SAR TEST REPORT

Product Name: RuxTek 3G WCDMA Fixed Wireless Phone without WiFi

Model Name: RTP-403

FCC ID: 2BDRQ-RTP403

Issued For	:	RuxTek Co.,Ltd 4F., No. 61, Sanfu St., Shulin Dist., New Taipei City 238035 , Taiwan
Issued By	:	Shenzhen LGT Test Service Co., Ltd. Room 205, Building 13, Zone B, Chen Hsong Industrial Park, No.177 Renmin West Road, Jinsha Community, Kengzi Street, Pingshan New District, Shenzhen, China

Report Number:	LGT23K084HA01
Sample Received Date:	Nov. 29, 2023
Date of Test:	Nov. 29, 2023 ~ Dec. 19, 2023
Date of Issue:	Dec. 20, 2023
Max. SAR (1g):	Body: 1.089 W/kg

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Revision History

Rev.	Issue Date	Contents
00	Dec. 20, 2023	Initial Issue

TEST REPORT CERTIFICATION

Applicant	RuxTek Co.,Ltd
Address	4F., No. 61, Sanfu St., Shulin Dist., New Taipei City 238035 , Taiwan
Manufacture	RuxTek Co.,Ltd
Address	4F., No. 61, Sanfu St., Shulin Dist., New Taipei City 238035 , Taiwan
Product Name	RuxTek 3G WCDMA Fixed Wireless Phone without WiFi
Trademark	RuxTek
Model Name	RTP-403
Sample number	LGT2311090-1

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
ANSI/IEEE Std. C95.1-1992 FCC 47 CFR Part 2 (2.1093) IEEE 1528: 2013	PASS

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Manager

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	RuxTek 3G WCDMA Fixed Wireless Phone without WiFi	
Trademark	RuxTek	
Model Name	RTP-403	
Series Model	N/A	
Model Difference	N/A	
Device Category	Portable	
Product stage	Production unit	
RF Exposure Environment	General Population / Uncontrolled	
Hardware Version	L3500_117-4G_MB REV:A/0	
Software Version	QX_W3600_SA_BW_T107_N44_0002	
Frequency Range	GGSM 850: 824 ~ 849 MHz PCS 1900: 1850 ~ 1910 MHz WCDMA Band II: 1850 ~ 1910 MHz	
Max. Reported SAR(1g): (Limit:1.6W/kg) Test distance:0mm	Mode	Body (W/kg))
	GSM 850	1.012
	PCS 1900	1.089
	WCDMA Band II	1.050
Battery	Rated Voltage:3.7V Capacity: 1000mAh	
Operating Mode:	GSM: GSM Voice; GPRS/EGPRS Class 12 WCDMA: RMC, HSDPA, HSUPA Release 6	
Antenna Specification	GSM/WCDMA: Paddle Antenna	
Operating Mode	Maximum continuous output	
SIM Card	Only Support single SIM card.	
Hotspot Mode	Not Support	
DTM Mode	Not Support	

1.2 Test Environment

Ambient conditions in the SAR laboratory:

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

1.3 Test Factory

Company Name:	Shenzhen LGT Test Service Co., Ltd.
Address:	Room 205, Building 13, Zone B, Chen Hsong Industrial Park, No.177 Renmin West Road, Jinsha Community, Kengzi Street, Pingshan New District, Shenzhen, China
Accreditation Certificate	FCC Registration No.: 746540
	A2LA Certificate No.: 6727.01
	IC Registration No.: CN0136

2. Test Standards and Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
7	FCC KDB 941225 D01 v03r01	SAR Measurement Procedures for 3G 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:

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

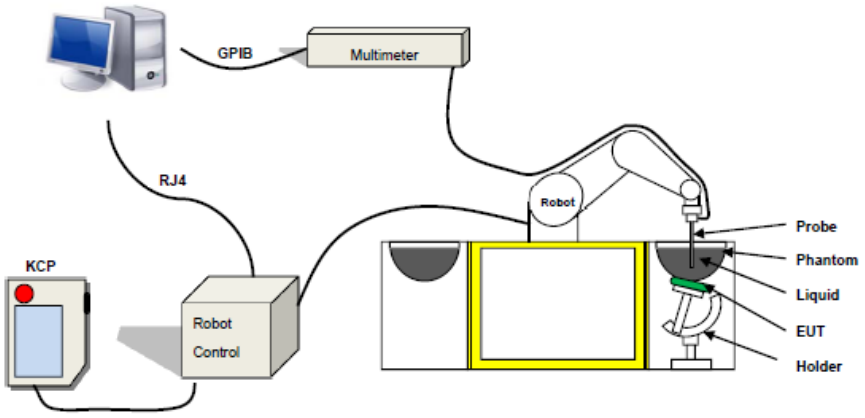
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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

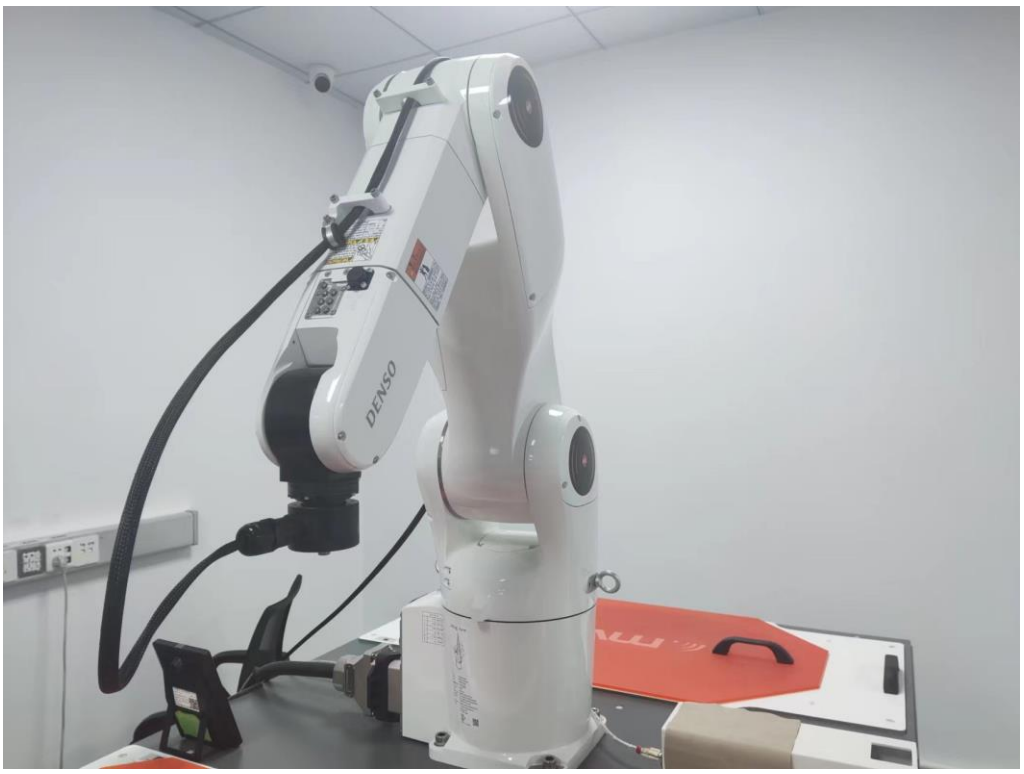
3.2 SAR System

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 OpenSAR software computes the results to give a SAR value in a 1g or 1g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 04/22 EPGO364 with following specifications is used
- Probe Length: 330 mm
- Length of Individual Dipoles: 2mm
- 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: 600 MHz to 6 GHz for head & body simulating liquid.
-Angle between probe axis (evaluation axis) and surface normal line: less than 30°

