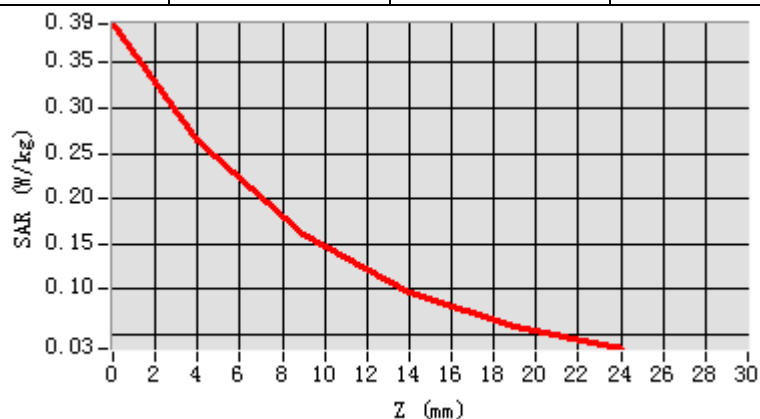
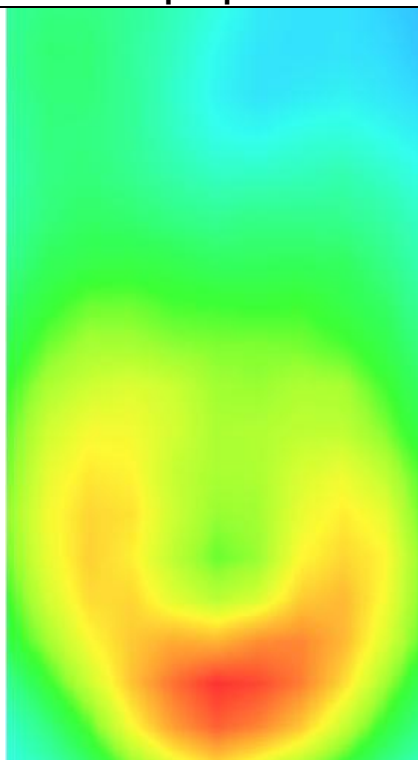


Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3941	0.2663	0.1681	0.0960	0.0592



Hot spot position



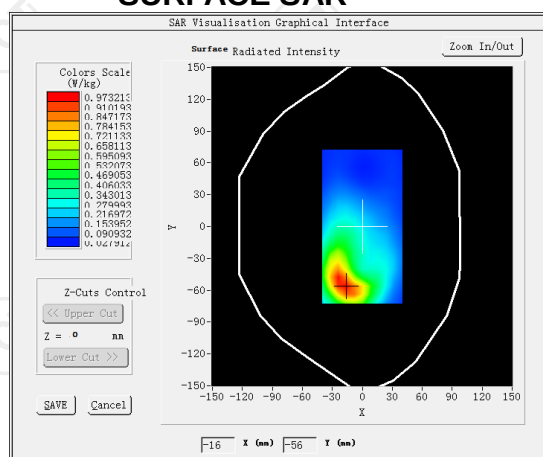
MEASUREMENT 3

Lower Band SAR (Channel 512):

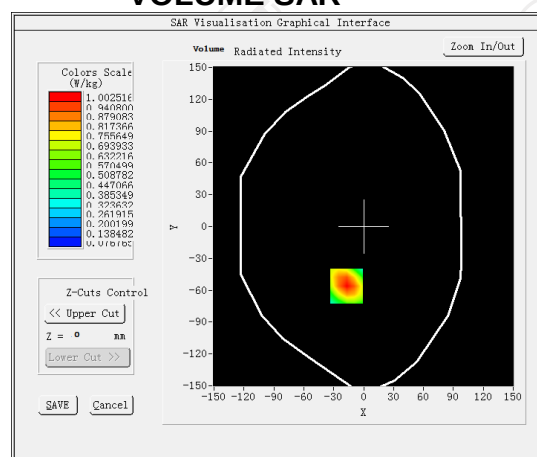
Date: 06/07/2021

Frequency (MHz)	1850.199951
Relative permittivity (real part)	53.291337
Relative permittivity (imaginary part)	14.322400
Conductivity (S/m)	1.531736
Variation (%)	0.480000
Crest Factor	1.0
Probe Conversion factor	2.32
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)</u>
Band	<u>GSM1900(GPRS 4slot)</u>

SURFACE SAR

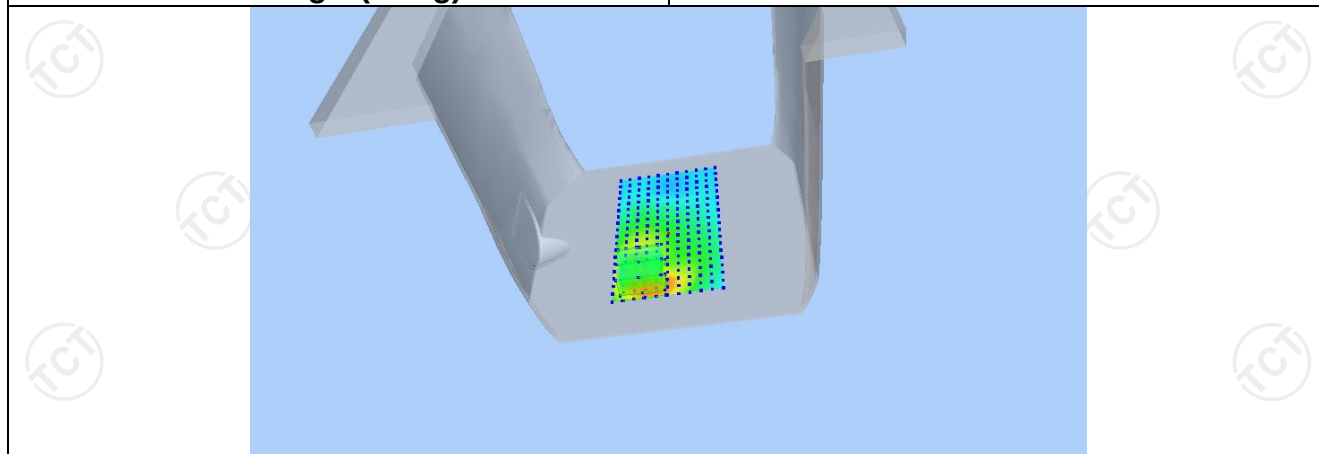


VOLUME SAR

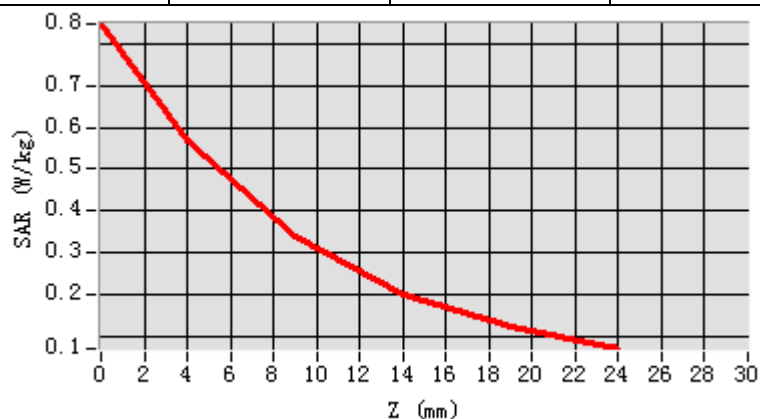


Maximum location: X=-17.00, Y=-56.00 SAR Peak: 1.58 W/kg

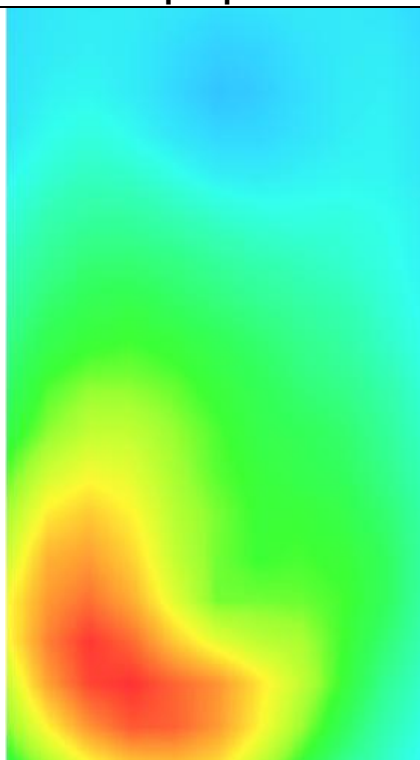
SAR 10g (W/Kg)	0.303660
SAR 1g (W/Kg)	0.524967



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8473	0.5679	0.3373	0.1999	0.1205



Hot spot position



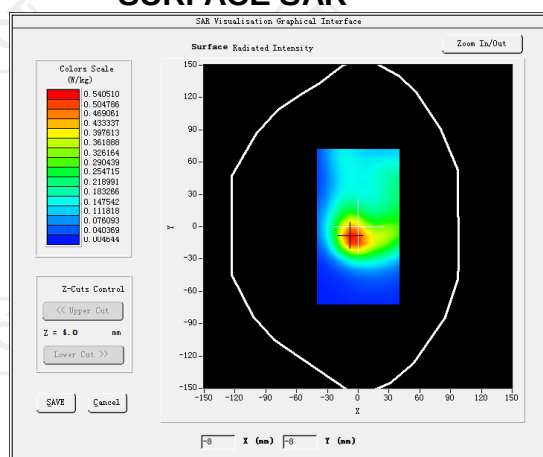
MEASUREMENT 4

Lower Band SAR (Channel 512):

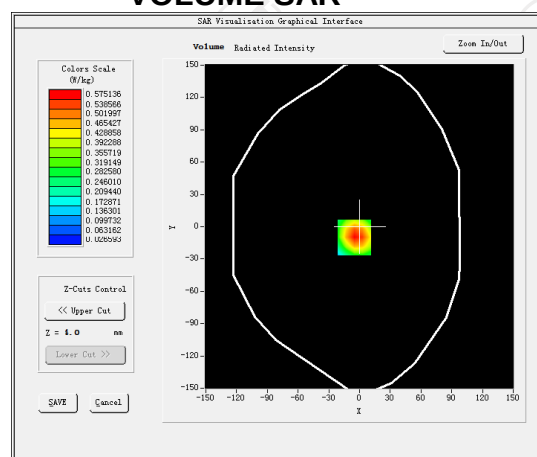
Date: 06/07/2021

Frequency (MHz)	1850.199951
Relative permittivity (real part)	53.341337
Relative permittivity (imaginary part)	14.322400
Conductivity (S/m)	1.491736
Variation (%)	1.060000
Crest Factor	1.0
Probe Conversion factor	2.32
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)
Band	GSM1900(GPRS 4slot hotspot)

SURFACE SAR

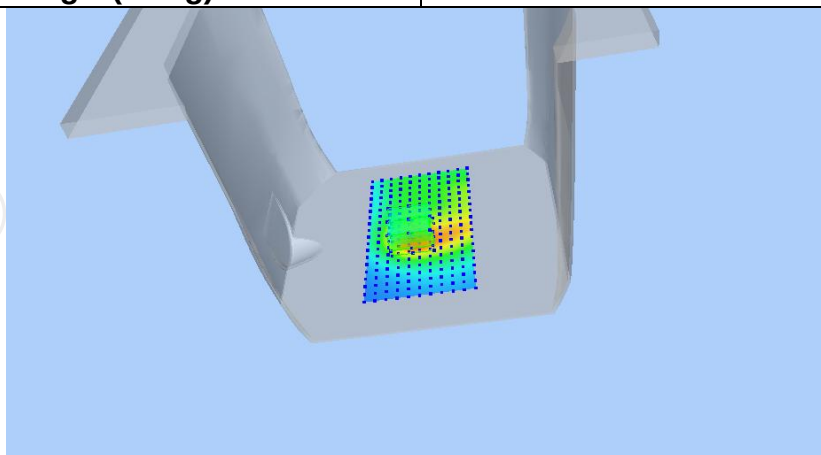


VOLUME SAR

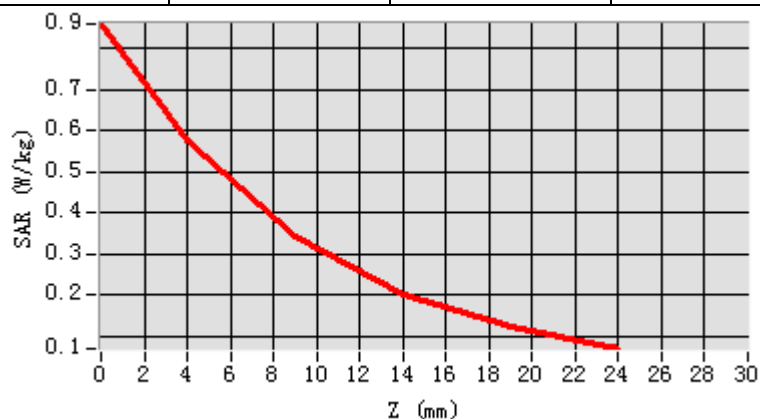


Maximum location: X=-5.00, Y=-10.00 SAR Peak: 0.87 W/kg

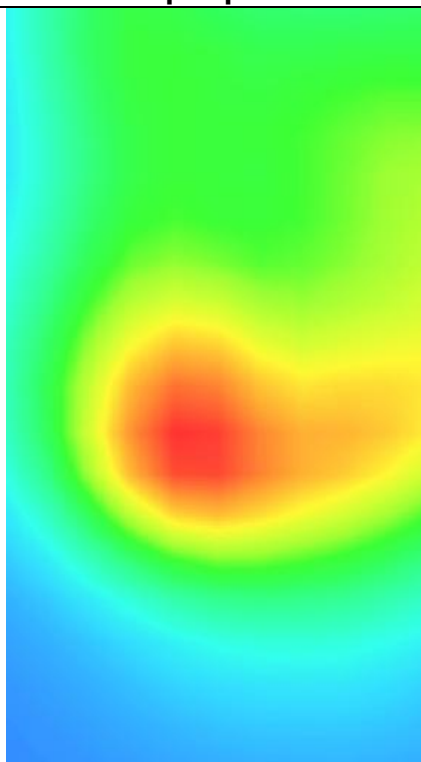
SAR 10g (W/Kg)	0.308172
SAR 1g (W/Kg)	0.543292



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8581	0.5751	0.3415	0.2023	0.1218



Hot spot position



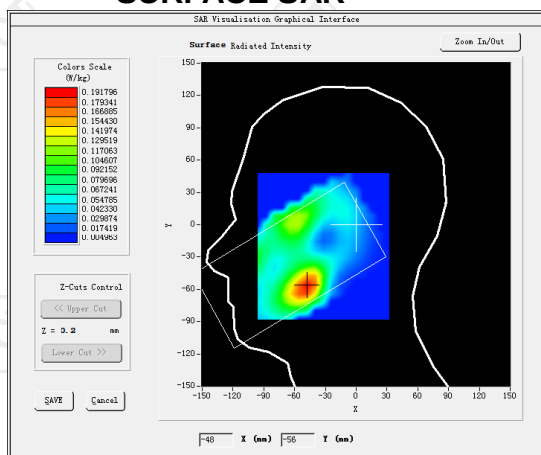
WCDMA Band II MEASUREMENT 1

Middle Band SAR (Channel 9400):

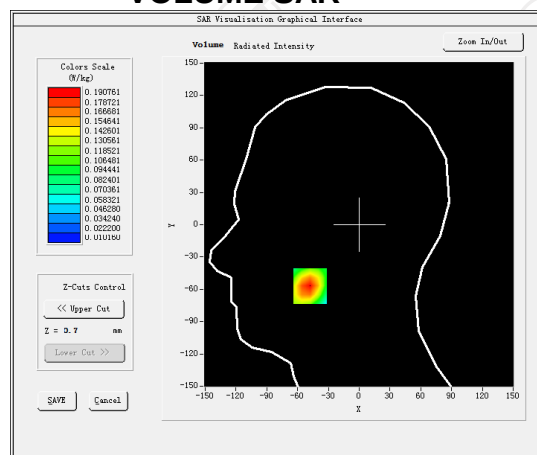
Date: 06/09/2021

Frequency (MHz)	1880.000000
Relative permittivity (real part)	39.072437
Relative permittivity (imaginary part)	12.607241
Conductivity (S/m)	1.377279
Variation (%)	-1.350000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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>Right head</u>
Device Position	<u>Cheek</u>
Band	<u>BAND1 WCDMA2100</u>

SURFACE SAR

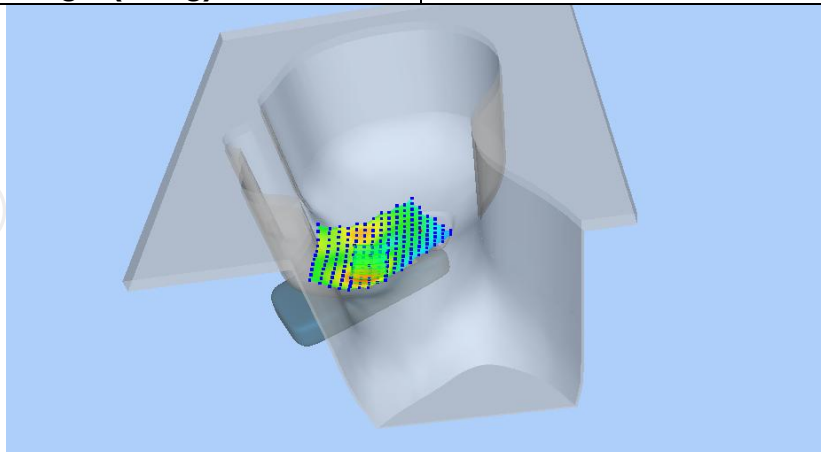


VOLUME SAR

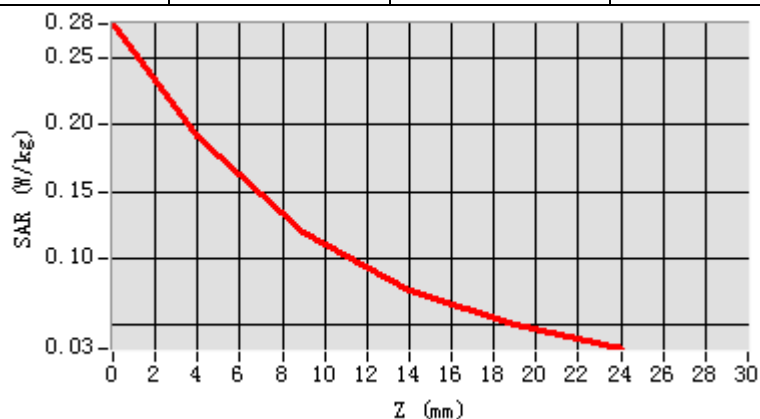


Maximum location: X=-48.00, Y=-53.00 SAR Peak: 0.28 W/kg

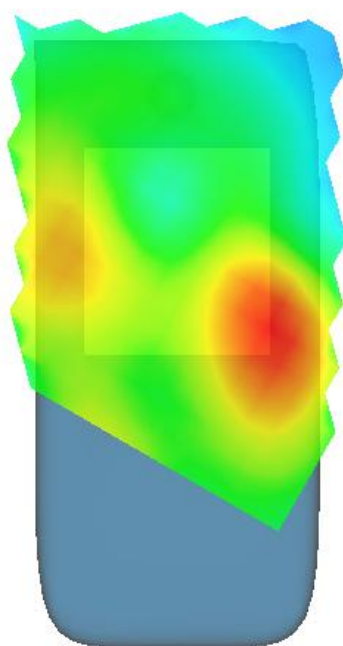
SAR 10g (W/Kg)	0.106065
SAR 1g (W/Kg)	0.219751



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2752	0.1908	0.1196	0.0761	0.0501



Hot spot position



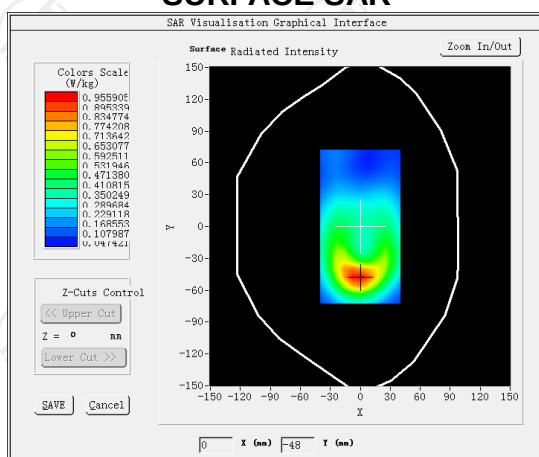
MEASUREMENT 2

Middle Band SAR (Channel 9400):

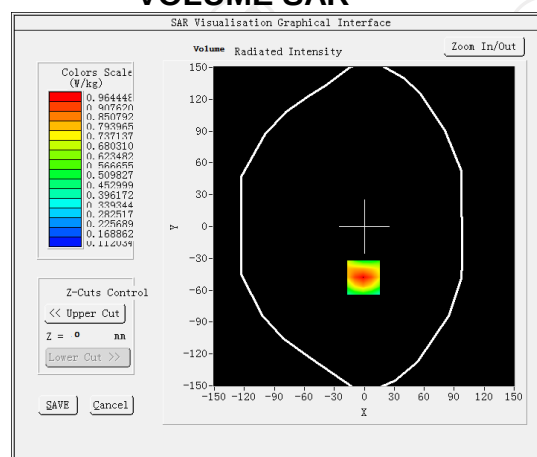
Date: 06/09/2021

Frequency (MHz)	1880.000000
Relative permittivity (real part)	53.291337
Relative permittivity (imaginary part)	14.232400
Conductivity (S/m)	1.526736
Variation (%)	-0.050000
Crest Factor	1.0
Probe Conversion factor	2.32
E-Field Probe:	SSE2 (SN 36/20 EPGO346)
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(10mm)</u>
Band	<u>BAND1 WCDMA2100</u>

SURFACE SAR

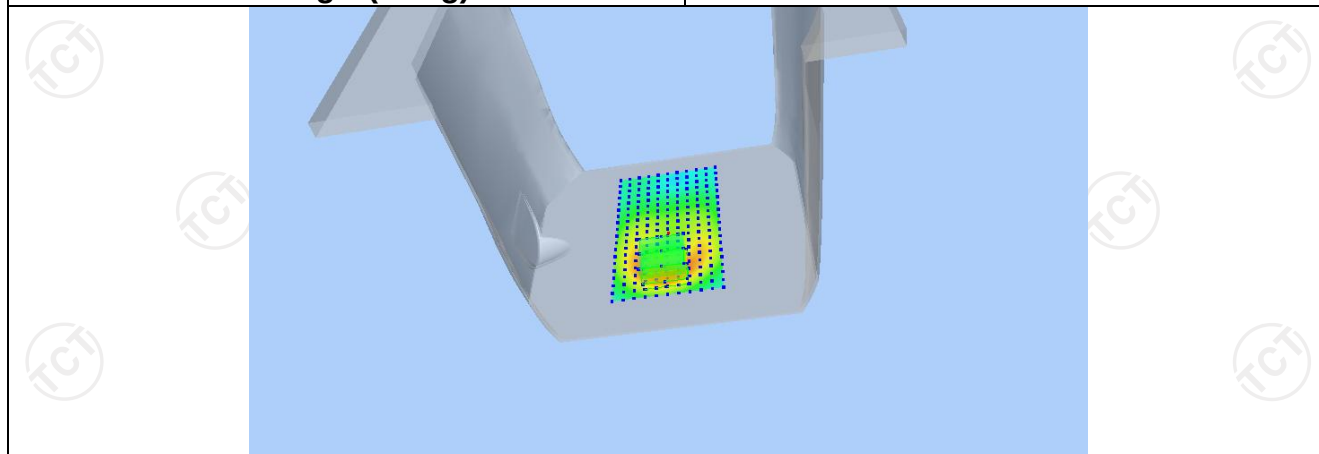


VOLUME SAR

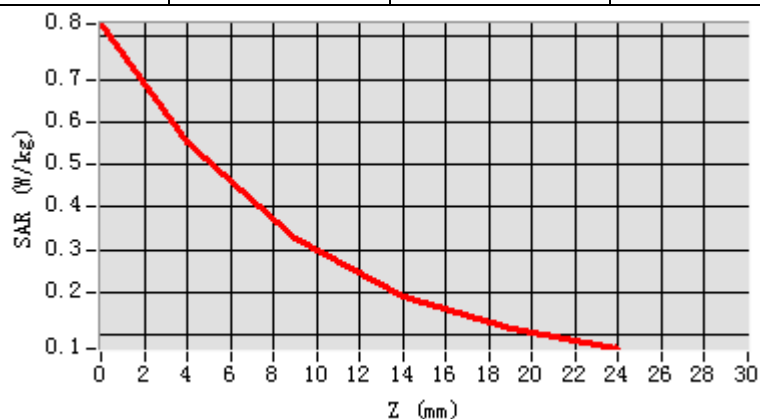


Maximum location: X=-1.00, Y=-48.00 SAR Peak: 1.38 W/kg

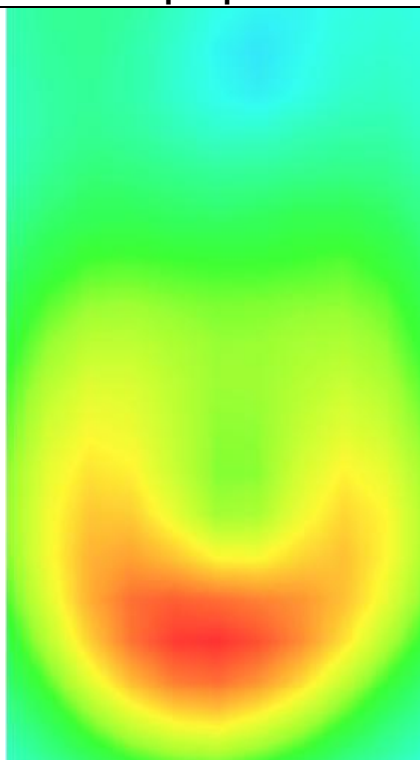
SAR 10g (W/Kg)	0.294218
SAR 1g (W/Kg)	0.618497



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8301	0.5529	0.3259	0.1923	0.1160



Hot spot position



MEASUREMENT 3

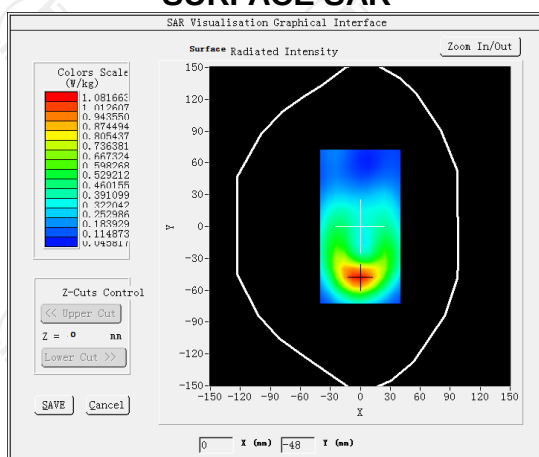
Middle Band SAR (Channel 9400):

