FCC SAR TEST REPORT

Report No.:	SET2015-06326
Product:	3G Smart Phone
Model No.:	Admiral 506
FCC ID:	2ADLMFRV506
Applicant:	G53 Limited
Address:	ROOM 1701 , 17/F,FEE TAT COMMERCIAL CENTRE,613 NATHAN ROAD,MONGKOK HONG KONG
Issued by:	CCIC-SET
Lab Location:	Building 28/29, Shigudong,Xili Industrial Area,Xili Street,Nanshan District,Shenzhen,Guangdong,China
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Test Report

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Applicant Address.:	ROOM 1701，17/F,FEE TAT COMMERCIAL CENTRE,613 NATHAN ROAD,MONGKOK HONG KONG
Manufacturer……:	G53 Limited
Manufacturer Address:	ROOM 1701，17/F,FEE TAT COMMERCIAL CENTRE,613 NATHAN ROAD,MONGKOK HONG KONG
Test Standards……..:	**447CFR § 2.1093-** Radiofrequency Radiation Exposure Evaluation: Portable Devices; **ANSI C95.1–1992:** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991) **IEEE 1528–2003:** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques;
Test Result……:	Pass
Tested by ……..:	Mei Chun 2015-05-18 Chun Mei, Test Engineer
Reviewed by……:	Shuangwen Zhang 2015-05-18 Shuangwen Zhang,Senior Egineer
Approved by……:	Wu Lian 2015-05-18 Wu Li'an , Manager

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1. GENERAL CONDITIONS

1.1 This report only refers to the item that has undergone the test.

1.2 This report standalone does not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities.

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1.4 This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of CCIC-SET and the Accreditation Bodies, if it applies.

2. Administrative Date

2.1. Identification of the Responsible Testing Laboratory

Company Name:	CCIC-SET
Department:	EMC & RF Department
Address:	Building 28/29, Shigudong,Xili Industrial Area,Xili Street, Nanshan District,Shenzhen,Guangdong,China
Telephone:	+86-755-26629676
Fax:	+86-755-26627238
Responsible Test Lab Managers:	Mr. Wu Li'an

2.2. Identification of the Responsible Testing Location(s)

Company Name:	CCIC-SET
Address:	Building 28/29, Shigudong,Xili Industrial Area,Xili Street,Nanshan District,Shenzhen,Guangdong,China

2.3. Organization Item

CCIC-SET Report No.:	SET2015-06326
CCIC-SET Project Leader:	Mr. Li Sixiong
CCIC-SET Responsible for accreditation scope:	Mr. Wu Li'an
Start of Testing:	2015-05-11
End of Testing:	2015-05-14

2.4. Identification of Applicant

Company Name:	G53 Limited
Address:	ROOM 1701，17/F,FEE TAT COMMERCIAL CENTRE,613 NATHAN ROAD,MONGKOK HONG KONG

2.5. Identification of Manufacture

Company Name:	G53 Limited
Address:	ROOM 1701，17/F,FEE TAT COMMERCIAL CENTRE,613 NATHAN ROAD,MONGKOK HONG KONG

Notes: This data is based on the information by the applicant.

3. Equipment Under Test (EUT)

3.1. Identification of the Equipment under Test

Sample Name:	3G Smart Phone	
Type Name:	Admiral 506	
General description:	Support Band	GSM850MHz/1900MHz, WCDMA 850 MHz/ 1900MHz,WIFI 802.11b ,BT,GPS
	Test Band	GSM 850MHz/ 1900MHz,GPRS 850MHz/ 1900MHz, WCDMA 850 MHz/ 1900MHz,WIFI 802.11b
	Multislot Class	GPRS: Class 12
	GPRS Class	Class B
	Accessories	Power Supply
	Battery type	3.8V 2000mAh
	Antenna type	Internal Antenna
	Operation mode	GSM / GPRS,GFSK, QPSK,π /4-DQPSK, 8-DPSK
	Test Modulation	GSM(GMSK/8PSK),UMTS(QPSK),WIFI(DSSS,OFDM)
	Max. RF Power	32.66dBm
	Max. SAR Value	Head:0.312w/kg; Body:1.197w/kg;

NOTE:

a. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

b. This device supports GPRS operation up to class12(max.uplin:4, max.downlink:4, total timeslots:5)

4 SAR SUMMARY

Highest Standalone SAR Summary

Exposure Position	Frequency Band	Scaled 1g-SAR(W/kg)	Highest Scaled 1g-SAR(W/kg)
Head	GSM850	0.312	0.312
	GSM1900	0.129	
	WCDMA Band II	0.247	
	WCDMA Band Ⅴ	0.171	
	WIFI	0.292	
Body-worn Accessory (10mm Gap)	GSM850	1.197	1.197
	GSM1900	0.340	
	WCDMA Band II	0.354	
	WCDMA Band Ⅴ	0.459	
	WIFI	0.088	

Highest Simultaneous SAR Summary

Exposure Position	Frequency Band	Scaled 1g-SAR(W/kg)	Highest Scaled 1g-SAR(W/kg)
Head	GSM850&WIFI	0.312+0.292	0.604
	GSM1900&WIFI	0.129+0.292	
	WCDMA Band II &WIFI	0.181+0.292	
	WCDMA Band Ⅴ&WIFI	0.171+0.292	
Body-worn Accessory (10mm Gap)	GSM850&WIFI	0.534+0.088	0.622
	GSM1900&WIFI	0.212+0.088	
	WCDMA Band II &WIFI	0.459	
	WCDMA Band Ⅴ&WIFI	0.354+0.088	

Exposure Position	Frequency Band	Scaled 1g-SAR(W/kg)	Highest Scaled 1g-SAR(W/kg)
Hotspot (10mm Gap)	GSM850&WIFI	1.197+0.088	1.285
	GSM1900&WIFI	0.340+0.088	
	WCDMA Band II &WIFI	0.459	
	WCDMA Band Ⅴ&WIFI	0.354+0.088	

5 Specific Absorption Rate (SAR)

5.1 Introduction

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.

5.2 SAR Definition

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 (). The equation description is as below:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathrm{SAR} = C\frac{\delta T}{\delta t}$$

where C is the specific head capacity, δT is the temperature rise and δt the exposure duration, or related to the electrical field in the tissue by

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

where σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the rms electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

5.3 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SATIMO. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

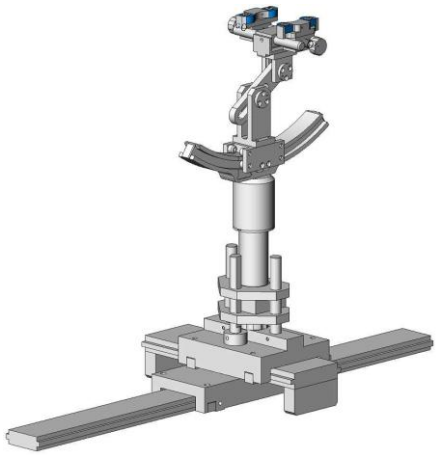
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

SAM Twin Phantom

5.4 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SATIMO as an integral part of the COMOSAR test system.

The device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



Device holder

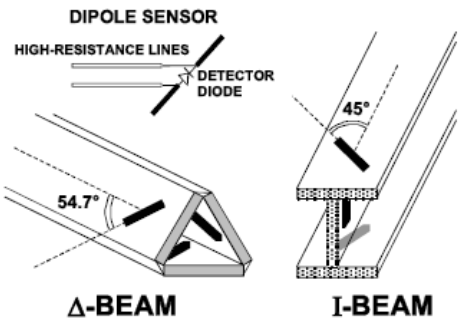
5.5 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	700 MHz to 3 GHz; Linearity: ± 0.5 dB (700 MHz to 3 GHz)
Directivity	± 0.25 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	1.5 µW/g to 100 mW/g; Linearity: ± 0.5 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 5 mm (Body: 8 mm) Distance from probe tip to dipole centers: <2.7 mm
Application	General dosimetry up to 3 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones
Compatibility	COMOSAR

Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



6 OPERATIONAL CONDITIONS DURING TEST

6.1 Schematic Test Configuration

During SAR test, EUT was operating in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established.

The Absolute Radio Frequency Channel Number (ARFCN) was allocated to 128, 189 and 251 respectively in the case of GSM 850MHz, or to 512, 661 and 810 respectively in the case of PCS 1900MHz. The EUT was commanded to operate at maximum transmitting power.

The EUT should use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link was used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset.

The signal transmitted by the simulator to the antenna feeding point should be lower than the output power level of the handset by at least 35 dB

6.2 SAR Measurement System

The SAR measurement system being used is the SATIMO system, the system is controlled remotely from a PC, which contains the software to control the robot and data acquisition equipment. The software also displays the data obtained from test scans.

In operation, the system first does an area (2D) scan at a fixed depth within the liquid from the inside wall of the phantom. When the maximum SAR point has been found, the system will then carry out a 3D scan centred at that point to determine volume averaged SAR level.

6.2.1 Tissue Dielectric Parameters for Head and Body Phantoms

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 Power drifts 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.

Table 1: Recommended Dielectric Performance of Tissue

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.46	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (s/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Table 2 Recommended Tissue Dielectric Parameters

Frequency (MHz)	Head Tissue		Body Tissue	
	ε_r	σ(S/m)	ε_r	σ(S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

6.2.2 Simulant liquids

For measurements against the phantom head, the “cheek” and “tilt” position on both the left hand and the right hand sides of the phantom. For body-worn measurements, the EUT was tested against flat phantom representing the user body. The EUT was put on in the belt holder. Simulant liquids that are used for testing at frequencies of GSM 850MHz/1900MHz, which are made mainly of sugar, salt and water solutions may be left in the phantoms.

Table 3: Dielectric Performance of Head Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	835MHz	41.5±5%	0.90±5%
Validation value (May 11th, 2015)	835MHz	41.17	0.88
Target value	1900MHz	40.0±5%	1.40±5%
Validation value (May 12th, 2015)	1900MHz	38.87	1.37
Target value	2450MHz	39.2±5%	1.80±5%
Validation value (May 13th, 2015)	2450MHz	38.53	1.76

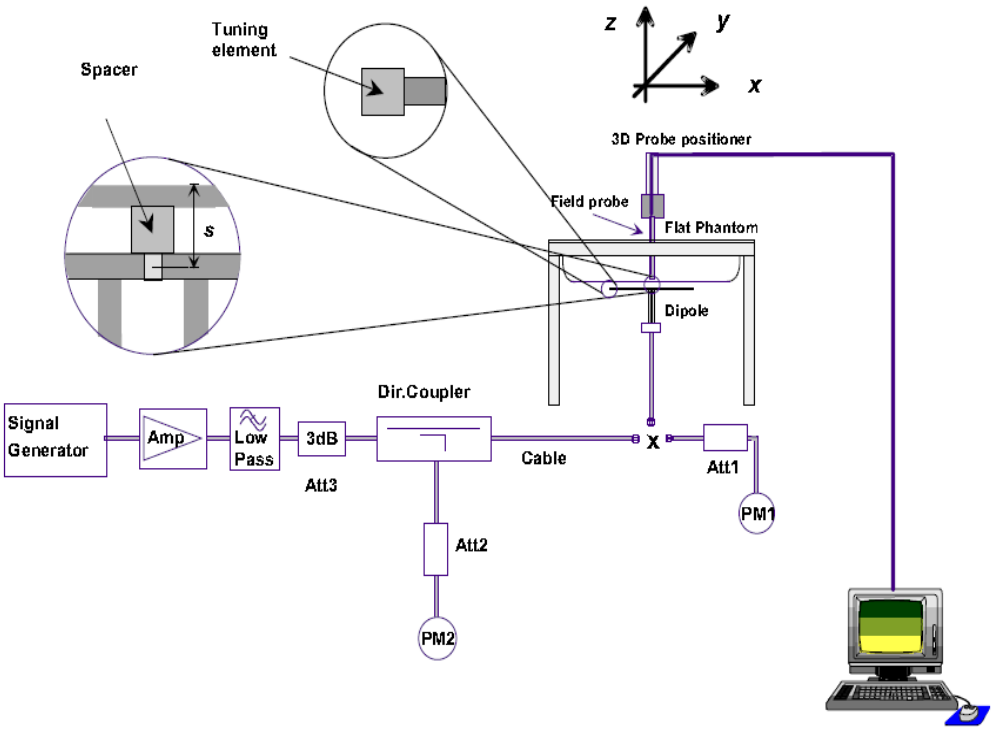
Table 4: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	835MHz	55.2±5%	0.97±5%
Validation value (May 11th, 2015)	835MHz	54.52	0.96
Target value	1900MHz	53.3±5%	1.52±5%
Validation value (May 12th, 2015)	1900MHz	52.37	1.49
Target value	2450MHz	52.7±5%	1.95±5%
Validation value (May 13th, 2015)	2450MHz	52.13	1.91

6.3 Equipments and results of validation testing

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

The following procedure, recommended for performing validation tests using box phantoms is based on the procedures described in the IEEE standard P1528 2003. Setup according to the setup diagram below :



With the SG and Amp and with directional coupler in place, set up the source signal at the relevant frequency and use a power meter to measure the power at the end of the SMA cable that you intend to connect to the balanced dipole. Adjust the SG to make this, say, 0.25W (24 dBm). If this level is too high to read directly with the power meter sensor, insert a calibrated attenuator (e.g. 10 or 20 dB) and make a suitable correction to the power meter reading.

Note 1: In this method, the directional coupler is used for monitoring rather than setting the exact feed power level. If, however, the directional coupler is used for power measurement, you should check the frequency range and power rating of the coupler and measure the coupling factor (referred to output) at the test frequency using a VNA.

Note 2: Remember that the use of a 3dB attenuator (as shown in Figure 8.1 of P1528) means that you need an RF amplifier of 2 times greater power for the same feed power. The other issue is the cable length. You might get up to 1dB of loss per meter of cable, so the cable length after the coupler needs to be quite short.

Note 3: For the validation testing done using CW signals, most power meters are suitable. However, if you are measuring the output of a modulated signal from either a signal generator or a handset, you must ensure that the power meter correctly reads the modulated signals.

The measured 1-gram averaged SAR values of the device against the phantom are provided in Tables 7 and Table 8. The humidity and ambient temperature of test facility were 64% and 23.2°C respectively. The body phantom were full of the body tissue simulating liquid. The EUT was supplied with full-charged battery for each measurement.

The distance between the back of the EUT and the bottom of the flat phantom is 5 mm (taking into account of the IEEE 1528 and the place of the antenna).

Table 7: Head SAR system validation (1g)

Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)	
			250 mW	1W
835MHz(May 11th, 2015)	1:1	9.77±10%	2.45	9.80
1900MHz(May 12th, 2015)	1:1	40.37±10%	9.79	39.16
2450MHz(May 13th, 2015)	1:1	53.60±10%	12.57	50.28

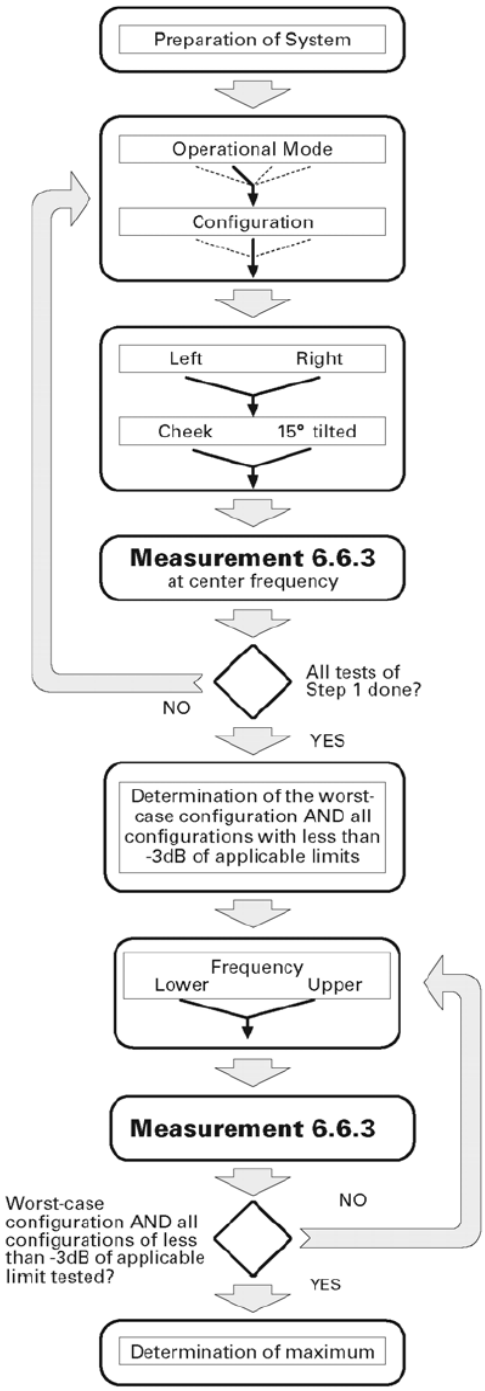
Table 8: Body SAR system validation (1g)

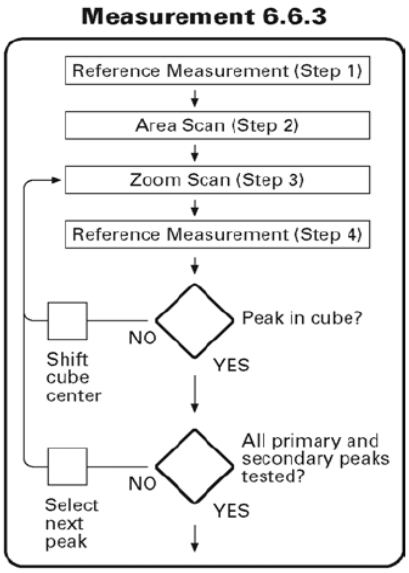
Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)	
			250 mW	1W
835MHz(May 11th, 2015)	1:1	10.31±10%	2.53	10.12
1900MHz(May 12th, 2015)	1:1	40.81±10%	10.15	40.60
2450MHz(May 13th, 2015)	1:1	52.66±10%	12.80	51.20

* Note: Target value was referring to the measured value in the calibration certificate of reference dipole.
Note: All SAR values are normalized to 1W forward power.

