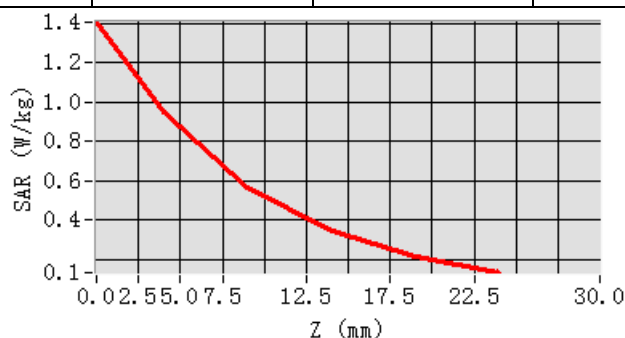
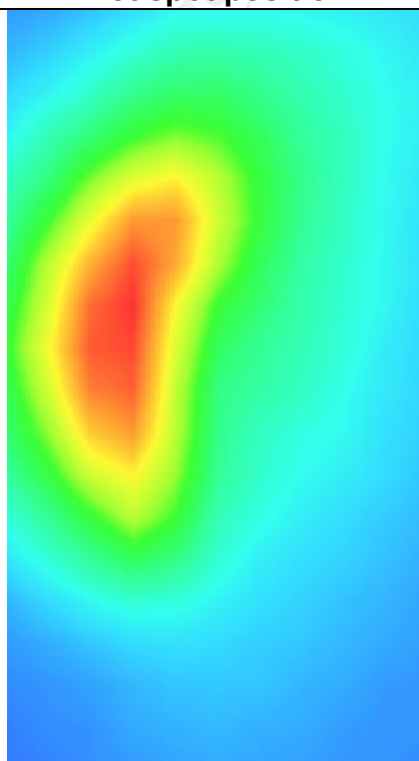


Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.4075	0.9477	0.5692	0.3451	0.2163

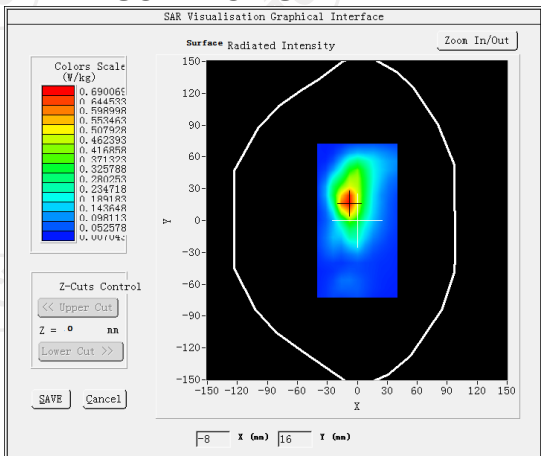
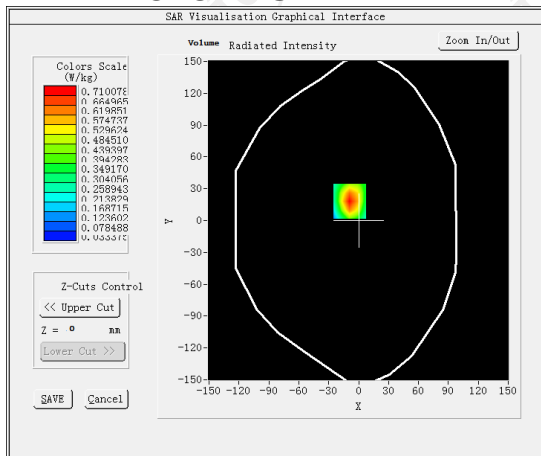


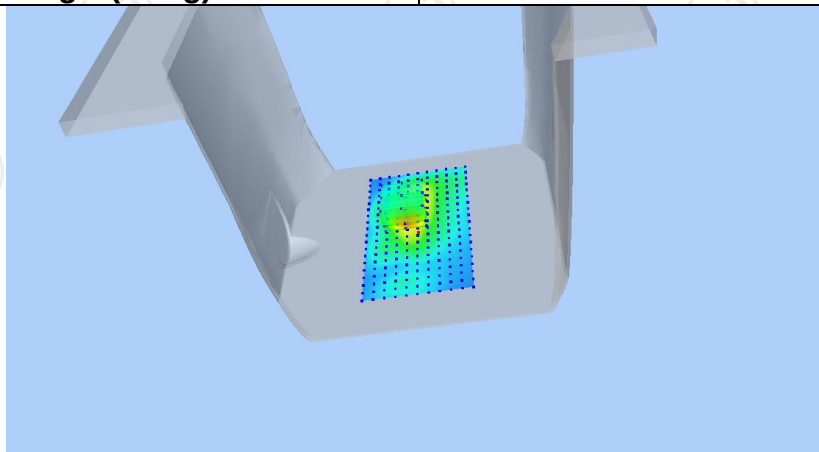
Hot spot position



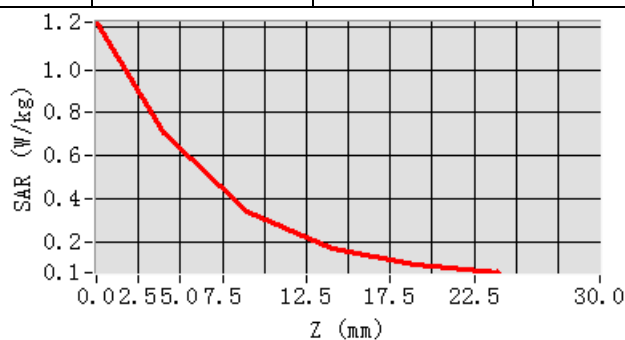
GSM1900

MEASUREMENT 1

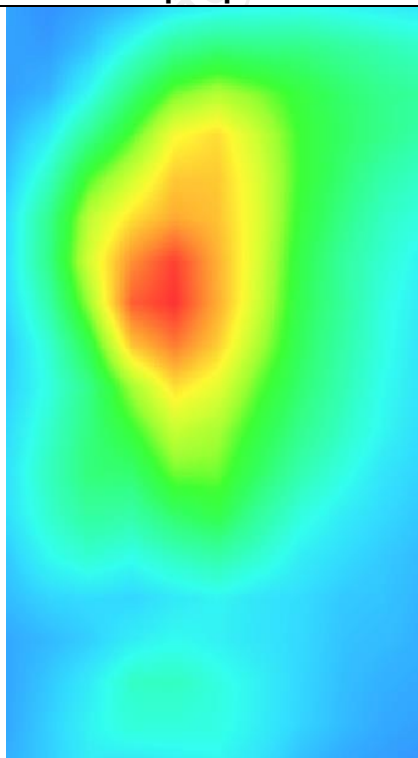
Middle Band SAR (Channel 661):		Date: 12/19/2023
Frequency (MHz)	1880.000000	
Relative permittivity (real part)	40.000000	
Relative permittivity (imaginary part)	13.408000	
Conductivity (S/m)	1.400391	
Variation (%)	3.510000	
Crest Factor	1.0	
Probe Conversion factor	2.32	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	GSM1900(voice)	
SURFACE SAR 		VOLUME SAR 
Maximum location: X=-9.00, Y=18.00 SAR Peak: 1.22 W/kg		
SAR 10g (W/Kg)	0.334060	
SAR 1g (W/Kg)	0.625682	



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.2196	0.7101	0.3463	0.1730	0.0983



Hot spot position



MEASUREMENT 2

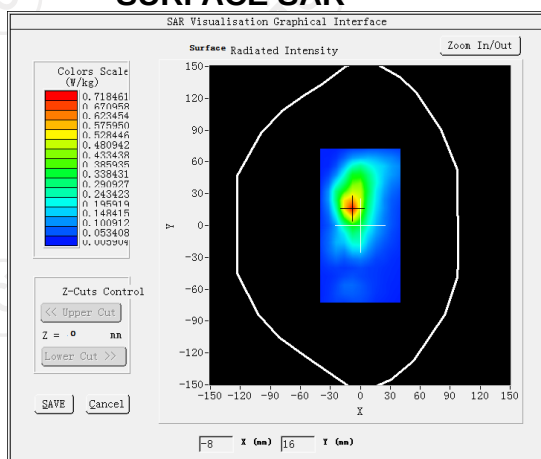
Middle Band SAR (Channel 661):

Date: 12/19/2023

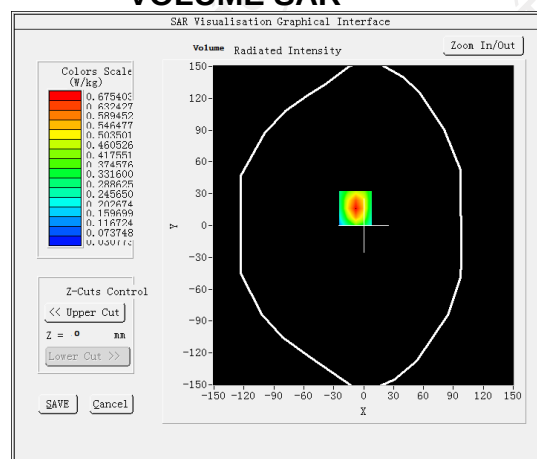
Frequency (MHz)	1880.000000
Relative permittivity (real part)	40.000000
Relative permittivity (imaginary part)	13.408000
Conductivity (S/m)	1.400391
Variation (%)	4.250000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	GSM1900(GPRS 2slot)

SURFACE SAR

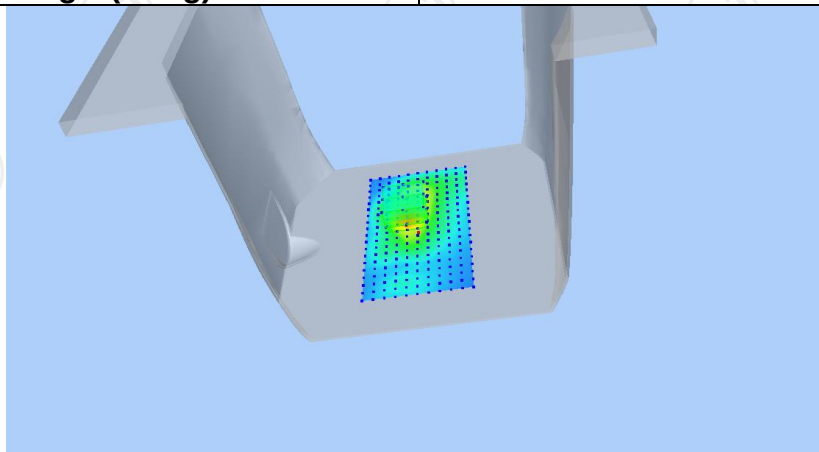


VOLUME SAR

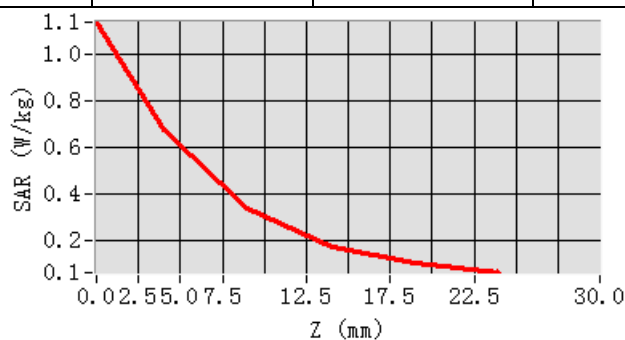


Maximum location: X=-8.00, Y=16.00 SAR Peak:1.14 W/kg

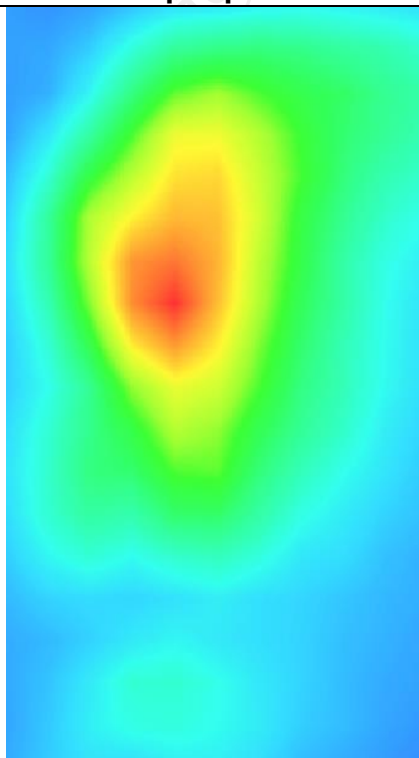
SAR 10g (W/Kg)	0.319427
SAR 1g (W/Kg)	0.579468



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1359	0.6754	0.3401	0.1753	0.1010



Hot spot position



MEASUREMENT 3

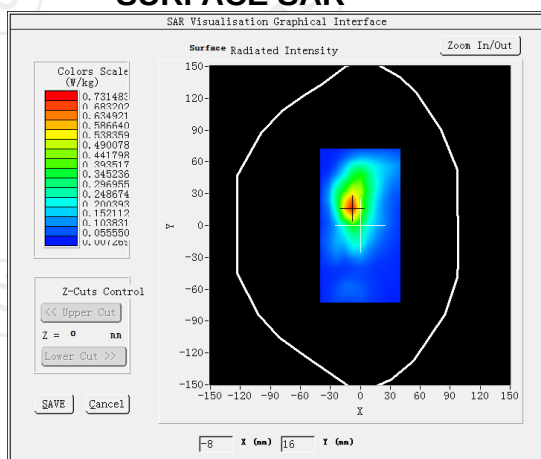
Middle Band SAR (Channel 661):

Date: 12/19/2023

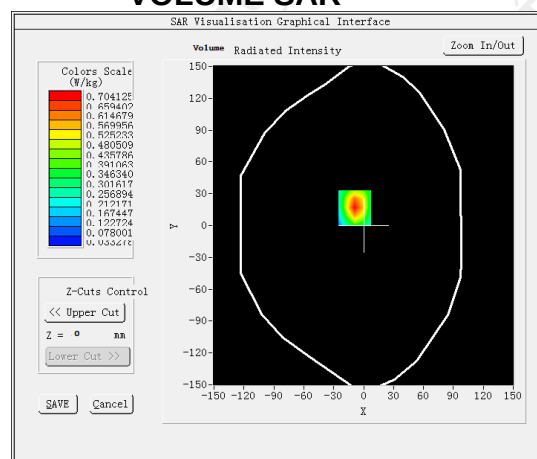
Frequency (MHz)	1880.000000
Relative permittivity (real part)	40.000000
Relative permittivity (imaginary part)	13.408000
Conductivity (S/m)	1.400391
Variation (%)	-1.660000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	GSM1900(GPRS 2slot hotspot)

SURFACE SAR

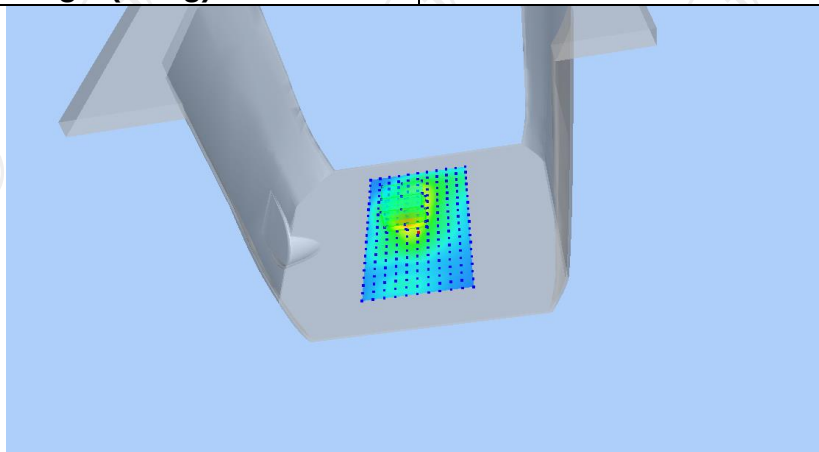


VOLUME SAR

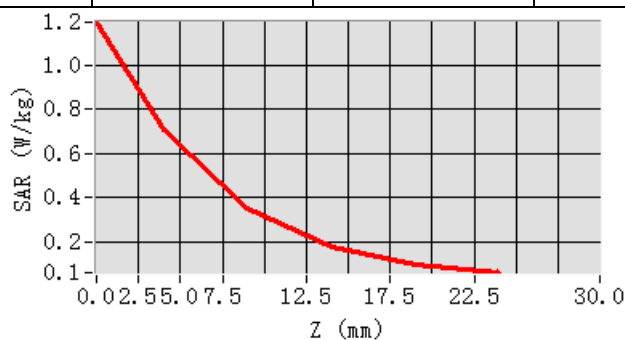


Maximum location: X=-9.00, Y=-17.00 SAR Peak: 1.20W/kg

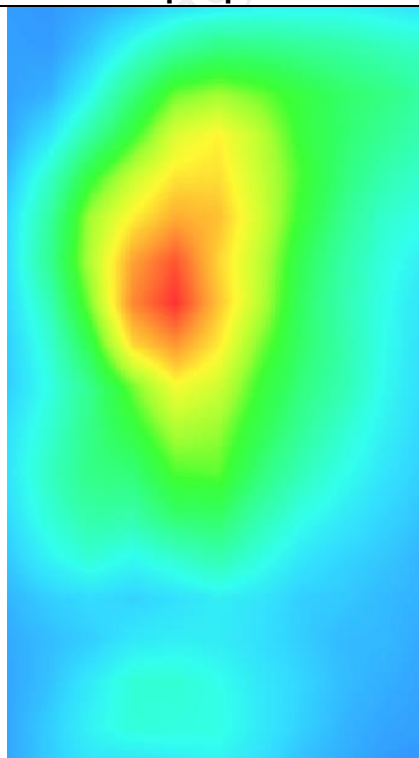
SAR 10g (W/Kg)	0.323140
SAR 1g (W/Kg)	0.636434



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1923	0.7041	0.3509	0.1790	0.1026



Hot spot position



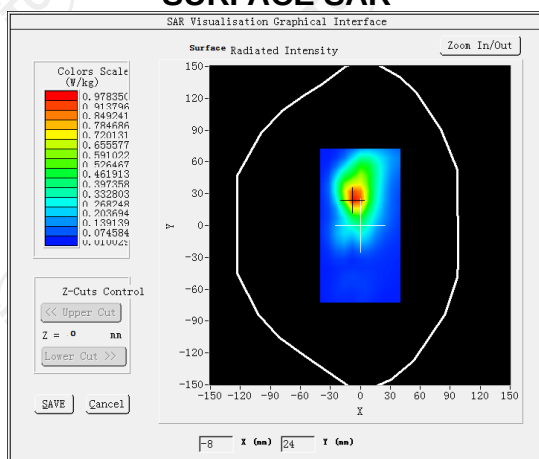
WCDMA Band II MEASUREMENT 1

Middle Band SAR (Channel 9400): Date: 12/19/2023

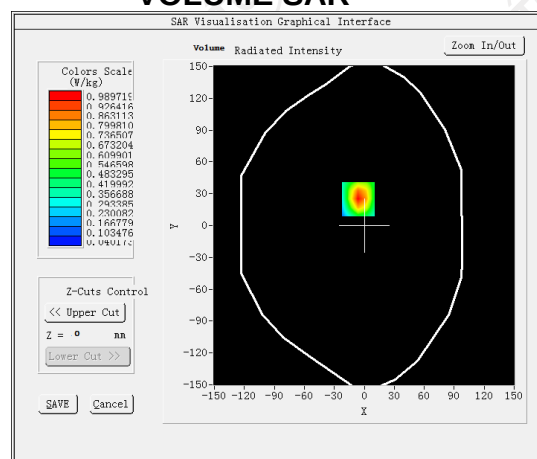
Frequency (MHz)	1880.000000
Relative permittivity (real part)	40.000000
Relative permittivity (imaginary part)	13.408000
Conductivity (S/m)	1.400391
Variation (%)	2.570000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7,dx=8mm dy=8mm</u> <u>dz=5mm,Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	BAND2 WCDMA1900

SURFACE SAR

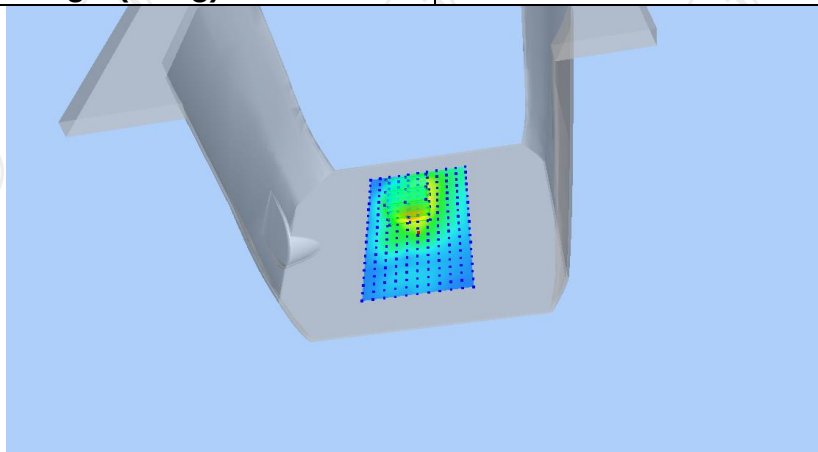


VOLUME SAR

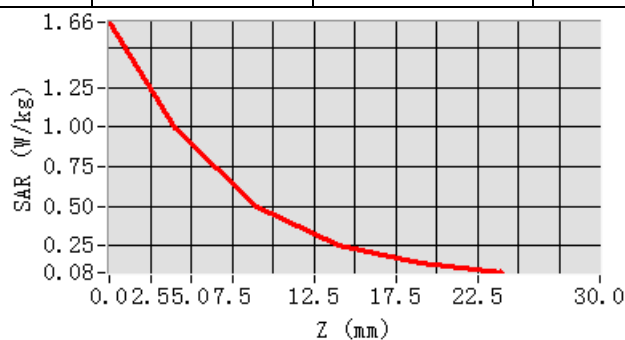


Maximum location: X=-6.00, Y=25.00 SAR Peak:1.68 W/kg

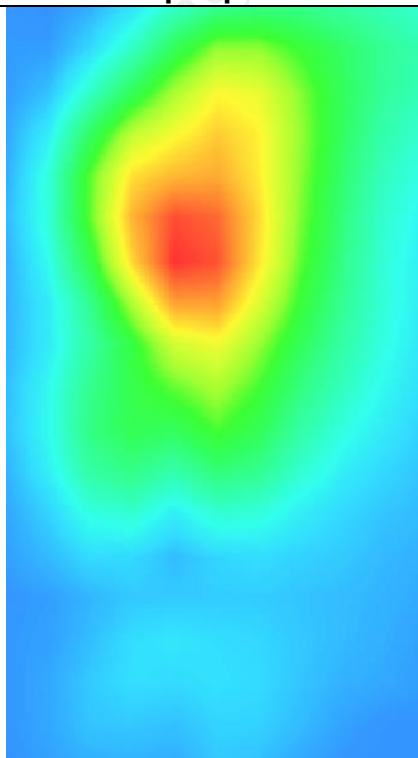
SAR 10g (W/Kg)	0.370217
SAR 1g (W/Kg)	0.708361



