FCC SAR
Measurement and Test Report

For

Shandong Senter Electronic Co., Ltd.

No.18 Liuyishan Rd, New & Hi-Tech Area, Zibo, Shandong, China

FCC ID: 2ASDXS917

FCC Rules:	FCC Part 2.1093 ANSI / IEEE C95.1 :2005+A1:2010 ANSI / IEEE C95.3 : 2002(R2008)
Product Description:	Industrial PDA
Tested Model:	S917
Report No.:	STR18098196H
Sample Received Date:	2019-01-02
Tested Date:	2019-01-02 to 2019-01-04
Issued Date:	2019-01-07
Tested By:	Lucy Wei / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager
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1. General Information

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shandong Senter Electronic Co., Ltd.
Address of applicant:	No.18 Liuyishan Rd, New & Hi-Tech Area, Zibo, Shandong, China
Manufacturer:	Shandong Senter Electronic Co., Ltd.
Address of manufacturer:	No.18 Liuyishan Rd, New & Hi-Tech Area, Zibo, Shandong, China

General Description of EUT	
Product Name:	Industrial PDA
Brand Name:	/
Model No.:	S917
Adding Model(s):	S917 V2, S917 V3, S917 V4, S917 V5, S917 V6, S917 V7, S917 V8, S917 V9
Rated Voltage:	DC3.8V
Battery Capacity:	6000mAh
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 S917, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
2G	
Support Networks:	GSM, GPRS,EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS 850: 824~849MHz GSM/GPRS 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS 850: 869~894MHz GSM/GPRS 1900: 1930~1990MHz
RF Output Power:	GSM850: 32.08dBm, GSM1900: 29.33dBm EDGE850: 26.53dBm, EDGE1900: 25.68dBm
Type of Modulation:	GMSK,8PSK
Antenna Type:	Integral Antenna
Antenna Gain:	GSM850: - 1.0dBi, GSM1900: - 1.0dBi
GPRS/EDGE Class:	Class 12
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 2, WCDMA Band 5

Uplink Frequency:	WCDMA Band 2: 1850~1910MHz WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 2: 1930~1990MHz WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 2: 23.48dBm, WCDMA Band 5: 23.02dBm
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: - 1.0dBi, WCDMA Band 5: - 1.0dBi,
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:	18.32dBm (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
Frequency Range:	2402-2480MHz
AV Output Power:	7.418dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, Pi/4 QDPSK, 8DPSK
Quantity of Channels:	79/40
Channel Separation:	1MHz/2MHz
Antenna Type:	Integral Antenna
Antenna Gain:	-1.0dBi
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 5,7, TDD-LTE Band 40
Uplink Frequency:	FDD-LTE Band 5: Tx: 824-849MHz, FDD-LTE Band 7: Tx: 2500-2570MHz, TDD-LTE Band 40: Tx: 2305-2315MHz&2350-2360MHz
Downlink Frequency:	FDD-LTE Band 5: Rx: 869-894MHz, FDD-LTE Band 7: Rx: 2620-2690MHz, TDD-LTE Band 40: Rx: 2305-2315MHz&2350-2360MHz
RF Output Power:	FDD-LTE Band 5: 22.16dBm FDD-LTE Band 7: 22.77dBm TDD-LTE Band 40: 22.39dBm

Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 5: - 1.0dBi, FDD-LTE Band 7: - 1.0dBi, TDD-LTE Band 40: - 1.0dBi

1.2 Test Standards

The following report is prepared on behalf of the Shandong Senter Electronic Co., Ltd. in accordance with FCC 47 CFR Part 2.1093, ANSI / IEEE C95.1 :2005+A1:2010, ANSI / IEEE C95.3: 2002(R2008) and KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02, KDB 941225 D01 v03r01,KDB 616217 D04 v01r02 and KDB 248227 D01 v02r02,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	Body (0mm Gap) Maximum SAR_{1g} (W/kg)	SAR_{1g} Limit (W/kg)
GSM	0.956	1.6
WCDMA	1.013	1.6
LTE	**1.014**	1.6
WLAN 2.4GHz	0.032	
Simultaneous Transmission	**1.245**	1.6

Remark:

*The highest reported SAR values for body, and simultaneous transmission conditions are**1.014W/kg, and 1.245W/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:

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

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

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

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

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

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

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

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

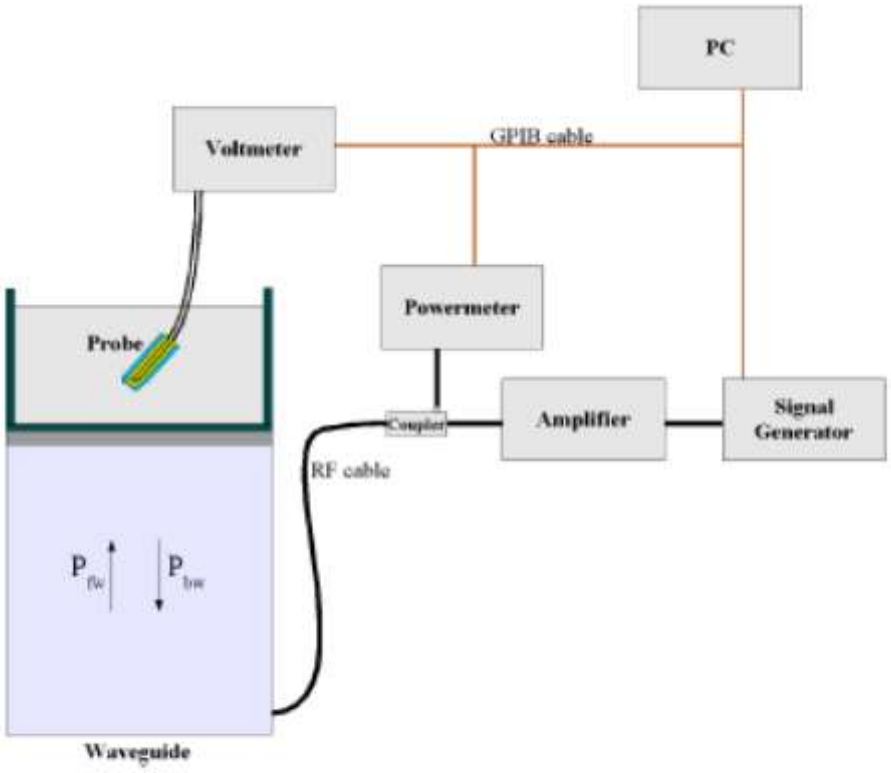
For the measurements the Specific Dosimetric E-Field Probe SSE5 SN 09/13 EP168 with following specifications is used

- 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.



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

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.

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

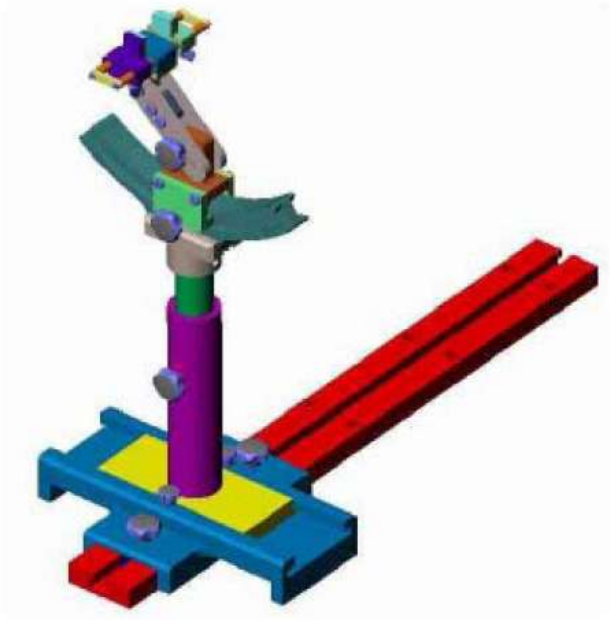
Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

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	2018-03-20	2019-03-19
1900MHz Dipole	MVG	SID1900	SN 47/12 DIP 1G900-207	2018-03-20	2019-03-19
2450MHz Dipole	MVG	SID2450	SN 13/15 DIP 2G450-364	2018-03-20	2019-03-19
2600MHz Dipole	MVG	SID2600	SN 13/15 DIP 2G600-365	2018-03-20	2019-03-19
Dielectric Probe Kit	SATIMO	SCLMP	SN 47/12 OCPG49	2018-03-20	2019-03-19
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 Tester	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 (%)
Body						
835	50.8	0.9	48.1	0.1	0.1	0
1700-1900	70.2	0.4	0	0	0	29.4
2450	68.6	0.1	0	0	0	31.3
2600	68.2	0.1	0	0	0	31.7

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

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	2019-01-02
1900	21.3	1.50	1.52	-1.32	52.42	53.30	-1.65	±5	2019-01-03
2450	21.3	1.91	1.95	-2.05	52.01	52.70	-1.31	±5	2019-01-04
2600	21.3	2.12	2.16	-1.85	52.24	52.50	-0.50	±5	2019-01-04

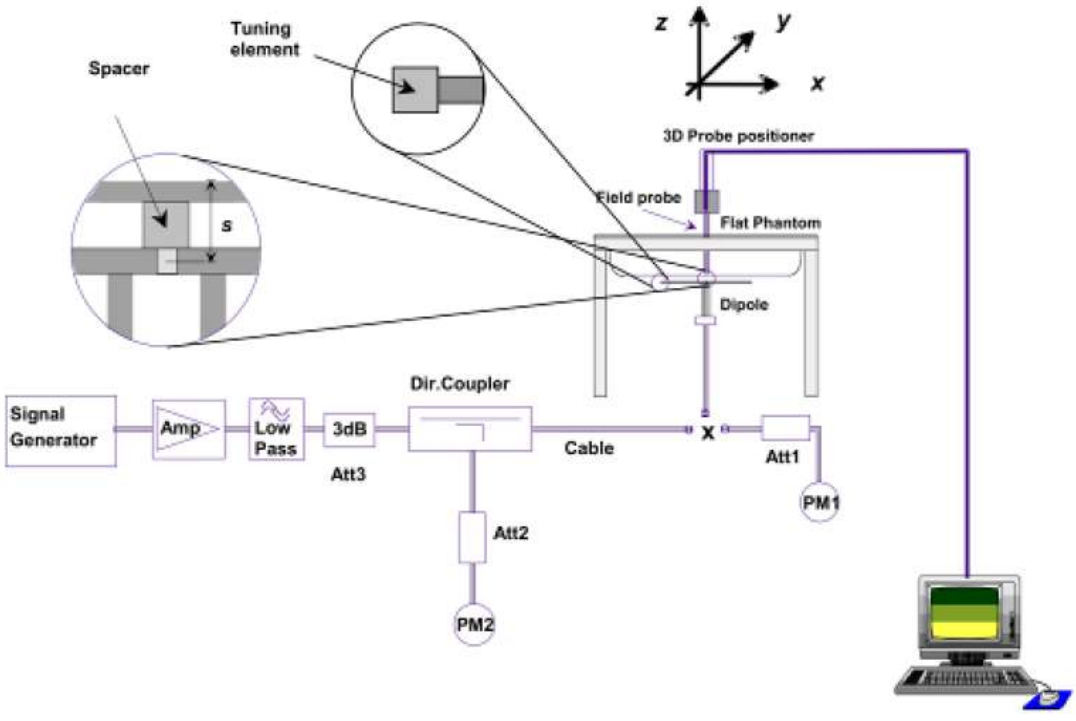
6. SAR Measurement Evaluation

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, 2450MHz and 2600MHz. 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.

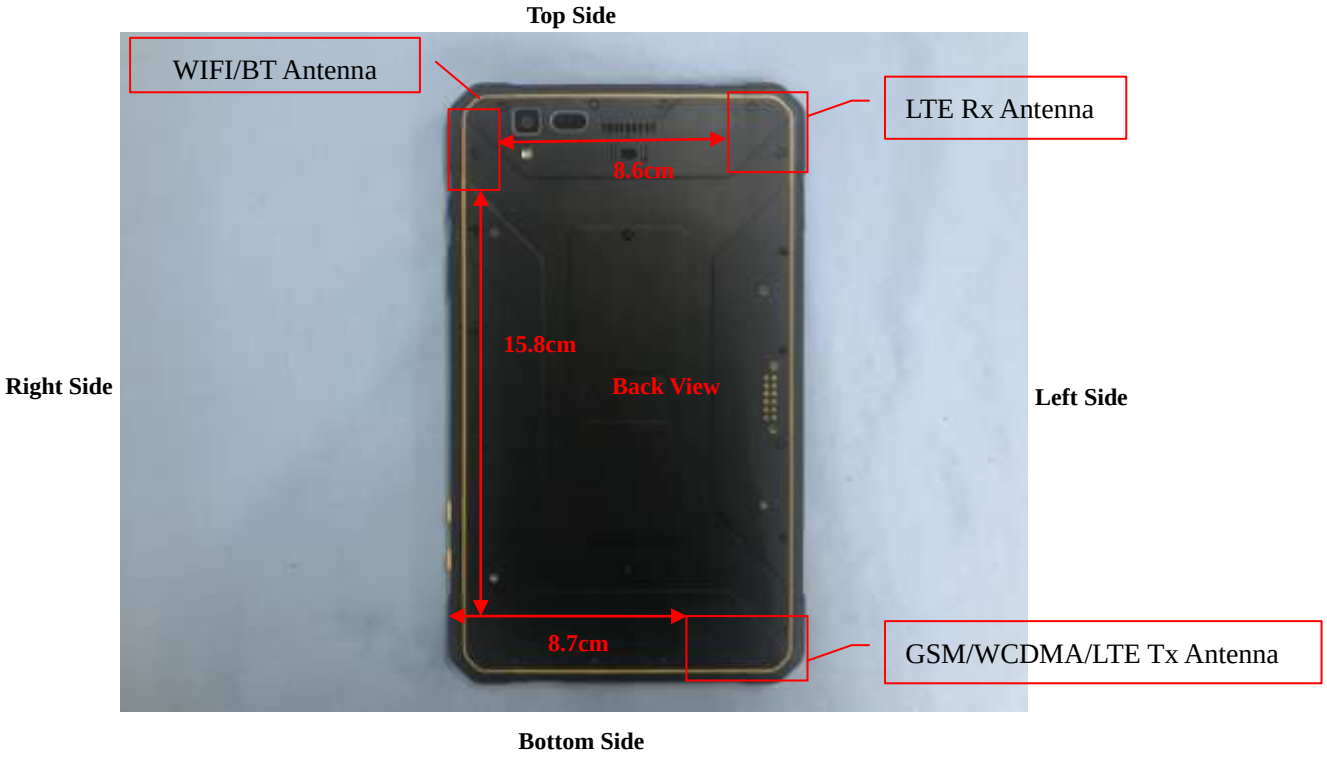
Frequency	Targeted SAR_{1g}	Measured SAR_{1g}	Normalized SAR_{1g}	Tolerance
MHz	(W/kg)	(W/kg)	(W/kg)	(%)
Body				
835	9.38	2.35	9.4	0.21
1900	39.10	9.78	39.12	0.05
2450	50.41	12.59	50.36	-0.10
2600	53.89	13.43	53.72	-0.32

