

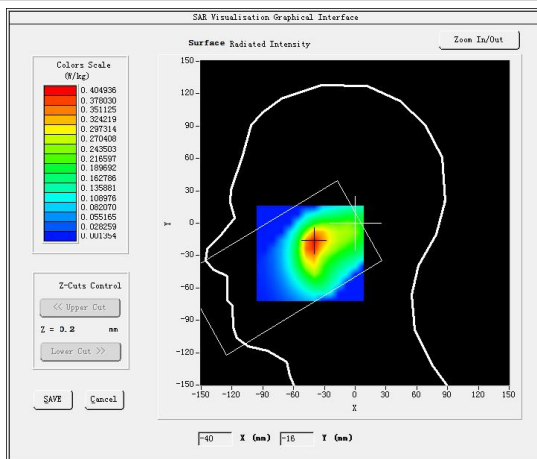


#15

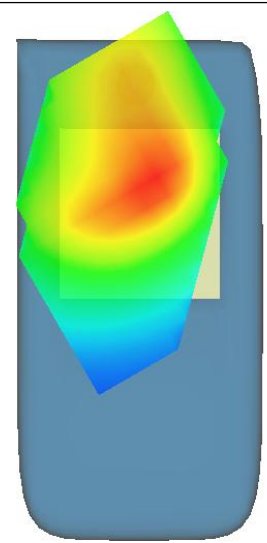
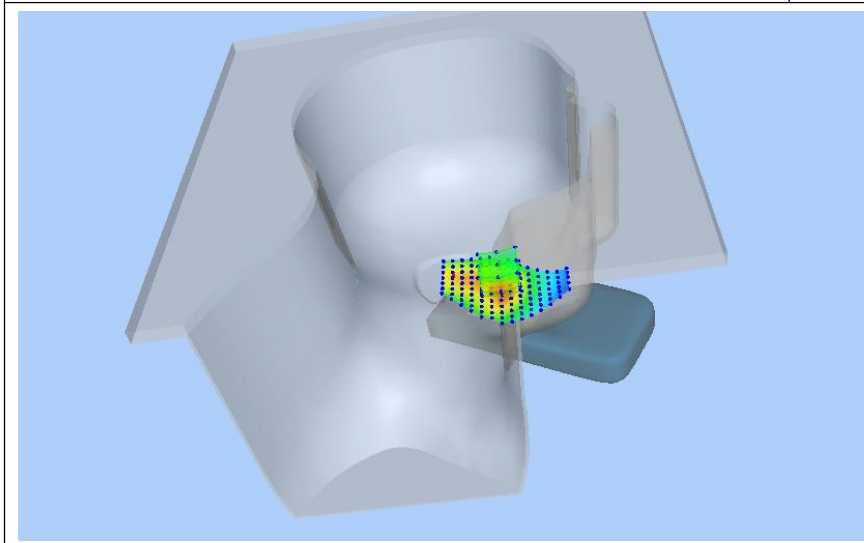
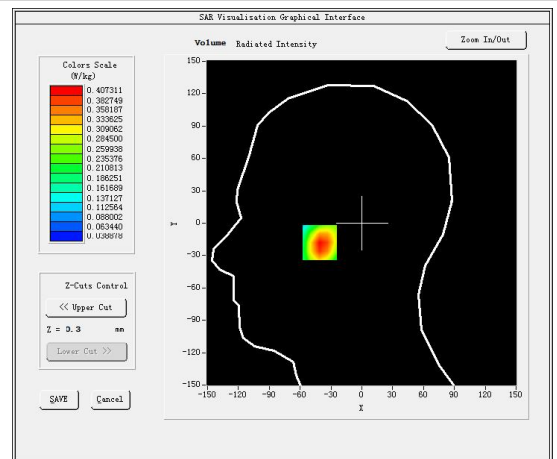
Test Mode: LTE Band 5, 1RB,Low channel(Head Left Cheek)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 14, 2022

Medium(liquid type)	HSL 835
Frequency (MHz)	829.0000
Relative permittivity (real part)	41.68
Conductivity (S/m)	0.89
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.55
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.160000
SAR 10g (W/Kg)	0.250968
SAR 1g (W/Kg)	0.391440

SURFACE SAR



VOLUME SAR

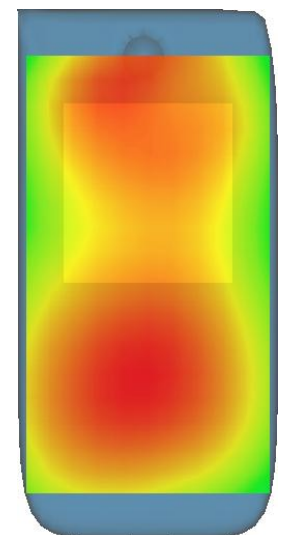
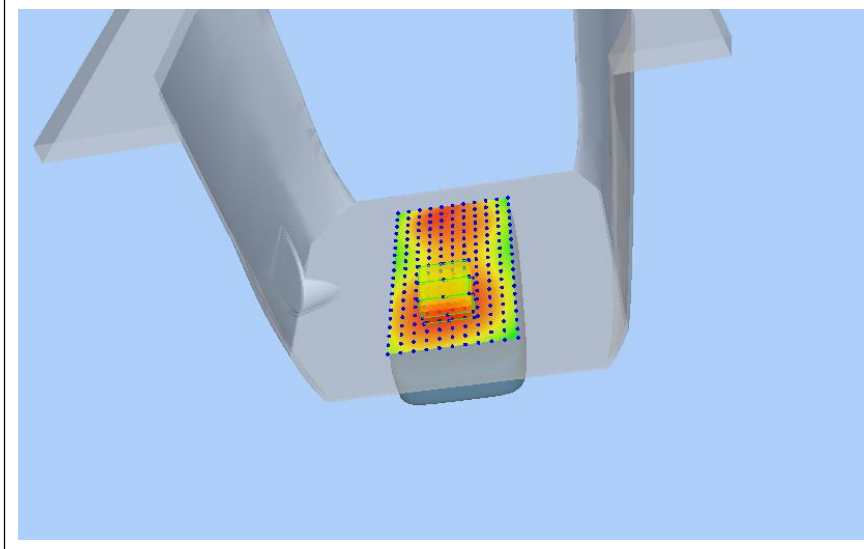
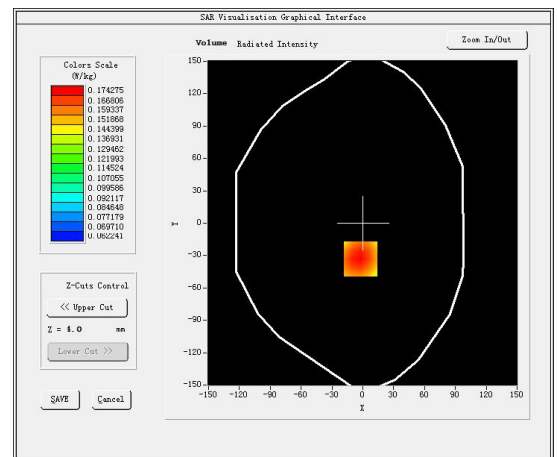
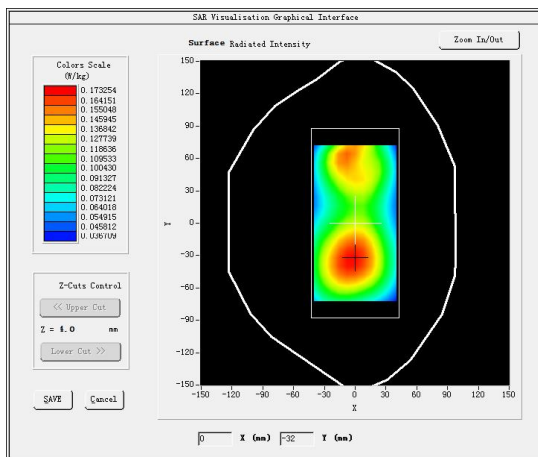




#16

Test Mode: LTE Band 5, 1RB, Low channel(Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 14, 2022

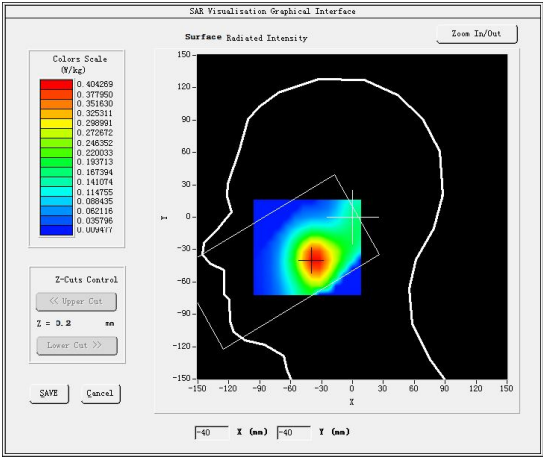
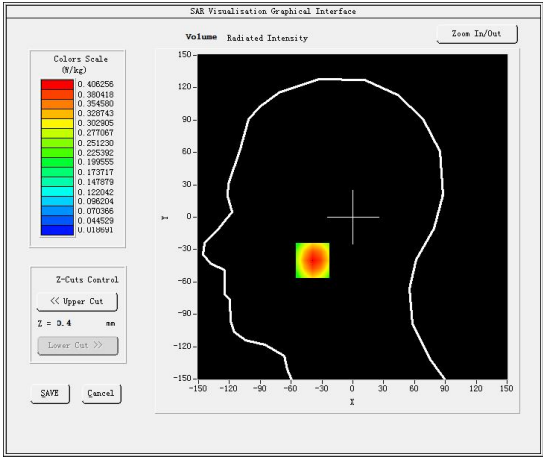
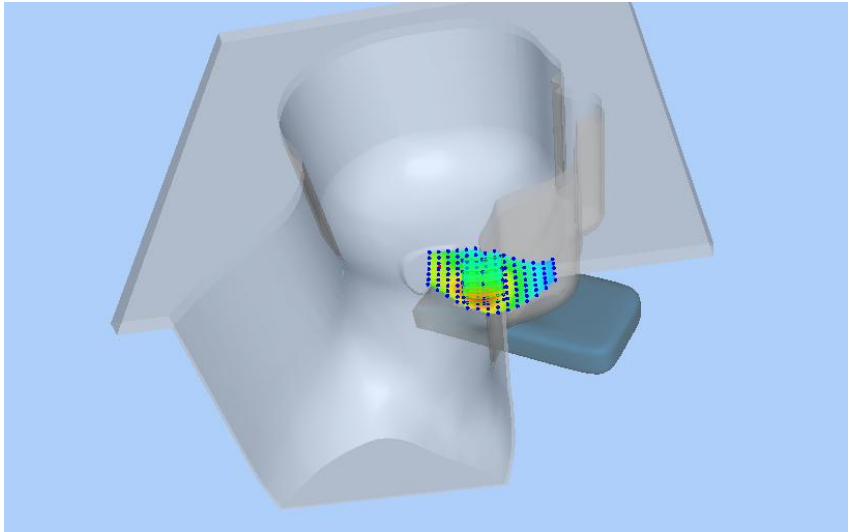
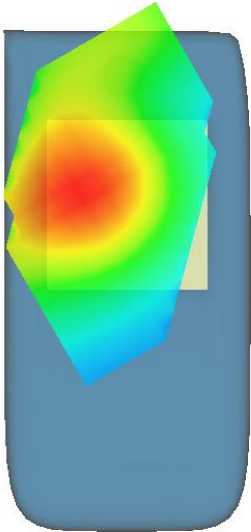
Medium(liquid type)	HSL_835
Frequency (MHz)	829.0000
Relative permittivity (real part)	41.68
Conductivity (S/m)	0.90
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.55
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	2.530000
SAR 10g (W/Kg)	0.136029
SAR 1g (W/Kg)	0.170465
SURFACE SAR	VOLUME SAR





