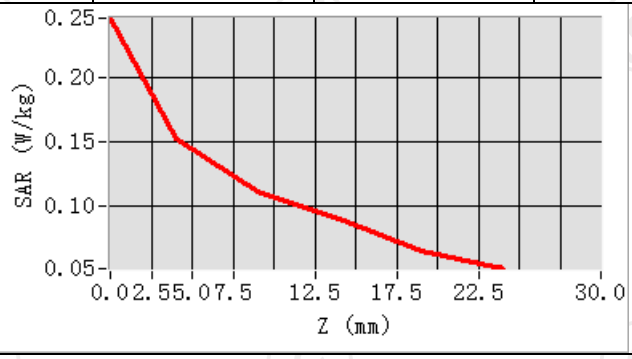
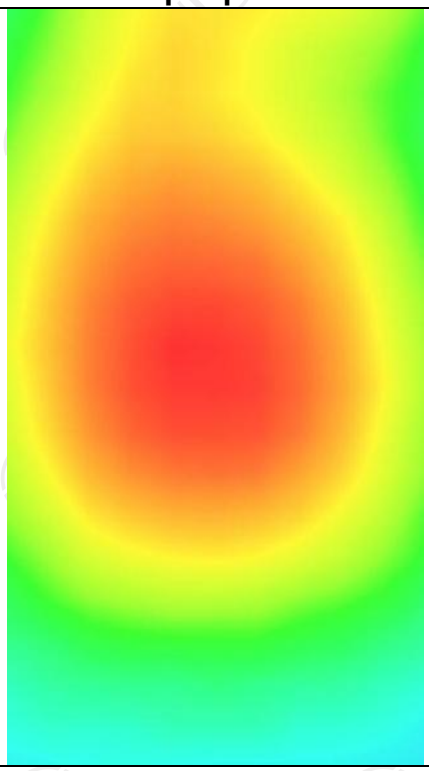
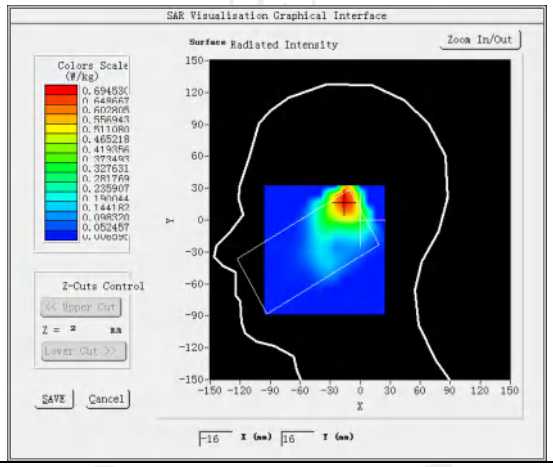
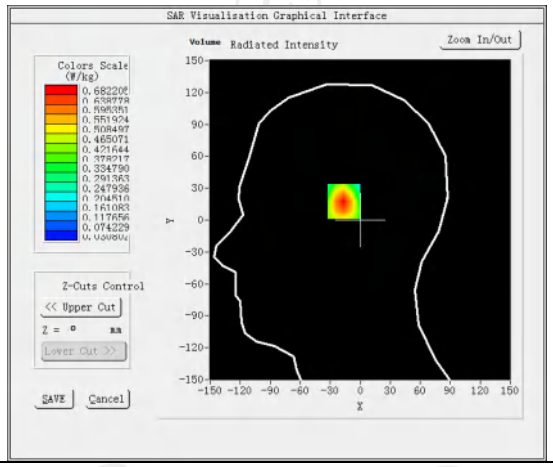
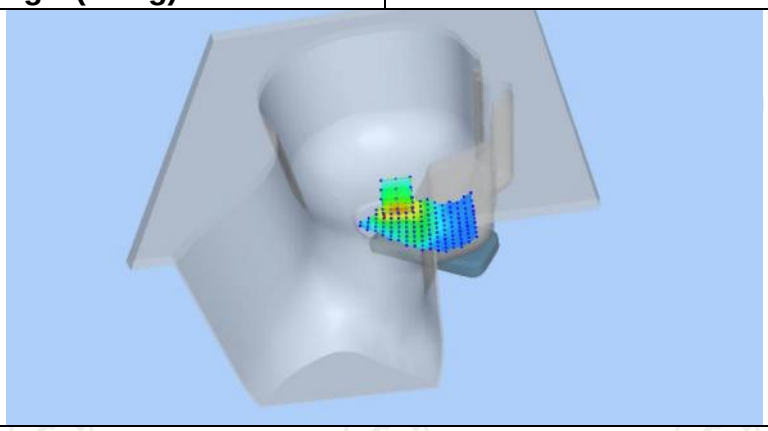
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2470	0.1525	0.1106	0.0899	0.0639



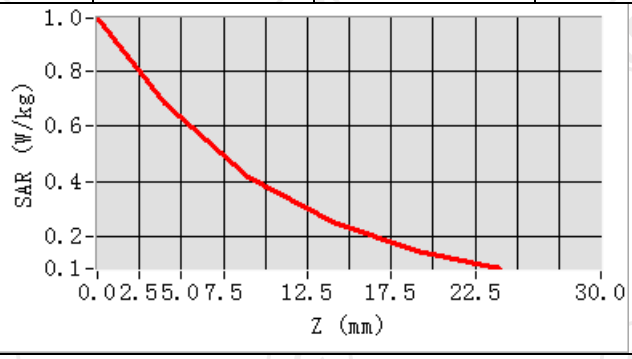
Hot spot position



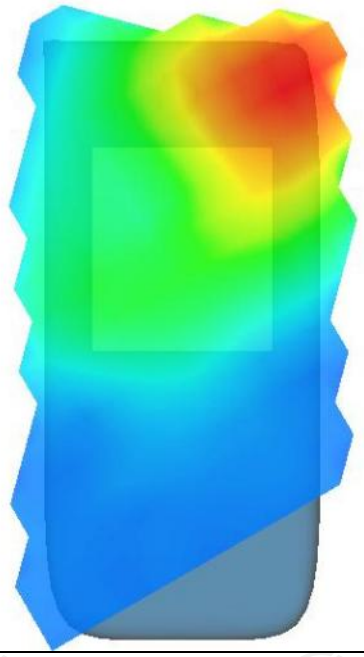
LTE Band 2

MEASUREMENT 1	
Low Band SAR (Channel 18700):	Date: 10/24/2024
Frequency (MHz)	1860.000000
Relative permittivity (real part)	39.073800
Relative permittivity (imaginary part)	14.142000
Conductivity (S/m)	1.443400
Variation (%)	0.090000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 2 (1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-15.00, Y=19.00 SAR Peak: 0.99 W/kg	
SAR 10g (W/Kg)	0.367235
SAR 1g (W/Kg)	0.639140
	

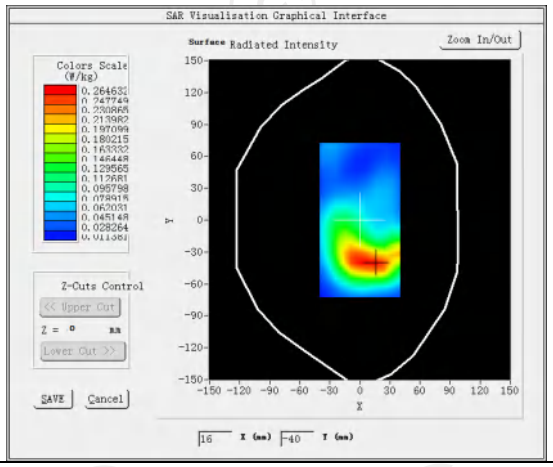
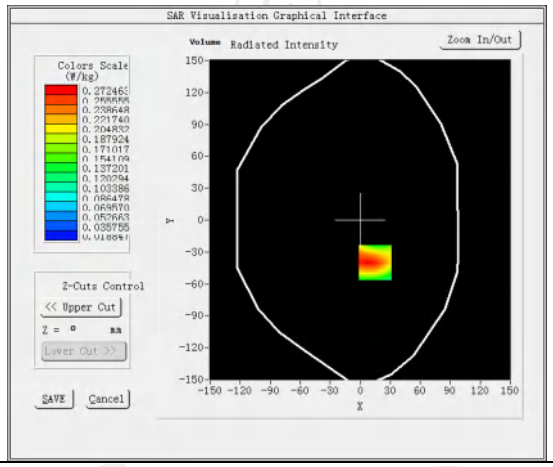
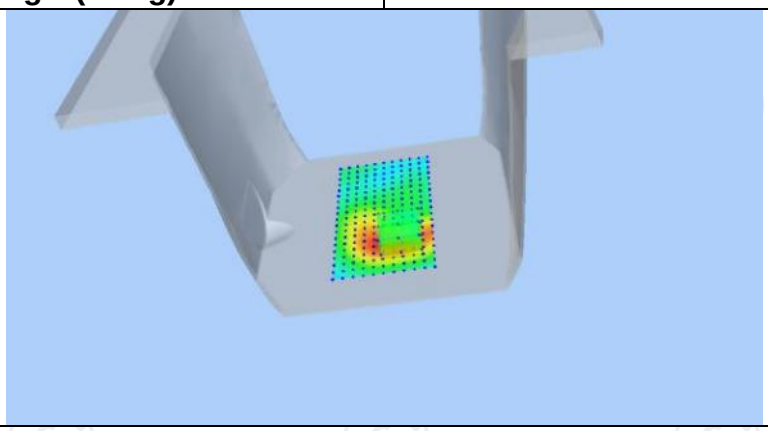
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.9930	0.6822	0.4168	0.2511	0.1500



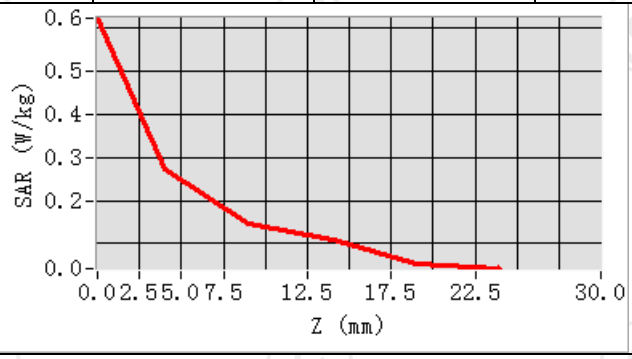
Hot spot position



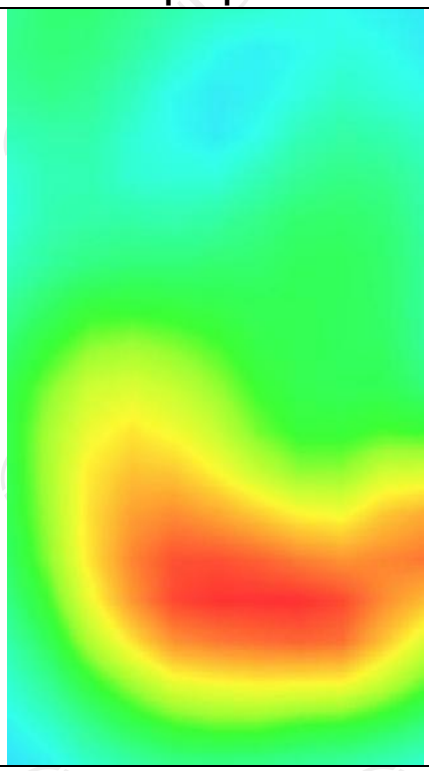
Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

MEASUREMENT 2	
Low Band SAR (Channel 18700):	Date: 10/24/2024
Frequency (MHz)	1860.000000
Relative permittivity (real part)	39.073800
Relative permittivity (imaginary part)	14.142000
Conductivity (S/m)	1.443400
Variation (%)	-3.180000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 2 (1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=15.00, Y=-40.00 SAR Peak: 0.39 W/kg	
SAR 10g (W/Kg)	0.155299
SAR 1g (W/Kg)	0.257372
	

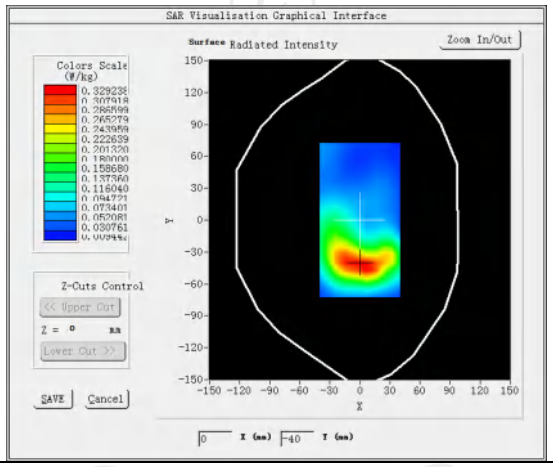
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.6242	0.2725	0.1447	0.1081	0.0527

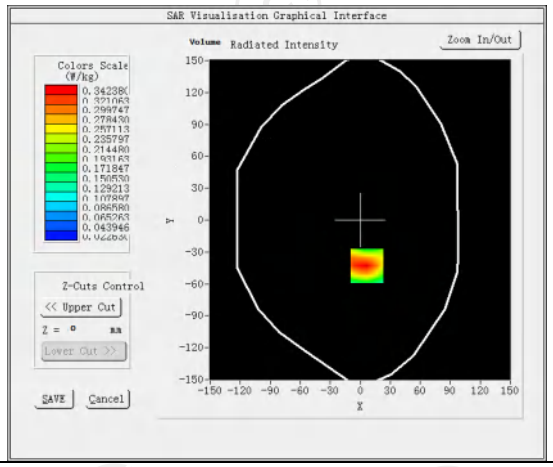


Hot spot position

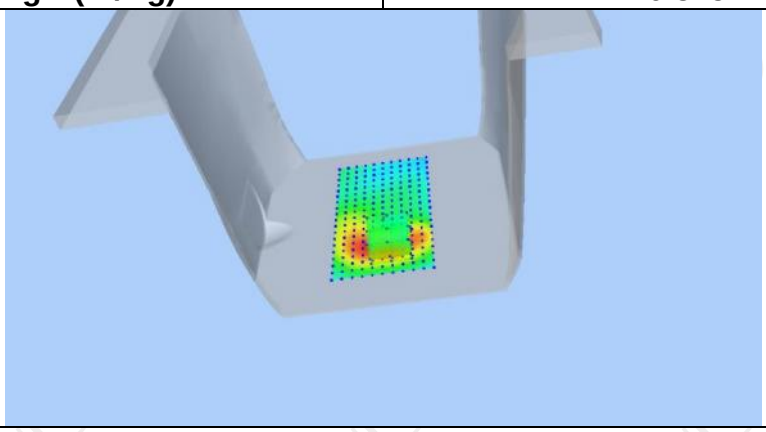


MEASUREMENT 3	
Low Band SAR (Channel 18700):	Date: 10/24/2024
Frequency (MHz)	1860.000000
Relative permittivity (real part)	39.073800
Relative permittivity (imaginary part)	14.142000
Conductivity (S/m)	1.443400
Variation (%)	-4.480000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(hotspot 10mm)
Band	LTE band 2 (1 RB#0)
SURFACE SAR	**VOLUME SAR**

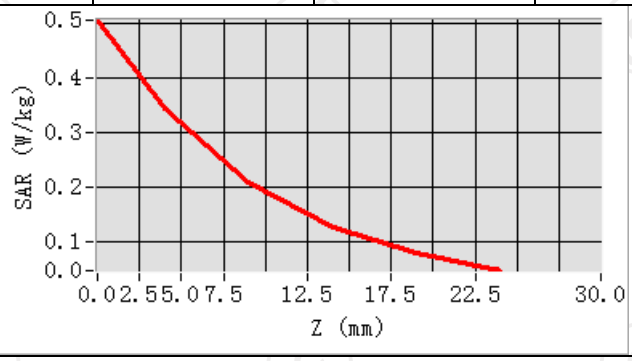




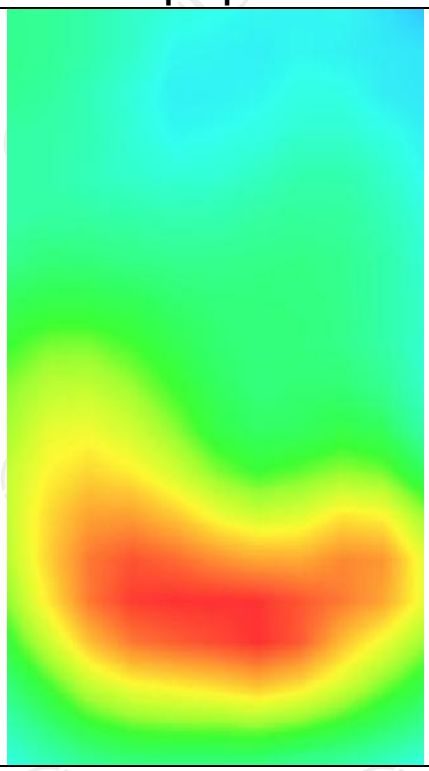
Maximum location: X=7.00, Y=-43.00 **SAR Peak: 0.51 W/kg**	
SAR 10g (W/Kg)	0.191111
SAR 1g (W/Kg)	0.325123



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5046	0.3424	0.2070	0.1252	0.0771

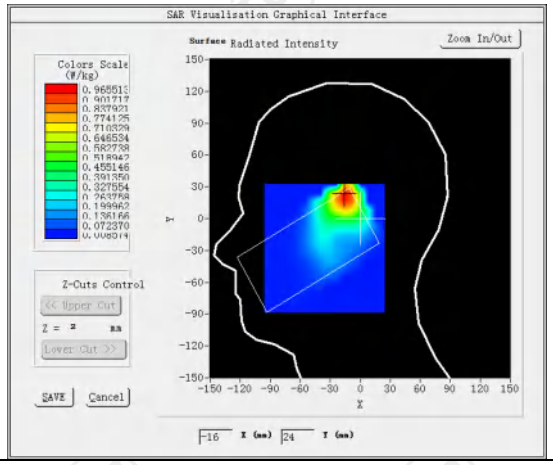


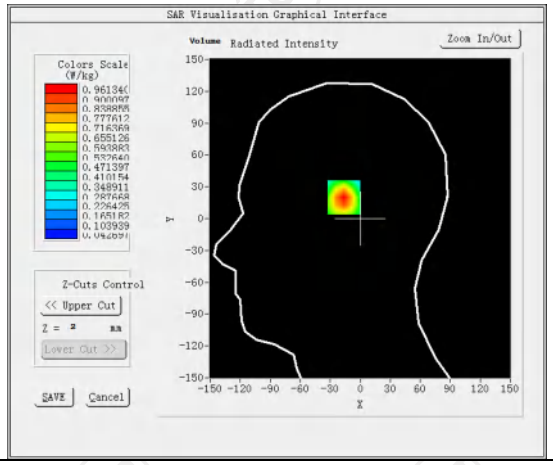
Hot spot position



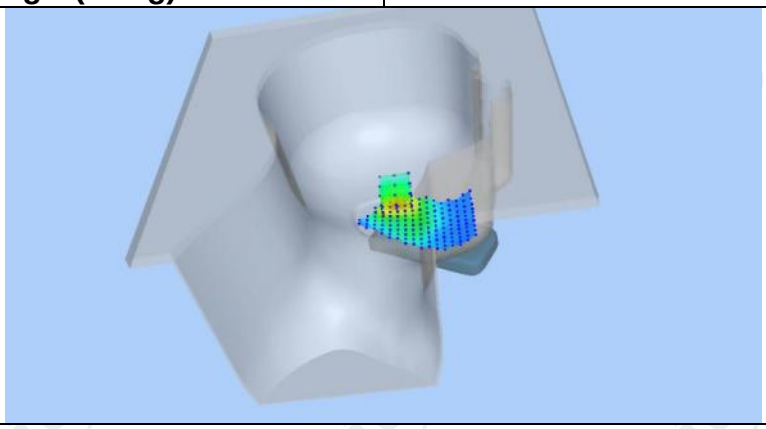
LTE Band 4

MEASUREMENT 1	
High Band SAR (Channel 20300):	Date: 10/18/2024
Frequency (MHz)	1745.000000
Relative permittivity (real part)	39.662062
Relative permittivity (imaginary part)	14.878653
Conductivity (S/m)	1.403503
Variation (%)	-3.400000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 4(1 RB#49)

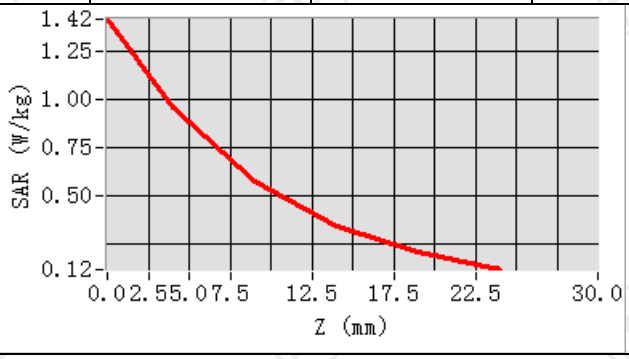




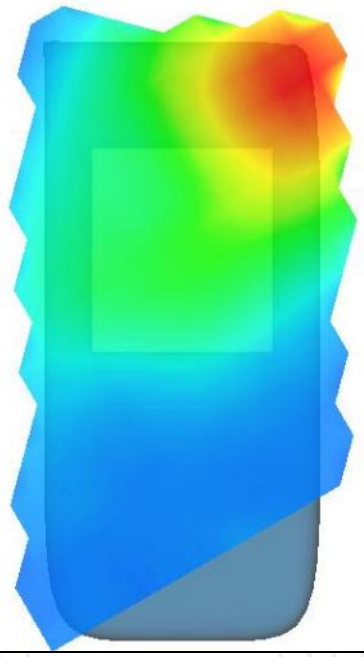
Maximum location: X=-15.00, Y=22.00 SAR Peak: 1.42 W/kg	
SAR 10g (W/Kg)	0.512212
SAR 1g (W/Kg)	0.899523

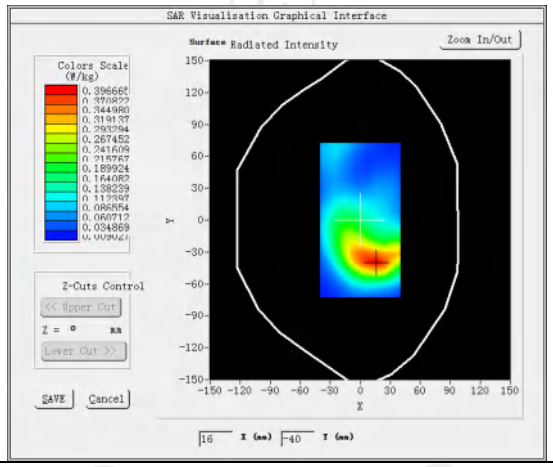
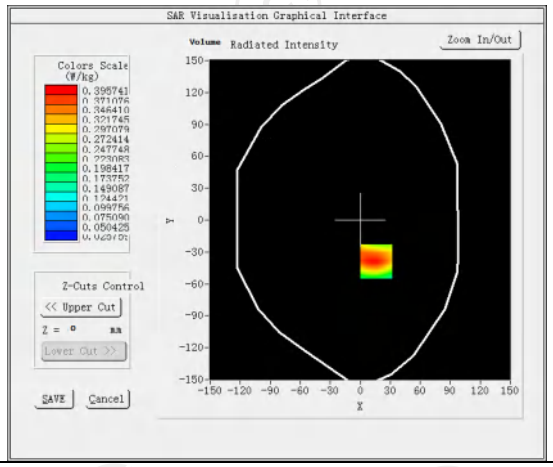
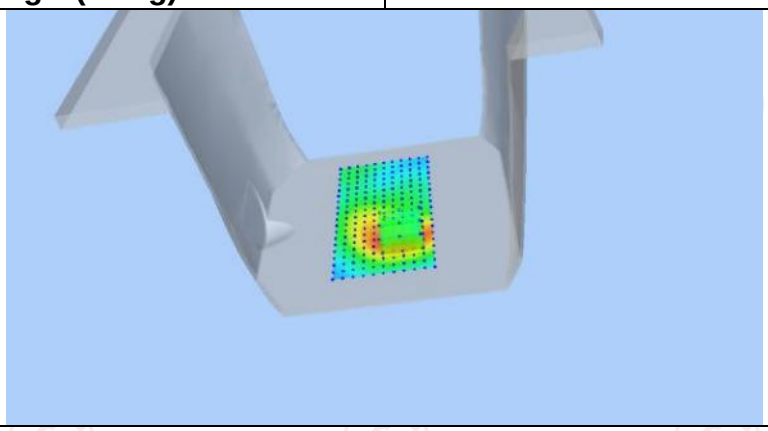


Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.4183	0.9613	0.5782	0.3451	0.2068

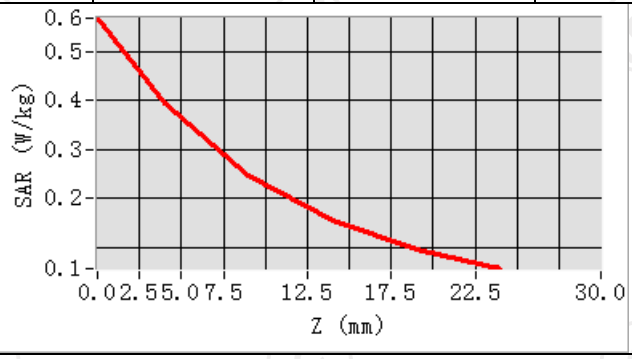


Hot spot position

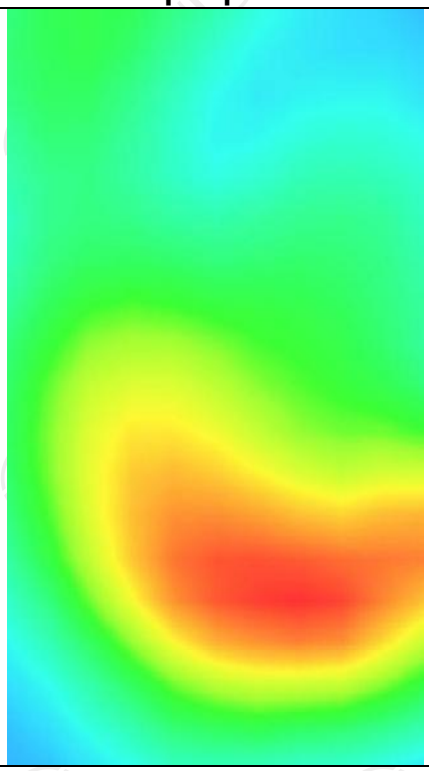


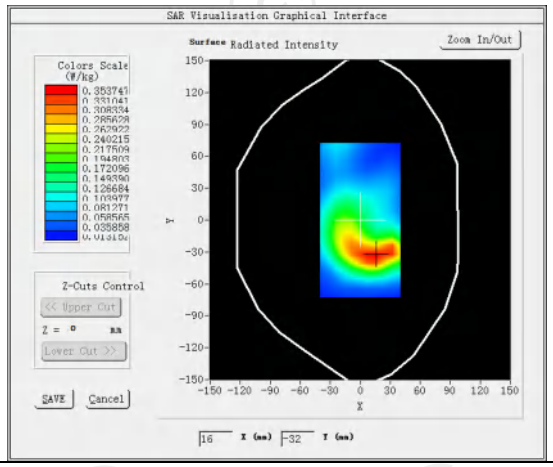
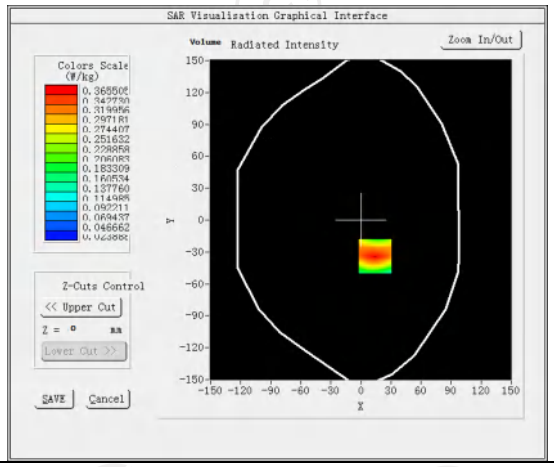
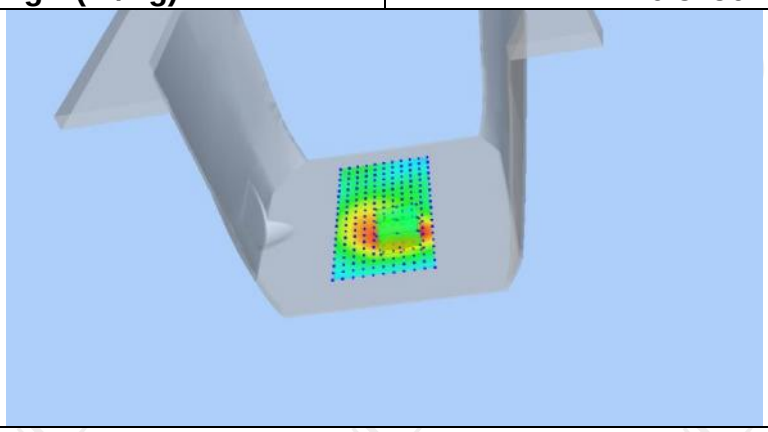
MEASUREMENT 2	
High Band SAR (Channel 20300):	Date: 10/18/2024
Frequency (MHz)	1745.000000
Relative permittivity (real part)	39.662062
Relative permittivity (imaginary part)	14.878653
Conductivity (S/m)	1.403503
Variation (%)	-1.610000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 4(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=16.00, Y=-39.00 SAR Peak: 0.57 W/kg	
SAR 10g (W/Kg)	0.227749
SAR 1g (W/Kg)	0.376312
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5684	0.3957	0.2471	0.1532	0.0951

