FCC

SAR

TEST REPORT

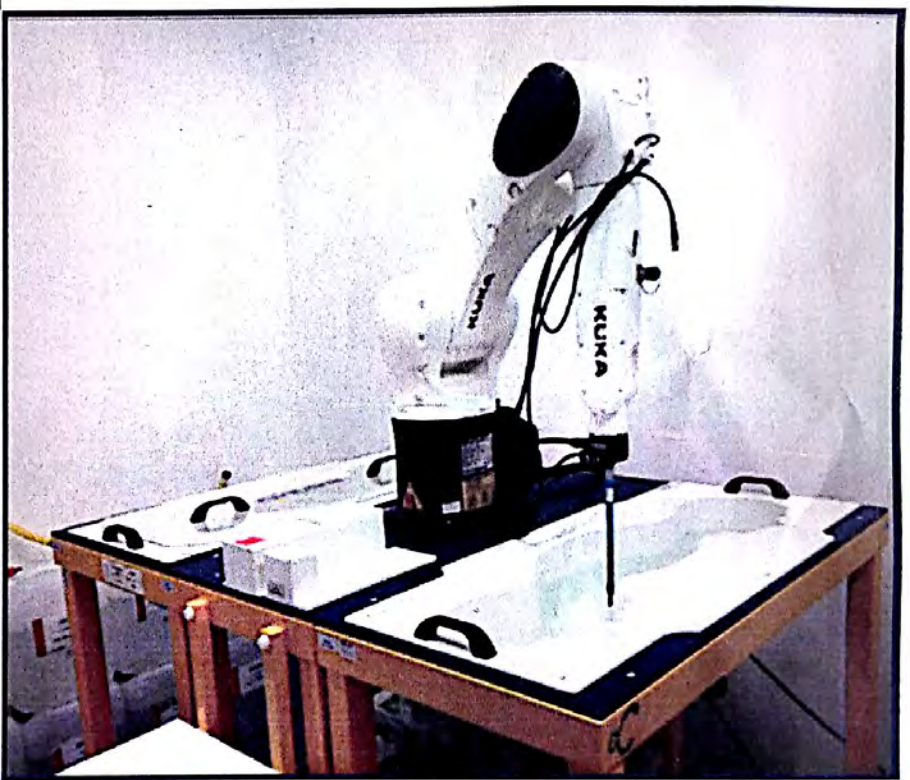
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Mini 300N wireless adapter

ISSUED TO
Intracom Asia Co., Ltd.

4F., No.77, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan



Report No.:	BL-SZ1550162-701
EUT Type:	Mini 300N wireless adapter
Model Name:	525527
Brand Name:	Manhattan
FCC ID:	2ADQY525527
Test Standard:	FCC 47 CFR Part 2.1093
	ANSI C95.1: 1992
	IEEE 1528: 2003
Maximum SAR:	Body (1 g): 0.342 W/kg
Test Conclusion:	Pass
Test Date:	Jun. 16, 2015 ~ Jun. 27, 2015
Date of Issue:	Jul. 13, 2015

Prepared by: Wen Lin
Wen Lin
(Reporting Specialist)
Date Jul. 13, 2015

Approved by: [signature]
Liao Jianming
(Technical Director)
Date Jul. 13, 2015

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Revision History

Version	Issue Date	Revisions
Rev. 01	Jun. 17, 2015	Initial Issue
Rev. 02	Jul. 10, 2015	Add Tune-up power tolerance in chapter 8; Add Measurement uncertainly evaluation for system check in chapter 3.4 Add Dielectric Probe Calibration Report in ANNEX F
Rev. 03	Jul. 13, 2015	Test Standards IEEE 1528:2013 has changed to IEEE 1528:2003

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 66850100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	20 to 23℃
Ambient Relative Humidity	35 to 50 %
Ambient Pressure	100 to 102kPa

1.4 Announce

(1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(2) The test report is invalid if there is any evidence and/or falsification.

(3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	Intracom Asia Co., Ltd.
Address	4F., No.77, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan

2.2 Manufacturer

Manufacturer	Intracom Asia Co., Ltd.
Address	4F., No.77, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan

2.3 General Description for Equipment under Test (EUT)

EUT Type	Mini 300N wireless adapter
EUT Model Name	525527
Hardware Version	V1.3
Software Version	1027.1.0902.2014
Dimensions	38×19×7 mm
Weight	4.18 g
Network and Wireless connectivity	WLAN
About the product	The EUT has two antennas and supports MIMO technology under WLAN 802.11n mode.

2.4 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	2.4G WLAN	
Frequency Range	802.11b/g/ n (HT20/ HT40)	2400~2483.5 MHz
Antenna Type	Ceramic Chip Antenna	
Environment	Uncontrolled	
EUT Stage	Portable Device; Production Unit	

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 248227 D01 v02r01	SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters
5	FCC KDB 447498 D01 v05r02	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
6	FCC KDB 447498 D02 v02	SAR Measurement Procedures for USB Dongle Transmitters
7	FCC KDB 865664 D01 v01r03	SAR Measurement 100 MHz to 6 GHz
8	FCC KDB 865664 D02 v01r01	RF Exposure Reporting

3.2 Device Category and SAR Limit

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

Table of Exposure Limits:

Body Position	SAR Value (W/Kg)	
	General Population/ Uncontrolled Exposure	Occupational/ Controlled Exposure
Whole-Body SAR (averaged over the entire body)	0.08	0.4
Partial-Body SAR (averaged over any 1gram of tissue)	1.60	8.0
SAR for hands, wrists, feet and ankles (averaged over any 1 grams of tissue)	4.0	20.0

NOTE:

General Population/Uncontrolled: Locations where there is the exposure of individuals who have no knowledge or control of their exposure. General population/uncontrolled exposure limits are appl icable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when ex posure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Occupational/Controlled: Locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

3.3 Test Result Summary

3.3.1 Highest SAR (1g Value)

Position	Band	Maximum Measurement SAR (W/kg)	Maximum Report SAR (W/kg)	Limit (W/kg)	Verdict
Body	802.11b ANT A	0.145	0.148	1.6	Pass
	802.11b ANT B	0.210	0.214	1.6	Pass
	802.11g ANT A	0.228	0.233	1.6	Pass
	802.11g ANT B	0.186	0.190	1.6	Pass
	802.11n HT20 ANT A	0.184	0.186	1.6	Pass
	802.11n HT20 ANT B	0.204	0.206	1.6	Pass
	802.11n HT40 ANT A	0.242	0.244	1.6	Pass
	802.11n HT40 ANT B	0.338	0.342	1.6	Pass
	802.11n HT20 MIMO	0.207	0.209	1.6	Pass
	802.11n HT40 MIMO	0.228	0.230	1.6	Pass

3.4 Measurement Uncertainly Evaluation

3.4.1 Measurement uncertainly evaluation for SAR test

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2003. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. The system measurement uncertainty frequency range is from 300 MHz to 3 GHz.

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	$\sqrt{3}$	0.7	0.7	1.41	1.41	∞
Hemispherical Isotropy	5.9	R	$\sqrt{3}$	0.7	0.7	2.38	2.38	∞
Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Reponse Time	0.0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related								
Test sample positioning	2.6	N	1	1	1	2.60	2.60	N−1
Device Holder Uncertainty	1.0	N	1	1	1	1.00	1.00	N−1
Output power Variation - SAR drift measurement	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	2.00	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Liquid conductivity (deviation from target values)	2.5	N	$\sqrt{3}$	0.64	0.43	0.92	0.62	∞
Liquid conductivity - measurement uncertainty	5.0	N	1	0.64	0.43	3.20	2.15	M
Liquid permittivity (deviation from target values)	2.5	N	$\sqrt{3}$	0.60	0.49	0.87	0.71	∞
Liquid permittivity - measurement uncertainty	5.0	N	1	0.60	0.49	3.00	2.45	M
Combined Standard Uncertainty		RSS				10.14	9.67	
Expanded Uncertainty (95% Confidence interval)		k				20.29	19.35	

3.4.2 Measurement uncertainly evaluation for system check

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The break down of the individual uncertainties is as follows:

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	$\sqrt{3}$	0.7	0.7	1.41	1.41	∞
Hemispherical Isotropy	5.9	R	$\sqrt{3}$	0.7	0.7	2.38	2.38	∞
Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Probe Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Reponse Time	0.0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Integration Time	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Dipole								
Deviation of experimental dipole	5.5	R	$\sqrt{3}$	1	1	3.20	3.20	∞
Dipole axis to liquid distance	2.0	R	1	1	1	1.20	1.20	∞
Power drift	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Liquid conductivity (deviation from target values)	2.5	N	$\sqrt{3}$	0.64	0.43	0.92	0.62	∞
Liquid conductivity - measurement uncertainty	5.0	N	1	0.64	0.43	3.20	2.15	M
Liquid permittivity (deviation from target values)	2.5	N	$\sqrt{3}$	0.60	0.49	0.87	0.71	∞
Liquid permittivity - measurement uncertainty	5.0	N	1	0.60	0.49	3.00	2.45	M
Combined Standard Uncertainty		RSS				10.18	9.73	
Expanded Uncertainty (95% Confidence interval)		k				20.36	19.45	

4 SAR MEASUREMENT SYSTEM

4.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{d}{\mathrm{dt}}\left(\frac{d\mathrm{W}}{\mathrm{dm}}\right) = \frac{d}{\mathrm{dt}}\left(\frac{d\mathrm{W}}{\rho \mathrm{dv}}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

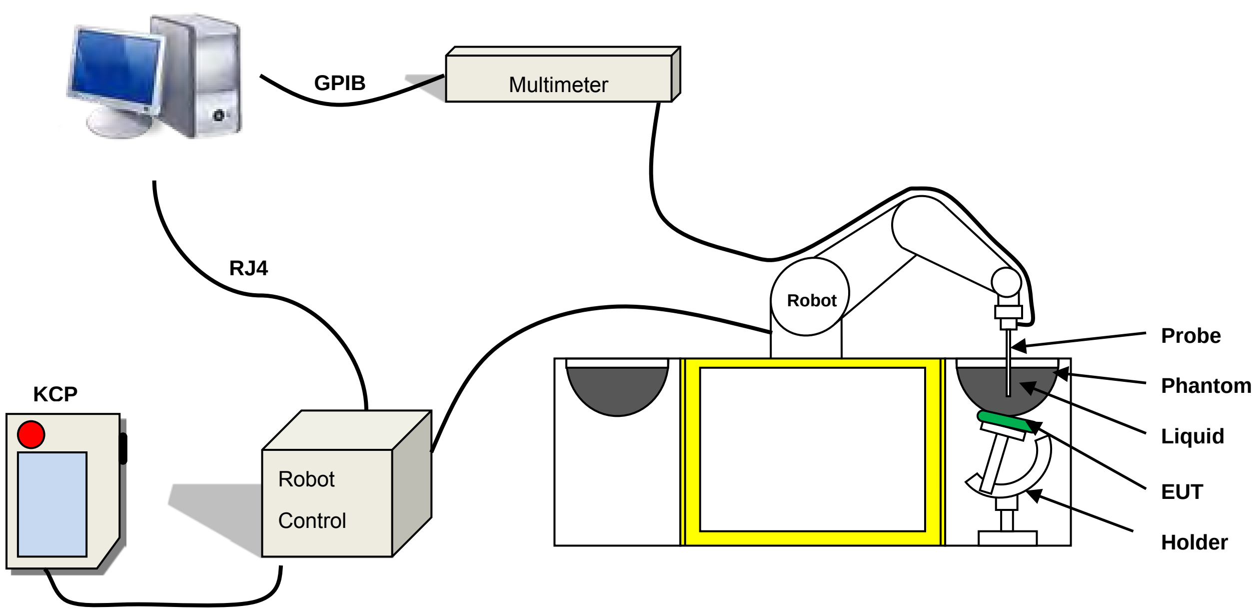
$$\mathbf{SAR} = \frac{\sigma E^2}{\rho}$$

Where: σ is the conductivity of the tissue,

ρis the mass density of the tissue and E is the RMS electrical field strength.

4.2 SATIMO SAR System

4.2.1 SATIMO SAR System Diagram



These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 850 mm), which positions the probes with a positional repeatability of better than ± 0.02 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit.

The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure described in SAR standard with accuracy of better than ±10%.The spherical isotropy was evaluated with the procedure described in SAR standard and found to be better than ±0.25 dB. The phantom used was the SAM Phantom as described in FCC supplement C, IEEE P1528 and CENELEC EN62209-1/-2.

4.2.2 Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

4.2.3 E-Field Probe

For the measurements the Specific Dosimetric E-Field Probe SN 27/13 EP187 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 2.5 mm
- Distance between probe tip and sensor center: 1.0mm
- Distance between sensor center and the inner phantom surface: 4 mm
(repeatability better than +/- 1mm)

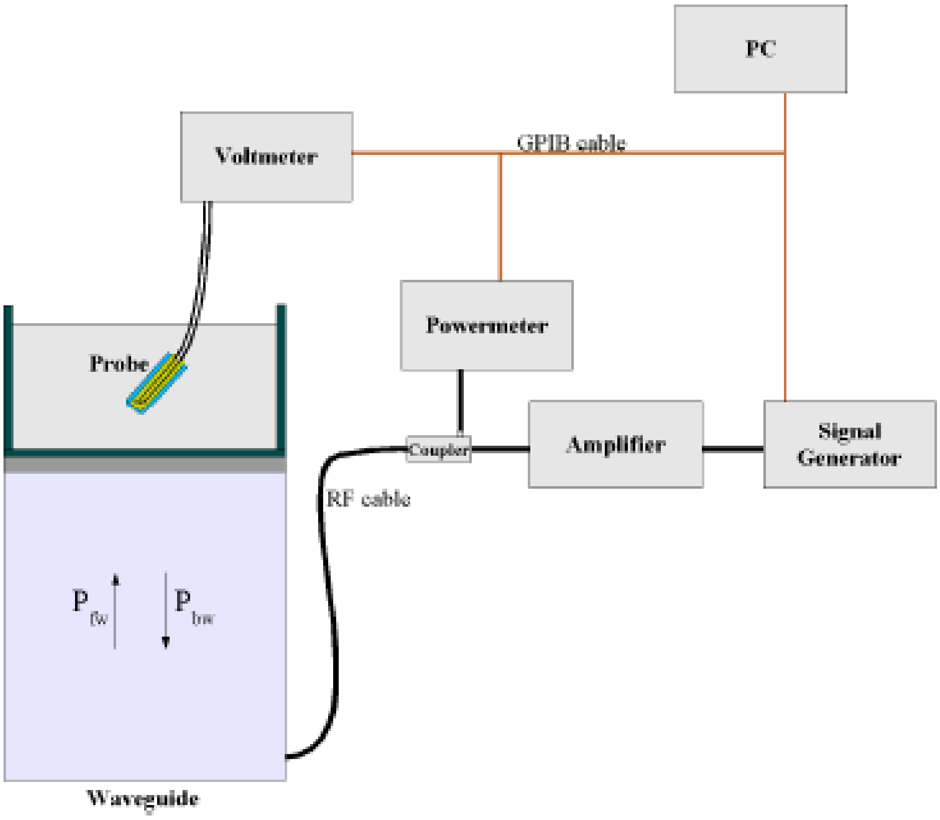
- Probe linearity: +/- 0.06 dB

- Axial Isotropy: ＜0.15 dB
- Spherical Isotropy: ＜0.15 dB
- Calibration range: 750MHz to 2600MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and surface normal line: less than 30°

E-Field Probe Calibration Process

Probe calibration is realized, in compliance with CENELEC EN 62209-1/-2 and IEEE 1528 std, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1/2 annexe technique using reference guide at the five frequencies.



$$SAR = \frac{4(P_{fw} - P_{bw})}{ab\sigma} \cos^2\left(\pi \frac{y}{a}\right) c^{(2\pi/\sigma)}$$

Where :

Pfw= Forward Power

Pbw= Backward Power

a and b = Waveguide dimensions

ı= Skin depth

Keithley configuration:

Rate = Medium; Filter =ON; RDGS=10; FILTER TYPE =MOVING AVERAGE; RANGE AUTO After each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N)   (N=1,2,3)

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N))   (N=1,2,3)

Where the DCP is the diode compression point in mV.

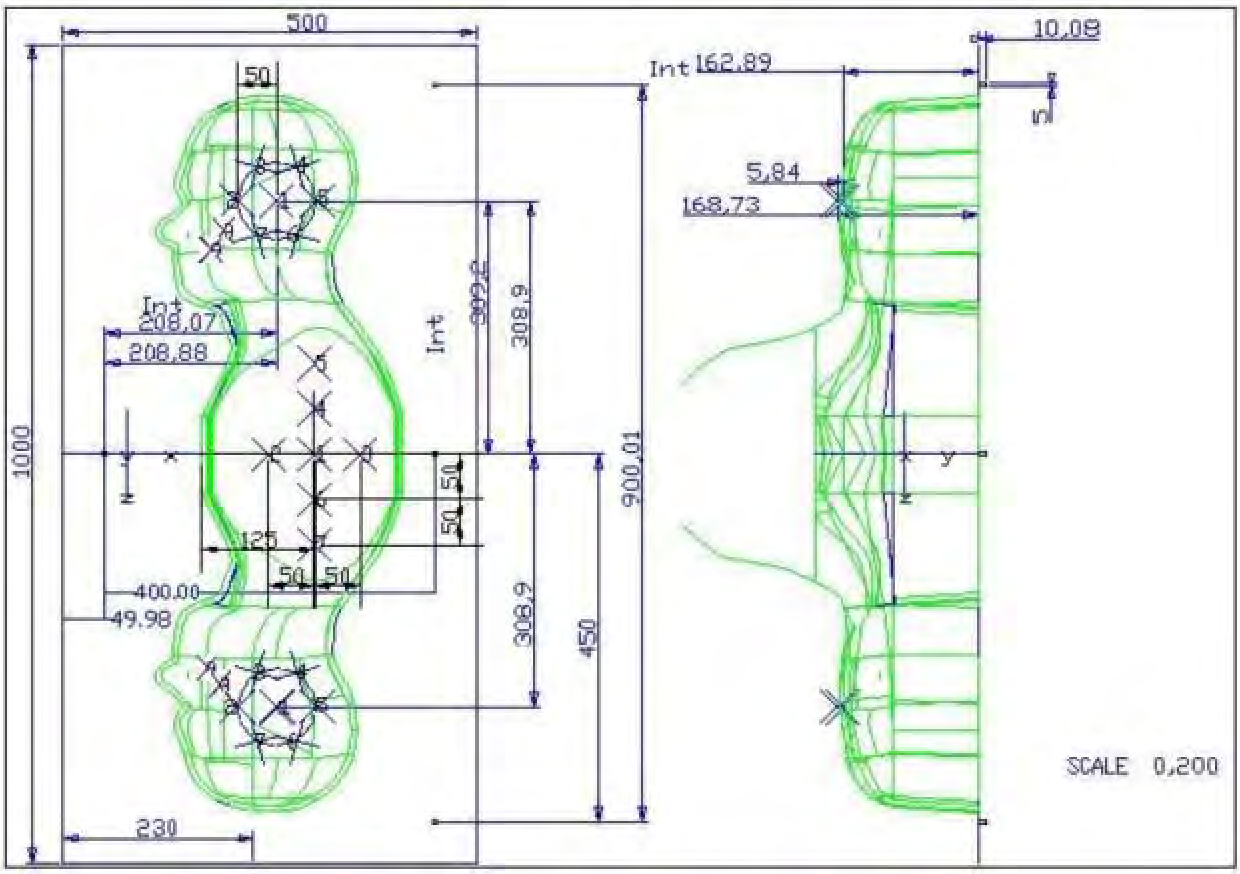
4.2.4 Phantoms

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

Photo of Phantom SN 30/13 SAM103

Photo of Phantom SN 30/13 SAM104

Serial Number	Positionner Material	Permittivity	Loss Tangent
SN 30/13 SAM103	Gelcoat with fiberglass	3.4	0.02
SN 30/13 SAM104	Gelcoat with fiberglass	3.4	0.02



Serial Number	Left Head		Right Head		Flat Part	
SN 30/13 SAM103	2	2.00	2	2.03	1	2.09
	3	2.02	3	2.05	2	2.10
	4	2.04	4	2.04	3	2.09
	5	2.04	5	2.07	4	2.11
	6	2.02	6	2.07	5	2.11
	7	2.01	7	2.09	6	2.09
	8	2.04	8	2.10	7	2.11
	9	2.02	9	2.09	-	-
SN 30/13 SAM104	2	2.05	2	2.06	1	2.03
	3	2.08	3	2.03	2	2.03
	4	2.05	4	2.03	3	2.01
	5	2.06	5	2.02	4	2.03
	6	2.08	6	2.02	5	2.03
	7	2.06	7	2.04	6	2.00
	8	2.07	8	2.04	7	1.98
	9	2.07	9	2.05	-	-

4.2.5 Device Holder

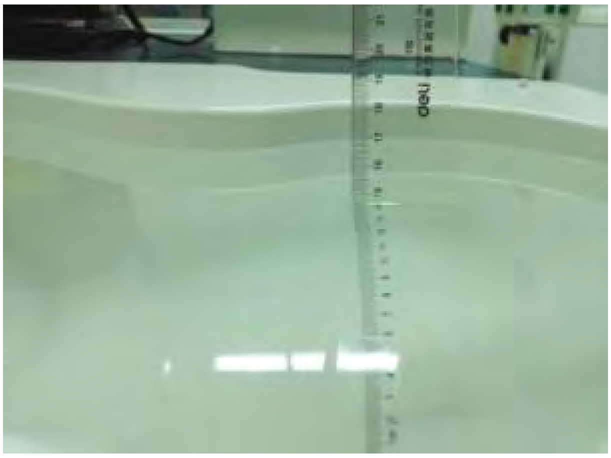
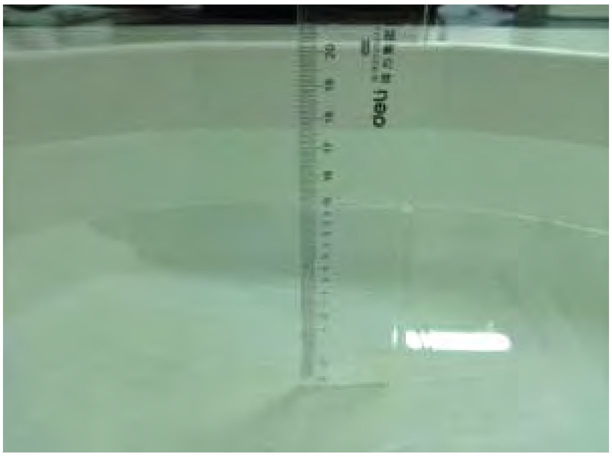
The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

Serial Number	Holder Material	Permittivity	Loss Tangent
SN 25/13 MSH87	Deirin	3.7	0.005
SN 25/13 MSH88	Deirin	3.7	0.005

The positioning system allows obtaining cheek and tilting position with a very good accuracy. Incompliance with CENELEC, the tilt angle uncertainty is lower than 1°.

4.2.6 Simulating Liquid

For SAR measurement of the field distribution inside the phantom, the phantom must be f illed with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear ref erence point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5%.

Head Liquid Depth	Vertical-Frontiquid Depth
	

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water %	Sugar %	Cellulose %	Salt %	Preventol %	DGBE %	Conductivity σ	Permittivity ε
Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.4	40.0
2450	55.0	0	0	0.1	0	44.9	1.80	39.2
2600	54.9	0	0	0.1	0	45.0	1.96	39.0
Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0.1	0	31.3	1.95	52.7
2600	68.2	0	0	0.1	0	31.7	2.16	52.5

5 SYSTEM VERIFICATION

5.1 Antenna Port Test Requirement

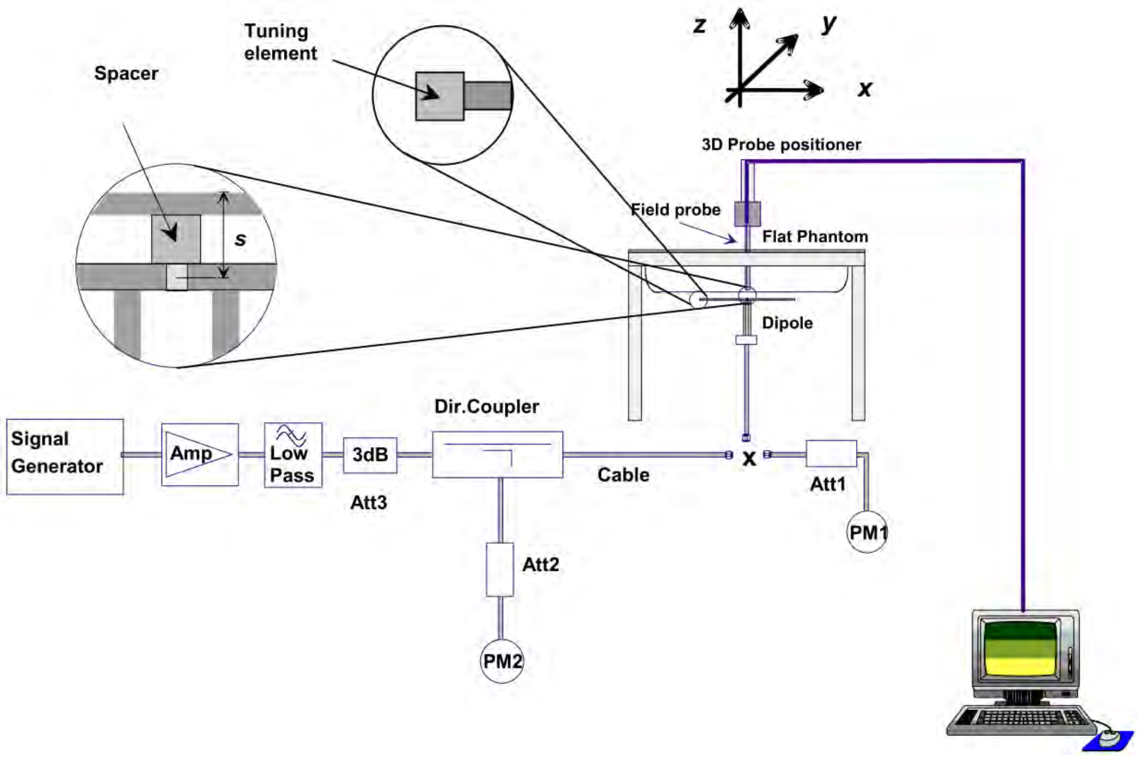
The SATIMO SAR system is equipped with one or more system validation kits. These units together with the predefined measurement procedures within the SATIMO software enable the user to conduct the system performance check and system validation. System validation kit includes a di pole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

5.2 Purpose of System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

5.3 System Check Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



6 EUT TEST POSITION CONFIGURATUONS

According to KDB 648474 D04 Handset v01r01, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

6.1 Head Exposure Conditions

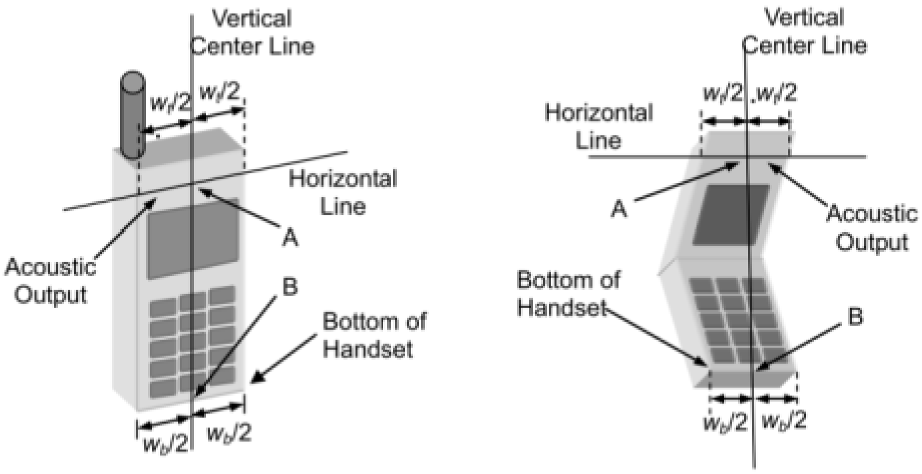
Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2003 using the SAM phantom illustrated as below.

6.1.1 Define two imaginary lines on the handset

(a) The vertical centerline passes through two points on the Horizontal-Up of the handset - the midpoint of the width w t of the handset at the level of the acoustic output, and the midpoint of the width w b of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

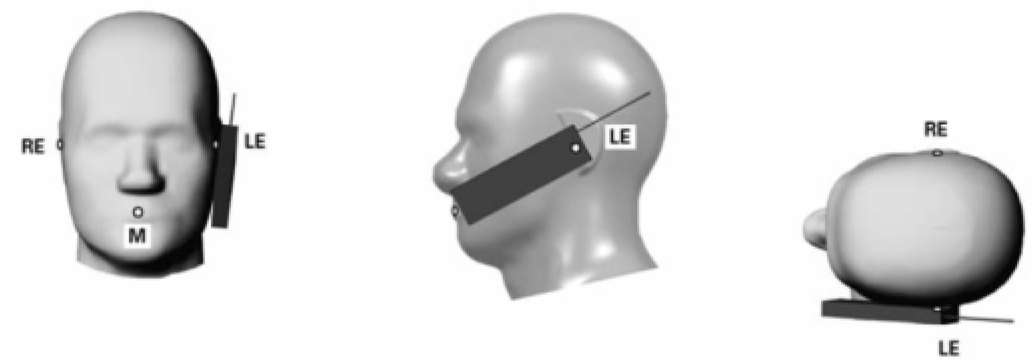
(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



6.1.2 Cheek Position

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

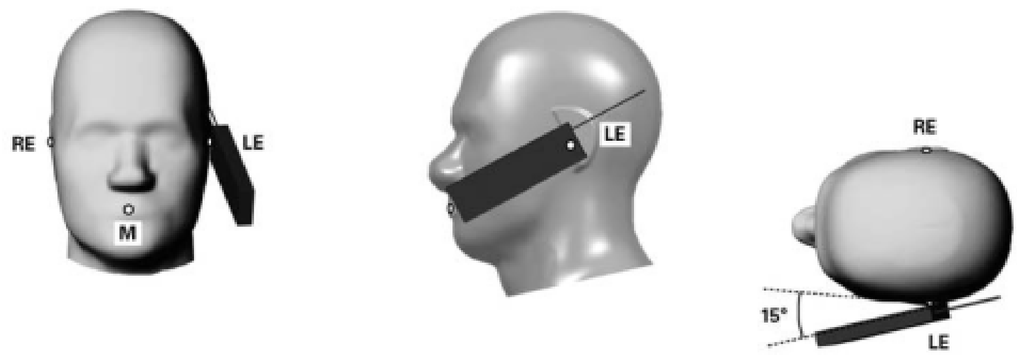
(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the Horizontal-Up is in contact with the cheek of the phantom or until contact with the ear is lost.



6.1.3 Tilted Position

(a) To position the device in the “cheek” position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.

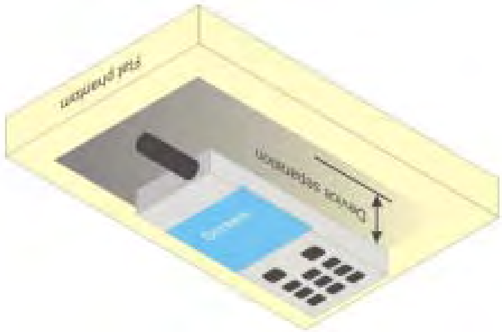


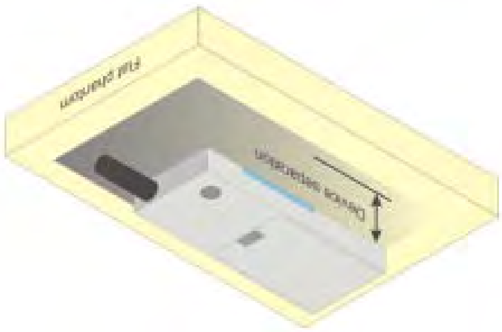
6.2 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when h andsets are c arried in body-worn accessories. The body-worn accessory procedures in KDB 447498 are used to test for body-worn accessory SAR compliance, without a heads et connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when t he body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Body-worn accessories that do not contain metallic or c onductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

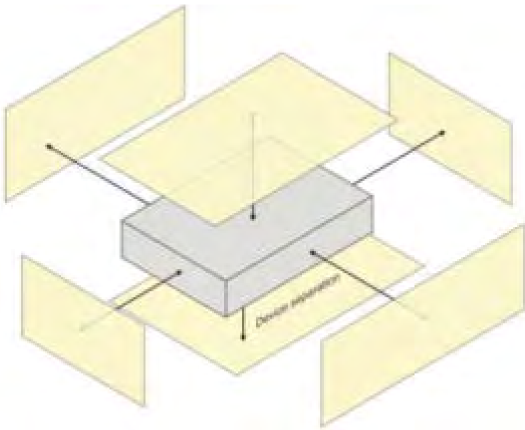
Body-worn accessory SAR compliance is based on a s ingle minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required. A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance <= 5 mm to support compliance.



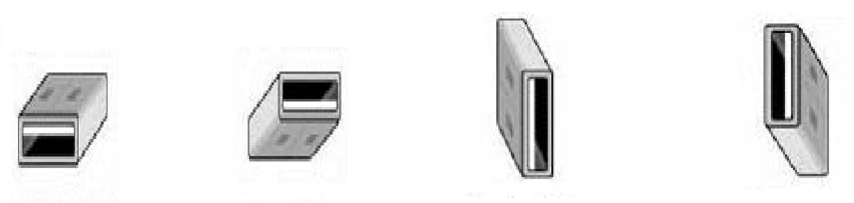


6.3 Hotspot Mode Exposure Position Conditions

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing functions, the relevant hand and body exposure conditions are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge. When the form factor of a handset is smaller than 9 cm x 5 cm, a test separation distance of 5 mm (instead of 10 mm) is required for testing hotspot mode. When the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).



6.4 USB Connector Orientations Implemented on Laptop Computers



Horizontal-Up Horizontal-Down Vertical-Front Vertical-Back

Note: These are USB connector orientations on laptop computers; USB dongles have the reverse configuration for plugging into the corresponding laptop computers.

6.5 Simple Dongle Test Procedures

Test all USB orientations [see figure below: (A) Horizontal-Up, (B) Horizontal-Down, (C) Vertical-Front, and (D) Vertical-Back] with a device-to-phantom separation distance of 5 mm or less, according to KDB 447498 requirements. These test orientations are intended for the exposure conditions found in typical laptop/notebook/netbook or tablet computers with either horizontal or vertical USB connector configurations at various locations in the keyboard section of the computer. Current generation portable host computers should be used to establish the required SAR measurement separation distance. The same test separation distance must be used to test all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of host computers, must be tested using an appropriate host computer. A host computer with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If a suitable host computer is not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a high quality USB cable, 12 inches or less, may be used for testing these other orientations. It must be documented that the USB cable does not influence the radiating characteristics and output power of the transmitter.

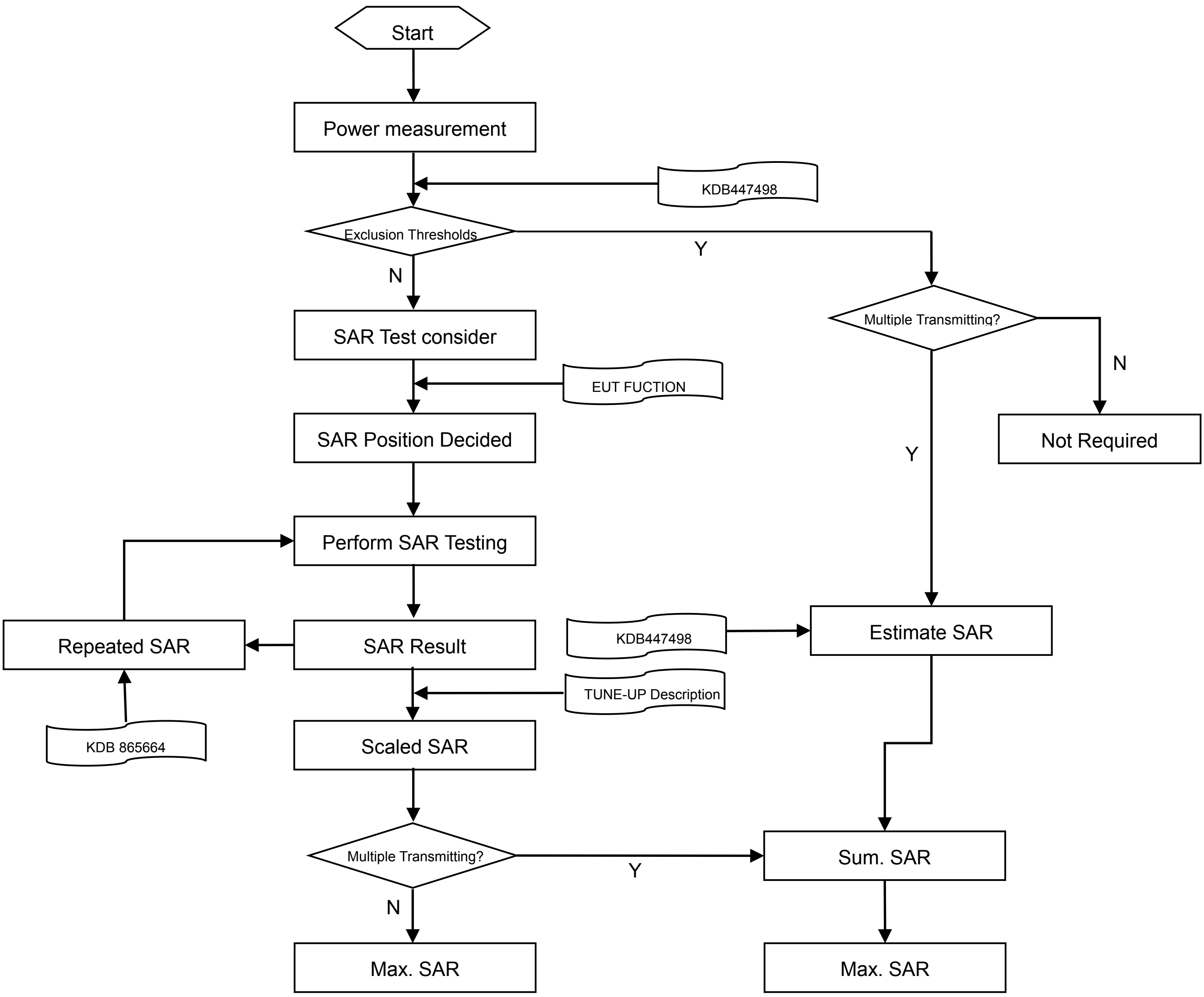
6.6 Dongles with Swivel or Rotating Connectors

A swivel or rotating USB connector may enable the dongle to connect in different orientations to host computers. When the antenna is built-in within the housing of a dongle, a swivel or rotating connector may allow the antenna to assume different positions. The combination of these possible configurations must be considered to determine the SAR test requirements. When the antenna is located near the tip of a dongle, it may operate at closer proximity to users in certain connector orientations where dongle tip testing may be required.

The 5 mm test separation distance used for testing simple dongles has been established based on the overall host platform (laptop/notebook/netbook) and device variations, and varying user operating configurations and exposure conditions expected for a peripheral device. The same test distance should generally apply to dongles with swivel or rotating connectors. The procedures described for simple dongles should be used to position the four surfaces of the dongle at 5 mm from the phantom to evaluate SAR. At least one of the horizontal and one of the vertical positions should be tested using an applicable host computer. If the antenna is within 1 cm from the tip of the dongle (the end without the USB connector), the tip of the dongle should also be tested at 5 mm perpendicular to the phantom. For antennas located within 2.5 cm from the USB connector and if the dongle can be positioned at 45º to 90º from the horizontal position [(A) or (B)], testing in one or more of these configurations may need to be considered. A KDB inquiry should be submitted to determine the applicable test configurations.

7 SAR MEASUREMENT PROCEDURES

7.1 SAR Measurement Process Diagram



7.2 SAR Scan General Requirements

Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std1528-2003.