#17

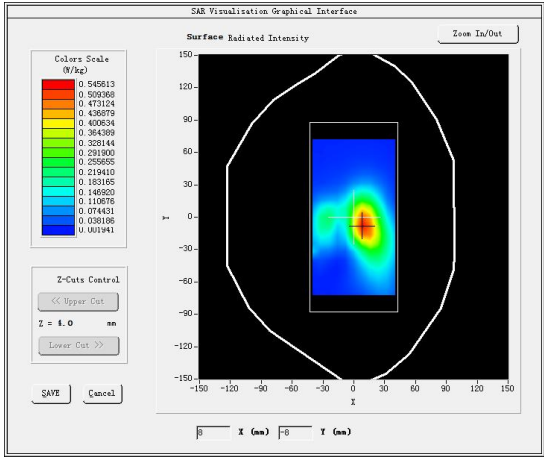
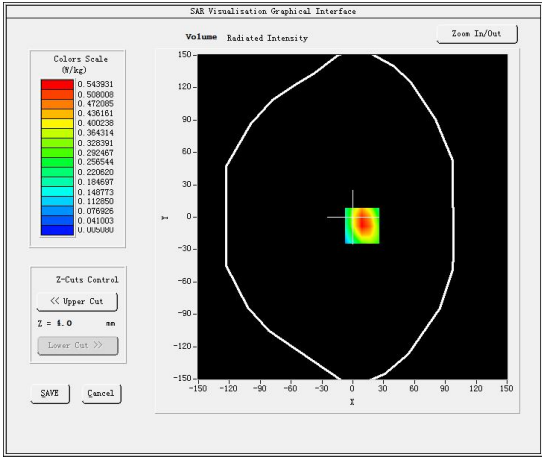
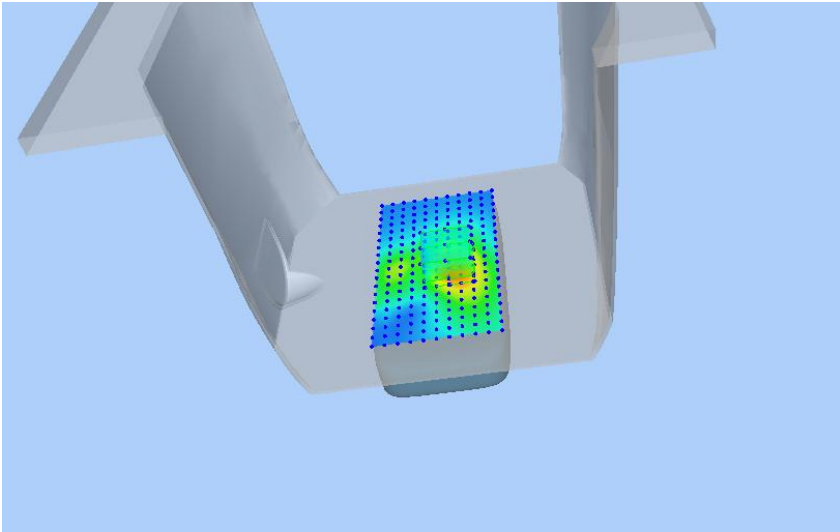
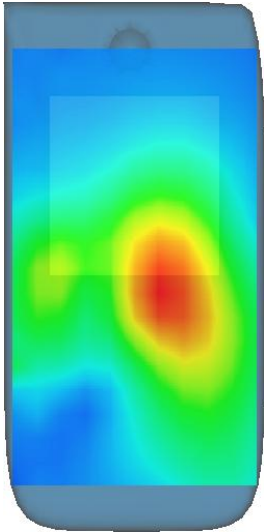
Test Mode: LTE Band 7, 1RB, Middle channel(Head Left Cheek)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 19, 2022

Medium(liquid type)	HSL 2600
Frequency (MHz)	2535.0000
Relative permittivity (real part)	39.62
Conductivity (S/m)	1.93
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.89
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.120000
SAR 10g (W/Kg)	0.223074
SAR 1g (W/Kg)	0.385340
SURFACE SAR	VOLUME SAR
	
	



#18

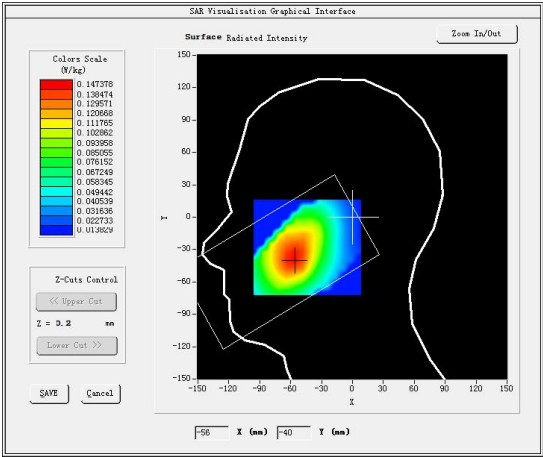
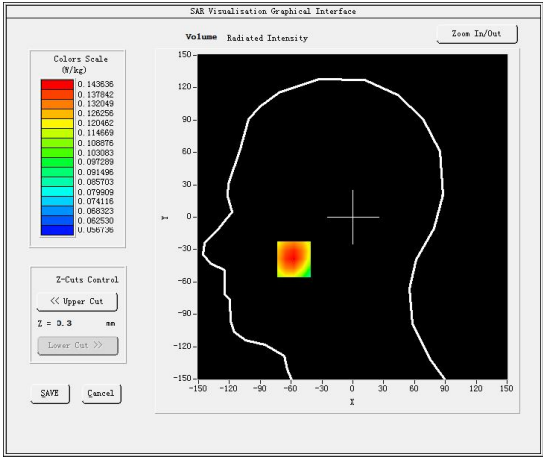
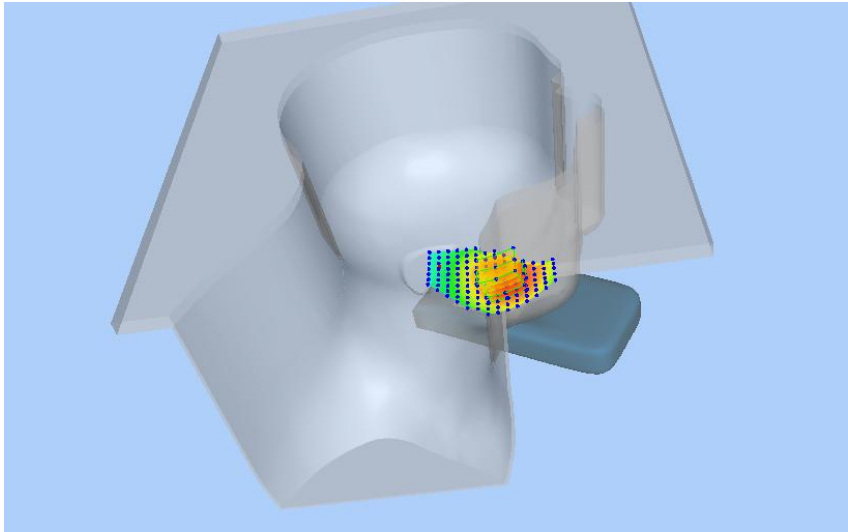
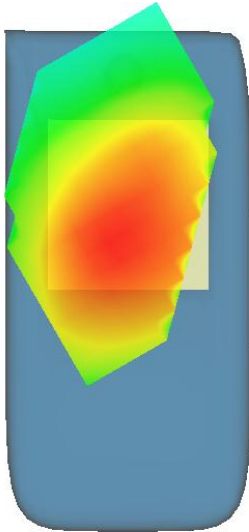
Test Mode: LTE Band 7, 1RB, Middle channel(Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 19, 2022

Medium(liquid type)	HSL 2600
Frequency (MHz)	2535.0000
Relative permittivity (real part)	39.49
Conductivity (S/m)	1.92
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.89
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.880000
SAR 10g (W/Kg)	0.263962
SAR 1g (W/Kg)	0.515673
SURFACE SAR	VOLUME SAR
	
	



#19

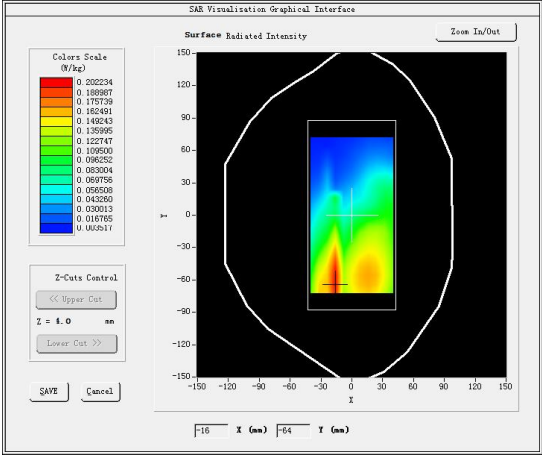
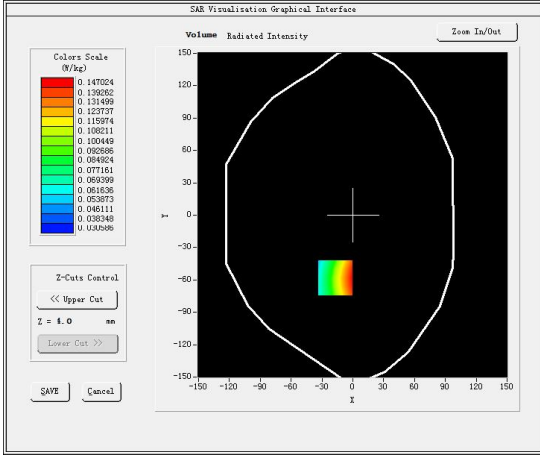
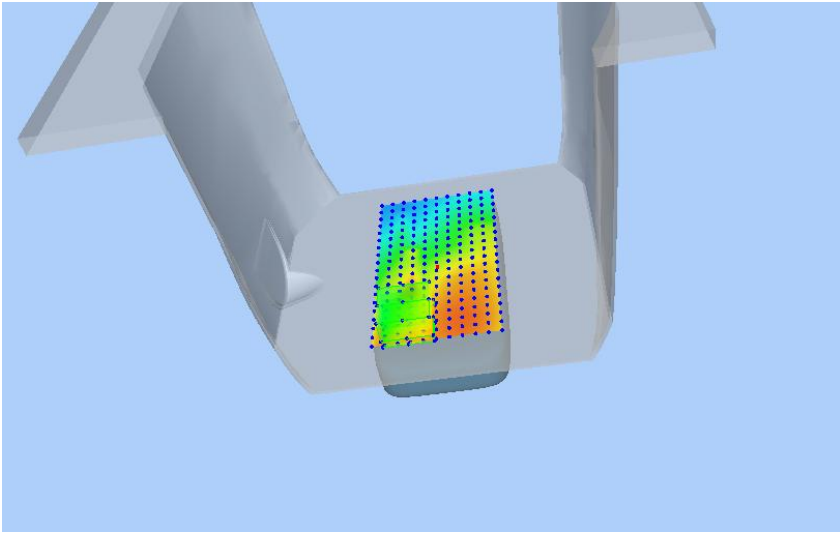
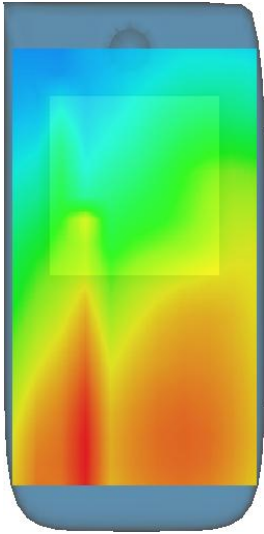
Test Mode: LTE Band 12, 1RB, High channel(Head Left Cheek)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 13, 2022

Medium(liquid type)	HSL 750
Frequency (MHz)	711.0000
Relative permittivity (real part)	55.40
Conductivity (S/m)	0.97
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.45
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.910000
SAR 10g (W/Kg)	0.123459
SAR 1g (W/Kg)	0.143887
SURFACE SAR	VOLUME SAR
	
