SAR Test Report

Report No.: AGC00607170501FH01

FCC ID	:	Q5EW60W65
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	POC Trunked Two-way Radio
BRAND NAME	:	KIRISUN
MODEL NAME	:	W60, iTALK-220, W65, iTALK-200
CLIENT	:	Kirisun Communications Co., Ltd.
DATE OF ISSUE	:	June 02,2017
STANDARD(S)	:	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
REPORT VERSION	:	V1.0

*A*ttestation of Global Compliance(Shenzhen) Co., Ltd.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	June 02,2017	Valid	Original Report

Test Report Certification

Applicant Name	Kirisun Communications Co., Ltd.
Applicant Address	3-6Flrs, ROBETA Building, No.1, QiMin Road, Song Ping Shan Area, Science & Industry Park, Nanshan District, Shenzhen518057 P.R.China
Manufacturer Name	Kirisun Communications Co., Ltd.
Manufacturer Address	3-6Flrs, ROBETA Building, No.1, QiMin Road, Song Ping Shan Area, Science & Industry Park, Nanshan District, Shenzhen518057 P.R.China
Product Designation	POC Trunked Two-way Radio
Brand Name	KIRISUN
Model Name	W60, iTALK-220, W65, iTALK-200
Different Description	All the same, except for the model name and appearance.W60 and iTALK-220 with screen and buttons, W65 and iTALK-200 without screen and buttons. The test model is W60.
EUT Voltage	DC3.7V by battery
Applicable Standard	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
Test Date	May 16,2017 to June 02,2017
Performed Location	Attestation of Global Compliance(Shenzhen) Co., Ltd. 2 F, Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen, China
Report Template	AGCRT-US-3G3/SAR (2016-01-01)

Tested By

Eric Zhou(Zhou Yongkang) June 02,2017

Checked By

Angela Li(Li Jiao) June 02,2017

Authorized By

Forrest Lei(Lei Yonggang) June 02,2017
Authorized Officer

TABLE OF CONTENTS

1. SUMMARY OF MAXIMUM SAR VALUE 5

2. GENERAL INFORMATION 6

2.1. EUT DESCRIPTION 6

3. SAR MEASUREMENT SYSTEM 8

3.1. THE SATIMO SYSTEM USED FOR PERFORMING COMPLIANCE TESTS CONSISTS OF FOLLOWING ITEMS 8
3.2. COMOSAR E-FIELD PROBE 9
3.3. ROBOT 9
3.4. VIDEO POSITIONING SYSTEM 10
3.5. DEVICE HOLDER 10
3.6. SAM TWIN PHANTOM 11

4. SAR MEASUREMENT PROCEDURE 12

4.1. SPECIFIC ABSORPTION RATE (SAR) 12
4.2. SAR MEASUREMENT PROCEDURE 13
4.3. RF EXPOSURE CONDITIONS 15

5. TISSUE SIMULATING LIQUID 16

5.1. THE COMPOSITION OF THE TISSUE SIMULATING LIQUID 16
5.2. TISSUE DIELECTRIC PARAMETERS FOR HEAD AND BODY PHANTOMS 16
5.3. TISSUE CALIBRATION RESULT 17

6. SAR SYSTEM CHECK PROCEDURE 19

6.1. SAR SYSTEM CHECK PROCEDURES 19
6.2. SAR SYSTEM CHECK 20

7. EUT TEST POSITION 21

7.1. BODY WORN POSITION 21

8. SAR EXPOSURE LIMITS 22

9. TEST EQUIPMENT LIST 23

10. MEASUREMENT UNCERTAINTY 24

11. CONDUCTED POWER MEASUREMENT 27

12. TEST RESULTS 35

12.1. SAR TEST RESULTS SUMMARY 35

APPENDIX A. SAR SYSTEM CHECK DATA 40

APPENDIX B. SAR MEASUREMENT DATA 52

APPENDIX C. TEST SETUP PHOTOGRAPHS 72

APPENDIX D. CALIBRATION DATA 74

1. SUMMARY OF MAXIMUM SAR VALUE

The maximum results of Specific Absorption Rate (SAR) found during testing for EUT are as follows:

Frequency Band	Highest Reported 1g-SAR(W/Kg)		SAR Test Limit (W/Kg)
	In Front of Face (with 25mm separation)	Body BackTouch (with 0mm separation)	
GSM 850	0.182	0.350	1.6
PCS 1900	0.090	0.423	
UMTS Band V	0.105	0.407	
UMTS Band II	0.048	0.068	
WIFI 2.4G	0.139	0.335	
Simultaneous Reported SAR	0.758		
SAR Test Result	PASS		

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/Kg) specified in IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and the following specific FCC Test Procedures:

- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 648474 D04 Handset SAR v01r03
- KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r04
- KDB 941225 D01 3G SAR Procedures v03r01
- KDB 248227 D01 802 11 Wi-Fi SAR v02r02
- KDB 643646 D01 SAR Test for PTT Radios v01r03

2. GENERAL INFORMATION

2.1. EUT Description

General Information	
Product Designation	POC Trunked Two-way Radio
Test Model	W60
Hardware Version	V1.0
Software Version	V1.0
Device Category	Portable
Exposure Category:	General Population/Uncontrolled Environments
Antenna Type	External
GSM and GPRS& EGPRS	
Support Band	☒GSM 850 ☒PCS 1900 ☒GSM 900 ☒DCS 1800
GPRS & EGPRS Type	Class B
GPRS & EGPRS Class	Class 12(1Tx+4Rx, 2Tx+3Rx, 3Tx+2Rx, 4Tx+1Rx)
TX Frequency Range	GSM 850 : 820-850MHz; PCS 1900: 1850-1910MHz;
RX Frequency Range	GSM 850 : 869~894MHz; PCS 1900: 1930~1990MHz
Release Version	R99
Type of modulation	GMSK for GSM/GPRS; GMSK & 8-PSK for EGPRS
Antenna Gain	0.5dBi
Max. Average Power	GSM850: 30.44dBm; PCS1900: 27.32dBm
WCDMA	
Support Band	☒UMTS FDD Band II ☒UMTS FDD Band V ☒UMTS FDD Band I ☒UMTS FDD Band VIII
HS Type	HSPA(HSUPA/HSDPA)
TX Frequency Range	WCDMA FDD Band II: 1850-1910MHz;WCDMA FDD Band V: 820-850MHz
RX Frequency Range	WCDMA FDD Band II: 1930-1990MHz;WCDMA FDD Band V: 869-894MHz
Release Version	Rel-6
Type of modulation	HSDPA:QPSK/16QAM; HSUPA:BPSK; WCDMA:QPSK
Antenna Gain	0.5dBi
Max. Average Power	Band II: 20.71dBm; Band V: 20.76dBm

EUT Description(Continue)

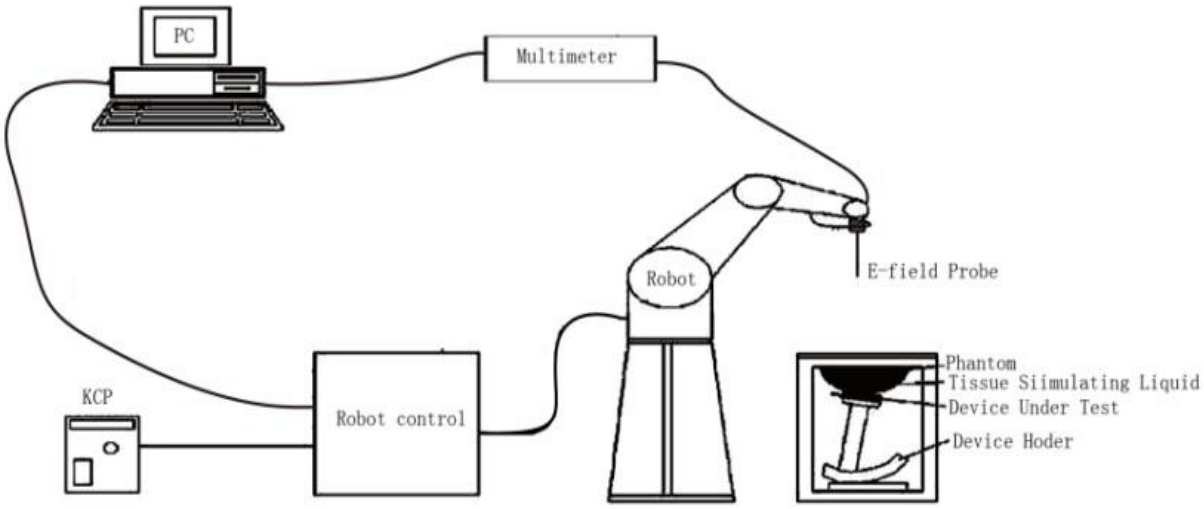
Bluetooth	
Bluetooth Version	☐V2.0 ☐V2.1 ☐V2.1+EDR ☐V3.0 ☐V3.0+HS ☒V4.0 ☐V4.1
Operation Frequency	2402~2480MHz
Type of modulation	☒GFSK ☒Π/4-DQPSK ☒8-DPSK
Peak Power	5.325dBm
Antenna Gain	0.6dBi
WIFI	
WIFI Specification	☐802.11a ☒802.11b ☒802.11g ☒802.11n(20) ☒802.11n(40)
Operation Frequency	2412~2462MHz
Avg. Burst Power	11b:15.88dBm,11g:13.10dBm,11n(20):12.87dBm,11n(40):11.39dBm
Antenna Gain	0.6dBi
Body-Worn Accessories:	Belt Clip with headset
Face-Head Accessories:	None
Battery	
Battery Type (s) Tested:	Brand name: KIRISUN Model No. : KB-W65 Voltage and Capacitance: 3.7 V & 3600mAh

Note: 1.CMU200 can measure the average power and Peak power at the same time
2.The sample used for testing is end product.

Product	Type
	☒ Production unit ☐ Identical Prototype

3. SAR MEASUREMENT SYSTEM

3.1. The SATIMO system used for performing compliance tests consists of following items



The COMOSAR system for performing compliance tests consists of the following items:

- The PC. It controls most of the bench devices and stores measurement data.A computer running WinXP and the Opensar software.
- The E-Field probe. The probe is a 3-axis system made of 3 distinct dipoles. Each dipole returns a voltage in function of the ambient electric field.
- The Keithley multimeter measures each probe dipole voltages.
- The SAM phantom simulates a human head. The measurement of the electric field is made inside the phantom.
- The liquids simulate the dielectric properties of the human head tissues.
- The network emulator controls the mobile phone under test.
- The validation dipoles are used to measure a reference SAR. They are used to periodically check the bench to make sure that there is no drift of the system characteristics over time.
- The phantom, the device holder and other accessories according to the targeted measurement.

3.2. COMOSAR E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SATIMO. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SATIMO conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528 and relevant KDB files.) The calibration data are in Appendix D.

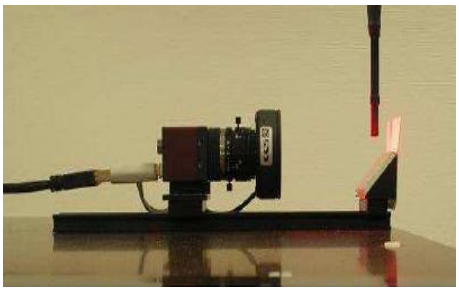
Isotropic E-Field Probe Specification

Model	SSE5	
Manufacture	MVG	
Identification No.	SN 14/16 EP308	
Frequency	0.3GHz-3.7GHz Linearity:±0.08dB(300MHz-3.7GHz)	
Dynamic Range	0.01W/Kg-100W/Kg Linearity:±0.08dB	
Dimensions	Overall length:330mm Length of individual dipoles:4.5mm Maximum external diameter:8mm Probe Tip external diameter:5mm Distance between dipoles/ probe extremity:2.7mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 3 GHz with precision of better 30%.	

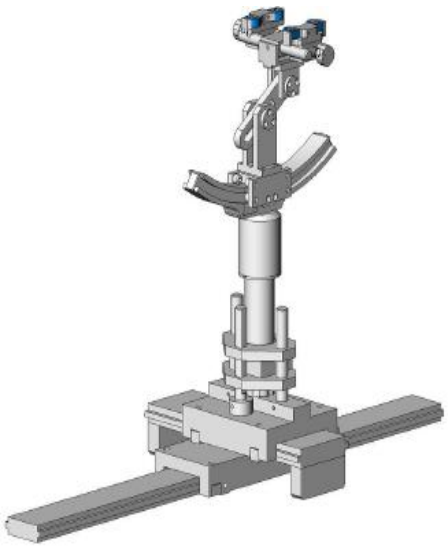
3.3. Robot

The COMOSAR system uses the KUKA robot from SATIMO SA (France).For the 6-axis controller COMOSAR system, the KUKA robot controller version from SATIMO is used. The XL robot series have many features that are important for our application: □ High precision (repeatability 0.02 mm) □ High reliability (industrial design) □ Jerk-free straight movements □ Low ELF interference (the closed metallic construction shields against motor control fields) □ 6-axis controller	

3.4. Video Positioning System

The video positioning system is used in OpenSAR to check the probe. Which is composed of a camera, LED, mirror and mechanical parts.The camera is piloted by the main computer with firewire link. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.	

3.5. Device Holder

The COMOSAR device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles. The COMOSAR device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity εr =3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.	

3.6. SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas: □ Left head □ Right head □ Flat phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

4. SAR MEASUREMENT PROCEDURE

4.1. Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in 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 occupational/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

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

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

SAR is expressed in units of Watts per kilogram (W/Kg)
SAR can be obtained using either of the following equations:

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

$$SAR = c_h \left.\frac{dT}{dt}\right|_{t=0}$$

Where

SAR	is the specific absorption rate in watts per kilogram;
E	is the r.m.s. value of the electric field strength in the tissue in volts per meter;
σ	is the conductivity of the tissue in siemens per metre;
ρ	is the density of the tissue in kilograms per cubic metre;
c_h	is the heat capacity of the tissue in joules per kilogram and Kelvin;
$\frac{dT}{dt} \mid t = 0$	is the initial time derivative of temperature in the tissue in kelvins per second

4.2. SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface is 2.7mm This distance cannot be smaller than the distance os sensor calibration points to probe tip as `defined in the probe properties,

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in SATIMO software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in db) is specified in the standards for compliance testing. For example, a 2db range is required in IEEE Standard 1528, whereby 3db is a requirement when compliance is assessed in accordance with the ARIB standard (Japan) If one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximum are detected, the number of Zoom Scan has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100MHz to 6GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

Zoom Scan are used to assess the peak spatial SAR value within a cubic average volume containing 1g abd 10g of simulated tissue. The Zoom Scan measures points(refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1g and 10g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB865664 d01 SAR Measurement 100MHz to 6GHz

Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the same settings. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

4.3. RF Exposure Conditions

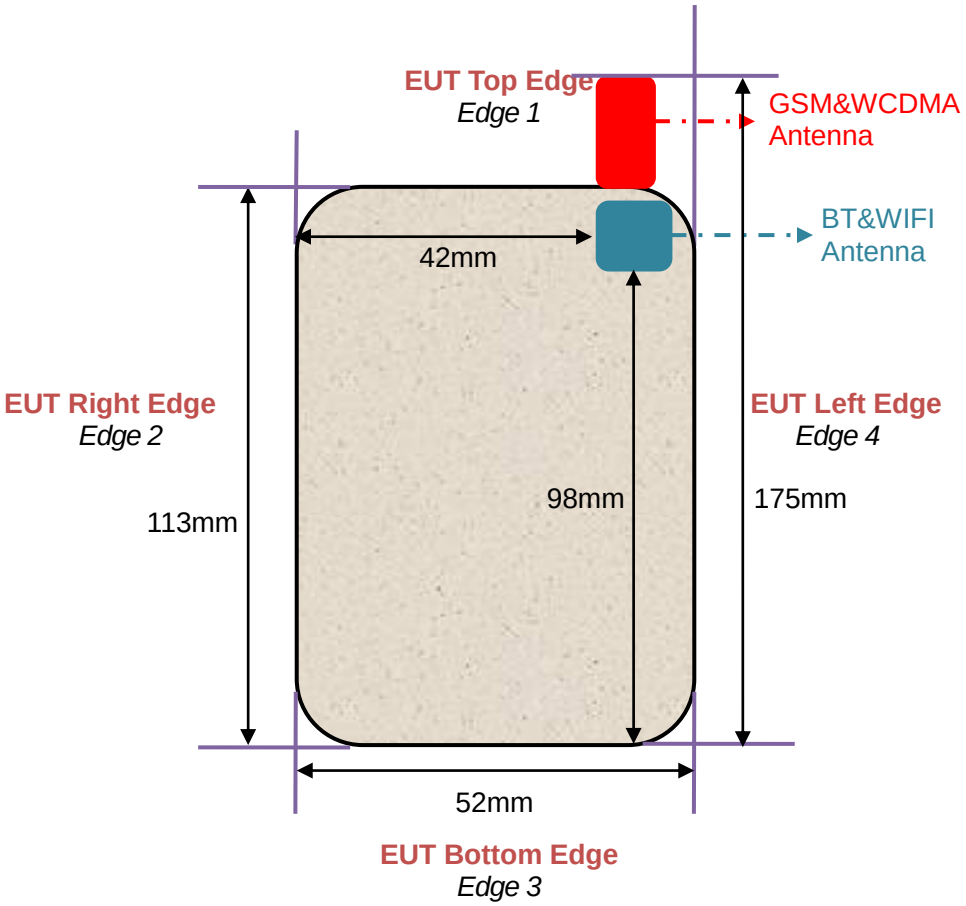
Test Configuration and setting:

The EUT is a model of Public network interphone. It supports GPRS/EGPRS, WCDMA/HSPA, BT, WIFI

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator were established by air link. The distance between the EUT and the antenna is larger than 50cm, and the output power radiated from the emulator antenna is at least 30db smaller than the output power of EUT.

