TEST REPORT

Report No.:	BCTC2409813282E
Applicant:	Shenzhen Huafurui Technology Co., Ltd.
Product Name:	Smartphone
Test Model:	KINGKONG X
Tested Date:	2024-09-12 to 2024-10-24
Issued Date:	2024-10-24

Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2AHZ5-KKSER

Product Name:	Smartphone
Trademark:	CUBOT
Model/Type Ref.:	KINGKONG X KINGKONG ACE 2, KINGKONG ACE 3, KINGKONG AX, KINGKONG ES, KINGKONG POWER 3, KINGKONG STAR 2, KINGKONG X PRO
Applicant:	Shenzhen Huafurui Technology Co., Ltd.
Address:	Unit 601-03, 6/F, Block A, Building 1, Ganfeng Technology Building, No. 993 Jiaxian Road, Shenzhen
Manufacturer:	Shenzhen Huafurui Technology Co., Ltd.
Address:	Unit 601-03, 6/F, Block A, Building 1, Ganfeng Technology Building, No. 993 Jiaxian Road, Shenzhen
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2024-09-12
Sample tested Date:	2024-09-12 to 2024-10-24
Issue Date:	2024-10-24
Test Standards:	IEEE Std C95.1-2019 IEEE Std 1528-2013 FCC Part 2.1093
Test Results:	PASS
Remark:	This is SAR test report

Tested by:

Min Zhi Cheng/ Project Handler

Approved by:

Zero Zhou/ Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

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(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2409813282E	2024-10-24	Original	Valid

2. Test Standards

IEEE Std C95.1-2019: IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz. It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.
IEEE Std 1528™-2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.
FCC Part 2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices
KDB 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations
KDB 248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 941225 D01 3G SAR Procedures: 3G SAR MEAUREMENT PROCEDURES
KDB 941225 D05 SAR for LTE Devices: SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES
KDB 941225 D06 Hotspot Mode v02r01: SAR EVALUATION PROCEDURES FOR PORTABLE DEVICES WITH WIRELESS ROUTER CAPABILITIES
KDB 648474 D04 Handset SAR v01r03: SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS

3. Test Summary

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

Frequency Band	Report SAR1g (W/kg)			SAR1g Limit (W/kg)
	Head	Body (10mm Gap)	Hotspot (10mm Gap)	
Bluetooth	0.133	0.133	/	1.6
WIFI 2.4G	0.177	0.180	0.161	
WIFI 5G	1.040	0.862	0.666	
GSM	0.186	0.718	0.610	
WCDMA	0.294	0.797	0.780	
LTE	0.624	0.862	0.803	
5G NR	0.235	0.121	0.155	
Simultaneous Transmission	1.226	1.384	1.000	

The device in 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 C95.1-2019, and had been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2013.

The 5G NR data is from the (WTX24X0921674W) report.

4. SAR Limits

FCC Limit (1g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average(averaged over the whole body)	0.08	0.4
Spatial Peak(averaged over any 1 g of tissue)	1.6	8.0
Spatial Peak(hands/wrists/ feet/anklesaveraged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.
Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is <3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k=2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. Product Information and Test Setup

6.1 Product Information

Model/Type reference:	KINGKONG X KINGKONG ACE 2, KINGKONG ACE 3, KINGKONG AX, KINGKONG ES, KINGKONG POWER 3, KINGKONG STAR 2, KINGKONG X PRO
Model differences:	All the model are the same circuit and RF module, except model names.
Bluetooth Version:	5.0
Hardware Version:	G2365-MUB-V2-BOM3
Software Version:	CUBOT_KINGKONG X_E021C_V21
Ratings:	DC 9V from Adapter/ DC 3.87 from battery
Adapter Information:	Model: HJ-PD33W-US Input: 100-240V~50/60Hz 0.8A Output: 5.0V3.0A 15.0W OR DC9V3.0A 27.0W OR DC 12V2.75A 33.0W MAX

BLE

Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK
Data Rate:	LE 1M PHY
Number Of Channel	40CH
Antenna installation:	Internal antenna
Antenna Gain:	1.42 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

BDR, EDR

Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK, π/ 4 DQPSK, 8DPSK
Number Of Channel	79CH
Antenna installation:	Internal antenna
Antenna Gain:	1.42 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

WIFI 2.4G

Operation Frequency:	802.11b/g/n20MHz/ax20MHz:2412~2462 MHz 802.11n40MHz/ax40MHz:2422~2452 MHz
Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n Up to 150Mbps 802.11ax:400Mbps
Type of Modulation:	OFDM/DSSS/OFDMA
Number Of Channel	802.11b/g/n20/ax20 MHz:11 CH 802.11n40/ax40 MHz: 7 CH
Antenna Gain:	1.42 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

WIFI 5G

IEEE 802.11 WLAN Mode Supported	802.11a/n/ac/ax(20MHz channel bandwidth) 802.11n/ac/ax(40MHz channel bandwidth) 802.11ac/ax(80MHz channel bandwidth)
Operation Frequency:	5180-5240MHz for 802.11a/n/ac/ax(HT20); 5190-5230MHz for 802.11n/ac/ax(HT40); 5210MHz for 802.11 ac/ax(HT80); 5745-5825 MHz for 802.11a/n/ac/ax(HT20); 5755-5795 MHz for 802.11n/ac/ax(HT40); 5775MHz for 802.11 ac/ax(HT80);
Data Rate	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15; 802.11ac/ax(VHT20): NSS1, MCS0-MCS8 802.11ac/ax(VHT40/VHT80):NSS1, MCS0-MCS
Type of Modulation:	OFDM/OFDMA
Number Of Channel	4 channels for 802.11a/n20/ac20/ax20 in the 5180-5240MHz band ; 2 channels for 802.11 n40/ac40/ax40 in the 5190-5230MHz band ; 1 channels for 802.11 ac80/ax80 in the 5210MHz band ; 5 channels for 802.11a/n20/ac20/ax20 in the 5745-5825MHz band ; 2 channels for 802.11 n40/ac40/ax40 in the 5755-5795MHz band ; 1 channels for 802.11 ac80/ax80 in the 5775MHz band
Antenna installation:	Internal antenna
Antenna Gain:	5.1G: -3.01 dBi 5.8G: -0.42 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

2G, 3G

Operation Frequency:	GSM/GPRS/EGPRS 850: TX: 824~849MHz; RX: 869~894MHz; GSM/GPRS/EGPRS 1900: TX:1850~1910MHz; RX:1930~1990MHz; WCDMA Band II: TX: 1852.40~1907.60MHz; Rx: 1932.60~1987.40MHz; WCDMA Band IV: TX: 1712.40~1752.60MHz; RX: 2112.60 – 2452.40MHz WCDMA Band V: TX: 826.40~846.60MHz; RX: 871.40~ 891.60MHz;
GPRS Class:	Class 12
Max RF Output Power:	GSM/GPRS/EGPRS 850: 32.79 dBm, GSM/GPRS/EGPRS 1900: 29.88 dBm WCDMA Band II: 20.50 dBm WCDMA Band IV: 21.46 dBm WCDMA Band V: 23.05 dBm
Type of Modulation:	GSM with GMSK Modulation WCDMA Mode with BPSK Modulation HSDPA Mode with QPSK, 16QAM Modulation HSUPA Mode with QPSK, 16QAM Modulation
Type of Emission:	GSM/GPRS 850: 250KGXW EGPRS 850:256KGXW GSM/GPRS 1900: 252KGXW EGPRS 1900:252KGXW WCDMA Band II: 4M16F9W WCDMA Band IV: 4M16F9W WCDMA Band V: 4M19F9W
Antenna installation:	Internal antenna
Antenna Gain:	GSM850: -2.9 dBi GSM1900: 4.4 dBi WCDMA Band II: 4.4 dBi WCDMA Band IV: -2.6 dBi WCDMA Band V: -2.9 dBi

Remark:

☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.

☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

4G

Tx Frequency:	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500MHz-2570MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 17: 704MHz-716MHz LTE Band 66: 1710MHz ~ 1780MHz
Rx Frequency:	LTE Band 2: 1930 MHz ~ 1990 MHz LTE Band 4: 2110 MHz ~ 2155 MHz LTE Band 5: 869 MHz ~ 894 MHz LTE Band 7: 2620MHz-2690MHz LTE Band 12: 729 MHz ~ 746 MHz LTE Band 17: 734MHz-746MHz LTE Band 66: 2110MHz ~ 2200MHz
Bandwidth:	LTE Band 2: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 4: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 5: 1.4MHz /3MHz /5MHz /10MHz LTE Band 7: 5MHz /10MHz /15MHz /20MHz LTE Band 12: 1.4MHz /3MHz /5MHz /10MHz LTE Band 17: 5MHz /10MHz LTE Band 66: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz
The Max RF Output Power (EIRP/ERP)	LTE Band 2: 25.33 dBm LTE Band 4: 18.96 dBm LTE Band 5: 18.06 dBm LTE Band 7: 18.1 dBm LTE Band 12: 15.51 dBm LTE Band 17: 14.93 dBm LTE Band 66: 18.94 dBm
99% Occupied Bandwidth:	LTE Band 2: 18M0W7D LTE Band 4: 18M0W7D LTE Band 5: 9M03W7D LTE Band 7: 18M0W7D LTE Band 12: 9M03W7D LTE Band 17: 9M01W7D LTE Band 66: 18M0G7D
Type of Modulation:	QPSK/16QAM
Antenna Type:	Internal Antenna
Antenna Gain:	LTE Band 2: 4.4 dBi LTE Band 4: -2.6 dBi LTE Band 5: -2.9 dBi LTE Band 7: -3.1 dBi LTE Band 12: -5.6 dBi LTE Band 17: -5.6 dBi LTE Band 66: -2.6 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

6.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

6.3 Support Equipment

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Shielded	Note
1	--	--	Applicant	---	Yes/No	--
2	--	--	BCTC	--	Yes/No	--

No.	Device Type	Brand	Model	Series No.	Note
1.	---	---	---	---	---
2.	--	--	--	--	--

Notes:
1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.4 Test Environment

1. Normal Test Conditions:

Humidity(%):	35-75
Atmospheric Pressure(kPa):	95-105
Temperature(℃):	18-25

2. Extreme Test Conditions:
N/A

7. Test Facility and Test Instrument Used

7.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850
A2LA certificate registration number is: CN1212
ISED Registered No.: 23583
ISED CAB identifier: CN0017

7.2 Test Instrument Used

Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
PC	DELL	\	\	N/A	N/A
SAR Measurement system	SATIMO	\	\	N/A	N/A
Signal Generator	Keysight	83711B	US37100131	May 16, 2024	May 15, 2025
Multimeter	Keithley	1160271	\	Nov. 10, 2023	Nov 09, 2024
S-parameter Network Analyzer	R&S	ZVB 8	101353	Dec. 07, 2023	Dec. 06, 2024
Wideband Radio Communication Tester	R&S	CMW500	126173	Nov. 13. 2023	Nov. 12, 2024
E SAR PROBE 6GHz	MVG	SSE2	2623-EPGO-420	July 18, 2024	July 17, 2025
DIPOLE 750	SATIMO	SID 750	SN 47/21 DIP 0G750-620	Nov. 25, 2021	Nov. 24, 2024
DIPOLE 835	SATIMO	SID 835	SN 47/21 DIP 0G835-621	Nov. 25, 2021	Nov. 24, 2024
DIPOLE 1800	SATIMO	SID 1800	SN 47/21 DIP 1G800-623	Nov. 25, 2021	Nov. 24, 2024
DIPOLE 1900	SATIMO	SID 1900	SN 47/21 DIP 1G900-624	Nov. 25, 2021	Nov. 24, 2024
DIPOLE 2450	SATIMO	SID 2450	SN 47/21 DIP 2G450-627	Nov. 25, 2021	Nov. 24, 2024
DIPOLE 2600	SATIMO	SID 2600	SN 47/21 DIP 2G600-628	Nov. 25, 2021	Nov. 24, 2024
DIPOLE 5000	SATIMO	SID 5000	SN 47/21 DIP 5G000-629	Nov. 25, 2021	Nov. 24, 2024
COMOSAR OPENCoaxial Probe	SATIMO	\	\	Nov. 18, 2023	Nov. 17, 2024
SAR Locator	SATIMO	\	\	Nov. 18, 2023	Nov. 17, 2024
Communication Antenna	SATIMO	\	\	Nov. 18, 2023	Nov. 17, 2024
FEATURE PHONEPOSITIONING DEVICE	SATIMO	\	\	N/A	N/A
DUMMY PROBE	SATIMO	\	\	N/A	N/A
SAM Phantom	MVG	\	SN 13/09 SAM68	N/A	N/A
Liquid measurement Kit	HP	85033D	3423A08186	N/A	N/A
Power meter	Agilent	E4419	A00065	May 16, 2024	May 15, 2025
Power sensor	Agilent	E9300A	US39211659	May 16, 2024	May 15, 2025
Power sensor	Agilent	E9300A	US39211305	May 16, 2024	May 15, 2025
Directional Coupler	Krytar 158020	131467	\	Nov. 10, 2023	Nov 09, 2024
Thermometer	BTE	\	\	Dec. 02, 2023	Dec. 01, 2024
Broad Band Tissue Simulation Liquid	Schmid	\	\	N/A	N/A

Note:
Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three year extended calibration interval. Each measured dipole is expected to evalute with following criteria at least on annual interval.

1. There is no physical damage on the dipole;
2. System check with specific dipole is within 10% of calibrated values;
3. The most recent return-loss results, measued at least annually, deviates by no more than 20% from the previous measurement;
4. The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the provious measurement.

8. Specific Absorption Rate (SAR)

8.1 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 techiques 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.

8.2 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:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

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

Where: C is the specific heat capacity, δ T is the temperature rise and δ t is the exposure duration, or related to the

electrical field in the tissue by

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

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.

9. SAR Measurement System

9.1 The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:
- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

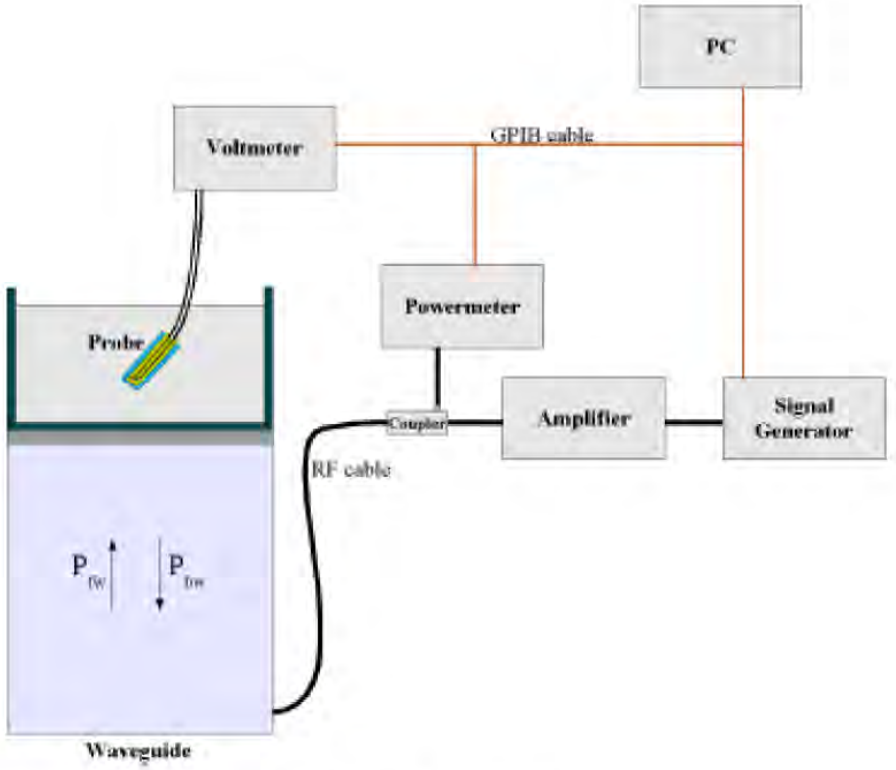


The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

9.2 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 46/21 EPGO362 with following specifications is used
- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 5 mm
- Distance between probe tip and sensor center: 2.10mm
- Distance between sensor center and the inner phantom surface: 4 mm (repeatability better than +/- 1mm)
- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.50 dB
- Calibration range: 835 to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and surface normal line:1ess than 30°
Probe calibration is realized, in compliance with EN 62209-1 and IEEE 1528 STD, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1 annex technique using reference guide at the five frequencies.



$$SAR = \frac{4(p_{\int w} - p_{Pbw})}{ab\delta} cos^2 \left(\pi \frac{y}{a}\right) c^{(2\pi/\delta)}$$

Where :
Pfw = Forward Power
Pbw = Backward Power
a and b =Waveguide dimensions
l = Skin depth

Keithley configuration:
Rate = Medium; Filter = ON; RDGS = 10; Filter type = Moving Average; Range auto after each calibration, a SAR measurement is 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 linearised 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 DCP is the diode compression point in mV.

9.3 Probe Calibration Process

Dosimetric Assessment Procedure
Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an with CALISAR, Antenna proprietary calibration system.

Free Space Assessment Procedure
The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm2.

Temperature Assessment Procedure
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:
Δt = exposure time (30 seconds),
C = heat capacity of tissue (brain or muscle),
ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

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

Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

9.4 Phantom

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

9.5 Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1°.



System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

10. Tissue Simulating Liquids

10.1 Composition of Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with SMTIMO, 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. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. Please see the following photos for the liquid height.



Liquid Height for Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	1,2-Propane diol (%)	HEC (%)	Preventol (%)	DGBE (%)
Head/Body						
835	40.3	1.4	57.9	0.2	0.2	0
900	40.3	1.4	57.9	0.2	0.2	0
1800-2000	55.2	0.3	0	0	0	44.5
2450	55.0	0.1	0	0	0	44.9
2600	54.9	0.1	0	0	0	45.0

Frequency (MHz)	Water (%)	Hexyl Carbitol (%)	Triton X-100 (%)
Head/Body			
5000-6000	65.52	17.24	17.24

10.2 Limit

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters

computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Target Frequency (MHz)	Head	
	Conductivity (σ)	Permittivity (ε_r)
150	0.76	52.3
300	0.87	45.3
450	0.87	43.5
750	0.89	41.9
835	0.90	41.5
900	0.97	41.5
915	0.98	41.5
1450	1.20	40.5
1610	1.29	40.3
1800-2000	1.40	40.0
2450	1.80	39.2
2600	1.96	39.0
3000	2.40	38.5
5200	4.66	36.0
5400	4.86	35.8
5600	5.07	35.5
5800	5.27	35.3

10.3 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an R&S ZVB 8. Dielectric Probe Kit and an Agilent Network Analyzer.

Calibration Result for Dielectric Parameters of Tissue Simulating Liquid

Frequency (MHz)	Liquid	Target (σ)	Target (εr)	Measured (σ)	Measured (εr)	Delta (σ)%	Delta (εr)%	Limit (%)	Temp. TSL (°C)	Date
750	Head	0.89	41.90	0.921	42.787	3.48	2.12	±5	23.4	11/10/2024
835	Head	0.90	41.50	0.870	42.101	-3.33	1.45	±5	23.1	12/10/2024
1800	Head	1.40	40.00	1.366	39.598	-2.43	-1.01	±5	23.1	18/10/2024
1900	Head	1.40	40.00	1.400	38.663	0.00	-3.34	±5	23.4	19/10/2024
2450	Head	1.80	39.20	1.783	39.847	-0.94	1.65	±5	23.3	21/10/2024
2600	Head	1.96	39.00	1.974	39.706	0.71	1.81	±5	23.4	11/10/2024
5200	Head	4.66	36.00	4.744	36.781	1.80	2.17	±5	23.3	21/10/2024
5800	Head	5.27	35.30	5.362	36.608	1.75	3.71	±5	23.3	21/10/2024

Remark:

1. The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.
2. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

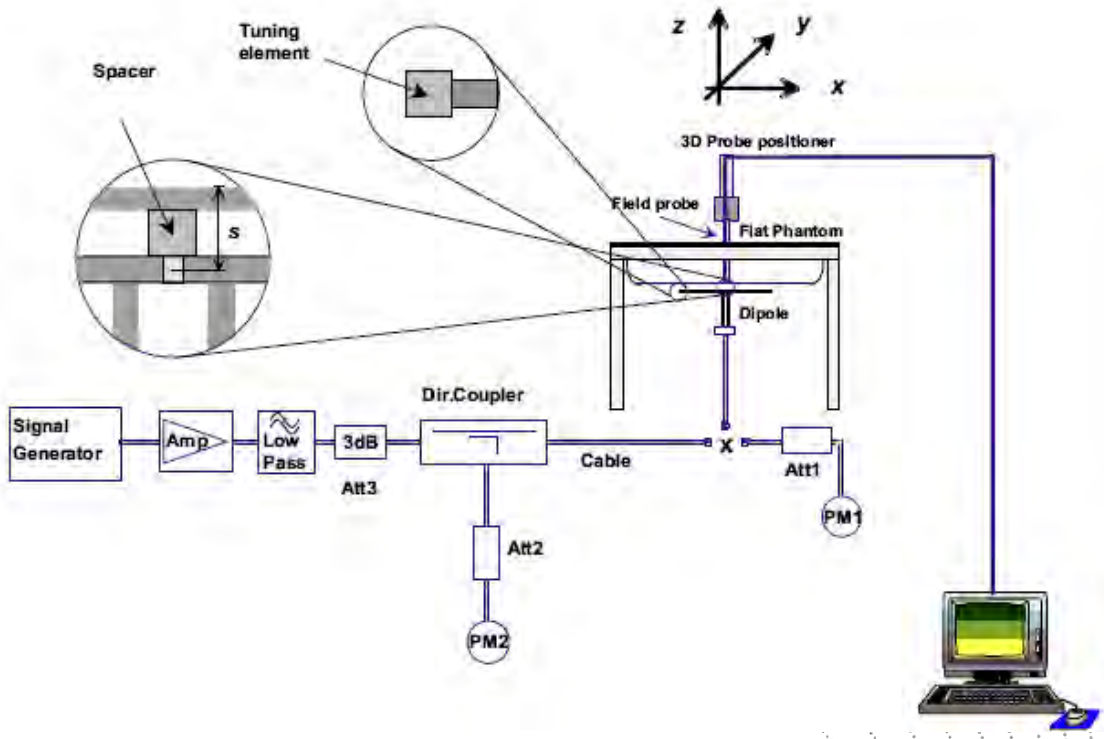
11. System Check

11.1 Purpose of System Performance Check

At the device test frequencies. System check verifies the measurement repeatability of a SAR system before compliance testing and is not a validation of all system specifications. The latter is not required for testing a device but is mandatory before the system is deployed. The system check detects possible short-term drift and unacceptable measurement errors or uncertainties in the system.

11.2 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 which comes from a signal generator at frequency 600MHz-6000MHz. 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 output power on dipole port must be calibrated to 20 dBm (100 mW) before dipole is connected.



System Verification Setup Block Diagram



Setup Photo of Dipole Antenna

11.3 Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %. The following table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion.

Frequency (MHz)	Power	Measured SAR_{1g} (W/Kg)	Normalize to 1 Watt	Drift (%)	1W Target SAR_{1g} (W/Kg)	Difference Percentage (%)	Limit (%)	Liquid Temp	Date
750	250 mW	2.039	8.157	-1.534	8.58	-4.930	±10	23.1	11/10/2024
835	250 mW	2.394	9.574	-1.989	10.01	-4.356	±10	23.4	12/10/2024
1800	250 mW	9.985	39.938	-0.830	39.74	0.498	±10	23.2	18/10/2024
1900	250 mW	10.253	41.012	2.003	41.26	-0.601	±10	23.2	19/10/2024
2450	250 mW	13.799	55.196	1.347	55.16	0.065	±10	23.1	21/10/2024
2600	250 mW	14.660	58.639	1.525	56.5	3.786	±10	23.1	11/10/2024
5200	250 mW	18.207	72.827	-1.302	76.41	-4.689	±10	23.1	21/10/2024
5800	250 mW	18.871	75.483	-0.220	76.49	-1.317	±10	23.1	21/10/2024

12. EUT Testing Position

12.1 Define Two Imaginary Lines on the Handset

(a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width wt of the handset at the level of the acoustic output, and the midpoint of the width wb of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic
output. The horizontal line is also tangential to the face of the handset at point A.

(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

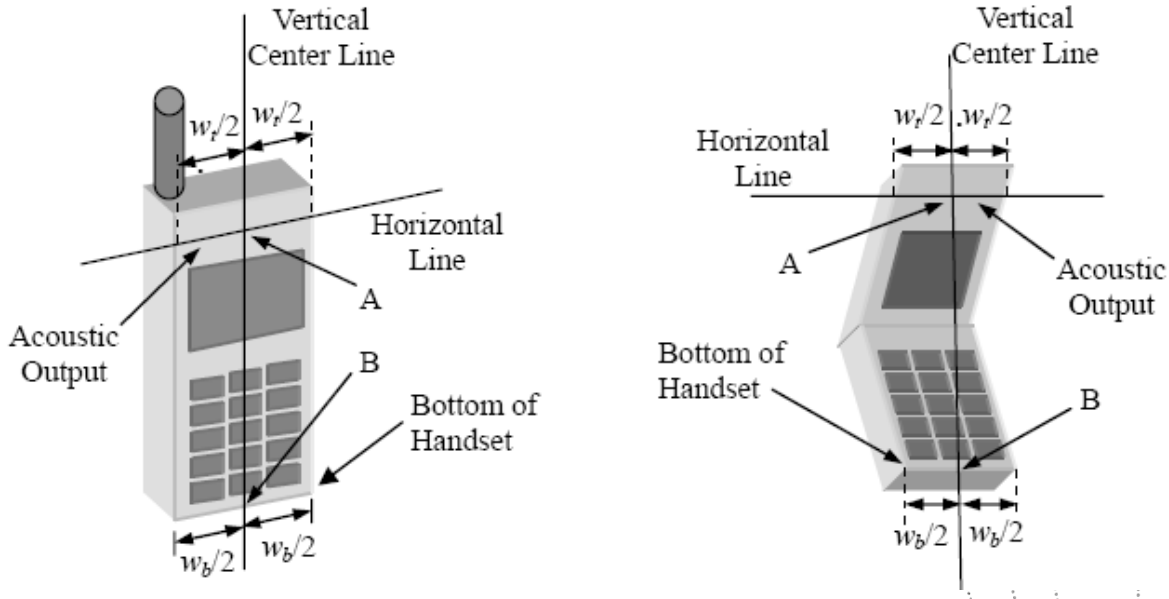


Illustration for Handset Vertical and Horizontal Reference Lines

12.2 Cheek Position

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

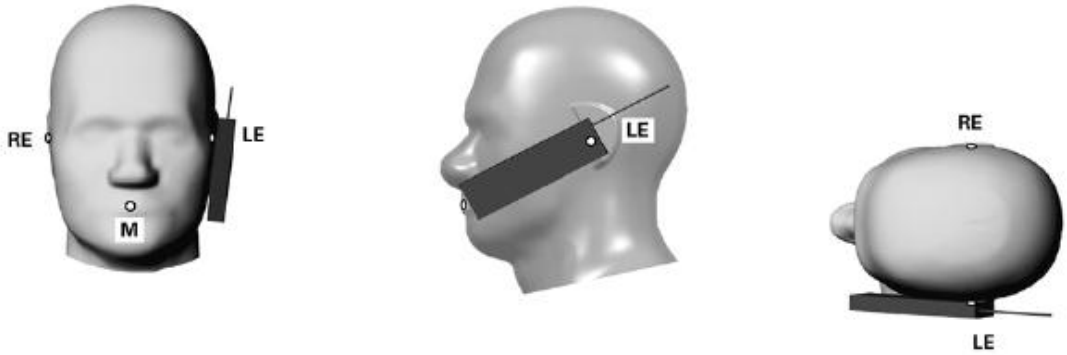


Illustration for Cheek Position

12.3 Tilted Position

(a) To position the device in the “cheek” position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see below).

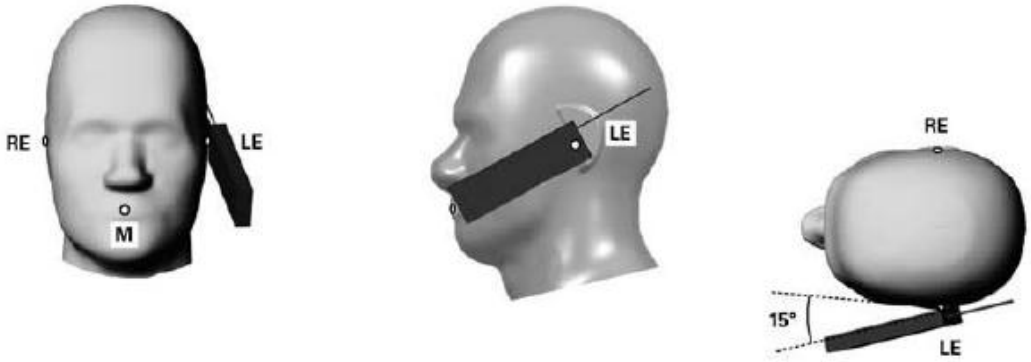
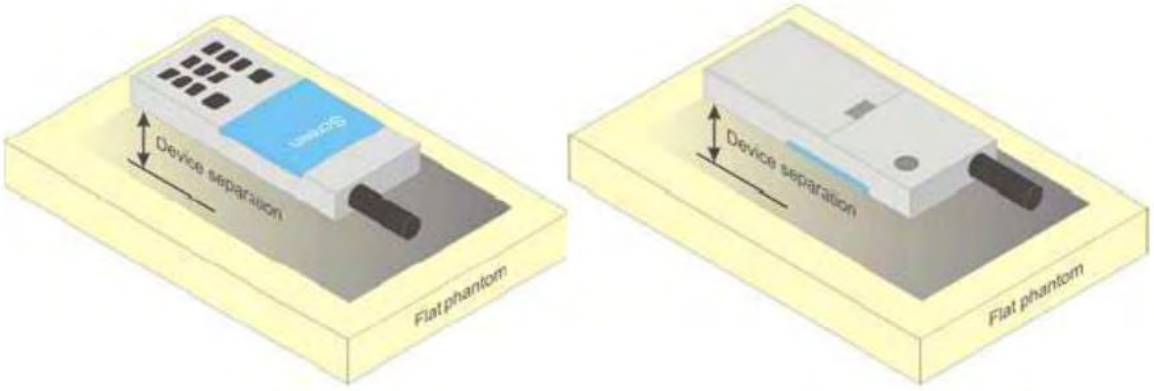


Illustration for Tilted Position

12.4 Body Position

A typical example of a body-worn device is a Mobile Phone , wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person’s body using a carry accessory approved by the wireless device manufacturer.



Test positions for body-worn devices

13. SAR Measurement Procedures

13.1 Measurement Procedures

The measurement procedures are as follows:
(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
(b) Keep EUT to radiate maximum output power or 100% factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the EUT in the positions as Annex D demonstrates.
(e) Set scan area, grid size and other setting on the SATIMO software.
(f) Measure SAR results for the highest power channel on each testing position.
(g) Find out the largest SAR result on these testing positions of each band
(h) Measure SAR results for other channels in worst SAR testing position if the SAR of 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:
(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

13.2 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 SATIMO 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 10g 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 the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

13.3 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 measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·ln(2) mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 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.

13.4 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 (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

13.5 SAR Averaged Methods

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10g and 1 g requires a very fine resolution in the three dimensional scanned data array.

13.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In SATIMO 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. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

14. SAR Test Result

14.1 Conducted RF Output Power

BLE			
Mode	**Frequency (MHz)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**
BLE 1M	2402	0.50	3.0
BLE 1M	2440	1.86	
BLE 1M	2480	2.69	

BDR, EDR			
Mode	**Frequency (MHz)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**
1-DH1	2402	1.27	2.0
1-DH1	2441	1.33	
1-DH1	2480	1.82	
2-DH1	2402	3.09	5.0
2-DH1	2441	3.66	
2-DH1	2480	4.57	
3-DH1	2402	3.72	5.0
3-DH1	2441	4.26	
3-DH1	2480	4.75	

Note:
Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] •[√f(GHz)] ≤ 3.0 for1-g SAR and ≤ 7.5 for 10-g extremity SAR

f(GHz) is the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation
The result is rounded to one decimal place for comparison

Turn up Power (dBm)	Turn up Power (mW)	Separation Distance (mm)	Frequency (GHz)	Result	Exclusion Thresholds
5.0	3.16	5	2.48	1.00	3

Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
According to the calculation results in the table above, Bluetooth SAR does not need to be tested.

WIFI 2.4G			
Mode	**Frequency (MHz)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**
b	2412	11.54	12.5
b	2437	11.52	
b	2462	12.49	
g	2412	10.13	11.0
g	2437	9.98	
g	2462	10.99	
n20	2412	9.09	9.5
n20	2437	8.90	
n20	2462	9.90	
n40	2422	7.71	9.5
n40	2437	8.12	
n40	2452	9.00	
ax20	2412	9.17	10.5
ax20	2437	8.99	
ax20	2462	10.08	
ax40	2422	8.10	9.5
ax40	2437	8.29	
ax40	2452	9.14	

WIFI 5.1G			
Mode	**Frequency (MHz)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**
a	5180	10.66	11.0
a	5200	10.92	
a	5240	10.68	
n20	5180	9.8	10.0
n20	5200	9.73	
n20	5240	9.72	
n40	5190	8.74	9.0
n40	5230	8.63	
ac20	5180	9.55	10.5
ac20	5200	9.9	
ac20	5240	10.18	
ac40	5190	8.59	9.0
ac40	5230	8.76	
ac80	5210	7.43	7.5
ax20	5180	9.99	11.0
ax20	5200	10.22	
ax20	5240	10.57	
ax40	5190	9.12	9.5
ax40	5230	9.15	
ax80	5210	7.47	7.5

WIFI 5.8G			
Mode	**Frequency (MHz)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**
a	5745	10.12	10.5
a	5785	9.3	
a	5825	8.61	
n20	5745	9.14	9.5
n20	5785	8.5	
n20	5825	7.59	
n40	5755	8.13	8.5
n40	5795	7.66	
ac20	5745	9.1	9.5
ac20	5785	8.41	
ac20	5825	7.8	
ac40	5755	8.04	8.5
ac40	5795	7.38	
ac80	5775	7.4	7.5
ax20	5745	9.13	9.5
ax20	5785	8.61	
ax20	5825	7.57	
ax40	5755	8.43	8.5
ax40	5795	7.73	
ax80	5775	7.65	8.0

GSM - Burst Average Power (dBm)								
Band	**GSM850**			**Tune-up**	**GSM1900**			**Tune-up**
Channel	**128**	**190**	**251**		**512**	**661**	**810**	
Frequency (MHz)	**824.2**	**836.6**	**848.8**		**1850.2**	**1880**	**1909.8**	
GSM	**32.79**	32.67	32.60	33.0	29.37	29.80	29.63	30.0
GPRS Slot -1	32.32	32.30	32.24	32.5	29.42	**29.88**	29.71	30.0
GPRS Slot -2	31.81	31.76	31.68	32.0	28.67	29.14	28.99	29.5
GPRS Slot -3	29.97	29.9	29.86	30.0	26.79	27.36	27.27	27.5
GPRS Slot -4	28.87	28.87	28.8	29.0	25.69	26.26	26.21	26.5
EGPRS Slot -1	26.22	26.90	26.85	27.0	24.91	24.66	24.56	25.0
EGPRS Slot -2	25.30	25.30	25.27	25.5	23.94	23.70	23.83	24.0
EGPRS Slot -3	22.62	23.15	23.31	23.5	21.51	21.27	21.42	22.0
EGPRS Slot -4	21.33	21.96	21.56	22.0	19.96	20.00	20.19	20.5

GSM - Source-Based Time-Average Power (dBm)						
Band	**GSM850**			**GSM1900**		
Channel	**128**	**190**	**251**	**512**	**661**	**810**
Frequency (MHz)	**824.2**	**836.6**	**848.8**	**1850.2**	**1880**	**1909.8**
GSM	23.79	23.67	23.60	20.37	20.80	20.63
GPRS Slot -1	23.32	23.30	23.24	20.42	20.88	20.71
GPRS Slot -2	25.81	25.76	25.68	22.67	23.14	22.99
GPRS Slot -3	25.72	25.65	25.61	22.54	23.11	23.02
GPRS Slot -4	25.87	**25.87**	25.80	22.69	**23.26**	23.21
EGPRS Slot -1	17.22	17.90	17.85	15.91	15.66	15.56
EGPRS Slot -2	19.30	19.30	19.27	17.94	17.70	17.83
EGPRS Slot -3	18.37	18.90	19.06	17.26	17.02	17.17
EGPRS Slot -4	18.33	18.96	18.56	16.96	17.00	17.19

Notes:
Division Factors
To average the power, the division factor is as follows:
1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.00dB
2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.00dB
3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB
4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.00dB

Band	WCDMA Band II				WCDMA Band IV			
Channel	9262	9400	9538	Tune-up	1312	1450	1513	Tune-up
Frequency (MHz)	1852.4	1880.0	1907.6		1712.4	1740	1752.6	
RMC 12.2K	20.28	20.43	**20.50**	21.0	**21.46**	21.22	21.31	21.5
HSDPA Subtest-1	19.23	19.39	19.45	19.5	20.47	20.19	20.29	20.5
HSDPA Subtest-2	18.88	19.09	19.01		19.88	19.56	19.97	
HSDPA Subtest-3	17.51	17.96	18.04		19.18	18.61	18.89	
HSDPA Subtest-4	17.87	17.93	18.10		18.65	18.63	18.88	
HSUPA Subtest-1	17.77	19.18	19.32	19.5	19.48	20.01	20.14	20.5
HSUPA Subtest-2	19.20	19.27	19.29		20.43	20.10	20.16	
HSUPA Subtest-3	17.38	17.95	18.07		19.03	18.71	19.04	
HSUPA Subtest-4	19.20	19.37	19.46		20.45	20.16	20.28	
HSUPA Subtest-5	17.60	18.79	18.51		18.92	19.50	19.53	

Band	WCDMA Band V							
Channel	4132	4182	4233	Tune-up				
Frequency (MHz)	826.4	836.4	846.6					
RMC 12.2K	**23.05**	22.90	22.91	23.5				
HSDPA Subtest-1	22.06	21.91	21.93	22.5				
HSDPA Subtest-2	21.85	21.28	21.54					
HSDPA Subtest-3	20.33	20.45	20.42					
HSDPA Subtest-4	20.32	20.45	20.51					
HSUPA Subtest-1	21.04	21.68	21.74	22.0				
HSUPA Subtest-2	21.76	21.62	21.88					
HSUPA Subtest-3	20.33	20.64	20.52					
HSUPA Subtest-4	22.02	21.89	21.90					
HSUPA Subtest-5	20.43	21.20	20.86					

Note:

1. Per KDB 941225 D01 v03, the 12.2kbps RMC mode was selected for SAR testing (the primary mode).
2. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤1/4dB higher than the primary mode (RMC12.2kbps) or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	Gain (dBm)	EIRP (dBm)	Verdict
Band2	1.4	18607	1	#0	QPSK	20.13	4.4	24.53	PASS
Band2	1.4	18607	1	#Mid	QPSK	20.15	4.4	24.55	PASS
Band2	1.4	18607	1	#Max	QPSK	20.08	4.4	24.48	PASS
Band2	1.4	18607	3	#0	QPSK	20.63	4.4	25.03	PASS
Band2	1.4	18607	3	#Mid	QPSK	20.64	4.4	25.04	PASS
Band2	1.4	18607	3	#Max	QPSK	20.60	4.4	25.00	PASS
Band2	1.4	18607	6	#0	QPSK	19.64	4.4	24.04	PASS
Band2	1.4	18607	1	#0	16QAM	19.01	4.4	23.41	PASS
Band2	1.4	18607	1	#Mid	16QAM	19.04	4.4	23.44	PASS
Band2	1.4	18607	1	#Max	16QAM	19.01	4.4	23.41	PASS
Band2	1.4	18607	3	#0	16QAM	19.78	4.4	24.18	PASS
Band2	1.4	18607	3	#Mid	16QAM	19.80	4.4	24.20	PASS
Band2	1.4	18607	3	#Max	16QAM	19.78	4.4	24.18	PASS
Band2	1.4	18607	6	#0	16QAM	18.75	4.4	23.15	PASS
Band2	1.4	18900	1	#0	QPSK	20.23	4.4	24.63	PASS
Band2	1.4	18900	1	#Mid	QPSK	20.30	4.4	24.70	PASS
Band2	1.4	18900	1	#Max	QPSK	20.20	4.4	24.60	PASS
Band2	1.4	18900	3	#0	QPSK	20.63	4.4	25.03	PASS
Band2	1.4	18900	3	#Mid	QPSK	20.63	4.4	25.03	PASS
Band2	1.4	18900	3	#Max	QPSK	20.69	4.4	25.09	PASS
Band2	1.4	18900	6	#0	QPSK	19.67	4.4	24.07	PASS
Band2	1.4	18900	1	#0	16QAM	19.39	4.4	23.79	PASS
Band2	1.4	18900	1	#Mid	16QAM	19.44	4.4	23.84	PASS
Band2	1.4	18900	1	#Max	16QAM	19.41	4.4	23.81	PASS
Band2	1.4	18900	3	#0	16QAM	19.83	4.4	24.23	PASS
Band2	1.4	18900	3	#Mid	16QAM	19.85	4.4	24.25	PASS
Band2	1.4	18900	3	#Max	16QAM	19.84	4.4	24.24	PASS
Band2	1.4	18900	6	#0	16QAM	18.83	4.4	23.23	PASS
Band2	1.4	19193	1	#0	QPSK	20.40	4.4	24.80	PASS
Band2	1.4	19193	1	#Mid	QPSK	20.44	4.4	24.84	PASS
Band2	1.4	19193	1	#Max	QPSK	20.42	4.4	24.82	PASS
Band2	1.4	19193	3	#0	QPSK	20.93	4.4	25.33	PASS
Band2	1.4	19193	3	#Mid	QPSK	20.90	4.4	25.30	PASS
Band2	1.4	19193	3	#Max	QPSK	20.92	4.4	25.32	PASS
Band2	1.4	19193	6	#0	QPSK	19.90	4.4	24.30	PASS
Band2	1.4	19193	1	#0	16QAM	19.66	4.4	24.06	PASS
Band2	1.4	19193	1	#Mid	16QAM	19.65	4.4	24.05	PASS
Band2	1.4	19193	1	#Max	16QAM	19.65	4.4	24.05	PASS
Band2	1.4	19193	3	#0	16QAM	20.14	4.4	24.54	PASS
Band2	1.4	19193	3	#Mid	16QAM	20.14	4.4	24.54	PASS
Band2	1.4	19193	3	#Max	16QAM	20.14	4.4	24.54	PASS
Band2	1.4	19193	6	#0	16QAM	19.06	4.4	23.46	PASS
Band2	3	18615	1	#0	QPSK	20.09	4.4	24.49	PASS
Band2	3	18615	1	#Mid	QPSK	20.09	4.4	24.49	PASS
Band2	3	18615	1	#Max	QPSK	19.96	4.4	24.36	PASS
Band2	3	18615	8	#0	QPSK	19.59	4.4	23.99	PASS
Band2	3	18615	8	#Mid	QPSK	19.58	4.4	23.98	PASS
Band2	3	18615	8	#Max	QPSK	19.51	4.4	23.91	PASS
Band2	3	18615	15	#0	QPSK	19.53	4.4	23.93	PASS
Band2	3	18615	1	#0	16QAM	19.54	4.4	23.94	PASS
Band2	3	18615	1	#Mid	16QAM	19.52	4.4	23.92	PASS
Band2	3	18615	1	#Max	16QAM	19.44	4.4	23.84	PASS
Band2	3	18615	8	#0	16QAM	18.63	4.4	23.03	PASS
Band2	3	18615	8	#Mid	16QAM	18.56	4.4	22.96	PASS

Band2	3	18615	8	#Max	16QAM	18.56	4.4	22.96	PASS
Band2	3	18615	15	#0	16QAM	18.58	4.4	22.98	PASS
Band2	3	18900	1	#0	QPSK	20.16	4.4	24.56	PASS
Band2	3	18900	1	#Mid	QPSK	20.19	4.4	24.59	PASS
Band2	3	18900	1	#Max	QPSK	20.20	4.4	24.60	PASS
Band2	3	18900	8	#0	QPSK	19.62	4.4	24.02	PASS
Band2	3	18900	8	#Mid	QPSK	19.64	4.4	24.04	PASS
Band2	3	18900	8	#Max	QPSK	19.63	4.4	24.03	PASS
Band2	3	18900	15	#0	QPSK	19.62	4.4	24.02	PASS
Band2	3	18900	1	#0	16QAM	19.35	4.4	23.75	PASS
Band2	3	18900	1	#Mid	16QAM	19.40	4.4	23.80	PASS
Band2	3	18900	1	#Max	16QAM	19.37	4.4	23.77	PASS
Band2	3	18900	8	#0	16QAM	18.65	4.4	23.05	PASS
Band2	3	18900	8	#Mid	16QAM	18.67	4.4	23.07	PASS
Band2	3	18900	8	#Max	16QAM	18.65	4.4	23.05	PASS
Band2	3	18900	15	#0	16QAM	18.61	4.4	23.01	PASS
Band2	3	19185	1	#0	QPSK	20.38	4.4	24.78	PASS
Band2	3	19185	1	#Mid	QPSK	20.43	4.4	24.83	PASS
Band2	3	19185	1	#Max	QPSK	20.42	4.4	24.82	PASS
Band2	3	19185	8	#0	QPSK	19.87	4.4	24.27	PASS
Band2	3	19185	8	#Mid	QPSK	19.87	4.4	24.27	PASS
Band2	3	19185	8	#Max	QPSK	19.90	4.4	24.30	PASS
Band2	3	19185	15	#0	QPSK	19.91	4.4	24.31	PASS
Band2	3	19185	1	#0	16QAM	19.29	4.4	23.69	PASS
Band2	3	19185	1	#Mid	16QAM	19.35	4.4	23.75	PASS
Band2	3	19185	1	#Max	16QAM	19.30	4.4	23.70	PASS
Band2	3	19185	8	#0	16QAM	18.90	4.4	23.30	PASS
Band2	3	19185	8	#Mid	16QAM	18.90	4.4	23.30	PASS
Band2	3	19185	8	#Max	16QAM	18.90	4.4	23.30	PASS
Band2	3	19185	15	#0	16QAM	18.97	4.4	23.37	PASS
Band2	5	18625	1	#0	QPSK	20.17	4.4	24.57	PASS
Band2	5	18625	1	#Mid	QPSK	20.11	4.4	24.51	PASS
Band2	5	18625	1	#Max	QPSK	20.05	4.4	24.45	PASS
Band2	5	18625	12	#0	QPSK	19.61	4.4	24.01	PASS
Band2	5	18625	12	#Mid	QPSK	19.54	4.4	23.94	PASS
Band2	5	18625	12	#Max	QPSK	19.45	4.4	23.85	PASS
Band2	5	18625	25	#0	QPSK	19.55	4.4	23.95	PASS
Band2	5	18625	1	#0	16QAM	19.68	4.4	24.08	PASS
Band2	5	18625	1	#Mid	16QAM	19.58	4.4	23.98	PASS
Band2	5	18625	1	#Max	16QAM	19.54	4.4	23.94	PASS
Band2	5	18625	12	#0	16QAM	18.58	4.4	22.98	PASS
Band2	5	18625	12	#Mid	16QAM	18.53	4.4	22.93	PASS
Band2	5	18625	12	#Max	16QAM	18.43	4.4	22.83	PASS
Band2	5	18625	25	#0	16QAM	18.51	4.4	22.91	PASS
Band2	5	18900	1	#0	QPSK	20.15	4.4	24.55	PASS
Band2	5	18900	1	#Mid	QPSK	20.21	4.4	24.61	PASS
Band2	5	18900	1	#Max	QPSK	20.19	4.4	24.59	PASS
Band2	5	18900	12	#0	QPSK	19.69	4.4	24.09	PASS
Band2	5	18900	12	#Mid	QPSK	19.68	4.4	24.08	PASS
Band2	5	18900	12	#Max	QPSK	19.65	4.4	24.05	PASS
Band2	5	18900	25	#0	QPSK	19.70	4.4	24.10	PASS
Band2	5	18900	1	#0	16QAM	19.51	4.4	23.91	PASS
Band2	5	18900	1	#Mid	16QAM	19.53	4.4	23.93	PASS
Band2	5	18900	1	#Max	16QAM	19.56	4.4	23.96	PASS
Band2	5	18900	12	#0	16QAM	18.68	4.4	23.08	PASS
Band2	5	18900	12	#Mid	16QAM	18.66	4.4	23.06	PASS
Band2	5	18900	12	#Max	16QAM	18.66	4.4	23.06	PASS

