



FCC SAR TEST REPORT

Report No.: SET2016-09509
Product: LTE/WCDMA/GSM Multi-Mode Digital Mobile Phone
Brand Name: ZTE
Model No.: ZTE BLADE V7 LITE/ ZTE BLADE V0720/
Blade V6 Plus/ ZTE Blade V6 Plus
FCC ID: SRQ-ZTEV6PLUS
Applicant: ZTE Corporation
Address: ZTE Plaza, Keji Road South, Shenzhen, China
Issued by: CCIC-SET
Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China
Tel: 86 755 26627338 **Fax:** 86 755 26627238
Mail: manager@ccic-set.com **Website:** <http://www.ccic-set.com>

This test report consists of **172** pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CCIC-SET. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CCIC-SET within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.



Test Report

Product: LTE/WCDMA/GSM Multi-Mode Digital Mobile Phone

Model No.: ZTE BLADE V7 LITE;ZTE BLADE V0720;Blade V6 Plus;
ZTE Blade V6 Plus

Brand Name.....: ZTE

FCC ID.....: SRQ-ZTEV6PLUS

Applicant.....: ZTE Corporation

Applicant Address.....: ZTE Plaza, Keji Road South, Shenzhen, China

Manufacturer.....: ZTE Corporation

Manufacturer Address: ZTE Plaza, Keji Road South, Shenzhen, China

Test 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 1528–2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

Test Result.....: Pass

Tested by: Mei Chun 2016-06-03
Chun Mei, Test Engineer

Reviewed by.....: Shuangwen Zhang 2016-06-03
Shuangwen Zhang, Senior EGINEER

Approved by.....: Wu Lian 2016-06-03
Wu Li'an , Manager



Contents

- 1. **GENERAL CONDITIONS**-----4
- 2. **ADMINISTRATIVE DATA**-----5
 - 2.1. Identification of the Responsible Testing Laboratory-----5
 - 2.2. Identification of the Responsible Testing Location(s)-----5
 - 2.3. Organization Item-----5
 - 2.4. Identification of Applicant-----5
 - 2.5. Identification of Manufacture-----5
- 3. **EQUIPMENT UNDER TEST (EUT)**-----6
- 4. **SAR SUMMAY**-----7
- 5. **Specific Absorption Rate(SAR)**-----8
 - 5.1. Introduction-----8
 - 5.2. SAR Definition-----8
 - 5.3. Phantoms-----9
 - 5.4. Device Holder-----9
 - 5.5. Probe Specification-----10
- 6. **OPERATIONAL CONDITIONS DURING TEST**-----11
 - 6.1. Schematic Test Configuration-----11
 - 6.2. SAR Measurement System-----11
 - 6.3. Equipments and results of validation testing-----15
 - 6.4. SAR measurement procedure-----17
 - 6.5. Antennas position and test position-----19
- 7. **CHARACTERISTICS OF THE TEST**-----20
 - 7.1. Applicable Limit Regulations-----20
 - 7.2. Applicable Measurement Standards-----20
- 8. **LABORATORY ENVIRONMENT**-----20
- 9. **CONDUCTED RF OUTPUT POWER**-----21
- 10. **TEST RESULTS**-----39
- 11. **MEASUREMENT UNCERTAINTY**-----49
- 12. **MAIN TEST INSTRUMENTS**-----52

This Test Report consists of the following Annexes:

Annex A: Test Layout -----	53
Annex B: Sample Photographs -----	56
Annex C: System Performance Check Data and Highest SAR Plots -----	58
Annex D: Calibration Certificate of Probe and Dipoles -----	89



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.

1.3 This document is only valid if complete; no partial reproduction can be made without written approval of CCIC-SET

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: Electronic Testing Building, Shahe Road, Nanshan District,
ShenZhen, P. R. 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: Electronic Testing Building, Shahe Road, Nanshan District,
Shenzhen, P. R. China

2.3. Organization Item

CCIC-SET Report No.: SET2016-09509

CCIC-SET Project Leader: Mr. Li Sixiong

CCIC-SET Responsible for accreditation scope: Mr. Wu Li'an

Start of Testing: 2016-05-23

End of Testing: 2016-05-27

2.4. Identification of Applicant

Company Name: ZTE Corporation

Address: ZTE Plaza, Keji Road South, Shenzhen, China

2.5. Identification of Manufacture

Company Name: ZTE Corporation

Address: ZTE Plaza, Keji Road South, Shenzhen, China

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:	LTE/WCDMA/GSM Multi-Mode Digital Mobile Phone	
Model Name:	ZTE BLADE V7 LITE/ ZTE BLADE V0720/ Blade V6 Plus/ ZTE Blade V6 Plus	
Brand Name:	ZTE	
General description:	Support Band	GSM850MHz/1900MHz/900MHz/1800MHz WCDMA 850MHz/1900MHz, LTE Band2/4/5/7,WIFI, BT
	Test Band	GSM 850MHz/ GSM 1900MHz, GPRS 850MHz/ GPRS 1900MHz, WCDMA 850MHz/1900MHz, LTE Band2/4/5/7,WIFI 802.11b
	Multislot Class	GPRS: Class 12; EGPRS: Class 12
	GPRS Class	Class B
	Development Stage	Identical Prototype
	Accessories	Power Supply
	Battery type	3.80V 2500mAh
	Antenna type	Inner Antenna
	Operation mode	GSM / GPRS /WCDMA / LTE /WIFI
	Modulation mode	GSM(GMSK),UMTS(QPSK),LTE(QPSK,16QAM), WIFI(OFDM/DSSS)
	Max. RF Power	33.78dBm
	Max. SAR Value	Head: 0.542 W/kg; Body-Worn: 0.995 W/kg; Hotspot: 0.995 W/kg (10mm distance)

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). This device supports EDGE 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	0.542	0.542
	GSM1900	0.341	
	WCDMA Band V	0.248	
	WCDMA Band II	0.304	
	LTE Band 2	0.229	
	LTE Band 4	0.178	
	LTE Band 5	0.164	
	LTE Band 7	0.303	
	WIFI	0.440	
Body-worn Accessory (10mm Gap)	GSM850	0.299	0.995
	GSM1900	0.384	
	WCDMA Band V	0.525	
	WCDMA Band II	0.944	
	LTE Band 2	0.995	
	LTE Band 4	0.880	
	LTE Band 5	0.317	
	LTE Band 7	0.566	
	WIFI	0.171	
Hotspot (10mm Gap)	GSM850	0.368	0.995
	GSM1900	0.663	
	WCDMA Band V	0.525	
	WCDMA Band II	0.944	
	LTE Band 2	0.995	
	LTE Band 4	0.880	
	LTE Band 5	0.317	
	LTE Band 7	0.566	
	WIFI	0.122	

Highest Simultaneous SAR Summary

Exposure Position	Frequency Band	Highest Scaled 1g-SAR(W/kg)
Head	WWAN(GSM850)&WIFI	0.910
Body-worn (10mmGap)	WWAN(LTE Band 2)&WIFI	1.166
Hotspot (10mmGap)	WWAN(LTE Band 2)&WIFI	1.166

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 (ρ). The equation description is as below:

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

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

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

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

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

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

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.

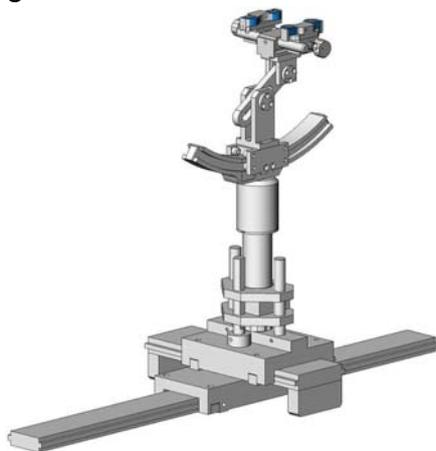


SAM Twin Phantom

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

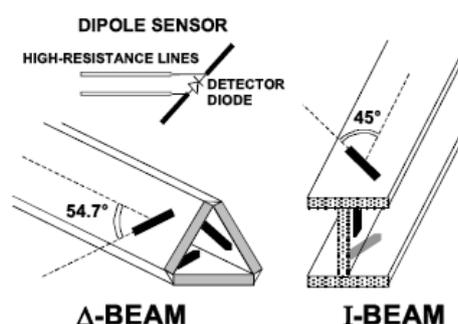


Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	700 MHz to 3 GHz; Linearity: ± 0.5 dB (700 MHz to 3 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 μ W/g to 100 mW/g; Linearity: ± 0.5 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 5 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 LTE/WCDMA/GSM (GPRS) Mutil-Mode Digital 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 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		2600	
Tissue Type	Head	Body	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	55.24	64.49
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04	0.5	0.024
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0	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	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	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	44.45	32.25
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7	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	39.0	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	1.96	2.16

MSL/HSL750 (Body and Head liquid for 650 – 850 MHz)

Item	Head Tissue Simulation Liquid HSL750 Muscle(body)Tissue Simulation Liquid MSL750			
H2O	Water, 35 – 58%			
Sucrose	Sugar, white, refined, 40-60%			
NaCl	Sodium Chloride, 0-6%			
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%			
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1-0.7%			
Frequency (MHz)	Head ϵ_r	Head σ (S/m)	Body ϵ_r	Body σ (S/m)
750	41.9	0.89	55.2	0.97

Note: The liquid of 700MHz&2600MHz typical liquid composition is provided by SATIMO.

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 Simulate liquid

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. Stimulate liquid that are used for testing at frequencies of GSM 850MHz/1900MHz, WCDMA850MHz/1900MHz, LTE Band2/4/5/7 and Wi-Fi 2.4GHz, 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	850MHz	$41.5 \pm 5\%$	$0.90 \pm 5\%$
Validation value (May. 23th, 2016)	850MHz	41.41	0.89
Target value	1800 MHz	$40.0 \pm 5\%$	$1.40 \pm 5\%$
Validation value (May. 25th, 2016)	1800 MHz	39.80	1.39
Target value	1900MHz	$40.0 \pm 5\%$	$1.40 \pm 5\%$
Validation value (May. 25th, 2016)	1900MHz	39.91	1.39
Target value	2450MHz	$39.2 \pm 5\%$	$1.80 \pm 5\%$
Validation value (May. 27th, 2016)	2450MHz	39.04	1.79
Target value	2600MHz	$39.0 \pm 5\%$	$1.96 \pm 5\%$
Validation value (May. 27th, 2016)	2600MHz	38.88	1.94



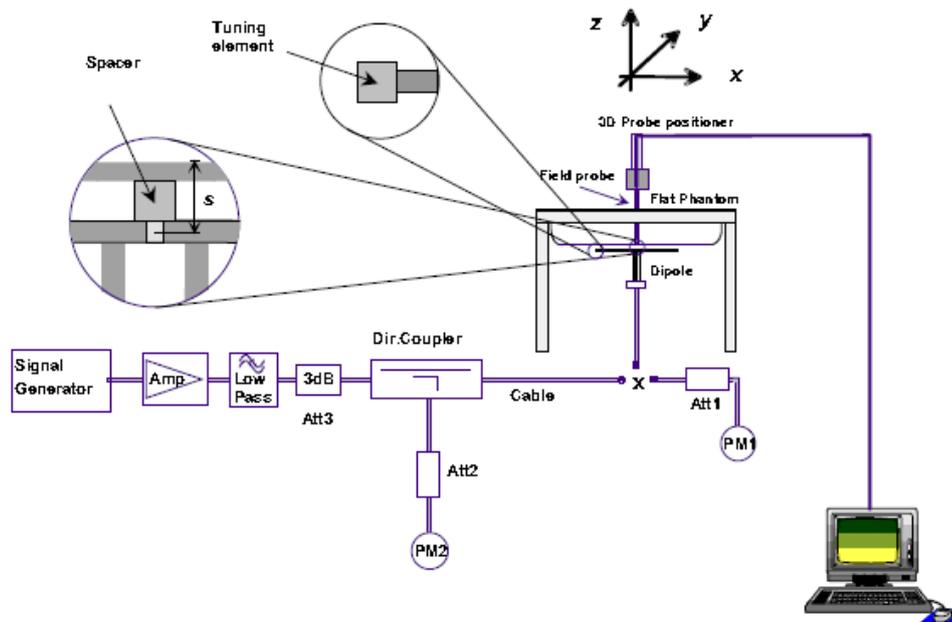
Table 4: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	850MHz	$55.2 \pm 5\%$	$0.97 \pm 5\%$
Validation value (May. 23th, 2016)	850MHz	55.11	0.97
Target value	1800 MHz	$53.3 \pm 5\%$	$1.52 \pm 5\%$
Validation value (May. 25th, 2016)	1800 MHz	53.20	1.51
Target value	1900MHz	$53.3 \pm 5\%$	$1.52 \pm 5\%$
Validation value (May. 25th, 2016)	1900MHz	53.12	1.52
Target value	2450MHz	$52.7 \pm 5\%$	$1.95 \pm 5\%$
Validation value (May. 27th, 2016)	2450MHz	52.55	1.94
Target value	2600MHz	$52.5 \pm 5\%$	$2.16 \pm 5\%$
Validation value (May. 27th, 2016)	2600MHz	52.41	2.15

6.3 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 $\pm 10\%$. 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. 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 5 and Table 6. 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 10 mm (taking into account of the IEEE 1528 and the place of the antenna).

Table 5: Head SAR system validation (1g)

Frequency	Duty cycle	Target value (W/kg)	Test value (W/kg)	
			250 mW	1W
835MHz(May. 23th, 2016)	1:1	9.77 ± 10%	2.40	9.60
1800MHz(May. 25th, 2016)	1:1	38.67 ± 10%	9.47	37.88
1900MHz(May. 25th, 2016)	1:1	40.37 ± 10%	9.91	39.64
2450MHz(May. 27th, 2016)	1:1	53.60 ± 10%	13.19	52.76
2600MHz(May. 27th, 2016)	1:1	56.19 ± 10%	13.99	55.96

Table 6: Body SAR system validation (1g)

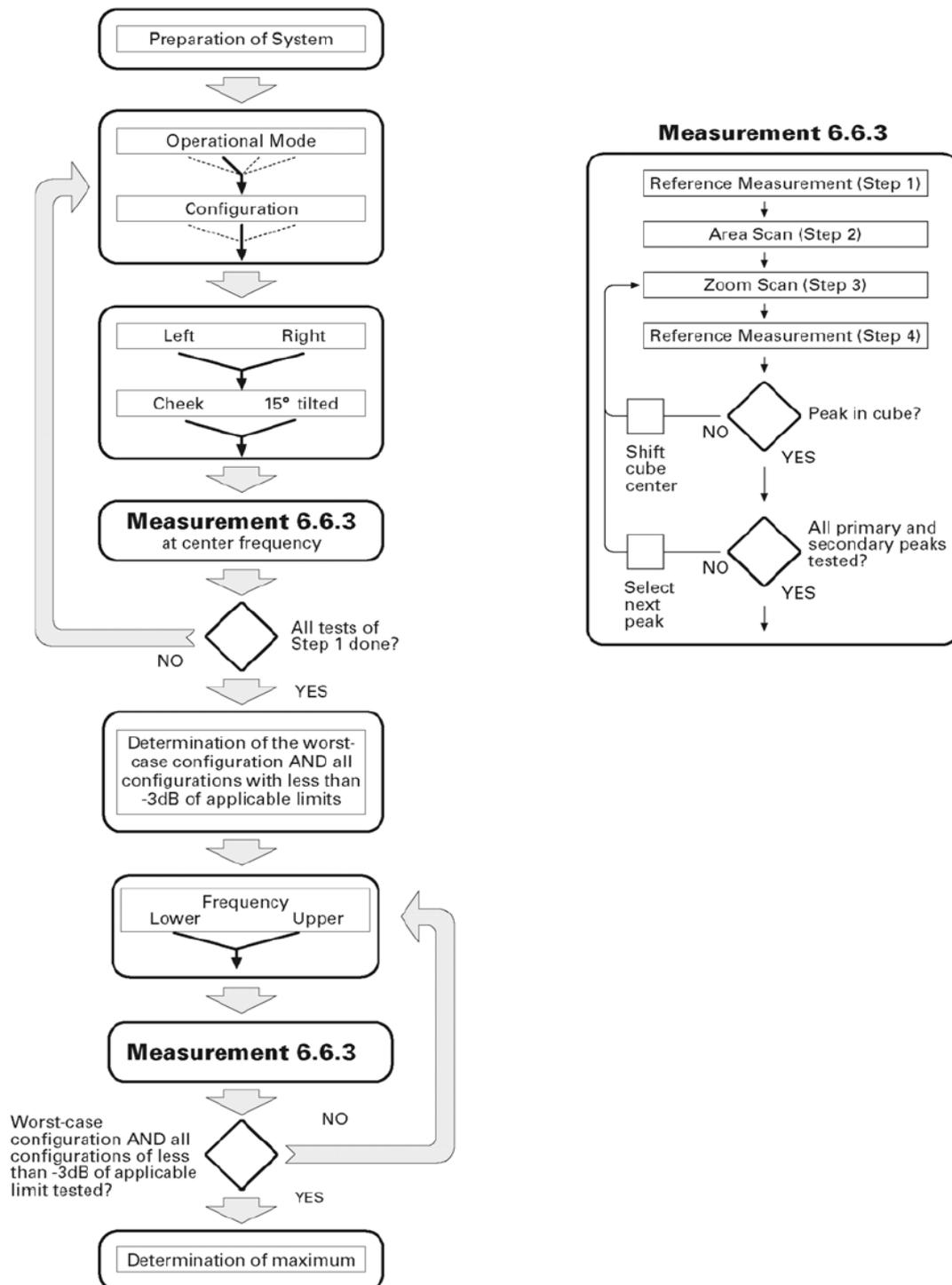
Frequency	Duty cycle	Target value (W/kg)	Test value (W/kg)	
			250 mW	1W
835MHz(May. 23th, 2016)	1:1	10.31 ± 10%	2.54	10.16
1800MHz(May. 25th, 2016)	1:1	40.07 ± 10%	9.87	39.48
1900MHz(May. 25th, 2016)	1:1	40.81 ± 10%	10.14	40.56
2450MHz(May. 27th, 2016)	1:1	52.66 ± 10%	13.08	52.32
2600MHz(May. 27th, 2016)	1:1	57.55 ± 10%	14.10	56.40

* 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:



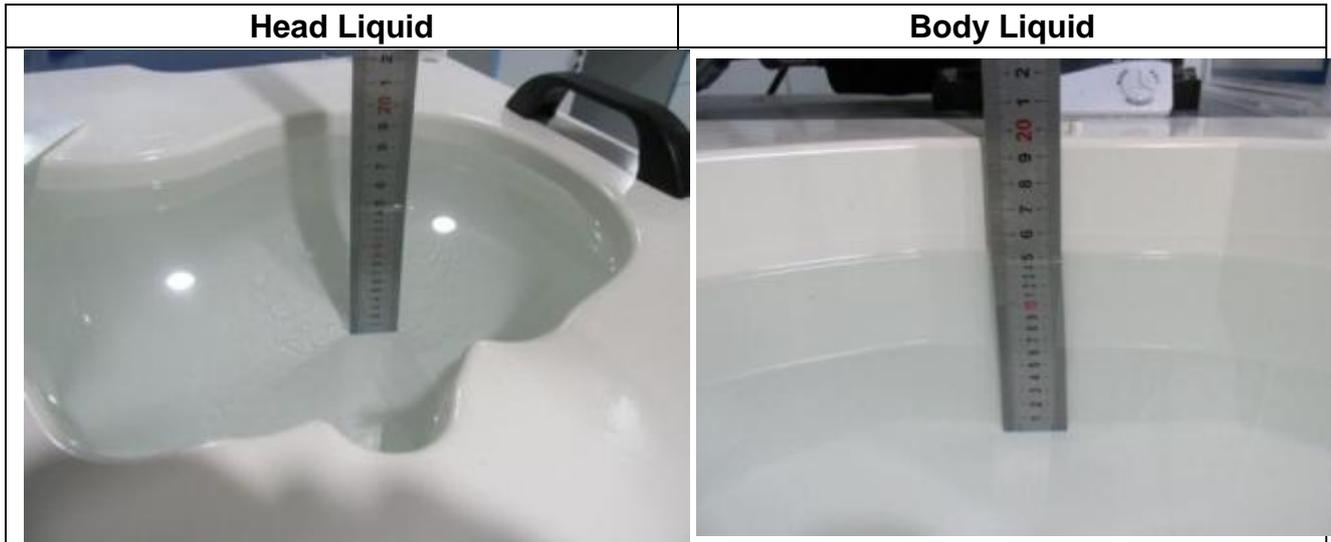
Establish a call with the maximum output power with a base station simulator, the connection between the EUT and the base station simulator is established via air interface.

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.

