FCC SAR
Measurement and Test Report

For

IDspire Corporation Ltd.

9F, No. 266, Sec. 1, Wenhua Rd., Banqiao District, New Taipei City 22041,

Taiwan (R.O.C.)

FCC ID: 2AJFS-TPSERIES

FCC Rules:	FCC Part 2.1093, IEEE 1528 :2013 ANSI / IEEE C95.1 ::2005+A1:2010 ANSI / IEEE C95.3 : 2002
Product Description:	Biometric Mobile Terminal
Tested Model:	TP SERIES
Report No.:	WTX19X03010911W-3
Sample Received Date:	2019-04-11
Tested Date:	2019-04-11 to 2019-04-12
Issued Date:	2019-04-15
Tested By:	Ruler Liu / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager
Prepared By:	

Ruler Liu

Silin chen

Jandyso

Shenzhen SEM Test Technology Co., Ltd. Approved

Shenzhen SEM Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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1. General Information

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	IDspire Corporation Ltd.
Address of applicant:	9F, No. 266, Sec. 1, Wenhua Rd., Banqiao District, New Taipei City 22041, Taiwan (R.O.C.)
Manufacturer:	IDspire Corporation Ltd.
Address of manufacturer:	9F, No. 266, Sec. 1, Wenhua Rd., Banqiao District, New Taipei City 22041, Taiwan (R.O.C.)

General Description of EUT:	
Product Name:	Biometric Mobile Terminal
Brand Name:	/
Model No.:	TP SERIES
Adding Model(s):	TP 1000, TP 1000-N, TP 1000-R, TP 1010, TP 1010-N,
	TP 1010-R, TPS 100, TPS 100-N, TPS 100-R
Rated Voltage:	DC3.7V
Battery:	4000mAh
Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model TP SERIES, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 5
Uplink Frequency:	WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 5: 23.11dBm
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 5: - 4.0dBi
WIFI(2.4G)	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 11n(HT40)
AV Output Power:	8.62dBm (Conducted)

Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels:	11/7
Channel Separation:	5MHz
Antenna Type:	Integral Antenna
Antenna Gain:	1.0dBi
Bluetooth	
Bluetooth Version:	V4.0+EDR
Frequency Range:	2402-2480MHz
AV Output Power:	-2.477dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, Pi/4 QDPSK, 8DPSK
Quantity of Channels:	79
Channel Separation:	1MHz
Antenna Type:	Integral Antenna
Antenna Gain:	1.0dBi
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 2,5
Uplink Frequency:	FDD-LTE Band 2: Tx: 1850-1910MHz, FDD-LTE Band 5: Tx: 824-849MHz,
Downlink Frequency:	FDD-LTE Band 2: Rx: 1930-1990MHz, FDD-LTE Band 5: Rx: 869-894MHz,
RF Output Power:	FDD-LTE Band 2: 24.47dBm FDD-LTE Band 5: 23.58dBm
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 2: - 1.5dBi, FDD-LTE Band 5: - 4.0dBi,

1.2 Test Standards

The following report is prepared on behalf of the IDspire Corporation Ltd. in accordance with FCC 47 CFR Part 2.1093, ANSI / IEEE C95.1 ::2005+A1:2010, ANSI / IEEE C95.3 : 2002(R2008), IEEE 1528-2013 and KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02, KDB 447498 D01 v06,KDB 941225 D01 v03r01,KDB 616217 D04 v01r02 and KDB941225 D05 v02r05.

The objective is to determine compliance with FCC Part 2.1093 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02. The public notice KDB 447498 D01 v06 for Mobile and Portable Devices RF Exposure Procedure also.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

2. Summary of Test Results

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

Frequency Band	Head SAR	Body (0mm Gap)	SAR_{1g} Limit (W/kg)
	Maximum SAR_{1g} (W/kg)	Maximum SAR_{1g} (W/kg)	
WCDMA	0.032	**0.766**	1.6
LTE	**0.049**	0.714	1.6
Simultaneous Transmission	0.378	**1.095**	1.6

Remark:

The highest reported SAR values for head, body, and simultaneous transmission conditions are ***0.049W/kg, 0.766W/kg, and 1.095W/kg*** *respectively.*

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2.1093 and ANSI / IEEE C95.1 ::2005+A1:2010, and had been tested in accordance with the measurement methods and procedure specified in KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02

3. Specific Absorption Rate (SAR)

3.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techiques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

3.2 SAR Definition

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

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

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

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δ T is the temperature rise and δ t is the exposure duration, or related to the
electrical field in the tissue by

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

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

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

4. SAR Measurement System

4.1 The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:
- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

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

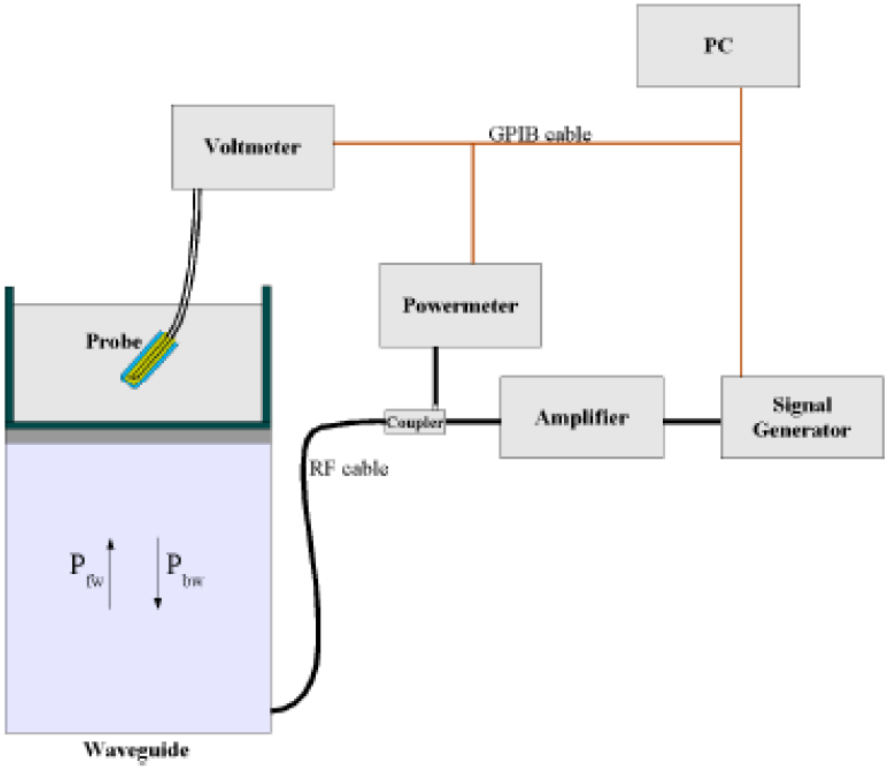
4.2 Probe

For the measurements the Specific Dosimetric E-Field Probe SSE5 SN 09/13 EP168 with following specifications is used
- Dynamic range: 0.01-100 W/kg
- Probe Length: 330 mm
- Length of Individual Dipoles: 4.5 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter : 5 mm
- Distance between dipoles / probe extremity: 2.7mm

- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.50 dB
- Calibration range: 700 to 3000MHz for head & body simulating liquid.

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

Probe calibration is realized, in compliance with EN 62209-1 and IEEE 1528 STD, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1 annexe technique using reference guide at the five frequencies.



$$SAR = \frac{4\,(P_{fw} - P_{bw})}{ab\delta}\cos^2\left(\pi\frac{y}{a}\right)c \quad (2z/\delta)$$

Where :

Pfw = Forward Power

Pbw = Backward Power

a and b =Waveguide dimensions

I = Skin depth

Keithley configuration:

Rate = Medium; Filter = ON; RDGS = 10; Filter type = Moving Average; Range auto after each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

$$CF(N)=SAR(N)/Vlin(N) \quad (N=1,2,3)$$

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

$$Vlin(N)=V(N)*(1+V(N)/DCP(N)) \quad (N=1,2,3)$$

where DCP is the diode compression point in mV.

4.3 Probe Calibration Process

Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an with CALISAR, Antenna proprietary calibration system.

Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm2.

Temperature Assessment Procedure

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

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

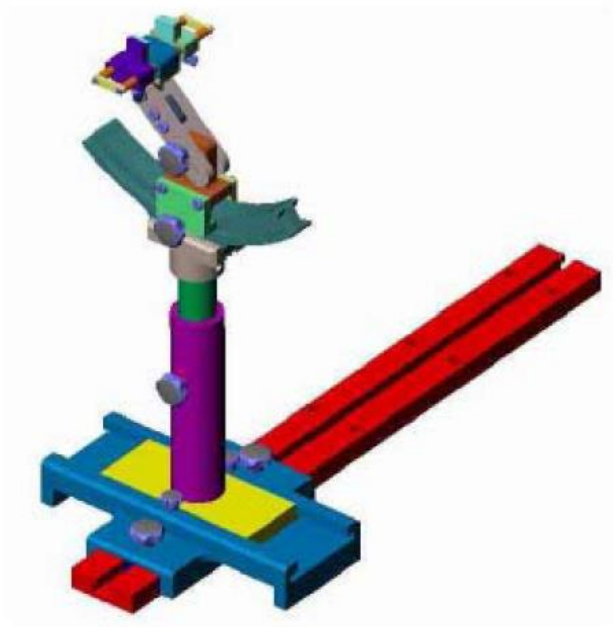
Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

4.4 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

4.5 Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 °.



System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

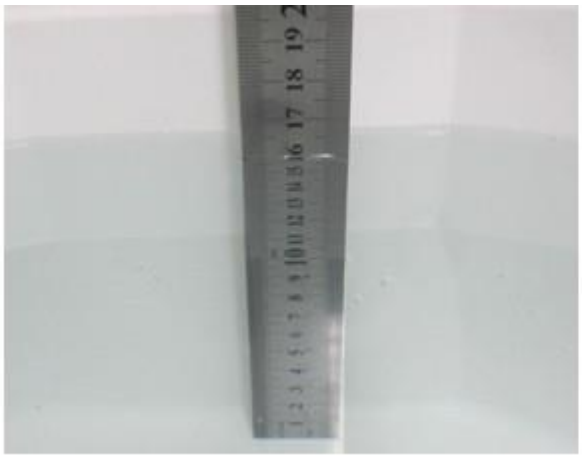
4.6 Test Equipment List

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
E-Field Probe	MVG	SSE5	SN 09/13 EP168	2018-06-01	2019-05-31
835MHz Dipole	MVG	SID835	SN 47/12 DIP 0G835-204	2019-03-16	2020-03-15
1900MHz Dipole	MVG	SID1900	SN 47/12 DIP 1G900-207	2019-03-16	2020-03-15
Dielectric Probe Kit	SATIMO	SCLMP	SN 47/12 OCPG49	2019-03-16	2020-03-15
SAM Phantom	SATIMO	SAM	SN/ 47/12 SAM95	N/A	N/A
MULTIMETER	KEITHLEY	Keithley 2000	4006367	2018-05-22	2019-05-21
Signal Generator	Rohde & Schwarz	SMR20	100047	2018-05-22	2019-05-21
Universal Tester	Rohde & Schwarz	CMU200	112012	2018-05-22	2019-05-21
Communications Test er	Rohde & Schwarz	CMW500	148650	2018-05-22	2019-05-21
Network Analyzer	HP	8753C	2901A00831	2018-05-22	2019-05-21
Directional Couplers	Agilent	778D	20160	2018-05-22	2019-05-21

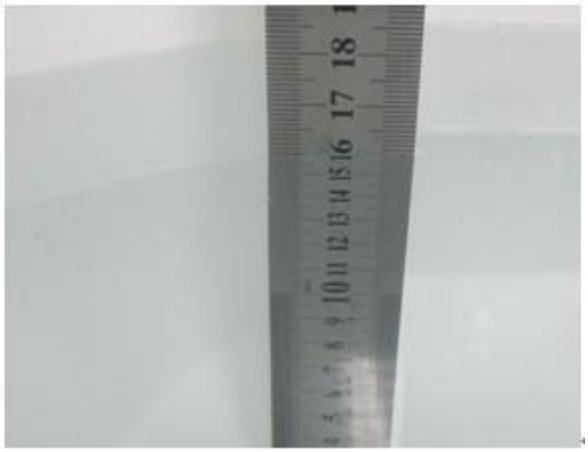
5. Tissue Simulating Liquids

5.1 Composition of Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with SMTIMO, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. Please see the following photos for the liquid height.



Liquid Height for Head SAR



Liquid Height for Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	Sugar (%)	HEC (%)	Preventol (%)	DGBE (%)
Head						
835	40.3	1.4	57.9	0.2	0.2	0
1800-1900	55.2	0.3	0	0	0	44.5
Body						
835	50.8	0.9	48.1	0.1	0.1	0
1800-1900	70.2	0.4	0	0	0	29.4

5.2 Tissue Dielectric Parameters for Head and Body Phantoms

The IEEE Std. 1528, FCC KDBs and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

Target Frequency (MHz)	**Head**		**Body**	
	Conductivity (σ)	**Permittivity** (ε_r)	**Conductivity** (σ)	**Permittivity** (ε_r)
150	0.76	52.3	0.80	61.9
300	0.87	45.3	0.92	58.2
450	0.87	43.5	0.94	56.7
750	0.89	41.9	0.96	55.5
835	**0.90**	**41.5**	**0.97**	**55.2**
900	0.97	41.5	1.05	55.0
915	0.98	41.5	1.06	55.0
1450	1.20	40.5	1.30	54.0
1610	1.29	40.3	1.40	53.8
1750	1.37	40.1	1.49	53.4
1800-2000	**1.40**	**40.0**	**1.52**	**53.3**
2450	1.80	39.2	1.95	52.7
3000	2.40	38.5	2.73	52.0
5200	4.66	36.0	5.30	49.0
5800	5.27	35.3	6.00	48.2

5.3 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using COMOSAR Dielectric Probe Kit and an Agilent Network Analyzer.

