Plot 9

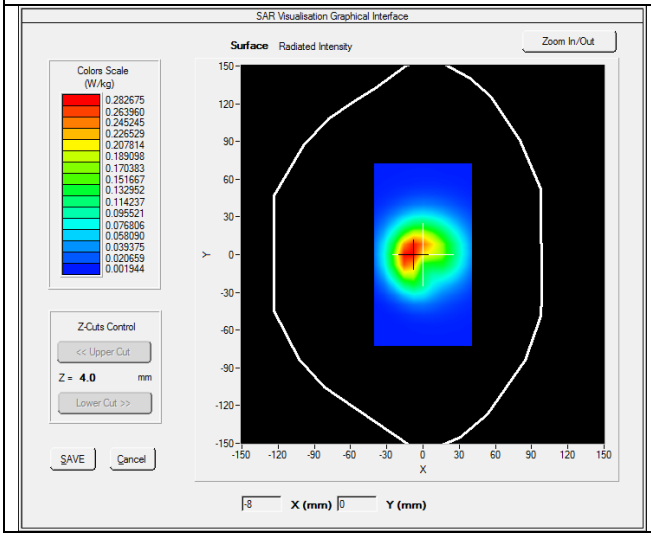
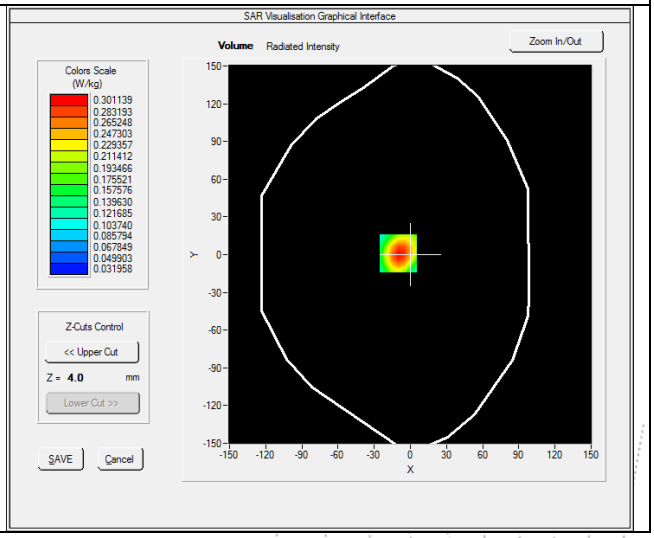
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	3.01
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Channels	Middle
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	836.500
Relative permitivity (real part)	42.277
Relative permitivity (imaginary part)	19.400
Conductivity (S/m)	0.938

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

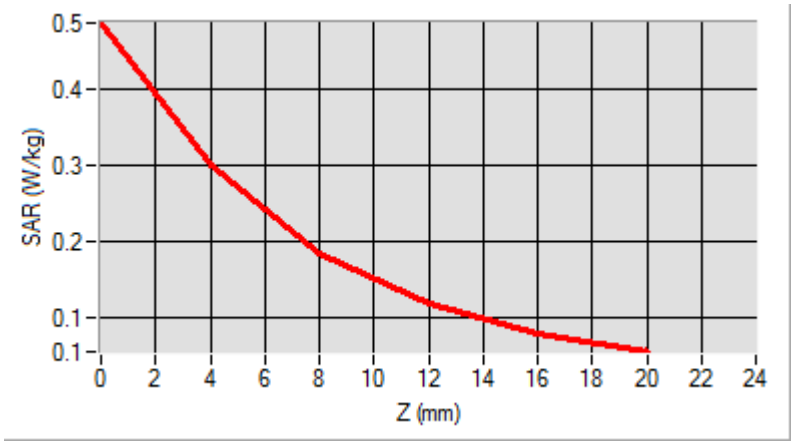
Maximum location: X=-10.00, Y=1.00 ; SAR Peak: 0.49 W/kg

D. SAR 1g & 10g

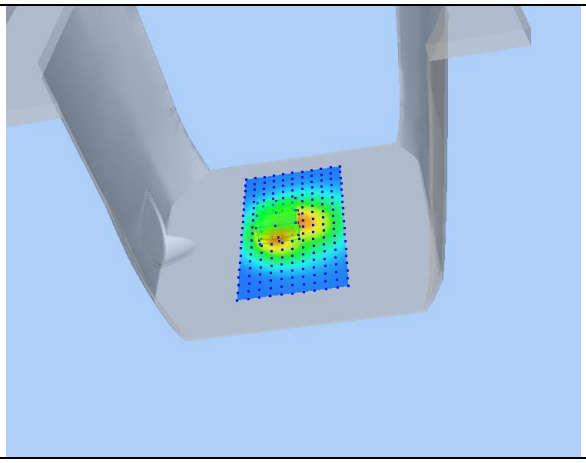
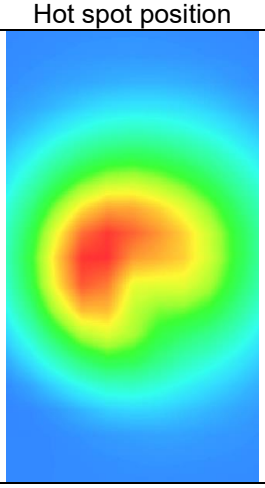
SAR 10g (W/Kg)	0.157
SAR 1g (W/Kg)	0.282
Variation (%)	-0.510
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.488	0.301	0.185	0.117	0.079