	



#20

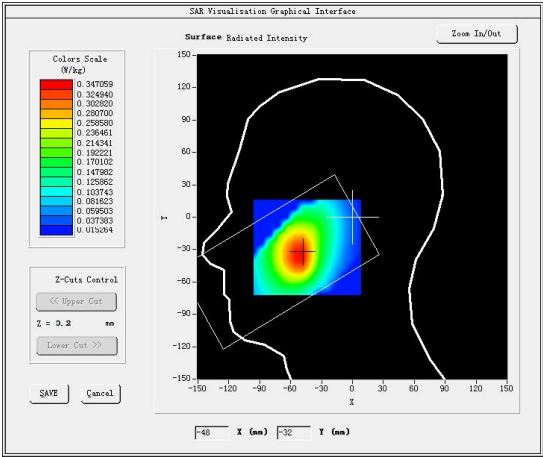
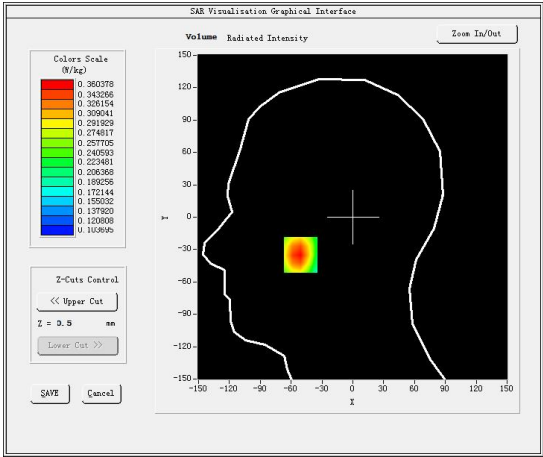
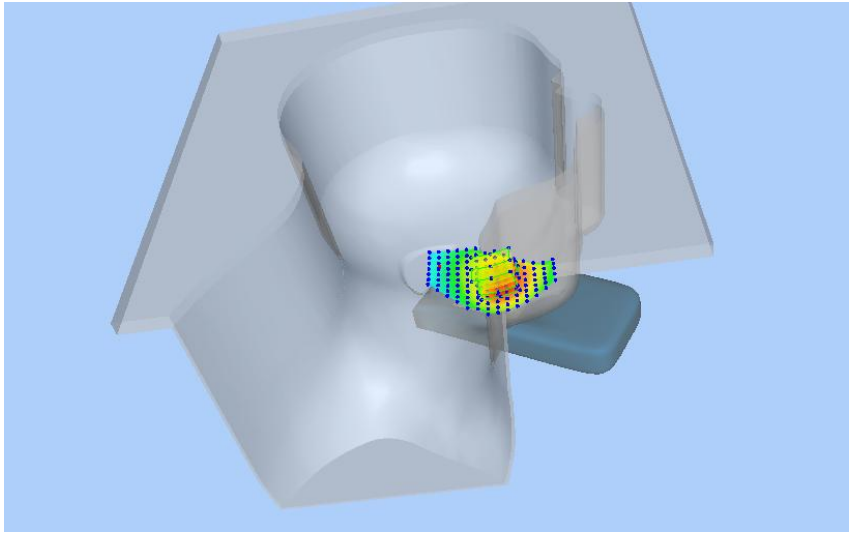
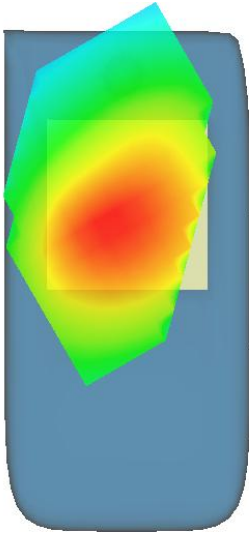
Test Mode: LTE Band 12, 1RB, Middle channel(Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 13, 2022

Medium(liquid type)	HSL 750
Frequency (MHz)	707.5000
Relative permittivity (real part)	55.40
Conductivity (S/m)	0.97
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.45
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-4.940000
SAR 10g (W/Kg)	0.104389
SAR 1g (W/Kg)	0.142323
SURFACE SAR	VOLUME SAR
	
	



#21

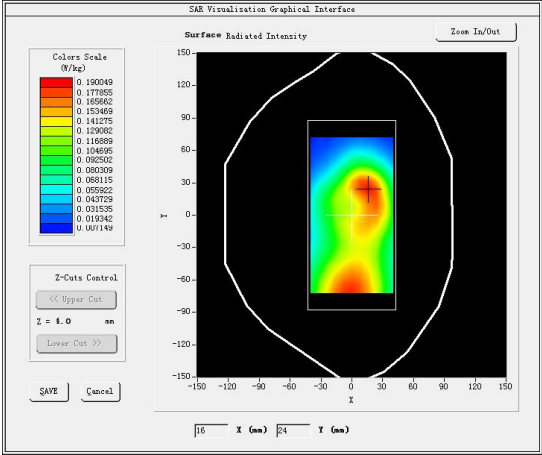
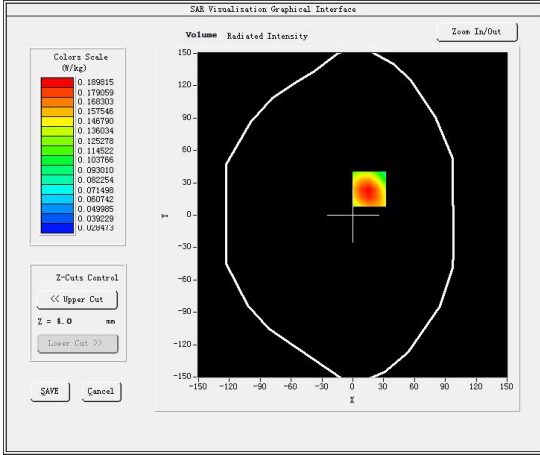
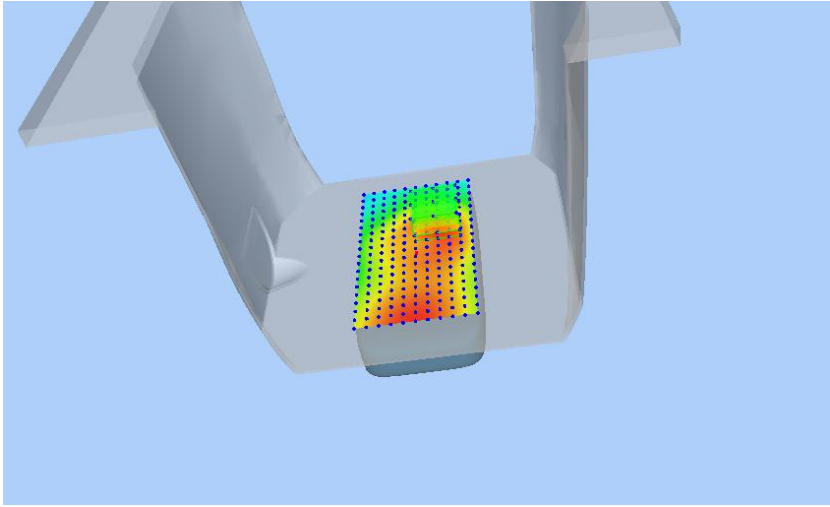
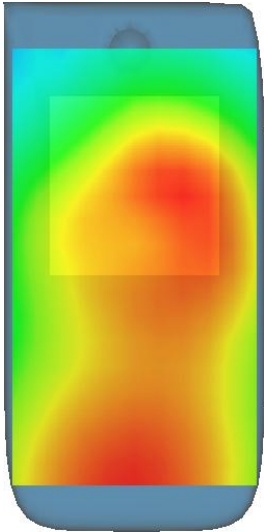
Test Mode: LTE Band 26, 1RB, High channel(Head Left Cheek)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 14, 2022

Medium(liquid type)	HSL 835
Frequency (MHz)	821.5000
Relative permittivity (real part)	41.68
Conductivity (S/m)	0.89
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.55
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.240000
SAR 10g (W/Kg)	0.264955
SAR 1g (W/Kg)	0.348655
SURFACE SAR	VOLUME SAR
	
	



#22

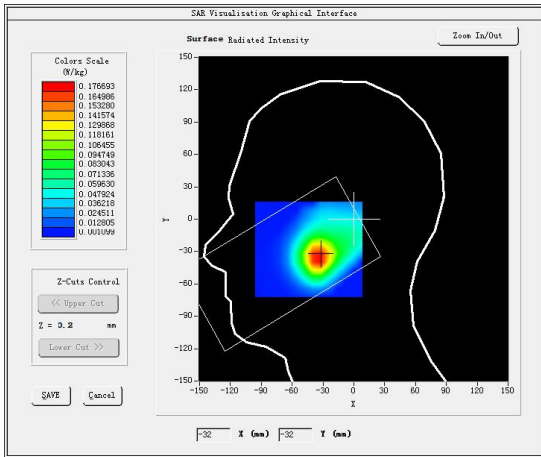
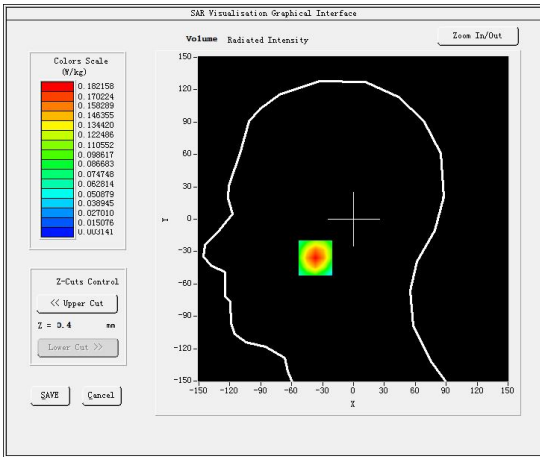
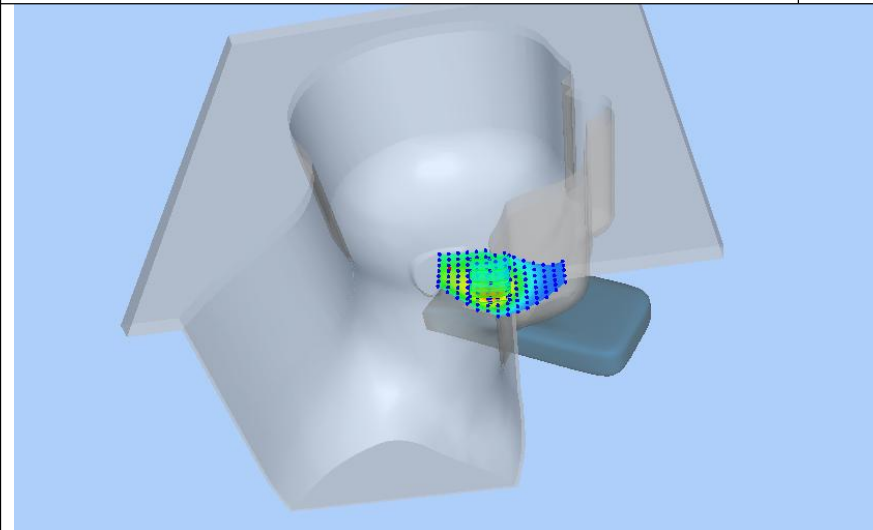
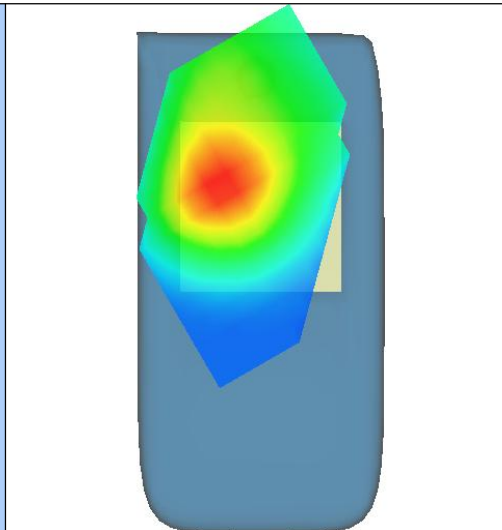
Test Mode: LTE Band 26, 1RB, High channel(Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 14, 2022