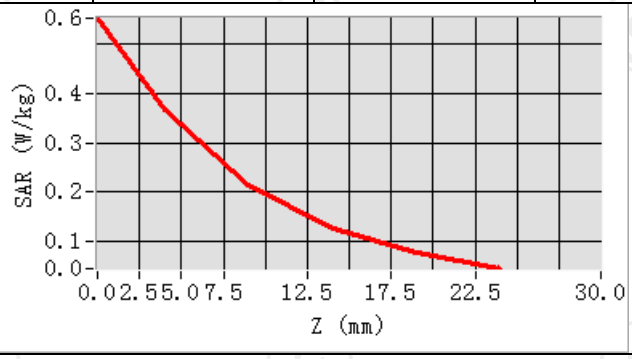


Hot spot position

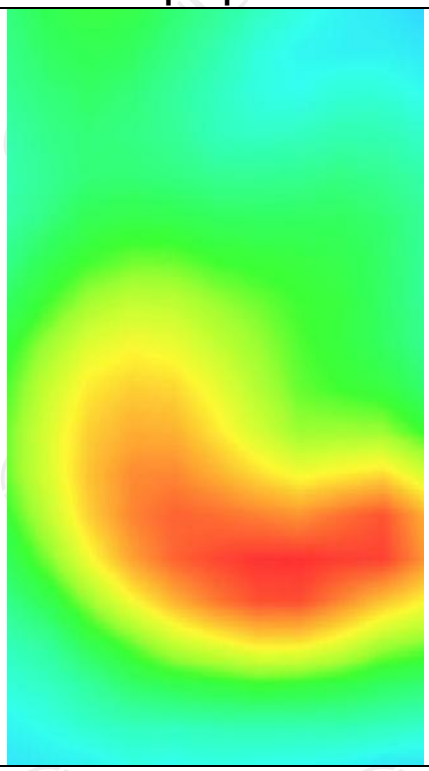


MEASUREMENT 3	
High Band SAR (Channel 20300):	Date: 10/18/2024
Frequency (MHz)	1745.000000
Relative permittivity (real part)	39.662062
Relative permittivity (imaginary part)	14.878653
Conductivity (S/m)	1.403503
Variation (%)	0.260000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(hotspot 10mm)
Band	LTE band 4(1 RB#49)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=14.00, Y=-34.00 **SAR Peak: 0.56 W/kg**	
SAR 10g (W/Kg)	0.203733
SAR 1g (W/Kg)	0.345648
	

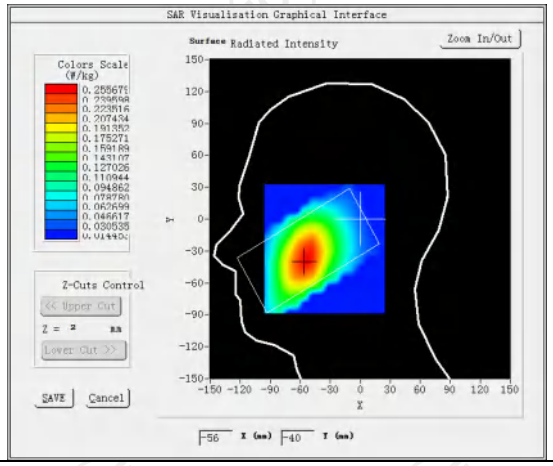
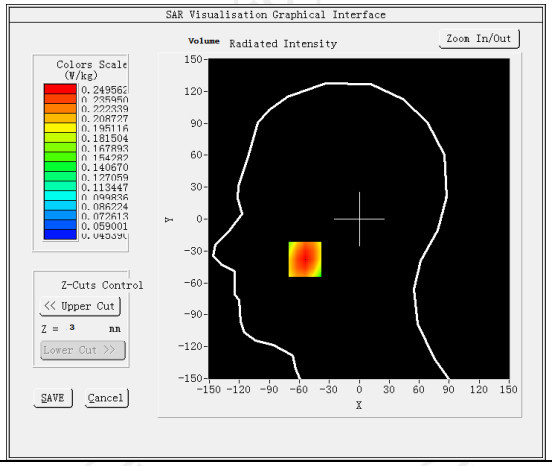
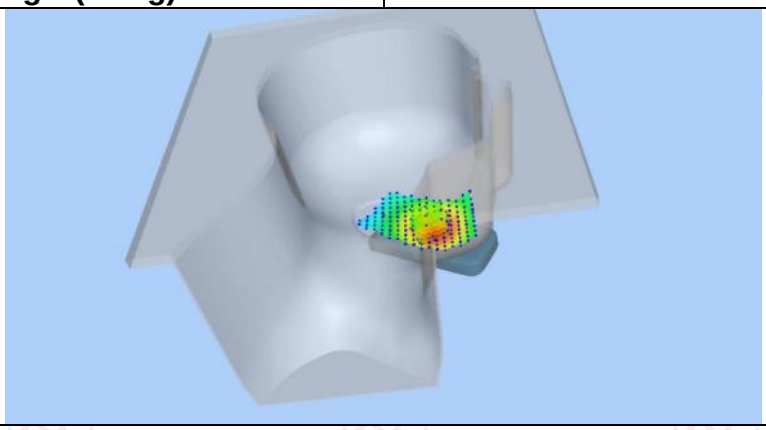
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5508	0.3655	0.2147	0.1268	0.0773



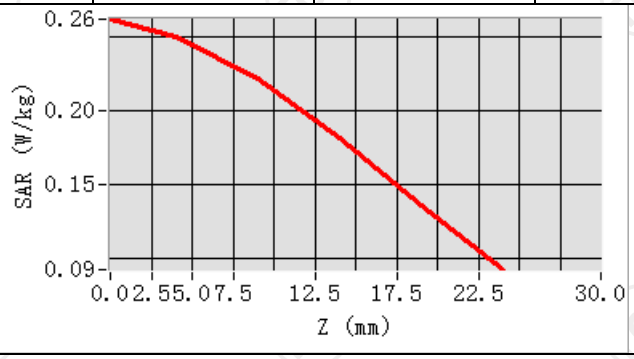
Hot spot position



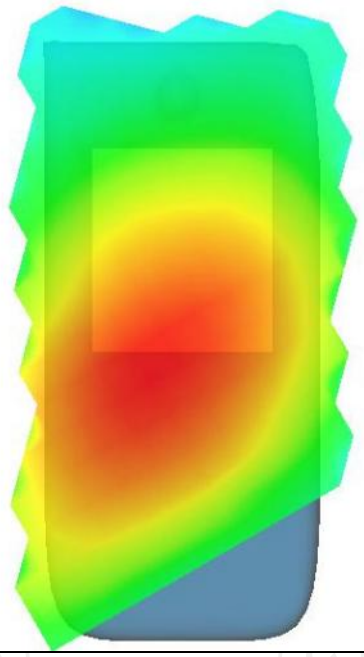
LTE Band 5

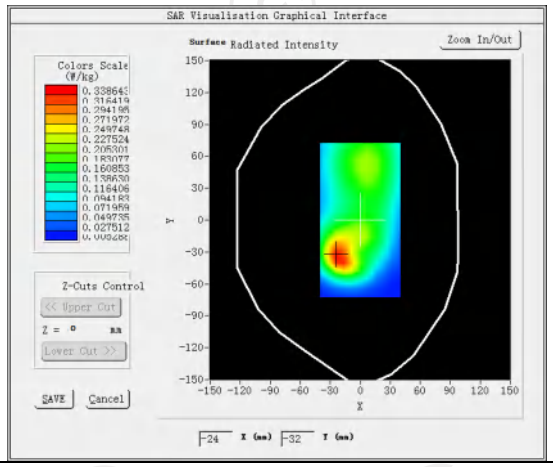
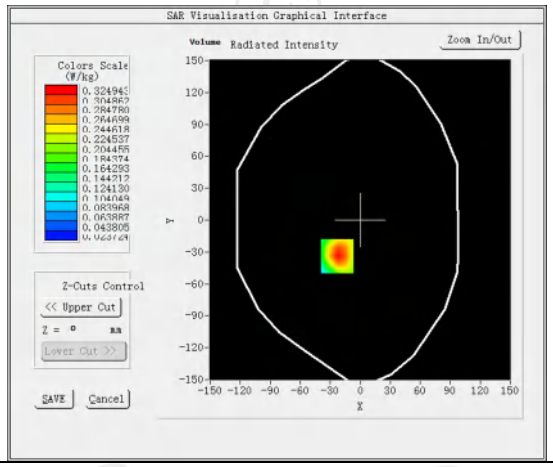
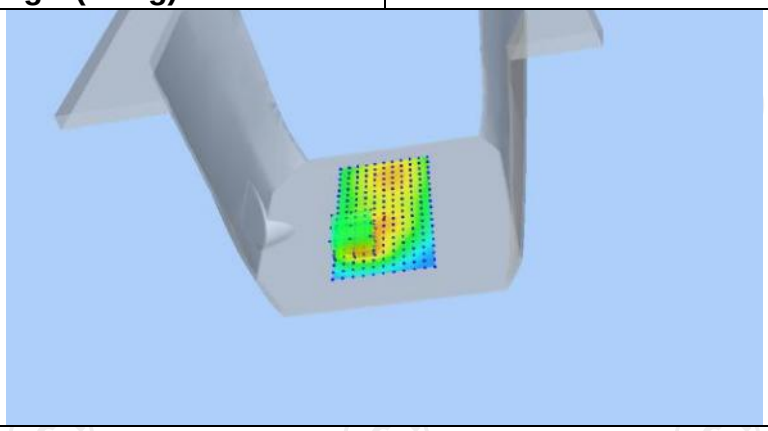
MEASUREMENT 1	
Middle Band SAR (Channel 20525):	Date: 10/14/2024
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.628753
Relative permittivity (imaginary part)	19.811855
Conductivity (S/m)	0.932777
Variation (%)	-2.690000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 5(1 RB#24)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-54.00, Y=-38.00 SAR Peak: 0.26 W/kg	
SAR 10g (W/Kg)	0.189885
SAR 1g (W/Kg)	0.242227
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2614	0.2496	0.2216	0.1817	0.1358

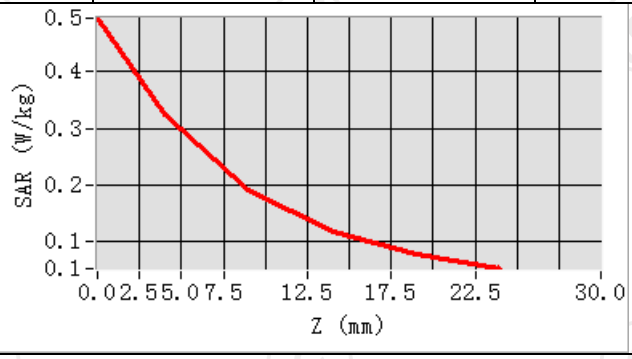


Hot spot position

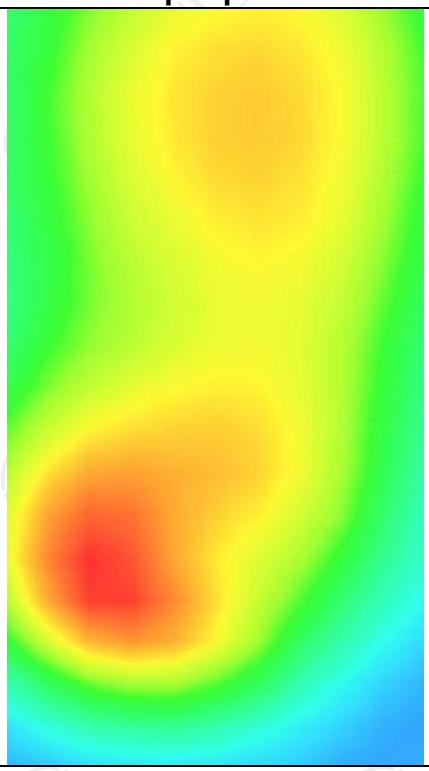


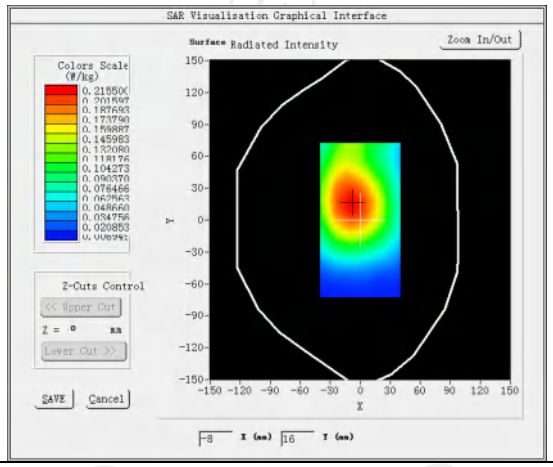
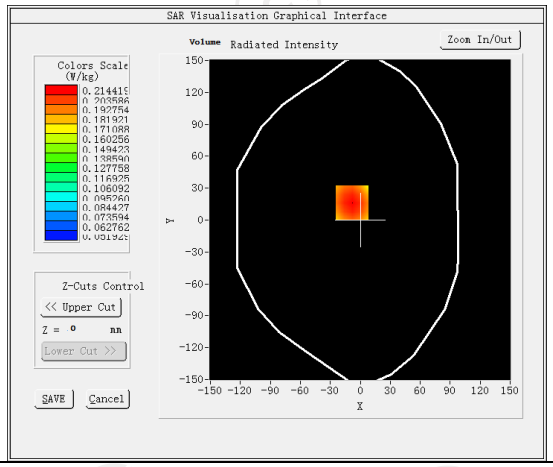
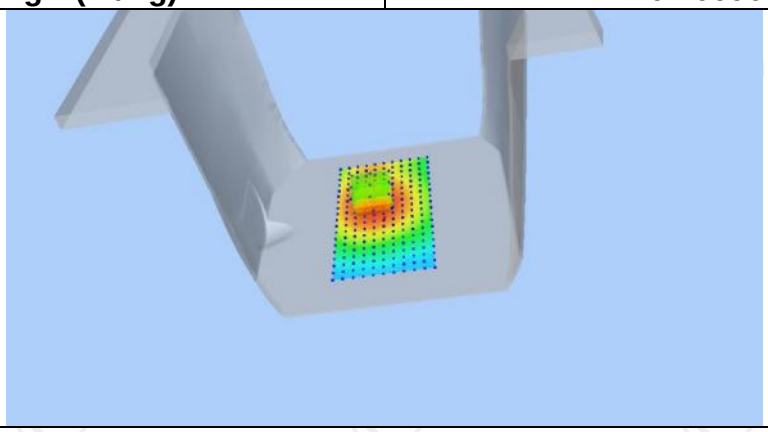
MEASUREMENT 2	
Middle Band SAR (Channel 20525):	Date: 10/14/2024
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.628753
Relative permittivity (imaginary part)	19.811855
Conductivity (S/m)	0.932777
Variation (%)	-2.620000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 5(1 RB#24)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-23.00, Y=-34.00 SAR Peak: 0.50 W/kg	
SAR 10g (W/Kg)	0.179500
SAR 1g (W/Kg)	0.307545
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4955	0.3249	0.1900	0.1150	0.0751

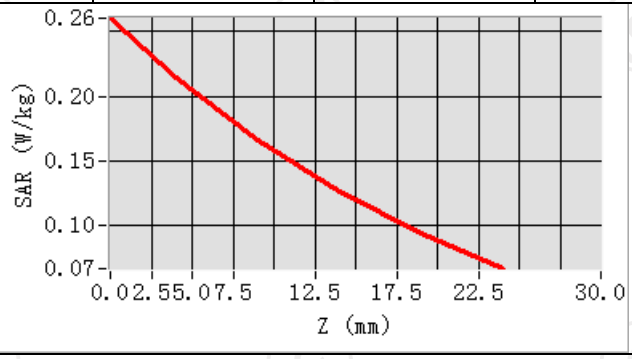


Hot spot position

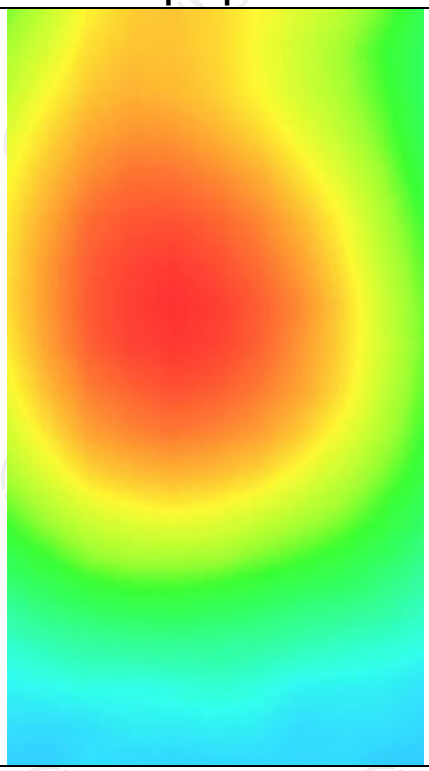


MEASUREMENT 3	
Middle Band SAR (Channel 20525):	Date: 10/14/2024
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.628753
Relative permittivity (imaginary part)	19.811855
Conductivity (S/m)	0.932777
Variation (%)	-1.780000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back((hotspot 10mm)
Band	LTE band 5(1 RB#24)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-8.00, Y=16.00 **SAR Peak: 0.26 W/kg**	
SAR 10g (W/Kg)	0.151825
SAR 1g (W/Kg)	0.206903
	

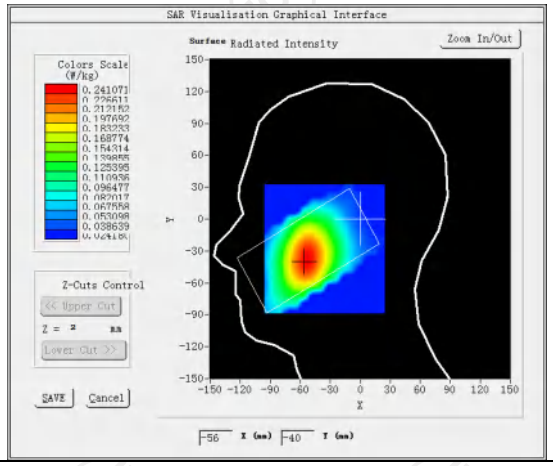
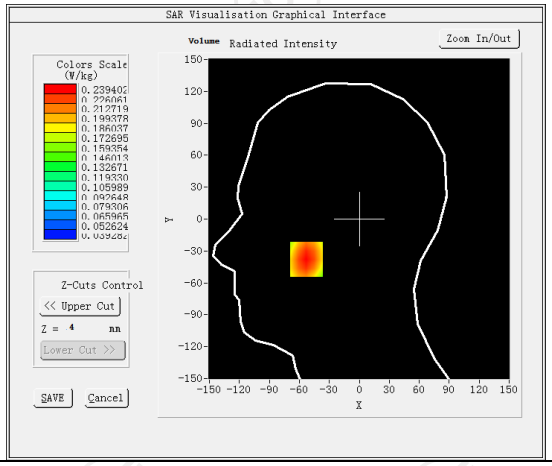
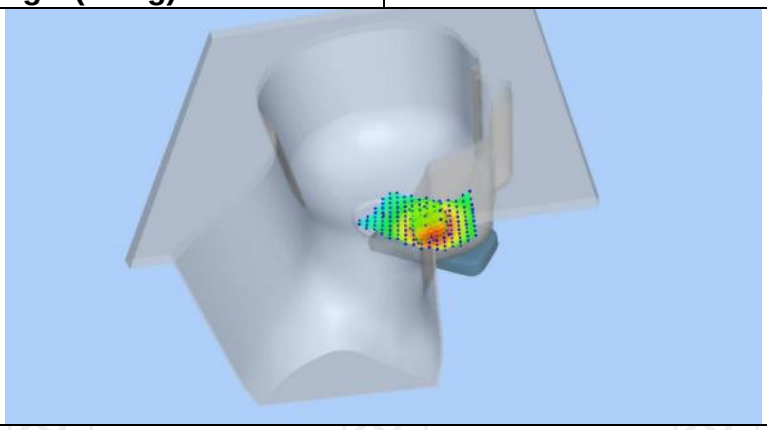
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2604	0.2144	0.1659	0.1262	0.0939



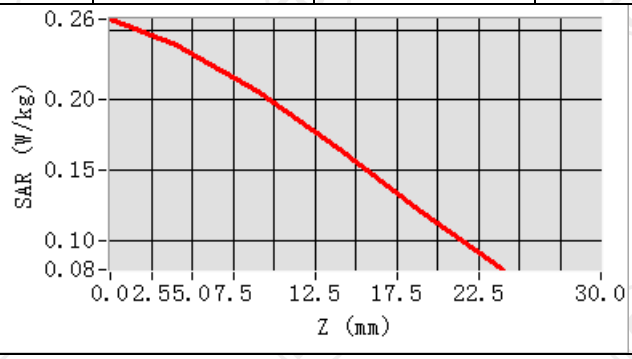
Hot spot position



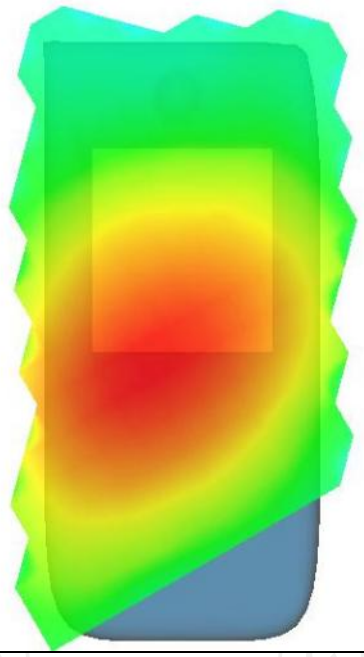
LTE Band 12

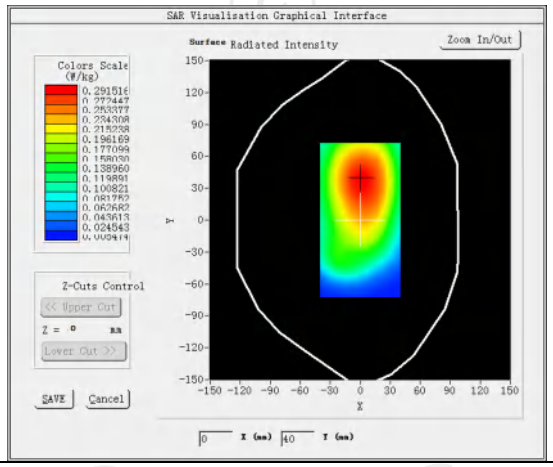
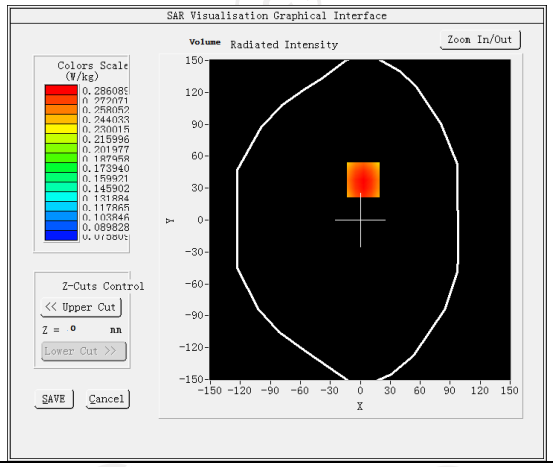
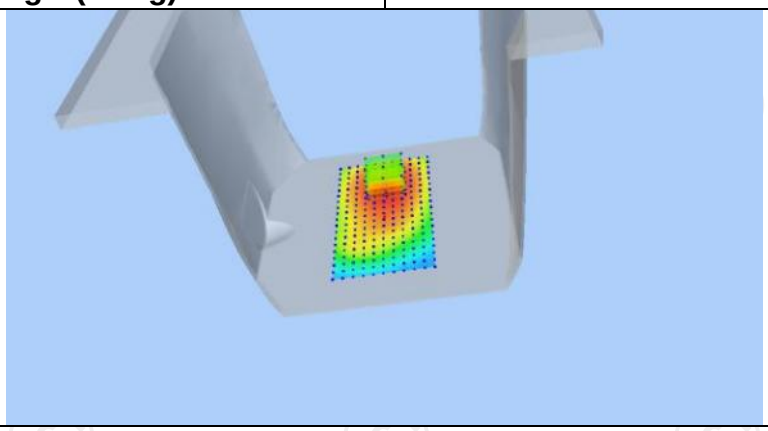
MEASUREMENT 1	
Middle Band SAR (Channel 23095):	Date: 10/08/2024
Frequency (MHz)	707.500000
Relative permittivity (real part)	42.093500
Relative permittivity (imaginary) part)	22.115000
Conductivity (S/m)	0.915500
Variation (%)	-1.290000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 12(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-53.00, Y=-38.00 SAR Peak: 0.26 W/kg	
SAR 10g (W/Kg)	0.180214
SAR 1g (W/Kg)	0.235713
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2576	0.2394	0.2065	0.1651	0.1204

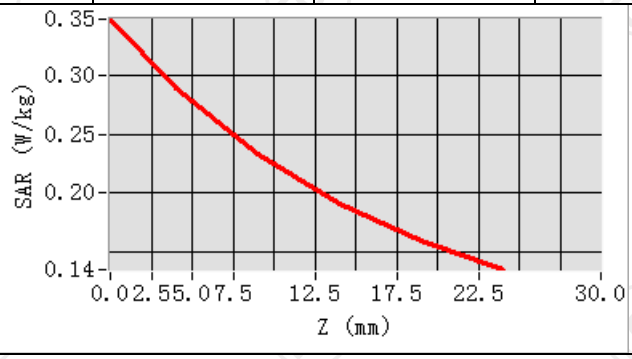


Hot spot position

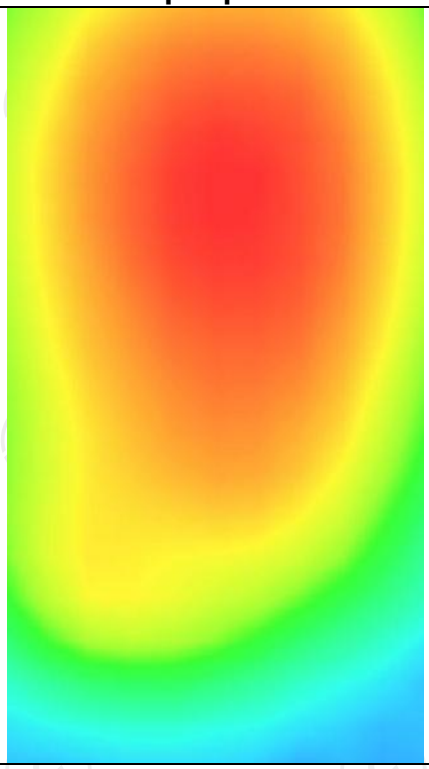


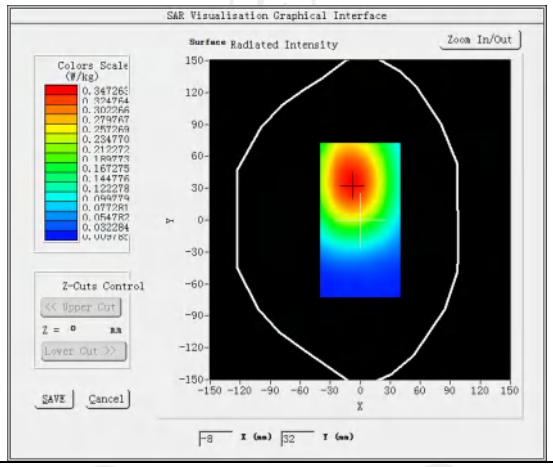
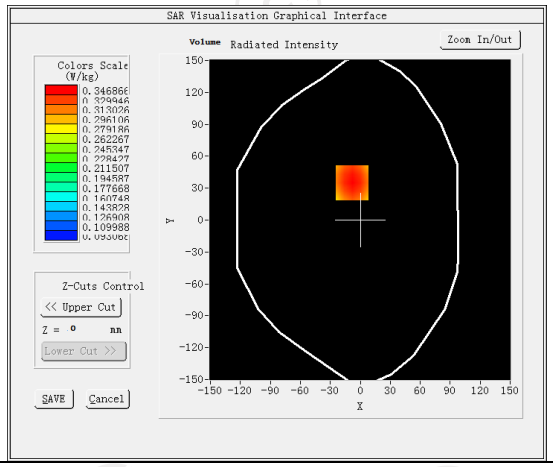
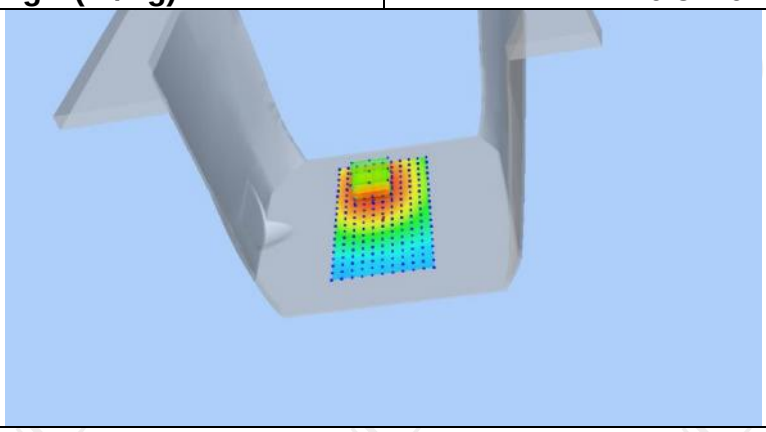
MEASUREMENT 2	
Middle Band SAR (Channel 23095):	Date: 10/08/2024
Frequency (MHz)	707.500000
Relative permittivity (real part)	42.093500
Relative permittivity (imaginary part)	22.115000
Conductivity (S/m)	0.915500
Variation (%)	-3.430000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 12(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=3.00, Y=38.00 SAR Peak: 0.35 W/kg	
SAR 10g (W/Kg)	0.209417
SAR 1g (W/Kg)	0.282608
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3486	0.2861	0.2215	0.1698	0.1286

