FCC SAR REPORT

Applicant: SKY PHONE LLC

Address of Applicant: 1348 Washington Av. Suite 350, Miami Beach, FL33139

Equipment Under Test (EUT)

Product Name: Tablet

Model No.: SKY PAD10

Trade mark SKY DEVICES

FCC ID: 2ABOSSKYPAD10

Applicable standards: FCC 47 CFR Part 2.1093

Date of Test: 14 Dec., 2022~ 25 Dec., 2022

Test Result: Maximum Reported 1-g SAR (W/kg)

Body: 1.124

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*13 Jan., 2023*	*Original*

Tested by:	Vieta Zhang	***Date:***	*13 Jan., 2023*
	Test Engineer		
Reviewed by:	Janet. Wei	***Date:***	*13 Jan., 2023*
	Project Engineer		

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4 SAR Results Summary

The maximum results of Specific Absorption Rate (SAR) found during test as bellows:

<Highest Reported standalone SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported 1-g SAR (W/kg)
Body (0 mm Gap)	GSM 850	0.687	PCB	1.124
	GSM 1900	0.829		
	WCDMA Band V	0.808		
	WCDMA Band II	0.967		
	LTE Band 2	0.632		
	LTE Band 5	1.124		
	LTE Band 12 & LTE Band 17	1.019		
	LTE Band 41	0.704		
	LTE Band 66 & LTE Band 4	0.779		
	LTE Band 71	0.800		
	WLAN 2.4GHz	0.358	DTS	
	Bluetooth	0.055	DSS	

<Highest Reported simultaneous SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported Simultaneous Transmission 1-g SAR (W/kg)
Back	LTE Band 5	1.124	PCB	1.482
	WLAN 2.4 GHz	0.358	DTS	

Note:

1. The highest simultaneous transmission is scalar summation of Reported standalone SAR per FCC KDB 690783 D01 v01r03, and scalar SAR summation of all possible simultaneous transmission scenarios are < 1.6W/kg.
2. This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.
3. For FDD-LTE Band 4 is full covered by FDD-LTE Band 66, so only FDD-LTE Band 66 was tested.
4. For FDD-LTE Band 17 is full covered by TDD-LTE Band 12, so only FDD-LTE Band 12 was tested.

5 General Information

5.1 Client Information

Applicant:	SKY PHONE LLC
Address of Applicant:	1348 Washington Av. Suite 350, Miami Beach, FL33139
Manufacturer:	SKY PHONE LLC
Address of Manufacturer:	1348 Washington Av. Suite 350, Miami Beach, FL33139

5.2 General Description of EUT

Product Name:	Tablet			
Model No.:	SKY PAD10			
Category of device	Portable device			
Operation Frequency:	GSM :	GSM850: 824.2~848.8 MHz	PCS 1900: 1850.2~1909.8 MHz	
	WCDMA :	Band II: 1852.4~1907.6 MHz	Band V: 826.4~846.6 MHz	
	LTE :	Band 2 :1850MHz~1910MHz	Band 4 :1710MHz~1755MHz	
		Band 5 :824MHz~849MHz	Band 12: 698MHz~716MHz	
		Band 17: 704MHz~716MHz	Band 41: 2555MHz~2655MHz	
		Band 66 :1710MHz~1780MHz	Band 71: 663MHz~698MHz	
	Wi-Fi:	2412MHz~2462MHz		
	Bluetooth: 2402 MHz ~ 2480 MHz			
Modulation technology:	GSM :	☐Voice(GMSK)	☒GPRS(GMSK)	☒EGPRS(GMSK, 8PSK)
	WCDMA :	☒RMC(QPSK)	☒HSUPA(QPSK)	☒HSDPA(QPSK,16QAM)
	LTE :	☒QPSK	☒16QAM	☐64QAM(Downlink Only)
	Wi-Fi:	☒802.11b(DSSS)	☒802.11g/n (OFDM)	
	Bluetooth:	☒BDR(GFSK)	☒EDR(π/4-DQPSK, 8DPSK)	☒LE(GFSK)
Antenna Type:	Internal Antenna			
Antenna Gain:	GSM 850: -1.9 dBi; PCS 1900: 1.1 dBi WCDMA Band V: -1.9 dBi ;WCDMA Band II: 1.1 dBi LTE Band 2: 1.1 dBi; LTE Band 4: 1.2 dBi LTE Band 5: -1.9 dBi; LTE Band 12: 0.4 dBi LTE Band 17: 0.4 dB i;LTE Band 41: 0.6 dBi LTE Band 66: 1.2 dB i;LTE Band 71: -0.6 dBi Bluetooth: 1.3 dBi; 2.4G Wi-Fi: 1.3 dBi			
(E)GPRS Class:	(E)GPRS Class: 12			
Dimensions (L*W*H):	208 mm (L)× 124 mm (W)× 10 mm (H)			
Accessories information:	Adapter: Input: AC100-240V, 50/60Hz, 0.3A Output: DC 5.0V, 2000mA		Battery: Rechargeable Li-ion Battery DC 3.85V, 5000mAh	
			Headset: Support headset	

5.3 Maximum RF Output Power

Mode	Average Power (dBm)	
	GSM 850	GSM 1900
GPRS (1 TX Slot)	33.49	29.70
GPRS (2 TX Slots)	31.44	27.65
GPRS (3 TX Slots)	29.57	26.12
GPRS (4 TX Slots)	27.06	24.11
EGPRS (1 TX Slot)	26.41	25.44
EGPRS (2 TX Slots)	26.39	25.27
EGPRS (3 TX Slots)	25.20	23.62
EGPRS (4 TX Slots)	22.89	21.48

Mode	Average Power (dBm)	
	WCDMA Band V	WCDMA Band II
RMC 12.2 kbps	23.17	22.65
HSDPA Sub-test 1	22.16	22.07
HSDPA Sub-test 2	21.94	22.03
HSDPA Sub-test 3	21.93	22.05
HSDPA Sub-test 4	21.95	22.03
HSUPA Sub-test 1	21.08	21.67
HSUPA Sub-test 2	20.73	21.62
HSUPA Sub-test 3	20.64	21.67
HSUPA Sub-test 4	20.80	21.66
HSUPA Sub-test 5	21.98	22.27

Mode	Average Power (dBm)					
	LTE Band 2	LTE Band 5	LTE Band 12	LTE Band 41	LTE Band 66	LTE Band 71
BW/1.4 MHz	22.72	23.07	23.16	/	22.89	/
BW/3.0 MHz	22.72	23.07	23.16	/	22.95	/
BW/5.0 MHz	22.80	23.02	23.11	22.73	22.95	23.05
BW/10 MHz	22.70	23.13	23.05	23.02	22.84	23.06
BW/15 MHz	22.75	/		23.02	22.86	23.83
BW/20 MHz	22.73	/	/	23.05	22.94	23.09

WLAN 2.4 GHz Band Average Power (dBm)				
Mode/Band	b	g	n (HT-20)	n (HT-40)
WLAN 2.4GHz	17.14	13.96	13.56	13.35

Bluetooth Average Power (dBm)							
Mode/Band	1 Mbps (GFSK)	2 Mbps (π/4DQPSK)	3 Mbps (8DPSK)	BLE PHY 1M	BLE PHY 2M	BLE Coded PHY S=2	BLE Coded PHY S=2
Bluetooth	7.53	8.83	9.09	6.74	6.47	6.65	6.56

5.4 Environment of Test Site

Temperature:	18°C ~25 °C
Humidity:	35%~75% RH
Atmospheric Pressure:	1010 mbar

5.5 Test Sample Plan

Sample Number	Used for Test Items
1#	SAR
***Remark**: JianYan Testing Group Shenzhen Co., Ltd. is only responsible for the test project data of the above samples, and will keep the above samples for a month.*	

5.6 Test Location

JianYan Testing Group Shenzhen Co., Ltd.
No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community,Xinqiao Street, Bao'an District, Shenzhen, Guangdong,People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://jyt.lets.com

6 Introduction

6.1 Introduction

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.

6.2 SAR Definition

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:

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

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

$$SAR = C\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 RF Exposure Limits

7.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

7.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

7.3 RF Exposure Limits

SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

Note:

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

8 SAR Measurement System

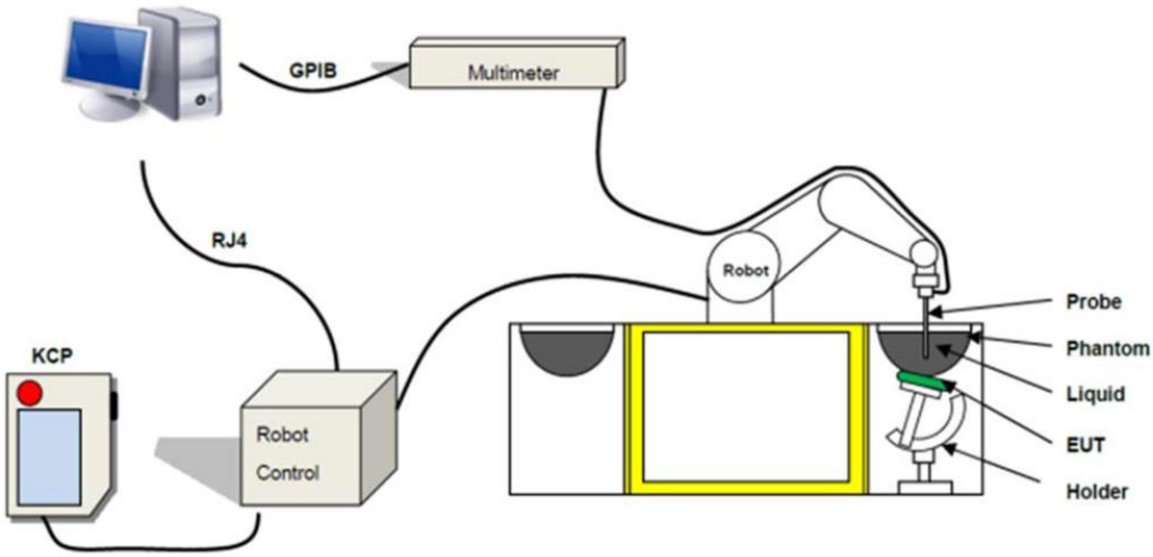


Fig. 8.1 MVG COMOSAR System Configurations

These measurements were performed with the automated near-field scanning system COMOSAR from MVG. The system is based on a high precision robot (working range: 850 mm), which positions the probes with a positional repeatability of better than ± 0.02 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit.

The SAR measurements were conducted with dosimetric probe (manufactured by MVG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure described in SAR standard with accuracy of better than ±10%.The spherical isotropy was evaluated with the procedure described in SAR standard and found to be better than ±0.25 dB. The phantom used was the SAM Phantom as described in FCC supplement C, IEEE P1528.

The MVG COMOSAR system for performance compliance tests is illustrated above graphically. This 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

8.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by MVG). 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. This probe has a built in optical surface detection system to prevent from collision with phantom.

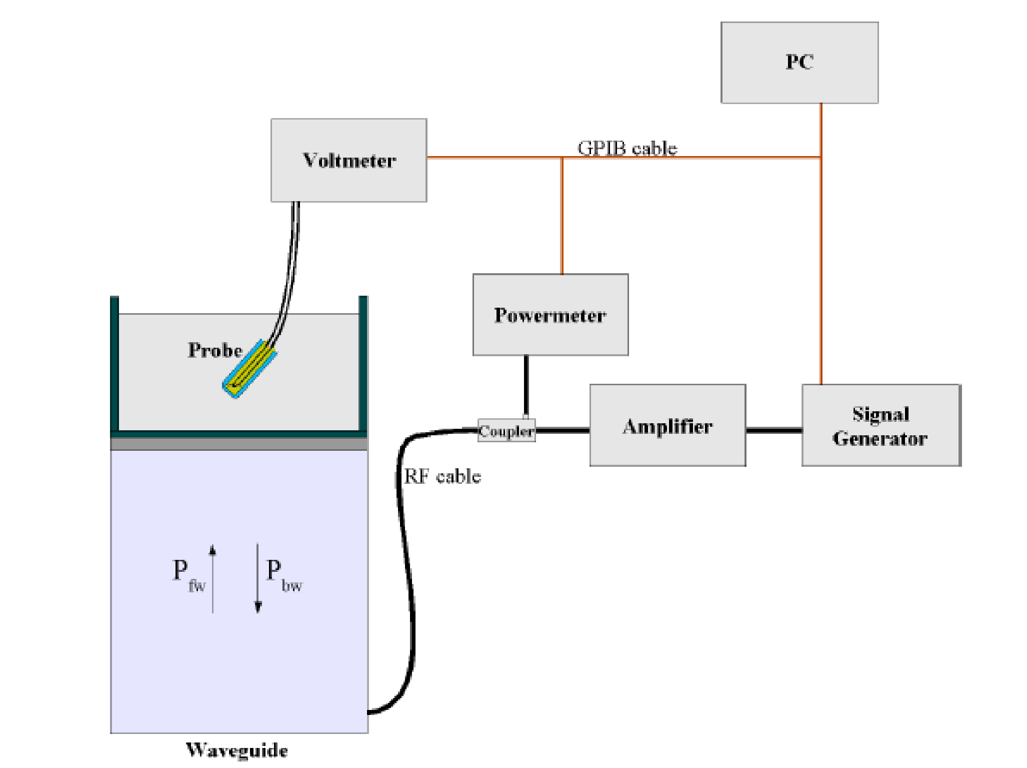
➢ **E-Field Probe Specification**

Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Model	SSE2
Frequency Range	150 MHz to 6 GHz
Dynamic Range	0.01W/kg to 100W/kg
Probe linearity	<0.25dB
Dimensions	Overall length: 330 mm Tip diameter: 2.5 mm Distance between dipoles / probe extremity: 1 mm

Fig. 8.2 Photo of E-Field Probe

➢ **E-Field Probe Calibration**

Probe calibration is realized, in compliance with EN/IEC 62209-1/-2 and IEEE 1528 std, with CALISAR, MVG proprietary calibration system. The calibration is performed with the technique using reference waveguide.



$$SAR = \frac{4(P_{fw} - P_{bw})}{ab\sigma} \cos^2\left(\pi \frac{y}{a}\right) c^{(2\pi/\sigma)}$$

Where :

Pfw = Forward Power

Pbw = Backward Power

a and b = Waveguide Dimensions

ı = Skin Depth

Keithley configuration

Rate=Medium; Filter=ON; RDGS=10; FILTER TYPE=MOVING AVERAGE; RANGE AUTO

After each calibration, a SAR measurement performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The Calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N) (N=1,2,3)

The linearized output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N)) N=1,2,3

Where the DCP is the dipole compression point in mV

8.2 Robot

The COMOSAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA-KRC2sr) from KUKA is used. The KUKA robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

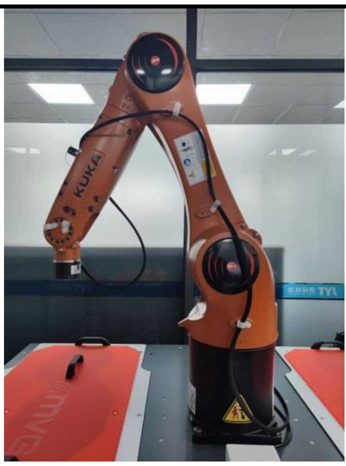


Fig. 8.4 Photo of Robot

8.3 Phantom

<SAM Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	 **Fig. 8.7 Photo of SAM Phantom**
Filling Volume Dimensions	Approx. 27 liters Length: 1000mm; Width: 500mm; Height: 200mm	
Material	Fiberglass based	
Relative permittivity	3-4	
Loss tangent	0.02	
Measurement Areas	Left Head, Right Head, Flat phantom	

The phantom developed by MVG is produced in accordance with the specified in the standards. It has been designed to fit the COMOSAR phantom tables and is delivered with a plastic cover to prevent liquid evaporation.

8.4 Device Holder

The positioning system is made of an extremely stable material, which ensures easy handling and reproducible positioning. It also allows correct positioning of the dipoles referenced by the IEEE, ANSI and IEC.

<Device Holder for SAM Phantom>

Model	Handset Positioning System	 **Fig. 8.9 Photo of Device Holder**
Material properties	The positioning system is made of PETP. This material offers a low permittivity of 3.2 and low loss, with a loss tangent of 0.005 to minimize the influence of the DUT on measurement results.	
Mechanical properties	The positioning system developed by MVG allows a positioning resolution better than 1 mm. The system is fixed on a bottom rail "x axis" so that the positioning system can be quickly moved from the right to the left part of the phantom. In addition, it can be moved on a perpendicular "y axis" and the height can be adapted. The system is also composed of three rotation points for accurate positioning of the device's acoustical output.	
Accuracy and precision	A curved rail on the top part allows the fast switch from the cheek to the tilt position. The required 15° angle for the tilt position can be easily checked thanks to a printed scale on the curved rail with a tolerance of ± 1°	

8.5 Test Equipment List

Manufacturer	Equipment Description	Model	Management Number	Cal. Information	
				Last Cal.	Due Date
MVG	COMOSAR DOSIMETRIC E FIELD PROBE	SSE2	WXJ076	06.30.2022	06.29.2023
MVG	COMOSAR 750 MHz REFERENCE DIPOLE	SID750	WXJ076-4	01.14.2021	01.13.2024
MVG	COMOSAR 835 MHz REFERENCE DIPOLE	SID835	WXJ076-5	01.14.2021	01.13.2024
MVG	COMOSAR 1750 MHz REFERENCE DIPOLE	SID1750	WXJ076-8	01.14.2021	01.13.2024
MVG	COMOSAR 1900 MHz REFERENCE DIPOLE	SID1900	WXJ076-9	01.14.2021	01.13.2024
MVG	COMOSAR 2450 MHz REFERENCE DIPOLE	SID2450	WXJ076-12	01.14.2021	01.13.2024
MVG	COMOSAR 2600 MHz REFERENCE DIPOLE	SID2600	WXJ076-13	01.14.2021	01.13.2024
KEITHLEY	DIGIT MULTIMETER	DMM6500	WXJ076-1	10.17.2022	10.16.2023
MVG	MVG Measurement Software	OpenSAR	Version: V5_01_09	N.C.R	N.C.R
MVG	COMOSAR IEEE SAM PHANTOM	N/A	WXG009-2	N.C.R	N.C.R
MVG	COMOSAR IEEE SAM PHANTOM	N/A	WXG009-3	N.C.R	N.C.R
MVG	MOBILE PHONE POSITIONNING SYSTEM	N/A	WXG009-4	N.C.R	N.C.R
KUKA	Robot	KR 6 R900 sixx	WXG009-1	N.C.R	N.C.R
Anritsu	Universal Radio Communication Analyzer	MT8820C	WXJ008-5	03.03.2021	03.02.2023
R&S	Universal Radio Communication Tester	CMU200	WXJ008-2	03.30.2022	03.29.2024
KEYSIGHT	Network Analyzer	E5071C	WXJ091	03.30.2022	03.29.2023
KEYSIGHT	EPM Series Power Meter	N1914A	WXJ075	06.29.2022	06.28.2023
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-1	06.29.2022	06.28.2023
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-2	06.29.2022	06.28.2023
KEYSIGHT	Signal Generator	N5173B	WXJ006-3	06.29.2022	06.28.2023
Huber Suhner	RF Cable	SUCOFLEX	WXG008-13	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-14	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-15	See Note 3	
Weinschel	Attenuator	23-3-34	WXG008-16	See Note 3	
Anritsu	Directional Coupler	MP654A	WXG008-17	See Note 3	
MVG	LIMESAR DIELECTRIC PROBE	SCLMP	WXG009-5	See Note 4	
TXC	Broadband Amplifier	BBA018000	WXG008-11	See Note 5	

Note:

1. The calibration certificate of MVG can be referred to appendix C of this report.
2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by MVG.
5. In system check we need to monitor the level on the spectrum analyzer, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1 W input power according to the ratio of 1 W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the spectrum analyzer is critical and we do have calibration for it
6. Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
7. N.C.R means No Calibration Requirement.