F. 3D Image

3D screen shot	Hot spot position
	

Plot 10

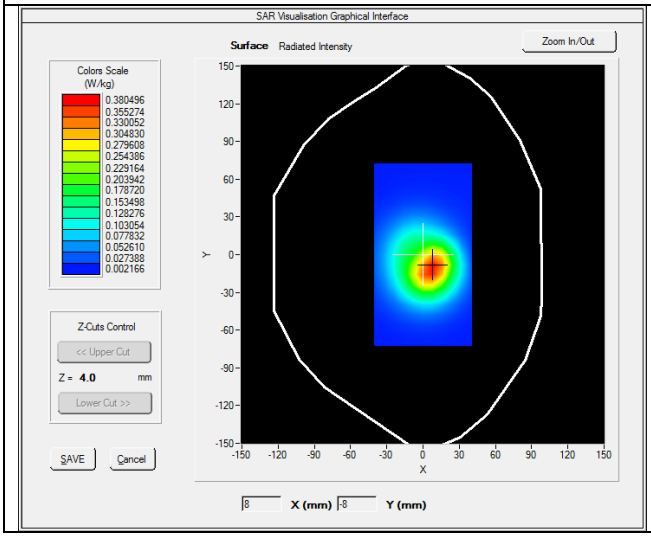
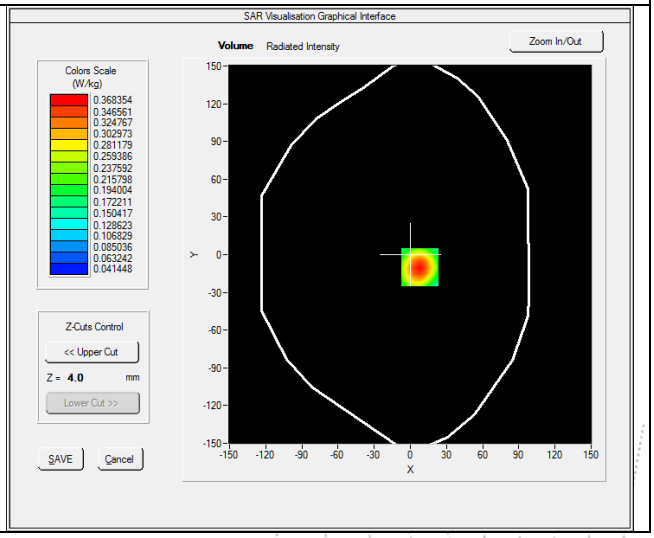
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	3.01
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Channels	Middle
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	836.500
Relative permitivity (real part)	42.277
Relative permitivity (imaginary part)	19.400
Conductivity (S/m)	0.938

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

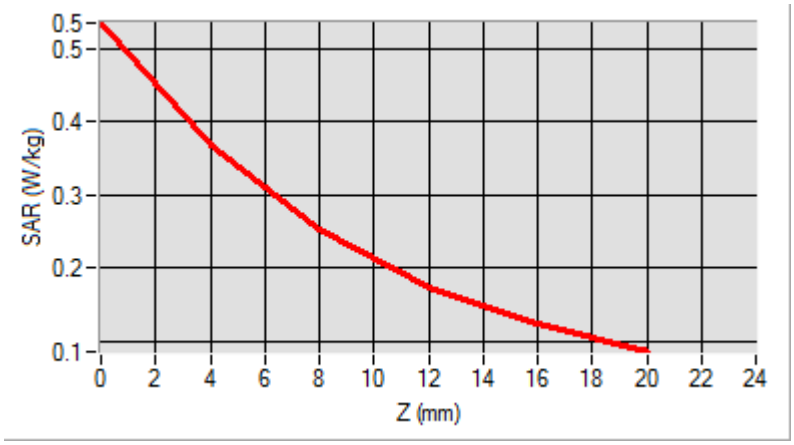
Maximum location: X=8.00, Y=-10.00 ; SAR Peak: 0.54 W/kg

D. SAR 1g & 10g

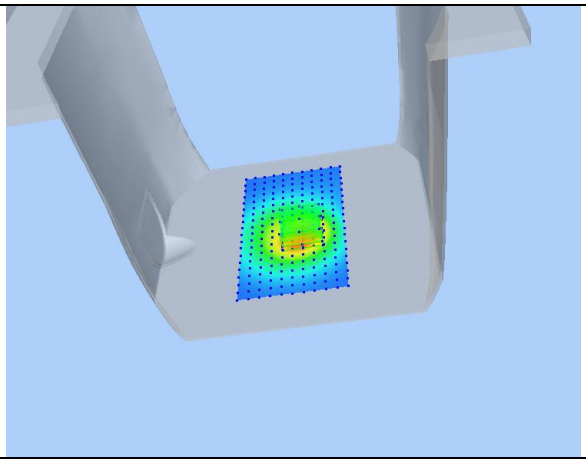
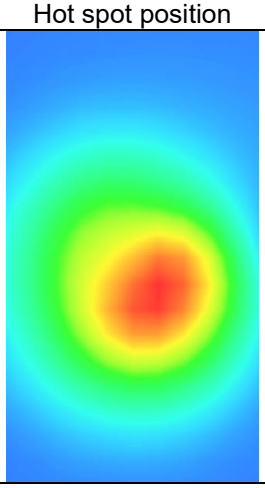
SAR 10g (W/Kg)	0.201
SAR 1g (W/Kg)	0.340
Variation (%)	-5.280
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.535	0.368	0.252	0.175	0.123



F. 3D Image

3D screen shot	Hot spot position
	

Plot 11

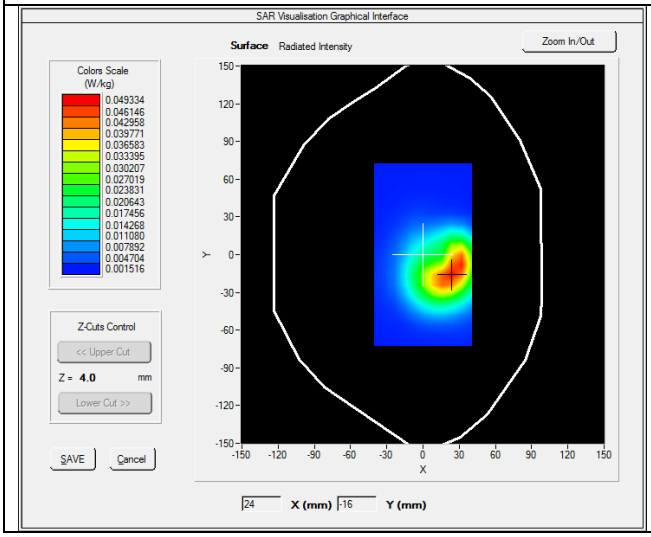
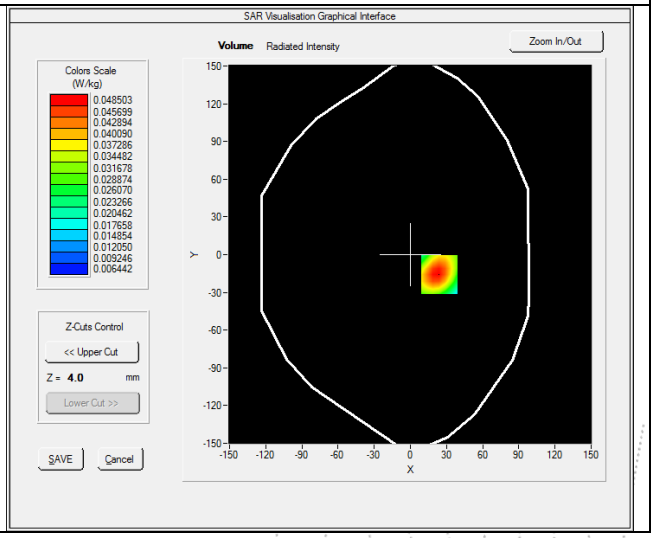
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	2.96
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 12
Channels	High
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	711.000
Relative permitivity (real part)	42.748
Relative permitivity (imaginary part)	23.152
Conductivity (S/m)	0.891