Band2	5	18900	25	#0	16QAM	0.00	4.4	4.40	PASS
Band2	5	19175	1	#0	QPSK	20.30	4.4	24.70	PASS
Band2	5	19175	1	#Mid	QPSK	20.45	4.4	24.85	PASS
Band2	5	19175	1	#Max	QPSK	20.44	4.4	24.84	PASS
Band2	5	19175	12	#0	QPSK	19.92	4.4	24.32	PASS
Band2	5	19175	12	#Mid	QPSK	19.90	4.4	24.30	PASS
Band2	5	19175	12	#Max	QPSK	19.85	4.4	24.25	PASS
Band2	5	19175	25	#0	QPSK	19.92	4.4	24.32	PASS
Band2	5	19175	1	#0	16QAM	19.72	4.4	24.12	PASS
Band2	5	19175	1	#Mid	16QAM	19.74	4.4	24.14	PASS
Band2	5	19175	1	#Max	16QAM	19.79	4.4	24.19	PASS
Band2	5	19175	12	#0	16QAM	18.95	4.4	23.35	PASS
Band2	5	19175	12	#Mid	16QAM	18.91	4.4	23.31	PASS
Band2	5	19175	12	#Max	16QAM	18.87	4.4	23.27	PASS
Band2	5	19175	25	#0	16QAM	18.86	4.4	23.26	PASS
Band2	10	18650	1	#0	QPSK	20.14	4.4	24.54	PASS
Band2	10	18650	1	#Mid	QPSK	20.03	4.4	24.43	PASS
Band2	10	18650	1	#Max	QPSK	19.89	4.4	24.29	PASS
Band2	10	18650	25	#0	QPSK	19.57	4.4	23.97	PASS
Band2	10	18650	25	#Mid	QPSK	19.51	4.4	23.91	PASS
Band2	10	18650	25	#Max	QPSK	19.50	4.4	23.90	PASS
Band2	10	18650	50	#0	QPSK	19.58	4.4	23.98	PASS
Band2	10	18650	1	#0	16QAM	19.55	4.4	23.95	PASS
Band2	10	18650	1	#Mid	16QAM	19.44	4.4	23.84	PASS
Band2	10	18650	1	#Max	16QAM	19.33	4.4	23.73	PASS
Band2	10	18650	25	#0	16QAM	18.55	4.4	22.95	PASS
Band2	10	18650	25	#Mid	16QAM	18.54	4.4	22.94	PASS
Band2	10	18650	25	#Max	16QAM	18.50	4.4	22.90	PASS
Band2	10	18650	50	#0	16QAM	18.54	4.4	22.94	PASS
Band2	10	18900	1	#0	QPSK	20.16	4.4	24.56	PASS
Band2	10	18900	1	#Mid	QPSK	20.25	4.4	24.65	PASS
Band2	10	18900	1	#Max	QPSK	20.24	4.4	24.64	PASS
Band2	10	18900	25	#0	QPSK	19.64	4.4	24.04	PASS
Band2	10	18900	25	#Mid	QPSK	19.70	4.4	24.10	PASS
Band2	10	18900	25	#Max	QPSK	19.68	4.4	24.08	PASS
Band2	10	18900	50	#0	QPSK	19.66	4.4	24.06	PASS
Band2	10	18900	1	#0	16QAM	19.31	4.4	23.71	PASS
Band2	10	18900	1	#Mid	16QAM	19.41	4.4	23.81	PASS
Band2	10	18900	1	#Max	16QAM	19.40	4.4	23.80	PASS
Band2	10	18900	25	#0	16QAM	18.64	4.4	23.04	PASS
Band2	10	18900	25	#Mid	16QAM	18.67	4.4	23.07	PASS
Band2	10	18900	25	#Max	16QAM	18.69	4.4	23.09	PASS
Band2	10	18900	50	#0	16QAM	18.70	4.4	23.10	PASS
Band2	10	19150	1	#0	QPSK	20.35	4.4	24.75	PASS
Band2	10	19150	1	#Mid	QPSK	20.48	4.4	24.88	PASS
Band2	10	19150	1	#Max	QPSK	20.48	4.4	24.88	PASS
Band2	10	19150	25	#0	QPSK	19.93	4.4	24.33	PASS
Band2	10	19150	25	#Mid	QPSK	19.85	4.4	24.25	PASS
Band2	10	19150	25	#Max	QPSK	19.87	4.4	24.27	PASS
Band2	10	19150	50	#0	QPSK	19.89	4.4	24.29	PASS
Band2	10	19150	1	#0	16QAM	19.24	4.4	23.64	PASS
Band2	10	19150	1	#Mid	16QAM	19.31	4.4	23.71	PASS
Band2	10	19150	1	#Max	16QAM	19.30	4.4	23.70	PASS
Band2	10	19150	25	#0	16QAM	18.95	4.4	23.35	PASS
Band2	10	19150	25	#Mid	16QAM	18.87	4.4	23.27	PASS
Band2	10	19150	25	#Max	16QAM	18.87	4.4	23.27	PASS
Band2	10	19150	50	#0	16QAM	18.86	4.4	23.26	PASS

Band2	15	18675	1	#0	QPSK	20.02	4.4	24.42	PASS
Band2	15	18675	1	#Mid	QPSK	19.97	4.4	24.37	PASS
Band2	15	18675	1	#Max	QPSK	19.81	4.4	24.21	PASS
Band2	15	18675	36	#0	QPSK	19.50	4.4	23.90	PASS
Band2	15	18675	36	#Mid	QPSK	19.38	4.4	23.78	PASS
Band2	15	18675	36	#Max	QPSK	19.42	4.4	23.82	PASS
Band2	15	18675	75	#0	QPSK	19.47	4.4	23.87	PASS
Band2	15	18675	1	#0	16QAM	19.47	4.4	23.87	PASS
Band2	15	18675	1	#Mid	16QAM	19.42	4.4	23.82	PASS
Band2	15	18675	1	#Max	16QAM	19.25	4.4	23.65	PASS
Band2	15	18675	36	#0	16QAM	18.52	4.4	22.92	PASS
Band2	15	18675	36	#Mid	16QAM	18.43	4.4	22.83	PASS
Band2	15	18675	36	#Max	16QAM	18.43	4.4	22.83	PASS
Band2	15	18675	75	#0	16QAM	18.48	4.4	22.88	PASS
Band2	15	18900	1	#0	QPSK	19.98	4.4	24.38	PASS
Band2	15	18900	1	#Mid	QPSK	20.19	4.4	24.59	PASS
Band2	15	18900	1	#Max	QPSK	20.13	4.4	24.53	PASS
Band2	15	18900	36	#0	QPSK	19.57	4.4	23.97	PASS
Band2	15	18900	36	#Mid	QPSK	19.65	4.4	24.05	PASS
Band2	15	18900	36	#Max	QPSK	19.66	4.4	24.06	PASS
Band2	15	18900	75	#0	QPSK	19.64	4.4	24.04	PASS
Band2	15	18900	1	#0	16QAM	19.16	4.4	23.56	PASS
Band2	15	18900	1	#Mid	16QAM	19.35	4.4	23.75	PASS
Band2	15	18900	1	#Max	16QAM	19.34	4.4	23.74	PASS
Band2	15	18900	36	#0	16QAM	18.63	4.4	23.03	PASS
Band2	15	18900	36	#Mid	16QAM	18.70	4.4	23.10	PASS
Band2	15	18900	36	#Max	16QAM	18.73	4.4	23.13	PASS
Band2	15	18900	75	#0	16QAM	18.59	4.4	22.99	PASS
Band2	15	19125	1	#0	QPSK	20.23	4.4	24.63	PASS
Band2	15	19125	1	#Mid	QPSK	20.38	4.4	24.78	PASS
Band2	15	19125	1	#Max	QPSK	20.36	4.4	24.76	PASS
Band2	15	19125	36	#0	QPSK	19.78	4.4	24.18	PASS
Band2	15	19125	36	#Mid	QPSK	19.82	4.4	24.22	PASS
Band2	15	19125	36	#Max	QPSK	19.80	4.4	24.20	PASS
Band2	15	19125	75	#0	QPSK	19.80	4.4	24.20	PASS
Band2	15	19125	1	#0	16QAM	19.34	4.4	23.74	PASS
Band2	15	19125	1	#Mid	16QAM	19.53	4.4	23.93	PASS
Band2	15	19125	1	#Max	16QAM	19.44	4.4	23.84	PASS
Band2	15	19125	36	#0	16QAM	18.77	4.4	23.17	PASS
Band2	15	19125	36	#Mid	16QAM	18.81	4.4	23.21	PASS
Band2	15	19125	36	#Max	16QAM	18.74	4.4	23.14	PASS
Band2	15	19125	75	#0	16QAM	18.79	4.4	23.19	PASS
Band2	20	18700	1	#0	QPSK	20.05	4.4	24.45	PASS
Band2	20	18700	1	#Mid	QPSK	19.95	4.4	24.35	PASS
Band2	20	18700	1	#Max	QPSK	19.82	4.4	24.22	PASS
Band2	20	18700	50	#0	QPSK	19.4	4.4	23.8	PASS
Band2	20	18700	50	#Mid	QPSK	19.36	4.4	23.76	PASS
Band2	20	18700	50	#Max	QPSK	19.33	4.4	23.73	PASS
Band2	20	18700	100	#0	QPSK	19.08	4.4	23.48	PASS
Band2	20	18700	1	#0	16QAM	18.48	4.4	22.88	PASS
Band2	20	18700	1	#Mid	16QAM	18.43	4.4	22.83	PASS
Band2	20	18700	1	#Max	16QAM	18.4	4.4	22.8	PASS
Band2	20	18700	50	#0	16QAM	18.51	4.4	22.91	PASS
Band2	20	18700	50	#Mid	16QAM	18.23	4.4	22.63	PASS
Band2	20	18700	50	#Max	16QAM	18.47	4.4	22.87	PASS
Band2	20	18700	100	#0	16QAM	18.45	4.4	22.85	PASS
Band2	20	18900	1	#0	QPSK	19.94	4.4	24.34	PASS

Band2	20	18900	1	#Mid	QPSK	20.20	4.4	24.60	PASS
Band2	20	18900	1	#Max	QPSK	20.19	4.4	24.59	PASS
Band2	20	18900	50	#0	QPSK	19.63	4.4	24.03	PASS
Band2	20	18900	50	#Mid	QPSK	19.64	4.4	24.04	PASS
Band2	20	18900	50	#Max	QPSK	19.65	4.4	24.05	PASS
Band2	20	18900	100	#0	QPSK	19.63	4.4	24.03	PASS
Band2	20	18900	1	#0	16QAM	19.30	4.4	23.70	PASS
Band2	20	18900	1	#Mid	16QAM	19.56	4.4	23.96	PASS
Band2	20	18900	1	#Max	16QAM	19.55	4.4	23.95	PASS
Band2	20	18900	50	#0	16QAM	18.65	4.4	23.05	PASS
Band2	20	18900	50	#Mid	16QAM	18.66	4.4	23.06	PASS
Band2	20	18900	50	#Max	16QAM	18.73	4.4	23.13	PASS
Band2	20	18900	100	#0	16QAM	18.64	4.4	23.04	PASS
Band2	20	19100	1	#0	QPSK	20.22	4.4	24.62	PASS
Band2	20	19100	1	#Mid	QPSK	20.36	4.4	24.76	PASS
Band2	20	19100	1	#Max	QPSK	20.38	4.4	24.78	PASS
Band2	20	19100	50	#0	QPSK	19.76	4.4	24.16	PASS
Band2	20	19100	50	#Mid	QPSK	19.82	4.4	24.22	PASS
Band2	20	19100	50	#Max	QPSK	19.69	4.4	24.09	PASS
Band2	20	19100	100	#0	QPSK	19.74	4.4	24.14	PASS
Band2	20	19100	1	#0	16QAM	19.44	4.4	23.84	PASS
Band2	20	19100	1	#Mid	16QAM	19.57	4.4	23.97	PASS
Band2	20	19100	1	#Max	16QAM	19.57	4.4	23.97	PASS
Band2	20	19100	50	#0	16QAM	18.70	4.4	23.10	PASS
Band2	20	19100	50	#Mid	16QAM	18.78	4.4	23.18	PASS
Band2	20	19100	50	#Max	16QAM	18.65	4.4	23.05	PASS
Band2	20	19100	100	#0	16QAM	18.70	4.4	23.10	PASS

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	Gain (dBm)	EIRP (dBm)	Verdict
Band4	1.4	19957	1	#0	QPSK	21.48	-2.6	18.88	PASS
Band4	1.4	19957	1	#Mid	QPSK	21.56	-2.6	18.96	PASS
Band4	1.4	19957	1	#Max	QPSK	21.49	-2.6	18.89	PASS
Band4	1.4	19957	3	#0	QPSK	21.51	-2.6	18.91	PASS
Band4	1.4	19957	3	#Mid	QPSK	21.51	-2.6	18.91	PASS
Band4	1.4	19957	3	#Max	QPSK	21.51	-2.6	18.91	PASS
Band4	1.4	19957	6	#0	QPSK	20.49	-2.6	17.89	PASS
Band4	1.4	19957	1	#0	16QAM	20.43	-2.6	17.83	PASS
Band4	1.4	19957	1	#Mid	16QAM	20.45	-2.6	17.85	PASS
Band4	1.4	19957	1	#Max	16QAM	20.45	-2.6	17.85	PASS
Band4	1.4	19957	3	#0	16QAM	20.66	-2.6	18.06	PASS
Band4	1.4	19957	3	#Mid	16QAM	20.67	-2.6	18.07	PASS
Band4	1.4	19957	3	#Max	16QAM	20.68	-2.6	18.08	PASS
Band4	1.4	19957	6	#0	16QAM	19.65	-2.6	17.05	PASS
Band4	1.4	20175	1	#0	QPSK	21.24	-2.6	18.64	PASS
Band4	1.4	20175	1	#Mid	QPSK	21.30	-2.6	18.70	PASS
Band4	1.4	20175	1	#Max	QPSK	21.26	-2.6	18.66	PASS
Band4	1.4	20175	3	#0	QPSK	21.23	-2.6	18.63	PASS
Band4	1.4	20175	3	#Mid	QPSK	21.25	-2.6	18.65	PASS
Band4	1.4	20175	3	#Max	QPSK	21.23	-2.6	18.63	PASS
Band4	1.4	20175	6	#0	QPSK	20.25	-2.6	17.65	PASS
Band4	1.4	20175	1	#0	16QAM	20.49	-2.6	17.89	PASS
Band4	1.4	20175	1	#Mid	16QAM	20.49	-2.6	17.89	PASS
Band4	1.4	20175	1	#Max	16QAM	20.46	-2.6	17.86	PASS
Band4	1.4	20175	3	#0	16QAM	20.49	-2.6	17.89	PASS
Band4	1.4	20175	3	#Mid	16QAM	20.48	-2.6	17.88	PASS
Band4	1.4	20175	3	#Max	16QAM	20.43	-2.6	17.83	PASS
Band4	1.4	20175	6	#0	16QAM	19.43	-2.6	16.83	PASS
Band4	1.4	20393	1	#0	QPSK	21.34	-2.6	18.74	PASS
Band4	1.4	20393	1	#Mid	QPSK	21.34	-2.6	18.74	PASS
Band4	1.4	20393	1	#Max	QPSK	21.29	-2.6	18.69	PASS
Band4	1.4	20393	3	#0	QPSK	21.37	-2.6	18.77	PASS
Band4	1.4	20393	3	#Mid	QPSK	21.35	-2.6	18.75	PASS
Band4	1.4	20393	3	#Max	QPSK	21.34	-2.6	18.74	PASS
Band4	1.4	20393	6	#0	QPSK	20.34	-2.6	17.74	PASS
Band4	1.4	20393	1	#0	16QAM	20.62	-2.6	18.02	PASS
Band4	1.4	20393	1	#Mid	16QAM	20.60	-2.6	18.00	PASS
Band4	1.4	20393	1	#Max	16QAM	20.64	-2.6	18.04	PASS
Band4	1.4	20393	3	#0	16QAM	20.55	-2.6	17.95	PASS
Band4	1.4	20393	3	#Mid	16QAM	20.56	-2.6	17.96	PASS
Band4	1.4	20393	3	#Max	16QAM	20.57	-2.6	17.97	PASS
Band4	1.4	20393	6	#0	16QAM	19.50	-2.6	16.90	PASS
Band4	3	19965	1	#0	QPSK	21.50	-2.6	18.90	PASS
Band4	3	19965	1	#Mid	QPSK	21.53	-2.6	18.93	PASS
Band4	3	19965	1	#Max	QPSK	21.48	-2.6	18.88	PASS
Band4	3	19965	8	#0	QPSK	20.47	-2.6	17.87	PASS
Band4	3	19965	8	#Mid	QPSK	20.47	-2.6	17.87	PASS
Band4	3	19965	8	#Max	QPSK	20.46	-2.6	17.86	PASS
Band4	3	19965	15	#0	QPSK	20.48	-2.6	17.88	PASS
Band4	3	19965	1	#0	16QAM	20.91	-2.6	18.31	PASS
Band4	3	19965	1	#Mid	16QAM	20.91	-2.6	18.31	PASS
Band4	3	19965	1	#Max	16QAM	20.88	-2.6	18.28	PASS
Band4	3	19965	8	#0	16QAM	19.49	-2.6	16.89	PASS
Band4	3	19965	8	#Mid	16QAM	19.49	-2.6	16.89	PASS

Band4	3	19965	8	#Max	16QAM	19.48	-2.6	16.88	PASS
Band4	3	19965	15	#0	16QAM	19.50	-2.6	16.90	PASS
Band4	3	20175	1	#0	QPSK	21.04	-2.6	18.44	PASS
Band4	3	20175	1	#Mid	QPSK	21.09	-2.6	18.49	PASS
Band4	3	20175	1	#Max	QPSK	20.81	-2.6	18.21	PASS
Band4	3	20175	8	#0	QPSK	20.22	-2.6	17.62	PASS
Band4	3	20175	8	#Mid	QPSK	20.24	-2.6	17.64	PASS
Band4	3	20175	8	#Max	QPSK	20.20	-2.6	17.60	PASS
Band4	3	20175	15	#0	QPSK	20.18	-2.6	17.58	PASS
Band4	3	20175	1	#0	16QAM	19.96	-2.6	17.36	PASS
Band4	3	20175	1	#Mid	16QAM	20.00	-2.6	17.40	PASS
Band4	3	20175	1	#Max	16QAM	19.93	-2.6	17.33	PASS
Band4	3	20175	8	#0	16QAM	19.24	-2.6	16.64	PASS
Band4	3	20175	8	#Mid	16QAM	19.24	-2.6	16.64	PASS
Band4	3	20175	8	#Max	16QAM	19.20	-2.6	16.60	PASS
Band4	3	20175	15	#0	16QAM	19.16	-2.6	16.56	PASS
Band4	3	20385	1	#0	QPSK	20.95	-2.6	18.35	PASS
Band4	3	20385	1	#Mid	QPSK	20.95	-2.6	18.35	PASS
Band4	3	20385	1	#Max	QPSK	20.91	-2.6	18.31	PASS
Band4	3	20385	8	#0	QPSK	20.37	-2.6	17.77	PASS
Band4	3	20385	8	#Mid	QPSK	20.37	-2.6	17.77	PASS
Band4	3	20385	8	#Max	QPSK	20.36	-2.6	17.76	PASS
Band4	3	20385	15	#0	QPSK	20.36	-2.6	17.76	PASS
Band4	3	20385	1	#0	16QAM	19.84	-2.6	17.24	PASS
Band4	3	20385	1	#Mid	16QAM	19.84	-2.6	17.24	PASS
Band4	3	20385	1	#Max	16QAM	19.83	-2.6	17.23	PASS
Band4	3	20385	8	#0	16QAM	19.40	-2.6	16.80	PASS
Band4	3	20385	8	#Mid	16QAM	19.37	-2.6	16.77	PASS
Band4	3	20385	8	#Max	16QAM	19.35	-2.6	16.75	PASS
Band4	3	20385	15	#0	16QAM	19.42	-2.6	16.82	PASS
Band4	5	19975	1	#0	QPSK	21.04	-2.6	18.44	PASS
Band4	5	19975	1	#Mid	QPSK	21.13	-2.6	18.53	PASS
Band4	5	19975	1	#Max	QPSK	21.03	-2.6	18.43	PASS
Band4	5	19975	12	#0	QPSK	20.56	-2.6	17.96	PASS
Band4	5	19975	12	#Mid	QPSK	20.47	-2.6	17.87	PASS
Band4	5	19975	12	#Max	QPSK	20.44	-2.6	17.84	PASS
Band4	5	19975	25	#0	QPSK	20.53	-2.6	17.93	PASS
Band4	5	19975	1	#0	16QAM	20.47	-2.6	17.87	PASS
Band4	5	19975	1	#Mid	16QAM	20.58	-2.6	17.98	PASS
Band4	5	19975	1	#Max	16QAM	20.55	-2.6	17.95	PASS
Band4	5	19975	12	#0	16QAM	19.52	-2.6	16.92	PASS
Band4	5	19975	12	#Mid	16QAM	19.48	-2.6	16.88	PASS
Band4	5	19975	12	#Max	16QAM	19.42	-2.6	16.82	PASS
Band4	5	19975	25	#0	16QAM	19.45	-2.6	16.85	PASS
Band4	5	20175	1	#0	QPSK	20.87	-2.6	18.27	PASS
Band4	5	20175	1	#Mid	QPSK	20.82	-2.6	18.22	PASS
Band4	5	20175	1	#Max	QPSK	20.82	-2.6	18.22	PASS
Band4	5	20175	12	#0	QPSK	20.29	-2.6	17.69	PASS
Band4	5	20175	12	#Mid	QPSK	20.23	-2.6	17.63	PASS
Band4	5	20175	12	#Max	QPSK	20.21	-2.6	17.61	PASS
Band4	5	20175	25	#0	QPSK	20.26	-2.6	17.66	PASS
Band4	5	20175	1	#0	16QAM	20.29	-2.6	17.69	PASS
Band4	5	20175	1	#Mid	16QAM	20.22	-2.6	17.62	PASS
Band4	5	20175	1	#Max	16QAM	20.22	-2.6	17.62	PASS
Band4	5	20175	12	#0	16QAM	19.22	-2.6	16.62	PASS
Band4	5	20175	12	#Mid	16QAM	19.15	-2.6	16.55	PASS
Band4	5	20175	12	#Max	16QAM	19.15	-2.6	16.55	PASS

Band4	5	20175	25	#0	16QAM	19.27	-2.6	16.67	PASS
Band4	5	20375	1	#0	QPSK	20.90	-2.6	18.30	PASS
Band4	5	20375	1	#Mid	QPSK	20.88	-2.6	18.28	PASS
Band4	5	20375	1	#Max	QPSK	20.91	-2.6	18.31	PASS
Band4	5	20375	12	#0	QPSK	20.36	-2.6	17.76	PASS
Band4	5	20375	12	#Mid	QPSK	20.40	-2.6	17.80	PASS
Band4	5	20375	12	#Max	QPSK	20.37	-2.6	17.77	PASS
Band4	5	20375	25	#0	QPSK	20.36	-2.6	17.76	PASS
Band4	5	20375	1	#0	16QAM	20.24	-2.6	17.64	PASS
Band4	5	20375	1	#Mid	16QAM	20.20	-2.6	17.60	PASS
Band4	5	20375	1	#Max	16QAM	20.26	-2.6	17.66	PASS
Band4	5	20375	12	#0	16QAM	19.39	-2.6	16.79	PASS
Band4	5	20375	12	#Mid	16QAM	19.41	-2.6	16.81	PASS
Band4	5	20375	12	#Max	16QAM	19.43	-2.6	16.83	PASS
Band4	5	20375	25	#0	16QAM	19.37	-2.6	16.77	PASS
Band4	10	20000	1	#0	QPSK	21.00	-2.6	18.40	PASS
Band4	10	20000	1	#Mid	QPSK	21.02	-2.6	18.42	PASS
Band4	10	20000	1	#Max	QPSK	20.95	-2.6	18.35	PASS
Band4	10	20000	25	#0	QPSK	20.56	-2.6	17.96	PASS
Band4	10	20000	25	#Mid	QPSK	20.49	-2.6	17.89	PASS
Band4	10	20000	25	#Max	QPSK	20.41	-2.6	17.81	PASS
Band4	10	20000	50	#0	QPSK	20.50	-2.6	17.90	PASS
Band4	10	20000	1	#0	16QAM	20.43	-2.6	17.83	PASS
Band4	10	20000	1	#Mid	16QAM	20.46	-2.6	17.86	PASS
Band4	10	20000	1	#Max	16QAM	20.37	-2.6	17.77	PASS
Band4	10	20000	25	#0	16QAM	19.59	-2.6	16.99	PASS
Band4	10	20000	25	#Mid	16QAM	19.51	-2.6	16.91	PASS
Band4	10	20000	25	#Max	16QAM	19.43	-2.6	16.83	PASS
Band4	10	20000	50	#0	16QAM	19.48	-2.6	16.88	PASS
Band4	10	20175	1	#0	QPSK	20.87	-2.6	18.27	PASS
Band4	10	20175	1	#Mid	QPSK	20.77	-2.6	18.17	PASS
Band4	10	20175	1	#Max	QPSK	20.71	-2.6	18.11	PASS
Band4	10	20175	25	#0	QPSK	20.30	-2.6	17.70	PASS
Band4	10	20175	25	#Mid	QPSK	20.23	-2.6	17.63	PASS
Band4	10	20175	25	#Max	QPSK	20.27	-2.6	17.67	PASS
Band4	10	20175	50	#0	QPSK	20.29	-2.6	17.69	PASS
Band4	10	20175	1	#0	16QAM	20.02	-2.6	17.42	PASS
Band4	10	20175	1	#Mid	16QAM	19.96	-2.6	17.36	PASS
Band4	10	20175	1	#Max	16QAM	19.89	-2.6	17.29	PASS
Band4	10	20175	25	#0	16QAM	19.27	-2.6	16.67	PASS
Band4	10	20175	25	#Mid	16QAM	19.23	-2.6	16.63	PASS
Band4	10	20175	25	#Max	16QAM	19.27	-2.6	16.67	PASS
Band4	10	20175	50	#0	16QAM	19.30	-2.6	16.70	PASS
Band4	10	20350	1	#0	QPSK	20.78	-2.6	18.18	PASS
Band4	10	20350	1	#Mid	QPSK	20.92	-2.6	18.32	PASS
Band4	10	20350	1	#Max	QPSK	20.90	-2.6	18.30	PASS
Band4	10	20350	25	#0	QPSK	20.30	-2.6	17.70	PASS
Band4	10	20350	25	#Mid	QPSK	20.37	-2.6	17.77	PASS
Band4	10	20350	25	#Max	QPSK	20.44	-2.6	17.84	PASS
Band4	10	20350	50	#0	QPSK	20.33	-2.6	17.73	PASS
Band4	10	20350	1	#0	16QAM	19.68	-2.6	17.08	PASS
Band4	10	20350	1	#Mid	16QAM	19.75	-2.6	17.15	PASS
Band4	10	20350	1	#Max	16QAM	19.78	-2.6	17.18	PASS
Band4	10	20350	25	#0	16QAM	19.27	-2.6	16.67	PASS
Band4	10	20350	25	#Mid	16QAM	19.35	-2.6	16.75	PASS
Band4	10	20350	25	#Max	16QAM	19.43	-2.6	16.83	PASS
Band4	10	20350	50	#0	16QAM	19.32	-2.6	16.72	PASS

Band4	15	20025	1	#0	QPSK	20.89	-2.6	18.29	PASS
Band4	15	20025	1	#Mid	QPSK	20.99	-2.6	18.39	PASS
Band4	15	20025	1	#Max	QPSK	20.80	-2.6	18.20	PASS
Band4	15	20025	36	#0	QPSK	20.49	-2.6	17.89	PASS
Band4	15	20025	36	#Mid	QPSK	20.46	-2.6	17.86	PASS
Band4	15	20025	36	#Max	QPSK	20.37	-2.6	17.77	PASS
Band4	15	20025	75	#0	QPSK	20.45	-2.6	17.85	PASS
Band4	15	20025	1	#0	16QAM	20.13	-2.6	17.53	PASS
Band4	15	20025	1	#Mid	16QAM	20.16	-2.6	17.56	PASS
Band4	15	20025	1	#Max	16QAM	20.01	-2.6	17.41	PASS
Band4	15	20025	36	#0	16QAM	19.57	-2.6	16.97	PASS
Band4	15	20025	36	#Mid	16QAM	19.53	-2.6	16.93	PASS
Band4	15	20025	36	#Max	16QAM	19.46	-2.6	16.86	PASS
Band4	15	20025	75	#0	16QAM	19.46	-2.6	16.86	PASS
Band4	15	20175	1	#0	QPSK	20.90	-2.6	18.30	PASS
Band4	15	20175	1	#Mid	QPSK	20.82	-2.6	18.22	PASS
Band4	15	20175	1	#Max	QPSK	20.70	-2.6	18.10	PASS
Band4	15	20175	36	#0	QPSK	20.26	-2.6	17.66	PASS
Band4	15	20175	36	#Mid	QPSK	20.22	-2.6	17.62	PASS
Band4	15	20175	36	#Max	QPSK	20.21	-2.6	17.61	PASS
Band4	15	20175	75	#0	QPSK	20.24	-2.6	17.64	PASS
Band4	15	20175	1	#0	16QAM	19.98	-2.6	17.38	PASS
Band4	15	20175	1	#Mid	16QAM	19.94	-2.6	17.34	PASS
Band4	15	20175	1	#Max	16QAM	19.74	-2.6	17.14	PASS
Band4	15	20175	36	#0	16QAM	19.25	-2.6	16.65	PASS
Band4	15	20175	36	#Mid	16QAM	19.23	-2.6	16.63	PASS
Band4	15	20175	36	#Max	16QAM	19.21	-2.6	16.61	PASS
Band4	15	20175	75	#0	16QAM	19.24	-2.6	16.64	PASS
Band4	15	20325	1	#0	QPSK	20.69	-2.6	18.09	PASS
Band4	15	20325	1	#Mid	QPSK	20.87	-2.6	18.27	PASS
Band4	15	20325	1	#Max	QPSK	20.82	-2.6	18.22	PASS
Band4	15	20325	36	#0	QPSK	20.15	-2.6	17.55	PASS
Band4	15	20325	36	#Mid	QPSK	20.24	-2.6	17.64	PASS
Band4	15	20325	36	#Max	QPSK	20.34	-2.6	17.74	PASS
Band4	15	20325	75	#0	QPSK	20.27	-2.6	17.67	PASS
Band4	15	20325	1	#0	16QAM	20.07	-2.6	17.47	PASS
Band4	15	20325	1	#Mid	16QAM	20.25	-2.6	17.65	PASS
Band4	15	20325	1	#Max	16QAM	20.24	-2.6	17.64	PASS
Band4	15	20325	36	#0	16QAM	19.21	-2.6	16.61	PASS
Band4	15	20325	36	#Mid	16QAM	19.33	-2.6	16.73	PASS
Band4	15	20325	36	#Max	16QAM	19.38	-2.6	16.78	PASS
Band4	15	20325	75	#0	16QAM	19.26	-2.6	16.66	PASS
Band4	20	20050	1	#0	QPSK	20.91	-2.6	18.31	PASS
Band4	20	20050	1	#Mid	QPSK	20.97	-2.6	18.37	PASS
Band4	20	20050	1	#Max	QPSK	20.80	-2.6	18.20	PASS
Band4	20	20050	50	#0	QPSK	20.63	-2.6	18.03	PASS
Band4	20	20050	50	#Mid	QPSK	20.48	-2.6	17.88	PASS
Band4	20	20050	50	#Max	QPSK	20.31	-2.6	17.71	PASS
Band4	20	20050	100	#0	QPSK	20.50	-2.6	17.90	PASS
Band4	20	20050	1	#0	16QAM	20.28	-2.6	17.68	PASS
Band4	20	20050	1	#Mid	16QAM	20.36	-2.6	17.76	PASS
Band4	20	20050	1	#Max	16QAM	20.19	-2.6	17.59	PASS
Band4	20	20050	50	#0	16QAM	19.65	-2.6	17.05	PASS
Band4	20	20050	50	#Mid	16QAM	19.50	-2.6	16.90	PASS
Band4	20	20050	50	#Max	16QAM	19.35	-2.6	16.75	PASS
Band4	20	20050	100	#0	16QAM	19.49	-2.6	16.89	PASS
Band4	20	20175	1	#0	QPSK	20.89	-2.6	18.29	PASS

Band4	20	20175	1	#Mid	QPSK	20.82	-2.6	18.22	PASS
Band4	20	20175	1	#Max	QPSK	20.73	-2.6	18.13	PASS
Band4	20	20175	50	#0	QPSK	20.35	-2.6	17.75	PASS
Band4	20	20175	50	#Mid	QPSK	20.31	-2.6	17.71	PASS
Band4	20	20175	50	#Max	QPSK	20.34	-2.6	17.74	PASS
Band4	20	20175	100	#0	QPSK	20.30	-2.6	17.70	PASS
Band4	20	20175	1	#0	16QAM	20.05	-2.6	17.45	PASS
Band4	20	20175	1	#Mid	16QAM	20.02	-2.6	17.42	PASS
Band4	20	20175	1	#Max	16QAM	19.90	-2.6	17.30	PASS
Band4	20	20175	50	#0	16QAM	19.30	-2.6	16.70	PASS
Band4	20	20175	50	#Mid	16QAM	19.22	-2.6	16.62	PASS
Band4	20	20175	50	#Max	16QAM	19.30	-2.6	16.70	PASS
Band4	20	20175	100	#0	16QAM	19.29	-2.6	16.69	PASS
Band4	20	20300	1	#0	QPSK	20.56	-2.6	17.96	PASS
Band4	20	20300	1	#Mid	QPSK	20.72	-2.6	18.12	PASS
Band4	20	20300	1	#Max	QPSK	20.71	-2.6	18.11	PASS
Band4	20	20300	50	#0	QPSK	20.13	-2.6	17.53	PASS
Band4	20	20300	50	#Mid	QPSK	20.31	-2.6	17.71	PASS
Band4	20	20300	50	#Max	QPSK	20.44	-2.6	17.84	PASS
Band4	20	20300	100	#0	QPSK	20.25	-2.6	17.65	PASS
Band4	20	20300	1	#0	16QAM	19.88	-2.6	17.28	PASS
Band4	20	20300	1	#Mid	16QAM	20.04	-2.6	17.44	PASS
Band4	20	20300	1	#Max	16QAM	20.03	-2.6	17.43	PASS
Band4	20	20300	50	#0	16QAM	19.14	-2.6	16.54	PASS
Band4	20	20300	50	#Mid	16QAM	19.30	-2.6	16.70	PASS
Band4	20	20300	50	#Max	16QAM	19.45	-2.6	16.85	PASS
Band4	20	20300	100	#0	16QAM	19.26	-2.6	16.66	PASS

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	Gain (dBm)	ERP (dBm)	Verdict
Band5	1.4	20407	1	#0	QPSK	23.01	-2.9	17.96	PASS
Band5	1.4	20407	1	#Mid	QPSK	23.07	-2.9	18.02	PASS
Band5	1.4	20407	1	#Max	QPSK	23.01	-2.9	17.96	PASS
Band5	1.4	20407	3	#0	QPSK	22.95	-2.9	17.90	PASS
Band5	1.4	20407	3	#Mid	QPSK	22.92	-2.9	17.87	PASS
Band5	1.4	20407	3	#Max	QPSK	22.89	-2.9	17.84	PASS
Band5	1.4	20407	6	#0	QPSK	22.01	-2.9	16.96	PASS
Band5	1.4	20407	1	#0	16QAM	21.94	-2.9	16.89	PASS
Band5	1.4	20407	1	#Mid	16QAM	21.95	-2.9	16.90	PASS
Band5	1.4	20407	1	#Max	16QAM	21.88	-2.9	16.83	PASS
Band5	1.4	20407	3	#0	16QAM	22.10	-2.9	17.05	PASS
Band5	1.4	20407	3	#Mid	16QAM	22.12	-2.9	17.07	PASS
Band5	1.4	20407	3	#Max	16QAM	22.12	-2.9	17.07	PASS
Band5	1.4	20407	6	#0	16QAM	21.09	-2.9	16.04	PASS
Band5	1.4	20525	1	#0	QPSK	22.89	-2.9	17.84	PASS
Band5	1.4	20525	1	#Mid	QPSK	22.94	-2.9	17.89	PASS
Band5	1.4	20525	1	#Max	QPSK	22.89	-2.9	17.84	PASS
Band5	1.4	20525	3	#0	QPSK	22.81	-2.9	17.76	PASS
Band5	1.4	20525	3	#Mid	QPSK	22.82	-2.9	17.77	PASS
Band5	1.4	20525	3	#Max	QPSK	22.85	-2.9	17.80	PASS
Band5	1.4	20525	6	#0	QPSK	21.80	-2.9	16.75	PASS
Band5	1.4	20525	1	#0	16QAM	22.06	-2.9	17.01	PASS
Band5	1.4	20525	1	#Mid	16QAM	22.09	-2.9	17.04	PASS
Band5	1.4	20525	1	#Max	16QAM	22.07	-2.9	17.02	PASS
Band5	1.4	20525	3	#0	16QAM	22.04	-2.9	16.99	PASS
Band5	1.4	20525	3	#Mid	16QAM	22.06	-2.9	17.01	PASS
Band5	1.4	20525	3	#Max	16QAM	22.06	-2.9	17.01	PASS
Band5	1.4	20525	6	#0	16QAM	20.98	-2.9	15.93	PASS
Band5	1.4	20643	1	#0	QPSK	22.86	-2.9	17.81	PASS
Band5	1.4	20643	1	#Mid	QPSK	22.92	-2.9	17.87	PASS
Band5	1.4	20643	1	#Max	QPSK	22.80	-2.9	17.75	PASS
Band5	1.4	20643	3	#0	QPSK	22.89	-2.9	17.84	PASS
Band5	1.4	20643	3	#Mid	QPSK	22.86	-2.9	17.81	PASS
Band5	1.4	20643	3	#Max	QPSK	22.83	-2.9	17.78	PASS
Band5	1.4	20643	6	#0	QPSK	21.87	-2.9	16.82	PASS
Band5	1.4	20643	1	#0	16QAM	22.12	-2.9	17.07	PASS
Band5	1.4	20643	1	#Mid	16QAM	22.13	-2.9	17.08	PASS
Band5	1.4	20643	1	#Max	16QAM	22.10	-2.9	17.05	PASS
Band5	1.4	20643	3	#0	16QAM	22.08	-2.9	17.03	PASS
Band5	1.4	20643	3	#Mid	16QAM	22.08	-2.9	17.03	PASS
Band5	1.4	20643	3	#Max	16QAM	22.06	-2.9	17.01	PASS
Band5	1.4	20643	6	#0	16QAM	21.04	-2.9	15.99	PASS
Band5	3	20415	1	#0	QPSK	0.00	-2.9	-5.05	PASS
Band5	3	20415	1	#Mid	QPSK	0.00	-2.9	-5.05	PASS
Band5	3	20415	1	#Max	QPSK	0.00	-2.9	-5.05	PASS
Band5	3	20415	8	#0	QPSK	0.00	-2.9	-5.05	PASS
Band5	3	20415	8	#Mid	QPSK	0.00	-2.9	-5.05	PASS
Band5	3	20415	8	#Max	QPSK	21.89	-2.9	16.84	PASS
Band5	3	20415	15	#0	QPSK	21.91	-2.9	16.86	PASS
Band5	3	20415	1	#0	16QAM	22.38	-2.9	17.33	PASS
Band5	3	20415	1	#Mid	16QAM	22.38	-2.9	17.33	PASS
Band5	3	20415	1	#Max	16QAM	22.29	-2.9	17.24	PASS
Band5	3	20415	8	#0	16QAM	20.91	-2.9	15.86	PASS
Band5	3	20415	8	#Mid	16QAM	20.92	-2.9	15.87	PASS

Band5	3	20415	8	#Max	16QAM	20.90	-2.9	15.85	PASS
Band5	3	20415	15	#0	16QAM	20.91	-2.9	15.86	PASS
Band5	3	20525	1	#0	QPSK	22.80	-2.9	17.75	PASS
Band5	3	20525	1	#Mid	QPSK	22.86	-2.9	17.81	PASS
Band5	3	20525	1	#Max	QPSK	22.81	-2.9	17.76	PASS
Band5	3	20525	8	#0	QPSK	21.79	-2.9	16.74	PASS
Band5	3	20525	8	#Mid	QPSK	21.81	-2.9	16.76	PASS
Band5	3	20525	8	#Max	QPSK	21.79	-2.9	16.74	PASS
Band5	3	20525	15	#0	QPSK	21.80	-2.9	16.75	PASS
Band5	3	20525	1	#0	16QAM	22.03	-2.9	16.98	PASS
Band5	3	20525	1	#Mid	16QAM	22.08	-2.9	17.03	PASS
Band5	3	20525	1	#Max	16QAM	22.04	-2.9	16.99	PASS
Band5	3	20525	8	#0	16QAM	20.79	-2.9	15.74	PASS
Band5	3	20525	8	#Mid	16QAM	20.80	-2.9	15.75	PASS
Band5	3	20525	8	#Max	16QAM	20.80	-2.9	15.75	PASS
Band5	3	20525	15	#0	16QAM	20.75	-2.9	15.70	PASS
Band5	3	20635	1	#0	QPSK	23.00	-2.9	17.95	PASS
Band5	3	20635	1	#Mid	QPSK	23.00	-2.9	17.95	PASS
Band5	3	20635	1	#Max	QPSK	22.88	-2.9	17.83	PASS
Band5	3	20635	8	#0	QPSK	21.88	-2.9	16.83	PASS
Band5	3	20635	8	#Mid	QPSK	21.92	-2.9	16.87	PASS
Band5	3	20635	8	#Max	QPSK	21.89	-2.9	16.84	PASS
Band5	3	20635	15	#0	QPSK	21.85	-2.9	16.80	PASS
Band5	3	20635	1	#0	16QAM	22.36	-2.9	17.31	PASS
Band5	3	20635	1	#Mid	16QAM	22.38	-2.9	17.33	PASS
Band5	3	20635	1	#Max	16QAM	22.27	-2.9	17.22	PASS
Band5	3	20635	8	#0	16QAM	20.96	-2.9	15.91	PASS
Band5	3	20635	8	#Mid	16QAM	20.96	-2.9	15.91	PASS
Band5	3	20635	8	#Max	16QAM	20.97	-2.9	15.92	PASS
Band5	3	20635	15	#0	16QAM	20.96	-2.9	15.91	PASS
Band5	5	20425	1	#0	QPSK	22.95	-2.9	17.90	PASS
Band5	5	20425	1	#Mid	QPSK	22.97	-2.9	17.92	PASS
Band5	5	20425	1	#Max	QPSK	22.91	-2.9	17.86	PASS
Band5	5	20425	12	#0	QPSK	21.98	-2.9	16.93	PASS
Band5	5	20425	12	#Mid	QPSK	21.90	-2.9	16.85	PASS
Band5	5	20425	12	#Max	QPSK	21.87	-2.9	16.82	PASS
Band5	5	20425	25	#0	QPSK	21.93	-2.9	16.88	PASS
Band5	5	20425	1	#0	16QAM	22.29	-2.9	17.24	PASS
Band5	5	20425	1	#Mid	16QAM	22.28	-2.9	17.23	PASS
Band5	5	20425	1	#Max	16QAM	22.23	-2.9	17.18	PASS
Band5	5	20425	12	#0	16QAM	21.03	-2.9	15.98	PASS
Band5	5	20425	12	#Mid	16QAM	20.92	-2.9	15.87	PASS
Band5	5	20425	12	#Max	16QAM	20.89	-2.9	15.84	PASS
Band5	5	20425	25	#0	16QAM	20.88	-2.9	15.83	PASS
Band5	5	20525	1	#0	QPSK	22.94	-2.9	17.89	PASS
Band5	5	20525	1	#Mid	QPSK	23.00	-2.9	17.95	PASS
Band5	5	20525	1	#Max	QPSK	22.92	-2.9	17.87	PASS
Band5	5	20525	12	#0	QPSK	21.70	-2.9	16.65	PASS
Band5	5	20525	12	#Mid	QPSK	21.82	-2.9	16.77	PASS
Band5	5	20525	12	#Max	QPSK	21.87	-2.9	16.82	PASS
Band5	5	20525	25	#0	QPSK	21.83	-2.9	16.78	PASS
Band5	5	20525	1	#0	16QAM	22.32	-2.9	17.27	PASS
Band5	5	20525	1	#Mid	16QAM	22.37	-2.9	17.32	PASS
Band5	5	20525	1	#Max	16QAM	22.35	-2.9	17.30	PASS
Band5	5	20525	12	#0	16QAM	20.75	-2.9	15.70	PASS
Band5	5	20525	12	#Mid	16QAM	20.76	-2.9	15.71	PASS
Band5	5	20525	12	#Max	16QAM	20.87	-2.9	15.82	PASS

Band5	5	20525	25	#0	16QAM	20.78	-2.9	15.73	PASS
Band5	5	20625	1	#0	QPSK	23.04	-2.9	17.99	PASS
Band5	5	20625	1	#Mid	QPSK	23.11	-2.9	18.06	PASS
Band5	5	20625	1	#Max	QPSK	23.04	-2.9	17.99	PASS
Band5	5	20625	12	#0	QPSK	22.01	-2.9	16.96	PASS
Band5	5	20625	12	#Mid	QPSK	21.93	-2.9	16.88	PASS
Band5	5	20625	12	#Max	QPSK	21.98	-2.9	16.93	PASS
Band5	5	20625	25	#0	QPSK	21.99	-2.9	16.94	PASS
Band5	5	20625	1	#0	16QAM	22.43	-2.9	17.38	PASS
Band5	5	20625	1	#Mid	16QAM	22.48	-2.9	17.43	PASS
Band5	5	20625	1	#Max	16QAM	22.35	-2.9	17.30	PASS
Band5	5	20625	12	#0	16QAM	20.93	-2.9	15.88	PASS
Band5	5	20625	12	#Mid	16QAM	20.85	-2.9	15.80	PASS
Band5	5	20625	12	#Max	16QAM	20.92	-2.9	15.87	PASS
Band5	5	20625	25	#0	16QAM	21.00	-2.9	15.95	PASS
Band5	10	20450	1	#0	QPSK	23.02	-2.9	17.97	PASS
Band5	10	20450	1	#Mid	QPSK	22.96	-2.9	17.91	PASS
Band5	10	20450	1	#Max	QPSK	22.87	-2.9	17.82	PASS
Band5	10	20450	25	#0	QPSK	21.97	-2.9	16.92	PASS
Band5	10	20450	25	#Mid	QPSK	21.92	-2.9	16.87	PASS
Band5	10	20450	25	#Max	QPSK	21.83	-2.9	16.78	PASS
Band5	10	20450	50	#0	QPSK	21.90	-2.9	16.85	PASS
Band5	10	20450	1	#0	16QAM	21.84	-2.9	16.79	PASS
Band5	10	20450	1	#Mid	16QAM	21.84	-2.9	16.79	PASS
Band5	10	20450	1	#Max	16QAM	21.74	-2.9	16.69	PASS
Band5	10	20450	25	#0	16QAM	20.97	-2.9	15.92	PASS
Band5	10	20450	25	#Mid	16QAM	20.91	-2.9	15.86	PASS
Band5	10	20450	25	#Max	16QAM	20.82	-2.9	15.77	PASS
Band5	10	20450	50	#0	16QAM	20.87	-2.9	15.82	PASS
Band5	10	20525	1	#0	QPSK	22.88	-2.9	17.83	PASS
Band5	10	20525	1	#Mid	QPSK	22.90	-2.9	17.85	PASS
Band5	10	20525	1	#Max	QPSK	22.89	-2.9	17.84	PASS
Band5	10	20525	25	#0	QPSK	21.75	-2.9	16.70	PASS
Band5	10	20525	25	#Mid	QPSK	21.82	-2.9	16.77	PASS
Band5	10	20525	25	#Max	QPSK	21.90	-2.9	16.85	PASS
Band5	10	20525	50	#0	QPSK	21.86	-2.9	16.81	PASS
Band5	10	20525	1	#0	16QAM	22.25	-2.9	17.20	PASS
Band5	10	20525	1	#Mid	16QAM	22.29	-2.9	17.24	PASS
Band5	10	20525	1	#Max	16QAM	22.31	-2.9	17.26	PASS
Band5	10	20525	25	#0	16QAM	20.82	-2.9	15.77	PASS
Band5	10	20525	25	#Mid	16QAM	20.85	-2.9	15.80	PASS
Band5	10	20525	25	#Max	16QAM	20.95	-2.9	15.90	PASS
Band5	10	20525	50	#0	16QAM	20.84	-2.9	15.79	PASS
Band5	10	20600	1	#0	QPSK	22.83	-2.9	17.78	PASS
Band5	10	20600	1	#Mid	QPSK	22.91	-2.9	17.86	PASS
Band5	10	20600	1	#Max	QPSK	22.87	-2.9	17.82	PASS
Band5	10	20600	25	#0	QPSK	22.00	-2.9	16.95	PASS
Band5	10	20600	25	#Mid	QPSK	21.91	-2.9	16.86	PASS
Band5	10	20600	25	#Max	QPSK	21.93	-2.9	16.88	PASS
Band5	10	20600	50	#0	QPSK	22.04	-2.9	16.99	PASS
Band5	10	20600	1	#0	16QAM	21.99	-2.9	16.94	PASS
Band5	10	20600	1	#Mid	16QAM	22.09	-2.9	17.04	PASS
Band5	10	20600	1	#Max	16QAM	22.03	-2.9	16.98	PASS
Band5	10	20600	25	#0	16QAM	21.01	-2.9	15.96	PASS
Band5	10	20600	25	#Mid	16QAM	20.90	-2.9	15.85	PASS
Band5	10	20600	25	#Max	16QAM	20.94	-2.9	15.89	PASS
Band5	10	20600	50	#0	16QAM	21.04	-2.9	15.99	PASS