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.6650	0.9897	0.4958	0.2507	0.1386



Hot spot position



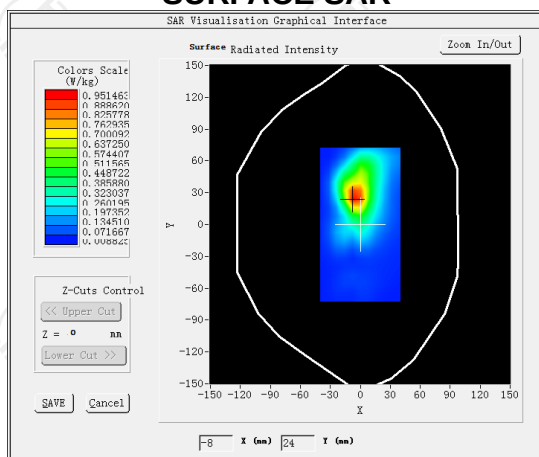
MEASUREMENT 2

Middle Band SAR (Channel 9400):

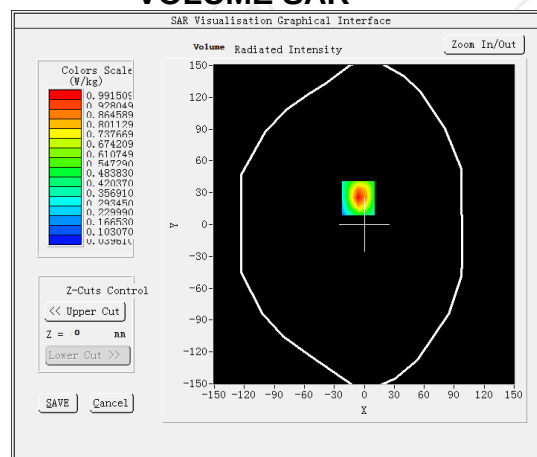
Date: 12/19/2023

Frequency (MHz)	1880.000000
Relative permittivity (real part)	40.000000
Relative permittivity (imaginary part)	13.408000
Conductivity (S/m)	1.400391
Variation (%)	4.050000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7,dx=8mm dy=8mm</u> <u>dz=5mm,Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>
Phantom	<u>Validation plane</u>
Device Position	<u>Body back(0mm)</u>
Band	<u>BAND2 WCDMA1900(hotspot)</u>

SURFACE SAR

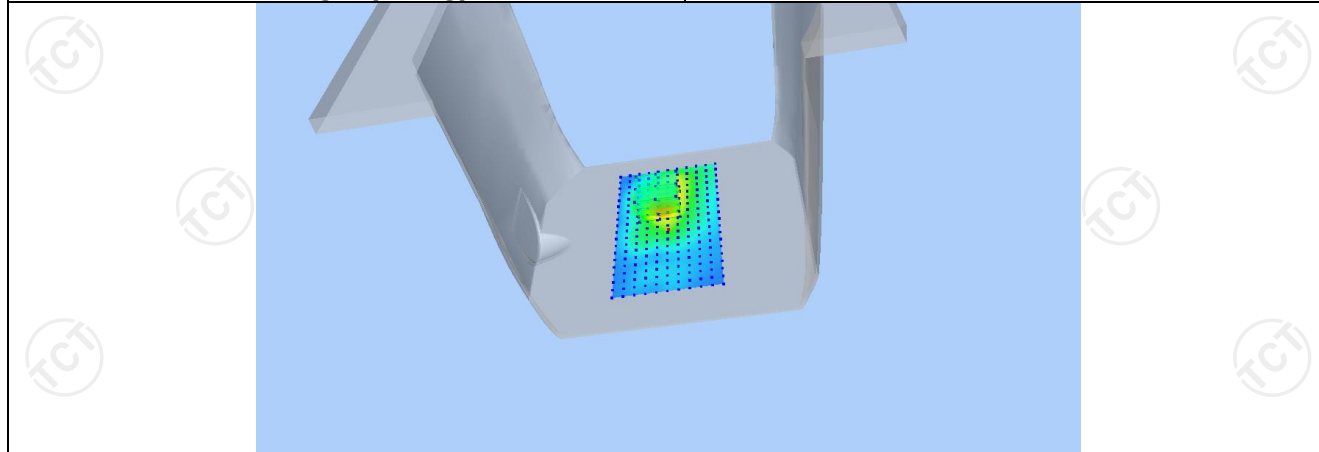


VOLUME SAR

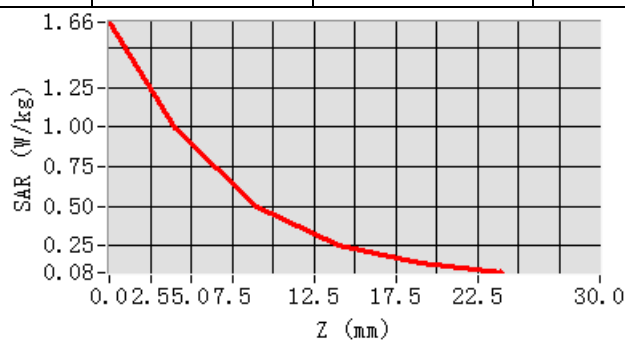


Maximum location: X=-6.00, Y=25.00 SAR Peak: 1.68 W/kg

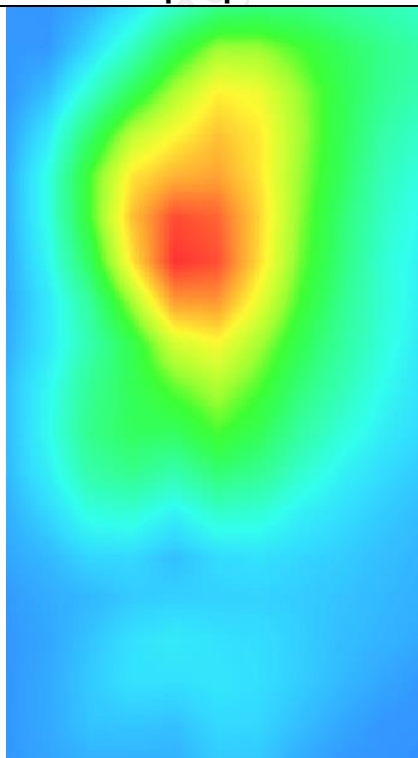
SAR 10g (W/Kg)	0.370039
SAR 1g (W/Kg)	0.718274



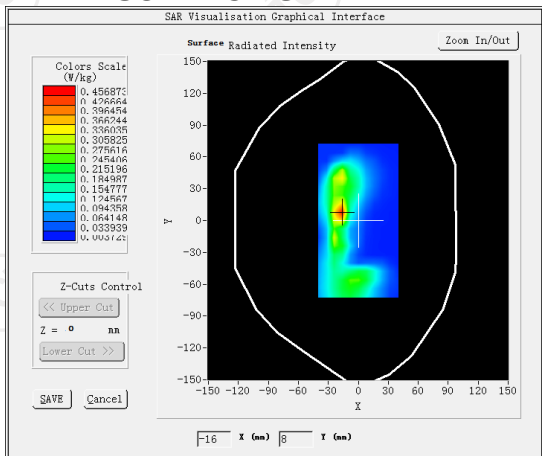
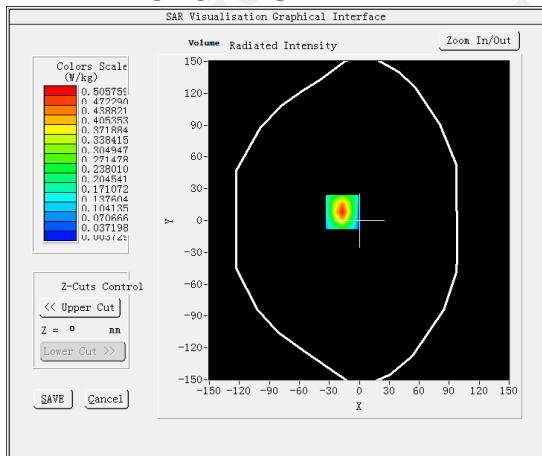
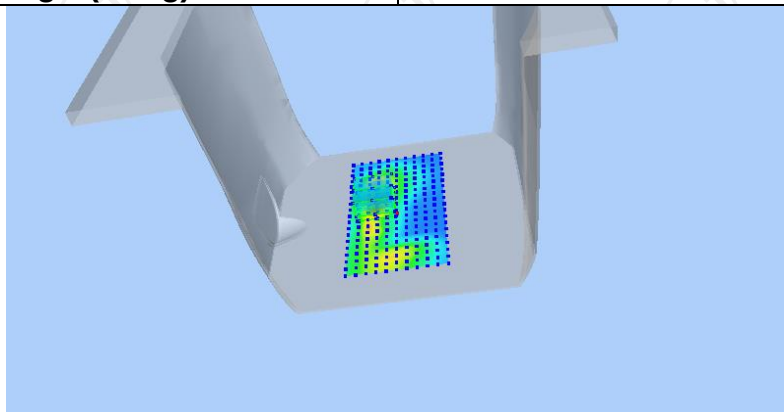
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.6643	0.9915	0.4984	0.2531	0.1404



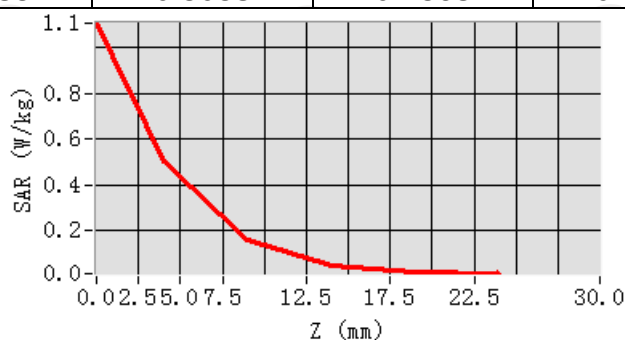
Hot spot position



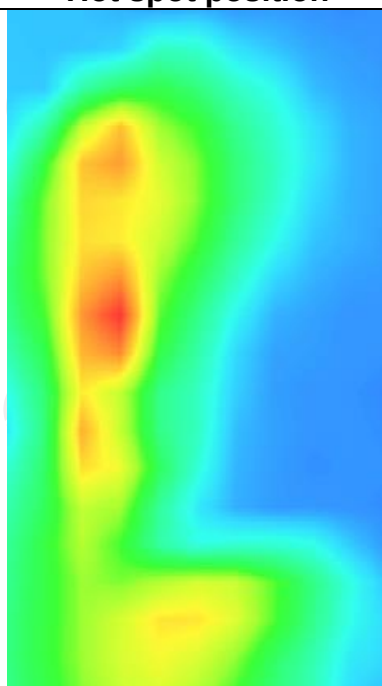
WCDMA Band IV MEASUREMENT 1

High Band SAR (Channel 1513):		Date: 12/18/2023
Frequency (MHz)	1752.600000	
Relative permittivity (real part)	41.500000	
Relative permittivity (imaginary part)	19.400000	
Conductivity (S/m)	0.901453	
Variation (%)	3.400000	
Crest Factor	1.0	
Probe Conversion factor	2.08	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	BAND4 WCDMA1700	
SURFACE SAR		VOLUME SAR
		
Maximum location: X=-17.00, Y=8.00 SAR Peak:1.10 W/kg		
SAR 10g (W/Kg)	0.312897	
SAR 1g (W/Kg)	0.656171	
		

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1085	0.5058	0.1563	0.0429	0.0165



Hot spot position



MEASUREMENT 2

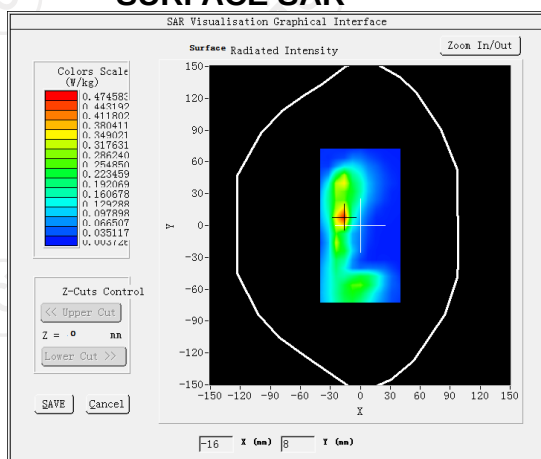
High Band SAR (Channel 1513):

Date: 12/18/2023

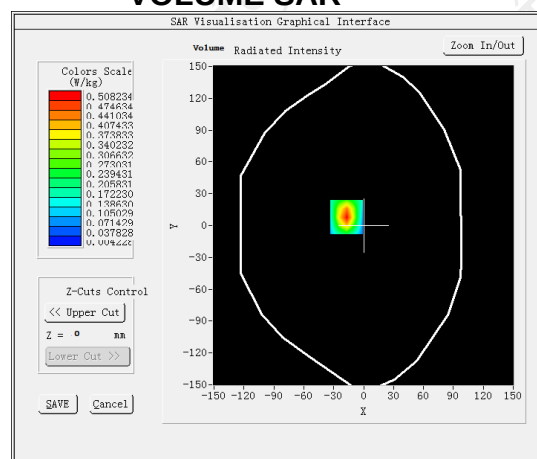
Frequency (MHz)	1752.600000
Relative permittivity (real part)	40.116364
Relative permittivity (imaginary part)	14.137455
Conductivity (S/m)	1.360337
Variation (%)	3.250000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	<u>Validation plane</u>
Device Position	<u>Body back(hotspot 0mm)</u>
Band	<u>BAND4 WCDMA1700</u>

SURFACE SAR

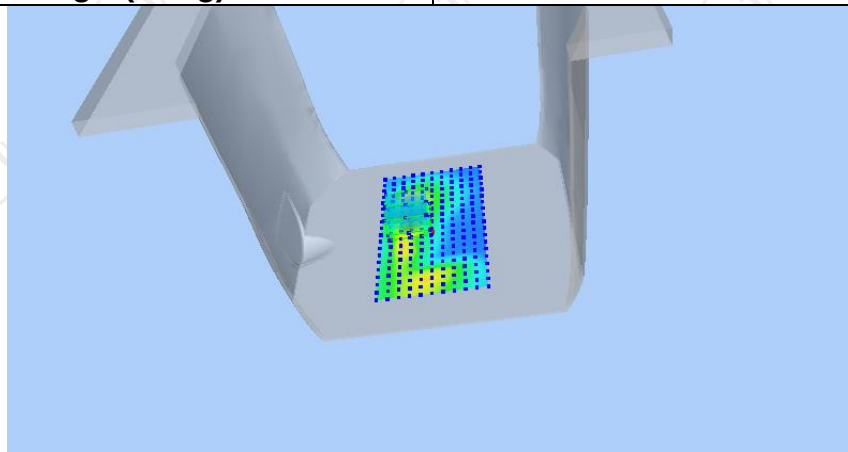


VOLUME SAR

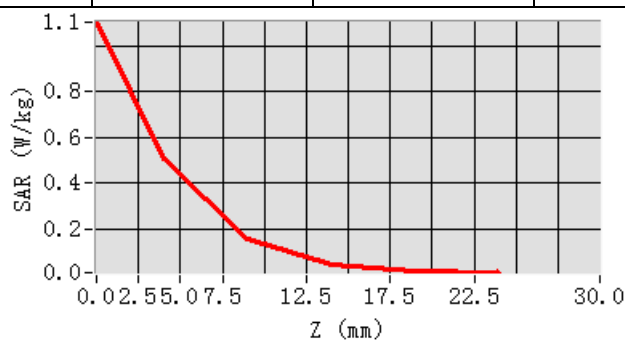


Maximum location: X=-17.00, Y=8.00 SAR Peak: 1.10 W/kg

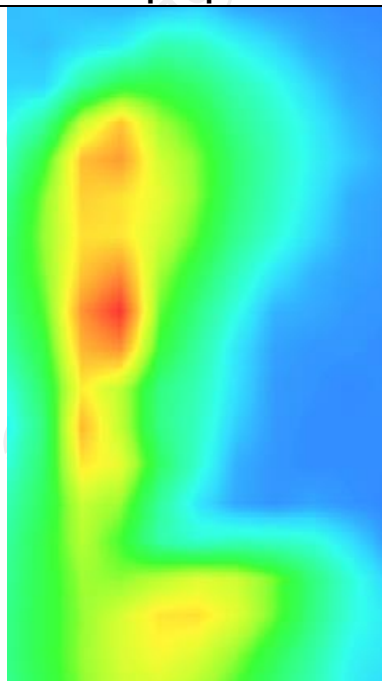
SAR 10g (W/Kg)	0.291353
SAR 1g (W/Kg)	0.668183



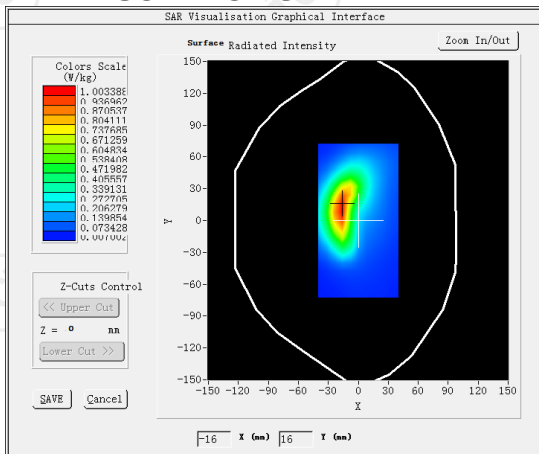
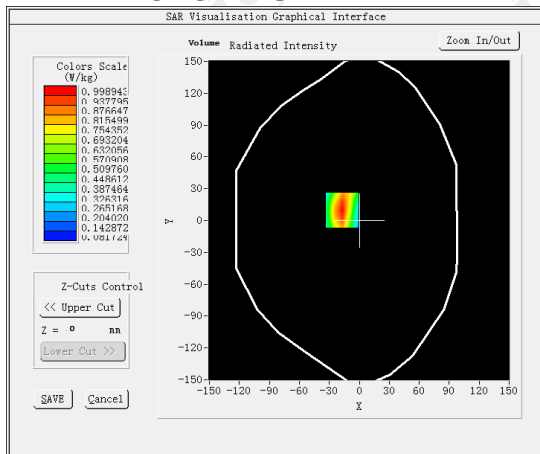
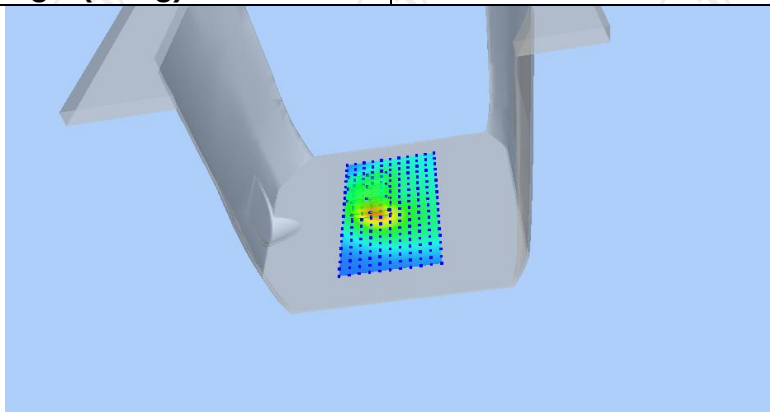
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1034	0.5082	0.1600	0.0448	0.0169



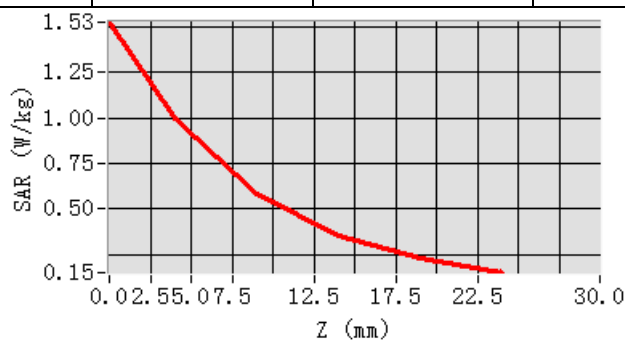
Hot spot position



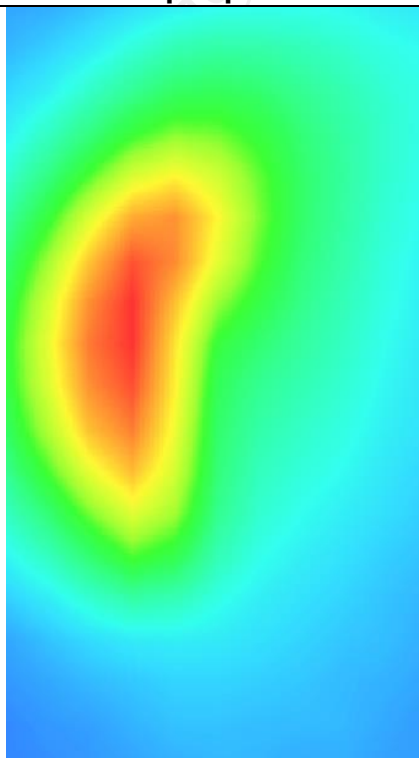
WCDMA Band V MEASUREMENT 1

Low Band SAR (Channel 4132):		Date: 12/14/2023
Frequency (MHz)	826.400000	
Relative permittivity (real part)	41.500000	
Relative permittivity (imaginary part)	19.400000	
Conductivity (S/m)	0.901453	
Variation (%)	2.680000	
Crest Factor:	1.0	
Probe Conversion factor	1.80	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	BAND5 WCDMA850	
SURFACE SAR		VOLUME SAR
		
Maximum location: X=-17.00, Y=10.00 SAR Peak: 1.53 W/kg		
SAR 10g (W/Kg)	0.201201	
SAR 1g (W/Kg)	0.303150	
		