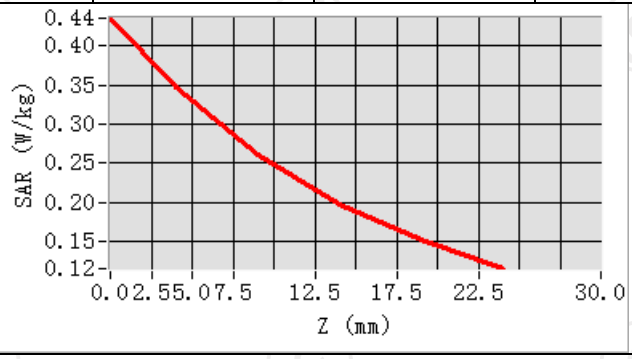


Hot spot position

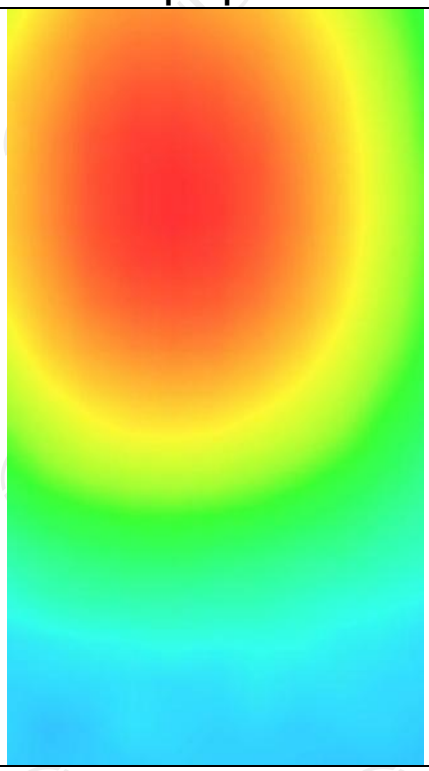


MEASUREMENT 3	
Middle Band SAR (Channel 23095):	Date: 10/08/2024
Frequency (MHz)	707.500000
Relative permittivity (real part)	42.093500
Relative permittivity (imaginary part)	22.115000
Conductivity (S/m)	0.915500
Variation (%)	-3.730000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(hotspot 10mm)
Band	LTE band 12(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-8.00, Y=35.00 **SAR Peak: 0.44 W/kg**	
SAR 10g (W/Kg)	0.249737
SAR 1g (W/Kg)	0.342026
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4359	0.3469	0.2608	0.1978	0.1515

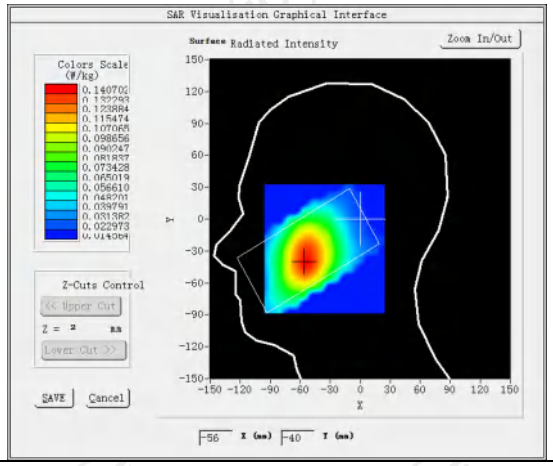
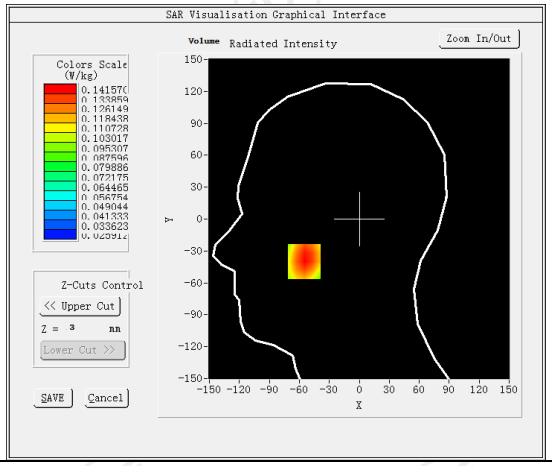
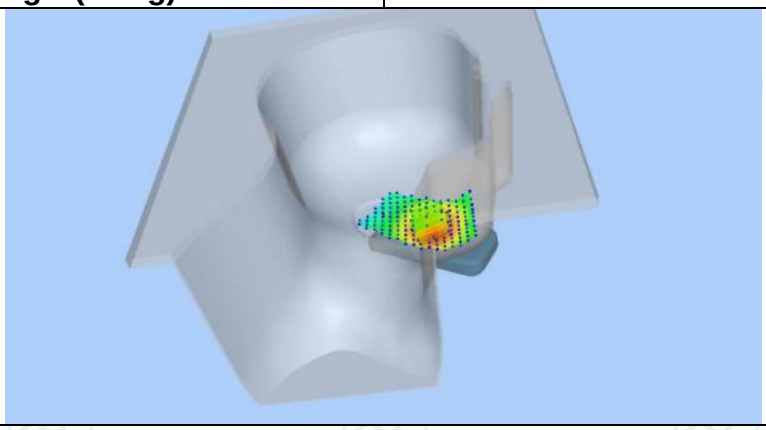


Hot spot position

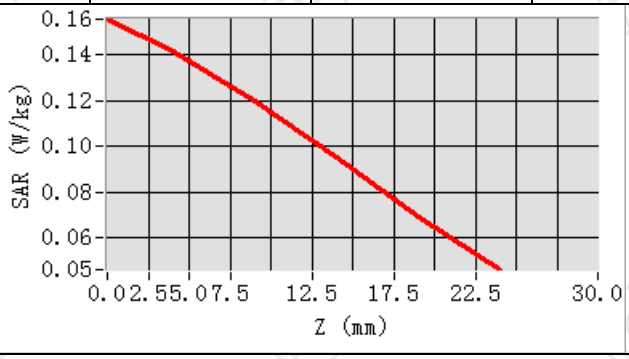


Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

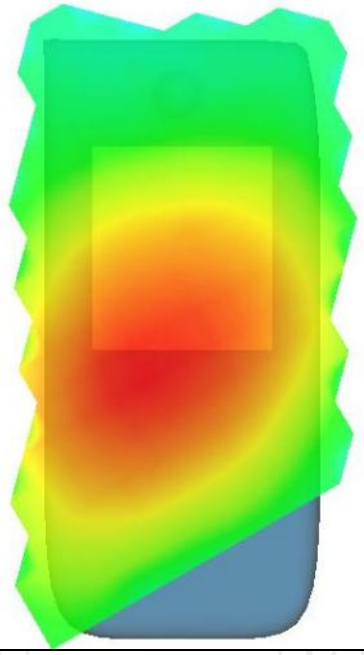
LTE Band 17

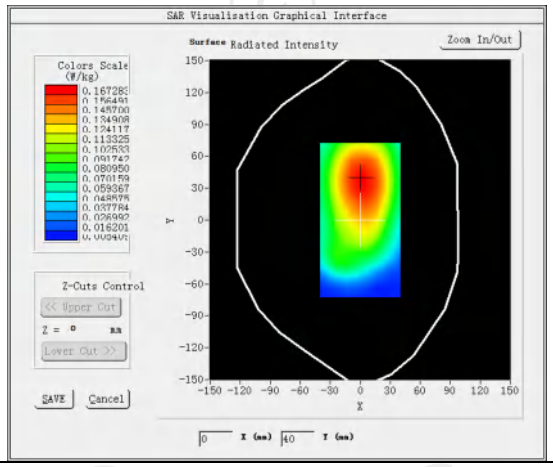
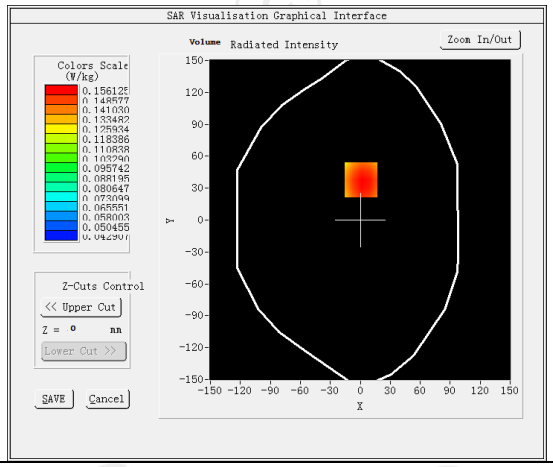
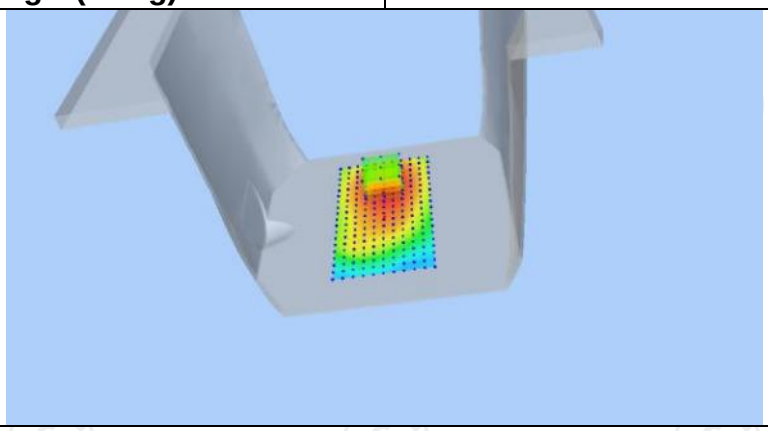
MEASUREMENT 1	
Middle Band SAR (Channel 23790):	Date: 10/08/2024
Frequency (MHz)	711.000000
Relative permittivity (real part)	42.071106
Relative permittivity (imaginary part)	22.052000
Conductivity (S/m)	0.915953
Variation (%)	-1.330000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 17(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-55.00, Y=-40.00 SAR Peak: 0.16 W/kg	
SAR 10g (W/Kg)	0.106097
SAR 1g (W/Kg)	0.139702
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1554	0.1416	0.1200	0.0951	0.0694

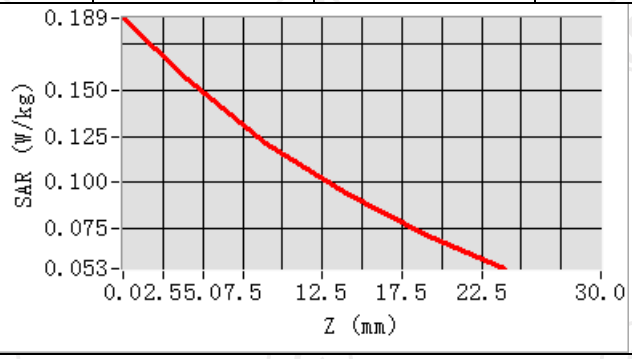


Hot spot position

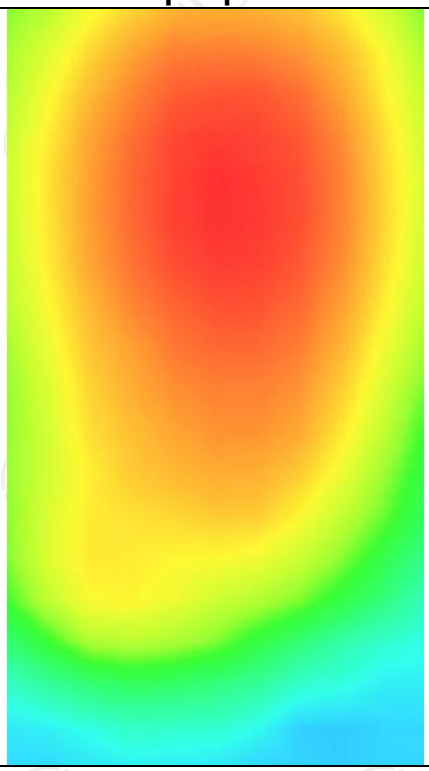


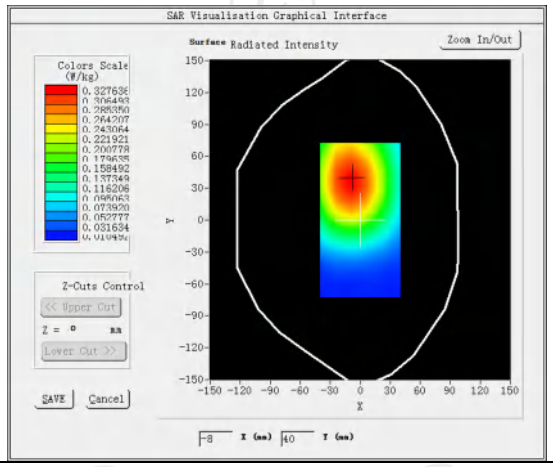
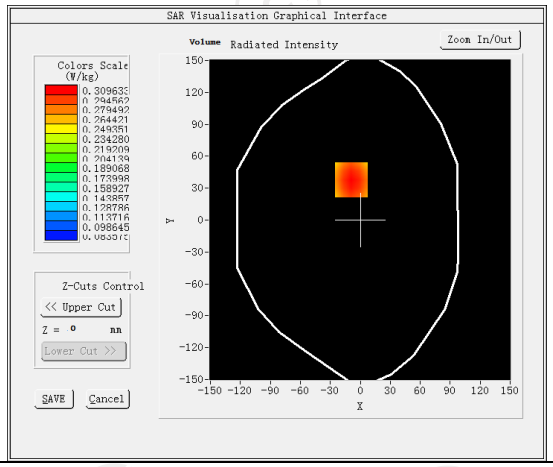
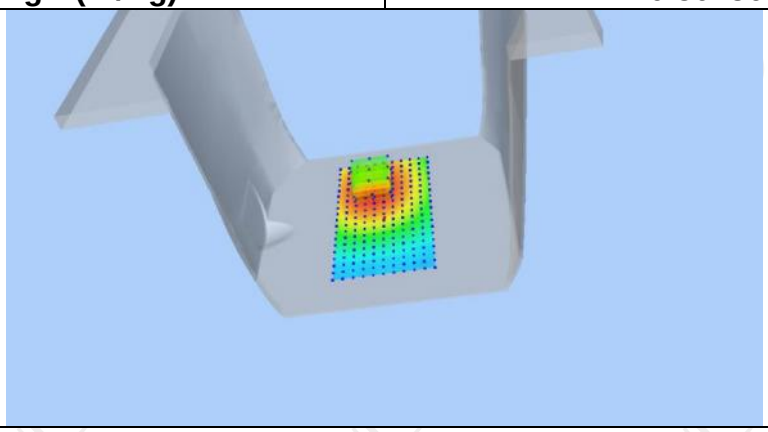
MEASUREMENT 2	
Middle Band SAR (Channel 23790):	Date: 10/08/2024
Frequency (MHz)	711.000000
Relative permittivity (real part)	42.071106
Relative permittivity (imaginary part)	22.052000
Conductivity (S/m)	0.915953
Variation (%)	-1.370000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 17(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=1.00, Y=38.00 SAR Peak: 0.19 W/kg	
SAR 10g (W/Kg)	0.115107
SAR 1g (W/Kg)	0.154401
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1894	0.1561	0.1216	0.0938	0.0715

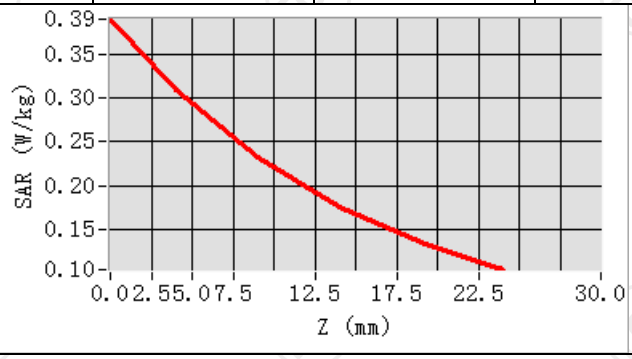


Hot spot position

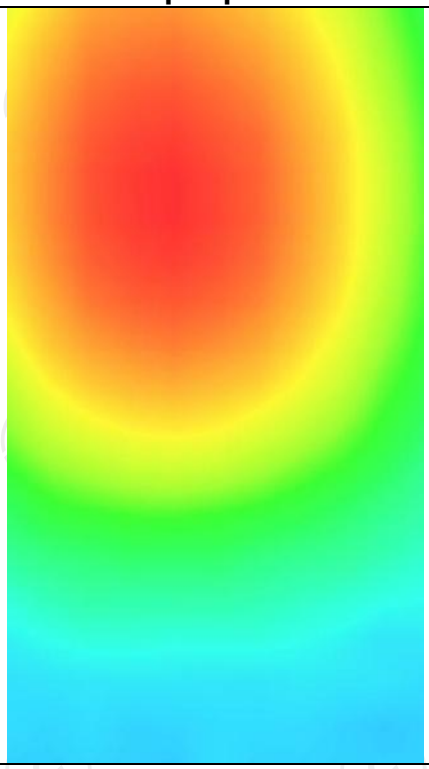


MEASUREMENT 3	
iddle Band SAR (Channel 23790):	Date: 10/08/2024
Frequency (MHz)	711.000000
Relative permittivity (real part)	42.071106
Relative permittivity (imaginary part)	22.052000
Conductivity (S/m)	0.915953
Variation (%)	-4.830000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(hotspot 10mm)
Band	LTE band 17(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-9.00, Y=38.00 **SAR Peak: 0.39 W/kg**	
SAR 10g (W/Kg)	0.222262
SAR 1g (W/Kg)	0.304860
	

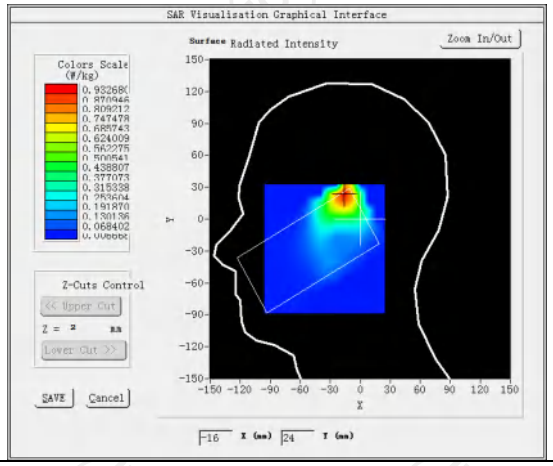
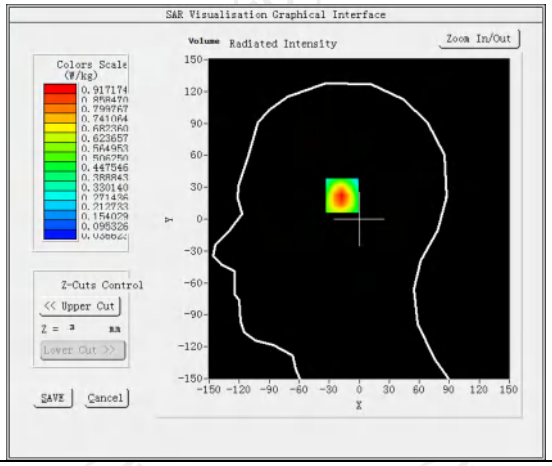
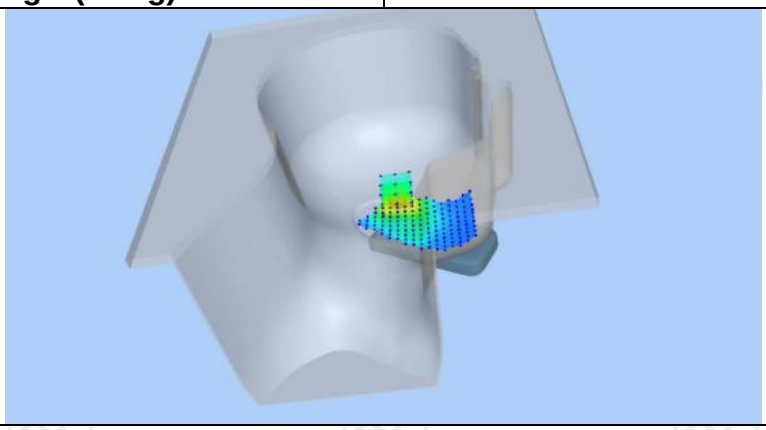
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3914	0.3096	0.2316	0.1753	0.1348



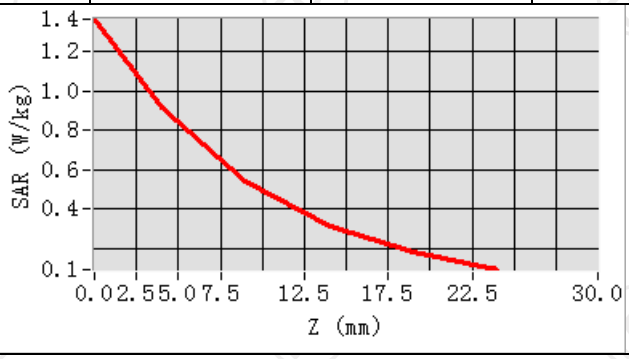
Hot spot position



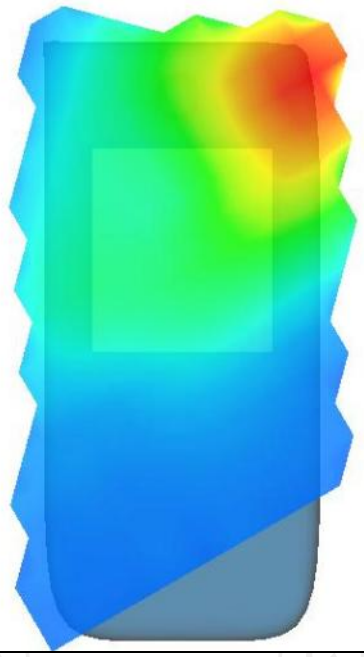
LTE Band 25

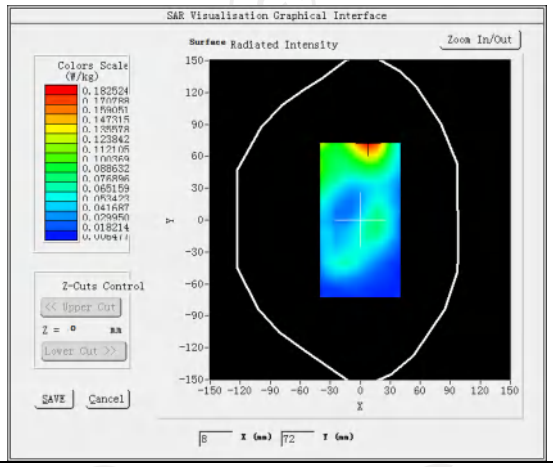
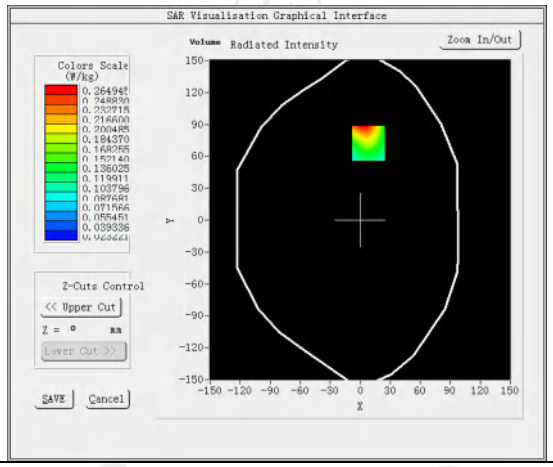
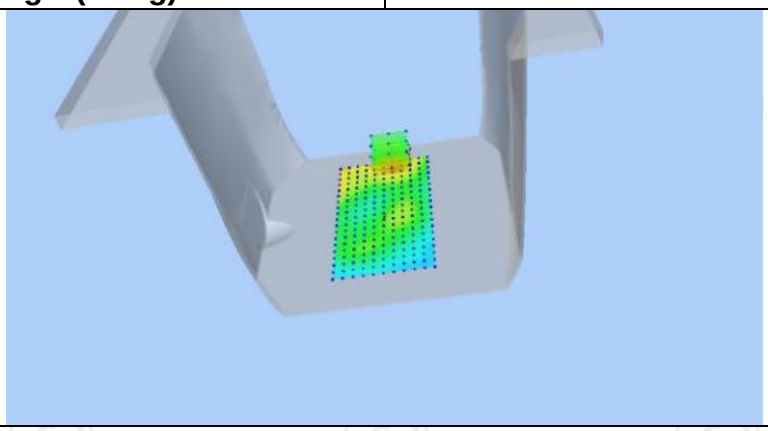
MEASUREMENT 1	
Low Band SAR (Channel 26140):	Date: 10/24/2024
Frequency (MHz)	1860.000000
Relative permittivity (real part)	39.073800
Relative permittivity (imaginary part)	14.142000
Conductivity (S/m)	1.443400
Variation (%)	-1.000000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 25(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-16.00, Y=24.00 SAR Peak: 1.36 W/kg	
SAR 10g (W/Kg)	0.478800
SAR 1g (W/Kg)	0.856828
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.3619	0.9172	0.5438	0.3160	0.1810