6.4 SAR measurement procedure

The SAR test against the head phantom was carried out as follow:





Establish a call with the maximum output power with a base station simulator, the connection between the EUT and the base station simulator is established via air interface.

After an area scan has been done at a fixed distance of 2mm from the surface of the phantom on the source side, a 3D scan is set up around the location of the maximum spot SAR. First, a point within the scan area is visited by the probe and a SAR reading taken at the start of testing. At the end of testing, the probe is returned to the same point and a second reading is taken. Comparison between these start and end readings enables the power drift during measurement to be assessed.

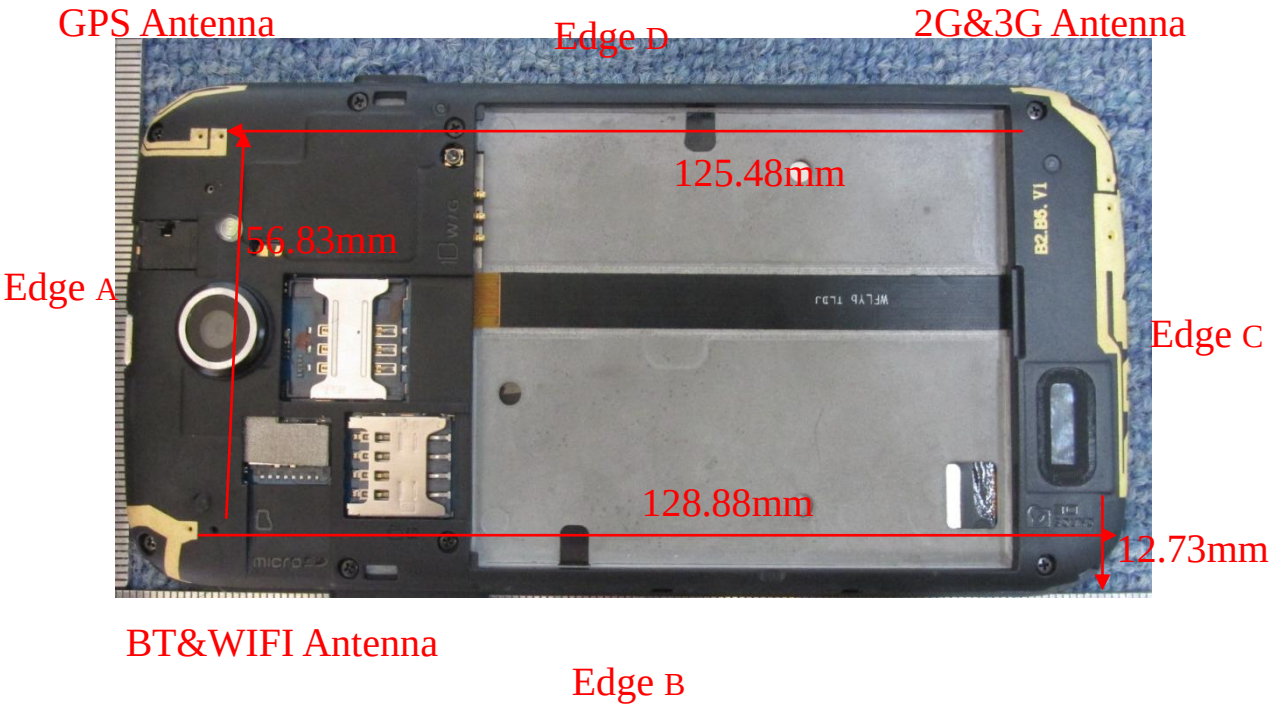
Above is the scanning procedure flow chart and table from the IEEEp1528 standard.

This is the procedure for which all compliant testing should be carried out to ensure that all variations of the device position and transmission behaviour are tested.

For body-worn measurement, the EUT was tested under two position: face upward and back upward.

6.5 Transmitting antenna information

There are GSM&WCDMA antenna, BT&WIFI antenna inside the EUT



7 Applicable Measurement Standards

47CFR § 2.1093- Radiofrequency Radiation Exposure Evaluation: Portable Devices;

ANSI C95.1–1992: Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)

IEEE 1528–2003: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques;

IEEE Std 1528a-2005: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

FCC KDB 865664 D01 v01r03 SAR Measurement 100MHz to 6GHz

FCC KDB 865664 D02 v01r01 RF Exposure Reporting

FCC KDB 447498 D01 v05r02 General RF Exposure Guidance v05r02

FCC KDB 648474 D04 v01r02 SAR Evaluation Considerations for Wireless Handsets

FCC KDB 941225 D01 v03 SAR test for 3G devices

FCC KDB 941225 D06 v02 Hotspot Mode

FCC KDB 248227 D01 v01r02 SAR Measurement Procedures-802.11a/b/g Transmitters

8 LABORATORY ENVIRONMENT

8.1 The Ambient Conditions during SAR Test

Temperature	Min. = 18 ℃, Max. = 25 ℃
Atmospheric pressure	Min.=86 kPa, Max.=106 kPa
Relative humidity	Min. = 45%, Max. = 75%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

9.Conducted RF Output Power

9.1 GSM Conducted Power

Band		Burst Average Power (dBm)			Frame-Average Power (dBm)		
GSM850	TX Channel	128	190	251	128	190	251
	Frequency(MHz)	824.2	836.4	848.8	824.2	836.4	848.8
	GSM	32.43	**32.66**	32.58	23.4	23.63	23.55
	GPRS (Slot 1)	32.4	32.64	32.58	23.37	23.61	23.55
	GPRS (Slot 2)	30.14	30.18	30.17	**24.12**	**24.16**	**24.15**
	GPRS (Slot 3)	28.24	28.25	28.23	23.98	23.99	23.97
	GPRS (Slot 4)	26.64	26.65	26.63	23.63	23.64	23.62
	EDGE (Slot 1)	32.35	32.62	32.56	23.32	23.59	23.53
	EDGE (Slot 2)	29.18	29.22	29.21	23.16	23.2	23.19
	EDGE (Slot 3)	27.23	27.24	27.27	22.97	22.98	23.01
	EDGE (Slot 4)	25.87	25.79	25.84	22.86	22.78	22.83
GSM1900	TX Channel	512	661	810	512	661	810
	Frequency(MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
	GSM	29.52	**29.57**	29.47	20.49	20.54	20.44
	GPRS (Slot 1)	29.47	29.55	29.46	20.44	20.52	20.43
	GPRS (Slot 2)	27.34	27.36	27.35	**21.32**	**21.33**	**21.29**

	GPRS (Slot 3)	25.55	25.57	25.55	21.17	21.21	21.29
	GPRS (Slot 4)	23.86	23.9	23.88	20.85	20.89	20.87
GSM1900	EDGE (Slot 1)	29.45	29.53	29.45	20.42	20.5	20.42
	EDGE (Slot 2)	27.14	27.19	27.21	21.12	21.17	21.19
	EDGE (Slot 3)	25.24	25.22	25.19	20.98	20.97	20.93
	EDGE (Slot 4)	23.47	23.45	23.51	20.46	20.44	20.49

Note: Per KDB 447498 D01 v05r02, the maximum output power channel is used for SAR testing and for further SAR test reduction.

For Head SAR testing, GSM should be evaluated, therefore the EUT was set in GSM Voice for GSM850 and GSM1900 due to its highest frame-average power.

For Body worn SAR testing, GSM should be evaluated, therefore the EUT was set in GSM Voice for GSM850 and GSM 1900 due to its highest frame-average power.

For hotspot mode SAR testing, GPRS and EDGE should be evaluated, therefore the EUT was set in GPRS（2Tx slots）due to its highest frame-average power.

Timeslot consignations:

No. Of Slots	Slot 1	Slot 2	Slot 3	Slot 4
Slot Consignation	1Up4Down	2Up3Down	3Up2Down	4Up1Down
Duty Cycle	1:8	1:4	1:267	1:2
Crest Factor	-9.03dB	-6.02dB	-4.26dB	-3.01dB

9.2 WCDMA Conducted peak output Power

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4182	4233	9262	9400	9538
	subtest	dBm			dBm		
RMC 12.2kbps	non	23.18	**23.26**	23.21	23.22	**23.24**	23.19
AMR	non	23.12	23.18	23.14	23.15	23.20	23.07
HSDPA	1	22.70	22.78	22.81	22.67	22.76	22.68
	2	22.43	22.62	22.51	22.47	22.35	22.54
	3	21.71	21.82	21.76	21.85	21.87	21.90
	4	21.62	21.54	21.58	21.77	21.82	21.79

HSUPA	1	22.30	22.35	22.42	22.24	22.32	22.37
	2	22.21	22.30	22.23	22.19	22.14	22.21
	3	21.86	22.05	22.00	21.92	22.03	22.06
	4	22.05	22.04	22.13	22.12	22.10	22.15
	5	22.13	22.15	22.11	22.16	22.14	22.13
Note:	The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA /HSPA+ was tested by power meter.						

HSUPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: 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.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

HSDPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Note:

1. Per KDB941225 D01v03, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
2. It is expected by the manufacturer that MPR for some HSPA subtests may be up to 2dB more than specified by 3GPP,but also as low as 0dB according to the chipset implementation in this model.

9.3 WLAN 2.4GHz Band Conducted Power

For the 802.11b/g SAR tests, a communication link is set up with the test mode software for WiFi mode test. The Absolute Radio Frequency Channel Number(ARFCN) is allocated to 1 ,6 and 11 respectively in the case of 2450 MHz.During the test,at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate.

802.11b/g operating modes are tested independently according to the service requirements in each frquency band. 802.11b/g modes are tested on channel 1, 6, 11; however,if output power reduction is necessary for channels 1 and/or 11 to meet restricted band requirements the highest output channel closest to each of these channels must be tested instead.

SAR is not required for 802.11g/n channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels.

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	2.412	1#	√	△
		2.437	6	√	△
		2.462	11#	√	△

Notes:
√ = "default test channels"
△= possible 802.11g channels with maximum average output ¼ dB the "default test channels"
= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

802.11 Test Channels per FCC KDB 248227

Channel	Frequency (MHz)	2.4G 802.11b Output Power(dBm)			
		1Mbps	2Mbps	5.5Mbps	11Mbps
CH 01	2412	16.17	15.82	15.75	15.80
CH 06	2437	16.06	15.89	15.87	15.85
CH 11	2462	15.99	15.88	15.79	15.81

Channel	Freq. (MHz)	2.4G 802.11g Output Power(dBm)							
		6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	13.02	12.89	12.94	12.96	12.95	12.94	12.99	13.00
CH 06	2437	13.38	13.23	13.35	13.29	13.33	13.35	13.37	13.30
CH 11	2462	13.21	13.19	13.16	13.20	13.18	13.19	13.15	13.18

Channel	Freq. (MHz)	2.4G 802.11n-20 Output Power(dBm)								
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps	72 Mbps
CH 01	2412	12.64	12.56	12.61	12.59	12.63	12.60	12.58	12.59	12.62
CH 06	2437	12.99	12.84	12.94	12.97	12.98	12.88	12.91	12.96	12.97
CH 11	2462	12.72	12.69	12.66	12.70	12.69	12.67	12.71	12.64	12.67

Channel	Freq. (MHz)	2.4G 802.11n-40 Output Power(dBm)								
		13.5 Mbps	27 Mbps	40.5 Mbps	54 Mbps	81 Mbps	108 Mbps	121.5 Mbps	135 Mbps	150 Mbps
CH 03	2422	11.31	11.26	11.29	11.30	11.28	11.27	11.25	11.28	11.27
CH 06	2437	11.84	11.81	11.79	11.83	11.80	11.76	11.75	11.79	11.82
CH 09	2452	11.19	11.16	11.17	11.13	11.18	11.15	11.14	11.12	11.16

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at lowest data rate
3. Per KDB 248227 D01 v01r02, 802.11g /11n-HT20/11n-HT40 is not required, for the maximum average output power is less than 1/4dB higher than measured on the corresponding 802.11b mode. Thus the SAR can be excluded.

Bluetooth Conducted Power

Channel	Frequency (MHz)	BT3.0 Output Power(dBm)		
		GFSK	π /4-DQPSK	8-DPSK
CH 0	2402	-4.52	-5.15	-4.93
CH 39	2441	-3.26	-4.31	-4.11
CH 78	2480	-3.10	-4.07	-3.87

Channel	Frequency(MHz)	BT 4.0
CH 0	2402	-10.34
CH 20	2442	-10.03
CH 39	2480	-10.23

Note:

1. Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thrssholds for 100MHz to 6GHz at test separation distances ≤ 50mm are determined by:[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [$\sqrt{f}$ (GHz)] ≤3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR
   (1) f(GHz) is the RF channel transmit frequency in GHz
   (2) Power and distance are round to the nearest mW and mm before calculation
   (3) The result is rounded to one decimal place for comparison
   (4) If the test separation diatance(antenna-user) is < 5mm, 5mm is used for excluded SAR calculation

Bluetooth Max Power (dBm)	mW	Test Distance (mm)	Frequency(Ghz)	Exclusion Thresholds
-2	0.631	5	2.4	0.195

Per KDB 447498 D01v05r02 exclusion thresholds is 0.195<3, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5=0.195/7.5=0.026W/Kg

Bluetooth Max Power (dBm)	mW	Test Distance (mm)	Frequency(Ghz)	Exclusion Thresholds
-2	0.631	10	2.4	0.098

Per KDB 447498 D01v05r02 exclusion thresholds is 0.098<3, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5=0.098/7.5=0.013W/Kg

The estimated SAR value is used for simultaneous transmission analysis.

General Note:

1. Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
2. Per KDB447498 D01v05r02, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is≤ 100 MHz. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
3. Per KDB941225 D06v02, the DUT Dimension is bigger than 9 cm x 5 cm, so 10mm is chosen as the test separation distance for Hotspot mode. When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested. As the manufacture required, the separation distance use 5mm for Hotspot mode.
4. Per KDB 865664 D01v01r03,for each frequency band,repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤20%,and the measured SAR <1.45W/Kg,only one repeated measurement is required.
5. Per KDB865664 D02v01r01, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing(Refer to appendix D for details).
6. Per KDB941225 D01v03, when multiple slots can be used, the GPRS/EDGE slot configuration with the highest frame–averaged output power was selected for SAR testing.
7. Per KDB941225 D01v03, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
8. Per KDB 248227 D01 v01r02, 802.11g /11n-HT20/11n-HT40 is not required, for the maximum average output power is less than 1/4dB higher than measured on the corresponding 802.11b mode. Thus the SAR can be excluded.

