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# SAR Test Report

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Report No.: AGC03057200501FH01

**FCC ID** : 2AWCR-D523F

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : 4G Wireless Router

**BRAND NAME** : signalinks

**MODEL NAME** : D523F

**APPLICANT** : Shenzhen Xinfengweiye Technology Co.,Ltd

**DATE OF ISSUE** : Jun. 24,2020

**STANDARD(S)** : IEEE Std. 1528:2013  
FCC 47 CFR Part 2§2.1093:2013  
IEEE Std C95.1™-2005  
IEC 62209-1: 2016

**REPORT VERSION** : V1.0

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### Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun. 24,2020	Valid	Initial Release

## Test Report

Applicant Name	Shenzhen Xinfengweiye Technology Co.,Ltd
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Factory Address	301, Blk 6, Donglongxing Science Park, Huaning Rd., Longhua Dist., Shenzhen, China
Product Designation	4G Wireless Router
Brand Name	signalinks
Model Name	D523F
Different Description	N/A
Applicable Standard	IEEE Std. 1528:2013 FCC 47 CFR Part 2§2.1093:2013 IEEE Std C95.1™-2005 IEC 62209-1: 2016
Test Date	May 22,2020 to Jun. 01,2020
Report Template	AGCRT-US-4G/SAR (2018-01-01)

Note: The results of testing in this report apply to the product/system which was tested only.

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## 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)
	Body-worn	
UMTS Band II	0.789	1.6
UMTS Band IV	0.798	
LTE Band 2	1.145	
LTE Band 4	0.765	
LTE Band 7	0.488	
LTE Band 12	0.407	
LTE Band 13	1.146	
LTE Band 25	1.026	
WIFI 2.4G	0.147	
Simultaneous Reported SAR	1.214	
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 941225 D06 Hotspot Mode v02r01
- KDB 248227 D01 802 11 Wi-Fi SAR v02r02
- KDB 941225 D05 SAR for LTE Devices v02r05

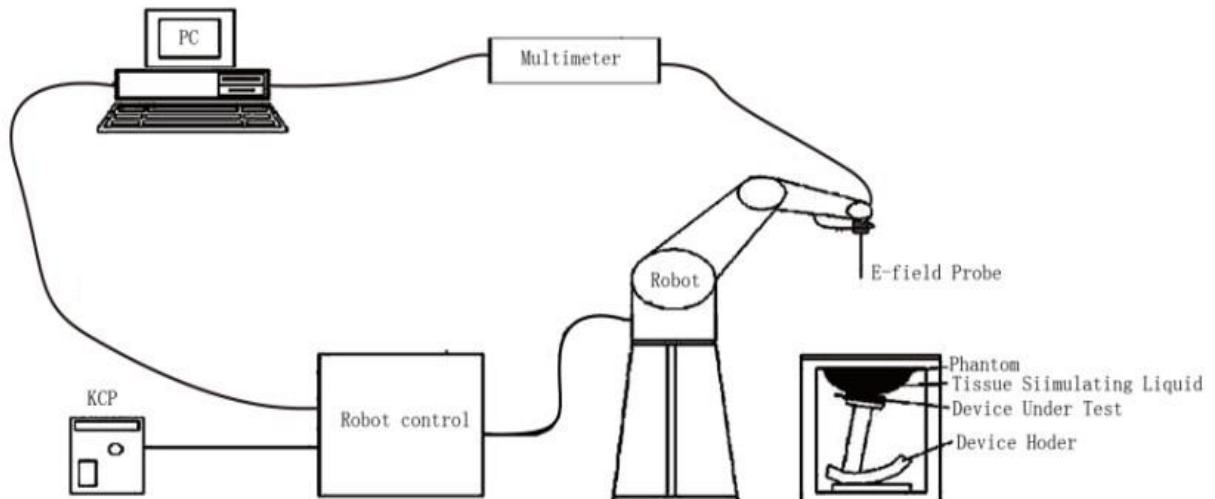
## 2. GENERAL INFORMATION

### 2.1. EUT Description

<b>General Information</b>	
Product Designation	4G Wireless Router
Test Model	D523F
Hardware Version	F231CE_V3.0_SM_FX
Software Version	XFNJ_B03P14_F231CE_V3.0_SM_FX_GLOBAL_P013
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
<b>WCDMA</b>	
Support Band	<input checked="" type="checkbox"/> UMTS FDD Band II <input checked="" type="checkbox"/> UMTS FDD Band IV
HS Type	HSPA(HSUPA/HSDPA)
TX Frequency Range	FDD Band II: 1850-1910MHz; FDD Band IV: 1712.4-1752.6MHz
RX Frequency Range	FDD Band II: 1930-1990MHz; FDD Band IV: 2112.4-5152.6MHz
Release Version	Rel-6
Type of modulation	HSDPA:QPSK/16QAM; HSUPA:BPSK; WCDMA:QPSK
Antenna Gain	Band II: -4.10dBi; Band IV: -4.50dBi;
Max. Average Power	Band II: 22.33dBm; Band IV: 24.13dBm;
<b>LTE</b>	
Support Band	<input checked="" type="checkbox"/> FDD Band 2 <input checked="" type="checkbox"/> FDD Band 4 <input checked="" type="checkbox"/> FDD Band 7 <input checked="" type="checkbox"/> FDD Band 12 <input checked="" type="checkbox"/> FDD Band 13 <input checked="" type="checkbox"/> FDD Band 25 (U.S. Bands) <input checked="" type="checkbox"/> TDD Band 28 (Non-U.S. Bands)
TX Frequency Range	Band 2:1850-1910MHz; Band 4:1710-1755MHz; Band 7:2500-2570MHz; Band 12:700-715.9MHz; Band 13:777-786.9MHz;Band 25: 1850-1915MHz;
RX Frequency Range	Band 2:1930-1990MHz; Band 4:2110-2155MHz; Band 7:2620-2690MHz; Band 12: 730-745.9 MHz; Band 13:746-755.9MHz;Band 25: 1930-1995MHz;
Release Version	Rel-8
Type of modulation	QPSK, 16QAM
Antenna Gain	Band 2: -4.10dBi; Band 4: -4.50dBi; Band 7: -2.90dBi; Band 12: -3.00dBi; Band 13: -3.80dBi; Band 25: -3.70dBi;
Diversity Antenna Gain	Band 2: -4.30dBi; Band 4: -4.50dBi; Band 7: -3.00dBi; Band 12: -3.20dBi; Band 13: -3.90dBi;Band 25: -3.70dBi;
Max. Average Power	Band 2: 22.93dBm; Band 4: 24.63dBm; Band 7:24.98dBm; Band 12: 25.16dBm; Band 13: 24.33dBm;Band 25: 22.86dBm;
<b>WIFI</b>	
WIFI Specification	<input type="checkbox"/> 802.11a <input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n(20) <input checked="" type="checkbox"/> 802.11n(40)
Operation Frequency	2412~2462MHz
Avg. Burst Power	11b: 14.85dBm,11g:12.84dBm,11n(20):12.69dBm,11n(40):12.07dBm
Antenna Gain	-2.50dBi

### 3. SAR MEASUREMENT SYSTEM

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



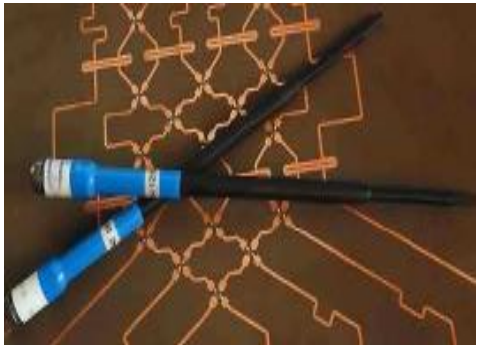
The COMOSAR system for performing compliance tests consists of the following items:

- 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

<b>Model</b>	SSE5	
<b>Manufacture</b>	MVG	
<b>Identification No.</b>	SN 22/16 EP315	
<b>Frequency</b>	0.7GHz-3GHz Linearity:±0.06dB(0.7GHz-3GHz)	
<b>Dynamic Range</b>	0.01W/Kg-100W/Kg Linearity:±0.06dB	
<b>Dimensions</b>	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	
<b>Application</b>	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:

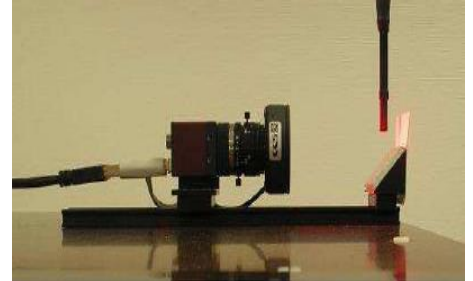
- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller





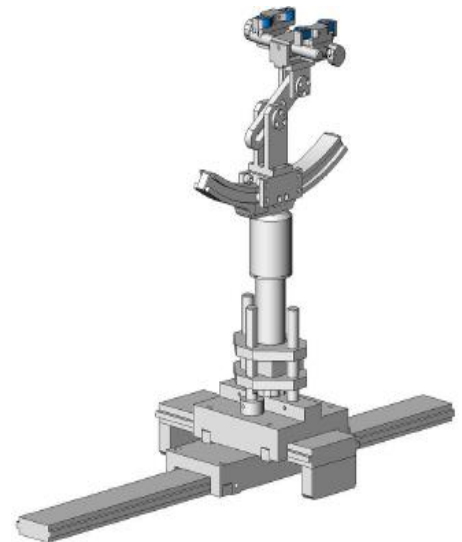
### 3.4. Video Positioning System

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  $\epsilon_r = 3$  and loss tangent  $\delta = 0.02$ . 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 <sub>h</sub>	is the heat capacity of the tissue in joules per kilogram and Kelvin;

$\left. \frac{dT}{dt} \right|_{t=0}$  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 and IEC62209 standards, 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

	$\leq 3$ GHz	$> 3$ GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1$ mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$	$\leq 2$ GHz: $\leq 15$ mm $2 - 3$ GHz: $\leq 12$ mm	$3 - 4$ GHz: $\leq 12$ mm $4 - 6$ GHz: $\leq 10$ 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 $\leq$ 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: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm
<p>Note: <math>\delta</math> is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.</p> <p>* When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based I-g SAR estimation</i> procedures of KDB 447498 is <math>\leq 1.4</math> W/kg, <math>\leq 8</math> mm, <math>\leq 7</math> mm and <math>\leq 5</math> 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.</p>			

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

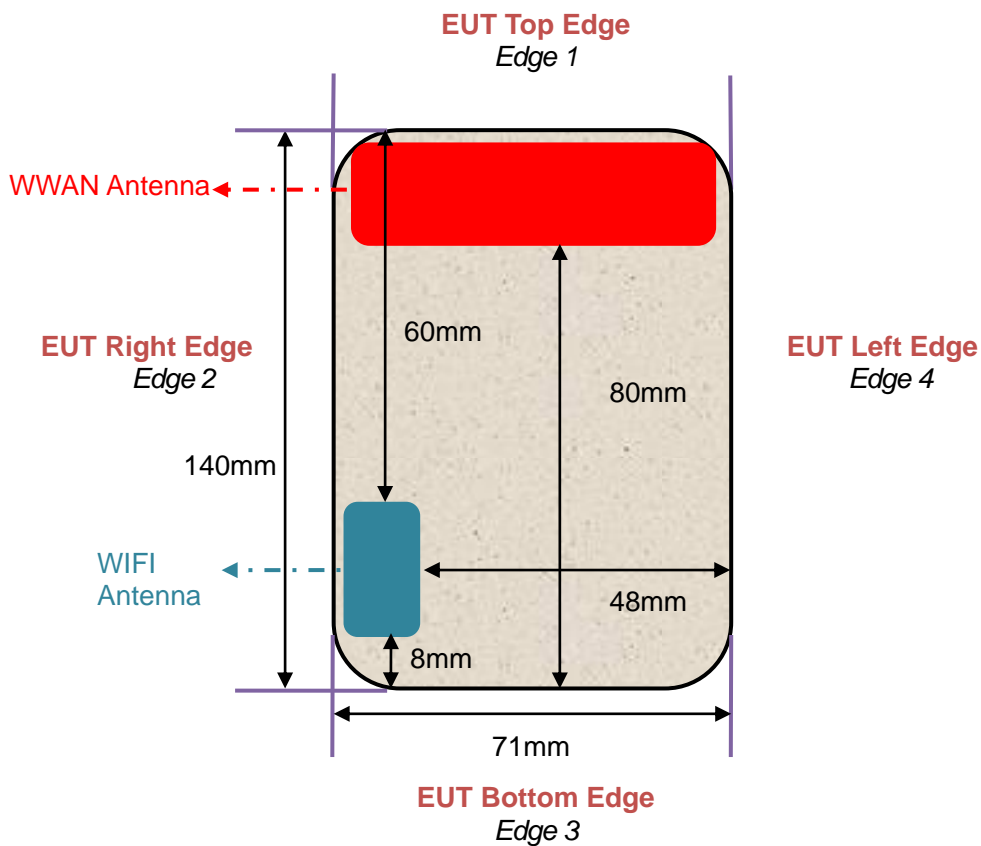
Test Configuration and setting:

The EUT is a model of 4G Wireless Router. It supports WCDMA/HSPA, LTE and 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 engineering command.

#### Antenna Location: (the back view)



For WWAN mode:

Test Configurations	Antenna to edges/surface	SAR required	Note
Head			
Left Touch		Yes	--
Left Tilt		Yes	--
Right Touch		Yes	--
Right Tilt		Yes	--
Body			
Back	<25mm	Yes	--
Front	<25mm	Yes	--
Hotspot			
Back	<25mm	Yes	--
Front	<25mm	Yes	--
Edge 1 (Top)	5mm	Yes	--
Edge 2 (Right)	5mm	Yes	--
Edge 3 (Bottom)	80mm	No	SAR is not required for the distance between the antenna and the edge is >25mm as per KDB 941225 D06 Hotspot SAR
Edge 4 (Left)	5mm	Yes	--

For WLAN mode:

Test Configurations	Antenna to edges/surface	SAR required	Note
Head			
Left Touch		Yes	--
Left Tilt		Yes	--
Right Touch		Yes	--
Right Tilt		Yes	--
Body			
Back	<25mm	Yes	--
Front	<25mm	Yes	--
Hotspot			
Back	<25mm	Yes	--
Front	<25mm	Yes	--
Edge 1 (Top)	60mm	No	SAR is not required for the distance between the antenna and the edge is >25mm as per KDB 941225 D06 Hotspot SAR
Edge 2 (Right)	2mm	Yes	--
Edge 3 (Bottom)	8mm	Yes	--
Edge 4 (Left)	48mm	No	SAR is not required for the distance between the antenna and the edge is >25mm as per KDB 941225 D06 Hotspot SAR

## 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 10% are listed in 6.2

### 5.1. The composition of the tissue simulating liquid

Ingredient (% Weight) Frequency (MHz)	Water	Nacl	Polysorbate 20	DGBE	1,2 Propanediol	Triton X-100
750 Head	35	2	0.0	0.0	63	0.0
1750 Head	52.64	0.36	0.0	47	0.0	0.0
1900 Head	54.9	0.18	0.0	44.92	0.0	0.0
2450 Head	71.88	0.16	0.0	7.99	0.0	19.97
2600 Head	55.242	0.306	0	44.452	0	0



## 5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEC 62209-1 have been incorporated in the following table. The body tissue dielectric parameters recommended by the IEC 62209-2 have been incorporated in the following table.

Target Frequency (MHz)	head		body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
300	45.3	0.87	45.3	0.87
450	43.5	0.87	43.5	0.87
<b>750</b>	41.9	0.89	<b>41.9</b>	<b>0.89</b>
835	41.5	0.90	41.5	0.90
900	41.5	0.97	41.5	0.97
915	41.5	1.01	41.5	1.01
1450	40.5	1.20	40.5	1.20
1610	40.3	1.29	40.3	1.29
<b>1750</b>	40.1	1.37	<b>40.1</b>	<b>1.37</b>
<b>1800 – 2000</b>	40.0	1.40	<b>40.0</b>	<b>1.40</b>
<b>2450</b>	39.2	1.80	<b>39.2</b>	<b>1.80</b>
<b>2600</b>	39.0	1.96	<b>39.0</b>	<b>1.96</b>
3000	38.5	2.40	38.5	2.40

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000$  kg/m<sup>3</sup>)

### 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 750MHz					
	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 41.9 (37.71-46.09)	$\delta$ [s/m] 0.89(0.801-0.979)		
Head	704	42.58	0.86	20.1	Jun. 01,2020
	709	42.39	0.87		
	707.5	42.04	0.88		
	710	41.97	0.89		
	711	41.74	0.90		
	750	41.61	0.91		
	782	41.32	0.92		

Tissue Stimulant Measurement for 1750MHz					
	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 40.1 (36.09-44.11)	$\delta$ [s/m]1.37(1.233-1.507)		
Head	1720	40.26	1.35	20.3	May 30,2020
	1732.5	40.08	1.36		
	1745	39.76	1.37		
	1750	39.52	1.38		

Tissue Stimulant Measurement for 1900MHz					
	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 40.00(36.00-44.00)	$\delta$ [s/m]1.40(1.26-1.54)		
Head	1850.2	40.69	1.33	19.8	May 28,2020
	1852.4	40.34	1.34		
	1880	39.98	1.35		
	1900	39.51	1.36		
	1907.6	39.32	1.37		
	1909.8	39.06	1.38		

Tissue Stimulant Measurement for 1900MHz					
	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 40.00(36.00-44.00)	$\delta$ [s/m]1.40(1.26-1.54)		
Head	1860	38.79	1.37	20.5	May 31,2020
	1880	38.62	1.38		
	1882.5	38.60	1.38		
	1900	38.58	1.39		

Tissue Stimulant Measurement for 2450MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 39.2(35.28-43.12)	$\delta$ [s/m]1.80(1.62-1.98)		
	2412	39.02	1.82	20.8	May 29,2020
	2437	38.89	1.83		
	2450	38.74	1.84		
	2462	38.56	1.85		

Tissue Stimulant Measurement for 2600MHz					
Head	Fr. (MHz)	Dielectric Parameters ( $\pm 10\%$ )		Tissue Temp [°C]	Test time
		$\epsilon_r$ 39(35.1-42.9)	$\delta$ [s/m]1.96(1.764-2.156)		
	2510	39.23	1.86	20.9	May 22,2020
	2535	39.17	1.87		
	2560	39.04	1.88		
	2600	38.92	1.89		

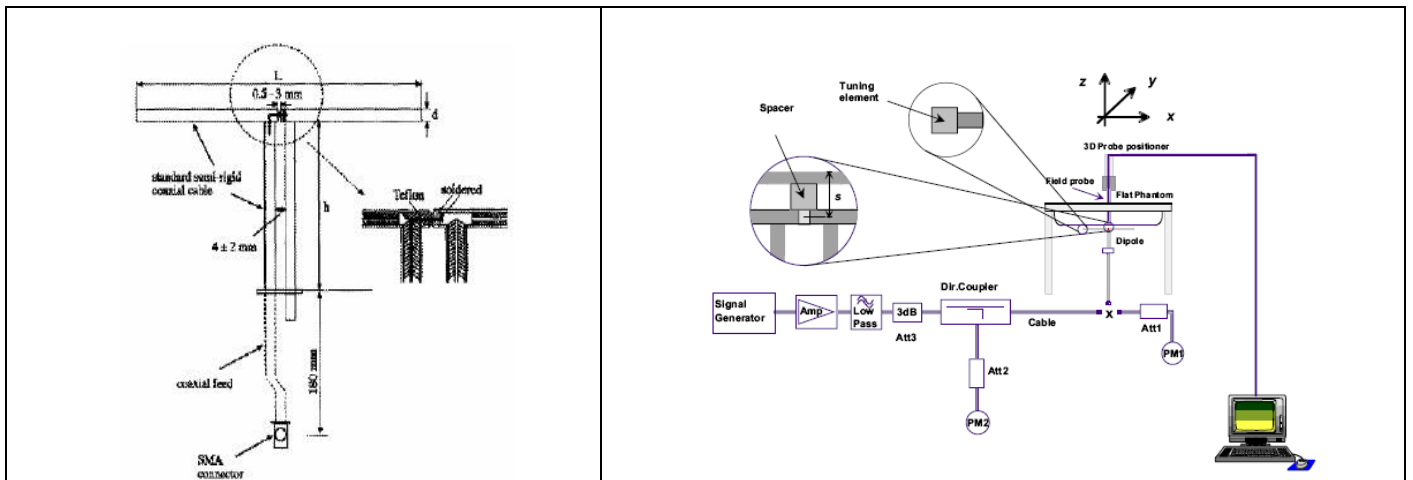
## 6. SAR SYSTEM CHECK PROCEDURE

### 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.

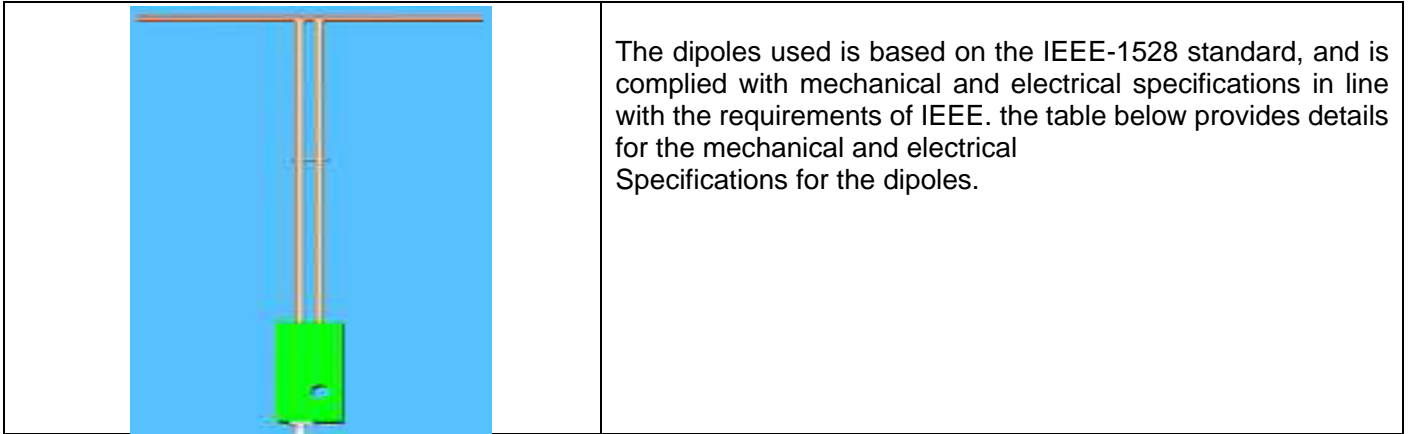
Each SATIMO system is equipped with one or more system check kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system check and system validation. System kit includes a dipole, and dipole device holder.

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



Frequency	L (mm)	h (mm)	d (mm)
750MHz	176	100	6.35
1800MHz	71.6	41.7	3.6
1900MHz	68	39.5	3.6
2450MHz	51.5	30.4	3.6
2600MHz	48.5	28.8	3.6

### 6.2.2. System Check Result

System Performance Check at 750MHz&1800MHz &1900MHz &2450MHz&2600MHz for Head								
Validation Kit: SN47/14 DIP 0G750-340& SN46/11 DIP 1G800-186& SN 46/11 DIP 1G900-187& SN46/11 DIP 2G450-189& SN 47/14 DIP 2G600-342								
Frequency [MHz]	Target Value(W/Kg)		Reference Result ( $\pm 10\%$ )		Tested Value(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
750	8.31	5.45	7.479-9.141	4.905-5.995	8.13	5.72	20.1	Jun. 01,2020
1800	39.07	20.29	35.163-42.977	18.261-22.319	36.02	18.98	20.3	May 30,2020
1900	40.25	20.50	36.225-44.275	18.45-22.55	41.16	20.02	19.8	May 28,2020
1900	40.25	20.50	36.225-44.275	18.45-22.55	38.26	19.45	20.5	May 31,2020
2450	53.97	24.01	48.573-59.367	21.609-26.411	52.90	23.68	20.8	May 29,2020
2600	56.86	24.84	51.174-62.546	22.356-27.324	54.16	24.31	20.9	May 22,2020

Note:

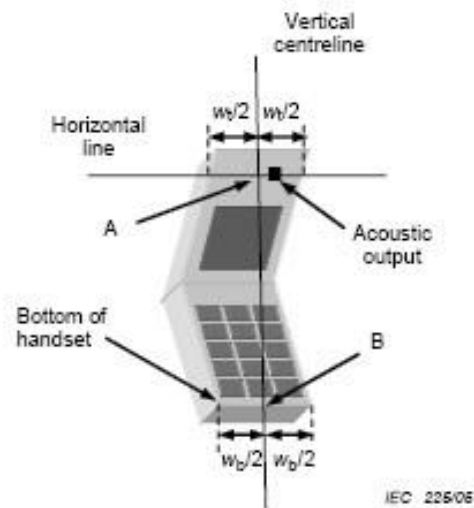
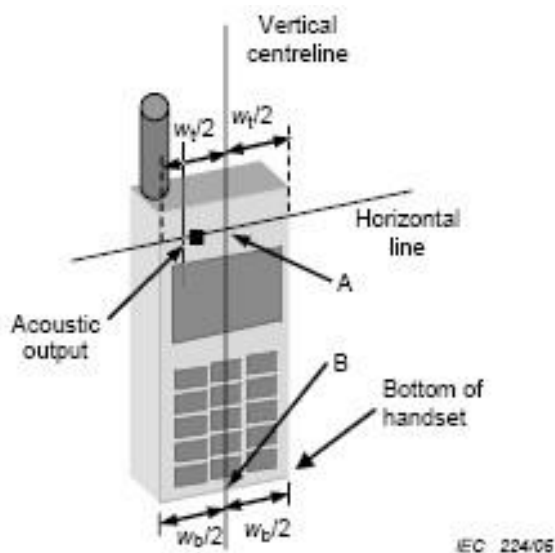
(1) We use a CW signal of 18dBm for system check, and then all SAR value are normalized to 1W forward power. The result must be within  $\pm 10\%$  of target value.