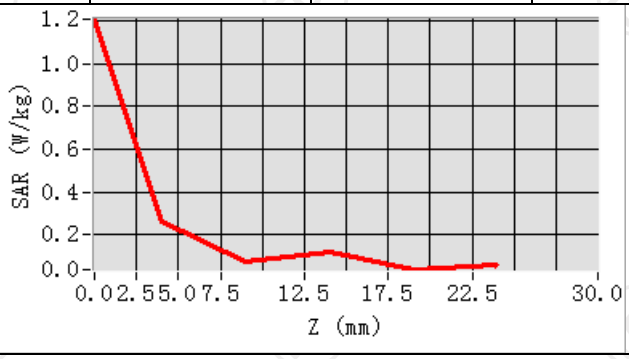


Hot spot position

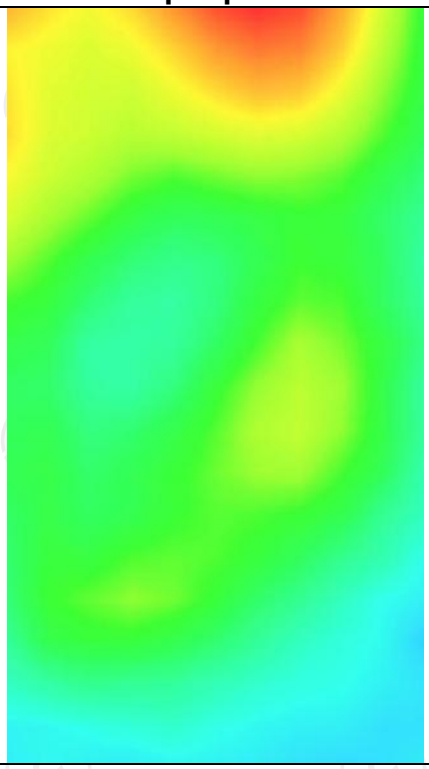


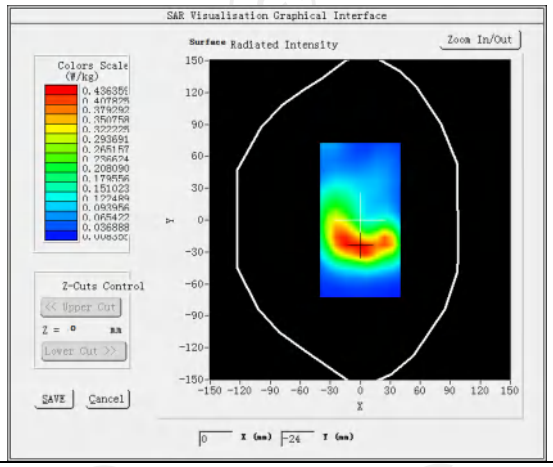
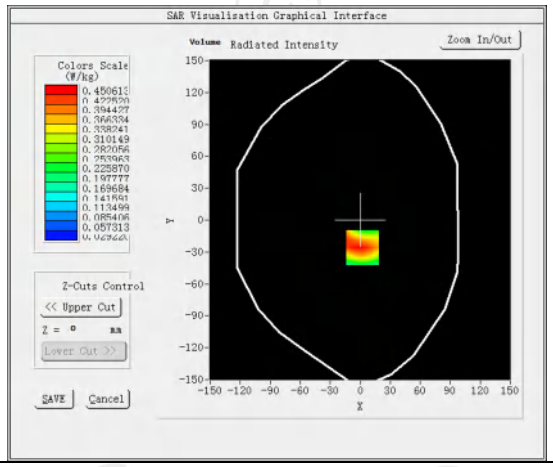
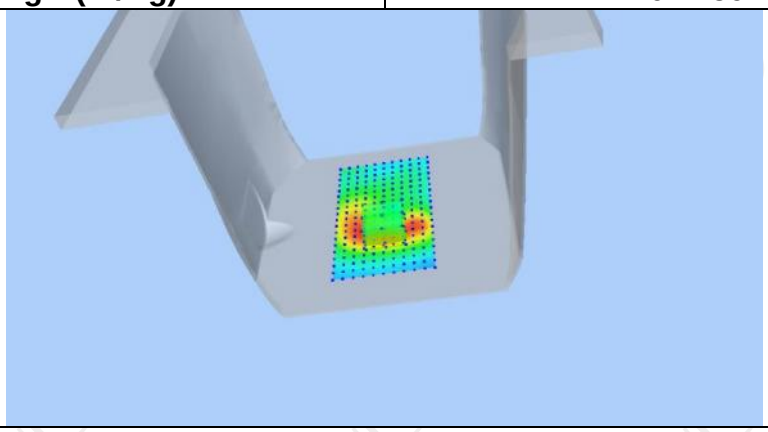
MEASUREMENT 2	
Low Band SAR (Channel 26140):	Date: 10/24/2024
Frequency (MHz)	1860.000000
Relative permittivity (real part)	39.073800
Relative permittivity (imaginary part)	14.142000
Conductivity (S/m)	1.443400
Variation (%)	-0.030000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 25(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=8.00, Y=72.00 SAR Peak: 0.38 W/kg	
SAR 10g (W/Kg)	0.136258
SAR 1g (W/Kg)	0.235964
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.2092	0.2649	0.0738	0.1182	0.0362

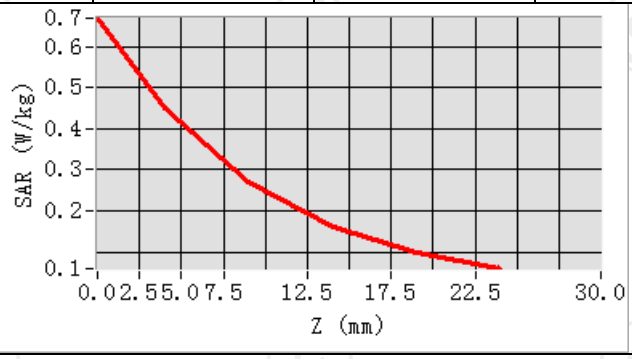


Hot spot position

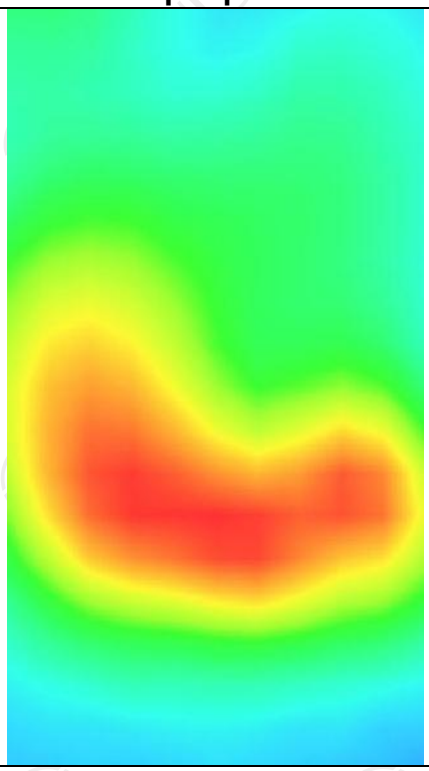


MEASUREMENT 3	
Low Band SAR (Channel 26140):	Date: 10/24/2024
Frequency (MHz)	1860.000000
Relative permittivity (real part)	39.073800
Relative permittivity (imaginary part)	14.142000
Conductivity (S/m)	1.443400
Variation (%)	0.200000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back((hotspot 10mm)
Band	LTE band 25(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=2.00, Y=-26.00 **SAR Peak: 0.67 W/kg**	
SAR 10g (W/Kg)	0.251851
SAR 1g (W/Kg)	0.425924
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.6698	0.4506	0.2696	0.1618	0.0994

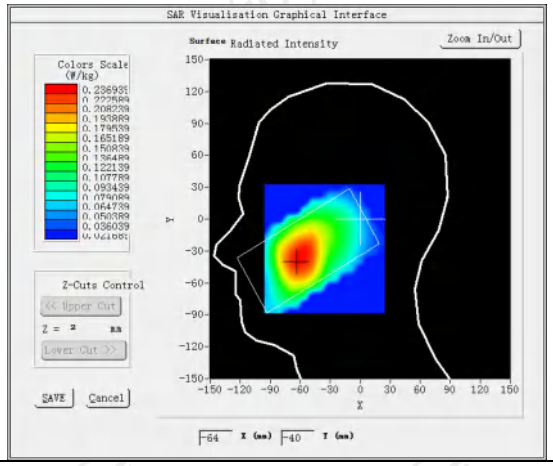
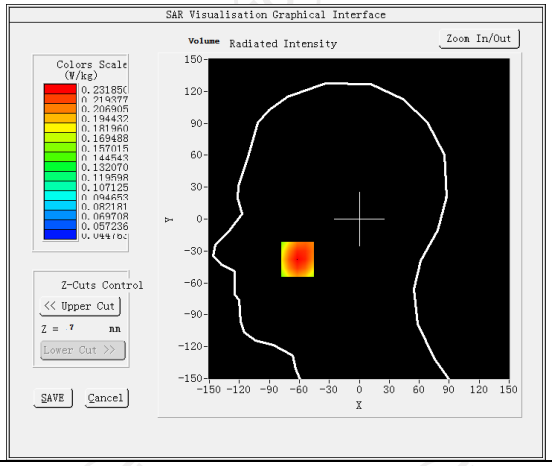
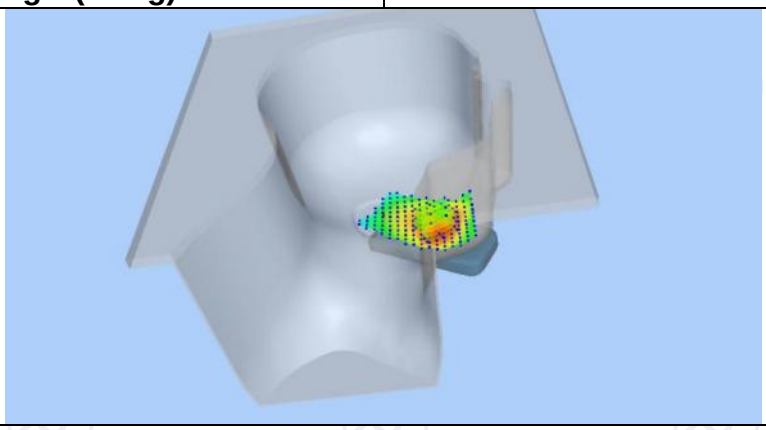


Hot spot position

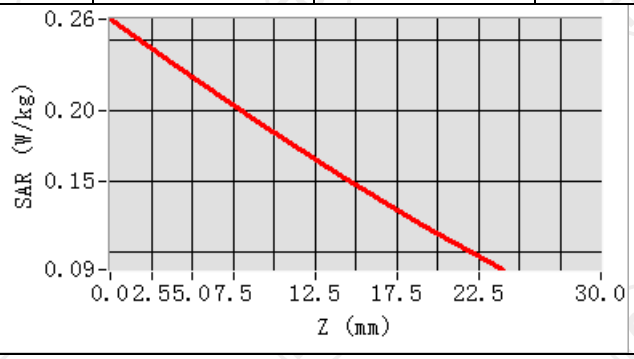


Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

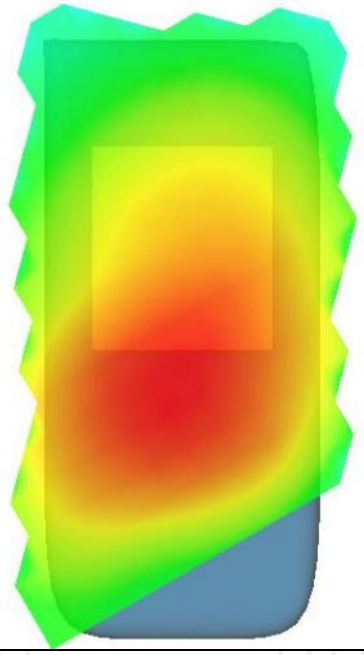
LTE Band 26-1

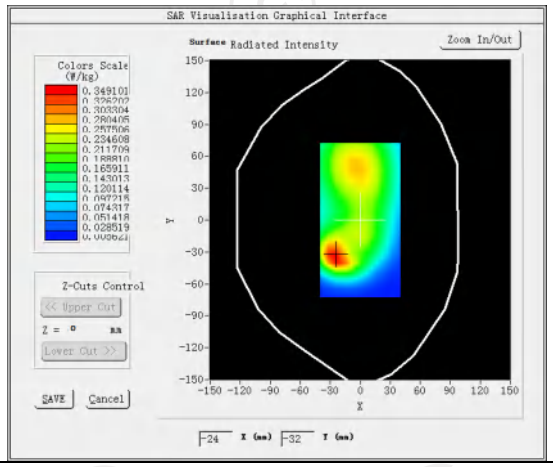
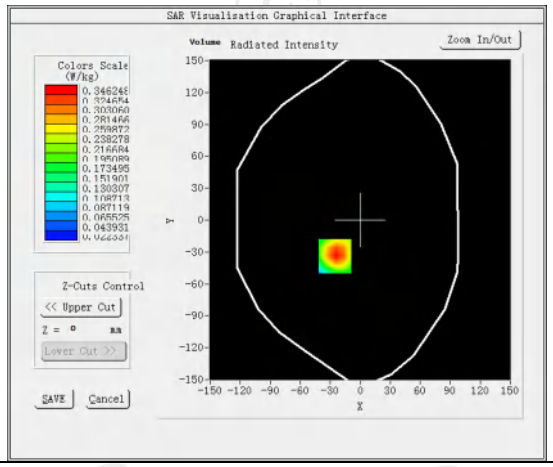
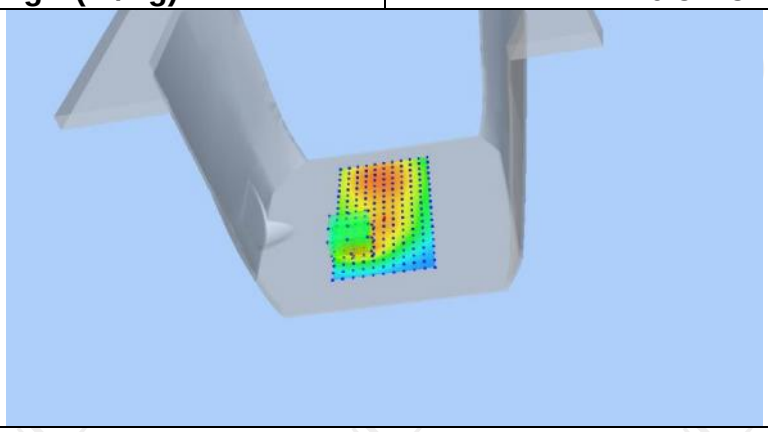
MEASUREMENT 1	
Middle Band SAR (Channel 26740):	Date: 10/14/2024
Frequency (MHz)	819.000000
Relative permittivity (real part)	41.688659
Relative permittivity (imaginary part)	20.108000
Conductivity (S/m)	0.929929
Variation (%)	-1.650000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 26-1(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-62.00, Y=-38.00 SAR Peak: 0.26 W/kg	
SAR 10g (W/Kg)	0.171710
SAR 1g (W/Kg)	0.224556
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2645	0.2319	0.1921	0.1543	0.1191

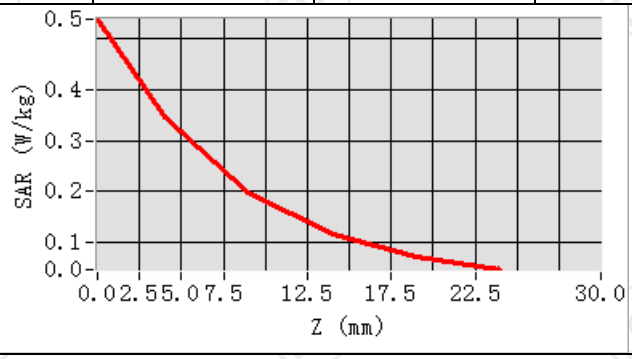


Hot spot position

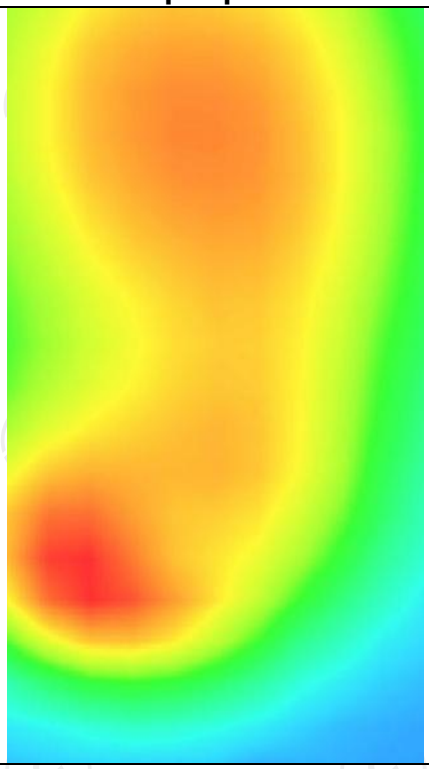


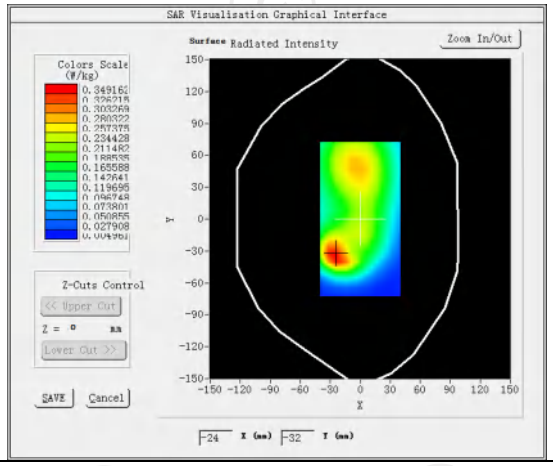
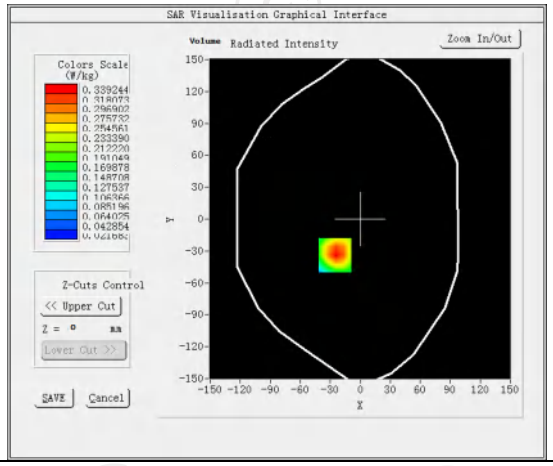
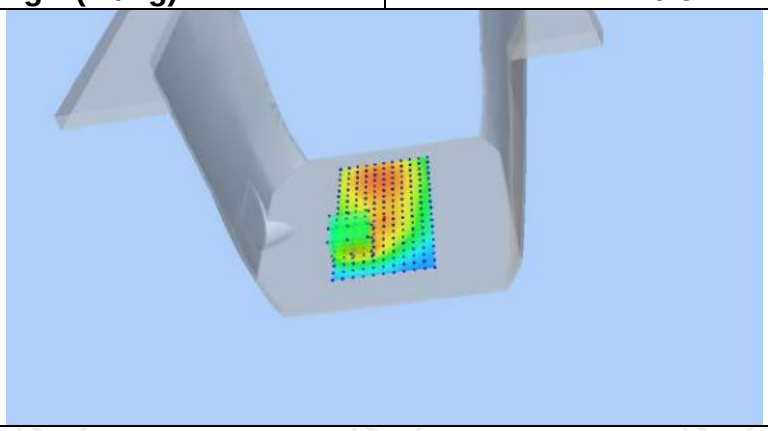
MEASUREMENT 2	
Middle Band SAR (Channel 26740):	Date: 10/14/2024
Frequency (MHz)	819.000000
Relative permittivity (real part)	41.688659
Relative permittivity (imaginary part)	20.108000
Conductivity (S/m)	0.929929
Variation (%)	-2.130000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 26-1(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-25.00, Y=-34.00 **SAR Peak: 0.54 W/kg**	
SAR 10g (W/Kg)	0.184922
SAR 1g (W/Kg)	0.327327
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5391	0.3462	0.1958	0.1137	0.0710

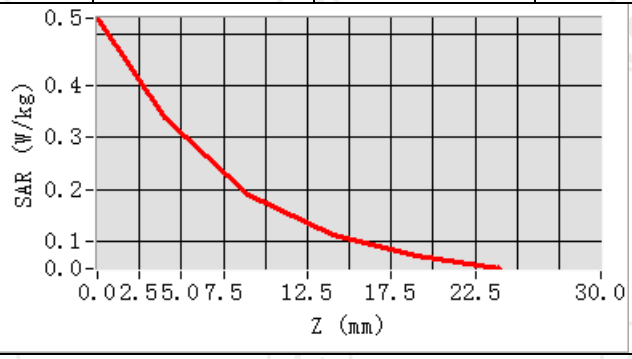


Hot spot position

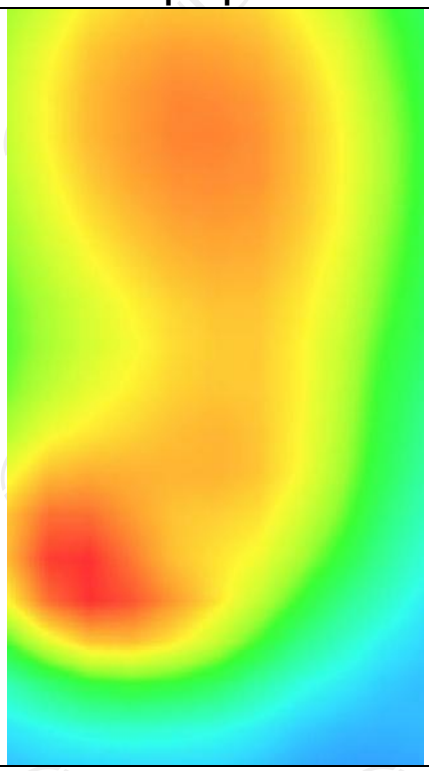


MEASUREMENT 3	
Middle Band SAR (Channel 26740):	Date: 10/14/2024
Frequency (MHz)	819.000000
Relative permittivity (real part)	41.688659
Relative permittivity (imaginary part)	20.108000
Conductivity (S/m)	0.929929
Variation (%)	-1.240000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(hotspot 10mm)
Band	LTE band 26-1(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-25.00, Y=-34.00 SAR Peak: 0.54 W/kg	
SAR 10g (W/Kg)	0.181668
SAR 1g (W/Kg)	0.321112
	

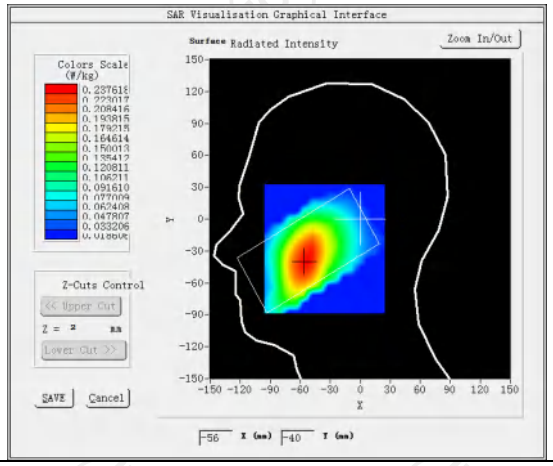
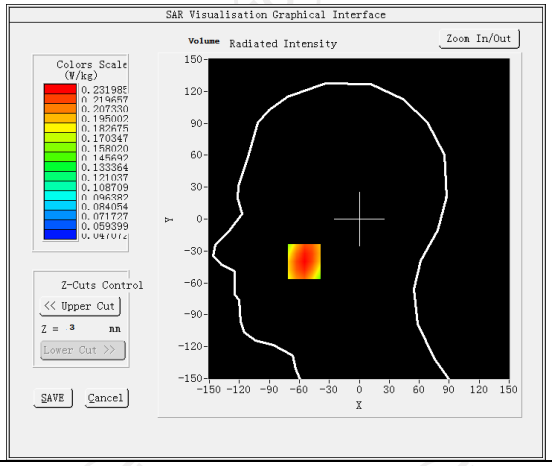
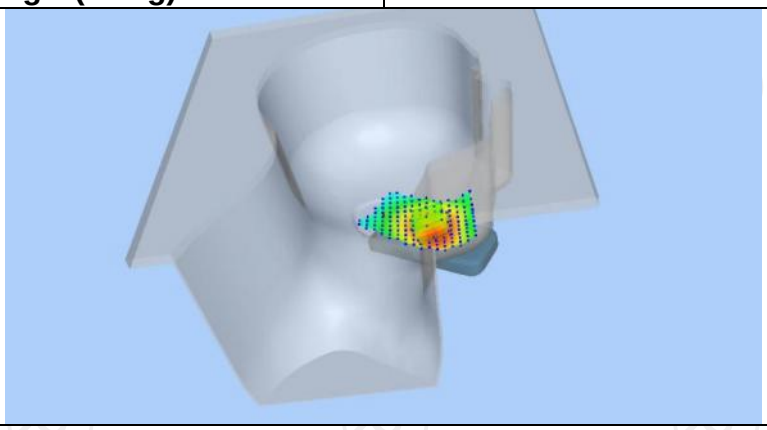
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5306	0.3392	0.1913	0.1117	0.0713



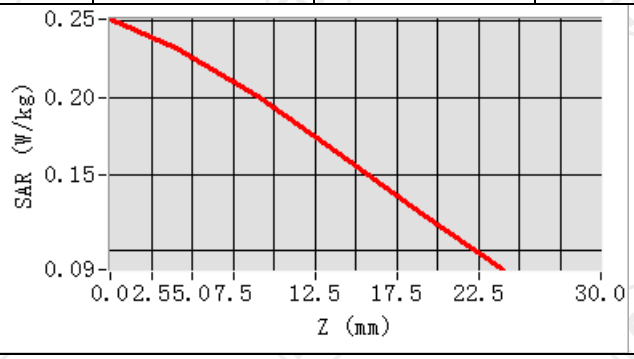
Hot spot position



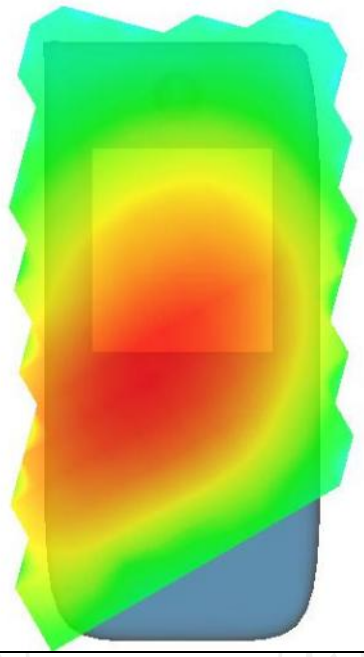
LTE Band 26-2

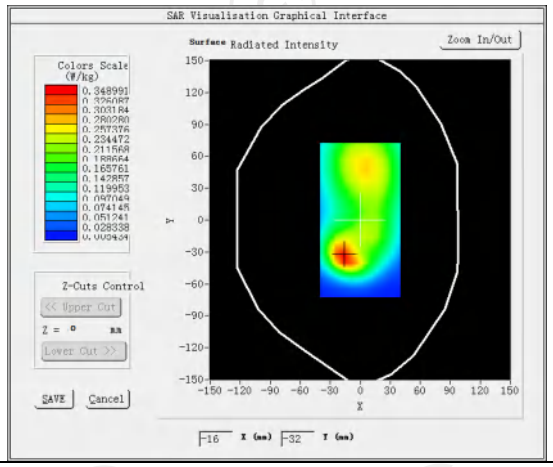
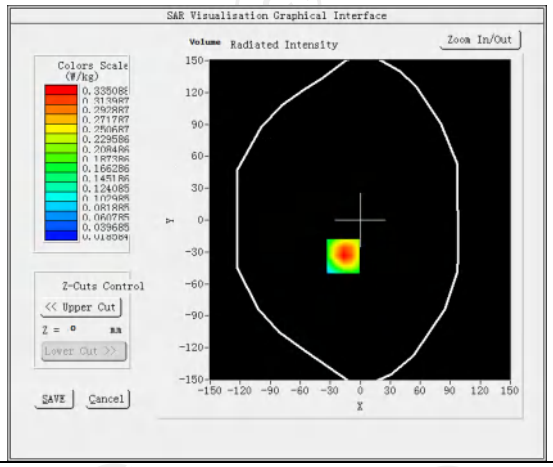
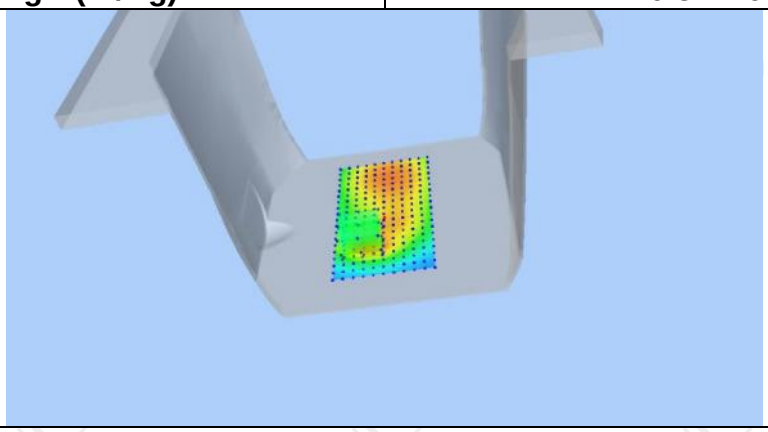
MEASUREMENT 1	
Middle Band SAR (Channel 26915):	Date: 10/14/2024
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.628753
Relative permittivity (imaginary part)	19.811855
Conductivity (S/m)	0.932777
Variation (%)	-2.530000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 26-2(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-55.00, Y=-40.00 SAR Peak: 0.25 W/kg	
SAR 10g (W/Kg)	0.175782
SAR 1g (W/Kg)	0.214129
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2513	0.2320	0.2008	0.1637	0.1244

