FCC SAR TEST REPORT

Report No.: STS2303102H01

Issued for

GRID Communications Pte Ltd

202 Bedok South Avenue 1 Building C, #01-21

Singapore 469332

Product Name:	Rugged Smart Phone
Brand:	GRID
Model Number:	H240S E
Series Model(s):	N/A
FCC ID:	2BA5GH240SE
Test Standard:	ANSI/IEEE Std. C95.1
	FCC 47 CFR Part 2 (2.1093)
	IEEE 1528: 2013
Max. Report SAR (1g):	Head: 0.836 W/kg
	Body: 0.884 W/kg

ShenZhen STS Test Services Co.,Ltd.
A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

Test Report Certification

Applicant's name ..... : GRID Communications Pte Ltd

Address ..... : 202 Bedok South Avenue 1 Building C, #01-21 Singapore 469332

Manufacturer's Name ..... : GRID Communications Pte Ltd

Address ..... : 202 Bedok South Avenue 1 Building C, #01-21 Singapore 469332

Product description

Product name ..... : Rugged Smart Phone

Brand name ..... : GRID

Model name ..... : H240S E

Series Model..... : N/A

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

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

Date of Test.....:

Date (s) of performance of tests.....: 29 Mar. 2023

Date of Issue.....: 04 Apr. 2023

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

Testing Engineer **:** Shi fan. long

(Shifan. Long)

Technical Manager **:** Sean she

(Sean she)

Authorized Signatory **:** Bovey Yang

(Bovey Yang)

Table of Contents

Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	04 Apr. 2023	STS2303102H01	ALL	Initial Issue

1. General Information

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

1.1 EUT Description

Product Name	Rugged Smart Phone			
Brand Name	GRID			
Model Name	H240S E			
Series Model	N/A			
Model Difference	N/A			
Battery	Rated Voltage:3.8V Charge Limit Voltage: 4.35V Capacity: 4000mAh			
Device Category	Portable			
Product stage	Production unit			
RF Exposure Environment	General Population / Uncontrolled			
IMEI	IMEI1:863434030742453 IMEI2:863434030742461			
Hardware Version	W105_MB_V1.1			
Software Version	H240SE_6.0_HW2.0_V02_20211109			
Frequency Range	LTE Band 26: 814 MHz ~ 849 MHz			
Max. Reported SAR(1g): (Limit:1.6W/kg)	Band	Mode	Head (W/kg)	Body Worn and Hotspot(W/kg)
	TNE	LTE Band 26	0.836	0.884
FCC Equipment Class	Licensed Non-Broadcast Transmitter Held to Ear			
Operating Mode:	LTE: QPSK, 16QAM			
Antenna Specification:	LTE: PIFA Antenna			
SIM Card	SIM 1 and SIM 2 is a chipset unit and tested as single chipset , SIM 1 is used to tested			
Hotspot Mode	Support			
DTM Mode	Not Support			

Note:
1. The dual SIM card mobile has 2 SIM slots and supports dual SIM dual standby. The WWAN radio transmission will be enabled by either one SIM at a time (Single active)
2. After pre-scan two SIM cards power, we found test result of the SIM1 was the worse, so we chose SIM1 card to perform all tests.
3. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power

1.2 Test Environment

Ambient conditions in the SAR laboratory:

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

1.3 Test Factory

ShenZhen STS Test Services Co.,Ltd.

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

FCC test Firm Registration No.: 625569

IC Registration No.: 12108A

A2LA Certificate No.: 4338.01

2. Test Standards and Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
8	FCC KDB 941225 D05 v02r05	SAR for LTE Devices

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

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

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

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

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

Population/Uncontrolled Environments:

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

Occupational/Controlled Environments:

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

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE

PARTIAL BODY LIMIT

1.6 W/kg

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.
The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

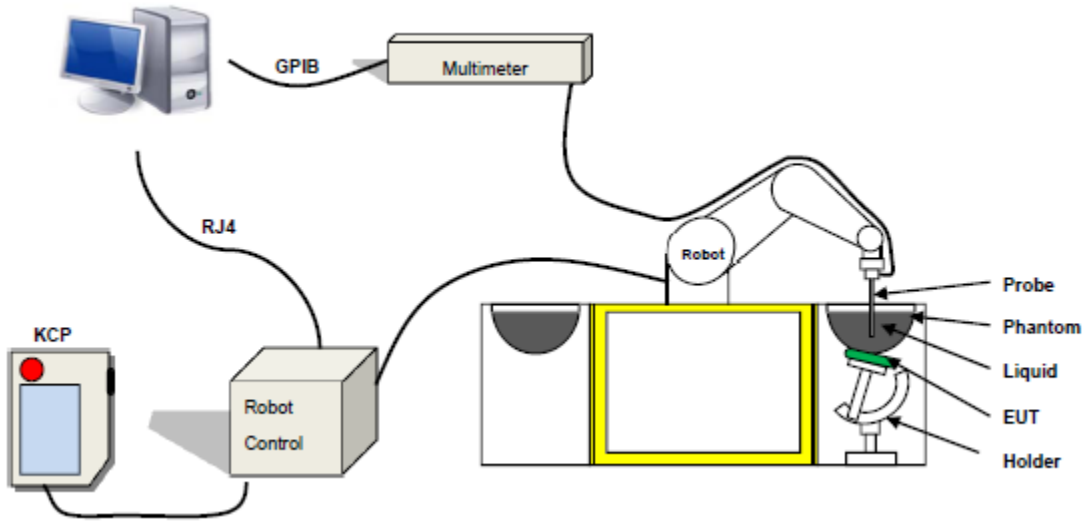
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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

3.2 SAR System

MVG SAR System Diagram:



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

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

The following figure shows the system.

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

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 07/21 EPGO352 with following specifications is used

- Probe Length: 330 mm
- Length of Individual Dipoles: 2 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter: 2.5 mm
- Distance between dipole/probe extremity: 1 mm
- Dynamic range: 0.01-100 W/kg
- Probe linearity: 3%
- Axial Isotropy: < 0.10 dB
- Spherical Isotropy: < 0.10 dB
- Calibration range: 450 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Figure 1-MVG COMOSAR Dosimetric E field Dipole

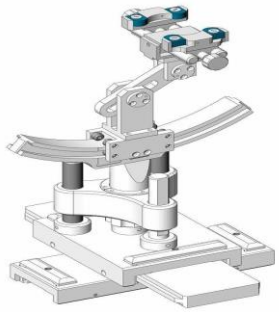
3.2.2 Phantom

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

SN 32/14 SAM115

Figure-SN 21/21 ELLI48

3.2.3 Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.4. Tissue Simulating Liquids

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

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

Head Tissue

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

Body Tissue

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

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

LIQUID MEASUREMENT RESULTS

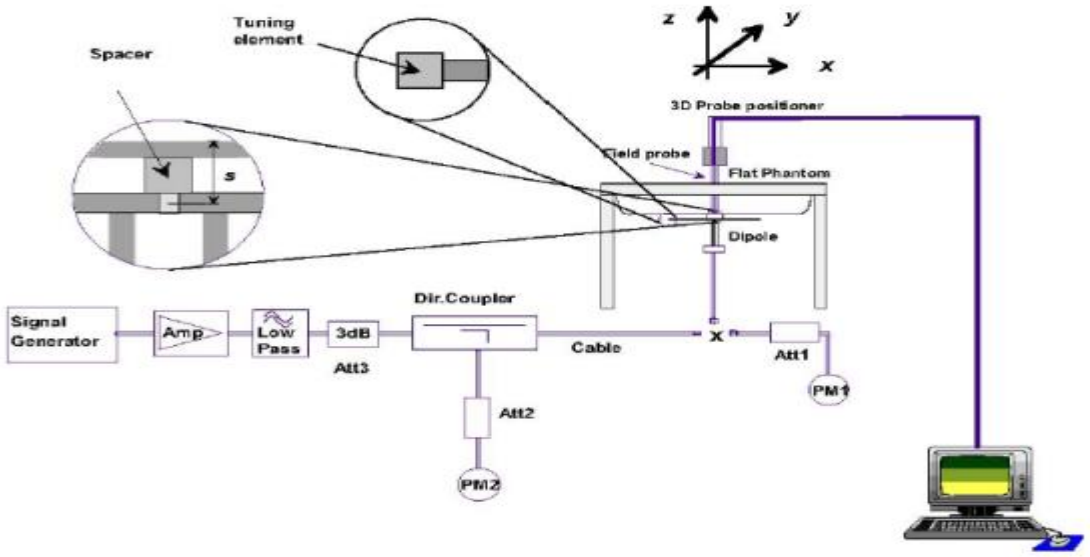
Date	Ambient		Simulating Liquid		Parameters	Target	Measured	Deviation %	Limited %
	Temp. [°C]	Humidity %	Frequency (MHz)	Temp. [°C]					
2023-03-29	20.2	58	821.5	19.9	Permittivity	41.56	40.96	-1.45	±5
					Conductivity	0.90	0.92	2.40	±5
2023-03-29	20.2	58	831.5	19.9	Permittivity	41.52	41.20	-0.76	±5
					Conductivity	0.90	0.89	-1.07	±5
2023-03-29	20.3	58	835	20.0	Permittivity	41.50	40.55	-2.29	±5
					Conductivity	0.90	0.94	4.44	±5
2023-03-29	20.4	58	841.5	20.1	Permittivity	41.47	41.14	-0.79	±5
					Conductivity	0.90	0.89	-1.20	±5

5. SAR System Validation

5.1 Validation System

Each MVG system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the MVG software, enable the user to conduct the system performance 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 validation setup is shown as below.



