STSLAB-SAR Test Report

FCC SAR EVALUATION REPORT

FCC ID: 2ADBRK968

For

Product Name:	**smart mobile phone**
Brand Name:	**KALIHO, K-CEL, K-TEN**
Model Name:	**K968**
Series Model:	**A600**
Test Report Number:	**STS1410012H01**
	ANSI/IEEE Std. C95.1
Test Standard:	**FCC 47 CFR Part 2 (2.1093)**
	IEEE 1528: 2003

Issued for

Shenzhen Kaliho Technology Development Limited

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Issued by

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Test Report Certification

Applicant's name	:	Shenzhen Kaliho Technology Development Limited
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Product description

Product name	:	smart mobile phone
Trademark	:	KALIHO. K-CEL. K-TEN
Model and/or type reference	:	K968
Serial Model：		A600
Standards	:	ANSI/IEEE Std. C95.1
		FCC 47 CFR Part 2 (2.1093)
		IEEE 1528: 2003

The device was tested by Shenzhen STS Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of Test..	:	
Date (s) of performance of tests.............	:	13 Oct. 2014
Date of Issue	:	16 Oct. 2014
Test Result	:	**Pass**

Testing Engineer :

(Tony Liu)

Technical Manager :

(Vita Li)

TESTING • CONSULTING • SOLUTION • CERTIFICATION
STS
APPROVAL

Authorized Signatory :

(Bovey Yang)

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1. General Information

1.1 EUT Description

Equipment	smart mobile phone	
Brand Name	KALIHO. K-CEL. K-TEN	
Model Name.	K968	
Serial Model	A600	
FCC ID	FCC IC: 2ADBRK968	
Model Difference	Only difference in model name	
Adapter	Input: AC100-240V, 0.2 A, 50/60 Hz Output: DC 5V, 500mA	
Battery	Rated Voltage: 3.7V Charge Limit: 4.2V Capacity :1000mAh	
Hardware Version	Z35-V3.0	
Software Version	N/A	
Frequency Range	GSM 850: 824.2 ~ 848.8 MHz PCS1900: 1850.2 ~ 1909.8 MHz WCDMA II: 1852.4~1907.6MHz WCDMA V: 826.4~846.6 MHz WLAN 802.11b/g/n(HT20): 2412 MHz ~ 2462 MHz; WLAN 802.11n(HT40): 2422 MHz~2452 MHz Bluetooth: 2402 ~ 2480 MHz	
Transmit Power(Average):	GSM 850: 31.72 dBm GSM 1900: 29.71 dBm WCDMA II: 22.94 dBm WCDMA V: 22.71 dBm	802.11b: 11.88 dBm 802.11g: 10.41 dBm 802.11n HT20: 9.40 dBm 802.11n HT40: 9.28 dBm
Max. Reported SAR(1g):	Head: GSM 850: 0.406 W/kg GSM 1900: 0.771 W/kg WCDMA II: 0.806 W/kg WCDMA V: 0.555 W/kg WIFI: 0.189 W/kg	Body: GSM 850: 0.579 W/kg GSM 1900: 0.552 W/kg WCDMA II: 0.728 W/kg WCDMA V: 0.459 W/kg WIFI: 0.161 W/kg
Operating Mode:	GSM: GSM Voice; GPRS Class 12; EDGE Class 12; WCDMA: RMC/HSDPA/HSUPA Release 6; WLAN: 802.11 b/g/n(HT20/HT40); Bluetooth: V2.1+EDR	
Antenna Specification:	GSM/WCDMA: PIFA Antenna Bluetooth/WIFI: PIFA Antenna	
Test Mode:	Maximum continuous output	
SIM Card:	Support dual-SIM, dual standby, the multiple SIM card with two lines cannot transmitting at the same time	
DTM Mode	Not Support	
Hospot Mode	Not Support	

1.2 Test Environment:

Ambient conditions in the SAR laboratory:

Items	Required	Actual
Temperature (℃)	18-25	22~23
Humidity (%RH)	30-70	55~65

1.3 Test Factory

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Bao' an District, Shenzhen, China

2. Test Standards And Limits

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 447498 D01 v05r02	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 865664 D01 v01r03	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D01 v01r03	SAR Measurement 100 MHz to 6 GHz
7	FCC KDB 941225 D01	SAR Measurement Procedures for 3G Devices
8	FCC KDB 248227 D01	SAR Measurement Procedures for 802.11 a/b/g Transmitters

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. According to EN 50360 and 1999/519/EC the limit for General Population/Uncontrolled exposure should be applied for this device, it is 2.0 W/kg as averaged over any 10 gram of tissue.

(A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

(B). Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 10 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Population/Uncontrolled Environments:
are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments:
are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE

PARTIAL BODY LIMIT

1.6 W/kg

3. SAR Measurement System

3.1 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:

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

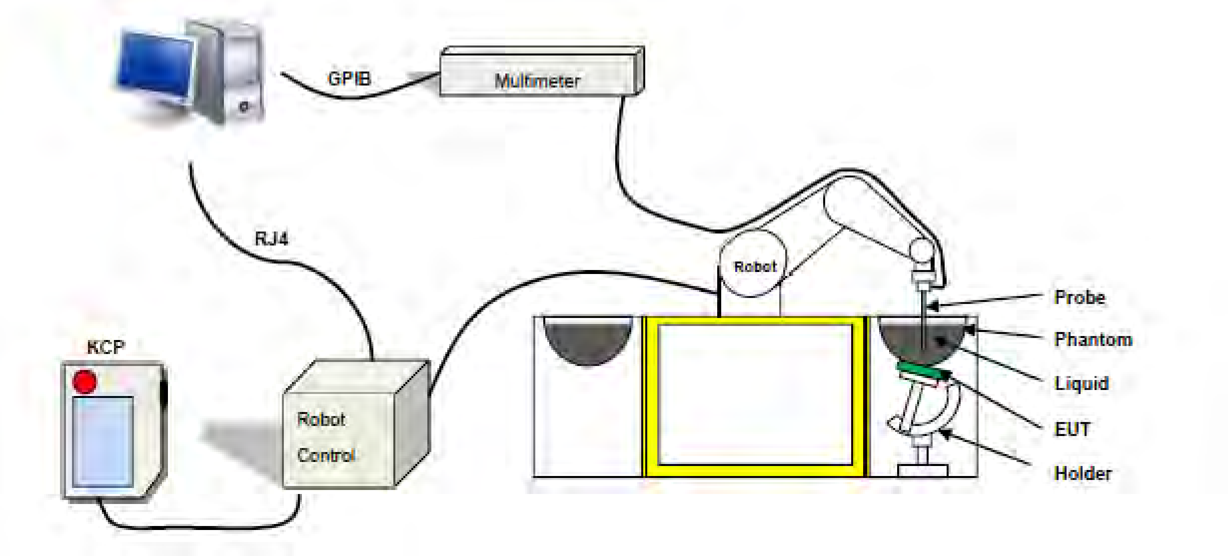
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue,
ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SAR System

SATIMO SAR System Diagram:



Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 17/14 EP221 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter :5 mm
- Distance between probe tip and sensor center: 2.7mm
- Distance between sensor center and the inner phantom surface: 4 mm (repeatability better than +/- 1mm)
- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.25 dB
- Calibration range: 450MHz to 2600MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and suface normal line:1ess than 30°

Figure 1 – *Satimo COMOSAR Dosimetric E field Dipole*

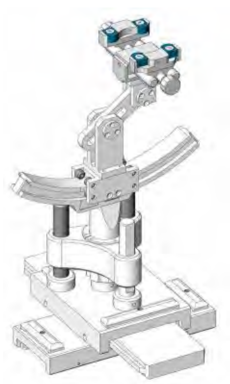
3.2.2 Phantom

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.

SN 32/14 SAM115

SN 32/14 SAM116

3.2.3 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.

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

LIQUID MEASUREMENT RESULTS

Date: October 13, 2014 **Ambient condition:** Temperature 22.3°C **Relative humidity:** 49%

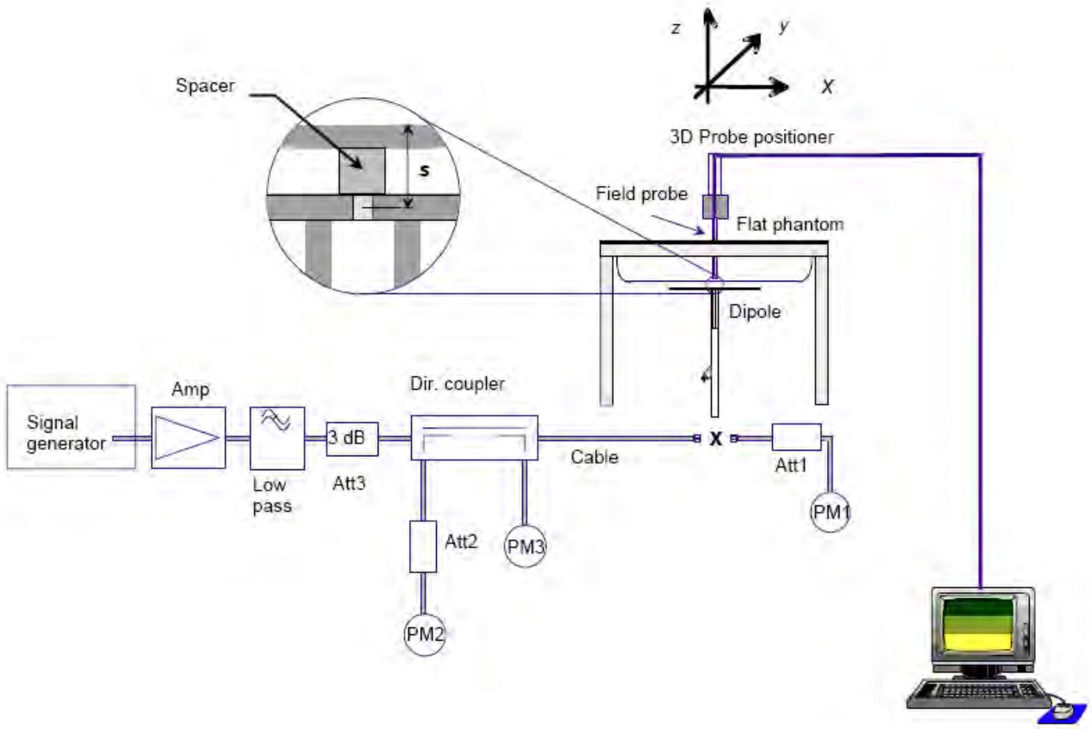
Head Simulatinf Liquid		Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]					
835 MHz	22.30	Permitivity:	41.50	41.27	-0.55	±5
		Conductivity:	0.90	0.91	1.11	± 5
1900 MHz	22.30	Permitivity:	40.00	39.57	-1.07	± 5
		Conductivity:	1.40	1.403	0.21	± 5
2450 MHz	22.30	Permitivity:	39.20	39.33	0.00	± 5
	22.30	Conductivity:	1.80	1.77	1.67	± 5

Body Simulatinf Liquid		Parameters	Target	Measured	Deviation[%]	Limited[%]
Frequency	Temp. [°C]					
835 MHz	22.30	Permitivity:	55.20	55.50	0.54	± 5
		Conductivity:	0.97	0.96	-1.03	± 5
1900 MHz	22.30	Permitivity:	53.30	51.68	-3.04	± 5
		Conductivity:	1.52	1.51	0.66	± 5
2450 MHz	22.30	Permitivity:	52.70	54.19	1.67	± 5
	22.30	Conductivity:	1.95	1.92	1.54	± 5

5. SAR System Validation

5.1 Validation System

Each SATIMO 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 kit includes a dipole, and dipole device holder.
The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system validation setup is shown as below.



5.2 Validation Result

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

Freq.(MHz)	Power(mW)	Tested Value (W/Kg)	Normalized SAR (W/kg)	Target(W/Kg)	Tolerance(%)	Date
835 Head	100	0.937	9.37	9.71	-3.50	2014-10-13
835 Body	100	0.968	9.68	10.19	-5.00	2014-10-13
1900 Head	100	3.840	38.4	40.01	-4.02	2014-10-13
1900 Body	100	4.142	41.42	40.32	2.73	2014-10-13
2450 Head	100	5.393	53.93	53.96	-0.06	2014-10-13
2450 Body	100	5.123	51.23	52.37	-2.18	2014-10-13

Note:

1. The tolerance limit of System validation ±10%.

6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:
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.

➢ Area Scan& Zoom Scan

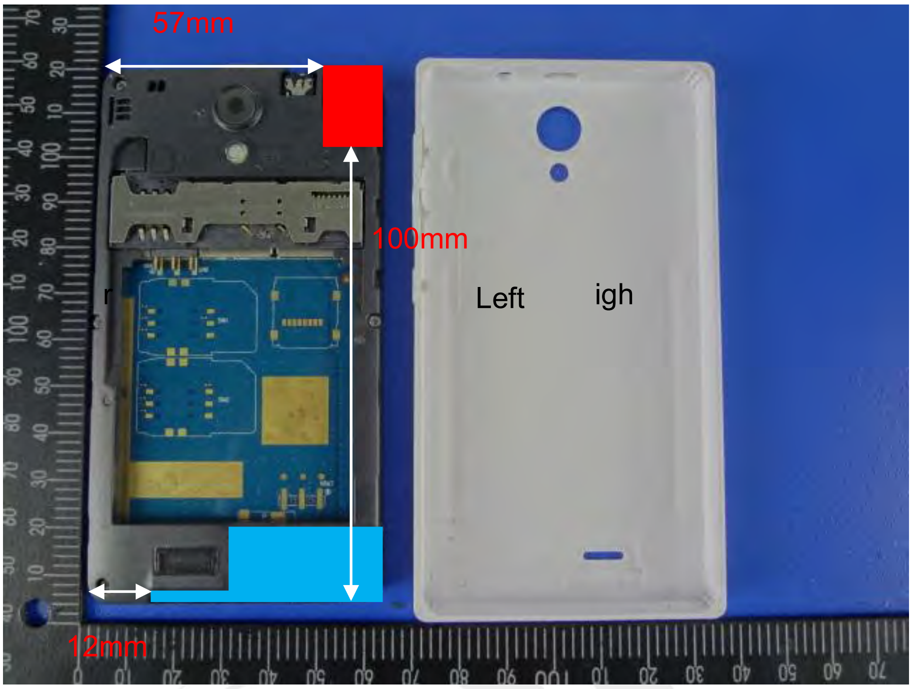
First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan 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 D01v01r01 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.

7. EUT Antenna Location Sketch

Top

Right



Bottom

WWAN Antenna

BT/WIFI Antenna

The simultaneous transmission possibilities are listed as below:

Simultaneous TX Combination	Configuration	Head	Body
1	GSM 850+WIFI/BT	Yes	Yes
2	GSM 1900+WIFI/BT	Yes	Yes
3	WCDMA II+WIFI/BT	Yes	Yes
4	WCDMA V+WIFI/BT	Yes	Yes

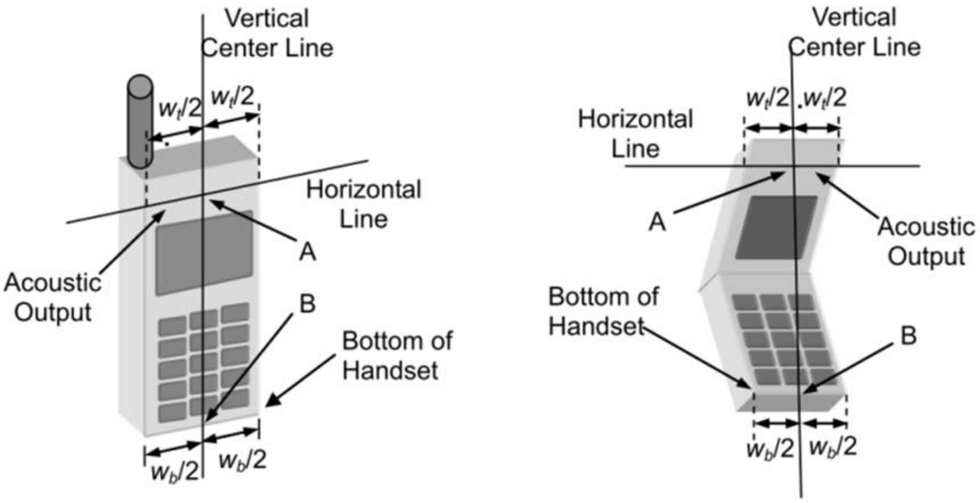
Note: WLAN and BT share the same antenna, and cannot transmit simultaneously

8. EUT Test Position

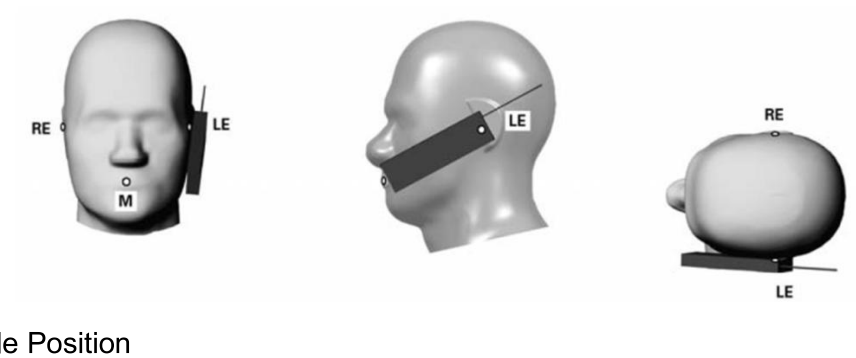
This EUT was tested in Right Cheek, Right Titled, Left Cheek, Left Titled, Front Face and Rear Face.

8.1 Define Two Imaginary Lines On The Handset

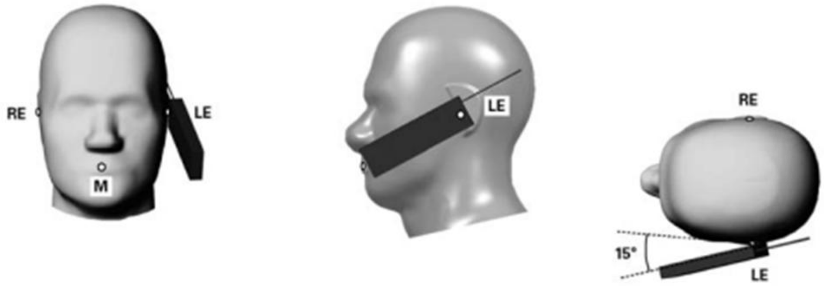
(1)The vertical centerline passes through two points on the front side of the handset the midpoint of the width wt of the handset at the level of the acoustic output, and the midpoint of the width wb of the handset.
(2)The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
(3)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 to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



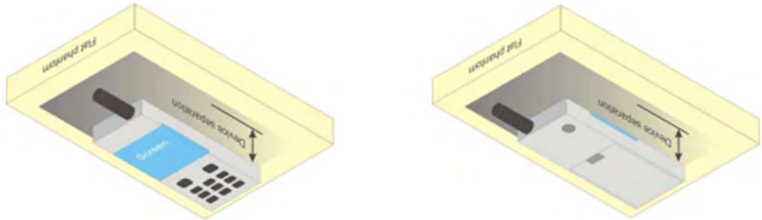
Cheek Position
1)To position the device with the vertical center line of the body of the device and the horizontal line crossing the center picec in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the 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.
2)To move the device towards the phantom with the ear piece aligned with the the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost



Title Position
(1)To position the device in the “cheek” position described above.
(2) While maintaining the device in 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 with the ear is lost.



Body-worn Position Conditions
(1) To position the EUT parallel to the phantom surface.
(2) To adjust the EUT parallel to the flat phantom.
(3) To adjust the distance between the EUT surface and the flat phantom to 5mm.



9. Measurement Uncertainty

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.

NO	Source	Tol(%)	Prob. Dist.	Div. k	ci (1g)	ci (10g)	1gUi	10gUi	Veff
Measurement System									
1	Probe calibration	5.8	N	1	1	1	5.8	5.8	∞
2	Axial isotropy	3.5	R	√3	$(1\text{-}cp)^{1/2}$	$(1\text{-}cp)^{1/2}$	1.43	1.43	∞
3	Hemispherical isotropy	5.9	R	√3	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
4	Boundary effect	1.0	R	√3	1	1	0.58	0.58	∞
5	Linearity	4.7	R	√3	1	1	2.71	2.71	∞
6	System Detection limits	1.0	R	√3	1	1	0.58	0.58	∞
7	Readout electronics	0.5	N	1	1	1	0.50	0.50	∞
8	Response time	0	R	√3	1	1	0	0	∞
9	Integration time	1.4	R	√3	1	1	0.81	0.81	∞
10	Ambient noise	3.0	R	√3	1	1	1.73	1.73	∞
11	Ambient reflections	3.0	R	√3	1	1	1.73	1.73	∞
12	Probe positioner mech. restrictions	1.4	R	√3	1	1	0.81	0.81	∞
13	Probe positioning with respect to phantom shell	1.4	R	√3	1	1	0.81	0.81	∞
14	Max.SAR evaluation	1.0	R	√3	1	1	0.6	0.6	∞
Test sample related									
15	Device positioning	2.6	N	1	1	1	2.6	2.6	11

16	Device holder	3	N	1	1	1	3.0	3.0	7
17	Drift of output power	5.0	R	√3	1	1	2.89	2.89	∞
Phantom and set-up									
18	Phantom uncertainty	4.0	R	√3	1	1	2.31	2.31	∞
19	Liquid conductivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	5
20	Liquid conductivity (meas)	4	N	1	0.23	0.26	0.92	1.04	5
21	Liquid Permittivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	∞
22	Liquid Permittivity (meas)	5.0	N	1	0.23	0.26	1.15	1.30	∞
Combined standard			RSS	$U_C = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$			10.63%	10.54%	
Expanded uncertainty (P=95%)		$U = k\ U_C$,k=2					21.26%	21.08%	

10. Conducted Power Measurement

Test Result:

Burst Average Power (dBm)						
Band	GSM 835			PCS1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909
GSM (GMSK, 1-Slot)	31.56	31.72	31.63	29.55	29.71	29.69
GPRS (GSMK, 1-Slot)	31.33	31.24	31.34	28.62	28.79	28.79
GPRS (GSMK, 2-Slot)	27.23	26.12	27.35	25.29	25.75	25.46
GPRS (GSMK, 3-Slot)	25.37	25.53	25.7	24.53	24.79	24.78
GPRS (GSMK, 4-Slot)	24.46	24.65	24.49	23.27	23.1	23.12
EGPRS (GMSK, 1-Slot)	31.19	31.17	31.11	29.37	29.49	29.55
EGPRS (GMSK, 2-Slot)	28.43	28.25	28.17	26.41	26.54	26.62
EGPRS (GMSK, 3-Slot)	26.21	25.93	25.91	24.75	24.55	24.42
EGPRS (GMSK, 4-Slot)	24.28	24.48	24.49	23.26	23.31	23.42

Source Based time Average Power (dBm)						
Band	GSM 835			PCS1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GSM (GMSK, 1-Slot)	22.56	22.72	22.63	20.55	20.71	20.69
GPRS (GSMK, 1-Slot)	22.33	22.24	22.34	19.62	19.79	19.79
GPRS (GSMK, 2-Slot)	21.23	20.12	21.35	19.29	19.75	19.46
GPRS (GSMK, 3-Slot)	21.11	21.27	21.44	20.27	20.53	20.52
GPRS (GSMK, 4-Slot)	21.46	21.65	21.49	20.27	20.1	20.12
EGPRS (GMSK, 1-Slot)	22.19	22.17	22.11	20.37	20.49	20.55
EGPRS (GMSK, 2-Slot)	22.43	22.25	22.17	20.41	20.54	20.62
EGPRS (GMSK, 3-Slot)	21.95	21.67	21.65	20.49	20.29	20.16
EGPRS (GMSK, 4-Slot)	21.28	21.48	21.49	20.26	20.31	20.42

