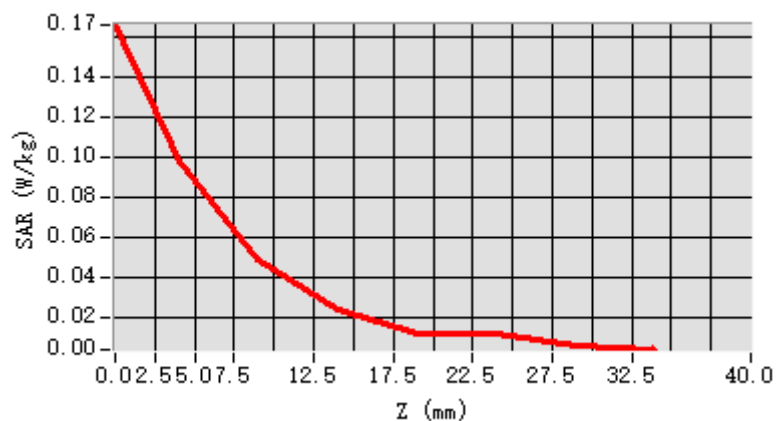
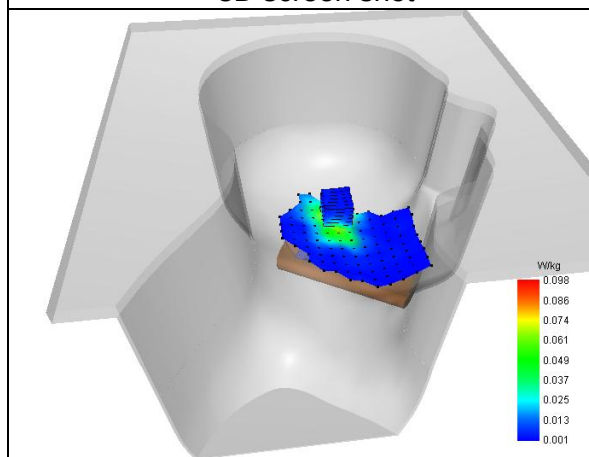


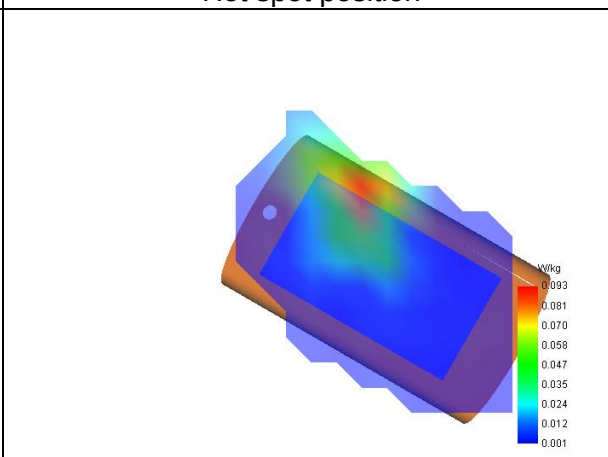


F. 3D Image

3D screen shot



Hot spot position



24# SAR Measurement at ISM (Cheek, Left)

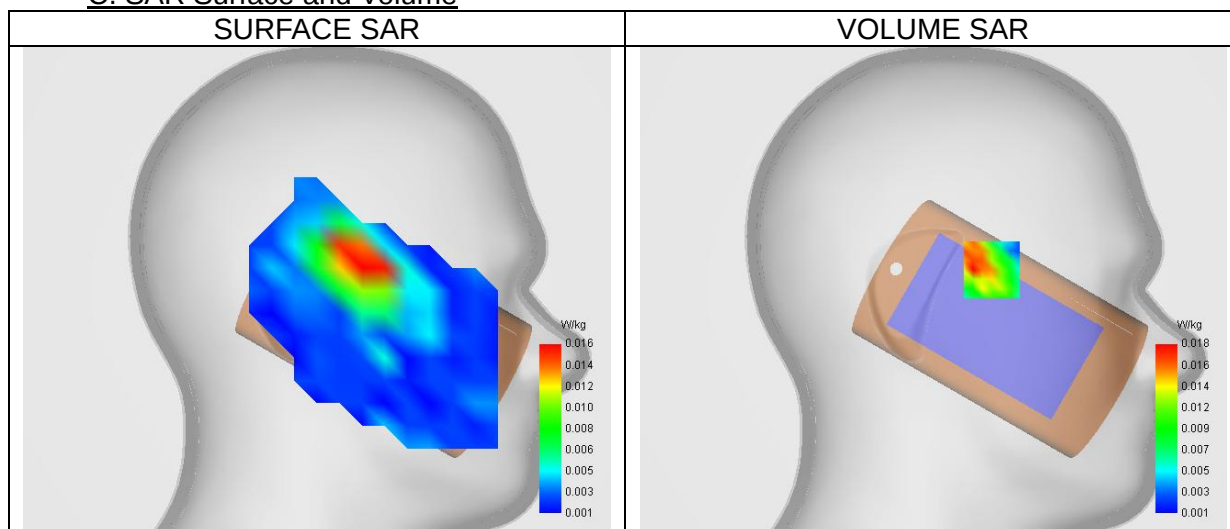
Date of measurement: 26/2/2025

A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	ISM
Signal	IEEE 802.11 b
Channels/Frequency	Middle (1)/ frequency 2412.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2412.00
Relative permittivity (real part)	38.25
Relative permittivity (imaginary part)	12.92
Conductivity (S/m)	1.75

C. SAR Surface and Volume

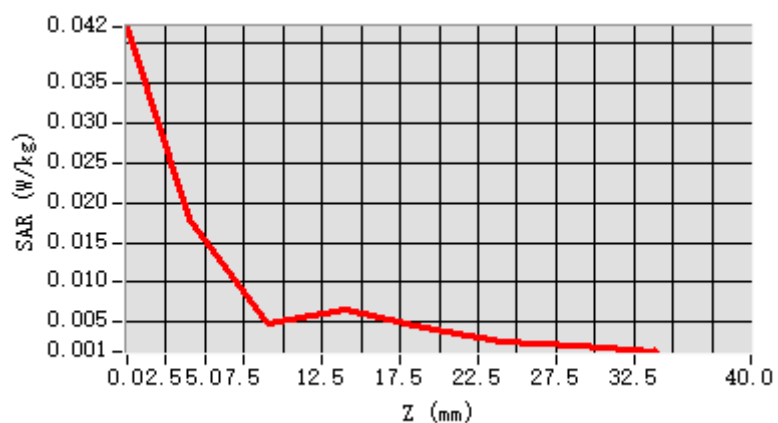
Maximum location: X=-31.00, Y=11.00 ; SAR Peak: 0.03 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.007
SAR 1g (W/Kg)	0.016
Variation (%)	0.99
Horizontal validation criteria: minimum distance (mm)	11.18
Vertical validation criteria: SAR ratio M2/M1 (%)	60.30

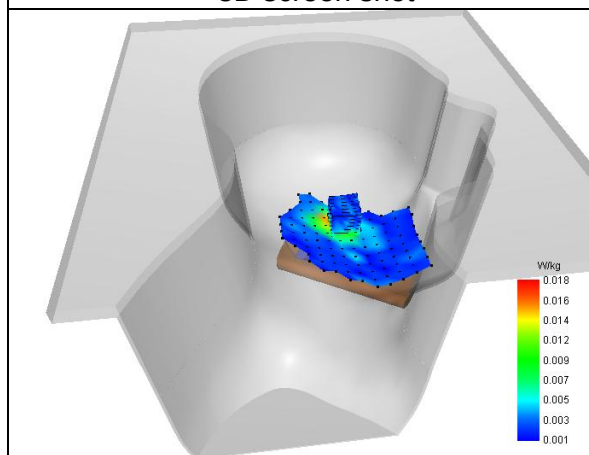
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.042	0.018	0.005	0.007	0.004	0.003	0.002

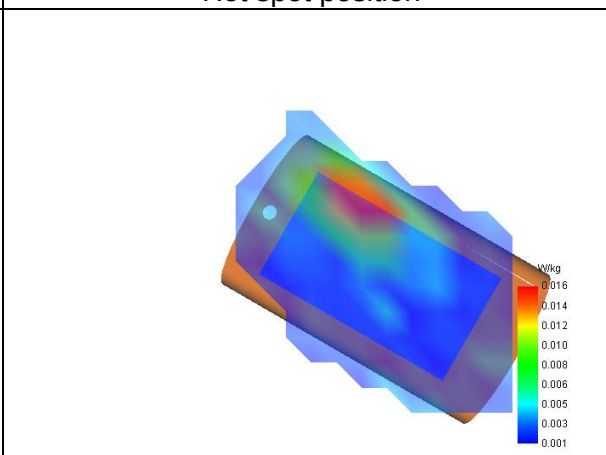


F. 3D Image

3D screen shot



Hot spot position



25# SAR Measurement at ISM (Cheek, Left)

Date of measurement: 26/2/2025

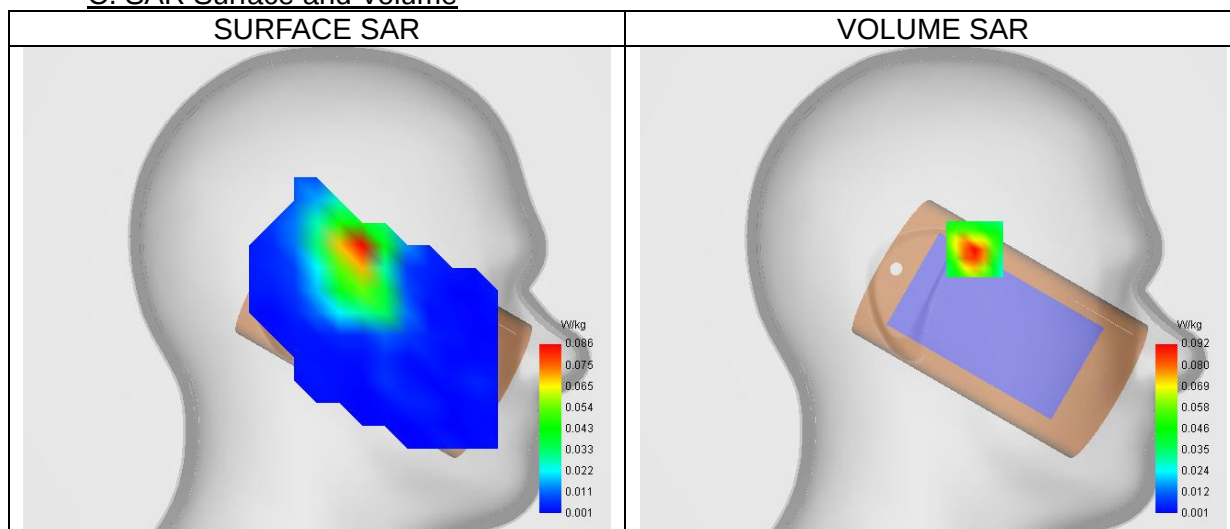
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	ISM
Signal	IEEE 802.11 n
Channels/Frequency	Middle (6)/ frequency 2437.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2437.00
Relative permittivity (real part)	38.25
Relative permittivity (imaginary part)	12.92
Conductivity (S/m)	1.75

C. SAR Surface and Volume



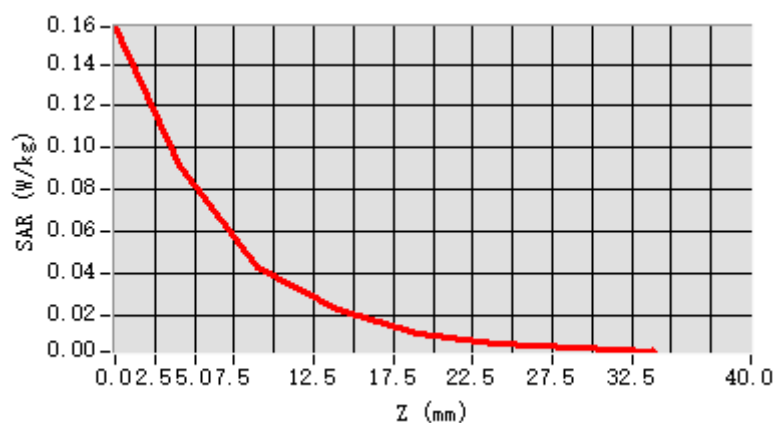
Maximum location: X=-22.00, Y=22.00 ; SAR Peak: 0.16 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.040
SAR 1g (W/Kg)	0.083
Variation (%)	0.20
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	50.06

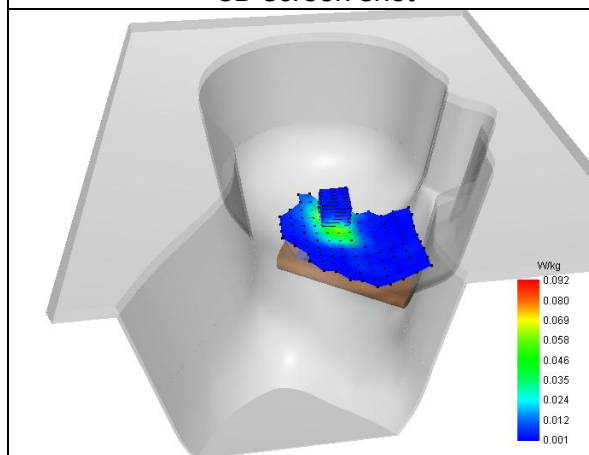
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.158	0.092	0.043	0.022	0.011	0.006	0.005

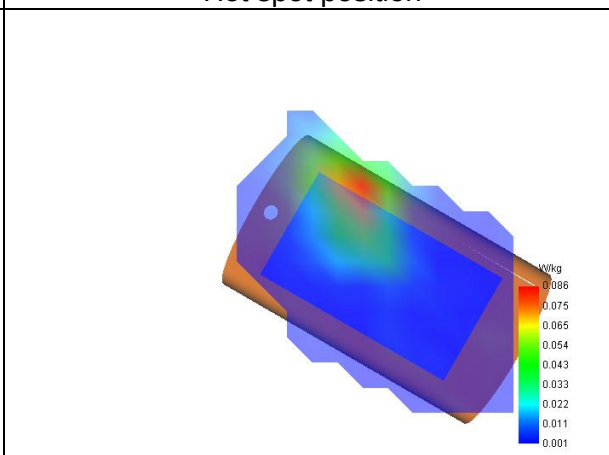


F. 3D Image

3D screen shot



Hot spot position



26# SAR Measurement at ISM (Body, Validation Plane)

Date of measurement: 26/2/2025

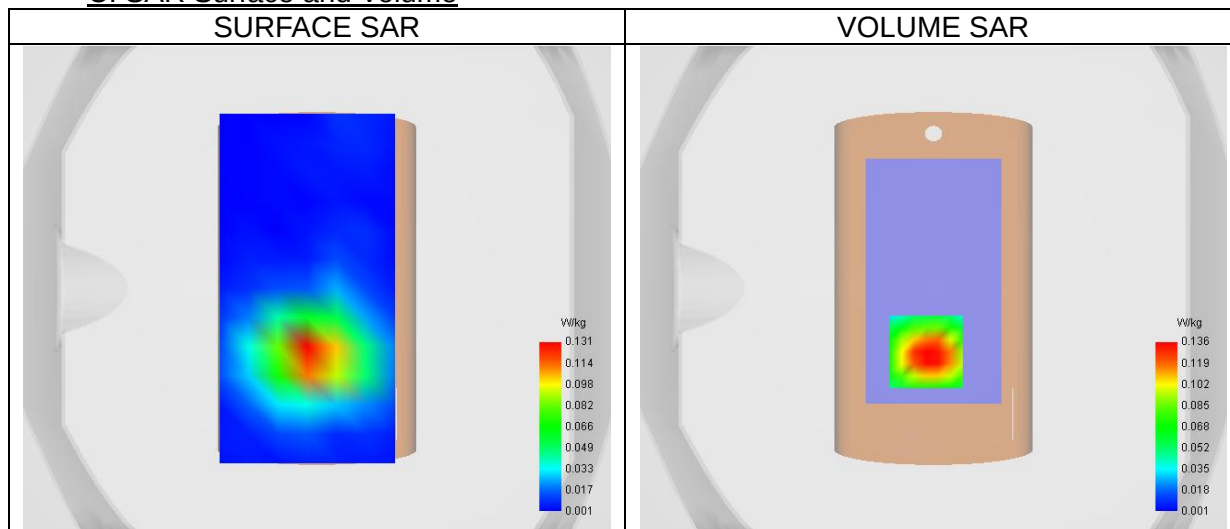
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7, dx=5mm dy=5mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Signal	IEEE 802.11 b
Channels/Frequency	Middle (6)/ frequency 2437.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2437.00
Relative permittivity (real part)	38.25
Relative permittivity (imaginary part)	12.92
Conductivity (S/m)	1.75

C. SAR Surface and Volume



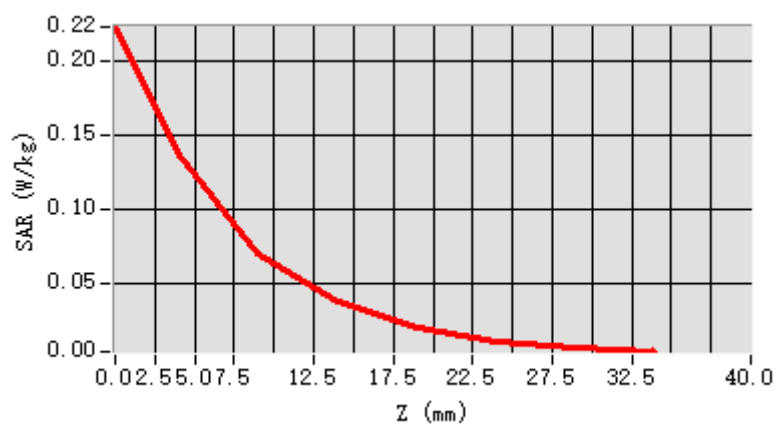
Maximum location: X=-3.00, Y=-26.00 ; SAR Peak: 0.23 W/kg

D. SAR 1g & 10g

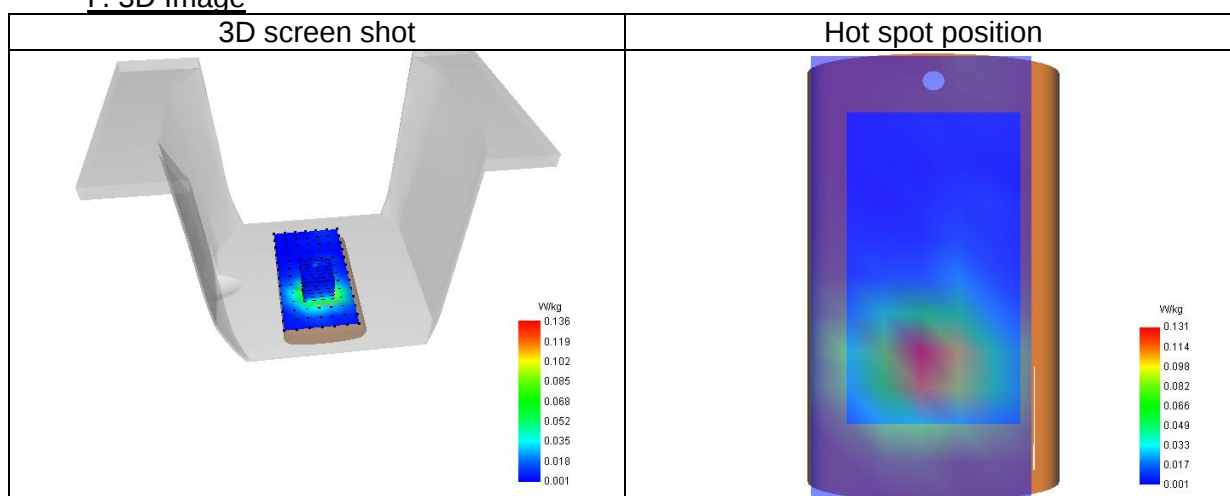
SAR 10g (W/Kg)	0.065
SAR 1g (W/Kg)	0.130
Variation (%)	0.26
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	52.02

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.224	0.136	0.070	0.037	0.019	0.010	0.006



F. 3D Image



27# SAR Measurement at ISM (Body, Validation Plane)

Date of measurement: 26/2/2025

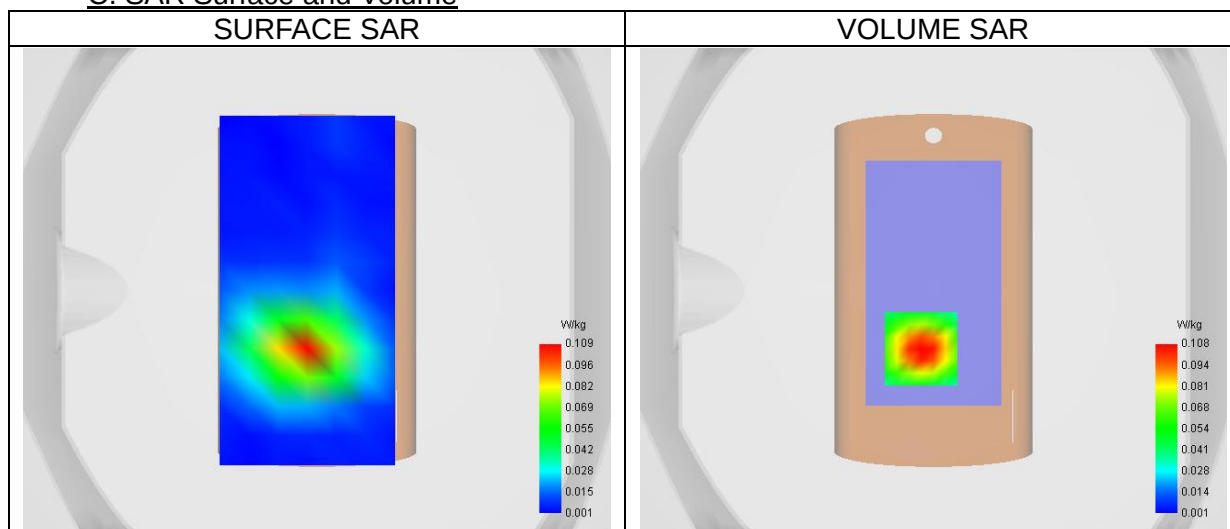
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7, dx=5mm dy=5mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Signal	IEEE 802.11 b
Channels/Frequency	Middle (6)/ frequency 2437.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2437.00
Relative permittivity (real part)	38.25
Relative permittivity (imaginary part)	12.92
Conductivity (S/m)	1.75