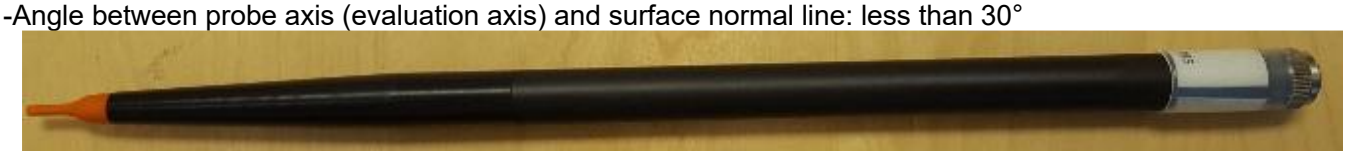


Figure 1-MVG COMOSAR Dosimetric E field Probe

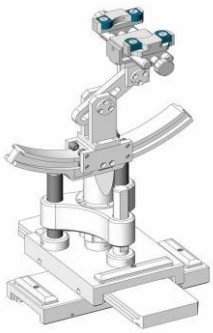
3.2.2 Phantom

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

Figure-SN 06/22 SAM 148

Figure-SN 06/22 ELLI 51

3.2.3 Device Holder



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

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values

The uncertainty due to the liquid conductivity and permittivity arises from two different sources. The first source of error is the deviation of the liquid conductivity from its target value (max _ 5 %) and the second source of error arises from the measurement procedures used to assess conductivity. The uncertainty shall be assessed using a rectangular probability For 1 g averaging, the maximum weighting coefficient for SAR is 0,5.

IEEE SCC-34/SC-2 RECOMMENDED TISSUE DIELECTRIC PARAMETERS
The head and body tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table.

Frequency	εr	σ 10g S/m
300	45.3	0.87
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1800 to 2000	40.0	1.40
2100	39.8	1.49
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40
3500	37.9	2.91
4000	37.4	3.43
4500	36.8	3.94
5000	36.2	4.45
5200	36.0	4.66
5400	35.8	4.86
5600	35.5	5.07
5800	35.3	5.27

LIQUID MEASUREMENT RESULTS

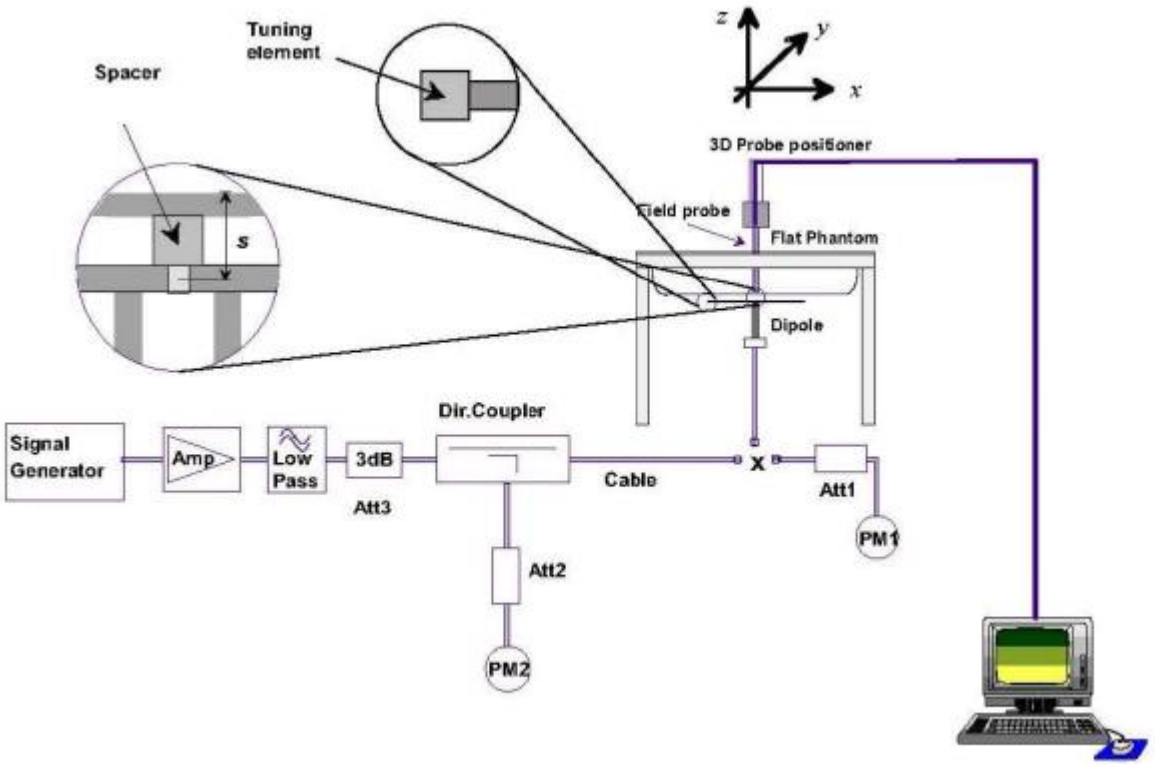
Date	Ambient		Simulating Liquid		Parameters	Target	Measured	Deviation %	Limited %
	Temp. [°C]	Humidity %	Frequency (MHz)	Temp. [°C]					
2023-11-29	23.4	57	835	23.1	Permittivity	41.50	41.36	-0.34	±5
					Conductivity	0.90	0.88	-2.22	±5
2023-12-19	22.3	42	1900	22	Permittivity	40.00	41.06	2.65	±5
					Conductivity	1.40	1.44	2.86	±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)	(%)	(%)
2023-11-29	835	100	0.982	9.82	9.75	0.72	10
2023-12-19	1900	100	4.048	40.48	40.85	-0.91	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 RuxTek 3G WCDMA Fixed Wireless Phone without WiFi, support GSM/WCDMA mode.

Antenna Separation Distance(mm)						
ANT	Back Side	Front Side	Left Side	Right Side	Top Side	Bottom Side
WWAN	≤5	≤5	196	≤5	30	124

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

2: The distance between the above antennas is measured by the vertical 90 ° position of the antenna.

