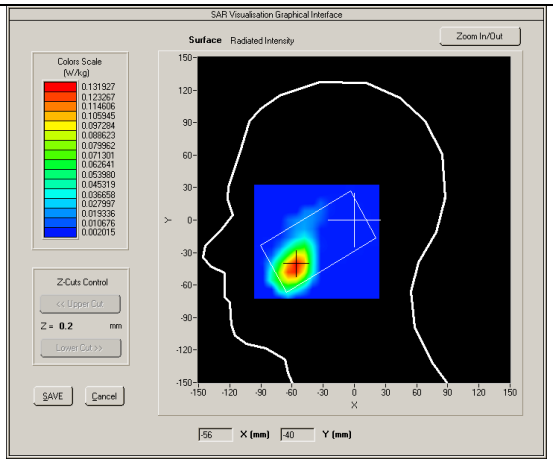
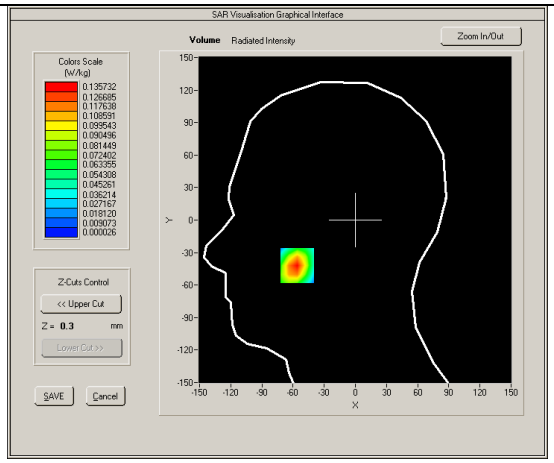
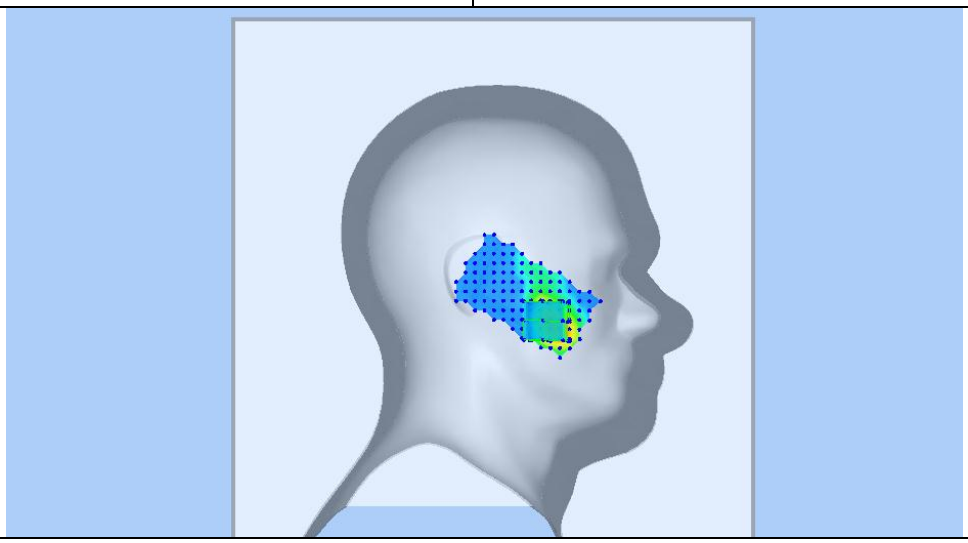
Test mode: WCDMA Band IV, Middle channel (Left Head Cheek)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 18,2017

Medium(liquid type)	HSL_1800
Frequency (MHz)	1732.600
Relative permittivity (real part)	39. 96
Conductivity (S/m)	1.42
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.01
Sensor-Surface	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.060417
SAR 1g (W/Kg)	0.126128
SURFACE SAR	**VOLUME SAR**

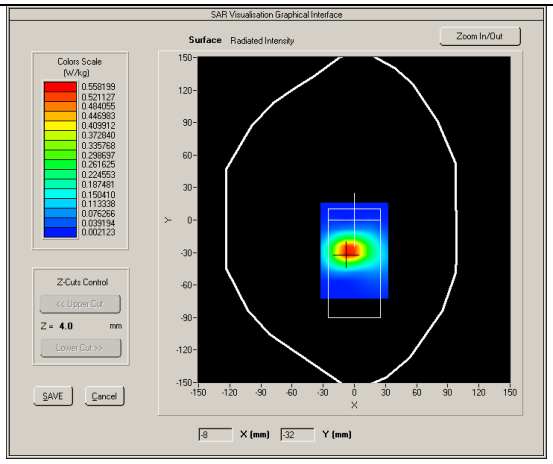


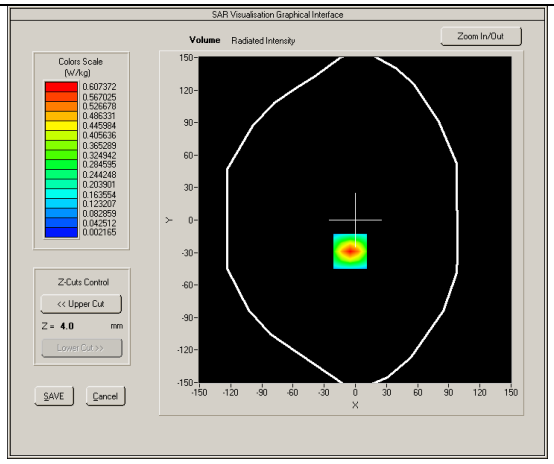


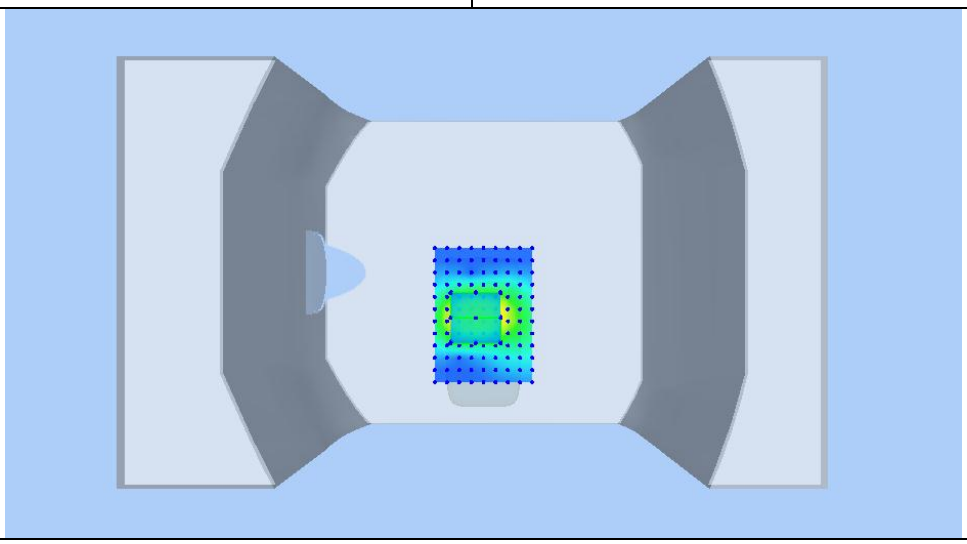


Test mode: WCDMA Band Ⅳ, Middle channel (Body Bottom Side)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 18,2017

Medium(liquid type)	MSL_1800
Frequency (MHz)	1712.000
Relative permittivity (real part)	53.26
Conductivity (S/m)	1.55
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.05
Sensor-Surface	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.010000
SAR 10g (W/Kg)	0.266598
SAR 1g (W/Kg)	0.551756
SURFACE SAR	**VOLUME SAR**