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

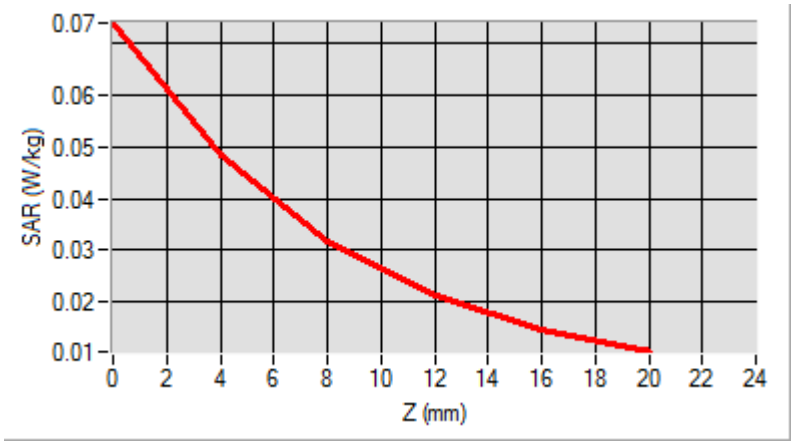
Maximum location: X=24.00, Y=-16.00 ; SAR Peak: 0.07 W/kg

D. SAR 1g & 10g

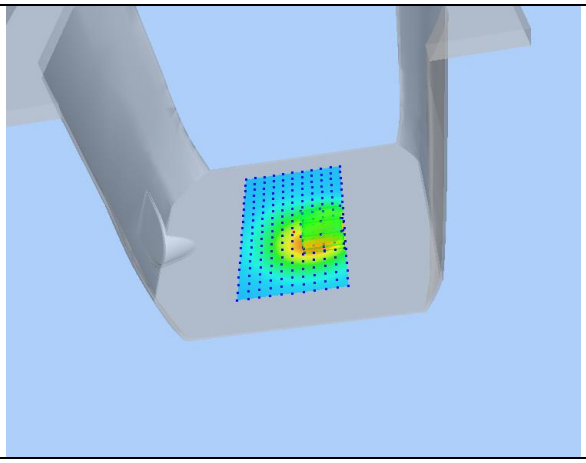
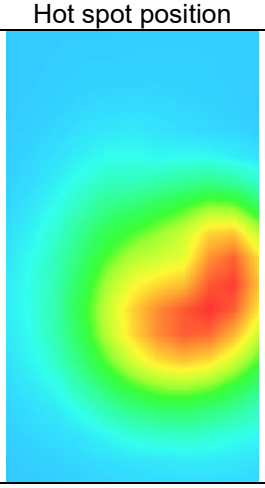
SAR 10g (W/Kg)	0.027
SAR 1g (W/Kg)	0.045
Variation (%)	-4.150
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.074	0.049	0.032	0.021	0.015



F. 3D Image

3D screen shot	Hot spot position
	

Plot 12

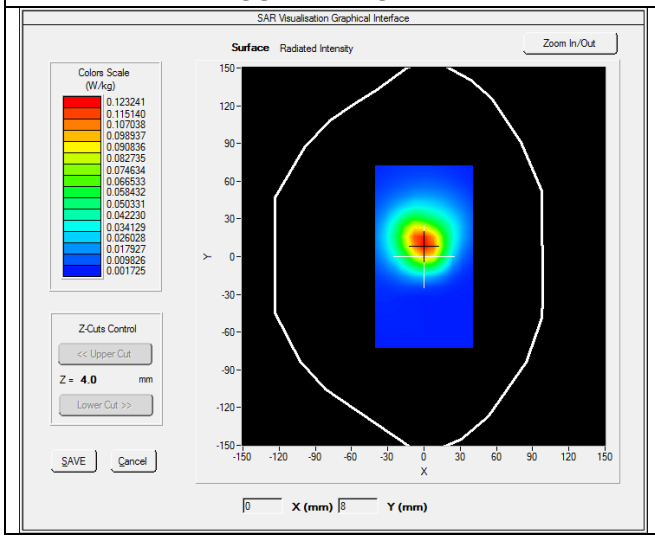
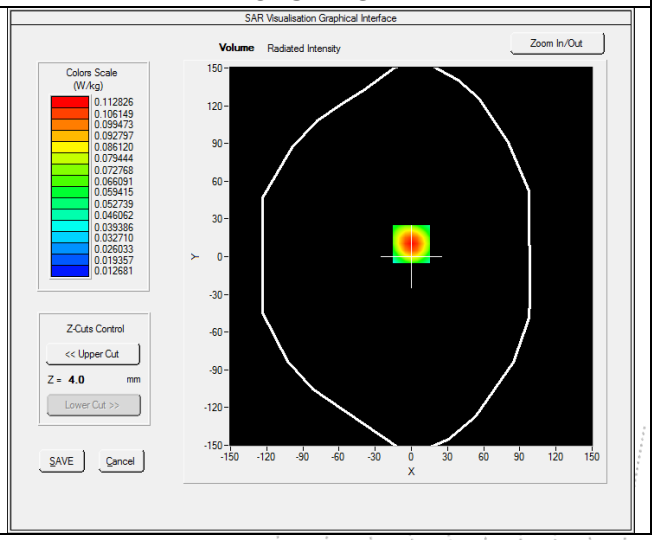
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	2.96
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 12
Channels	High
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	711.000
Relative permitivity (real part)	42.748
Relative permitivity (imaginary part)	23.152
Conductivity (S/m)	0.891