Note 1:
The Frame Power (Source-based time-averaged Power) is scaled the maximum burst average power based on time slots. The calculated methods are show as following:
Frame Power = Max burst power (1 Up Slot) – 9 dB
Frame Power = Max burst power (2 Up Slot) – 6 dB
Frame Power = Max burst power (3 Up Slot) – 4.26 dB
Frame Power = Max burst power (4 Up Slot) – 3 dB

WCDMA

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4182	4233	9262	9400	9538
	subtest	dBm			dBm		
RMC	non	22.58	22.71	22.67	22.76	22.94	22.89
HSDPA	1	22.23	22.37	22.34	22.56	22.47	22.43
	2	21.59	21.78	21.77	20.34	20.52	20.49
	3	20.49	20.63	20.69	19.27	19.48	19.39
	4	20.50	20.71	20.68	18.84	19.04	18.99
HSUPA	1	22.17	22.41	22.35	20.49	20.70	20.67
	2	20.41	20.57	20.54	21.29	21.50	21.40
	3	20.48	20.64	20.68	19.40	19.52	19.53
	4	22.15	22.32	22.33	21.21	21.35	21.27
	5	20.28	20.42	20.41	19.32	19.51	19.49

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for β c/β d=12/15, β hs/ β c=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensation for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

WIFI

Mode	Channel Number	Frequency (MHz)	Average Power (dBm)
802.11b (DSSS)	1	2412	11.61
	6	2441	11.44
	11	2462	11.88
802.11g (OFDM)	1	2412	9.80
	6	2441	10.41
	11	2462	10.01
802.11g (OFDM)	1	2412	8.87
	6	2441	9.28
	11	2462	9.40
802.11n40	3	2422	6.71
	6	2437	6.92
	9	2452	7.28

Bluetooth (2.4Gband)

Mode	Channel Number	Frequency (MHz)	Maximum Conducted Peak Output Power (dBm)
GFSK(1M)	0	2402	-1.61
	39	2441	-1.59
	78	2480	-1.19
π/4-DQPSK(2Mbps)	0	2402	-2.83
	39	2441	-2.59
	78	2480	-2.04
8-DPSK(3Mbps)	0	2402	-3.62
	39	2441	-3.31
	78	2480	-2.94

Turn up

Mode	The Tune-up Maximum Power (Customer Declared)(dBm)
GSM 850	31±1dBm
GPRS 850-1TS	31±1dBm
GPRS 850-2TS	27±1dBm
GPRS 850-3TS	25±1dBm
GPRS 850-4TS	24±1dBm
EGPRS 850-1TS	31±1dBm
EGPRS 850-2TS	28±1dBm
EGPRS 850-3TS	26±1dBm
EGPRS 850-4TS	24±1dBm
GSM 1900	29±1dBm

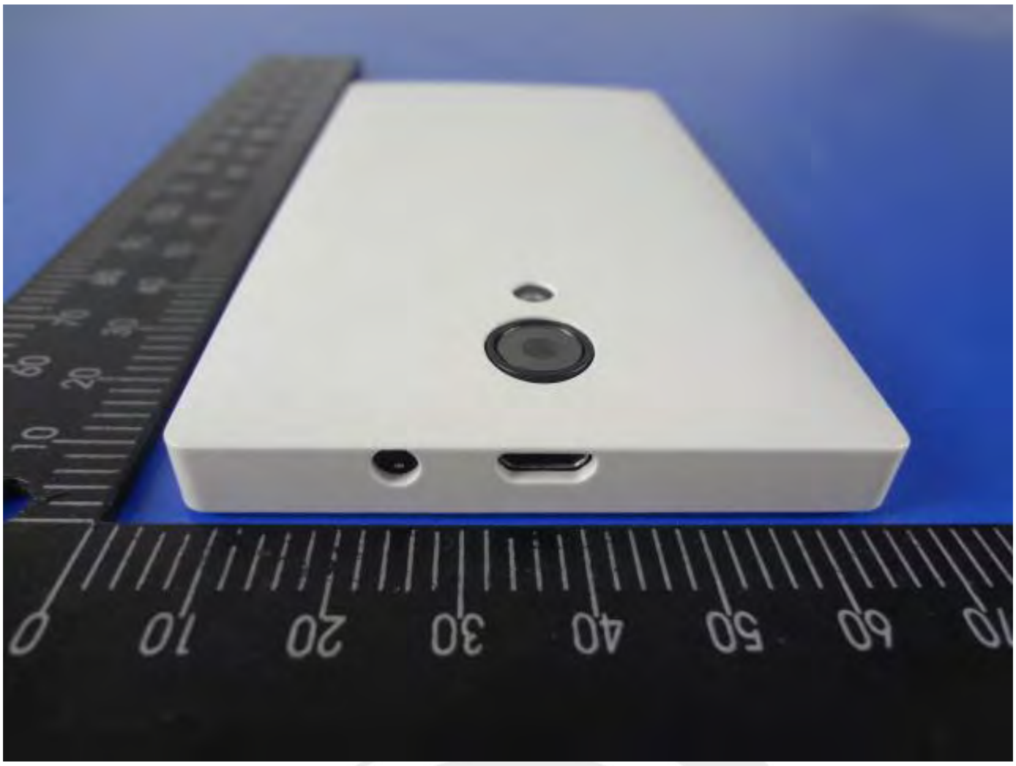
GPRS 1900-1TS	28±1dBm
GPRS 1900-2TS	25±1dBm
GPRS 1900-3TS	24±1dBm
GPRS 1900-4TS	23±1dBm
EGPRS 1900-1TS	29±1dBm
EGPRS 1900-2TS	26±1dBm
EGPRS 1900-3TS	24±1dBm
EGPRS 1900-4TS	23±1dBm
WCDMA Band V	22±1dBm
HSDPA Band V Sub-1	22±1dBm
HSDPA Band V Sub-2	21±1dBm
HSDPA Band V Sub-3	20±1dBm
HSDPA Band V Sub-4	20±1dBm
HSUPA Band V Sub-1	22±1dBm
HSUPA Band V Sub-2	20±1dBm
HSUPA Band V Sub-3	20±1dBm
HSUPA Band V Sub-4	22±1dBm
HSUPA Band V Sub-5	20±1dBm
WCDMA Band II	22±1dBm
HSDPA Band II Sub-1	22±1dBm
HSDPA Band II Sub-2	20±1dBm
HSDPA Band II Sub-3	19±1dBm
HSDPA Band II Sub-4	18±1dBm
HSUPA Band II Sub-1	20±1dBm
HSUPA Band II Sub-2	21±1dBm
HSUPA Band II Sub-3	19±1dBm
HSUPA Band II Sub-4	21±1dBm
HSUPA Band II Sub-5	19±1dBm
IEEE 802.11b	11±1dBm
IEEE 802.11g	10±1dBm
IEEE 802.11n20	9±1dBm
IEEE 802.11n40	7±1dBm
Bluetooth 1Mbps	-2±1dBm
Bluetooth 2Mbps	-3±1dBm
Bluetooth 3Mbps	-4±1dBm