Medium(liquid type)	HSL 835
Frequency (MHz)	821.5000
Relative permittivity (real part)	41.68
Conductivity (S/m)	0.89
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.55
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.510000
SAR 10g (W/Kg)	0.116305
SAR 1g (W/Kg)	0.182130
SURFACE SAR	VOLUME SAR
	
	



#23

Test Mode: 802.11b (WiFi2.4G), Middle channel (Head Left Cheek)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 18, 2022

Medium(liquid type)	HSL 2450
Frequency (MHz)	2437.0000
Relative permittivity (real part)	39.67
Conductivity (S/m)	1.81
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.91
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.750000
SAR 10g (W/Kg)	0.095624
SAR 1g (W/Kg)	0.204758
SURFACE SAR	VOLUME SAR
	
	



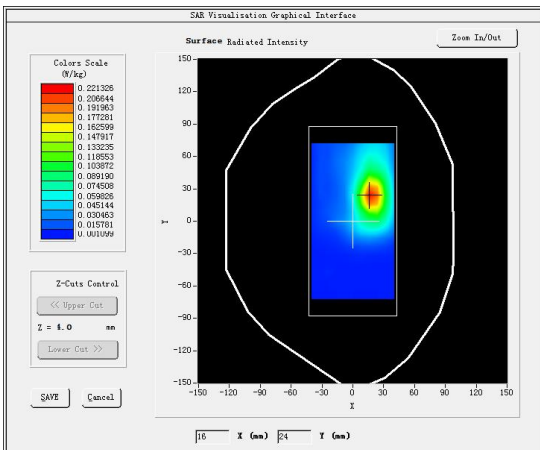
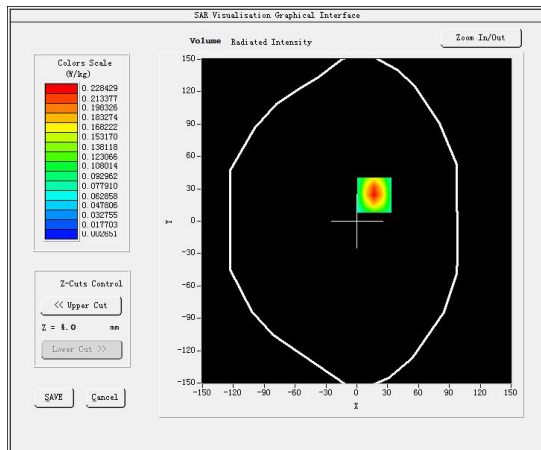
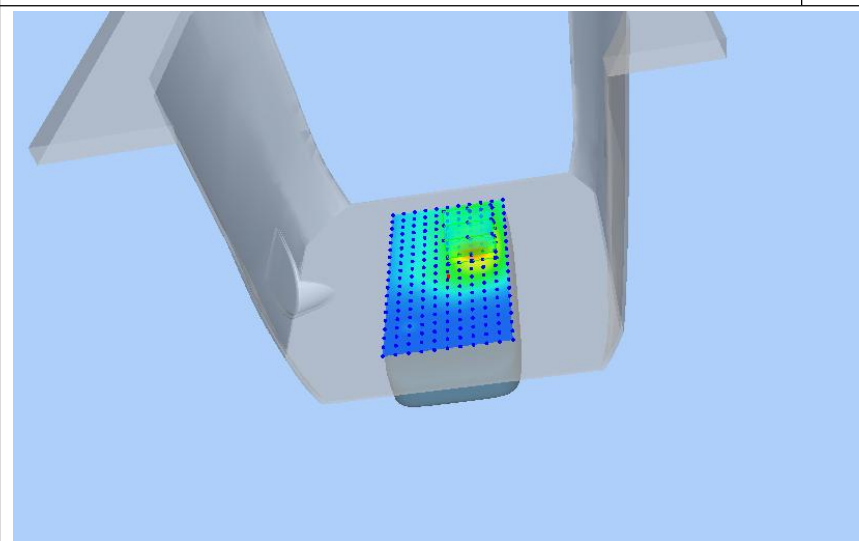
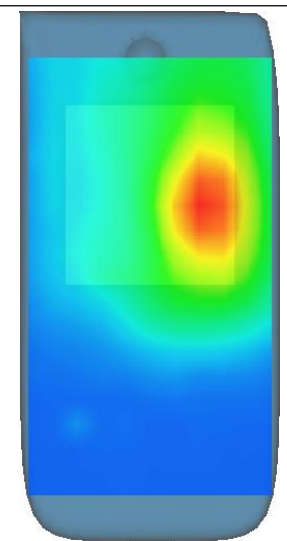
#24

Test Mode: 802.11b (WiFi2.4G), Middle channel (Body Rear Side)

Product Description: Smart Phone

Model: HLTE241E

Test Date: May 18, 2022

Medium(liquid type)	HSL 2450
Frequency (MHz)	2437.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPG0324
Crest Factor	1.0
Conversion Factor	1.91
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	2.840000
SAR 10g (W/Kg)	0.117812
SAR 1g (W/Kg)	0.256404
SURFACE SAR	VOLUME SAR
	
	



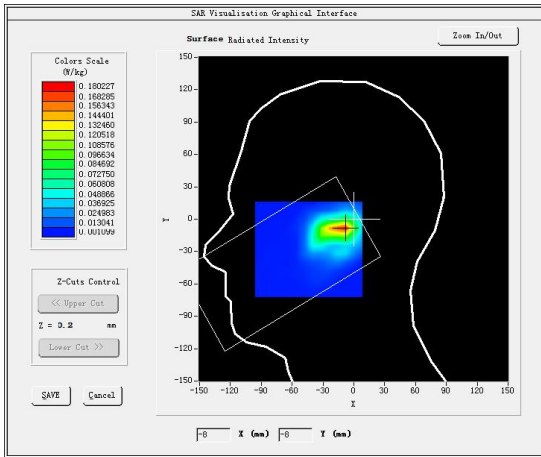
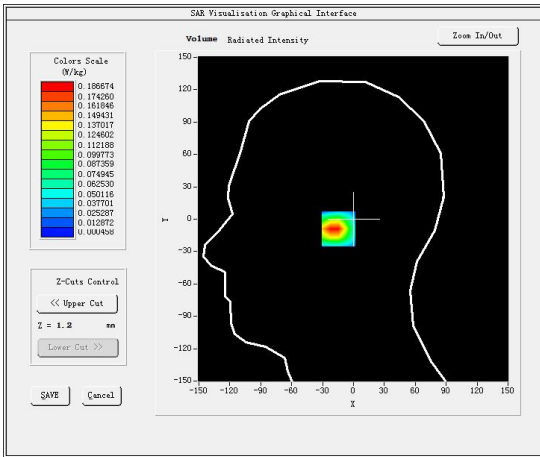
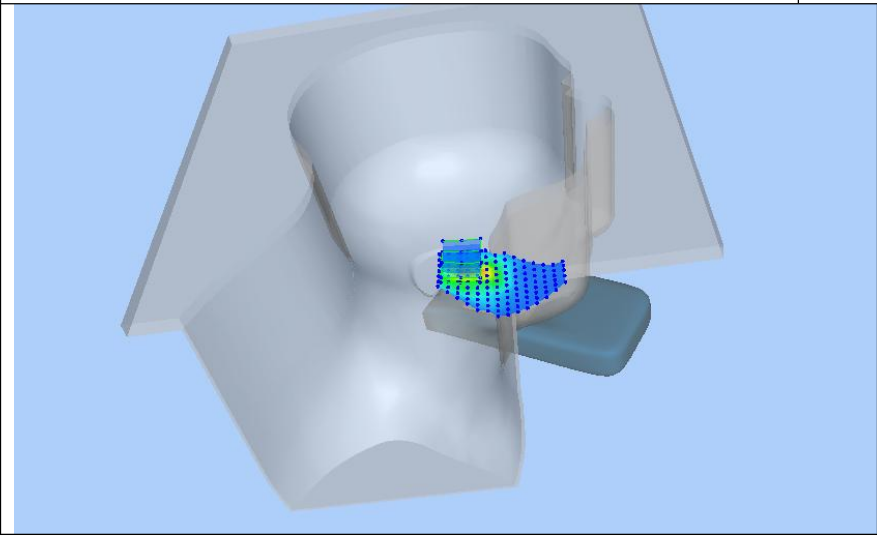
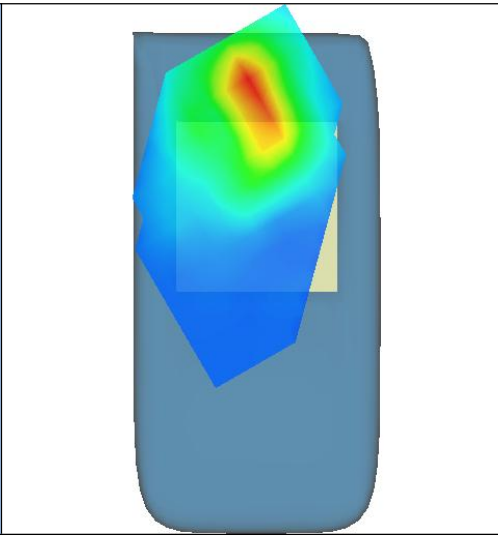
#25

Test Mode: 802.11a (WiF5.2G), Low channel (Head Left Cheek)

Product Description: Smart Phone

Model: HLTE241E

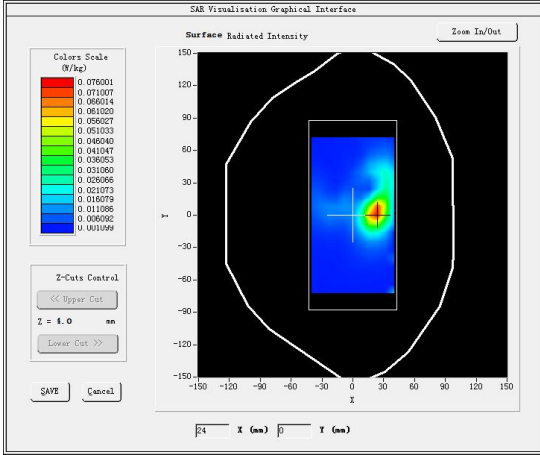
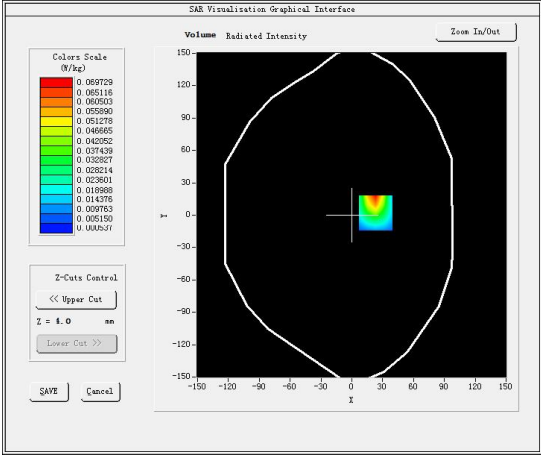
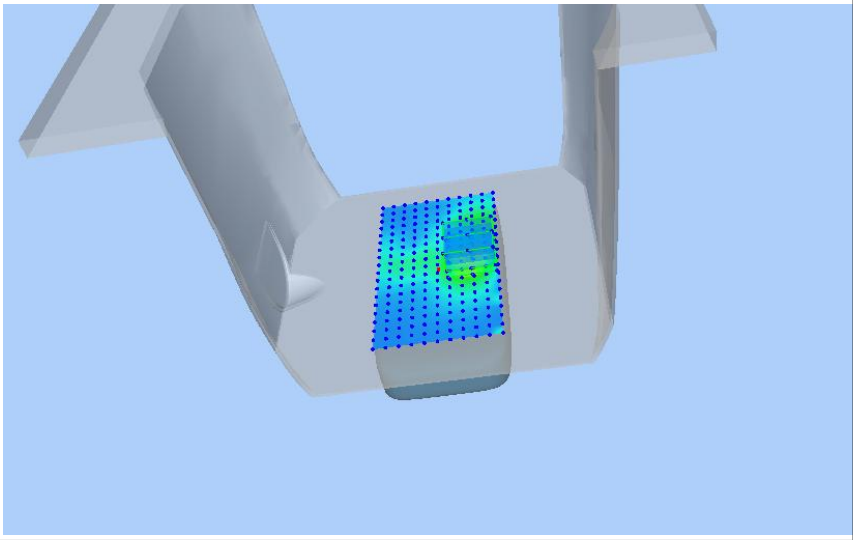
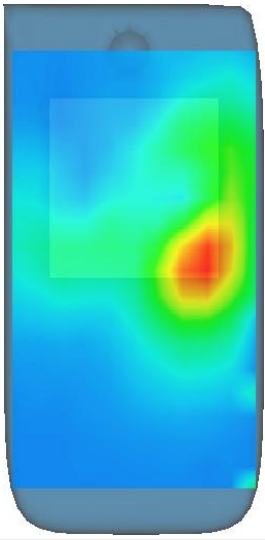
Test Date: May 20, 2022

