FCC SAR
Measurement and Test Report

For

Guardian Band lnc.

437 Dimmocks Mill Rd.Hillsborough, NC 27278

FCC ID: 2AROTGB

Test Standards:	FCC Part 2.1093 ANSI / IEEE C95.1 : 2005+A1:2010 ANSI / IEEE C95.3 : 2002(R2008) IEEE 1528 :2013
Product Description:	Guardian Band
Tested Model:	G|B
Report No.:	STR18098240H
Sample Received Date:	2018-10-08
Tested Date:	2018-10-08 to 2018-10-11
Issued Date:	2018-10-12
Tested By:	Lucy Wei / Engineer
Reviewed By:	Silin Chen / EMC Manager
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Prepared By:	

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1. General Information

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Guardian Band lnc.
Address of applicant:	437 Dimmocks Mill Rd.Hillsborough, NC 27278
Manufacturer:	Shenzhen eIoT Technology Co.,Ltd.
Address of manufacturer:	North Wing of 2F, Building 2, Vision Business Park, No.9 High-Tech Park South Ninth Avenue, Nanshan District, Shenzhen.China

General Description of EUT:	
Product Name:	Guardian Band
Brand Name:	Guardian Band
Model No.:	G|B
Adding Model(s):	/
Rated Voltage:	3.8V
Battery:	440mAh
Device Category:	Portable Device
The EUT Main board support GSM850/900/DCS1800/PCS1900, WCDMA Band 2/5, LTE Band 2/4/12 function. It is intended for speech, Multimedia Message Service (MMS) transmission. It is equipped with GPRS/EDGE class 12 for GSM850/900/DCS1800/PCS1900, GPS, Wi-Fi functions. For more information see the following datasheet	
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT:	
2G	
Support Networks:	GSM, GPRS, EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS/EDGE 850: 869~894MHz GSM/GPRS/EDGE 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 32.67dBm, GSM1900: 28.73dBm EDGE850: 27.53dBm, EDGE1900: 26.53dBm
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850: 0.5dBi; GSM1900: 1.2dBi
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: 22.44dBm, WCDMA Band 5: 23.00dBm
Type of Modulation:	BPSK, QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: 1.2dBi,WCDMA Band 5: 0.5dBi
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 2, 4, 12
Uplink Frequency:	FDD-LTE Band 2: Tx: 1850-1910MHz, FDD-LTE Band 4: Tx: 1710-1755MHz, FDD-LTE Band 12: Tx: 699-716MHz
Downlink Frequency:	FDD-LTE Band 2: Rx: 1930-1990MHz, FDD-LTE Band 4: Rx: 2110-2155MHz, FDD-LTE Band 12: Rx: 729-746MHz
RF Output Power:	FDD-LTE Band 2: 23.05dBm, FDD-LTE Band 4: 23.38dBm, FDD-LTE Band 12: 24.18dBm
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 2: 1.2dBi, FDD-LTE Band 4: 1.3dBi, FDD-LTE Band 12: 0.8dBi,

WIFI	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz for 11b/g/n(HT20) 2422-2452MHz for 11n(HT40)
RF Output Power:	16.6dBm (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:	1.2dBi

1.2 Test Standards

The following report is prepared on behalf of the Guardian Band lnc. in accordance with FCC 47 CFR Part 2.1093, ANSI/IEEE C95.1-2005, ANSI / IEEE C95.3 :2002, IEEE 1528-2013, KDB 447498 D01 v06, KDB 248227 D01 v02r02, KDB 941225 D01 v03r01, KDB 941225 D05 v02r05 , and KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02.

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:

Near to Mouth(10mm Gap)

Frequency Band	Maximum SAR_{1g} (W/kg)	SAR_{1g} Limit (W/kg)
GSM	0.663	1.6
WCDMA	1.175	1.6
FDD-LTE	**1.268**	1.6
WLAN 2.4G	0.212	1.6
Simultaneous Transmission	**1.480**	1.6

Wrist-worn(0mm Gap)

Frequency Band	Maximum SAR_{10g} (W/kg)	SAR_{10g} Limit (W/kg)
GSM	1.495	4.0
WCDMA	1.677	4.0
FDD-LTE	**1.759**	4.0
WLAN 2.4G	0.405	4.0
Simultaneous Transmission	**2.164**	4.0

Remark:

*The highest reported SAR values for Near to Mouth , Wrist-worn and simultaneous transmission conditions are **1.268 W/kg , 1.759W/kg and 2.164W/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, and had been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2013 and 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

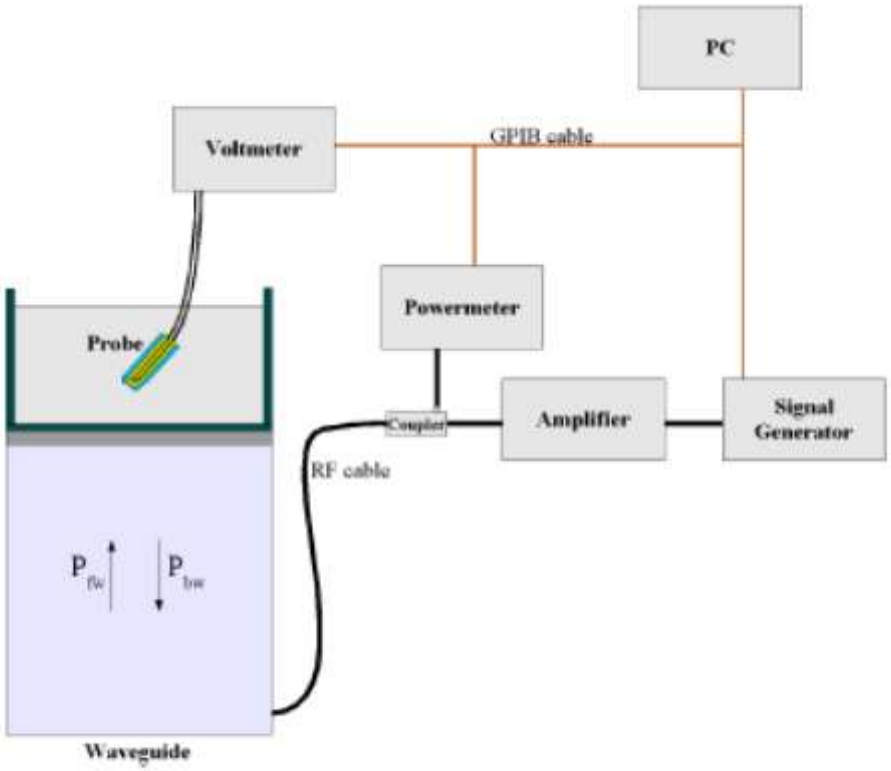
For the measurements the Specific Dosimetric E-Field Probe SSE5 SN 09/13 EP168 with following specifications is used

- 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.



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

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.

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

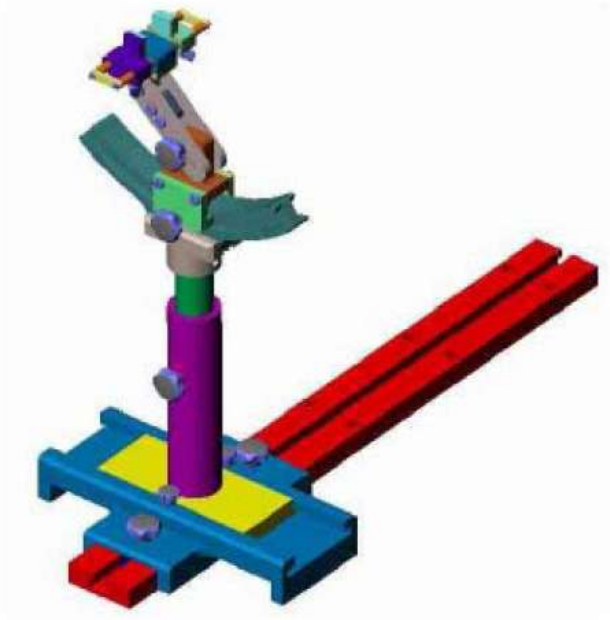
Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

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
750MHz Dipole	MVG	SID750	SN 47/12 DIP 0G750-203	2018-03-20	2019-03-19
835MHz Dipole	MVG	SID835	SN 47/12 DIP 0G835-204	2018-03-20	2019-03-19
1800MHz Dipole	MVG	SID1800	SN 47/12 DIP 1G800-206	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
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	Agilent	N5182A	MY47070282	2018-05-22	2019-05-21
Universal Tester	Rohde & Schwarz	CMU200	112315	2018-05-22	2019-05-21
Communications Tester	Rohde & Schwarz	CMW500	148650	2018-05-22	2019-05-21
Network Analyzer	HP	8753C	SEMT-1064	2018-05-22	2019-05-21
Directional Couplers	Agilent	778D	SEMT-1198	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						
750	41.1	1.4	57.0	0.2	0.3	0
835	40.3	1.4	57.9	0.2	0.2	0
1800-1900	55.2	0.3	0	0	0	44.5
2450	55.0	0.1	0	0	0	44.9
Body						
750	50.0	0.8	48.8	0.2	0.2	0
835	50.8	0.9	48.1	0.1	0.1	0
1800-1900	70.2	0.4	0	0	0	29.4
2450	68.6	0.1	0	0	0	31.3

5.2 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

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
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 (%)		
750	21.2	0.86	0.89	-3.37	41.32	41.90	-1.38	±5	2018-10-08
835	21.2	0.87	0.90	-3.33	41.11	41.50	-0.94	±5	2018-10-08
1750	21.3	1.37	1.37	0.00	39.02	40.1	-2.69	±5	2018-10-09
1800	21.3	1.37	1.40	-2.14	39.02	40.0	-2.45	±5	2018-10-09
1900	21.3	1.38	1.40	-1.43	38.56	40.00	-3.60	±5	2018-10-09
2450	21.3	1.74	1.80	-3.33	38.15	39.20	-2.68	±5	2018-10-10