11. Test Photos And Results

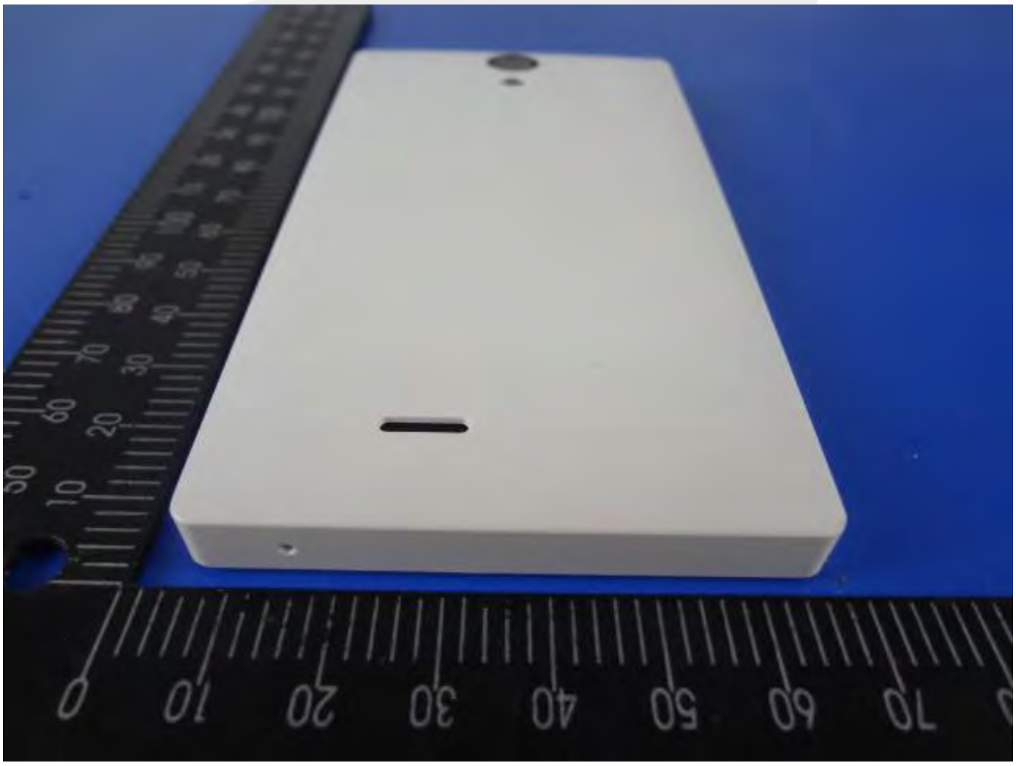
11.1 EUT Photos

Front side

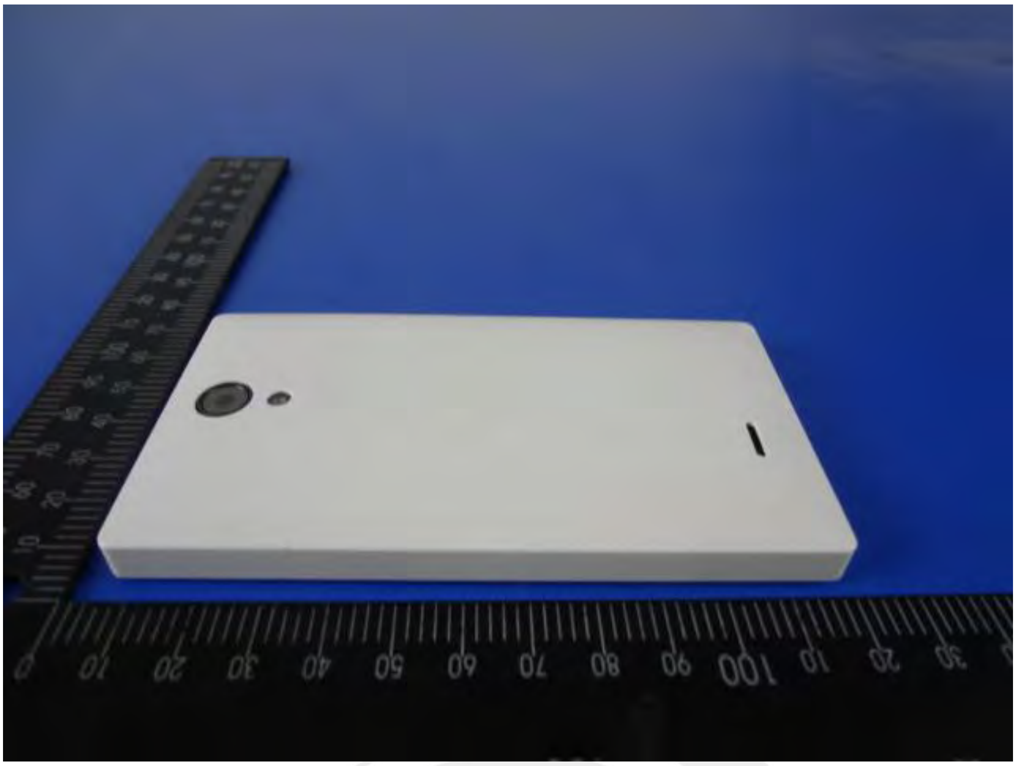
Back side



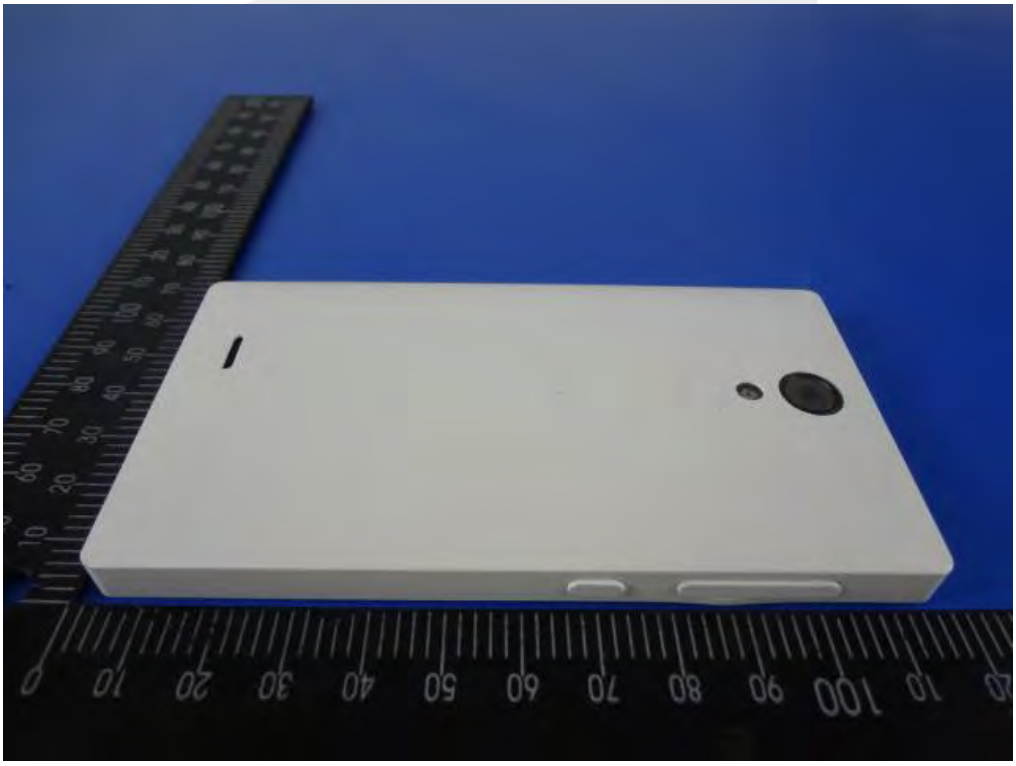
Top side



Bottom side

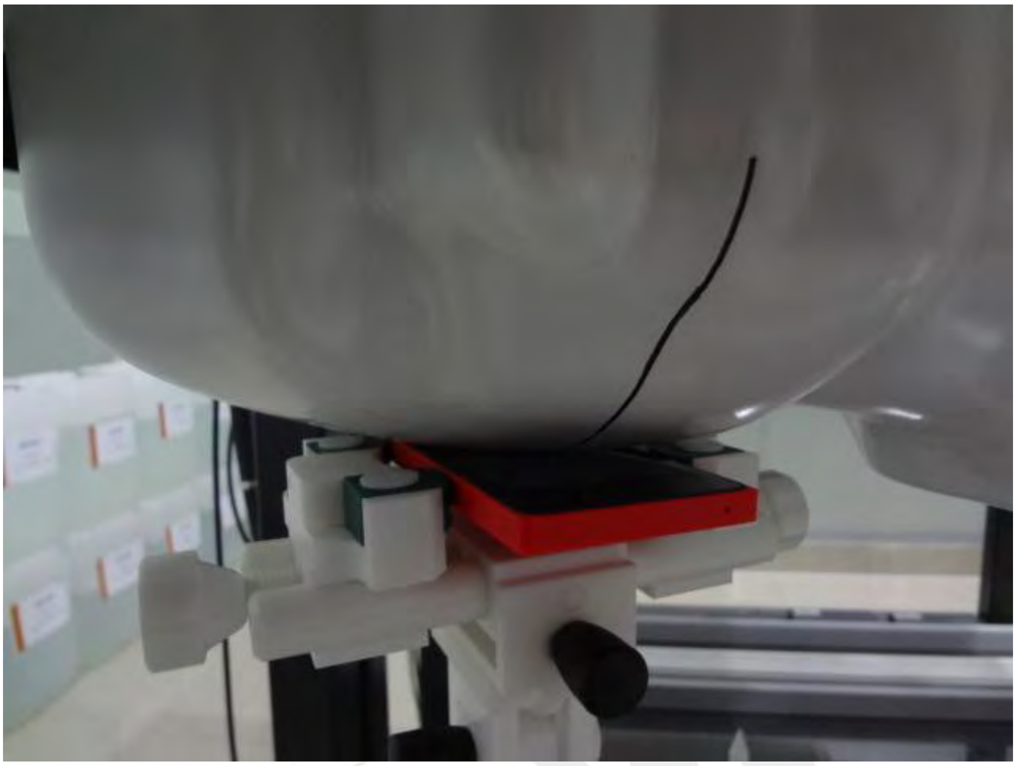


Left side

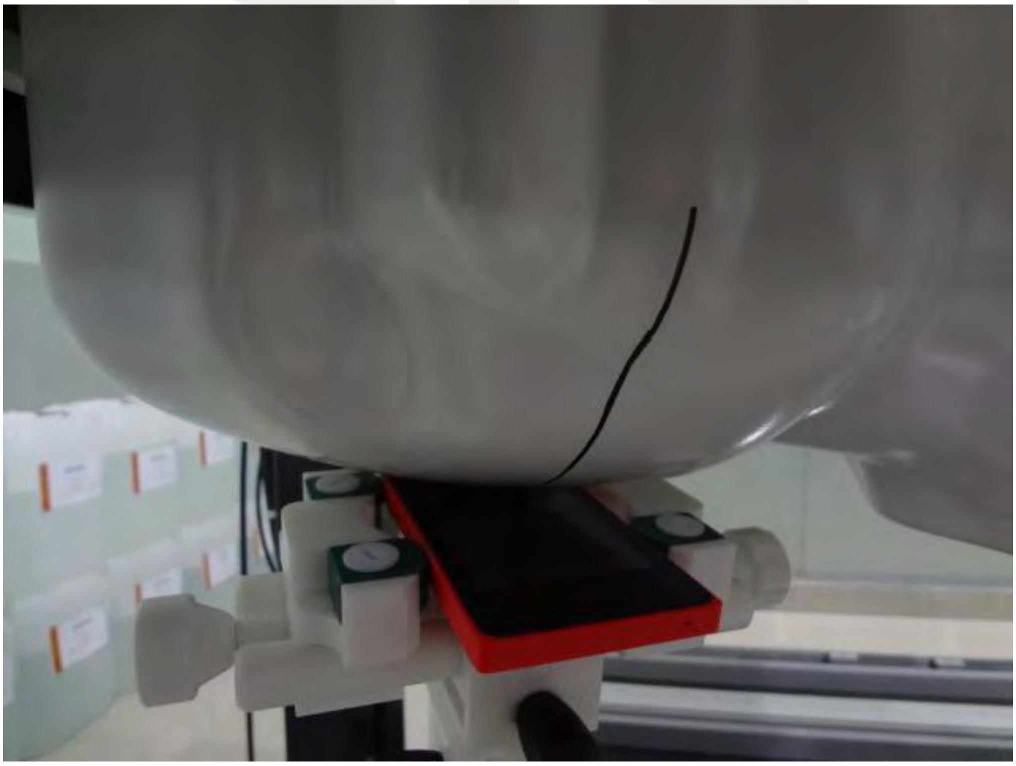


Right side

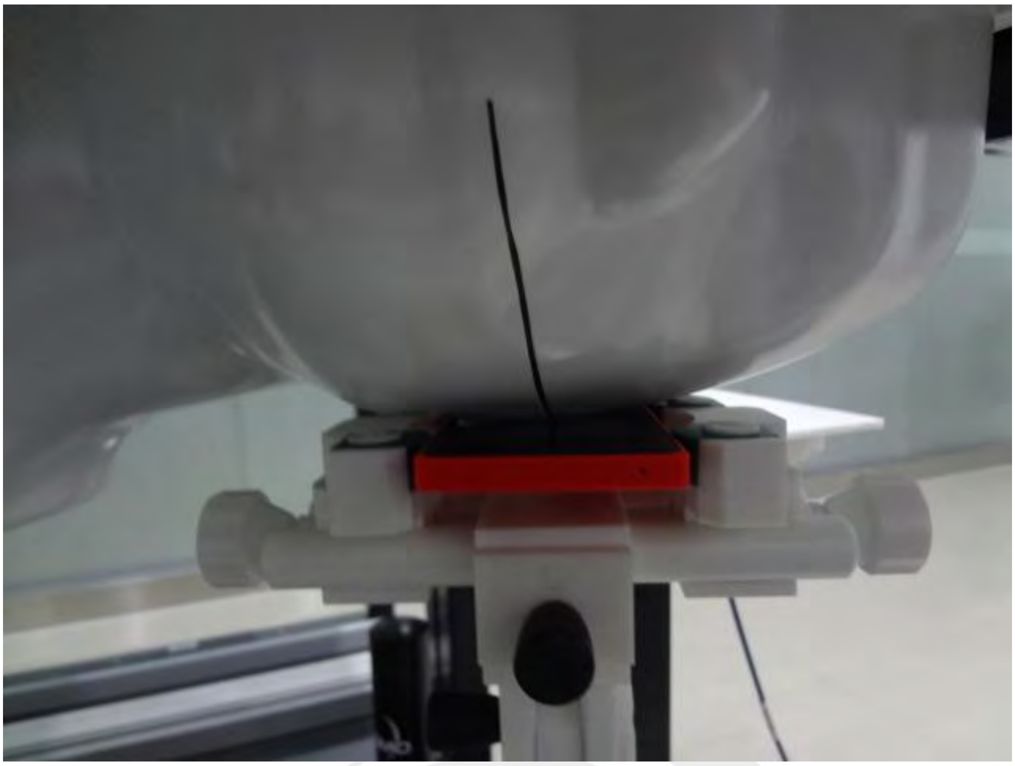
11.2 Setup Photos



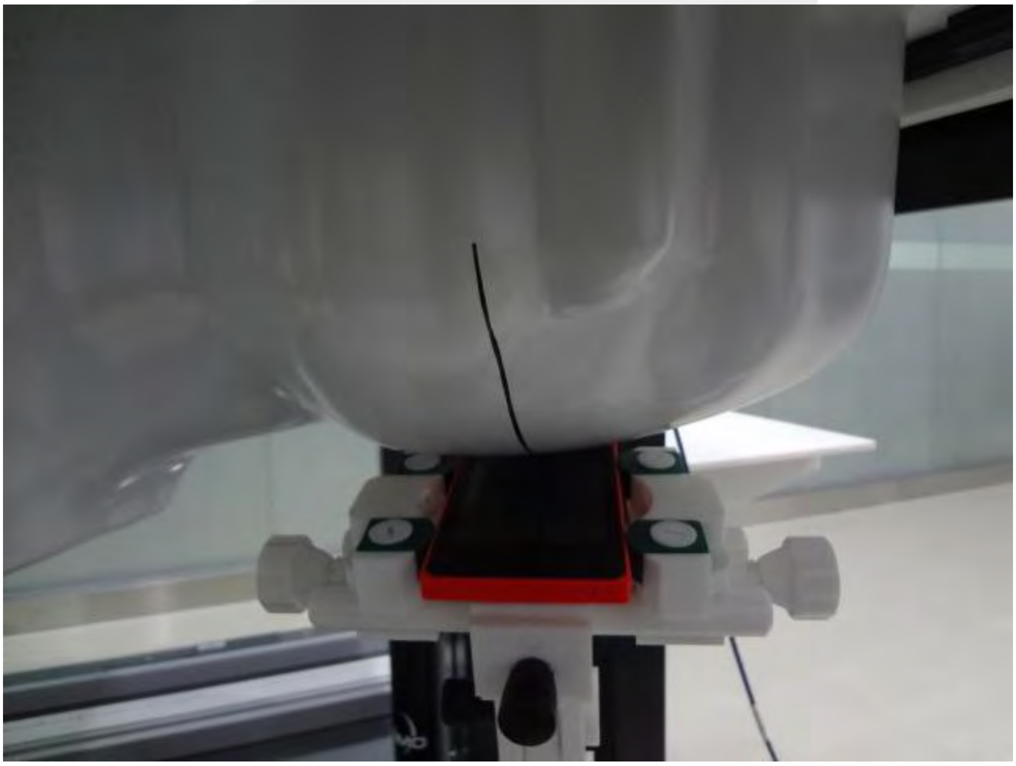
Right Touch



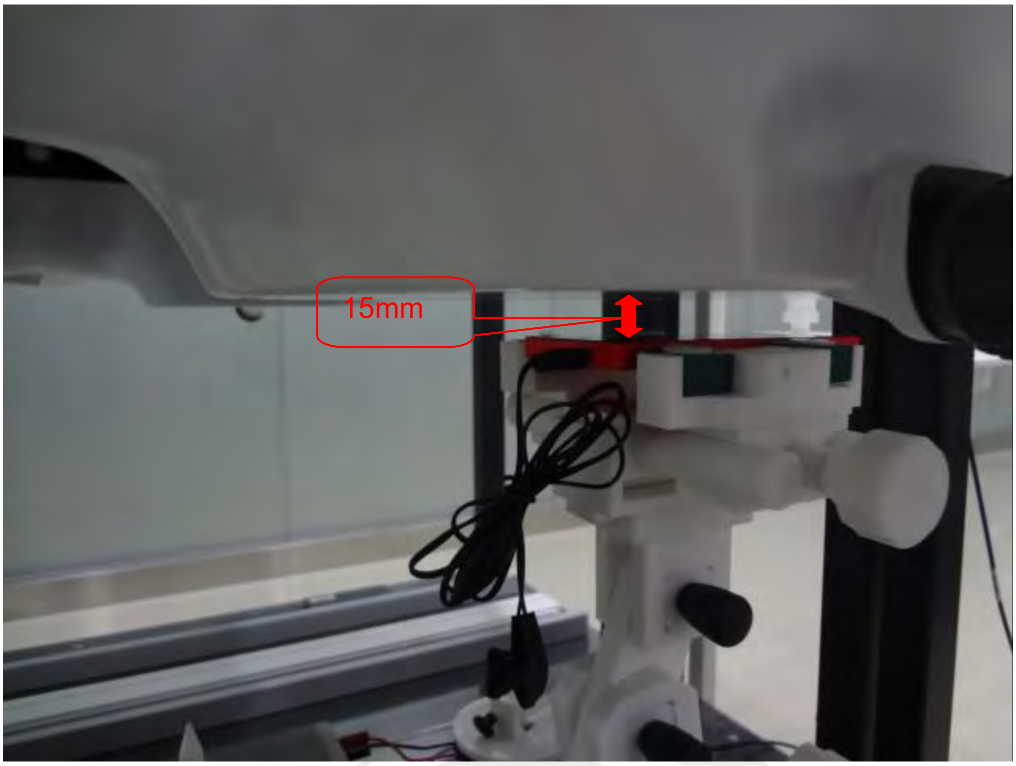
Right Tilt



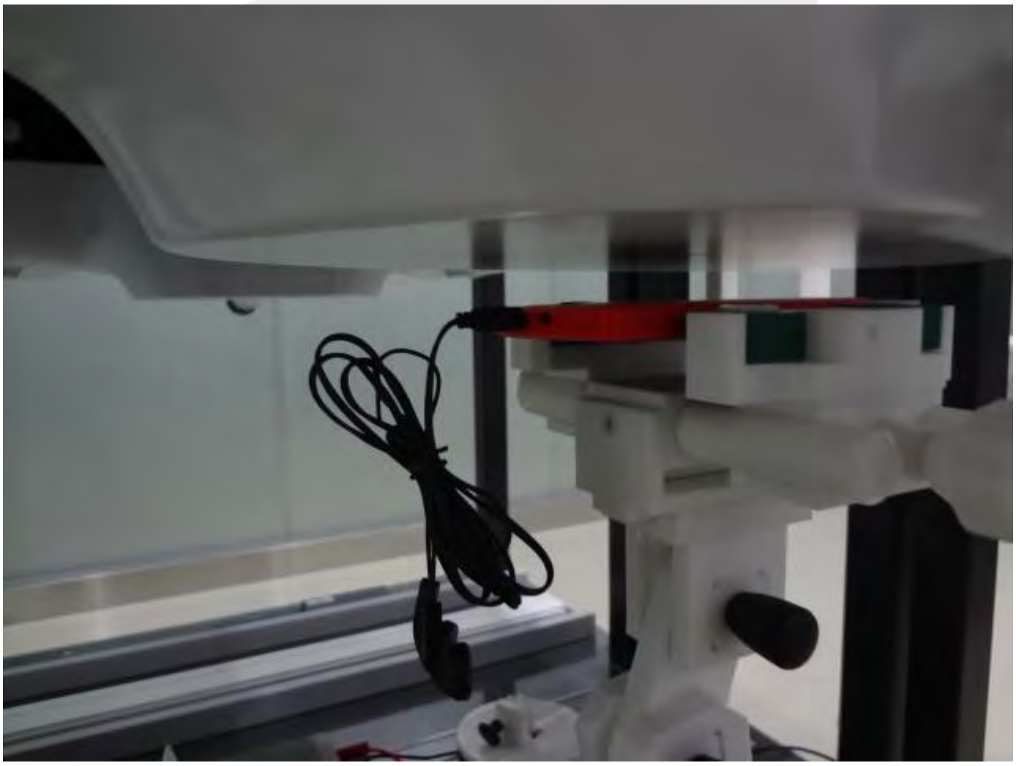
Left Touch



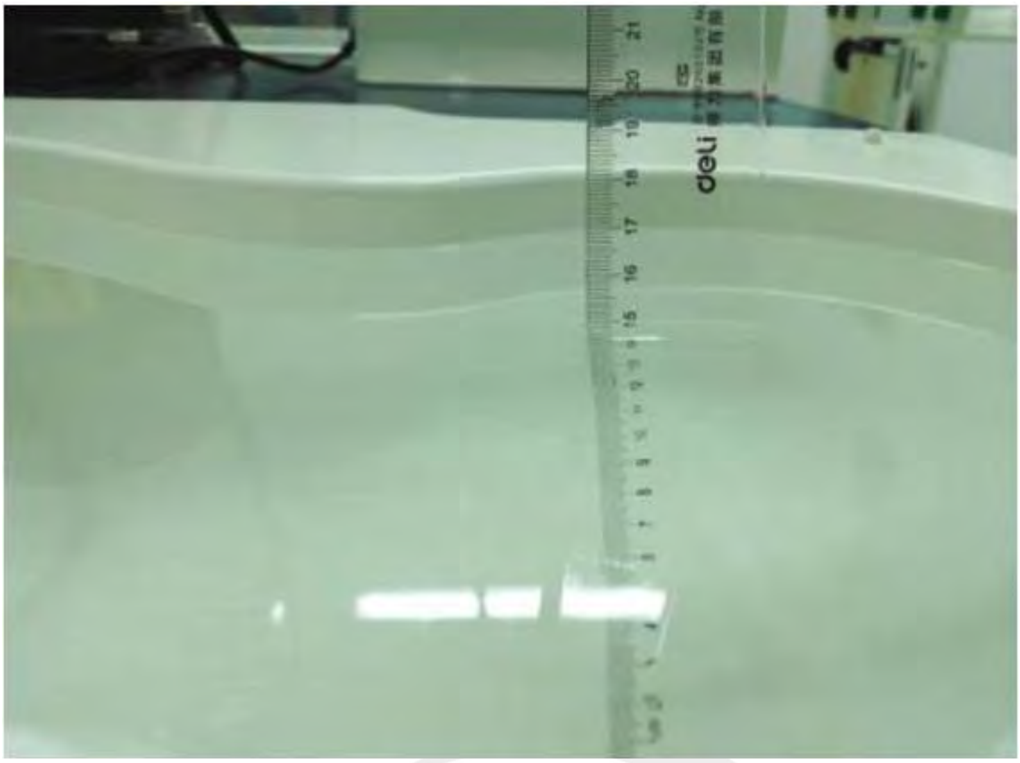
Left Tilt



Front side



Back side



Liquid depth (15 mm)

12. SAR Result Summary

Test Case of Head				Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)
Band	Test Position	Mode	Channel					
GSM 835	Right Touch Cheek	Voice	CH 190	0.381	-2.17	32	31.72	**0.406**
	Right Tilt	Voice	CH 190	0.269	-1.77	32	31.72	0.287
	Left Touch Cheek	Voice	CH 190	0.349	1.20	32	31.72	0.372
	Left Tilt	Voice	CH 190	0.339	-2.30	32	31.72	0.361
	Body Front	Voice	CH 190	0.535	0.76	32	31.72	0.570
	Body back	Voice	CH 190	0.543	-0.95	32	31.72	**0.579**

Note:
The worst mode is voice mode.
Two card slot can’t work at the same time.
The test separation of all above table is 15mm.

Test Case of Head				Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)
Band	Test Position	Mode	Channel					
GSM 1900	Right Touch Cheek	Voice	CH 661	0.230	0.24	30	29.71	0.246
	Right Tilt	Voice	CH 661	0.177	-0.53	30	29.71	0.189
	Left Touch Cheek	Voice	CH 661	0.253	-1.04	30	29.71	**0.271**
	Left Tilt	Voice	CH 661	0.110	0.91	30	29.71	0.118
	Body Front	Voice	CH 661	0.516	1.78	30	29.71	**0.552**
	Body back	Voice	CH 661	0.175	4.06	30	29.71	0.187

Note:
The worst mode is voice mode.
Two card slot can’t work at the same time.
The test separation of all above table is 15mm.

Test Case of Head				Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)
Band	Test Position	Mode	Channel					
WCDMA II RMC12.2Kbps mode	Right Touch Cheek	RMC	CH 9400	0.795	-0.49	23	22.94	**0.806**
	Right Tilt	RMC	CH 9400	0.064	-0.55	23	22.94	0.065
	Left Touch Cheek	RMC	CH 9400	0.780	0.56	23	22.94	0.791
	Left Tilt	RMC	CH 9400	0.242	-1.01	23	22.94	0.245
	Body Front	RMC	CH 9400	0.356	1.39	23	22.94	0.361
	Body back	RMC	CH 9400	0.718	-0.17	23	22.94	**0.728**

Note:
The worst mode is voice mode.
Two card slot can’t work at the same time.
The test separation of all above table is 15mm.

Test Case of Head				Result 1g (W/Kg)	Power Drift	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)
Band	Test Position	Mode	Channel					
WCDMA V RMC12.2Kbps mode	Right Touch Cheek	RMC	CH 4182	0.525	1.11	23	22.71	**0.555**
	Right Tilt	RMC	CH 4182	0.403	-0.11	23	22.71	0.426
	Left Touch Cheek	RMC	CH 4182	0.492	-0.12	23	22.71	0.520
	Left Tilt	RMC	CH 4182	0.479	-0.38	23	22.71	0.507
	Body Front	RMC	CH 4182	0.623	-0.44	23	22.71	**0.659**
	Body back	RMC	CH 4182	0.422	-0.52	23	22.71	0.446

Note:
The worst mode is voice mode.
Two card slot can’t work at the same time.
The test separation of all above table is 15mm.

WIFI

Test Case of Head				Result g (W/Kg)	Power Drift	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)
Band	Test Position	Mode	Channel					
WIFI	Right Touch Cheek	802.11b	CH 11	0.102	-0.43	12	11.88	0.105
	Right Tilt	802.11b	CH 11	0.107	2.91	12	11.88	0.110
	Left Touch Cheek	802.11b	CH 11	0.151	-1.23	12	11.88	0.156
	Left Tilt	802.11b	CH 11	0.183	-0.19	12	11.88	0.189
	Body Front	802.11b	CH 11	0.156	-0.19	12	11.88	0.161
	Body back	802.11b	CH 11	0.114	1.94	12	11.88	0.118

Note:
The test separation of all above table is 15mm.
Two Sim card slot can’t work at the same time.

Simultaneous Multi-band Transmission Evaluation:

Application Simultaneous Transmission information:

Position	Simultaneous state
Head	1. GSM Voice + WIFI
	2. WCDMA+ WIFI
	3. GSM Voice + Bluetooth
	4. WCDMA+ Bluetooth
Body	1. GSM Voice + WIFI
	2. WCDMA + WIFI
	3. GSM Voice + Bluetooth
	4. WCDMA + Bluetooth

NOTE:

1. For simultaneous transmission at head and body exposure position, 2transmitters simultaneous transmission was the worst state.
2. Based upon KDB 447498 D01 v05, BT SAR is excluded as below table.
3. If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.
4. For minimum test separation distance≦50mm,Bluetooth standalone SAR is excluded according to *[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm) ·[√f (GHz) /x] ≦ 3.0 for 1-g SAR and ≦ 7.5 for 10-g extremity SAR*
5. The reported SAR summation is calculated based on the same configuration and test position.
6. KDB 447498 / 4.3.2 (2) when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

a) (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f (GHz) /x] W/kg for test separation distances≤ 50 mm;
Where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
b) 0.4W/Kg for 1-g SAR and 1.0W/Kg for 10-g SAR, when the separation distance is >50mm.

Estimated SAR		MAX Tune up power		Antenna to user(mm)	Frequency(GHz)	Stand alone SAR(1g) [W/kg]
		dBm	mW			
BT	Head	-1	0.794	5	2480	0.033
	Body			15	2480	0.011

Simultaneous Mode	Position	Mode	Max. 1-g SAR (W/kg)	1-g Sum SAR (W/kg)
GSM Voice +WIFI	Head	GSM Voice	0.771	0.96
		WIFI	0.189	
	Body-worn	GSM Voice	0.579	0.74
		WIFI	0.161	
GSM Voice + BT	Head	GSM Voice	0.771	0.804
		Bluetooth	0.033	
	Body-worn	GSM Voice	0.579	0.590
		Bluetooth	0.011	
WCDMA RMC+ WIFI	Head	WCDMA RMC	0.806	0.995
		WIFI	0.189	
	Body-worn	WCDMA RMC	0.728	0.889
		WIFI	0.161	
WCDMA RMC + BT	Head	WCDMA RMC	0.806	0.839
		Bluetooth	0.033	
	Body-worn	WCDMA RMC	0.728	0.739
		Bluetooth	0.011	

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.

When the sum of SAR 1g of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR 1g 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR 1g is greater than the SAR limit (SAR 1g 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

13. Equipment List

NO.	Instrument	Manufacturer	Model	S/N	Cal. Date	Cal. Due Date
1	835MHz Dipole	SATIMO	SID835	SN 30/14 DIP0G835-332	Sep.1, 2014	Sep.1, 2015
2	1900MHz Dipole	SATIMO	SID1900	SN 30/14 DIP0G835-332	Sep.1, 2014	Sep.1, 2015
3	2450 MHz Dipole	SATIMO	SID 2450	SN 30/14 DIP2G450-335	Sep.1, 2014	Sep.1, 2015
3	E-Field Probe	SATIMO	SSE5	SN 17/14 EP221	Sep.1, 2014	Sep.1, 2015
4	Antenna	SATIMO	ANTA3	SN 17/13 ZNTA45	Sep.1, 2014	Sep.1, 2015
5	Phantom1	SATIMO	SAM	SN 32/14 SAM115	Sep.1, 2014	Sep.1, 2015
6	Phantom2	SATIMO	SAM	SN 32/14 SAM116	Sep.1, 2014	Sep.1, 2015
7	Dielectric Probe Kit	Agilent	E5071C	MY461076 15	Sep.1, 2014	Sep.1, 2015
8	MultiMeter	Keithley	MultiMeter 2000	4050073	Sep.1, 2014	Sep.1, 2015
9	Signal Generator	R&S	SMF100A	1167.0000k02/ 104260	Sep.1, 2014	Sep.1, 2015
10	Power Meter	Agilent	5738A	11290	Sep.1, 2014	Sep.1, 2015
11	Power Sensor	R&S	NRP-Z21	103971	Sep.1, 2014	Sep.1, 2015
12	Power Amplifier	SATIMO	6552B	22374	Sep.1, 2014	Sep.1, 2015
13	Wireless Communication Test Set	Agilent	8960-E5515C	MY50260493	Sep.1, 2014	Sep.1, 2015
14	Network Analyzer	RS	5071C	EMY46103472	Sep.1, 2014	Sep.1, 2015

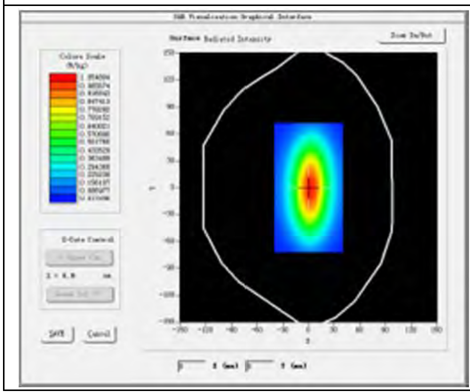
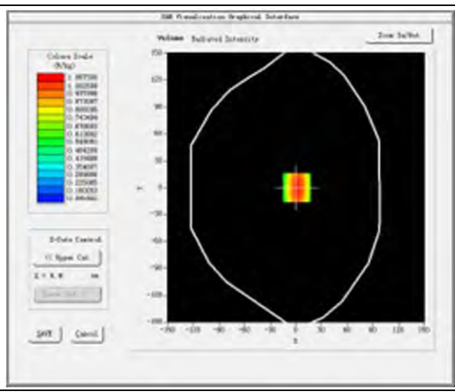
Appendix A. System Validation Plots

System Performance Check Data(835MHz Head)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2014.10.13

Experimental conditions.

Phantom	Validation plane
Device Position	-
Band	835MHz
Channels	-
Signal	CW
Frequency (MHz)	835MHz
Relative permittivity (real part)	41.27
Relative permittivity	18.72
Conductivity (S/m)	0.91
Power drift (%)	0.45
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
ConvF:	4.83
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

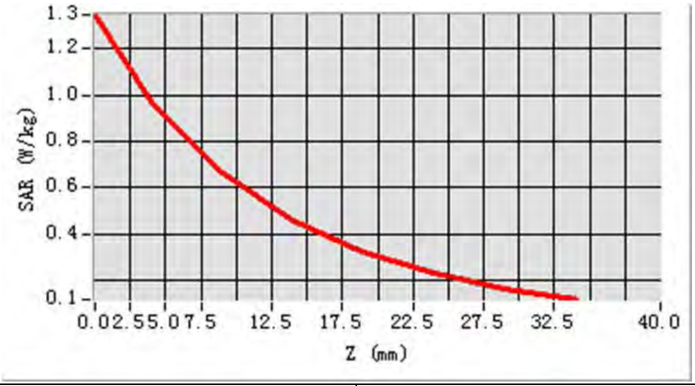
Maximum location: X=1.00, Y=0.00

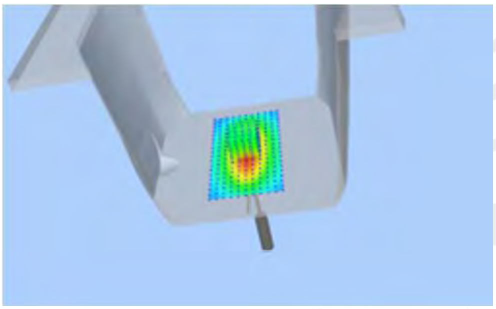
SAR Peak: 1.46 W/kg

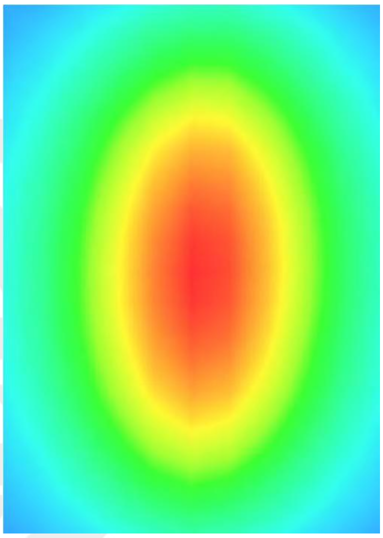
SAR 10g (W/Kg)	0.608155
SAR 1g (W/Kg)	0.93716

Z Axis Scan

Z (mm)	0	4	9	14	19	24	29
SAR(W/Kg)	1.3472	0.97891	0.66265	0.5042	0.3512	0.2505	0.11794





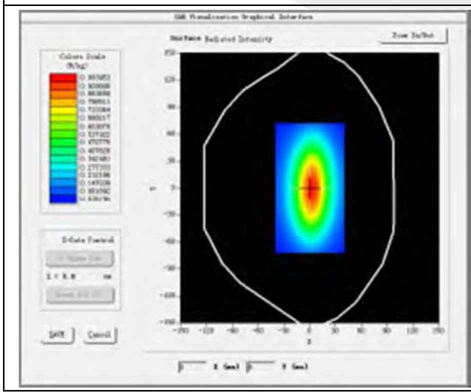
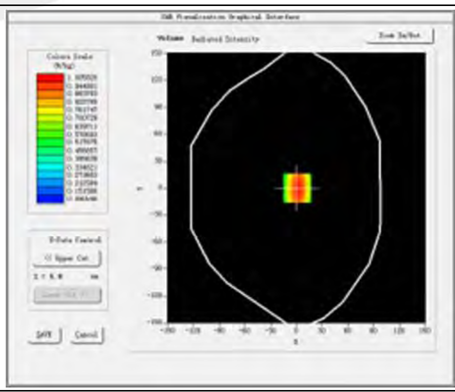


System Performance Check Data(835MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2014.10.13

Experimental conditions.