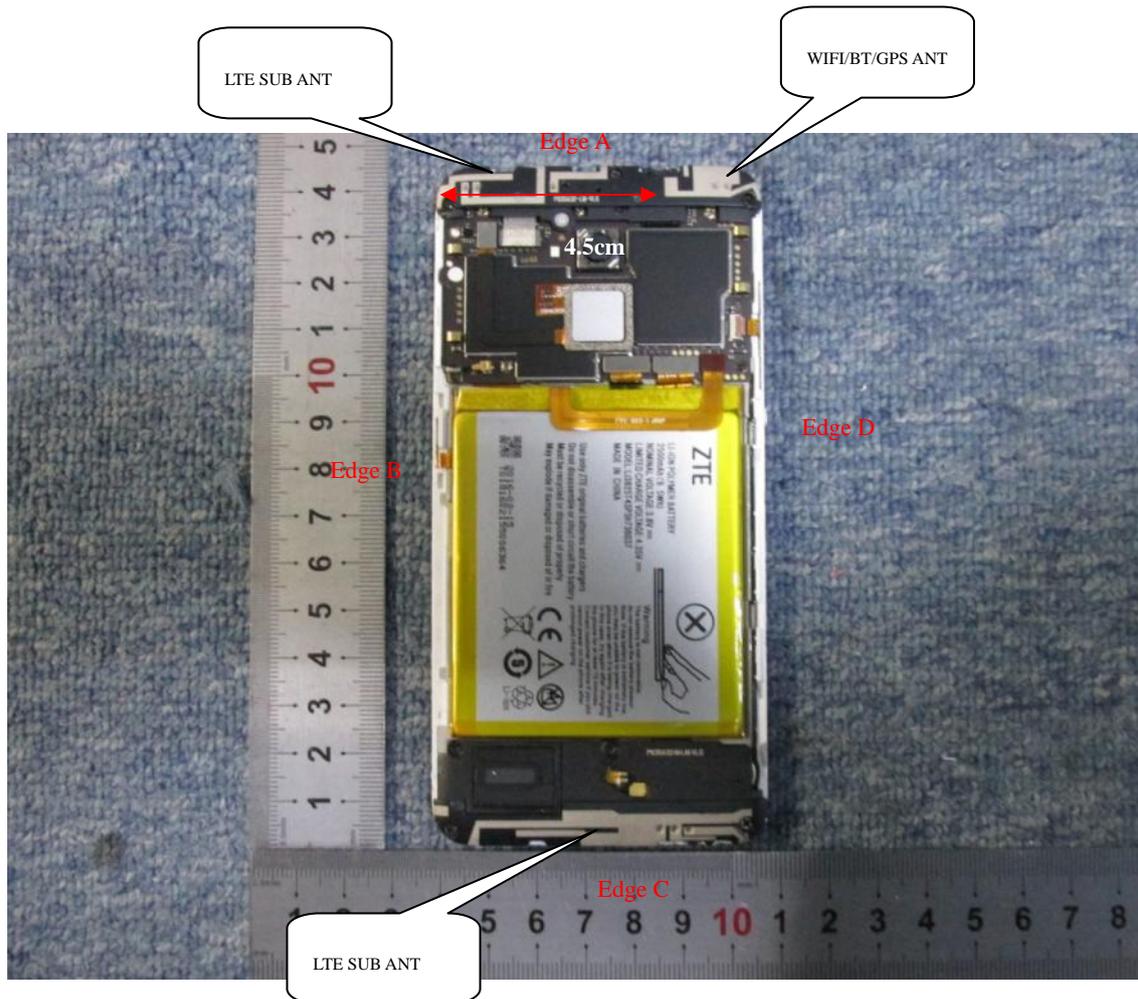
Above is the scanning procedure flow chart and table from the IEEE p1528 standard. This is the procedure for which all compliant testing should be carried out to ensure that all variations of the device position and transmission behavior are tested.

For SAR measurement, the liquid deep max more than 15cm as below photo



6.5 Transmitting antenna information

The GSM&WCDMA<E&WIFI&BT antennas inside the EUT.



The Body SAR measurement positions of each band are as below:

Antenna	Front	Back	Edge A	Edge B	Edge C	Edge D
WWAN Antenna Body-worn	Yes	Yes	No	No	No	No
WWAN Antenna hotspot	Yes	Yes	No	Yes	Yes	Yes
WIFI Antenna Body-worn	Yes	Yes	No	No	No	No
WIFI Antenna hotspot	Yes	Yes	Yes	No	No	Yes

Note: According to KDB 941225 D06 v02r01, when antenna-to-edge>2.5cm, SAR is not required.



7 CHARACTERISTICS OF THE TEST

7.1 Applicable Limit Regulations

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 1528–2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

7.2 Applicable Measurement Standards

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this is in accordance with the following standards:

FCC 47 CFR Part2 (2.1093)

ANSI/IEEE C95.1-1992

IEEE 1528-2013

FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02

FCC KDB 447498 D01 v06 General RF Exposure Guidance

FCC KDB 648474 D04 v01r03 Handset SAR

FCC KDB 865664 D01 v01r04 SAR Measurement 100MHz to 6GHz

FCC KDB 865664 D02 v01r02 SAR Exposure Reporting

FCC KDB 941225 D01 v03r01 3G SAR Procedures

FCC KDB 941225 D05 v02r05 SAR for LTE Devices

FCC KDB 941225 D06 v02r01 Hotspot Mode

8 LABORATORY ENVIRONMENTS

The Ambient Conditions during SAR Test

Temperature	Min. = 22 ° C, Max. = 25 ° C
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	836.6	848.8	824.2	836.6	848.8
	GSM	33.78	33.71	33.75	24.75	24.68	24.72
	GPRS (Slot 1)	33.56	33.61	33.67	24.53	24.58	24.64
	GPRS (Slot 2)	30.87	30.82	30.85	24.85	24.8	24.83
	GPRS (Slot 3)	29.24	29.22	29.18	24.98	24.96	24.92
	GPRS (Slot 4)	28.73	28.71	28.68	25.72	25.7	25.67
	EDGE (Slot 1)	29.86	29.83	29.79	20.83	20.80	20.76
	EDGE (Slot 2)	27.55	27.47	27.52	21.53	21.45	21.50
	EDGE (Slot 3)	26.49	26.37	26.44	22.23	22.11	22.18
EDGE (Slot 4)	25.13	25.06	24.98	22.12	22.05	21.97	

Band		Burst Average Power (dBm)			Frame-Average Power (dBm)		
GSM1900	TX Channel	512	661	810	512	661	810
	Frequency(MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
	GSM	30.18	30.22	30.25	21.15	21.19	21.22
	GPRS (Slot 1)	30.12	30.21	30.15	21.09	21.18	21.12
	GPRS (Slot 2)	28.13	28.22	28.17	22.11	22.20	22.15
	GPRS (Slot 3)	27.05	27.14	27.09	22.79	22.88	22.83
	GPRS (Slot 4)	26.61	26.65	26.62	23.60	23.64	23.61
	EDGE (Slot 1)	27.57	27.61	27.55	18.54	18.58	18.52
	EDGE (Slot 2)	25.46	25.52	25.38	19.44	19.50	19.36
	EDGE (Slot 3)	24.22	24.36	24.27	19.96	20.10	20.01
	EDGE (Slot 4)	23.35	23.41	23.32	20.34	20.40	20.31

Note: Per KDB 447498 D01 v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.

For hotspot SAR, EUT was performed at GPRS Class 12 multi-slots(4TX) mode

Timeslot consignations

No. Of Slots	Slot 1	Slot 2	Slot 3	Slot 4
Slot Consignation	1Up4Down	2UpDown	3UpDown	4Up1Down
Duty Cycle	1:8	1:4	1:2.67	1:2
Crest Factor	-9.03dB	-6.02dB	-4.26dB	-3.01dB

9.2 WCDMA Conducted output Power

WCDMA conducted output power

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4183	4233	9262	9400	9538
	subtest	dBm			dBm		
RMC 12.2kbps	non	23.34	23.31	23.42	22.45	22.49	22.53
HSDPA	1	22.65	22.71	22.68	22.08	22.03	22.06
	2	22.15	21.07	22.21	21.79	21.83	21.77
	3	21.92	21.87	21.91	21.58	21.61	21.65
	4	21.57	21.62	21.75	21.28	20.25	20.21
HSUPA	1	22.59	22.43	22.57	21.91	21.89	21.87
	2	22.19	22.21	22.04	21.74	21.69	21.67
	3	21.81	21.75	21.88	21.65	21.57	21.61
	4	21.66	21.63	21.69	21.54	21.48	21.52
	5	21.47	21.31	21.32	21.15	21.18	21.21

Note:

1. WCDMA SAR was tested under PMC 12.2kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25dB higher than the RMC level and SAR was less than 1.2W/kg.
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.

9.2 LTE Conducted peak output Power

LTE Test Configurations

The CMW500 Wide Band Radio Communication Tester was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR test were performed with the same number of RB and RB offsets transmitting on all frames.

1)Spectrum Plots for RB configurations

A properly configured base station simulator was used for LTE output power measurements and SAR testing. Therefore, spectrum plots for RB configurations were not required to be included in this report.

2)MPR

When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed by 3GPP for the channel bandwidth and modulation combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR.

The allowed Maximum Power Reduction(MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101:

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

3)A-MPR LTE procedures for SAR testing

A-MPR(Additional MPR) has been disabled for all SAR tests by using Network Signaling Value of "NS_01" on the base station simulator.

4)LTE procedures for SAR testing

A) Largest channel bandwidth standalone SAR test

requirements i) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is $\leq 0.8\text{W/kg}$, testing of the remaining RB offset configurations and required test channels is not required for 1RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is $> 1.45\text{ W/kg}$, SAR is required for all three RB offset configurations for that required test channel.



1. LTE Band 2 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				18700	18900	19100
Frequency(MHz)				1860	1880	1900
20	QPSK	1	0	23.42	23.45	23.49
20		1	49	23.41	23.37	23.42
20		1	99	23.35	23.38	23.35
20		50	0	22.64	22.60	22.62
20		50	24	22.56	22.58	22.60
20		50	49	22.51	22.53	22.47
20		100	0	22.45	22.44	22.50
20	16QAM	1	0	22.12	22.15	22.14
20		1	49	22.07	22.12	22.13
20		1	99	22.12	22.14	22.09
20		50	0	21.65	21.78	21.74
20		50	24	21.51	21.59	21.65
20		50	49	21.55	21.52	21.54
20		100	0	21.51	21.52	21.52
Channel				18675	18900	19125
Frequency(MHz)				1857.5	1880	1902.5
15	QPSK	1	0	23.35	23.31	23.34
15		1	37	23.31	23.30	23.31
15		1	74	23.30	23.33	23.32
15		36	0	22.62	22.65	22.63
15		36	18	22.58	22.63	22.59
15		36	37	22.53	22.57	22.61
15		75	0	22.56	22.59	22.63
15	16QAM	1	0	22.09	22.05	22.04
15		1	37	22.13	22.10	22.09
15		1	74	22.05	22.07	22.11
15		36	0	21.63	21.71	21.62
15		36	18	21.65	21.62	21.59
15		36	37	21.61	21.64	21.71
15		75	0	21.57	21.52	21.58



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				18650	18900	19150
Frequency(MHz)				1855	1880	1905
10	QPSK	1	0	23.31	23.34	23.30
10		1	24	23.25	23.29	23.31
10		1	49	23.30	23.27	23.28
10		25	0	22.71	22.61	22.63
10		25	12	22.62	22.68	22.65
10		25	24	22.69	22.60	22.64
10		50	0	22.51	22.55	22.56
10	16QAM	1	0	22.07	22.11	22.10
10		1	24	22.06	22.09	22.11
10		1	49	22.05	22.12	22.08
10		25	0	21.72	21.75	21.74
10		25	12	21.65	21.68	21.72
10		25	24	21.59	21.56	21.62
10		50	0	21.51	21.52	21.52
Channel				18625	18900	19175
Frequency(MHz)				1852.5	1880	1907.5
5	QPSK	1	0	23.38	23.41	23.42
5		1	12	23.37	23.37	23.35
5		1	24	23.34	23.35	23.30
5		12	0	22.71	22.69	22.62
5		12	6	22.62	22.64	22.59
5		12	11	22.61	22.58	22.57
5		25	0	22.54	22.51	22.52
5	16QAM	1	0	22.15	22.12	22.14
5		1	12	22.12	22.11	22.08
5		1	24	22.05	22.10	22.09
5		12	0	21.66	21.64	21.61
5		12	6	21.57	21.55	21.53
5		12	11	21.54	21.51	21.55
5		25	0	21.50	21.55	21.47



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				18615	18900	19185
Frequency(MHz)				1851.5	1880	1908.5
3	QPSK	1	0	23.33	23.29	23.27
3		1	7	23.27	23.31	23.25
3		1	14	23.30	23.27	23.32
3		8	0	22.75	22.72	22.70
3		8	4	22.68	22.71	22.73
3		8	7	22.64	22.68	22.65
3		15	0	22.71	22.69	22.63
3	16QAM	1	0	22.16	22.14	22.12
3		1	7	22.12	22.07	22.10
3		1	14	22.04	22.08	22.11
3		8	0	21.52	21.51	21.55
3		8	4	21.55	21.57	21.52
3		8	7	21.44	21.39	21.44
3		15	0	21.47	21.42	21.40
Channel				18607	18900	19193
Frequency(MHz)				1850.7	1732.5	1909.3
1.4	QPSK	1	0	23.20	23.28	23.27
1.4		1	2	23.23	23.22	23.26
1.4		1	5	23.21	23.26	23.19
1.4		3	0	22.70	22.69	22.72
1.4		3	1	22.74	22.68	22.73
1.4		3	2	22.64	22.57	22.61
1.4		6	0	22.58	22.56	22.53
1.4	16QAM	1	0	22.03	22.07	22.05
1.4		1	2	22.05	22.10	22.04
1.4		1	5	22.07	22.12	22.04
1.4		3	0	21.55	21.51	21.47
1.4		3	1	21.54	21.48	21.55
1.4		3	2	21.50	21.47	21.43
1.4		6	0	21.48	21.41	21.44



2. LTE Band 4 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20050	20175	20300
Frequency(MHz)				1720	1732.5	1745
20	QPSK	1	0	22.21	22.26	22.25
20		1	49	22.19	22.15	22.19
20		1	99	22.18	22.17	22.15
20		50	0	21.52	21.54	21.57
20		50	24	21.61	21.55	21.61
20		50	49	21.58	21.62	21.55
20		100	0	21.61	21.56	21.57
20	16QAM	1	0	21.32	21.28	21.24
20		1	49	21.20	21.25	21.23
20		1	99	21.14	21.15	21.17
20		50	0	20.57	20.49	20.52
20		50	24	20.49	20.47	20.50
20		50	49	20.51	20.55	20.46
20		100	0	20.54	20.55	20.41
Channel				20025	20175	20325
Frequency(MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	22.20	22.16	22.18
15		1	37	22.16	22.11	22.12
15		1	74	22.10	22.17	22.13
15		36	0	21.65	21.57	21.59
15		36	18	21.58	21.56	21.57
15		36	37	21.56	21.50	21.54
15		75	0	21.58	21.56	21.62
15	16QAM	1	0	21.27	21.19	21.23
15		1	37	21.24	21.25	21.21
15		1	74	21.19	21.15	21.18
15		36	0	20.56	20.53	20.58
15		36	18	20.59	20.63	20.60
15		36	37	20.41	20.51	20.43
15		75	0	20.52	20.54	20.51



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20000	20175	20350
Frequency(MHz)				1715	1732.5	1750
10	QPSK	1	0	22.12	22.19	22.15
10		1	24	22.15	22.14	22.11
10		1	49	22.12	22.09	22.05
10		25	0	21.64	21.66	21.68
10		25	12	21.62	21.65	21.67
10		25	24	21.57	21.60	21.55
10		50	0	21.55	21.62	21.58
10	16QAM	1	0	21.23	21.17	21.24
10		1	24	21.21	21.22	21.15
10		1	49	21.18	21.14	21.16
10		25	0	20.65	20.63	20.70
10		25	12	20.58	20.60	20.62
10		25	24	20.62	20.68	20.64
10		50	0	20.59	20.64	20.53
Channel				19975	20175	20375
Frequency(MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	22.24	22.21	22.17
5		1	12	22.15	22.22	22.13
5		1	24	22.11	22.13	22.15
5		12	0	21.62	21.57	21.62
5		12	6	21.57	21.60	21.58
5		12	11	21.55	21.53	21.67
5		25	0	21.63	21.58	21.59
5	16QAM	1	0	21.17	21.26	21.10
5		1	12	21.21	21.17	21.12
5		1	24	21.19	21.21	21.15
5		12	0	20.65	20.71	20.68
5		12	6	20.56	20.62	20.65
5		12	11	20.65	20.64	20.62
5		25	0	20.53	20.58	20.50



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				19965	20175	20385
Frequency(MHz)				1711.5	1732.5	1753.5
3	QPSK	1	0	22.16	22.14	22.18
3		1	7	22.11	22.10	22.13
3		1	14	22.09	22.15	22.17
3		8	0	21.67	21.61	21.56
3		8	4	21.60	21.55	21.58
3		8	7	21.58	21.62	21.65
3		15	0	21.55	21.59	21.61
3	16QAM	1	0	21.21	21.12	21.15
3		1	7	21.17	21.15	21.13
3		1	14	21.12	21.10	21.06
3		8	0	20.63	20.65	20.72
3		8	4	20.54	20.58	20.55
3		8	7	20.63	20.68	20.65
3		15	0	20.62	20.66	20.58
Channel				19957	20175	20393
Frequency(MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	22.21	22.11	22.17
1.4		1	2	22.11	22.15	22.09
1.4		1	5	22.15	22.09	22.13
1.4		3	0	21.61	21.58	21.55
1.4		3	1	21.57	21.63	21.58
1.4		3	2	21.56	21.57	21.61
1.4		6	0	21.55	21.56	21.59
1.4	16QAM	1	0	21.22	21.17	21.19
1.4		1	2	21.13	21.14	21.21
1.4		1	5	21.21	21.12	21.14
1.4		3	0	20.65	20.71	20.67
1.4		3	1	20.59	20.63	20.67
1.4		3	2	20.60	20.58	20.57
1.4		6	0	20.69	20.62	20.63



3. LTE Band 5 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20450	20525	20600
Frequency(MHz)				829	836.5	844
10	QPSK	1	0	23.62	23.69	23.65
10		1	24	23.65	23.62	23.63
10		1	49	23.62	23.61	23.60
10		25	0	22.81	22.89	22.84
10		25	12	22.82	22.86	22.80
10		25	24	22.87	22.80	22.85
10		50	0	22.85	22.82	22.78
10	16QAM	1	0	22.53	22.45	22.54
10		1	24	22.41	22.42	22.45
10		1	49	22.48	22.49	22.46
10		25	0	21.85	21.93	21.90
10		25	12	21.88	21.80	21.82
10		25	24	21.82	21.88	21.84
10		50	0	21.80	21.84	21.83
Channel				20425	20525	20625
Frequency(MHz)				826.5	836.5	846.5
5	QPSK	1	0	23.58	23.66	23.60
5		1	12	23.65	23.62	23.61
5		1	24	23.65	23.59	23.50
5		12	0	22.84	22.86	22.82
5		12	6	22.85	22.83	22.81
5		12	11	22.84	22.78	22.85
5		25	0	22.81	22.79	22.77
5	16QAM	1	0	22.59	22.51	22.52
5		1	12	22.52	22.49	22.50
5		1	24	22.53	22.47	22.48
5		12	0	21.85	21.83	21.74
5		12	6	21.88	21.80	21.72
5		12	11	21.81	21.78	21.71
5		25	0	21.77	21.74	21.79



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20415	20525	20635
Frequency(MHz)				825.5	836.5	847.5
3	QPSK	1	0	23.62	23.65	23.63
3		1	7	23.64	23.62	23.61
3		1	14	23.56	23.54	23.57
3		8	0	22.87	22.91	22.86
3		8	4	22.80	22.85	22.88
3		8	7	22.78	22.82	22.85
3		15	0	22.77	22.84	22.81
3	16QAM	1	0	22.51	22.52	22.55
3		1	7	22.47	22.48	22.53
3		1	14	22.42	22.50	22.46
3		8	0	21.83	21.85	21.80
3		8	4	21.74	21.78	21.79
3		8	7	21.73	21.76	21.75
3		15	0	21.72	21.76	21.78
Channel				20407	20525	20643
Frequency(MHz)				824.7	836.5	848.3
1.4	QPSK	1	0	23.61	23.63	23.58
1.4		1	2	23.56	23.57	23.61
1.4		1	5	23.59	23.56	23.53
1.4		3	0	22.81	22.88	22.82
1.4		3	1	22.77	22.83	22.78
1.4		3	2	22.76	22.77	22.81
1.4		6	0	22.77	22.80	22.83
1.4	16QAM	1	0	22.52	22.57	22.59
1.4		1	2	22.53	22.54	22.51
1.4		1	5	22.54	22.52	22.46
1.4		3	0	21.85	21.84	21.85
1.4		3	1	21.79	21.73	21.75
1.4		3	2	21.80	21.78	21.77
1.4		6	0	21.78	21.72	21.73



4. LTE Band 7 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20850	21100	21350
Frequency(MHz)				2510	2535	2560
20	QPSK	1	0	22.42	22.46	22.44
20		1	49	22.38	22.37	22.43
20		1	99	22.31	22.42	22.35
20		50	0	21.72	21.74	21.77
20		50	24	21.77	21.75	21.71
20		50	49	21.68	21.69	21.65
20		100	0	21.65	21.60	21.63
20	16QAM	1	0	21.40	21.41	21.35
20		1	49	21.34	21.32	21.33
20		1	99	21.28	21.27	21.31
20		50	0	20.77	20.75	20.72
20		50	24	20.69	20.67	20.70
20		50	49	20.64	20.61	20.66
20		100	0	20.70	20.65	20.71
Channel				20825	21100	21375
Frequency(MHz)				2507.5	2535	2562.5
15	QPSK	1	0	22.40	22.42	22.41
15		1	37	22.37	22.35	22.38
15		1	74	22.36	22.38	22.37
15		36	0	21.75	21.73	21.76
15		36	18	21.72	21.71	21.72
15		36	37	21.65	21.67	21.66
15		75	0	21.64	21.63	21.65
15	16QAM	1	0	21.22	21.25	21.19
15		1	37	21.24	21.22	21.15
15		1	74	21.17	21.15	21.14
15		36	0	20.75	20.74	20.79
15		36	18	20.69	20.68	20.72
15		36	37	20.65	20.66	20.64
15		75	0	20.71	20.65	20.67



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20800	21100	21400
Frequency(MHz)				2505	2535	2565
10	QPSK	1	0	22.27	22.32	22.28
10		1	24	22.31	22.27	22.23
10		1	49	22.30	22.23	22.21
10		25	0	21.74	21.70	21.75
10		25	12	21.72	21.74	21.72
10		25	24	21.65	21.67	21.68
10		50	0	21.63	21.62	21.65
10	16QAM	1	0	21.13	21.20	21.15
10		1	24	21.20	21.12	21.21
10		1	49	21.15	21.10	21.15
10		25	0	20.70	20.64	20.63
10		25	12	20.61	20.65	20.64
10		25	24	20.55	20.50	20.55
10		50	0	20.50	20.55	20.53
Channel				20775	21100	21425
Frequency(MHz)				2502.5	2535	2567.5
5	QPSK	1	0	22.28	22.29	22.25
5		1	12	22.26	22.27	22.21
5		1	24	22.24	22.16	22.19
5		12	0	21.75	21.75	21.72
5		12	6	21.74	21.75	21.70
5		12	11	21.63	21.65	21.60
5		25	0	21.62	21.60	21.62
5	16QAM	1	0	21.20	21.24	21.23
5		1	12	21.25	21.22	21.20
5		1	24	21.19	21.14	21.18
5		12	0	20.74	20.70	20.72
5		12	6	20.65	20.61	20.70
5		12	11	20.65	20.66	20.60
5		25	0	20.59	20.60	20.67

WLAN 2.4GHz Band Conducted Power

Channel/Freq.(MHz)	Out Power (dBm) for Data Rates (Mbps)		
	802.11b	802.11g	802.11n(HT20)
1(2412)	15.69	15.23	14.22
6(2437)	15.82	15.58	14.78
11(2462)	15.84	15.69	14.98

Bluetooth Output Power

Channel	Frequency (MHz)	BT3.0 Output Power(dBm)		
		GFSK	$\pi/4$ -DQPSK	8-DPSK
CH 0	2402	2.81	2.03	2.19
CH 39	2441	3.57	2.72	2.76
CH 78	2480	4.15	3.37	3.29
Channel	Frequency (MHz)	BT4.0 Output Power(dBm)		
		GFSK		
CH 0	2402	-3.78		
CH 20	2442	-3.49		
CH 39	2480	-2.88		

**SAR test Exclusion and estimate SAR calculation:****Note:**

1. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances $\leq 50\text{mm}$ are determined by: $[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f} \text{ (GHz)}] \leq 3.0$ 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 distance(antenna-user) is $< 5\text{mm}$, 5mm is used for excluded SAR calculation
 - (5)

BT3.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
4.5	2.82	5	2.45	0.88

Per KDB 447498 D01v06 exclusion thresholds is $0.88 < 3$, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5= $0.88/7.5=0.12\text{W/Kg}$

BT3.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
4.5	2.82	10	2.45	0.44

Per KDB 447498 D01v06 exclusion thresholds is $0.623 < 3$, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5= $0.44/7.5=0.06\text{W/Kg}$

BT4.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
-2.0	0.63	5	2.45	0.20

Per KDB 447498 D01v06 exclusion thresholds is $0.20 < 3$, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5= $0.20/7.5=0.03\text{W/Kg}$

BT4.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
-2.0	0.63	10	2.45	0.10

Per KDB 447498 D01v06 exclusion thresholds is $0.124 < 3$, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5= $0.10/7.5=0.01\text{W/Kg}$

The estimated SAR value is used for simultaneous transmission analysis.