For WLAN testing, the EUT is configured with the WLAN continuous TX tool through software control.

Antenna Location: (the back view)



5. TISSUE SIMULATING LIQUID

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm.The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in 5.2

5.1. The composition of the tissue simulating liquid

Ingredient (% Weight) / **Frequency** (MHz)	**Water**	**Nacl**	**Polysorbate 20**	**DGBE**	**1,2-Propanediol**	**Triton X-100**
835 Head	50.36	1.25	48.39	0.0	0.0	0.0
835 Body	54.00	1	0.0	15	0.0	30
1900 Head	54.9	0.18	0.0	44.92	0.0	0.0
1900 Body	70	1	0.0	9	0.0	20
2450 Head	71.88	0.16	0.0	7.99	0.0	19.97
2450 Body	70	1	0.0	9	0.0	20

5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE 1528 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 IEEE 1528.

Target Frequency (MHz)	**head**		**body**	
	εr	**σ (S/m)**	**εr**	**σ (S/m)**
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	1.01	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

(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using SATIMO Dielectric Probe Kit and R&S Network Analyzer ZVL6.

Tissue Stimulant Measurement for 835MHz					
	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [°C]	Test time
		εr 41.5 (39.425-43.575)	δ[s/m] 0.90(0.855-0.945)		
Head	824.2	42.31	0.88	21.5	May 16,2017
	826.4	42.12	0.89		
	835	41.88	0.90		
	836.6	41.43	0.91		
	846.6	41.16	0.93		
	848.8	40.95	0.94		
	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr 55.20(52.44-57-96)	δ[s/m]0.97(0.9215-1.0185)		
Body	824.2	56.63	0.93	21.6	May 16,2017
	826.4	56.32	0.94		
	835	55.96	0.95		
	836.6	55.54	0.96		
	846.6	55.29	0.97		
	848.8	54.88	0.98		

Tissue Stimulant Measurement for 1900MHz					
	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [°C]	Test time
		εr40.00(38.00-42.00)	δ[s/m]1.40(1.33-1.47)		
Head	1850.2	41.03	1.35	21.9	May 23,2017
	1852.4	40.95	1.36		
	1880	40.12	1.38		
	1900	39.25	1.40		
	1907.6	38.77	1.42		
	1909.8	38.52	1.43		
	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr53.30(50.635-55.965)	δ[s/m]1.52(1.444-1.596)		
Body	1850.2	55.06	1.47	21.7	May 23,2017
	1852.4	54.82	1.48		
	1880	53.04	1.52		
	1900	52.23	1.54		
	1907.6	51.98	1.55		
	1909.8	51.55	1.56		

Tissue Stimulant Measurement for 2450MHz					
Head	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [°C]	Test time
		εr39.2(37.24-41.16)	δ[s/m]1.80(1.71-1.89)		
	2412	40.66	1.75	21.4	June 02,2017
	2437	39.87	1.79		
	2450	39.32	1.81		
	2462	38.68	1.85		
Body	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [°C]	Test time
		εr52.7(50.065-55.335)	δ[s/m]1.95(1.8525-2.0475)		
	2412	54.08	1.88	21.2	June 02,2017
	2437	53.15	1.92		
	2450	52.56	1.94		
	2462	51.89	1.97		

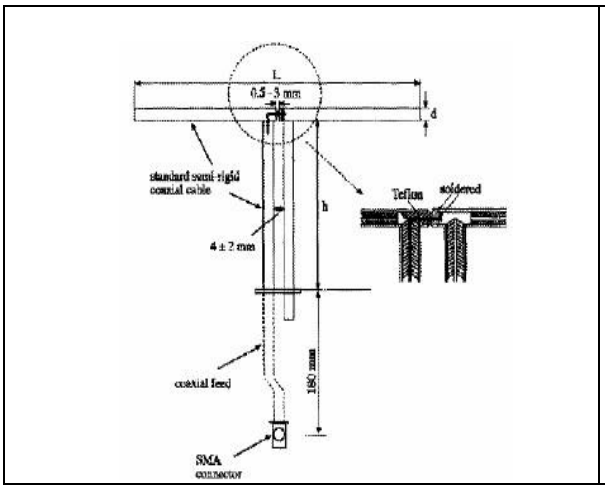
6. SAR SYSTEM CHECK PROCEDURE

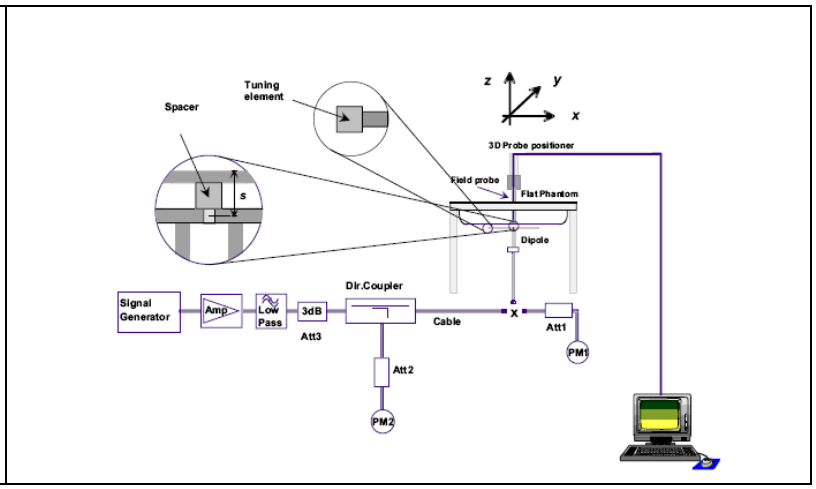
6.1. SAR System Check Procedures

SAR system check is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

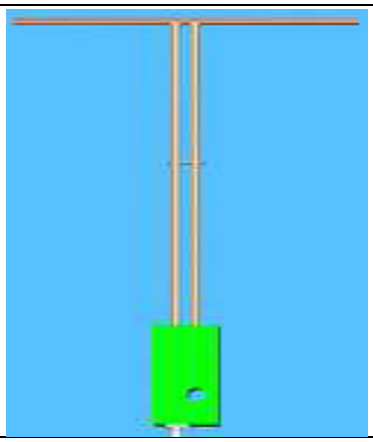
Each SATIMO system is equipped with one or more system check kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system check and system validation. System kit includes a dipole, and dipole device holder.

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





6.2. SAR System Check
6.2.1. Dipoles

	The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of IEEE. the table below provides details for the mechanical and electrical Specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
835MHz	161.0	89.8	3.6
1900MHz	68	39.5	3.6
2450MHz	51.5	30.4	3.6

6.2.2. System Check Result

System Performance Check at 835MHz&1900MHz &2450MHz for Head								
Validation Kit: SN29/15 DIP 0G835-383&SN 29/15 DIP 1G900-389& SN 29/15DIP 2G450-393								
Frequency [MHz]	Target Value(W/Kg)		Reference Result (± 10%)		Tested Value(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
835	10.04	6.43	9.036-11.044	5.787 -7.073	9.59	5.89	21.5	May 16,2017
1900	41.44	21.33	37.296-45.584	19.197-23.463	39.47	20.43	21.9	May 23,2017
2450	54.53	24.30	49.077-59.983	21.87-26.730	49.73	22.40	21.4	June 02,2017
System Performance Check at 835 MHz &1900MHz & 2450MHz for Body								
Frequency [MHz]	Target Value(W/Kg)		Reference Result (± 10%)		Tested Value(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
835	9.85	6.45	8.865-10.835	5.805-7.095	9.83	6.04	21.6	May 16,2017
1900	39.38	20.86	35.442-43.318	18.774-22.946	38.89	19.97	21.7	May 23,2017
2450	49.92	23.16	44.928-54.912	20.844-25.476	51.54	23.17	21.2	June 02,2017

7. EUT TEST POSITION

This EUT was tested in **Body back and Face up.**

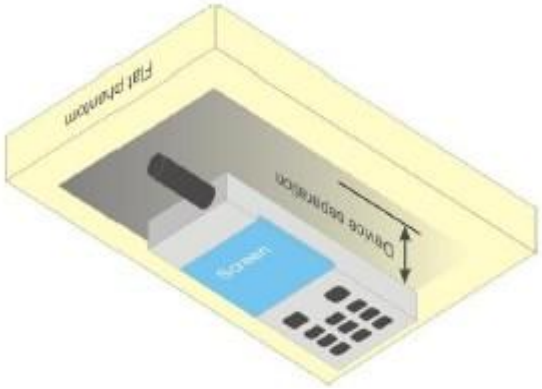
7.1. Body Worn Position

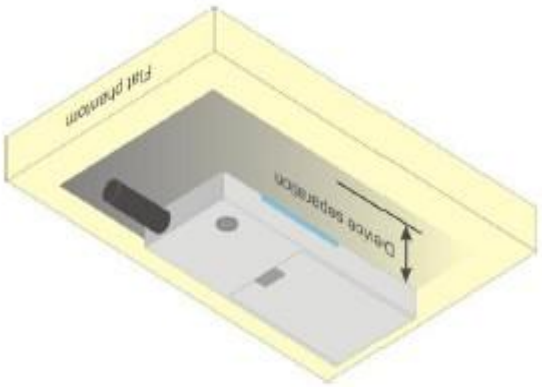
(1) To position the EUT parallel to the phantom surface.

(2) To adjust the EUT parallel to the flat phantom.

(3) To adjust the distance between the EUT surface and the flat phantom to **0mm for body back touch and face up with 25mm.**

.





8. SAR EXPOSURE LIMITS

SAR assessments have been made in line with the requirements of IEEE-1528, and comply with ANSI/IEEE C95.1-2005 “Uncontrolled Environments” limits. These limits apply to a location which is deemed as “Uncontrolled Environment” which can be described as a situation where the general public may be exposed to an RF source with no prior knowledge or control over their exposure.

Limits for General population/Uncontrolled exposure Environment

Type Exposure Limits	general population/uncontrolled exposure limits (W/Kg)
Spatial Average SAR (whole body)	1.6

9. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
SAR Probe	MVG	SN 14/16 EP308	12/05/2016	12/04/2017
TISSUE Probe	SATIMO	SN 23/16 OCPG 75	07/05/2016	07/04/2017
Phantom	SATIMO	SN_4511_SAM90	Validated. No cal required.	Validated. No cal required.
Liquid	SATIMO	-	Validated. No cal required.	Validated. No cal required.
Comm Tester	Agilent-8960	GB46310822	03/02/2017	03/01/2018
Multimeter	Keithley 2000	1188656	03/02/2017	03/01/2018
Dipole	SATIMO SID835	SN29/15 DIP 0G835-383	07/05/2016	07/04/2019
Dipole	SATIMO SID1900	SN 29/15 DIP 1G900-389	07/05/2016	07/04/2019
Dipole	SATIMO SID2450	SN29/15 DIP 2G450-393	07/05/2016	07/04/2019
Signal Generator	Agilent-E4438C	US41461365	03/02/2017	03/01/2018
Vector Analyzer	Agilent / E4440A	US40420298	07/02/2016	07/01/2017
Network Analyzer	Rhode & Schwarz ZVL6	SN100132	03/02/2017	03/01/2018
Attenuator	Warison /WATT-6SR1211	N/A	N/A	N/A
Attenuator	Mini-circuits / VAT-10+	N/A	N/A	N/A
Amplifier	EM30180	SN060552	03/02/2017	03/01/2018
Directional Couple	Werlatone/ C5571-10	SN99463	07/02/2016	07/01/2017
Directional Couple	Werlatone/ C6026-10	SN99482	07/02/2016	07/01/2017
Power Sensor	NRP-Z21	1137.6000.02	10/10/2016	10/09/2017
Power Sensor	NRP-Z23	US38261498	03/02/2017	03/01/2018
Power Viewer	R&S	V2.3.1.0	N/A	N/A

Note: Per KDB 865664 Dipole SAR Validation, AGC Lab has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:
1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

10. MEASUREMENT UNCERTAINTY

SATIMO Uncertainty-SN 14/16 EP308 Measurement uncertainty for DUT averaged over 1 gram / 10 gram.(Head)									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	5.831	N	1	1	1	5.83	5.83	∞
Probe Modulation	E2.5	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Axial Isotropy	E.2.2	0.6	R	$\sqrt{3}$	1	1	0.36	0.35	∞
Hemispherical Isotropy	E.2.2	0.9	R	$\sqrt{3}$	1	1	0.52	0.52	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	1.91	R	$\sqrt{3}$	1	1	0.69	0.69	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∞
Response Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
RF Ambient Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF Ambient Reflection	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe Positioner	E.6.2	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Probe Positioning	E.6.3	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Post-processing	E.5	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Test sample Related									
Device Positioning	E.4.2	0.03	N	1	1	1	3.60	3.60	∞
Device Holder	E.4.1	5	N	1	1	1	2.90	2.90	∞
Measurement SAR Drift	E.2.9	0.65	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Power Scaling	E.6.5	5	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Phantom and set-up									
Phantom Uncertainty	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid Conductivity(Meas.)	E.3.3	5	N	1	0.78	0.71	3.90	3.55	M
Liquid Permittivity(Meas.)	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid Conductivity-temperature uncertainty	E.3.4	5	R	$\sqrt{3}$	0.78	0.71	2.25	2.05	∞
Liquid Permittivity-temperature uncertainty	E.3.4	5	R	$\sqrt{3}$	0.23	0.26	0.66	0.75	∞
Combined Standard Uncertainty			RSS				10.39	10.118	∞
Expanded Uncertainty (95% Confidence interval)			k				20.86	20.315	

SATIMO Uncertainty-SN 14/16 EP308 System validation uncertainty for Dipole averaged over 1 gram / 10 gram.(Head)									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	5.831	N	1	1	1	5.83	5.83	∞
Probe Modulation	E.2.5	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Axial Isotropy	E.2.2	0.6	R	$\sqrt{3}$	1	1	1.44	1.44	∞
Hemispherical Isotropy	E.2.2	0.9	R	$\sqrt{3}$	1	1	0.52	0.52	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	1.2	R	$\sqrt{3}$	1	1	0.69	0.69	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∞
Response Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
RF Ambient Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF Ambient Reflection	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe Positioner	E.6.1	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Probe Positioning	E.6.2	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Post-processing	E.6.3	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
System validation source（dipole）									
Deviation of exp. dipole	E6.4	5	R	1	1	1	5.00	5.00	∞
Dipole Axis to Liquid Dist.	8,E.6.6	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Input power & SAR drift	8,6.6.4	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Phantom and set-up									
Phantom Uncertainty	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid Conductivity(Meas.)	E.3.3	5	N	1	0.78	0.71	3.90	3.55	M
Liquid Permittivity(Meas.)	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid Conductivity-temperature uncertainty	E.3.4	5	R	$\sqrt{3}$	0.78	0.71	2.25	2.05	∞
Liquid Permittivity-temperature uncertainty	E.3.4	5	R	$\sqrt{3}$	0.23	0.26	0.66	0.75	∞
Combined Standard Uncertainty			RSS				11.17	10.920	∞
Expanded Uncertainty (95% Confidence interval)			k				20.879	20.333	