9 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 9.1, for body SAR testing, the liquid height from the center of the flat phantom to liquid top surface is larger than 15 cm, which is shown in Fig. 9.2.

Fig. 9.1 Photo of Liquid Height for Head SAR (depth>15cm)

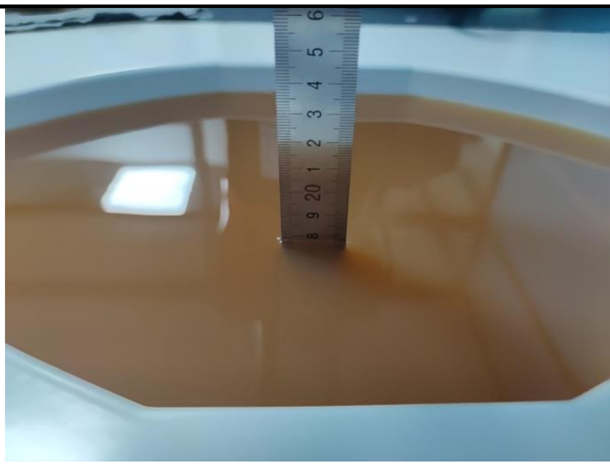


Fig. 9.2 Photo of Liquid Height for Body SAR (depth>15cm)

The relative permittivity and conductivity of the tissue material should be within ±5% of the values given in the table below recommended by the FCC OET 65 supplement C and RSS 102 Issue 5.

Target Frequency (MHz)	εr	σ(S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800-2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5800	35.3	5.27

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

The dielectric parameters of liquids were verified prior to the SAR evaluation using a MVG Liquid measurement Kit and an Agilent Network Analyzer.
The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target(σ)	Permittivity Target(εr)	Delta (σ)%	Delta (εr)%	Limit (%)	Date (mm/dd/yy)
750	22.9	0.87	41.37	0.89	41.90	-2.25	-1.26	±5	14.12.2022
835	22.9	0.88	40.95	0.90	41.50	-2.22	-1.33	±5	14.12.2022
1750	22.6	1.39	40.34	1.37	40.10	1.46	0.60	±5	17.12.2022
1900	22.6	1.41	40.11	1.40	40.00	0.71	0.27	±5	17.12.2022
2450	22.5	1.79	39.45	1.80	39.20	-0.56	0.64	±5	25.12.2022
2600	22.5	1.93	39.24	1.96	39.00	-1.53	0.62	±5	25.12.2022

10 SAR System Verification

Each ComoSAR system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the OpenSAR software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

- **Purpose of System Performance check**
  The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

- **System Setup**

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

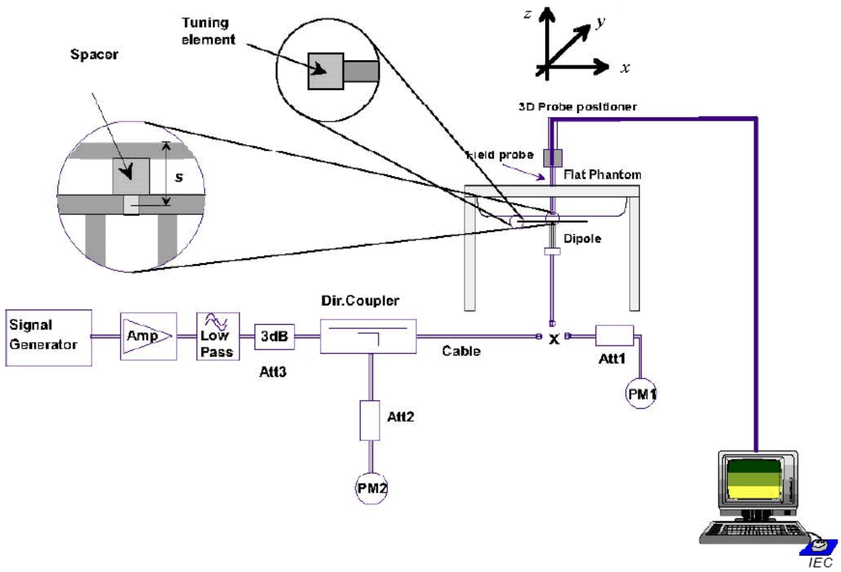


Fig.10.1 System Verification Setup Diagram

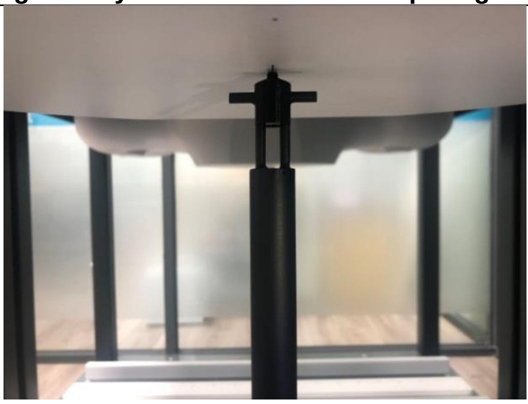


Fig.10.2 Photo of Dipole setup

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➢ **System Verification Results**

Comparing to the original SAR value provided by MVG, the verification data should be within its specification of 10%. The table as below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix C of this report.

Date (mm/dd/yy)	Frequency (MHz)	Power fed onto dipole (mW)	Measured 1g SAR (W/kg)	Normalized to 1W 1g SAR (W/kg)	1W Target 1g SAR (W/kg)	Deviation (%)
14.12.2022	750	100	0.847	8.47	8.57	-1.17
14.12.2022	835	100	0.942	9.42	9.57	-1.57
17.12.2022	1750	100	3.617	36.17	36.5	-0.90
17.12.2022	1900	100	3.952	39.52	39.6	-0.20
25.12.2022	2450	100	2.144	53.60	52.92	1.28
25.12.2022	2600	100	2.241	56.03	55.47	1.00

11 EUT Testing Position

This EUT was tested in four different positions. They are Back/Right/Top/Bottom of the EUT with phantom 10 mm gap, as illustrated below; please refer to Appendix B for the test setup photos.

11.1 Body Accessory Configurations

- To position the device parallel to the phantom surface with either keypad up or down.
- To adjust the device parallel to the flat phantom.
- To adjust the distance between the device surface and the flat phantom to 0 mm or holster surface and the flat phantom to 0 mm.

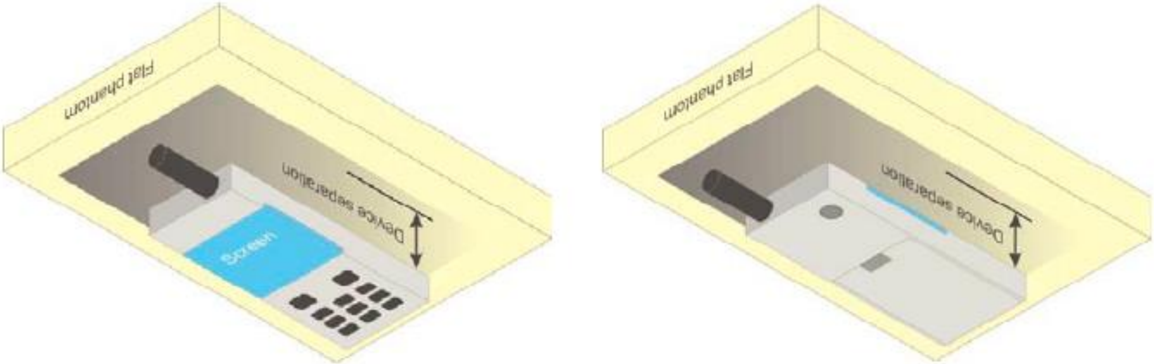


Fig.11.1 Illustration for Body Position

12 Measurement Procedures

The measurement procedures are as bellows:

<Conducted power measurement>
- For WWAN power measurement, use base station simulator to configure EUT WWAN transition in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- Read the WWAN RF power level from the base station simulator.
- For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
- Connect EUT RF port through RF cable to the power meter or spectrum analyzer, and measure WLAN/BT output power.

<Conducted power measurement>
- Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- Place the EUT in positions as Appendix B demonstrates.
- Set scan area, grid size and other setting on the OpenSAR software.
- Measure SAR results for the highest power channel on each testing position.
- Find out the largest SAR result on these testing positions of each band.
- Measure SAR results for other channels in worst SAR testing position if the Reported SAR or highest power channel is larger than 0.8 W/kg.

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Area scan
- Zoom scan
- Power drift measurement

12.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The OpenSAR software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a “cube” measurement. The measured volume must include the 1g and 10 g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine. The system always gives the maximum values for 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
- Extraction of the measured data (grid and values) from the Zoom Scan.
- Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
- Generation of a high-resolution mesh within the measured volume.
- Interpolation of all measured values form the measurement grid to the high-resolution grid
- Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- Calculation of the averaged SAR within masses of 1g and 10g.

12.2 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 determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

12.3 Area & Zoom Scan Procedures

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 10g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r04 quoted below.

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">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 <u>reported</u> 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.</td></tr>
</table>

12.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

12.5 SAR Averaged Methods

In COMOSAR system, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1g and 10g cubes, the extrapolation distance should not be larger than 5 mm.

12.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In OpenSAR measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. If the power drifts more than 5%, the SAR will be retested.

13 Conducted RF Output Power

13.1 GSM Conducted Power

Band: GSM 850	Burst Average Power (dBm)			Frame-Average Power(dBm)		
Channel	128	190	251	128	190	251
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
GPRS (GMSK, 1 TX slot)	33.39	33.49	33.38	24.36	24.46	24.35
GPRS (GMSK, 2 TX slots)	**31.44**	31.43	31.25	**25.42**	25.41	25.23
GPRS (GMSK, 3 TX slots)	29.57	29.55	29.41	25.31	25.29	25.15
GPRS (GMSK, 4 TX slots)	27.06	27.06	26.95	24.05	24.05	23.94
EGPRS (8PSK, 1 TX slot)	26.07	26.41	26.19	17.04	17.38	17.16
EGPRS (8PSK, 2 TX slots)	25.96	26.39	26.11	19.94	20.37	20.09
EGPRS (8PSK, 3 TX slots)	24.72	25.20	24.97	20.46	20.94	20.71
EGPRS (8PSK, 4 TX slots)	22.20	22.89	22.70	19.19	19.88	19.69

Remark:

1. The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:
   The duty cycle "x" of different time slots as below:
   1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8
   Based on the calculation formula:
   Frame-averaged power = Burst averaged power + 10 1og (x)
   So,
   Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03
   Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02
   Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26
   Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01
2. CS1 coding scheme was used in GPRS conducted power measurements and SAR testing, MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary).

Note:

1. For Body mode SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 2 TX slots mode due to the highest frame-averaged power.
2. Per KDB447498 D04v01, the maximum output power channel is used for SAR testing and for further SAR test reduction.

Band: PCS 1900	Burst Average Power (dBm)			Frame-Average Power(dBm)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GPRS (GMSK, 1 TX slot)	29.67	29.70	29.63	20.64	20.67	20.60
GPRS (GMSK, 2 TX slots)	27.65	27.46	27.16	21.63	21.44	21.14
GPRS (GMSK, 3 TX slots)	**26.12**	25.91	25.60	**21.86**	21.65	21.34
GPRS (GMSK, 4 TX slots)	24.11	23.89	23.54	21.10	20.88	20.53
EGPRS (8PSK, 1 TX slot)	25.44	25.14	24.93	16.41	16.11	15.90
EGPRS (8PSK, 2 TX slots)	25.27	25.06	24.81	19.25	19.04	18.79
EGPRS (8PSK, 3 TX slots)	23.62	23.53	23.24	19.36	19.27	18.98
EGPRS (8PSK, 4 TX slots)	21.48	21.24	21.15	18.47	18.23	18.14

Remark:

3. The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:
   The duty cycle "x" of different time slots as below:
   1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8
   Based on the calculation formula:
   Frame-averaged power = Burst averaged power + 10 1og (x)
   So,
   Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03
   Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02
   Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26
   Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01
4. CS1 coding scheme was used in GPRS conducted power measurements and SAR testing, MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary).

Note:

1. For Body mode SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 3 TX slots mode due to the highest frame-averaged power.
2. Per KDB447498 D04v01, the maximum output power channel is used for SAR testing and for further SAR test reduction.

13.2 WCDMA Conducted Power

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

HSDPA Setup Configuration:

a. The EUT was connected to Base Station Rohde & Schwarz CMU200 referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table 1

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM (dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$.

Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

HSDPA Sub-test setup configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station Rohde & Schwarz CMU200 referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) 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
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table 2

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM(2) (dB)	MPR (dB)	AG(4) Index	E-TFCI
1	11/15(3)	15/15(3)	64	11/15(3)	22/15	209/225	1039/225	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	β_{ed1}: 47/15 β_{ed2}: 47/15	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(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: 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.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} cannot be set directly; it is set by Absolute Grant Value.

HSUPA Sub-test setup configuration

WCDMA Conducted Power:

WCDMA Average power (dBm)			
Band	WCDMA Band V		
Channel	4132	4183	4233
Frequency (MHz)	826.4	836.6	846.6
RMC 12.2 kbps	23.14	**23.17**	23.09
HSDPA Sub-test 1	22.16	21.96	21.77
HSDPA Sub-test 2	21.79	21.94	21.78
HSDPA Sub-test 3	21.78	21.93	21.78
HSDPA Sub-test 4	21.80	21.95	21.75
HSUPA Sub-test 1	21.08	20.50	20.55
HSUPA Sub-test 2	20.28	20.73	20.54
HSUPA Sub-test 3	20.29	20.55	20.64
HSUPA Sub-test 4	20.41	20.80	20.62
HSUPA Sub-test 5	21.98	21.92	21.68

WCDMA Average power (dBm)			
Band	WCDMA Band II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2 kbps	22.57	22.59	**22.65**
HSDPA Sub-test 1	22.07	22.07	22.00
HSDPA Sub-test 2	22.02	22.03	21.97
HSDPA Sub-test 3	22.04	22.05	21.98
HSDPA Sub-test 4	22.01	22.03	21.96
HSUPA Sub-test 1	21.56	21.43	21.67
HSUPA Sub-test 2	21.37	21.62	21.61
HSUPA Sub-test 3	21.41	21.67	21.67
HSUPA Sub-test 4	21.39	21.66	21.65
HSUPA Sub-test 5	22.27	22.19	22.16

Note:

1. Applying the subtest setup in Table C.11.1.3 of 3GPP TS 34.121-1
2. Per KDB 941225 D01, RMC 12.2kbps mode is used to evaluate SAR due the highest output power. If AMR 12.2 kbps power is < 0.25dB higher than RMC 12.2kbps, SAR tests with AMR 12.2 kbps can be excluded.
3. AMR, HSDPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.

13.3 LTE Conducted Power

13.3.1 Largest channel bandwidth standalone SAR test requirements

QPSK with 1 RB allocation

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 among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel.8 When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

QPSK with 50% RB allocation

The procedures required for 1 RB allocation in section 4.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.9

QPSK with 100% RB allocation

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 in sections 4.2.1 and 4.2.2 are ≤ 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.

Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 4.2.1, 5.2.2 and 4.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

13.3.2 Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section 4.2 to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg. The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth. For example, 50 RB in 10 MHz channel bandwidth does not apply to 5 MHz channel bandwidth; therefore, this cannot be tested in the smaller channel bandwidth. However, 50% RB allocation in 10 MHz channel bandwidth is equivalent to 100% RB allocation in 5 MHz channel bandwidth; therefore, these are the equivalent configurations to be compared to determine the specific channel and configuration in the smaller channel bandwidth that need SAR testing.

