/15 DIP 2G450-393& SN 22/16 DIP 2G600-407								
Frequency [MHz]	Target Value(W/kg)		Reference Result (± 10%)		Tested Value(W/kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
835	9.67	6.14	8.703-10.637	5.526-6.754	9.43	5.93	20.3	Dec. 28, 2023
1800	37.76	19.60	33.984-41.536	17.640-21.560	40.45	20.15	21.3	Jan. 26, 2024
1900	41.26	20.86	37.134-45.386	18.774-22.946	41.34	21.19	20.9	Jan. 25, 2024
2450	54.32	24.25	48.888-59.752	21.825-26.675	53.86	23.90	21.2	Dec. 31, 2023
2600	54.94	23.77	49.446-60.434	21.393-26.147	51.64	22.76	20.1	Jan. 06, 2024

Note:
(1) We use a CW signal of 18dBm for system check, and then all SAR value are normalized to 1W forward power. The result must be within ±10% of target value.

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7. EUT TEST POSITION

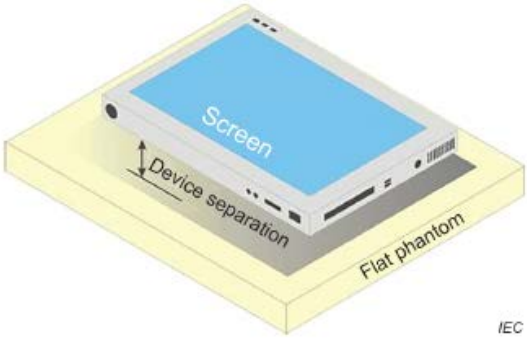
This EUT was tested in **Body back, Body front and 4 edges.**

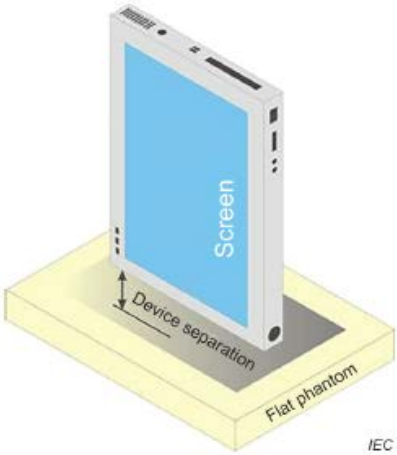
7.1. Body Worn Position

(1) To position the EUT parallel to the phantom surface.

(2) To adjust the EUT parallel to the flat phantom.

(3) To adjust the distance between the EUT surface and the flat phantom to **0mm.**





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8. SAR EXPOSURE LIMITS

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

Type Exposure	Uncontrolled Environment Limit (W/kg)
Spatial Peak SAR (1g cube tissue for brain or body)	1.60
Spatial Average SAR (Whole body)	0.08
Spatial Peak SAR (Limbs)	4.0

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9. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

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10. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Software version	Current calibration date	Next calibration date
SAR Probe	MVG	2023-EPGO-414	N/A	May 31, 2023	May 30, 2024
Phantom	SATIMO	SN_2316_ELLI39	N/A	Validated. No cal required.	Validated. No cal required.
Liquid	SATIMO	N/A	N/A	Validated. No cal required.	Validated. No cal required.
Comm Tester	Agilent-8960	GB46310822	A.13.07	Jun. 03, 2023	Jun. 02, 2024
Comm Tester	R&S- CMW500	121209	V3.7.40	Jun. 01, 2023	May 31, 2024
Multimeter	Keithley 2000	4114939	N/A	Jun. 01, 2023	May 31, 2024
SAR Software	MVG-OpenSAR	N/A	OpenSAR V4_02_35	N/A	N/A
Dipole	SATIMO SID835	SN 15/16 DIP 0G835-399	N/A	Apr. 28, 2022	Apr. 27, 2025
Dipole	SATIMO SID1800	SN 46/11 DIP 1G800-186	N/A	Apr. 28, 2022	Apr. 27, 2025
Dipole	SATIMO SID1900	SN 29/15 DIP 1G900-389	N/A	Apr. 28, 2022	Apr. 27, 2025
Dipole	SATIMO SID2450	SN 29/15 DIP 2G450-393	N/A	Apr. 28, 2022	Apr. 27, 2025
Dipole	SATIMO SID2600	SN 22/16 DIP 2G600-407	N/A	Apr. 28, 2022	Apr. 27, 2025
Signal Generator	Agilent-E4438C	US41461365	V5.03	Jun. 01, 2023	May 31, 2024
EXA Signal Analyzer	Agilent / N9010A	MY53470504	N/A	Jun. 01, 2023	May 31, 2024
Network Analyzer	Rhode & Schwarz ZVL6	SN101443	3.2	Sep. 21, 2023	Sep. 20, 2024
Attenuator	Warison /WATT-6SR1211	S/N:WRJ34AYM2F1	N/A	June 07, 2023	June 06, 2024
Attenuator	Mini-circuits / VAT-10+	31405	N/A	June 07, 2023	June 06, 2024
Amplifier	AS0104-55_55	1004793	N/A	N/A	N/A
Directional Couple	Werlatone/ C5571-10	SN99463	N/A	Mar. 10, 2022	Mar. 09, 2024
Directional Couple	Werlatone/ C6026-10	SN99482	N/A	Mar. 10, 2022	Mar. 09, 2024
Power Sensor	NRP-Z21	1137.6000.02	N/A	Sep. 05, 2023	Sep. 04, 2024
Power Sensor	NRP-Z23	100323	N/A	Feb. 15, 2023	Feb. 14, 2024
Power Viewer	R&S	V2.3.1.0	N/A	N/A	N/A
Calibration standard parts for network sub - port	R&S/ ZV-Z132	N/A	V2.3.1.0	Nov. 11, 2023	Nov. 10, 2024

Note: Per KDB 865664 Dipole SAR Validation, AGC 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;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

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11. MEASUREMENT UNCERTAINTY

SATIMO Uncertainty- 2023-EPGO-414 Measurement uncertainty for DUT averaged over 1 gram / 10 gram.									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
Measurement System									
Probe calibration	E.2.1	7.000	N	1	1	1	7.000	7.000	∞
Axial Isotropy	E.2.2	1.695	R	1.732	0.707	0.707	0.692	0.692	∞
Hemispherical Isotropy	E.2.2	1.695	R	1.732	0.707	0.707	0.692	0.692	∞
Boundary effect	E.2.3	1.000	R	1.732	1	1	0.577	0.577	∞
Linearity	E.2.4	2.250	R	1.732	1	1	1.299	1.299	∞
System detection limits	E.2.4	1.000	R	1.732	1	1	0.577	0.577	∞
Modulation response	E2.5	3.000	R	1.732	1	1	1.732	1.732	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0.000	R	1.732	1	1	0.000	0.000	∞
Integration Time	E.2.8	1.400	R	1.732	1	1	0.808	0.808	∞
RF ambient conditions-Noise	E.6.1	3.000	R	1.732	1	1	1.732	1.732	∞
RF ambient conditions-reflections	E.6.1	3.000	R	1.732	1	1	1.732	1.732	∞
Probe positioner mechanical tolerance	E.6.2	1.400	R	1.732	1	1	0.808	0.808	∞
Probe positioning with respect to phantom shell	E.6.3	1.400	R	1.732	1	1	0.808	0.808	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.300	R	1.732	1	1	1.328	1.328	∞
Test sample Related									
Test sample positioning	E.4.2	2.6	N	1	1	1	2.60	2.60	∞
Device holder uncertainty	E.4.1	3	N	1	1	1	3.00	3.00	∞
Output power variation—SAR drift measurement	E.2.9	5	R	1.732	1	1	2.89	2.89	∞
SAR scaling	E.6.5	5	R	1.732	1	1	2.89	2.89	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	1.732	1	1	2.309	2.309	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.900	1.596	∞
Liquid conductivity measurement	E.3.3	4	N	1	0.78	0.71	3.120	2.840	M
Liquid permittivity measurement	E.3.3	5	N	1	0.23	0.26	1.150	1.300	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	1.732	0.78	0.71	1.126	1.025	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	1.732	0.23	0.26	0.332	0.375	∞
Combined Standard Uncertainty			RSS				10.616	10.432	
Expanded Uncertainty (95% Confidence interval)			K=2				21.232	20.865	

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SATIMO Uncertainty- 2023-EPGO-414 System Validation uncertainty for DUT averaged over 1 gram / 10 gram.									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
Measurement System									
Probe calibration	E.2.1	7.000	N	1	1	1	7.000	7.000	∞
Axial Isotropy	E.2.2	1.695	R	1.732	1.000	1.000	0.979	0.979	∞
Hemispherical Isotropy	E.2.2	1.695	R	1.732	0.000	0.000	0.000	0.000	∞
Boundary effect	E.2.3	1.000	R	1.732	1.000	1.000	0.577	0.577	∞
Linearity	E.2.4	2.250	R	1.732	1.000	1.000	1.299	1.299	∞
System detection limits	E.2.4	1.000	R	1.732	1.000	1.000	0.577	0.577	∞
Modulation response	E2.5	3.000	R	1.732	0.000	0.000	0.000	0.000	∞
Readout Electronics	E.2.6	0.021	N	1.000	1.000	1.000	0.021	0.021	∞
Response Time	E.2.7	0.000	R	1.732	0.000	0.000	0.000	0.000	∞
Integration Time	E.2.8	1.400	R	1.732	0.000	0.000	0.000	0.000	∞
RF ambient conditions-Noise	E.6.1	3.000	R	1.732	1.000	1.000	1.732	1.732	∞
RF ambient conditions-reflections	E.6.1	3.000	R	1.732	1.000	1.000	1.732	1.732	∞
Probe positioner mechanical tolerance	E.6.2	1.400	R	1.732	1.000	1.000	0.808	0.808	∞
Probe positioning with respect to phantom shell	E.6.3	1.400	R	1.732	1.000	1.000	0.808	0.808	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.300	R	1.732	1.000	1.000	1.328	1.328	∞
System validation source									
Deviation of experimental dipole from numerical dipole	E.6.4	5	N	1	1	1	5	5	∞
Input power and SAR drift measurement	8,6.6.4	5	R	1.732	1	1	2.887	2.887	∞
Dipole axis to liquid distance	8,E.6.6	2	R	1.732	1	1	1.155	1.155	∞
Phantom and set-up									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	1.732	1	1	2.309	2.309	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.9	1.596	∞
Liquid conductivity（temperature uncertainty）	E.3.3	4	N	1	0.78	0.71	3.12	2.84	∞
Liquid conductivity（measured）	E.3.3	5	N	1	0.23	0.26	1.15	1.3	M
Liquid permittivity（temperature uncertainty）	E.3.4	2.5	R	1.732	0.78	0.71	1.126	1.025	∞
Liquid permittivity（measured）	E.3.4	2.5	R	1.732	0.23	0.26	0.332	0.375	M
Combined Standard Uncertainty			RSS				10.572	10.387	
Expanded Uncertainty (95% Confidence interval)			K=2				21.143	20.775	

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SATIMO Uncertainty- 2023-EPGO-414 System Check uncertainty for DUT averaged over 1 gram / 10 gram.									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
Measurement System									
Probe calibration drift	E.2.1.3	0.5	N	1	1	1	0.5	0.5	∞
Axial Isotropy	E.2.2	1.695	R	$\sqrt{3}$	0	0	0	0	∞
Hemispherical Isotropy	E.2.2	1.695	R	$\sqrt{3}$	0	0	0	0	∞
Boundary effect	E.2.3	1.000	R	$\sqrt{3}$	0	0	0	0	∞
Linearity	E.2.4	2.250	R	$\sqrt{3}$	0	0	0	0	∞
System detection limits	E.2.4	1	R	$\sqrt{3}$	0	0	0	0	∞
Modulation response	E2.5	3	R	$\sqrt{3}$	0	0	0	0	∞
Readout Electronics	E.2.6	0.021	N	$\sqrt{3}$	0	0	0	0	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	0	0	0	0	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0	0	∞
RF ambient conditions-Noise	E.6.1	3	R	$\sqrt{3}$	0	0	0	0	∞
RF ambient conditions-reflections	E.6.1	3	R	$\sqrt{3}$	0	0	0	0	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	0	0	0	0.00	∞
System check source (dipole)									
Deviation of experimental dipoles	E.6.4	2	N	1	1	1	2	2	∞
Input power and SAR drift measurement	8,6.6.4	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1.000	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	4	N	1.000	0.78	0.71	3.12	2.84	∞
Liquid permittivity measurement	E.3.3	5	N	1.000	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	M
Combined Standard Uncertainty			RSS				5.562	5.203	
Expanded Uncertainty (95% Confidence interval)			K=2				11.124	10.406	

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12. CONDUCTED POWER MEASUREMENT

GSM BAND

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
GSM 850	824.2	33.00	-9	24.00
	836.6	33.07	-9	24.07
	848.8	33.12	-9	24.12
GPRS 850 （1 Slot）	824.2	33.08	-9	24.08
	836.6	33.11	-9	24.11
	848.8	**33.16**	-9	24.16
GPRS 850 （2 Slot）	824.2	30.89	-6	**24.89**
	836.6	30.80	-6	24.80
	848.8	30.77	-6	24.77
GPRS 850 （3 Slot）	824.2	29.02	-4.26	24.76
	836.6	28.94	-4.26	24.68
	848.8	28.93	-4.26	24.67
GPRS 850 （4 Slot）	824.2	26.78	-3	23.78
	836.6	26.76	-3	23.76
	848.8	26.73	-3	23.73
EGPRS 850 （1 Slot）	824.2	25.67	-9	16.67
	836.6	25.86	-9	16.86
	848.8	25.82	-9	16.82
EGPRS 850 （2 Slot）	824.2	24.16	-6	18.16
	836.6	24.63	-6	18.63
	848.8	24.43	-6	18.43
EGPRS 850 （3 Slot）	824.2	21.84	-4.26	17.58
	836.6	22.43	-4.26	18.17
	848.8	21.96	-4.26	17.70
EGPRS 850 （4 Slot）	824.2	19.93	-3	16.93
	836.6	20.13	-3	17.13
	848.8	20.03	-3	17.03

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Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <2>				
GSM 850	824.2	31.12	-9	22.12
	836.6	31.01	-9	22.01
	848.8	21.16	-9	12.16
GPRS 850 （1 Slot）	824.2	31.16	-9	22.16
	836.6	31.03	-9	22.03
	848.8	**31.25**	-9	22.25
GPRS 850 （2 Slot）	824.2	30.20	-6	24.20
	836.6	30.29	-6	24.29
	848.8	30.08	-6	24.08
GPRS 850 （3 Slot）	824.2	28.27	-4.26	24.01
	836.6	28.02	-4.26	23.76
	848.8	27.99	-4.26	23.73
GPRS 850 （4 Slot）	824.2	26.22	-3	23.22
	836.6	26.21	-3	23.21
	848.8	25.86	-3	22.86

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GSM BAND CONTINUE

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
PCS1900	1850.2	29.91	-9	20.91
	1880	**29.98**	-9	20.98
	1909.8	29.90	-9	20.90
GPRS1900 （1 Slot）	1850.2	29.89	-9	20.89
	1880	29.93	-9	20.93
	1909.8	29.91	-9	20.91
GPRS1900 （2 Slot）	1850.2	27.73	-6	21.73
	1880	27.62	-6	21.62
	1909.8	27.39	-6	21.39
GPRS1900 （3 Slot）	1850.2	26.14	-4.26	**21.88**
	1880	26.05	-4.26	21.79
	1909.8	25.82	-4.26	21.56
GPRS1900 （4 Slot）	1850.2	24.05	-3	21.05
	1880	23.99	-3	20.99
	1909.8	23.76	-3	20.76
EGPRS1900 （1 Slot）	1850.2	24.68	-9	15.68
	1880	26.57	-9	17.57
	1909.8	25.76	-9	16.76
EGPRS1900 （2 Slot）	1850.2	23.10	-6	17.10
	1880	24.96	-6	18.96
	1909.8	24.73	-6	18.73
EGPRS1900 （3 Slot）	1850.2	22.35	-4.26	18.09
	1880	22.78	-4.26	18.52
	1909.8	22.65	-4.26	18.39
EGPRS1900 （4 Slot）	1850.2	18.10	-3	15.10
	1880	20.87	-3	17.87
	1909.8	19.36	-3	16.36

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Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <2>				
PCS1900	1850.2	27.10	-9	18.10
	1880	**27.33**	-9	18.33
	1909.8	27.23	-9	18.23
GPRS1900 （1 Slot）	1850.2	27.01	-9	18.01
	1880	27.16	-9	18.16
	1909.8	27.20	-9	18.20
GPRS1900 （2 Slot）	1850.2	27.35	-6	21.35
	1880	26.82	-6	20.82
	1909.8	26.86	-6	20.86
GPRS1900 （3 Slot）	1850.2	26.08	-4.26	21.82
	1880	25.63	-4.26	21.37
	1909.8	25.71	-4.26	21.45
GPRS1900 （4 Slot）	1850.2	23.70	-3	20.70
	1880	23.50	-3	20.50
	1909.8	23.61	-3	20.61

Note 1:
The Frame Power (Source-based time-averaged Power) is scaled the maximum burst average power based on time slots. The calculated methods are show as following:
Frame Power = Max burst power (1 Up Slot) – 9 dB
Frame Power = Max burst power (2 Up Slot) – 6 dB
Frame Power = Max burst power (3 Up Slot) – 4.26 dB
Frame Power = Max burst power (4 Up Slot) – 3 dB
Note 2:
SAR is not required for GPRS (1 Slot) Mode because its output power is less than of Voice Mode

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UMTS BAND
HSDPA Setup Configuration:

·The EUT was connected to Base Station Agilent-8960 referred to the Setup Configuration.

·The RF path losses were compensated into the measurements.

·A call was established between EUT and Based Station with following setting:

(1) Set Gain Factors(βc and βd) parameters set according to each

(2) Set RMC 12.2Kbps+HSDPA mode.

(3) Set Cell Power=-86dBm

(4) Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)

(5) Select HSDPA Uplink Parameters

(6) Set Delta ACK, Delta NACK and Delta CQI=8

(7) Set Ack - Nack Repetition Factor to 3

(8) Set CQI Feedback Cycle (k) to 4ms

(9) Set CQI Repetition Factor to 2

(10) Power Ctrl Mode=All Up bits

·The transmitted maximum output power was recorded.

Table C.10.2.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	βc (Note5)	βd	βd (SF)	βc/βd	βHS (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15(Note 4)	15/15(Note 4)	64	12/15(Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: ΔACK, ΔNACK and ΔCQI = 30/15 with β_{hs} = 30/15 * β_c .
Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, ΔACK and ΔNACK = 30/15 with β_{hs} = 30/15 * β_c , and ΔCQI = 24/15 with β_{hs} = 24/15 * β_c .
Note 3: CM = 1 for βc/βd =12/15,
HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
Note 4: For subtest 2 the
achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to

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HSUPA Setup Configuration:

· The EUT was connected to Base Station Agilent-8960 referred to the Setup Configuration.

· The RF path losses were compensated into the measurements.