Medium(liquid type)	HSL 5200
Frequency (MHz)	5180.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.500000
SAR 10g (W/Kg)	0.079037
SAR 1g (W/Kg)	0.228392
SURFACE SAR	VOLUME SAR
	
	



#26

Test Mode: 802.11a (WiFi5.2G), Low channel (Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 20, 2022

Medium(liquid type)	HSL 5200
Frequency (MHz)	5180.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPG0324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-3.040000
SAR 10g (W/Kg)	0.025997
SAR 1g (W/Kg)	0.077511
SURFACE SAR	VOLUME SAR
	
	



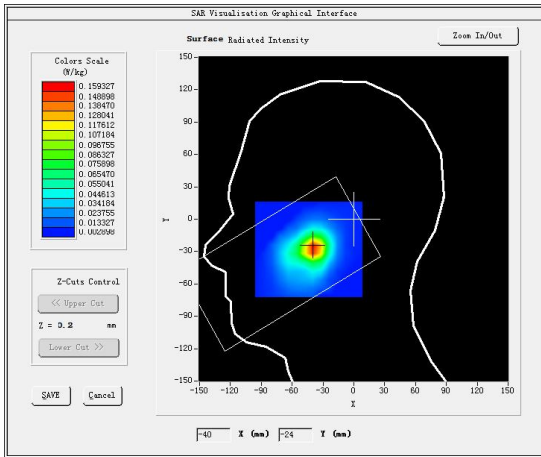
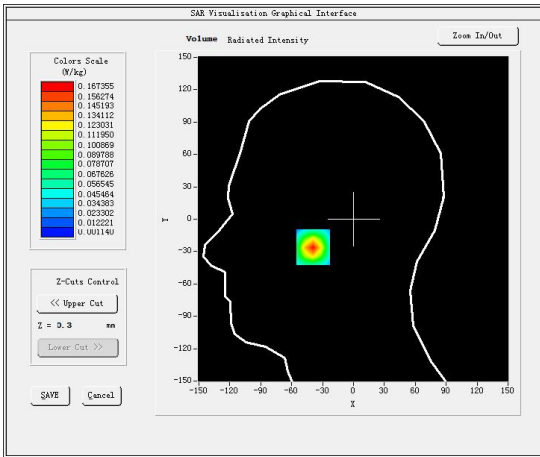
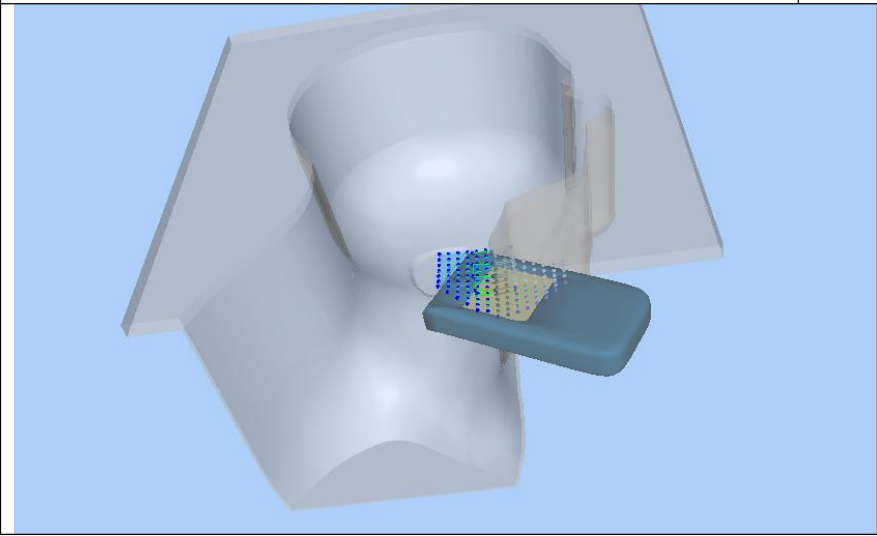
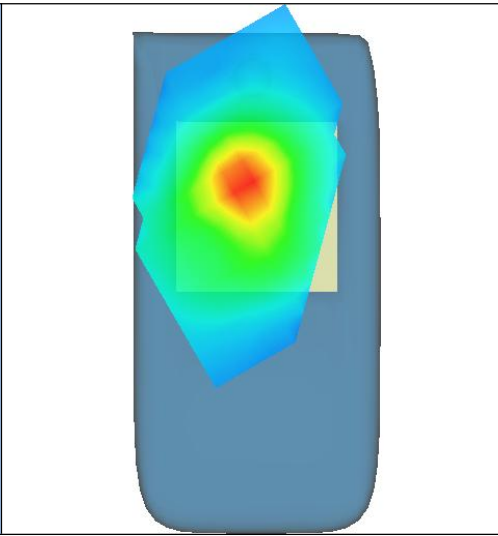
#27

Test Mode: 802.11a (WiF5.3G), Low channel (Head Left Cheek)

Product Description: Smart Phone

Model: HLTE241E

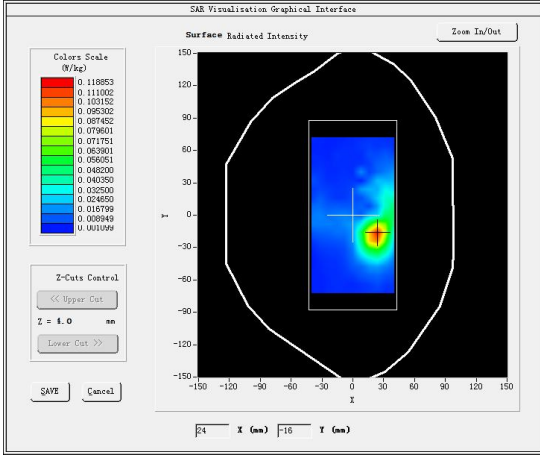
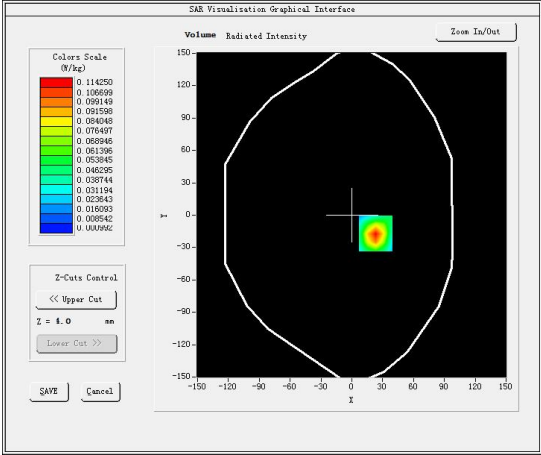
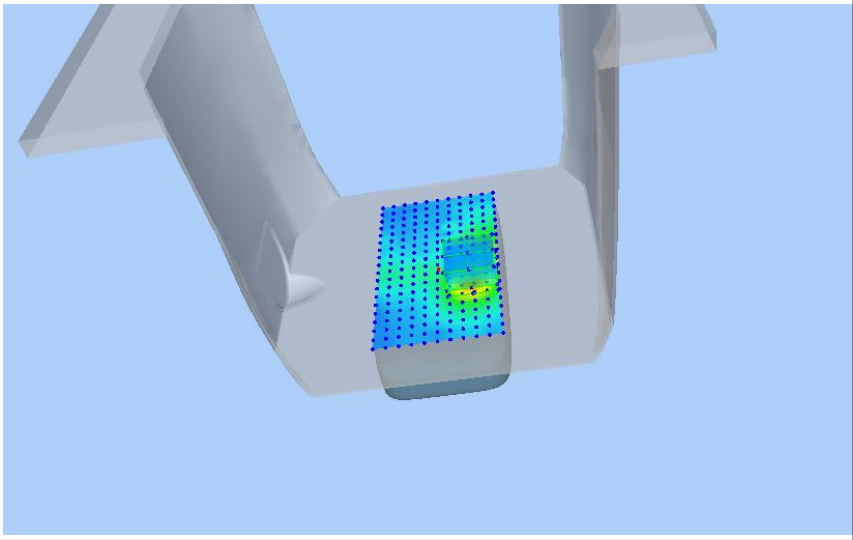
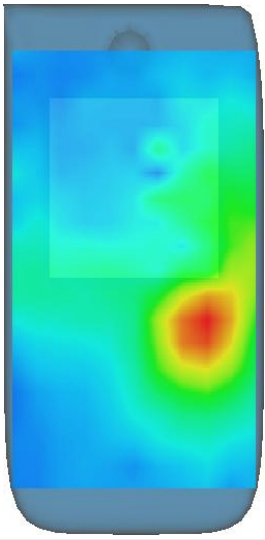
Test Date: May 23, 2022

Medium(liquid type)	HSL 5300
Frequency (MHz)	5260.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	2.890000
SAR 10g (W/Kg)	0.069060
SAR 1g (W/Kg)	0.190830
SURFACE SAR	VOLUME SAR
	
	



#28

Test Mode: 802.11a (WiFi5.3G), Low channel (Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 23, 2022

Medium(liquid type)	HSL 5300
Frequency (MHz)	5260.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPG0324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.050000
SAR 10g (W/Kg)	0.048298
SAR 1g (W/Kg)	0.131677
SURFACE SAR	VOLUME SAR
	
	