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
GPRS850	GPRS(3slots)	29.5dBm	25.25dBm	90mm
GPRS1900	GPRS(2slots)	29.0dBm	23.0dBm	60mm
WCDMA Band II	RMC 12.2k	23.5dBm	23.5dBm	70mm
WCDMA Band V	RMC 12.2k	23.5dBm	23.5dBm	70mm
LTE_ Band 5	QPSK(10 MHz)	22.5dBm	22.5dBm	60mm
LTE_ Band 7	QPSK(20 MHz)	23.0dBm	23.0dBm	70mm
LTE_ Band 40	QPSK(10 MHz)	22.5dBm	22.5dBm	60mm
WLAN(2.4G)	802.11b	18.5dBm	18.5dBm	40mm
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:

Body SAR tests, Test distance: 0mm						
Antennas	**Front**	**Back**	**Right Side**	**Left Side**	**Top Side**	**Bottom**
WWAN_GPRS850	No	Yes	Yes	Yes	No	Yes
WWAN_GPRS1900	No	Yes	No	Yes	No	Yes
WWAN_WCDMA Band II	No	Yes	No	Yes	No	Yes
WWAN_WCDMA Band V	No	Yes	No	Yes	No	Yes
WWAN_LTE_ Band 5	No	Yes	No	Yes	No	Yes
WWAN_LTE_ Band 7	No	Yes	No	Yes	No	Yes
WWAN_LTE_ Band 40	No	Yes	No	Yes	No	Yes
WLAN(2.4G)	No	Yes	Yes	No	Yes	No

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.
2. Referring to KDB 616217 D04 v01r02, Exposures from antennas through the front (top) surface of the display section of a full-size tablet, away from the edges, are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary.
3. Referring to KDB 616217 D04 v01r02, The standalone and simultaneous transmission SAR tests required for tablets are more conservative than the hotspot mode use configurations; therefore, additional testing for hotspot SAR is not

required when the procedures in this document are applied

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

GSM - Burst Average Power (dBm)								
Band	**GSM850**			**Tune-up power (dBm)**	**PCS1900**			**Tune-up power (dBm)**
Channel	**128**	**190**	**251**		**512**	**661**	**810**	
Frequency (MHz)	**824.2**	**836.6**	**848.8**		**1850.2**	**1880**	**1909.8**	
GSM	31.97	32.05	31.92	32.5	29.21	29.33	29.09	29.5
GPRS (1 slot)	31.99	32.08	31.94	32.5	29.11	29.23	29.17	29.5
GPRS (2 slots)	30.79	30.57	30.75	31.0	28.40	28.77	28.72	29.0
GPRS (3 slots)	28.99	29.04	29.10	29.5	26.46	26.98	26.97	27.0
GPRS (4 slots)	27.77	27.44	27.42	28.0	25.18	25.29	25.20	25.5
EDGE (1 slot)	26.41	26.51	26.53	27.0	25.54	25.61	25.68	26.0
EDGE (2 slots)	26.28	25.61	25.68	26.5	24.86	24.92	25.08	25.5
EDGE (3 slots)	24.67	23.79	23.89	25.0	23.21	23.30	24.13	24.5
EDGE (4 slots)	23.07	22.59	22.66	23.5	21.67	21.76	21.78	22.0

GSM - Source-Based Time-Average Power (dBm)								
Band	**GSM850**			**Tune-up power (dBm)**	**PCS1900**			**Tune-up power (dBm)**
Channel	**128**	**190**	**251**		**512**	**661**	**810**	
Frequency (MHz)	**824.2**	**836.6**	**848.8**		**1850.2**	**1880**	**1909.8**	
GSM	22.97	23.05	22.92	23.5	20.21	20.33	20.09	20.5
GPRS (1 slot)	22.99	23.08	22.94	23.5	20.11	20.23	20.17	20.5
GPRS (2 slots)	24.79	24.57	24.75	25.0	22.40	22.77	22.72	23.0
GPRS (3 slots)	24.74	24.79	24.85	25.0	22.21	22.73	22.72	23.0
GPRS (4 slots)	24.77	24.44	24.42	25.0	22.18	22.29	22.20	22.5
EDGE (1 slot)	17.41	17.51	17.53	18.0	16.54	16.61	16.68	17.0
EDGE (2 slots)	20.28	19.61	19.68	20.5	18.86	18.92	19.08	19.5
EDGE (3 slots)	20.42	19.54	19.64	20.5	18.96	19.05	19.88	20.0
EDGE (4 slots)	20.07	19.59	19.66	20.5	18.67	18.76	18.78	19.0
Note: The source-based time-averaged power is linearly scaled the maximum burst averaged power based on time slots. The calculated method are shown as below: Source based time-average power = Burst averaged power - Duty cycle factor in dB Duty cycle factor = 9 dB for 1 Tx slot, 6 dB for 2 Tx slots, 4.25 dB for 3 Tx slots, 3 dB for 4 Tx slots								

Remark:

1. For Body SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS (3Tx slots) for GSM850 and GPRS (2Tx slots) for GSM1900 due to its highest source-based time-average power.
2. Per KDB 447498 D01 v06 , the maximum output power channel is used for SAR testing and for further SAR test reduction.
3. The DUT do not support DTM function.

WCDMA - Average Power (dBm)								
Band	**WCDMA Band II**				**WCDMA Band V**			
Channel	**9262**	**9400**	**9538**	**Tune-up power (dBm)**	**4132**	**4182**	**4233**	**Tune-up power (dBm)**
Frequency (MHz)	**1852.4**	**1880.0**	**1907.6**		**826.4**	**836.6**	**846.6**	
RMC 12.2k	23.37	23.48	23.41	23.5	22.97	23.02	23.01	23.5
HSDPA Subtest-1	22.32	22.33	22.40	22.5	22.02	21.95	21.99	22.5
HSDPA Subtest-2	22.28	22.31	22.38	22.5	22.00	21.93	21.96	22.5
HSDPA Subtest-3	22.29	22.31	22.37	22.5	21.98	21.92	21.97	22.5
HSDPA Subtest-4	22.27	22.31	22.37	22.5	21.97	21.93	21.96	22.5
HSUPA Subtest-1	21.83	21.93	21.86	22.5	21.43	21.50	21.46	22.0
HSUPA Subtest-2	21.8	21.91	21.85	22.5	21.42	21.48	21.43	22.0
HSUPA Subtest-3	21.82	21.92	21.85	22.5	21.41	21.48	21.45	22.0
HSUPA Subtest-4	21.81	21.91	21.84	22.5	21.41	21.47	21.43	22.0
HSUPA Subtest-5	21.82	21.91	21.84	22.5	21.41	21.47	21.45	22.0

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 5:

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	21.04	0
		1	3	22.01	0
		1	5	21.96	0
		3	0	20.99	0
		3	2	21.03	0
		3	3	21.02	0
		6	0	20.56	1
	MCH	1	0	21.87	0
		1	3	21.91	0
		1	5	21.91	0
		3	0	20.92	0
		3	2	20.97	0
		3	3	20.85	0
		6	0	20.93	1
	HCH	1	0	20.85	0
		1	3	21.96	0
		1	5	21.87	0
		3	0	20.98	0
		3	2	21.02	0
		3	3	20.95	0
		6	0	20.51	1
16QAM	LCH	1	0	21.29	1
		1	3	21.42	1
		1	5	21.31	1
		3	0	20.7	1
		3	2	20.73	1
		3	3	20.68	1
		6	0	20.42	2
	MCH	1	0	21.4	1
		1	3	21.47	1
		1	5	21.36	1
		3	0	20.51	1
		3	2	20.54	1
		3	3	20.5	1
		6	0	20.47	2
	HCH	1	0	21.23	1
		1	3	21.33	1

		1	5	21.23	1
		3	0	20.66	1
		3	2	20.6	1
		3	3	20.64	1
		6	0	20.37	2

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	21.99	0
		1	7	22.1	0
		1	14	22.01	0
		8	0	21.09	1
		8	4	21.11	1
		8	7	21.06	1
		15	0	21.13	1
	MCH	1	0	21.98	0
		1	7	22.03	0
		1	14	21.96	0
		8	0	20.97	1
		8	4	21.03	1
		8	7	20.98	1
		15	0	21	1
	HCH	1	0	21.96	0
		1	7	22.05	0
		1	14	21.93	0
		8	0	20.96	1
		8	4	21.02	1
		8	7	21	1
		15	0	21.06	1
16QAM	LCH	1	0	21.4	1
		1	7	21.02	1
		1	14	21.36	1
		8	0	20.41	2
		8	4	20.39	2
		8	7	20.48	2
		15	0	20.35	2
	MCH	1	0	21.5	1
		1	7	21.32	1
		1	14	21.42	1
		8	0	20.36	2
		8	4	20.37	2
		8	7	20.42	2

		15	0	20.47	2
	HCH	1	0	21.39	1
		1	7	21.47	1
		1	14	21.33	1
		8	0	20.36	2
		8	4	20.42	2
		8	7	20.43	2
		15	0	20.39	2

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.06	0
		1	12	22.07	0
		1	24	22.03	0
		12	0	21.13	1
		12	6	21.12	1
		12	13	21.07	1
		25	0	21.12	1
	MCH	1	0	22	0
		1	12	22.02	0
		1	24	22.01	0
		12	0	21.05	1
		12	6	21.03	1
		12	13	20.97	1
		25	0	20.98	1
	HCH	1	0	22.1	0
		1	12	22.06	0
		1	24	22.04	0
		12	0	21.18	1
		12	6	21.17	1
		12	13	21.21	1
		25	0	21.15	1
16QAM	LCH	1	0	21.48	1
		1	12	21.43	1
		1	24	21.43	1
		12	0	20.36	2
		12	6	20.42	2
		12	13	20.41	2
		25	0	20.43	2
	MCH	1	0	21.39	1
		1	12	21.38	1
		1	24	21.35	1

		12	0	20.39	2
		12	6	20.41	2
		12	13	20.37	2
		25	0	20.33	2
	HCH	1	0	21.31	1
		1	12	21.5	1
		1	24	21.02	1
		12	0	20.44	2
		12	6	20.41	2
		12	13	20.35	2
		25	0	20.39	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.16	0
		1	24	22.03	0
		1	49	21.95	0
		25	0	21.23	1
		25	12	21.08	1
		25	25	21.06	1
		50	0	21.07	1
	MCH	1	0	22.01	0
		1	24	21.97	0
		1	49	21.92	0
		25	0	21.08	1
		25	12	21.09	1
		25	25	21.03	1
		50	0	21.04	1
	HCH	1	0	21.94	0
		1	24	22.08	0
		1	49	22.07	0
		25	0	21.09	1
		25	12	21.19	1
		25	25	21.15	1
		50	0	21.09	1
16QAM	LCH	1	0	21.46	1
		1	24	21.41	1
		1	49	21.41	1
		25	0	20.38	2
		25	12	20.42	2
		25	25	20.38	2
		50	0	20.41	2

	MCH	1	0	20.4	1
		1	24	21.02	1
		1	49	21.46	1
		25	0	20.35	2
		25	12	20.36	2
		25	25	20.34	2
		50	0	20.36	2
	HCH	1	0	21.4	1
		1	24	21.32	1
		1	49	21.44	1
		25	0	20.42	2
		25	12	20.41	2
		25	25	20.42	2
		50	0	20.34	2

FDD-LTE Band 7:

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	21.75	0
		1	12	21.68	0
		1	24	21.47	0
		12	0	21.7	1
		12	6	21.7	1
		12	13	21.56	1
		25	0	21.59	1
	MCH	1	0	22.38	0
		1	12	22.28	0
		1	24	22.08	0
		12	0	21.38	1
		12	6	21.38	1
		12	13	21.33	1
		25	0	21.35	1
	HCH	1	0	21.79	0
		1	12	21.61	0
		1	24	21.44	0
		12	0	20.91	1
		12	6	20.91	1
		12	13	20.86	1
		25	0	20.86	1
16QAM	LCH	1	0	21.96	1
		1	12	21.91	1
		1	24	21.81	1
		12	0	20.76	2
		12	6	20.81	2
		12	13	20.62	2
		25	0	20.64	2
	MCH	1	0	21.93	1
		1	12	21.81	1
		1	24	21.64	1
		12	0	20.56	2
		12	6	20.56	2
		12	13	20.52	2
		25	0	20.51	2
	HCH	1	0	21.18	1
		1	12	21.14	1
		1	24	21.03	1

		12	0	20.46	2
		12	6	20.49	2
		12	13	20.59	2
		25	0	20.67	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.62	0
		1	24	22.64	0
		1	49	22.65	0
		25	0	21.73	1
		25	12	21.75	1
		25	25	21.72	1
		50	0	21.67	1
	MCH	1	0	22.25	0
		1	24	22.25	0
		1	49	22.22	0
		25	0	21.35	1
		25	12	21.32	1
		25	25	21.33	1
		50	0	21.32	1
	HCH	1	0	21.71	0
		1	24	21.53	0
		1	49	21.58	0
		25	0	20.77	1
		25	12	20.7	1
		25	25	20.67	1
		50	0	20.8	1
16QAM	LCH	1	0	21.95	1
		1	24	21.95	1
		1	49	21.98	1
		25	0	20.75	2
		25	12	20.77	2
		25	25	20.82	2
		50	0	20.8	2
	MCH	1	0	21.9	1
		1	24	21.81	1
		1	49	21.81	1
		25	0	20.54	2
		25	12	20.54	2
		25	25	20.49	2
		50	0	20.55	2

	HCH	1	0	21.13	1
		1	24	21.06	1
		1	49	21.04	1
		25	0	20.98	2
		25	12	20.86	2
		25	25	20.88	2
		50	0	20.46	2

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.63	0
		1	37	22.6	0
		1	74	22.56	0
		37	0	21.69	1
		37	18	21.69	1
		37	38	21.64	1
		75	0	21.7	1
	MCH	1	0	22.3	0
		1	37	22.18	0
		1	74	22.07	0
		37	0	21.29	1
		37	18	21.27	1
		37	38	21.26	1
		75	0	21.26	1
	HCH	1	0	21.84	0
		1	37	21.63	0
		1	74	21.63	0
		37	0	20.84	1
		37	18	20.83	1
		37	38	20.65	1
		75	0	20.78	1
16QAM	LCH	1	0	21.94	1
		1	37	21.89	1
		1	74	21.96	1
		37	0	20.73	2
		37	18	20.74	2
		37	38	20.75	2
		75	0	20.75	2
	MCH	1	0	21.76	1
		1	37	21.69	1
		1	74	21.53	1
		37	0	20.5	2

		37	18	20.49	2
		37	38	20.38	2
		75	0	20.42	2
	HCH	1	0	21.22	1
		1	37	21.07	1
		1	74	21.1	1
		37	0	20.96	2
		37	18	20.97	2
		37	38	20.8	2
		75	0	20.96	2