· A call was established between EUT and Base Station with following setting * :

(1) Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK

(2) Set the Gain Factors (βc and βd) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121

(3) Set Cell Power = -86 dBm

(4) Set Channel Type = 12.2k + HSPA

(5) Set UE Target Power

(6) Power Ctrl Mode= Alternating bits

(7) Set and observe the E-TFCI

(8) Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI

· The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	βc	βd	βd (SF)	βc/βd	βHS (Note 1)	βec	βed (Note 4) (Note 5)	βed (SF)	βed (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	βed1: 47/15 βed2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, ΔACK, ΔNACK and ΔCQI = 30/15 with β_{hs} = 30/15 * β_c. For sub-test 5, ΔACK, ΔNACK and ΔCQI = 5/15 with β_{hs} = 5/15 * β_c.
Note 2: CM = 1 for βc/βd =12/15, βhs=24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the
achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to
Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 5: βed cannot be set directly; it is set by Absolute Grant Value.
Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

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UMTS BAND II

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 1900 RMC	1852.4	**19.78**
	1880	19.39
	1907.6	19.14
HSDPA Subtest 1	1852.4	18.81
	1880	18.42
	1907.6	18.15
HSDPA Subtest 2	1852.4	18.34
	1880	17.94
	1907.6	17.65
HSDPA Subtest 3	1852.4	18.35
	1880	17.97
	1907.6	17.70
HSDPA Subtest 4	1852.4	18.35
	1880	17.96
	1907.6	17.68
HSUPA Subtest 1	1852.4	16.81
	1880	16.45
	1907.6	16.19
HSUPA Subtest 2	1852.4	17.35
	1880	16.96
	1907.6	16.69
HSUPA Subtest 3	1852.4	17.84
	1880	17.47
	1907.6	17.21
HSUPA Subtest 4	1852.4	16.87
	1880	16.48
	1907.6	16.20
HSUPA Subtest 5	1852.4	18.85
	1880	18.48
	1907.6	18.17

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UMTS BAND V

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 850 RMC	826.4	**21.50**
	836.4	21.46
	846.6	21.36
HSDPA Subtest 1	826.4	20.57
	836.4	20.42
	846.6	20.43
HSDPA Subtest 2	826.4	20.03
	836.4	19.88
	846.6	19.94
HSDPA Subtest 3	826.4	20.07
	836.4	19.92
	846.6	20.02
HSDPA Subtest 4	826.4	20.04
	836.4	19.85
	846.6	19.91
HSUPA Subtest 1	826.4	18.58
	836.4	18.45
	846.6	18.46
HSUPA Subtest 2	826.4	19.09
	836.4	18.97
	846.6	19.00
HSUPA Subtest 3	826.4	19.63
	836.4	19.50
	846.6	19.51
HSUPA Subtest 4	826.4	18.66
	836.4	18.51
	846.6	18.59
HSUPA Subtest 5	826.4	20.62
	836.4	20.52
	846.6	20.52

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

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

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

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

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

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

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

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LTE Band

Conducted Power of LTE Band 2(dBm)							
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 18607**	**Channel 18900**	**Channel 19193**
1.4MHz	QPSK	1	0	0	20.89	21.24	21.66
			3	0	20.99	21.48	21.52
			5	0	20.91	21.08	21.68
		3	0	0	20.96	21.34	21.78
			2	0	20.89	20.94	21.82
			3	0	20.96	20.86	21.78
		6	0	1	19.79	19.69	20.68
	16QAM	1	0	1	19.69	20.34	20.32
			3	1	19.89	20.41	20.59
			5	1	19.73	20.02	20.68
		3	0	1	19.70	20.13	20.52
			2	1	19.69	19.76	20.63
			3	1	19.66	19.66	20.46
		6	0	2	18.78	18.74	19.68
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 18615**	**Channel 18900**	**Channel 19185**
3MHz	QPSK	1	0	0	20.88	21.27	21.70
			7	0	20.99	20.86	21.72
			14	0	21.01	20.84	21.72
		8	0	1	19.77	19.88	20.66
			4	1	19.56	19.84	20.64
			7	1	19.91	19.90	20.59
		15	0	1	19.53	19.76	20.63
	16QAM	1	0	1	20.01	20.53	20.87
			7	1	20.09	20.12	20.84
			14	1	19.98	19.94	20.82
		8	0	2	18.81	18.95	19.73
			4	2	18.73	18.81	19.70
			7	2	18.54	18.82	19.70
		15	0	2	18.46	18.75	19.64

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Conducted Power of LTE Band 2(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 18625	Channel 18900	Channel 19175
5MHz	QPSK	1	0	0	20.88	21.32	21.67
			13	0	21.16	21.25	21.61
			24	0	20.55	21.09	21.51
		12	0	1	19.45	19.79	20.29
			6	1	19.77	19.86	20.51
			13	1	20.00	19.92	20.49
		25	0	1	19.96	20.01	20.70
	16QAM	1	0	1	19.82	20.27	20.17
			13	1	19.98	20.26	20.21
			24	1	19.96	19.85	20.41
		12	0	2	18.62	18.75	19.49
			6	2	18.82	18.79	19.61
			13	2	18.97	18.81	19.70
		25	0	2	18.65	18.92	19.62
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 18650	Channel 18900	Channel 19150
10MHz	QPSK	1	0	0	21.12	21.31	21.53
			25	0	21.33	21.57	21.72
			49	0	21.24	21.42	21.44
		25	0	1	20.12	20.40	20.67
			13	1	20.13	20.40	20.63
			25	1	20.36	20.27	20.41
		50	0	1	20.23	20.09	20.45
	16QAM	1	0	1	20.26	20.45	20.61
			25	1	20.44	20.64	20.82
			49	1	20.41	20.45	20.45
		25	0	2	19.12	19.06	19.30
			13	2	18.99	19.32	19.52
			25	2	19.39	19.22	19.54
		50	0	2	19.20	19.28	19.30

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Conducted Power of LTE Band 2(dBm)							
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 18675**	**Channel 18900**	**Channel 19125**
15MHz	QPSK	1	0	0	21.04	21.26	21.45
			38	0	21.21	21.46	21.66
			74	0	21.06	21.35	21.45
		36	0	1	20.26	20.24	20.45
			18	1	20.19	20.10	20.55
			39	1	20.26	20.03	20.58
		75	0	1	20.22	20.00	20.32
	16QAM	1	0	1	20.18	20.34	20.52
			38	1	20.33	20.56	20.77
			74	1	20.30	20.30	20.27
		36	0	2	20.23	20.24	20.36
			18	2	20.21	20.04	20.35
			39	2	20.24	19.92	20.53
		75	0	2	19.20	18.97	19.25
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 18700**	**Channel 18900**	**Channel 19100**
20MHz	QPSK	1	0	0	21.78	21.83	21.71
			50	0	21.65	**21.93**	21.78
			99	0	21.45	21.71	21.63
		50	0	1	20.05	20.57	20.49
			25	1	20.04	20.54	20.84
			50	1	20.32	20.75	20.83
		100	0	1	20.18	20.55	20.70
	16QAM	1	0	1	20.21	20.42	20.41
			50	1	20.69	20.81	20.83
			99	1	20.42	20.64	20.50
		50	0	2	19.06	19.58	19.73
			25	2	19.06	19.59	19.74
			50	2	19.35	19.79	19.65
		100	0	2	19.22	19.61	19.58

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Conducted Power of LTE Band 4(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 19957	Channel 20175	Channel 20393
1.4MHz	QPSK	1	0	0	20.74	20.84	21.21
			3	0	20.91	21.00	21.21
			5	0	20.74	20.89	21.20
		3	0	0	20.80	20.96	21.30
			2	0	20.79	20.95	21.30
			3	0	20.81	20.99	20.98
		6	0	1	19.74	19.80	19.87
	16QAM	1	0	1	19.81	20.02	20.23
			3	1	20.00	20.20	20.42
			5	1	19.84	19.98	20.25
		3	0	1	19.67	19.79	20.12
			2	1	19.62	19.84	20.05
			3	1	19.64	19.83	19.76
		6	0	2	18.75	18.43	18.85
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 19965	Channel 20175	Channel 20385
3MHz	QPSK	1	0	0	20.75	20.87	21.13
			7	0	20.80	20.97	21.28
			14	0	20.82	20.96	21.23
		8	0	1	19.84	19.81	20.19
			4	1	19.84	19.82	20.19
			7	1	19.82	19.80	20.20
		15	0	1	19.76	19.81	20.11
	16QAM	1	0	1	19.91	20.06	20.36
			7	1	19.94	20.03	20.34
			14	1	19.92	20.06	20.37
		8	0	2	18.78	18.80	19.25
			4	2	18.79	18.83	19.20
			7	2	18.84	18.91	19.19
		15	0	2	18.68	18.79	19.18

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Conducted Power of LTE Band 4(dBm)							
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 19975**	**Channel 20175**	**Channel 20375**
5MHz	QPSK	1	0	0	20.65	20.82	21.07
			13	0	20.93	21.10	21.32
			24	0	20.73	20.88	21.22
		12	0	1	19.64	19.81	20.07
			6	1	19.67	19.81	20.10
			13	1	19.76	19.85	20.14
		25	0	1	19.75	19.89	20.14
	16QAM	1	0	1	19.62	19.98	20.05
			13	1	19.86	20.19	20.31
			24	1	19.69	20.07	20.16
		12	0	2	18.54	18.84	19.10
			6	2	18.58	18.88	19.10
			13	2	18.66	18.91	19.11
		25	0	2	18.62	18.84	19.20
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 20000**	**Channel 20175**	**Channel 20350**
10MHz	QPSK	1	0	0	20.67	20.81	21.08
			25	0	20.91	21.03	**21.34**
			49	0	20.80	20.94	21.24
		25	0	1	19.68	19.81	20.05
			13	1	19.62	19.84	20.05
			25	1	19.73	19.91	20.14
		50	0	1	19.71	19.81	20.06
	16QAM	1	0	1	19.82	19.94	20.28
			25	1	19.97	20.24	20.36
			49	1	19.96	20.06	20.36
		25	0	2	18.59	18.90	19.06
			13	2	18.56	18.89	19.03
			25	2	18.67	18.99	19.11
		50	0	2	18.62	18.86	19.04

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Conducted Power of LTE Band 4(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 20025	Channel 20175	Channel 20325
15MHz	QPSK	1	0	0	20.64	20.84	20.92
			38	0	20.83	20.96	21.17
			74	0	20.85	20.94	21.14
		36	0	1	19.75	19.94	20.12
			18	1	19.87	19.95	20.13
			39	1	19.99	19.94	20.12
		75	0	1	19.99	19.91	20.17
	16QAM	1	0	1	19.78	20.08	20.10
			38	1	19.98	20.20	20.33
			74	1	19.96	20.17	20.25
		36	0	2	19.75	19.97	20.15
			18	2	19.87	19.91	20.13
			39	2	19.98	19.93	20.15
		75	0	2	18.65	18.90	19.07
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 20050	Channel 20175	Channel 20300
20MHz	QPSK	1	0	0	20.63	20.78	20.95
			50	0	21.03	21.16	21.25
			99	0	20.86	20.92	21.13
		50	0	1	19.66	19.83	19.91
			25	1	19.68	19.83	19.92
			50	1	19.80	19.95	20.09
		100	0	1	19.75	19.83	19.98
	16QAM	1	0	1	19.66	19.87	19.86
			50	1	20.11	20.25	20.30
			99	1	19.87	20.01	20.16
		50	0	2	18.62	18.83	18.94
			25	2	18.62	18.84	18.93
			50	2	18.74	18.95	19.12
		100	0	2	18.70	18.79	19.03

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Conducted Power of LTE Band 5(dBm)							
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 20407**	**Channel 20525**	**Channel 20643**
1.4MHz	QPSK	1	0	0	21.99	21.95	21.88
			3	0	**22.15**	22.14	22.05
			5	0	22.02	21.92	21.95
		3	0	0	22.02	22.00	21.95
			2	0	22.03	22.02	21.91
			3	0	22.08	21.98	22.05
		6	0	1	21.02	20.95	20.97
	16QAM	1	0	1	20.88	20.92	20.87
			3	1	20.99	21.07	21.05
			5	1	20.90	20.93	20.92
		3	0	1	20.84	20.78	20.73
			2	1	20.82	20.76	20.76
			3	1	20.81	20.74	20.75
		6	0	2	19.94	19.95	19.74
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 20415**	**Channel 20525**	**Channel 20635**
3MHz	QPSK	1	0	0	21.91	21.91	21.91
			7	0	21.98	21.98	21.94
			14	0	21.98	21.94	21.91
		8	0	1	20.97	20.87	20.89
			4	1	21.01	20.85	20.86
			7	1	21.03	20.80	20.83
		15	0	1	20.93	20.83	20.81
	16QAM	1	0	1	21.11	21.01	20.74
			7	1	21.14	20.97	20.73
			14	1	21.07	20.98	20.77
		8	0	2	19.98	19.83	19.85
			4	2	20.00	19.83	19.84
			7	2	19.94	19.83	19.84
		15	0	2	19.85	19.74	19.72

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Conducted Power of LTE Band 5(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 20425	Channel 20525	Channel 20625
5MHz	QPSK	1	0	0	21.95	21.90	21.94
			13	0	22.12	22.01	22.04
			24	0	21.92	21.91	21.96
		12	0	1	20.96	20.83	20.74
			6	1	20.95	20.83	20.75
			13	1	20.86	20.77	20.71
		25	0	1	20.99	20.84	20.77
	16QAM	1	0	1	20.93	20.95	20.85
			13	1	21.07	21.08	20.93
			24	1	20.91	21.03	20.83
		12	0	2	19.87	19.82	19.68
			6	2	19.89	19.82	19.73
			13	2	19.84	19.75	19.71
		25	0	2	19.90	19.84	19.81
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 20450	Channel 20525	Channel 20600
10MHz	QPSK	1	0	0	21.91	22.17	21.96
			25	0	22.07	22.11	21.98
			49	0	21.93	21.98	21.97
		25	0	1	21.09	20.90	21.01
			13	1	21.05	20.89	20.97
			25	1	20.98	20.74	20.94
		50	0	1	20.94	20.82	20.96
	16QAM	1	0	1	21.11	21.05	20.77
			25	1	21.23	21.10	20.84
			49	1	21.02	21.14	20.79
		25	0	2	19.94	19.88	20.07
			13	2	19.97	19.88	20.07
			25	2	20.01	19.77	19.99
		50	0	2	19.96	19.83	19.94

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Conducted Power of LTE Band 7 (dBm)							
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 20775**	**Channel 21100**	**Channel 21425**
5MHz	QPSK	1	0	0	20.03	21.04	20.73
			12	0	**21.19**	20.98	20.50
			24	0	21.07	20.69	20.25
		12	0	1	20.01	19.97	19.25
			6	1	20.02	20.07	19.34
			13	1	20.07	20.09	19.56
		25	0	1	20.07	19.98	19.56
	16QAM	1	0	1	20.05	19.87	19.23
			12	1	20.09	19.72	19.30
			24	1	20.01	19.66	19.17
		12	0	2	18.97	18.85	18.46
			6	2	18.96	18.90	18.15
			13	2	19.01	18.91	18.49
		25	0	2	19.03	19.02	18.31
Bandwidth	**Modulation**	**RB size**	**RB offset**	**Target MPR**	**Channel 20800**	**Channel 21100**	**Channel 21400**
10MHz	QPSK	1	0	0	20.66	20.81	20.74
			24	0	20.67	20.49	20.27
			49	0	20.56	20.42	20.14
		25	0	1	19.60	19.51	19.26
			12	1	19.61	19.55	19.28
			25	1	19.82	19.66	19.36
		50	0	1	19.73	19.58	19.26
	16QAM	1	0	1	19.72	19.55	19.32
			24	1	19.85	19.72	19.49
			49	1	19.58	19.59	19.33
		25	0	2	18.67	18.51	18.28
			12	2	18.97	18.51	18.32
			25	2	18.99	18.60	18.28
		50	0	2	18.65	18.54	18.26

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Conducted Power of LTE Band 7 (dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 20825	Channel 21100	Channel 21375
15MHz	QPSK	1	0	0	20.56	20.87	20.62
			37	0	20.55	20.50	20.23
			74	0	20.61	20.40	20.11
		37	0	1	19.82	19.88	19.36
			16	1	19.79	19.75	19.48
			35	1	19.59	19.65	19.36
		75	0	1	19.71	19.64	19.40
	16QAM	1	0	1	19.63	19.63	19.32
			37	1	19.73	19.75	19.39
			74	1	19.42	19.55	19.23
		37	0	2	19.61	19.63	19.36
			16	2	19.56	19.74	19.34
			35	2	19.64	19.62	19.36
		75	0	2	18.55	18.58	18.18
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel 20850	Channel 21100	Channel 21350
20MHz	QPSK	1	0	0	20.55	20.91	20.80
			49	0	20.87	20.72	20.51
			99	0	20.33	20.39	20.17
		50	0	1	19.53	19.45	19.22
			25	1	19.44	19.38	19.40
			49	1	19.63	19.51	19.26
		100	0	1	19.70	19.48	19.23
	16QAM	1	0	1	19.40	19.38	19.36
			49	1	19.61	19.72	19.46
			99	1	19.32	19.45	19.17
		50	0	2	18.29	18.48	18.20
			25	2	18.46	18.41	18.15
			49	2	18.48	18.43	18.21
		100	0	2	18.39	18.59	18.52

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The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.
UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1 of the 3GPP TS36.101.

Table 6.2.3.3-1 Maximum Power Reduction (MPR) for Power class3

Modulation	Maximum Power Reduction (MPR) for Power[RB]						MPR(dB)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	＞5	＞4	＞8	＞12	＞16	＞18	≤1
16QAM	≤5	≤4	≤8	≤12	≤16	≤18	≤1
16QAM	＞5	＞4	＞8	＞12	＞16	＞18	≤2

The allowed A-MPR values specified below in Table 6.2.4.3-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of “NS_01”.3

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Table 6.2.4.3-1: Additional Maximum Power Reduction (A-MPR) / Spectrum Emission requirements

Network Signaling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.2-1	1.4,3,5,10,15,20	Table 5.4.2-1	N/A
NS_03	6.6.2.2.3.1	2,4,10, 23, 25,35,36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.3.2	41	5	>6	≤1
			10, 15, 20	Table 6.2.4.3-4	
NS_05	6.6.3.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.4.2-1	N/A
NS_07	6.6.2.2.3.3 6.6.3.3.3.2	13	10	Table 6.2.4.3-2	Table 6.2.4.3-2
NS_08	6.6.3.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4.3-3	Table 6.2.4.3-3
NS_11	6.6.2.2.1 6.6.3.3.13	231	1.4, 3, 5, 10,15,20	Table 6.2.4.3-5	Table 6.2.4.3-5
NS_12	6.6.3.3.5	26	1.4, 3, 5	Table 6.2.4.3-6	Table 6.2.4.3-6
NS_13	6.6.3.3.6	26	5	Table 6.2.4.3-7	Table 6.2.4.3-7
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4.3-8	Table 6.2.4.3-8
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4.3-9 Table 6.2.4.3-10	Table 6.2.4.3-9, Table 6.2.4.3-10
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4.3-11, Table 6.2.4.3-12, Table 6.2.4.3-13	
NS_17	6.6.3.3.10 6.6.3.3.11	28 28	5, 10	Table 5.4.2-1	N/A
			5	≥ 2	≤ 1
NS_18			10, 15, 20	≥ 1	≤ 4
NS_19			10, 15, 20	Table 6.2.4.3-15	Table 6.2.4.3-15
NS_20			5, 10, 15, 20	Table 6.2.4.3-14	Table 6.2.4.3-14
…					
NS_20	-	-	-	-	-

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WIFI

Mode	Data Rate (Mbps)	Channel	Frequency(MHz)	Avg. Burst Power(dBm)
802.11b	1	01	2412	14.75
		06	2437	14.59
		11	2462	13.75
802.11g	6	01	2412	12.38
		06	2437	**18.38**
		11	2462	11.75
802.11n(20)	6.5	01	2412	12.24
		06	2437	12.39
		11	2462	11.51
802.11n(40)	13.5	03	2422	12.57
		06	2437	10.61
		09	2452	10.08

Bluetooth_V5.0(BR/EDR)

Modulation	Channel	Frequency(MHz)	Peak Power (dBm)
GFSK	0	2402	1.920
	39	2441	**1.974**
	78	2480	1.423
π /4-DQPSK	0	2402	1.692
	39	2441	1.796
	78	2480	1.180
8-DPSK	0	2402	1.854
	39	2441	1.973
	78	2480	1.326

Bluetooth_V5.0(BLE)

Modulation	Channel	Frequency(MHz)	Peak Power (dBm)
GFSK	0	2402	**3.227**
	19	2440	2.847
	39	2480	2.136

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13. TEST RESULTS

13.1. SAR Test Results Summary

13.1.1. Test position and configuration

Body-worn and 4 Edges SAR was performed with the device 0mm from the phantom.