Body Tissue Simulating Liquid									
Freq. MHz.	Temp. (℃)	Conductivity			Permittivity			Limit (%)	Date
		Reading (σ)	Target (σ)	Delta (%)	Reading (ε r)	Target (ε r)	Delta (%)		
750	21.2	0.93	0.96	-3.12	54.96	55.50	-0.97	±5	2018-10-08
835	21.2	0.95	0.97	-2.06	54.85	55.20	-0.63	±5	2018-10-08
1750	21.3	1.46	1.49	-2.01	51.22	53.40	-4.08	±5	2018-10-09
1800	21.3	1.46	1.52	-3.95	51.22	53.30	-3.90	±5	2018-10-09
1900	21.3	1.50	1.52	-1.32	52.42	53.30	-1.65	±5	2018-10-09
2450	21.3	1.91	1.95	-2.05	52.01	52.70	-1.31	±5	2018-10-10

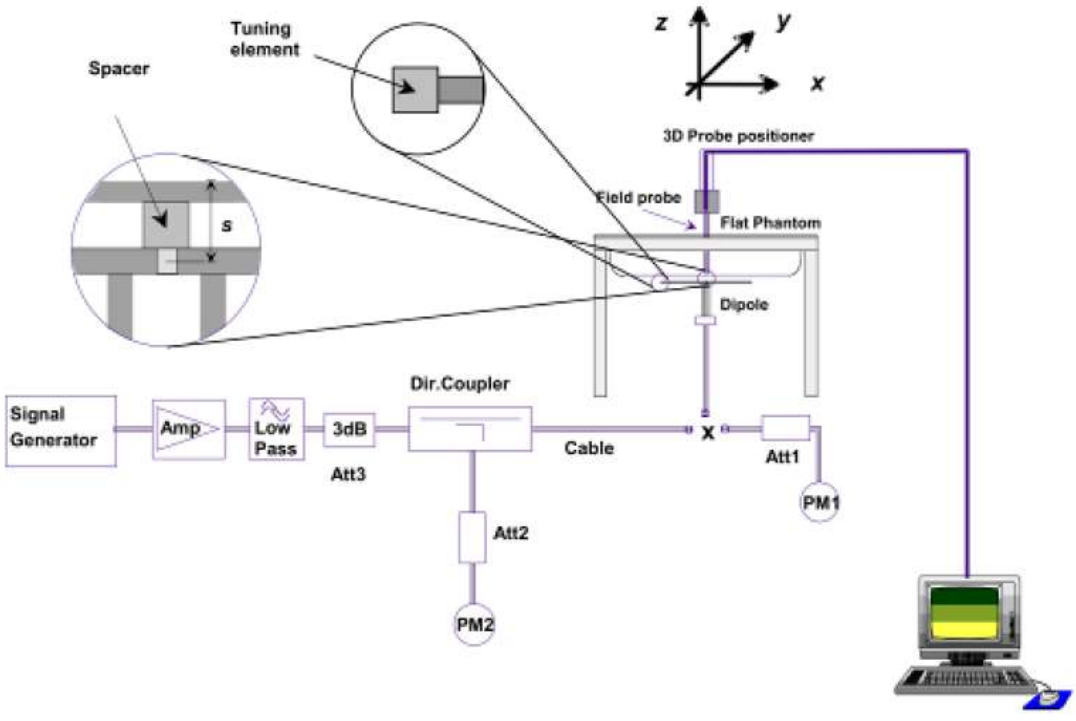
6. SAR Measurement Evaluation

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 and 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 24 dBm(250 mW) 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				
750	8.40	2.16	8.64	2.86
835	9.67	2.41	9.64	-0.31
1800	38.51	9.61	38.44	-0.18
1900	39.58	9.91	39.64	0.15
2450	53.69	13.45	53.8	0.20

Frequency	Targeted SAR_{10g}	Measured SAR_{10g}	Normalized SAR_{10g}	Tolerance
MHz	(W/kg)	(W/kg)	(W/kg)	(%)
Body				
750	5.51	1.30	5.2	-5.63
835	6.23	1.53	6.12	-1.77
1800	20.85	5.22	20.88	0.14
1900	20.58	5.13	20.52	-0.29
2450	23.35	6.12	24.48	4.84

Remark: Referring to IEEE 1528-2013, Section 8.2, The system check shall be performed at a test frequency that is within ±10% or ±100 MHz of the compliance test mid-band frequency, so the 1750 MHz system verification is made of 1800MHz Dipole.

Targeted and Measurement SAR

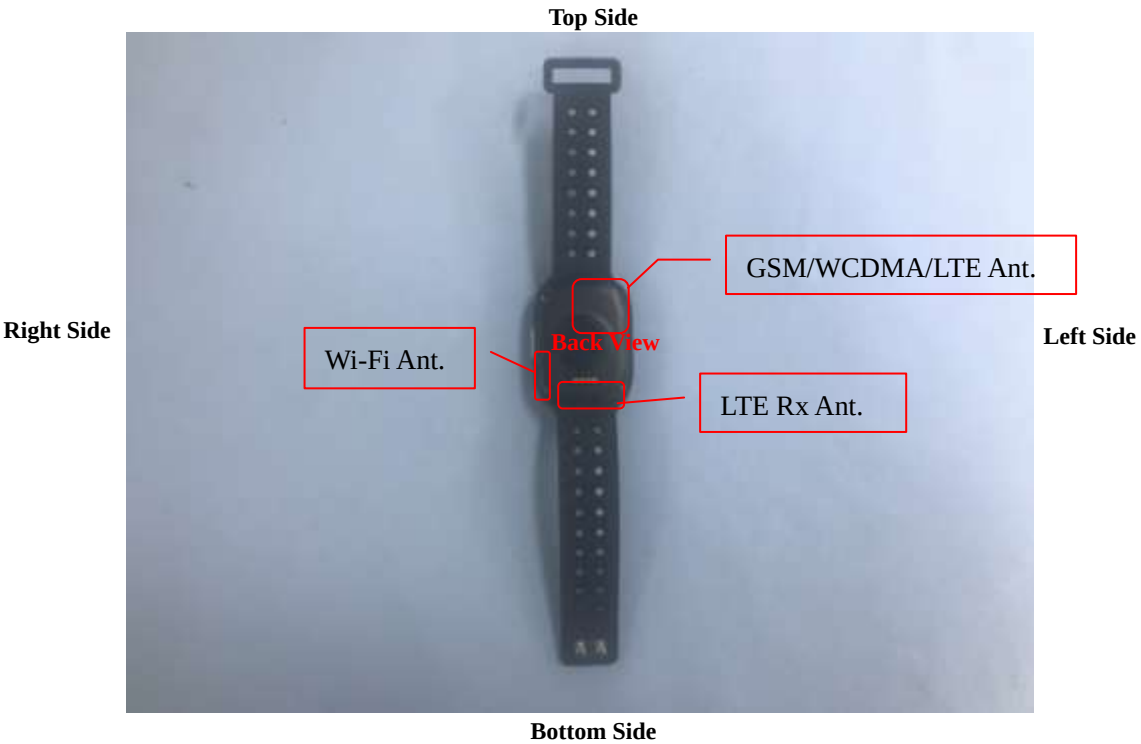
Please refer to Annex A for the plots of system performance check.

7. EUT Testing Position

7.1 Wrist-worn device

(a) Transmitters that are built-in within a wrist watch or similar wrist-worn devices typically operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth. Next to the mouth exposure requires 1-g SAR, and the wrist-worn condition requires 10-g extremity SAR.
(b) The 10-g extremity and 1-g SAR test exclusions may be applied to the wrist and face exposure conditions. When SAR evaluation is required, next to the mouth use is evaluated with the front of the device positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium.
(c) For wrist-worn condition, 10g SAR value should be measured for the inner wrist band at a separation of 0mm. The design of the hard wrist band prevents opening it to a flat shape to be placed under the flat phantom.
(d) Next to the mouth use is evaluated with the front of the device positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium. SAR for wrist exposure is evaluated with the back of the devices positioned in direct contact against a flat phantom fill with body tissue-equivalent medium.

7.2 EUT Antenna Position



Block Diagram for EUT Antenna Position

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	32.4	32.61	32.52	33.0	28.41	28.72	28.69	29.0
GPRS (1 slot)	32.49	32.67	32.6	33.0	28.43	28.72	28.73	29.0
GPRS (2 slots)	31.82	32.03	31.92	32.5	27.93	28.22	28.21	28.5
GPRS (3 slots)	30.14	30.33	30.27	30.5	26.47	26.77	26.8	27.0
GPRS (4 slots)	28.99	29.17	29.11	29.5	25.5	25.69	25.68	26.0
EDGE (1 slot)	27.53	27.32	27.01	28.0	25.26	26.53	25.35	27.0
EDGE (2 slots)	26.57	26.38	26.11	27.0	24.55	25.7	24.35	26.0
EDGE (3 slots)	23.95	23.74	23.37	24.5	21.77	22.97	23.41	24.0
EDGE (4 slots)	22.71	22.47	22.09	23.0	21.08	22.21	22.14	22.5

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	23.40	23.61	23.52	24.0	19.41	19.72	19.69	20.0
GPRS (1 slot)	23.49	23.67	23.60	24.0	19.43	19.72	19.73	20.0
GPRS (2 slots)	25.82	26.03	25.92	26.5	21.93	22.22	22.21	22.5
GPRS (3 slots)	25.89	26.08	26.02	26.5	22.22	22.52	22.55	23.0
GPRS (4 slots)	25.99	26.17	26.11	26.5	22.50	22.69	22.68	23.0
EDGE (1 slot)	18.53	18.32	18.01	19.0	16.26	17.53	16.35	18.0
EDGE (2 slots)	20.57	20.38	20.11	21.0	18.55	19.70	18.35	20.0
EDGE (3 slots)	19.70	19.49	19.12	20.0	17.52	18.72	19.16	19.5
EDGE (4 slots)	19.71	19.47	19.09	20.0	18.08	19.21	19.14	19.5
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 Near to Mouth SAR testing, GSM should be evaluated, therefore the EUT was set in GSM due to its highest source-based time-average power.