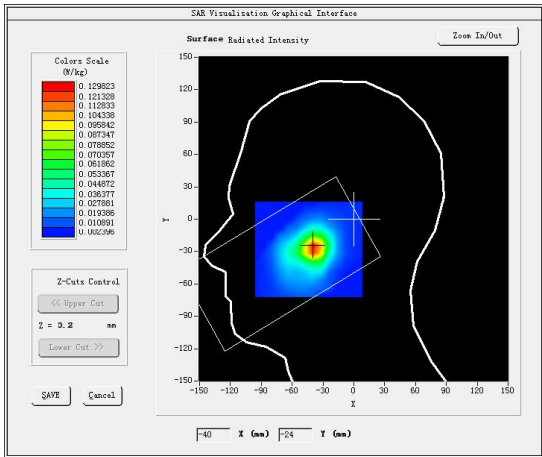
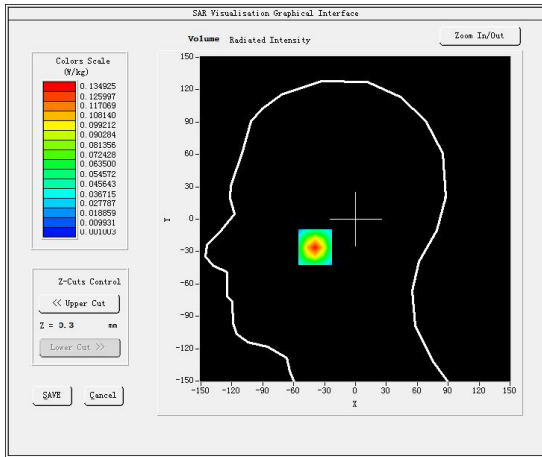
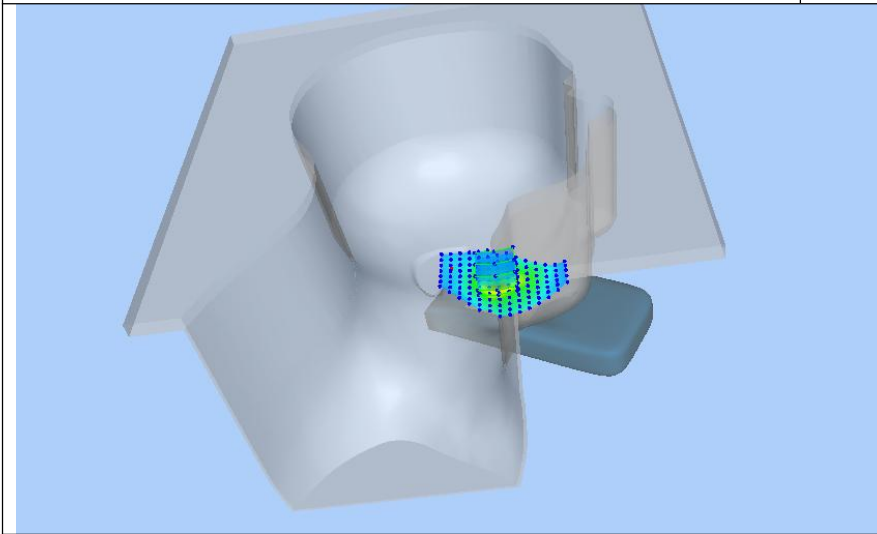
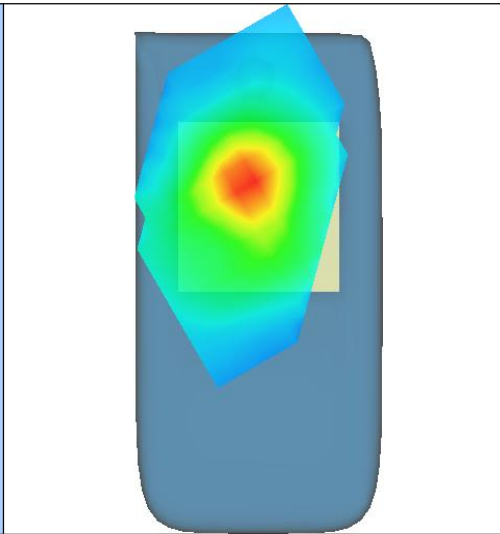
#29

Test Mode: 802.11a (WiF5.5G), Low channel (Head Left Cheek)

Product Description: Smart Phone

Model: HLTE241E

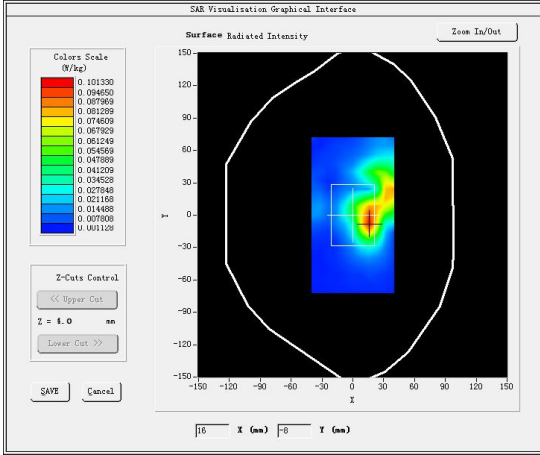
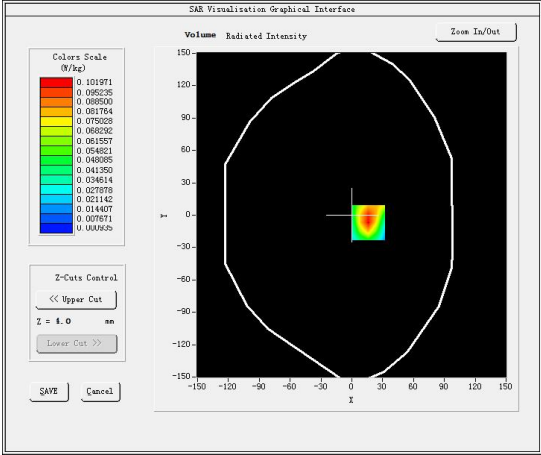
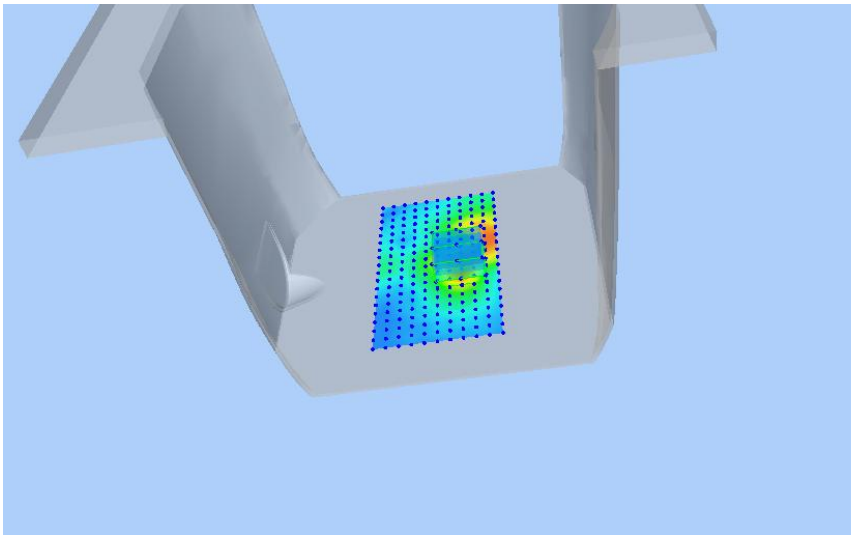
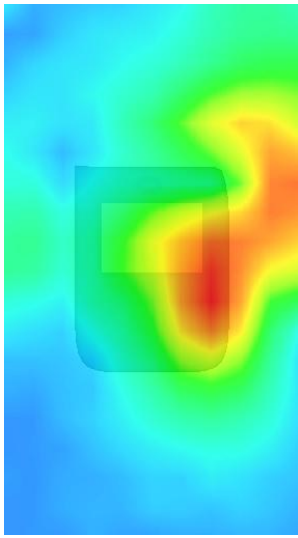
Test Date: May 25, 2022

Medium(liquid type)	HSL 5500
Frequency (MHz)	5500.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.48
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.250000
SAR 10g (W/Kg)	0.056531
SAR 1g (W/Kg)	0.153512
SURFACE SAR	VOLUME SAR
	
	



#30

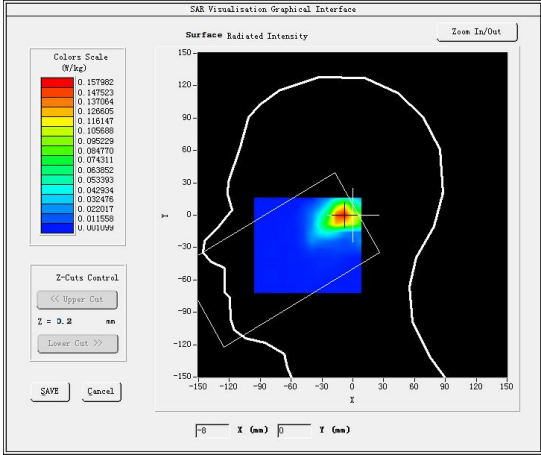
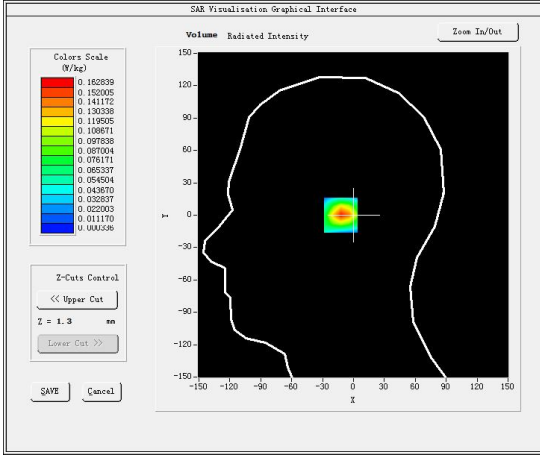
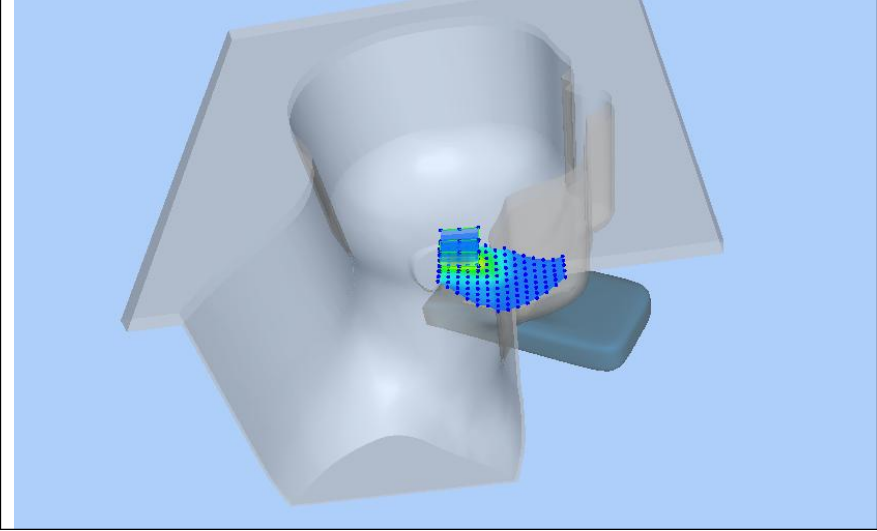
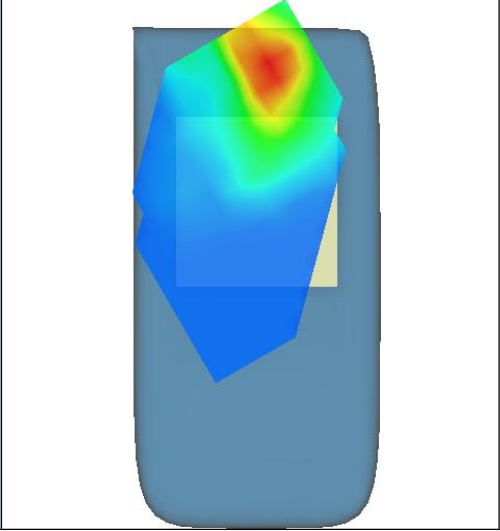
Test Mode: 802.11a (WiFi5.5G), Low channel (Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 25, 2022

Medium(liquid type)	HSL 5300
Frequency (MHz)	5500.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPG0324
Crest Factor	1.0
Conversion Factor	1.48
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-3.930000
SAR 10g (W/Kg)	0.046565
SAR 1g (W/Kg)	0.121911
SURFACE SAR	VOLUME SAR
	
	