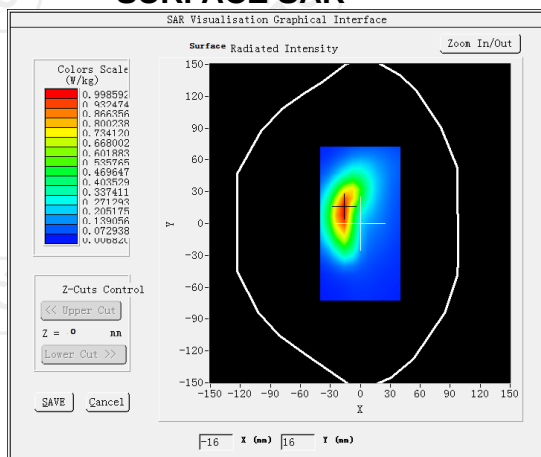
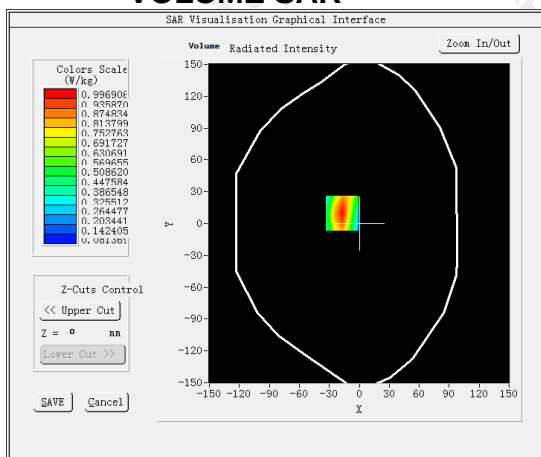
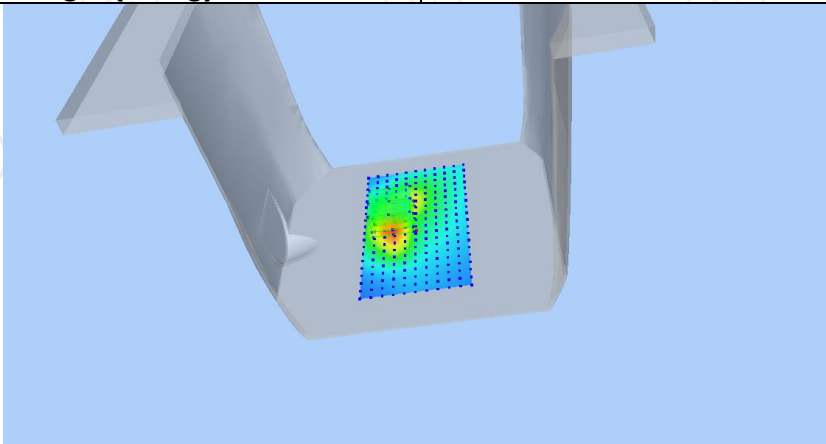
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.5251	0.9989	0.5827	0.3510	0.2279



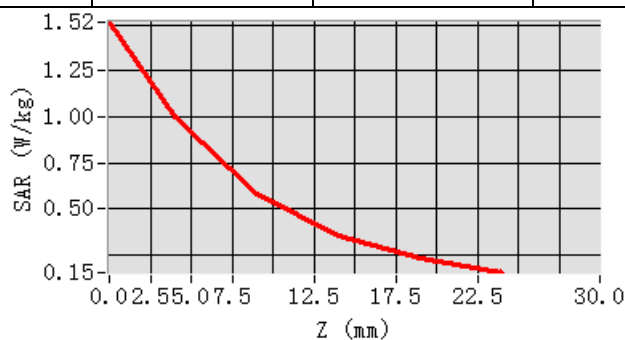
Hot spot position



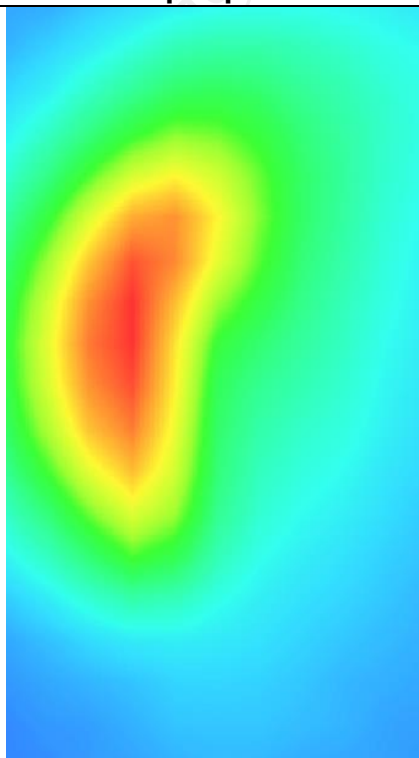
MEASUREMENT 2

Low Band SAR (Channel 4132):		Date: 12/14/2023
Low Band SAR (Channel 4132):		826.400000
Relative permittivity (real part)		41.500000
Relative permittivity (imaginary part)		19.400000
Conductivity (S/m)		0.901453
Variation (%)		1.520000
Crest Factor:		1.0
Probe Conversion factor		1.80
E-Field Probe:		SSE2 (SN 25/22 EPG0375)
Area Scan		<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan		<u>5x5x7,dx=8mm dy=8mm</u> <u>dz=5mm,Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>
Phantom		<u>Validation plane</u>
Device Position		<u>Body back(0mm)</u>
Band		<u>BAND5 WCDMA850(hotspot)</u>
SURFACE SAR		VOLUME SAR
		
Maximum location: X=-17.00, Y=10.00 SAR Peak:1.52 W/kg		
SAR 10g (W/Kg)		0.231588
SAR 1g (W/Kg)		0.353151
		

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.5162	0.9969	0.5845	0.3536	0.2301

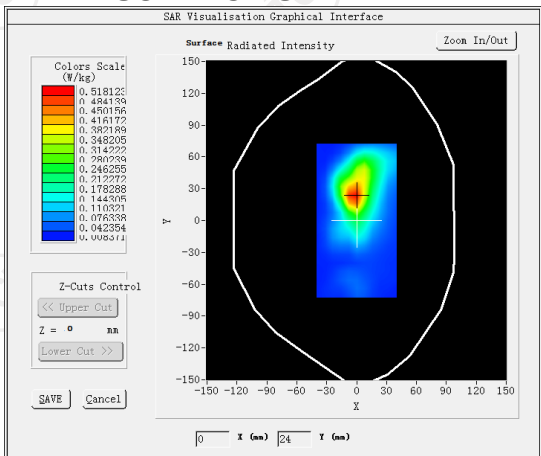
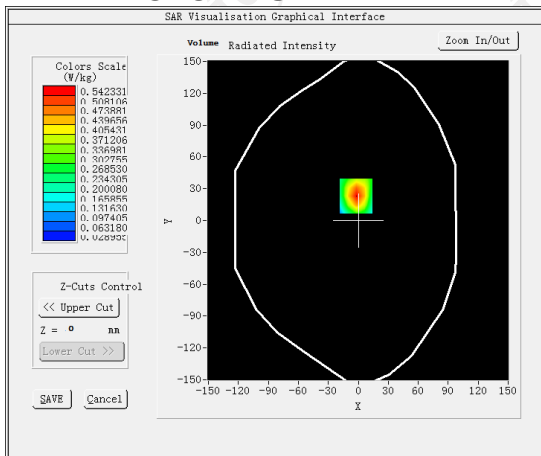


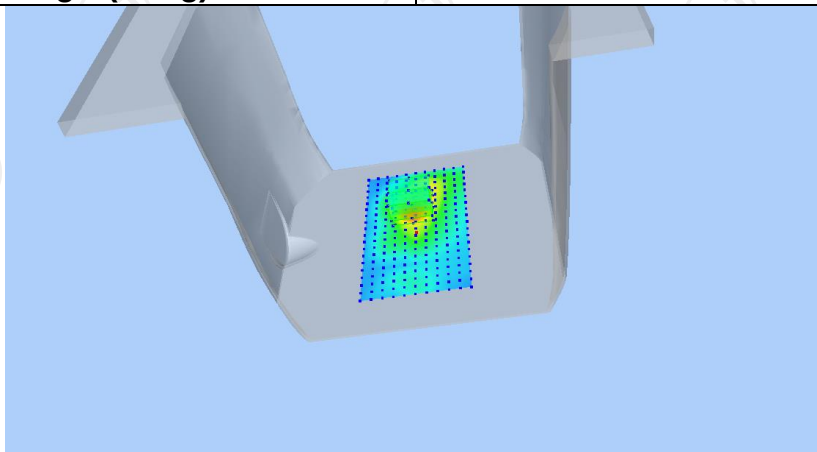
Hot spot position



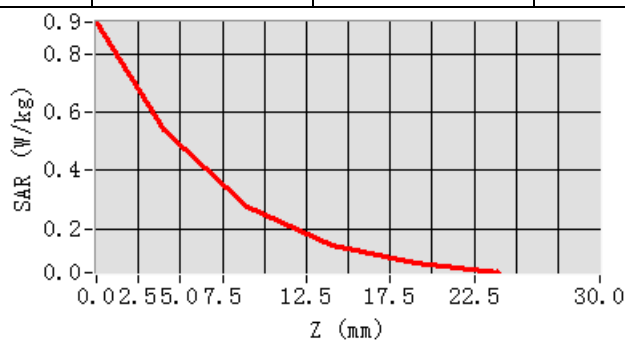
LTE Band 2

MEASUREMENT 1

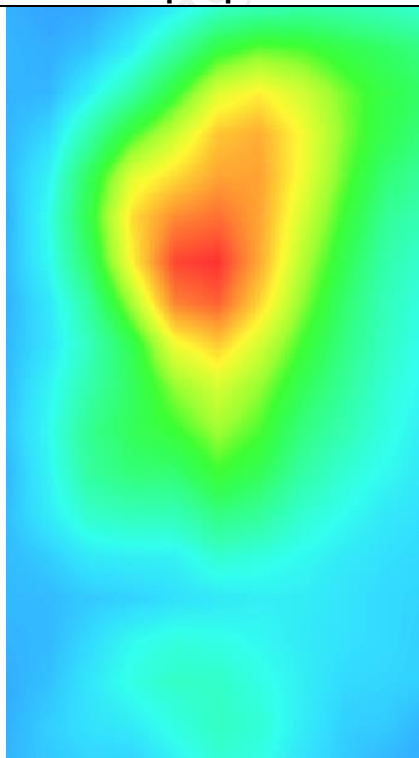
Low Band SAR (Channel 18700):		Date: 12/19/2023
Frequency (MHz)	1860.000000	
Relative permittivity (real part)	40.000000	
Relative permittivity (imaginary part)	13.411700	
Conductivity (S/m)	1.400405	
Variation (%)	2.650000	
Crest Factor	1.0	
Probe Conversion factor	2.23	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	LTE band 2 (1 RB#49)	
SURFACE SAR 		VOLUME SAR 
Maximum location: X=-2.00, Y=23.00 SAR Peak: 0.91 W/kg		
SAR 10g (W/Kg)	0.259421	
SAR 1g (W/Kg)	0.595141	



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.9110	0.5423	0.2733	0.1405	0.0802



Hot spot position



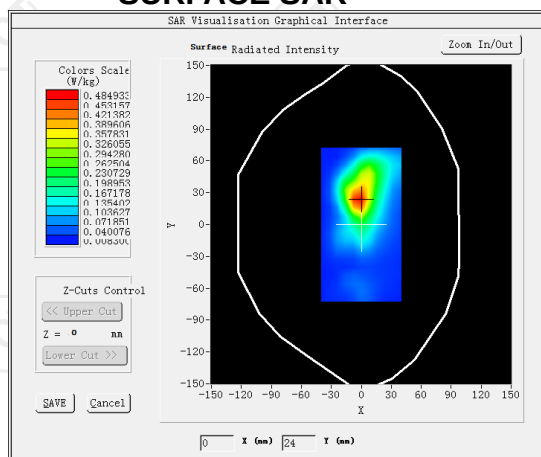
MEASUREMENT 2

Low Band SAR (Channel 18700):

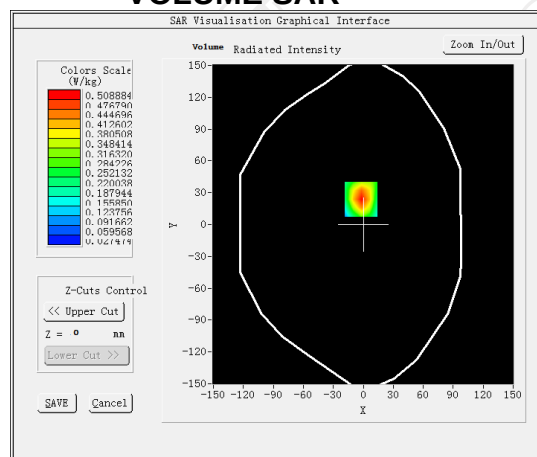
Date: 12/19/2023

Frequency (MHz)	1860.000000
Relative permittivity (real part)	40.000000
Relative permittivity (imaginary part)	13.411700
Conductivity (S/m)	1.400405
Variation (%)	-3.250000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
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 0mm)
Band	LTE band 2 (1 RB#49)

SURFACE SAR

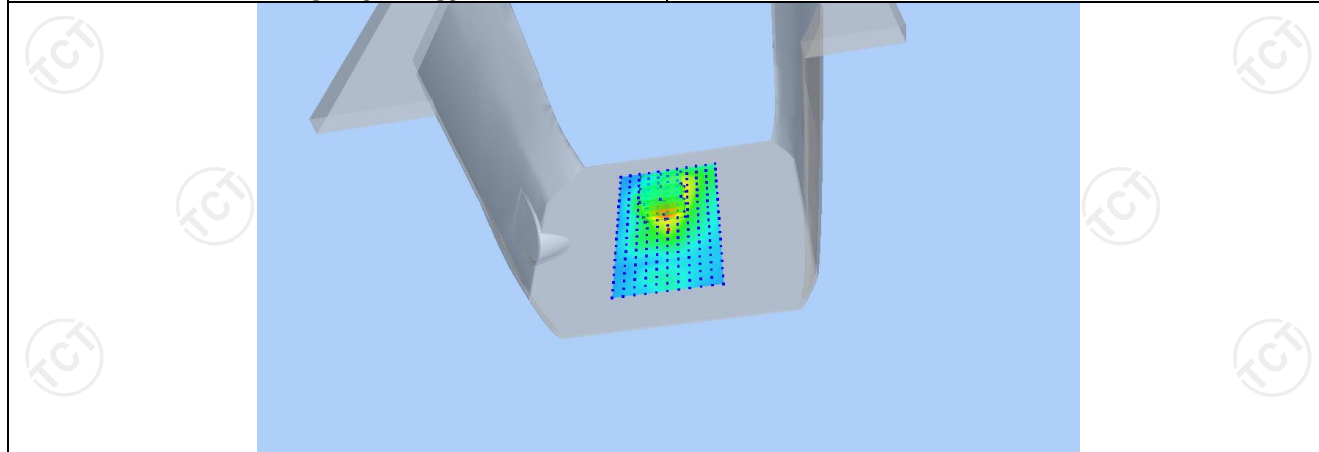


VOLUME SAR

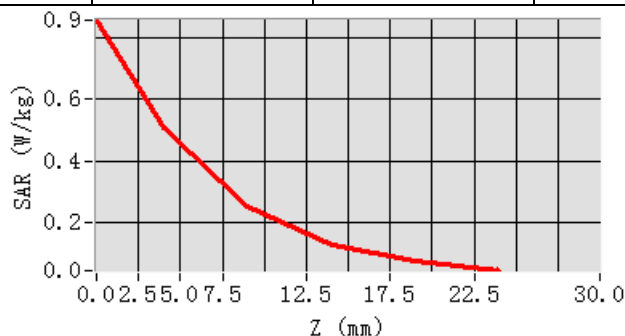


Maximum location: X=-2.00, Y=24.00 SAR Peak: 0.86 W/kg

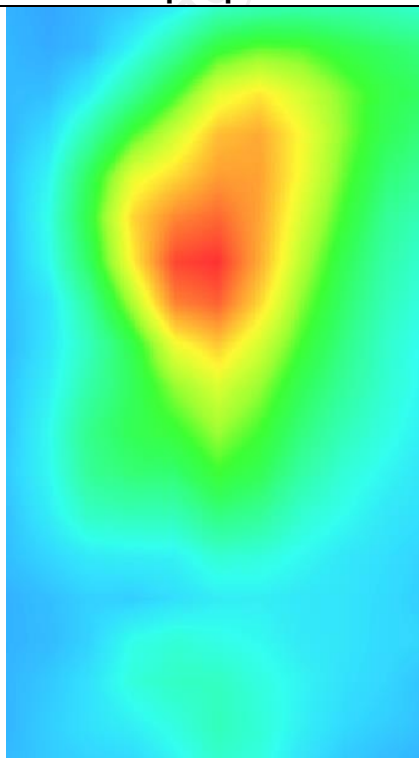
SAR 10g (W/Kg)	0.251371
SAR 1g (W/Kg)	0.576750



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8584	0.5089	0.2545	0.1295	0.0730

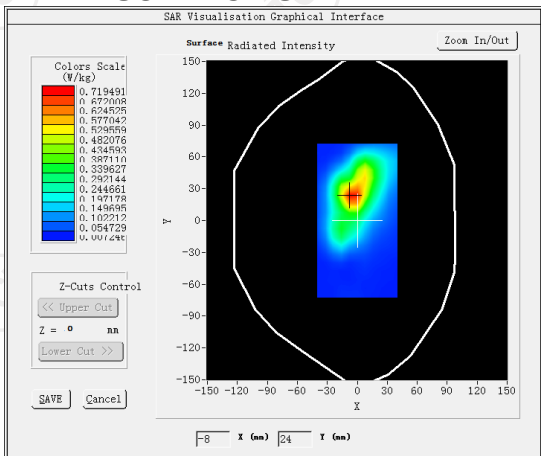
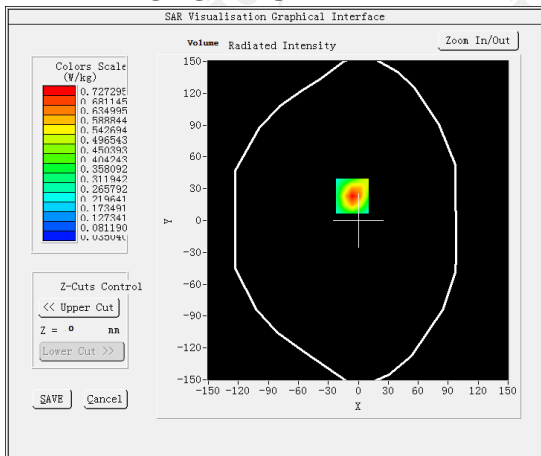


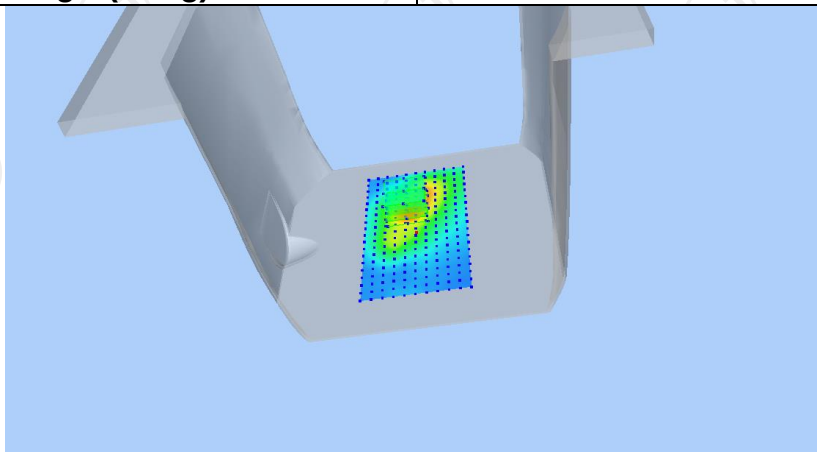
Hot spot position



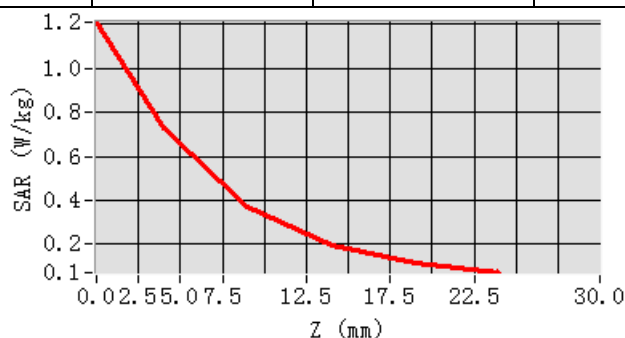
LTE Band 4

MEASUREMENT 1

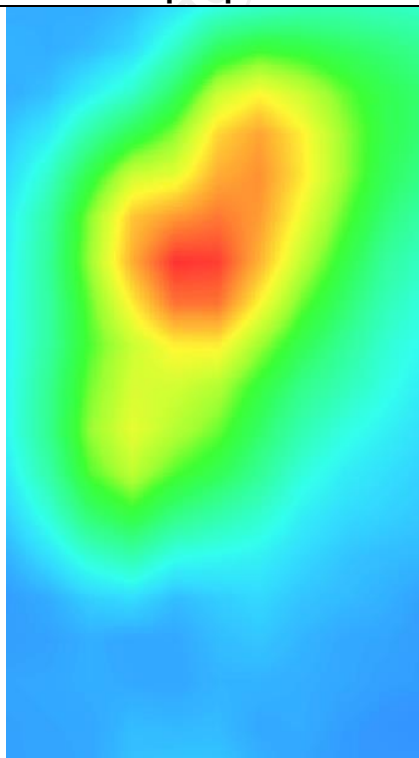
High Band SAR (Channel 20300):		Date: 12/18/2023
Frequency (MHz)	1745.000000	
Relative permittivity (real part)	40.115910	
Relative permittivity (imaginary part)	14.136136	
Conductivity (S/m)	1.360603	
Variation (%)	3.580000	
Crest Factor	1.0	
Probe Conversion factor	2.08	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	LTE band 4(1 RB#0)	
SURFACE SAR 		VOLUME SAR 
Maximum location: X=-6.00, Y=23.00 SAR Peak: 1.21 W/kg		
SAR 10g (W/Kg)	0.356790	
SAR 1g (W/Kg)	0.699160	



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.2095	0.7273	0.3730	0.1965	0.1154



Hot spot position



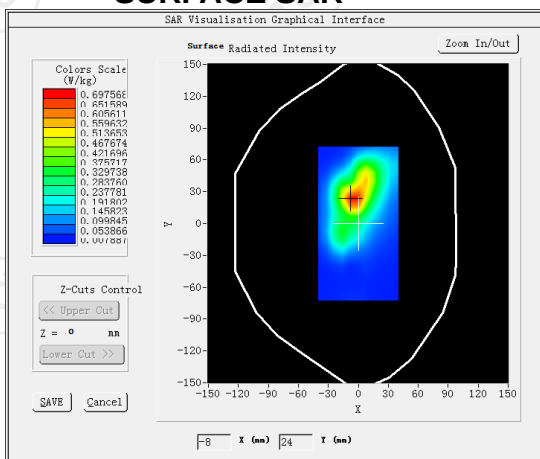
MEASUREMENT 2

High Band SAR (Channel 20300):

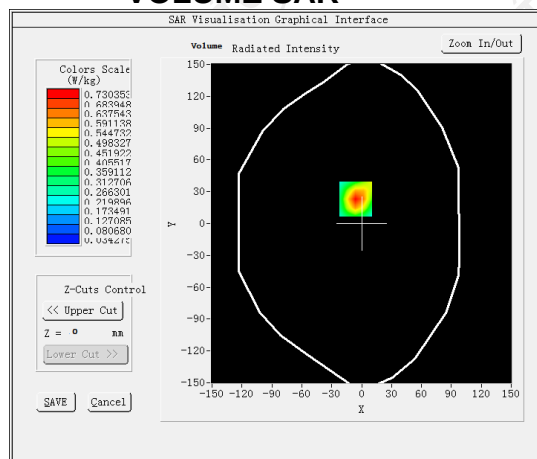
Date: 12/18/2023

Frequency (MHz)	1745.000000
Relative permittivity (real part)	40.115910
Relative permittivity (imaginary part)	14.136136
Conductivity (S/m)	1.360603
Variation (%)	-1.200000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 25/22 EPGO375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7,dx=8mm dy=8mm</u> <u>dz=5mm,Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>
Phantom	<u>Validation plane</u>
Device Position	<u>Body back(hotspot 0mm)</u>
Band	<u>LTE band 4(1 RB#0)</u>