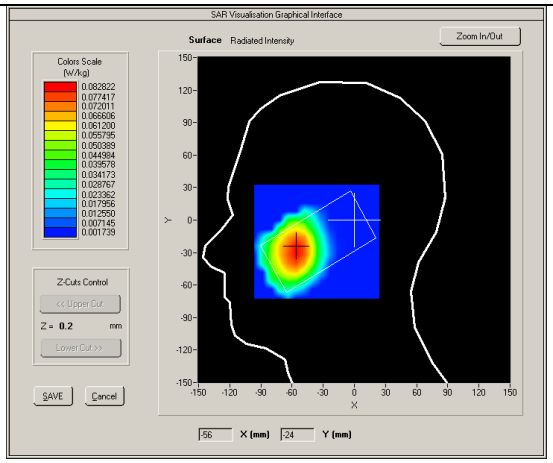


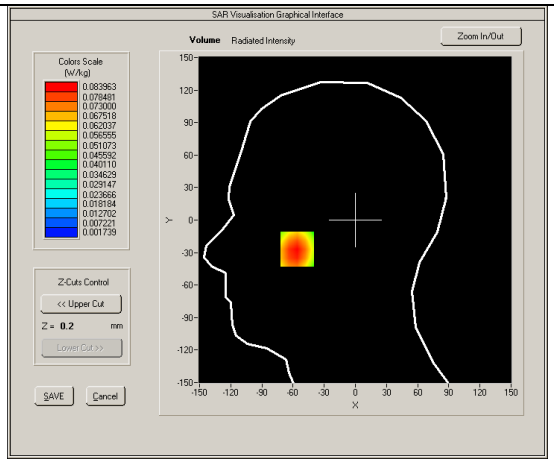


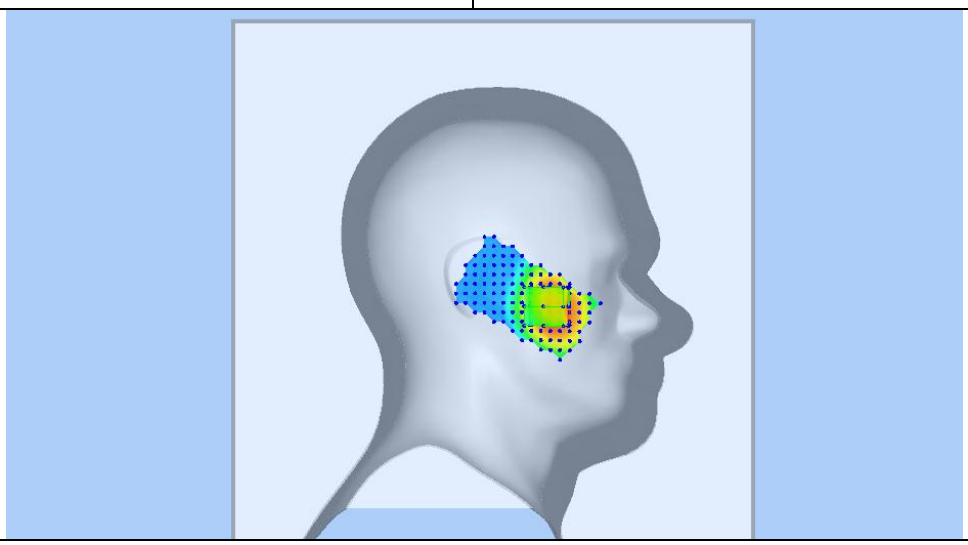


Test mode: LTE BAND 17, Middle channel (Left Head Cheek)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 12,2017

Medium(liquid type)	HSL_750
Frequency (MHz)	710.0000
Relative permittivity (real part)	41.95
Conductivity (S/m)	0.91
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	1.68
Sensor-Surface	4mm
Bandwidth(MHz)	10
RB Allocation	1
RB Offset	24
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.062591
SAR 1g (W/Kg)	0.085703
SURFACE SAR	**VOLUME SAR**

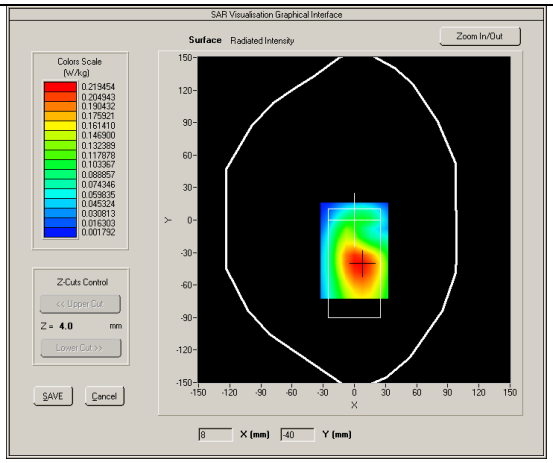


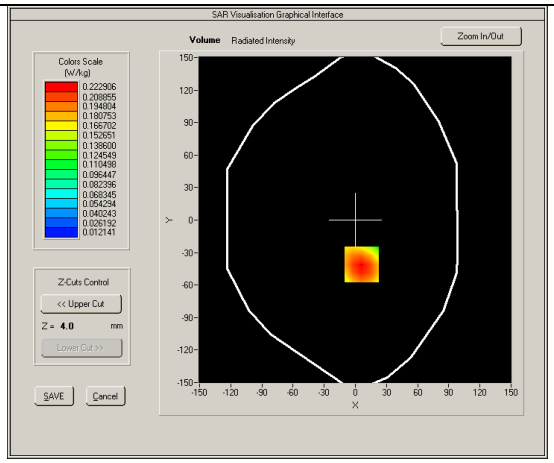


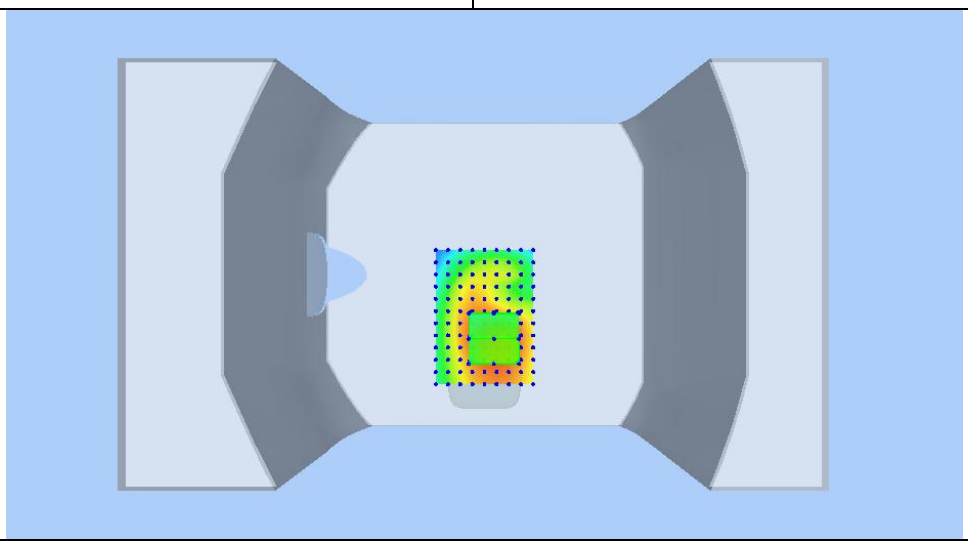


Test mode: LTE BAND 17, Middle channel (Body Back Side)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 12,2017

Medium(liquid type)	MSL_750
Frequency (MHz)	710.0000
Relative permittivity (real part)	55.56
Conductivity (S/m)	0.97
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	1.74
Sensor-Surface	4mm
Bandwidth(MHz)	10
RB Allocation	1
RB Offset	24
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.660000
SAR 10g (W/Kg)	0.154077
SAR 1g (W/Kg)	0.226177
SURFACE SAR	**VOLUME SAR**