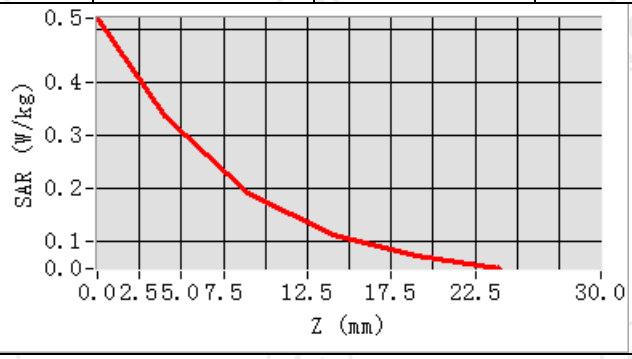


Hot spot position

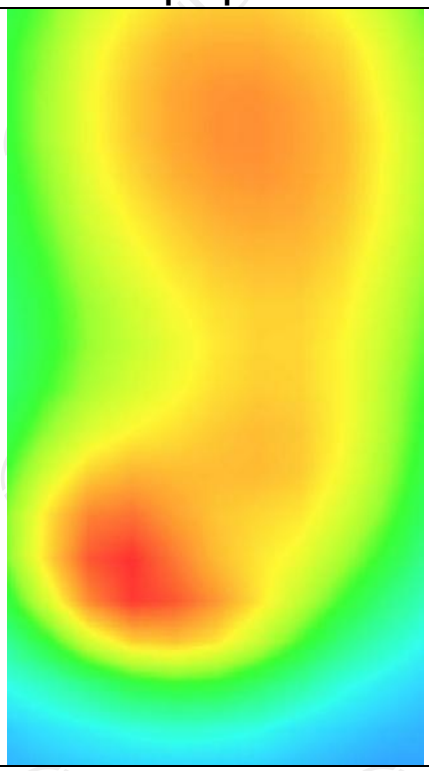


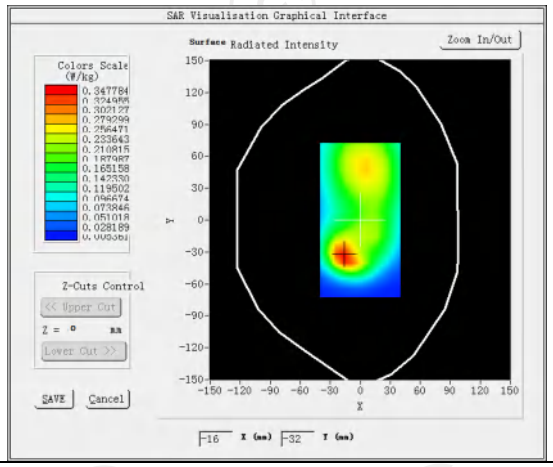
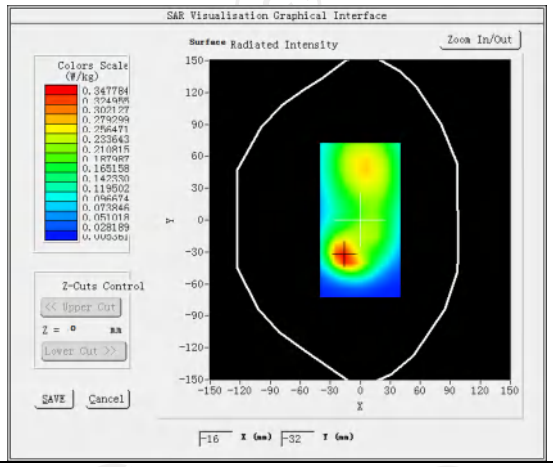
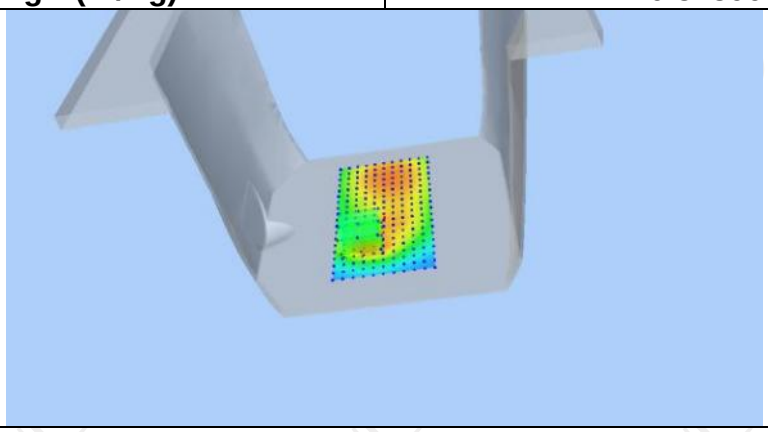
MEASUREMENT 2	
Middle Band SAR (Channel 26915):	Date: 10/14/2024
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.628753
Relative permittivity (imaginary part)	19.811855
Conductivity (S/m)	0.932777
Variation (%)	-2.930000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 26-2(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-17.00, Y=-34.00 **SAR Peak: 0.53 W/kg**	
SAR 10g (W/Kg)	0.180365
SAR 1g (W/Kg)	0.317492
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5203	0.3351	0.1907	0.1120	0.0713

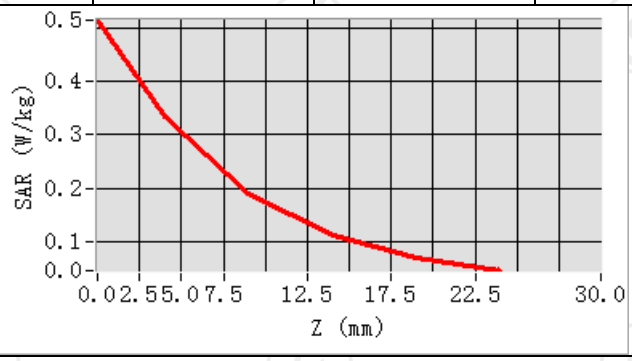


Hot spot position

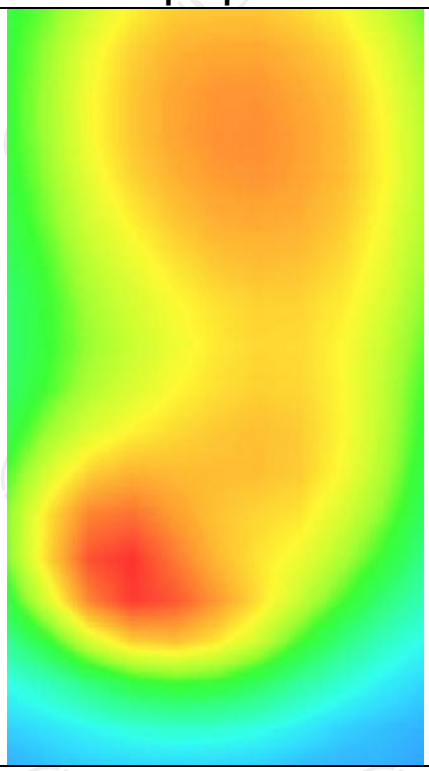


MEASUREMENT 3	
Middle Band SAR (Channel 26915):	Date: 10/14/2024
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.628753
Relative permittivity (imaginary part)	19.811855
Conductivity (S/m)	0.932777
Variation (%)	-1.870000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back((hotspot 10mm)
Band	LTE band 26-2(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-17.00, Y=-33.00 SAR Peak: 0.52 W/kg	
SAR 10g (W/Kg)	0.178770
SAR 1g (W/Kg)	0.313990
	

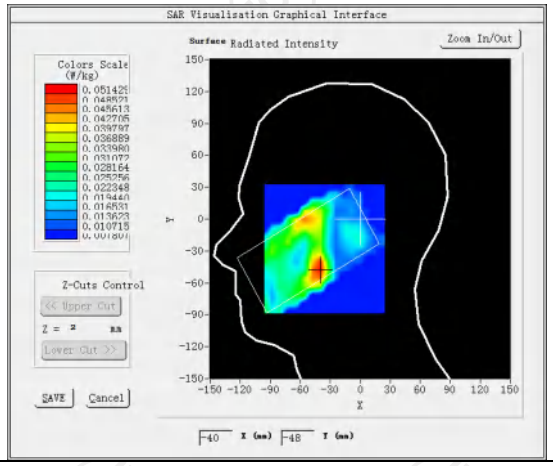
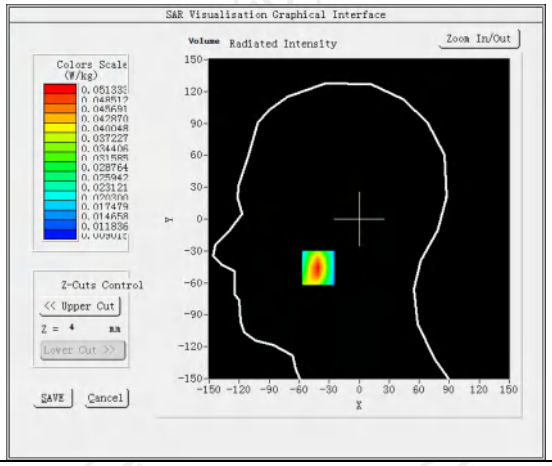
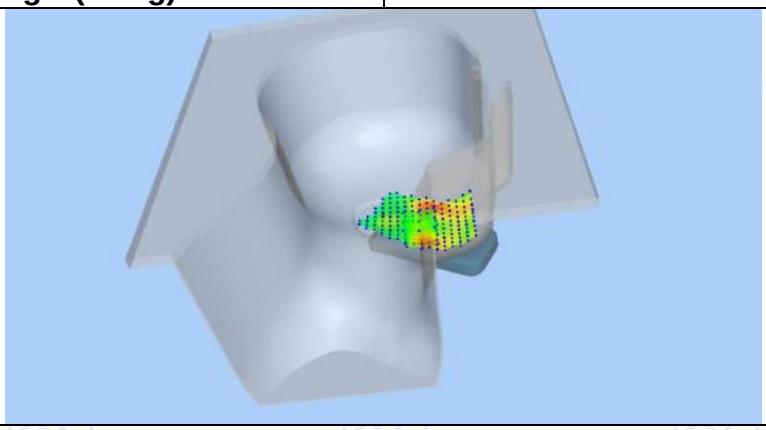
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5140	0.3326	0.1902	0.1116	0.0704



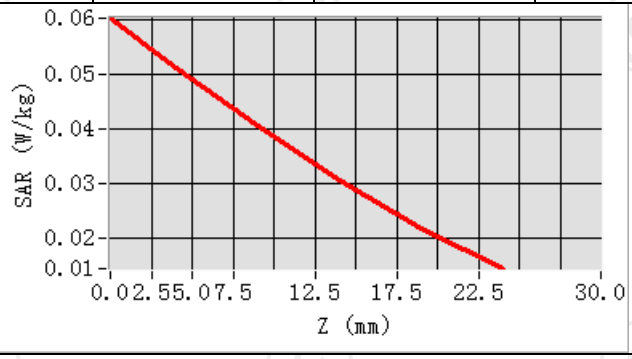
Hot spot position



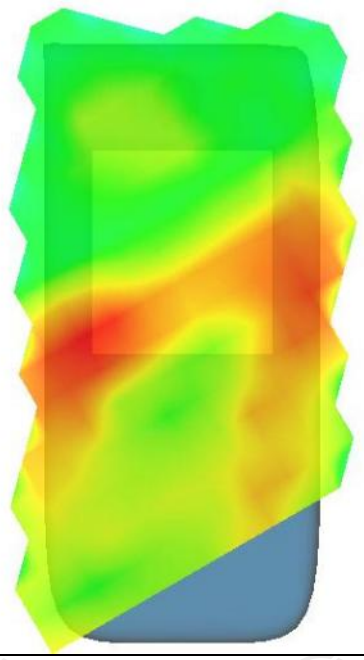
LTE Band 41

MEASUREMENT 1	
High Band SAR (Channel 41490):	Date: 11/05/2024
Frequency (MHz)	2680.000000
Relative permittivity (real part)	37.771523
Relative permittivity (imaginary part)	12.819015
Conductivity (S/m)	2.027631
Variation (%)	-1.880000
Crest Factor	1.0
Probe Conversion factor	4.36
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 41(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-41.00, Y=-46.00 SAR Peak: 0.06 W/kg	
SAR 10g (W/Kg)	0.031596
SAR 1g (W/Kg)	0.048058
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0604	0.0513	0.0406	0.0306	0.0218



Hot spot position



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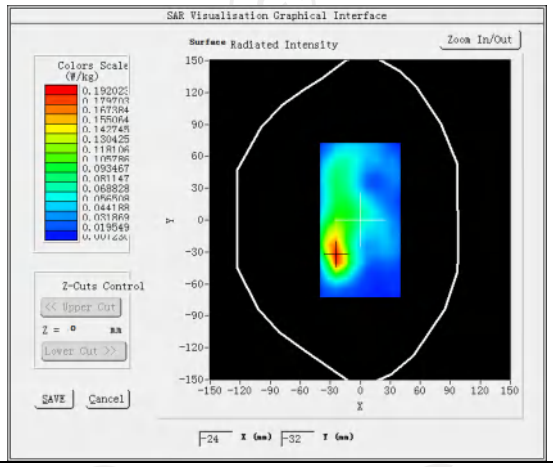
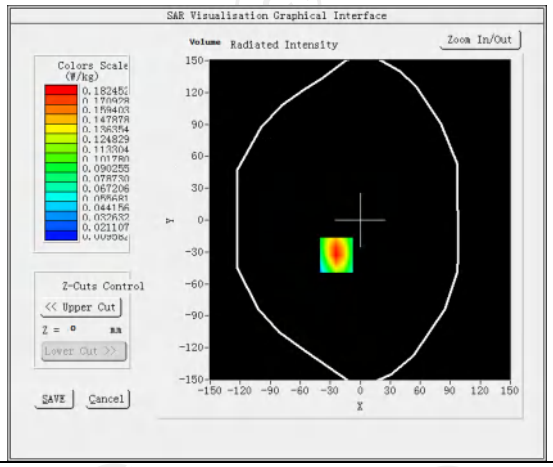
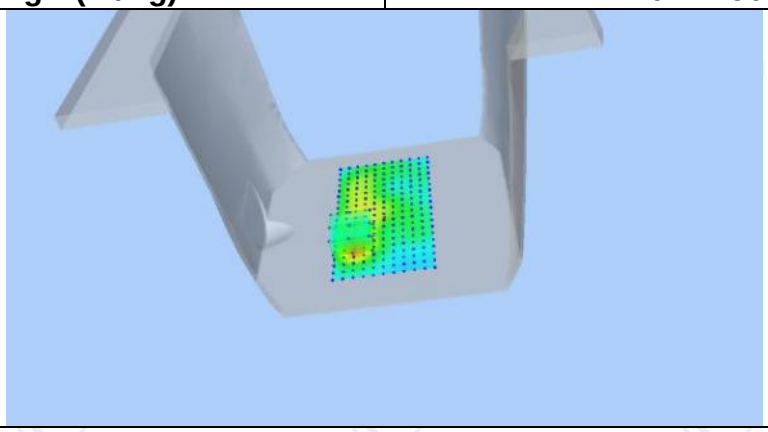
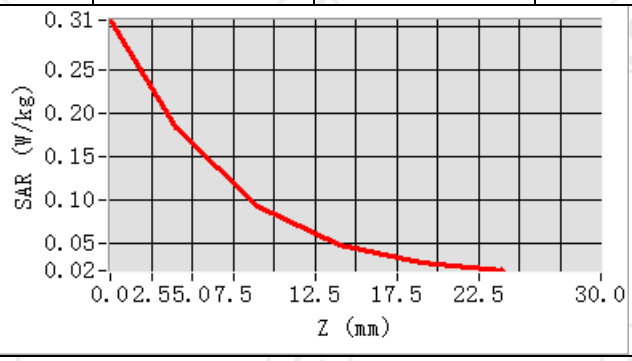
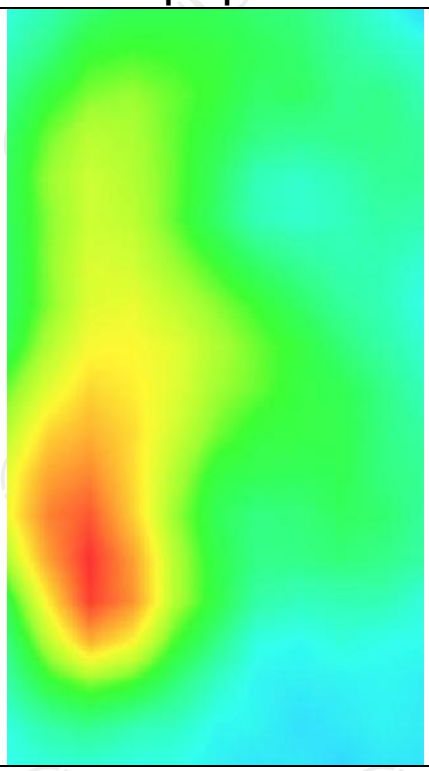
MEASUREMENT 2	
High Band SAR (Channel 41490):	Date: 11/05/2024
Frequency (MHz)	2680.000000
Relative permittivity (real part)	37.771523
Relative permittivity (imaginary part)	12.819015
Conductivity (S/m)	2.027631
Variation (%)	4.230000
Crest Factor	1.0
Probe Conversion factor	4.36
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back (10mm)
Band	LTE band 41(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-24.00, Y=-33.00 **SAR Peak: 0.31 W/kg**	
SAR 10g (W/Kg)	0.090517
SAR 1g (W/Kg)	0.171564
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3073	0.1825	0.0921	0.0481	0.0287



Hot spot position



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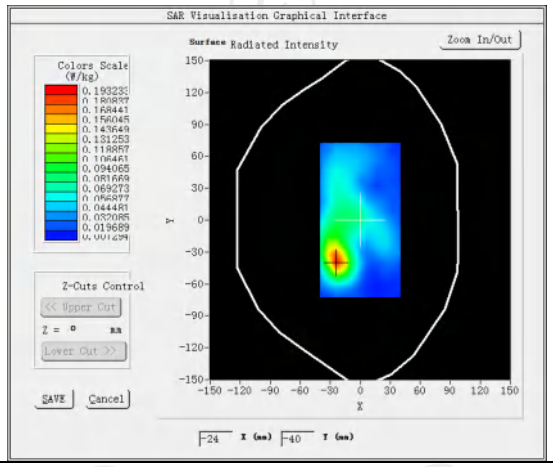
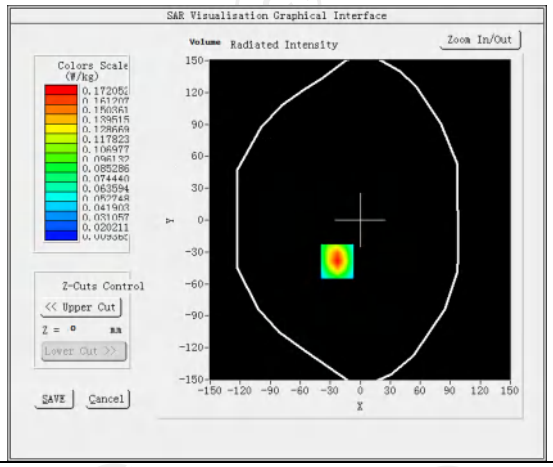
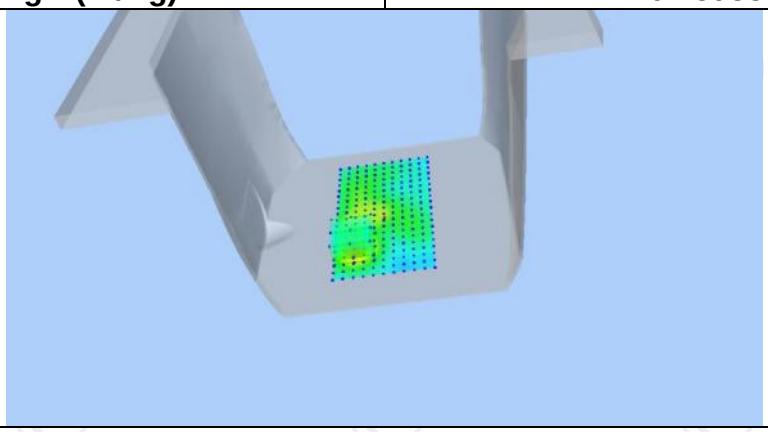
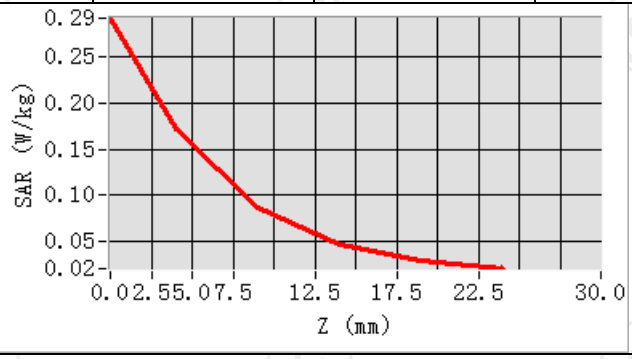
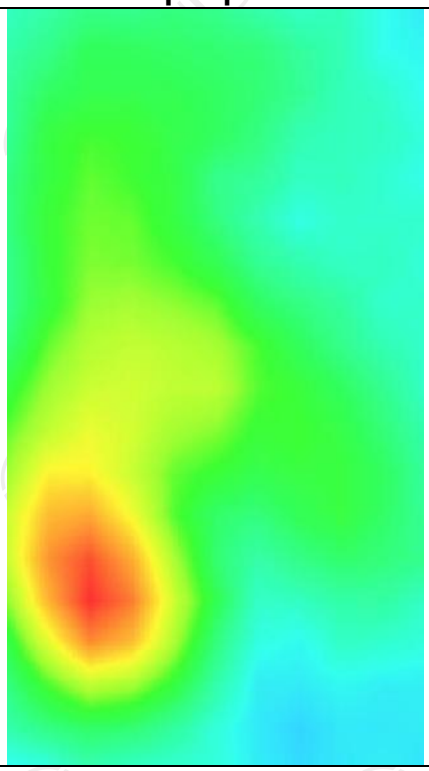
MEASUREMENT 3	
High Band SAR (Channel 41490):	Date: 11/05/2024
Frequency (MHz)	2680.000000
Relative permittivity (real part)	37.771523
Relative permittivity (imaginary part)	12.819015
Conductivity (S/m)	2.027631
Variation (%)	-3.010000
Crest Factor	1.0
Probe Conversion factor	4.36
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back (hotspot 10mm)
Band	LTE band 41(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-23.00, Y=-39.00 **SAR Peak: 0.29 W/kg**	
SAR 10g (W/Kg)	0.081499
SAR 1g (W/Kg)	0.159839
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2922	0.1721	0.0863	0.0458	0.0287



Hot spot position



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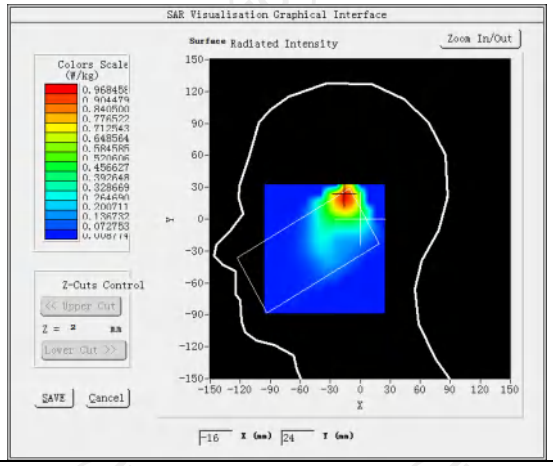
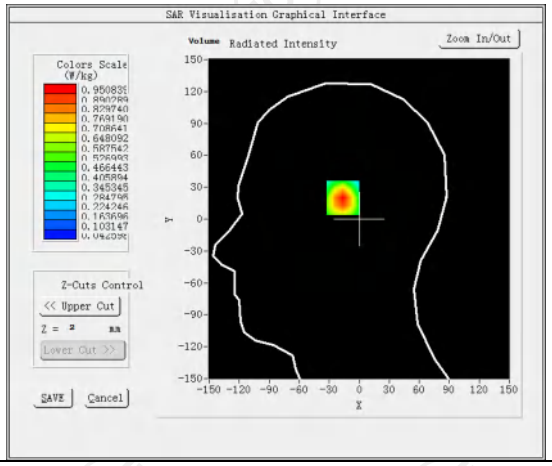
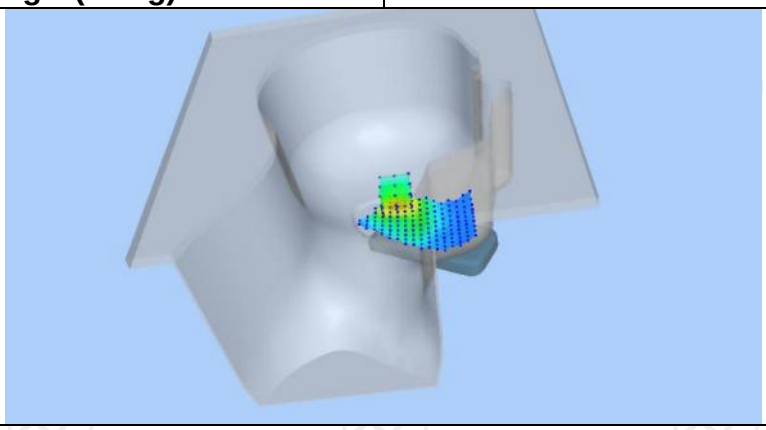
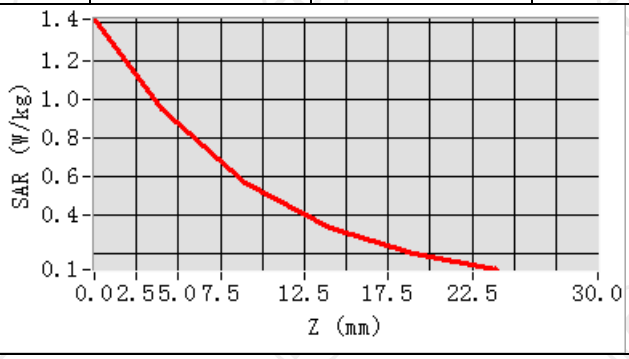
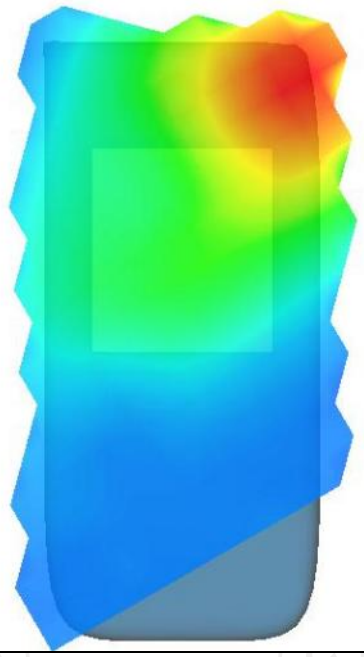
LTE Band 66

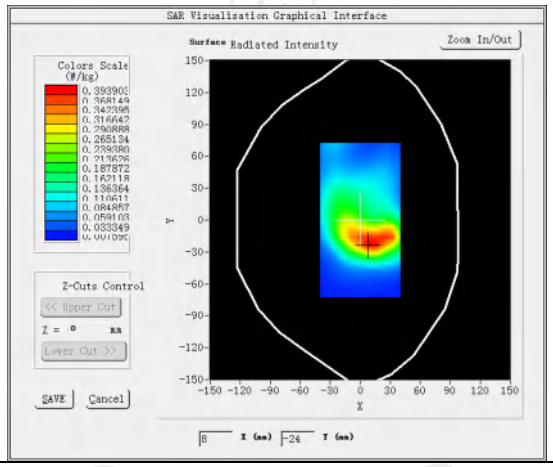
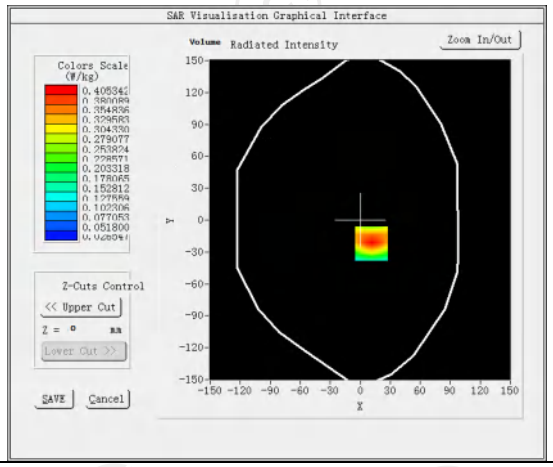
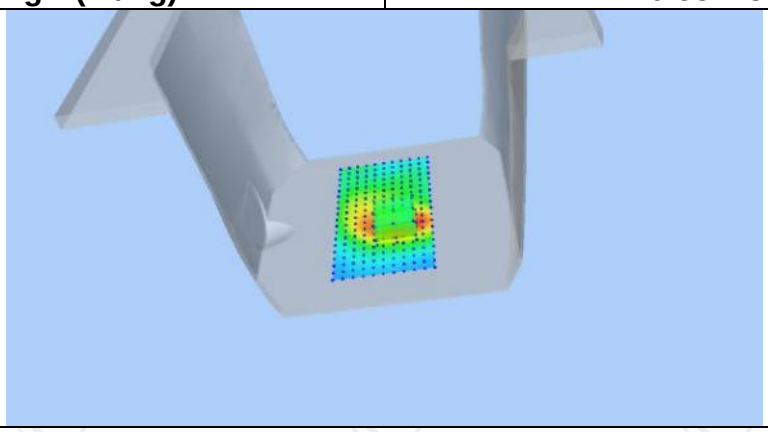
MEASUREMENT 1	
High Band SAR (Channel 132572):	Date: 10/18/2024
Frequency (MHz)	1770.000000
Relative permittivity (real part)	39.607943
Relative permittivity (imaginary part)	14.742902
Conductivity (S/m)	1.416456
Variation (%)	-1.220000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 66(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-15.00, Y=22.00 SAR Peak: 1.42 W/kg	
SAR 10g (W/Kg)	0.406534
SAR 1g (W/Kg)	0.732171
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.4148	0.9508	0.5661	0.3355	0.2012