Calibration Result for Dielectric Parameters of Tissue Simulating Liquid

Head Tissue Simulating Liquid									
Freq. MHz.	Temp. (℃)	Conductivity			Permittivity			Limit (%)	Date
		Reading (σ)	Target (σ)	Delta (%)	Reading (ε r)	Target (ε r)	Delta (%)		
835	21.2	0.87	0.90	-3.33	41.11	41.50	-0.94	±5	2019-04-11
1900	21.3	1.38	1.40	-1.43	38.56	40.00	-3.60	±5	2019-04-12

Body Tissue Simulating Liquid									
Freq. MHz.	Temp. (℃)	Conductivity			Permittivity			Limit (%)	Date
		Reading (σ)	Target (σ)	Delta (%)	Reading (ε r)	Target (ε r)	Delta (%)		
835	21.2	0.95	0.97	-2.06	54.85	55.20	-0.63	±5	2019-04-11
1900	21.3	1.50	1.52	-1.32	52.42	53.30	-1.65	±5	2019-04-12

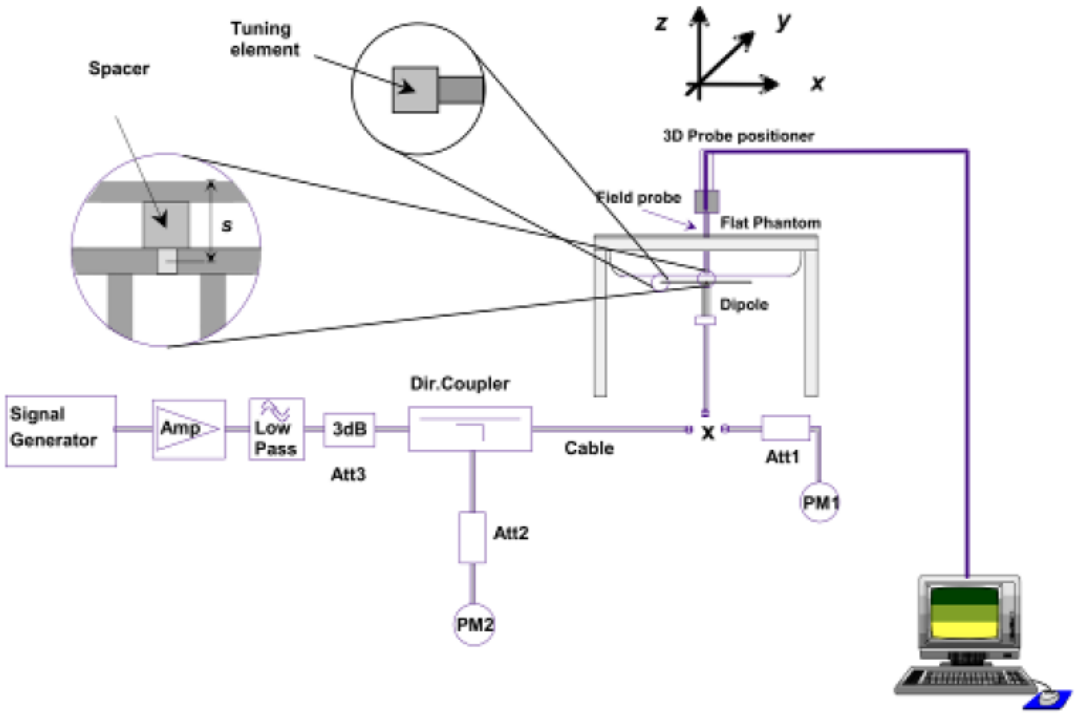
6. SAR Measurement Evaluation

6.1 Purpose of System Performance Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

6.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 835 MHz,1900MHz,. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom.



System Verification Setup Block Diagram

Setup Photo of Dipole Antenna

The output power on dipole port must be calibrated to 24dBm (250mW) before dipole is connected.

6.3 Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %. Table 6.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion.

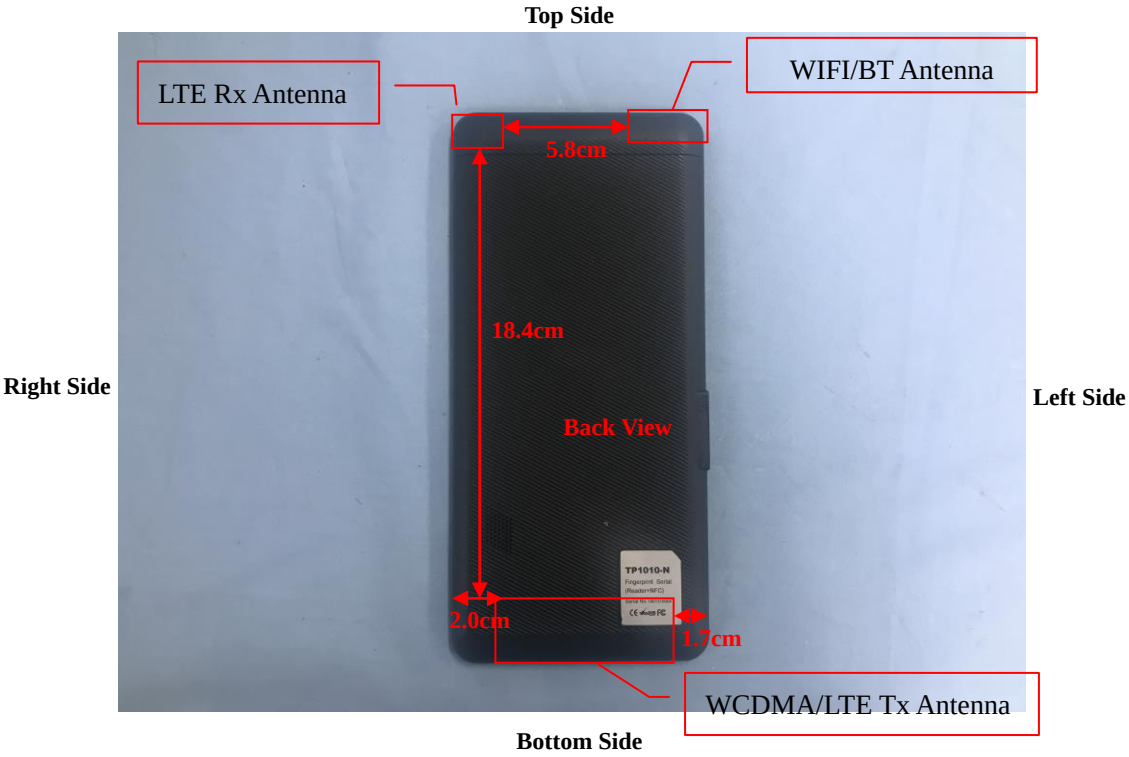
Frequency	Targeted SAR_{1g}	Measured SAR_{1g}	Normalized SAR_{1g}	Tolerance
MHz	(W/kg)	(W/kg)	(W/kg)	(%)
Head				
835	9.65	2.41	9.64	-0.10
1900	39.59	9.91	39.64	0.13
Body				
835	9.36	2.35	9.4	0.43
1900	39.01	9.78	39.12	0.28

Targeted and Measurement SAR

Please refer to Annex A for the plots of system performance check.

7. EUT Testing Position

7.1 EUT Antenna Position



7.2 EUT Testing Position

Exclusion Distance Calculation				
Frequency Bands	Service	Maximum Tune-up Power	Average Power	Exclusion Distance
WCDMA Band 5	RMC 12.2k	23.5dBm	23.5dBm	70mm
LTE_ Band 2	QPSK(20 MHz)	24.5dBm	24.5dBm	70mm
LTE_ Band 5	QPSK(10 MHz)	24.0dBm	24.0dBm	70mm
Note: Refer to Chapter 9.1 Conducted RF Output Power				

Remark:

1. Referring to KDB 447498 D01v06, the distance of the antennas to all adjacent edges SAR test exclusion for adjacent edges.

Body mode SAR assessments are required for this device. This EUT was tested in different positions for different SAR test modes, more information as below:

Head SAR tests				
Antennas	**Right Cheek**	**Left Cheek**	**Right Tilted**	**Left Tilted**
WWAN	Yes	Yes	Yes	Yes

Body SAR tests, Test distance: 0mm						
Antennas	**Front**	**Back**	**Right Side**	**Left Side**	**Top Side**	**Bottom**
WCDMA Band 5	Yes	Yes	Yes	Yes	No	Yes
LTE_ Band 2	Yes	Yes	Yes	Yes	No	Yes
LTE_ Band 5	Yes	Yes	Yes	Yes	No	Yes

Remark:

1. Referring to KDB 616217 D04 v01r02, KDB 248227 D01 v02r02 and KDB 447498 D01 v06, this device is overall diagonal dimension(>20cm) tablet, tested in direct contact (no gap) with flat phantom.

Please refer to Annex D for the EUT test setup photos.

8. SAR Measurement Procedures

8.1 Measurement Procedures

The measurement procedures are as follows:
(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
(b) Keep EUT to radiate maximum output power or 100% factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the EUT in the positions as Annex D demonstrates.
(e) Set scan area, grid size and other setting on the SATIMO software.
(f) Measure SAR results for the highest power channel on each testing position.
(g) Find out the largest SAR result on these testing positions of each band
(h) Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:
(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

8.2 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The SATIMO software includes all numerical procedures necessary to evaluate the spatial peak SAR value.
The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.
The entire evaluation of the spatial peak values is performed within the post-processing engine. The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

8.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

8.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.5 SAR Averaged Methods

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10g and 1 g requires a very fine resolution in the three dimensional scanned data array.

8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In SATIMO measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

9. SAR Test Result

9.1 Conducted RF Output Power

WCDMA - Average Power (dBm)								
Band	**WCDMA Band 5**							
Channel	**4132**	**4182**	**4233**	**Tune-up power (dBm)**				
Frequency (MHz)	**826.4**	**836.6**	**846.6**					
RMC 12.2k	23.11	22.99	23.04	23.5				
HSDPA Subtest-1	22.35	22.18	22.13	22.5				
HSDPA Subtest-2	22.31	22.14	22.11	22.5				
HSDPA Subtest-3	22.30	22.16	22.11	22.5				
HSDPA Subtest-4	22.34	22.15	22.11	22.5				
HSUPA Subtest-1	22.25	22.12	22.07	22.5				
HSUPA Subtest-2	22.22	22.08	22.05	22.5				
HSUPA Subtest-3	22.21	22.09	22.04	22.5				
HSUPA Subtest-4	22.23	22.09	22.04	22.5				
HSUPA Subtest-5	22.23	22.1	22.03	22.5				

Remark:

1. per KDB 941225 D01 v03, The 12.2kbps RMC mode was selected for SAR testing(the primary mode).

2. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤1/4 dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

FDD-LTE Band 2:

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.88	0
		1	3	24.05	0
		1	5	23.94	0
		3	0	22.93	0
		3	2	22.92	0
		3	3	22.97	0
		6	0	22.03	1
	MCH	1	0	24.31	0
		1	3	24.27	0
		1	5	24.25	0
		3	0	23.16	0
		3	2	23.19	0
		3	3	23.19	0
		6	0	22.31	1
	HCH	1	0	24.47	0
		1	3	24.34	0
		1	5	24.32	0
		3	0	23.14	0
		3	2	23.24	0
		3	3	23.15	0
		6	0	22.35	1
16QAM	LCH	1	0	23.15	1
		1	3	23.31	1
		1	5	23.21	1
		3	0	22.16	1
		3	2	22.18	1
		3	3	22.24	1
		6	0	21.48	2
	MCH	1	0	23.23	1
		1	3	23.4	1
		1	5	23.23	1
		3	0	23.17	1
		3	2	23.19	1
		3	3	23.2	1
		6	0	22.16	2
	HCH	1	0	22.83	1
		1	3	22.83	1
		1	5	22.73	1

		3	0	22.24	1
		3	2	22.09	1
		3	3	22.6	1
		6	0	21.52	2

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.81	0
		1	7	24	0
		1	14	23.96	0
		8	0	23.04	1
		8	4	23.07	1
		8	7	23.1	1
		15	0	23.03	1
	MCH	1	0	23.96	0
		1	7	23.99	0
		1	14	23.97	0
		8	0	23.29	1
		8	4	23.28	1
		8	7	23.26	1
		15	0	23.19	1
	HCH	1	0	24.4	0
		1	7	24.35	0
		1	14	24.17	0
		8	0	22.77	1
		8	4	22.73	1
		8	7	22.67	1
		15	0	22.74	1
16QAM	LCH	1	0	23	1
		1	7	23.19	1
		1	14	23.12	1
		8	0	22.02	2
		8	4	22.03	2
		8	7	22.05	2
		15	0	21.93	2
	MCH	1	0	23.36	1
		1	7	23.44	1
		1	14	23.28	1
		8	0	22.25	2
		8	4	22.2	2
		8	7	22.19	2
		15	0	22.16	2

	HCH	1	0	22.77	1
		1	7	22.71	1
		1	14	22.58	1
		8	0	21.58	2
		8	4	21.83	2
		8	7	21.79	2
		15	0	21.89	2

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	24.01	0
		1	12	23.8	0
		1	24	24.09	0
		12	0	23.01	1
		12	6	22.94	1
		12	13	23.06	1
		25	0	23.02	1
	MCH	1	0	23.91	0
		1	12	23.61	0
		1	24	23.83	0
		12	0	22.96	1
		12	6	22.84	1
		12	13	22.87	1
		25	0	22.86	1
	HCH	1	0	24.36	0
		1	12	24.15	0
		1	24	24.18	0
		12	0	23.16	1
		12	6	23.14	1
		12	13	23.12	1
		25	0	23.04	1
16QAM	LCH	1	0	23.12	1
		1	12	23.13	1
		1	24	23.31	1
		12	0	22.05	2
		12	6	22.09	2
		12	13	22.16	2
		25	0	22.03	2
	MCH	1	0	23.22	1
		1	12	22.93	1
		1	24	23.17	1
		12	0	22.15	2

		12	6	22.02	2
		12	13	22.08	2
		25	0	21.98	2
	HCH	1	0	22.8	1
		1	12	22.5	1
		1	24	22.56	1
		12	0	21.36	2
		12	6	21.65	2
		12	13	21.56	2
		25	0	21.59	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.53	0
		1	24	23.73	0
		1	49	23.71	0
		25	0	22.99	1
		25	12	23.05	1
		25	25	23.13	1
		50	0	23.07	1
	MCH	1	0	23.45	0
		1	24	23.48	0
		1	49	23.21	0
		25	0	22.84	1
		25	12	22.75	1
		25	25	22.71	1
		50	0	22.77	1
	HCH	1	0	23.59	0
		1	24	23.96	0
		1	49	23.71	0
		25	0	23.28	1
		25	12	23.33	1
		25	25	23.34	1
		50	0	23.28	1
16QAM	LCH	1	0	22.87	1
		1	24	23.11	1
		1	49	23.07	1
		25	0	22.03	2
		25	12	22.13	2
		25	25	22.2	2
		50	0	22.15	2
	MCH	1	0	22.91	1

		1	24	22.96	1
		1	49	22.68	1
		25	0	21.95	2
		25	12	21.89	2
		25	25	21.83	2
		50	0	21.91	2
	HCH	1	0	22.95	1
		1	24	23.33	1
		1	49	23.12	1
		25	0	22.39	2
		25	12	22.47	2
		25	25	22.47	2
		50	0	22.43	2

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.65	0
		1	37	23.8	0
		1	74	23.6	0
		37	0	22.97	1
		37	18	23.02	1
		37	38	22.99	1
		75	0	23.01	1
	MCH	1	0	23.66	0
		1	37	23.5	0
		1	74	23.18	0
		37	0	22.78	1
		37	18	22.67	1
		37	38	22.52	1
		75	0	22.63	1
	HCH	1	0	23.28	0
		1	37	23.76	0
		1	74	23.74	0
		37	0	22.86	1
		37	18	23.06	1
		37	38	23.17	1
		75	0	23	1
16QAM	LCH	1	0	22.99	1
		1	37	23.17	1
		1	74	22.99	1
		37	0	22.06	2
		37	18	22.13	2