7.1 SAR test exclusion consider table

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

Exposure Position	Wireless Interface	GSM850	PCS1900	WCDMA II
	Calculated Frequency(MHz)	824.2	1850.2	1907.6
	Maximum Turn-up power (dBm)	33.5	30.5	23.5
	Maximum rated power(mW)	2238.72	1122.02	223.87
Back Side	Separation distance (mm)	5	5	5
	exclusion threshold(mW)	16.52	11.03	10.86
	Testing required?	YES	YES	YES
Front Side	Separation distance (mm)	5	5	5
	exclusion threshold(mW)	16.52	11.03	10.86
	Testing required?	YES	YES	YES
Left Side	Separation distance (mm)	196	196	196
	exclusion threshold(mW)	967.45	1570.28	1568.60
	Testing required?	YES	NO	NO
Right Side	Separation distance (mm)	5	5	5
	exclusion threshold(mW)	16.52	11.03	10.86
	Testing required?	YES	YES	YES
Top Side	Separation distance (mm)	30	30	30
	exclusion threshold(mW)	99.13	66.17	65.16
	Testing required?	YES	YES	YES
Bottom Side	Separation distance (mm)	124	124	124
	exclusion threshold(mW)	409.76	850.28	848.60
	Testing required?	YES	YES	NO

Note：

1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. per KDB 447498 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <25mm,25mm is user to determine SAR exclusion threshold
4. per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distance ≤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

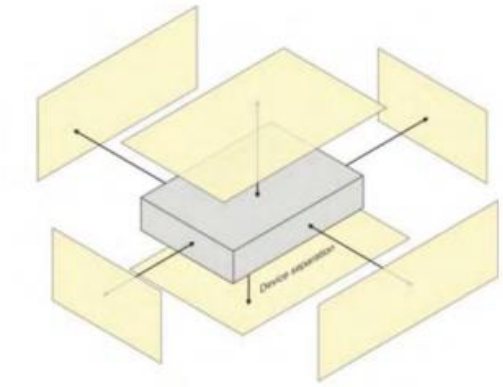
5. per KDB 447498 D01, at 100 MHz to 6GHz and for test separation distances >50mm, the SAR test exclusion threshold is determined according to the following
   a)[threshold at 50mm in step 1]+(test separation distance -50mm)*(f (MHz)/150)]mW, at 100 MHz to 1500 MHz
   b) [threshold at 50mm in step1]+(test 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.

8. EUT Test Position

This EUT was tested in Back Side, Front Side, Left Side, Right Side, Bottom Side and Top Side.

8.1 Body-worn Position Conditions

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



9. 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)	5.8	2	2.90	1	2.90	∞
CF_{drift}	Probe calibration drift	R	0.12	√3	0.07	1	0.07	∞
LIN	Probe linearity and detection limit	R	1.91	√3	1.10	1	1.10	∞
BBS	Broadband signal	R	0.15	√3	0.09	1	0.09	∞
ISO	Probe isotropy	R	0.18	√3	0.10	1	0.10	∞
DAE	Other probe and data acquisition errors	N	2.7	1	2.70	1	2.70	∞
AMB	RF ambient and noise	N	1.73	1	1.73	1	1.73	∞
Δ_{xyz}	Probe positioning errors	N	0.81	1	0.81	2/δ	0.81	
DAT	Data processing errors	N	2.5	1	2.50	1	2.50	∞
Phantom and device (DUT or validation antenna) errors								
LIQ(σ)	Measurement of phantom conductivity(σ)	N	4.4	1	4.4	cε, cσ	4.40	∞
LIQ(T_c)	Temperature effects (medium)	R	2.9	√3	1.67	cε, cσ	1.67	∞
EPS	Shell permittivity	R	3.4	√3	1.96	See 8.4.2.3	0.49	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	N	0.8	1	0.8	2	1.60	∞
D_{xyz}	Repeatability of positioning the DUT or source against the phantom	N	1.5	1	1.5	1	1.50	5
H	Device holder effects	N	3	1	3	1	3.00	
MOD	Effect of operating mode on probe sensitivity	R	3.59	√3	2.07	1	2.07	∞
TAS	Time-average SAR	R	1.73	√3	1.00	1	1.00	∞
RF_{drift}	Variation in SAR due to drift in output of DUT	N	2.89	1	2.89	1	2.89	
VAL	Validation antenna uncertainty (validation measurement only)	N	1.45	1	1.45	1	1.45	
P_{in}	Uncertainty in accepted power (validation measurement only)	N	2.5	1	2.5	1	2.50	
Corrections to the SAR result (if applied)								
C(ε′,σ)	Phantom deviation from target (ε′,σ))	N	2.31	1	2.31	1	2.31	
C(R)	SAR scaling	R	1.15	√3	0.66	1	0.66	
u(ΔSAR)	Combined uncertainty						9.53	
U	Expanded uncertainty and effective degrees of freedom					U =	19.06	

10. Conducted Power Measurement

10.1 Test Result:

Burst Average Power (dBm)						
Band	GSM 850			PCS 1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GSM (GMSK, 1-Slot)	33.44	32.98	33.19	30.40	30.31	30.13
GPRS (GMSK, 1-Slot)	33.45	33.03	33.22	30.39	30.30	30.16
GPRS (GMSK, 2-Slot)	31.59	31.07	31.04	28.46	28.09	27.78
GPRS (GMSK, 3-Slot)	29.66	29.14	29.11	26.92	26.60	26.29
GPRS (GMSK, 4-Slot)	27.43	27.01	26.96	24.75	24.43	24.19
EGPRS (8PSK, 1-Slot)	26.95	27.18	27.17	25.86	26.32	26.91
EGPRS (8PSK, 2-Slot)	26.06	26.39	25.97	24.37	25.18	25.43
EGPRS (8PSK, 3-Slot)	23.84	24.55	23.93	21.92	23.14	23.41
EGPRS (8PSK, 4-Slot)	22.31	22.94	22.66	19.71	21.22	21.42
Remark: GPRS, CS4 coding scheme. EGPRS, MCS5 coding scheme. Multi-Slot Class 8, Support Max 4 downlink, 1 uplink, 5 working link Multi-Slot Class 10, Support Max 4 downlink, 2 uplink, 5 working link Multi-Slot Class 12, Support Max 4 downlink, 4 uplink, 5 working link						

Frame- Average Power(dBm)						
Band	GSM 850			PCS 1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GSM (GMSK, 1-Slot)	24.41	23.95	24.16	21.37	21.28	21.10
GPRS (GMSK, 1-Slot)	24.42	24.00	24.19	21.36	21.27	21.13
GPRS (GMSK, 2-Slot)	25.57	25.05	25.02	22.44	22.07	21.76
GPRS (GMSK, 3-Slot)	25.40	24.88	24.85	22.66	22.34	22.03
GPRS (GMSK, 4-Slot)	24.42	24.00	23.95	21.74	21.42	21.18
EGPRS (8PSK, 1-Slot)	17.92	18.15	18.14	16.83	17.29	17.88
EGPRS (8PSK, 2-Slot)	20.04	20.37	19.95	18.35	19.16	19.41
EGPRS (8PSK, 3-Slot)	19.58	20.29	19.67	17.66	18.88	19.15
EGPRS (8PSK, 4-Slot)	19.30	19.93	19.65	16.70	18.21	18.41
Remark: 1. SAR testing was performed on the maximum frame-averaged power mode. 2. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum Burst - averaged power based on time slots. The calculated method is shown as below: Frame-averaged power = Burst averaged power (1 TX Slot) – 9.03 dB Frame-averaged power = Burst averaged power (2 TX Slots) – 6.02 dB Frame-averaged power = Burst averaged power (3 TX Slots) - 4.26 dB Frame-averaged power = Burst averaged power (4 TX Slots) – 3.01 dB						

WCDMA

Band	WCDMA Band 2		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880	1907.6
RMC 12.2Kbps	22.88	23.19	23.38
HSDPA Subtest-1	23.03	22.53	22.76
HSDPA Subtest-2	22.72	22.15	22.55
HSDPA Subtest-3	22.32	22.17	22.10
HSDPA Subtest-4	22.24	21.93	22.07
HSUPA Subtest-1	22.90	22.42	22.76
HSUPA Subtest-2	22.93	22.47	22.71
HSUPA Subtest-3	22.76	22.34	22.50
HSUPA Subtest-4	22.81	22.41	22.70
HSUPA Subtest-5	22.47	22.30	22.34

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

Table 6.1A: 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 βc/βd=12/15, βhs/ βc=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.