<table>
<tr><th colspan="3"></th><th>≤3GHz</th><th>>3GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5±1 mm</td><td>½·δ·ln(2)±0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30°±1°</td><td>20°±1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx Area , Δy Area</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3–4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx Zoom , Δy Zoom</td><td>≤ 2 GHz: ≤ 8 mm
2 –3 GHz: ≤ 5 mm*</td><td>3–4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="7">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2" rowspan="3">uniform grid: Δz Zoom (n)</td><td rowspan="3">≤ 5 mm</td><td>3–4 GHz: ≤ 4 mm</td></tr>
<tr><td>4–5 GHz: ≤ 3 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="4">graded grid</td><td rowspan="3">Δz Zoom (1): between 1st two points closest to phantom surface</td><td rowspan="3">≤ 4 mm</td><td>3–4 GHz: ≤ 3 mm</td></tr>
<tr><td>4–5 GHz: ≤ 2.5 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td>Δz Zoom (n>1): between subsequent points</td><td colspan="2">≤ 1.5·Δz Zoom (n-1)</td></tr>
<tr><td rowspan="3">Minimum zoom scan volume</td><td colspan="2" rowspan="3">x, y, z</td><td rowspan="3">≥30 mm</td><td>3–4 GHz: ≥ 28 mm</td></tr>
<tr><td>4–5 GHz: ≥ 25 mm</td></tr>
<tr><td>5–6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note:
1. δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
2. * When zoom scan is required and the reported SAR from the area scan based1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

7.3 SAR Measurement Procedure

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 *32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.
-

7.4 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r03 quoted below.
When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

8 CONDUCTED RF OUPUT POWER

WLAN 2.4G mode:

ANT A:

Mode	**802.11b**			**802.11g**		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Peak Power (dBm)	**12.302**	12.222	12.219	12.115	12.098	**12.206**
Tune-up power tolerance (dBm):	12.00~12.40			11.90~12.30		
Mode	**802.11n (HT-20)**			**802.11n (HT-40)**		
Channel	1	6	11	3	6	9
Frequency (MHz)	2412	2437	2462	2422	2437	2452
Peak Power (dBm)	**8.658**	8.594	8.580	**7.772**	7.748	7.735
Tune-up power tolerance (dBm):	8.30~8.70			7.40~7.80		

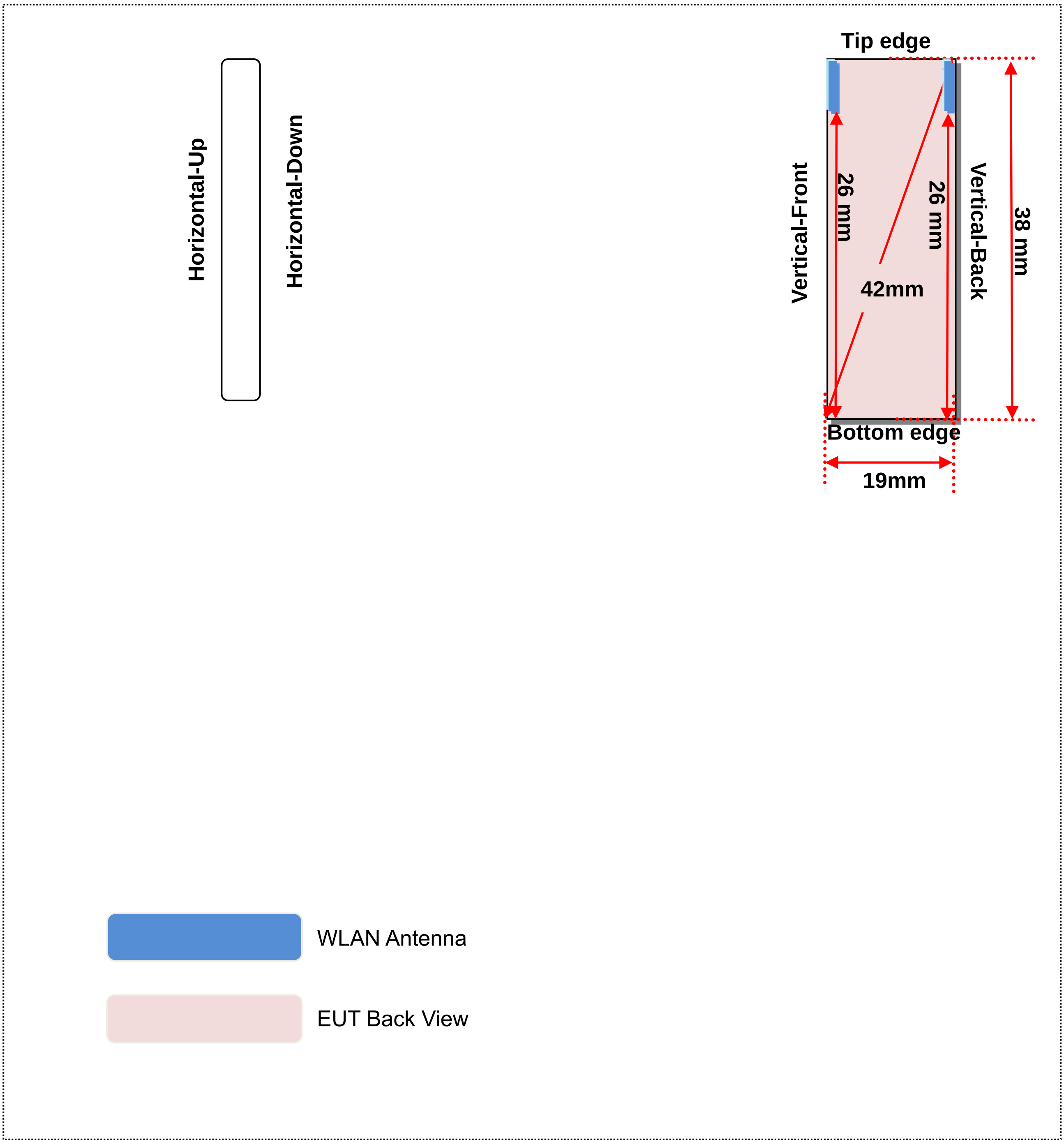
ANT B:

Mode	**802.11b**			**802.11g**		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Peak Power (dBm)	**13.812**	13.691	13.584	**13.412**	13.295	13.037
Tune-up power tolerance (dBm):	13.30~13.90			12.90~13.50		
Mode	**802.11n (HT-20)**			**802.11n (HT-40)**		
Channel	1	6	11	3	6	9
Frequency (MHz)	2412	2437	2462	2422	2437	2452
Peak Power (dBm)	**9.758**	9.733	9.731	8.874	8.864	**8.895**
Tune-up power tolerance (dBm):	9.40~9.80			8.55~8.95		

SUM power of ANT A and ANT B:

Mode	**802.11n(HT-20)**			**802.11n(HT-40)**		
Channel	1	6	11	3	6	9
Frequency (MHz)	2412	2437	2462	2422	2437	2452
Peak Power (dBm)	**12.253**	12.211	12.204	**11.368**	11.352	11.364
Tune-up power tolerance(dBm):	11.90~12.30			11.00~11.40		

9 EUT ANTENNA LOCATION SKETCH



9.1 SAR Test Exclusion Consider Table

According with FCC KDB 447498 D01v05r02, Appendix A, <SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm> Table, this Device SAR test configurations consider as following :

Band	Mode	Max. Peak Power		Test Position Configurations					
		dBm	mW	Head	Horizontal-Up/ Horizontal-Down	Vertical-front	Vertical-Back	Tip Edge	Bottom Edge
WLAN 2.4 G	Distance to User			<5mm	<5mm	<5mm	<5mm	<5mm	27mm
	802.11b ANTA	12.302	16.99	No	Yes	Yes	Yes	Yes	No
	802.11b ANTB	13.812	24.05	No	Yes	Yes	Yes	Yes	No
	802.11g ANTA	12.206	16.62	No	Yes	Yes	Yes	Yes	No
	802.11g ANTB	13.412	21.94	No	Yes	Yes	Yes	Yes	No
	802.11n(HT20) ANT A	8.658	7.34	No	Yes	Yes	Yes	Yes	No
	802.11n(HT20) ANT B	9.758	9.46	No	Yes	Yes	Yes	Yes	No
	802.11n(HT40) ANT A	7.772	5.99	No	Yes	Yes	Yes	Yes	No
	802.11n(HT40) ANT B	8.895	7.75	No	Yes	Yes	Yes	Yes	No
	802.11n(HT20) MIMO	12.253	16.80	No	Yes	Yes	Yes	Yes	No
	802.11n(HT40) MIMO	11.368	13.70	No	Yes	Yes	Yes	Yes	No

10 TEST RESULTS

10.1 Body SAR (5mm separation)

Band	Mode	Position	Ch.	Freq. (MHz)	Power Drift	Meas. SAR (W/Kg)	Meas. Power (dBm)	Max. tune-up Power(dBm)	Scaling Factor	Scaled SAR(W/Kg)	Meas. No.
802.11b ANT A	DATA	Horizontal-Down	1	2412	-4.55	0.115	12.302	12.40	1.02	0.118	1#
		Horizontal-Up	1	2412	-3.33	**0.145**	12.302	12.40	1.02	**0.148**	2#
		Vertical-Front	1	2412	3.52	0.076	12.302	12.40	1.02	0.078	3#
		Vertical-Back	1	2412	-1.15	0.050	12.302	12.40	1.02	0.051	4#
		Tip edge	1	2412	3.07	0.049	12.302	12.40	1.02	0.050	5#
802.11b ANT B	DATA	Horizontal-Down	1	2412	-4.29	**0.210**	13.812	13.90	1.020	**0.214**	6#
		Horizontal-Up	1	2412	-3.48	0.174	13.812	13.90	1.020	0.178	7#
		Vertical-Front	1	2412	3.97	0.175	13.812	13.90	1.020	0.179	8#
		Vertical-Back	1	2412	3.28	0.097	13.812	13.90	1.020	0.099	9#
		Tip edge	1	2412	-4.71	0.080	13.812	13.90	1.020	0.082	10#
802.11g ANT A	DATA	Horizontal-Down	11	2462	-3.97	**0.228**	12.206	12.30	1.020	**0.233**	11#
		Horizontal-Up	11	2462	3.96	0.223	12.206	12.30	1.020	0.227	12#
		Vertical-Front	11	2462	-2.26	0.244	12.206	12.30	1.020	0.249	13#
		Vertical-Back	11	2462	-3.71	0.047	12.206	12.30	1.020	0.048	14#
		Tip edge	11	2462	-3.88	0.150	12.206	12.30	1.020	0.153	15#
802.11g ANT B	DATA	Horizontal-Down	1	2412	-3.54	0.126	13.412	13.50	1.020	0.129	16#
		Horizontal-Up	1	2412	-4.47	**0.186**	13.412	13.50	1.020	**0.190**	17#
		Vertical-Front	1	2412	-3.70	0.044	13.412	13.50	1.020	0.045	18#
		Vertical-Back	1	2412	-3.08	0.067	13.412	13.50	1.020	0.068	19#
		Tip edge	1	2412	-3.54	0.093	13.412	13.50	1.020	0.095	20#
802.11n HT-20 ANT A	DATA	Horizontal-Down	1	2412	-2.79	**0.184**	8.658	8.70	1.010	**0.186**	21#
		Horizontal-Up	1	2412	-4.19	0.093	8.658	8.70	1.010	0.094	22#
		Vertical-Front	1	2412	-3.88	0.097	8.658	8.70	1.010	0.098	23#
		Vertical-Back	1	2412	4.17	0.073	8.658	8.70	1.010	0.074	24#
		Tip edge	1	2412	-2.58	0.080	8.658	8.70	1.010	0.081	25#
802.11n HT-20 ANT B	DATA	Horizontal-Down	1	2412	-4.56	**0.204**	9.758	9.80	1.010	**0.206**	26#
		Horizontal-Up	1	2412	-1.35	0.129	9.758	9.80	1.010	0.130	27#
		Vertical-Front	1	2412	-2.43	0.157	9.758	9.80	1.010	0.159	28#
		Vertical-Back	1	2412	3.21	0.108	9.758	9.80	1.010	0.109	29#
		Tip edge	1	2412	-4.36	0.115	9.758	9.80	1.010	0.116	30#
802.11n HT-40 ANT A	DATA	Horizontal-Down	3	2422	4.90	**0.242**	7.772	7.80	1.010	**0.244**	31#
		Horizontal-Up	3	2422	3.58	0.171	7.772	7.80	1.010	0.172	32#
		Vertical-Front	3	2422	-1.11	0.073	7.772	7.80	1.010	0.073	33#
		Vertical-Back	3	2422	-4.01	0.133	7.772	7.80	1.010	0.134	34#
		Tip edge	3	2422	-2.08	0.137	7.772	7.80	1.010	0.138	35#

Band	Mode	Position	Ch.	Freq. (MHz)	Power Drift	Meas. SAR (W/Kg)	Meas. Power (dBm)	Max. tune-up Power(dBm)	Scaling Factor	Scaled SAR(W/Kg)	Meas. No.
802.11n HT-40 ANT B	DATA	Horizontal-Down	9	2452	0.80	0.144	8.895	8.95	1.013	0.146	36#
		Horizontal-Up	9	2452	-1.62	0.317	8.895	8.95	1.013	0.321	37#
		Vertical-Front	9	2452	-0.65	**0.338**	8.895	8.95	1.013	**0.342**	38#
		Vertical-Back	9	2452	-2.03	0.243	8.895	8.95	1.013	0.246	39#
		Tip edge	9	2452	-3.77	0.218	8.895	8.95	1.013	0.221	40#
802.11n HT20 MIMO	DATA	Horizontal-Down	1	2412	-3.53	**0.207**	12.253	12.30	1.011	**0.209**	41#
		Horizontal-Up	1	2412	3.21	0.193	12.253	12.30	1.011	0.195	42#
		Vertical-Front	1	2412	-2.01	0.144	12.253	12.30	1.011	0.146	43#
		Vertical-Back	1	2412	-1.89	0.109	12.253	12.30	1.011	0.110	44#
		Tip edge	1	2412	4.25	0.086	12.253	12.30	1.011	0.087	45#
802.11n HT40 MIMO	DATA	Horizontal-Down	3	2422	-2.65	0.220	11.368	11.40	1.007	0.222	46#
		Horizontal-Up	3	2422	-4.27	**0.228**	11.368	11.40	1.007	**0.230**	47#
		Vertical-Front	3	2422	-1.41	0.059	11.368	11.40	1.007	0.059	48#
		Vertical-Back	3	2422	2.70	0.072	11.368	11.40	1.007	0.073	49#
		Tip edge	3	2422	-1.95	0.026	11.368	11.40	1.007	0.026	50#

10.2 SAR Measurement Variability

According to KDB 865664 D01v01r03, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is >= 0.80 W/kg, repeat that measurement once.
3. If the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20, or when the original or repeated measurement is >= 1.45 W/kg, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20, and the original, first or second repeated measurement is >= 1.5 W/kg, perform a third repeated measurement.

SAR Repeated Measurement

Note: The highest measured SAR is 0.342 W/kg, which is less than 0.80 W/kg, repeated measurement is not required.

11 TEST EQUIPMENTS LIST

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
PC	Dell	N/A	N/A	N/A	N/A
2450MHz Dipole	SATIMO	SID 2450	S/N 25/13 DIP 2G450-251	2015/03/16	2016/03/15
E-Field Probe	SATIMO	SSE1	SN 27/13 EP187	2014/08/17	2015/08/16
Antenna	SATIMO	ANTA3	SN 17/13 ZNTA45	N/A	N/A
Phantom1	SATIMO	SAM	SN 30/13 SAM013	N/A	N/A
Phantom2	SATIMO	SAM	SN 30/13 SAM014	N/A	N/A
Dielectric Probe Kit	SATIMO	SCLMP	SN 25/13 OCPG56	2014/08/17	2015/08/16
MultiMeter	Keithley	MultiMeter 2000	4024022	2014/12/13	2015/12/12
Signal Generator	R&S	SMF100A	1167.0000k02/104260	2015/07/07	2016/07/06
Power Meter 1	Agilent	5738A	11290	2014/10/18	2015/10/17
Power Meter 2	Agilent	E4419B	GB40201833	2014/11/03	2015/11/02
Power Sensor	R&S	NRP-Z21	103971	2014/11/03	2015/11/02
Power Amplifier	SATIMO	6552B	22374	N/A	N/A
Network Analyzer	Agilent	5071C	EMY46103472	2014/11/03	2015/11/02
Attenuator	COM-MW	ZA-S1-31	1305003187	N/A	N/A
Directional coupler	AA-MCS	AAMCS-UDC	000272	N/A	N/A
Laptop 1	Lenovo	Thinkpad X200	N/A	N/A	N/A
Laptop 2	Lenovo	Thinkpad T500	N/A	N/A	N/A
USB cable	N/A	N/A	N/A	N/A	N/A

12 REFERENCES

1 FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

2 ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

3 IEEE Std. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, June 2013

4 FCC KDB 248227 D01 v02r01, “SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters”, June 2015

5 FCC KDB 447498 D01 v05r02, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, May 2013

6 FCC KDB 447498 D02 v02, “SAR Measurement Procedures for USB Dongle Transmitters”

7 FCC KDB 648474 D04 v01r02, “SAR Evaluation Considerations for Wireless Handsets”, May 2013

8 FCC KDB 616217 D04 v01r01, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, May 2013

9 FCC KDB 865664 D01 v01r03, "SAR Measurement Requirements for 100 MHz to 6 GHz", May 2013.

10 FCC KDB 865664 D02 v01r01, “RF Exposure Compliance Reporting and Documentation Considerations”, May 2013

11 SATIMO COMOSAR_V4

12 SATIMO OPENSAR_V4

ANNEX A SIMULATING LIQUID VERIFICATION RESULT

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an SATIMO SCLMP Dielectric Probe Kit and a Network Analyzer.

Date	Liquid Type	Freq. (MHz)	Temp. (℃)	Meas. Conductivity (σ)	Meas. Permittivity (ε)	Target conductivity (σ)	Target Permittivity (ε)	Conductivity tolerance (%)	Permittivity tolerance (%)
2015.06.16	Body	2450	22.1	2.01	53.56	1.95	52.70	3.08	1.63
2015.06.27	Body	2450	22.1	1.98	53.40	1.95	52.70	1.54	1.33
Note: The tolerance limit of Conductivity and Permittivity is ± 5%.									

ANNEX B SYSTEM CHECK RESULT

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %(for 1 g).

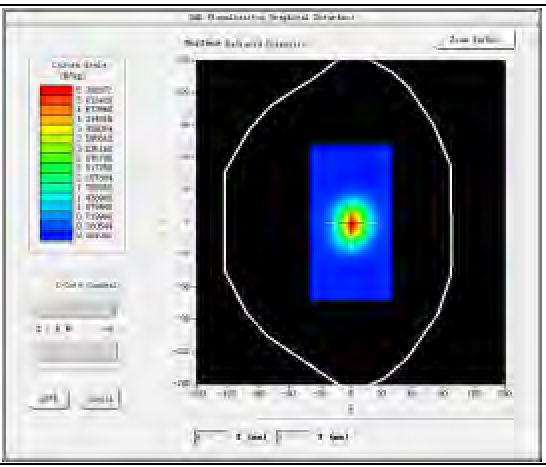
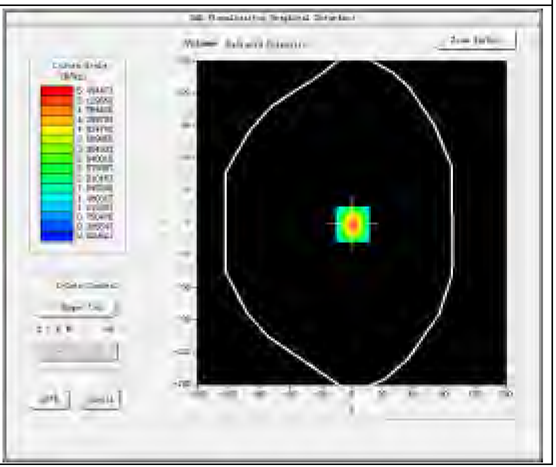
Date	Liquid Type	Freq. (MHz)	Power (mW)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Dipole SAR (W/kg)	Tolerance (%)	Targeted SAR(W/kg)	Tolerance (%)
2015.06.16	Body	2450	100	5.563	55.63	54.70	1.70	52.40	6.16
2015.06.27	Body	2450	100	5.580	55.80	54.70	2.01	52.40	6.49
Note: The tolerance limit of System validation ±10%.									

System Performance Check Data(2450MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2015.06.16
Measurement duration: 14 minutes 46 seconds

Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	-
Band	2450MHz
Channels	-
Signal	CW
Frequency (MHz)	2450.000000
Relative permittivity (real part)	53.560000
Relative permittivity	11.982563
Conductivity (S/m)	2.013568
Power drift (%)	0.370000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.1°C
ConvF:	4.42
Crest factor:	1:1

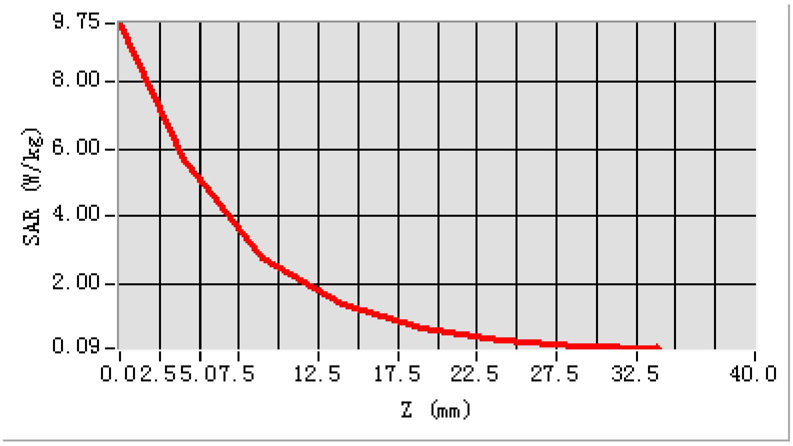
SURFACE SAR	VOLUME SAR
	

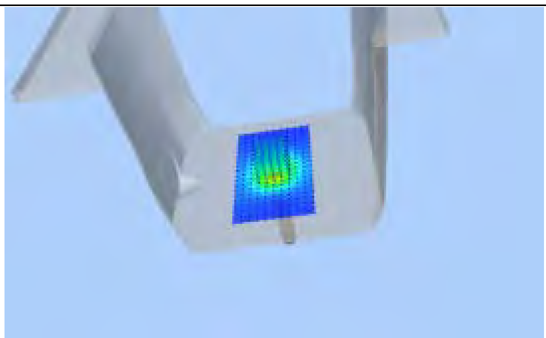
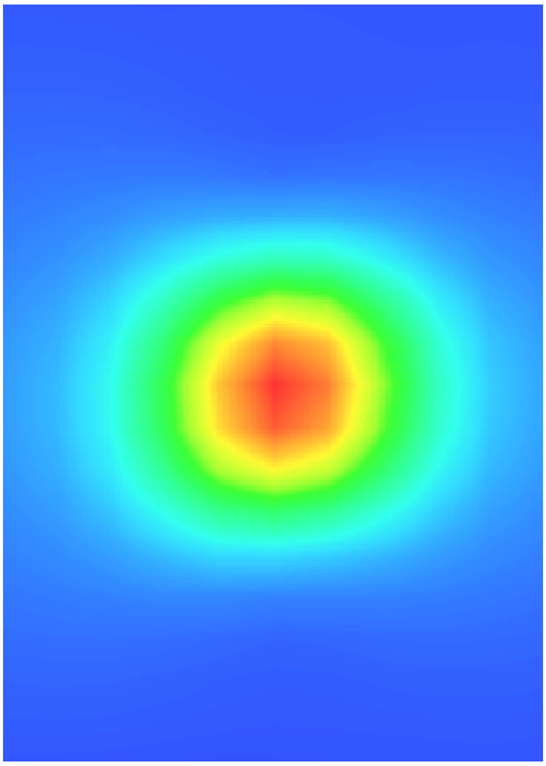
Maximum location: X=1.00, Y=-1.00

SAR Peak: 9.72 W/kg

SAR 10g (W/Kg)	2.302133
SAR 1g (W/Kg)	5.562953

Z Axis Scan



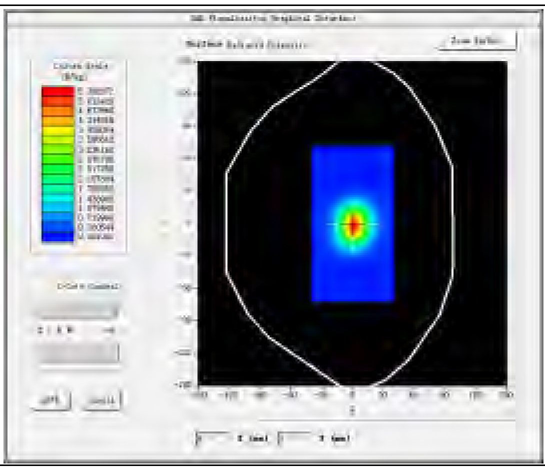
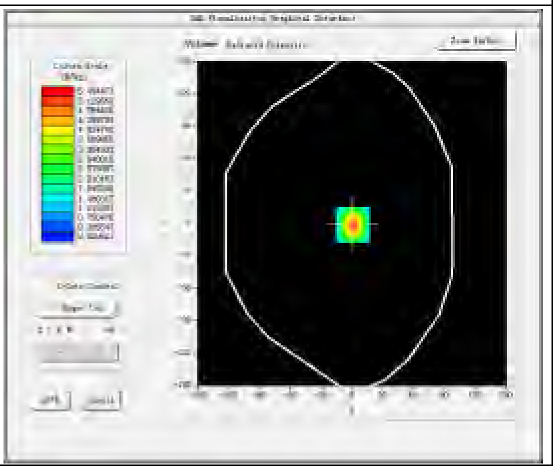
3D screen shot	Hot spot position
	

System Performance Check Data(2450MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2015.06.27
Measurement duration: 14 minutes 46 seconds

Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	-
Band	2450MHz
Channels	-
Signal	CW
Frequency (MHz)	2450.000000
Relative permittivity (real part)	53.400000
Relative permittivity	11.982563
Conductivity (S/m)	1.9753568
Power drift (%)	0.370000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.1°C
ConvF:	4.42
Crest factor:	1:1

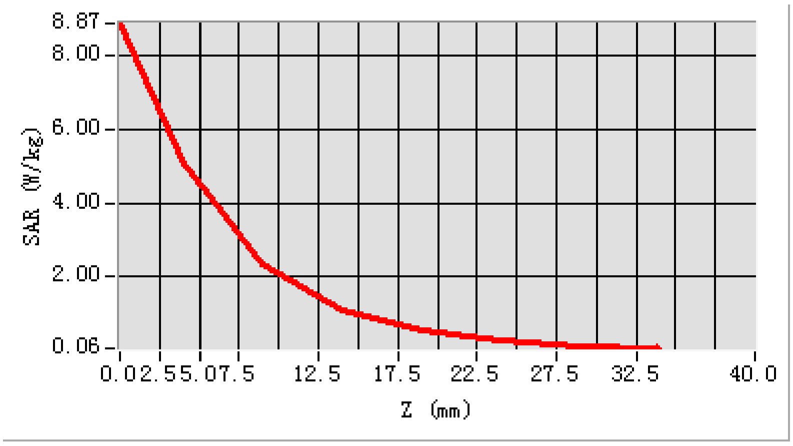
SURFACE SAR	VOLUME SAR
	

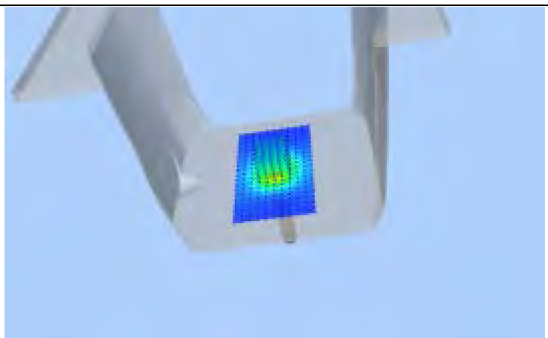
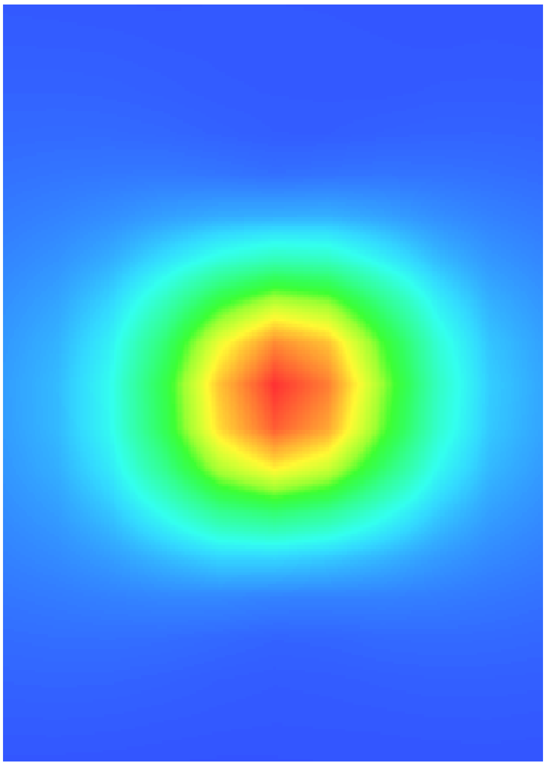
Maximum location: X=1.00, Y=-1.00

SAR Peak: 9.72 W/kg

SAR 10g (W/Kg)	2.402133
SAR 1g (W/Kg)	5.579953

Z Axis Scan



3D screen shot	Hot spot position
	

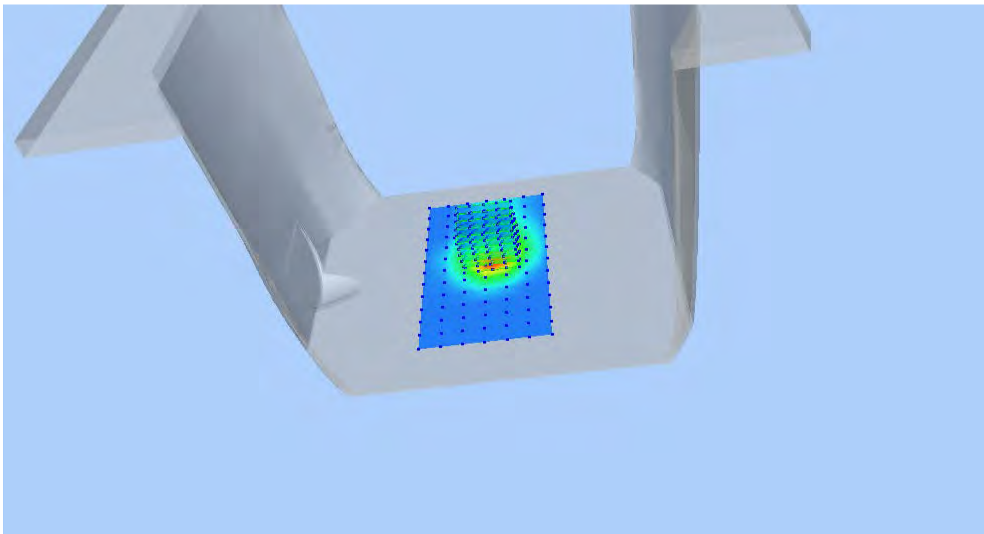
ANNEX C TEST DATA

MEAS. 1 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11b

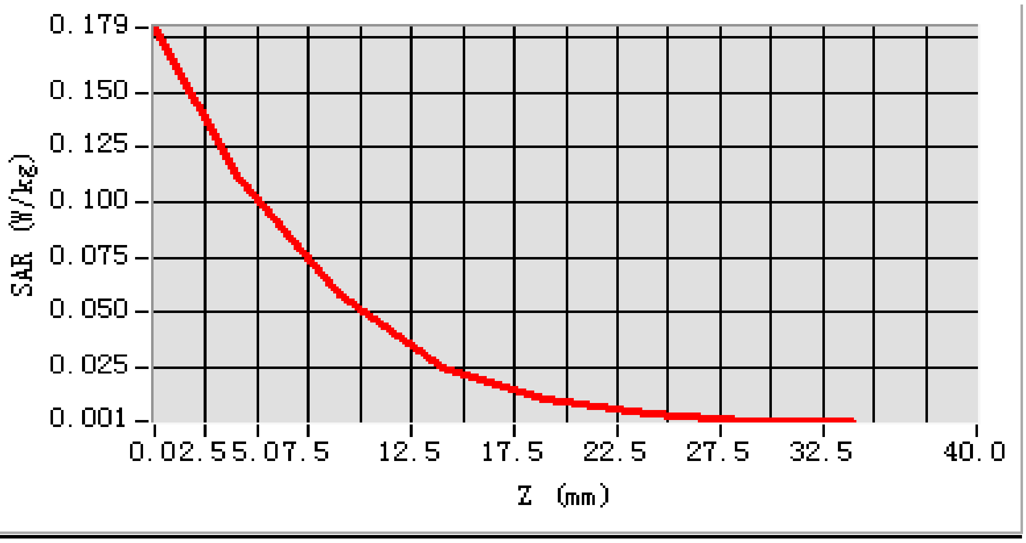
ANT A mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=-22.000000
SAR 10g (W/Kg):	0.050906
SAR 1g (W/Kg):	0.115
Power drift (%):	-4.55

3D screen shot



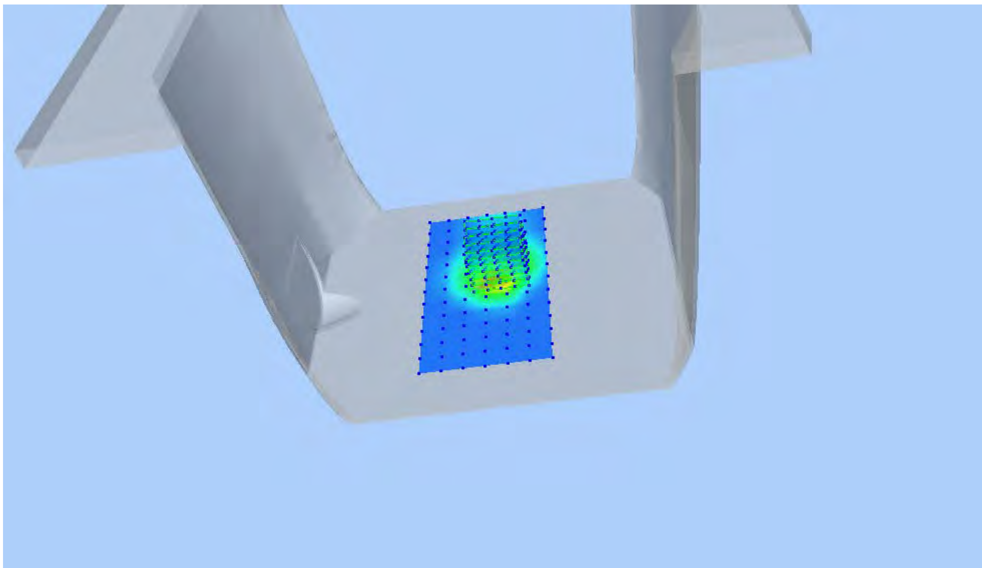
Z Axis Scan



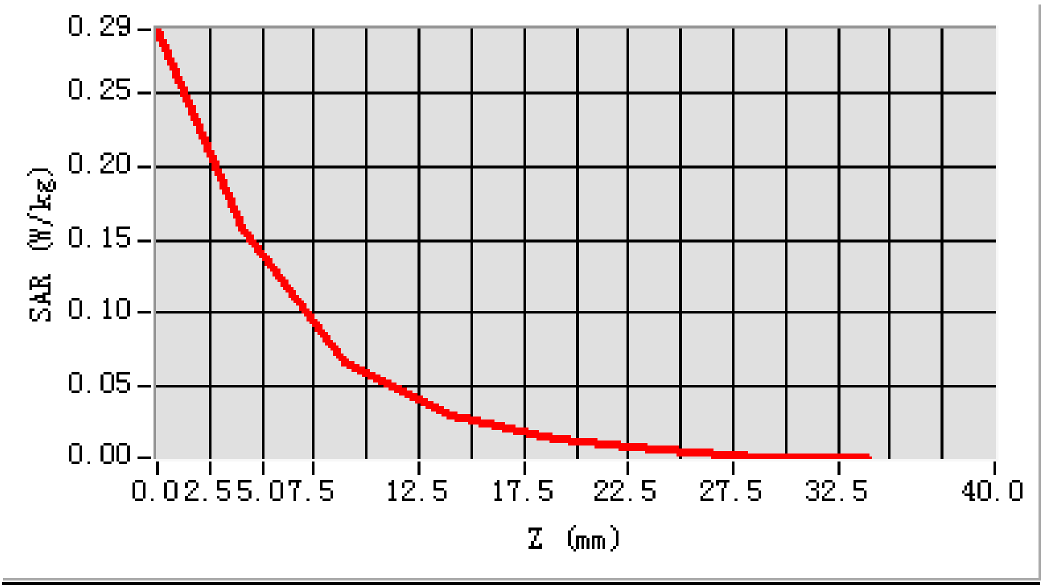
MEAS. 2 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11b ANT

A mode

Test Date: 16/6/2015
Signal: WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters: Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition: Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe: EP187, ConvF: 4.42
Area Scan: sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan: 5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location: X=-4.000000, Y=-16.000000
SAR 10g (W/Kg): 0.0602393
SAR 1g (W/Kg): 0.144797
Power drift (%): -3.33
3D screen shot



Z Axis Scan

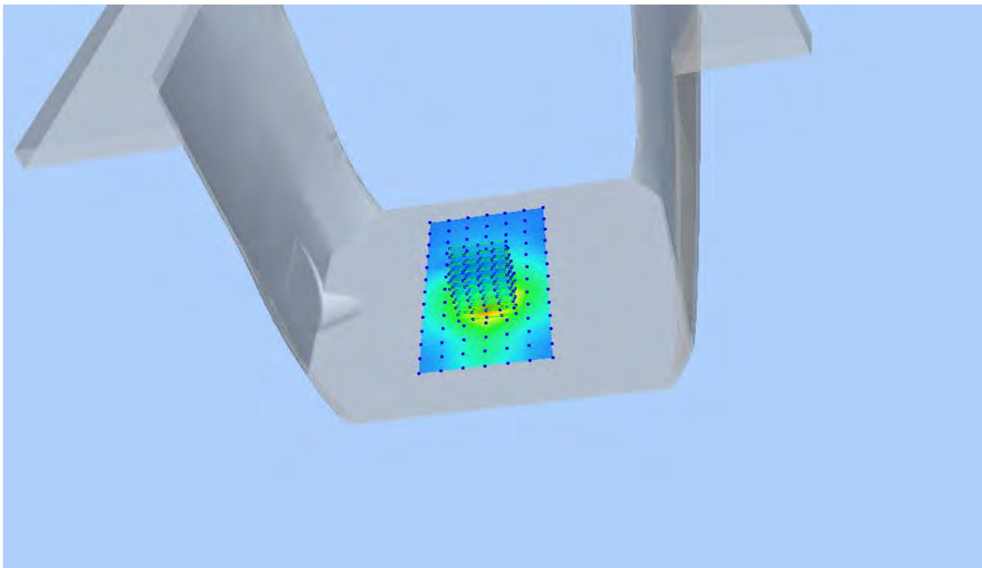


MEAS. 3 Body Plane with Vertical-Front on Low Channel in IEEE 802.11b ANT

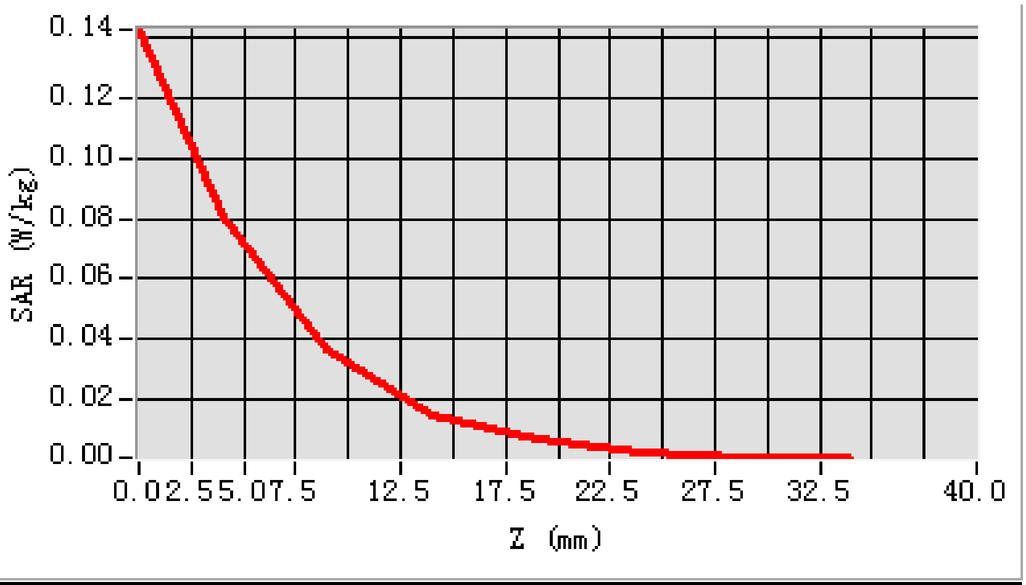
A mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-8.000000, Y=-32.000000
SAR 10g (W/Kg):	0.034140
SAR 1g (W/Kg):	0.076182
Power drift (%):	3.52