		37	38	22.11	2
		75	0	22.11	2
	MCH	1	0	23.01	1
		1	37	22.82	1
		1	74	22.56	1
		37	0	21.89	2
		37	18	21.75	2
		37	38	21.66	2
		75	0	21.75	2
	HCH	1	0	22.65	1
		1	37	23.12	1
		1	74	23.14	1
		37	0	22	2
		37	18	22.19	2
		37	38	22.3	2
		75	0	22.16	2

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	24.47	0
		1	49	23.93	0
		1	99	23.43	0
		50	0	23.35	1
		50	25	23.04	1
		50	50	22.88	1
		100	0	23.15	1
	MCH	1	0	24.44	0
		1	49	23.44	0
		1	99	23.04	0
		50	0	22.97	1
		50	25	22.58	1
		50	50	22.81	1
		100	0	22.9	1
	HCH	1	0	23.2	0
		1	49	23.34	0
		1	99	23.63	0
		50	0	22.65	1
		50	25	22.86	1
		50	50	23.07	1
		100	0	22.86	1
16QAM	LCH	1	0	23.02	1
		1	49	23.19	1

		1	99	22.72	1
		50	0	22.12	2
		50	25	22.13	2
		50	50	21.96	2
		100	0	22.04	2
	MCH	1	0	23.13	1
		1	49	22.86	1
		1	99	22.46	1
		50	0	21.93	2
		50	25	21.74	2
		50	50	21.56	2
		100	0	21.7	2
	HCH	1	0	22.59	1
		1	49	22.73	1
		1	99	23.04	1
		50	0	21.8	2
		50	25	22.01	2
		50	50	22.21	2
		100	0	22.02	2

FDD-LTE Band 5:

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.39	0
		1	3	23.57	0
		1	5	23.36	0
		3	0	22.49	0
		3	2	22.42	0
		3	3	22.48	0
		6	0	22.42	1
	MCH	1	0	23.06	0
		1	3	23.14	0
		1	5	22.99	0
		3	0	22.6	0
		3	2	22.62	0
		3	3	22.62	0
		6	0	22.05	1
	HCH	1	0	22.91	0
		1	3	23.02	0
		1	5	22.92	0
		3	0	22.52	0
		3	2	22.52	0
		3	3	22.54	0
		6	0	21.85	1
16QAM	LCH	1	0	22.85	1
		1	3	22.91	1
		1	5	22.78	1
		3	0	21.51	1
		3	2	21.45	1
		3	3	21.56	1
		6	0	21.12	2
	MCH	1	0	22.35	1
		1	3	22.52	1
		1	5	22.31	1
		3	0	21.78	1
		3	2	21.77	1
		3	3	21.79	1
		6	0	21.08	2
	HCH	1	0	22.15	1
		1	3	22.42	1

		1	5	22.16	1
		3	0	21.53	1
		3	2	21.52	1
		3	3	21.57	1
		6	0	21.07	2

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.32	0
		1	7	23.49	0
		1	14	23.26	0
		8	0	22.47	1
		8	4	22.44	1
		8	7	22.43	1
		15	0	22.46	1
	MCH	1	0	23.09	0
		1	7	23.19	0
		1	14	22.97	0
		8	0	22.16	1
		8	4	22.1	1
		8	7	22.08	1
		15	0	22.09	1
	HCH	1	0	22.91	0
		1	7	23.07	0
		1	14	22.87	0
		8	0	21.93	1
		8	4	21.89	1
		8	7	21.89	1
		15	0	21.93	1
16QAM	LCH	1	0	22.65	1
		1	7	22.79	1
		1	14	22.51	1
		8	0	21.56	2
		8	4	21.54	2
		8	7	21.5	2
		15	0	21.48	2
	MCH	1	0	22.53	1
		1	7	22.6	1
		1	14	22.4	1
		8	0	21.19	2
		8	4	21.14	2
		8	7	21.13	2

		15	0	21.14	2
	HCH	1	0	22.15	1
		1	7	22.28	1
		1	14	22.12	1
		8	0	20.94	2
		8	4	20.91	2
		8	7	20.9	2
		15	0	21	2

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.5	0
		1	12	23.56	0
		1	24	23.33	0
		12	0	22.49	1
		12	6	22.46	1
		12	13	22.42	1
		25	0	22.4	1
	MCH	1	0	23.23	0
		1	12	23.32	0
		1	24	23.02	0
		12	0	22.22	1
		12	6	22.18	1
		12	13	22.13	1
		25	0	22.14	1
	HCH	1	0	23.07	0
		1	12	23.21	0
		1	24	22.97	0
		12	0	22.02	1
		12	6	21.98	1
		12	13	21.96	1
		25	0	21.94	1
16QAM	LCH	1	0	22.78	1
		1	12	22.86	1
		1	24	22.55	1
		12	0	21.59	2
		12	6	21.53	2
		12	13	21.49	2
		25	0	21.47	2
	MCH	1	0	22.53	1
		1	12	22.57	1
		1	24	22.32	1

		12	0	21.39	2
		12	6	21.36	2
		12	13	21.27	2
		25	0	21.21	2
	HCH	1	0	22.17	1
		1	12	22.39	1
		1	24	22.15	1
		12	0	21.06	2
		12	6	21	2
		12	13	21.02	2
		25	0	21.03	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.58	0
		1	24	23.33	0
		1	49	23.14	0
		25	0	22.64	1
		25	12	22.39	1
		25	25	22.32	1
		50	0	22.59	1
	MCH	1	0	23.49	0
		1	24	23.11	0
		1	49	23	0
		25	0	22.52	1
		25	12	22.18	1
		25	25	22.18	1
		50	0	22.17	1
	HCH	1	0	23.14	0
		1	24	23	0
		1	49	22.97	0
		25	0	22.46	1
		25	12	22.18	1
		25	25	22.17	1
		50	0	22.01	1
16QAM	LCH	1	0	22.76	1
		1	24	22.57	1
		1	49	22.47	1
		25	0	21.49	2
		25	12	21.44	2
		25	25	21.37	2
		50	0	21.44	2

	MCH	1	0	22.69	1
		1	24	22.58	1
		1	49	22.4	1
		25	0	21.32	2
		25	12	21.26	2
		25	25	21.16	2
		50	0	21.26	2
	HCH	1	0	22.36	1
		1	24	22.21	1
		1	49	22.22	1
		25	0	21.07	2
		25	12	21.05	2
		25	25	21.03	2
		50	0	21.1	2

Remark:

1. Per KDB941225 D05 v02r05, Start with the largest channel bandwidth then measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle, and lower edge of each required test channel. When the reported SAR is≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. 6 When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2. Per KDB941225 D05 v02r05, The procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.
3. Per KDB941225 D05 v02r05, 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 1 RB allocations, and the highest reported SAR for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB941225 D05 v02r05, For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in 5.2.1, 5.2.2, and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

WLAN(2.4G) - Maximum Average Power				
Test Mode	**Data Rate**	**Channel**	**Frequency (MHz)**	**Average Power (dBm)**
802.11b	1Mbps	CH 01	2412	8.62
		CH 06	2437	8.55
		CH 11	2462	8.17
802.11g	6Mbps	CH 01	2412	7.65
		CH 06	2437	7.52
		CH 11	2462	7.41
802.11n (20MHz)	MCS0	CH 01	2412	6.84
		CH 06	2437	6.53
		CH 11	2462	6.47
802.11n (40MHz)	MCS0	CH 03	2422	6.34
		CH 06	2437	6.17
		CH 09	2452	6.66

Remark:

WLAN maximum output power is 8.62dBm, and Tune-Up output power is 9.0dBm. Per KDB 447498 D01 V06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,16 where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation17
- The result is rounded to one decimal place for comparison

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	Result	Limit
9.0	7.94	5	2.412	2.47	3

The exclusion thresholds is 2.47< 3, therefore, the RF exposure evaluation is not required.

Bluetooth - Maximum Average Power		
Test Mode	**Data Rate**	**Average Power(dBm)**
GFSK	1Mbps	-2.664
Pi/4 QDPSK	2Mbps	-2.572
8DPSK	3Mbps	-2.477

Remark:

Bluetooth maximum output power is-2.477dBm, and Tune-Up output power is -2.0dBm. Per KDB 447498 D01 V06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,16 where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation17
- The result is rounded to one decimal place for comparison

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	Result	Limit
-2.0	0.63	5	2.480	0.20	3

The exclusion thresholds is 0.20< 3, therefore, the RF exposure evaluation is not required.

9.2 Test Results for Standalone SAR Test

Head SAR

WCDMA Band 5 – Head SAR Test									
Plot No.	Mode	Test Position Head	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
1.	RMC	Right Cheek	4132	826.4	23.11	23.5	1.094	0.019	0.021
2.	RMC	Right Tilted	4132	826.4	23.11	23.5	1.094	0.016	0.018
3.	RMC	Left Cheek	4132	826.4	23.11	23.5	1.094	0.029	0.032
4.	RMC	Left Tilted	4132	826.4	23.11	23.5	1.094	0.021	0.023

LTE Band 2– Head SAR Test								
Plot No.	Mode	Test Position Head	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
5.	QPSK 20MHz 1RB	Right Cheek	1860.0	24.47	24.5	1.007	0.023	0.023
6.	QPSK 20MHz 1RB	Right Tilted	1860.0	24.47	24.5	1.007	0.018	0.018
7.	QPSK 20MHz 1RB	Left Cheek	1860.0	24.47	24.5	1.007	0.049	0.049
8.	QPSK 20MHz 1RB	Left Tilted	1860.0	24.47	24.5	1.007	0.037	0.037
9.	QPSK 20MHz 50%RB	Right Cheek	1860.0	23.35	23.5	1.035	0.019	0.020
10.	QPSK 20MHz 50%RB	Right Tilted	1860.0	23.35	23.5	1.035	0.015	0.016
11.	QPSK 20MHz 50%RB	Left Cheek	1860.0	23.35	23.5	1.035	0.038	0.039
12.	QPSK 20MHz 50%RB	Left Tilted	1860.0	23.35	23.5	1.035	0.027	0.028

LTE Band 5– Head SAR Test								
Plot No.	Mode	Test Position Head	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
13.	QPSK 10MHz 1RB	Right Cheek	829.0	23.58	24.0	1.102	0.014	0.015
14.	QPSK 10MHz 1RB	Right Tilted	829.0	23.58	24.0	1.102	0.012	0.013
15.	QPSK 10MHz 1RB	Left Cheek	829.0	23.58	24.0	1.102	0.02	0.022
16.	QPSK 10MHz 1RB	Left Tilted	829.0	23.58	24.0	1.102	0.015	0.017
17.	QPSK 10MHz 50%RB	Right Cheek	829.0	22.64	23.0	1.086	0.013	0.014
18.	QPSK 10MHz 50%RB	Right Tilted	829.0	22.64	23.0	1.086	0.01	0.011
19.	QPSK 10MHz 50%RB	Left Cheek	829.0	22.64	23.0	1.086	0.018	0.020
20.	QPSK 10MHz 50%RB	Left Tilted	829.0	22.64	23.0	1.086	0.011	0.012

Body SAR

WCDMA Band 5 – Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
21.	RMC 12.2k	Back Side	4132	826.4	23.11	23.5	1.094	0.700	0.766
22.	RMC 12.2k	Front Side	4132	826.4	23.11	23.5	1.094	0.335	0.366
23.	RMC 12.2k	Right side	4132	826.4	23.11	23.5	1.094	0.150	0.164
24.	RMC 12.2k	Left side	4132	826.4	23.11	23.5	1.094	0.187	0.205
25.	RMC 12.2k	Bottom side	4132	826.4	23.11	23.5	1.094	0.398	0.435

LTE Band 2–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position Body	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth		MHz					
26.	QPSK 20MHz 1RB	Back Side	1860.0	24.47	24.5	1.007	0.709	0.714
27.	QPSK 20MHz 1RB	Front Side	1860.0	24.47	24.5	1.007	0.407	0.410
28.	QPSK 20MHz 1RB	Right Side	1860.0	24.47	24.5	1.007	0.203	0.204
29.	QPSK 20MHz 1RB	Left Side	1860.0	24.47	24.5	1.007	0.251	0.253
30.	QPSK 20MHz 1RB	Bottom side	1860.0	24.47	24.5	1.007	0.529	0.533
31.	QPSK 20MHz 50%RB	Back Side	1860.0	23.35	23.5	1.035	0.571	0.591
32.	QPSK 20MHz 50%RB	Front side	1860.0	23.35	23.5	1.035	0.311	0.322
33.	QPSK 20MHz 50%RB	Right side	1860.0	23.35	23.5	1.035	0.161	0.167
34.	QPSK 20MHz 50%RB	Left Side	1860.0	23.35	23.5	1.035	0.211	0.218
35.	QPSK 20MHz 50%RB	Bottom side	1860.0	23.35	23.5	1.035	0.425	0.440

LTE Band 5–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position Body	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
36.	QPSK 10MHz 1RB	Back Side	829.0	23.58	24.0	1.102	0.501	0.552
37.	QPSK 10MHz 1RB	Front side	829.0	23.58	24.0	1.102	0.284	0.313
38.	QPSK 10MHz 1RB	Right side	829.0	23.58	24.0	1.102	0.132	0.145
39.	QPSK 10MHz 1RB	Left side	829.0	23.58	24.0	1.102	0.166	0.183
40.	QPSK 10MHz 1RB	Bottom side	829.0	23.58	24.0	1.102	0.345	0.380
41.	QPSK 10MHz 50%RB	Back Side	829.0	22.64	23.0	1.086	0.413	0.449
42.	QPSK 10MHz 50%RB	Front side	829.0	22.64	23.0	1.086	0.172	0.187
43.	QPSK 10MHz 50%RB	Right side	829.0	22.64	23.0	1.086	0.101	0.110
44.	QPSK 10MHz 50%RB	Left side	829.0	22.64	23.0	1.086	0.126	0.137
45.	QPSK 10MHz 50%RB	Bottom side	829.0	22.64	23.0	1.086	0.245	0.266

Remark: Per KDB 447498 D01 v06 , if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

9.3 Simultaneous Multi-band Transmission SAR Analysis

List of Mode for Simultaneous Multi-band Transmission

No.	Configurations	Head SAR	Body
1	WCDMA (Voice/Data)+ WLAN(Data)	Yes	Yes
2	LTE(Data) + WLAN(Data)	Yes	Yes
3	WCDMA (Voice/Data) + Bluetooth(Data)	Yes	Yes
4	LTE(Data) + Bluetooth(Data)	Yes	Yes

Remark:

1. WCDMA and LTE share the same antenna, and cannot transmit simultaneously.
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. According to the KDB 447498 D01v06, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;

where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

For simultaneous transmission analysis, WLAN/ Bluetooth SAR is estimated per KDB 447498 D01v06 as below:

WLAN:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g) 5mm
9.0	7.94	5	2.412	7.5	0.329