SATIMO Uncertainty-SN 14/16 EP308 System Check uncertainty for Dipole averaged over 1 gram / 10 gram.(Head)									
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Modulation response	E.2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.02	N	1	0	0	0.00	0.00	∞
Response Time	E.2.7	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF Ambient Noise	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF Ambient Reflection	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Probe Positioner	E.6.1	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Probe Positioning	E.6.2	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Post-processing	E.6.3	5.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Field source									
Deviation of exp. dipole	E6.4	5	R	1	1	1	5.00	5.00	∞
Dipole Axis to Liquid Dist.	8,E.6.6	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
Input power & SAR drift	8,6.6.4	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Phantom and set-up									
Phantom Uncertainty	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid Conductivity(Meas.)	E.3.3	5	N	1	0.78	0.71	3.90	3.55	M
Liquid Permittivity(Meas.)	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid Conductivity-temperature uncertainty	E.3.4	5	R	$\sqrt{3}$	0.78	0.71	2.25	2.05	∞
Liquid Permittivity-temperature uncertainty	E.3.4	5	R	$\sqrt{3}$	0.23	0.26	0.66	0.75	∞
Combined Standard Uncertainty			RSS				7.076	6.667	∞
Expanded Uncertainty (95% Confidence interval)			k				14.152	13.334	

11. CONDUCTED POWER MEASUREMENT

GSM BAND

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
GPRS 850 （1 Slot）	824.2	30.35	-9	21.35
	836.6	30.32	-9	21.32
	848.8	**30.44**	-9	21.44
GPRS 850 （2 Slot）	824.2	27.30	-6	21.30
	836.6	27.29	-6	21.29
	848.8	27.42	-6	21.42
GPRS 850 （3 Slot）	824.2	25.46	-4.26	21.20
	836.6	25.32	-4.26	21.06
	848.8	25.43	-4.26	21.17
GPRS 850 （4 Slot）	824.2	24.24	-3	21.24
	836.6	24.41	-3	21.41
	848.8	24.59	-3	**21.59**
EGPRS 850 （1 Slot）	824.2	23.40	-9	14.40
	836.6	23.46	-9	14.46
	848.8	23.22	-9	14.22
EGPRS 850 （2 Slot）	824.2	21.15	-6	15.15
	836.6	20.90	-6	14.90
	848.8	20.87	-6	14.87
EGPRS 850 （3 Slot）	824.2	19.11	-4.26	14.85
	836.6	19.78	-4.26	15.52
	848.8	19.23	-4.26	14.97
EGPRS 850 （4 Slot）	824.2	18.31	-3	15.31
	836.6	18.44	-3	15.44
	848.8	18.83	-3	15.83

GSM BAND CONTINUE

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
GPRS1900 （1 Slot）	1850.2	27.11	-9	18.11
	1880	27.07	-9	18.07
	1909.8	**27.32**	-9	18.32
GPRS1900 （2 Slot）	1850.2	24.64	-6	**18.64**
	1880	24.29	-6	18.29
	1909.8	24.45	-6	18.45
GPRS1900 （3 Slot）	1850.2	22.59	-4.26	18.33
	1880	22.05	-4.26	17.79
	1909.8	22.37	-4.26	18.11
GPRS1900 （4 Slot）	1850.2	20.51	-3	17.51
	1880	20.39	-3	17.39
	1909.8	20.16	-3	17.16
EGPRS1900 （1 Slot）	1850.2	23.29	-9	14.29
	1880	23.45	-9	14.45
	1909.8	23.30	-9	14.30
EGPRS1900 （2 Slot）	1850.2	21.62	-6	15.62
	1880	21.11	-6	15.11
	1909.8	21.43	-6	15.43
EGPRS1900 （3 Slot）	1850.2	20.58	-4.26	16.32
	1880	20.47	-4.26	16.21
	1909.8	20.76	-4.26	16.50
EGPRS1900 （4 Slot）	1850.2	19.74	-3	16.74
	1880	19.70	-3	16.70
	1909.8	19.89	-3	16.89

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

UMTS BAND
HSDPA Setup Configuration:

·The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.

·The RF path losses were compensated into the measurements.

·A call was established between EUT and Based Station with following setting:

(1) Set Gain Factors(βc and βd) parameters set according to each

(2) Set RMC 12.2Kbps+HSDPA mode.

(3) Set Cell Power=-86dBm

(4) Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)

(5) Select HSDPA Uplink Parameters

(6) Set Delta ACK, Delta NACK and Delta CQI=8

(7) Set Ack - Nack Repetition Factor to 3

(8) Set CQI Feedback Cycle (k) to 4ms

(9) Set CQI Repetition Factor to 2

(10) Power Ctrl Mode=All Up bits

·The transmitted maximum output power was recorded.

Table C.10.2.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	βc (Note5)	βd	βd (SF)	βc/βd	βHS (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15(Note 4)	15/15(Note 4)	64	12/15(Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: ΔACK, ΔNACK and ΔCQI = 30/15 with β_{hs} = 30/15 * β_c .
Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, ΔACK and ΔNACK = 30/15 with β_{hs} = 30/15 * β_c , and ΔCQI = 24/15 with β_{hs} = 24/15 * β_c .
Note 3: CM = 1 for βc/βd =12/15, hs/ c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
Note 4: For subtest 2 the c/ d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to c = 11/15 and d = 15/15.

HSUPA Setup Configuration:

· The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.

· The RF path losses were compensated into the measurements.

· A call was established between EUT and Base Station with following setting * :

(1) Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK

(2) Set the Gain Factors (βc and βd) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121

(3) Set Cell Power = -86 dBm

(4) Set Channel Type = 12.2k + HSPA

(5) Set UE Target Power

(6) Power Ctrl Mode= Alternating bits

(7) Set and observe the E-TFCI

(8) Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI

· The transmitted maximum output power was recorded.

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

Sub-test	βc	βd	βd (SF)	βc/βd	βHS (Note 1)	βec	βed (Note 4) (Note 5)	βed (SF)	βed (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	βed1: 47/15 βed2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, ΔACK, ΔNACK and ΔCQI = 30/15 with β_{hs} = 30/15 * β_c. For sub-test 5, ΔACK, ΔNACK and ΔCQI = 5/15 with β_{hs} = 5/15 * β_c.

Note 2: CM = 1 for βc/βd =12/15, hs/ c=24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

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

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: βed cannot be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

UMTS BAND II

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 1900 RMC	1852.4	20.66
	1880	**20.71**
	1907.6	20.58
WCDMA 1900 AMR	1852.4	20.28
	1880	20.66
	1907.6	20.32
HSDPA Subtest 1	1852.4	19.84
	1880	19.90
	1907.6	19.84
HSDPA Subtest 2	1852.4	19.84
	1880	19.76
	1907.6	19.76
HSDPA Subtest 3	1852.4	19.70
	1880	19.69
	1907.6	19.73
HSDPA Subtest 4	1852.4	19.56
	1880	19.55
	1907.6	19.69
HSUPA Subtest 1	1852.4	19.62
	1880	19.80
	1907.6	19.67
HSUPA Subtest 2	1852.4	19.67
	1880	19.64
	1907.6	19.48
HSUPA Subtest 3	1852.4	19.82
	1880	19.62
	1907.6	19.72
HSUPA Subtest 4	1852.4	19.81
	1880	19.91
	1907.6	19.65
HSUPA Subtest 5	1852.4	19.79
	1880	19.68
	1907.6	19.58

UMTS BAND V

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 850 RMC	826.4	20.70
	836.6	**20.76**
	846.6	20.66
WCDMA 850 AMR	826.4	20.27
	836.6	20.64
	846.6	20.58
HSDPA Subtest 1	826.4	19.94
	836.6	19.81
	846.6	20.05
HSDPA Subtest 2	826.4	19.72
	836.6	19.90
	846.6	19.34
HSDPA Subtest 3	826.4	19.68
	836.6	19.57
	846.6	19.65
HSDPA Subtest 4	826.4	19.59
	836.6	19.90
	846.6	19.19
HSUPA Subtest 1	826.4	19.54
	836.6	19.78
	846.6	19.66
HSUPA Subtest 2	826.4	19.67
	836.6	19.91
	846.6	19.80
HSUPA Subtest 3	826.4	19.77
	836.6	19.91
	846.6	19.59
HSUPA Subtest 4	826.4	19.60
	836.6	19.91
	846.6	19.75
HSUPA Subtest 5	826.4	19.78
	836.6	19.75
	846.6	19.71

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

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

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

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

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

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

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

WIFI

Mode	Data Rate (Mbps)	Channel	Frequency(MHz)	Avg. Burst Power(dBm)
802.11b	1	01	2412	**15.88**
		06	2437	15.28
		11	2462	15.06
802.11g	6	01	2412	11.78
		06	2437	13.10
		11	2462	12.44
802.11n(20)	6.5	01	2412	11.66
		06	2437	12.87
		11	2462	11.96
802.11n(40)	13.5	03	2422	9.19
		06	2437	11.39
		09	2452	9.33

Bluetooth_V4.0(EDR)

Modulation	Channel	Frequency(MHz)	Peak Power (dBm)
GFSK	0	2402	4.951
	39	2441	**5.325**
	78	2480	5.131
π /4-DQPSK	0	2402	4.212
	39	2441	4.592
	78	2480	4.378
8-DPSK	0	2402	4.107
	39	2441	4.425
	78	2480	4.248

Bluetooth_ V4.0(BLE)

Modulation	Channel	Frequency(MHz)	Peak Power (dBm)
GFSK	0	2402	-2.972
	19	2440	-2.633
	39	2480	-2.810

12. TEST RESULTS

12.1. SAR Test Results Summary

12.1.1. Test position and configuration

Head SAR was performed with the device configured in the positions according to KDB 643646 and Body SAR was performed with the device configurated with all accessories close to the Flat Phantom.

12.1.2. Operation Mode

1. Per KDB 447498 D01 v06 ,for each exposure position, if the highest 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional.
2. Per KDB 865664 D01 v01r04,for each frequency band, if the measured SAR is ≥0.8W/Kg, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
   (1) When the original highest measured SAR is ≥0.8W/Kg, repeat that measurement once.
   (2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is >1.20 or when the original or repeated measurement is ≥1.45 W/Kg.
   (3) Perform a third repeated measurement only if the original, first and second repeated measurement is ≥1.5 W/Kg and ratio of largest to smallest SAR for the original, first and second measurement is ≥ 1.20.
3. Per KDB 648474 D04 v01r03,when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤1.2W/Kg, SAR testing with a headset connected is not required.
4. Per KDB 248227 D01v02r02,for 2.4GHz 802.11g/n SAR testing 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 ≤1.2W/kg.
5. Per KDB 941225 D06 V02r01, When the same wireless mode transmission configurations for data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations.
6. Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows:
   Maximum Scaling SAR =tested SAR (Max.) ×[maximum turn-up power (mw)/ maximum measurement output power(mw)]

12.1.3. Test Result

SAR MEASUREMENT									
Depth of Liquid (cm):>15									
Product: POC Trunked Two-way Radio									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit (W/kg)**
Test Mode: GSM850									
Back back	GPRS-4 slot	190	836.6	0.12	0.336	24.59	24.41	0.350	1.6
Face Up	GPRS-4slot	190	836.6	-0.03	0.175	24.59	24.41	0.182	1.6
Test Mode: PCS1900									
Back back	GPRS-2 slot	661	1880.0	-0.01	0.390	24.64	24.29	0.423	1.6
Face Up	GPRS-2 slot	661	1880.0	0.05	0.083	24.64	24.29	0.090	1.6
Test Mode: WCDMA Band II									
Back back	RMC 12.2kbps	9400	1880	0.02	0.399	20.80	20.71	0.407	1.6
Face Up	RMC 12.2kbps	9400	1880	0.06	0.103	20.80	20.71	0.105	1.6
Test Mode: WCDMA Band V									
Back back	RMC 12.2kbps	4183	836.6	0.13	0.067	20.80	20.76	0.068	1.6
Face Up	RMC 12.2kbps	4183	836.6	0.25	0.048	20.80	20.76	0.048	1.6

Note:
・When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.

SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%): 54.8					
Product: POC Trunked Two-way Radio									
Test Mode:802.11b									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit (W/kg)**
Body back	DTS	6	2437	0.12	0.292	15.88	15.28	0.335	1.6
Face Up	DTS	6	2437	0.06	0.121	15.88	15.28	0.139	1.6

Note:
・According to KDB248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels.
・All of above “DTS” means data transmitter

Simultaneous Multi-band Transmission Evaluation:

Application Simultaneous Transmission information:

NO	Simultaneous state	Portable Handset		
		Head	Body-worn	Hotspot
1	GSM (Data) + Bluetooth(data)	Yes	Yes	-
2	GSM (Data) + WLAN 2.4GHz (data)	Yes	Yes	-
3	WCDMA (Data) + Bluetooth(data)	Yes	Yes	Yes
4	WCDMA (Data) + WLAN 2.4GHz (data)	Yes	Yes	Yes

NOTE:

1. WIFI and BT share the same antenna, and cannot transmit simultaneously.
2. Simultaneous with every transmitter must be the same test position.
3. KDB 447498 D01, BT SAR is excluded as below table.
4. KDB 447498 D01, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user; which is 25mm for head SAR and 0mm for body-worn SAR.
5. According to KDB 447498 D01 4.3.1, Standalone SAR test exclusion is as follow:
   For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:
   [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] • [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR[30], where
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation[31]
   - The result is rounded to one decimal place for comparison
   - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

   The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.
6. If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.
7. According to KDB 447498 D01 4.3.2, simultaneous transmission SAR test exclusion is as follow:
   (1) Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.
   (2) Any transmitters and antennas should be considered when calculating simultaneous mode.
   (3) For mobile phone and PC, it's the sum of all transmitters and antennas at the same mode with same position in each applicable exposure condition
   (4)When the standalone SAR test exclusion of section 4.3.2 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to det
   (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;
   where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

8. When the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion. The ratio is determined by (SAR1 + SAR2)1.5/Ri, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

Estimated SAR		Max Power including Tune-up Tolerance		Separation Distance (mm)	Estimated SAR (W/kg)
		dBm	mW		
BT	Face Up	6	3.98	25	0.033
	Body Back Touch	6	3.98	0	0.166

Simultaneous Multi-band Transmission SAR:

Frequency	RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			Σ1-g SAR (W/Kg)	SPLSR (Yes/No)
			GSM/WCDMA	WI-Fi DTS Band	Bluetooth		
GSM850	Body-part (data/hot spot)	Face Up	0.182		0.033	0.215	**No**
		Body Touch	0.350		0.166	0.516	**No**
		Face Up	0.182	0.139		0.321	**No**
		Body Touch	0.350	0.335		0.685	**No**
PCS1900	Body-part (data/hot spot)	Face Up	0.090		0.033	0.123	**No**
		Body Touch	0.423		0.166	0.589	**No**
		Face Up	0.090	0.139		0.229	**No**
		Body Touch	0.423	0.335		**0.758**	**No**
WCDMA Band II	Body-part (data/hot spot)	Face Up	0.105		0.033	0.138	**No**
		Body Touch	0.407		0.166	0.573	**No**
		Face Up	0.105	0.139		0.244	**No**
		Body Touch	0.407	0.335		0.742	**No**
WCDMA Band V	Body-part (data/hot spot)	Face Up	0.048		0.033	0.081	**No**
		Body Touch	0.068		0.166	0.234	**No**
		Face Up	0.048	0.139		0.187	**No**
		Body Touch	0.068	0.335		0.403	**No**

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/Kg, SPLSR assessment is not required.