3D screen shot



Z Axis Scan

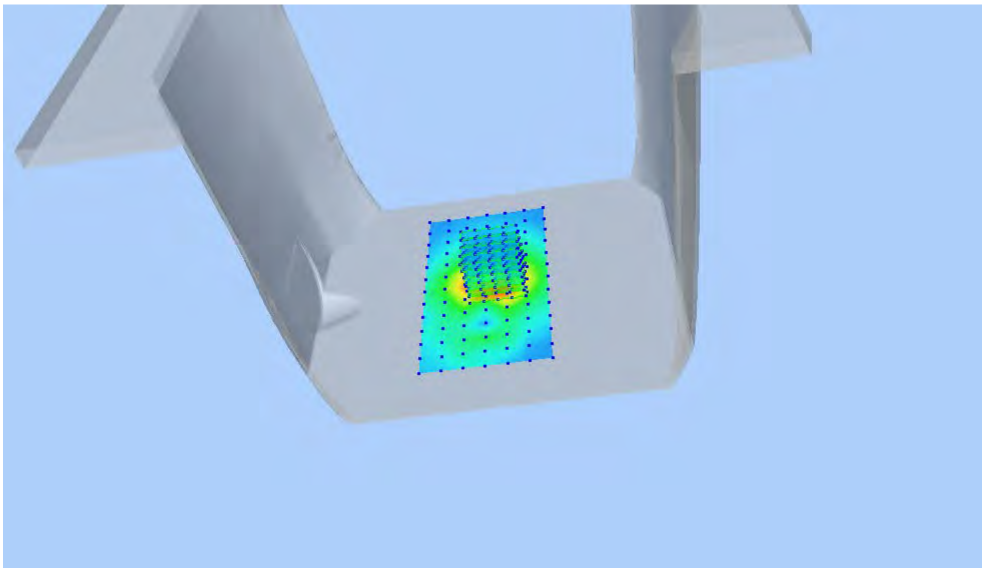


MEAS. 4 Body Plane with Vertical-Back on Low Channel in IEEE 802.11b ANT

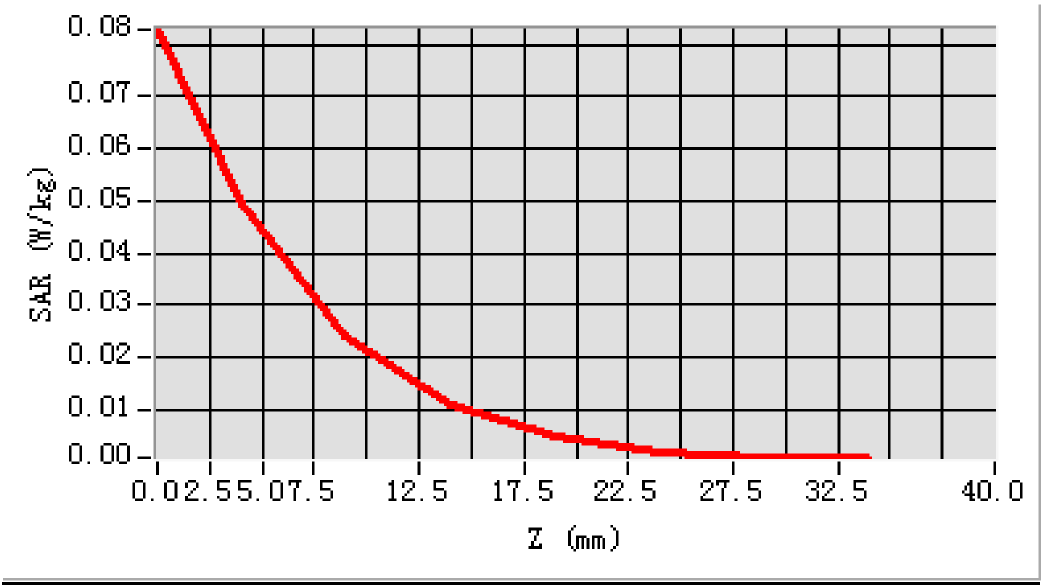
A mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=16.000000, Y=4.000000
SAR 10g (W/Kg):	0.023247
SAR 1g (W/Kg):	0.050089
Power drift (%):	-1.15

3D screen shot



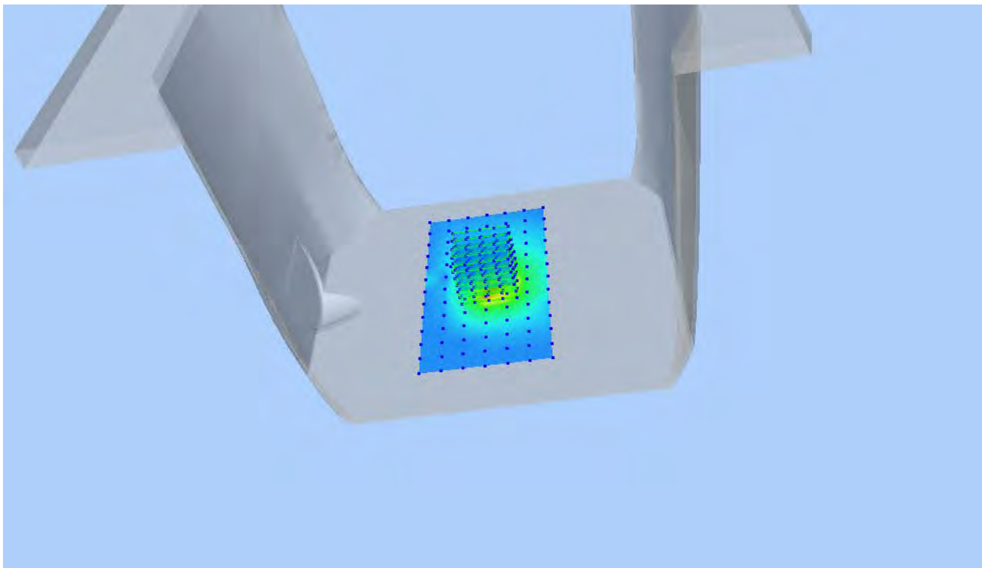
Z Axis Scan



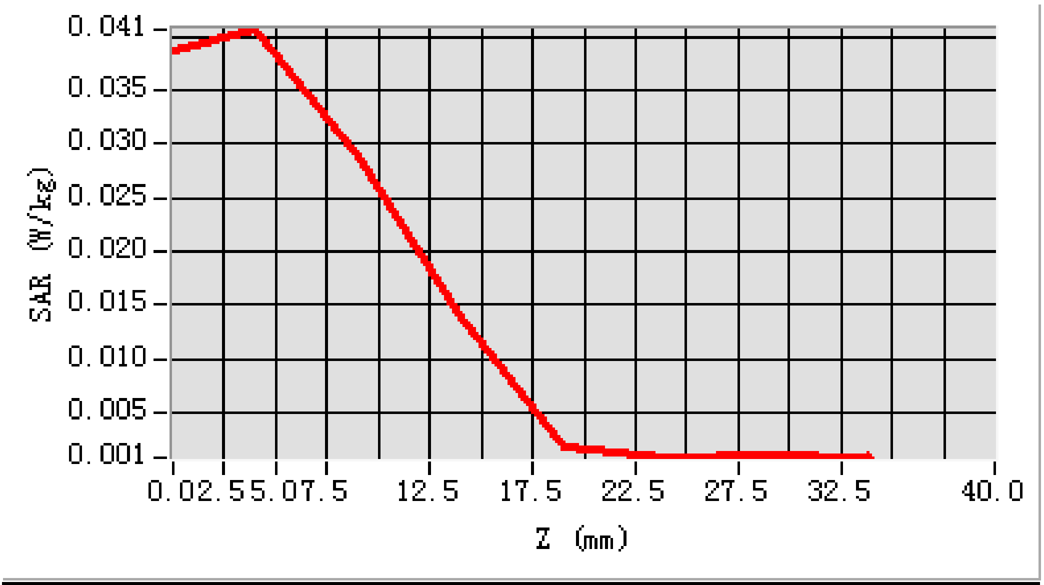
MEAS. 5 Body Plane with Tip Edge on Low Channel in IEEE 802.11b ANT A mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-16.000000, Y=-8.000000
SAR 10g (W/Kg):	0.020002
SAR 1g (W/Kg):	0.048500
Power drift (%):	3.07

3D screen shot



Z Axis Scan

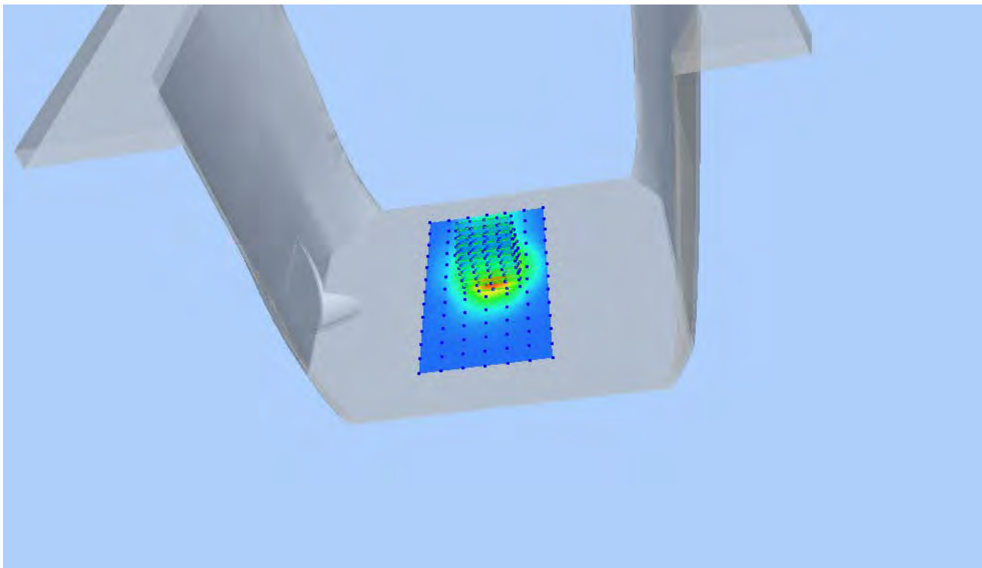


MEAS. 6 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11b

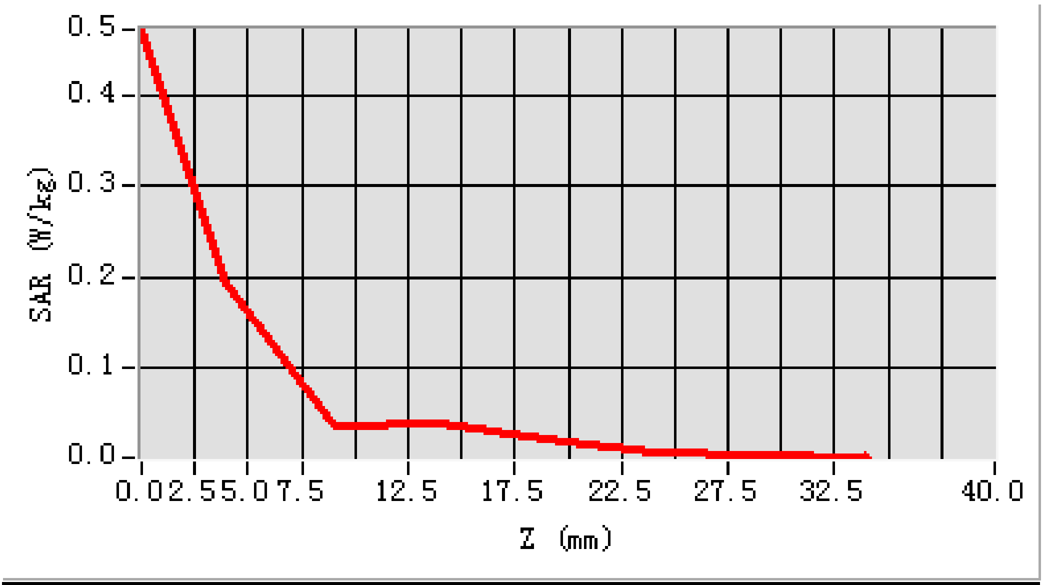
ANT B mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=8.000000, Y=-16.000000
SAR 10g (W/Kg):	0.083034
SAR 1g (W/Kg):	0.209739
Power drift (%):	-4.29

3D screen shot



Z Axis Scan

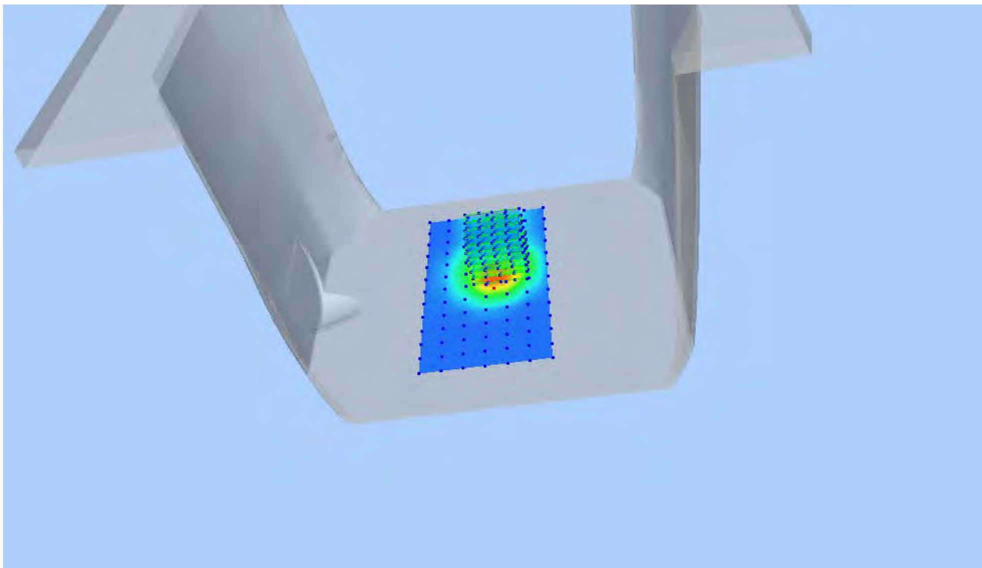


MEAS. 7 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11b ANT

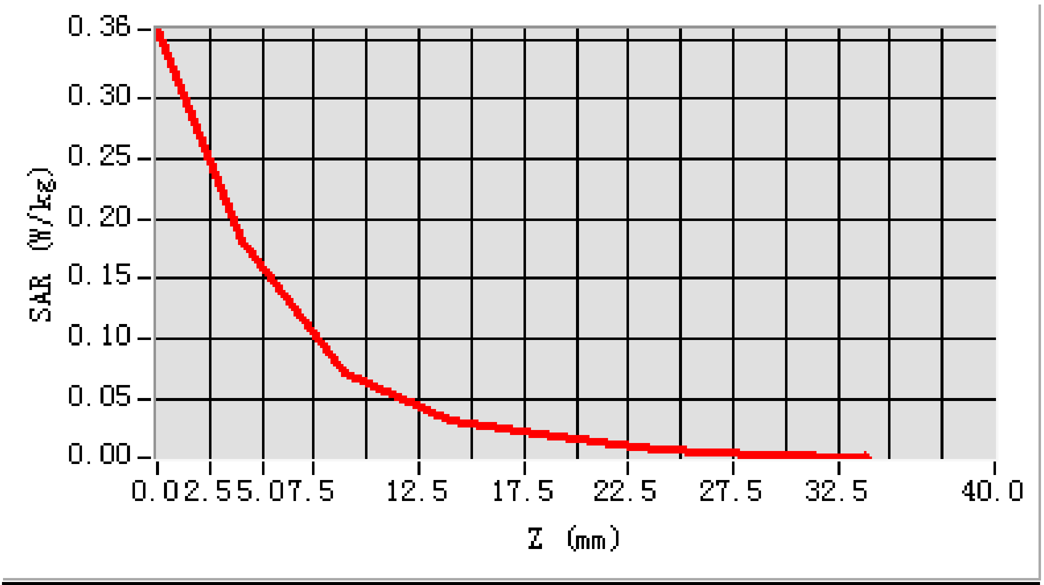
B mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=8.000000
SAR 10g (W/Kg):	0.071827
SAR 1g (W/Kg):	0.173967
Power drift (%):	-3.48

3D screen shot



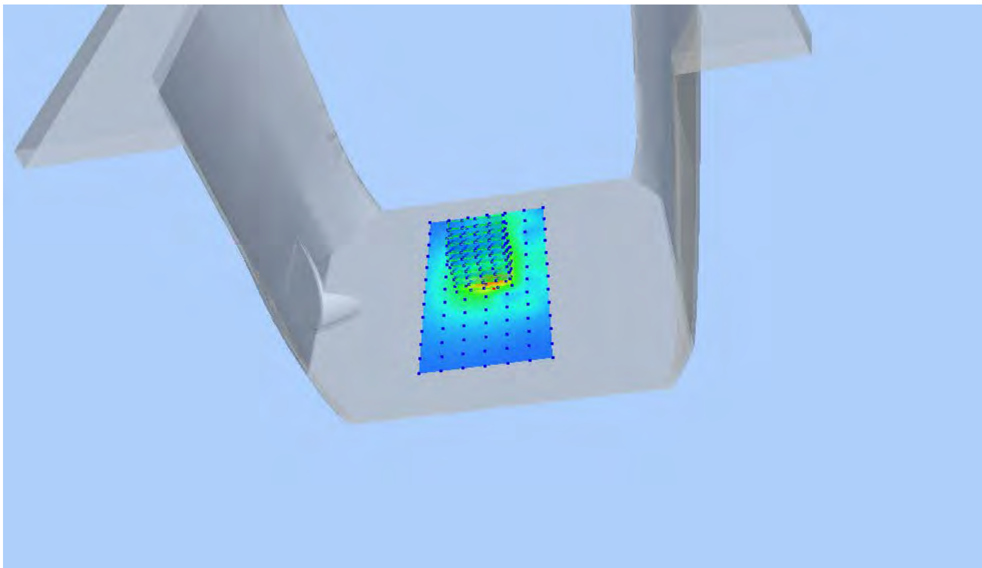
Z Axis Scan



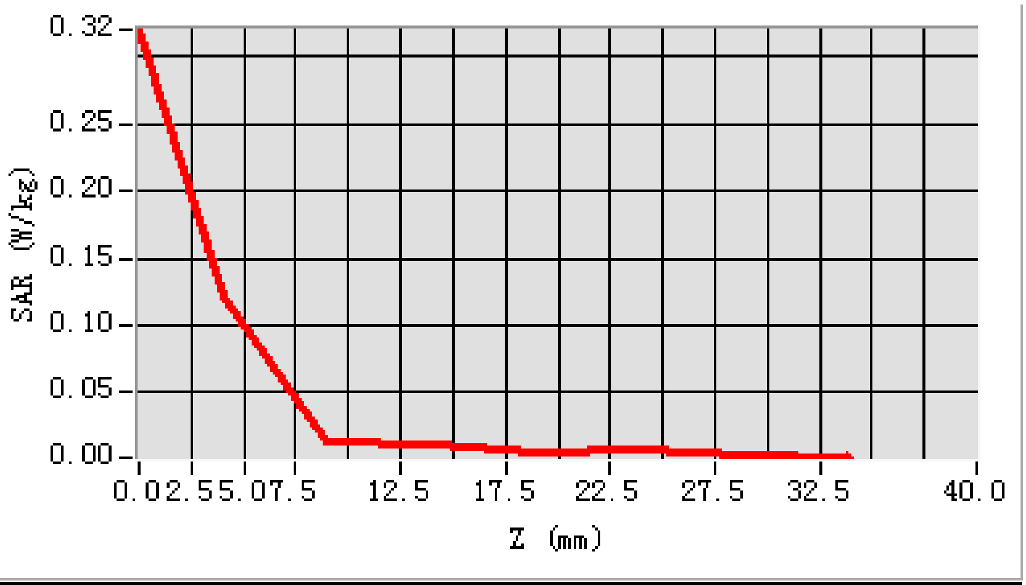
MEAS. 8 Body Plane with Vertical-Front on Low Channel in IEEE 802.11b ANT B mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-16.000000, Y=4.000000
SAR 10g (W/Kg):	0.064163
SAR 1g (W/Kg):	0.174868
Power drift (%):	3.97

3D screen shot



Z Axis Scan

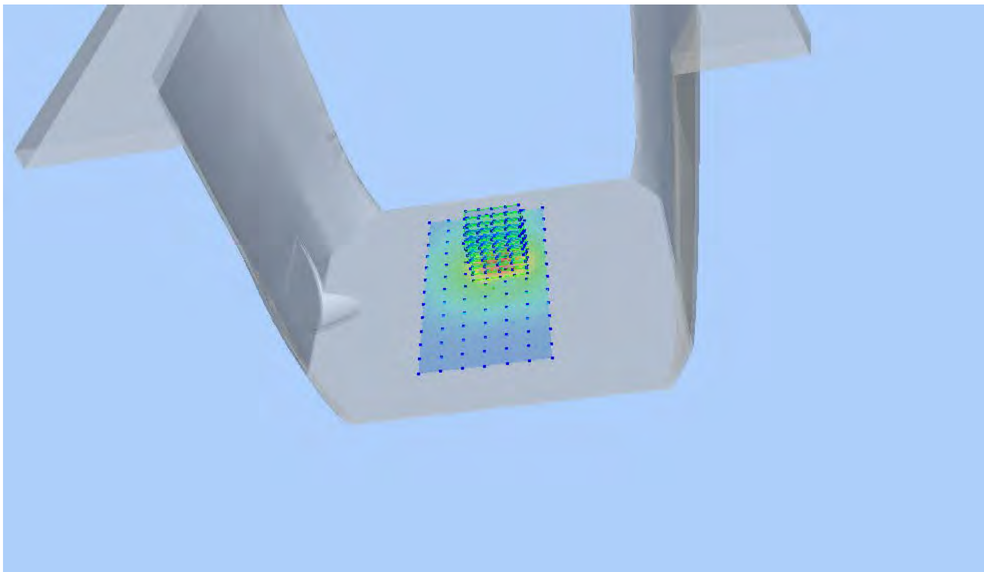


MEAS. 9 Body Plane with Vertical-Back on Low Channel in IEEE 802.11b ANT

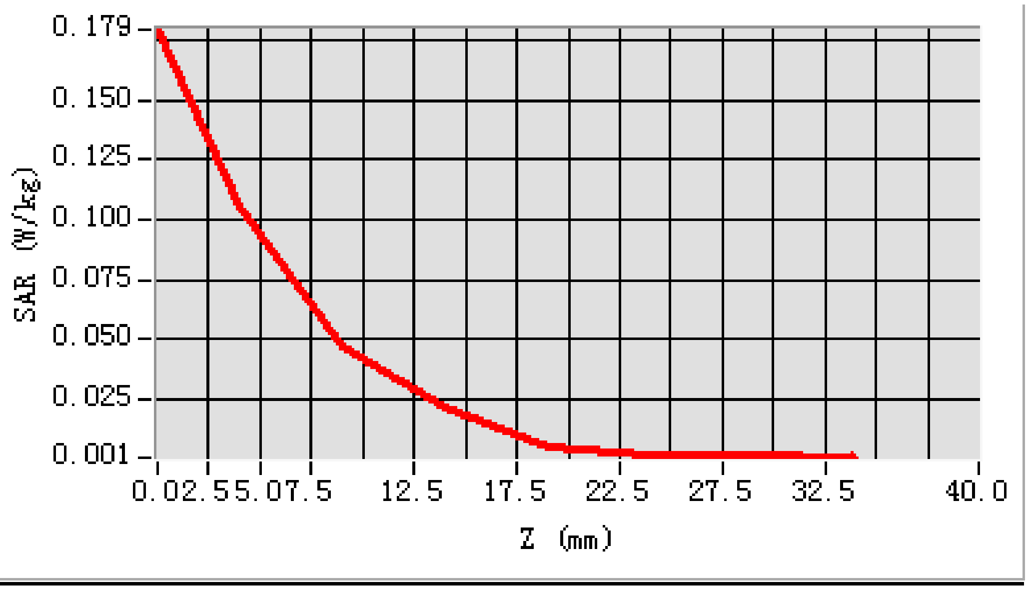
B mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=32.000000, Y=-20.000000
SAR 10g (W/Kg):	0.042809
SAR 1g (W/Kg):	0.096763
Power drift (%):	3.28

3D screen shot



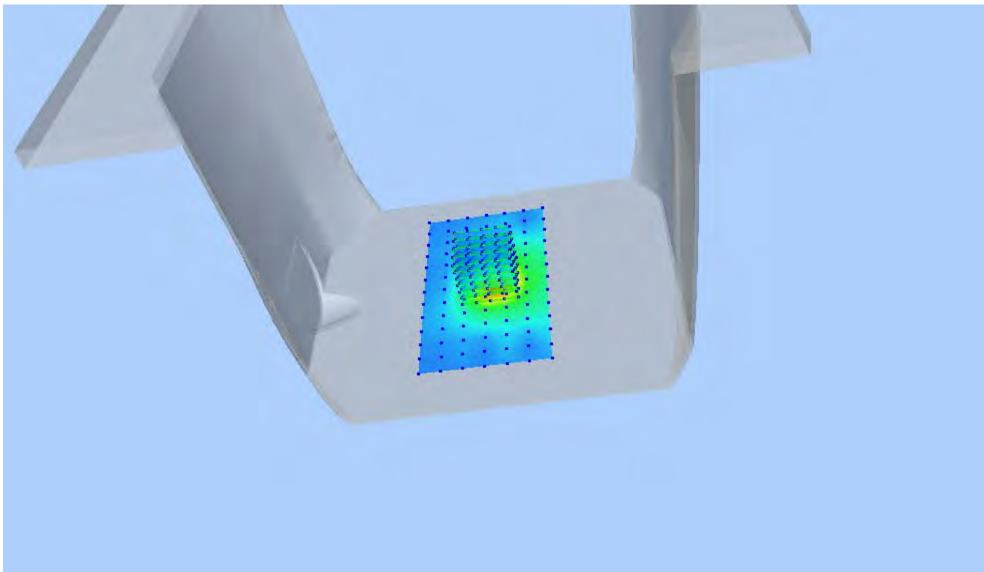
Z Axis Scan



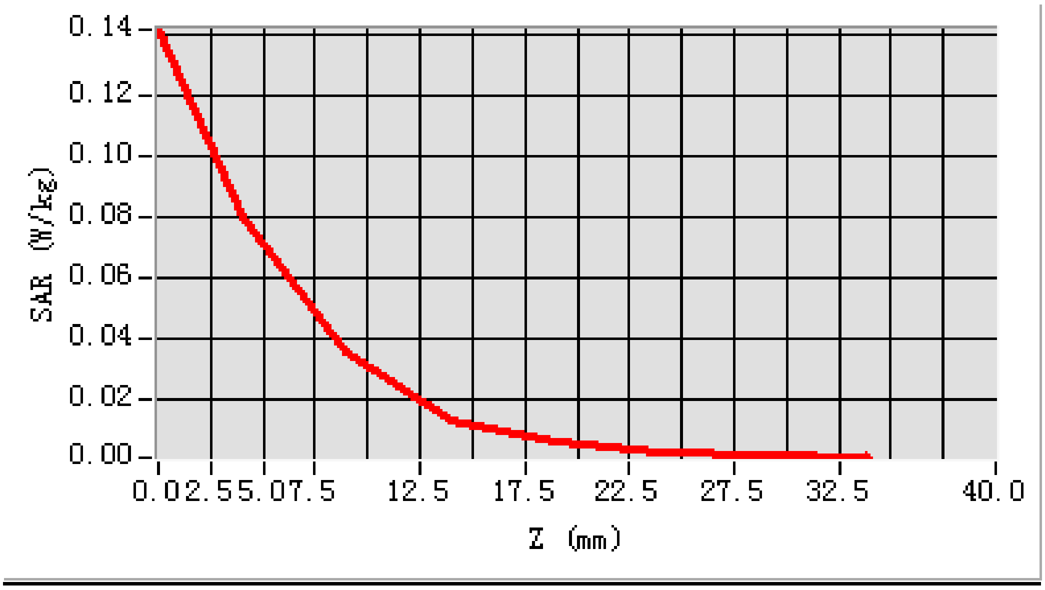
MEAS. 10 Body Plane with Tip Edge on Low Channel in IEEE 802.11b ANT B mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=4.000000
SAR 10g (W/Kg):	0.032766
SAR 1g (W/Kg):	0.079796
Power drift (%):	-4.71

3D screen shot



<u>Z Axis Scan</u>

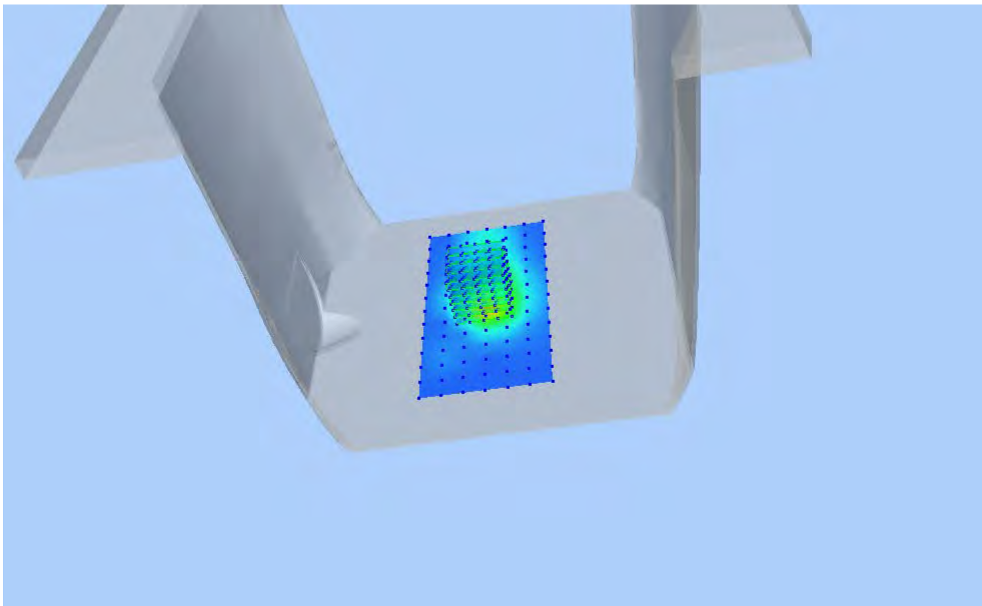


MEAS. 11 Body Plane with Horizontal-Down on High Channel in IEEE 802.11g

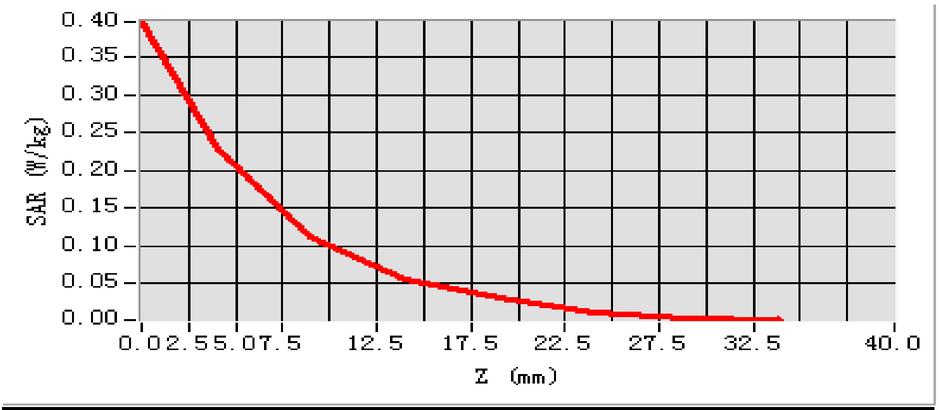
ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2462.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.68; Conductivity: 1.97 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=-22.000000
SAR 10g (W/Kg):	0.096504
SAR 1g (W/Kg):	0.228297
Power drift (%):	-3.97

3D screen shot



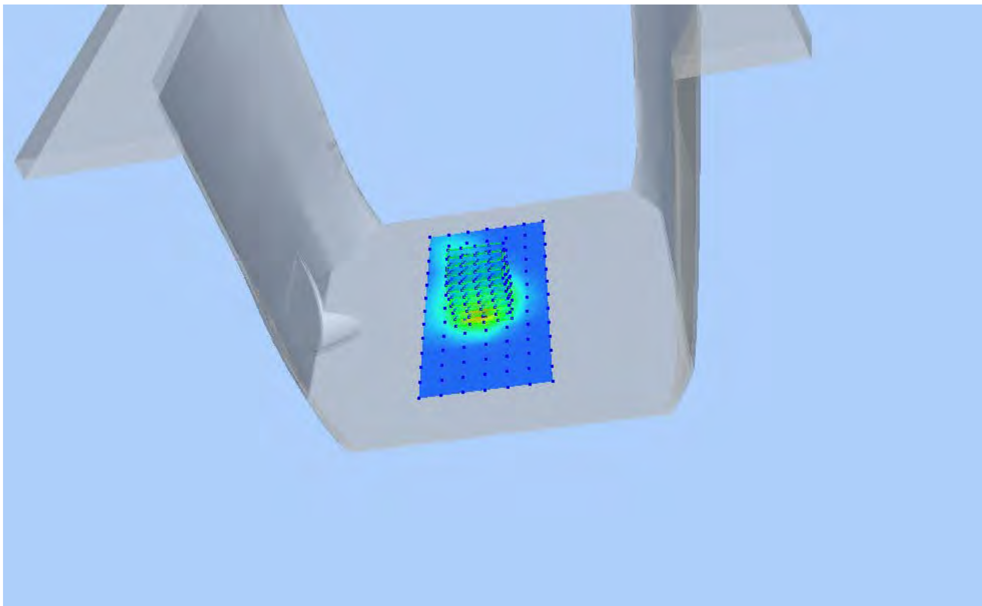
Z Axis Scan



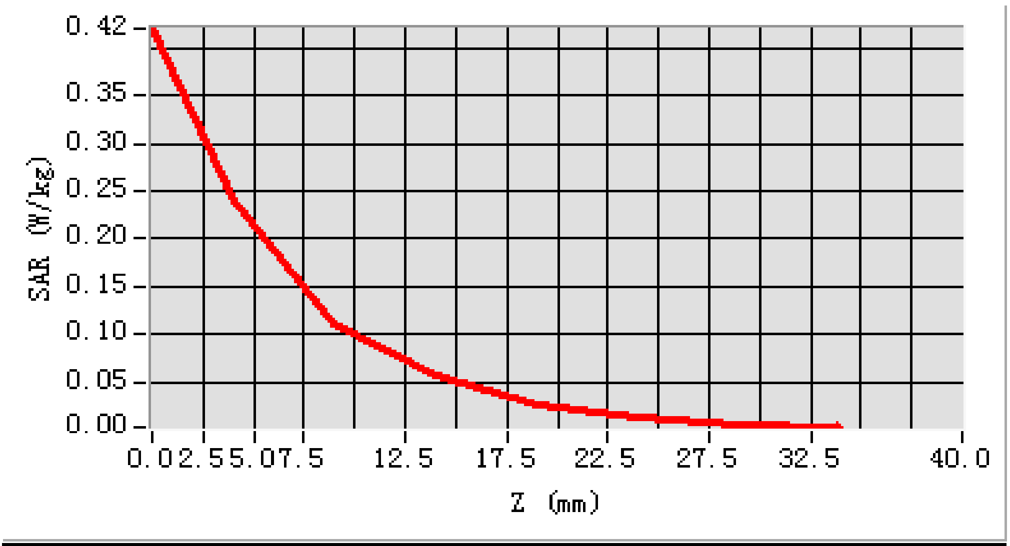
MEAS.12 Body Plane with Horizontal-UP on High Channel in IEEE 802.11 g

ANT A mode

Test Date: 27/6/2015
Signal: WLAN, f=2462.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters: Permittivity: 52.68; Conductivity: 1.97 S/m
Test condition: Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe: EP 187, ConvF: 4.42
Area Scan: sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan: 5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location: X=30.000000, Y=-22.000000
SAR 10g (W/Kg): 0.102393
SAR 1g (W/Kg): 0.222797
Power drift (%): 3.96
3D screen shot



Z Axis Scan

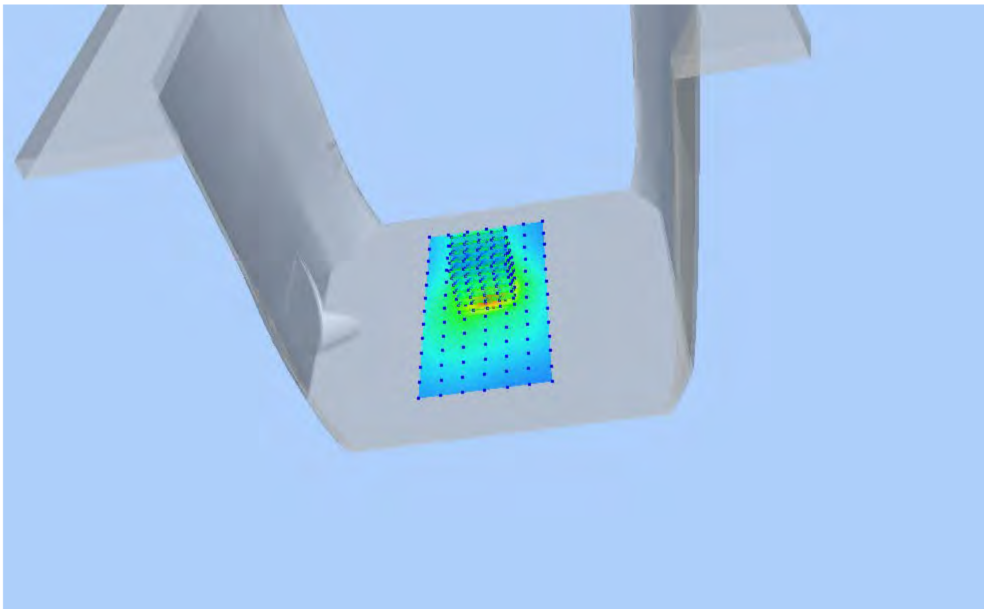


MEAS. 13 Body Plane with Vertical-Front on High Channel in IEEE 802.11 g

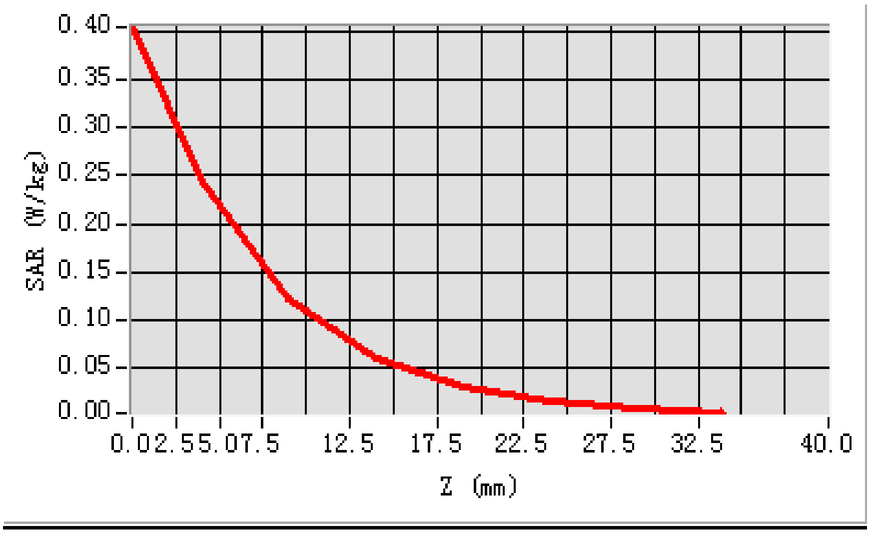
ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2462.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.68; Conductivity: 1.97 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=-16.000000
SAR 10g (W/Kg):	0.110588
SAR 1g (W/Kg):	0.243811
Power drift (%):	-2.26