5.2 Validation Result

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

Date	Freq.	Power	Tested Value	Normalized SAR	Target SAR	Tolerance	Limit
	(MHz)	(mW)	(W/Kg)	(W/kg)	1g(W/kg)	(%)	(%)
2023-03-29	835	100	0.980	9.80	9.63	1.77	10

Note:

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

6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:
The following steps are used for each test position

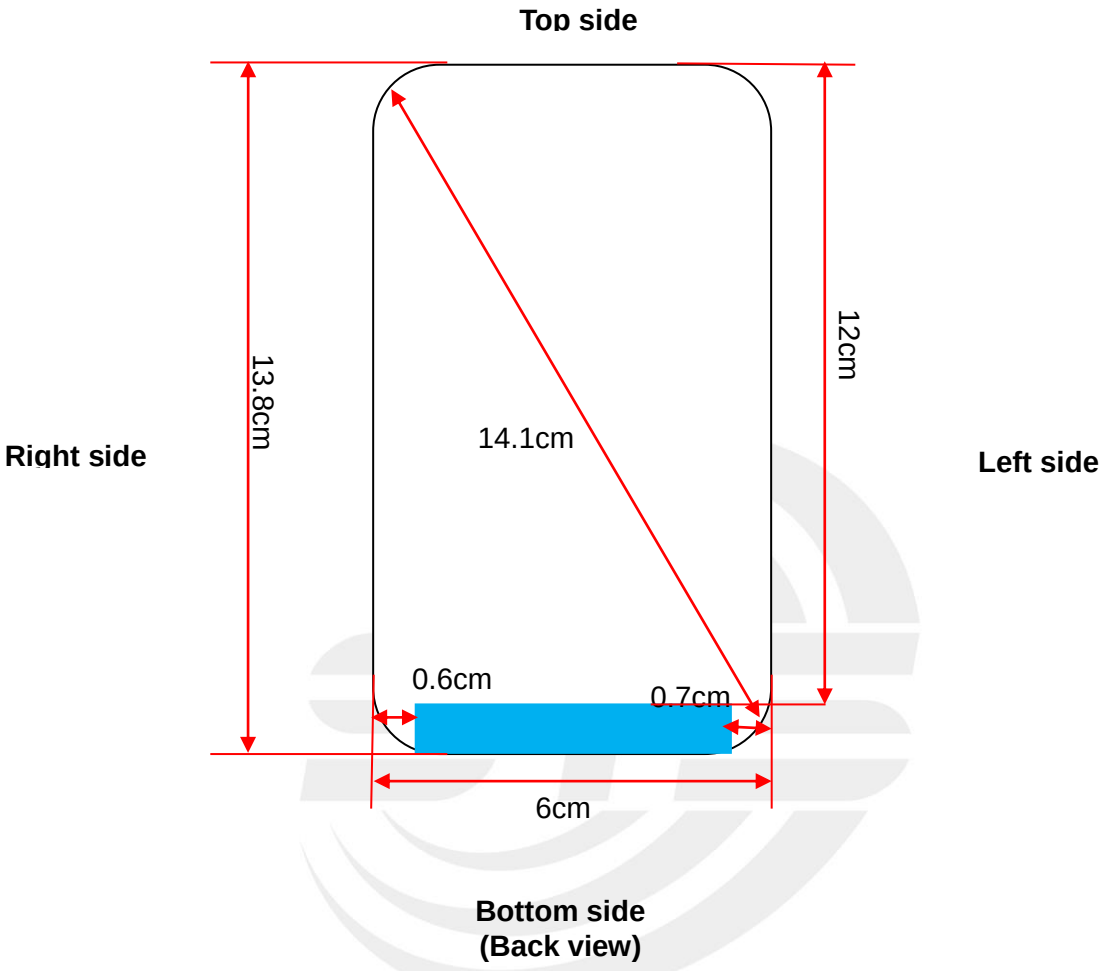
- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

➢ Area Scan& Zoom Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01 quoted below.
When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

7. EUT Antenna Location Sketch

It is a Rugged Smart Phone, support LTE mode.



WWAN Antenna

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

7.1 SAR test exclusion consider table

The WWAN SAR evaluation of Maximum power (dBm) summing tolerance.

Exposure Position	Wireless Interface	LTE Band 26
	Calculated Frequency(GHz)	0.8415
	Maximum Turn-up power (dBm)	25
	Maximum rated power(mW)	316.23
Back Side	Separation distance (cm)	≤0.5
	exclusion threshold(mW)	9.15
	Testing required?	YES
Front Side	Separation distance (cm)	≤0.5
	exclusion threshold(mW)	9.15
	Testing required?	YES
Left Side	Separation distance (cm)	0.7
	exclusion threshold(mW)	14.74
	Testing required?	YES
Right Side	Separation distance (cm)	0.6
	exclusion threshold(mW)	11.85
	Testing required?	YES
Top Side	Separation distance (cm)	12
	exclusion threshold(mW)	5170.66
	Testing required?	NO
Bottom Side	Separation distance (cm)	≤0.5
	exclusion threshold(mW)	9.15
	Testing required?	YES

Note：

1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. per KDB 447498 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <25mm,25mm is user to determine SAR exclusion threshold
4. per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distance ≤50mm are determined by:
   [(max.power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]*[√f(GHz）)≤3.0 for 1-g SAR and≤7.5 for10-g extremity SAR ,f(GHz) is the RF channel transmit frequency in GHz. Power and distance are rounded to the nearest mW and mm before calculation.

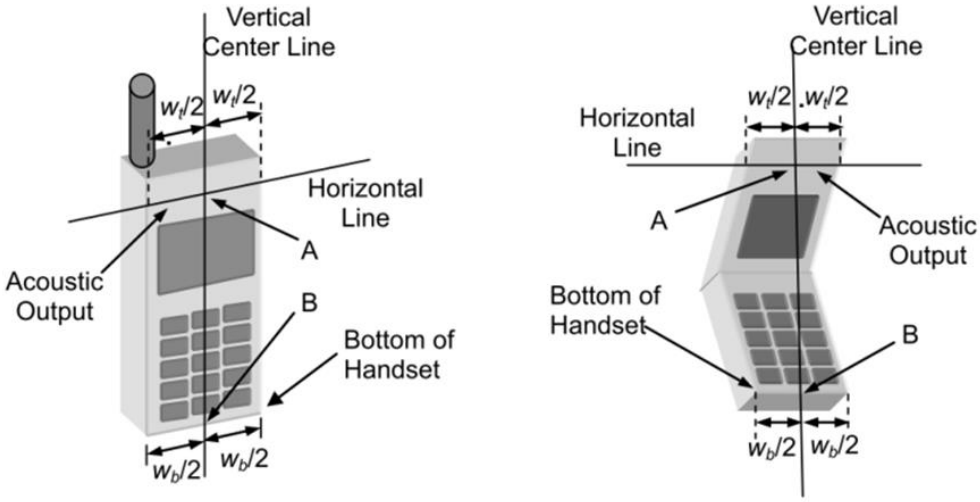
   The result is rounded to one decimal place for comparison
   For <50mm distance, we just calculate mW of the exclusion threshold value(3.0)to do compare
5. per KDB 447498 D01, at 100 MHz to 6GHz and for test separation distances >50mm, the SAR test exclusion threshold is determined according to the following
   a)[threshold at 50mm in step 1]+(test separation distance -50mm)*(f (MHz)/150)]mW, at 100 MHz to 1500 MHz
   b) [threshold at 50mm in step1]+(test separation distance -50mm) *10]mW at＞1500MHz and≤ 6GHz
6. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion 8.for each frequency band ,testing at higher data rates and higher order modulations is not required when the maximum average output power for each of each of these configurations is less than 1/4db higher than those measured at the lower data rate than 11b mode ,thus the SAR can be excluded.
7. Per KDB 616217 D04, SAR evaluation for the front surface of tablet display screens are generally not necessary.