C. SAR Surface and Volume



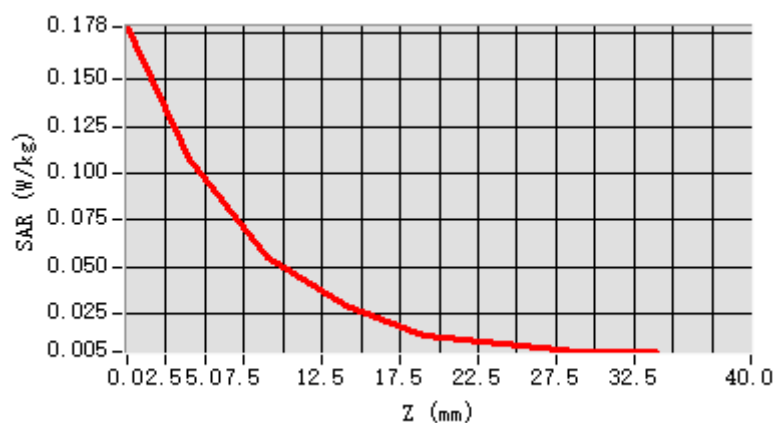
Maximum location: X=-5.00, Y=-24.00 ; SAR Peak: 0.18 W/kg

D. SAR 1g & 10g

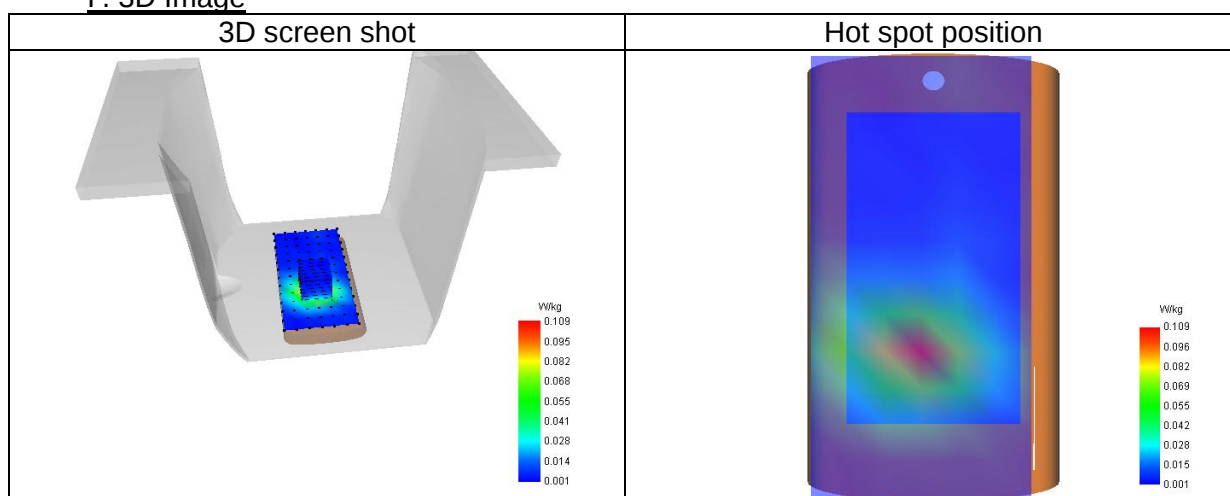
SAR 10g (W/Kg)	0.050
SAR 1g (W/Kg)	0.101
Variation (%)	0.94
Horizontal validation criteria: minimum distance (mm)	15.00
Vertical validation criteria: SAR ratio M2/M1 (%)	50.70

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.178	0.108	0.055	0.029	0.014	0.009	0.005



F. 3D Image



28# SAR Measurement at ISM (Body, Validation Plane)

Date of measurement: 26/2/2025

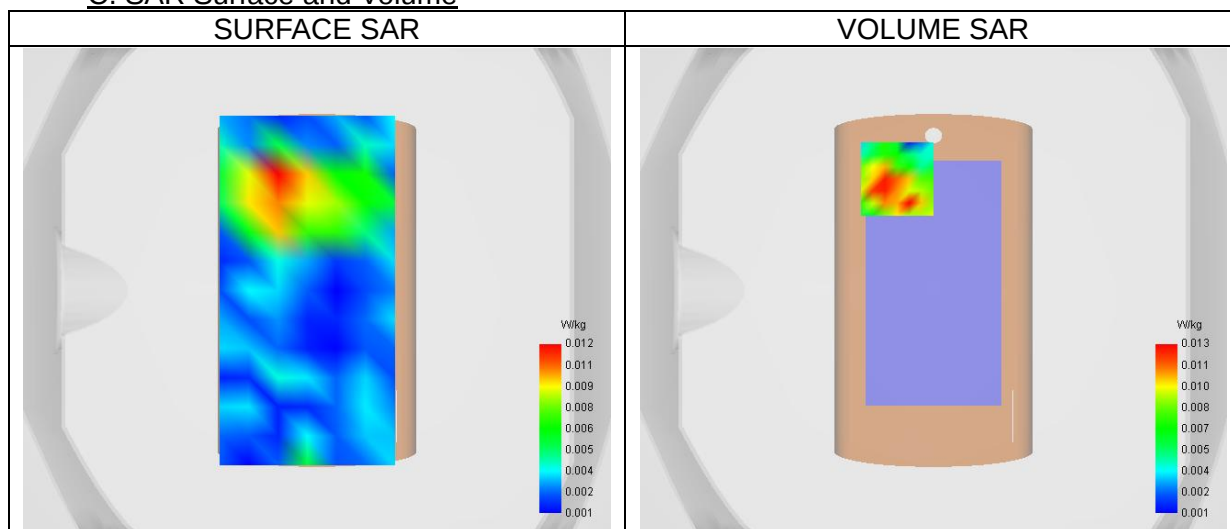
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7, dx=5mm dy=5mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Signal	IEEE 802.11 b
Channels/Frequency	Middle (1)/ frequency 2412.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2412.00
Relative permittivity (real part)	38.25
Relative permittivity (imaginary part)	12.92
Conductivity (S/m)	1.75

C. SAR Surface and Volume



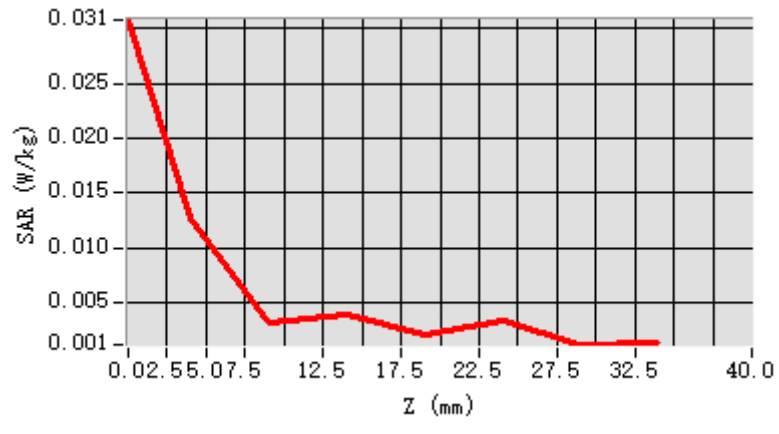
Maximum location: X=-15.00, Y=46.00 ; SAR Peak: 0.02 W/kg

D. SAR 1g & 10g

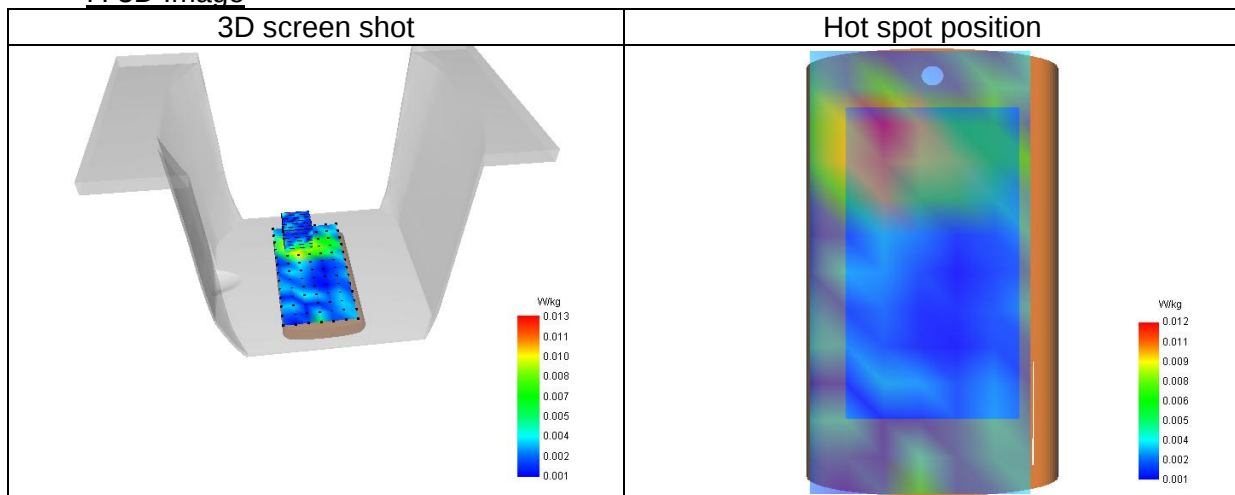
SAR 10g (W/Kg)	0.005
SAR 1g (W/Kg)	0.012
Variation (%)	0.18
Horizontal validation criteria: minimum distance (mm)	15.81
Vertical validation criteria: SAR ratio M2/M1 (%)	62.88

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.031	0.013	0.003	0.004	0.002	0.003	0.001



F. 3D Image



29# SAR Measurement at LTE band 2 (Cheek, Left)

Date of measurement: 2/3/2025

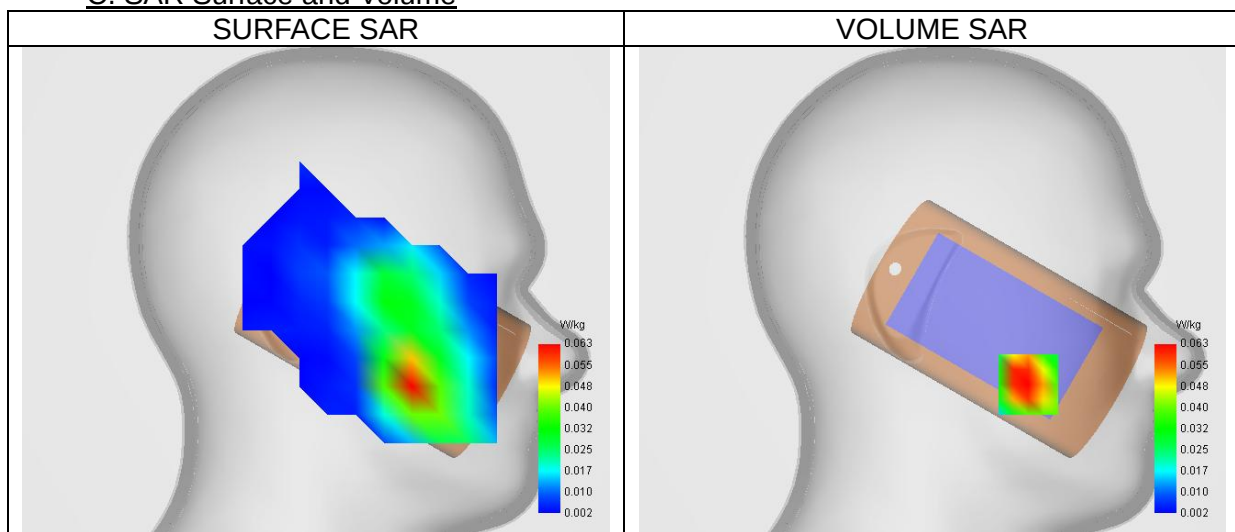
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 2
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (18900)/ frequency 1880.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1880.00

B. Permittivity

Middle TX Frequency (MHz)	1880.00
Relative permittivity (real part)	38.36
Relative permittivity (imaginary part)	13.67
Conductivity (S/m)	1.43

C. SAR Surface and Volume



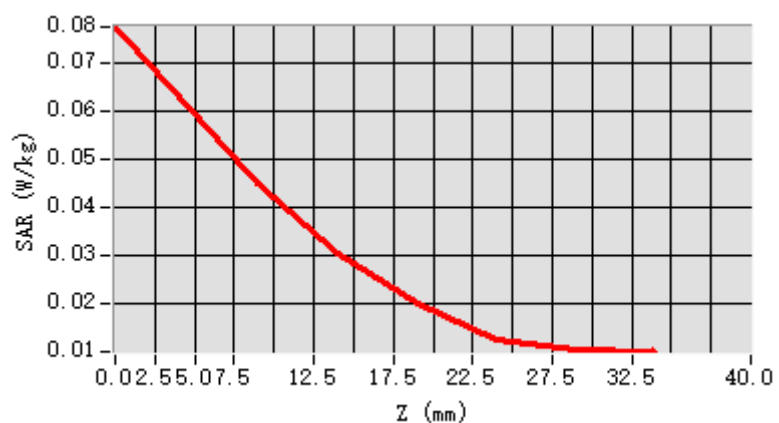
Maximum location: X=-51.00, Y=-50.00 ; SAR Peak: 0.09 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.036
SAR 1g (W/Kg)	0.061
Variation (%)	3.68
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	71.77

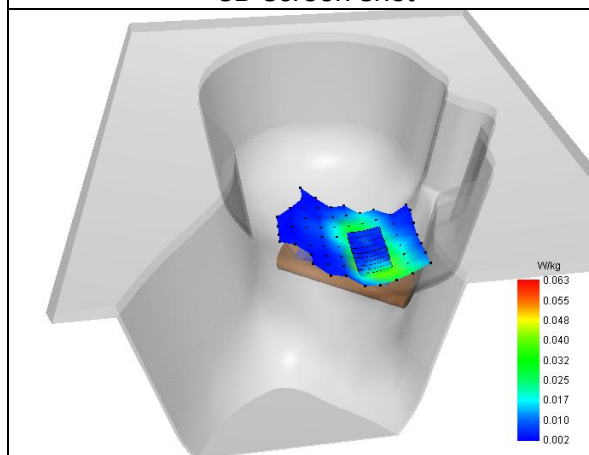
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.078	0.063	0.045	0.030	0.020	0.012	0.010

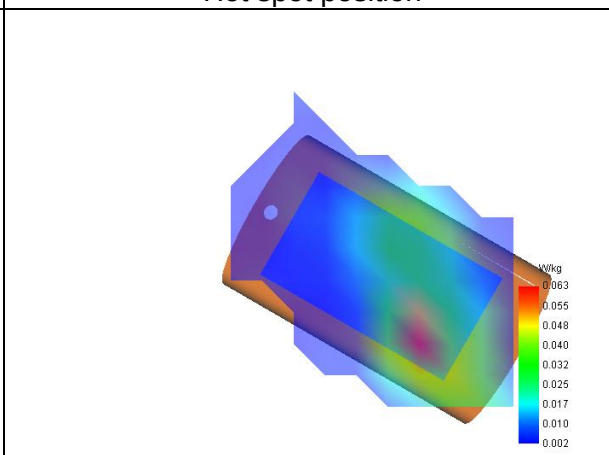


F. 3D Image

3D screen shot



Hot spot position



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

Date of measurement: 2/3/2025

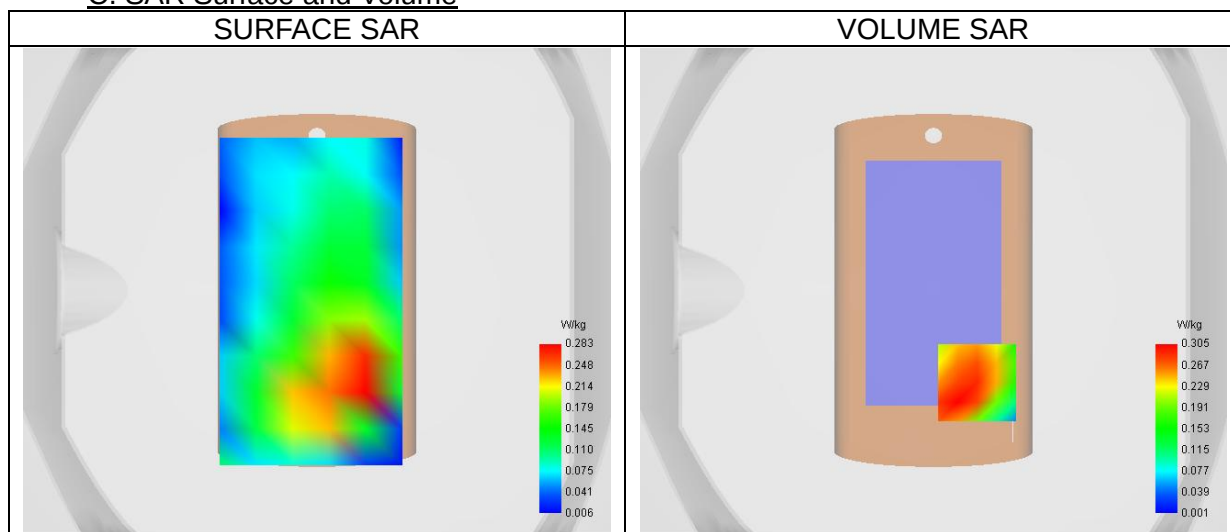
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (18900)/ frequency 1880.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1880.00

B. Permittivity

Middle TX Frequency (MHz)	1880.00
Relative permittivity (real part)	38.36
Relative permittivity (imaginary part)	13.67
Conductivity (S/m)	1.43

C. SAR Surface and Volume



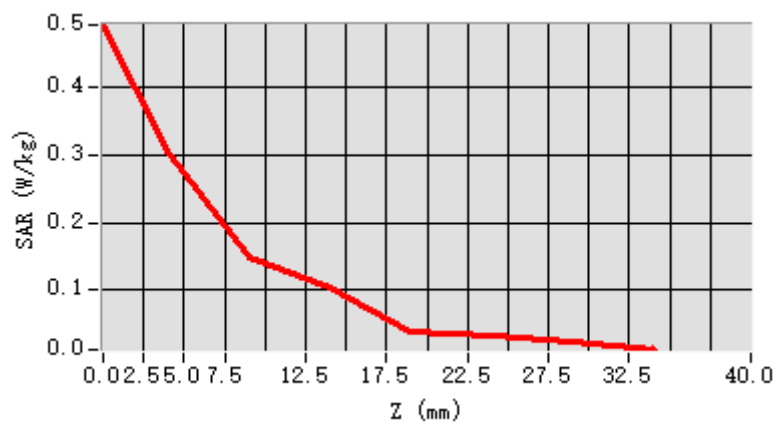
Maximum location: X=18.00, Y=-38.00 ; SAR Peak: 0.47 W/kg

D. SAR 1g & 10g

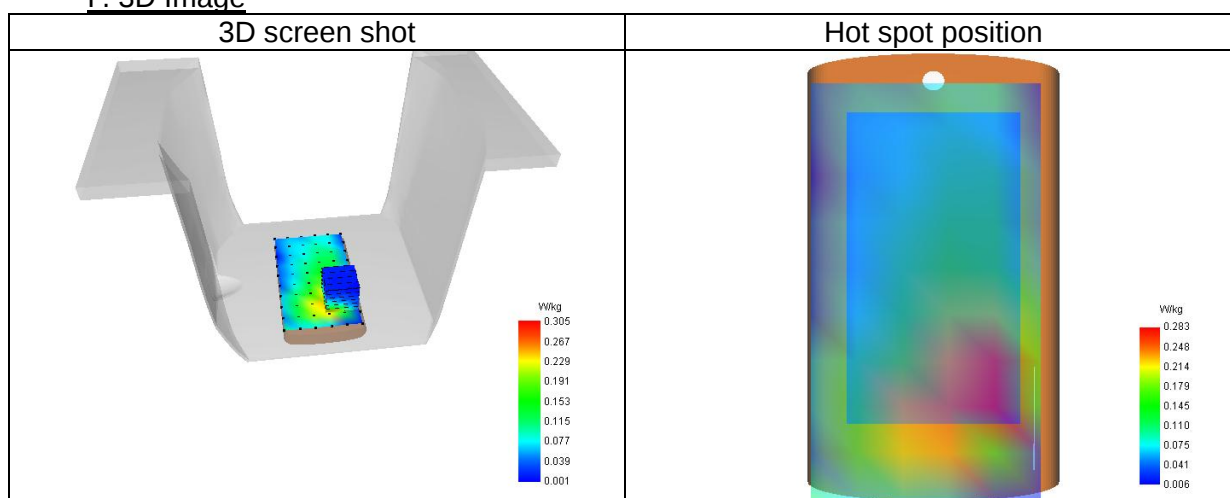
SAR 10g (W/Kg)	0.147
SAR 1g (W/Kg)	0.292
Variation (%)	0.17
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	57.77

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.493	0.305	0.150	0.103	0.038	0.033	0.022



F. 3D Image



31# SAR Measurement at LTE band 4 (Cheek, Left)