SURFACE SAR



VOLUME SAR



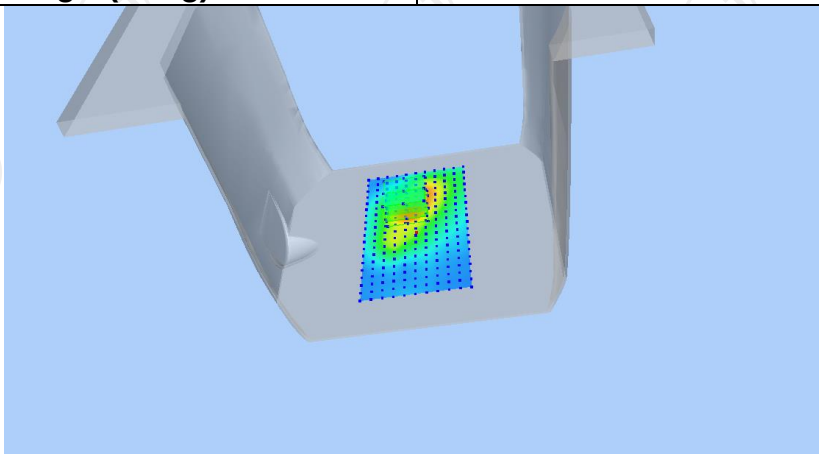
Maximum location: X=-6.00, Y=23.00 SAR Peak: 1.22 W/kg

SAR 10g (W/Kg)

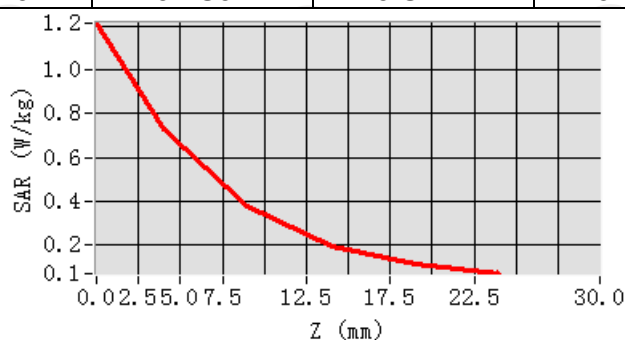
0.355407

SAR 1g (W/Kg)

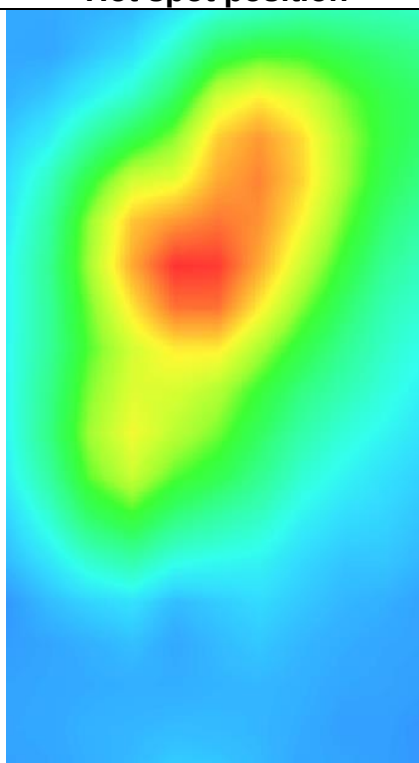
0.705625



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.2140	0.7304	0.3741	0.1956	0.1128



Hot spot position



LTE Band 5

MEASUREMENT 1

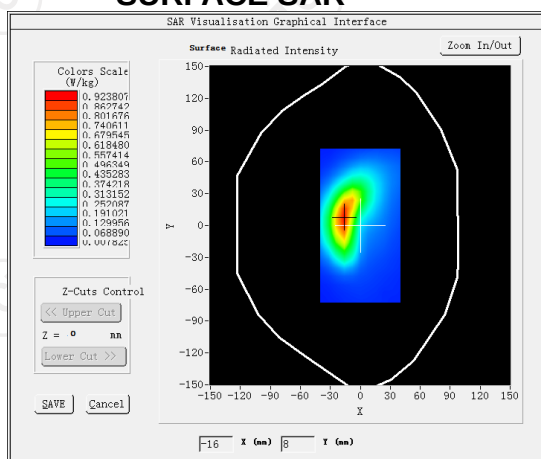
High Band SAR (Channel 20600):

Date: 12/14/2023

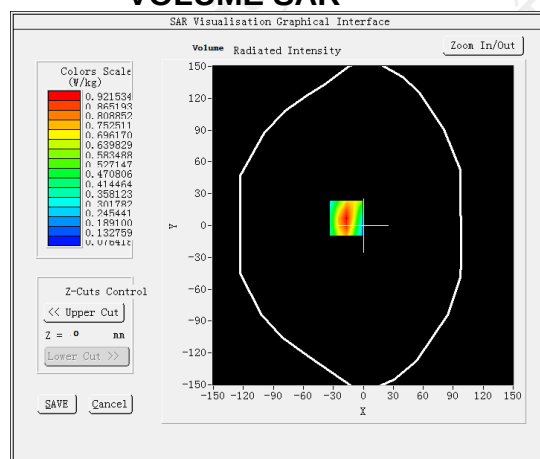
Frequency (MHz)	844.000000
Relative permittivity (real part)	41.500000
Relative permittivity (imaginary part)	19.400000
Conductivity (S/m)	0.901561
Variation (%)	1.270000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	LTE band 5(1 RB#0)

SURFACE SAR

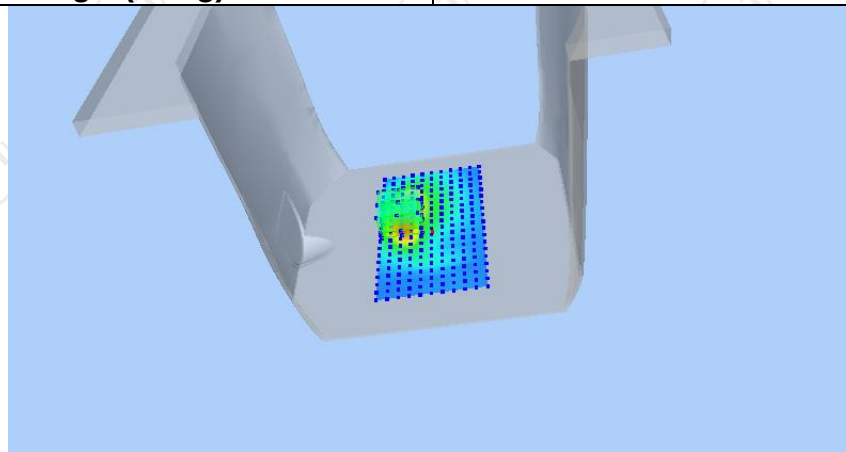


VOLUME SAR

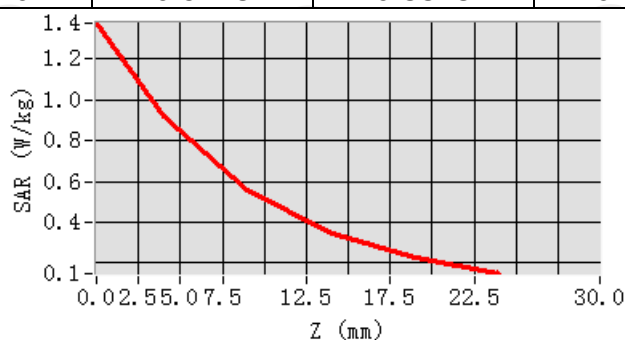


Maximum location: X=-17.00, Y=7.00 SAR Peak: 1.38 W/kg

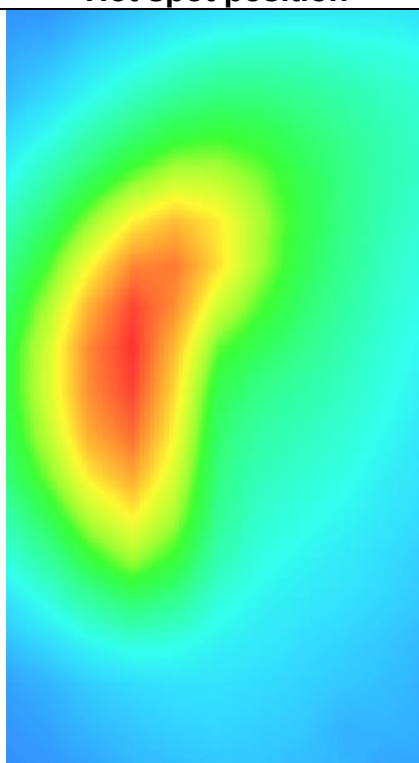
SAR 10g (W/Kg)	0.192668
SAR 1g (W/Kg)	0.383510



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.3740	0.9215	0.5545	0.3424	0.2242



Hot spot position



MEASUREMENT 2

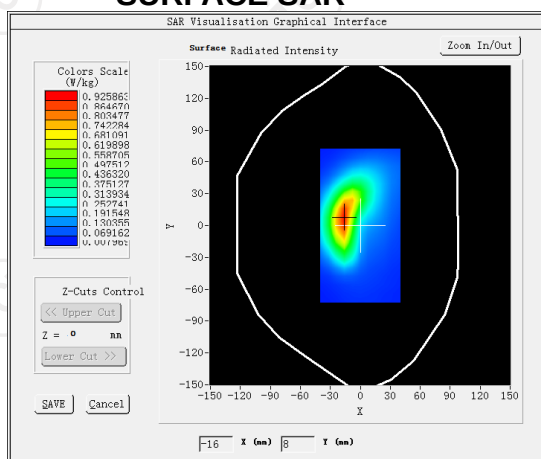
High Band SAR (Channel 20600):

Date: 12/14/2023

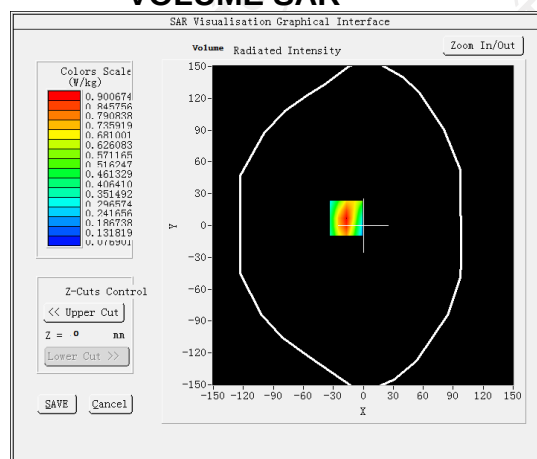
Frequency (MHz)	844.000000
Relative permittivity (real part)	41.500000
Relative permittivity (imaginary part)	19.400000
Conductivity (S/m)	0.901561
Variation (%)	3.720000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back((hotspot 0mm)
Band	LTE band 5(1 RB#0)

SURFACE SAR

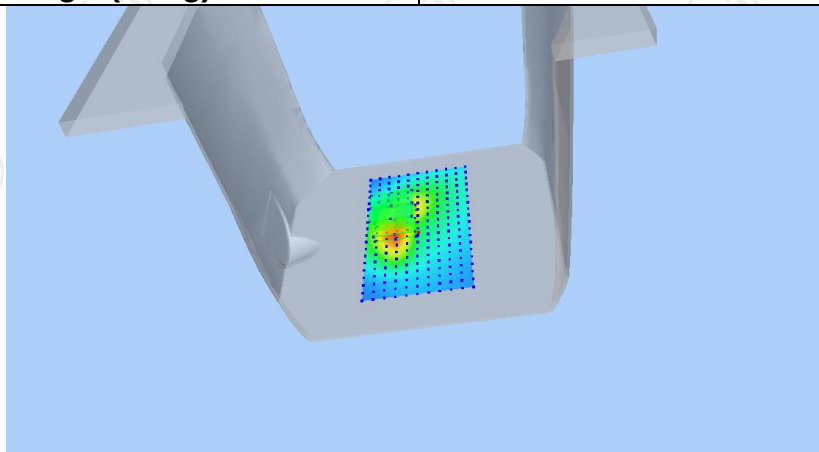


VOLUME SAR

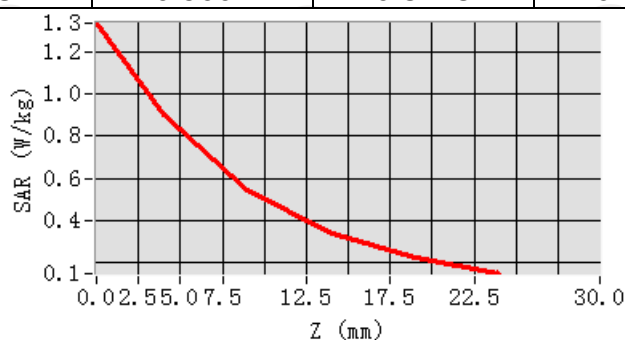


Maximum location: X=-17.00, Y=7.00 SAR Peak: 1.34 W/kg

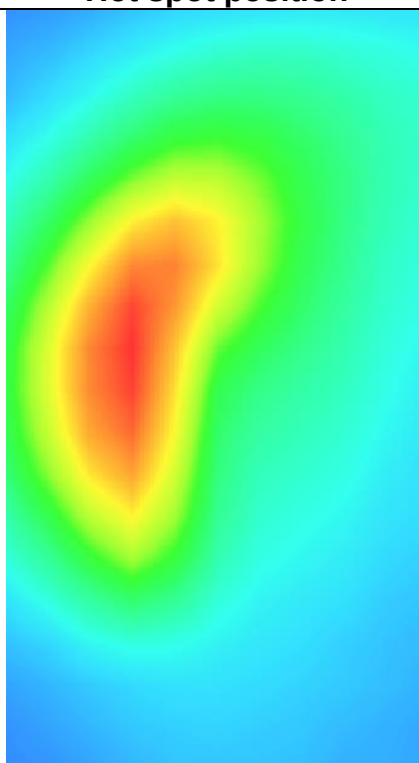
SAR 10g (W/Kg)	0.196979
SAR 1g (W/Kg)	0.403452



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.3381	0.9007	0.5445	0.3375	0.2212



Hot spot position



LTE Band 12

MEASUREMENT 1

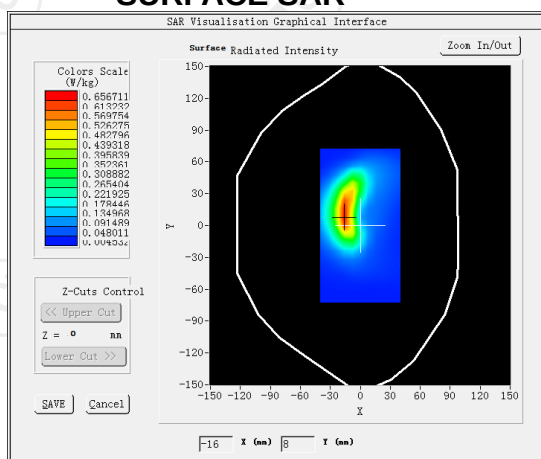
Low Band SAR (Channel 23060):

Date: 12/11/2023

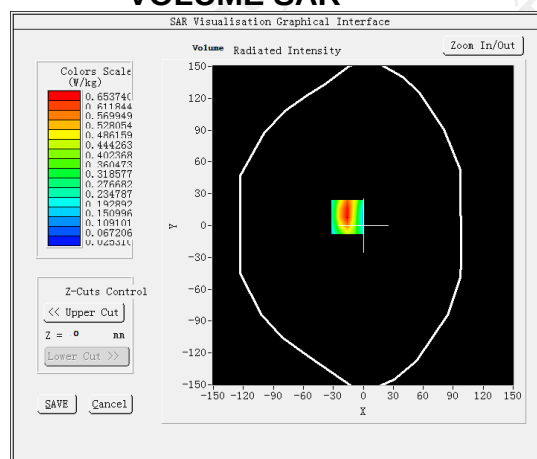
Frequency (MHz)	704.000000
Relative permittivity (real part)	42.126667
Relative permittivity (imaginary part)	23.264000
Conductivity (S/m)	0.914404
Variation (%)	2.040000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	<u>LTE band 12(1 RB#0)</u>

SURFACE SAR

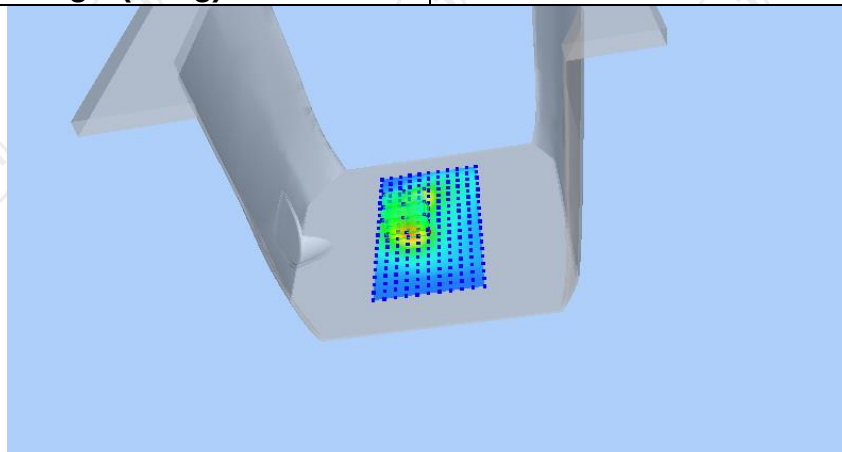


VOLUME SAR

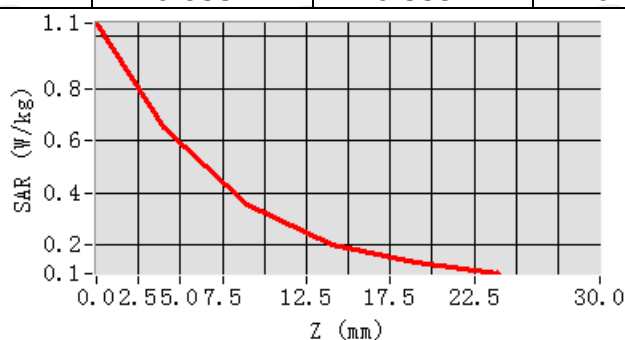


Maximum location: X=-16.00, Y=8.00 SAR Peak:1.07 W/kg

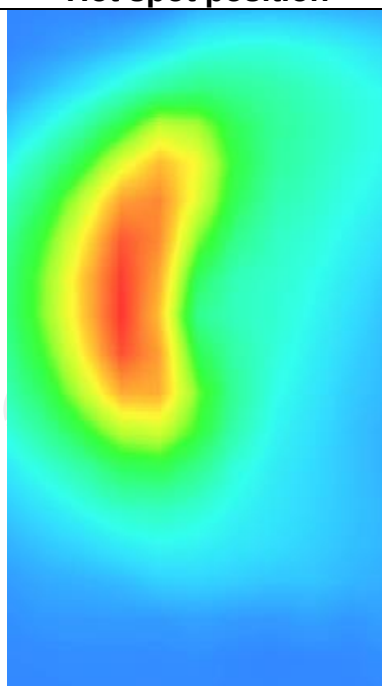
SAR 10g (W/Kg)	0.337382
SAR 1g (W/Kg)	0.627512



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.0511	0.6537	0.3557	0.2029	0.1306



Hot spot position



MEASUREMENT 2

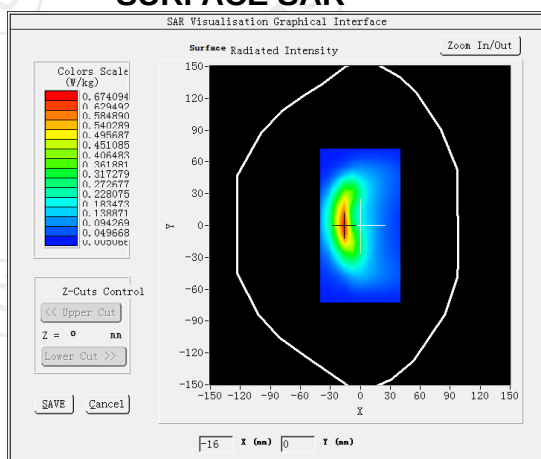
Low Band SAR (Channel 23060):

Date: 12/11/2023

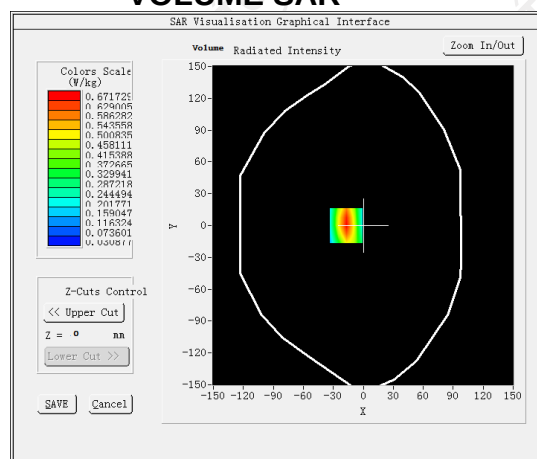
Frequency (MHz)	704.000000
Relative permittivity (real part)	42.126667
Relative permittivity (imaginary part)	23.264000
Conductivity (S/m)	0.914404
Variation (%)	2.640000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(hotspot 0mm)
Band	<u>LTE band 12(1 RB#0)</u>