Probe	
Phantom	Validation plane
Device Position	-
Band	835MHz
Channels	-
Signal	CW
Frequency (MHz)	835MHz
Relative permittivity (real part)	55.50
Relative permittivity	21.408187
Conductivity (S/m)	0.96
Power drift (%)	0.090000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
ConvF:	5.02
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

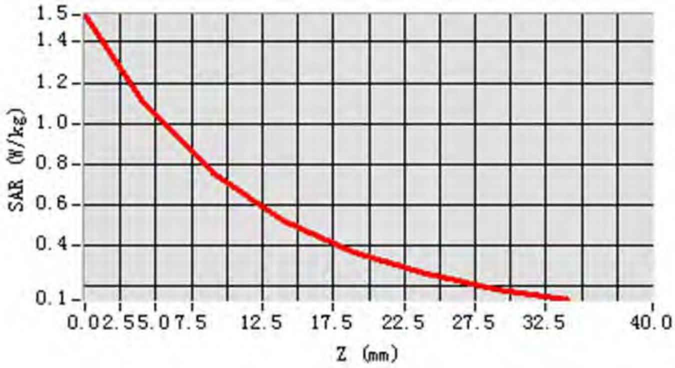
Maximum location: X=1.00, Y=0.00

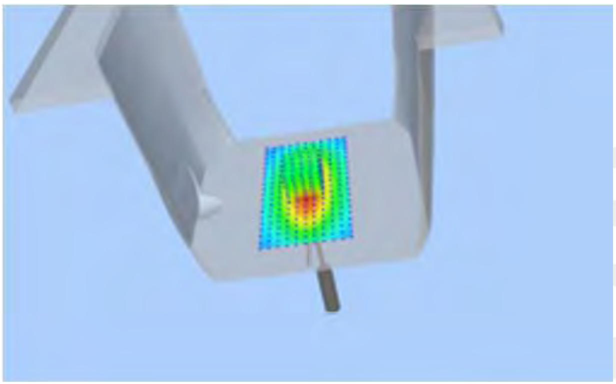
SAR Peak: 1.48 W/kg

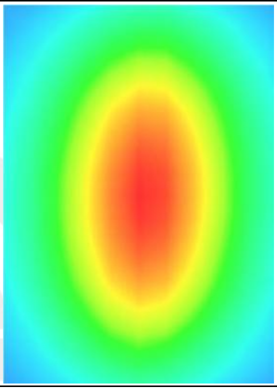
SAR 10g (W/Kg)	0.693221
SAR 1g (W/Kg)	0.967939

Z Axis Scan

Z (mm)	0	4	9	14	19	24	29
SAR(W/Kg)	1.3725	1.0058	0.6838	0.4755	0.3314	0.2365	0.1688







System Performance Check Data(1900MHz Head)

Type: Phone measurement (Complete)

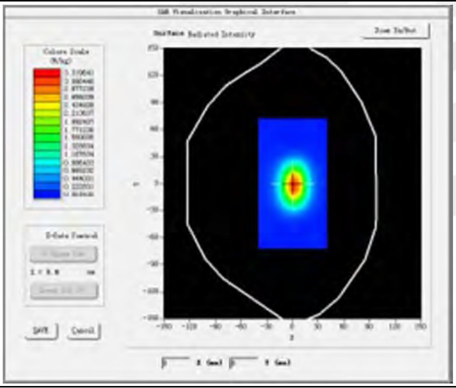
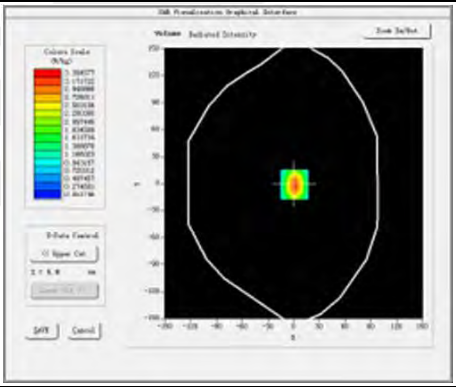
Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 2014.10.13

Experimental conditions.

Phantom	Validation plane
Device Position	-
Band	1900MHz
Channels	-
Signal	CW
Frequency (MHz)	1900MHz
Relative permittivity (real part)	39.57
Relative permittivity	13.26
Conductivity (S/m)	1.40
Power drift (%)	0.47
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
Probe	SN 17/14 EP221
ConvF:	4.71
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

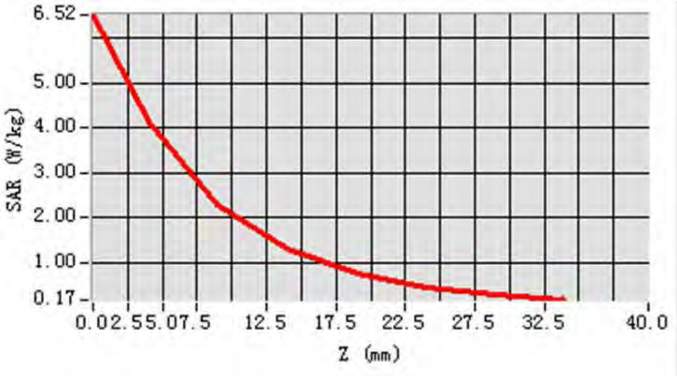
Maximum location: X=1.00, Y=0.00

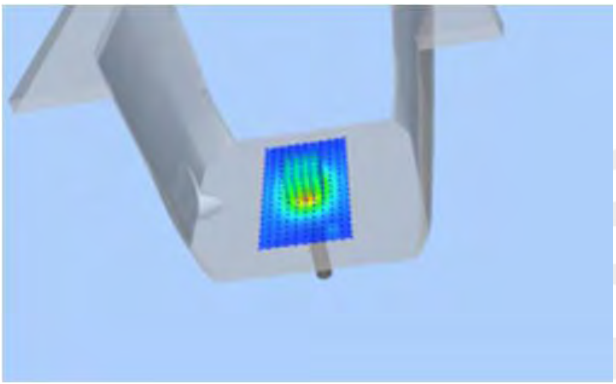
SAR Peak: 5.39 W/kg

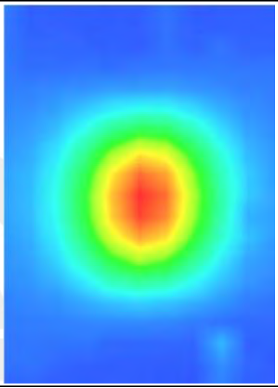
SAR 10g (W/Kg)	1.967525
SAR 1g (W/Kg)	3.840170

Z Axis Scan

Z (mm)	0	4	9	14	19	24	29
SAR(W/Kg)	6.5296	4.1946	2.3311	1.3187	0.5733	0.3288	0.1617





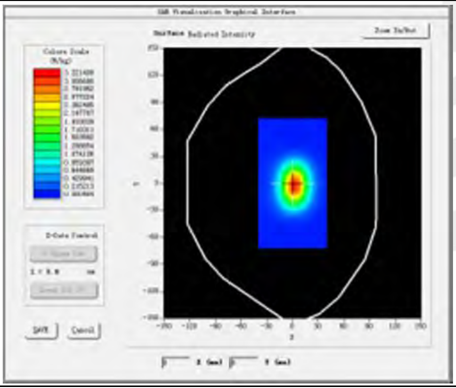
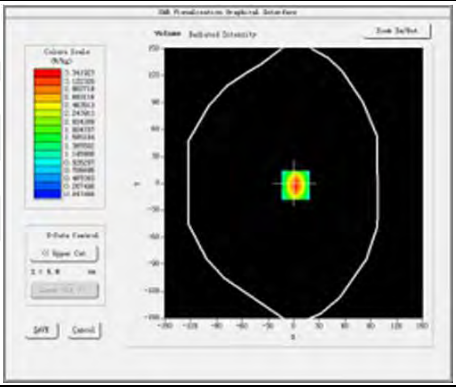


System Performance Check Data(1900MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2014.10.13

Experimental conditions.

Device Position	-
Band	1900MHz
Channels	-
Signal	CW
Frequency (MHz)	1900
Relative permittivity (real part)	51.68
Relative permittivity	12.87531
Conductivity (S/m)	1.51
Power drift (%)	0.37
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
Probe	SN 17/14 EP221
ConvF:	4.85
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

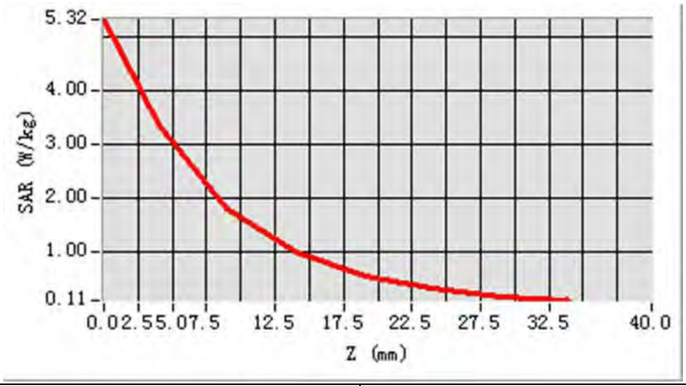
Maximum location: X=2.00, Y=2.00

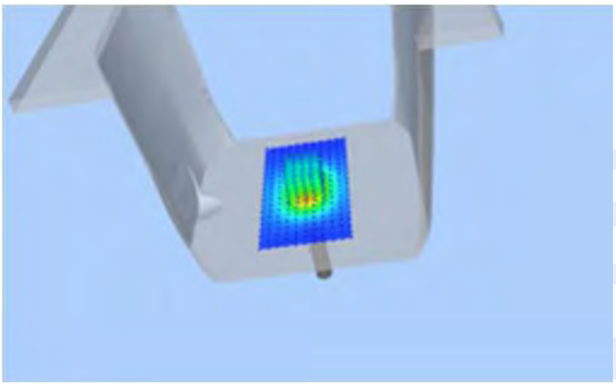
SAR Peak: 5.27 W/kg

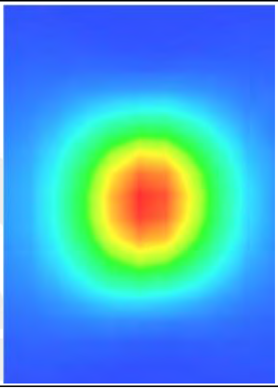
SAR 10g (W/Kg)	2.124122
SAR 1g (W/Kg)	4.141824

Z Axis Scan

Z (mm)	0	4	9	14	19	24	29
SAR(W/Kg)	5.3196	3.3419	1.8167	1.0186	0.5752	0.3285	0.1898





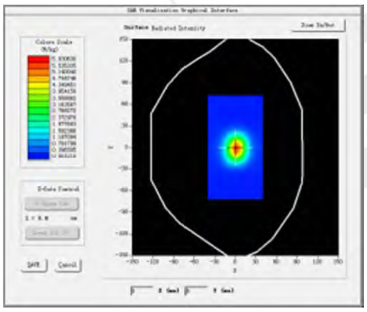
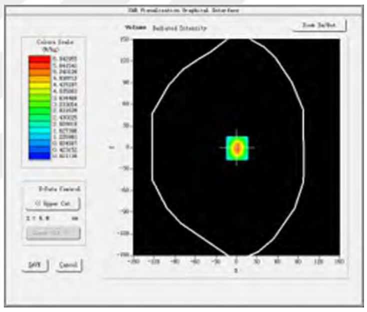


System Performance Check Data(2450 MHz Head)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2014.10.13

Experimental conditions.

Phantom	Validation plane
Device Position	-
Band	2450MHz
Channels	-
Signal	CW
Frequency (MHz)	2450MHz
Relative permittivity (real part)	39.33
Relative permittivity	13.207
Conductivity (S/m)	1.77
Power drift (%)	-1.2
Ambient Temperature:	22.7˚C
Liquid Temperature:	22.3˚C
Probe	SN 17/14 EP221
ConvF:	4.11
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

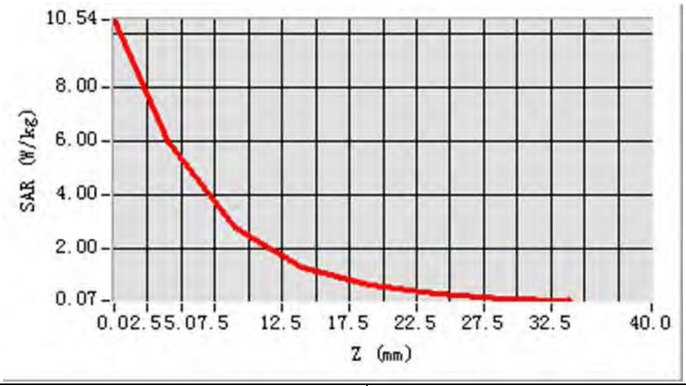
Maximum location: X=1.00, Y=0.00

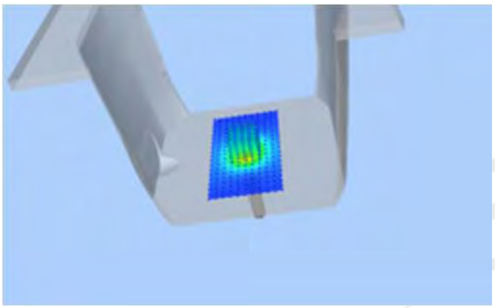
SAR Peak: 10.40 W/kg

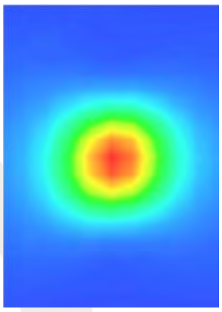
SAR 10g (W/Kg)	2.563006
SAR 1g (W/Kg)	5.392723

Z Axis Scan

Z (mm)	0	4	9	14	19	24	29
SAR(W/Kg)	10.7621	7.9862	3.6672	1.9872	0.5979	0.2875	0.1721





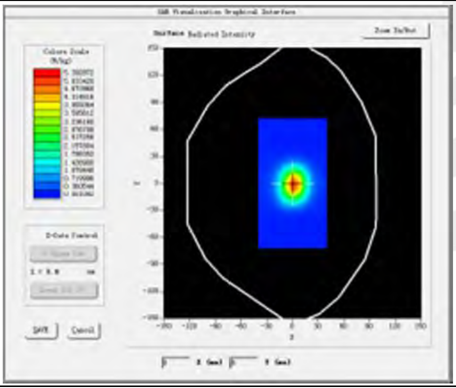
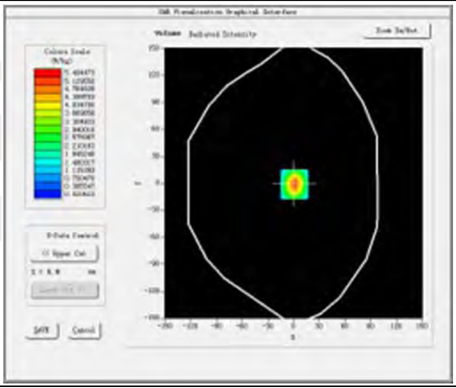


System Performance Check Data(2450MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2014.10.13

Experimental conditions.

Device Position	-
Band	2450MHz
Channels	-
Signal	CW
Frequency (MHz)	2450MHz
Relative permittivity (real part)	54.19
Relative permittivity	11.97
Conductivity (S/m)	1.92
Power drift (%)	0.37
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
Probe	SN 17/14 EP221
ConvF:	4.25
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

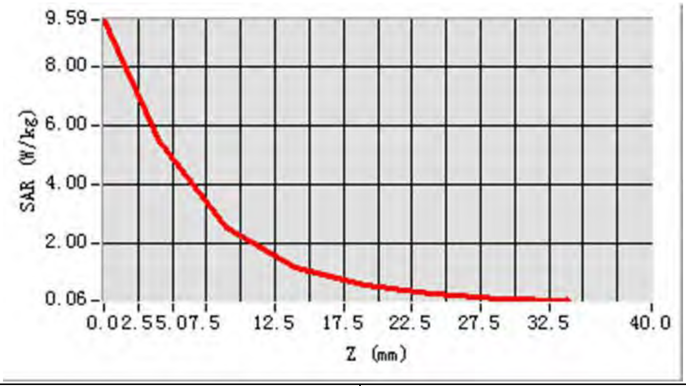
Maximum location: X=1.00, Y=1.00

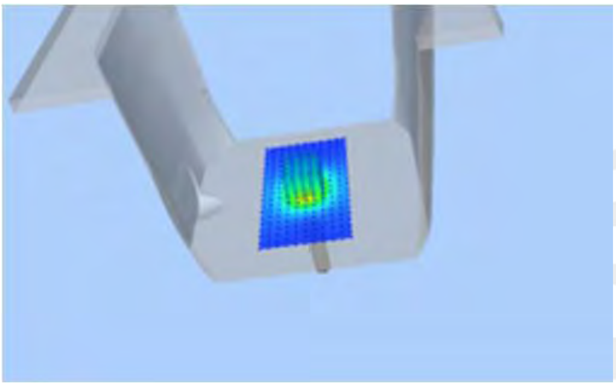
SAR Peak: 9.46 W/kg

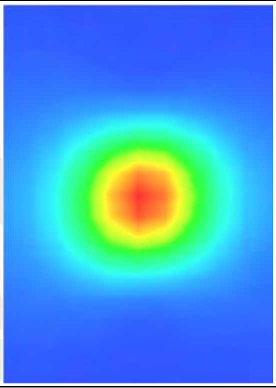
SAR 10g (W/Kg)	2.294654
SAR 1g (W/Kg)	5.122832

Z Axis Scan

Z (mm)	0	4	9	14	19	24	29
SAR(W/Kg)	9.7552	7.4847	2.8567	1.7823	0.4983	0.1763	0.1091







Appendix B. SAR Test Plots

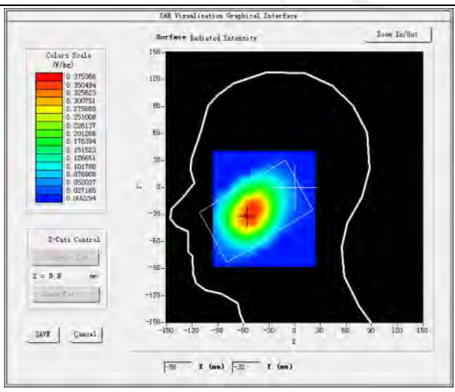
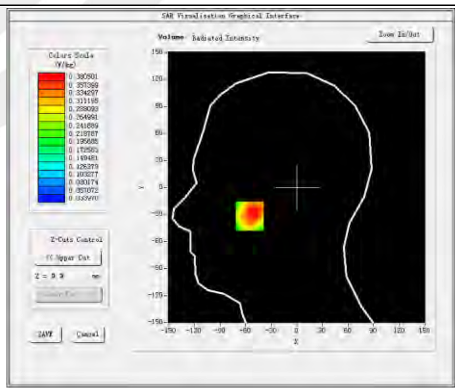
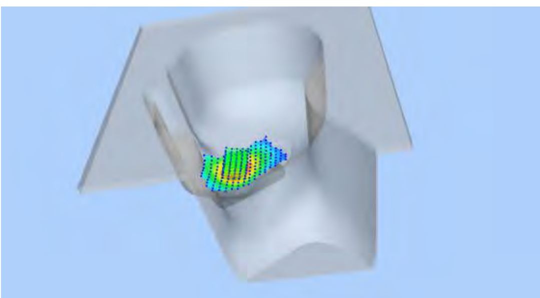
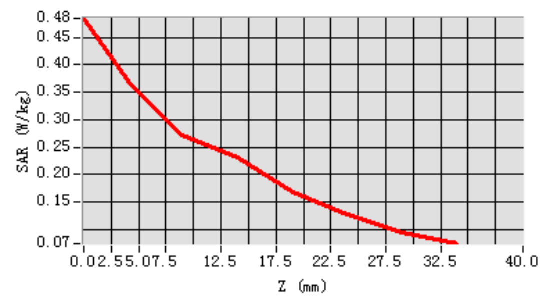
Plot 1: DUT: smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Cheek
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	836.400024
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	-2.17

Maximum location: X=-55.00, Y=-32.00

SAR Peak: 0.55 W/kg

SAR 10g (W/Kg)	0.260367
SAR 1g (W/Kg)	0.381295

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

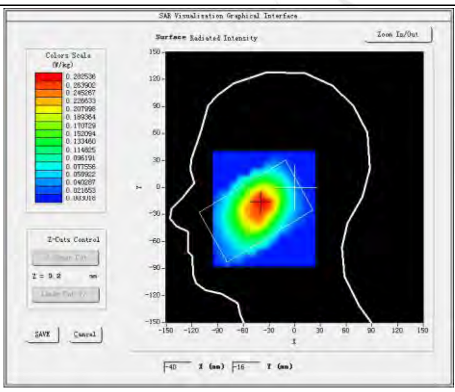
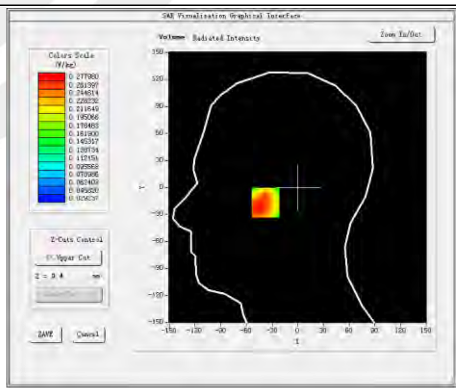
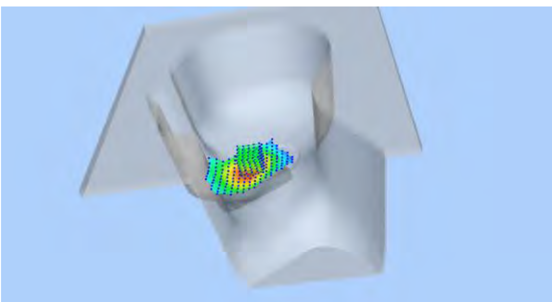
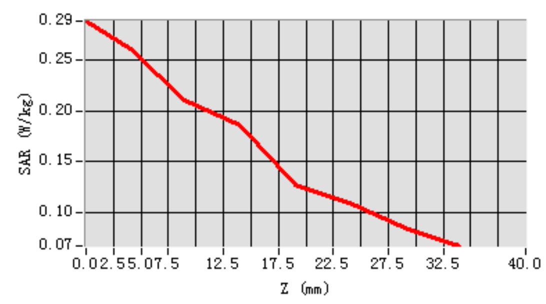
Plot 2: DUT: smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Tilt
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	836.4
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	-1.77

Maximum location: X=-36.00, Y=-20.00

SAR Peak: 0.37 W/kg

SAR 10g (W/Kg)	0.195717
SAR 1g (W/Kg)	0.269209

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

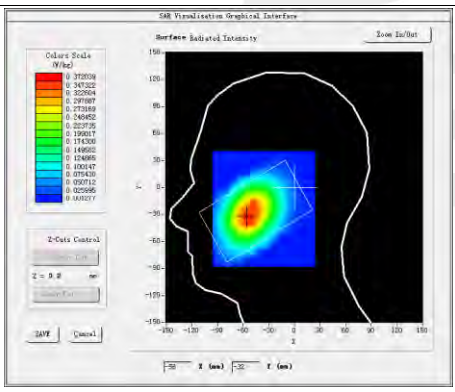
Plot 3: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	836.4
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	1.20

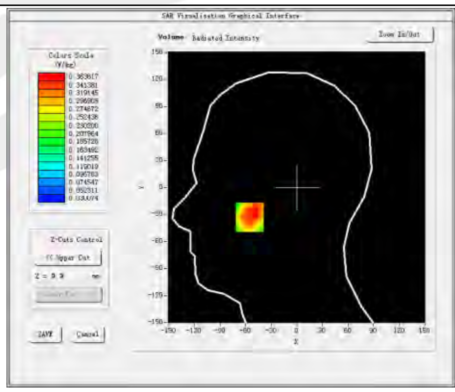
Maximum location: X=-55.00, Y=-33.00
SAR Peak: 0.46 W/kg

SAR 10g (W/Kg)	0.250655
SAR 1g (W/Kg)	0.349181

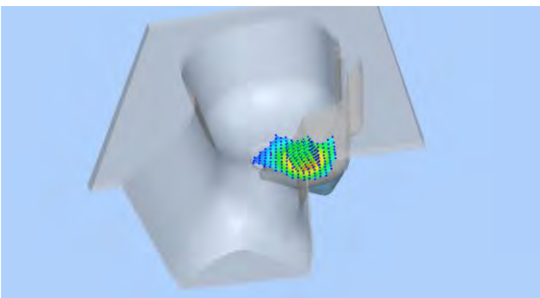
SURFACE SAR



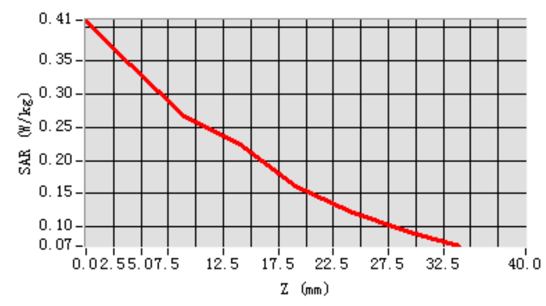
VOLUME SAR



3D screen shot



Z Axis Scan



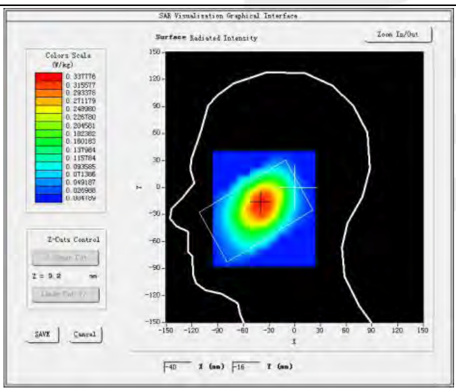
Plot 4: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Tilt
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	836.4
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	-2.30