Simultaneous SAR

No.	Transmitter Combinations	Scenario Supported or not	Supported for Mobile Hotspot or not
1	GSM(Voice)+GSM(Data)	No	No
2	WCDMA(Voice)+WCDMA(Data)	Yes	No
3	GSM(Voice)+ WCDMA(Data)	No	No
4	WCDMA(Voice)+GSM(Data)	No	No
5	GSM(Voice)+ WCDMA(Voice)	No	No
6	GSM(Voice)+Wifi	Yes	Yes
7	WCDMA(Voice) +Wifi	Yes	Yes
8	GSM(Voice)+ BT	Yes	No
9	WCDMA(Voice) + BT	Yes	No
10	WCDMA(Voice)+WCDMA(Data)+ Wifi	Yes	Yes
11	WCDMA(Voice)+WCDMA(Data)+ BT	Yes	No
12	GSM(Data)+wifi	Yes	Yes
13	WCDMA(Data) +wifi	Yes	Yes

. Scaling Factor calculation

Operation Mode	Channel	Output Power(dBm)	Tune up Power in tolerance(dBm)	Scaling Factor
GSM 850	128	32.43	32.00 ±1	1.140
	190	32.66	32.00 ±1	1.081
	251	32.58	32.00 ±1	1.102
GPRS 850(2Tx)	128	30.14	30.00 ±0.5	1.086
	190	30.18	30.00 ±0.5	1.076
	251	30.17	30.00 ±0.5	1.079
GSM1900	512	29.52	29.00 ±1	1.117
	661	29.57	29.00 ± 1	1.104
	810	29.47	29.00 ± 1	1.130
GPRS1900(2Tx)	512	27.34	27.00 ± 0.5	1.038
	661	27.36	27.00 ±0.5	1.033
	810	27.35	27.00 ±0.5	1.035
WCDMA1900	9262	23.22	23.00 ±0.5	1.067
	9400	23.24	23.00 ±0.5	1.062
	9538	23.19	23.00 ±0.5	1.074
WCDMA850	4132	23.18	23.00 ±0.5	1.076
	4183	23.26	23.00 ±0.5	1.057
	4233	23.21	23.00 ±0.5	1.069
2.4G 802.11b	2412	16.17	16.00 ±0.5	1.079
	2437	16.06	16.00 ±0.5	1.107
	2462	15.99	16.00 ±0.5	1.125
BT GFSK	2402	-4.52	-3.5 ± 1.5	1.786
	2441	-3.26	-3.5 ± 1.5	1.337
	2480	-3.1	-3.5 ± 1.5	1.288

10 TEST RESULTS

10.1 Summary of Power Measurement Results

According the description above, the measurements against the head phantom were executed on the operation mode: GSM850 /1900MHz, WCDMA 850 /1900MHz, WIFI 802.11b, while the tests against the body-worn were carried out on the operation mode : GSM850/1900MHz, GPRS 850 /1900MHz, WCDMA850 /1900MHz,WIFI 802.11b.

Table 1: SAR Values of GSM 850MHz Band

Temperature: 22.0~23.5°C, humidity: 62~64%.					
Test Positions			Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
				SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek		190/836.4	**0.289**	0.312
	Tilt 15 degrees		190/836.4	0.186	0.201
Left Side of Head	Cheek		190/836.4	0.272	0.294
	Tilt 15 degrees		190/836.4	0.139	0.150
Body (10mm Separation)	GSM	Face Upward	190/836.4	0.367	0.397
		Back Upward	190/836.4	**0.494**	0.534
		Edge B	190/836.4	0.351	0.379
		Edge C	190/836.4	0.118	0.128
		Edge D	190/836.6	0.235	0.254
	GPRS (2Tx)	Face Upward	190/836.4	0.646	0.695
		Back Upward	128/824.2	0.890	0.958
			190/836.4	**1.112**	1.197
			251/848.8	0.932	1.003
		Edge B	190/836.4	0.731	0.787
		Edge C	190/836.4	0.183	0.197
		Edge D	190/836.4	0.463	0.498

Table 2: SAR Values of GSM1900 MHz Band

Temperature: 22.0~23.5°C, humidity: 62~64%.					
Test Positions			Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
				SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek		661/1880.0	**0.117**	0.129
	Tilt 15 degrees		661/1880.0	0.028	0.031
Left Side of Head	Cheek		661/1880.0	0.106	0.117
	Tilt 15 degrees		661/1880.0	0.026	0.029
Body (10mm Separation)	GSM	Face Upward	661/1880.0	0.176	0.194
		Back Upward	661/1880.0	0.192	0.212
		Edge B	661/1880.0	0.057	0.063
		Edge C	661/1880.0	**0.204**	0.225
		Edge D	661/1880.0	0.140	0.155
	GPRS (2Tx)	Face Upward	661/1880.0	0.212	0.219
		Back Upward	661/1880.0	**0.329**	0.340
		Edge B	661/1880.0	0.080	0.083
		Edge C	661/1880.0	0.252	0.260
		Edge D	661/1880.0	0.185	0.191

Table 3: SAR Values of WCDMA850

Temperature: 22.0~23.5°C, humidity: 62~64%.				
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
			SAR(W/Kg1g Peak)	Scaled SAR(W/Kg,1g)
Right Side of Head	Cheek	4183/836.6	**0.161**	0.171
	Tilt 15 degrees	4183/836.6	0.129	0.137
Left Side of Head	Cheek	4183/836.6	0.137	0.145
	Tilt 15 degrees	4183/836.6	0.098	0.104
Body (5mm Separation)	Face Upward	4183/836.6	0.227	0.241
	Back Upward	4183/836.6	**0.333**	0.354
	Edge B	4183/836.6	0.269	0.286
	Edge C	4183/836.6	0.095	0.101
	Edge D	4183/836.6	0.188	0.200

Table 4: SAR Values of WCDMA1900

Temperature: 22.0~23.5°C, humidity: 62~64%.				
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
			SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek	9400/1880.0	0.171	0.181
	Tilt 15 degrees	9400/1880.0	0.116	0.123
Left Side of Head	Cheek	9400/1880.0	**0.234**	0.247
	Tilt 15 degrees	9400/1880.0	0.112	0.118
Body (5mm Separation)	Face Upward	9400/1880.0	0.205	0.217
	Back Upward	9400/1880.0	0.313	0.331
	Edge B	9400/1880.0	0.117	0.124
	Edge C	9400/1880.0	**0.434**	0.459
	Edge D	9400/1880.0	0.295	0.312

Table 5:SAR Values of Wi-Fi 802.11b

Temperature: 22.0~23.5°C, humidity: 62~64%.				
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
			SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek	1/2402	**0.271**	0.292
	Tilt 15 degrees	1/2402	0.206	0.222
Left Side of Head	Cheek	1/2402	0.183	0.197
	Tilt 15 degrees	1/2402	0.124	0.134
802.11b(5mm Separation)	Edge A	1/2402	0.034	0.037
	Edge B	1/2402	0.054	0.058
	Face Upward	1/2402	0.069	0.074
	Back Upward	1/2402	**0.082**	0.088

Note:

When the 1-g SAR for the mid-band channel or the channel with the Highest output power satisfy the following conditions, testing of the other channels in the band is not required.(Per KDB 447498 D01 General RF Exposure Guidance v05r02)

• ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz
• ≤ 0.6 W/kg, when the transmission band is between 100 MHz and 200 MHz
• ≤ 0.4 W/kg, when the transmission band is ≥ 200 MHz

SIMULTANEOUS TRANSMISSION ANALYSIS

Test Position		Right Cheek	Right Title	Left Cheek	Left Tilt
Head MAX 1-g SAR(W/Kg)	GSM850	0.312	0.201	0.294	0.150
	GSM1900	0.129	0.031	0.117	0.029
	WCDMA850	0.171	0.137	0.145	0.104
	WCDMA1900	0.181	0.123	0.247	0.118
	WIFI 802.11b	0.292	0.222	0.197	0.134
	BT	*0.026	*0.026	*0.026	*0.026
BT Simultaneous ∑1-g SAR(W/Kg)		0.338	0.227	0.320	0.176
WiFi Simultaneous ∑1-g SAR(W/Kg)		**0.604**	0.423	0.491	0.284

Simultaneous Tx Combination of GSM/WCDMA and BT/WIFI (Head).

Test Position		Face	Back	Edge A	Edge B	Edge C	Edge D
Body-worn 10mm separation MAX 1-g SAR(W/Kg)	GSMS850	0.397	0.534	--	0.379	0.128	0.254
	GSM1900	0.194	0.212	--	0.063	0.225	0.155
	WCDMA850	0.241	0.354	--	0.286	0.101	0.200
	WCDMA1900	0.217	0.331	--	0.124	0.459	0.312
	WIFI 802.11b	0.074	0.088	0.037	0.058	--	--
	BT	*0.013	*0.013	*0.013	*0.013	*0.013	*0.013
BT Simultaneous ∑1-g SAR(W/Kg)		0.410	0.547	0.013	0.392	0.472	0.325
WiFi Simultaneous ∑1-g SAR(W/Kg)		0.471	**0.622**	0.037	0.437	0.459	0.312

Simultaneous Tx Combination of GSM/WCDMA and BT/WIFI (Body).

Test Position		Face	Back	Edge A	Edge B	Edge C	Edge D
Hotspot 10mm separation MAX 1-g SAR(W/Kg)	GPRS850	0.695	1.197	--	0.787	0.197	0.498
	GPRS1900	0.219	0.340	--	0.083	0.260	0.191
	WCDMA 850	0.241	0.354	--	0.286	0.101	0.200
	WCDMA 1900	0.217	0.331	--	0.124	0.459	0.312
	WiFi	0.074	0.088	0.037	0.058	--	--
WiFi Simultaneous ∑1-g SAR(W/Kg)		0.733	**1.285**	0.037	0.845	0.459	0.498

Simultaneous Tx Combination of GSM/WCDMA and WIFI (Body).

The estimated SAR value with * Signal

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required

11 Measurement Uncertainty

No.	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	ci	Standard Uncertainty (%) ui(%)	Degree of freedom Veff or vi
	Measurement System							
1	– Probe Calibration	B	5.8	N	1	1	5.8	∞
2	– Axial isotropy	B	3.5	R	$\sqrt{3}$	0.5	1.43	∞
3	–Hemispherical Isotropy	B	5.9	R	$\sqrt{3}$	0.5	2.41	∞
4	– Boundary Effect	B	1	R	$\sqrt{3}$	1	0.58	∞
5	– Linearity	B	4.7	R	$\sqrt{3}$	1	2.71	∞
6	– System Detection Limits	B	1.0	R	$\sqrt{3}$	1	0.58	∞
7	Modulation response	B	3	N	1	1	3.00	
8	– Readout Electronics	B	0.5	N	1	1	0.50	∞
9	– Response Time	B	1.4	R	$\sqrt{3}$	1	0.81	∞
10	– Integration Time	B	3.0	R	$\sqrt{3}$	1	1.73	∞
11	– RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
12	– Probe Position Mechanical tolerance	B	1.4	R	$\sqrt{3}$	1	0.81	∞
13	– Probe Position with respect to Phantom Shell	B	1.4	R	$\sqrt{3}$	1	0.81	∞
14	– Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	2.3	R	$\sqrt{3}$	1	1.33	∞
	Uncertainties of the DUT							
15	– Position of the DUT	A	2.6	N	$\sqrt{3}$	1	2.6	5
16	– Holder of the DUT	A	3	N	$\sqrt{3}$	1	3.0	5

17	– Output Power Variation –SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.89	∞
Phantom and Tissue Parameters								
18	– Phantom Uncertainty(shape and thickness tolerances)	B	4	R	$\sqrt{3}$	1	2.31	∞
19	Uncertainty in SAR correction for deviation(in permittivity and conductivity)	B	2	N	1	1	2.00	
20	– Liquid Conductivity Target –tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
21	– Liquid Conductivity –measurement Uncertainty)	B	4	N	$\sqrt{3}$	1	0.92	9
22	– Liquid Permittivity Target tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
23	– Liquid Permittivity –measurement uncertainty	B	5	N	$\sqrt{3}$	1	1.15	∞
Combined Standard Uncertainty				RSS			10.63	
Expanded uncertainty (Confidence interval of 95 %)				K=2			21.26	

System Check Uncertainty

No.	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	ci	Standard Uncertainty (%) ui(%)	Degree of freedom Veff or vi
	Measurement System							
1	– Probe Calibration	B	5.8	N	1	1	5.8	∞
2	– Axial isotropy	B	3.5	R	$\sqrt{3}$	0.5	1.43	∞
3	–Hemispherical Isotropy	B	5.9	R	$\sqrt{3}$	0.5	2.41	∞
4	– Boundary Effect	B	1	R	$\sqrt{3}$	1	0.58	∞
5	– Linearity	B	4.7	R	$\sqrt{3}$	1	2.71	∞
6	– System Detection Limits	B	1	R	$\sqrt{3}$	1	0.58	∞
7	Modulation response	B	0	N	1	1	0.00	

8	– Readout Electronics	B	0.5	N	1	1	0.50	∞
9	– Response Time	B	0.00	R	$\sqrt{3}$	1	0.00	∞
10	– Integration Time	B	1.4	R	$\sqrt{3}$	1	0.81	∞
11	– RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
12	– Probe Position Mechanical tolerance	B	1.4	R	$\sqrt{3}$	1	0.81	∞
13	– Probe Position with respect to Phantom Shell	B	1.4	R	$\sqrt{3}$	1	0.81	∞
14	– Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	2.3	R	$\sqrt{3}$	1	1.33	∞
	Uncertainties of the DUT							
15	Deviation of experimental source from numberical source	A	4	N	1	1	4.00	5
16	Input Power and SAR drift measurement	A	5	R	$\sqrt{3}$	1	2.89	5
17	Dipole Axis to Liquid Distance	B	2	R	$\sqrt{3}$	1	1.2	∞
Phantom and Tissue Parameters								
18	– Phantom Uncertainty(shape and thickness tolerances)	B	4	R	$\sqrt{3}$	1	2.31	∞
19	Uncertainty in SAR correction for deviation(in permittivity and conductivity)	B	2	N	1	1	2.00	
20	– Liquid Conductivity Target –tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
21	– Liquid Conductivity –measurement Uncertainty)	B	4	N	$\sqrt{3}$	1	0.92	9
22	– Liquid Permittivity Target tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
23	– Liquid Permittivity –measurement uncertainty	B	5	N	$\sqrt{3}$	1	1.15	∞
Combined Standard Uncertainty				RSS			10.15	
Expanded uncertainty (Confidence interval of 95 %)				K=2			20.29	

12 MAIN TEST INSTRUMENTS

No.	EQUIPMENT	TYPE	Series No.	Last Calibration	Due Date
1	System Simulator	E5515C	GB 47200710	2015/02/23	1 Year
2	SAR Probe	SATIMO	SN 04/13 EP166	2014/08/14	1 Year
3	Dipole	SID835	SN09/13 DIP0G835-217	2014/08/28	1 Year
4	Dipole	SID1900	SN09/13 DIP1G900-218	2014/08/28	1 Year
5	Dipole	SID2450	SN09/13 DIP2G450-220	2014/08/28	1 Year
6	Network Analyzer	ZVB8	A0802530	2014/06/13	1 Year
7	Signal Generator	SMR27	A0304219	2014/06/10	1 Year
8	Amplifier	Nucletudes	143060	2015/03/27	1 Year
9	Directional Coupler	DC6180A	305827	2014/06/10	1 Year
10	Power Meter	NRVS	1020.1809.02	2014/06/13	1 Year
11	Power Sensor	NRV-Z4	100069	2014/06/10	1 Year
12	Power Meter	NRP2	A140401673	2015/03/27	1 Year
13	Power Sensor	NPR-Z11	1138.3004.02-114072-nq	2015/03/27	1 Year
14	Multimeter	Keithley2000	4014020	2015/03/27	1 Year
15	Device Holder	SATIMO	SN 09/13 MSH80	2015/03/27	1 Year
16	SAM Phantom	SAM97	SN 09/13 SAM97	2015/03/27	1 Year

ANNEX A

of

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2015-06326

Haier Telecom (Qingdao) Co., Ltd.