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

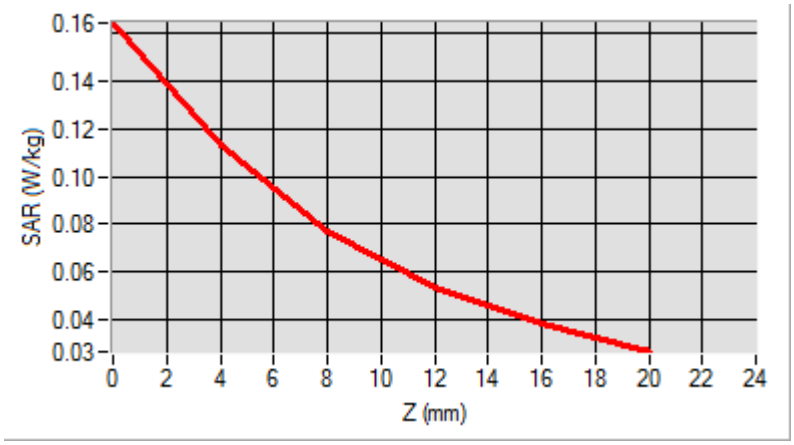
Maximum location: X=0.00, Y=10.00 ; SAR Peak: 0.16 W/kg

D. SAR 1g & 10g

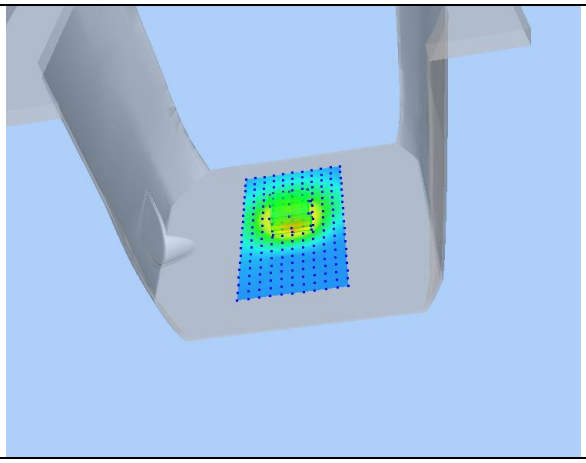
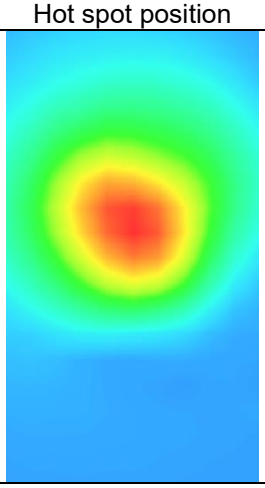
SAR 10g (W/Kg)	0.061
SAR 1g (W/Kg)	0.106
Variation (%)	-4.690
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.164	0.113	0.077	0.054	0.038



F. 3D Image

3D screen shot	Hot spot position
	

Plot 13

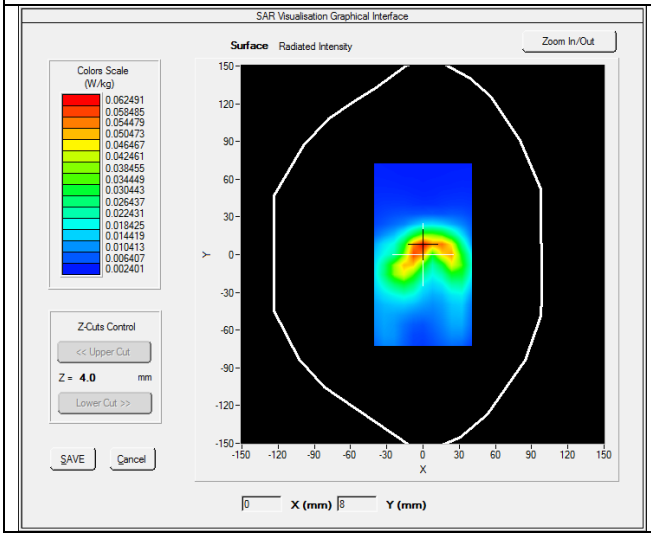
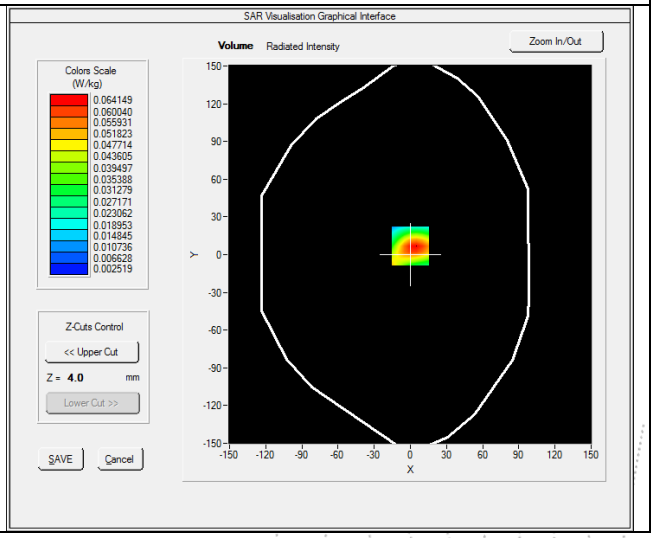
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	3.63
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 41
Channels	Middle
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2605.000
Relative permitivity (real part)	39.847
Relative permitivity (imaginary part)	13.318
Conductivity (S/m)	2.025

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

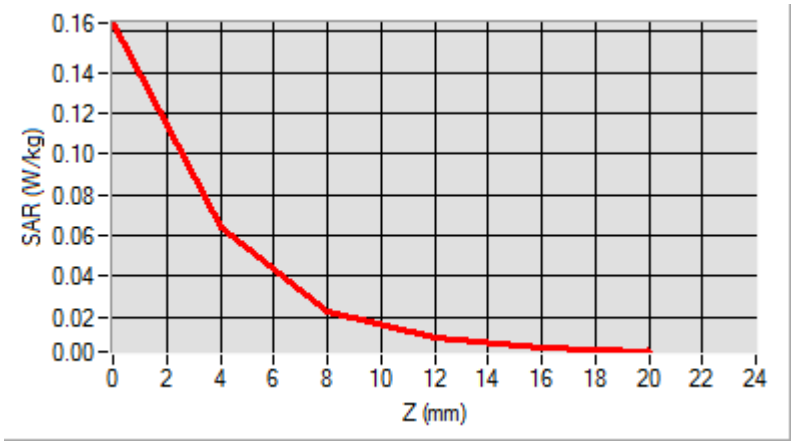
Maximum location: X=0.00, Y=7.00 ; SAR Peak: 0.15 W/kg