SURFACE SAR

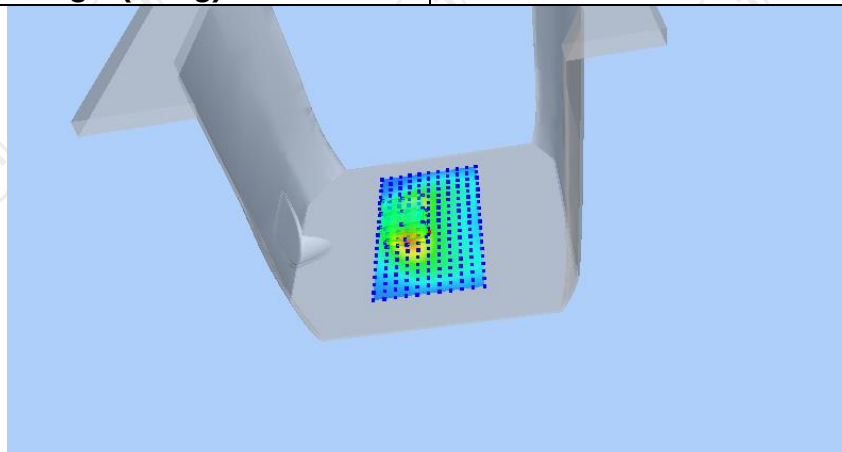


VOLUME SAR

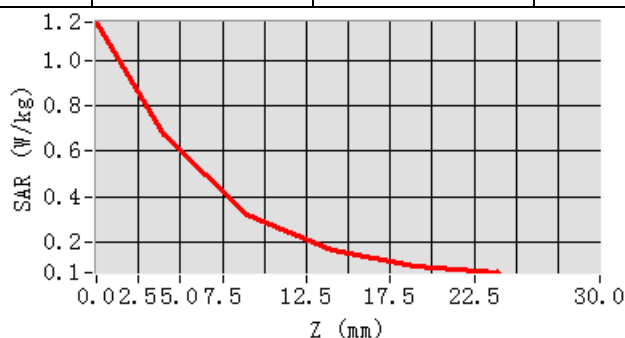


Maximum location: X=-17.00, Y=0.00 SAR Peak: 1.18W/kg

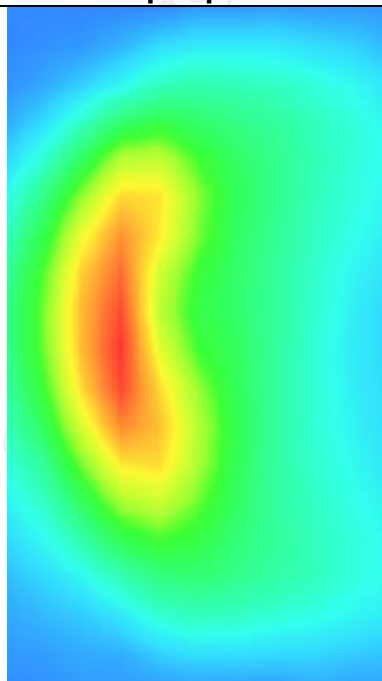
SAR 10g (W/Kg)	0.326643
SAR 1g (W/Kg)	0.641629



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1685	0.6717	0.3234	0.1630	0.0975



Hot spot position



LTE Band 41

MEASUREMENT 1

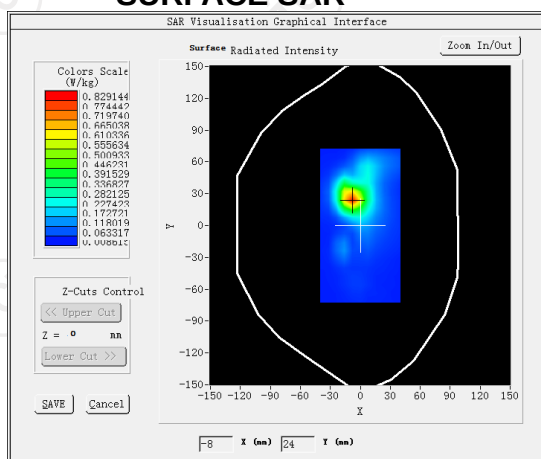
Low Band SAR (Channel 39750):

Date: 12/25/2023

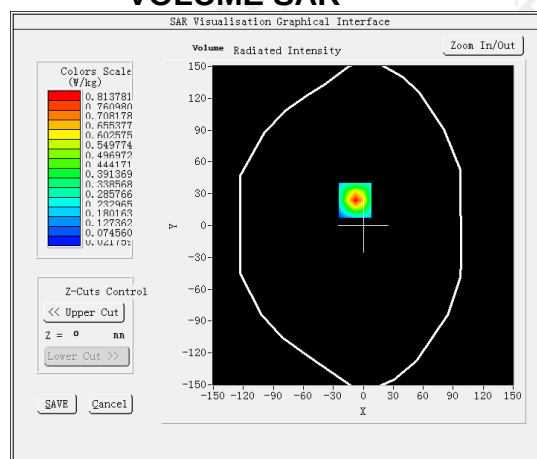
Frequency (MHz)	2506.000000
Relative permittivity (real part)	39.009335
Relative permittivity (imaginary part)	13.553667
Conductivity (S/m)	1.952481
Variation (%)	2.880000
Crest Factor	1.0
Probe Conversion factor	4.36
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7,dx=8mm dy=8mm</u> <u>dz=5mm,Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	<u>LTE band 41(1 RB#0)</u>

SURFACE SAR

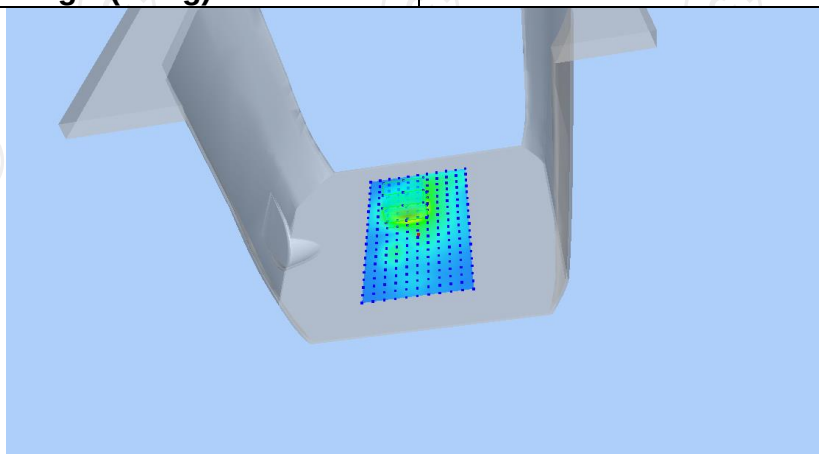


VOLUME SAR

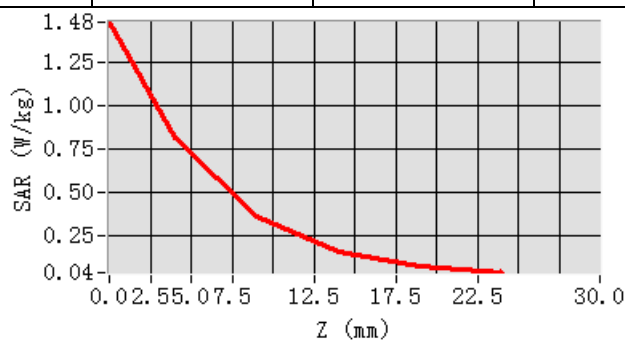


Maximum location: X=-8.00, Y=24.00 SAR Peak: 1.48W/kg

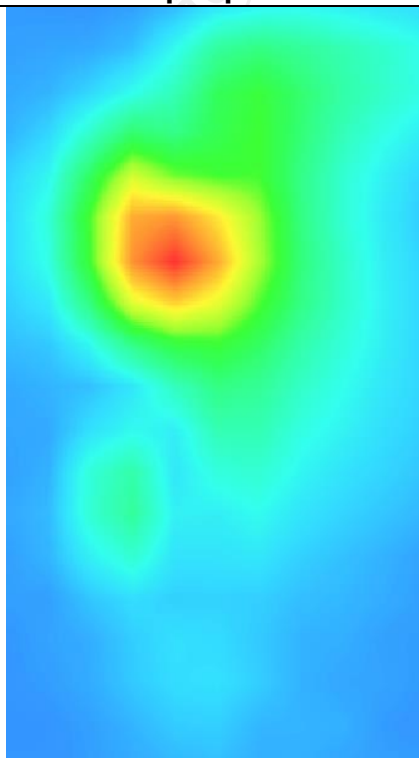
SAR 10g (W/Kg)	0.364941
SAR 1g (W/Kg)	0.716889



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.4764	0.8138	0.3601	0.1580	0.0786



Hot spot position



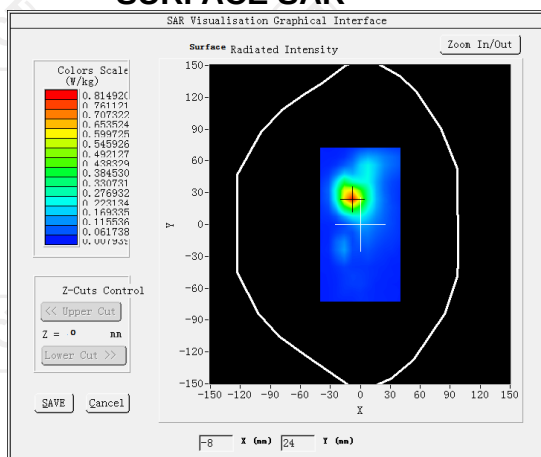
MEASUREMENT 2

Low Band SAR (Channel 39750):

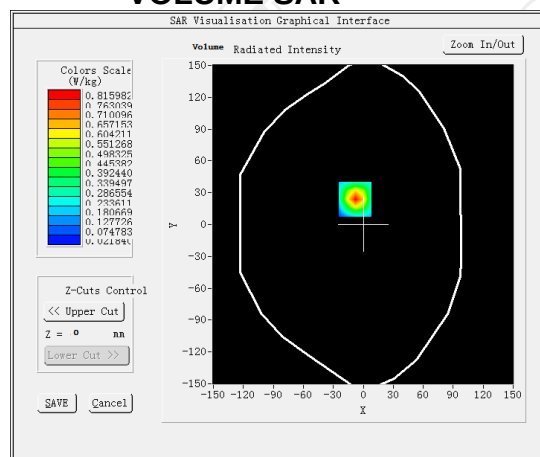
Date: 12/25/2023

Frequency (MHz)	2506.000000
Relative permittivity (real part)	39.009335
Relative permittivity (imaginary part)	13.553667
Conductivity (S/m)	1.952481
Variation (%)	3.140000
Crest Factor	1.0
Probe Conversion factor	4.36
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
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 0mm)
Band	LTE band 41(1 RB#0)

SURFACE SAR

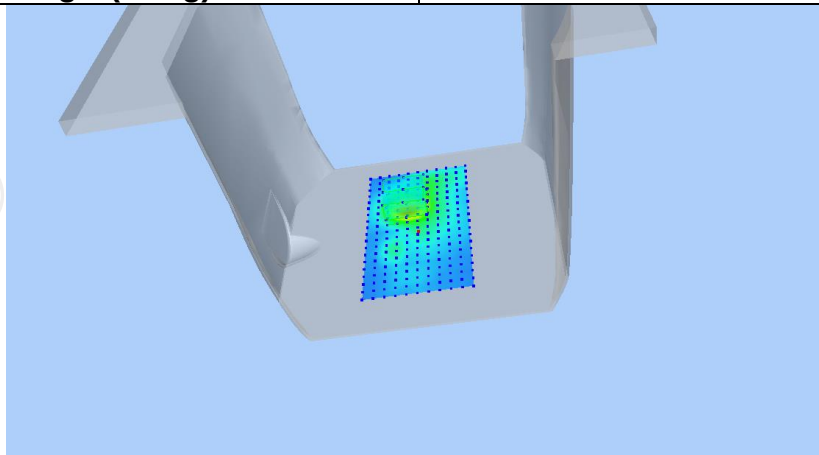


VOLUME SAR

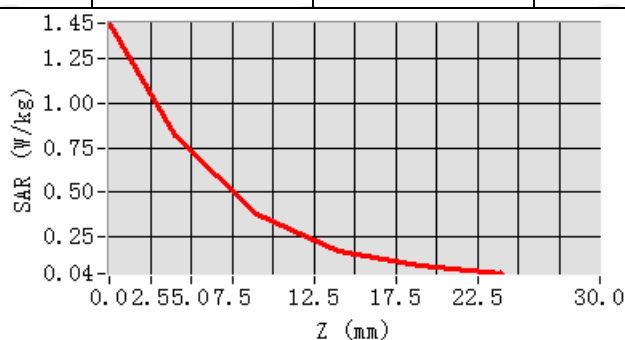


Maximum location: X=-8.00, Y=24.00 SAR Peak: 1.45 W/kg

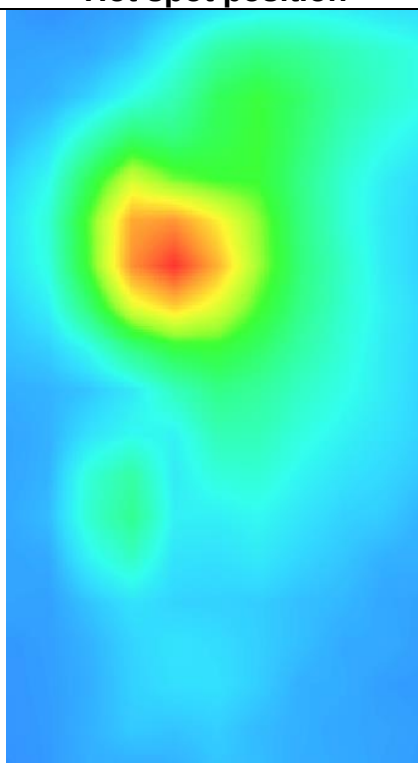
SAR 10g (W/Kg)	0.340238
SAR 1g (W/Kg)	0.726860



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.4481	0.8160	0.3736	0.1691	0.0841



Hot spot position



LTE Band 66

MEASUREMENT 1

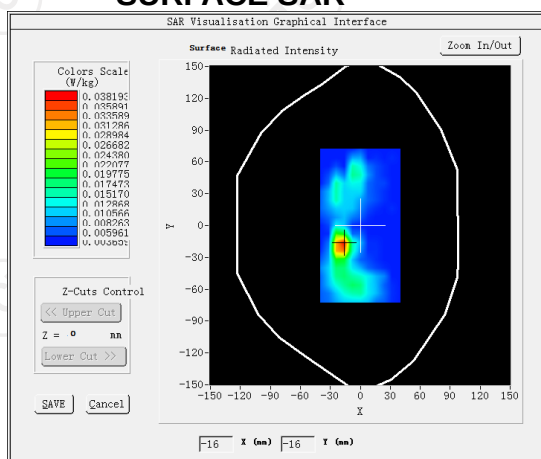
Middle Band SAR (Channel132322):

Date: 12/22/2023

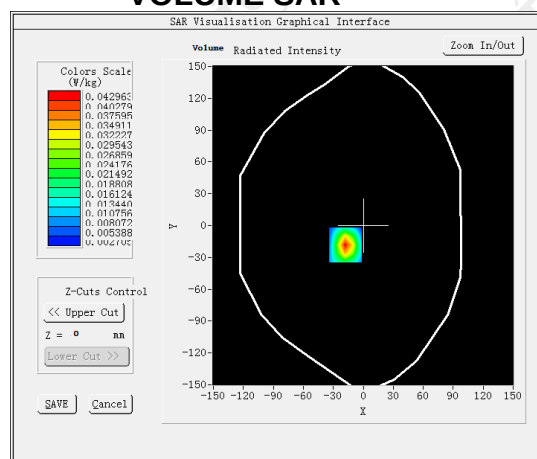
Frequency (MHz)	1748.000000
Relative permittivity (real part)	40.115910
Relative permittivity (imaginary part)	14.136136
Conductivity (S/m)	1.360603
Variation (%)	-2.180000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	<u>LTE band 66(1 RB#49)</u>

SURFACE SAR



VOLUME SAR



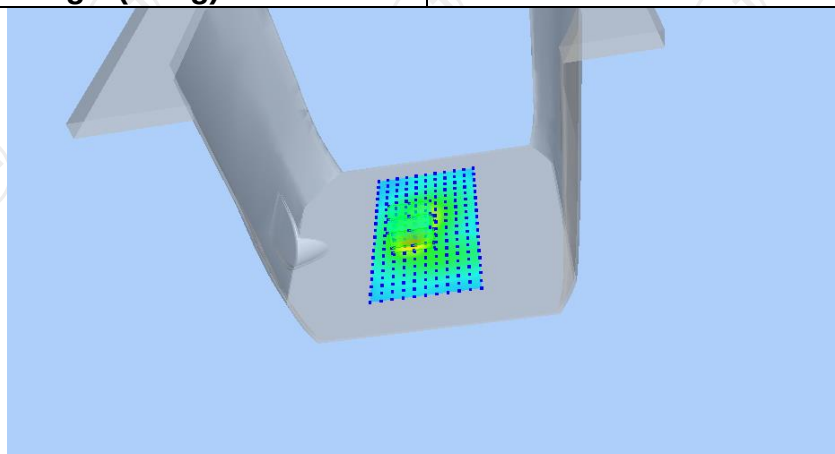
Maximum location: X=-18.00, Y=-18.00 SAR Peak: 0.63 W/kg

SAR 10g (W/Kg)

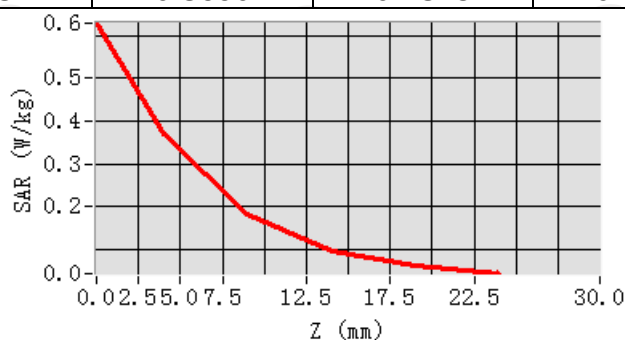
0.302792

SAR 1g (W/Kg)

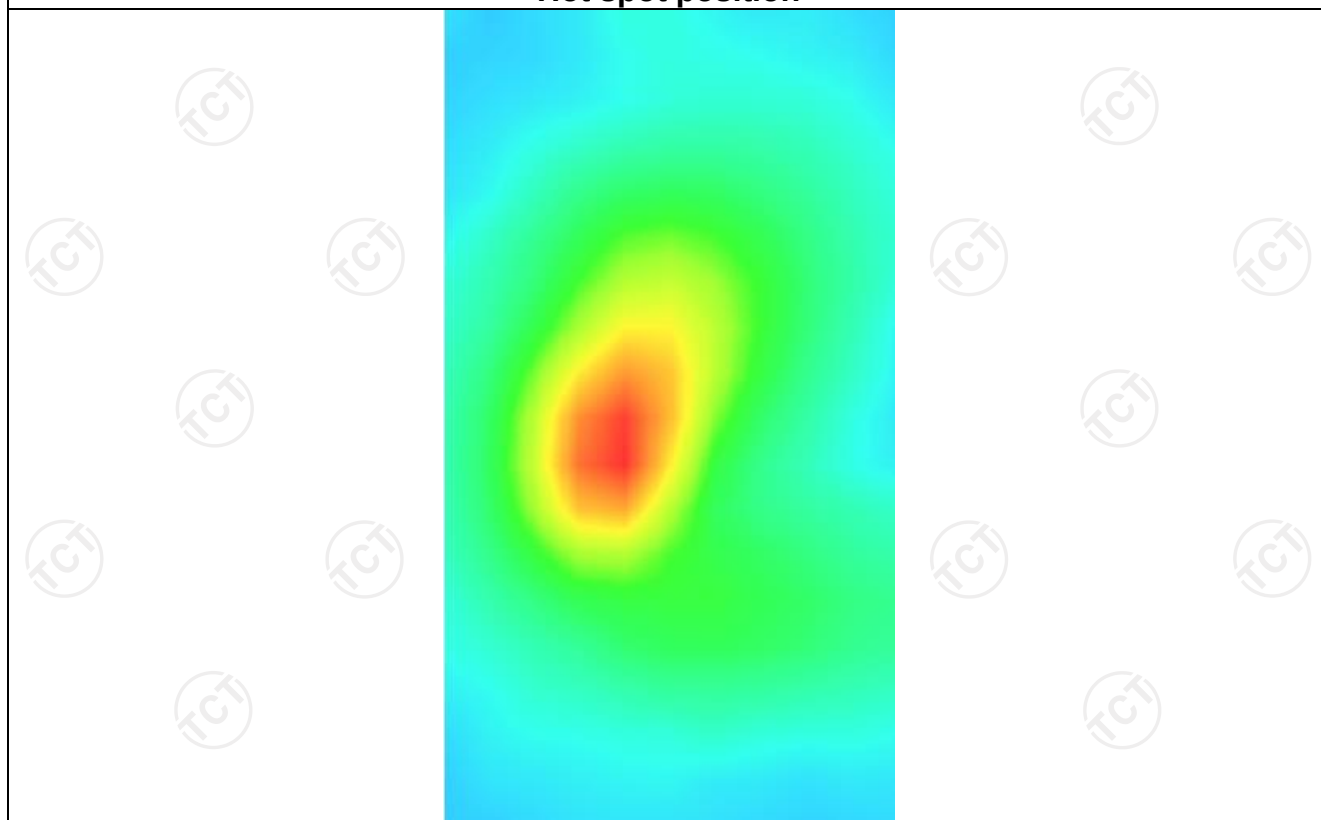
0.483658



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.6287	0.3690	0.1845	0.0978	0.0617



Hot spot position



MEASUREMENT 2

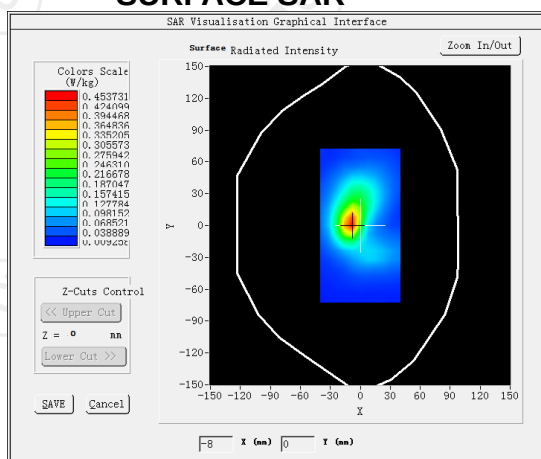
Middle Band SAR (Channel132322):

Date: 12/22/2023

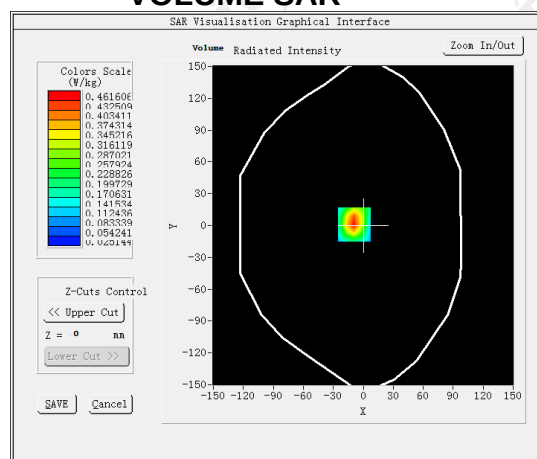
Frequency (MHz)	1748.000000
Relative permittivity (real part)	40.115910
Relative permittivity (imaginary part)	14.136136
Conductivity (S/m)	1.360603
Variation (%)	-0.830000
Crest Factor	1.0
Probe Conversion factor	1.71
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(hotspot 0mm)
Band	<u>LTE band 66(1 RB#99)</u>