3G Smart Phone

Type Name: Admiral 506

Hardware Version: TMAW

Software Version: FRV506.V1.0.0.2015.05.19

Accreditation Certificate

This Annex consists of 2 pages

Date of Report: 2015-05-18

China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L1659)

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Building 28/29, Shigudong, Xili Industrial Area, Xili Street,

Nanshan District, Shenzhen, Guangdong, China

is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) *for the competence of testing and calibration.*

The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.

Date of Issue: 2012-09-29

Date of Expiry: 2015-09-28

Date of Initial Accreditation: 1999-08-03

Date of Update: 2012-09-29

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment (CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is the signatory to International Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (ILAC MRA) and Asia Pacific Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (APLAC MRA).

No.CNAS AL 2

0005210

ANNEX B

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2015-06326

Haier Telecom (Qingdao) Co., Ltd.

3G Smart Phone

Type Name: Admiral 506

Hardware Version: TMAW

Software Version: FRV506.V1.0.0.2015.05.19

TEST LAYOUT

This Annex consists of 10 pages

Date of Report: 2015-05-18

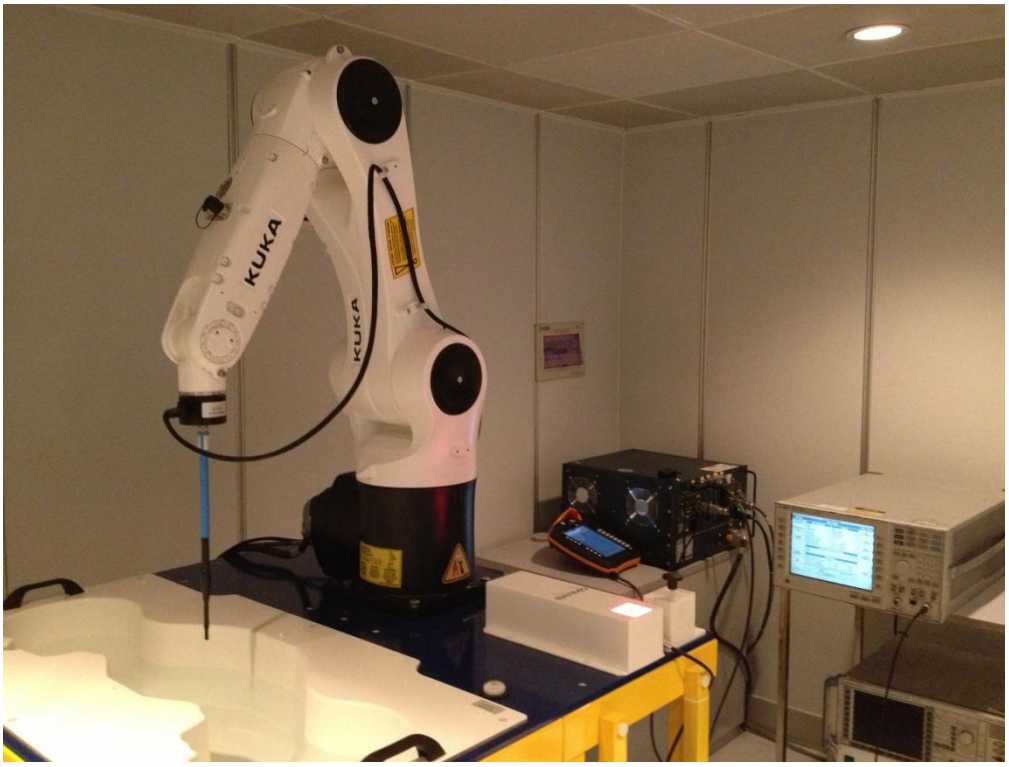


Fig.1 COMO SAR Test System

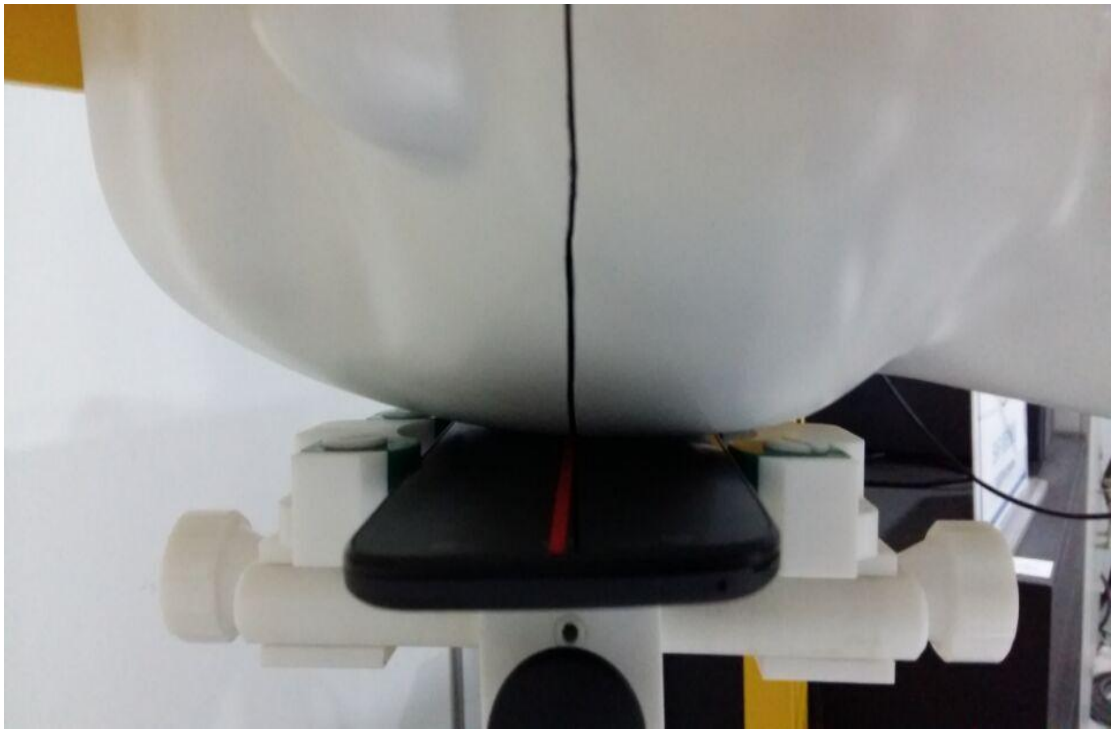


Fig.2 Right_Cheek

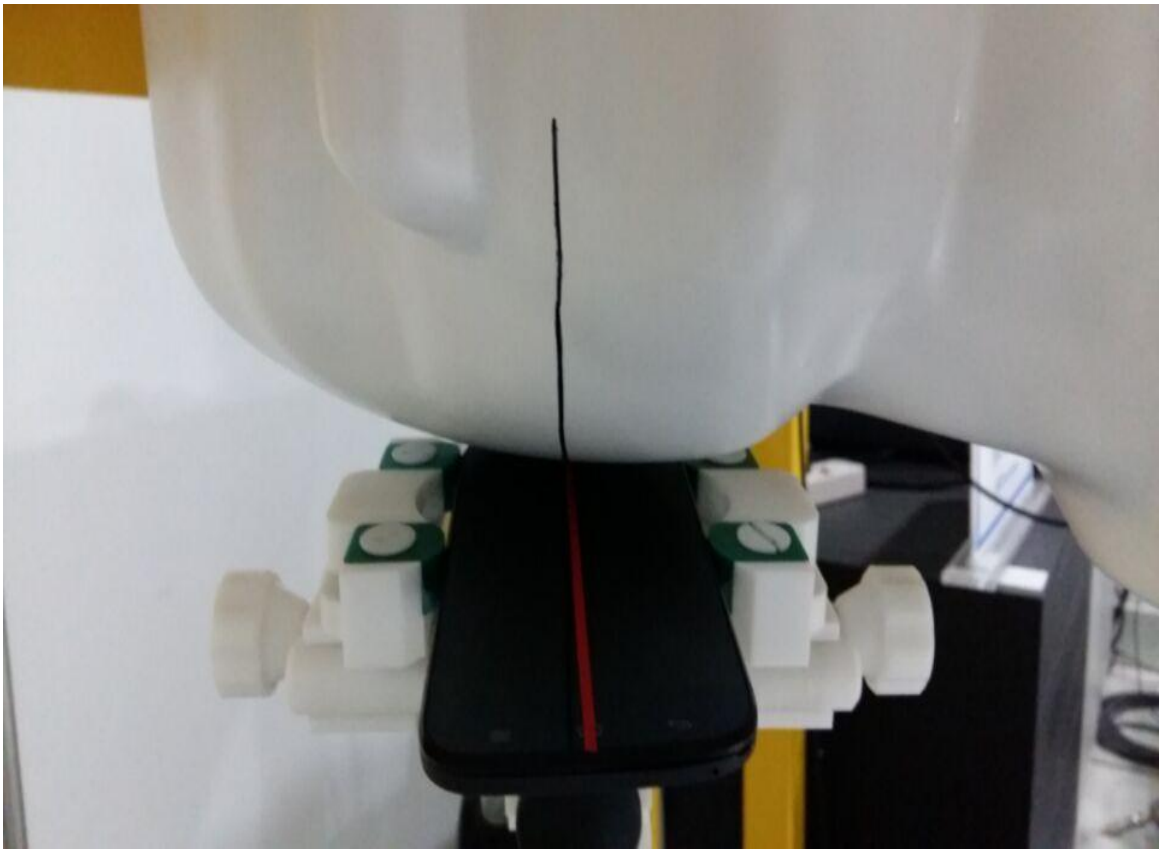


Fig.3 Right_Tilt

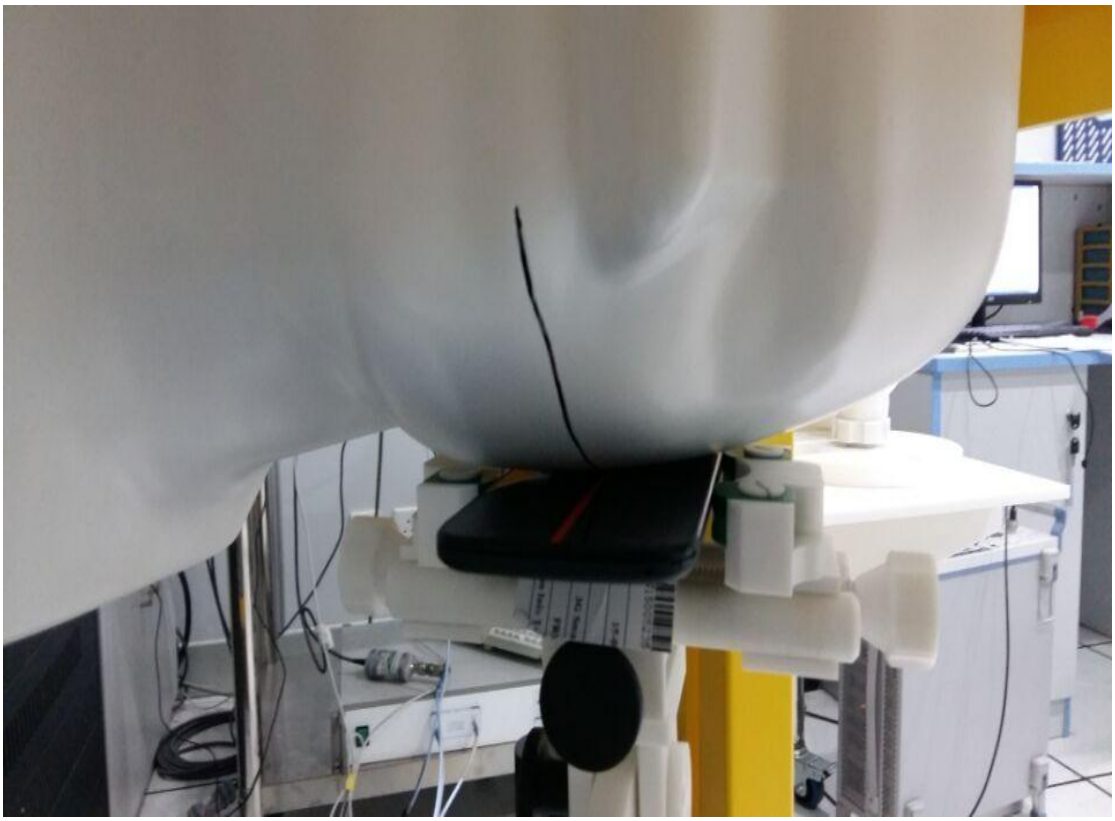


Fig.4 Left Cheek

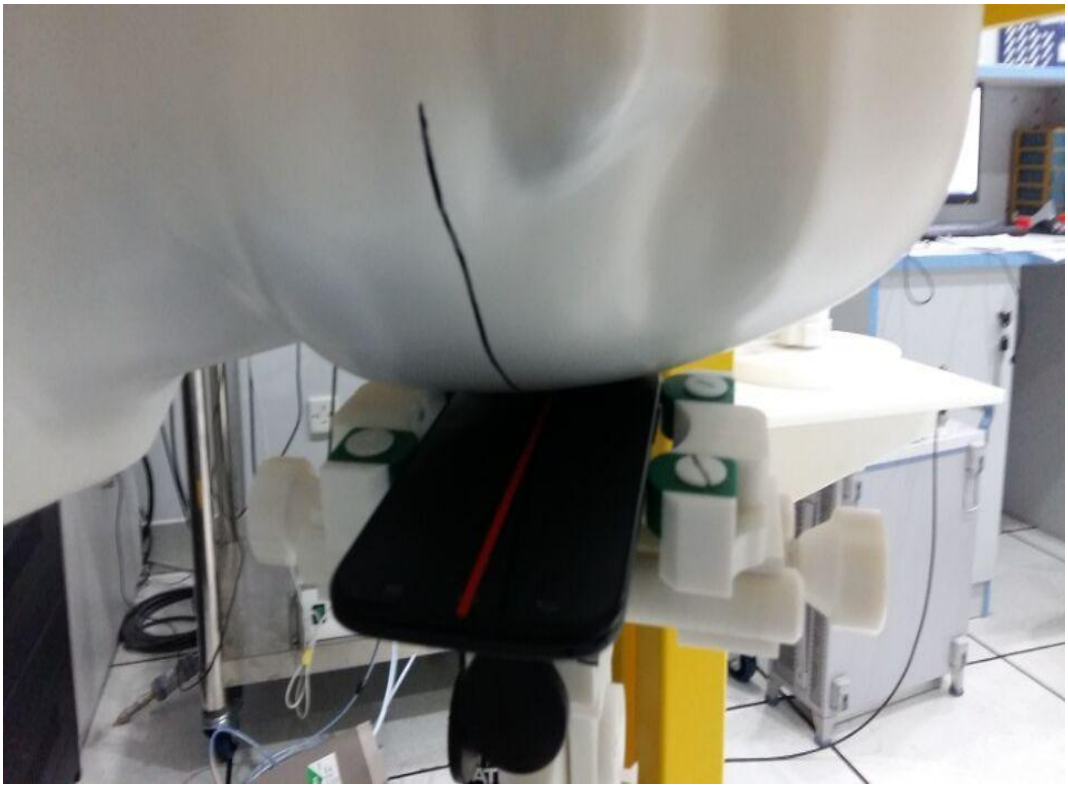


Fig.5 Left_Tilt

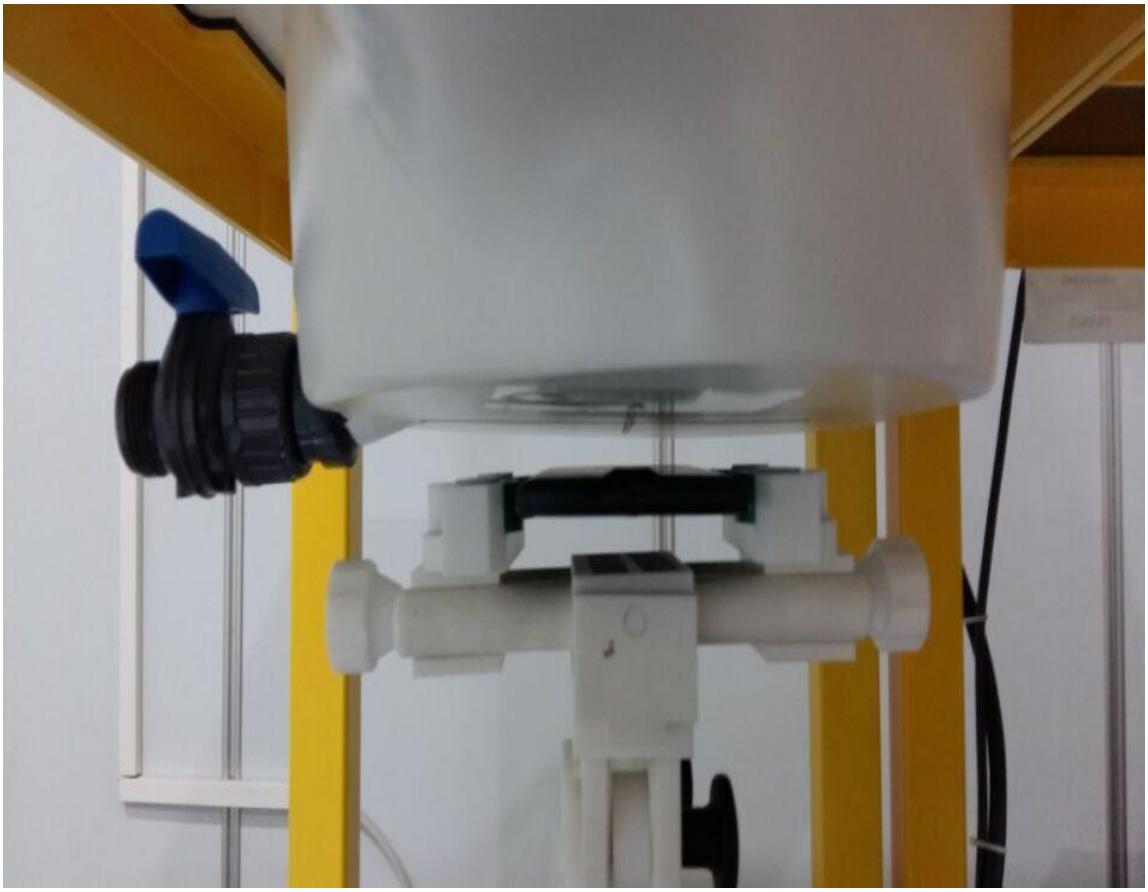


Fig.6 Body(Back upside,10mm seperation)