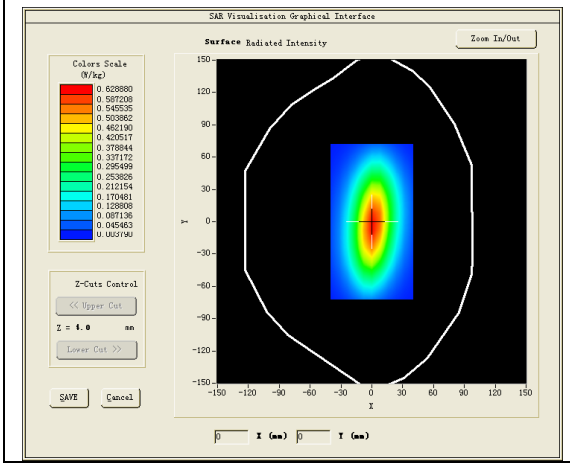
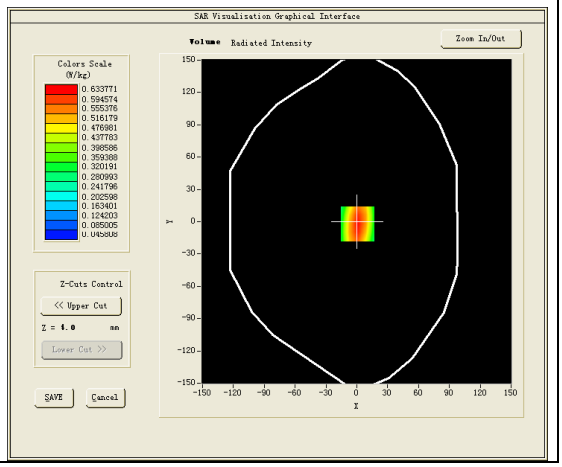
·SPLSR mean is “The SAR to Peak Location Separation Ratio “

APPENDIX A. SAR SYSTEM CHECK DATA

Test Laboratory: AGC Lab **Date: May 16,2017**
System Check Head 835 MHz
DUT: Dipole 835 MHz Type: SID 835
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1; Conv.F=5.72
Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.90 mho/m; εr =41.88; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):22.6, Liquid temperature (℃): 21.5, Relative Humidity (%): 54.8

SATIMO Configuration
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

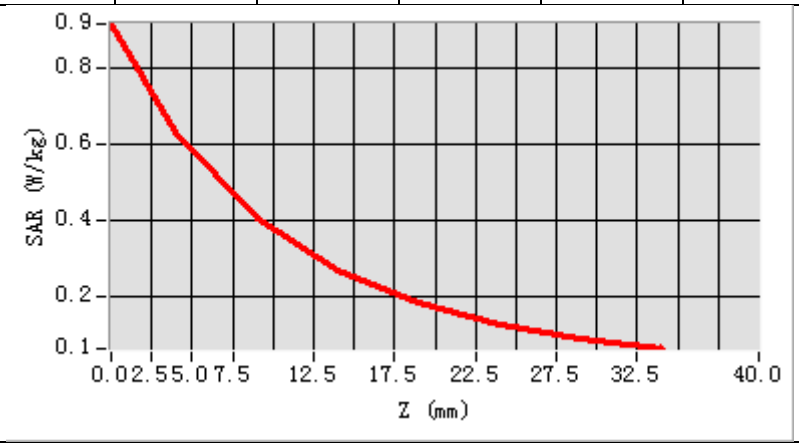
Configuration/System Check 835MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 835MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

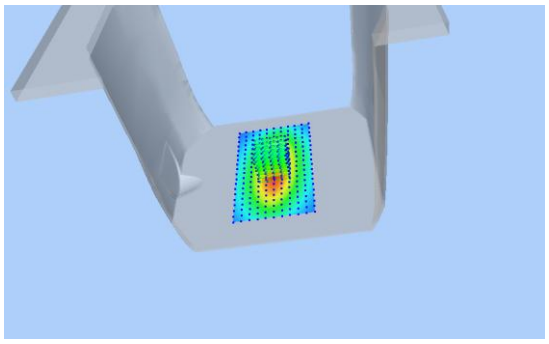
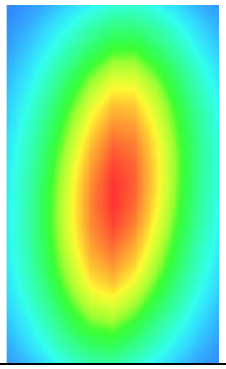
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=-2.00
SAR Peak: 0.91 W/kg

SAR 10g (W/Kg)	0.371447
SAR 1g (W/Kg)	0.604911

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.9174	0.6338	0.4017	0.2657	0.1796	0.1233	0.0859

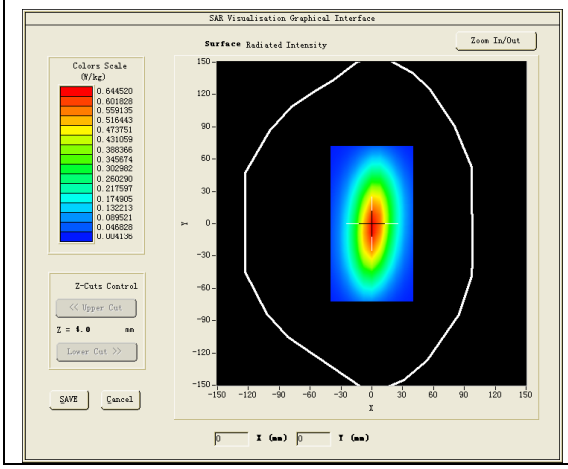
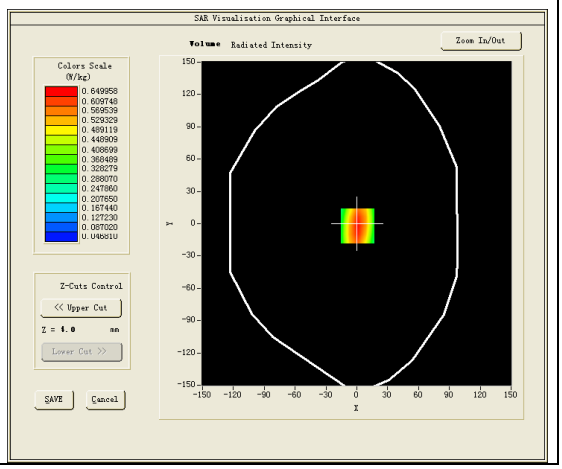


3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: May 16,2017**
System Check Body 835 MHz
DUT: Dipole 835 MHz Type: SID 835
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1; Conv.F=5.94
Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.95 mho/m; εr =55.96; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):22.6, Liquid temperature (℃): 21.6, Relative Humidity (%): 54.8

SATIMO Configuration
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

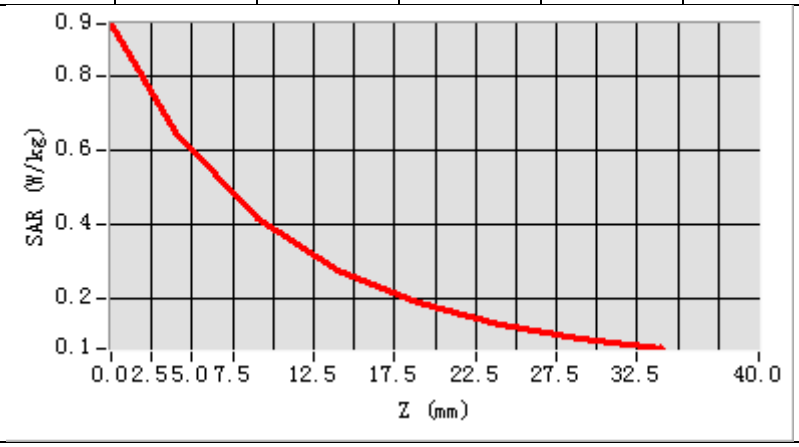
Configuration/System Check 835MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 835MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

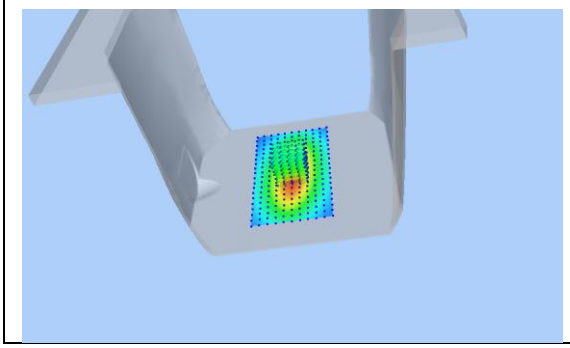
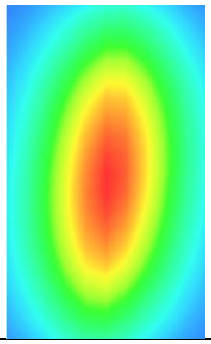
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=-2.00
SAR Peak: 0.93 W/kg

SAR 10g (W/Kg)	0.380792
SAR 1g (W/Kg)	0.620302

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.9407	0.6500	0.4119	0.2725	0.1838	0.1265	0.0879

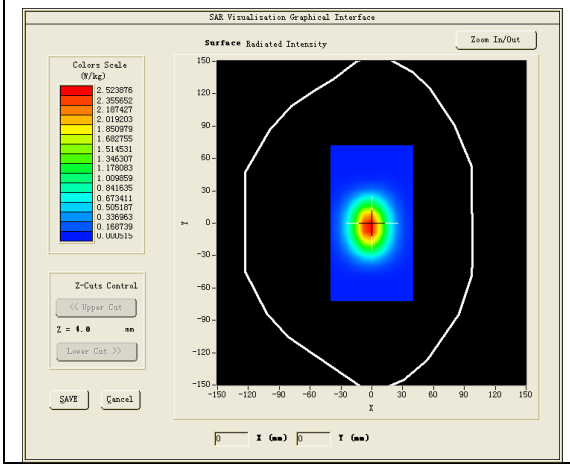
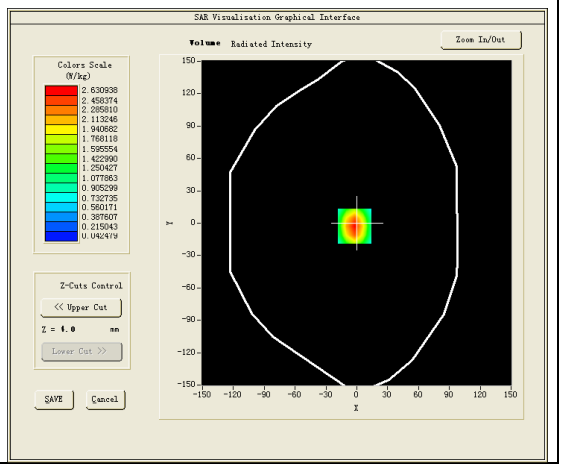


3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: May 23,2017**
System Check Head 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=5.74
Frequency: 1900 MHz; Medium parameters used: f = 1900 MHz; σ=1.40 mho/m; εr =39.25; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):22.6, Liquid temperature (℃): 21.9, Relative Humidity (%): 57.9

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

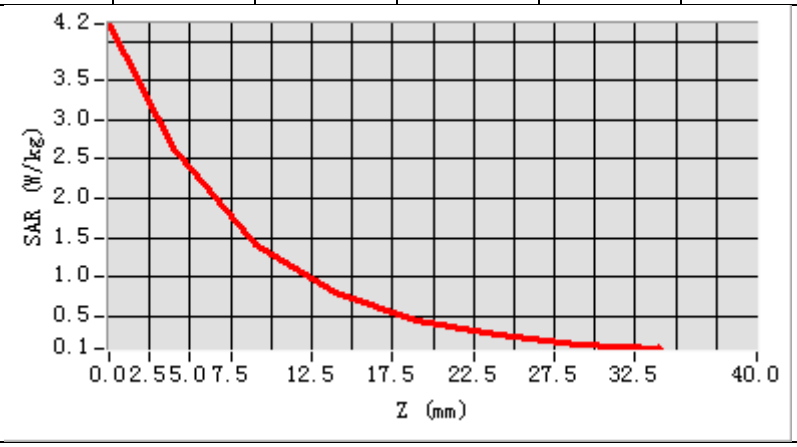
Configuration/System Check 1900MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 1900MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

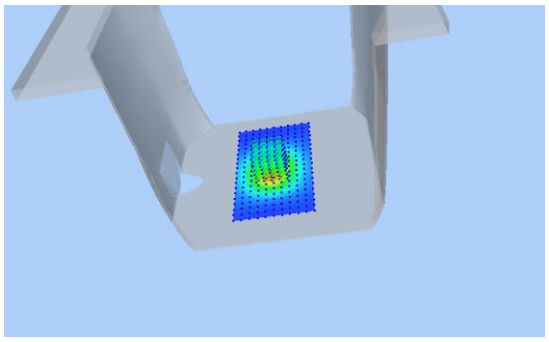
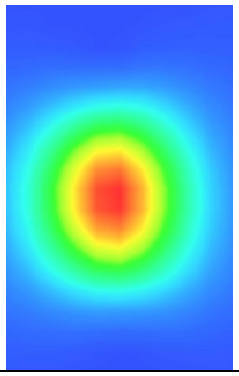
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-2.00, Y=-3.00
SAR Peak: 4.21 W/kg

SAR 10g (W/Kg)	1.289188
SAR 1g (W/Kg)	2.490148

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	4.2186	2.6309	1.4167	0.7897	0.4452	0.2550	0.1459

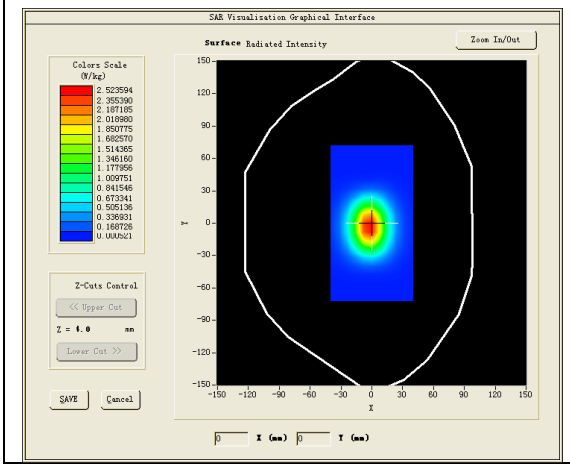
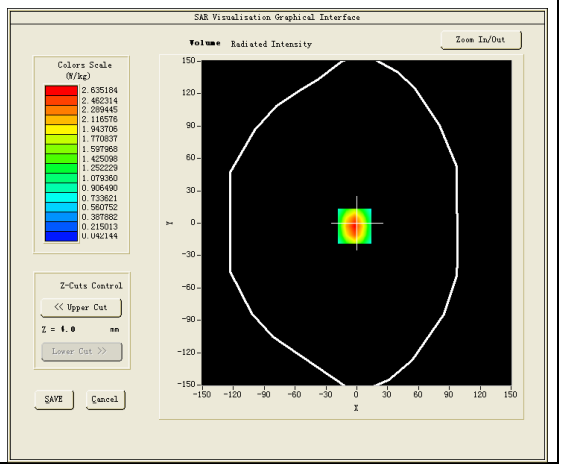


3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: May 23,2017**
System Check Body 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=5.90
Frequency: 1900 MHz; Medium parameters used: f = 1900 MHz; σ=1.54 mho/m; εr =52.23; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):22.6, Liquid temperature (℃): 21.7, Relative Humidity (%): 57.9

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

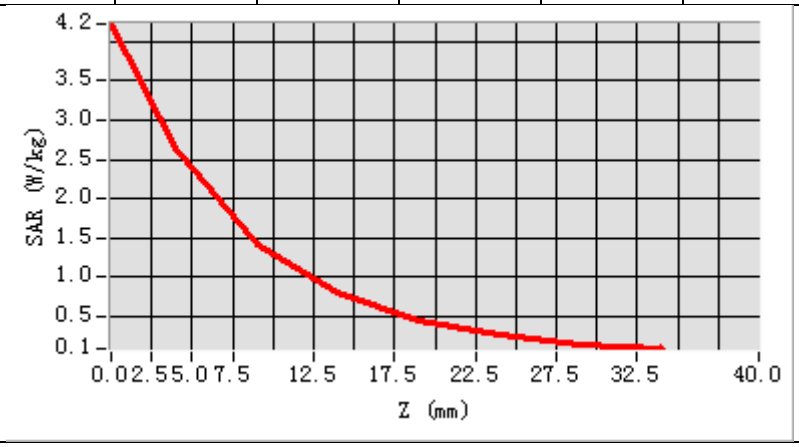
Configuration/System Check 1900MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 1900MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