D. SAR 1g & 10g

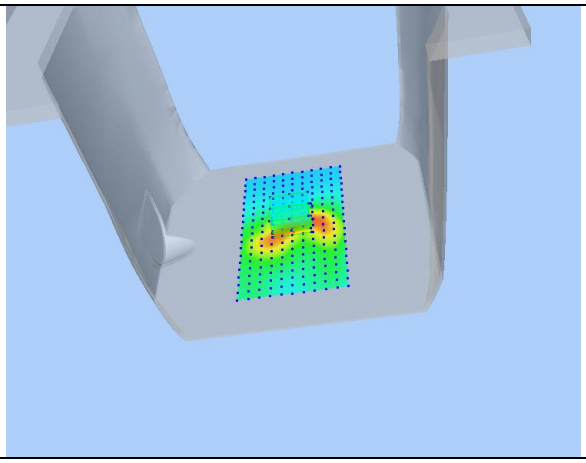
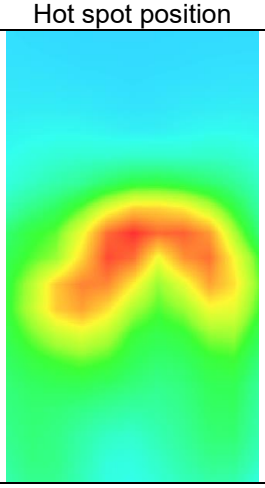
SAR 10g (W/Kg)	0.028
SAR 1g (W/Kg)	0.062
Variation (%)	-0.070
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.164	0.064	0.023	0.009	0.005



F. 3D Image

3D screen shot	Hot spot position
	

Plot 14

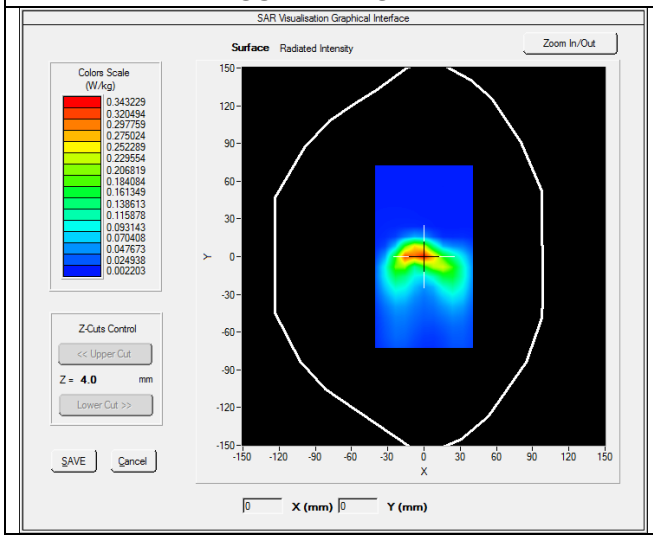
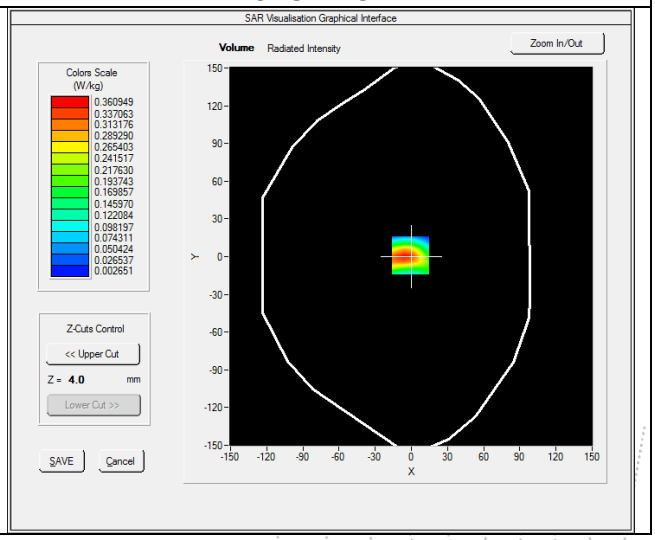
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	3.63
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 41
Channels	Middle
Signal	LTE (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2605.000
Relative permitivity (real part)	39.847
Relative permitivity (imaginary part)	13.318
Conductivity (S/m)	2.025

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

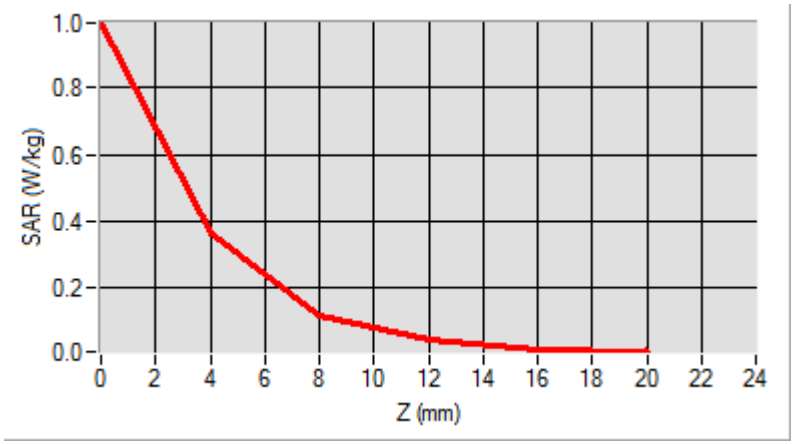
Maximum location: X=-1.00, Y=1.00 ; SAR Peak: 0.87 W/kg

D. SAR 1g & 10g

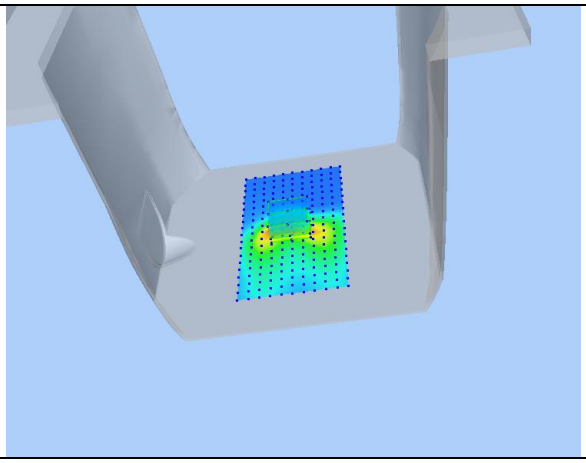
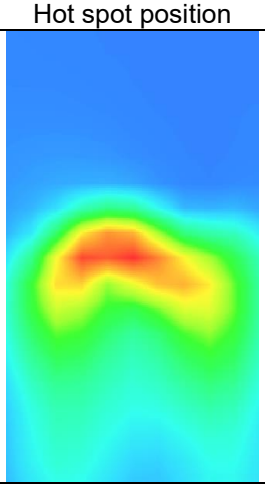
SAR 10g (W/Kg)	0.139
SAR 1g (W/Kg)	0.344
Variation (%)	-0.460
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.996	0.361	0.114	0.040	0.015