11. EUT and Test Setup Photo

11.1 EUT Photos

Front side

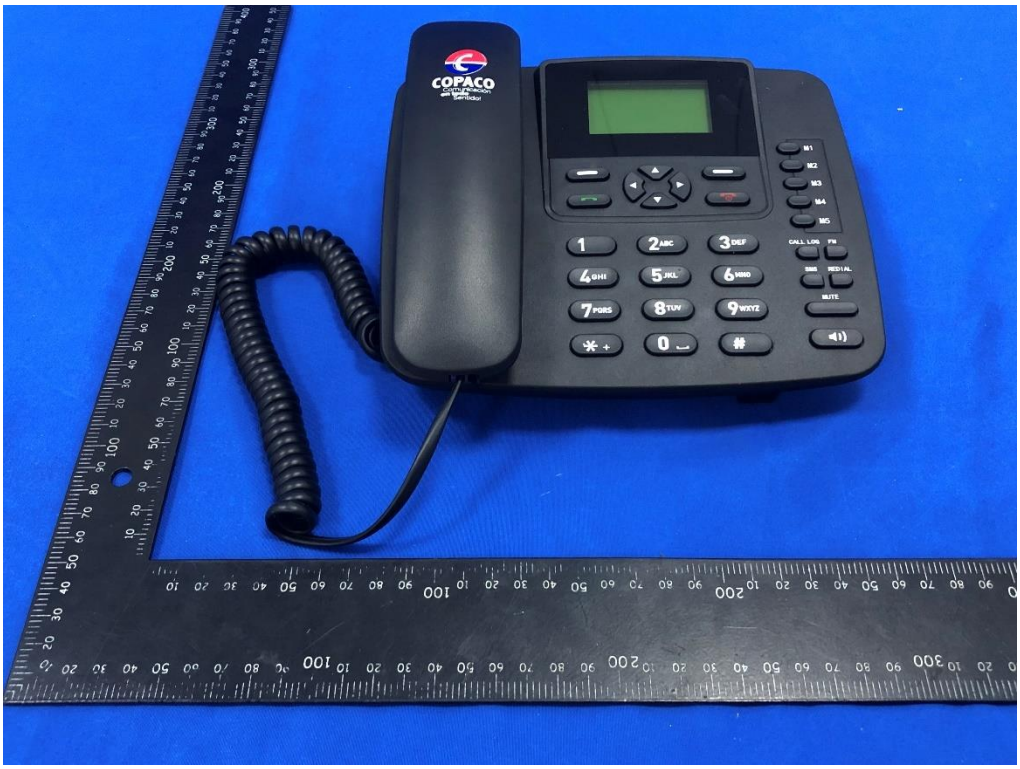
Back side

Right Edge

Left Edge

Top Edge

Bottom Edge



Antenna Horizontal 0°

Antenna Vertical 90°

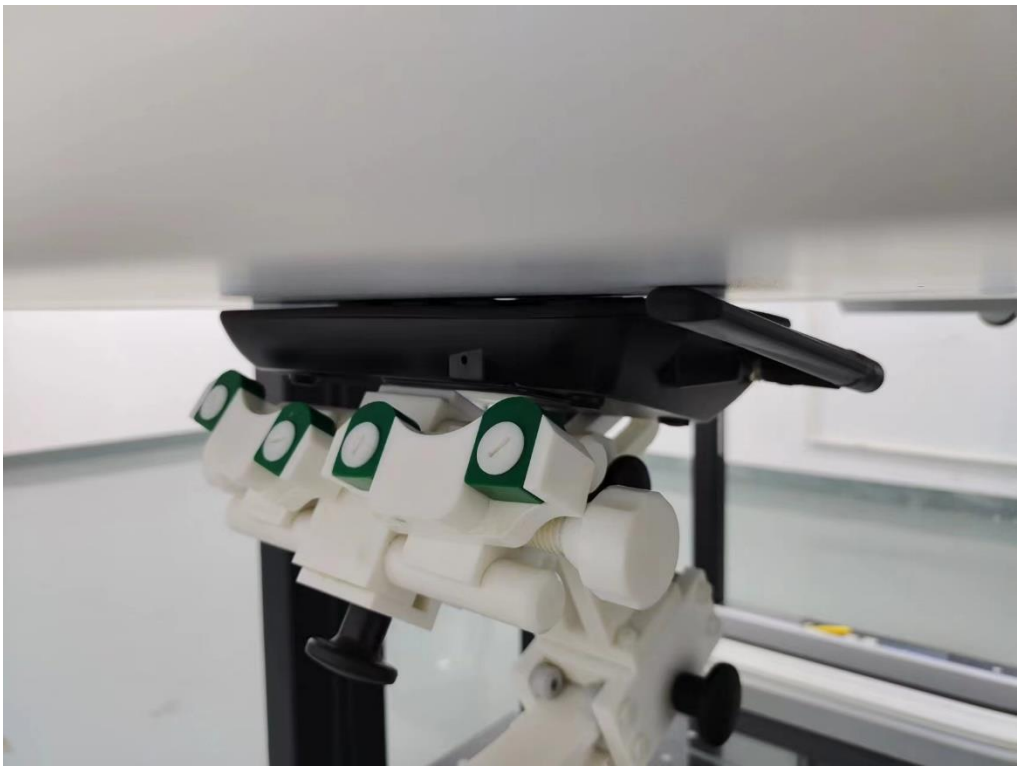
Antenna Horizontal 180°

11.2 Setup Photos

Front Side Antenna Horizontal 0° (separation distance is 0mm)

Front Side Antenna Vertical 90° (separation distance 0mm)

Front Side Antenna Horizontal 180° (separation distance 0mm)



Back Side Antenna Horizontal 180° (separation distance 0mm)

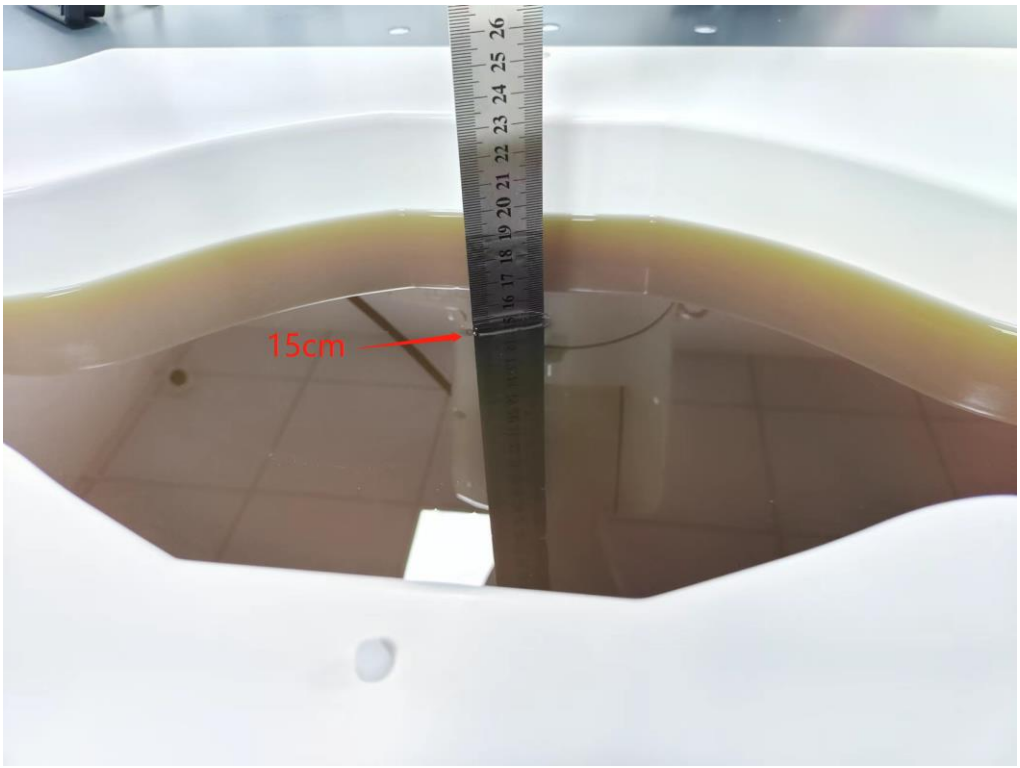
Right Side Antenna Horizontal 180°（separation distance is 0mm)