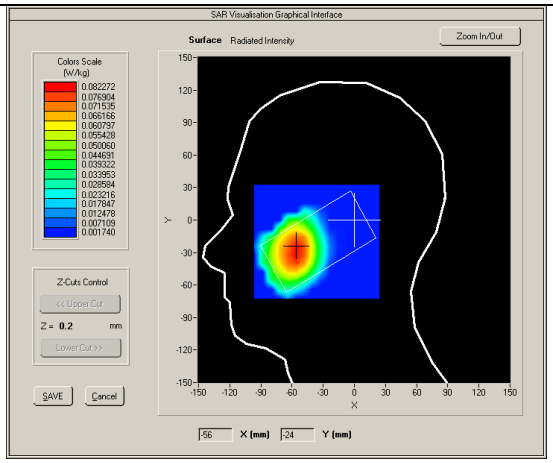


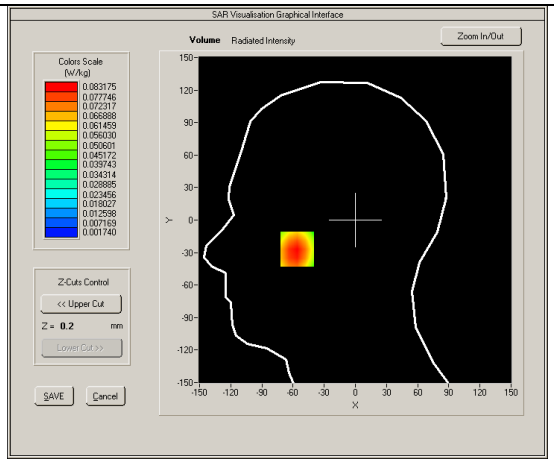


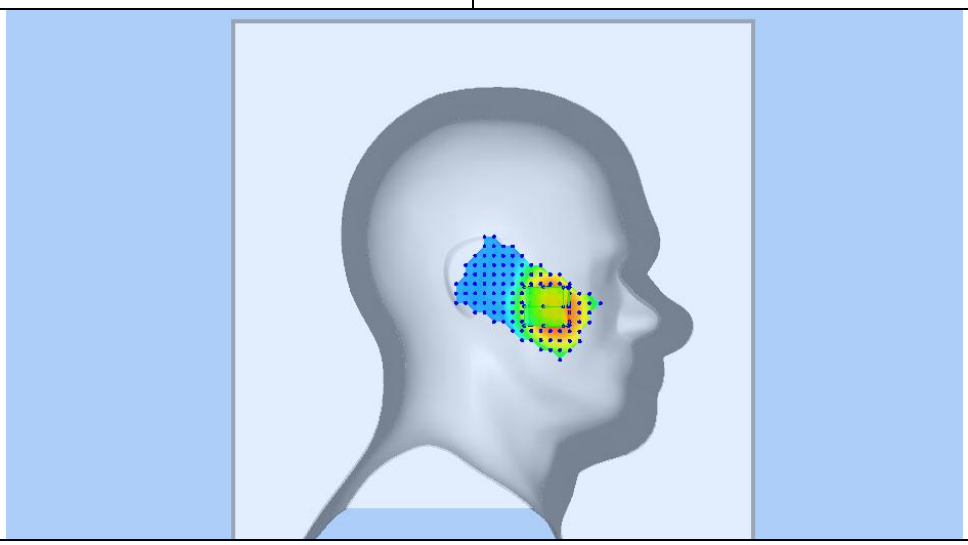


Test mode: LTE BAND 12, Middle channel (Left Head Cheek)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 12,2017

Medium(liquid type)	HSL_750
Frequency (MHz)	710.0000
Relative permittivity (real part)	41.95
Conductivity (S/m)	0.91
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	1.68
Sensor-Surface	4mm
Bandwidth(MHz)	10
RB Allocation	1
RB Offset	24
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.061987
SAR 1g (W/Kg)	0.085017
SURFACE SAR	**VOLUME SAR**

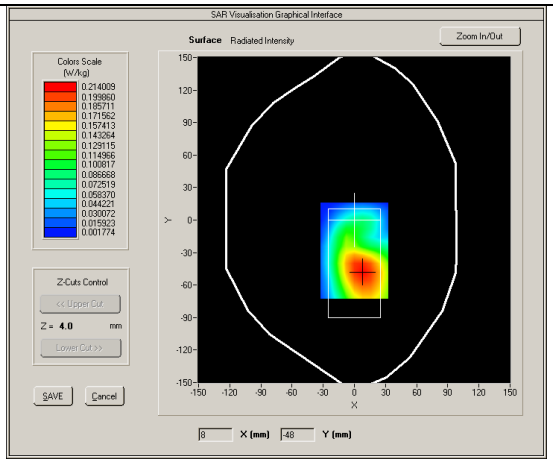


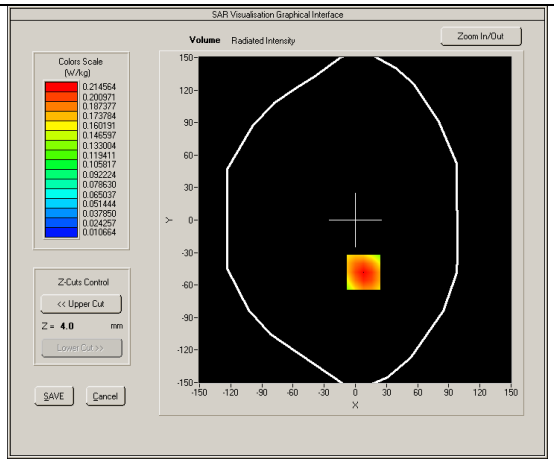


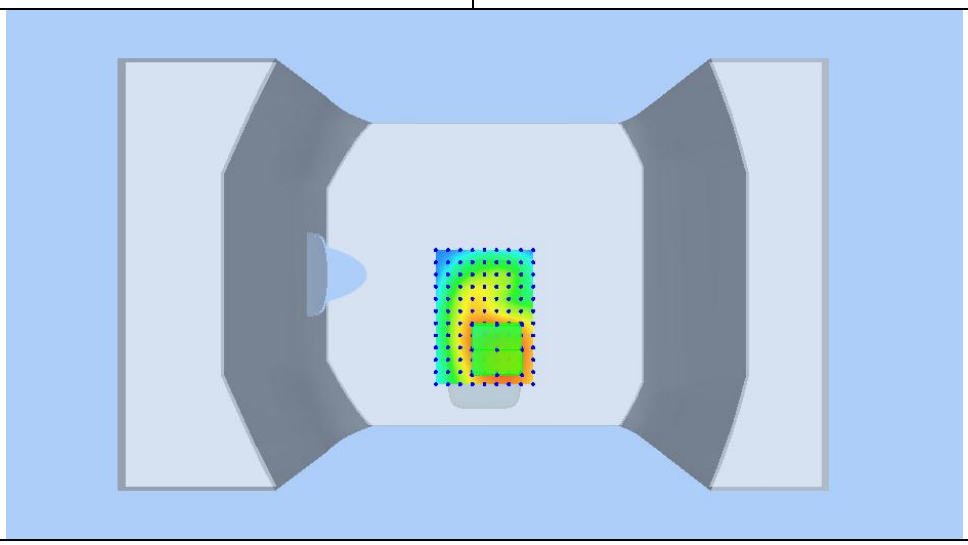


Test mode: LTE BAND 12, Middle channel (Body Back Side)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 12,2017

Medium(liquid type)	MSL_750
Frequency (MHz)	710.0000
Relative permittivity (real part)	55.56
Conductivity (S/m)	0.97
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	1.74
Sensor-Surface	4mm
Bandwidth(MHz)	10
RB Allocation	1
RB Offset	24
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.040000
SAR 10g (W/Kg)	0.147437
SAR 1g (W/Kg)	0.217210
SURFACE SAR	**VOLUME SAR**