13.3.3 TDD LTE configuration setup for SAR measurement

According to KDB 941225 D05v02r03 and April 2013 TCB workshop slides, SAR must be tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

- see 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
- “special subframe S” contains both uplink and downlink transmissions and must be taken into consideration to determine the transmission duty factor

  – according to the worst case uplink and downlink cyclic prefix requirements for UpPTS to determine the highest SAR test duty factor

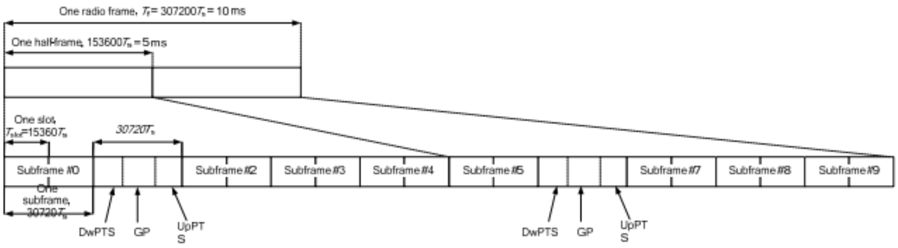


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Per 3GPP 36.211 section 4.2, each radio frame of length T_f=37200·*Ts* = 10 ms consists of two half-frames of length 153600·Ts = 5ms each. Each half-frame consists of five subframes of length 30720 ·*Ts* = 1ms. So, the uplink duty factor in special subframe as below:

Special Subframe configuration	Normal cyclic prefix in downlink		Extended cyclic prefix in downlink	
	Duty factor of Uplink		Duty factor of Uplink	
	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	7.14%	8.33%	7.14%	8.33%
1	7.14%	8.33%	7.14%	8.33%
2	7.14%	8.33%	7.14%	8.33%
3	7.14%	8.33%	7.14%	8.33%
4	7.14%	8.33%	14.27%	16.67%
5	14.27%	16.67%	14.27%	16.67%
6	14.27%	16.67%	14.27%	16.67%
7	14.27%	16.67%	14.27%	16.67%
8	14.27%	16.67%	/	/
9	14.27%	16.67%	/	/

Table 4.2-2: Uplink-downlink configurations

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

According to above table:

1. The highest duty factor is configuration 0;
2. The duty factor of uplink in one half-frame with normal cyclic prefix is: (3ms + 0.143ms)/5ms=62.86%;
3. The duty factor of uplink in one half-frame with extended cyclic prefix is: (3ms + 0.167ms)/5ms=63.34%;
4. For purpose to get the worst case SAR test duty factor, the duty factor of normal cyclic prefix in uplink scaled-up to the extended cyclic prefix in uplink, the scaling factor is 63.34%/62.86%=1.008, and the scaling factor will be taken into the final measured SAR.

LTE Band 2 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18607	18900	19193
					1850.7MHz	1880.0MHz	1909.3MHz
Band 2	1.4	QPSK	1	0	22.56	22.43	22.67
			1	2	22.49	22.34	22.67
			1	5	22.49	22.44	22.72
			3	0	22.60	22.58	22.54
			3	1	22.59	22.58	22.56
			3	2	22.57	22.57	22.55
			6	0	21.52	21.62	21.49
		16QAM	1	0	21.99	21.52	21.83
			1	2	22.46	21.51	21.87
			1	5	22.46	21.50	22.07
			3	0	21.26	21.39	21.29
			3	1	21.27	21.38	21.56
			3	2	21.31	21.37	21.55
			6	0	20.92	20.42	20.72

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18615	18900	19185
					1851.5MHz	1880.0MHz	1908.5MHz
Band 2	3	QPSK	1	0	22.50	22.53	22.72
			1	7	22.49	22.51	22.71
			1	14	22.52	22.50	22.71
			8	0	21.61	21.63	21.63
			8	4	21.64	21.64	21.62
			8	7	21.63	21.58	21.56
			15	0	21.58	21.61	21.57
		16QAM	1	0	21.34	21.37	21.48
			1	7	21.33	21.55	21.47
			1	14	21.34	21.55	21.49
			8	0	20.77	20.63	20.72
			8	4	20.76	20.63	20.69
			8	7	20.83	20.57	20.82
			15	0	20.76	20.52	20.65

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18625	18900	19175
					1852.5MHz	1880.0MHz	1907.5MHz
Band 2	5	QPSK	1	0	22.53	22.42	22.80
			1	12	22.62	22.55	22.68
			1	24	22.58	22.47	22.73
			12	0	21.70	21.54	21.68
			12	6	21.70	21.47	21.70
			12	11	21.60	21.56	21.70
			25	0	21.53	21.51	21.63
		16QAM	1	0	20.89	21.72	21.33
			1	12	20.90	21.72	21.40
			1	24	20.92	21.76	21.32
			12	0	20.74	20.76	20.51
			12	6	20.72	20.72	20.53
			12	11	20.74	20.73	20.46
			25	0	20.74	20.75	20.70

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18650	18900	19150
					1855.0MHz	1880.0MHz	1905.0MHz
Band 2	10	QPSK	1	0	22.50	22.43	22.65
			1	24	22.64	22.44	22.70
			1	49	22.41	22.52	22.61
			25	0	21.58	21.56	21.57
			25	12	21.63	21.57	21.59
			25	24	21.63	21.57	21.60
			50	0	21.55	21.60	21.56
		16QAM	1	0	21.47	21.43	22.12
			1	24	21.42	21.44	22.08
			1	49	21.30	21.38	22.16
			25	0	20.61	21.13	20.76
			25	12	20.61	21.13	20.80
			25	24	20.61	21.11	20.86
			50	0	20.64	20.66	20.66

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18675	18900	19125
					1857.5MHz	1880.0MHz	1902.5MHz
Band 2	15	QPSK	1	0	22.59	22.27	22.75
			1	37	22.50	22.30	22.75
			1	74	22.58	22.41	22.74
			36	0	21.42	21.54	21.65
			36	16	21.64	21.58	21.56
			36	35	21.63	21.54	21.57
			75	0	21.99	21.63	21.69
		16QAM	1	0	21.67	21.57	21.47
			1	37	22.03	21.55	21.51
			1	74	21.50	21.70	21.50
			36	0	20.58	21.10	20.91
			36	16	20.61	21.01	20.82
			36	35	20.56	21.12	20.76
			75	0	21.05	20.65	20.67

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18700	18900	19100
					1860.0MHz	1880.0MHz	1900.0MHz
Band 2	20	QPSK	1	0	22.73	22.56	22.56
			1	49	22.61	22.62	22.64
			1	99	22.71	22.66	22.60
			50	0	21.69	21.60	21.65
			50	24	21.68	21.55	21.55
			50	49	21.68	21.52	21.55
			100	0	21.45	21.54	21.54
		16QAM	1	0	21.55	22.02	21.46
			1	49	21.59	21.87	21.52
			1	99	21.71	22.28	21.46
			50	0	20.68	20.61	20.72
			50	24	20.68	20.62	20.73
			50	49	20.68	20.62	20.73
			100	0	20.69	20.75	20.70

LTE Band 5 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20407	20525	20643
					824.7MHz	836.5MHz	848.3MHz
Band 5	1.4	QPSK	1	0	22.92	22.98	23.03
			1	2	22.92	22.95	22.95
			1	5	22.88	23.03	23.06
			3	0	23.00	23.07	22.82
			3	1	23.01	23.06	22.82
			3	2	23.01	23.07	22.98
			6	0	22.01	22.01	22.02
		16QAM	1	0	22.52	21.73	22.17
			1	2	22.57	21.92	22.12
			1	5	22.61	21.56	22.06
			3	0	21.67	21.71	21.57
			3	1	21.67	21.68	21.60
			3	2	21.67	21.73	21.57
			6	0	21.21	20.94	20.81

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20415	20525	20635
					825.5MHz	836.5MHz	847.5MHz
Band 5	3	QPSK	1	0	22.93	23.07	23.07
			1	7	22.97	22.97	23.02
			1	14	23.06	22.99	23.03
			8	0	22.03	22.09	21.87
			8	4	22.04	22.10	21.90
			8	7	21.92	21.88	21.83
			15	0	21.99	21.92	21.87
		16QAM	1	0	21.57	21.67	21.91
			1	7	21.60	21.75	22.59
			1	14	21.66	21.70	22.46
			8	0	21.14	21.13	20.95
			8	4	21.15	21.14	20.96
			8	7	21.49	21.08	21.02
			15	0	21.06	20.81	20.97

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20425	20525	20625
					826.5MHz	836.5MHz	846.5MHz
Band 5	5	QPSK	1	0	22.90	22.94	23.00
			1	12	22.96	22.97	22.93
			1	24	22.94	23.01	23.02
			12	0	21.91	22.06	21.96
			12	6	21.92	22.07	21.98
			12	11	21.92	22.04	21.89
			25	0	21.94	21.99	21.91
		16QAM	1	0	21.16	22.12	22.07
			1	12	21.25	22.01	21.97
			1	24	21.28	22.19	21.78
			12	0	21.02	21.11	21.03
			12	6	21.03	21.12	21.03
			12	11	21.03	21.12	21.04
			25	0	21.55	21.01	20.99

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20450	20525	20600
					829MHz	836.5MHz	844MHz
Band 5	10	QPSK	1	0	22.86	22.92	23.00
			1	24	22.95	22.85	22.96
			1	49	23.13	22.84	22.95
			25	0	21.82	22.09	21.97
			25	12	21.83	22.07	22.00
			25	24	21.83	22.02	22.01
			50	0	21.86	21.97	21.98
		16QAM	1	0	21.97	21.88	22.45
			1	24	21.86	21.80	22.30
			1	49	21.74	21.87	22.38
			25	0	21.39	21.11	21.08
			25	12	21.39	21.04	21.09
			25	24	21.42	21.05	21.13
			50	0	20.81	21.04	21.43

LTE Band 12 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23017	23095	23175
					699.7MHz	707.5MHz	715.3MHz
Band 12	1.4	QPSK	1	0	22.88	22.90	23.10
			1	2	22.83	22.90	23.16
			1	5	22.83	22.96	23.14
			3	0	23.04	22.98	22.99
			3	1	23.05	22.98	23.00
			3	2	23.04	22.98	23.00
			6	0	21.84	22.00	22.09
		16QAM	1	0	22.47	21.40	22.17
			1	2	22.43	21.82	22.24
			1	5	22.41	21.49	22.12
			3	0	21.70	21.66	21.83
			3	1	21.67	21.66	21.83
			3	2	21.63	21.65	21.83
			6	0	21.63	20.95	21.11

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23025	23095	23165
					700.5MHz	707.5MHz	714.5MHz
Band 12	3	QPSK	1	0	22.83	22.86	23.16
			1	7	22.85	23.06	23.06
			1	14	22.93	23.00	23.14
			8	0	22.07	21.97	21.88
			8	4	21.94	21.87	21.90
			8	7	22.03	21.87	22.01
			15	0	22.06	22.10	21.96
		16QAM	1	0	21.76	21.77	21.97
			1	7	21.55	21.60	22.04
			1	14	21.67	21.53	22.50
			8	0	21.54	21.11	21.09
			8	4	21.55	21.11	21.10
			8	7	21.53	21.17	21.08
			15	0	21.50	21.00	21.05

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23035	23095	23155
					701.5MHz	707.5MHz	713.5MHz
Band 12	5	QPSK	1	0	22.90	22.93	22.96
			1	12	23.00	22.89	23.08
			1	24	22.89	22.94	23.11
			12	0	22.00	21.87	22.09
			12	6	21.97	21.89	22.01
			12	11	22.00	21.90	22.02
			25	0	22.10	22.14	21.95
		16QAM	1	0	21.31	22.04	21.71
			1	12	21.26	22.11	21.92
			1	24	21.14	22.63	22.03
			12	0	21.38	21.07	21.49
			12	6	21.38	21.08	21.49
			12	11	21.38	21.08	21.49
			25	0	21.58	20.92	21.14

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23060	23095	23130
					704MHz	707.5MHz	711MHz
Band 12	10	QPSK	1	0	22.89	22.79	22.93
			1	24	23.00	22.86	23.05
			1	49	23.02	22.97	23.04
			25	0	21.98	21.91	22.03
			25	12	22.00	21.93	22.04
			25	24	21.96	21.93	22.05
			50	0	21.86	22.10	22.39
		16QAM	1	0	21.60	21.69	22.39
			1	24	21.44	21.77	22.92
			1	49	21.57	21.87	22.45
			25	0	21.29	21.20	21.15
			25	12	21.42	21.19	21.16
			25	24	21.36	21.19	21.13
			50	0	21.35	21.13	21.50

LTE Band 41 part:

LTE Band	Band-width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40265	40500	40740	40975	41215
					2557.5MHz	2581.0MHz	2605.0MHz	2628.5MHz	2652.5MHz
Band 41	5	QPSK	1	0	22.55	22.61	22.59	22.60	22.67
			1	12	22.57	22.60	22.64	22.61	22.63
			1	24	22.73	22.73	22.64	22.70	22.72
			12	0	21.54	21.73	21.73	21.73	21.91
			12	6	21.69	21.80	21.72	21.77	21.91
			12	11	21.68	21.79	21.71	21.76	21.90
			25	0	21.64	21.76	21.72	21.75	21.88
		16QAM	1	0	21.64	21.99	21.85	21.94	22.33
			1	12	22.19	22.24	21.81	22.10	22.29
			1	24	22.03	22.16	21.80	22.04	22.29
			12	0	20.57	20.73	20.92	20.79	20.88
			12	6	20.55	20.72	20.91	20.78	20.88
			12	11	20.54	20.72	20.90	20.78	20.89
			25	0	20.81	20.91	21.02	20.94	21.00

LTE Band	Band-width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40290	40515	40740	40965	41190
					2560.0MHz	2582.5MHz	2605.0MHz	2627.5MHz	2650.0MHz
Band 41	10	QPSK	1	0	22.68	22.73	22.92	22.79	22.78
			1	24	22.73	22.77	22.99	22.84	22.81
			1	49	22.86	22.83	23.02	22.89	22.80
			25	0	21.58	21.74	21.83	21.77	21.89
			25	12	21.71	21.81	21.83	21.81	21.90
			25	24	21.71	21.81	21.83	21.81	21.90
			50	0	21.65	21.83	21.81	21.82	22.00
		16QAM	1	0	21.88	21.77	22.14	21.89	21.66
			1	24	21.89	21.75	22.15	21.88	21.61
			1	49	22.00	21.84	22.12	21.93	21.67
			25	0	20.80	21.07	21.06	21.06	21.33
			25	12	20.80	21.07	20.96	21.03	21.34
			25	24	20.80	21.05	21.05	21.05	21.30
			50	0	20.83	20.89	20.98	20.92	20.94

LTE Band	Band-width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40315	40525	40740	40950	41165
					2562.5MHz	2583.5MHz	2605.0MHz	2626.0MHz	2647.5MHz
Band 41	15	QPSK	1	0	22.53	22.71	22.96	22.79	22.88
			1	37	22.79	22.87	23.01	22.91	22.94
			1	74	22.83	22.86	23.02	22.91	22.89
			36	0	21.74	21.86	21.82	21.84	21.97
			36	16	21.57	21.78	21.99	21.85	21.98
			36	35	21.76	21.87	21.98	21.91	21.98
			75	0	21.74	21.86	21.87	21.86	21.98
		16QAM	1	0	21.91	21.74	22.05	21.84	21.57
			1	37	22.04	21.69	22.09	21.82	21.33
			1	74	21.88	21.69	22.13	21.84	21.50
			36	0	20.86	21.00	20.98	20.99	21.13
			36	16	20.74	20.96	20.98	20.96	21.17
			36	35	20.87	21.04	20.97	21.02	21.21
			75	0	20.79	20.91	21.07	20.96	21.02

LTE Band	Band-width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40340	40540	40740	40940	41140
					2565.0MHz	2585.0MHz	2605.0MHz	2625.0MHz	2645.0MHz
Band 41	20	QPSK	1	0	22.58	22.78	22.85	22.80	22.97
			1	49	22.64	22.80	22.87	22.82	22.95
			1	99	22.76	22.91	23.00	22.94	23.05
			50	0	21.60	21.79	21.78	21.79	21.98
			50	24	21.63	21.81	21.79	21.80	21.99
			50	49	21.63	21.74	21.79	21.75	21.84
			100	0	21.70	21.79	21.85	21.81	21.88
		16QAM	1	0	22.05	22.13	22.30	22.19	22.21
			1	49	22.12	22.14	22.24	22.17	22.15
			1	99	22.28	22.26	22.33	22.28	22.24
			50	0	20.92	21.04	21.15	21.07	21.15
			50	24	20.93	21.04	21.15	21.08	21.15
			50	49	20.92	21.04	20.99	21.02	21.16
			100	0	20.90	21.04	21.02	21.03	21.17

Note:

1. Per KDB 447498 D04v01 section 3.1.6, the required test channels number is 5 for LTE Band 41.

LTE Band 66 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131979	132322	132665
					1710.70MHz	1745.00MHz	1779.3MHz
Band 66	1.4	QPSK	1	0	22.66	22.82	22.84
			1	2	22.66	22.80	22.88
			1	5	22.62	22.84	22.89
			3	0	22.82	22.72	22.70
			3	1	22.82	22.74	22.78
			3	2	22.82	22.71	22.71
			6	0	21.65	21.56	21.82
		16QAM	1	0	22.69	21.74	21.90
			1	2	22.65	21.68	21.68
			1	5	22.64	21.75	21.80
			3	0	21.49	21.17	21.49
			3	1	21.48	21.20	21.50
			3	2	21.48	21.22	21.50
			6	0	20.84	21.39	20.72

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131987	132322	132657
					1711.50MHz	1745.00MHz	1778.50MHz
Band 66	3	QPSK	1	0	22.66	22.84	22.95
			1	7	22.61	22.87	22.89
			1	14	22.63	22.91	22.82
			8	0	21.75	21.63	21.84
			8	4	21.70	21.63	21.83
			8	7	21.68	21.65	21.78
			15	0	21.72	21.64	21.68
		16QAM	1	0	21.54	21.44	21.70
			1	7	21.61	21.56	22.27
			1	14	21.57	21.54	22.26
			8	0	20.89	21.51	21.01
			8	4	20.90	21.51	21.05
			8	7	20.96	21.40	20.89
			15	0	20.81	21.18	20.73

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131997	132322	132647
					1712.50MHz	1745.00MHz	1777.50MHz
Band 66	5	QPSK	1	0	22.57	22.71	22.95
			1	12	22.70	22.63	22.89
			1	24	22.70	22.69	22.89
			12	0	21.90	21.75	21.78
			12	6	21.81	21.76	21.79
			12	11	21.83	21.76	21.80
			25	0	21.80	21.54	21.78
		16QAM	1	0	21.01	21.83	21.88
			1	12	21.14	21.92	21.78
			1	24	21.00	21.60	21.79
			12	0	20.79	20.77	20.82
			12	6	20.82	20.83	20.86
			12	11	20.79	20.78	20.84
			25	0	20.92	21.06	21.01