Left Side Antenna Horizontal 180°（separation distance is 0mm)

Top Side Antenna Horizontal 180°（separation distance is 0mm)

Bottom Side Antenna Horizontal 180°（separation distance is 0mm)

Liquid depth (15 cm)



12. SAR Result Summary

12.1 Body-worn and Hotspot SAR

Band	Model	Test Position	Freq.	SAR (1g) (W/kg)	Power Drift (%)	Max. Turn-up Power (dBm)	Meas. Output Power (dBm)	Scaled SAR (W/Kg)	Meas. No.
GSM850	Voice	Front Side ANT 0°	824.2	0.116	1.97	33.50	33.44	0.118	/
		Front Side ANT 90°	824.2	0.050	3.77	33.50	33.44	0.051	/
		Front Side ANT 180°	824.2	0.253	-1.44	33.50	33.44	0.257	/
		Back Side ANT 180°	824.2	0.482	-0.37	33.50	33.44	0.489	/
		Left Side ANT 180°	824.2	0.153	1.87	33.50	33.44	0.155	/
		Right Side ANT 180°	824.2	0.998	-1.72	33.50	33.44	**1.012**	**1**
		Right Side ANT 180°	836.6	0.753	0.69	33.50	32.98	0.849	/
		Right Side ANT 180°	848.8	0.816	-0.03	33.50	33.19	0.876	/
		Top Side ANT 180°	824.2	0.247	-1.00	33.50	33.44	0.250	/
		Bottom Side ANT 180°	824.2	0.066	3.05	33.50	33.44	0.067	/
PCS 1900	Voice	Front Side ANT 0°	1850.2	0.157	3.73	30.50	30.40	0.161	/
		Front Side ANT 90°	1850.2	0.124	-1.41	30.50	30.40	0.127	/
		Front Side ANT 180°	1850.2	0.500	3.74	30.50	30.40	0.512	/
		Back Side ANT 180°	1850.2	0.085	-1.51	30.50	30.40	0.087	/
		Right Side ANT 180°	1850.2	1.064	3.90	30.50	30.40	**1.089**	**2**
		Right Side ANT 180°	1880	0.927	-2.30	30.50	30.31	0.968	/
		Right Side ANT 180°	1909.8	0.856	-1.26	30.50	30.13	0.932	/
		Top Side ANT 180°	1850.2	0.410	2.39	30.50	30.40	0.420	/
		Bottom Side ANT 180°	1850.2	0.071	-2.47	30.50	30.40	0.073	/
WCDMA Band II	RMC	Front Side ANT 0°	1907.6	0.356	0.87	23.50	23.38	0.366	/
		Front Side ANT 90°	1907.6	0.057	2.39	23.50	23.38	0.059	/
		Front Side ANT 180°	1907.6	0.745	0.81	23.50	23.38	0.766	/
		Back Side ANT 180°	1907.6	0.068	-1.67	23.50	23.38	0.070	/
		Right Side ANT 180°	1852.4	0.758	1.68	23.50	22.88	0.874	/
		Right Side ANT 180°	1880	0.886	-3.09	23.50	23.19	0.952	/
		Right Side ANT 180°	1907.6	1.021	-0.91	23.50	23.38	**1.050**	**3**
		Top Side ANT 180°	1907.6	0.123	-3.58	23.50	23.38	0.126	/

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. Scaled SAR(W/kg) = Measured SAR(W/kg) *Tune-up Scaling Factor
2. Per KDB 865664 D01, Repeated measurement is not required when the original highest measured SAR is <0.80 W/kg.

Repeated SAR

Band	Mode	Test Position	Freq.	Result 1g (W/Kg)	Power Drift (%)	Max. Turn-up Power (dBm)	Meas. Output Power (dBm)	Scaled SAR (W/Kg)
GSM 850	Voice	Right Side ANT 180°	824.2	0.966	-3.53	33.5	33.44	0.979
		Right Side ANT 180°	836.6	0.745	-1.53	33.5	32.98	0.840
		Right Side ANT 180°	848.8	0.779	2.49	33.5	33.19	0.837
GSM1900	Voice	Right Side ANT 180°	1850.2	1.011	-2.37	30.5	30.4	1.035
		Right Side ANT 180°	1880	0.901	-0.53	30.5	30.31	0.941
		Right Side ANT 180°	1909.8	0.852	2.92	30.5	30.13	0.928
WCDMA Band II	RMC	Right Side ANT 180°	1852.4	0.725	-3.33	23.5	22.88	0.836
		Right Side ANT 180°	1880	0.880	2.08	23.5	23.19	0.945
		Right Side ANT 180°	1907.6	0.998	2.40	23.5	23.38	1.026

Repeated SAR measurement

Band	Mode	Test Position	Freq.	Original Measured SAR 1g(W/kg)	1 st Repeated SAR 1g	Ratio
GSM 850	Voice	Right Side ANT 180°	824.2	0.998	0.966	1.033
		Right Side ANT 180°	836.6	0.753	0.745	1.010
		Right Side ANT 180°	848.8	0.816	0.779	1.047
GSM1900	Voice	Right Side ANT 180°	1850.2	1.064	1.011	1.052
		Right Side ANT 180°	1880	0.927	0.901	1.029
		Right Side ANT 180°	1909.8	0.856	0.852	1.004
WCDMA Band II	RMC	Right Side ANT 180°	1852.4	0.758	0.725	1.046
		Right Side ANT 180°	1880	0.886	0.880	1.007
		Right Side ANT 180°	1907.6	1.021	0.998	1.023