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
2. Per KDB447498 D01v06, 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 $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel must be used.
3. Per KDB941225 D06 v02r01, 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 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/Kg; if the deviation among the repeated measurement is $\leq 20\%$, and the measured SAR < 1.45 W/Kg, only one repeated measurement is required.
5. Per KDB865664 D02 v01r02, 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 D01 v03r01, 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 D01 v03r01, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ 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 KDB248227 D01 v02r02, 802.11g /11n-HT20/11n-HT40 is not required. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/Kg. Thus the SAR can be excluded.



9.3. Scaling Factor calculation

Operation Mode	Channel	Output Power(dBm)	Tune up Power in tolerance(dBm)	Scaling Factor
GSM 850	128	33.78	33.0 ± 1.0	1.052
	190	33.71	33.0 ± 1.0	1.069
	251	33.56	33.0 ± 1.0	1.107
GPRS 850(4Tx)	128	28.73	28.0 ± 1.0	1.064
	190	28.71	28.0 ± 1.0	1.069
	251	28.68	28.0 ± 1.0	1.076
GSM1900	512	30.18	30.0 ± 1.0	1.208
	661	30.22	30.0 ± 1.0	1.197
	810	30.25	30.0 ± 1.0	1.189
GPRS1900(4Tx)	512	26.61	26.0 ± 1.0	1.094
	661	26.65	26.0 ± 1.0	1.084
	810	26.62	26.0 ± 1.0	1.091
WCDMA850	4132	23.34	23.0 ± 1.0	1.164
	4183	23.31	23.0 ± 1.0	1.172
	4233	23.42	23.0 ± 1.0	1.143
WCDMA1900	9262	22.45	22.0 ± 1.0	1.135
	9400	22.49	22.0 ± 1.0	1.125
	9538	22.53	22.0 ± 1.0	1.114
LTE B2 20MHz 1RB#0	18700	23.42	23.0 ± 1.0	1.143
	18900	23.45	23.0 ± 1.0	1.135
	19100	23.49	23.0 ± 1.0	1.125
LTE B2 20MHz 50RB#0	18700	22.64	22.0 ± 1.0	1.086
	18900	22.60	22.0 ± 1.0	1.096
	19100	22.62	22.0 ± 1.0	1.091
LTE B4 20MHz 1RB#0	20050	22.21	22.0 ± 1.0	1.199
	20175	22.26	22.0 ± 1.0	1.186
	20300	22.25	22.0 ± 1.0	1.189
LTE B4 20MHz 50RB#24	20050	21.61	21.0 ± 1.0	1.094
	20175	21.55	21.0 ± 1.0	1.109
	20300	21.61	21.0 ± 1.0	1.094
LTE B5 10MHz 1RB#0	20450	23.62	23.0 ± 1.0	1.091
	20525	23.69	23.0 ± 1.0	1.074
	20600	23.65	23.0 ± 1.0	1.084
LTE B5 10MHz 25RB#0	20450	22.81	22.0 ± 1.0	1.045
	20525	22.89	22.0 ± 1.0	1.026
	20600	22.84	22.0 ± 1.0	1.038
LTE B7 20MHz 1RB#0	20850	22.42	22.0 ± 1.0	1.143
	21100	22.46	22.0 ± 1.0	1.132
	21350	22.44	22.0 ± 1.0	1.138



LTE B7 20MHz 50RB#0	20850	21.72	21.0 ± 1.0	1.067
	21100	21.74	21.0 ± 1.0	1.062
	21350	21.77	21.0 ± 1.0	1.054
WIFI 802.11b	1	15.69	15.5 ± 1.0	1.205
	6	15.82	15.5 ± 1.0	1.169
	11	15.84	15.5 ± 1.0	1.164
BT	39	4.15	3.5 ± 1.0	1.084

Note: for LTE power tolerance, only QPSK modulation mode was provide here.

10 TEST RESULTS

10.1 Summary of SAR Measurement Results

Table 7: SAR Values of GSM 850MHz Band

Temperature: 23.0~23.5°C, humidity: 62~64%.							
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.	
			SAR (W/Kg), 1g	Scaled Factor	Scaled SAR(W/Kg) ,1g		
Right Side of Head	Cheek	190/836.6	0.507	1.069	0.542	1	
	Tilt 15 degrees	190/836.6	0.380	1.069	0.406	--	
Left Side of Head	Cheek	190/836.6	0.243	1.069	0.260	--	
	Tilt 15 degrees	190/836.6	0.082	1.069	0.088	--	
Body-worn (10mm Separation)	GSM	Face Upward	190/836.6	0.147	1.069	0.157	--
		Back Upward	190/836.6	0.280	1.069	0.299	2
Hotspot (10mm Separation)	GPRS (4Tx)	Face Upward	190/836.6	0.332	1.069	0.355	--
		Back Upward	190/836.6	0.671	1.069	0.717	3
		Edge B	190/836.6	0.344	1.069	0.368	--
		Edge C	190/836.6	0.283	1.069	0.303	--
		Edge D	190/836.6	0.190	1.069	0.203	--

Table 8: SAR Values of GSM1900 MHz Band

Temperature: 23.0~23.5°C, humidity: 62~64%.							
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.	
			SAR (W/Kg), 1g	Scaled Factor	Scaled SAR(W/Kg) ,1g		
Right Side of Head	Cheek	661/1880.0	0.117	1.197	0.140	--	
	Tilt 15 degrees	661/1880.0	0.088	1.197	0.105	--	
Left Side of Head	Cheek	661/1880.0	0.285	1.197	0.341	4	
	Tilt 15 degrees	661/1880.0	0.246	1.197	0.294	--	
Body-worn (10mm Separation)	GSM	Face Upward	661/1880.0	0.127	1.197	0.152	--
		Back Upward	661/1880.0	0.321	1.197	0.384	5
Hotspot (10mm Separation)	GPRS (4Tx)	Face Upward	661/1880.0	0.165	1.084	0.179	--
		Back Upward	661/1880.0	0.566	1.084	0.614	--
		Edge B	661/1880.0	0.117	1.084	0.127	--
		Edge C	661/1880.0	0.612	1.084	0.663	6
		Edge D	661/1880.0	0.109	1.084	0.118	--

Table 9: SAR Values of WCDMA850

Temperature: 23.0~23.5°C, humidity: 62~64%.						
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.
			SAR (W/Kg), 1g	Scaled Factor	Scaled SAR(W/Kg),1g	
Right Side of Head	Cheek	4183/836.6	0.212	1.172	0.248	7
	Tilt 15 degrees	4183/836.6	0.164	1.172	0.192	--
Left Side of Head	Cheek	4183/836.6	0.193	1.172	0.226	--
	Tilt 15 degrees	4183/836.6	0.130	1.172	0.152	--
Body-worn (10mm Separation)	Face Upward	4183/836.6	0.122	1.172	0.143	--
	Back Upward	4183/836.6	0.448	1.172	0.525	8
Hotspot (10mm Separation)	Face Upward	4183/836.6	0.122	1.172	0.143	--
	Back Upward	4183/836.6	0.448	1.172	0.525	8
	Edge B	4183/836.6	0.207	1.172	0.243	--
	Edge C	4183/836.6	0.152	1.172	0.178	--
	Edge D	4183/836.6	0.104	1.172	0.122	--

Table 10: SAR Values of WCDMA1900

Temperature: 23.0~23.5°C, humidity: 62~64%.						
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.
			SAR (W/Kg), 1g	Scaled Factor	Scaled SAR(W/Kg),1g	
Right Side of Head	Cheek	9400/1880	0.270	1.125	0.304	9
	Tilt 15 degrees	9400/1880	0.102	1.125	0.115	--
Left Side of Head	Cheek	9400/1880	0.113	1.125	0.127	--
	Tilt 15 degrees	9400/1880	0.081	1.125	0.091	--
Body-worn (10mm Separation)	Face Upward	9400/1880	0.335	1.125	0.377	--
	Back Upward	9262/1852.4	0.826	1.135	0.938	--
	Back Upward	9400/1880	0.817	1.125	0.919	--
	Back Upward	9538/1907.6	0.820	1.114	0.913	--
	Back Upward	9262/1852.4	0.832	1.135	0.944	10
Hotspot (10mm Separation)	Face Upward	9400/1880	0.335	1.125	0.377	--
	Back Upward	9262/1852.4	0.826	1.135	0.938	--
	Back Upward	9400/1880	0.817	1.125	0.919	--
	Back Upward	9538/1907.6	0.820	1.114	0.913	--
	Back Upward	9262/1852.4	0.832	1.135	0.944	10
	Edge B	9400/1880	0.043	1.125	0.048	--
	Edge C	9400/1880	0.736	1.125	0.828	--
Edge D	9400/1880	0.230	1.125	0.259	--	



Table 11: SAR Values of LTE Band 2, 20MHz, QPSK

Temperature: 23.0~23.5°C, humidity: 62~64%.						
Test Positions	Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.	
		SAR (W/Kg),1g	Scaled Factor	Scaled SAR(W/Kg),1g		
1RB #0						
Right Side of Head	Cheek	18900/1880	0.202	1.135	0.229	11
	Tilt 15 degrees	18900/1880	0.067	1.135	0.076	--
Left Side of Head	Cheek	18900/1880	0.105	1.135	0.119	--
	Tilt 15 degrees	18900/1880	0.062	1.135	0.070	--
Body (10mm Separation) Body-worn	Face Upward	18900/1880	0.381	1.135	0.432	--
	Back Upward	18700/1860	0.842	1.143	0.962	--
	Back Upward	18900/1880	0.877	1.135	0.995	12
	Back Upward	19100/1900	0.858	1.124	0.964	--
	Back Upward	18900/1880	0.873	1.135	0.991	--
Body (10mm Separation) Hotspot	Face Upward	19100/1900	0.381	1.135	0.432	--
	Back Upward	18700/1860	0.842	1.143	0.962	--
	Back Upward	18900/1880	0.877	1.135	0.995	12
	Back Upward	19100/1900	0.858	1.124	0.964	--
	Back Upward	18900/1880	0.873	1.135	0.991	--
	Edge B	19100/1900	0.051	1.135	0.058	--
	Edge C	19100/1900	0.692	1.135	0.785	--
	Edge D	19100/1900	0.220	1.135	0.250	--
50%RB #0						
Right Side of Head	Cheek	18700/1860	0.132	1.096	0.145	--
	Tilt 15 degrees	18700/1860	0.041	1.096	0.045	--
Left Side of Head	Cheek	18700/1860	0.085	1.096	0.093	--
	Tilt 15 degrees	18700/1860	0.028	1.096	0.031	--
Body (10mm Separation) Body-worn	Face Upward	18700/1860	0.203	1.096	0.222	--
	Back Upward	18700/1860	0.614	1.096	0.673	--
Body (10mm Separation) Hotspot	Face Upward	18700/1860	0.203	1.096	0.222	--
	Back Upward	18700/1860	0.614	1.096	0.673	--
	Edge B	18700/1860	0.033	1.096	0.036	--
	Edge C	18700/1860	0.523	1.096	0.573	--
	Edge D	18700/1860	0.135	1.096	0.148	--



Table 12: SAR Values of LTE Band 4, 20MHz, QPSK

Temperature: 23.0~23.5°C, humidity: 62~64%.						
Test Positions	Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.	
		SAR (W/Kg), 1g	Scaled Factor	Scaled SAR(W/Kg), 1g		
1RB #0						
Right Side of Head	Cheek	20175/1732.5	0.118	1.186	0.140	--
	Tilt 15 degrees	20175/1732.5	0.063	1.186	0.075	--
Left Side of Head	Cheek	20175/1732.5	0.150	1.186	0.178	13
	Tilt 15 degrees	20175/1732.5	0.089	1.186	0.106	--
Body (10mm Separation) Body-worn	Face Upward	20175/1732.5	0.677	1.186	0.803	--
	Back Upward	20175/1732.5	0.742	1.186	0.880	14
Body (10mm Separation) Hotspot	Face Upward	20175/1732.5	0.677	1.186	0.803	--
	Back Upward	20175/1732.5	0.742	1.186	0.880	14
	Edge B	20175/1732.5	0.115	1.186	0.136	--
	Edge C	20175/1732.5	0.380	1.186	0.451	--
	Edge D	20175/1732.5	0.087	1.186	0.103	--
50%RB #24						
Right Side of Head	Cheek	20175/1732.5	0.094	1.109	0.104	--
	Tilt 15 degrees	20175/1732.5	0.041	1.109	0.045	--
Left Side of Head	Cheek	20175/1732.5	0.111	1.109	0.123	--
	Tilt 15 degrees	20175/1732.5	0.046	1.109	0.051	--
Body (10mm Separation) Body-worn	Face Upward	20175/1732.5	0.493	1.109	0.547	--
	Back Upward	20175/1732.5	0.588	1.109	0.652	--
Body (10mm Separation) Hotspot	Face Upward	20175/1732.5	0.493	1.109	0.547	--
	Back Upward	20175/1732.5	0.588	1.109	0.652	--
	Edge B	20175/1732.5	0.080	1.109	0.089	--
	Edge C	20175/1732.5	0.223	1.109	0.247	--
	Edge D	20175/1732.5	0.071	1.109	0.079	--



Table 13: SAR Values of LTE Band 5 , 10MHz, QPSK

Temperature: 23.0~23.5°C, humidity: 62~64%.						
Test Positions	Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.	
		SAR (W/Kg),1g	Scaled Factor	Scaled SAR(W/Kg), 1g		
1RB #0						
Right Side of Head	Cheek	20525/836.5	0.147	1.074	0.158	--
	Tilt 15 degrees	20525/836.5	0.133	1.074	0.143	--
Left Side of Head	Cheek	20525/836.5	0.153	1.074	0.164	15
	Tilt 15 degrees	20525/836.5	0.138	1.074	0.148	--
Body (10mm Separation) Body-worn	Face Upward	20525/836.5	0.186	1.074	0.200	--
	Back Upward	20525/836.5	0.295	1.074	0.317	16
Body (10mm Separation) Hotspot	Face Upward	20525/836.5	0.186	1.074	0.200	--
	Back Upward	20525/836.5	0.295	1.074	0.317	16
	Edge B	20525/836.5	0.166	1.074	0.178	--
	Edge C	20525/836.5	0.045	1.074	0.048	--
	Edge D	20525/836.5	0.113	1.074	0.121	--
50%RB #0						
Right Side of Head	Cheek	20525/836.5	0.140	1.026	0.144	--
	Tilt 15 degrees	20525/836.5	0.125	1.026	0.128	--
Left Side of Head	Cheek	20525/836.5	0.145	1.026	0.149	--
	Tilt 15 degrees	20525/836.5	0.133	1.026	0.136	--
Body (10mm Separation) Body-worn	Face Upward	20525/836.5	0.168	1.026	0.172	--
	Back Upward	20525/836.5	0.282	1.026	0.289	--
Body (10mm Separation) Hotspot	Face Upward	20525/836.5	0.168	1.026	0.172	--
	Back Upward	20525/836.5	0.282	1.026	0.289	--
	Edge B	20525/836.5	0.160	1.026	0.164	--
	Edge C	20525/836.5	0.038	1.026	0.039	--
	Edge D	20525/836.5	0.102	1.026	0.105	--



Table 14: SAR Values of LTE Band 7,20MHz, QPSK

Temperature: 23.0~23.5°C, humidity: 62~64%.						
Test Positions	Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.	
		SAR (W/Kg),1g	Scaled Factor	Scaled SAR(W/Kg),1g		
1RB #0						
Right Side of Head	Cheek	21100/2535	0.217	1.132	0.246	--
	Tilt 15 degrees	21100/2535	0.110	1.132	0.125	--
Left Side of Head	Cheek	21100/2535	0.268	1.132	0.303	17
	Tilt 15 degrees	21100/2535	0.115	1.132	0.130	--
Body (10mm Separation) Body-worn	Face Upward	21100/2535	0.446	1.132	0.505	--
	Back Upward	21350/2550	0.500	1.132	0.566	18
Body (10mm Separation) Hotspot	Face Upward	21100/2535	0.446	1.132	0.505	--
	Back Upward	21100/2535	0.500	1.132	0.566	18
	Edge B	21100/2535	0.066	1.132	0.075	--
	Edge C	21100/2535	0.186	1.132	0.211	--
	Edge D	21100/2535	0.054	1.132	0.061	--
50%RB #0						
Right Side of Head	Cheek	21100/2535	0.182	1.062	0.193	--
	Tilt 15 degrees	21100/2535	0.091	1.062	0.097	--
Left Side of Head	Cheek	21100/2535	0.212	1.062	0.225	--
	Tilt 15 degrees	21100/2535	0.097	1.062	0.103	--
Body (10mm Separation) Body-worn	Face Upward	21100/2535	0.397	1.062	0.422	--
	Back Upward	21350/2550	0.433	1.062	0.460	--
Body (10mm Separation) Hotspot	Face Upward	21100/2535	0.397	1.062	0.422	--
	Back Upward	21100/2535	0.433	1.062	0.460	--
	Edge B	21100/2535	0.054	1.062	0.057	--
	Edge C	21100/2535	0.157	1.062	0.167	--
	Edge D	21100/2535	0.045	1.062	0.048	--

Table 15: SAR Values of Wi-Fi 802.11b

Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)			Plot No.
			SAR(W/Kg) 1g	Scaled Factor	Scaled SAR(W/Kg) ,1g	
Right Side of Head	Cheek	6/2437	0.315	1.169	0.368	--
	Tilt 15 degrees	6/2437	0.376	1.169	0.440	19
Left Side of Head	Cheek	6/2437	0.179	1.169	0.209	--
	Tilt 15 degrees	6/2437	0.199	1.169	0.233	--
Body-worn (10mm Separation)	Face Upward	6/2437	0.072	1.169	0.084	--
	Back Upward	6/2437	0.146	1.169	0.171	20
Hotspot (10mm Separation)	Face Upward	6/2437	0.072	1.169	0.084	--
	Back Upward	6/2437	0.146	1.169	0.171	20
	Edge A	6/2437	0.104	1.169	0.122	--
	Edge D	6/2437	0.074	1.169	0.087	--

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 v06)

- ≤ 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



10.2 Simultaneous Transmissions Analysis

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 6 of this report. Maximum localized SAR is **below** exposure limits specified in the relevant standards.