## 7. EUT TEST POSITION

This EUT was tested in **Body back, Body front and 4 edges.**

### 7.1. Define Two Imaginary Lines on the Handset

- (1) The vertical centerline passes through two points on the front side of the handset: the midpoint of the width  $w_t$  of the handset at the level of the acoustic output, and the midpoint of the width  $w_b$  of the handset.
- (2) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
- (3) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



## 7.2. Cheek Position

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



## 7.3. Tilt Position

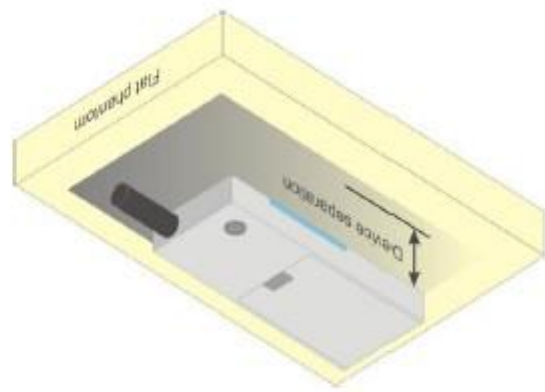
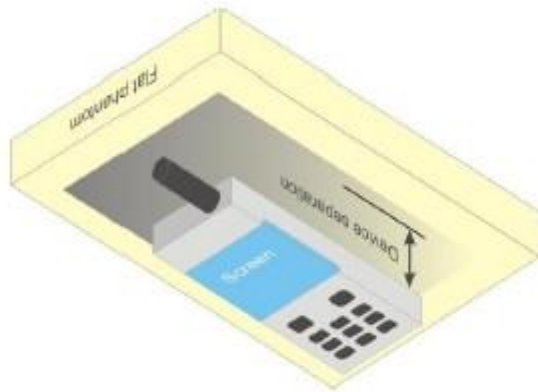
- (1) To position the device in the “cheek” position described above.
- (2) While maintaining the device in the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until with the ear is lost.





#### 7.4. 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 **10mm**.



## 8. SAR EXPOSURE LIMITS

### Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	Uncontrolled Environment Limit (W/kg)
Spatial Peak SAR (1g cube tissue for brain or body)	1.60
Spatial Average SAR (Whole body)	0.08
Spatial Peak SAR (Limbs)	4.0

## 9. TEST FACILITY

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<b>Designation Number</b>	CN1259
<b>FCC Test Firm Registration Number</b>	975832
<b>A2LA Cert. No.</b>	5054.02
<b>Description</b>	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

## 10. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
SAR Probe	MVG	SN 22/16 EP315	Jun. 04,2019	Jun. 03,2020
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	Oct. 08,2019	Oct. 07,2020
Comm Tester	R&S- CMW500	S/N120909	Jul. 02,2019	Jul. 01,2020
Multimeter	Keithley 2000	4114939	Sep. 09,2019	Sep. 08,2020
Dipole	SATIMO SID750	SN47/14 DIP 0G750-340	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID1800	SN46/11 DIP 1G800-186	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID1900	SN 46/11 DIP 1G900-187	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID2450	SN46/11 DIP 2G450-189	Apr. 26,2019	Apr. 25,2022
Dipole	SATIMO SID2600	SN 47/14 DIP 2G600-342	Apr. 26,2019	Apr. 25,2022
Signal Generator	Agilent-E4438C	US41461365	Oct. 08,2019	Oct. 07,2020
Vector Analyzer	Agilent / E4440A	US41421290	Sep. 09,2019	Sep. 08,2020
Network Analyzer	Rhode & Schwarz ZVL6	SN101443	Oct. 08,2019	Oct. 07,2020
Attenuator	Warison /WATT-6SR1211	S/N:WRJ34AYM2F1	June 11,2019	June 10, 2020
Attenuator	Mini-circuits / VAT-10+	31405	June 11,2019	June 10, 2020
Amplifier	AS0104-55_55	1004793	June 12,2019	June 11,2020
Directional Couple	Werlatone/ C5571-10	SN99463	June 12,2019	June 11,2020
Directional Couple	Werlatone/ C6026-10	SN99482	June 12,2019	June 11,2020
Power Sensor	NRP-Z21	1137.6000.02	Sep. 09,2019	Sep. 08,2020
Power Sensor	NRP-Z23	US38261498	Feb. 18,2020	Feb. 17,2021
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.

## 11. MEASUREMENT UNCERTAINTY

Measurement uncertainty for Dipole averaged over 1 gram / 10 gram									
a	b	c	d	<sup>e</sup> f(d,k)	f	g	<sup>h</sup> cx <sub>f</sub> /e	<sup>i</sup> cx <sub>g</sub> /e	k
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g U <sub>i</sub> (±%)	10g U <sub>i</sub> (±%)	v <sub>i</sub>
<b>Measurement System</b>									
Probe calibration	E.2.1	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	0.57	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.23	0.23	∞
Hemispherical Isotropy	E.2.2	0.915	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.37	0.37	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	0.675	R	$\sqrt{3}$	1	1	0.39	0.39	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	E.2.5	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	1	1	0	0	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
<b>Test sample Related</b>									
Test sample positioning	E.4.2	2.6	N	1	1	1	2.6	2.6	∞
Device holder uncertainty	E.4.1	3	N	1	1	1	3	3	∞
Output power variation—SAR drift measurement	E.2.9	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	E.6.5	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
<b>Phantom and tissue parameters</b>									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
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 measurement	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				9.787	9.587	
Expanded Uncertainty (95% Confidence interval)			K=2				19.573	19.175	

System Validation uncertainty for Dipole averaged over 1 gram / 10 gram.									
a	b	c	d	e f(d,k)	f	g	h cxf/e	i cxg/e	k
Uncertainty Component	Sec.	Tol (±%)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (±%)	10g Ui (±%)	vi
<b>Measurement System</b>									
Probe calibration	E.2.1	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	0.57	R	$\sqrt{3}$	1	1	0.33	0.33	∞
Hemispherical Isotropy	E.2.2	0.915	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	0.675	R	$\sqrt{3}$	1	1	0.39	0.39	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	E.2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
<b>System check source (dipole)</b>									
Deviation of experimental dipole from numerical dipole	E.6.4	5.0	N	1	1	1	5.00	5.00	∞
Input power and SAR drift measurement	8,6.6.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
<b>Phantom and tissue parameters</b>									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
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 measurement	E.3.3	4.0	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5.0	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				9.735	9.534	
Expanded Uncertainty (95% Confidence interval)			K=2				19.470	19.069	

System check uncertainty for Dipole averaged over 1 gram / 10 gram.									
a	b	c	d	e f(d,k)	f	g	h cx <sub>f</sub> /e	i cx <sub>g</sub> /e	k
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g U <sub>i</sub> (+-%)	10g U <sub>i</sub> (+-%)	v <sub>i</sub>
<b>Measurement System</b>									
Probe calibration drift	E.2.1.3	0.5	N	1	1	1	0.50	0.50	∞
Axial Isotropy	E.2.2	0.57	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Hemispherical Isotropy	E.2.2	0.915	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	∞
Linearity	E.2.4	0.675	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	∞
Modulation response	E.2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	0	0	0.00	0.00	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	0	0	0.00	0.00	∞
<b>System check source (dipole)</b>									
Deviation of experimental dipoles	E.6.4	2	N	1	1	1	2	2	∞
Input power and SAR drift measurement	8,6.6.4	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞
<b>Phantom and tissue parameters</b>									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
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 measurement	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				5.564	5.205	
Expanded Uncertainty (95% Confidence interval)			K=2				11.128	10.410	

## 12. CONDUCTED POWER MEASUREMENT

### 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( $\beta_c$  and  $\beta_d$ ) 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:  $\beta$  values for transmitter characteristics tests with HS-DPCCH

Sub-test	$\beta_c$ (Note5)	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15(Note 4)	15/15(Note 4)	64	12/15(Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1:  $\Delta ACK$ ,  $\Delta NACK$  and  $\Delta CQI = 30/15$  with  $\beta_{hs} = 30/15 * \beta_c$ .

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,  $\Delta ACK$  and  $\Delta NACK = 30/15$  with  $\beta_{hs} = 30/15 * \beta_c$ , and  $\Delta CQI = 24/15$  with  $\beta_{hs} = 24/15 * \beta_c$ .

Note 3: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $hs/c=24/15$ . 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 ( $\beta_c$  and  $\beta_d$ ) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
  - (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:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1)	$\beta_{ec}$	$\beta_{ed}$ (Note 4) (Note 5)	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Code s)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TF CI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}$ : 47/15 $\beta_{ed2}$ : 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,  $\Delta ACK$ ,  $\Delta NACK$  and  $\Delta CQI = 30/15$  with  $\beta_{hs} = 30/15 * \beta_c$ . For sub-test 5,  $\Delta ACK$ ,  $\Delta NACK$  and  $\Delta CQI = 5/15$  with  $\beta_{hs} = 5/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $hs/c = 24/15$ . 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:  $\beta_{ed}$  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**

<b>Mode</b>	<b>Frequency (MHz)</b>	<b>Avg. Burst Power (dBm)</b>
WCDMA 1900 RMC	1852.4	21.95
	1880	21.94
	1907.6	<b>22.33</b>
WCDMA 1900 AMR	1852.4	22.03
	1880	22.15
	1907.6	22.28
HSDPA Subtest 1	1852.4	21.66
	1880	22.15
	1907.6	22.08
HSDPA Subtest 2	1852.4	21.22
	1880	21.66
	1907.6	21.61
HSDPA Subtest 3	1852.4	20.26
	1880	21.69
	1907.6	21.62
HSDPA Subtest 4	1852.4	20.76
	1880	21.20
	1907.6	21.16
HSUPA Subtest 1	1852.4	18.66
	1880	18.91
	1907.6	17.97
HSUPA Subtest 2	1852.4	16.96
	1880	17.27
	1907.6	16.95
HSUPA Subtest 3	1852.4	18.75
	1880	19.16
	1907.6	18.23
HSUPA Subtest 4	1852.4	17.11
	1880	18.69
	1907.6	17.63
HSUPA Subtest 5	1852.4	17.88
	1880	18.00
	1907.6	17.15

**UMTS BAND IV**

<b>Mode</b>	<b>Frequency (MHz)</b>	<b>Avg. Burst Power (dBm)</b>
WCDMA 1700 RMC	1712.5	<b>24.13</b>
	1732.5	23.97
	1752.5	23.86
WCDMA 1700 AMR	1712.5	23.25
	1732.5	23.11
	1752.5	23.28
HSDPA Subtest 1	1712.5	23.11
	1732.5	21.33
	1752.5	23.03
HSDPA Subtest 2	1712.5	22.41
	1732.5	20.68
	1752.5	22.44
HSDPA Subtest 3	1712.5	22.39
	1732.5	20.70
	1752.5	22.49
HSDPA Subtest 4	1712.5	21.90
	1732.5	20.22
	1752.5	22.06
HSUPA Subtest 1	1712.5	20.87
	1732.5	19.24
	1752.5	20.79
HSUPA Subtest 2	1712.5	20.09
	1732.5	17.24
	1752.5	18.82
HSUPA Subtest 3	1712.5	20.96
	1732.5	19.31
	1752.5	20.89
HSUPA Subtest 4	1712.5	20.28
	1732.5	18.75
	1752.5	20.28
HSUPA Subtest 5	1712.5	19.78
	1732.5	20.32
	1752.5	21.84

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	$0 \leq CM \leq 3.5$	$MAX(CM-1,0)$
Note: CM=1 for $\beta_c/\beta_d=12/15$ , $\beta_{hs}/\beta_c=24/15$ .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.

**LTE Band**

Conducted Power of LTE Band 2(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					18607	18900	19193	
1.4MHz	QPSK	1	0	0	22.03	22.66	22.73	
			2	0	21.75	22.57	22.59	
			5	0	21.71	22.58	22.64	
		3	0	0	21.74	22.61	22.56	
			1	0	21.72	22.61	22.59	
			2	0	21.68	22.58	22.52	
	6	0	1	21.00	21.17	21.01		
	16QAM	1	0	1	21.57	21.23	21.10	
			2	1	21.58	21.19	21.08	
			5	1	21.58	21.21	21.20	
		3	0	1	21.11	21.29	20.99	
			1	1	21.22	21.19	20.89	
			2	1	21.18	21.18	20.95	
		6	0	2	20.55	20.58	20.64	
		Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel
						18615	18900	19185
3MHz	QPSK	1	0	0	21.27	22.44	22.29	
			8	0	20.51	21.75	21.79	
			14	0	21.16	22.41	22.46	
		8	0	1	20.35	21.71	21.52	
			4	1	20.35	21.71	21.51	
			8	1	20.34	21.70	21.60	
	15	0	1	20.27	21.67	21.52		
	16QAM	1	0	1	20.85	21.84	21.38	
			8	1	20.27	21.50	21.36	
			14	1	20.45	21.87	21.75	
		8	0	2	19.92	20.12	20.17	
			4	2	19.86	20.13	20.23	
			8	2	19.84	20.15	20.28	
		15	0	2	19.86	20.01	20.23	

Conducted Power of LTE Band 2(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					18625	18900	19175	
5MHz	QPSK	1	0	0	21.21	22.12	21.71	
			12	0	20.91	21.84	22.12	
			24	0	21.37	22.15	22.51	
		12	0	1	20.54	21.65	21.36	
			6	1	20.54	21.65	21.36	
			13	1	20.53	21.65	21.80	
		25	0	1	20.53	21.69	21.61	
		16QAM	1	0	1	20.87	21.65	21.64
				12	1	20.45	21.72	21.78
	24			1	20.91	21.00	21.06	
	12		0	2	20.08	20.09	20.03	
			6	2	20.12	20.12	20.04	
			13	2	20.11	20.10	20.47	
	25	0	2	20.08	20.05	20.27		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					18650	18900	19150	
10MHz	QPSK	1	0	0	21.96	22.76	21.47	
			24	0	20.70	21.78	20.65	
			49	0	21.48	<b>22.93</b>	22.88	
		25	0	1	20.50	21.63	20.48	
			12	1	20.50	21.63	20.48	
			25	1	20.19	21.69	21.29	
		50	0	1	20.66	21.53	20.79	
		16QAM	1	0	1	21.56	21.36	21.17
				24	1	20.22	21.54	20.51
	49			1	20.96	21.56	20.44	
	25		0	2	20.06	20.11	19.98	
			12	2	20.07	20.03	19.99	
			25	2	19.74	20.08	19.95	
	50		0	2	20.21	19.98	20.47	

Conducted Power of LTE Band 2(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					18675	18900	19125	
15MHz	QPSK	1	0	0	21.53	22.00	21.08	
			38	0	19.98	21.40	20.49	
			74	0	21.27	22.17	22.77	
		38	0	1	19.99	21.21	20.89	
			18	1	19.99	21.20	20.89	
			37	1	19.99	21.20	20.88	
		75	0	1	19.97	21.19	20.85	
		16QAM	1	0	1	21.12	21.48	20.85
				38	1	19.67	21.03	20.32
	74			1	20.91	21.65	20.30	
	38		0	2	19.98	20.15	20.88	
			18	2	19.97	20.20	20.87	
			37	2	19.98	20.23	20.87	
	75	0	2	19.49	20.85	20.33		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
18700						18900	19100	
20MHz	QPSK	1	0	0	22.46	22.65	22.33	
			49	0	20.35	21.87	20.53	
			99	0	21.63	21.95	22.72	
		50	0	1	20.48	21.10	19.96	
			25	1	20.47	21.10	19.96	
			49	1	20.20	21.21	20.86	
		100	0	1	20.13	21.22	20.72	
		16QAM	1	0	1	21.30	21.44	20.88
				49	1	20.13	21.59	20.20
	99			1	21.29	21.63	21.40	
	50		0	2	19.98	20.76	19.50	
			25	2	19.99	20.75	19.52	
			49	2	19.71	20.85	20.38	
	100		0	2	19.66	20.87	20.20	

Conducted Power of LTE Band 4(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					19957	20175	20393	
1.4MHz	QPSK	1	0	0	23.69	23.01	22.36	
			2	0	23.58	22.94	22.14	
			5	0	23.79	23.07	22.13	
		3	0	0	23.57	22.91	22.11	
			1	0	23.56	22.90	22.10	
			2	0	23.58	22.96	21.98	
		6	0	1	23.08	22.54	21.50	
		16QAM	1	0	1	23.44	22.55	22.04
				2	1	23.26	22.51	21.73
	5			1	23.36	22.65	21.74	
	3		0	1	23.18	22.70	21.69	
			1	1	23.22	22.67	21.68	
			2	1	23.21	22.60	21.58	
	6	0	2	22.02	22.27	21.13		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					19965	20175	20385	
3MHz	QPSK	1	0	0	23.36	23.39	22.36	
			7	0	23.19	22.37	21.51	
			14	0	23.67	22.66	21.90	
		8	0	1	22.88	22.08	21.49	
			4	1	22.87	22.07	21.49	
			7	1	22.92	22.23	21.28	
		15	0	1	22.82	22.28	21.32	
		16QAM	1	0	1	23.36	22.99	21.97
				7	1	22.73	22.21	21.09
	14			1	23.32	22.52	21.53	
	8		0	2	22.48	22.07	21.15	
			4	2	22.49	21.97	21.18	
			7	2	22.57	22.22	20.95	
	15		0	2	22.33	21.96	20.90	



Conducted Power of LTE Band 4(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					19975	20175	20375	
5MHz	QPSK	1	0	0	23.54	23.41	22.47	
			12	0	23.16	22.61	21.68	
			24	0	23.54	22.88	21.74	
		12	0	1	22.91	22.52	21.57	
			6	1	22.90	22.51	21.57	
			11	1	22.91	22.01	21.16	
		25	0	1	22.91	22.20	21.59	
		16QAM	1	0	1	23.20	22.68	22.23
				12	1	22.85	22.04	21.43
	24			1	23.29	22.43	21.48	
	12		0	2	22.57	22.13	21.53	
			6	2	22.57	22.12	21.53	
			11	2	22.59	21.61	21.10	
	25	0	2	22.50	21.88	21.20		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20000	20175	20350	
10MHz	QPSK	1	0	0	23.86	23.84	22.48	
			24	0	22.79	22.18	21.74	
			49	0	24.10	23.16	22.10	
		25	0	1	22.79	22.36	21.46	
			12	1	22.80	22.52	21.47	
			25	1	22.82	22.41	21.37	
		50	0	1	22.73	22.27	22.23	
		16QAM	1	0	1	22.52	22.51	22.31
				24	1	22.48	22.13	21.49
	49			1	23.73	22.93	22.07	
	25		0	2	22.39	21.97	21.19	
			12	2	22.41	21.96	21.47	
			25	2	22.43	21.77	21.52	
	50		0	2	22.31	21.98	21.77	

Conducted Power of LTE Band 4(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					20025	20175	20325	
15MHz	QPSK	1	0	0	24.14	23.80	23.28	
			37	0	23.04	22.37	21.58	
			74	0	<b>24.63</b>	22.98	22.24	
		36	0	1	23.07	22.54	21.47	
			16	1	23.07	22.53	21.49	
			35	1	23.06	22.53	21.50	
		75	0	1	23.01	22.51	21.72	
		16QAM	1	0	1	23.93	23.42	23.14
				37	1	22.77	22.23	21.25
	74			1	22.17	22.80	22.04	
	36		0	2	21.04	22.51	21.52	
			16	2	21.03	22.50	21.50	
			35	2	21.03	22.51	21.61	
	75	0	2	22.58	22.19	21.24		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20050	20175	20300	
20MHz	QPSK	1	0	0	23.96	23.87	23.75	
			49	0	23.27	22.64	21.78	
			99	0	24.32	22.82	22.24	
		50	0	1	22.84	22.62	22.11	
			25	1	22.86	22.91	22.10	
			49	1	23.19	22.58	21.86	
		100	0	1	22.90	22.64	21.31	
		16QAM	1	0	1	23.51	22.79	23.19
				49	1	22.72	22.39	21.27
	99			1	21.75	22.56	22.04	
	50		0	2	22.35	22.21	21.90	
			25	2	22.37	22.21	21.88	
			49	2	21.87	21.87	21.78	
	100		0	2	22.58	22.54	20.88	

Conducted Power of LTE Band 7 (dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20775	21100	21425
5MHz	QPSK	1	0	0	23.26	24.02	22.46
			12	0	23.34	23.85	21.74
			24	0	24.01	24.08	21.89
		12	0	1	22.88	23.45	21.71
			6	1	22.88	23.44	21.72
			13	1	23.27	23.65	21.36
	25	0	1	23.10	23.66	21.57	
	16QAM	1	0	1	22.91	23.62	22.10
			12	1	22.94	23.38	21.43
			24	1	23.50	23.66	21.45
		12	0	2	22.58	22.96	21.44
			6	2	22.59	22.01	21.46
			13	2	22.96	22.03	21.12
		25	0	2	22.78	22.21	21.25
Bandwidth		Modulation	RB size	RB offset	Target MPR	Channel	Channel
					20800	21100	21400
10MHz	QPSK	1	0	0	23.93	23.37	22.88
			24	0	23.53	22.48	22.10
			49	0	24.37	23.73	22.87
		25	0	1	23.16	22.37	21.55
			12	1	23.16	22.38	21.57
			25	1	23.45	22.59	21.99
	50	0	1	23.51	22.64	22.28	
	16QAM	1	0	1	23.42	23.08	22.45
			24	1	23.09	22.25	21.64
			49	1	23.84	23.41	22.64
		25	0	2	22.86	21.94	21.16
			12	2	22.86	21.94	21.20
			25	2	22.58	21.94	21.79
		50	0	2	22.19	22.18	21.96

## Conducted Power of LTE Band 7 (dBm)

Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20825	21100	21375
15MHz	QPSK	1	0	0	24.59	23.84	23.49
			37	0	23.64	22.70	22.04
			74	0	24.26	23.89	22.89
		36	0	1	23.72	22.61	21.90
			16	1	23.72	22.61	21.90
			35	1	23.73	22.60	21.89
	75	0	1	23.74	23.83	21.88	
	16QAM	1	0	1	23.10	23.26	22.91
			37	1	23.29	22.15	21.52
			74	1	23.68	23.46	22.39
		36	0	2	22.73	22.81	21.89
			16	2	22.74	22.80	21.88
			35	2	22.74	22.73	21.88
	75	0	2	22.87	22.60	21.37	
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20850	21100	21350
20MHz	QPSK	1	0	0	24.32	24.34	24.18
			49	0	23.75	24.16	22.35
			99	0	<b>24.98</b>	24.85	22.71
		50	0	1	23.71	23.42	22.12
			25	1	23.70	23.43	22.13
			49	1	23.56	23.89	22.32
	100	0	1	23.60	23.88	22.04	
	16QAM	1	0	1	23.70	23.69	23.19
			49	1	23.77	23.68	22.01
			99	1	23.57	23.46	22.53
		50	0	2	22.35	22.15	21.57
			25	2	22.35	22.17	21.58
			49	2	22.68	22.41	22.02
	100	0	2	22.74	22.37	21.55	

Conducted Power of LTE Band 12(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					23017	23095	23173	
1.4MHz	QPSK	1	0	0	24.70	23.86	23.27	
			2	0	24.59	23.61	23.36	
			5	0	24.63	23.69	23.62	
		3	0	0	24.66	23.92	23.28	
			1	0	24.67	23.90	23.25	
			2	0	24.59	23.73	23.51	
		6	0	1	23.03	23.29	23.74	
		16QAM	1	0	1	23.03	23.26	23.54
				2	1	23.97	23.95	23.72
	5			1	23.95	23.95	23.97	
	3		0	1	23.97	23.12	23.51	
			1	1	23.96	23.21	23.51	
			2	1	23.89	23.90	23.74	
	6	0	2	22.40	22.66	22.14		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					23025	23095	23165	
3MHz	QPSK	1	0	0	24.60	24.16	22.02	
			7	0	23.70	23.10	21.23	
			14	0	24.31	23.46	22.19	
		8	0	1	24.09	24.05	22.12	
			4	1	24.07	24.04	22.12	
			7	1	24.96	23.90	22.17	
		15	0	1	24.99	23.70	22.11	
		16QAM	1	0	1	<b>25.16</b>	24.64	22.36
				7	1	24.39	23.59	21.79
	14			1	24.99	23.93	22.54	
	8		0	2	22.22	22.49	21.55	
			4	2	22.19	22.49	21.52	
			7	2	22.08	22.39	21.55	
	15		0	2	22.12	22.19	21.52	