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.77	0
		1	49	22.69	0
		1	99	22.72	0
		50	0	21.76	1
		50	25	21.69	1
		50	50	21.69	1
		100	0	21.7	1
	MCH	1	0	22.27	0
		1	49	22.29	0
		1	99	22.23	0
		50	0	21.25	1
		50	25	21.29	1
		50	50	21.27	1
		100	0	21.25	1
	HCH	1	0	22.32	0
		1	49	22.16	0
		1	99	21.58	0
		50	0	21.64	1
		50	25	21.65	1
		50	50	21.62	1
		100	0	21.63	1
16QAM	LCH	1	0	21.53	1
		1	49	21.67	1
		1	99	21.65	1
		50	0	20.8	2
		50	25	20.81	2
		50	50	20.82	2
		100	0	20.77	2
	MCH	1	0	21.67	1

		1	49	21.64	1
		1	99	21.65	1
		50	0	20.55	2
		50	25	20.59	2
		50	50	20.55	2
		100	0	20.45	2
	HCH	1	0	20.96	1
		1	49	20.96	1
		1	99	20.97	1
		50	0	20.84	2
		50	25	20.81	2
		50	50	20.83	2
		100	0	20.89	2

FDD-LTE Band 40: 2305-2315MHz

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dBm)
		Size	Offset		
QPSK	LCH	1	0	21.3	0
		1	12	21.2	0
		1	24	21.25	0
		12	0	21.28	0
		12	6	21.35	0
		12	13	21.34	0
		25	0	21.24	0
	HCH	1	0	21.31	0
		1	12	21.45	0
		1	24	21.49	0
		12	0	21.37	0
		12	6	21.46	0
		12	13	21.51	0
		25	0	21.41	0
16QAM	LCH	1	0	20.59	1
		1	12	20.57	1
		1	24	20.57	1
		12	0	20.46	1
		12	6	20.48	1
		12	13	20.51	1
		25	0	20.35	1
	HCH	1	0	20.7	1
		1	12	20.81	1
		1	24	20.83	1
		12	0	20.59	1
		12	6	20.61	1
		12	13	20.58	1
		25	0	20.53	1

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dBm)
		Size	Offset		
QPSK	MCH	1	0	21.61	0
		1	24	21.28	0
		1	49	21.41	0
		25	0	21.52	0
		25	12	21.27	0
		25	25	21.41	0
		50	0	21.45	0
16QAM	MCH	1	0	20.59	1
		1	24	20.58	1
		1	49	20.76	1
		25	0	20.41	1
		25	12	20.52	1
		25	25	20.56	1
		50	0	20.52	1

FDD-LTE Band 40: 2350-2360MHz

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dBm)
		Size	Offset		
QPSK	LCH	1	0	22.14	0
		1	12	22.18	0
		1	24	22.22	0
		12	0	21.2	1
		12	6	21.24	1
		12	13	21.34	1
		25	0	21.2	1
	HCH	1	0	22.28	0
		1	12	22.28	0
		1	24	22.36	0
		12	0	21.31	1
		12	6	21.26	1
		12	13	21.34	1
		25	0	21.25	1
16QAM	LCH	1	0	21.46	1
		1	12	21.35	1
		1	24	21.34	1
		12	0	20.39	2
		12	6	20.46	2

		12	13	20.41	2
		25	0	20.34	2
	HCH	1	0	21.36	1
		1	12	21.36	1
		1	24	21.37	1
		12	0	20.44	2
		12	6	20.41	2
		12	13	20.47	2
		25	0	20.34	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dBm)
		Size	Offset		
QPSK	MCH	1	0	22.14	0
		1	24	22.23	0
		1	49	22.39	0
		25	0	21.24	1
		25	12	21.28	1
		25	25	21.35	1
		50	0	21.29	1
16QAM	MCH	1	0	21.44	1
		1	24	21.34	1
		1	49	21.39	1
		25	0	21.28	2
		25	12	21.4	2
		25	25	21.43	2
		50	0	21.38	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	18.32
		CH 06	2437	17.99
		CH 11	2462	17.96
802.11g	6Mbps	CH 01	2412	16.43
		CH 06	2437	15.69
		CH 11	2462	15.01
802.11n (20MHz)	MCS0	CH 01	2412	16.12
		CH 06	2437	15.65
		CH 11	2462	14.65
802.11n (40MHz)	MCS0	CH 03	2422	15.46
		CH 06	2437	15.16
		CH 09	2452	14.74

Remark:

1. Per KDB 248227 D01 v02r02, For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions.

2. Per KDB 248227 D01 v02r02, For 802.11b DSSS SAR measurements ,when the reported SAR of the highest measured maximum output power channel (see 3.1) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

3 .For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is <= 1.2W/kg.

Bluetooth - Maximum Average Power		
Test Mode	**Data Rate**	**Average Power(dBm)**
GFSK	1Mbps	7.418
Pi/4 QDPSK	2Mbps	6.646
8DPSK	3Mbps	7.056

Bluetooth - Maximum Average Power				
Test Mode	**Data Rate**	**Channel**	**Frequency (MHz)**	**Average Power (dBm)**
BLE	1Mbps	CH 00	2402	-4.782
		CH 19	2440	-5.996
		CH 39	2480	-3.201

Remark:

Bluetooth maximum output power is7.418dBm, and Tune-Up output power is 7.5dBm. 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
7.5	5.62	5	2.402	1.74	3

The exclusion thresholds is 1.74< 3, therefore, the RF exposure evaluation is not required.

9.2 Test Results for Standalone SAR Test

Body SAR

GSM850 – 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					
1.	GPRS_3TX	Back Side	251	848.8	29.10	29.5	1.096	0.522	0.572
2.	GPRS_3TX	Bottom side	251	848.8	29.10	29.5	1.096	0.137	0.150
3.	GPRS_3TX	Left side	251	848.8	29.10	29.5	1.096	0.038	0.042
4.	GPRS_3TX	Right side	251	848.8	29.10	29.5	1.096	0.004	0.004

GSM1900 – 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					
5.	GPRS_2TX	Back Side	661	1880.0	28.77	29.0	1.054	0.876	0.924
6.	GPRS_2TX	Back Side	512	1850.2	28.40	29.0	1.148	0.833	0.956
7.	GPRS_2TX	Back Side	810	1909.8	28.72	29.0	1.067	0.85	0.907
8.	GPRS_2TX	Bottom side	661	1880.0	28.77	29.0	1.054	0.306	0.323
9.	GPRS_2TX	Left side	661	1880.0	28.77	29.0	1.054	0.451	0.476

WCDMA Band V – 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					
10.	RMC 12.2k	Back Side	4182	836.4	23.02	23.5	1.117	0.301	0.336
11.	RMC 12.2k	Bottom side	4182	836.4	23.02	23.5	1.117	0.163	0.182
12.	RMC 12.2k	Left side	4182	836.4	23.02	23.5	1.117	0.032	0.036

WCDMA Band II – 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					
13.	RMC 12.2k	Back Side	9400	1880.0	23.48	23.5	1.005	1.008	1.013
14.	RMC 12.2k	Back Side	9262	1852.4	23.37	23.5	1.030	0.943	0.972
15.	RMC 12.2k	Back Side	9538	1907.6	23.41	23.5	1.021	0.987	1.008
16.	RMC 12.2k	Bottom side	9400	1880.0	23.48	23.5	1.005	0.421	0.423
17.	RMC 12.2k	Left side	9400	1880.0	23.48	23.5	1.005	0.398	0.400

LTE Band 5–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position	Frequency	Output Power	Rated Limit	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB	Body	MHz	(dBm)	(dBm)			
18.	QPSK 10MHz 1RB	Back Side	829.0	22.16	22.5	1.081	0.272	0.294
19.	QPSK 10MHz 1RB	Bottom side	829.0	22.16	22.5	1.081	0.08	0.087
20.	QPSK 10MHz 1RB	Left side	829.0	22.16	22.5	1.081	0.038	0.041
21.	QPSK 10MHz 50%RB	Back Side	829.0	21.23	21.5	1.064	0.113	0.120
22.	QPSK 10MHz 50%RB	Bottom side	829.0	21.23	21.5	1.064	0.045	0.048
23.	QPSK 10MHz 50%RB	Left side	829.0	21.23	21.5	1.064	0.02	0.021

LTE Band 7–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position	Frequency	Output Power	Rated Limit	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth	Body	MHz	(dBm)	(dBm)			
24.	QPSK 20MHz 1RB	Back Side	2510.0	22.77	23.0	1.054	0.882	0.930
25.	QPSK 20MHz 1RB	Back Side	2535.0	22.29	23.0	1.178	0.822	0.968
26.	QPSK 20MHz 1RB	Back Side	2560.0	22.32	23.0	1.169	0.71	0.830
27.	QPSK 20MHz 1RB	Bottom side	2510.0	22.77	23.0	1.054	0.933	0.984
28.	QPSK 20MHz 1RB	Bottom side	2535.0	22.29	23.0	1.178	0.861	1.014
29.	QPSK 20MHz 1RB	Bottom side	2560.0	22.32	23.0	1.169	0.737	0.862
30.	QPSK 20MHz 1RB	Left side	2510.0	22.77	23.0	1.054	0.138	0.146
31.	QPSK 20MHz 50%RB	Back Side	2510.0	21.76	22.0	1.057	0.471	0.498
32.	QPSK 20MHz 50%RB	Bottom side	2510.0	21.76	22.0	1.057	0.511	0.540
33.	QPSK 20MHz 50%RB	Left side	2510.0	21.76	22.0	1.057	0.061	0.064
34.	QPSK 20MHz 100%RB	Back Side	2510.0	21.7	22.0	1.072	0.421	0.451
35.	QPSK 20MHz 100%RB	Bottom side	2510.0	21.7	22.0	1.072	0.425	0.455

LTE Band 40:2305-2315MHz–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position	Frequency	Output Power	Rated Limit	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB	Body	MHz	(dBm)	(dBm)			
36.	QPSK 10MHz 1RB	Back Side	2310.0	21.61	22.0	1.094	0.551	0.603
37.	QPSK 10MHz 1RB	Bottom side	2310.0	21.61	22.0	1.094	0.36	0.394
38.	QPSK 10MHz 1RB	Left side	2310.0	21.61	22.0	1.094	0.098	0.107
39.	QPSK 10MHz 50%RB	Back Side	2310.0	21.52	22.0	1.117	0.248	0.277
40.	QPSK 10MHz 50%RB	Bottom side	2310.0	21.52	22.0	1.117	0.188	0.210
41.	QPSK 10MHz 50%RB	Left side	2310.0	21.52	22.0	1.117	0.041	0.046

LTE Band 40: 2350-2360MHz–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					
42.	QPSK 10MHz 1RB	Back Side	2355.0	22.39	22.5	1.026	0.667	0.684
43.	QPSK 10MHz 1RB	Bottom side	2355.0	22.39	22.5	1.026	0.415	0.426
44.	QPSK 10MHz 1RB	Left side	2355.0	22.39	22.5	1.026	0.095	0.097
45.	QPSK 10MHz 50%RB	Back Side	2355.0	21.35	21.5	1.035	0.303	0.314
46.	QPSK 10MHz 50%RB	Bottom side	2355.0	21.35	21.5	1.035	0.211	0.218
47.	QPSK 10MHz 50%RB	Left side	2355.0	21.35	21.5	1.035	0.047	0.049

WLAN 2.4GHz –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					
48.	802.11b	Back Side	01	2412	18.32	18.5	1.042	0.031	0.032
49.	802.11b	Top Side	01	2412	18.32	18.5	1.042	0.025	0.026
50.	802.11b	Right Side	01	2412	18.32	18.5	1.042	0.016	0.017

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.

Repeated SAR

GSM1900 – 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					
51.	GPRS_2TX	Back Side	661	1880.0	28.77	29.0	1.054	0.872	0.919

WCDMA Band II – 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					
52.	RMC 12.2k	Back Side	9400	1880.0	23.48	23.5	1.005	1.001	1.006

LTE Band 7–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					
53.	QPSK 20MHz 1RB	Bottom side	2510.0	22.77	23.0	1.054	0.930	0.981

Remark:

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

9.3 Simultaneous Multi-band Transmission SAR Analysis

List of Mode for Simultaneous Multi-band Transmission

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

Remark:

1. GSM ,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, Bluetooth SAR is estimated per KDB 447498 D01v06 as below:

Bluetooth:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g) 5mm
7.5	5.62	5	2.402	7.5	0.232

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

Body SAR

WWAN and WLAN

	WWAN		WLAN(2.4G)	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back	GSM850	0.572	0.032	0.604
Front	GSM850	--	--	--
Top side	GSM850	--	0.026	0.026
Bottom side	GSM850	0.150	--	0.150
Right side	GSM850	0.004	0.017	0.021
Left side	GSM850	0.042	--	0.042
Back	GSM1900	0.956	0.032	0.988
Front	GSM1900	--	--	--
Top side	GSM1900	--	0.026	0.026
Bottom side	GSM1900	0.323	--	0.323
Right side	GSM1900	--	0.017	0.017
Left side	GSM1900	0.476	--	0.476
Back	WCDMA Band V	0.336	0.032	0.368
Front	WCDMA Band V	--	--	--
Top side	WCDMA Band V	--	0.026	0.026
Bottom side	WCDMA Band V	0.182	--	0.182
Right side	WCDMA Band V	--	0.017	0.017
Left side	WCDMA Band V	0.036	--	0.036
Back	WCDMA Band II	1.013	0.032	**1.045**
Front	WCDMA Band II	--	--	--
Top side	WCDMA Band II	--	0.026	0.026
Bottom side	WCDMA Band II	0.423	--	0.423
Right side	WCDMA Band II	--	0.017	0.017
Left side	WCDMA Band II	0.400	--	0.400
Back	LTE Band 5	0.294	0.032	0.326
Front	LTE Band 5	--	--	--
Top side	LTE Band 5	--	0.026	0.026
Bottom side	LTE Band 5	0.087	--	0.087
Right side	LTE Band 5	--	0.017	0.017
Left side	LTE Band 5	0.041	--	0.041
Back	LTE Band 7	0.968	0.032	1
Front	LTE Band 7	--	--	--
Top side	LTE Band 7	--	0.026	0.026
Bottom side	LTE Band 7	1.014	--	1.014
Right side	LTE Band 7	--	0.017	0.017
Left side	LTE Band 7	0.146	--	0.146

Back	LTE Band 40	0.684	0.032	0.716
Front	LTE Band 40	--	--	--
Top side	LTE Band 40	--	0.026	0.026
Bottom side	LTE Band 40	0.426	--	0.426
Right side	LTE Band 40	--	0.017	0.017
Left side	LTE Band 40	0.107	--	0.107