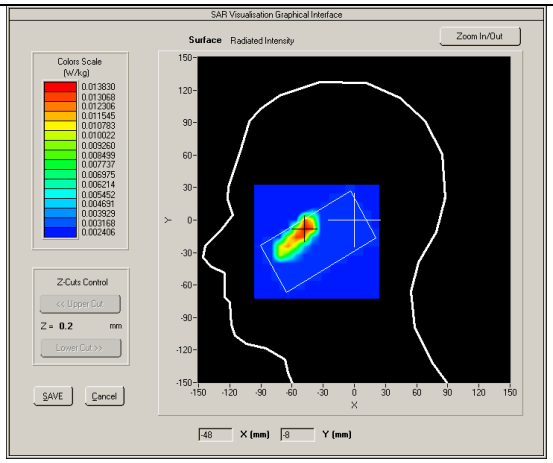


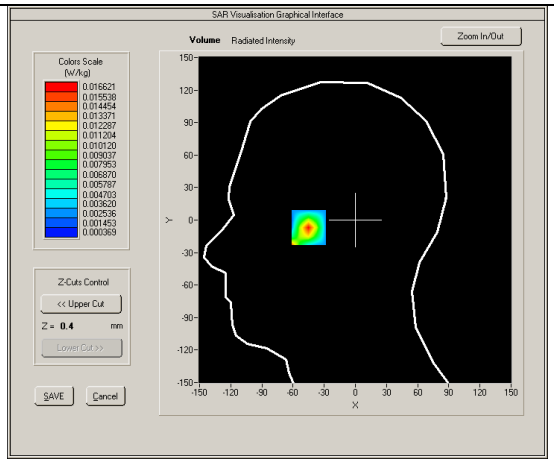


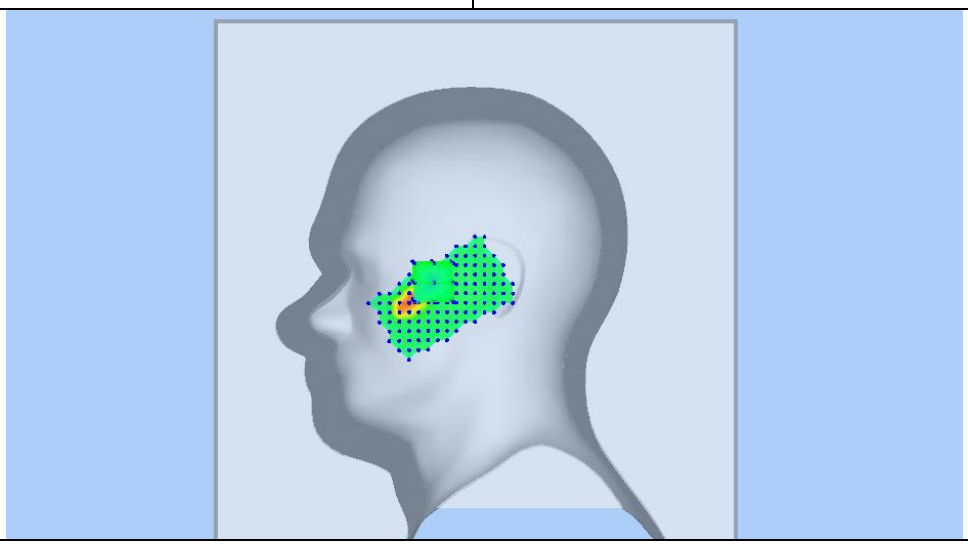


Test mode: LTE BAND 7, Middle channel (Right Head Cheek)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 25,2017

Medium(liquid type)	HSL_2600
Frequency (MHz)	2535.0000
Relative permittivity (real part)	55.29
Conductivity (S/m)	1.97
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.28
Sensor-Surface	4mm
Bandwidth(MHz)	20
RB Allocation	1
RB Offset	49
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.006433
SAR 1g (W/Kg)	0.016445
SURFACE SAR	**VOLUME SAR**

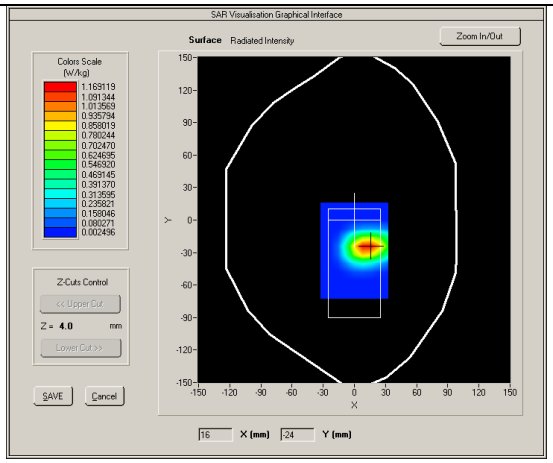


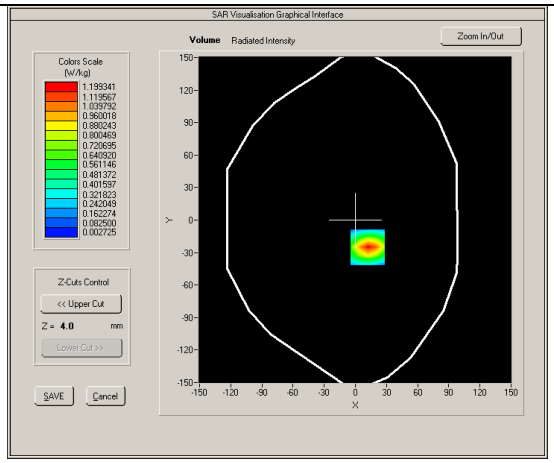


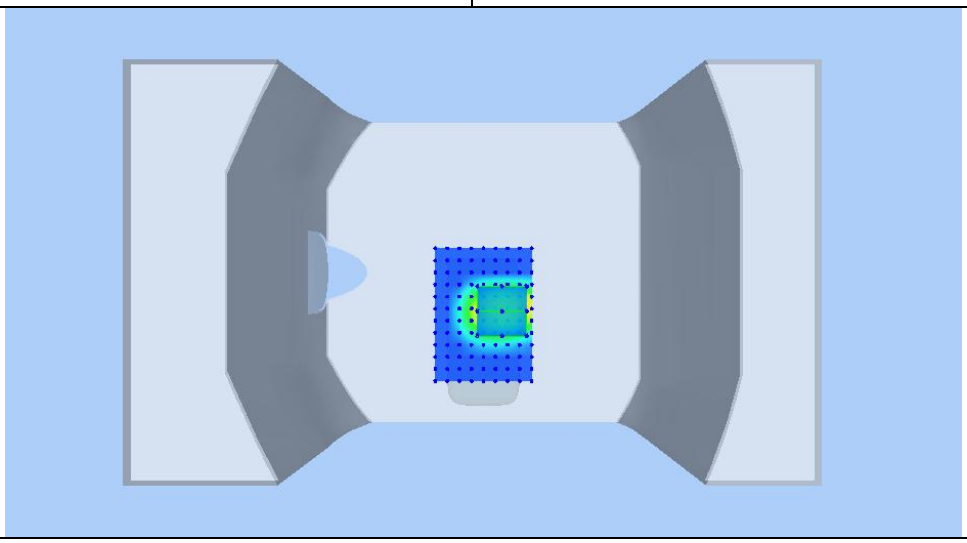


Test mode: LTE BAND 7, Mid channel (Body Bottom Side)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 25,2017

Medium(liquid type)	MSL_2600
Frequency (MHz)	2535.0000
Relative permittivity (real part)	51.96
Conductivity (S/m)	2.17
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.34
Sensor-Surface	4mm
Bandwidth(MHz)	20
RB Allocation	1
RB Offset	49
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.490426
SAR 1g (W/Kg)	1.089586
SURFACE SAR	**VOLUME SAR**