Date of measurement: 19/3/2025

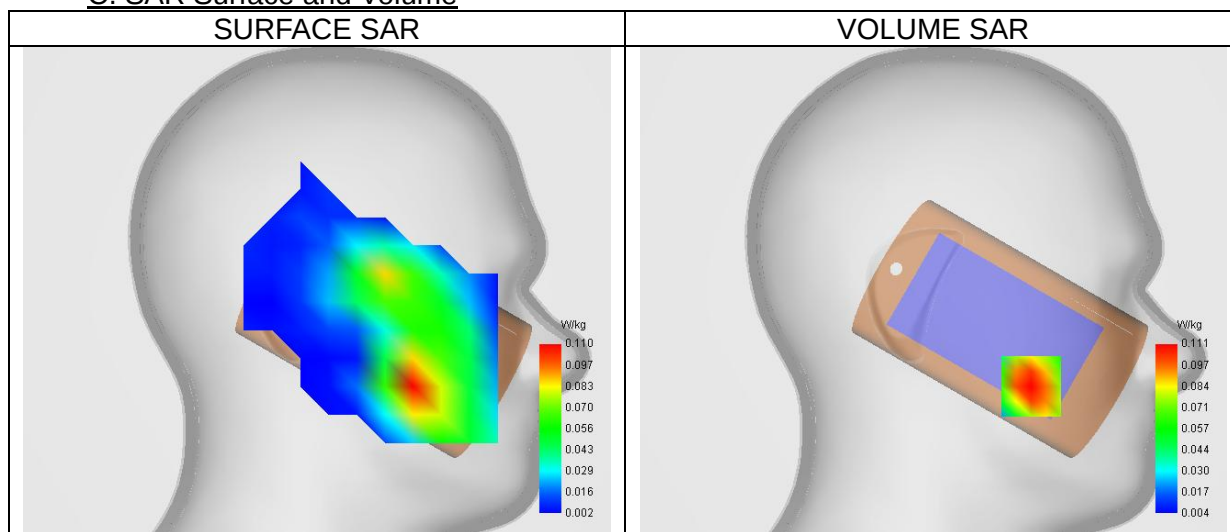
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 4
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (20175)/ frequency 1732.50 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1732.50

B. Permittivity

Middle TX Frequency (MHz)	1732.50
Relative permittivity (real part)	39.38
Relative permittivity (imaginary part)	13.70
Conductivity (S/m)	1.32

C. SAR Surface and Volume



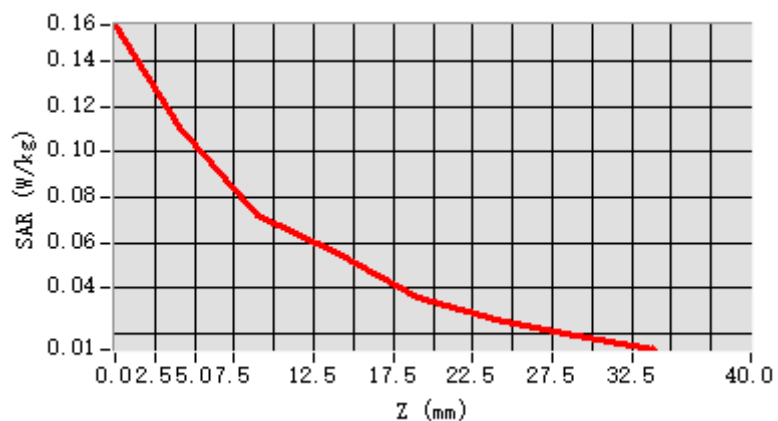
Maximum location: X=-52.00, Y=-51.00 ; SAR Peak: 0.16 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.066
SAR 1g (W/Kg)	0.107
Variation (%)	-2.42
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	66.28

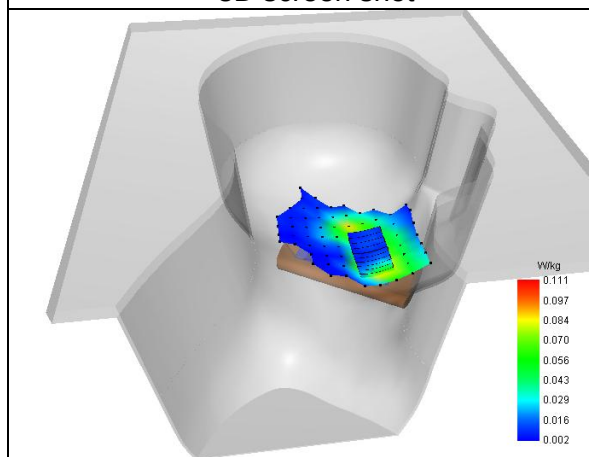
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.156	0.111	0.072	0.055	0.036	0.026	0.019

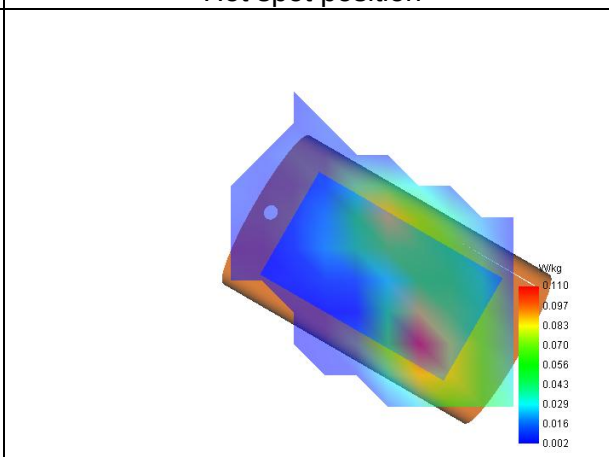


F. 3D Image

3D screen shot



Hot spot position



32# SAR Measurement at LTE band 4 (Body, Validation Plane)

Date of measurement: 19/3/2025

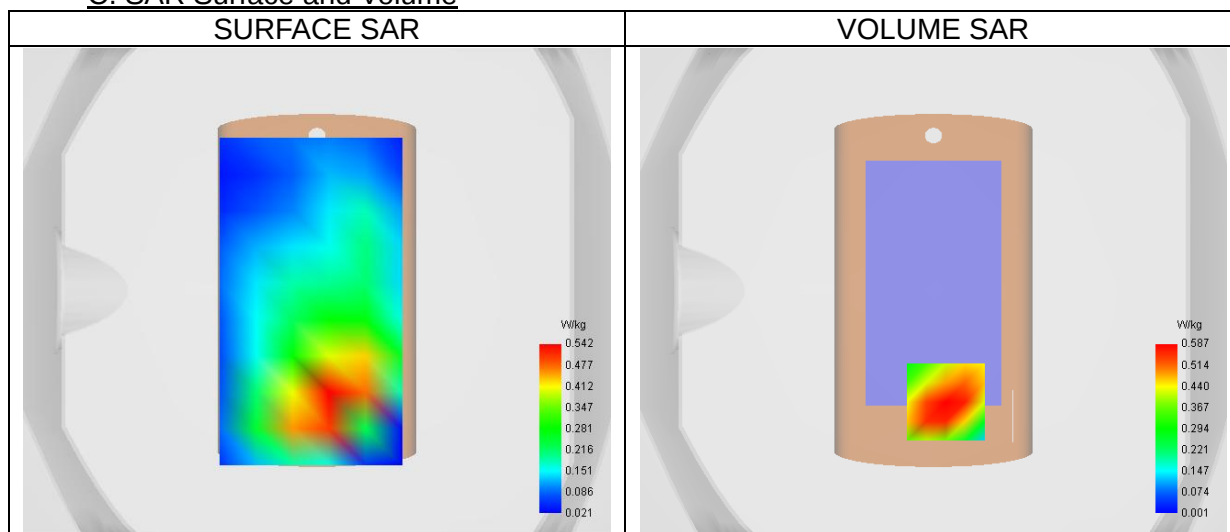
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 4
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (20175)/ frequency 1732.50 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1732.50

B. Permittivity

Middle TX Frequency (MHz)	1732.50
Relative permittivity (real part)	39.38
Relative permittivity (imaginary part)	13.70
Conductivity (S/m)	1.32

C. SAR Surface and Volume



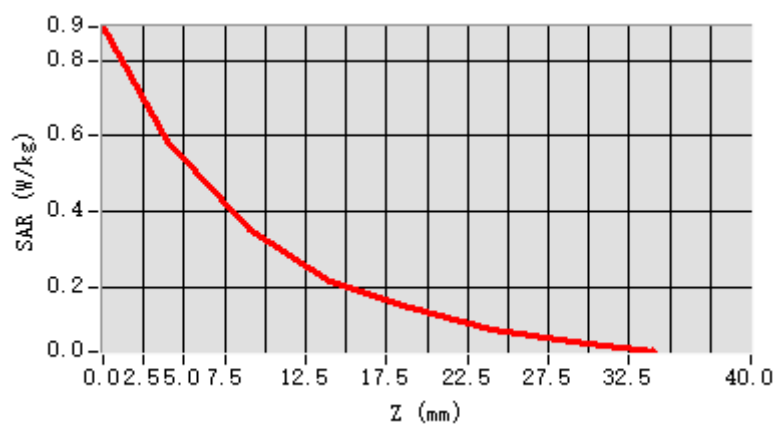
Maximum location: X=5.00, Y=-46.00 ; SAR Peak: 0.91 W/kg

D. SAR 1g & 10g

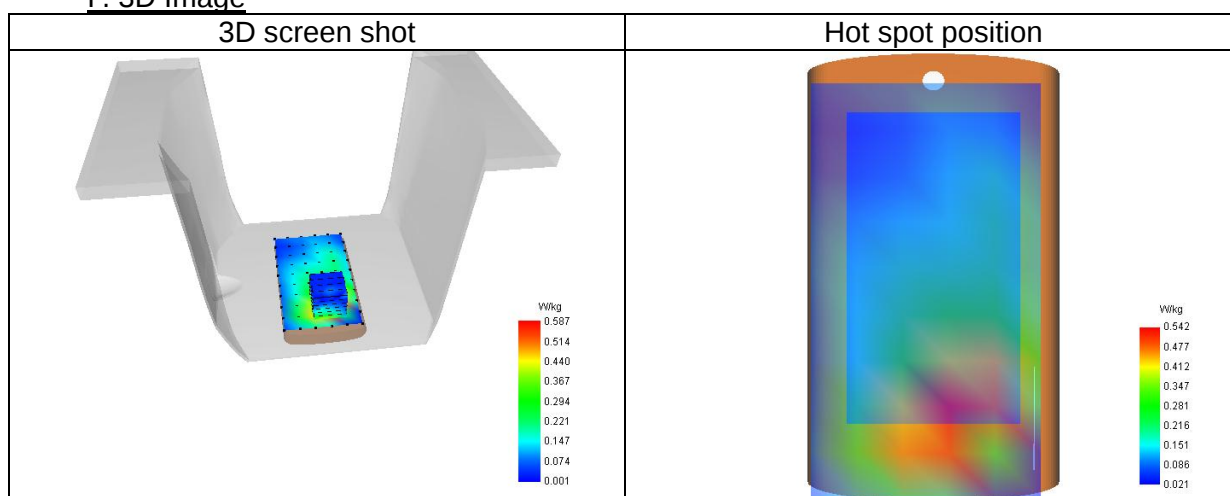
SAR 10g (W/Kg)	0.327
SAR 1g (W/Kg)	0.579
Variation (%)	-0.70
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	60.27

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.888	0.587	0.354	0.218	0.146	0.089	0.055



F. 3D Image



33# SAR Measurement at LTE band 5 (Cheek, Left)

Date of measurement: 1/3/2025

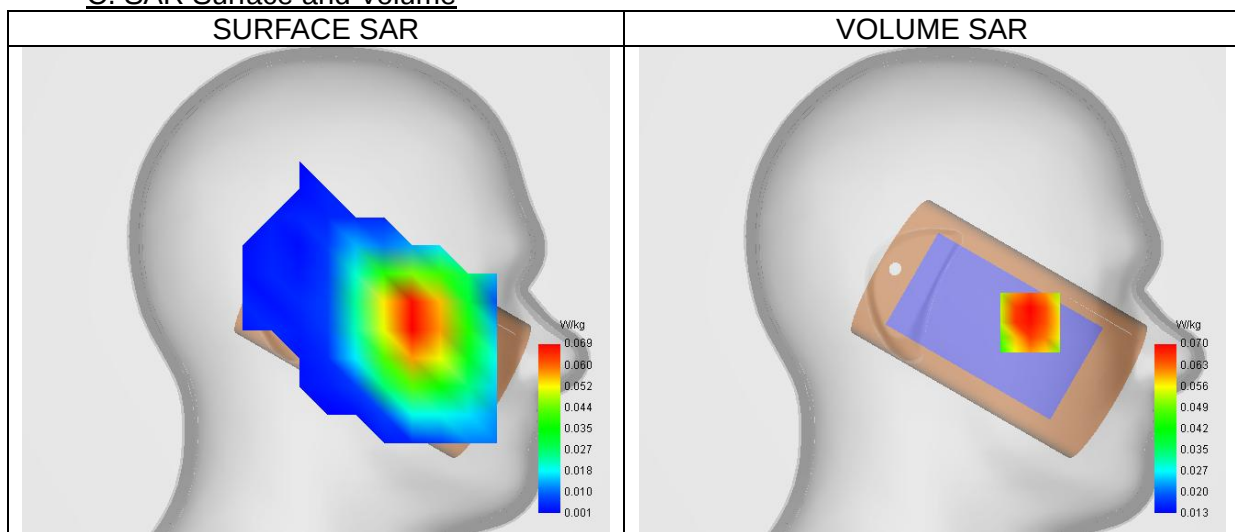
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 5
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (20525)/ frequency 836.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	836.50

B. Permittivity

Middle TX Frequency (MHz)	836.50
Relative permittivity (real part)	41.56
Relative permittivity (imaginary part)	19.49
Conductivity (S/m)	0.91

C. SAR Surface and Volume



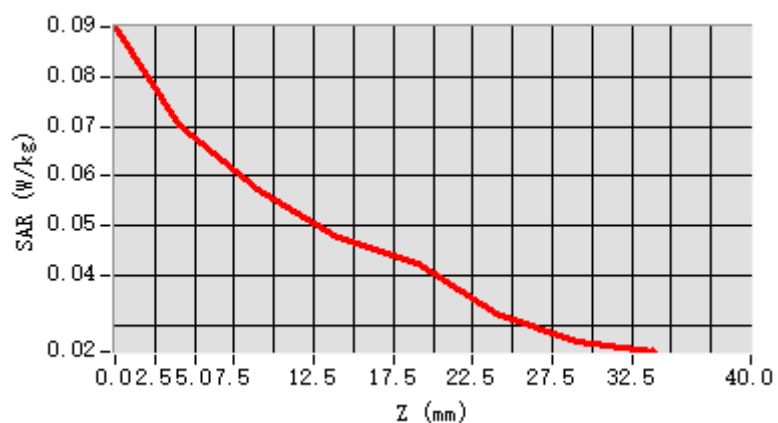
Maximum location: X=-52.00, Y=-17.00 ; SAR Peak: 0.08 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.054
SAR 1g (W/Kg)	0.069
Variation (%)	-2.06
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

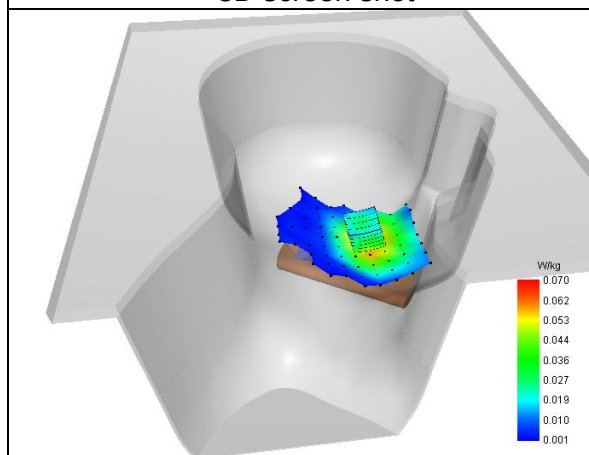
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.090	0.070	0.057	0.048	0.043	0.033	0.027

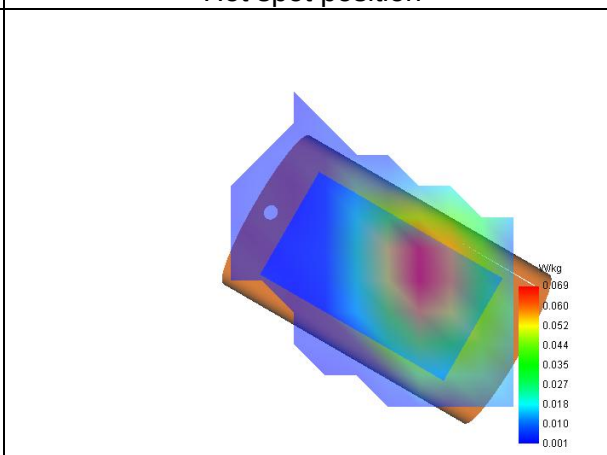


F. 3D Image

3D screen shot



Hot spot position



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

Date of measurement: 1/3/2025

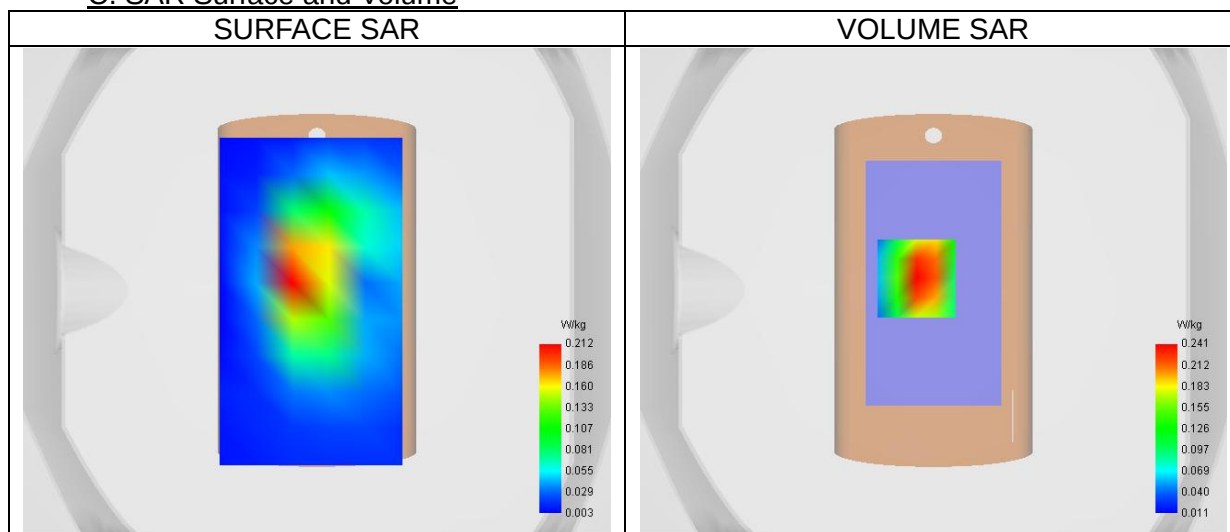
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (20525)/ frequency 836.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	836.50

B. Permittivity

Middle TX Frequency (MHz)	836.50
Relative permittivity (real part)	41.56
Relative permittivity (imaginary part)	19.49
Conductivity (S/m)	0.91

C. SAR Surface and Volume



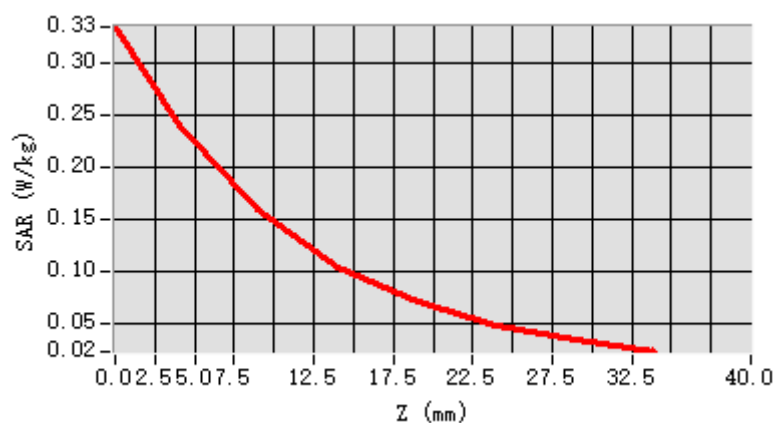
Maximum location: X=-7.00, Y=5.00 ; SAR Peak: 0.36 W/kg

D. SAR 1g & 10g

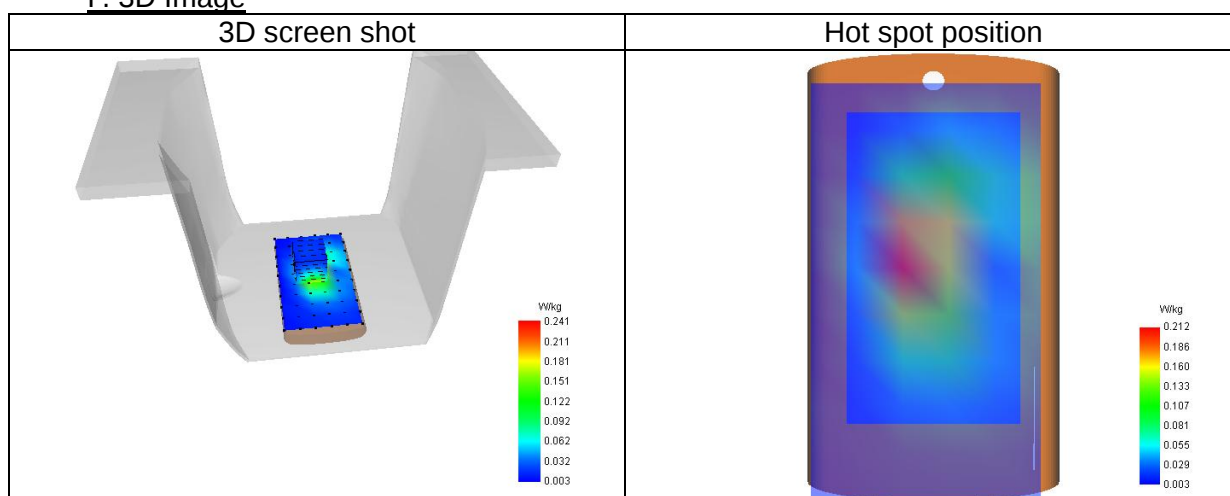
SAR 10g (W/Kg)	0.134
SAR 1g (W/Kg)	0.233
Variation (%)	-0.15
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	66.04