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	Gain (dBm)	EIRP (dBm)	Verdict
Band7	5	20775	1	#0	QPSK	21.04	-3.1	17.94	PASS
Band7	5	20775	1	#Mid	QPSK	21.06	-3.1	17.96	PASS
Band7	5	20775	1	#Max	QPSK	21.11	-3.1	18.01	PASS
Band7	5	20775	12	#0	QPSK	20.04	-3.1	16.94	PASS
Band7	5	20775	12	#Mid	QPSK	20.08	-3.1	16.98	PASS
Band7	5	20775	12	#Max	QPSK	20.07	-3.1	16.97	PASS
Band7	5	20775	25	#0	QPSK	20.09	-3.1	16.99	PASS
Band7	5	20775	1	#0	16QAM	20.38	-3.1	17.28	PASS
Band7	5	20775	1	#Mid	16QAM	20.42	-3.1	17.32	PASS
Band7	5	20775	1	#Max	16QAM	20.44	-3.1	17.34	PASS
Band7	5	20775	12	#0	16QAM	19.06	-3.1	15.96	PASS
Band7	5	20775	12	#Mid	16QAM	19.10	-3.1	16.00	PASS
Band7	5	20775	12	#Max	16QAM	19.12	-3.1	16.02	PASS
Band7	5	20775	25	#0	16QAM	19.05	-3.1	15.95	PASS
Band7	5	21100	1	#0	QPSK	21.00	-3.1	17.90	PASS
Band7	5	21100	1	#Mid	QPSK	20.98	-3.1	17.88	PASS
Band7	5	21100	1	#Max	QPSK	20.97	-3.1	17.87	PASS
Band7	5	21100	12	#0	QPSK	19.93	-3.1	16.83	PASS
Band7	5	21100	12	#Mid	QPSK	19.88	-3.1	16.78	PASS
Band7	5	21100	12	#Max	QPSK	19.83	-3.1	16.73	PASS
Band7	5	21100	25	#0	QPSK	19.88	-3.1	16.78	PASS
Band7	5	21100	1	#0	16QAM	20.38	-3.1	17.28	PASS
Band7	5	21100	1	#Mid	16QAM	20.37	-3.1	17.27	PASS
Band7	5	21100	1	#Max	16QAM	20.35	-3.1	17.25	PASS
Band7	5	21100	12	#0	16QAM	18.83	-3.1	15.73	PASS
Band7	5	21100	12	#Mid	16QAM	18.82	-3.1	15.72	PASS
Band7	5	21100	12	#Max	16QAM	18.75	-3.1	15.65	PASS
Band7	5	21100	25	#0	16QAM	18.91	-3.1	15.81	PASS
Band7	5	21425	1	#0	QPSK	20.58	-3.1	17.48	PASS
Band7	5	21425	1	#Mid	QPSK	20.58	-3.1	17.48	PASS
Band7	5	21425	1	#Max	QPSK	20.50	-3.1	17.40	PASS
Band7	5	21425	12	#0	QPSK	19.53	-3.1	16.43	PASS
Band7	5	21425	12	#Mid	QPSK	19.49	-3.1	16.39	PASS
Band7	5	21425	12	#Max	QPSK	19.51	-3.1	16.41	PASS
Band7	5	21425	25	#0	QPSK	19.53	-3.1	16.43	PASS
Band7	5	21425	1	#0	16QAM	19.82	-3.1	16.72	PASS
Band7	5	21425	1	#Mid	16QAM	19.84	-3.1	16.74	PASS
Band7	5	21425	1	#Max	16QAM	19.79	-3.1	16.69	PASS
Band7	5	21425	12	#0	16QAM	18.58	-3.1	15.48	PASS
Band7	5	21425	12	#Mid	16QAM	18.55	-3.1	15.45	PASS
Band7	5	21425	12	#Max	16QAM	18.56	-3.1	15.46	PASS
Band7	5	21425	25	#0	16QAM	18.50	-3.1	15.40	PASS
Band7	10	20800	1	#0	QPSK	21.11	-3.1	18.01	PASS
Band7	10	20800	1	#Mid	QPSK	21.20	-3.1	18.10	PASS
Band7	10	20800	1	#Max	QPSK	21.20	-3.1	18.10	PASS
Band7	10	20800	25	#0	QPSK	20.05	-3.1	16.95	PASS
Band7	10	20800	25	#Mid	QPSK	20.11	-3.1	17.01	PASS
Band7	10	20800	25	#Max	QPSK	20.16	-3.1	17.06	PASS
Band7	10	20800	50	#0	QPSK	20.12	-3.1	17.02	PASS
Band7	10	20800	1	#0	16QAM	19.93	-3.1	16.83	PASS
Band7	10	20800	1	#Mid	16QAM	19.94	-3.1	16.84	PASS
Band7	10	20800	1	#Max	16QAM	19.96	-3.1	16.86	PASS
Band7	10	20800	25	#0	16QAM	19.06	-3.1	15.96	PASS
Band7	10	20800	25	#Mid	16QAM	19.09	-3.1	15.99	PASS

Band7	10	20800	25	#Max	16QAM	19.14	-3.1	16.04	PASS
Band7	10	20800	50	#0	16QAM	19.12	-3.1	16.02	PASS
Band7	10	21100	1	#0	QPSK	20.46	-3.1	17.36	PASS
Band7	10	21100	1	#Mid	QPSK	20.41	-3.1	17.31	PASS
Band7	10	21100	1	#Max	QPSK	20.31	-3.1	17.21	PASS
Band7	10	21100	25	#0	QPSK	19.90	-3.1	16.80	PASS
Band7	10	21100	25	#Mid	QPSK	19.90	-3.1	16.80	PASS
Band7	10	21100	25	#Max	QPSK	19.81	-3.1	16.71	PASS
Band7	10	21100	50	#0	QPSK	19.86	-3.1	16.76	PASS
Band7	10	21100	1	#0	16QAM	19.85	-3.1	16.75	PASS
Band7	10	21100	1	#Mid	16QAM	19.80	-3.1	16.70	PASS
Band7	10	21100	1	#Max	16QAM	19.70	-3.1	16.60	PASS
Band7	10	21100	25	#0	16QAM	18.94	-3.1	15.84	PASS
Band7	10	21100	25	#Mid	16QAM	18.91	-3.1	15.81	PASS
Band7	10	21100	25	#Max	16QAM	18.85	-3.1	15.75	PASS
Band7	10	21100	50	#0	16QAM	18.86	-3.1	15.76	PASS
Band7	10	21400	1	#0	QPSK	20.16	-3.1	17.06	PASS
Band7	10	21400	1	#Mid	QPSK	20.10	-3.1	17.00	PASS
Band7	10	21400	1	#Max	QPSK	19.92	-3.1	16.82	PASS
Band7	10	21400	25	#0	QPSK	19.61	-3.1	16.51	PASS
Band7	10	21400	25	#Mid	QPSK	19.54	-3.1	16.44	PASS
Band7	10	21400	25	#Max	QPSK	19.54	-3.1	16.44	PASS
Band7	10	21400	50	#0	QPSK	19.62	-3.1	16.52	PASS
Band7	10	21400	1	#0	16QAM	19.34	-3.1	16.24	PASS
Band7	10	21400	1	#Mid	16QAM	19.29	-3.1	16.19	PASS
Band7	10	21400	1	#Max	16QAM	19.16	-3.1	16.06	PASS
Band7	10	21400	25	#0	16QAM	18.62	-3.1	15.52	PASS
Band7	10	21400	25	#Mid	16QAM	18.57	-3.1	15.47	PASS
Band7	10	21400	25	#Max	16QAM	18.56	-3.1	15.46	PASS
Band7	10	21400	50	#0	16QAM	18.64	-3.1	15.54	PASS
Band7	15	20825	1	#0	QPSK	20.50	-3.1	17.40	PASS
Band7	15	20825	1	#Mid	QPSK	20.67	-3.1	17.57	PASS
Band7	15	20825	1	#Max	QPSK	20.63	-3.1	17.53	PASS
Band7	15	20825	36	#0	QPSK	19.95	-3.1	16.85	PASS
Band7	15	20825	36	#Mid	QPSK	20.04	-3.1	16.94	PASS
Band7	15	20825	36	#Max	QPSK	20.14	-3.1	17.04	PASS
Band7	15	20825	75	#0	QPSK	20.10	-3.1	17.00	PASS
Band7	15	20825	1	#0	16QAM	19.91	-3.1	16.81	PASS
Band7	15	20825	1	#Mid	16QAM	20.04	-3.1	16.94	PASS
Band7	15	20825	1	#Max	16QAM	20.02	-3.1	16.92	PASS
Band7	15	20825	36	#0	16QAM	19.03	-3.1	15.93	PASS
Band7	15	20825	36	#Mid	16QAM	19.10	-3.1	16.00	PASS
Band7	15	20825	36	#Max	16QAM	19.18	-3.1	16.08	PASS
Band7	15	20825	75	#0	16QAM	19.05	-3.1	15.95	PASS
Band7	15	21100	1	#0	QPSK	20.37	-3.1	17.27	PASS
Band7	15	21100	1	#Mid	QPSK	20.31	-3.1	17.21	PASS
Band7	15	21100	1	#Max	QPSK	20.16	-3.1	17.06	PASS
Band7	15	21100	36	#0	QPSK	19.84	-3.1	16.74	PASS
Band7	15	21100	36	#Mid	QPSK	19.80	-3.1	16.70	PASS
Band7	15	21100	36	#Max	QPSK	19.75	-3.1	16.65	PASS
Band7	15	21100	75	#0	QPSK	19.82	-3.1	16.72	PASS
Band7	15	21100	1	#0	16QAM	19.61	-3.1	16.51	PASS
Band7	15	21100	1	#Mid	16QAM	19.59	-3.1	16.49	PASS
Band7	15	21100	1	#Max	16QAM	19.40	-3.1	16.30	PASS
Band7	15	21100	36	#0	16QAM	18.94	-3.1	15.84	PASS
Band7	15	21100	36	#Mid	16QAM	18.87	-3.1	15.77	PASS
Band7	15	21100	36	#Max	16QAM	18.82	-3.1	15.72	PASS

Band7	15	21100	75	#0	16QAM	18.84	-3.1	15.74	PASS
Band7	15	21375	1	#0	QPSK	20.21	-3.1	17.11	PASS
Band7	15	21375	1	#Mid	QPSK	20.23	-3.1	17.13	PASS
Band7	15	21375	1	#Max	QPSK	20.01	-3.1	16.91	PASS
Band7	15	21375	36	#0	QPSK	19.61	-3.1	16.51	PASS
Band7	15	21375	36	#Mid	QPSK	19.57	-3.1	16.47	PASS
Band7	15	21375	36	#Max	QPSK	19.53	-3.1	16.43	PASS
Band7	15	21375	75	#0	QPSK	19.62	-3.1	16.52	PASS
Band7	15	21375	1	#0	16QAM	19.25	-3.1	16.15	PASS
Band7	15	21375	1	#Mid	16QAM	19.30	-3.1	16.20	PASS
Band7	15	21375	1	#Max	16QAM	19.07	-3.1	15.97	PASS
Band7	15	21375	36	#0	16QAM	18.62	-3.1	15.52	PASS
Band7	15	21375	36	#Mid	16QAM	18.59	-3.1	15.49	PASS
Band7	15	21375	36	#Max	16QAM	18.52	-3.1	15.42	PASS
Band7	15	21375	75	#0	16QAM	18.63	-3.1	15.53	PASS
Band7	20	20850	1	#0	QPSK	20.49	-3.1	17.39	PASS
Band7	20	20850	1	#Mid	QPSK	20.71	-3.1	17.61	PASS
Band7	20	20850	1	#Max	QPSK	20.62	-3.1	17.52	PASS
Band7	20	20850	50	#0	QPSK	20.09	-3.1	16.99	PASS
Band7	20	20850	50	#Mid	QPSK	20.21	-3.1	17.11	PASS
Band7	20	20850	50	#Max	QPSK	20.11	-3.1	17.01	PASS
Band7	20	20850	100	#0	QPSK	20.05	-3.1	16.95	PASS
Band7	20	20850	1	#0	16QAM	19.71	-3.1	16.61	PASS
Band7	20	20850	1	#Mid	16QAM	19.93	-3.1	16.83	PASS
Band7	20	20850	1	#Max	16QAM	19.81	-3.1	16.71	PASS
Band7	20	20850	50	#0	16QAM	19.03	-3.1	15.93	PASS
Band7	20	20850	50	#Mid	16QAM	19.15	-3.1	16.05	PASS
Band7	20	20850	50	#Max	16QAM	19.10	-3.1	16.00	PASS
Band7	20	20850	100	#0	16QAM	19.09	-3.1	15.99	PASS
Band7	20	21100	1	#0	QPSK	20.35	-3.1	17.25	PASS
Band7	20	21100	1	#Mid	QPSK	20.33	-3.1	17.23	PASS
Band7	20	21100	1	#Max	QPSK	20.20	-3.1	17.10	PASS
Band7	20	21100	50	#0	QPSK	19.95	-3.1	16.85	PASS
Band7	20	21100	50	#Mid	QPSK	19.86	-3.1	16.76	PASS
Band7	20	21100	50	#Max	QPSK	19.87	-3.1	16.77	PASS
Band7	20	21100	100	#0	QPSK	19.90	-3.1	16.80	PASS
Band7	20	21100	1	#0	16QAM	19.73	-3.1	16.63	PASS
Band7	20	21100	1	#Mid	16QAM	19.68	-3.1	16.58	PASS
Band7	20	21100	1	#Max	16QAM	19.59	-3.1	16.49	PASS
Band7	20	21100	50	#0	16QAM	18.99	-3.1	15.89	PASS
Band7	20	21100	50	#Mid	16QAM	18.92	-3.1	15.82	PASS
Band7	20	21100	50	#Max	16QAM	18.84	-3.1	15.74	PASS
Band7	20	21100	100	#0	16QAM	18.88	-3.1	15.78	PASS
Band7	20	21350	1	#0	QPSK	20.20	-3.1	17.10	PASS
Band7	20	21350	1	#Mid	QPSK	20.25	-3.1	17.15	PASS
Band7	20	21350	1	#Max	QPSK	20.04	-3.1	16.94	PASS
Band7	20	21350	50	#0	QPSK	19.70	-3.1	16.60	PASS
Band7	20	21350	50	#Mid	QPSK	19.72	-3.1	16.62	PASS
Band7	20	21350	50	#Max	QPSK	19.64	-3.1	16.54	PASS
Band7	20	21350	100	#0	QPSK	19.72	-3.1	16.62	PASS
Band7	20	21350	1	#0	16QAM	19.60	-3.1	16.50	PASS
Band7	20	21350	1	#Mid	16QAM	19.65	-3.1	16.55	PASS
Band7	20	21350	1	#Max	16QAM	19.39	-3.1	16.29	PASS
Band7	20	21350	50	#0	16QAM	18.77	-3.1	15.67	PASS
Band7	20	21350	50	#Mid	16QAM	18.76	-3.1	15.66	PASS
Band7	20	21350	50	#Max	16QAM	18.71	-3.1	15.61	PASS
Band7	20	21350	100	#0	16QAM	18.70	-3.1	15.60	PASS

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	Gain (dBm)	ERP (dBm)	Verdict
Band12	1.4	23017	1	#0	QPSK	23.05	-5.6	15.30	PASS
Band12	1.4	23017	1	#Mid	QPSK	23.11	-5.6	15.36	PASS
Band12	1.4	23017	1	#Max	QPSK	23.03	-5.6	15.28	PASS
Band12	1.4	23017	3	#0	QPSK	23.10	-5.6	15.35	PASS
Band12	1.4	23017	3	#Mid	QPSK	23.09	-5.6	15.34	PASS
Band12	1.4	23017	3	#Max	QPSK	23.09	-5.6	15.34	PASS
Band12	1.4	23017	6	#0	QPSK	22.11	-5.6	14.36	PASS
Band12	1.4	23017	1	#0	16QAM	22.39	-5.6	14.64	PASS
Band12	1.4	23017	1	#Mid	16QAM	22.37	-5.6	14.62	PASS
Band12	1.4	23017	1	#Max	16QAM	22.37	-5.6	14.62	PASS
Band12	1.4	23017	3	#0	16QAM	22.31	-5.6	14.56	PASS
Band12	1.4	23017	3	#Mid	16QAM	22.31	-5.6	14.56	PASS
Band12	1.4	23017	3	#Max	16QAM	22.31	-5.6	14.56	PASS
Band12	1.4	23017	6	#0	16QAM	21.26	-5.6	13.51	PASS
Band12	1.4	23095	1	#0	QPSK	22.97	-5.6	15.22	PASS
Band12	1.4	23095	1	#Mid	QPSK	23.02	-5.6	15.27	PASS
Band12	1.4	23095	1	#Max	QPSK	22.95	-5.6	15.20	PASS
Band12	1.4	23095	3	#0	QPSK	23.02	-5.6	15.27	PASS
Band12	1.4	23095	3	#Mid	QPSK	23.05	-5.6	15.30	PASS
Band12	1.4	23095	3	#Max	QPSK	23.01	-5.6	15.26	PASS
Band12	1.4	23095	6	#0	QPSK	21.99	-5.6	14.24	PASS
Band12	1.4	23095	1	#0	16QAM	22.23	-5.6	14.48	PASS
Band12	1.4	23095	1	#Mid	16QAM	22.22	-5.6	14.47	PASS
Band12	1.4	23095	1	#Max	16QAM	22.21	-5.6	14.46	PASS
Band12	1.4	23095	3	#0	16QAM	22.26	-5.6	14.51	PASS
Band12	1.4	23095	3	#Mid	16QAM	22.28	-5.6	14.53	PASS
Band12	1.4	23095	3	#Max	16QAM	22.26	-5.6	14.51	PASS
Band12	1.4	23095	6	#0	16QAM	21.19	-5.6	13.44	PASS
Band12	1.4	23173	1	#0	QPSK	23.06	-5.6	15.31	PASS
Band12	1.4	23173	1	#Mid	QPSK	23.10	-5.6	15.35	PASS
Band12	1.4	23173	1	#Max	QPSK	23.05	-5.6	15.30	PASS
Band12	1.4	23173	3	#0	QPSK	23.11	-5.6	15.36	PASS
Band12	1.4	23173	3	#Mid	QPSK	23.12	-5.6	15.37	PASS
Band12	1.4	23173	3	#Max	QPSK	23.15	-5.6	15.40	PASS
Band12	1.4	23173	6	#0	QPSK	22.11	-5.6	14.36	PASS
Band12	1.4	23173	1	#0	16QAM	22.37	-5.6	14.62	PASS
Band12	1.4	23173	1	#Mid	16QAM	22.39	-5.6	14.64	PASS
Band12	1.4	23173	1	#Max	16QAM	22.37	-5.6	14.62	PASS
Band12	1.4	23173	3	#0	16QAM	22.29	-5.6	14.54	PASS
Band12	1.4	23173	3	#Mid	16QAM	22.35	-5.6	14.60	PASS
Band12	1.4	23173	3	#Max	16QAM	22.39	-5.6	14.64	PASS
Band12	1.4	23173	6	#0	16QAM	21.28	-5.6	13.53	PASS
Band12	3	23025	1	#0	QPSK	23.15	-5.6	15.40	PASS
Band12	3	23025	1	#Mid	QPSK	23.26	-5.6	15.51	PASS
Band12	3	23025	1	#Max	QPSK	23.09	-5.6	15.34	PASS
Band12	3	23025	8	#0	QPSK	22.04	-5.6	14.29	PASS
Band12	3	23025	8	#Mid	QPSK	22.05	-5.6	14.30	PASS
Band12	3	23025	8	#Max	QPSK	21.99	-5.6	14.24	PASS
Band12	3	23025	15	#0	QPSK	22.08	-5.6	14.33	PASS
Band12	3	23025	1	#0	16QAM	21.79	-5.6	14.04	PASS
Band12	3	23025	1	#Mid	16QAM	21.67	-5.6	13.92	PASS
Band12	3	23025	1	#Max	16QAM	21.63	-5.6	13.88	PASS
Band12	3	23025	8	#0	16QAM	21.11	-5.6	13.36	PASS
Band12	3	23025	8	#Mid	16QAM	21.10	-5.6	13.35	PASS

Band12	3	23025	8	#Max	16QAM	21.04	-5.6	13.29	PASS
Band12	3	23025	15	#0	16QAM	21.15	-5.6	13.40	PASS
Band12	3	23095	1	#0	QPSK	22.64	-5.6	14.89	PASS
Band12	3	23095	1	#Mid	QPSK	22.63	-5.6	14.88	PASS
Band12	3	23095	1	#Max	QPSK	22.49	-5.6	14.74	PASS
Band12	3	23095	8	#0	QPSK	21.91	-5.6	14.16	PASS
Band12	3	23095	8	#Mid	QPSK	21.94	-5.6	14.19	PASS
Band12	3	23095	8	#Max	QPSK	21.90	-5.6	14.15	PASS
Band12	3	23095	15	#0	QPSK	21.93	-5.6	14.18	PASS
Band12	3	23095	1	#0	16QAM	21.96	-5.6	14.21	PASS
Band12	3	23095	1	#Mid	16QAM	21.94	-5.6	14.19	PASS
Band12	3	23095	1	#Max	16QAM	21.88	-5.6	14.13	PASS
Band12	3	23095	8	#0	16QAM	21.01	-5.6	13.26	PASS
Band12	3	23095	8	#Mid	16QAM	21.03	-5.6	13.28	PASS
Band12	3	23095	8	#Max	16QAM	20.95	-5.6	13.20	PASS
Band12	3	23095	15	#0	16QAM	21.00	-5.6	13.25	PASS
Band12	3	23165	1	#0	QPSK	22.50	-5.6	14.75	PASS
Band12	3	23165	1	#Mid	QPSK	22.56	-5.6	14.81	PASS
Band12	3	23165	1	#Max	QPSK	22.56	-5.6	14.81	PASS
Band12	3	23165	8	#0	QPSK	22.04	-5.6	14.29	PASS
Band12	3	23165	8	#Mid	QPSK	22.08	-5.6	14.33	PASS
Band12	3	23165	8	#Max	QPSK	22.07	-5.6	14.32	PASS
Band12	3	23165	15	#0	QPSK	22.09	-5.6	14.34	PASS
Band12	3	23165	1	#0	16QAM	21.77	-5.6	14.02	PASS
Band12	3	23165	1	#Mid	16QAM	21.87	-5.6	14.12	PASS
Band12	3	23165	1	#Max	16QAM	21.83	-5.6	14.08	PASS
Band12	3	23165	8	#0	16QAM	21.10	-5.6	13.35	PASS
Band12	3	23165	8	#Mid	16QAM	21.11	-5.6	13.36	PASS
Band12	3	23165	8	#Max	16QAM	21.16	-5.6	13.41	PASS
Band12	3	23165	15	#0	16QAM	21.06	-5.6	13.31	PASS
Band12	5	23035	1	#0	QPSK	22.63	-5.6	14.88	PASS
Band12	5	23035	1	#Mid	QPSK	22.54	-5.6	14.79	PASS
Band12	5	23035	1	#Max	QPSK	22.56	-5.6	14.81	PASS
Band12	5	23035	12	#0	QPSK	22.17	-5.6	14.42	PASS
Band12	5	23035	12	#Mid	QPSK	22.07	-5.6	14.32	PASS
Band12	5	23035	12	#Max	QPSK	22.03	-5.6	14.28	PASS
Band12	5	23035	25	#0	QPSK	22.14	-5.6	14.39	PASS
Band12	5	23035	1	#0	16QAM	21.99	-5.6	14.24	PASS
Band12	5	23035	1	#Mid	16QAM	21.95	-5.6	14.20	PASS
Band12	5	23035	1	#Max	16QAM	21.93	-5.6	14.18	PASS
Band12	5	23035	12	#0	16QAM	21.20	-5.6	13.45	PASS
Band12	5	23035	12	#Mid	16QAM	21.10	-5.6	13.35	PASS
Band12	5	23035	12	#Max	16QAM	21.06	-5.6	13.31	PASS
Band12	5	23035	25	#0	16QAM	21.11	-5.6	13.36	PASS
Band12	5	23095	1	#0	QPSK	22.61	-5.6	14.86	PASS
Band12	5	23095	1	#Mid	QPSK	22.68	-5.6	14.93	PASS
Band12	5	23095	1	#Max	QPSK	22.61	-5.6	14.86	PASS
Band12	5	23095	12	#0	QPSK	21.93	-5.6	14.18	PASS
Band12	5	23095	12	#Mid	QPSK	21.98	-5.6	14.23	PASS
Band12	5	23095	12	#Max	QPSK	22.00	-5.6	14.25	PASS
Band12	5	23095	25	#0	QPSK	21.94	-5.6	14.19	PASS
Band12	5	23095	1	#0	16QAM	21.97	-5.6	14.22	PASS
Band12	5	23095	1	#Mid	16QAM	21.98	-5.6	14.23	PASS
Band12	5	23095	1	#Max	16QAM	21.96	-5.6	14.21	PASS
Band12	5	23095	12	#0	16QAM	20.88	-5.6	13.13	PASS
Band12	5	23095	12	#Mid	16QAM	20.96	-5.6	13.21	PASS
Band12	5	23095	12	#Max	16QAM	20.93	-5.6	13.18	PASS

Band12	5	23095	25	#0	16QAM	20.91	-5.6	13.16	PASS
Band12	5	23155	1	#0	QPSK	22.59	-5.6	14.84	PASS
Band12	5	23155	1	#Mid	QPSK	22.71	-5.6	14.96	PASS
Band12	5	23155	1	#Max	QPSK	22.83	-5.6	15.08	PASS
Band12	5	23155	12	#0	QPSK	22.15	-5.6	14.40	PASS
Band12	5	23155	12	#Mid	QPSK	22.09	-5.6	14.34	PASS
Band12	5	23155	12	#Max	QPSK	22.04	-5.6	14.29	PASS
Band12	5	23155	25	#0	QPSK	22.13	-5.6	14.38	PASS
Band12	5	23155	1	#0	16QAM	22.02	-5.6	14.27	PASS
Band12	5	23155	1	#Mid	16QAM	22.13	-5.6	14.38	PASS
Band12	5	23155	1	#Max	16QAM	22.20	-5.6	14.45	PASS
Band12	5	23155	12	#0	16QAM	21.08	-5.6	13.33	PASS
Band12	5	23155	12	#Mid	16QAM	21.03	-5.6	13.28	PASS
Band12	5	23155	12	#Max	16QAM	21.04	-5.6	13.29	PASS
Band12	5	23155	25	#0	16QAM	21.14	-5.6	13.39	PASS
Band12	10	23060	1	#0	QPSK	22.66	-5.6	14.91	PASS
Band12	10	23060	1	#Mid	QPSK	22.56	-5.6	14.81	PASS
Band12	10	23060	1	#Max	QPSK	22.51	-5.6	14.76	PASS
Band12	10	23060	25	#0	QPSK	22.10	-5.6	14.35	PASS
Band12	10	23060	25	#Mid	QPSK	22.03	-5.6	14.28	PASS
Band12	10	23060	25	#Max	QPSK	22.15	-5.6	14.40	PASS
Band12	10	23060	50	#0	QPSK	22.12	-5.6	14.37	PASS
Band12	10	23060	1	#0	16QAM	22.04	-5.6	14.29	PASS
Band12	10	23060	1	#Mid	16QAM	21.94	-5.6	14.19	PASS
Band12	10	23060	1	#Max	16QAM	21.88	-5.6	14.13	PASS
Band12	10	23060	25	#0	16QAM	21.14	-5.6	13.39	PASS
Band12	10	23060	25	#Mid	16QAM	21.03	-5.6	13.28	PASS
Band12	10	23060	25	#Max	16QAM	21.19	-5.6	13.44	PASS
Band12	10	23060	50	#0	16QAM	21.13	-5.6	13.38	PASS
Band12	10	23095	1	#0	QPSK	22.59	-5.6	14.84	PASS
Band12	10	23095	1	#Mid	QPSK	22.46	-5.6	14.71	PASS
Band12	10	23095	1	#Max	QPSK	22.50	-5.6	14.75	PASS
Band12	10	23095	25	#0	QPSK	21.82	-5.6	14.07	PASS
Band12	10	23095	25	#Mid	QPSK	21.93	-5.6	14.18	PASS
Band12	10	23095	25	#Max	QPSK	21.88	-5.6	14.13	PASS
Band12	10	23095	50	#0	QPSK	21.89	-5.6	14.14	PASS
Band12	10	23095	1	#0	16QAM	21.68	-5.6	13.93	PASS
Band12	10	23095	1	#Mid	16QAM	21.68	-5.6	13.93	PASS
Band12	10	23095	1	#Max	16QAM	21.71	-5.6	13.96	PASS
Band12	10	23095	25	#0	16QAM	20.83	-5.6	13.08	PASS
Band12	10	23095	25	#Mid	16QAM	20.98	-5.6	13.23	PASS
Band12	10	23095	25	#Max	16QAM	20.89	-5.6	13.14	PASS
Band12	10	23095	50	#0	16QAM	20.87	-5.6	13.12	PASS
Band12	10	23130	1	#0	QPSK	22.57	-5.6	14.82	PASS
Band12	10	23130	1	#Mid	QPSK	22.59	-5.6	14.84	PASS
Band12	10	23130	1	#Max	QPSK	22.67	-5.6	14.92	PASS
Band12	10	23130	25	#0	QPSK	22.00	-5.6	14.25	PASS
Band12	10	23130	25	#Mid	QPSK	21.95	-5.6	14.20	PASS
Band12	10	23130	25	#Max	QPSK	21.95	-5.6	14.20	PASS
Band12	10	23130	50	#0	QPSK	22.01	-5.6	14.26	PASS
Band12	10	23130	1	#0	16QAM	21.45	-5.6	13.70	PASS
Band12	10	23130	1	#Mid	16QAM	21.43	-5.6	13.68	PASS
Band12	10	23130	1	#Max	16QAM	21.55	-5.6	13.80	PASS
Band12	10	23130	25	#0	16QAM	20.98	-5.6	13.23	PASS
Band12	10	23130	25	#Mid	16QAM	20.97	-5.6	13.22	PASS
Band12	10	23130	25	#Max	16QAM	20.95	-5.6	13.20	PASS
Band12	10	23130	50	#0	16QAM	20.95	-5.6	13.20	PASS

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	Gain (dBm)	ERP (dBm)	Verdict
Band17	5	23755	1	#0	QPSK	22.62	-5.6	14.87	PASS
Band17	5	23755	1	#Mid	QPSK	22.62	-5.6	14.87	PASS
Band17	5	23755	1	#Max	QPSK	22.68	-5.6	14.93	PASS
Band17	5	23755	12	#0	QPSK	21.94	-5.6	14.19	PASS
Band17	5	23755	12	#Mid	QPSK	21.96	-5.6	14.21	PASS
Band17	5	23755	12	#Max	QPSK	21.99	-5.6	14.24	PASS
Band17	5	23755	25	#0	QPSK	21.93	-5.6	14.18	PASS
Band17	5	23755	1	#0	16QAM	21.92	-5.6	14.17	PASS
Band17	5	23755	1	#Mid	16QAM	21.96	-5.6	14.21	PASS
Band17	5	23755	1	#Max	16QAM	21.99	-5.6	14.24	PASS
Band17	5	23755	12	#0	16QAM	20.87	-5.6	13.12	PASS
Band17	5	23755	12	#Mid	16QAM	20.95	-5.6	13.20	PASS
Band17	5	23755	12	#Max	16QAM	20.95	-5.6	13.20	PASS
Band17	5	23755	25	#0	16QAM	20.90	-5.6	13.15	PASS
Band17	5	23790	1	#0	QPSK	22.58	-5.6	14.83	PASS
Band17	5	23790	1	#Mid	QPSK	22.66	-5.6	14.91	PASS
Band17	5	23790	1	#Max	QPSK	22.68	-5.6	14.93	PASS
Band17	5	23790	12	#0	QPSK	21.95	-5.6	14.20	PASS
Band17	5	23790	12	#Mid	QPSK	21.97	-5.6	14.22	PASS
Band17	5	23790	12	#Max	QPSK	21.89	-5.6	14.14	PASS
Band17	5	23790	25	#0	QPSK	21.96	-5.6	14.21	PASS
Band17	5	23790	1	#0	16QAM	22.00	-5.6	14.25	PASS
Band17	5	23790	1	#Mid	16QAM	22.05	-5.6	14.30	PASS
Band17	5	23790	1	#Max	16QAM	22.06	-5.6	14.31	PASS
Band17	5	23790	12	#0	16QAM	20.92	-5.6	13.17	PASS
Band17	5	23790	12	#Mid	16QAM	20.87	-5.6	13.12	PASS
Band17	5	23790	12	#Max	16QAM	20.81	-5.6	13.06	PASS
Band17	5	23790	25	#0	16QAM	20.94	-5.6	13.19	PASS
Band17	5	23825	1	#0	QPSK	22.55	-5.6	14.80	PASS
Band17	5	23825	1	#Mid	QPSK	22.64	-5.6	14.89	PASS
Band17	5	23825	1	#Max	QPSK	22.60	-5.6	14.85	PASS
Band17	5	23825	12	#0	QPSK	22.17	-5.6	14.42	PASS
Band17	5	23825	12	#Mid	QPSK	22.06	-5.6	14.31	PASS
Band17	5	23825	12	#Max	QPSK	22.11	-5.6	14.36	PASS
Band17	5	23825	25	#0	QPSK	22.12	-5.6	14.37	PASS
Band17	5	23825	1	#0	16QAM	21.89	-5.6	14.14	PASS
Band17	5	23825	1	#Mid	16QAM	21.96	-5.6	14.21	PASS
Band17	5	23825	1	#Max	16QAM	21.89	-5.6	14.14	PASS
Band17	5	23825	12	#0	16QAM	21.19	-5.6	13.44	PASS
Band17	5	23825	12	#Mid	16QAM	21.08	-5.6	13.33	PASS
Band17	5	23825	12	#Max	16QAM	21.14	-5.6	13.39	PASS
Band17	5	23825	25	#0	16QAM	21.09	-5.6	13.34	PASS
Band17	10	23780	1	#0	QPSK	22.52	-5.6	14.77	PASS
Band17	10	23780	1	#Mid	QPSK	22.62	-5.6	14.87	PASS
Band17	10	23780	1	#Max	QPSK	22.67	-5.6	14.92	PASS
Band17	10	23780	25	#0	QPSK	21.80	-5.6	14.05	PASS
Band17	10	23780	25	#Mid	QPSK	21.99	-5.6	14.24	PASS
Band17	10	23780	25	#Max	QPSK	21.85	-5.6	14.10	PASS
Band17	10	23780	50	#0	QPSK	21.83	-5.6	14.08	PASS
Band17	10	23780	1	#0	16QAM	21.92	-5.6	14.17	PASS
Band17	10	23780	1	#Mid	16QAM	21.97	-5.6	14.22	PASS
Band17	10	23780	1	#Max	16QAM	22.01	-5.6	14.26	PASS
Band17	10	23780	25	#0	16QAM	20.81	-5.6	13.06	PASS
Band17	10	23780	25	#Mid	16QAM	20.96	-5.6	13.21	PASS

Band17	10	23780	25	#Max	16QAM	20.83	-5.6	13.08	PASS
Band17	10	23780	50	#0	16QAM	20.86	-5.6	13.11	PASS
Band17	10	23790	1	#0	QPSK	22.41	-5.6	14.66	PASS
Band17	10	23790	1	#Mid	QPSK	22.47	-5.6	14.72	PASS
Band17	10	23790	1	#Max	QPSK	22.50	-5.6	14.75	PASS
Band17	10	23790	25	#0	QPSK	21.89	-5.6	14.14	PASS
Band17	10	23790	25	#Mid	QPSK	21.98	-5.6	14.23	PASS
Band17	10	23790	25	#Max	QPSK	21.89	-5.6	14.14	PASS
Band17	10	23790	50	#0	QPSK	21.91	-5.6	14.16	PASS
Band17	10	23790	1	#0	16QAM	21.63	-5.6	13.88	PASS
Band17	10	23790	1	#Mid	16QAM	21.71	-5.6	13.96	PASS
Band17	10	23790	1	#Max	16QAM	21.73	-5.6	13.98	PASS
Band17	10	23790	25	#0	16QAM	20.88	-5.6	13.13	PASS
Band17	10	23790	25	#Mid	16QAM	21.00	-5.6	13.25	PASS
Band17	10	23790	25	#Max	16QAM	20.88	-5.6	13.13	PASS
Band17	10	23790	50	#0	16QAM	20.89	-5.6	13.14	PASS
Band17	10	23800	1	#0	QPSK	22.50	-5.6	14.75	PASS
Band17	10	23800	1	#Mid	QPSK	22.62	-5.6	14.87	PASS
Band17	10	23800	1	#Max	QPSK	22.62	-5.6	14.87	PASS
Band17	10	23800	25	#0	QPSK	21.99	-5.6	14.24	PASS
Band17	10	23800	25	#Mid	QPSK	21.99	-5.6	14.24	PASS
Band17	10	23800	25	#Max	QPSK	21.92	-5.6	14.17	PASS
Band17	10	23800	50	#0	QPSK	21.99	-5.6	14.24	PASS
Band17	10	23800	1	#0	16QAM	21.39	-5.6	13.64	PASS
Band17	10	23800	1	#Mid	16QAM	21.45	-5.6	13.70	PASS
Band17	10	23800	1	#Max	16QAM	21.49	-5.6	13.74	PASS
Band17	10	23800	25	#0	16QAM	20.95	-5.6	13.20	PASS
Band17	10	23800	25	#Mid	16QAM	20.98	-5.6	13.23	PASS
Band17	10	23800	25	#Max	16QAM	20.93	-5.6	13.18	PASS
Band17	10	23800	50	#0	16QAM	20.96	-5.6	13.21	PASS

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	Gain (dBm)	EIRP (dBm)	Verdict
Band66	1.4	131979	1	#0	QPSK	21.02	-2.6	18.42	PASS
Band66	1.4	131979	1	#Mid	QPSK	21.09	-2.6	18.49	PASS
Band66	1.4	131979	1	#Max	QPSK	21.05	-2.6	18.45	PASS
Band66	1.4	131979	3	#0	QPSK	21.52	-2.6	18.92	PASS
Band66	1.4	131979	3	#Mid	QPSK	21.53	-2.6	18.93	PASS
Band66	1.4	131979	3	#Max	QPSK	21.54	-2.6	18.94	PASS
Band66	1.4	131979	6	#0	QPSK	20.55	-2.6	17.95	PASS
Band66	1.4	131979	1	#0	16QAM	19.95	-2.6	17.35	PASS
Band66	1.4	131979	1	#Mid	16QAM	19.96	-2.6	17.36	PASS
Band66	1.4	131979	1	#Max	16QAM	19.95	-2.6	17.35	PASS
Band66	1.4	131979	3	#0	16QAM	20.70	-2.6	18.10	PASS
Band66	1.4	131979	3	#Mid	16QAM	20.71	-2.6	18.11	PASS
Band66	1.4	131979	3	#Max	16QAM	20.72	-2.6	18.12	PASS
Band66	1.4	131979	6	#0	16QAM	19.67	-2.6	17.07	PASS
Band66	1.4	132322	1	#0	QPSK	20.90	-2.6	18.30	PASS
Band66	1.4	132322	1	#Mid	QPSK	20.92	-2.6	18.32	PASS
Band66	1.4	132322	1	#Max	QPSK	20.87	-2.6	18.27	PASS
Band66	1.4	132322	3	#0	QPSK	21.34	-2.6	18.74	PASS
Band66	1.4	132322	3	#Mid	QPSK	21.37	-2.6	18.77	PASS
Band66	1.4	132322	3	#Max	QPSK	21.35	-2.6	18.75	PASS
Band66	1.4	132322	6	#0	QPSK	20.40	-2.6	17.80	PASS
Band66	1.4	132322	1	#0	16QAM	19.81	-2.6	17.21	PASS
Band66	1.4	132322	1	#Mid	16QAM	19.81	-2.6	17.21	PASS
Band66	1.4	132322	1	#Max	16QAM	19.80	-2.6	17.20	PASS
Band66	1.4	132322	3	#0	16QAM	20.52	-2.6	17.92	PASS
Band66	1.4	132322	3	#Mid	16QAM	20.48	-2.6	17.88	PASS
Band66	1.4	132322	3	#Max	16QAM	20.51	-2.6	17.91	PASS
Band66	1.4	132322	6	#0	16QAM	19.49	-2.6	16.89	PASS
Band66	1.4	132665	1	#0	QPSK	20.51	-2.6	17.91	PASS
Band66	1.4	132665	1	#Mid	QPSK	20.54	-2.6	17.94	PASS
Band66	1.4	132665	1	#Max	QPSK	20.46	-2.6	17.86	PASS
Band66	1.4	132665	3	#0	QPSK	20.93	-2.6	18.33	PASS
Band66	1.4	132665	3	#Mid	QPSK	20.93	-2.6	18.33	PASS
Band66	1.4	132665	3	#Max	QPSK	20.94	-2.6	18.34	PASS
Band66	1.4	132665	6	#0	QPSK	19.95	-2.6	17.35	PASS
Band66	1.4	132665	1	#0	16QAM	19.65	-2.6	17.05	PASS
Band66	1.4	132665	1	#Mid	16QAM	19.67	-2.6	17.07	PASS
Band66	1.4	132665	1	#Max	16QAM	19.63	-2.6	17.03	PASS
Band66	1.4	132665	3	#0	16QAM	20.15	-2.6	17.55	PASS
Band66	1.4	132665	3	#Mid	16QAM	20.16	-2.6	17.56	PASS
Band66	1.4	132665	3	#Max	16QAM	20.14	-2.6	17.54	PASS
Band66	1.4	132665	6	#0	16QAM	19.10	-2.6	16.50	PASS
Band66	3	131987	1	#0	QPSK	21.03	-2.6	18.43	PASS
Band66	3	131987	1	#Mid	QPSK	21.06	-2.6	18.46	PASS
Band66	3	131987	1	#Max	QPSK	21.01	-2.6	18.41	PASS
Band66	3	131987	8	#0	QPSK	20.53	-2.6	17.93	PASS
Band66	3	131987	8	#Mid	QPSK	20.51	-2.6	17.91	PASS
Band66	3	131987	8	#Max	QPSK	20.54	-2.6	17.94	PASS
Band66	3	131987	15	#0	QPSK	20.51	-2.6	17.91	PASS
Band66	3	131987	1	#0	16QAM	20.43	-2.6	17.83	PASS
Band66	3	131987	1	#Mid	16QAM	20.53	-2.6	17.93	PASS
Band66	3	131987	1	#Max	16QAM	20.48	-2.6	17.88	PASS
Band66	3	131987	8	#0	16QAM	19.54	-2.6	16.94	PASS
Band66	3	131987	8	#Mid	16QAM	19.54	-2.6	16.94	PASS

Band66	3	131987	8	#Max	16QAM	19.53	-2.6	16.93	PASS
Band66	3	131987	15	#0	16QAM	19.52	-2.6	16.92	PASS
Band66	3	132322	1	#0	QPSK	20.82	-2.6	18.22	PASS
Band66	3	132322	1	#Mid	QPSK	20.85	-2.6	18.25	PASS
Band66	3	132322	1	#Max	QPSK	20.81	-2.6	18.21	PASS
Band66	3	132322	8	#0	QPSK	20.28	-2.6	17.68	PASS
Band66	3	132322	8	#Mid	QPSK	20.28	-2.6	17.68	PASS
Band66	3	132322	8	#Max	QPSK	20.30	-2.6	17.70	PASS
Band66	3	132322	15	#0	QPSK	20.31	-2.6	17.71	PASS
Band66	3	132322	1	#0	16QAM	20.06	-2.6	17.46	PASS
Band66	3	132322	1	#Mid	16QAM	20.11	-2.6	17.51	PASS
Band66	3	132322	1	#Max	16QAM	20.07	-2.6	17.47	PASS
Band66	3	132322	8	#0	16QAM	19.30	-2.6	16.70	PASS
Band66	3	132322	8	#Mid	16QAM	19.35	-2.6	16.75	PASS
Band66	3	132322	8	#Max	16QAM	19.36	-2.6	16.76	PASS
Band66	3	132322	15	#0	16QAM	19.28	-2.6	16.68	PASS
Band66	3	132657	1	#0	QPSK	20.44	-2.6	17.84	PASS
Band66	3	132657	1	#Mid	QPSK	20.49	-2.6	17.89	PASS
Band66	3	132657	1	#Max	QPSK	20.40	-2.6	17.80	PASS
Band66	3	132657	8	#0	QPSK	19.96	-2.6	17.36	PASS
Band66	3	132657	8	#Mid	QPSK	19.92	-2.6	17.32	PASS
Band66	3	132657	8	#Max	QPSK	19.93	-2.6	17.33	PASS
Band66	3	132657	15	#0	QPSK	19.96	-2.6	17.36	PASS
Band66	3	132657	1	#0	16QAM	19.39	-2.6	16.79	PASS
Band66	3	132657	1	#Mid	16QAM	19.44	-2.6	16.84	PASS
Band66	3	132657	1	#Max	16QAM	19.33	-2.6	16.73	PASS
Band66	3	132657	8	#0	16QAM	18.97	-2.6	16.37	PASS
Band66	3	132657	8	#Mid	16QAM	18.92	-2.6	16.32	PASS
Band66	3	132657	8	#Max	16QAM	18.91	-2.6	16.31	PASS
Band66	3	132657	15	#0	16QAM	18.99	-2.6	16.39	PASS
Band66	5	131997	1	#0	QPSK	21.12	-2.6	18.52	PASS
Band66	5	131997	1	#Mid	QPSK	21.14	-2.6	18.54	PASS
Band66	5	131997	1	#Max	QPSK	21.17	-2.6	18.57	PASS
Band66	5	131997	12	#0	QPSK	20.60	-2.6	18.00	PASS
Band66	5	131997	12	#Mid	QPSK	20.52	-2.6	17.92	PASS
Band66	5	131997	12	#Max	QPSK	20.54	-2.6	17.94	PASS
Band66	5	131997	25	#0	QPSK	20.55	-2.6	17.95	PASS
Band66	5	131997	1	#0	16QAM	20.59	-2.6	17.99	PASS
Band66	5	131997	1	#Mid	16QAM	20.60	-2.6	18.00	PASS
Band66	5	131997	1	#Max	16QAM	20.62	-2.6	18.02	PASS
Band66	5	131997	12	#0	16QAM	19.58	-2.6	16.98	PASS
Band66	5	131997	12	#Mid	16QAM	19.52	-2.6	16.92	PASS
Band66	5	131997	12	#Max	16QAM	19.46	-2.6	16.86	PASS
Band66	5	131997	25	#0	16QAM	19.51	-2.6	16.91	PASS
Band66	5	132322	1	#0	QPSK	20.98	-2.6	18.38	PASS
Band66	5	132322	1	#Mid	QPSK	20.97	-2.6	18.37	PASS
Band66	5	132322	1	#Max	QPSK	21.05	-2.6	18.45	PASS
Band66	5	132322	12	#0	QPSK	20.31	-2.6	17.71	PASS
Band66	5	132322	12	#Mid	QPSK	20.31	-2.6	17.71	PASS
Band66	5	132322	12	#Max	QPSK	20.33	-2.6	17.73	PASS
Band66	5	132322	25	#0	QPSK	20.34	-2.6	17.74	PASS
Band66	5	132322	1	#0	16QAM	20.34	-2.6	17.74	PASS
Band66	5	132322	1	#Mid	16QAM	20.35	-2.6	17.75	PASS
Band66	5	132322	1	#Max	16QAM	20.38	-2.6	17.78	PASS
Band66	5	132322	12	#0	16QAM	19.25	-2.6	16.65	PASS
Band66	5	132322	12	#Mid	16QAM	19.28	-2.6	16.68	PASS
Band66	5	132322	12	#Max	16QAM	19.29	-2.6	16.69	PASS