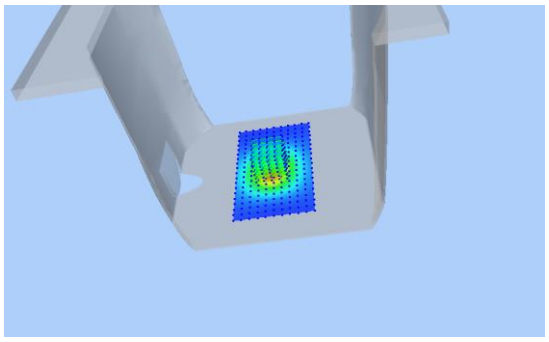
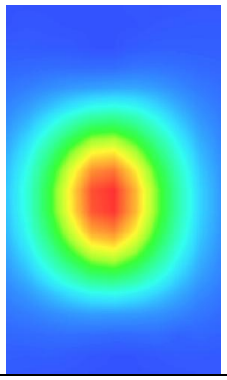
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-2.00, Y=-3.00
SAR Peak: 4.19 W/kg

SAR 10g (W/Kg)	1.260265
SAR 1g (W/Kg)	2.453562

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	4.2280	2.6352	1.4175	0.7889	0.4444	0.2548	0.1458

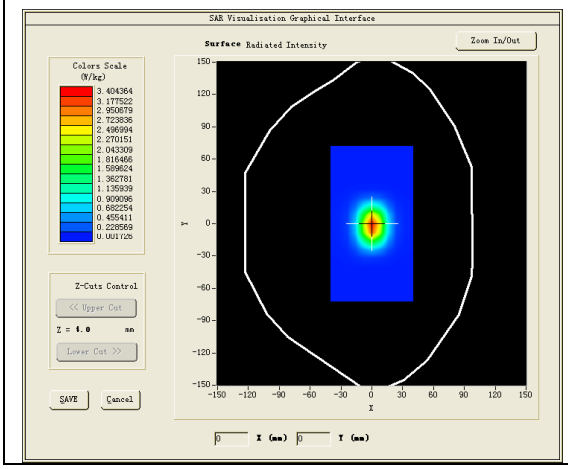
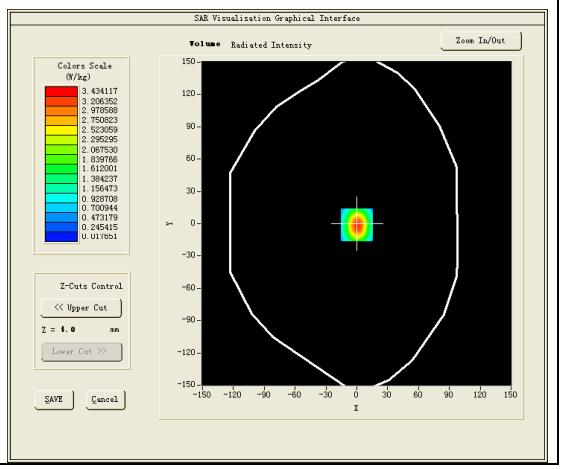


3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: June 02,2017**
System Check Head 2450 MHz
DUT: Dipole 2450 MHz Type: SID 2450
Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1; Conv.F=5.19
Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ=1.81 mho/m; εr =39.32; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):22.3, Liquid temperature (℃): 21.4

SATIMO Configuration
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

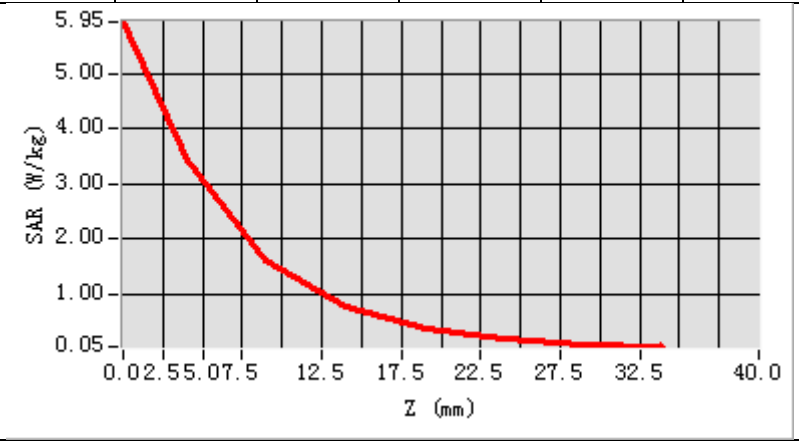
Configuration/System Check 2450MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 2450MHz Head/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm

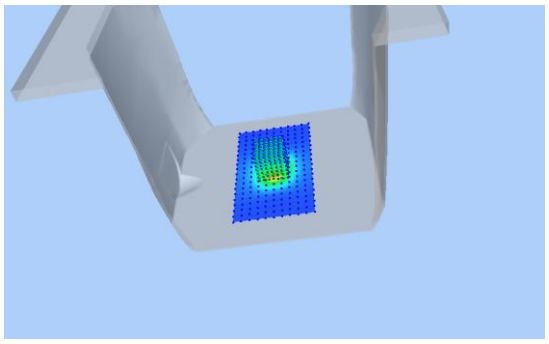
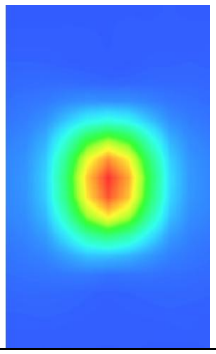
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-1.00
SAR Peak: 5.88 W/kg

SAR 10g (W/Kg)	1.413401
SAR 1g (W/Kg)	3.137659

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	5.9453	3.4341	1.6189	0.7871	0.3871	0.1934	0.0966

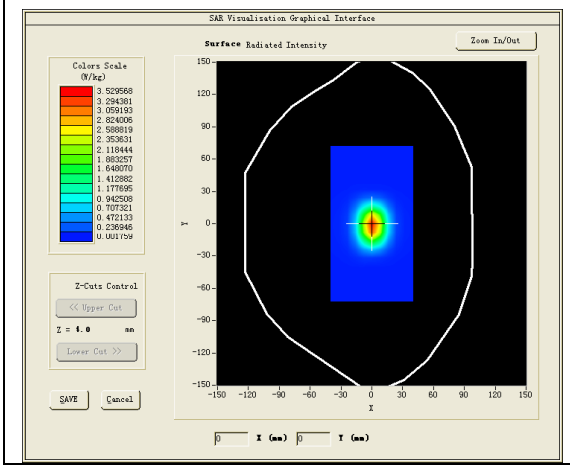
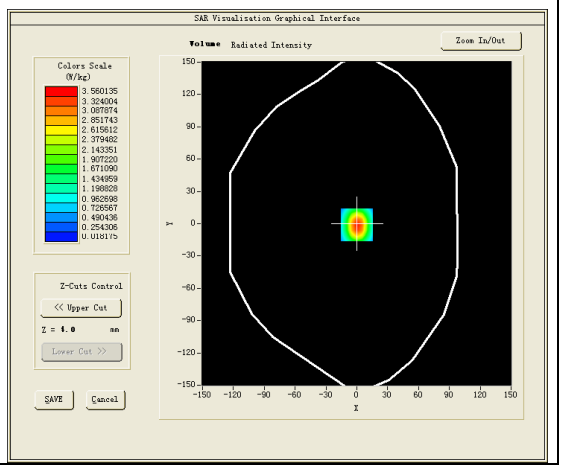


3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: June 02,2017**
System Check Body 2450 MHz
DUT: Dipole 2450 MHz Type: SID 2450
Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1; Conv.F=5.33
Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ=1.94 mho/m; εr =52.56; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):22.3, Liquid temperature (℃): 21.2

SATIMO Configuration
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

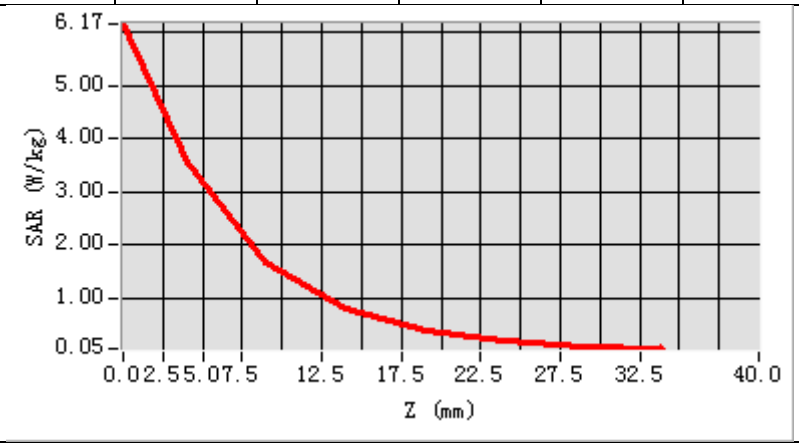
Configuration/System Check 2450MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 2450MHz Body/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm

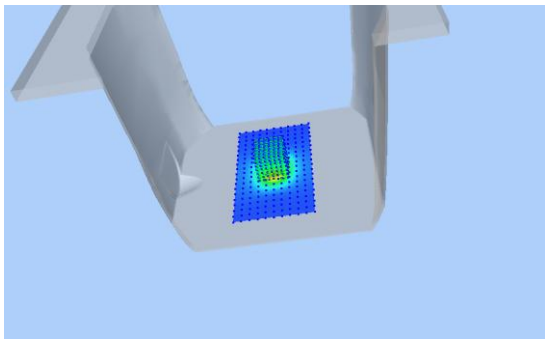
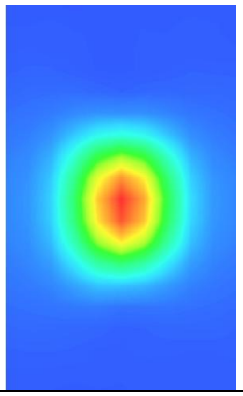
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-1.00
SAR Peak: 6.10 W/kg

SAR 10g (W/Kg)	1.461894
SAR 1g (W/Kg)	3.251752

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.1686	3.5601	1.6744	0.8088	0.3959	0.1976	0.0994



3D screen shot	Hot spot position
	

APPENDIX B. SAR MEASUREMENT DATA

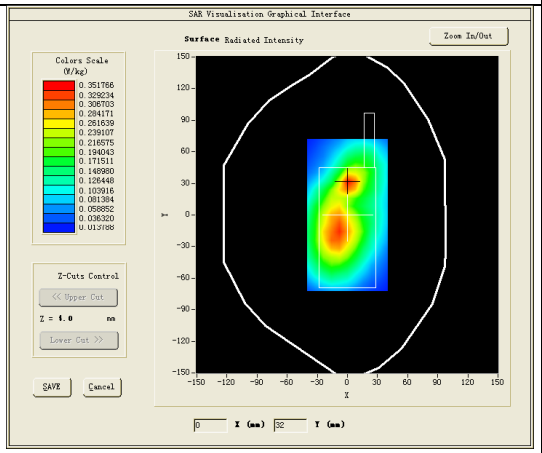
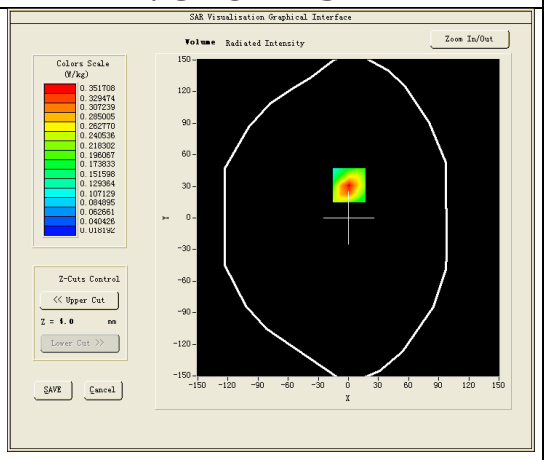
Test Laboratory: AGC Lab **Date: May 16,2017**
GPRS 850 Mid- Body- Back (4up) <SIM 1>
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: GPRS-4 Slot; Communication System Band: GSM 850; Duty Cycle: 1:2.1; Conv.F=5.94;
Frequency: 836.6 MHz; Medium parameters used: f = 835 MHz; σ= 0.96 mho/m; εr = 55.54; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.6

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/GPRS 850 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS 850 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

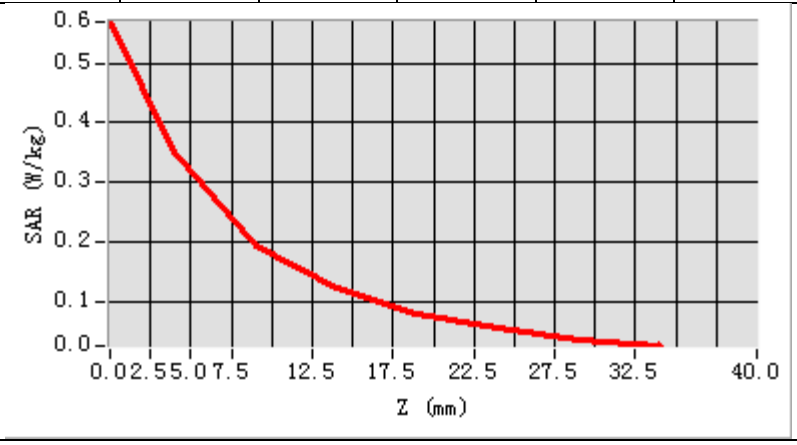
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 2.0)

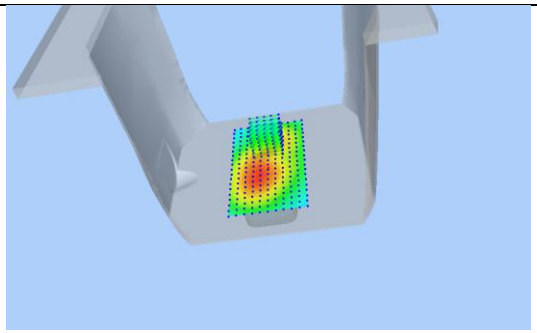
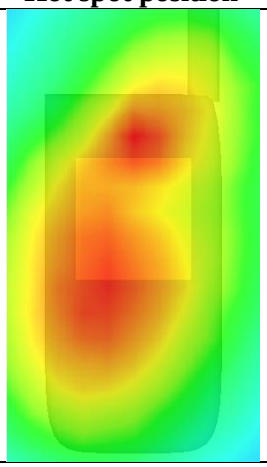
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=31.00
SAR Peak: 0.58 W/kg

SAR 10g (W/Kg)	0.189248
SAR 1g (W/Kg)	0.335847

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.5689	0.3517	0.1946	0.1231	0.0808	0.0561	0.0378



3D screen shot	Hot spot position
	

The first cube is outside the 2dB of the SAR compliance limit (0.336W/Kg<1.0 W/Kg for 2db), and the SAR test system had been setup the second cube configure that is :
The first cube is within the 2dB of the SAR compliance limit and the second cube is within the first cube 2db at the same time;
Thus, there is no need to test second cube;

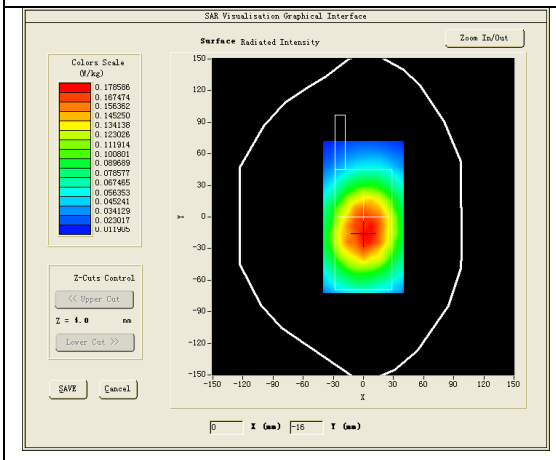
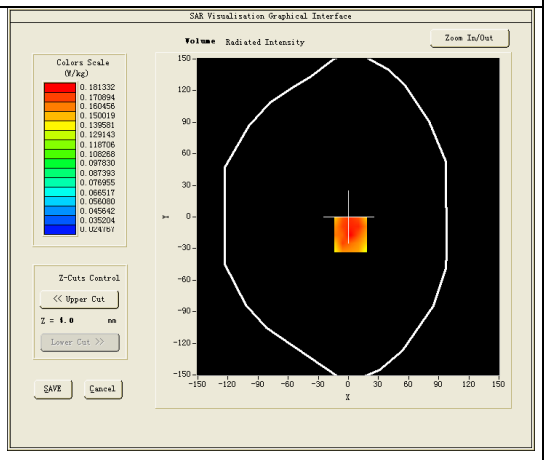
Test Laboratory: AGC Lab **Date: May 16,2017**
GPRS 850 Mid- Face Up (4up) <SIM 1>
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: GPRS-4 Slot; Communication System Band: GSM 850; Duty Cycle: 1:2.1; Conv.F=5.72;
Frequency: 836.6 MHz; Medium parameters used: f = 835 MHz; σ= 1.38mho/m; εr = 40.12; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.5