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.334	0.241	0.159	0.103	0.071	0.048	0.033



F. 3D Image



35# SAR Measurement at LTE band 7 (Cheek, Left)

Date of measurement: 22/3/2025

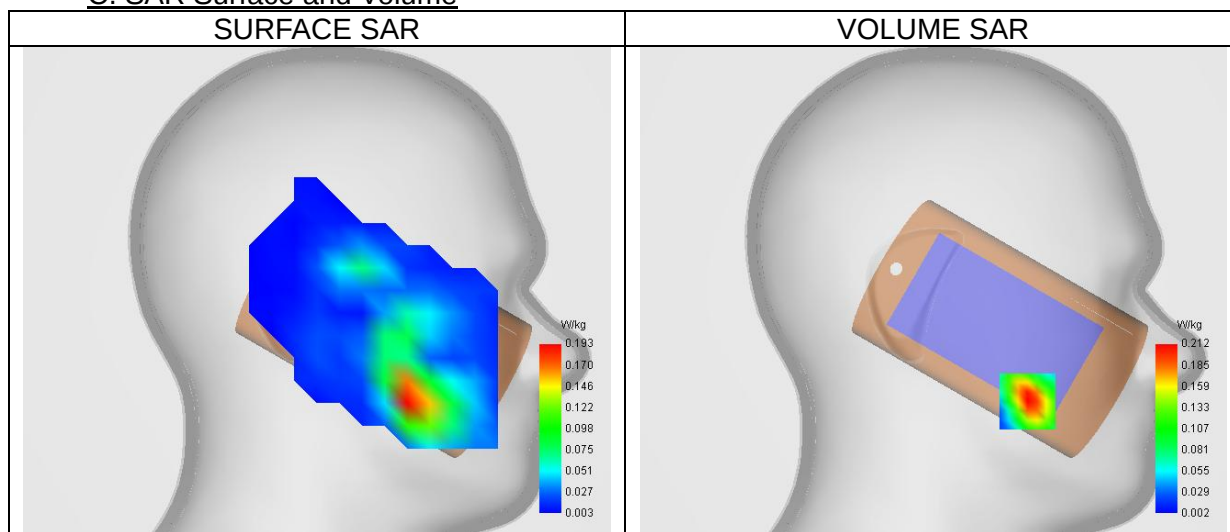
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 7
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (21100)/ frequency 2535.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2535.00

B. Permittivity

Middle TX Frequency (MHz)	2535.00
Relative permittivity (real part)	39.47
Relative permittivity (imaginary part)	13.61
Conductivity (S/m)	1.92

C. SAR Surface and Volume



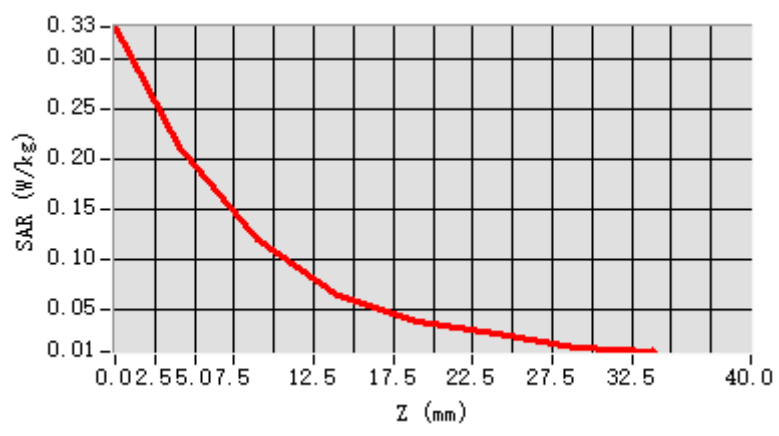
Maximum location: X=-50.00, Y=-59.00 ; SAR Peak: 0.33 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.097
SAR 1g (W/Kg)	0.193
Variation (%)	1.01
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	56.61

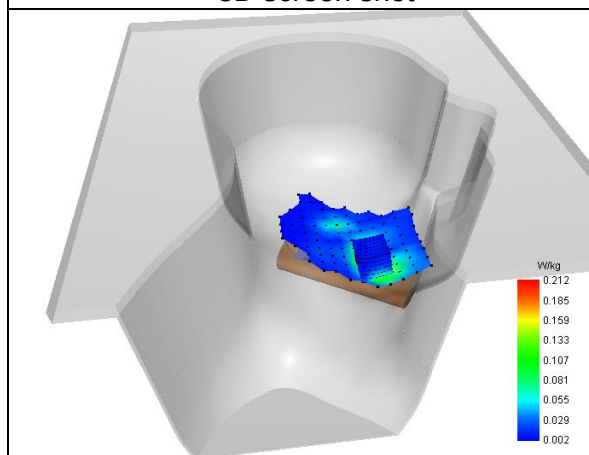
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.331	0.212	0.120	0.065	0.039	0.026	0.014

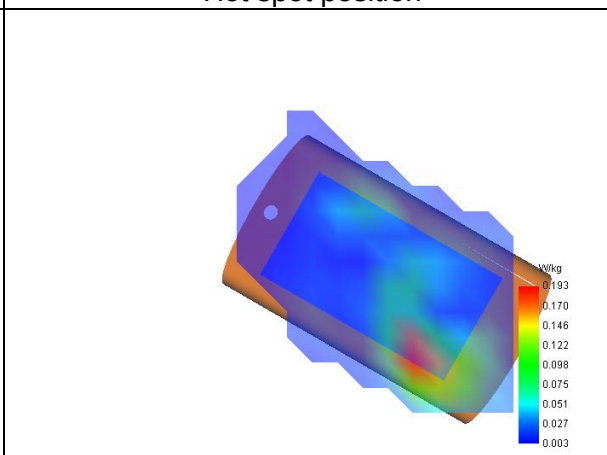


F. 3D Image

3D screen shot



Hot spot position



36# SAR Measurement at LTE band 7 (Body, Validation Plane)

Date of measurement: 22/3/2025

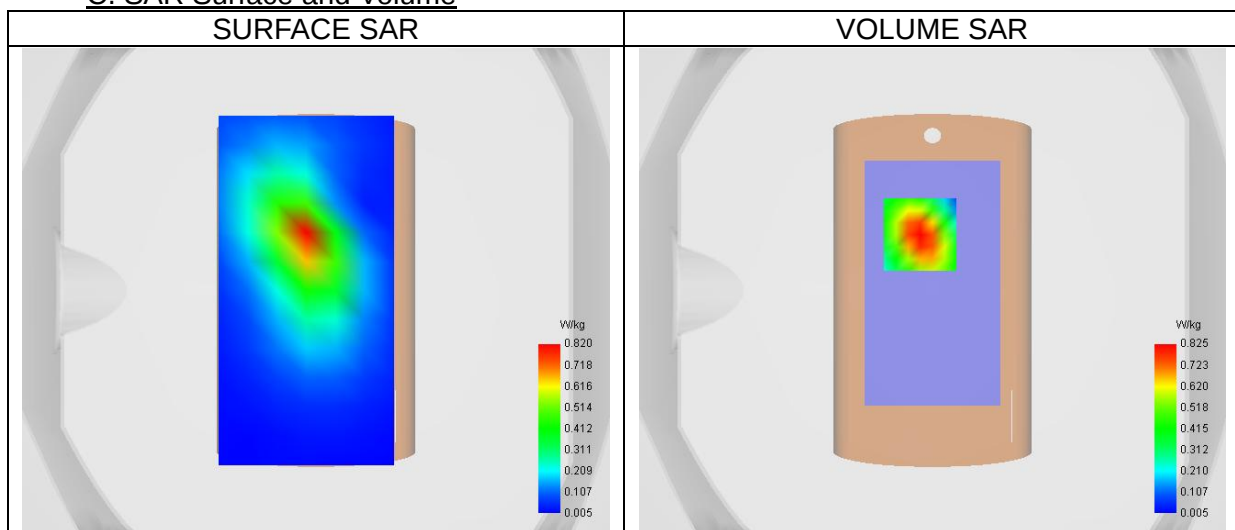
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7, dx=5mm dy=5mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 7
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (21100)/ frequency 2535.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2530.00

B. Permittivity

Middle TX Frequency (MHz)	2535.00
Relative permittivity (real part)	39.47
Relative permittivity (imaginary part)	13.61
Conductivity (S/m)	1.92

C. SAR Surface and Volume



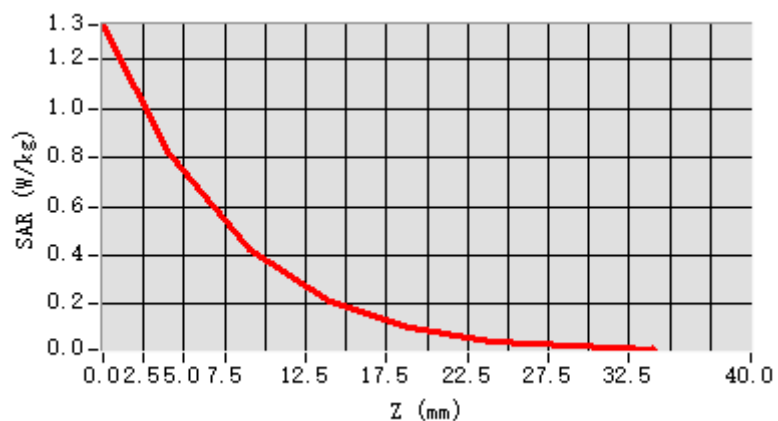
Maximum location: X=-5.00, Y=23.00 ; SAR Peak: 1.33 W/kg

D. SAR 1g & 10g

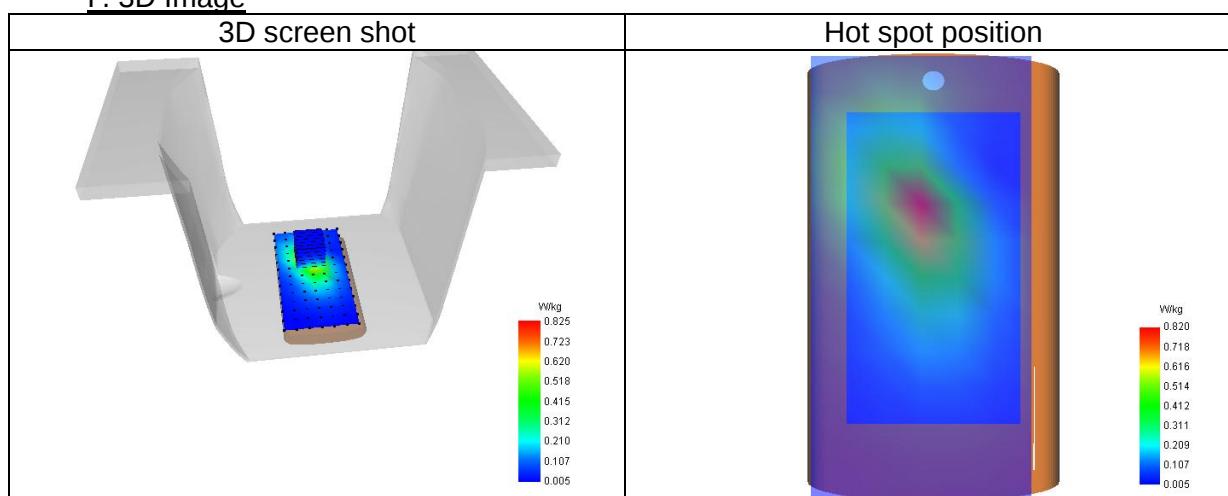
SAR 10g (W/Kg)	0.373
SAR 1g (W/Kg)	0.762
Variation (%)	-0.72
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	51.41

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.343	0.825	0.424	0.215	0.107	0.050	0.028



F. 3D Image



37# SAR Measurement at LTE band 12 (Cheek, Left)

Date of measurement: 8/3/2025

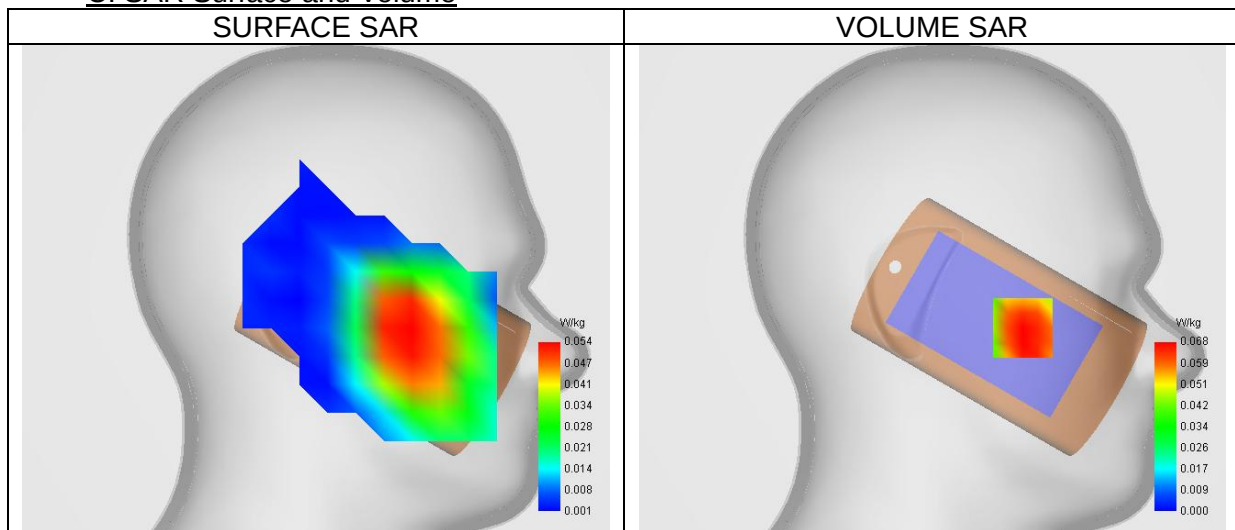
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 12
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23095)/ frequency 707.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	707.50

B. Permittivity

Middle TX Frequency (MHz)	707.50
Relative permittivity (real part)	41.39
Relative permittivity (imaginary part)	21.98
Conductivity (S/m)	0.86

C. SAR Surface and Volume



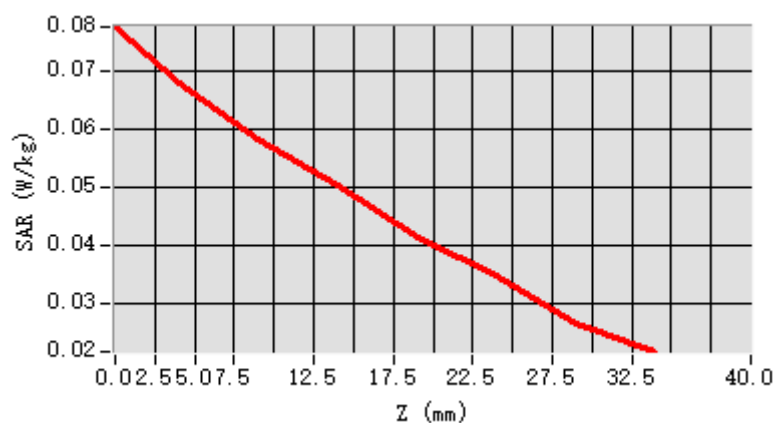
Maximum location: X=-48.00, Y=-21.00 ; SAR Peak: 0.08 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.052
SAR 1g (W/Kg)	0.067
Variation (%)	-3.18
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

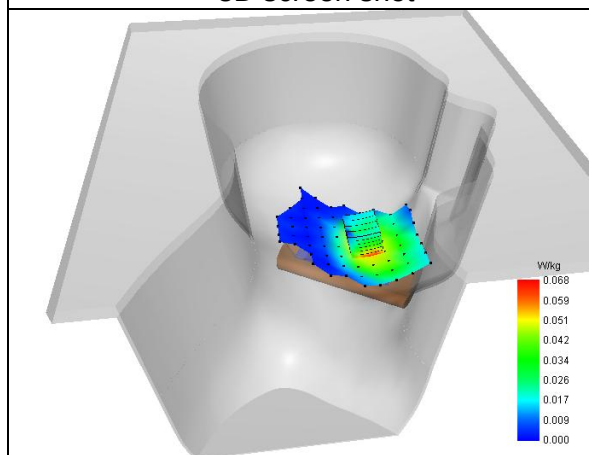
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.077	0.068	0.058	0.050	0.042	0.035	0.027

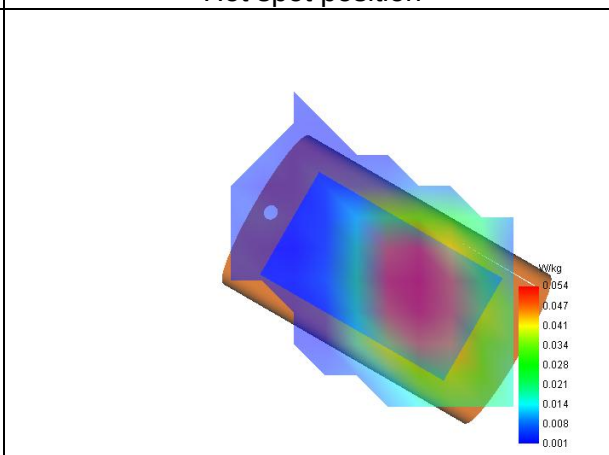


F. 3D Image

3D screen shot



Hot spot position



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

Date of measurement: 8/3/2025

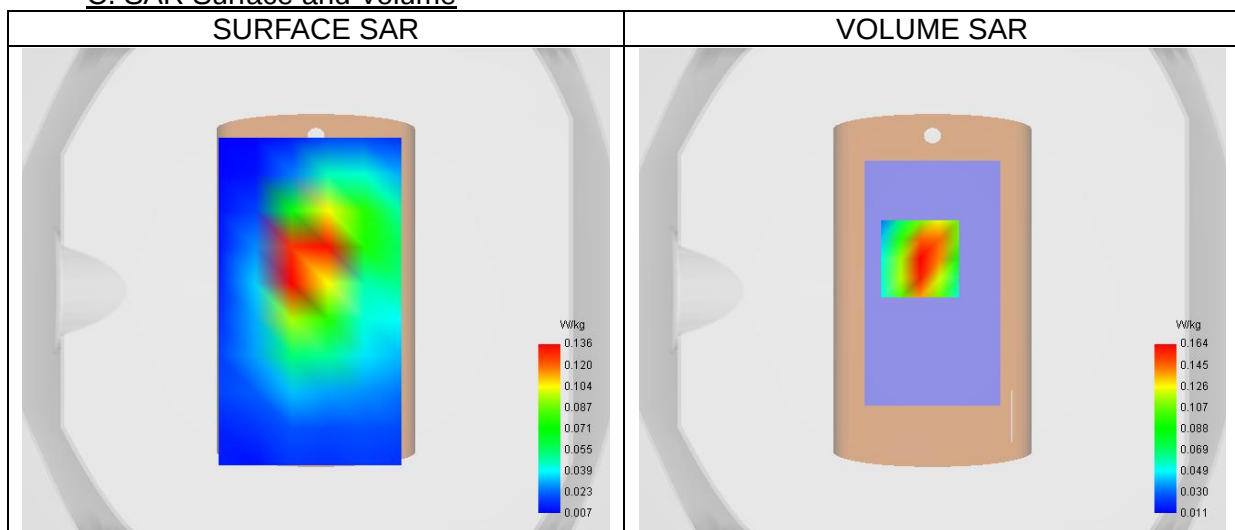
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 12
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23095)/ frequency 707.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	707.50

B. Permittivity

Middle TX Frequency (MHz)	707.50
Relative permittivity (real part)	41.39
Relative permittivity (imaginary part)	21.98
Conductivity (S/m)	0.86

C. SAR Surface and Volume



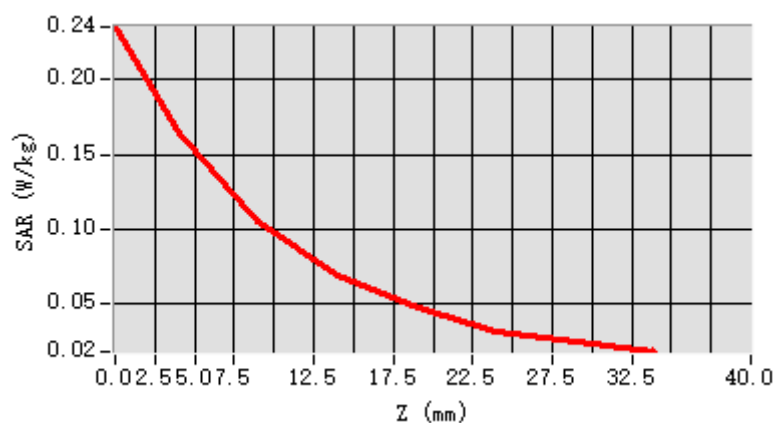
Maximum location: X=-5.00, Y=13.00 ; SAR Peak: 0.24 W/kg