13.1.2. Operation Mode

1. Per KDB 447498 D01 v06 ,for each exposure position, if the highest 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional.
2. Per KDB 865664 D01 v01r04,for each frequency band, if the measured SAR is ≥0.8W/kg, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
   (1) When the original highest measured SAR is ≥0.8W/kg, repeat that measurement once.
   (2) 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 ≥1.45 W/kg.
   (3) Perform a third repeated measurement only if the original, first and second repeated measurement is ≥1.5 W/kg and ratio of largest to smallest SAR for the original, first and second measurement is ≥ 1.20.
3. Body-worn exposure conditions are intended to voice call operations, therefore GSM voice call mode is selected to be test.
4. Per KDB 248227 D01v02r02,for 2.4GHz 802.11g/n SAR testing is not required 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 ≤1.2W/kg.
5. Per KDB 941225 D06 V02r01, When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations.
6. Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows:
   Maximum Scaling SAR =tested SAR (Max.) ×[maximum turn-up power (mw)/ maximum measurement output power(mw)]
7. Proximity sensor, just for avoiding the wrong operation in the phone screen when call, and has no influence on output power or SAR result
8. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1RB allocation using the RB offset and required test channel combination with highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
9. Per KDB 941125 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
10. Per KDB 941125 D05v02r05. For QPSK with 100% RB allocation. SAR is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1RB allocation and the highest reported SAR is >1.45 W/kg, the remaining required test channels must also be tested.

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11. Per KDB 941125 D05v02r05. 16QAM output power for each RB allocation configuration is not 1/2 dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤1.45W/kg, Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
12. Per KDB 941125 D05v02r05. Smaller bandwidth output power for each RB allocation configuration is >not 1/2 dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤1.45W/kg. Per KDB 941125 D05v02r05, smaller bandwidth SAR testing is not required.

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13.1.3. Test Result

SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%):48.7					
Product: Rugged tablet									
Test Mode: GSM850 with GMSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**
SIM 1 Card									
Body back	voice	190	836.6	-0.30	0.076	33.50	33.07	0.084	1.6
Body front	voice	190	836.6	0.10	**0.094**	33.50	33.07	**0.104**	1.6
Body back	GPRS-2 slot	190	836.6	-0.45	0.292	31.00	30.80	0.306	1.6
Body front	GPRS-2 slot	190	836.6	0.43	**0.363**	31.00	30.80	**0.380**	1.6
Edge 2(Right)	GPRS-2 slot	190	836.6	-0.22	0.154	31.00	30.80	0.161	1.6
Edge 3(Bottom)	GPRS-2 slot	190	836.6	0.39	0.177	31.00	30.80	0.185	1.6

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%):52.1					
Product: Rugged tablet									
Test Mode: PCS1900 with GMSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**
SIM 1 Card									
Body back	voice	661	1880.0	-0.12	**0.200**	30.00	29.98	**0.201**	1.6
Body front	voice	661	1880.0	0.39	0.116	30.00	29.98	0.117	1.6
Body back	GPRS-3 slot	661	1880	0.06	**0.628**	26.50	26.05	**0.697**	1.6
Body front	GPRS-3 slot	661	1880.0	-0.40	0.414	26.50	26.05	0.459	1.6
Edge 2(Right)	GPRS-3 slot	661	1880.0	-0.10	0.327	26.50	26.05	0.363	1.6
Edge 3(Bottom)	GPRS-3 slot	661	1880.0	0.25	0.089	26.50	26.05	0.099	1.6

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%):52.1					
Product: Rugged tablet									
Test Mode: WCDMA Band II with QPSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**
Body back	RMC 12.2kbps	9262	1852.4	-0.01	1.096	19.80	19.78	1.101	1.6
Body back	RMC 12.2kbps	9400	1880	-0.09	1.164	19.80	19.39	1.279	1.6
Body back	RMC 12.2kbps	9538	1907.6	0.38	**1.185**	19.80	19.14	**1.379**	1.6
Body front	RMC 12.2kbps	9400	1880	-0.32	0.717	19.80	19.39	0.788	1.6
Edge 2(Right)	RMC 12.2kbps	9400	1880	-0.03	0.356	19.80	19.39	0.391	1.6
Edge 3(Bottom)	RMC 12.2kbps	9400	1880	0.27	0.045	19.80	19.39	0.049	1.6

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%):48.7					
Product: Rugged tablet									
Test Mode: WCDMA Band V with QPSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**
Body back	RMC 12.2kbps	4183	836.4	-0.12	0.586	22.00	21.46	0.664	1.6
Body front	RMC 12.2kbps	4183	836.4	-0.10	**0.678**	22.00	21.46	**0.768**	1.6
Edge 2(Right)	RMC 12.2kbps	4183	836.4	-0.40	0.371	22.00	21.46	0.420	1.6
Edge 3(Bottom)	RMC 12.2kbps	4183	836.4	0.33	0.337	22.00	21.46	0.382	1.6

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT													
Depth of Liquid (cm):>15						Relative Humidity (%):52.1							
Product: Rugged tablet													
Test Mode: LTE Band 2													
BM MHz	**MOD**	**Position**	**Test Mode**		**Ch.**	**Freq. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**	
			UL RB Allocation	**UL RB START**									
20	**QPSK**	Body back	1	0	18700	1860	-0.30	1.210	21.95	21.78	1.258	1.6	
		Body back	1	0	18900	1880	-0.21	1.289	21.95	21.83	1.325	1.6	
		Body back	1	0	19100	1900	0.21	**1.316**	21.95	21.71	**1.391**	1.6	
		Body front	1	0	18900	1880	-0.36	0.669	21.95	21.43	0.754	1.6	
		Edge 2(Right)	1	0	18900	1880	-0.20	0.404	21.95	21.43	0.455	1.6	
		Edge 3(Bottom)	1	0	18900	1880	0.40	0.062	21.95	21.43	0.070	1.6	

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT													
Depth of Liquid (cm):>15						Relative Humidity (%):54.3							
Product: Rugged tablet													
Test Mode: LTE Band 4													
BM MHz	**MOD**	**Position**	**Test Mode**		**Ch.**	**Freq. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tuneup Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**	
			UL RB Allocation	**UL RB START**									
20	**QPSK**	Body back	1	0	20175	1732.5	-0.17	0.244	21.40	20.78	0.281	1.6	
		Body front	1	0	20175	1732.5	-0.44	**0.409**	21.40	20.78	**0.472**	1.6	
		Edge 2(Right)	1	0	20175	1732.5	-0.45	0.229	21.40	20.78	0.264	1.6	
		Edge 3(Bottom)	1	0	20175	1732.5	0.37	0.031	21.40	20.78	0.036	1.6	

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT													
Depth of Liquid (cm):>15					Relative Humidity (%):48.7								
Product: Rugged tablet													
Test Mode: LTE Band 5													
BM MHz	**MOD**	**Position**	**Test Mode**		**Ch.**	**Freq. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tuneup Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**	
			UL RB Allocation	**UL RB START**									
10	**QPSK**	Body back	1	0	20525	836.5	-0.14	0.670	22.20	22.17	0.675	1.6	
		Body front	1	0	20525	836.5	-0.36	**0.768**	22.20	22.17	**0.773**	1.6	
		Edge 2(Right)	1	0	20525	836.5	-0.13	0.422	22.20	22.17	0.425	1.6	
		Edge 3(Bottom)	1	0	20525	836.5	0.29	0.380	22.20	22.17	0.383	1.6	

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT													
Depth of Liquid (cm):>15						Relative Humidity (%):48.7							
Product: Rugged tablet													
Test Mode: LTE Band 7													
BM MHz	**MOD**	**Position**	**Test Mode**		**Ch.**	**Freq. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tuneup Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**
			UL RB Allocation	**UL RB START**								
20	**QPSK**	Body back	1	0	21100	2535	-0.02	**0.501**	21.20	20.91	**0.536**	1.6
		Body front	1	0	21100	2535	0.21	0.216	21.20	20.91	0.231	1.6
		Edge 2(Right)	1	0	21100	2535	-0.02	0.193	21.20	20.91	0.206	1.6
		Edge 3(Bottom)	1	0	21100	2535	0.05	0.018	21.20	20.91	0.019	1.6

Note:
· When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%):54.1					
Product: Rugged tablet									
Test Mode:802.11b									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/kg)**	**Limit (W/kg)**
Body back	DTS	6	2437	-0.08	0.193	14.80	14.59	0.203	1.6
Body front	DTS	6	2437	-0.15	**0.287**	14.80	14.59	**0.301**	1.6
Edge 2(Right)	DTS	6	2437	-0.00	0.151	14.80	14.59	0.158	1.6

Note:
· According to KDB248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels.
· All of above “DTS” means data transmitters.
·The test separation for body back, body front and 4 Edges is 0mm of all above table.

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Repeated SAR											
Product: Rugged tablet											
Test Mode: WCDMA Band II & LTE Band 2											
Position	**Mode**		**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**Once SAR (1g) (W/kg)**	**Power Drift (<±5%)**	**Twice SAR (1g) (W/kg)**	**Power Drift (<±5%)**	**Third SAR (1g) (W/kg)**	**Limit W/kg**
Body back	RMC 12.2kbps		9538	1907.6	0.12	1.174	--	--	--	--	1.6
Position	**Mode**		**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**Once SAR (1g) (W/kg)**	**Power Drift (<±5%)**	**Twice SAR (1g) (W/kg)**	**Power Drift (<±5%)**	**Third SAR (1g) (W/kg)**	**Limit W/kg**
	UL RB Allocation	**UL RB START**									
Body back	1	0	19100	1900	0.16	1.312	--	--	--	--	1.6

The second repeated SAR judge reference									
Product: Rugged tablet									
Band	**Position**	**Mode**		**Ch.**	**Fr. (MHz)**	**Original SAR (1g) (W/kg)**	**First SAR (1g) (W/kg)**	**Ratio**	**Limit**
WCDMA Band II	Body back	RMC 12.2kbps		9538	1907.6	1.185	1.174	1.009	＜1.2
Band	**Position**	**Mode**		**Ch.**	**Fr. (MHz)**	**Original SAR (1g) (W/kg)**	**First SAR (1g) (W/kg)**	**Ratio**	**Limit**
		UL RB Allocation	**UL RB START**						
LTE Band 2	Body back	1	0	19100	1900	1.316	1.312	1.003	＜1.2

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Simultaneous Multi-band Transmission Evaluation:

Application Simultaneous Transmission information:

NO	Simultaneous state	Portable Handset	
		Body-worn	Hotspot
1	GSM(voice)+ WLAN 2.4GHz (data)	Yes	-
2	GSM(voice)+ Bluetooth(data)	Yes	-
3	GSM (Data) + WLAN 2.4GHz (data)	Yes	Yes
4	GSM (Data) + Bluetooth(data)	Yes	Yes
5	WCDMA+ WLAN 2.4GHz (data)	Yes	Yes
6	WCDMA+ Bluetooth(data)	Yes	Yes
7	LTE + WLAN 2.4GHz (data)	Yes	Yes
8	LTE + Bluetooth(data)	Yes	Yes

NOTE:

1. WIFI and BT share the same antenna, and cannot transmit simultaneously.
2. Simultaneous with every transmitter must be the same test position.
3. KDB 447498 D01, BT SAR is excluded as below table.
4. KDB 447498 D01, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user; which is 0mm for body-worn SAR.
5. According to KDB 447498 D01 4.3.1, Standalone SAR test exclusion is as follow:
   For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:
   [(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[30], where
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation[31]
   - The result is rounded to one decimal place for comparison
   - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

   The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.
6. If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.
7. According to KDB 447498 D01 4.3.2, simultaneous transmission SAR test exclusion is as follow:
   (1) Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.
   (2) Any transmitters and antennas should be considered when calculating simultaneous mode.
   (3) For mobile phone and PC, it's the sum of all transmitters and antennas at the same mode with same position in each applicable exposure condition
   (4)When the standalone SAR test exclusion of section 4.3.2 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to det
   (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;
   where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

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8. When the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion. The ratio is determined by (SAR1 + SAR2)1.5/Ri, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

Estimated SAR		Max Power including Tune-up Tolerance		Separation Distance (mm)	Estimated SAR (W/kg)
		dBm	mW		
BT	Body	4	2.512	0	0.104

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Sum of the SAR for GSM 850 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		GSM 850	WI-Fi DTS Band	Bluetooth		
Body-worn (voice)	Rear	0.084	0.203		0.287	No
		0.084		0.104	0.188	No
	Front	0.104	0.301		0.405	No
		0.104		0.104	0.208	No
Body-worn (Data)	Rear	0.306		0.104	0.410	No
		0.306	0.203		0.509	No
	Front	0.380		0.104	0.484	No
		0.380	0.301		0.681	No
Body-worn (Hotspot)	Edge 2	0.161	0.158		0.319	No
	Edge 2	0.161		0.104	0.265	No

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.

·SPLSR mean is “The SAR to Peak Location Separation Ratio “

Sum of the SAR for GSM 1900 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		PCS 1900	WI-Fi DTS Band	Bluetooth		
Body-worn (voice)	Rear	0.201	0.203		0.404	No
		0.201		0.104	0.305	No
	Front	0.117	0.301		0.418	No
		0.117		0.104	0.221	No
Body-worn (Data)	Rear	0.697		0.104	0.801	No
		0.697	0.203		0.900	No
	Front	0.459		0.104	0.563	No
		0.459	0.301		0.760	No
Body-worn (Hotspot)	Edge 2	0.363	0.158		0.521	No
	Edge 2	0.363		0.104	0.467	No

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

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Sum of the SAR for WCDMA Band II &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		WCDMA Band II	Wi-Fi DTS Band	Bluetooth		
Body-worn	Rear	1.379	0.203		1.582	No
	Front	0.788	0.301		1.089	No
	Edge 2	0.391	0.158		0.549	No
	Rear	1.379		0.104	1.483	No
	Front	0.788		0.104	0.892	No
	Edge 2	0.391		0.104	0.495	No

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

Sum of the SAR for WCDMA Band V &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		WCDMA Band V	Wi-Fi DTS Band	Bluetooth		
Body-worn	Rear	0.664	0.203		0.867	No
	Front	0.768	0.301		1.069	No
	Edge 2	0.420	0.158		0.578	No
	Rear	0.664		0.104	0.768	No
	Front	0.768		0.104	0.872	No
	Edge 2	0.420		0.104	0.524	No

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

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Sum of the SAR for LTE Band 2 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		LTE Band 2	Wi-Fi DTS Band	Bluetooth		
Body-worn	Rear	1.391	0.203		**1.594**	**No**
	Front	0.754	0.301		1.055	**No**
	Edge 2	0.455	0.158		0.613	**No**
	Rear	1.391		0.104	1.495	**No**
	Front	0.754		0.104	0.858	**No**
	Edge 2	0.455		0.104	0.559	**No**

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

Sum of the SAR for LTE Band 4 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		LTE Band 4	Wi-Fi DTS Band	Bluetooth		
Body-worn	Rear	0.281	0.203		0.484	**No**
	Front	0.472	**0.301**		0.773	**No**
	Edge 2	0.264	0.158		0.422	**No**
	Rear	0.281		0.104	0.385	**No**
	Front	0.472		0.104	0.576	**No**
	Edge 2	0.264		0.104	0.368	**No**

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

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Sum of the SAR for LTE Band 5 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		LTE Band 5	Wi-Fi DTS Band	Bluetooth		
Body-worn	Rear	0.675	0.203		0.878	No
	Front	0.773	0.301		1.074	No
	Edge 2	0.425	0.158		0.583	No
	Rear	0.675		0.104	0.779	No
	Front	0.773		0.104	0.877	No
	Edge 2	0.425		0.104	0.529	No

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

Sum of the SAR for LTE Band 7 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/kg)	SPLSR (Yes/No)
		LTE Band 7	Wi-Fi DTS Band	Bluetooth		
Body-worn	Rear	0.536	0.203		0.739	No
	Front	0.231	0.301		0.532	No
	Edge 2	0.206	0.158		0.364	No
	Rear	0.536		0.104	0.640	No
	Front	0.231		0.104	0.335	No
	Edge 2	0.206		0.104	0.310	No

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/kg, SPLSR assessment is not required.
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

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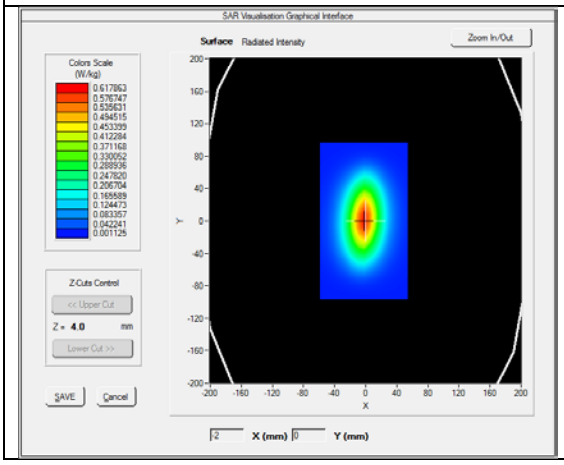
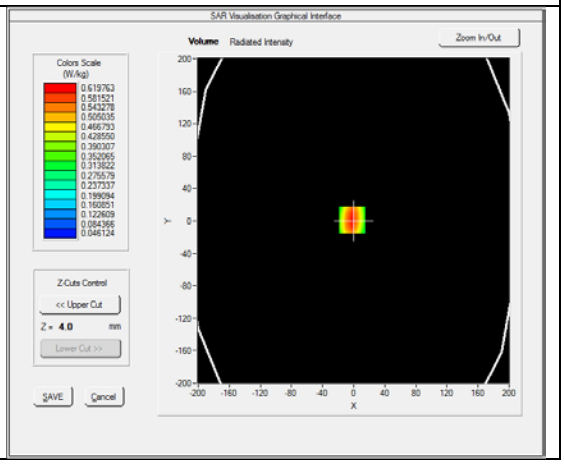
APPENDIX A. SAR SYSTEM CHECK DATA

Test Laboratory: AGC Lab **Date: Dec. 28, 2023**
System Check Head 835 MHz
DUT: Dipole 835 MHz Type: SID 835
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1; Conv.F=2.02
Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.88 mho/m; εr =41.83; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):20.8, Liquid temperature (℃): 20.3

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/System Check 835MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 835MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-2.00, Y=1.00
SAR Peak: 0.87 W/kg

SAR 10g (W/Kg)	0.374405
SAR 1g (W/Kg)	0.595124

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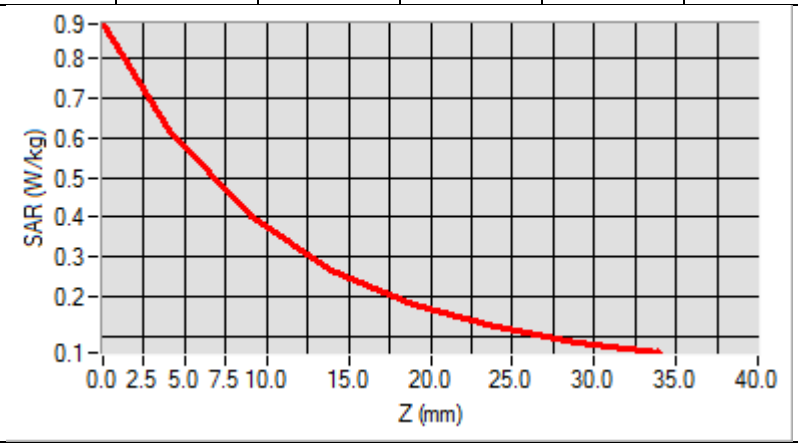
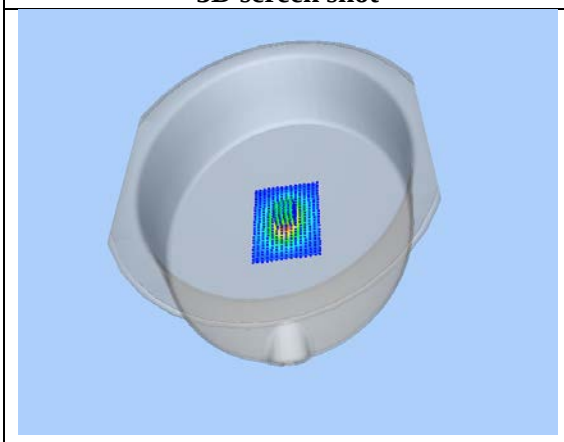
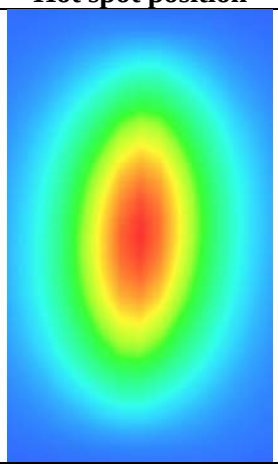
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.8816	0.6184	0.4001	0.2672	0.1810	0.1256	0.0878