Bluetooth:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g) 5mm
-2.0	0.63	5	2.480	7.5	0.026

4. The maximum SAR summation is calculated based on the same configuration and test position.

Head SAR

WWAN and WLAN

	WWAN		WLAN	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Right Cheek	WCDMA Band 5	0.021	0.329	0.35
Right Tilted	WCDMA Band 5	0.018	0.329	0.347
Left Cheek	WCDMA Band 5	0.032	0.329	0.361
Left Tilted	WCDMA Band 5	0.023	0.329	0.352
Right Cheek	LTE Band 2	0.023	0.329	0.352
Right Tilted	LTE Band 2	0.018	0.329	0.347
Left Cheek	LTE Band 2	0.049	0.329	**0.378**
Left Tilted	LTE Band 2	0.037	0.329	0.366
Right Cheek	LTE Band 5	0.015	0.329	0.344
Right Tilted	LTE Band 5	0.013	0.329	0.342
Left Cheek	LTE Band 5	0.022	0.329	0.351
Left Tilted	LTE Band 5	0.017	0.329	0.346

WWAN and Bluetooth

	WWAN		Bluetooth	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Right Cheek	WCDMA Band 5	0.021	0.026	0.047
Right Tilted	WCDMA Band 5	0.018	0.026	0.044
Left Cheek	WCDMA Band 5	0.032	0.026	0.058
Left Tilted	WCDMA Band 5	0.023	0.026	0.049
Right Cheek	LTE Band 2	0.023	0.026	0.049
Right Tilted	LTE Band 2	0.018	0.026	0.044
Left Cheek	LTE Band 2	0.049	0.026	**0.075**
Left Tilted	LTE Band 2	0.037	0.026	0.063
Right Cheek	LTE Band 5	0.015	0.026	0.041
Right Tilted	LTE Band 5	0.013	0.026	0.039
Left Cheek	LTE Band 5	0.022	0.026	0.048
Left Tilted	LTE Band 5	0.017	0.026	0.043

Body SAR

WWAN and WLAN

	WWAN		WLAN(2.4G)	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back Side	WCDMA Band 5	0.766	0.329	**1.095**
Front Side	WCDMA Band 5	0.366	0.329	0.695
Right side	WCDMA Band 5	0.164	0.329	0.493
Left side	WCDMA Band 5	0.205	0.329	0.534
Bottom side	WCDMA Band 5	0.435	0.329	0.764
Top side	WCDMA Band 5	--	0.329	0.329
Back Side	LTE Band 2	0.714	0.329	1.043
Front Side	LTE Band 2	0.410	0.329	0.739
Right side	LTE Band 2	0.204	0.329	0.533
Left side	LTE Band 2	0.253	0.329	0.582
Bottom side	LTE Band 2	0.533	0.329	0.862
Top side	LTE Band 2	--	0.329	0.329
Back Side	LTE Band 5	0.552	0.329	0.881
Front Side	LTE Band 5	0.313	0.329	0.642
Right side	LTE Band 5	0.145	0.329	0.474
Left side	LTE Band 5	0.183	0.329	0.512
Bottom side	LTE Band 5	0.380	0.329	0.709
Top side	LTE Band 5	--	0.329	0.329

WLAN and Bluetooth

	WWAN		Bluetooth	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back Side	WCDMA Band 5	0.766	0.026	**0.792**
Front Side	WCDMA Band 5	0.366	0.026	0.392
Right side	WCDMA Band 5	0.164	0.026	0.19
Left side	WCDMA Band 5	0.205	0.026	0.231
Bottom side	WCDMA Band 5	0.435	0.026	0.461
Top side	WCDMA Band 5	--	0.026	0.026
Back Side	LTE Band 2	0.714	0.026	0.74
Front Side	LTE Band 2	0.410	0.026	0.436
Right side	LTE Band 2	0.204	0.026	0.23
Left side	LTE Band 2	0.253	0.026	0.279
Bottom side	LTE Band 2	0.533	0.026	0.559
Top side	LTE Band 2	--	0.026	0.026
Back Side	LTE Band 5	0.552	0.026	0.578
Front Side	LTE Band 5	0.313	0.026	0.339
Right side	LTE Band 5	0.145	0.026	0.171
Left side	LTE Band 5	0.183	0.026	0.209
Bottom side	LTE Band 5	0.380	0.026	0.406
Top side	LTE Band 5	--	0.026	0.026

10. Measurement Uncertainty

10.1 Uncertainty for EUT SAR Test

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N		1	1	7.00	7.00	
Axial Isotropy	E.2.2	2.5	R		(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	
Hemispherical Isotropy	E.2.2	4.0	R		(Cp)^1/2	(Cp)^1/2	1.63	1.63	
Boundary effect	E.2.3	1.0	R		1	1	0.58	0.58	
Linearity	E.2.4	5.0	R		1	1	2.89	2.89	
System detection limits	E.2.5	1.0	R		1	1	0.58	0.58	
Readout Electronics	E.2.6	0.02	N		1	1	0.02	0.02	
Reponse Time	E.2.7	3.0	R		1	1	1.73	1.73	
Integration Time	E.2.8	2.0	R		1	1	1.15	1.15	
RF ambient Conditions – Noise	E.6.1	3.0	R		1	1	1.73	1.73	
RF ambient Conditions - Reflections	E.6.1	3.0	R		1	1	1.73	1.73	
Probe positioner Mechanical Tolerance	E.6.2	2.0	R		1	1	1.15	1.15	
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R		1	1	0.03	0.03	
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5	5.0	R		1	1	2.89	2.89	
Test Sample Related									
Test sample positioning	E.4.2	0.03	N		1	1	0.03	0.03	
Device Holder Uncertainty	E.4.1	5.00	N		1	1	5.00	5.00	
Output power Variation - SAR drift measurement	E.2.9	12.02	R		1	1	6.94	6.94	
SAR scaling	E6.5	0.0	R		1	1	0.0	0.0	
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R		1	1	0.03	0.03	
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	1.9	R		1	0.84	1.10	0.90	

Liquid conductivity - deviation from target value	E.3.2	5.00	R		0.64	0.43	1.85	1.24	
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N		0.64	0.43	3.20	2.15	
Liquid permittivity - deviation from target value	E.3.2	0.37	R		0.6	0.49	0.13	0.10	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N		0.6	0.49	6.00	4.90	
Combined Standard Uncertainty			RSS				12.98	12.53	
Expanded Uncertainty (95% Confidence interval)			K=2				25.32	24.43	

10.2 Uncertainty for System Performance Check

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N		1	1	7.00	7.00	
Axial Isotropy	E.2.2	2.5	R		(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	
Hemispherical Isotropy	E.2.2	4.0	R		(Cp)^1/2	(Cp)^1/2	1.63	1.63	
Boundary effect	E.2.3	1.0	R		1	1	0.58	0.58	
Linearity	E.2.4	5.0	R		1	1	2.89	2.89	
System detection limits	E.2.5	1.0	R		1	1	0.58	0.58	
Modulation response	E.2.5	0	R		0	0	0.0	0.0	
Readout Electronics	E.2.6	0.02	N		1	1	0.02	0.02	
Reponse Time	E.2.7	3.0	R		1	1	1.73	1.73	
Integration Time	E.2.8	2.0	R		1	1	1.15	1.15	
RF ambient Conditions – Noise	E.6.1	3.0	R		1	1	1.73	1.73	
RF ambient Conditions - Reflections	E.6.1	3.0	R		1	1	1.73	1.73	
Probe positioner Mechanical Tolerance	E.6.2	2.0	R		1	1	1.15	1.15	
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R		1	1	0.03	0.03	
Extrapolation, interpolation and	E.5.2	5.0	R		1	1	2.89	2.89	

integration Algoritms for Max. SAR Evaluation									
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N		1	1	0.58	0.58	
Input power and SAR drift measurement	8,6.6.2	12.02	R		1	1	6.94	6.94	
Deviation of experimental dipole from numerical dipole	E.6.4	5.5	R		1	1	3.20	3.20	
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R		1	1	0.03	0.03	
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	2.0	R		1	0.84	1.10	1.10	
Liquid conductivity - deviation from target value	E.3.2	5.00	R		0.64	0.43	1.85	1.24	
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N		0.64	0.43	3.20	2.15	
Liquid permittivity - deviation from target value	E.3.2	0.37	R		0.6	0.49	0.13	0.10	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N		0.6	0.49	6.00	4.90	
Combined Standard Uncertainty			RSS				12.00	11.50	
Expanded Uncertainty (95% Confidence interval)			K=2				23.39	22.43	

Annex A. Plots of System Performance Check

MEASUREMENT 1

For Head Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 04/11/2019

Measurement duration: 7 minutes 21 seconds

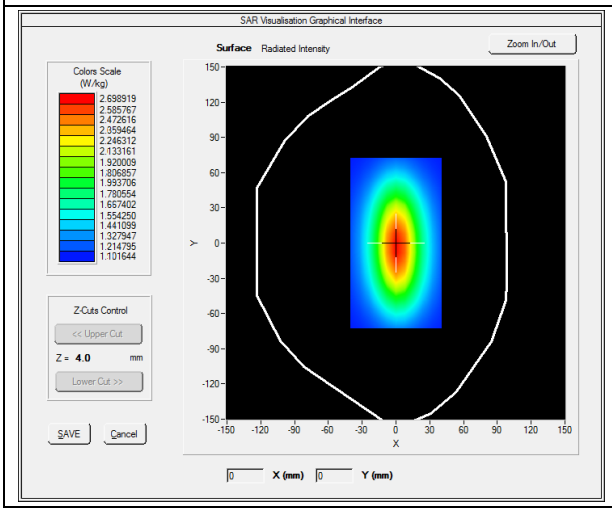
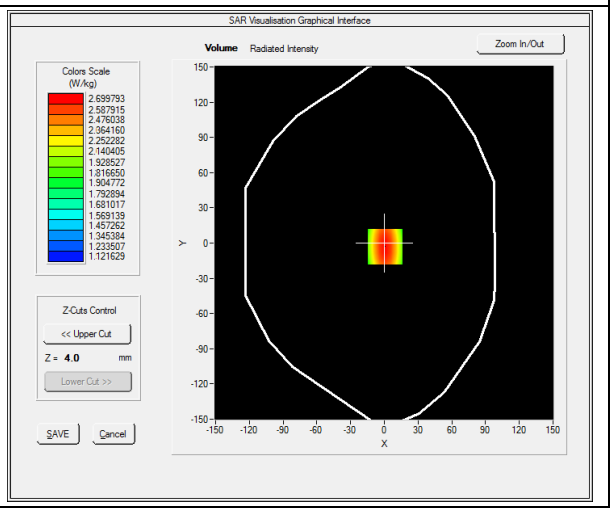
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.93; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	835.000000
Relative Permittivity (real part)	41.110245
Conductivity (S/m)	0.871245
Power Variation (%)	0.038437
Ambient Temperature	21.1
Liquid Temperature	21.3

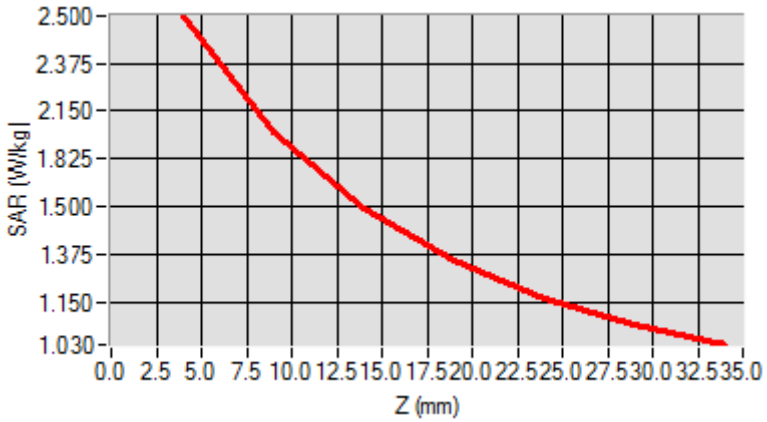
SURFACE SAR	VOLUME SAR
	

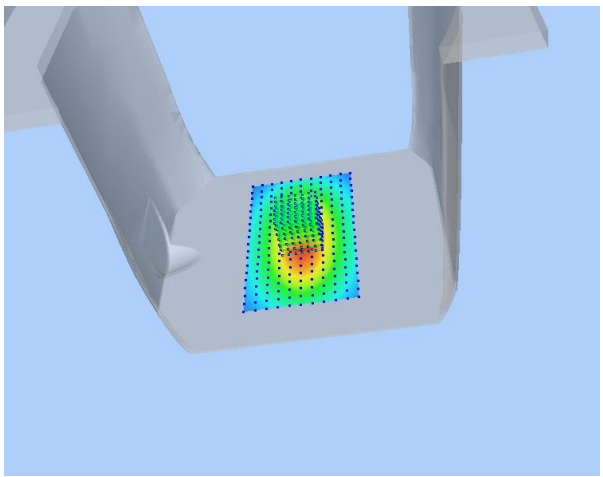
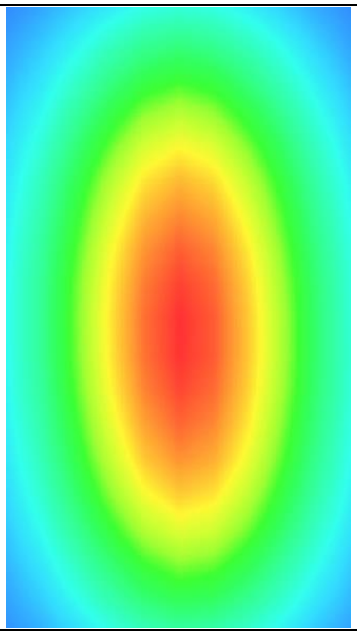
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.129489
SAR 1g (W/Kg)	2.411253

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.4900	1.8942	1.4811	1.3541	1.1123	1.0539