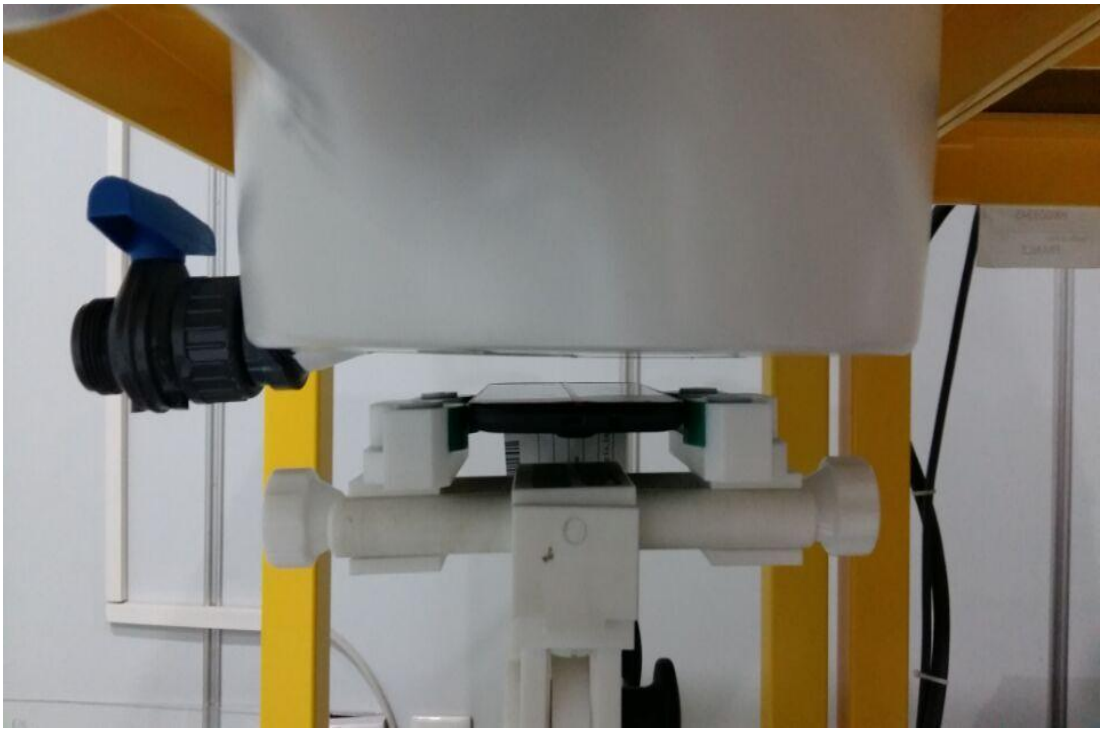


Fig.7 Body(Face upside,10mm seperation)

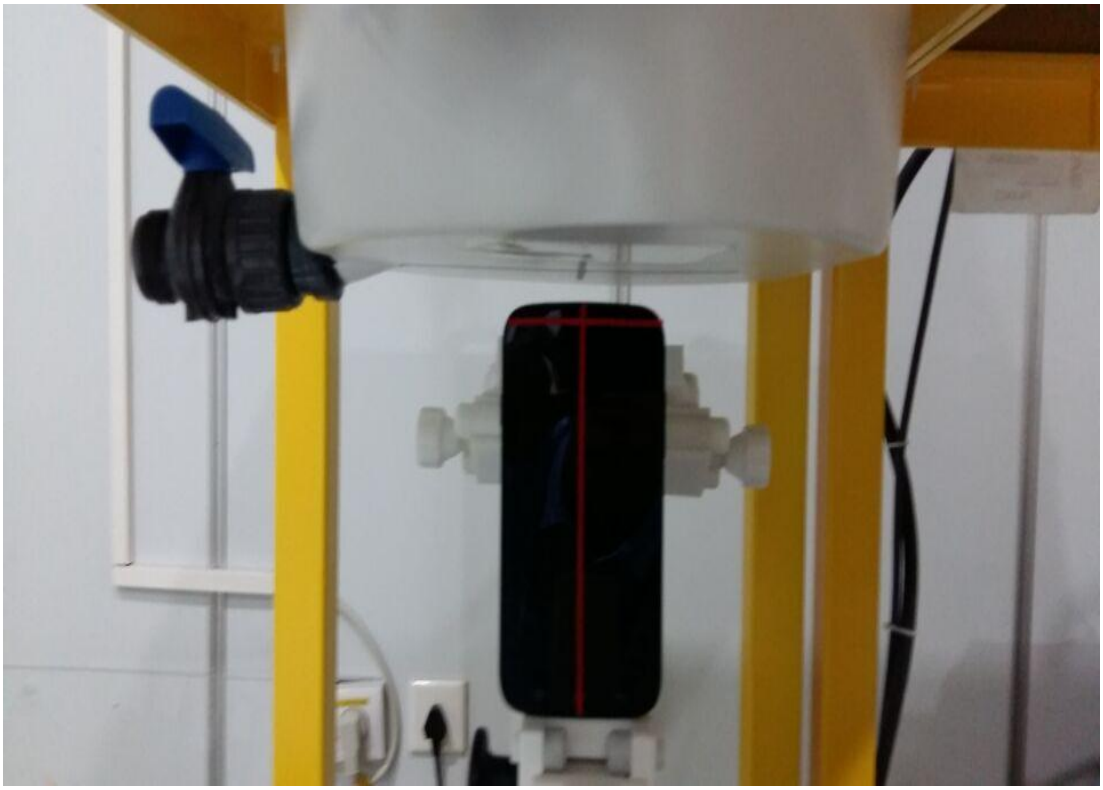


Fig.8 Body Edge A(UP,10mm seperation)

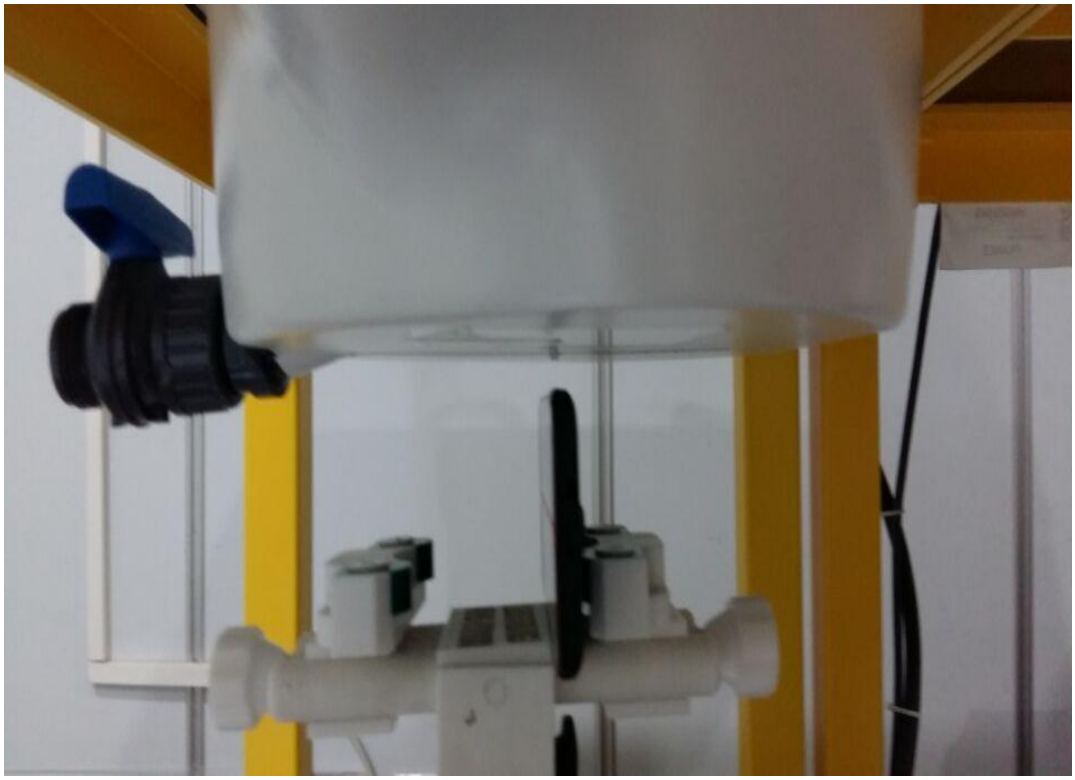


Fig.9 Body Edge B(Right upside,10mm separation)

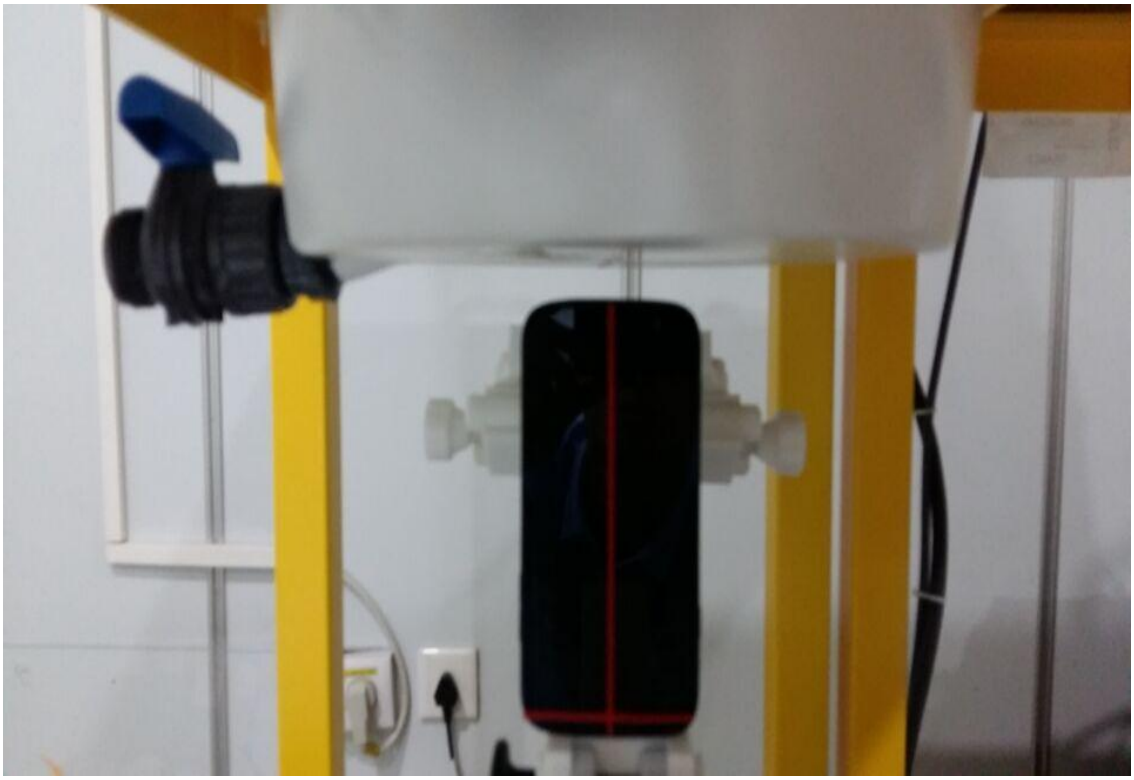


Fig.10 Body Edge C(Down,10mm seperation)

Fig.11 Body Edge D(Left upside,10mm separation)

Fig.12 Head Liquid of 835MHz(15cm)

Fig.13 Body Liquid of 835MHz(15cm)

Fig.14 Head Liquid of 1900MHz(15cm)

Fig.15 Body Liquid of 1900MHz(15cm)

Fig.16 Head Liquid of 2450MHz(15cm)

Fig.17 Body Liquid of 2450MHz(15cm)

ANNEX C

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2015-06326

3G Smart Phone

Type Name: Admiral 506

Hardware Version: TMAW

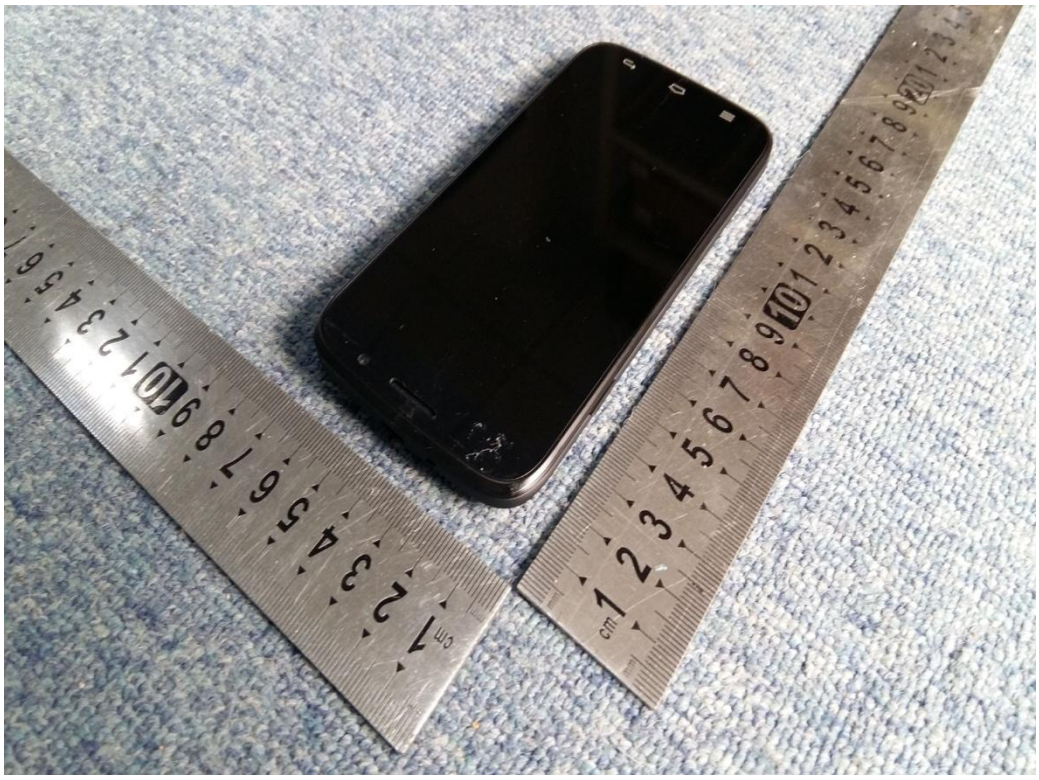
Software Version: FRV506.V1.0.0.2015.05.19