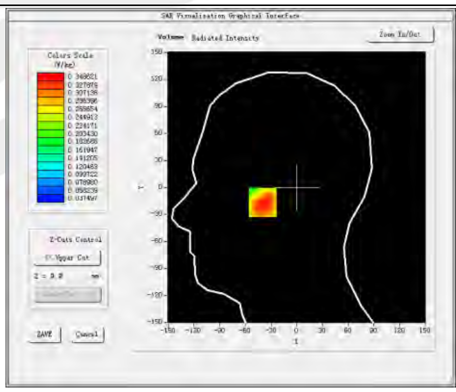
Maximum location: X=-40.00, Y=-16.00
SAR Peak: 0.48 W/kg

SAR 10g (W/Kg)	0.239598
SAR 1g (W/Kg)	0.338869

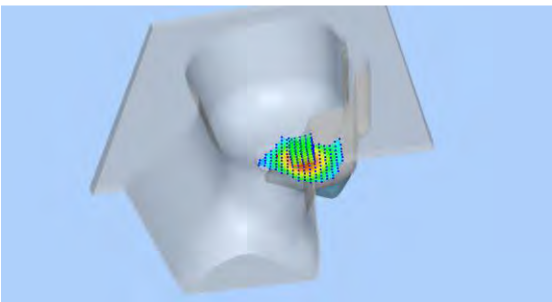
SURFACE SAR



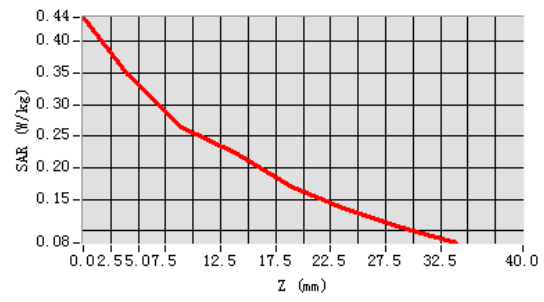
VOLUME SAR



3D screen shot



Z Axis Scan

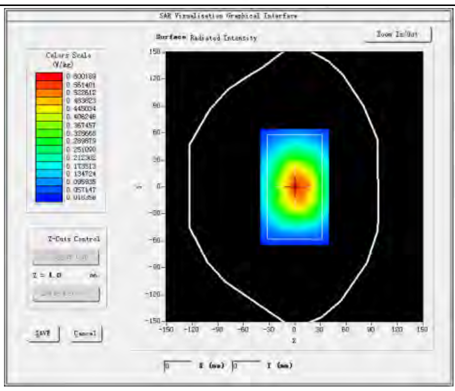
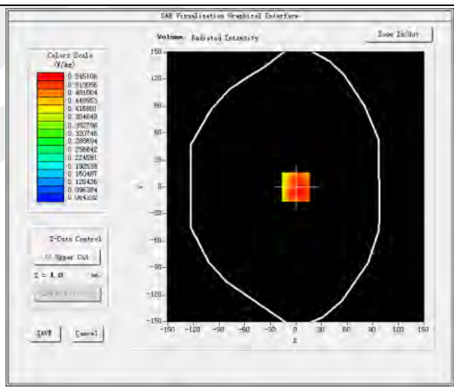
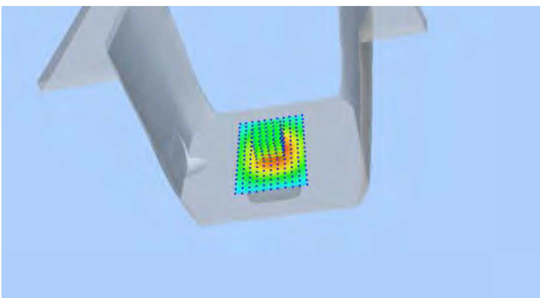
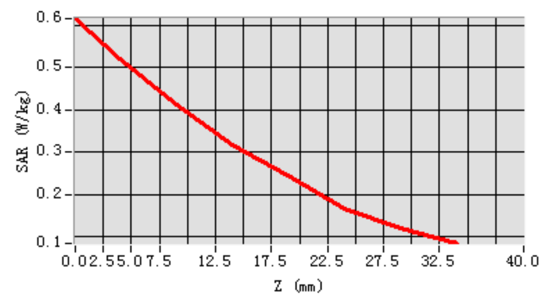


Plot 5: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	5.02
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Front
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	836.40
Relative permittivity (real part)	55.20
Conductivity (S/m)	0.97
Variation (%)	0.76

Maximum location: X=0.00, Y=0.00
SAR Peak: 0.75 W/kg

SAR 10g (W/Kg)	0.378869
SAR 1g (W/Kg)	0.535857

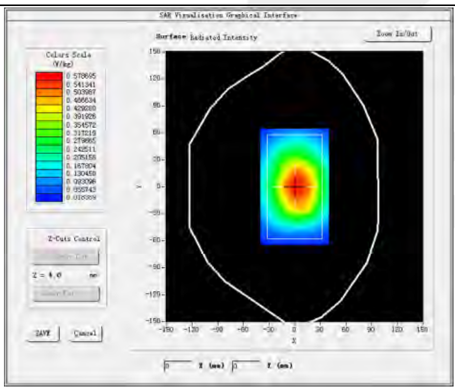
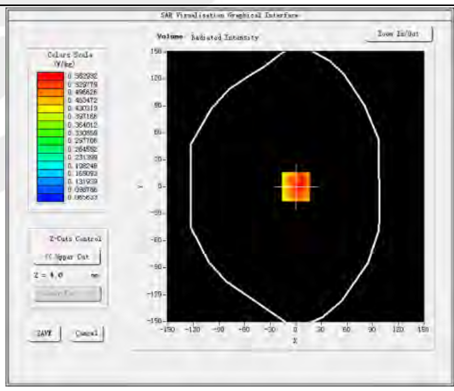
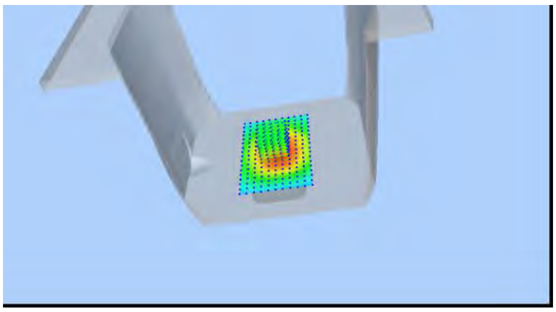
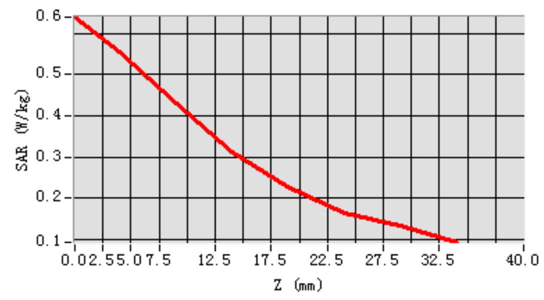
SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 6: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	5.02
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Behind
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	836.40
Relative permittivity (real part)	55.20
Conductivity (S/m)	0.97
Variation (%)	-0.95

Maximum location: X=0.00, Y=0.00
SAR Peak: 0.76 W/kg

SAR 10g (W/Kg)	0.378511
SAR 1g (W/Kg)	0.543476

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

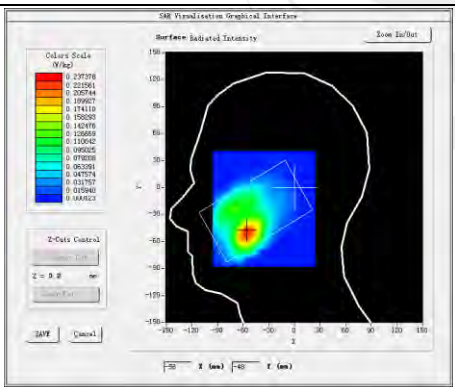
Plot 7: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Cheek
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	0.24

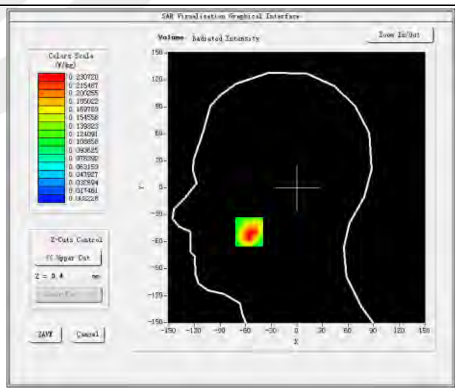
Maximum location: X=-56.00, Y=-49.00
SAR Peak: 0.37 W/kg

SAR 10g (W/Kg)	0.125156
SAR 1g (W/Kg)	0.230262

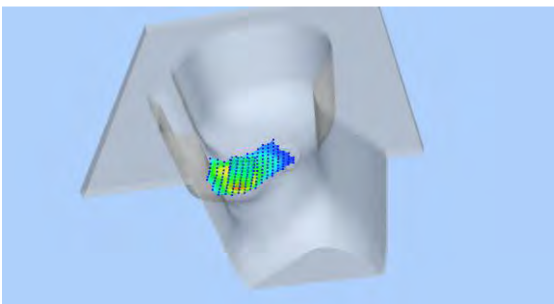
SURFACE SAR



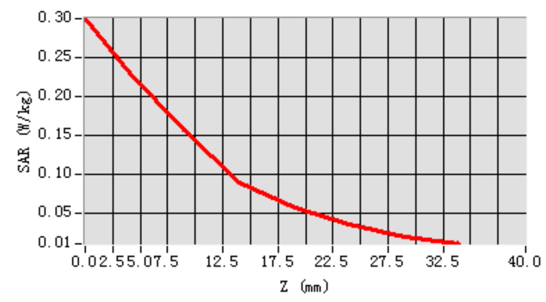
VOLUME SAR



3D screen shot



Z Axis Scan



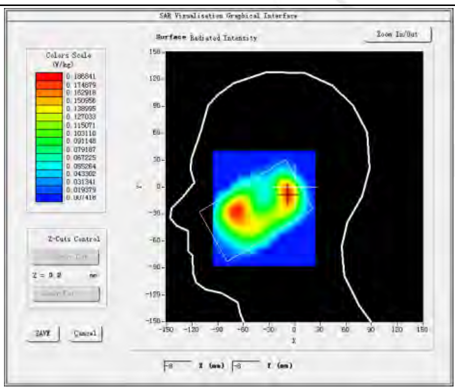
Plot 8: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Tilt
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	-0.53

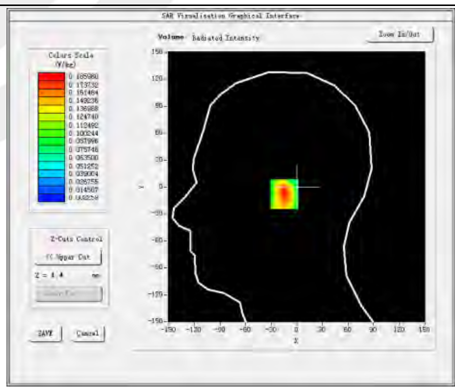
Maximum location: X=-8.00, Y=-8.00
SAR Peak: 0.27 W/kg

SAR 10g (W/Kg)	0.101552
SAR 1g (W/Kg)	0.177428

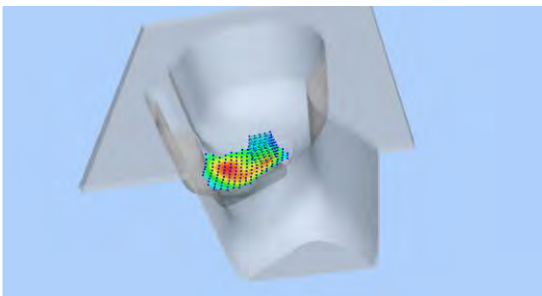
SURFACE SAR



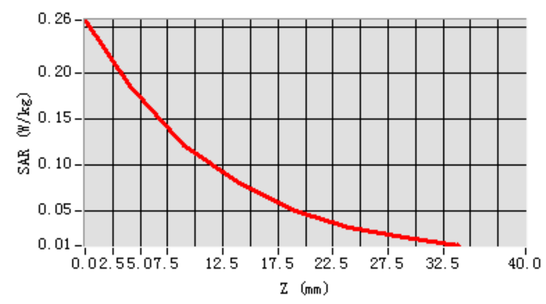
VOLUME SAR



3D screen shot



Z Axis Scan

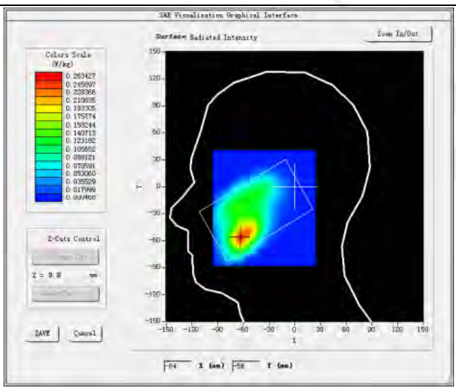
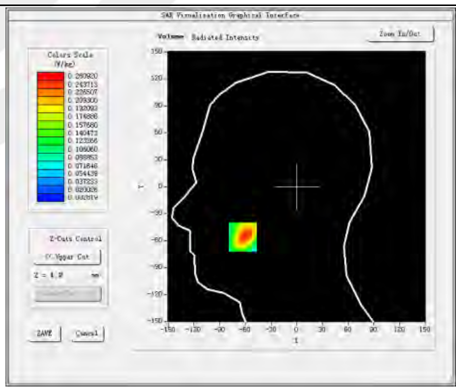
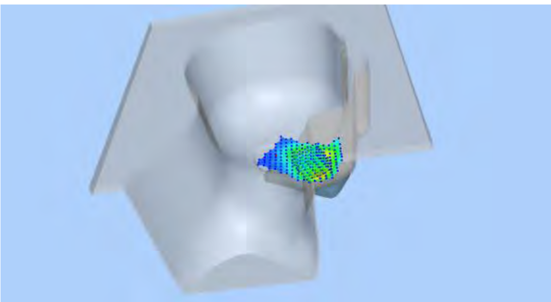
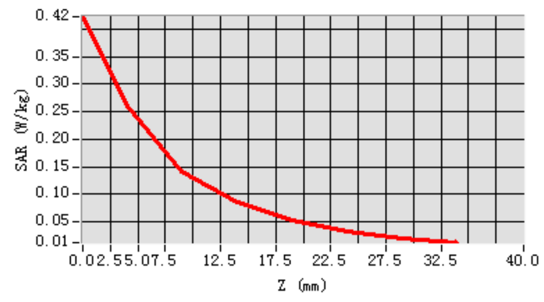


Plot 9: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	-1.04

Maximum location: X=-63.00, Y=-56.00
SAR Peak: 0.42 W/kg

SAR 10g (W/Kg)	0.133772
SAR 1g (W/Kg)	0.252956

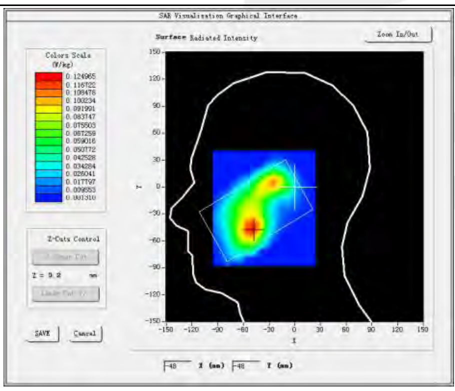
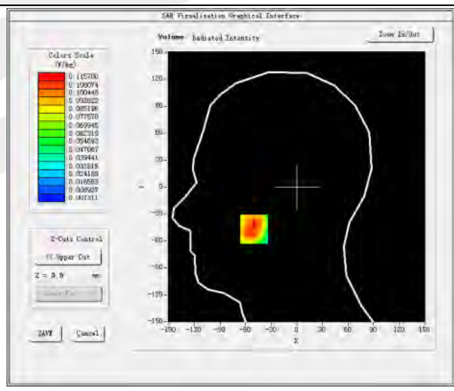
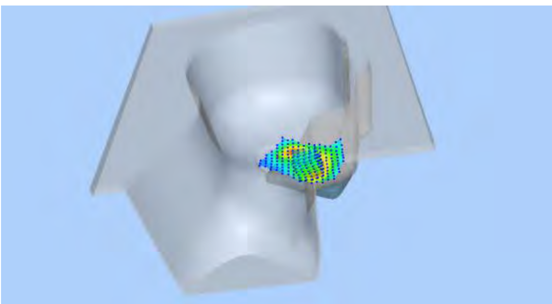
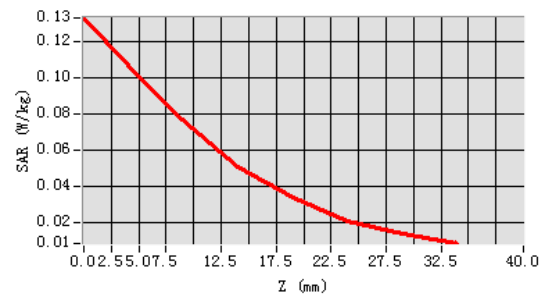
SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 10: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Tilt
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	0.91

Maximum location: X=-50.00, Y=-47.00
SAR Peak: 0.18 W/kg

SAR 10g (W/Kg)	0.066458
SAR 1g (W/Kg)	0.110296

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

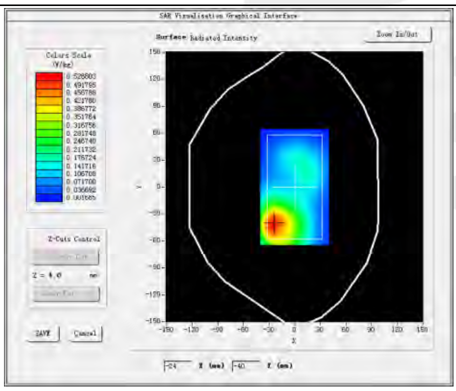
Plot 11: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.85
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Front
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.30
Conductivity (S/m)	1.52
Variation (%)	1.78

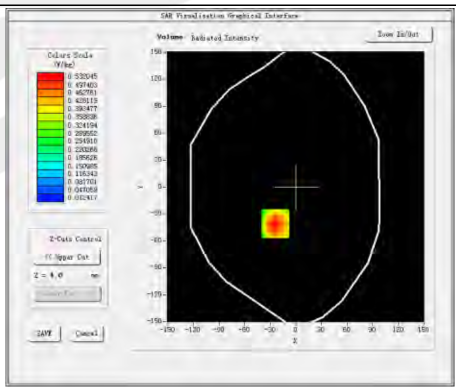
Maximum location: X=5.00, Y=-37.00
SAR Peak: 0.07 W/kg

SAR 10g (W/Kg)	0.289889
SAR 1g (W/Kg)	0.516068

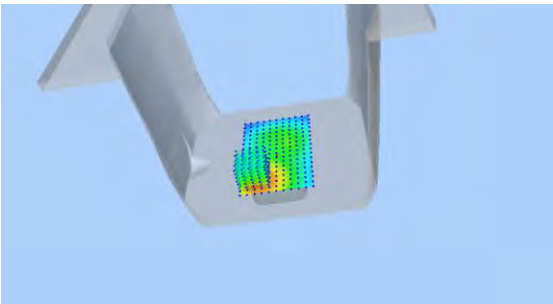
SURFACE SAR



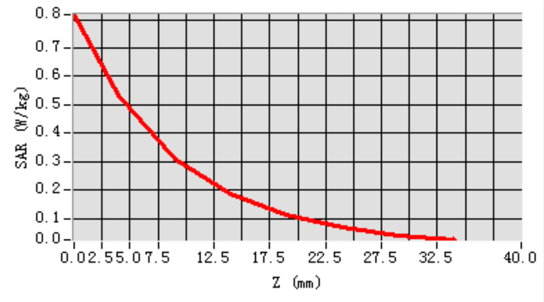
VOLUME SAR



3D screen shot



Z Axis Scan

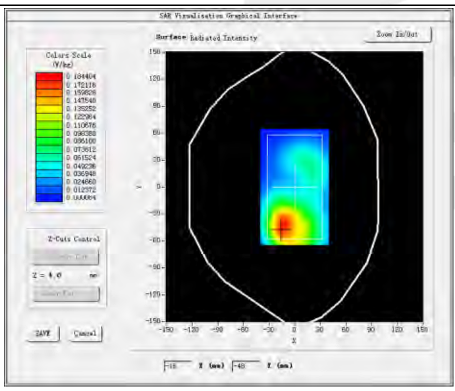
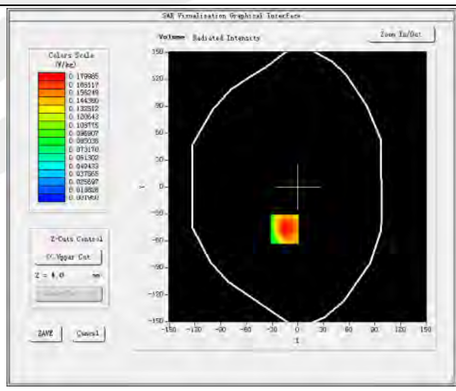
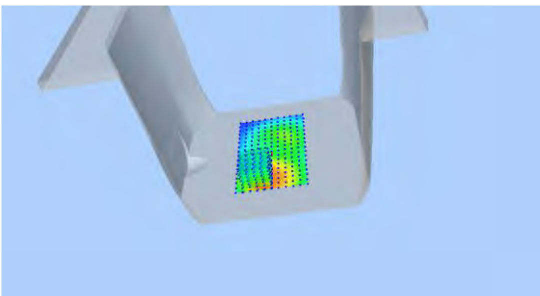
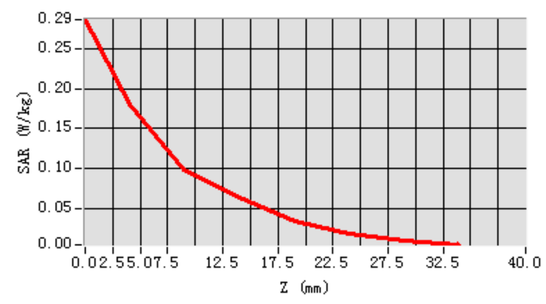


Plot 12: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.85
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Behind
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.30
Conductivity (S/m)	1.52
Variation (%)	4.06

Maximum location: X=-15.00, Y=-47.00
SAR Peak: 0.28 W/kg

SAR 10g (W/Kg)	0.099308
SAR 1g (W/Kg)	0.175066

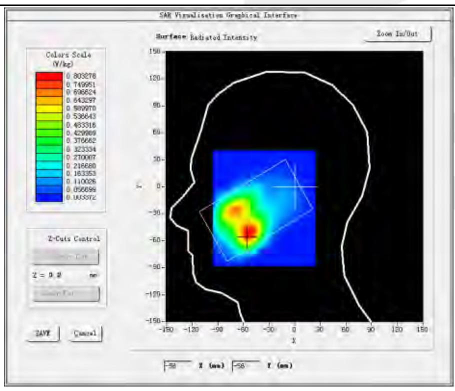
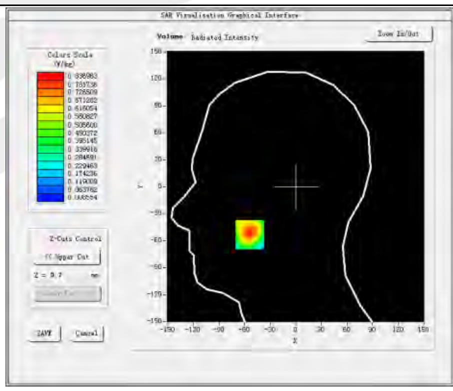
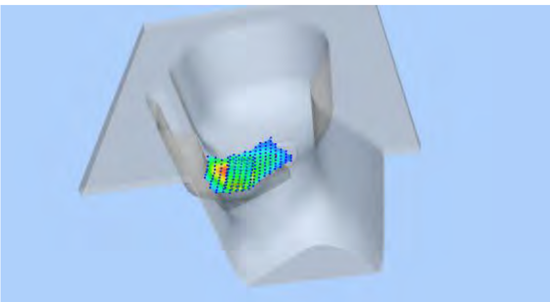
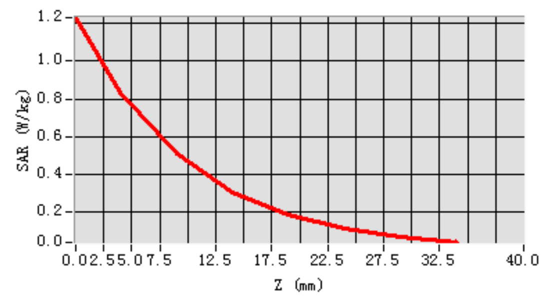
SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 13: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Cheek
Band	WCDMA II
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	-0.49