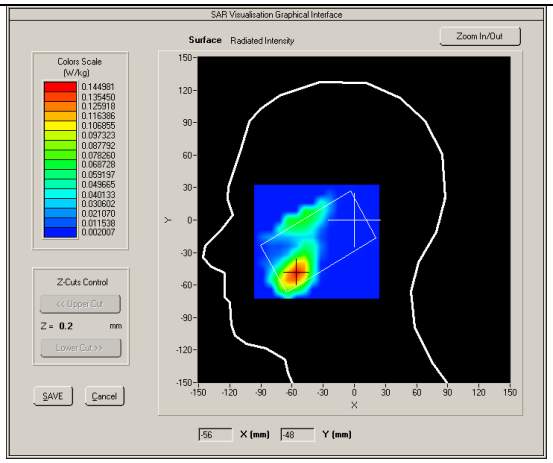


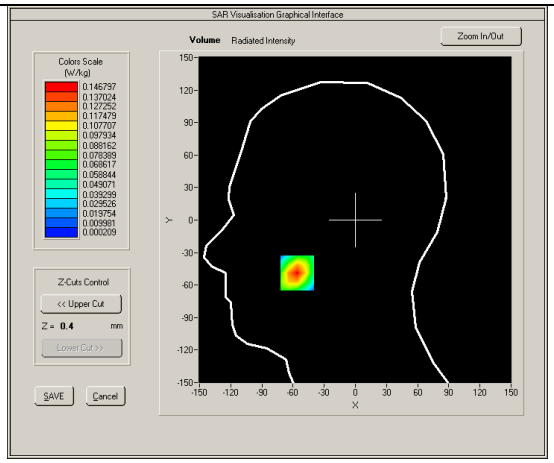


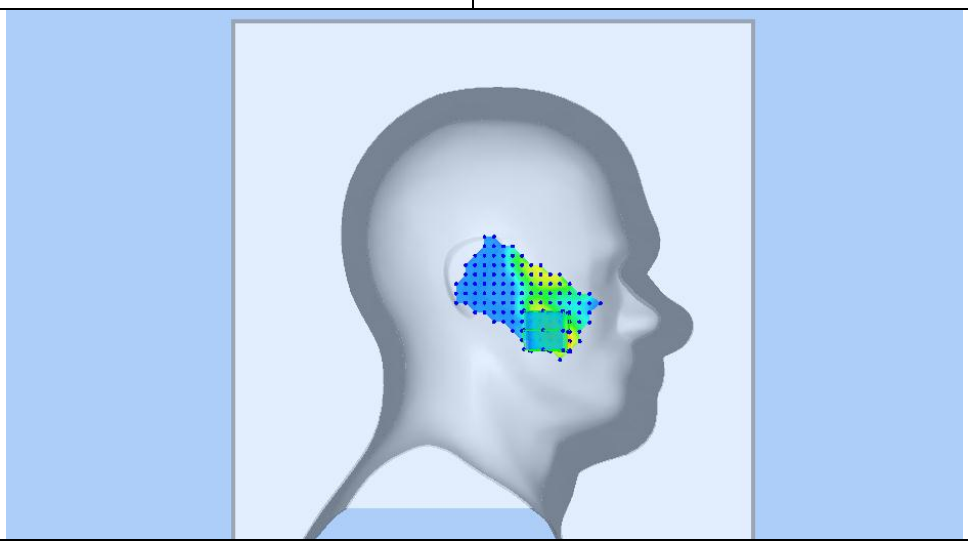


Test mode: LTE BAND 4, Middle channel (Left Head Cheek)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 18,2017

Medium(liquid type)	HSL_1800
Frequency (MHz)	1732.5000
Relative permittivity (real part)	39.98
Conductivity (S/m)	1.41
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.01
Sensor-Surface	4mm
Bandwidth(MHz)	20
RB Allocation	1
RB Offset	50
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.064824
SAR 1g (W/Kg)	0.135357
SURFACE SAR	**VOLUME SAR**

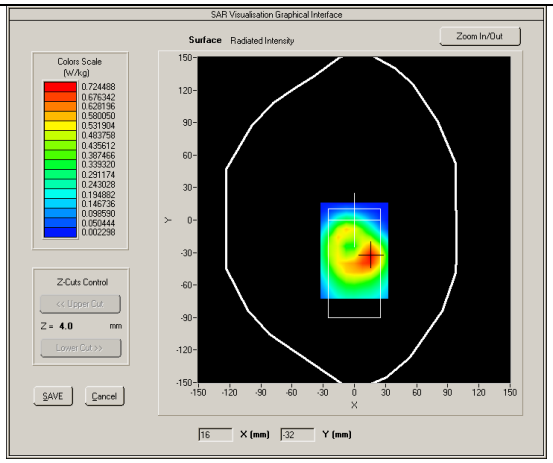


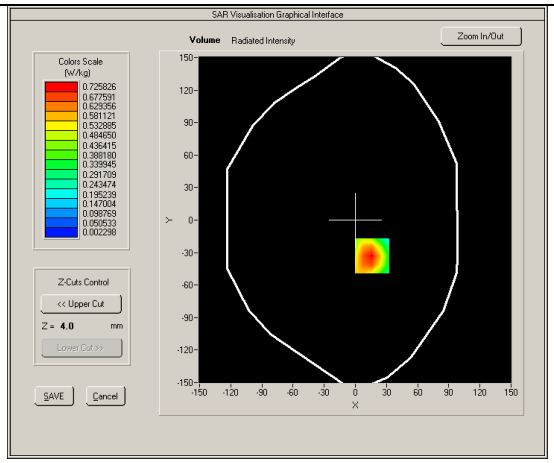


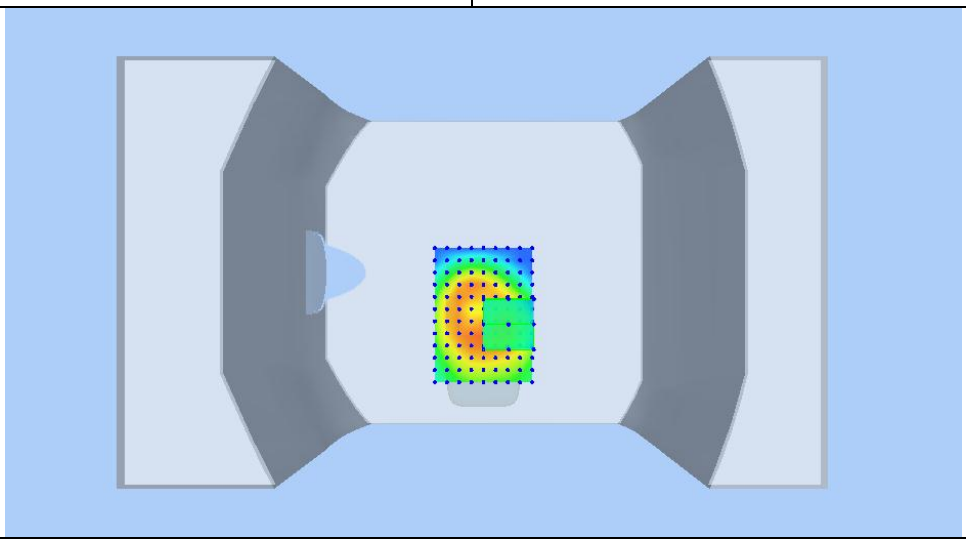


Test mode: LTE BAND 4, Middle channel (Body Back Side)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 18,2017

Medium(liquid type)	MSL_1800
Frequency (MHz)	1732.5000
Relative permittivity (real part)	53.25
Conductivity (S/m)	1.56
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.05
Sensor-Surface	4mm
Bandwidth(MHz)	20
RB Allocation	1
RB Offset	50
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.970000
SAR 10g (W/Kg)	0.391126
SAR 1g (W/Kg)	0.685115
SURFACE SAR	**VOLUME SAR**