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/GPRS 850 Mid-Face Up/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS 850 Mid-Face Up/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

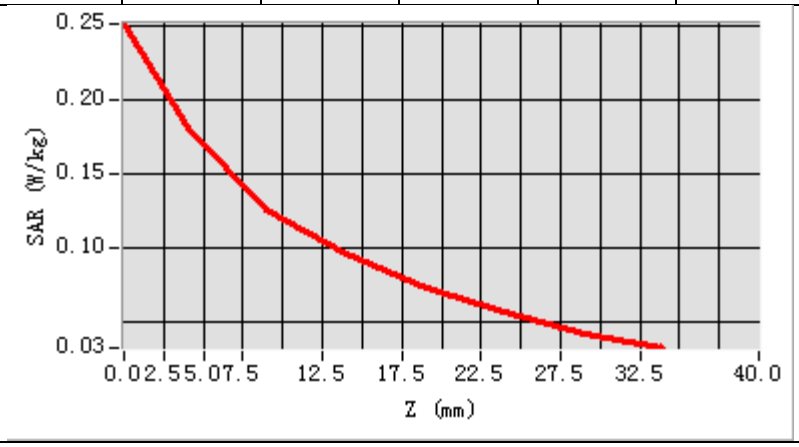
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Face Up
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 2.0)

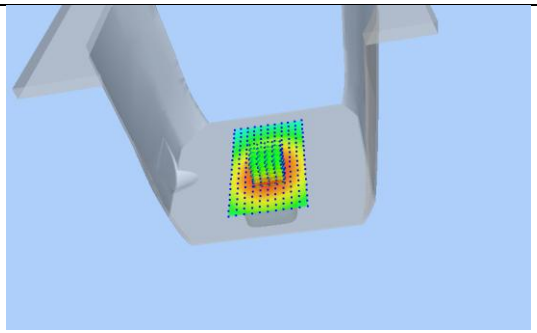
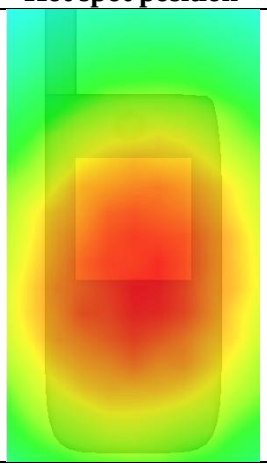
SURFACE SAR	VOLUME SAR
	

Maximum location: X=2.00, Y=-17.00
SAR Peak: 0.25 W/kg

SAR 10g (W/Kg)	0.123289
SAR 1g (W/Kg)	0.174915

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.2518	0.1813	0.1261	0.0964	0.0728	0.0562	0.0415



3D screen shot	Hot spot position
	

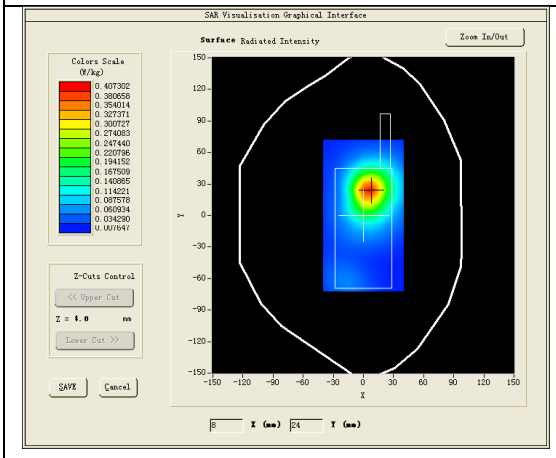
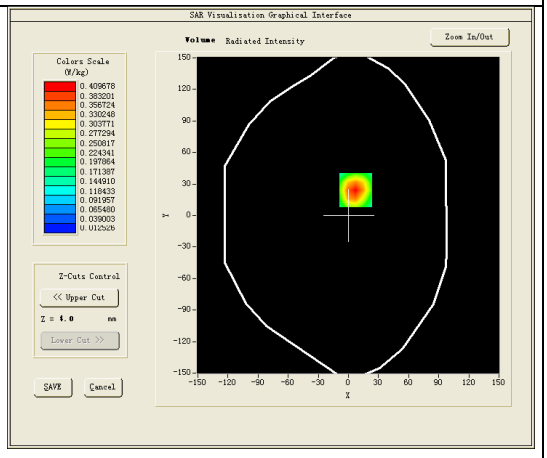
Test Laboratory: AGC Lab **Date: May 23,2017**
GPRS 1900 Mid-Body-Back (2up) <SIM 1>
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.90;
Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ= 1.52 mho/m; εr =53.04; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.7

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/GPRS1900 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS1900 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

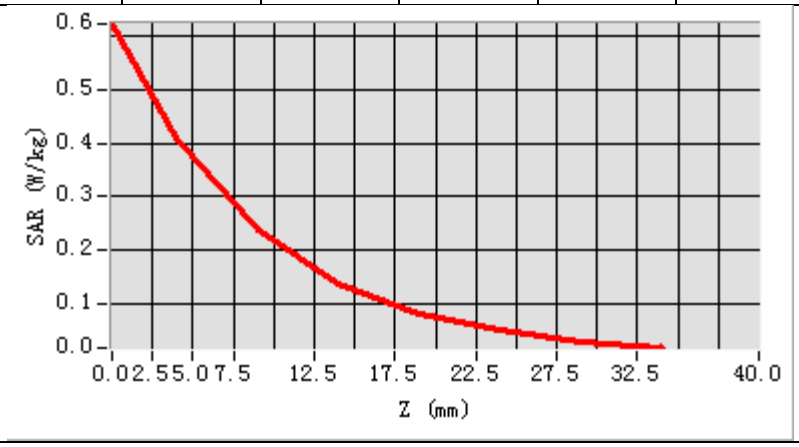
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

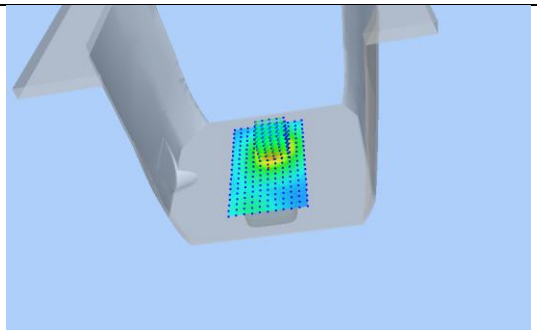
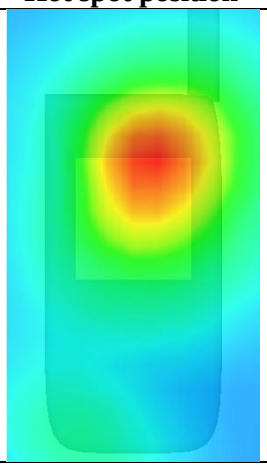
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=7.00, Y=24.00
SAR Peak: 0.64 W/kg

SAR 10g (W/Kg)	0.211212
SAR 1g (W/Kg)	0.390118

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.6224	0.4097	0.2385	0.1378	0.0816	0.0496	0.0286



3D screen shot	Hot spot position
	

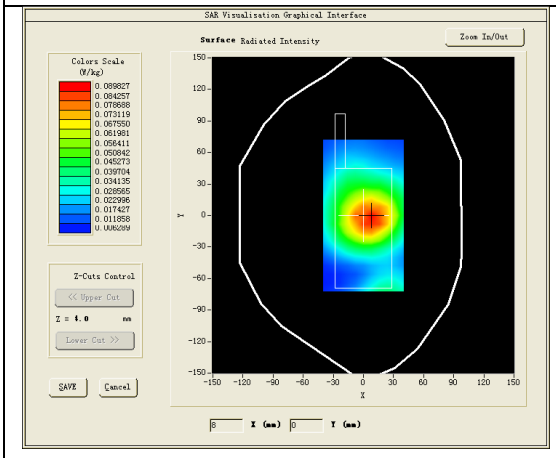
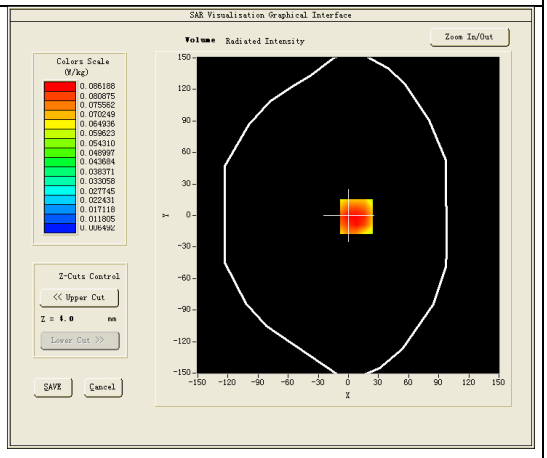
Test Laboratory: AGC Lab **Date: May 23,2017**
GPRS 1900 Mid-Face Up (2up) <SIM 1>
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.74; Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ= 1.38 mho/m; εr =40.12; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.9

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/GPRS1900 Mid-Face Up/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS1900 Mid-Face Up/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

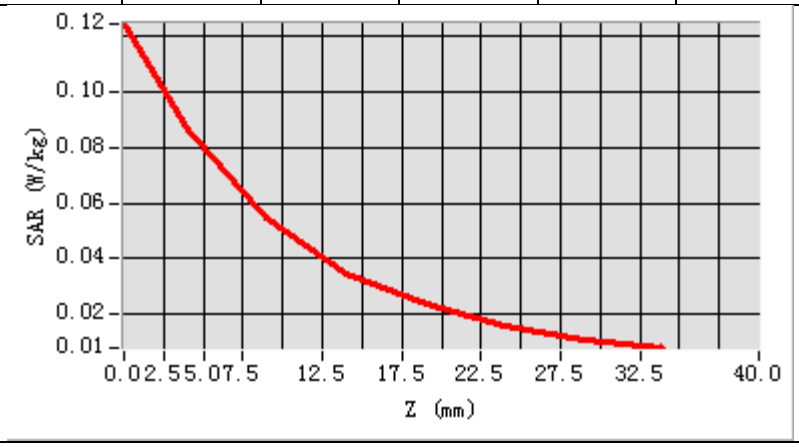
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Face Up
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

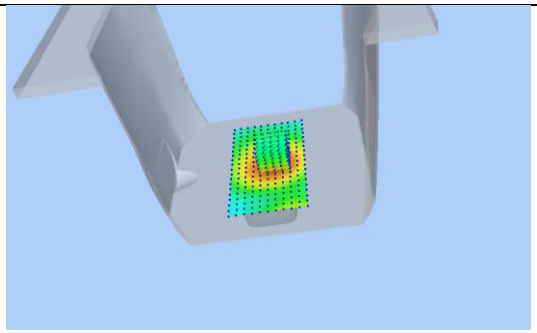
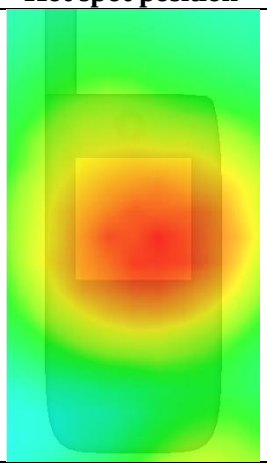
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=-1.00
SAR Peak: 0.12 W/kg

SAR 10g (W/Kg)	0.052983
SAR 1g (W/Kg)	0.083206

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1245	0.0862	0.0547	0.0346	0.0236	0.0160	0.0110



3D screen shot	Hot spot position
	

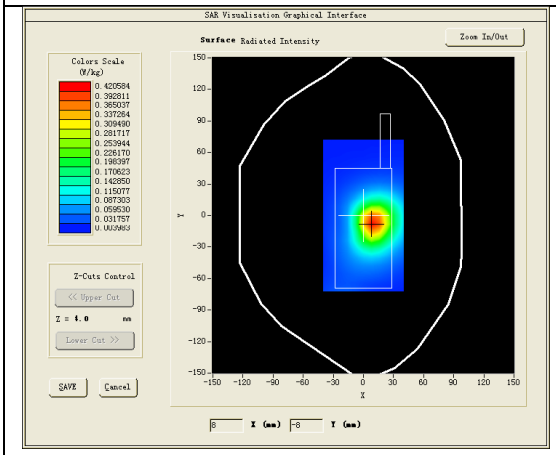
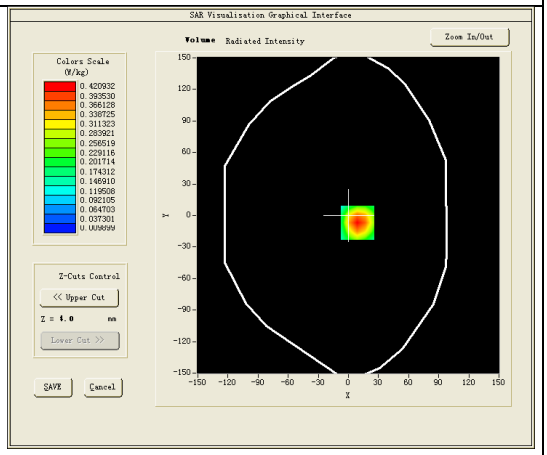
Test Laboratory: AGC Lab **Date: May 23,2017**
WCDMA Band Ⅱ Mid-Body-Towards Grounds (RMC 12.2kbps)
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: UMTS; Communication System Band: Band Ⅱ UTRA/FDD ;Duty Cycle:1:1; Conv.F=5.90;
Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ=1.52 mho/m; εr =53.04; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.7

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/ WCDMA band Ⅱ Mid-Body-back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ WCDMA band Ⅱ Mid-Body-back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

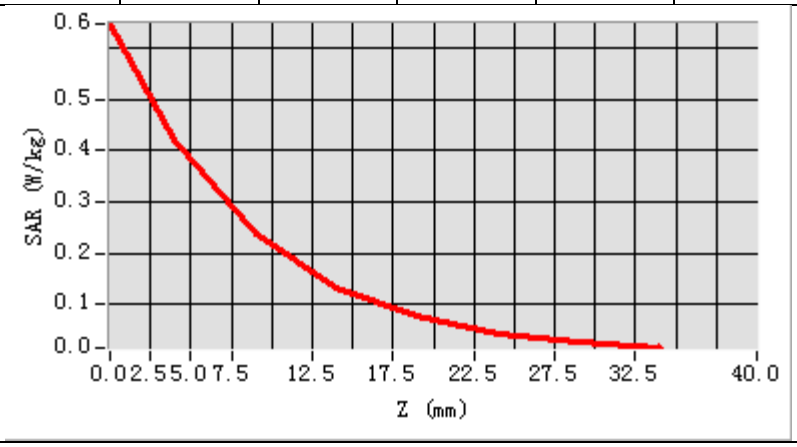
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	WCDMA band Ⅱ
Channels	Middle
Signal	CDMA (Crest factor: 1.0)

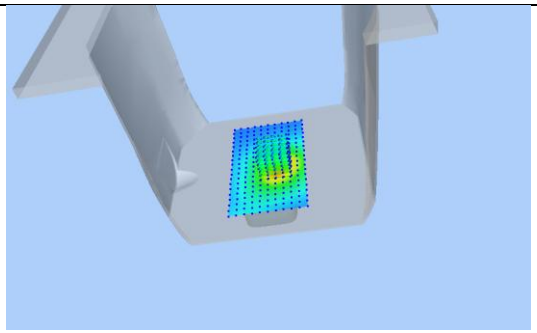
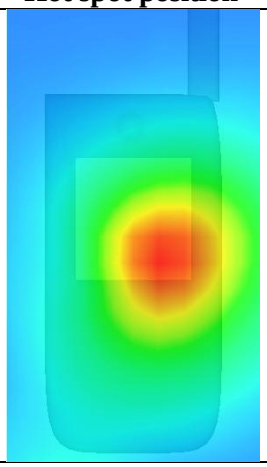
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=9.00, Y=-7.00
SAR Peak: 0.64 W/kg