Sample Photographs

This Annex consists of 2 pages

Date of Report: 2015-05-18

1. Appearance



Appearance and size (obverse)

Appearance and size (reverse)

ANNEX D

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2015-06326

3G Smart Phone

Type Name: Admiral 506

Hardware Version: TMAW

Software Version: FRV506.V1.0.0.2015.05.19

System Performance Check Data and Highest SAR Plots

This Annex consists of 19 pages

Date of Report: 2015-05-18

System Performance Check (Head, 835MHz)

Type: Phone measurement (Complete)

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

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

Date of measurement:11/05/2015

Measurement duration: 21 minutes 24 seconds

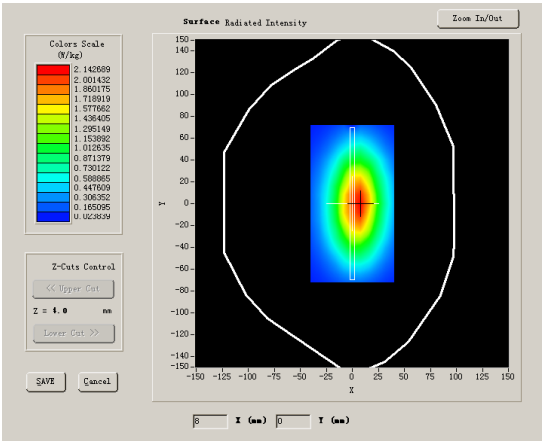
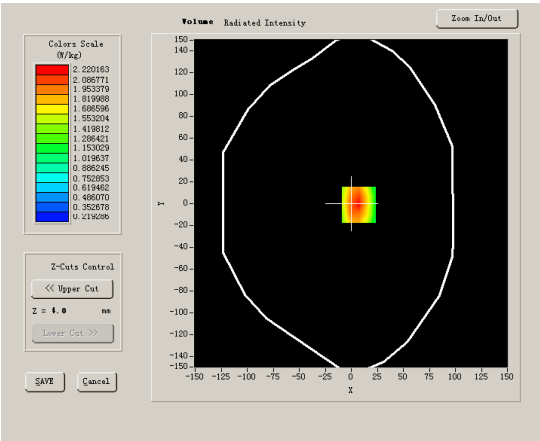
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	
Band	835MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	835.000000
Relative permittivity (real part)	41.17
Relative permittivity	18.64
Conductivity (S/m)	0.88
Power drift (%)	1.23
Ambient Temperature:	23.2 ℃
Liquid Temperature:	23.5 ℃
ConvF:	5.68
Duty factor:	1:1

SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=-1.00

SAR 10g (W/Kg)	1.820843
SAR 1g (W/Kg)	2.452347

System Performance Check (Head, 1900MHz)

Type: Phone measurement (Complete)

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

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

Date of measurement: 12/05/2015

Measurement duration: 20 minutes 57 seconds

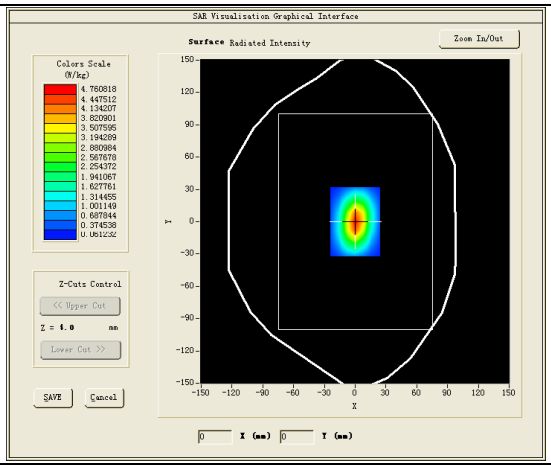
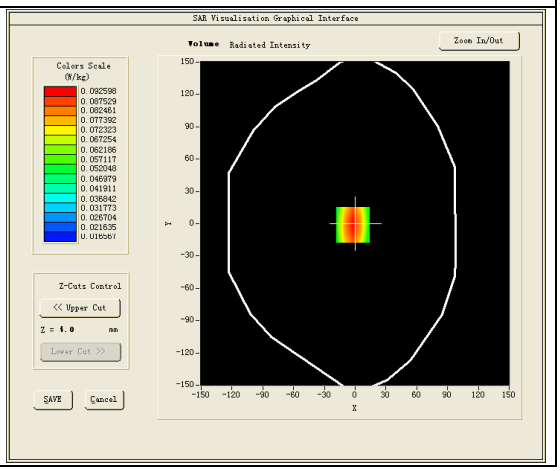
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	
Band	1900MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1900.000000
Relative permittivity (real part)	39.87
Relative permittivity	12.98
Conductivity (S/m)	1.37
Power drift (%)	-0.42
Ambient Temperature:	22.3℃
Liquid Temperature:	22.6℃
ConvF:	5.25
Duty factor:	1:1

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=6.00, Y=0.00

SAR 10g (W/Kg)	5.140843
SAR 1g (W/Kg)	9.792961

System Performance Check (Head, 2450MHz)

Type: Phone measurement (Complete)

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

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

Date of measurement:13/05/2015

Measurement duration: 21 minutes 08 seconds

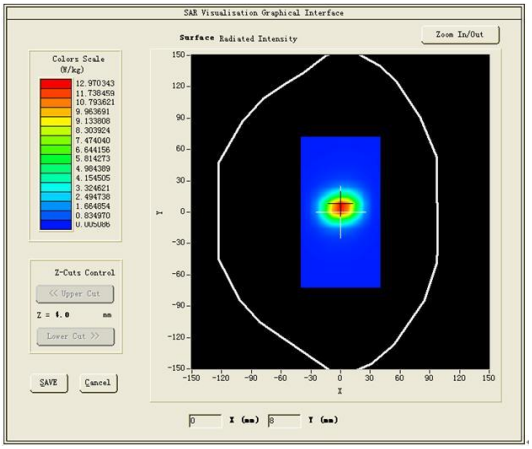
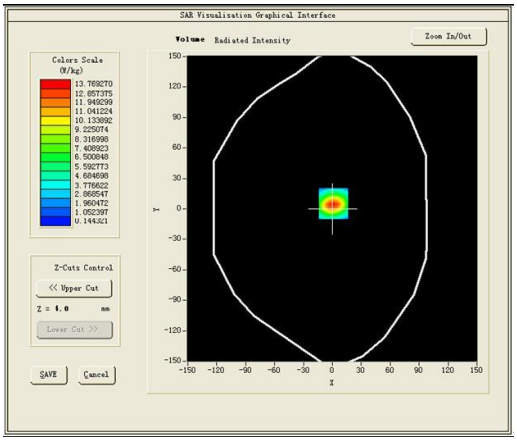
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Dipole
Band	2450MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	2450
Relative permittivity (real part)	38.53
Relative permittivity	12.93
Conductivity (S/m)	1.76
Power Drift (%)	0.75
ConvF:	4.93
Duty factor:	1:1

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=7.00

SAR 10g (W/Kg)	5.356328
SAR 1g (W/Kg)	12.570844

System Performance Check (Body, 835MHz)

Type: Phone measurement (Complete)

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

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

Date of measurement: 11/05/2015

Measurement duration: 20 minutes 12 seconds

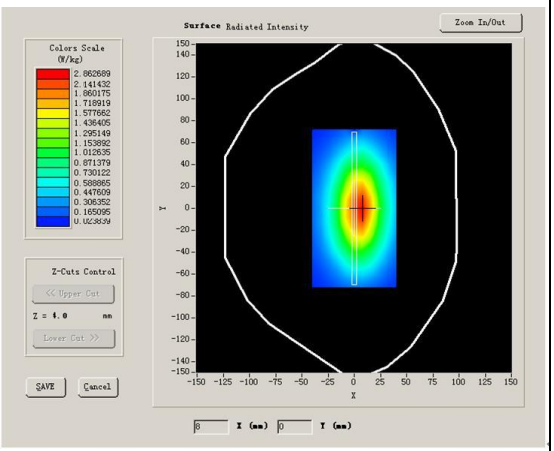
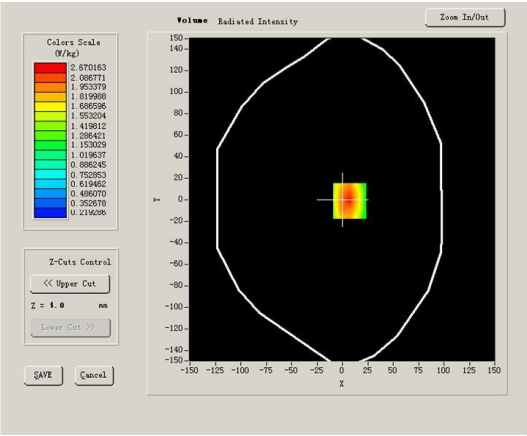
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Dipole
Band	835MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	835
Relative permittivity (real part)	54.52
Relative permittivity	20.69
Conductivity (S/m)	0.96
Power drift (%)	2.30
Ambient Temperature:	22.2 ℃
Liquid Temperature:	22.5 ℃
ConvF:	5.84
Duty factor:	1:1

SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=-1.00

SAR 10g (W/Kg)	1.603124
SAR 1g (W/Kg)	2.532147

System Performance Check (Body, 1900MHz)

Type: Phone measurement (Complete)

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

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

Date of measurement: 12/05/2015

Measurement duration: 21 minutes 34 seconds

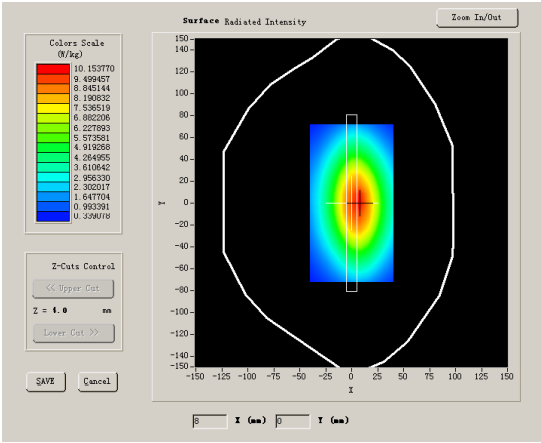
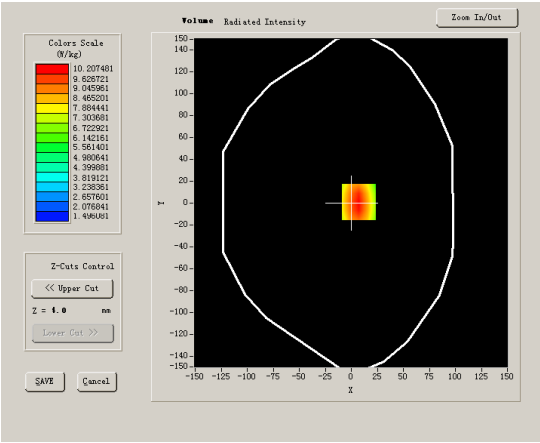
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Dipole
Band	1900MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1900
Relative permittivity (real part)	52.37
Relative permittivity	14.12
Conductivity (S/m)	1.49
Power Drift (%)	3.21
Ambient Temperature:	22.1 ℃
Liquid Temperature:	22.6 ℃
ConvF:	5.42
Duty factor:	1:1

SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=1.00, Y=6.00

SAR 10g (W/Kg)	5.264217
SAR 1g (W/Kg)	10.153415

System Performance Check (Body, 2450MHz)

Type: Validation measurement (Complete)

Date of measurement: 13/05/2015

Measurement duration: 22 minutes 08 seconds

Mobile Phone IMEI number: --

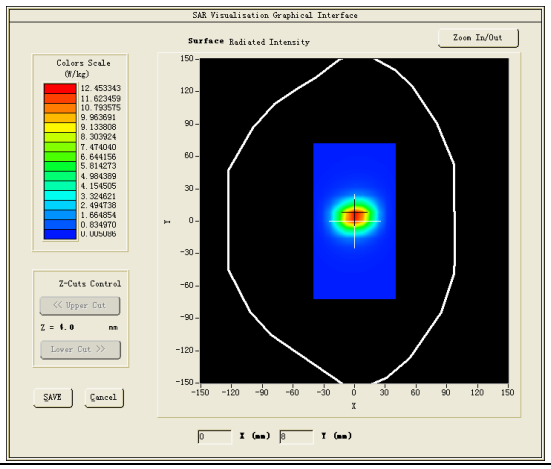
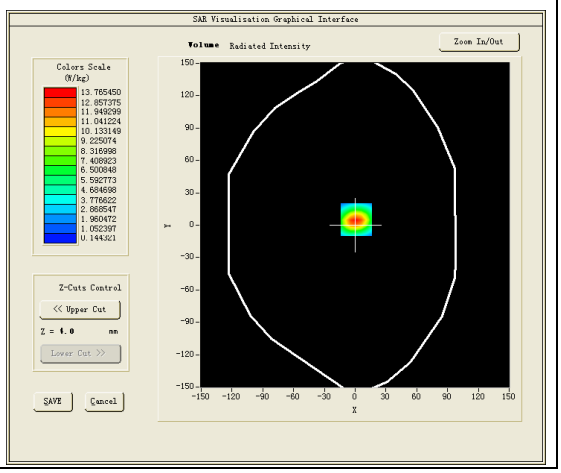
A. Experimental conditions.

Phantom File	surf_sam_plan.txt, h= 5.00 mm
Phantom	7x7x8,dx=5mm dy=5mm dz=4mm,Complete/nsurf_sam_plan.txt, h= 5.00 mm
Device Position	Dipole
Band	2450MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	2450
Relative permittivity (real part)	52.13
Relative permittivity	14.03
Conductivity (S/m)	1.91
Power Drift (%)	0.30
Ambient Temperature:	22.1 ℃
Liquid Temperature:	22.6 ℃
Duty factor:	1:1
ConvF:	5.07

SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=5.00

SAR Peak: 22.36 W/kg

SAR 10g (W/Kg)	6.196436
SAR 1g (W/Kg)	12.803417

GSM850, Right Cheek, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 11/05/2015

Measurement duration: 6 minutes 35 seconds

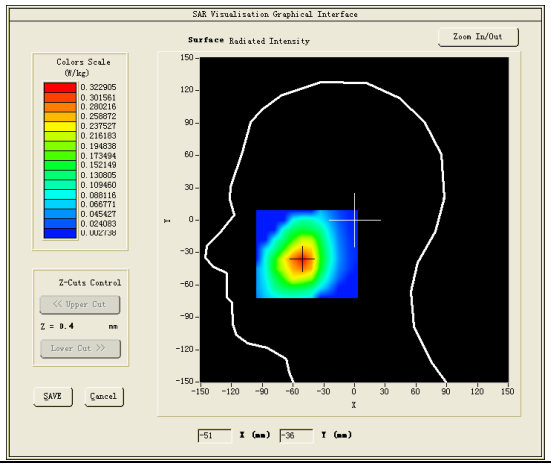
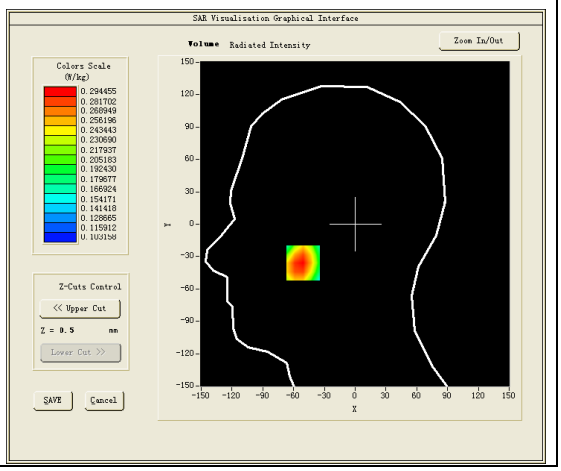
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	GSM850
Channels	190
Signal	GSM (Duty cycle: 1:8)

B. SAR Measurement Results

Frequency (MHz)	836.4
Relative permittivity (real part)	41.17
Relative permittivity (imaginary part)	18.64
Conductivity (S/m)	0.88
Variation (%)	-4.60
ConvF:	5.68