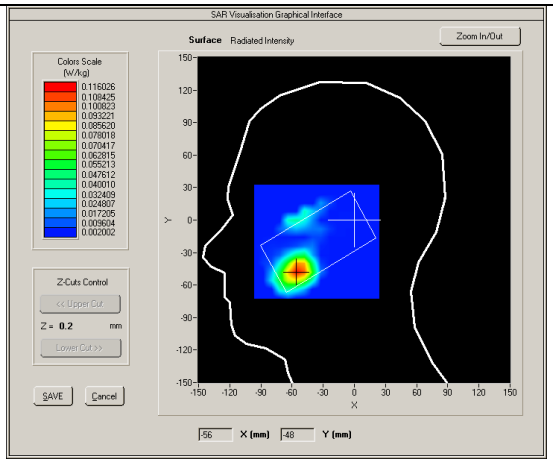


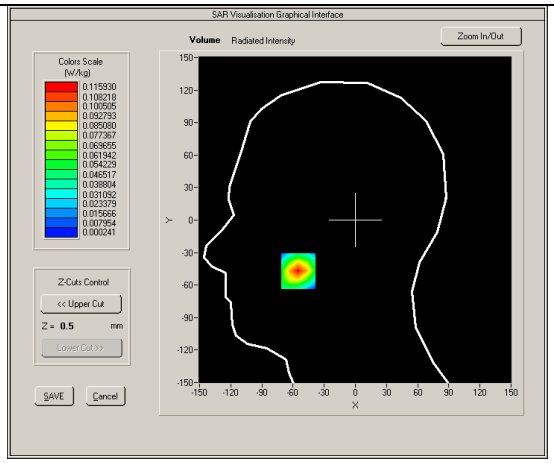


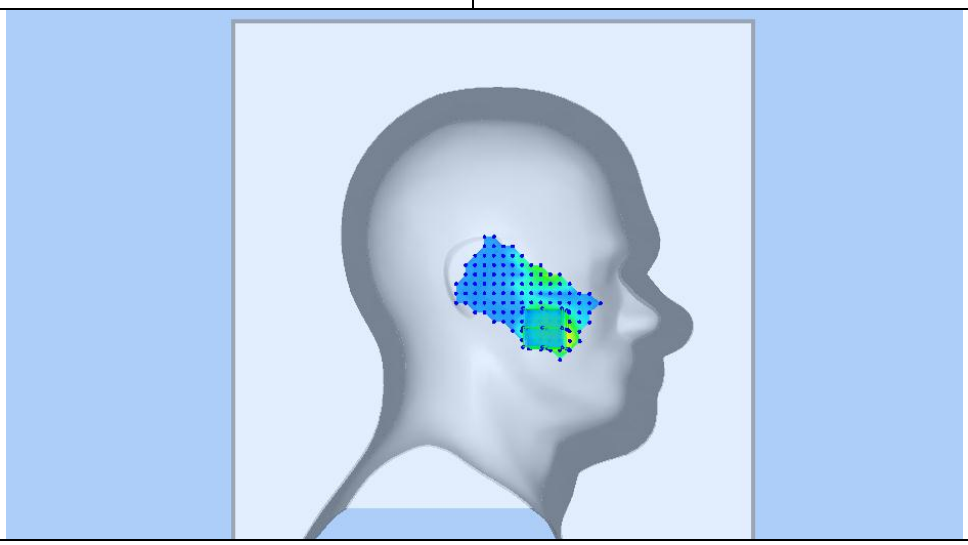


Test mode: LTE BAND 2, Middle channel (Left Head Cheek)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 20,2017

Medium(liquid type)	HSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	40.03
Conductivity (S/m)	1.39
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.26
Sensor-Surface	4mm
Bandwidth(MHz)	20
RB Allocation	1
RB Offset	49
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.048356
SAR 1g (W/Kg)	0.105542
SURFACE SAR	**VOLUME SAR**

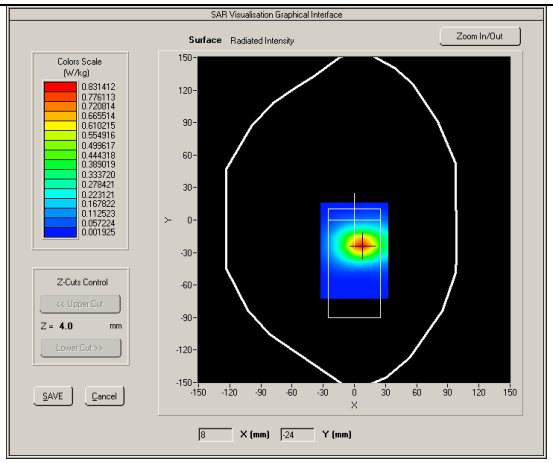


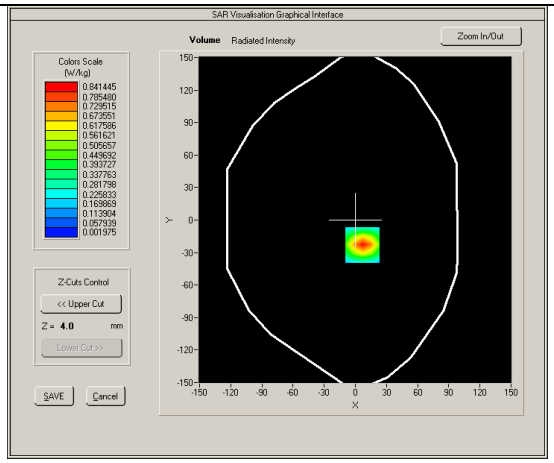


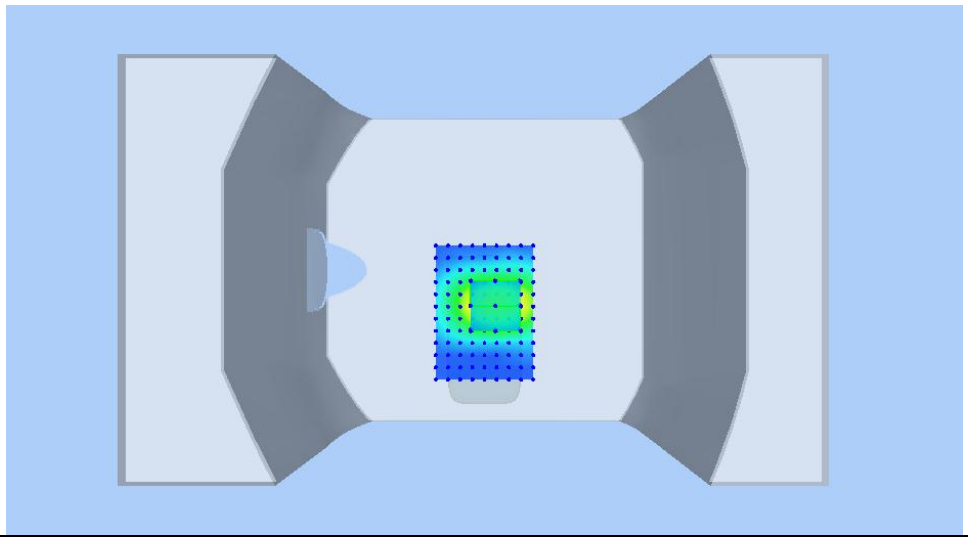


Test mode: LTE BAND 2, Middle channel (Body Bottom Side)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 20,2017

Medium(liquid type)	MSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	53.28
Conductivity (S/m)	1.53
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.32
Sensor-Surface	4mm
Bandwidth(MHz)	20
RB Allocation	1
RB Offset	49
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.520000
SAR 10g (W/Kg)	0.380008
SAR 1g (W/Kg)	0.768106
SURFACE SAR	**VOLUME SAR**