Date: 06/09/2021

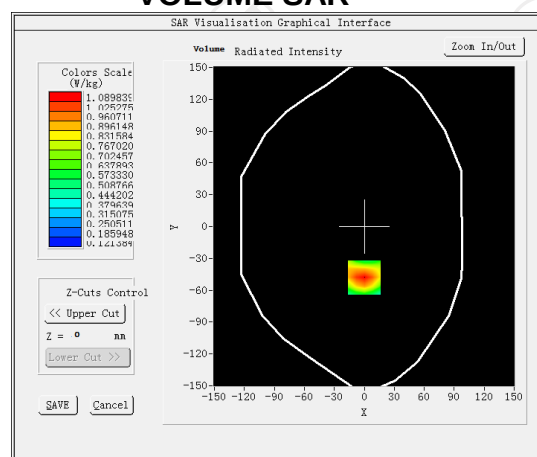
Frequency (MHz)	1880.000000
Relative permittivity (real part)	53.291337
Relative permittivity (imaginary part)	14.232400
Conductivity (S/m)	1.526736
Variation (%)	-1.100000
Crest Factor	1.0
Probe Conversion factor	2.32
E-Field Probe:	SSE2 (SN 36/20 EPGO346)
Area Scan	<u>dx=8mm dy=8mm, h= 5.00 mm</u>
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 bottom(10mm)
Band	BAND1 WCDMA2100(hotspot)

SURFACE SAR

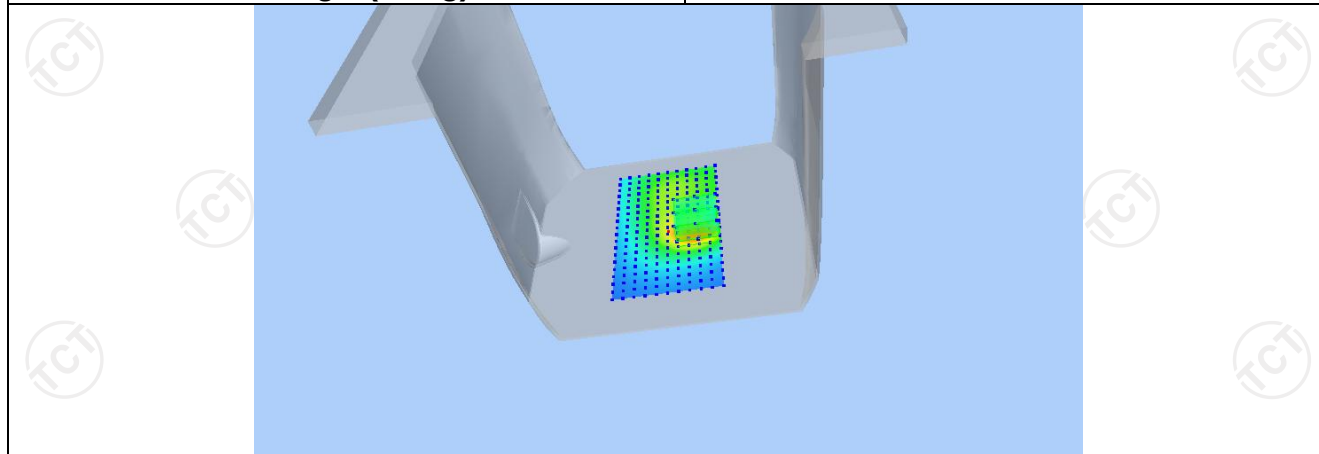


VOLUME SAR

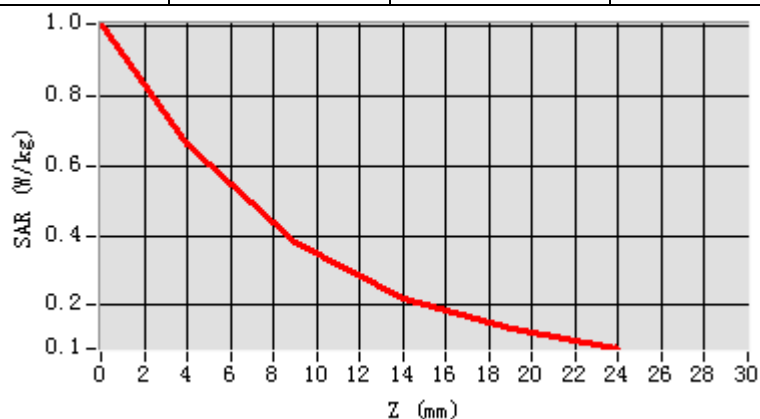


Maximum location: X=0.00, Y=-48.00 SAR Peak: 1.56 W/kg

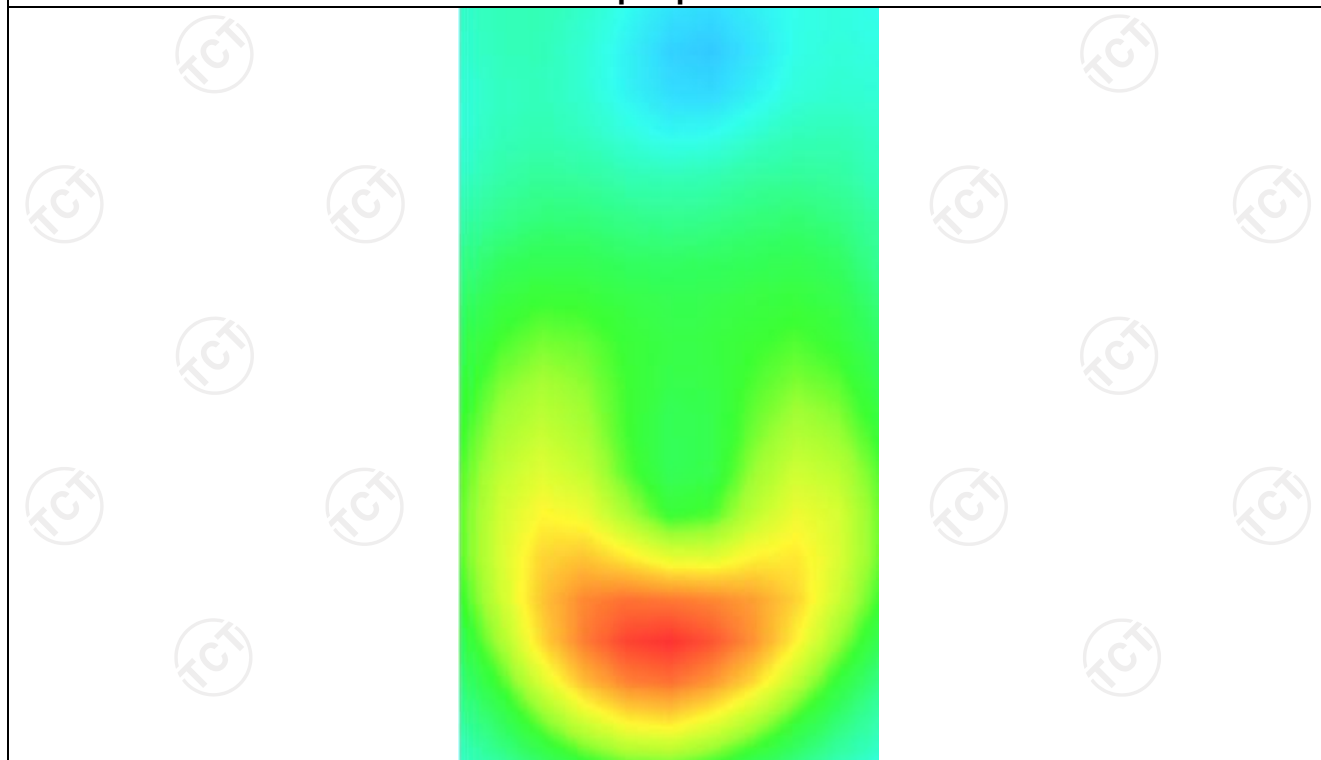
SAR 10g (W/Kg)	0.347134
SAR 1g (W/Kg)	0.641439



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.0080	0.6627	0.3834	0.2220	0.1320



Hot spot position



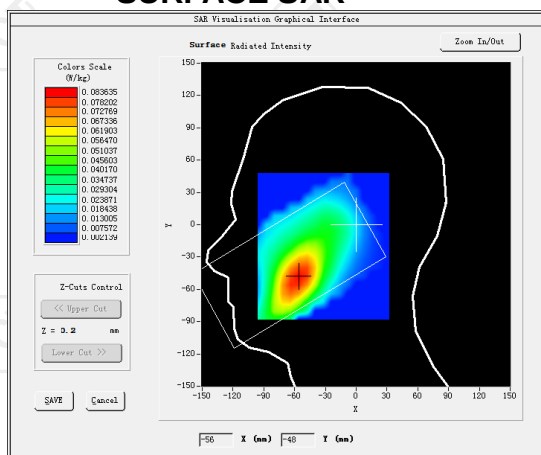
WCDMA Band V MEASUREMENT 1

Middle Band SAR (Channel 4182):

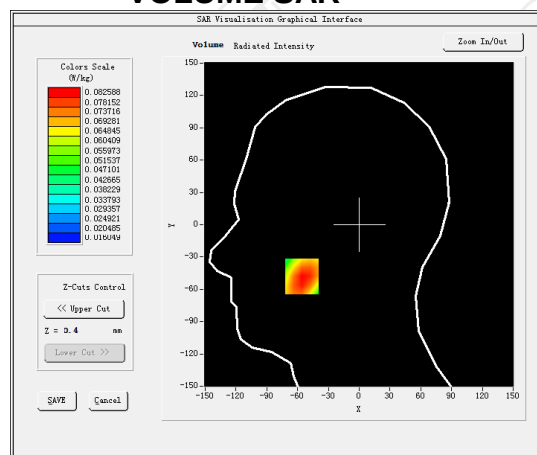
Date: 06/03/2021

Frequency (MHz)	836.400000
Relative permittivity (real part)	41.422883
Relative permittivity (imaginary part)	18.129634
Conductivity (S/m)	0.867241
Variation (%)	-1.040000
Crest Factor:	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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>Right head</u>
Device Position	<u>Cheek</u>
Band	<u>BAND5 WCDMA850</u>

SURFACE SAR

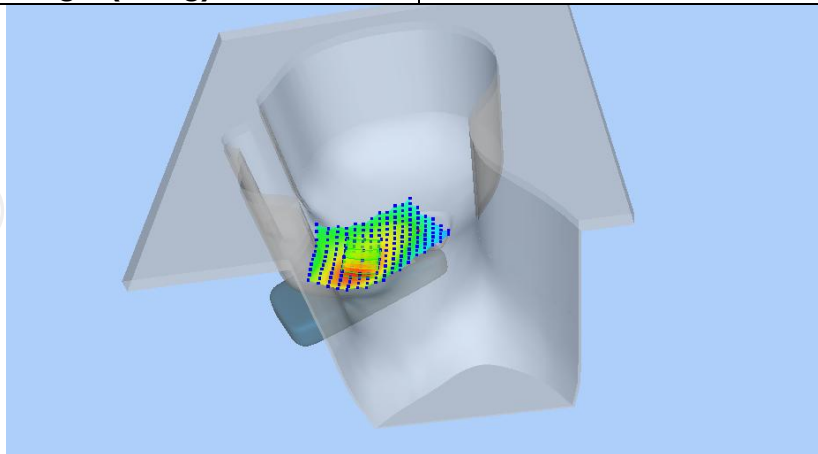


VOLUME SAR

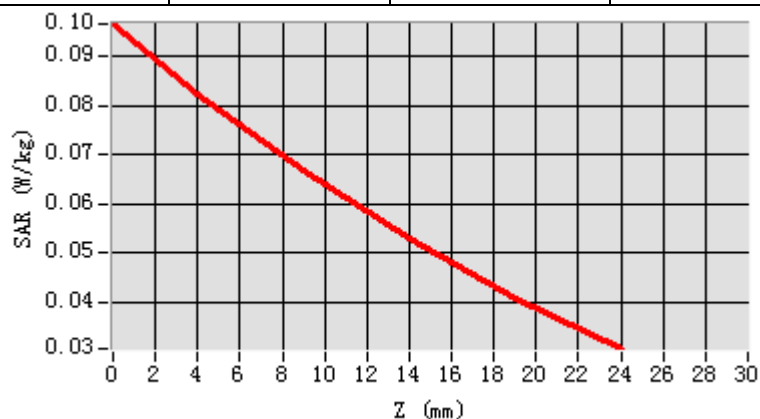


Maximum location: X=-56.00, Y=-48.00 SAR Peak: 0.10 W/kg

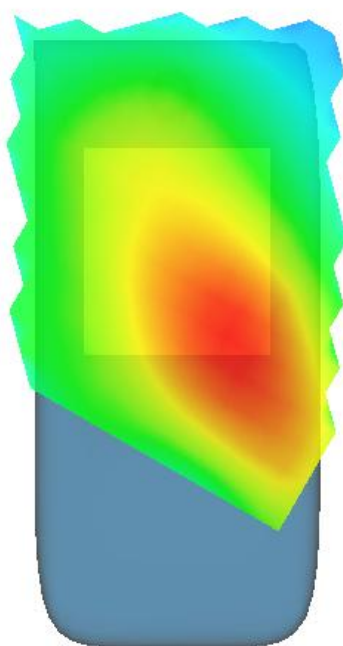
SAR 10g (W/Kg)	0.059169
SAR 1g (W/Kg)	0.080108



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0967	0.0826	0.0668	0.0529	0.0408



Hot spot position



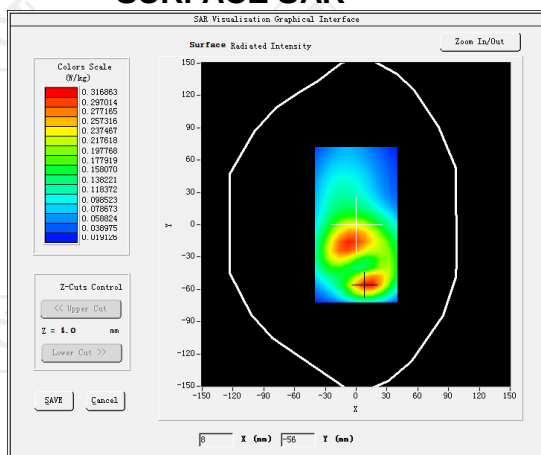
MEASUREMENT 2

Middle Band SAR (Channel 4182):

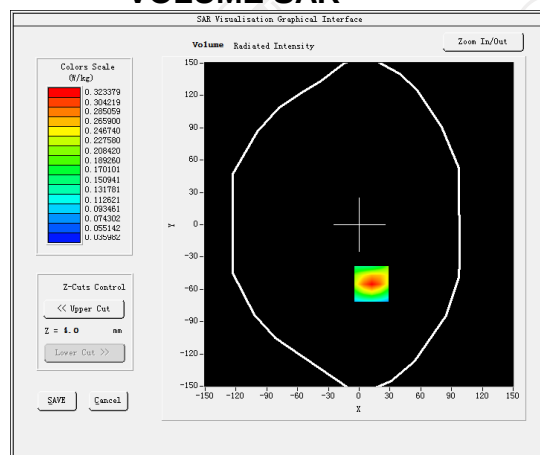
Date: 06/03/2021

Frequency (MHz)	836.400000
Relative permittivity (real part)	55.262927
Relative permittivity (imaginary part)	21.378266
Conductivity (S/m)	0.931230
Variation (%)	-1.160000
Crest Factor:	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)
Band	BAND5 WCDMA850

SURFACE SAR

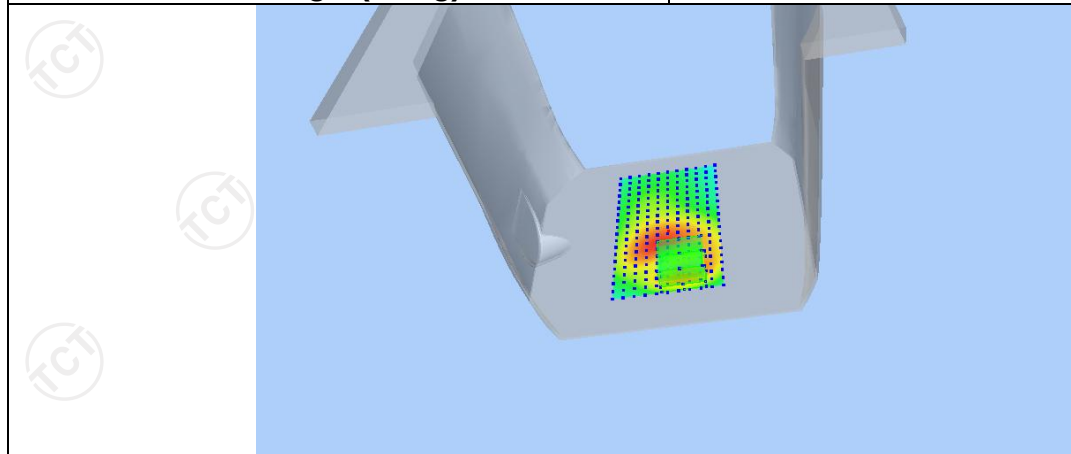


VOLUME SAR

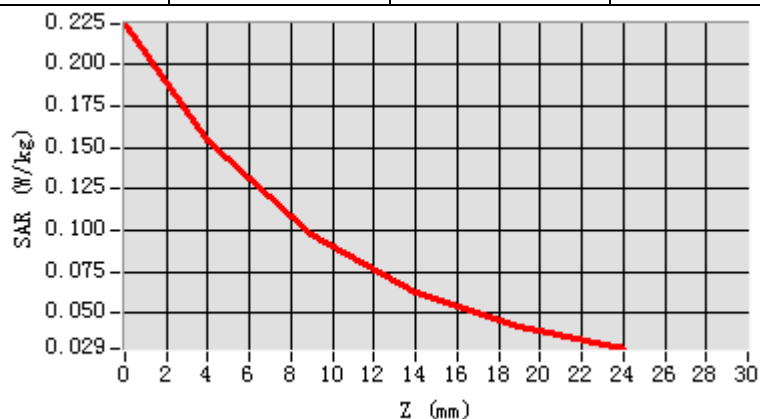


Maximum location: X=11.00, Y=-50.00 SAR Peak: 0.23 W/kg

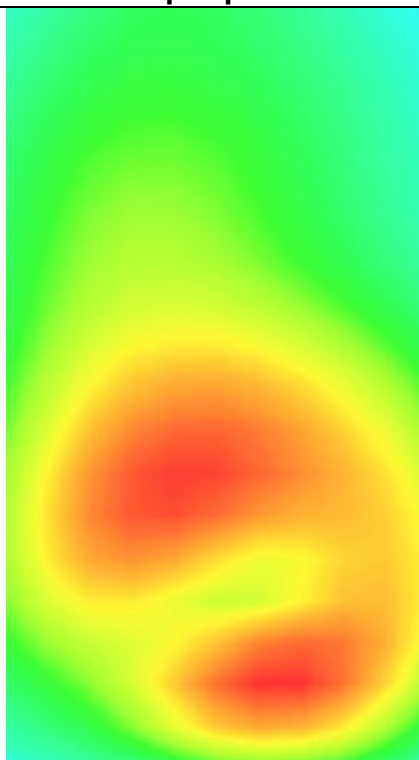
SAR 10g (W/Kg)	0.089898
SAR 1g (W/Kg)	0.197819



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2246	0.1549	0.0969	0.0622	0.0419



Hot spot position



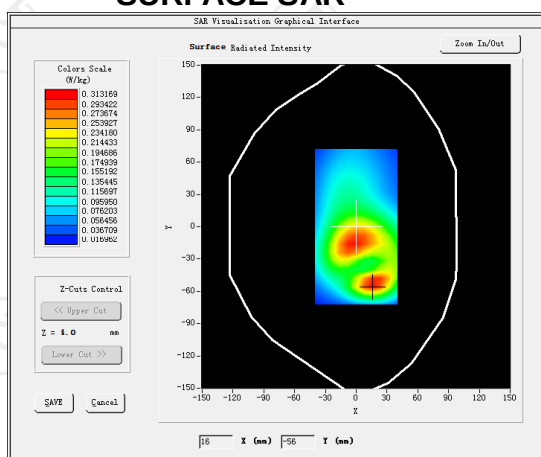
MEASUREMENT 3

Middle Band SAR (Channel 4182):

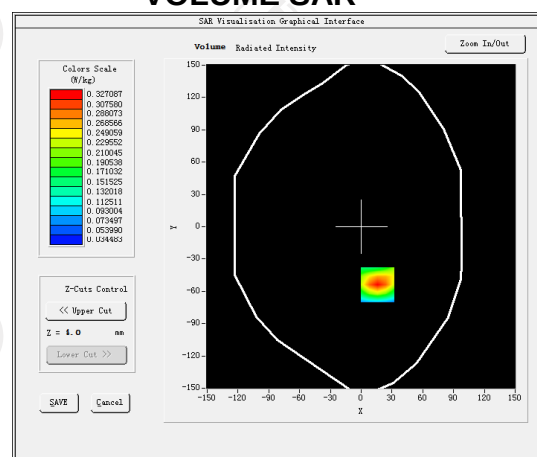
Date: 06/03/2021

Frequency (MHz)	836.400000
Relative permittivity (real part)	55.262927
Relative permittivity (imaginary part)	21.378266
Conductivity (S/m)	0.931230
Variation (%)	-2.410000
Crest Factor:	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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	BAND5 WCDMA850(hotspot)

SURFACE SAR

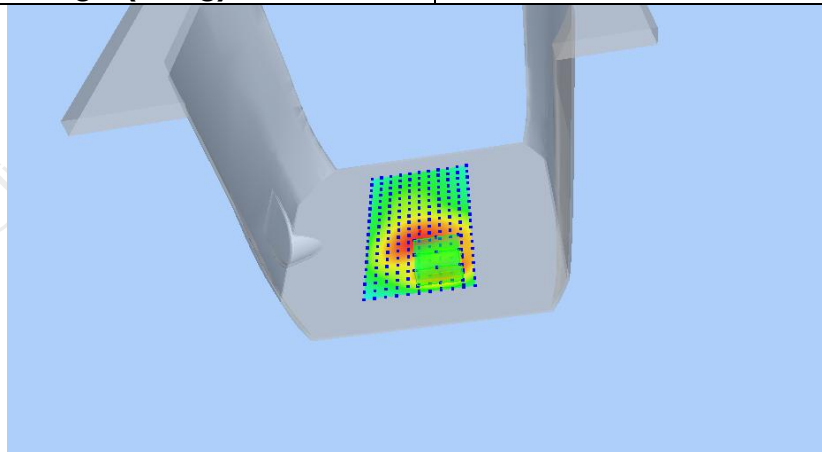


VOLUME SAR

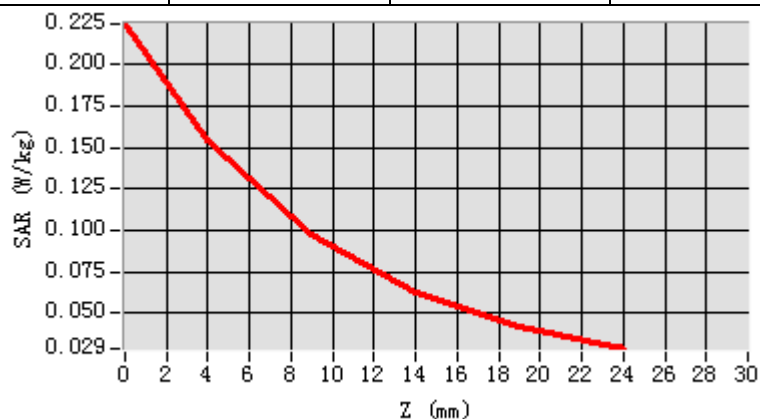


Maximum location: X=19.00, Y=-58.00 SAR Peak: 0.23 W/kg

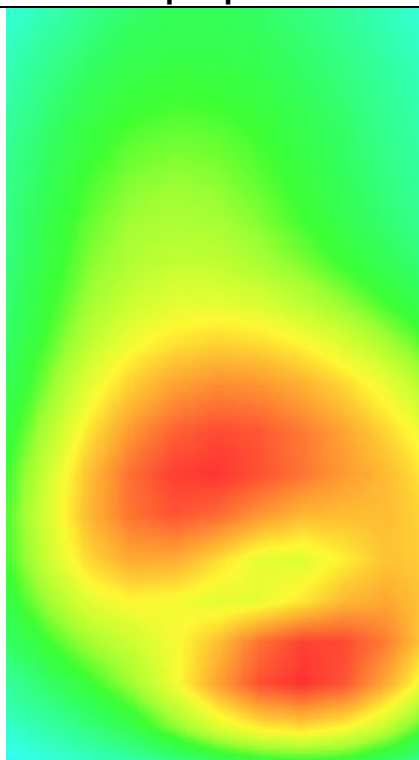
SAR 10g (W/Kg)	0.092273
SAR 1g (W/Kg)	0.209034



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2253	0.1557	0.0975	0.0631	0.0430



Hot spot position



LTE Band 2

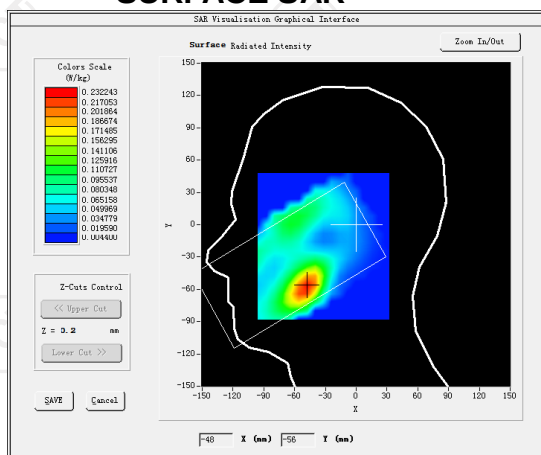
MEASUREMENT 1

Middle Band SAR (Channel 18900):

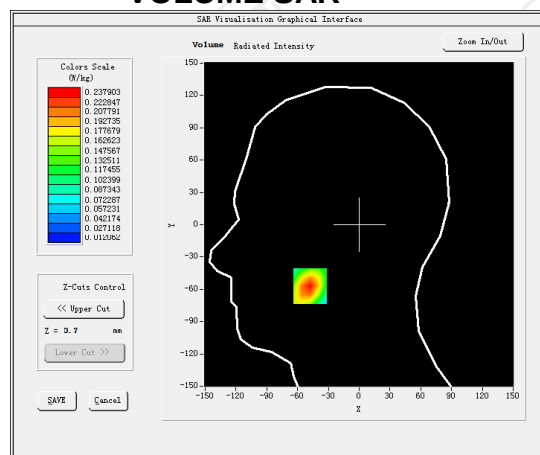
Date: 06/09/2021

Frequency (MHz)	1880.000000
Relative permittivity (real part)	39.065208
Relative permittivity (imaginary part)	12.607628
Conductivity (S/m)	1.382108
Variation (%)	1.980000
Crest Factor	1.0
Probe Conversion factor	2.23
E-Field Probe:	SSE2 (SN36/20 EPG0346)
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>Right head</u>
Device Position	<u>Cheek</u>
Band	<u>LTE band 2 (1 RB#49)</u>