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-51.00, Y=-36.00

SAR 10g (W/Kg)	0.244632
SAR 1g (W/Kg)	0.288753

GSM850, Back, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 11/05/2015

Measurement duration: 7 minutes 32 seconds

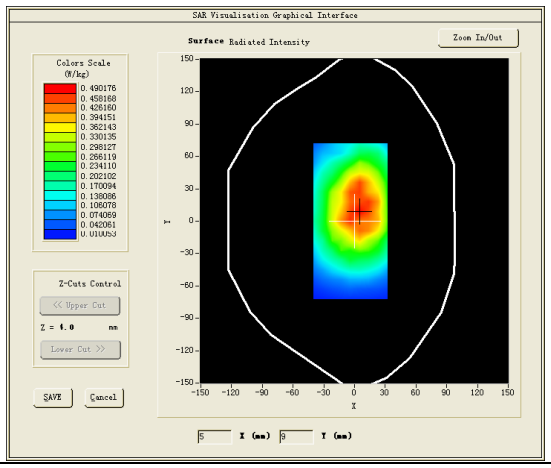
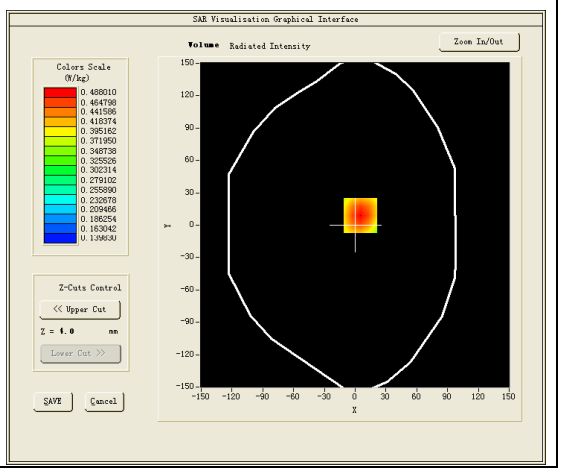
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	GSM850
Channels	190
Signal	GSM(Duty cycle: 1:8)

B. SAR Measurement Results

Frequency (MHz)	836.4
Relative permittivity (real part)	54.52
Relative permittivity (imaginary part)	20.69
Conductivity (S/m)	0.96
Variation (%)	-4.67
ConvF:	5.84

SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=9.00

SAR 10g (W/Kg)	0.380027
SAR 1g (W/Kg)	0.493812

GPRS 850, Back, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 11/05/2015

Measurement duration: 7 minutes 33 seconds

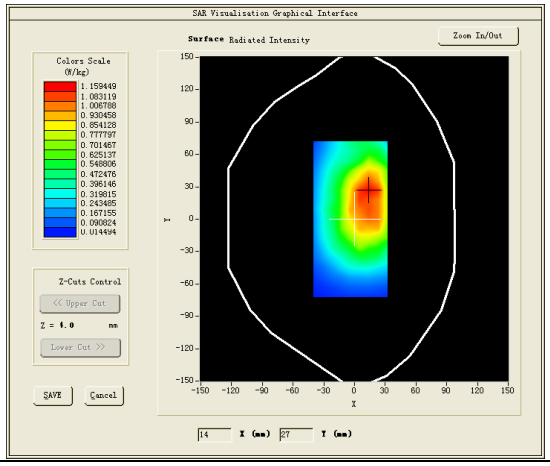
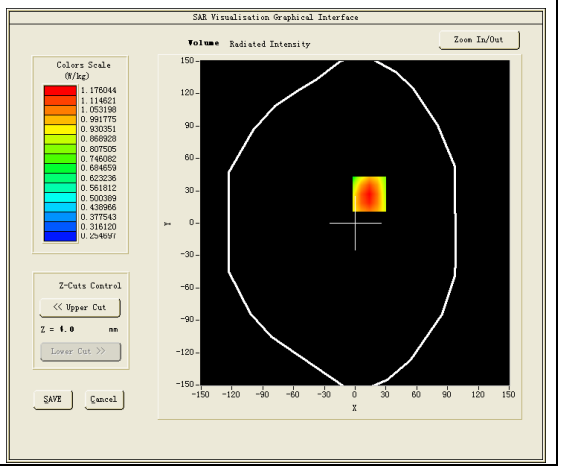
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	CUSTOM (GPRS850_2Tx)
Channels	190
Signal	GPRS(Duty cycle: 1:4)

B.SAR Measurement Results

Frequency (MHz)	836.6
Relative permittivity (real part)	54.52
Relative permittivity (imaginary part)	20.69
Conductivity (S/m)	0.96
Variation (%)	-3.15
ConvF:	5.84

SURFACE SAR	VOLUME SAR
	

Maximum location: X=14.00, Y=27.00

SAR Peak: 1.54 W/kg

SAR 10g (W/Kg)	0.804135
SAR 1g (W/Kg)	1.112467

GSM1900, Right Cheek, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 12/05/2015

Measurement duration: 7 minutes 37 seconds

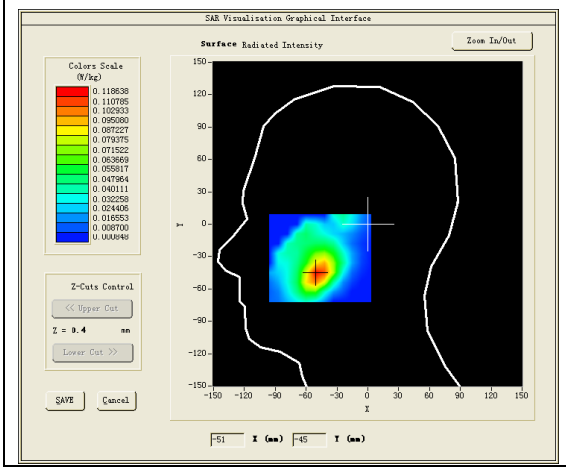
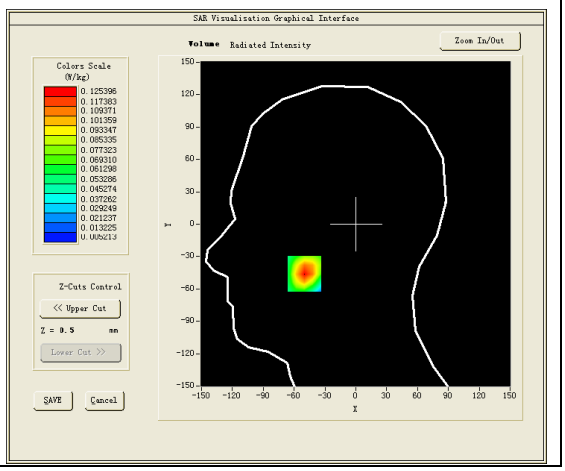
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	GSM1900
Channels	661
Signal	GSM (Duty cycle: 1:8)

B.SAR Measurement Results

Frequency (MHz)	1880
Relative permittivity (real part)	39.87
Relative permittivity (imaginary part)	12.98
Conductivity (S/m)	1.37
Variation (%)	1.15
ConvF:	5.25

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-50.00, Y=-46.00

SAR 10g (W/Kg)	0.072039
SAR 1g (W/Kg)	0.117335

GSM1900, Edge C, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 12/05/2015

Measurement duration: 6 minutes 52 seconds

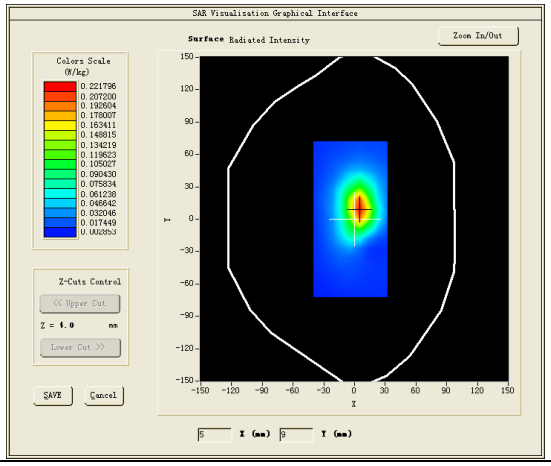
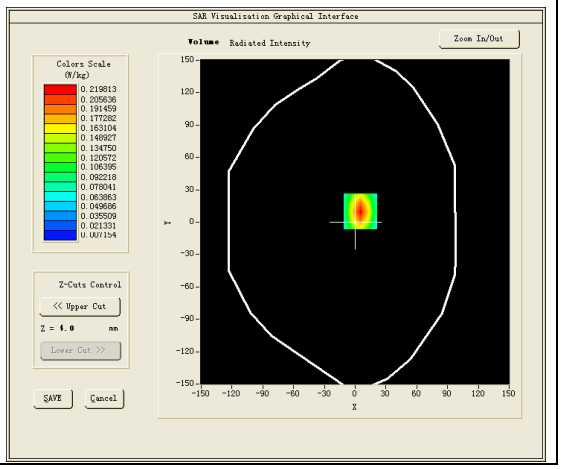
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Edge C
Band	GSM1900
Channels	661
Signal	GSM (Duty cycle: 1:8)

B. SAR Measurement Results

Frequency (MHz)	1880.0
Relative permittivity (real part)	52.37
Relative permittivity (imaginary part)	14.12
Conductivity (S/m)	1.49
Variation (%)	-4.48
ConvF:	5.42

SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=10.00

SAR 10g (W/Kg)	0.111803
SAR 1g (W/Kg)	0.203905

GPRS1900, BACK, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 12/05/2015

Measurement duration: 7 minutes 24 seconds

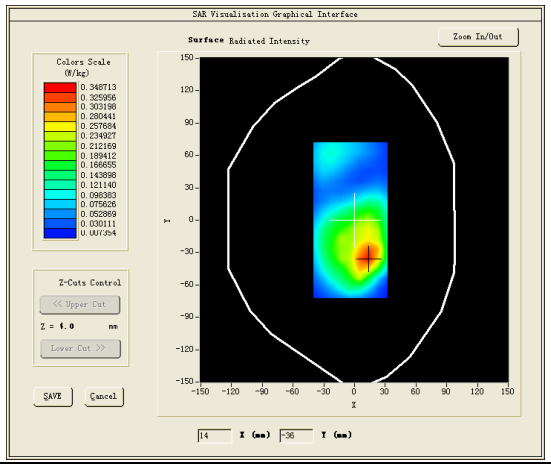
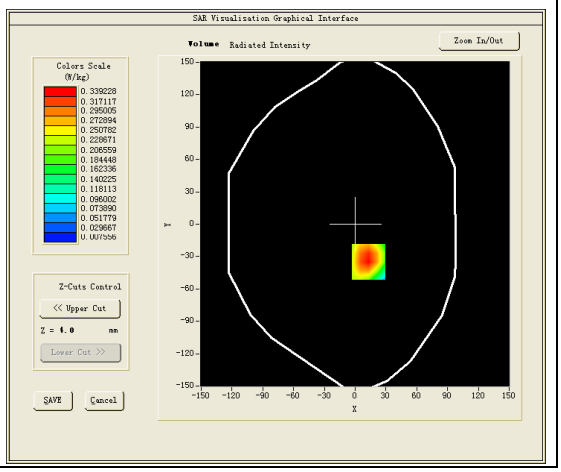
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (GPRS1900_2Tx)
Channels	661
Signal	GPRS (Duty cycle: 1:4)

B. SAR Measurement Results

Frequency (MHz)	1880.0
Relative permittivity (real part)	52.37
Relative permittivity (imaginary part)	14.12
Conductivity (S/m)	1.49
Variation (%)	-2.48
ConvF:	5.42

SURFACE SAR	VOLUME SAR
	

Maximum location: X=13.00, Y=-35.00

SAR 10g (W/Kg)	0.187062
SAR 1g (W/Kg)	0.328631

WCDMA1900, Left Cheek, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 12/05/2015

Measurement duration: 6 minutes 6 seconds

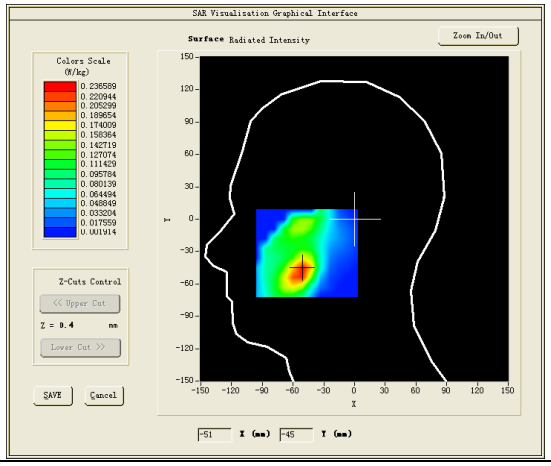
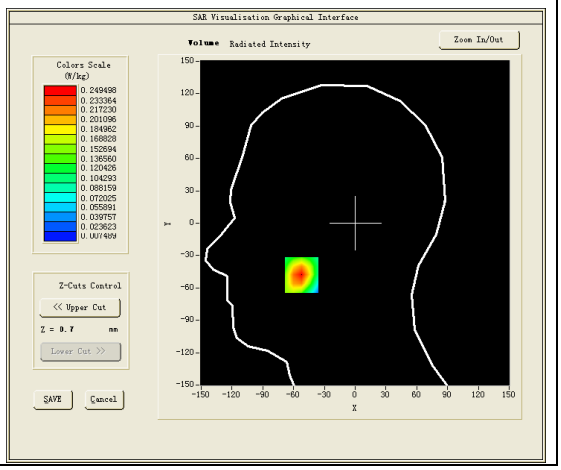
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	Band2_WCDMA1900
Channels	9400
Signal	WCDMA (Duty cycle: 1:1)

B. SAR Measurement Results

Frequency (MHz)	1880.0
Relative permittivity (real part)	39.87
Relative permittivity (imaginary	12.98
Conductivity (S/m)	1.37
Variation (%)	-3.15
ConvF:	5.25

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-52.00, Y=-48.00

SAR 10g (W/Kg)	0.144152
SAR 1g (W/Kg)	0.233785

WCDMA1900, Edge C, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 12/05/2015

Measurement duration: 7 minutes 37 seconds

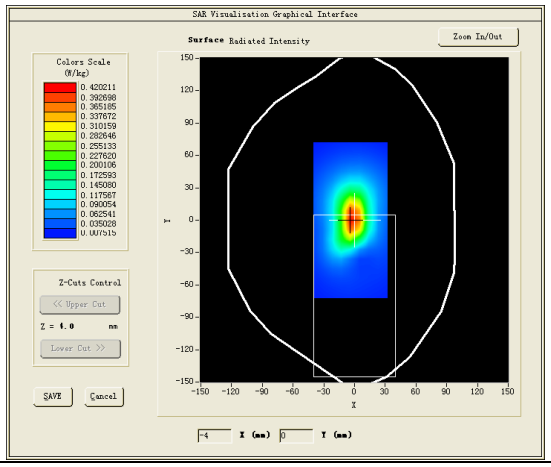
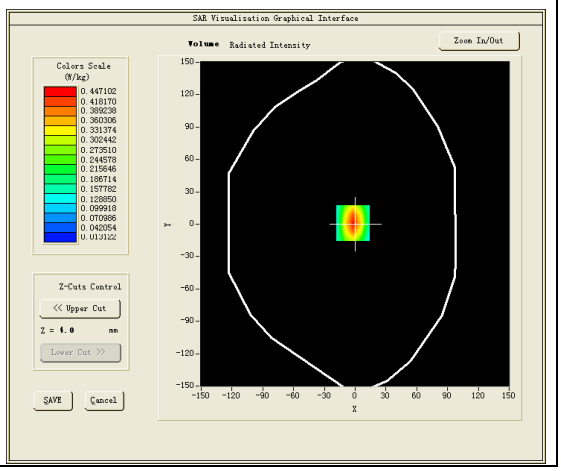
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Edge C
Band	Band2_WCDMA1900
Channels	9400
Signal	WCDMA (Duty cycle: 1:1)

B. SAR Measurement Results

Frequency (MHz)	1880.0
Relative permittivity (real part)	52.37
Relative permittivity (imaginary	14.12
Conductivity (S/m)	1.49
Variation (%)	0.26
ConvF:	5.42

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-2.00, Y=1.00

SAR 10g (W/Kg)	0.231751
SAR 1g (W/Kg)	0.434467

WCDMA850, Right Cheek, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 11/05/2015