8. EUT Test Position

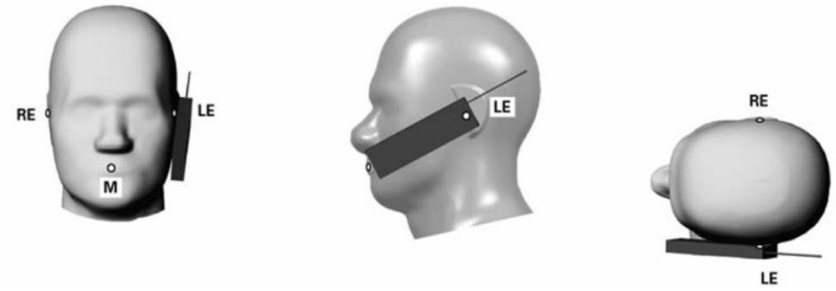
This EUT was tested in Right Cheek, Right Titled, Left Cheek, Left Titled, Front Face and Rear Face.

8.1 Define Two Imaginary Lines on the Handset

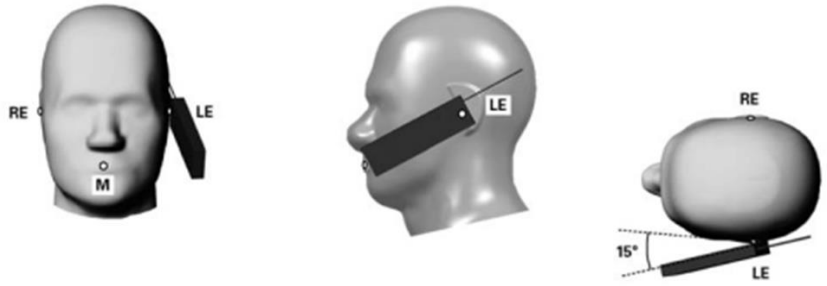
(1)The vertical centerline passes through two points on the front side of the handset the midpoint of the width wt of the handset at the level of the acoustic output, and the midpoint of the width wb of the handset.
(2)The horizontal line is perpendicular to the vertical centerline and passes through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



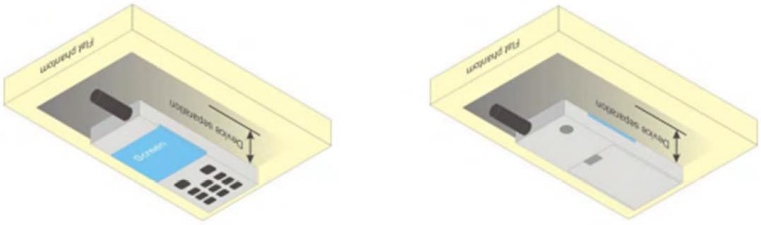
Cheek Position
1) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
2) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost



Title Position
(1)To position the device in the “cheek” position described above.
(2) While maintaining the device in the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until with the ear is lost.

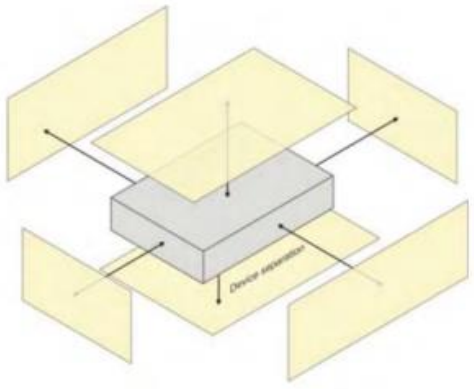


Body-worn Position Conditions:
Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset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



8.2 Hotspot mode exposure position condition

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



9. Uncertainty

9.1 Measurement Uncertainty

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

Symbol	Uncertainty Component	Prob. Dist.	Unc. $a(x_i)$	Div. q_i	$u(x_i) = a(x_i)/q_i$	C_i	$u(y) = C_i * u(x_i)$	v_i
Measurement system errors								
CF	Probe calibration	N (k = 2)	5.72	2	2.86	1	2.86	∞
CF_{drift}	Probe calibration drift	R	0.15	√3	0.09	1	0.09	∞
LIN	Probe linearity and detection limit	R	1.27	√3	0.73	1	0.73	∞
BBS	Broadband signal	R	0.12	√3	0.07	1	0.07	∞
ISO	Probe isotropy	R	0.16	√3	0.09	1	0.09	∞
DAE	Other probe and data acquisition errors	N	2.4	1	2.40	1	2.40	∞
AMB	RF ambient and noise	N	3.51	1	3.51	1	3.51	∞
Δ_{xyz}	Probe positioning errors	N	1.2	1	1.20	2/δ	1.20	
DAT	Data processing errors	N	2.1	1	2.10	1	2.10	∞
Phantom and device (DUT or validation antenna) errors								
LIQ(σ)	Measurement of phantom conductivity(σ)	N	4.1	1	4.1	c_ε, c_σ	4.10	∞
$LIQ(T_c)$	Temperature effects (medium)	R	2.7	√3	1.56	c_ε, c_σ	1.56	∞
EPS	Shell permittivity	R	2.1	√3	1.21	See 8.4.2.3	0.30	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	N	0.7	1	0.7	2	1.40	∞
D_{xyz}	Repeatability of positioning the DUT or source against the phantom	N	1.2	1	1.2	1	1.20	5
H	Device holder effects	N	3.8	1	3.8	1	3.80	
MOD	Effect of operating mode on probe sensitivity	R	3.42	√3	1.97	1	1.97	∞
TAS	Time-average SAR	R	1.8	√3	1.04	1	1.04	∞
RF_{drift}	Variation in SAR due to drift in output of DUT	N	4.5	1	4.5	1	4.50	
VAL	Validation antenna uncertainty (validation measurement only)	N	1.4	1	1.4	1	1.40	
P_{in}	Uncertainty in accepted power (validation measurement only)	N	2.4	1	2.4	1	2.40	
Corrections to the SAR result (if applied)								
$C(\varepsilon',\sigma)$	Phantom deviation from target $(\varepsilon',\sigma))$	N	3.7	1	3.7	1	3.70	
C(R)	SAR scaling	R	1.8	√3	1.04	1	1.04	
u(ΔSAR)	Combined uncertainty						10.84	
U	Expanded uncertainty and effective degrees of freedom					U =	21.68	

10. Conducted Power Measurement

LTE Conducted Power

General Note:

1. Anritsu CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05, 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 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are $\leqslant$ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is $\leqslant$ 1.45 W/kg; Per KDB 941225 D05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is $\leqslant$ 1.45 W/kg; Per KDB 941225 D05, smaller bandwidth SAR testing is not required.

LTE BAND 26 Part22

LTE Band 26 Part22-824-849M Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
1.4	1	0	QPSK	24.57	24.19	24.38
1.4	1	2		24.66	24.31	24.47
1.4	1	5		24.56	24.20	24.36
1.4	3	0		24.57	24.32	24.33
1.4	3	1		24.51	24.25	24.26
1.4	3	2		24.56	24.30	24.33
1.4	6	0		23.46	23.19	23.25
1.4	1	0	16-QAM	23.65	23.40	23.04
1.4	1	2		23.71	23.46	23.09
1.4	1	5		23.64	23.43	23.07
1.4	3	0		23.78	23.55	23.44
1.4	3	1		23.72	23.49	23.37
1.4	3	2		23.75	23.55	23.45
1.4	6	0		22.69	22.38	22.42
3	1	0	QPSK	24.42	24.16	24.38
3	1	7		24.45	24.22	24.46
3	1	14		24.38	24.17	24.35
3	8	0		23.53	23.28	23.38
3	8	4		23.55	23.29	23.38
3	8	7		23.53	23.28	23.35
3	15	0		23.51	23.25	23.30
3	1	0	16-QAM	23.83	23.37	23.06
3	1	7		23.85	23.43	23.08
3	1	14		23.73	23.36	23.00
3	8	0		22.57	22.30	22.33
3	8	4		22.57	22.31	22.33
3	8	7		22.55	22.33	22.32
3	15	0		22.57	22.22	22.37