SURFACE SAR



VOLUME SAR



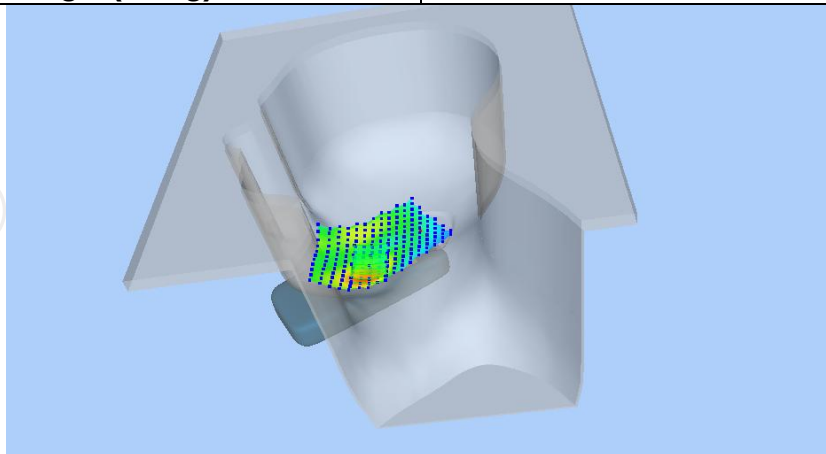
Maximum location: X=-42.00, Y=-50.00 SAR Peak: 0.35 W/kg

SAR 10g (W/Kg)

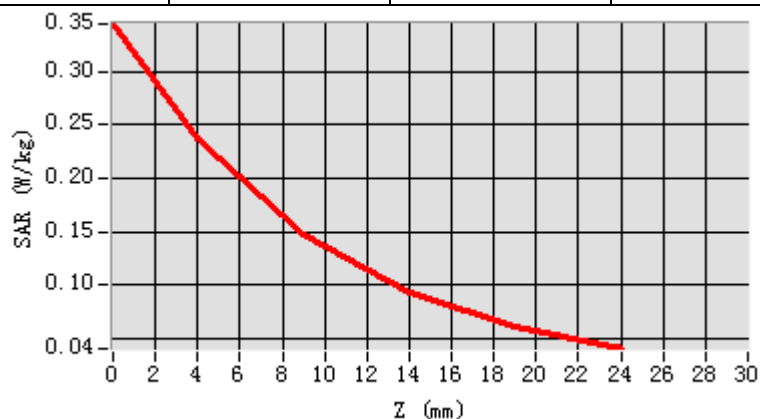
0.129981

SAR 1g (W/Kg)

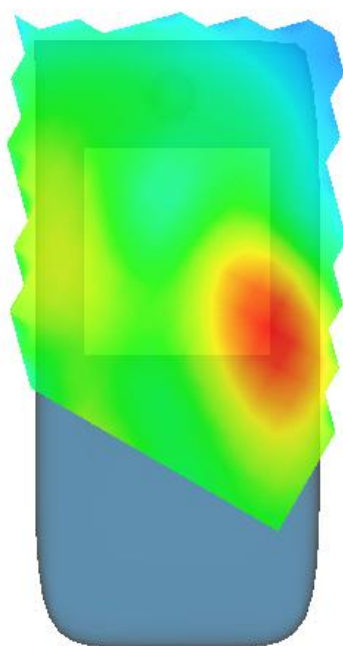
0.233044



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3451	0.2379	0.1480	0.0935	0.0613



Hot spot position



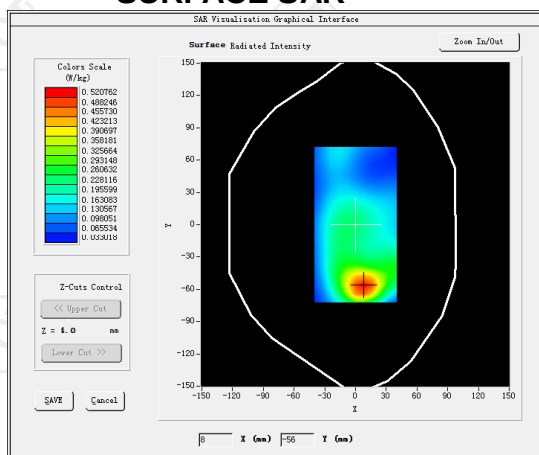
MEASUREMENT 2

Middle Band SAR (Channel 18900):

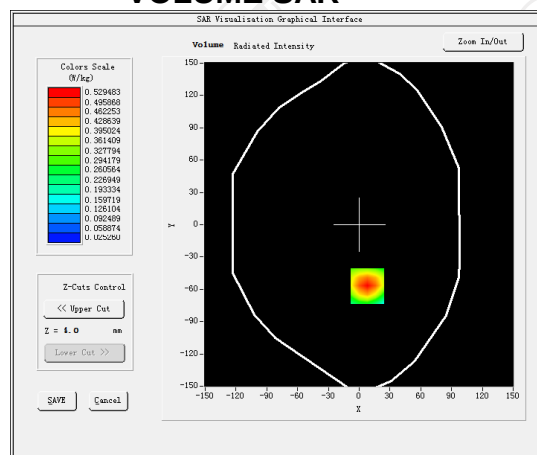
Date: 06/09/2021

Frequency (MHz)	1880.000000
Relative permittivity (real part)	53.291337
Relative permittivity (imaginary part)	14.232400
Conductivity (S/m)	1.531736
Variation (%)	2.180000
Crest Factor	1.0
Probe Conversion factor	2.32
E-Field Probe:	SSE2 (SN36/20 EPG0346)
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(10mm)
Band	LTE band 2 (1 RB#49)

SURFACE SAR

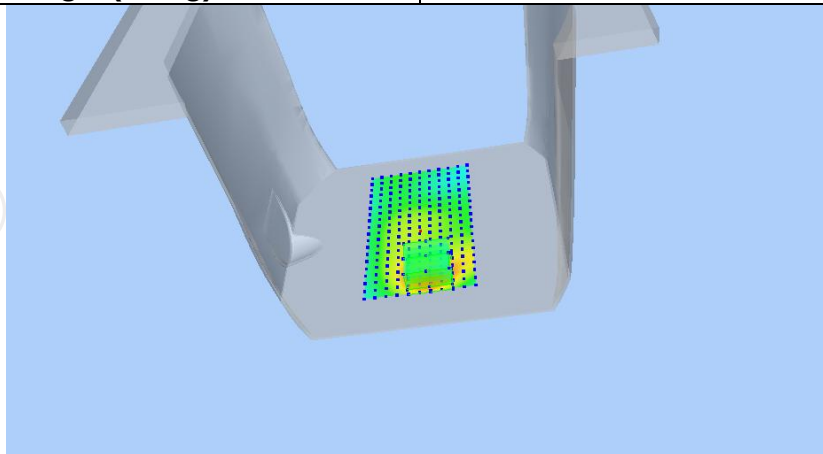


VOLUME SAR

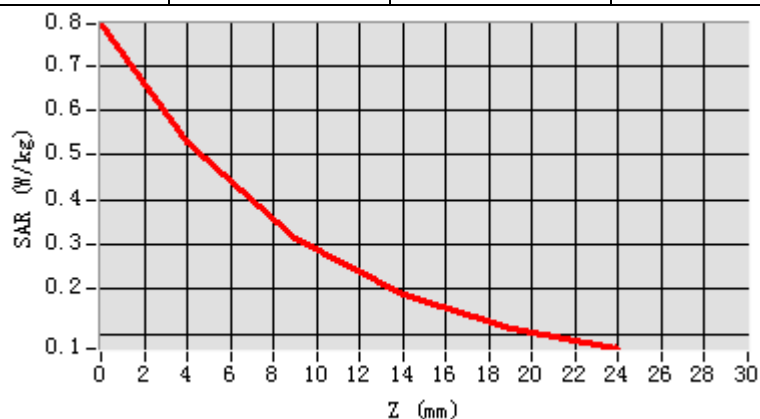


Maximum location: X=18.00, Y=-37.00 SAR Peak: 0.79 W/kg

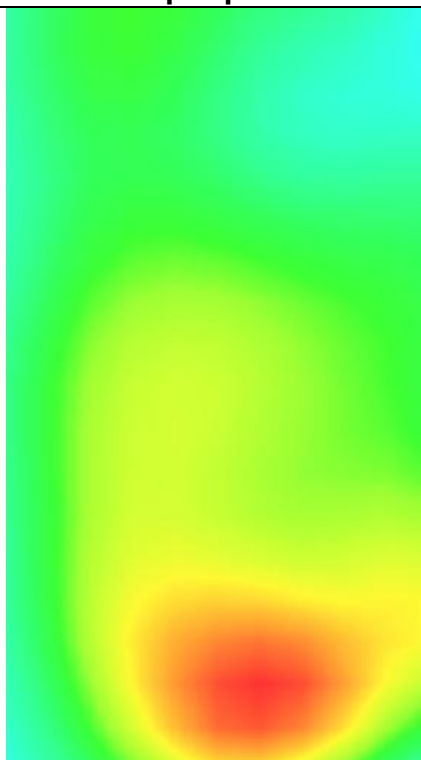
SAR 10g (W/Kg)	0.285447
SAR 1g (W/Kg)	0.507064



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.7921	0.5295	0.3141	0.1871	0.1145



Hot spot position



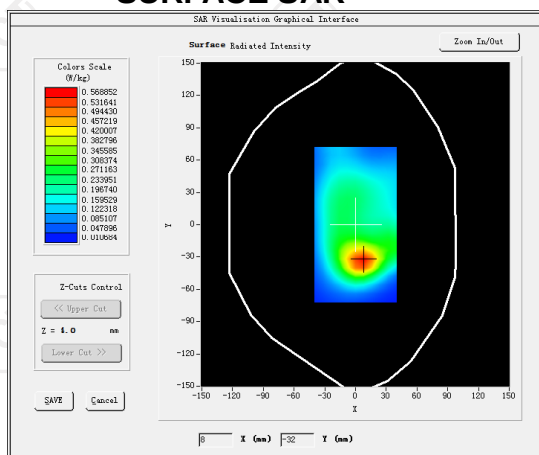
MEASUREMENT 3

Middle Band SAR (Channel 18900):

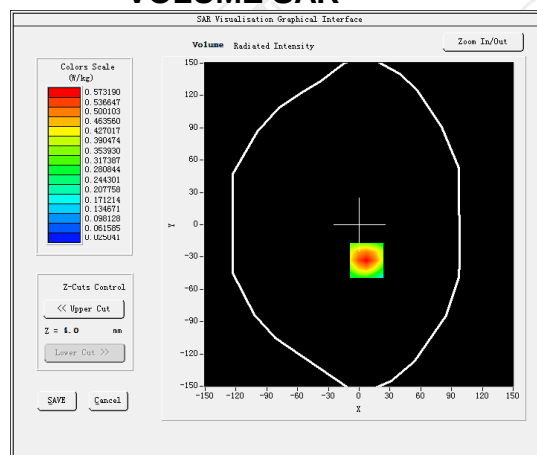
Date: 06/09/2021

Frequency (MHz)	1880.000000
Relative permittivity (real part)	53.291337
Relative permittivity (imaginary part)	14.232400
Conductivity (S/m)	1.531736
Variation (%)	-1.030000
Crest Factor	1.0
Probe Conversion factor	2.32
E-Field Probe:	SSE2 (SN36/20 EPG0346)
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	<u>Body back(hotspot 10mm)</u>
Band	<u>LTE band 2 (1 RB#49)</u>

SURFACE SAR

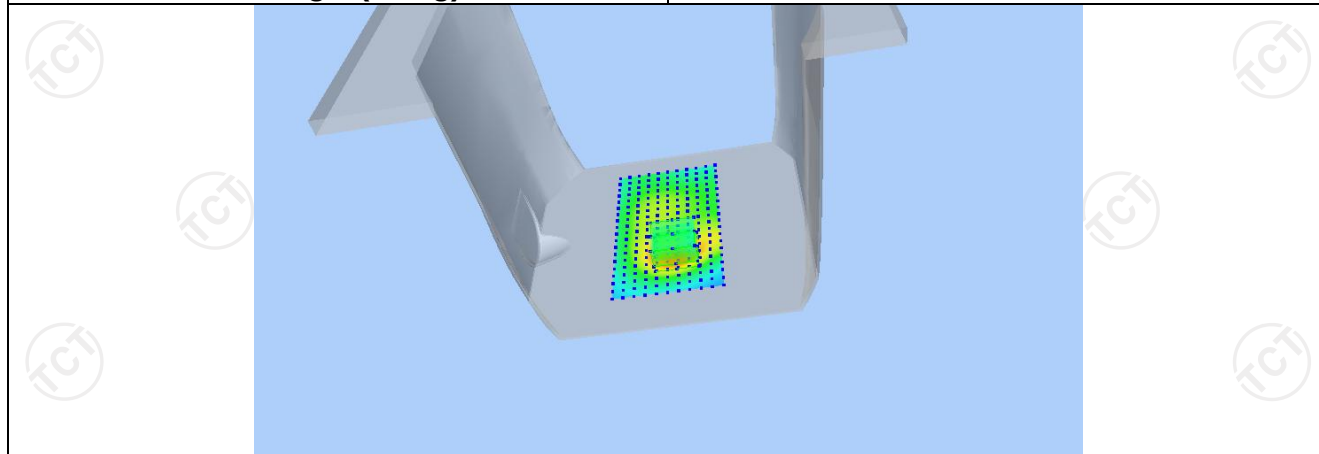


VOLUME SAR

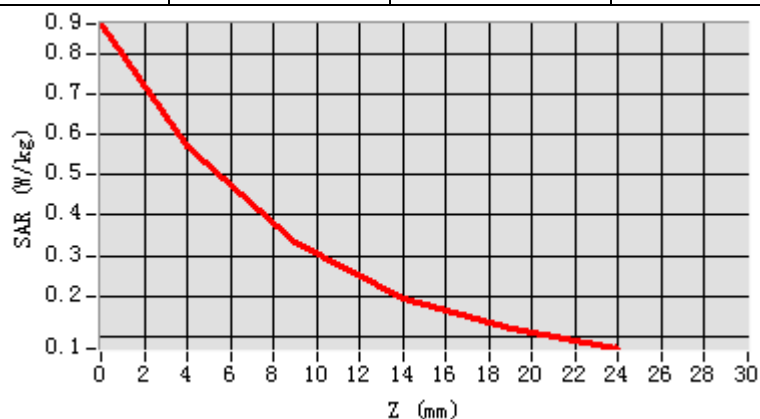


Maximum location: X=7.00, Y=-33.00 SAR Peak: 0.87 W/kg

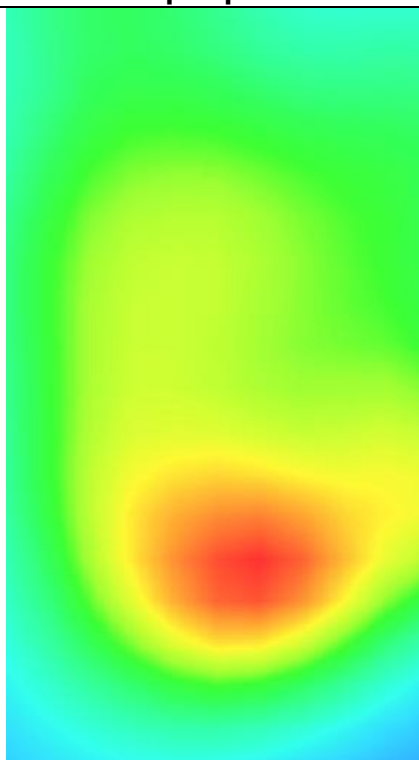
SAR 10g (W/Kg)	0.306230
SAR 1g (W/Kg)	0.548711



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.9040	0.5731	0.3313	0.1931	0.1170



Hot spot position



LTE Band 4

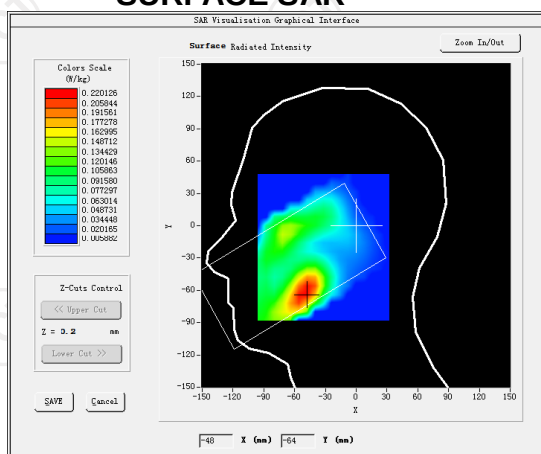
MEASUREMENT 1

Lower Band SAR (Channel 20050):

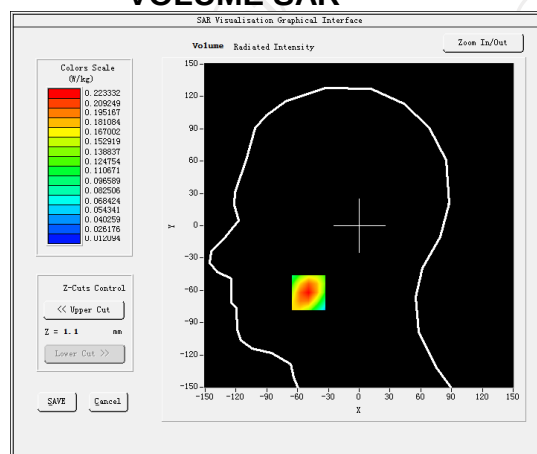
Date: 06/07/2021

Frequency (MHz)	1720.000000
Relative permittivity (real part)	39.101249
Relative permittivity (imaginary part)	12.468850
Conductivity (S/m)	1.350792
Variation (%)	-1.460000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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>Left head</u>
Device Position	<u>Cheek</u>
Band	<u>LTE band 4(1 RB#0)</u>

SURFACE SAR



VOLUME SAR



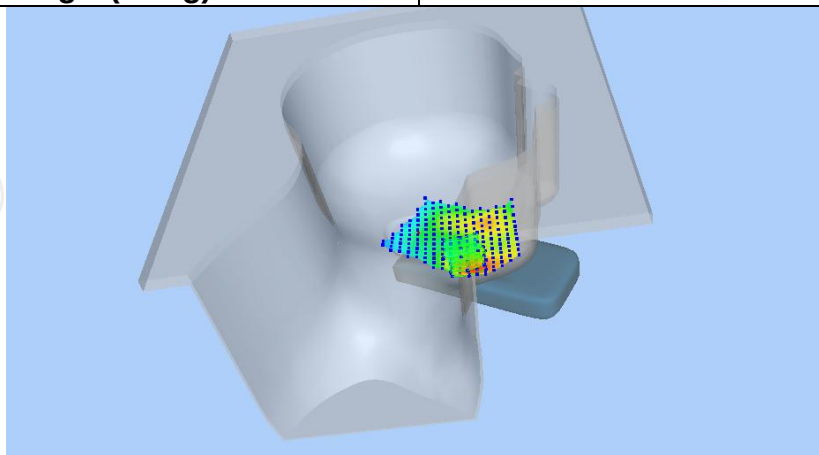
Maximum location: X=-49.00, Y=-62.00 SAR Peak: 0.32 W/kg

SAR 10g (W/Kg)

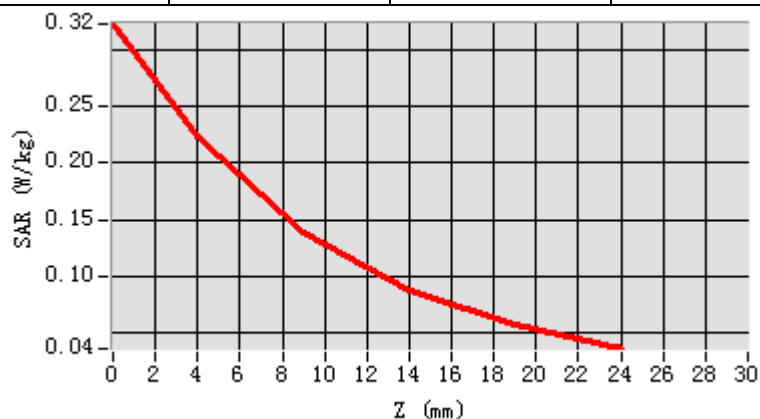
0.095058

SAR 1g (W/Kg)

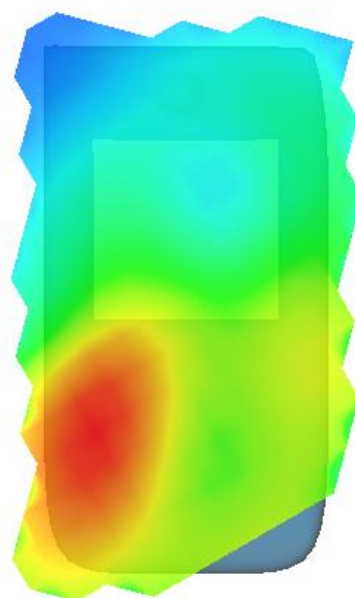
0.200398



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3221	0.2231	0.1380	0.0881	0.0571



Hot spot position



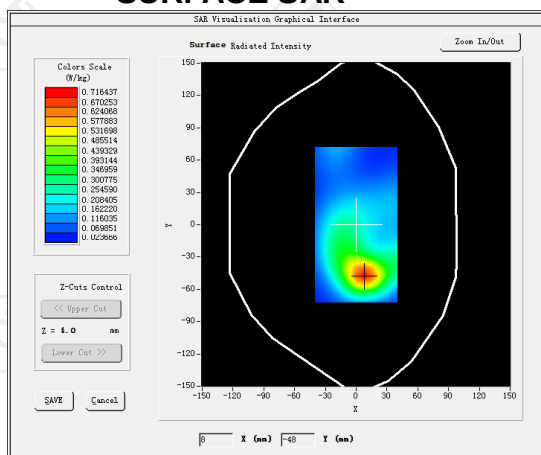
MEASUREMENT 2

Lower Band SAR (Channel 20050):

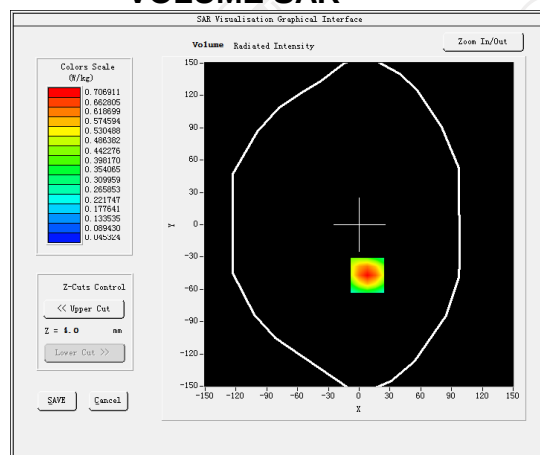
Date: 06/07/2021

Frequency (MHz)	1720.000000
Relative permittivity (real part)	53.321249
Relative permittivity (imaginary part)	12.468850
Conductivity (S/m)	1.502592
Variation (%)	-0.350000
Crest Factor	1.0
Probe Conversion factor	2.16
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)
Band	LTE band 4(1 RB#0)

SURFACE SAR

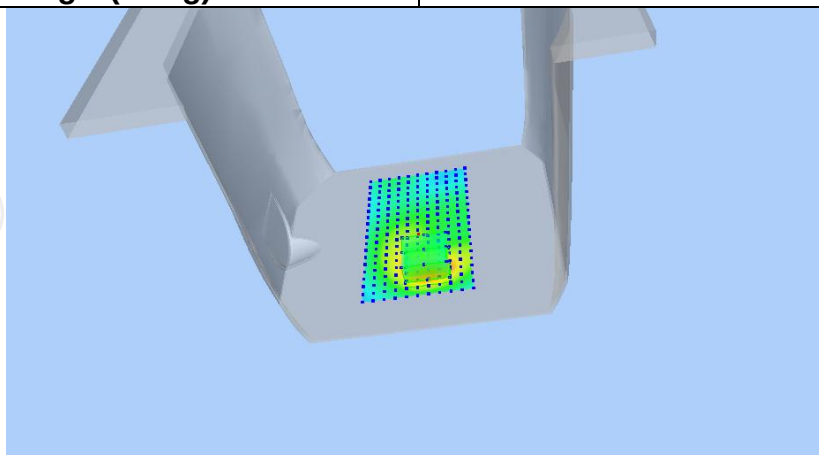


VOLUME SAR

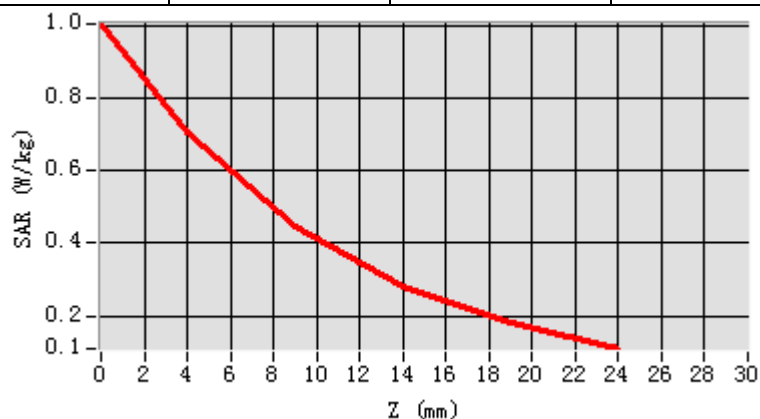


Maximum location: X=8.00, Y=-47.00 SAR Peak: 1.01 W/kg

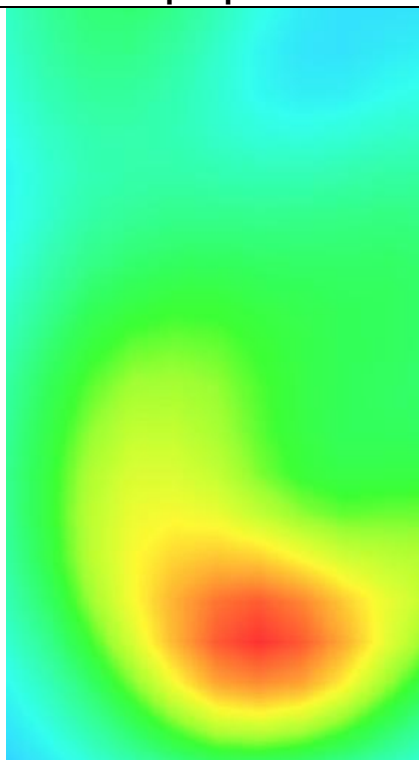
SAR 10g (W/Kg)	0.390679
SAR 1g (W/Kg)	0.653149



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.0069	0.7071	0.4460	0.2820	0.1710



Hot spot position



LTE Band 5

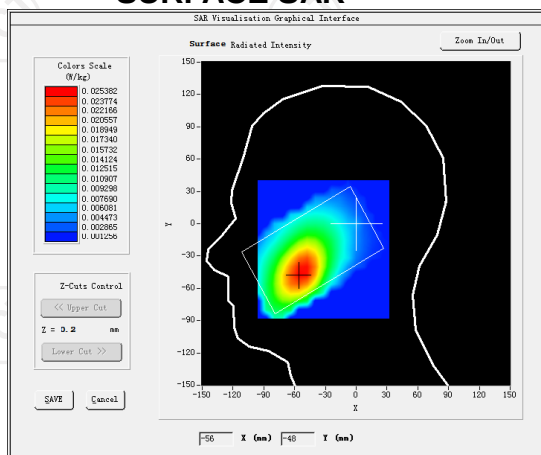
MEASUREMENT 1

Higher Band SAR (Channel 20600):