3D screen shot	Hot spot position
	

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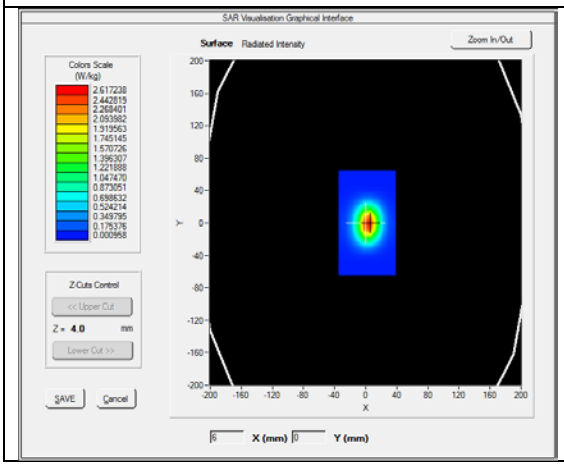
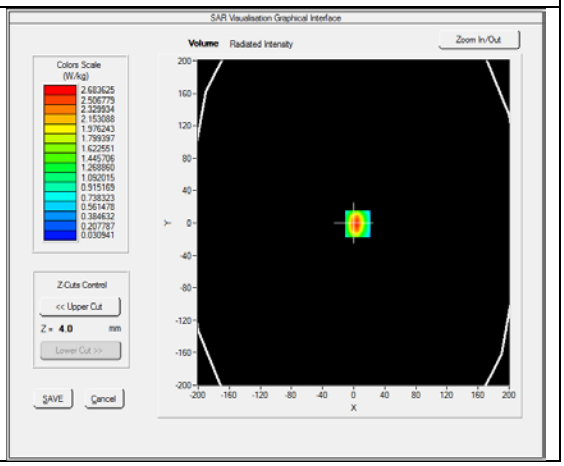
Test Laboratory: AGC Lab **Date: Jan. 26, 2024**
System Check Head 1750MHz
DUT: Dipole 1800 MHz; Type: SID 1800
Communication System: CW; Communication System Band: D1700 (1750.0 MHz); Duty Cycle:1:1; Conv.F=2.17
Frequency: 1750 MHz; Medium parameters used: f = 1750MHz; σ=1.38 mho/m; εr =39.72; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃): 21.6, Liquid temperature (℃): 21.3

SATIMO Configuration:
Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/System Check 1750MHz Head/Area Scan: Measurement grid: dx=8mm,dy=8mm
Configuration/System Check 1750MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=-1.00
SAR Peak: 4.37 W/kg

SAR 10g (W/Kg)	1.271527
SAR 1g (W/Kg)	2.552358

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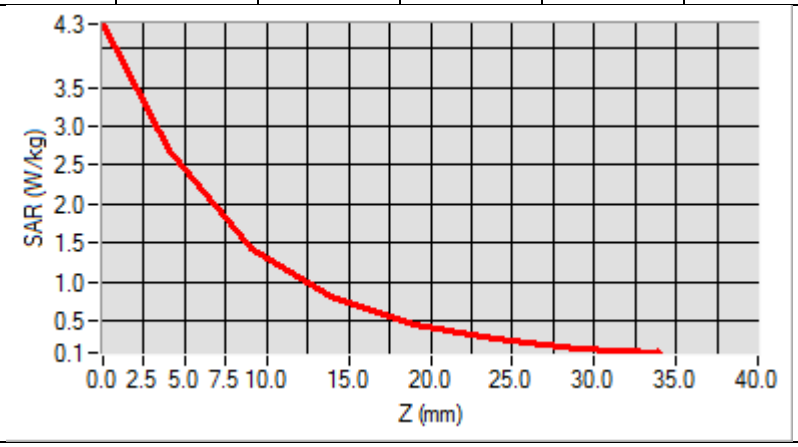
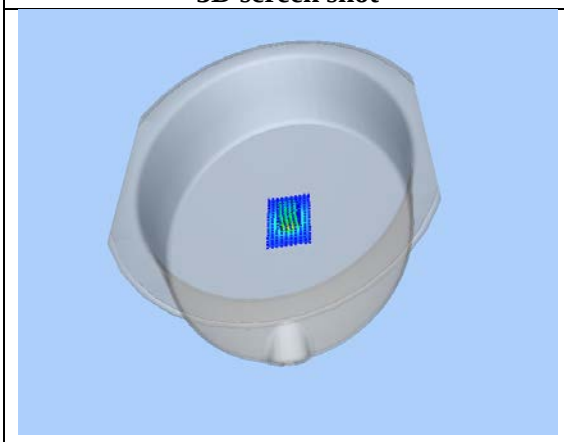
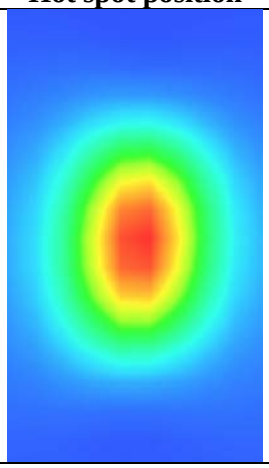
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	4.3217	2.6817	1.4336	0.8067	0.4518	0.2559	0.1447



3D screen shot	Hot spot position
	

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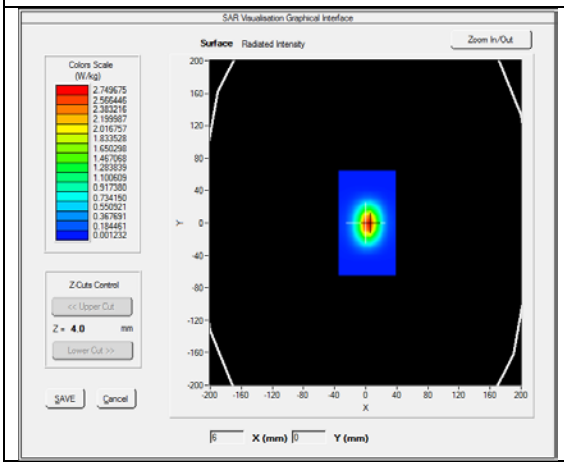
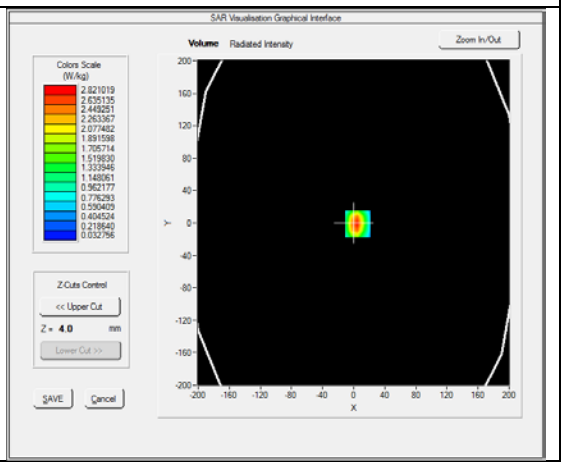
Test Laboratory: AGC Lab **Date: Jan. 25, 2024**
System Check Head 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=2.15
Frequency: 1900 MHz; Medium parameters used: f = 1900 MHz; σ=1.41 mho/m; εr =40.74; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):21.2, Liquid temperature (℃): 20.9

SATIMO Configuration:
Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/System Check 1900MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 1900MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=-1.00
SAR Peak: 4.60 W/kg

SAR 10g (W/Kg)	1.337246
SAR 1g (W/Kg)	2.608354

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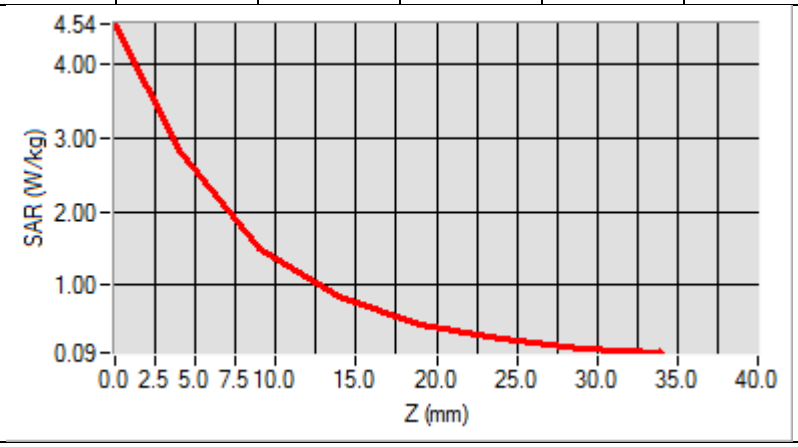
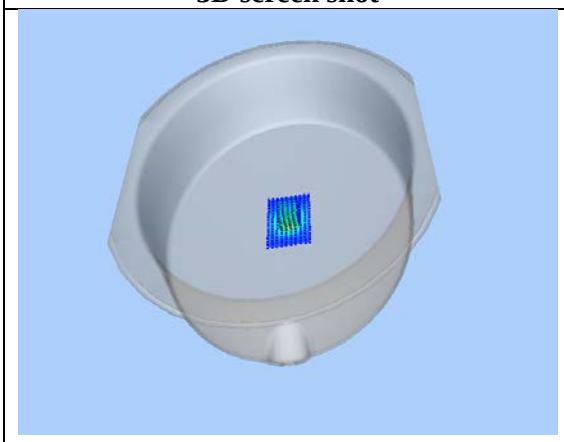
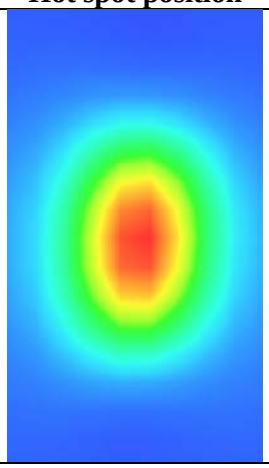
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	4.5419	2.8238	1.5093	0.8464	0.4731	0.2690	0.1530



3D screen shot	Hot spot position
	

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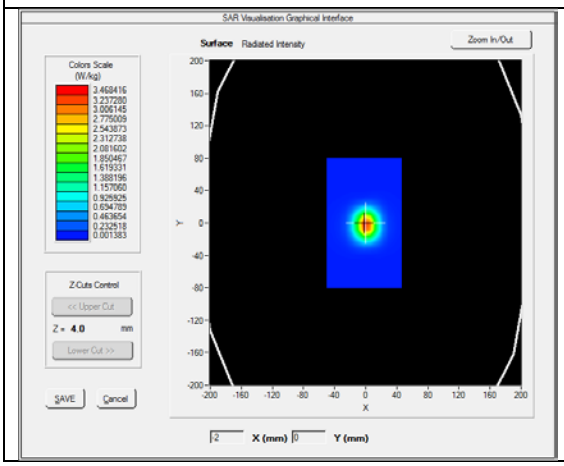
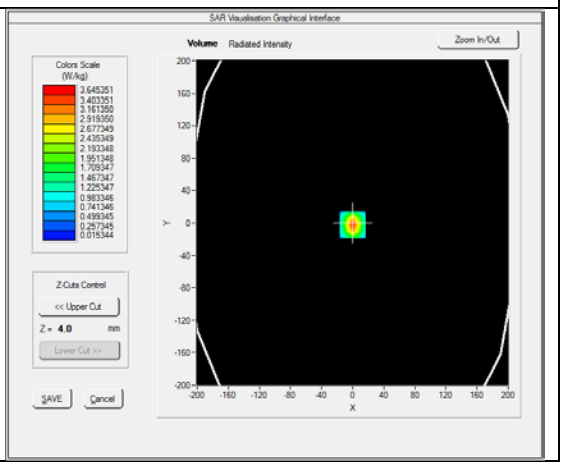
Test Laboratory: AGC Lab **Date: Dec. 31, 2023**
System Check Head 2450 MHz
DUT: Dipole 2450 MHz Type: SID 2450
Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1; Conv.F=2.29
Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ=1.78 mho/m; εr =38.89; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):21.4, Liquid temperature (℃): 21.2

SATIMO Configuration

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/System Check 2450MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 2450MHz Head/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-2.00
SAR Peak: 6.33 W/kg

SAR 10g (W/Kg)	1.507813
SAR 1g (W/Kg)	3.398548

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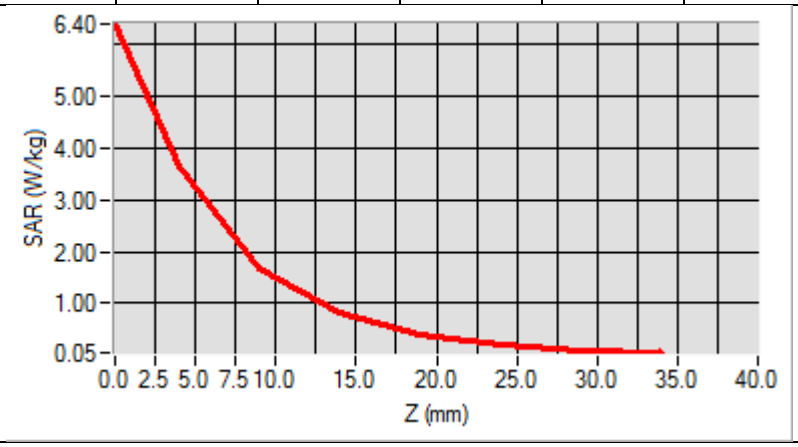
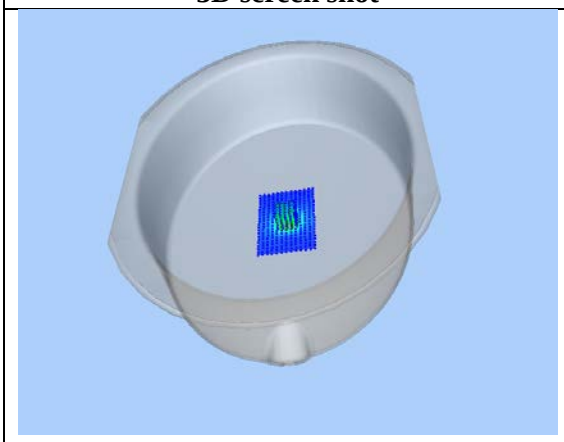
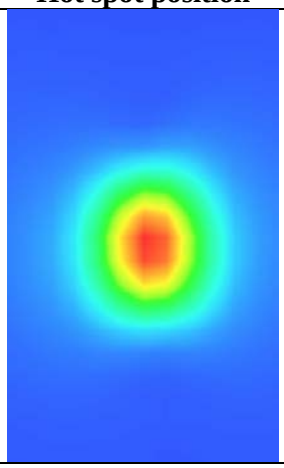
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.4019	3.6454	1.6764	0.8025	0.3883	0.1891	0.0931



3D screen shot	Hot spot position
	

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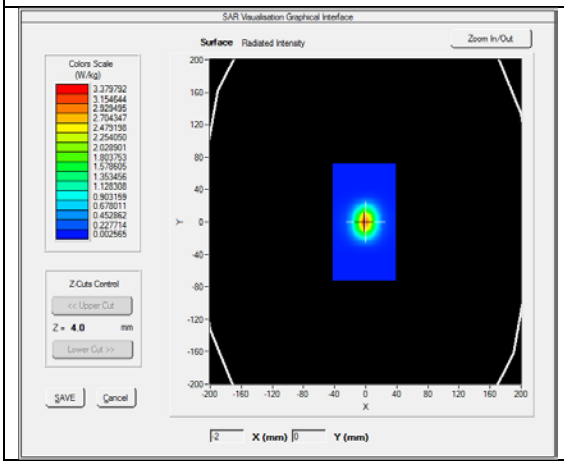
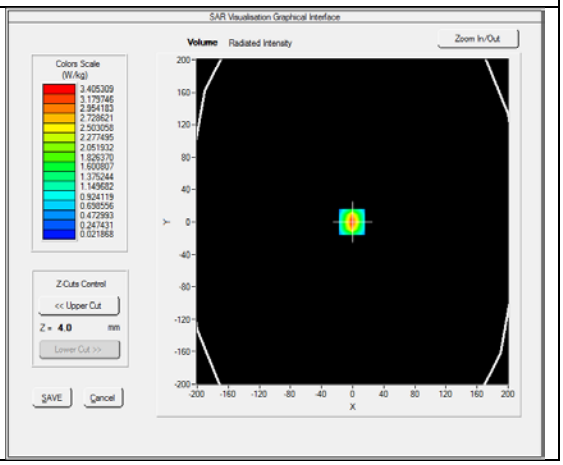
Test Laboratory: AGC Lab **Date: Jan. 06, 2024**
System Check Head 2600MHz
DUT: Dipole 2600 MHz; Type: SID 2600
Communication System: CW; Communication System Band: D2600 (2600.0 MHz); Duty Cycle: 1:1; Conv.F=2.13
Frequency:2600 MHz; Medium parameters used: f = 2600 MHz; σ=1.89 mho/m; εr =38.74; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃): 20.3, Liquid temperature (℃): 20.1

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/System Check 2600 Head/Area Scan: Measurement grid: dx=8mm,dy=8mm
Configuration/System Check 2600 Head/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=0.00
SAR Peak: 5.58 W/kg

SAR 10g (W/Kg)	1.435840
SAR 1g (W/Kg)	3.258063

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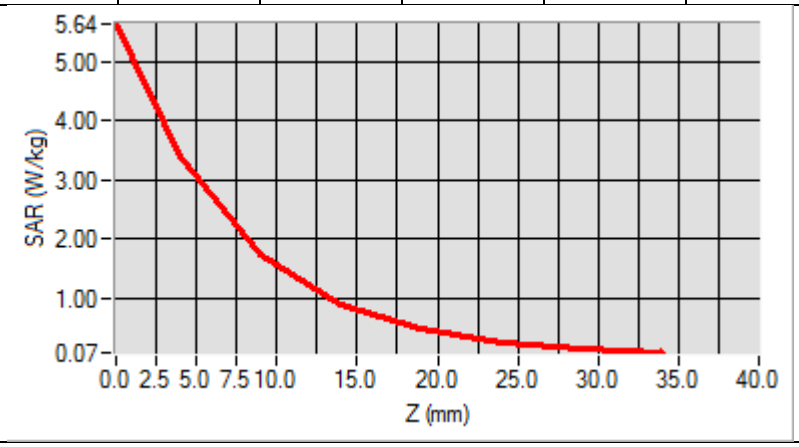
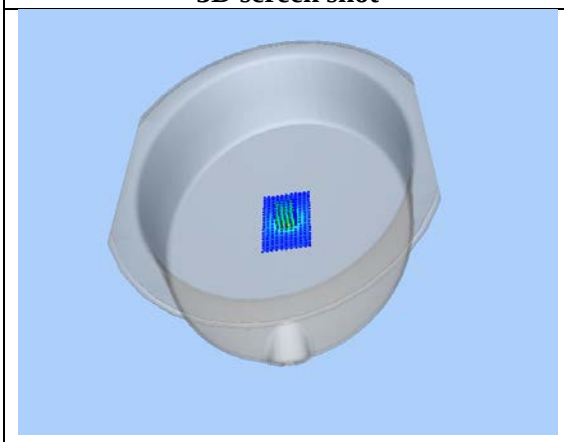
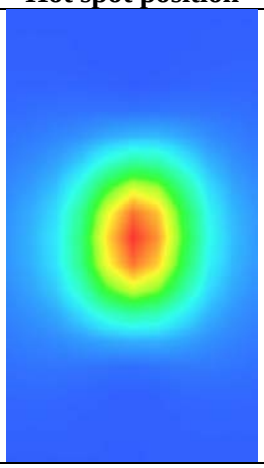
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	5.6327	3.4074	1.7359	0.8997	0.4713	0.2494	0.1352