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	DIP0G835	SN 06/22 DIP0G835-639	2022.02.11	2025.02.10
1900MHz Dipole	MVG	DIP1G900	SN 06/22 DIP1G900-641	2022.02.11	2025.02.10
E-Field Probe	MVG	EPGO364	SN 04/22 EPGO364	2023.02.10	2024.02.09
Liquid Calibration Kit	MVG	OCPG 87	SN 06/22 OCPG87	2023.02.10	2024.02.09
Antenna	MVG	ANTA 73	SN 06/22 ANTA 73	N/A	N/A
Ellipsoid Phantom	MVG	ELLI 51	SN 06/22 ELLI 51	N/A	N/A
Phantom	MVG	SAM 148	SN 06/22 SAM148	N/A	N/A
Phone holder	MVG	MSH 117	SN 06/22 MSH 117	N/A	N/A
Laptop holder	MVG	LSH 36	SN 06/22 LSH 38	N/A	N/A
Directional coupler	SHW	SHWDCP	202303280013	N/A	N/A
Network Analyzer	Agilent	E5071C	MY46418070	2023.03.27	2024.03.26
Multi Meter	Keithley	DMM6500	DMM6500	2023.03.27	2024.03.26
Signal Generator	Keithley	N5182B	MY59100717	2023.04.07	2024.04.06
Wireless Communication Test Set	R&S	CMW500	137737	2023.04.14	2024.04.13
Power Sensor	R&S	Z11	116184	2023.04.13	2024.04.12
Temperature hygrometer	N/A	ST-W2318	N/A	2023.04.24	2024.04.23
Thermograph	N/A	TP101	N/A	2023.04.25	2024.04.24

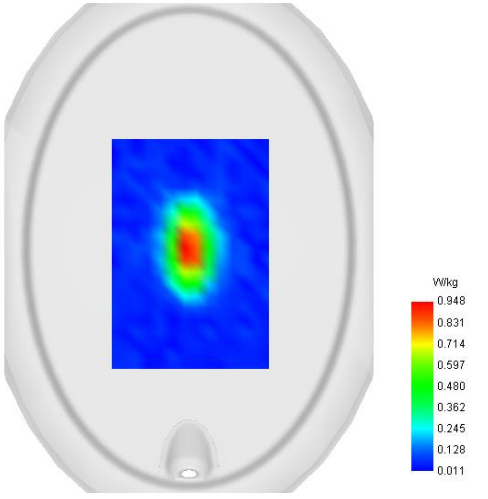
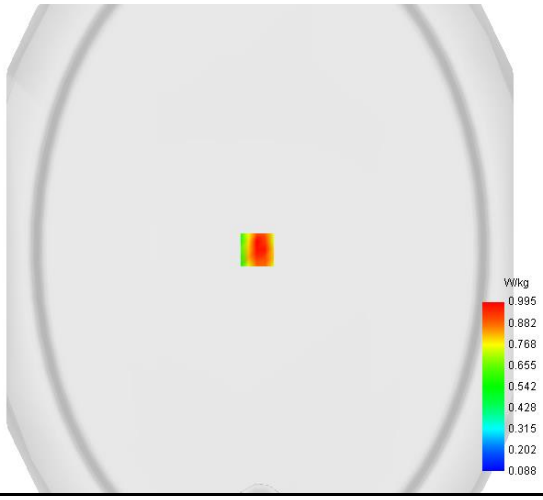
Appendix A. System Validation Plots

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: 2023-11-29

Experimental conditions.

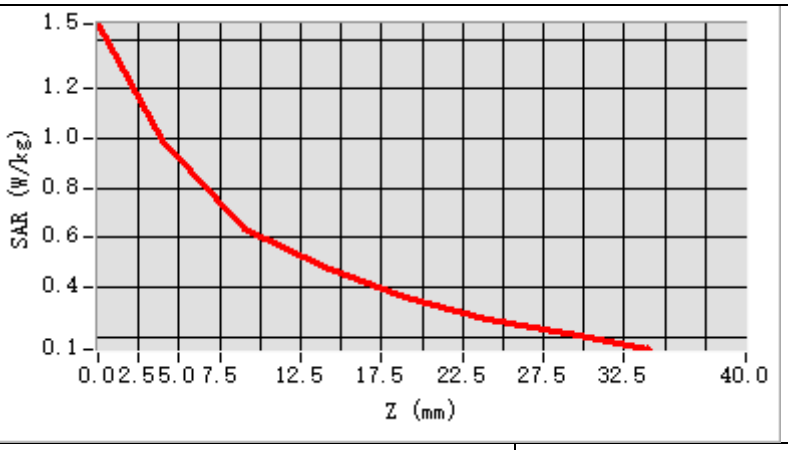
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Channels	Middle
Signal	CW
Frequency (MHz)	835.000
Relative permittivity	41.36
Conductivity (S/m)	0.88
Probe	SN 04/22 EPGO364
ConvF	1.72
Crest factor:	1:1

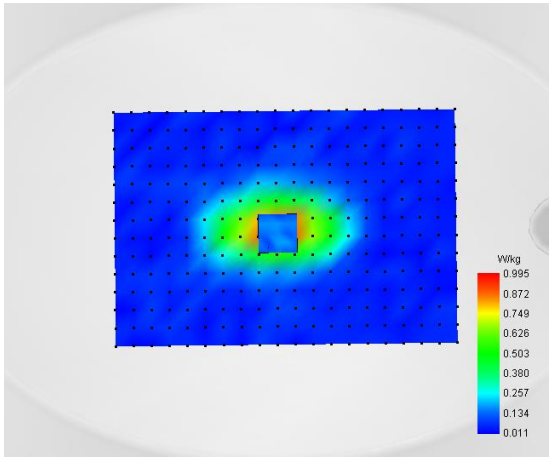
SURFACE SAR	VOLUME SAR
	

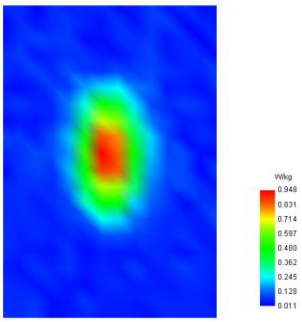
Maximum location: X=-3.00, Y=-1.00 ; SAR Peak: 1.40 W/kg

SAR 10g (W/Kg)	0.634
SAR 1g (W/Kg)	0.982

Z Axis Scan


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


W/kg
0.995
0.872
0.749
0.626
0.503
0.380
0.257
0.134
0.011

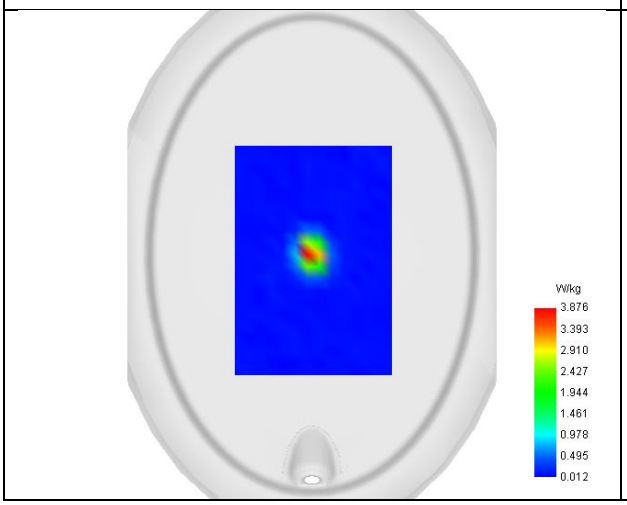
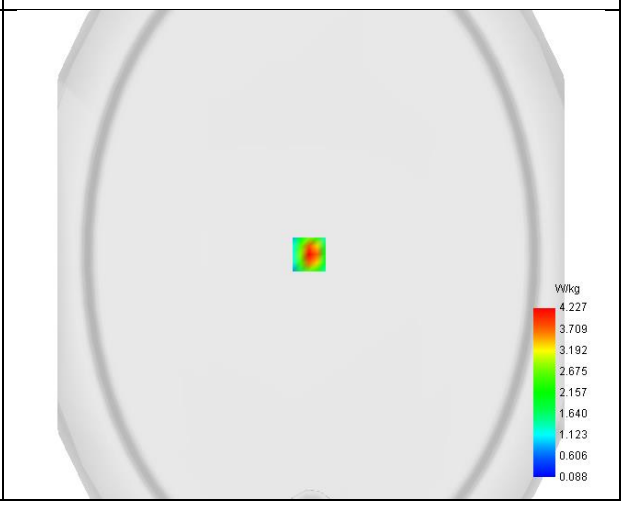


System Performance Check Data (1900MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2023-12-19

Experimental conditions.