LTE Band 26 Part22-824-849M Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
5	1	0	QPSK	24.53	24.30	24.31
5	1	12		24.49	24.29	24.31
5	1	24		24.44	24.25	24.19
5	12	0		23.55	23.29	23.33
5	12	6		23.52	23.31	23.34
5	12	11		23.50	23.29	23.33
5	25	0		23.48	23.27	23.31
5	1	0	16-QAM	24.01	23.56	23.59
5	1	12		23.96	23.58	23.54
5	1	24		23.85	23.57	23.46
5	12	0		22.60	22.27	22.41
5	12	6		22.56	22.29	22.40
5	12	11		22.52	22.27	22.37
5	25	0		22.47	22.31	22.24
10	1	0	QPSK	24.46	24.29	24.38
10	1	24		24.41	24.26	24.42
10	1	49		24.34	24.29	24.38
10	25	0		23.45	23.27	23.28
10	25	12		23.40	23.27	23.30
10	25	24		23.39	23.26	23.30
10	50	0		23.42	23.33	23.29
10	1	0	16-QAM	23.86	23.42	23.23
10	1	24		23.74	23.43	23.15
10	1	49		23.69	23.47	23.03
10	25	0		22.50	22.28	22.33
10	25	12		22.47	22.27	22.33
10	25	24		22.43	22.29	22.27
10	50	0		22.44	22.35	22.29

LTE Band 26 Part22-824-849M Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
15	1	0	QPSK	24.40	24.31	24.32
15	1	37		24.35	24.30	24.36
15	1	74		24.31	24.28	24.69
15	36	0		23.44	23.37	23.31
15	36	18		23.38	23.33	23.29
15	36	39		23.38	23.31	23.42
15	75	0		23.41	23.33	23.71
15	1	0	16-QAM	23.82	23.50	23.48
15	1	38		23.64	23.46	23.49
15	1	75		23.75	23.46	23.68
15	36	0		22.45	22.40	22.28
15	36	18		22.42	22.41	22.25
15	36	39		22.40	22.39	22.92
15	75	0		22.39	22.34	22.33

LTE BAND 26 Part90

LTE Band 26 Part90-814-824M Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
1.4	1	0	QPSK	24.62	24.46	24.54
1.4	1	2		24.74	24.58	24.65
1.4	1	5		24.82	24.47	24.54
1.4	3	0		24.44	24.61	24.58
1.4	3	1		24.45	24.52	24.51
1.4	3	2		24.61	24.60	24.58
1.4	6	0		23.47	23.46	23.46
1.4	1	0	16-QAM	23.59	23.70	23.39
1.4	1	2		23.66	23.76	23.49
1.4	1	5		23.63	23.73	23.36
1.4	3	0		23.75	23.85	23.77
1.4	3	1		23.69	23.79	23.70
1.4	3	2		23.75	23.88	23.77
1.4	6	0		22.69	22.67	22.68
3	1	0	QPSK	24.49	24.44	24.52
3	1	7		24.53	24.52	24.60
3	1	14		24.44	24.45	24.52
3	8	0		23.61	23.57	23.53
3	8	4		23.61	23.57	23.55
3	8	7		23.58	23.56	23.56
3	15	0		23.54	23.56	23.55
3	1	0	16-QAM	23.84	23.66	23.39
3	1	7		23.89	23.75	23.44
3	1	14		23.86	23.66	23.30
3	8	0		22.64	22.59	22.60
3	8	4		22.65	22.58	22.55
3	8	7		22.62	22.57	22.58
3	15	0		22.62	22.54	22.64

LTE Band 26 Part90-814-824M Maximum Average Power [dBm]						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
5	1	0	QPSK	24.58	24.58	24.52
5	1	12		24.59	24.58	24.53
5	1	24		24.52	24.52	24.44
5	12	0		23.62	23.57	23.64
5	12	6		23.61	23.58	23.60
5	12	11		23.58	23.59	23.61
5	25	0		23.53	23.54	23.54
5	1	0	16-QAM	23.98	23.84	23.89
5	1	12		24.07	23.90	23.90
5	1	24		24.06	23.86	23.80
5	12	0		22.62	22.58	22.69
5	12	6		22.61	22.57	22.66
5	12	11		22.62	22.58	22.66
5	25	0		22.53	22.60	22.58
10	1	0	QPSK	N/A	24.51	N/A
10	1	24		N/A	24.93	N/A
10	1	49		N/A	24.51	N/A
10	25	0		N/A	23.55	N/A
10	25	12		N/A	23.53	N/A
10	25	24		N/A	23.54	N/A
10	50	0		N/A	23.56	N/A
10	1	0	16-QAM	N/A	23.87	N/A
10	1	24		N/A	23.94	N/A
10	1	49		N/A	23.93	N/A
10	25	0		N/A	22.60	N/A
10	25	12		N/A	22.61	N/A
10	25	24		N/A	22.58	N/A
10	50	0		N/A	22.59	N/A