SAR 10g (W/Kg)	0.216383
SAR 1g (W/Kg)	0.399191

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.6472	0.4209	0.2390	0.1345	0.0768	0.0438	0.0258



3D screen shot	Hot spot position
	

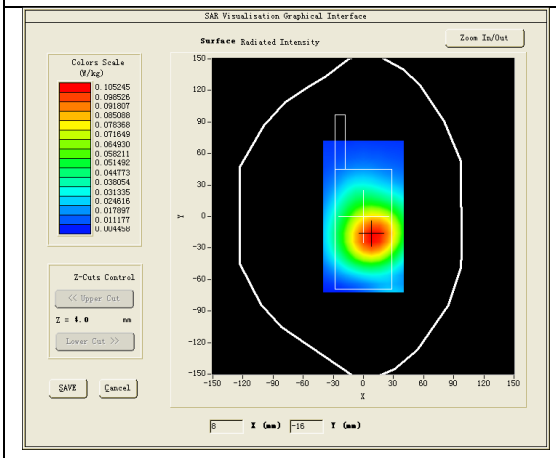
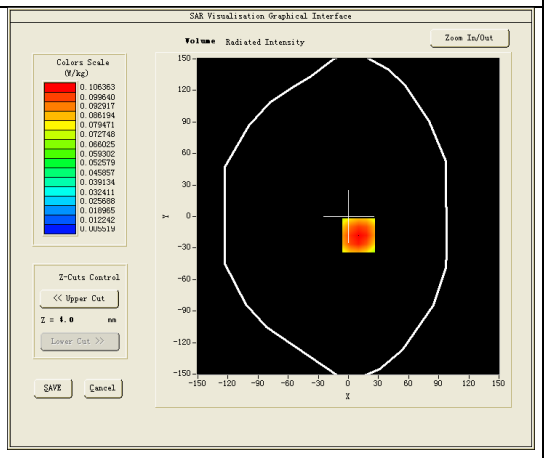
Test Laboratory: AGC Lab **Date: May 23,2017**
WCDMA Band Ⅱ Mid - Face Up (RMC 12.2kbps)
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: UMTS; Communication System Band: Band Ⅱ UTRA/FDD ;Duty Cycle:1:1; Conv.F=5.74;
Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ=1.38 mho/m; εr =40.12; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.9

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/ WCDMA band Ⅱ Mid-Face Up/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ WCDMA band Ⅱ Mid-Face Up/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

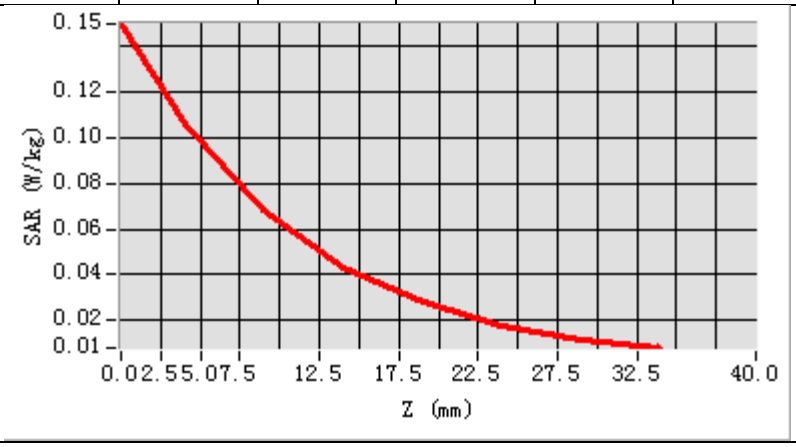
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Face Up
Band	WCDMA band Ⅱ
Channels	Middle
Signal	CDMA (Crest factor: 1.0)

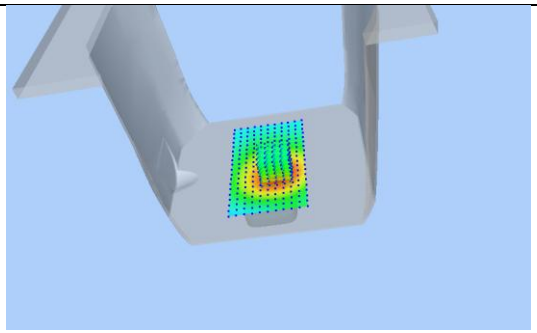
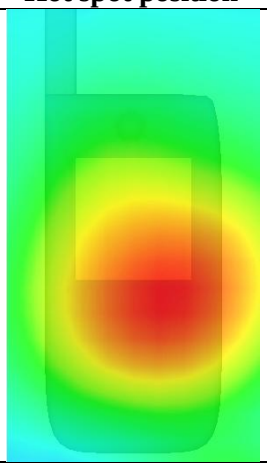
SURFACE SAR	VOLUME SAR
	

Maximum location: X=10.00, Y=-18.00
SAR Peak: 0.15 W/kg

SAR 10g (W/Kg)	0.064104
SAR 1g (W/Kg)	0.102624

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1500	0.1064	0.0684	0.0434	0.0277	0.0176	0.0113



3D screen shot	Hot spot position
	

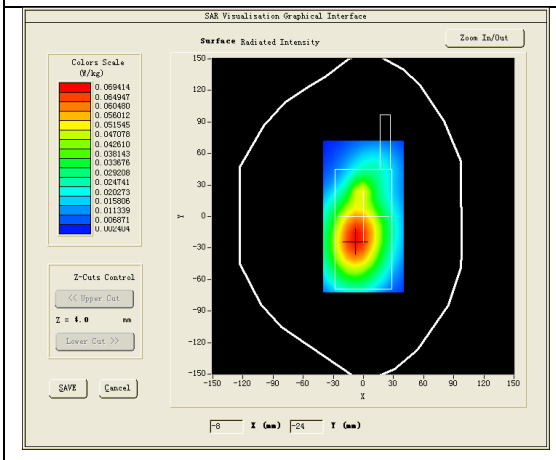
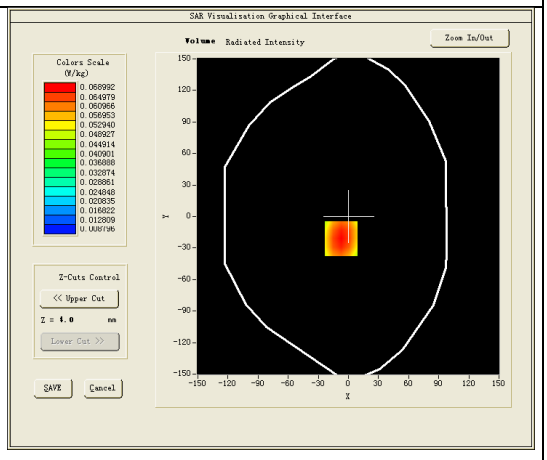
Test Laboratory: AGC Lab **Date: May 16,2017**
WCDMA Band Ⅴ Mid-Body-Towards Grounds (RMC 12.2kbps)
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: UMTS; Communication System Band: BAND Ⅴ UTRA/FDD; Duty Cycle:1: 1; Conv.F=5.94; Frequency: 836.6 MHz; Medium parameters used: f = 835MHz; σ=0.96 mho/m; εr =55.54; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.6

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/ WCDMA Band Ⅴ Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ WCDMA Band Ⅴ Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

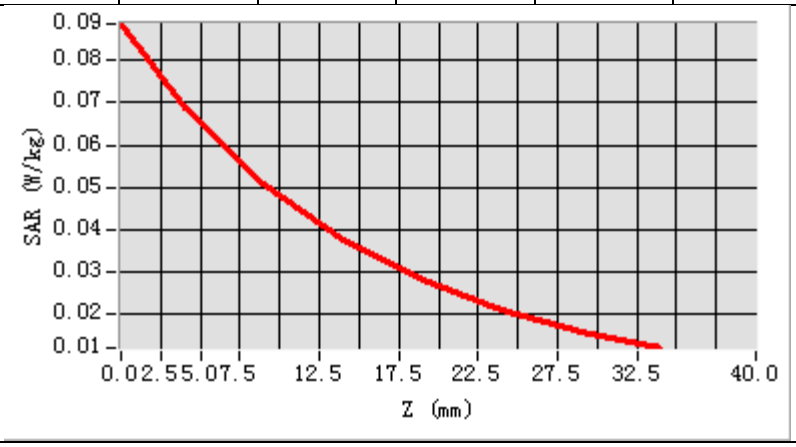
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	WCDMA Band Ⅴ
Channels	Middle
Signal	CDMA (Crest factor: 1.0)

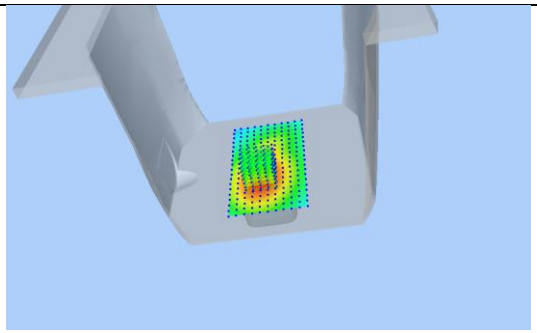
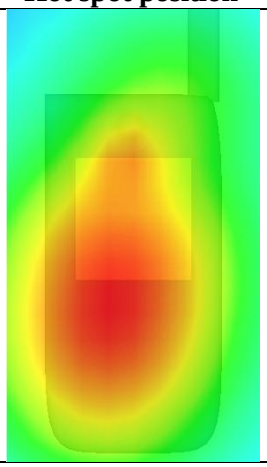
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-7.00, Y=-21.00
SAR Peak: 0.09 W/kg

SAR 10g (W/Kg)	0.047023
SAR 1g (W/Kg)	0.066651

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0887	0.0690	0.0506	0.0377	0.0281	0.0209	0.0158



3D screen shot	Hot spot position
	

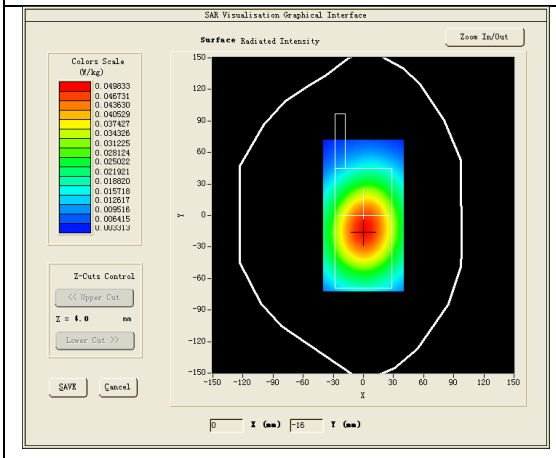
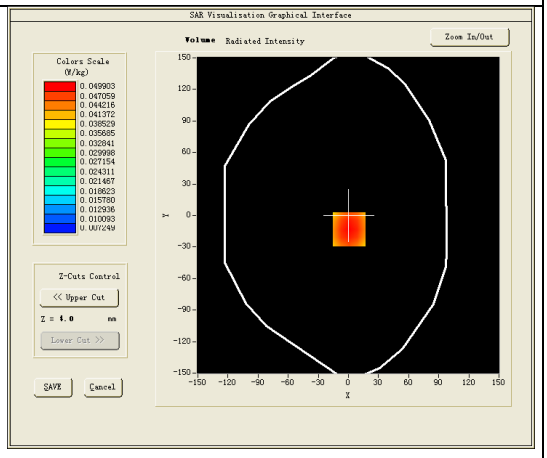
Test Laboratory: AGC Lab **Date: May 16,2017**
WCDMA Band Ⅴ Mid- Face up (RMC 12.2kbps)
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: UMTS; Communication System Band: BAND Ⅴ UTRA/FDD ; Duty Cycle:1: 1; Conv.F=5.72;
Frequency: 836.6 MHz; Medium parameters used: f = 835MHz;σ=0.91 mho/m; εr =41.43; ρ= 1000kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 22.6, Liquid temperature (℃): 21.5

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/ WCDMA Band Ⅴ Mid-Face Up/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/ WCDMA Band Ⅴ Mid-Face Up/Zoom Scan: Measurement grid: dx=8mm, dy=8mm, dz=5mm;

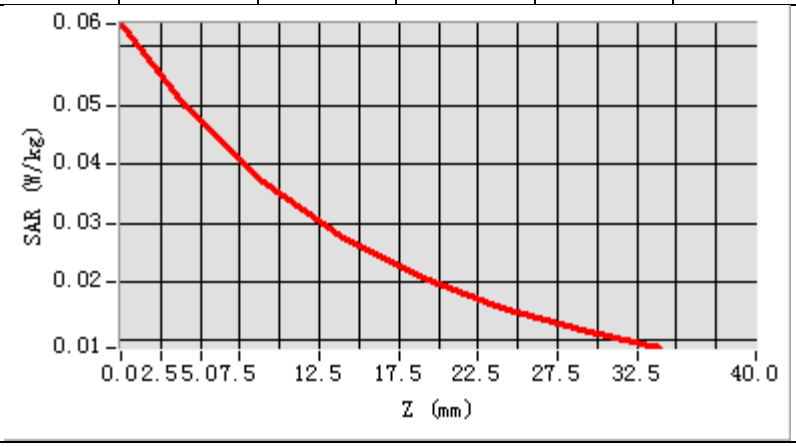
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Face Up
Band	WCDMA Band Ⅴ
Channels	Middle
Signal	CDMA (Crest factor: 1.0)

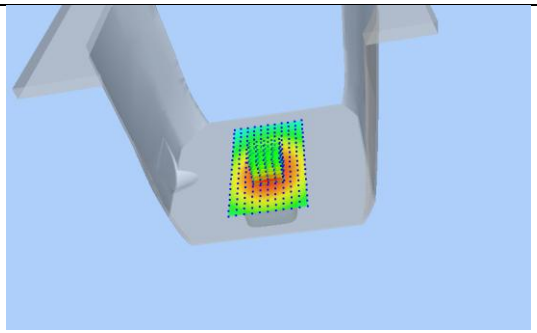
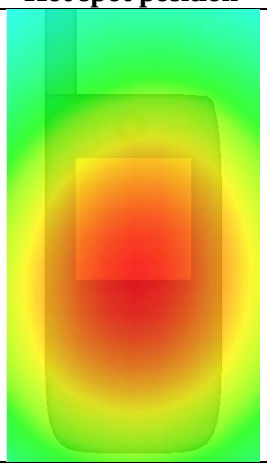
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=-13.00
SAR Peak: 0.06 W/kg

SAR 10g (W/Kg)	0.034722
SAR 1g (W/Kg)	0.048281

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0638	0.0499	0.0369	0.0276	0.0207	0.0156	0.0118



3D screen shot	Hot spot position
	

WIFI MODE

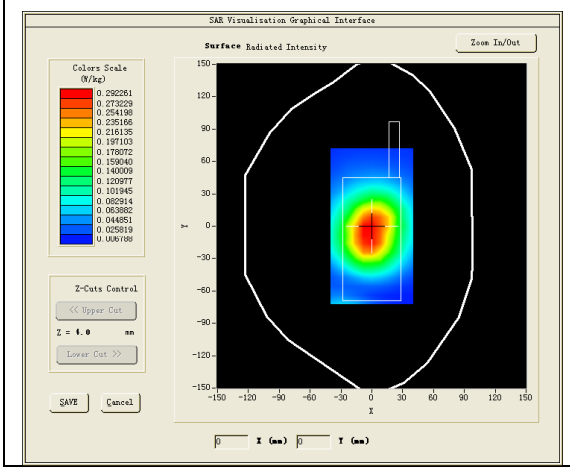
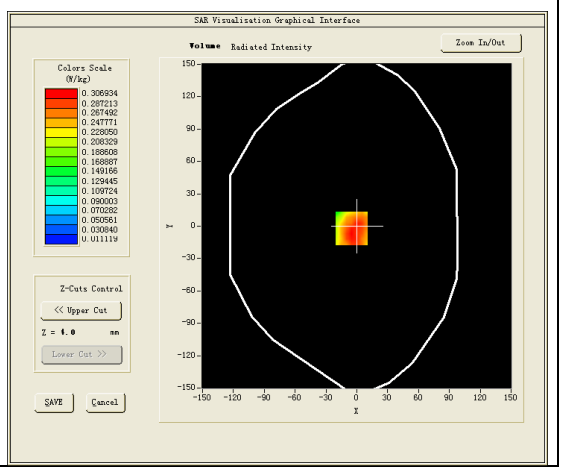
Test Laboratory: AGC Lab **Date: June 02,2017**
802.11b Mid-Body-Worn- Back
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: Wi-Fi; Communication System Band: 802.11b; Duty Cycle: 1:1; Conv.F=5.33;
Frequency: 2437 MHz; Medium parameters used: f = 2450 MHz; σ =1.92 mho/m; εr =53.15; ρ= 1000 kg/m^3 ;
Phantom section: Flat Section
Ambient temperature (℃):22.3, Liquid temperature (℃): 21.2