Band66	5	132322	25	#0	16QAM	19.36	-2.6	16.76	PASS
Band66	5	132647	1	#0	QPSK	20.46	-2.6	17.86	PASS
Band66	5	132647	1	#Mid	QPSK	20.50	-2.6	17.90	PASS
Band66	5	132647	1	#Max	QPSK	20.47	-2.6	17.87	PASS
Band66	5	132647	12	#0	QPSK	20.04	-2.6	17.44	PASS
Band66	5	132647	12	#Mid	QPSK	19.99	-2.6	17.39	PASS
Band66	5	132647	12	#Max	QPSK	19.90	-2.6	17.30	PASS
Band66	5	132647	25	#0	QPSK	20.01	-2.6	17.41	PASS
Band66	5	132647	1	#0	16QAM	19.84	-2.6	17.24	PASS
Band66	5	132647	1	#Mid	16QAM	19.85	-2.6	17.25	PASS
Band66	5	132647	1	#Max	16QAM	19.83	-2.6	17.23	PASS
Band66	5	132647	12	#0	16QAM	19.03	-2.6	16.43	PASS
Band66	5	132647	12	#Mid	16QAM	18.98	-2.6	16.38	PASS
Band66	5	132647	12	#Max	16QAM	18.95	-2.6	16.35	PASS
Band66	5	132647	25	#0	16QAM	18.96	-2.6	16.36	PASS
Band66	10	132022	1	#0	QPSK	21.04	-2.6	18.44	PASS
Band66	10	132022	1	#Mid	QPSK	21.12	-2.6	18.52	PASS
Band66	10	132022	1	#Max	QPSK	21.06	-2.6	18.46	PASS
Band66	10	132022	25	#0	QPSK	20.63	-2.6	18.03	PASS
Band66	10	132022	25	#Mid	QPSK	20.55	-2.6	17.95	PASS
Band66	10	132022	25	#Max	QPSK	20.48	-2.6	17.88	PASS
Band66	10	132022	50	#0	QPSK	20.56	-2.6	17.96	PASS
Band66	10	132022	1	#0	16QAM	20.46	-2.6	17.86	PASS
Band66	10	132022	1	#Mid	16QAM	20.51	-2.6	17.91	PASS
Band66	10	132022	1	#Max	16QAM	20.41	-2.6	17.81	PASS
Band66	10	132022	25	#0	16QAM	19.63	-2.6	17.03	PASS
Band66	10	132022	25	#Mid	16QAM	19.54	-2.6	16.94	PASS
Band66	10	132022	25	#Max	16QAM	19.47	-2.6	16.87	PASS
Band66	10	132022	50	#0	16QAM	19.57	-2.6	16.97	PASS
Band66	10	132322	1	#0	QPSK	20.78	-2.6	18.18	PASS
Band66	10	132322	1	#Mid	QPSK	20.87	-2.6	18.27	PASS
Band66	10	132322	1	#Max	QPSK	20.87	-2.6	18.27	PASS
Band66	10	132322	25	#0	QPSK	20.24	-2.6	17.64	PASS
Band66	10	132322	25	#Mid	QPSK	20.35	-2.6	17.75	PASS
Band66	10	132322	25	#Max	QPSK	20.43	-2.6	17.83	PASS
Band66	10	132322	50	#0	QPSK	20.37	-2.6	17.77	PASS
Band66	10	132322	1	#0	16QAM	19.97	-2.6	17.37	PASS
Band66	10	132322	1	#Mid	16QAM	20.09	-2.6	17.49	PASS
Band66	10	132322	1	#Max	16QAM	20.10	-2.6	17.50	PASS
Band66	10	132322	25	#0	16QAM	19.27	-2.6	16.67	PASS
Band66	10	132322	25	#Mid	16QAM	19.38	-2.6	16.78	PASS
Band66	10	132322	25	#Max	16QAM	19.47	-2.6	16.87	PASS
Band66	10	132322	50	#0	16QAM	19.37	-2.6	16.77	PASS
Band66	10	132622	1	#0	QPSK	20.61	-2.6	18.01	PASS
Band66	10	132622	1	#Mid	QPSK	20.61	-2.6	18.01	PASS
Band66	10	132622	1	#Max	QPSK	20.50	-2.6	17.90	PASS
Band66	10	132622	25	#0	QPSK	20.08	-2.6	17.48	PASS
Band66	10	132622	25	#Mid	QPSK	19.99	-2.6	17.39	PASS
Band66	10	132622	25	#Max	QPSK	19.96	-2.6	17.36	PASS
Band66	10	132622	50	#0	QPSK	19.99	-2.6	17.39	PASS
Band66	10	132622	1	#0	16QAM	19.47	-2.6	16.87	PASS
Band66	10	132622	1	#Mid	16QAM	19.45	-2.6	16.85	PASS
Band66	10	132622	1	#Max	16QAM	19.35	-2.6	16.75	PASS
Band66	10	132622	25	#0	16QAM	19.14	-2.6	16.54	PASS
Band66	10	132622	25	#Mid	16QAM	19.02	-2.6	16.42	PASS
Band66	10	132622	25	#Max	16QAM	18.94	-2.6	16.34	PASS
Band66	10	132622	50	#0	16QAM	18.98	-2.6	16.38	PASS

Band66	15	132047	1	#0	QPSK	20.97	-2.6	18.37	PASS
Band66	15	132047	1	#Mid	QPSK	21.05	-2.6	18.45	PASS
Band66	15	132047	1	#Max	QPSK	20.88	-2.6	18.28	PASS
Band66	15	132047	36	#0	QPSK	20.55	-2.6	17.95	PASS
Band66	15	132047	36	#Mid	QPSK	20.47	-2.6	17.87	PASS
Band66	15	132047	36	#Max	QPSK	20.36	-2.6	17.76	PASS
Band66	15	132047	75	#0	QPSK	20.49	-2.6	17.89	PASS
Band66	15	132047	1	#0	16QAM	20.41	-2.6	17.81	PASS
Band66	15	132047	1	#Mid	16QAM	20.45	-2.6	17.85	PASS
Band66	15	132047	1	#Max	16QAM	20.30	-2.6	17.70	PASS
Band66	15	132047	36	#0	16QAM	19.61	-2.6	17.01	PASS
Band66	15	132047	36	#Mid	16QAM	19.52	-2.6	16.92	PASS
Band66	15	132047	36	#Max	16QAM	19.43	-2.6	16.83	PASS
Band66	15	132047	75	#0	16QAM	19.49	-2.6	16.89	PASS
Band66	15	132322	1	#0	QPSK	20.75	-2.6	18.15	PASS
Band66	15	132322	1	#Mid	QPSK	20.81	-2.6	18.21	PASS
Band66	15	132322	1	#Max	QPSK	20.77	-2.6	18.17	PASS
Band66	15	132322	36	#0	QPSK	20.22	-2.6	17.62	PASS
Band66	15	132322	36	#Mid	QPSK	20.33	-2.6	17.73	PASS
Band66	15	132322	36	#Max	QPSK	20.39	-2.6	17.79	PASS
Band66	15	132322	75	#0	QPSK	20.32	-2.6	17.72	PASS
Band66	15	132322	1	#0	16QAM	19.96	-2.6	17.36	PASS
Band66	15	132322	1	#Mid	16QAM	20.05	-2.6	17.45	PASS
Band66	15	132322	1	#Max	16QAM	20.01	-2.6	17.41	PASS
Band66	15	132322	36	#0	16QAM	19.27	-2.6	16.67	PASS
Band66	15	132322	36	#Mid	16QAM	19.39	-2.6	16.79	PASS
Band66	15	132322	36	#Max	16QAM	19.48	-2.6	16.88	PASS
Band66	15	132322	75	#0	16QAM	19.26	-2.6	16.66	PASS
Band66	15	132597	1	#0	QPSK	20.68	-2.6	18.08	PASS
Band66	15	132597	1	#Mid	QPSK	20.61	-2.6	18.01	PASS
Band66	15	132597	1	#Max	QPSK	20.44	-2.6	17.84	PASS
Band66	15	132597	36	#0	QPSK	20.10	-2.6	17.50	PASS
Band66	15	132597	36	#Mid	QPSK	20.05	-2.6	17.45	PASS
Band66	15	132597	36	#Max	QPSK	19.96	-2.6	17.36	PASS
Band66	15	132597	75	#0	QPSK	20.01	-2.6	17.41	PASS
Band66	15	132597	1	#0	16QAM	19.74	-2.6	17.14	PASS
Band66	15	132597	1	#Mid	16QAM	19.74	-2.6	17.14	PASS
Band66	15	132597	1	#Max	16QAM	19.52	-2.6	16.92	PASS
Band66	15	132597	36	#0	16QAM	19.09	-2.6	16.49	PASS
Band66	15	132597	36	#Mid	16QAM	18.98	-2.6	16.38	PASS
Band66	15	132597	36	#Max	16QAM	18.91	-2.6	16.31	PASS
Band66	15	132597	75	#0	16QAM	19.06	-2.6	16.46	PASS
Band66	20	132072	1	#0	QPSK	20.98	-2.6	18.38	PASS
Band66	20	132072	1	#Mid	QPSK	21.05	-2.6	18.45	PASS
Band66	20	132072	1	#Max	QPSK	20.81	-2.6	18.21	PASS
Band66	20	132072	50	#0	QPSK	20.71	-2.6	18.11	PASS
Band66	20	132072	50	#Mid	QPSK	20.52	-2.6	17.92	PASS
Band66	20	132072	50	#Max	QPSK	20.37	-2.6	17.77	PASS
Band66	20	132072	100	#0	QPSK	20.56	-2.6	17.96	PASS
Band66	20	132072	1	#0	16QAM	20.33	-2.6	17.73	PASS
Band66	20	132072	1	#Mid	16QAM	20.43	-2.6	17.83	PASS
Band66	20	132072	1	#Max	16QAM	20.18	-2.6	17.58	PASS
Band66	20	132072	50	#0	16QAM	19.72	-2.6	17.12	PASS
Band66	20	132072	50	#Mid	16QAM	19.53	-2.6	16.93	PASS
Band66	20	132072	50	#Max	16QAM	19.38	-2.6	16.78	PASS
Band66	20	132072	100	#0	16QAM	19.53	-2.6	16.93	PASS
Band66	20	132322	1	#0	QPSK	20.70	-2.6	18.10	PASS

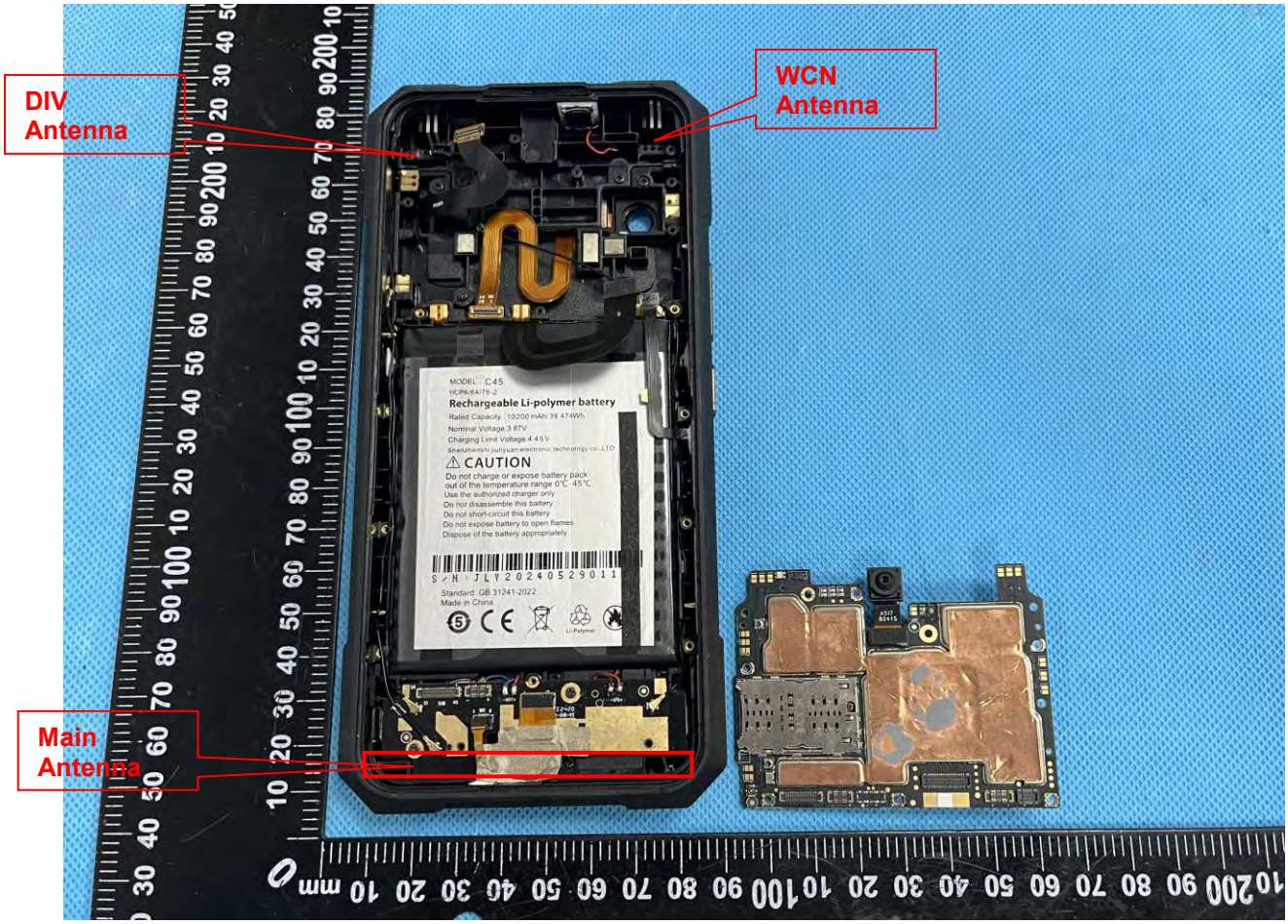
Band66	20	132322	1	#Mid	QPSK	20.91	-2.6	18.31	PASS
Band66	20	132322	1	#Max	QPSK	20.83	-2.6	18.23	PASS
Band66	20	132322	50	#0	QPSK	20.15	-2.6	17.55	PASS
Band66	20	132322	50	#Mid	QPSK	20.37	-2.6	17.77	PASS
Band66	20	132322	50	#Max	QPSK	20.49	-2.6	17.89	PASS
Band66	20	132322	100	#0	QPSK	20.29	-2.6	17.69	PASS
Band66	20	132322	1	#0	16QAM	19.91	-2.6	17.31	PASS
Band66	20	132322	1	#Mid	16QAM	20.10	-2.6	17.50	PASS
Band66	20	132322	1	#Max	16QAM	20.06	-2.6	17.46	PASS
Band66	20	132322	50	#0	16QAM	19.10	-2.6	16.50	PASS
Band66	20	132322	50	#Mid	16QAM	19.30	-2.6	16.70	PASS
Band66	20	132322	50	#Max	16QAM	19.44	-2.6	16.84	PASS
Band66	20	132322	100	#0	16QAM	19.31	-2.6	16.71	PASS
Band66	20	132572	1	#0	QPSK	20.61	-2.6	18.01	PASS
Band66	20	132572	1	#Mid	QPSK	20.58	-2.6	17.98	PASS
Band66	20	132572	1	#Max	QPSK	20.35	-2.6	17.75	PASS
Band66	20	132572	50	#0	QPSK	20.27	-2.6	17.67	PASS
Band66	20	132572	50	#Mid	QPSK	20.11	-2.6	17.51	PASS
Band66	20	132572	50	#Max	QPSK	19.91	-2.6	17.31	PASS
Band66	20	132572	100	#0	QPSK	20.05	-2.6	17.45	PASS
Band66	20	132572	1	#0	16QAM	19.97	-2.6	17.37	PASS
Band66	20	132572	1	#Mid	16QAM	19.84	-2.6	17.24	PASS
Band66	20	132572	1	#Max	16QAM	19.60	-2.6	17.00	PASS
Band66	20	132572	50	#0	16QAM	19.28	-2.6	16.68	PASS
Band66	20	132572	50	#Mid	16QAM	19.12	-2.6	16.52	PASS
Band66	20	132572	50	#Max	16QAM	18.89	-2.6	16.29	PASS
Band66	20	132572	100	#0	16QAM	19.06	-2.6	16.46	PASS

NFC								
Modulation	Frequency (MHz)	Output Power (dBuV/m)	Output Power (dBm)	Max. Tune up Power (dBm)	Max. Tune up Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
ASK	13.56	51.96	-47.394	-47.00	0.00002	5	0.00001	3.0

Note:
Below 1GHz: dBm=dBuV/m-95.2-4.7
Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
According to the calculation results in the table above, NFC SAR does not need to be tested.

14.2 Transmit Antennas and SAR Measurement Position

EUT Antenna Location:



Antennas	Support Band
Main	GSM 850/1900 + WCDMA Band 2/4/5 + LTE Band 2/4/5/7/12/17/66 TX
DIV	GSM 850/1900 + WCDMA Band 2/4/5 + LTE Band 2/4/5/7/12/17/66 RX
WCN	Bluetooth + WIFI

Distance of The Antenna to the EUT surface and edge (mm)						
Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
Main	<25	<25	145	<25	<25	<25
WCN	<25	<25	<25	150	58	<25

Positions for SAR tests; Hotspot mode						
Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
Main	Yes	Yes	No	Yes	Yes	Yes
WCN	Yes	Yes	Yes	No	No	Yes

14.3 Measured and Reported (Scaled) SAR Results

The calculated SAR is obtained by the following formula:
1. Reported SAR for WWAN=Measured SAR * Tune-up Scaling factor
2. Reported SAR for WLAN and Bluetooth=Measured SAR * Tune-up Scaling factor * Duty Cycle Scaling factor
3. Duty Cycle Scaling factor=1/ Duty Cycle (%)

KDB 447498 D01 General RF Exposure Guidance:
Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 648474 D04 Handset SAR v01r03:
1. When the *reported* SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest *reported* SAR configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.
2. when the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, using the same wireless mode test configuration for voice and data, such as UMTS, LTE and Wi-Fi, and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface)
3. For Smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

KDB 941225 D01 3G SAR Procedures:
When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤1/4dB higher than the primary mode (RMC12.2kbps) or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

KDB 941225 D05 SAR for LTE Devices:
1. Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% 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.
2. When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
3. Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
4. SAR measurement is not required for the 16QAM and 64QAM. When the highest maximum output power for 16QAM and 64QAM is ≤ ½ dB higher than the QPSK or when the reported SAR for the QPSK configuration is ≤ 1.45 W/kg.
5. Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

WIFI 2.4G									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	b	Left Cheek	2462	12.49	12.5	1.002	0.177	0.177	
		Left Tilt	2462	12.49	12.5	1.002	0.101	0.101	
		Right Cheek	2462	12.49	12.5	1.002	0.142	0.142	
		Right Tilt	2462	12.49	12.5	1.002	0.150	0.150	
Body (10mm)	b	Front Face	2462	12.49	12.5	1.002	0.180	**0.180**	1
		Back Face	2462	12.49	12.5	1.002	0.175	0.175	
Hotspot (10mm)	b	Right Side	2462	12.49	12.5	1.002	0.123	0.123	
		Top Side	2462	12.49	12.5	1.002	0.161	0.161	

WIFI 5.1G									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	a	Left Cheek	5200	10.92	11.0	1.019	0.405	0.413	
		Left Tilt	5200	10.92	11.0	1.019	1.021	**1.040**	2
		Right Cheek	5200	10.92	11.0	1.019	0.591	0.602	
		Right Tilt	5200	10.92	11.0	1.019	0.351	0.358	
		Left Tilt	5180	10.66	11.0	1.081	0.889	0.961	
		Left Tilt	5240	10.68	11.0	1.076	0.749	0.806	
Body (10mm)	a	Front Face	5200	10.92	11.0	1.019	0.335	0.341	
		Back Face	5200	10.92	11.0	1.019	0.217	0.221	
Hotspot (10mm)	a	Right Side	5200	10.92	11.0	1.019	0.387	0.394	
		Top Side	5200	10.92	11.0	1.019	0.654	0.666	

WIFI 5.8G									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	a	Left Cheek	5745	10.12	10.5	1.091	0.609	0.665	
		Left Tilt	5745	10.12	10.5	1.091	0.425	0.464	
		Right Cheek	5745	10.12	10.5	1.091	0.787	**0.859**	3
		Right Tilt	5745	10.12	10.5	1.091	0.436	0.476	
Body (10mm)	a	Front Face	5745	10.12	10.5	1.091	0.586	0.640	
		Back Face	5745	10.12	10.5	1.091	0.478	0.522	
Hotspot (10mm)	a	Right Side	5745	10.12	10.5	1.091	0.397	0.433	
		Top Side	5745	10.12	10.5	1.091	0.491	0.536	

Remark:
1. The value with the bold is the maximum SAR Value of each test band.
2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels SAR tests are not necessary.

GSM 850									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	GSM	Left Cheek	824.2	32.79	33.0	1.050	0.104	0.109	
		Left Tilt	824.2	32.79	33.0	1.050	0.177	0.186	
		Right Cheek	824.2	32.79	33.0	1.050	0.106	0.111	
		Right Tilt	824.2	32.79	33.0	1.050	0.135	0.142	
Body (10mm)	GSM	Front Face	824.2	32.79	33.0	1.050	0.255	0.268	
		Back Face	824.2	32.79	33.0	1.050	0.586	0.615	
	GPRS Slot-4	Front Face	836.6	28.87	29.0	1.030	0.443	0.456	
		Back Face	836.6	28.87	29.0	1.030	0.697	**0.718**	4
Hotspot (10mm)	GPRS Slot-4	Left Side	836.6	28.87	29.0	1.030	0.151	0.156	
		Right Side	836.6	28.87	29.0	1.030	0.432	0.445	
		Bottom Side	836.6	28.87	29.0	1.030	0.473	0.487	

GSM 1900									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	GSM	Left Cheek	1880	29.80	30.0	1.047	0.129	0.135	
		Left Tilt	1880	29.80	30.0	1.047	0.116	0.121	
		Right Cheek	1880	29.80	30.0	1.047	0.081	0.085	
		Right Tilt	1880	29.80	30.0	1.047	0.098	0.103	
Body (10mm)	GSM	Front Face	1880	29.80	30.0	1.047	0.244	0.255	
		Back Face	1880	29.80	30.0	1.047	0.285	0.298	
	GPRS Slot-4	Front Face	1880	26.26	26.5	1.057	0.549	0.580	
		Back Face	1880	26.26	26.5	1.057	0.535	0.565	
Hotspot (10mm)	GPRS Slot-4	Left Side	1880	26.26	26.5	1.057	0.577	**0.610**	5
		Right Side	1880	26.26	26.5	1.057	0.178	0.188	
		Bottom Side	1880	26.26	26.5	1.057	0.560	0.592	

Remark:
1. The value with the bold is the maximum SAR Value of each test band.
2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels SAR tests are not necessary.

WCDMA Band II									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	RMC	Left Cheek	1907.6	20.50	21.0	1.122	0.120	0.135	
		Left Tilt	1907.6	20.50	21.0	1.122	0.123	0.138	
		Right Cheek	1907.6	20.50	21.0	1.122	0.143	0.160	
		Right Tilt	1907.6	20.50	21.0	1.122	0.121	0.136	
Body (10mm)	RMC	Front Face	1907.6	20.50	21.0	1.122	0.247	0.277	
		Back Face	1907.6	20.50	21.0	1.122	0.710	**0.797**	6
Hotspot (10mm)	RMC	Left Side	1907.6	20.50	21.0	1.122	0.206	0.231	
		Right Side	1907.6	20.50	21.0	1.122	0.137	0.154	
		Bottom Side	1907.6	20.50	21.0	1.122	0.478	0.536	

WCDMA Band IV									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	RMC	Left Cheek	1712.4	21.46	21.5	1.009	0.085	0.086	
		Left Tilt	1712.4	21.46	21.5	1.009	0.153	0.154	
		Right Cheek	1712.4	21.46	21.5	1.009	0.146	0.147	
		Right Tilt	1712.4	21.46	21.5	1.009	0.093	0.094	
Body (10mm)	RMC	Front Face	1712.4	21.46	21.5	1.009	0.100	0.101	
		Back Face	1712.4	21.46	21.5	1.009	0.656	**0.662**	7
Hotspot (10mm)	RMC	Left Side	1712.4	21.46	21.5	1.009	0.099	0.100	
		Right Side	1712.4	21.46	21.5	1.009	0.037	0.037	
		Bottom Side	1712.4	21.46	21.5	1.009	0.250	0.252	

WCDMA Band IV									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	RMC	Left Cheek	826.4	23.05	23.5	1.109	0.265	0.294	
		Left Tilt	826.4	23.05	23.5	1.109	0.161	0.179	
		Right Cheek	826.4	23.05	23.5	1.109	0.121	0.134	
		Right Tilt	826.4	23.05	23.5	1.109	0.103	0.114	
Body (10mm)	RMC	Front Face	826.4	23.05	23.5	1.109	0.155	0.172	
		Back Face	826.4	23.05	23.5	1.109	0.715	**0.793**	8
Hotspot (10mm)	RMC	Left Side	826.4	23.05	23.5	1.109	0.185	0.205	
		Right Side	826.4	23.05	23.5	1.109	0.385	0.427	
		Bottom Side	826.4	23.05	23.5	1.109	0.703	0.780	

Remark:
1. The value with the bold is the maximum SAR Value of each test band.
2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channel SAR tests are not necessary.

LTE Band 2 (20MHz Bandwidth)									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	1RB	Left Cheek	1900	20.36	20.5	1.033	0.096	0.099	
		Left Tilt	1900	20.36	20.5	1.033	0.125	0.129	
		Right Cheek	1900	20.36	20.5	1.033	0.116	0.120	
		Right Tilt	1900	20.36	20.5	1.033	0.231	0.239	
	50%RB	Left Cheek	1900	19.82	20.0	1.042	0.133	0.139	
		Left Tilt	1900	19.82	20.0	1.042	0.122	0.127	
		Right Cheek	1900	19.82	20.0	1.042	0.105	0.109	
		Right Tilt	1900	19.82	20.0	1.042	0.176	0.183	
Body (10mm)	1RB	Front Face	1900	20.36	20.5	1.033	0.219	0.226	
		Back Face	1900	20.36	20.5	1.033	0.424	0.438	
	50%RB	Front Face	1900	19.82	20.0	1.042	0.207	0.216	
		Back Face	1900	19.82	20.0	1.042	0.339	0.353	
Hotspot (10mm)	1RB	Left Side	1900	20.36	20.5	1.033	0.493	**0.509**	9
		Right Side	1900	20.36	20.5	1.033	0.114	0.118	
		Bottom Side	1900	20.36	20.5	1.033	0.467	0.482	
	50%RB	Left Side	1900	19.82	20.0	1.042	0.304	0.317	
		Right Side	1900	19.82	20.0	1.042	0.083	0.087	
		Bottom Side	1900	19.82	20.0	1.042	0.440	0.459	

LTE Band 4 (20MHz Bandwidth)									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	1RB	Left Cheek	1720	20.97	21.0	1.007	0.126	0.127	
		Left Tilt	1720	20.97	21.0	1.007	0.105	0.106	
		Right Cheek	1720	20.97	21.0	1.007	0.094	0.095	
		Right Tilt	1720	20.97	21.0	1.007	0.107	0.108	
	50%RB	Left Cheek	1720	20.63	21.0	1.089	0.099	0.108	
		Left Tilt	1720	20.63	21.0	1.089	0.115	0.125	
		Right Cheek	1720	20.63	21.0	1.089	0.088	0.096	
		Right Tilt	1720	20.63	21.0	1.089	0.109	0.119	
Body (10mm)	1RB	Front Face	1720	20.97	21.0	1.007	0.126	0.127	
		Back Face	1720	20.97	21.0	1.007	0.282	0.284	
	50%RB	Front Face	1720	20.63	21.0	1.089	0.092	0.100	
		Back Face	1720	20.63	21.0	1.089	0.208	0.226	
Hotspot (10mm)	1RB	Left Side	1720	20.97	21.0	1.007	0.130	0.131	
		Right Side	1720	20.97	21.0	1.007	0.088	0.089	
		Bottom Side	1720	20.97	21.0	1.007	0.296	0.298	
	50%RB	Left Side	1720	20.63	21.0	1.089	0.112	0.122	
		Right Side	1720	20.63	21.0	1.089	0.067	0.073	
		Bottom Side	1720	20.63	21.0	1.089	0.279	**0.304**	10

LTE Band 5 (10MHz Bandwidth)									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	1RB	Left Cheek	829	23.02	23.5	1.117	0.197	0.220	
		Left Tilt	829	23.02	23.5	1.117	0.141	0.157	
		Right Cheek	829	23.02	23.5	1.117	0.106	0.118	
		Right Tilt	829	23.02	23.5	1.117	0.134	0.150	
	50%RB	Left Cheek	844	22.00	22.5	1.122	0.103	0.116	
		Left Tilt	844	22.00	22.5	1.122	0.125	0.140	
		Right Cheek	844	22.00	22.5	1.122	0.166	0.186	
		Right Tilt	844	22.00	22.5	1.122	0.111	0.125	
Body (10mm)	1RB	Front Face	829	23.02	23.5	1.117	0.346	0.386	
		Back Face	829	23.02	23.5	1.117	0.772	**0.862**	11
	50%RB	Front Face	844	22.00	22.5	1.122	0.193	0.217	
		Back Face	844	22.00	22.5	1.122	0.593	0.665	
Hotspot (10mm)	1RB	Left Side	829	23.02	23.5	1.117	0.150	0.168	
		Right Side	829	23.02	23.5	1.117	0.437	0.488	
		Bottom Side	829	23.02	23.5	1.117	0.409	0.457	
	50%RB	Left Side	844	22.00	22.5	1.122	0.145	0.163	
		Right Side	844	22.00	22.5	1.122	0.368	0.413	
		Bottom Side	844	22.00	22.5	1.122	0.222	0.249	

LTE Band 7 (20MHz Bandwidth)									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	1RB	Left Cheek	2510	20.71	21.0	1.069	0.121	0.129	
		Left Tilt	2510	20.71	21.0	1.069	0.172	0.184	
		Right Cheek	2510	20.71	21.0	1.069	0.138	0.148	
		Right Tilt	2510	20.71	21.0	1.069	0.203	0.217	
	50%RB	Left Cheek	2510	20.21	20.5	1.069	0.181	0.193	
		Left Tilt	2510	20.21	20.5	1.069	0.180	0.192	
		Right Cheek	2510	20.21	20.5	1.069	0.205	0.219	
		Right Tilt	2510	20.21	20.5	1.069	0.183	0.196	
Body (10mm)	1RB	Front Face	2510	20.71	21.0	1.069	0.293	0.313	
		Back Face	2510	20.71	21.0	1.069	0.545	0.583	
	50%RB	Front Face	2510	20.21	20.5	1.069	0.267	0.285	
		Back Face	2510	20.21	20.5	1.069	0.308	0.329	
Hotspot (10mm)	1RB	Left Side	2510	20.71	21.0	1.069	0.751	**0.803**	12
		Right Side	2510	20.71	21.0	1.069	0.530	0.567	
		Bottom Side	2510	20.71	21.0	1.069	0.550	0.588	
	50%RB	Left Side	2510	20.21	20.5	1.069	0.571	0.610	
		Right Side	2510	20.21	20.5	1.069	0.288	0.308	
		Bottom Side	2510	20.21	20.5	1.069	0.483	0.516	

LTE Band 12 (10MHz Bandwidth)									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	1RB	Left Cheek	711	22.67	23.0	1.079	0.221	0.238	
		Left Tilt	711	22.67	23.0	1.079	0.135	0.624	
		Right Cheek	711	22.67	23.0	1.079	0.119	0.166	
		Right Tilt	711	22.67	23.0	1.079	0.115	0.242	
	50%RB	Left Cheek	704	22.15	22.5	1.084	0.147	0.159	
		Left Tilt	704	22.15	22.5	1.084	0.106	0.115	
		Right Cheek	704	22.15	22.5	1.084	0.120	0.130	
		Right Tilt	704	22.15	22.5	1.084	0.098	0.106	
Body (10mm)	1RB	Front Face	711	22.67	23.0	1.079	0.241	0.260	
		Back Face	711	22.67	23.0	1.079	0.578	**0.624**	13
	50%RB	Front Face	704	22.15	22.5	1.084	0.215	0.233	
		Back Face	704	22.15	22.5	1.084	0.504	0.546	
Hotspot (10mm)	1RB	Left Side	711	22.67	23.0	1.079	0.154	0.166	
		Right Side	711	22.67	23.0	1.079	0.224	0.242	
		Bottom Side	711	22.67	23.0	1.079	0.219	0.236	
	50%RB	Left Side	704	22.15	22.5	1.084	0.137	0.148	
		Right Side	704	22.15	22.5	1.084	0.137	0.148	
		Bottom Side	704	22.15	22.5	1.084	0.194	0.210	

LTE Band 17 (10MHz Bandwidth)									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	1RB	Left Cheek	709	22.67	23.0	1.079	0.127	0.137	
		Left Tilt	709	22.67	23.0	1.079	0.153	0.165	
		Right Cheek	709	22.67	23.0	1.079	0.105	0.113	
		Right Tilt	709	22.67	23.0	1.079	0.129	0.139	
	50%RB	Left Cheek	709	21.99	22.0	1.002	0.081	0.081	
		Left Tilt	709	21.99	22.0	1.002	0.129	0.129	
		Right Cheek	709	21.99	22.0	1.002	0.157	0.157	
		Right Tilt	709	21.99	22.0	1.002	0.127	0.127	
Body (10mm)	1RB	Front Face	709	22.67	23.0	1.079	0.261	0.282	
		Back Face	709	22.67	23.0	1.079	0.285	**0.307**	14
	50%RB	Front Face	709	21.99	22.0	1.002	0.250	0.251	
		Back Face	709	21.99	22.0	1.002	0.279	0.280	
Hotspot (10mm)	1RB	Left Side	709	22.67	23.0	1.079	0.176	0.190	
		Right Side	709	22.67	23.0	1.079	0.249	0.269	
		Bottom Side	709	22.67	23.0	1.079	0.219	0.236	
	50%RB	Left Side	709	21.99	22.0	1.002	0.167	0.167	
		Right Side	709	21.99	22.0	1.002	0.223	0.224	
		Bottom Side	709	21.99	22.0	1.002	0.161	0.161	

LTE Band 66 (20MHz Bandwidth)									
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)			SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Scaling Factor	Meas.	Scaled	
Head (0mm)	1RB	Left Cheek	1720	21.05	21.5	1.109	0.123	0.136	
		Left Tilt	1720	21.05	21.5	1.109	0.104	0.115	
		Right Cheek	1720	21.05	21.5	1.109	0.121	0.134	
		Right Tilt	1720	21.05	21.5	1.109	0.180	0.200	
	50%RB	Left Cheek	1720	20.71	21.0	1.069	0.113	0.121	
		Left Tilt	1720	20.71	21.0	1.069	0.117	0.125	
		Right Cheek	1720	20.71	21.0	1.069	0.081	0.087	
		Right Tilt	1720	20.71	21.0	1.069	0.147	0.157	
Body (10mm)	1RB	Front Face	1720	21.05	21.5	1.109	0.144	0.160	
		Back Face	1720	21.05	21.5	1.109	0.303	0.336	
	50%RB	Front Face	1720	20.71	21.0	1.069	0.089	0.095	
		Back Face	1720	20.71	21.0	1.069	0.221	0.236	
Hotspot (10mm)	1RB	Left Side	1720	21.05	21.5	1.109	0.146	0.162	
		Right Side	1720	21.05	21.5	1.109	0.118	0.131	
		Bottom Side	1720	21.05	21.5	1.109	0.317	**0.352**	15
	50%RB	Left Side	1720	20.71	21.0	1.069	0.143	0.153	
		Right Side	1720	20.71	21.0	1.069	0.107	0.114	
		Bottom Side	1720	20.71	21.0	1.069	0.213	0.228	

14.4 SAR Measurement Variability

According to KDB865664, Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required. The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.19 The repeated measurement results must be clearly identified in the SAR report. All measured SAR, including the repeated results, must be considered to determine compliance and for reporting according to KDB 690783.Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

1) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20

Test Mode	Frequency Band (MHz)	RF Exposure Configuration	Test Position	Repeated SAR (yes/no)	Highest Measured SAR1-g (W/Kg)	First Repeated	
						Measured SAR1-g (W/Kg)	Largest to Smallest SAR Ratio
WIFI 5.1G	5200	Head	Left Tilt	yes	1.021	0.987	1.034
WIFI 5.1G	5180	Head	Left Tilt	yes	0.889	0.817	1.088

14.5 Simultaneous Transmission Evaluation

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmiting antenna.

Application Simultaneous Transmission information:

No.	Configurations	Head SAR	Body SAR	Hotspot SAR
1	WWAN+WIFI	Yes	Yes	Yes
2	WWAN+Bluetooth	Yes	Yes	Yes
3	WIFI+Bluetooth	No	No	No

Remark:
1. WWAN cannot transmit simultaneously.
2. Bluetooth and WIFI share the same antenna and cannot transmit data at the same time.
3. According to the KDB 447498 D01 v06, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
● (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[$\sqrt{}$ f(GHz)/x] W/kg for test separation distances ≤ 50 mm;
where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
● 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm

Estimated stand alone SAR						
Mode	Frequency (MHz)	Maximum Power (dBm)	Maximum Power (mW)	Separation Distance (mm)	X	Estimated SAR1-g (W/kg)
Bluetooth	2480	5.0	3.16	5	3	0.133
Bluetooth	2480	5.0	3.16	10	7.5	0.053

Note:
1. Bluetooth*- Including Lower power Bluetooth
2. Maximum average power including tune-up tolerance;
3. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

4. Per FCC KD B447498 D01, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the transmitting antenna in a specific a physical test configuration is ≤1.6 W/Kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

$$\text{Ratio}=\frac{(SAR_1+SAR_2)^{1.5}}{(\text{peak location separation,mm})}<0.04$$

5. Simultaneous transmission of maximum SAR sum calculation.

RF Exposure Conditions	Test Position	WWAN	WCN	Summed SAR (W/kg)	SAR1-g Limit (W/kg)
		Scaled SAR (W/kg)	Scaled SAR (W/kg)		
Head	Left Cheek	0.294	0.665	0.959	1.6
	Left Tilt	0.186	1.040	**1.226**	1.6
	Right Cheek	0.219	0.859	1.078	1.6
	Right Tilt	0.239	0.476	0.715	1.6
Body	Front Face	0.580	0.640	1.220	1.6
	Back Face	0.862	0.522	**1.384**	1.6
Hotspot	Left Side	0.803	/	0.803	1.6
	Right Side	0.567	0.433	**1.000**	1.6
	Top Side	/	0.666	0.666	1.6
	Bottom Side	0.780	/	0.780	1.6

15. Test Plots

15.1 System Performance Check

System check at 750 MHz
Date of measurement: 11/10/2024

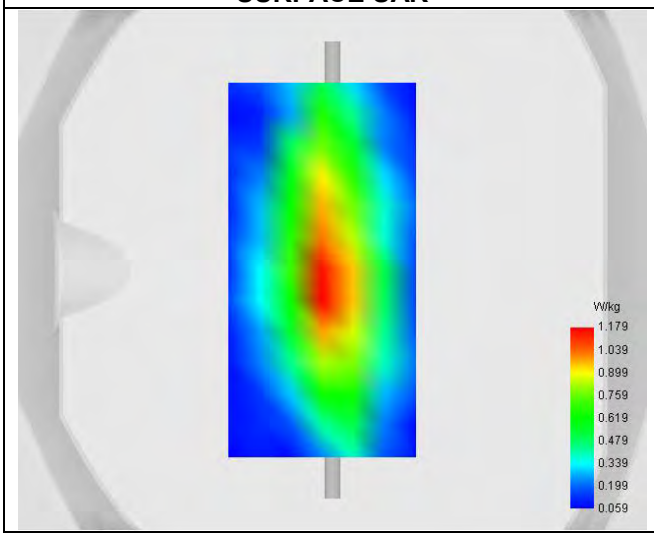
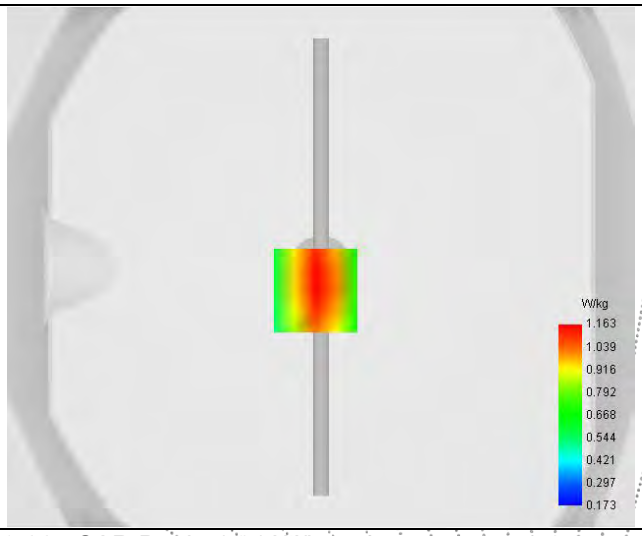
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.87
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Signal	CW

B. Permitivity

Frequency (MHz)	750.000
Relative permitivity (real part)	42.787
Relative permitivity (imaginary part)	24.595
Conductivity (S/m)	0.921

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

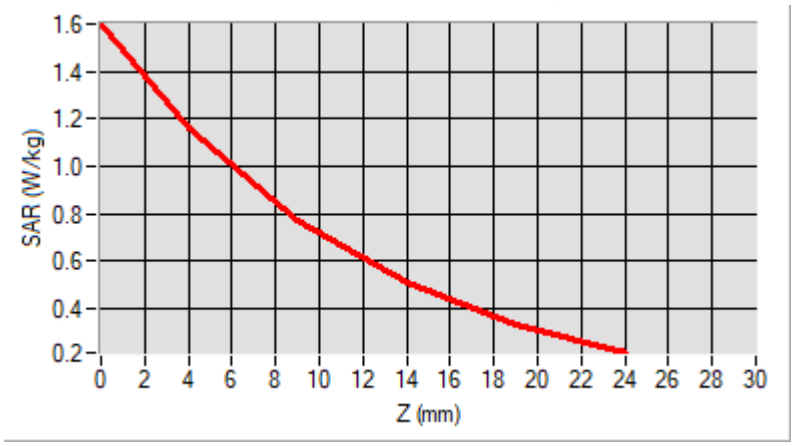
Maximum location: X=-2.00, Y=-9.00 ; SAR Peak: 1.61 W/kg

D. SAR 1g & 10g

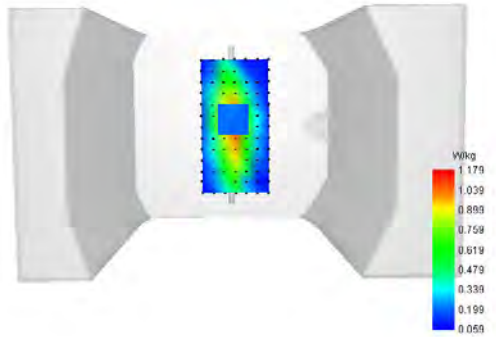
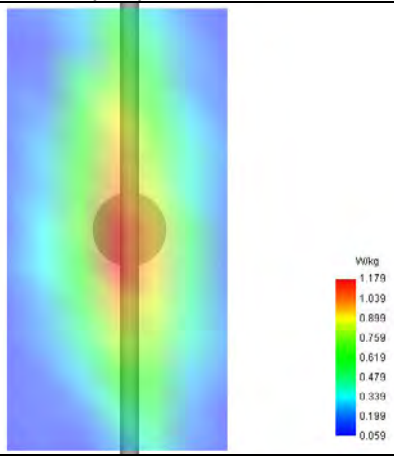
SAR 10g (W/Kg)	0.962
SAR 1g (W/Kg)	2.039
Variation (%)	-1.534
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.603	1.163	0.769	0.506	0.333



F. 3D Image

3D screen shot	Hot spot position
	

System check at 835 MHz
Date of measurement: 12/10/2024

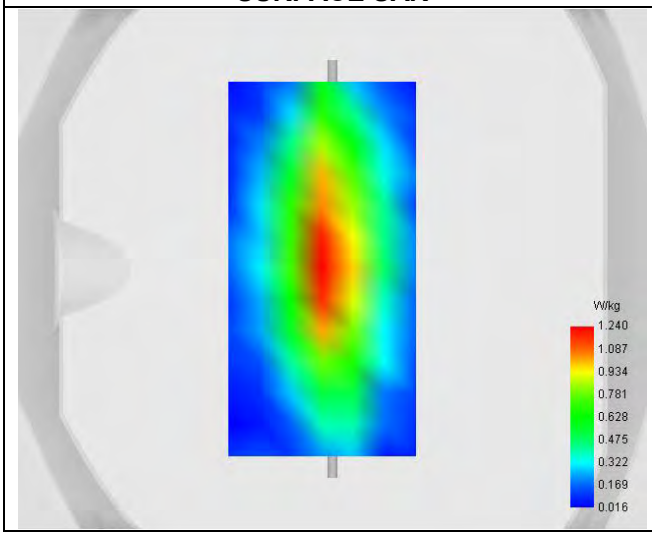
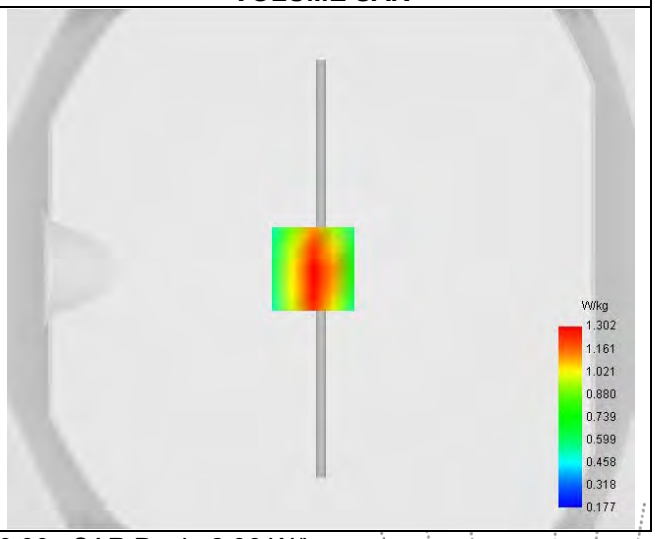
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.80
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Signal	CW

B. Permitivity

Frequency (MHz)	835.000
Relative permitivity (real part)	42.101
Relative permitivity (imaginary part)	20.910
Conductivity (S/m)	0.870

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

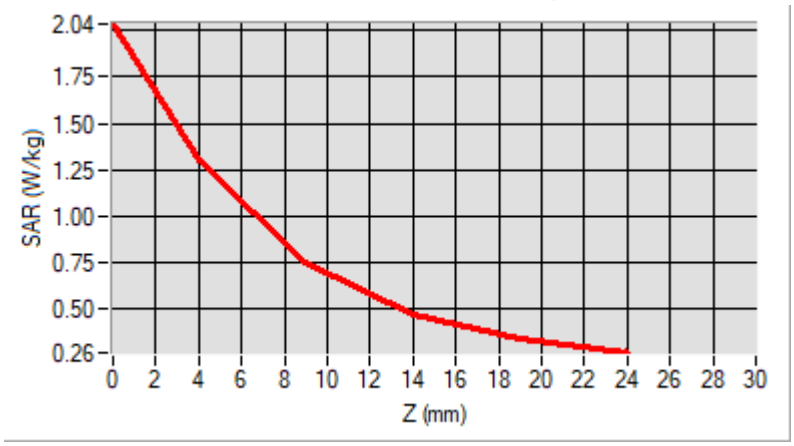
Maximum location: X=-3.00, Y=0.00 ; SAR Peak: 2.06 W/kg

D. SAR 1g & 10g

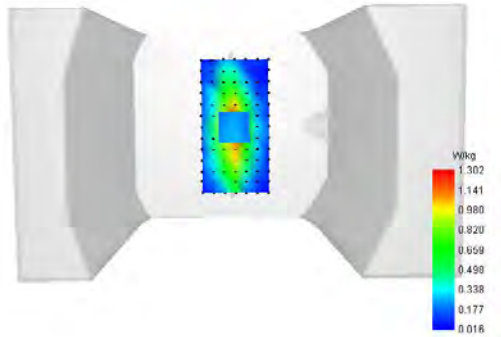
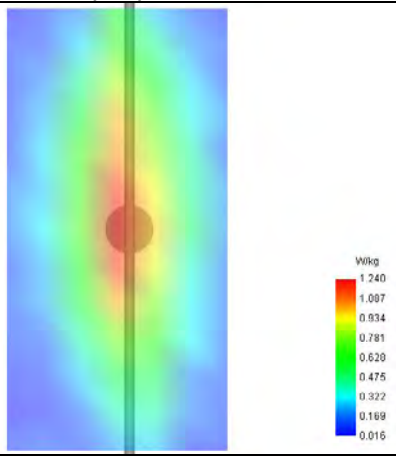
SAR 10g (W/Kg)	0.564
SAR 1g (W/Kg)	2.394
Variation (%)	-1.989
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.036	1.302	0.747	0.462	0.331



F. 3D Image

3D screen shot	Hot spot position
	

System check at 1800 MHz
Date of measurement: 18/10/2024

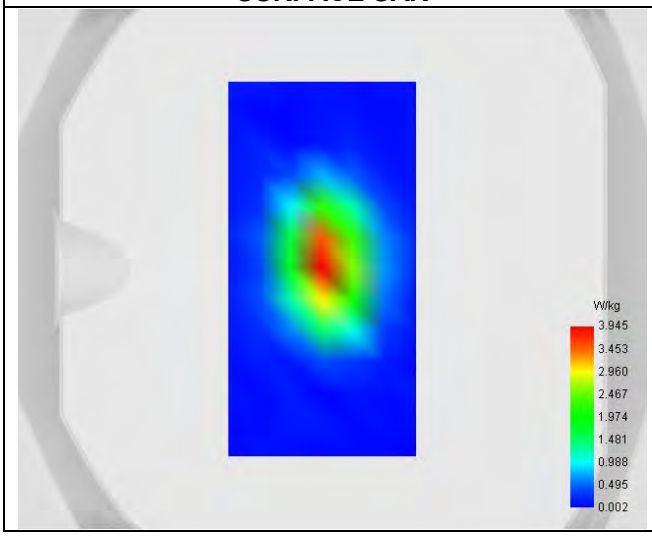
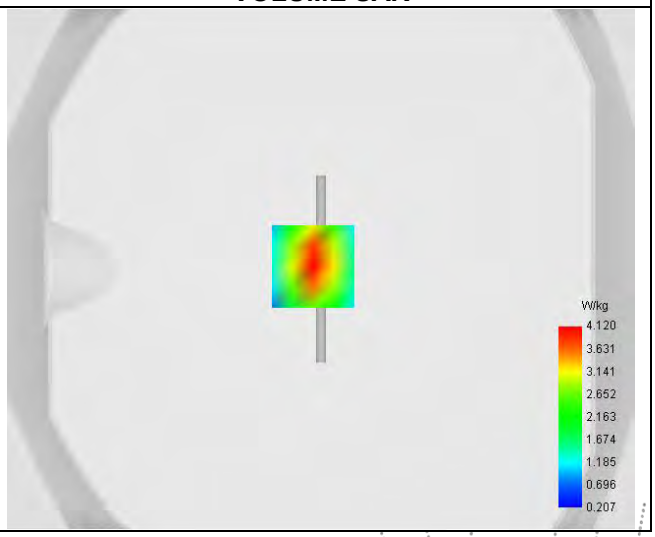
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.01
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW