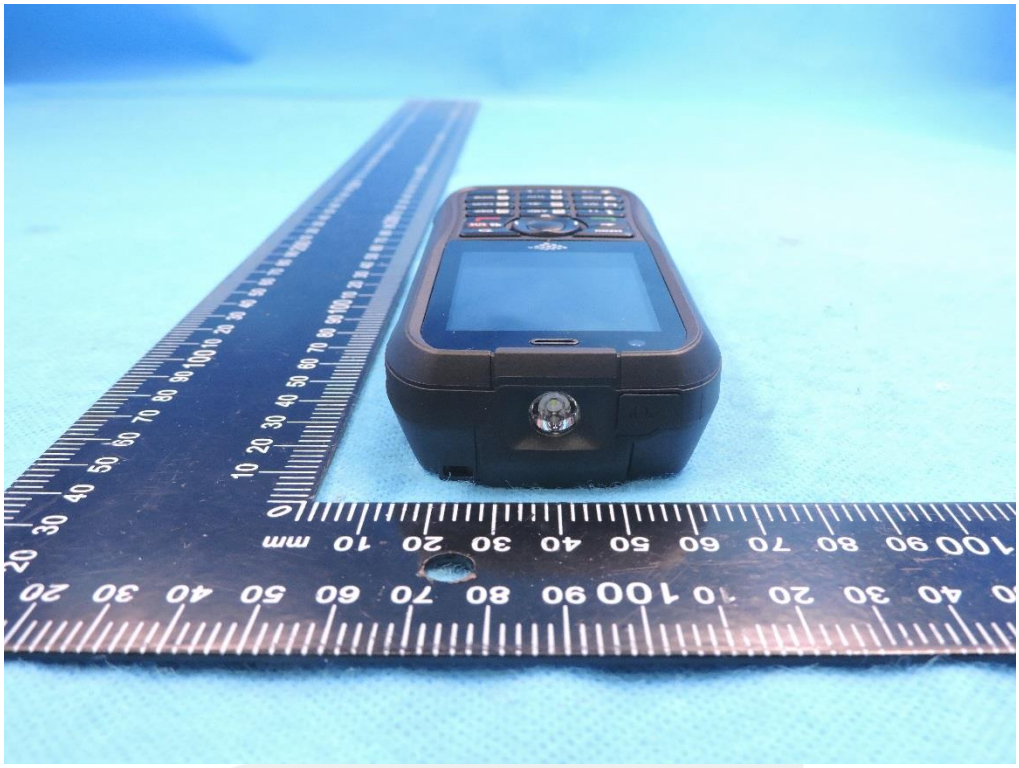
11. EUT and Test Setup Photo

11.1 EUT Photo

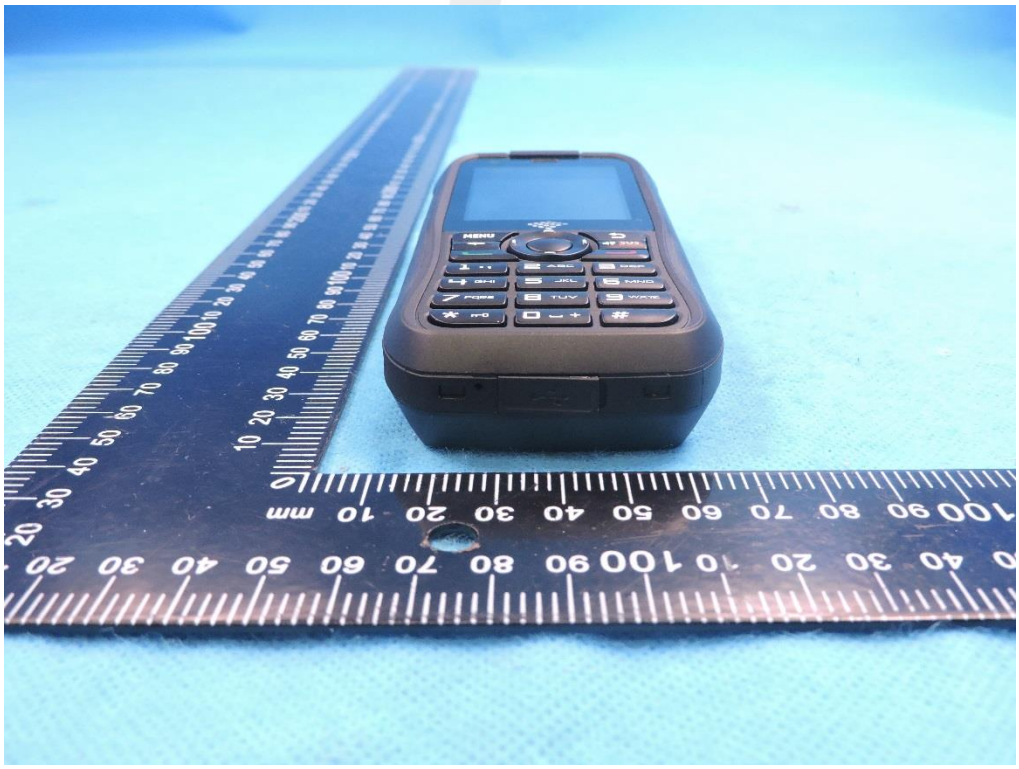
Front side

Back side

Top side



Bottom side

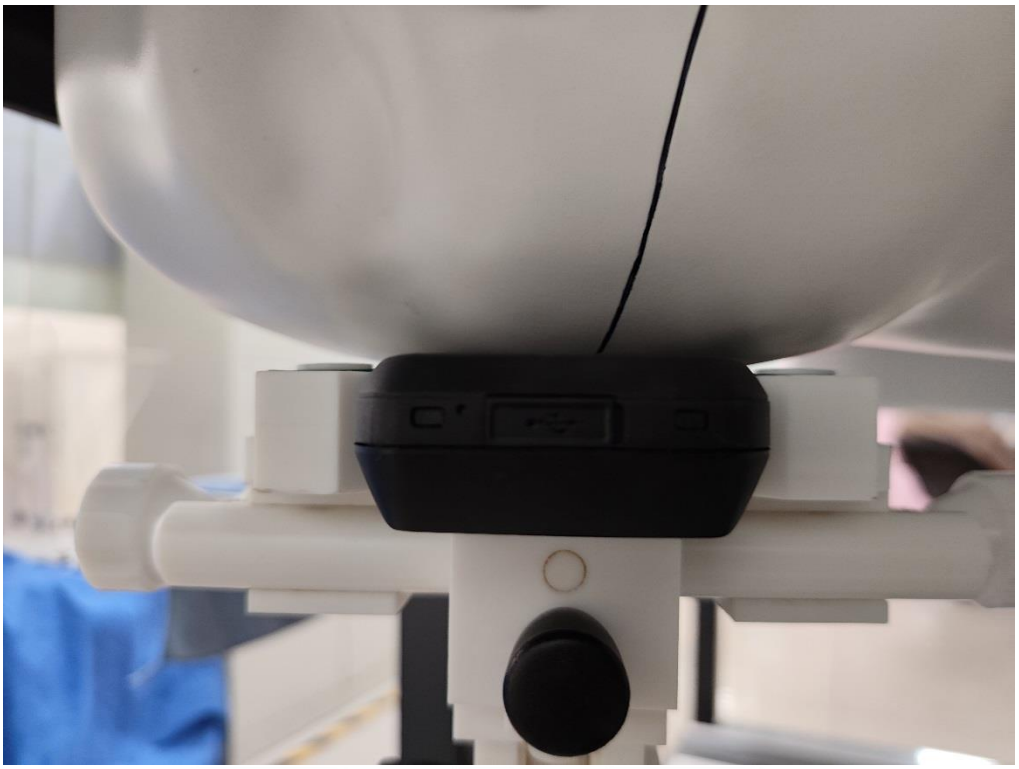


Left side

Right side

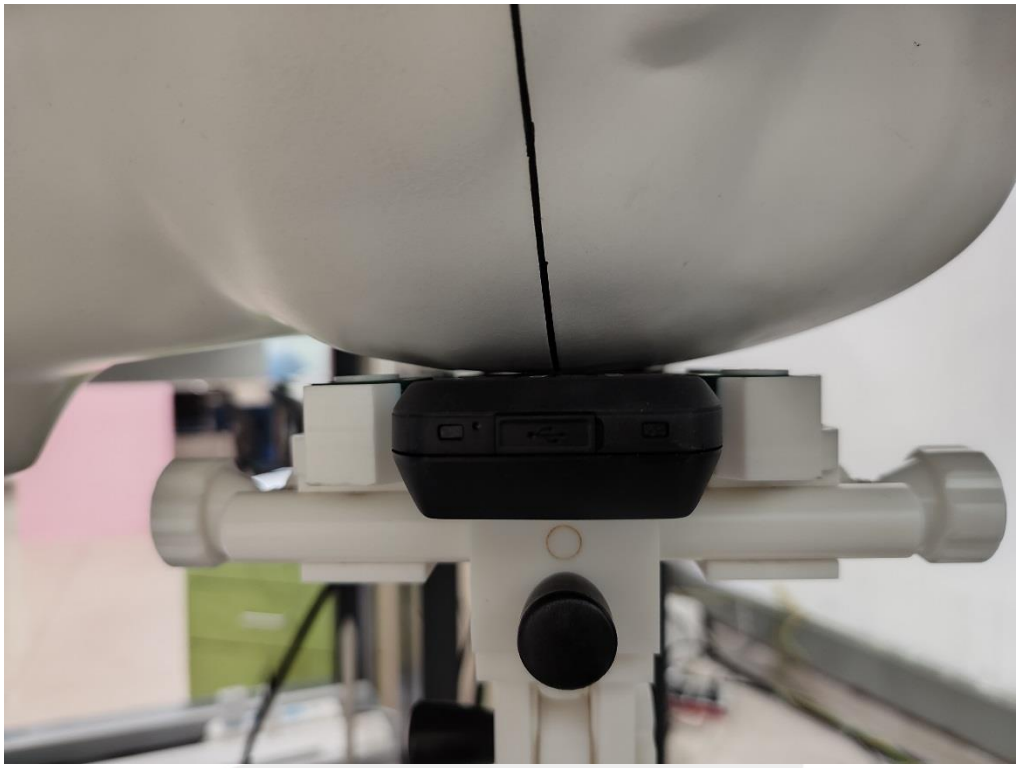
11.2 Setup Photo

Right Touch



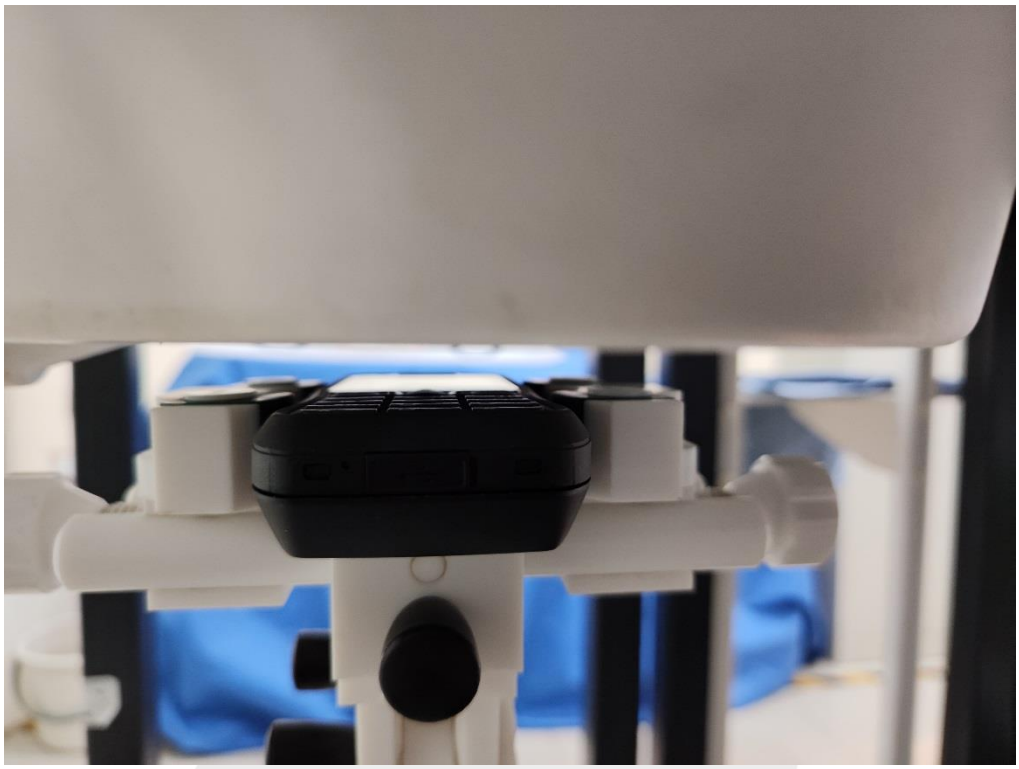
Right Tilt

Left Touch

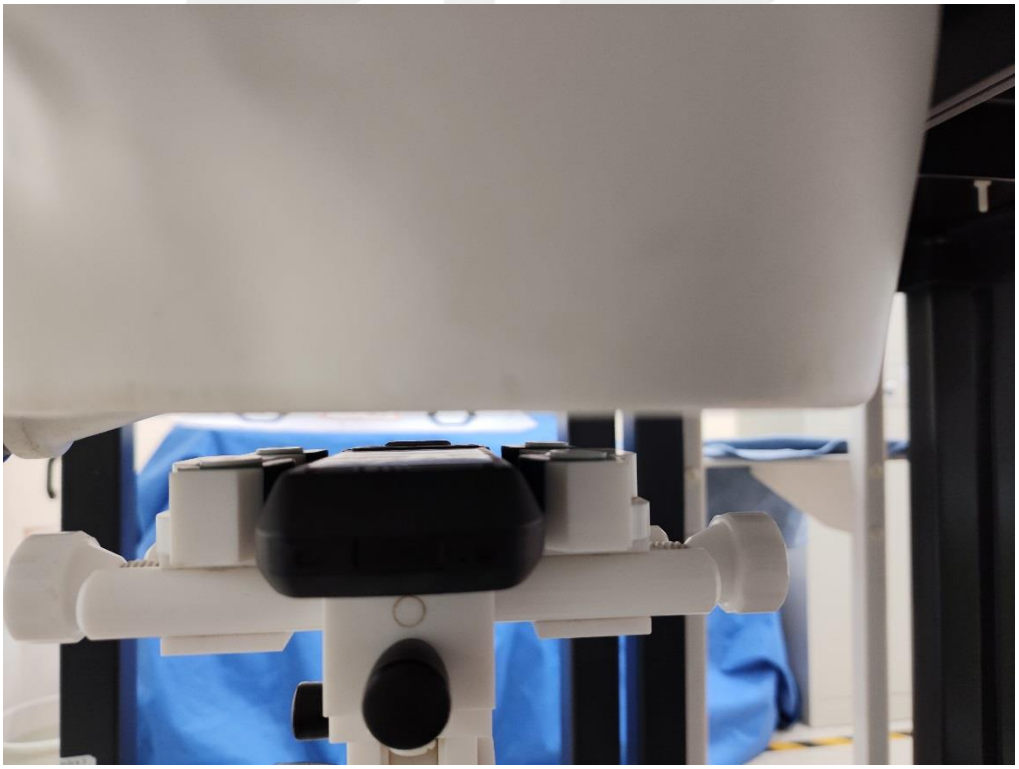


Left Tilt

Body Front side(separation distance is 10mm)



Body Back side(separation distance is 10mm)

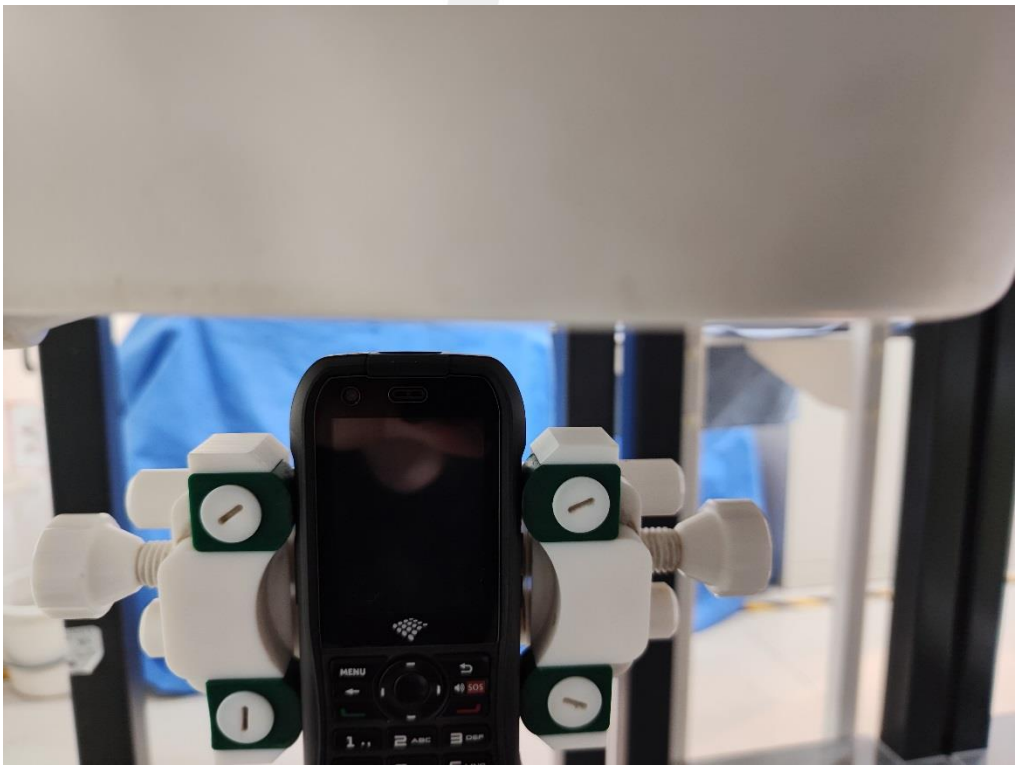


Body Left side(separation distance is 10mm)

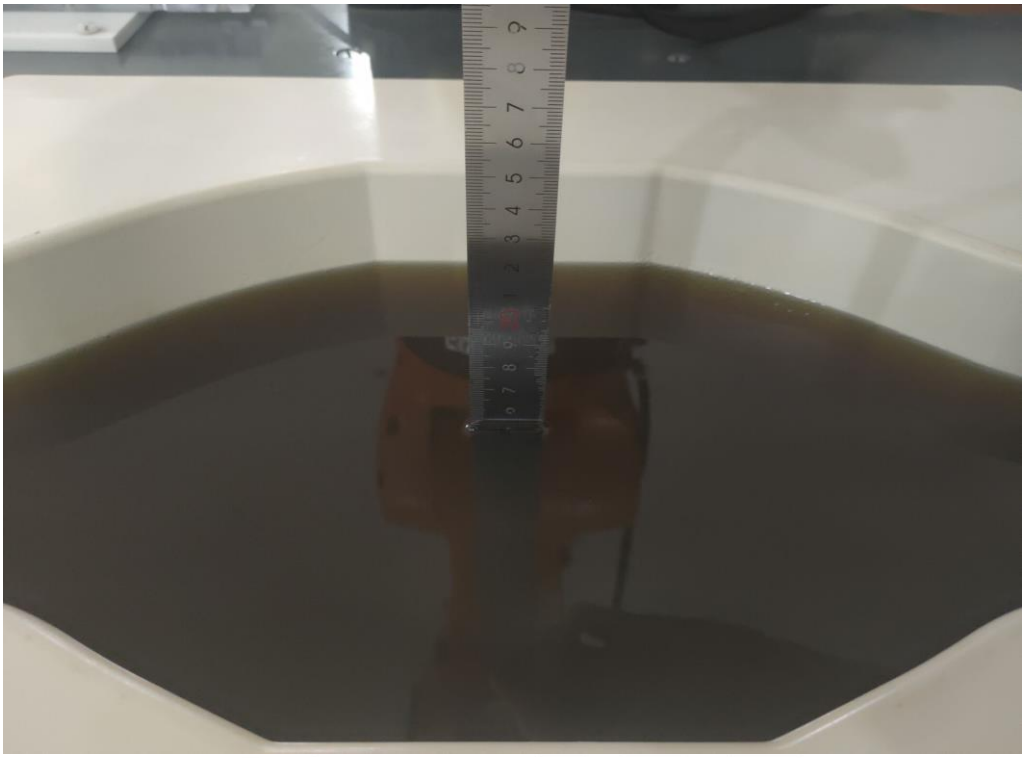
Body Right side(separation distance is 10mm)

Body Bottom side(separation distance is 10mm)

Body Top side(separation distance is 10mm)



Liquid depth (15 cm)



12. SAR Result Summary

12.1 Head SAR

Band	BW (MHz)	Mod.	RB Size	RB offset	Test Position	Freq.	Result 1g (W/Kg)	Power Drift(%)	Max. Turn-up Power(dBm)	Meas. Output Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
LTE Band 26	15M	QPSK	1	0	Right Cheek	841.5	0.663	-1.02	25	24.69	0.712	/
			36	0	Right Cheek	821.5	0.651	1.85	23.5	23.44	0.660	/
			1	0	Right Tilt	841.5	0.564	3.03	25	24.69	0.606	/
			36	0	Right Tilt	821.5	0.553	3.43	23.5	23.44	0.561	/
			1	0	Left Cheek	821.5	0.702	-1.81	25	24.31	0.823	/
			1	0	Left Cheek	831.5	0.686	3.26	25	24.28	0.810	/
			1	0	Left Cheek	841.5	0.778	0.84	25	24.69	**0.836**	**1**
			36	0	Left Cheek	821.5	0.652	-0.55	23.5	23.44	0.661	/
			1	0	Left Tilt	841.5	0.502	1.64	25	24.69	0.539	/
			36	0	Left Tilt	821.5	0.465	-1.25	23.5	23.44	0.471	/