Simultaneous SAR

No.	Transmitter Combinations	Scenario Supported or not	Supported for Mobile Hotspot or not
1	GSM+ BT	Yes	No
2	GSM + WIFI	Yes	Yes
3	WCDMA +BT	Yes	No
4	WCDMA +WIFI	Yes	Yes
5	LTE+BT	Yes	No
6	LTE+WIFI	Yes	Yes
7	WIFI+BT	No	No



Test Position		Right Cheek	Right Title	Left Cheek	Left Tilt
Head MAX 1-g SAR(W/Kg)	GSM850	0.542	0.406	0.260	0.088
	GSM1900	0.140	0.105	0.341	0.294
	WCDMA850	0.248	0.192	0.226	0.152
	WCDMA1900	0.304	0.115	0.127	0.091
	LTE Band2	0.229	0.076	0.119	0.070
	LTE Band4	0.140	0.075	0.178	0.106
	LTE Band5	0.158	0.143	0.164	0.148
	LTE Band7	0.246	0.125	0.303	0.130
	WIFI 802.11b	0.368	0.440	0.209	0.233
	BT	*0.12	*0.12	*0.12	*0.12
WIFI Simultaneous Σ 1-g SAR(W/Kg)		0.910	0.846	0.550	0.527
BT Simultaneous Σ 1-g SAR(W/Kg)		0.662	0.526	0.461	0.414

Simultaneous Tx Combination of GSM/WCDMA/LTE 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)	GSM850	0.157	0.299	--	--	--	--
	GSM1900	0.152	0.384	--	--	--	--
	WCDMA850	0.143	0.525	--	--	--	--
	WCDMA1900	0.377	0.944	--	--	--	--
	LTE Band2	0.432	0.995	--	--	--	--
	LTE Band4	0.803	0.880	--	--	--	--
	LTE Band5	0.200	0.317	--	--	--	--
	LTE Band7	0.505	0.566	--	--	--	--
	WIFI 802.11b	0.084	0.171	--	--	--	--
	BT	*0.06	*0.06	--	--	--	--
WIFI Simultaneous Σ 1-g SAR(W/Kg)		0.887	1.166	--	--	--	--
BT Simultaneous Σ 1-g SAR(W/Kg)		0.863	1.055	--	--	--	--

Simultaneous Tx Combination of GSM/WCDMA/LTE 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	0.355	0.717	--	0.368	0.303	0.203
	GPRS1900	0.179	0.614	--	0.127	0.663	0.118
	WCDMA 850	0.143	0.525	--	0.243	0.178	0.122
	WCDMA 1900	0.377	0.944	--	0.048	0.828	0.259
	LTE Band2	0.432	0.995	--	0.058	0.785	0.250
	LTE Band4	0.803	0.880	--	0.136	0.451	0.103
	LTE Band5	0.200	0.317	--	0.178	0.048	0.121
	LTE Band7	0.505	0.566	--	0.075	0.211	0.061
	WIFI 802.11b	0.084	0.171	0.122	0.087	--	--
	BT	*0.06	*0.06	*0.06	*0.06	--	--
WIFI Simultaneous Σ 1-g SAR(W/Kg)		0.887	1.166	--	0.455	--	--
BT Simultaneous Σ 1-g SAR(W/Kg)		0.863	1.055	--	0.428	--	--

Simultaneous Tx Combination of GSM/WCDMA/LTE 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 (%) $u_i(\%)$	Degree of freedom ν_{eff} or ν_i
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 (%) $u_i(\%)$	Degree of freedom v_{eff} or v_i
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 numerical 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**

EQUIPMENT	TYPE	Series No.	Calibration Date	calibration period
System Simulator	E5515C	GB 47200710	2015/06/10	1 Year
System Simulator	CMW500	130805	2015/08/10	1 Year
SAR Probe	SATIMO	SN_0413_EP166	2015/08/10	1 Year
Dipole	SID835	SN09/13 DIP0G835-217	2014/08/28	2 Year
Dipole	SID1800	SN09/13 DIP1G800-216	2014/08/28	2 Year
Dipole	SID1900	SN09/13 DIP1G900-218	2014/08/28	2 Year
Dipole	SID2450	SN09/13 DIP2G450-220	2014/08/28	2 Year
Dipole	SID2600	SN32/14 DIP2G600-338	2014/08/12	2 Year
Vector Network Analyzer	ZVB8	A0802530	2015/06/08	1 Year
Signal Generator	SMR27	A0304219	2015/06/08	1 Year
Power Meter	NRP2	A140401673	2016/03/09	1 Year
Power Sensor	NPR-Z11	1138.3004.02-114072-nq	2016/03/09	1 Year
Amplifier	Nucletudes	143060	2016/03/09	1 Year
Directional Coupler	DC6180A	305827	2016/03/09	1 Year
Power Meter	NRVS	A0802531	2016/03/09	1 Year
Power Sensor	NRV-Z4	100069	2016/03/09	1 Year
Multimeter	Keithley-2000	4014020	2016/03/09	1 Year



ANNEX A

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2016-09509

LTE/WCDMA/GSM Multi-Mode Digital Mobile Phone
Type Name: ZTE BLADE V7 LITE/ ZTE BLADE V0720/
Blade V6 Plus/ ZTE Blade V6 Plus

Hardware Version: ue4A

Software Version: ZTE_LA_P635A32V0.0.0B02

TEST SETUP

This Annex consists of 3 pages

Date of Report: 2016-06-03

Photo 1: Measurement System SATIMO



Photo 2: Right Head Cheek

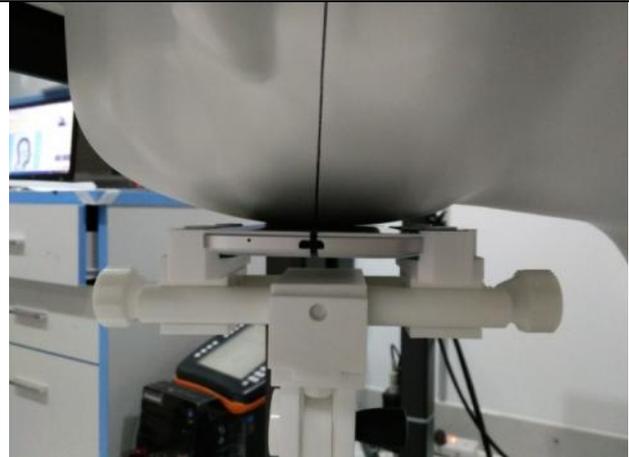


Photo 3: Right Head Tilt

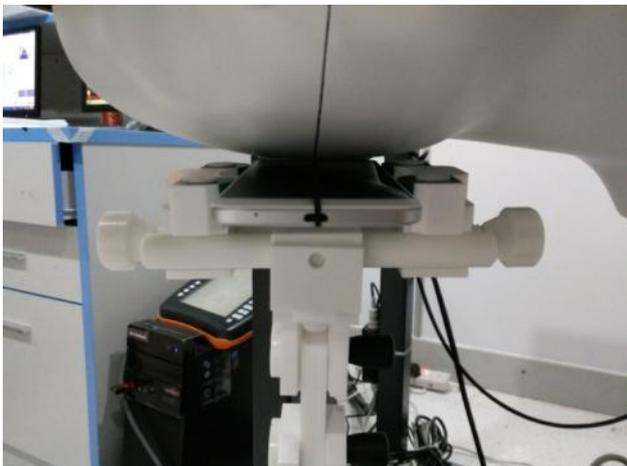


Photo 4: Left Head Cheek

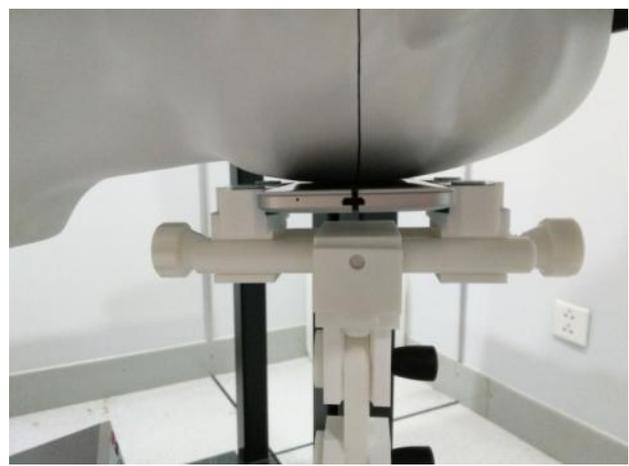


Photo 5: Left Head Tilt

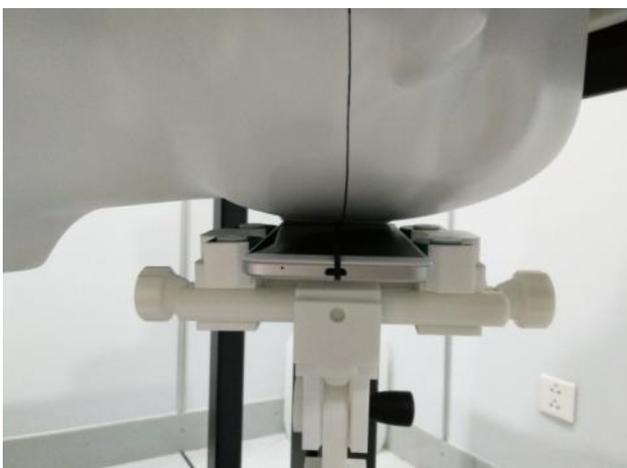


Photo 6: Body-Worn/hotspot Front(10mm)



Photo 7: Body-Worn/hotspot Back(10mm)

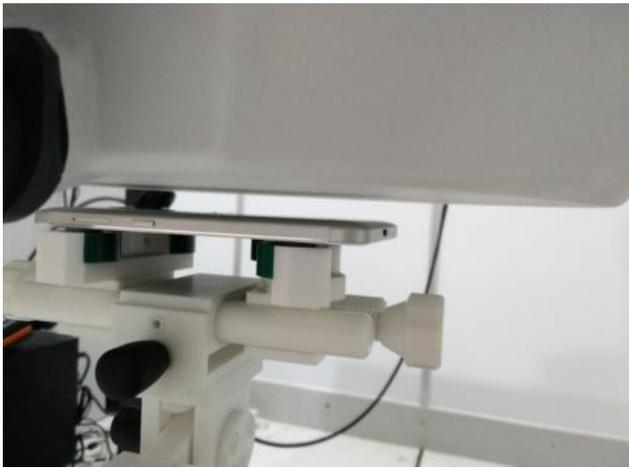


Photo 8: Edge A(10mm)



Photo 9: Edge B(10mm)



Photo 10: Edge C(10mm)

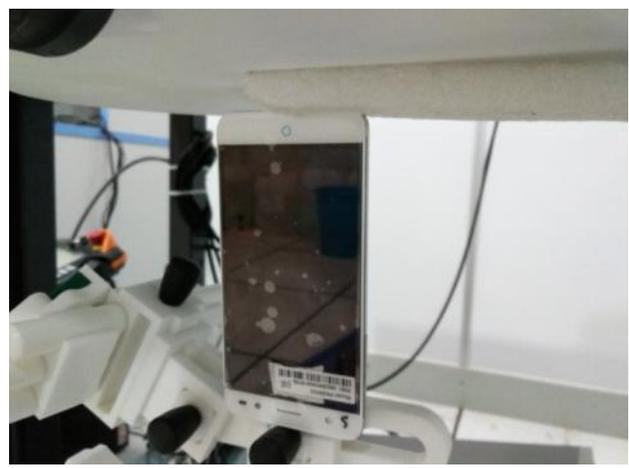


Photo 11: Edge D(10mm)





ANNEX B

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2016-09509

LTE/WCDMA/GSM Multi-Mode Digital Mobile Phone

Type Name: ZTE BLADE V7 LITE/ ZTE BLADE V0720/

Blade V6 Plus/ ZTE Blade V6 Plus

Hardware Version: ue4A

Software Version: ZTE_LA_P635A32V0.0.0B02

Sample Photographs

This Annex consists of 2 page

Date of Report: 2016-06-03

1. Appearance





ANNEX C
of
CCIC-SET

CONFORMANCE TEST REPORT FOR
HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2016-09509

LTE/WCDMA/GSM Multi-Mode Digital Mobile Phone

Type Name: ZTE BLADE V7 LITE/ ZTE BLADE V0720/
Blade V6 Plus/ ZTE Blade V6 Plus

Hardware Version: ue4A

Software Version: ZTE_LA_P635A32V0.0.0B02

System Performance Check Data and Highest SAR Plots

This Annex consists of 31 pages

Date of Report: 2016-06-03

System Performance Check (Head, 835MHz)

Type: Validation measurement

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

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

Date of measurement: 23/05/2016

Measurement duration: 21 minutes 27 seconds

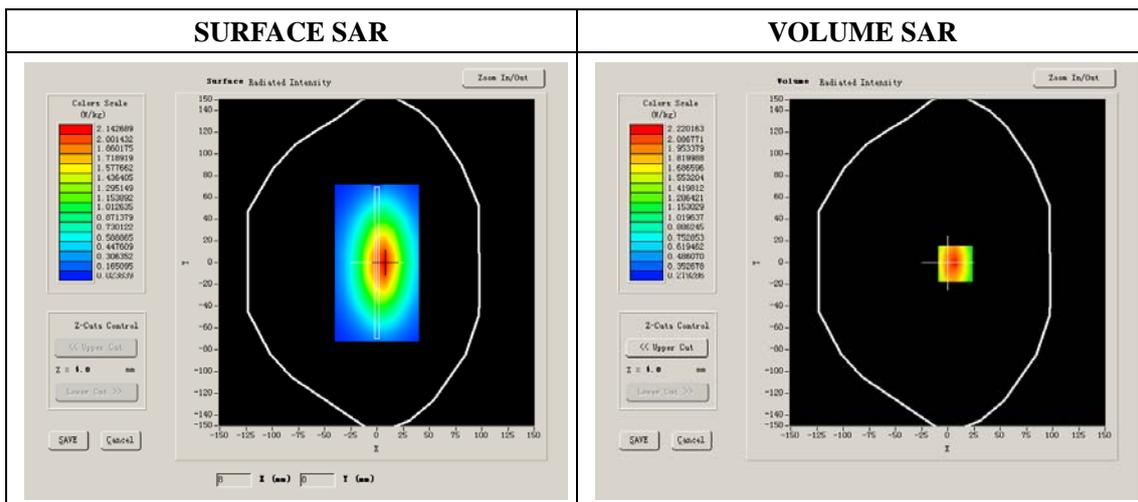
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	5x5x7,dx=8mm dy=8mm dz=5mm
Device Position	
Band	850MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	850
Relative permittivity (real part)	41.41
Relative permittivity	19.19
Conductivity (S/m)	0.89
Power drift (%)	-0.87
Ambient Temperature:	23.2°C
Liquid Temperature:	23.5°C
ConvF:	5.69
Duty factor:	1:1



Maximum location: X=7.00, Y=-1.00

SAR 10g (W/Kg)	1.812670
SAR 1g (W/Kg)	2.402368

System Performance Check (Head, 1800MHz)

Type: Validation measurement

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

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

Date of measurement: 25/05/2016

Measurement duration: 21 minutes 31seconds

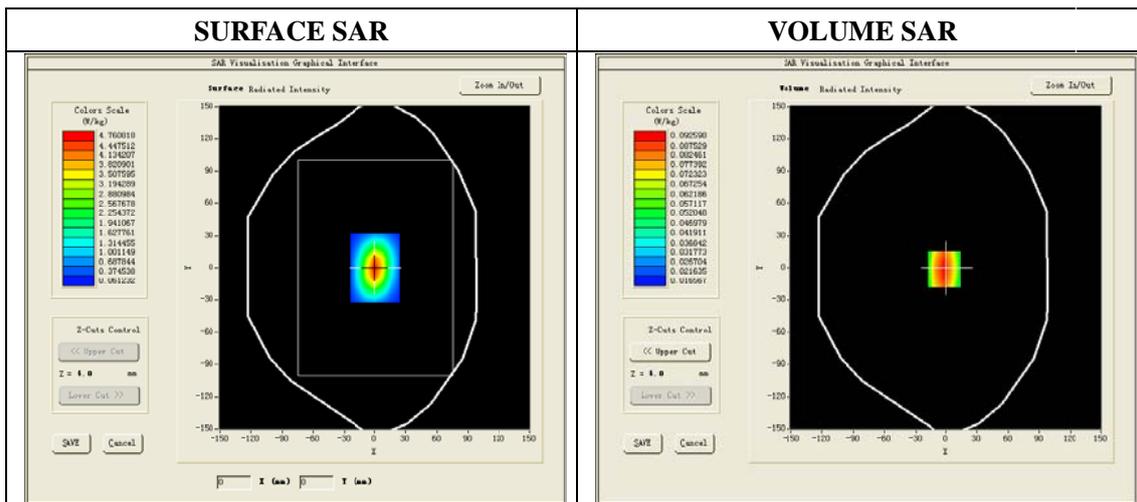
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	5x5x7,dx=8mm dy=8mm dz=5mm
Device Position	
Band	1800MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1800
Relative permittivity (real part)	39.80
Relative permittivity	19.20
Conductivity (S/m)	1.39
Power drift (%)	3.07
Ambient Temperature:	22.2°C
Liquid Temperature:	22.5°C
ConvF:	4.75
Duty factor:	1:1



Maximum location: X=6.00, Y=0.00

SAR 10g (W/Kg)	4.982580
SAR 1g (W/Kg)	9.470357

System Performance Check (Head, 1900MHz)

Type: Validation measurement

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

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

Date of measurement: 25/05/2016

Measurement duration: 22 minutes 24seconds

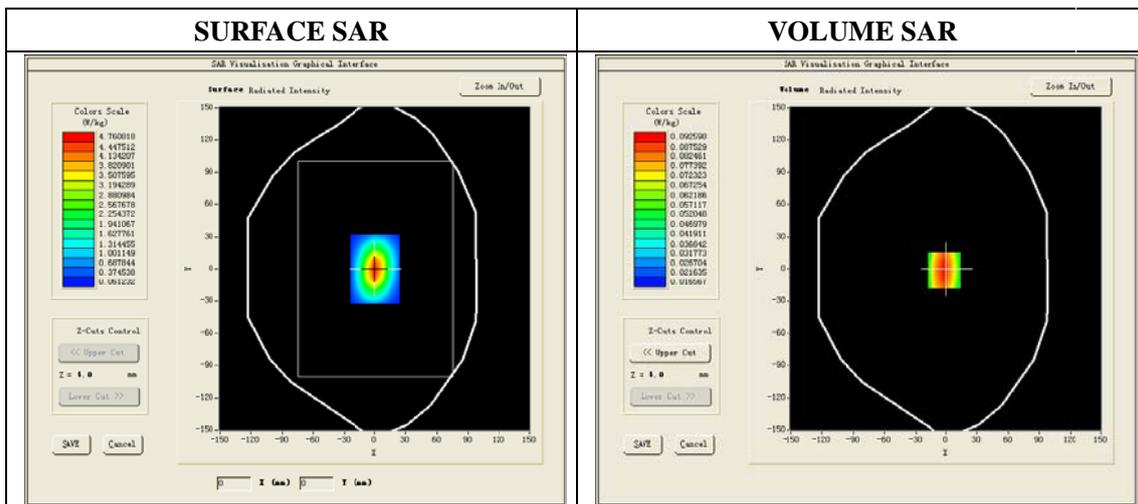
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	5x5x7,dx=8mm dy=8mm dz=5mm
Device Position	
Band	1900MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1900
Relative permittivity (real part)	39.91
Relative permittivity	13.17
Conductivity (S/m)	1.39
Power drift (%)	0.22
Ambient Temperature:	22.2°C
Liquid Temperature:	22.5°C
ConvF:	5.25
Duty factor:	1:1



Maximum location: X=6.00, Y=0.00

SAR 10g (W/Kg)	5.166358
SAR 1g (W/Kg)	9.905873

System Performance Check (Head, 2450MHz)

Type: Phone measurement

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

Zoom scan resolution: dx=5mm dy=5mm dz=4mm

Date of measurement:27/05/2016

Measurement duration: 21 minutes 25 seconds

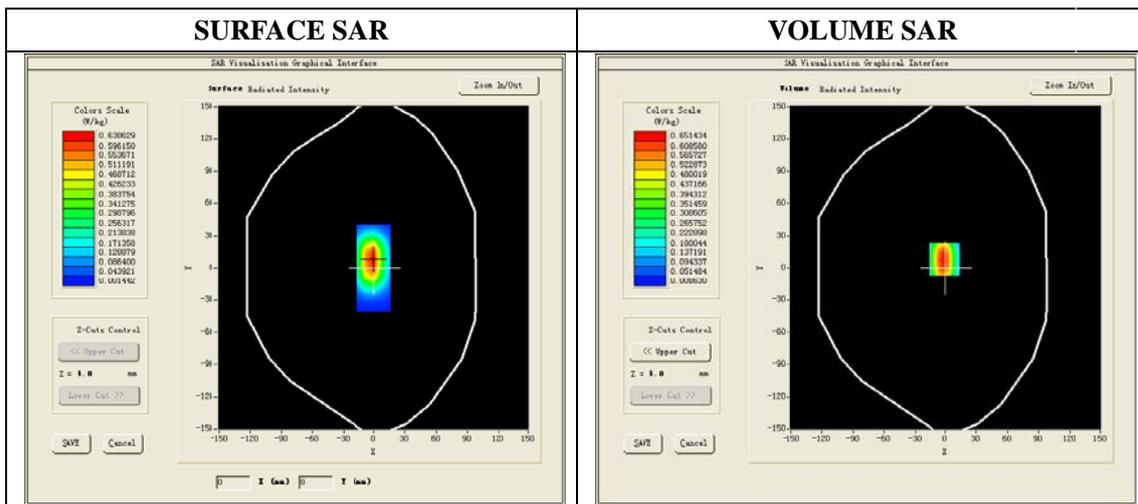
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	7x7x8,dx=5mm dy=5mm dz=4mm
Device Position	Dipole
Band	2450MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2450
Relative permittivity (real part)	39.04
Relative permittivity	13.15
Conductivity (S/m)	1.79
Power Drift (%)	2.11
ConvF:	4.93
Duty factor:	1:1



Maximum location: X=0.00, Y=8.00

SAR 10g (W/Kg)	5.922236
SAR 1g (W/Kg)	13.193547

System Performance Check (Head, 2600MHz)