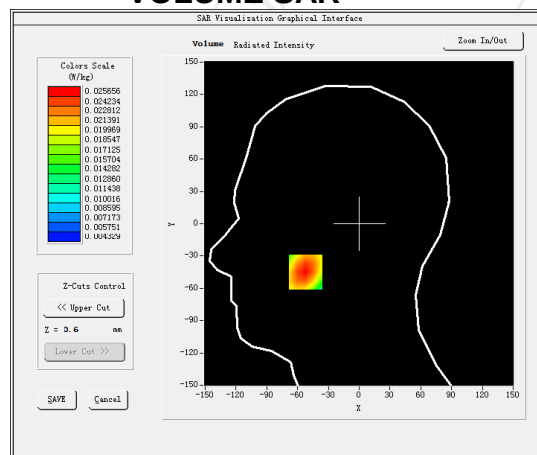
Date: 06/03/2021

Frequency (MHz)	844.000000
Relative permittivity (real part)	41.432976
Relative permittivity (imaginary part)	12.468860
Conductivity (S/m)	0.862835
Variation (%)	-1.250000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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>Left head</u>
Device Position	<u>Cheek</u>
Band	<u>LTE band 5(1 RB#24)</u>

SURFACE SAR



VOLUME SAR



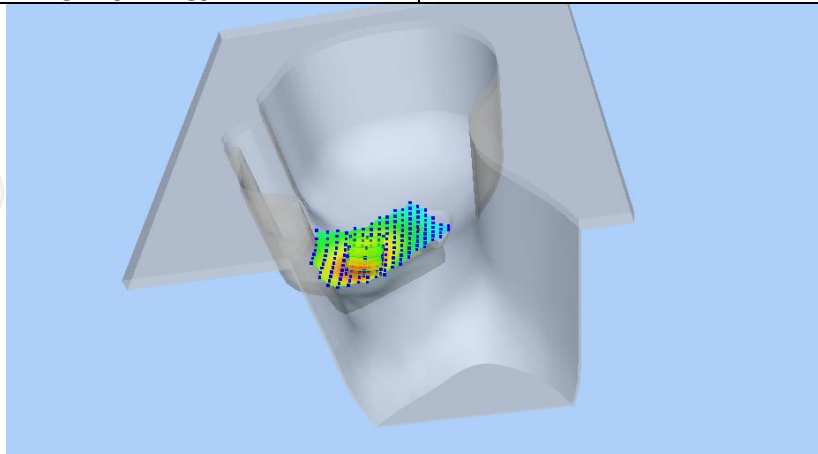
Maximum location: X=-52.00, Y=-45.00 SAR Peak: 0.10 W/kg

SAR 10g (W/Kg)

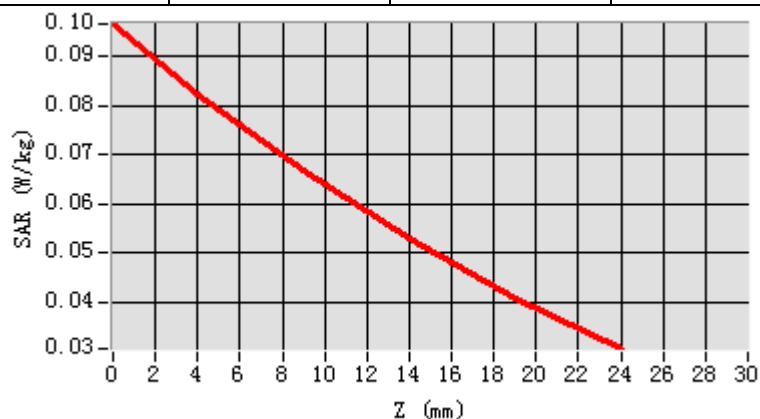
0.031965

SAR 1g (W/Kg)

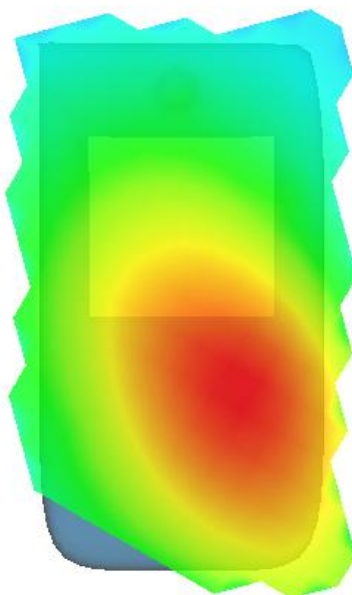
0.062092



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0980	0.0817	0.0659	0.0518	0.0406



Hot spot position



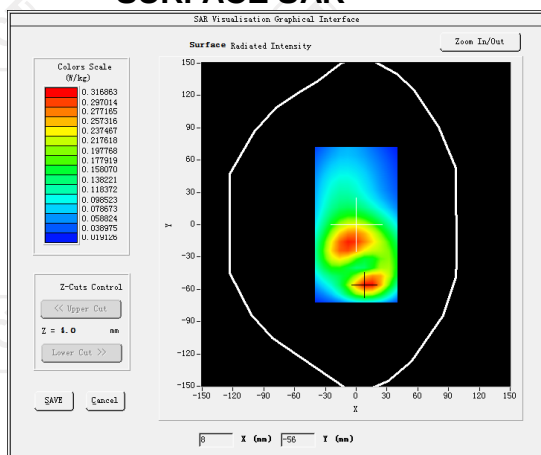
MEASUREMENT 2

Higher Band SAR (Channel 20600):

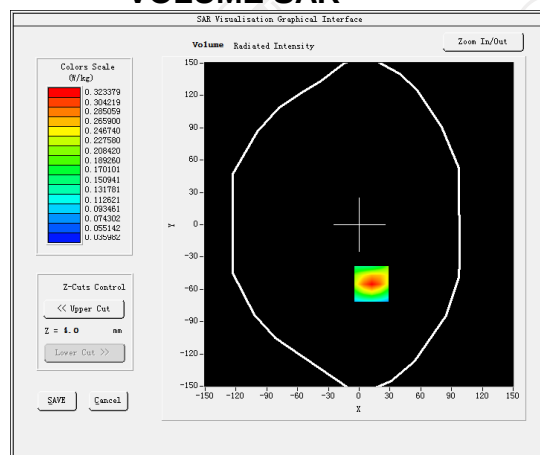
Date: 06/03/2021

Frequency (MHz)	844.000000
Relative permittivity (real part)	55.260832
Relative permittivity (imaginary part)	12.468860
Conductivity (S/m)	0.934272
Variation (%)	-1.540000
Crest Factor	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)</u>
Band	<u>LTE band 5(1 RB#24)</u>

SURFACE SAR

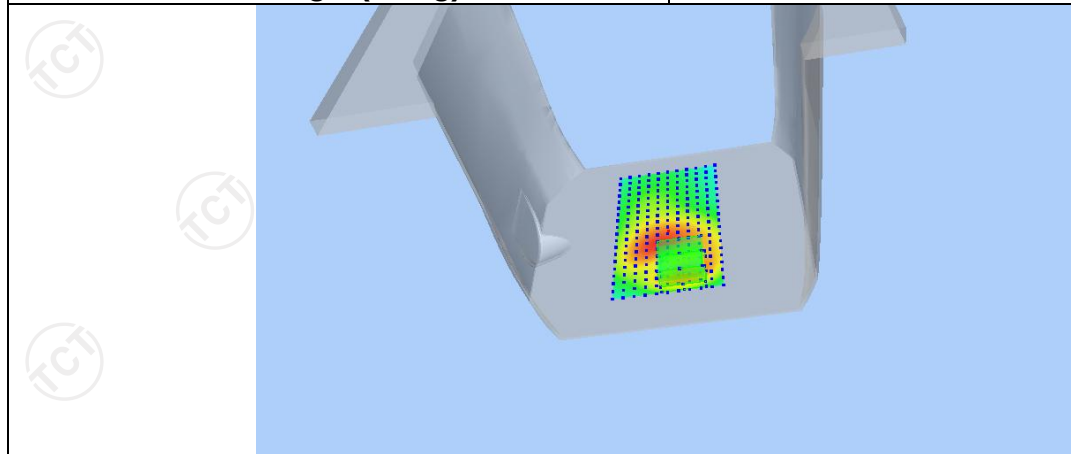


VOLUME SAR

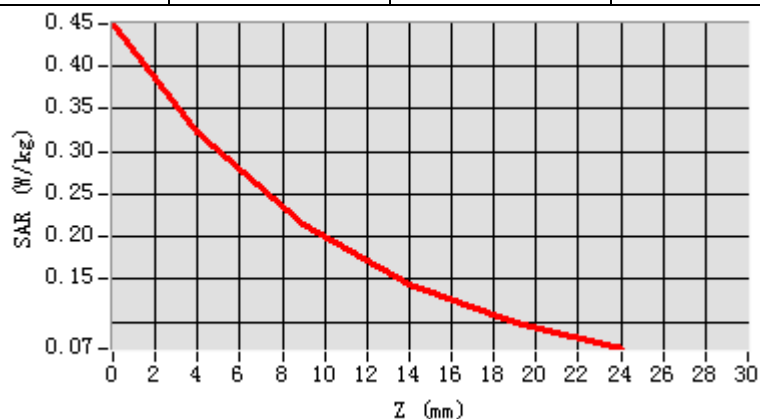


Maximum location: X=12.00, Y=-55.00 SAR Peak: 0.45 W/kg

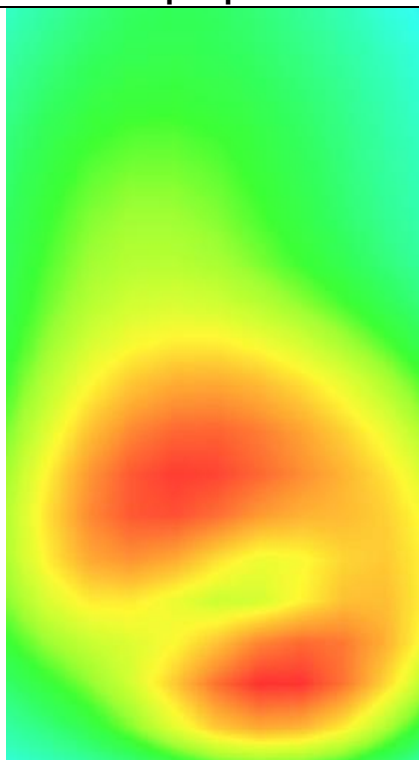
SAR 10g (W/Kg)	0.182644
SAR 1g (W/Kg)	0.323078



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4495	0.3234	0.2137	0.1437	0.0997



Hot spot position



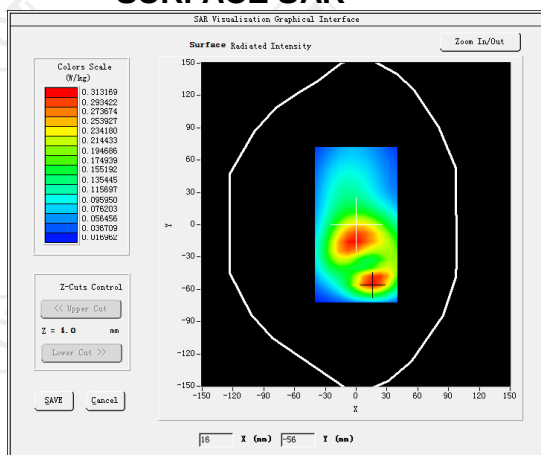
MEASUREMENT 3

Higher Band SAR (Channel 20600):

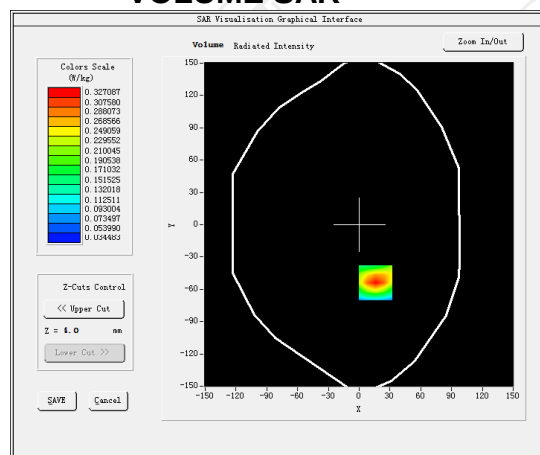
Date: 06/03/2021

Frequency (MHz)	844.000000
Relative permittivity (real part)	55.260832
Relative permittivity (imaginary part)	12.468860
Conductivity (S/m)	0.934272
Variation (%)	-1.090000
Crest Factor	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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

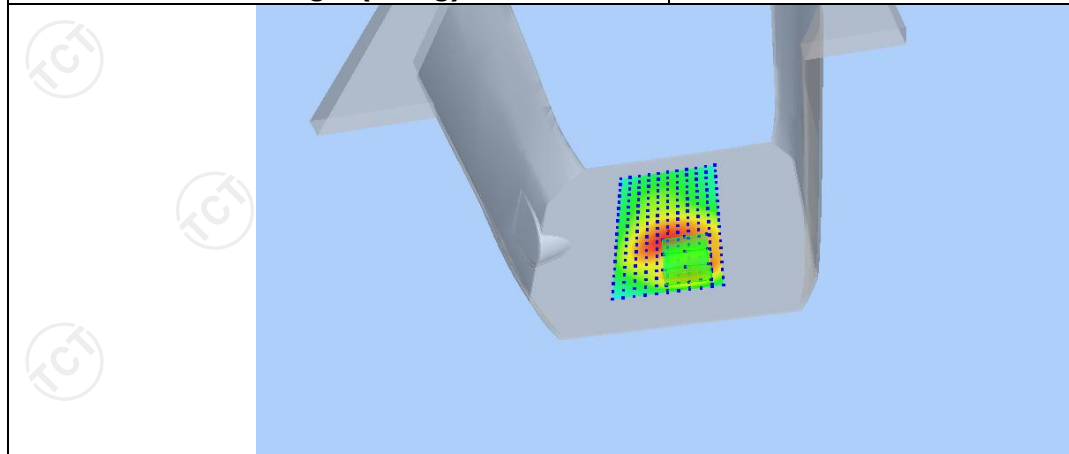


VOLUME SAR

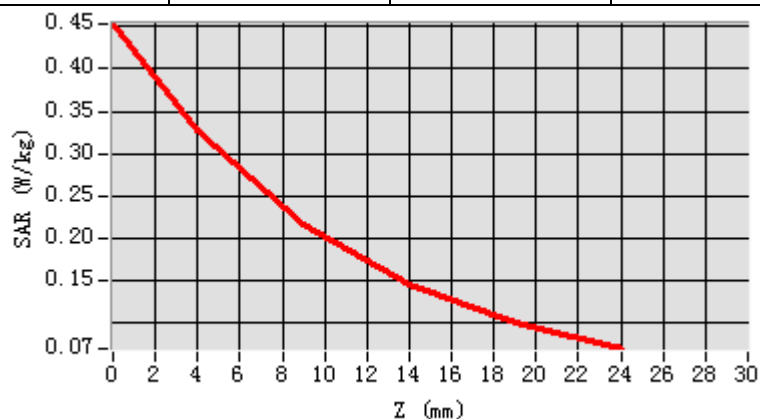


Maximum location: X=-23.00, Y=-41.00 SAR Peak: 0.23 W/kg

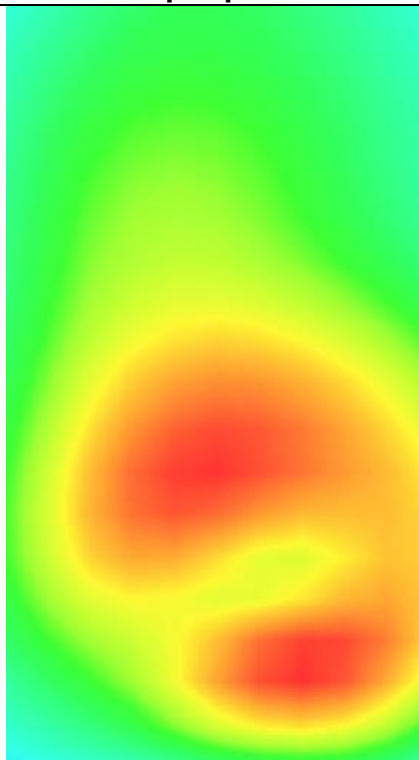
SAR 10g (W/Kg)	0.184888
SAR 1g (W/Kg)	0.347301



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4530	0.3271	0.2171	0.1465	0.1019



Hot spot position



LTE Band 7

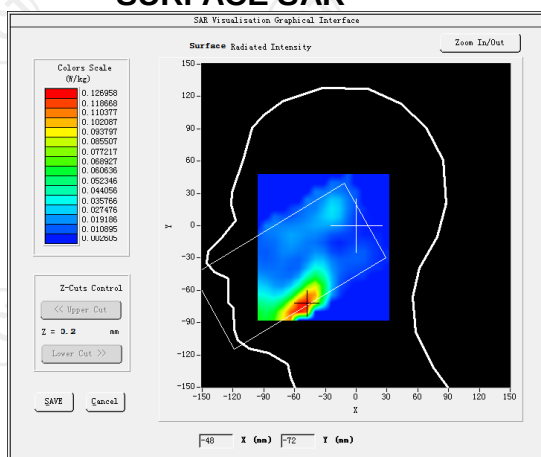
MEASUREMENT 1

Lower Band SAR (Channel 20850):

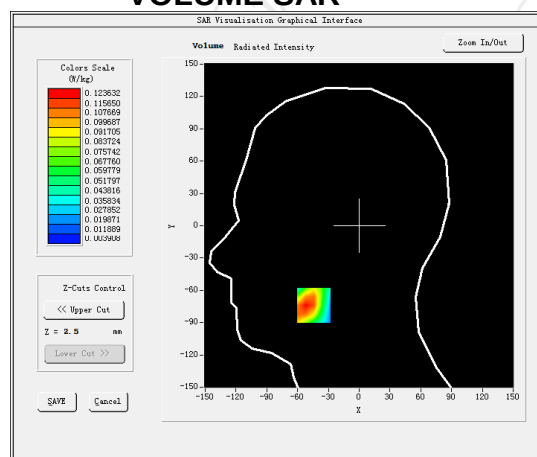
Date: 06/21/2021

Frequency (MHz)	2510.000000
Relative permittivity (real part)	38.892754
Relative permittivity (imaginary part)	12.468850
Conductivity (S/m)	1.902731
Variation (%)	1.750000
Crest Factor	1.0
Probe Conversion factor	4.38
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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>Left head</u>
Device Position	<u>Cheek</u>
Band	<u>LTE band 7(1 RB#49)</u>

SURFACE SAR



VOLUME SAR



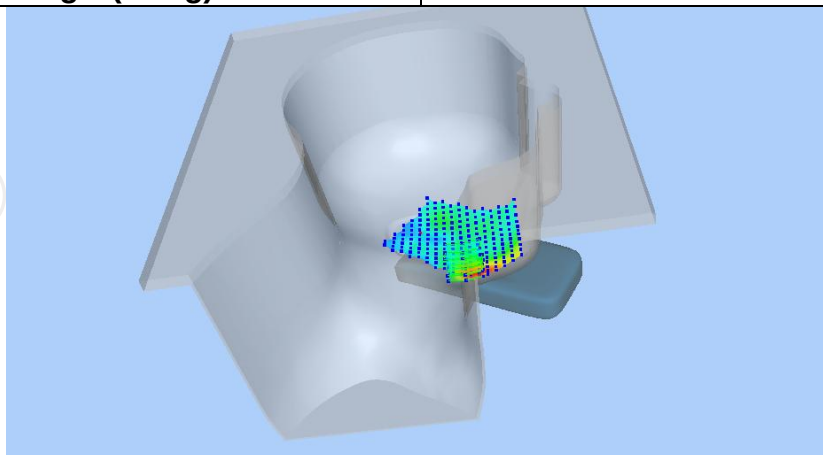
Maximum location: X=-44.00, Y=-74.00 SAR Peak: 0.20 W/kg

SAR 10g (W/Kg)

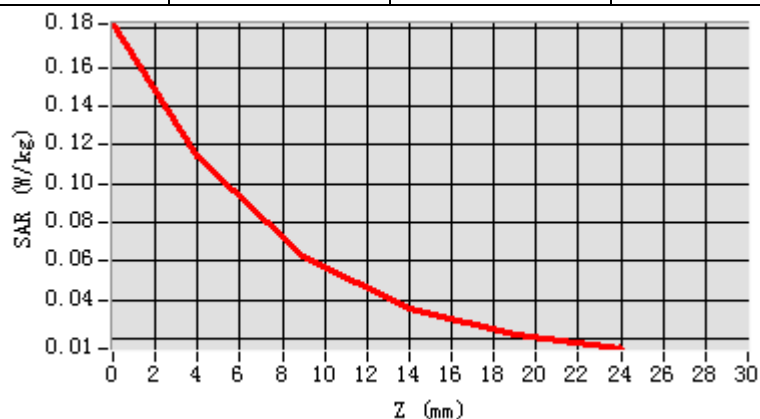
0.063364

SAR 1g (W/Kg)

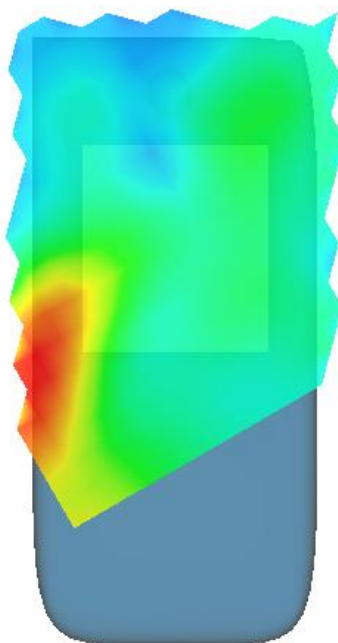
0.118417



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1824	0.1140	0.0622	0.0353	0.0222



Hot spot position



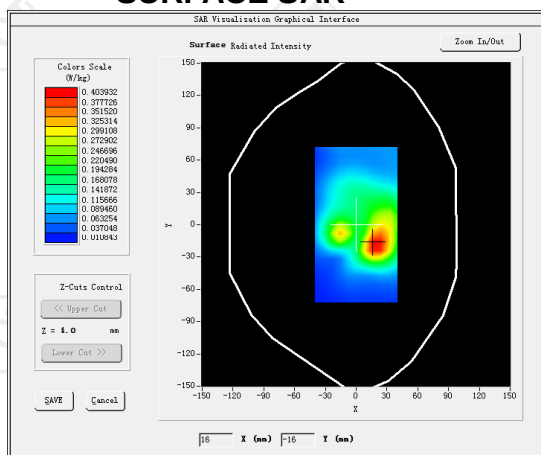
MEASUREMENT 2

Lower Band SAR (Channel 20850):

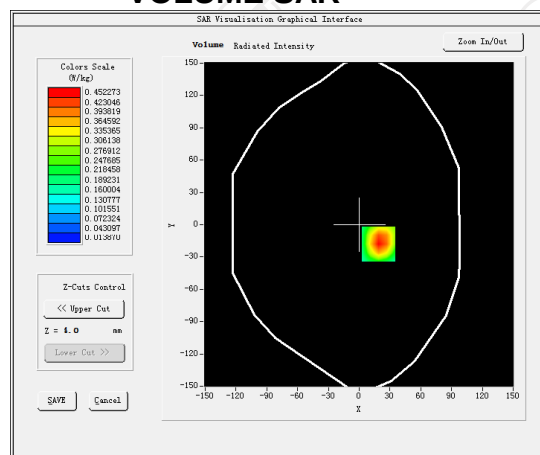
Date: 06/21/2021

Frequency (MHz)	2510.000000
Relative permittivity (real part)	52.131509
Relative permittivity (imaginary part)	12.468850
Conductivity (S/m)	2.128245
Variation (%)	0.770000
Crest Factor	1.0
Probe Conversion factor	4.52
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)</u>
Band	<u>LTE band 7(1 RB#49)</u>

SURFACE SAR

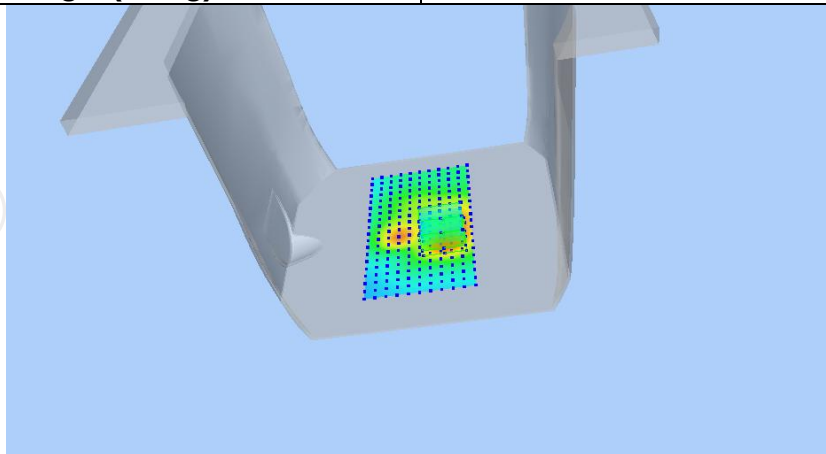


VOLUME SAR

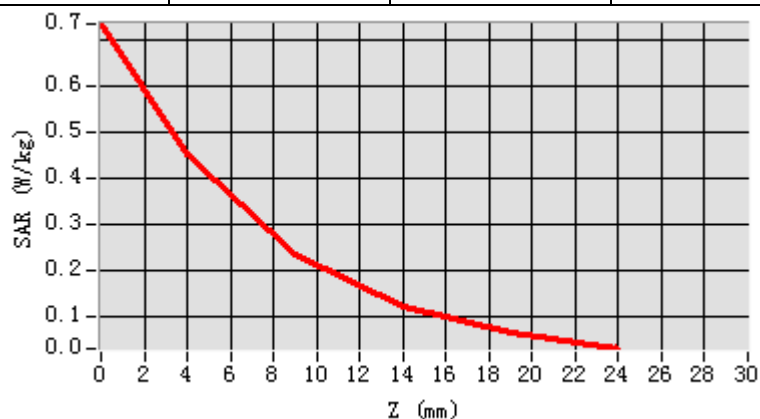


Maximum location: X=19.00, Y=-18.00 SAR Peak: 0.74 W/kg

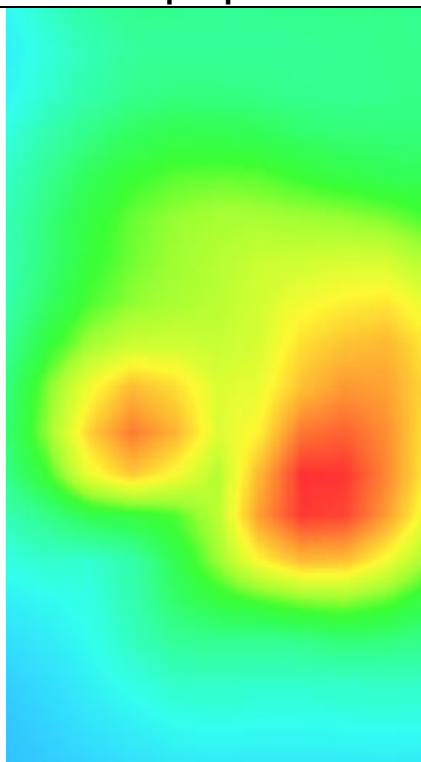
SAR 10g (W/Kg)	0.221093
SAR 1g (W/Kg)	0.425483