Conducted Power of LTE Band 12(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					23035	23095	23155	
5MHz	QPSK	1	0	0	24.48	24.28	23.03	
			12	0	24.04	23.44	21.79	
			24	0	24.16	23.54	22.29	
		12	0	1	23.11	23.93	22.89	
			6	1	23.11	23.92	22.90	
			13	1	23.03	23.78	22.42	
		25	0	1	23.05	23.00	22.66	
		16QAM	1	0	1	23.10	23.92	23.35
				12	1	23.71	23.93	22.23
	24			1	23.92	23.78	22.58	
	12		0	2	22.28	22.02	22.35	
			6	2	22.27	22.00	22.35	
			13	2	22.13	22.29	21.85	
	25	0	2	22.17	22.43	22.10		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
23060						23095	23130	
10MHz	QPSK	1	0	0	23.12	23.65	23.14	
			24	0	23.80	23.01	23.28	
			49	0	23.17	22.55	23.22	
		25	0	1	23.60	23.18	22.93	
			12	1	23.25	22.80	23.26	
			25	1	23.60	22.35	22.95	
		50	0	1	23.83	23.43	23.16	
		16QAM	1	0	1	23.10	23.09	22.49
				24	1	23.69	23.13	22.65
	49			1	23.34	23.19	23.78	
	25		0	2	22.52	22.56	22.20	
			12	2	22.99	22.18	22.20	
			25	2	22.67	22.39	22.81	
	50		0	2	22.36	22.99	21.99	

Conducted Power of LTE Band 13(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					23205	23230	23255	
5MHz	QPSK	1	0	0	23.43	22.97	23.00	
			12	0	22.85	22.84	23.25	
			24	0	23.03	23.52	23.92	
		12	0	1	23.61	23.08	23.73	
			6	1	23.59	23.08	23.72	
			13	1	23.10	23.75	24.19	
		25	0	1	23.29	23.54	23.86	
		16QAM	1	0	1	23.71	23.62	23.56
				12	1	23.20	23.55	23.73
	24			1	23.42	24.20	<b>24.33</b>	
	12		0	2	22.91	22.51	22.16	
			6	2	22.91	22.53	22.16	
			13	2	22.51	22.16	21.52	
	25	0	2	22.88	22.93	22.23		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					23230	23230	23230	
10MHz	QPSK	1	0	0	23.43	23.43	23.43	
			24	0	22.67	22.67	22.67	
			49	0	22.16	22.16	22.16	
		25	0	1	22.79	22.79	22.79	
			12	1	22.94	22.94	22.94	
			25	1	22.65	22.65	22.65	
		50	0	1	22.29	22.29	22.29	
		16QAM	1	0	1	22.76	22.76	22.76
				24	1	23.10	23.10	23.10
	49			1	23.22	23.22	23.22	
	25		0	2	22.05	22.05	22.05	
			12	2	22.84	22.84	22.84	
			25	2	21.01	21.01	21.01	
	50		0	2	22.14	22.14	22.14	

Conducted Power of LTE Band 25(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					26047	26365	26683	
1.4MHz	QPSK	1	0	0	21.70	22.78	21.69	
			2	0	21.48	22.67	21.23	
			5	0	21.60	22.70	21.11	
		3	0	0	21.54	22.79	21.42	
			1	0	21.52	22.80	21.40	
			2	0	21.47	22.74	21.02	
	6	0	1	20.71	20.99	21.29		
	16QAM	1	0	1	20.98	21.49	20.90	
			2	1	20.86	21.39	20.55	
			5	1	20.97	21.43	20.77	
		3	0	1	20.79	21.10	21.63	
			1	1	20.80	21.02	21.66	
			2	1	20.79	20.96	21.34	
		6	0	2	20.24	20.54	20.83	
		Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel
26055							26365	26675
3MHz	QPSK	1	0	0	22.54	22.68	22.37	
			7	0	21.63	21.92	21.25	
			14	0	22.54	22.44	21.14	
		8	0	1	21.62	21.82	21.39	
			4	1	21.60	21.82	21.40	
			7	1	21.61	21.69	20.79	
	15	0	1	21.48	21.70	21.21		
	16QAM	1	0	1	20.91	21.15	21.61	
			7	1	20.19	20.53	20.48	
			14	1	20.92	20.95	20.39	
		8	0	2	20.16	20.32	20.14	
			4	2	20.17	20.33	20.17	
			7	2	20.18	20.21	20.61	
		15	0	2	20.37	20.26	20.80	



Conducted Power of LTE Band 25(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					26065	26365	26665	
5MHz	QPSK	1	0	0	22.60	22.65	22.71	
			12	0	22.20	22.08	21.70	
			24	0	22.68	22.34	21.01	
		12	0	1	21.55	21.76	21.79	
			6	1	21.55	21.76	21.79	
			13	1	21.59	21.60	20.88	
		25	0	1	21.55	21.66	21.34	
		16QAM	1	0	1	21.84	21.22	21.23
				12	1	21.46	21.78	21.31
	24			1	20.95	20.94	20.57	
	12		0	2	19.95	20.27	20.34	
			6	2	20.17	20.26	20.35	
			13	2	20.20	20.09	20.20	
	25	0	2	20.05	20.19	20.30		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					26090	26365	26640	
10MHz	QPSK	1	0	0	22.75	<b>22.86</b>	22.78	
			24	0	21.73	21.39	21.93	
			49	0	22.73	22.06	21.37	
		25	0	1	21.23	21.57	21.55	
			12	1	21.22	21.56	21.55	
			25	1	21.49	21.25	21.22	
		50	0	1	21.40	21.47	21.48	
		16QAM	1	0	1	21.40	21.52	20.93
				24	1	20.96	21.05	21.31
	49			1	21.12	21.81	20.94	
	25		0	2	20.78	20.13	20.08	
			12	2	20.80	20.15	20.08	
			25	2	20.07	20.74	20.81	
	50		0	2	19.93	20.00	20.00	

Conducted Power of LTE Band 25(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					26115	26365	26615	
15MHz	QPSK	1	0	0	22.69	22.61	20.80	
			37	0	21.87	21.38	21.81	
			74	0	22.24	21.37	21.59	
		37	0	1	21.53	21.29	21.34	
			18	1	21.53	21.29	21.33	
			38	1	21.53	21.29	21.33	
		75	0	1	21.51	21.29	21.31	
		16QAM	1	0	1	21.40	20.00	20.55
				37	1	21.05	20.94	21.37
	74			1	21.81	20.92	21.14	
	37		0	2	20.54	20.29	20.34	
			18	2	20.53	20.30	20.32	
			38	2	20.51	20.29	20.31	
	75	0	2	20.05	20.52	20.06		
	Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
26140						26365	26590	
20MHz	QPSK	1	0	0	22.74	22.39	22.65	
			49	0	22.01	21.92	21.50	
			99	0	22.59	21.30	21.70	
		50	0	1	20.87	21.66	19.82	
			25	1	20.86	21.66	19.82	
			50	1	21.25	20.90	21.75	
		100	0	1	21.38	21.37	21.14	
		16QAM	1	0	1	20.52	21.07	19.79
				49	1	21.46	21.64	21.04
	99			1	22.34	21.09	21.36	
	50		0	2	19.12	20.19	19.30	
			25	2	19.12	20.19	19.31	
			50	2	19.71	20.45	20.20	
	100		0	2	19.92	20.29	20.57	

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1 of the 3GPP TS36.101.

**Table 6.2.3.3-1 Maximum Power Reduction (MPR) for Power class3**

Modulation	Maximum Power Reduction (MPR) for Power[RB]						MPR(dB)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	>5	>4	>8	>12	>16	>18	≤1
16QAM	≤5	≤4	≤8	≤12	≤16	≤18	≤1
16QAM	>5	>4	>8	>12	>16	>18	≤2

The allowed A-MPR values specified below in Table 6.2.4.3-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS\_01".3

**Table 6.2.4.3-1: Additional Maximum Power Reduction (A-MPR) / Spectrum Emission requirements**

Network Signaling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks ( $N_{RB}$ )	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.2-1	1.4,3,5,10,15,20	Table 5.4.2-1	N/A
NS_03	6.6.2.2.3.1	2,4,10, 23, 25,35,36	3	>5	$\leq 1$
			5	>6	$\leq 1$
			10	>6	$\leq 1$
			15	>8	$\leq 1$
			20	>10	$\leq 1$
NS_04	6.6.2.2.3.2	41	5	>6	$\leq 1$
			10, 15, 20	Table 6.2.4.3-4	
NS_05	6.6.3.3.3.1	1	10,15,20	$\geq 50$	$\leq 1$
NS_06	6.6.2.2.3.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.4.2-1	N/A
NS_07	6.6.2.2.3.3 6.6.3.3.3.2	13	10	Table 6.2.4.3-2	Table 6.2.4.3-2
NS_08	6.6.3.3.3.3	19	10, 15	> 44	$\leq 3$
NS_09	6.6.3.3.3.4	21	10, 15	> 40	$\leq 1$
				> 55	$\leq 2$
NS_10		20	15, 20	Table 6.2.4.3-3	Table 6.2.4.3-3
NS_11	6.6.2.2.1 6.6.3.3.13	231	1.4, 3, 5, 10,15,20	Table 6.2.4.3-5	Table 6.2.4.3-5
NS_12	6.6.3.3.5	26	1.4, 3, 5	Table 6.2.4.3-6	Table 6.2.4.3-6
NS_13	6.6.3.3.6	26	5	Table 6.2.4.3-7	Table 6.2.4.3-7
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4.3-8	Table 6.2.4.3-8
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4.3-9 Table 6.2.4.3-10	Table 6.2.4.3-9, Table 6.2.4.3-10
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4.3-11, Table 6.2.4.3-12, Table 6.2.4.3-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.4.2-1	N/A
	6.6.3.3.11	28	5	$\geq 2$	$\leq 1$
NS_18			10, 15, 20	$\geq 1$	$\leq 4$
NS_19			10, 15, 20	Table 6.2.4.3-15	Table 6.2.4.3-15
NS_20			5, 10, 15, 20	Table 6.2.4.3-14	Table 6.2.4.3-14
...					
NS_20	-	-	-	-	-

**WIFI**

Mode	Data Rate (Mbps)	Channel	Frequency(MHz)	Avg. Burst Power(dBm)
802.11b	1	01	2412	14.57
		06	2437	14.63
		11	2462	<b>14.85</b>
802.11g	6	01	2412	11.13
		06	2437	12.68
		11	2462	12.84
802.11n(20)	6.5	01	2412	10.65
		06	2437	11.12
		11	2462	12.69
802.11n(40)	13.5	03	2422	10.66
		06	2437	10.77
		09	2452	12.07

## 13. TEST RESULTS

### 13.1. SAR Test Results Summary

#### 13.1.1. Test position and configuration

Body-worn and 4 Edges SAR was performed with the device 10mm from the phantom.

#### 13.1.2. Operation Mode

1. Per KDB 447498 D01 v06 ,for each exposure position, if the highest 1-g SAR is  $\leq 0.8$  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  $\geq 0.8$ W/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  $\geq 0.8$ W/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  $\geq 1.45$  W/Kg.
  - (3) Perform a third repeated measurement only if the original, first and second repeated measurement is  $\geq 1.5$  W/Kg and ratio of largest to smallest SAR for the original, first and second measurement is  $\geq 1.20$ .
3. Per KDB 648474 D04 v01r03,when the reported SAR for a body-worn accessory measured without a headset connected to the handset is  $\leq 1.2$ W/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  $\leq 1.2$ W/kg.
5. Per KDB 941225 D06 V02r01, When the same wireless mode transmission configurations for voice and 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.)  $\times$  [maximum turn-up power (mw)/ maximum measurement output power(mw) ]
7. Proximity sensor, just for avoiding the wrong operation in the phone screen when call, and has no influence on output power or SAR result
8. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1RB allocation using the RB offset and required test channel combination with highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
9. Per KDB 941125 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
10. Per KDB 941125 D05v02r03. For QPSK with 100% RB allocation. SAR is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1RB allocation and the highest reported SAR is  $>1.45$  W/Kg, the remaining required test channels must also be tested.

11. Per KDB 941125 D05v02r03. 16QAM output power for each RB allocation configuration is not 1/2 dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45\text{W/Kg}$ , Per KDB 941225 D05v02r02, 16QAM SAR testing is not required.
12. Per KDB 941125 D05v02r03. Smaller bandwidth output power for each RB allocation configuration is >not 1/2 dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45\text{W/Kg}$ . Per KDB 941125 D05v02r03, smaller bandwidth SAR testing is not required.

### 13.1.3. Test Result

SAR MEASUREMENT									
Depth of Liquid (cm):>15					Relative Humidity (%): 48.5				
Product: 4G Wireless Router									
Test Mode: WCDMA Band II with QPSK modulation									
Position	Mode	Ch.	Fr. (MHz)	Power Drift (<math>\leq \pm 5\%</math>)	SAR (1g) (W/kg)	Max. Tune-up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)
Body back	RMC 12.2kbps	9400	1880	-0.36	<b>0.721</b>	22.33	21.94	<b>0.789</b>	1.6
Body front	RMC 12.2kbps	9400	1880	0.28	0.557	22.33	21.94	0.609	1.6
Edge 1 (Top)	RMC 12.2kbps	9400	1880	-0.15	0.534	22.33	21.94	0.584	1.6
Edge 2(Right)	RMC 12.2kbps	9400	1880	0.29	0.173	22.33	21.94	0.189	1.6
Edge 4(Left)	RMC 12.2kbps	9400	1880	-0.34	0.456	22.33	21.94	0.499	1.6

Note:

- When the 1-g Reported SAR is  $\leq 0.8$  W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.



SAR MEASUREMENT									
Depth of Liquid (cm):>15					Relative Humidity (%): 49.3				
Product: 4G Wireless Router									
Test Mode: WCDMA Band IV with QPSK modulation									
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	RMC 12.2kbps	8662	1732.5	0.36	<b>0.769</b>	24.13	23.97	<b>0.798</b>	1.6
Body front	RMC 12.2kbps	8662	1732.5	-0.52	0.391	24.13	23.97	0.406	1.6
Edge 1 (Top)	RMC 12.2kbps	8662	1732.5	-0.69	0.312	24.13	23.97	0.324	1.6
Edge 2(Right)	RMC 12.2kbps	8662	1732.5	0.48	0.172	24.13	23.97	0.178	1.6
Edge 4(Left)	RMC 12.2kbps	8662	1732.5	-0.67	0.444	24.13	23.97	0.461	1.6

Note:

- When the 1-g Reported SAR is  $\leq 0.8$  W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.

SAR MEASUREMENT												
Depth of Liquid (cm):>15						Relative Humidity (%): 48.4						
Product: 4G Wireless Router												
Test Mode: LTE Band 2												
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tune up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)
			UL RB Allocation	UL RB START								
20	QPSK	Body back	1	0	18700	1860	0.74	0.882	22.93	22.46	0.983	1.6
		Body back	1	0	18900	1880	-0.85	<b>1.054</b>	22.93	22.65	1.124	1.6
		Body back	1	0	19100	1900	0.82	0.997	22.93	22.33	<b>1.145</b>	1.6
		Body front	1	0	18900	1880	-0.68	0.740	22.93	22.65	0.789	1.6
		Edge 1 (Top)	1	0	18900	1880	0.60	0.512	22.93	22.65	0.546	1.6
		Edge 2(Right)	1	0	18900	1880	-0.43	0.304	22.93	22.65	0.324	1.6
		Edge 4(Left)	1	0	18900	1880	0.45	0.651	22.93	22.65	0.694	1.6

Note:

- When the 1-g Reported SAR is  $\leq 0.8$  W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.

SAR MEASUREMENT												
Depth of Liquid (cm):>15						Relative Humidity (%): 49.3						
Product: 4G Wireless Router												
Test Mode: LTE Band 4												
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)
			UL RB Allocation	UL RB START								
20	QPSK	Body back	1	0	20175	1732.5	-0.43	<b>0.742</b>	24.00	23.87	<b>0.765</b>	1.6
		Body front	1	0	20175	1732.5	0.36	0.521	24.00	23.87	0.537	1.6
		Edge 1 (Top)	1	0	20175	1732.5	-0.33	0.500	24.00	23.87	0.515	1.6
		Edge 2(Right)	1	0	20175	1732.5	-0.56	0.203	24.00	23.87	0.209	1.6
		Edge 4(Left)	1	0	20175	1732.5	0.48	0.474	24.00	23.87	0.488	1.6

Note:

- When the 1-g Reported SAR is  $\leq 0.8$  W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.

SAR MEASUREMENT												
Depth of Liquid (cm):>15						Relative Humidity (%): 57.7						
Product: 4G Wireless Router												
Test Mode: LTE Band 7												
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)
			UL RB Allocation	UL RB START								
20	QPSK	Body back	1	0	21100	2535	-0.13	0.019	25.00	24.34	0.022	1.6
		Body front	1	0	21100	2535	0.26	<b>0.419</b>	25.00	24.34	<b>0.488</b>	1.6
		Edge 1 (Top)	1	0	21100	2535	-0.03	0.354	25.00	24.34	0.412	1.6
		Edge 2(Right)	1	0	21100	2535	0.15	0.108	25.00	24.34	0.126	1.6
		Edge 4(Left)	1	0	21100	2535	-0.07	0.064	25.00	24.34	0.075	1.6

Note:

- When the 1-g Reported SAR is  $\leq 0.8$  W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.

SAR MEASUREMENT												
Depth of Liquid (cm):>15						Relative Humidity (%): 58.3						
Product: 4G Wireless Router												
Test Mode: LTE Band 12												
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)
			UL RB Allocation	UL RB START								
10	QPSK	Body back	1	0	23095	707.5	0.03	<b>0.285</b>	25.20	23.65	<b>0.407</b>	1.6
		Body front	1	0	23095	707.5	-0.16	0.173	25.20	23.65	0.247	1.6
		Edge 1 (Top)	1	0	23095	707.5	0.25	0.042	25.20	23.65	0.060	1.6
		Edge 2(Right)	1	0	23095	707.5	-0.02	0.070	25.20	23.65	0.100	1.6
		Edge 4(Left)	1	0	23095	707.5	-0.10	0.092	25.20	23.65	0.131	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.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.

SAR MEASUREMENT												
Depth of Liquid (cm):>15						Relative Humidity (%): 58.3						
Product: 4G Wireless Router												
Test Mode: LTE Band 13												
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)
			UL RB Allocation	UL RB START								
10	QPSK	Body back	1	0	23230	782	-0.76	0.834	24.40	23.43	1.043	1.6
		Body back	1	0	23230	782	0.65	0.848	24.40	23.43	1.060	1.6
		Body back	1	0	23230	782	-0.69	<b>0.917</b>	24.40	23.43	<b>1.146</b>	1.6
		Body front	1	0	23230	782	0.78	0.516	24.40	23.43	0.645	1.6
		Edge 1 (Top)	1	0	23230	782	-0.24	0.074	24.40	23.43	0.093	1.6
		Edge 2(Right)	1	0	23230	782	0.19	0.238	24.40	23.43	0.298	1.6
		Edge 4(Left)	1	0	23230	782	-0.23	0.311	24.40	23.43	0.389	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.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.

SAR MEASUREMENT												
Depth of Liquid (cm):>15						Relative Humidity (%): 48.4						
Product: 4G Wireless Router												
Test Mode: LTE Band 25												
BW MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)
			UL RB Allocation	UL RB START								
20	QPSK	Body back	1	0	26140	1860	0.85	0.869	22.90	22.74	0.902	1.6
		Body back	1	0	26365	1882.5	-0.79	<b>0.912</b>	22.90	22.39	<b>1.026</b>	1.6
		Body back	1	0	26590	1905	-0.84	0.868	22.90	22.65	0.919	1.6
		Body front	1	0	26365	1882.5	0.76	0.692	22.90	22.39	0.778	1.6
		Edge 1 (Top)	1	0	26365	1882.5	-0.65	0.704	22.90	22.39	0.792	1.6
		Edge 2(Right)	1	0	26365	1882.5	-0.45	0.318	22.90	22.39	0.358	1.6
		Edge 4(Left)	1	0	26365	1882.5	0.62	0.655	22.90	22.39	0.737	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.
- The test separation for body back, body front and 4 Edges is 10mm of all above table

SAR MEASUREMENT									
Depth of Liquid (cm):>15					Relative Humidity (%): 46.2				
Product: 4G Wireless Router									
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	-0.18	0.064	14.90	14.63	0.068	1.6
Body front	DTS	6	2437	0.05	<b>0.138</b>	14.90	14.63	<b>0.147</b>	1.6
Edge 1 (Top)	DTS	6	2437	-0.12	0.024	14.90	14.63	0.026	1.6
Edge 2(Right)	DTS	6	2437	0.06	0.072	14.90	14.63	0.077	1.6
Edge 3(Bottom)	DTS	6	2437	-0.19	0.046	14.90	14.63	0.049	1.6
Edge 4(Left)	DTS	6	2437	0.03	0.013	14.90	14.63	0.014	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 transmitters.
- The test separation for body back, body front and 4 Edges is 10mm of all above table.

Repeated SAR												
Product: 4G Wireless Router												
Test Mode: LTE Band 2& LTE Band 13& LTE Band 25with QPSK modulation												
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	Once SAR (1g) (W/kg)	Power Drift (<±5%)	Twice SAR (1g) (W/kg)	Power Drift (<±5%)	Limit (W/kg)
			UL RB Allocation	UL RB START								
20	QPSK	Body back	1	0	18900	1880	-0.79	1.068	--	--	--	1.6
10	QPSK	Body back	1	0	23230	782	0.62	0.879	--	--	--	1.6
20	QPSK	Body back	1	0	26365	1882.5	-0.77	0.868	--	--	--	1.6



**Simultaneous Multi-band Transmission Evaluation:**  
**Application Simultaneous Transmission information:**

NO	Simultaneous state	Portable Handset
		Body-worn
1	WCDMA+ WLAN 2.4GHz (data)	Yes
2	LTE + WLAN 2.4GHz (data)	Yes

NOTE:

1. WLAN antenna.
2. Simultaneous with every transmitter must be the same test position.
3. 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 10mm for body-worn SAR.
4. 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  $\leq 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:  

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$
for 1-g SAR, and  $\leq 7.5$  for 10-g extremity SAR<sup>30</sup>, where
  - f(GHz) is the RF channel transmit frequency in GHz
  - Power and distance are rounded to the nearest mW and mm before calculation<sup>31</sup>
  - 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  $\leq 50$  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.
5. If the test separation distance is  $< 5$ mm, 5mm is used for excluded SAR calculation.
6. 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
$$(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})} / x] \text{ W/kg}$$
for test separation distances  $\leq 50$  mm;  
where  $x = 7.5$  for 1-g SAR, and  $x = 18.75$  for 10-g SAR.