Type: Phone measurement

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

Zoom scan resolution: dx=5mm, dy=5mm, dz=4mm

Date of measurement: 27/05/2016

Measurement duration: 22 minutes 26 seconds

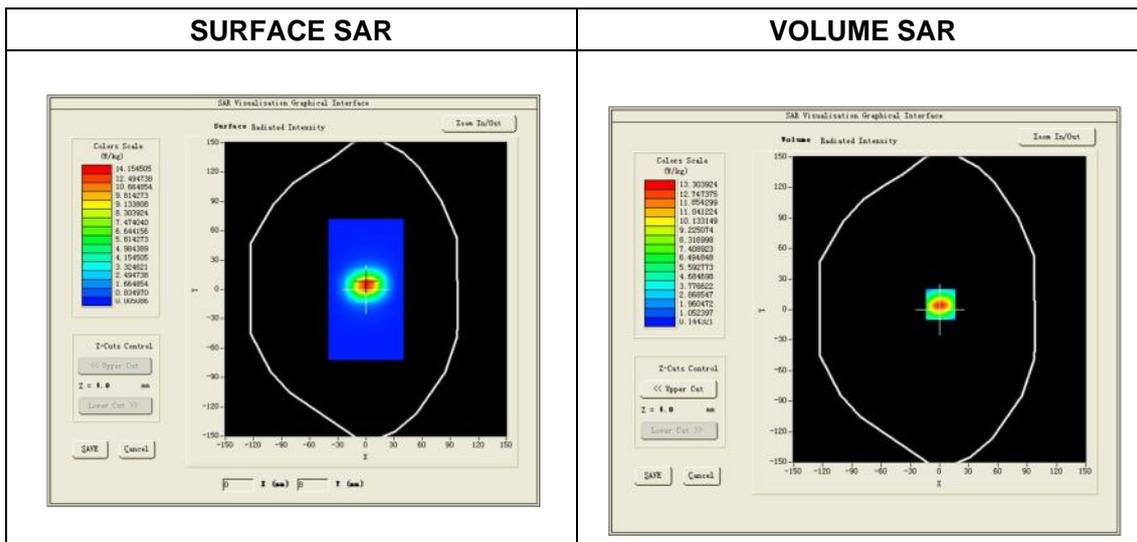
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	7x7x8,dx=5mm dy=5mm dz=4mm
Device Position	Dipole
Band	2600MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2600
Relative permittivity (real part)	38.88
Relative permittivity	13.15
Conductivity (S/m)	1.94
Power drift (%)	4.39
Ambient Temperature:	22.2°C
Liquid Temperature:	22.5°C
Crest factor:	1:1
ConvF:	5.08



Maximum location: X=1.00, Y=5.00

SAR 10g (W/Kg)	5.966325
SAR 1g (W/Kg)	13.993654

System Performance Check (Body, 835MHz)

Type: Validation measurement

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

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

Date of measurement: 05/05/2016

Measurement duration: 21 minutes 28seconds

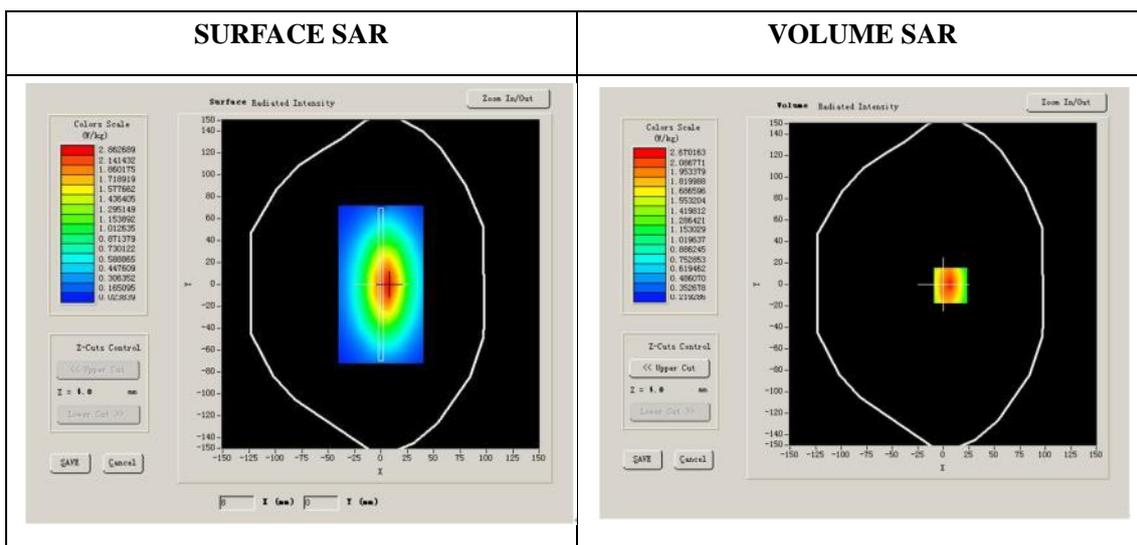
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	5x5x7,dx=8mm dy=8mm dz=5mm
Device Position	Dipole
Band	835MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	850
Relative permittivity (real part)	55.11
Relative permittivity	20.54
Conductivity (S/m)	0.97
Power drift (%)	0.37
Ambient Temperature:	22.2°C
Liquid Temperature:	22.5°C
ConvF:	5.82
Duty factor:	1:1



Maximum location: X=7.00, Y=-1.00

SAR 10g (W/Kg)	1.643562
SAR 1g (W/Kg)	2.542630

System Performance Check (Body, 1800MHz)

Type: Phone measurement

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

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

Date of measurement: 08/05/2016

Measurement duration: 20 minutes 58seconds

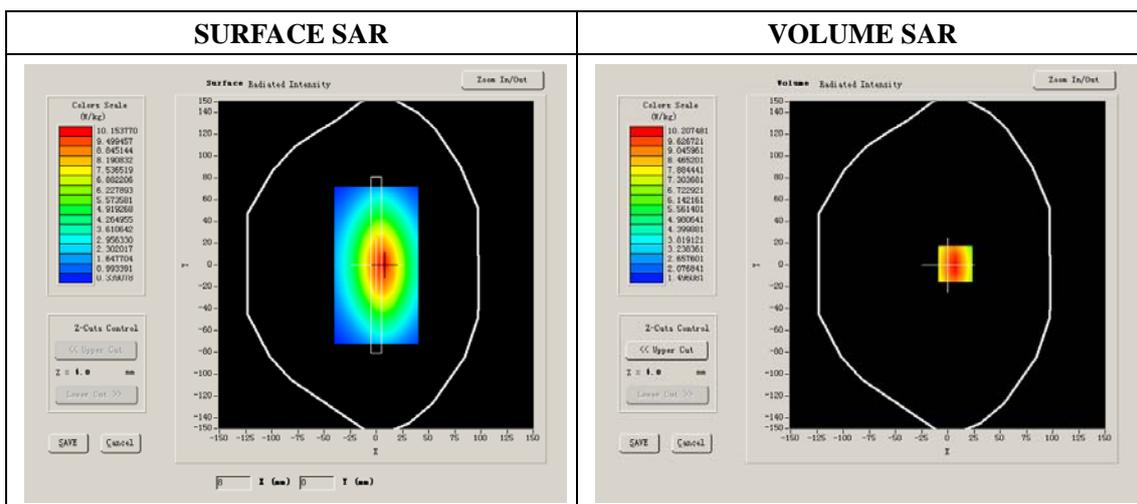
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	5x5x7,dx=8mm dy=8mm dz=5mm
Device Position	Dipole
Band	1800MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1800
Relative permittivity (real part)	53.20
Relative permittivity	15.10
Conductivity (S/m)	1.51
Power drift (%)	4.33
Ambient Temperature:	22.2°C
Liquid Temperature:	22.6°C
ConvF:	4.96
Crest factor:	1:1



Maximum location: X=7.00, Y=1.00

SAR 10g (W/Kg)	5.024625
SAR 1g (W/Kg)	9.870254

System Performance Check (Body, 1900MHz)

Type: Validation measurement

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

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

Date of measurement: 08/05/2016

Measurement duration: 21 minutes 42 seconds

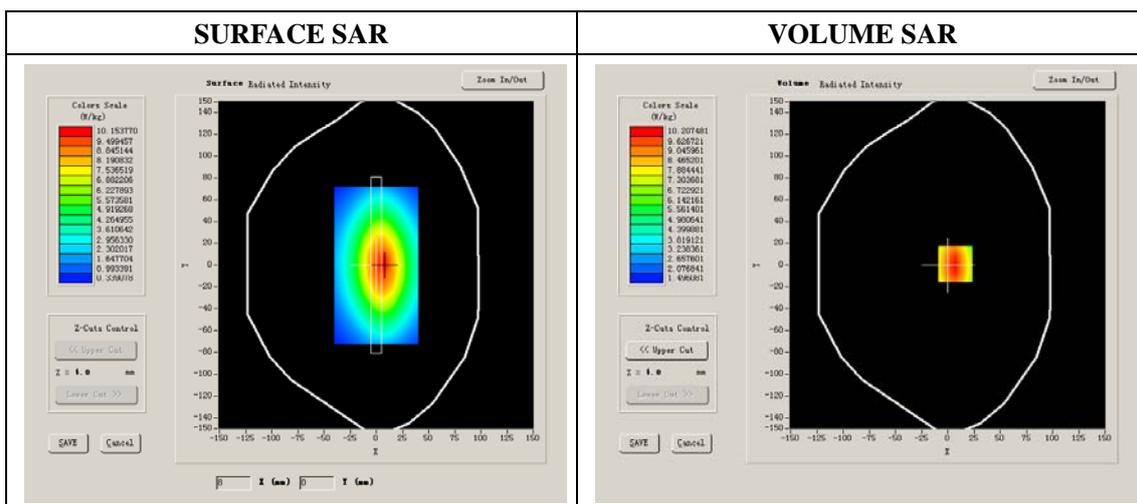
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	5x5x7,dx=8mm dy=8mm dz=5mm
Device Position	Dipole
Band	1900MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1900
Relative permittivity (real part)	53.12
Relative permittivity	14.40
Conductivity (S/m)	1.52
Power Drift (%)	-3.66
Ambient Temperature:	22.1°C
Liquid Temperature:	22.6°C
ConvF:	5.43
Duty factor:	1:1



Maximum location: X=1.00, Y=6.00

SAR 10g (W/Kg)	5.283065
SAR 1g (W/Kg)	10.140258

System Performance Check (Body, 2450MHz)

Type: Phone measurement

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

Zoom scan resolution: dx=5mm, dy=5mm, dz=4mm

Date of measurement: 09/05/2016

Measurement duration: 22 minutes 22 seconds

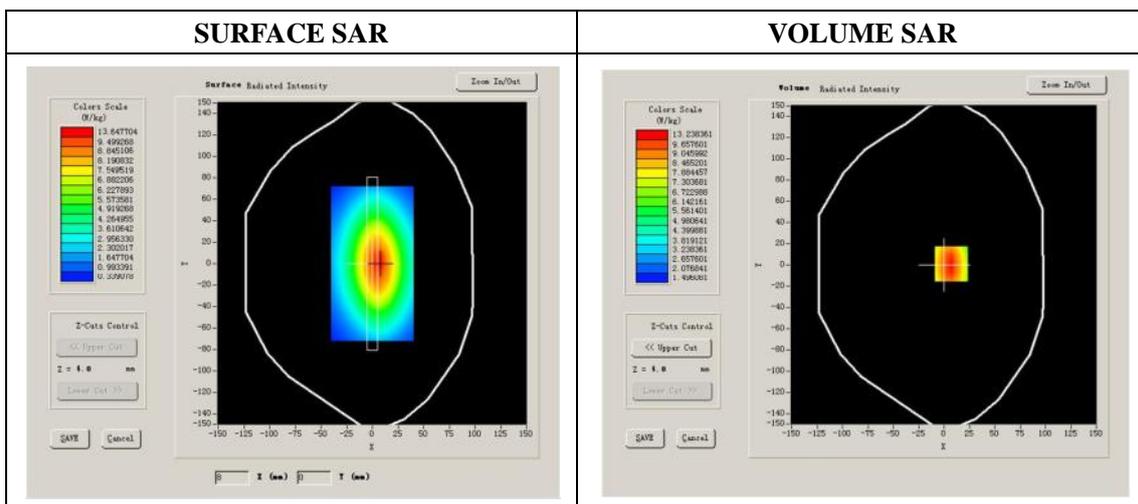
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	7x7x8,dx=5mm dy=5mm dz=4mm
Device Position	Dipole
Band	2450MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2450
Relative permittivity (real part)	52.55
Relative permittivity	14.25
Conductivity (S/m)	1.94
Power Drift (%)	-2.70
Duty factor:	1:1
ConvF:	5.09



Maximum location: X=0.00, Y=8.00

SAR 10g (W/Kg)	6.067236
SAR 1g (W/Kg)	13.080354

System Performance Check (Body, 2600MHz)

Type: Phone measurement

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

Zoom scan resolution: dx=5mm, dy=5mm, dz=4mm

Date of measurement: 09/05/2016

Measurement duration: 22 minutes 23 seconds

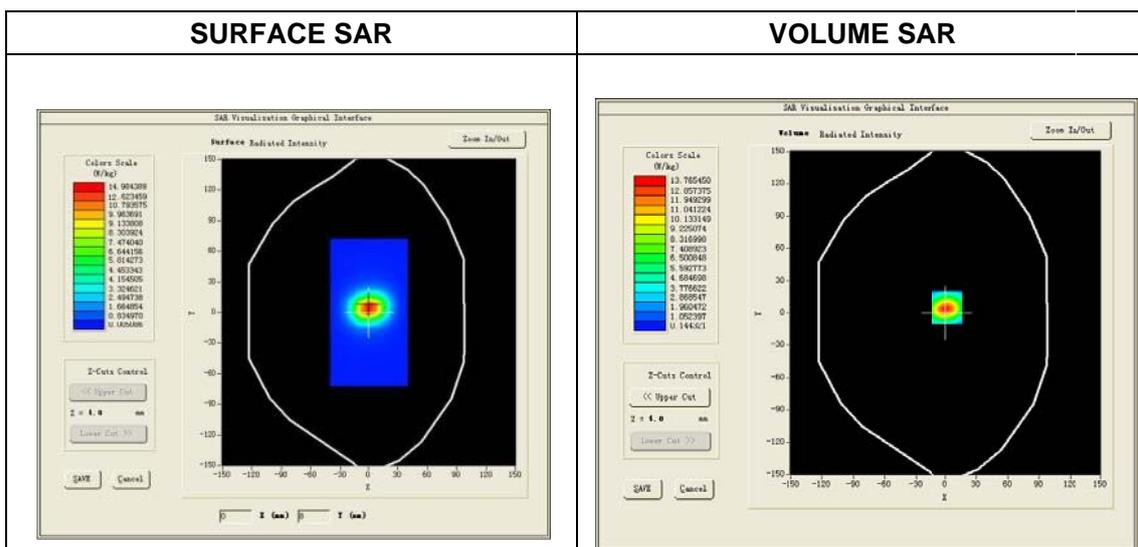
A. Experimental conditions.

Phantom File	dx=8mm dy=8mm
Phantom	7x7x8,dx=5mm dy=5mm dz=4mm
Device Position	Dipole
Band	2600MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2600
Relative permittivity (real part)	52.41
Relative permittivity	14.88
Conductivity (S/m)	2.15
Power drift (%)	-3.56
Ambient Temperature:	22.2°C
Liquid Temperature:	22.5°C
Crest factor:	1:1
ConvF:	5.22



Maximum location: X=1.00, Y=4.00

SAR 10g (W/Kg)	5.992635
SAR 1g (W/Kg)	14.103254

Plot 1: GSM850,Right Cheek, Mid

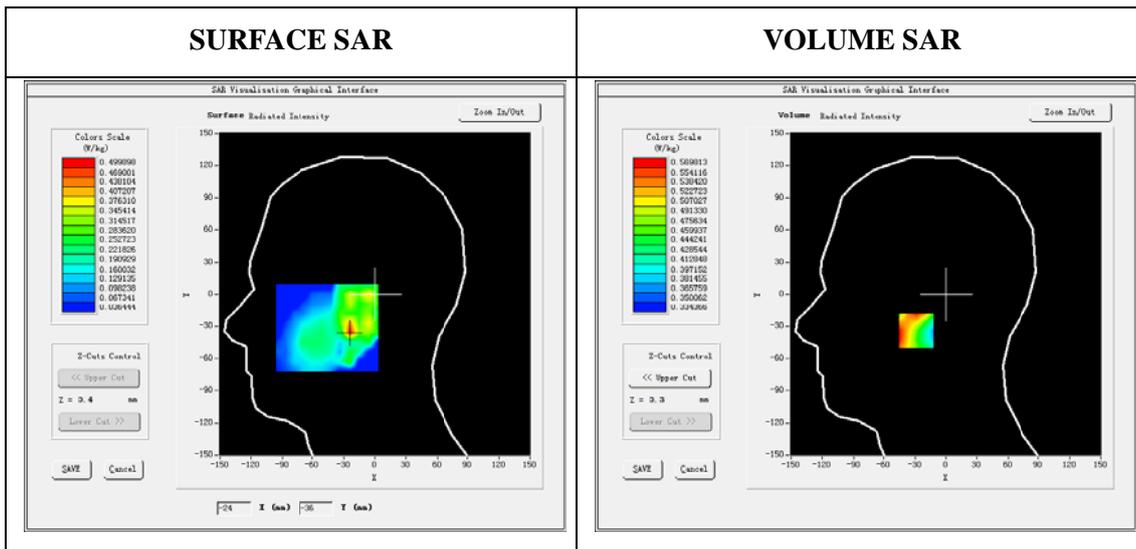
Type: Phone measurement
 Date of measurement: 23/05/2016
 Measurement duration: 22 minutes 11seconds
 Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
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

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	836.6
Relative permittivity (real part)	41.42
Relative permittivity (imaginary part)	19.19
Conductivity (S/m)	0.89
Variation (%)	-3.01
ConvF:	5.69



Maximum location: X=-23.00, Y=-34.00
 SAR Peak: 0.58 W/kg

SAR 10g (W/Kg)	0.403547
SAR 1g (W/Kg)	0.507325

Plot 2: GSM850, Back-Worn, Mid

Type: Phone measurement

Date of measurement: 23/05/2016

Measurement duration: 23 minutes 04 seconds

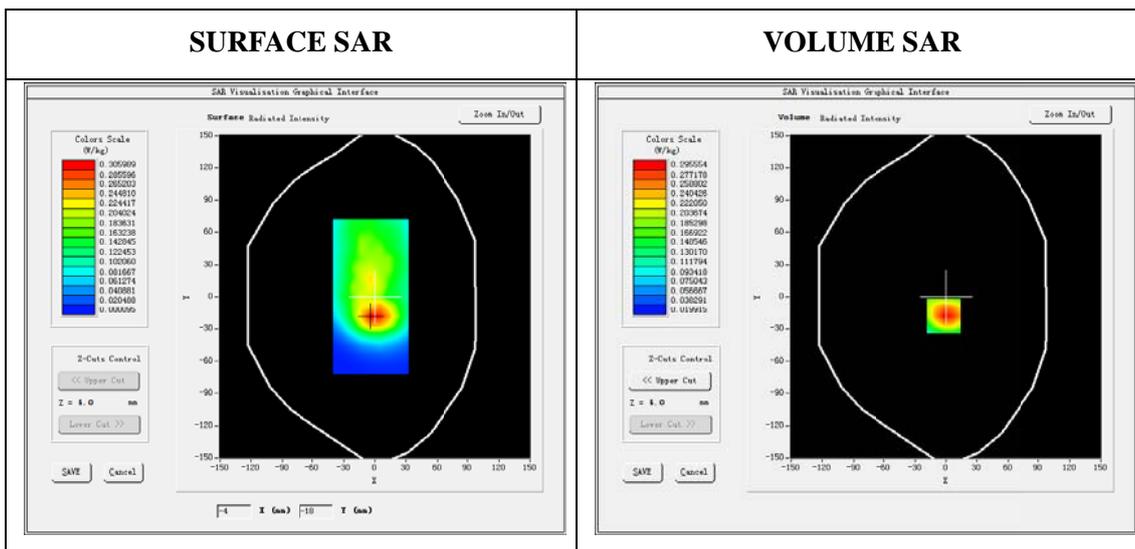
Mobile Phone IMEI number: --

A. Experimental conditions.

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

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	836.6
Relative permittivity (real part)	55.13
Relative permittivity (imaginary part)	20.54
Conductivity (S/m)	0.97
Variation (%)	0.52
ConvF:	5.82



Maximum location: X=-2.00, Y=-18.00
SAR Peak: 0.42W/kg

SAR 10g (W/Kg)	0.170121
SAR 1g (W/Kg)	0.280324

Plot 3: GPRS850, Back, Mid, Hotspot

Type: Phone measurement

Date of measurement: 23/05/2016

Measurement duration: 22 minutes 11 seconds

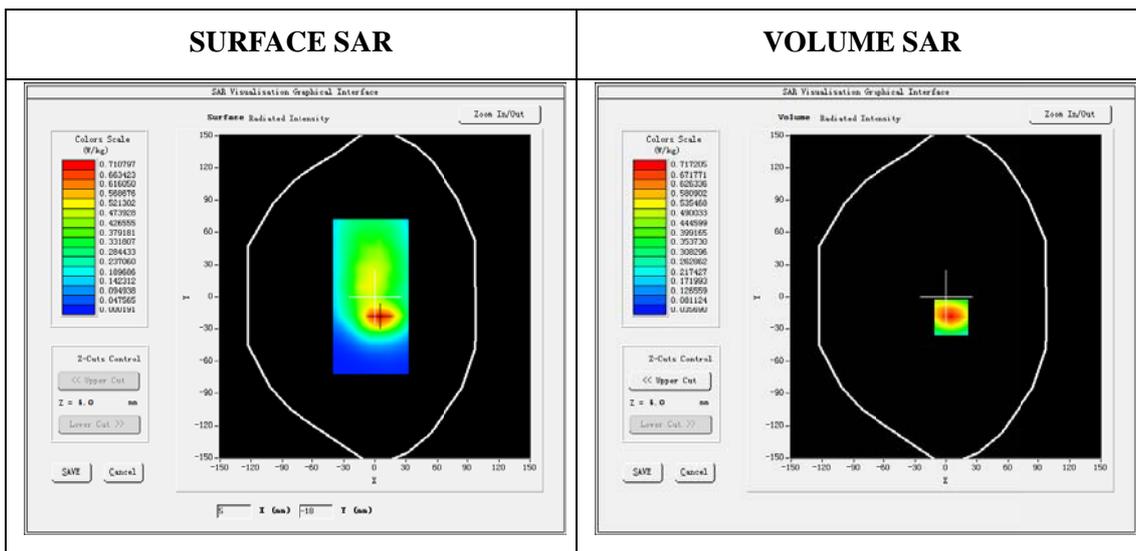
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	GSPRS850_4Tx
Channels	190
Signal	GPRS(Duty cycle: 1:2)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	836.6
Relative permittivity (real part)	55.13
Relative permittivity (imaginary part)	20.54
Conductivity (S/m)	0.97
Variation (%)	1.34
ConvF:	5.82