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.7333	0.4523	0.2372	0.1224	0.0647



Hot spot position



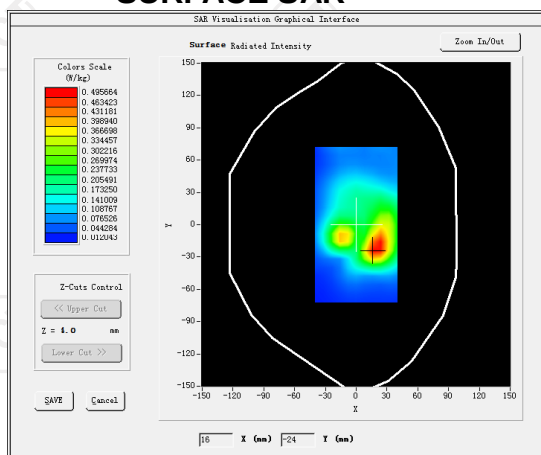
MEASUREMENT 3

Lower Band SAR (Channel 20850):

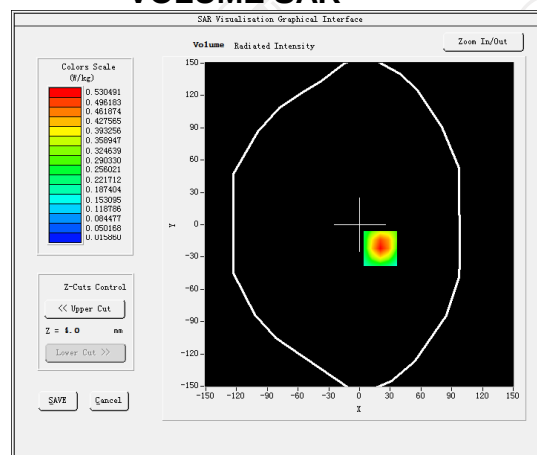
Date: 06/21/2021

Frequency (MHz)	2510.000000
Relative permittivity (real part)	52.131509
Relative permittivity (imaginary part)	12.468850
Conductivity (S/m)	2.128245
Variation (%)	1.280000
Crest Factor	1.0
Probe Conversion factor	4.52
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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 7(1 RB#49)

SURFACE SAR

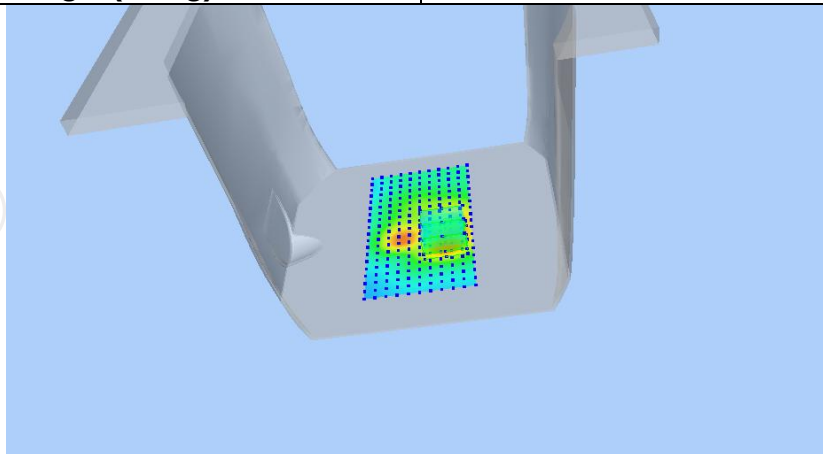


VOLUME SAR

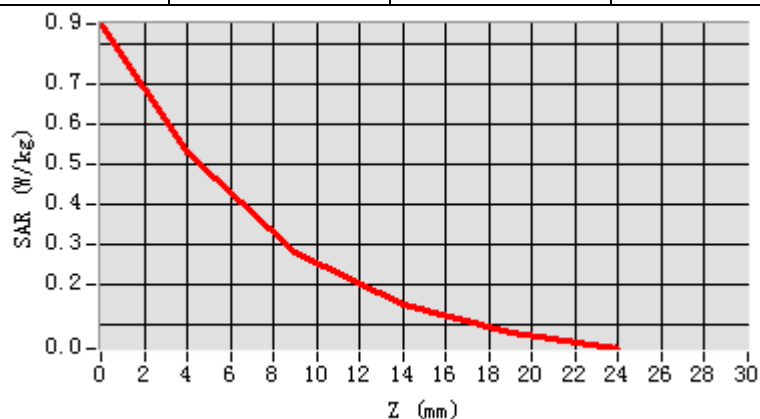


Maximum location: X=20.00, Y=-22.00 SAR Peak: 0.86 W/kg

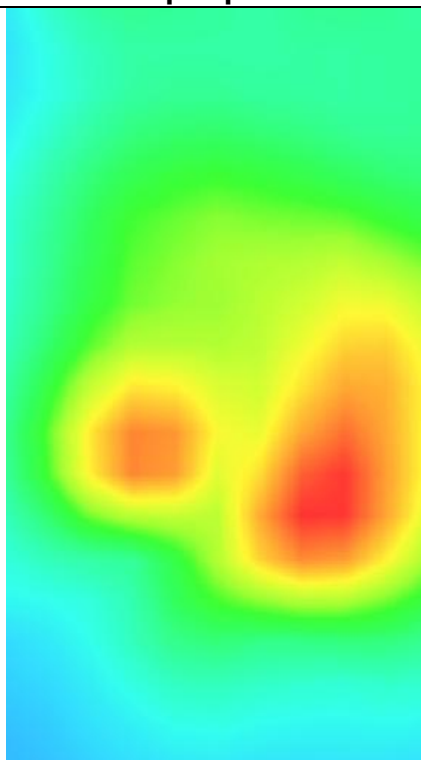
SAR 10g (W/Kg)	0.257940
SAR 1g (W/Kg)	0.498053



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8523	0.5305	0.2818	0.1473	0.0784



Hot spot position

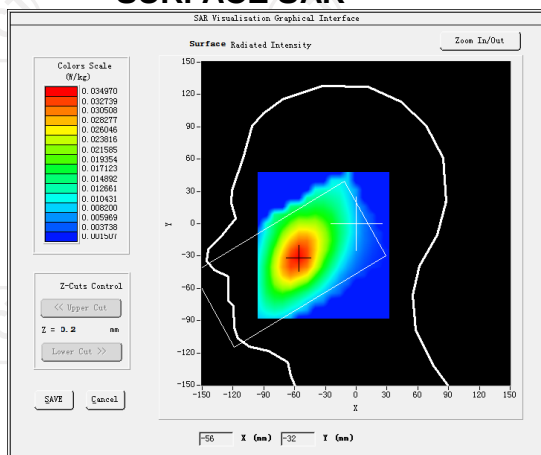


LTE Band 12

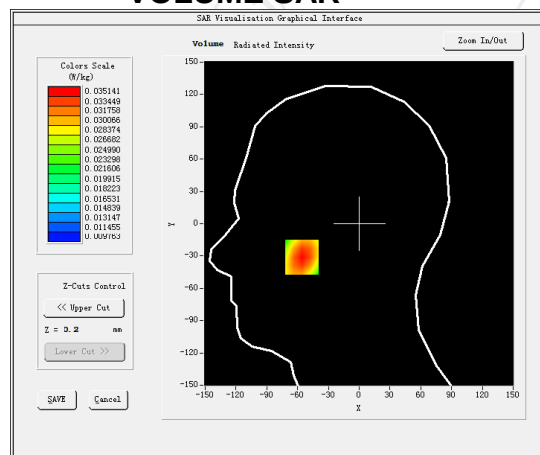
MEASUREMENT 1

Lower Band SAR (Channel 23060):		Date: 06/01/2021
Frequency (MHz)	704.000000	
Relative permittivity (real part)	41.432976	
Relative permittivity (imaginary part)	12.468860	
Conductivity (S/m)	0.862835	
Variation (%)	0.570000	
Crest Factor	1.0	
Probe Conversion factor	1.80	
E-Field Probe:	SSE2 (SN 36/20 EPG0346)	
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	Right head	
Device Position	Cheek	
Band	LTE band 12(1 RB#24)	

SURFACE SAR



VOLUME SAR



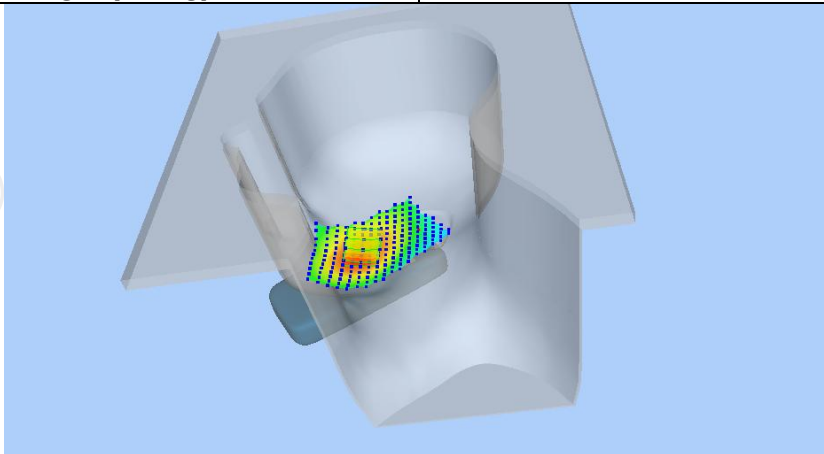
Maximum location: X=-56.00, Y=-31.00 SAR Peak: 0.39 W/kg

SAR 10g (W/Kg)

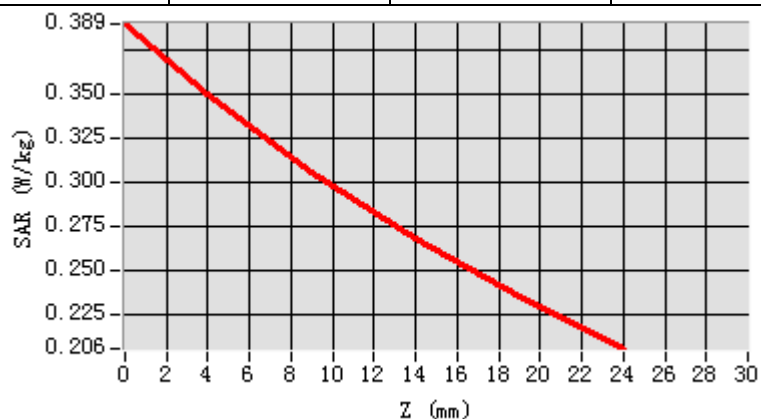
0.027075

SAR 1g (W/Kg)

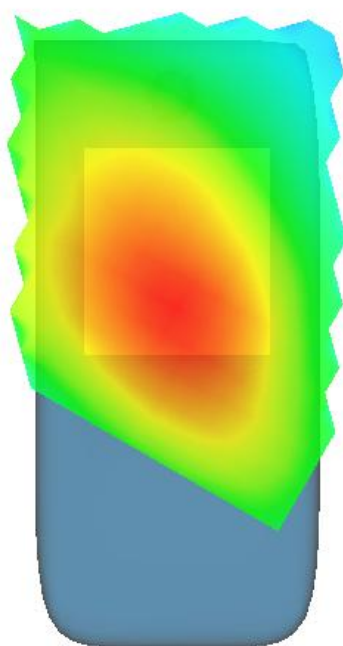
0.134680



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3892	0.3503	0.3102	0.2704	0.2350



Hot spot position



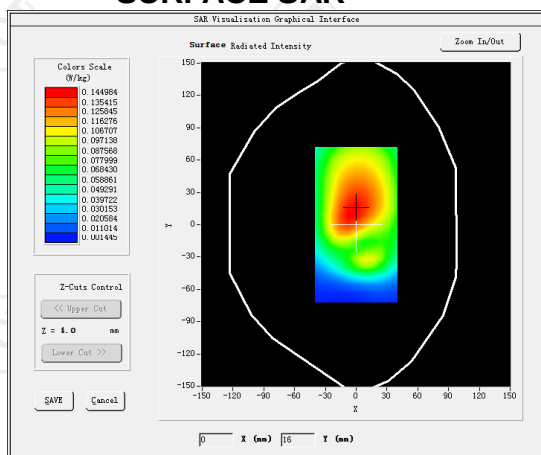
MEASUREMENT 2

Lower Band SAR (Channel 23060):

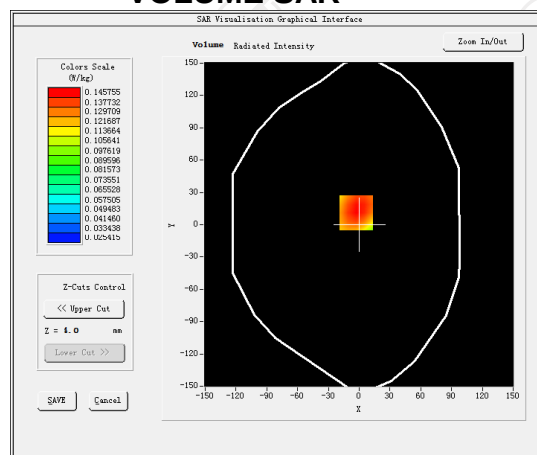
Date: 06/01/2021

Frequency (MHz)	704.000000
Relative permittivity (real part)	55.260832
Relative permittivity (imaginary part)	12.468860
Conductivity (S/m)	0.934272
Variation (%)	-1.160000
Crest Factor	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)
Band	LTE band 12(1 RB#24)

SURFACE SAR

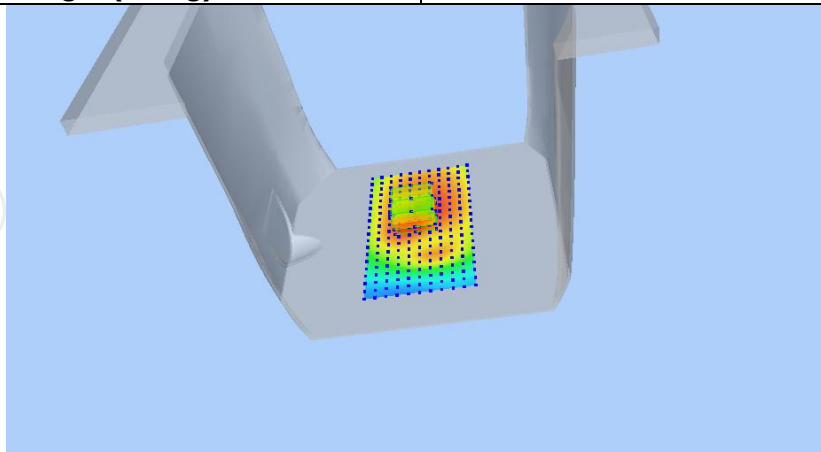


VOLUME SAR

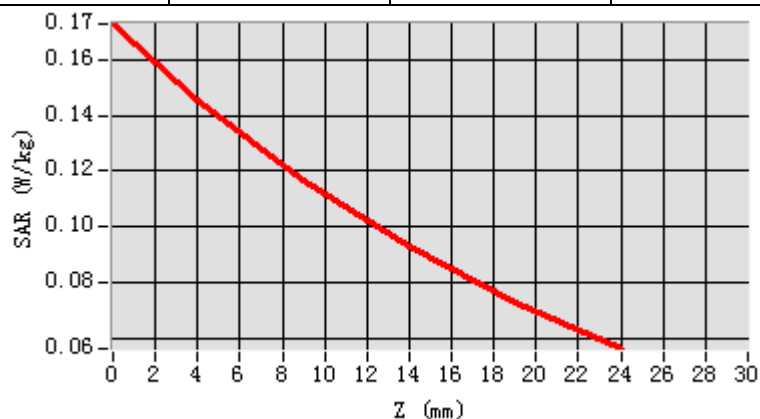


Maximum location: X=-3.00, Y=11.00 SAR Peak: 0.17 W/kg

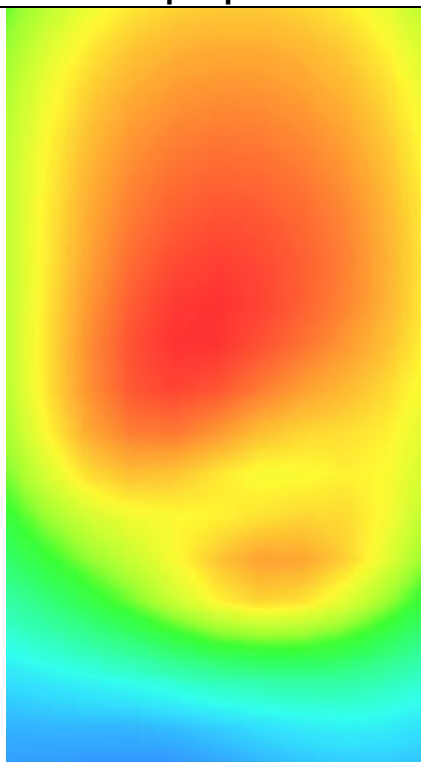
SAR 10g (W/Kg)	0.108746
SAR 1g (W/Kg)	0.141547



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1728	0.1458	0.1169	0.0930	0.0732



Hot spot position



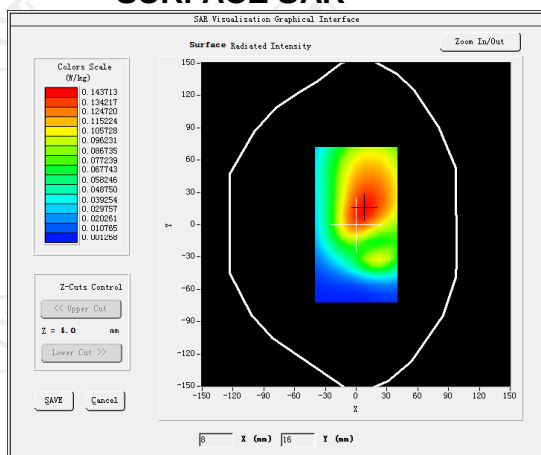
MEASUREMENT 3

Lower Band SAR (Channel 23060):

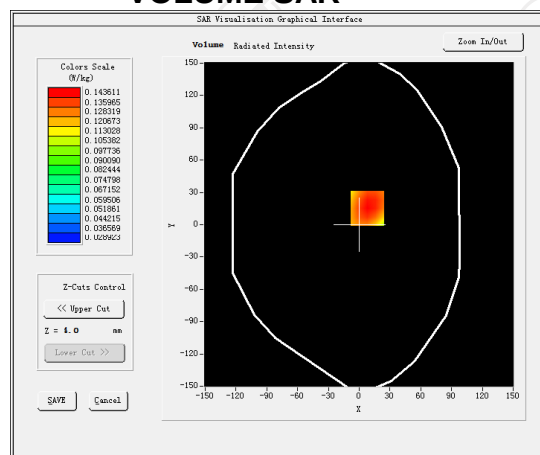
Date: 06/01/2021

Frequency (MHz)	704.000000
Relative permittivity (real part)	55.260832
Relative permittivity (imaginary part)	12.468860
Conductivity (S/m)	0.934272
Variation (%)	-0.460000
Crest Factor	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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#24)

SURFACE SAR

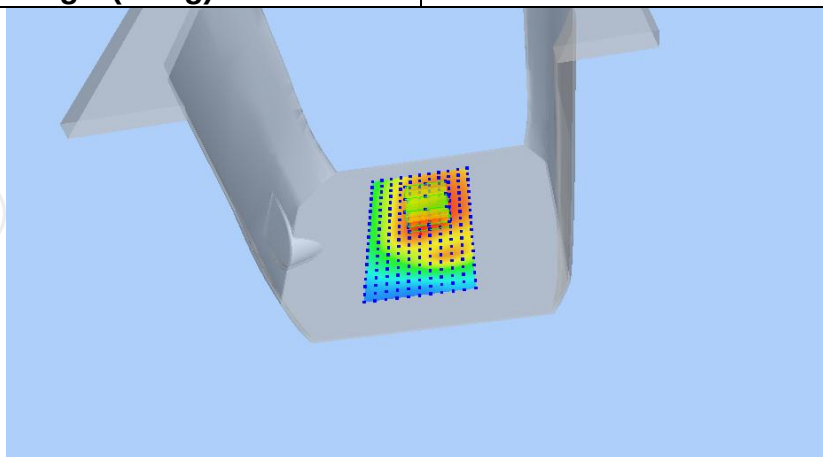


VOLUME SAR

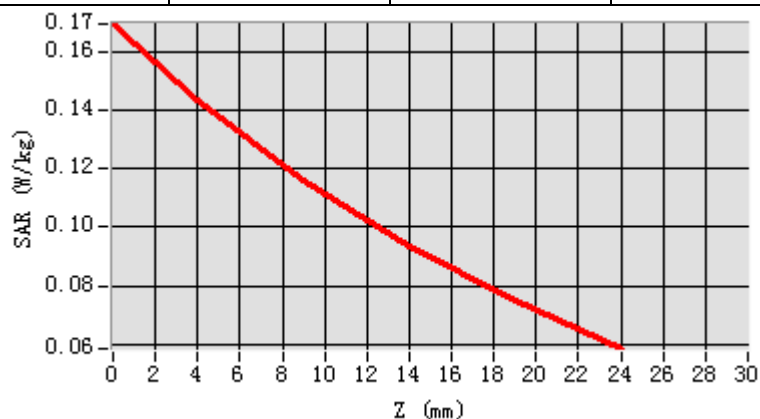


Maximum location: X=8.00, Y=15.00 SAR Peak: 0.17 W/kg

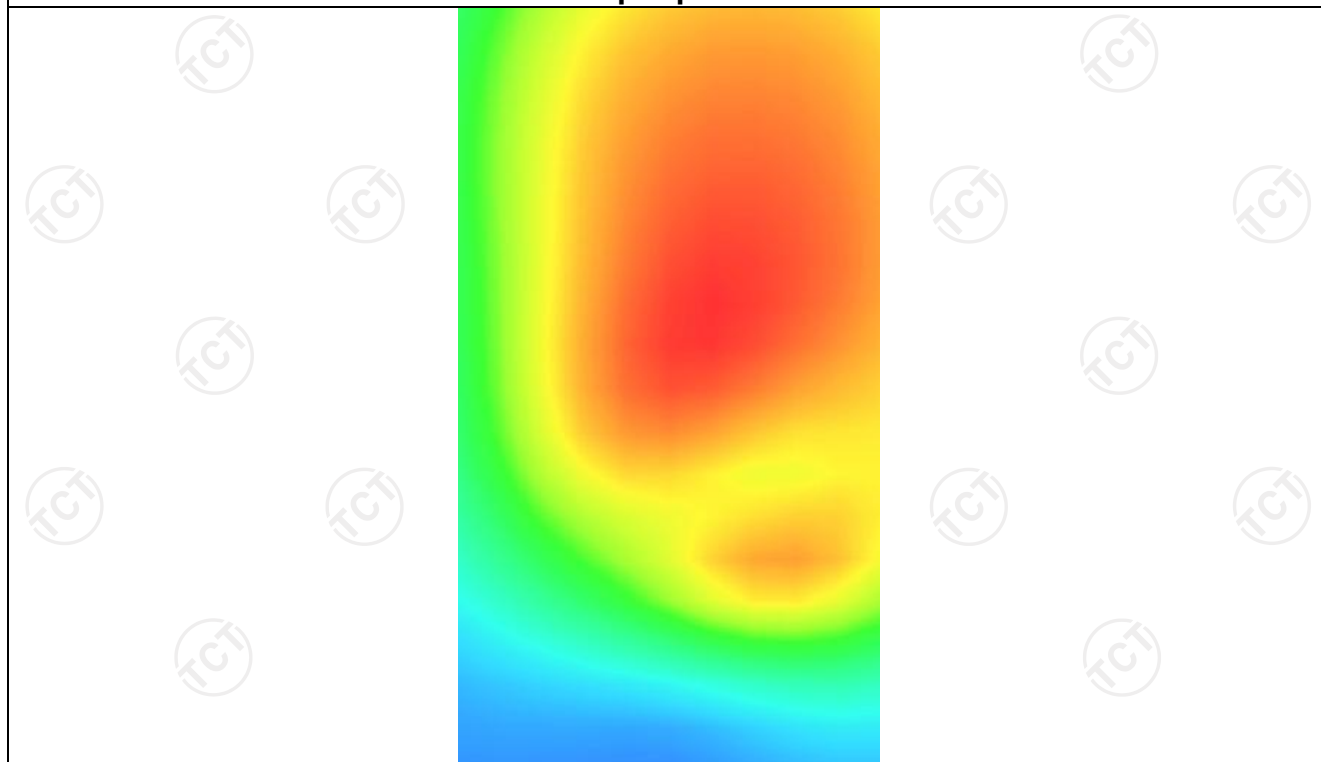
SAR 10g (W/Kg)	0.108025
SAR 1g (W/Kg)	0.159366



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1693	0.1436	0.1162	0.0936	0.0747



Hot spot position



LTE Band 17_

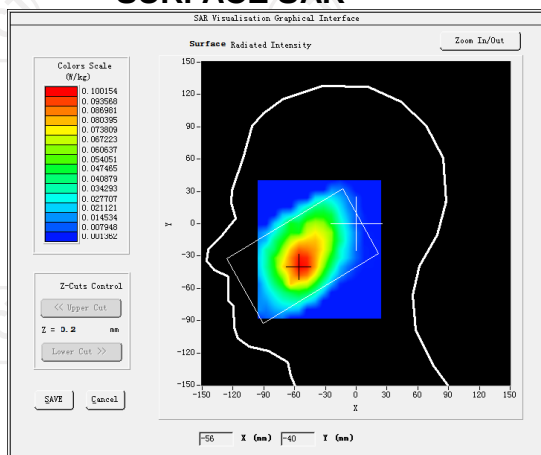
MEASUREMENT 1

Middle Band SAR (Channel 23790):

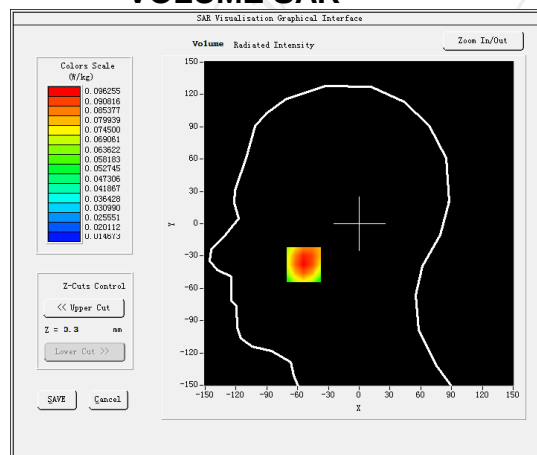
Date: 06/01/2021

Frequency (MHz)	710.000000
Relative permittivity (real part)	41.430182
Relative permittivity (imaginary part)	12.468765
Conductivity (S/m)	0.859210
Variation (%)	-1.040000
Crest Factor	1.0
Probe Conversion factor	1.80
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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	Right head
Device Position	Cheek
Band	LTE band 17(1 RB#24)