WLAN and Bluetooth

	WWAN		Bluetooth	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back	GSM850	0.572	0.232	0.804
Front	GSM850	--	--	--
Top side	GSM850	--	0.232	0.232
Bottom side	GSM850	0.150	--	0.150
Right side	GSM850	0.004	0.232	0.236
Left side	GSM850	0.042	--	0.042
Back	GSM1900	0.956	0.232	1.188
Front	GSM1900	--	--	--
Top side	GSM1900	--	0.232	0.232
Bottom side	GSM1900	0.323	--	0.323
Right side	GSM1900	--	0.232	0.232
Left side	GSM1900	0.476	--	0.476
Back	WCDMA Band V	0.336	0.232	0.568
Front	WCDMA Band V	--	--	--
Top side	WCDMA Band V	--	0.232	0.232
Bottom side	WCDMA Band V	0.182	--	0.182
Right side	WCDMA Band V	--	0.232	0.232
Left side	WCDMA Band V	0.036	--	0.036
Back	WCDMA Band II	1.013	0.232	**1.245**
Front	WCDMA Band II	--	--	--
Top side	WCDMA Band II	--	0.232	0.232
Bottom side	WCDMA Band II	0.423	--	0.423
Right side	WCDMA Band II	--	0.232	0.232
Left side	WCDMA Band II	0.400	--	0.400
Back	LTE Band 5	0.294	0.232	0.526
Front	LTE Band 5	--	--	--
Top side	LTE Band 5	--	0.232	0.232
Bottom side	LTE Band 5	0.087	--	0.087
Right side	LTE Band 5	--	0.232	0.232
Left side	LTE Band 5	0.041	--	0.041
Back	LTE Band 7	0.968	0.232	1.2
Front	LTE Band 7	--	--	--
Top side	LTE Band 7	--	0.232	0.232
Bottom side	LTE Band 7	1.014	--	1.014
Right side	LTE Band 7	--	0.232	0.232
Left side	LTE Band 7	0.146	--	0.146
Back	LTE Band 40	0.684	0.232	0.916

Front	LTE Band 40	--	--	--
Top side	LTE Band 40	--	0.232	0.232
Bottom side	LTE Band 40	0.426	--	0.426
Right side	LTE Band 40	--	0.232	0.232
Left side	LTE Band 40	0.107	--	0.107

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 Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 01/02/2019

Measurement duration: 12 minutes 21 seconds

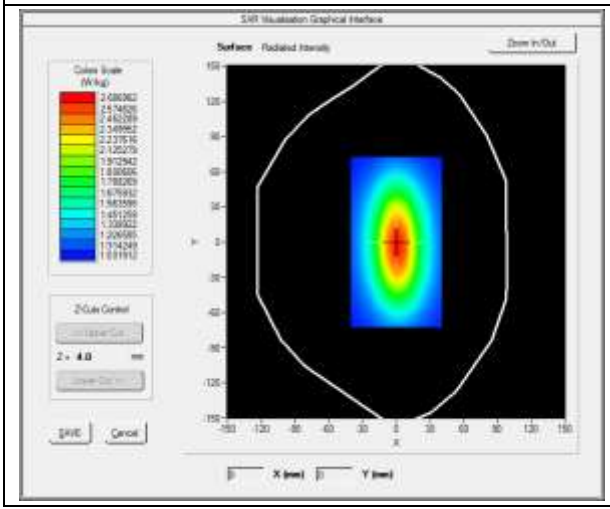
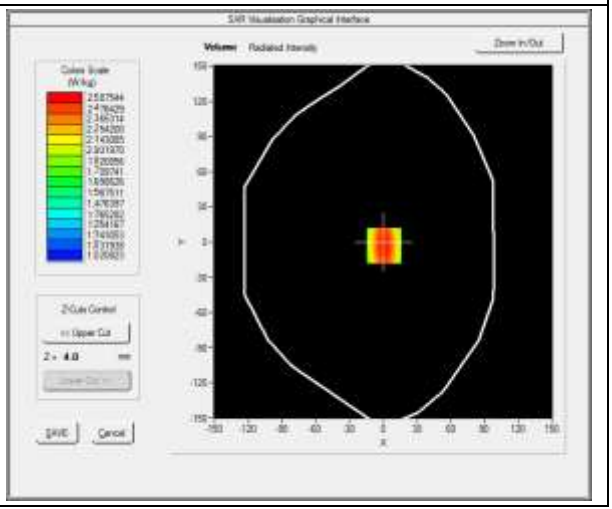
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

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

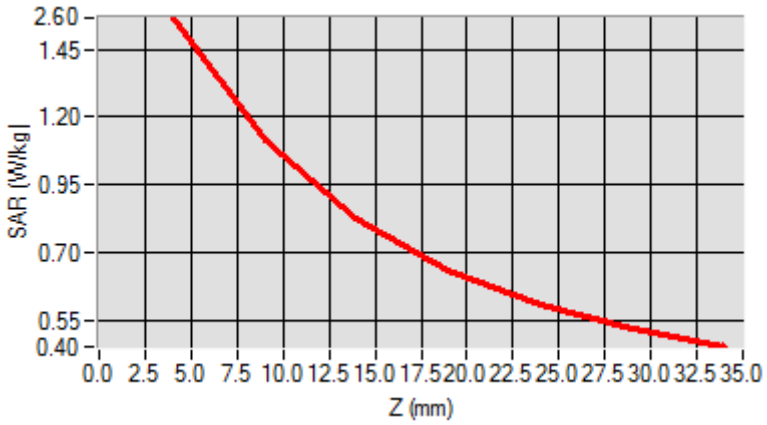
SURFACE SAR	VOLUME SAR
	

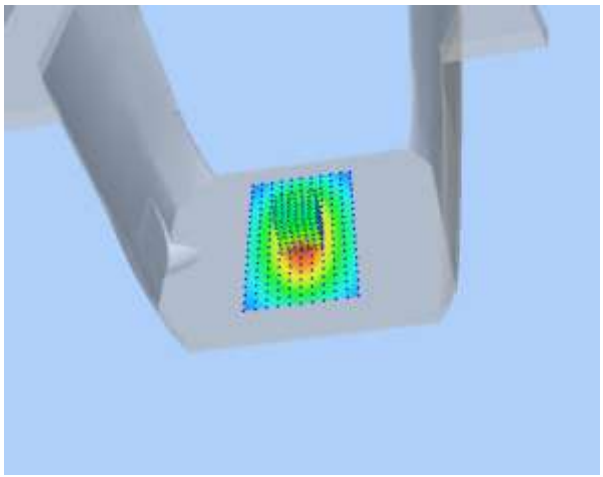
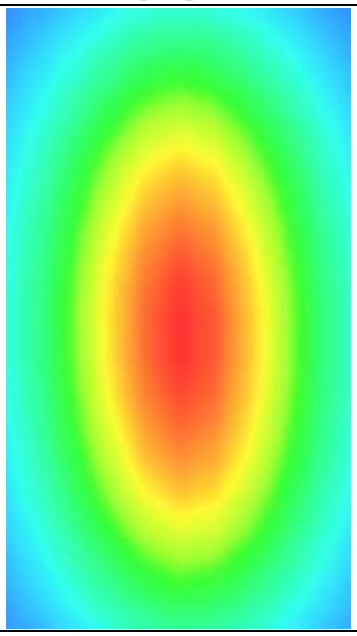
Maximum location: X=0.00, Y=0.00

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 2

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 01/03/2019

Measurement duration: 12 minutes 21 seconds

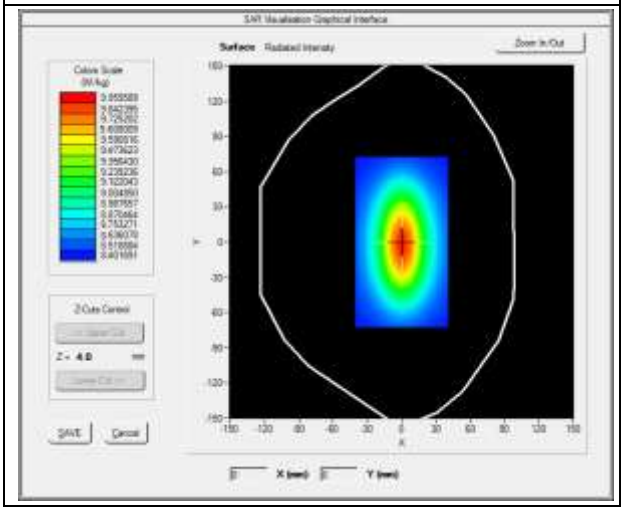
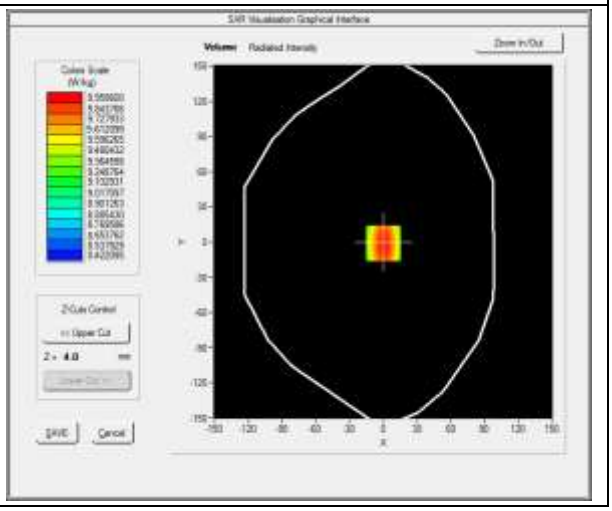
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

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

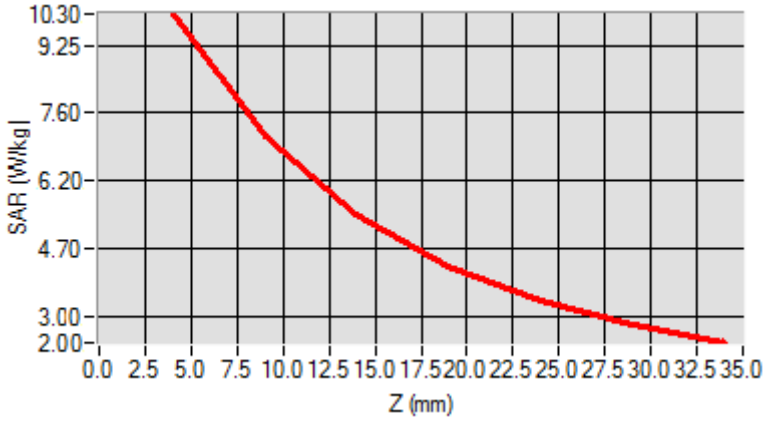
SURFACE SAR	VOLUME SAR
	

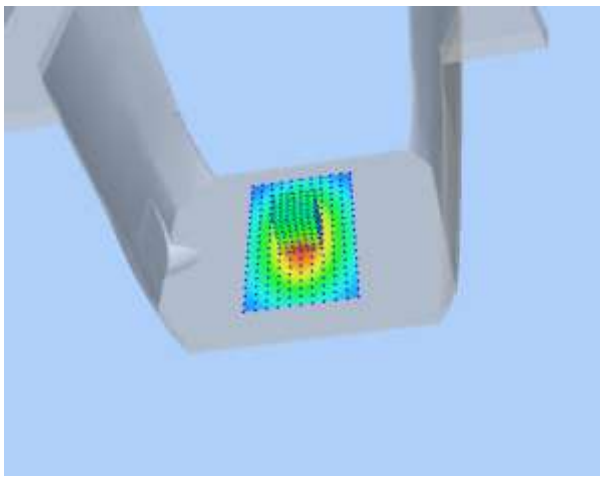
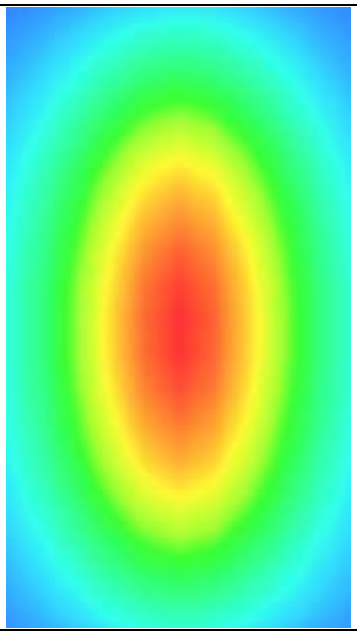
Maximum location: X=0.00, Y=0.00

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
	

MEASUREMENT 3

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 01/04/2019

Measurement duration: 12 minutes 21 seconds

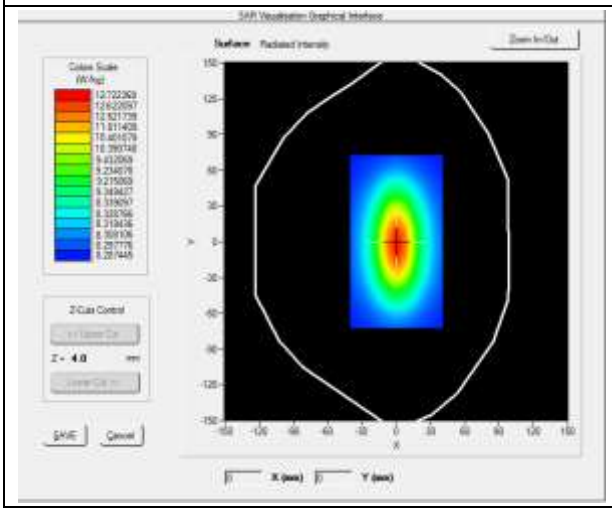
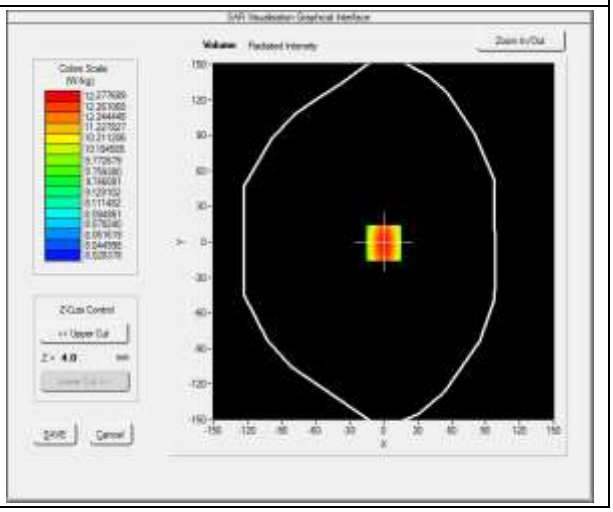
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.80; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	2450.000000
Relative Permittivity (real part)	52.010212
Conductivity (S/m)	1.910255
Power Variation (%)	1.369745
Ambient Temperature	21.1
Liquid Temperature	21.2