Maximum location: X=5.00, Y=-19.00

SAR Peak: 1.05 W/kg

SAR 10g (W/Kg)	0.386357
SAR 1g (W/Kg)	0.671035

Plot 4: GSM1900, Left Cheek, Middle

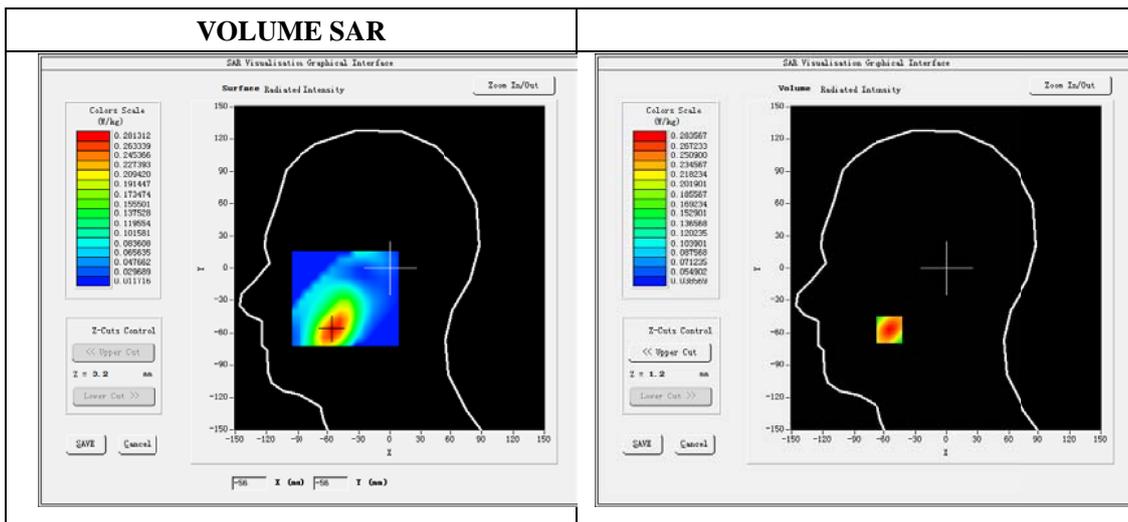
Type: Phone measurement
 Date of measurement: 25/05/2016
 Measurement duration: 22 minutes 22 seconds
 Mobile Phone IMEI number: --

A. Experimental conditions.

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

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1880.0
Relative permittivity (real part)	39.89
Relative permittivity (imaginary part)	13.17
Conductivity (S/m)	1.39
Variation (%)	1.85
ConvF:	5.25



Maximum location: X=-55.00, Y=-57.00

SAR Peak: 0.40 W/kg

SAR 10g (W/Kg)	0.167685
SAR 1g (W/Kg)	0.285367

Plot 5: GSM1900, body-worn Back, Middle

Type: Phone measurement

Date of measurement: 25/05/2016

Measurement duration: 22 minutes 16 seconds

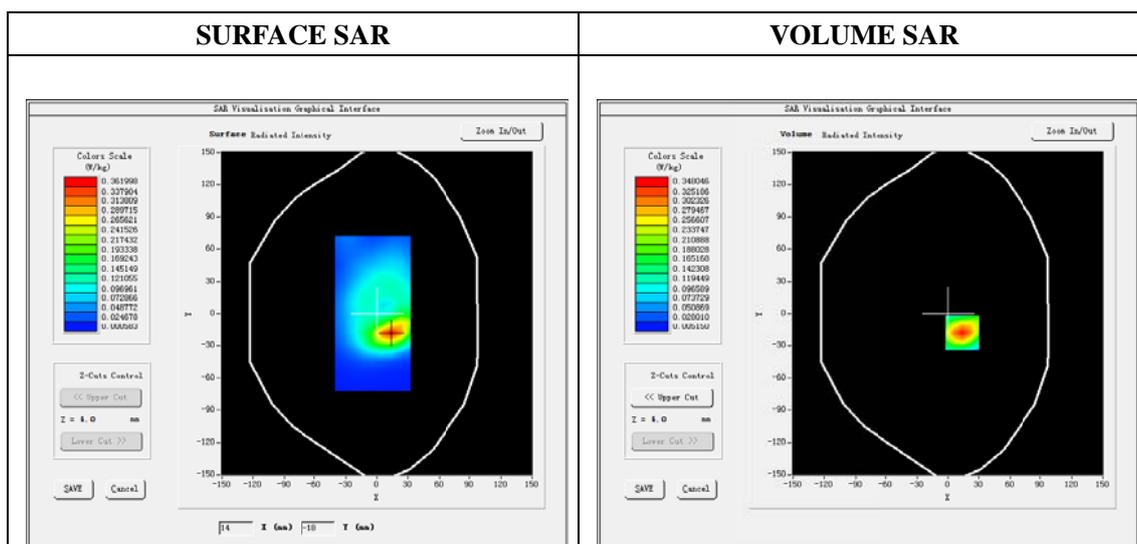
Mobile Phone IMEI number: --

A. Experimental conditions.

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

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1880
Relative permittivity (real part)	53.14
Relative permittivity (imaginary part)	14.40
Conductivity (S/m)	1.52
Variation (%)	-1.70
ConvF:	5.43



Maximum location: X=14.00, Y=-28.00

SAR Peak: 0.51 W/kg

SAR 10g (W/Kg)	0.167568
SAR 1g (W/Kg)	0.320862

Plot 6: GPRS1900, Edge C , Middle

Type: Phone measurement

Date of measurement: 25/05/2016

Measurement duration: 22 minutes 15 seconds

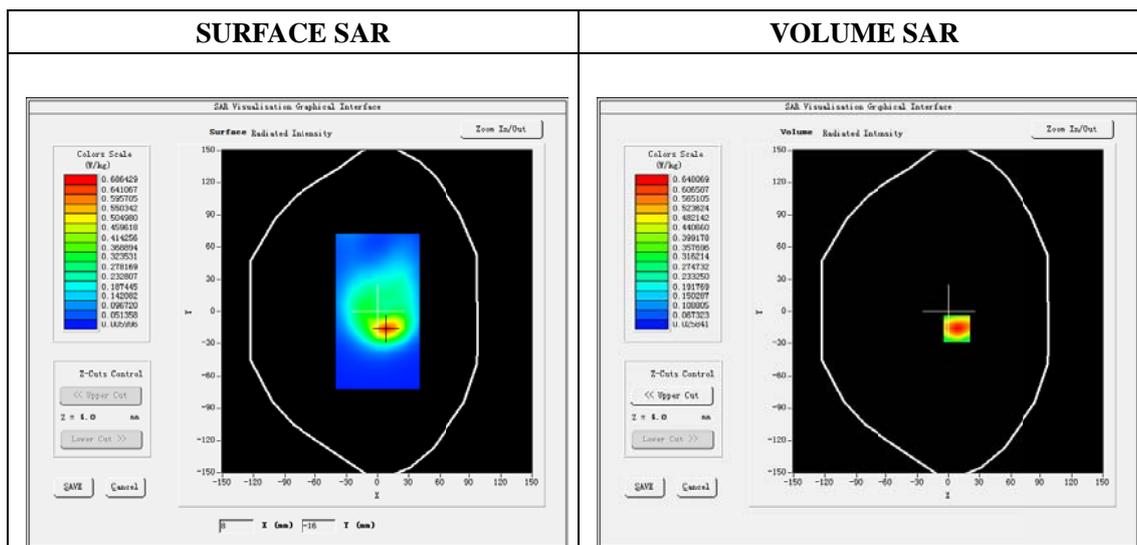
Mobile Phone IMEI number: --

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	GPRS1900_4Tx
Channels	661
Signal	GPRS (Duty cycle: 1:2)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.14
Relative permittivity (imaginary part)	14.40
Conductivity (S/m)	1.52
Variation (%)	-2.34
ConvF:	5.43



Maximum location: X=8.00, Y=-16.00

SAR Peak: 0.93 W/kg

SAR 10g (W/Kg)	0.316472
SAR 1g (W/Kg)	0.612420

Plot 7: WCDMA850, Right Cheek, Mid

Type: Phone measurement

Date of measurement: 23/05/2016

Measurement duration: 22 minutes 07seconds

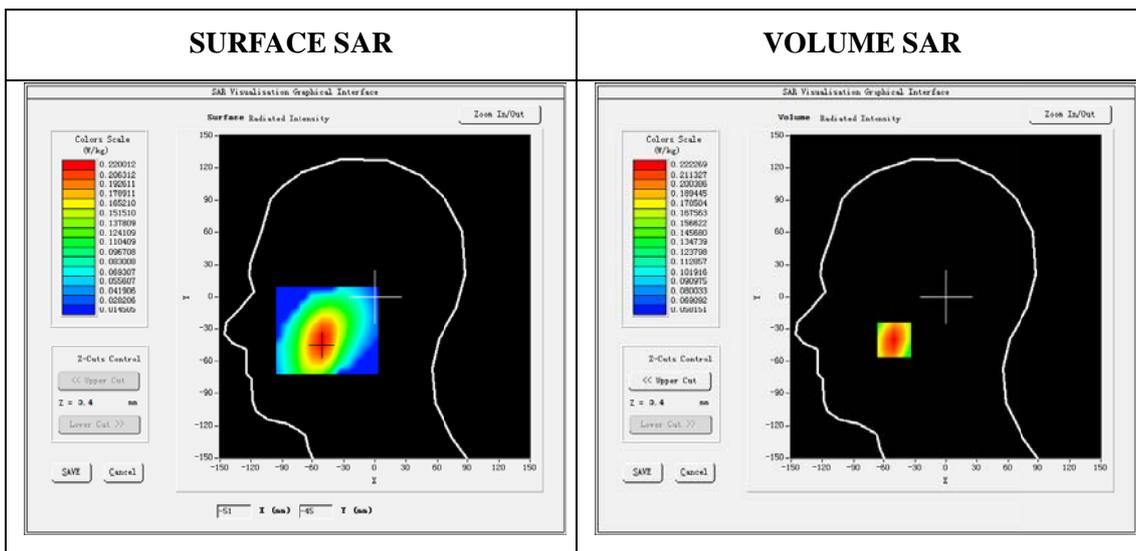
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
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

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	836.6
Relative permittivity (real part)	41.42
Relative permittivity (imaginary part)	19.19
Conductivity (S/m)	0.89
Variation (%)	2.66
ConvF:	5.69



Maximum location: X=-50.00, Y=-39.00

SAR Peak: 0.26 W/kg

SAR 10g (W/Kg)	0.168241
SAR 1g (W/Kg)	0.212364

Plot 8: WCDMA850, Back Upward(Body-worn, hotspot), Mid

Type: Phone measurement

Date of measurement:23/05/2016

Measurement duration: 22 minutes 14 seconds

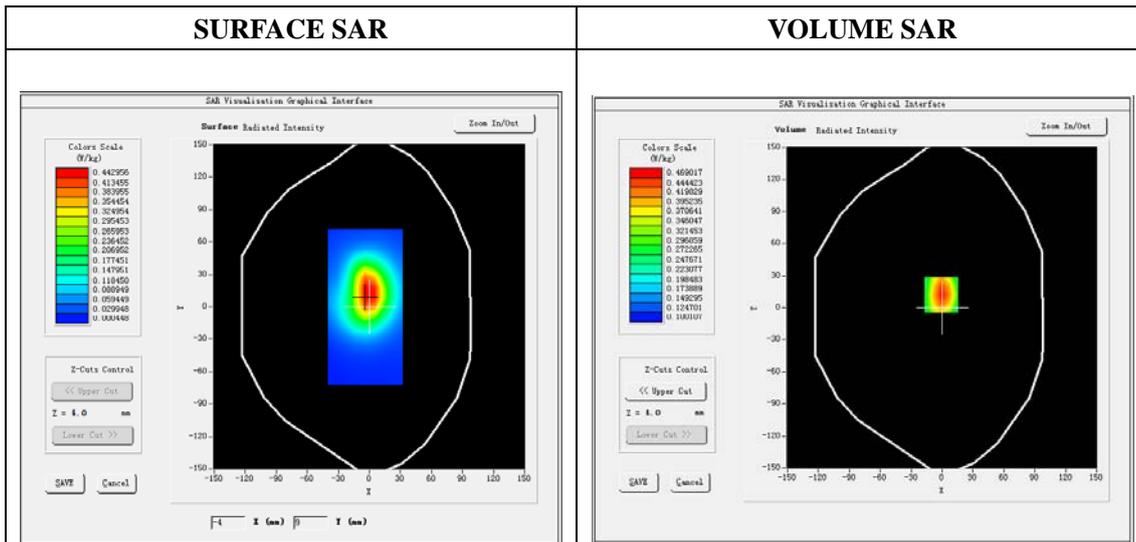
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	Band5_WCDMA850
Channels	4283
Signal	WCDMA (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	836.6
Relative permittivity (real part)	55.13
Relative permittivity (imaginary part)	20.54
Conductivity (S/m)	0.97
Variation (%)	1.05
ConvF:	5.82



Maximum location: X=10.00, Y=72.00
SAR Peak: 0.56 W/kg

SAR 10g (W/Kg)	0.312574
SAR 1g (W/Kg)	0.448367

Plot 9: WCDMA1900, Left Cheek, Mid

Type: Phone measurement

Date of measurement: 25/05/2016

Measurement duration: 22 minutes 12 seconds

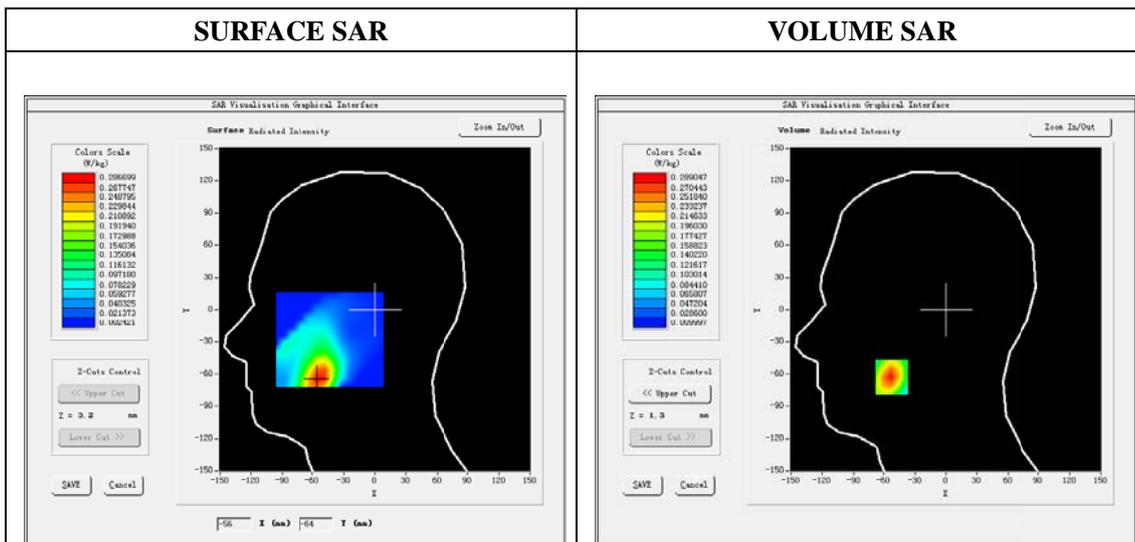
Mobile Phone IMEI number: --

A. Experimental conditions.

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

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1880.0
Relative permittivity (real part)	39.89
Relative permittivity (imaginary)	13.17
Conductivity (S/m)	1.39
Variation (%)	0.24
ConvF:	5.25



Maximum location: X=-53.00, Y=-63.00

SAR Peak: 0.41 W/kg

SAR 10g (W/Kg)	0.157053
SAR 1g (W/Kg)	0.270105

Plot 10: WCDMA1900, Body-Worn/Hotspot, Low

Type: Phone measurement

Date of measurement: 25/05/2016

Measurement duration: 22 minutes 17 seconds

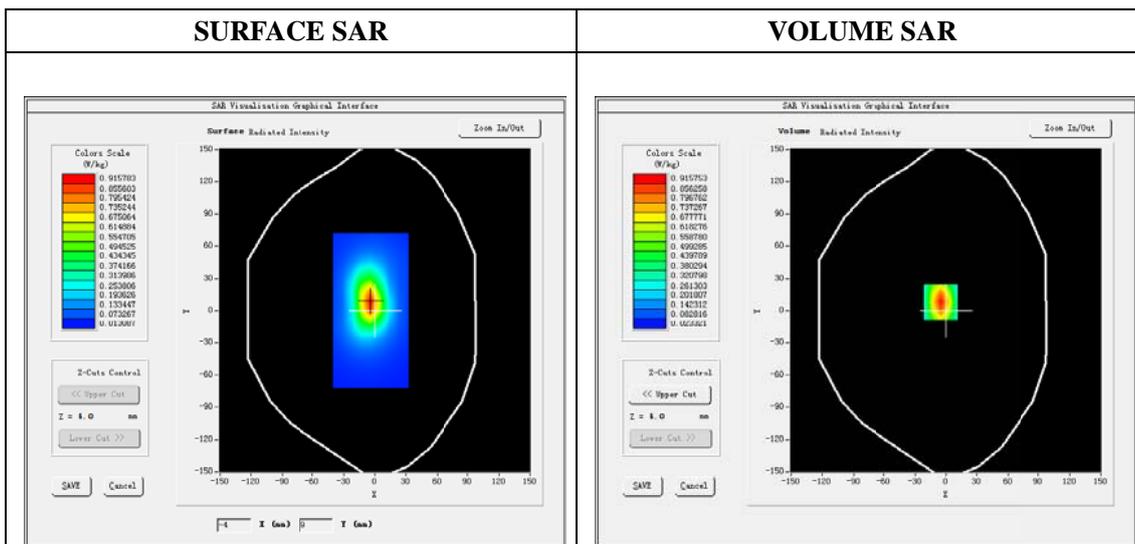
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	Band2_WCDMA1900
Channels	9262
Signal	WCDMA (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1852.4
Relative permittivity (real part)	53.14
Relative permittivity (imaginary)	14.40
Conductivity (S/m)	1.52
Variation (%)	-1.01
ConvF:	5.43



Maximum location: X=-5.00, Y=8.00

SAR Peak: 1.41 W/kg

SAR 10g (W/Kg)	0.420354
SAR 1g (W/Kg)	0.832105

Plot 11: LTE Band2, 20MHz, Left Cheek, Mid

Type: Phone measurement

Date of measurement: 25/05/2016

Measurement duration: 22 minutes 11 seconds

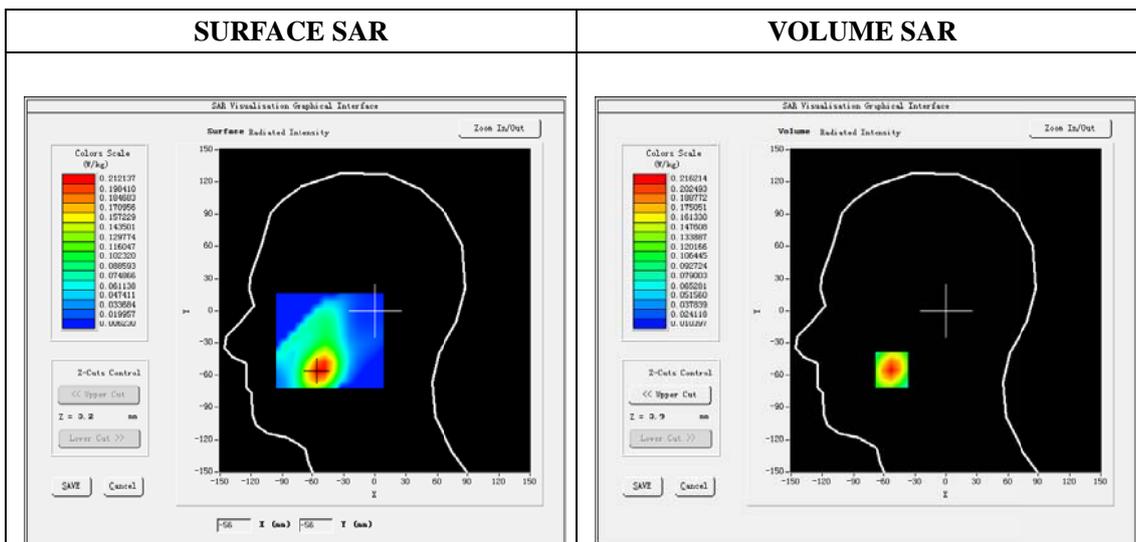
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Left head
Band	Cheek
Channels	18900
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1880
Relative permittivity (real part)	53.14
Relative permittivity (imaginary)	14.40
Conductivity (S/m)	1.52
Variation (%)	3.01
ConvF:	5.25