7. 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  $(SAR1 + SAR2)1.5/R_i$ , rounded to two decimal digits, and must be  $\leq 0.04$  for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

**Sum of the SAR for WCDMA Band II &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		Σ1-g SAR (W/Kg)	SPLSR (Yes/No)
		WCDMA Band II	Wi-Fi DTS Band		
Body-worn	Rear	0.789	0.068	0.857	No
	Front	0.609	0.147	0.756	No
	Edge 1	0.584	0.026	0.610	No
	Edge 2	0.189	0.077	0.266	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.499	0.014	0.513	No

**Sum of the SAR for WCDMA Band IV &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		Σ1-g SAR (W/Kg)	SPLSR (Yes/No)
		WCDMA Band IV	Wi-Fi DTS Band		
Body-worn	Rear	0.798	0.068	0.866	No
	Front	0.406	0.147	0.553	No
	Edge 1	0.324	0.026	0.350	No
	Edge 2	0.178	0.077	0.255	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.461	0.014	0.475	No

**Note:**

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

**Sum of the SAR for LTE Band 2 &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/Kg)	SPLSR (Yes/No)
		LTE Band 2	Wi-Fi DTS Band		
Body-worn	Rear	1.145	0.068	1.213	No
	Front	0.789	0.147	0.936	No
	Edge 1	0.546	0.026	0.572	No
	Edge 2	0.324	0.077	0.401	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.694	0.014	0.708	No

**Sum of the SAR for LTE Band 4 &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/Kg)	SPLSR (Yes/No)
		LTE Band 4	Wi-Fi DTS Band		
Body-worn	Rear	0.765	0.068	0.833	No
	Front	0.537	0.147	0.684	No
	Edge 1	0.515	0.026	0.541	No
	Edge 2	0.209	0.077	0.286	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.488	0.014	0.502	No

**Sum of the SAR for LTE Band 7 &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		$\Sigma$ 1-g SAR (W/Kg)	SPLSR (Yes/No)
		LTE Band 7	Wi-Fi DTS Band		
Body-worn	Rear	0.022	0.068	0.090	No
	Front	0.488	0.147	0.635	No
	Edge 1	0.412	0.026	0.438	No
	Edge 2	0.126	0.077	0.203	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.075	0.014	0.089	No

**Note:**

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

**Sum of the SAR for LTE Band 12 &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		Σ1-g SAR (W/Kg)	SPLSR (Yes/No)
		LTE Band 12	Wi-Fi DTS Band		
Body-worn	Rear	0.407	0.068	0.475	No
	Front	0.247	0.147	0.394	No
	Edge 1	0.060	0.026	0.086	No
	Edge 2	0.100	0.077	0.177	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.131	0.014	0.145	No

**Sum of the SAR for LTE Band 13 &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		Σ1-g SAR (W/Kg)	SPLSR (Yes/No)
		LTE Band 13	Wi-Fi DTS Band		
Body-worn	Rear	1.146	0.068	1.214	No
	Front	0.645	0.147	0.792	No
	Edge 1	0.093	0.026	0.119	No
	Edge 2	0.298	0.077	0.375	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.389	0.014	0.403	No

**Sum of the SAR for LTE Band 25 &Wi-Fi:**

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		Σ1-g SAR (W/Kg)	SPLSR (Yes/No)
		LTE Band 25	Wi-Fi DTS Band		
Body-worn	Rear	1.026	0.068	1.094	No
	Front	0.778	0.147	0.925	No
	Edge 1	0.792	0.026	0.818	No
	Edge 2	0.358	0.077	0.435	No
	Edge 3	/	0.049	0.049	No
	Edge 4	0.737	0.014	0.751	No

**Note:**

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 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: Jun. 01,2020

System Check Head 750 MHz

DUT: Dipole 750 MHz Type: SID 750

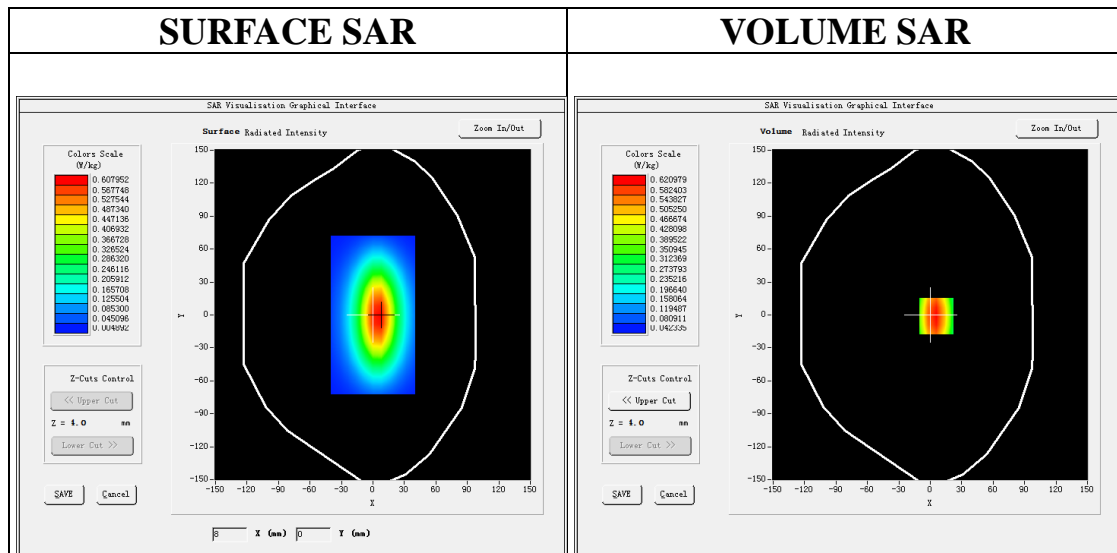
Communication System CW; Communication System Band: D750 (750.0 MHz); Duty Cycle: 1:1; Conv.F=4.97  
Frequency: 750 MHz; Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.61$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section; Input Power=18dBm  
Ambient temperature (°C):20.4, Liquid temperature (°C): 20.1

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

Configuration/System Check 750MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm

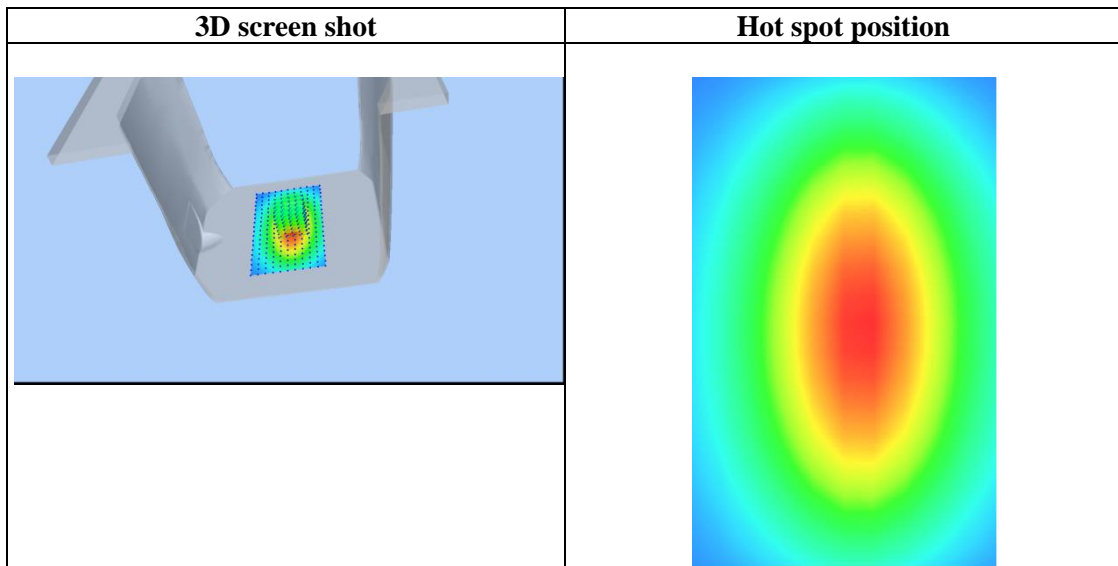
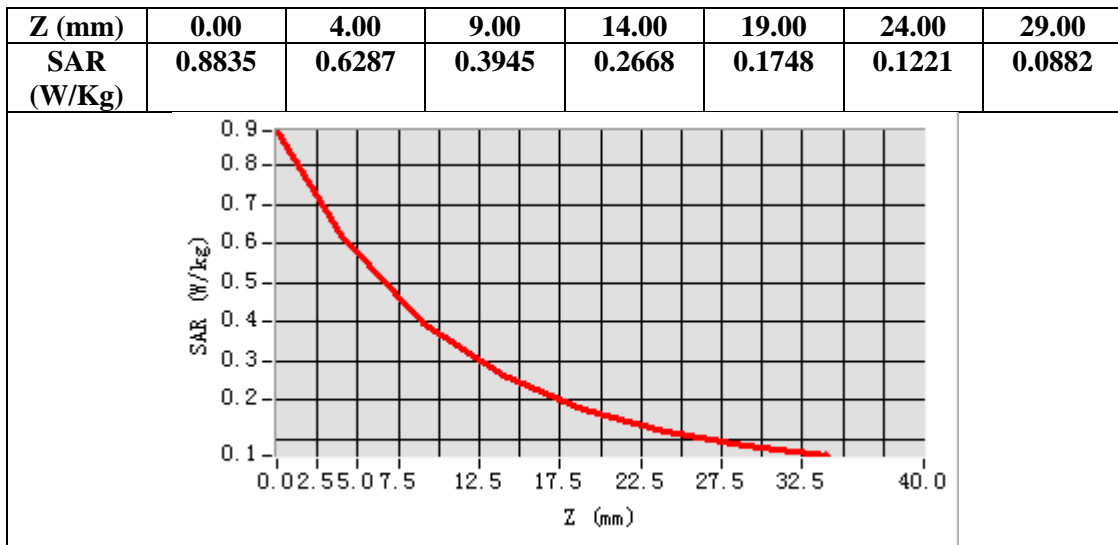
Configuration/System Check 750MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=6.00, Y=-1.00

SAR Peak: 0.89 W/kg

SAR 10g (W/Kg)	0.360951
SAR 1g (W/Kg)	0.512874



**Test Laboratory: AGC Lab**  
**System Check Head 1750MHz**

**Date: May 30,2020**

**DUT: Dipole 1800 MHz; Type: SID 1800**

Communication System: CW; Communication System Band: D1700 (1750.0 MHz); Duty Cycle:1:1; Conv.F=4.05  
Frequency: 1750 MHz; Medium parameters used:  $f = 1800\text{MHz}$ ;  $\sigma = 1.38 \text{ mho/m}$ ;  $\epsilon_r = 39.52$ ;  $\rho = 1000 \text{ kg/m}^3$  ;  
Phantom section: Flat Section; Input Power=18dBm  
Ambient temperature ( $^{\circ}\text{C}$ ): 20.6, Liquid temperature ( $^{\circ}\text{C}$ ): 20.3

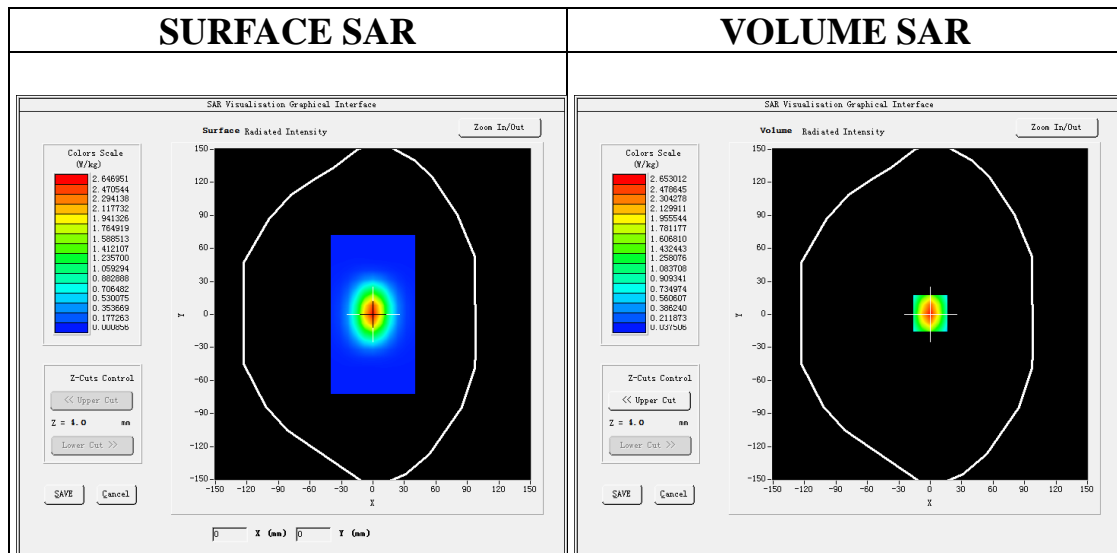
SATIMO Configuration:

Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/System Check 1750MHz Head/Area Scan:** Measurement grid: dx=8mm,dy=8mm

**Configuration/System Check 1750MHz Head/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm



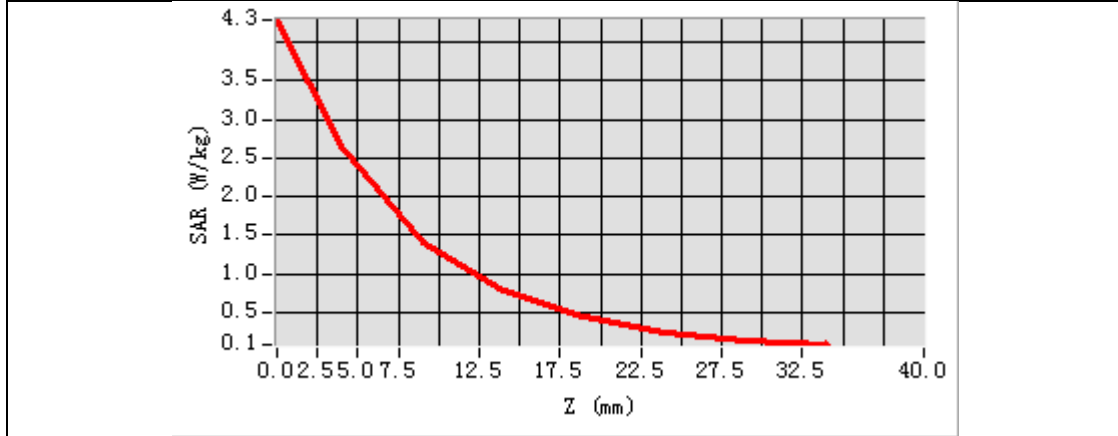
**Maximum location: X=0.00, Y=1.00**

**SAR Peak: 4.25 W/kg**

<b>SAR 10g (W/Kg)</b>	<b>1.197353</b>
<b>SAR 1g (W/Kg)</b>	<b>2.272548</b>



<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>	<b>24.00</b>	<b>29.00</b>
<b>SAR (W/Kg)</b>	<b>4.2870</b>	<b>2.6530</b>	<b>1.4115</b>	<b>0.7802</b>	<b>0.4363</b>	<b>0.2479</b>	<b>0.1421</b>



3D screen shot	Hot spot position
<p>A 3D perspective view of a grey, L-shaped device. A small rectangular area on the inner surface of the 'L' is highlighted with a color gradient from blue to red, indicating the location of the maximum SAR exposure.</p>	<p>A 2D heatmap showing the spatial distribution of SAR. The highest intensity (red) is concentrated in a central oval region, which transitions through yellow and green to blue as the intensity decreases. The heatmap is centered on a white background.</p>

**Test Laboratory: AGC Lab**  
**System Check Head 1900MHz**

**Date: May 28,2020**

**DUT: Dipole 1900 MHz; Type: SID 1900**

Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=4.48  
Frequency: 1900 MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 39.51$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section; Input Power=18dBm  
Ambient temperature (°C):20.1, Liquid temperature (°C): 19.8

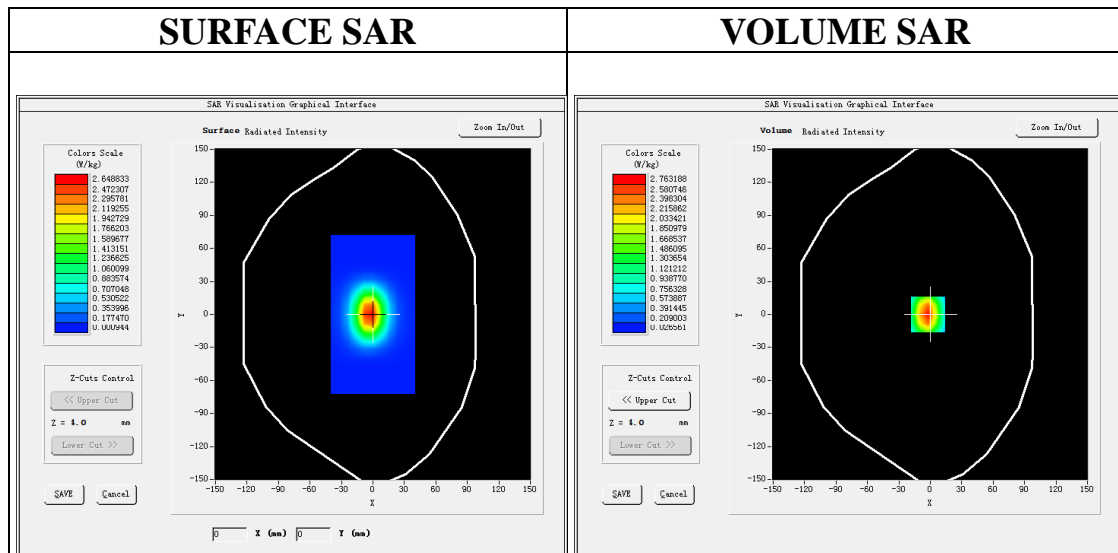
SATIMO Configuration:

Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

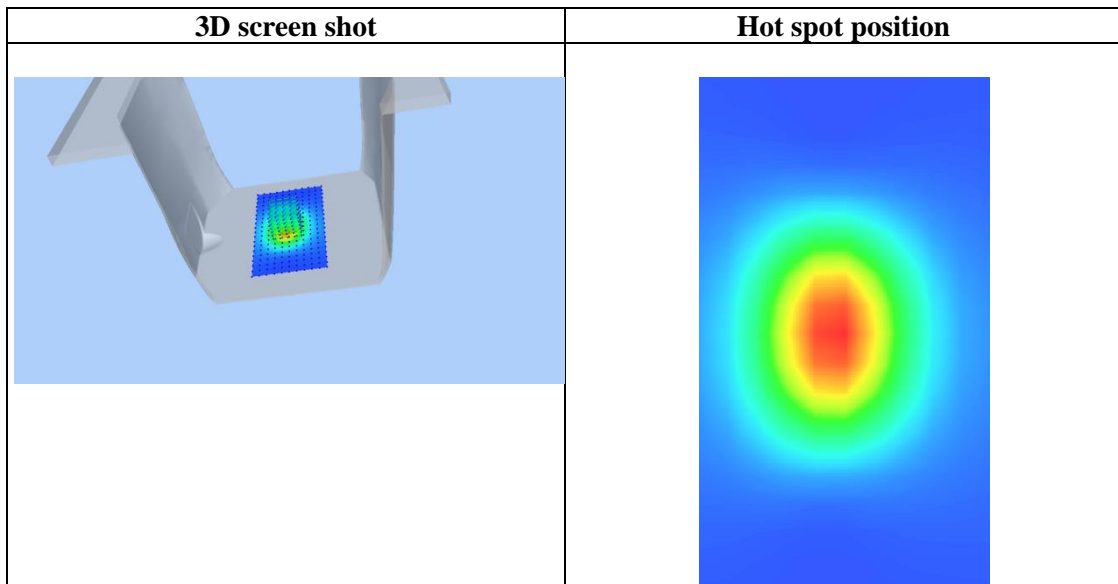
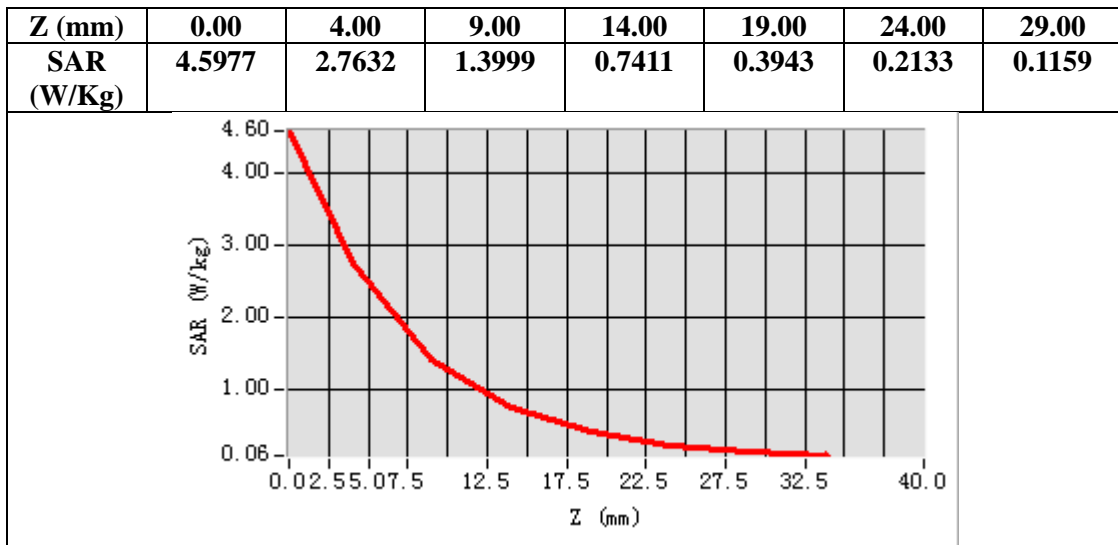
**Configuration/System Check 1900MHz Head/Area Scan:** Measurement grid: dx=8mm, dy=8mm

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



**Maximum location: X=-2.00, Y=0.00**  
**SAR Peak: 4.58 W/kg**

<b>SAR 10g (W/Kg)</b>	1.263171
<b>SAR 1g (W/Kg)</b>	2.597192



**Test Laboratory: AGC Lab**  
**System Check Head 1900MHz**

**Date: May 31,2020**

**DUT: Dipole 1900 MHz; Type: SID 1900**

Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=4.48  
Frequency: 1900 MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 38.58$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section; Input Power=18dBm  
Ambient temperature (°C):20.8, Liquid temperature (°C): 20.5

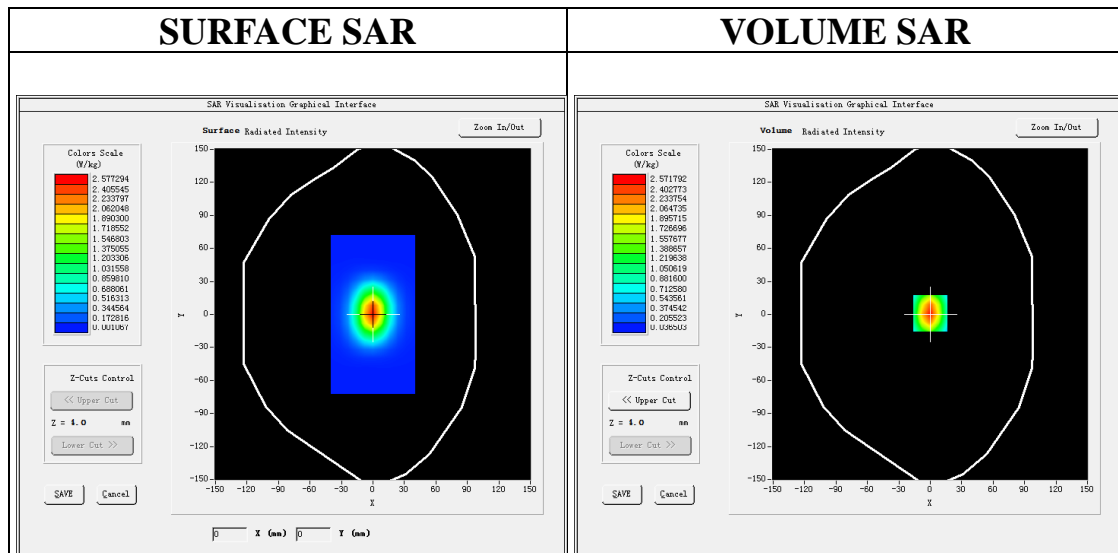
SATIMO Configuration:

Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

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

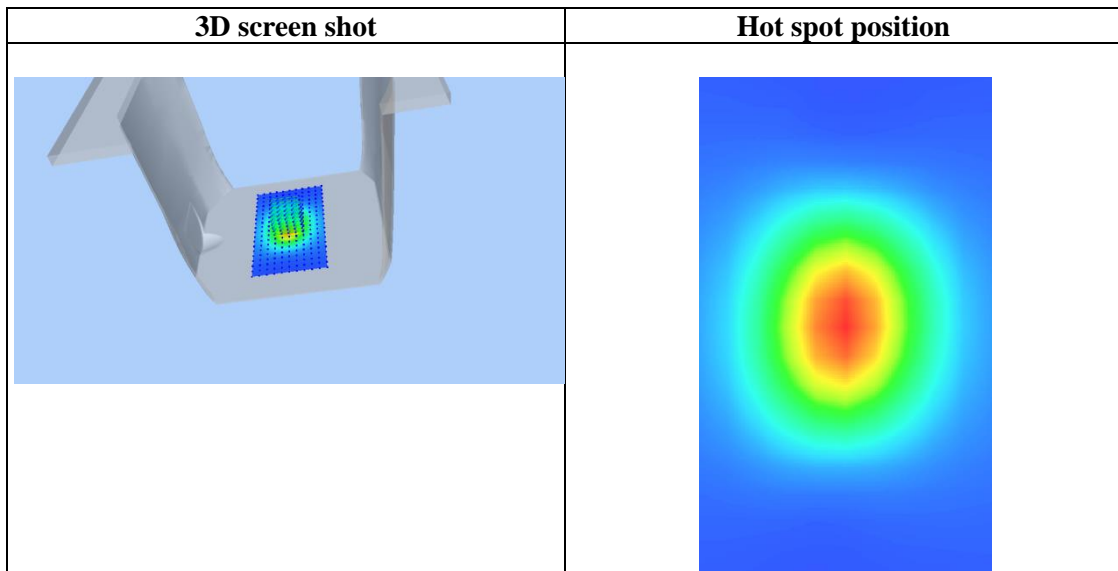
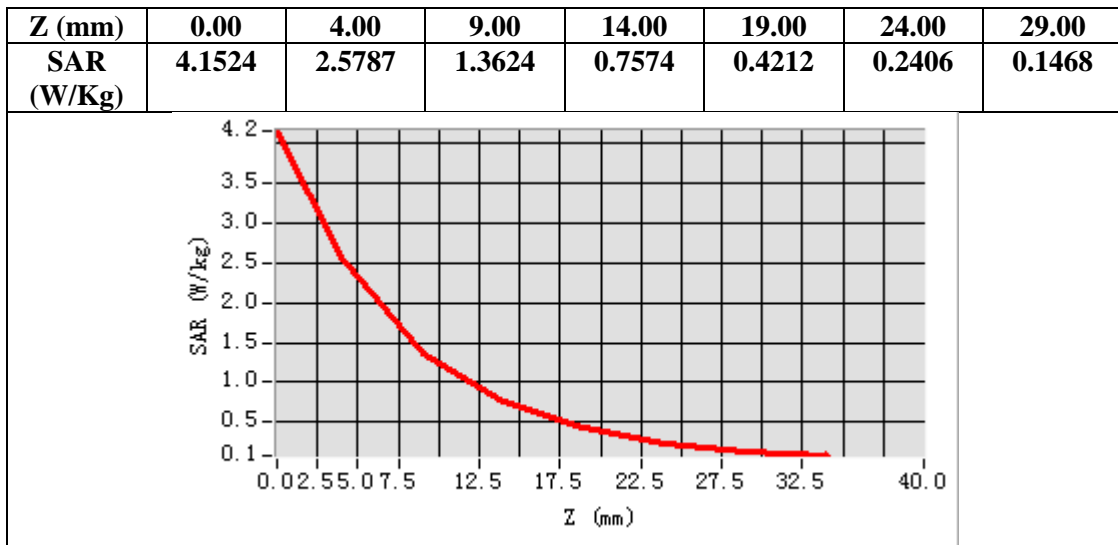
**Configuration/System Check 1900MHz Head/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm