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132022	132322	132622
					1715.00MHz	1745.00MHz	1775.00MHz
Band 66	10	QPSK	1	0	22.63	22.68	22.67
			1	24	22.70	22.65	22.78
			1	49	22.81	22.72	22.84
			25	0	21.79	21.57	22.02
			25	12	21.78	21.56	22.04
			25	24	21.80	21.67	21.98
			50	0	21.67	21.71	21.76
		16QAM	1	0	21.80	21.52	22.25
			1	24	21.74	21.52	22.30
			1	49	21.79	21.57	22.27
			25	0	20.84	20.89	21.28
			25	12	20.84	20.88	21.29
			25	24	20.86	20.91	21.29
			50	0	20.76	21.27	20.87

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132047	132322	132597
					1717.50MHz	1745.00MHz	1772.50MHz
Band 66	15	QPSK	1	0	22.70	22.66	22.84
			1	37	22.72	22.84	22.77
			1	74	22.82	22.63	22.86
			36	0	21.74	21.72	21.67
			36	16	21.67	21.57	21.71
			36	35	21.67	21.71	21.69
			75	0	21.68	21.67	22.04
		16QAM	1	0	21.71	21.93	22.31
			1	37	21.66	22.10	22.66
			1	74	21.81	21.73	22.25
			36	0	20.76	20.92	21.18
			36	16	20.69	20.89	21.16
			36	35	20.70	20.86	21.16
			75	0	20.76	21.37	21.26

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132072	132322	132572
					1720.00MHz	1745.00MHz	1770.00MHz
Band 66	20	QPSK	1	0	22.77	22.86	22.73
			1	49	22.87	22.94	22.74
			1	99	22.88	22.91	22.85
			50	0	21.60	21.63	21.78
			50	24	21.61	21.64	21.72
			50	49	21.61	21.64	21.72
			100	0	21.69	21.70	21.69
		16QAM	1	0	21.43	22.19	21.59
			1	49	21.43	22.06	21.49
			1	99	21.45	21.98	21.68
			50	0	20.79	20.77	20.87
			50	24	20.79	20.70	20.88
			50	49	20.80	20.78	20.85
			100	0	20.71	21.26	21.22

LTE Band 71 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133147	133297	133447
					665.5MHz	680.5MHz	695.5MHz
Band 71	5	QPSK	1	0	22.92	22.95	22.89
			1	12	22.94	22.91	22.91
			1	24	22.87	22.91	23.05
			12	0	22.03	22.40	21.80
			12	6	22.01	22.29	21.88
			12	11	22.02	22.30	21.88
			25	0	21.94	22.36	21.94
		16QAM	1	0	21.28	21.96	21.69
			1	12	21.38	22.30	21.85
			1	24	21.36	22.03	21.72
			12	0	20.75	21.25	21.40
			12	6	20.76	21.26	21.40
			12	11	20.75	21.27	21.28
			25	0	21.04	21.16	21.02

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133172	133297	133422
					668MHz	680.5MHz	693MHz
Band 71	10	QPSK	1	0	22.75	23.05	22.82
			1	24	22.71	22.95	22.82
			1	49	22.80	23.06	22.87
			25	0	22.13	22.06	22.00
			25	12	22.05	22.12	21.93
			25	24	22.04	22.13	21.96
			50	0	22.02	22.37	21.90
		16QAM	1	0	21.78	21.61	21.45
			1	24	21.63	22.81	21.54
			1	49	22.16	22.34	21.64
			25	0	21.05	21.46	20.98
			25	12	21.05	21.43	20.94
			25	24	21.10	21.44	20.99
			50	0	21.05	21.37	21.35

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133197	133297	133397
					670.5MHz	680.5MHz	690.5MHz
Band 71	15	QPSK	1	0	22.90	23.01	22.83
			1	37	22.91	22.98	22.92
			1	74	23.83	23.06	22.99
			36	0	22.07	22.15	21.82
			36	16	22.07	22.05	21.94
			36	35	22.07	22.04	21.94
			75	0	22.29	22.42	21.94
		16QAM	1	0	22.01	21.66	21.73
			1	37	22.49	22.22	21.66
			1	74	23.16	21.83	21.61
			36	0	21.04	21.41	20.89
			36	16	21.08	21.40	20.95
			36	35	21.04	21.28	20.97
			75	0	21.39	21.33	21.20

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133222	133322	133372
					673MHz	683MHz	688MHz
Band 71	20	QPSK	1	0	22.97	22.95	23.00
			1	49	22.96	22.99	22.96
			1	99	23.09	23.08	23.04
			50	0	21.90	22.07	21.92
			50	24	21.89	22.05	21.97
			50	49	21.89	22.11	21.90
			100	0	22.29	22.06	21.81
		16QAM	1	0	22.19	22.03	21.57
			1	49	22.56	22.10	21.33
			1	99	22.24	21.94	21.57
			50	0	20.79	21.39	21.04
			50	24	20.78	21.47	21.00
			50	49	20.78	21.48	21.01
			100	0	21.40	21.07	20.89

13.4 WLAN 2.4 GHz Band Conducted Power

Average Power (dBm)				
Channel	Frequency (MHz)	802.11 b	802.11 g	802.11n (HT20)
CH 01	2412	**17.14**	13.87	12.89
CH 06	2437	15.47	13.39	12.59
CH 11	2462	17.08	13.96	13.56

Average Power (dBm)		
Channel	Frequency (MHz)	802.11n (HT40)
CH 03	2422	12.93
CH 06	2437	13.17
CH 09	2452	13.35

Note:

1. SAR test of WLAN 2.4GHz is performed.
2. Per KDB 248227 D01v02r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
3. Per KDB 248227 D01v02r02, In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. SAR is not required for the following 2.4 GHz OFDM conditions:
   1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
   2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
4. The output power of all data rate were pre-scan, just the worst case (the lowest data rate) of all mode were shown in report.
5. Per KDB 248227 D01V02r02 section 2.2, when the EUT in continuously transmitting mode, the actual duty cycle is 100%, so the duty cycle factor is 1.

13.5 Bluetooth Conducted Power

Average Power (dBm)				
Channel	Frequency (MHz)	GFSK	π/4-DQPSK	8DPSK
CH 00	2402	6.98	8.45	8.81
CH 39	2441	7.53	8.83	**9.09**
CH 78	2480	6.18	7.25	7.55

Average Power (dBm)					
Channel	Frequency (MHz)	BLE PHY 1M	BLE PHY 2M	BLE Coded PHY S=2	BLE Coded PHY S=8
CH 00	2402	5.31	5.12	5.33	5.20
CH 20	2442	6.74	6.47	6.65	6.56
CH 39	2480	4.99	4.88	4.89	4.86

Note:

1. SAR test of Bluetooth is performed and the mode with highest average power is selected for SAR testing.
2. The output power of all data rate were pre-scan, just the worst case of all mode were shown in report.
3. Per KDB 248227 D01V02r02 section 2.2, when the EUT in continuously transmitting mode, the actual duty cycle is 100%, so the duty cycle factor is 1.

14 Exposure Positions Consideration

14.1 EUT Antenna Locations EUT Antenna Locations

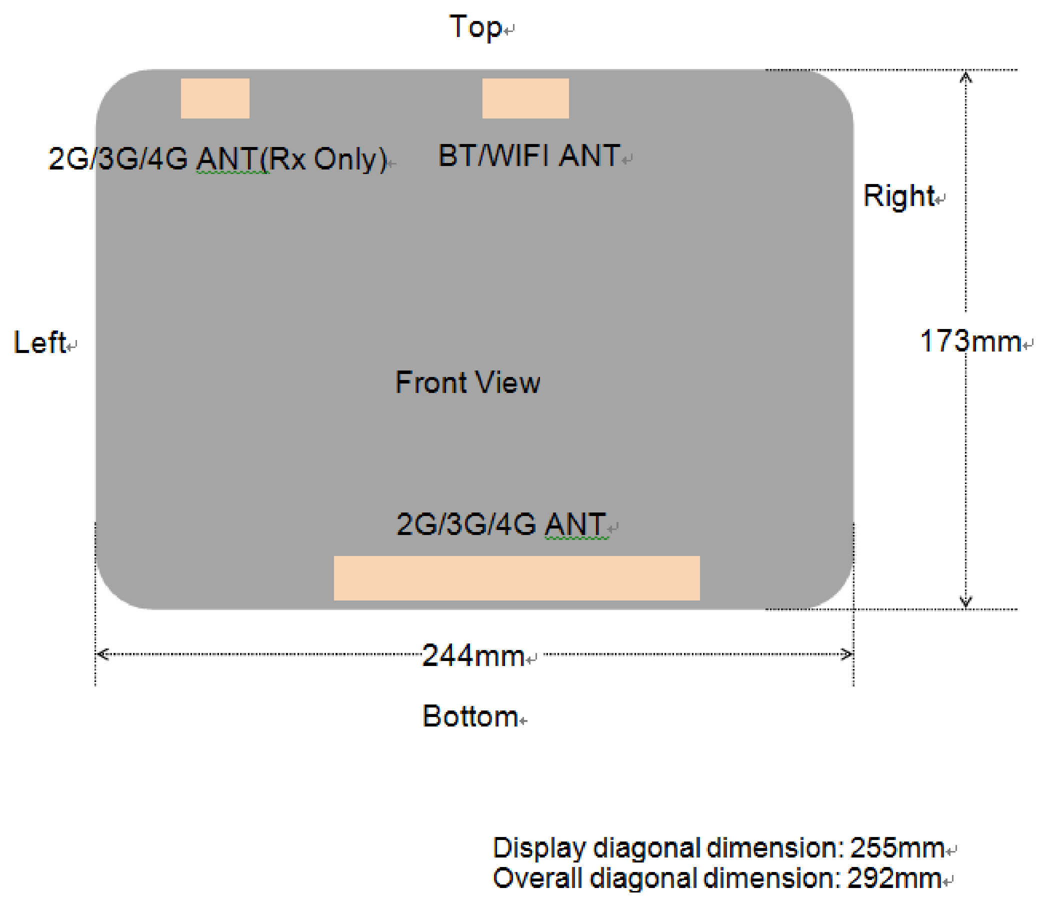


Fig.14.1 EUT Antenna Locations

Note: This antenna diagram is only used as a reference for the distance from the antenna to each edge. For the specific shape of the antenna, please refer to the physical photo.

14.2 Test Positions Consideration

SAR exclusion calculations for antenna														
Antennas	Freq. (MHz)	Max. tune-up Power		Distance of Antennas to EUT edge/surface (mm)					exclusion thresholds (mW)					
		dBm	mW	Back	Left	Right	Top	Bott.	Back	Left	Right	Top	Bott.
GPRS 850	824.2	25.5	354.8	5	88	59	153	2	9.42	530.3	302.3	1154	2.60
GPRS 1900	1850.2	22.0	158.5	5	88	59	153	2	3.44	674.9	323.3	1869	0.64
WCDMA Band II	1907.6	23.0	199.5	5	88	59	153	2	3.35	671.3	320.7	1865	0.62
WCDMA Band V	836.6	23.5	223.9	5	88	59	153	2	9.22	534.0	303.3	1168	2.52
LTE Band 2	1860	23.0	199.5	5	88	59	153	2	3.42	674.3	322.8	1868	0.63
LTE Band 5	844	23.5	223.9	5	88	59	153	2	9.11	536.2	303.8	1177	2.48
LTE Band 12	711	23.5	223.9	5	88	59	153	2	11.59	495.1	293.3	1021	3.49
LTE Band 41	2645	23.5	223.9	5	88	59	153	2	2.58	633.3	294.1	1830	0.44
LTE Band 66	1745	23.0	199.5	5	88	59	153	2	3.60	682.0	328.3	1875	0.67
LTE Band 71	673	23.5	223.9	5	88	59	153	2	12.51	482.6	290.0	976.1	3.90
2.4GWIFI	2412	17.5	56.2	2	95	128	2	162	0.49	744.5	1311	0.49	2051
BT	2441	9.5	8.91	2	95	128	2	162	0.48	743.0	1310	0.48	2050

Test Positions					
Antennas	Back	Left Side	Right Side	Top Side	Bottom Side
GPRS 850	Yes	No	Yes	No	Yes
GPRS 1900	Yes	No	No	No	Yes
WCDMA Band II	Yes	No	No	No	Yes
WCDMA Band V	Yes	No	No	No	Yes
LTE Band 2	Yes	No	No	No	Yes
LTE Band 5	Yes	No	No	No	Yes
LTE Band 12	Yes	No	No	No	Yes
LTE Band 41	Yes	No	No	No	Yes
LTE Band 66	Yes	No	No	No	Yes
LTE Band 71	Yes	No	No	No	Yes
2.4GWIFI	Yes	No	No	Yes	No
BT	Yes	No	No	Yes	No

Note:

1. Referring to KDB 941225 D07, The internal antennas will be tested on all surfaces and side edges except for front surface with a transmitting antenna located at < 25 mm from that surface or edge.
2. Per KDB 616217 D04v01r02, SAR evaluation for the front surface of tablet display screens is generally not necessary.
3. Per KDB 616217 D04v01r02, additional testing for hotspot SAR is not required.
4. Per KDB 616217 D04v01r02, when the reported SAR with the protrusions in place is > 1.2 W/kg, a KDB inquiry is required to determine if additional SAR measurements in more conservative test configurations are necessary

15 SAR Test Results Summary

15.1 Standalone Body SAR

➢ GSM Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
1	GPRS850/2 slots	Back	128	824.2	31.44	1.73	31.5	**0.678**	1.014	0.687
	GPRS850/2 slots	Right	128	824.2	31.44	-0.69	31.5	0.034	1.014	0.034
	GPRS850/2 slots	Bottom	128	824.2	31.44	2.51	31.5	0.368	1.014	0.373
2	PCS1900/3 slots	Back	512	1850.2	26.12	-0.17	26.5	**0.760**	1.091	0.829
	PCS1900/3 slots	Bottom	512	1850.2	26.12	-1.12	26.5	0.340	1.091	0.371
	PCS1900/3 slots	Back	661	1880	25.91	-2.05	26.5	0.691	1.146	0.792
	PCS1900/3 slots	Back	810	1909.8	25.60	-1.54	26.5	0.665	1.230	0.818
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ WCDMA Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
3	Band V/RMC	Back	4183	836.6	23.17	0.17	23.5	**0.906**	1.067	0.967
	Band V/RMC	Bottom	4183	836.6	23.17	0.98	23.5	0.484	1.067	0.516
	Band V/RMC	Back	4132	826.4	23.14	-1.29	23.5	0.743	1.086	0.807
	Band V/RMC	Back	4233	846.6	23.09	-0.22	23.5	0.797	1.099	0.876
	Band V/RMC	**Back**	**4183**	**836.6**	**23.17**	**0.25**	**23.5**	**0.874**	**1.067**	**0.933**
4	Band II/RMC	Back	9538	1907.6	22.65	-1.68	23.0	**0.745**	1.084	0.808
	Band II/RMC	Bottom	9538	1907.6	22.65	1.76	23.0	0.326	1.084	0.353
	Band II/RMC	Back	9400	1880	22.59	-0.81	23.0	0.710	1.099	0.780
	Band II/RMC	Back	9262	1852.4	22.57	-1.10	23.0	0.700	1.104	0.773
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ FDD-LTE Band 2(20MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
5	Band2/1RB#0	Back	18700	1860	22.73	-0.39	23.0	**0.594**	1.064	0.632
	Band2/1RB#0	Bottom	18700	1860	22.73	3.34	23.0	0.263	1.064	0.280
	Band2/50%RB#0	Back	18700	1860	21.69	0.35	22.0	0.472	1.074	0.507
	Band2/50%RB#0	Bottom	18700	1860	21.69	-0.12	22.0	0.205	1.074	0.220
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ FDD-LTE Band 5(10MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band5/1RB#49	Back	20450	829	23.13	1.93	23.5	0.976	1.089	1.063
	Band5/1RB#49	Bottom	20450	829	23.13	-2.04	23.5	0.533	1.089	0.580
	Band5/1RB#0	Back	20525	836.5	22.92	-0.83	23.5	0.982	1.143	1.122
6	Band5/1RB#0	Back	20600	844	23.00	-0.43	23.5	**1.002**	1.122	1.124
	Band5/50%RB#0	Back	20525	836.5	22.09	-0.08	22.5	0.872	1.099	0.958
	Band5/50%RB#0	Bottom	20525	836.5	22.09	1.90	22.5	0.458	1.099	0.503
	Band5/50%RB#12	Back	20450	829	21.83	-0.05	22.5	0.784	1.167	0.915
	Band5/50%RB#24	Back	20600	844	22.01	1.02	22.5	0.806	1.119	0.902
	Band5/100%RB#0	Back	20600	844	21.98	1.44	22.0	0.782	1.005	0.786
	Band5/1RB#0	**Back**	**20600**	**844**	**23.00**	**1.64**	**23.5**	**0.978**	**1.122**	**1.097**
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ FDD-LTE Band 12(10MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
7	Band12/1RB#24	Back	23130	711	23.05	0.17	23.5	**0.919**	1.109	1.019
	Band12/1RB#24	Bottom	23130	711	23.05	0.75	23.5	0.475	1.109	0.527
	Band12/1RB#49	Back	23060	704	23.02	0.37	23.5	0.857	1.117	0.957
	Band12/1RB#49	Back	23095	707.5	22.97	-0.56	23.5	0.830	1.130	0.938
	Band12/50%RB#24	Back	23130	711	22.05	-0.50	22.5	0.761	1.109	0.844
	Band12/50%RB#24	Bottom	23130	711	22.05	-1.85	22.5	0.404	1.109	0.448
	Band12/50%RB#12	Back	23060	704	22.00	1.33	22.5	0.715	1.122	0.802
	Band12/50%RB#12	Back	23095	707.5	21.93	0.75	22.5	0.692	1.140	0.789
	Band12/100%RB#0	Back	23130	711	22.39	0.55	22.5	0.656	1.026	0.673
	Band12/1RB#24	**Back**	**23130**	**711**	**23.05**	**0.66**	**23.5**	**0.886**	**1.109**	**0.983**
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ TDD-LTE Band 41(20MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
8	Band41/1RB#99	Back	41140	2645	23.05	0.60	23.5	**0.630**	1.109	1.008	0.704
	Band41/1RB#99	Bottom	41140	2645	23.05	-0.71	23.5	0.207	1.109	1.008	0.231
	Band41/50%RB#24	Back	41140	2645	21.99	0.70	22.0	0.538	1.002	1.008	0.543
	Band41/50%RB#24	Bottom	41140	2645	21.99	-0.22	22.0	0.171	1.002	1.008	0.173
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ FDD-LTE Band 66(20MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
9	Band66/1RB#49	Back	132322	1745	22.94	1.94	23.0	**0.768**	1.014	0.779
	Band66/1RB#49	Bottom	132322	1745	22.94	2.01	23.0	0.348	1.014	0.353
	Band66/50%RB#0	Back	132572	1770	21.78	-1.38	22.0	0.624	1.052	0.656
	Band66/50%RB#0	Bottom	132572	1770	21.78	1.66	22.0	0.291	1.052	0.306
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ FDD-LTE Band 71(20MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
10	Band71/1RB#99	Back	133222	673	23.09	-0.68	23.5	**0.728**	1.099	0.800
	Band71/1RB#99	Bottom	133222	673	23.09	0.93	23.5	0.325	1.099	0.357
	Band71/50%RB#49	Back	133322	683	22.11	-0.05	22.50	0.573	1.094	0.627
	Band71/50%RB#49	Bottom	133322	683	22.11	-0.11	22.50	0.254	1.094	0.278
	Band71/100%RB#0	Back	133222	673	22.29	0.55	22.5	0.504	1.050	0.529
	Band71/1RB#99	Back	133322	683	23.08	-2.39	23.5	0.716	1.102	0.789
	Band71/1RB#99	Back	133372	688	23.04	-2.02	23.5	0.703	1.112	0.782
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ WLAN 2.4GHz Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
11	2.4GHz/802.11b	Back	1	2412	17.14	-1.46	17.5	**0.330**	1.086	1.000	0.358
	2.4GHz/802.11b	Top	1	2412	17.14	-0.29	17.5	0.078	1.086	1.000	0.085
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ Bluetooth Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Variation (%)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
12	BT/8DPSK	Back	39	2441	9.09	1.33	9.5	**0.050**	1.099	1.000	0.055
	BT/8DPSK	Top	39	2441	9.09	0.63	9.5	0.007	1.099	1.000	0.008
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