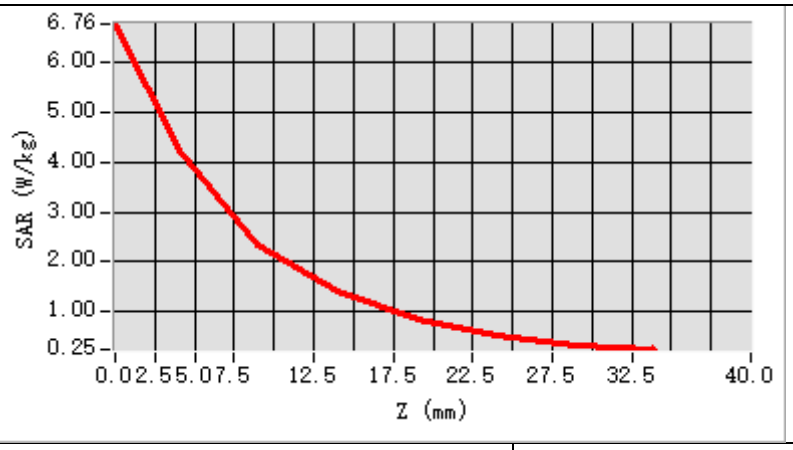
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Channels	Middle
Signal	CW
Frequency (MHz)	1900.000
Relative permittivity	41.06
Conductivity (S/m)	1.44
Probe	SN 04/22 EPGO364
ConvF	2.25
Crest factor:	1:1

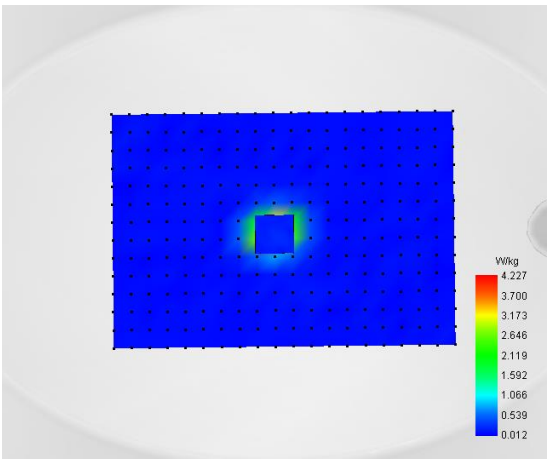
SURFACE	VOLUME SAR
	

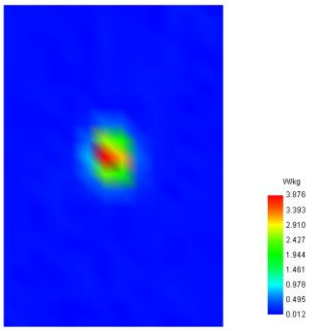
Maximum location: X=5.00, Y=1.00 ; SAR Peak: 6.89 W/kg

SAR 10g (W/Kg)	2.078
SAR 1g (W/Kg)	4.048

Z Axis Scan


6.76
6.00
5.00
4.00
3.00
2.00
1.00
0.25
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)


W/kg
4.227
3.700
3.173
2.646
2.119
1.592
1.066
0.539
0.012

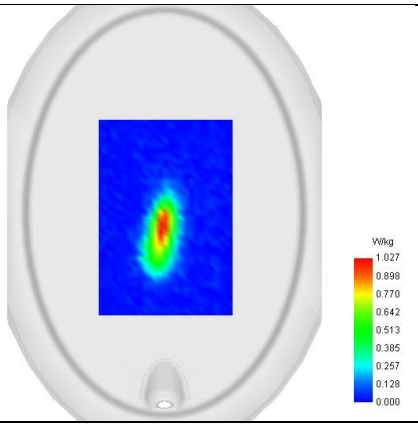
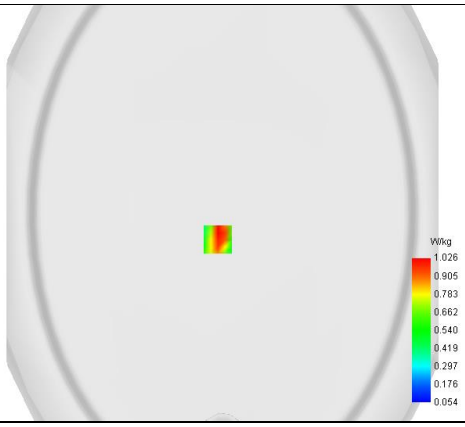
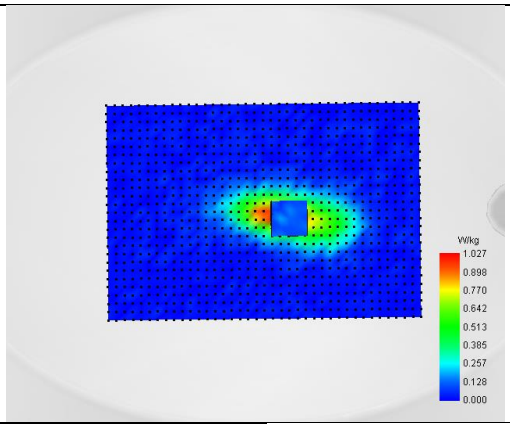
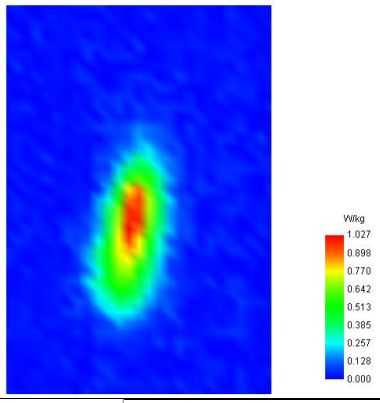
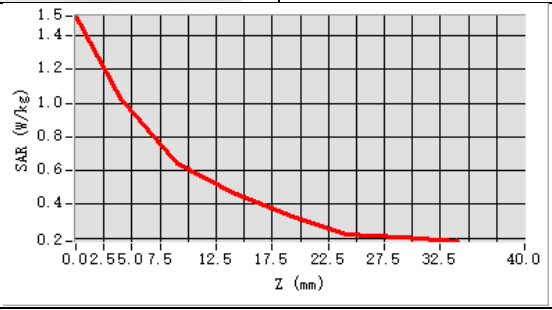

W/kg
3.876
3.393
2.910
2.427
1.944
1.461
0.978
0.495
0.012

Appendix B. SAR Test Plots

Plot 1:

Test Date	2023-11-29
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Right Side ANT 180°
Band	GSM850
Signal	TDMA (GSM)
Frequency	824.2
SAR 10g (W/Kg)	0.527
SAR 1g (W/Kg)	0.998
Relative permittivity	41.36
Conductivity (S/m)	0.88
ConvF	1.72