SURFACE SAR



VOLUME SAR



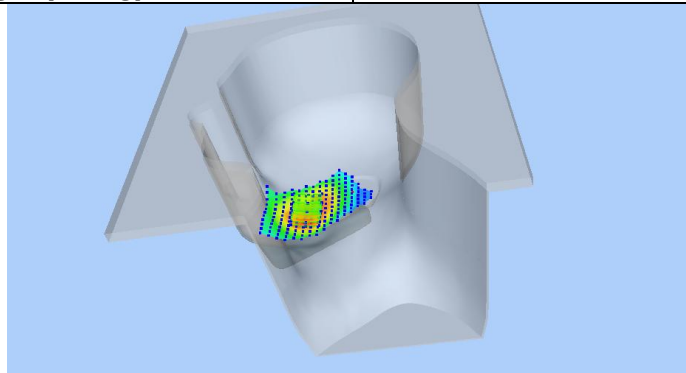
Maximum location: X=-54.00, Y=-38.00 SAR Peak: 0.11 W/kg

SAR 10g (W/Kg)

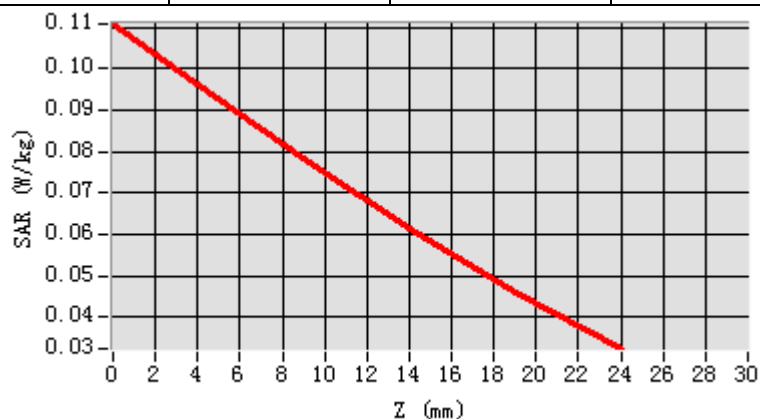
0.070160

SAR 1g (W/Kg)

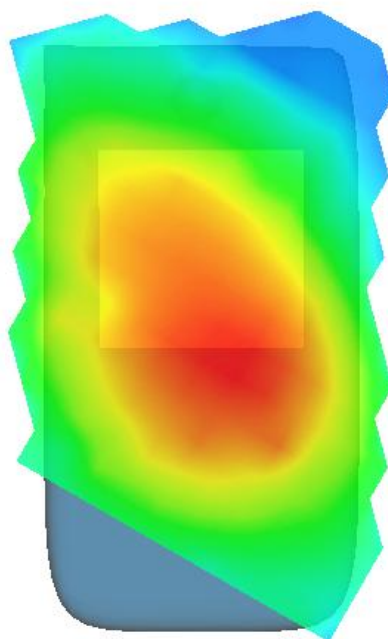
0.094565



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1109	0.0963	0.0785	0.0616	0.0460



Hot spot position



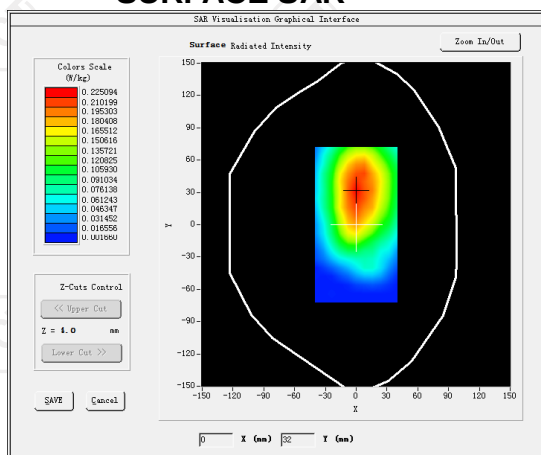
MEASUREMENT 2

Middle Band SAR (Channel 23790):

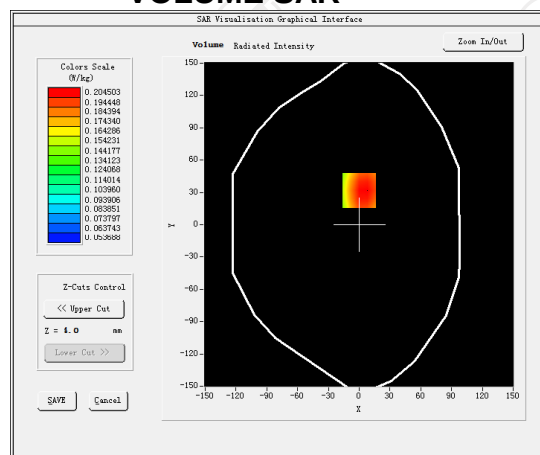
Date: 06/01/2021

Frequency (MHz)	710.000000
Relative permittivity (real part)	55.263812
Relative permittivity (imaginary part)	12.468867
Conductivity (S/m)	0.930822
Variation (%)	-1.360000
Crest Factor	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)</u>
Band	<u>LTE band 17(1 RB#24)</u>

SURFACE SAR

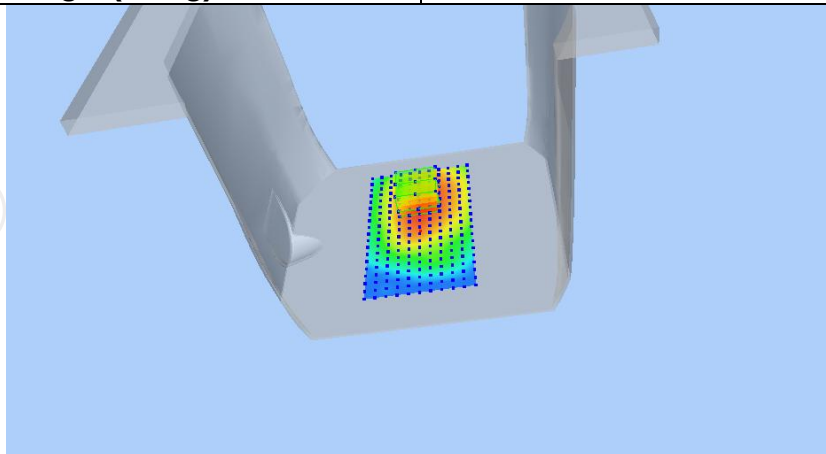


VOLUME SAR

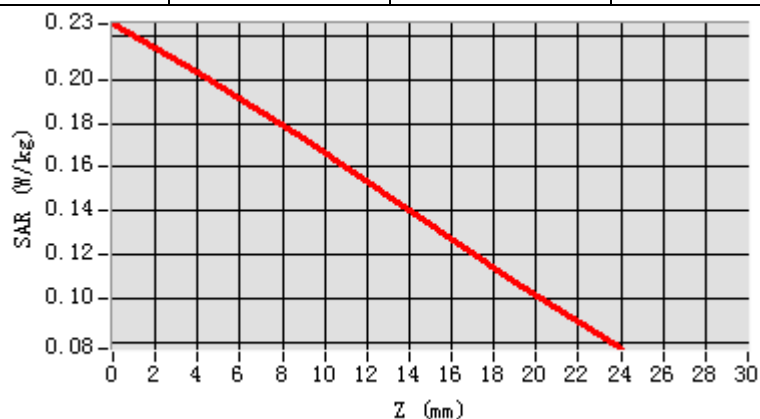


Maximum location: X=0.00, Y=32.00 SAR Peak: 0.23 W/kg

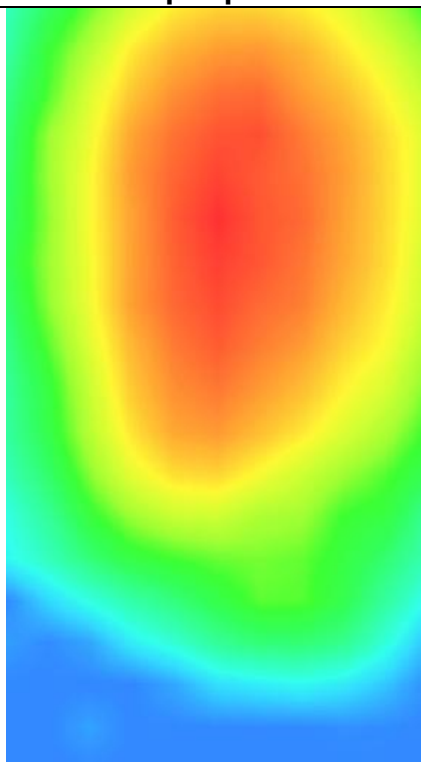
SAR 10g (W/Kg)	0.163761
SAR 1g (W/Kg)	0.211528



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2255	0.2037	0.1731	0.1402	0.1071



Hot spot position



LTE Band 66

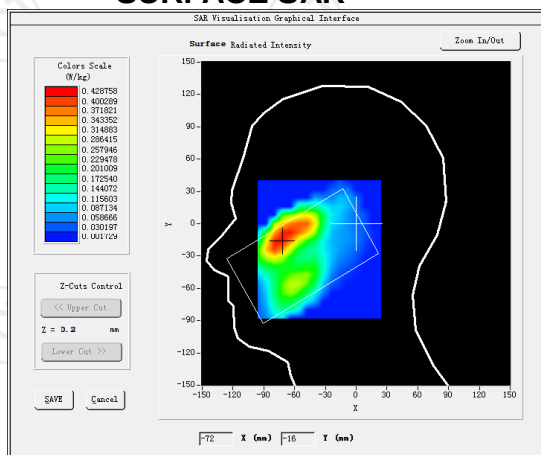
MEASUREMENT 1

Higher Band SAR (Channel 132572):

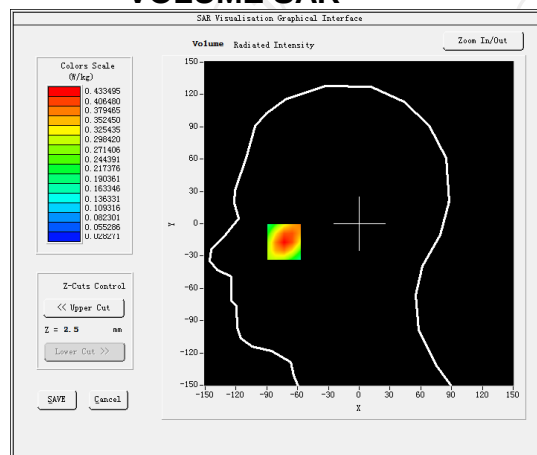
Date: 06/07/2021

Frequency (MHz)	1770.000000
Relative permittivity (real part)	39.111249
Relative permittivity (imaginary part)	12.468850
Conductivity (S/m)	1.340792
Variation (%)	-1.310000
Crest Factor	1.0
Probe Conversion factor	2.08
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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>Left head</u>
Device Position	<u>Cheek</u>
Band	<u>LTE band 66(1 RB#0)</u>

SURFACE SAR



VOLUME SAR



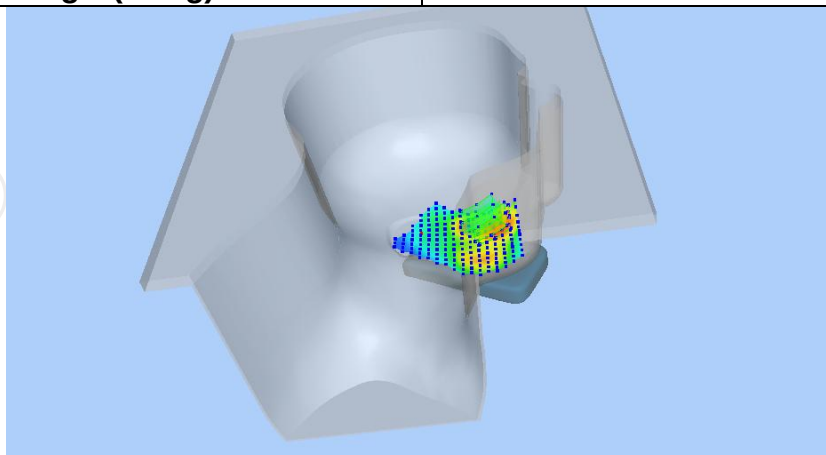
Maximum location: X=-73.00, Y=-15.00 SAR Peak: 0.61 W/kg

SAR 10g (W/Kg)

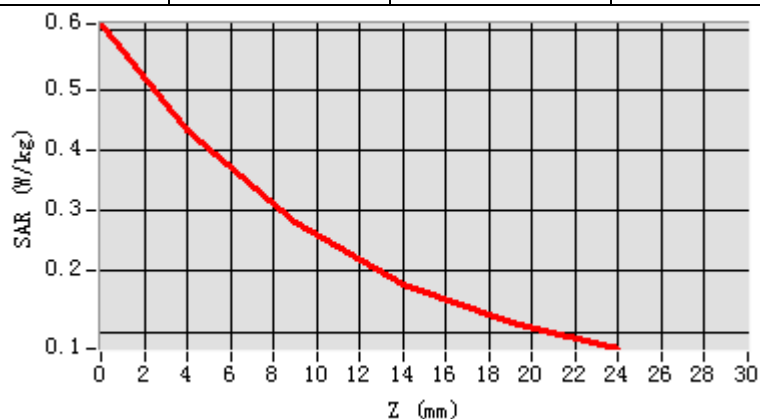
0.254114

SAR 1g (W/Kg)

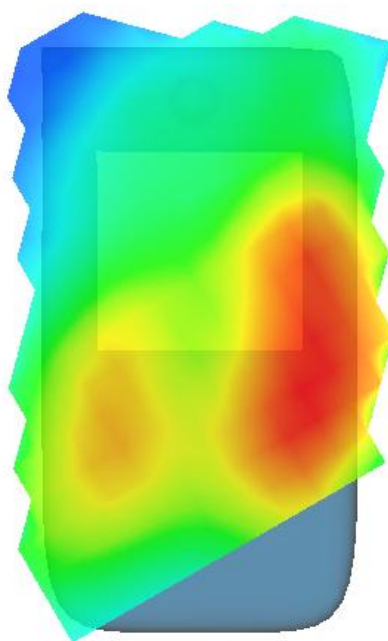
0.249920



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.6091	0.4335	0.2795	0.1799	0.1163



Hot spot position



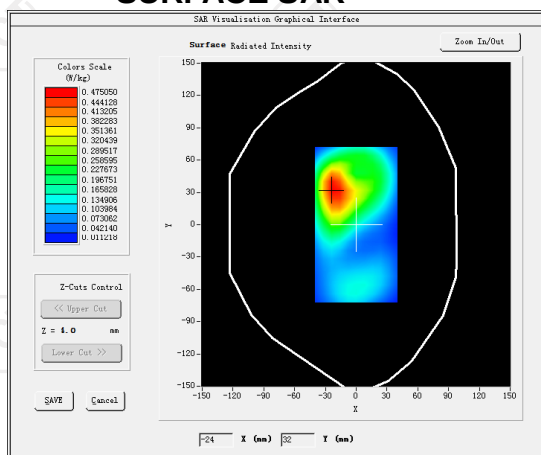
MEASUREMENT 2

Higher Band SAR (Channel 132572):

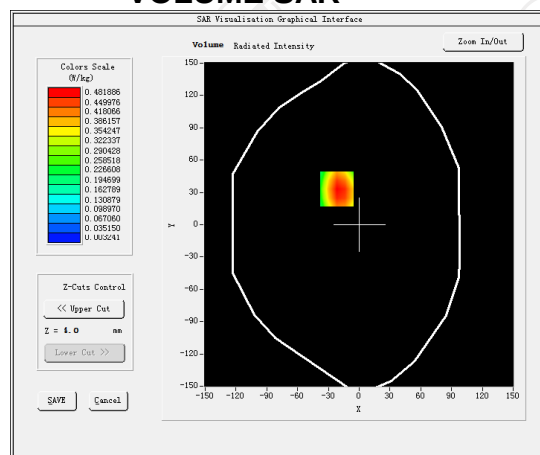
Date: 06/07/2021

Frequency (MHz)	1770.000000
Relative permittivity (real part)	53.341249
Relative permittivity (imaginary part)	15.168850
Conductivity (S/m)	1.492592
Variation (%)	-0.400000
Crest Factor	1.0
Probe Conversion factor	2.16
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)
Band	LTE band 66(1 RB#0)

SURFACE SAR

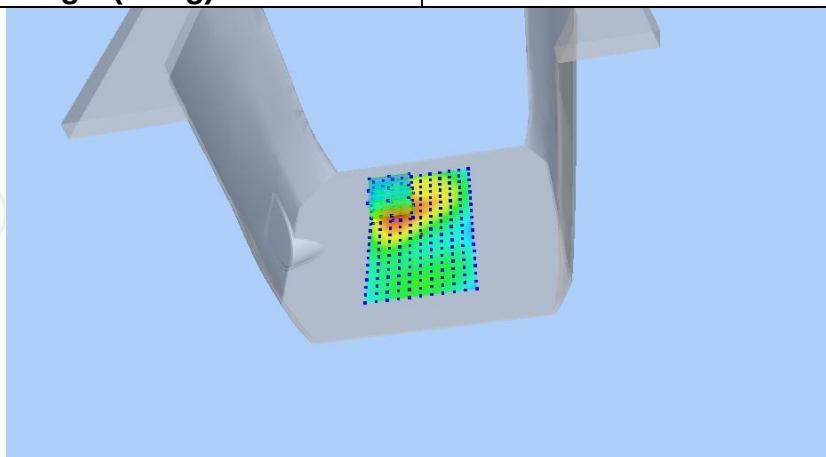


VOLUME SAR

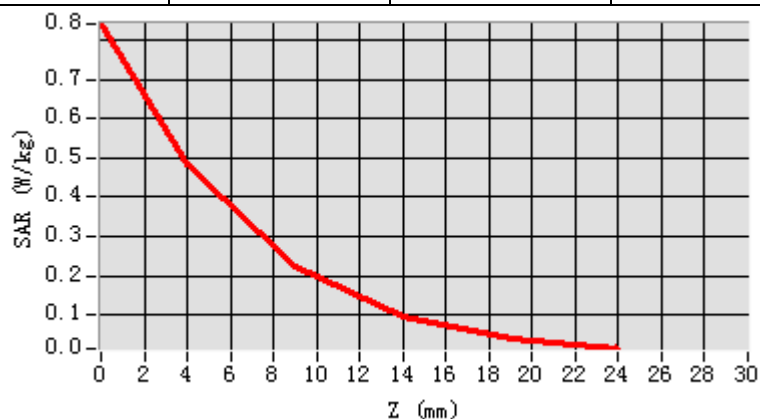


Maximum location: X=-22.00, Y=33.00 SAR Peak: 0.85 W/kg

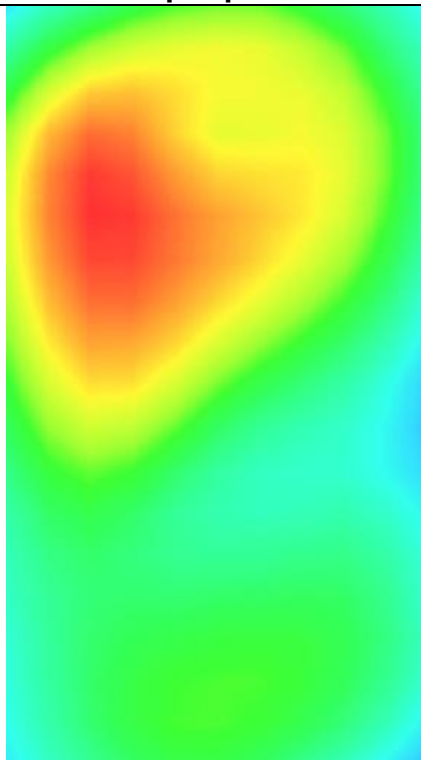
SAR 10g (W/Kg)	0.238743
SAR 1g (W/Kg)	0.463235



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8405	0.4819	0.2230	0.0970	0.0413



Hot spot position



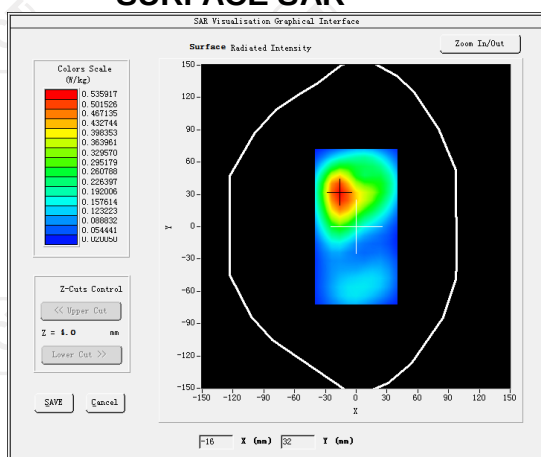
MEASUREMENT 3

Higher Band SAR (Channel 132572):

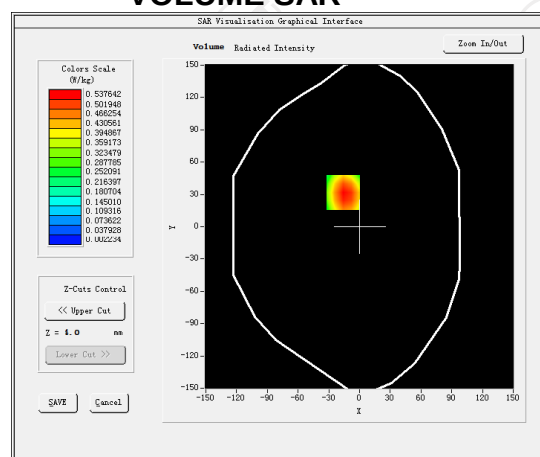
Date: 06/07/2021

Frequency (MHz)	1770.000000
Relative permittivity (real part)	53.341249
Relative permittivity (imaginary part)	15.168850
Conductivity (S/m)	1.492592
Variation (%)	0.290000
Crest Factor	1.0
Probe Conversion factor	2.16
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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	<u>Body back(hotspot 10mm)</u>
Band	<u>LTE band 66(1 RB#0)</u>

SURFACE SAR

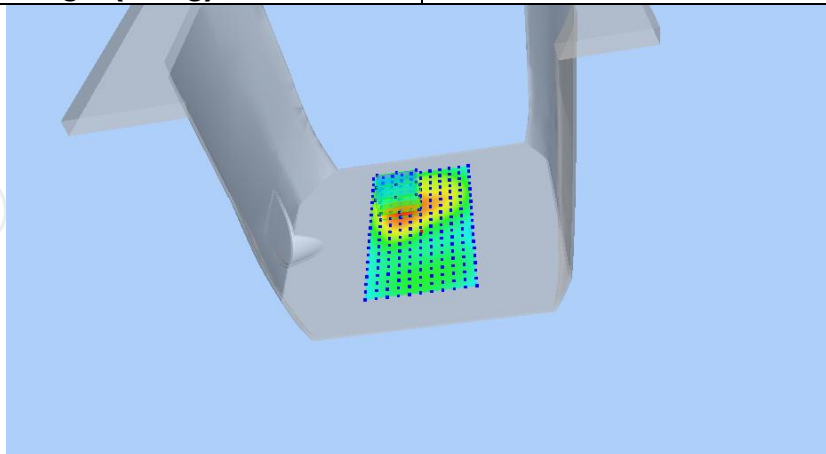


VOLUME SAR

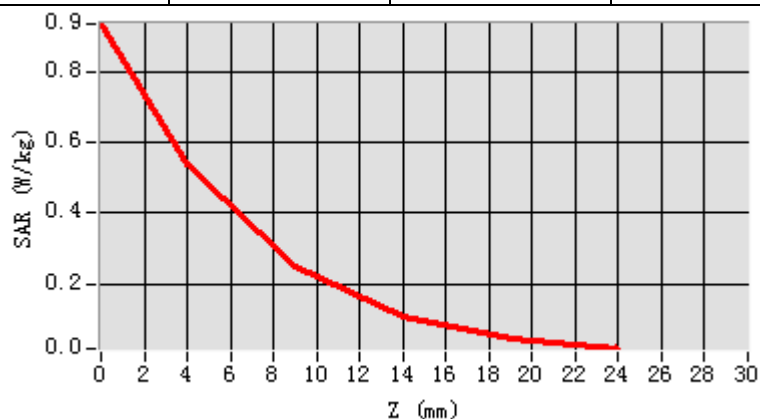


Maximum location: X=-16.00, Y=32.00 SAR Peak: 0.94 W/kg

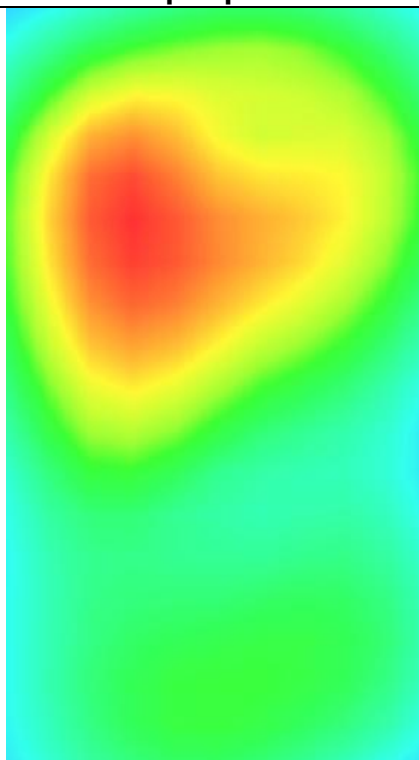
SAR 10g (W/Kg)	0.266158
SAR 1g (W/Kg)	0.506035



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.9366	0.5376	0.2491	0.1082	0.0457



Hot spot position

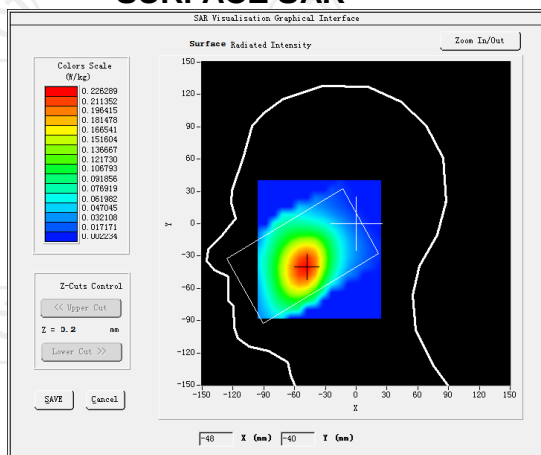


LTE Band 71

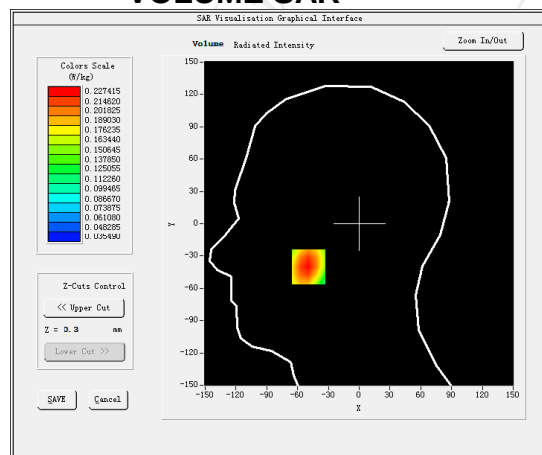
MEASUREMENT 1

Middle Band SAR (Channel 133322):		Date: 06/01/2021
Frequency (MHz)	683.000000	
Relative permittivity (real part)	41.432976	
Relative permittivity (imaginary part)	12.468860	
Conductivity (S/m)	0.862835	
Variation (%)	1.320000	
Crest Factor	1.0	
Probe Conversion factor	1.80	
E-Field Probe:	SSE2 (SN 36/20 EPG0346)	
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#49)	