2. For Wrist-worn SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS (4TX slots) for GSM850 and GSM1900 due to its highest source-based time-average power.

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

4. 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	22.44	22.27	22.28	22.5	22.99	23.00	22.95	23.5
HSDPA Subtest-1	21.79	21.67	21.53	22.0	22.45	22.38	22.38	23.0
HSDPA Subtest-2	21.74	21.65	21.52	22.0	22.43	22.32	22.35	23.0
HSDPA Subtest-3	21.75	21.63	21.51	22.0	22.41	22.36	22.34	23.0
HSDPA Subtest-4	21.76	21.64	21.51	22.0	22.43	22.37	22.35	23.0
HSUPA Subtest-1	22.12	22.16	21.99	22.5	22.53	22.40	22.46	23.0
HSUPA Subtest-2	22.1	22.12	21.93	22.5	22.51	22.38	22.42	23.0
HSUPA Subtest-3	22.09	22.15	21.94	22.5	22.5	22.37	22.44	23.0
HSUPA Subtest-4	22.08	22.14	21.94	22.5	22.51	22.35	22.45	23.0
HSUPA Subtest-5	22.07	22.14	21.95	22.5	22.52	22.37	22.43	23.0

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 2:

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.57	0
		1	3	22.64	0
		1	5	22.59	0
		3	0	22.15	0
		3	2	22.06	0
		3	3	22.06	0
		6	0	21.64	1
	MCH	1	0	22.66	0
		1	3	22.64	0
		1	5	22.66	0
		3	0	22.21	0
		3	2	22.14	0
		3	3	22.16	0
		6	0	21.68	1
	HCH	1	0	21.53	0
		1	3	21.57	0
		1	5	21.95	0
		3	0	21.53	0
		3	2	21.64	0
		3	3	21.75	0
		6	0	20.84	1
16QAM	LCH	1	0	21.61	1
		1	3	21.77	1
		1	5	21.64	1
		3	0	21.57	1
		3	2	21.55	1
		3	3	21.57	1
		6	0	20.5	2
	MCH	1	0	21.81	1
		1	3	21.82	1
		1	5	21.78	1
		3	0	21.46	1
		3	2	21.42	1
		3	3	21.46	1
		6	0	20.51	2
	HCH	1	0	21.03	1
		1	3	20.62	1

		1	5	20.84	1
		3	0	20.82	1
		3	2	20.54	1
		3	3	20.68	1
		6	0	20.69	2

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.45	0
		1	7	22.48	0
		1	14	22.51	0
		8	0	21.56	1
		8	4	21.59	1
		8	7	21.6	1
		15	0	21.54	1
	MCH	1	0	22.63	0
		1	7	22.63	0
		1	14	22.61	0
		8	0	21.71	1
		8	4	21.67	1
		8	7	21.69	1
		15	0	21.58	1
	HCH	1	0	22.27	0
		1	7	21.57	0
		1	14	21.79	0
		8	0	21.26	1
		8	4	21.29	1
		8	7	20.9	1
		15	0	21.14	1
16QAM	LCH	1	0	21.6	1
		1	7	21.63	1
		1	14	21.65	1
		8	0	20.56	2
		8	4	20.59	2
		8	7	20.55	2
		15	0	20.46	2
	MCH	1	0	21.78	1
		1	7	21.77	1
		1	14	21.73	1
		8	0	20.6	2
		8	4	20.55	2
		8	7	20.58	2

		15	0	20.54	2
	HCH	1	0	21.15	1
		1	7	21.04	1
		1	14	21.35	1
		8	0	21.02	2
		8	4	21.06	2
		8	7	20.98	2
		15	0	20.97	2

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.6	0
		1	12	22.59	0
		1	24	22.6	0
		12	0	21.58	1
		12	6	21.6	1
		12	13	21.61	1
		25	0	21.56	1
	MCH	1	0	22.75	0
		1	12	22.57	0
		1	24	22.59	0
		12	0	21.66	1
		12	6	21.59	1
		12	13	21.6	1
		25	0	21.58	1
	HCH	1	0	22.37	0
		1	12	22.09	0
		1	24	21.89	0
		12	0	21.26	1
		12	6	21.22	1
		12	13	20.98	1
		25	0	21.16	1
16QAM	LCH	1	0	21.67	1
		1	12	21.73	1
		1	24	21.74	1
		12	0	20.59	2
		12	6	20.6	2
		12	13	20.59	2
		25	0	20.49	2
	MCH	1	0	21.78	1
		1	12	21.73	1
		1	24	21.63	1

		12	0	20.7	2
		12	6	20.65	2
		12	13	20.63	2
		25	0	20.54	2
	HCH	1	0	21.34	1
		1	12	21.21	1
		1	24	20.74	1
		12	0	20.69	2
		12	6	20.45	2
		12	13	20.36	2
		25	0	20.74	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.53	0
		1	24	22.56	0
		1	49	22.6	0
		25	0	21.59	1
		25	12	21.59	1
		25	25	21.62	1
		50	0	21.6	1
	MCH	1	0	22.73	0
		1	24	22.4	0
		1	49	21.5	0
		25	0	21.66	1
		25	12	21.61	1
		25	25	21.5	1
		50	0	21.59	1
	HCH	1	0	22.35	0
		1	24	22.3	0
		1	49	21.68	0
		25	0	21.31	1
		25	12	21.24	1
		25	25	21.2	1
		50	0	21.21	1
16QAM	LCH	1	0	21.7	1
		1	24	21.75	1
		1	49	21.81	1
		25	0	20.56	2
		25	12	20.55	2
		25	25	20.59	2
		50	0	20.59	2

	MCH	1	0	21.96	1
		1	24	21.82	1
		1	49	20.98	1
		25	0	20.65	2
		25	12	20.57	2
		25	25	20.53	2
		50	0	20.6	2
	HCH	1	0	21.43	1
		1	24	21.33	1
		1	49	20.95	1
		25	0	21.25	2
		25	12	21.18	2
		25	25	21.35	2
		50	0	21.15	2

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.57	0
		1	37	22.6	0
		1	74	22.69	0
		37	0	21.78	1
		37	18	21.8	1
		37	38	21.87	1
		75	0	21.84	1
	MCH	1	0	22.84	0
		1	37	22.23	0
		1	74	21.98	0
		37	0	21.88	1
		37	18	21.83	1
		37	38	21.21	1
		75	0	21.85	1
	HCH	1	0	21.76	0
		1	37	22.32	0
		1	74	21.6	0
		37	0	21.57	1
		37	18	21.5	1
		37	38	21.45	1
		75	0	21.53	1
16QAM	LCH	1	0	21.72	1
		1	37	21.79	1
		1	74	21.88	1
		37	0	20.68	2

		37	18	20.7	2
		37	38	20.77	2
		75	0	20.75	2
	MCH	1	0	21.94	1
		1	37	21.66	1
		1	74	20.63	1
		37	0	20.78	2
		37	18	20.72	2
		37	38	20.36	2
		75	0	20.74	2
	HCH	1	0	21.07	1
		1	37	21.4	1
		1	74	21.08	1
		37	0	20.42	2
		37	18	20.37	2
		37	38	20.27	2
		75	0	20.38	2

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.61	0
		1	49	22.84	0
		1	99	22.92	0
		50	0	21.69	1
		50	25	21.73	1
		50	50	21.79	1
		100	0	21.72	1
	MCH	1	0	23.05	0
		1	49	22.13	0
		1	99	21.95	0
		50	0	22.34	1
		50	25	21.92	1
		50	50	21.54	1
		100	0	22.24	1
	HCH	1	0	22.65	0
		1	49	22.89	0
		1	99	22.65	0
		50	0	21.43	1
		50	25	21.37	1
		50	50	21.3	1
		100	0	21.65	1
16QAM	LCH	1	0	21.84	1

		1	49	21.89	1
		1	99	21.96	1
		50	0	20.64	2
		50	25	20.69	2
		50	50	20.73	2
		100	0	20.69	2
	MCH	1	0	22.09	1
		1	49	21.57	1
		1	99	20.98	1
		50	0	20.75	2
		50	25	20.63	2
		50	50	20.24	2
		100	0	20.59	2
	HCH	1	0	21.46	1
		1	49	21.45	1
		1	99	20.83	1
		50	0	20.36	2
		50	25	20.46	2
		50	50	20.78	2
		100	0	20.56	2

FDD-LTE Band 4:

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.31	0
		1	3	23.34	0
		1	5	23.31	0
		3	0	22.13	0
		3	2	22.15	0
		3	3	22.15	0
		6	0	21.32	1
	MCH	1	0	22.45	0
		1	3	22.52	0
		1	5	22.46	0
		3	0	22.19	0
		3	2	22.15	0
		3	3	22.18	0
		6	0	21.51	1
	HCH	1	0	22.42	0
		1	3	22.52	0

		1	5	22.48	0
		3	0	22.18	0
		3	2	22.16	0
		3	3	22.16	0
		6	0	21.56	1
16QAM	LCH	1	0	22.12	1
		1	3	22.22	1
		1	5	22.12	1
		3	0	22.07	1
		3	2	22.06	1
		3	3	22.05	1
		6	0	21.14	2
	MCH	1	0	21.72	1
		1	3	21.84	1
		1	5	21.72	1
		3	0	21.41	1
		3	2	21.4	1
		3	3	21.41	1
		6	0	20.42	2
	HCH	1	0	21.52	1
		1	3	21.66	1
		1	5	21.57	1
		3	0	21.43	1
		3	2	21.4	1
		3	3	21.44	1
		6	0	20.55	2