3D screen shot



Z Axis Scan

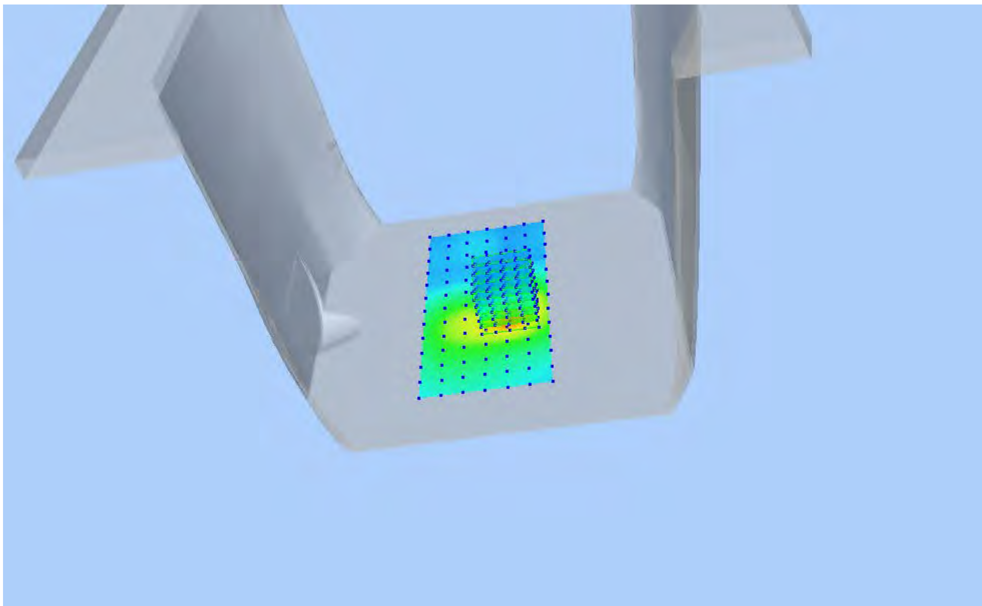


MEAS. 14 Body Plane with Vertical-Back on High Channel in IEEE 802.11 g

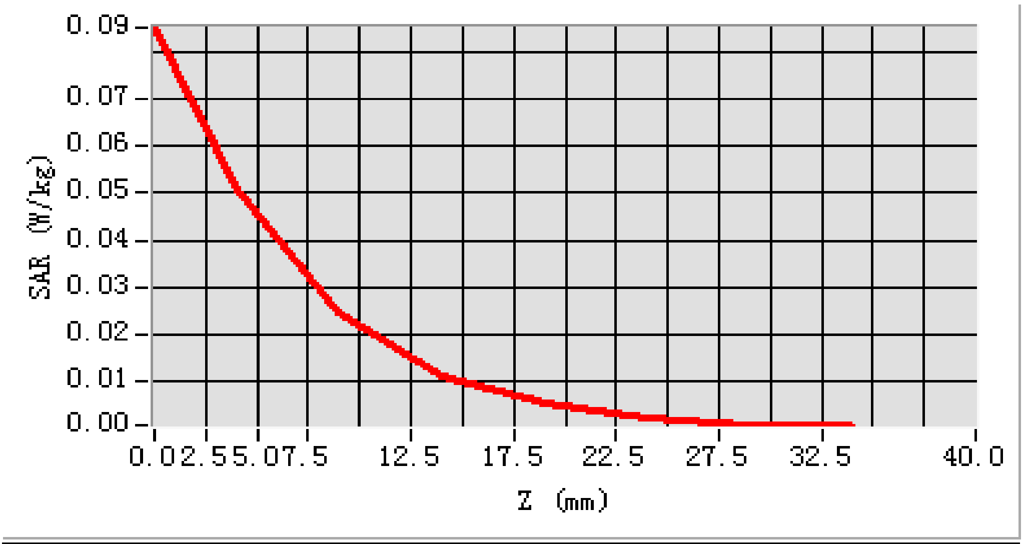
ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2462.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.68; Conductivity: 1.97 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=-12.000000
SAR 10g (W/Kg):	0.022439
SAR 1g (W/Kg):	0.047076
Power drift (%):	-3.71

3D screen shot



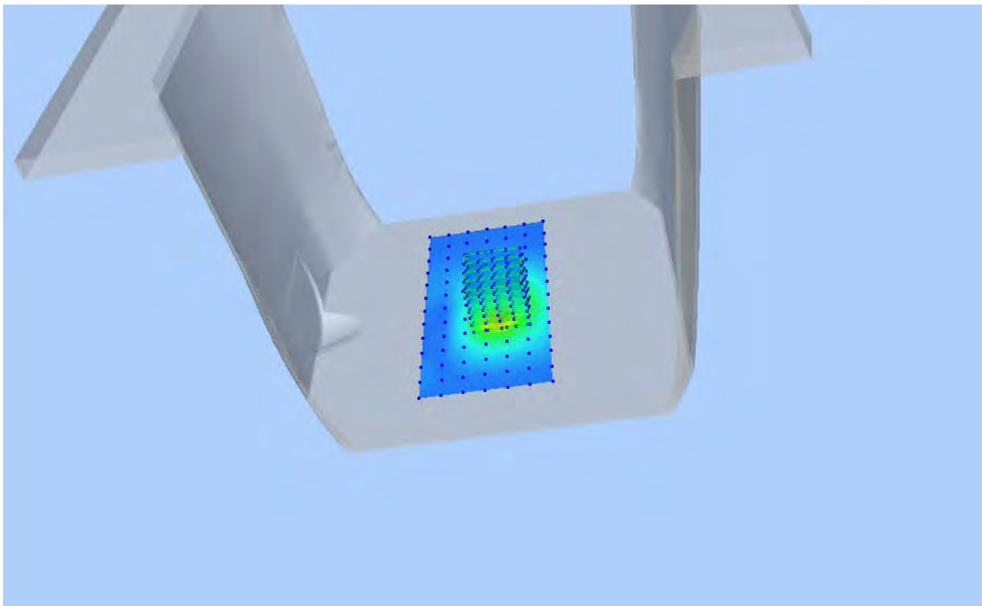
Z Axis Scan



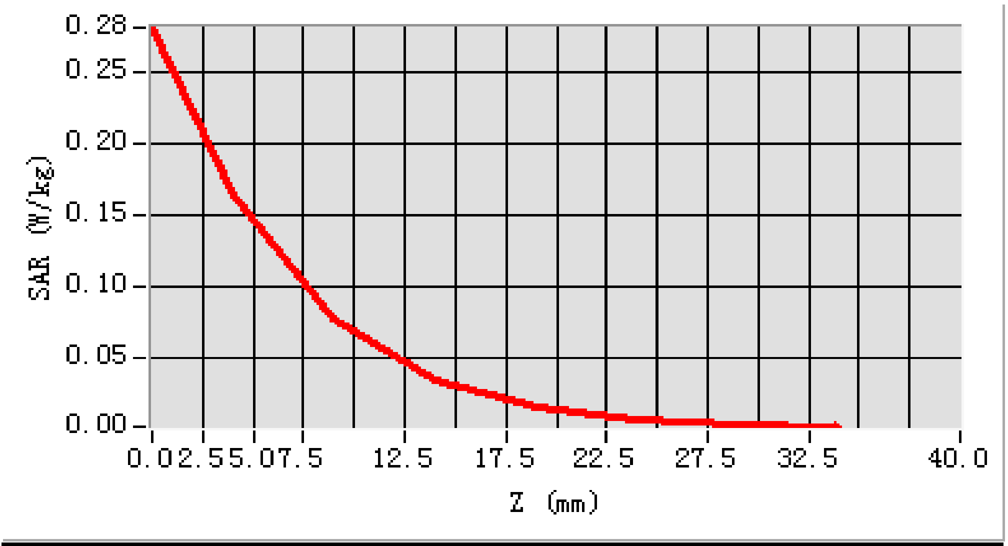
MEAS. 15 Body Plane with Tip Edge on High Channel in IEEE 802.11 g ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2462.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.68; Conductivity: 1.97 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=-16.000000
SAR 10g (W/Kg):	0.063104
SAR 1g (W/Kg):	0.150130
Power drift (%):	-3.88

3D screen shot



Z Axis Scan

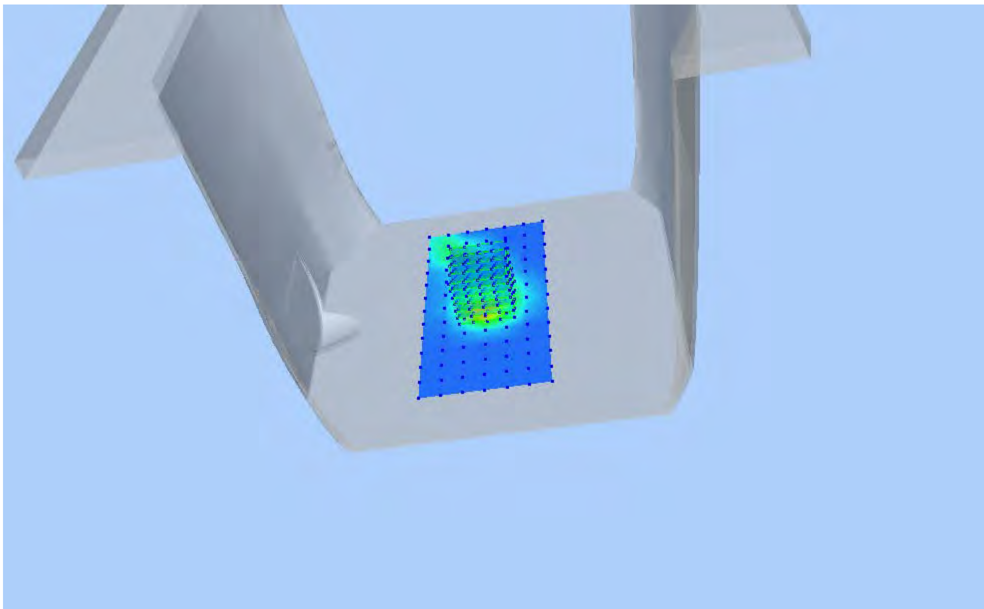


MEAS. 16 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11g

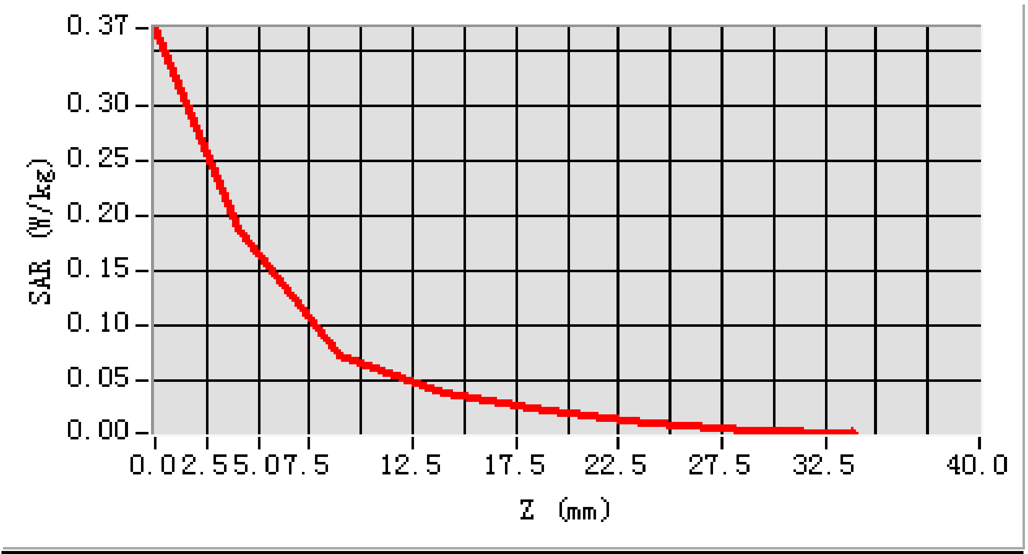
ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-16.000000, Y=4.000000
SAR 10g (W/Kg):	0.058673
SAR 1g (W/Kg):	0.126087
Power drift (%):	-3.54

3D screen shot



Z Axis Scan

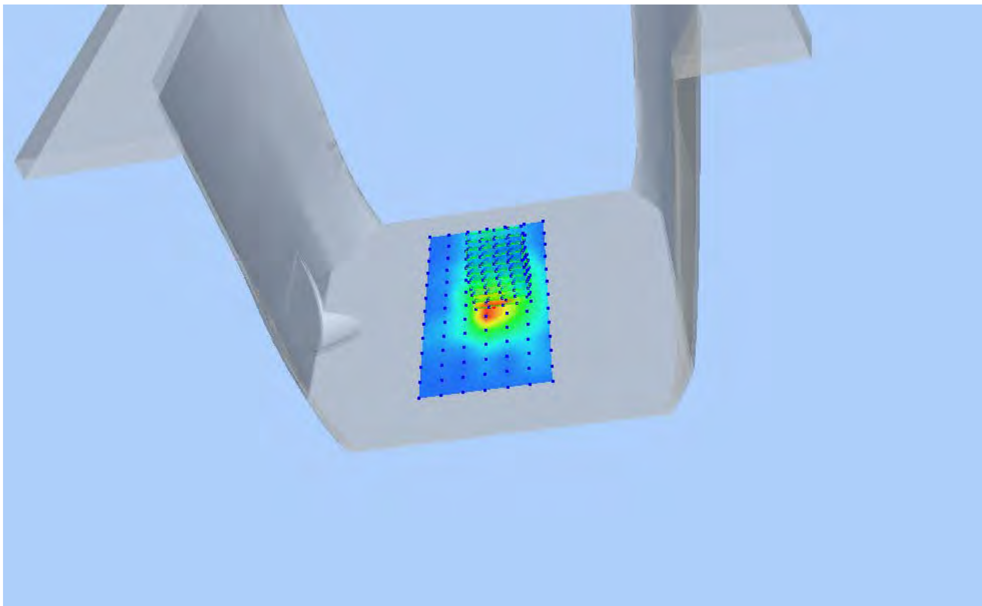


MEAS. 17 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11g

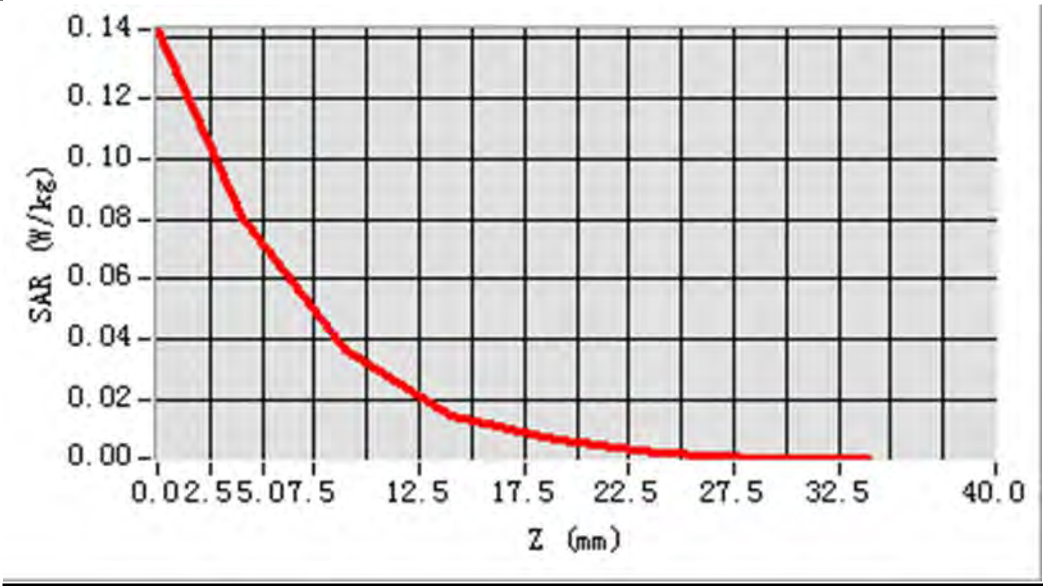
ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=12.000000
SAR 10g (W/Kg):	0.082458
SAR 1g (W/Kg):	0.185666
Power drift (%):	-4.47

3D screen shot



Z Axis Scan

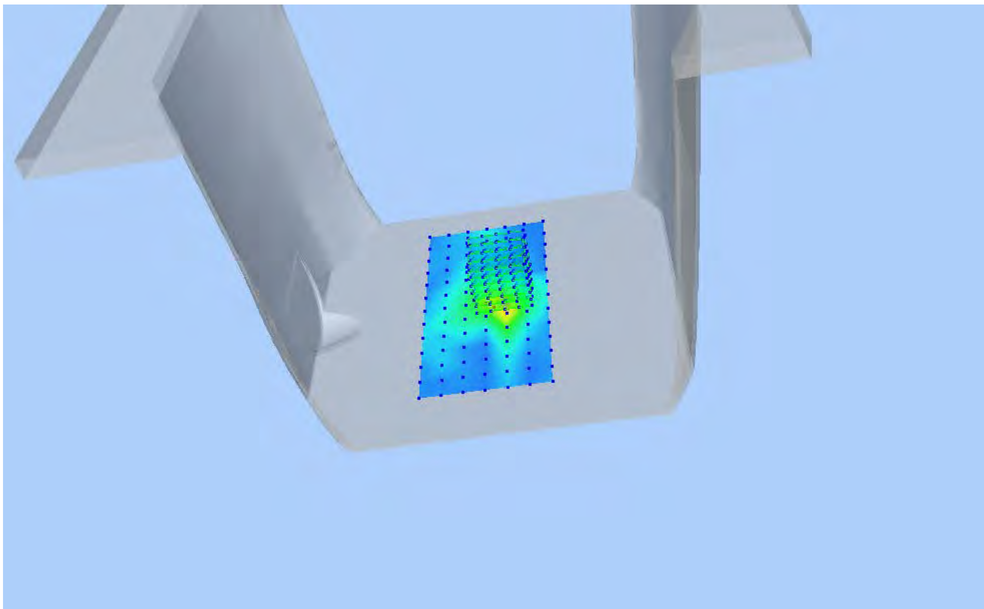


MEAS. 18 Body Plane with Vertical-Front on Low Channel in IEEE 802.11g

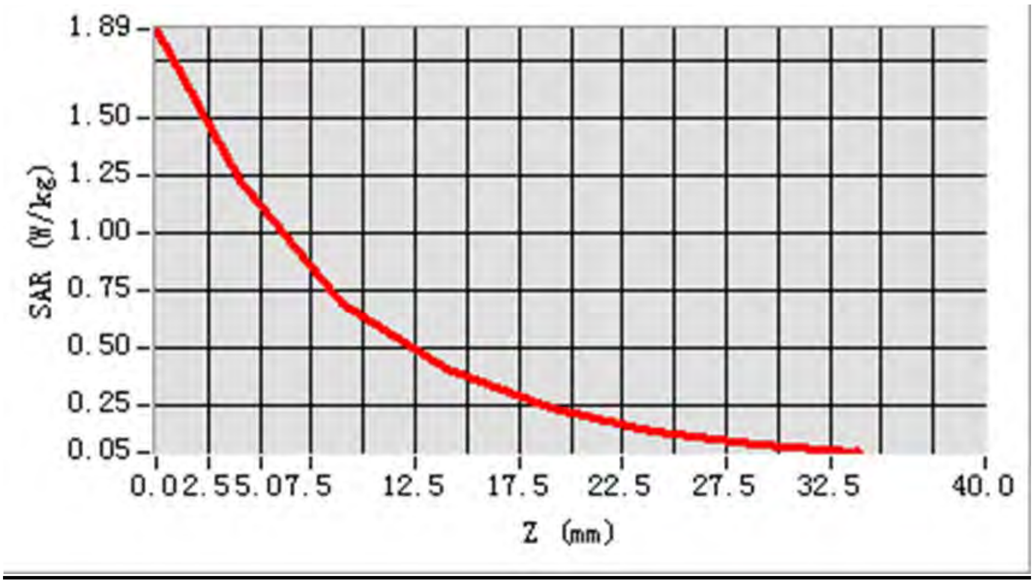
ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-8.000000, Y=-32.000000
SAR 10g (W/Kg):	0.019952
SAR 1g (W/Kg):	0.044315
Power drift (%):	-3.70

3D screen shot



Z Axis Scan

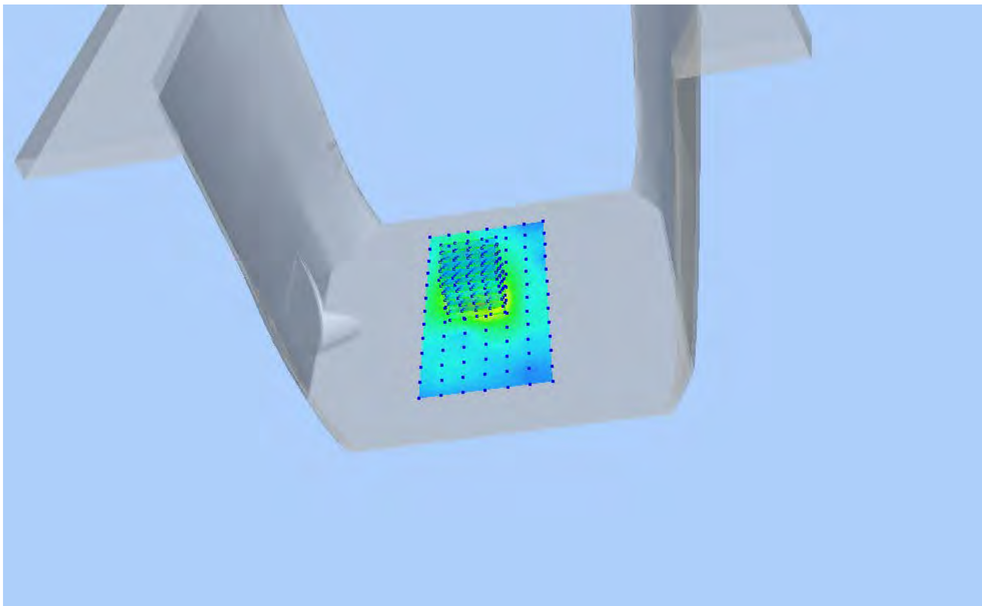


MEAS. 19 Body Plane with Vertical-Back on Low Channel in IEEE 802.11 g

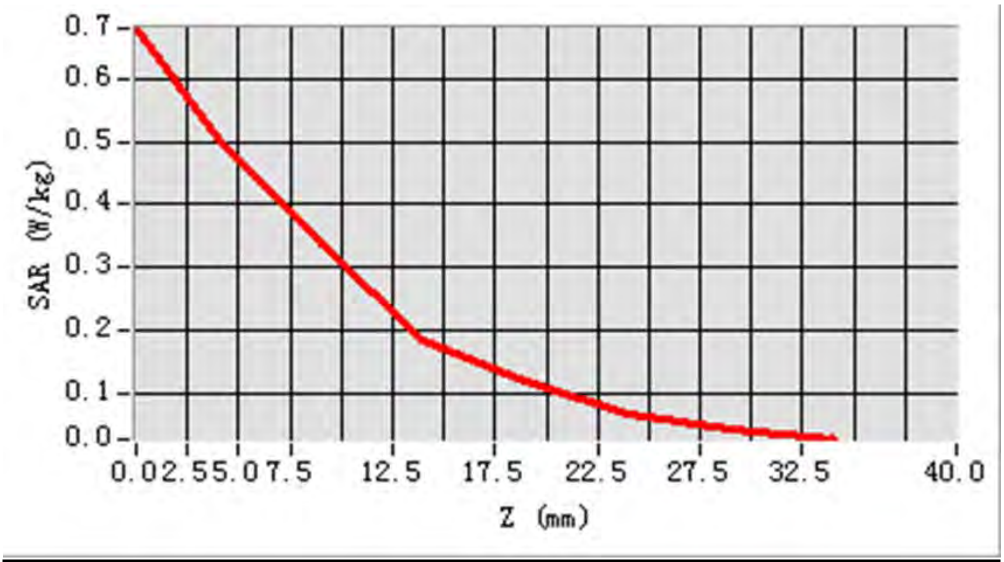
ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=28.000000
SAR 10g (W/Kg):	0.024530
SAR 1g (W/Kg):	0.066700
Power drift (%):	-3.08

3D screen shot



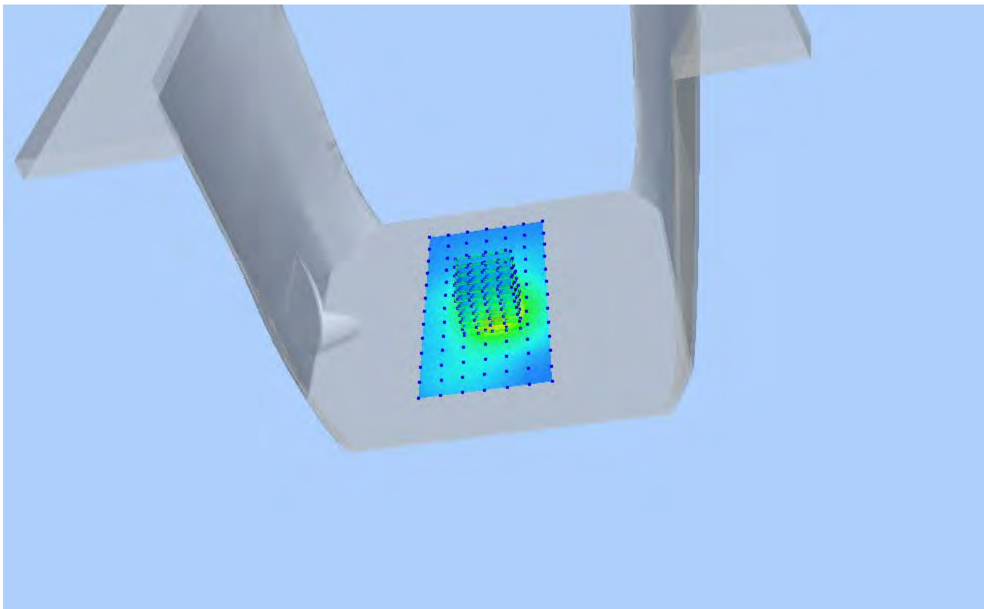
Z Axis Scan



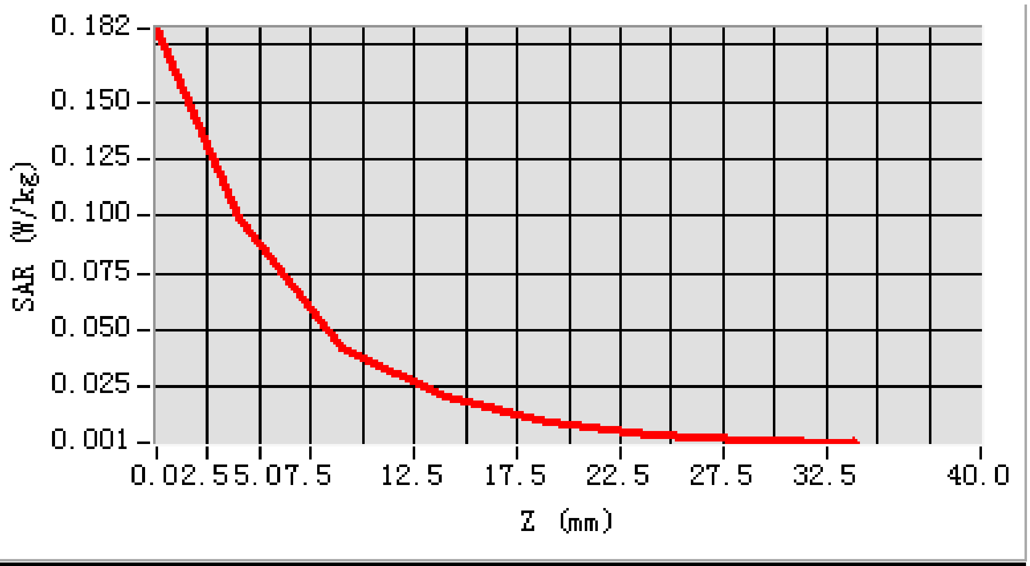
MEAS. 20 Body Plane with Tip Edge on Low Channel in IEEE 802.11 g ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=12.000000
SAR 10g (W/Kg):	0.039909
SAR 1g (W/Kg):	0.093224
Power drift (%):	-3.54

3D screen shot



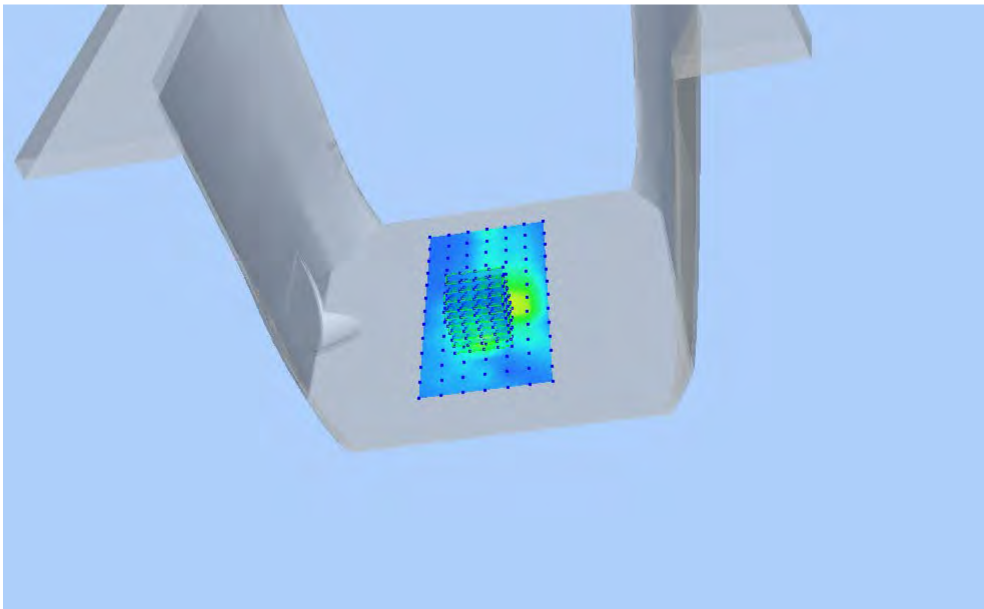
Z Axis Scan



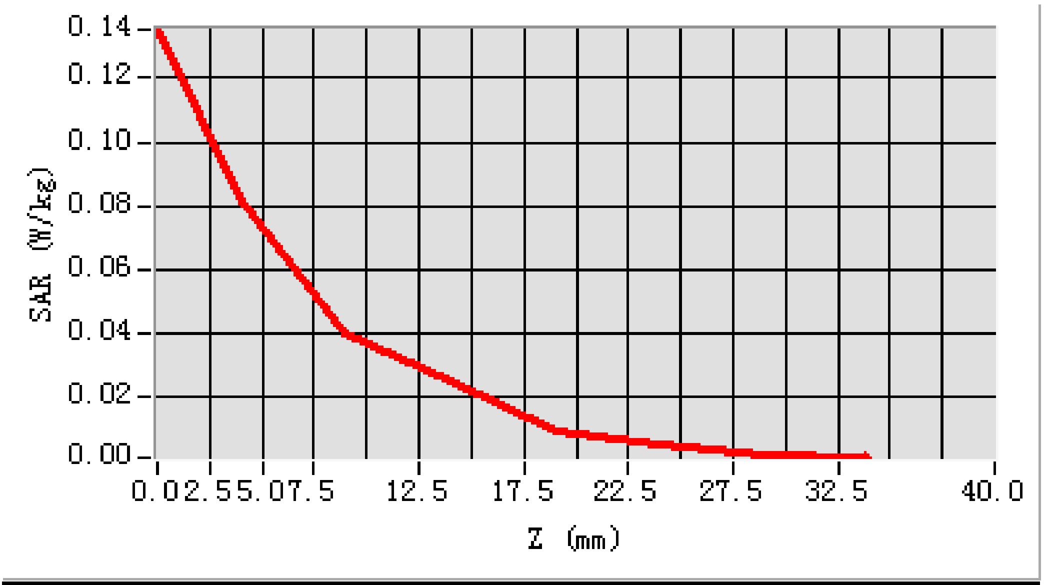
MEAS. 21 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11n (HT-20) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-8.000000, Y=-32.000000
SAR 10g (W/Kg):	0.050390
SAR 1g (W/Kg):	0.184493
Power drift (%):	-2.79

3D screen shot



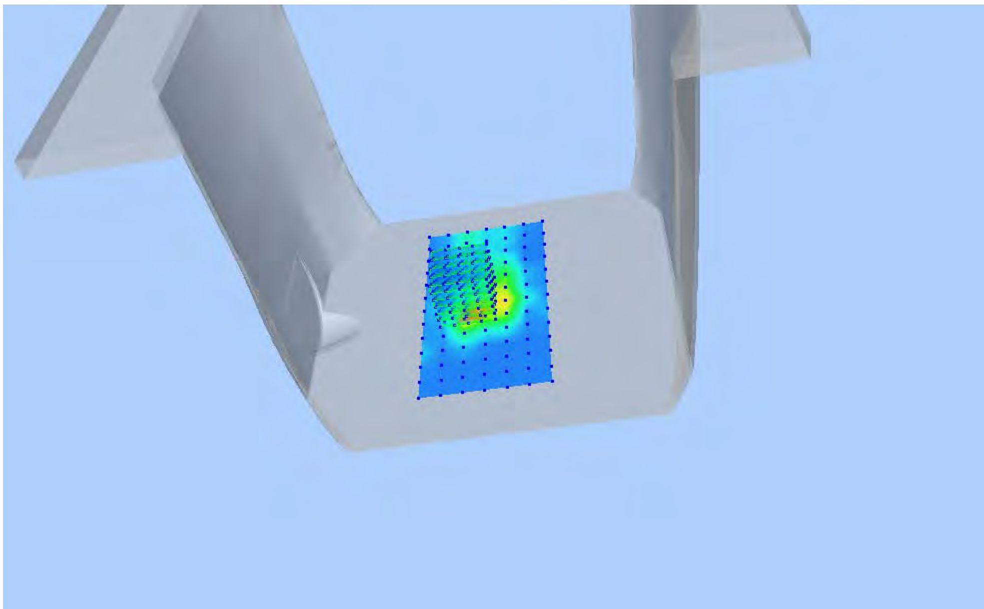
Z Axis Scan



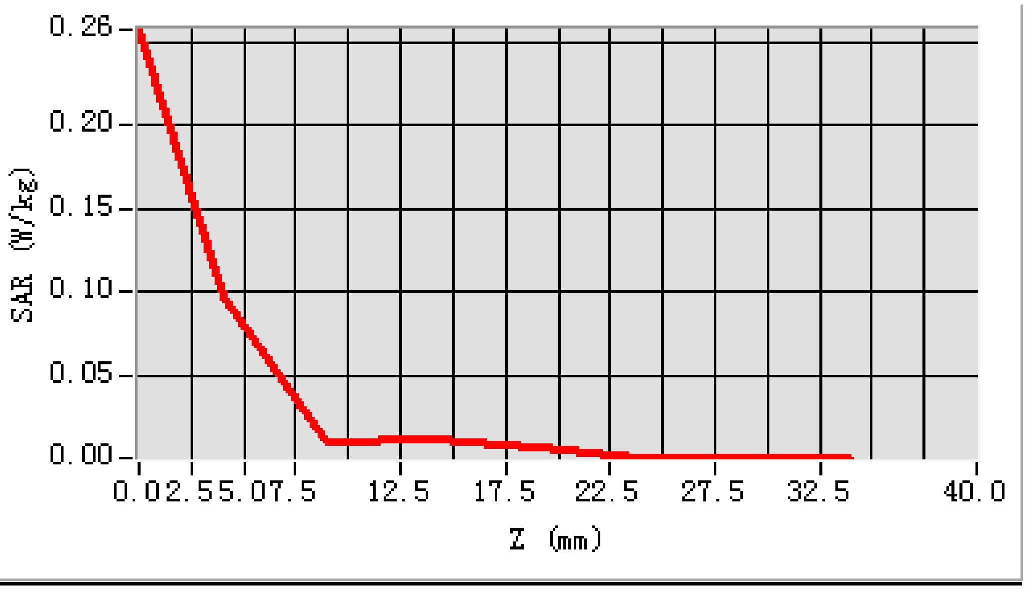
MEAS. 22 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11n (HT-20) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=12.000000
SAR 10g (W/Kg):	0.037617
SAR 1g (W/Kg):	0.093047
Power drift (%):	-4.19

3D screen shot



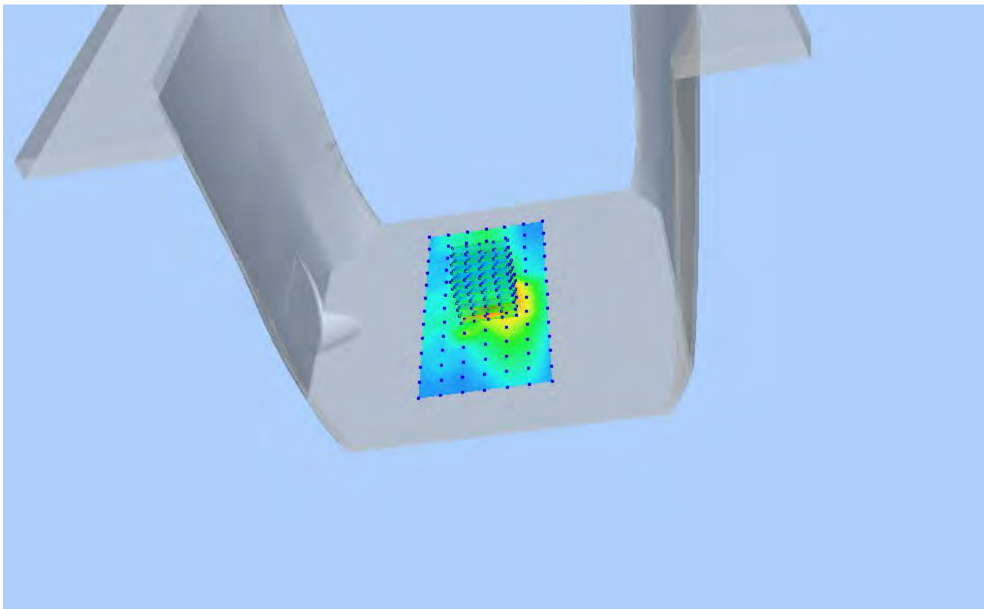
Z Axis Scan



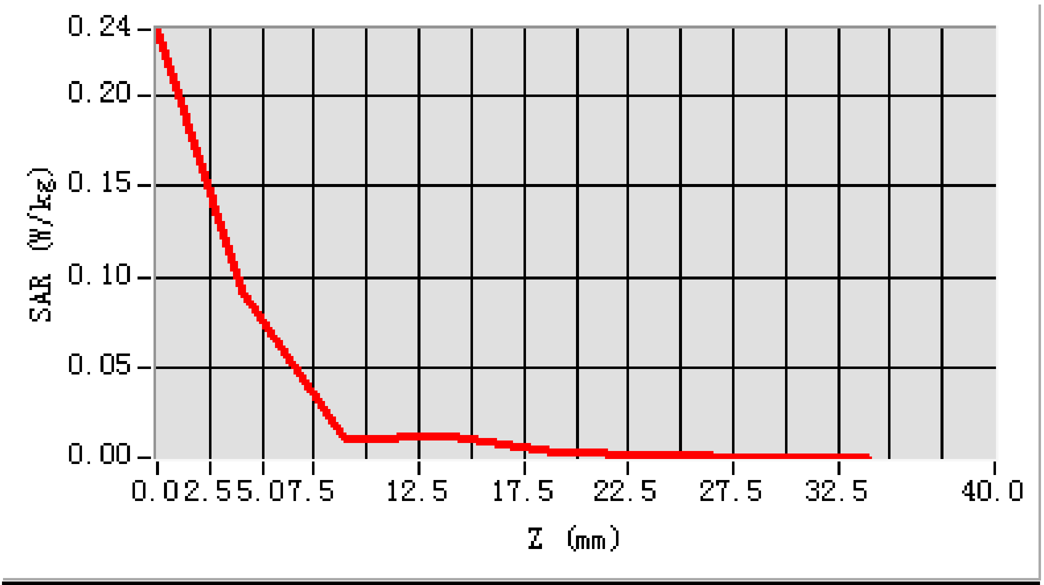
MEAS. 23 Body Plane with Vertical-Front on Low Channel in IEEE 802.11n (HT-20) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=36.000000
SAR 10g (W/Kg):	0.036345
SAR 1g (W/Kg):	0.096795
Power drift (%):	-3.88