SURFACE SAR



VOLUME SAR



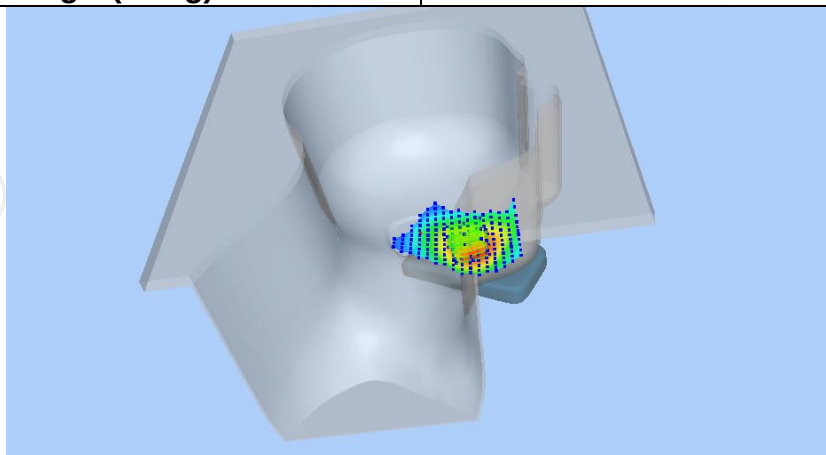
Maximum location: X=-40.00, Y=-41.00 SAR Peak: 0.17 W/kg

SAR 10g (W/Kg)

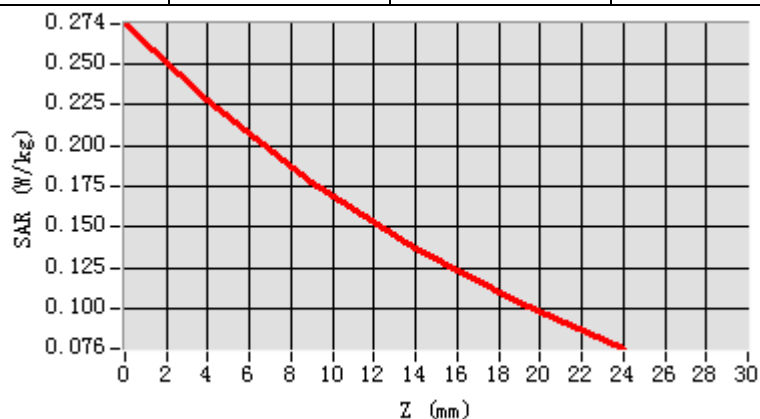
0.157551

SAR 1g (W/Kg)

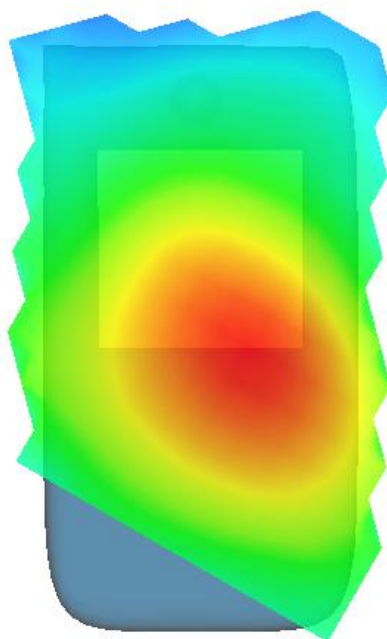
0.215212



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.2741	0.2262	0.1734	0.1371	0.1037



Hot spot position



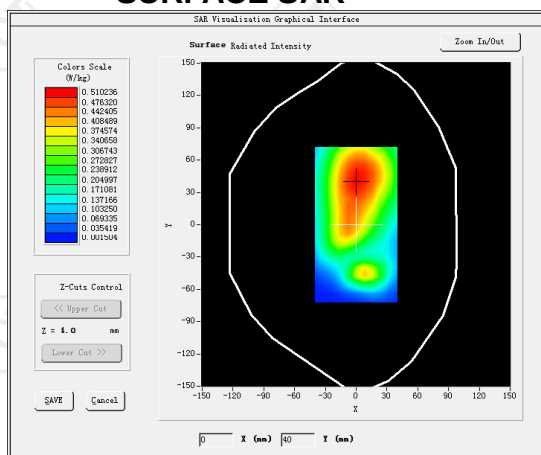
MEASUREMENT 2

Middle Band SAR (Channel 133322):

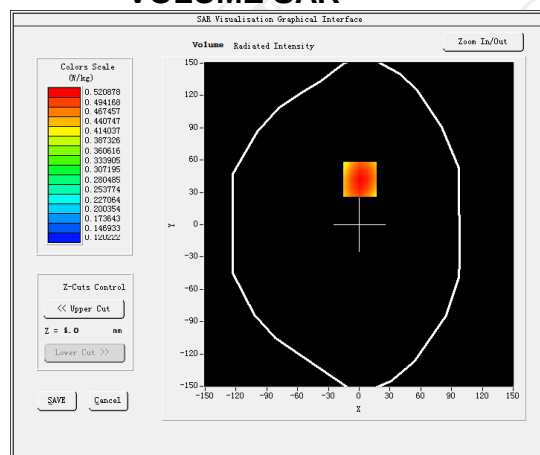
Date: 06/01/2021

Frequency (MHz)	683.000000
Relative permittivity (real part)	55.260832
Relative permittivity (imaginary part)	12.468860
Conductivity (S/m)	0.934272
Variation (%)	1.100000
Crest Factor	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)</u>
Band	<u>LTE band 71(1 RB#49)</u>

SURFACE SAR

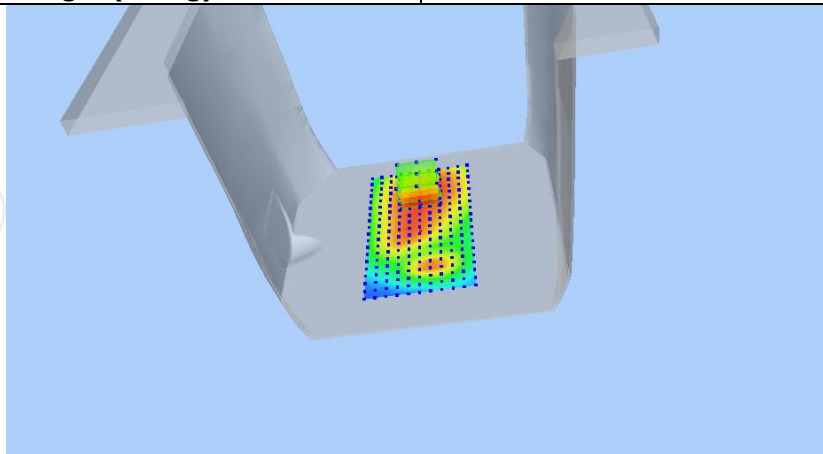


VOLUME SAR

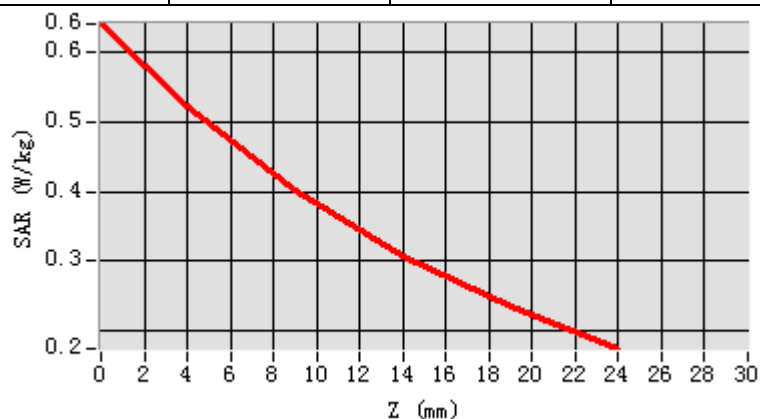


Maximum location: X=2.00, Y=32.00 SAR Peak: 0.52 W/kg

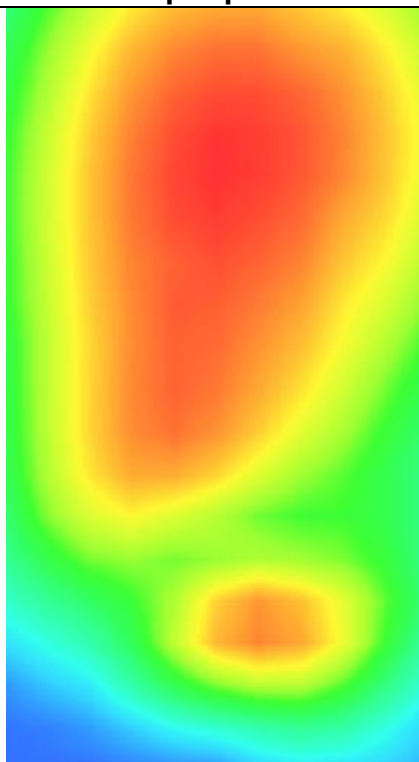
SAR 10g (W/Kg)	0.371244
SAR 1g (W/Kg)	0.501571



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.6443	0.5218	0.4011	0.3054	0.2324



Hot spot position



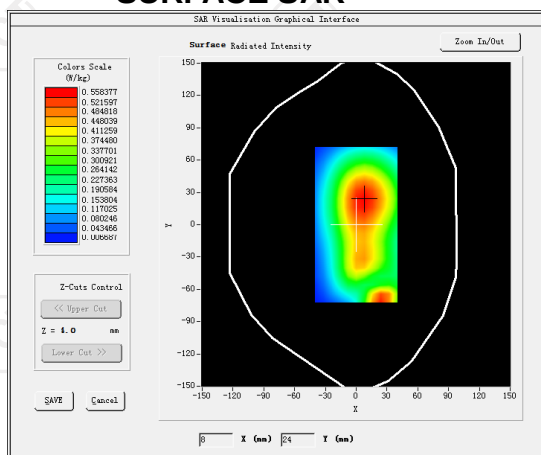
MEASUREMENT 3

Middle Band SAR (Channel 133322):

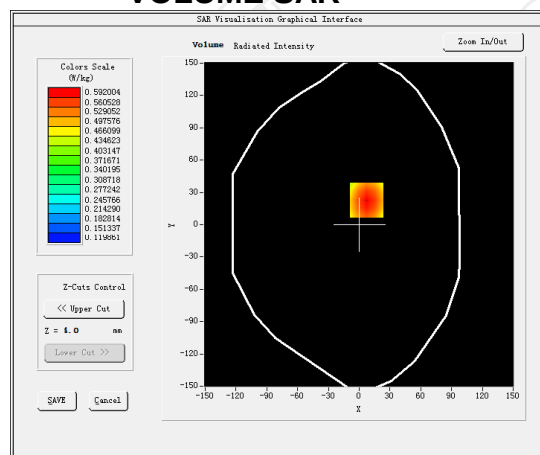
Date: 06/01/2021

Frequency (MHz)	683.000000
Relative permittivity (real part)	55.260832
Relative permittivity (imaginary part)	12.468860
Conductivity (S/m)	0.934272
Variation (%)	-1.260000
Crest Factor	1.0
Probe Conversion factor	1.86
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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	<u>Body back(hotspot 10mm)</u>
Band	<u>LTE band 71(1 RB#49)</u>

SURFACE SAR

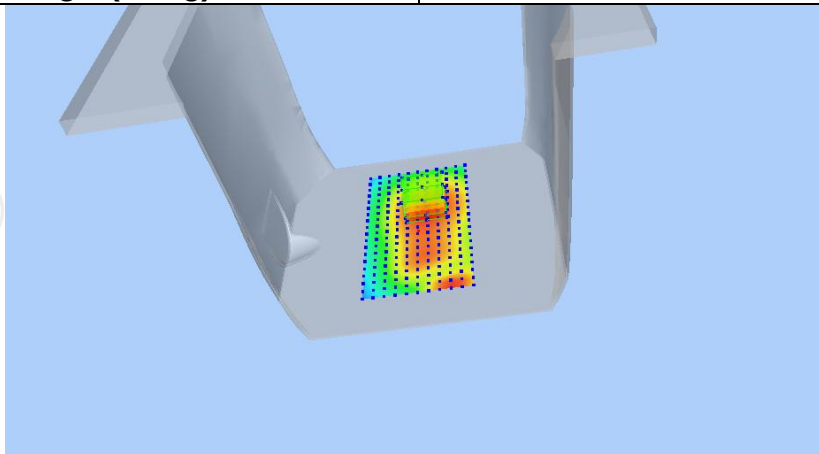


VOLUME SAR

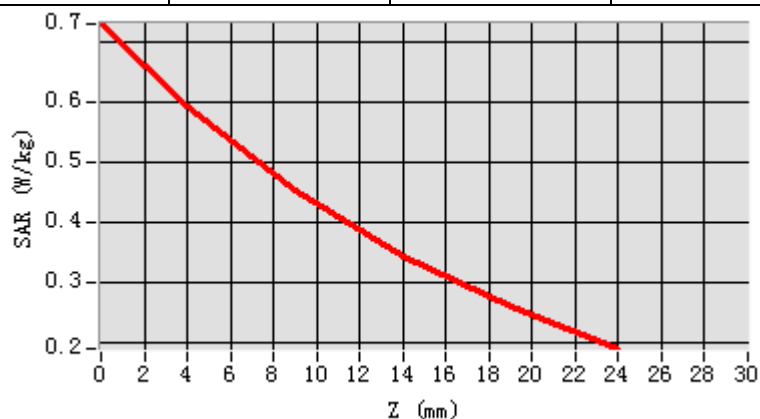


Maximum location: X=6.00, Y=12.00 SAR Peak: 0.70 W/kg

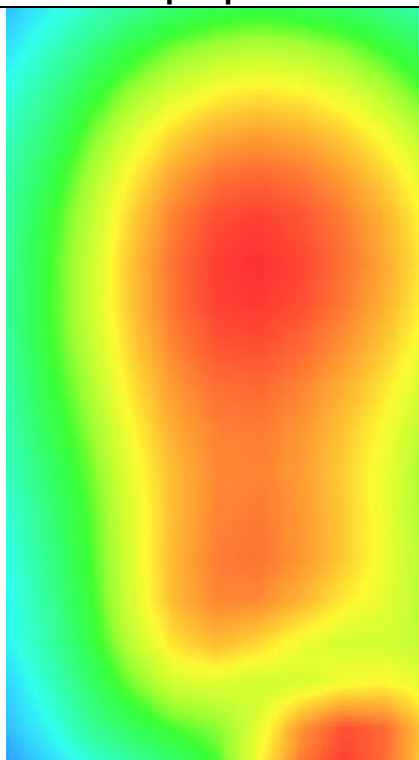
SAR 10g (W/Kg)	0.411566
SAR 1g (W/Kg)	0.568731



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.7311	0.5944	0.4521	0.3422	0.2562



Hot spot position



WLAN 2.4G

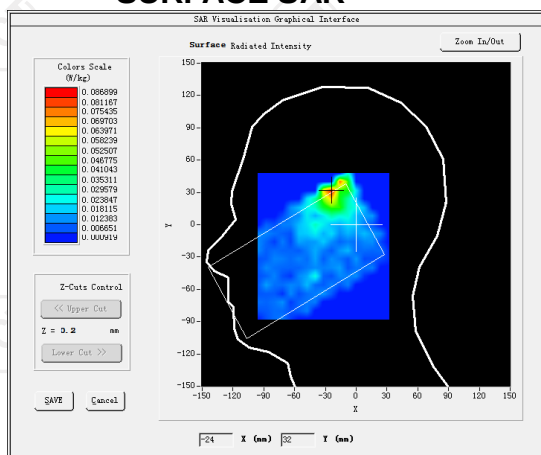
MEASUREMENT 1

Middle Band SAR (Channel 06):

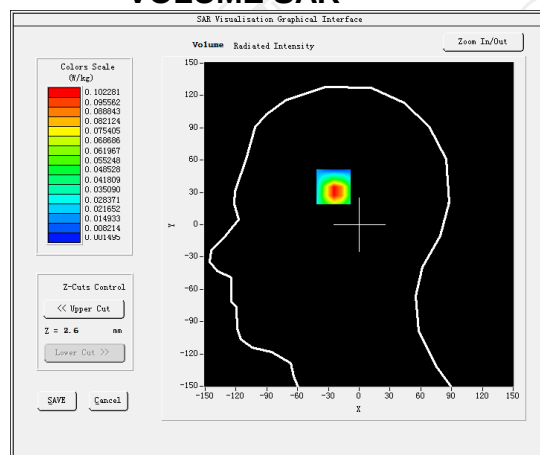
Date: 06/15/2021

Frequency (MHz)	2437.000000
Relative permittivity (real part)	37.852831
Relative permittivity (imaginary part)	13.546209
Conductivity (S/m)	1.812611
Variation (%)	1.210000
Crest Factor	1.0
Probe Conversion factor	2.31
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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>Right head</u>
Device Position	<u>Cheek</u>
Band	<u>IEEE 802.11b ISM</u>

SURFACE SAR

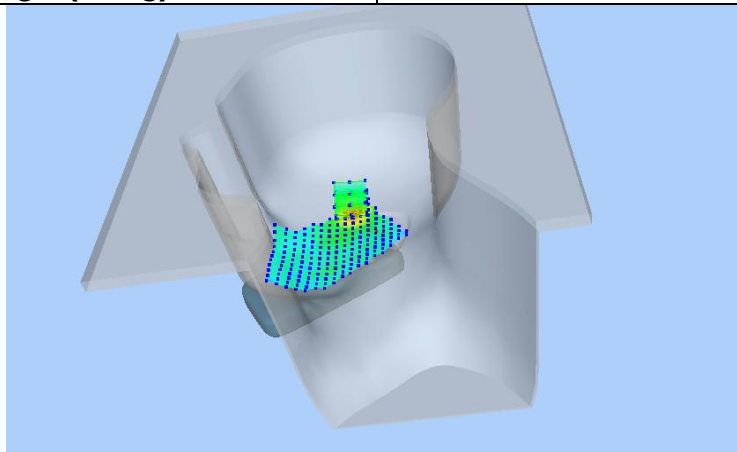


VOLUME SAR

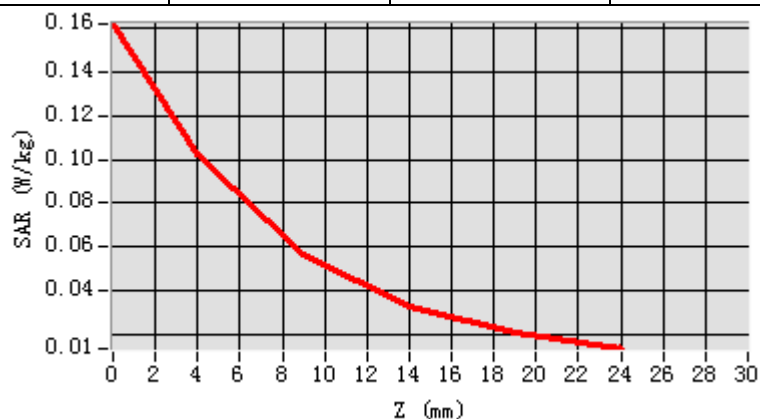


Maximum location: X=-25.00, Y=40.00 SAR Peak: 0.18 W/kg

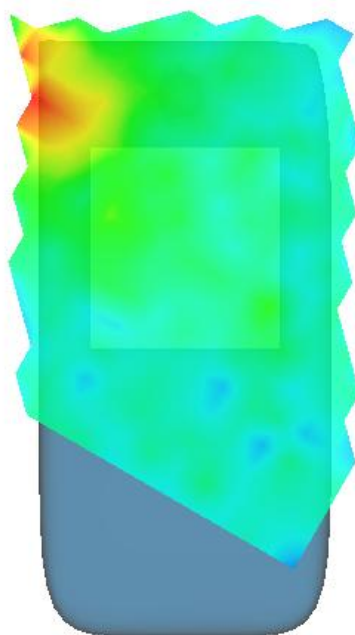
SAR 10g (W/Kg)	0.062740
SAR 1g (W/Kg)	0.133952



Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1621	0.1032	0.0510	0.0347	0.0210



Hot spot position



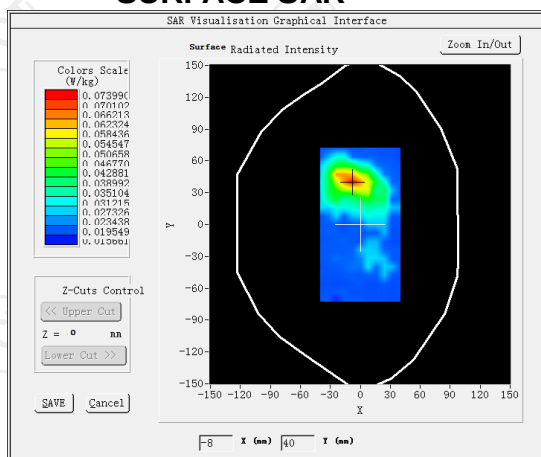
MEASUREMENT 2

Middle Band SAR (Channel 06):

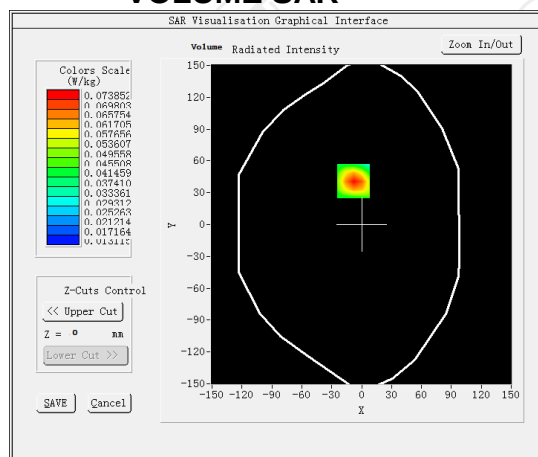
Date: 06/15/2021

Frequency (MHz)	243700000
Relative permittivity (real part)	54.630667
Relative permittivity (imaginary part)	14.318428
Conductivity (S/m)	1.982536
Variation (%)	-0.560000
Crest Factor	1.0
Probe Conversion factor	2.37
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)
Band	IEEE 802.11b ISM

SURFACE SAR

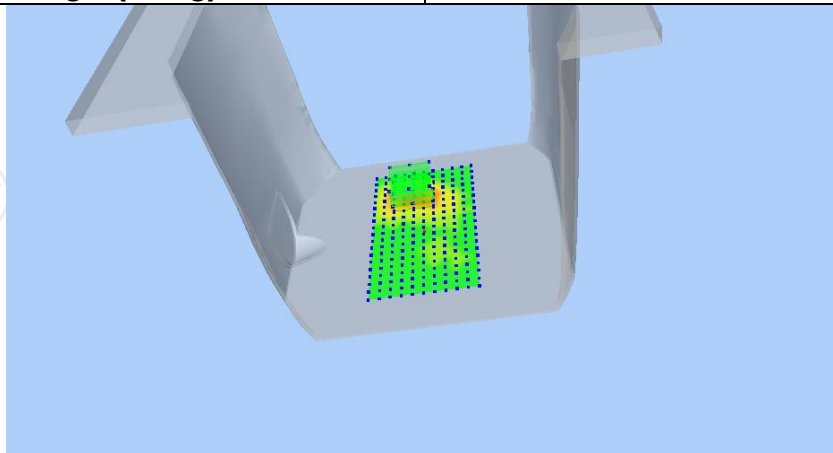


VOLUME SAR

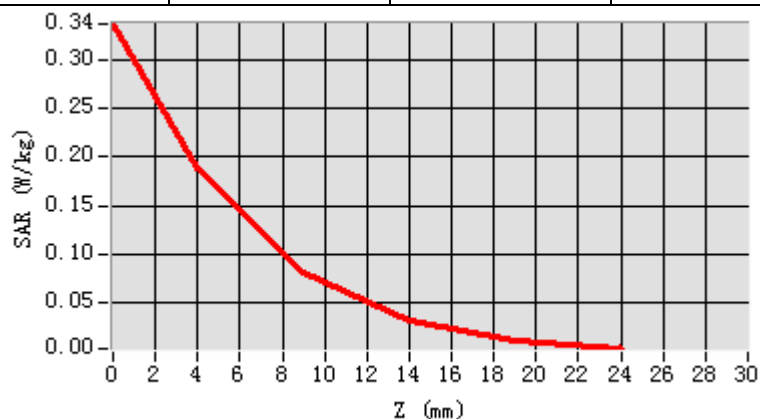


Maximum location: X=16.00, Y=63.00 SAR Peak: 0.10 W/kg

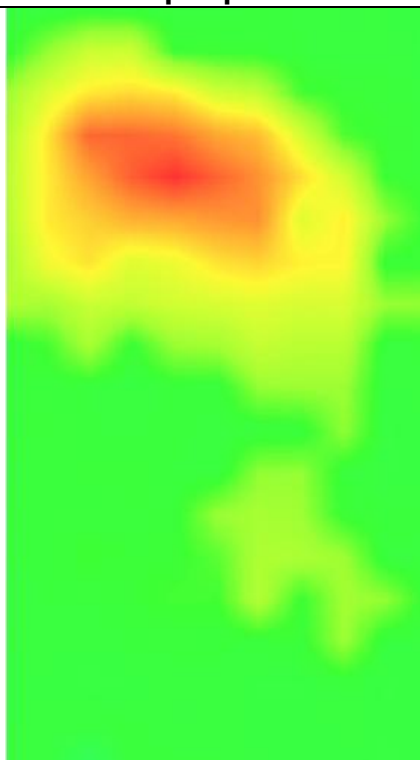
SAR 10g (W/Kg)	0.140642
SAR 1g (W/Kg)	0.268531



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



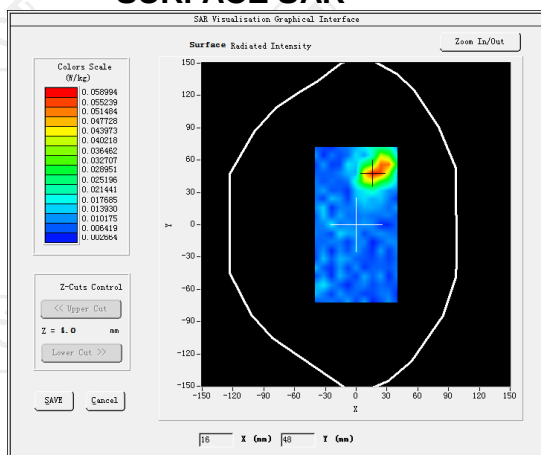
MEASUREMENT 3

Middle Band SAR (Channel 06):