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.14	0
		1	7	23.08	0
		1	14	22.94	0
		8	0	22.21	1
		8	4	22.16	1
		8	7	22.13	1
		15	0	22.06	1
	MCH	1	0	22.41	0
		1	7	22.51	0
		1	14	22.43	0
		8	0	21.51	1
		8	4	21.5	1
		8	7	21.52	1

		15	0	21.45	1
	HCH	1	0	22.38	0
		1	7	22.46	0
		1	14	22.46	0
		8	0	21.47	1
		8	4	21.48	1
		8	7	21.51	1
		15	0	21.44	1
16QAM	LCH	1	0	22.1	1
		1	7	22.12	1
		1	14	21.98	1
		8	0	21.05	2
		8	4	21.05	2
		8	7	21	2
		15	0	20.9	2
	MCH	1	0	21.7	1
		1	7	21.78	1
		1	14	21.7	1
		8	0	20.5	2
		8	4	20.44	2
		8	7	20.48	2
		15	0	20.42	2
	HCH	1	0	21.52	1
		1	7	21.59	1
		1	14	21.54	1
		8	0	20.34	2
		8	4	20.38	2
		8	7	20.36	2
		15	0	20.38	2

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.31	0
		1	12	23.13	0
		1	24	22.9	0
		12	0	22.12	1
		12	6	22.04	1
		12	13	21.95	1
		25	0	21.95	1
	MCH	1	0	22.53	0
		1	12	22.56	0
		1	24	22.51	0

		12	0	21.54	1
		12	6	21.54	1
		12	13	21.55	1
		25	0	21.49	1
	HCH	1	0	22.52	0
		1	12	22.57	0
		1	24	22.62	0
		12	0	21.5	1
		12	6	21.49	1
		12	13	21.5	1
		25	0	21.45	1
16QAM	LCH	1	0	22.22	1
		1	12	22.16	1
		1	24	21.98	1
		12	0	21.02	2
		12	6	20.96	2
		12	13	20.9	2
		25	0	20.87	2
	MCH	1	0	21.7	1
		1	12	21.74	1
		1	24	21.67	1
		12	0	20.63	2
		12	6	20.62	2
		12	13	20.64	2
		25	0	20.5	2
	HCH	1	0	21.6	1
		1	12	21.64	1
		1	24	21.62	1
		12	0	20.46	2
		12	6	20.45	2
		12	13	20.46	2
		25	0	20.45	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.31	0
		1	24	23.13	0
		1	49	22.9	0
		25	0	22.12	1
		25	12	22.04	1
		25	25	21.95	1
		50	0	21.95	1
	MCH	1	0	22.53	0
		1	24	22.56	0
		1	49	22.51	0
		25	0	21.54	1
		25	12	21.54	1
		25	25	21.55	1
		50	0	21.49	1
	HCH	1	0	22.52	0
		1	24	22.57	0
		1	49	22.62	0
		25	0	21.5	1
		25	12	21.49	1
		25	25	21.5	1
		50	0	21.45	1
16QAM	LCH	1	0	22.22	1
		1	24	22.16	1
		1	49	21.98	1
		25	0	21.02	2
		25	12	20.96	2
		25	25	20.9	2
		50	0	20.87	2
	MCH	1	0	21.7	1
		1	24	21.74	1
		1	49	21.67	1
		25	0	20.63	2
		25	12	20.62	2
		25	25	20.64	2
		50	0	20.5	2
	HCH	1	0	21.6	1
		1	24	21.64	1
		1	49	21.62	1
		25	0	20.46	2

		25	12	20.45	2
		25	25	20.46	2
		50	0	20.45	2

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.27	0
		1	37	22.7	0
		1	74	22.46	0
		37	0	22.03	1
		37	18	21.84	1
		37	38	21.72	1
		75	0	21.92	1
	MCH	1	0	22.66	0
		1	37	22.62	0
		1	74	22.7	0
		37	0	21.64	1
		37	18	21.63	1
		37	38	21.65	1
		75	0	21.61	1
	HCH	1	0	22.55	0
		1	37	22.52	0
		1	74	22.63	0
		37	0	21.65	1
		37	18	21.62	1
		37	38	21.64	1
		75	0	21.64	1
16QAM	LCH	1	0	22.28	1
		1	37	21.83	1
		1	74	21.6	1
		37	0	20.94	2
		37	18	20.8	2
		37	38	20.67	2
		75	0	20.86	2
	MCH	1	0	21.65	1
		1	37	21.83	1
		1	74	21.68	1
		37	0	20.55	2
		37	18	20.55	2
		37	38	20.56	2
		75	0	20.54	2
	HCH	1	0	21.61	1

		1	37	21.64	1
		1	74	21.69	1
		37	0	20.59	2
		37	18	20.55	2
		37	38	20.49	2
		75	0	20.57	2

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.38	0
		1	49	22.66	0
		1	99	22.62	0
		50	0	22.33	1
		50	25	21.61	1
		50	50	21.53	1
		100	0	22.25	1
	MCH	1	0	23.15	0
		1	49	22.47	0
		1	99	22.47	0
		50	0	21.48	1
		50	25	21.36	1
		50	50	21.32	1
		100	0	21.33	1
	HCH	1	0	23.03	0
		1	49	22.41	0
		1	99	22.79	0
		50	0	21.3	1
		50	25	21.31	1
		50	50	21.42	1
		100	0	21.35	1
16QAM	LCH	1	0	22.28	1
		1	49	21.76	1
		1	99	21.71	1
		50	0	20.77	2
		50	25	20.58	2
		50	50	20.51	2
		100	0	20.61	2
	MCH	1	0	21.85	1
		1	49	21.56	1
		1	99	21.51	1
		50	0	20.43	2
		50	25	20.32	2

		50	50	20.57	2
		100	0	20.32	2
	HCH	1	0	21.55	1
		1	49	21.54	1
		1	99	21.84	1
		50	0	20.33	2
		50	25	20.34	2
		50	50	20.44	2
		100	0	20.33	2

FDD-LTE Band 12:

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.38	0
		1	3	23.44	0
		1	5	23.43	0
		3	0	22.65	0
		3	2	22.65	0
		3	3	22.61	0
		6	0	22.32	1
	MCH	1	0	23.47	0
		1	3	23.15	0
		1	5	23.14	0
		3	0	23.01	0
		3	2	23.11	0
		3	3	23.14	0
		6	0	22.48	1
	HCH	1	0	23.2	0
		1	3	23.46	0
		1	5	23.01	0
		3	0	22.21	0
		3	2	22.39	0
		3	3	22.24	0
		6	0	22.23	1
16QAM	LCH	1	0	21.65	1
		1	3	22.31	1
		1	5	22.22	1
		3	0	22.05	1
		3	2	22.02	1
		3	3	22.17	1
		6	0	21.05	2

	MCH	1	0	22.49	1
		1	3	22.47	1
		1	5	22.46	1
		3	0	22.04	1
		3	2	22.15	1
		3	3	22.17	1
		6	0	20.65	2
	HCH	1	0	22.12	1
		1	3	22.08	1
		1	5	22.31	1
		3	0	21.91	1
		3	2	22.09	1
		3	3	22.03	1
		6	0	21.08	2

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.25	0
		1	7	23.41	0
		1	14	23.35	0
		8	0	22.32	1
		8	4	22.41	1
		8	7	22.25	1
		15	0	22.32	1
	MCH	1	0	23.45	0
		1	7	23.02	0
		1	14	23.11	0
		8	0	22.38	1
		8	4	22.21	1
		8	7	22.01	1
		15	0	22.41	1
	HCH	1	0	23.32	0
		1	7	23.21	0
		1	14	23.42	0
		8	0	22.26	1
		8	4	22.45	1
		8	7	22.49	1
		15	0	22.26	1
16QAM	LCH	1	0	22.35	1
		1	7	22.42	1
		1	14	22.2	1
		8	0	21.05	2

		8	4	21.11	2
		8	7	21.24	2
		15	0	21.11	2
	MCH	1	0	21.98	1
		1	7	22.36	1
		1	14	22.14	1
		8	0	21.26	2
		8	4	21.08	2
		8	7	21.25	2
		15	0	21.35	2
	HCH	1	0	22.18	1
		1	7	22.3	1
		1	14	22.43	1
		8	0	21.15	2
		8	4	21.32	2
		8	7	21.23	2
		15	0	21.28	2

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.42	0
		1	12	23.1	0
		1	24	23.23	0
		12	0	21.65	1
		12	6	22.05	1
		12	13	22.33	1
		25	0	21.65	1
	MCH	1	0	23.39	0
		1	12	23.14	0
		1	24	23.01	0
		12	0	22.52	1
		12	6	22.7	1
		12	13	22.54	1
		25	0	22.45	1
	HCH	1	0	23.38	0
		1	12	23.21	0
		1	24	23.47	0
		12	0	22.31	1
		12	6	22.26	1
		12	13	22.38	1
		25	0	22.22	1
16QAM	LCH	1	0	22.54	1