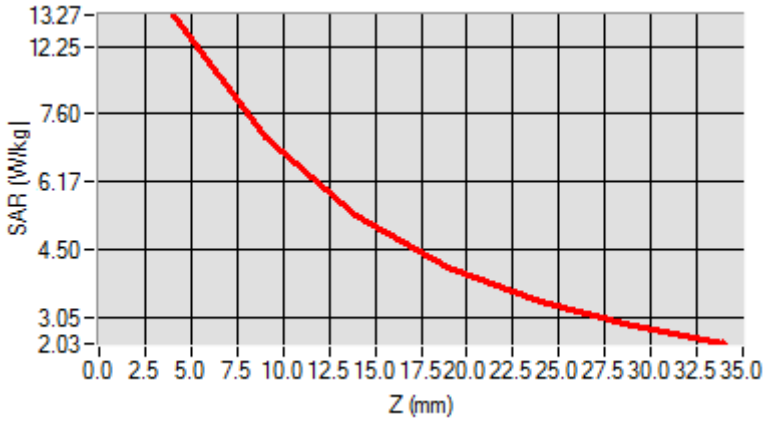
SURFACE SAR	VOLUME SAR
	

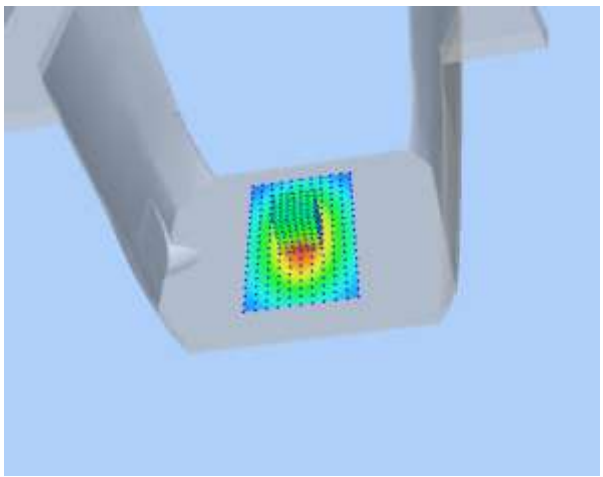
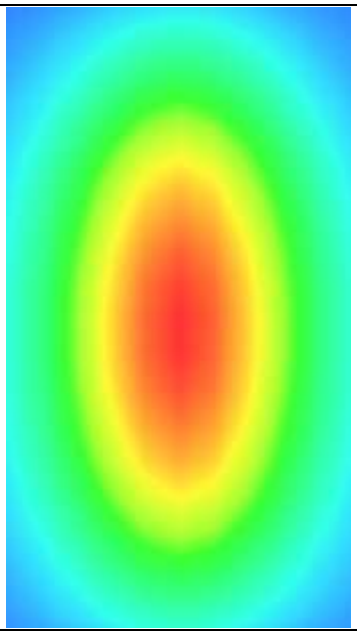
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	6.119522
SAR 1g (W/Kg)	12.592360

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	13.3911	11.7951	9.2945	8.5400	6.3712	4.6225



3D screen shot	Hot spot position
	

MEASUREMENT 4

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 01/04/2019

Measurement duration: 12 minutes 21 seconds

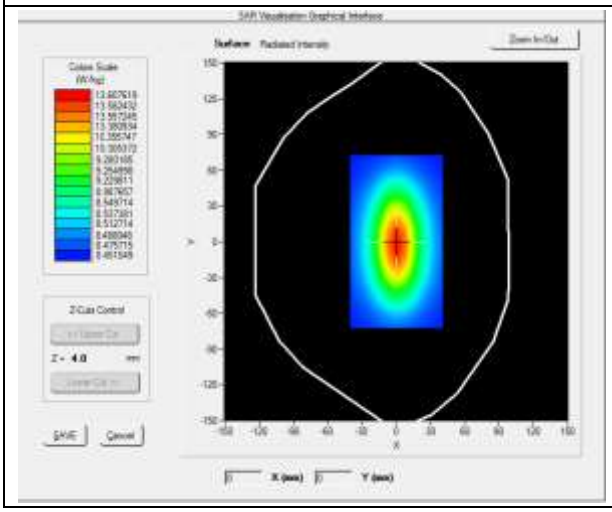
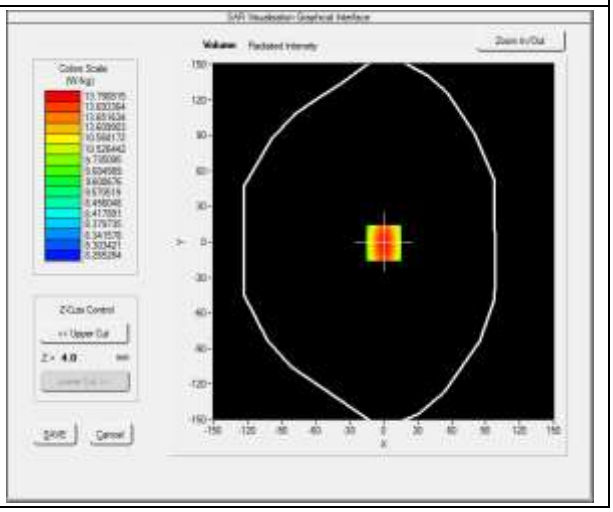
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.58; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	2600.000000
Relative Permittivity (real part)	52.241202
Conductivity (S/m)	2.120943
Power Variation (%)	1.038832
Ambient Temperature	21.1
Liquid Temperature	21.2

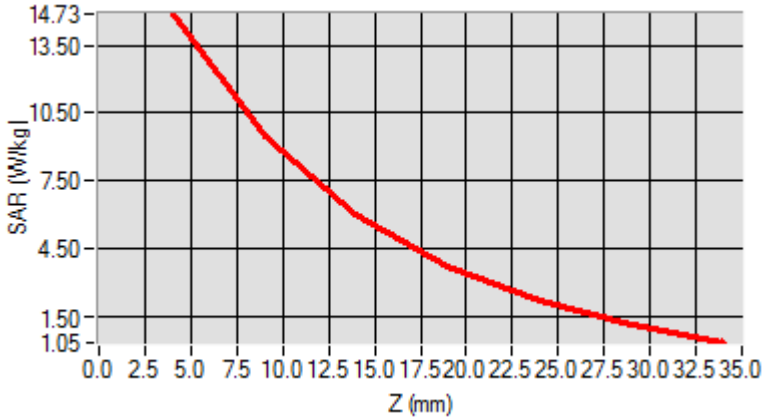
SURFACE SAR	VOLUME SAR
	

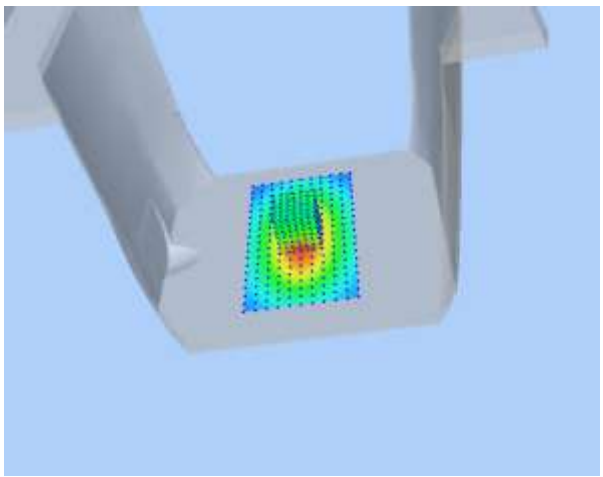
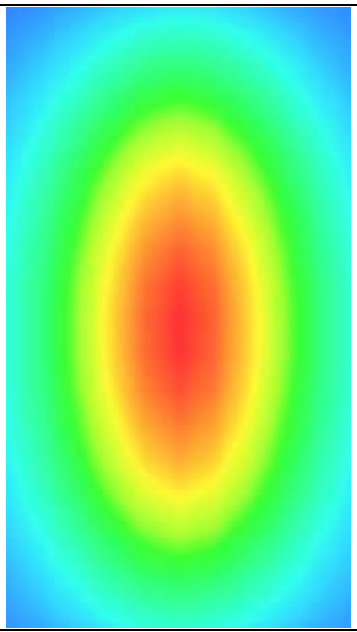
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	6.083781
SAR 1g (W/Kg)	13.430481

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	13.6473	11.8441	9.3627	8.5782	6.4357	4.6342



3D screen shot	Hot spot position
	

Annex B. Plots of SAR Measurement

TYPE	BAND	PARAMETERS
Tablet	**GPRS850_3TX**	Measurement 1: Flat Plane with Back device position on High Channel in GPRS mode
Tablet	**GPRS1900_2TX**	Measurement 5: Flat Plane with Back device position on Middle Channel in GPRS mode
Tablet	**WCDMA850_RMC**	Measurement 10: Flat Plane with Back device position on Middle Channel in WCDMA mode
Tablet	**WCDMA1900_RMC**	Measurement 13: Flat Plane with Back device position on Middle Channel in WCDMA mode
Tablet	**LTE Band 5**	Measurement 18: Flat Plane with Back device position on Low Channel in LTE mode
Tablet	**LTE Band 7**	Measurement 27: Flat Plane with Bottom device position on Low Channel in LTE mode
Tablet	**LTE Band 40 2305-2315MHz**	Measurement 36: Flat Plane with Back device position on Middle Channel in LTE mode
Tablet	**LTE Band 40 2350-2360MHz**	Measurement 42: Flat Plane with Back device position on Middle Channel in LTE mode
Tablet	**WiFi(2.4G)_802.11b**	Measurement 48: Flat Plane with Back side device position on Low Channel in 802.11b mode
Remark: SAR plot is showed the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.		

MEASUREMENT 1

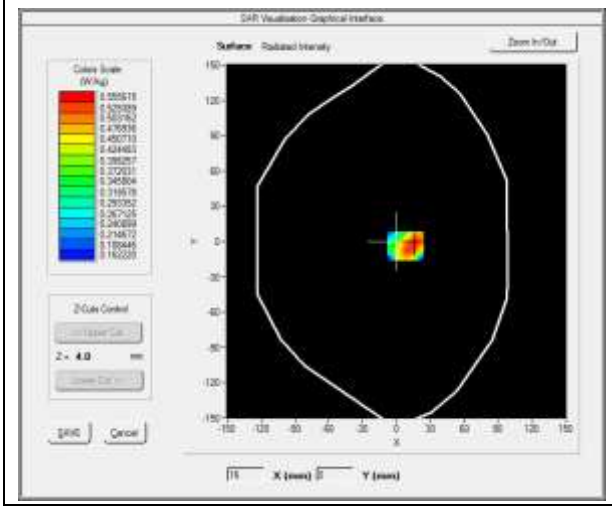
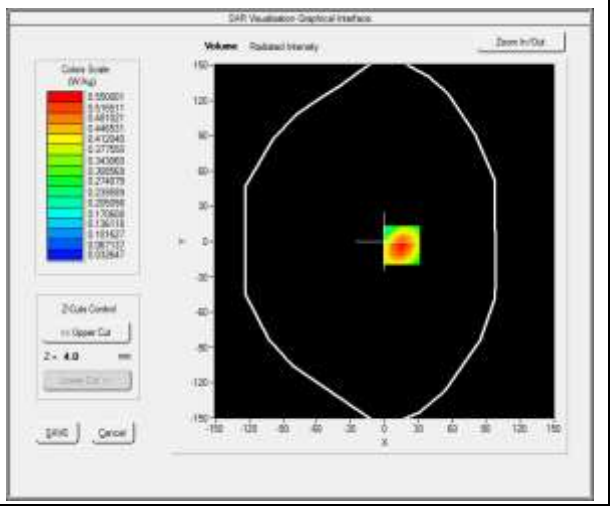
Type: Phone measurement (Complete)
Date of measurement: 01/02/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat plane
Device Position	Back
Band	GPRS850_3TX
Channels	High
Signal	Duty Cycle 1:2.66

B. SAR Measurement Results

Frequency (MHz)	848.800000
Relative Permittivity (real part)	54.851214
Conductivity (S/m)	0.951454
Power Variation (%)	0.903892
Ambient Temperature	21.1
Liquid Temperature	21.3

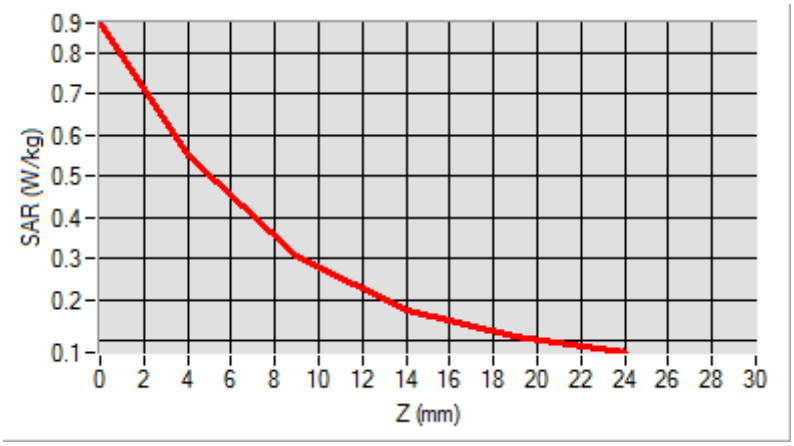
SURFACE SAR	VOLUME SAR
	

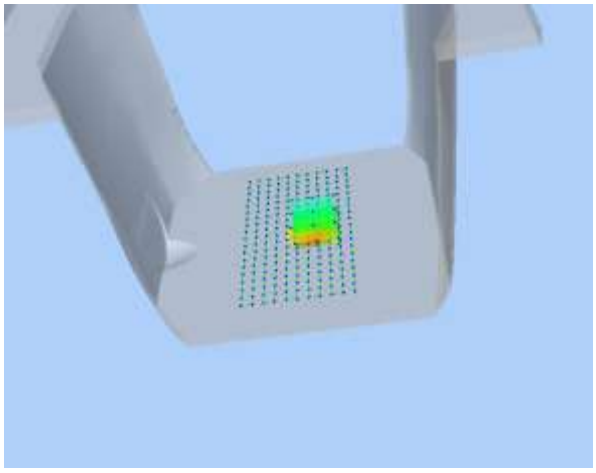
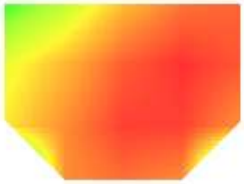
Maximum location: X=15.00, Y=-3.00

SAR Peak: 0.87 W/kg

SAR 10g (W/Kg)	0.304017
SAR 1g (W/Kg)	0.522280

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.8716	0.5500	0.3039	0.1735	0.1085



3D screen shot	Hot spot position
	

MEASUREMENT 5

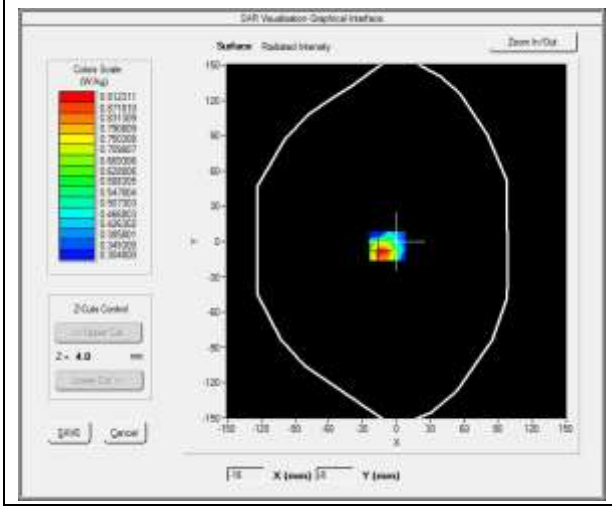
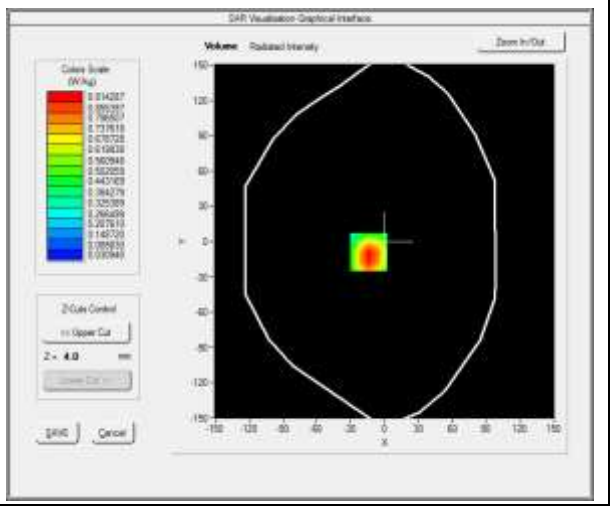
Type: Phone measurement (Complete)
Date of measurement: 01/03/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat plane
Device Position	Back
Band	GPRS1900_2TX
Channels	Middle
Signal	Duty Cycle 1:4