**Maximum location: X=0.00, Y=1.00**

**SAR Peak: 4.12 W/kg**

<b>SAR 10g (W/Kg)</b>	1.227156
<b>SAR 1g (W/Kg)</b>	2.413781



Test Laboratory: AGC Lab  
System Check Head 2450 MHz

Date: May 29,2020

DUT: Dipole 2450 MHz Type: SID 2450

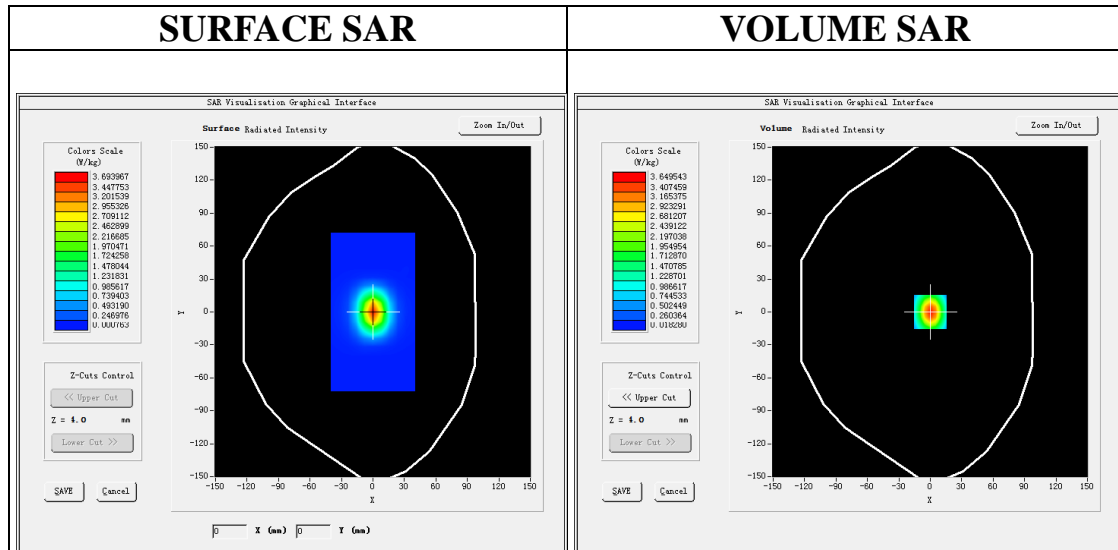
Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1; Conv.F=4.12  
Frequency: 2450 MHz; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.84$  mho/m;  $\epsilon_r = 38.74$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section; Input Power=18dBm  
Ambient temperature (°C):21.1, Liquid temperature (°C): 20.8

SATIMO Configuration

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

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

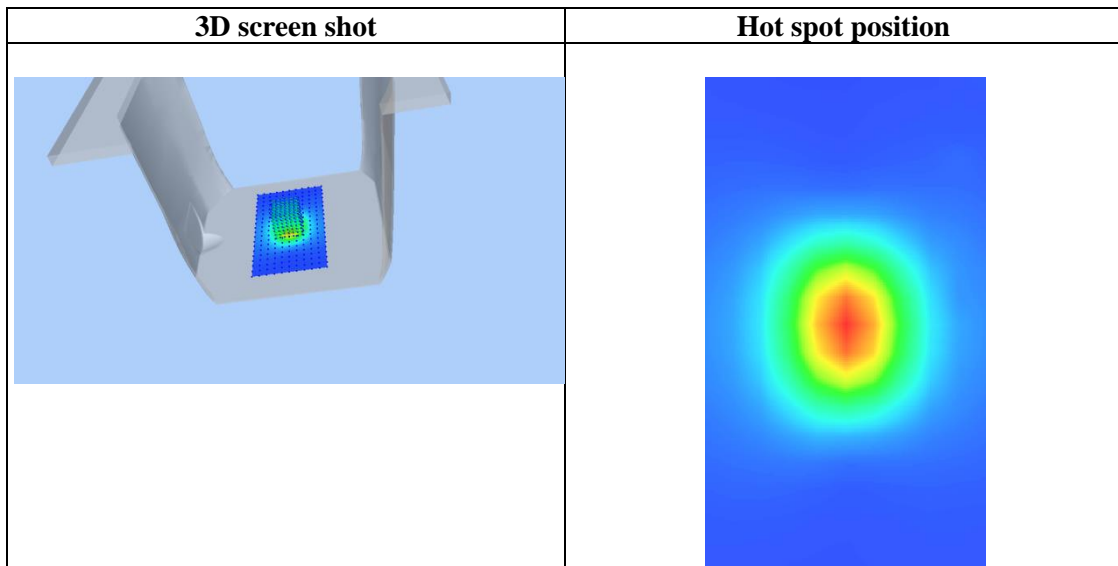
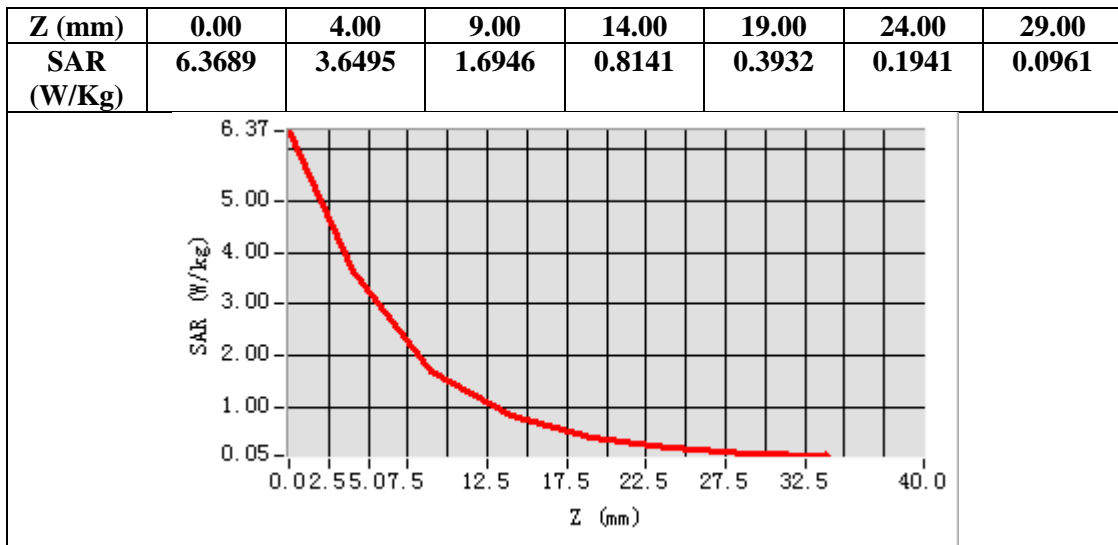
Configuration/System Check 2450MHz Head/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm



Maximum location: X=0.00, Y=0.00

SAR Peak: 6.28 W/kg

SAR 10g (W/Kg)	1.493819
SAR 1g (W/Kg)	3.337937



**Test Laboratory: AGC Lab**  
**System Check Head 2600MHz**

**Date: May 22,2020**

**DUT: Dipole 2600 MHz; Type: SID 2600**

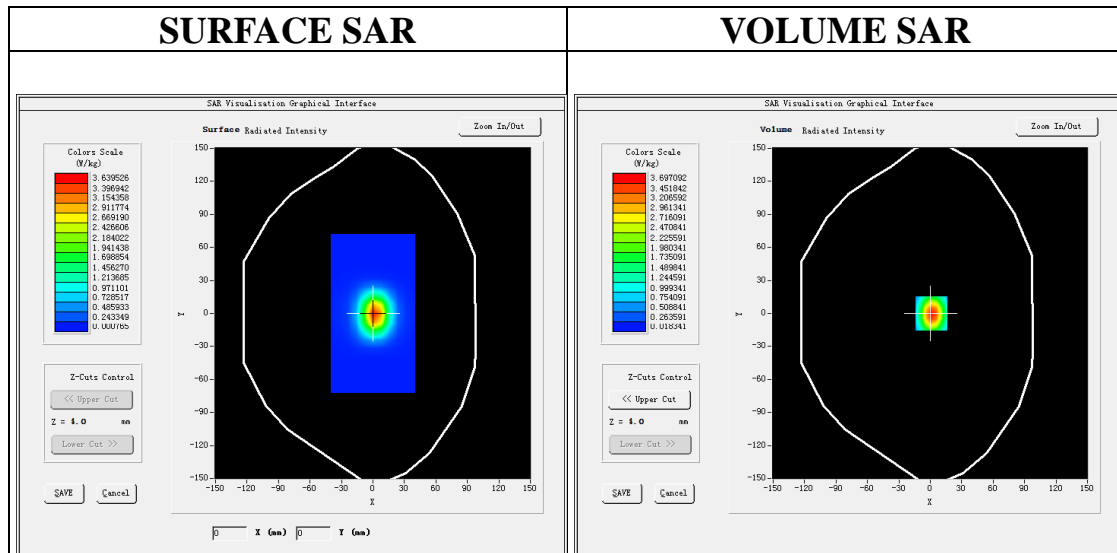
Communication System: CW; Communication System Band: D2600 (2600.0 MHz); Duty Cycle: 1:1; Conv.F=3.77  
Frequency:2600 MHz; Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.89$  mho/m;  $\epsilon_r = 38.92$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section; Input Power=18dBm  
Ambient temperature (°C): 21.1, Liquid temperature (°C): 20.9

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/System Check 2600 Head/Area Scan:** Measurement grid: dx=8mm,dy=8mm

**Configuration/System Check 2600 Head/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm



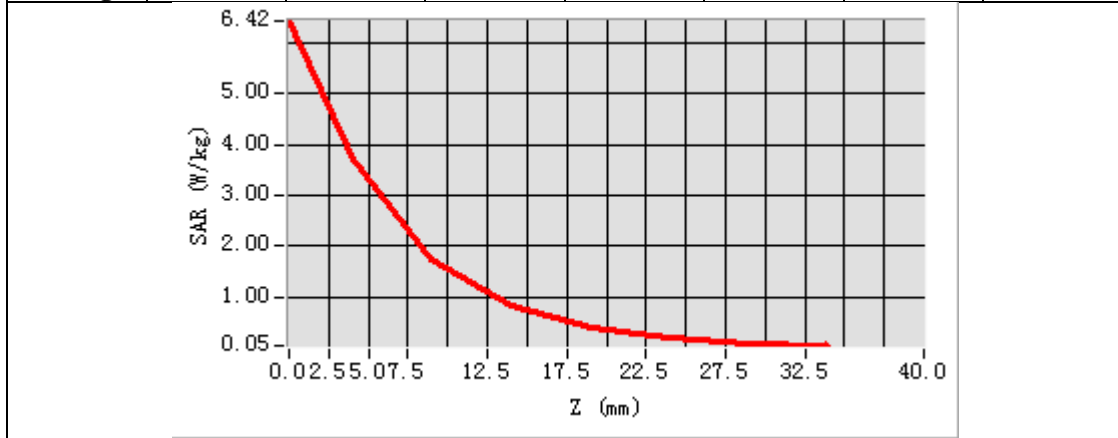
**Maximum location: X=1.00, Y=0.00**

**SAR Peak: 6.39 W/kg**

<b>SAR 10g (W/Kg)</b>	1.533692
<b>SAR 1g (W/Kg)</b>	3.417057



Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.4203	3.6971	1.7316	0.8354	0.4061	0.2005	0.0991



3D screen shot	Hot spot position
<p>A 3D perspective view of a grey, rectangular device. A small rectangular area on the front face is highlighted with a color gradient from blue to red, indicating a hot spot. The background is a light blue gradient.</p>	<p>A 2D heatmap visualization of the hot spot. It shows a circular region of high intensity, with the center being red and transitioning through yellow and green to a blue background. The shape is roughly circular and centered within a rectangular frame.</p>

## APPENDIX B. SAR MEASUREMENT DATA

Test Laboratory: AGC Lab

Date: May 28,2020

WCDMA Band II Mid-Body-Towards Grounds (RMC 12.2kbps)

DUT: 4G Wireless Router; Type: D523F

Communication System: UMTS; Communication System Band: Band II UTRA/FDD ;Duty Cycle:1:1; Conv.F=4.48;  
Frequency: 1880 MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 39.98$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C):20.1, Liquid temperature (°C): 19.8

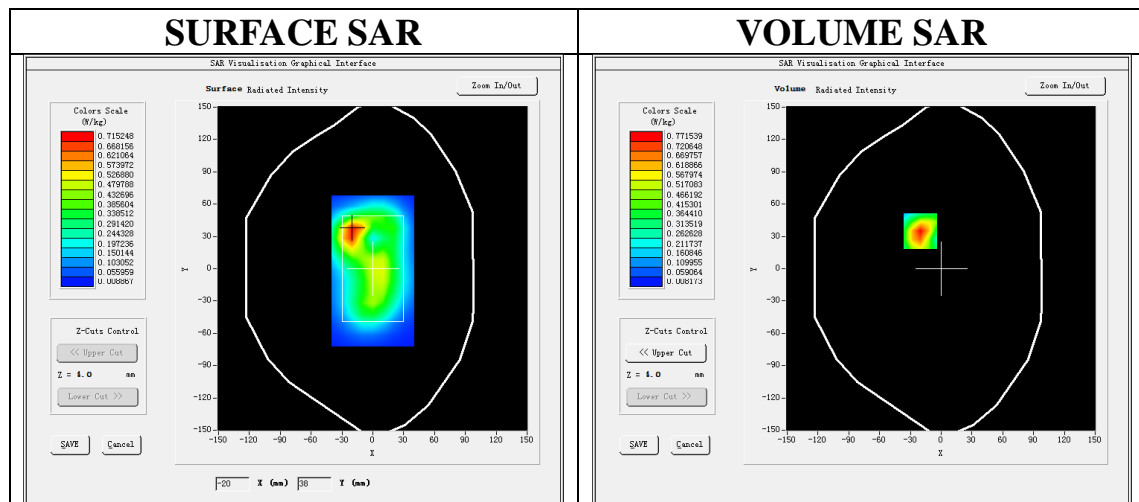
SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

Configuration/ WCDMA band II Mid-Body-back/Area Scan: Measurement grid: dx=10mm, dy=10mm

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

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	WCDMA band II
<b>Channels</b>	Middle
<b>Signal</b>	CDMA (Crest factor: 1.0)



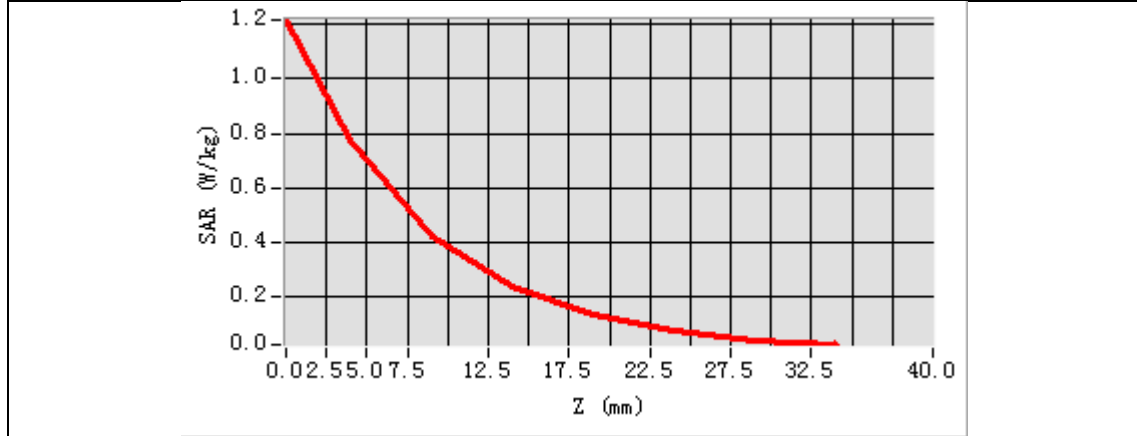
**Maximum location: X=-20.00, Y=35.00**

**SAR Peak: 1.21 W/kg**

<b>SAR 10g (W/Kg)</b>	0.369846
<b>SAR 1g (W/Kg)</b>	0.720608



<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>	<b>24.00</b>	<b>29.00</b>
<b>SAR (W/Kg)</b>	<b>1.2170</b>	<b>0.7715</b>	<b>0.4226</b>	<b>0.2374</b>	<b>0.1307</b>	<b>0.0717</b>	<b>0.0399</b>



<b>3D screen shot</b>	<b>Hot spot position</b>
<p>A 3D perspective view of a grey, L-shaped device. A small rectangular area on the device's surface is highlighted with a color-coded SAR distribution, showing a hot spot in red and yellow.</p>	<p>A 2D heatmap showing the SAR distribution on the device's surface. The color scale ranges from blue (low SAR) to red (high SAR). The highest SAR values (red) are concentrated in the upper-left portion of the device's main body.</p>

**Test Laboratory: AGC Lab**  
**WCDMA Band IV Mid-Body-Towards Grounds (RMC)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: May 30,2020**

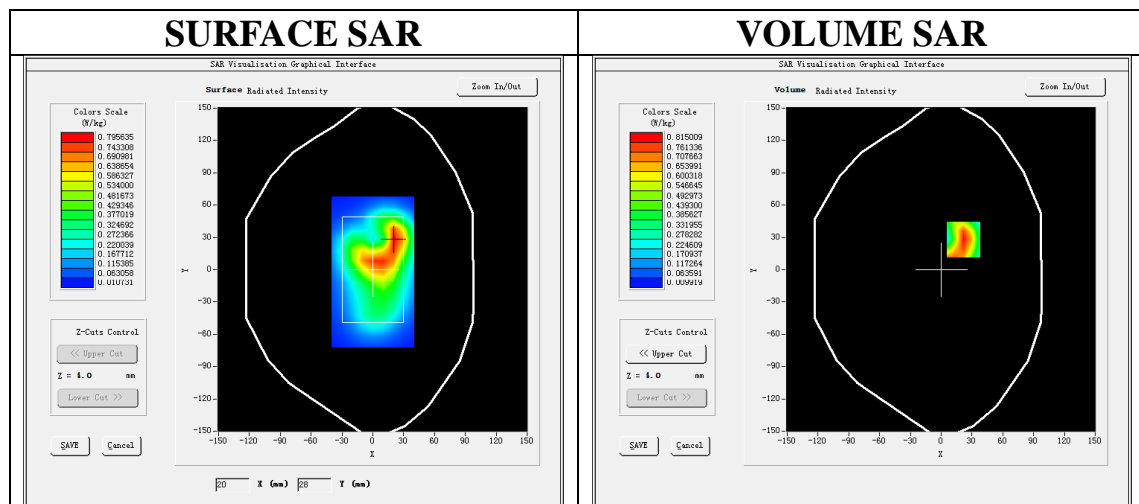
Communication System: UMTS; Communication System Band: BAND IV UTRA/FDD; Duty Cycle:1: 1; Conv.F=4.05;  
Frequency: 1732.5 MHz; Medium parameters used:  $f = 1700\text{MHz}$ ;  $\sigma = 1.36 \text{ mho/m}$ ;  $\epsilon_r = 40.08$ ;  $\rho = 1000 \text{ kg/m}^3$  ;  
Phantom section: Flat Section  
Ambient temperature ( $^{\circ}\text{C}$ ): 20.6, Liquid temperature ( $^{\circ}\text{C}$ ): 20.3

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ WCDMA Band IV Mid-Body-Back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ WCDMA Band IV Mid-Body-Back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	WCDMA Band IV
<b>Channels</b>	Middle
<b>Signal</b>	CDMA (Crest factor: 1.0)

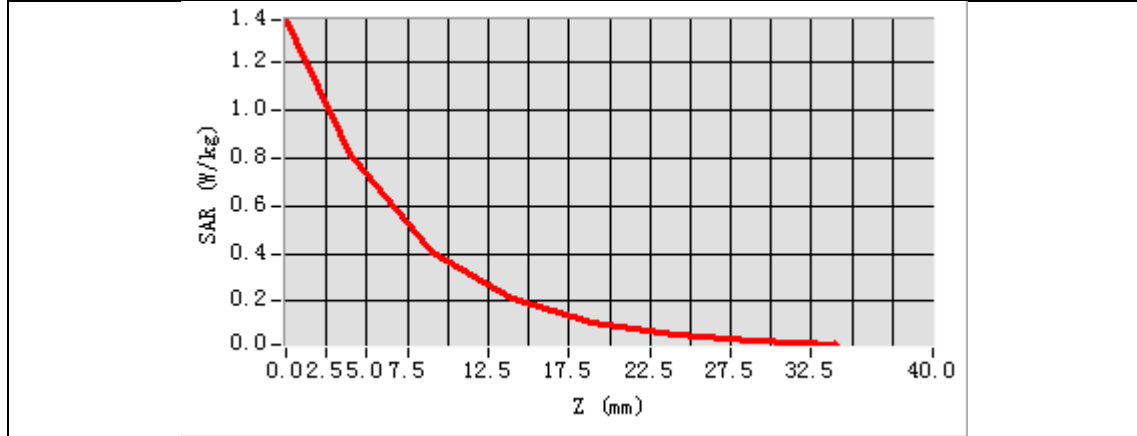


**Maximum location: X=22.00, Y=28.00**

**SAR Peak: 1.38 W/kg**

<b>SAR 10g (W/Kg)</b>	0.380805
<b>SAR 1g (W/Kg)</b>	0.769436

<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>	<b>24.00</b>	<b>29.00</b>
<b>SAR (W/Kg)</b>	<b>1.3720</b>	<b>0.8150</b>	<b>0.4065</b>	<b>0.2152</b>	<b>0.1158</b>	<b>0.0634</b>	<b>0.0360</b>



<b>3D screen shot</b>	<b>Hot spot position</b>

**Test Laboratory: AGC Lab**  
**LTE Band 2 Mid-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: May 31,2020**

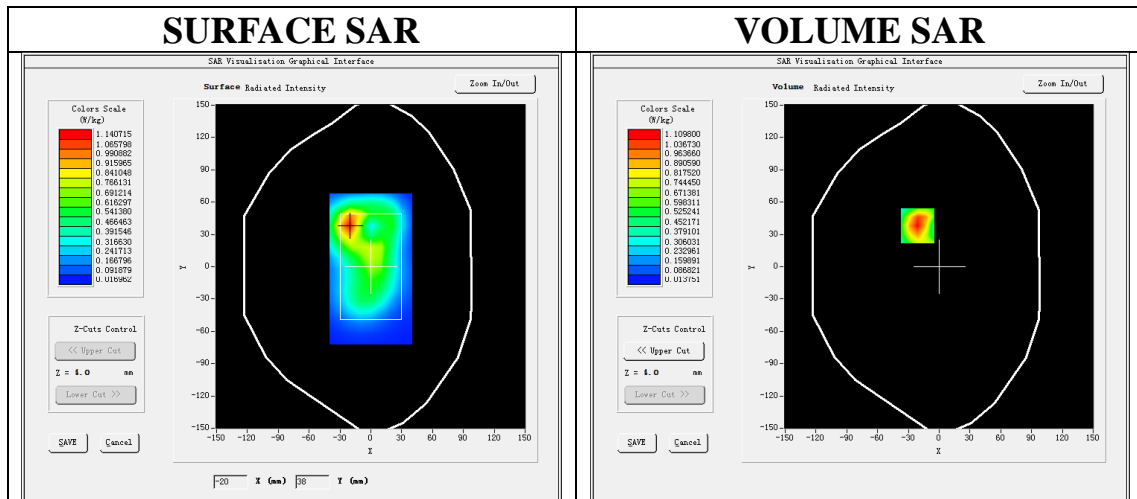
Communication System: LTE; Communication System Band: LTE Band 2; Duty Cycle:1:1; Conv.F=4.48;  
Frequency:1880MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 38.62$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.8, Liquid temperature (°C): 20.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 2 Mid-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 2 Mid-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 2
<b>Channels</b>	Middle
<b>Signal</b>	OFDM (Crest factor: 1.0)