		1	12	21.87	1
		1	24	21.7	1
		12	0	21.63	2
		12	6	21.37	2
		12	13	21.34	2
		25	0	21.74	2
	MCH	1	0	22.07	1
		1	12	22.94	1
		1	24	22.41	1
		12	0	21.3	2
		12	6	21.7	2
		12	13	21.55	2
		25	0	21.52	2
	HCH	1	0	22.22	1
		1	12	21.67	1
		1	24	22.15	1
		12	0	21.31	2
		12	6	21.22	2
		12	13	21.24	2
		25	0	21.38	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.39	0
		1	24	23.34	0
		1	49	23.98	0
		25	0	22.56	1
		25	12	22.38	1
		25	25	22.66	1
		50	0	22.54	1
	MCH	1	0	23.38	0
		1	24	24.18	0
		1	49	22.97	0
		25	0	22.54	1
		25	12	23.28	1
		25	25	22.6	1
		50	0	22.45	1
	HCH	1	0	23.5	0
		1	24	23.91	0
		1	49	23.05	0
		25	0	22.57	1
		25	12	22.47	1
		25	25	22.14	1
		50	0	22.48	1
16QAM	LCH	1	0	22.62	1
		1	24	22.32	1
		1	49	23.17	1
		25	0	21.34	2
		25	12	21.37	2
		25	25	21.58	2
		50	0	21.41	2
	MCH	1	0	22.82	1
		1	24	23.14	1
		1	49	22.22	1
		25	0	21.35	2
		25	12	21.7	2
		25	25	21.48	2
		50	0	21.48	2
	HCH	1	0	22.19	1
		1	24	22.58	1
		1	49	21.58	1
		25	0	21.53	2

		25	12	21.36	2
		25	25	21.15	2
		50	0	21.5	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 - Maximum Average Power					
Test Mode	**Data Rate**	**Channel**	**Frequency (MHz)**	**Average Power (dBm)**	**Tune-up power (dBm)**
802.11b	1Mbps	CH 01	2412	15.84	17.0
		CH 06	2437	16.6	17.0
		CH 11	2462	16.18	17.0
802.11g	6Mbps	CH 01	2412	13.12	14.0
		CH 06	2437	13.75	14.0
		CH 11	2462	13.69	14.0
802.11n (20MHz)	MCS0	CH 01	2412	14.77	15.0
		CH 06	2437	14.01	15.0
		CH 11	2462	13.22	15.0
802.11n (40MHz)	MCS0	CH 03	2422	12.61	13.0
		CH 06	2437	12.41	13.0
		CH 09	2452	12.69	13.0

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.

9.2 Test Results for Standalone SAR Test

Near to Mouth SAR

GSM850 – Body SAR Test (Gap: 10mm)									
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.	GSM	Front side	190	836.6	32.61	33.0	1.094	0.018	0.020

GSM1900 – Body SAR Test (Gap: 10mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
2.	GSM	Front side	661	1880.0	28.72	29.0	1.067	0.622	0.663

WCDMA Band 2 – Body SAR Test (Gap: 10mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
3.	RMC 12.2k	Front Side	9262	1852.4	22.44	22.5	1.014	1.159	1.175
4.	RMC 12.2k	Front Side	9400	1880.0	22.27	22.5	1.054	1.078	1.137
5.	RMC 12.2k	Front Side	9538	1907.6	22.28	22.5	1.052	0.912	0.959

WCDMA Band 5 – Body SAR Test (Gap: 10mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
6.	RMC 12.2k	Front Side	4182	836.6	23.00	23.5	1.122	0.013	0.015

LTE Band 2–Body SAR Test (Gap: 10mm)								
Plot No.	Mode	Test Position Body	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Bandwidth, RB		MHz					
7.	QPSK 20MHz 1RB	Front Side	1880.0	23.05	23.5	1.109	1.074	1.191
8.	QPSK 20MHz 1RB	Front Side	1860.0	22.92	23.5	1.143	0.767	0.877
9.	QPSK 20MHz 1RB	Front Side	1900.0	22.89	23.5	1.151	0.556	0.640
10.	QPSK 20MHz 50%RB	Front Side	1880.0	22.34	22.5	1.038	0.717	0.744
11.	QPSK 20MHz 100%RB	Front Side	1880.0	22.24	23.5	1.337	0.689	0.921

LTE Band 4–Body SAR Test (Gap: 10mm)								
Plot No.	Mode Bandwidth, RB	Test Position Body	Frequency MHz	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
12.	QPSK 20MHz 1RB	Front Side	1720.0	23.38	23.5	1.028	1.162	1.195
13.	QPSK 20MHz 1RB	Front Side	1732.5	23.15	23.5	1.084	1.170	1.268
14.	QPSK 20MHz 1RB	Front Side	1745.0	23.03	23.5	1.114	1.076	1.199
15.	QPSK 20MHz 50%RB	Front Side	1720.0	22.33	22.5	1.040	0.707	0.735
16.	QPSK 20MHz 100%RB	Front Side	1720.0	22.25	22.5	1.059	0.683	0.723

LTE Band 12–Body SAR Test (Gap: 10mm)								
Plot No.	Mode Bandwidth, RB	Test Position Body	Frequency MHz	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
17.	QPSK 10MHz 1RB	Front Side	707.5	24.18	24.5	1.076	0.102	0.110
18.	QPSK 10MHz 50%RB	Front Side	707.5	23.28	23.5	1.052	0.057	0.060

WLAN 2.4GHz –Body SAR Test									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
19.	802.11b	Front Side	06	2437	16.6	17.0	1.096	0.193	0.212

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.

Wrist-worn SAR

GSM850 – Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
			CH.	MHz					
20.	GPRS_4TX	Back Side	190	836.6	29.17	29.5	1.079	0.046	0.050

GSM1900 – Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
			CH.	MHz					
21.	GPRS_4TX	Back Side	661	1880.0	25.69	26.0	1.074	1.392	1.495

WCDMA Band 2 – Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
			CH.	MHz					
22.	RMC 12.2k	Back Side	9262	1852.4	22.44	22.5	1.014	1.654	1.677

WCDMA Band 5 – Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
			CH.	MHz					
23.	RMC 12.2k	Back Side	4182	836.6	23.00	23.5	1.122	0.006	0.007

LTE Band 2–Body SAR Test (Gap: 0mm)								
Plot No.	Mode	Test Position Body	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
	Bandwidth, RB		MHz					
24.	QPSK 20MHz 1RB	Back Side	1880.0	23.05	23.5	1.109	1.586	1.759
25.	QPSK 20MHz 50%RB	Back Side	1880.0	22.34	22.5	1.038	0.661	0.686

LTE Band 4–Body SAR Test (Gap: 0mm)								
Plot No.	Mode Bandwidth, RB	Test Position Body	Frequency MHz	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
26.	QPSK 20MHz 1RB	Back Side	1720.0	23.38	23.5	1.028	1.376	1.415
27.	QPSK 20MHz 50%RB	Back Side	1720.0	22.33	22.5	1.040	0.822	0.855

LTE Band 12–Body SAR Test (Gap: 0mm)								
Plot No.	Mode Bandwidth, RB	Test Position Body	Frequency MHz	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
28.	QPSK 10MHz 1RB	Back Side	707.5	24.18	24.5	1.076	0.028	0.030
29.	QPSK 10MHz 50%RB	Back Side	707.5	23.28	23.5	1.052	0.011	0.012

WLAN 2.4GHz –Body SAR Test(Gap: 0mm)									
Plot No.	Mode	Test Position Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR10g (W/kg)	Scaled SAR10g (W/kg)
			CH.	MHz					
30.	802.11b	Back Side	06	2437	16.6	17.0	1.096	0.369	0.405

Remark: Per 447498 D01 General RF Exposure Guidance v06, if the highest output channel SAR for each exposure position ≤ 2.0 W/kg other channels SAR tests are not necessary.

Repeated SAR

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	Near to Mouth SAR	Wrist-worn SAR
1	GSM(Voice/Data) + WLAN(Data)	Yes	Yes
2	WCDMA (Voice/Data)+ WLAN(Data)	Yes	Yes
3	LTE(Data) + WLAN(Data)	Yes	Yes

Remark:

1. GSM and WCDMA share the same antenna, and cannot transmit simultaneously.
2. The maximum SAR summation is calculated based on the same configuration and test position.

Near to Mouth SAR

WWAN and WLAN

	WWAN		WLAN	Summed SAR (W/kg)
Position	Band	Scaled SAR (W/kg)	Scaled SAR (W/kg)	
Front	GSM850	0.020	0.212	0.232
Front	GSM1900	0.663	0.212	0.875
Front	WCDMA Band 2	1.175	0.212	1.387
Front	WCDMA Band 5	0.015	0.212	0.227
Front	LTE Band 2	1.191	0.212	1.403
Front	LTE Band 4	1.268	0.212	**1.480**
Front	LTE Band 12	0.110	0.212	0.322

Wrist-worn SAR

WWAN and WLAN

	WWAN		WLAN	Summed SAR (W/kg)
Position	Band	Scaled SAR (W/kg)	Scaled SAR (W/kg)	
Back	GSM850	0.050	0.405	0.455
Back	GSM1900	1.495	0.405	1.900
Back	WCDMA Band 2	1.677	0.405	2.082
Back	WCDMA Band 5	0.007	0.405	0.412
Back	LTE Band 2	1.759	0.405	**2.164**
Back	LTE Band 4	1.415	0.405	1.820
Back	LTE Band 12	0.030	0.405	0.435

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	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions – Noise	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
RF ambient Conditions - Reflections	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5	5.0	R	√3	1	1	2.89	2.89	∝
Test Sample Related									
Test sample positioning	E.4.2	0.03	N	1	1	1	0.03	0.03	N–1
Device Holder Uncertainty	E.4.1	5.00	N	1	1	1	5.00	5.00	
Output power Variation - SAR drift measurement	E.2.9	12.02	R	√3	1	1	6.94	6.94	∝
SAR scaling	E6.5	0.0	R	√3	1	1	0.0	0.0	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	1.9	R	√3	1	0.84	1.10	0.90	∝
Liquid conductivity - deviation	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	∝

from target value									
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	∝
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	∝
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	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	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Modulation response	E.2.5	0	R	√3	0	0	0.0	0.0	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions – Noise	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
RF ambient Conditions - Reflections	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and integration Algoritms for Max.	E.5.2	5.0	R	√3	1	1	2.89	2.89	∝