3D screen shot	Hot spot position
	

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APPENDIX B. SAR MEASUREMENT DATA

Test Laboratory: AGC Lab **Date: Dec. 28, 2023**
GSM 850 Mid- Body- Front (MS) <SIM 1>
DUT: Rugged tablet; Type: X7

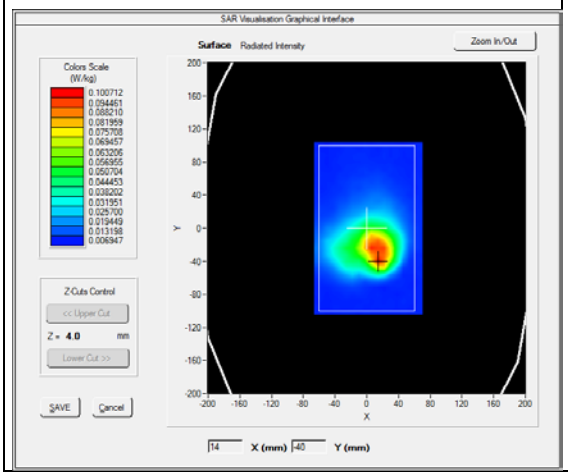
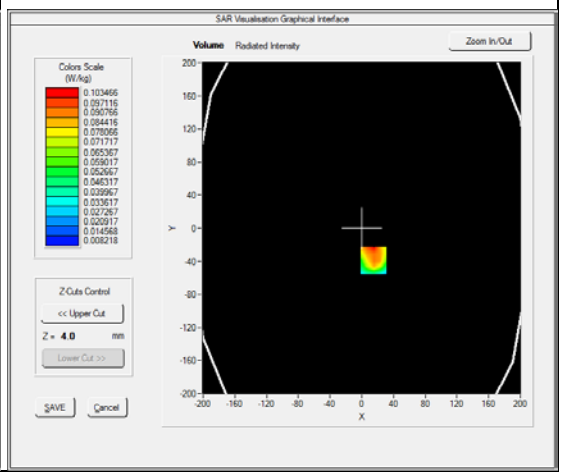
Communication System: Generic GSM; Communication System Band: GSM 850; Duty Cycle: 1:8.3; Conv.F=2.02; Frequency: 836.6 MHz; Medium parameters used: f = 835 MHz; σ= 0.90 mho/m; εr = 40.93; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.8, Liquid temperature (℃): 20.3

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GSM 850 Mid-Body- Front /Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GSM 850 Mid-Body- Front Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	ELLI
Device Position	Body Front
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=15.00, Y=-39.00
SAR Peak: 0.15 W/kg

SAR 10g (W/Kg)	0.059447
SAR 1g (W/Kg)	0.093544

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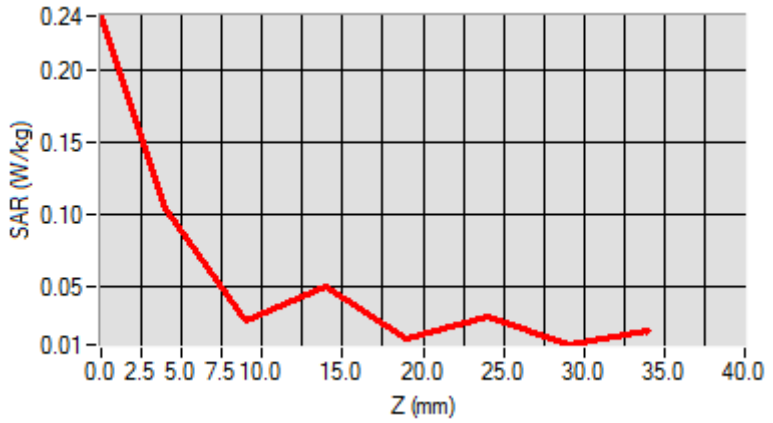
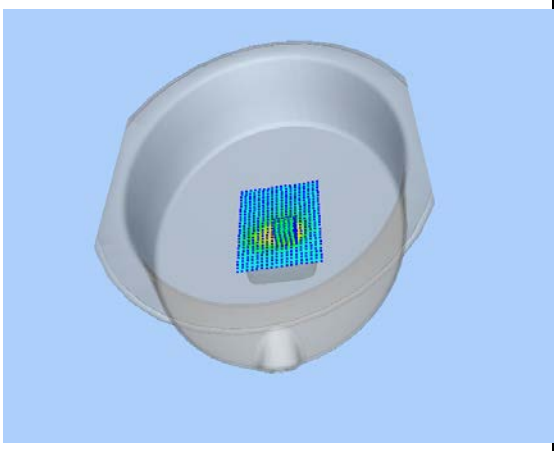
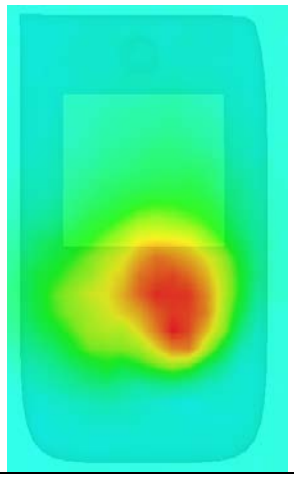
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.2384	0.1035	0.0261	0.0500	0.0127	0.0287	0.0087



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Dec. 28, 2023**
GPRS 850 Mid- Body- Front (2up)
DUT: Rugged tablet; Type: X7

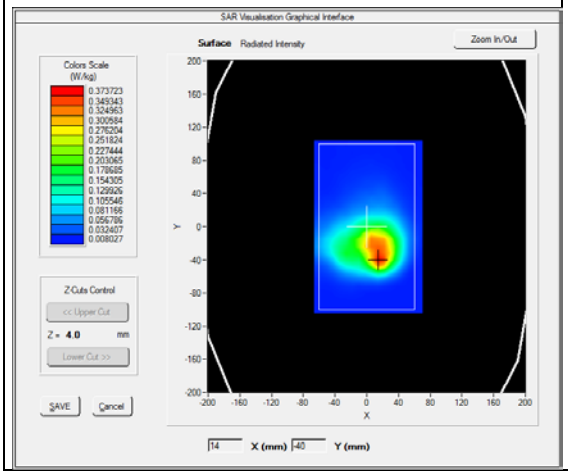
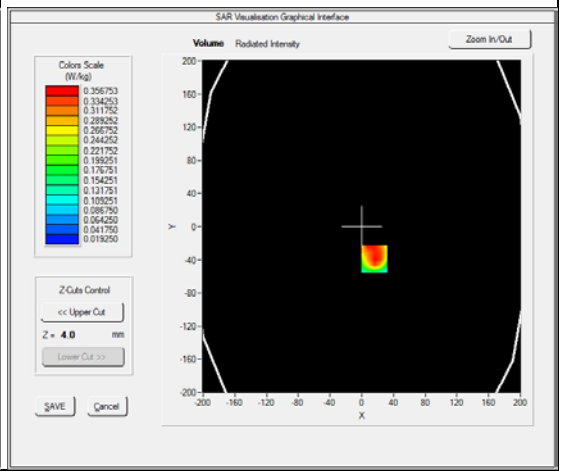
Communication System: GPRS-2 Slot; Communication System Band: GSM 850; Duty Cycle: 1:4.2; Conv.F=2.02; Frequency: 836.6 MHz; Medium parameters used: f = 835 MHz; σ= 0.90 mho/m; εr = 40.93; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.8, Liquid temperature (℃): 20.3

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS 850 Mid-Body-Front/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS 850 Mid-Body-Front/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	ELLI
Device Position	Body Front
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=16.00, Y=-39.00
SAR Peak: 0.60 W/kg

SAR 10g (W/Kg)	0.217355
SAR 1g (W/Kg)	0.363390

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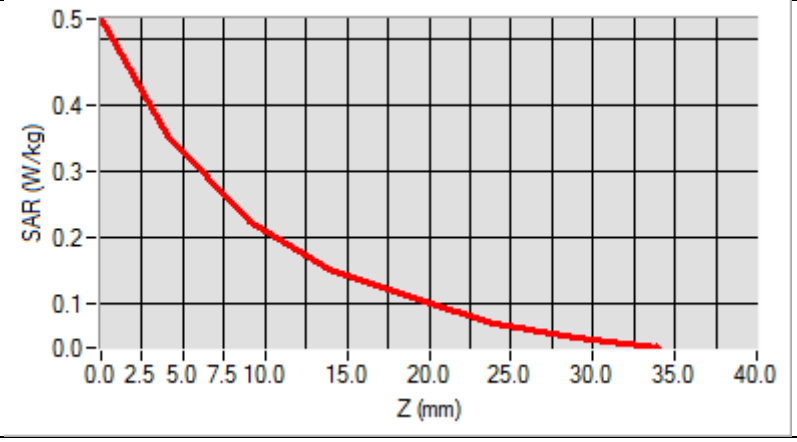
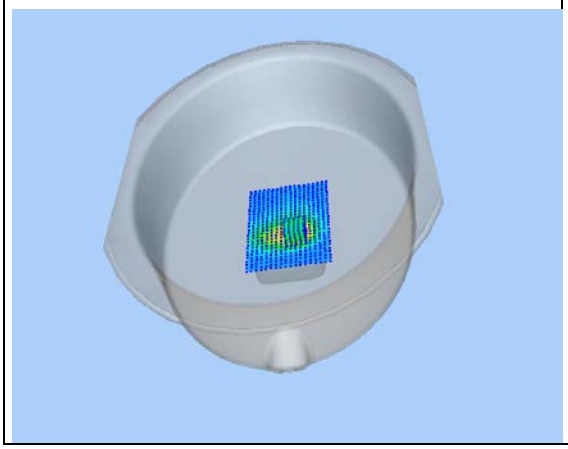
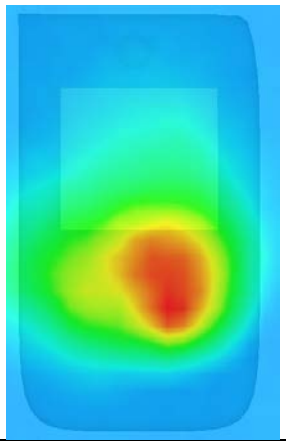
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.5310	0.3568	0.2255	0.1520	0.1113	0.0711	0.0499



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Jan. 25, 2024**
PCS 1900 Mid-Body-Back (MS)<SIM 1>
DUT: Rugged tablet; Type: X7

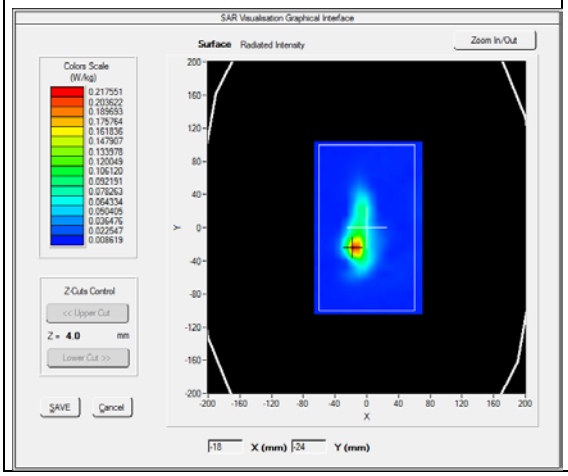
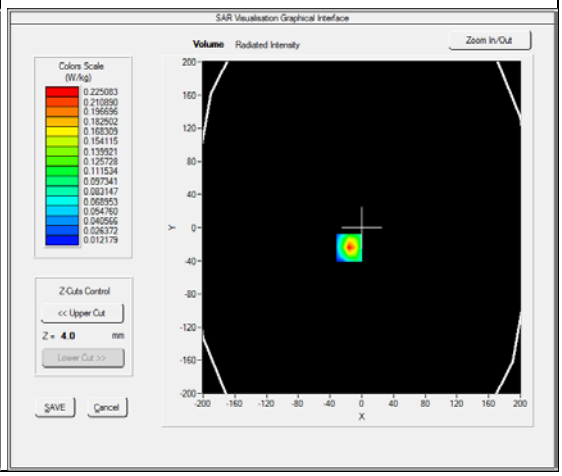
Communication System: Generic GSM; Communication System Band: PCS 1900; Duty Cycle: 1:8.3; Conv.F=2.15; Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ= 1.39 mho/m; εr =41.39; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.2, Liquid temperature (℃): 20.9

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/PCS1900 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/PCS1900 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	ELLI
Device Position	Body Back
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=-16.00, Y=-24.00
SAR Peak: 0.35 W/kg

SAR 10g (W/Kg)	0.093514
SAR 1g (W/Kg)	0.200385

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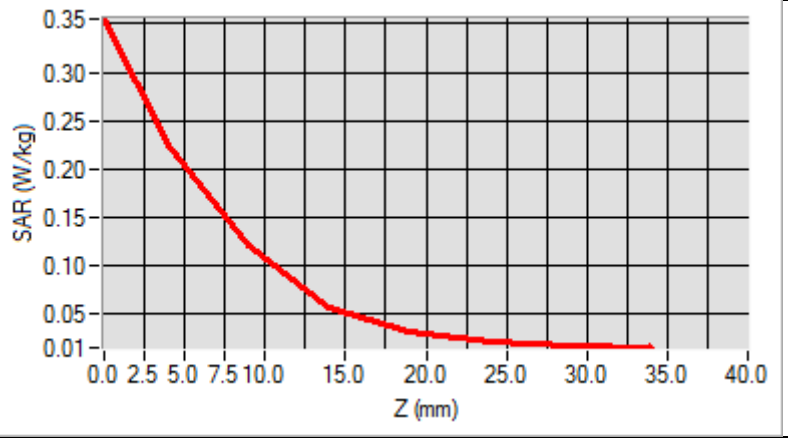
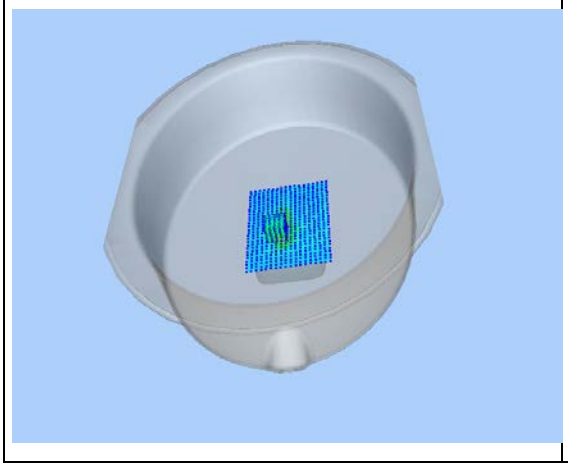
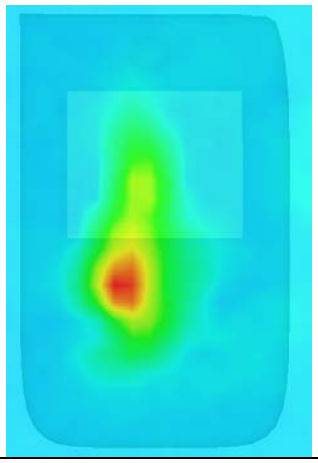
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.3550	0.2251	0.1207	0.0563	0.0315	0.0208	0.0172



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Jan. 25, 2024**
GPRS 1900 Mid-Body-Back (3up)
DUT: Rugged tablet; Type: X7

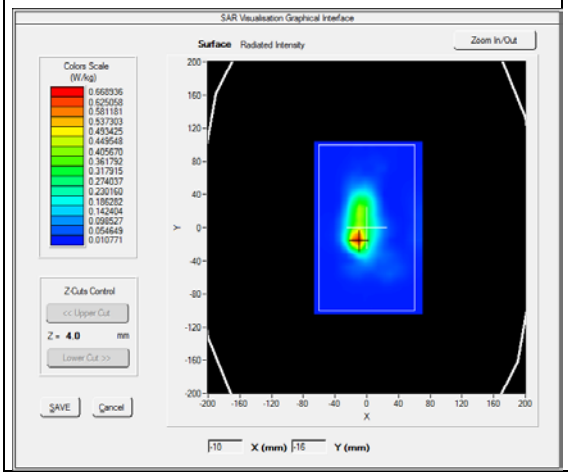
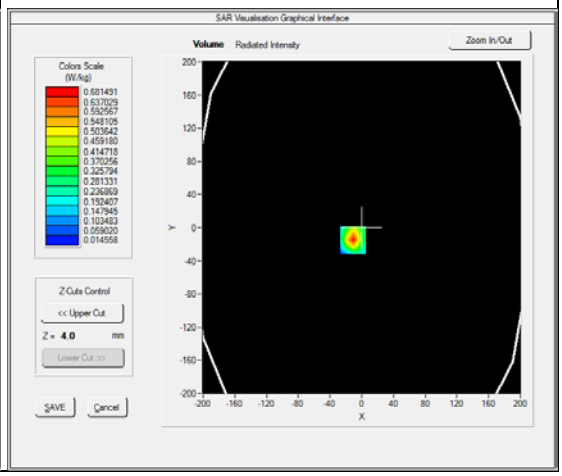
Communication System: GPRS-3Slot; Communication System Band: PCS 1900; Duty Cycle: 1:2.7; Conv.F=2.15; Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ= 1.39 mho/m; εr =41.39; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.2, Liquid temperature (℃): 20.9

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS1900 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS1900 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	ELLI
Device Position	Body Back
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 2.7)

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-11.00, Y=-15.00
SAR Peak: 1.11 W/kg

SAR 10g (W/Kg)	0.298981
SAR 1g (W/Kg)	0.627790

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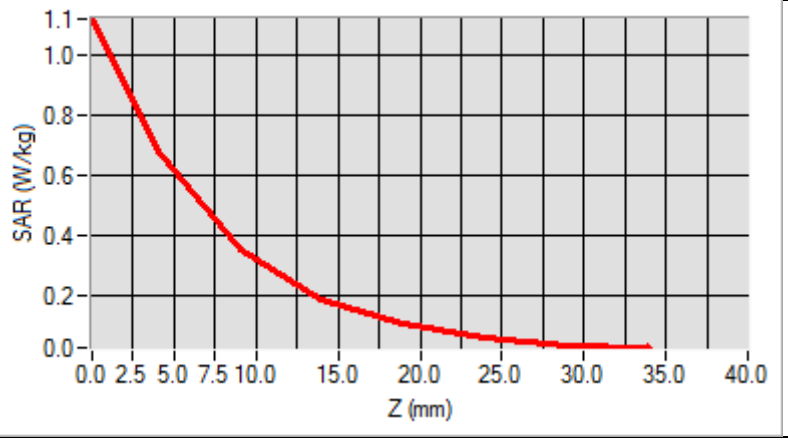
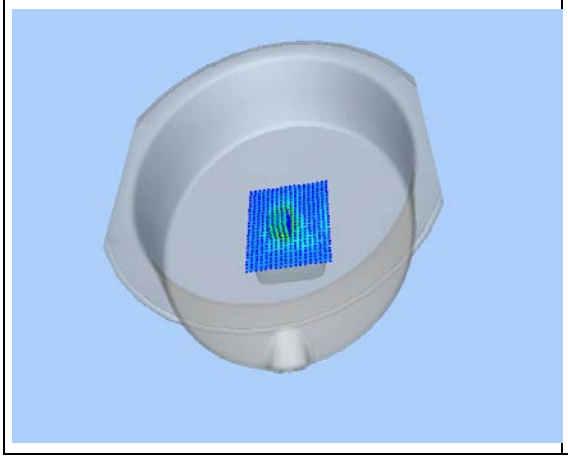
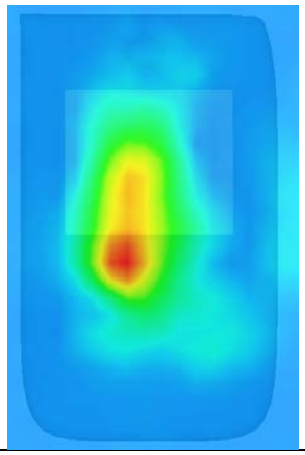
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.1234	0.6815	0.3526	0.1886	0.1056	0.0560	0.0339



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Jan. 25, 2024**
WCDMA Band II High-Body-Towards Grounds (RMC 12.2kbps)
DUT: Rugged tablet; Type: X7