3D screen shot



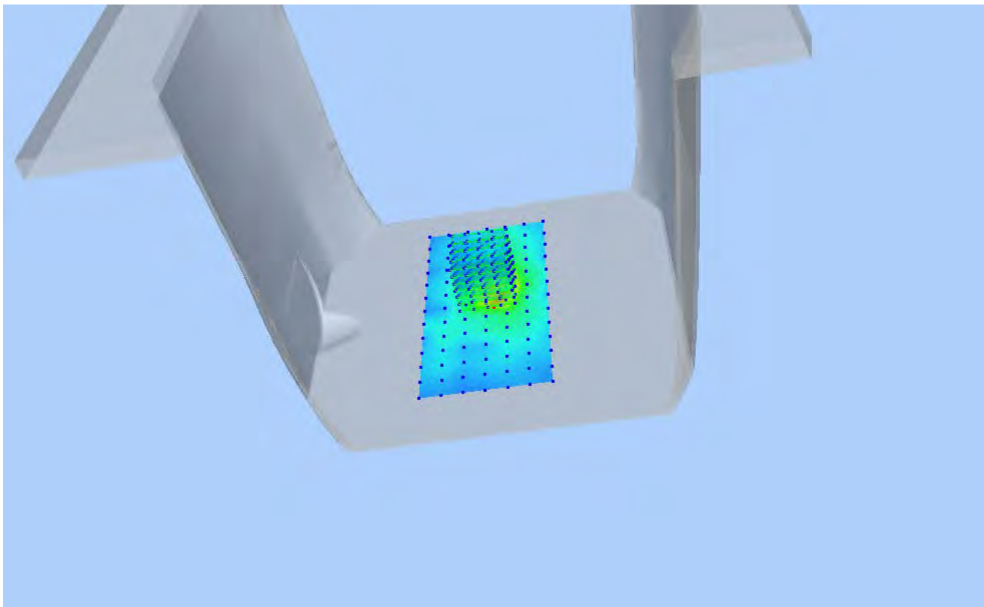
Z Axis Scan



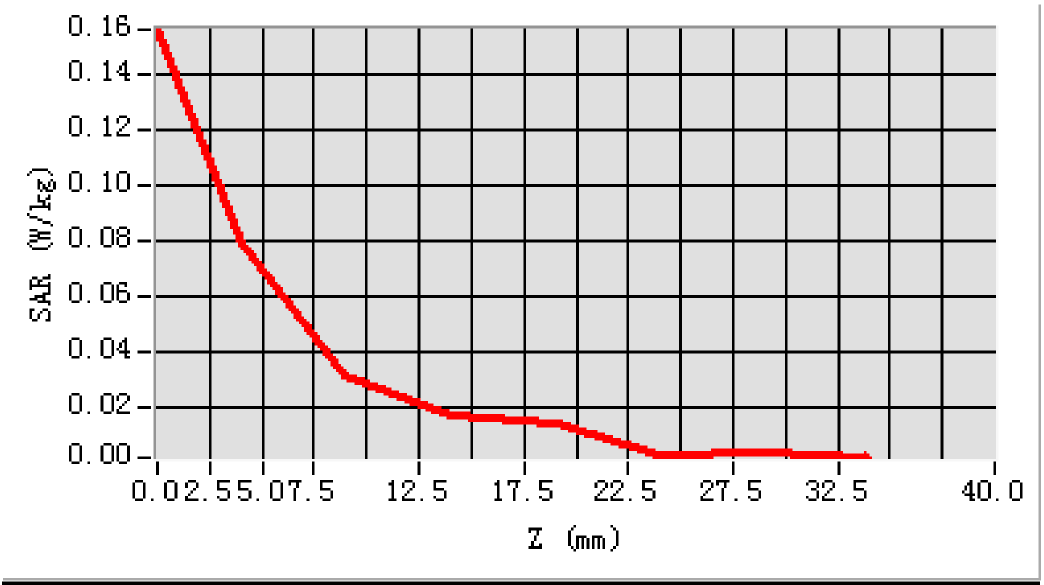
MEAS. 24 Body Plane with Vertical-Back on Low Channel in IEEE 802.11n (HT-20) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=36.000000
SAR 10g (W/Kg):	0.029502
SAR 1g (W/Kg):	0.073339
Power drift (%):	4.17

3D screen shot



Z Axis Scan

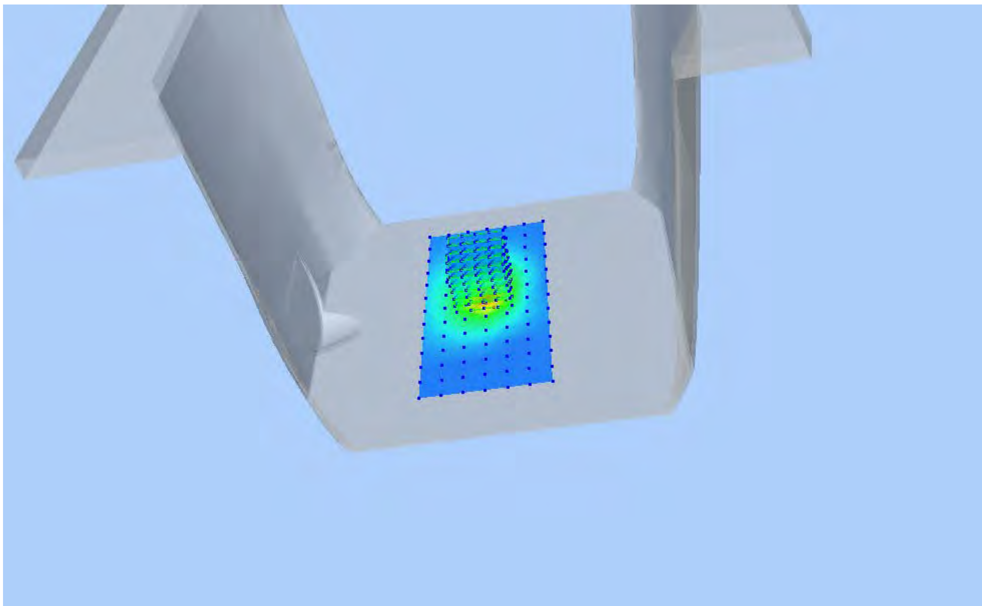


MEAS. 25 Body Plane with Tip Edge on Low Channel in IEEE 802.11n (HT-20)

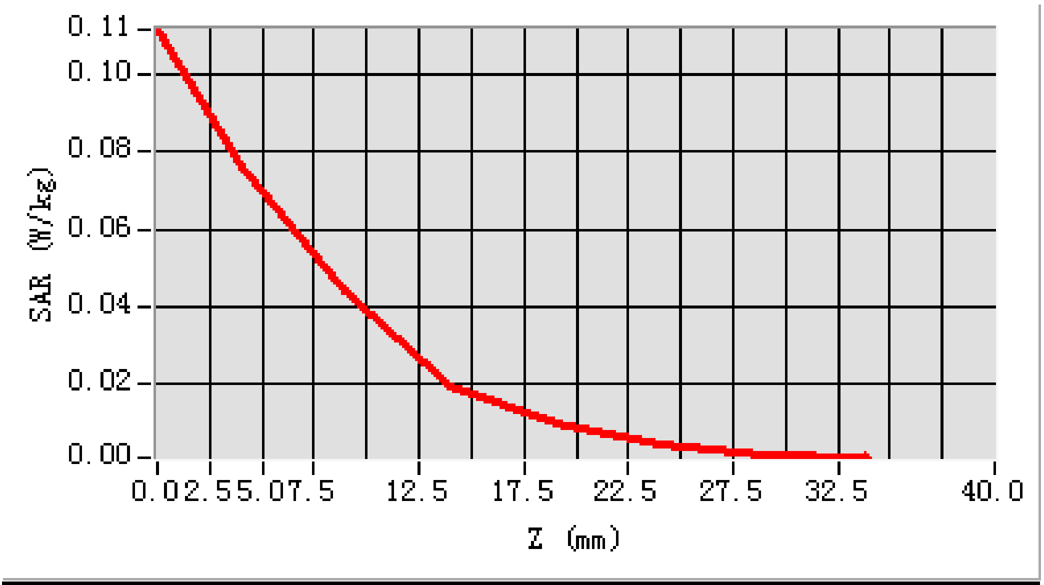
ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=12.000000
SAR 10g (W/Kg):	0.035311
SAR 1g (W/Kg):	0.079957
Power drift (%):	-2.58

3D screen shot



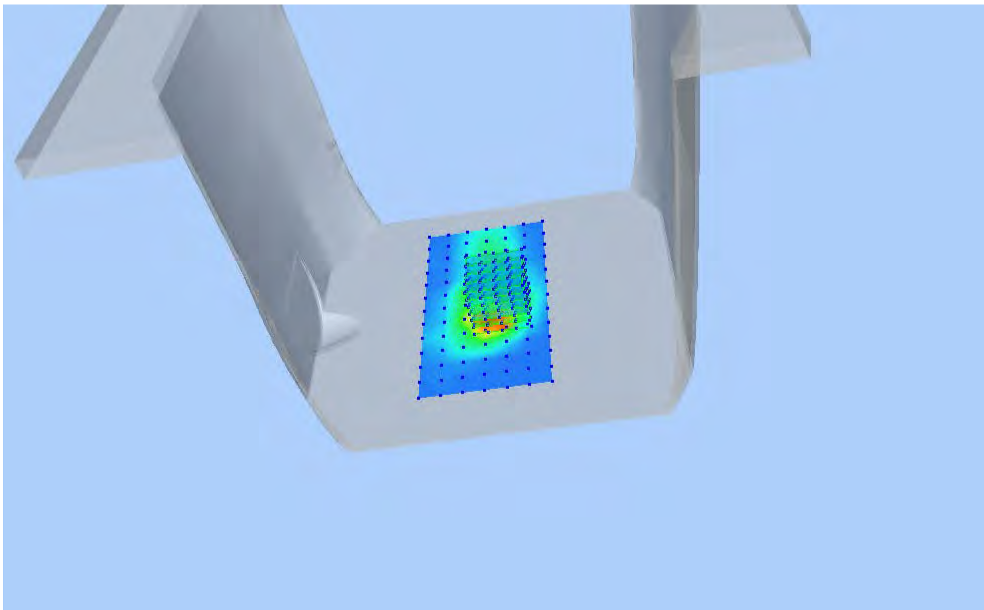
Z Axis Scan



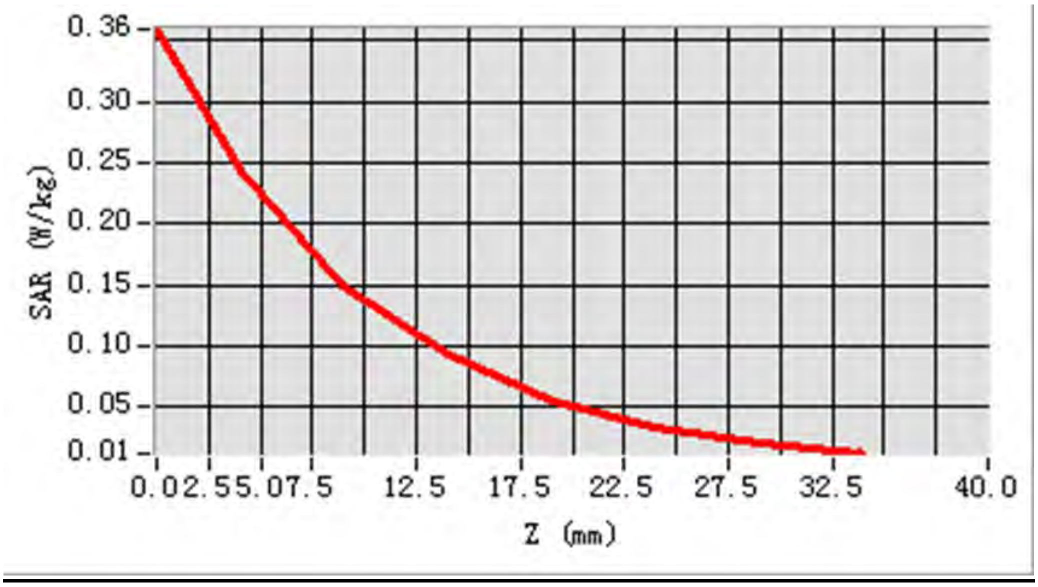
MEAS. 26 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11n (HT-20) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=8.000000, Y=48.000000
SAR 10g (W/Kg):	0.084514
SAR 1g (W/Kg):	0.204117
Power drift (%):	-4.56

3D screen shot



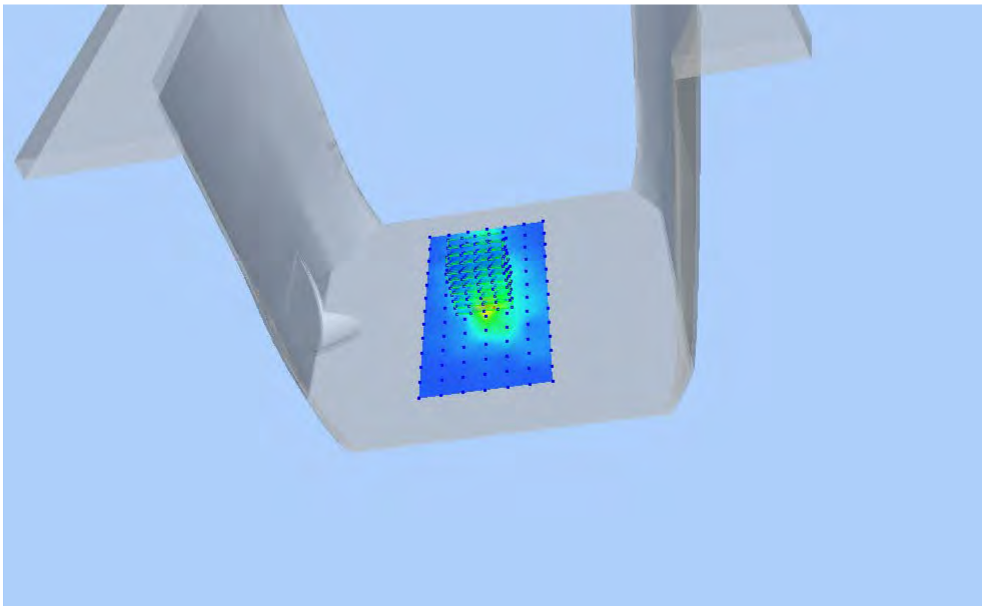
Z Axis Scan



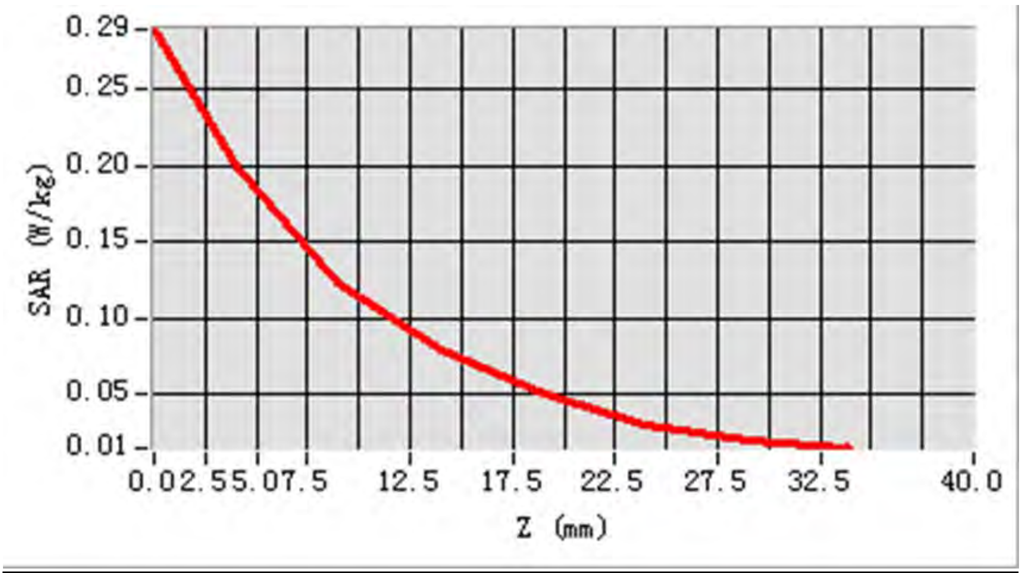
MEAS. 27 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11n (HT-20) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=36.000000
SAR 10g (W/Kg):	0.056606
SAR 1g (W/Kg):	0.128836
Power drift (%):	-1.35

3D screen shot



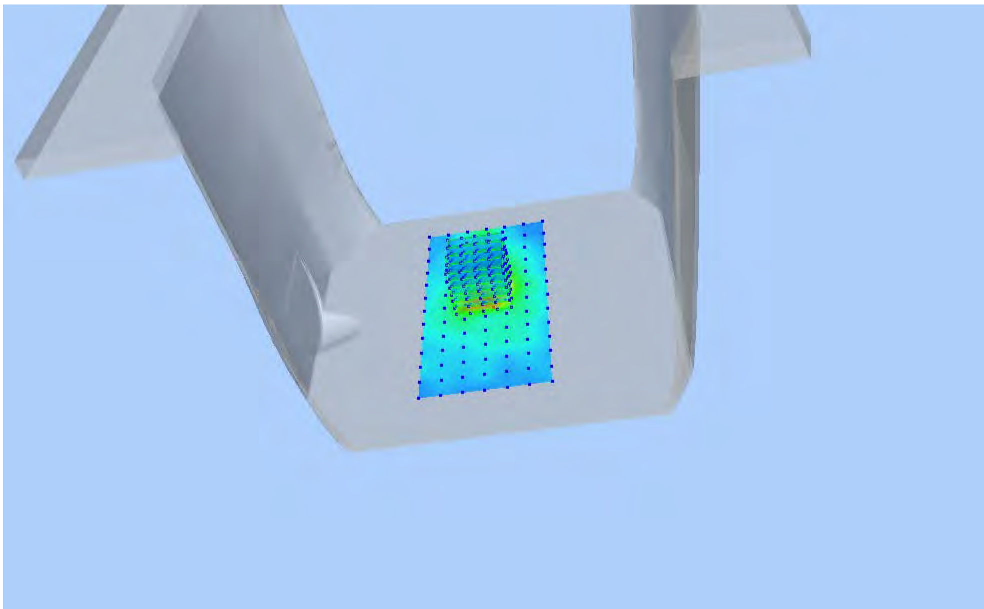
Z Axis Scan



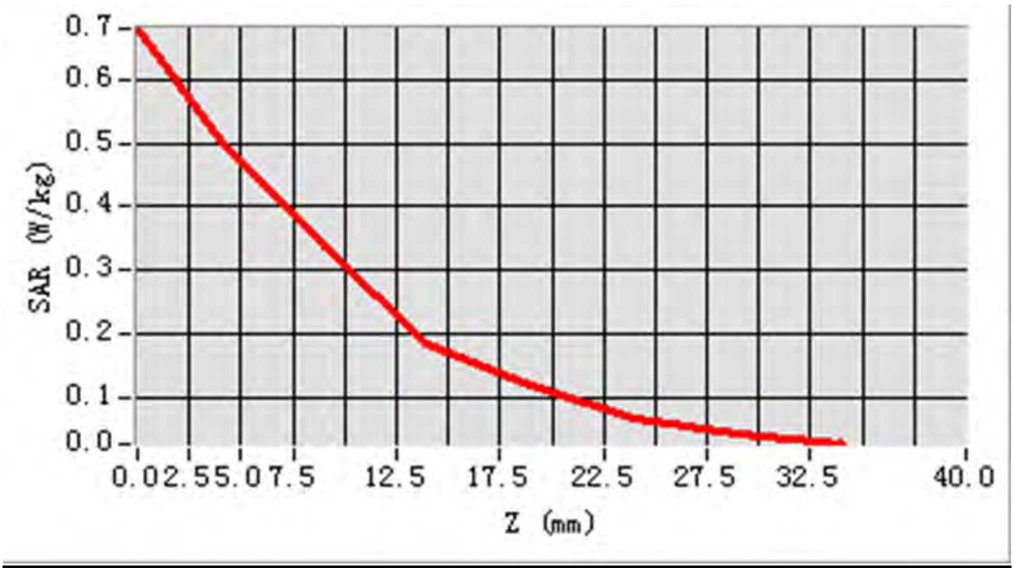
MEAS. 28 Body Plane with Vertical-Front on Low Channel in IEEE 802.11n (HT-20) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=8.000000, Y=48.000000
SAR 10g (W/Kg):	0.057203
SAR 1g (W/Kg):	0.157230
Power drift (%):	-2.43

3D screen shot



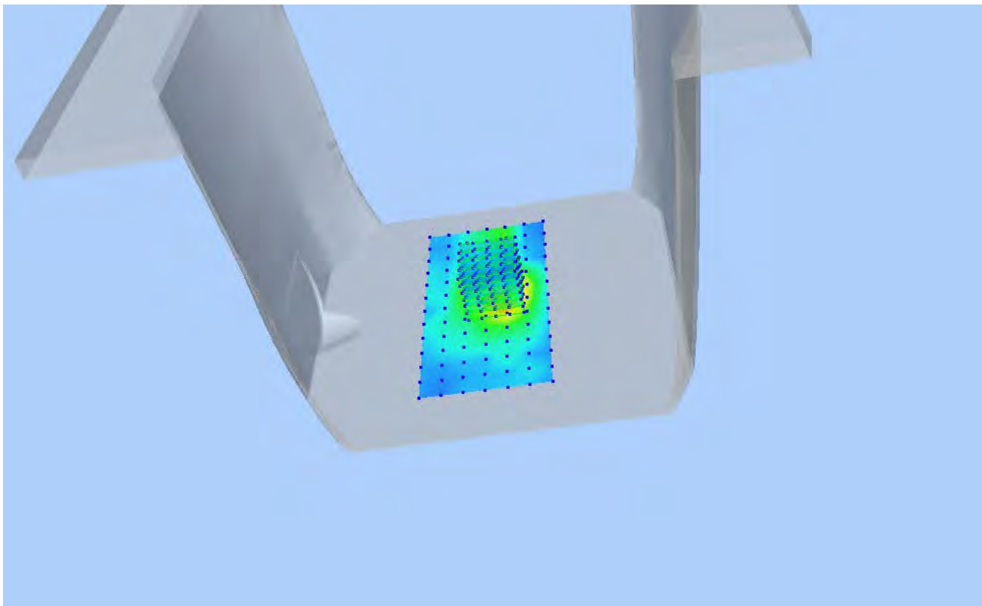
Z Axis Scan



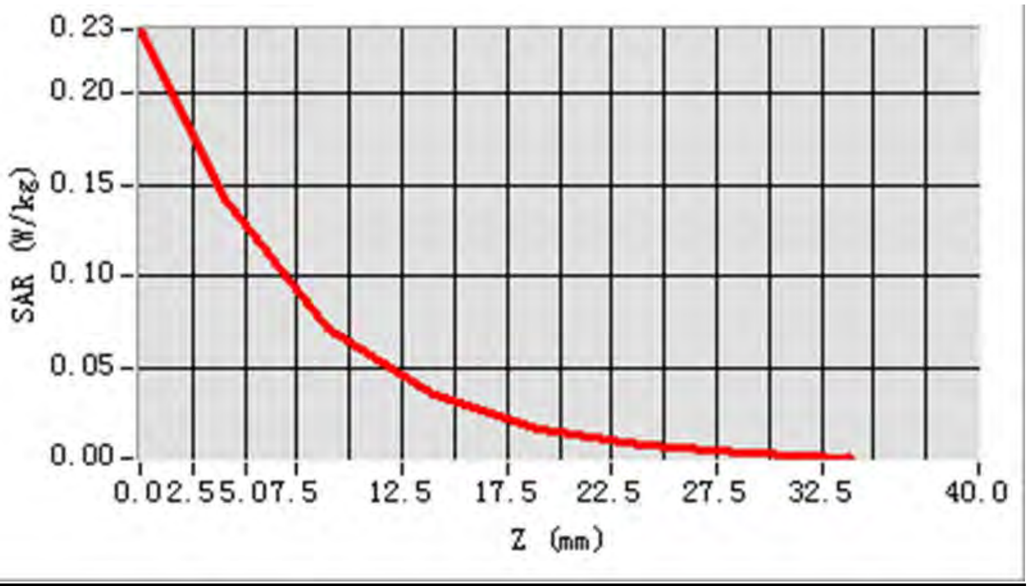
MEAS. 29 Body Plane with Vertical-Backon Low Channel in IEEE 802.11n (HT-20) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=8.000000, Y=0.000000
SAR 10g (W/Kg):	0.039924
SAR 1g (W/Kg):	0.107503
Power drift (%):	3.21

3D screen shot



Z Axis Scan

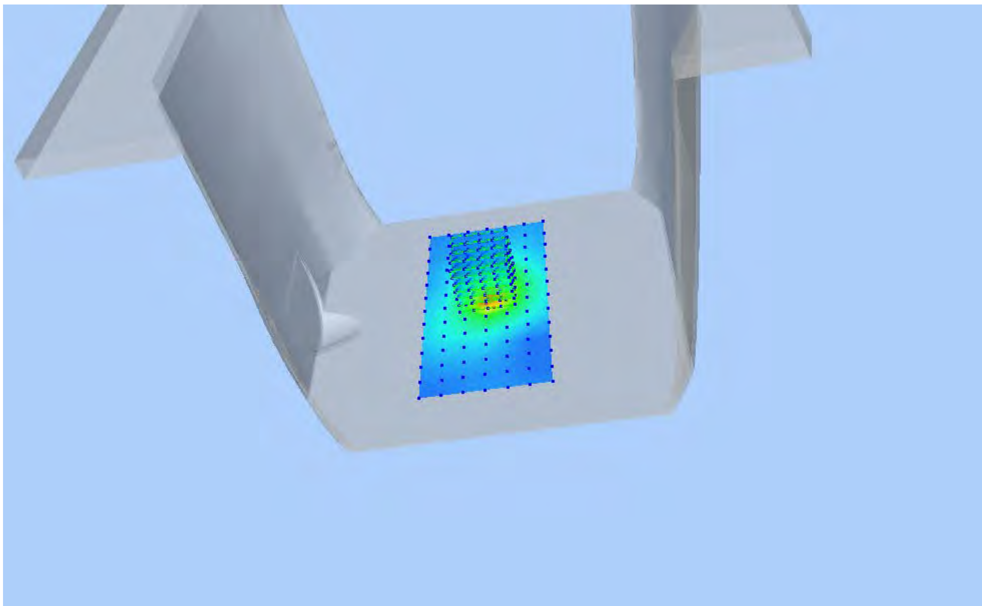


MEAS. 30 Body Plane with Tip Edge on Low Channel in IEEE 802.11n (HT-20)

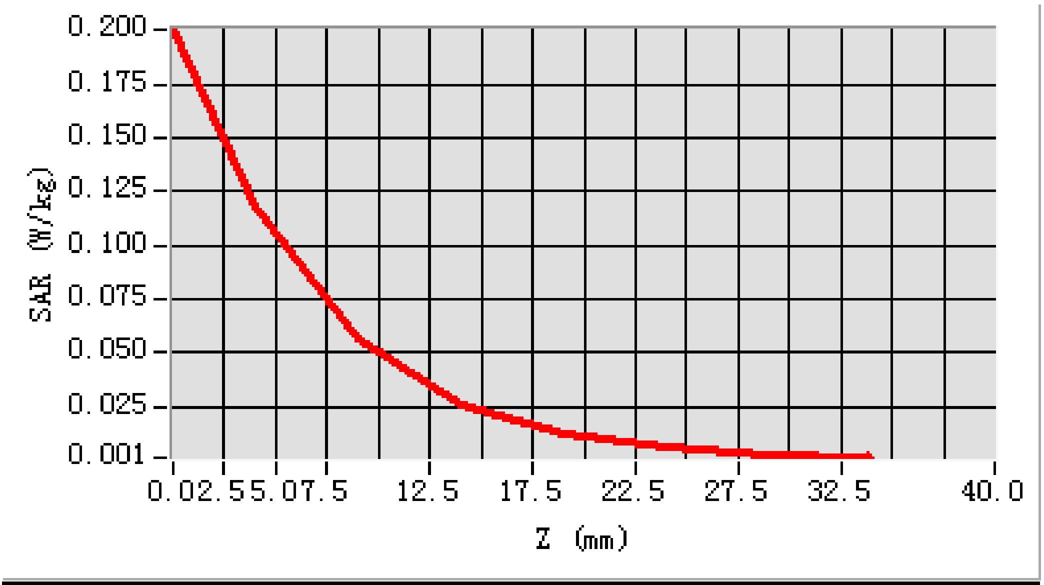
ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=8.000000, Y=48.000000
SAR 10g (W/Kg):	0.048577
SAR 1g (W/Kg):	0.114513
Power drift (%):	-4.36

3D screen shot



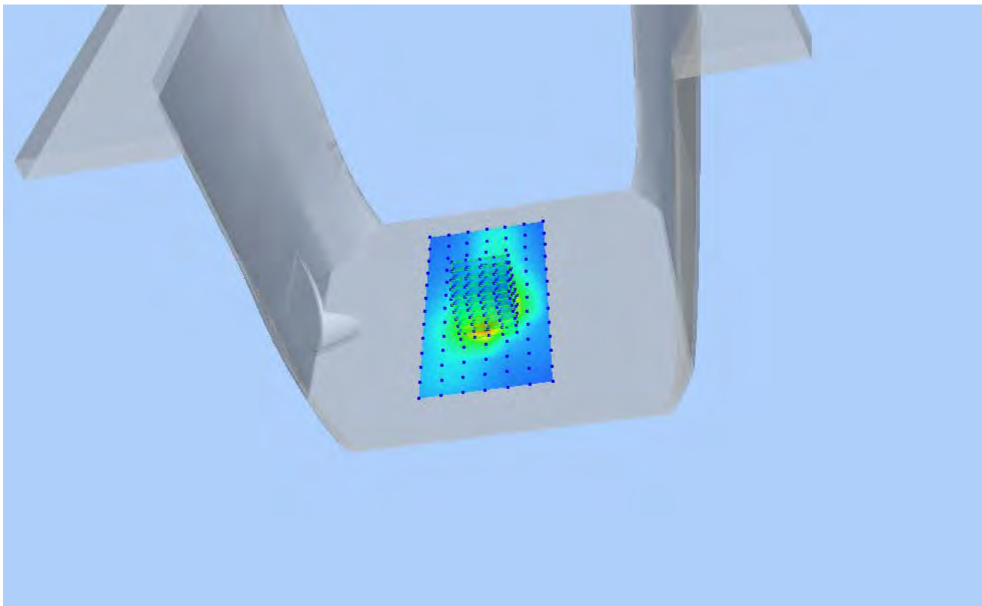
Z Axis Scan



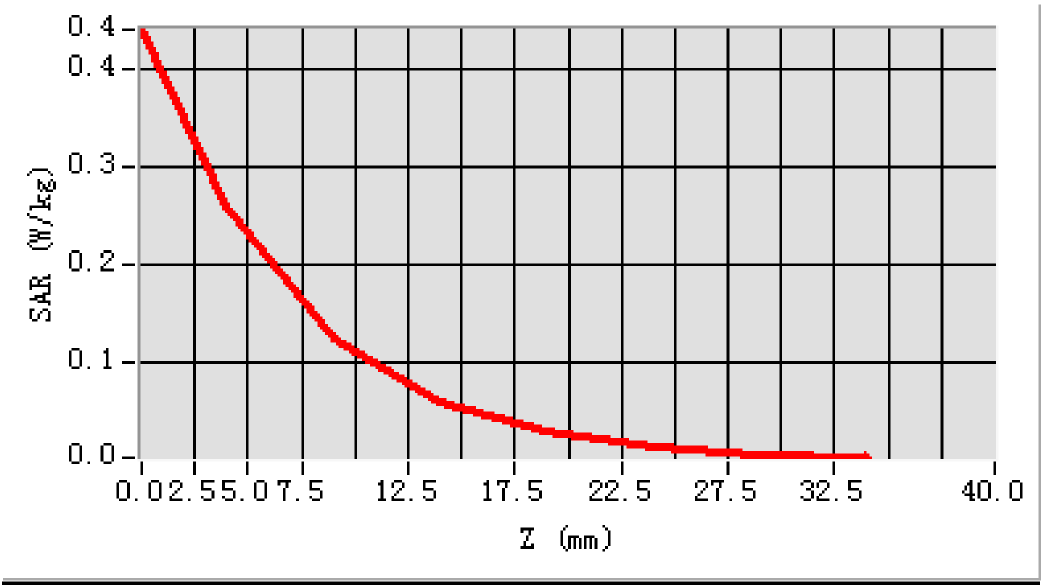
MEAS. 31 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11n (HT-40) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.75; Conductivity: 1.93 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=20.000000, Y=60.000000
SAR 10g (W/Kg):	0.112305
SAR 1g (W/Kg):	0.241750
Power drift (%):	4.90

3D screen shot



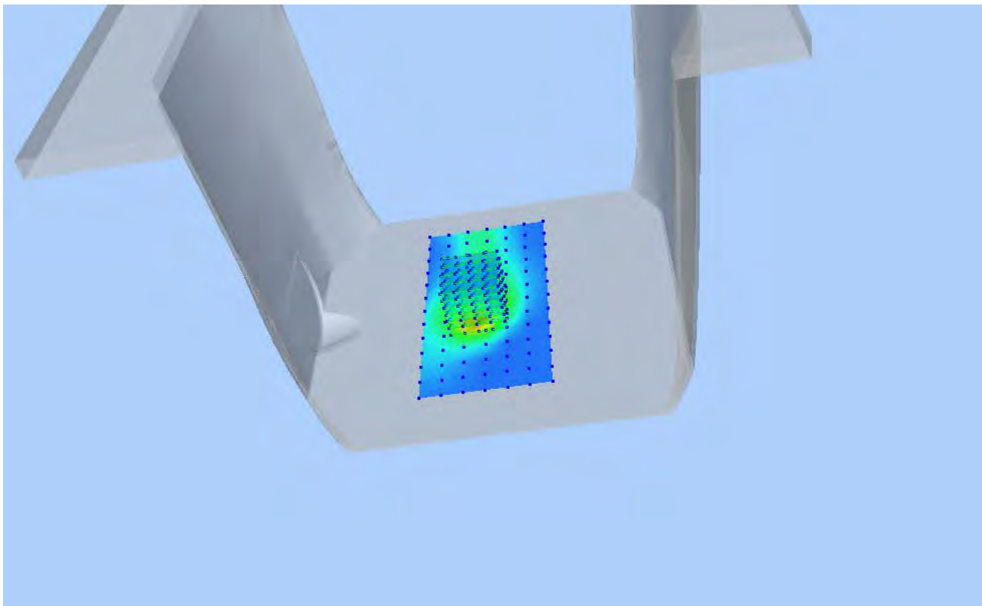
Z Axis Scan



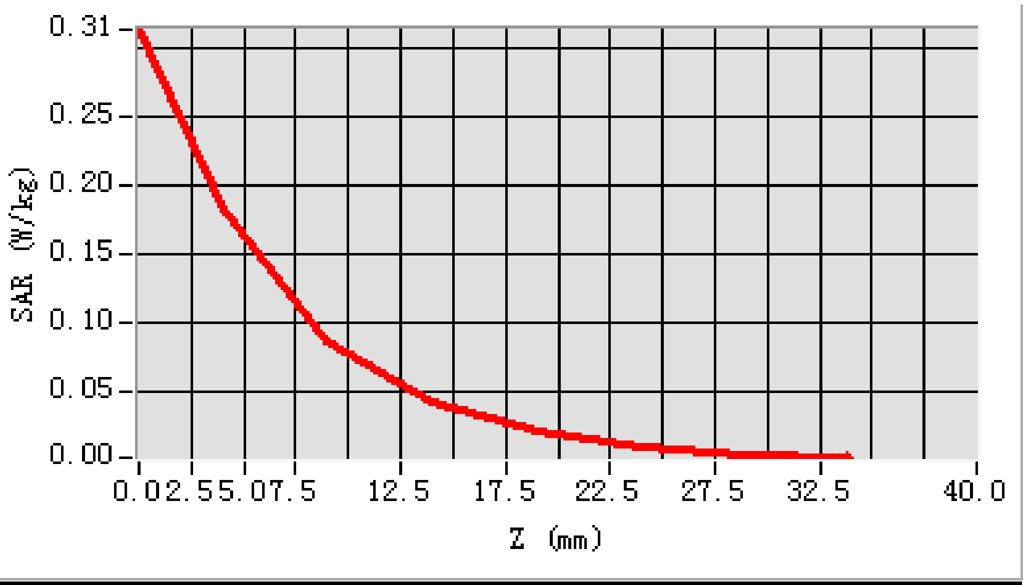
MEAS. 32 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11n (HT-40) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.75; Conductivity: 1.93 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-4.000000, Y=36.000000
SAR 10g (W/Kg):	0.076265
SAR 1g (W/Kg):	0.170834
Power drift (%):	3.58