SAR Evaluation									
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	√3	1	1	0.58	0.58	N–1
Input power and SAR drift measurement	8,6.6.2	12.02	R	√3	1	1	6.94	6.94	∝
Deviation of experimental dipole from numerical dipole	E.6.4	5.5	R	√3	1	1	3.20	3.20	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	2.0	R	√3	1	0.84	1.10	1.10	∝
Liquid conductivity - deviation from target value	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	M
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: 10/08/2018

Measurement duration: 7 minutes 21 seconds

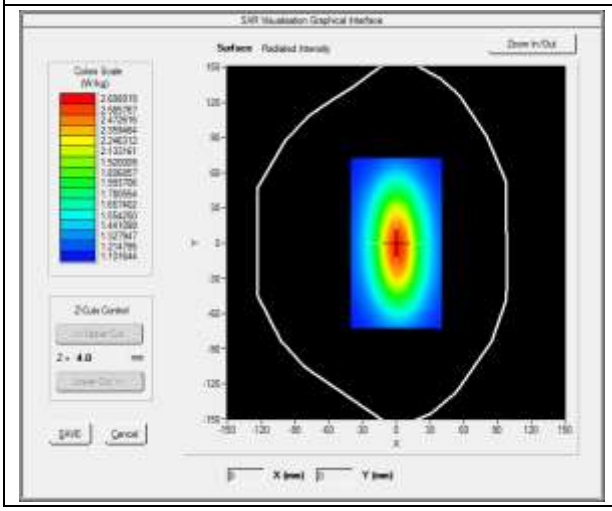
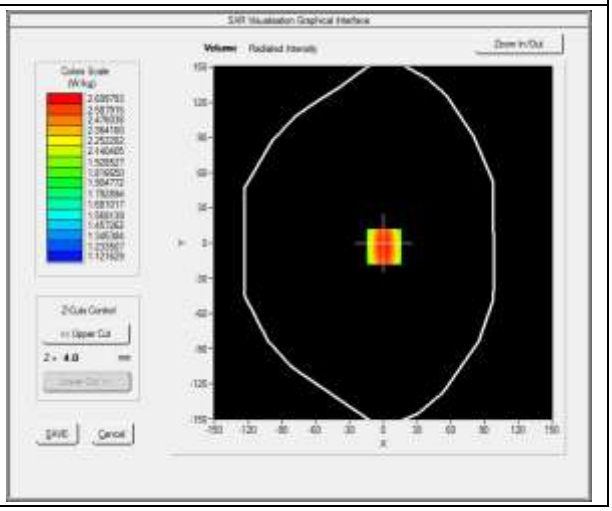
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.99; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	750.000000
Relative Permittivity (real part)	41.320574
Conductivity (S/m)	0.862373
Power Variation (%)	0.038363
Ambient Temperature	21.1
Liquid Temperature	21.3

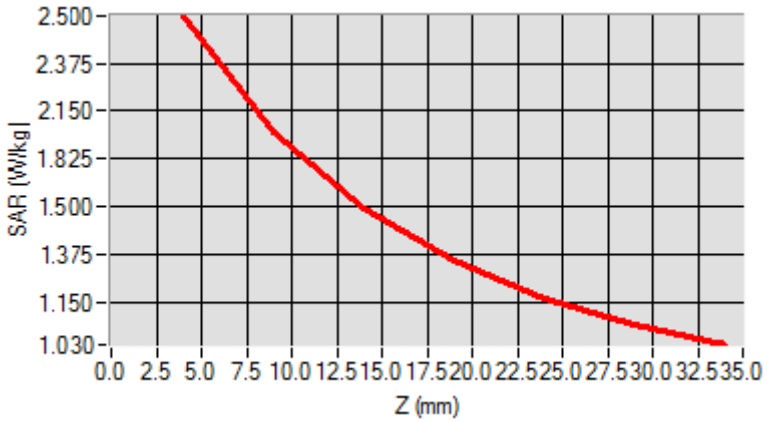
SURFACE SAR	VOLUME SAR
	

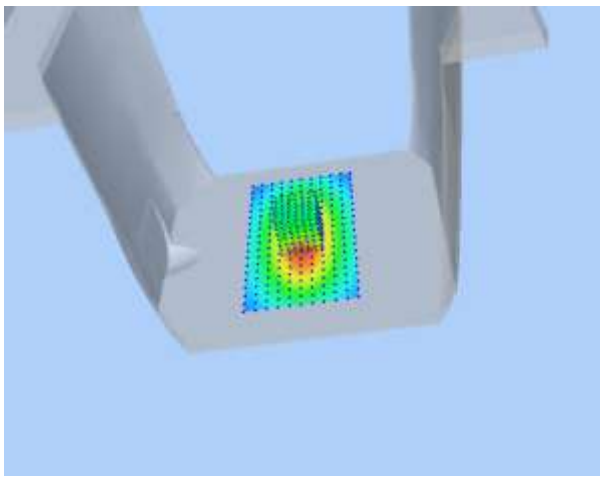
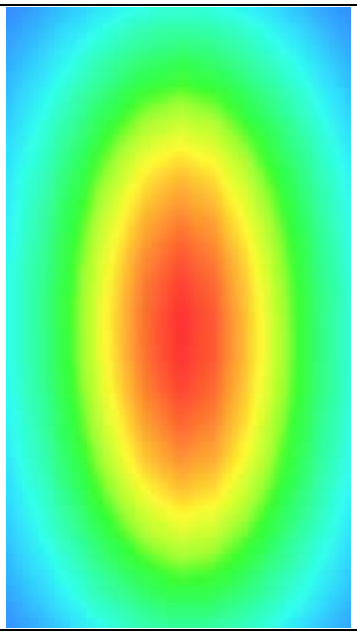
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.342744
SAR 1g (W/Kg)	2.164534

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.3634	1.8023	1.4523	1.2514	1.1005	1.0245



3D screen shot	Hot spot position
	

MEASUREMENT 2

For Head Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/08/2018

Measurement duration: 7 minutes 21 seconds

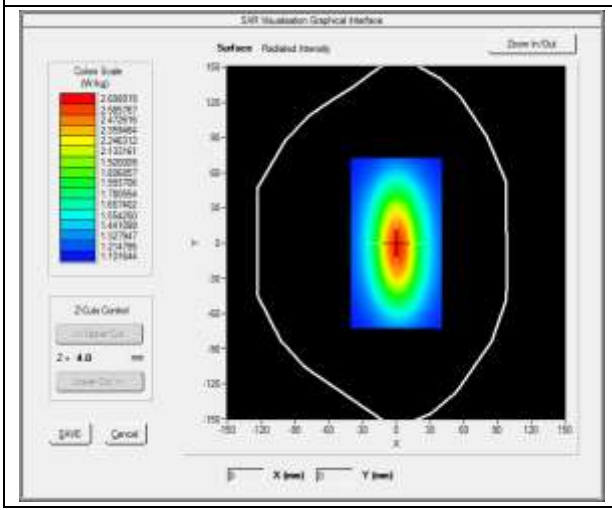
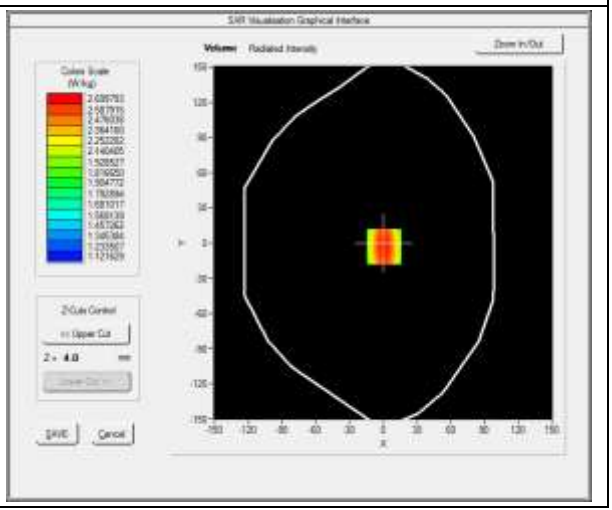
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.93; Calibrated: 06/01/2018

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

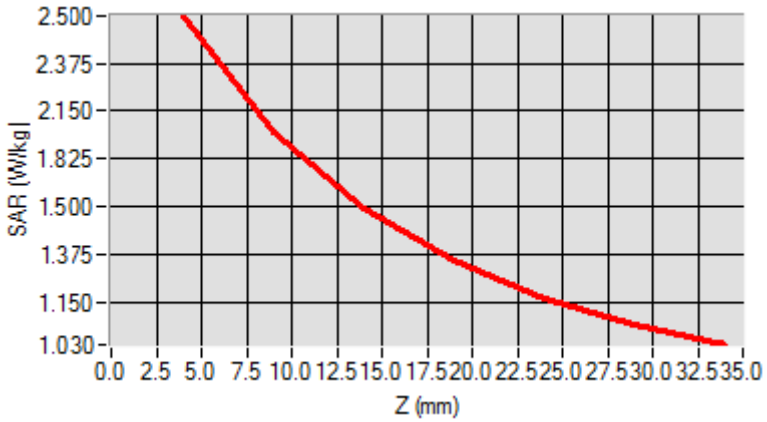
SURFACE SAR	VOLUME SAR
	

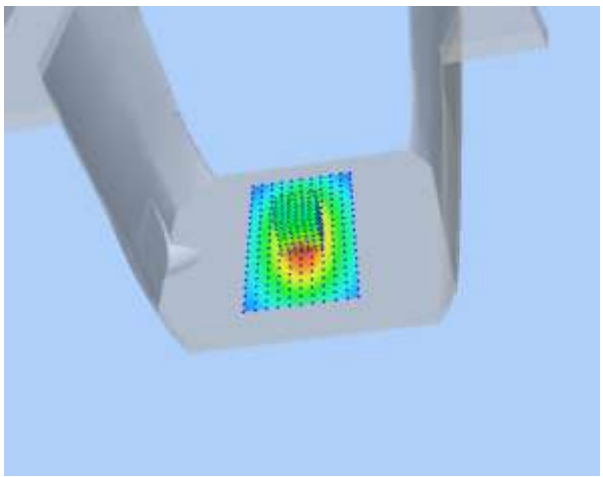
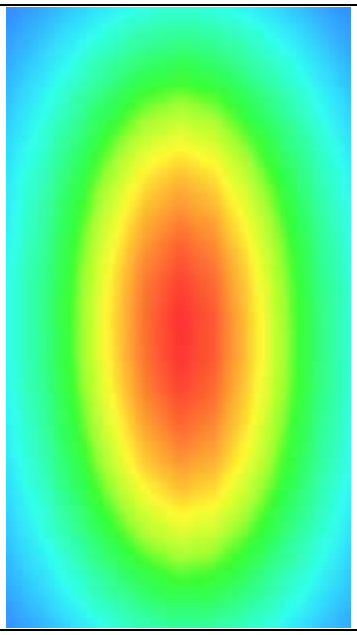
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.449489
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 3