D. SAR 1g & 10g

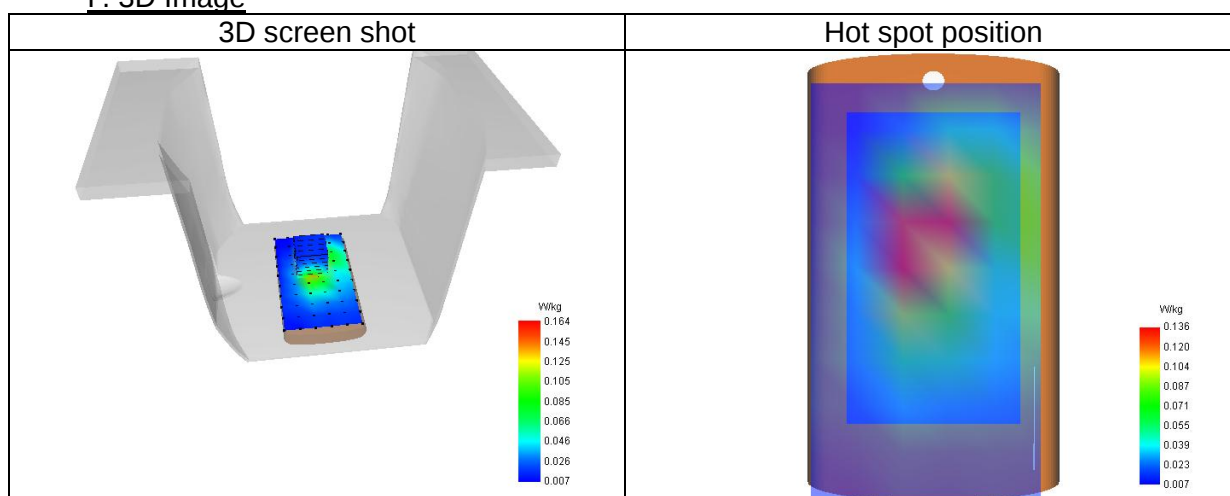
SAR 10g (W/Kg)	0.091
SAR 1g (W/Kg)	0.155
Variation (%)	-1.27
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	63.37

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.236	0.164	0.104	0.068	0.047	0.031	0.024



F. 3D Image



39# SAR Measurement at LTE band 17 (Cheek, Left)

Date of measurement: 8/3/2025

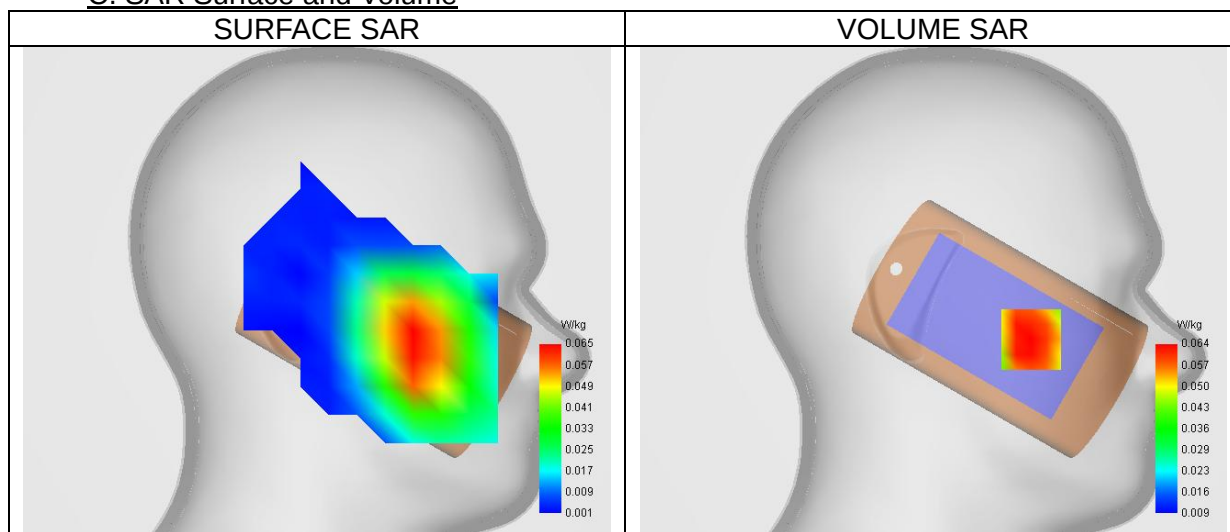
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 17
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23790)/ frequency 710.00 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	710.00

B. Permittivity

Middle TX Frequency (MHz)	710.00
Relative permittivity (real part)	41.38
Relative permittivity (imaginary part)	21.92
Conductivity (S/m)	0.86

C. SAR Surface and Volume



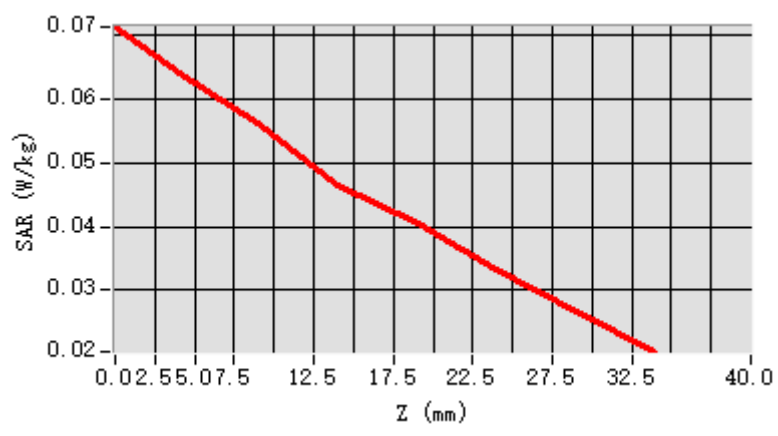
Maximum location: X=-52.00, Y=-26.00 ; SAR Peak: 0.08 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.050
SAR 1g (W/Kg)	0.063
Variation (%)	2.87
Horizontal validation criteria: minimum distance (mm)	11.57
Vertical validation criteria: SAR ratio M2/M1 (%)	51.32

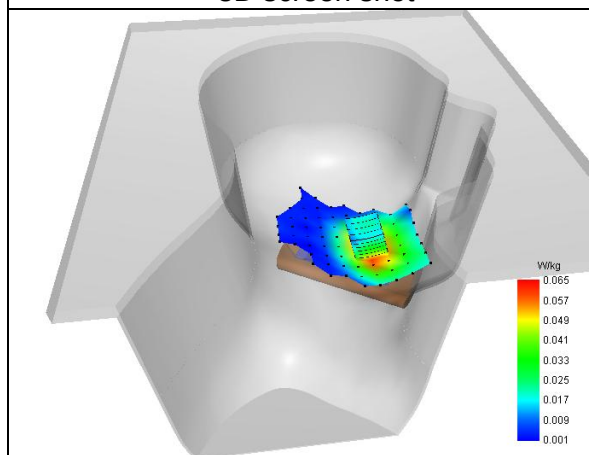
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.071	0.064	0.056	0.047	0.041	0.033	0.027

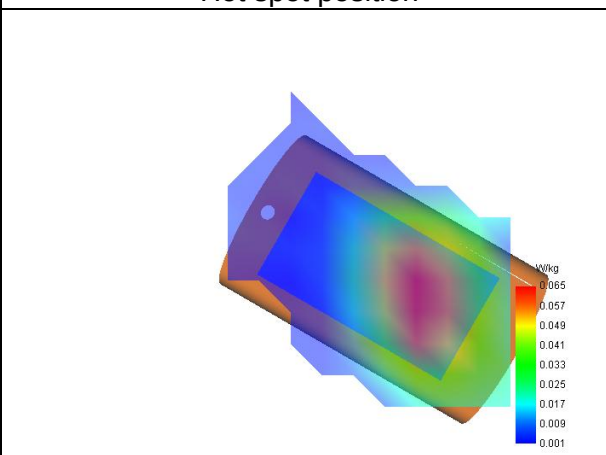


F. 3D Image

3D screen shot



Hot spot position



40# SAR Measurement at LTE band 17 (Body, Validation Plane)

Date of measurement: 8/3/2025

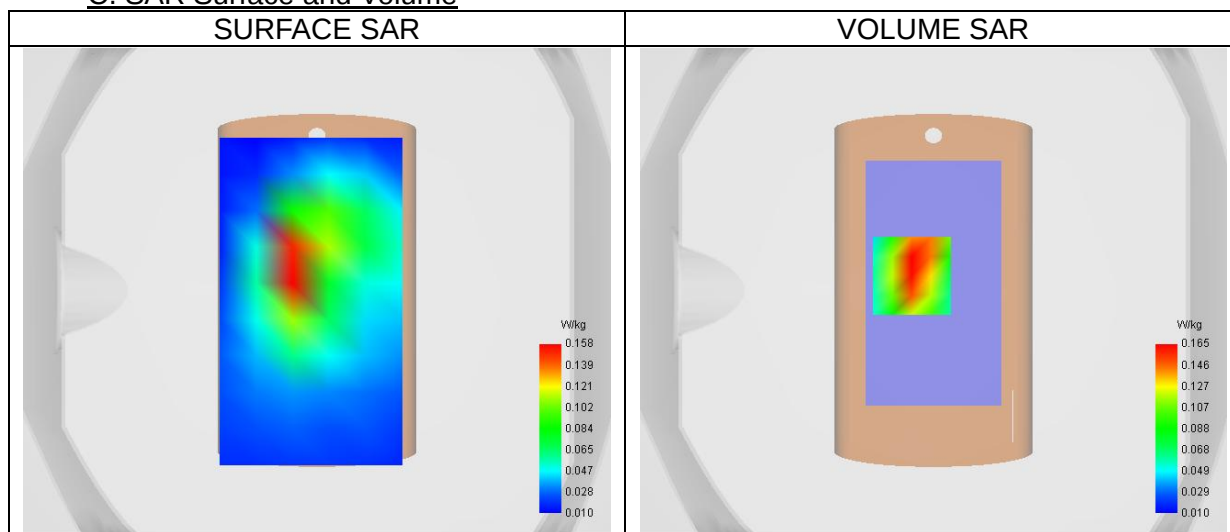
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 17
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23790)/ frequency 710.00 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	710.00

B. Permittivity

Middle TX Frequency (MHz)	710.00
Relative permittivity (real part)	41.38
Relative permittivity (imaginary part)	21.92
Conductivity (S/m)	0.86

C. SAR Surface and Volume



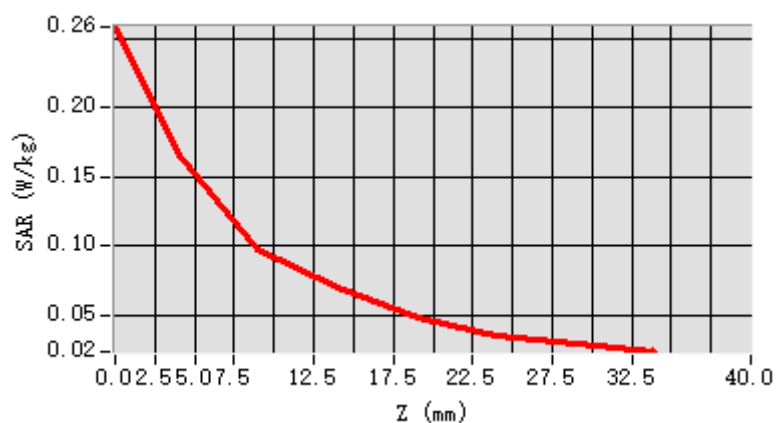
Maximum location: X=-9.00, Y=6.00 ; SAR Peak: 0.25 W/kg

D. SAR 1g & 10g

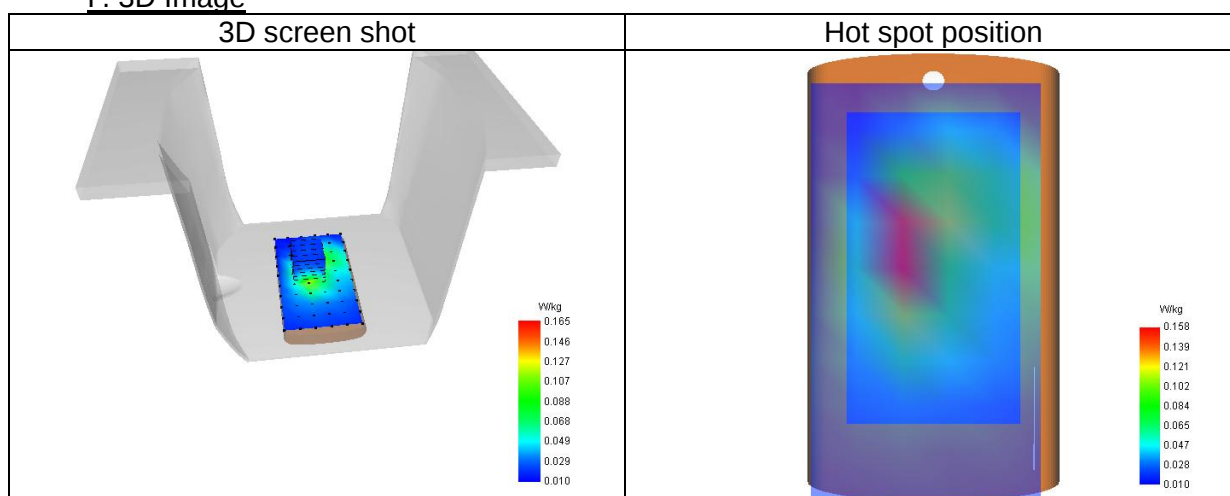
SAR 10g (W/Kg)	0.093
SAR 1g (W/Kg)	0.159
Variation (%)	-0.73
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	64.83

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.258	0.165	0.097	0.069	0.048	0.036	0.029



F. 3D Image



41# SAR Measurement at LTE band 25 (Cheek, Left)

Date of measurement: 2/3/2025

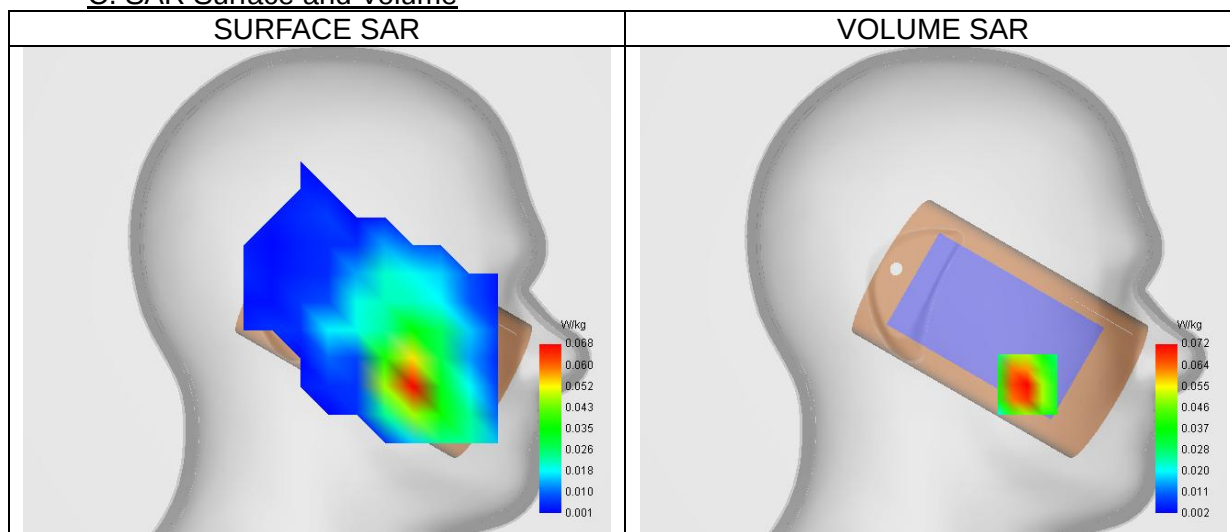
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 25
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (26365)/ frequency 1882.50 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1882.50

B. Permittivity

Middle TX Frequency (MHz)	1882.50
Relative permittivity (real part)	38.34
Relative permittivity (imaginary part)	13.68
Conductivity (S/m)	1.43

C. SAR Surface and Volume



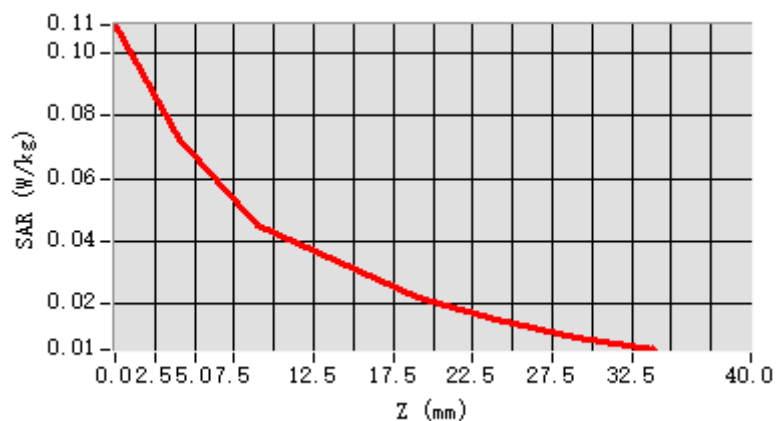
Maximum location: X=-50.00, Y=-50.00 ; SAR Peak: 0.11 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.040
SAR 1g (W/Kg)	0.073
Variation (%)	-0.66
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	65.38

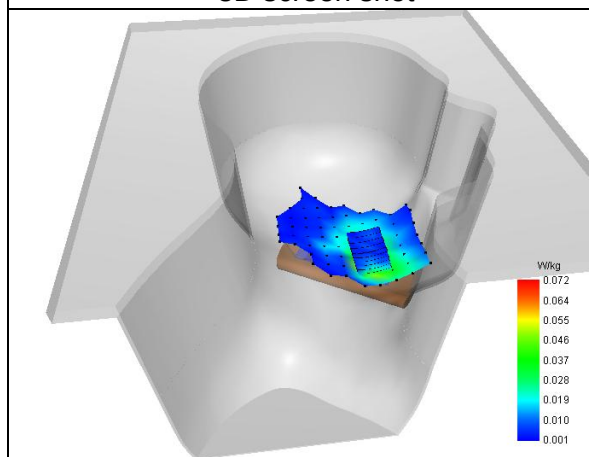
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.109	0.072	0.045	0.033	0.022	0.015	0.010

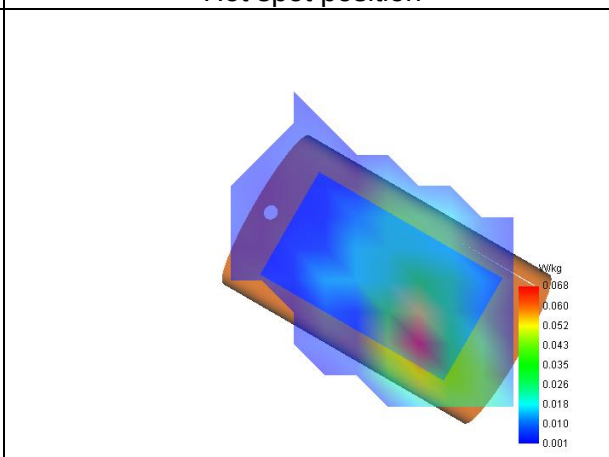


F. 3D Image

3D screen shot



Hot spot position



42# SAR Measurement at LTE band 25 (Body, Validation Plane)

Date of measurement: 2/3/2025

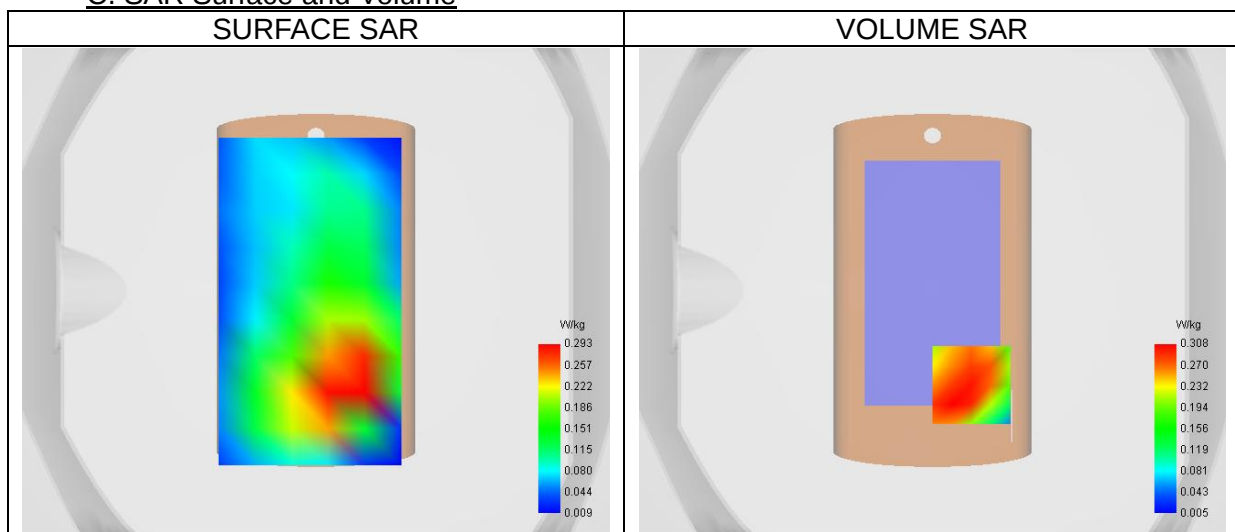
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 25
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (26365)/ frequency 1882.50 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1882.50

B. Permittivity

Middle TX Frequency (MHz)	1882.50
Relative permittivity (real part)	38.34
Relative permittivity (imaginary part)	13.68
Conductivity (S/m)	1.43