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative Permittivity (real part)	52.420415
Conductivity (S/m)	1.501966
Power Variation (%)	0.642662
Ambient Temperature	21.1
Liquid Temperature	21.3

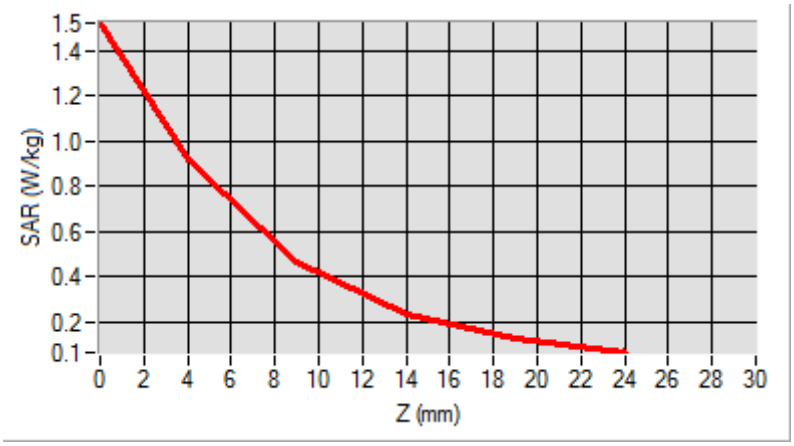
SURFACE SAR	VOLUME SAR
	

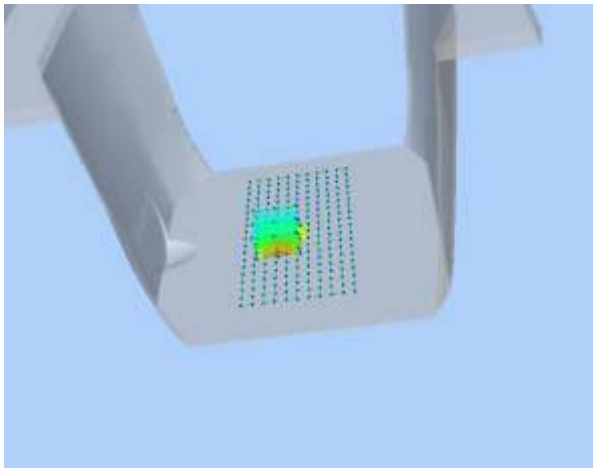
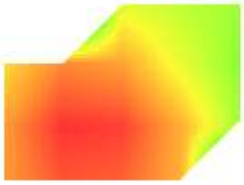
Maximum location: X=-14.00, Y=-9.00

SAR Peak: 1.55 W/kg

SAR 10g (W/Kg)	0.458828
SAR 1g (W/Kg)	0.876050

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.5202	0.9143	0.4638	0.2343	0.1253



3D screen shot	Hot spot position
	

MEASUREMENT 10

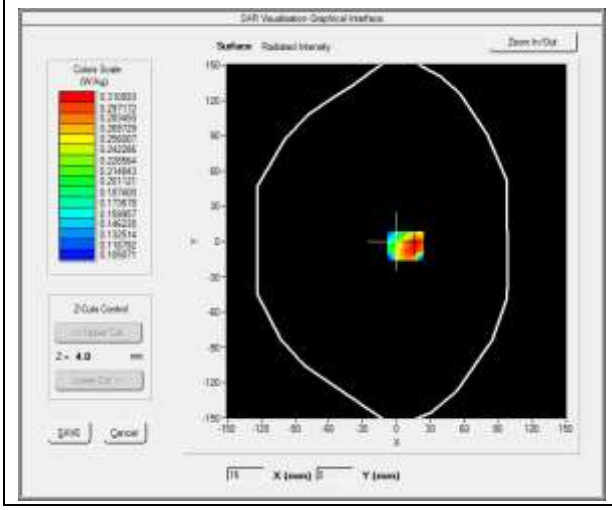
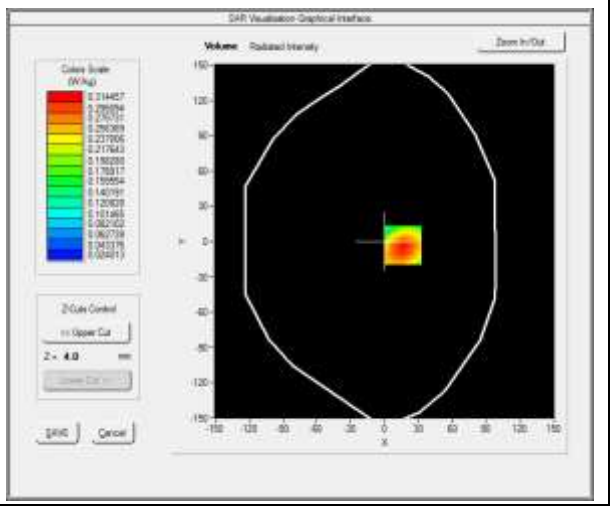
Type: Phone measurement (Complete)
Date of measurement: 01/02/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

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	Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	836.400000
Relative Permittivity (real part)	54.851214
Conductivity (S/m)	0.951454
Power Variation (%)	0.707382
Ambient Temperature	21.1
Liquid Temperature	21.3

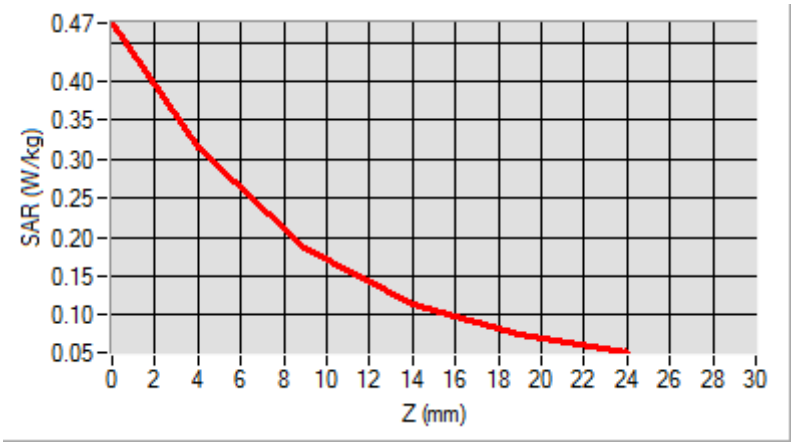
SURFACE SAR	VOLUME SAR
	

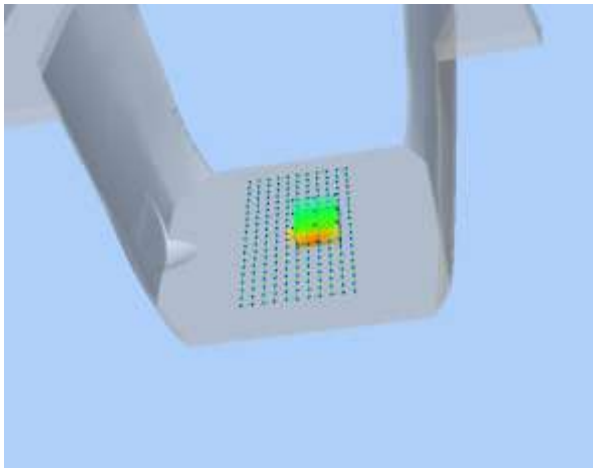
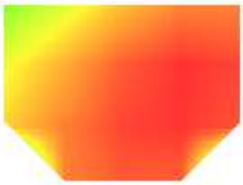
Maximum location: X=16.00, Y=-3.00

SAR Peak: 0.48 W/kg

SAR 10g (W/Kg)	0.185416
SAR 1g (W/Kg)	0.301366

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4750	0.3145	0.1866	0.1147	0.0761



3D screen shot	Hot spot position
	

MEASUREMENT 13

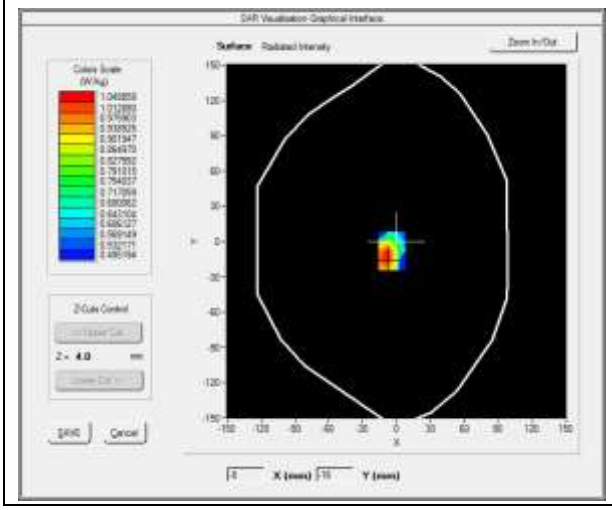
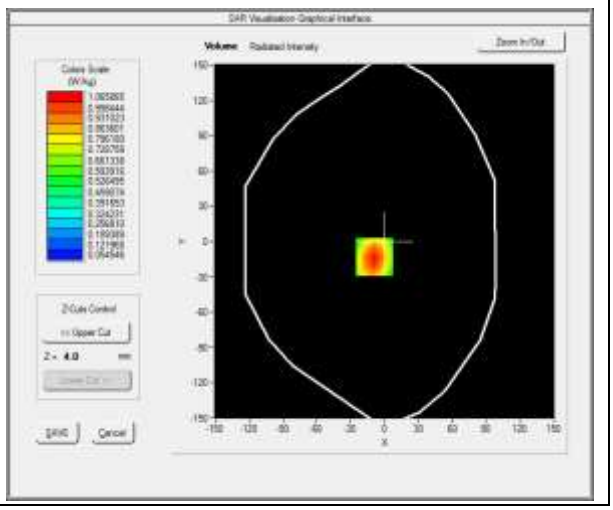
Type: Phone measurement (Complete)
Date of measurement: 01/03/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Back
Band	WCDMA1900_RMC
Channels	Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative Permittivity (real part)	52.420415
Conductivity (S/m)	1.501966
Power Variation (%)	0.706372
Ambient Temperature	21.1
Liquid Temperature	21.3

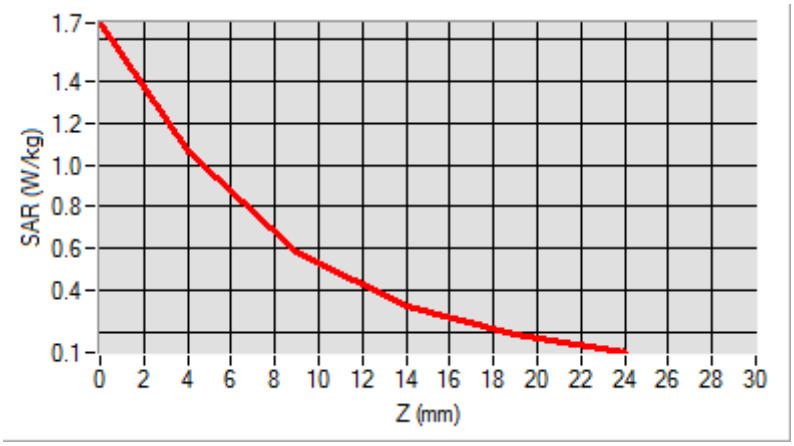
SURFACE SAR	VOLUME SAR
	

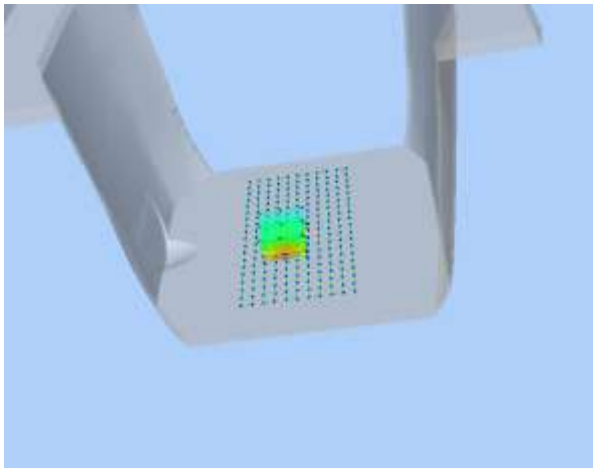
Maximum location: X=-9.00, Y=-13.00

SAR Peak: 1.68 W/kg

SAR 10g (W/Kg)	0.560473
SAR 1g (W/Kg)	1.007620

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.6798	1.0659	0.5856	0.3213	0.1825



3D screen shot	Hot spot position
	

MEASUREMENT 18

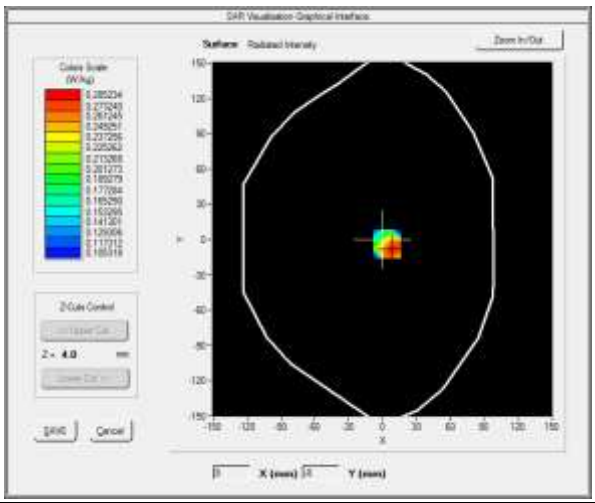
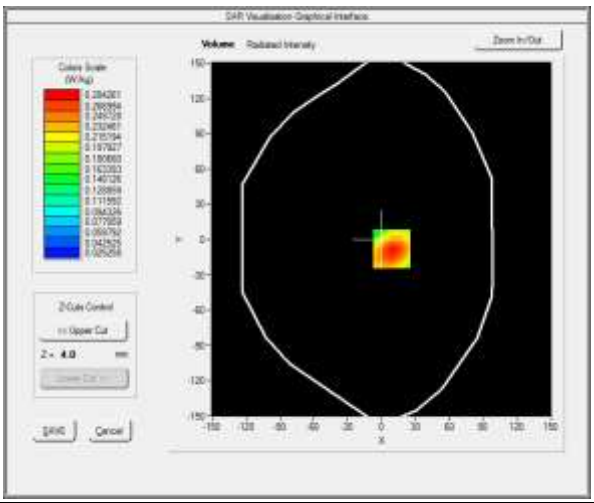
Type: Phone measurement (Complete)
Date of measurement: 01/02/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