Measurement duration: 5 minutes 19 seconds

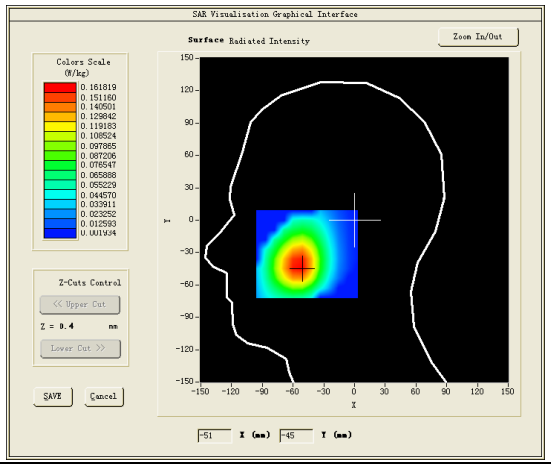
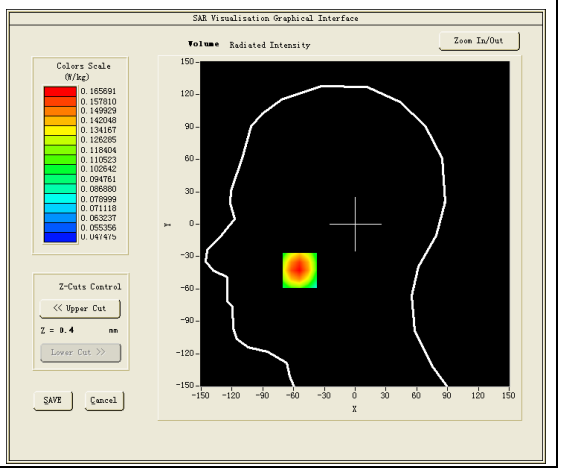
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	Band5_WCDMA850
Channels	4183
Signal	WCDMA (Duty cycle: 1:1)

B. SAR Measurement Results

Frequency (MHz)	836.6
Relative permittivity (real part)	41.17
Relative permittivity (imaginary part)	18.64
Conductivity (S/m)	0.88
Variation (%)	-1.11
ConvF:	5.68

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-54.00, Y=-43.00

SAR Peak: 0.19 W/kg

SAR 10g (W/Kg)	0.129050
SAR 1g (W/Kg)	0.160813

WCDMA850, BACK, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 11/05/2015

Measurement duration: 7 minutes 26 seconds

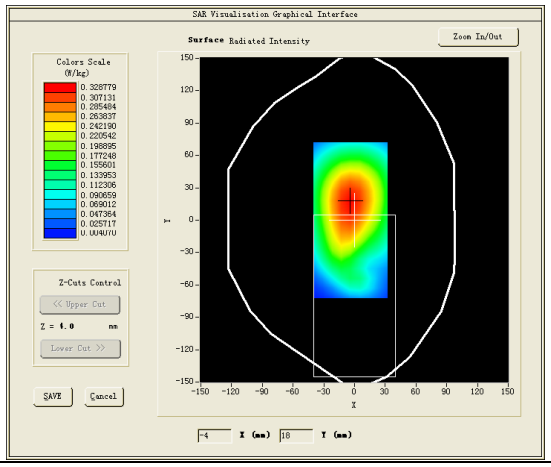
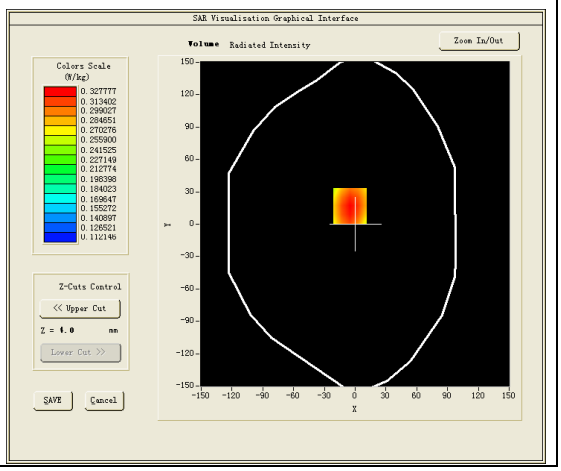
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	BACK
Band	Band5_WCDMA850
Channels	4183
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

Frequency (MHz)	836.6
Relative permittivity (real part)	54.52
Relative permittivity (imaginary part)	20.69
Conductivity (S/m)	0.96
Variation (%)	0.51
ConvF:	5.84

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-5.00, Y=17.00

SAR Peak: 0.40 W/kg

SAR 10g (W/Kg)	0.261122
SAR 1g (W/Kg)	0.333088

Wi-Fi 802.11b ,Right Cheek, Low

Type: Phone measurement (11 points in the volume)

Date of measurement: 13/05/2015

Measurement duration: 7 minutes 21 seconds

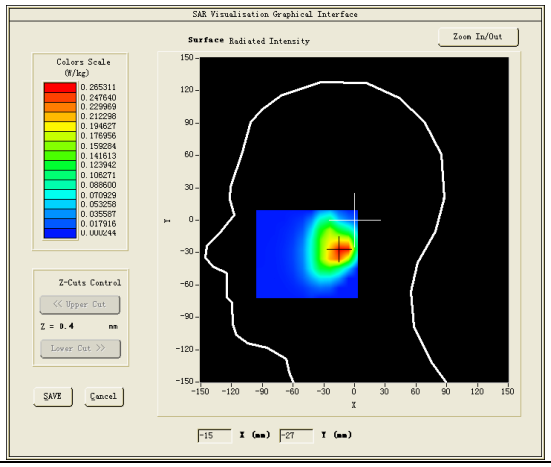
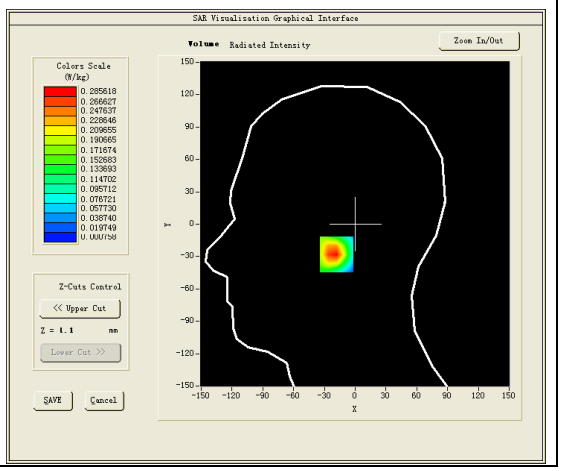
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=5mm dy=5mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	IEEE 802.11b ISM
Channels	1
Signal	DSSS (Crest factor: 1:1)

B. SAR Measurement Results

Frequency (MHz)	2402
Relative permittivity (real part)	38.53
Relative permittivity (imaginary part)	12.93
Conductivity (S/m)	1.76
Variation (%)	1.31
ConvF:	4.93

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-12.00, Y=-28.00

SAR 10g (W/Kg)	0.127465
SAR 1g (W/Kg)	0.270664

Wi-Fi 802.11b , Back, Low

Type: Phone measurement (Complete)

Date of measurement: 13/05/2015

Measurement duration: 20 minutes 24 seconds

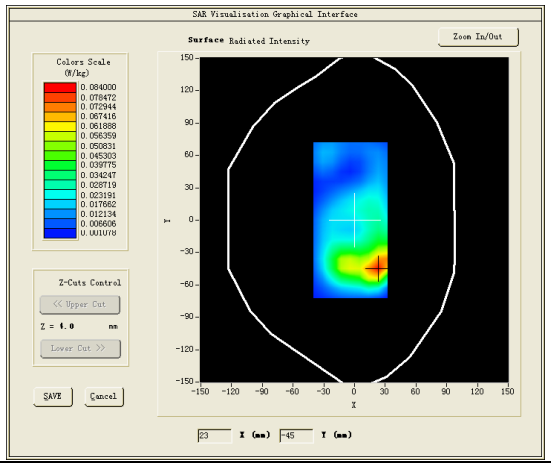
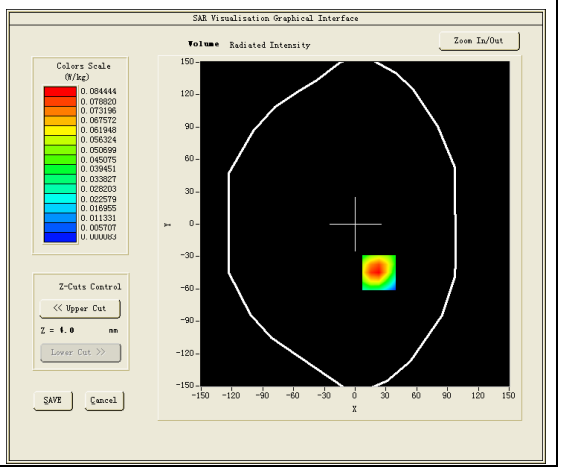
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	7x7x8,dx=5mm dy=5mm dz=4mm,Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b
Channels	1
Signal	DSSS (Crest factor: 1:1)

B. SAR Measurement Results

Frequency (MHz)	2402
Relative permittivity (real part)	52.13
Relative permittivity (imaginary part)	14.03
Conductivity (S/m)	1.91
Variation (%)	-0.57
ConvF:	5.07

SURFACE SAR	VOLUME SAR
	

Maximum location: X=23.00, Y=-45.00

SAR 10g (W/Kg)	0.038562
SAR 1g (W/Kg)	0.082186

ANNEX E

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2015-06326

3G Smart Phone

Type Name: Admiral 506

**Hardware Version: **

**Software Version: **

Calibration Certificate of Probe and Dipoles

This Annex consists of 43 pages

Date of Report: 2015-05-18

Probe Calibration Ceriticate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.227.15.14.SATU.A

CCIC SOUTHERN ELECTRONIC PRODUCT TESTING (SHENZHEN) CO., LTD

ELECTRONIC TESTING BUILDING, SHAHE ROAD, XILI TOWN

SHENZHEN, P.R. CHINA (POST CODE:518055)

SATIMO COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 04/13 EP166

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED

Calibration CERT #2246-02

08/14/2014

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	8/15/2014	
Checked by :	Jérôme LUC	Product Manager	8/15/2014	
Approved by :	Kim RUTKOWSKI	Quality Manager	8/15/2014	Kim Rutkowski

	Customer Name
Distribution :	CCIC SOUTHERN ELECTRONIC PRODUCT TESTING (SHENZHEN) Co., Ltd

Issue	Date	Modifications
A	8/15/2014	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 04/13 EP166
Product Condition (new / used)	Used
Frequency Range of Probe	0.7 GHz-3GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.232 MΩ Dipole 2: R2=0.226 MΩ Dipole 3: R3=0.228 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.

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3.2 SENSITIVITY

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

3.3 LOWER DETECTION LIMIT

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

3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 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%

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Combined standard uncertainty					5.83 1%
Expanded uncertainty 95 % confidence level k = 2					12.0%

5 CALIBRATION MEASUREMENT RESULTS

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

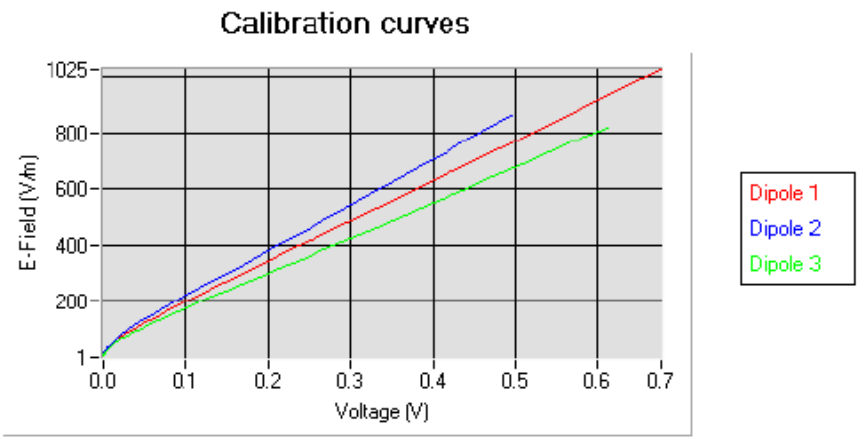
5.1 SENSITIVITY IN AIR

Normx dipole 1 (µV/(V/m)^2)	Normy dipole 2 (µV/(V/m)^2)	Normz dipole 3 (µV/(V/m)^2)
8.57	4.83	7.15

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
92	90	95

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

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



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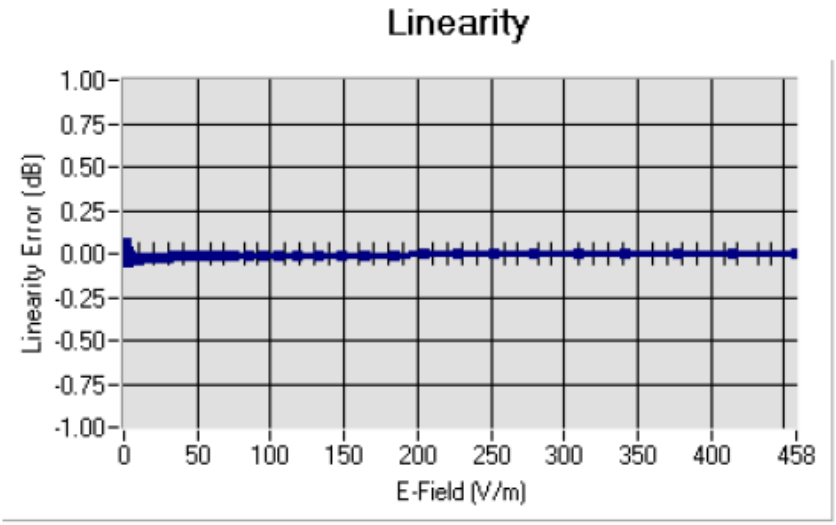
5.2 LINEARITY



Linearity: +/-1.55% (+/-0.07dB)

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL850	835	42.81	0.89	5.68
BL850	835	53.46	0.96	5.84
HL900	900	42.47	0.96	5.34
BL900	900	56.69	1.08	5.54
HL1800	1800	41.31	1.38	4.75
BL1800	1800	53.27	1.51	4.93
HL1900	1900	41.09	1.42	5.25
BL1900	1900	54.20	1.54	5.42
HL2000	2000	39.72	1.43	4.81
BL2000	2000	53.91	1.53	4.91
HL2450	2450	39.05	1.77	4.93
BL2450	2450	52.97	1.93	5.07
HL2600	2600	38.35	1.92	5.02
BL2600	2600	51.81	2.19	5.22

LOWER DETECTION LIMIT: 7mW/kg

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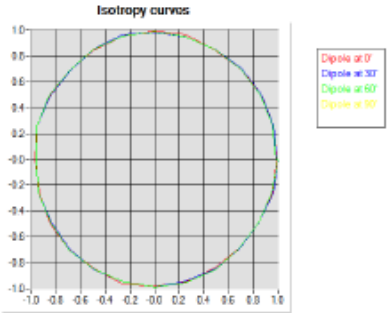
5.4 ISOTROPY

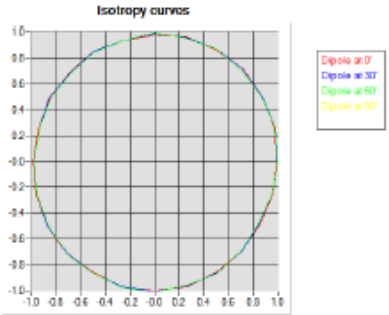
HL900 MHz

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



HL1800 MHz

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



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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

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SID835 Dipole Calibration Ceriticate

SATIMO
The microwave vision company

SAR Reference Dipole Calibration Report

Ref : ACR.240.1.14.SATU.A

CCIC SOUTHERN ELECTRONIC PRODUCT TESTING (SHENZHEN) CO., LTD

ELECTRONIC TESTING BUILDING, SHAHE ROAD, XILI TOWN

SHENZHEN, P.R. CHINA (POST CODE:518055)

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 835 MHZ

SERIAL NO.: SN 09/13 DIP0G835-217

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ilac-MRA

ACCREDITED
Calibration CERT #2246-02

08/28/14

Summary:

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

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	8/29/2014	JS
Checked by :	Jérôme LUC	Product Manager	8/29/2014	JS
Approved by :	Kim RUTKOWSKI	Quality Manager	8/29/2014	Kim Rutkowski

	Customer Name
Distribution :	CCIC SOUTHERN ELECTRONIC PRODUCT TESTING (SHENZHEN) Co., Ltd

Issue	Date	Modifications
A	8/29/2014	Initial release

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