3D screen shot



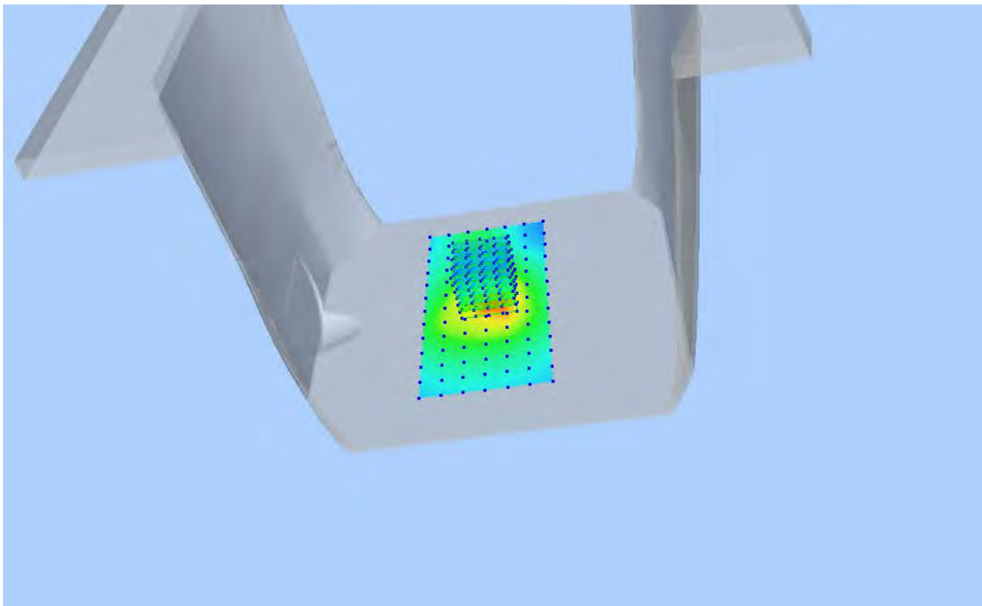
Z Axis Scan



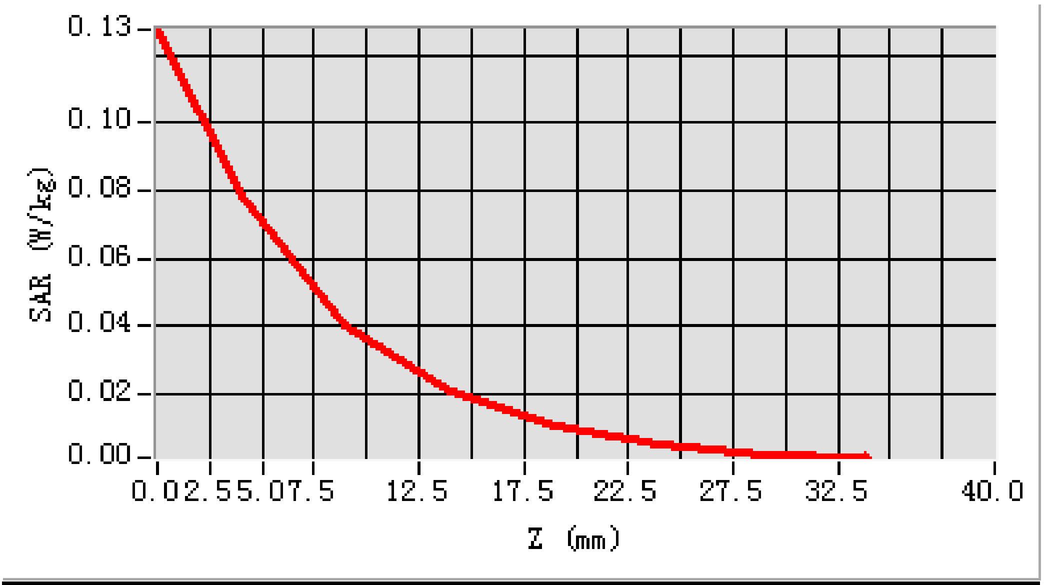
MEAS. 33 Body Plane with Vertical-Front on Low Channel in IEEE 802.11n (HT-40) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.75; Conductivity: 1.93 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=20.000000, Y=60.000000
SAR 10g (W/Kg):	0.035457
SAR 1g (W/Kg):	0.072961
Power drift (%):	-1.11

3D screen shot



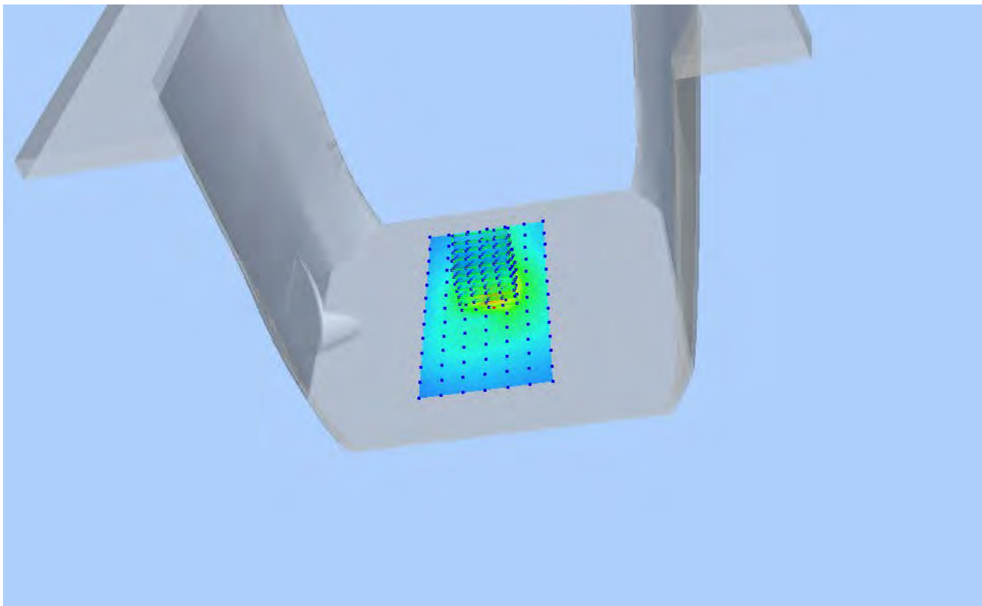
Z Axis Scan



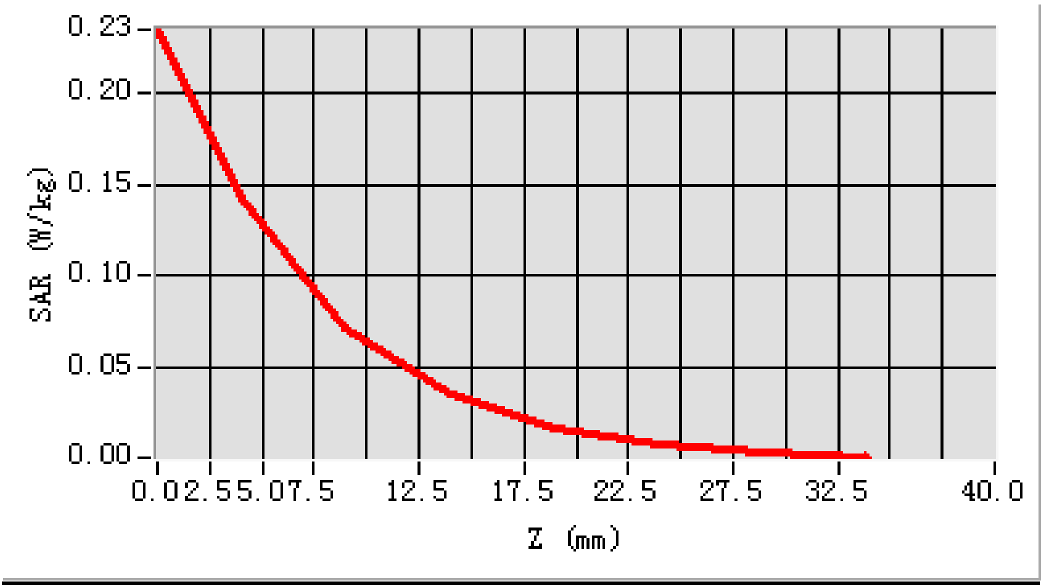
MEAS. 34 Body Plane with Vertical-Back on Low Channel in IEEE 802.11n (HT-40) ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.75; Conductivity: 1.93 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=20.000000, Y=60.000000
SAR 10g (W/Kg):	0.061598
SAR 1g (W/Kg):	0.132965
Power drift (%):	-4.01

3D screen shot



Z Axis Scan

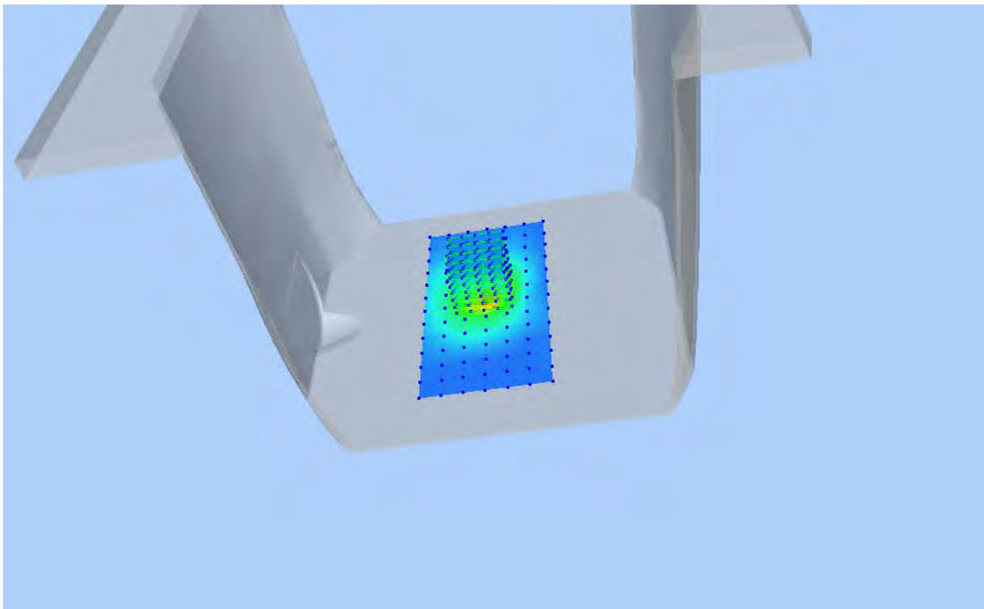


MEAS. 35 Body Plane with Tip Edge on Low Channel in IEEE 802.11n (HT-40)

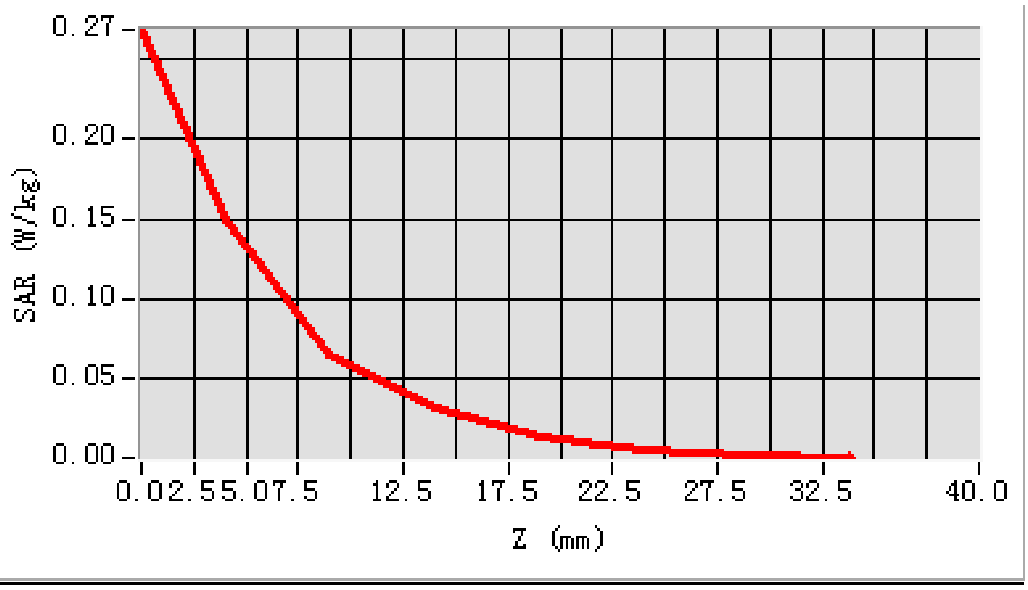
ANT A mode

Test Date:	27/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=-22.000000
SAR 10g (W/Kg):	0.057091
SAR 1g (W/Kg):	0.137397
Power drift (%):	-2.08

3D screen shot



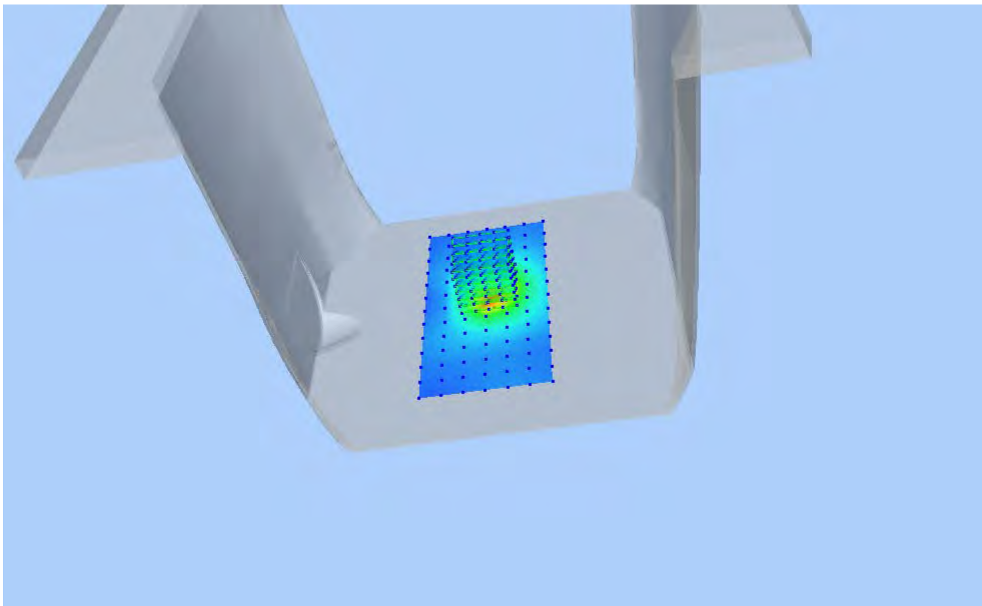
Z Axis Scan



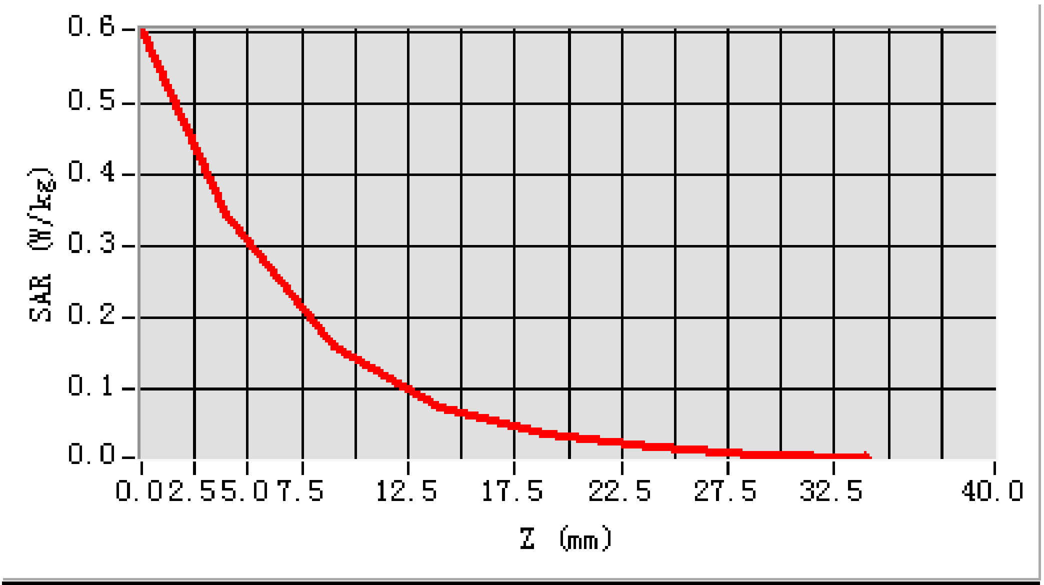
MEAS. 36 Body Plane with Horizontal-Down on High Channel in IEEE 802.11n (HT-40) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2452.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.40; Conductivity: 1.90 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=20.000000, Y=60.000000
SAR 10g (W/Kg):	0.070261
SAR 1g (W/Kg):	0.144365
Power drift (%):	0.80

3D screen shot



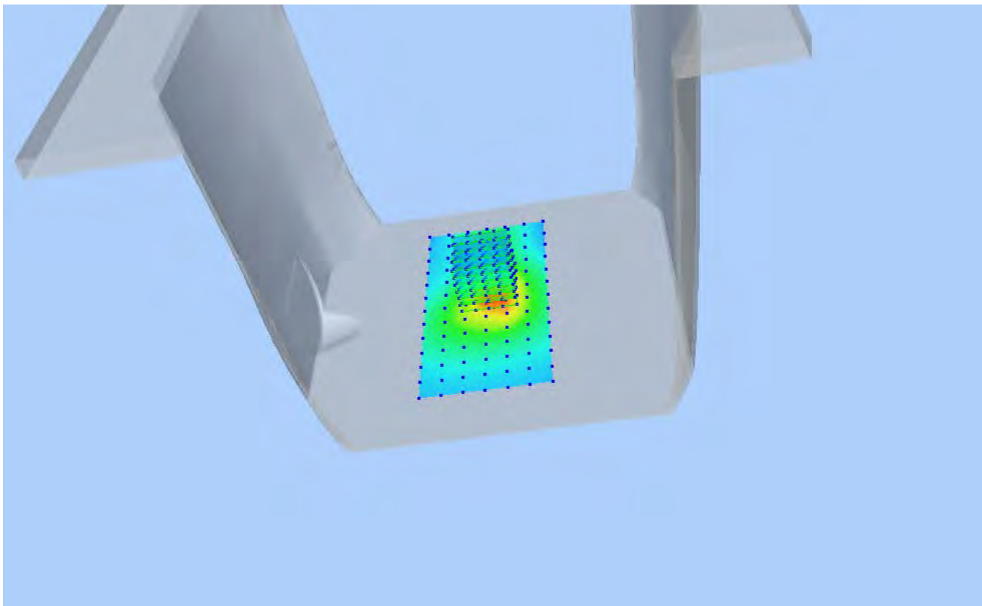
Z Axis Scan



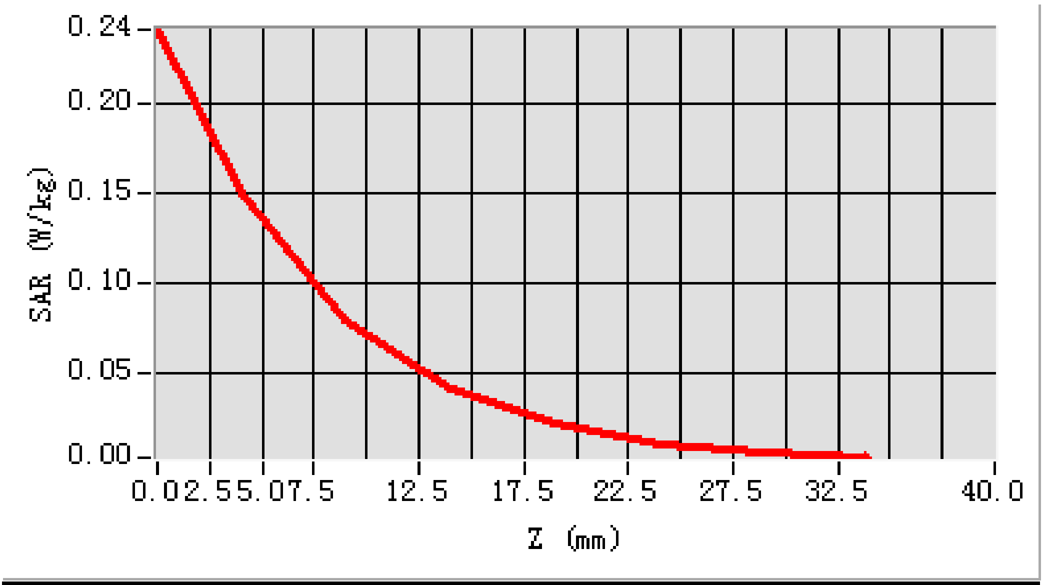
MEAS. 37 Body Plane with Horizontal-Up on High Channel in IEEE 802.11n (HT-40) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2452.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.40; Conductivity: 1.90 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=-22.000000
SAR 10g (W/Kg):	0.134155
SAR 1g (W/Kg):	0.316584
Power drift (%):	-1.62

3D screen shot



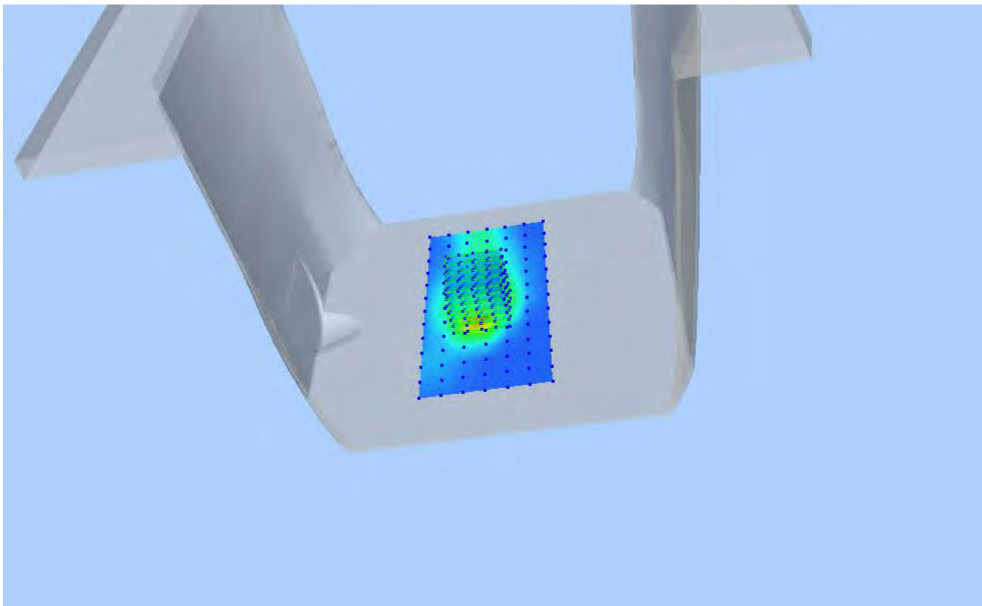
Z Axis Scan



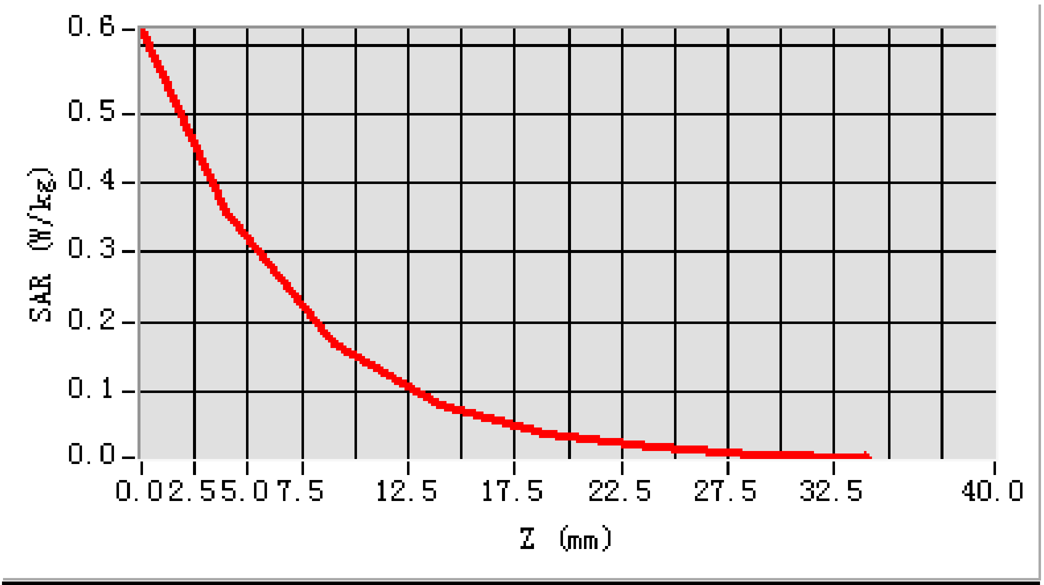
MEAS. 38 Body Plane with Vertical-Front on High Channel in IEEE 802.11n (HT-40) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2452.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.40; Conductivity: 1.90 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=20.000000, Y=60.000000
SAR 10g (W/Kg):	0.151006
SAR 1g (W/Kg):	0.338086
Power drift (%):	-0.65

3D screen shot



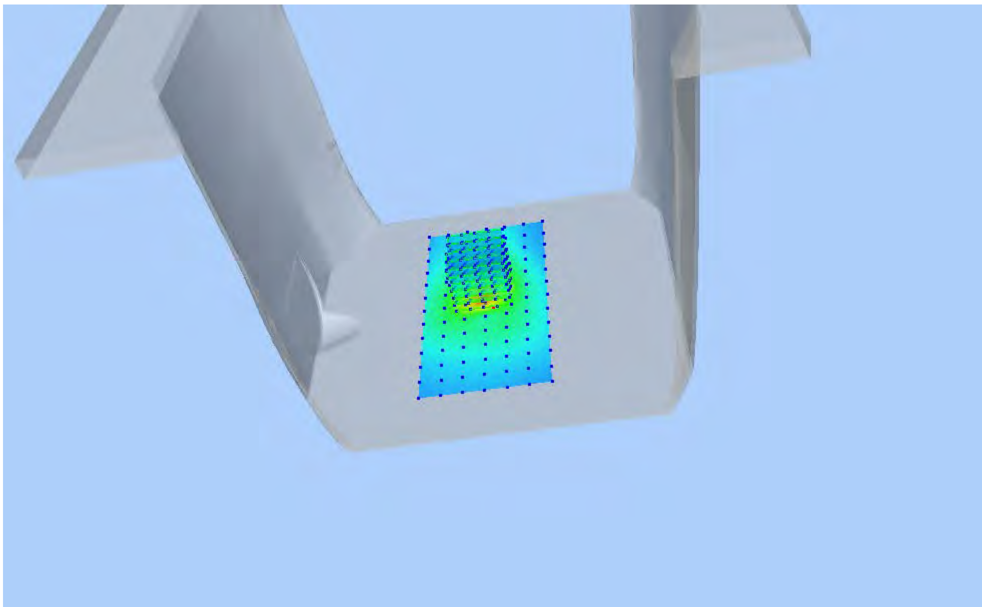
Z Axis Scan



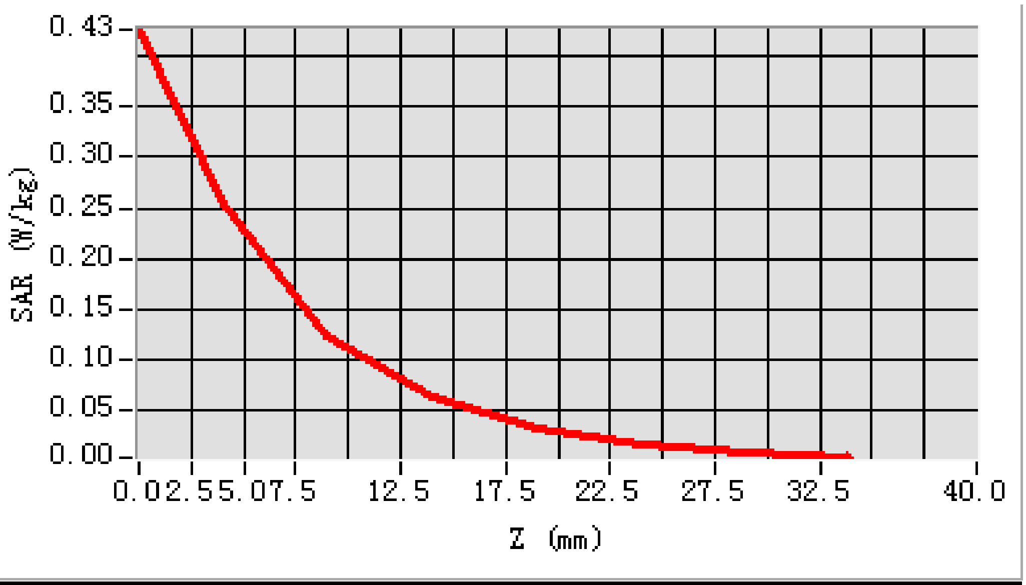
MEAS. 39 Body Plane with Vertical-Back on High Channel in IEEE 802.11n (HT-40) ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2452.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.40; Conductivity: 1.90 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=20.000000, Y=60.000000
SAR 10g (W/Kg):	0.109871
SAR 1g (W/Kg):	0.242913
Power drift (%):	-2.03

3D screen shot



Z Axis Scan

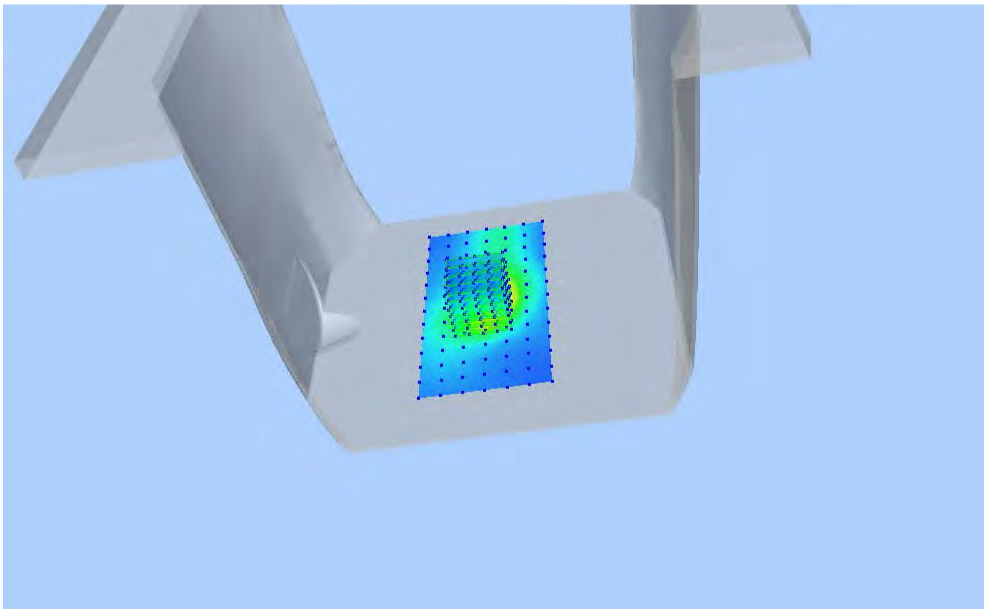


MEAS. 40 Body Plane with Tip Edge on High Channel in IEEE 802.11n (HT-40)

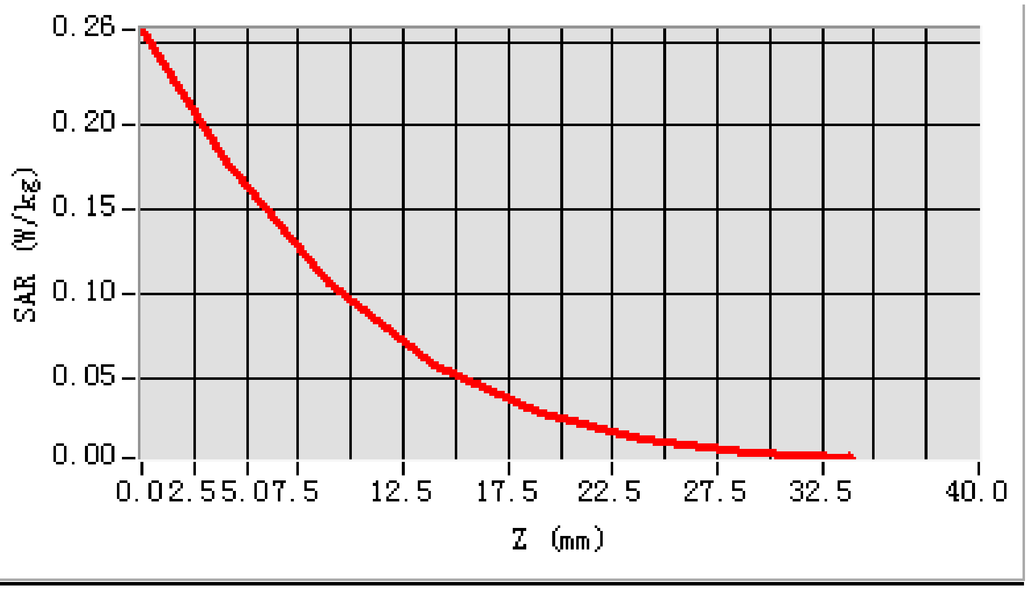
ANT B mode

Test Date:	27/6/2015
Signal:	WLAN, f=2452.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 50.40; Conductivity: 1.90 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP 187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=8.000000, Y=0.000000
SAR 10g (W/Kg):	0.098048
SAR 1g (W/Kg):	0.218281
Power drift (%):	-3.77

3D screen shot



Z Axis Scan

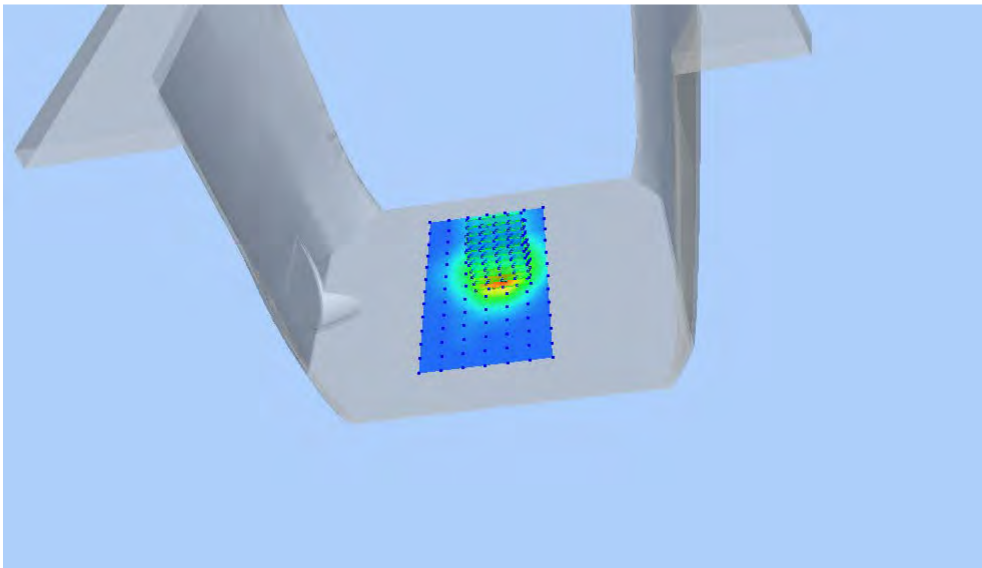


MEAS. 41 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11n

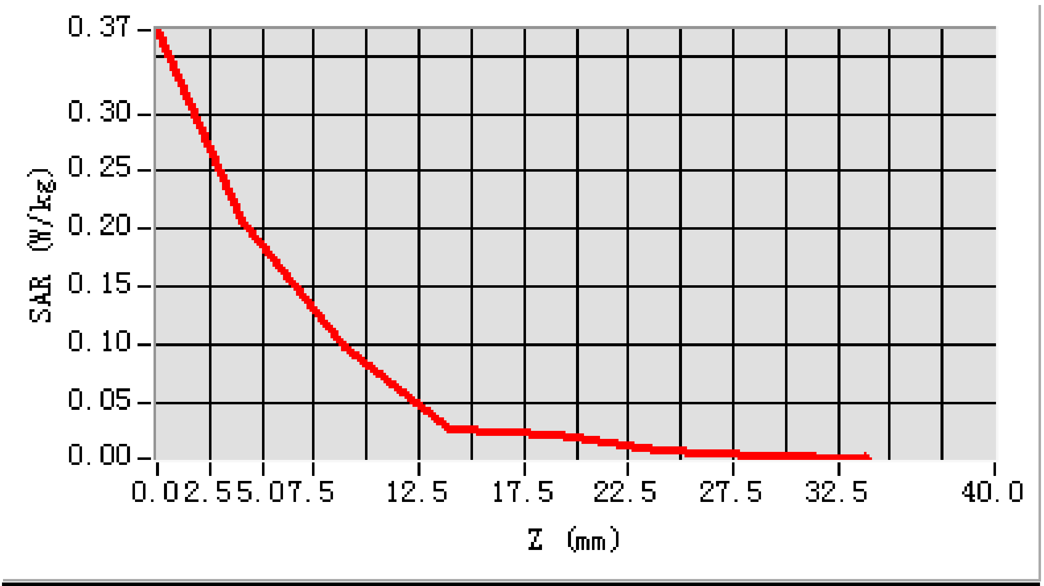
HT20 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-16.000000, Y=-4.000000
SAR 10g (W/Kg):	0.090351
SAR 1g (W/Kg):	0.206863
Power drift (%):	-3.53

3D screen shot



Z Axis Scan

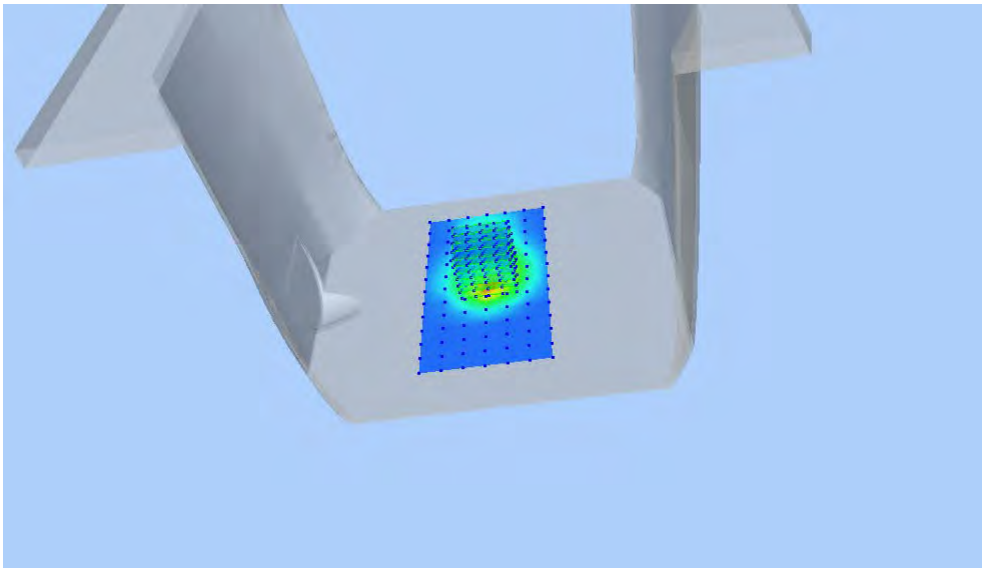


MEAS. 42 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11n

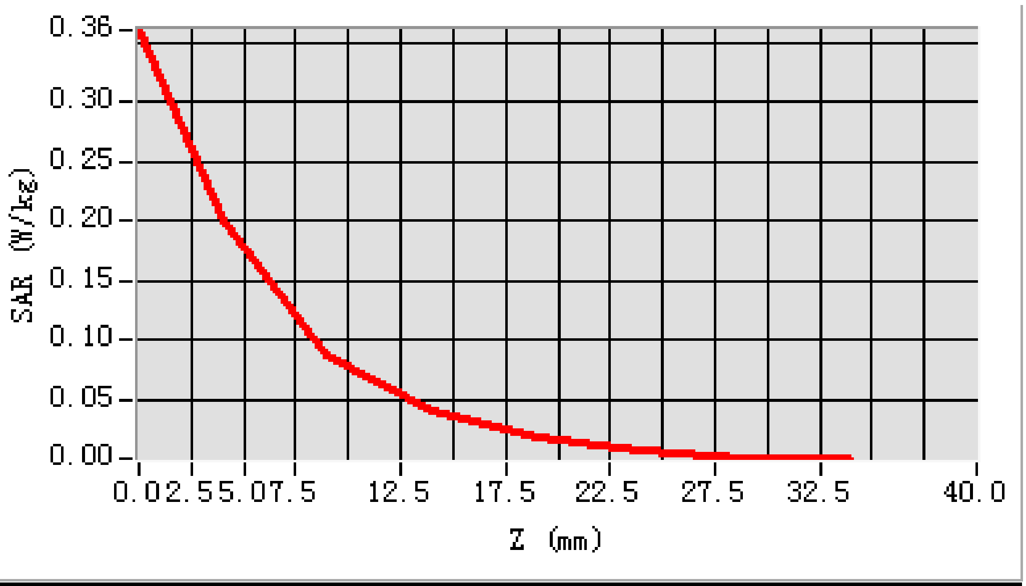
HT20 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=16.000000, Y=2.000000
SAR 10g (W/Kg):	0.081754
SAR 1g (W/Kg):	0.193193
Power drift (%):	3.21