3D screen shot	Hot spot position
	

MEASUREMENT 2

For Head Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 04/12/2019

Measurement duration: 12 minutes 21 seconds

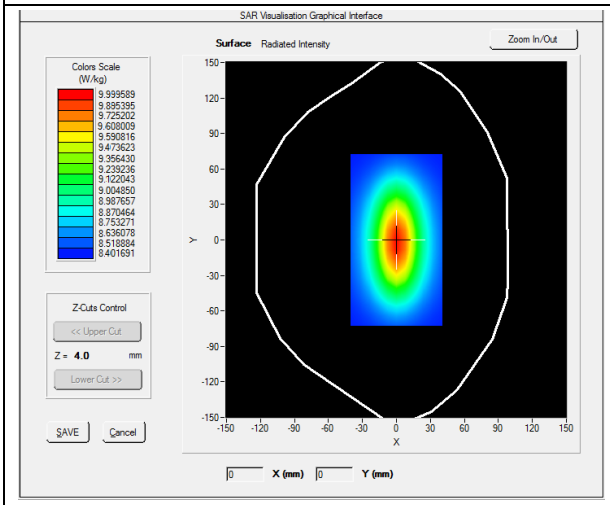
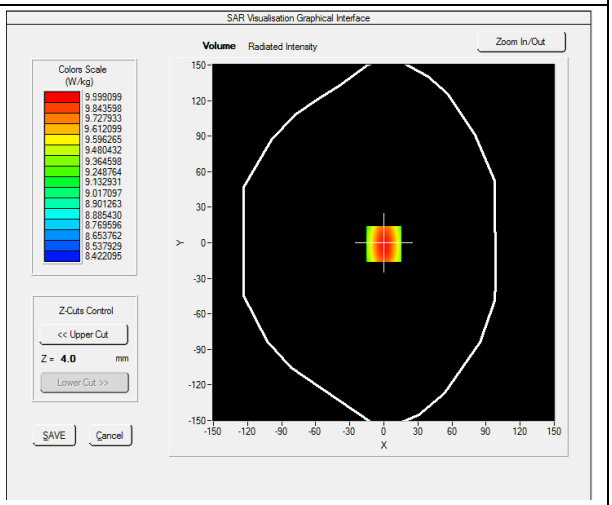
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.35; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1900.000000
Relative Permittivity (real part)	38.560124
Conductivity (S/m)	1.380369
Power Variation (%)	1.022540
Ambient Temperature	21.1
Liquid Temperature	21.3

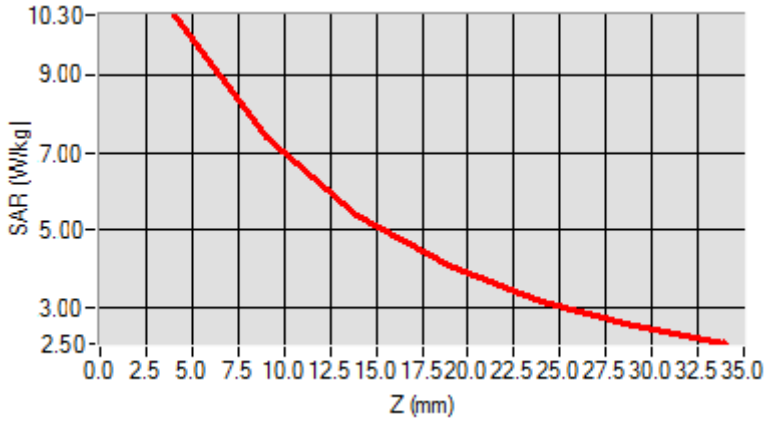
SURFACE SAR	VOLUME SAR
	

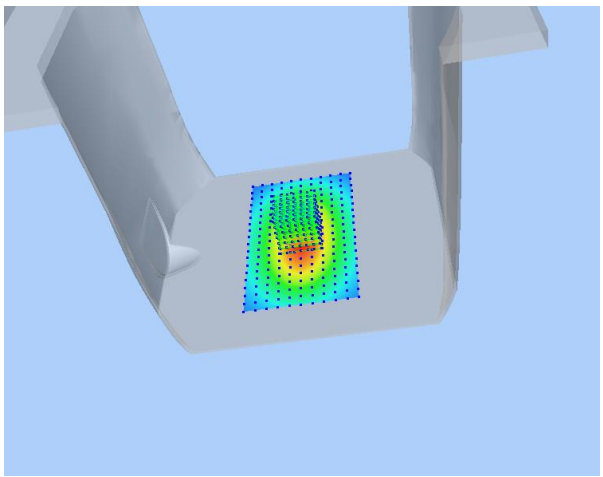
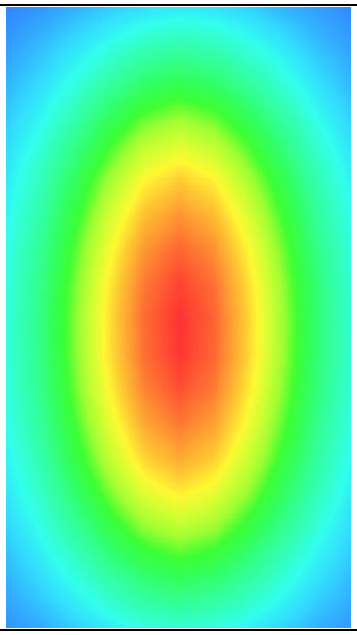
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	7.174526
SAR 1g (W/Kg)	9.913214

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.2354	6.8400	5.0121	4.1189	3.0522	2.8424



3D screen shot	Hot spot position
	

MEASUREMENT 3

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 04/11/2019

Measurement duration: 12 minutes 21 seconds

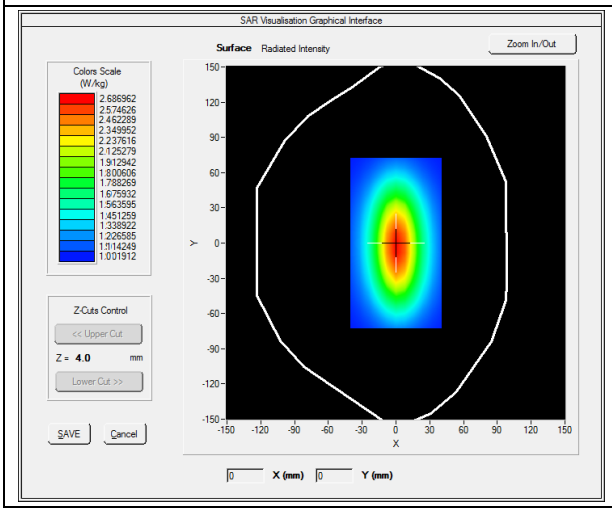
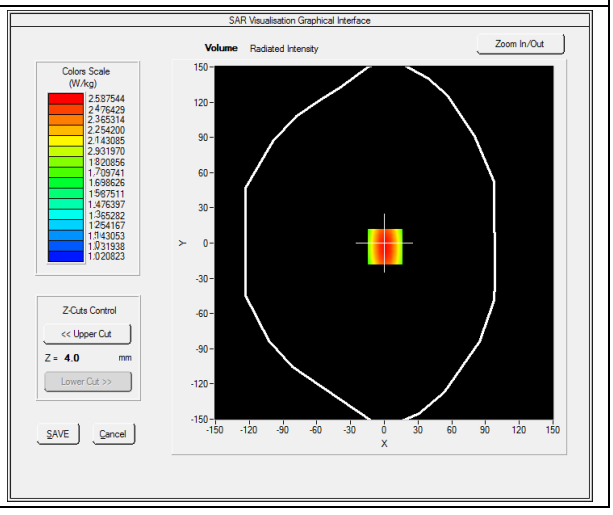
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	835.000000
Relative Permittivity (real part)	54.851214
Conductivity (S/m)	0.951454
Power Variation (%)	0.901472
Ambient Temperature	21.1
Liquid Temperature	21.3

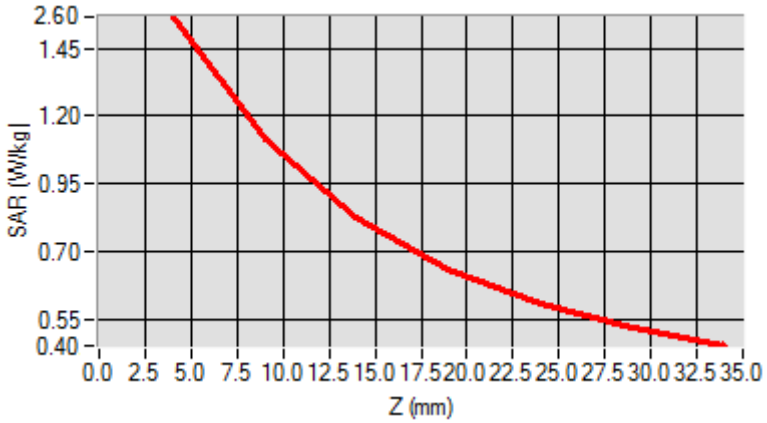
SURFACE SAR	VOLUME SAR
	

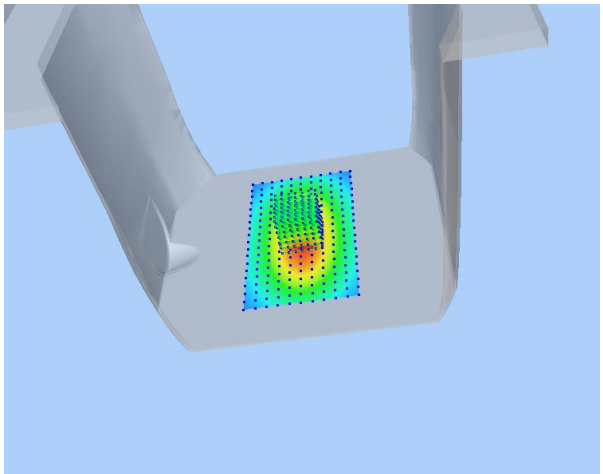
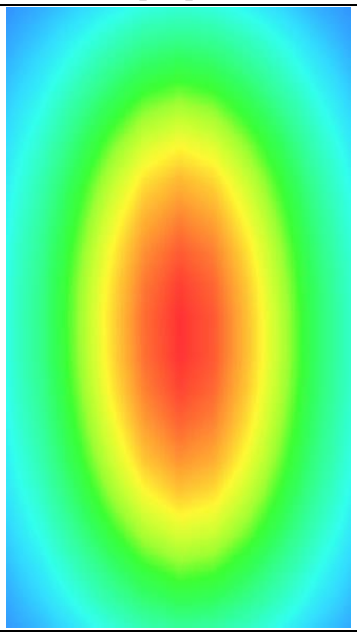
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.028956
SAR 1g (W/Kg)	2.354211

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.5789	1.1300	0.8795	0.5940	0.5011	0.5100



3D screen shot	Hot spot position
	

MEASUREMENT 4

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 04/12/2019

Measurement duration: 12 minutes 21 seconds

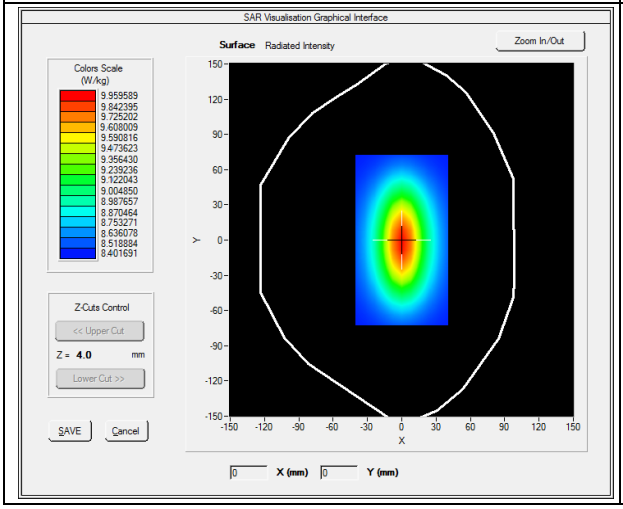
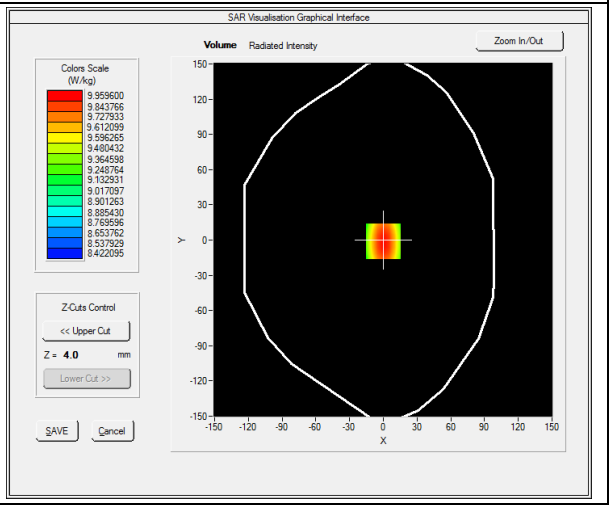
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1900.000000
Relative Permittivity (real part)	52.420415
Conductivity (S/m)	1.501966
Power Variation (%)	0.541872
Ambient Temperature	21.1
Liquid Temperature	21.3

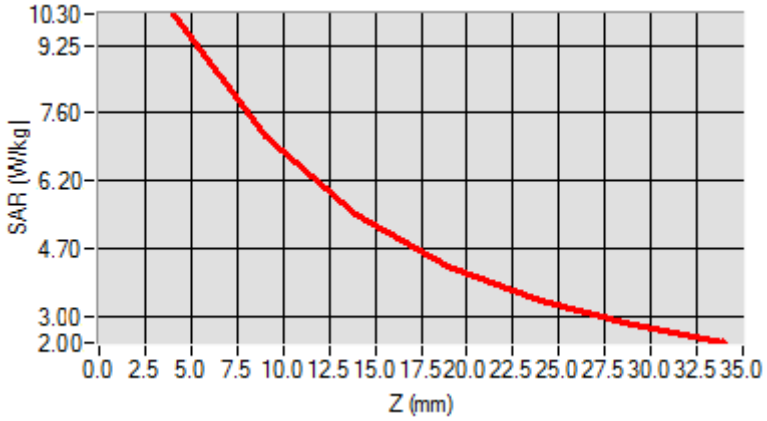
SURFACE SAR	VOLUME SAR
	

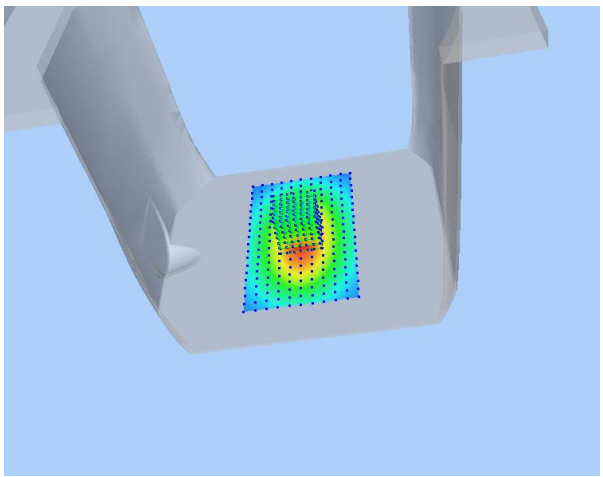
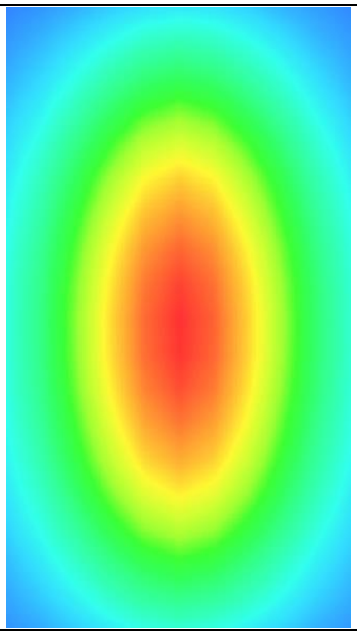
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	5.134651
SAR 1g (W/Kg)	9.781550

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.2031	6.43001	4.9011	4.5325	3.1201	2.5024



3D screen shot	Hot spot position
	

Annex B. Plots of SAR Measurement

BAND	PARAMETERS
WCDMA850_RMC	Measurement 3:Left Head with Cheek device position on Low Channel in WCDMA mode
LTE Band 2	Measurement 7: Left Head with Cheek device position on Low Channel in LTE mode
LTE Band 5	Measurement 15: Left Head with Cheek device position on Low Channel in LTE mode
WCDMA850_RMC	Measurement 21: Flat Plane with Back device position on Low Channel in WCDMA mode
LTE Band 2	Measurement 26: Flat Plane with Back device position on Low Channel in LTE mode
LTE Band 5	Measurement 36: Flat Plane with Back device position on Low Channel in LTE mode
Remark: SAR plot is showed the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.	