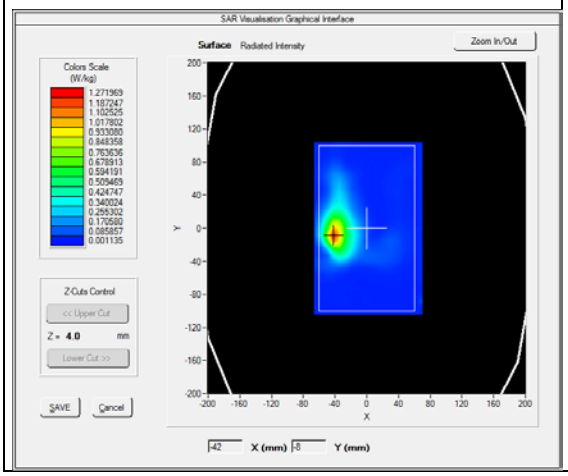
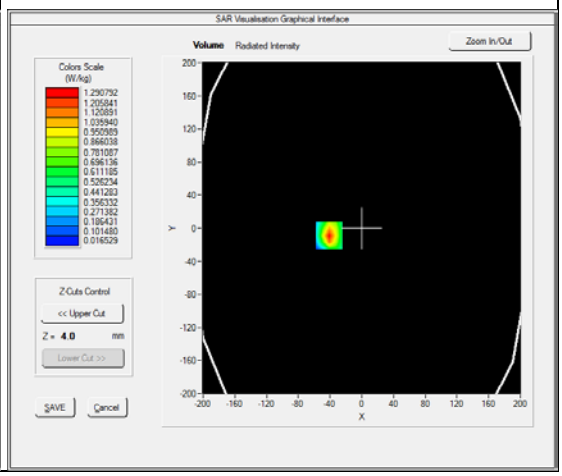
Communication System: UMTS; Communication System Band: Band II UTRA/FDD ;Duty Cycle:1:1; Conv.F=2.15;
Frequency: 1907.6 MHz; Medium parameters used: f = 1900 MHz; σ=1.43 mho/m; εr =39.60; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.2, Liquid temperature (℃): 20.9

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ WCDMA band II High -Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ WCDMA band II High -Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	ELLI
Device Position	Body Back
Band	WCDMA band II
Channels	High
Signal	CDMA (Crest factor: 1.0)

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=-41.00, Y=-9.00
SAR Peak: 2.06 W/kg

SAR 10g (W/Kg)	0.577790
SAR 1g (W/Kg)	1.185047

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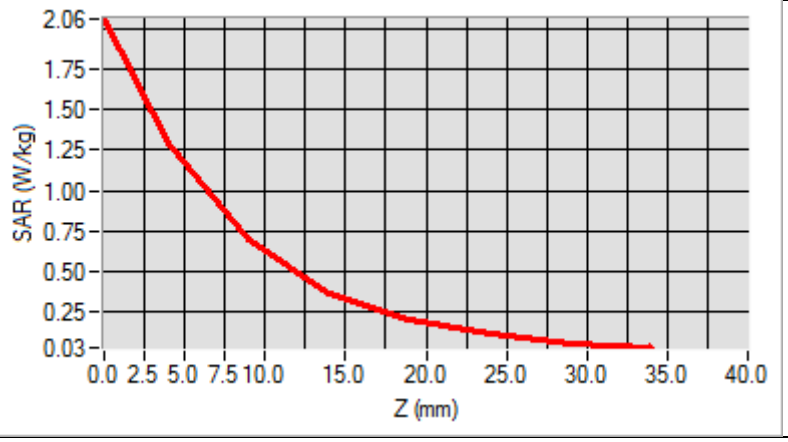
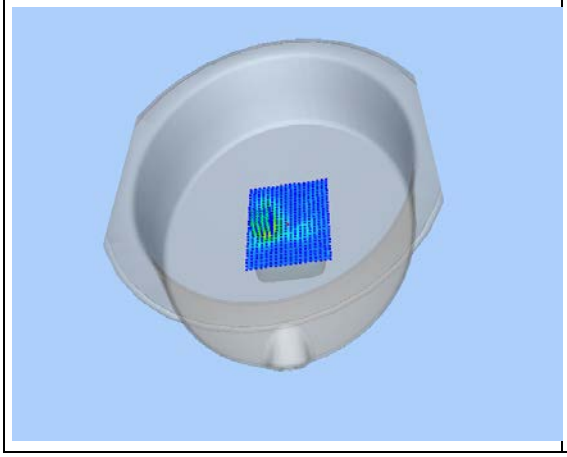
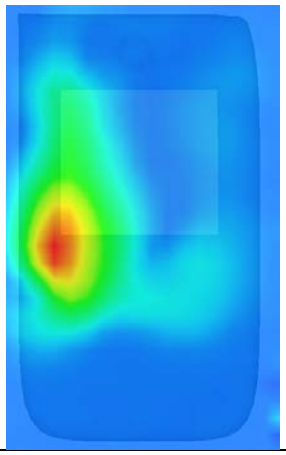
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.0584	1.2908	0.7010	0.3708	0.2112	0.1147	0.0608



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Dec. 28, 2023**

WCDMA Band Ⅴ Mid-Body-Towards Phantom (RMC)

DUT: Rugged tablet; Type: X7

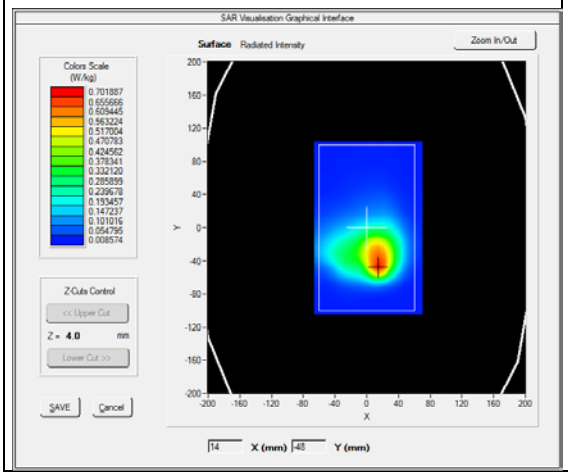
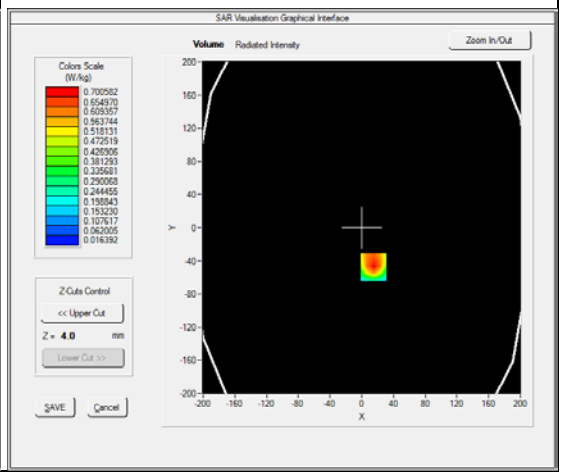
Communication System: UMTS; Communication System Band: BAND V UTRA/FDD; Duty Cycle:1: 1; Conv.F=2.02;
Frequency: 836.4 MHz; Medium parameters used: f = 835MHz; σ= 0.90 mho/m; εr = 40.93; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.8, Liquid temperature (℃): 20.3

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ WCDMA Band V Mid-Body-Front/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ WCDMA Band V Mid-Body-Front /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	ELLI
Device Position	Body Front
Band	WCDMA Band V
Channels	Middle
Signal	CDMA (Crest factor: 1.0)

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=15.00, Y=-47.00
SAR Peak: 1.11 W/kg

SAR 10g (W/Kg)	0.391445
SAR 1g (W/Kg)	0.678435

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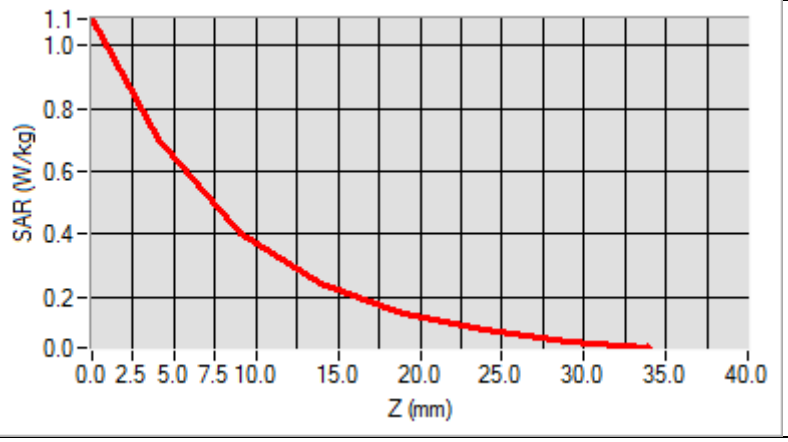
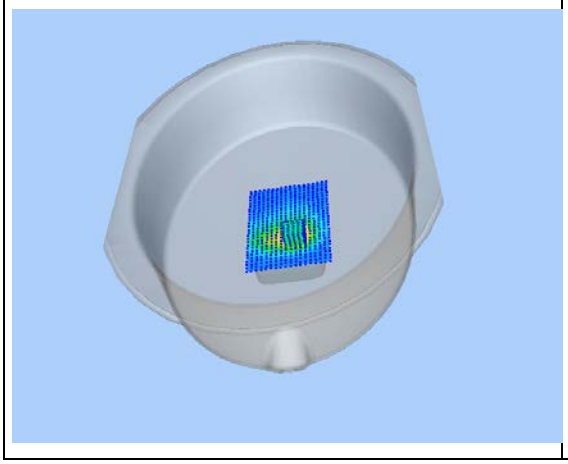
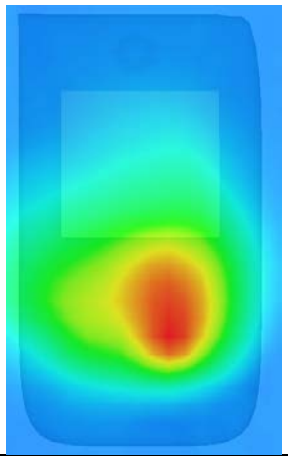
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.0852	0.7006	0.4027	0.2408	0.1497	0.0936	0.0587



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Jan. 25, 2024**
LTE Band 2 High-Body-Back (1 RB#0)
DUT: Rugged tablet; Type: X7

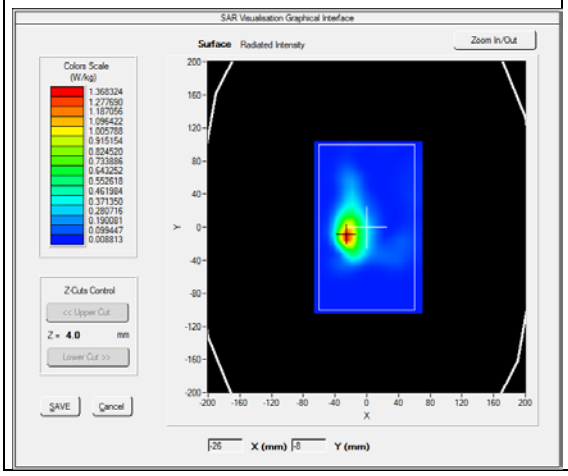
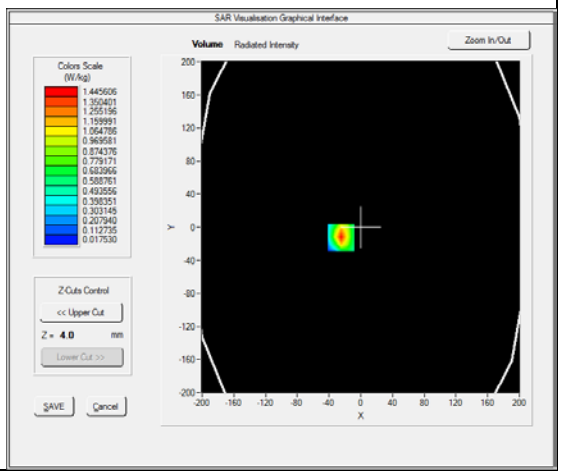
Communication System: LTE; Communication System Band: LTE Band 2; Duty Cycle:1:1; Conv.F=2.15; Frequency:1900MHz; Medium parameters used: f = 1900 MHz; σ= 1.41 mho/m; εr =40.74; ρ= 1000 kg/m³ ; Phantom section: Flat Section
Ambient temperature (℃): 21.2, Liquid temperature (℃): 20.9

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band 2 High -Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ LTE Band 2 High -Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	ELLI
Device Position	Body Back
Band	LTE Band 2
Channels	High
Signal	OFDM (Crest factor: 1.0)

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-25.00, Y=-12.00
SAR Peak: 2.26 W/kg

SAR 10g (W/Kg)	0.651729
SAR 1g (W/Kg)	1.315584

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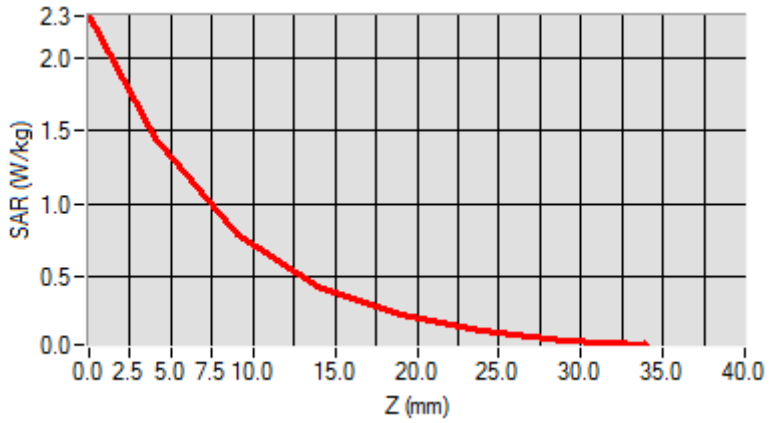
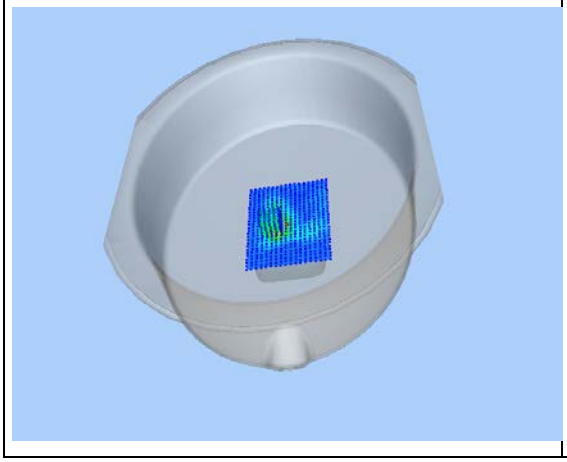
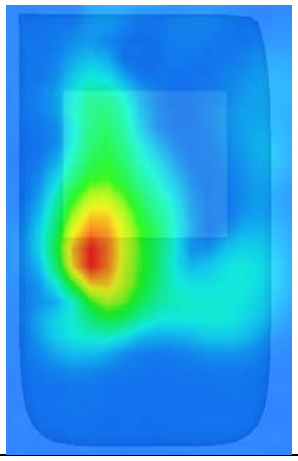
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.2820	1.4456	0.7916	0.4363	0.2398	0.1319	0.0699



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Jan. 26, 2024**
LTE Band 4 Mid-Body-Front (1 RB#0)
DUT: Rugged tablet; Type: X7

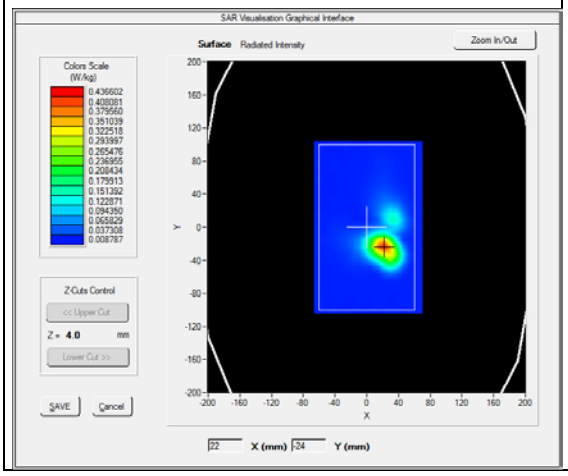
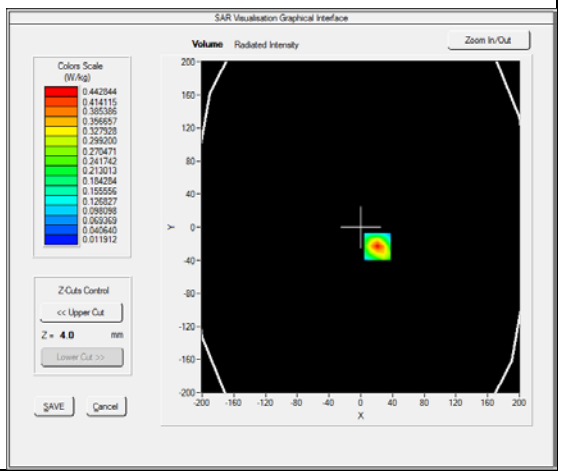
Communication System: LTE; Communication System Band: LTE Band 4; Duty Cycle:1:1; Conv.F=2.17; Frequency:1732.5 MHz; Medium parameters used: f = 1750 MHz; σ= 1.36 mho/m; εr =40.22; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.6, Liquid temperature (℃): 21.3

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band 4 Mid-Body-Front/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ LTE Band 4 Mid-Body-Front/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	ELLI
Device Position	Body Front
Band	LTE Band 4
Channels	Middle
Signal	OFDM (Crest factor: 1.0)

SURFACE SAR	VOLUME SAR
	

Maximum location: X=21.00, Y=-23.00
SAR Peak: 0.68 W/kg

SAR 10g (W/Kg)	0.212762
SAR 1g (W/Kg)	0.409127

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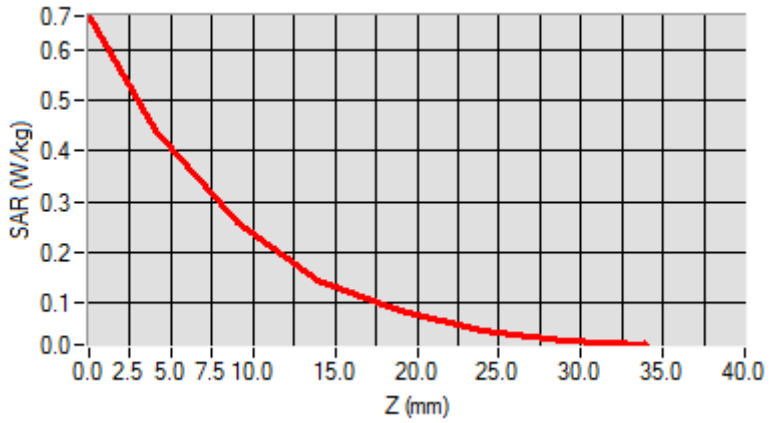
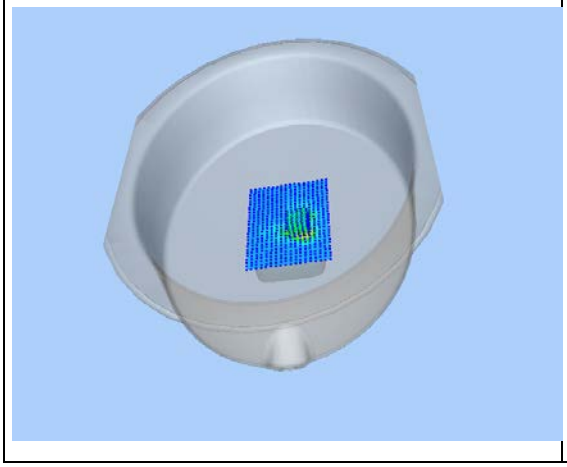
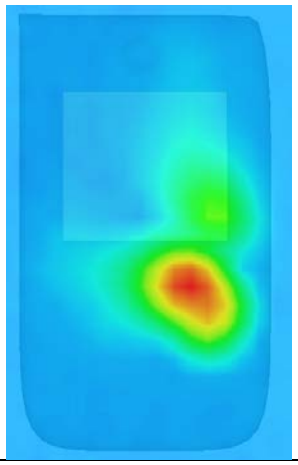
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.6672	0.4428	0.2584	0.1458	0.0832	0.0431	0.0240