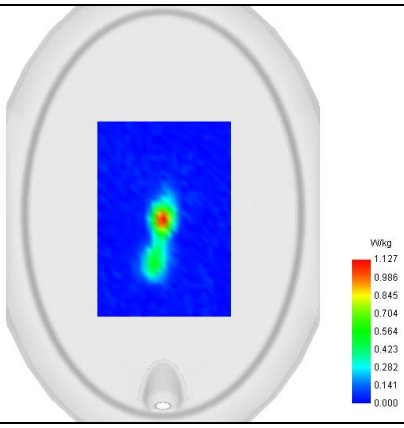
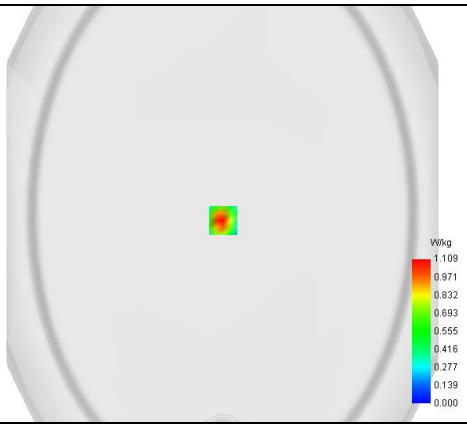
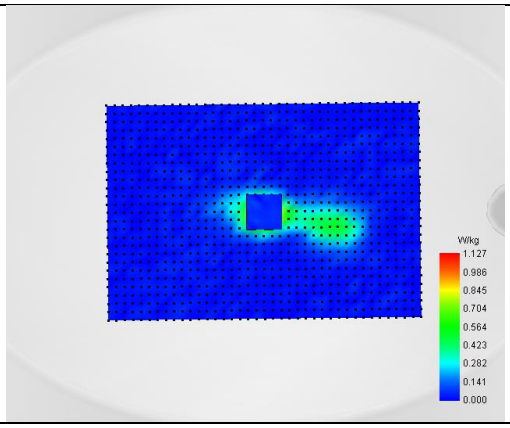
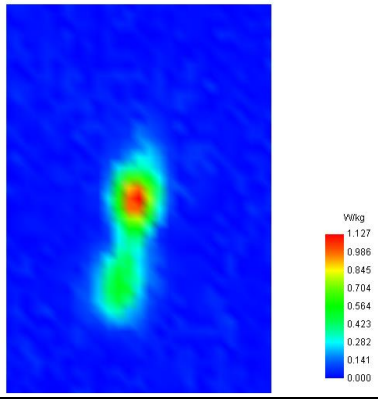
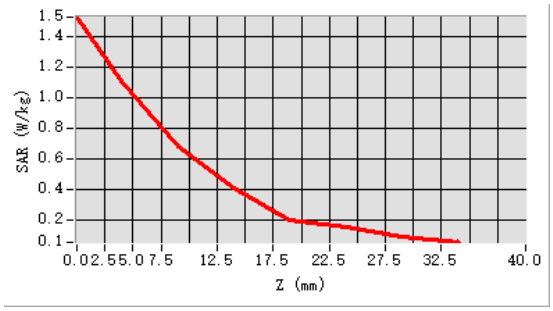
Maximum location: X=-5.00, Y=-31.00 ; SAR Peak: 1.57 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	
	

Plot 2:

Test Date	2023-12-19
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Right Side ANT 180°
Band	GSM1900
Signal	TDMA (GSM)
Frequency	1850.2
SAR 10g (W/Kg)	0.568
SAR 1g (W/Kg)	1.064
Relative permittivity	41.06
Conductivity (S/m)	1.44
ConvF	2.25

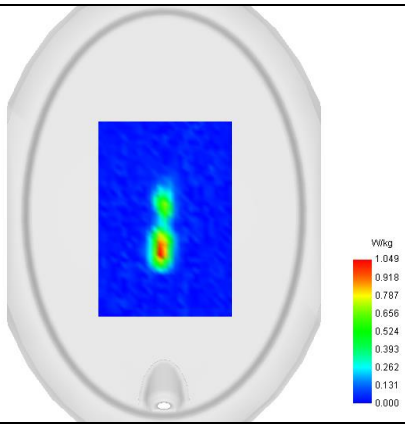
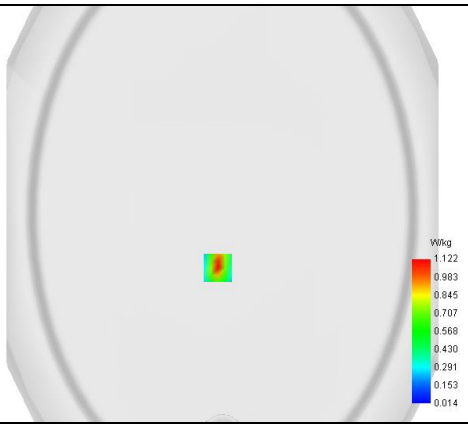
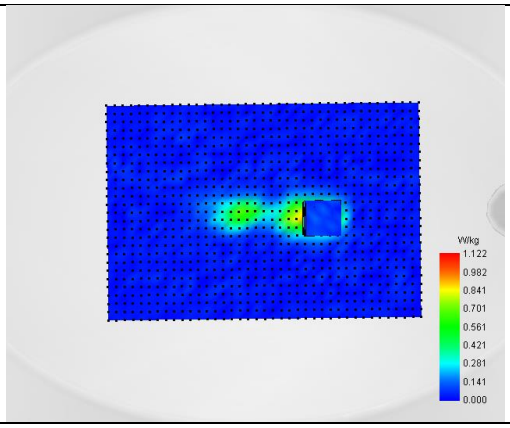
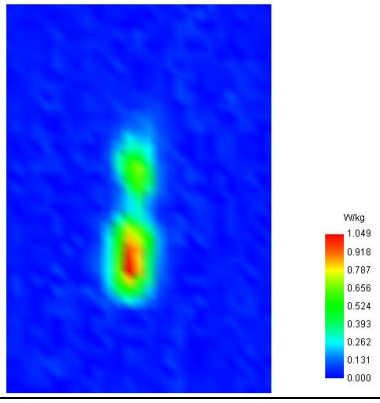
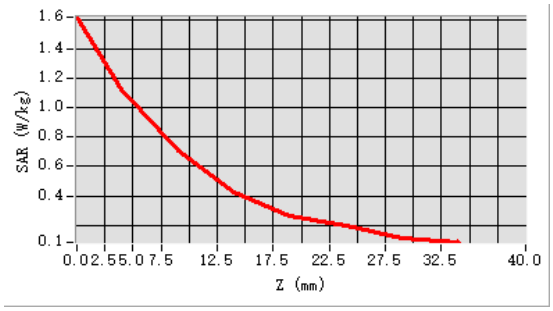
Maximum location: X=1.00, Y=-8.00 ; SAR Peak: 1.75 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	
	

Plot 3:

Test Date	2023-12-19
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Right Side ANT 180°
Band	Band 2 (1900)
Signal	WCDMA
Frequency	1907.6
SAR 10g (W/Kg)	0.565
SAR 1g (W/Kg)	1.021
Relative permittivity	41.06
Conductivity (S/m)	1.44
ConvF	2.25

Maximum location: X=-5.00, Y=-62.00 ; SAR Peak: 1.64 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	
	

Appendix C. Probe Calibration and Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※