MEASUREMENT 3

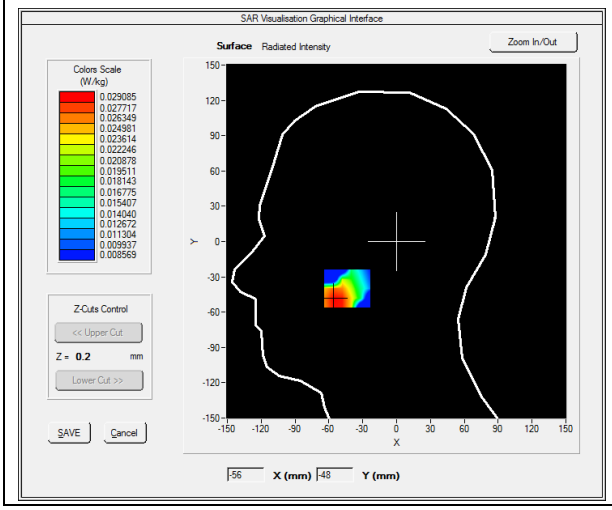
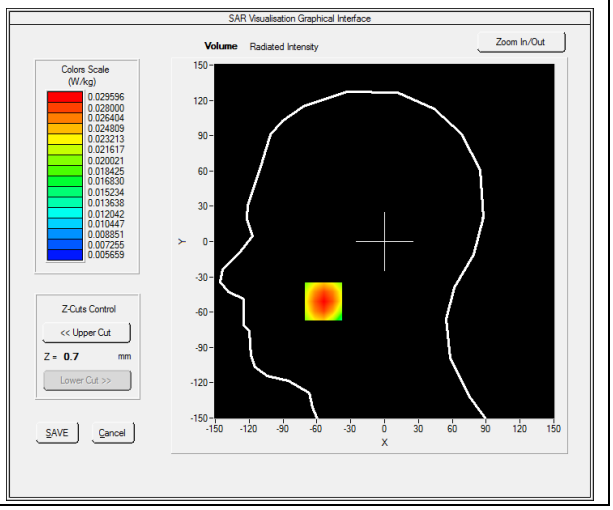
Type: Phone measurement (Complete)
Date of measurement: 04/11/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.93; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	WCDMA850_RMC
Channels	Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	826.400000
Relative Permittivity (real part)	41.110245
Conductivity (S/m)	0.871245
Power Variation (%)	1.342427
Ambient Temperature	21.1
Liquid Temperature	21.3

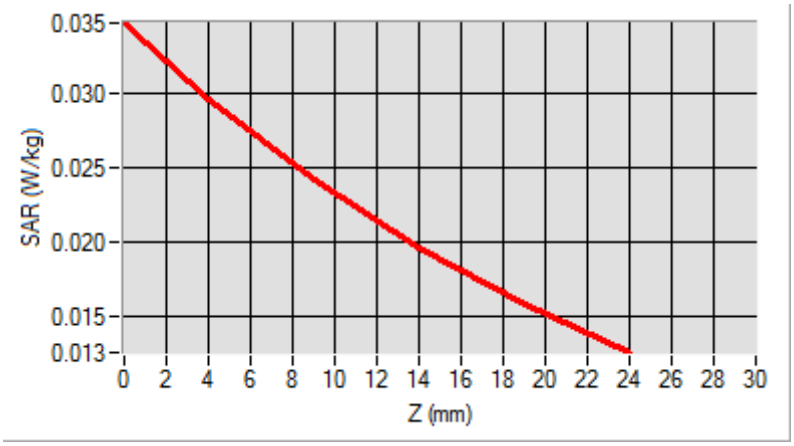
SURFACE SAR	VOLUME SAR
	

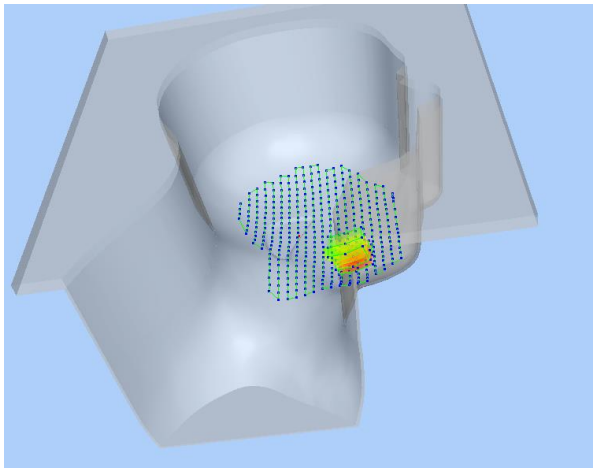
Maximum location: X=-54.00, Y=-51.00

SAR Peak: 0.03 W/kg

SAR 10g (W/Kg)	0.021612
SAR 1g (W/Kg)	0.028522

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0347	0.0296	0.0241	0.0196	0.0158



3D screen shot	Hot spot position
	

MEASUREMENT 7

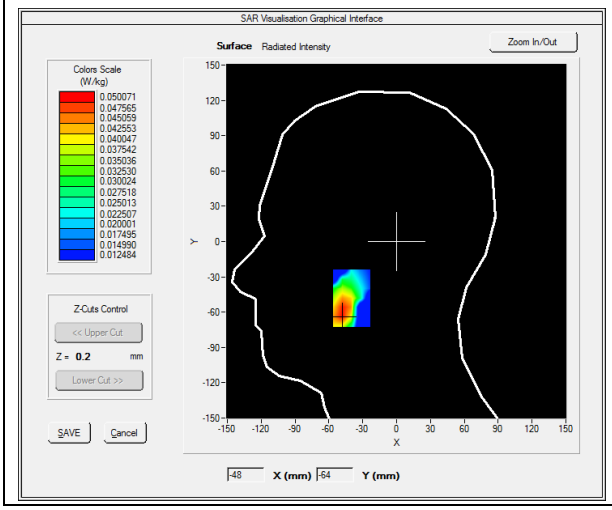
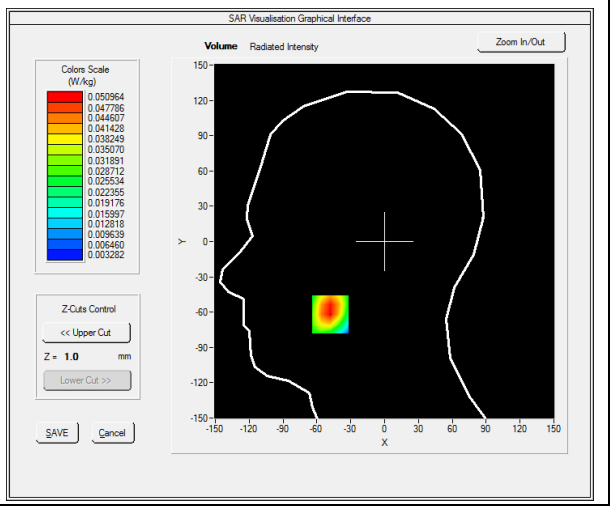
Type: Phone measurement (Complete)
Date of measurement: 04/12/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.35; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE Band 2
Channels	QPSK, 20MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1860.000000
Relative Permittivity (real part)	38.560124
Conductivity (S/m)	1.380369
Power Variation (%)	1.743564
Ambient Temperature	21.1
Liquid Temperature	21.3

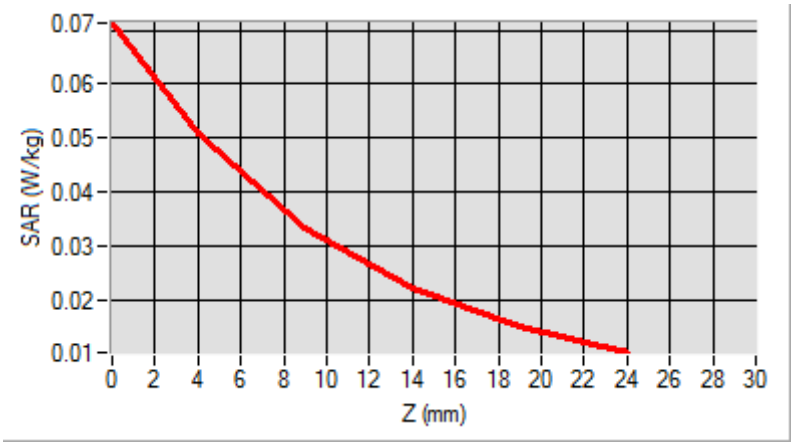
SURFACE SAR	VOLUME SAR
	

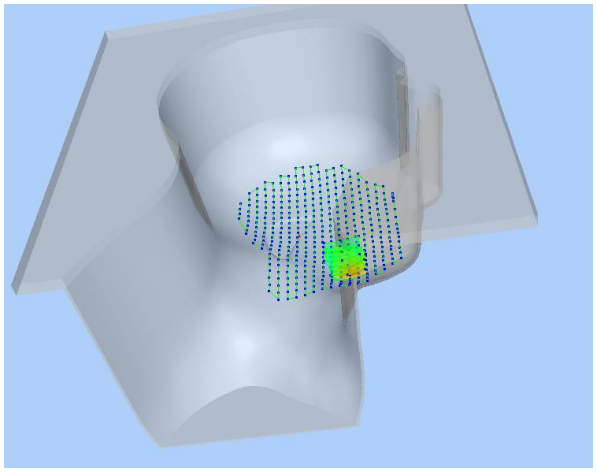
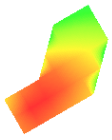
Maximum location: X=-48.00, Y=-62.00

SAR Peak: 0.07 W/kg

SAR 10g (W/Kg)	0.029285
SAR 1g (W/Kg)	0.048768

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0713	0.0510	0.0333	0.0222	0.0152



3D screen shot	Hot spot position
	

MEASUREMENT 15

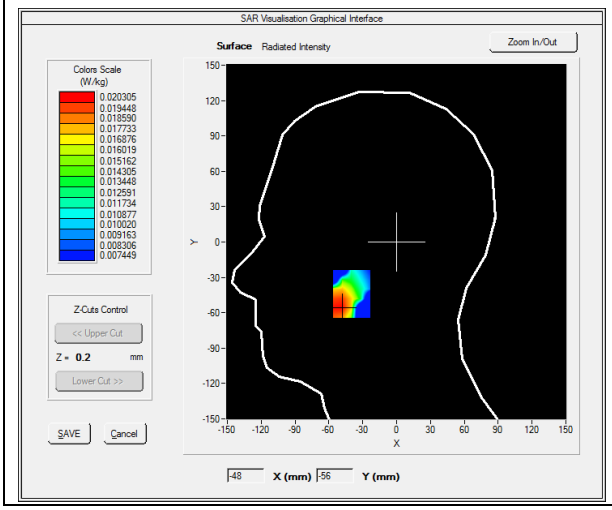
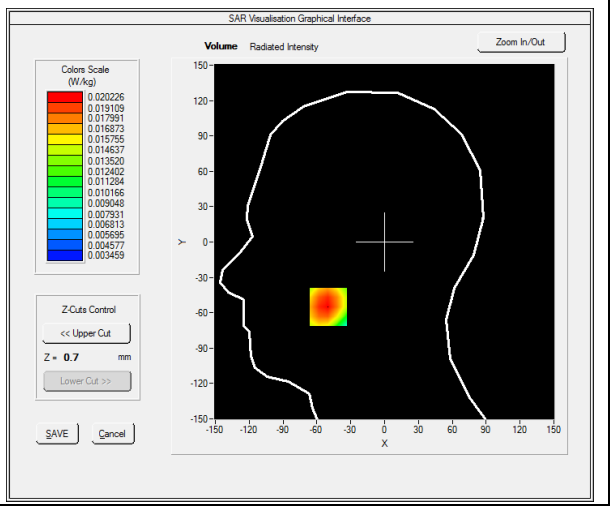
Type: Phone measurement (Complete)
Date of measurement: 04/11/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.93; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE Band 5
Channels	QPSK, 10MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	829.000000
Relative Permittivity (real part)	41.110245
Conductivity (S/m)	0.871245
Power Variation (%)	0.924535
Ambient Temperature	21.1
Liquid Temperature	21.2

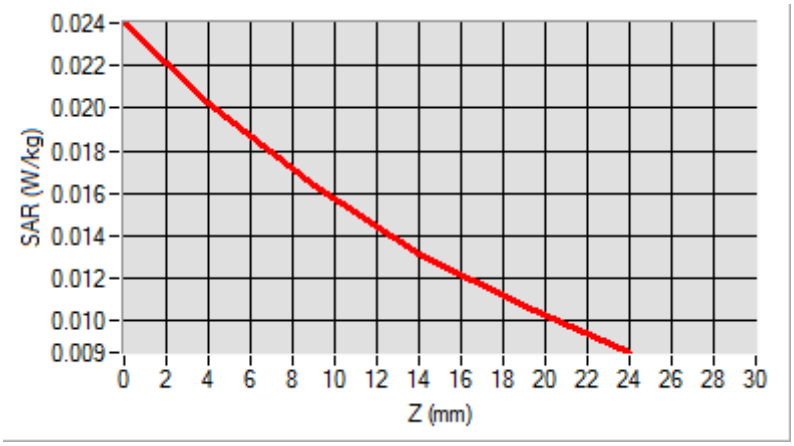
SURFACE SAR	VOLUME SAR
	

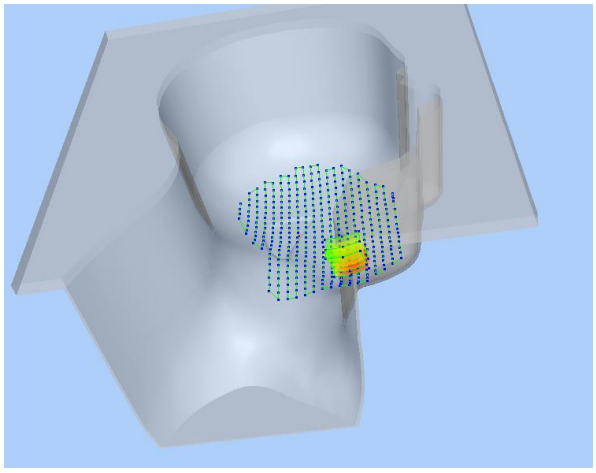
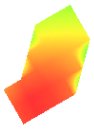
Maximum location: X=-50.00, Y=-55.00