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Dec. 28, 2023**
LTE Band 5 Mid-Body-Front (1 RB#0)
DUT: Rugged tablet; Type: X7

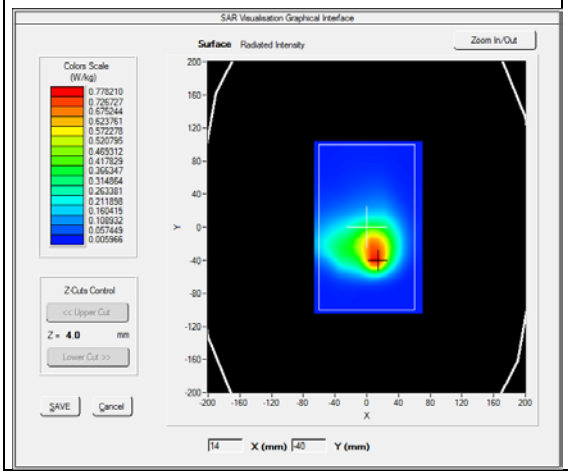
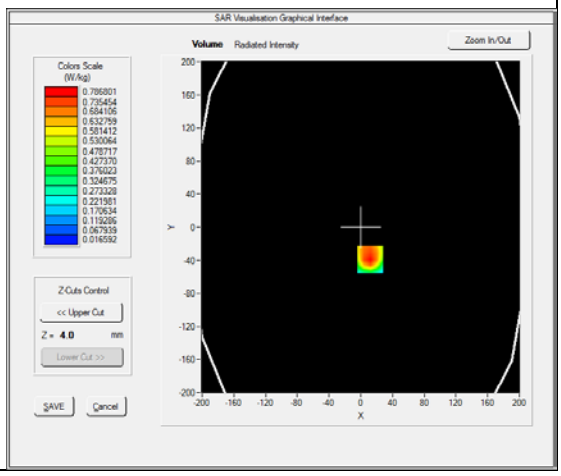
Communication System: LTE; Communication System Band: LTE Band 5; Duty Cycle:1:1; Conv.F=2.02
Frequency:836.5 MHz; Medium parameters used: f = 835 MHz; σ=0.90mho/m; εr =40.93; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.8, Liquid temperature (℃): 20.3

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band 5 Mid-Body-Front/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ LTE Band 5 Mid-Body- Front /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	ELLI
Device Position	Body Front
Band	LTE Band 5
Channels	Middle
Signal	OFDM (Crest factor: 1.0)

SURFACE SAR	VOLUME SAR
	

Maximum location: X=12.00, Y=-39.00
SAR Peak: 1.28 W/kg

SAR 10g (W/Kg)	0.441059
SAR 1g (W/Kg)	0.768131

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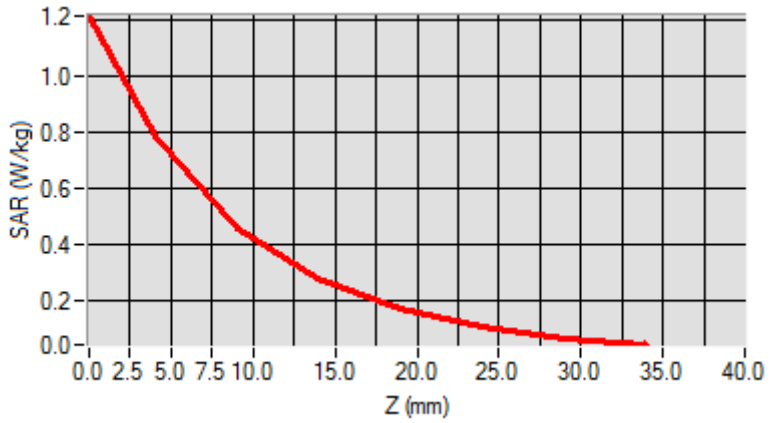
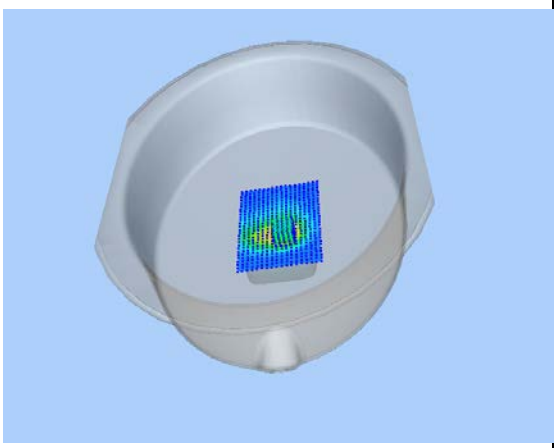
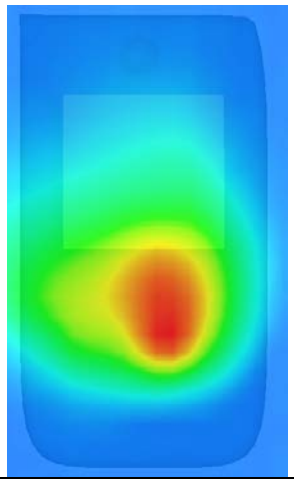
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.2140	0.7868	0.4544	0.2759	0.1706	0.1059	0.0652



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Jan. 06, 2024**
LTE Band 7 Mid-Body-Back (1RB#0)
DUT: Rugged tablet; Type: X7

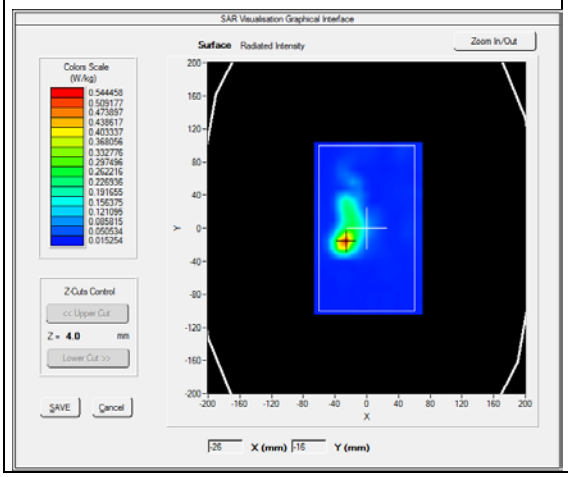
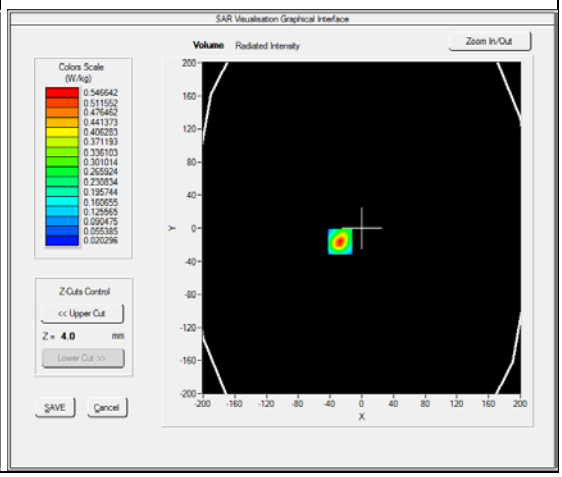
Communication System: LTE; Communication System Band: LTE Band 7; Duty Cycle:1:1; Conv.F=2.13
Frequency: 2535MHz; Medium parameters used: f =2600 MHz; σ=1.86 mho/m; εr =39.16; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.3, Liquid temperature (℃): 20.1

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE BAND 7 Mid-Body-Back /Area Scan: Measurement grid: dx=10mm, y=10mm
Configuration/ LTE BAND 7 Mid-Body-Back /Zoom Scan: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	ELLI
Device Position	Body Back
Band	LTE BAND 7
Channels	Middle
Signal	OFDM (Crest factor: 1.0)

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=-27.00, Y=-16.00
SAR Peak: 1.00 W/kg

SAR 10g (W/Kg)	0.212174
SAR 1g (W/Kg)	0.501324

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**	**24.00**	**29.00**

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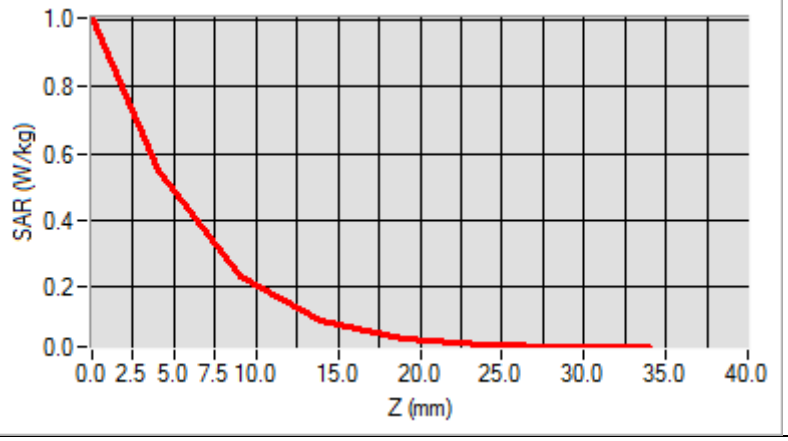
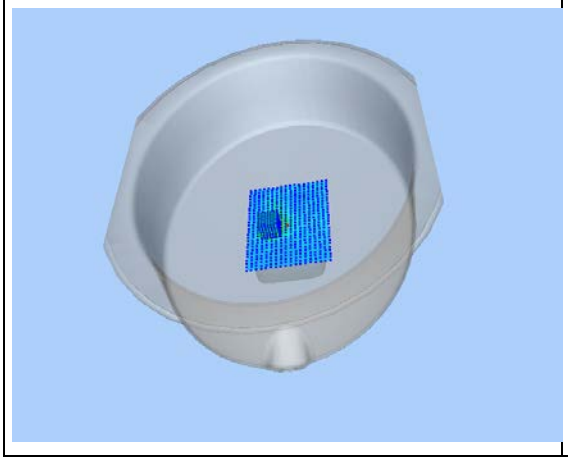
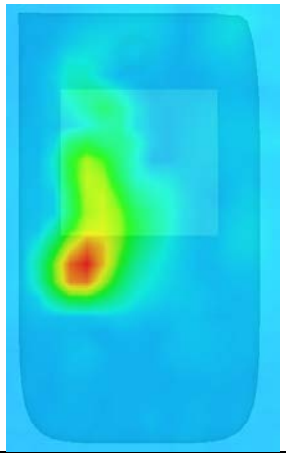
SAR (W/Kg)	1.0044	0.5466	0.2310	0.0980	0.0489	0.0297	0.0238



3D screen shot	Hot spot position
	

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WIFI MODE

Test Laboratory: AGC Lab **Date: Dec. 31, 2023**
802.11b Mid-Body-Worn- Front
DUT: Rugged tablet; Type: X7

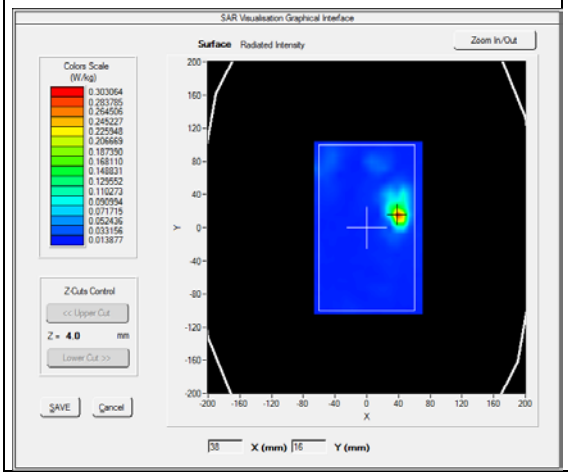
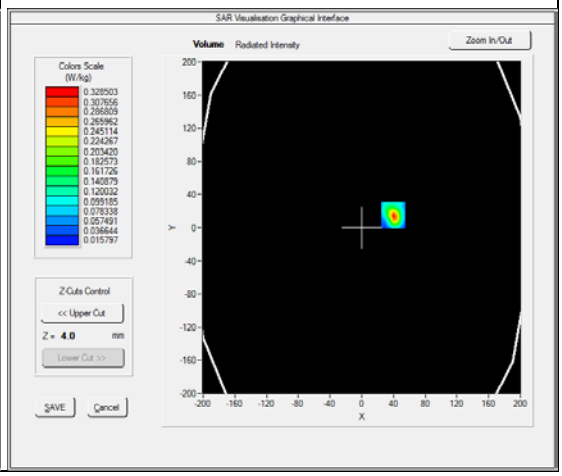
Communication System: Wi-Fi; Communication System Band: 802.11b; Duty Cycle: 1:1; Conv.F=2.29;
Frequency: 2437 MHz; Medium parameters used: f = 2450 MHz; σ =1.75mho/m; εr =39.61; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃):21.4, Liquid temperature (℃): 21.2

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/802.11b Mid- Body- Front /Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/802.11b Mid- Body- Front /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	ELLI
Device Position	Body Front
Band	2450MHz
Channels	Middle
Signal	Crest factor: 1.0

SURFACE SAR	VOLUME SAR
	

Maximum location: X=40.00, Y=15.00
SAR Peak: 0.65 W/kg

SAR 10g (W/Kg)	0.104462
SAR 1g (W/Kg)	0.287498

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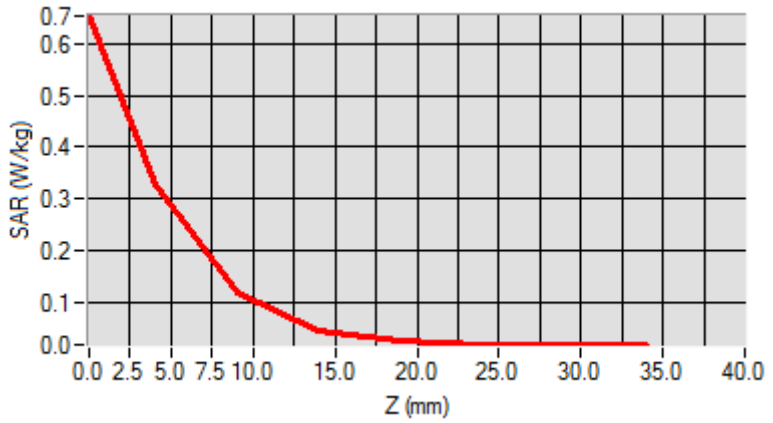
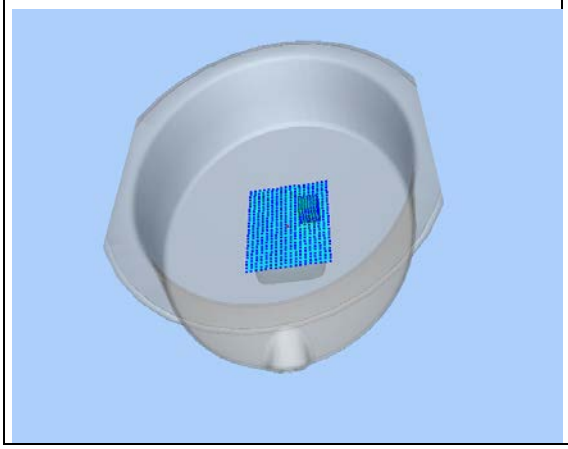
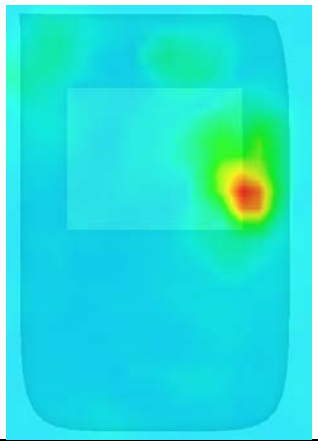
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.6532	0.3285	0.1186	0.0444	0.0254	0.0194	0.0192



3D screen shot	Hot spot position
	

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Repeated SAR
Test Laboratory: AGC Lab **Date: Jan. 25, 2024**
WCDMA Band II High-Body-Towards Grounds (RMC 12.2kbps)
DUT: Rugged tablet; Type: X7

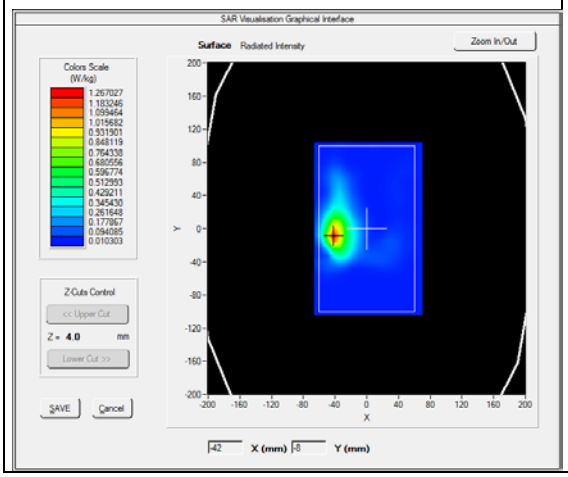
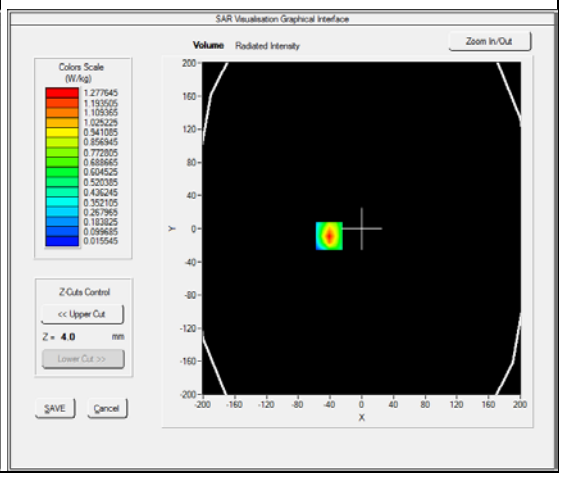
Communication System: UMTS; Communication System Band: Band II UTRA/FDD ;Duty Cycle:1:1; Conv.F=2.15;
Frequency: 1907.6 MHz; Medium parameters used: f = 1900 MHz; σ=1.43 mho/m; εr =39.60; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.2, Liquid temperature (℃): 20.9

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ WCDMA band II High -Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ WCDMA band II High -Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	ELLI
Device Position	Body Back
Band	WCDMA band II
Channels	High
Signal	CDMA (Crest factor: 1.0)

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=-41.00, Y=-9.00
SAR Peak: 2.03 W/kg

SAR 10g (W/Kg)	0.573827
SAR 1g (W/Kg)	1.174060

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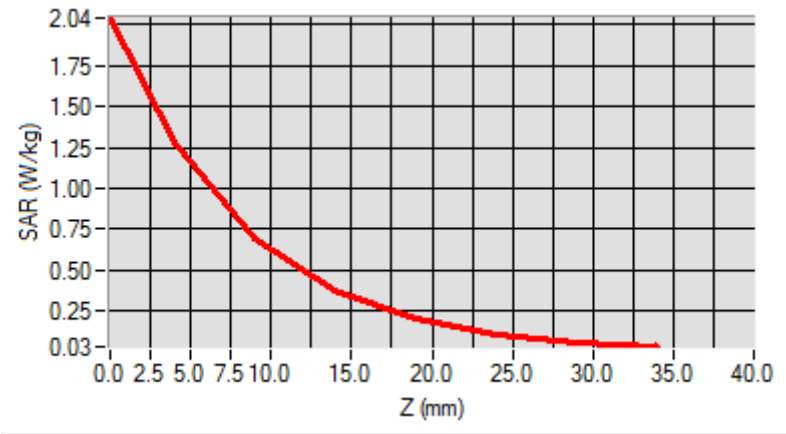
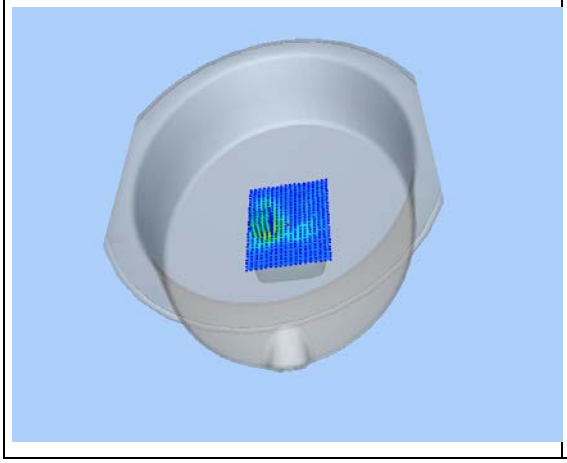
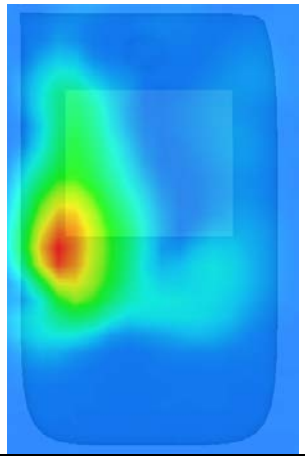
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.0382	1.2776	0.6916	0.3812	0.2096	0.1127	0.0585