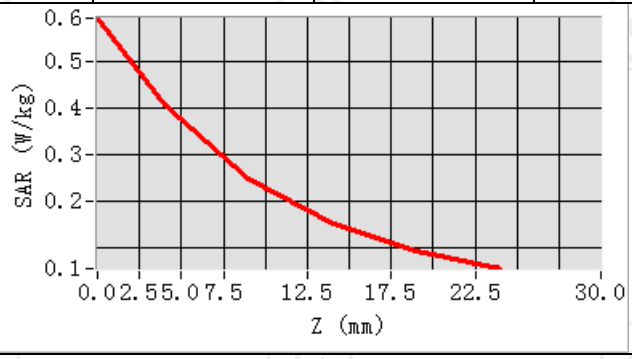


Hot spot position

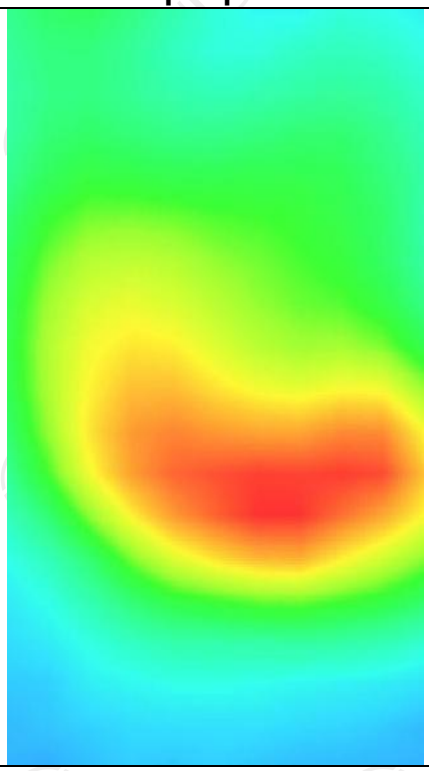


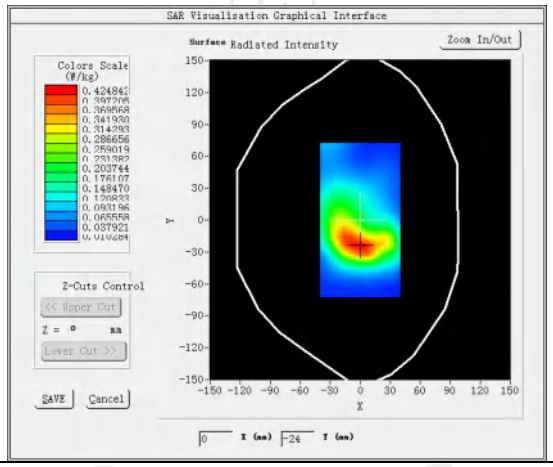
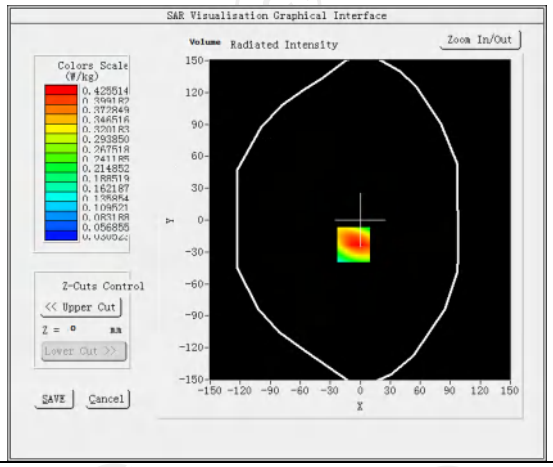
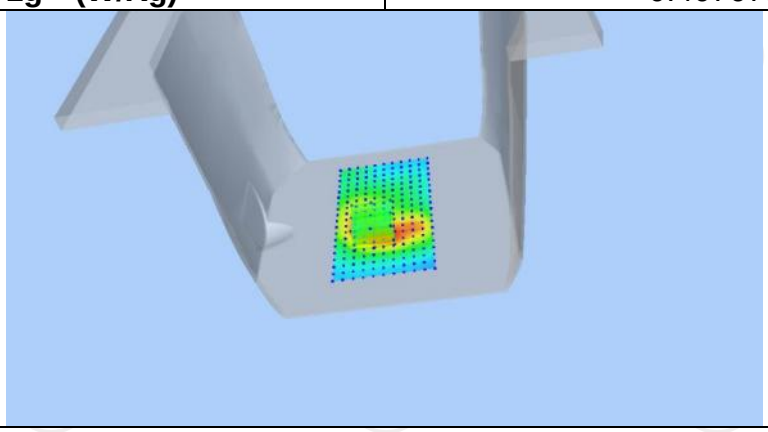
MEASUREMENT 2	
High Band SAR (Channel 132572):	Date: 10/18/2024
Frequency (MHz)	1770.000000
Relative permittivity (real part)	39.607943
Relative permittivity (imaginary part)	14.742902
Conductivity (S/m)	1.416456
Variation (%)	-3.520000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 66(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=11.00, Y=-22 **SAR Peak: 0.60W/kg**	
SAR 10g (W/Kg)	0.226938
SAR 1g (W/Kg)	0.384484
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.5914	0.4053	0.2483	0.1519	0.0940

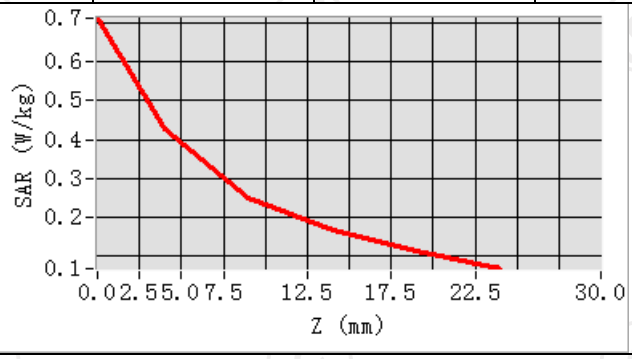


Hot spot position

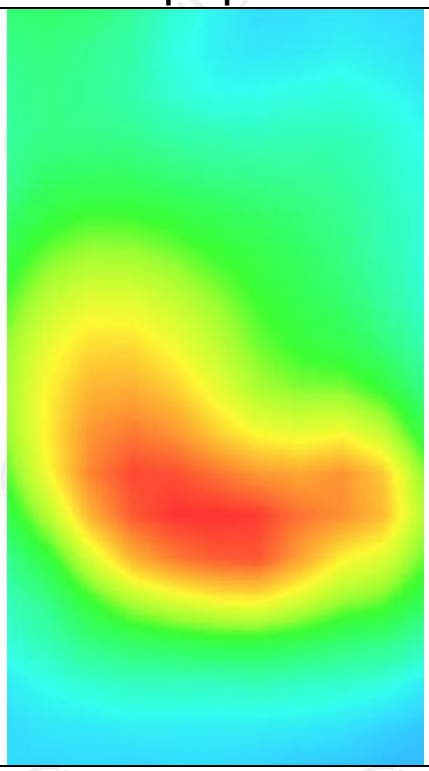


MEASUREMENT 3	
High Band SAR (Channel 132572):	Date: 10/18/2024
Frequency (MHz)	1770.000000
Relative permittivity (real part)	39.607943
Relative permittivity (imaginary part)	14.742902
Conductivity (S/m)	1.416456
Variation (%)	-0.240000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back((hotspot10mm)
Band	LTE band 66(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-7.00, Y=-23.00 SAR Peak: 0.62 W/kg	
SAR 10g (W/Kg)	0.250474
SAR 1g (W/Kg)	0.407673
	

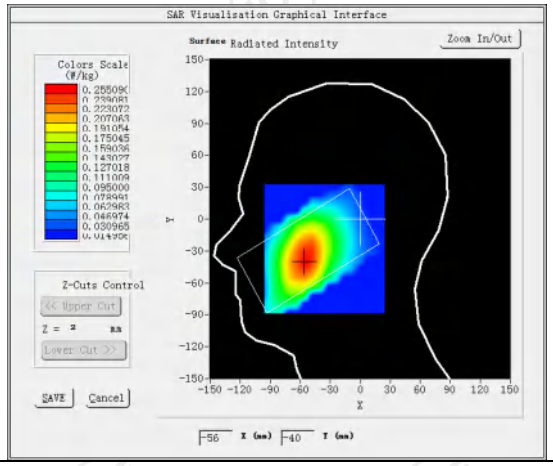
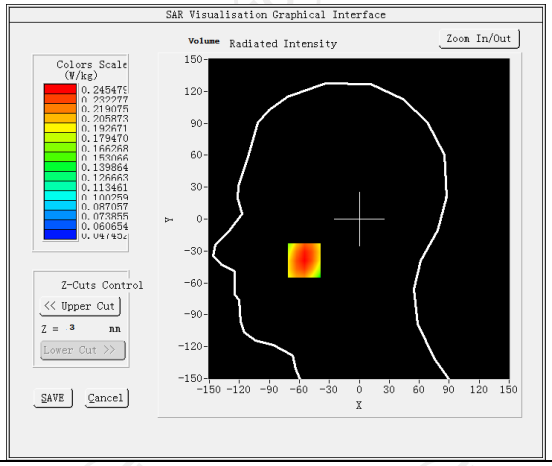
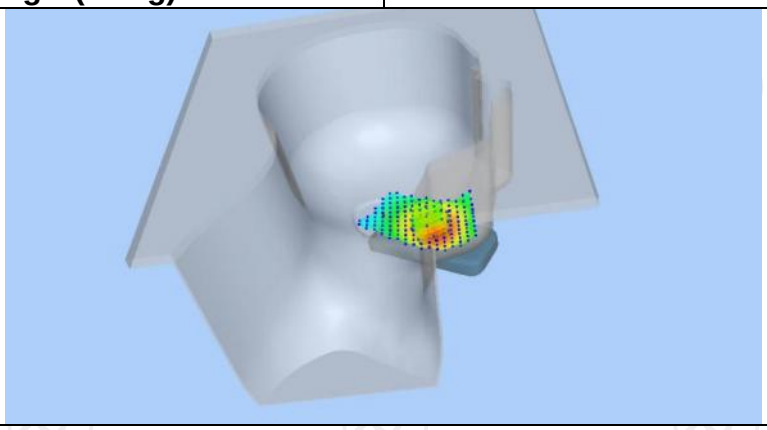
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.7131	0.4255	0.2482	0.1661	0.1113



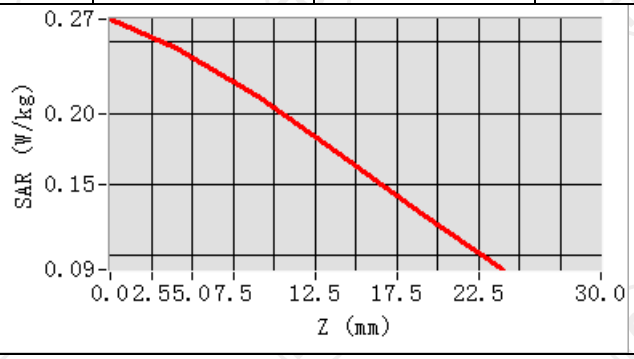
Hot spot position



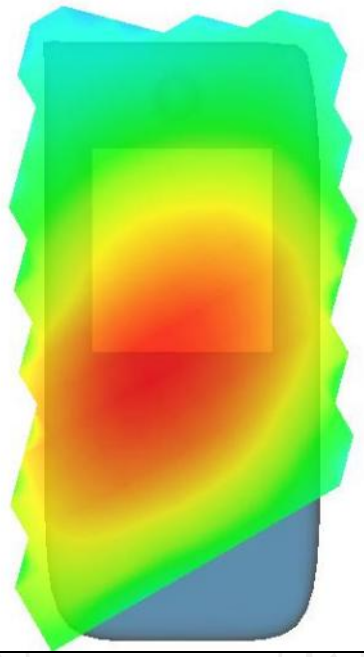
LTE Band 71

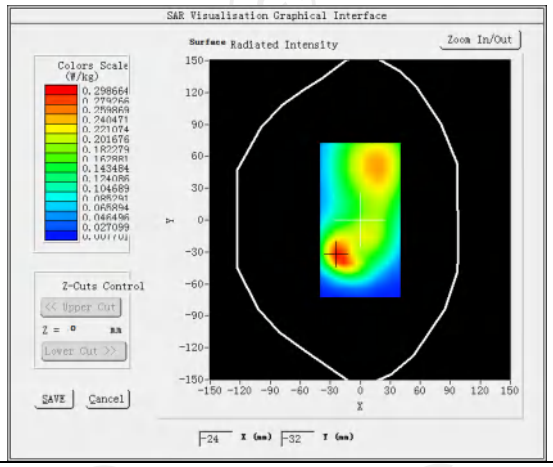
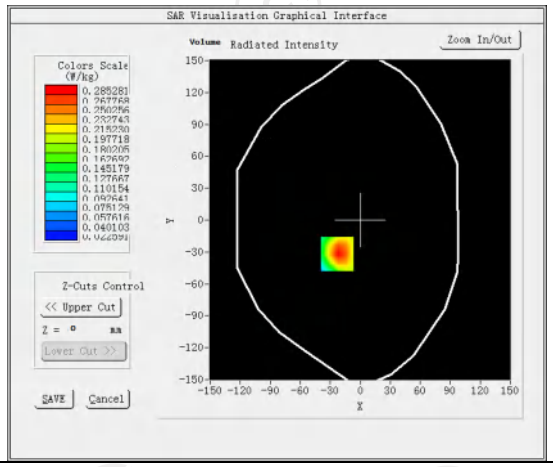
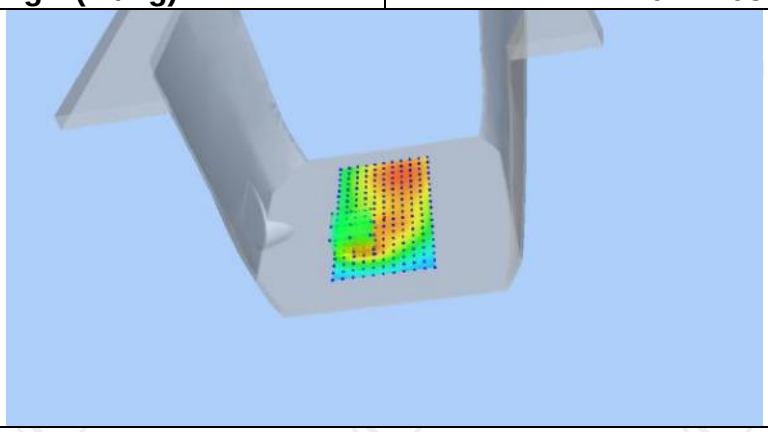
MEASUREMENT 1	
Middle Band SAR (Channel 133322):	Date: 10/08/2024
Frequency (MHz)	683.000000
Relative permittivity (real part)	42.170259
Relative permittivity (imaginary part)	22.556000
Conductivity (S/m)	0.912329
Variation (%)	-3.310000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 71(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-55.00, Y=-39.00 SAR Peak: 0.27 W/kg	
SAR 10g (W/Kg)	0.183873
SAR 1g (W/Kg)	0.237590
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2664	0.2455	0.2117	0.1716	0.1291

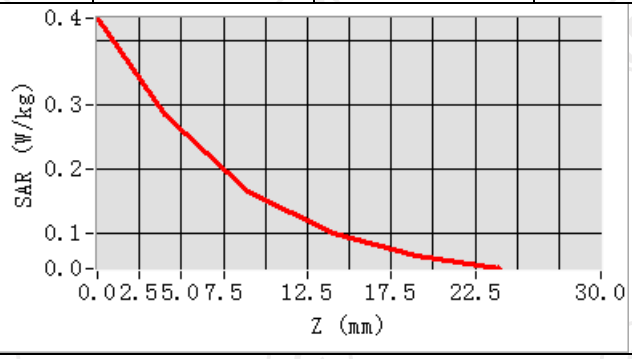


Hot spot position

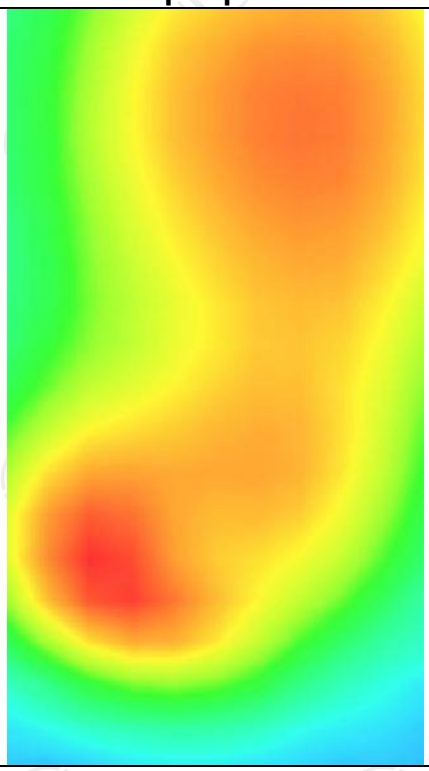


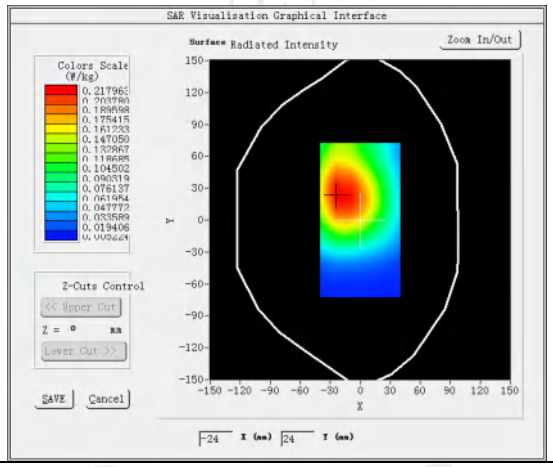
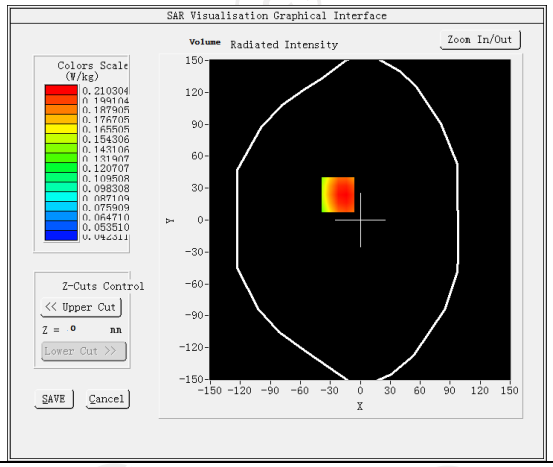
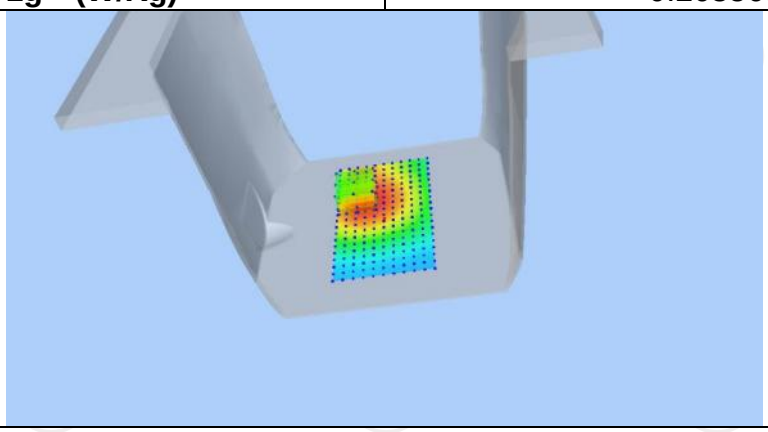
MEASUREMENT 2	
Middle Band SAR (Channel 133322):	Date: 10/08/2024
Frequency (MHz)	683.000000
Relative permittivity (real part)	42.170259
Relative permittivity (imaginary part)	22.556000
Conductivity (S/m)	0.912329
Variation (%)	-2.880000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	LTE band 71(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-23.00, Y=-32 **SAR Peak: 0.44W/kg**	
SAR 10g (W/Kg)	0.157810
SAR 1g (W/Kg)	0.271087
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4358	0.2853	0.1667	0.1011	0.0667

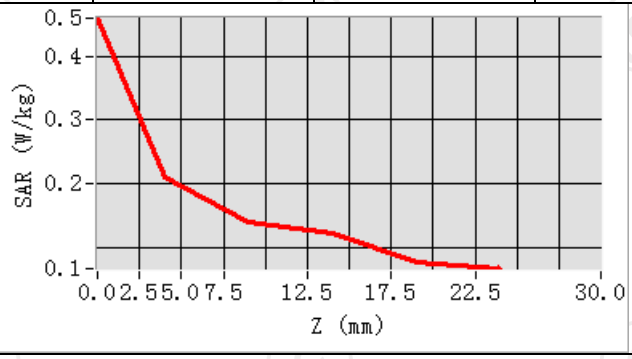


Hot spot position

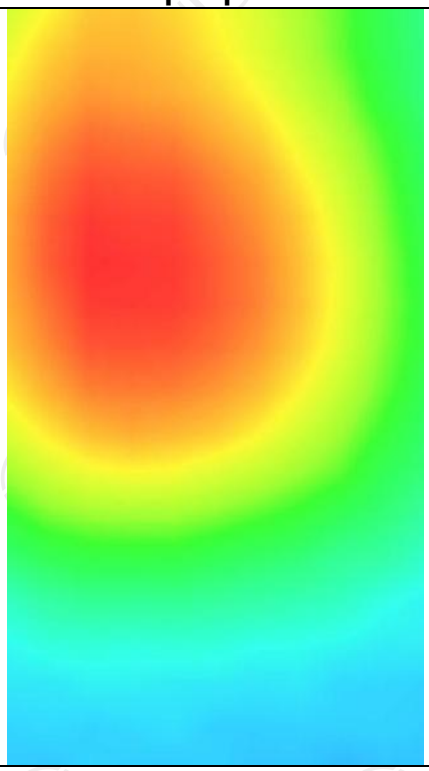


MEASUREMENT 3	
Middle Band SAR (Channel 133322):	Date: 10/08/2024
Frequency (MHz)	683.000000
Relative permittivity (real part)	42.170259
Relative permittivity (imaginary part)	22.556000
Conductivity (S/m)	0.912329
Variation (%)	-4.140000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back((hotspot10mm)
Band	LTE band 71(1 RB#0)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-22.00, Y=24.00 **SAR Peak: 0.26 W/kg**	
SAR 10g (W/Kg)	0.149654
SAR 1g (W/Kg)	0.203569
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4591	0.2103	0.1397	0.1235	0.0772



Hot spot position



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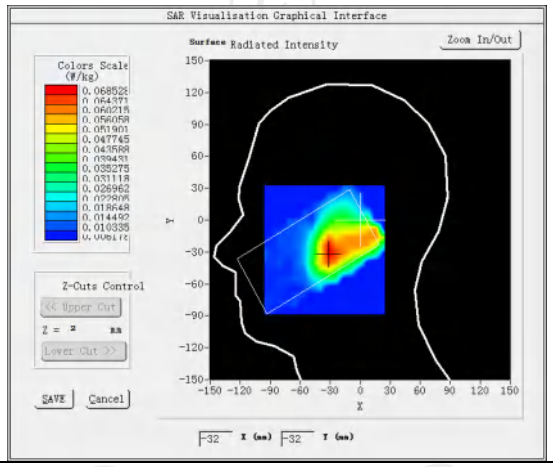
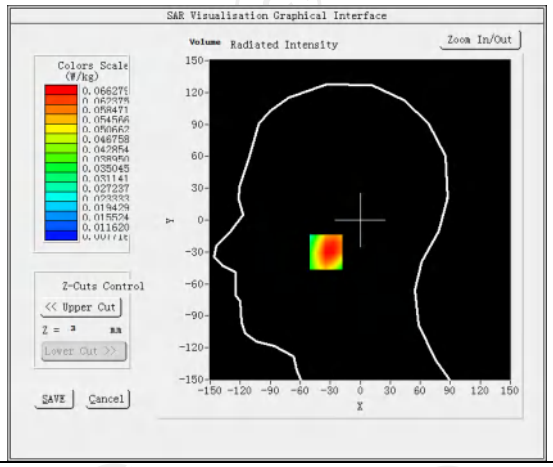
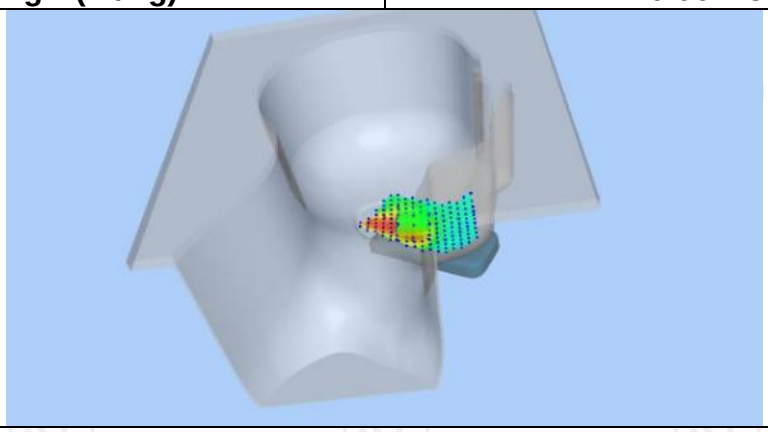
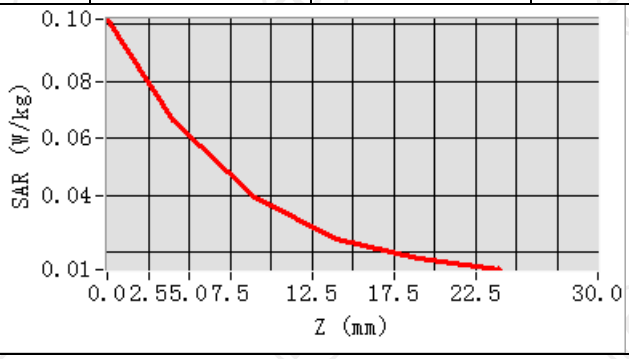
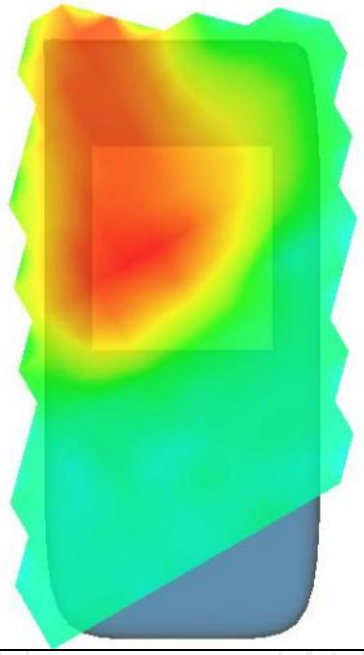
WLAN 2.4G