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

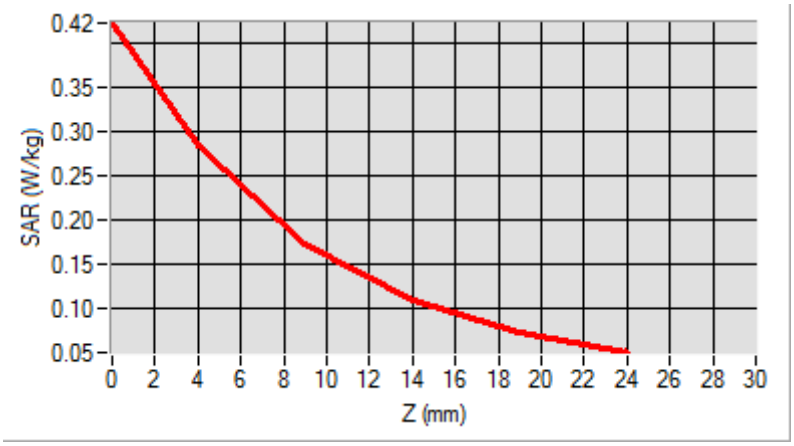
SURFACE SAR	VOLUME SAR
	

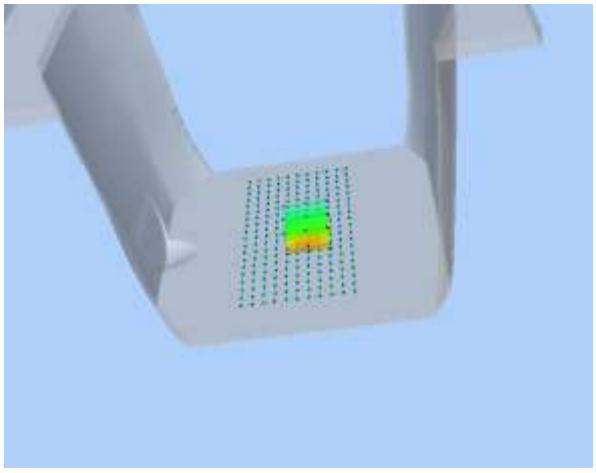
Maximum location: X=9.00, Y=-8.00

SAR Peak: 0.42 W/kg

SAR 10g (W/Kg)	0.169846
SAR 1g (W/Kg)	0.271530

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4220	0.2843	0.1727	0.1085	0.0729



3D screen shot	Hot spot position
	

MEASUREMENT 27

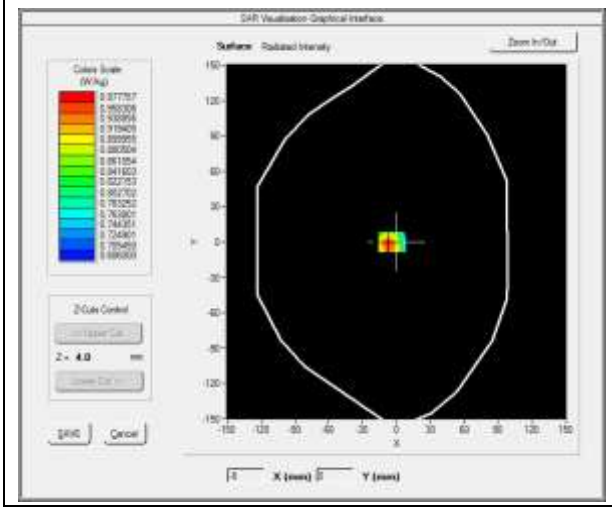
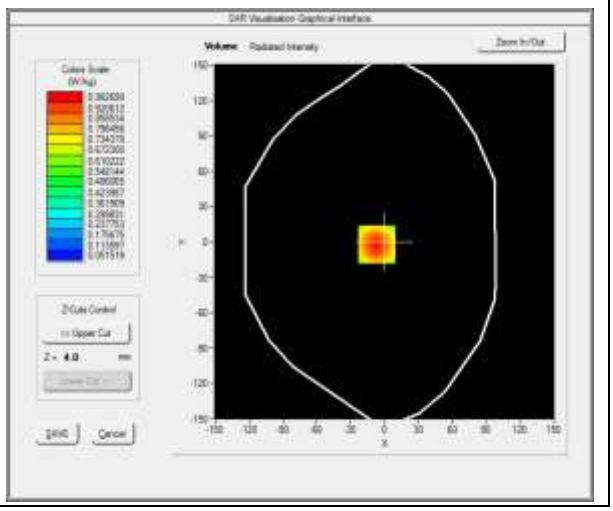
Type: Phone measurement (Complete)
Date of measurement: 01/04/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.58; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat Plane
Device Position	Bottom
Band	LTE Band 7
Channels	QPSK, 20MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	2510.000000
Relative Permittivity (real part)	52.241202
Conductivity (S/m)	2.120943
Power Variation (%)	3.261771
Ambient Temperature	21.1
Liquid Temperature	21.2

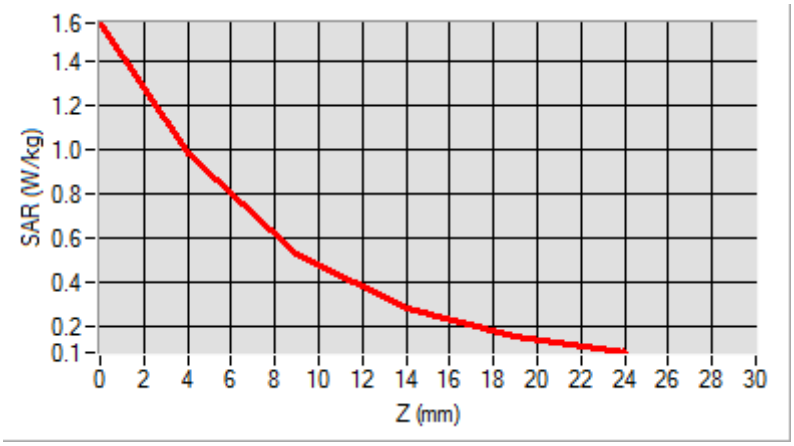
SURFACE SAR	VOLUME SAR
	

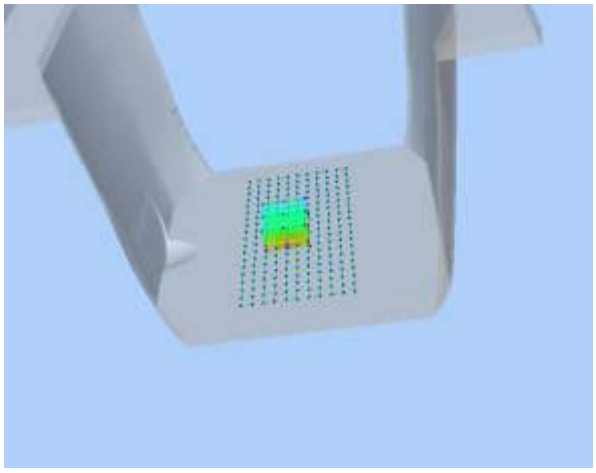
Maximum location: X=-7.00, Y=-2.00

SAR Peak: 1.58 W/kg

SAR 10g (W/Kg)	0.519352
SAR 1g (W/Kg)	0.933105

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.5767	0.9827	0.5245	0.2774	0.1512



3D screen shot	Hot spot position
	

MEASUREMENT 36

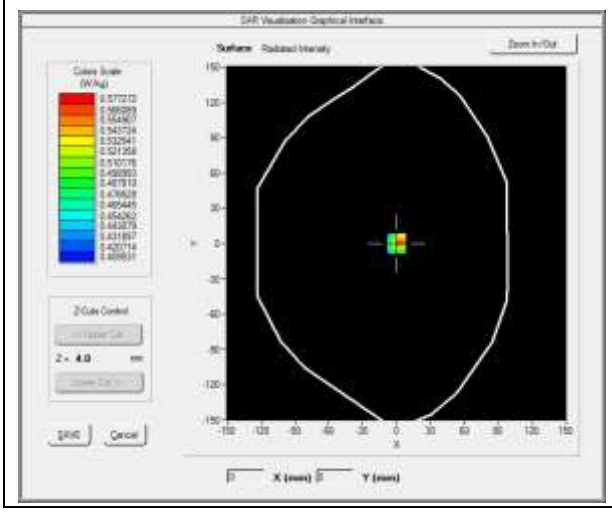
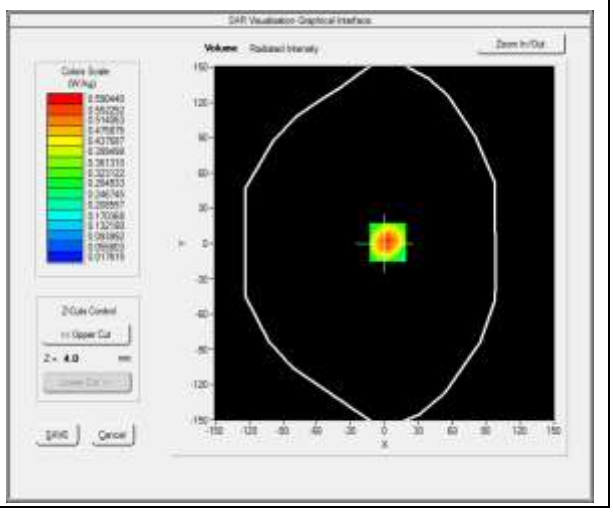
Type: Phone measurement (Complete)
Date of measurement: 01/04/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.80; Calibrated: 06/01/2018

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 40
Channels	QPSK, 10MHz, 1RB, Middle
Signal	Duty Cycle: 1:1.58

B. SAR Measurement Results

Frequency (MHz)	2310.000000
Relative Permittivity (real part)	52.010212
Conductivity (S/m)	1.910255
Power Variation (%)	2.492743
Ambient Temperature	21.1
Liquid Temperature	21.2

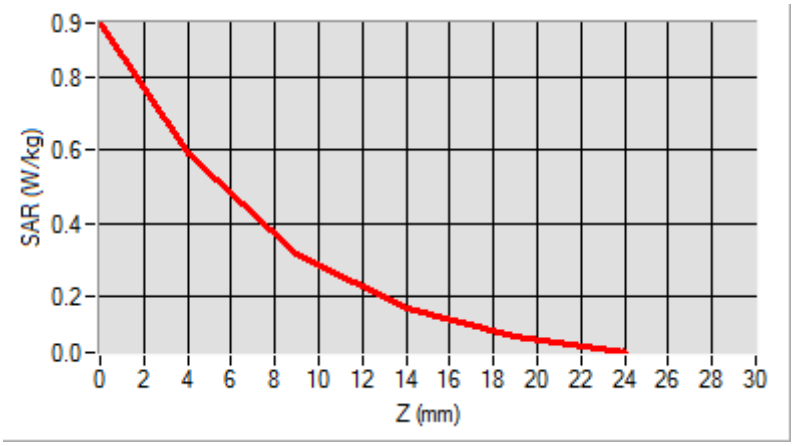
SURFACE SAR	VOLUME SAR
	

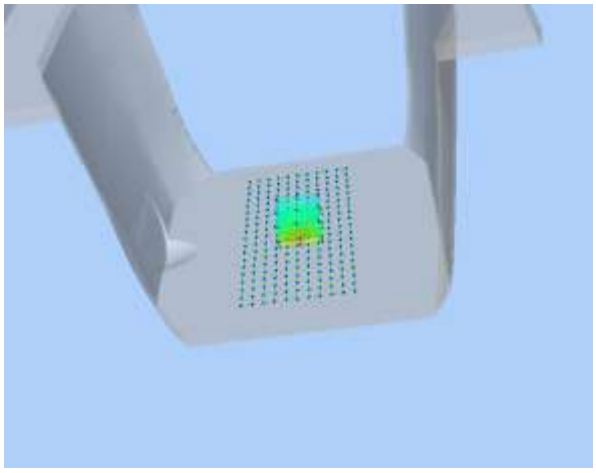
Maximum location: X=3.00, Y=1.00

SAR Peak: 0.95 W/kg

SAR 10g (W/Kg)	0.289922
SAR 1g (W/Kg)	0.551382

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.9468	0.5904	0.3150	0.1660	0.0895



3D screen shot	Hot spot position
	

MEASUREMENT 42

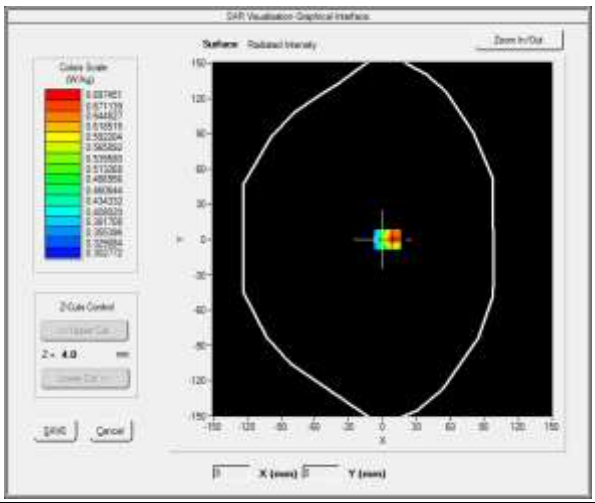
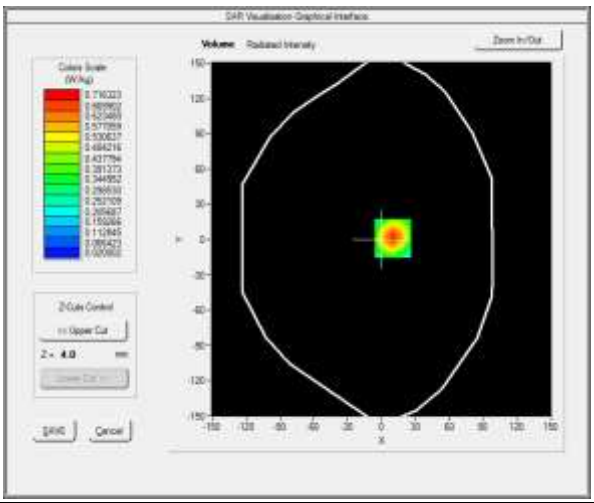
Type: Phone measurement (Complete)
Date of measurement: 01/04/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.80; Calibrated: 06/01/2018

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 40
Channels	QPSK, 10MHz, 1RB, Middle
Signal	Duty Cycle: 1:1.58

B. SAR Measurement Results

Frequency (MHz)	2355.000000
Relative Permittivity (real part)	52.010212
Conductivity (S/m)	1.910255
Power Variation (%)	2.017811
Ambient Temperature	21.1
Liquid Temperature	21.2