B. Permitivity

Frequency (MHz)	1800.000
Relative permitivity (real part)	39.598
Relative permitivity (imaginary part)	15.200
Conductivity (S/m)	1.366

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

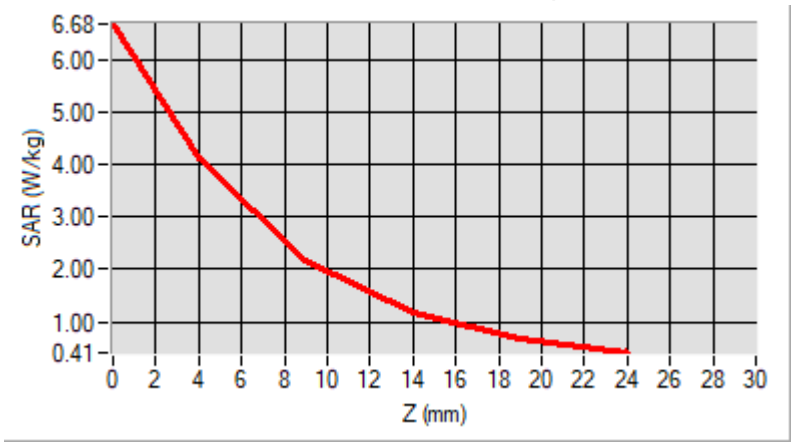
Maximum location: X=-3.00, Y=1.00 ; SAR Peak: 6.69 W/kg

D. SAR 1g & 10g

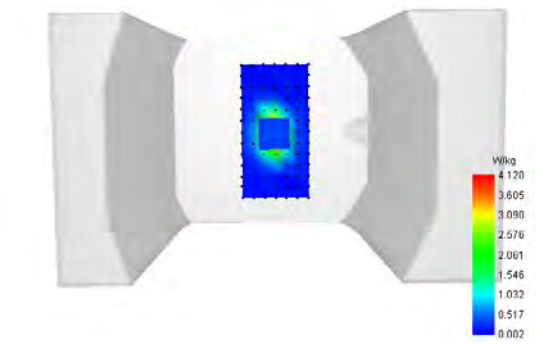
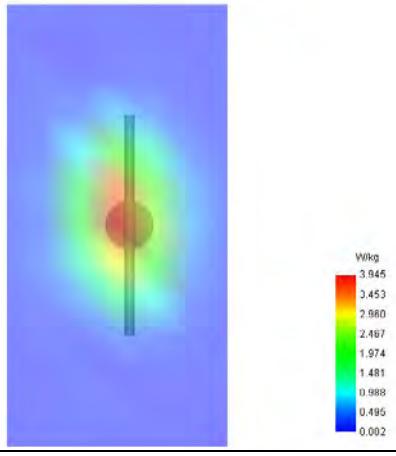
SAR 10g (W/Kg)	4.017
SAR 1g (W/Kg)	9.985
Variation (%)	-0.830
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	6.684	4.120	2.184	1.177	0.685



F. 3D Image

3D screen shot	Hot spot position
	

System check at 1900 MHz
Date of measurement: 19/10/2024

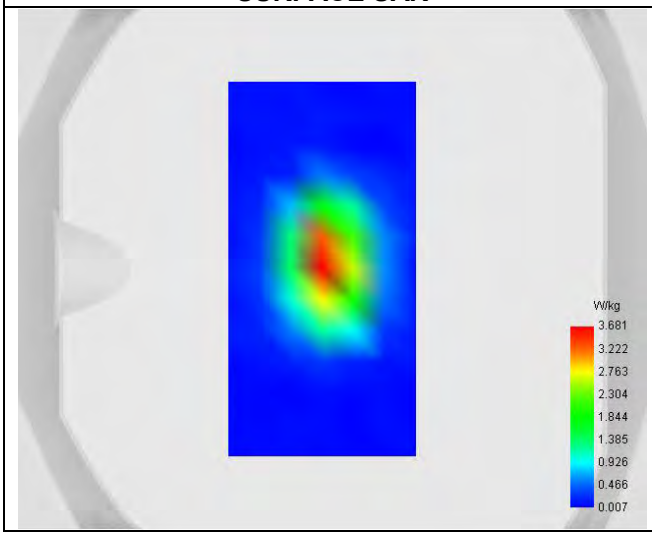
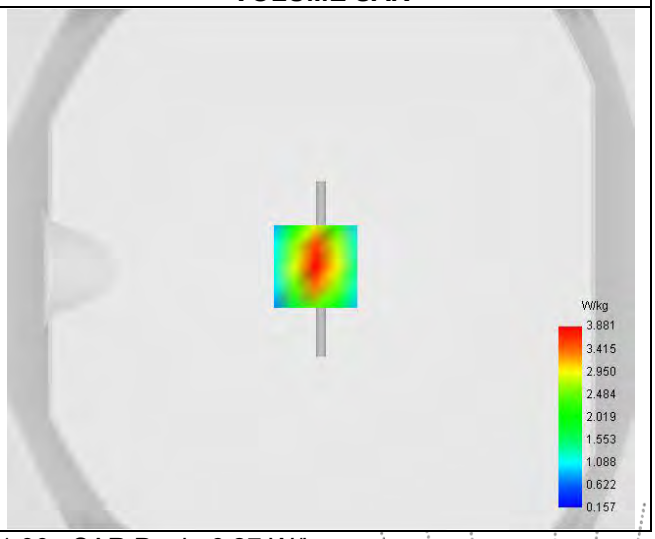
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.11
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Signal	CW

B. Permitivity

Frequency (MHz)	1900.000
Relative permitivity (real part)	38.663
Relative permitivity (imaginary part)	14.400
Conductivity (S/m)	1.400

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

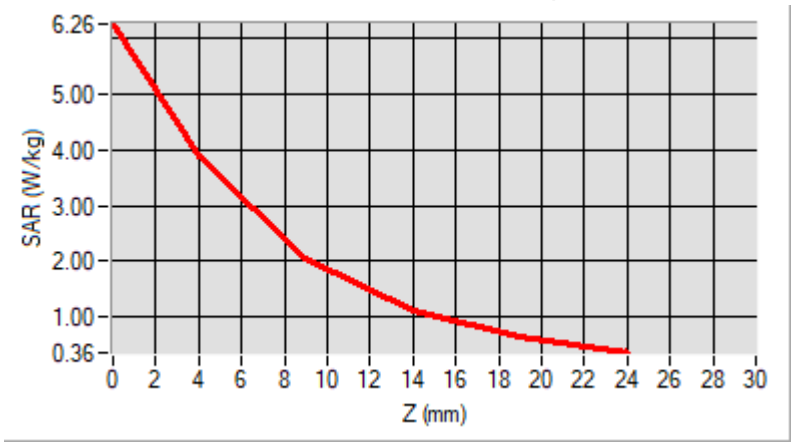
Maximum location: X=-2.00, Y=1.00 ; SAR Peak: 6.27 W/kg

D. SAR 1g & 10g

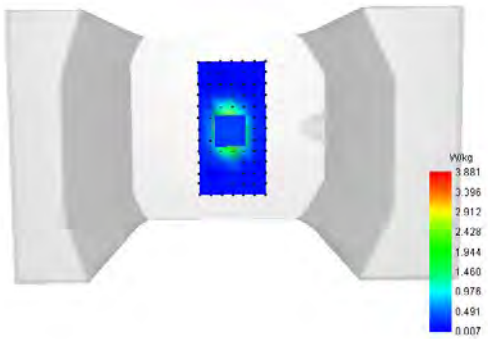
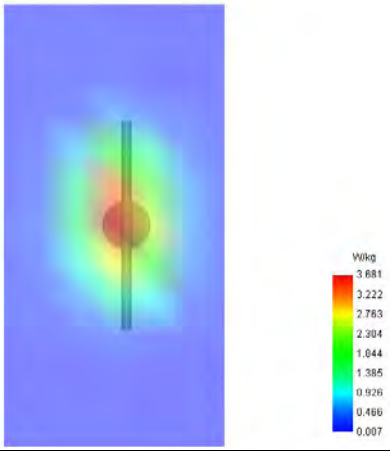
SAR 10g (W/Kg)	5.074
SAR 1g (W/Kg)	10.253
Variation (%)	2.003
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	6.259	3.881	2.069	1.111	0.634



F. 3D Image

3D screen shot	Hot spot position
	

System check at 2450 MHz
Date of measurement: 21/10/2024

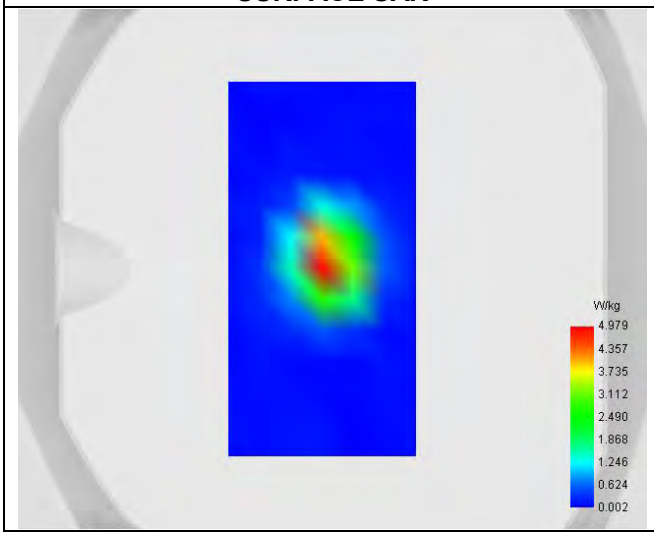
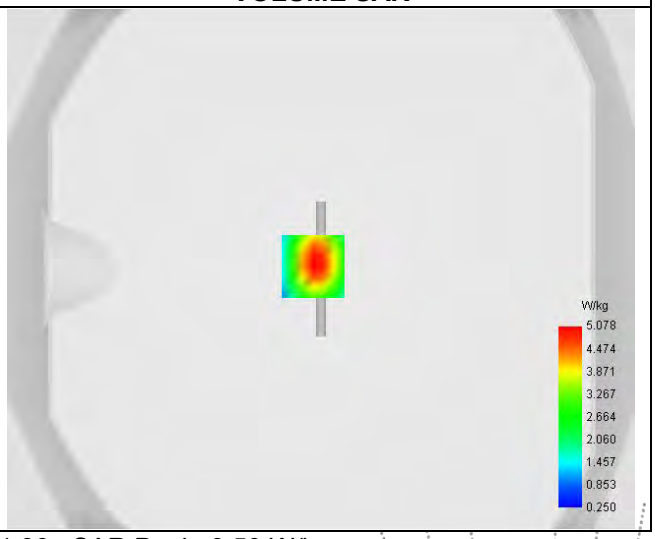
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.32
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Signal	CW

B. Permitivity

Frequency (MHz)	2450.000
Relative permitivity (real part)	39.847
Relative permitivity (imaginary part)	14.330
Conductivity (S/m)	1.783

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

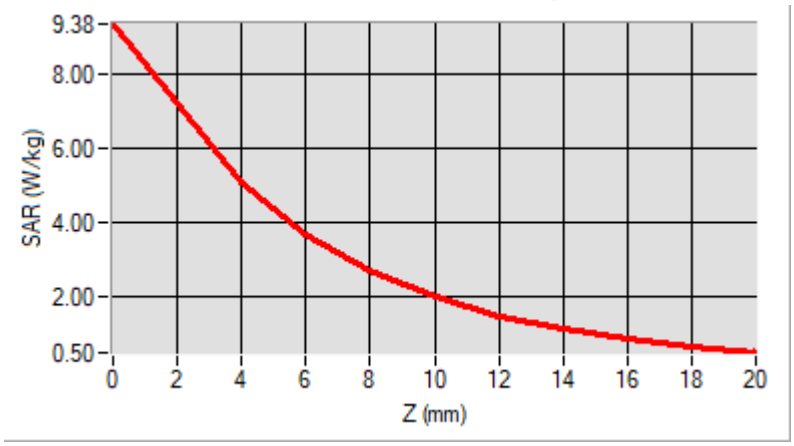
Maximum location: X=-3.00, Y=1.00 ; SAR Peak: 9.50 W/kg

D. SAR 1g & 10g

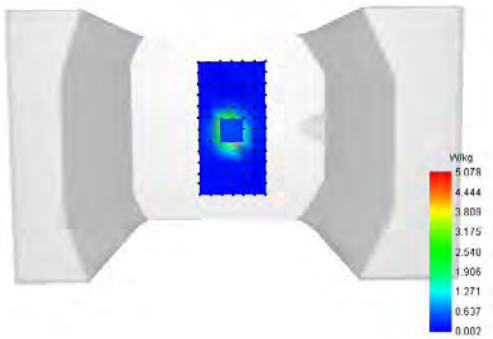
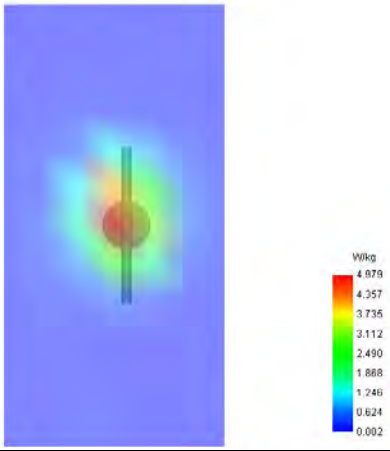
SAR 10g (W/Kg)	6.584
SAR 1g (W/Kg)	13.799
Variation (%)	1.347
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00
SAR (W/Kg)	9.380	5.078	3.712	2.709	2.001	1.499	1.138	0.871	0.667



F. 3D Image

3D screen shot	Hot spot position
	

System check at 2600 MHz
Date of measurement: 11/10/2024

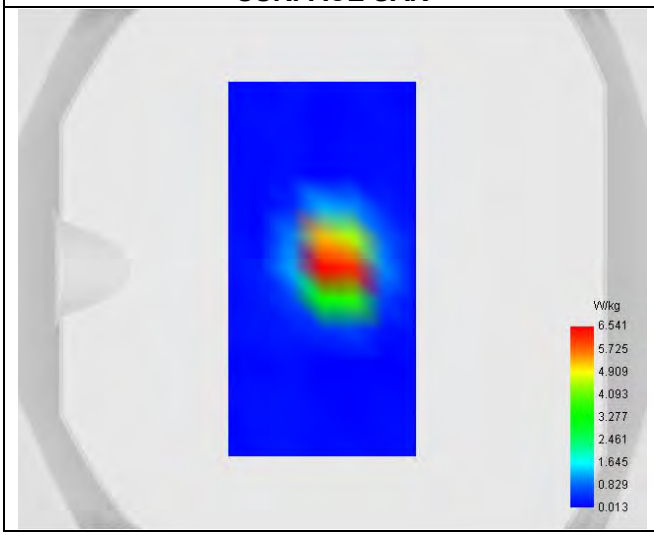
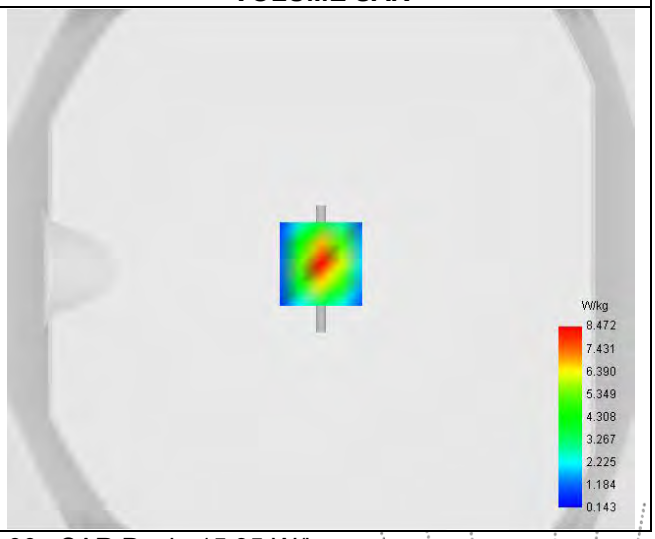
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.19
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Signal	CW

B. Permitivity

Frequency (MHz)	2600.000
Relative permitivity (real part)	39.706
Relative permitivity (imaginary part)	14.889
Conductivity (S/m)	1.974

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

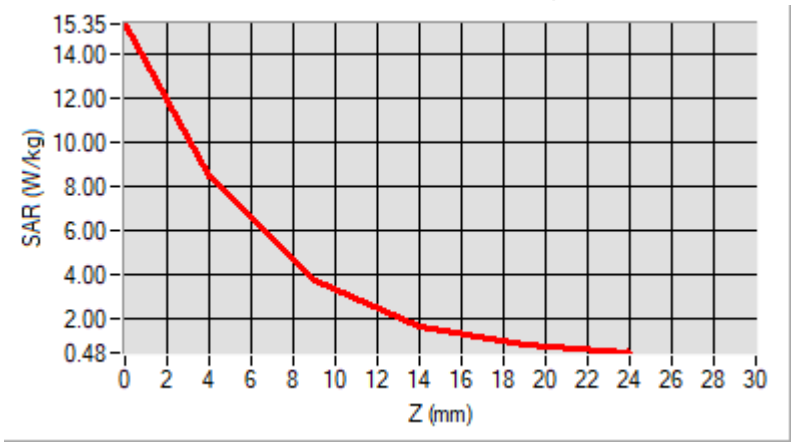
Maximum location: X=0.00, Y=2.00 ; SAR Peak: 15.35 W/kg

D. SAR 1g & 10g

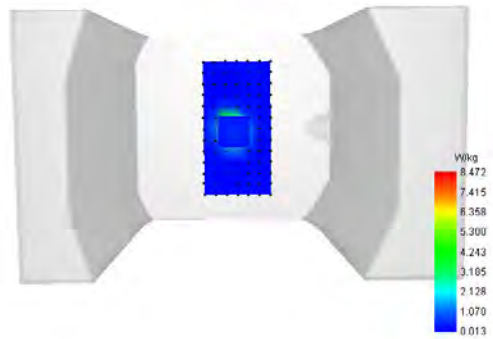
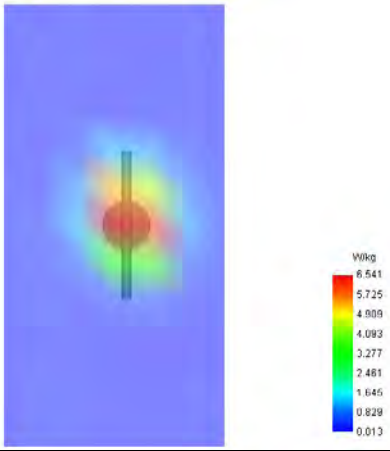
SAR 10g (W/Kg)	6.100
SAR 1g (W/Kg)	14.660
Variation (%)	1.525
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	15.347	8.472	3.768	1.677	0.856



F. 3D Image

3D screen shot	Hot spot position
	

System check at 5200 MHz
Date of measurement: 21/10/2024

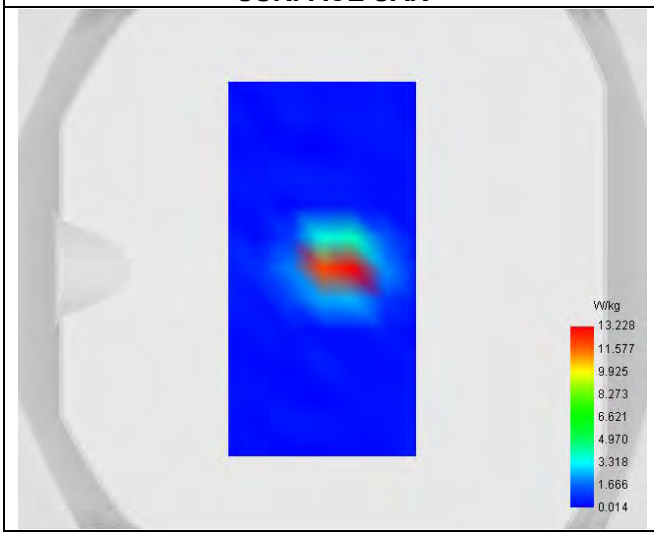
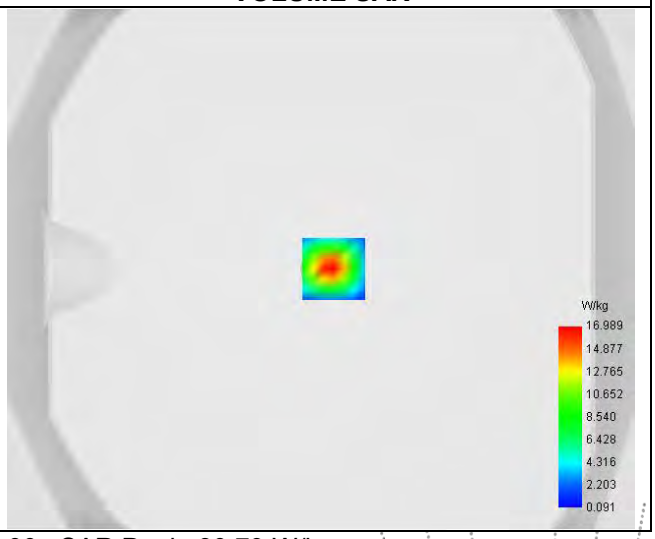
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.97
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm
Phantom	Validation plane
Device Position	Dipole
Band	CW5200
Signal	CW

B. Permitivity

Frequency (MHz)	5200.000
Relative permitivity (real part)	36.781
Relative permitivity (imaginary part)	18.140
Conductivity (S/m)	4.744

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

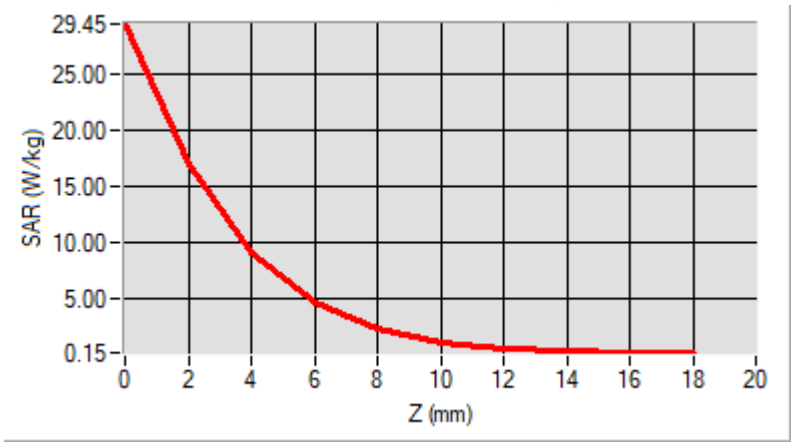
Maximum location: X=5.00, Y=0.00 ; SAR Peak: 30.79 W/kg

D. SAR 1g & 10g

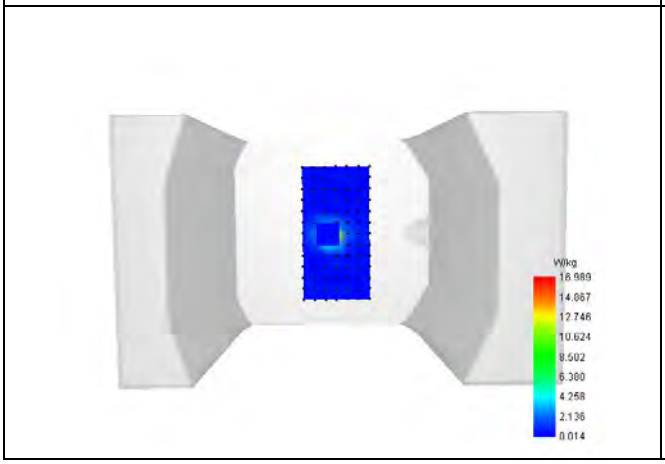
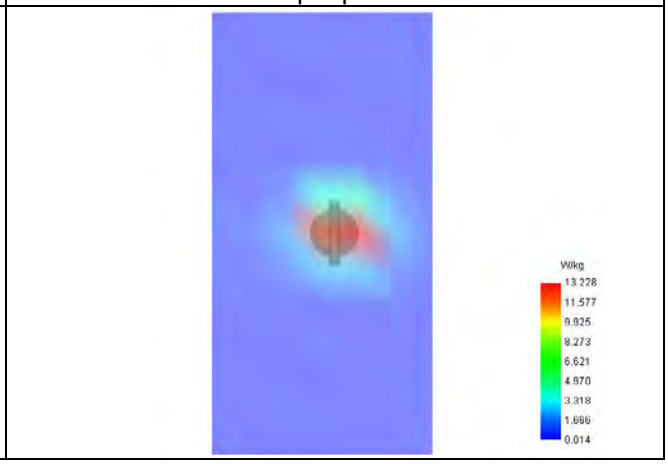
SAR 10g (W/Kg)	8.460
SAR 1g (W/Kg)	18.207
Variation (%)	-1.302
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	29.452	16.989	9.130	4.585	2.232	1.083	0.552	0.315	0.209



F. 3D Image

3D screen shot	Hot spot position
	

System check at 5800 MHz
Date of measurement: 21/10/2024

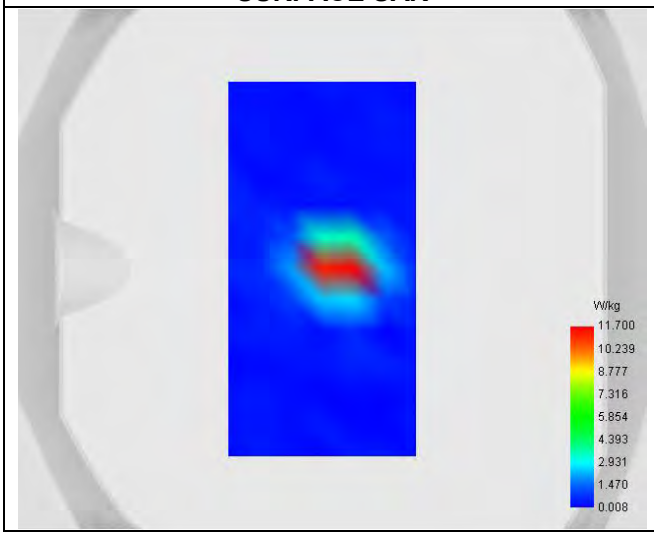
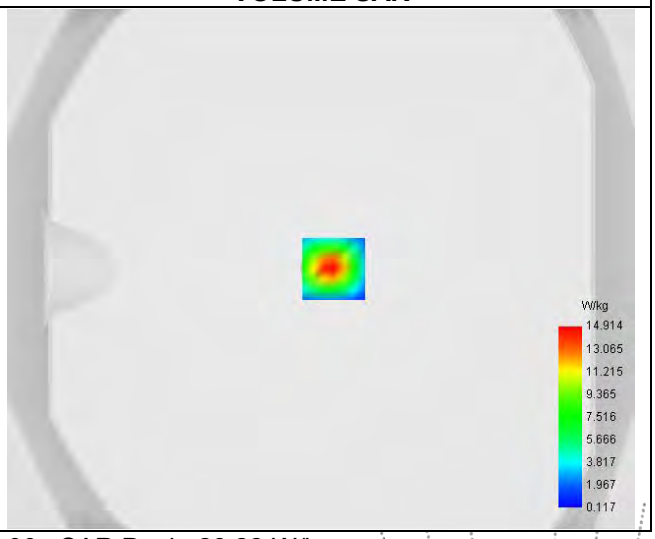
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.05
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Signal	CW

B. Permitivity

Frequency (MHz)	5800.000
Relative permitivity (real part)	36.608
Relative permitivity (imaginary part)	18.620
Conductivity (S/m)	5.362

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

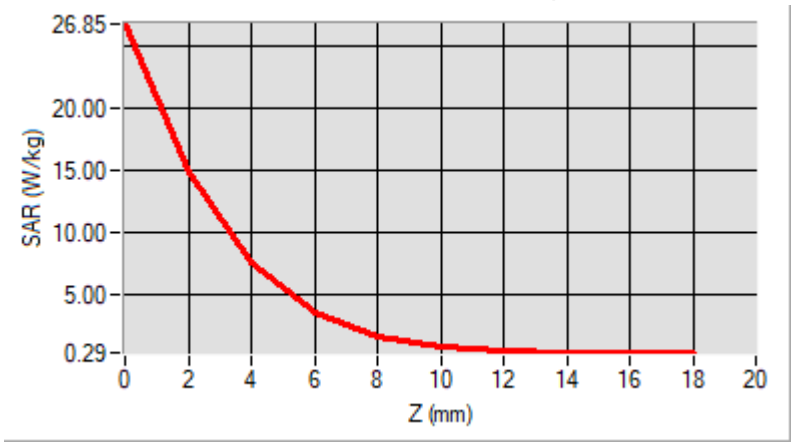
Maximum location: X=5.00, Y=0.00 ; SAR Peak: 28.22 W/kg

D. SAR 1g & 10g

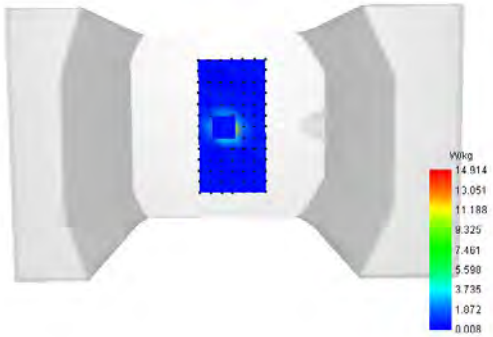
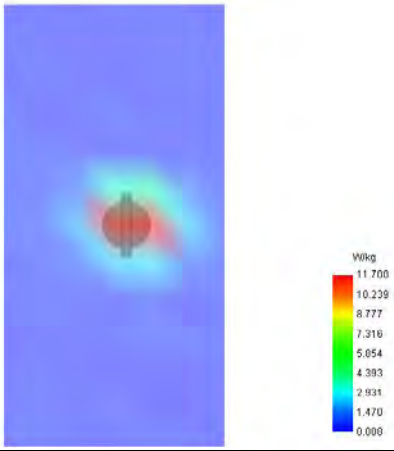
SAR 10g (W/Kg)	8.245
SAR 1g (W/Kg)	18.871
Variation (%)	-0.220
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	26.852	14.914	7.581	3.559	1.627	0.770	0.423	0.303	0.288



F. 3D Image

3D screen shot	Hot spot position
	

15.2 SAR Test Graph Results

Plot 1
Date of measurement: 21/10/2024

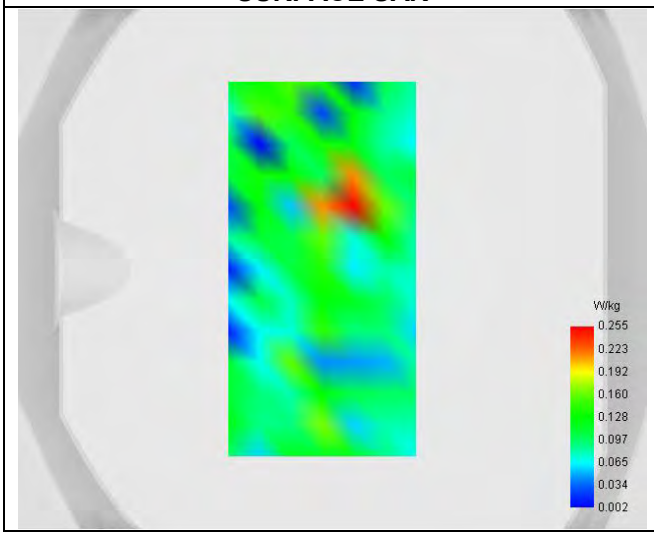
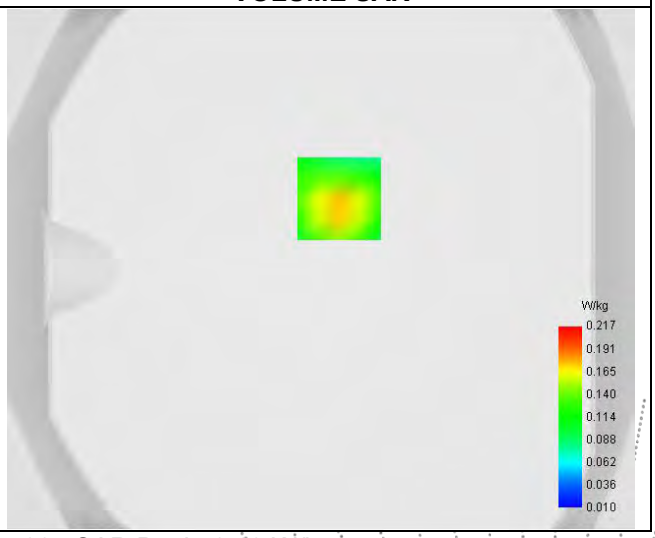
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.11
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	ISM
Signal	IEEE 802.11 b

B. Permitivity

Frequency (MHz)	2462.000
Relative permitivity (real part)	39.847
Relative permitivity (imaginary part)	13.207
Conductivity (S/m)	1.783

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

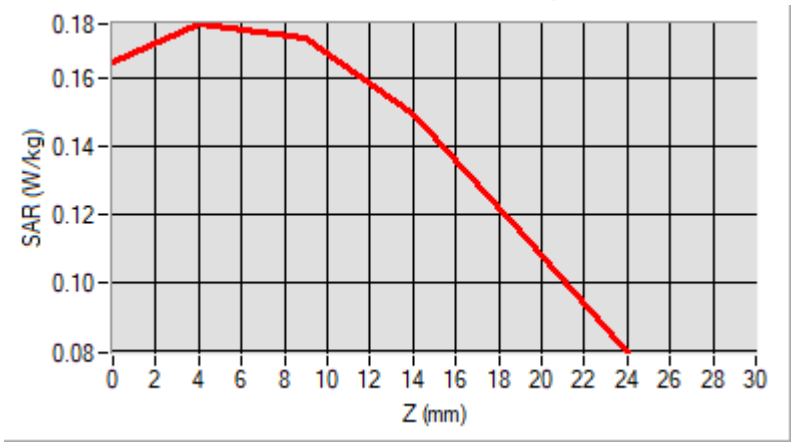
Maximum location: X=7.00, Y=27.00 ; SAR Peak: 0.18 W/kg

D. SAR 1g & 10g

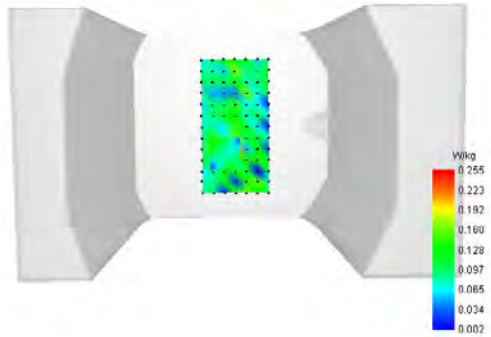
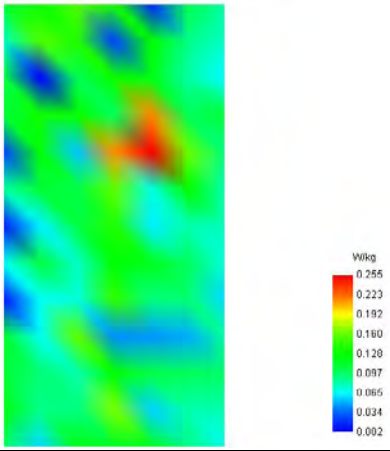
SAR 10g (W/Kg)	0.124
SAR 1g (W/Kg)	0.180
Variation (%)	-1.530
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.165	0.176	0.172	0.150	0.115



F. 3D Image

3D screen shot	Hot spot position
	

Plot 2
Date of measurement: 21/10/2024

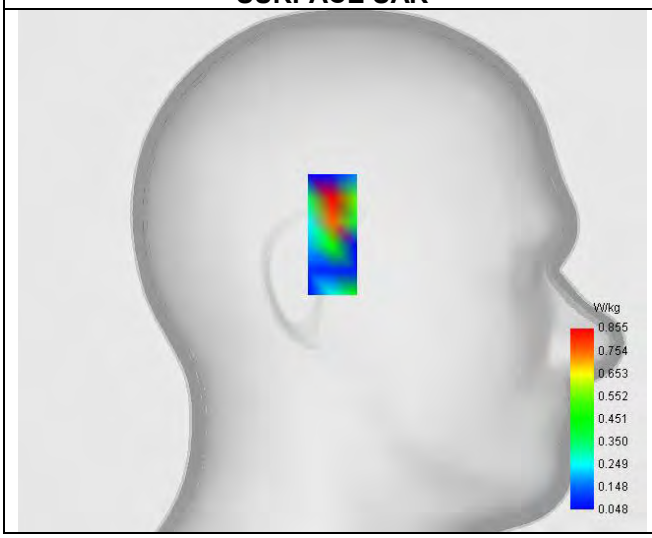
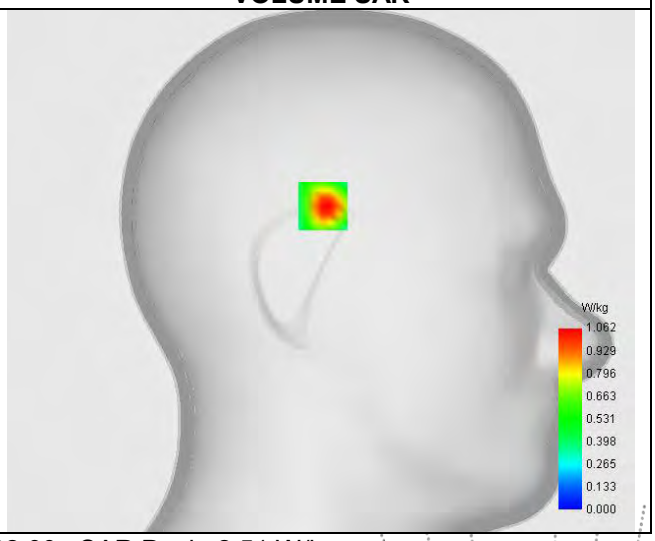
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.18
Area Scan	dx=12mm dy=12mm, Adaptative 1 max
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm
Phantom	Left head
Device Position	Tilt
Band	5200
Signal	--

B. Permitivity

Frequency (MHz)	5180.000
Relative permitivity (real part)	36.781
Relative permitivity (imaginary part)	16.130
Conductivity (S/m)	4.744

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

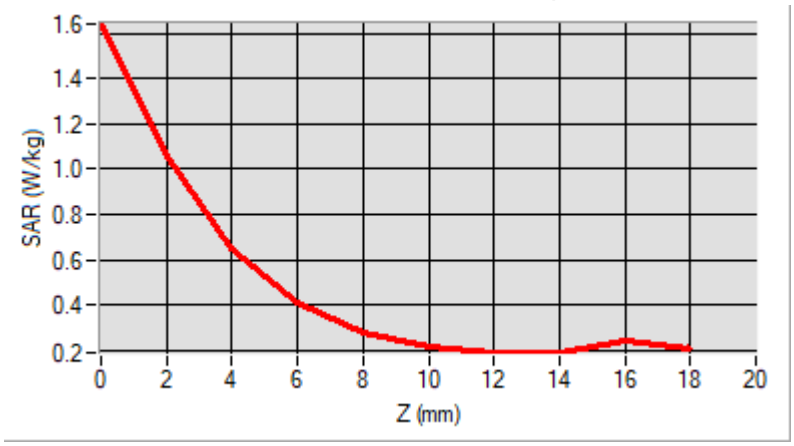
Maximum location: X=-1.00, Y=32.00 ; SAR Peak: 2.51 W/kg

D. SAR 1g & 10g

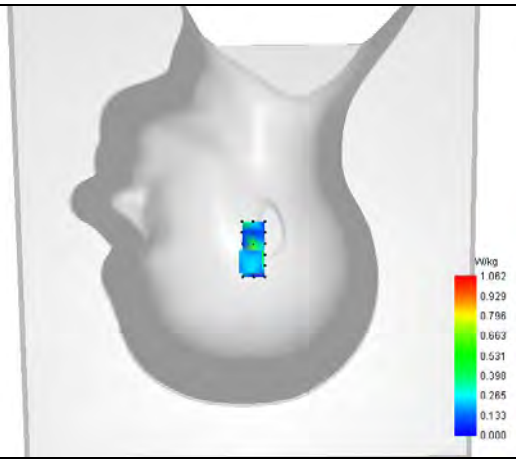
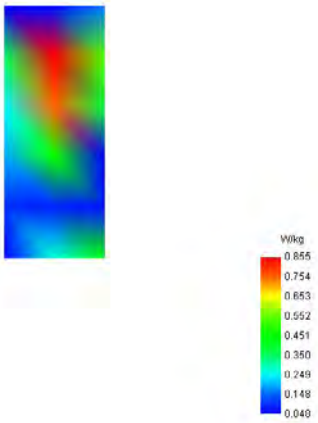
SAR 10g (W/Kg)	0.430
SAR 1g (W/Kg)	1.021
Variation (%)	-1.380
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	1.643	1.062	0.651	0.407	0.276	0.212	0.187	0.188	0.237



F. 3D Image

3D screen shot	Hot spot position
	

Plot 3
Date of measurement: 21/10/2024

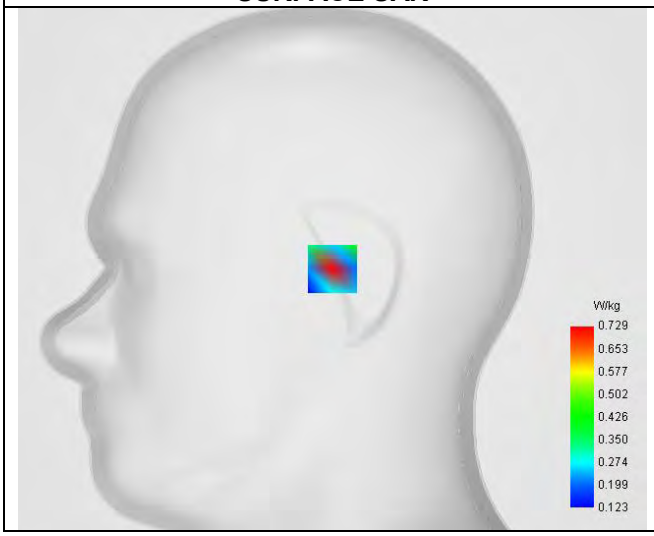
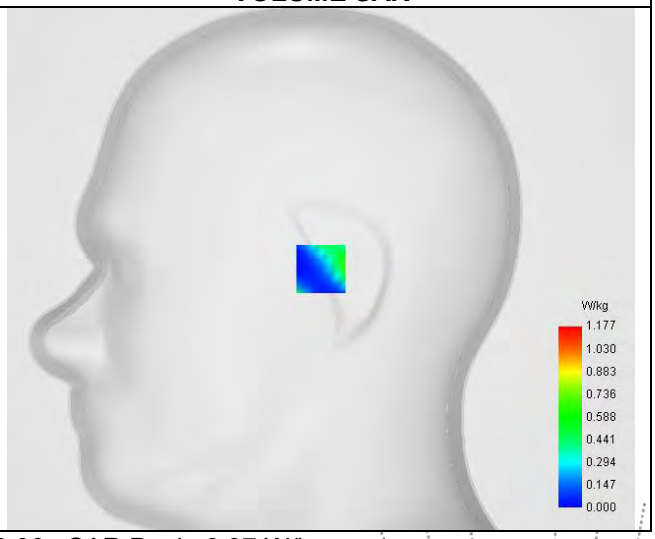
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.15
Area Scan	dx=12mm dy=12mm, Adaptative 1 max
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm
Phantom	Right head
Device Position	Cheek
Band	5800
Signal	--

B. Permitivity

Frequency (MHz)	5745.000
Relative permitivity (real part)	36.608
Relative permitivity (imaginary part)	16.355
Conductivity (S/m)	5.362

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

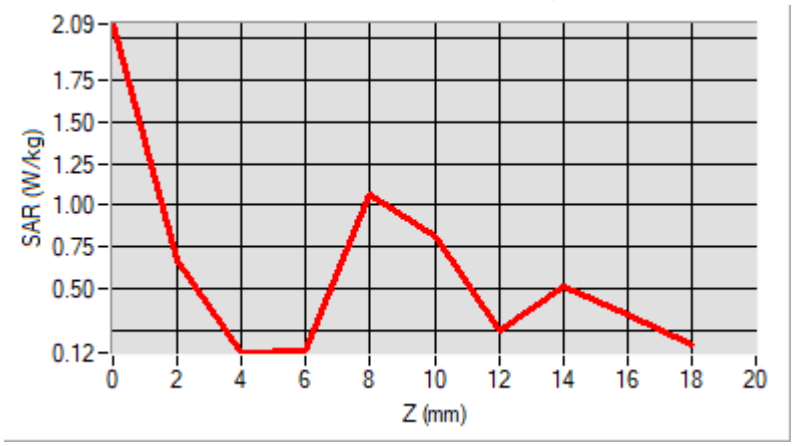
Maximum location: X=0.00, Y=0.00 ; SAR Peak: 3.97 W/kg

D. SAR 1g & 10g

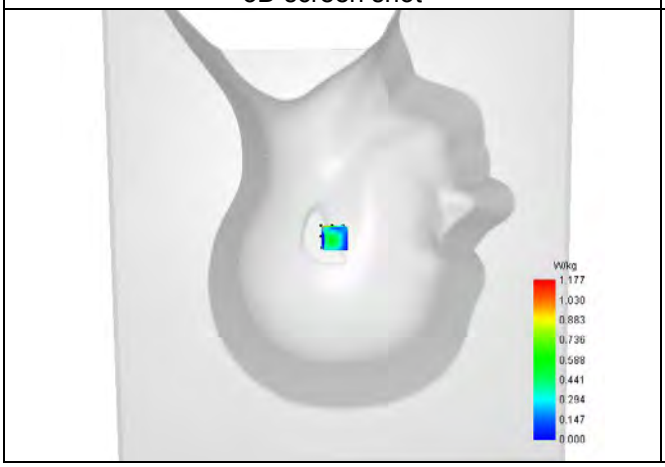
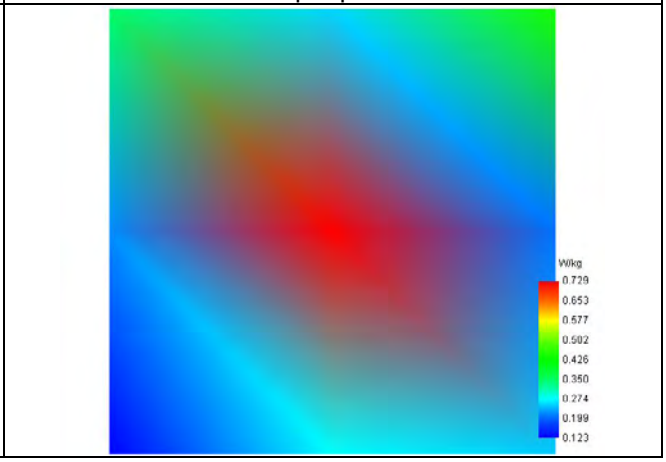
SAR 10g (W/Kg)	0.446
SAR 1g (W/Kg)	0.787
Variation (%)	-3.460
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	2.086	0.664	0.118	0.125	1.067	0.813	0.246	0.509	0.348



F. 3D Image

3D screen shot	Hot spot position
	

Plot 4
Date of measurement: 12/10/2024

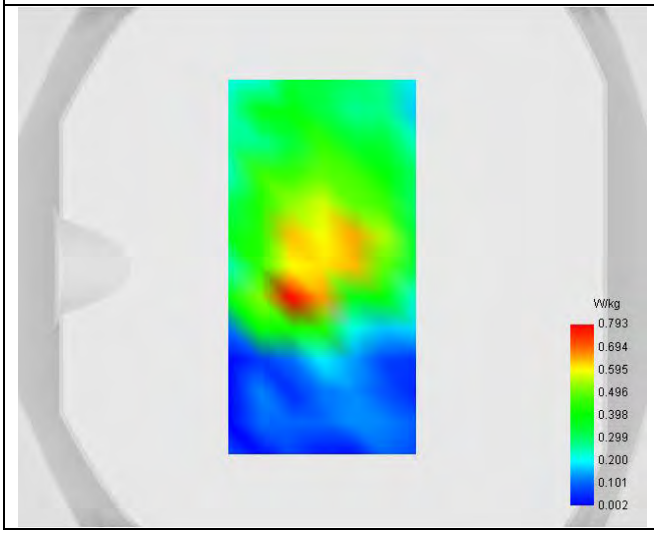
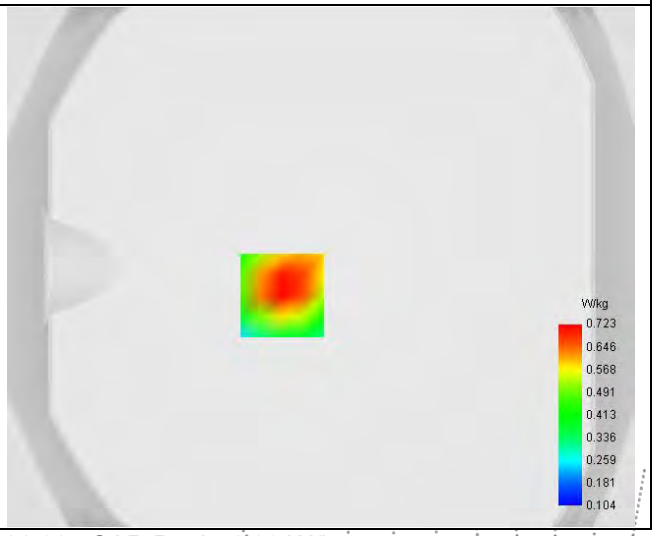
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GPRS850
Signal	TDMA (GPRS)
Modulation	GMSK (CS-1)