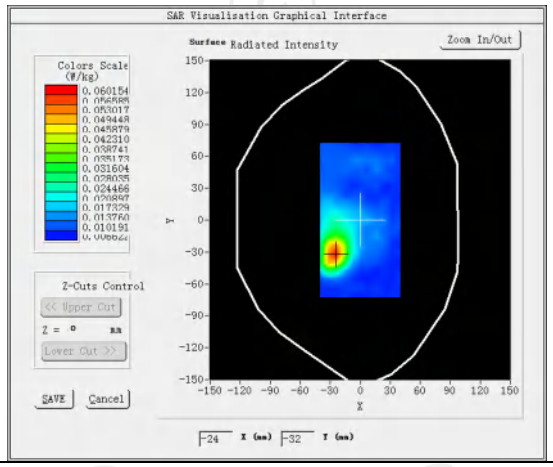
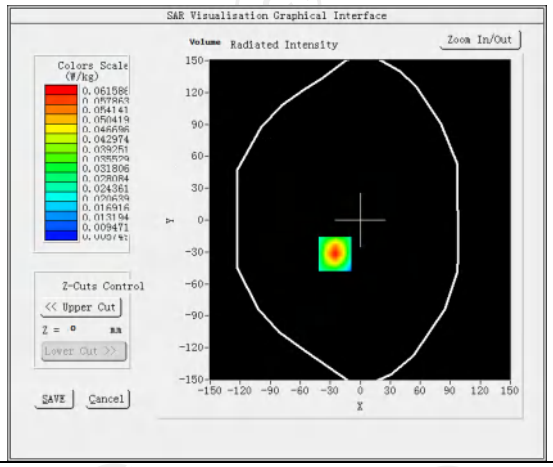
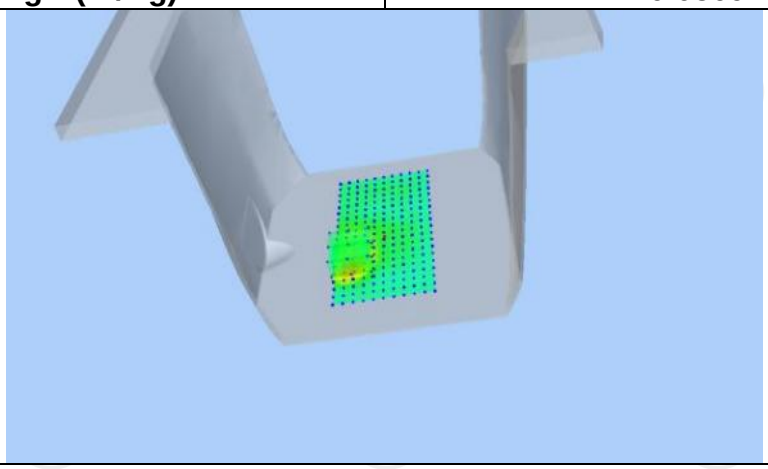
MEASUREMENT 1	
High Band SAR (Channel 11):	Date: 10/30/2024
Frequency (MHz)	2462.000000
Relative permittivity (real part)	38.182320
Relative permittivity (imaginary part)	13.188560
Conductivity (S/m)	1.863200
Variation (%)	-1.210000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	IEEE 802.11b ISM
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-30.00, Y=-30.00 SAR Peak: 0.10 W/kg	
SAR 10g (W/Kg)	0.039504
SAR 1g (W/Kg)	0.064485
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1019	0.0663	0.0389	0.0245	0.0176

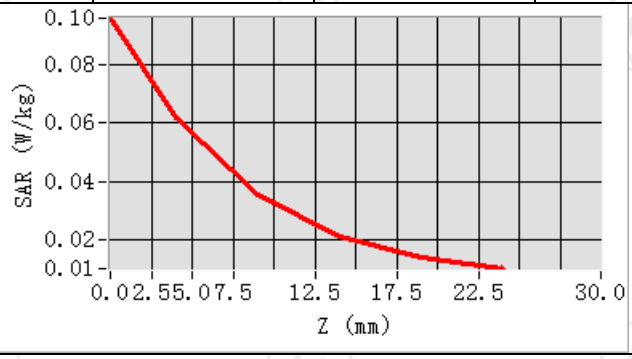


Hot spot position

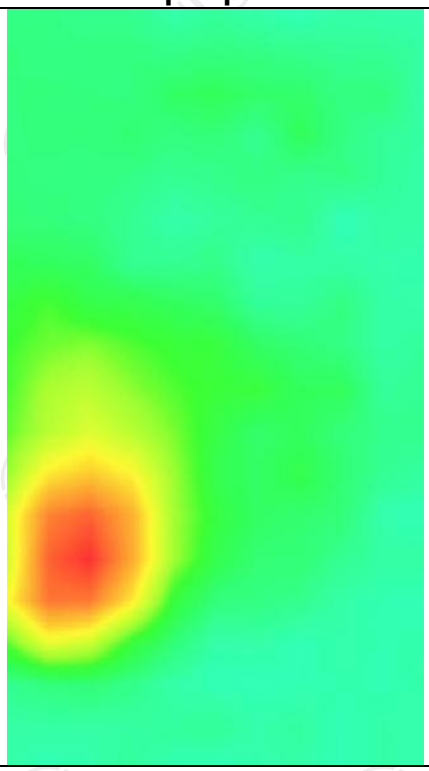


MEASUREMENT 2	
High Band SAR (Channel 11):	Date: 10/30/2024
Frequency (MHz)	2462.000000
Relative permittivity (real part)	38.182320
Relative permittivity (imaginary part)	13.188560
Conductivity (S/m)	1.863200
Variation (%)	-1.970000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	IEEE 802.11n ISM
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-25.00, Y=-32.00 SAR Peak: 0.10 W/kg	
SAR 10g (W/Kg)	0.031076
SAR 1g (W/Kg)	0.056975
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0956	0.0616	0.0353	0.0214	0.0144



Hot spot position



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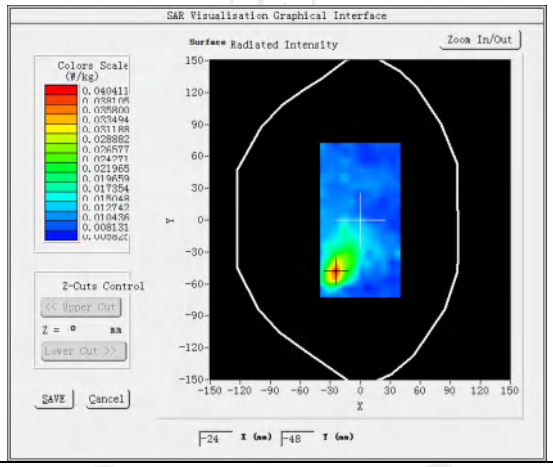
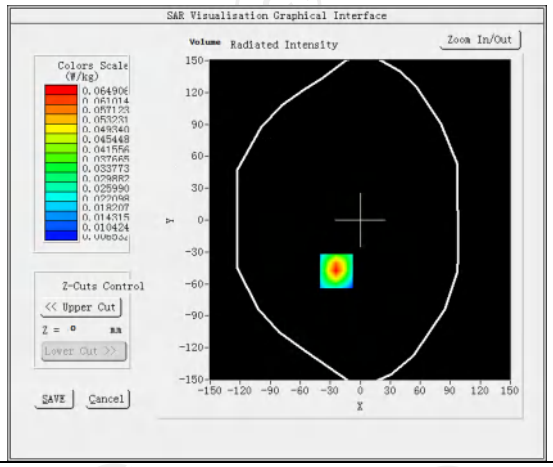
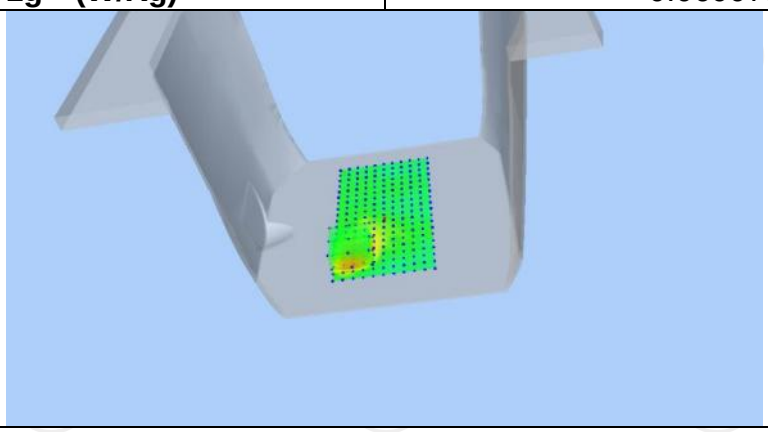
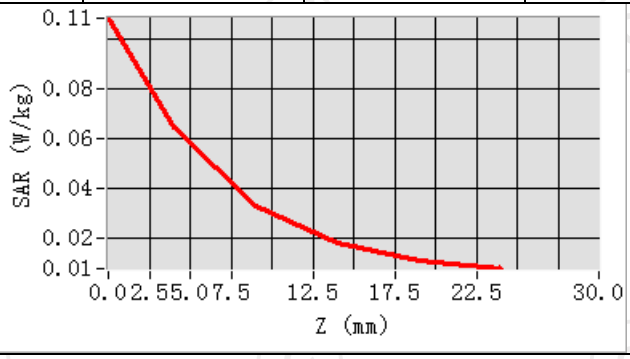
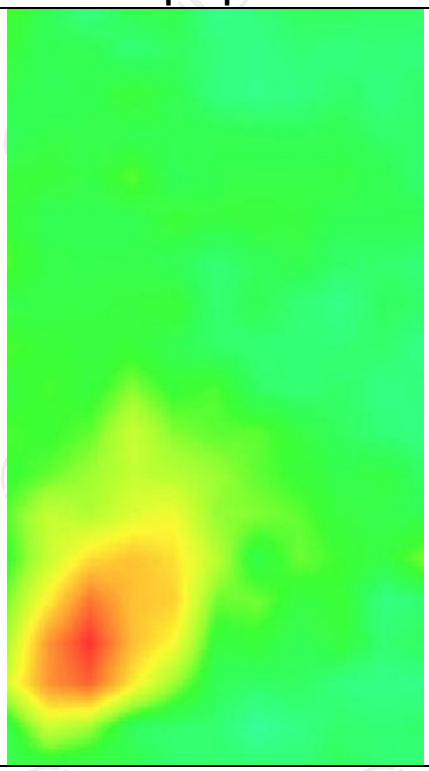
MEASUREMENT 3	
High Band SAR (Channel 11):	Date: 10/30/2024
Frequency (MHz)	2462.000000
Relative permittivity (real part)	38.182320
Relative permittivity (imaginary part)	13.188560
Conductivity (S/m)	1.863200
Variation (%)	-2.540000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	IEEE 802.11b ISM(hotspot)
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-24.00, Y=-48.00 **SAR Peak: 0.11 W/kg**	
SAR 10g (W/Kg)	0.030555
SAR 1g (W/Kg)	0.060075
	

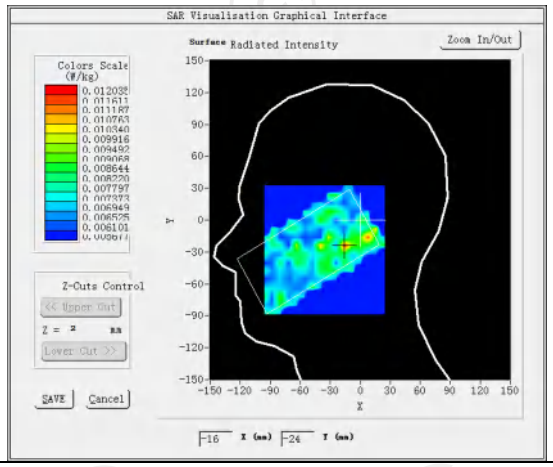
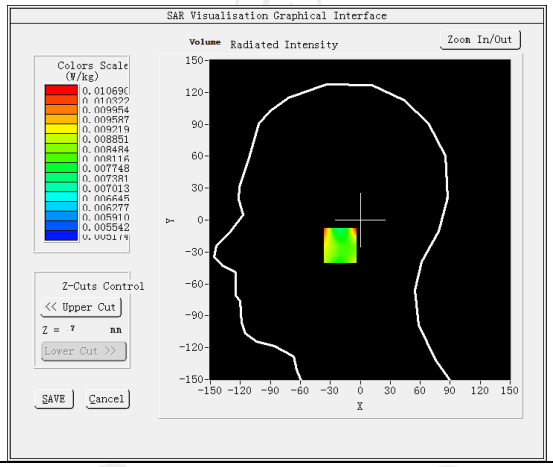
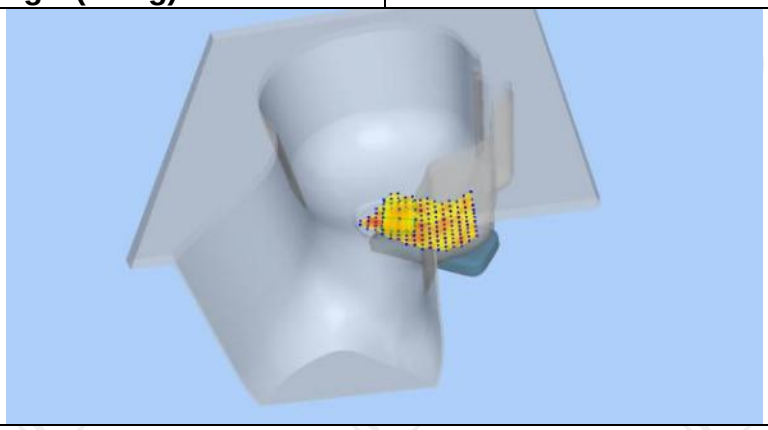
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1086	0.0649	0.0333	0.0180	0.0113



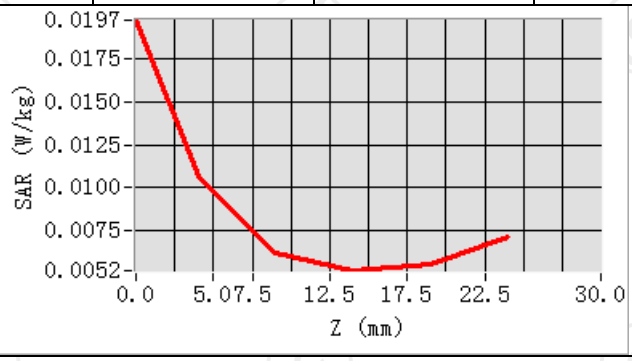
Hot spot position



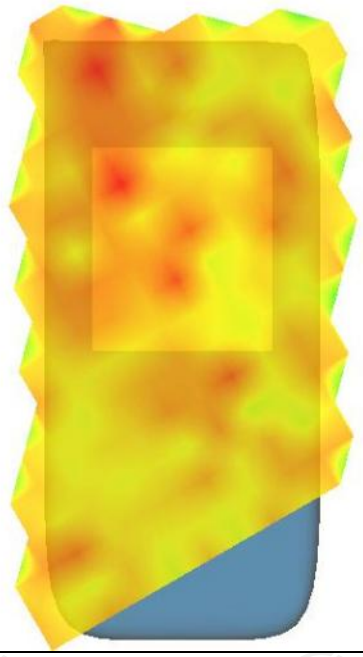
Bluetooth

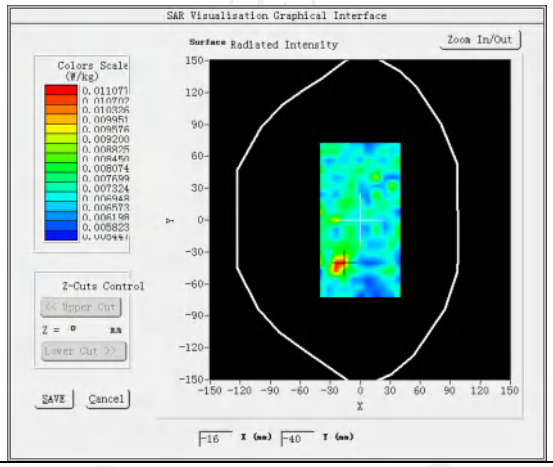
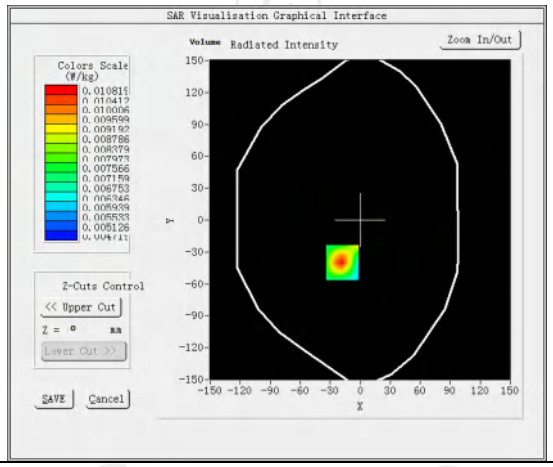
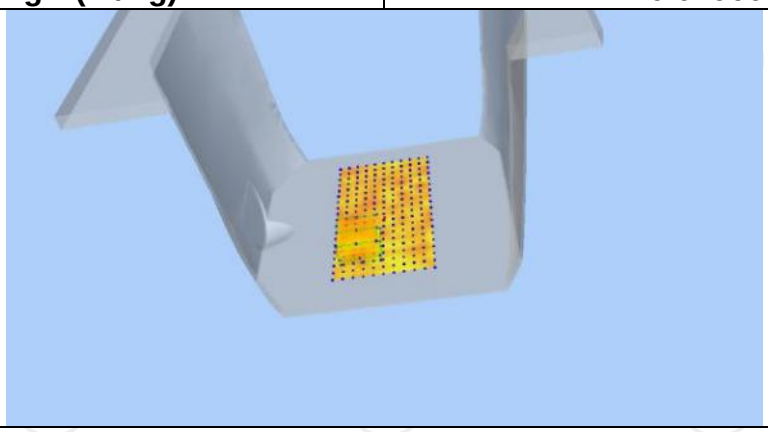
MEASUREMENT 1	
Low Band SAR (Channel 0):	Date: 10/30/2024
Frequency (MHz)	2402.000000
Relative permittivity (real part)	38.259913
Relative permittivity (imaginary part)	13.284109
Conductivity (S/m)	1.817004
Variation (%)	-1.490000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	Bluetooth
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-15.00, Y=-24.00 **SAR Peak: 0.02 W/kg**	
SAR 10g (W/Kg)	0.008329
SAR 1g (W/Kg)	0.009734
	

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0197	0.0107	0.0062	0.0052	0.0055

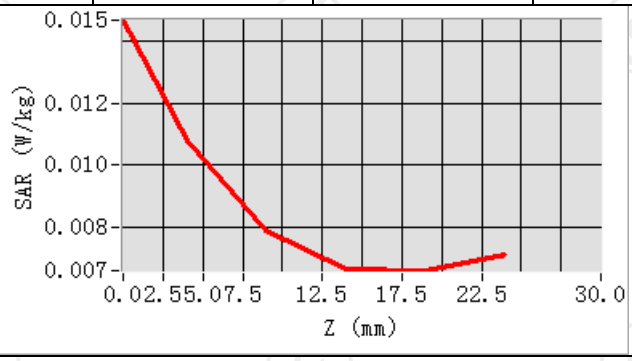


Hot spot position

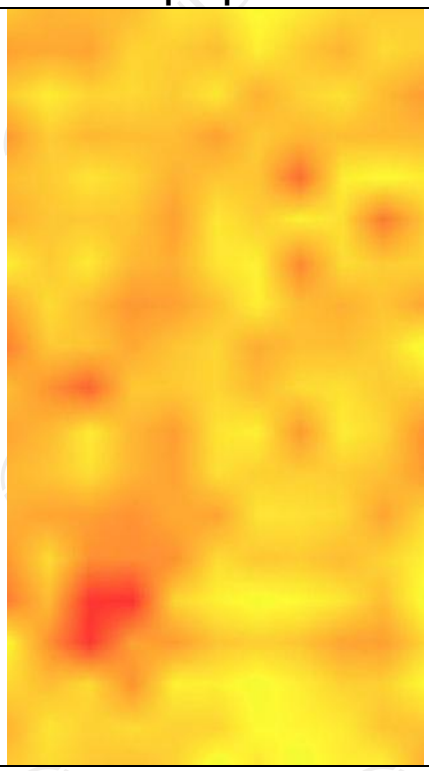


MEASUREMENT 2	
Low Band SAR (Channel 0):	Date: 10/30/2024
Frequency (MHz)	2402.000000
Relative permittivity (real part)	38.259913
Relative permittivity (imaginary part)	13.284109
Conductivity (S/m)	1.817004
Variation (%)	-0.300000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body back(10mm)
Band	Bluetooth
SURFACE SAR	**VOLUME SAR**
	
Maximum location: X=-18.00, Y=-40.00 SAR Peak: 0.01 W/kg	
SAR 10g (W/Kg)	0.008644
SAR 1g (W/Kg)	0.010608
	

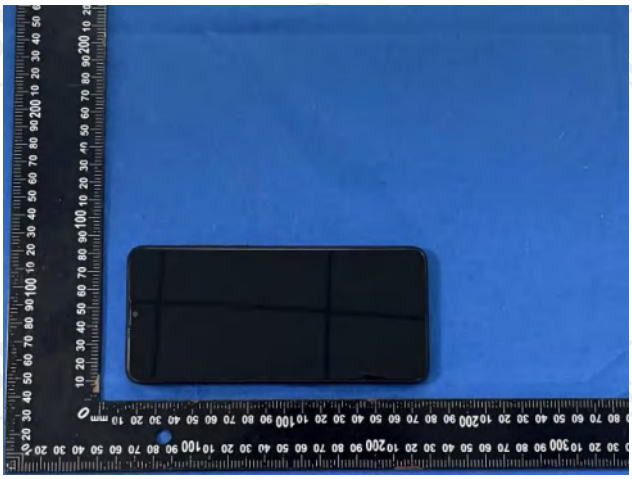
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0147	0.0108	0.0079	0.0067	0.0066



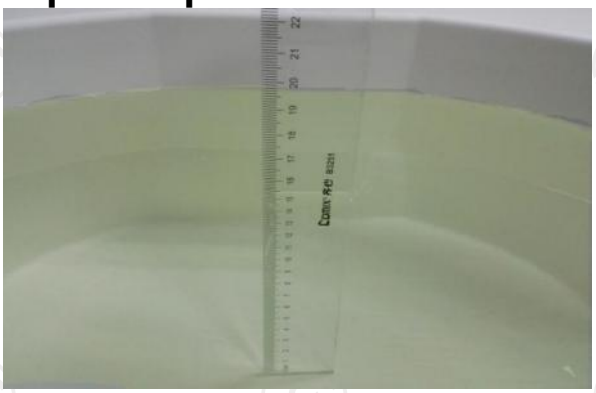
Hot spot position



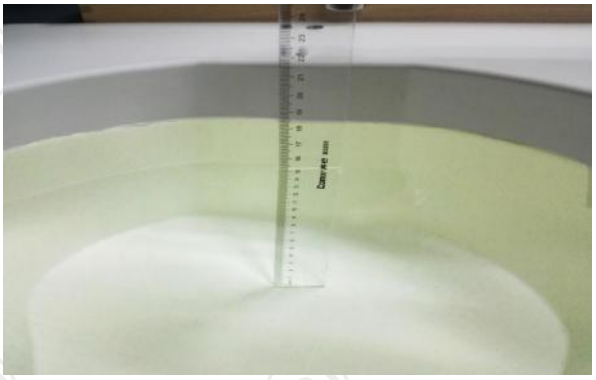
Appendix A: EUT Photos



Liquid depth

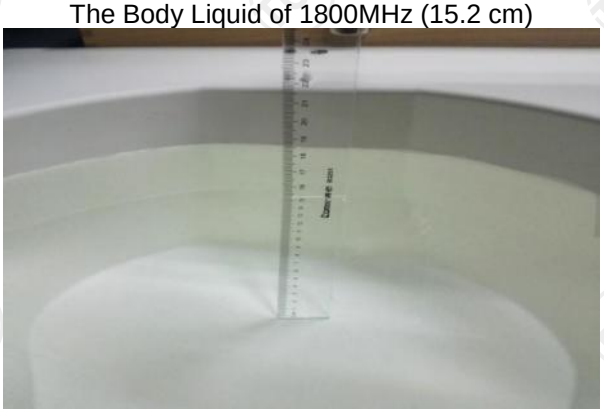


The Body Liquid of 835MHz (15.4cm)

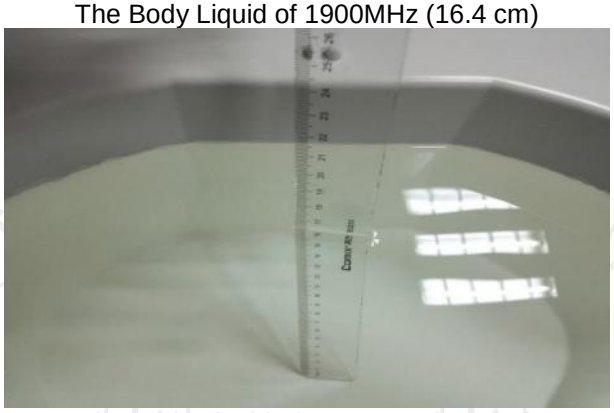


The Body Liquid of 1800MHz (15.2 cm)

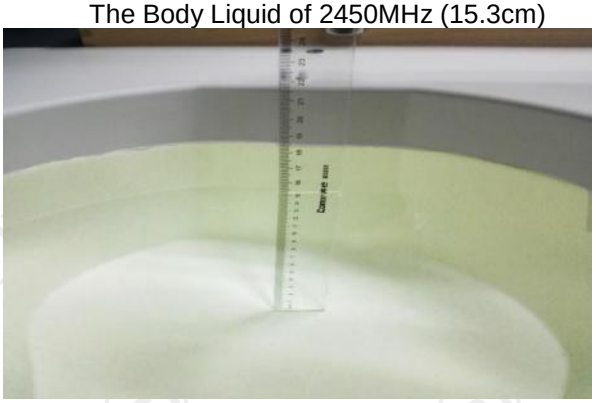
The Body Liquid of 1900MHz (16.4 cm)



The Body Liquid of 2450MHz (15.3cm)



The Body Liquid of 2600MHz (16.5cm)



The Body Liquid of 750MHz (15.2 cm)

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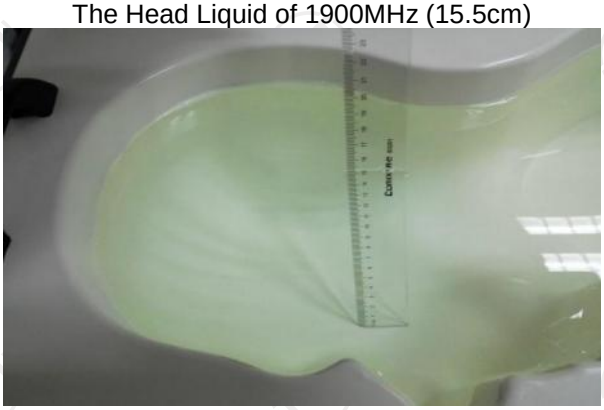
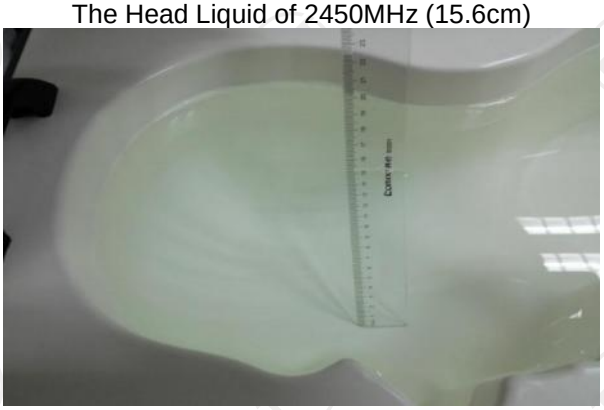
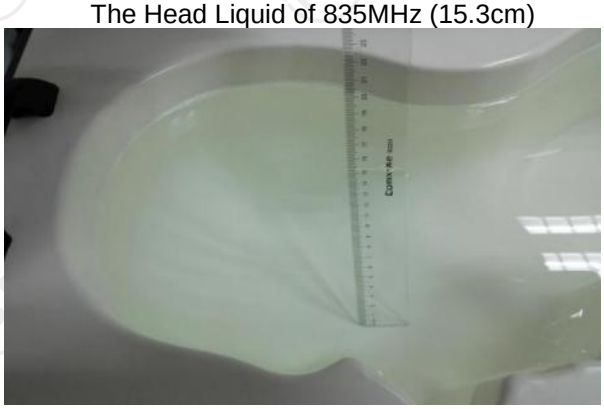
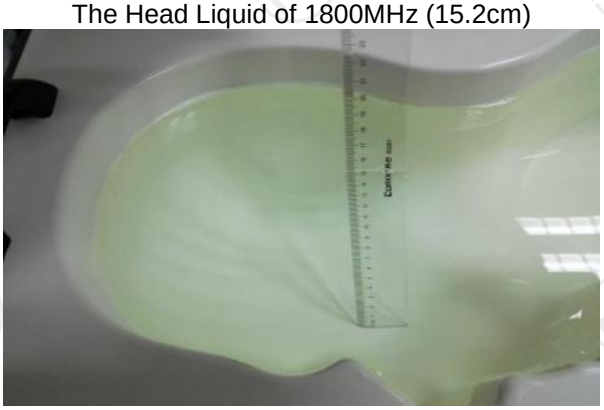
The Head Liquid of 1900MHz (15.5cm)

The Head Liquid of 2450MHz (15.6cm)


The Head Liquid of 835MHz (15.3cm)


The Head Liquid of 1800MHz (15.2cm)


The Head Liquid of 2600MHz (15.1cm)


The Head Liquid of 750MHz (15.3cm)