Maximum location: X=-50.00, Y=-56.00

SAR Peak: 0.31 W/kg

SAR 10g (W/Kg)	0.118532
SAR 1g (W/Kg)	0.202054

Plot 12: LTE Band2, 20MHz, Back (Body-worn, hotspot), High

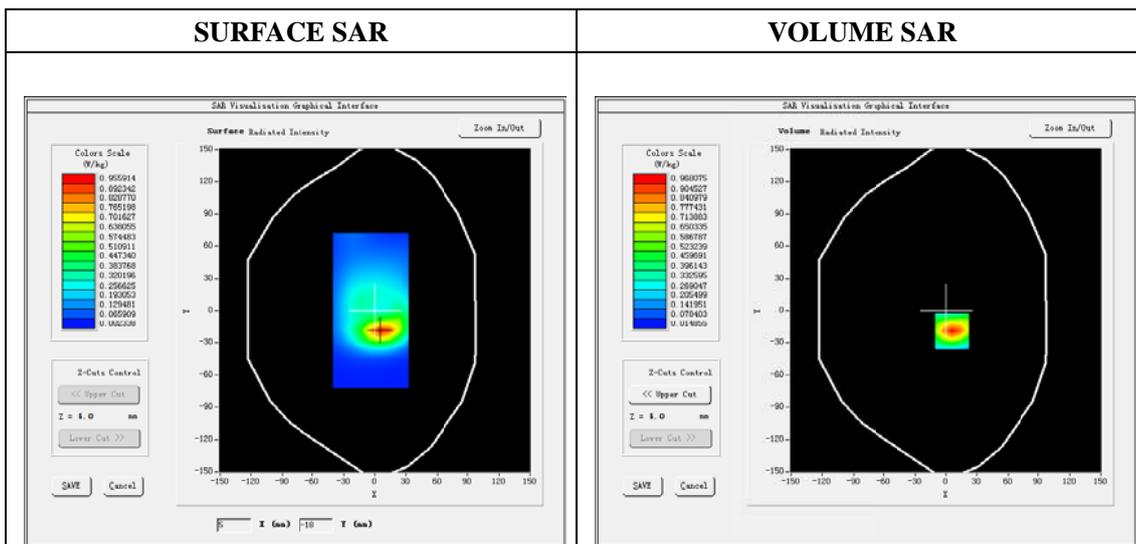
Type: Phone measurement
 Date of measurement: 25/05/2016
 Measurement duration: 22 minutes 07 seconds
 Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	LTE Band 2
Channels	18900
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1880
Relative permittivity (real part)	53.14
Relative permittivity (imaginary)	14.40
Conductivity (S/m)	1.52
Variation (%)	1.42
ConvF:	5.43



Maximum location: X=-11.00, Y=-34.00

SAR Peak: 1.50 W/kg

SAR 10g (W/Kg)	0.452305
SAR 1g (W/Kg)	0.877358

Plot 13: LTE Band4, 20MHz, Left Cheek, Middle

Type: Phone measurement

Date of measurement: 25/05/2016

Measurement duration: 22 minutes 14 seconds

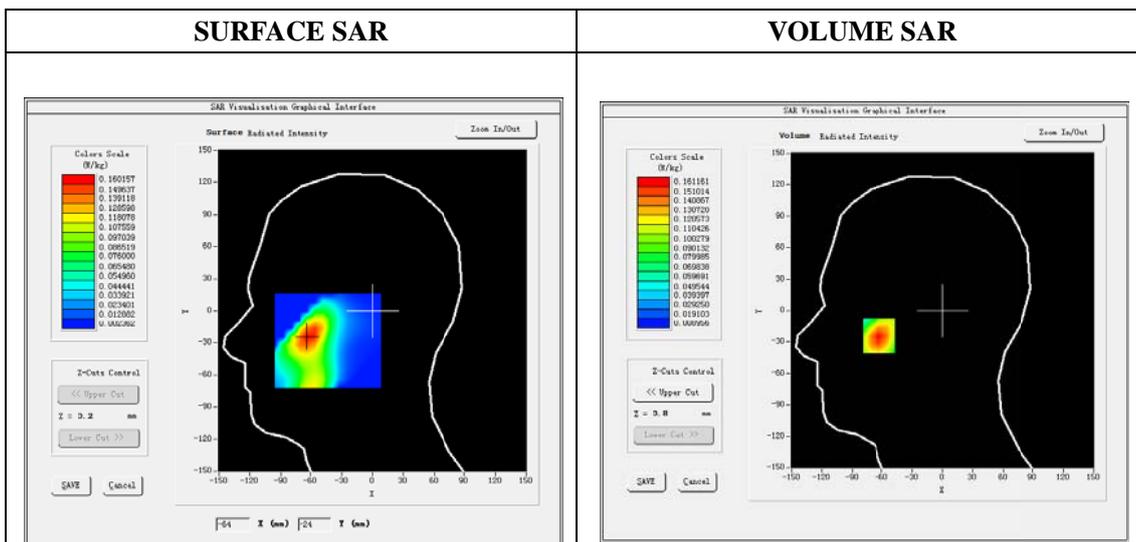
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Right head
Band	Cheek
Channels	20175
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1732.5
Relative permittivity (real part)	39.81
Relative permittivity (imaginary)	19.20
Conductivity (S/m)	1.39
Variation (%)	2.30
ConvF:	4.75



Maximum location: X=-49.00, Y=-49.00

SAR Peak :0.223572

SAR 10g (W/Kg)	0.094267
SAR 1g (W/Kg)	0.150123

Plot 14: LTE Band4, 20MHz, Back Upward(Body-worn, hotspot), Mid

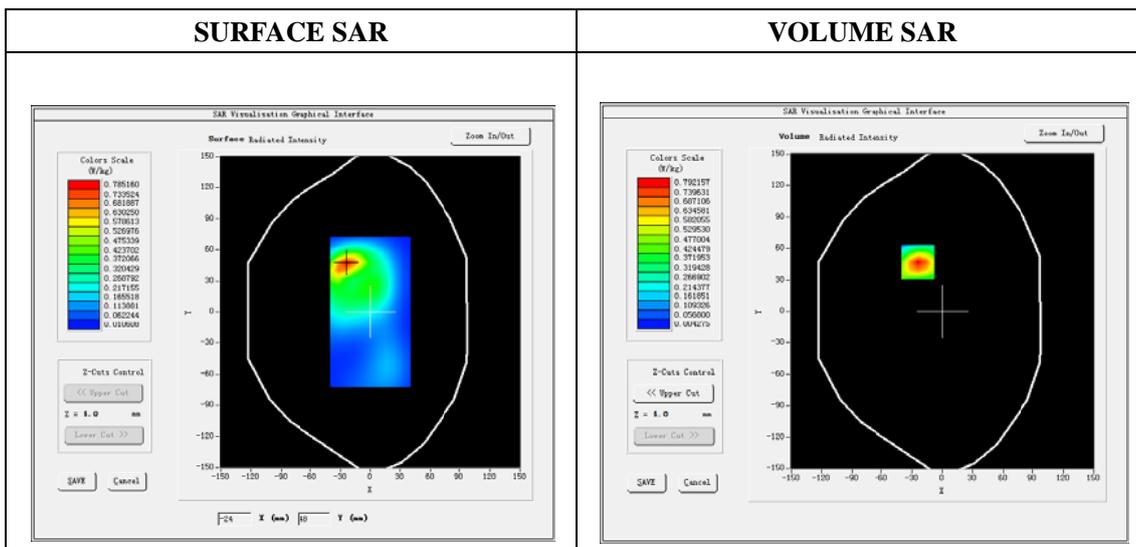
Type: Phone measurement
 Date of measurement: 25/05/2016
 Measurement duration: 22 minutes 21 seconds
 Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	LTE Band 4
Channels	20175
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	1732.5
Relative permittivity (real part)	53.24
Relative permittivity (imaginary)	15.10
Conductivity (S/m)	1.51
Variation (%)	1.07
ConvF:	4.96



**Maximum location: X=9.00, Y=-25.00
 SAR Peak: 1.447350**

SAR 10g (W/Kg)	0.347035
SAR 1g (W/Kg)	0.742034

Plot 15: LTE Band5, 10MHz, Left Cheek, Mid

Type: Phone measurement

Date of measurement: 23/05/2016

Measurement duration: 21 minutes 22 seconds

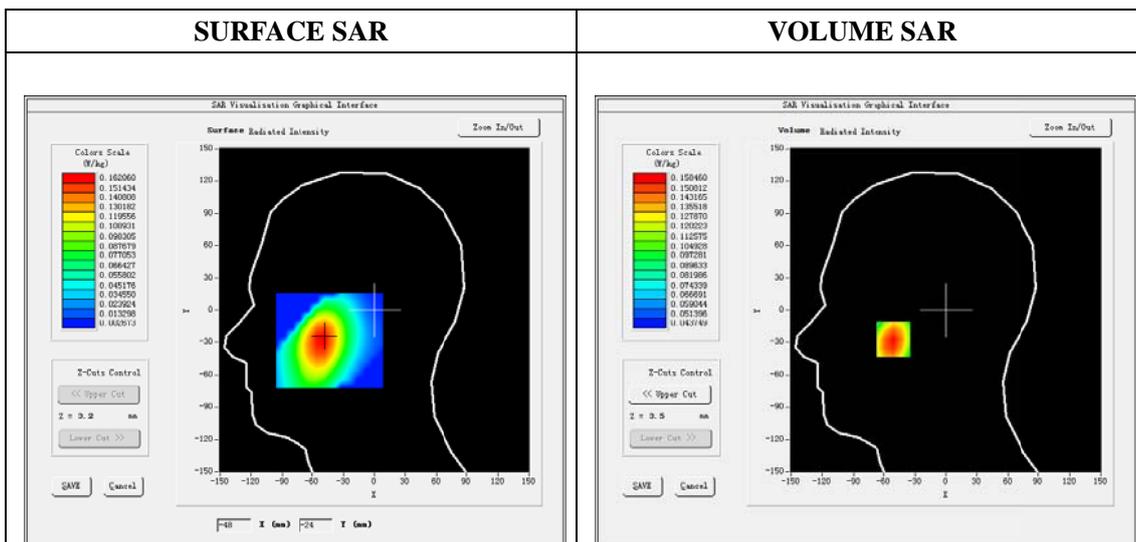
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Left head
Band	Cheek
Channels	20525
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	836.5
Relative permittivity (real part)	41.40
Relative permittivity (imaginary)	19.19
Conductivity (S/m)	0.89
Variation (%)	2.62
ConvF:	5.69



Maximum location: X=-51.00, Y=-27.00

SAR 10g (W/Kg)	0.117428
SAR 1g (W/Kg)	0.153035

Plot 16: LTE Band5, 10MHz, Back Upward(Body-worn, hotspot), Mid

Type: Phone measurement

Date of measurement: 23/05/2016

Measurement duration: 21 minutes 24 seconds

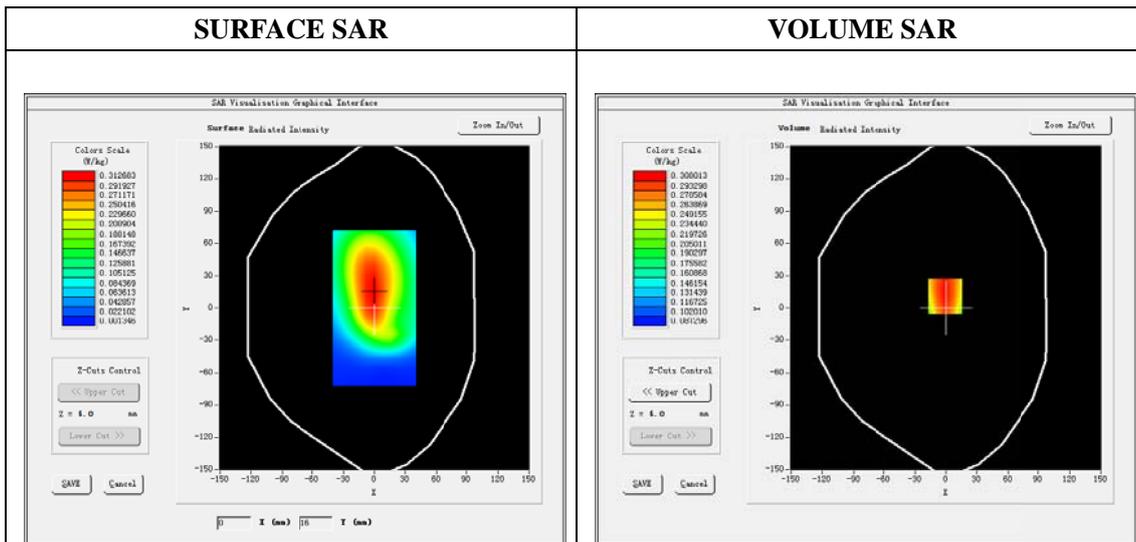
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	LTE Band 5
Channels	20525
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	836.5
Relative permittivity (real part)	55.27
Relative permittivity (imaginary)	20.54
Conductivity (S/m)	0.97
Variation (%)	3.05
ConvF:	5.82



Maximum location: X=-1.00, Y=11.00

SAR Peak: 0.36 W/kg

SAR 10g (W/Kg)	0.178211
SAR 1g (W/Kg)	0.295368

Plot 17: LTE Band7, 20MHz, Left Cheek, Mid

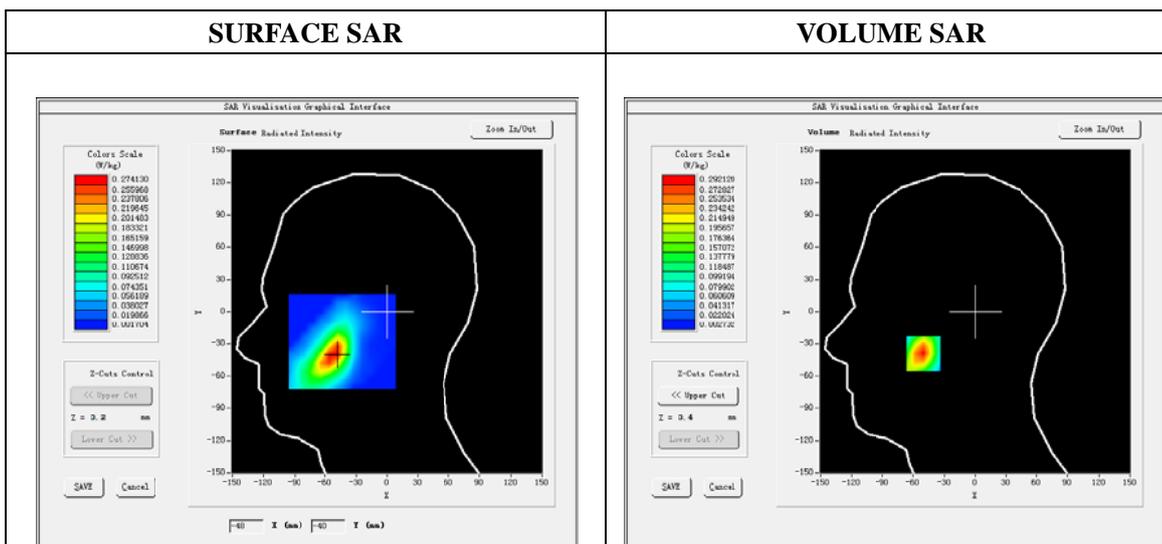
Type: Phone measurement
 Date of measurement: 27/05/2016
 Measurement duration: 22 minutes 13 seconds
 Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Right head
Band	Cheek
Channels	21100
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2535
Relative permittivity (real part)	38.89
Relative permittivity (imaginary)	13.15
Conductivity (S/m)	1.94
Variation (%)	2.04
ConvF:	5.08



Maximum location: X=-49.00, Y=-39.00

SAR Peak: 0.50 W/kg

SAR 10g (W/Kg)	0.135236
SAR 1g (W/Kg)	0.268235

Plot 18: LTE Band7, 20MHz, Body-worn Back/Hotspot, Middle

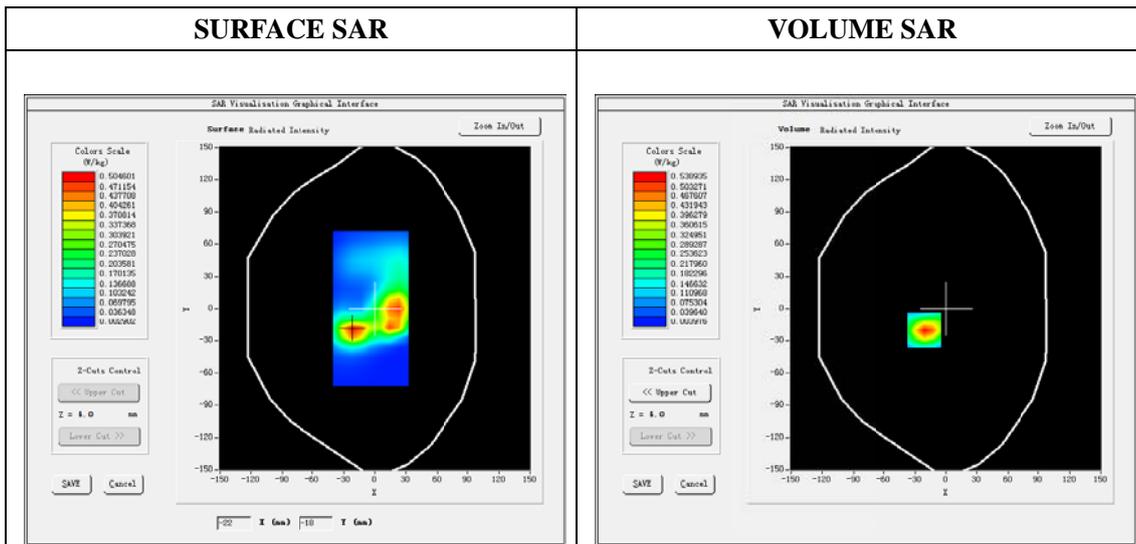
Type: Phone measurement
 Date of measurement: 27/05/2016
 Measurement duration: 21 minutes 12 seconds
 Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	LTE Band 7
Channels	21100
Signal	LTE (Duty cycle: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2535
Relative permittivity (real part)	52.38
Relative permittivity (imaginary)	14.88
Conductivity (S/m)	2.15
Variation (%)	1.24
ConvF:	5.22



Maximum location: X=-21.00, Y=-20.00

SAR Peak: 0.94 W/kg

SAR 10g (W/Kg)	0.225368
SAR 1g (W/Kg)	0.500354

Plot 19: Wi-Fi 802.11b ,Left Tilt, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 27/05/2016

Measurement duration: 27 minutes 06 seconds

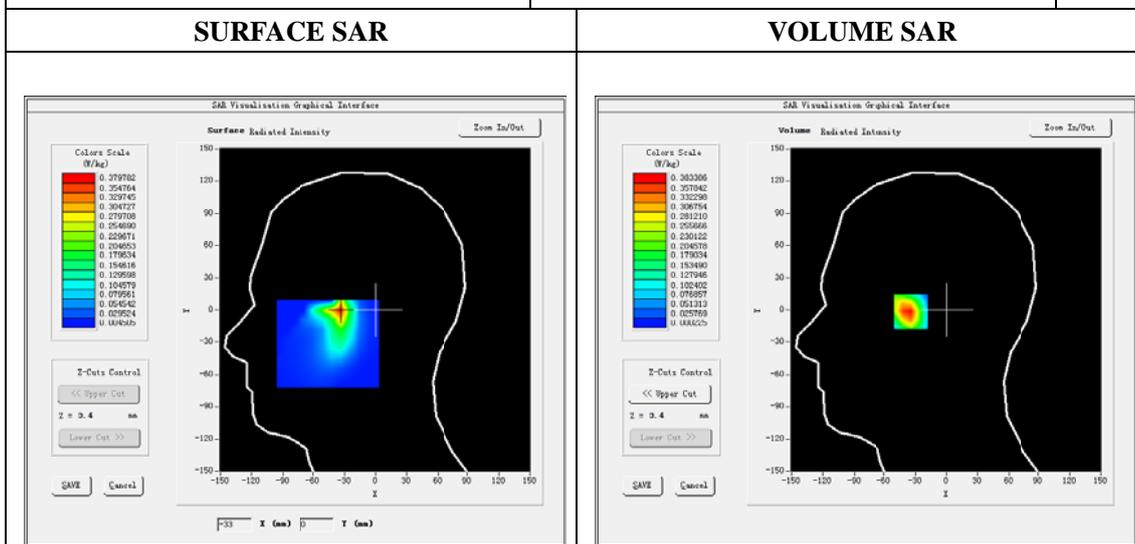
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	7x7x8,dx=5mm dy=5mm dz=4mm
Phantom	Left head
Device Position	Cheek
Band	IEEE 802.11b ISM
Channels	6
Signal	DSSS (Crest factor: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2437
Relative permittivity (real part)	39.01
Relative permittivity (imaginary part)	13.15
Conductivity (S/m)	1.79
Variation (%)	1.08
ConvF:	4.93



**Maximum location: X=-34.00, Y=0.00
SAR Peak: 0.87 W/kg**

SAR 10g (W/Kg)	0.153570
SAR 1g (W/Kg)	0.376014

Plot 20:Wi-Fi 802.11b , Body-Worn/ (Hotspot), Mid

Type: Phone measurement

Date of measurement: 27/05/2016

Measurement duration: 27 minutes 21 seconds

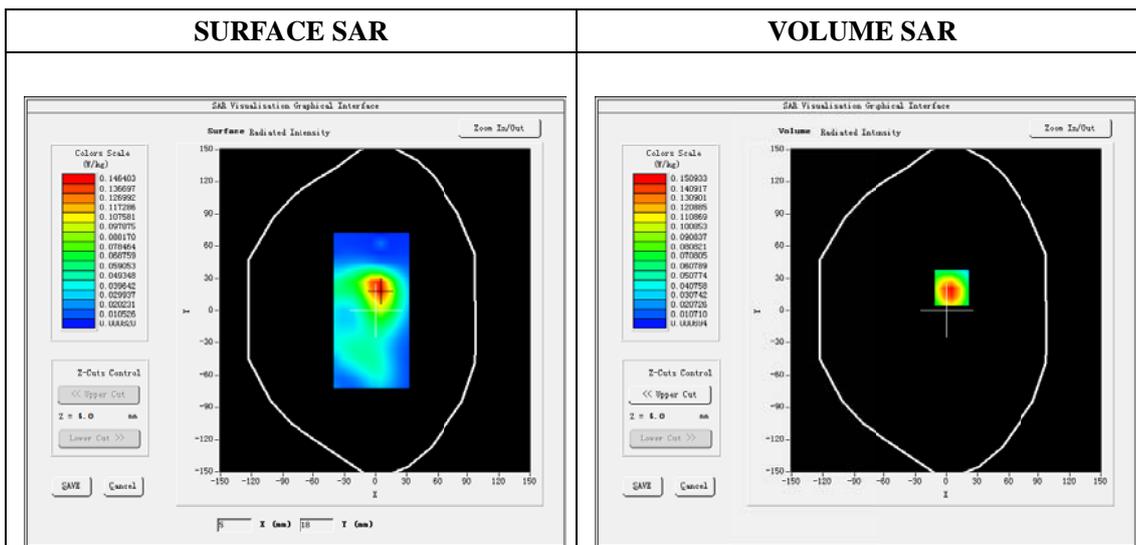
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	7x7x8,dx=5mm dy=5mm dz=4mm
Phantom	Validation plane
Device Position	Back
Band	IEEE 802.11b
Channels	6
Signal	DSSS (Crest factor: 1:1)

B. SAR Measurement Results

E-Field Probe	SATIMO SN_04/13_EP166
Frequency (MHz)	2437
Relative permittivity (real part)	52.56
Relative permittivity (imaginary part)	14.25
Conductivity (S/m)	1.94
Variation (%)	2.33
ConvF:	5.09



Maximum location: X=5.00, Y=21.00

SAR Peak: 0.32W/kg

SAR 10g (W/Kg)	0.066321
SAR 1g (W/Kg)	0.146357



ANNEX D
of
CCIC-SET

CONFORMANCE TEST REPORT FOR
HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2016-09509

LTE/WCDMA/GSM Multi-Mode Digital Mobile Phone

Type Name: ZTE BLADE V7 LITE/ ZTE BLADE V0720/

Blade V6 Plus/ ZTE Blade V6 Plus

Hardware Version: ue4A

Software Version: ZTE_LA_P635A32V0.0.0B02

Calibration Certificate of Probe and Dipoles

This Annex consists of 84 pages

Date of Report: 2016-06-03

Probe Calibration Certificate

**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**

**08/10/2015***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.



	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Jérôme LUC	Product Manager	8/11/2015	<i>JS</i>
<i>Checked by :</i>	Jérôme LUC	Product Manager	8/11/2015	<i>JS</i>
<i>Approved by :</i>	Kim RUTKOWSKI	Quality Manager	8/11/2015	<i>Kim Rutkowski</i>

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

<i>Issue</i>	<i>Date</i>	<i>Modifications</i>
A	8/11/2015	Initial release

*This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.*



TABLE OF CONTENTS

- 1 Device Under Test 4
- 2 Product Description 4
 - 2.1 General Information 4
- 3 Measurement Method 4
 - 3.1 Linearity 4
 - 3.2 Sensitivity 5
 - 3.3 Lower Detection Limit 5
 - 3.4 Isotropy 5
 - 3.5 Boundary Effect 5
- 4 Measurement Uncertainty 5
- 5 Calibration Measurement Results 6
 - 5.1 Sensitivity in air 6
 - 5.2 Linearity 7
 - 5.3 Sensitivity in liquid 7
 - 5.4 Isotropy 8
- 6 List of Equipment 9

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.