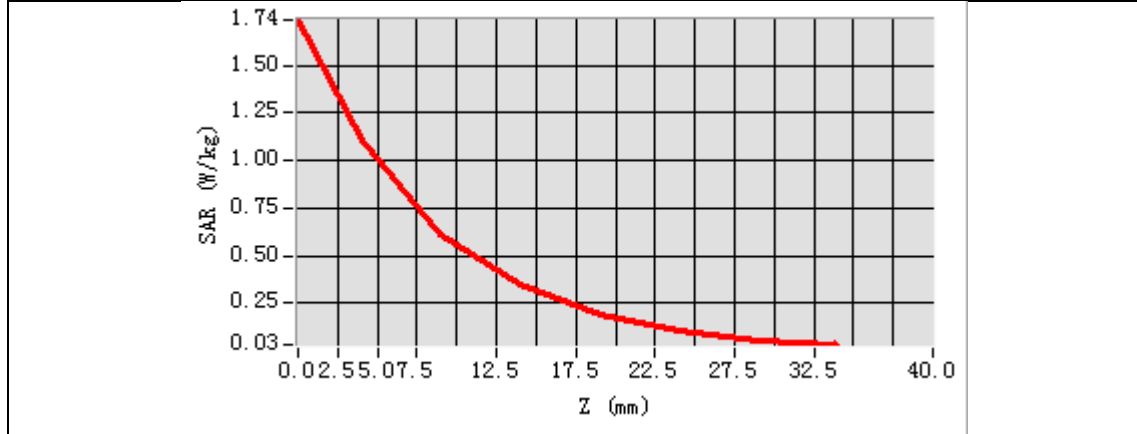


**Maximum location: X=-21.00, Y=38.00**

**SAR Peak: 1.77 W/kg**

<b>SAR 10g (W/Kg)</b>	0.542109
<b>SAR 1g (W/Kg)</b>	1.053985

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.7389	1.1098	0.6136	0.3453	0.1903	0.1098	0.0602



3D screen shot	Hot spot position



**Test Laboratory: AGC Lab**  
**LTE Band 2 High-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: May 31,2020**

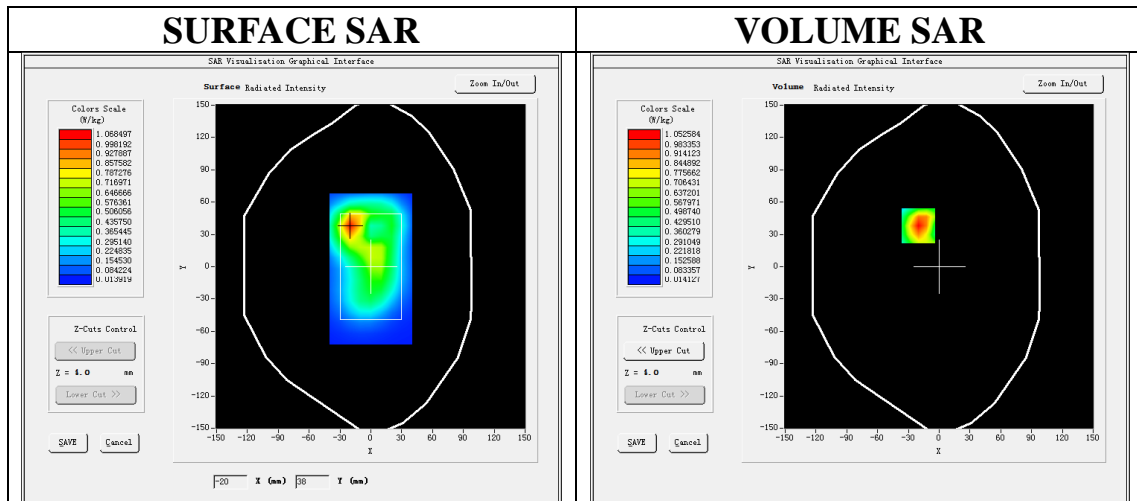
Communication System: LTE; Communication System Band: LTE Band 2; Duty Cycle:1:1; Conv.F=4.48;  
Frequency:1900MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 38.58$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.8, Liquid temperature (°C): 20.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 2 High-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 2 High-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm;

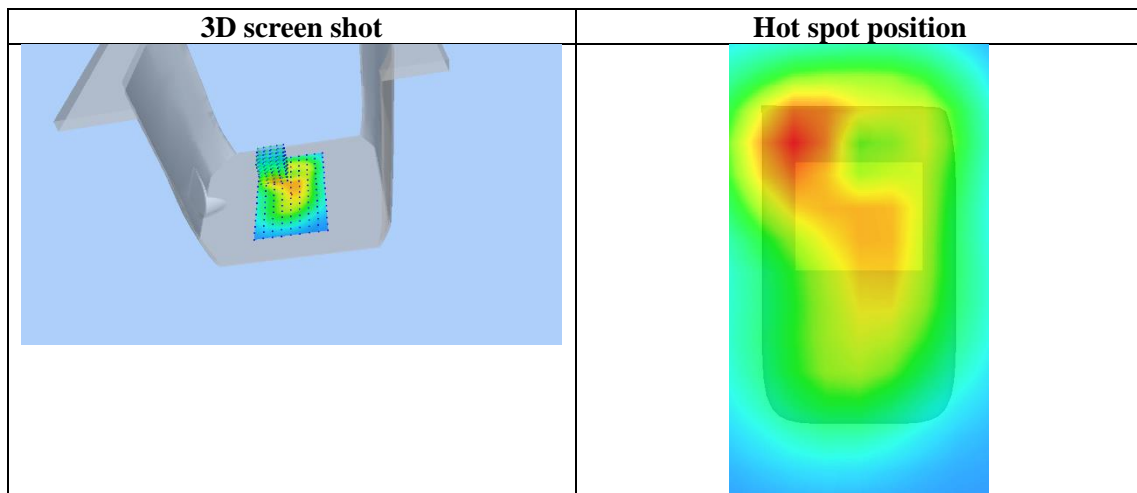
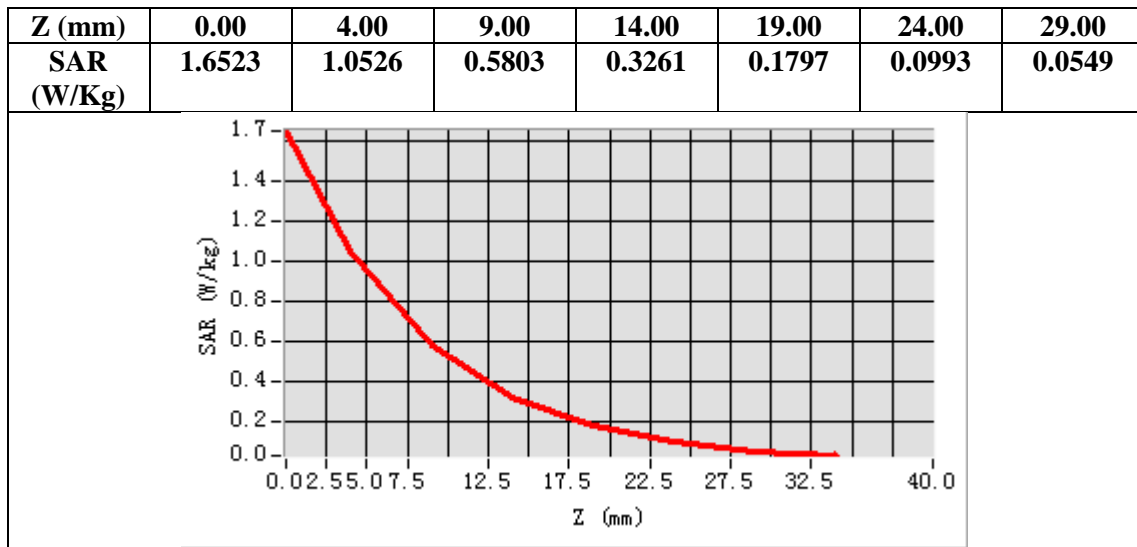
<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 2
<b>Channels</b>	High
<b>Signal</b>	OFDM (Crest factor: 1.0)



**Maximum location: X=-20.00, Y=38.00**

**SAR Peak: 1.68 W/kg**

<b>SAR 10g (W/Kg)</b>	0.510761
<b>SAR 1g (W/Kg)</b>	0.997332



**Test Laboratory: AGC Lab**  
**LTE Band 4 Mid-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: May 30,2020**

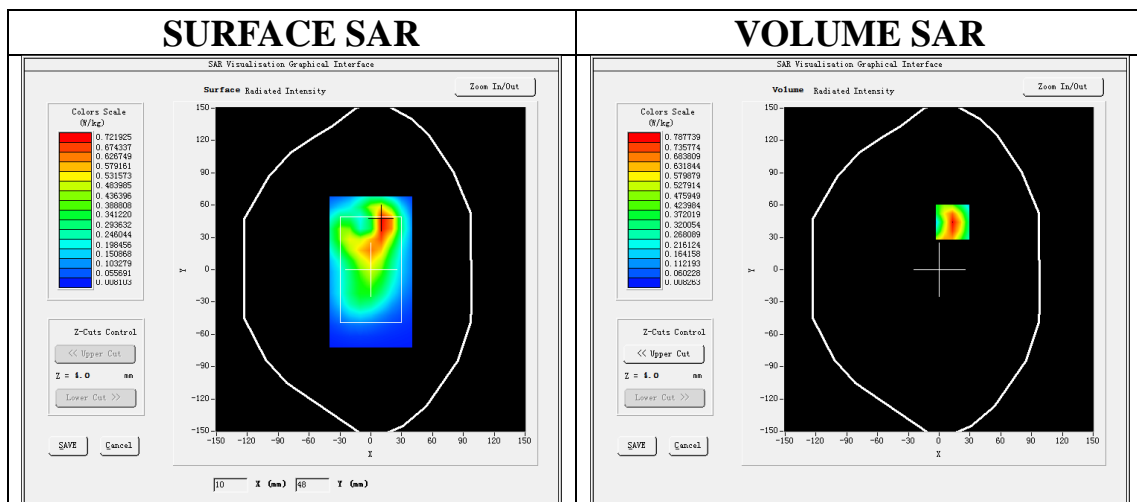
Communication System: LTE; Communication System Band: LTE Band 4; Duty Cycle:1:1; Conv.F=4.05;  
Frequency:1732.5 MHz; Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 40.08$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.6, Liquid temperature (°C): 20.3

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 4 Mid-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 4 Mid-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 4
<b>Channels</b>	Middle
<b>Signal</b>	OFDM (Crest factor: 1.0)

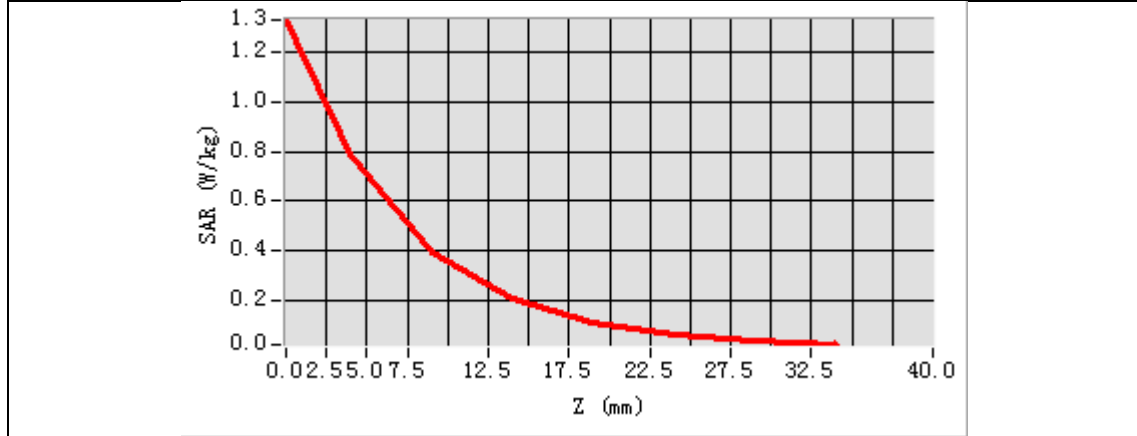


**Maximum location: X=13.00, Y=44.00**

**SAR Peak: 1.32 W/kg**

<b>SAR 10g (W/Kg)</b>	0.367293
<b>SAR 1g (W/Kg)</b>	0.741562

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.3334	0.7877	0.3895	0.2028	0.1088	0.0585	0.0325



3D screen shot	Hot spot position
<p>A 3D perspective view of a grey, L-shaped device. A small rectangular area on the top surface is highlighted with a color-coded SAR distribution, showing a hot spot in red and yellow, transitioning to green and blue towards the edges.</p>	<p>A 2D cross-sectional view of the device. The SAR distribution is shown as a color map, with the highest intensity (red) concentrated in the upper-middle section of the device's body, indicating the hot spot position.</p>

**Test Laboratory: AGC Lab**  
**LTE Band 7 Mid-Body-Front (1RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: May 22,2020**

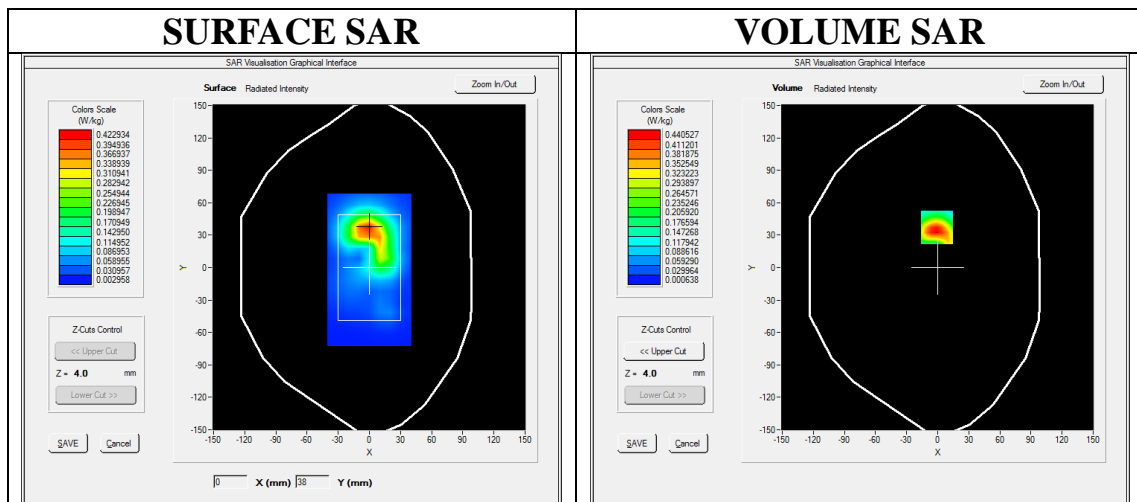
Communication System: LTE; Communication System Band: LTE Band 7; Duty Cycle:1:1; Conv.F=3.77  
Frequency: 2535MHz; Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.87$  mho/m;  $\epsilon_r = 39.17$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 21.1, Liquid temperature (°C): 20.9

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE BAND 7 Mid-Body-Front /Area Scan:** Measurement grid: dx=10mm, y=10mm  
**Configuration/ LTE BAND 7 Mid-Body-Front /Zoom Scan:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

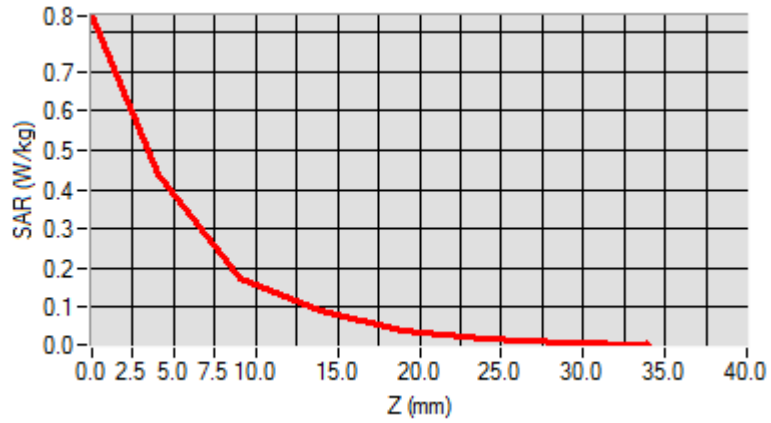
<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>ZoomScan</b>	7x7x7,dx=5mm dy=5mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Front
<b>Band</b>	LTE BAND 7
<b>Channels</b>	Middle
<b>Signal</b>	OFDM (Crest factor: 1.0)



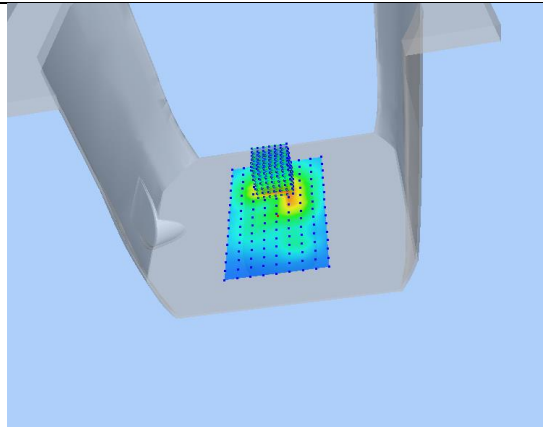
**Maximum location: X=-1.00, Y=37.00**  
**SAR Peak: 0.77 W/kg**

<b>SAR 10g (W/Kg)</b>	0.195898
<b>SAR 1g (W/Kg)</b>	0.419141

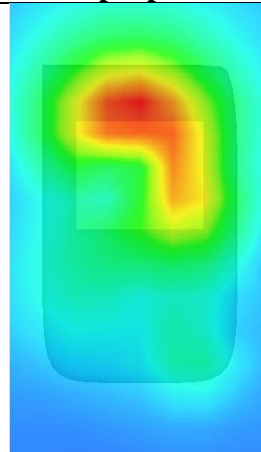
<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>	<b>24.00</b>	<b>29.00</b>
<b>SAR (W/Kg)</b>	<b>0.8420</b>	<b>0.4405</b>	<b>0.1738</b>	<b>0.0936</b>	<b>0.0438</b>	<b>0.0208</b>	<b>0.0111</b>



**3D screen shot**



**Hot spot position**



**Test Laboratory: AGC Lab**  
**LTE Band 12 Mid-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: Jun. 01,2020**

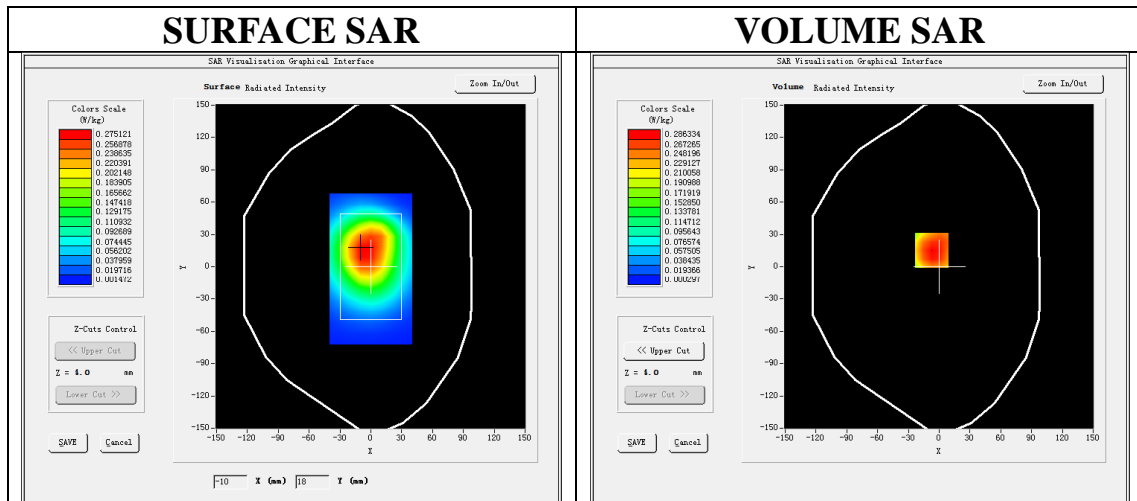
Communication System: LTE; Communication System Band: LTE Band 12; Duty Cycle:1:1; Conv.F=4.97;  
Frequency: 707.5 MHz; Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.88$  mho/m;  $\epsilon_r = 42.04$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.4, Liquid temperature (°C): 20.1

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 12 Mid-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 12 Mid-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 12
<b>Channels</b>	Middle
<b>Signal</b>	OFDM (Crest factor: 1.0)

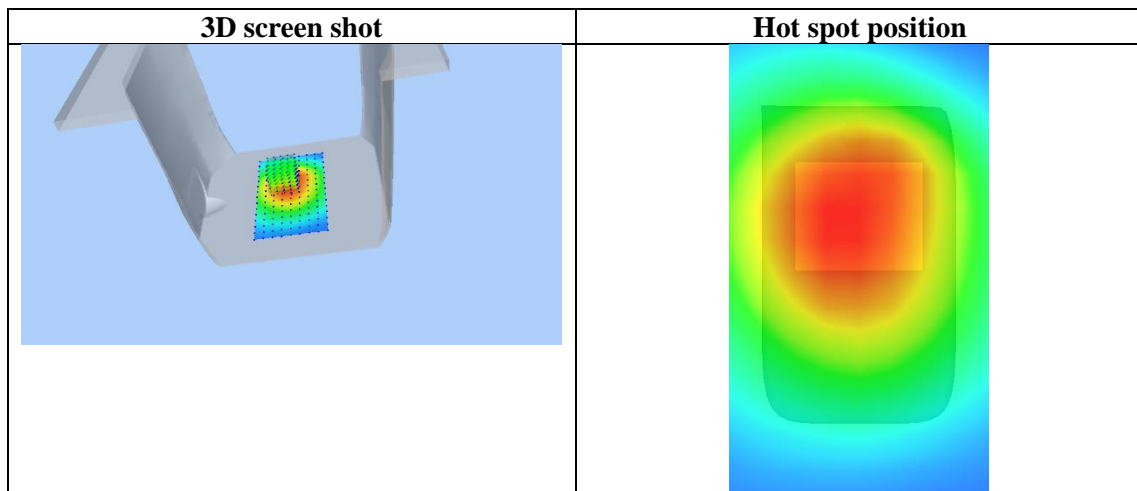
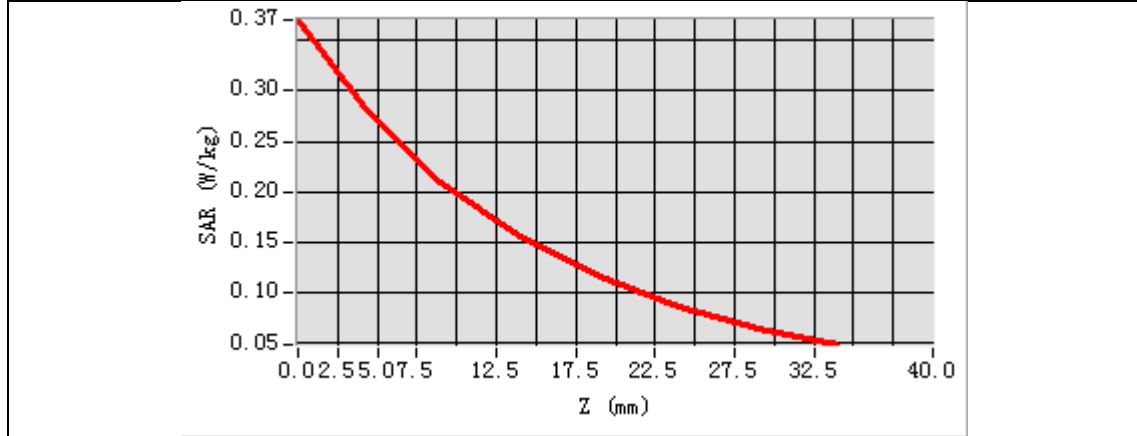


**Maximum location: X=-7.00, Y=15.00**

**SAR Peak: 0.37 W/kg**

<b>SAR 10g (W/Kg)</b>	0.200242
<b>SAR 1g (W/Kg)</b>	0.284835

<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>	<b>24.00</b>	<b>29.00</b>
<b>SAR (W/Kg)</b>	<b>0.3703</b>	<b>0.2863</b>	<b>0.2091</b>	<b>0.1557</b>	<b>0.1158</b>	<b>0.0864</b>	<b>0.0648</b>