SAR Peak: 0.02 W/kg

SAR 10g (W/Kg)	0.014898
SAR 1g (W/Kg)	0.019610

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0240	0.0202	0.0163	0.0132	0.0106



3D screen shot	Hot spot position
	

MEASUREMENT 21

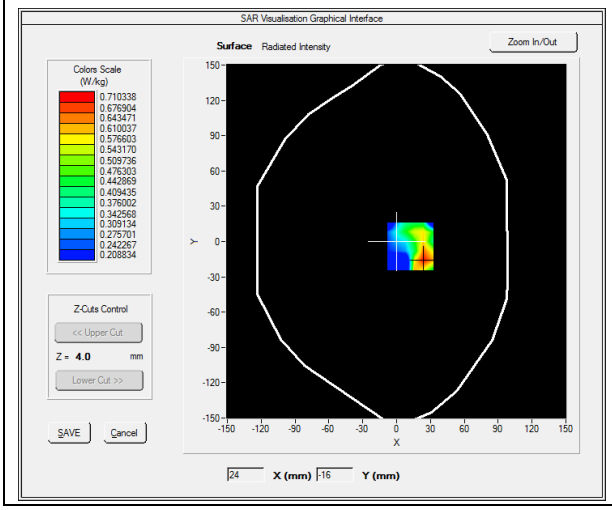
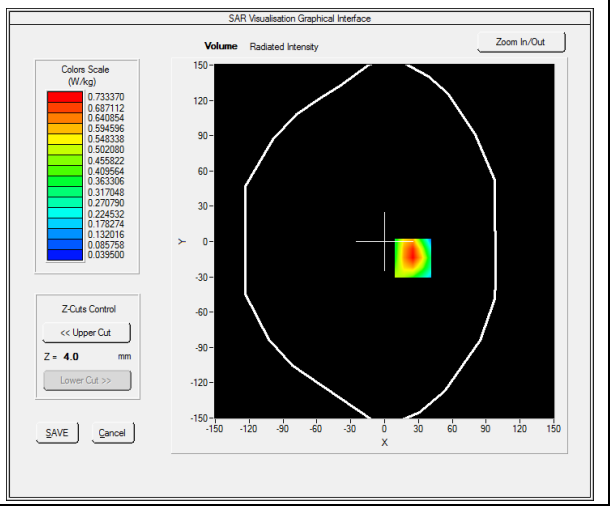
Type: Phone measurement (Complete)
Date of measurement: 04/11/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Back
Band	WCDMA850_RMC
Channels	Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	826.400000
Relative Permittivity (real part)	54.851214
Conductivity (S/m)	0.951454
Power Variation (%)	0.707382
Ambient Temperature	21.1
Liquid Temperature	21.3

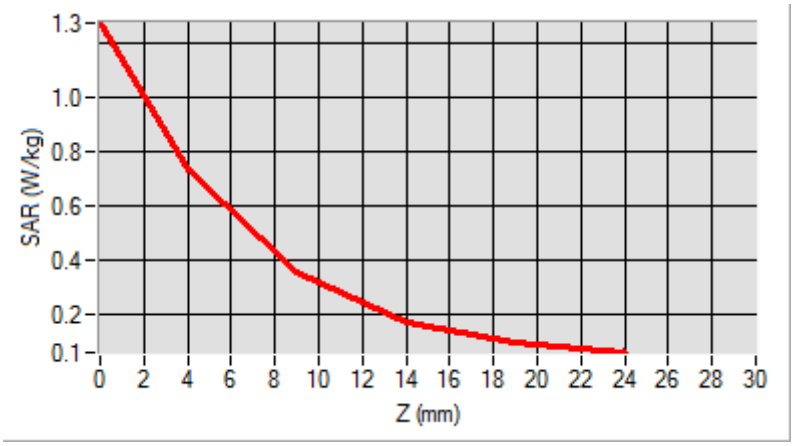
SURFACE SAR	VOLUME SAR
	

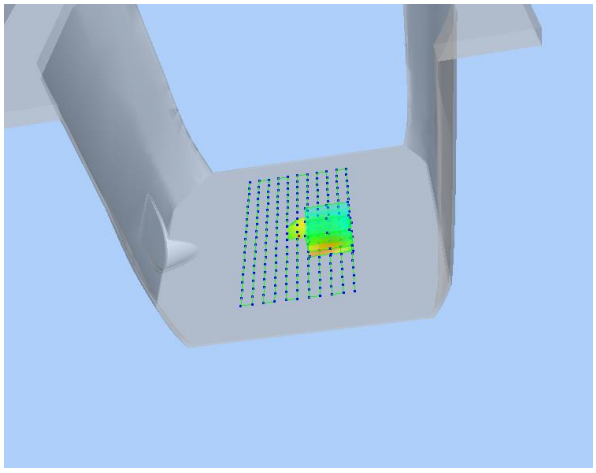
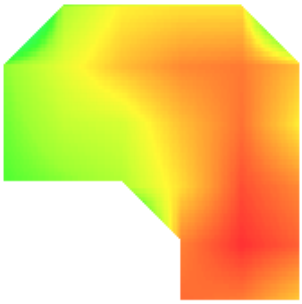
Maximum location: X=25.00, Y=-14.00

SAR Peak: 1.30 W/kg

SAR 10g (W/Kg)	0.365444
SAR 1g (W/Kg)	0.700414

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.2703	0.7334	0.3529	0.1739	0.0980



3D screen shot	Hot spot position
	

MEASUREMENT 26

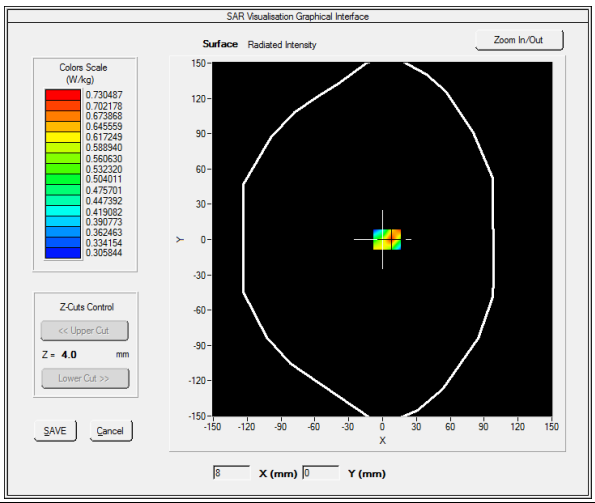
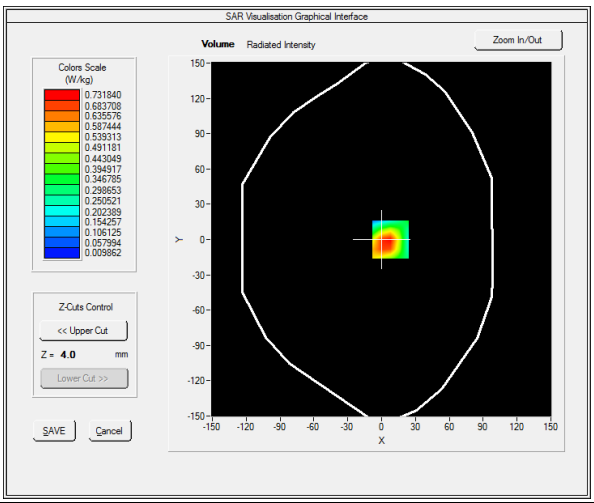
Type: Phone measurement (Complete)
Date of measurement: 04/12/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Back
Band	LTE Band 2
Channels	QPSK, 20MHz, 1RB,Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1860.000000
Relative Permittivity (real part)	52.420415
Conductivity (S/m)	1.501966
Power Variation (%)	0.706372
Ambient Temperature	21.1
Liquid Temperature	21.3

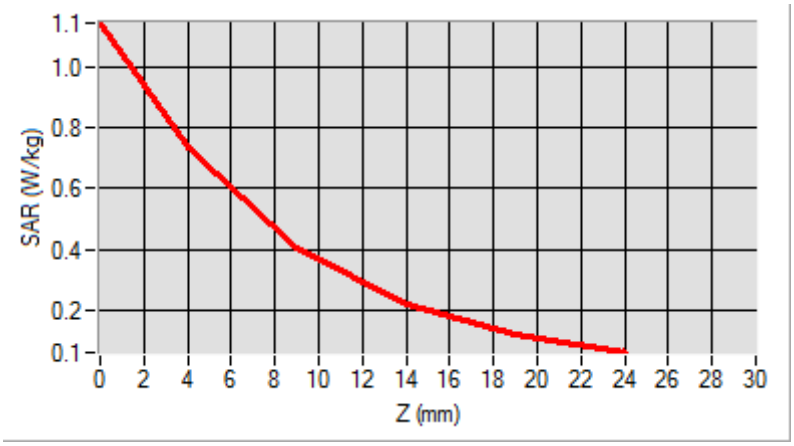
SURFACE SAR	VOLUME SAR
	

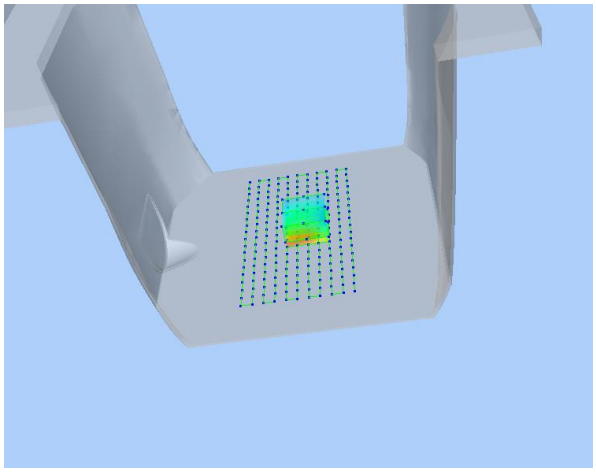
Maximum location: X=8.00, Y=0.00

SAR Peak: 1.21 W/kg

SAR 10g (W/Kg)	0.361889
SAR 1g (W/Kg)	0.709451

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1425	0.7318	0.4050	0.2203	0.1203



3D screen shot	Hot spot position
	

MEASUREMENT 36

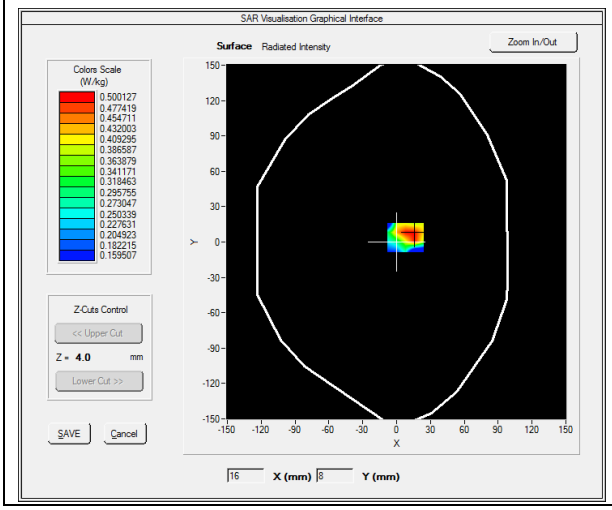
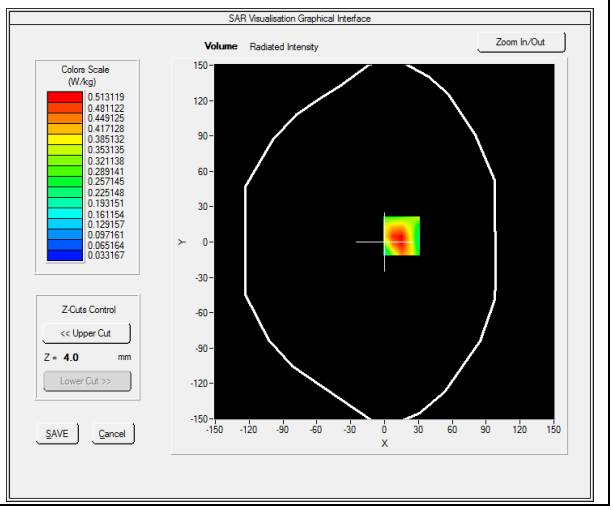
Type: Phone measurement (Complete)
Date of measurement: 04/11/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Back
Band	LTE Band 5
Channels	QPSK, 10MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	829.000000
Relative Permittivity (real part)	54.851214
Conductivity (S/m)	0.951454
Power Variation (%)	3.672346
Ambient Temperature	21.1
Liquid Temperature	21.2

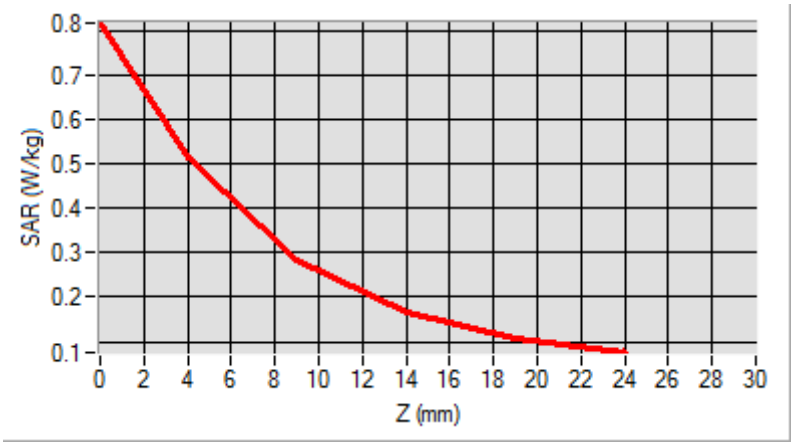
SURFACE SAR	VOLUME SAR
	

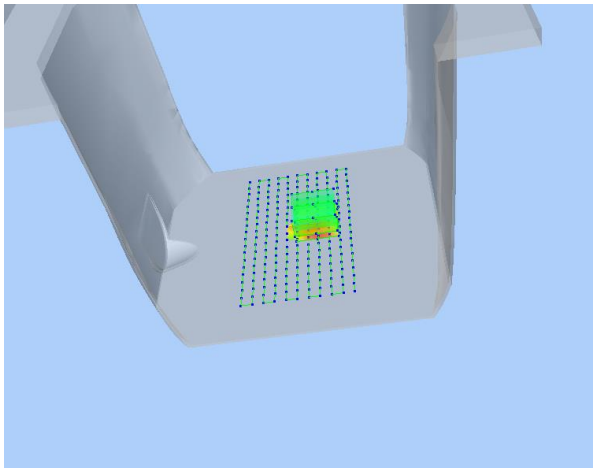
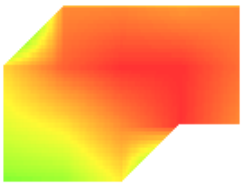
Maximum location: X=15.00, Y=5.00