Note:

1. Per KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.

b. For WWAN: Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor

2. Per KDB865664 D01, Repeated measurement is not required when the original highest measured SAR is <0.80 W/kg

12.2 Body-worn and Hotspot SAR

Band	BW (MHz)	Mod.	RB Size	RB offset	Test Position	Freq.	Result 1g (W/Kg)	Power Drift(%)	Max. Turn-up Power(dBm)	Meas. Output Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
LTE Band 26	15M	QPSK	1	0	Front side	841.5	0.662	-2.26	25	24.69	0.711	/
			36	0	Front side	821.5	0.622	-0.16	23.5	23.44	0.631	/
			1	0	Back Side	821.5	0.732	1.54	25	24.31	0.858	/
			1	0	Back Side	831.5	0.712	-1.59	25	24.28	0.840	/
			1	0	Back Side	841.5	0.823	-0.36	25	24.69	**0.884**	**2**
			36	0	Back Side	821.5	0.632	-0.99	23.5	23.44	0.641	/
			1	0	Left Side	841.5	0.662	2.07	25	24.69	0.711	/
			36	0	Left Side	821.5	0.598	2.53	23.5	23.44	0.606	/
			1	0	Right Side	841.5	0.606	-3.36	25	24.69	0.651	/
			36	0	Right Side	821.5	0.550	-2.04	23.5	23.44	0.558	/
			1	0	Bottom Side	841.5	0.119	2.91	25	24.69	0.128	/
			36	0	Bottom Side	821.5	0.112	3.63	23.5	23.44	0.114	/

Note:

1. The test separation of all above table is 10mm.
2. Per KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
3. When the user enables the personal Wireless router functions for the handsets, actual operations include simultaneous transmission of both the Wi-Fi transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. The “Portable Hotspot” feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

Repeated SAR

Band	BW (MHz)	Mod.	RB Size	RB offset	Test Position	Freq.	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR(W/Kg)	Meas. No.
LTE Band 26	15M	QPSK	1	0	Left Cheek	821.5	0.677	1.99	25	24.31	0.794	-
			1	0	Left Cheek	831.5	0.653	3.91	25	24.28	0.771	-
			1	0	Left Cheek	841.5	0.748	-2.82	25	24.69	0.803	-
LTE Band 26	15M	QPSK	1	0	Back Side	821.5	0.716	0.59	25	24.31	0.839	-
			1	0	Back Side	831.5	0.690	0.07	25	24.28	0.814	-
			1	0	Back Side	841.5	0.789	1.51	25	24.69	0.847	-

12.3 repeated SAR measurement

Band	BW (MHz)	Mod.	RB Size	RB offset	Test Position	Freq.	Original Measured SAR 1g(W/kg)	1 st Repeated SAR 1g	Ratio	Original Measured	2nd Repeated SAR 1g	Ratio
LTE Band 26	15M	QPSK	1	0	Left Cheek	821.5	0.702	0.677	1.037	-	-	-
			1	0	Left Cheek	831.5	0.686	0.653	1.051	-	-	-
			1	0	Left Cheek	841.5	0.778	0.748	1.040	-	-	-
LTE Band 26	15M	QPSK	1	0	Back Side	821.5	0.732	0.716	1.022	-	-	-
			1	0	Back Side	831.5	0.712	0.690	1.032	-	-	-
			1	0	Back Side	841.5	0.823	0.789	1.043	-	-	-

Note:

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

13. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
835MHz Dipole	MVG	SID835	SN 30/14 DIP0G835-332	2020.07.14	2023.07.13
E-Field Probe	MVG	SSE2	SN 07/21 EPGO352	2023.02.24	2024.02.23
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2022.11.15	2023.11.14
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	N/A	N/A
Phantom3	MVG	SAM	SN 21/21 ELLI48	N/A	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	N/A	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	N/A	N/A
Attenuator	Agilent	99899	DC-18GHz	N/A	N/A
Directional coupler	Narda	4226-20	3305	N/A	N/A
Network Analyzer	Agilent	8753ES	US38432810	2022.09.28	2023.09.27
Multi Meter	Keithley	Multi Meter 2000	4050073	2022.09.29	2023.09.28
Signal Generator	Agilent	N5182A	MY50140530	2022.09.28	2023.09.27
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2022.09.28	2023.09.27
Wireless Communication Test Set	R&S	CMW500	156324	2022.09.29	2023.09.28
Power Amplifier	DESAY	ZHL-42W	9638	2022.10.08	2023.10.07
Power Meter	R&S	NRP	100510	2022.09.28	2023.09.27
Power Sensor	R&S	NRP-Z11	101919	2022.09.28	2023.09.27
Power Sensor	Keysight	U2021XA	MY56280002	2022.09.29	2023.09.28
Temperature hygrometer	SuWei	SW-108	N/A	2022.09.30	2023.09.29
Thermograph	Elitech	RC-4	S/N EF7176501537	2022.09.30	2023.09.29

Note:
Per KDB 865664 D01, Dipole SAR Validation Verification, STS LAB has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:
1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value Return-loss in within 20% of calibrated measurement

Appendix A. System Validation Plots

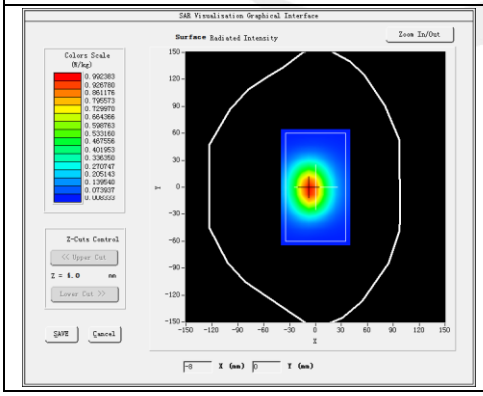
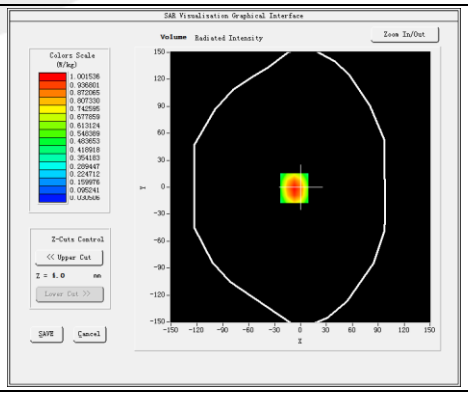
System Performance Check Data (835MHz)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2023-03-29

Experimental conditions

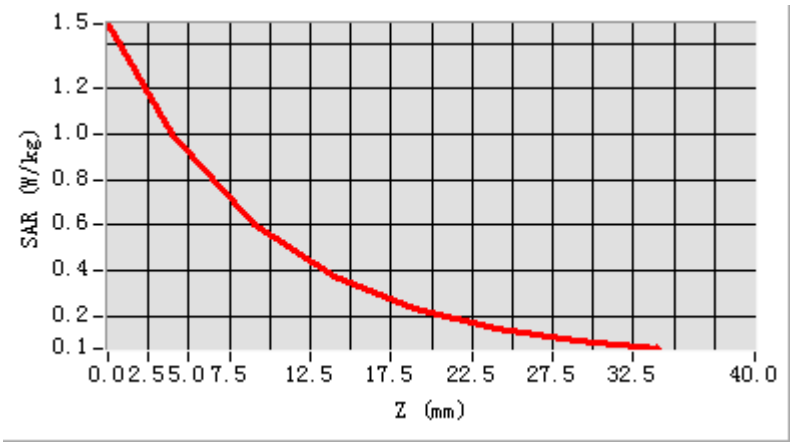
Phantom	Validation plane
Device Position	-
Band	835MHz
Channels	-
Signal	CW
Frequency (MHz)	835MHz
Relative permittivity	40.55
Conductivity (S/m)	0.94
Probe	SN 07/21 EPGO352
ConvF:	1.57
Crest factor:	1:1