For Head Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/09/2018

Measurement duration: 12 minutes 21 seconds

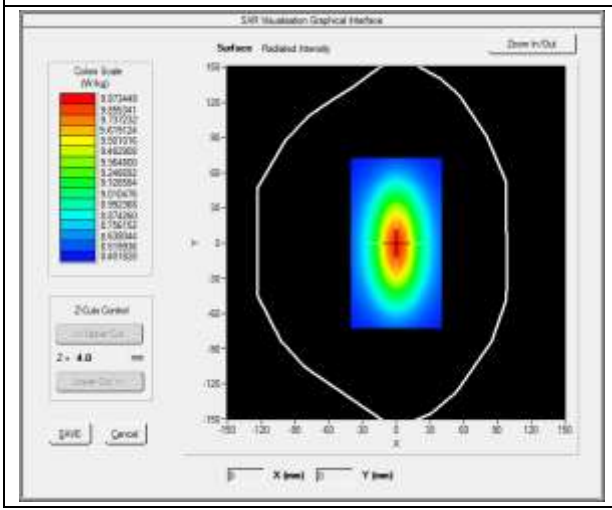
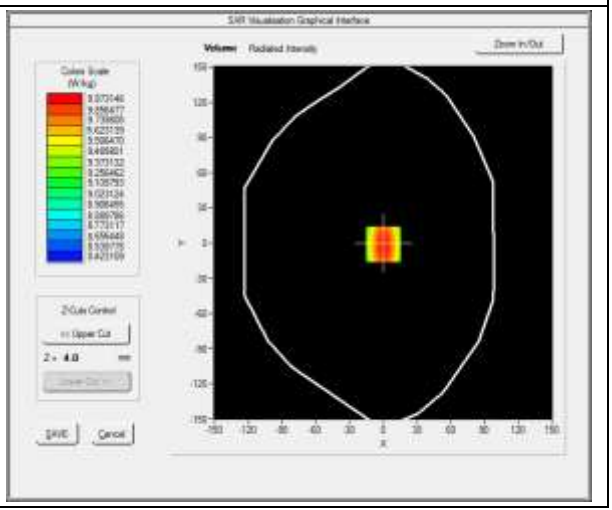
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.84; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative Permittivity (real part)	39.024890
Conductivity (S/m)	1.371250
Power Variation (%)	1.401232
Ambient Temperature	21.1
Liquid Temperature	21.2

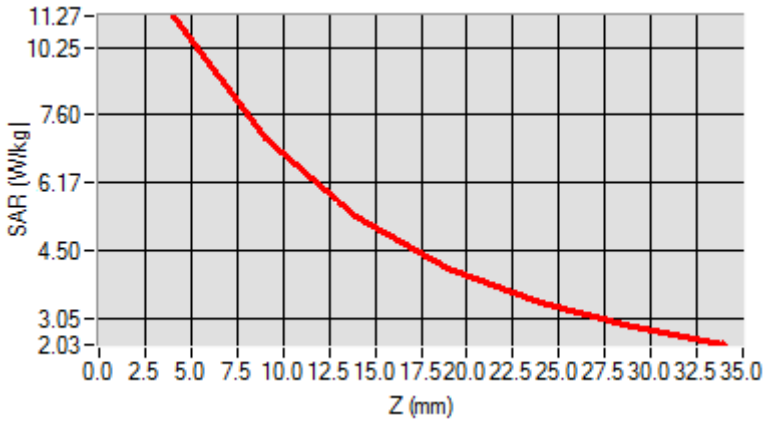
SURFACE SAR	VOLUME SAR
	

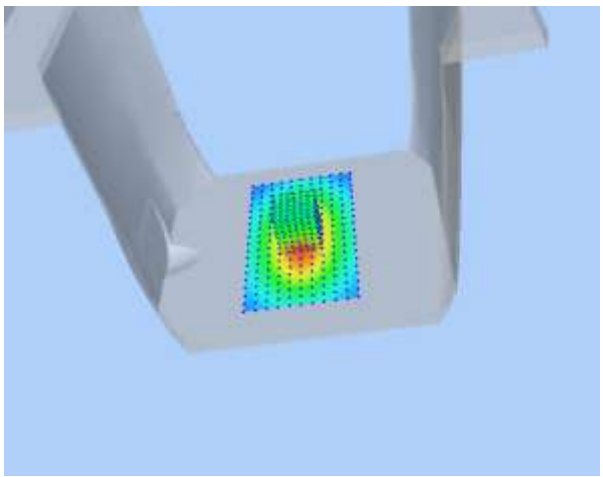
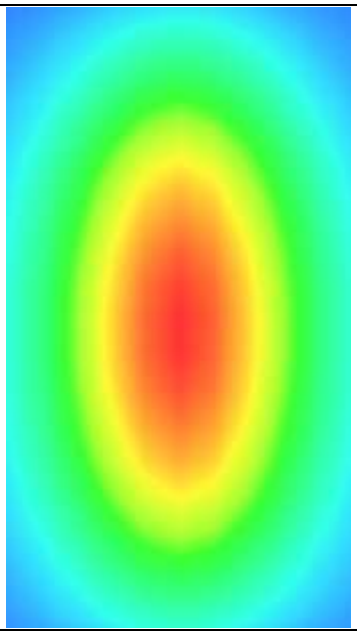
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	5.171252
SAR 1g (W/Kg)	9.611250

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.3455	7.1125	5.1026	3.425	3.0242	2.1125



3D screen shot	Hot spot position
	

MEASUREMENT 4

For Head Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/09/2018

Measurement duration: 12 minutes 21 seconds

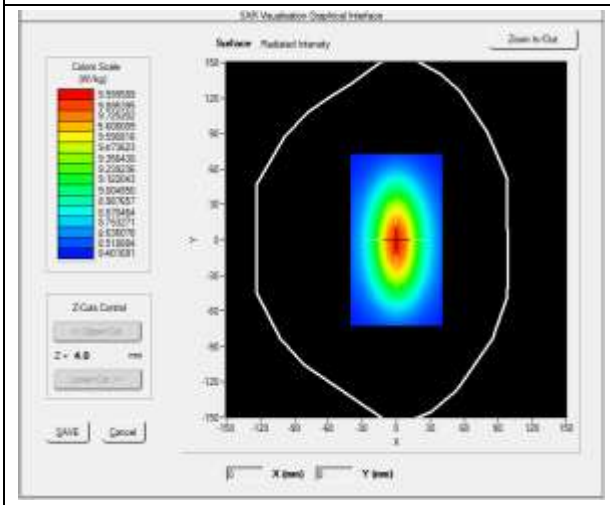
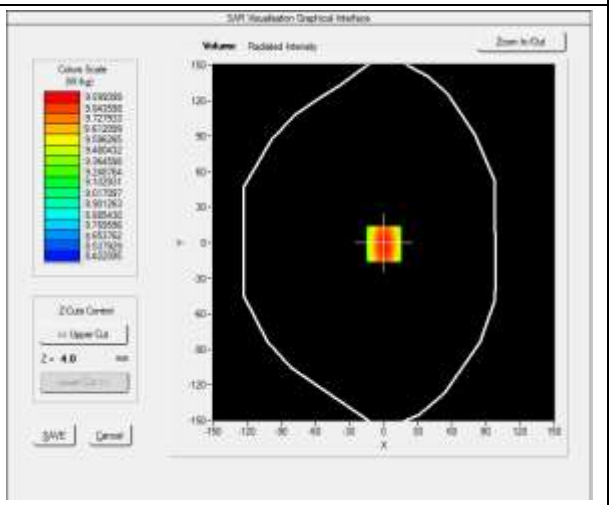
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.35; Calibrated: 06/01/2018