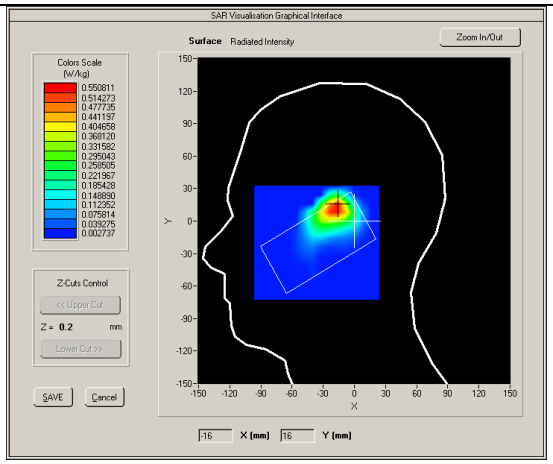


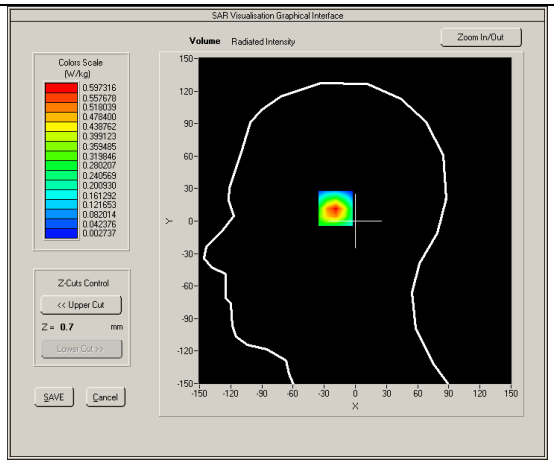


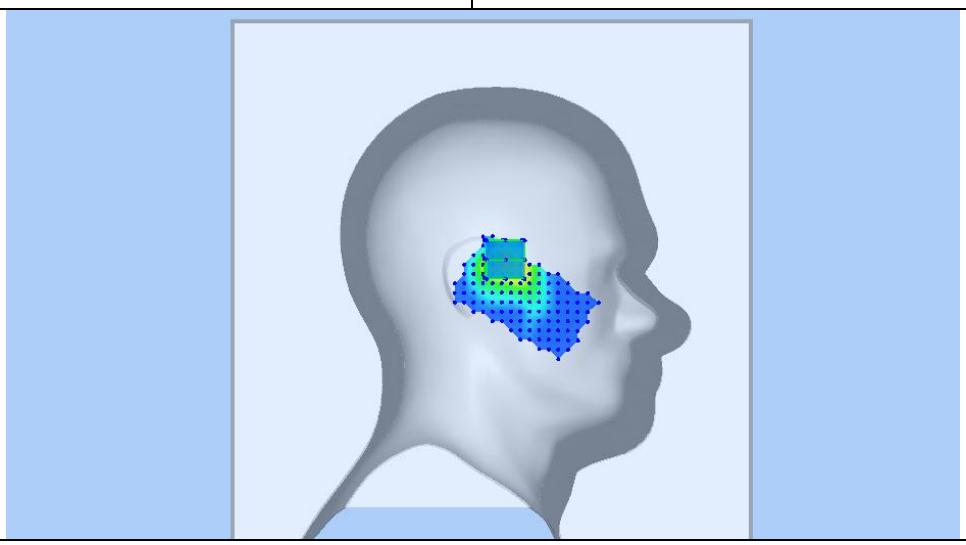


Test mode: 802.11b, Middle channel (Left Head Cheek)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 22,2017

Medium(liquid type)	HSL_2450
Frequency (MHz)	2437.000
Relative permittivity (real part)	40.42
Conductivity (S/m)	1.77
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.04
Sensor-Surface	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.690000
SAR 10g (W/Kg)	0.237019
SAR 1g (W/Kg)	0.557449
SURFACE SAR	**VOLUME SAR**

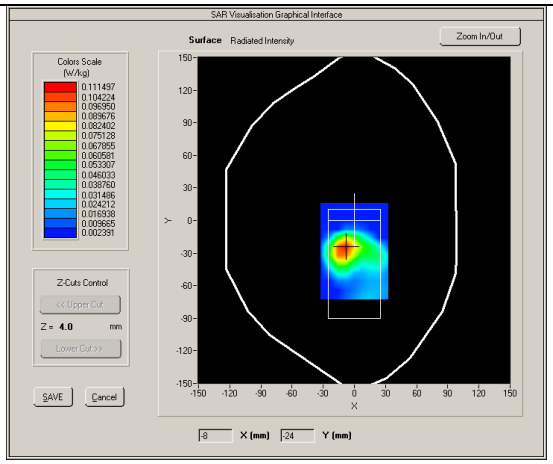


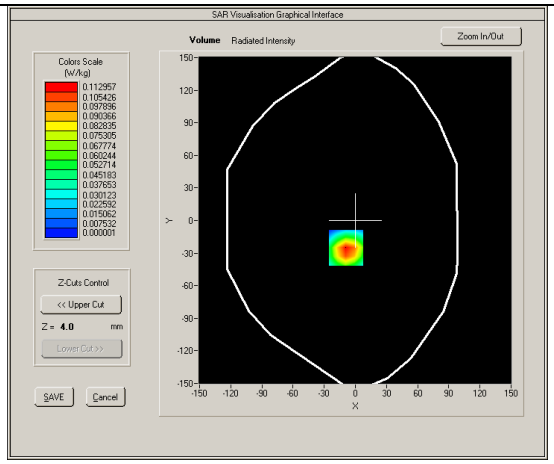


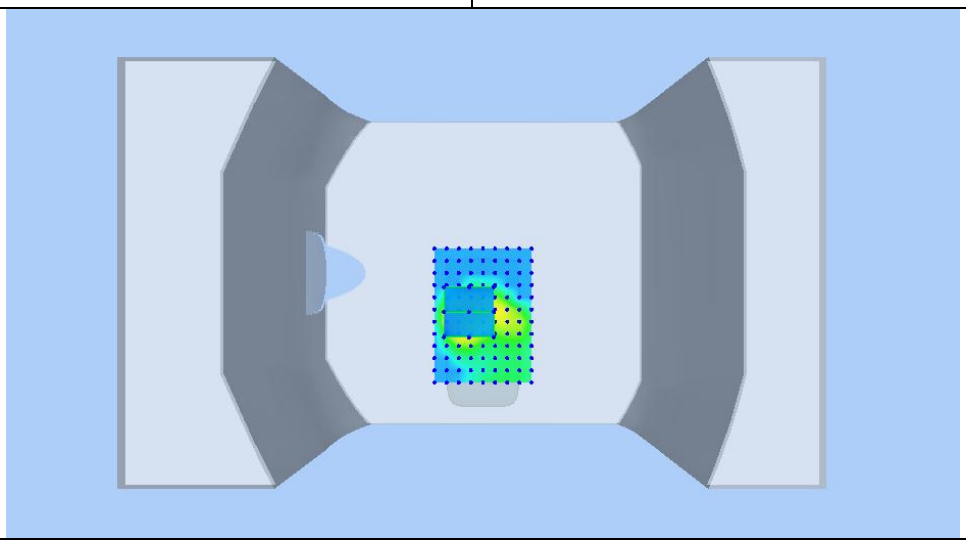


Test mode: 802.11b, Middle channel (Body Back Side)
Product Description: Mobile Phone
Model: VIVO ONE
Test Date: Dec 22,2017

Medium(liquid type)	MSL_2450
Frequency (MHz)	2437.000
Relative permittivity (real part)	52.78
Conductivity (S/m)	1.97
E-Field Probe	SN 27/15 EPGO262
Crest factor	1.0
Conversion Factor	2.12
Sensor-Surface	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.000000
SAR 10g (W/Kg)	0.045118
SAR 1g (W/Kg)	0.113083
SURFACE SAR	**VOLUME SAR**







Annex A CALIBRATION REPORTS

COMOSAR E-Field Probe Calibration Report

Ref : ACR.264.3.16.SATU.A

SIEMIC TESTING AND CERTIFICATION SERVICES

ZONE A,FLOOR 1,BUILDING 2,WAN YE LONG TECHNOLOGY PARK,SOUTH SIDE OF ZHOUSHI ROAD, SHIYAN STREET,BAO'AN DISTRICT, SHENZHEN 518108 , GUANGDONG , P.R.C.

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 27/15 EPGO262

Calibrated at MVG US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED
Calibration CERT #2246-02

Calibration Date: 09/20/2016

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.264.3.16.SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	9/20/2016	
Checked by :	Jérôme LUC	Product Manager	9/20/2016	
Approved by :	Kim RUTKOWSKI	Quality Manager	9/20/2016	

	Customer Name
Distribution :	SIEMIC Testing and Certification Services

Issue	*Date*	*Modifications*
A	9/20/2016	Initial release

TABLE OF CONTENTS

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 27/15 EPGO262
Product Condition (new / used)	Used
Frequency Range of Probe	0.7 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.221 MΩ Dipole 2: R2=0.199 MΩ Dipole 3: R3=0.199 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.