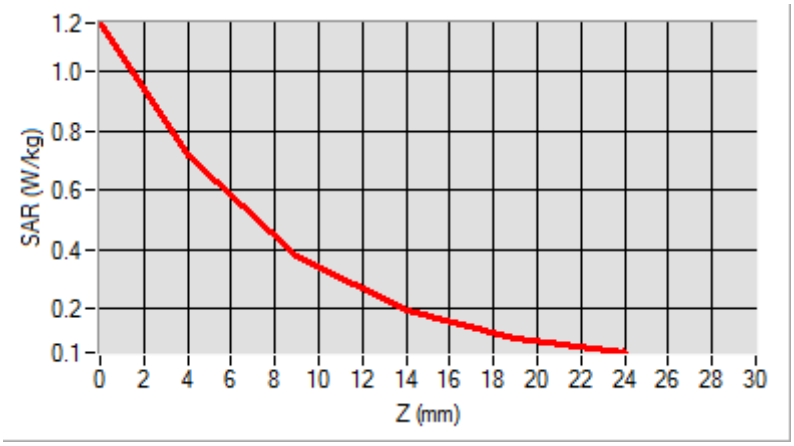
SURFACE SAR	VOLUME SAR
	

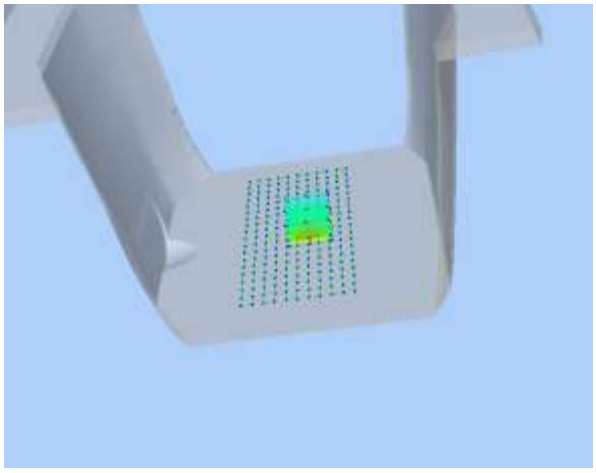
Maximum location: X=10.00, Y=1.00

SAR Peak: 1.16 W/kg

SAR 10g (W/Kg)	0.342725
SAR 1g (W/Kg)	0.667133

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.1649	0.7163	0.3743	0.1931	0.1026



3D screen shot	Hot spot position
	

MEASUREMENT 48

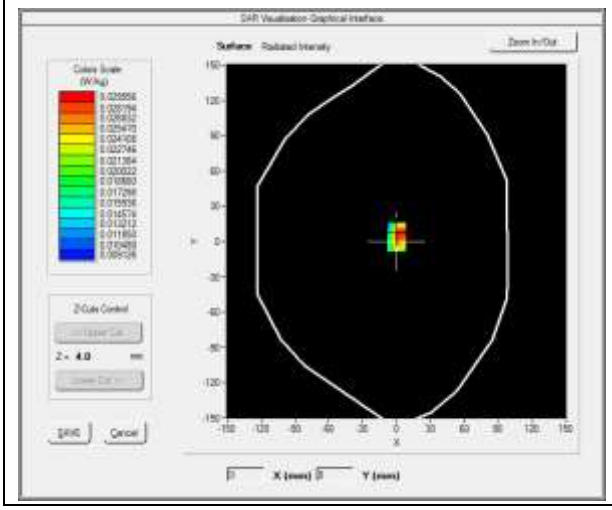
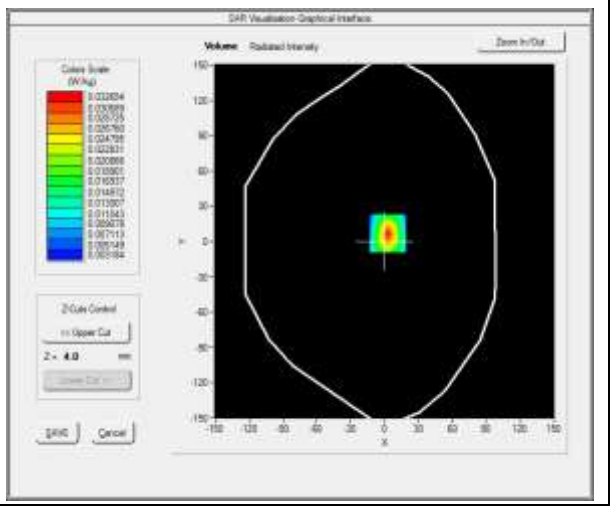
Type: Phone measurement (Complete)
Date of measurement: 01/04/2019
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.80; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Back
Band	WiFi_802.11b
Channels	Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	2412.000000
Relative Permittivity (real part)	52.010212
Conductivity (S/m)	1.910255
Power Variation (%)	0.462345
Ambient Temperature	21.1
Liquid Temperature	21.2

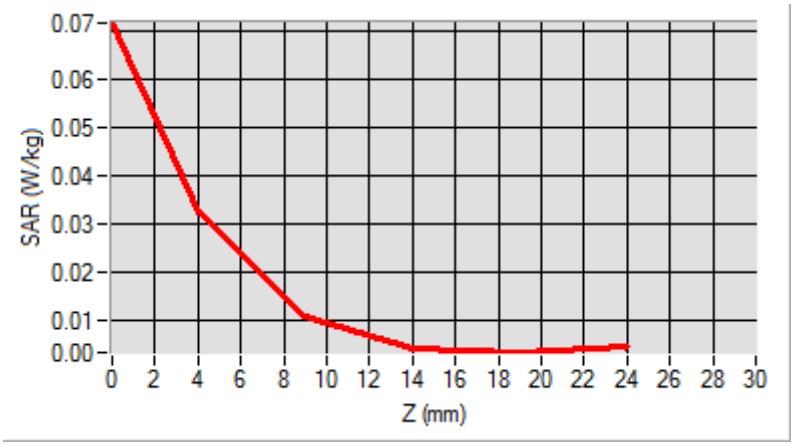
SURFACE SAR	VOLUME SAR
	

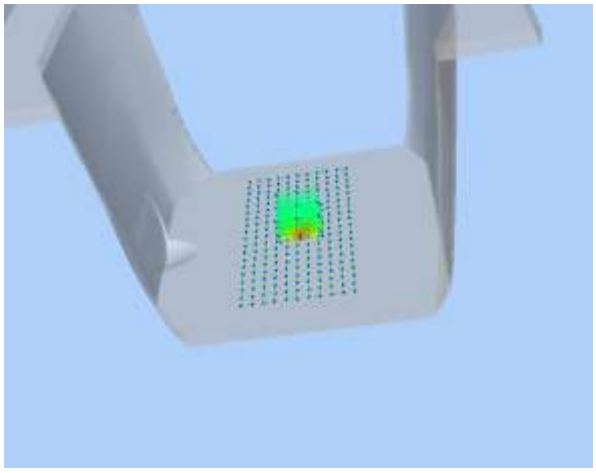
Maximum location: X=3.00, Y=7.00

SAR Peak: 0.07 W/kg

SAR 10g (W/Kg)	0.014120
SAR 1g (W/Kg)	0.031107

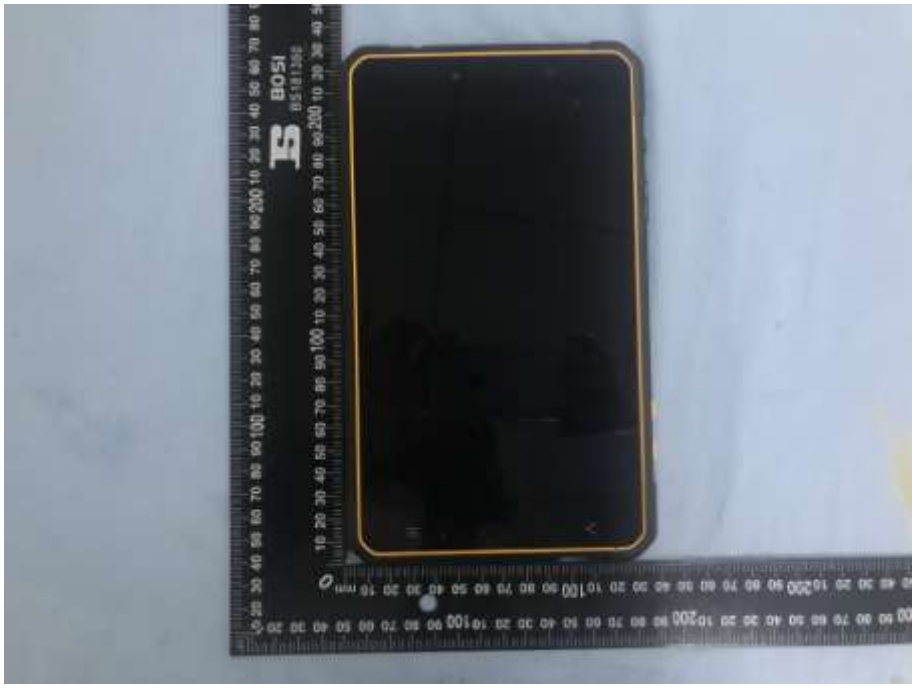
Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0718	0.0327	0.0106	0.0040	0.0032



3D screen shot	Hot spot position
	

Annex C. EUT Photos

EUT View Front



EUT View Back

Antenna View

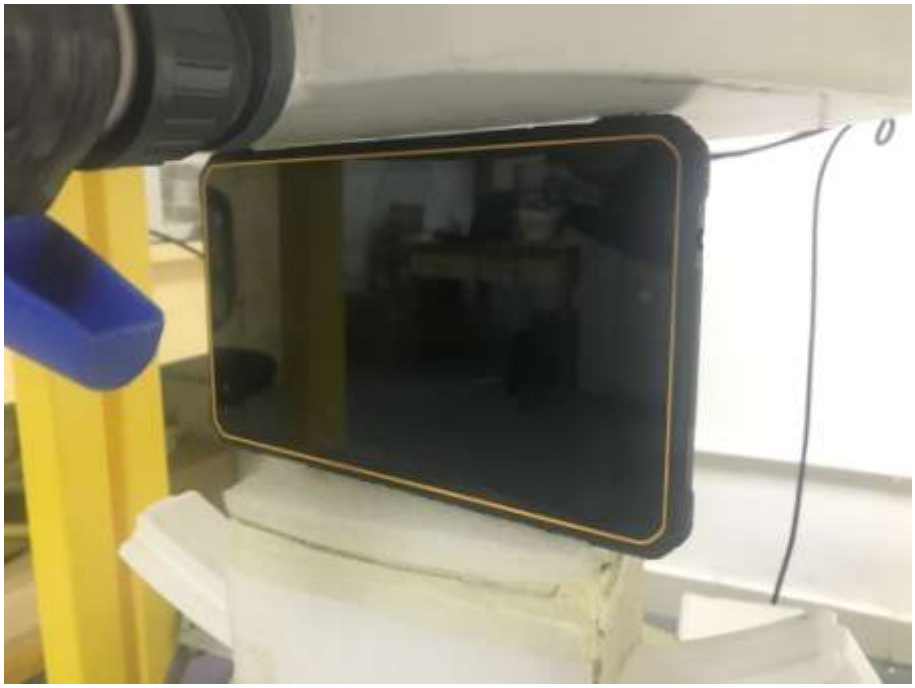
Annex D. Test Setup Photos

Body Exposure Conditions

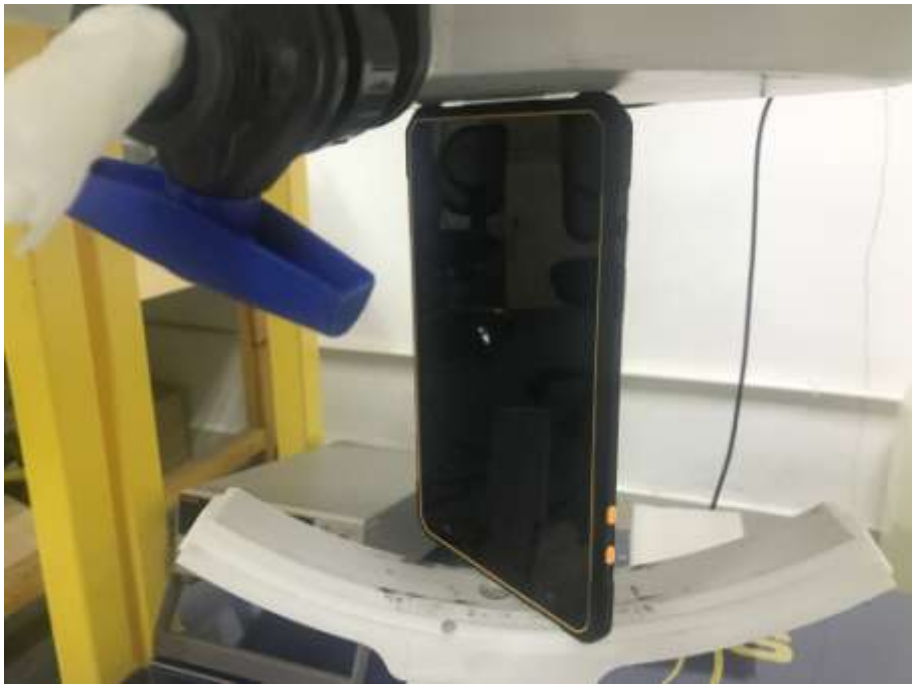
Body Back

Body Right

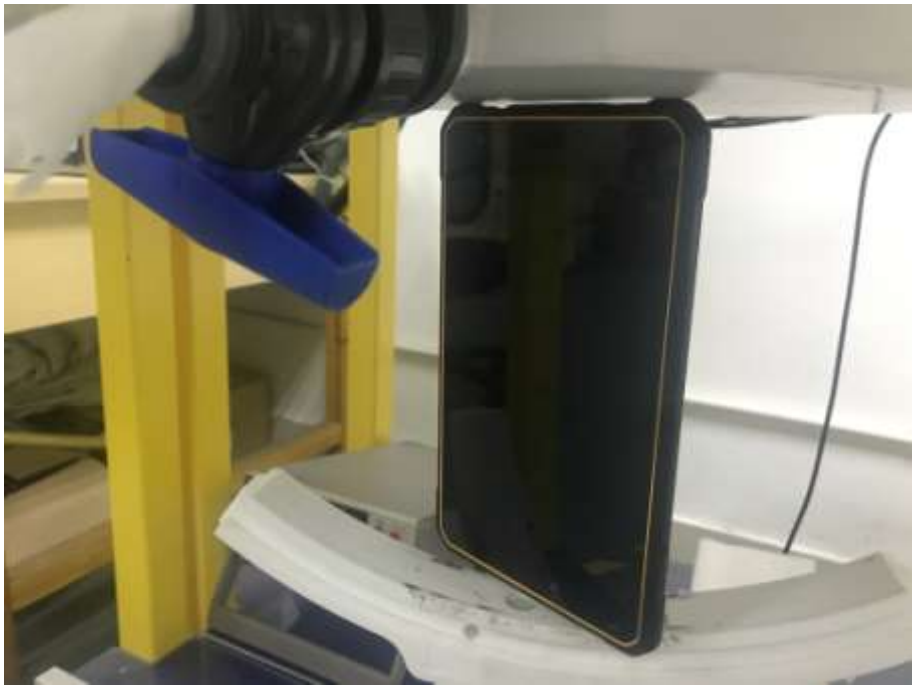
Body Left



Body Top



Body Bottom



Annex E. Calibration Certificate

Please refer to the Exhibit for the Calibration Certificate

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