Note:
1. Per KDB 447498 D04v01, for each exposure position, if the highest output channel Reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA output power is < 0.25dB higher than RMC 12.2kbps, or Reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA SAR evaluation can be excluded.
3. Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel.
4. Per KDB 248227 D01v02r02, OFDM SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg. Cuz the maximum output power specified for OFDM and DSSS are 25.12mW(14.0dBm) and 56.23mW(17.5dBm), the scaled SAR would be 0.358×(25.12/56.23)=0.156W/Kg < 1.2 W/kg, therefore, SAR is not required for OFDM.
5. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
6. Highlight part of test data means repeated test.

15.2 Repeated SAR measurement

Band/ Mode	Test Position	CH.	Freq. (MHz)	Measured SAR (W/kg)				
				Original	1st Repeated		2nd Repeated	
					Value	Ratio	Value	Ratio
Band V/RMC	Back	4183	836.6	0.906	0.874	1.04	/	/
Band5/1RB#0	Back	20600	844	1.002	0.978	1.02	/	/
Band12/1RB#24	Back	23130	711	0.919	0.886	1.04	/	/
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population				**1.6 W/kg (mW/g) Averaged over 1g**				

Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8 W/kg
2. Per KDB 865664 D01v01r04, if the ratio of *original* and *repeated* is ≤ 1.2 and the measured SAR <1.45 W/kg, only one repeated measurement is required.

15.3 Multi-Band Simultaneous Transmission Considerations

➢ **Simultaneous Transmission Capabilities**

According to FCC KDB Publication 447498 D04v01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the EUT are shown in below Figure and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Fig.15.1 Simultaneous Transmission Paths

➢ **Multi-Band simultaneous Transmission Consideration**

➢ Simultaneous ➢ Transmission ➢ Consideration	Position	Applicable Combination
	Body	WWAN (Data) + WLAN 2.4 GHz
		WWAN (Data) + Bluetooth

Note:

1. WLAN 2.4GHz Band, Bluetooth share the same antenna, and cannot transmit simultaneously.
2. GSM/WCDMA/LTE shares the same antenna, and cannot transmit simultaneously.
3. The Report SAR summation is calculated based on the same configuration and test position.
4. Per KDB 447498 D04v01, simultaneous transmission SAR is compliant if,
   i. Scalar SAR summation < 1.6 W/kg.
   ii. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
   iii. Simultaneously transmission SAR measurement, and the Reported multi-band SAR < 1.6 W/kg

15.4 SAR Simultaneous Transmission Analysis

➢ **Body mode Simultaneous Transmission**

➢

Position		Standalone SAR(W/kg)			Σ SAR_{1g} (W/kg)	
		1	2	3	1+2	1+3
		WWAN	2.4G WLAN	BT		
Body	Back	1.124	0.358	0.055	1.482	1.179
	Left	0.000	0.000	0.000	0.000	0.000
	Right	0.034	0.000	0.000	0.000	0.000
	Top	0.000	0.085	0.008	0.085	0.008
	Bottom	0.580	0.000	0.000	0.580	0.580

➢ **Simultaneous Transmission Conclusion**

The above numerical summed SAR results for all the case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01.

15.5 Measurement Uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

16 Reference

[1]. FCC 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”, September 1992

[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”, September2013

[4]. OpenSAR V5 Software User Manual

[5]. FCC KDB 248227 D01 v02r02, “SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS”, October 2015

[6]. FCC KDB 447498 D04 v01, “RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES”, November 2021

[7]. FCC KDB 648474 D04 v01r03, “SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS”, October 2015

[8]. FCC KDB 616217 D04 v01r02, “SAR EVALUATION CONSIDERATIONS FOR LAPTOP, NOTEBOOK, NETBOOK AND TABLET COMPUTERS”, October 2015

[9]. FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, October 2015

[10]. FCC KDB 941225 D05 v02r05, “SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES”, Dec 2015

[11]. FCC KDB 941225 D06 v02r01, " SAR EVALUATION PROCEDURES FOR PORTABLE DEVICES WITH WIRELESS ROUTER CAPABILITIES", October 2015

[12]. FCC KDB 865664 D01 v01r04, “SAR MEASUREMENT REQUIREMENTS FOR 100 MHz TO 6 GHz”, August 2015

Appendix A: Plots of SAR System Check

System check at 750 MHz

Date of measurement: 14/12/2022

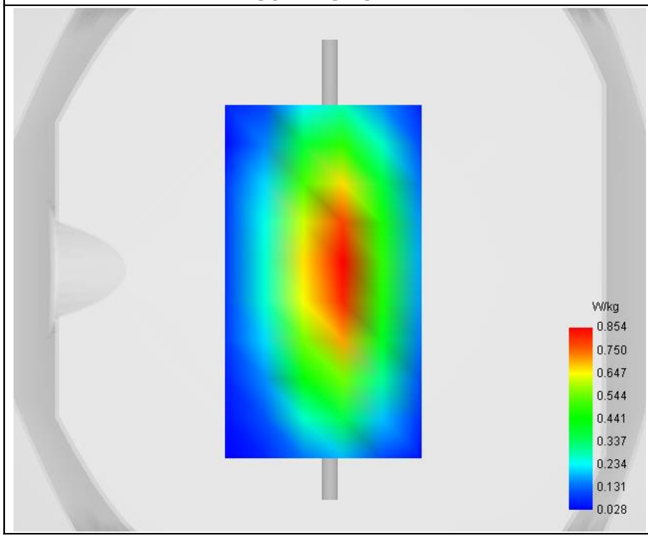
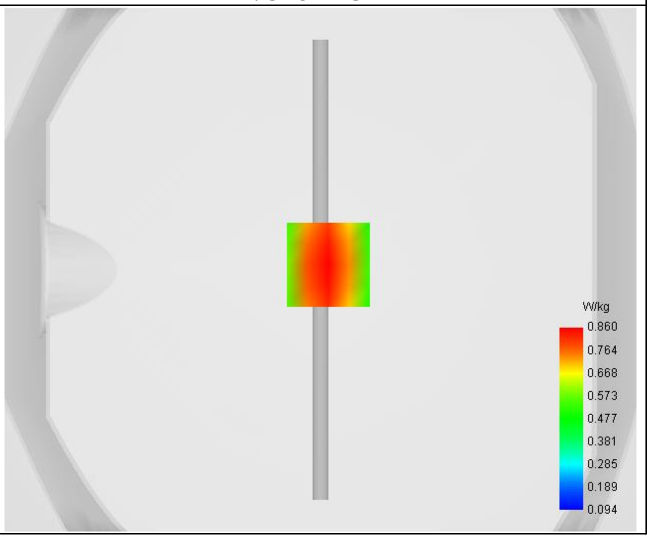
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	1.70
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	750.000000
Relative permitivity (real part)	41.372564
Conductivity (S/m)	0.874382

C. SAR Surface and Volume

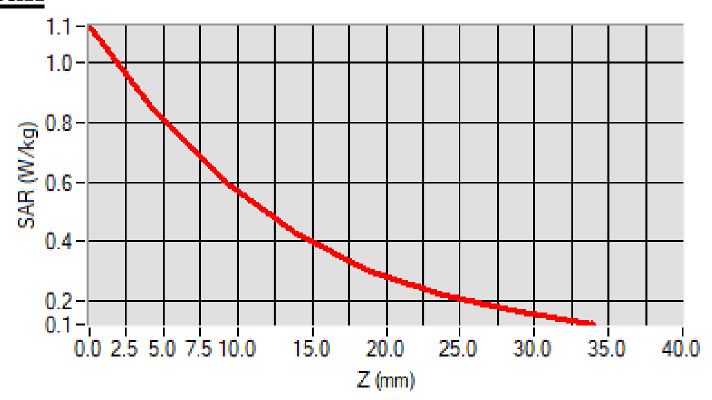
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=2.00 ; SAR Peak: 1.12 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.546443
SAR 1g (W/Kg)	0.847034
Variation (%)	1.240000

E. Z Axis Scan



System check at 835 MHz

Date of measurement: 14/12/2022

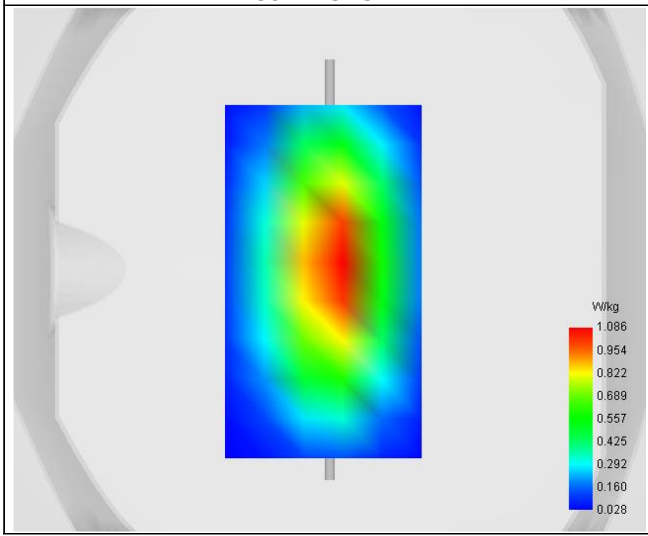
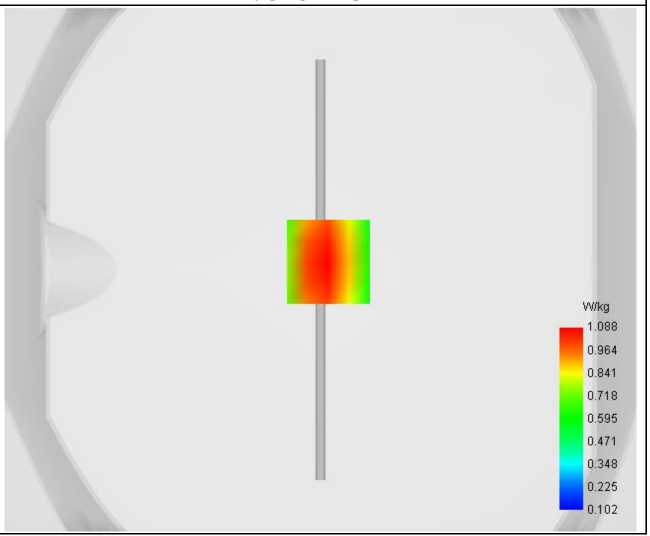
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	1.73
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	835.000000
Relative permitivity (real part)	40.952574
Conductivity (S/m)	0.881247

C. SAR Surface and Volume

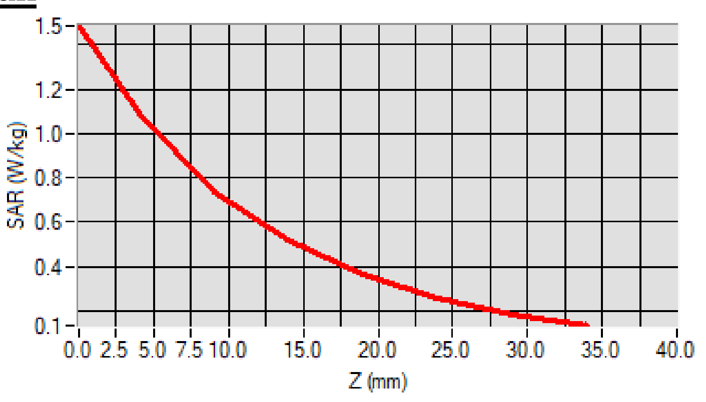
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=3.00 ; SAR Peak: 1.44 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.592062
SAR 1g (W/Kg)	0.942125
Variation (%)	-0.860000

E. Z Axis Scan



System check at 1750 MHz

Date of measurement: 17/12/2022

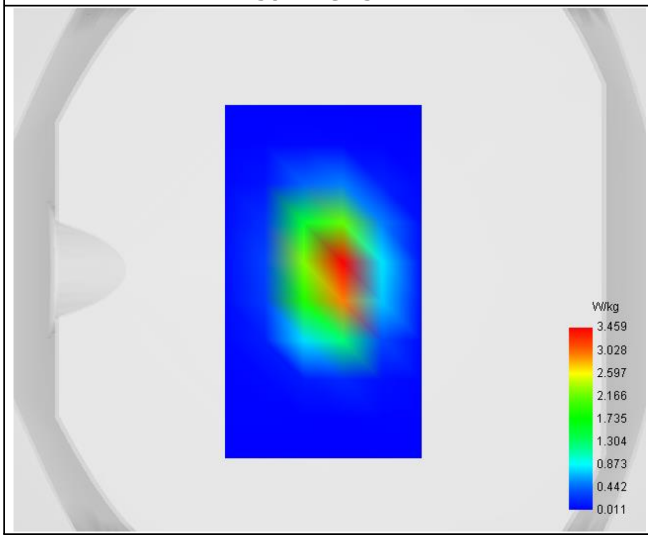
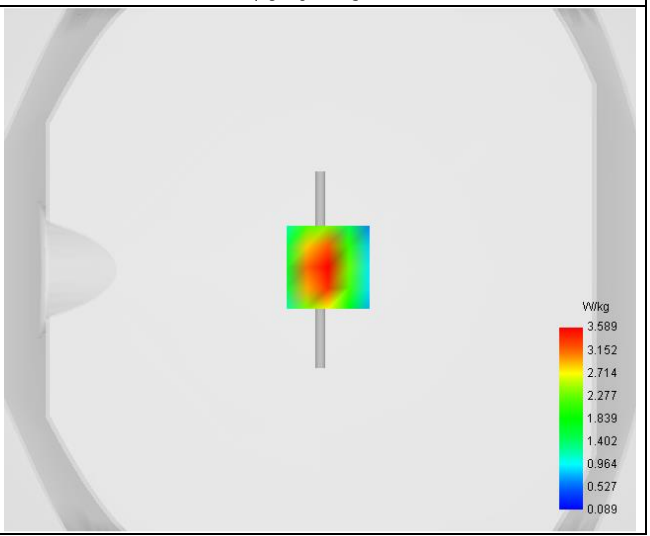
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.05
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW1750
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	1750.000000
Relative permitivity (real part)	40.338564
Conductivity (S/m)	1.392621

C. SAR Surface and Volume

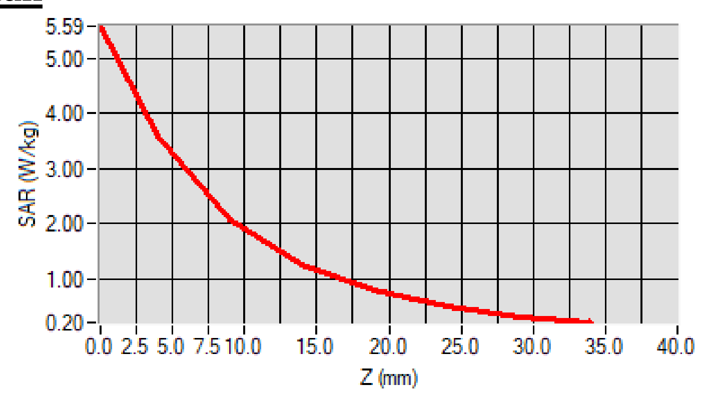
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=1.00 ; SAR Peak: 5.75 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	1.914327
SAR 1g (W/Kg)	3.617245
Variation (%)	2.750000

E. Z Axis Scan



System check at 1900 MHz

Date of measurement: 17/12/2022

A. Experimental conditions.

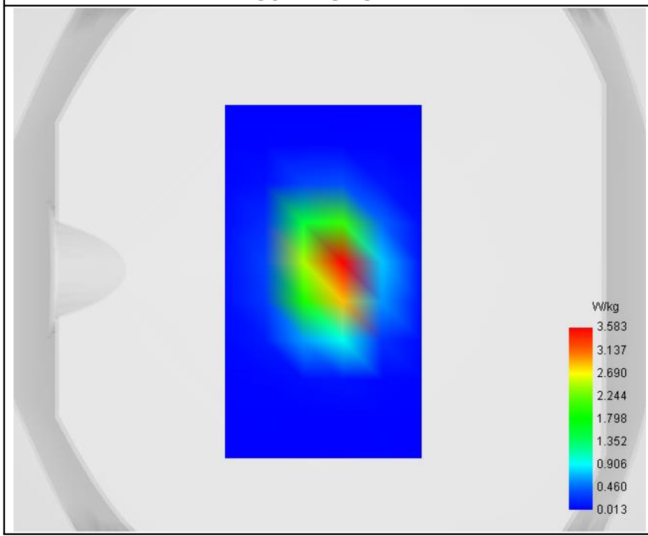
Probe	SN 18/21 EPGO354
ConvF	2.00
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Channels	Middle
Signal	CW (Crest factor: 1.0)