3D screen shot



Z Axis Scan

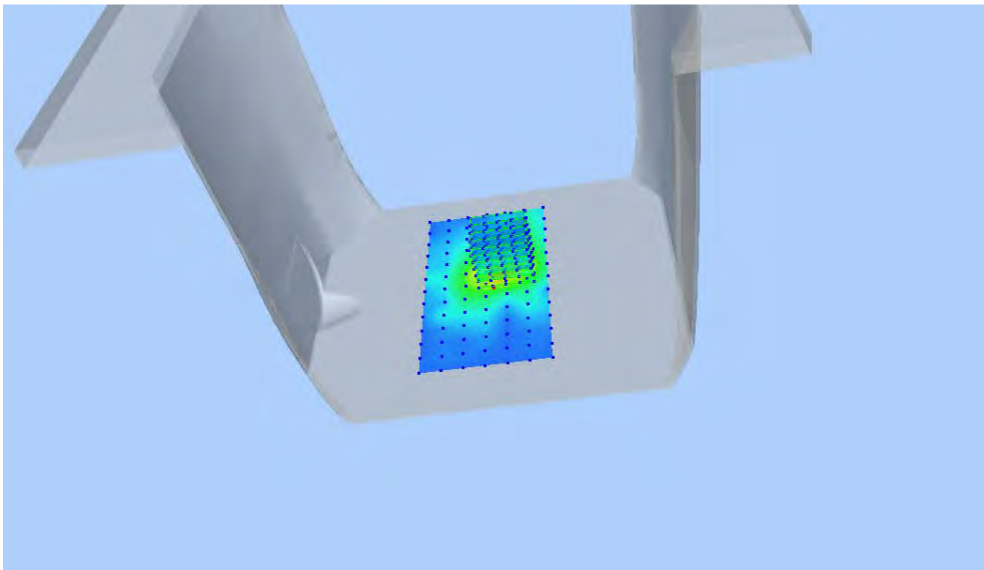


MEAS. 43 Body Plane with Vertical-Front on Low Channel in IEEE 802.11n

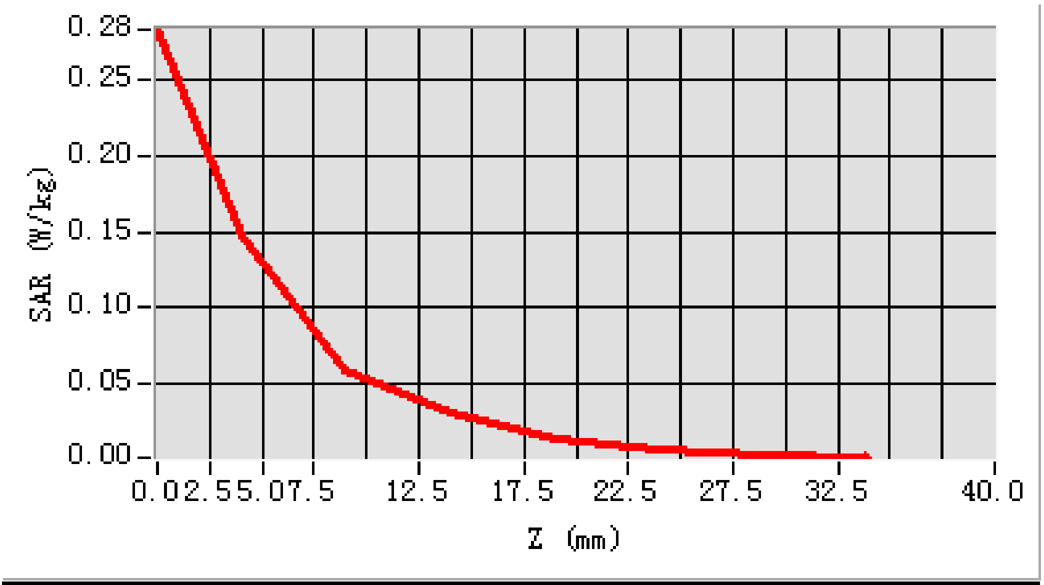
HT20 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=-8.000000, Y=-16.000000
SAR 10g (W/Kg):	0.061350
SAR 1g (W/Kg):	0.143769
Power drift (%):	-2.01

3D screen shot



Z Axis Scan

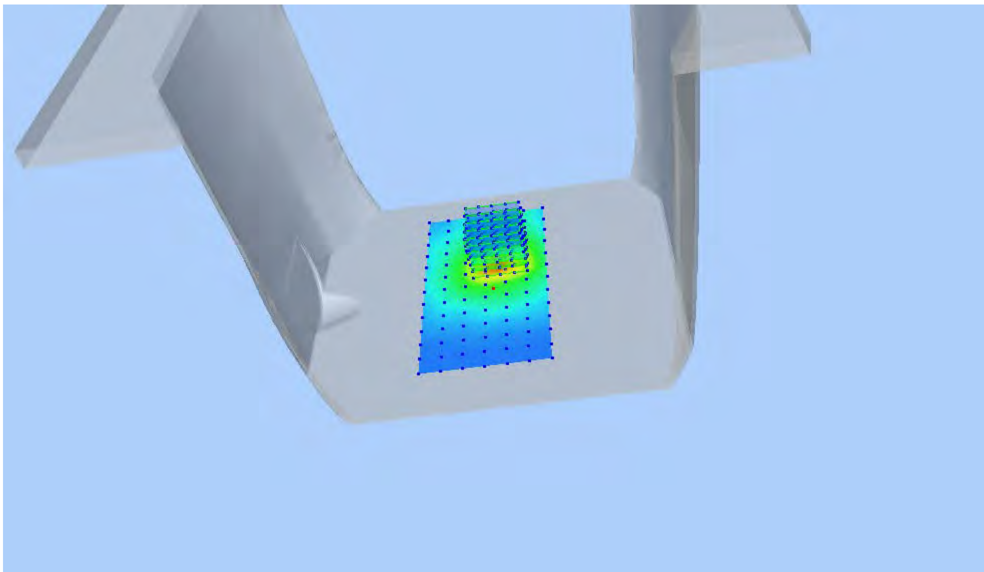


MEAS. 44 Body Plane with Vertical-Back on Low Channel in IEEE 802.11n

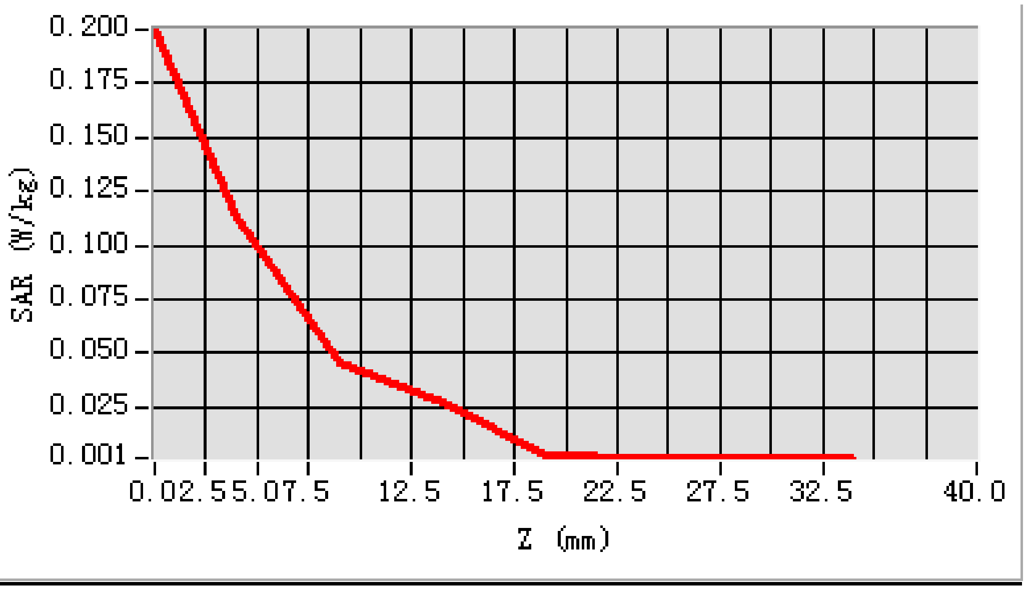
HT20 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=-56.000000
SAR 10g (W/Kg):	0.044852
SAR 1g (W/Kg):	0.108877
Power drift (%):	-1.89

3D screen shot



Z Axis Scan

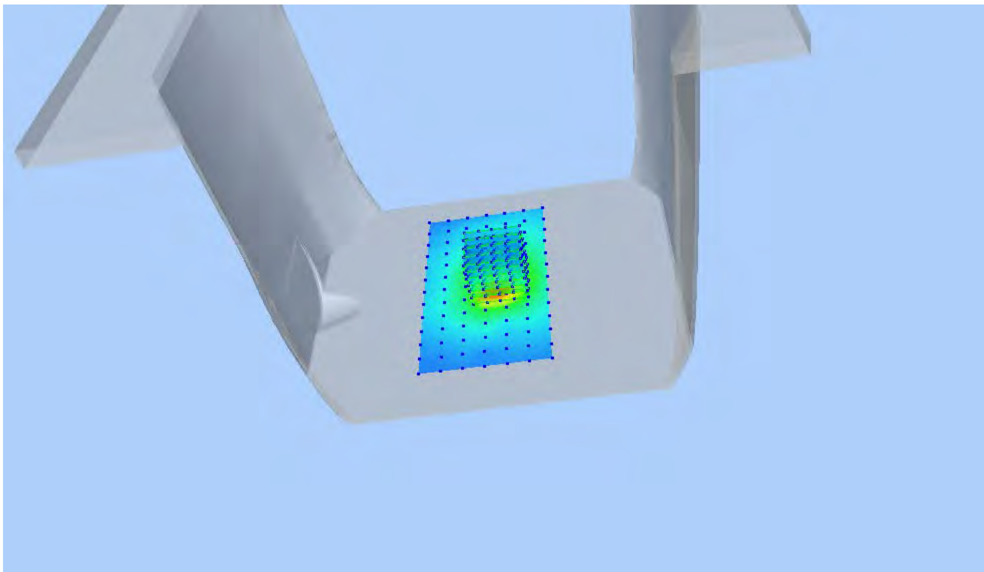


MEAS. 45 Body Plane with Tip Edge on Low Channel in IEEE 802.11n HT20

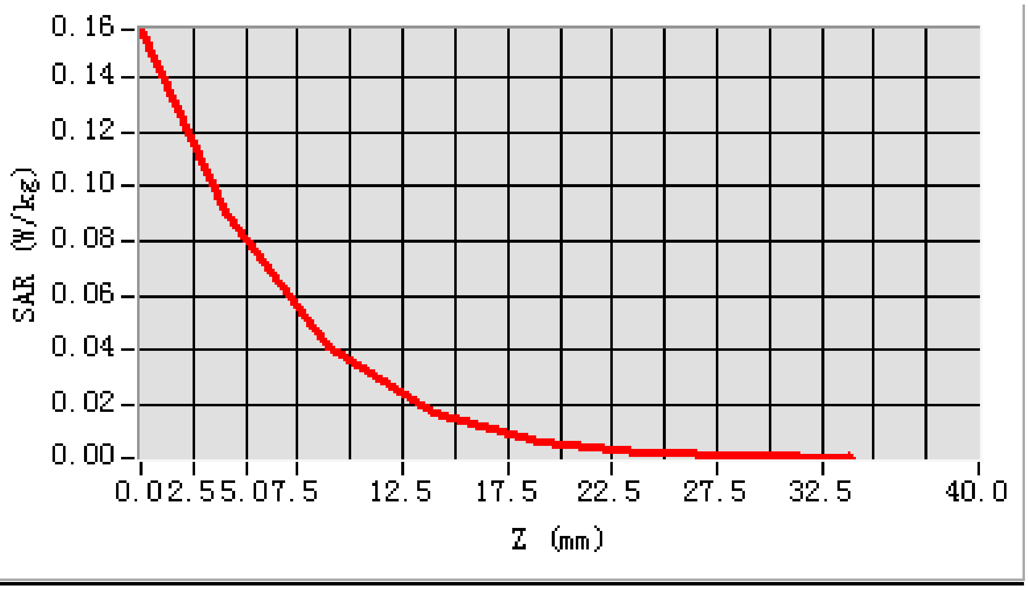
MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2412.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=24.000000, Y=-22.000000
SAR 10g (W/Kg):	0.035994
SAR 1g (W/Kg):	0.086345
Power drift (%):	4.25

3D screen shot



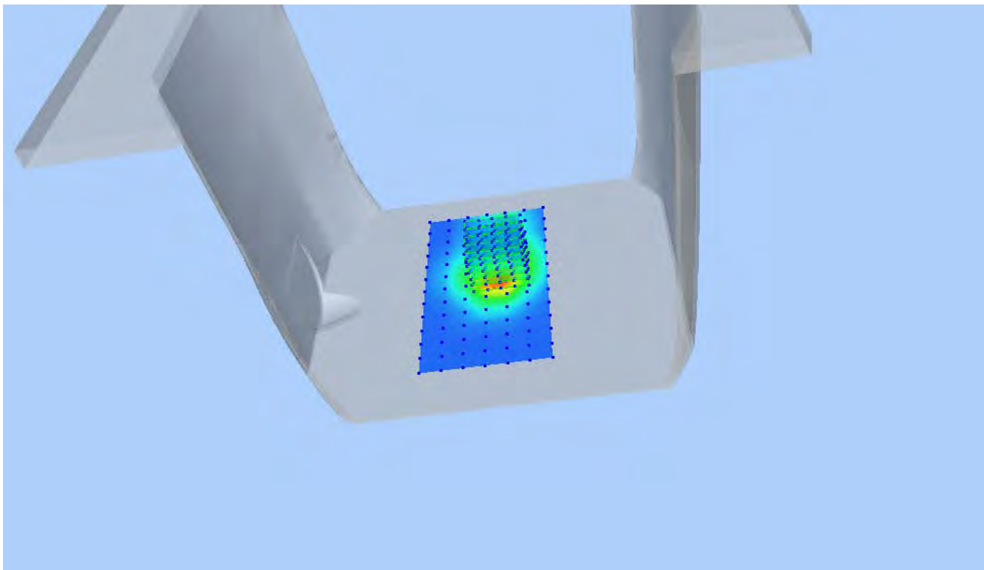
Z Axis Scan



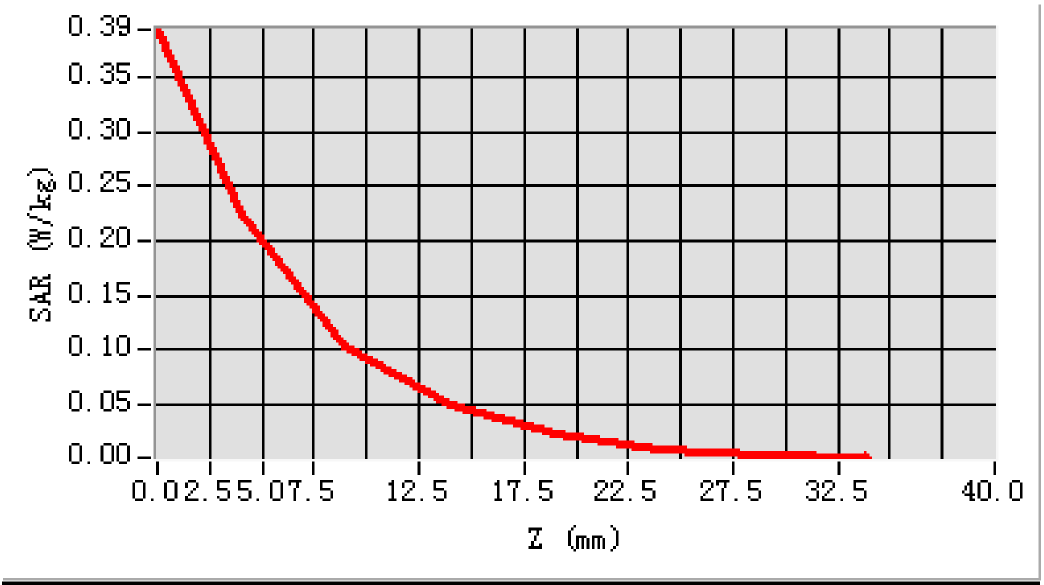
MEAS. 46 Body Plane with Horizontal-Down on Low Channel in IEEE 802.11n HT40 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=8.000000, Y=16.000000
SAR 10g (W/Kg):	0.098593
SAR 1g (W/Kg):	0.219922
Power drift (%):	-2.65

3D screen shot



Z Axis Scan

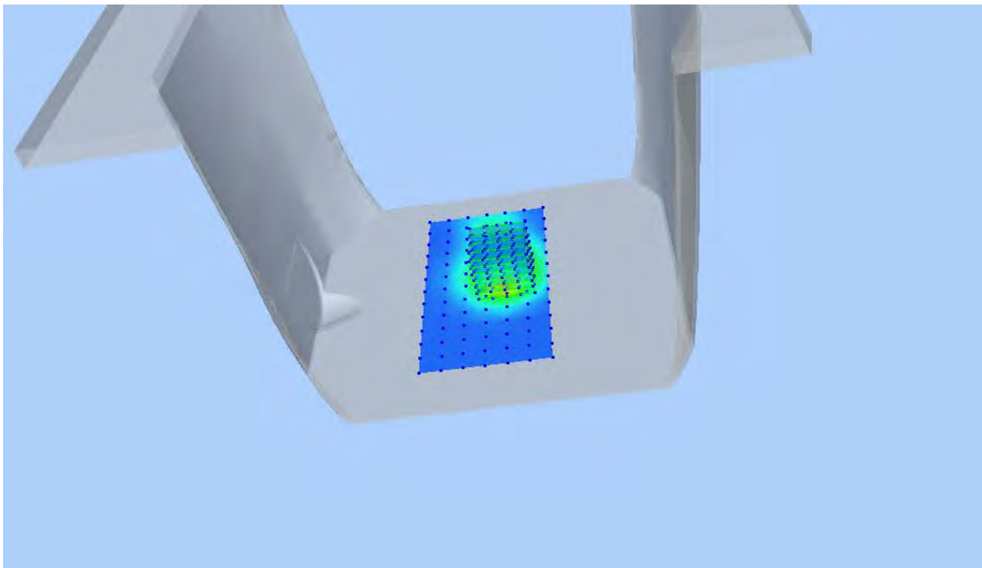


MEAS. 47 Body Plane with Horizontal-Up on Low Channel in IEEE 802.11n

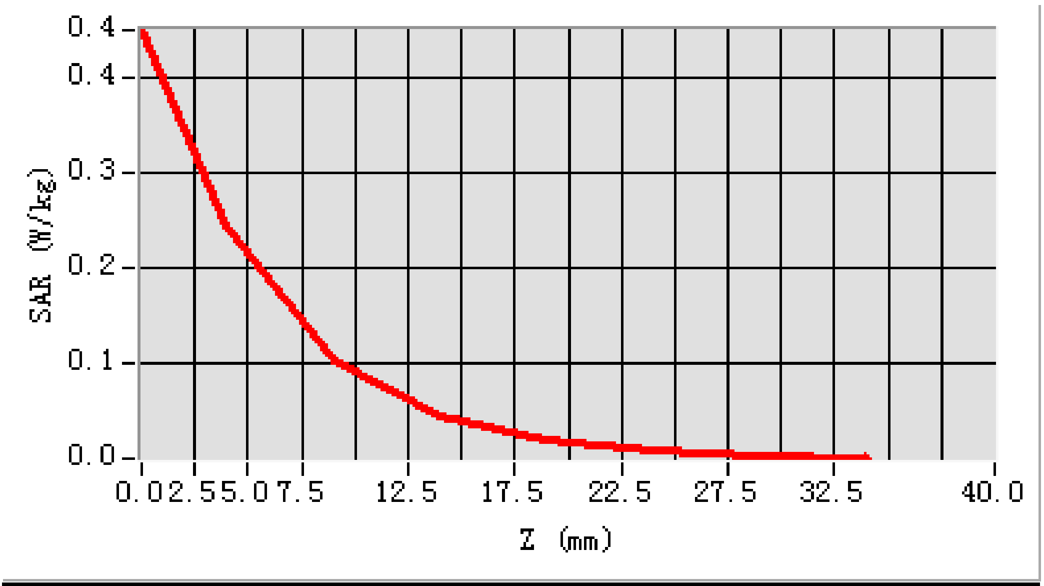
HT40 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=18.000000, Y=-6.000000
SAR 10g (W/Kg):	0.094955
SAR 1g (W/Kg):	0.227949
Power drift (%):	-4.27

3D screen shot



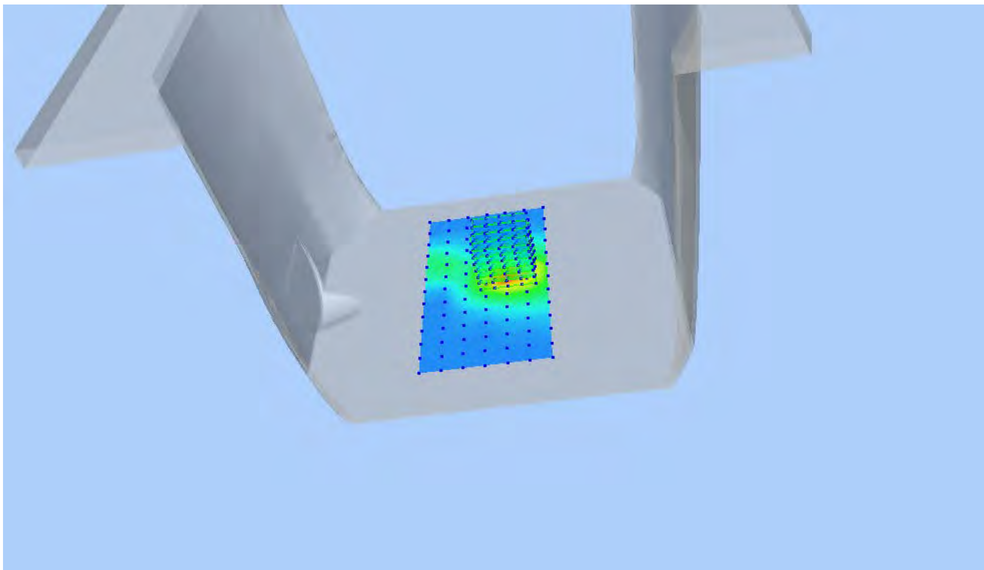
Z Axis Scan



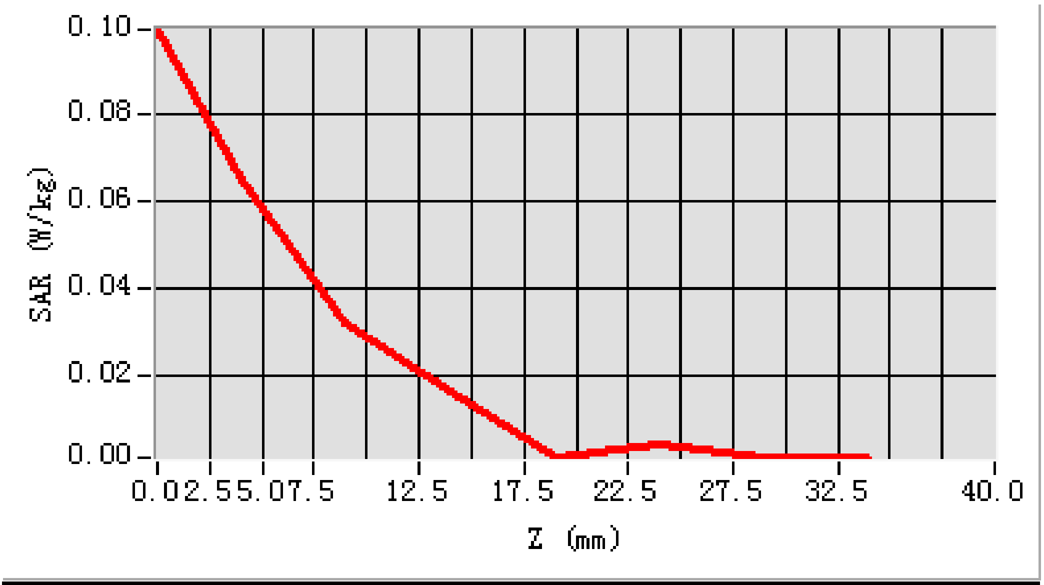
MEAS. 48 Body Plane with Vertical-Front on Low Channel in IEEE 802.11n HT40 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=30.000000, Y=-22.000000
SAR 10g (W/Kg):	0.026288
SAR 1g (W/Kg):	0.058985
Power drift (%):	-1.41

3D screen shot



Z Axis Scan

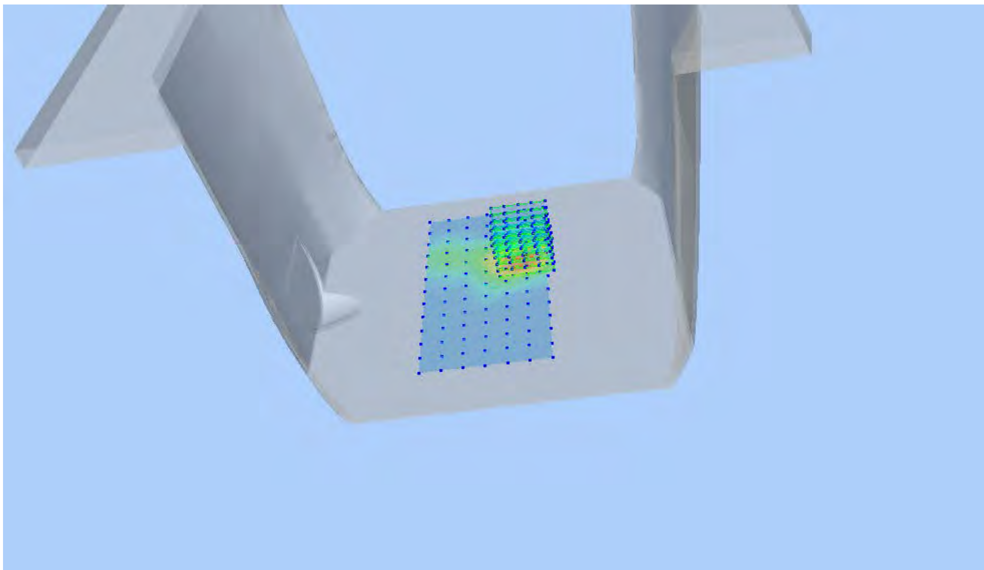


MEAS. 49 Body Plane with Vertical-Back on Low Channel in IEEE 802.11n

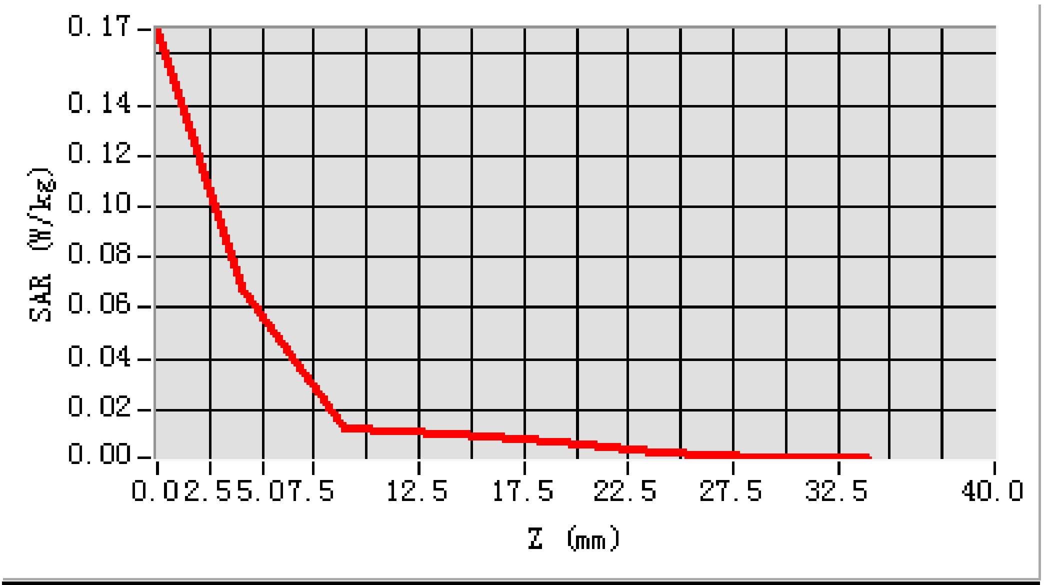
HT40 MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=10.000000, Y=-12.000000
SAR 10g (W/Kg):	0.028684
SAR 1g (W/Kg):	0.071686
Power drift (%):	2.70

3D screen shot



Z Axis Scan

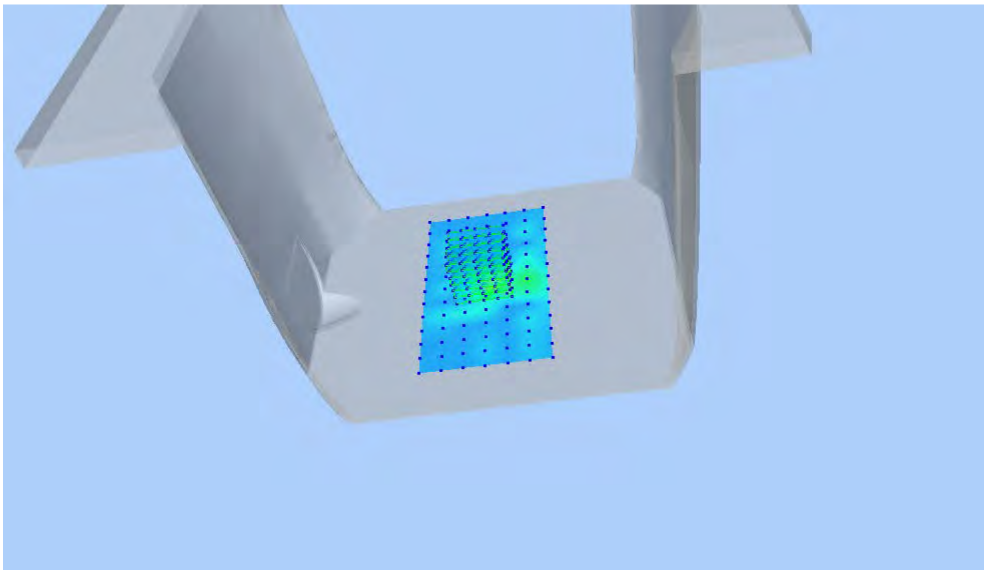


MEAS. 50 Body Plane with Tip Edge on Low Channel in IEEE 802.11n HT40

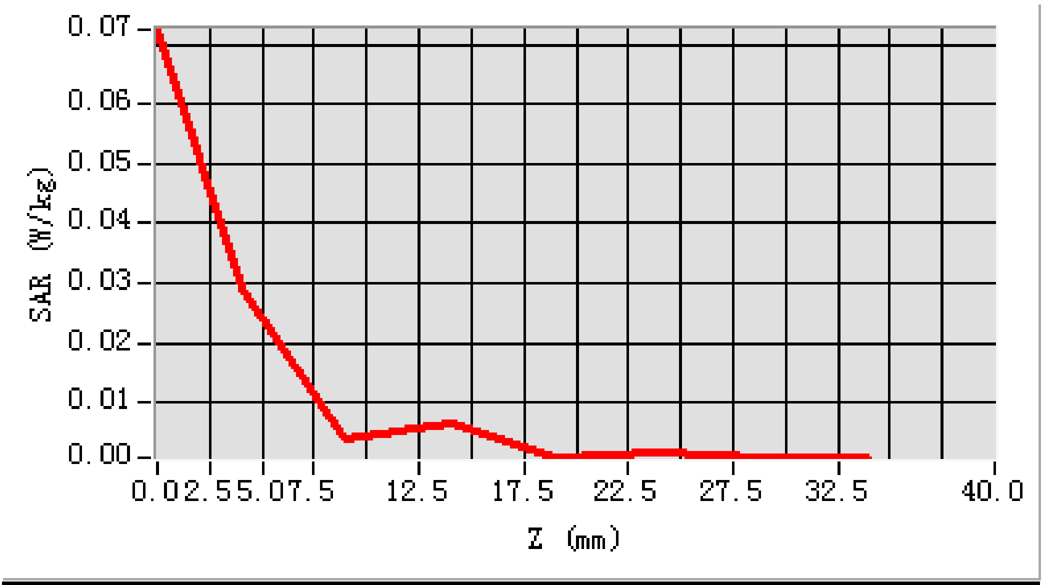
MIMO mode

Test Date:	16/6/2015
Signal:	WLAN, f=2422.0 MHz, Duty Cycle: 1:1.0
Liquid Parameters:	Permittivity: 52.75; Conductivity: 1.91 S/m
Test condition:	Ambient Temperature: 22.7°C, Liquid Temperature: 22.1°C
Probe:	EP187, ConvF: 4.42
Area Scan:	sam_direct_droit2_surf12mm.txt, h= 5.00 mm
Zoom Scan:	5x5x7,dx=8mm, dy=8mm, dz=5mm,Complete
Maximum location:	X=16.000000, Y=-8.000000
SAR 10g (W/Kg):	0.008937
SAR 1g (W/Kg):	0.026394
Power drift (%):	-1.95