F. 3D Image

3D screen shot	Hot spot position
	

Plot 15

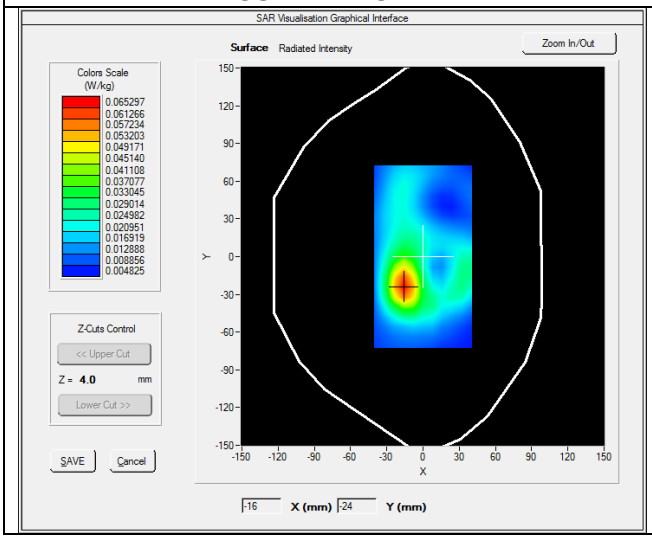
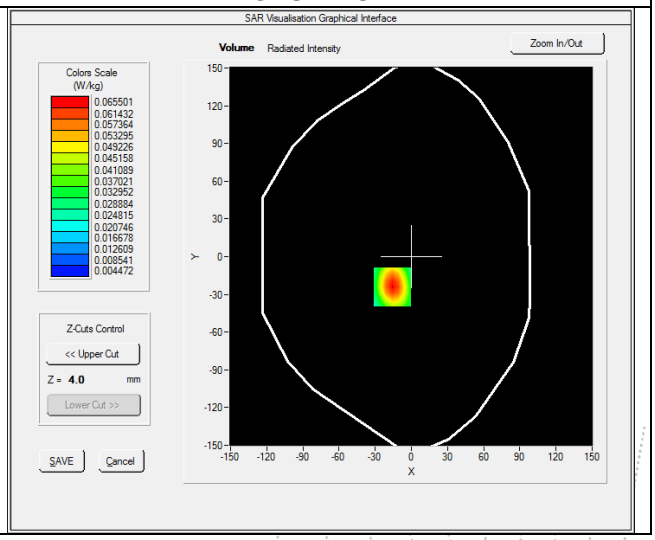
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	3.96
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	Middle
Signal	IEEE802.b (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2437.000
Relative permitivity (real part)	40.082
Relative permitivity (imaginary part)	13.212
Conductivity (S/m)	1.819

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

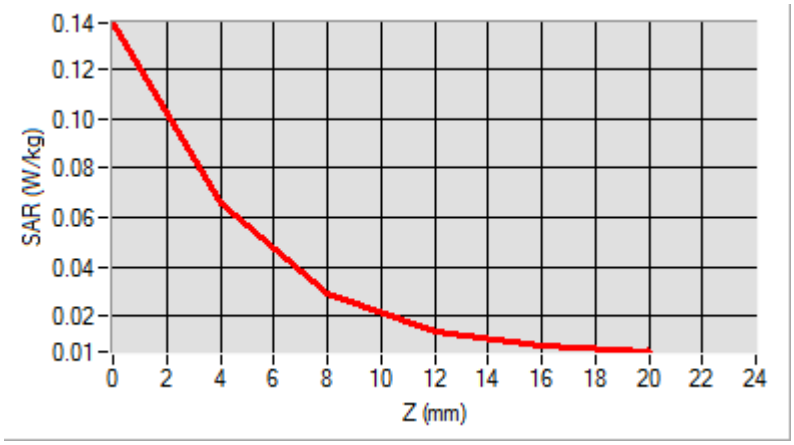
Maximum location: X=-16.00, Y=-24.00 ; SAR Peak: 0.14 W/kg

D. SAR 1g & 10g

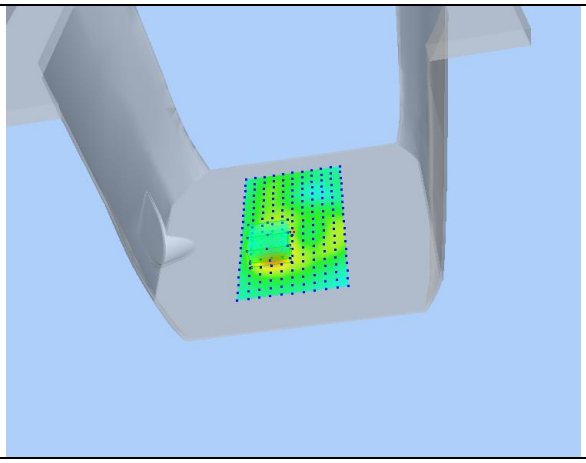
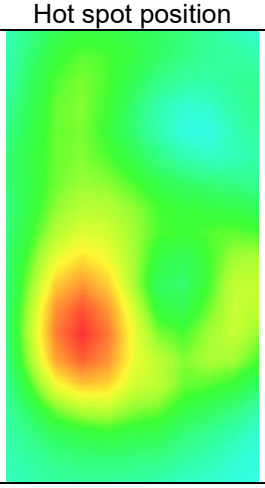
SAR 10g (W/Kg)	0.030
SAR 1g (W/Kg)	0.062
Variation (%)	0.420
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.139	0.066	0.029	0.013	0.008