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/802.11b Mid- Body- Back /Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/802.11b Mid- Body- Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

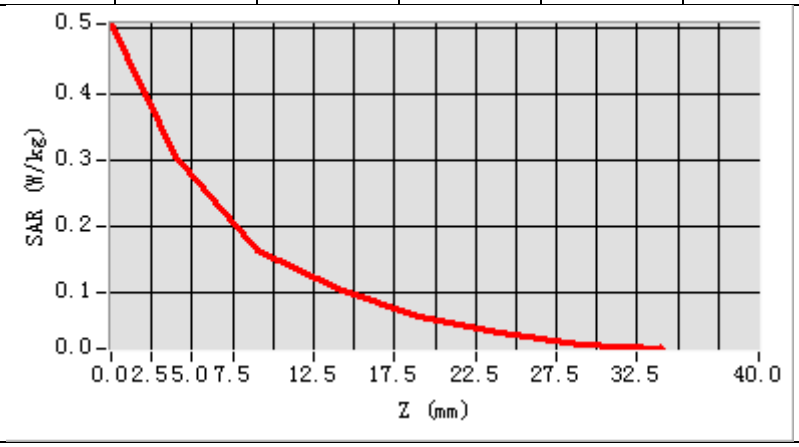
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	2450MHz
Channels	Middle
Signal	Crest factor: 1.0

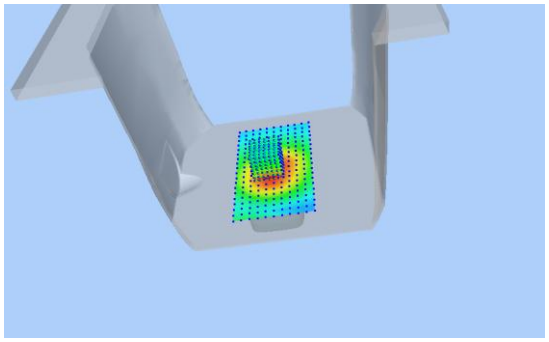
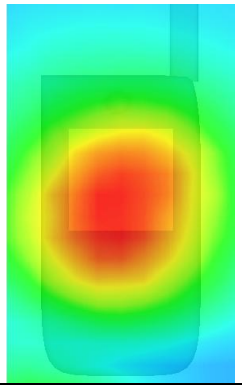
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-5.00, Y=-2.00
SAR Peak: 0.48 W/kg

SAR 10g (W/Kg)	0.174330
SAR 1g (W/Kg)	0.291818

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.5047	0.3069	0.1649	0.1065	0.0634	0.0414	0.0228



3D screen shot	Hot spot position
	

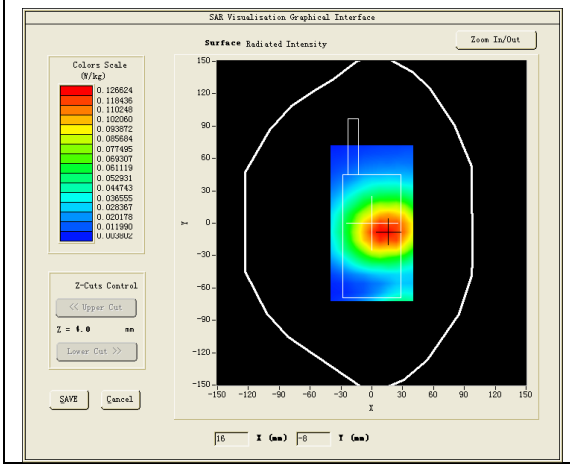
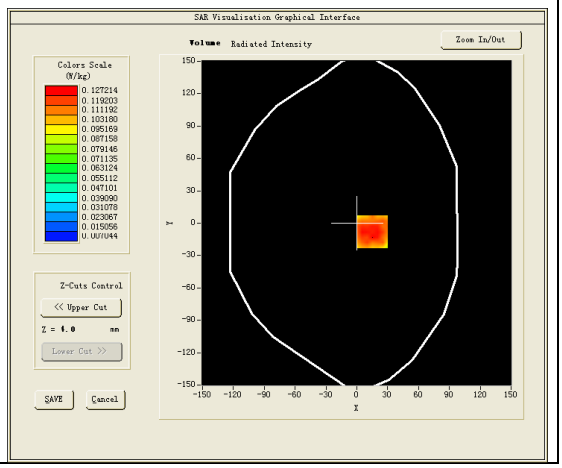
Test Laboratory: AGC Lab **Date: June 02,2017**
802.11b Mid-Face Up
DUT: POC Trunked Two-way Radio; Type: W60

Communication System: Wi-Fi; Communication System Band: 802.11b; Duty Cycle: 1:1; Conv.F=5.19;
Frequency: 2437 MHz; Medium parameters used: f = 2450 MHz; σ =1.79 mho/m; εr =39.87; ρ= 1000 kg/m^3 ;
Phantom section: Flat Section
Ambient temperature (℃):22.3, Liquid temperature (℃): 21.4

SATIMO Configuration:
Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
Sensor-Surface: 4mm (Mechanical Surface Detection)
Phantom: SAM twin phantom
Measurement SW: OpenSAR V4_02_32

Configuration/802.11b Mid- Face Up /Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/802.11b Mid- Face Up /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

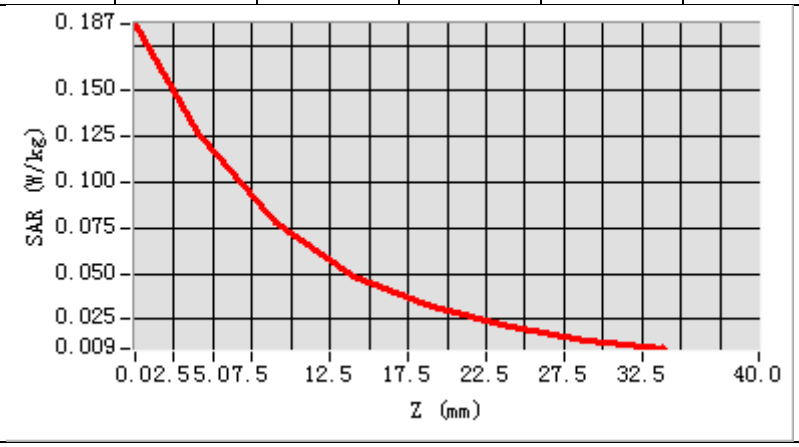
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Face Up
Band	2450MHz
Channels	Middle
Signal	Crest factor: 1.0

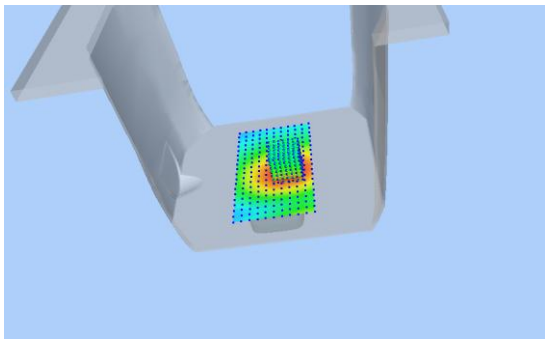
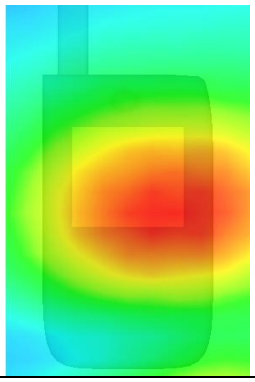
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=15.00, Y=-8.00
SAR Peak: 0.19 W/kg

SAR 10g (W/Kg)	0.075176
SAR 1g (W/Kg)	0.120535

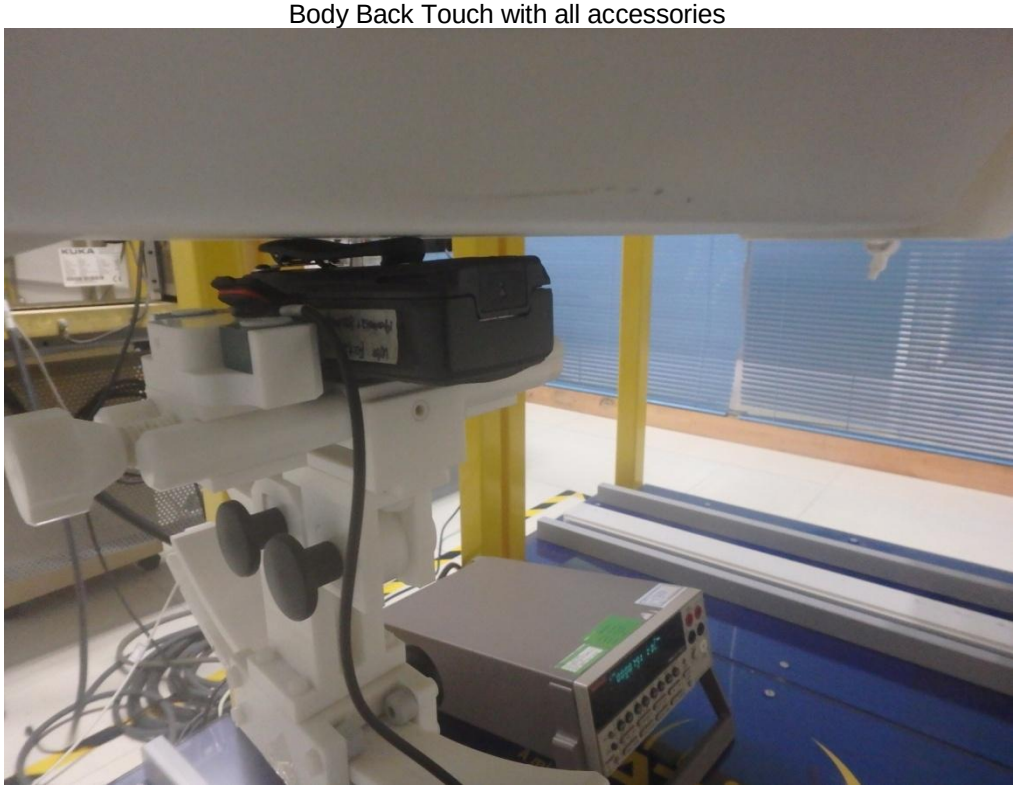
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1867	0.1272	0.0783	0.0488	0.0314	0.0210	0.0137



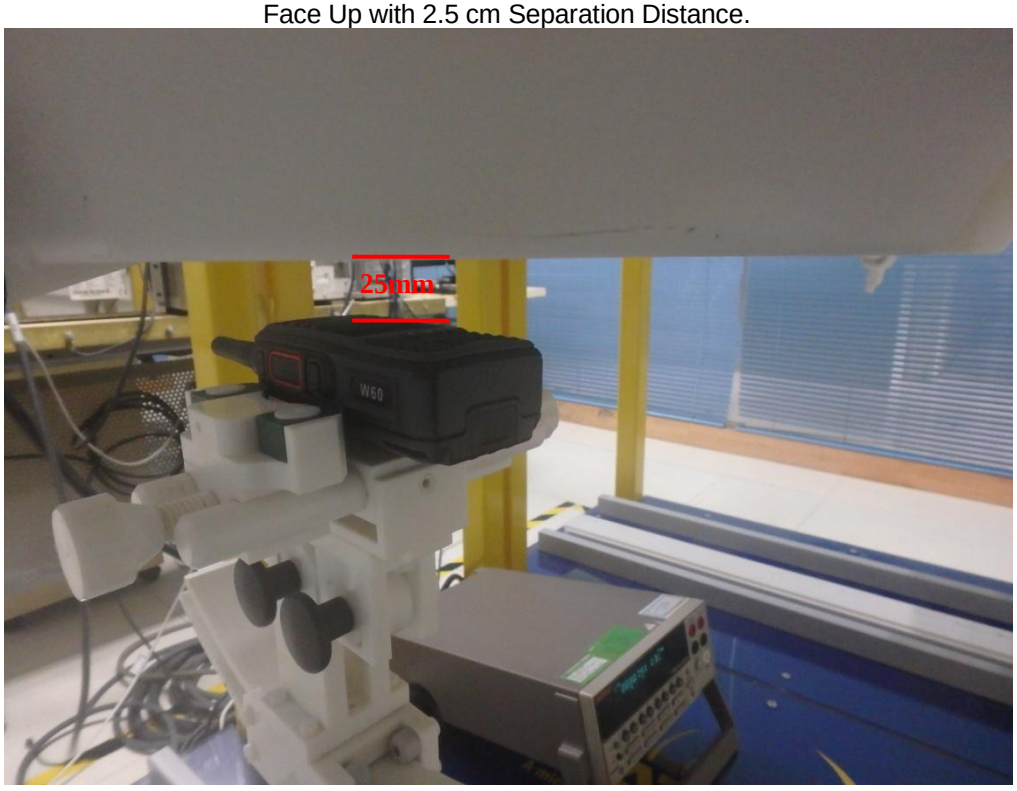
3D screen shot	Hot spot position
	

APPENDIX C. TEST SETUP PHOTOGRAPHS

Body Back Touch with all accessories

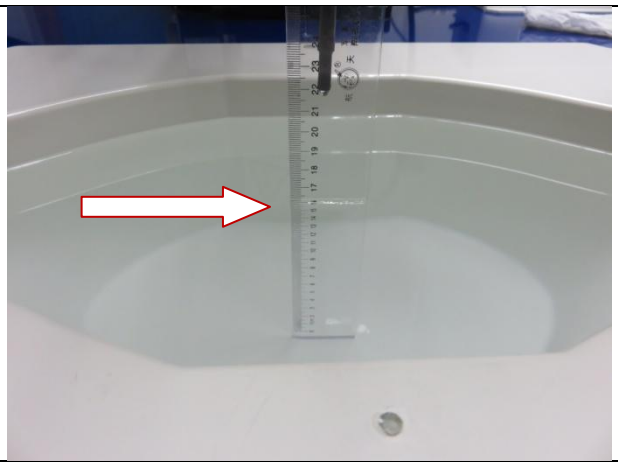
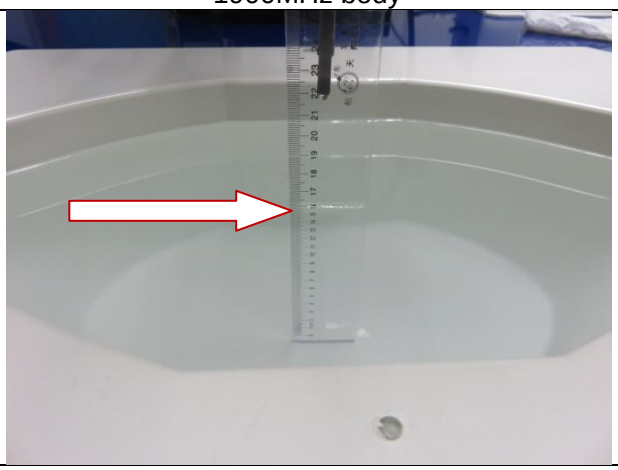


Face Up with 2.5 cm Separation Distance.



DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

Note：The position used in the measurement were according to IEEE 1528-2013

835MHz head	835MHz body
	
1900MHz head	1900MHz body
	
2450MHz head	2450MHz body
	

APPENDIX D. CALIBRATION DATA

Refer to Attached files.