B. Permitivity

Frequency (MHz)	836.600
Relative permitivity (real part)	42.101
Relative permitivity (imaginary part)	19.400
Conductivity (S/m)	0.870

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

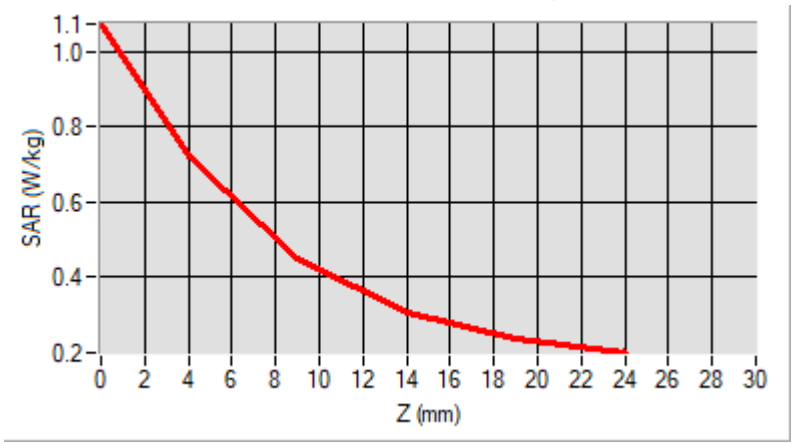
Maximum location: X=-15.00, Y=-11.00 ; SAR Peak: 1.09 W/kg

D. SAR 1g & 10g

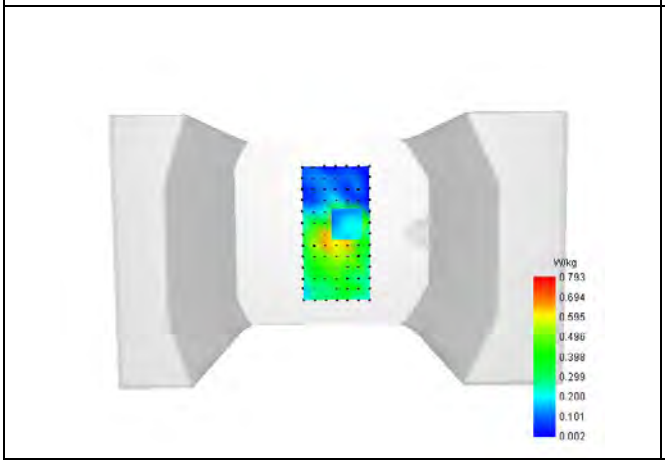
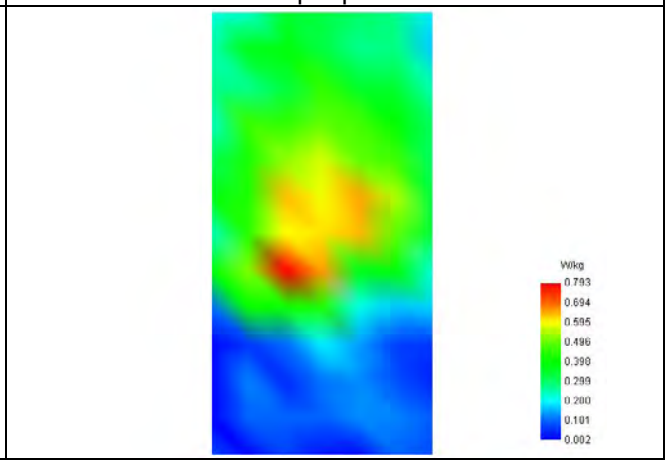
SAR 10g (W/Kg)	0.404
SAR 1g (W/Kg)	0.697
Variation (%)	1.120
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.074	0.723	0.450	0.304	0.235



F. 3D Image

3D screen shot	Hot spot position
	

Plot 5

Date of measurement: 19/10/2024

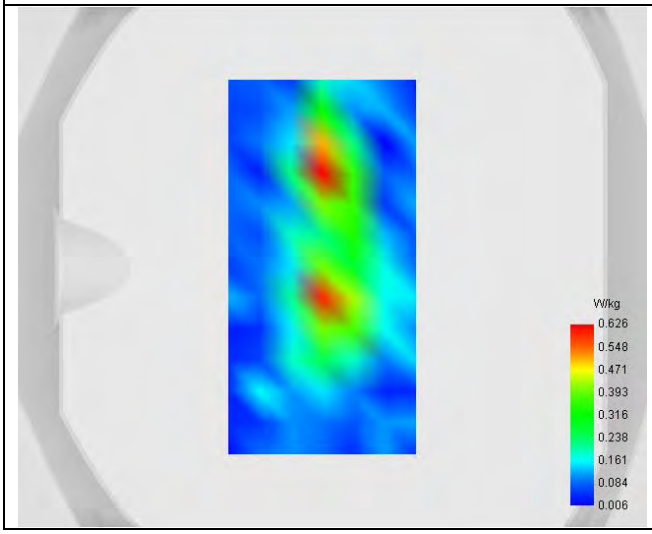
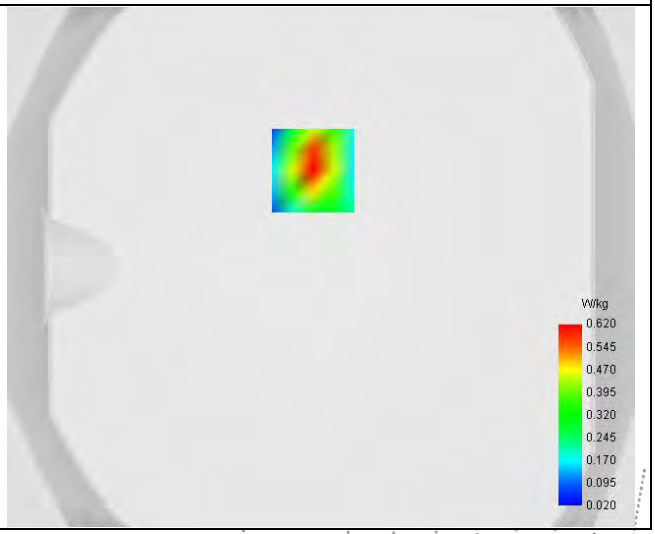
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GPRS1900
Signal	TDMA (GPRS)
Modulation	GMSK (CS-1)

B. Permitivity

Frequency (MHz)	1880.000
Relative permitivity (real part)	38.663
Relative permitivity (imaginary part)	13.408
Conductivity (S/m)	1.400

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

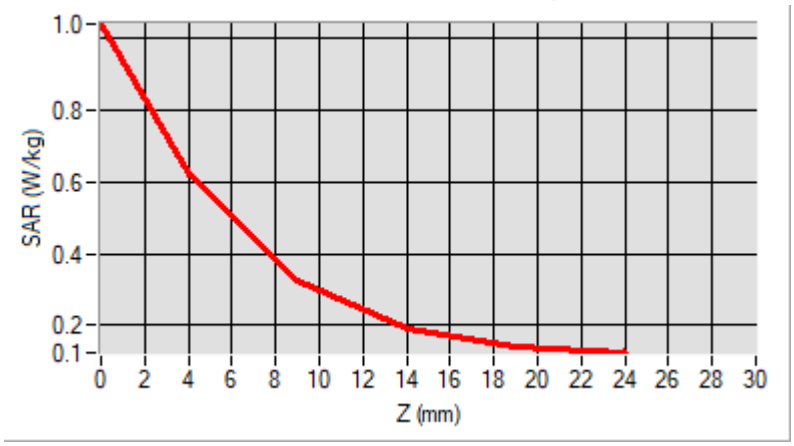
Maximum location: X=-3.00, Y=37.00 ; SAR Peak: 1.06 W/kg

D. SAR 1g & 10g

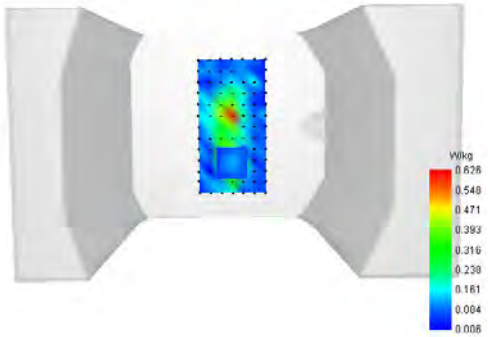
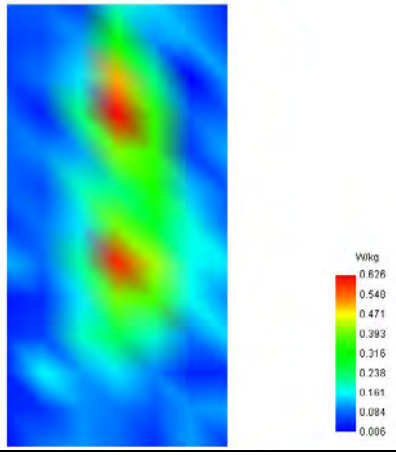
SAR 10g (W/Kg)	0.301
SAR 1g (W/Kg)	0.577
Variation (%)	-3.400
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.042	0.620	0.324	0.190	0.141



F. 3D Image

3D screen shot	Hot spot position
	

Plot 6

Date of measurement: 19/10/2024

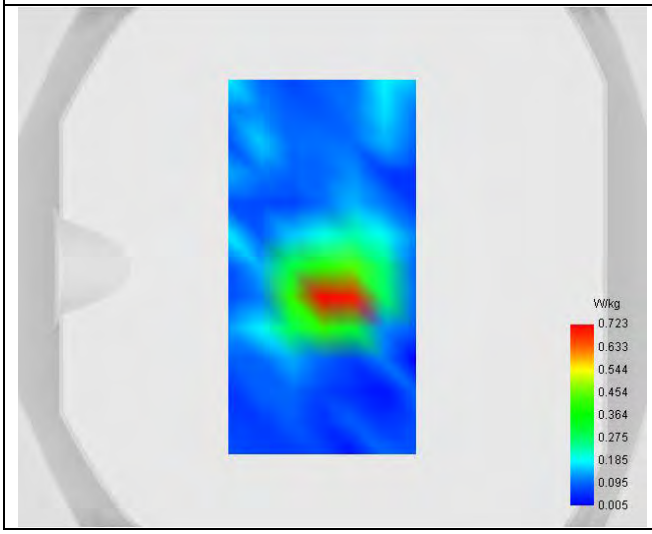
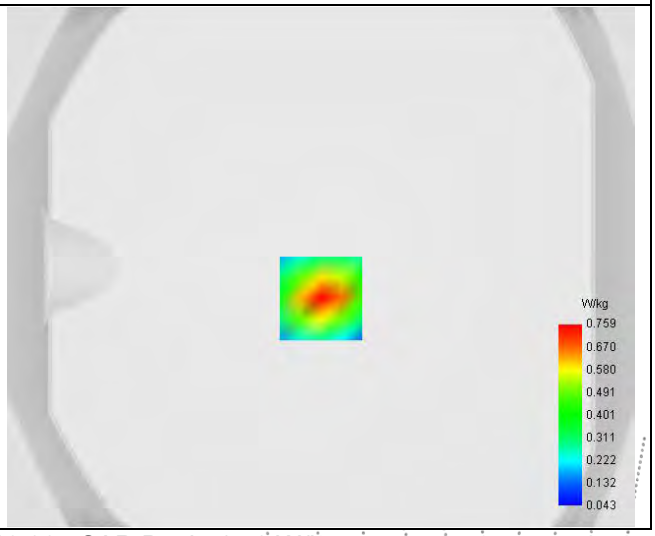
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 2 (1900)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Frequency (MHz)	1907.600
Relative permitivity (real part)	38.663
Relative permitivity (imaginary part)	13.408
Conductivity (S/m)	1.400

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

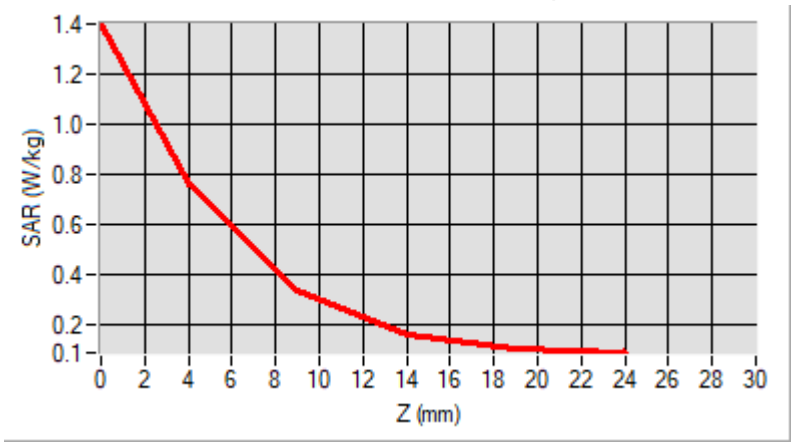
Maximum location: X=0.00, Y=-12.00 ; SAR Peak: 1.40 W/kg

D. SAR 1g & 10g

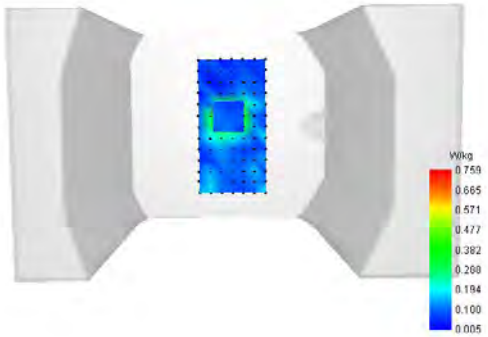
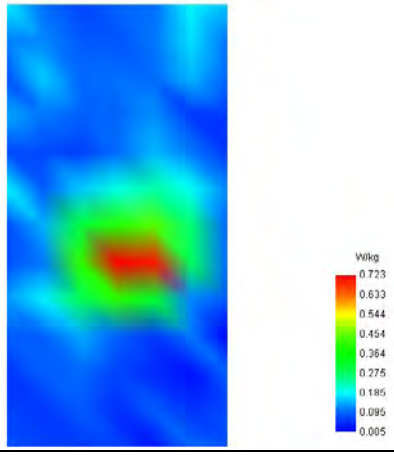
SAR 10g (W/Kg)	0.331
SAR 1g (W/Kg)	0.710
Variation (%)	-1.020
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.399	0.759	0.338	0.164	0.108



F. 3D Image

3D screen shot	Hot spot position
	

Plot 7
Date of measurement: 18/10/2024

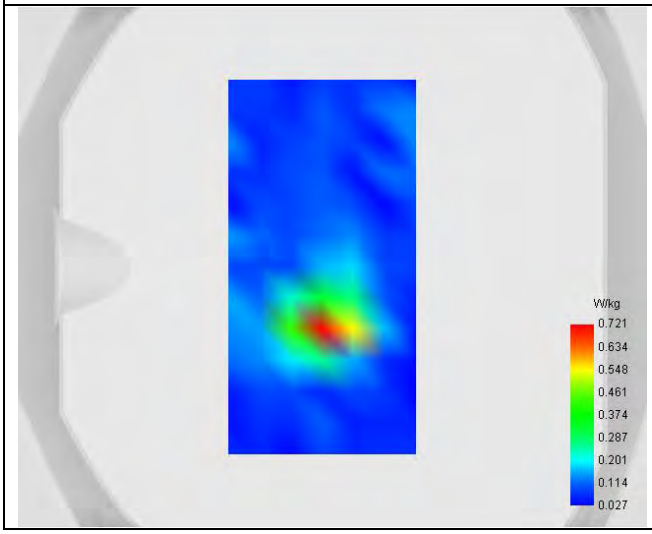
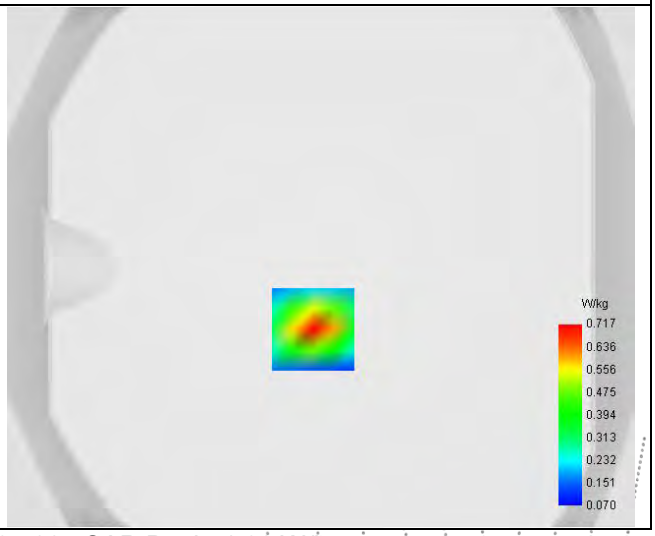
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.96
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 4 (1700)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Frequency (MHz)	1712.400
Relative permitivity (real part)	39.598
Relative permitivity (imaginary part)	14.136
Conductivity (S/m)	1.366

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

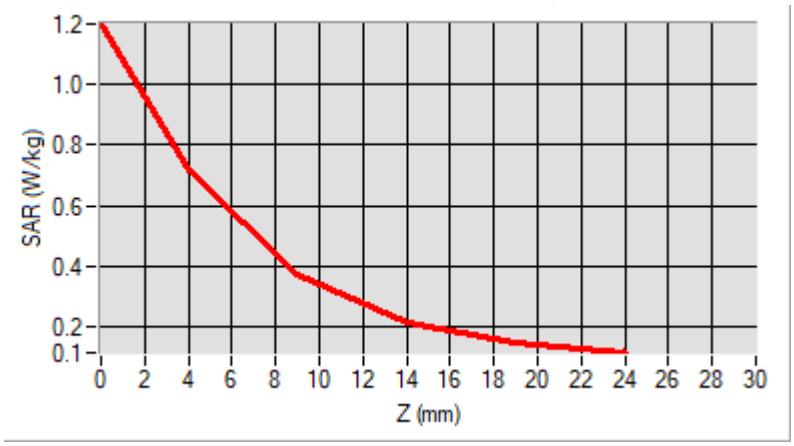
Maximum location: X=-3.00, Y=-24.00 ; SAR Peak: 1.20 W/kg

D. SAR 1g & 10g

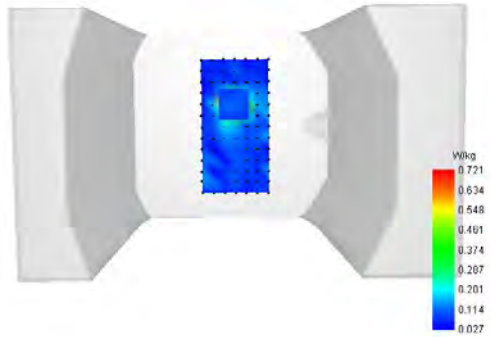
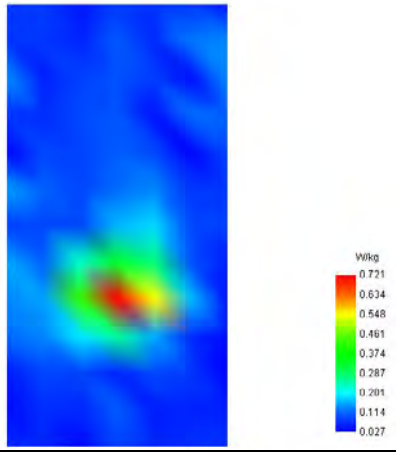
SAR 10g (W/Kg)	0.332
SAR 1g (W/Kg)	0.656
Variation (%)	3.040
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.196	0.717	0.374	0.213	0.147



F. 3D Image

3D screen shot	Hot spot position
	

Plot 8
Date of measurement: 12/10/2024

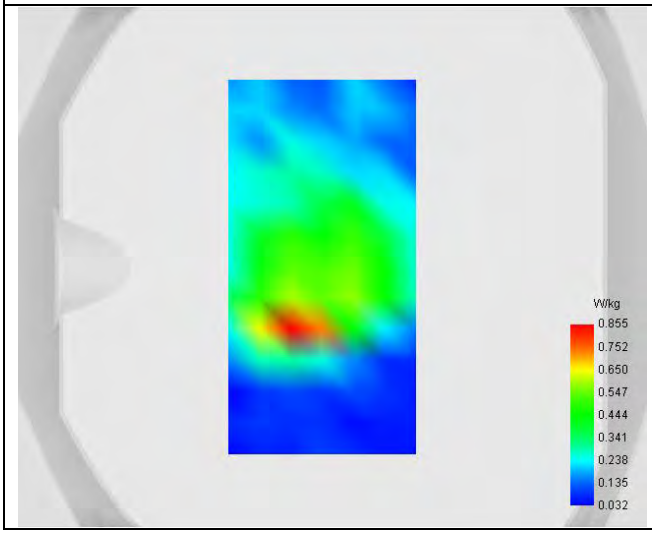
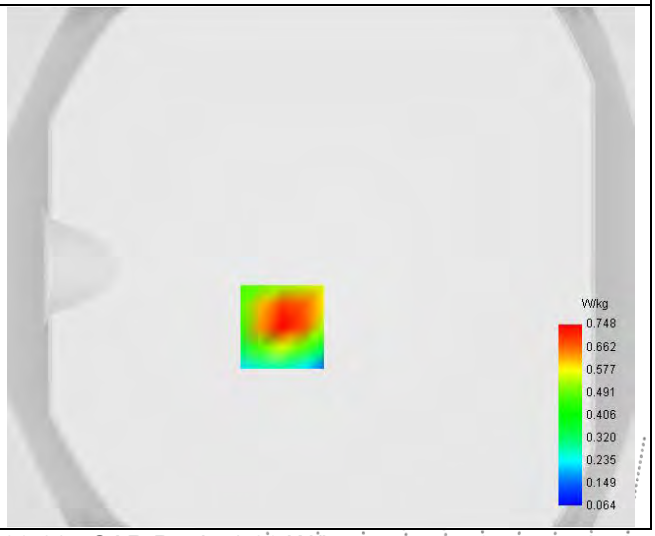
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 5 (850)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Frequency (MHz)	826.400
Relative permitivity (real part)	42.101
Relative permitivity (imaginary part)	19.400
Conductivity (S/m)	0.870

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

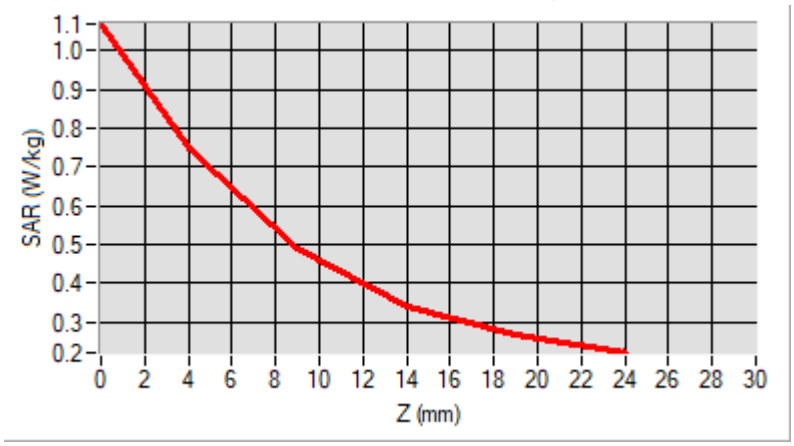
Maximum location: X=-15.00, Y=-23.00 ; SAR Peak: 1.09 W/kg

D. SAR 1g & 10g

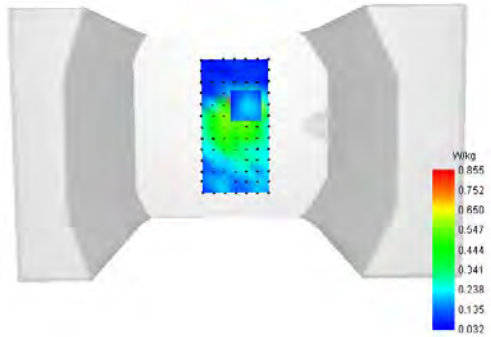
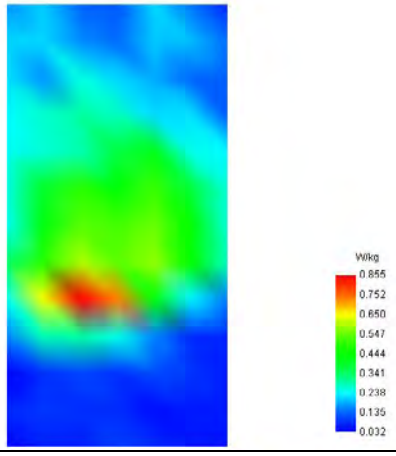
SAR 10g (W/Kg)	0.448
SAR 1g (W/Kg)	0.715
Variation (%)	-3.090
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.069	0.748	0.488	0.342	0.267



F. 3D Image

3D screen shot	Hot spot position
	

Plot 9

Date of measurement: 19/10/2024

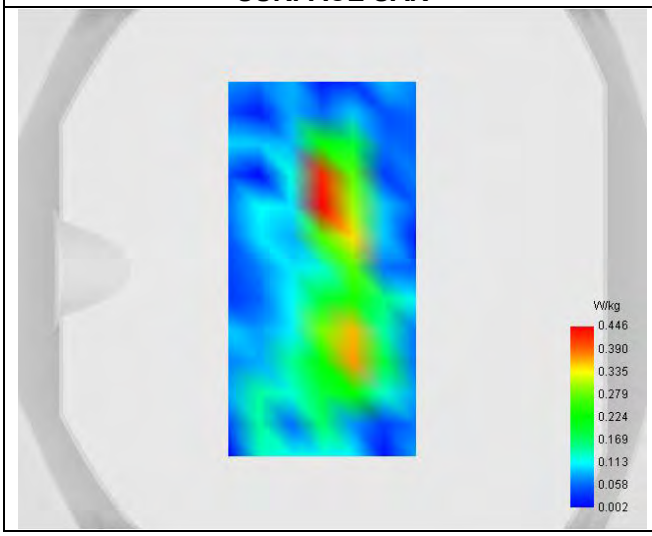
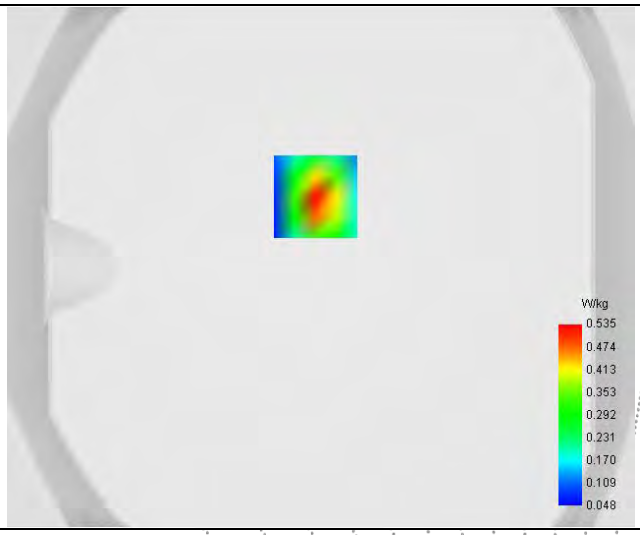
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	1900.000
Relative permitivity (real part)	38.663
Relative permitivity (imaginary part)	13.455
Conductivity (S/m)	1.400

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

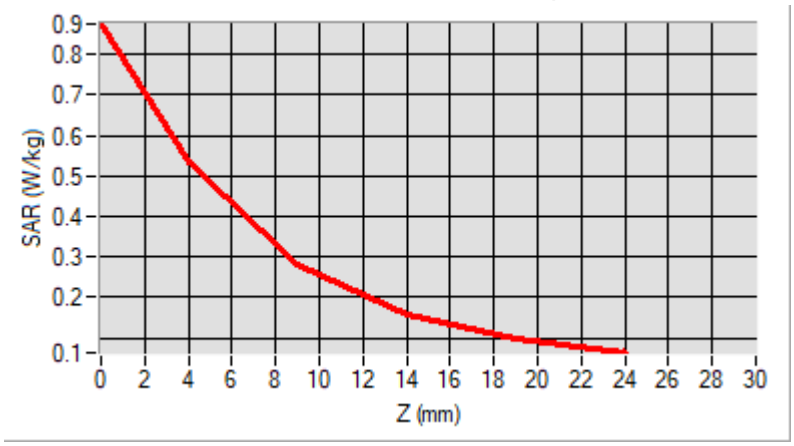
Maximum location: X=-2.00, Y=27.00 ; SAR Peak: 0.89 W/kg

D. SAR 1g & 10g

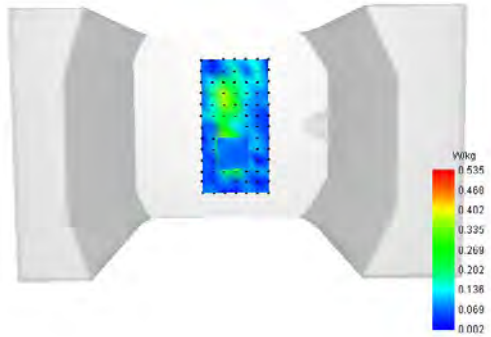
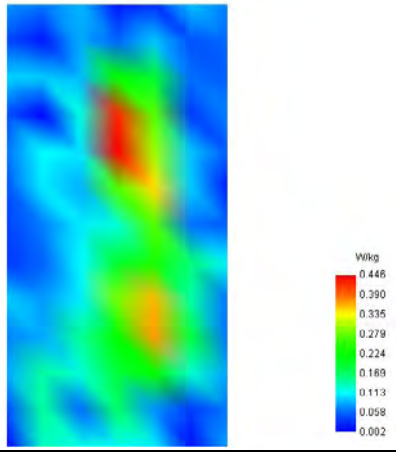
SAR 10g (W/Kg)	0.246
SAR 1g (W/Kg)	0.493
Variation (%)	-4.040
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.875	0.535	0.283	0.155	0.096



F. 3D Image

3D screen shot	Hot spot position
	

Plot 10

Date of measurement: 18/10/2024

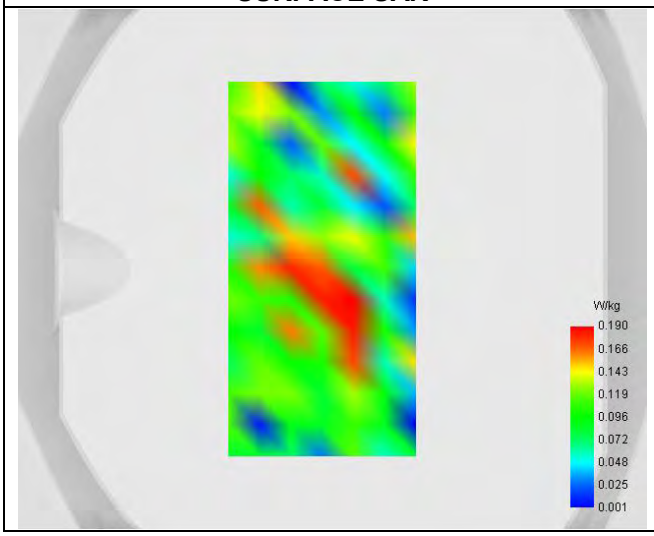
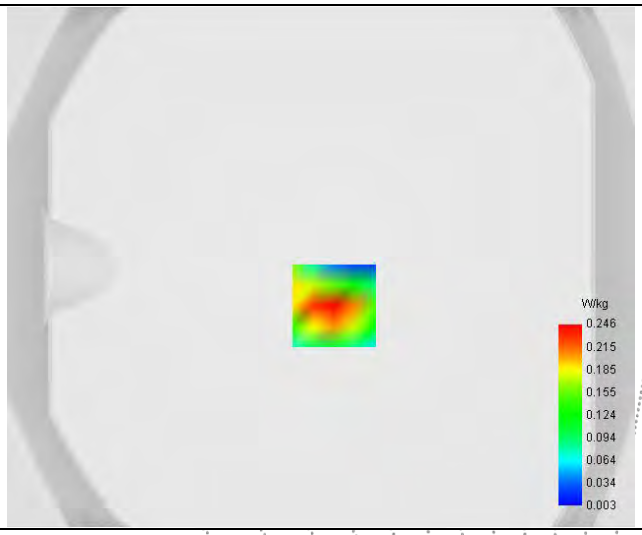
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.96
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 4
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	1720.000
Relative permitivity (real part)	39.598
Relative permitivity (imaginary part)	14.153
Conductivity (S/m)	1.366

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

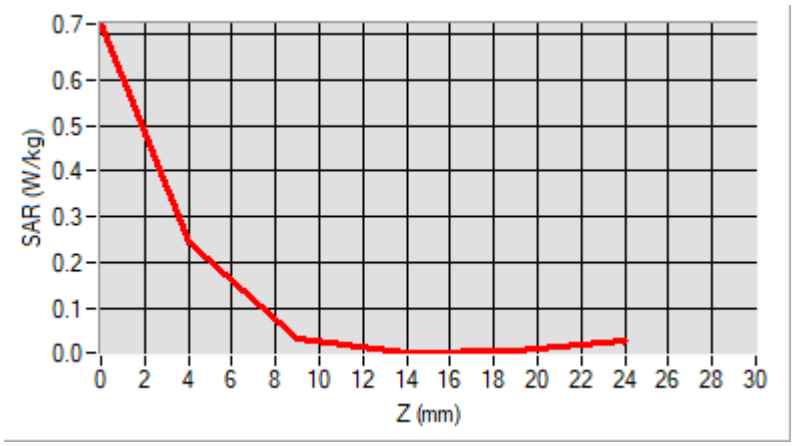
Maximum location: X=5.00, Y=-15.00 ; SAR Peak: 0.73 W/kg

D. SAR 1g & 10g

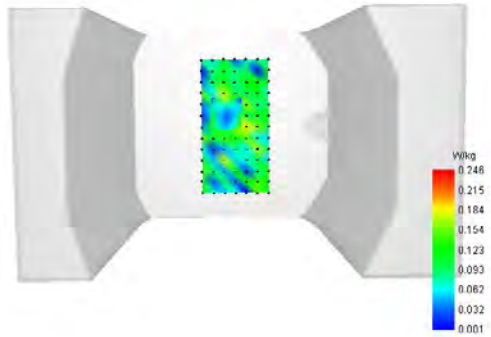
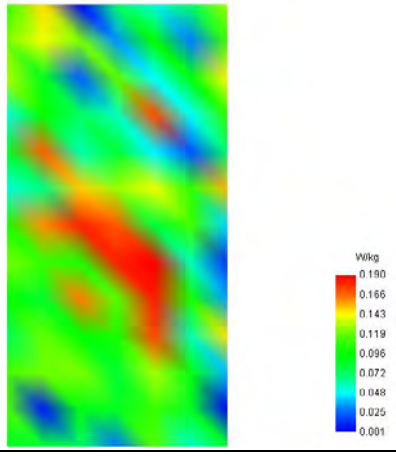
SAR 10g (W/Kg)	0.114
SAR 1g (W/Kg)	0.279
Variation (%)	-0.690
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.722	0.246	0.035	0.003	0.006



F. 3D Image

3D screen shot	Hot spot position
	

Plot 11
Date of measurement: 12/10/2024

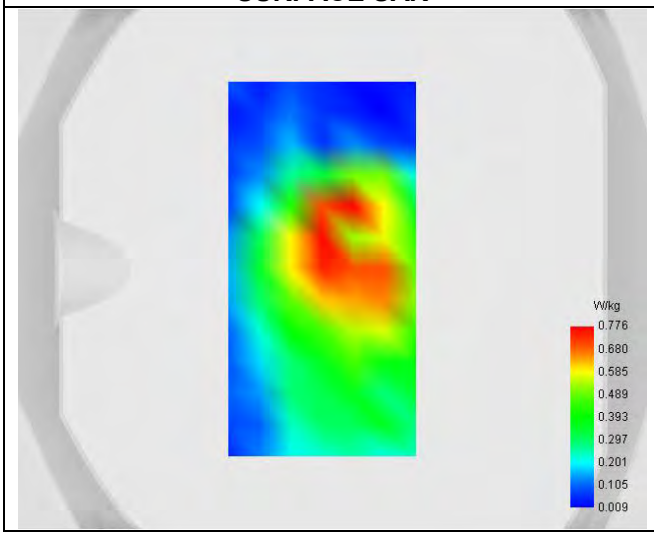
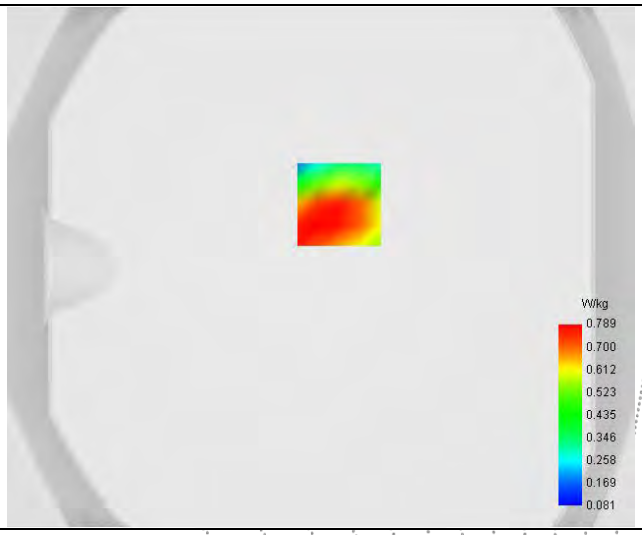
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	829.000
Relative permitivity (real part)	42.101
Relative permitivity (imaginary part)	19.407
Conductivity (S/m)	0.870

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

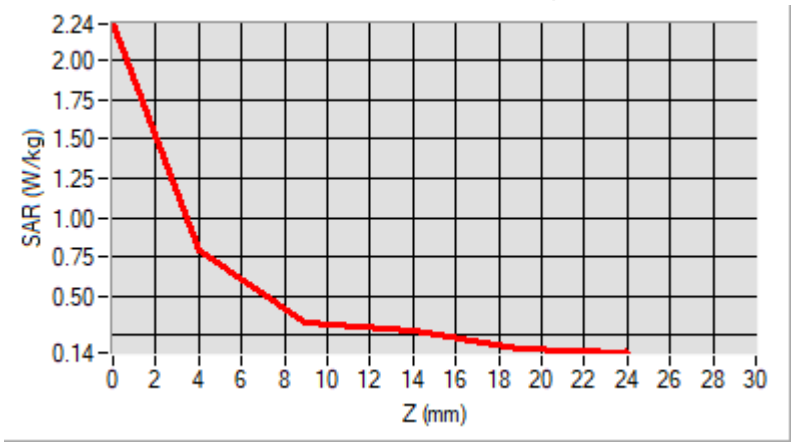
Maximum location: X=7.00, Y=24.00 ; SAR Peak: 1.29 W/kg

D. SAR 1g & 10g

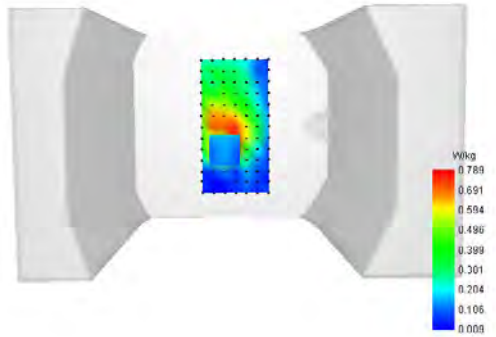
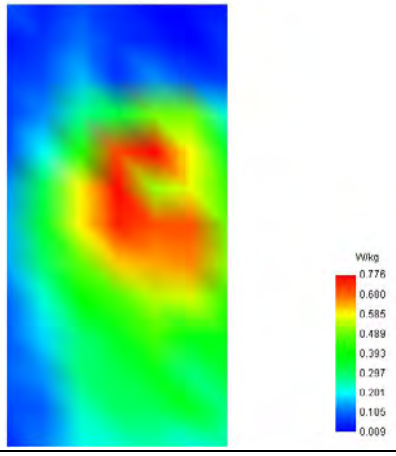
SAR 10g (W/Kg)	0.370
SAR 1g (W/Kg)	0.772
Variation (%)	-1.760
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.235	0.789	0.322	0.278	0.157



F. 3D Image

3D screen shot	Hot spot position
	

Plot 12
Date of measurement: 11/10/2024

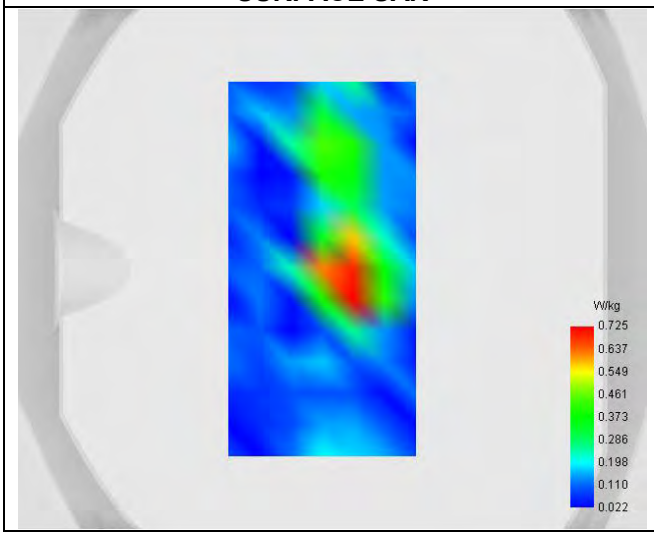
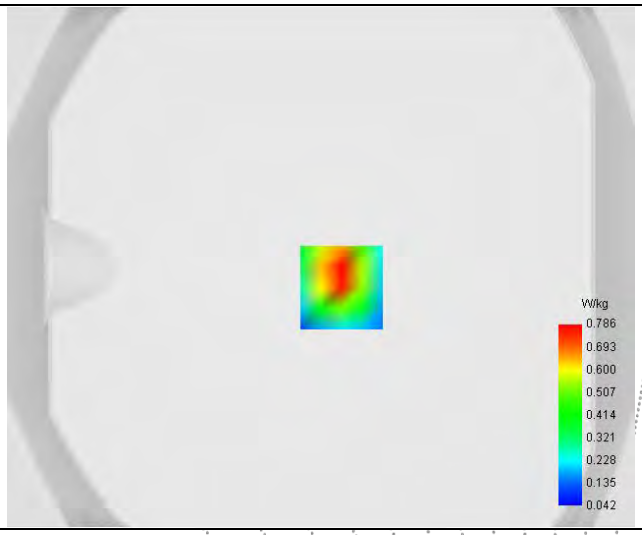
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.03
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 7
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	2510.000
Relative permitivity (real part)	39.706
Relative permitivity (imaginary part)	13.404
Conductivity (S/m)	1.974

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

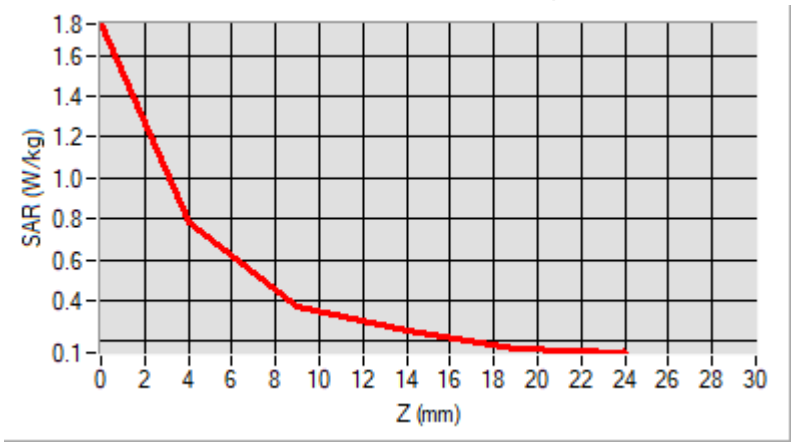
Maximum location: X=8.00, Y=-8.00 ; SAR Peak: 1.27 W/kg

D. SAR 1g & 10g

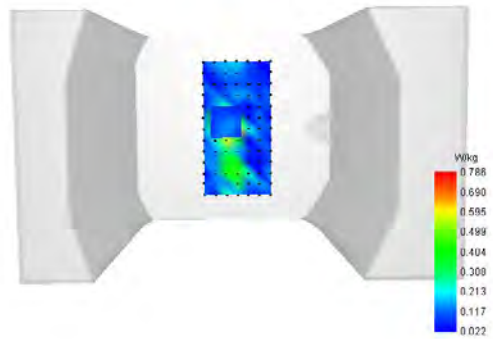
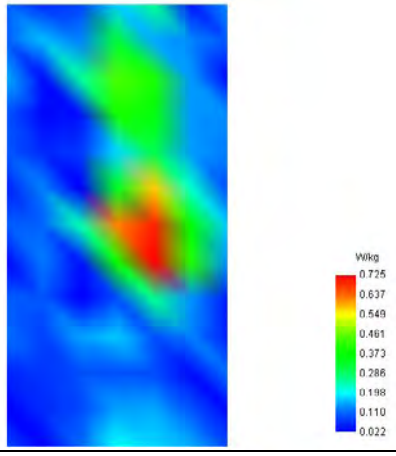
SAR 10g (W/Kg)	0.412
SAR 1g (W/Kg)	0.751
Variation (%)	-0.550
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.754	0.786	0.366	0.257	0.168



F. 3D Image

3D screen shot	Hot spot position
	

Plot 13
Date of measurement: 11/10/2024

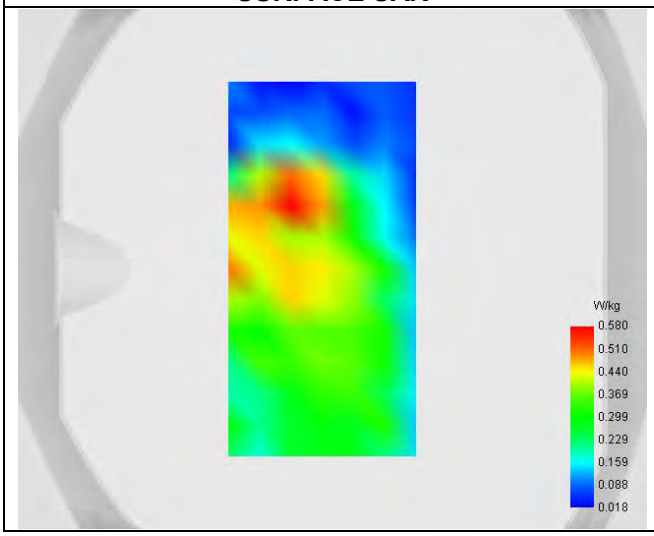
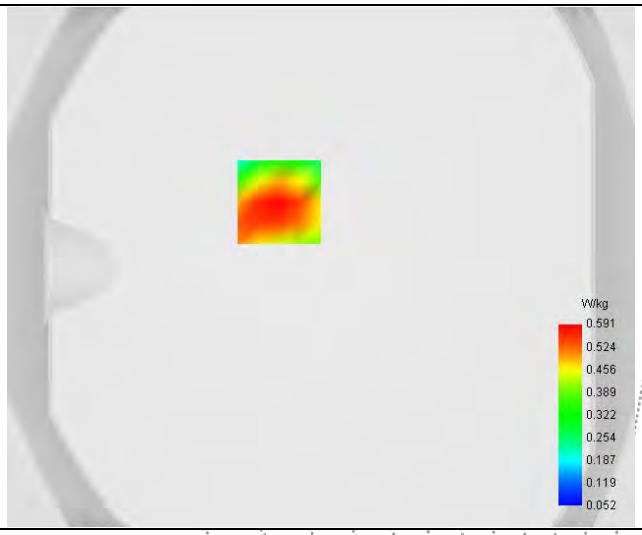
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.80
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 12
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	711.000
Relative permitivity (real part)	42.787
Relative permitivity (imaginary part)	23.345
Conductivity (S/m)	0.921

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

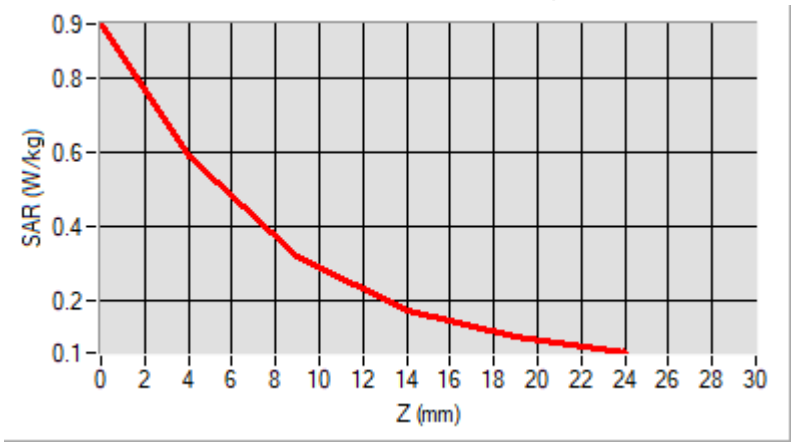
Maximum location: X=-16.00, Y=25.00 ; SAR Peak: 0.95 W/kg

D. SAR 1g & 10g

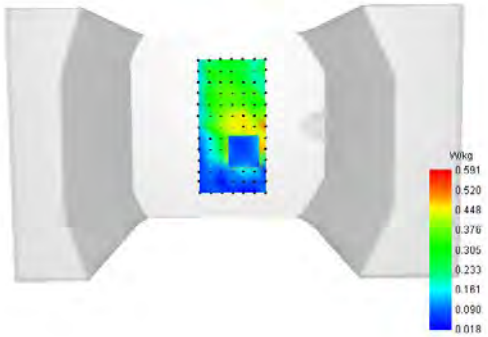
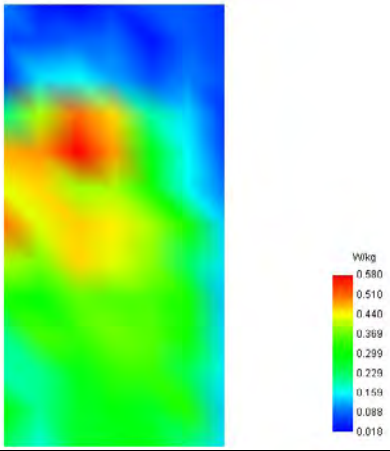
SAR 10g (W/Kg)	0.296
SAR 1g (W/Kg)	0.578
Variation (%)	-3.910
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.944	0.591	0.321	0.176	0.104



F. 3D Image

3D screen shot	Hot spot position
	

Plot 14
Date of measurement: 11/10/2024

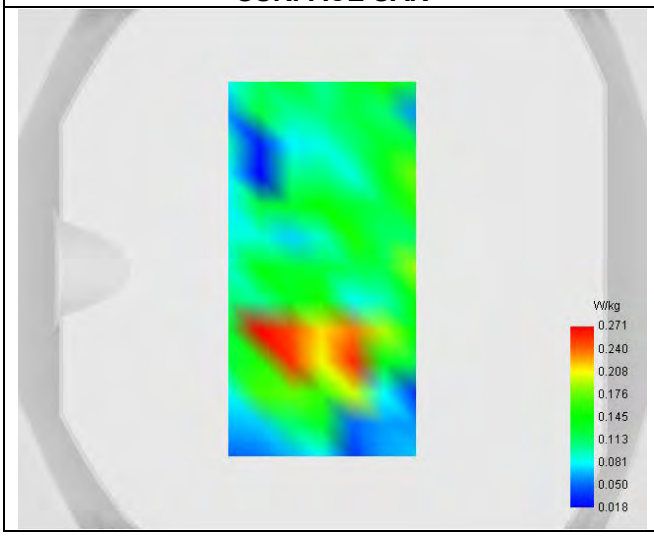
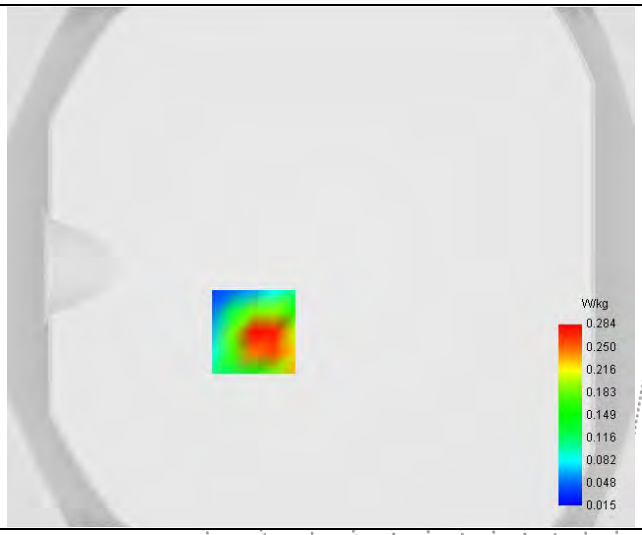
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.80
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 17
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	708.200
Relative permitivity (real part)	42.787
Relative permitivity (imaginary part)	23.233
Conductivity (S/m)	0.921

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

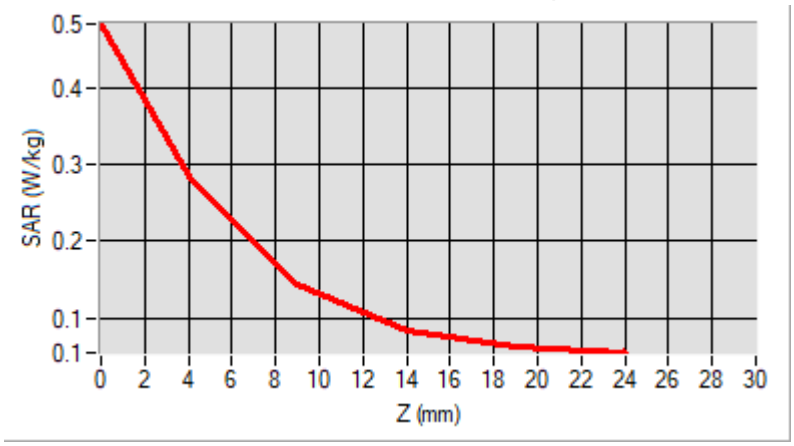
Maximum location: X=-26.00, Y=-25.00 ; SAR Peak: 0.50 W/kg

D. SAR 1g & 10g

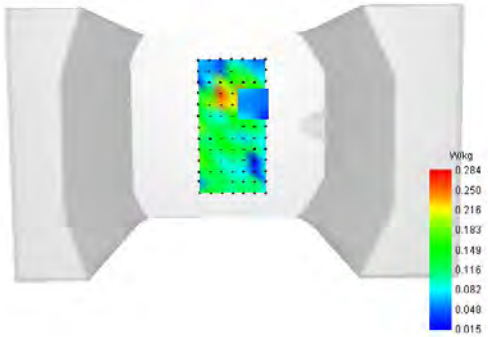
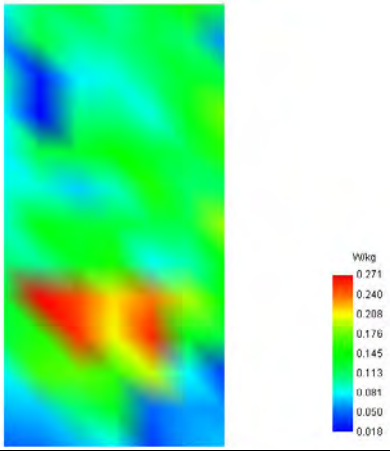
SAR 10g (W/Kg)	0.145
SAR 1g (W/Kg)	0.285
Variation (%)	2.440
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.482	0.284	0.145	0.084	0.063



F. 3D Image

3D screen shot	Hot spot position
	

16. CALIBRATION CERTIFICATES

Probe-EPGO420 Calibration Certificate
SID750Dipole Calibration Ceriticate
SID835Dipole Calibration Ceriticate
SID1800Dipole Calibration Ceriticate
SID1900Dipole Calibration Ceriticate
SID2450Dipole Calibration Ceriticate
SID2600Dipole Calibration Ceriticate
SID5000Dipole Calibration Ceriticate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.199.1.23.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: 2623-EPGO-420

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 7/18/2023

Accreditations #2-6789
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed at MVG, using the CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.199.1.23.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Cyrille ONNEE	Measurement Responsible	7/18/2023	
Checked & approved by:	Jérôme Luc	Technical Manager	7/18/2023	
Authorized by:	Yann Toutain	Laboratory Director	7/18/2023	

Yann Toutain ID Signature numérique de Yann Toutain ID Date : 2023.07.18 10:38:49 +02'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Cyrille ONNEE	7/18/2023	Initial release

Template_ACR.DDD.N.YY.MVGB.ISSUE_COMOSAR Probe vL

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	2623-EPGO-420
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.228 MΩ Dipole 2: R2=0.238 MΩ Dipole 3: R3=0.230 MΩ

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards.