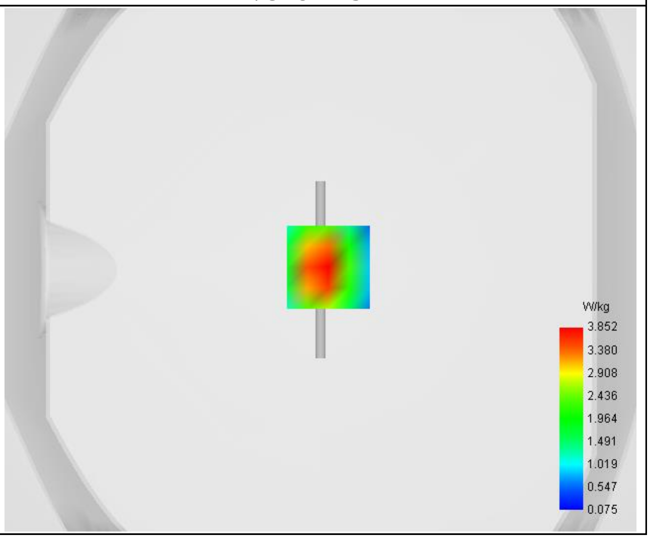
B. Permitivity

Frequency (MHz)	1900.000000
Relative permitivity (real part)	40.113036
Conductivity (S/m)	1.414552

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR



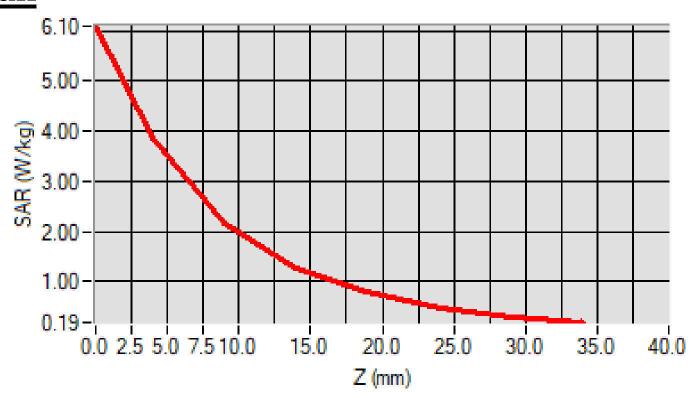


Maximum location: X=3.00, Y=1.00 ; SAR Peak: 6.29 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	2.034227
SAR 1g (W/Kg)	3.952365
Variation (%)	-0.950000

E. Z Axis Scan



System check at 2450 MHz

Date of measurement: 25/12/2022

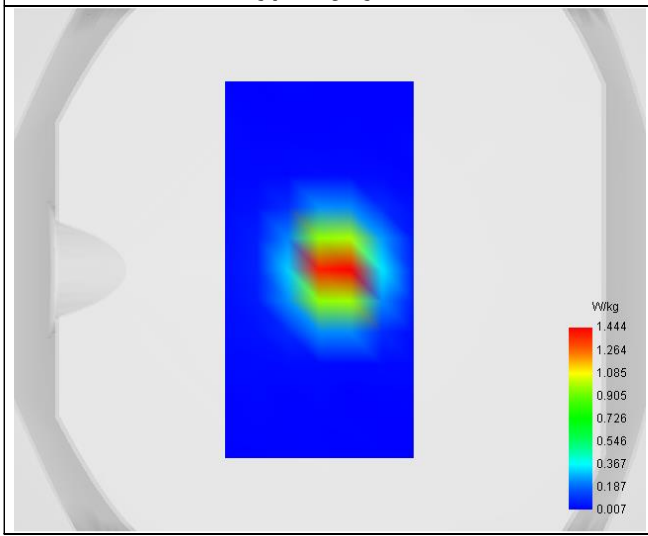
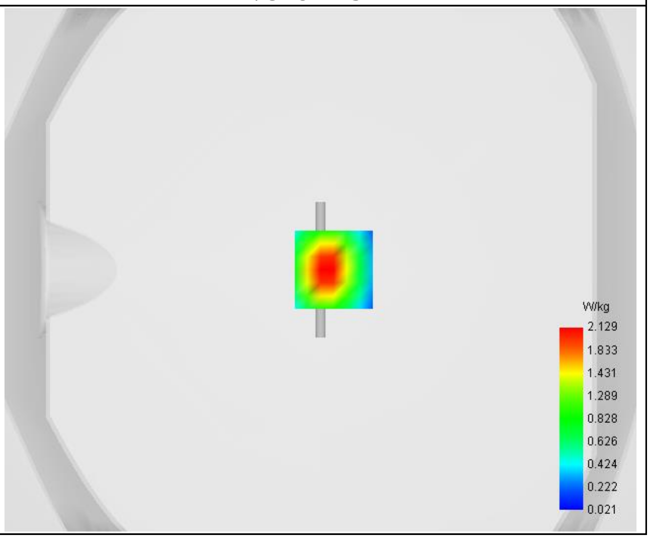
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.46
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2450.000000
Relative permitivity (real part)	39.453235
Conductivity (S/m)	1.791448

C. SAR Surface and Volume

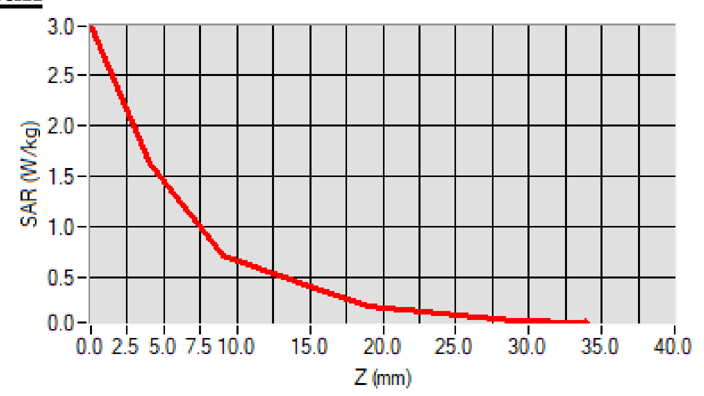
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=0.00 ; SAR Peak: 2.67 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.957454
SAR 1g (W/Kg)	2.144432
Variation (%)	0.520000

E. Z Axis Scan



System check at 2600 MHz

Date of measurement: 25/12/2022

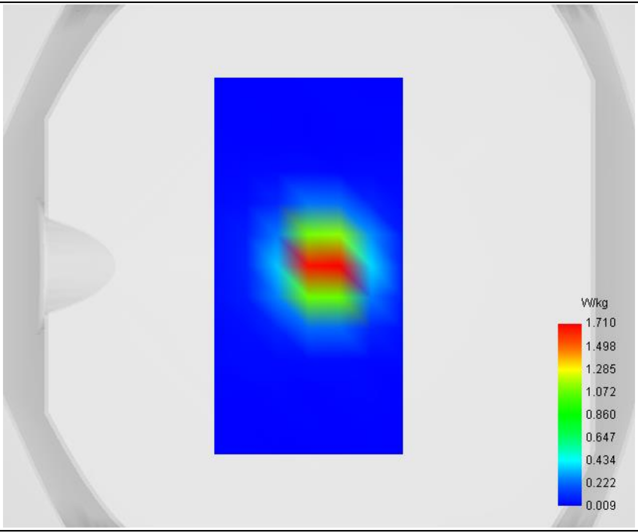
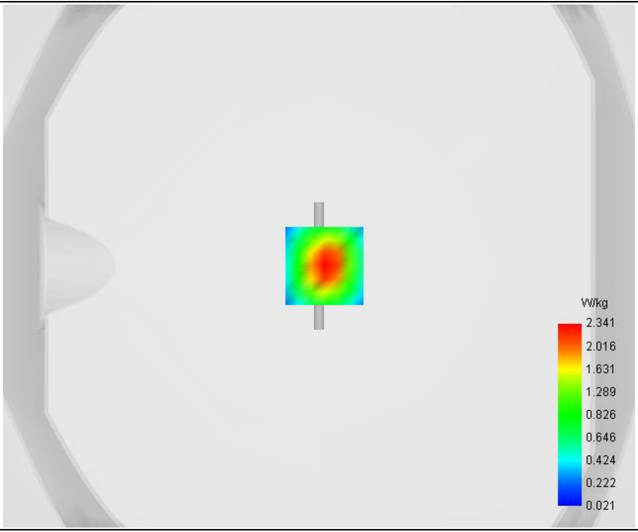
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.27
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2600.000000
Relative permitivity (real part)	39.239057
Conductivity (S/m)	1.932376

C. SAR Surface and Volume

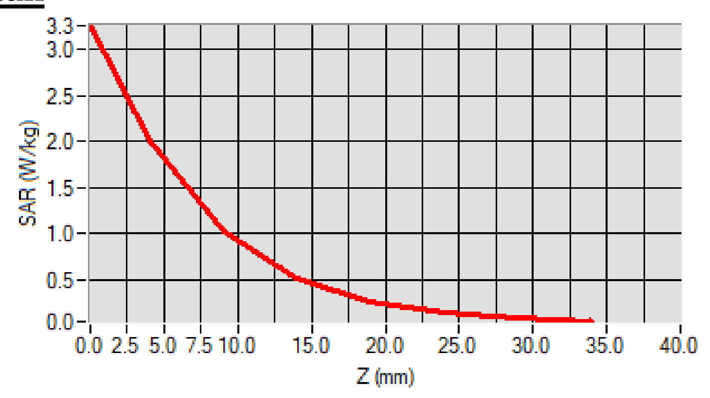
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=0.00 ; SAR Peak: 3.28 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.965208
SAR 1g (W/Kg)	2.241392
Variation (%)	-1.450000

E. Z Axis Scan



Appendix B: Plots of SAR Test Data

SAR Measurement at CUSTOM (GPRS8502Txslots) (Body, Validation Plane)

Date of measurement: 14/12/2022

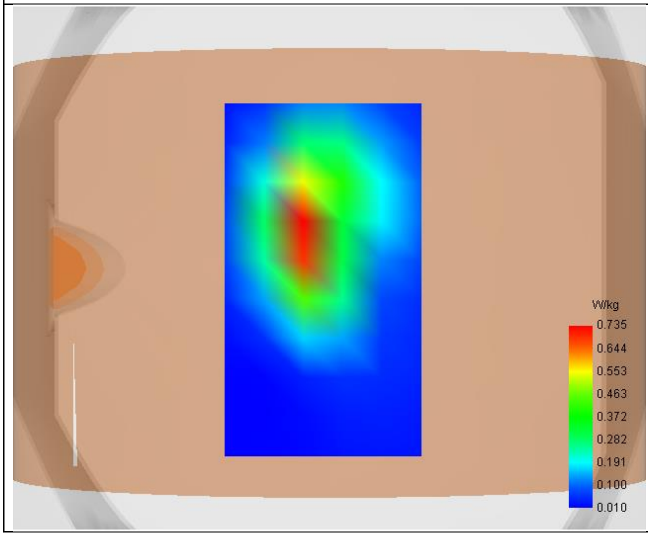
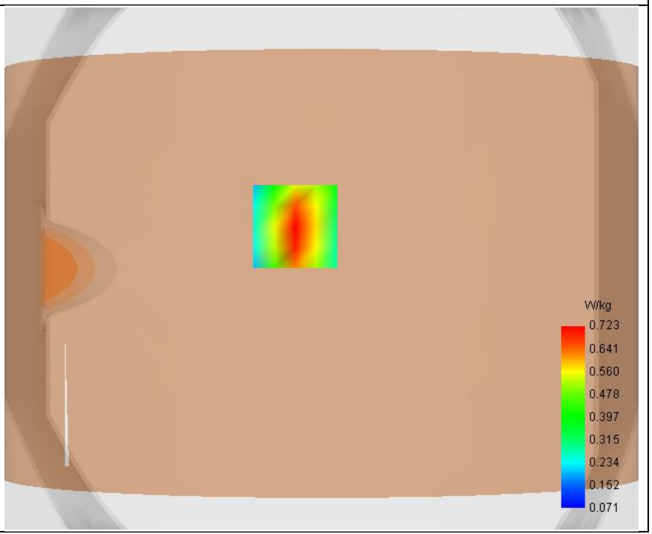
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	1.70
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GSM850
Channels	Low
Signal	TDMA (Crest factor: 4.0)

B. Permitivity

Frequency (MHz)	824.200012
Relative permitivity (real part)	41.050823
Conductivity (S/m)	0.883707

C. SAR Surface and Volume

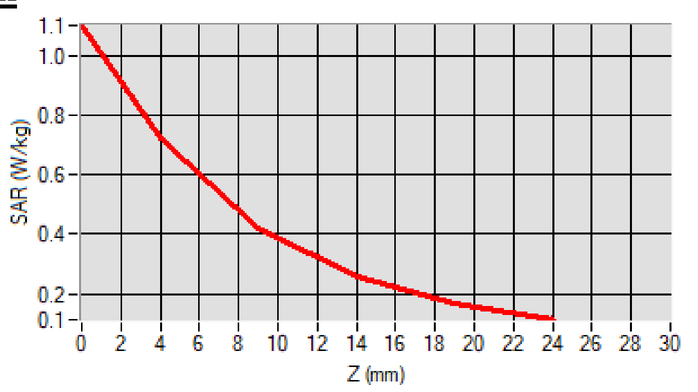
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-10.00, Y=16.00 ; SAR Peak: 1.11 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.385625
SAR 1g (W/Kg)	0.677576
Variation (%)	1.730000

E. Z Axis Scan



SAR Measurement at CUSTOM (GPRS19003TXslots) (Body, Validation Plane)

Date of measurement: 17/12/2022

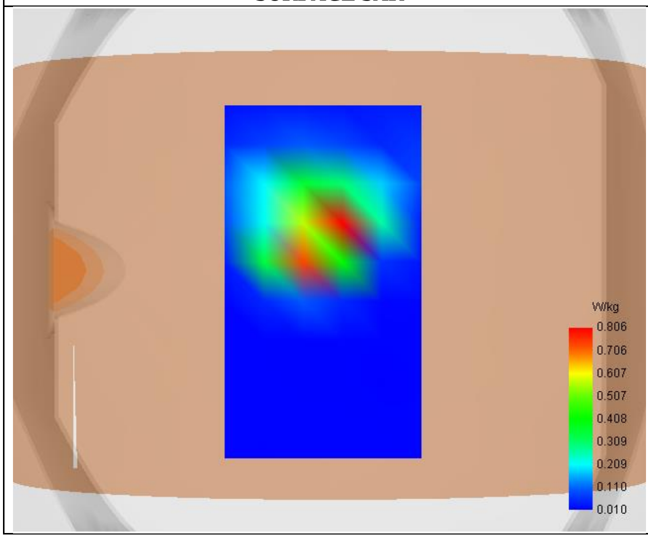
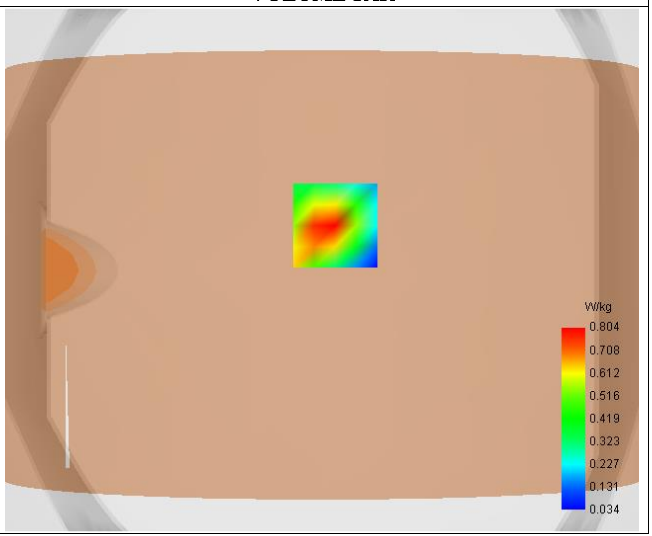
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.00
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GSM1900
Channels	Low
Signal	TDMA (Crest factor: 2.7)

B. Permitivity

Frequency (MHz)	1850.199951
Relative permitivity (real part)	40.194428
Conductivity (S/m)	1.400860

C. SAR Surface and Volume

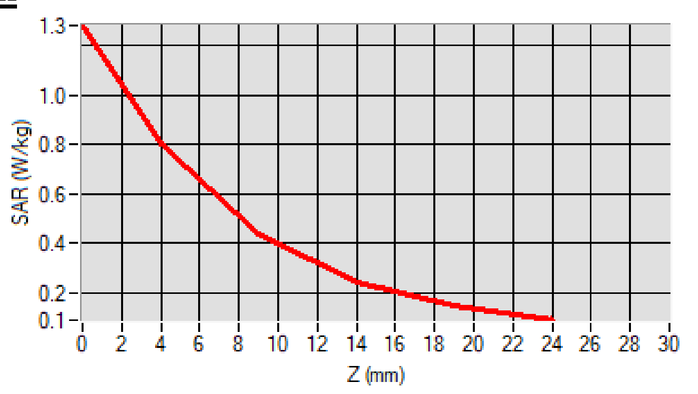
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=17.00 ; SAR Peak: 1.31 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.399675
SAR 1g (W/Kg)	0.760434
Variation (%)	-0.170000

E. Z Axis Scan



SAR Measurement at Band5_WCDMA850 (Body, Validation Plane)