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: Jan. 25, 2024**
LTE Band 2 High-Body-Back (1 RB#0)
DUT: Rugged tablet; Type: X7

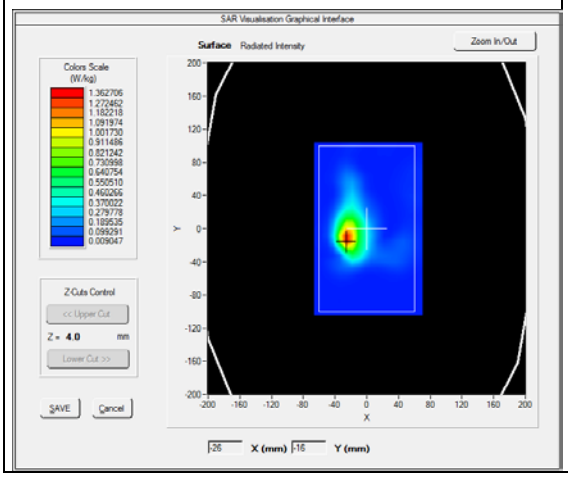
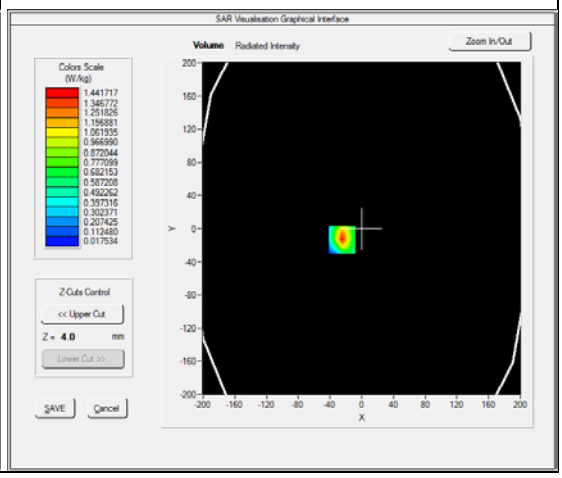
Communication System: LTE; Communication System Band: LTE Band 2; Duty Cycle:1:1; Conv.F=2.15; Frequency:1900MHz; Medium parameters used: f = 1900 MHz; σ= 1.41 mho/m; εr =40.74; ρ= 1000 kg/m³ ; Phantom section: Flat Section
Ambient temperature (℃): 21.2, Liquid temperature (℃): 20.9

SATIMO Configuration:

- Probe: SSE2; Calibrated: May 31, 2023; Serial No.: 2023-EPGO-414
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: ELLI39 Phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band 2 High -Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ LTE Band 2 High -Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	ELLI
Device Position	Body Back
Band	LTE Band 2
Channels	High
Signal	OFDM (Crest factor: 1.0)

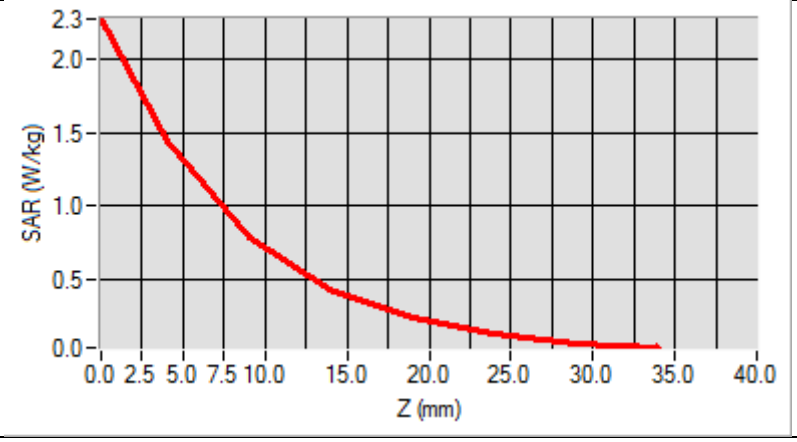
SURFACE SAR	VOLUME SAR
	

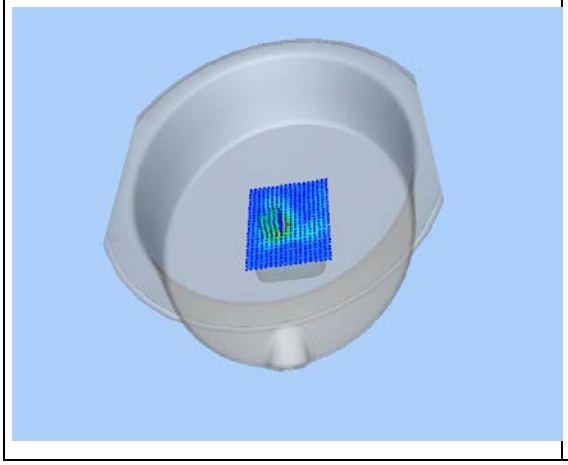
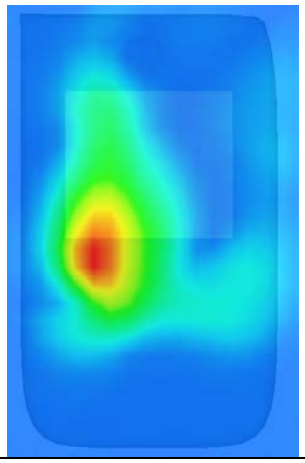
Maximum location: X=-25.00, Y=-13.00
SAR Peak: 2.25 W/kg

SAR 10g (W/Kg)	0.651428
SAR 1g (W/Kg)	1.312499

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.2740	1.4417	0.7901	0.4332	0.2394	0.1297	0.0701



3D screen shot	Hot spot position
	

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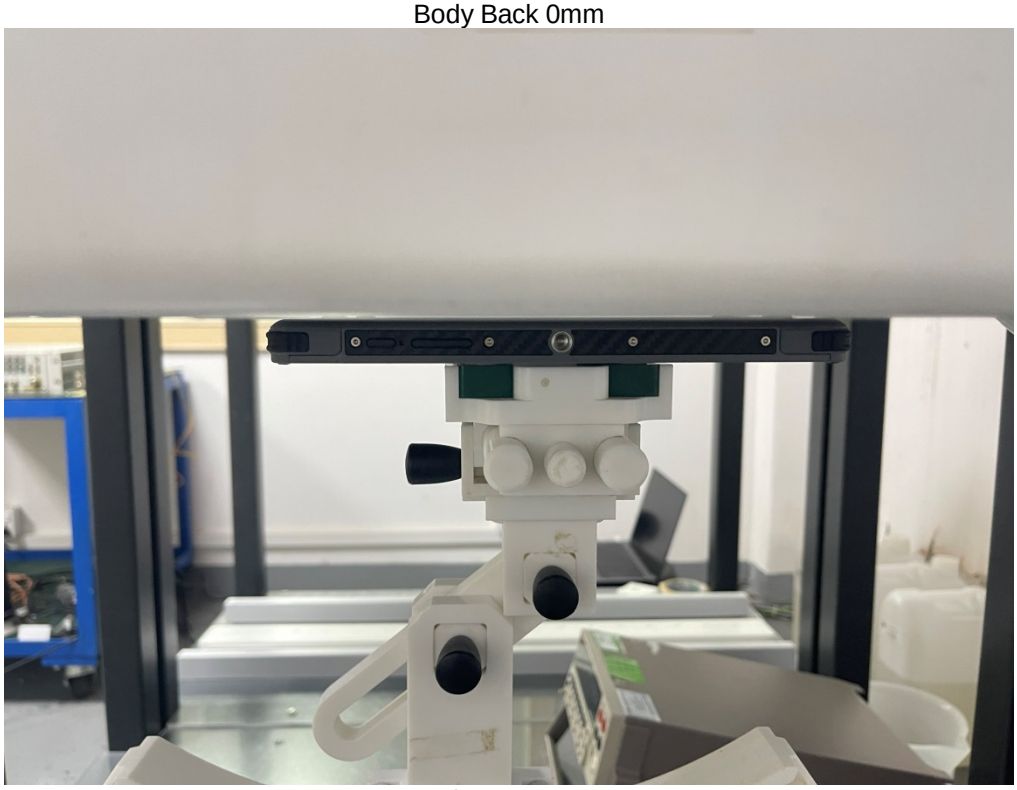
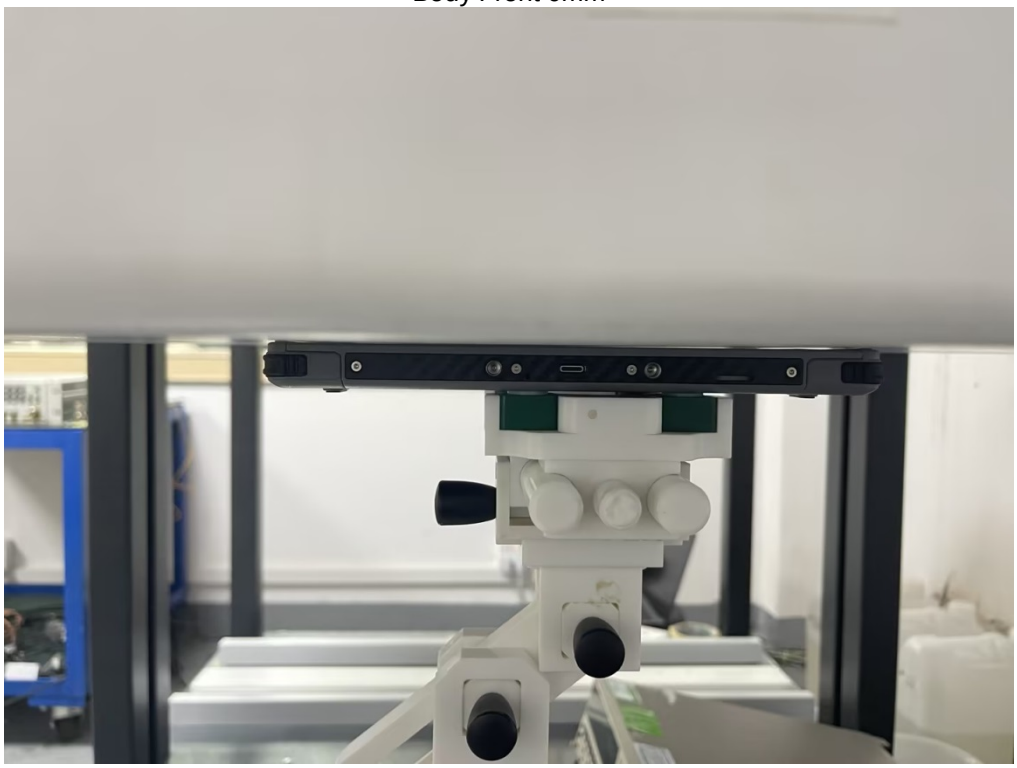
APPENDIX C. TEST SETUP PHOTOGRAPHS

Body Back 0mm



Body Front 0mm



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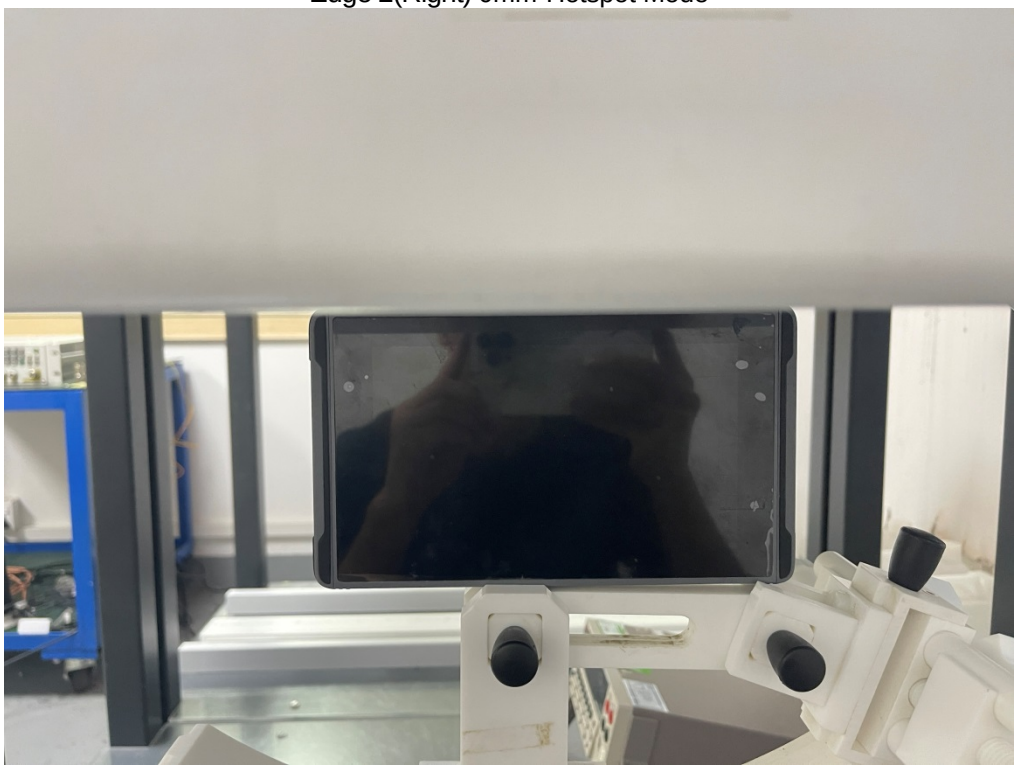
Edge 1(Top) 0mm-Hotspot Mode

Edge 2(Right) 0mm-Hotspot Mode



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Edge 3(Bottom) 0mm-Hotspot Mode

Edge 4(Left) 0mm-Hotspot Mode

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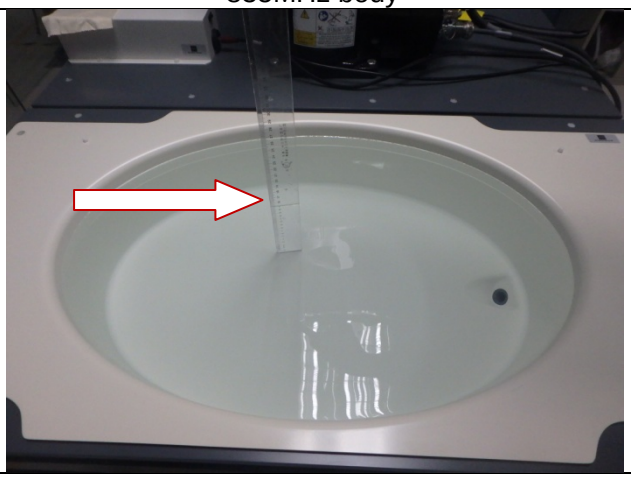
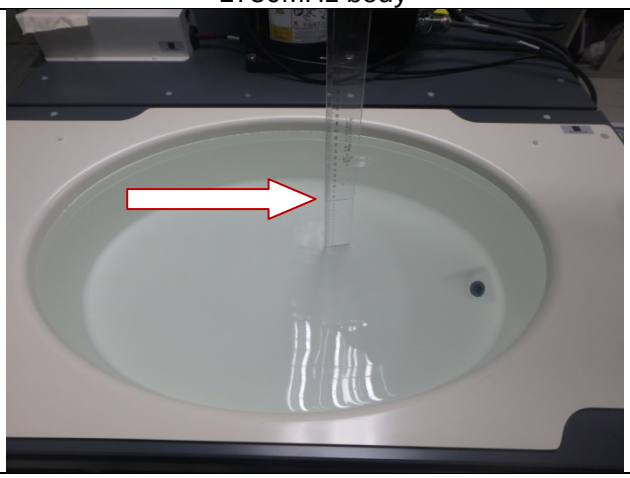
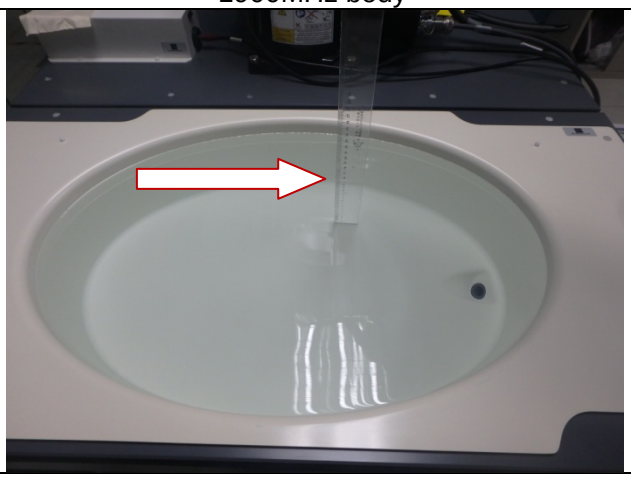
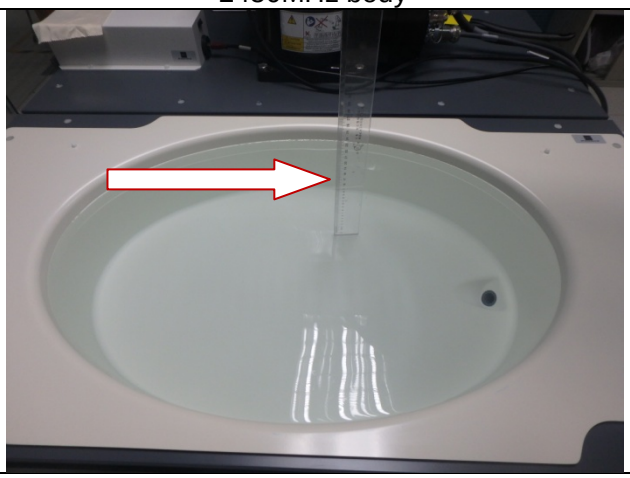
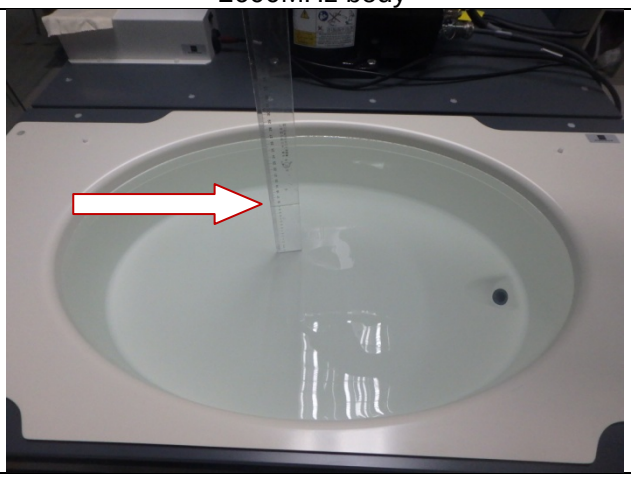
DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

Note：The position used in the measurement were according to IEEE 1528-2013

835MHz body	1750MHz body
	
1900MHz body	2450MHz body
	
2600MHz body	
	

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APPENDIX D. CALIBRATION DATA

Refer to Attached files.

----END OF REPORT----

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

7.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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