C. SAR Surface and Volume



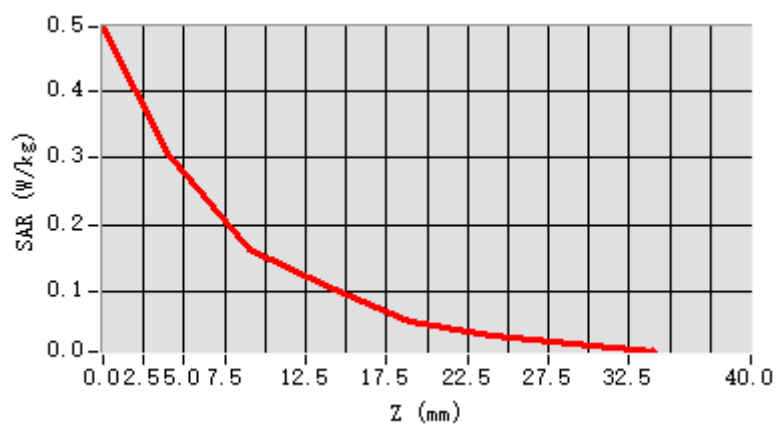
Maximum location: X=16.00, Y=-39.00 ; SAR Peak: 0.48 W/kg

D. SAR 1g & 10g

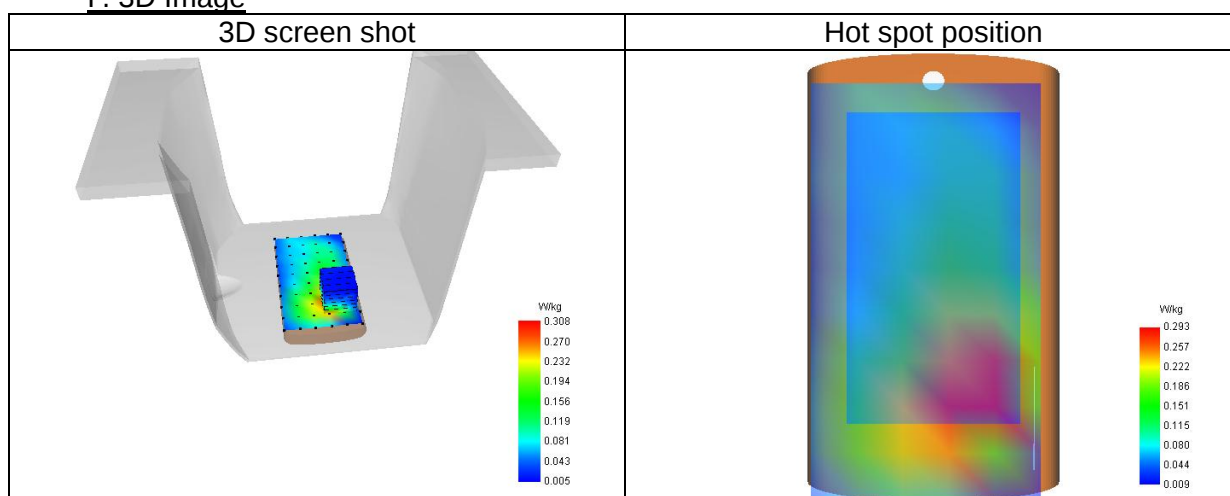
SAR 10g (W/Kg)	0.165
SAR 1g (W/Kg)	0.303
Variation (%)	1.75
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	58.76

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.496	0.308	0.163	0.107	0.057	0.034	0.022



F. 3D Image



43# SAR Measurement at LTE band 26A (Cheek, Left)

Date of measurement: 1/3/2025

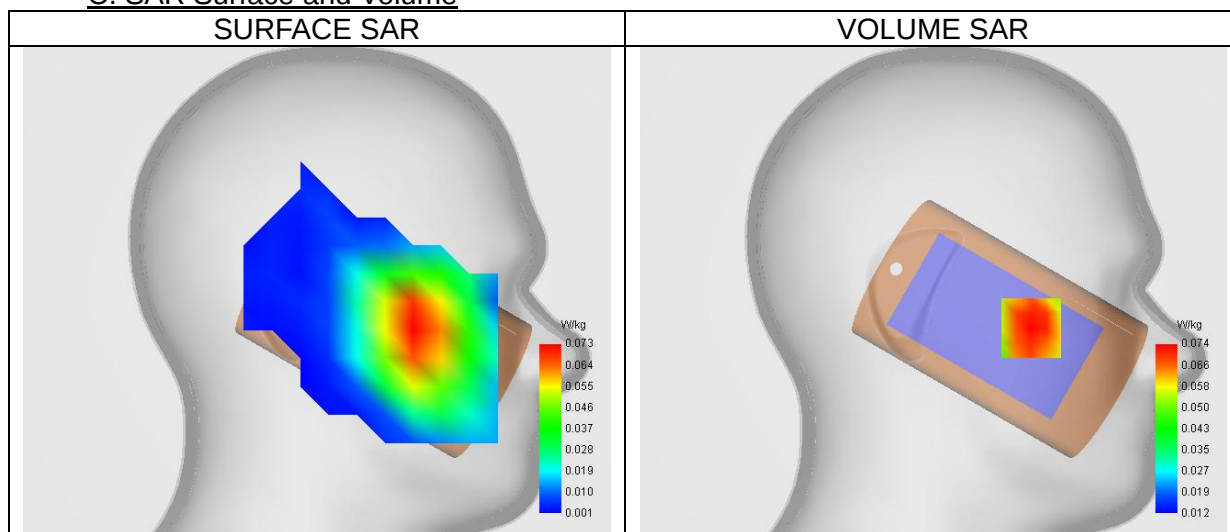
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 26A
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (26740)/ frequency 819.00 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	819.00

B. Permittivity

Middle TX Frequency (MHz)	819.00
Relative permittivity (real part)	41.82
Relative permittivity (imaginary part)	19.47
Conductivity (S/m)	0.89

C. SAR Surface and Volume



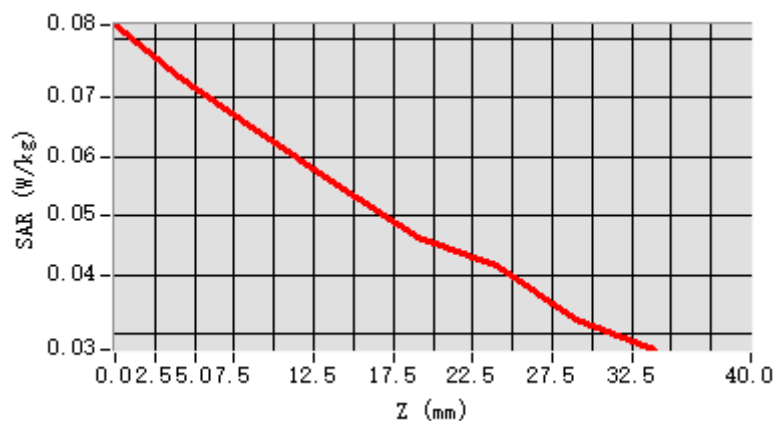
Maximum location: X=-52.00, Y=-20.00 ; SAR Peak: 0.10 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.056
SAR 1g (W/Kg)	0.073
Variation (%)	-4.20
Horizontal validation criteria: minimum distance (mm)	11.74
Vertical validation criteria: SAR ratio M2/M1 (%)	41.05

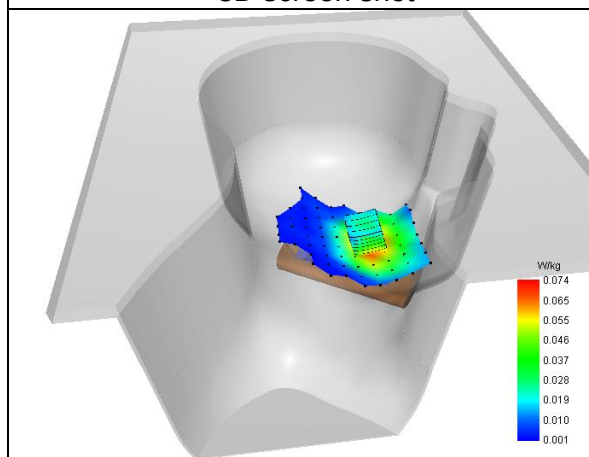
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.082	0.074	0.064	0.055	0.046	0.042	0.033

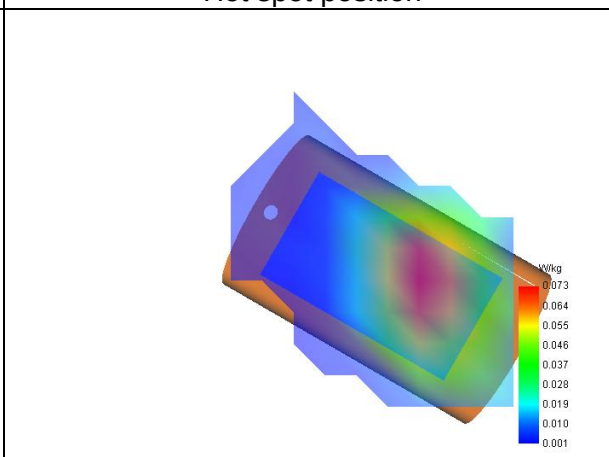


F. 3D Image

3D screen shot



Hot spot position



44# SAR Measurement at LTE band 26B (Cheek, Left)

Date of measurement: 1/3/2025

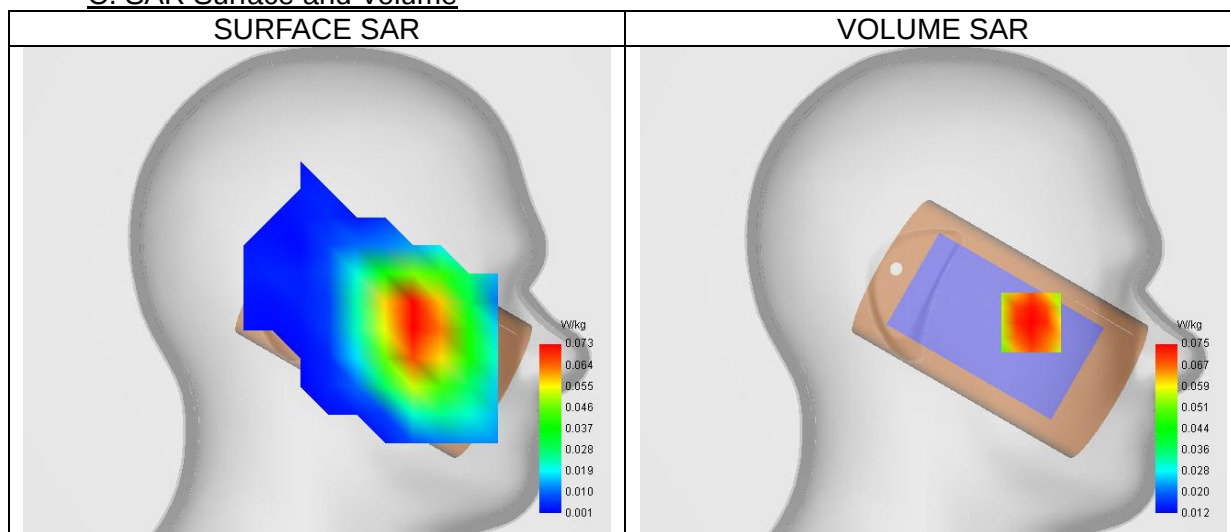
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 26B
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (26865)/ frequency 831.50 Mhz
Cell Bandwidth	15 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	831.50

B. Permittivity

Middle TX Frequency (MHz)	831.50
Relative permittivity (real part)	41.61
Relative permittivity (imaginary part)	19.48
Conductivity (S/m)	0.90

C. SAR Surface and Volume



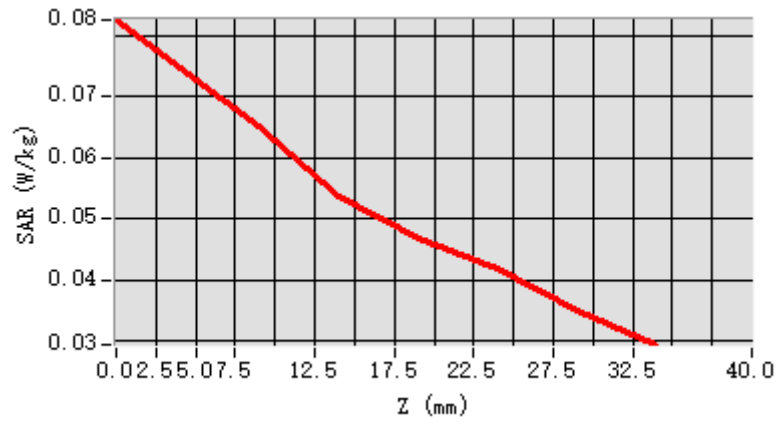
Maximum location: X=-52.00, Y=-17.00 ; SAR Peak: 0.09 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.058
SAR 1g (W/Kg)	0.073
Variation (%)	1.06
Horizontal validation criteria: minimum distance (mm)	11.74
Vertical validation criteria: SAR ratio M2/M1 (%)	41.05

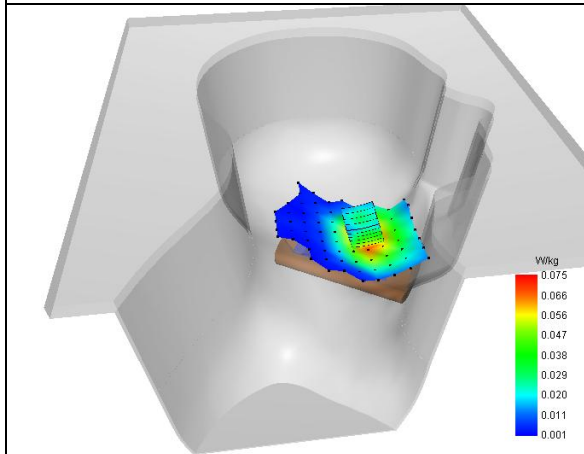
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.083	0.075	0.065	0.054	0.047	0.042	0.035

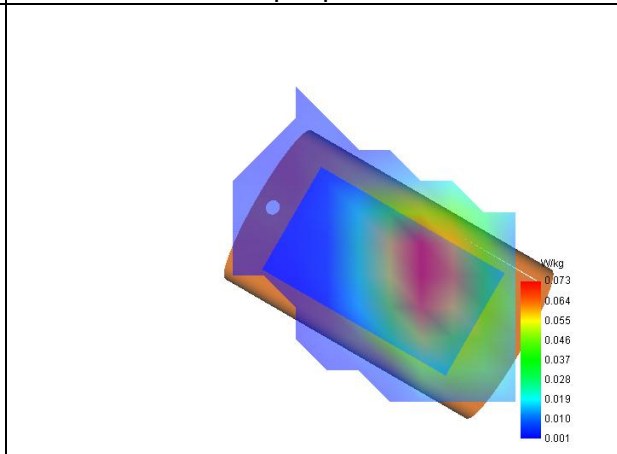


F. 3D Image

3D screen shot



Hot spot position



45# SAR Measurement at LTE band 26A (Body, Validation Plane)

Date of measurement: 1/3/2025

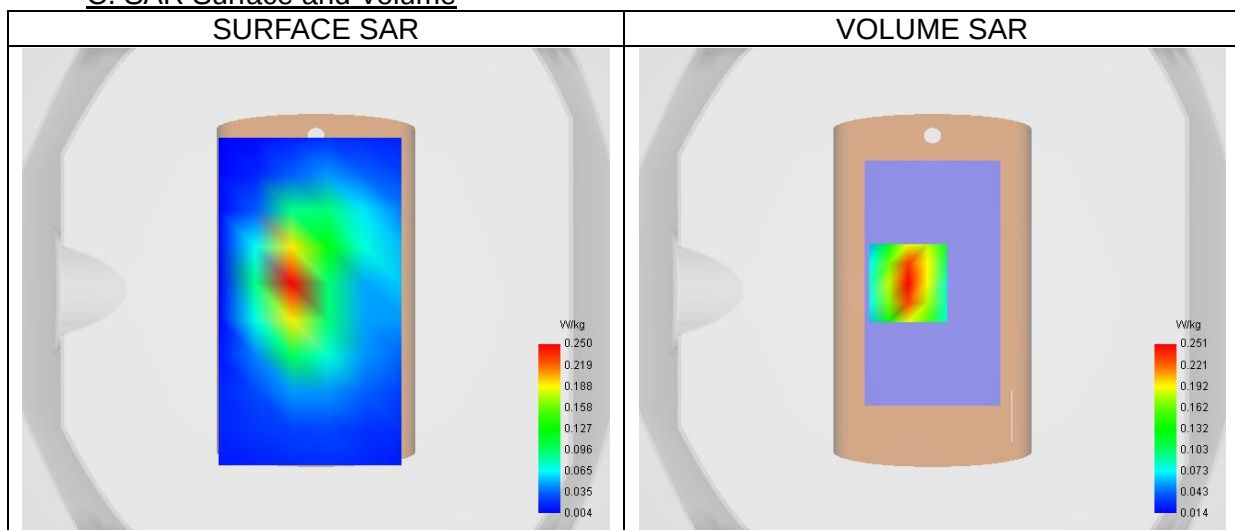
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 26A
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (26740)/ frequency 819.00 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	819.00

B. Permittivity

Middle TX Frequency (MHz)	819.00
Relative permittivity (real part)	41.82
Relative permittivity (imaginary part)	19.47
Conductivity (S/m)	0.89

C. SAR Surface and Volume



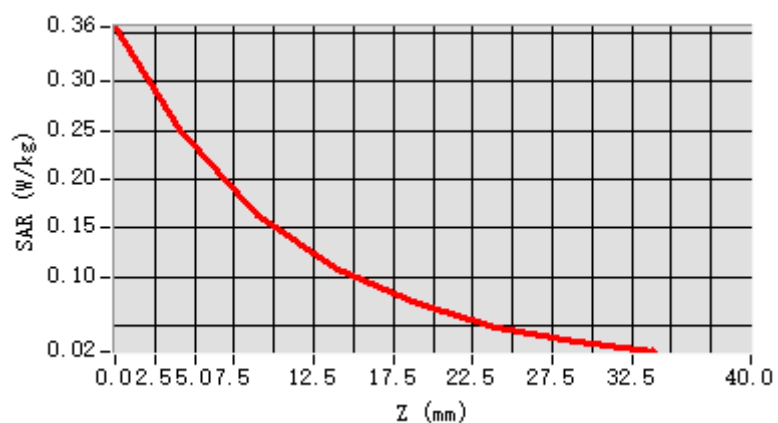
Maximum location: X=-10.00, Y=3.00 ; SAR Peak: 0.36 W/kg

D. SAR 1g & 10g

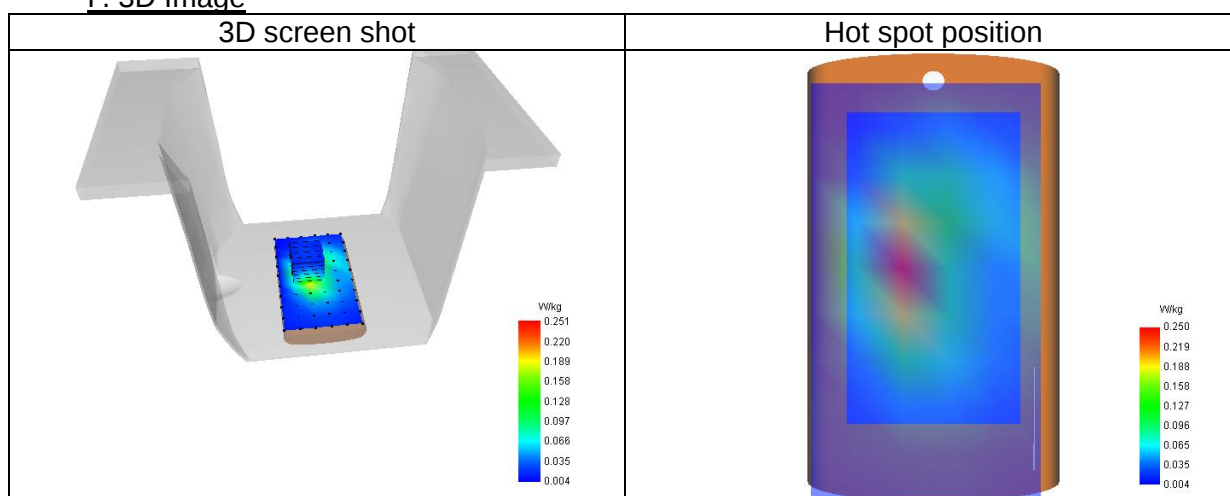
SAR 10g (W/Kg)	0.136
SAR 1g (W/Kg)	0.234
Variation (%)	-1.39
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	64.62

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.356	0.251	0.162	0.107	0.072	0.048	0.034



F. 3D Image



46# SAR Measurement at LTE band 26B (Body, Validation Plane)

Date of measurement: 1/3/2025

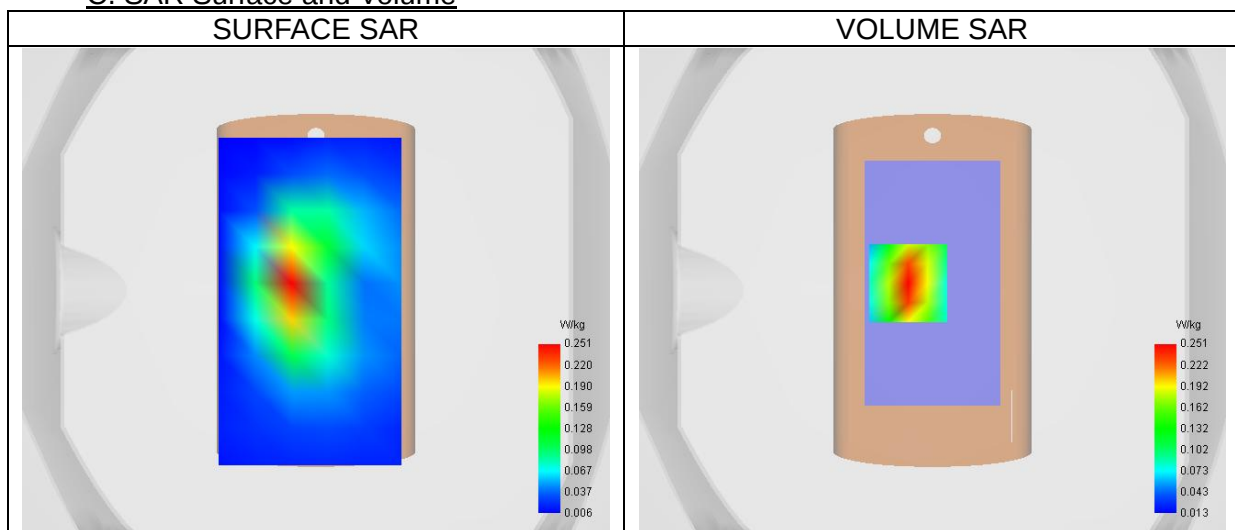
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 26B
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (26865)/ frequency 831.50 Mhz
Cell Bandwidth	15 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	831.50