Maximum location: X=-54.00, Y=-53.00
SAR Peak: 1.23 W/kg

SAR 10g (W/Kg)	0.437147
SAR 1g (W/Kg)	0.795364

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

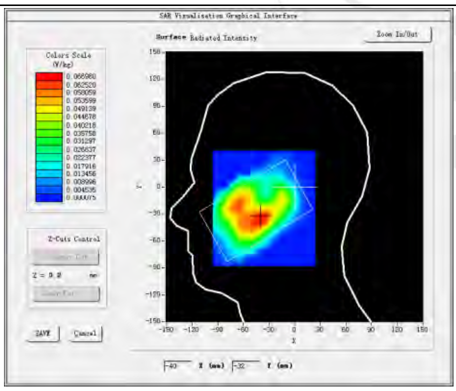
Plot 14: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Tilt
Band	WCDMA II
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	-0.55

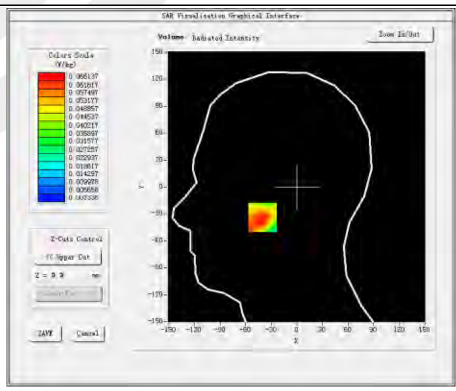
Maximum location: X=-39.00, Y=-34.00
SAR Peak: 0.10 W/kg

SAR 10g (W/Kg)	0.038043
SAR 1g (W/Kg)	0.064040

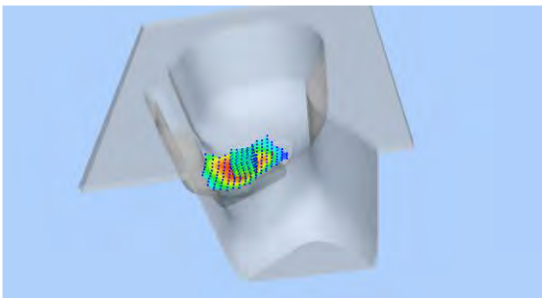
SURFACE SAR



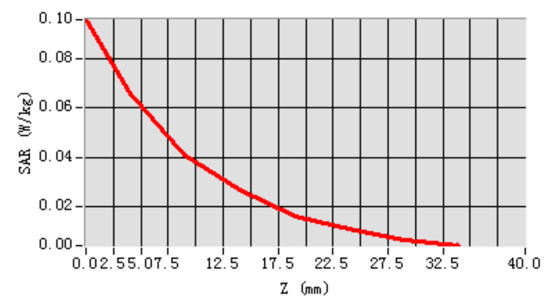
VOLUME SAR



3D screen shot



Z Axis Scan

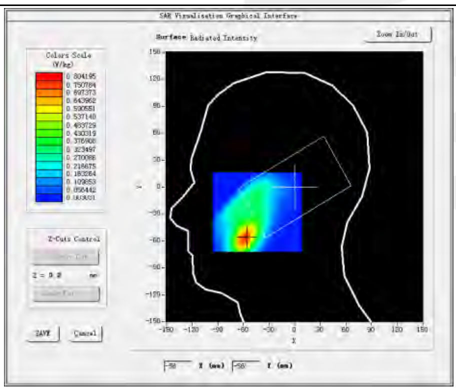
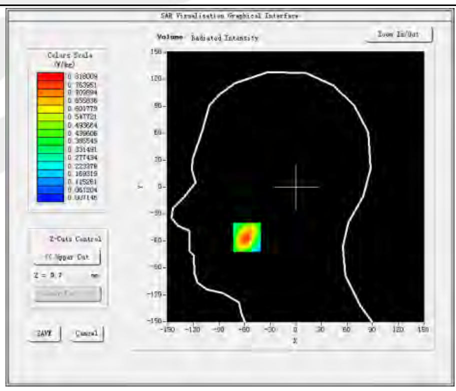
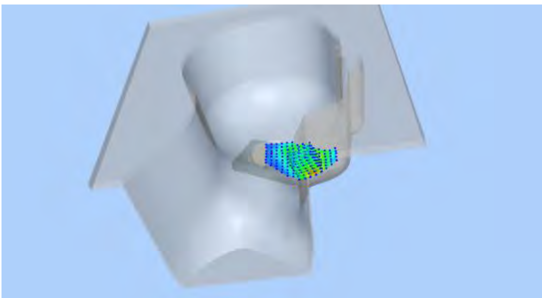
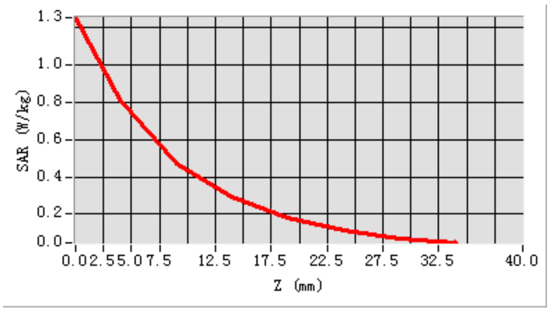


Plot 15: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	WCDMA II
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	0.56

Maximum location: X=-57.00, Y=-56.00
SAR Peak: 1.27 W/kg

SAR 10g (W/Kg)	0.406648
SAR 1g (W/Kg)	0.780448

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

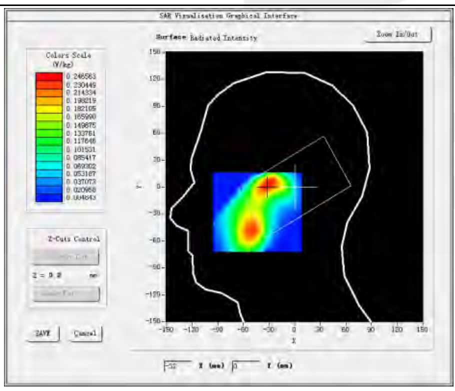
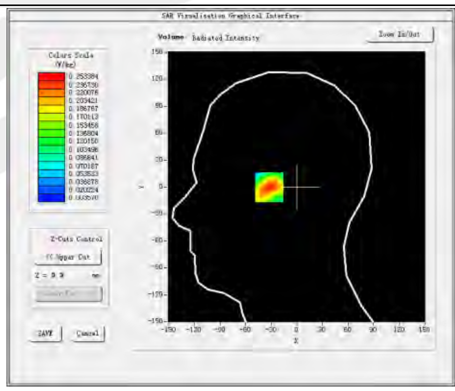
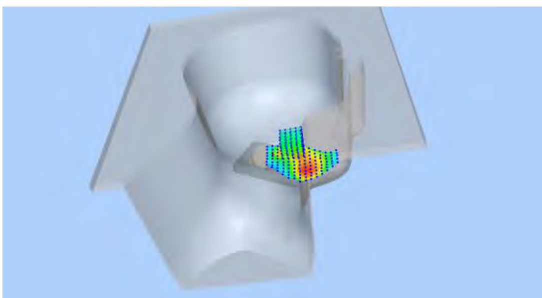
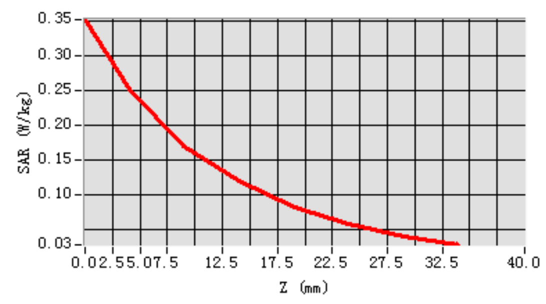
Plot 16: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.71
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Tilt
Band	WCDMA II
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	40.00
Conductivity (S/m)	1.40
Variation (%)	-1.01

Maximum location: X=-31.00, Y=2.00

SAR Peak: 0.35 W/kg

SAR 10g (W/Kg)	0.143220
SAR 1g (W/Kg)	0.242025

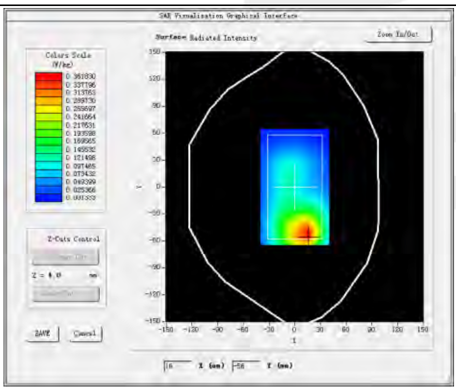
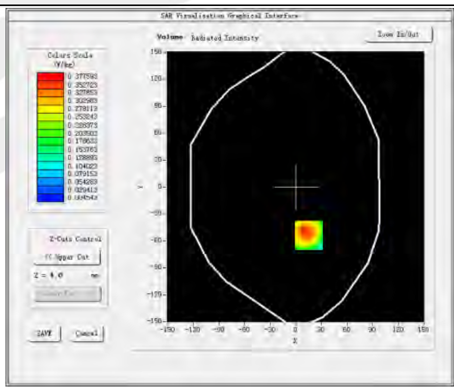
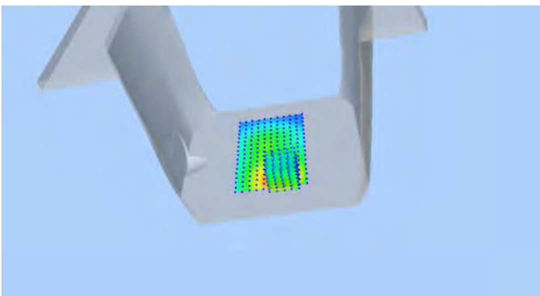
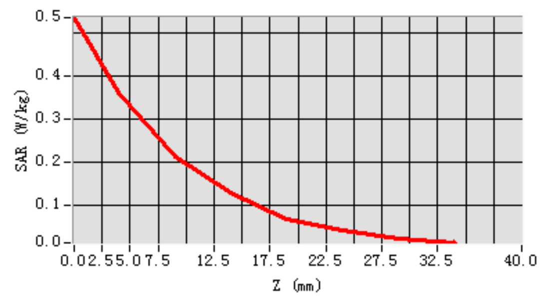
SURFACE SAR	**VOLUME SAR**
	
3D screen shot	**Z Axis Scan**
	

Plot 17: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.85
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Front
Band	WCDMA II
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.30
Conductivity (S/m)	1.52
Variation (%)	1.39

Maximum location: X=15.00, Y=-54.00
SAR Peak: 0.66 W/kg

SAR 10g (W/Kg)	0.194063
SAR 1g (W/Kg)	0.356226

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 18: DUT: Smart mobile phone; EUT Model: K968

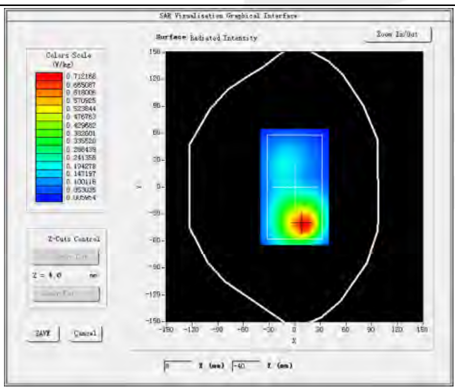
Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.85
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Behind
Band	WCDMA II
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.30
Conductivity (S/m)	1.52
Variation (%)	-0.17

Maximum location: X=11.00, Y=-42.00

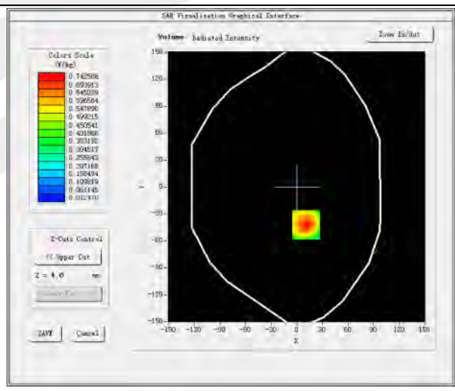
SAR Peak: 1.15 W/kg

SAR 10g (W/Kg)	0.393047
SAR 1g (W/Kg)	0.718261

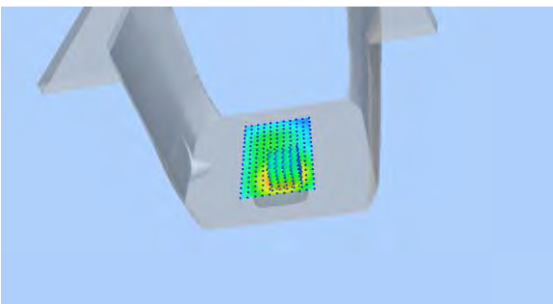
SURFACE SAR



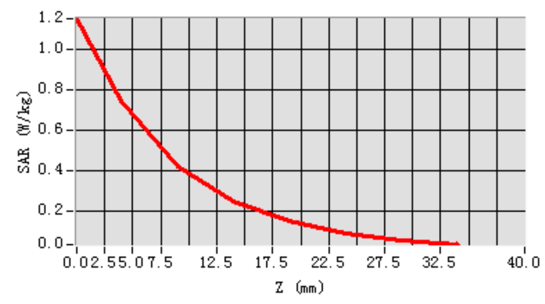
VOLUME SAR



3D screen shot



Z Axis Scan

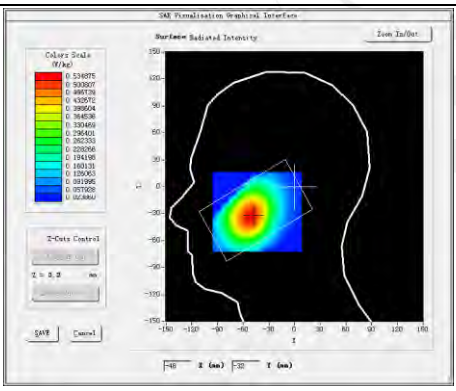
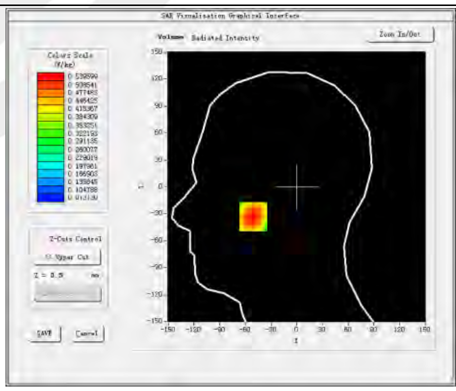
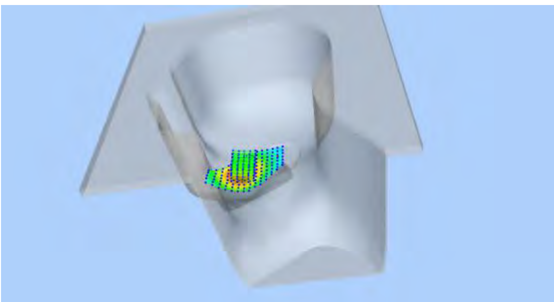
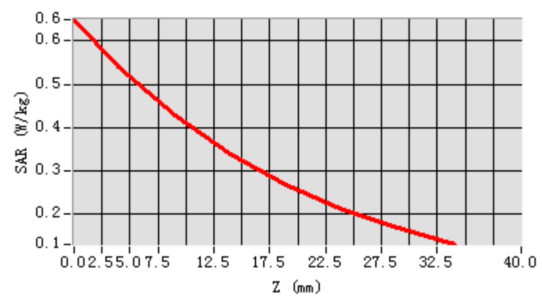


Plot 19: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Cheek
Band	WCDMA 850
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	836.6
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	1.11

Maximum location: X=-51.00, Y=-33.00
SAR Peak: 0.66 W/kg

SAR 10g (W/Kg)	0.385516
SAR 1g (W/Kg)	0.524964

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

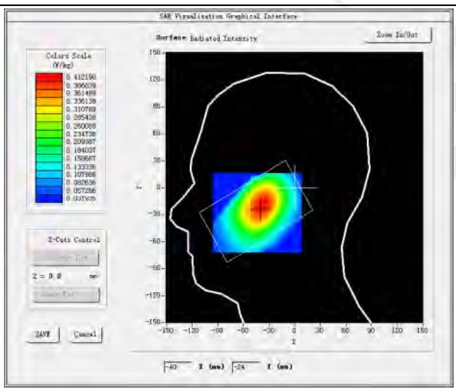
Plot 20: DUT: smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Tilt
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	836.6
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	-0.11

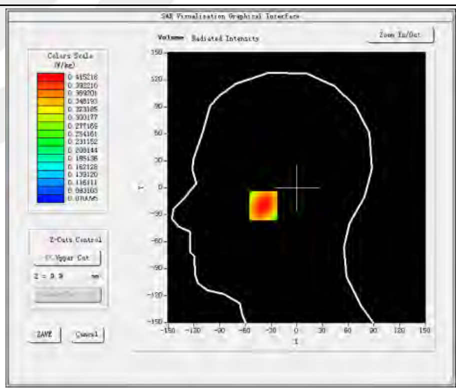
Maximum location: X=-39.00, Y=-20.00
SAR Peak: 0.49 W/kg

SAR 10g (W/Kg)	0.303185
SAR 1g (W/Kg)	0.402583

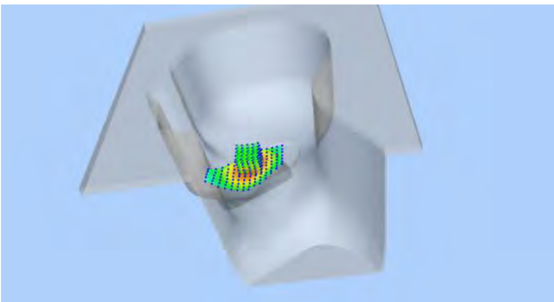
SURFACE SAR



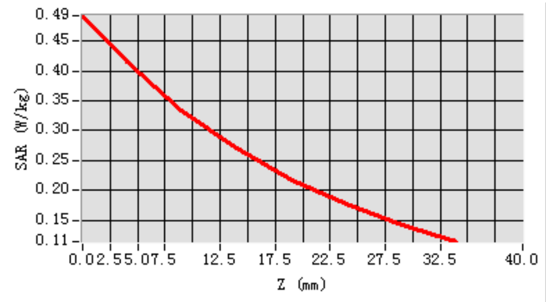
VOLUME SAR



3D screen shot



Z Axis Scan



Plot 21: DUT: Smart mobile phone; EUT Model: K968

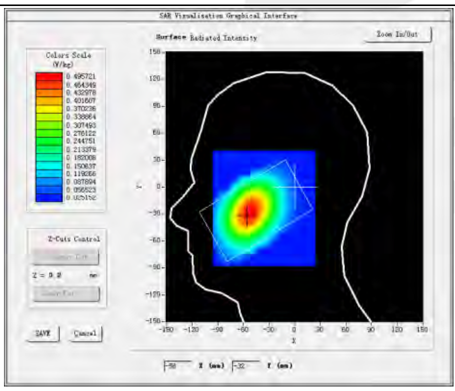
Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	WCDMA V
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	836.6
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	-0.12

Maximum location: X=-53.00, Y=-29.00

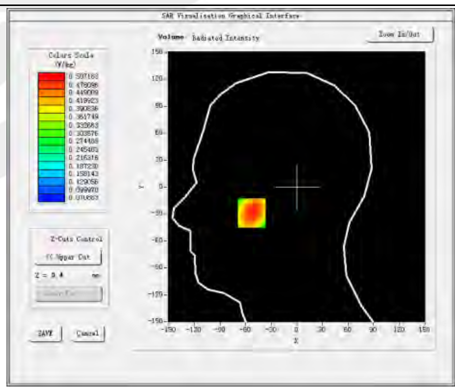
SAR Peak: 0.62 W/kg

SAR 10g (W/Kg)	0.360733
SAR 1g (W/Kg)	0.491640

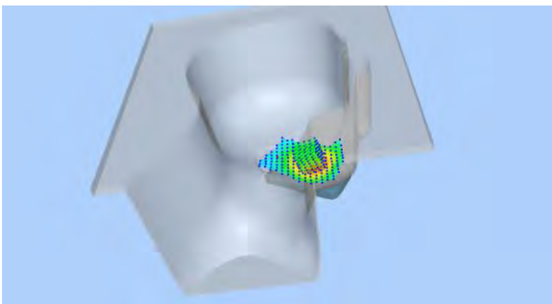
SURFACE SAR



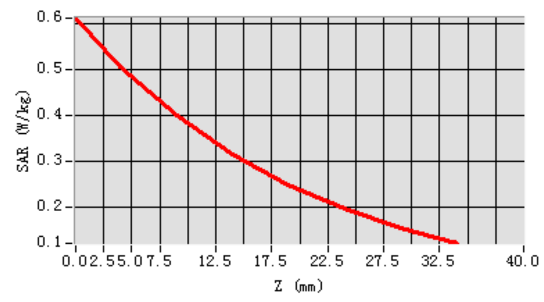
VOLUME SAR



3D screen shot



Z Axis Scan



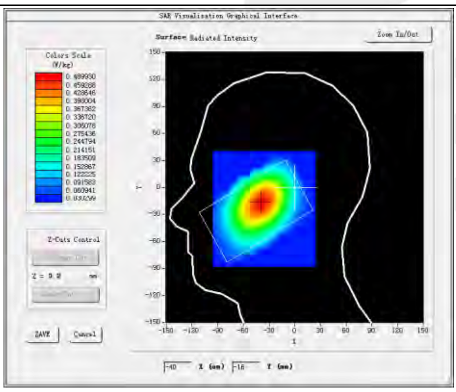
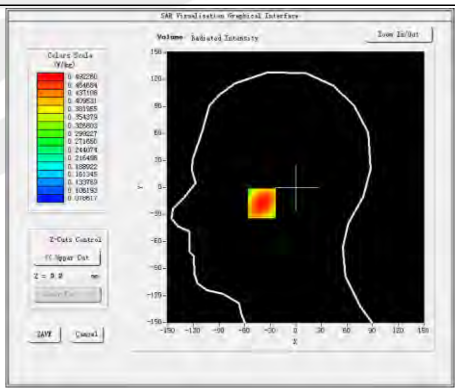
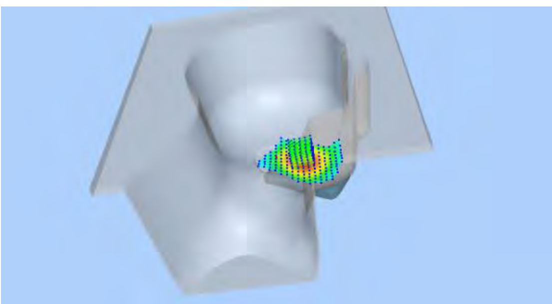
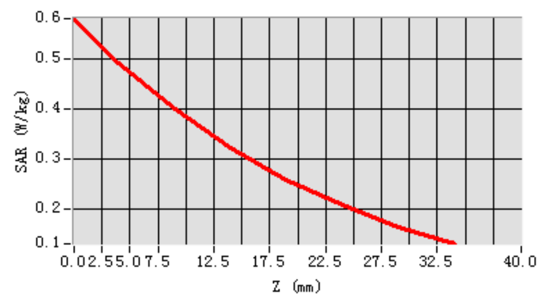
Plot 22: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.83
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Tilt
Band	WCDMA V
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	836.6
Relative permittivity (real part)	41.5
Conductivity (S/m)	0.90
Variation (%)	-0.38