F. 3D Image

3D screen shot	Hot spot position
	

Plot 16

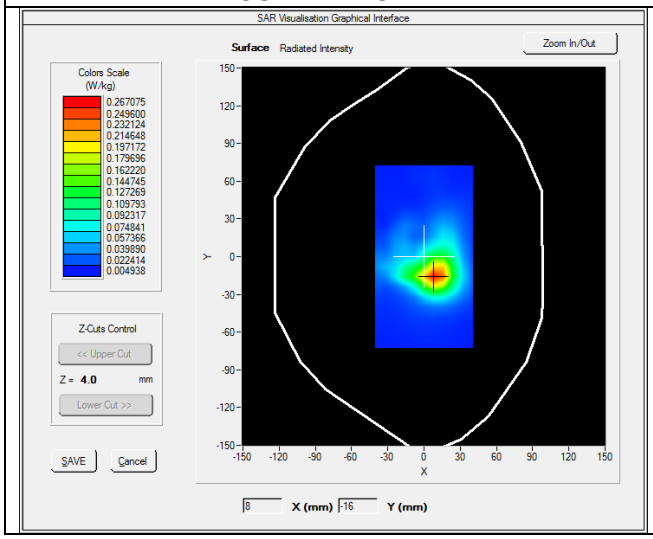
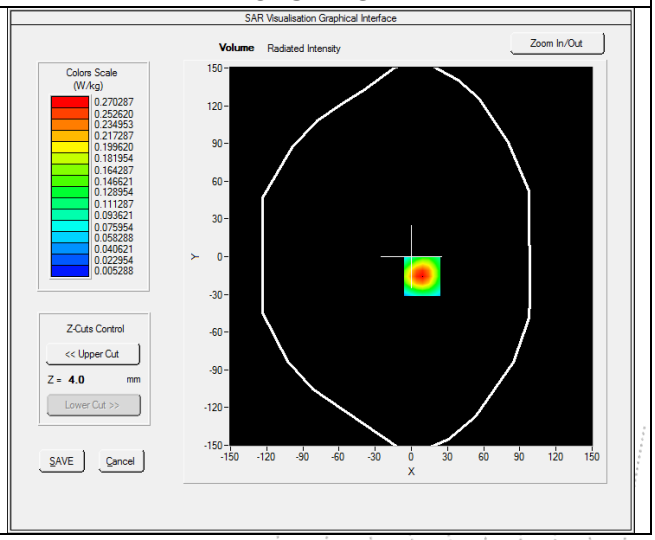
A. Experimental conditions.

Probe	SN 25/22 EPGO373
ConvF	3.96
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x8,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	Middle
Signal	IEEE802.b (Crest factor: 1.0)

B. Permitivity

Frequency (MHz)	2437.000
Relative permitivity (real part)	40.082
Relative permitivity (imaginary part)	13.212
Conductivity (S/m)	1.819

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

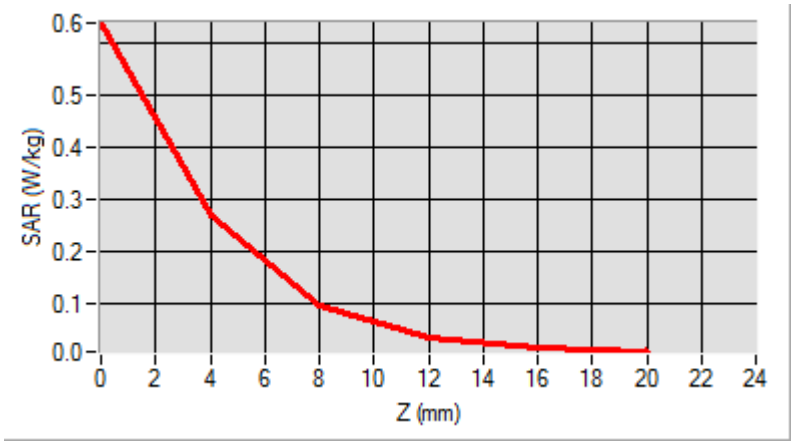
Maximum location: X=9.00, Y=-16.00 ; SAR Peak: 0.64 W/kg

D. SAR 1g & 10g

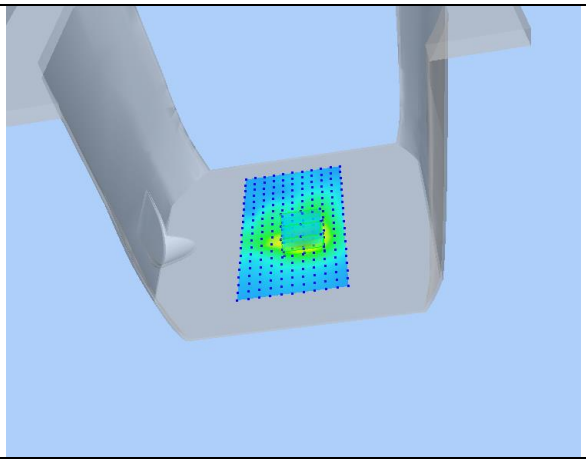
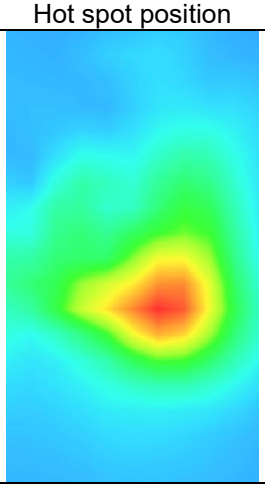
SAR 10g (W/Kg)	0.109
SAR 1g (W/Kg)	0.260
Variation (%)	0.790
Horizontal validation criteria: minimum distance (mm)	--
Vertical validation criteria: SAR ratio M2/M1 (%)	--

E. Z Axis Scan

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.640	0.270	0.099	0.035	0.015



F. 3D Image

3D screen shot	Hot spot position
	

16. CALIBRATION CERTIFICATES

Probe-EPGO373 Calibration Certificate
SID750Dipole Calibration Ceriticate
SID835Dipole Calibration Ceriticate
SID1800Dipole Calibration Ceriticate
SID1900Dipole Calibration Ceriticate
SID2450Dipole Calibration Ceriticate
SID2600Dipole Calibration Ceriticate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.180.5.22.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.: SN 25/22 EPGO373

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

Calibration date: 06/29/2022

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

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.180.5.22.BES.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Le Gall	Measurement Responsible	6/30/2022	
Checked & approved by:	Jérôme Luc	Technical Manager	6/30/2022	
Authorized by:	Yann Toutain	Laboratory Director	6/30/2022	Yann TOUTAIN 2022.06.30 13:38:42 +02'00'

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

Issue	Name	Date	Modifications
A	Jérôme Le Gall	6/30/2022	Initial release

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 25/22 EPGO373
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.234 MΩ Dipole 2: R2=0.195 MΩ Dipole 3: R3=0.250 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	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 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 affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 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.

3.2 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.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 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°).

3.1 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 SAR uncertainty[%] for scanning distances larger than 4mm is 1.0% Limit ,2%).