Figure 1 – *MVG COMOSAR Dosimetric E field Probe*

Probe Length	330 mm
Length of Individual Dipoles	24.5 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.55 mm
Distance between dipoles / probe extremity	12.7 mm

3 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their effect. All calibrations / measurements performed meet the fore-mentioned standards.

3.1 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards for frequency range 600-7500MHz and using the calorimeter cell method (transfer method) as outlined in the standards for frequency 150-450 MHz.

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3.2 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

3.3 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 to 360 degrees in 15-degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.4 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

The boundary effect uncertainty can be estimated according to the following uncertainty approximation formula based on linear and exponential extrapolations between the surface and $d_{be} + d_{step}$ along lines that are approximately normal to the surface:

$$\mathrm{SAR}_{\mathrm{uncertainty}}[\%] = \delta\mathrm{SAR}_{be}\,\frac{\left(d_{be}+d_{step}\right)^2}{2d_{step}}\,\frac{\left(e^{-d_{be}/(\delta/2)}\right)}{\delta/2} \quad \text{for } \left(d_{be}+d_{step}\right) < 10\ \text{mm}$$

where

$\mathrm{SAR}_{\mathrm{uncertainty}}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest *zoom-scan* measurement point, in millimetre
Δ_{step}	is the separation distance between the first and second measurement points that are closest to the phantom surface, in millimetre, assuming the boundary effect at the second location is negligible
δ	is the minimum penetration depth in millimetres of the head tissue-equivalent liquids defined in this standard, i.e., $\delta \approx 14$ mm at 3 GHz;
$\Delta\mathrm{SAR}_{be}$	in percent of SAR is the deviation between the measured SAR value, at the distance d_{be} from the boundary, and the analytical SAR value.

The measured worst case boundary effect SARuncertainty[%] for scanning distances larger than 4mm is 1.0% Limit ,2%).

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4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty associated with a SAR probe calibration using the waveguide or calorimetric cell technique depending on the frequency.

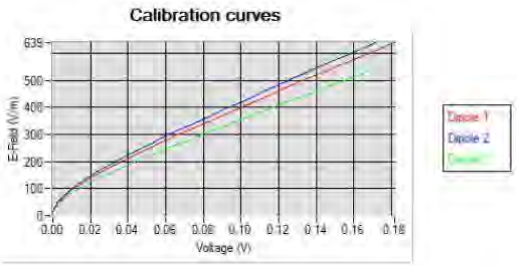
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-11% for the frequency range 150-450MHz.
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

5 CALIBRATION RESULTS

Ambient condition	
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

5.1 CALIBRATION IN AIR

The following curve represents the measurement in waveguide of the voltage picked up by the probe toward the E-field generated inside the waveguide.



From this curve, the sensitivity in air is calculated using the below formula.

$$E^2 = \sum_{i=1}^{3} \frac{V_i \left(1 + {}^{V_i}/_{DCP_i}\right)}{Norm_i}$$

where
Vi=voltage readings on the 3 channels of the probe
DCPi=diode compression point given below for the 3 channels of the probe
Normi=dipole sensitivity given below for the 3 channels of the probe

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Normx dipole 1 (μV/(V/m)²)	Normy dipole 2 (μV/(V/m)²)	Normz dipole 3 (μV/(V/m)²)
1.21	1.09	1.56

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
106	109	103

5.2 CALIBRATION IN LIQUID

The calorimeter cell or the waveguide is used to determine the calibration in liquid using the formula below.

$$ConvF = \frac{E^2_{liquid}}{E^2_{air}}$$

The E-field in the liquid is determined from the SAR measurement according to the below formula.

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

where
σ=the conductivity of the liquid
ρ=the volumetric density of the liquid
SAR=the SAR measured from the formula that depends on the setup used. The SAR formulas are given below

For the calorimeter cell (150-450 MHz), the formula is:

$$SAR = c\frac{dT}{dt}$$

where
c=the specific heat for the liquid
dT/dt=the temperature rises over the time

For the waveguide setup (600-75000 MHz), the formula is:

$$SAR = \frac{4Pw}{ab\delta} e^{\frac{-2z}{\delta}}$$

where
a=the larger cross-sectional of the waveguide
b=the smaller cross-sectional of the waveguide
δ=the skin depth for the liquid in the waveguide
Pw=the power delivered to the liquid

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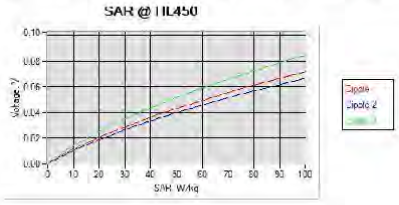
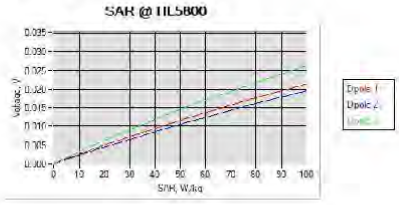
The below table summarize the ConvF for the calibrated liquid. The curves give examples for the measured SAR depending on the voltage in some liquid.

Liquid	Frequency (MHz*)	ConvF
HL450	450	0.86
BL450	450	0.78
HL750	750	0.80
BL750	750	0.87
HL850	835	0.81
BL850	835	0.80
HL900	900	0.76
BL900	900	0.87
HL1800	1800	0.96
BL1800	1800	1.01
HL1900	1900	1.04
BL1900	1900	1.11
HL2100	2100	1.00
BL2100	2100	1.16
HL2300	2300	1.11
BL2300	2300	1.23
HL2450	2450	1.11
BL2450	2450	1.32
HL2600	2600	1.03
BL2600	2600	1.19
HL5200	5200	1.18
BL5200	5200	0.97
HL5400	5400	1.17
BL5400	5400	1.00
HL5600	5600	1.20
BL5600	5600	0.95
HL5800	5800	1.15
BL5800	5800	1.05

(*) Frequency validity is +/-50MHz below 600MHz, +/-100MHz from 600MHz to 6GHz and +/-700MHz above 6GHz





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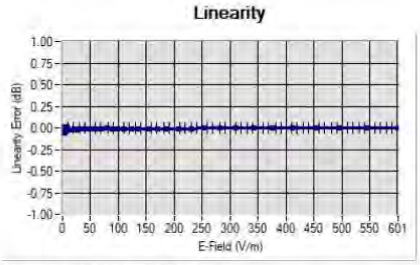
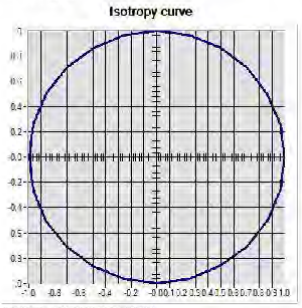
6 VERIFICATION RESULTS

The figures below represent the measured linearity and axial isotropy for this probe. The probe specification is +/-0.2 dB for linearity and +/-0.15 dB for axial isotropy.



Linearity +/-1.48% (+/-0.06dB)



Isotropy +/-0.25% (+/-0.01dB)

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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
CALIPROBE Test Bench	Version 2	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2023
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Fluoroptic Thermometer	LumaSense Luxtron 812	94264	09/2022	09/2025
Coaxial cell	MVG	SN 32/16 COAXCELL_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG2_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G600_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G900_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG8_1	Validated. No cal required.	Validated. No cal required.

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Liquid transition	MVG	SN 32/16 WGLIQ_1G800B_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800H_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG10_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_3G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG12_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_5G000_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG14_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_7G000_1	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.329.8.21.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA

MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 750 MHZ
SERIAL NO.: SN 47/21 DIP 0G750-620

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/13

SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.329.8.21.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Luc	Technical Manager	11/25/2021	
Checked by :	Jérôme Luc	Technical Manager	11/25/2021	
Approved by :	Yann Toutain	Laboratory Director	11/25/2021	Yann TOUTAIN 2021.11.25 11:51:55 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	11/25/2021	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 750 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID750
Serial Number	SN 47/21 DIP 0G750-620
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *MVG COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

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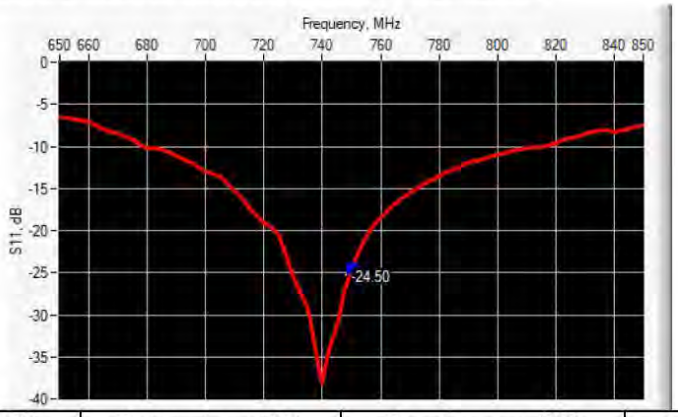
Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

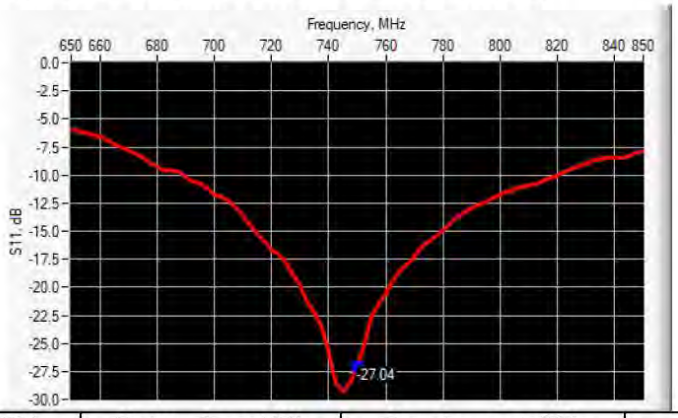
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-24.50	-20	55.7 Ω - 1.7 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-27.04	-20	53.8 Ω + 2.3 jΩ

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6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.	177.28	100.0 ±1 %.	99.79	6.35 ±1 %.	6.35
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	86.2 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3300	-		-		-	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3900	-		-		-	
4200	-		-		-	
4600	-		-		-	
4900	-		-		-	

7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

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7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %	41.0	0.89 ±10 %	0.82
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3300	38.2 ±10 %		2.71 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	
3700	37.7 ±10 %		3.12 ±10 %	
3900	37.5 ±10 %		3.32 ±10 %	
4200	37.1 ±10 %		3.63 ±10 %	
4600	36.7 ±10 %		4.04 ±10 %	
4900	36.3 ±10 %		4.35 ±10 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.8.21.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 41.0 sigma : 0.82
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	750 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49	8.58 (0.86)	5.55	5.59 (0.56)
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3300	-		-	
3500	67.1		25	
3700	67.4		24.2	
3900	-		-	
4200	-		-	
4600	-		-	
4900	-		-	

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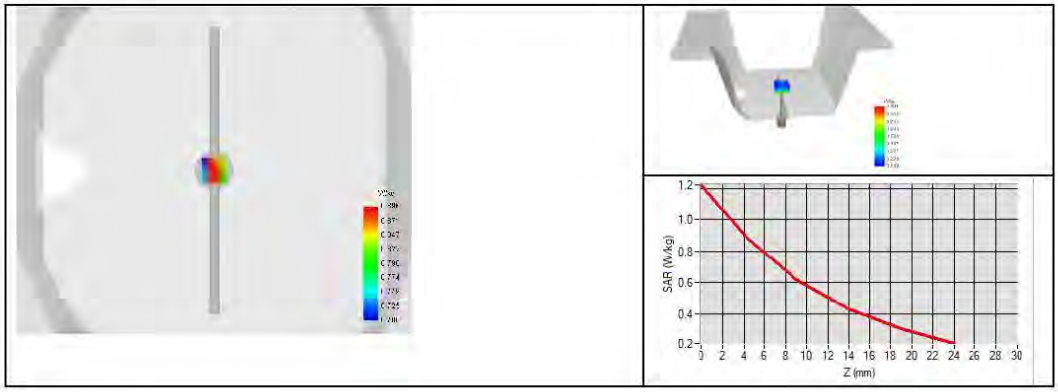

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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±10 %		0.80 ±10 %	
300	58.2 ±10 %		0.92 ±10 %	
450	56.7 ±10 %		0.94 ±10 %	
750	55.5 ±10 %	52.9	0.96 ±10 %	0.89
835	55.2 ±10 %		0.97 ±10 %	
900	55.0 ±10 %		1.05 ±10 %	
915	55.0 ±10 %		1.06 ±10 %	
1450	54.0 ±10 %		1.30 ±10 %	
1610	53.8 ±10 %		1.40 ±10 %	
1800	53.3 ±10 %		1.52 ±10 %	
1900	53.3 ±10 %		1.52 ±10 %	
2000	53.3 ±10 %		1.52 ±10 %	
2100	53.2 ±10 %		1.62 ±10 %	
2300	52.9 ±10 %		1.81 ±10 %	
2450	52.7 ±10 %		1.95 ±10 %	
2600	52.5 ±10 %		2.16 ±10 %	
3000	52.0 ±10 %		2.73 ±10 %	
3300	51.6 ±10 %		3.08 ±10 %	
3500	51.3 ±10 %		3.31 ±10 %	
3700	51.0 ±10 %		3.55 ±10 %	
3900	50.8 ±10 %		3.78 ±10 %	
4200	50.4 ±10 %		4.13 ±10 %	
4600	49.8 ±10 %		4.60 ±10 %	
4900	49.4 ±10 %		4.95 ±10 %	
5200	49.0 **±10** %		5.30 **±10** %	
5300	48.9 **±10** %		5.42 **±10** %	
5400	48.7 **±10** %		5.53 **±10** %	
5500	48.6 **±10** %		5.65 **±10** %	
5600	48.5 **±10** %		5.77 **±10** %	
5800	48.2 **±10** %		6.00 **±10** %	

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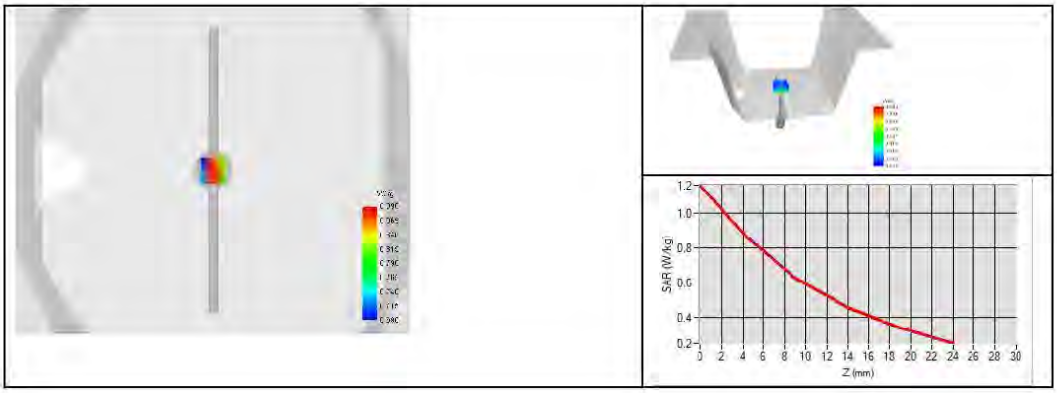
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Body Liquid Values: eps' : 52.9 sigma : 0.89
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	750 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
750	8.41 (0.84)	5.66 (0.57)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	SN 41/18 EPGO333	10/2021	10/2022
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2019	11/2022
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.329.9.21.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 835 MHZ
SERIAL NO.: SN 47/21 DIP 0G835-621

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/13

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.9.21.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Luc	Technical Manager	11/25/2021	
Checked by :	Jérôme Luc	Technical Manager	11/25/2021	
Approved by :	Yann Toutain	Laboratory Director	11/25/2021	Yann TOUTAIN 2021.11.25 11:52:29 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	11/25/2021	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 835 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID835
Serial Number	SN 47/21 DIP 0G835-621
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *MVG COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

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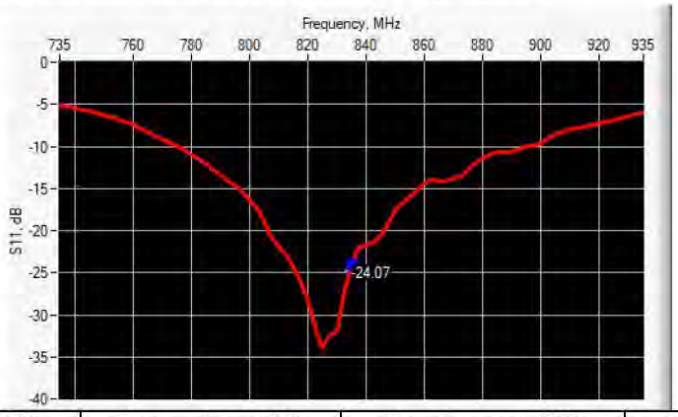
Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

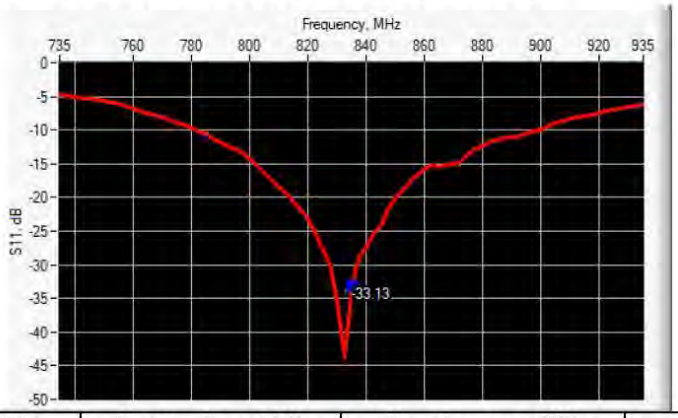
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-24.07	-20	55.3 Ω - 3.3 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-33.13	-20	52.2 Ω - 0.4 jΩ

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6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.	161.47	89.8 ±1 %.	89.78	3.6 ±1 %.	3.61
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	86.2 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3300	-		-		-	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3900	-		-		-	
4200	-		-		-	
4600	-		-		-	
4900	-		-		-	

7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

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7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %	39.9	0.90 ±10 %	0.91
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3300	38.2 ±10 %		2.71 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	
3700	37.7 ±10 %		3.12 ±10 %	
3900	37.5 ±10 %		3.32 ±10 %	
4200	37.1 ±10 %		3.63 ±10 %	
4600	36.7 ±10 %		4.04 ±10 %	
4900	36.3 ±10 %		4.35 ±10 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.9.21.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 39.9 sigma : 0.91
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	835 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56	10.01 (1.00)	6.22	6.32 (0.63)
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3300	-		-	
3500	67.1		25	
3700	67.4		24.2	
3900	-		-	
4200	-		-	
4600	-		-	
4900	-		-	

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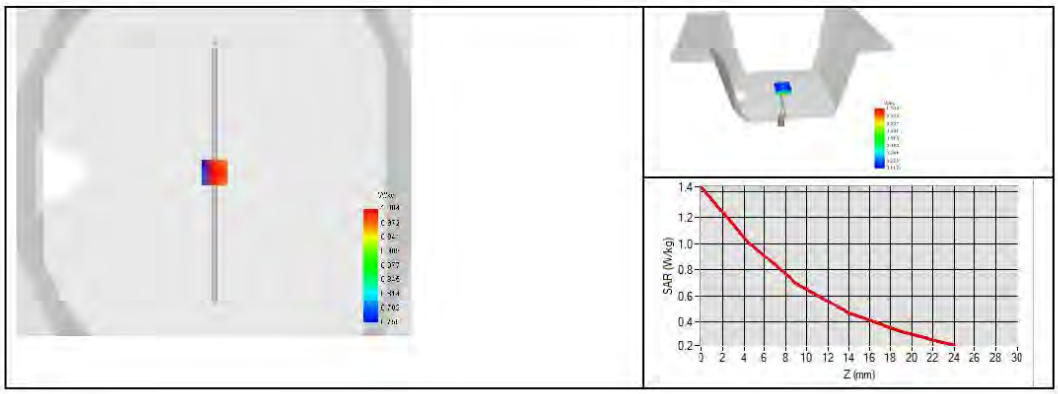

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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±10 %		0.80 ±10 %	
300	58.2 ±10 %		0.92 ±10 %	
450	56.7 ±10 %		0.94 ±10 %	
750	55.5 ±10 %		0.96 ±10 %	
835	55.2 ±10 %	52.3	0.97 ±10 %	0.94
900	55.0 ±10 %		1.05 ±10 %	
915	55.0 ±10 %		1.06 ±10 %	
1450	54.0 ±10 %		1.30 ±10 %	
1610	53.8 ±10 %		1.40 ±10 %	
1800	53.3 ±10 %		1.52 ±10 %	
1900	53.3 ±10 %		1.52 ±10 %	
2000	53.3 ±10 %		1.52 ±10 %	
2100	53.2 ±10 %		1.62 ±10 %	
2300	52.9 ±10 %		1.81 ±10 %	
2450	52.7 ±10 %		1.95 ±10 %	
2600	52.5 ±10 %		2.16 ±10 %	
3000	52.0 ±10 %		2.73 ±10 %	
3300	51.6 ±10 %		3.08 ±10 %	
3500	51.3 ±10 %		3.31 ±10 %	
3700	51.0 ±10 %		3.55 ±10 %	
3900	50.8 ±10 %		3.78 ±10 %	
4200	50.4 ±10 %		4.13 ±10 %	
4600	49.8 ±10 %		4.60 ±10 %	
4900	49.4 ±10 %		4.95 ±10 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

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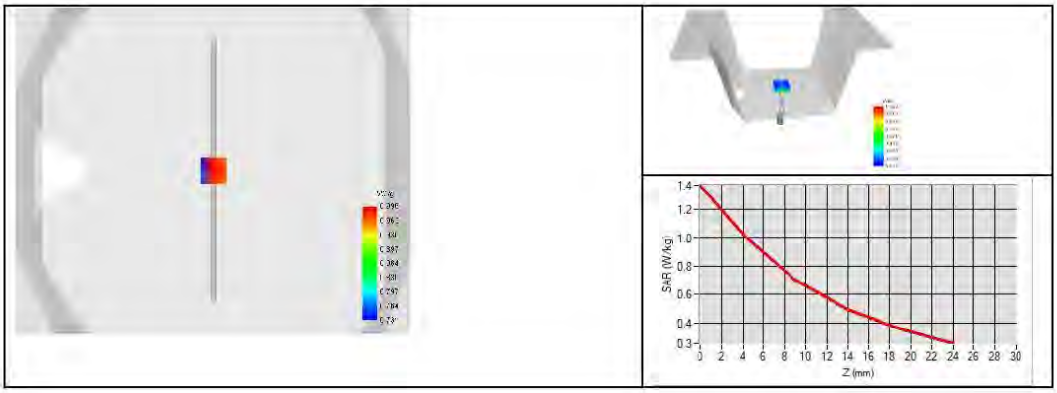
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Body Liquid Values: eps' : 52.3 sigma : 0.94
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	835 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
835	9.70 (0.97)	6.32 (0.63)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	SN 41/18 EPGO333	10/2021	10/2022
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2019	11/2022
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.329.11.21.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 1800 MHZ
SERIAL NO.: SN 47/21 DIP 1G800-623

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021

Accreditations #2-6789 and #2-6814
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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

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SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.329.11.21.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Luc	Technical Manager	11/25/2021	
Checked by :	Jérôme Luc	Technical Manager	11/25/2021	
Approved by :	Yann Toutain	Laboratory Director	11/25/2021	Yann TOUTAIN 2021.11.25 11:53:42 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	11/25/2021	Initial release

Template_ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole v3
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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 1800 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID1800
Serial Number	SN 47/21 DIP 1G800-623
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *MVG COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

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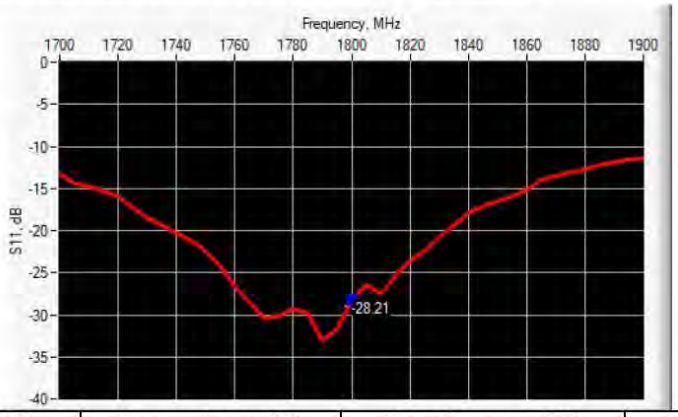
Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

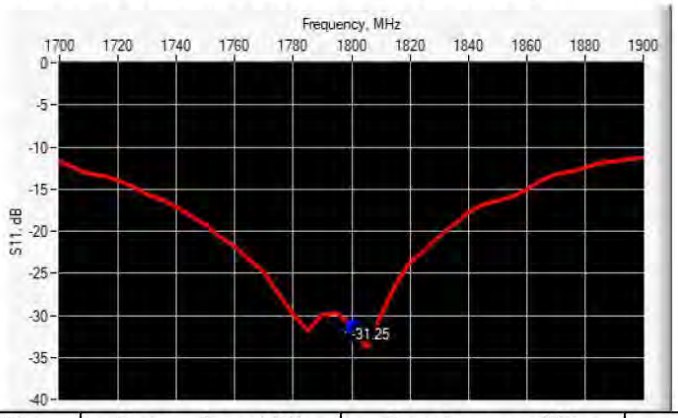
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1800	-28.21	-20	49.8 Ω + 3.9 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1800	-31.25	-20	47.7 Ω - 1.4 jΩ

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6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	86.2 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.	72.31	41.7 ±1 %.	41.63	3.6 ±1 %.	3.59
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3300	-		-		-	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3900	-		-		-	
4200	-		-		-	
4600	-		-		-	
4900	-		-		-	

7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

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7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %	38.4	1.40 ±10 %	1.36
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3300	38.2 ±10 %		2.71 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	
3700	37.7 ±10 %		3.12 ±10 %	
3900	37.5 ±10 %		3.32 ±10 %	
4200	37.1 ±10 %		3.63 ±10 %	
4600	36.7 ±10 %		4.04 ±10 %	
4900	36.3 ±10 %		4.35 ±10 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.11.21.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 38.4 sigma : 1.36
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4	39.74 (3.97)	20.1	20.82 (2.08)
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3300	-		-	
3500	67.1		25	
3700	67.4		24.2	
3900	-		-	
4200	-		-	
4600	-		-	
4900	-		-	

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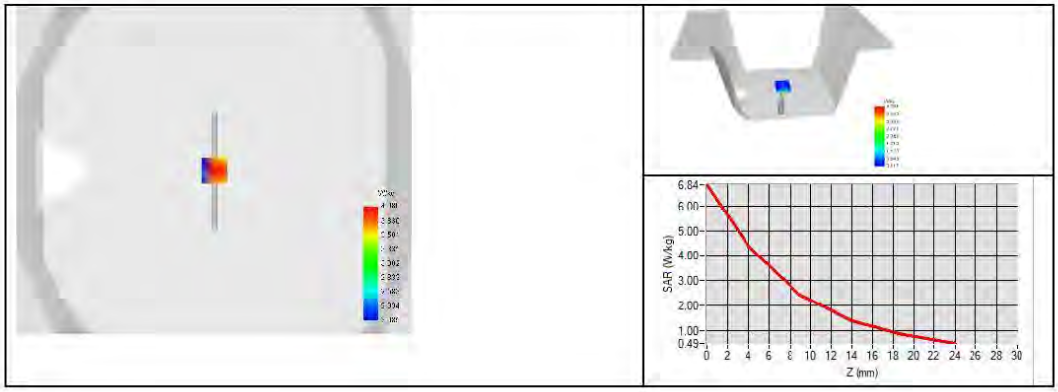

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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±10 %		0.80 ±10 %	
300	58.2 ±10 %		0.92 ±10 %	
450	56.7 ±10 %		0.94 ±10 %	
750	55.5 ±10 %		0.96 ±10 %	
835	55.2 ±10 %		0.97 ±10 %	
900	55.0 ±10 %		1.05 ±10 %	
915	55.0 ±10 %		1.06 ±10 %	
1450	54.0 ±10 %		1.30 ±10 %	
1610	53.8 ±10 %		1.40 ±10 %	
1800	53.3 ±10 %	55.3	1.52 ±10 %	1.49
1900	53.3 ±10 %		1.52 ±10 %	
2000	53.3 ±10 %		1.52 ±10 %	
2100	53.2 ±10 %		1.62 ±10 %	
2300	52.9 ±10 %		1.81 ±10 %	
2450	52.7 ±10 %		1.95 ±10 %	
2600	52.5 ±10 %		2.16 ±10 %	
3000	52.0 ±10 %		2.73 ±10 %	
3300	51.6 ±10 %		3.08 ±10 %	
3500	51.3 ±10 %		3.31 ±10 %	
3700	51.0 ±10 %		3.55 ±10 %	
3900	50.8 ±10 %		3.78 ±10 %	
4200	50.4 ±10 %		4.13 ±10 %	
4600	49.8 ±10 %		4.60 ±10 %	
4900	49.4 ±10 %		4.95 ±10 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

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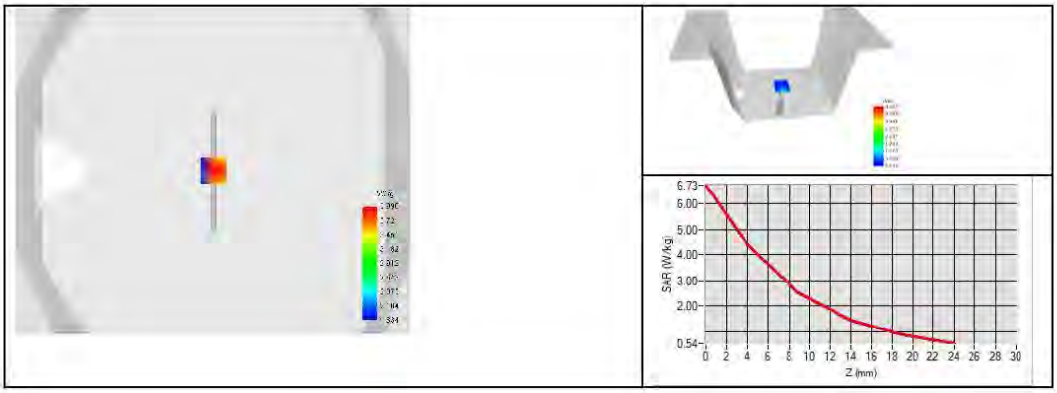
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Body Liquid Values: eps' : 55.3 sigma : 1.49
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
1800	39.54 (3.95)	20.63 (2.06)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	SN 41/18 EPGO333	10/2021	10/2022
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2019	11/2022
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.329.12.21.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 1900 MHZ
SERIAL NO.: SN 47/21 DIP 1G900-624

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.12.21.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Luc	Technical Manager	11/25/2021	
Checked by :	Jérôme Luc	Technical Manager	11/25/2021	
Approved by :	Yann Toutain	Laboratory Director	11/25/2021	Yann TOUTAIN 2021.11.25 11:54:31 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	11/25/2021	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 1900 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID1900
Serial Number	SN 47/21 DIP 1G900-624
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *MVG COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

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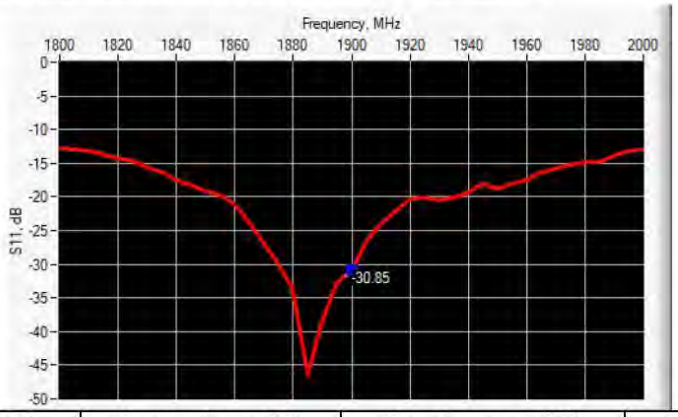
Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

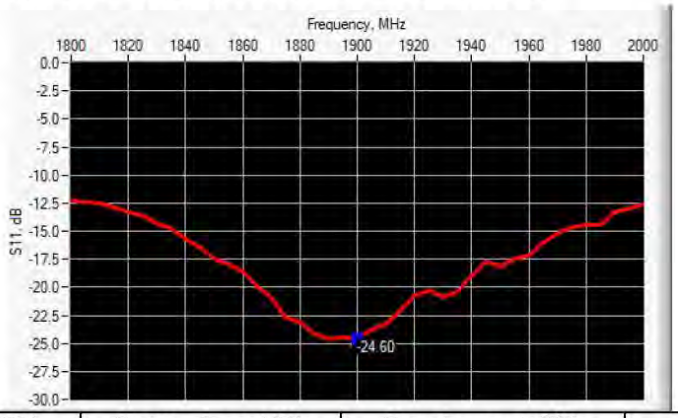
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1900	-30.85	-20	51.9 Ω + 2.2 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1900	-24.60	-20	45.9 Ω + 4.2 jΩ

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6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	86.2 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.	67.97	39.5 ±1 %.	39.61	3.6 ±1 %.	3.60
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3300	-		-		-	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3900	-		-		-	
4200	-		-		-	
4600	-		-		-	
4900	-		-		-	

7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

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7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %	37.9	1.40 ±10 %	1.43
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3300	38.2 ±10 %		2.71 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	
3700	37.7 ±10 %		3.12 ±10 %	
3900	37.5 ±10 %		3.32 ±10 %	
4200	37.1 ±10 %		3.63 ±10 %	
4600	36.7 ±10 %		4.04 ±10 %	
4900	36.3 ±10 %		4.35 ±10 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.12.21.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 37.9 sigma : 1.43
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	1900 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7	41.26 (4.13)	20.5	20.94 (2.09)
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3300	-		-	
3500	67.1		25	
3700	67.4		24.2	
3900	-		-	
4200	-		-	
4600	-		-	
4900	-		-	

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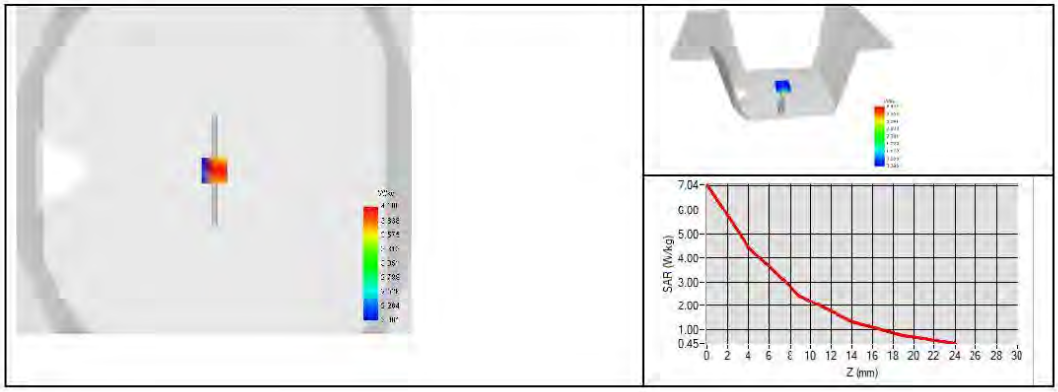

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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±10 %		0.80 ±10 %	
300	58.2 ±10 %		0.92 ±10 %	
450	56.7 ±10 %		0.94 ±10 %	
750	55.5 ±10 %		0.96 ±10 %	
835	55.2 ±10 %		0.97 ±10 %	
900	55.0 ±10 %		1.05 ±10 %	
915	55.0 ±10 %		1.06 ±10 %	
1450	54.0 ±10 %		1.30 ±10 %	
1610	53.8 ±10 %		1.40 ±10 %	
1800	53.3 ±10 %		1.52 ±10 %	
1900	53.3 ±10 %	55.0	1.52 ±10 %	1.57
2000	53.3 ±10 %		1.52 ±10 %	
2100	53.2 ±10 %		1.62 ±10 %	
2300	52.9 ±10 %		1.81 ±10 %	
2450	52.7 ±10 %		1.95 ±10 %	
2600	52.5 ±10 %		2.16 ±10 %	
3000	52.0 ±10 %		2.73 ±10 %	
3300	51.6 ±10 %		3.08 ±10 %	
3500	51.3 ±10 %		3.31 ±10 %	
3700	51.0 ±10 %		3.55 ±10 %	
3900	50.8 ±10 %		3.78 ±10 %	
4200	50.4 ±10 %		4.13 ±10 %	
4600	49.8 ±10 %		4.60 ±10 %	
4900	49.4 ±10 %		4.95 ±10 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

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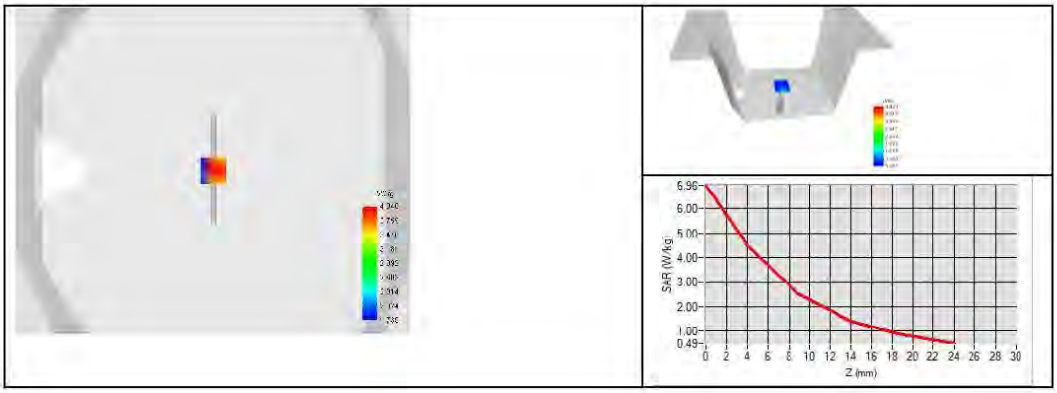
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Body Liquid Values: eps' : 55.0 sigma : 1.57
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	1900 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
1900	40.66 (4.07)	20.57 (2.06)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	SN 41/18 EPGO333	10/2021	10/2022
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2019	11/2022
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.329.15.21.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 2450 MHZ
SERIAL NO.: SN 47/21 DIP 2G450-627

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/13

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.15.21.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Luc	Technical Manager	11/25/2021	
Checked by :	Jérôme Luc	Technical Manager	11/25/2021	
Approved by :	Yann Toutain	Laboratory Director	11/25/2021	Yann TOUTAIN 2021.11.25 11:56:55 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	11/25/2021	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2450 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2450
Serial Number	SN 47/21 DIP 2G450-627
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *MVG COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

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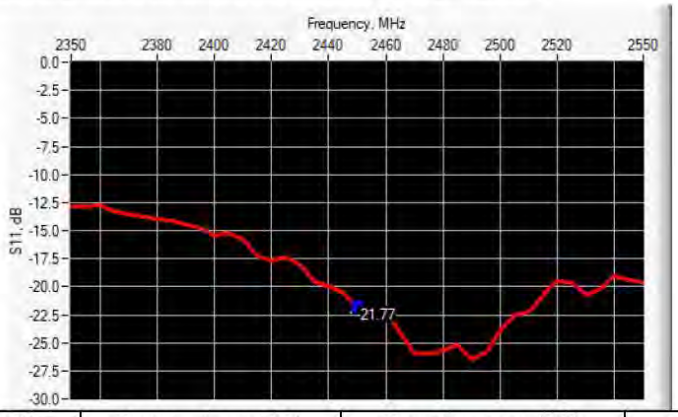
Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

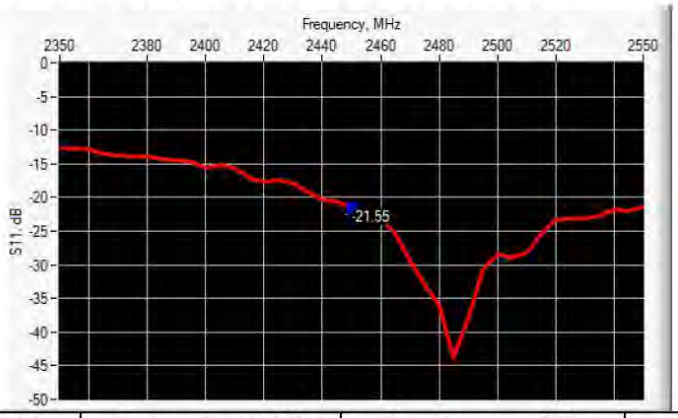
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-21.77	-20	49.1 Ω + 8.1 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-21.55	-20	54.7 Ω + 6.8 jΩ

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6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	86.2 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.	51.37	30.4 ±1 %.	30.45	3.6 ±1 %.	3.60
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3300	-		-		-	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3900	-		-		-	
4200	-		-		-	
4600	-		-		-	
4900	-		-		-	

7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

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7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %	36.4	1.80 ±10 %	1.96
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3300	38.2 ±10 %		2.71 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	
3700	37.7 ±10 %		3.12 ±10 %	
3900	37.5 ±10 %		3.32 ±10 %	
4200	37.1 ±10 %		3.63 ±10 %	
4600	36.7 ±10 %		4.04 ±10 %	
4900	36.3 ±10 %		4.35 ±10 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.15.21.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 36.4 sigma : 1.96
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4	55.16 (5.52)	24	24.15 (2.41)
2600	55.3		24.6	
3000	63.8		25.7	
3300	-		-	
3500	67.1		25	
3700	67.4		24.2	
3900	-		-	
4200	-		-	
4600	-		-	
4900	-		-	