Date of measurement: 14/12/2022

A. Experimental conditions.

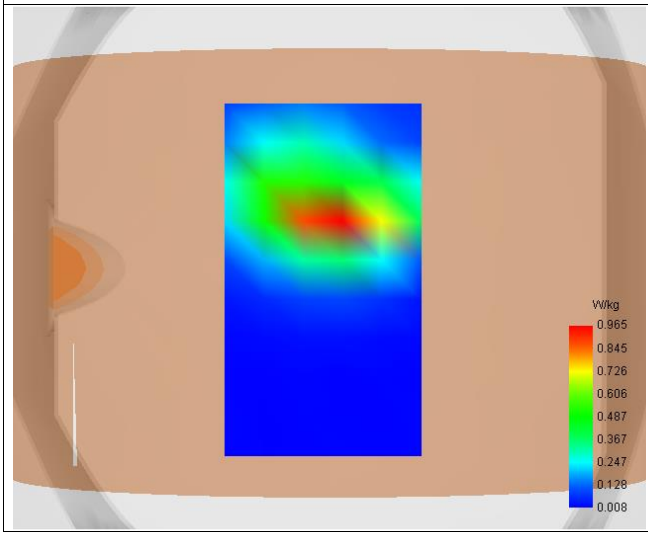
Probe	SN 18/21 EPGO354
ConvF	1.73
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Band5_WCDMA850
Channels	Middle
Signal	WCDMA (Crest factor: 1.0)

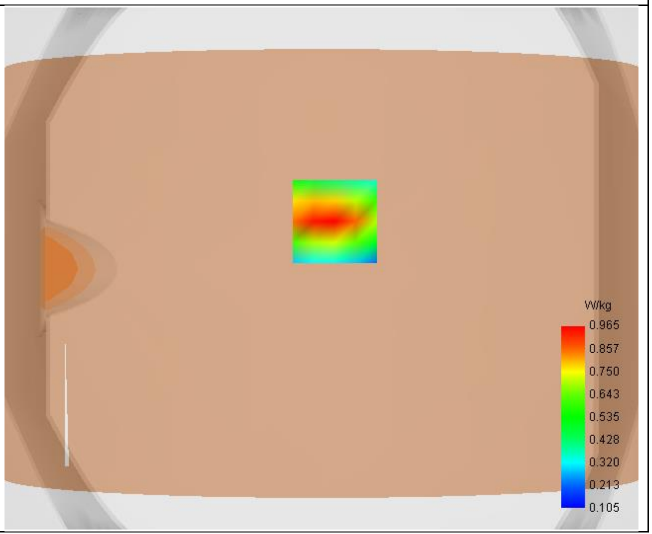
B. Permitivity

Frequency (MHz)	836.599976
Relative permitivity (real part)	40.973725
Conductivity (S/m)	0.885669

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR



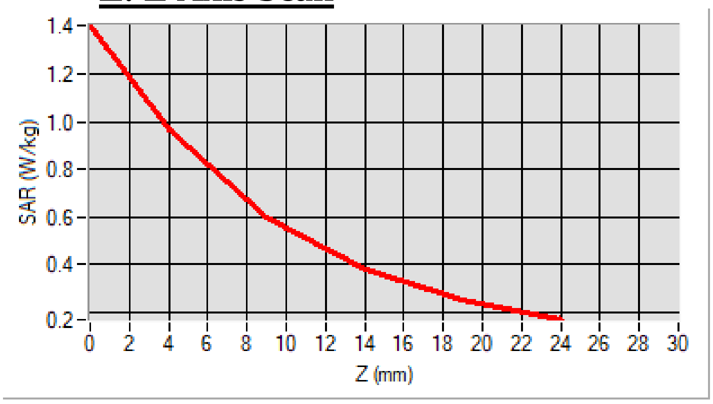


Maximum location: X=5.00, Y=18.00 ; SAR Peak: 1.42 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.531680
SAR 1g (W/Kg)	0.906212
Variation (%)	0.170000

E. Z Axis Scan



SAR Measurement at Band2_WCDMA1900 (Body, Validation Plane)

Date of measurement: 17/12/2022

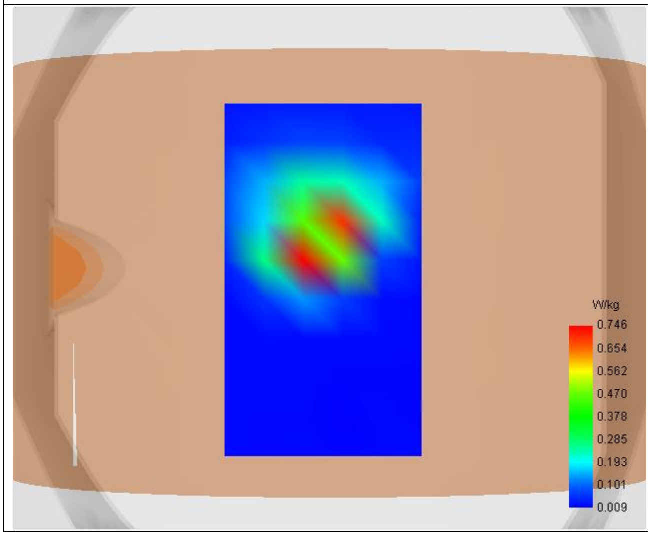
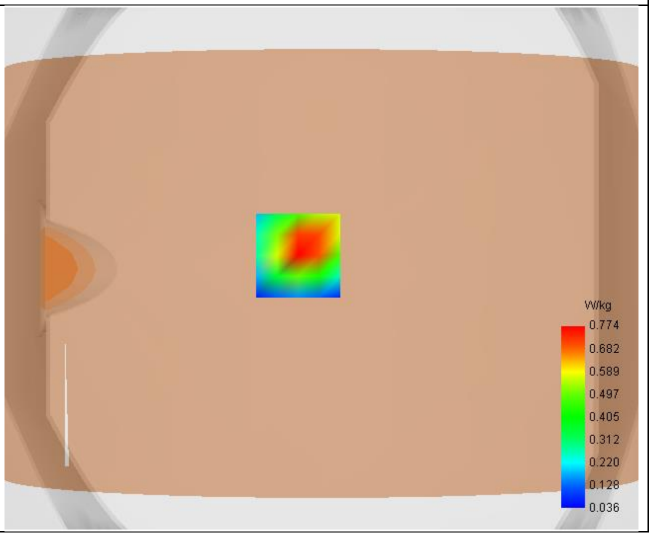
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.00
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Band2_WCDMA1900
Channels	High
Signal	WCDMA (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	1907.599976
Relative permitivity (real part)	40.020454
Conductivity (S/m)	1.419949

C. SAR Surface and Volume

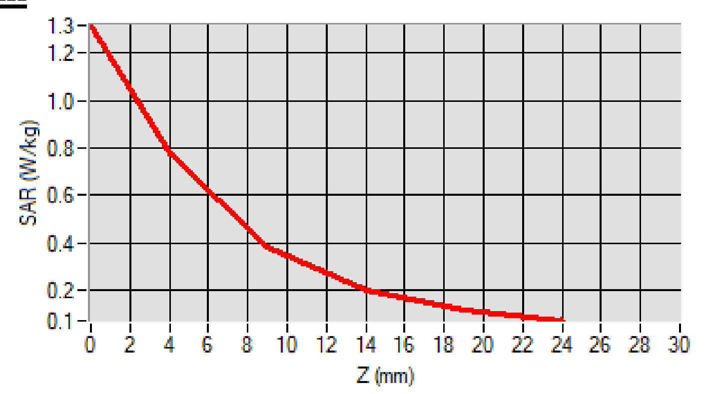
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-9.00, Y=5.00 ; SAR Peak: 1.37 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.377955
SAR 1g (W/Kg)	0.744643
Variation (%)	-1.680000

E. Z Axis Scan



SAR Measurement at LTE band 2 (Body, Validation Plane)

Date of measurement: 17/12/2022

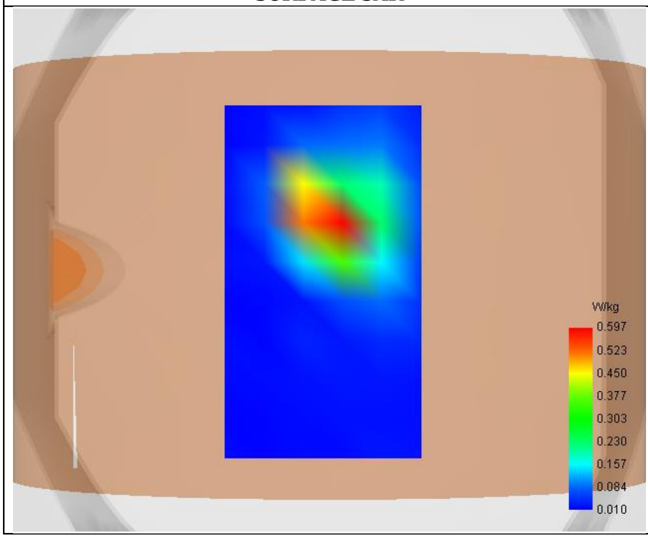
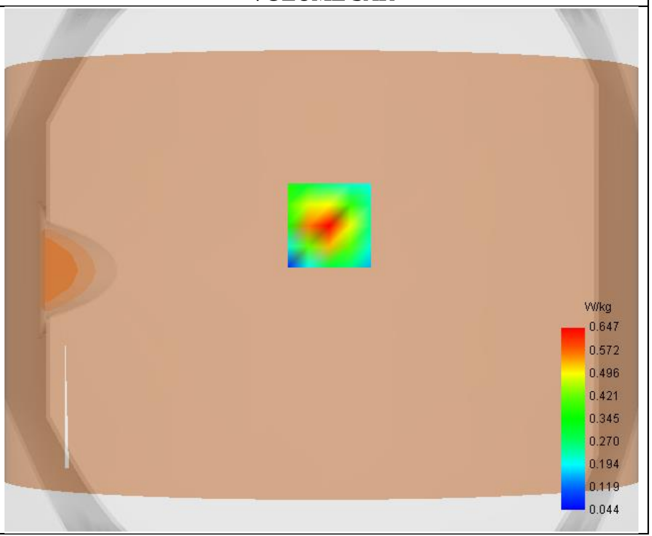
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.00
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Channels	Low
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	1860.000000
Relative permitivity (real part)	40.183600
Conductivity (S/m)	1.402857

C. SAR Surface and Volume

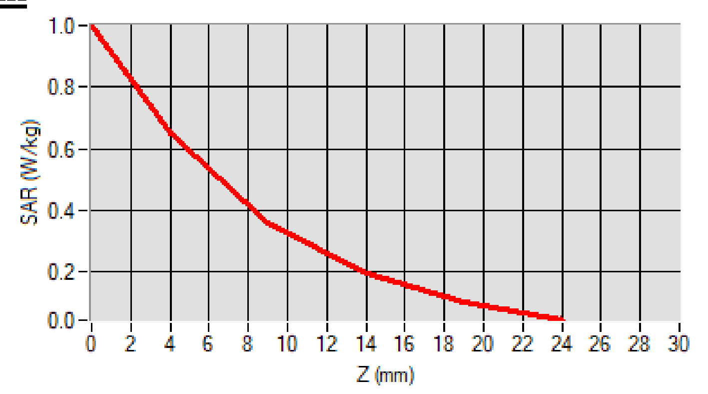
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=17.00 ; SAR Peak: 1.00 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.308549
SAR 1g (W/Kg)	0.594408
Variation (%)	-0.390000

E. Z Axis Scan



SAR Measurement at LTE band 5 (Body, Validation Plane)

Date of measurement: 14/12/2022

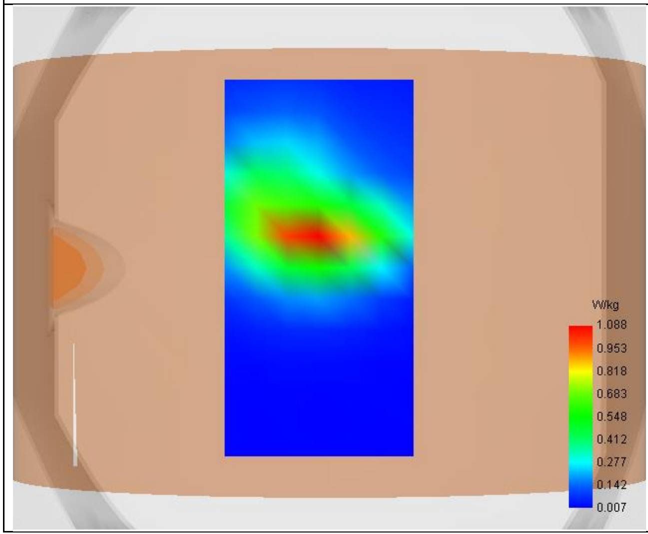
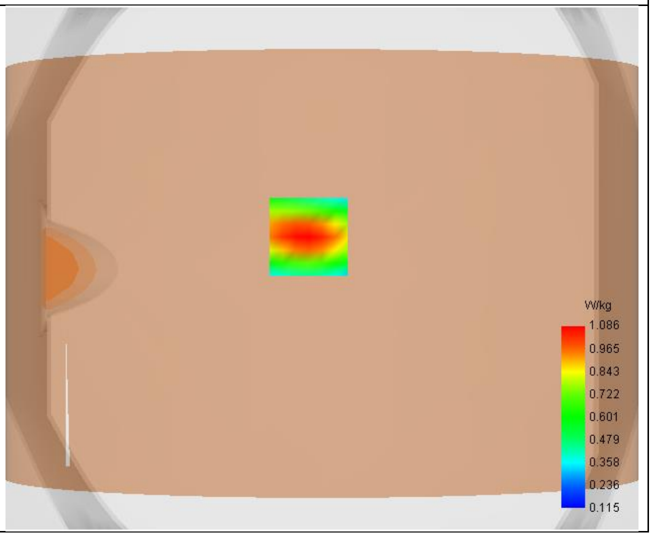
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	1.73
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Channels	High
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	844.000000
Relative permitivity (real part)	41.062425
Conductivity (S/m)	0.887644

C. SAR Surface and Volume

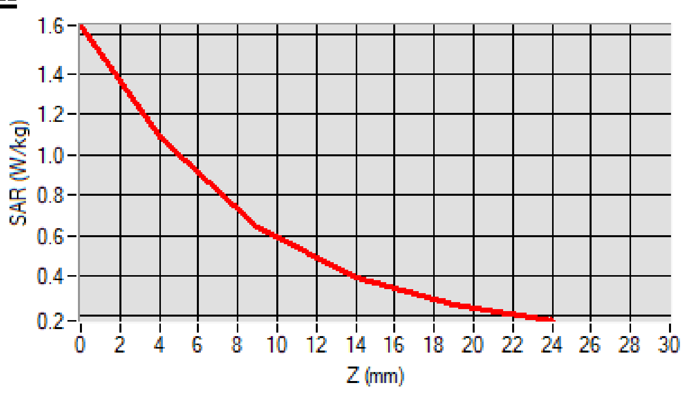
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-5.00, Y=12.00 ; SAR Peak: 1.64 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.578463
SAR 1g (W/Kg)	1.002444
Variation (%)	-0.430000

E. Z Axis Scan



SAR Measurement at LTE band 12 (Body, Validation Plane)

Date of measurement: 14/12/2022

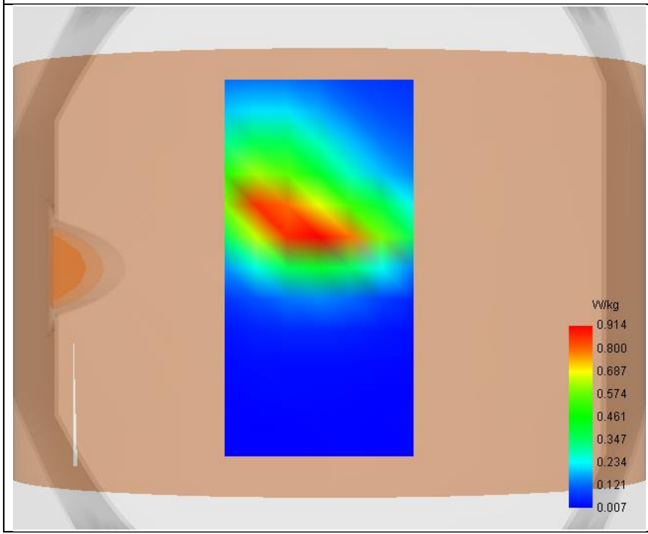
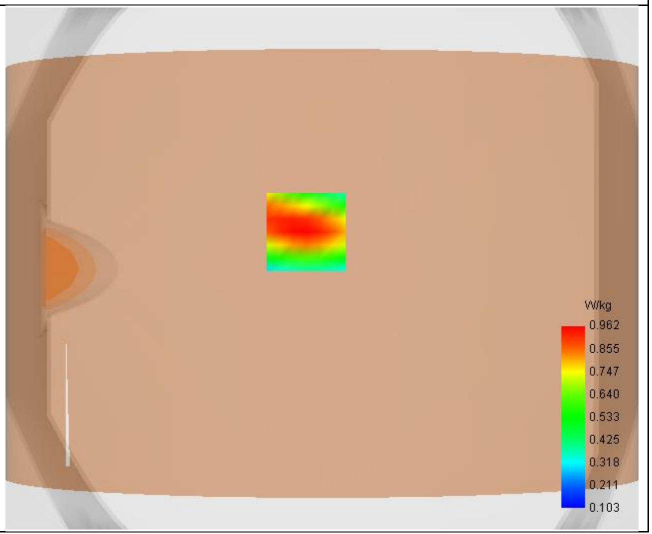
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	1.70
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 12
Channels	High
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	711.000000
Relative permitivity (real part)	41.628002
Conductivity (S/m)	0.872734

C. SAR Surface and Volume

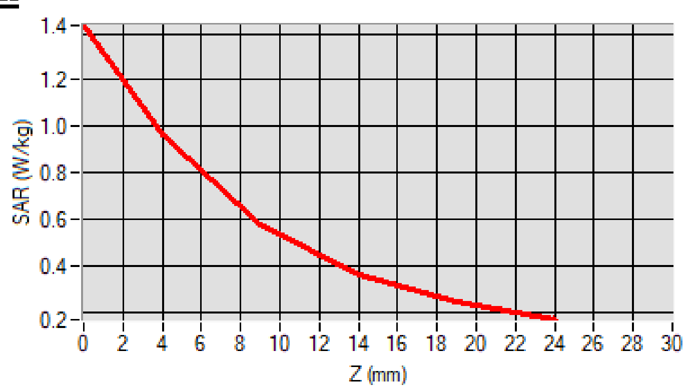
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-6.00, Y=14.00 ; SAR Peak: 1.44 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.549249
SAR 1g (W/Kg)	0.918991
Variation (%)	0.170000