#31

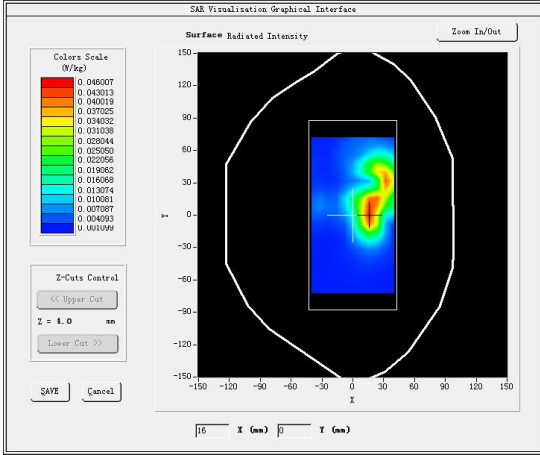
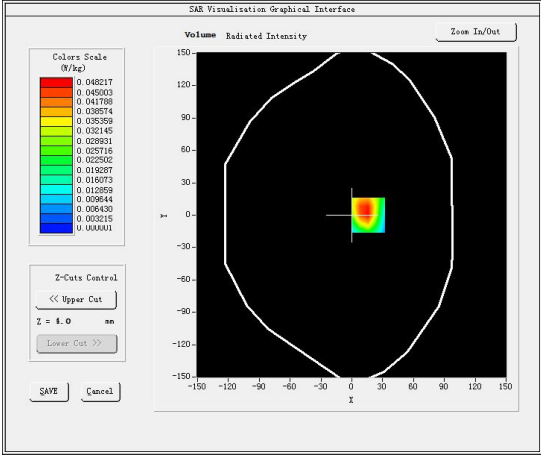
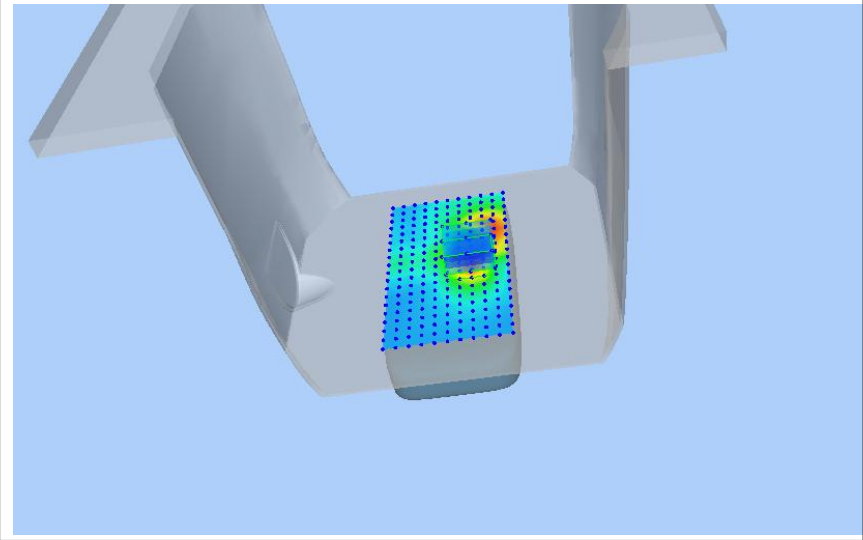
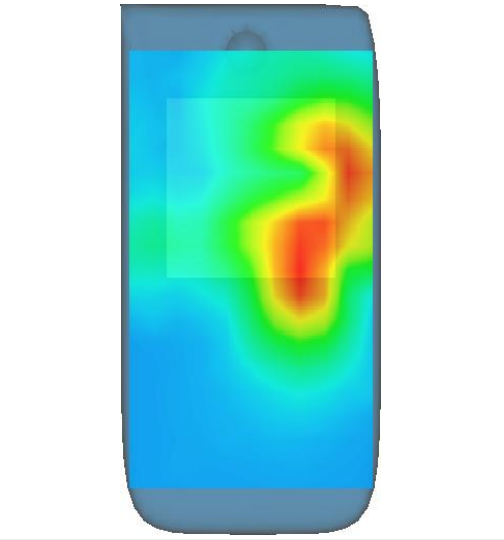
Test Mode:802.11a (WiFi5.8G), High channel (Head Left Cheek)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 26, 2022

Medium(liquid type)	HSL 5800
Frequency (MHz)	5825.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-4.130000
SAR 10g (W/Kg)	0.067151
SAR 1g (W/Kg)	0.194751
SURFACE SAR	VOLUME SAR
	
	



#32

Test Mode: 802.11a (WiFi5.8G), High channel (Body Rear Side)
Product Description: Smart Phone
Model: HLTE241E
Test Date: May 26, 2022

Medium(liquid type)	HSL 5800
Frequency (MHz)	5825.0000
Relative permittivity (real part)	38.92
Conductivity (S/m)	1.83
E-Field Probe	SN 31/17 EPG0324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.020000
SAR 10g (W/Kg)	0.025632
SAR 1g (W/Kg)	0.071610
SURFACE SAR	VOLUME SAR
	
	



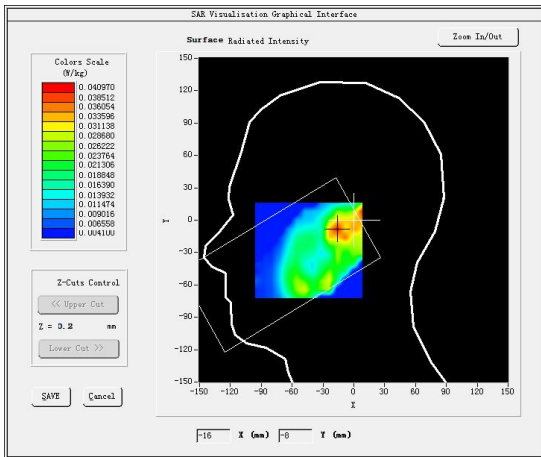
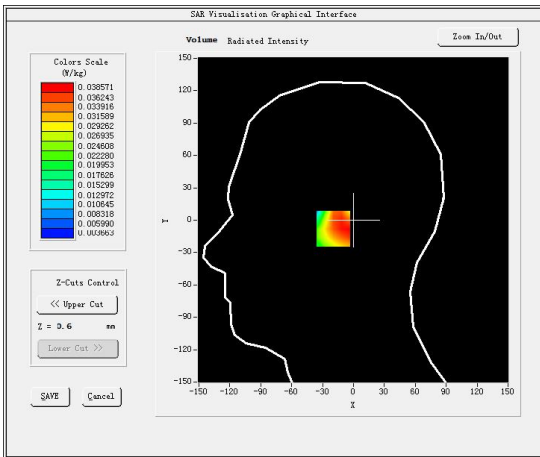
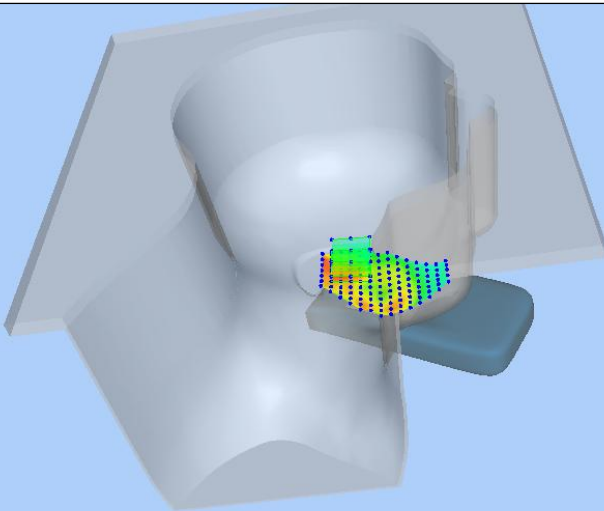
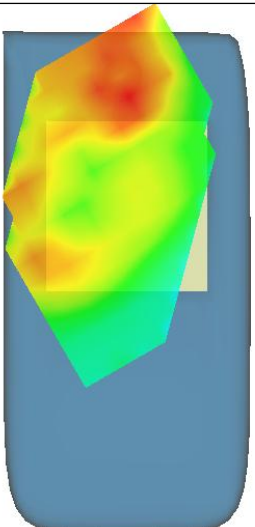
#33

Test Mode: $\pi/4$ -DQPSK (BT 5.0), High channel (Head Left Cheek)

Product Description: Smart Phone

Model: HLTE241E

Test Date: May 18, 2022

Medium(liquid type)	HSL_2450
Frequency (MHz)	2480.0000
Relative permittivity (real part)	40.03
Conductivity (S/m)	1.79
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.91
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.760000
SAR 10g (W/Kg)	0.025768
SAR 1g (W/Kg)	0.045205
SURFACE SAR	VOLUME SAR
	
	



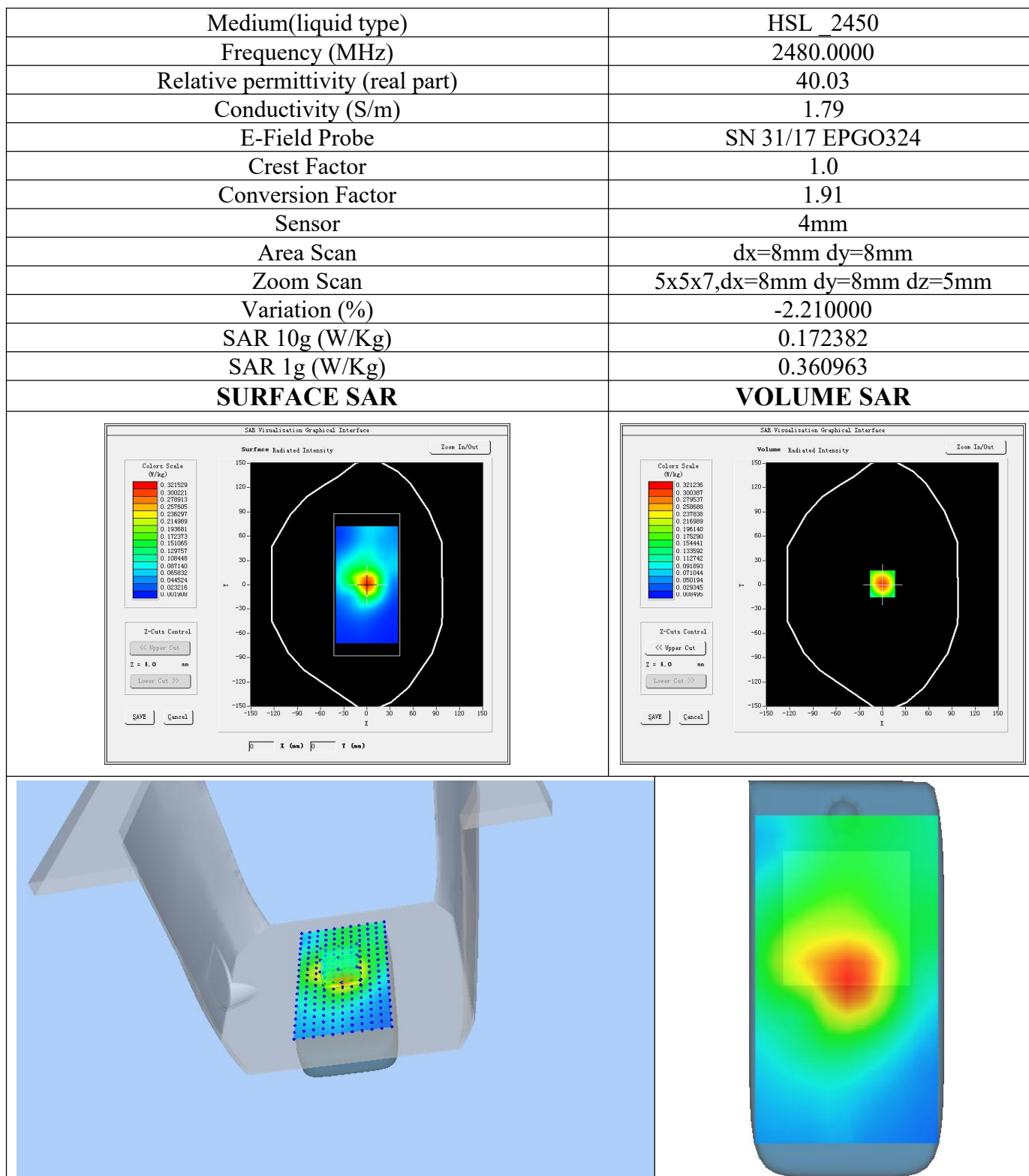
#34

Test Mode: $\pi/4$ -DQPSK (BT 5.0), High channel (Body Rear Side)

Product Description: Smart Phone

Model: HLTE241E

Test Date: May 18, 2022





5. CALIBRATION CERTIFICATES

5.1 Probe-EPGO324 Calibration Certificate



COMOSAR E-Field Probe Calibration Report

Ref: ACR.281.2.18.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

**1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD,
BAO'AN BLVD**

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 31/17 EPGO324

Calibrated at MVG US

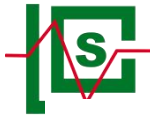
2105 Barrett Park Dr. - Kennesaw, GA 30144



Calibration Date: 10/06/2021

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in MVG USA using the CALISAR / CALIBAIR test bench, for use with a COMOSAR system only. All calibration results are traceable to national metrology institutions.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATU.A

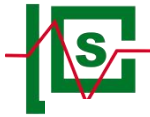
	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Jérôme LUC	Product Manager	10/6/2021	<i>JS</i>
<i>Checked by :</i>	Jérôme LUC	Product Manager	10/6/2021	<i>JS</i>
<i>Approved by :</i>	Kim RUTKOWSKI	Quality Manager	10/6/2021	<i>Kim Rutkowski</i>

	<i>Customer Name</i>
<i>Distribution :</i>	Shenzhen LCS Compliance Testing Laboratory Ltd.