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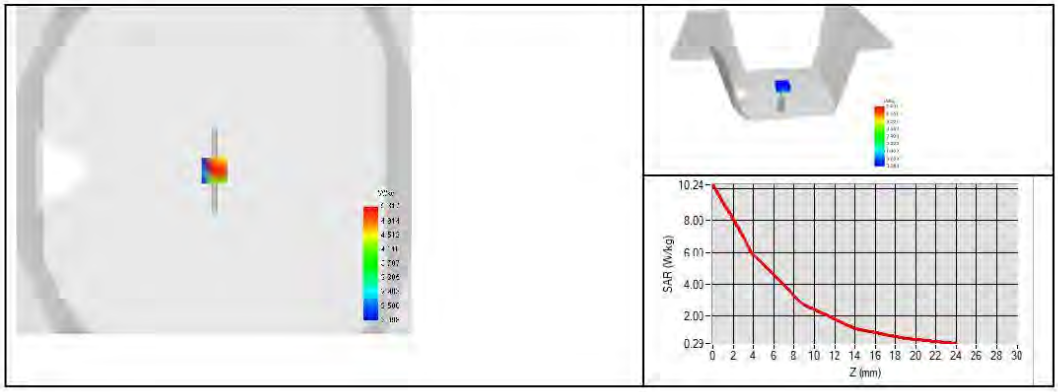

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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±10 %		0.80 ±10 %	
300	58.2 ±10 %		0.92 ±10 %	
450	56.7 ±10 %		0.94 ±10 %	
750	55.5 ±10 %		0.96 ±10 %	
835	55.2 ±10 %		0.97 ±10 %	
900	55.0 ±10 %		1.05 ±10 %	
915	55.0 ±10 %		1.06 ±10 %	
1450	54.0 ±10 %		1.30 ±10 %	
1610	53.8 ±10 %		1.40 ±10 %	
1800	53.3 ±10 %		1.52 ±10 %	
1900	53.3 ±10 %		1.52 ±10 %	
2000	53.3 ±10 %		1.52 ±10 %	
2100	53.2 ±10 %		1.62 ±10 %	
2300	52.9 ±10 %		1.81 ±10 %	
2450	52.7 ±10 %	53.4	1.95 ±10 %	2.14
2600	52.5 ±10 %		2.16 ±10 %	
3000	52.0 ±10 %		2.73 ±10 %	
3300	51.6 ±10 %		3.08 ±10 %	
3500	51.3 ±10 %		3.31 ±10 %	
3700	51.0 ±10 %		3.55 ±10 %	
3900	50.8 ±10 %		3.78 ±10 %	
4200	50.4 ±10 %		4.13 ±10 %	
4600	49.8 ±10 %		4.60 ±10 %	
4900	49.4 ±10 %		4.95 ±10 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

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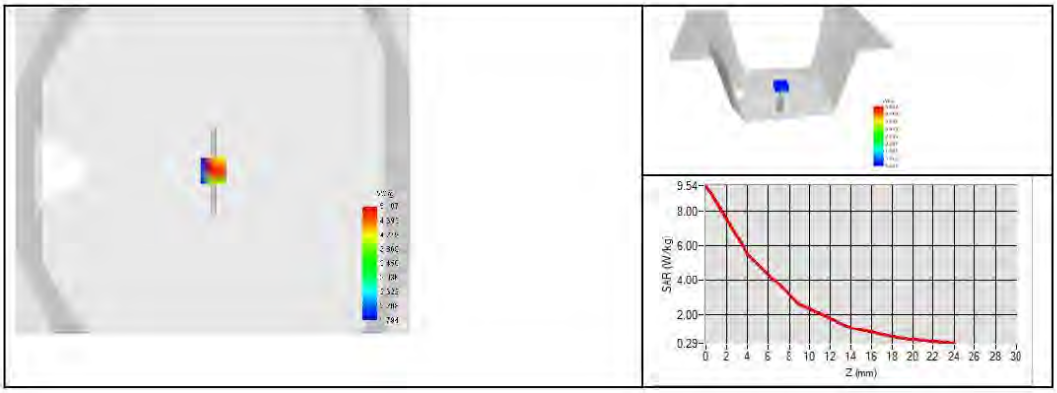
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Body Liquid Values: eps' : 53.4 sigma : 2.14
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2450	52.28 (5.23)	22.68 (2.27)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	SN 41/18 EPGO333	10/2021	10/2022
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2019	11/2022
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.329.16.21.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 2600 MHZ
SERIAL NO.: SN 47/21 DIP 2G600-628

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/13

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.16.21.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Luc	Technical Manager	11/25/2021	
Checked by :	Jérôme Luc	Technical Manager	11/25/2021	
Approved by :	Yann Toutain	Laboratory Director	11/25/2021	Yann TOUTAIN 2021.11.25 11:57:32 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	11/25/2021	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2600 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2600
Serial Number	SN 47/21 DIP 2G600-628
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *MVG COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

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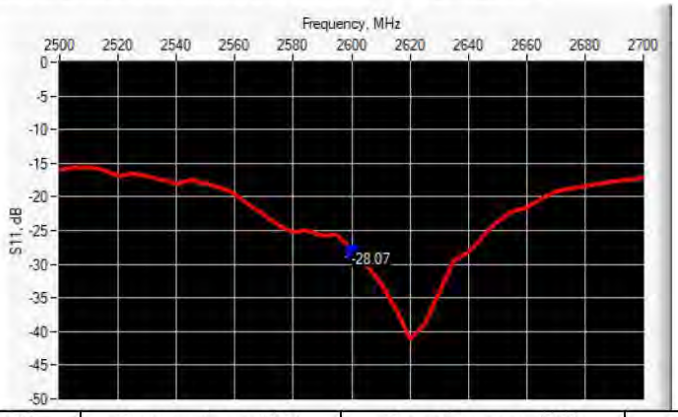
Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

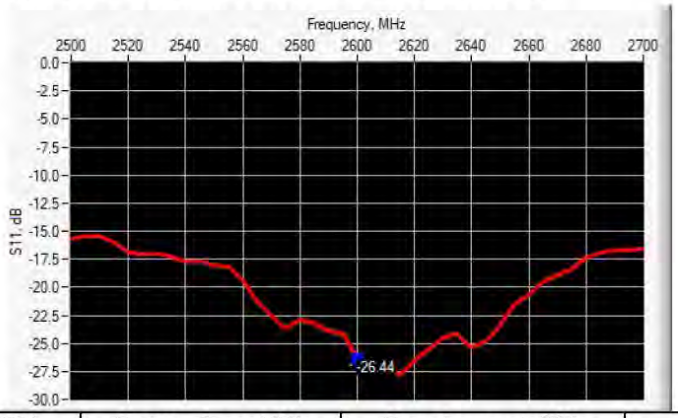
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2600	-28.07	-20	52.8 Ω - 2.8 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2600	-26.44	-20	46.7 Ω - 3.4 jΩ

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6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	
450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	86.2 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.	48.19	28.8 ±1 %.	28.80	3.6 ±1 %.	3.59
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3300	-		-		-	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3900	-		-		-	
4200	-		-		-	
4600	-		-		-	
4900	-		-		-	

7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

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7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %	36.0	1.96 ±10 %	2.12
3000	38.5 ±10 %		2.40 ±10 %	
3300	38.2 ±10 %		2.71 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	
3700	37.7 ±10 %		3.12 ±10 %	
3900	37.5 ±10 %		3.32 ±10 %	
4200	37.1 ±10 %		3.63 ±10 %	
4600	36.7 ±10 %		4.04 ±10 %	
4900	36.3 ±10 %		4.35 ±10 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.16.21.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 36.0 sigma : 2.12
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	2600 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3	56.50 (5.65)	24.6	24.18 (2.42)
3000	63.8		25.7	
3300	-		-	
3500	67.1		25	
3700	67.4		24.2	
3900	-		-	
4200	-		-	
4600	-		-	
4900	-		-	

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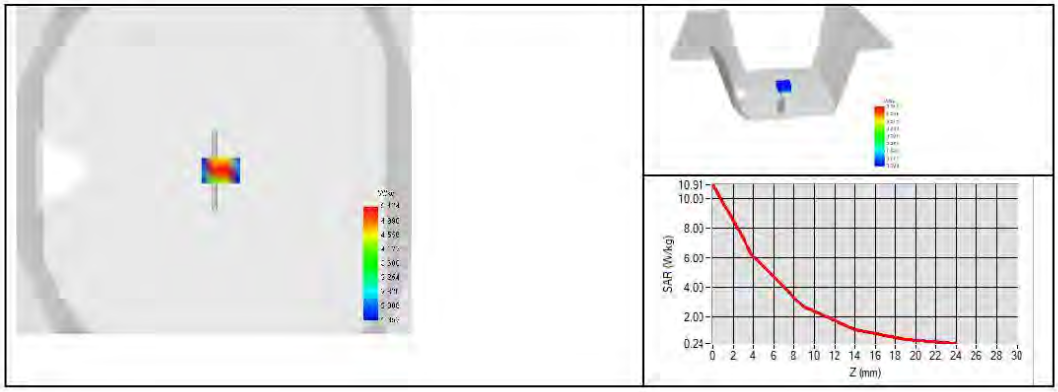

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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±10 %		0.80 ±10 %	
300	58.2 ±10 %		0.92 ±10 %	
450	56.7 ±10 %		0.94 ±10 %	
750	55.5 ±10 %		0.96 ±10 %	
835	55.2 ±10 %		0.97 ±10 %	
900	55.0 ±10 %		1.05 ±10 %	
915	55.0 ±10 %		1.06 ±10 %	
1450	54.0 ±10 %		1.30 ±10 %	
1610	53.8 ±10 %		1.40 ±10 %	
1800	53.3 ±10 %		1.52 ±10 %	
1900	53.3 ±10 %		1.52 ±10 %	
2000	53.3 ±10 %		1.52 ±10 %	
2100	53.2 ±10 %		1.62 ±10 %	
2300	52.9 ±10 %		1.81 ±10 %	
2450	52.7 ±10 %		1.95 ±10 %	
2600	52.5 ±10 %	48.5	2.16 ±10 %	2.11
3000	52.0 ±10 %		2.73 ±10 %	
3300	51.6 ±10 %		3.08 ±10 %	
3500	51.3 ±10 %		3.31 ±10 %	
3700	51.0 ±10 %		3.55 ±10 %	
3900	50.8 ±10 %		3.78 ±10 %	
4200	50.4 ±10 %		4.13 ±10 %	
4600	49.8 ±10 %		4.60 ±10 %	
4900	49.4 ±10 %		4.95 ±10 %	
5200	49.0 **±10** %		5.30 **±10** %	
5300	48.9 **±10** %		5.42 **±10** %	
5400	48.7 **±10** %		5.53 **±10** %	
5500	48.6 **±10** %		5.65 **±10** %	
5600	48.5 **±10** %		5.77 **±10** %	
5800	48.2 **±10** %		6.00 **±10** %	

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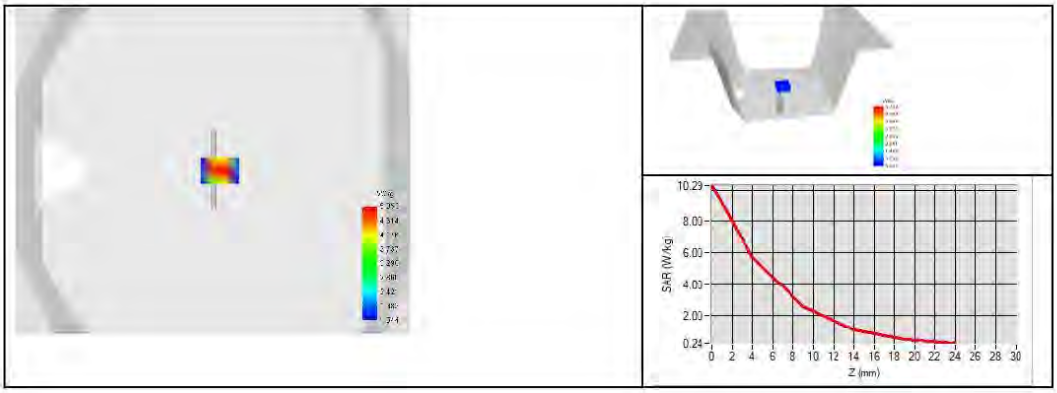
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Body Liquid Values: eps' : 48.5 sigma : 2.11
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	2600 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2600	55.40 (5.54)	23.25 (2.32)



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	SN 41/18 EPGO333	10/2021	10/2022
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2019	11/2022
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.329.17.21.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD,TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINAMVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 5200-5800 MHZ
SERIAL NO.: SN 47/21 DIP 5G000-629

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2021

Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed at MVG, using the COMOSAR test bench. The test results covered by accreditation are traceable to the International System of Units (SI).

Page: 1/13

SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.329.17.21.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Luc	Technical Manager	11/25/2021	
Checked by :	Jérôme Luc	Technical Manager	11/25/2021	
Approved by :	Yann Toutain	Laboratory Director	11/25/2021	Yann TOUTAIN 2021.11.25 11:58:11 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	11/25/2021	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 5200-5800 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID5000
Serial Number	SN 47/21 DIP 5G000-629
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – *MVG COMOSAR Validation Dipole*

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4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

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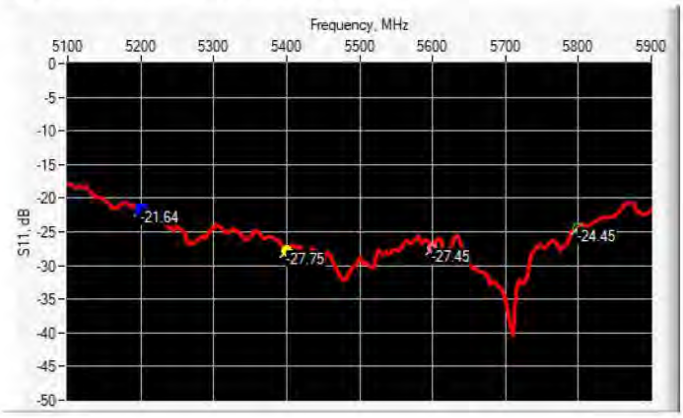
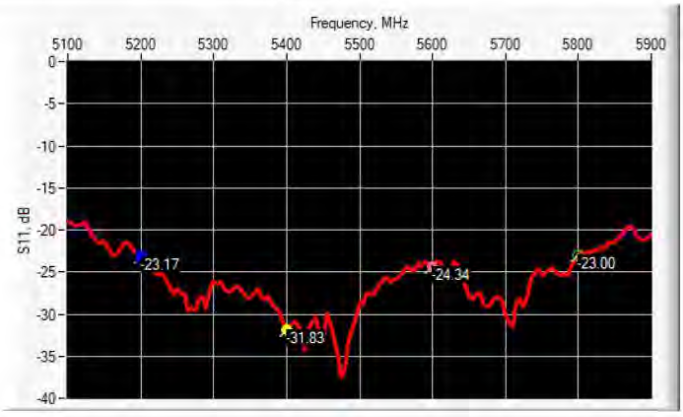
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
5200	-21.64	-20	54.48 Ω - 6.92 jΩ
5400	-27.75	-20	50.97 Ω + 3.98 jΩ
5600	-27.45	-20	54.05 Ω + 1.24 jΩ
5800	-24.45	-20	45.31 Ω + 3.71 jΩ

6.2 RETURN LOSS IN BODY LIQUID



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Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
5200	-23.17	-20	54.03 Ω - 5.62 jΩ
5400	-31.83	-20	51.01 Ω + 2.35 jΩ
5600	-24.34	-20	55.50 Ω + 2.51 jΩ
5800	-23.00	-20	43.65 Ω + 3.06 jΩ

6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
5000 to 6000	20.6±1 %.	20.62	40.3 ±1 %.	40.45	3.6 ±1 %.	3.61

7 VALIDATION MEASUREMENT

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
5000	36.2 ±10 %		4.45 ±10 %	
5100	36.1 ±10 %		4.56 ±10 %	
5200	36.0 ±10 %	34.44	4.66 ±10 %	4.64
5300	35.9 ±10 %		4.76 ±10 %	
5400	35.8 ±10 %	33.63	4.86 ±10 %	4.88
5500	35.6 ±10 %		4.97 ±10 %	
5600	35.5 ±10 %	32.80	5.07 ±10 %	5.12
5700	35.4 ±10 %		5.17 ±10 %	
5800	35.3 ±10 %	32.63	5.27 ±10 %	5.31
5900	35.2 ±10 %		5.38 ±10 %	
6000	35.1 ±10 %		5.48 ±10 %	

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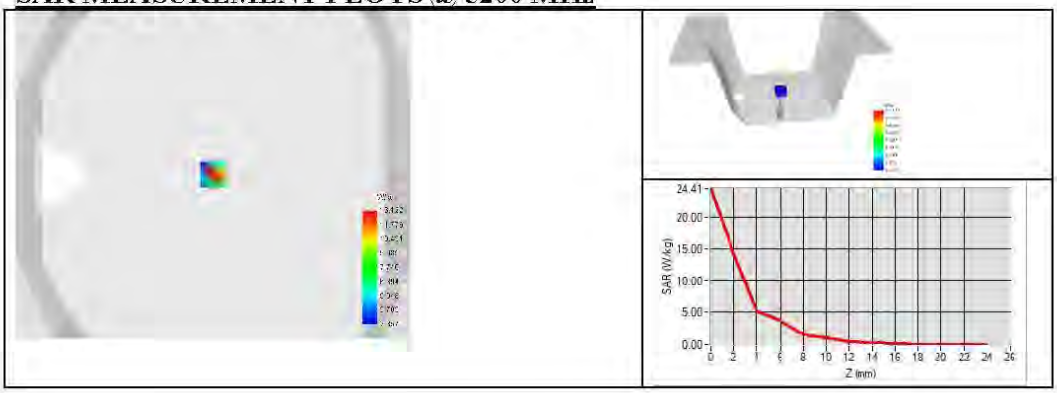
7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

At those frequencies, the target SAR value can not be generic. Hereunder is the target SAR value defined by MVG, within the uncertainty for the system validation. All SAR values are normalized to 1 W net power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values 5200 MHz: eps' :34.44 sigma : 4.64 Head Liquid Values 5400 MHz: eps' :33.63 sigma : 4.88 Head Liquid Values 5600 MHz: eps' :32.80 sigma : 5.12 Head Liquid Values 5800 MHz: eps' :32.63 sigma : 5.31
Distance between dipole and liquid	10 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=4mm/dy=4m/dz=2mm
Frequency	5200 MHz 5400 MHz 5600 MHz 5800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency (MHz)	1 g SAR (W/kg)		10 g SAR (W/kg)	
	required	measured	required	measured
5200	76.50	76.41 (7.64)	21.60	21.86 (2.19)
5400	-	80.52 (8.05)	-	22.91 (2.29)
5600	-	79.08 (7.91)	-	22.73 (2.27)
5800	78.00	76.49 (7.65)	21.90	22.03 (2.20)

SAR MEASUREMENT PLOTS @ 5200 MHz



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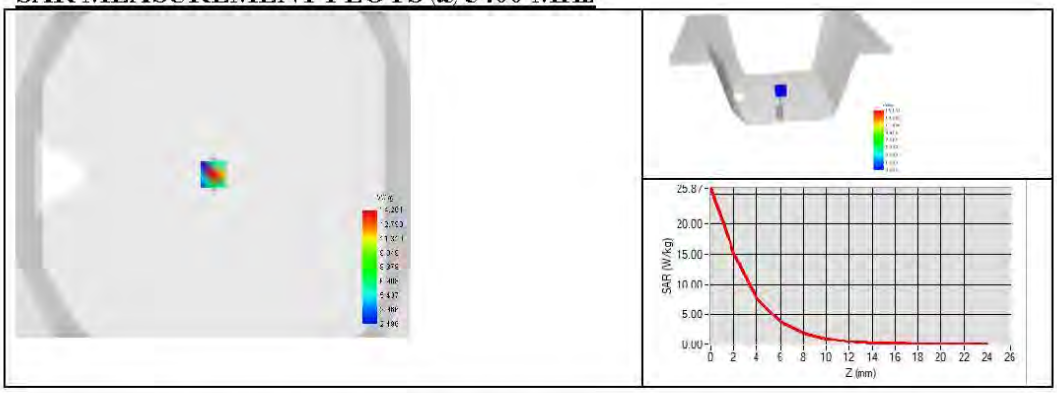
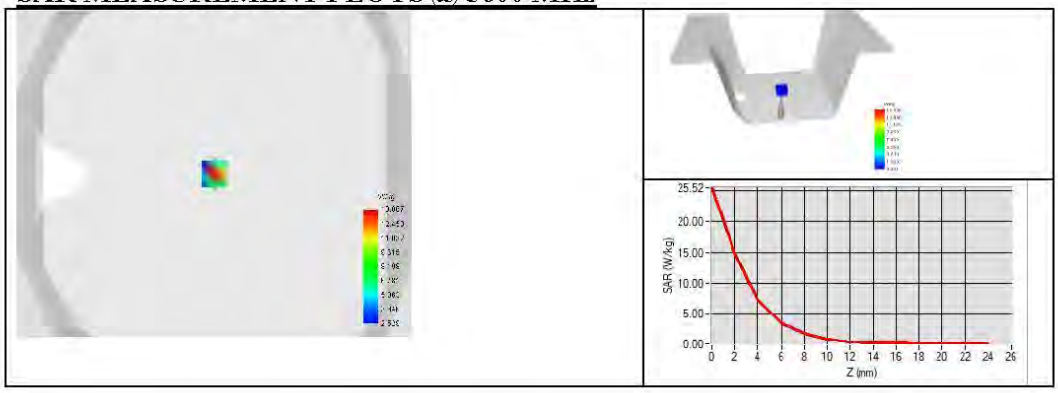
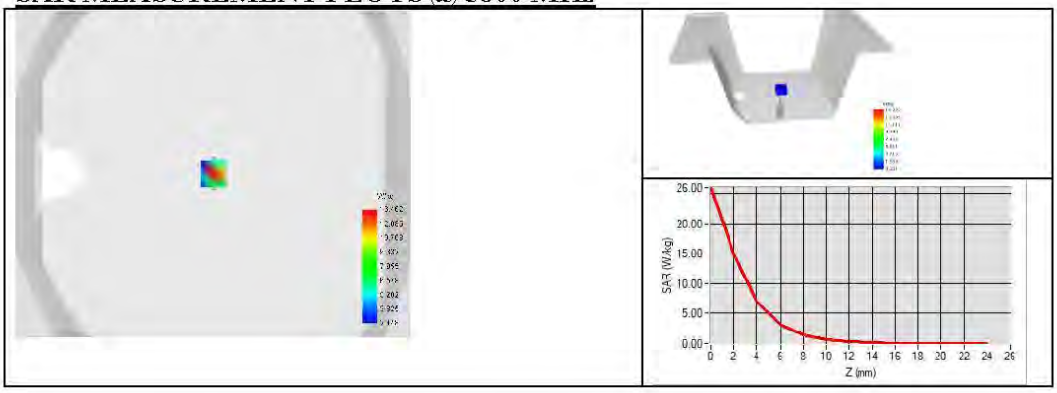
SAR MEASUREMENT PLOTS @ 5400 MHz



SAR MEASUREMENT PLOTS @ 5600 MHz



SAR MEASUREMENT PLOTS @ 5800 MHz



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7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
5200	49.0 **±10** %	45.50	5.30 **±10** %	5.63
5300	48.9 **±10** %		5.42 **±10** %	
5400	48.7 **±10** %	44.78	5.53 **±10** %	5.95
5500	48.6 **±10** %		5.65 **±10** %	
5600	48.5 **±10** %	44.85	5.77 **±10** %	6.26
5800	48.2 **±10** %	44.45	6.00 **±10** %	6.58

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Body Liquid Values 5200 MHz: eps' :45.50 sigma : 5.63 Body Liquid Values 5400 MHz: eps' :44.78 sigma : 5.95 Body Liquid Values 5600 MHz: eps' :44.85 sigma : 6.26 Body Liquid Values 5800 MHz: eps' :44.45 sigma : 6.58
Distance between dipole and liquid	10 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=4mm/dy=4m/dz=2mm
Frequency	5200 MHz 5400 MHz 5600 MHz 5800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency (MHz)	1 g SAR (W/kg)	10 g SAR (W/kg)
	measured	measured
5200	73.02 (7.30)	20.58 (2.06)
5400	77.86 (7.79)	21.85 (2.19)
5600	79.90 (7.99)	22.73 (2.27)
5800	71.90 (7.19)	20.50 (2.05)

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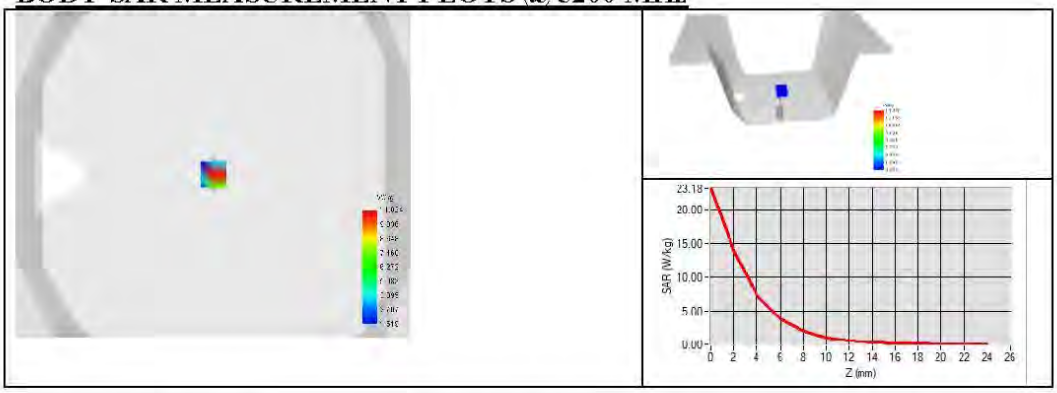
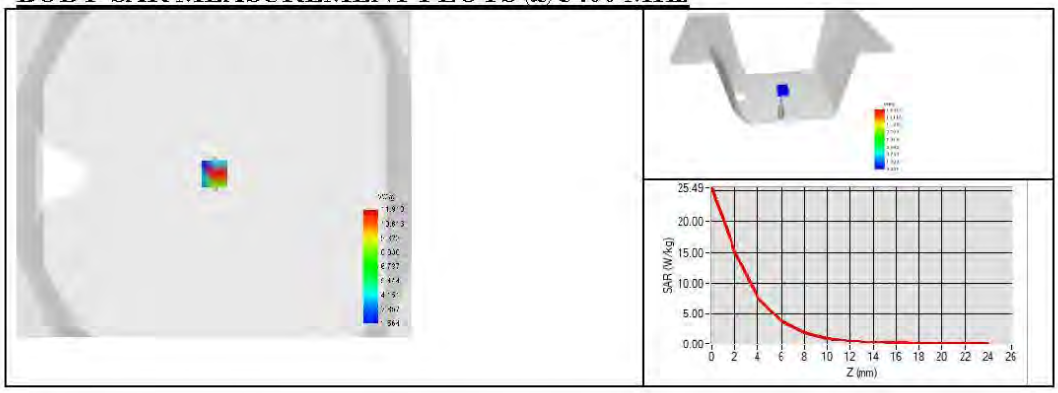
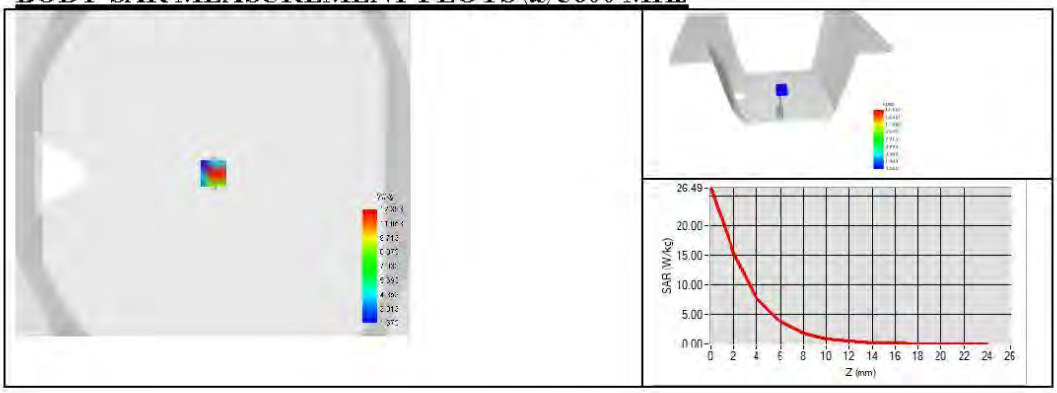
BODY SAR MEASUREMENT PLOTS @ 5200 MHz



BODY SAR MEASUREMENT PLOTS @ 5400 MHz



BODY SAR MEASUREMENT PLOTS @ 5600 MHz



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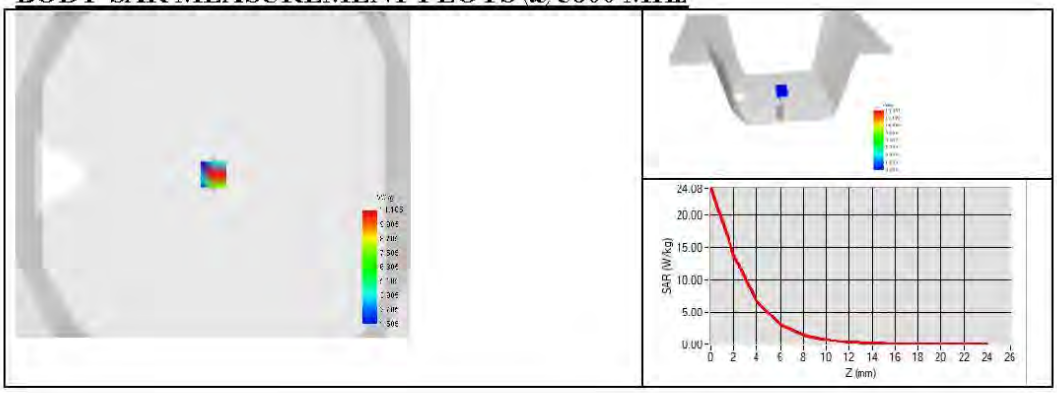
BODY SAR MEASUREMENT PLOTS @ 5800 MHz



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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	SN 41/18 EPGO333	10/2021	10/2022
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2019	11/2022
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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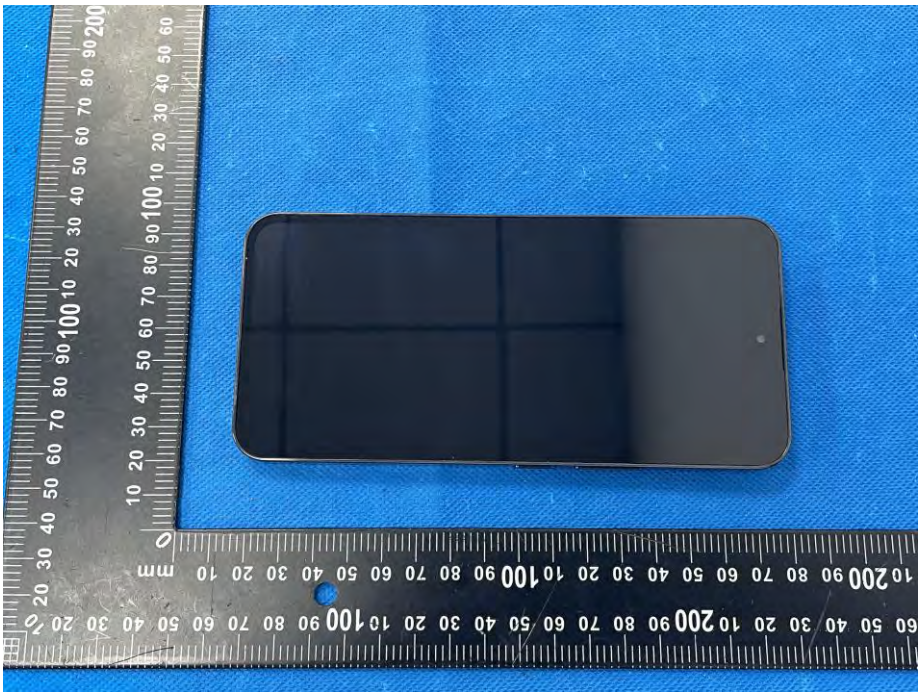
17. EUT Photographs

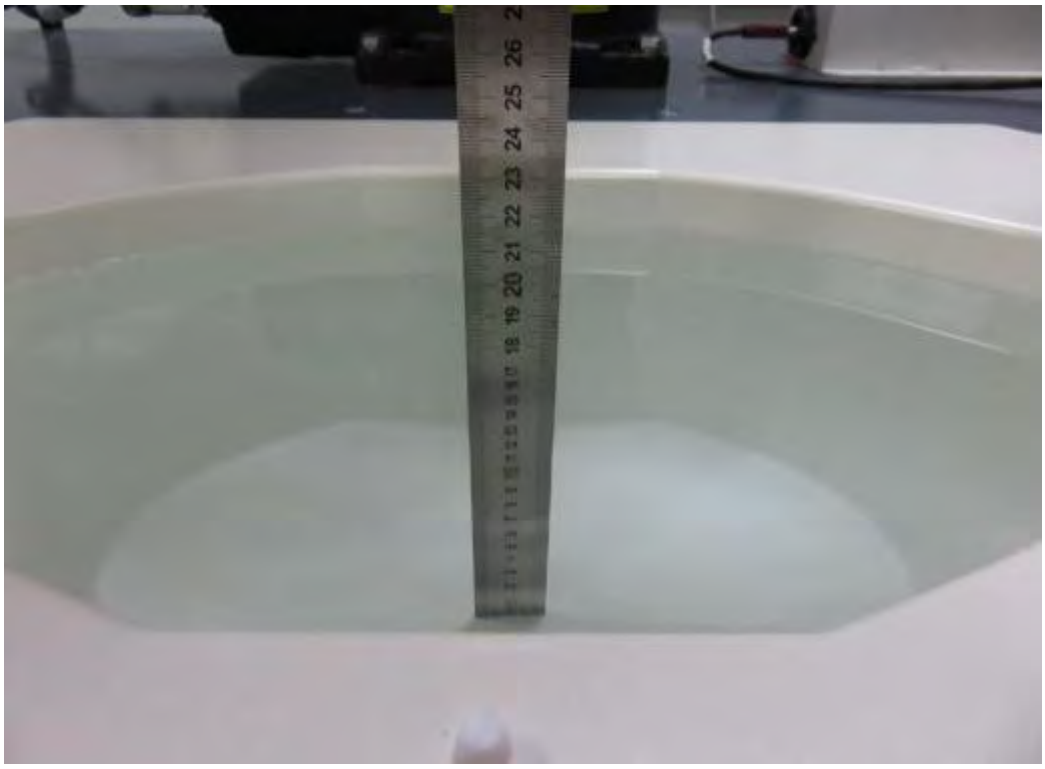
EUT Front View



EUT Back View



18. Photographs Of The Liquid

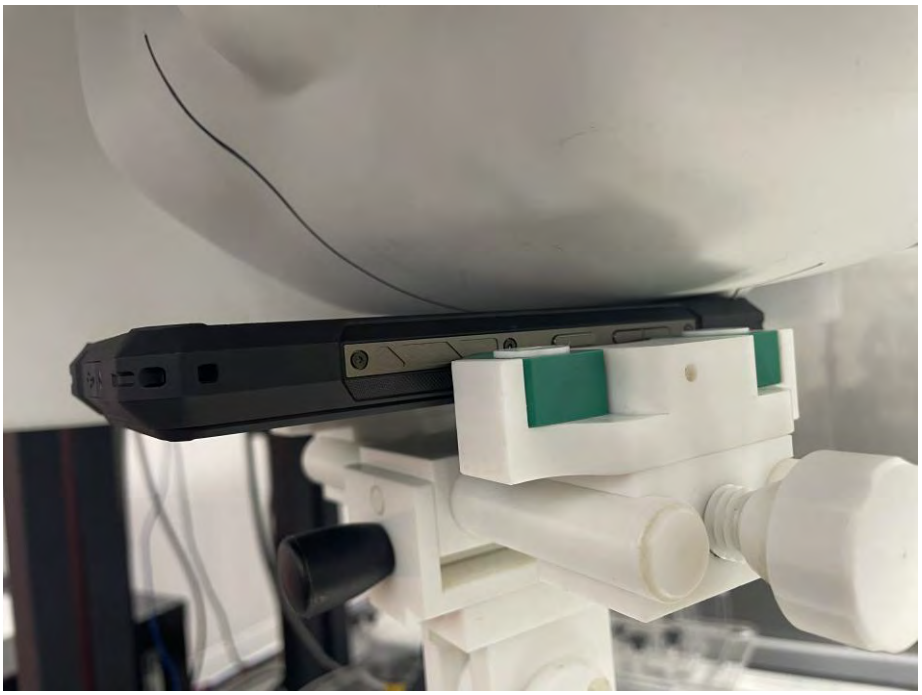


Photograph of the depth in the Body Phantom (600-10000MHz, depth >15cm)

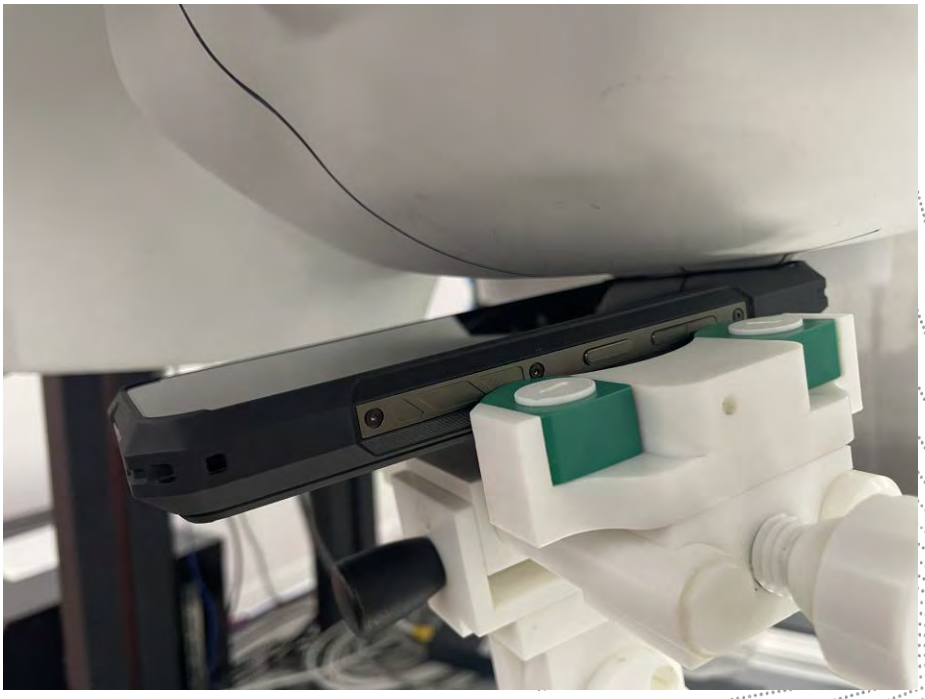
19. EUT Test Setup Photographs

Head mode Exposure Conditions

Left Cheek



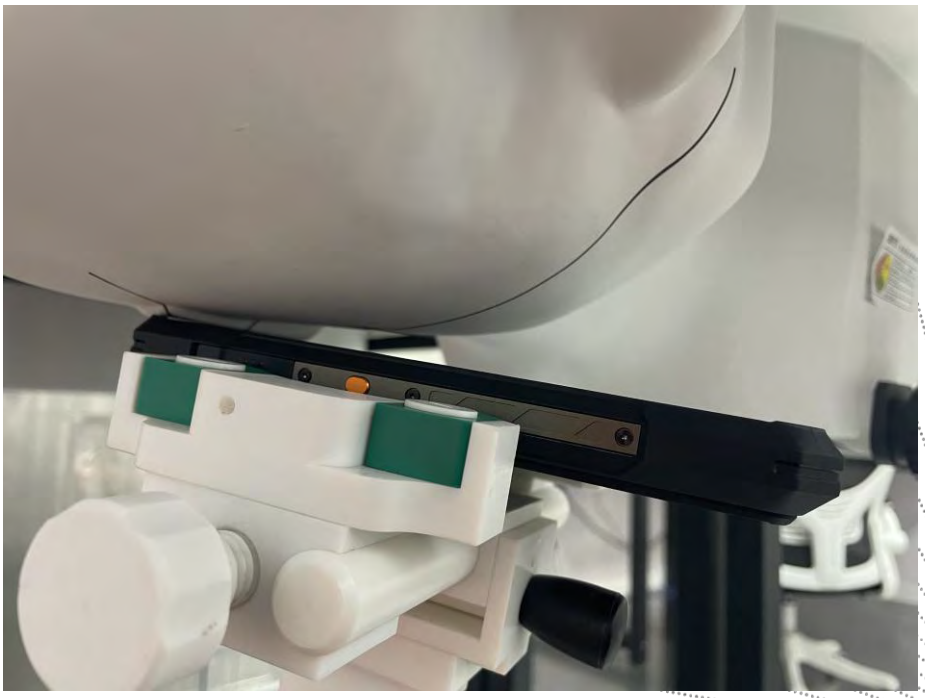
Left Tilt



Right Cheek

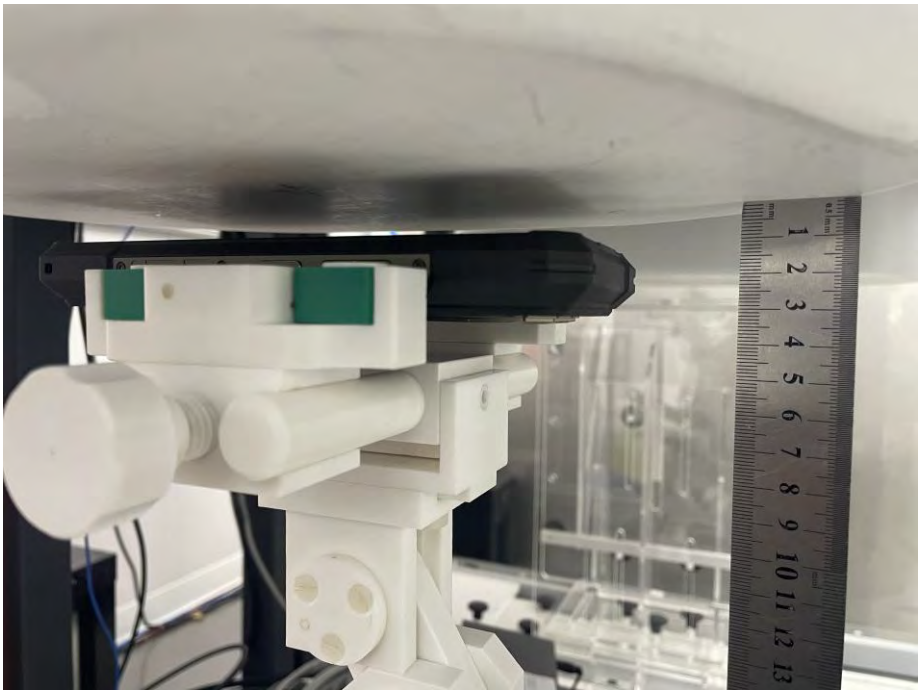


Right Tilt

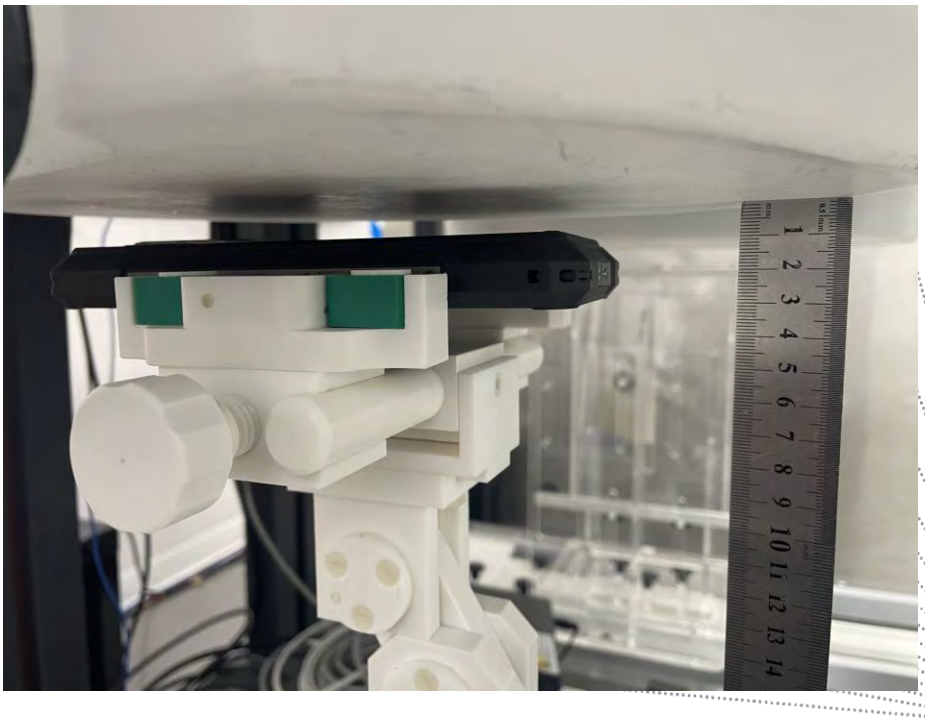


Body mode Exposure Conditions
Test distance: 10mm

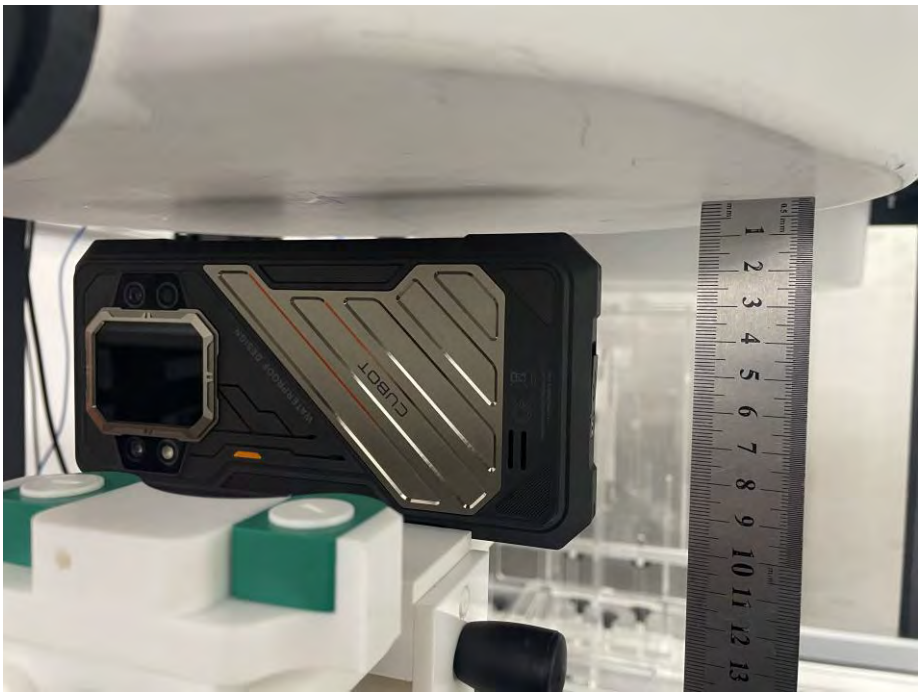
Front



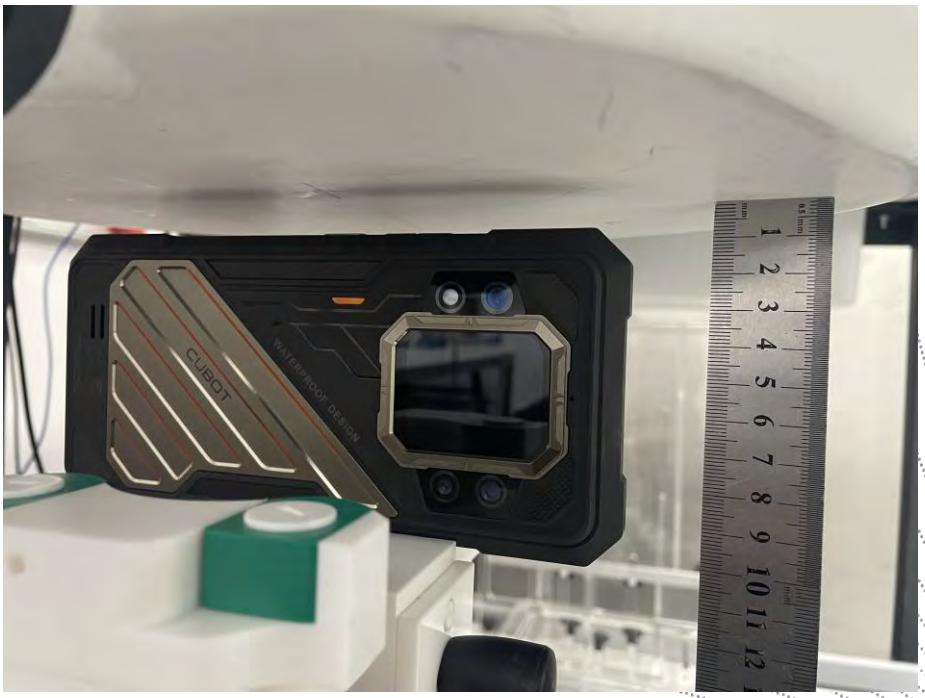
Back



Left



Right



Top



Bottom



STATEMENT

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without the "special seal for inspection and testing".

4. The test report is invalid without the signature of the approver.

5. The test process and test result is only related to the Unit Under Test.

6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.

7. The quality system of our laboratory is in accordance with ISO/IEC17025.

8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:
1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL: 400-788-9558

P.C.: 518103

FAX: 0755-33229357

Website: http://www.chnbctc.com

Consultation E-mail: bctc@bctc-lab.com.cn

Complaint/Advice E-mail: advice@bctc-lab.com.cn

※※※※※ END ※※※※※