B. Permittivity

Middle TX Frequency (MHz)	831.50
Relative permittivity (real part)	41.61
Relative permittivity (imaginary part)	19.48
Conductivity (S/m)	0.90

C. SAR Surface and Volume



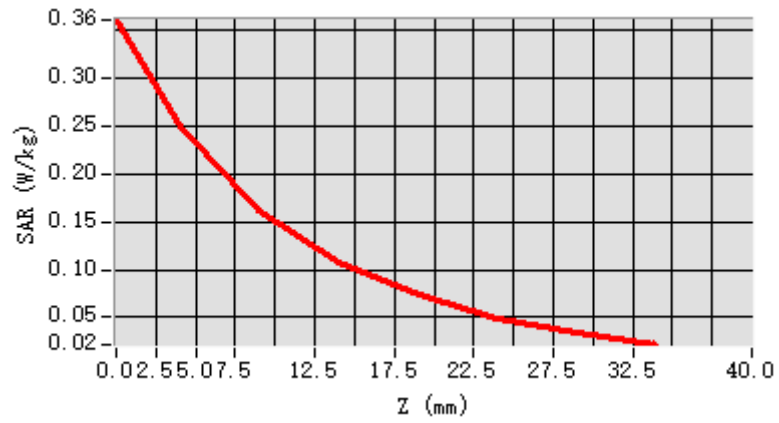
Maximum location: X=-10.00, Y=3.00 ; SAR Peak: 0.36 W/kg

D. SAR 1g & 10g

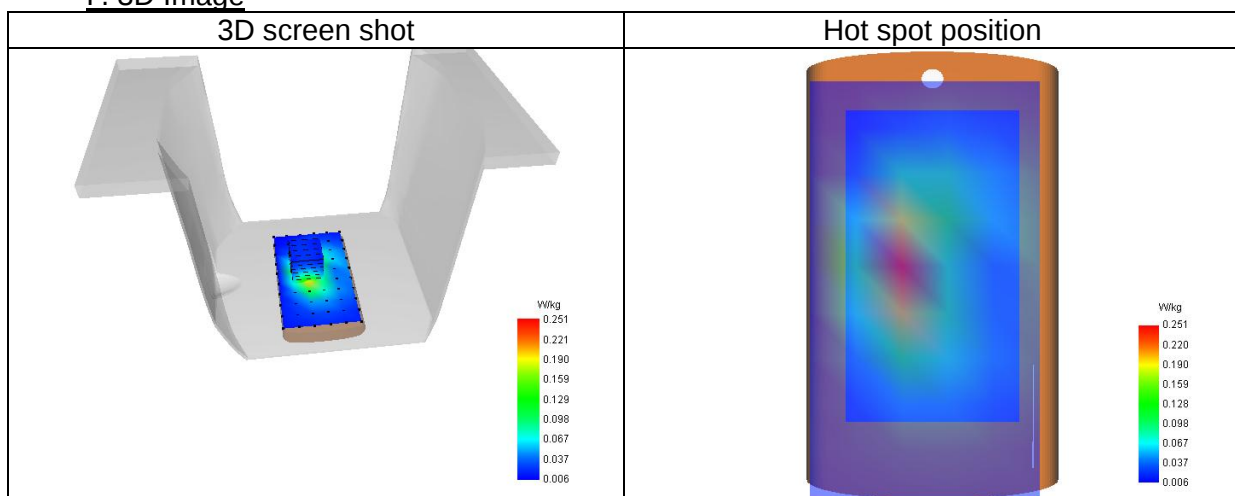
SAR 10g (W/Kg)	0.136
SAR 1g (W/Kg)	0.235
Variation (%)	-4.81
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	64.16

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.361	0.251	0.161	0.107	0.075	0.048	0.035



F. 3D Image



47# SAR Measurement at LTE band 41 (Cheek, Left)

Date of measurement: 22/3/2025

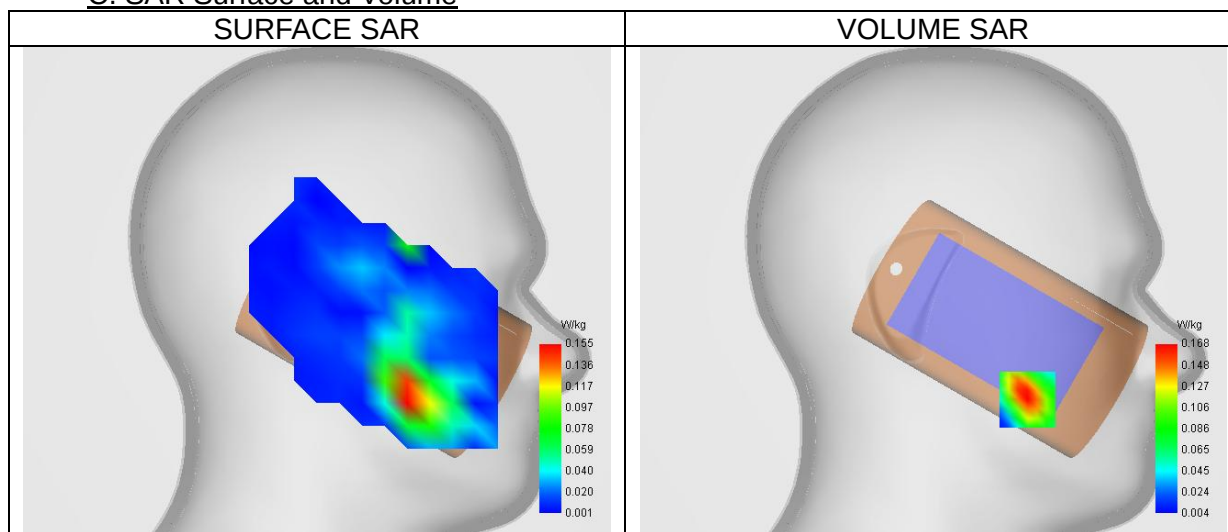
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 41
Signal	LTE TDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (40620)/ frequency 2593.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2593.00

B. Permittivity

Middle TX Frequency (MHz)	2593.00
Relative permittivity (real part)	39.19
Relative permittivity (imaginary part)	13.78
Conductivity (S/m)	1.98

C. SAR Surface and Volume



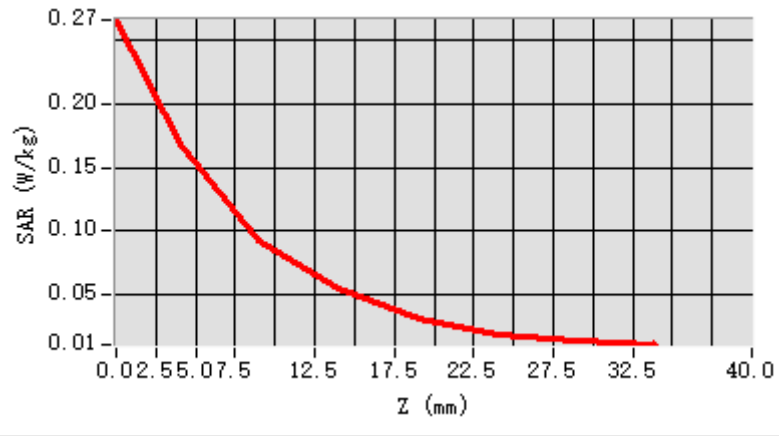
Maximum location: X=-50.00, Y=-58.00 ; SAR Peak: 0.26 W/kg

D. SAR 1g & 10g

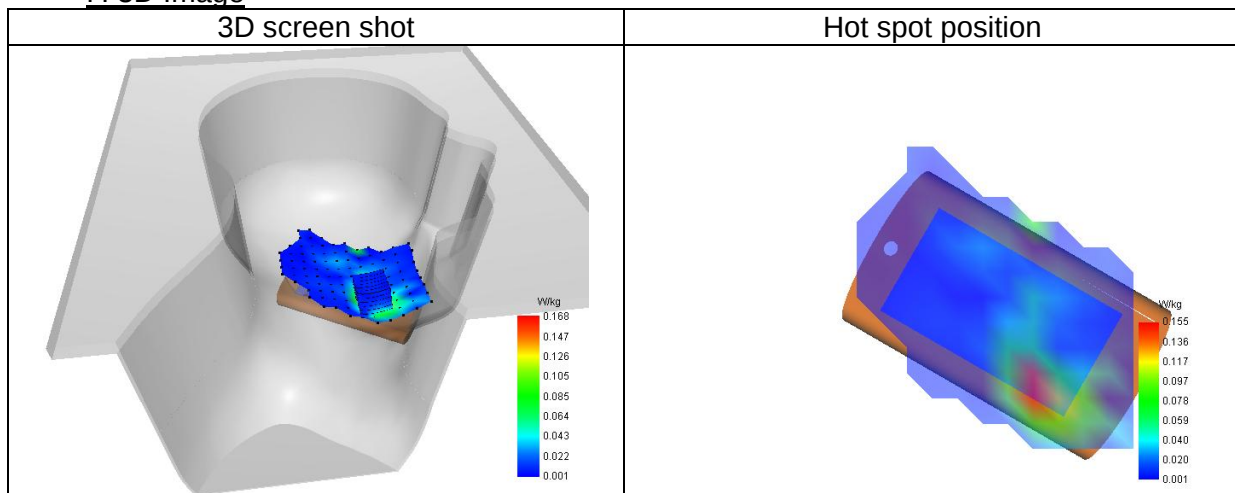
SAR 10g (W/Kg)	0.076
SAR 1g (W/Kg)	0.155
Variation (%)	3.84
Horizontal validation criteria: minimum distance (mm)	11.18
Vertical validation criteria: SAR ratio M2/M1 (%)	54.99

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.265	0.168	0.092	0.055	0.032	0.019	0.014



F. 3D Image



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

Date of measurement: 22/3/2025

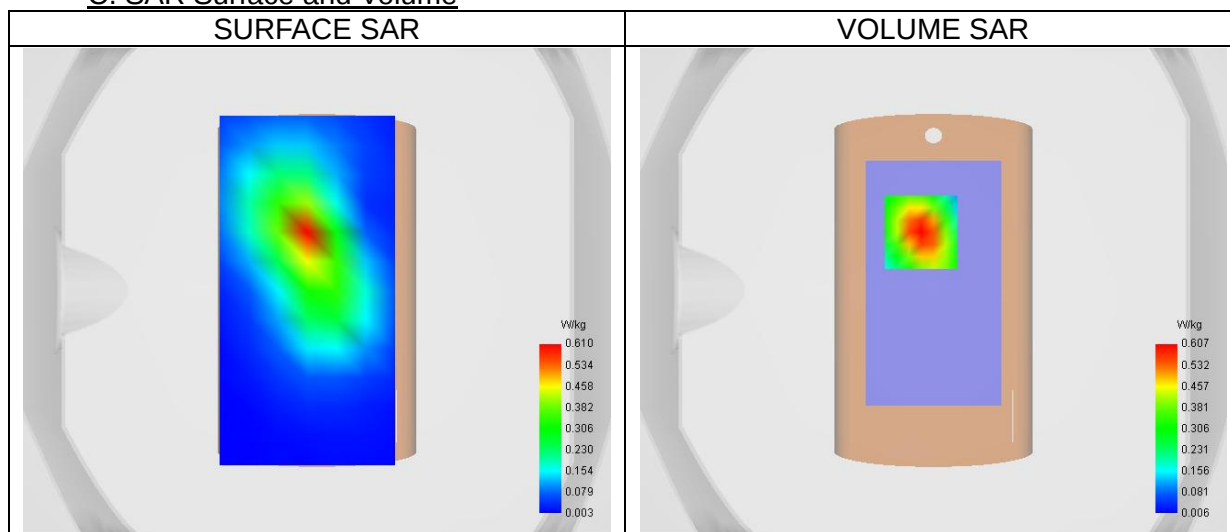
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7, dx=5mm dy=5mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 41
Signal	LTE TDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (40620)/ frequency 2593.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2593.00

B. Permittivity

Middle TX Frequency (MHz)	2593.00
Relative permittivity (real part)	39.19
Relative permittivity (imaginary part)	13.78
Conductivity (S/m)	1.98

C. SAR Surface and Volume



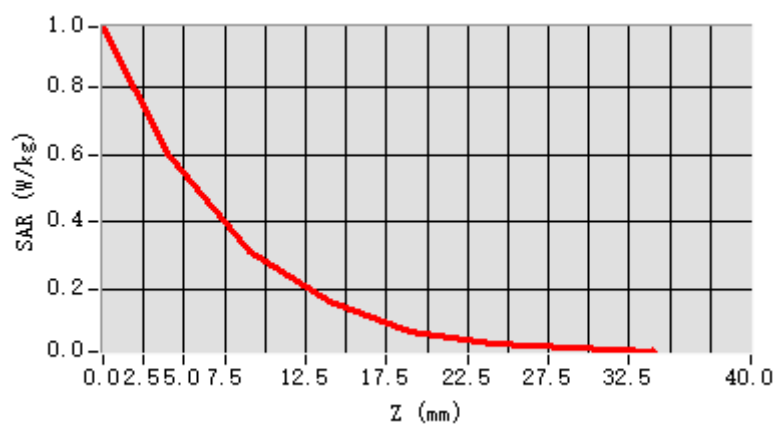
Maximum location: X=-5.00, Y=24.00 ; SAR Peak: 0.97 W/kg

D. SAR 1g & 10g

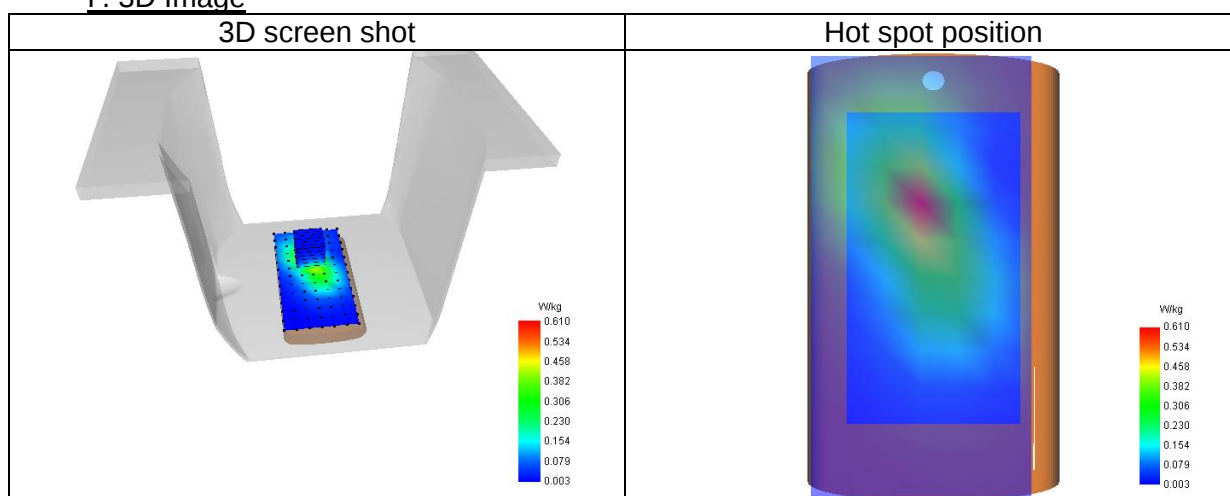
SAR 10g (W/Kg)	0.275
SAR 1g (W/Kg)	0.559
Variation (%)	1.99
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	51.30

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.981	0.607	0.311	0.161	0.076	0.039	0.024



F. 3D Image



49# SAR Measurement at LTE band 66 (Cheek, Left)

Date of measurement: 19/3/2025

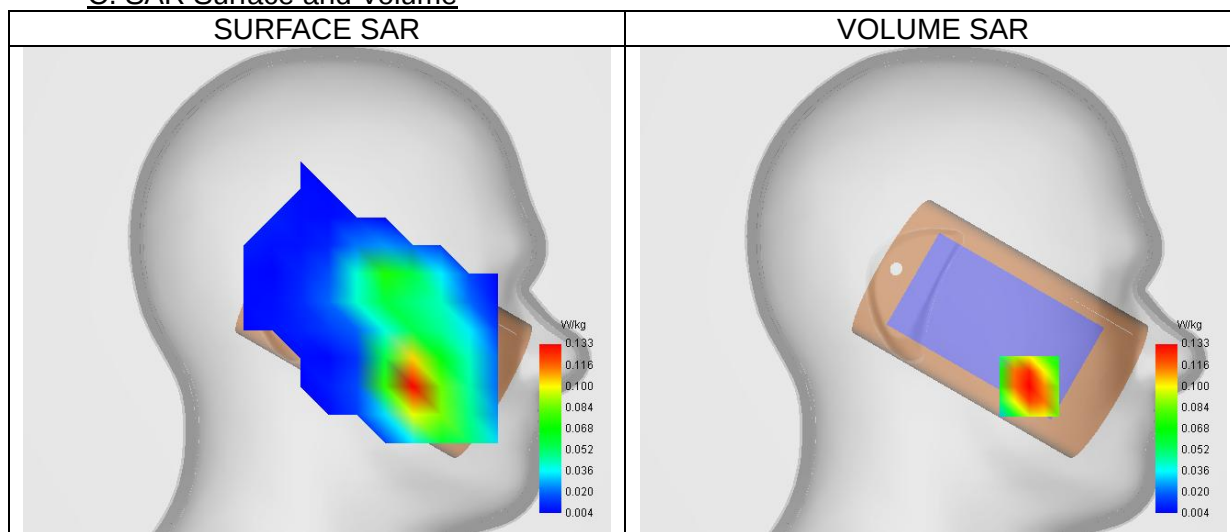
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 66
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (132322)/ frequency 1745.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1745.00

B. Permittivity

Middle TX Frequency (MHz)	1745.00
Relative permittivity (real part)	39.31
Relative permittivity (imaginary part)	13.70
Conductivity (S/m)	1.33

C. SAR Surface and Volume



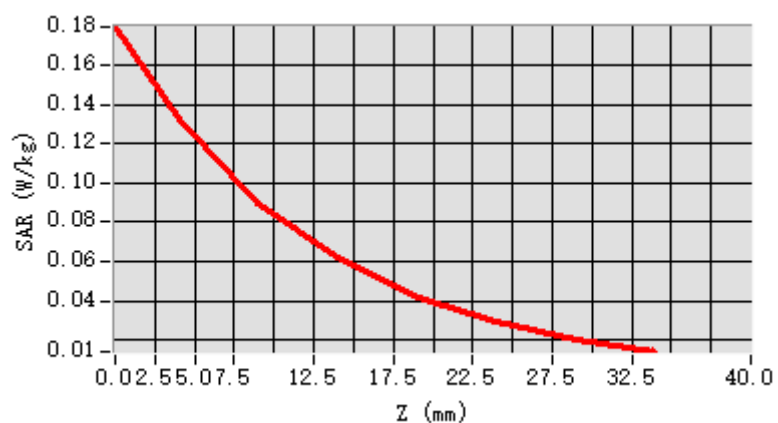
Maximum location: X=-51.00, Y=-51.00 ; SAR Peak: 0.19 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.077
SAR 1g (W/Kg)	0.126
Variation (%)	-2.99
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	67.54

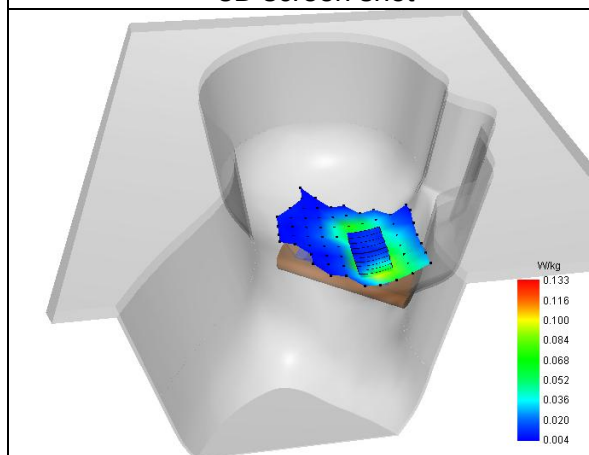
E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.179	0.133	0.089	0.063	0.041	0.029	0.020

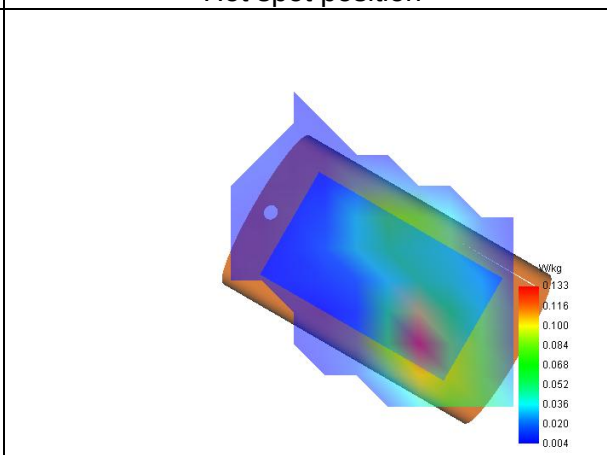


F. 3D Image

3D screen shot



Hot spot position



50# SAR Measurement at LTE band 66 (Body, Validation Plane)