Maximum location: X=-40.00, Y=-17.00

SAR Peak: 0.58 W/kg

SAR 10g (W/Kg)	0.360618
SAR 1g (W/Kg)	0.479324

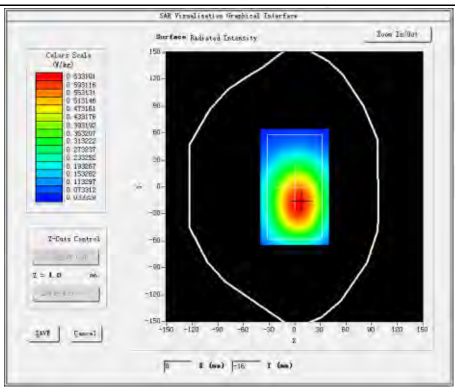
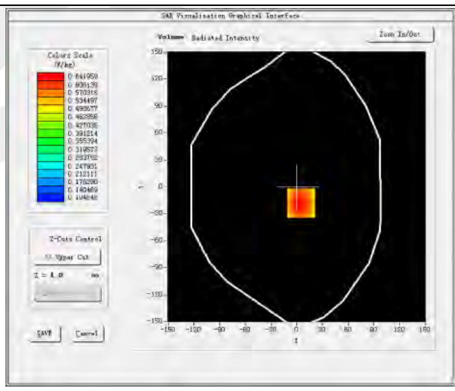
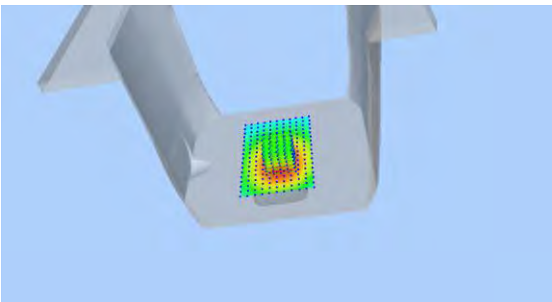
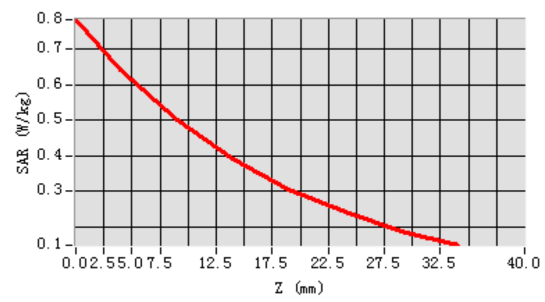
SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 23: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	5.02
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Front
Band	WCDMA V
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	836.6
Relative permittivity (real part)	55.20
Conductivity (S/m)	0.97
Variation (%)	-0.44

Maximum location: X=5.00, Y=-18.00
SAR Peak: 0.78 W/kg

SAR 10g (W/Kg)	0.461694
SAR 1g (W/Kg)	0.622672

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

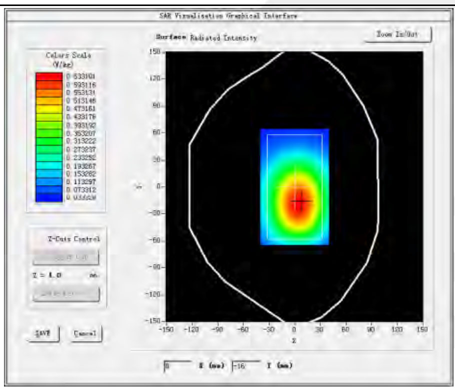
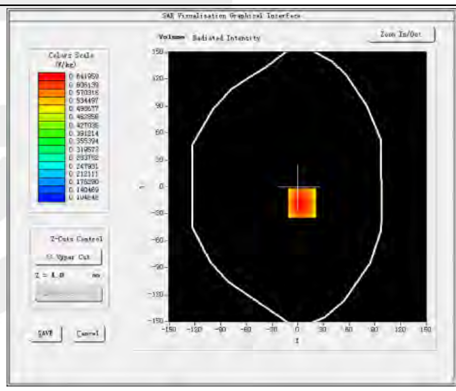
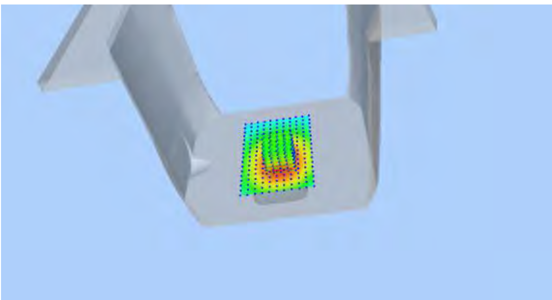
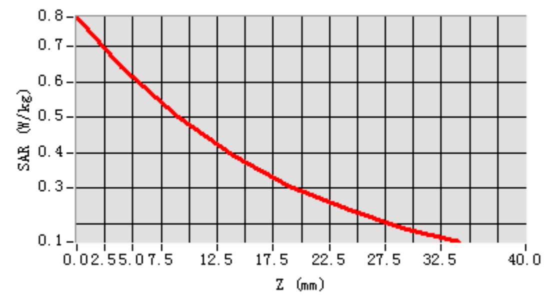
Plot 24: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	5.02
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Behind
Band	WCDMA V
Channels	Middle
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	836.6
Relative permittivity (real part)	55.20
Conductivity (S/m)	0.97
Variation (%)	-0.52

Maximum location: X=-3.00, Y=-20.00

SAR Peak: 0.53 W/kg

SAR 10g (W/Kg)	0.318550
SAR 1g (W/Kg)	0.422401

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

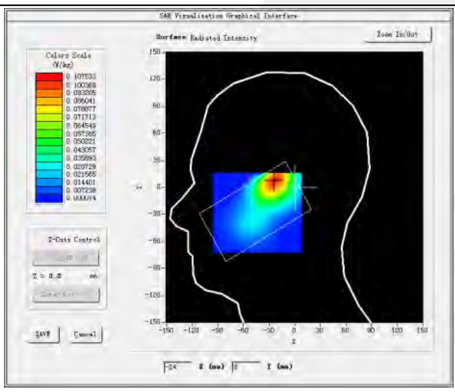
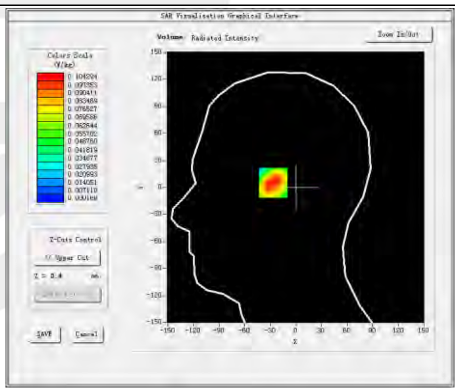
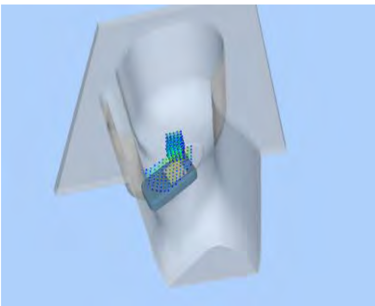
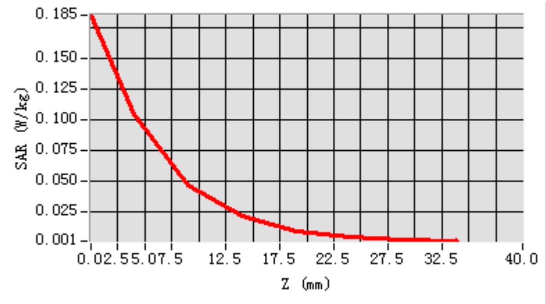
Plot 25: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.11
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Cheek
Band	IEEE 802.11b ISM
Channels	High
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	39.2
Conductivity (S/m)	1.80
Variation (%)	-0.43

Maximum location: X=-24.00, Y=7.00

SAR Peak: 0.19 W/kg

SAR 10g (W/Kg)	0.048030
SAR 1g (W/Kg)	0.102016

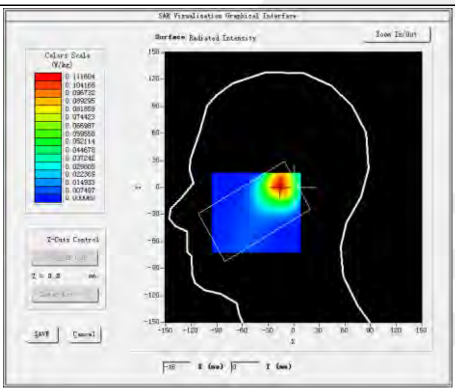
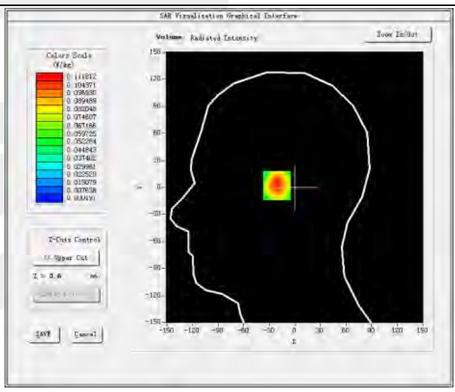
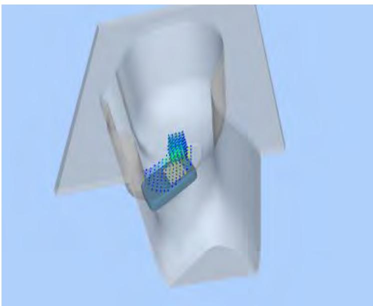
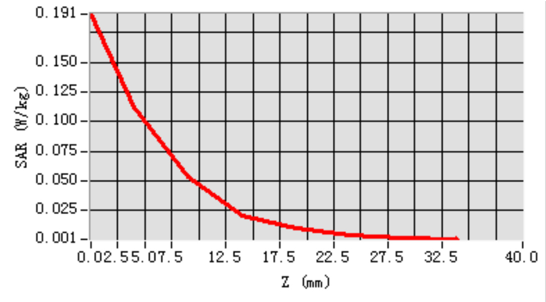
SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 26: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.11
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Right head
Device Position	Tilt
Band	IEEE 802.11b ISM
Channels	High
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	39.2
Conductivity (S/m)	1.80
Variation (%)	2.91

Maximum location: X=-17.00, Y=2.00
SAR Peak: 0.20 W/kg

SAR 10g (W/Kg)	0.051638
SAR 1g (W/Kg)	0.107483

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

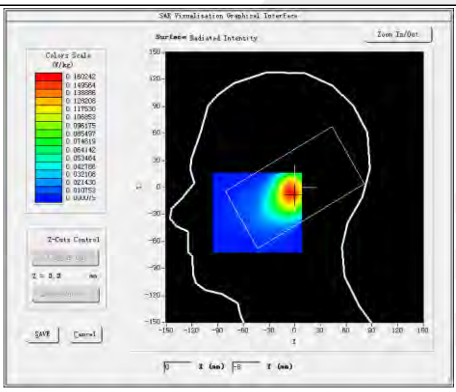
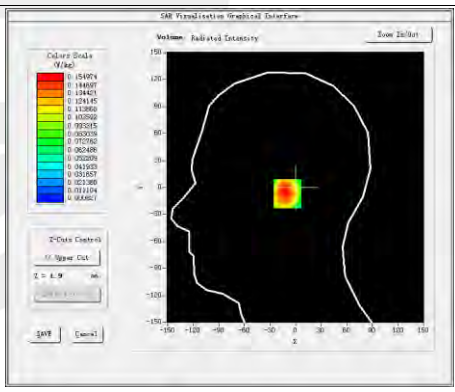
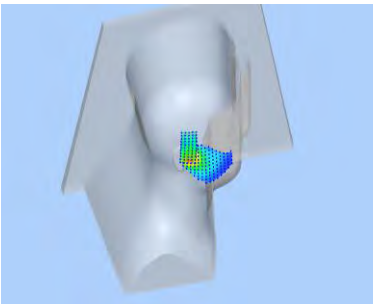
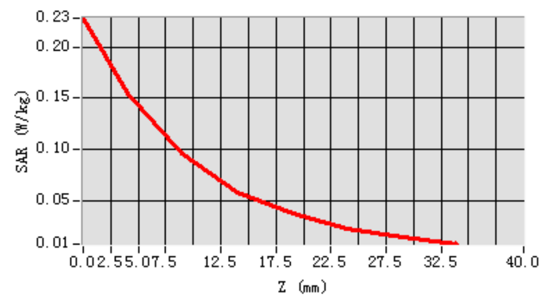
Plot 27: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.11
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Cheek
Band	IEEE 802.11b ISM
Channels	High
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	39.2
Conductivity (S/m)	1.80
Variation (%)	-1.23

Maximum location: X=-2.00, Y=-7.00

SAR Peak: 0.23 W/kg

SAR 10g (W/Kg)	0.086199
SAR 1g (W/Kg)	0.150848

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 28: DUT: Smart mobile phone; EUT Model: K968

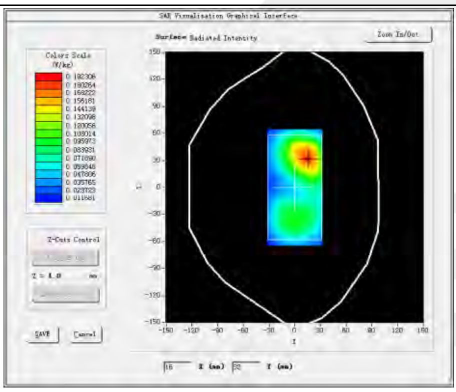
Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.11
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Left head
Device Position	Tilt
Band	IEEE 802.11b ISM
Channels	High
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	39.2
Conductivity (S/m)	1.80
Variation (%)	-0.19

Maximum location: X=15.00, Y=33.00

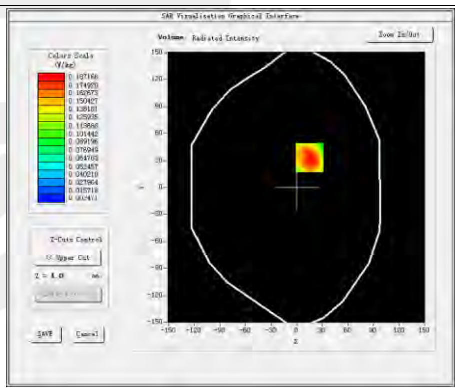
SAR Peak: 0.30 W/kg

SAR 10g (W/Kg)	0.102047
SAR 1g (W/Kg)	0.182940

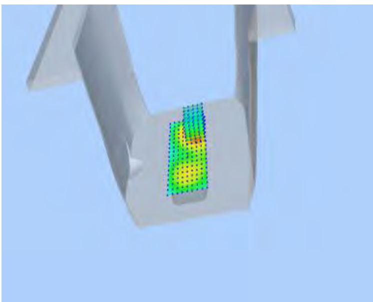
SURFACE SAR



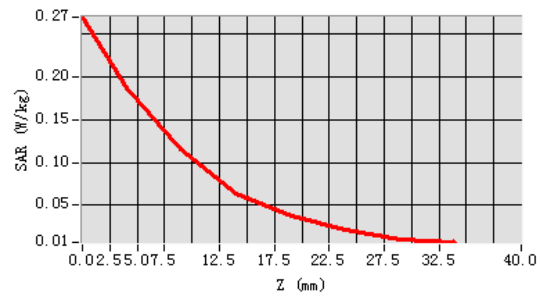
VOLUME SAR



3D screen shot



Z Axis Scan



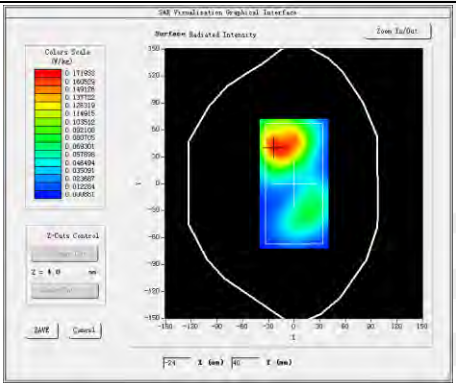
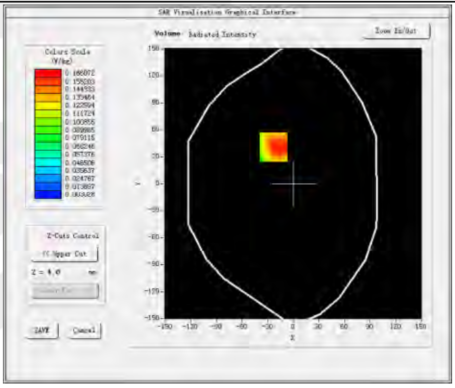
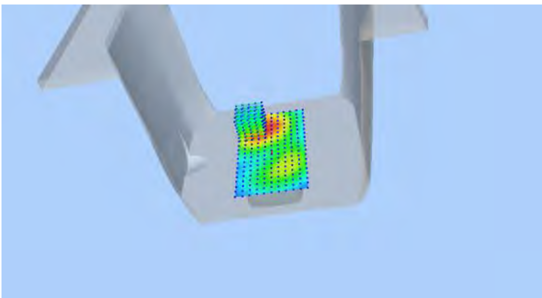
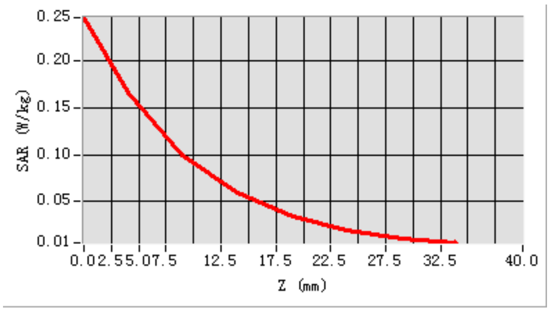
Plot 29: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.25
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Front
Band	IEEE 802.11b ISM
Channels	High
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	52.7
Conductivity (S/m)	1.95
Variation (%)	-0.19

Maximum location: X=-23.00, Y=41.00

SAR Peak: 0.25 W/kg

SAR 10g (W/Kg)	0.094434
SAR 1g (W/Kg)	0.156800

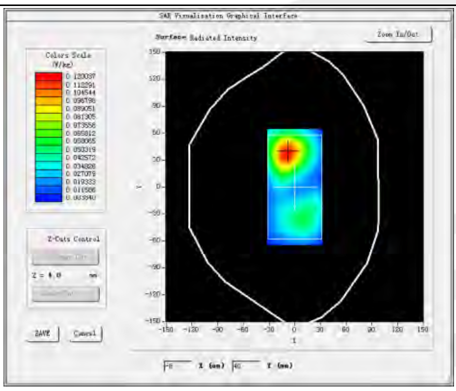
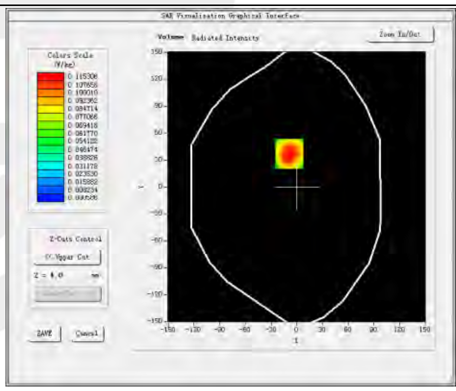
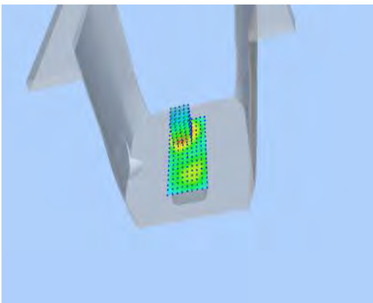
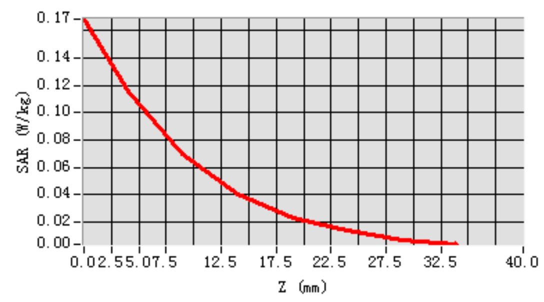
SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Plot 30: DUT: Smart mobile phone; EUT Model: K968

Test Data	2014-10-13
Probe	SN 17/14 EP221
ConvF	4.25
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body Behind
Band	IEEE 802.11b ISM
Channels	High
Signal	TDMA (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	52.7
Conductivity (S/m)	1.95
Variation (%)	1.94

Maximum location: X=-9.00, Y=37.00
SAR Peak: 0.19 W/kg

SAR 10g (W/Kg)	0.062562
SAR 1g (W/Kg)	0.113653

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Z Axis Scan**
	

Appendix C. Probe Calibration And Dipole Calibration Report

COMOSAR E-Field Probe Calibration Report

Ref : ACR.262.1.14.SATU.A

SHENZHEN STS TEST SERVICES CO., LTD.
1/F, BUILDING 2, ZHUOKE SCIENCE PARK, CHONGQING ROAD
FUYONG, BAO' AN DISTRICT, SHENZHEN,CHINA
SATIMO COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: SN 17/14 EP221

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

09/01/2014

Summary:

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

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	9/19/2014	
Checked by :	Jérôme LUC	Product Manager	9/19/2014	
Approved by :	Kim RUTKOWSKI	Quality Manager	9/19/2014	

	Customer Name
Distribution :	Shenzhen STS Test Services Co., Ltd.

Issue	*Date*	*Modifications*
A	9/19/2014	Initial release

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	Satimo
Model	SSE5
Serial Number	SN 17/14 EP221
Product Condition (new / used)	New
Frequency Range of Probe	0.4 GHz- 6 GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.179 MΩ Dipole 2: R2=0.167 MΩ Dipole 3: R3=0.178 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.