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 an E-field probe calibration using the waveguide technique. 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.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	**Uncertainty value (%)**	**Probability Distribution**	**Divisor**	**ci**	**Standard Uncertainty (%)**
Expanded uncertainty 95 % confidence level k = 2					14 %

5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

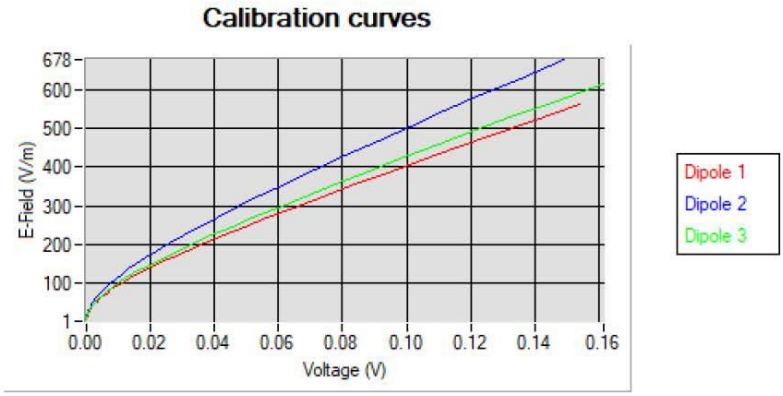
5.1 SENSITIVITY IN AIR

Normx dipole 1 (μV/(V/m)²)	Normy dipole 2 (μV/(V/m)²)	Normz dipole 3 (μV/(V/m)²)
1.19	0.77	1.05

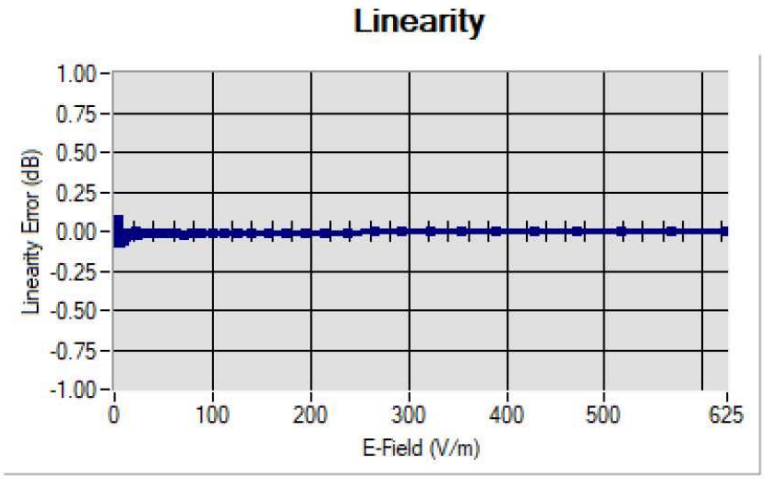
DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
108	109	110

Calibration curves ei=f(V) (i=1,2,3) allow to obtain E-field value using the formula:

$$E = \sqrt{E_1^2 + E_2^2 + E_3^2}$$



5.2 LINEARITY



Linearity:+/-1.77% (+/-0.08dB)

5.3 SENSITIVITY IN LIQUID

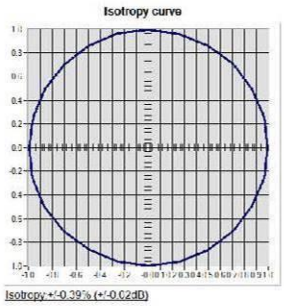
Liquid	Frequency (MHz +/- 100MHz)	ConvF
HL450*	450*	3.00*
BL450*	450*	2.83*
HL750	750	2.96
BL750	750	3.07
HL850	835	3.01
BL850	835	3.13
HL900	900	3.08
BL900	900	3.18
HL1800	1800	3.35
BL1800	1800	3.42
HL1900	1900	3.27
BL1900	1900	3.55
HL2100	2100	3.77
BL2100	2100	3.92
HL2300	2300	3.77
BL2300	2300	3.94
HL2450	2450	3.96
BL2450	2450	4.13
HL2600	2600	3.63
BL2600	2600	3.79
HL5200	5200	2.72
BL5200	5200	2.45
HL5400	5400	2.92
BL5400	5400	2.74
HL5600	5600	3.09
BL5600	5600	2.90
HL5800	5800	2.86
BL5800	5800	2.72

* Frequency not cover by COFRAC scope, calibration not accredited

LOWER DETECTION LIMIT: 7mW/kg

5.4 ISOTROPY

HL1800 MHz



6 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	10/2022
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Multimeter	Keithley 2000	1160271	02/2020	02/2023
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	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.
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.
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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

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.329.8.21.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*

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

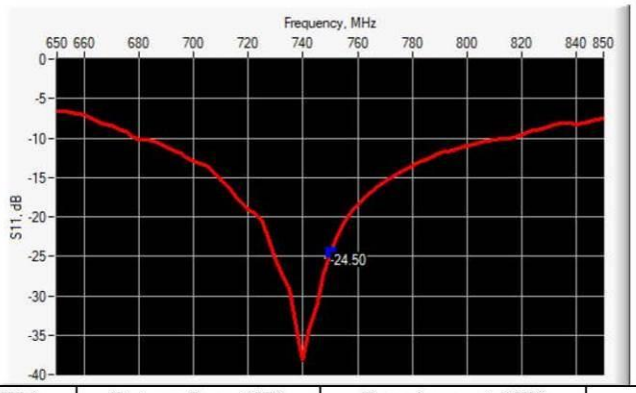
5.3 VALIDATION MEASUREMENT

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

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

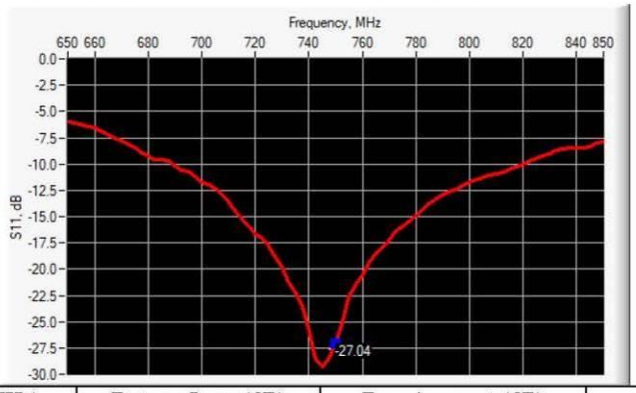
6 CALIBRATION MEASUREMENT RESULTS

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