SURFACE SAR

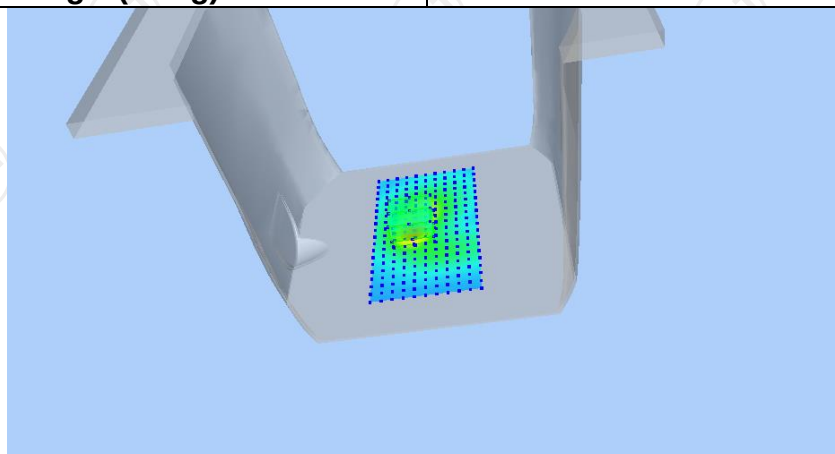


VOLUME SAR

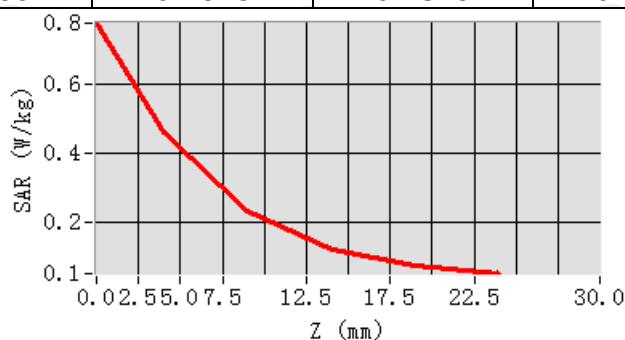


Maximum location: X=-9.00, Y=1.00 SAR Peak: 0.78 W/kg

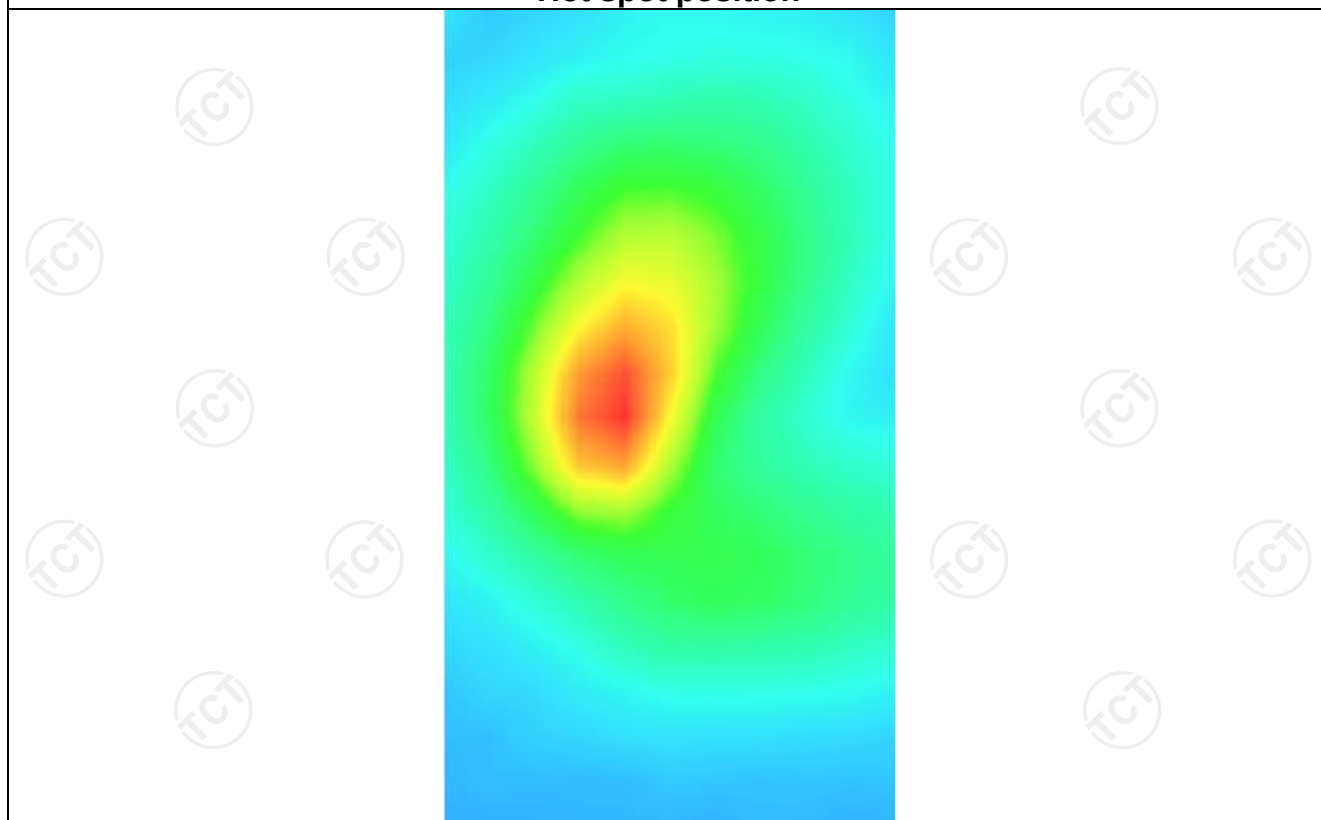
SAR 10g (W/Kg)	0.372906
SAR 1g (W/Kg)	0.529674



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.7760	0.4616	0.2349	0.1256	0.0781

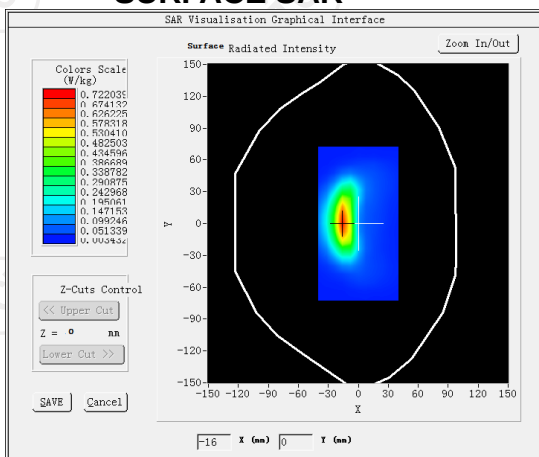
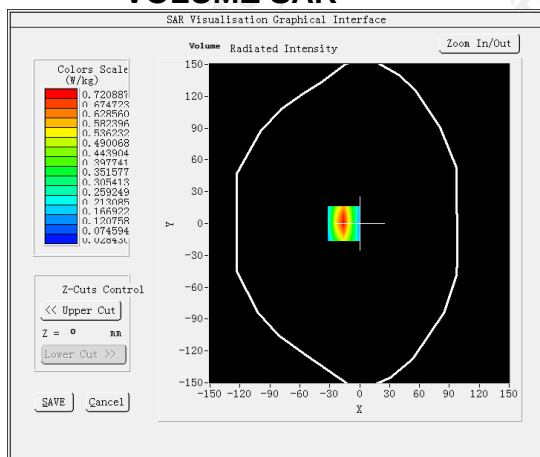
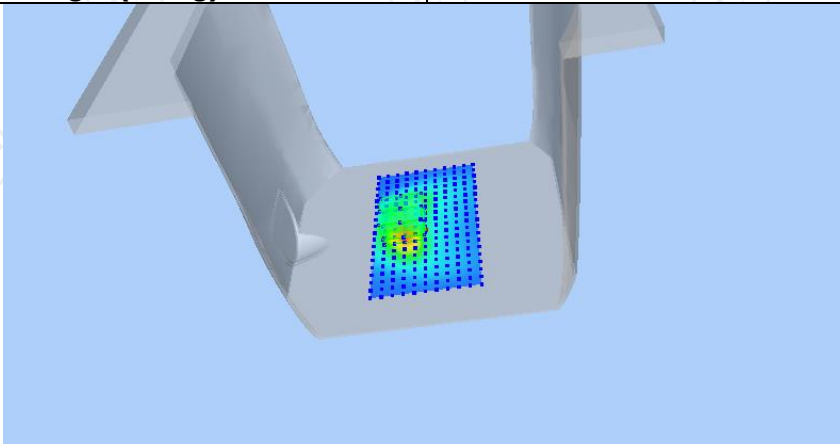


Hot spot position

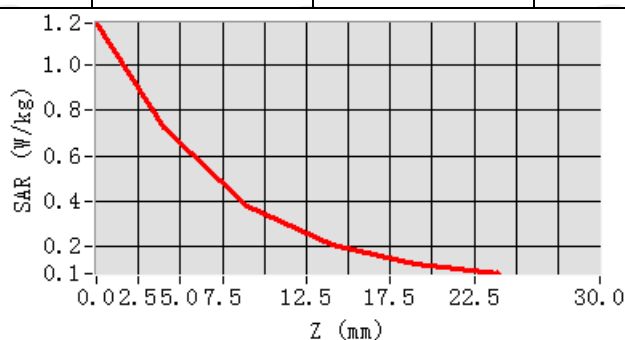


LTE Band 71

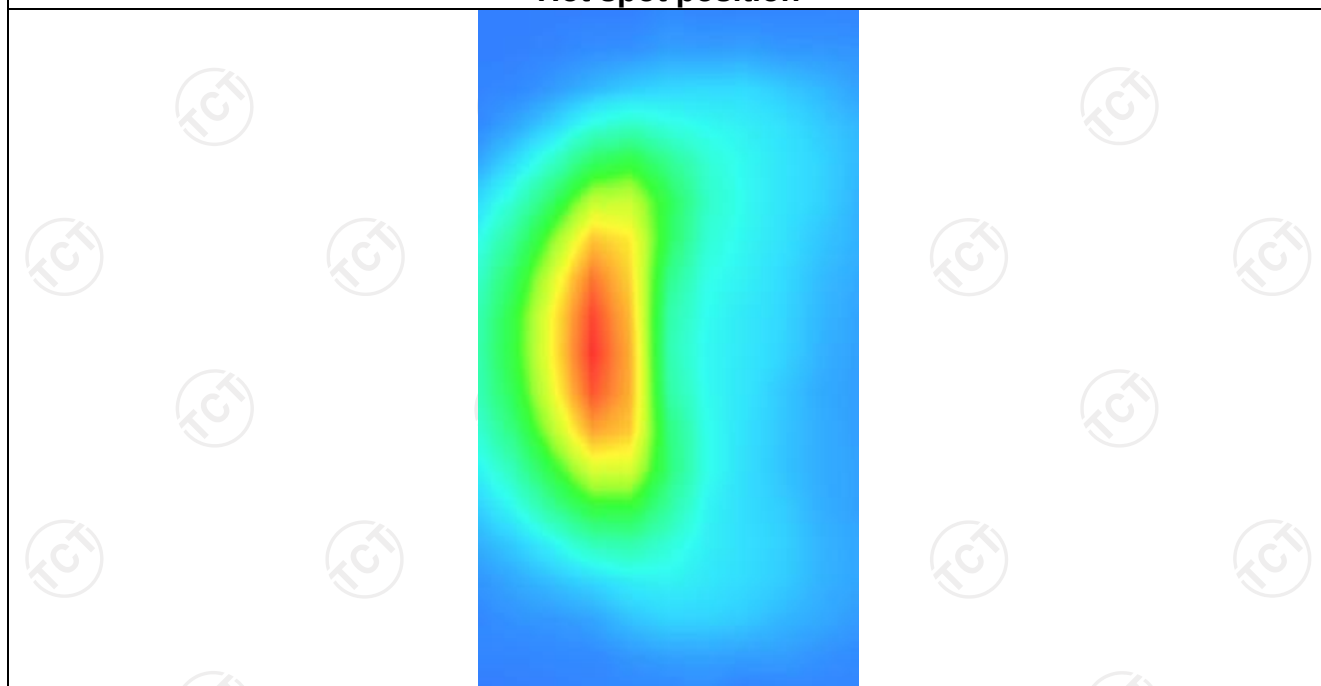
MEASUREMENT 1

High Band SAR (Channel 133372):		Date: 12/11/2023
Frequency (MHz)	688.000000	
Relative permittivity (real part)	41.500000	
Relative permittivity (imaginary part)	19.400000	
Conductivity (S/m)	0.901561	
Variation (%)	2.130000	
Crest Factor	1.0	
Probe Conversion factor	4.36	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	LTE band 71(1 RB#0)	
SURFACE SAR		VOLUME SAR
		
Maximum location: X=-16.00, Y=0.00 SAR Peak: 1.19 W/kg		
SAR 10g (W/Kg)	0.351625	
SAR 1g (W/Kg)	0.627157	
		

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1828	0.7209	0.3786	0.2060	0.1256



Hot spot position



MEASUREMENT 2

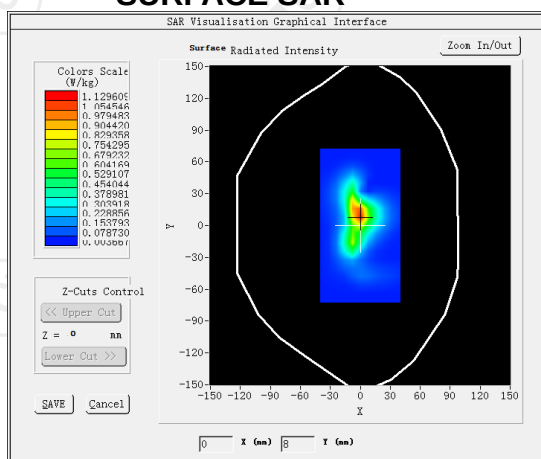
High Band SAR (Channel 133372):

Date: 12/11/2023

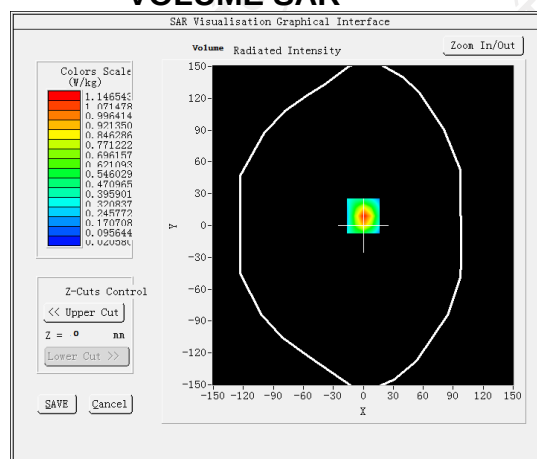
Frequency (MHz)	688.000000
Relative permittivity (real part)	41.500000
Relative permittivity (imaginary part)	19.400000
Conductivity (S/m)	0.901561
Variation (%)	1.570000
Crest Factor	1.0
Probe Conversion factor	4.36
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(hotspot 0mm)
Band	<u>LTE band 71(1 RB#0)</u>

SURFACE SAR

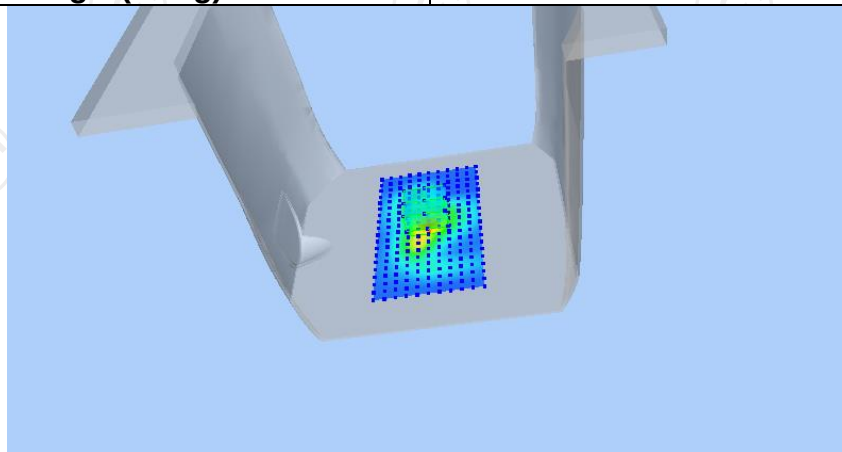


VOLUME SAR

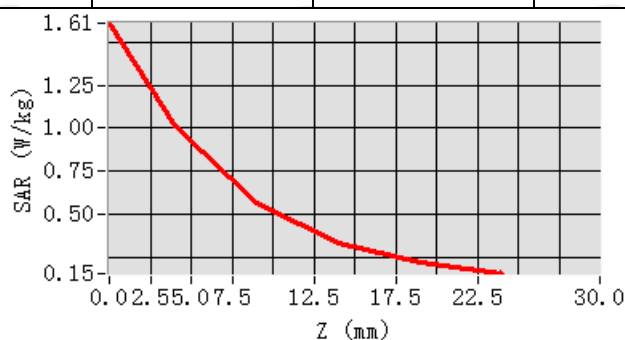


Maximum location: X=-16.00, Y=0.00 SAR Peak: 1.63 W/kg

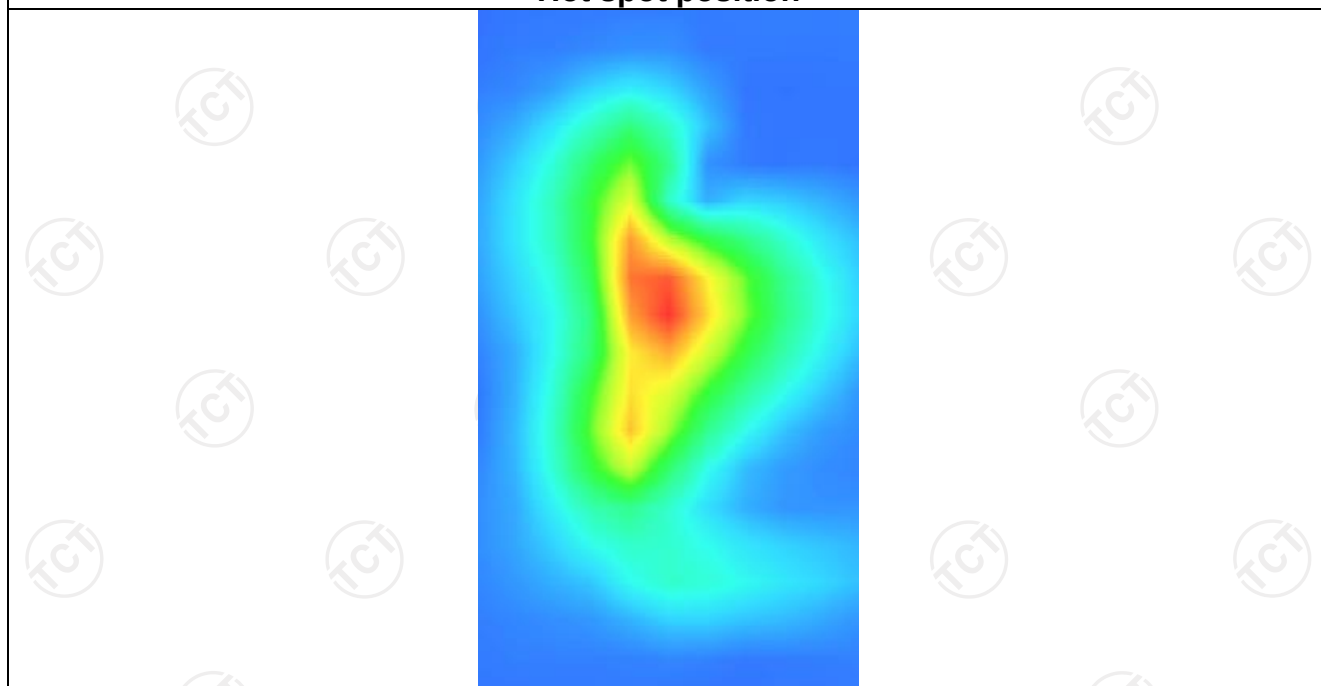
SAR 10g (W/Kg)	0.423159
SAR 1g (W/Kg)	0.601387



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.6115	1.0167	0.5657	0.3309	0.2175

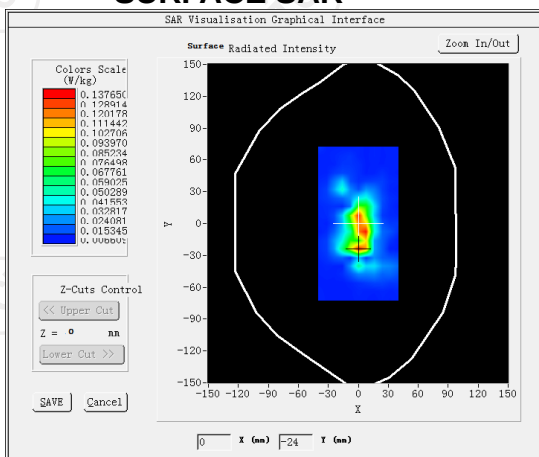
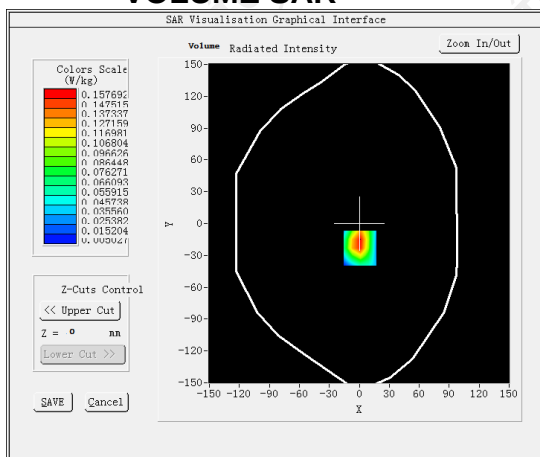
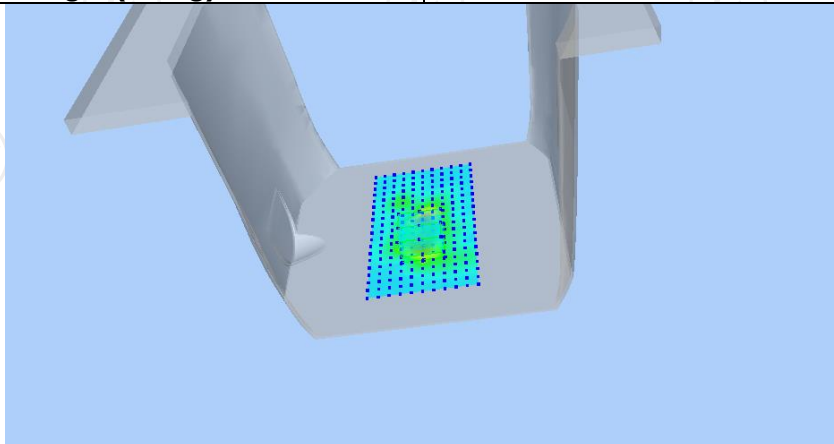