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%

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 %

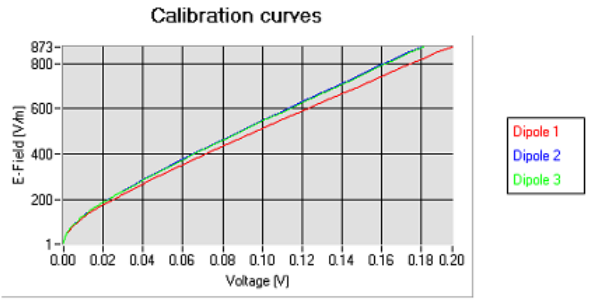
5.1 SENSITIVITY IN AIR

Normx dipole 1 (μV/(V/m)^2)	Normy dipole 2 (μV/(V/m)^2)	Normz dipole 3 (μV/(V/m)^2)
0.80	0.71	0.72

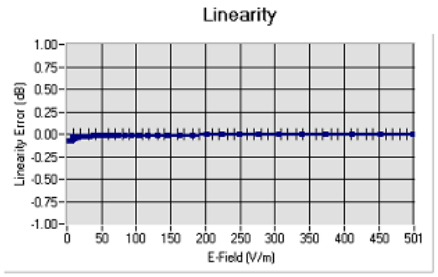
DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
92	90	91

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

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



5.2 LINEARITY



Linearity:±1.69% (+/-0.07dB)

5.3 SENSITIVITY IN LIQUID

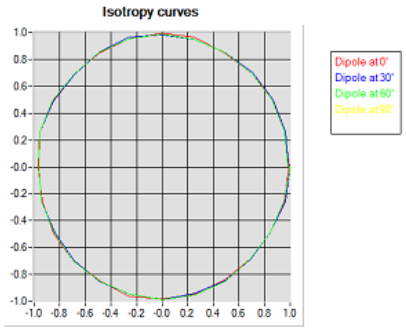
Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL750	750	40.03	0.93	1.57
BL750	750	56.83	1.00	1.62
HL850	835	42.19	0.90	1.74
BL850	835	54.67	1.01	1.81
HL900	900	42.08	1.01	1.67
BL900	900	55.25	1.08	1.73
HL1800	1800	41.68	1.46	1.81
BL1800	1800	53.86	1.46	1.87
HL1900	1900	38.45	1.45	2.01
BL1900	1900	53.32	1.56	2.05
HL2000	2000	38.26	1.38	1.86
BL2000	2000	52.70	1.51	1.91
HL2450	2450	37.50	1.80	2.04
BL2450	2450	53.22	1.89	2.12
HL2600	2600	39.80	1.99	2.05
BL2600	2600	52.52	2.23	2.12
HL3500	3500	38.21	2.98	2.02
BL3500	3500	52.95	3.43	2.08
HL5200	5200	35.64	4.67	1.51
BL5200	5200	48.64	5.51	1.55
HL5400	5400	36.44	4.87	1.56
BL5400	5400	46.52	5.77	1.61
HL5600	5600	36.66	5.17	1.55
BL5600	5600	46.79	5.77	1.60
HL5800	5800	35.31	5.31	1.44
BL5800	5800	47.04	6.10	1.48

LOWER DETECTION LIMIT: 7mW/kg

5.4 ISOTROPY

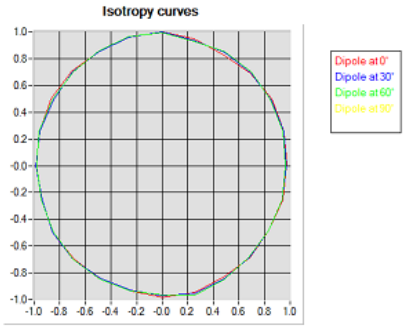
HL900 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.05 dB



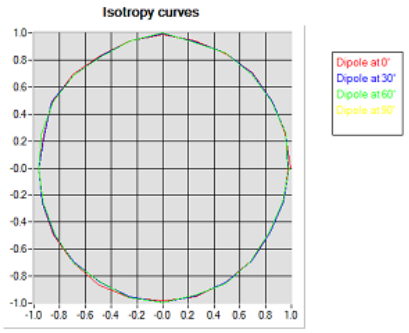
HL1800 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.06 dB



HL5600 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.08 dB



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	02/2016	02/2019
Reference Probe	MVG	EP 94 SN 37/08	10/2015	10/2016
Multimeter	Keithley 2000	1188656	12/2013	12/2016
Signal Generator	Agilent E4438C	MY49070581	12/2013	12/2016
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2013	12/2016
Power Sensor	HP ECP-E26A	US37181460	12/2013	12/2016
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	10/2015	10/2017

SAR Reference Dipole Calibration Report

Ref : ACR.165.1.17.SATU.A

SIEMIC TESTING AND CERTIFICATION SERVICES

ZONE A,FLOOR 1,BUILDING 2,WAN YE LONG TECHNOLOGY PARK,SOUTH SIDE OF ZHOUSHI ROAD, SHIYAN STREET,BAO'AN DISTRICT, SHENZHEN 518108 , GUANGDONG , P.R.C.

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 750 MHZ

SERIAL NO.: SN 26/14 DIP0G750-325

Calibrated at MVG US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED Calibration CERT #2246-02

Calibration Date: 06/8/2017

Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.165.1.17.SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	6/14/2017	
Checked by :	Jérôme LUC	Product Manager	6/14/2017	
Approved by :	Kim RUTKOWSKI	Quality Manager	6/14/2017	

	Customer Name
Distribution :	SIEMIC Testing and Certification Services

Issue	*Date*	*Modifications*
A	6/14/2017	Initial release

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 750 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID750
Serial Number	SN 26/14 DIP0G750-325
Product Condition (new / used)	Used

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, FCC KDBs and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.

Figure 1 – *MVG COMOSAR Validation Dipole*

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

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

4.2 MECHANICAL REQUIREMENTS

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

5 MEASUREMENT UNCERTAINTY

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

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

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

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

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

5.3 VALIDATION MEASUREMENT

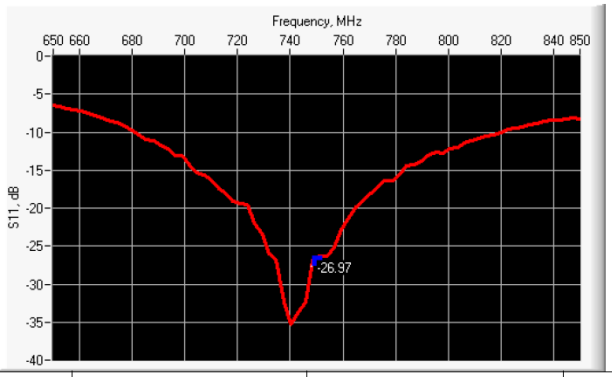
The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %

10 g	20.1 %

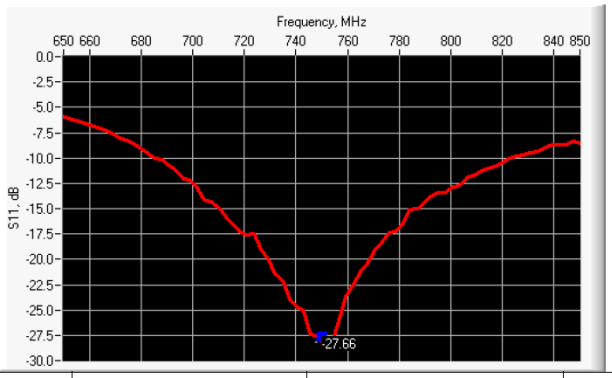
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-26.97	-20	54.4 Ω - 1.4 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-27.66	-20	53.5 Ω + 2.5 jΩ

6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	