E. Z Axis Scan



SAR Measurement at LTE band 41 (Body, Validation Plane)

Date of measurement: 25/12/2022

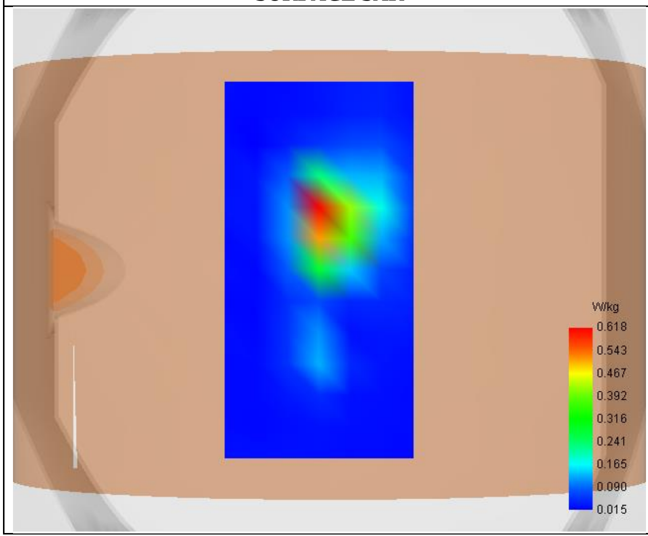
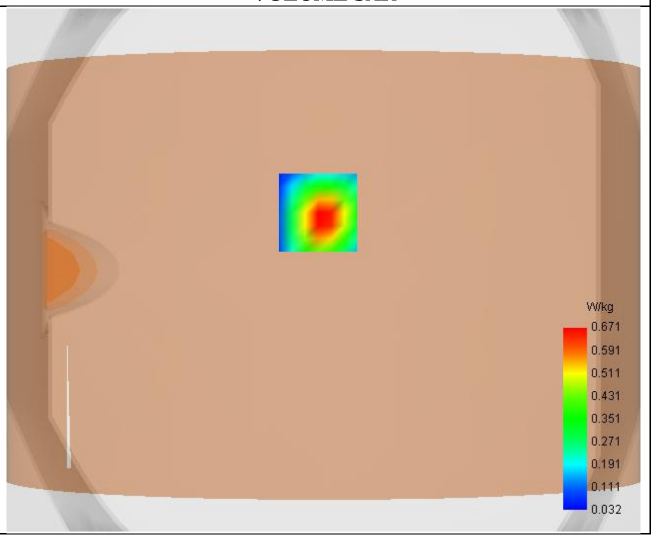
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.27
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 41
Channels	High
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2645.000000
Relative permitivity (real part)	38.975142
Conductivity (S/m)	1.945138

C. SAR Surface and Volume

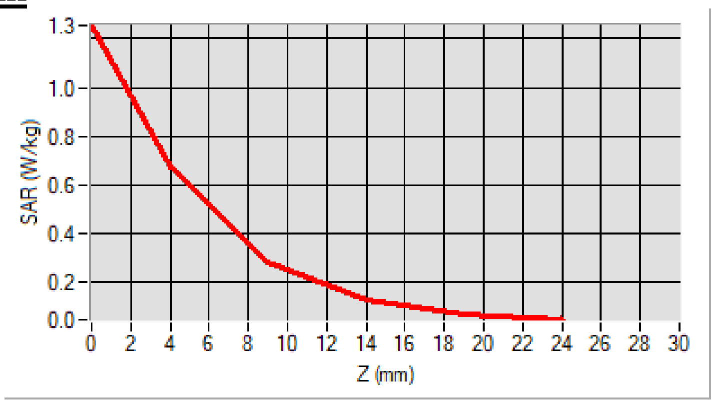
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-2.00, Y=22.00 ; SAR Peak: 1.28 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.287285
SAR 1g (W/Kg)	0.630072
Variation (%)	0.600000

E. Z Axis Scan



SAR Measurement at CUSTOM (LTE_Band 66) (Body, Validation Plane)

Date of measurement: 17/12/2022

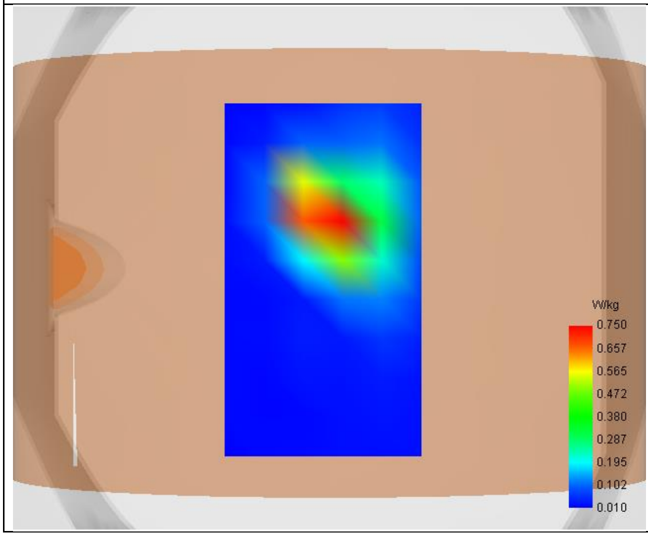
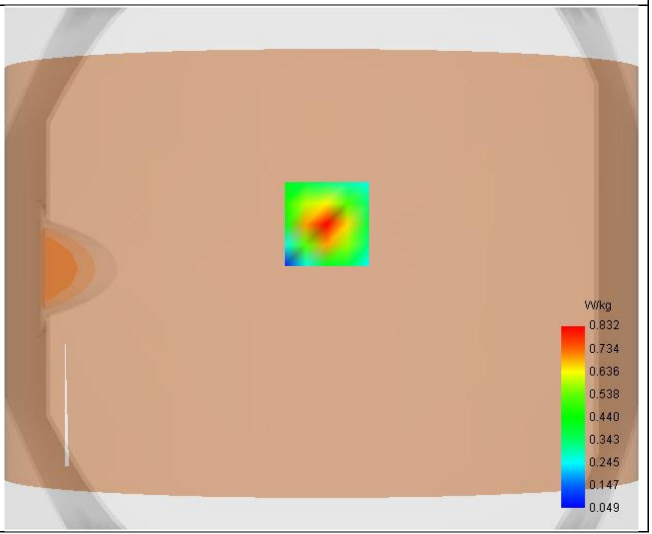
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.05
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 66
Channels	Middle
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	1745.000000
Relative permitivity (real part)	40.404546
Conductivity (S/m)	1.387225

C. SAR Surface and Volume

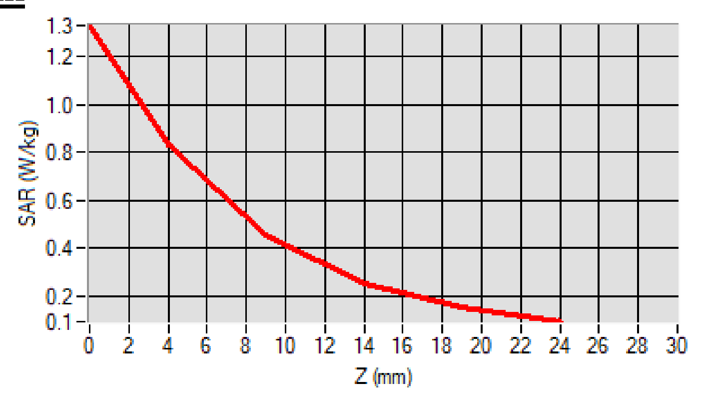
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=2.00, Y=17.00 ; SAR Peak: 1.33 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.400174
SAR 1g (W/Kg)	0.767705
Variation (%)	1.940000

E. Z Axis Scan



SAR Measurement at CUSTOM (LTE_Band_71) (Body, Validation Plane)

Date of measurement: 14/12/2022

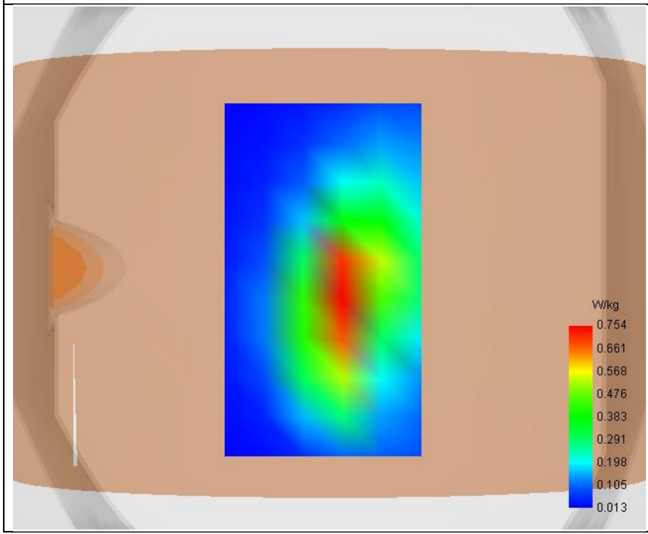
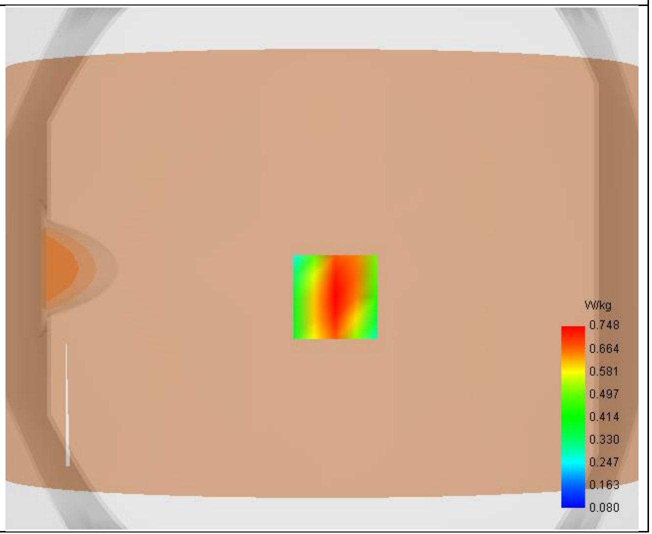
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	1.70
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 71
Channels	Low
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	673.000000
Relative permitivity (real part)	42.230667
Conductivity (S/m)	0.852593

C. SAR Surface and Volume

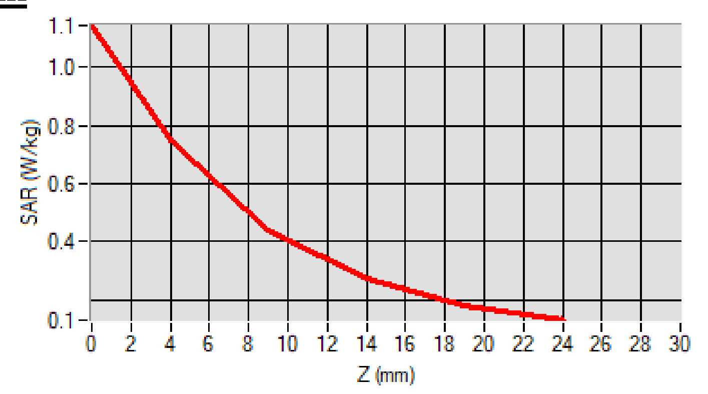
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=-11.00 ; SAR Peak: 1.14 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.433222
SAR 1g (W/Kg)	0.728281
Variation (%)	-0.680000

E. Z Axis Scan



SAR Measurement at IEEE 802.11b ISM (Body, Validation Plane)

Date of measurement: 25/12/2022

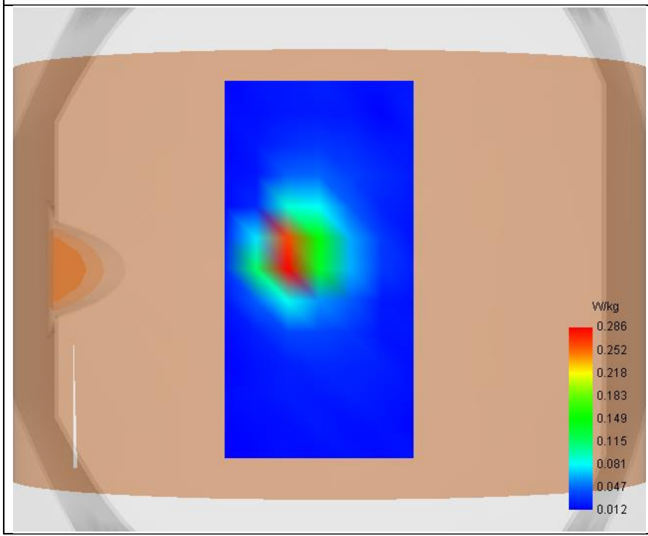
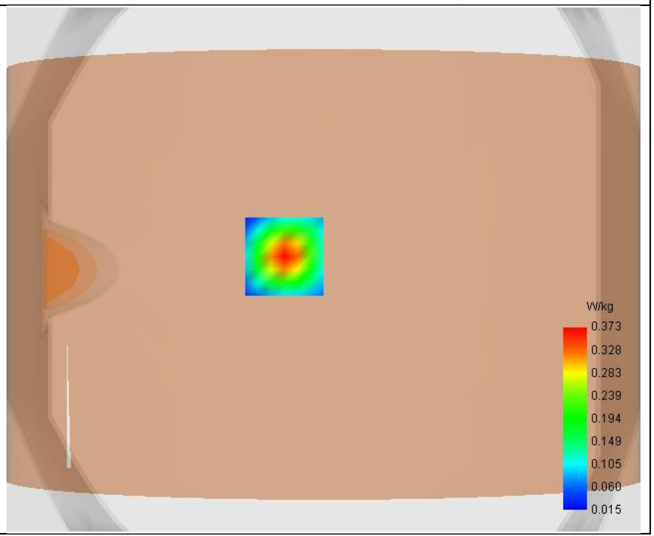
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.46
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	Low
Signal	IEEE802.b (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2412.000000
Relative permitivity (real part)	39.776001
Conductivity (S/m)	1.776388

C. SAR Surface and Volume

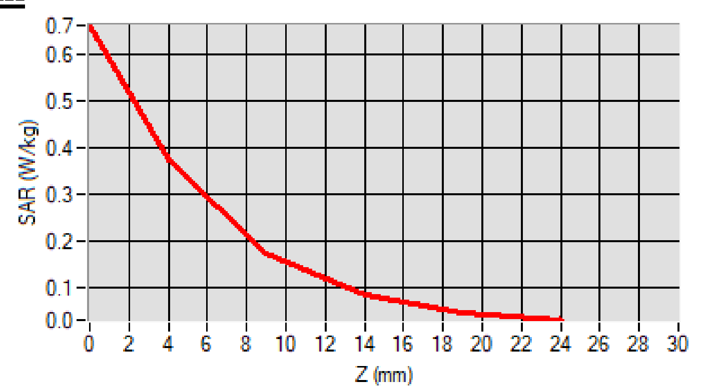
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=-15.00, Y=5.00 ; SAR Peak: 0.66 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.148444
SAR 1g (W/Kg)	0.329525
Variation (%)	-1.460000

E. Z Axis Scan



SAR Measurement at Bluetooth (Body, Validation Plane)

Date of measurement: 25/12/2022

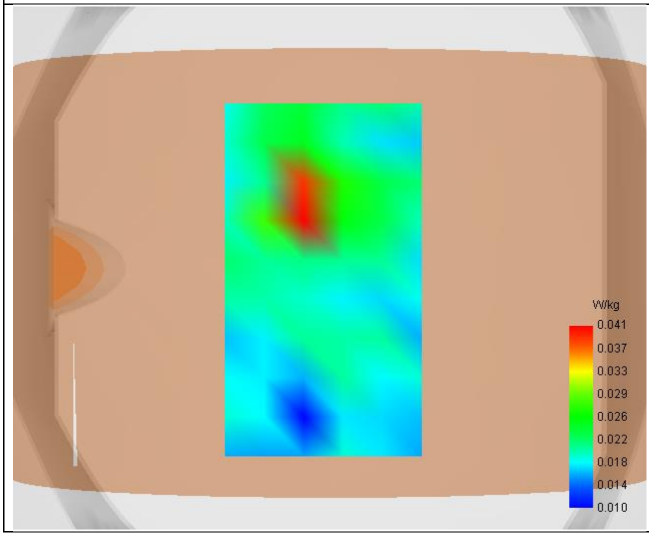
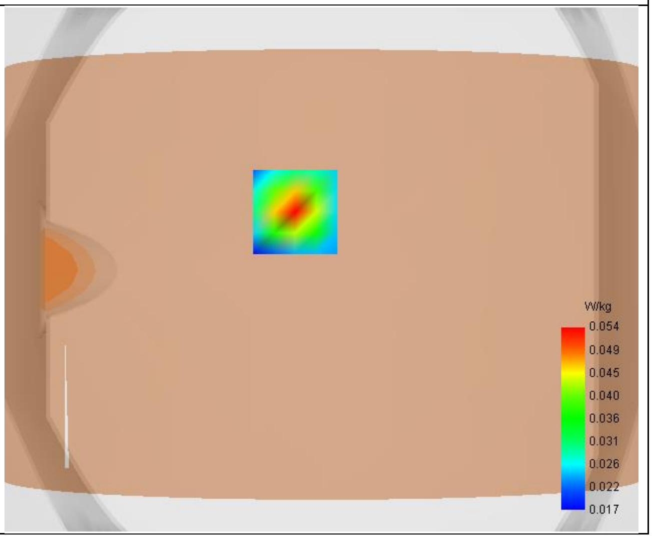
A. Experimental conditions.

Probe	SN 18/21 EPGO354
ConvF	2.46
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=5mm dy=5mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Channels	Middle
Signal	Bluetooth (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2441.000000
Relative permitivity (real part)	39.487999
Conductivity (S/m)	1.791558

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-10.00, Y=22.00 ; SAR Peak: 0.08 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.032322
SAR 1g (W/Kg)	0.050464
Variation (%)	1.330000

E. Z Axis Scan