Hot spot position

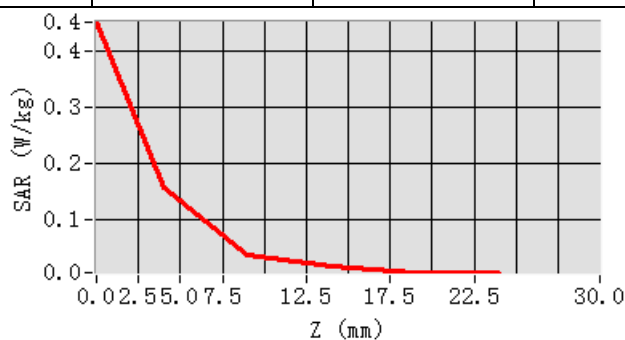


WLAN 2.4G

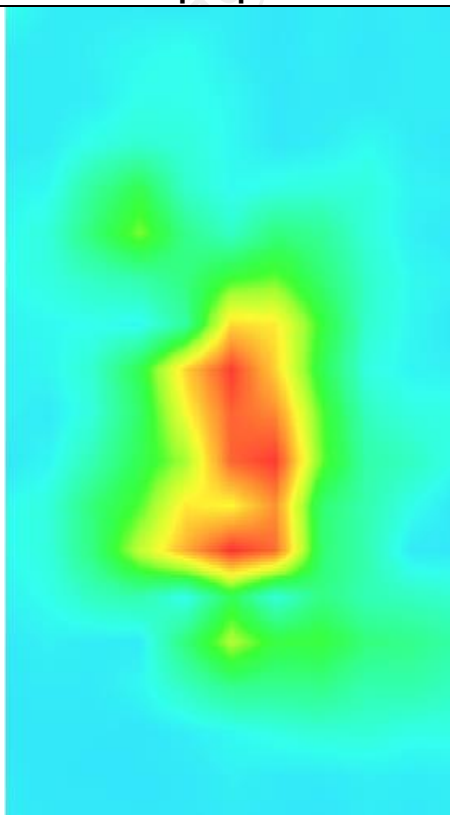
MEASUREMENT 1

High Band SAR (Channel 11):		Date: 12/21/2023
Frequency (MHz)	2462.000000	
Relative permittivity (real part)	39.226002	
Relative permittivity (imaginary part)	13.207000	
Conductivity (S/m)	1.788081	
Variation (%)	2.140000	
Crest Factor	1.0	
Probe Conversion factor	2.31	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	IEEE 802.11b ISM	
SURFACE SAR		VOLUME SAR
		
Maximum location: X=1.00, Y=23.00 SAR Peak: 0.44 W/kg		
SAR 10g (W/Kg)		0.170419
SAR 1g (W/Kg)		0.253701
		

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4497	0.1577	0.0368	0.0175	0.0072



Hot spot position



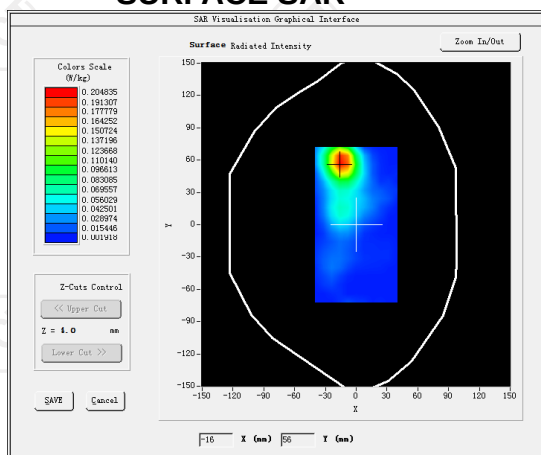
MEASUREMENT 2

High Band SAR (Channel 11):

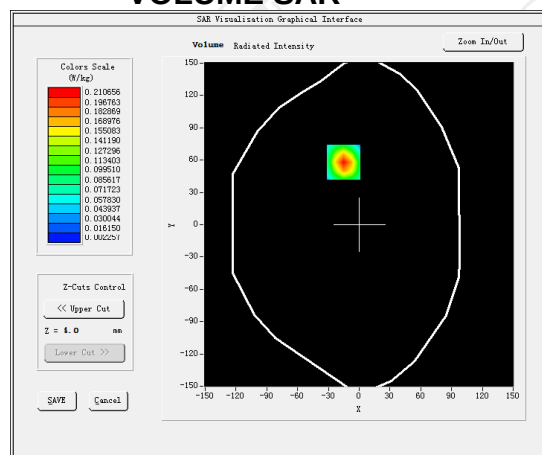
Date: 12/21/2023

Frequency (MHz)	2462.000000
Relative permittivity (real part)	39.226002
Relative permittivity (imaginary part)	13.207000
Conductivity (S/m)	1.788081
Variation (%)	-1.380000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
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(0mm)
Band	IEEE 802.11b ISM(hotspot)

SURFACE SAR

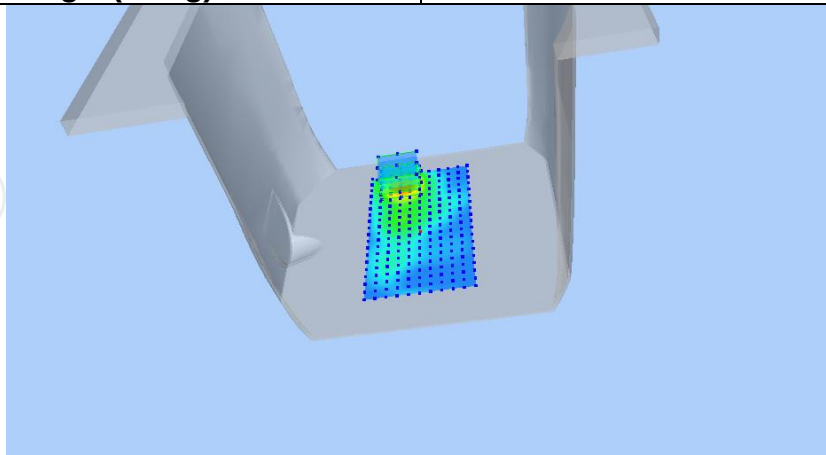


VOLUME SAR

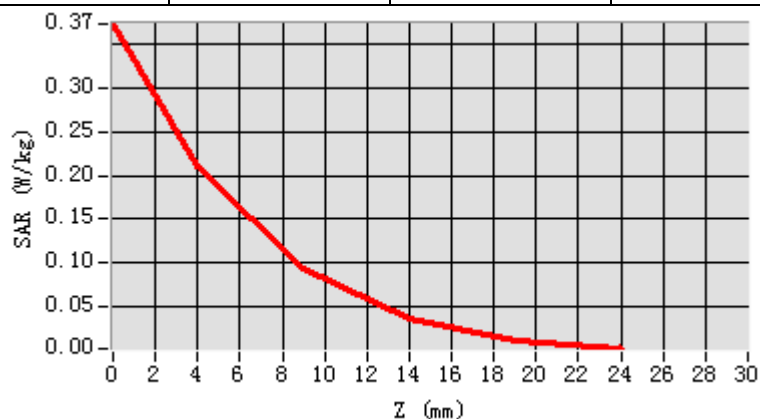


Maximum location: X=-15.00, Y=58.00 SAR Peak: 0.57 W/kg

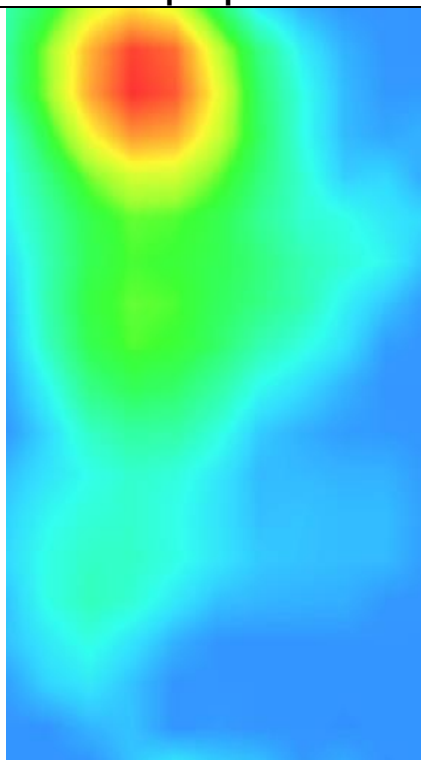
SAR 10g (W/Kg)	0.192132
SAR 1g (W/Kg)	0.300288



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3732	0.2107	0.0935	0.0368	0.0124

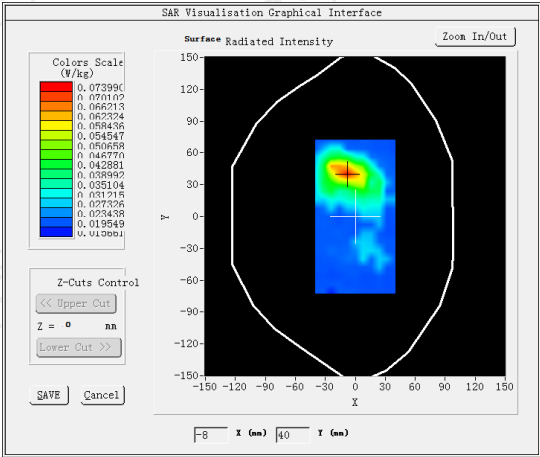
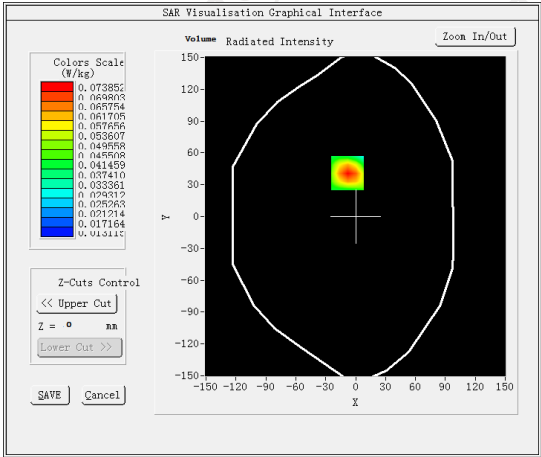
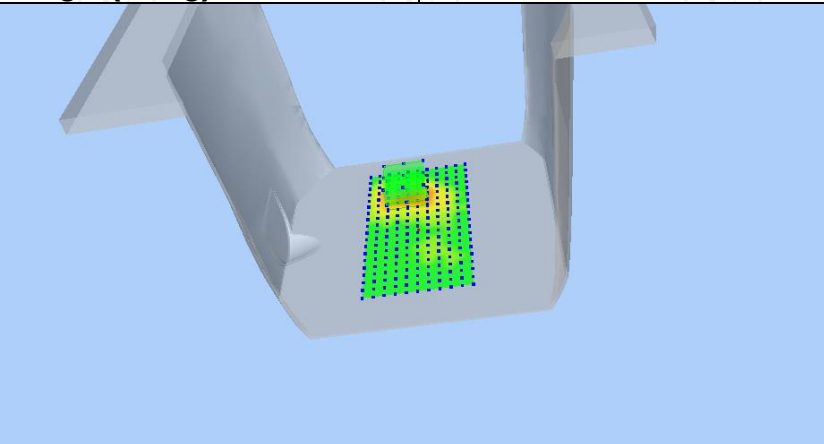


Hot spot position

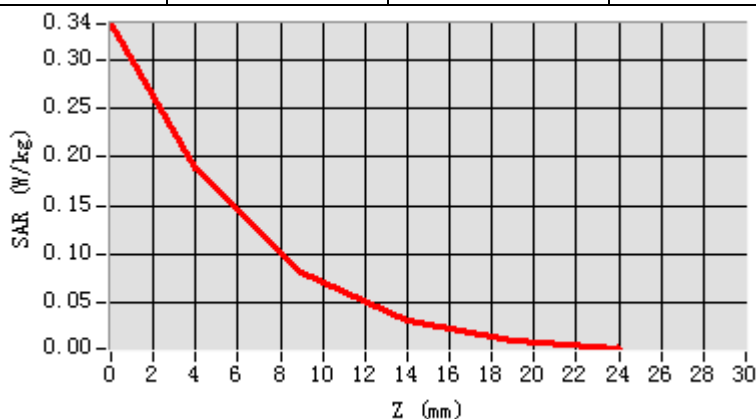


WLAN 5.2G

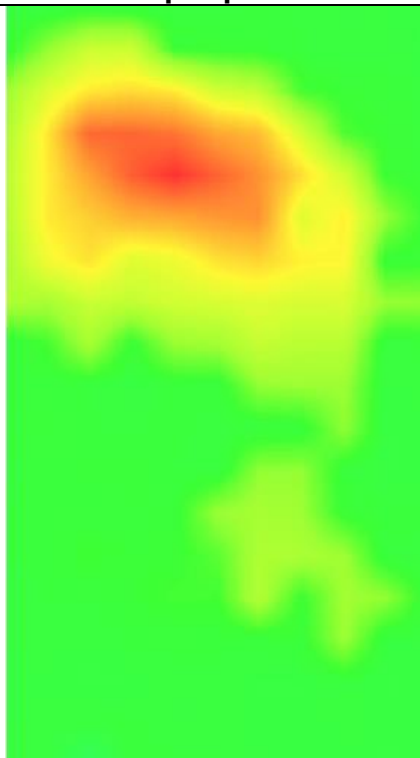
MEASUREMENT 1

SAR (Channel 36):		Date: 12/27/2023
Frequency (MHz)	5180.000000	
Relative permittivity (real part)	35.068832	
Relative permittivity (imaginary part)	13.679428	
Conductivity (S/m)	5.220788	
Variation (%)	3.120000	
Crest Factor	1.0	
Probe Conversion factor	2.01	
E-Field Probe:	SSE2 (SN 25/22 EPG0375)	
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(0mm)	
Band	IEEE 802.11a	
SURFACE SAR		VOLUME SAR
		
Maximum location: X=16.00, Y=63.00 SAR Peak: 0.30 W/kg		
SAR 10g (W/Kg)	0.138422	
SAR 1g (W/Kg)	0.219001	
		

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3372	0.1876	0.0816	0.0317	0.0109



Hot spot position



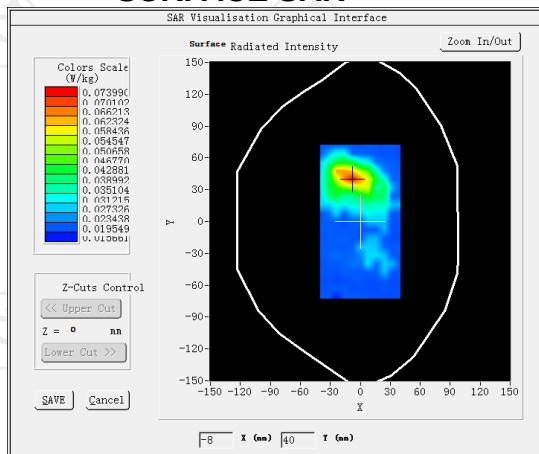
MEASUREMENT 2

SAR (Channel 36):

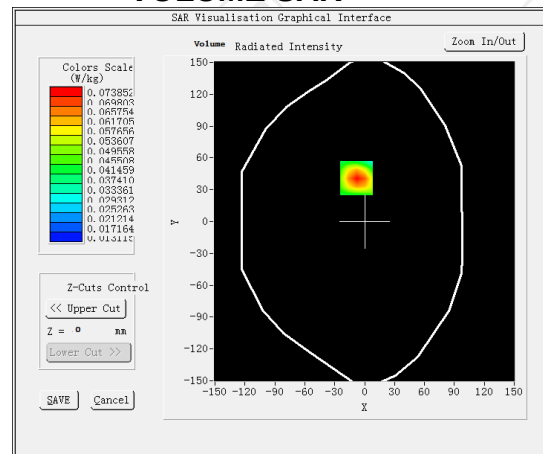
Date: 12/27/2023

Frequency (MHz)	5180.000000
Relative permittivity (real part)	35.068832
Relative permittivity (imaginary part)	13.679428
Conductivity (S/m)	5.220788
Variation (%)	-0.510000
Crest Factor	1.0
Probe Conversion factor	2.01
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
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 0mm)
Band	IEEE 802.11a

SURFACE SAR

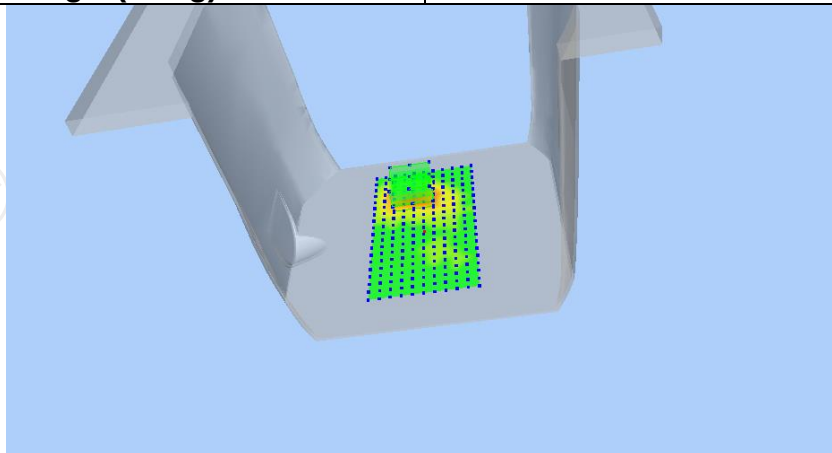


VOLUME SAR

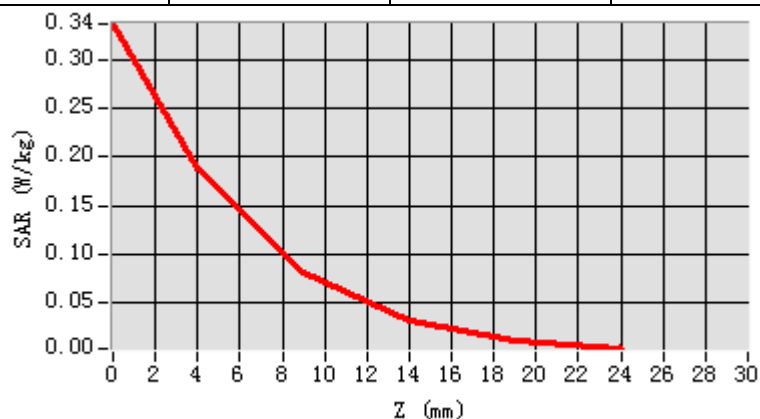


Maximum location: X=19.00, Y=-12.00 SAR Peak: 0.34 W/kg

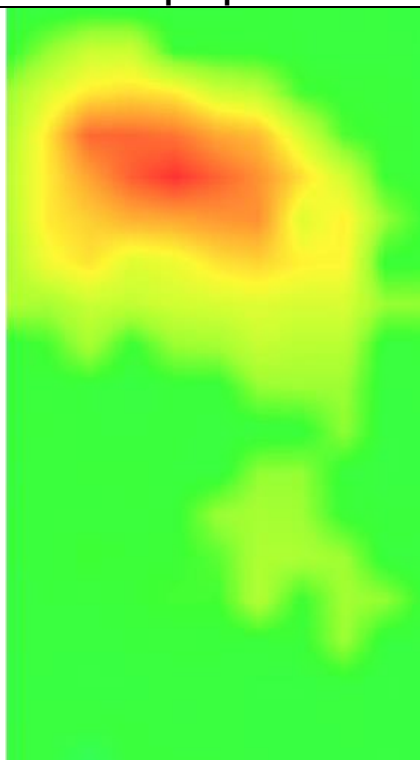
SAR 10g (W/Kg)	0.168191
SAR 1g (W/Kg)	0.231620



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3397	0.1890	0.0823	0.0317	0.0117



Hot spot position



WLAN 5.8G

MEASUREMENT 1

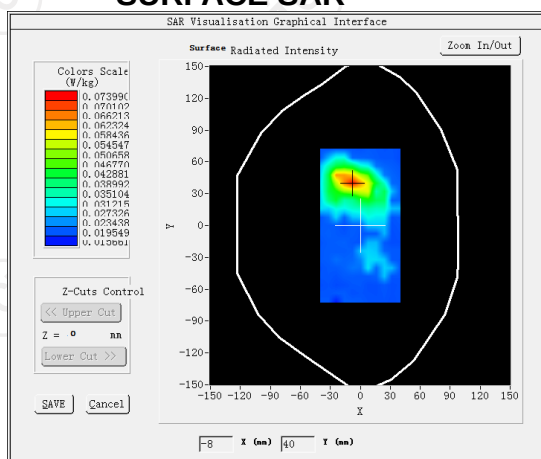
SAR (Channel 157):

Date: 12/27/2023

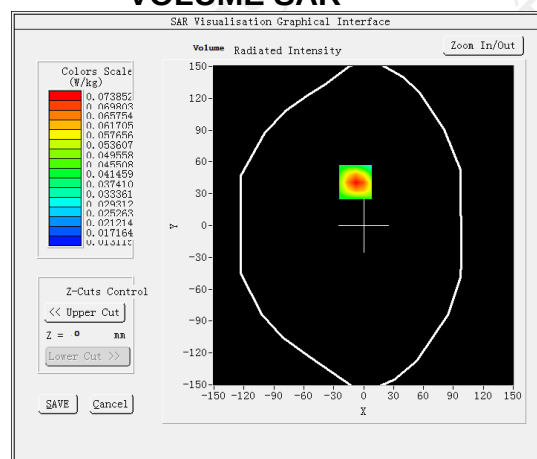
Frequency (MHz)	5785.000000
Relative permittivity (real part)	38.352823
Relative permittivity (imaginary part)	13.671675
Conductivity (S/m)	5.430828
Variation (%)	2.120000
Crest Factor	1.0
Probe Conversion factor	2.13
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	Validation plane
Device Position	Body back(0mm)
Band	IEEE 802.11ac VHT20