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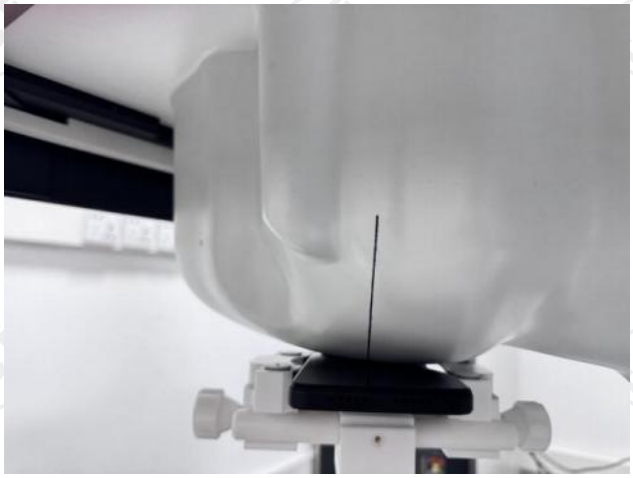
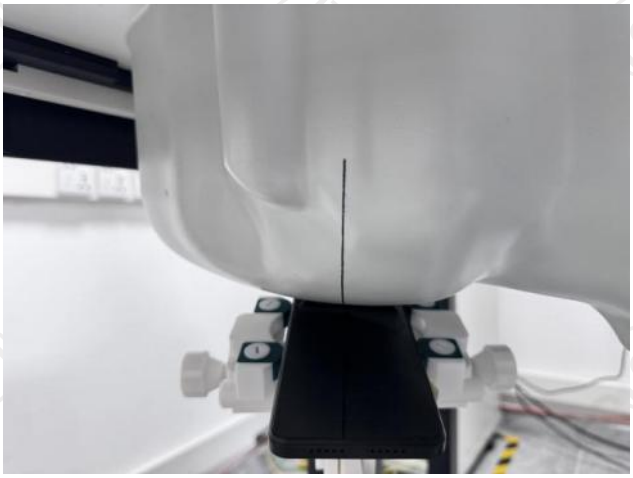
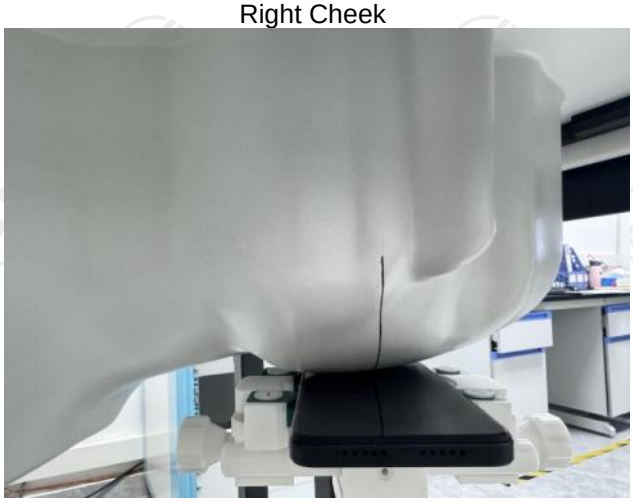
Appendix B: Test Setup Photos



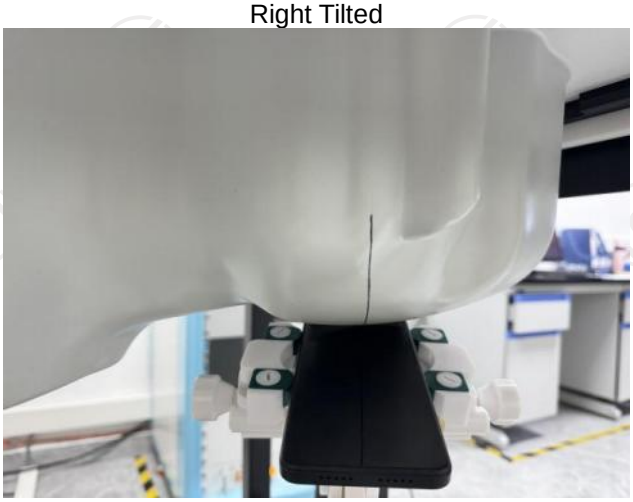
Right Cheek



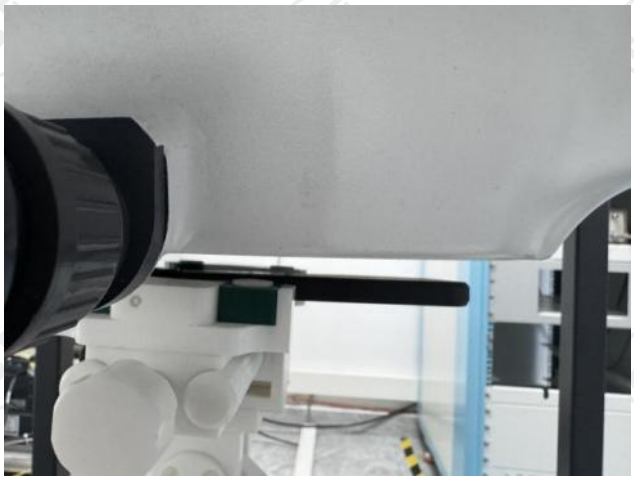
Right Tilted



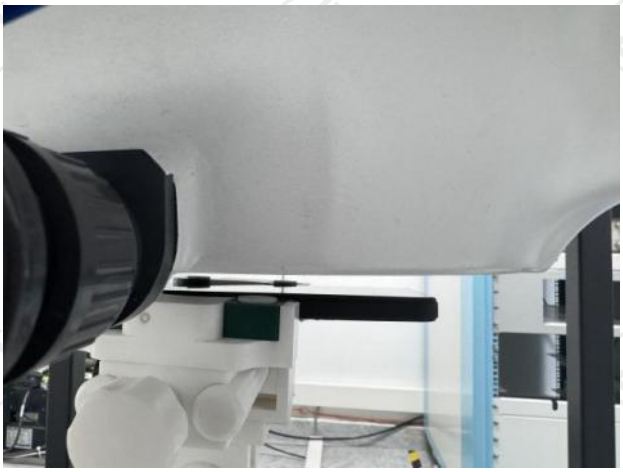
Left Cheek



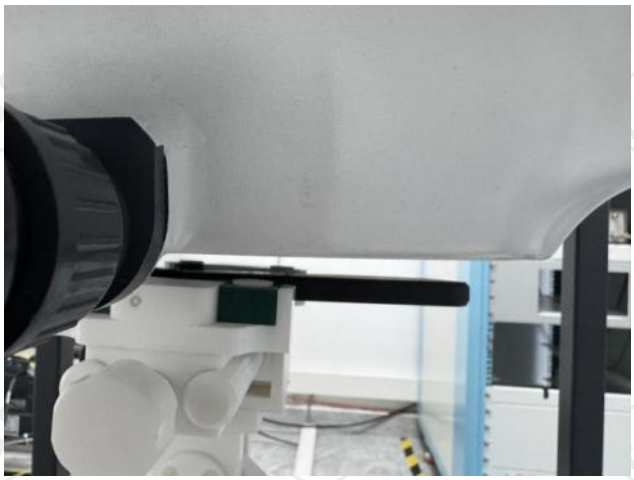
Left Tilted

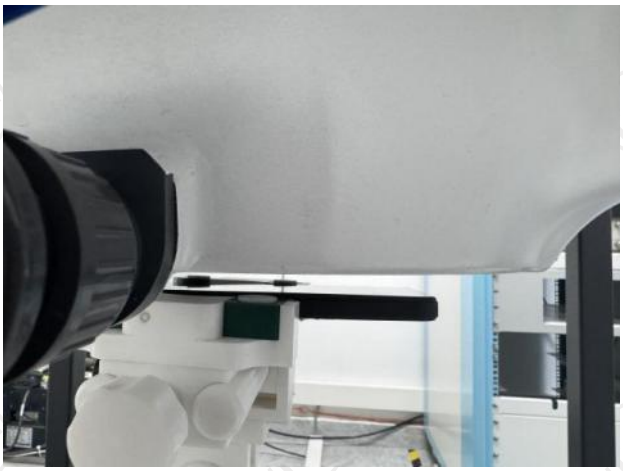


Body worn – Front (10mm)



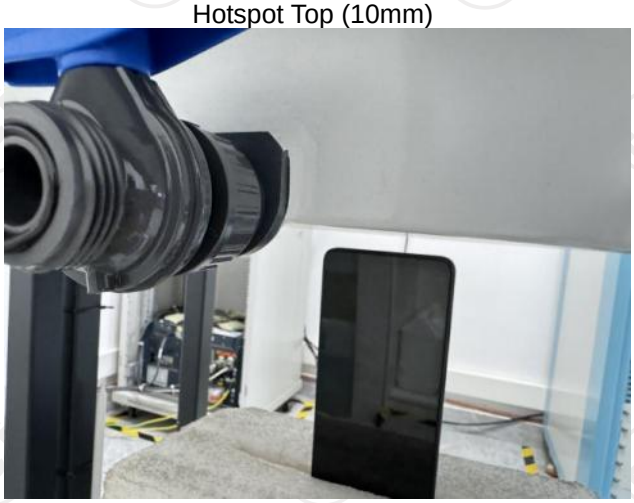
Body worn – Back (10mm)

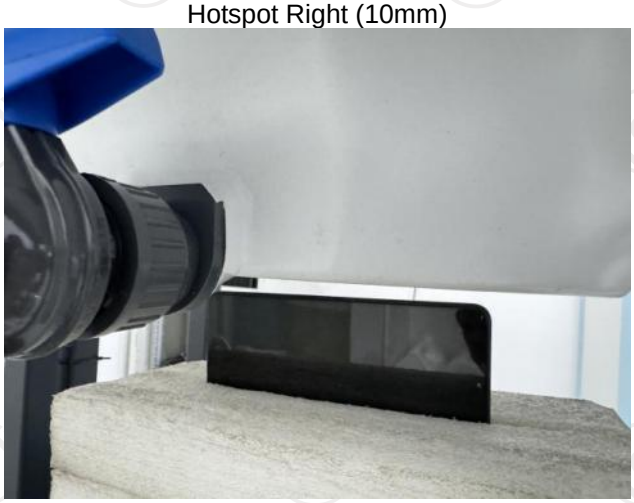

Hotspo Front (10mm)


Hotspo Back (10mm)

Hotspot Top (10mm)

Hotspot Right (10mm)


Hotspot Bottom (10mm)


Hotspot Left (10mm)

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Appendix C: Probe Calibration Certificate

COMOSAR E-FIELD Probe

COMOSAR E-Field Probe Calibration Report

Ref : ACR.180.7.22.BES.B

SHENZHEN TONGCE TESTING LAB

2101 & 2201, ZHENCHANG FACTORY RENSHAN INDUSTRIAL ZONE, FUHAI SUBDISTRICT, BAO'AN DISTRICT SHENZHEN, GUANGDONG, 518103, PEOPLE'S REPUBLIC OF CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 25/22 EPGO375

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 06/29/2024

Accreditations #2-6789

Scope available on www.cofrac.fr

The use of the Cofrac brand and the accreditation references is prohibited from any reproduction.

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).

COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.180.7.22.BES.B

	Name	Function	Date	Signature
Prepared by :	Jérôme Le Gall	Measurement Responsible	6/30/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	6/30/2024	
Authorized by:	Yann Toutain	Laboratory Director	7/05/2024	Yann TOUTAIN

	Customer Name
Distribution :	Shenzhen Tongce Testing Lab

Issue	Name	Date	Modifications
A	Jérôme Le Gall	6/30/2024	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 EPGO375
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.197 MΩ Dipole 2: R2=0.230 MΩ Dipole 3: R3=0.208 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.

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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:

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

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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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)
0.64	0.53	0.44

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
106	108	109

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

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

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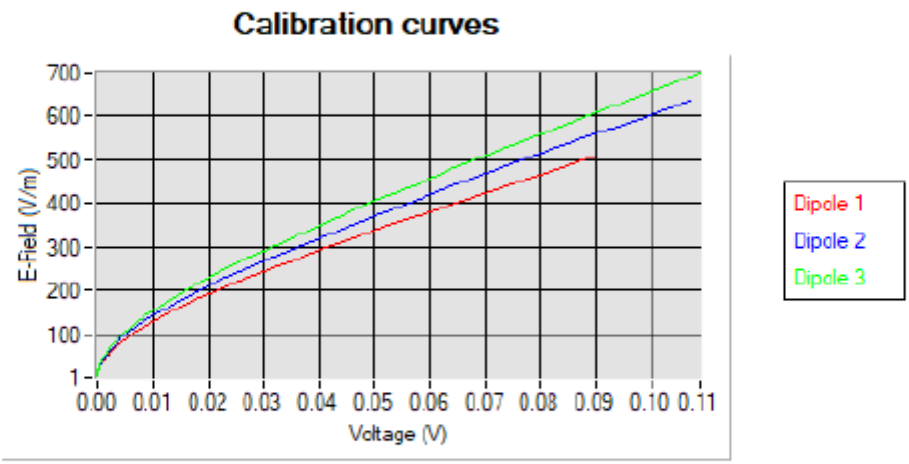
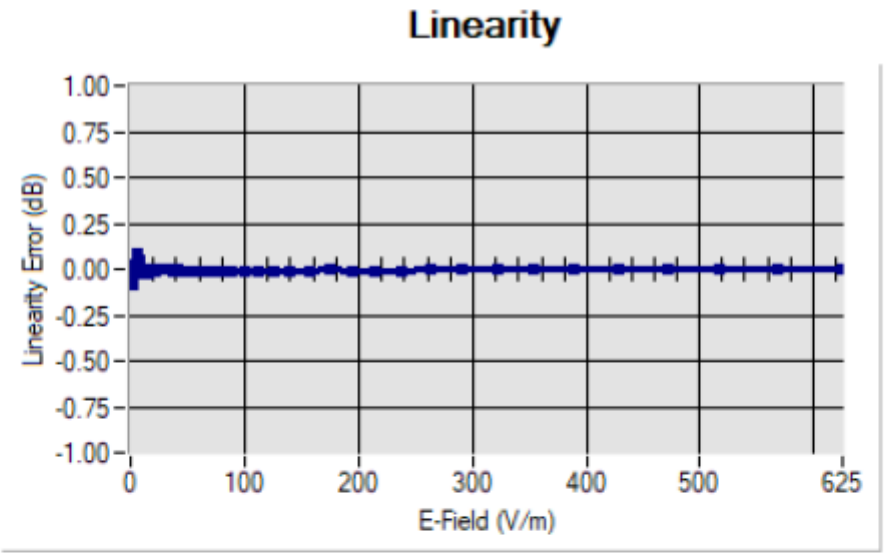


5.2 LINEARITY



Linearity:+/-1.94% (+/-0.09dB)

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5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	ConvF
HL750	750	1.71
BL750	750	1.78
HL900	900	1.91
BL900	900	1.96
HL1800	1800	2.08
BL1800	1800	2.16
HL2000	2000	2.03
BL2000	2000	2.10
HL2450	2450	2.31
BL2450	2450	2.37
HL2600	2600	2.16
BL2600	2600	2.23
HL3500	3500	2.21
BL3500	3500	2.28
HL3700	3700	3.45
BL3700	3700	3.15
HL4600	4600	3.30
BL4600	4600	3.70
HL5200	5200	2.01
BL5200	5200	2.08
HL5600	5600	2.07
BL5600	5600	2.12
HL5800	5800	2.06
BL5800	5800	2.13

LOWER DETECTION LIMIT: 7mW/kg

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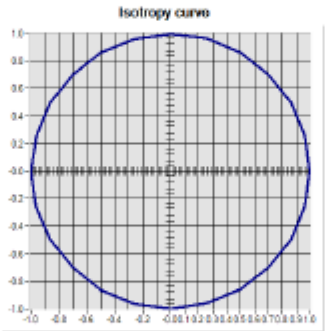
5.4 ISOTROPY

HL1800 MHz



Isotropy:+/-0.41% (+/-0.02dB)

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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	08/2024	08/2027
Network Analyzer	Agilent 8753ES	MY40003210	10/2023	10/2026
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Multimeter	Keithley 2000	1160271	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	06/2024	06/2027
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2023	11/2026
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.

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

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.180.7.22.BES.B

Liquid transition	MVG	SN 32/16 WGLIQ_5G000_1	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2024	06/2027

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

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Dielectric Probe Calibration Report

Ref : ACR.138.4.33.SATU.A

SHENZHEN TONGCE TESTING LAB
2101&2201, ZHENCHANG FACTORY, RENSHAN INDUSTRIAL ZONE, FUHAI SUBDISTRICT, BAOAN DISTRICT, SHENZHEN, GUANGDONG, 518103, PEOPLES REPUBLIC OF CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

FREQUENCY: 0.3-6 GHZ
SERIAL NO.: SN 19/15 OCPG 71

Calibrated at MVG US
2105 Barrett Park Dr. - Kennesaw, GA 30144

ilac-MRA ACCREDITED Calibration CERT #2246-02

Calibration Date: 06/05/2024

Summary:

This document presents the method and results from an accredited Dielectric Probe calibration performed in MVG USA using the LIMESAR test bench. All calibration results are traceable to national metrology institutions.

SAR DIELECTRIC PROBE CALIBRATION REPORT

Ref: ACR.138.4.33..SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	06/05/2024	
Checked by :	Jérôme LUC	Product Manager	06/05/2024	
Approved by :	Kim RUTKOWSKI	Quality Manager	06/05/2024	

	Customer Name
Distribution :	SHENZHEN TONGCE TESTING LAB

Issue	*Date*	*Modifications*
A	06/05/2024	Initial release

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1 INTRODUCTION

This document contains a summary of the suggested methods and requirements set forth by the IEEE 1528 and CEI/IEC 62209 standards for liquid permittivity measurements 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	LIMESAR DIELECTRIC PROBE
Manufacturer	MVG
Model	SCLMP
Serial Number	SN 19/15 OCPG 71
Product Condition (new / used)	Used

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's Dielectric Probes are built in accordance to the IEEE 1528 and CEI/IEC 62209 standards. The product is designed for use with the LIMESAR test bench only.

Figure 1 – *MVG LIMESAR Dielectric Probe*

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4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209-1 & 2 standards outline techniques for dielectric property measurements. The LIMESAR test bench employs one of the methods outlined in the standards, using a contact probe or open-ended coaxial transmission-line probe and vector network analyzer. The standards recommend the measurement of two reference materials that have well established and stable dielectric properties to validate the system, one for the calibration and one for checking the calibration. The LIMESAR test bench uses De-ionized water as the reference for the calibration and either DMS or Methanol as the reference for checking the calibration. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 LIQUID PERMITTIVITY MEASUREMENTS

The permittivity of a liquid with well established dielectric properties was measured and the measurement results compared to the values provided in the fore mentioned standards.

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 DIELECTRIC PERMITTIVITY MEASUREMENT

The following uncertainties apply to the Dielectric Permittivity measurement:

Uncertainty analysis of Permittivity Measurement					
ERROR SOURCES	**Uncertainty value (+/-%)**	**Probability Distribution**	**Divisor**	**ci**	**Standard Uncertainty (+/-%)**
Repeatability (n repeats, mid-band)	4.00%	N	1	1	4.000%
Deviation from reference liquid	5.00%	R	√3	1	2.887%
Network analyser-drift, linearity	2.00%	R	√3	1	1.155%
Test-port cable variations	0.00%	U	√2	1	0.000%
Combined standard uncertainty					5.066%
Expanded uncertainty (confidence level of 95%, k = 2)					10.0%

Uncertainty analysis of Conductivity Measurement					
ERROR SOURCES	**Uncertainty value (+/-%)**	**Probability Distribution**	**Divisor**	**ci**	**Standard Uncertainty (+/-%)**
Repeatability (n repeats, mid-band)	3.50%	N	1	1	3.500%
Deviation from reference liquid	3.00%	R	√3	1	1.732%
Network analyser-drift, linearity	2.00%	R	√3	1	1.155%
Test-port cable variations	0.00%	U	√2	1	0.000%
Combined standard uncertainty					4.072%
Expanded uncertainty (confidence level of 95%, k = 2)					8.1%

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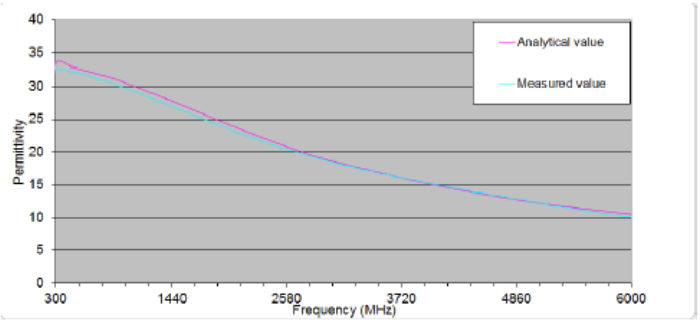
6 CALIBRATION MEASUREMENT RESULTS

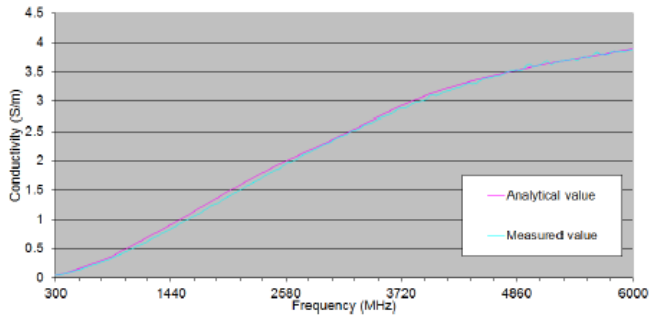
Measurement Condition

Software	LIMESAR
Liquid Temperature	21°C
Lab Temperature	21°C
Lab Humidity	44%

6.1 LIQUID PERMITTIVITY MEASUREMENT

A liquid of known characteristics (methanol at 20°C) is measured with the probe and the results (complex permittivity ε'+jε") are compared with the well-known theoretical values for this liquid.





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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
LIMESAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2024	02/2027
Methanol CAS 67-56-1	Alpha Aesar	Lot D13W011	Validated. No cal required.	Validated. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	09/2024	09/2025

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Appendix D: Dipole Calibration Report

SID 750

SAR Reference Dipole Calibration Report

Ref : ACR.156.3.15.SATU.A

SHENZHEN TONGCE TESTING LAB

2101&2201, ZHENCHANG FACTORY, RENSHAN INDUSTRIAL ZONE, FUHAI SUBDISTRICT, BAOAN DISTRICT, SHENZHEN, GUANGDONG, 518103, PEOPLES REPUBLIC OF CHINA

COMOSAR REFERENCE DIPOLE

FREQUENCY: 750 MHZ

SERIAL NO.: SN 16/15 DIP 0G750-368

Calibrated at MVG US

2105 Barrett Park Dr. - Kennesaw, GA 30144

Calibration Date: 06/05/2024

Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.156.3.15.SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	06/05/2024	
Checked by :	Jérôme LUC	Product Manager	06/05/2024	
Approved by :	Kim RUTKOWSKI	Quality Manager	06/05/2024	Kim Rutkowski

	Customer Name
Distribution :	SHENZHEN TONGCE TESTING LAB

Issue	*Date*	*Modifications*
A	06/05/2024	Initial release

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, FCC KDBs and CEI/IEC 62209 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 16/15 DIP 0G750-368
Product Condition (new / used)	Used

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, FCC KDBs and CEI/IEC 62209 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 IEEE 1528, FCC KDBs and CEI/IEC 62209 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 constucted as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions 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.

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	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %

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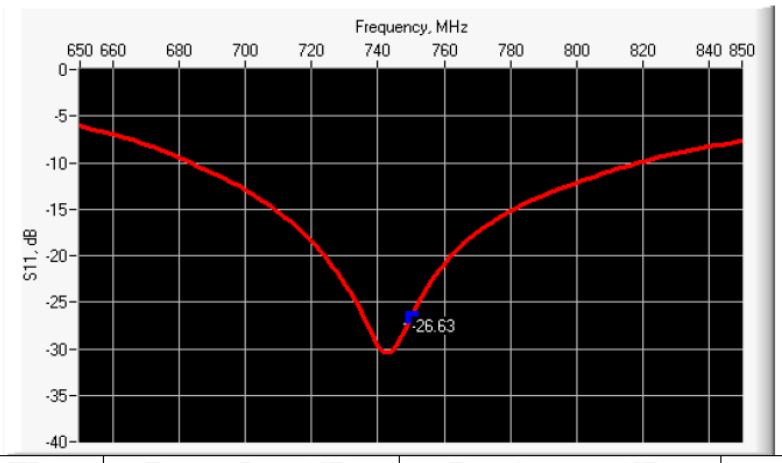
10 g	20.1 %

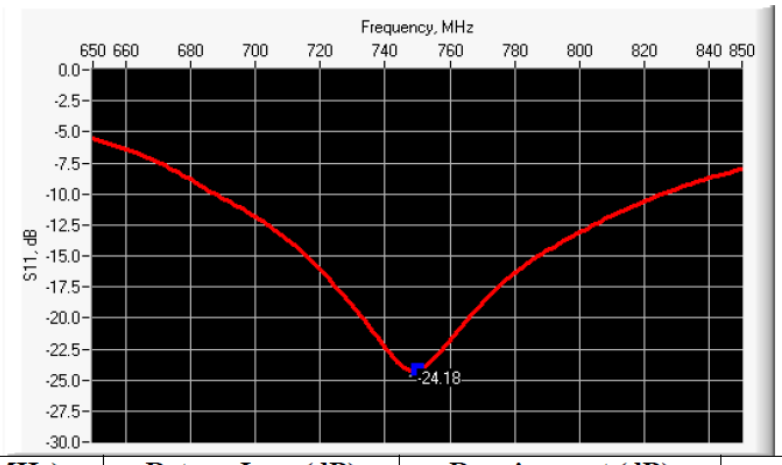
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-26.63	-20	54.1 Ω + 1.4 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-24.18	-20	52.4 Ω + 5.8 jΩ

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 %.	

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450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.	PASS	100.0 ±1 %.	PASS	6.35 ±1 %.	PASS
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	80.5 ±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 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

The IEEE Std. 1528, FCC KDBs and CEI/IEC 62209 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
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %	PASS	0.89 ±5 %	PASS
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	

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1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 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.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 41.8 sigma : 0.90
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	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

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	8.31 (0.73)	5.55	5.71 (0.54)
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	

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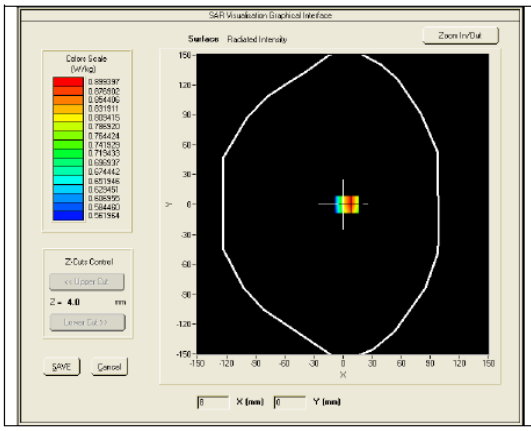
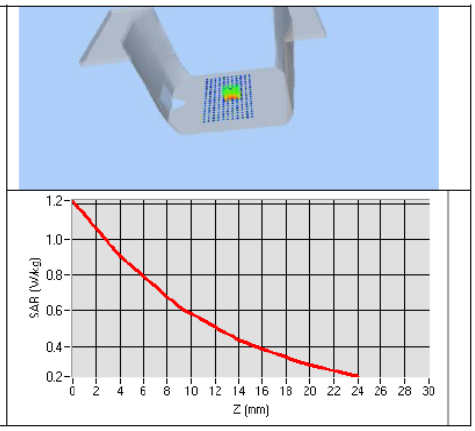
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	





7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %	PASS	0.96 ±5 %	PASS
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	

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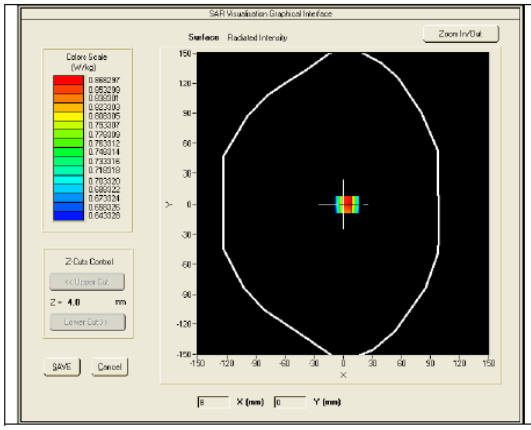
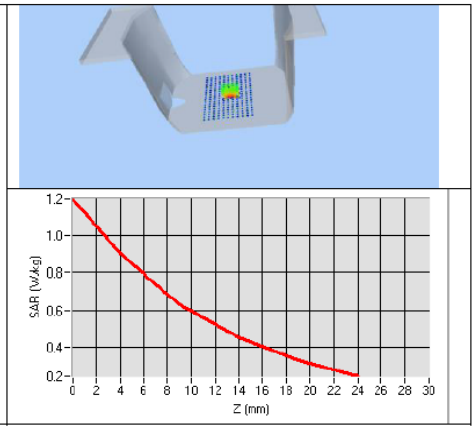
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 56.3 sigma : 0.98
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	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
750	8.46 (0.77)	5.81 (0.45)





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