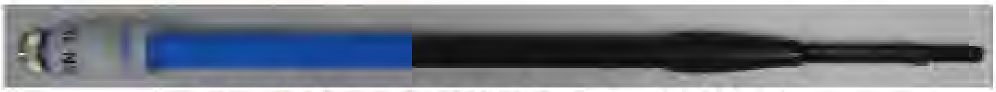


Figure 1 – *Satimo COMOSAR Dosimetric E field Dipole*

Probe Length	330 mm
Length of Individual Dipoles	4.5 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	5 mm
Distance between dipoles / probe extremity	2.7 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 %

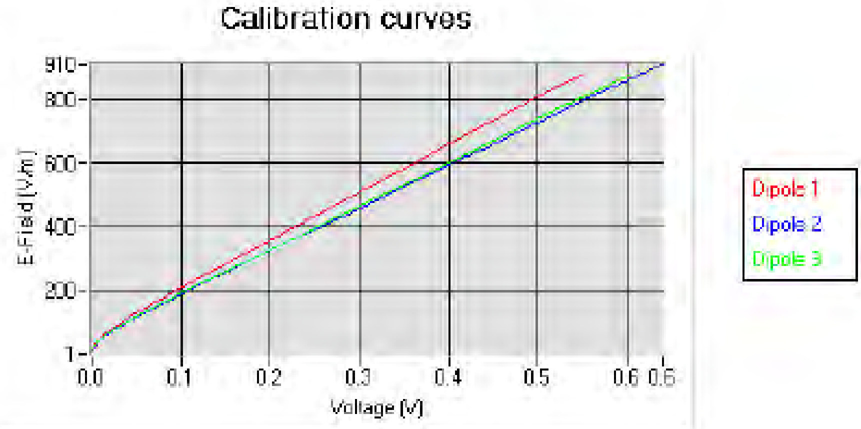
5.1 SENSITIVITY IN AIR

Normx dipole 1 ($\mu V/(V/m)^2$)	Normy dipole 2 ($\mu V/(V/m)^2$)	Normz dipole 3 ($\mu V/(V/m)^2$)
4.81	6.15	6.02

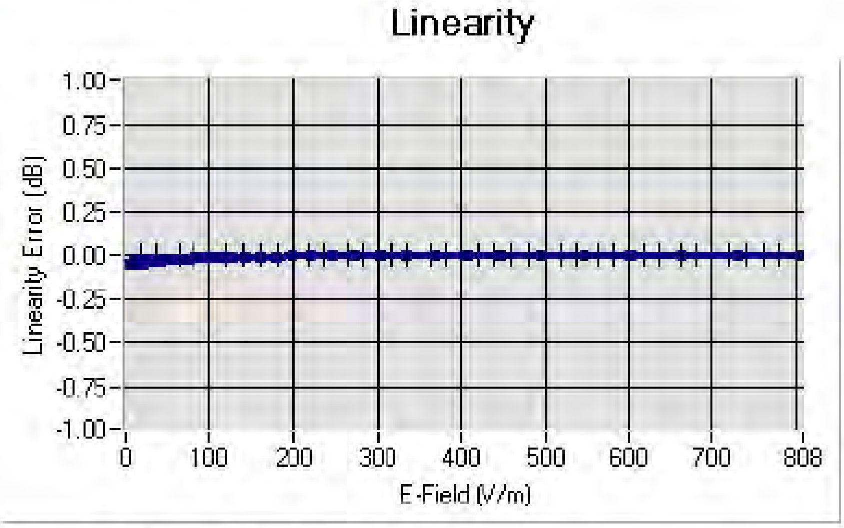
DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
95	100	90

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:+/-1.16% (+/-0.05dB)

5.3 SENSITIVITY IN LIQUID

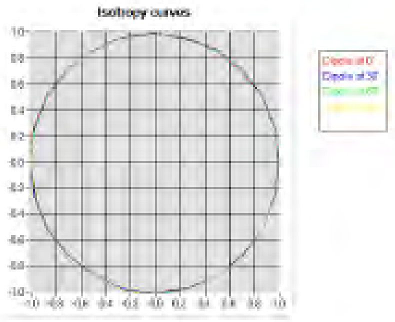
Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL450	450	43.90	0.87	4.84
BL450	450	58.63	0.98	4.98
HL750	750	42.06	0.89	4.53
BL750	750	56.57	0.99	4.70
HL850	835	42.81	0.89	4.83
BL850	835	53.46	0.96	5.02
HL900	900	42.47	0.96	4.74
BL900	900	56.69	1.08	4.89
HL1800	1800	41.31	1.38	4.25
BL1800	1800	53.27	1.51	4.34
HL1900	1900	41.09	1.42	4.71
BL1900	1900	54.20	1.54	4.85
HL2000	2000	39.72	1.43	4.27
BL2000	2000	53.91	1.53	4.44
HL2450	2450	39.05	1.77	4.11
BL2450	2450	52.97	1.93	4.25
HL2600	2600	38.35	1.92	4.20
BL2600	2600	51.81	2.19	4.32

LOWER DETECTION LIMIT: 7mW/kg

5.4 ISOTROPY

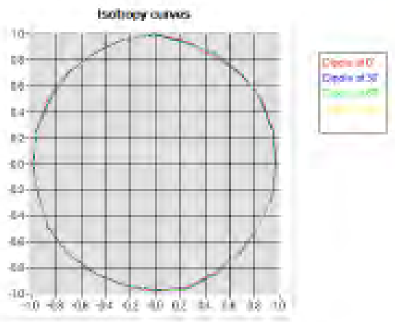
HL900 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.07 dB



HL1800 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.08 dB



6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
Flat Phantom	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	10/2013	10/2014
Multimeter	Keithley 2000	1188656	12/2013	12/2016
Signal Generator	Agilent E4438C	MY49070581	12/2013	12/2016
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2013	12/2016
Power Sensor	HP ECP-E26A	US37181460	12/2013	12/2016
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	11-661-9	8/2012	8/2015

SAR Reference Dipole Calibration Report

Ref : ACR.262.5.14.SATU.A

SHENZHEN STS TEST SERVICES CO., LTD.
1/F, BUILDING 2, ZHUOKE SCIENCE PARK, CHONGQING ROAD
FUYONG, BAO' AN DISTRICT, SHENZHEN,CHINA
SATIMO COMOSAR REFERENCE DIPOLE
FREQUENCY: 835 MHZ
SERIAL NO.: SN 30/14 DIP0G835-332

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

09/01/2014

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	9/19/2014	
Checked by :	Jérôme LUC	Product Manager	9/19/2014	
Approved by :	Kim RUTKOWSKI	Quality Manager	9/19/2014	Kim Rutkowski

	Customer Name
Distribution :	Shenzhen STS Test Services Co., Ltd.

Issue	*Date*	*Modifications*
A	9/19/2014	Initial release

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 835 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID835
Serial Number	SN 30/14 DIP0G835-332
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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

Figure 1 – *Satimo COMOSAR Validation Dipole*

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

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

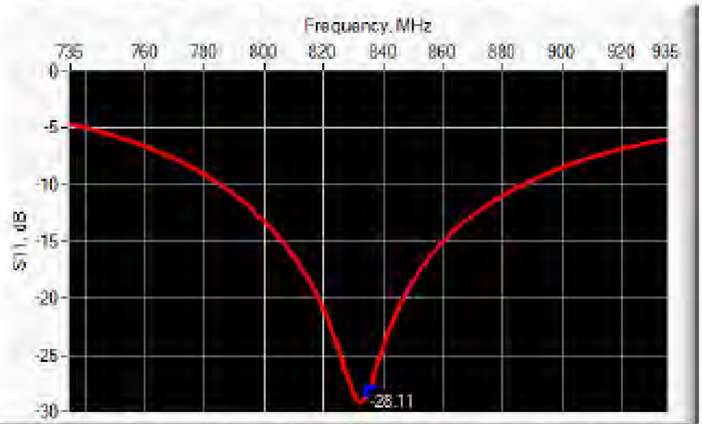
5.3 VALIDATION MEASUREMENT

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

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

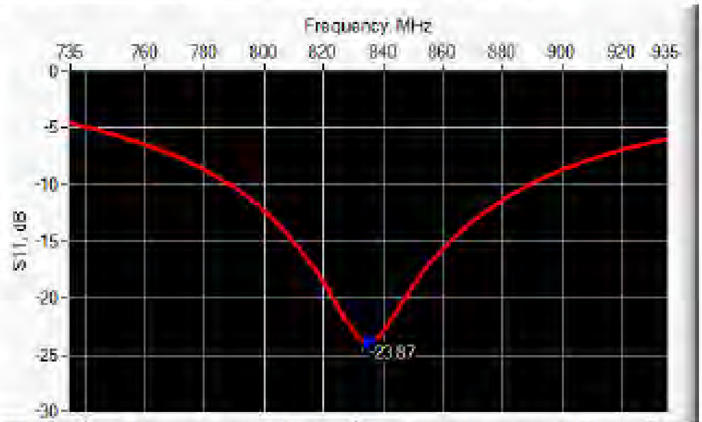
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-28.11	-20	51.6 Ω + 3.6 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-23.87	-20	49.0 Ω + 6.3 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 %.	PASS	89.8 ±1 %.	PASS	3.6 ±1 %.	PASS

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 %.		30.4 ±1 %.		3.6 ±1 %.	
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, OET 65 Bulletin C 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 %	PASS	0.90 ±5 %	PASS
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 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

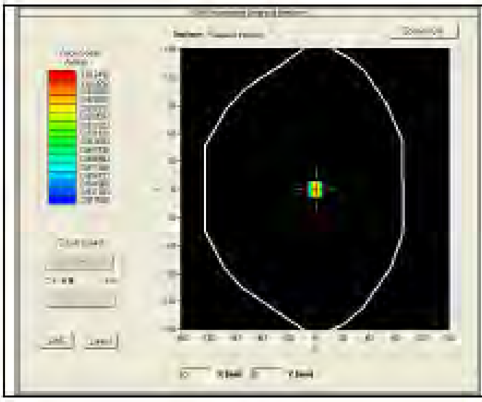
7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

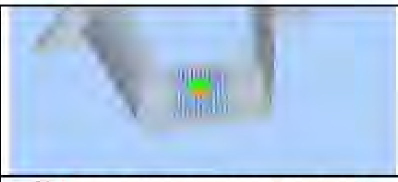
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

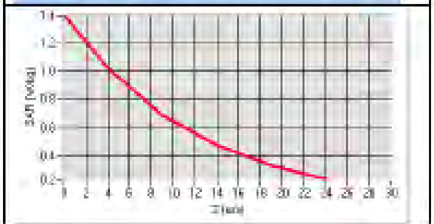
Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 42.3 sigma : 0.92
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	835 MHz
Input power	20 dBm
Liquid Temperature	21 °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	9.63 (0.96)	6.22	6.15 (0.62)
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		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	







7.3 BODY LIQUID MEASUREMENT

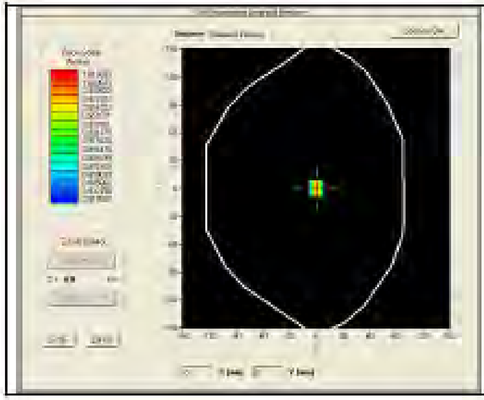
Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %	PASS	0.97 ±5 %	PASS
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±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 %		1.95 ±5 %	
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 %	

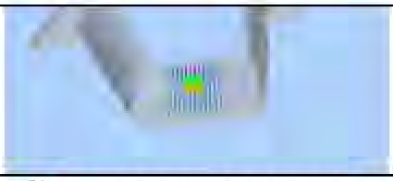
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

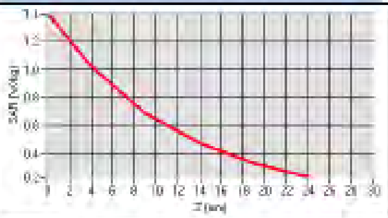
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 54.1 sigma : 0.97
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	835 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
835	9.93 (0.99)	6.35 (0.63)







8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM 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
Calipers	Carrera	CALIPER-01	12/2013	12/2016
Reference Probe	Satimo	EPG122 SN 18/11	10/2013	10/2014
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

SAR Reference Dipole Calibration Report

Ref : ACR.262.8.14.SATU.A

SHENZHEN STS TEST SERVICES CO., LTD.
1/F, BUILDING 2, ZHUOKE SCIENCE PARK, CHONGQING ROAD
FUYONG, BAO' AN DISTRICT, SHENZHEN,CHINA
SATIMO COMOSAR REFERENCE DIPOLE
FREQUENCY: 1900 MHZ
SERIAL NO.: SN 30/14 DIP1G900-333

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

09/01/2014

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	9/19/2014	JS
Checked by :	Jérôme LUC	Product Manager	9/19/2014	JS
Approved by :	Kim RUTKOWSKI	Quality Manager	9/19/2014	Kim Rutkowski

	Customer Name
Distribution :	Shenzhen STS Test Services Co., Ltd.

Issue	Date	Modifications
A	9/19/2014	Initial release

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 1900 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID1900
Serial Number	SN 30/14 DIP1G900-333
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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

Figure 1 – *Satimo COMOSAR Validation Dipole*

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

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

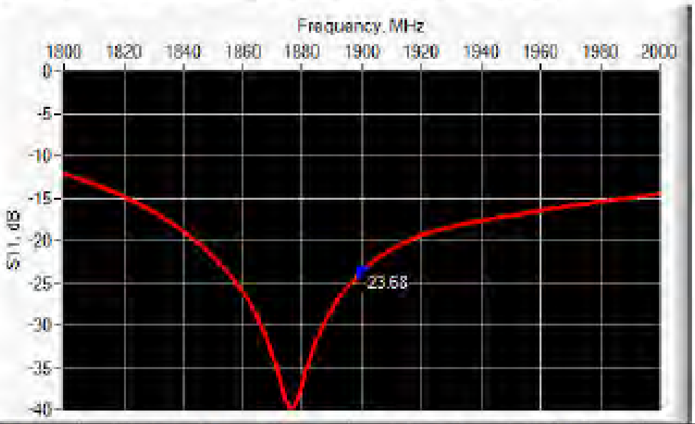
5.3 VALIDATION MEASUREMENT

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

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

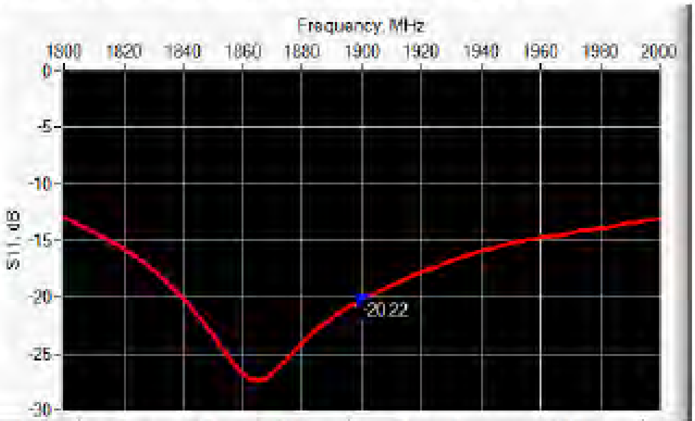
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1900	-23.68	-20	51.2 Ω + 6.4 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1900	-20.22	-20	48.8 Ω + 9.6 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 %.	PASS	39.5 ±1 %.	PASS	3.6 ±1 %.	PASS
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 %.		30.4 ±1 %.		3.6 ±1 %.	
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, OET 65 Bulletin C 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 %	PASS	1.40 ±5 %	PASS
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 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

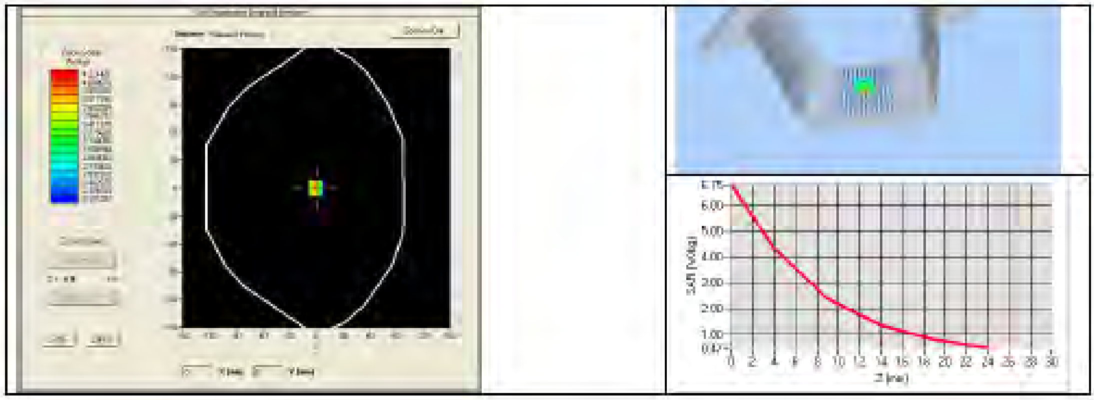
7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

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' : 41.1 sigma : 1.42
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	1900 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	39.84 (3.98)	20.5	20.20 (2.02)
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	

2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



7.3 BODY LIQUID MEASUREMENT

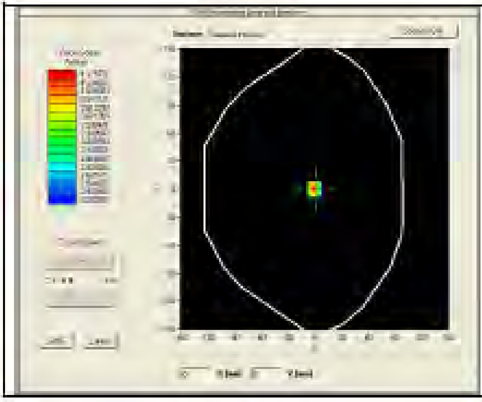
Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %	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

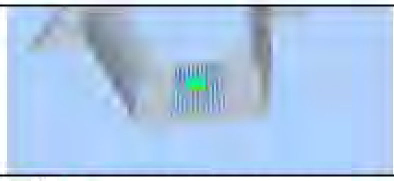
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

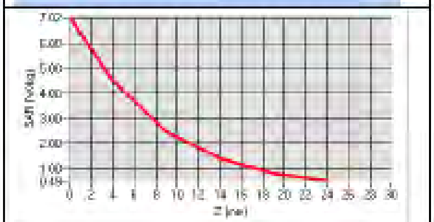
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 54.2 sigma : 1.54
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/dz=5mm
Frequency	1900 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
1900	43.33 (4.33)	21.59 (2.16)







8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM 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
Calipers	Carrera	CALIPER-01	12/2013	12/2016
Reference Probe	Satimo	EPG122 SN 18/11	10/2013	10/2014
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

SAR Reference Dipole Calibration Report

Ref : ACR.262.10.14.SATU.A

SHENZHEN STS TEST SERVICES CO., LTD.
1/F, BUILDING 2, ZHUOKE SCIENCE PARK, CHONGQING ROAD
FUYONG, BAO' AN DISTRICT, SHENZHEN,CHINA
SATIMO COMOSAR REFERENCE DIPOLE
FREQUENCY: 2450 MHZ
SERIAL NO.: SN 30/14 DIP2G450-335

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

09/01/2014

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.

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.262.10.14.SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	9/19/2014	
Checked by :	Jérôme LUC	Product Manager	9/19/2014	
Approved by :	Kim RUTKOWSKI	Quality Manager	9/19/2014	

	Customer Name
Distribution :	Shenzhen STS Test Services Co., Ltd.

Issue	*Date*	*Modifications*
A	9/19/2014	Initial release

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2450 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID2450
Serial Number	SN 30/14 DIP2G450-335
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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

Figure 1 – *Satimo COMOSAR Validation Dipole*

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

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

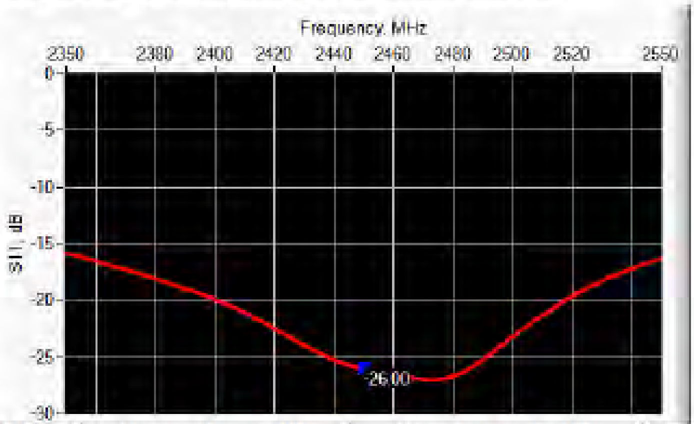
5.3 VALIDATION MEASUREMENT

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

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

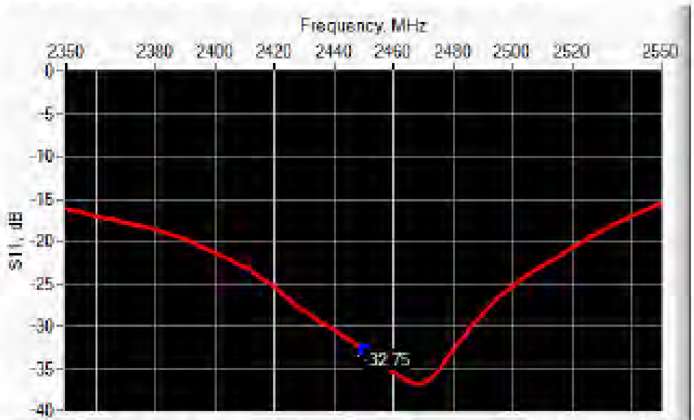
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-26.00	-20	46.1 Ω + 3.2 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-32.75	-20	48.8 Ω + 1.9 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, OET 65 Bulletin C 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 %	

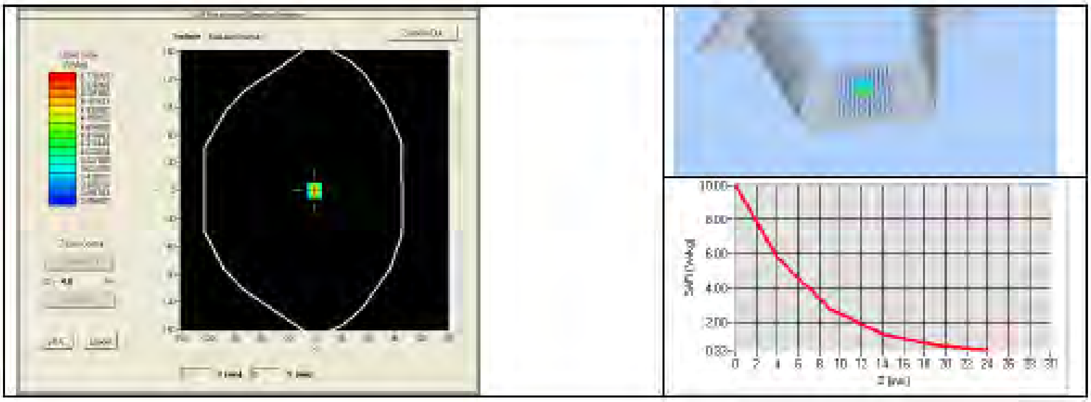
7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

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' : 39.0 sigma : 1.77
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/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	54.70 (5.47)	24	24.11 (2.41)
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



7.3 BODY LIQUID MEASUREMENT

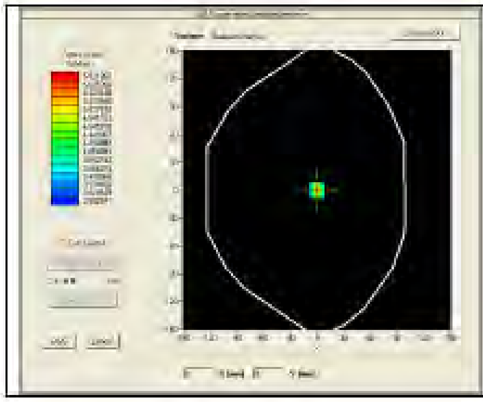
Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		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 %	

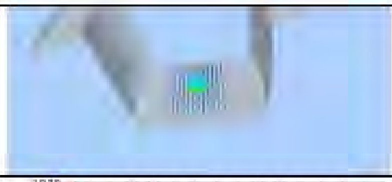
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

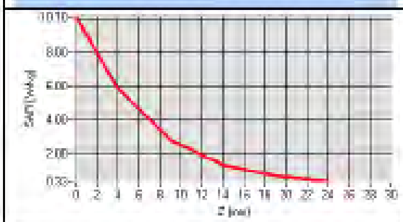
7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 53.0 sigma : 1.93
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8m/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	55.65 (5.57)	24.56 (2.46)







8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM 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
Calipers	Carrera	CALIPER-01	12/2013	12/2016
Reference Probe	Satimo	EPG122 SN 18/11	10/2013	10/2014
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