Date of measurement: 19/3/2025

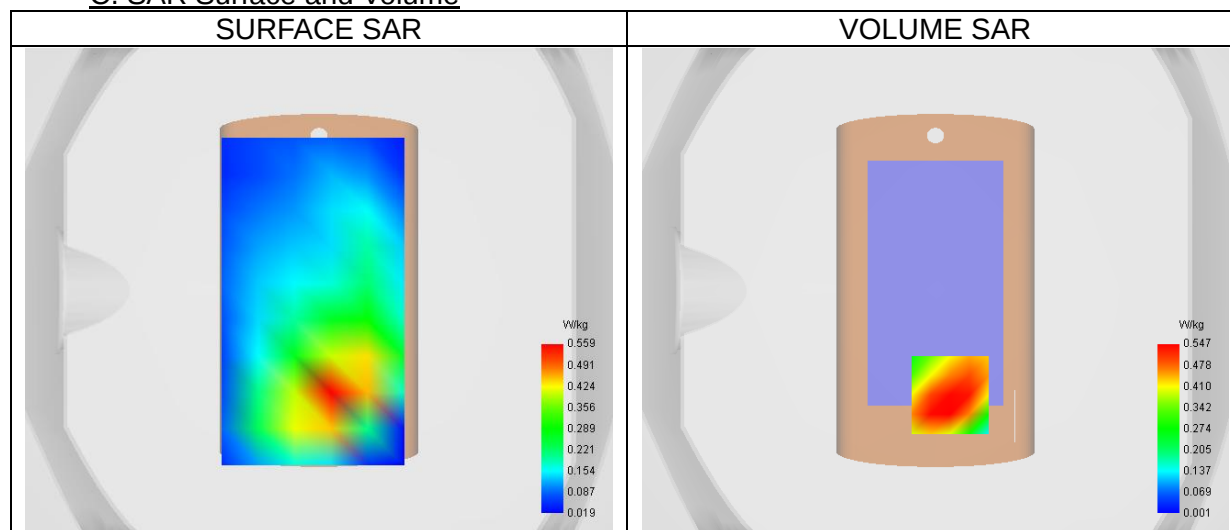
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7, dx=8mm dy=8mm dz=5.0mm, Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 66
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (132322)/ frequency 1745.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1745.00

B. Permittivity

Middle TX Frequency (MHz)	1745.00
Relative permittivity (real part)	39.31
Relative permittivity (imaginary part)	13.70
Conductivity (S/m)	1.33

C. SAR Surface and Volume



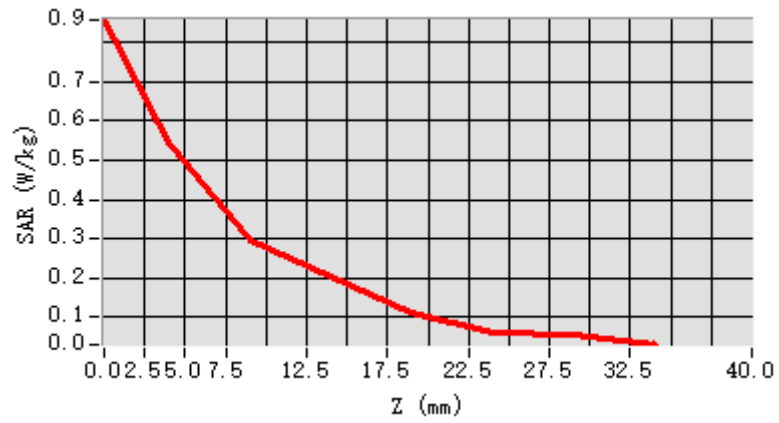
Maximum location: X=6.00, Y=-43.00 ; SAR Peak: 0.85 W/kg

D. SAR 1g & 10g

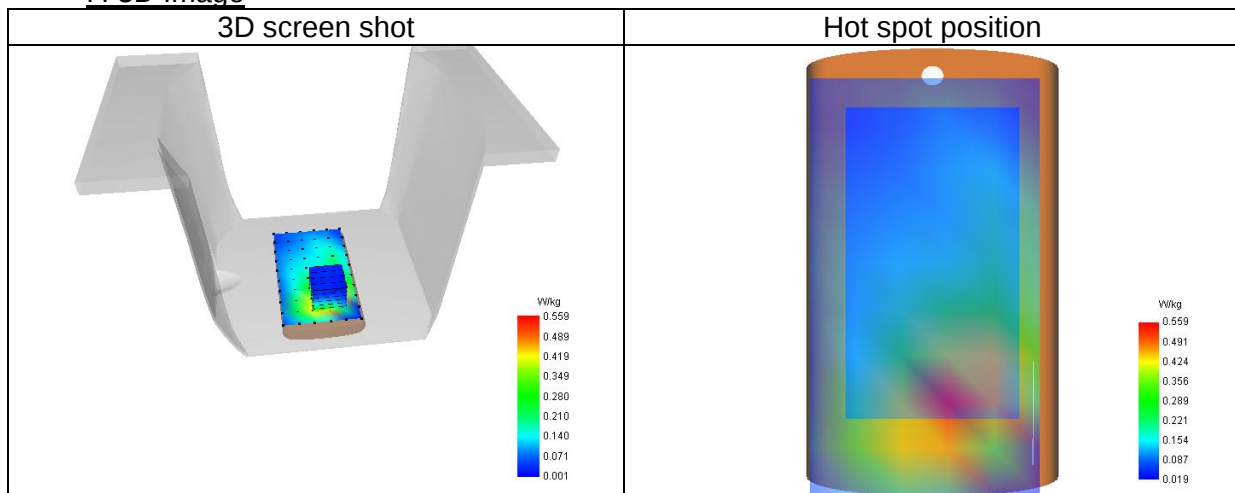
SAR 10g (W/Kg)	0.303
SAR 1g (W/Kg)	0.539
Variation (%)	-4.95
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	61.25

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.858	0.547	0.295	0.203	0.115	0.063	0.057



F. 3D Image



51# SAR Measurement at NR band 78 (Cheek, Left)

Date of measurement: 24/2/2025

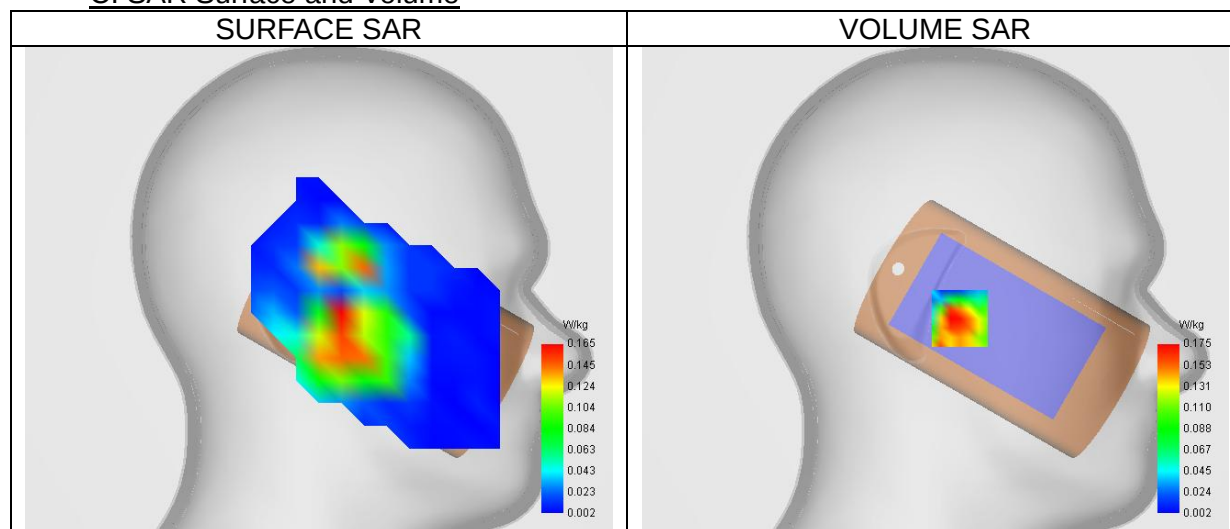
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.15
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	NR band 78
Signal	NR TDD
Channel Center [NR-ARFCN] / Channel Center [MHz]	Middle (636666)/ frequency 3549.99 Mhz
Cell Bandwidth	100 Mhz
Modulation	CP-OFDM - QPSK
subcarrier spacing (SCS)	30 kHz
Middle TX Frequency (MHz)	3549.99
pattern/periodicity/DL Dur/DL Sym/UL Dur/UL Sym/CG Sym	not Specified

B. Permittivity

Middle TX Frequency (MHz)	3549.99
Relative permittivity (real part)	37.10
Relative permittivity (imaginary part)	14.53
Conductivity (S/m)	2.88

C. SAR Surface and Volume



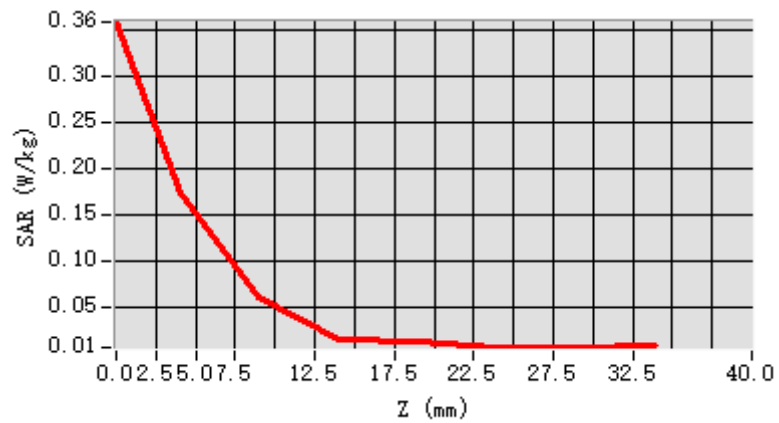
Maximum location: X=-13.00, Y=-15.00 ; SAR Peak: 0.34 W/kg

D. SAR 1g & 10g

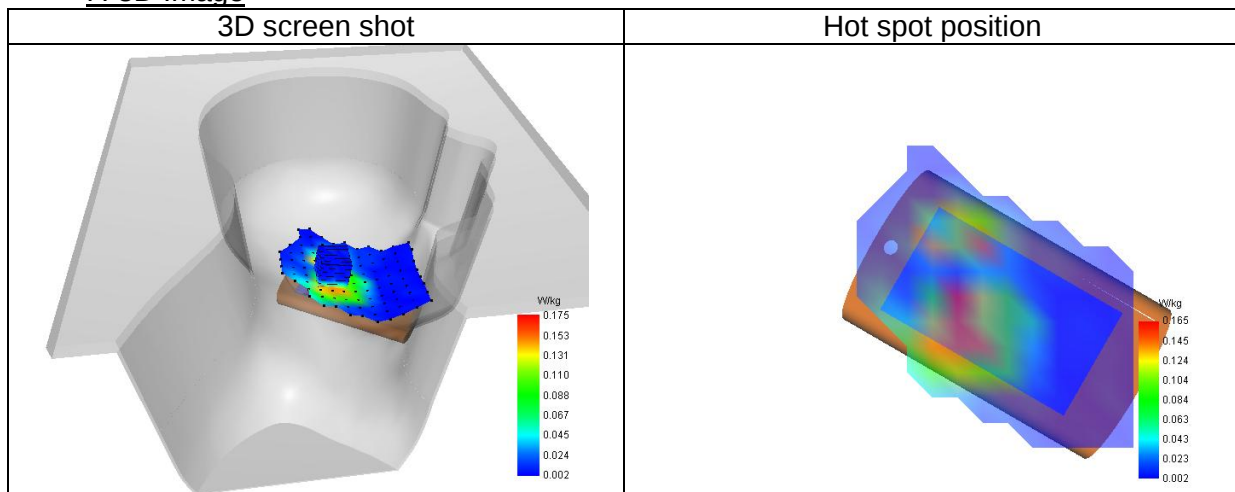
SAR 10g (W/Kg)	0.063
SAR 1g (W/Kg)	0.160
Variation (%)	-3.03
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	42.16

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.359	0.175	0.060	0.014	0.012	0.005	0.006



F. 3D Image



52# SAR Measurement at NR band 78 (Body, Validation Plane)

Date of measurement: 24/2/2025

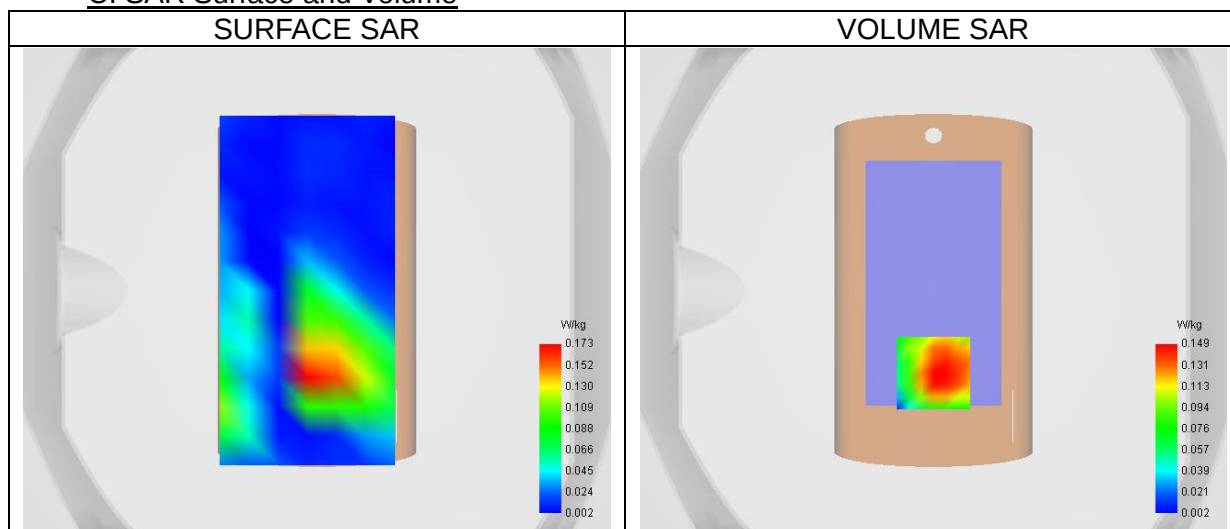
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.15
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	NR band 78
Signal	NR TDD
Channel Center [NR-ARFCN] / Channel Center [MHz]	Middle (636666)/ frequency 3549.99 Mhz
Cell Bandwidth	100 Mhz
Modulation	CP-OFDM - QPSK
subcarrier spacing (SCS)	30 kHz
Middle TX Frequency (MHz)	3549.99
pattern/periodicity/DL Dur/DL Sym/UL Dur/UL Sym/CG Sym	not Specified

B. Permittivity

Middle TX Frequency (MHz)	3549.99
Relative permittivity (real part)	37.10
Relative permittivity (imaginary part)	14.53
Conductivity (S/m)	2.88

C. SAR Surface and Volume



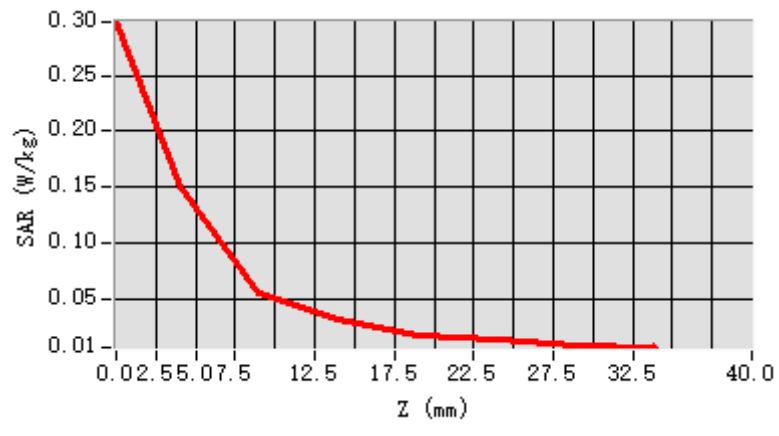
Maximum location: X=0.00, Y=-34.00 ; SAR Peak: 0.27 W/kg

D. SAR 1g & 10g

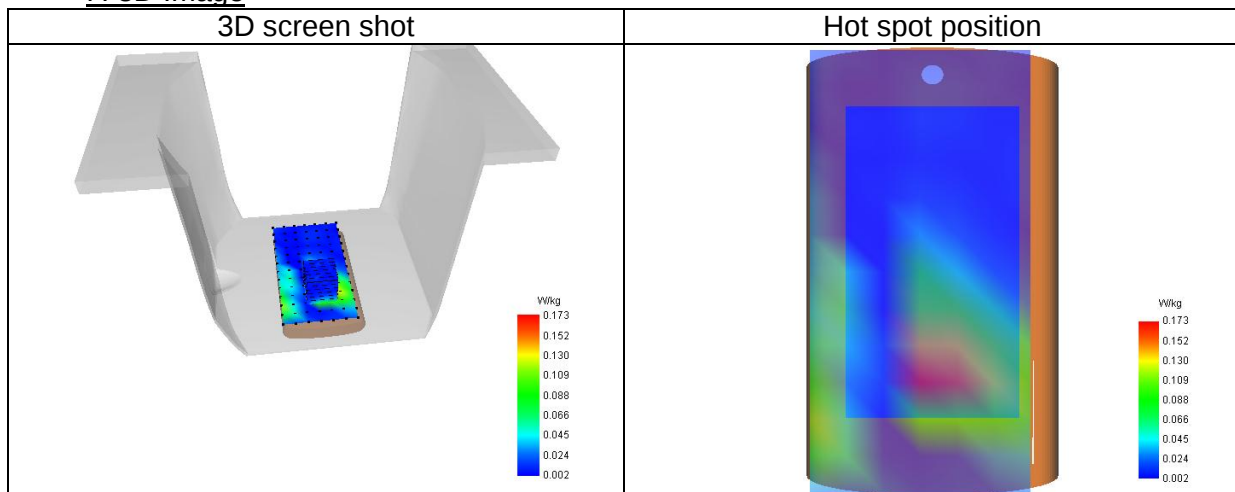
SAR 10g (W/Kg)	0.067
SAR 1g (W/Kg)	0.143
Variation (%)	0.85
Horizontal validation criteria: minimum distance (mm)	18.03
Vertical validation criteria: SAR ratio M2/M1 (%)	45.25

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.298	0.149	0.055	0.031	0.016	0.013	0.008



F. 3D Image



14. Appendix D. Calibration Certificate

Table of contents
E Field Probe - 4024-EPGO-442
750 MHz Dipole - SN 03/15 DIP 0G750-355
835 MHz Dipole - SN 03/15 DIP 0G835-347
1800 MHz Dipole - SN 03/15 DIP 1G800-349
1900 MHz Dipole - SN 03/15 DIP 1G900-350
2450 MHz Dipole - SN 03/15 DIP 2G450-352
2600 MHz Dipole - SN 03/15 DIP 2G600-356
3500 MHz Dipole - SN 09/12 DIP 3G500-360
5000-6000 MHz Dipole - SN 13/14 WGA 33

DocuSign Envelope ID: 223C1A7C-4751-4B95-8502-1618DC0951E3



COMOSAR E-Field Probe Calibration Report

Ref : ACR.278.12.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: 4024-EPGO-442

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 10/04/2024



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).

DocuSign Envelope ID: 223C1A7C-4751-4B95-8502-1618DC0951E3



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Cyrille ONNEE	Measurement Responsible	10/4/2024	
Checked & approved by:	Pedro Ruiz	Technical Manager	10/4/2024	
Authorized by:	Pedro Ruiz	Laboratory Director	10/4/2024	

Assinado por:

Pedro RUIZ

29093B31C46F428...

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Cyrille ONNEE	10/4/2024	Initial release

Docusign Envelope ID: 223C1A7C-4751-4B95-8502-1618DC0951E3



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	4024-EPGO-442
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.206 MΩ Dipole 2: R2=0.223 MΩ Dipole 3: R3=0.235 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 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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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

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 0.01 W/kg to 100 W/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:

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

where

$SAR_{uncertainty}$ 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;

ΔSAR_{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%).

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

3.5 PROBE MODULATION RESPONSE

MVG's probe were evaluated experimentally with various modulated signal and the deviation from CW response were found neglectable in the used power range of the probe. So the correction to taking into account the linearization parameters for different modulation is null, therefore the CW factor given in this report can be used whatever the measured modulation

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.

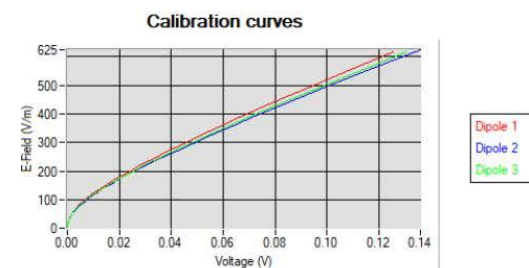
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

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.

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

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where

V_i =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

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
0.73	0.79	0.78

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
105	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.

$$\text{ConvF} = \frac{E_{\text{liquid}}^2}{E_{\text{air}}^2}$$

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

$$E_{\text{liquid}}^2 = \frac{\rho \text{ SAR}}{\sigma}$$

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:

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

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:

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

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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

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
HL750	750	2.42
HL850	835	2.34
HL900	900	2.24
HL1800	1800	2.51
HL1900	1900	2.57
HL2000	2000	2.64
HL2300	2300	2.73
HL2450	2450	2.74
HL2600	2600	2.51
HL3300	3300	2.11
HL3500	3500	2.15
HL3700	3700	2.08
HL3900	3900	2.27
HL4200	4200	2.39
HL4600	4600	2.30
HL4900	4900	2.13
HL5200	5200	1.89
HL5400	5400	1.97
HL5600	5600	1.88
HL5800	5800	1.90

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