<i>Issue</i>	<i>Date</i>	<i>Modifications</i>
A	10/6/2021	Initial release

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATU.A

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATU.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 31/17 EPG0324
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.189 MΩ Dipole 2: R2=0.203 MΩ Dipole 3: R3=0.218 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C 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, OET 65 Bulletin C, CENELEC EN50361 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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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATU.A

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 - 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°).

3.5 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.

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 (%)
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATUL.A

Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

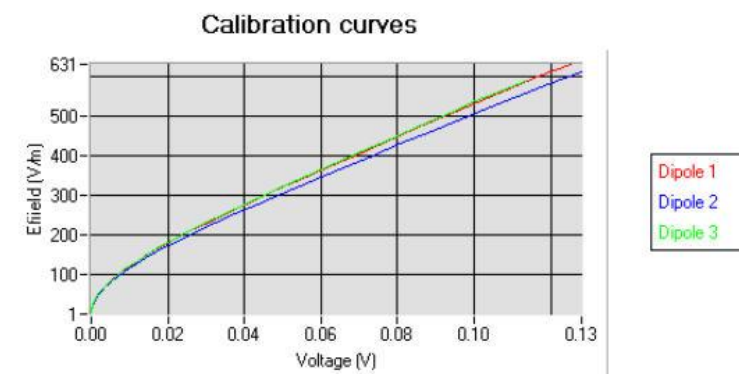
5.1 SENSITIVITY IN AIR

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 ($\mu\text{V}/(\text{V}/\text{m})^2$)
0.80	0.83	0.68

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
95	90	93

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

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



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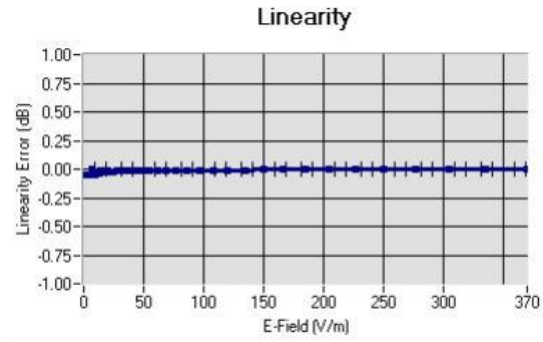
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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATU.A

5.2 LINEARITY



Linearity: $\pm 1.13\%$ ($\pm 0.05\text{dB}$)

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL450	450	42.17	0.86	1.56
BL450	450	57.65	0.95	1.60
HL750	750	40.03	0.93	1.45
BL750	750	56.83	1.00	1.50
HL850	835	42.19	0.90	1.55
BL850	835	54.67	1.01	1.59
HL900	900	42.08	1.01	1.54
BL900	900	55.25	1.08	1.60
HL1800	1800	41.68	1.46	1.65
BL1800	1800	53.86	1.46	1.68
HL1900	1900	38.45	1.45	1.86
BL1900	1900	53.32	1.56	1.93
HL2000	2000	38.26	1.38	1.83
BL2000	2000	52.70	1.51	1.89
HL2300	2300	39.44	1.62	1.95
BL2300	2300	54.52	1.77	2.01
HL2450	2450	37.50	1.80	1.91
BL2450	2450	53.22	1.89	1.95
HL2600	2600	39.80	1.99	1.89
BL2600	2600	52.52	2.23	1.94
HL5200	5200	35.64	4.67	1.50
BL5200	5200	48.64	5.51	1.56
HL5400	5400	36.44	4.87	1.44
BL5400	5400	46.52	5.77	1.47
HL5600	5600	36.66	5.17	1.48
BL5600	5600	46.79	5.77	1.53
HL5800	5800	35.31	5.31	1.50
BL5800	5800	47.04	6.10	1.55

LOWER DETECTION LIMIT: 9mW/kg

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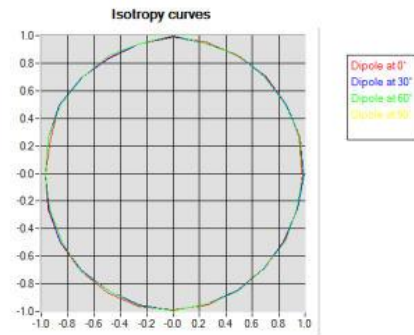
COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATULA

5.4 ISOTROPY

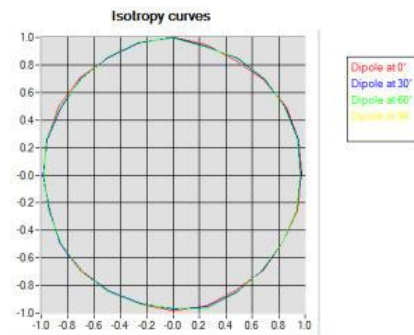
HL900 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.07 dB



HL1800 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.07 dB



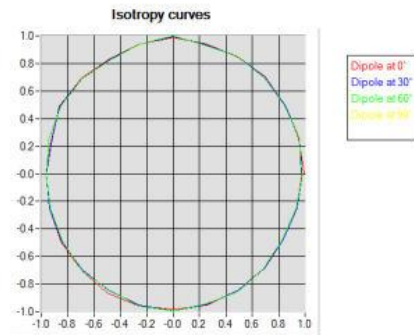


COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATULA

HL5600 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.10 dB





COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.281.2.18.SATULA

6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
Flat Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2019	02/2022
Reference Probe	MVG	EP 94 SN 37/08	10/2019	10/2021
Multimeter	Keithley 2000	1188656	01/2020	01/2023
Signal Generator	Agilent E4438C	MY49070581	01/2020	01/2023
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	01/2020	01/2023
Power Sensor	HP ECP-E26A	US37181460	01/2020	01/2023
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	150798832	11/2020	11/2023

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5.1 SID750Dipole Calibration Certificate



SAR Reference Dipole Calibration Report

Ref : ACR.287.3.14.SATU.A

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.

**1F., XINGYUAN INDUSTRIAL PARK, TONGDA ROAD,
BAO'AN BLVD**

BAO'AN DISTRICT, SHENZHEN, GUANGDONG, CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 750 MHZ

SERIAL NO.: SN 07/14 DIP 0G750-302

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144



09/29/2021

Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.287.3.14.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/12/2021	
Checked by :	Jérôme LUC	Product Manager	10/12/2021	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/12/2021	

	Customer Name
Distribution :	Shenzhen LCS Compliance Testing Laboratory Ltd.

Issue	Date	Modifications
A	10/12/2021	Initial release

Page: 2/11

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 750 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID750
Serial Number	SN 07/14 DIP 0G750-302
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – Satimo COMOSAR Validation Dipole



4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

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

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

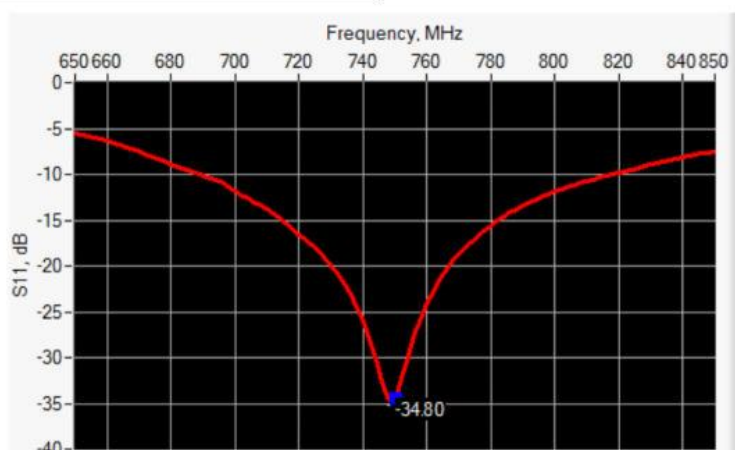
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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-34.80	-20	$50.7 \Omega + 1.6 j\Omega$

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %		250.0 $\pm$ 1 %		6.35 $\pm$ 1 %	
450	290.0 $\pm$ 1 %		166.7 $\pm$ 1 %		6.35 $\pm$ 1 %	
750	176.0 $\pm$ 1 %	PASS	100.0 $\pm$ 1 %	PASS	6.35 $\pm$ 1 %	PASS
835	161.0 $\pm$ 1 %		89.8 $\pm$ 1 %		3.6 $\pm$ 1 %	
900	149.0 $\pm$ 1 %		83.3 $\pm$ 1 %		3.6 $\pm$ 1 %	
1450	89.1 $\pm$ 1 %		51.7 $\pm$ 1 %		3.6 $\pm$ 1 %	
1500	80.5 $\pm$ 1 %		50.0 $\pm$ 1 %		3.6 $\pm$ 1 %	
1640	79.0 $\pm$ 1 %		45.7 $\pm$ 1 %		3.6 $\pm$ 1 %	
1750	75.2 $\pm$ 1 %		42.9 $\pm$ 1 %		3.6 $\pm$ 1 %	
1800	72.0 $\pm$ 1 %		41.7 $\pm$ 1 %		3.6 $\pm$ 1 %	
1900	68.0 $\pm$ 1 %		39.5 $\pm$ 1 %		3.6 $\pm$ 1 %	
1950	66.3 $\pm$ 1 %		38.5 $\pm$ 1 %		3.6 $\pm$ 1 %	
2000	64.5 $\pm$ 1 %		37.5 $\pm$ 1 %		3.6 $\pm$ 1 %	
2100	61.0 $\pm$ 1 %		35.7 $\pm$ 1 %		3.6 $\pm$ 1 %	
2300	55.5 $\pm$ 1 %		32.6 $\pm$ 1 %		3.6 $\pm$ 1 %	
2450	51.5 $\pm$ 1 %		30.4 $\pm$ 1 %		3.6 $\pm$ 1 %	
2600	48.5 $\pm$ 1 %		28.8 $\pm$ 1 %		3.6 $\pm$ 1 %	
3000	41.5 $\pm$ 1 %		25.0 $\pm$ 1 %		3.6 $\pm$ 1 %	
3500	37.0 $\pm$ 1 %		26.4 $\pm$ 1 %		3.6 $\pm$ 1 %	
3700	34.7 $\pm$ 1 %		26.4 $\pm$ 1 %		3.6 $\pm$ 1 %	

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