3D screen shot

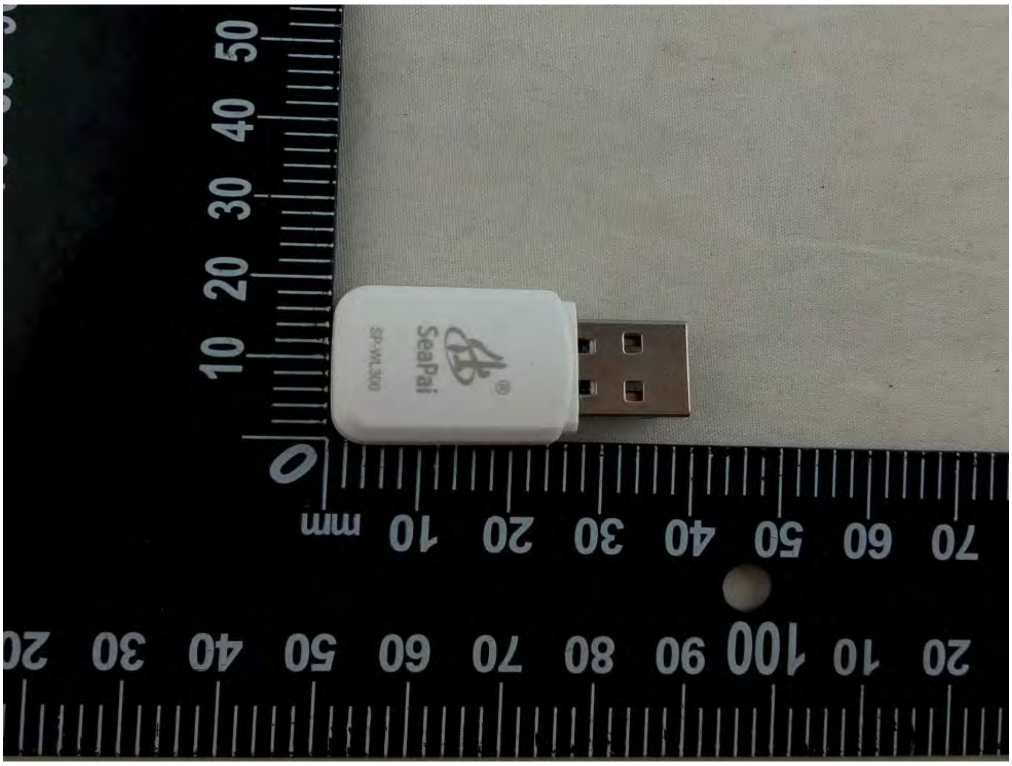


Z Axis Scan

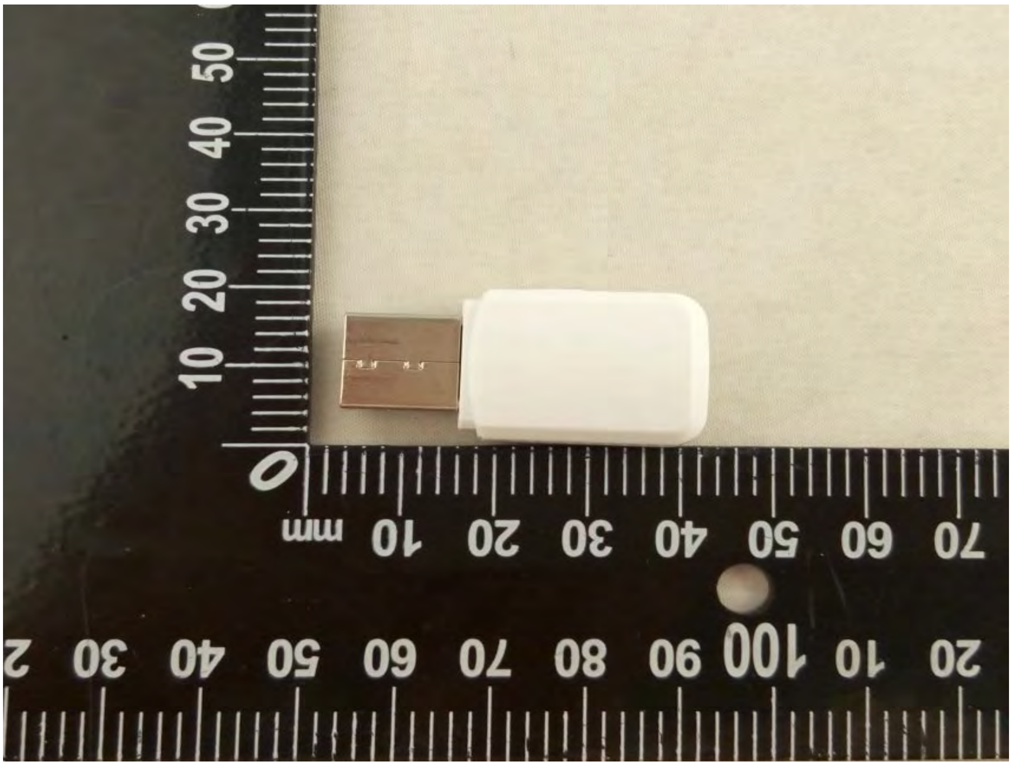


ANNEX D EUT PHOTO

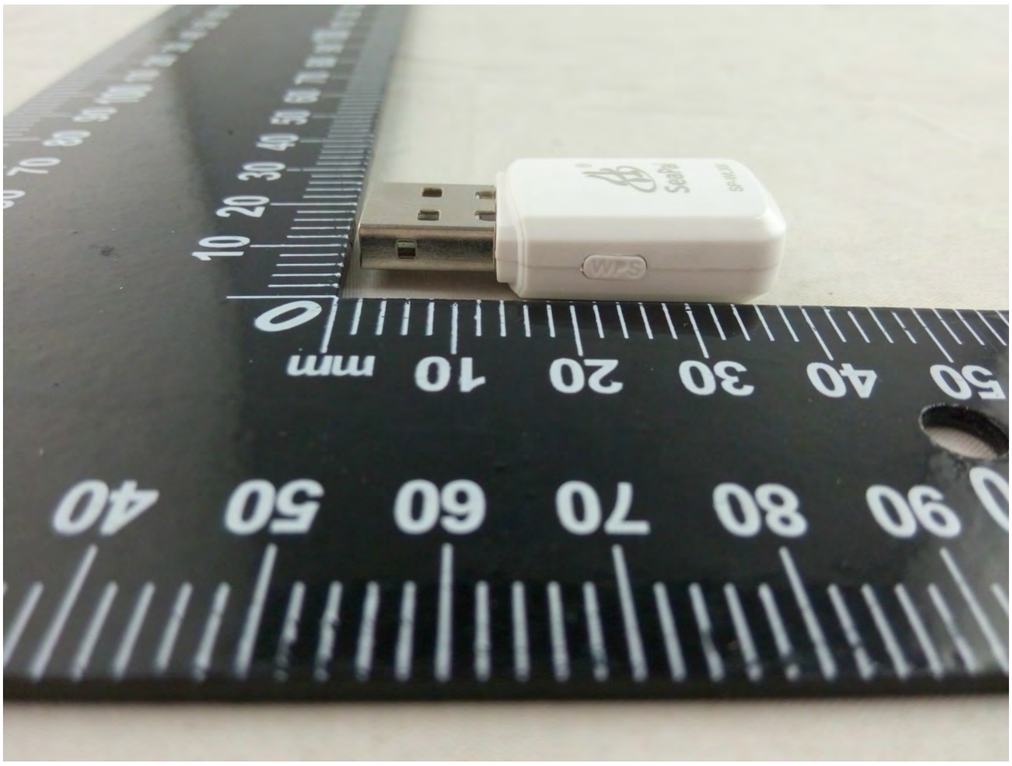
THE FRONT OF EUT



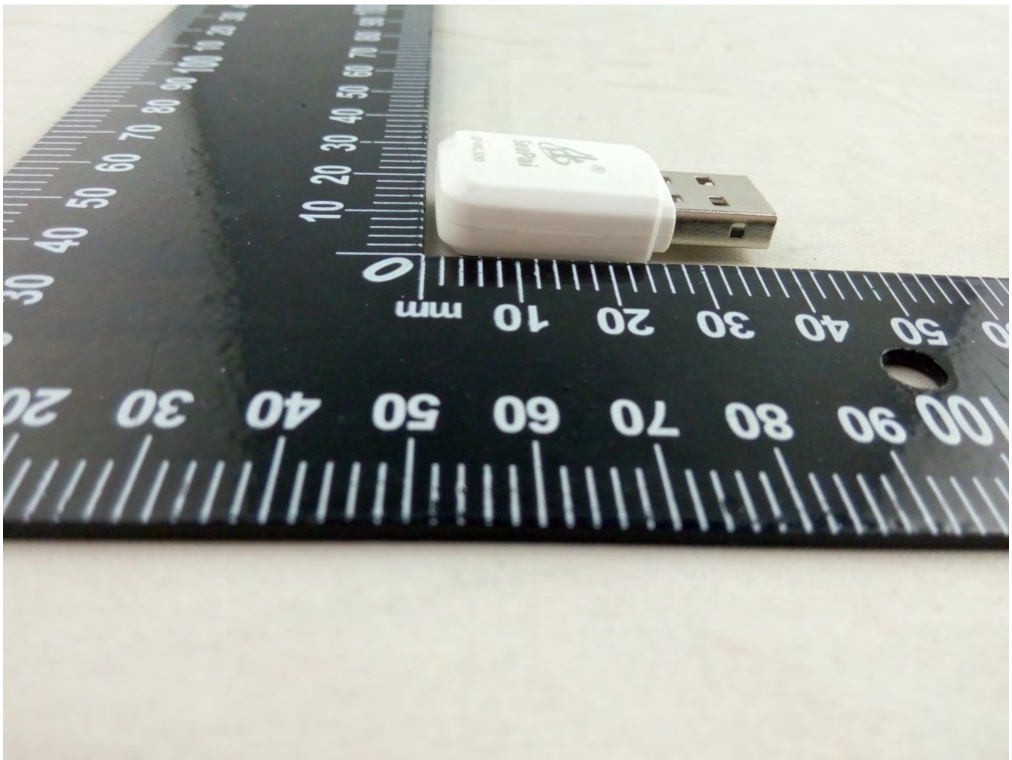
THE BACK OF EUT



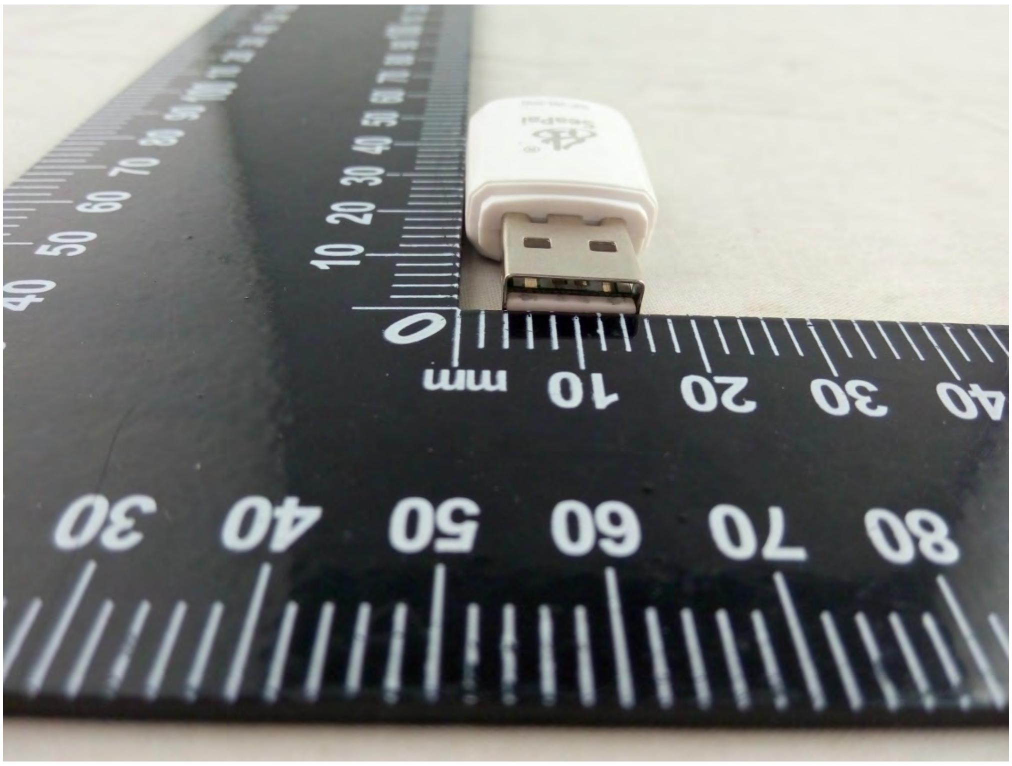
THE LEFT OF EUT



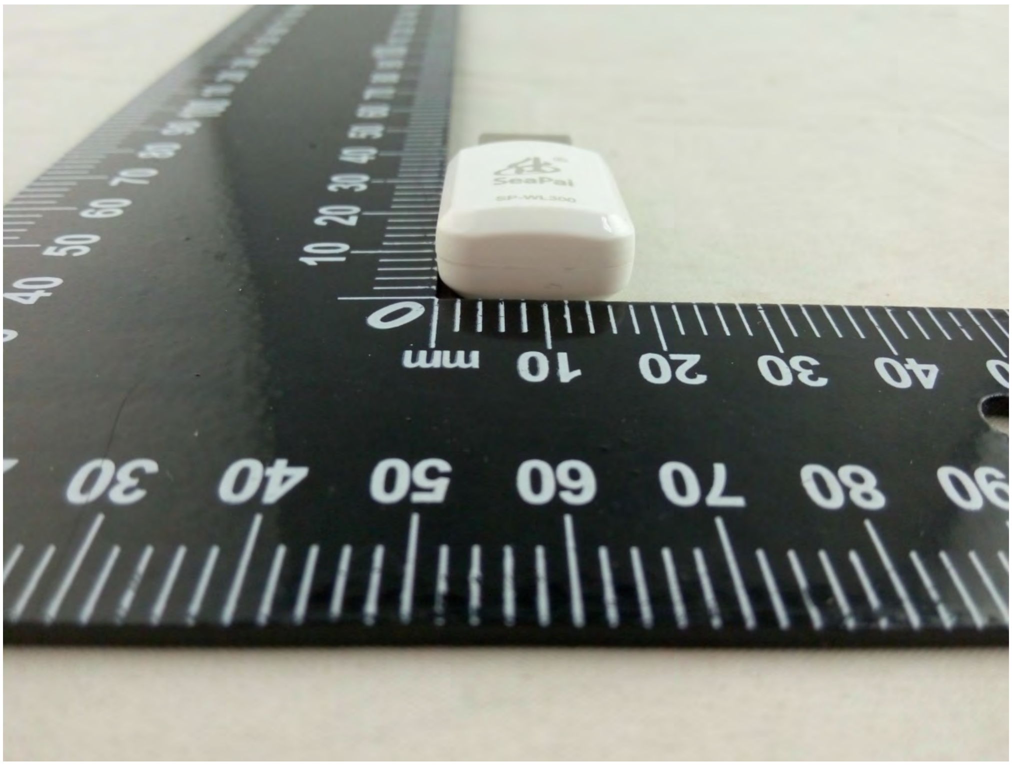
THE RIGHT OF EUT



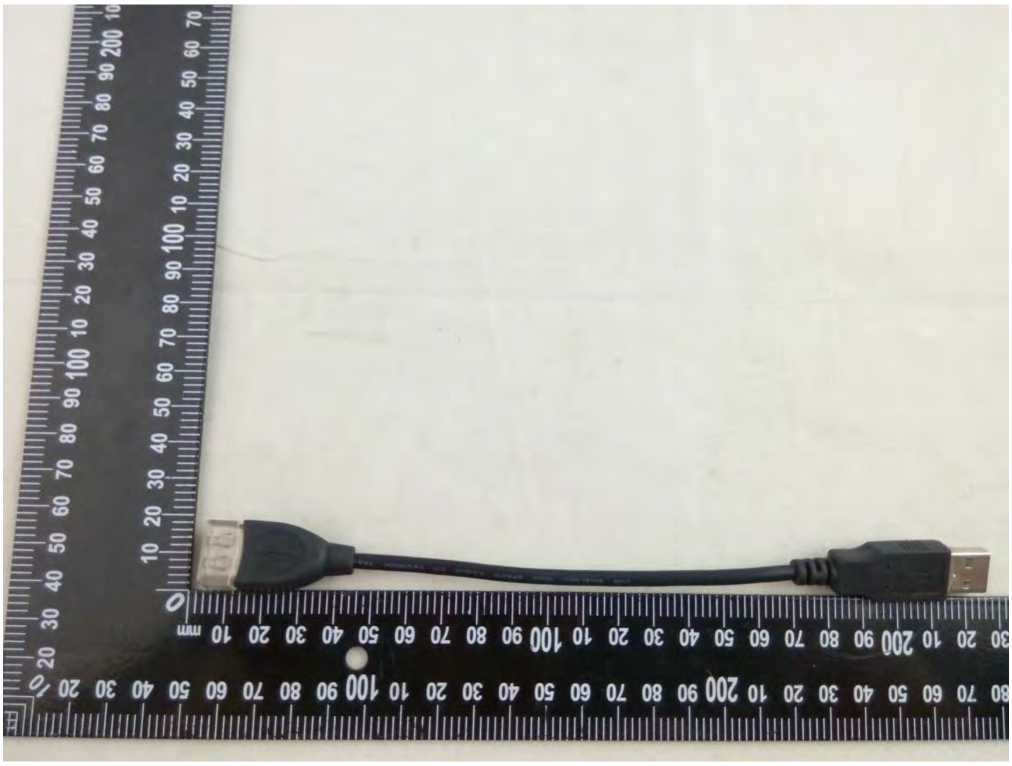
THE UP OF EUT



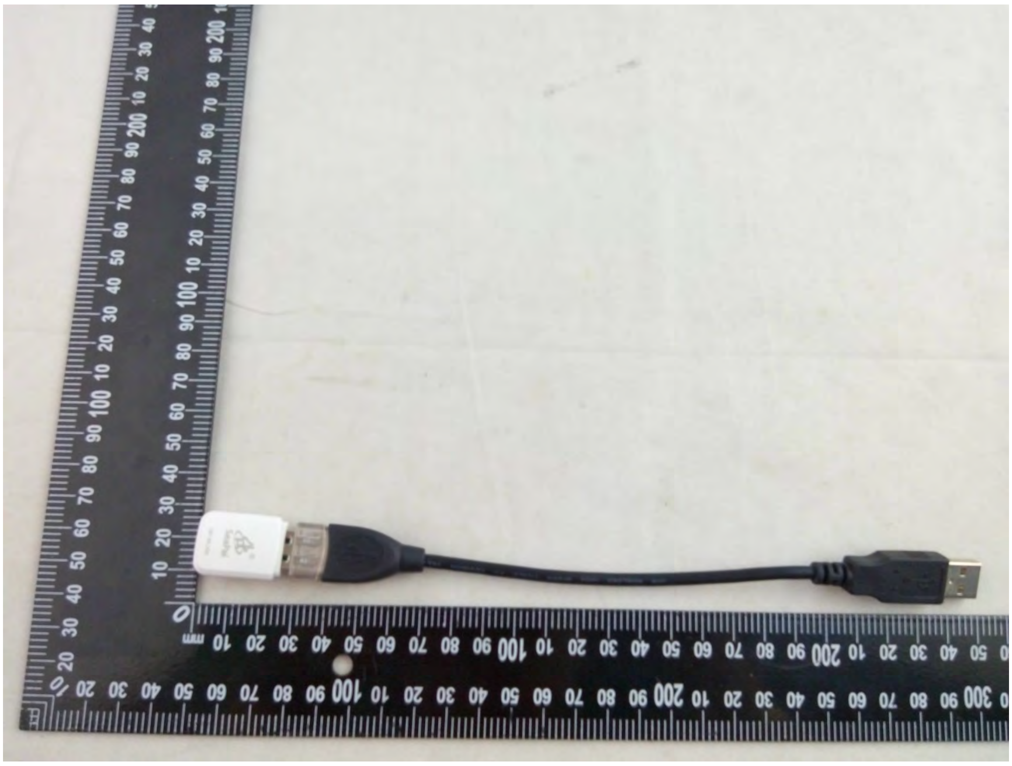
THE DOWN OF EUT



THE USB CABLE

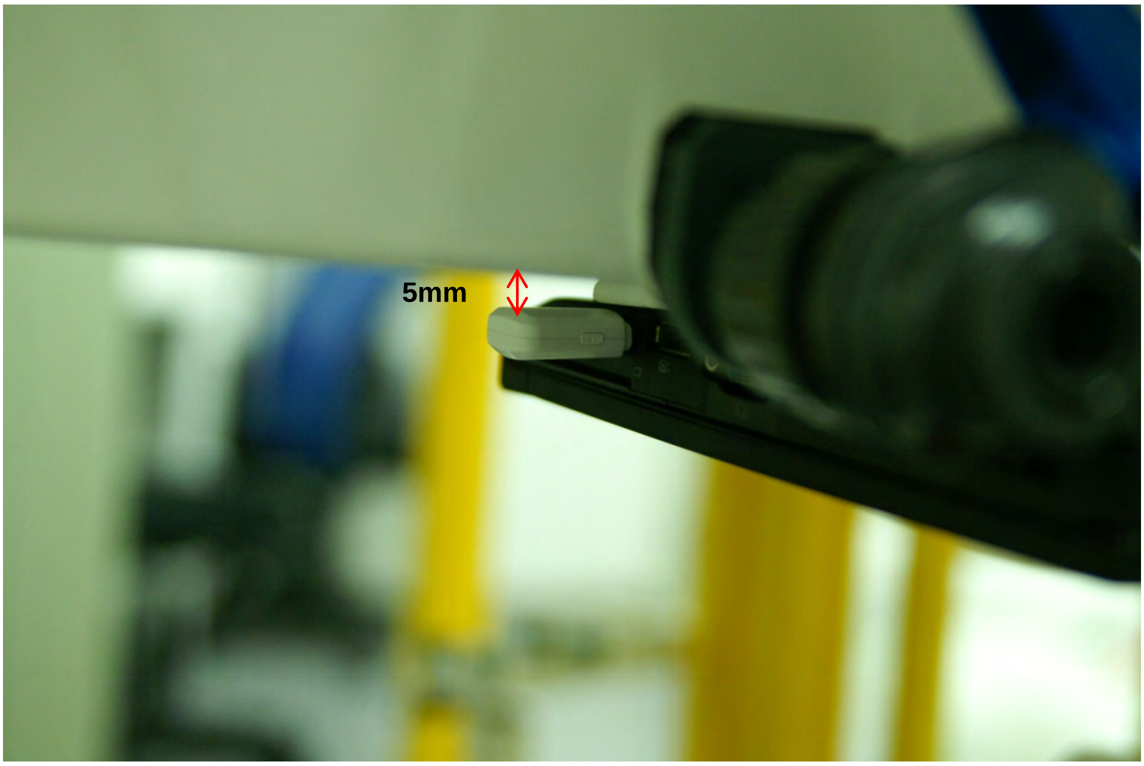


THE COVER

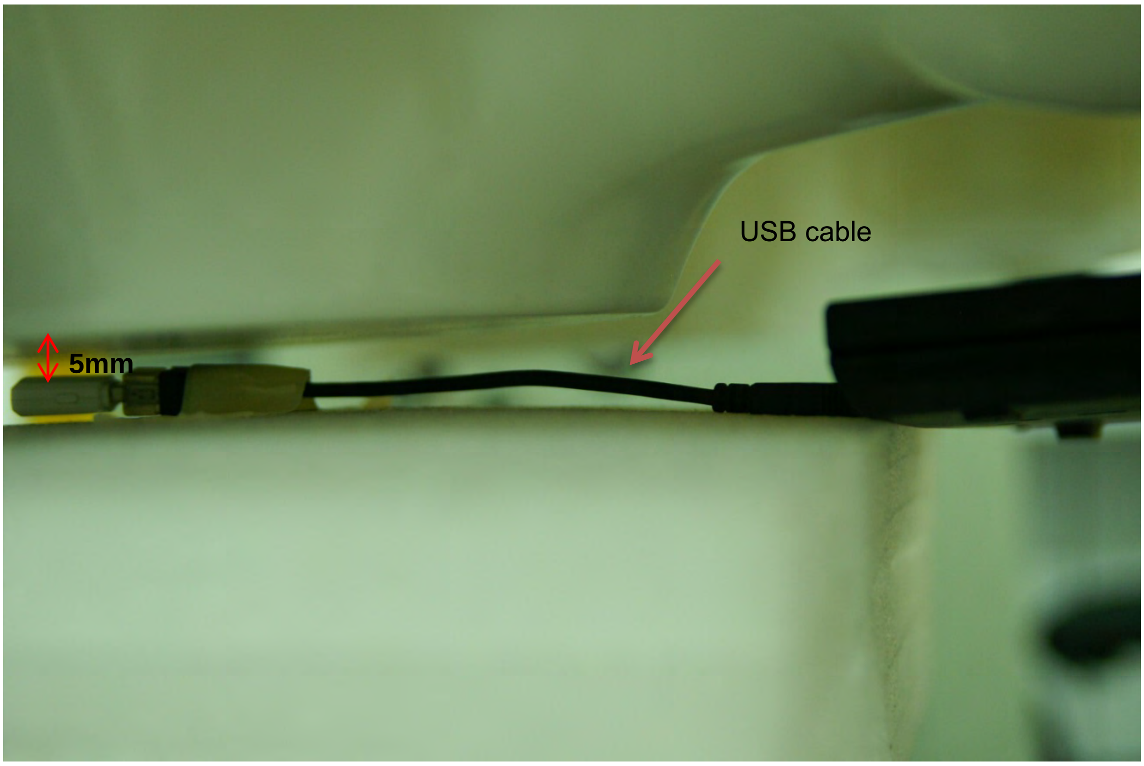


ANNEX E TEST SETUP PHOTOS

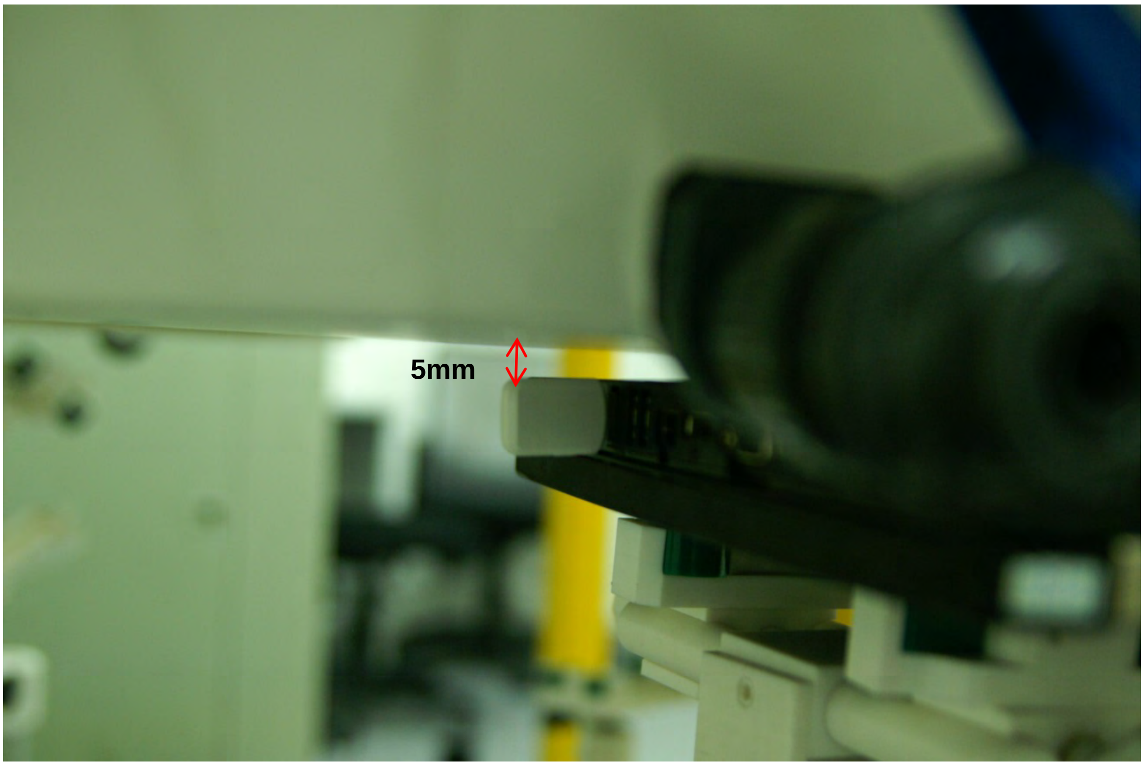
Horizontal-Up(5mm separation)



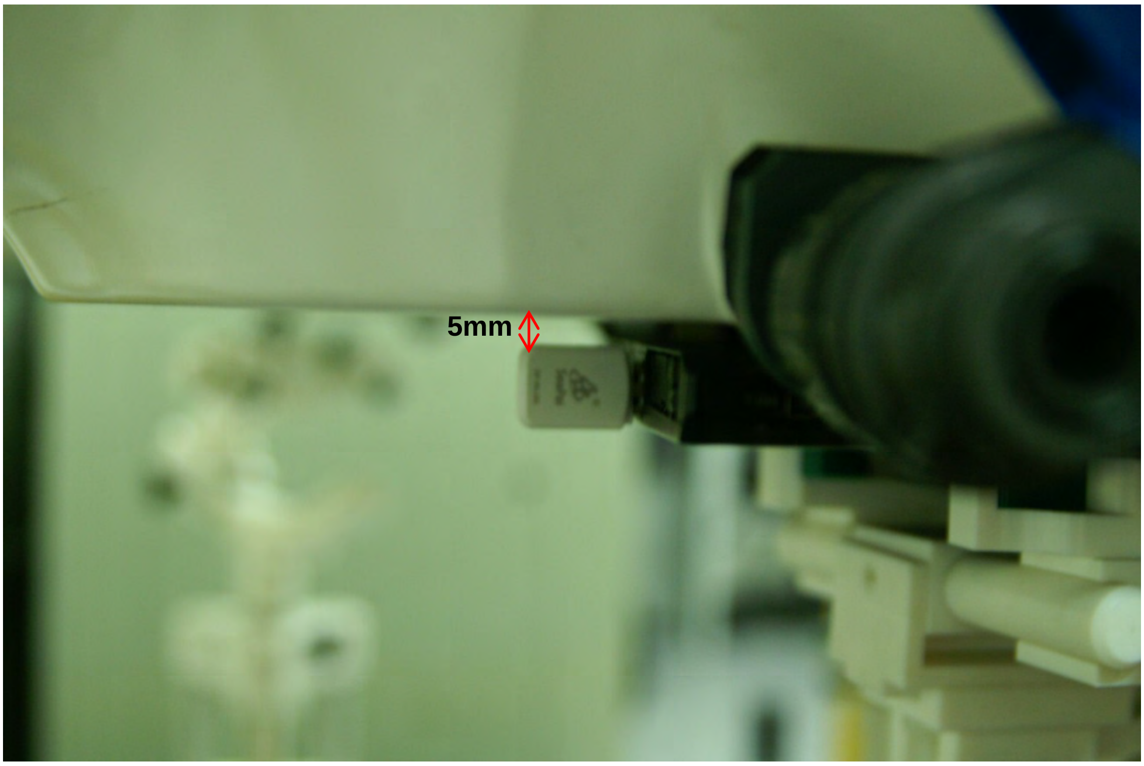
Horizontal-Down(5mm separation)



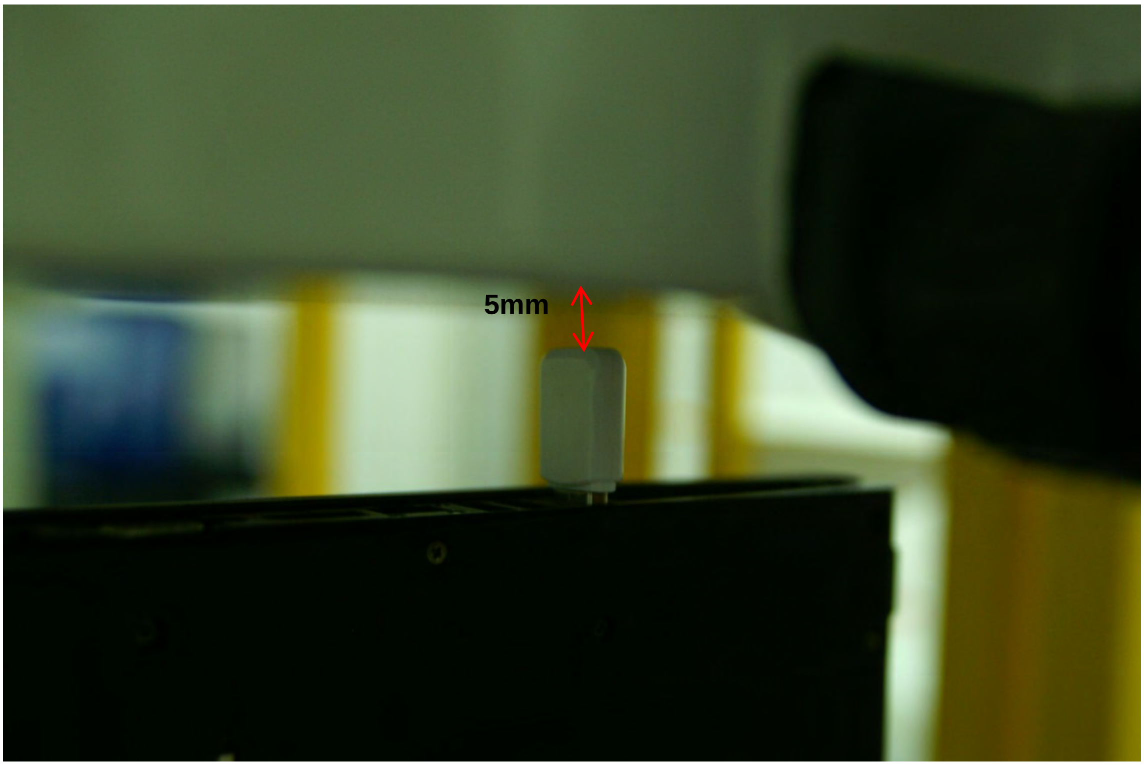
Vertical-Back (5mm separation)



Vertical-Front (5mm separation)



Tip Edge (5mm separation)



ANNEX F CALIBRATION REPORT

F.1 E-Field Probe

SATIMO
The microwave vision company

受控文件

COMOSAR E-Field Probe Calibration Report

Ref : ACR.219.1.13.SATU.A

SHENZHEN BALUN TECHNOLOGY CO., LTD.
BLOCK B, FL 1, BAISHA SCIENCE AND TECHNOLOGY PARK, SHAHE XI ROAD, NANSHAN DISTRICT, SHENZHEN, GUANGDONG PROVINCE, 518055 P. R. CHINA
SATIMO COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: SN 27/13 EP187

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

ACCREDITED
Calibration CERT #2246.02

17/08/2014

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.

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	8/17/2014	
Checked by :	Jérôme LUC	Product Manager	8/17/2014	
Approved by :	Kim RUTKOWSKI	Quality Manager	8/17/2014	

	Customer Name
Distribution :	Shenzhen Balun Technology Co.,Ltd.

Issue	*Date*	*Modifications*
A	8/17/2014	Initial release

TABLE OF CONTENTS

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	Satimo
Model	SSE1
Serial Number	SN 27/13 EP187
Product Condition (new / used)	New
Frequency Range of Probe	0.1 GHz-3GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.1482 MΩ Dipole 2: R2=0.2189 MΩ Dipole 3: R3=0.1968 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

Satimo's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.

Figure 1 – *Satimo 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 %

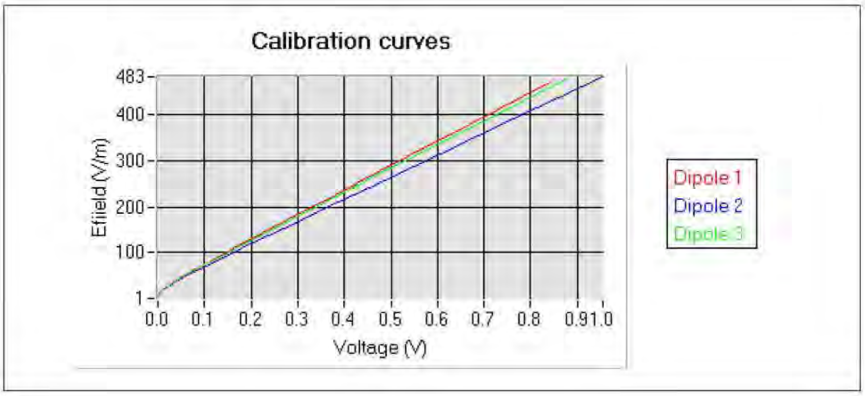
5.1 SENSITIVITY IN AIR

Normx dipole 1 ($\mu V/(V/m)^2$)	Normy dipole 2 ($\mu V/(V/m)^2$)	Normz dipole 3 ($\mu V/(V/m)^2$)
0.52	0.53	0.52

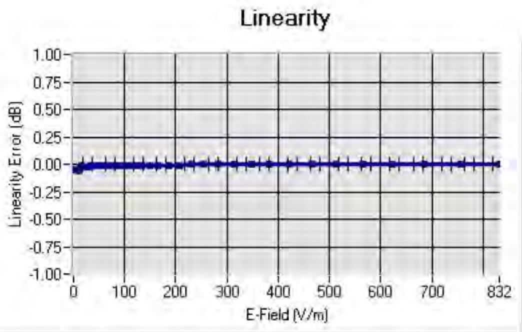
DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
98	99	97

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: +/-1.42% (+/-0.06dB)

5.3 SENSITIVITY IN LIQUID

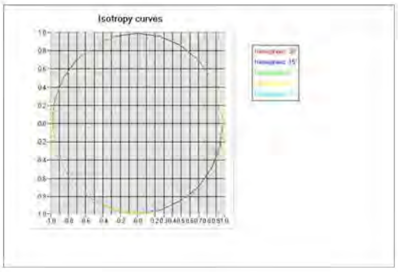
Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HI750	750	41.90	0.89	3.17
BL750	750	55.70	0.96	3.20
HL850	835	42.56	0.88	3.34
BL850	835	55.26	0.96	3.58
HL900	900	41.79	0.96	3.31
BL900	900	55.98	1.04	3.44
HL1800	1800	40.17	1.38	3.68
BL1800	1800	52.05	1.48	3.79
HL1900	1900	39.80	1.43	4.27
BL1900	1900	52.55	1.50	4.38
HL2000	2000	38.93	1.44	4.11
BL2000	2000	53.12	1.51	4.19
HL2450	2450	38.64	1.82	4.38
BL2450	2450	52.02	1.94	4.42
HL2600	2600	38.31	1.95	4.73
BL2600	2600	51.97	2.17	4.91

LOWER DETECTION LIMIT: 9mW/kg

5.4 ISOTROPY

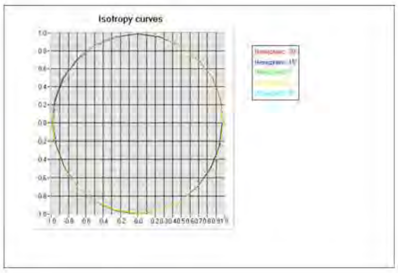
HL900 MHz

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



HL1800 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.06 dB



6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
Flat Phantom	Satimo	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	02/2013	02/2016
Reference Probe	Satimo	EP 94 SN 37/08	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Multimeter	Keithley 2000	1188656	12/2012	12/2015
Signal Generator	Agilent E4438C	MY49070581	12/2012	12/2015
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	11/2012	11/2015
Power Sensor	HP ECP-E26A	US37181460	11/2012	11/2015
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	11-661-9	3/2013	3/2015

F.2 Dielectric Probe

SATIMO
The microwave vision company

Dielectric Probe Calibration Report

Ref : ACR.219.12.13.SATU.A

SHENZHEN BALUN TECHNOLOGY CO., LTD.
ROOM 601, EAST TOWER, NANSHAN SOFTWARE PARK,
10128 SHENNAN ROAD, SHENZHEN, 518084, CHINA
SATIMO LIMESAR DIELECTRIC PROBE
FREQUENCY: 0.3-6 GHZ
SERIAL NO.: SN 25/13 OCPG56

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

ACCREDITED
Calibration CERT #2246.02

17/08/2014

Summary:

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

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	8/17/2014	
Checked by :	Jérôme LUC	Product Manager	8/17/2014	
Approved by :	Kim RUTKOWSKI	Quality Manager	8/17/2014	Kim Rutkowski

	Customer Name
Distribution :	Shenzhen BALUN Technology Co., Ltd.

Issue	*Date*	*Modifications*
A	8/17/2014	Initial release

TABLE OF CONTENTS

1 INTRODUCTION

This document contains a summary of the suggested methods and requirements set forth by the IEEE 1528 and CEI/IEC 62209 standards for liquid permittivity measurements and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	LIMESAR DIELECTRIC PROBE
Manufacturer	Satimo
Model	SCLMP
Serial Number	SN 25/13 OCPG56
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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

Figure 1 – *Satimo LIMESAR Dielectric Probe*

4 MEASUREMENT METHOD

The IEEE 1528-2003, OET 65 Bulletin C and CEI/IEC 62209-1 & 2 standards outline techniques for dielectric property measurements. The LIMESAR test bench employs one of the methods outlined in the standards, using a contact probe or open-ended coaxial transmission-line probe and vector network analyzer. The standards recommend the measurement of two reference materials that have well established and stable dielectric properties to validate the system, one for the calibration and one for checking the calibration. The LIMESAR test bench uses De-ionized water as the reference for the calibration and either DMS or Methanol as the reference for checking the calibration. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 LIQUID PERMITTIVITY MEASUREMENTS

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

5 MEASUREMENT UNCERTAINTY

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

5.1 DIELECTRIC PERMITTIVITY MEASUREMENT

The following uncertainties apply to the Dielectric Permittivity measurement:

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

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

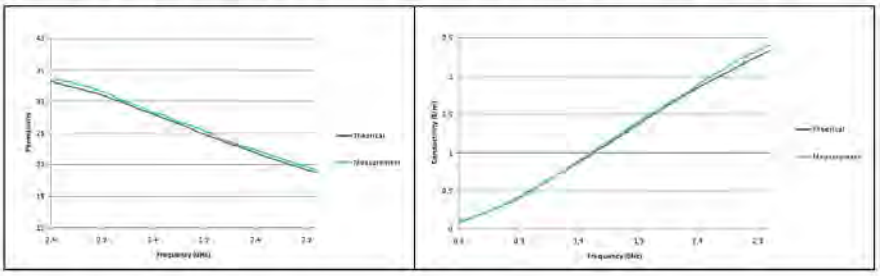
6 CALIBRATION MEASUREMENT RESULTS

Measurement Condition

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

6.1 LIQUID PERMITTIVITY MEASUREMENT

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



7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
LIMESAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2012	02/2015
Methanol CAS 67-56-1	Alpha Aesar	Lot D13W011	Validated. No cal required.	Validated. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	3/2013	3/2015

F.3 2450MHz Dipole

SAR Reference Dipole Calibration Report

Ref : ACR.75.13.15.SATU.A

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MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 2450 MHZ
SERIAL NO.: SN 25/13 DIP 2G450-251

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

03/16/2015

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.75.13.15.SATU.A

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Distribution :	SHENZHEN BALUN TECHNOLOGY Co.,Ltd.

Issue	Date	Modifications
A	3/16/2015	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 2450 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2450
Serial Number	SN 25/13 DIP 2G450-251
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 %

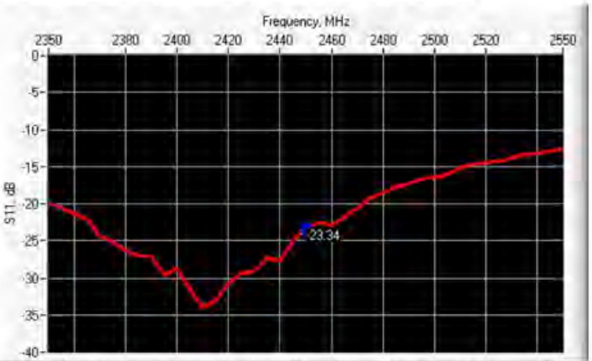
10 g	20.1 %

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-26.46	-20	49.3 Ω - 4.7 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-23.34	-20	53.4 Ω - 6.2 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 %.	

450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.	PASS	30.4 ±1 %.	PASS	3.6 ±1 %.	PASS
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

The IEEE Std. 1528, FCC KDBs and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	

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

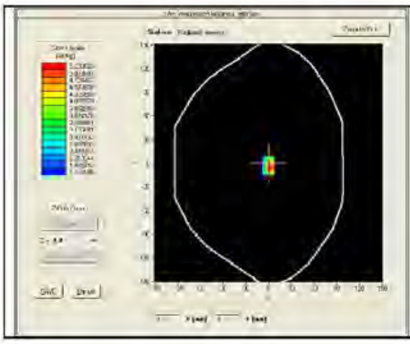
7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

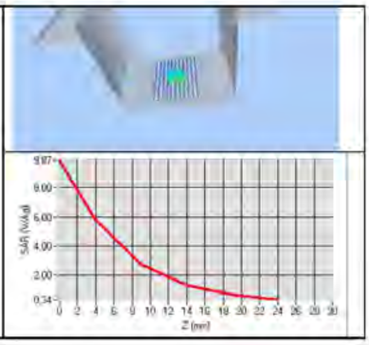
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 38.9 sigma : 1.79
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5m/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	

1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4	54.29 (5.43)	24	24.20 (2.42)
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	





7.3 BODY LIQUID MEASUREMENT

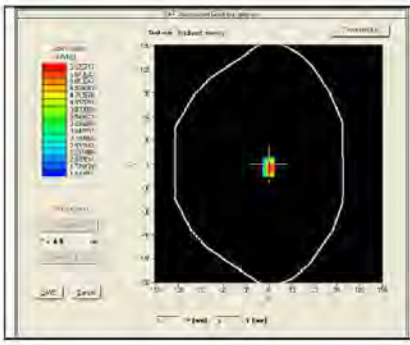
Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %	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

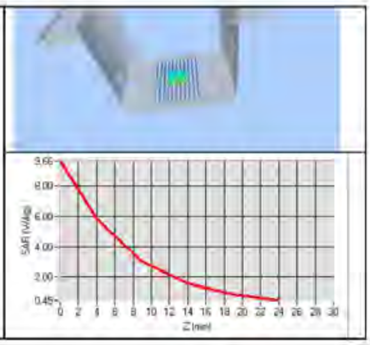
2600	52.5 ±5 %		2.16 ±5 %	
3000	52.0 ±5 %		2.73 ±5 %	
3500	51.3 ±5 %		3.31 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 52.7 sigma : 1.94
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5m/dz=5mm
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
2450	54.70 (5.47)	24.86 (2.49)





8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM 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	02/2013	02/2016
Calipers	Carrera	CALIPER-01	12/2013	12/2016
Reference Probe	MVG	EPG122 SN 18/11	10/2014	10/2015
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.
Temperature and Humidity Sensor	Control Company	11-661-9	8/2012	8/2015

--END OF REPORT--