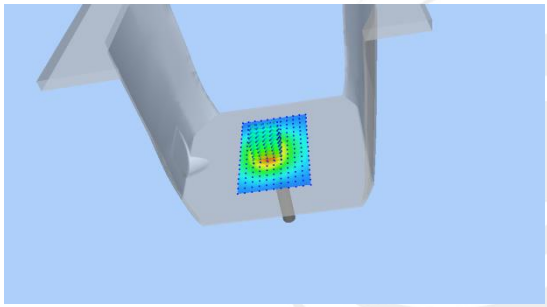
SURFACE SAR	VOLUME SAR
	

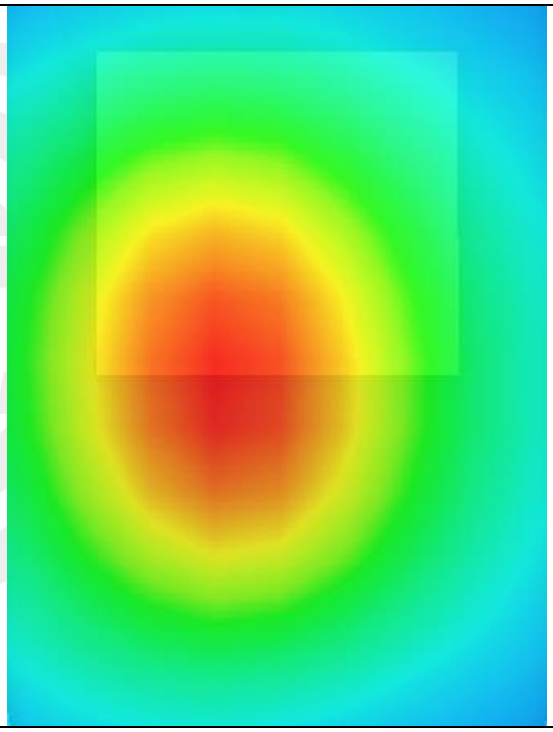
Maximum location: X=-7.00, Y=-1.00

SAR 10g (W/Kg)	0.631149
SAR 1g (W/Kg)	0.979828

Z Axis Scan


1.5
1.2
1.0
0.8
0.6
0.4
0.2
0.1
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)





Appendix B. SAR Test Plots

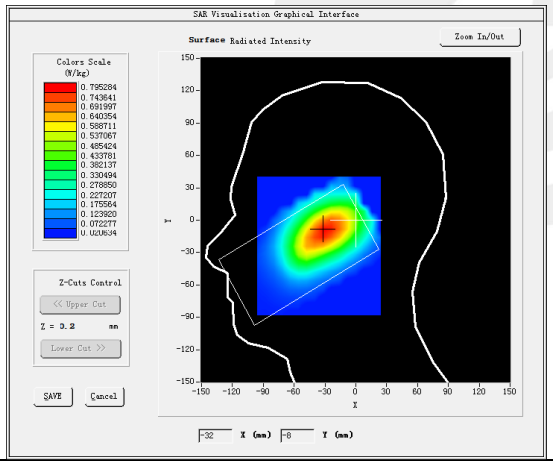
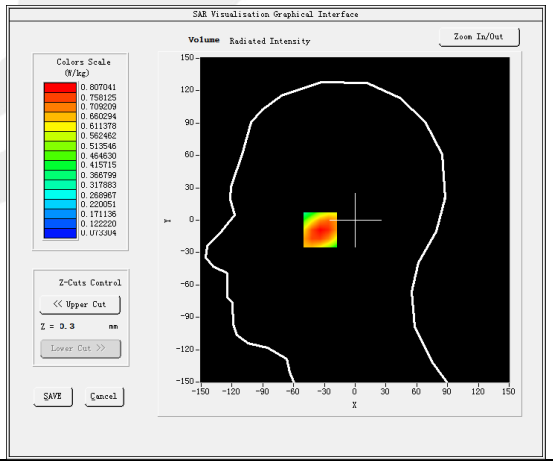
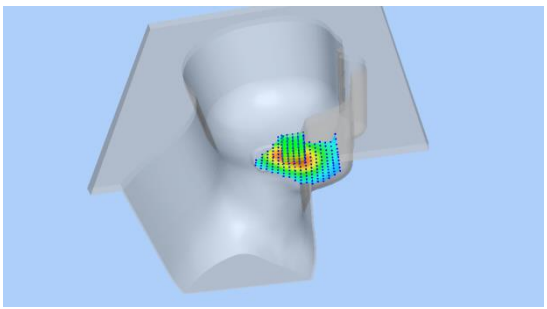
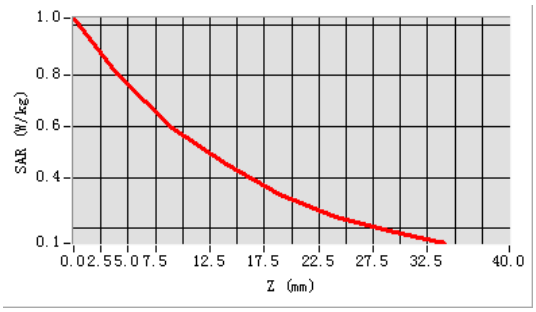
Plot 1: DUT: Rugged Smart Phone; EUT Model: H240S E

Test Date	2023-03-29
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Left Cheek
Device Position	Cheek
Band	LTE Band 26 (RB 1)
Signal	LTE (Crest factor: 1.0)
Frequency (MHz)	841.5
Relative permittivity (real part)	41.14
Conductivity (S/m)	0.89

Maximum location: X=-31.00, Y=-9.00

SAR Peak: 1.03 W/kg

SAR 10g (W/Kg)	0.535769
SAR 1g (W/Kg)	0.777574

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

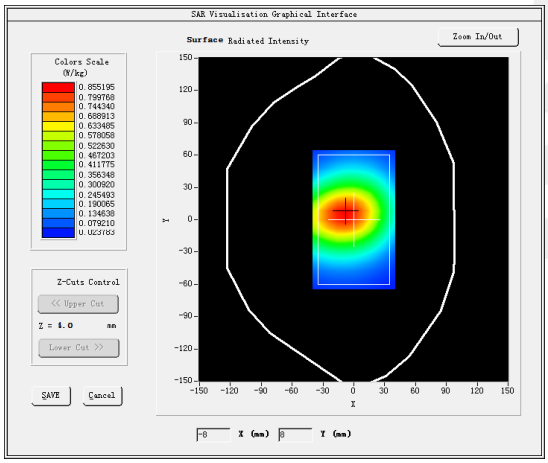
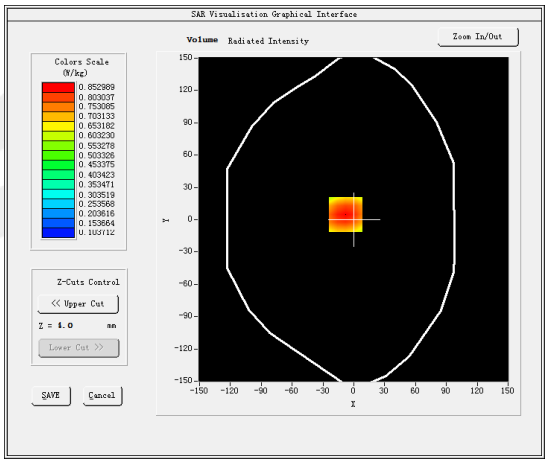
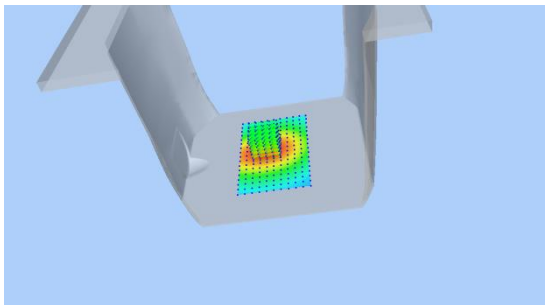
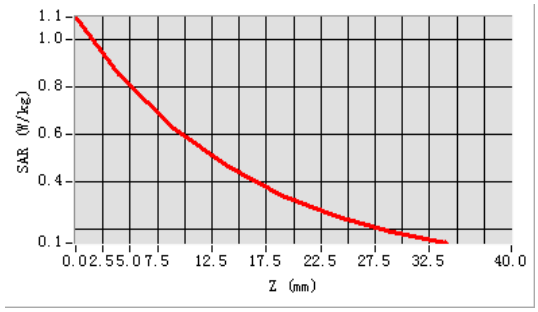
Plot 2: DUT: Rugged Smart Phone; EUT Model: H240S E

Test Date	2023-03-29
Probe	SN 07/21 EPGO352
Area Scan	dx=8mm, dy=8mm, h= 5.00 mm
Zoom Scan	5x5x7, dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Back Side
Band	LTE Band 26 (RB 1)
Signal	LTE (Crest factor: 1.0)
Frequency (MHz)	841.5
Relative permittivity (real part)	41.14
Conductivity (S/m)	0.89

Maximum location: X=-8.00, Y=5.00

SAR Peak: 1.09 W/kg

SAR 10g (W/Kg)	0.579048
SAR 1g (W/Kg)	0.823348

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Appendix C. Probe Calibration and Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※