SAR Peak: 0.86 W/kg

SAR 10g (W/Kg)	0.284547
SAR 1g (W/Kg)	0.500961

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8161	0.5131	0.2839	0.1650	0.1078



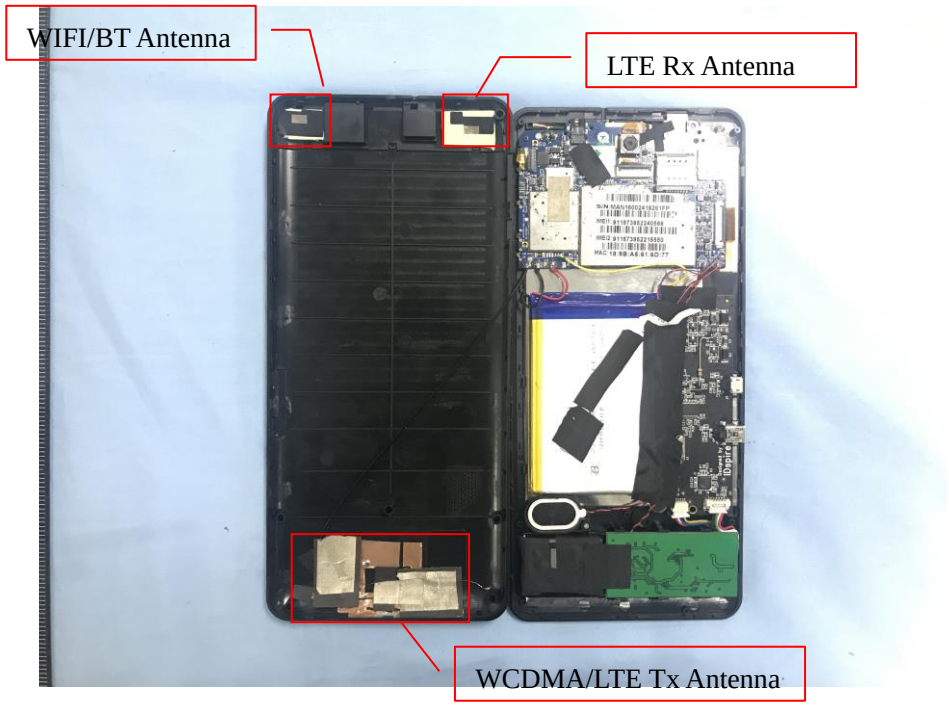
3D screen shot	Hot spot position
	

Annex C. EUT Photos

EUT View Front

EUT View Back

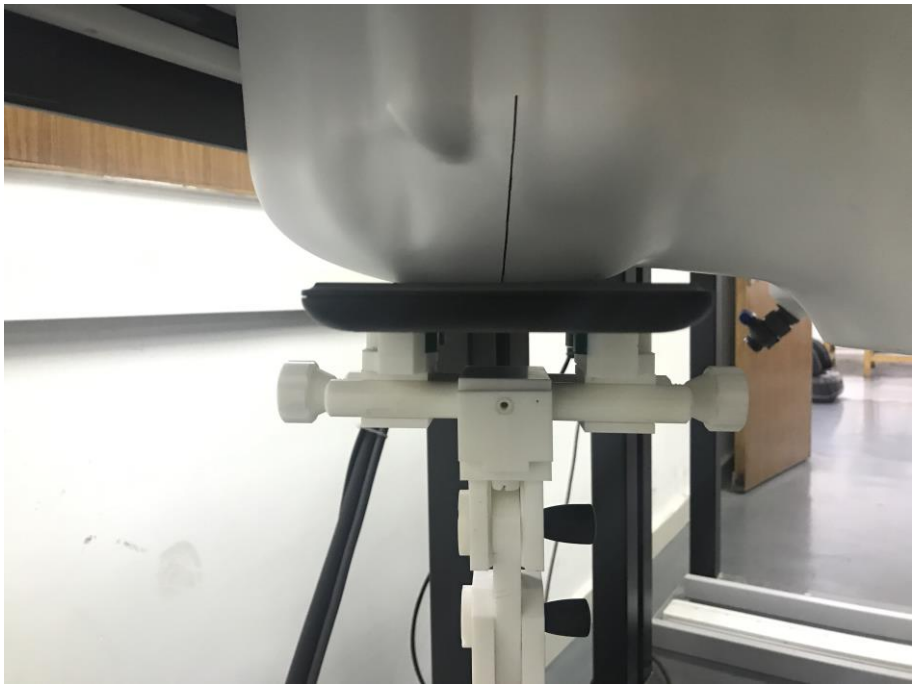
Antenna View



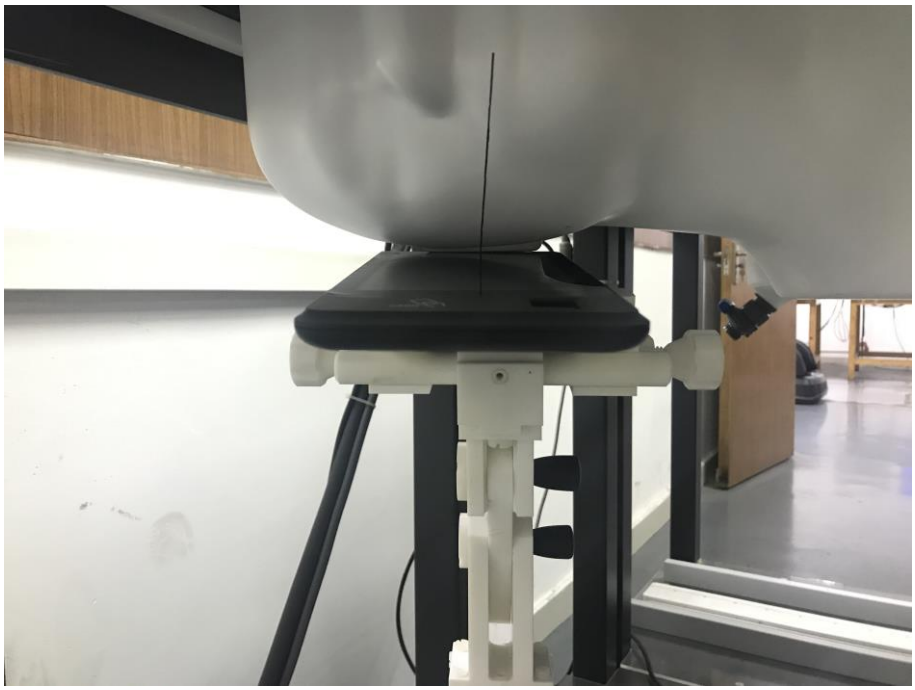
Annex D. Test Setup Photos

Head Exposure Conditions

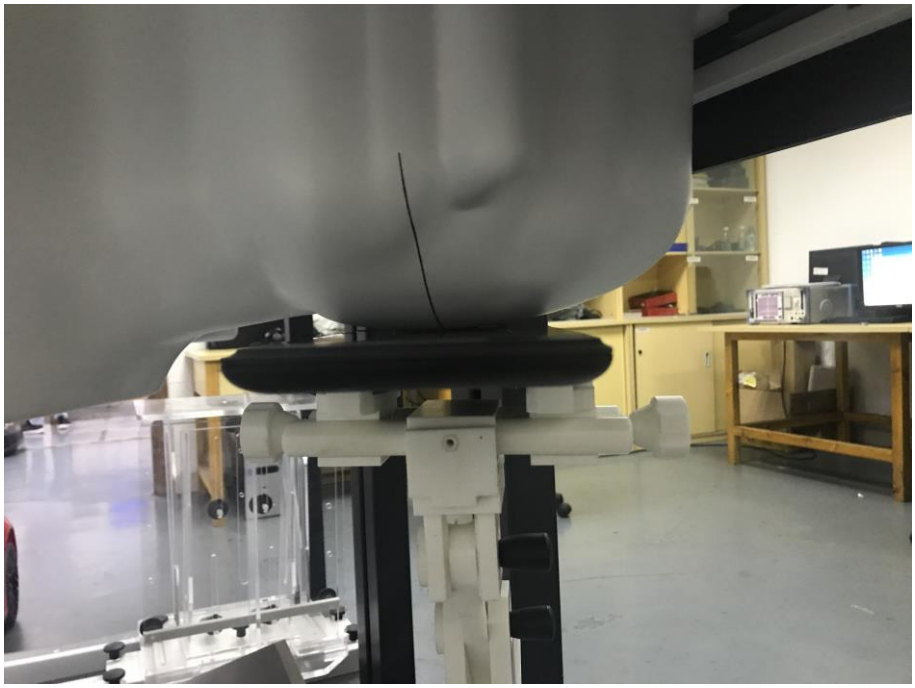
Cheek



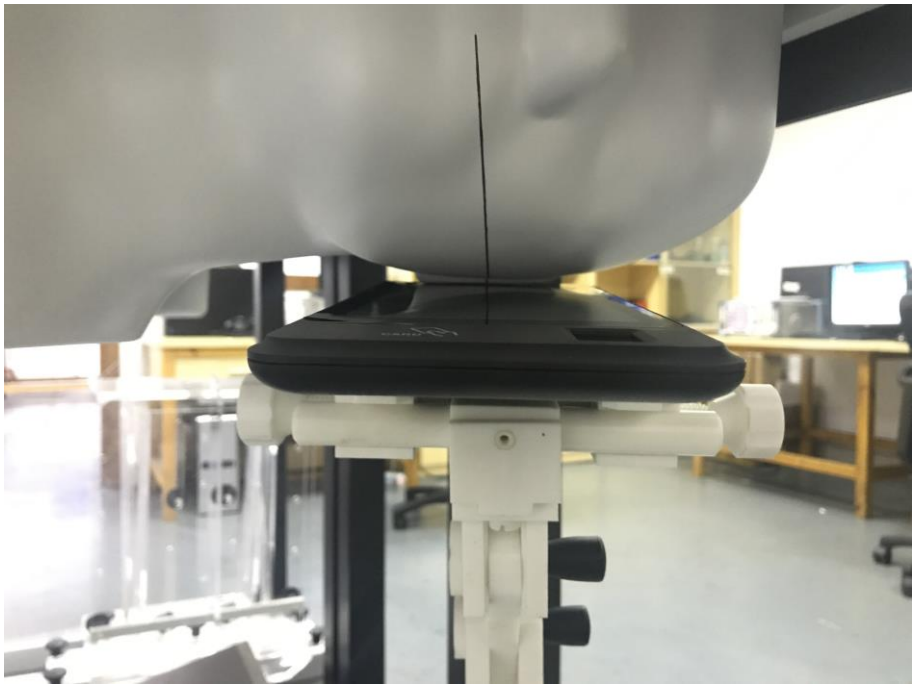
Tilt



Cheek



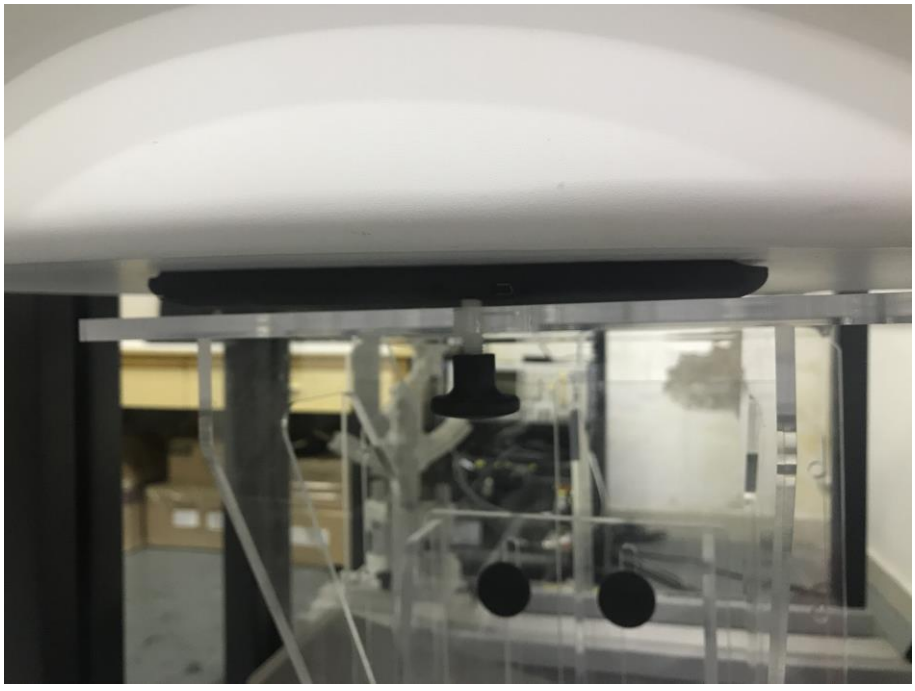
Tilt



Body Exposure Conditions

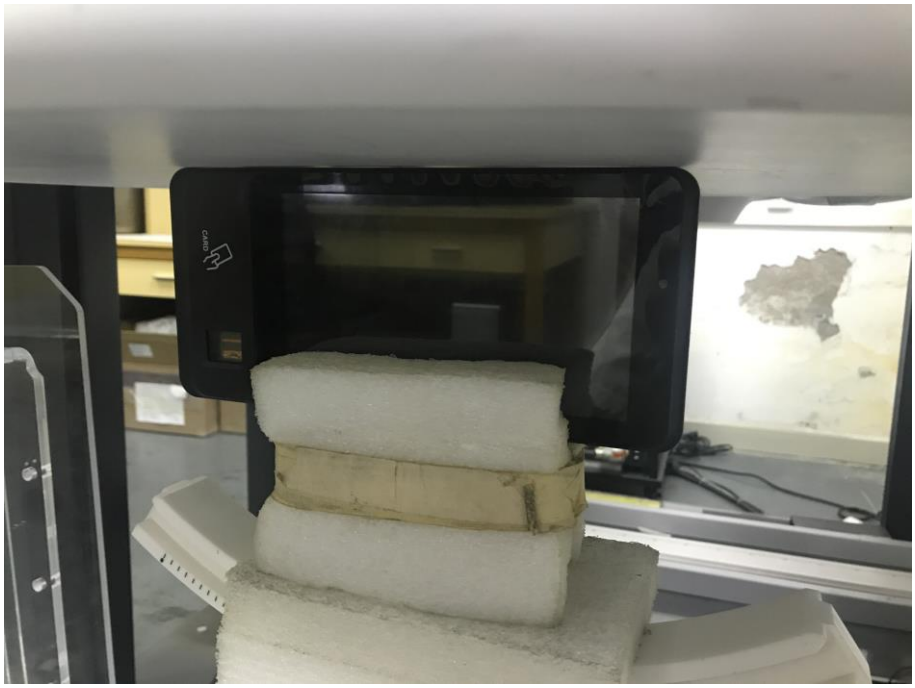
Body Back

Body Front



Body Right

Body Left



Body Top

Body Bottom

Annex E. Calibration Certificate

Please refer to the Exhibit for the Calibration Certificate

******* END OF REPORT *******