**Test Laboratory: AGC Lab**  
**LTE Band 13 High-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: Jun. 01,2020**

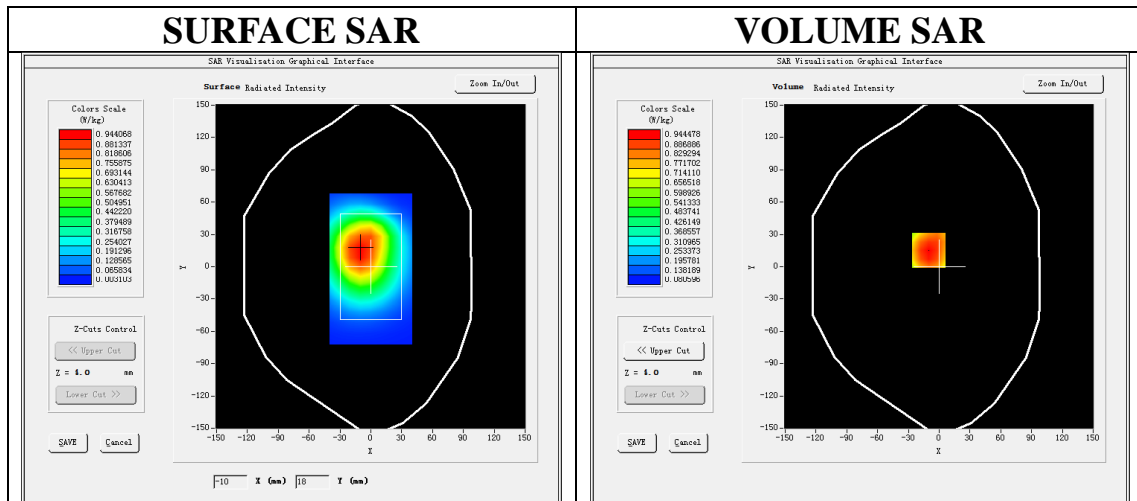
Communication System: LTE; Communication System Band: LTE Band 13; Duty Cycle:1:1; Conv.F=4.97;  
Frequency: 782 MHz; Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 41.32$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.4, Liquid temperature (°C): 20.1

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 13 High-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 13 High-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5m;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 13
<b>Channels</b>	High
<b>Signal</b>	OFDM (Crest factor: 1.0)

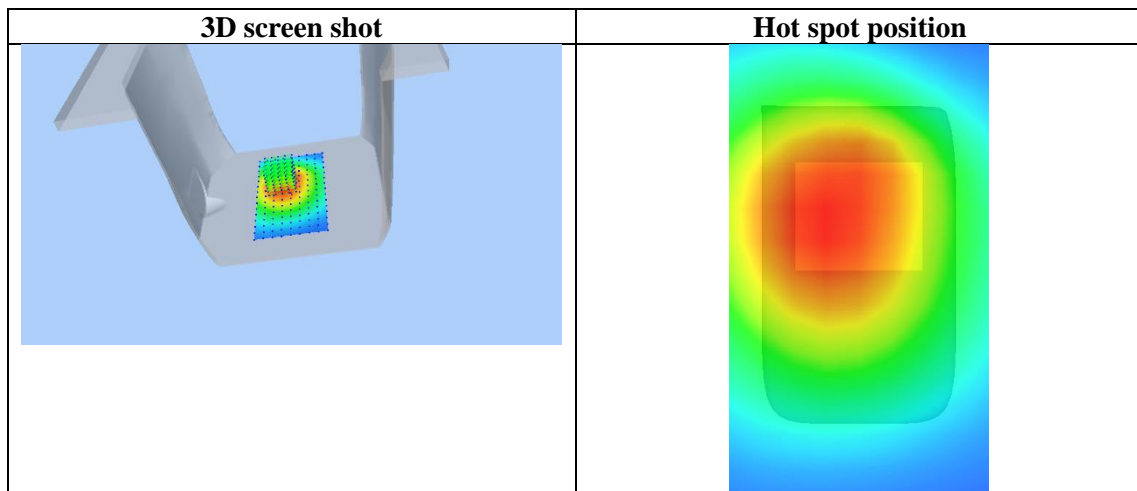
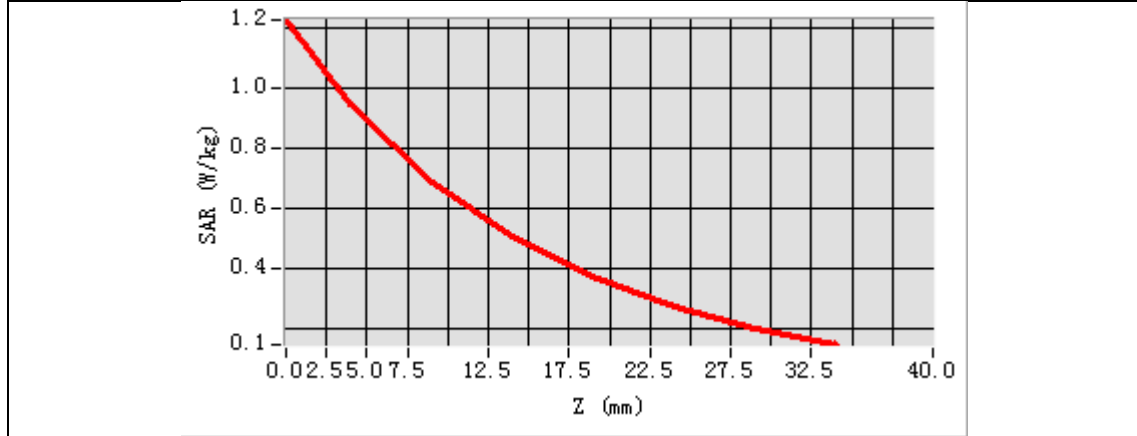


**Maximum location: X=-10.00, Y=15.00**

**SAR Peak: 1.23 W/kg**

<b>SAR 10g (W/Kg)</b>	0.641348
<b>SAR 1g (W/Kg)</b>	0.917021

<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>	<b>24.00</b>	<b>29.00</b>
<b>SAR (W/Kg)</b>	<b>1.2249</b>	<b>0.9445</b>	<b>0.6875</b>	<b>0.5073</b>	<b>0.3758</b>	<b>0.2745</b>	<b>0.2021</b>



**Test Laboratory: AGC Lab**  
**LTE Band 25 Mid-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: May 31,2020**

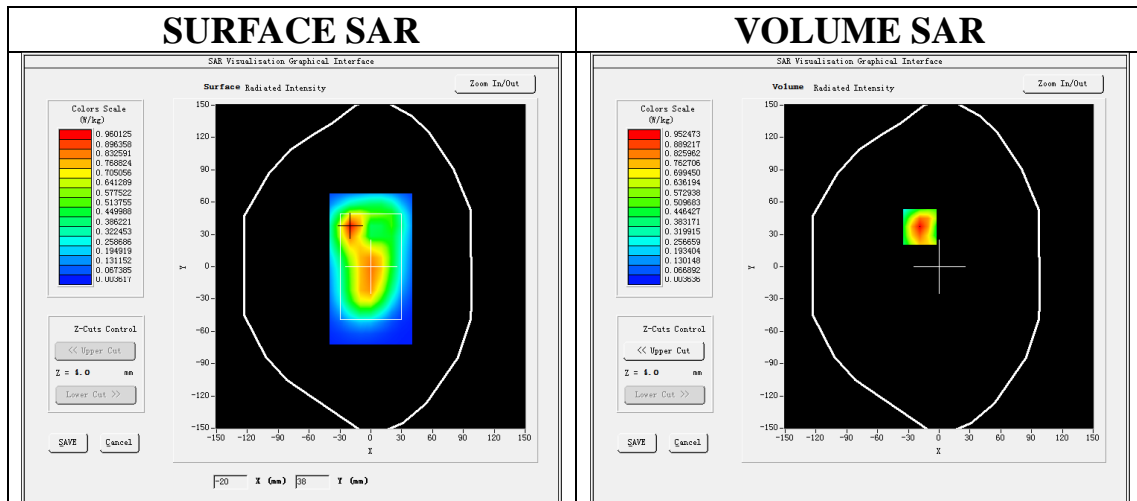
Communication System: LTE; Communication System Band: LTE Band 25; Duty Cycle:1:1; Conv.F=4.48;  
Frequency:1882.5MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon r = 38.60$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.8, Liquid temperature (°C): 20.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 25 Mid-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 25 Mid-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 25
<b>Channels</b>	Middle
<b>Signal</b>	OFDM (Crest factor: 1.0)

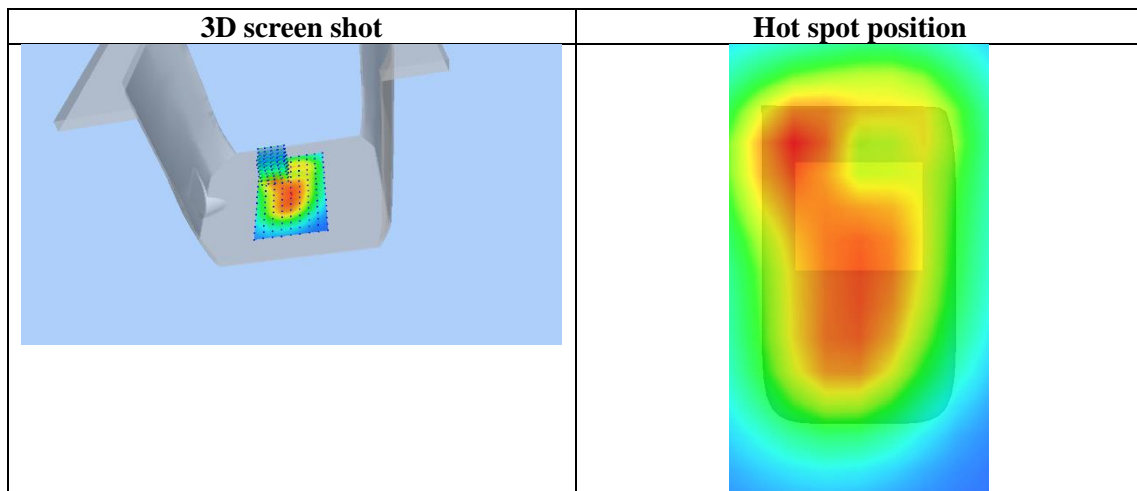
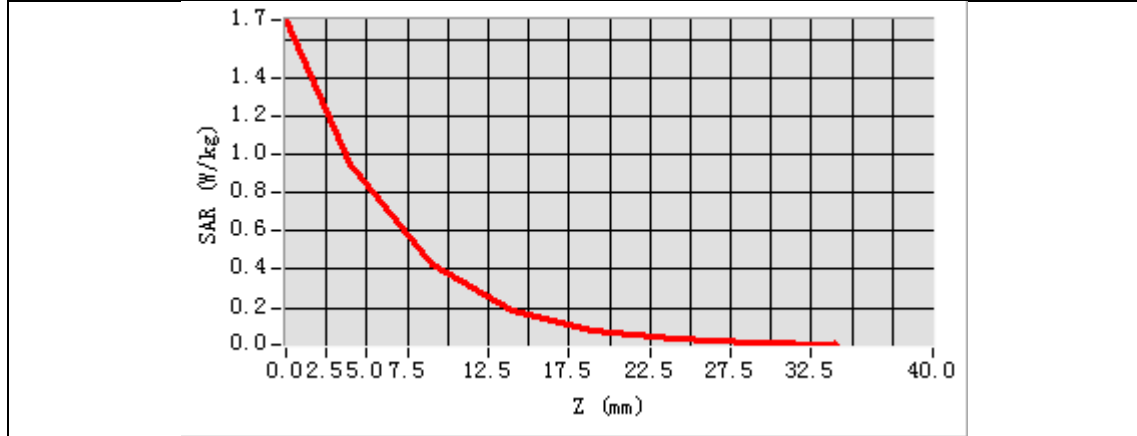


**Maximum location: X=-19.00, Y=37.00**

**SAR Peak: 1.69 W/kg**

<b>SAR 10g (W/Kg)</b>	0.426460
<b>SAR 1g (W/Kg)</b>	0.912469

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.7013	0.9525	0.4210	0.1862	0.0826	0.0367	0.0163



**WIFI MODE**

Test Laboratory: AGC Lab  
802.11b Mid-Body-Worn- Front  
DUT: 4G Wireless Router; Type: D523F

Date: May 29,2020

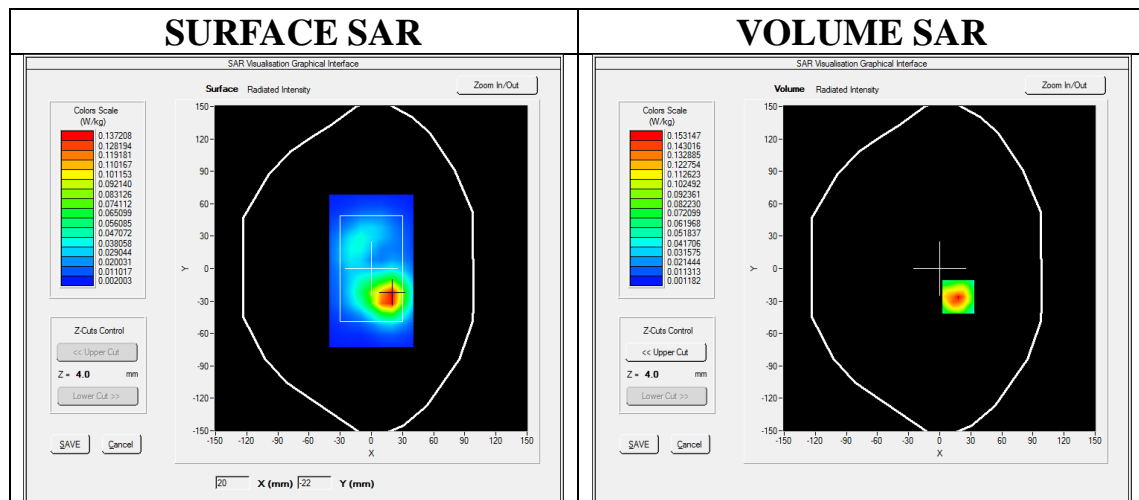
Communication System: Wi-Fi; Communication System Band: 802.11b; Duty Cycle: 1:1; Conv.F=4.12;  
Frequency: 2437 MHz; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.83$  mho/m;  $\epsilon_r = 38.89$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C):21.1, Liquid temperature (°C): 20.8

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

Configuration/802.11b Mid- Body- Front /Area Scan: Measurement grid: dx=10mm, dy=10mm  
Configuration/802.11b Mid- Body- Front /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

Area Scan	surf_sam_plan.txt, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body Front
Band	2450MHz
Channels	Middle
Signal	Crest factor: 1.0

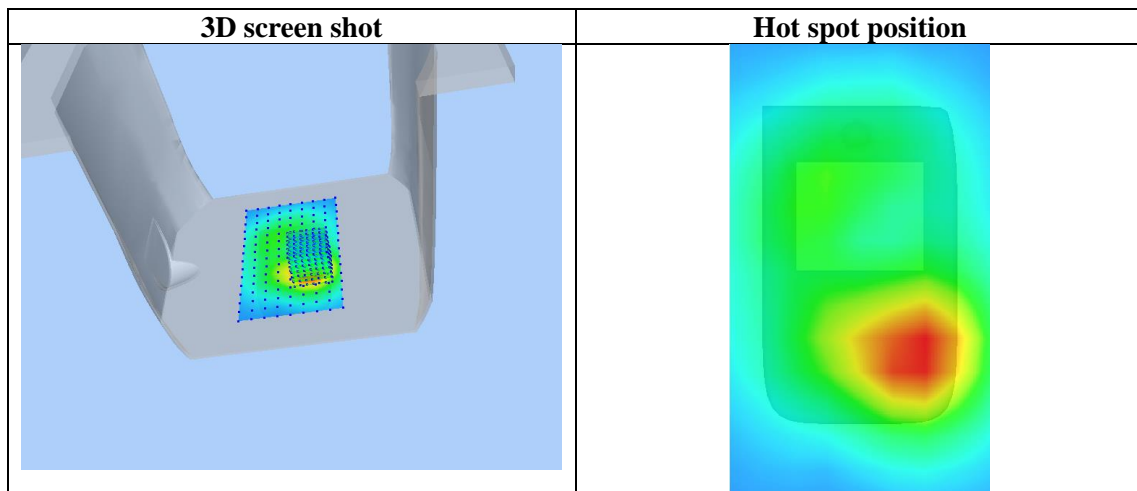
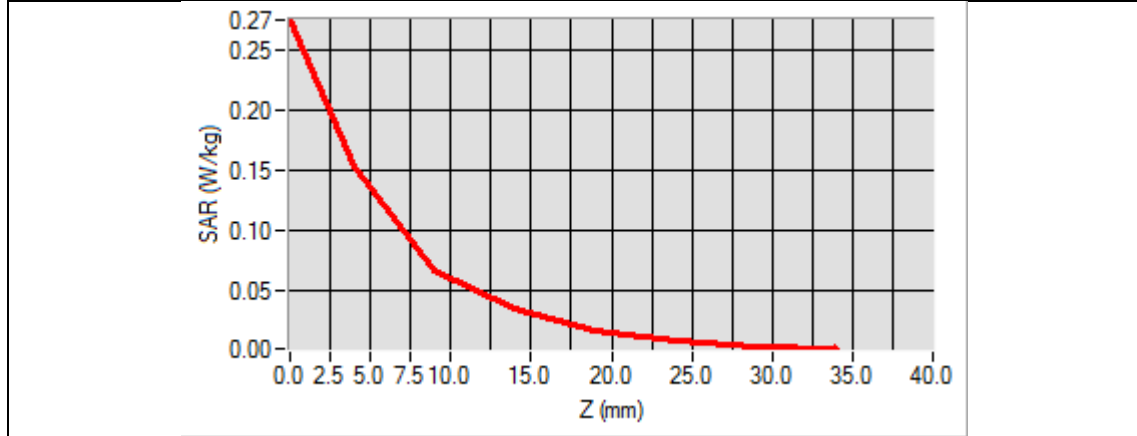


**Maximum location: X=18.00, Y=-26.00**  
**SAR Peak: 0.27 W/kg**

<b>SAR 10g (W/Kg)</b>	0.067536
<b>SAR 1g (W/Kg)</b>	0.137896



Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.2750	0.1531	0.0680	0.0365	0.0174	0.0091	0.0048



### Repeated SAR

Test Laboratory: AGC Lab  
LTE Band 2 Mid-Body-Back (1 RB#0)  
DUT: 4G Wireless Router; Type: D523F

Date: May 31,2020

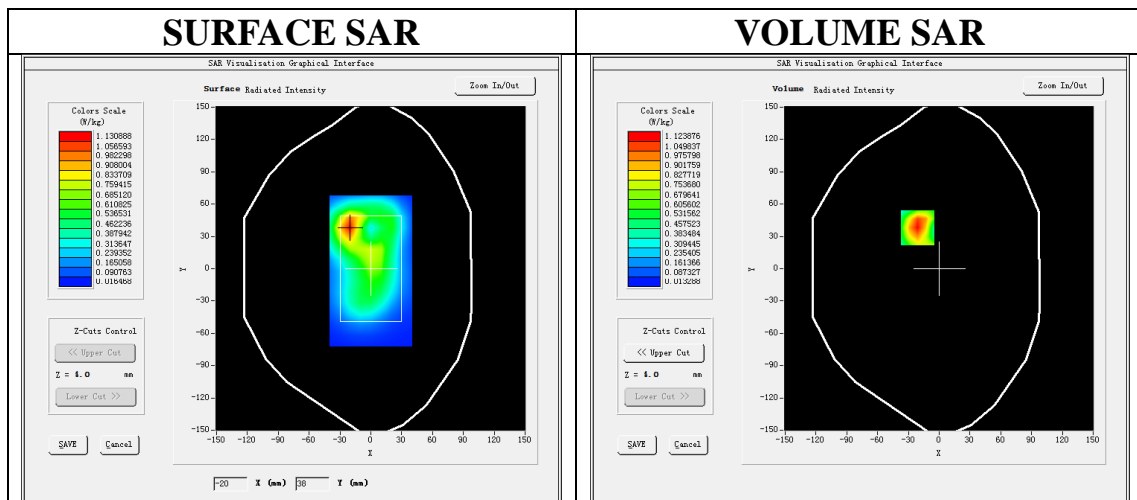
Communication System: LTE; Communication System Band: LTE Band 2; Duty Cycle:1:1; Conv.F=4.48;  
Frequency:1880MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 38.62$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.8, Liquid temperature (°C): 20.5

#### SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

Configuration/ LTE Band 2 Mid-Body-back/Area Scan: Measurement grid: dx=10mm, dy=10mm  
Configuration/ LTE Band 2 Mid-Body-back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	surf_sam_plan.txt, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	LTE Band 2
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



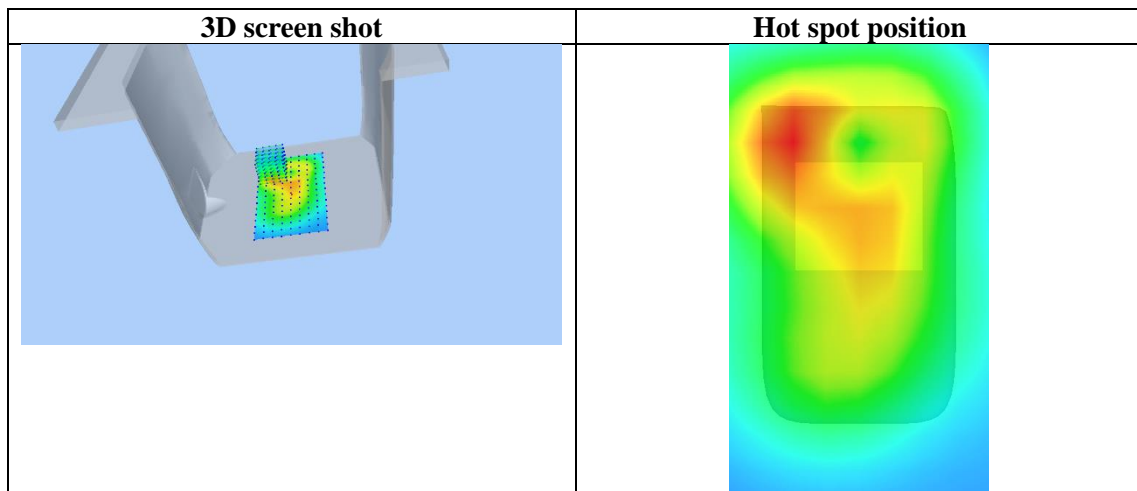
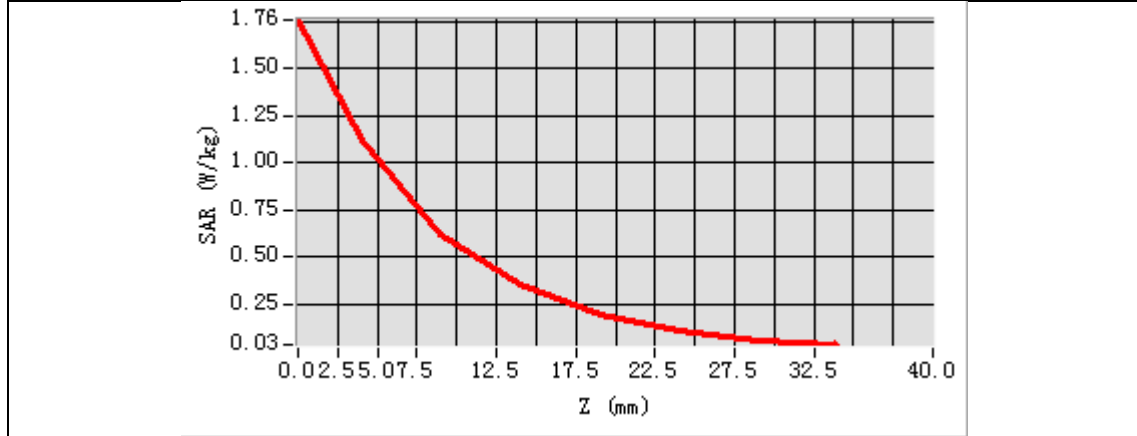
Maximum location: X=-21.00, Y=38.00  
SAR Peak: 1.79 W/kg

SAR 10g (W/Kg)	0.549846
SAR 1g (W/Kg)	1.068054





Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.7595	1.1239	0.6228	0.3512	0.1954	0.1078	0.0598