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-3 GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.231 MΩ Dipole 2: R2=0.225 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.

Page: 4/9

*This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.*

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%

Page: 5/9

*This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.*

Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

5 CALIBRATION MEASUREMENT RESULTS

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

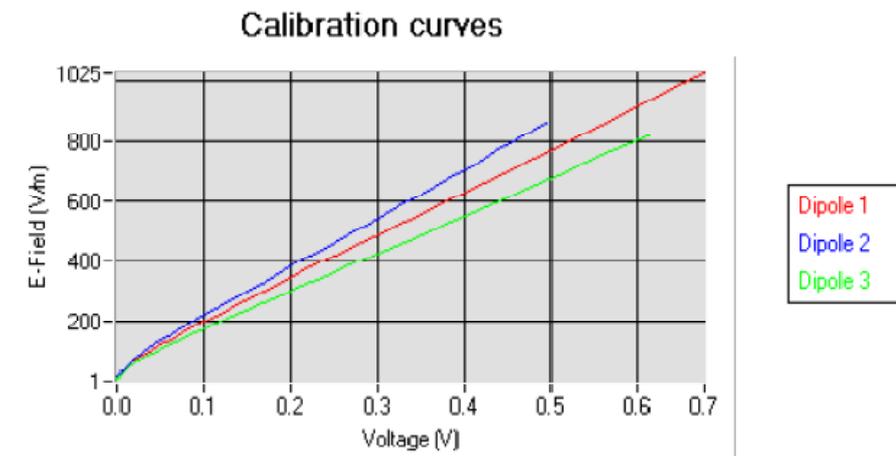
5.1 SENSITIVITY IN AIR

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
8.57	4.83	7.15

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

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

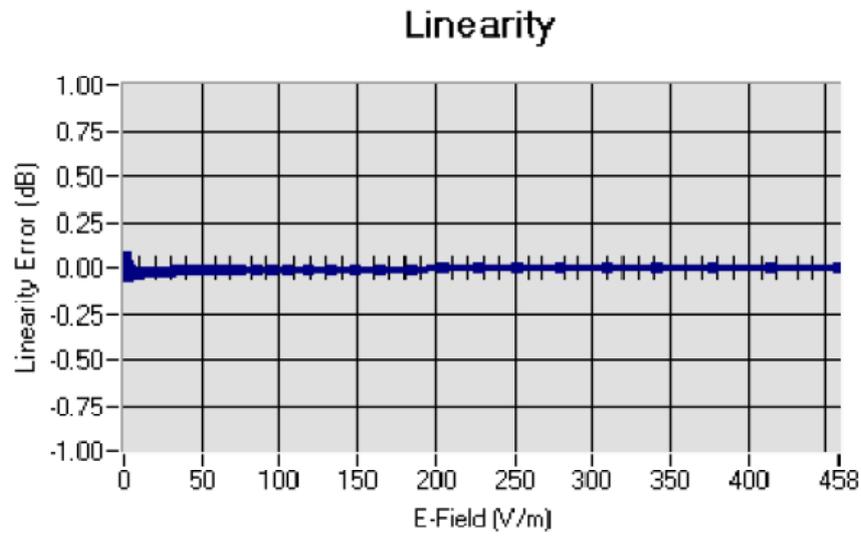
$$E = \sqrt{E_1^2 + E_2^2 + E_3^2}$$



Page: 6/9

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.

5.2 LINEARITY



Linearity: $\pm 1.55\%$ ($\pm 0.07\text{dB}$)

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL850	835	42.80	0.89	5.69
BL850	835	53.45	0.96	5.82
HL900	900	42.47	0.96	5.34
BL900	900	56.68	1.08	5.55
HL1800	1800	41.30	1.38	4.75
BL1800	1800	53.27	1.51	4.96
HL1900	1900	41.09	1.42	5.25
BL1900	1900	54.20	1.54	5.43
HL2000	2000	39.72	1.43	4.81
BL2000	2000	53.90	1.53	4.95
HL2450	2450	39.05	1.77	4.93
BL2450	2450	52.98	1.93	5.09
HL2600	2600	38.35	1.92	5.08
BL2600	2600	51.82	2.19	5.22

LOWER DETECTION LIMIT: 7mW/kg

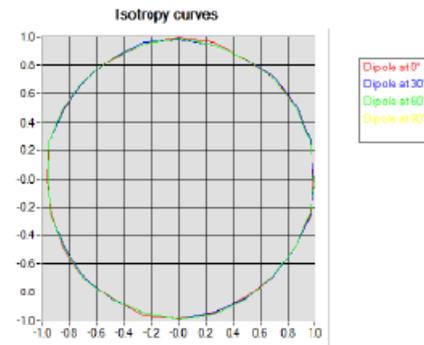
Page: 7/9

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.

5.4 ISOTROPY

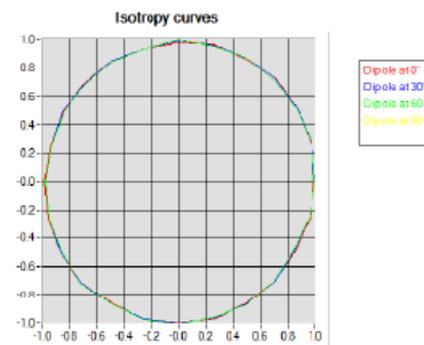
HL900 MHz

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



HL1300 MHz

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



Page: 819

*This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.*

**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	10/2014	10/2015
Multimeter	Keithley 2000	1188658	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	8/2013	8/2016

Page: 9/9

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of SATIMO.



COMOSAR E-Field Probe Calibration Report

Ref: ACR.125.1.15.SATU.A

**CCIC SOUTHERN ELECTRONIC PRODUCT
TESTING (SHENZHEN) CO., LTD
ELECTRONIC TESTING BUILDING, SHAHE ROAD, XILI
TOWN
SHENZHEN, P.R. CHINA (POST CODE:518055)
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: SN 09/13 EP169**

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



05/05/15

Summary:

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



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.125.1.14.SATU.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Jérôme LUC	Product Manager	5/5/2015	<i>JS</i>
<i>Checked by :</i>	Jérôme LUC	Product Manager	5/5/2015	<i>JS</i>
<i>Approved by :</i>	Kim RUTKOWSKI	Quality Manager	5/5/2015	<i>Kim Rutkowski</i>

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

<i>Issue</i>	<i>Date</i>	<i>Modifications</i>
A	5/5/2015	Initial release

Page: 2/9

*This document shall not be reproduced, except in full or in part, without the written approval of MVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to
be released in whole or part without written approval of MVG.*

TABLE OF CONTENTS

1	Device Under Test	4
2	Product Description	4
2.1	General Information	4
3	Measurement Method	4
3.1	Linearity	4
3.2	Sensitivity	5
3.3	Lower Detection Limit	5
3.4	Isotropy	5
3.5	Boundary Effect	5
4	Measurement Uncertainty	5
5	Calibration Measurement Results	6
5.1	Sensitivity in air	6
5.2	Linearity	7
5.3	Sensitivity in liquid	7
5.4	Isotropy	8
6	List of Equipment	9

Page: 3/9

*This document shall not be reproduced, except in full or in part, without the written approval of MVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to
be released in whole or part without written approval of MVG.*



1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE5
Serial Number	SN 09/13 EP169
Product Condition (new / used)	Used
Frequency Range of Probe	0.7 GHz-3GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.222 MΩ Dipole 2: R2=0.232 MΩ Dipole 3: R3=0.221 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Dosimetric E field Dipole

Probe Length	330 mm
Length of Individual Dipoles	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.

Page: 4/9

*This document shall not be reproduced, except in full or in part, without the written approval of MVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.*



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%

Page: 5/9

*This document shall not be reproduced, except in full or in part, without the written approval of MVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.*

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

5 CALIBRATION MEASUREMENT RESULTS

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

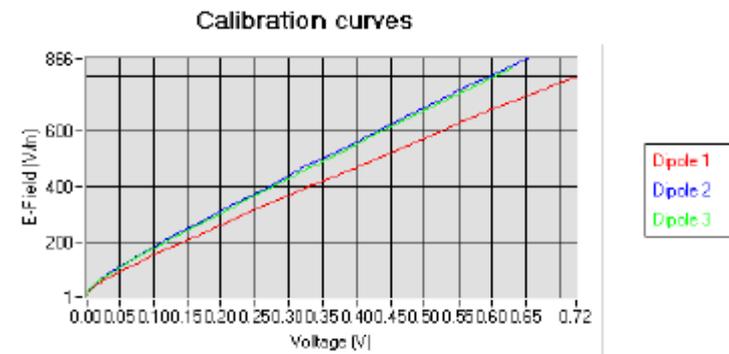
5.1 SENSITIVITY IN AIR

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Nomy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Nomz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
7.16	6.11	5.85

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
95	96	91

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

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

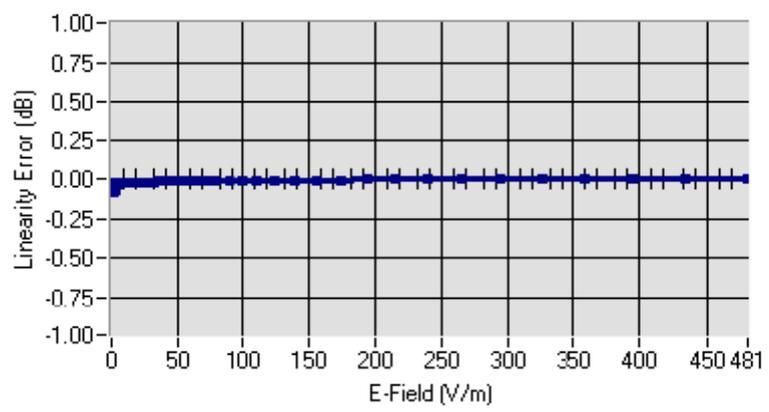


Page: 6/9

*This document shall not be reproduced, except in full or in part, without the written approval of hdVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of hdVG.*


COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.125.1.14.SATUA

 5.2 LINEARITY
Linearity


Linearity: $\pm 1.83\%$ ($\pm 0.08\text{dB}$)

 5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon(S/m)	ConvF
HL750	750	41.85	0.90	5.26
BL750	750	56.28	0.98	5.41
HL2300	2300	38.75	1.64	4.75
BL2300	2300	51.66	1.77	4.93

LOWER DETECTION LIMIT: 7mW/kg

Page: 7/9

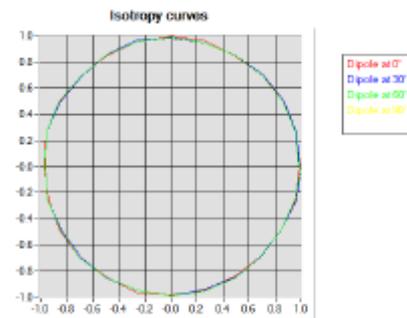
*This document shall not be reproduced, except in full or in part, without the written approval of MVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to
be released in whole or part without written approval of MVG.*



5.4 ISOTROPY

HL 750 MHz

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



Page: 8/9

*This document shall not be reproduced, except in full or in part, without the written approval of MVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to
be released in whole or part without written approval of MVG.*



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.125.1.14.SATU.A

6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
Flat Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2013	02/2016
Reference Probe	MVG	EP 94 SN 37/08	10/2014	10/2015
Multimeter	Keithley 2000	1188656	12/2013	12/2016
Signal Generator	Agilent E4438C	MY49070581	12/2013	12/2016
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2013	12/2016
Power Sensor	HP ECP-E26A	US37181460	12/2013	12/2016
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
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

Page: 9/9

*This document shall not be reproduced, except in full or in part, without the written approval of hVVG.
The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of hVVG.*

SID835 Dipole Calibration Certificate**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**



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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.240.1.14 SATU.A

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

<i>Distribution :</i>	<i>Customer Name</i> CCIC SOUTHERN ELECTRONIC PRODUCT TESTING (SHENZHEN) Co., Ltd
-----------------------	---

<i>Issue</i>	<i>Date</i>	<i>Modifications</i>
A	8/29/2014	Initial release



TABLE OF CONTENTS

1 Introduction.....4

2 Device Under Test4

3 Product Description4

 3.1 General Information 4

4 Measurement Method 5

 4.1 Return Loss Requirements 5

 4.2 Mechanical Requirements 5

5 Measurement Uncertainty 5

 5.1 Return Loss 5

 5.2 Dimension Measurement 5

 5.3 Validation Measurement 5

6 Calibration Measurement Results..... 6

 6.1 Return Loss and Impedance In Head Liquid 6

 6.2 Return Loss and Impedance In Body Liquid 6

 6.3 Mechanical Dimensions 6

7 Validation measurement 7

 7.1 Head Liquid Measurement 7

 7.2 SAR Measurement Result With Head Liquid 8

 7.3 Body Liquid Measurement 9

 7.4 SAR Measurement Result With Body Liquid 10

8 List of Equipment 11

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 09/13 DIP0G835-217
Product Condition (new / used)	used

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

Page: 4/11

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.



4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

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

4.2 MECHANICAL REQUIREMENTS

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

5 MEASUREMENT UNCERTAINTY

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

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

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

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

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

5.3 VALIDATION MEASUREMENT

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

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

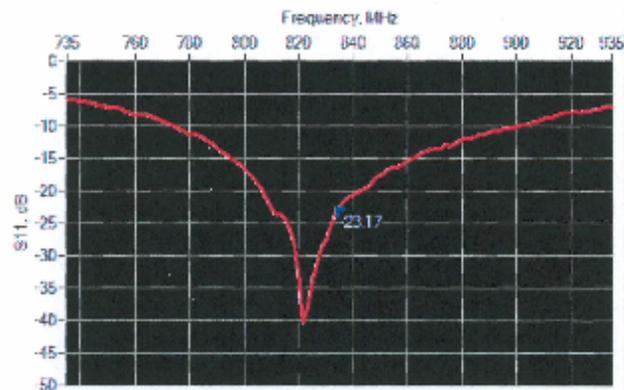
Page: 3/11

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.



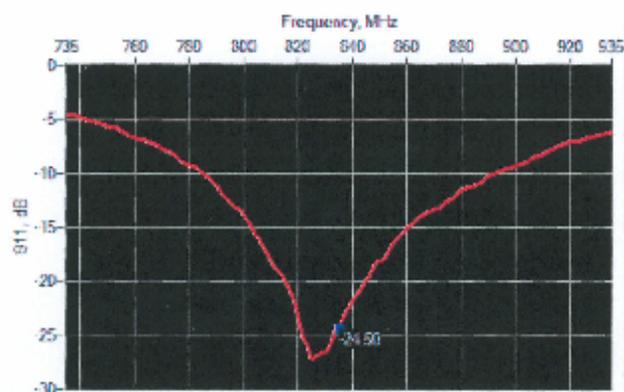
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-23.17	-20	$57.4 \Omega - 0.2 j\Omega$

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-24.50	-20	$55.0 \Omega + 3.9 j\Omega$

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 %		156.7 ±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

Page: 6/11

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.240.L14.SATU.A

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 %		42.7 ±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 %	

Page: 7/11

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.240.14.SATU.A

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	OPEN SAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: ϵ_{ps} : 42.3 σ_{sigma} : 0.92
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoan Scan Resolution	dx=8mm/dy=8mm/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	9.77 (0.98)	6.22	6.30 (0.63)
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	

Page: 8/11

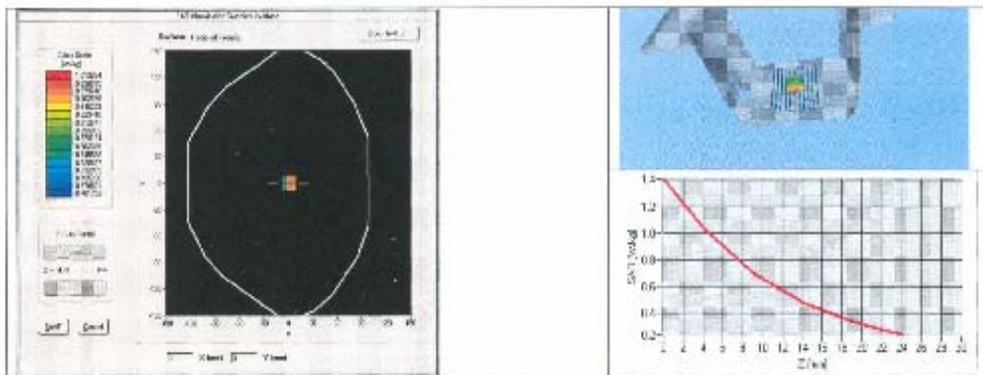
This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.240.1.14.SAT1.A

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 %	

Page: 9/11

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.



SAR REFERENCE DIPOLE CALIBRATION REPORT

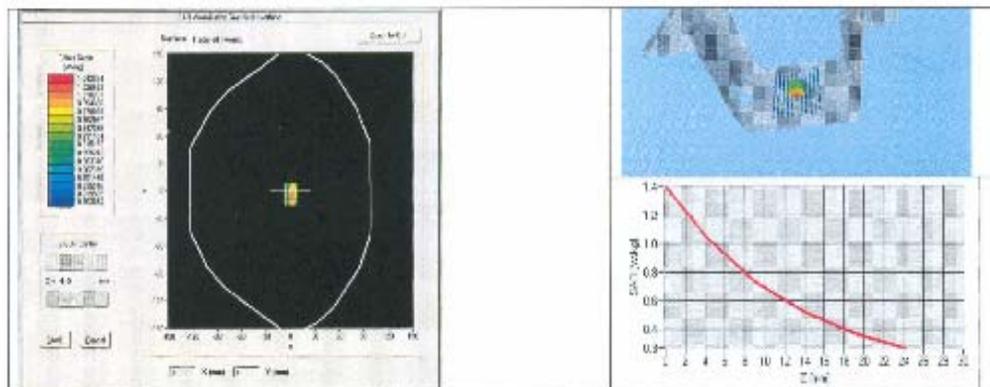
Ref: ACR 340 1 14-SAT/IA

5500	48.5 ±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	10.31 (1.03)	6.74 (0.67)





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	11-861-9	8/2012	8/2015

Page: 11/11

This document shall not be reproduced, except in full or in part, without the written approval of SATIMO.

SID1800 Dipole Calibration Certificate**SAR Reference Dipole Calibration Report**

Ref : ACR.240.3.14.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: 1800 MHZ
SERIAL NO.: SN 09/13 DIP1G800-216**

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

**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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.240.3.14.SATU.A

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

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

<i>Issue</i>	<i>Date</i>	<i>Modifications</i>
A	8/29/2014	Initial release



TABLE OF CONTENTS

1 Introduction..... 4

2 Device Under Test 4

3 Product Description 4

 3.1 General Information 4

4 Measurement Method 5

 4.1 Return Loss Requirements 5

 4.2 Mechanical Requirements 5

5 Measurement Uncertainty 5

 5.1 Return Loss 5

 5.2 Dimension Measurement 5

 5.3 Validation Measurement 5

6 Calibration Measurement Results 6

 6.1 Return Loss and Impedance In Head Liquid 6

 6.2 Return Loss and Impedance In Body Liquid 6

 6.3 Mechanical Dimensions 6

7 Validation measurement 7

 7.1 Head Liquid Measurement 7

 7.2 SAR Measurement Result With Head Liquid 8

 7.3 Body Liquid Measurement 9

 7.4 SAR Measurement Result With Body Liquid 10

8 List of Equipment 11

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 1800 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID1800
Serial Number	SN 09/13 DIP1G800-216
Product Condition (new / used)	Used

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