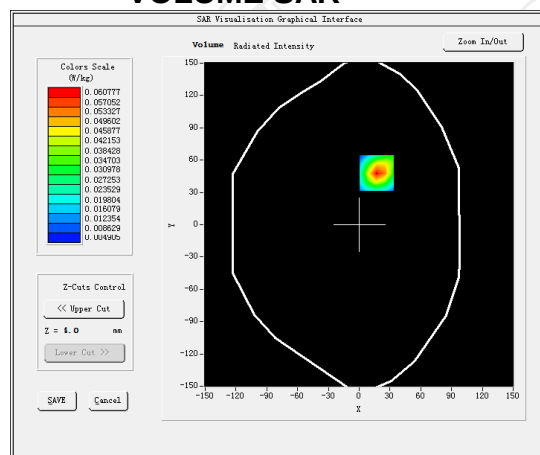
Date: 06/15/2021

Frequency (MHz)	2437.000000
Relative permittivity (real part)	54.630667
Relative permittivity (imaginary part)	14.318428
Conductivity (S/m)	1.982536
Variation (%)	-0.950000
Crest Factor	1.0
Probe Conversion factor	2.37
E-Field Probe:	SSE2 (SN 36/20 EPG0346)
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(10mm)
Band	<u>IEEE 802.11b ISM(hotspot)</u>

SURFACE SAR

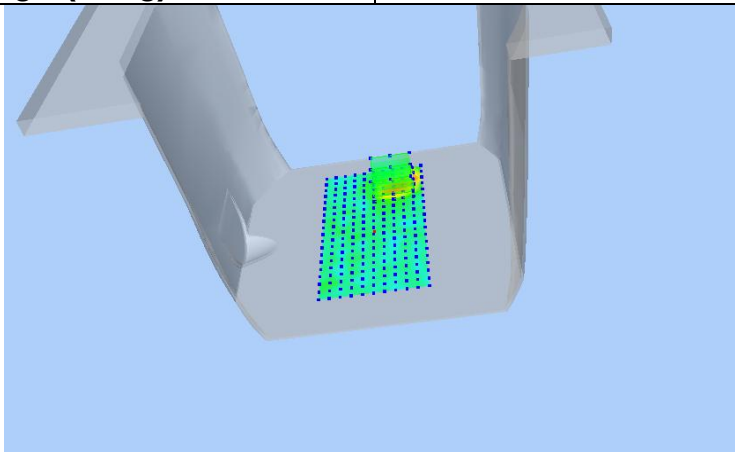


VOLUME SAR

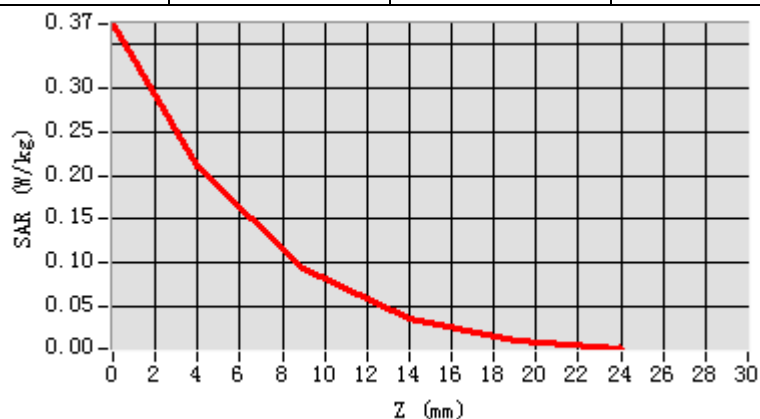


Maximum location: X=17.00, Y=48.00 SAR Peak: 0.10 W/kg

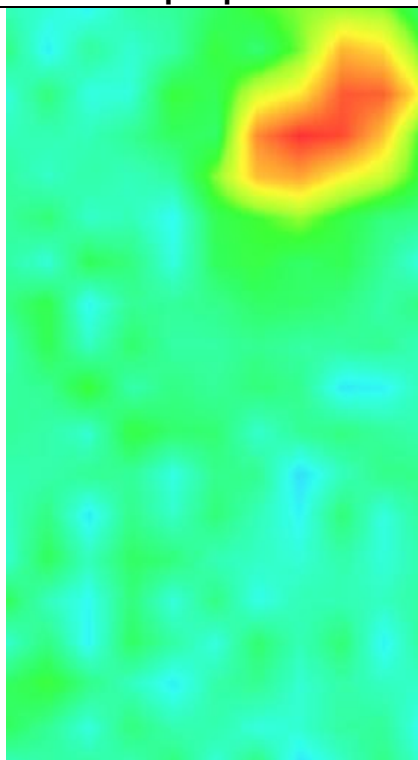
SAR 10g (W/Kg)	0.153770
SAR 1g (W/Kg)	0.277093



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



13. Appendix A: EUT Photos



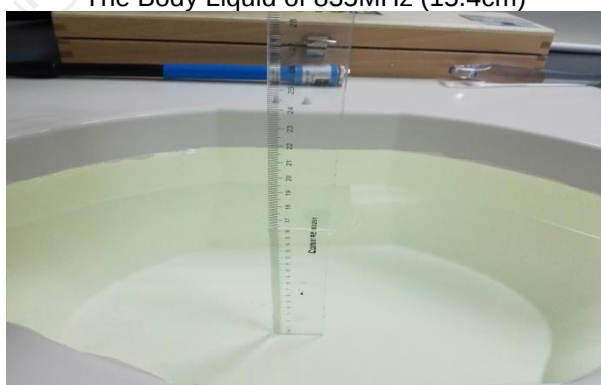
Liquid depth



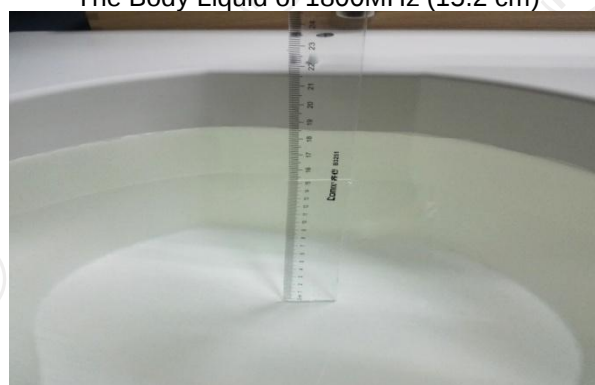
The Body Liquid of 835MHz (15.4cm)



The Body Liquid of 1800MHz (15.2 cm)



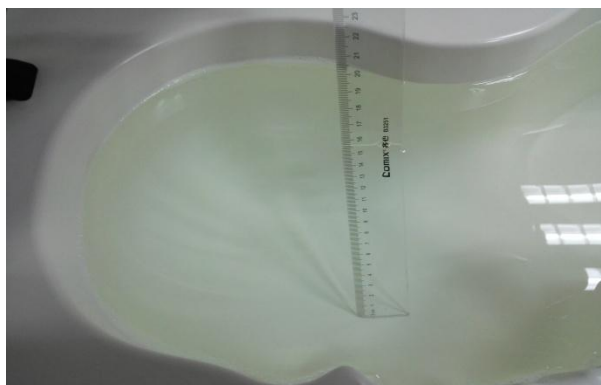
The Body Liquid of 1900MHz (16.4 cm)



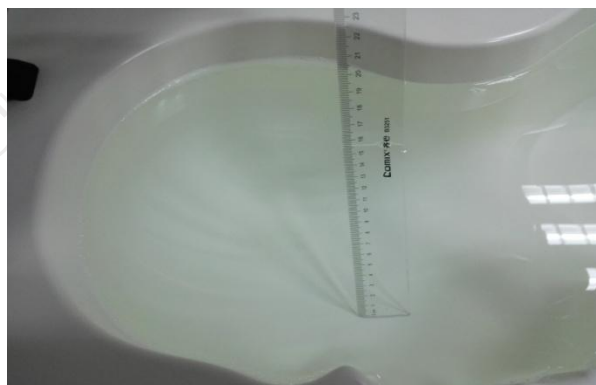
The Body Liquid of 2450MHz (15.3cm)



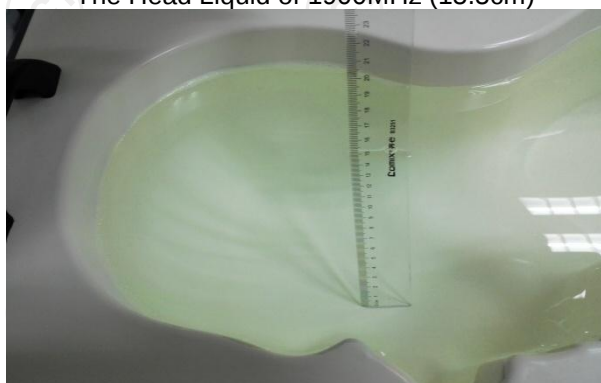
The Body Liquid of 2600MHz (16.5cm)



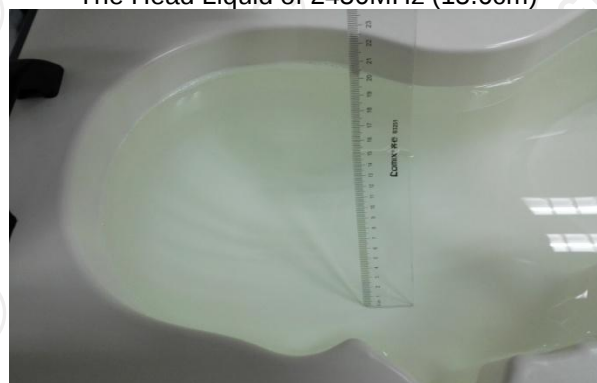
The Head Liquid of 1900MHz (15.5cm)



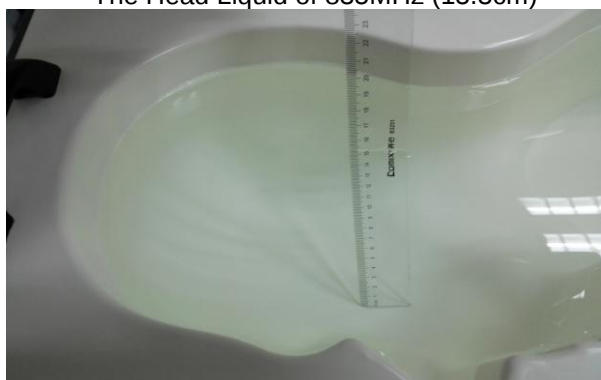
The Head Liquid of 2450MHz (15.6cm)



The Head Liquid of 835MHz (15.3cm)



The Head Liquid of 1800MHz (15.2cm)

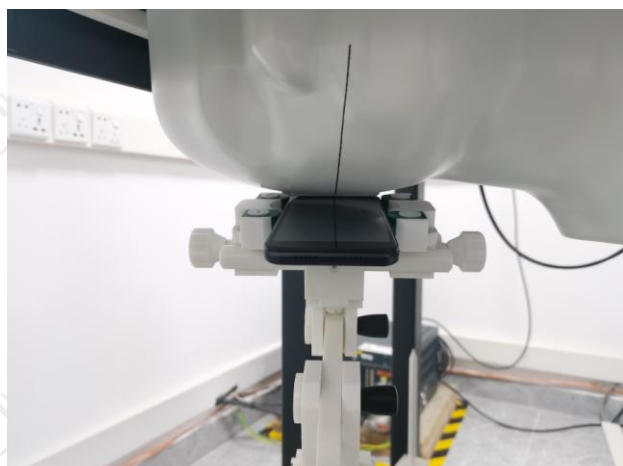


The Head Liquid of 1800MHz (15.2cm)

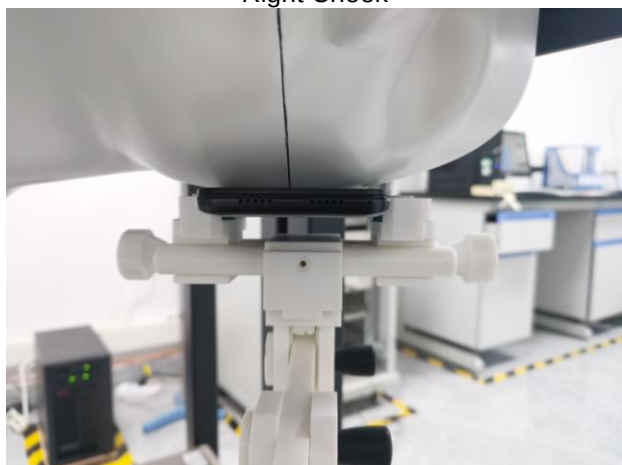
Appendix B: Test Setup Photos



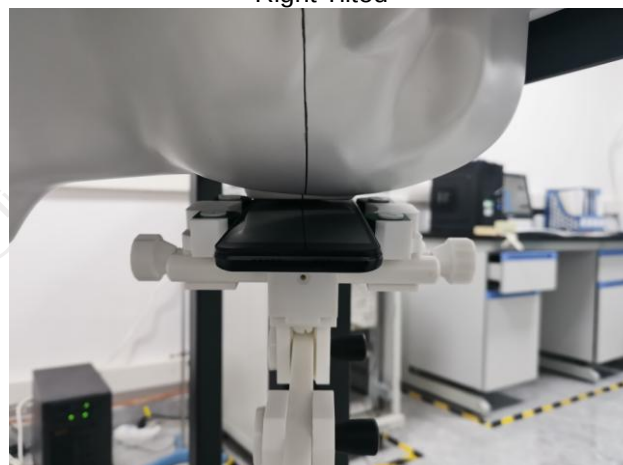
Right Cheek



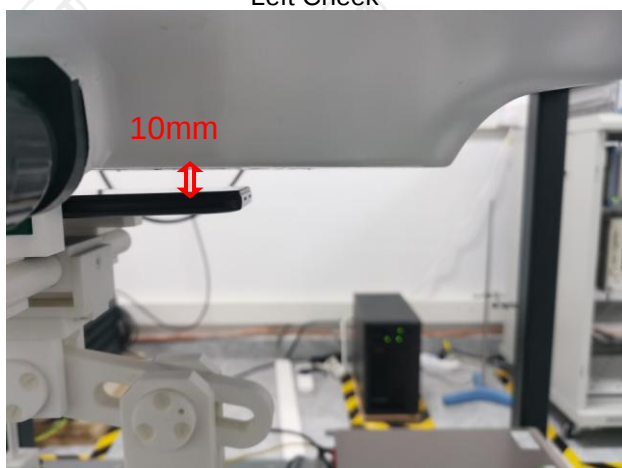
Right Tilted



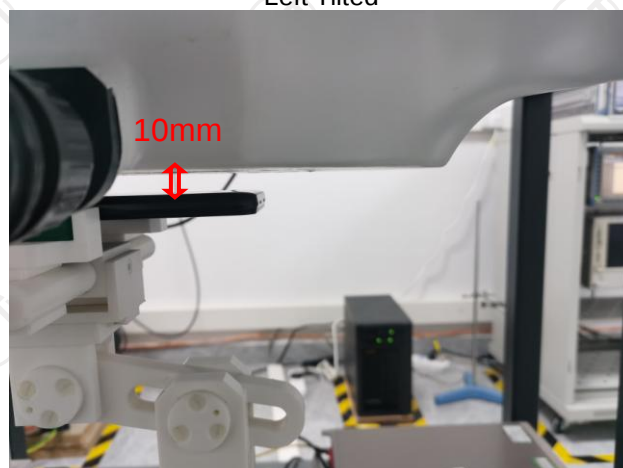
Left Cheek



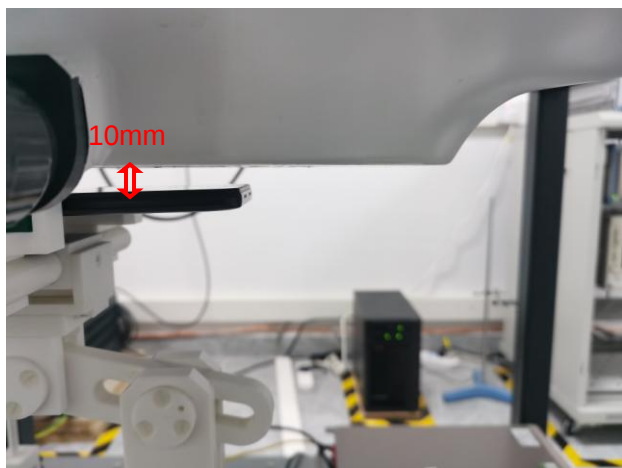
Left Tilted



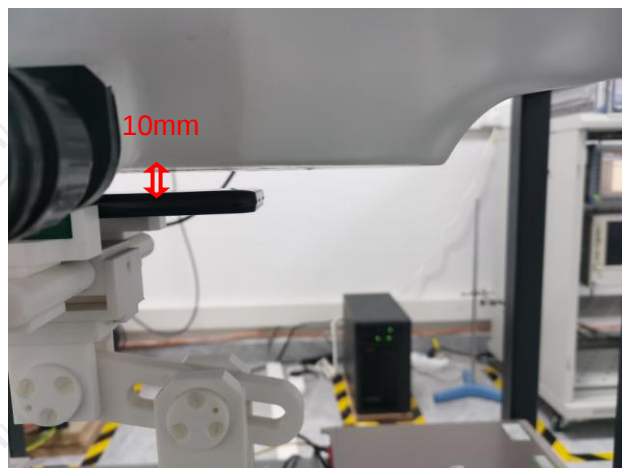
Body worn – Front (10mm)



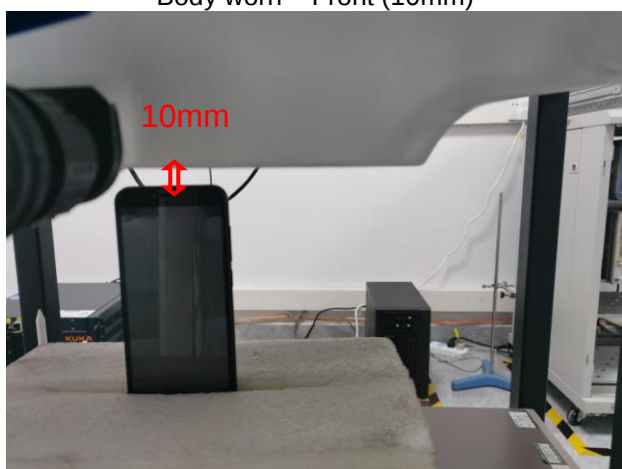
Body worn – Back (10mm)



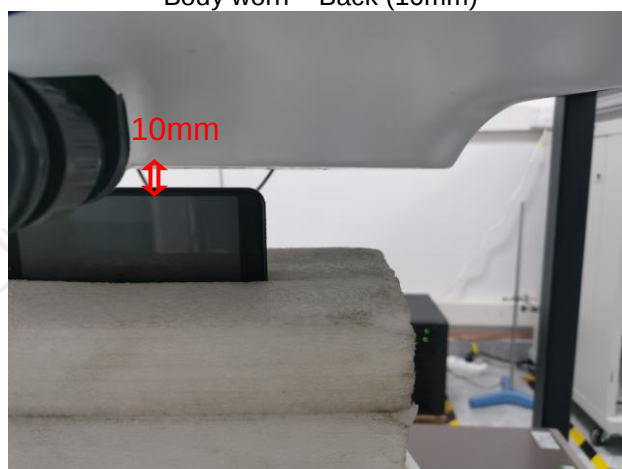
Body worn – Front (10mm)



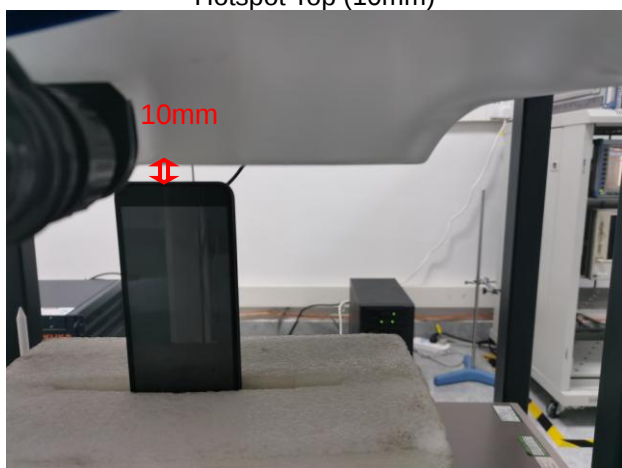
Body worn – Back (10mm)



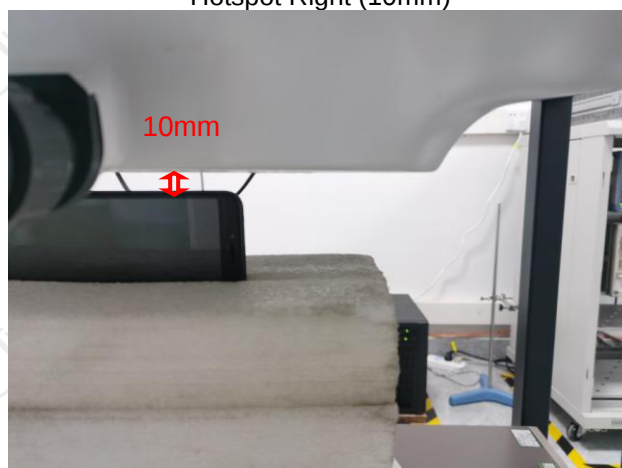
Hotspot Top (10mm)



Hotspot Right (10mm)



Hotspot Bottom (0mm)



Hotspot Left (10mm)

Appendix C: Probe Calibration Certificate

COMOSAR E-FIELD Probe



COMOSAR E-Field Probe Calibration Report

Ref : ACR.297.1.20.MVGB.A

SHENZHEN TONGCE TESTING LAB.
TCT TESTING INDUSTRIAL PARK, FUQIAO 5TH
INDUSTRIAL ZONE, FUHAI STREET,
BAOAN DISTRICT, SHENZHEN, GUANGDONG ,
518103, PEOPLES REPUBLIC OF CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: SN 36/20 EPG0346

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

Calibration date: 10/23/2020



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

Summary:

This document presents the method and results from an accredited COMOSAR 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.297.1.20.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Technical Manager	10/23/2020	<i>JS</i>
Checked by :	Jérôme LUC	Technical Manager	10/23/2020	<i>JS</i>
Approved by :	Yann Toutain	Laboratory Director	10/26/2020	<i>Yann Toutain</i>

2020.10.2
6 09:25:59
+01'00'

	Customer Name
Distribution :	SHENHEN TONGCE TESTING LAB.

Issue	Name	Date	Modifications
A	Jérôme LUC	10/23/2020	Initial release



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.297.1.20.MVGB.A

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**COMOSAR E-FIELD PROBE CALIBRATION REPORT**

Ref: ACR.297.1.20.MVGB.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 36/20 EPGO346
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.217 MΩ Dipole 2: R2=0.245 MΩ Dipole 3: R3=0.219 MΩ

2 PRODUCT DESCRIPTION**2.1 GENERAL INFORMATION**

MVG's COMOSAR E field Probes are built in accordance to the IEEE 1528, FCC KDB865664 D01, CENELEC EN62209 and CEI/IEC 62209 standards.



Figure 1 – MVG COMOSAR Dosimetric E field Dipole

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 IEEE 1528, FCC KDB865664 D01, CENELEC EN62209 and CEI/IEC 62209 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.

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3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

3.3 LOWER DETECTION LIMIT

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

3.4 ISOTROPY

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

3.1 BOUNDARY EFFECT

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

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

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

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.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.297.1.20.MVGB.A

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

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 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	30-80 %

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)
0.81	0.71	0.80

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
115	112	112

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

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

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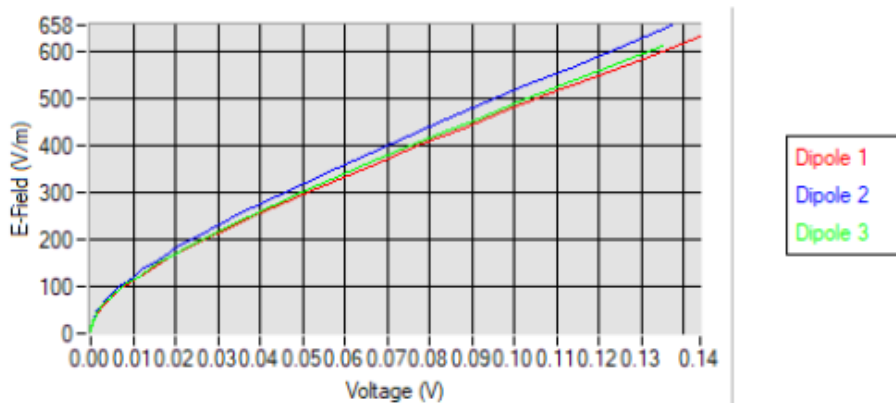
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COMOSAR E-FIELD PROBE CALIBRATION REPORT

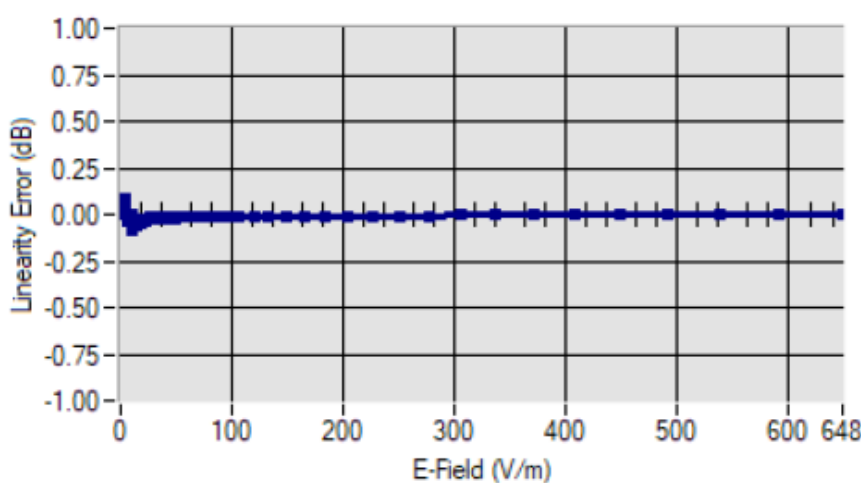
Ref: ACR.297.1.20.MVGB.A

Calibration curves



5.2 LINEARITY

Linearity



Linearity: $\pm 1.97\%$ ($\pm 0.09\text{dB}$)



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.297.1.20.MVGB.A

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	ConvF	Epsilon (S/m)	Permittivity
HL750	750	1.71	0.93	40.76
BL750	750	1.78	0.98	56.70
HL900	900	1.91	0.93	41.94
BL900	900	1.96	0.98	54.62
HL1800	1800	2.08	1.29	40.86
BL1800	1800	2.16	1.47	52.27
HL2000	2000	2.03	1.42	38.37
BL2000	2000	2.10	1.52	52.03
HL2450	2450	2.31	1.80	38.72
BL2450	2450	2.37	1.97	54.91
HL2600	2600	2.16	1.89	39.98
BL2600	2600	2.23	2.18	54.42
HL5200	5200	2.01	4.45	36.68
BL5200	5200	2.08	5.46	49.02
HL5800	5800	2.06	5.08	34.81
BL5800	5800	2.13	6.12	47.81

LOWER DETECTION LIMIT: 8mW/kg

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