**Test Laboratory: AGC Lab**  
**LTE Band 13 High-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: Jun. 01,2020**

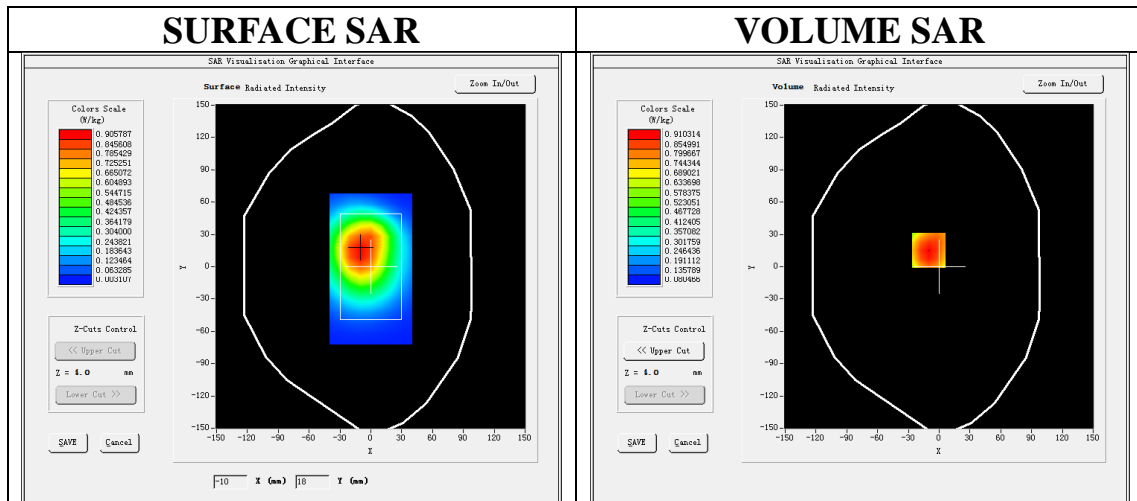
Communication System: LTE; Communication System Band: LTE Band 13; Duty Cycle:1:1; Conv.F=4.97;  
Frequency: 782 MHz; Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 41.32$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.4, Liquid temperature (°C): 20.1

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 13 High-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 13 High-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5m;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 13
<b>Channels</b>	High
<b>Signal</b>	OFDM (Crest factor: 1.0)

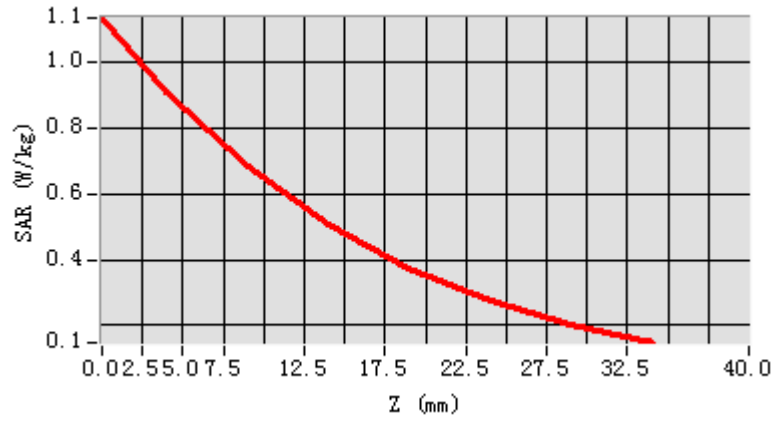


**Maximum location: X=-10.00, Y=15.00**

**SAR Peak: 1.15 W/kg**

<b>SAR 10g (W/Kg)</b>	0.626257
<b>SAR 1g (W/Kg)</b>	0.878959

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.1359	0.9103	0.6825	0.5061	0.3732	0.2746	0.2022



3D screen shot	Hot spot position
<p>A 3D perspective view of a grey, L-shaped device. A small rectangular area on the horizontal part of the device is highlighted with a color-coded SAR distribution, showing a central red/orange area (high SAR) transitioning to yellow, green, and blue (lower SAR) towards the edges.</p>	<p>A 2D heatmap showing the SAR distribution on the device. The central area is red, indicating the highest SAR, surrounded by concentric rings of yellow, green, and blue, indicating decreasing SAR levels. The shape of the hot spot matches the device's geometry.</p>

**Test Laboratory: AGC Lab**  
**LTE Band 25 Mid-Body-Back (1 RB#0)**  
**DUT: 4G Wireless Router; Type: D523F**

**Date: May 31,2020**

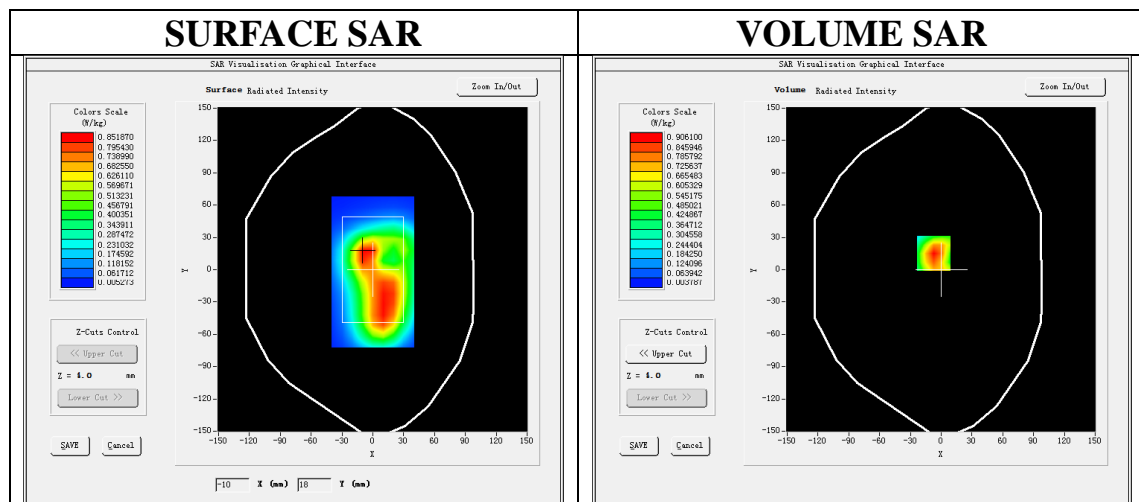
Communication System: LTE; Communication System Band: LTE Band 25; Duty Cycle:1:1; Conv.F=4.48;  
Frequency:1882.5MHz; Medium parameters used:  $f = 1850$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 38.60$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 20.8, Liquid temperature (°C): 20.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: Jun. 04,2019; Serial No.: SN 22/16 EP315
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4\_02\_35

**Configuration/ LTE Band 25 Mid-Body-back/Area Scan:** Measurement grid: dx=10mm, dy=10mm  
**Configuration/ LTE Band 25 Mid-Body-back/Zoom Scan:** Measurement grid: dx=8mm,dy=8mm, dz=5mm;

<b>Area Scan</b>	surf_sam_plan.txt, h= 5.00 mm
<b>Zoom Scan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body Back
<b>Band</b>	LTE Band 25
<b>Channels</b>	Middle
<b>Signal</b>	OFDM (Crest factor: 1.0)

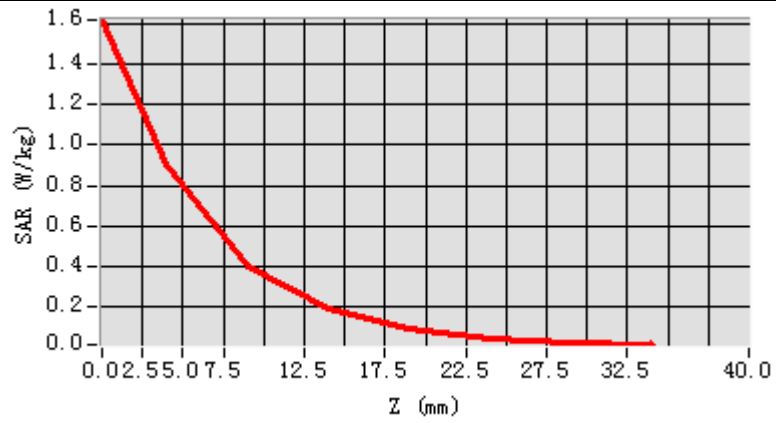


**Maximum location: X=-7.00, Y=15.00**

**SAR Peak: 1.61 W/kg**

<b>SAR 10g (W/Kg)</b>	0.409087
<b>SAR 1g (W/Kg)</b>	0.867923

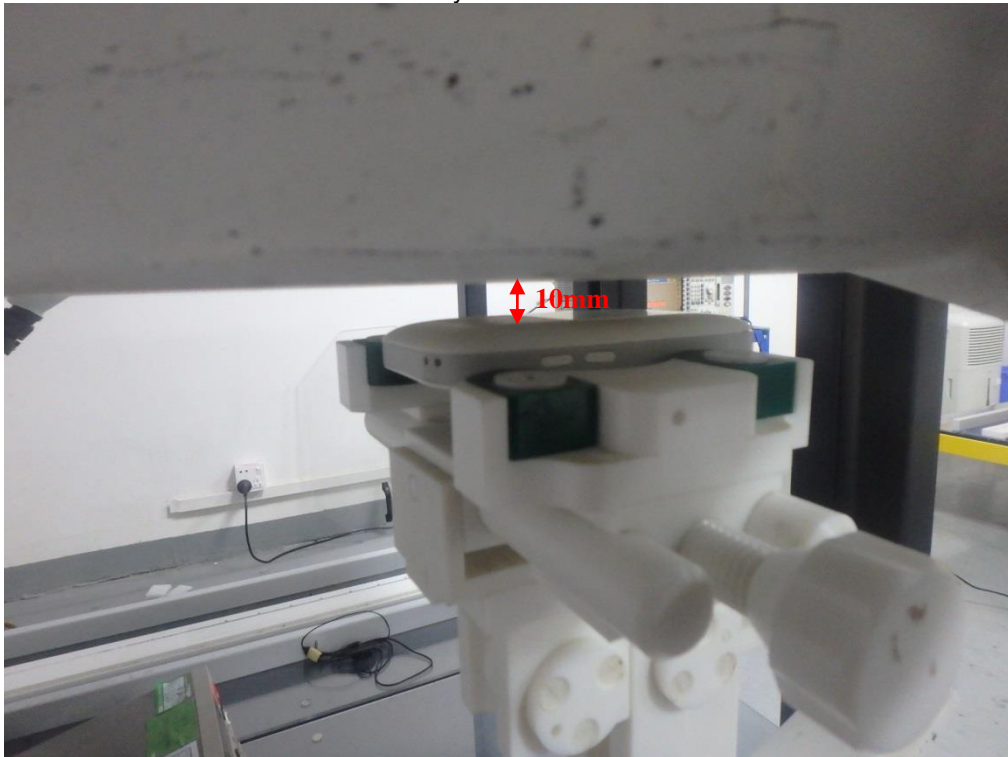
<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>	<b>24.00</b>	<b>29.00</b>
<b>SAR (W/Kg)</b>	<b>1.6229</b>	<b>0.9061</b>	<b>0.3992</b>	<b>0.1866</b>	<b>0.0831</b>	<b>0.0368</b>	<b>0.0167</b>



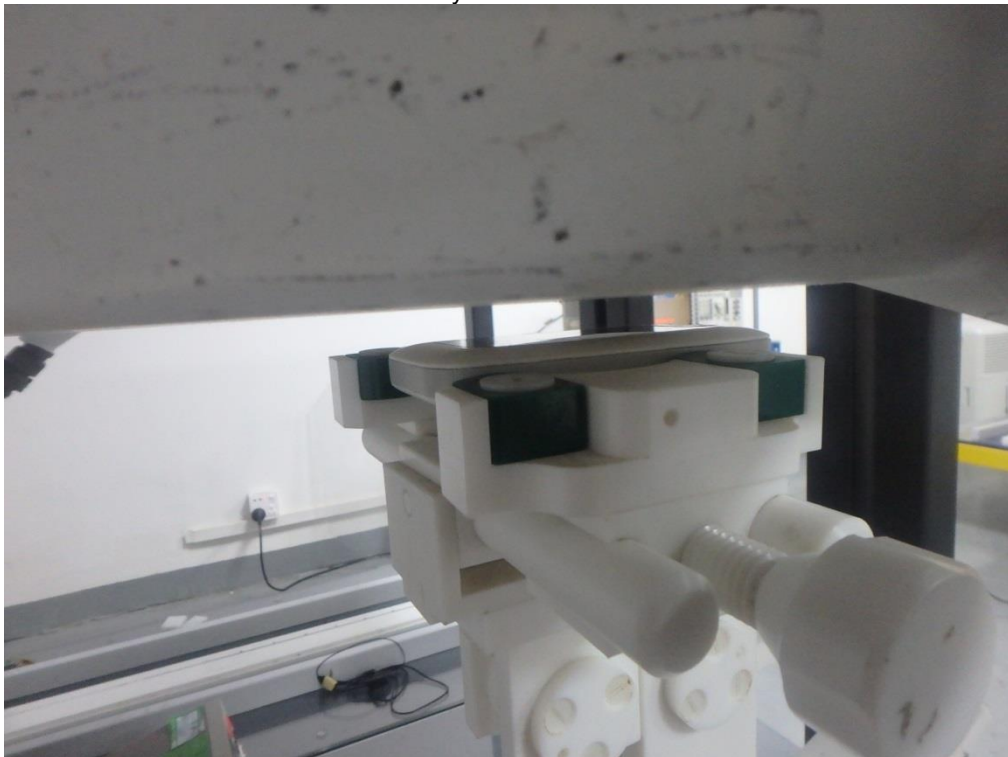
<b>3D screen shot</b>	<b>Hot spot position</b>
<p>A 3D perspective view of a grey, L-shaped device. A small rectangular area on the horizontal part of the device is highlighted with a color-coded SAR distribution, showing a red hot spot in the center transitioning to blue at the edges.</p>	<p>A 2D color map showing the SAR distribution on the device. The highest SAR values (red) are concentrated in the central region of the horizontal part, with values decreasing (yellow, green, blue) towards the edges and the vertical part of the device.</p>

## APPENDIX C. TEST SETUP PHOTOGRAPHS

Body Back 10mm



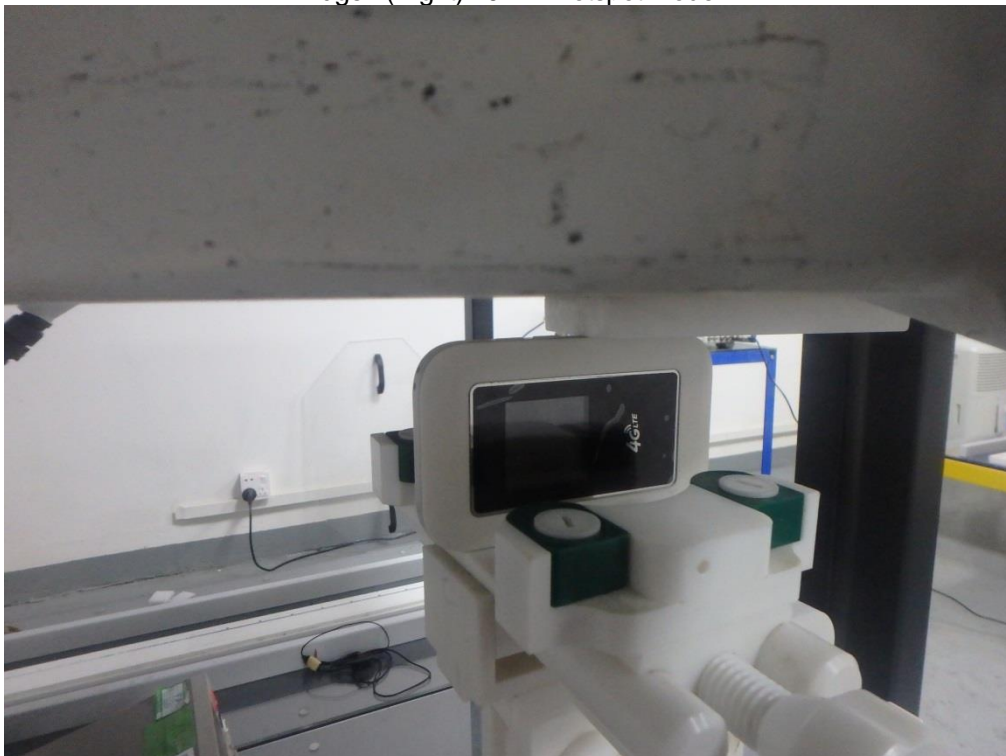
Body Front 10mm



Edge 1(Top) 10mm-Hotspot Mode

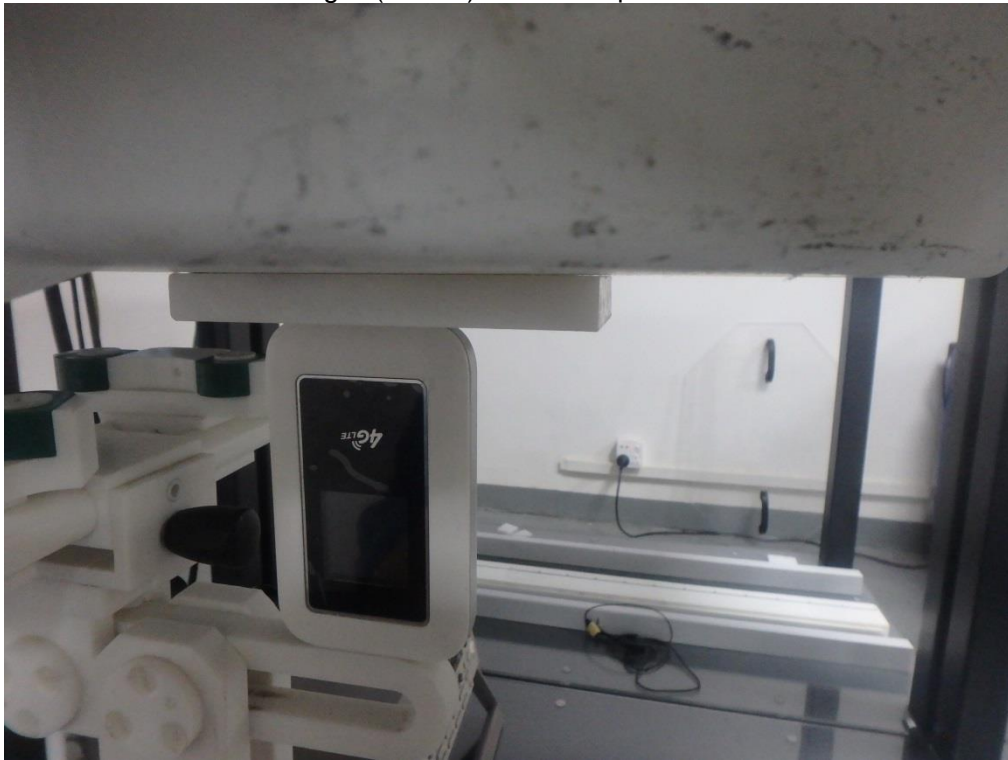


Edge 2(Right) 10mm-Hotspot Mode

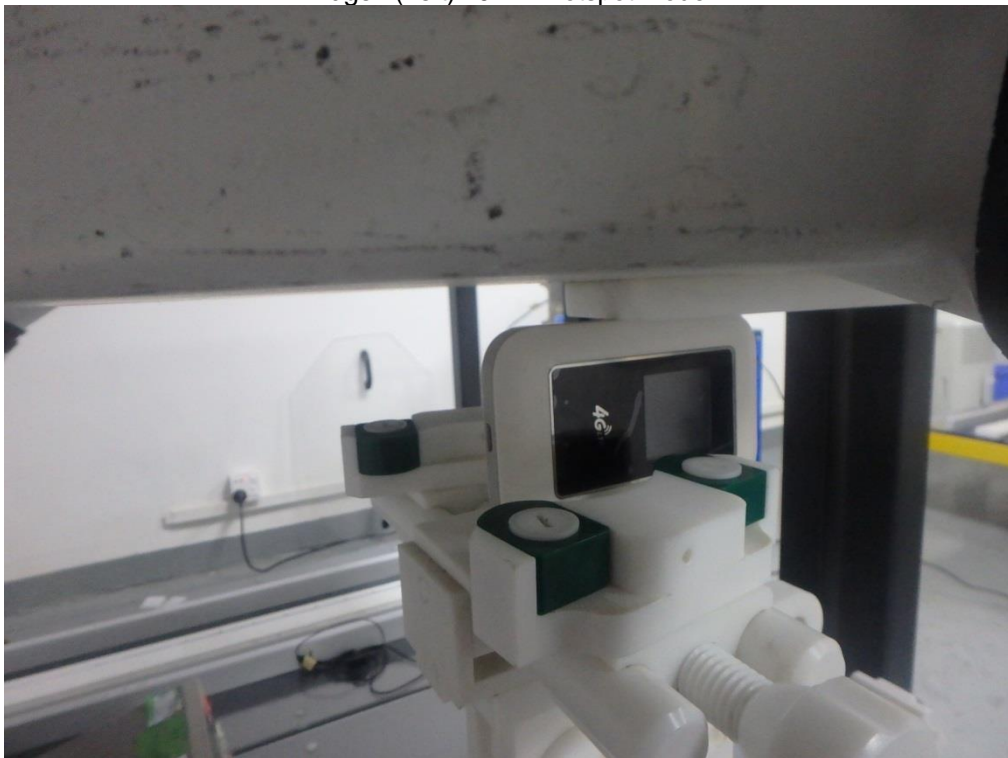




Edge 3(Bottom) 10mm-Hotspot Mode

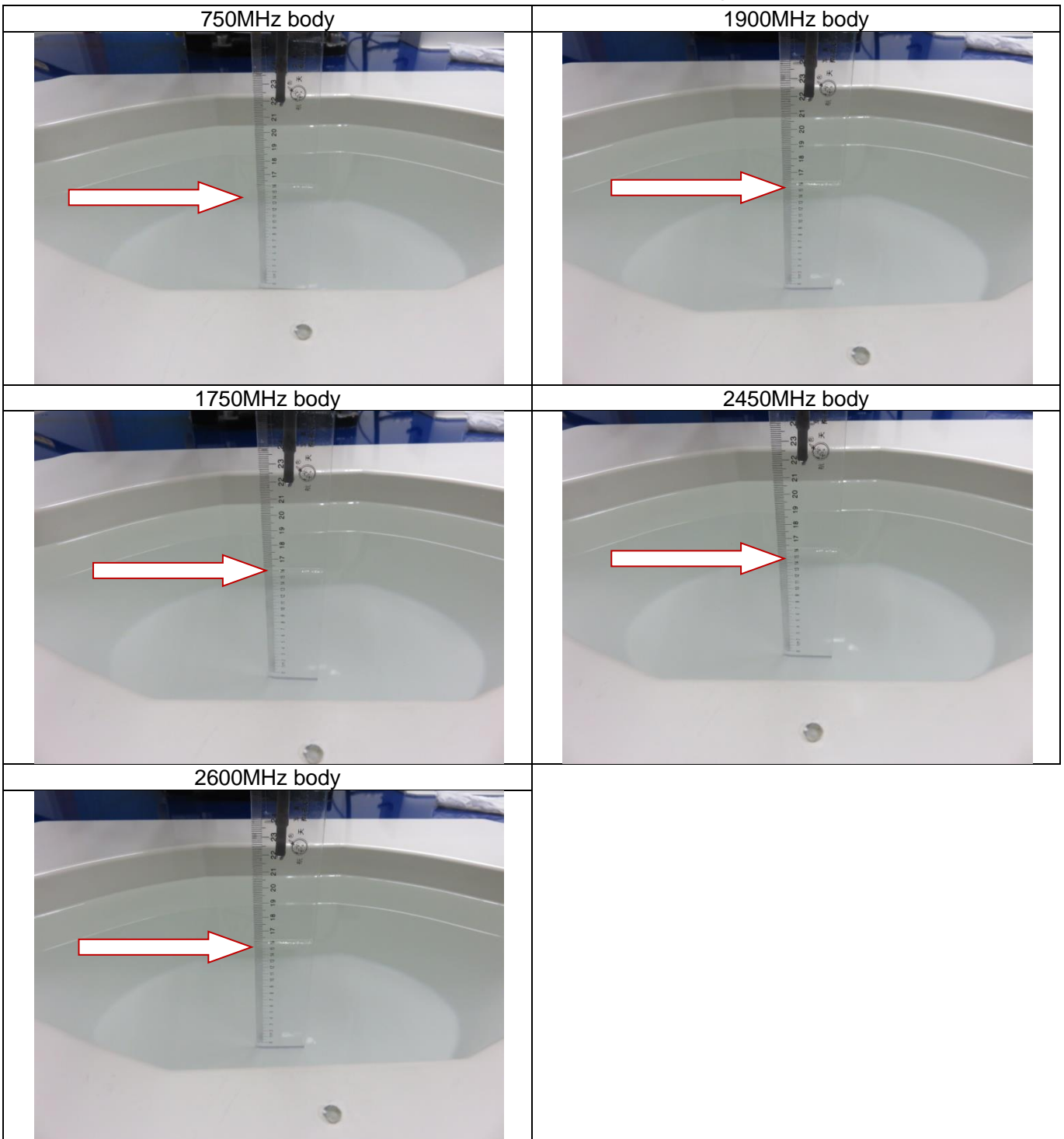


Edge 4(Left) 10mm-Hotspot Mode



### DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

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



## **APPENDIX D. CALIBRATION DATA**

Refer to Attached files.