SURFACE SAR

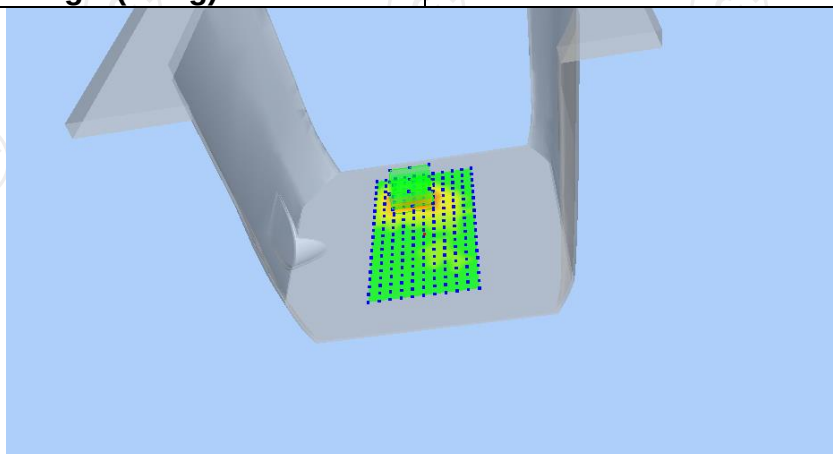


VOLUME SAR

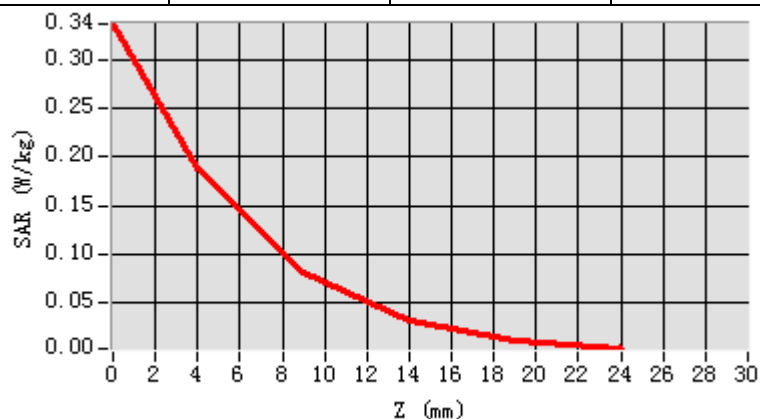


Maximum location: X=15.00, Y=60.00 SAR Peak: 0.34 W/kg

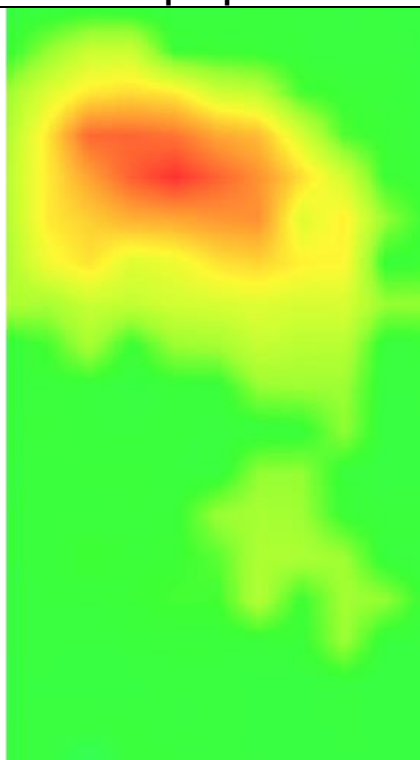
SAR 10g (W/Kg)	0.116201
SAR 1g (W/Kg)	0.168130



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3410	0.1901	0.0791	0.0327	0.0109



Hot spot position



MEASUREMENT 2

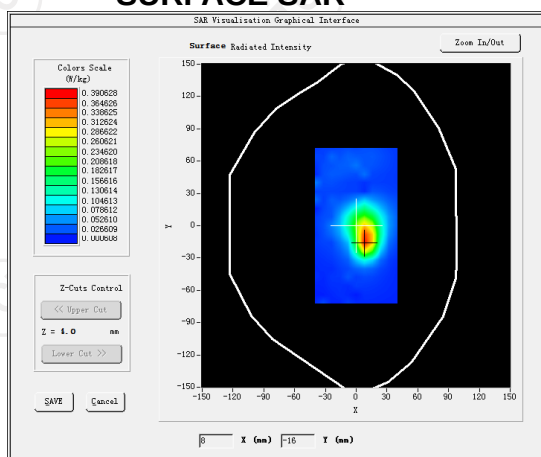
SAR (Channel 157):

Date: 12/27/2023

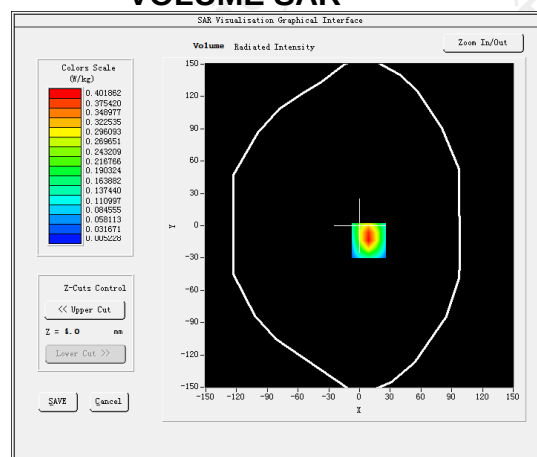
Frequency (MHz)	5785.000000
Relative permittivity (real part)	38.352823
Relative permittivity (imaginary part)	13.671675
Conductivity (S/m)	5.430828
Variation (%)	2.350000
Crest Factor	1.0
Probe Conversion factor	2.13
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7,dx=8mm dy=8mm</u> <u>dz=5mm,Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

Phantom	<u>Validation plane</u>
Device Position	<u>Body back(0mm)</u>
Band	<u>IEEE 802.11ac HT20(hotspot)</u>

SURFACE SAR

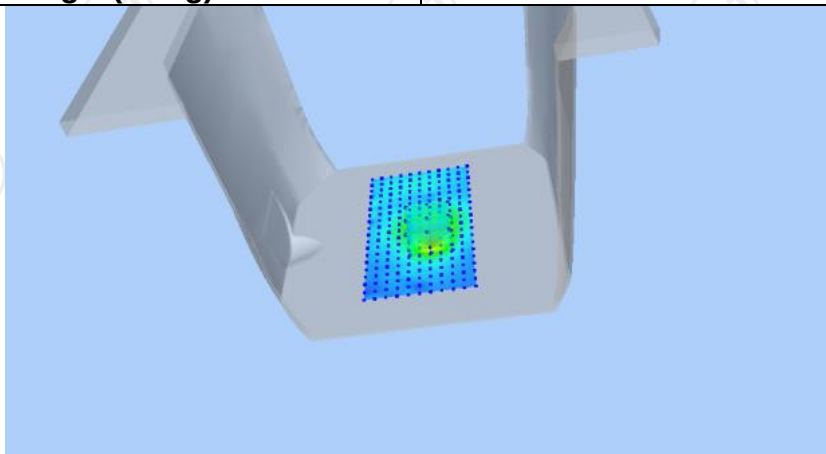


VOLUME SAR

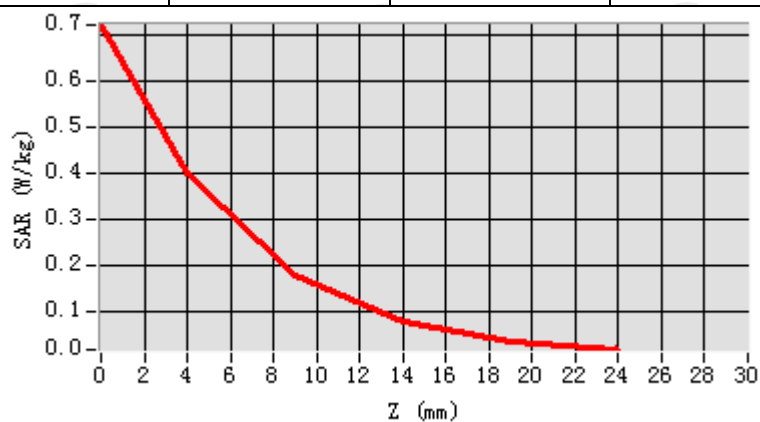


Maximum location: X=19.00, Y=-12.00 SAR Peak: 0.69 W/kg

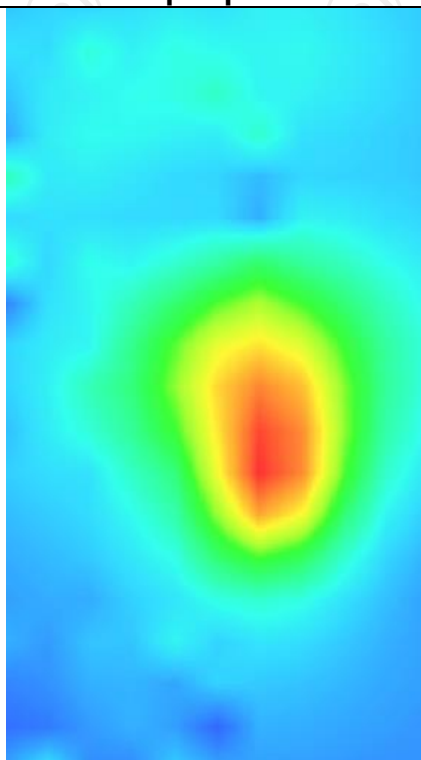
SAR 10g (W/Kg)	0.151267
SAR 1g (W/Kg)	0.216830



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.6971	0.3951	0.1904	0.0694	0.0381



Hot spot position



BT

MEASUREMENT 1

Low Band SAR (Channel 0):

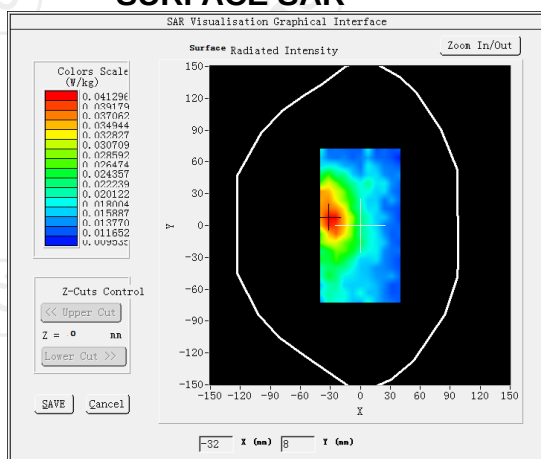
Date: 12/21/2023

Frequency (MHz)	2402.000000
Relative permittivity (real part)	39.217999
Relative permittivity (imaginary part)	13.211000
Conductivity (S/m)	1.791558
Variation (%)	-1.420000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 25/22 EPG0375)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
ZoomScan	<u>5x5x7, dx=8mm dy=8mm</u> <u>dz=5mm, Complete/ndx=8mm dy=8mm, h=</u> <u>5.00 mm</u>

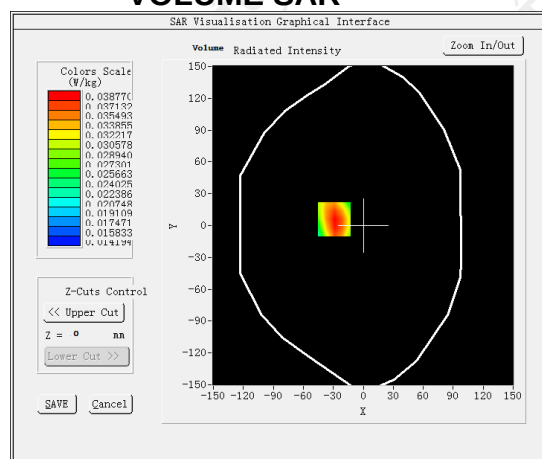
Phantom	Validation plane
Device Position	Body back(0mm)

Band	GFSK
------	------

SURFACE SAR



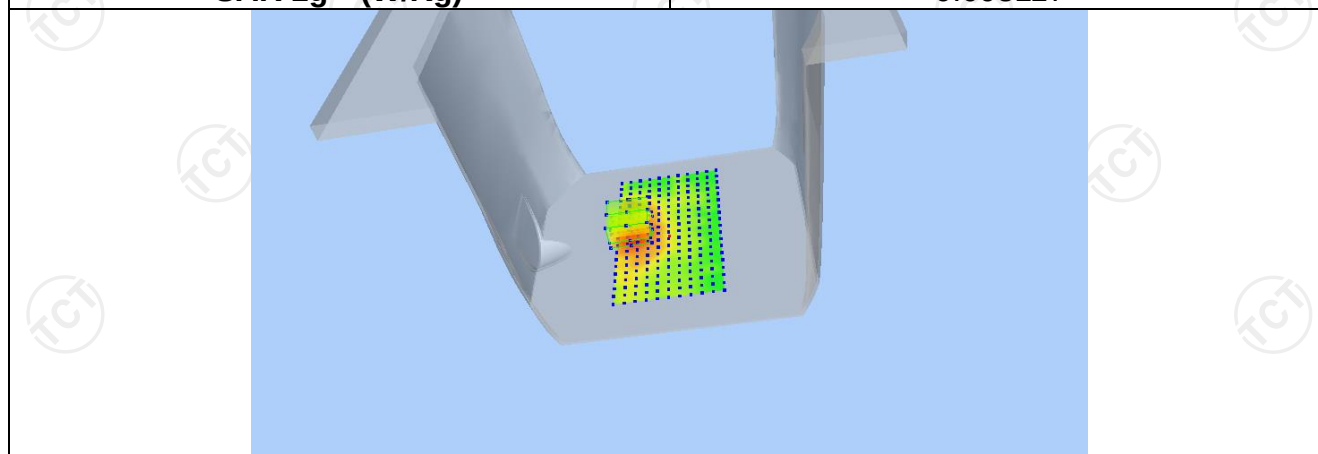
VOLUME SAR



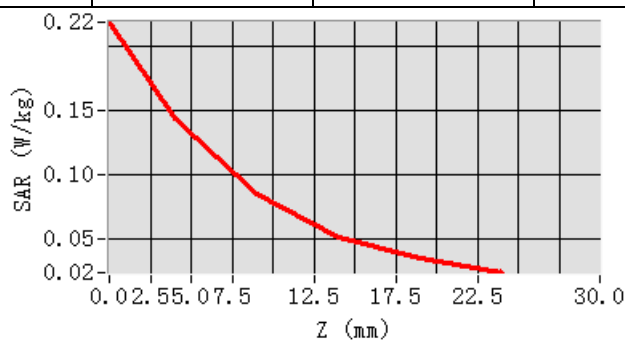
Maximum location: X=-29.00, Y=6.00 SAR Peak: 0.22 W/kg

SAR 10g (W/Kg)	0.058107
----------------	----------

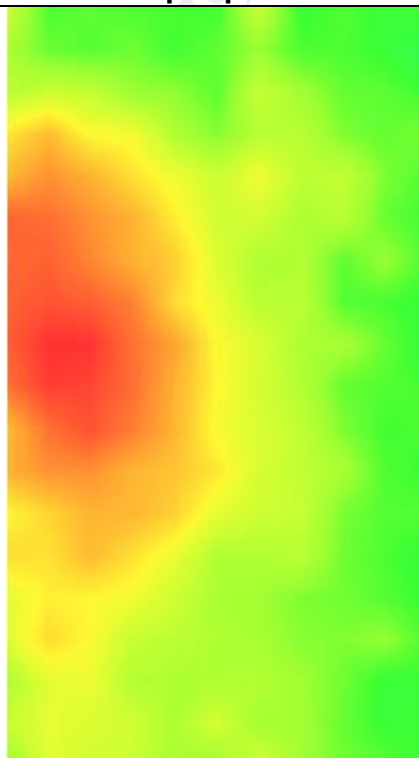
SAR 1g (W/Kg)	0.098117
---------------	----------



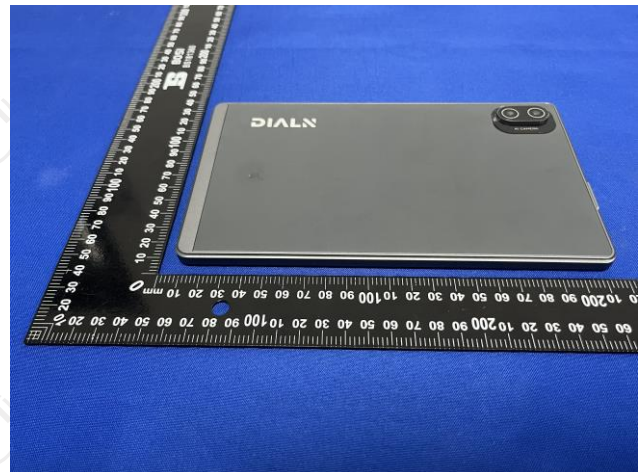
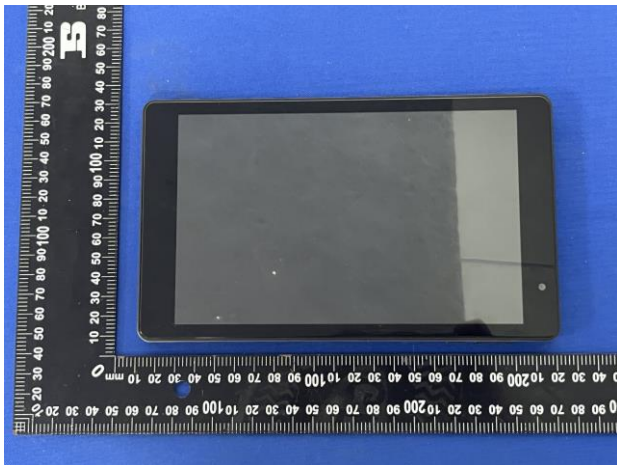
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2186	0.1441	0.0851	0.0523	0.0350



Hot spot position



Appendix A: EUT Photos



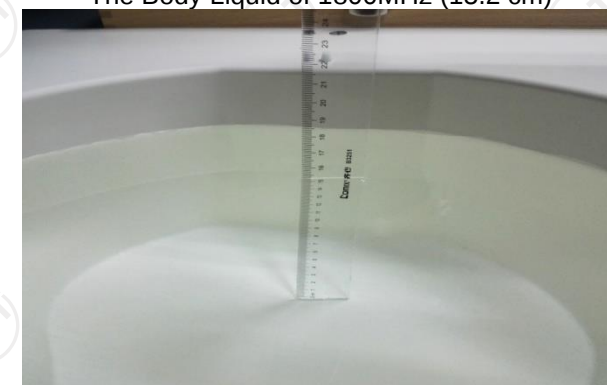
Liquid depth



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 5000-6000MHz (16.5cm)

The Body Liquid of 750MHz (15.4cm)



The Body Liquid of 2600MHz (16.5cm)

Appendix B: Test Setup Photos



Body worn – Front (0mm)



Body worn – Back (0mm)



Body worn – Bottom (0mm)



Body worn – Top (0mm)



Hotspo Front (0mm)



Hotspo Back (0mm)



Hotspot Bottom (0mm)



Hotspot Top (0mm)

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 EPG0375

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 06/29/2023



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	6/30/2023	
Checked & approved by:	Jérôme Luc	Technical Manager	6/30/2023	
Authorized by:	Yann Toutain	Laboratory Director	7/05/2023	

	Customer Name
Distribution :	Shenzhen Tongce Testing Lab

Issue	Name	Date	Modifications
A	Jérôme Le Gall	6/30/2023	Initial release

Page: 2/11

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.180.7.22.BES.B

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**COMOSAR E-FIELD PROBE CALIBRATION REPORT**

Ref: ACR.180.7.22.BES.B

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:

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

where

$SAR_{uncertainty}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest <i>zoom-scan</i> 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%).



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 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
0.64	0.53	0.44

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

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

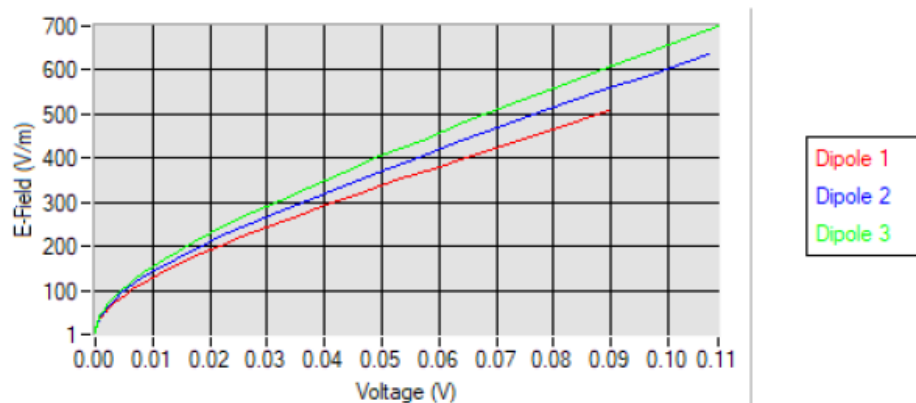
$$E = \sqrt{E_1^2 + E_2^2 + E_3^2}$$



COMOSAR E-FIELD PROBE CALIBRATION REPORT

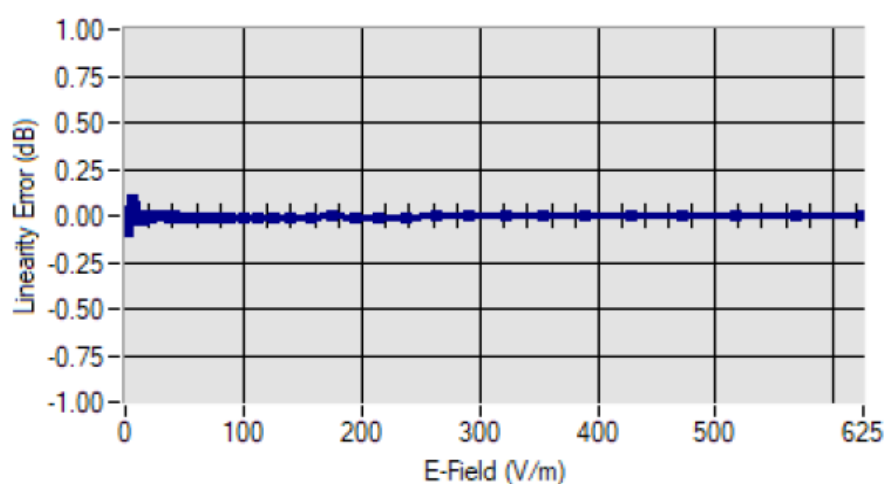
Ref: ACR.180.7.22.BES.B

Calibration curves



5.2 LINEARITY

Linearity



Linearity: $\pm 1.94\%$ ($\pm 0.09\text{dB}$)



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.180.7.22.BES.B

5.3 SENSITIVITY IN LIQUID

<u>Liquid</u>	<u>Frequency (MHz +/- 100MHz)</u>	<u>ConvF</u>
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

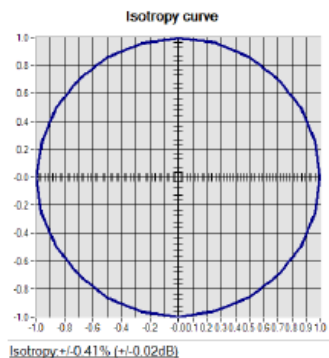


COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.180.7.22.BES.B

5.4 ISOTROPY

HL1800 MHz





COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.180.7.22.BES.B

6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
CALIPROBE Test Bench	Version 2	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2023	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	06/2021	06/2024
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.

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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	06/2021	06/2024



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



Calibration Date: 06/05/2021

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..SATUA

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	06/05/2021	<i>JS</i>
Checked by :	Jérôme LUC	Product Manager	06/05/2021	<i>JS</i>
Approved by :	Kim RUTKOWSKI	Quality Manager	06/05/2021	<i>Kim Rutkowski</i>

	Customer Name
Distribution :	SHENZHEN TONGCE TESTING LAB

Issue	Date	Modifications
A	06/05/2021	Initial release



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SAR DIELECTRIC PROBE CALIBRATION REPORT

Ref: ACR.138.4.33..SATU.A

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	$\sqrt{3}$	1	2.887%
Network analyser-drift, linearity	2.00%	R	$\sqrt{3}$	1	1.155%
Test-port cable variations	0.00%	U	$\sqrt{2}$	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	$\sqrt{3}$	1	1.732%
Network analyser-drift, linearity	2.00%	R	$\sqrt{3}$	1	1.155%
Test-port cable variations	0.00%	U	$\sqrt{2}$	1	0.000%
Combined standard uncertainty					4.072%
Expanded uncertainty (confidence level of 95%, k = 2)					8.1%

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