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

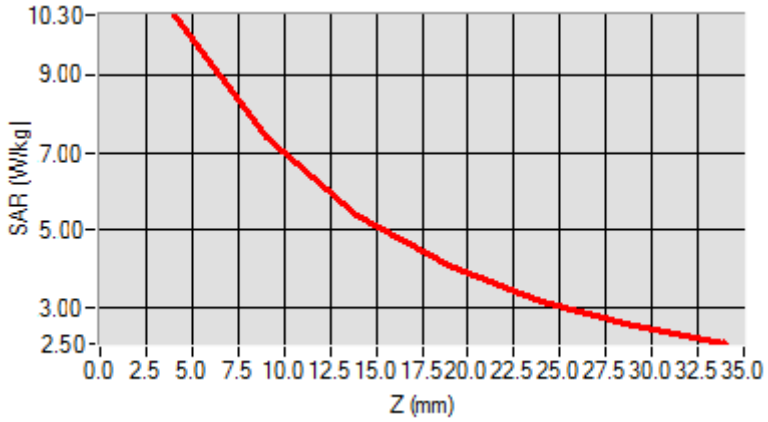
SURFACE SAR	VOLUME SAR
	

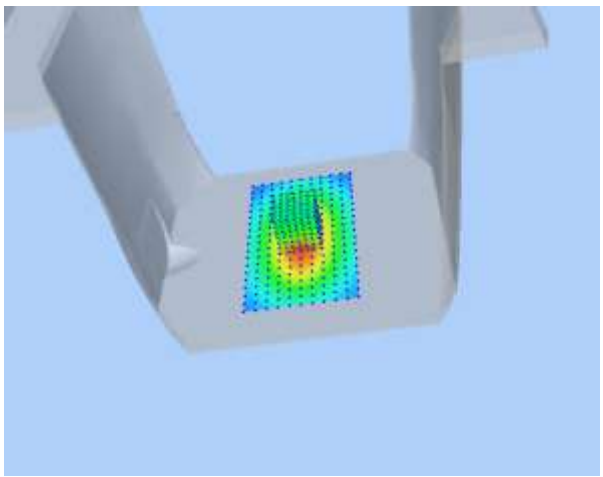
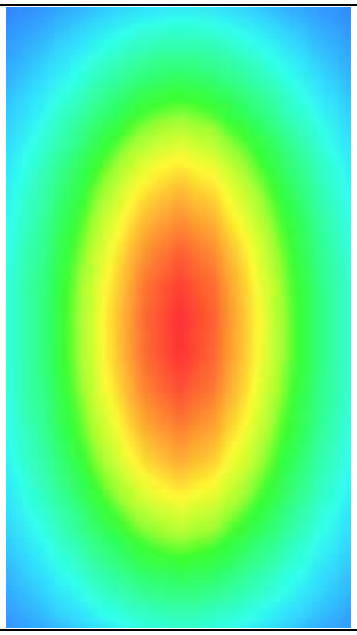
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	5.174526
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 5

For Head Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/10/2018

Measurement duration: 12 minutes 21 seconds

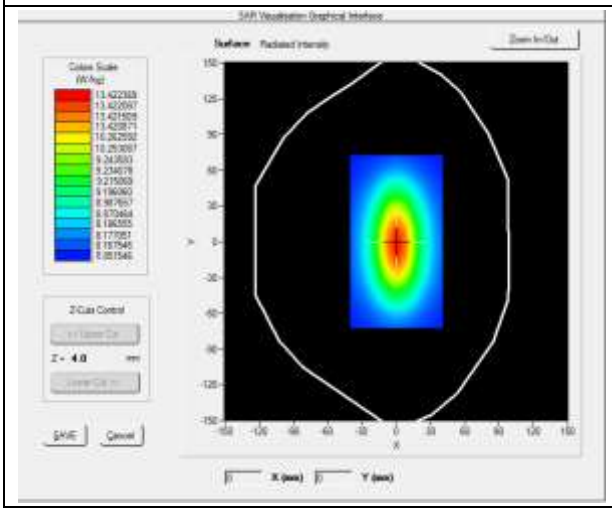
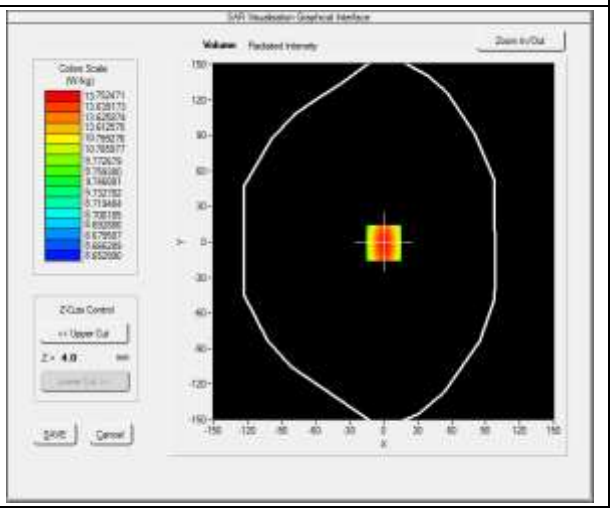
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.64; Calibrated: 06/01/2018

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)	38.153660
Conductivity (S/m)	1.740236
Power Variation (%)	1.141452
Ambient Temperature	21.1
Liquid Temperature	21.2

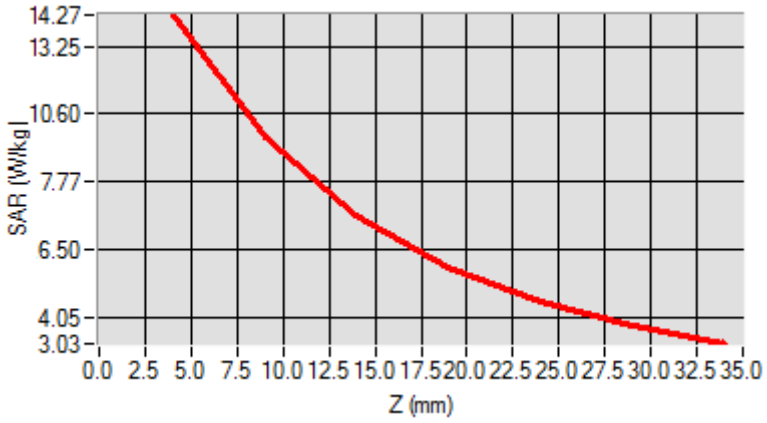
SURFACE SAR	VOLUME SAR
	

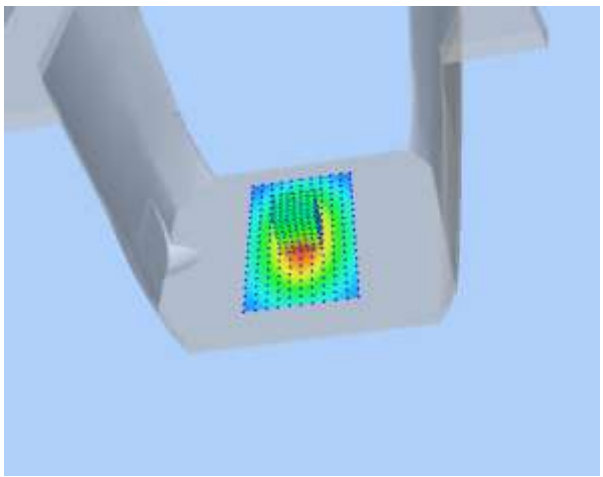
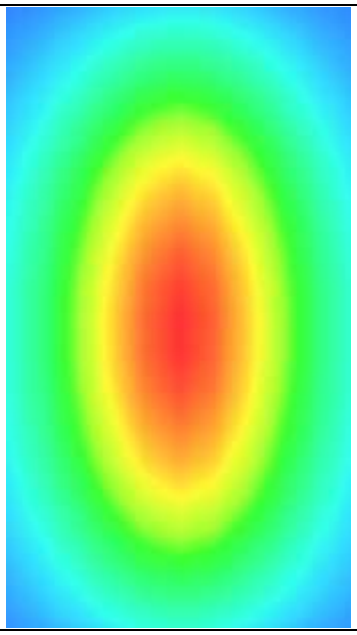
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	6.020427
SAR 1g (W/Kg)	13.452457

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	14.1034	12.0012	10.2624	7.4715	5.9022	4.5114



3D screen shot	Hot spot position
	

MEASUREMENT 6

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/08/2018

Measurement duration: 12 minutes 21 seconds

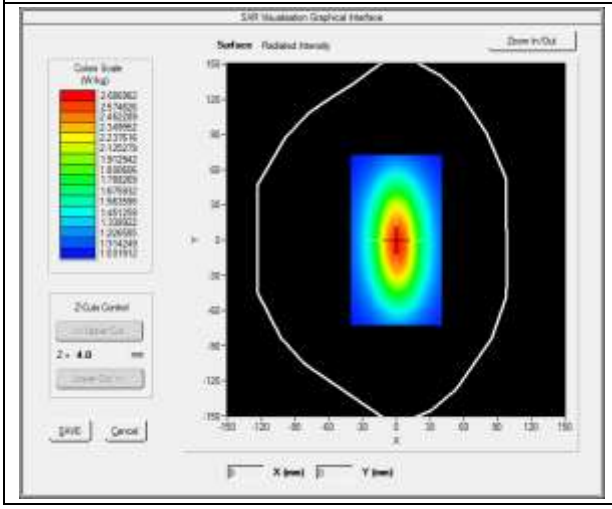
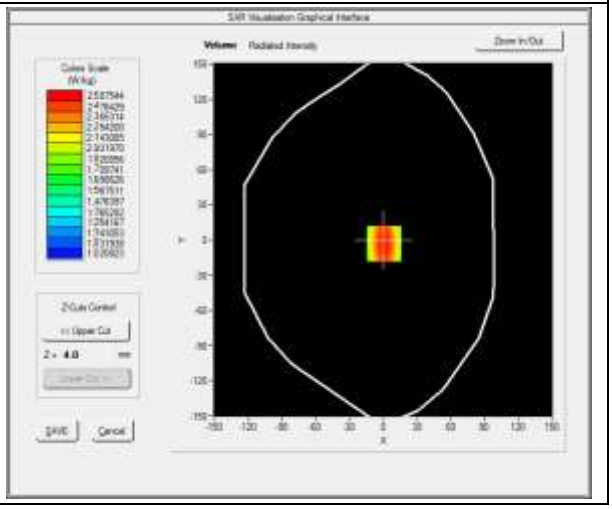
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.28; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	750.000000
Relative Permittivity (real part)	54.964739
Conductivity (S/m)	0.931048
Power Variation (%)	0.034745
Ambient Temperature	21.1
Liquid Temperature	21.3

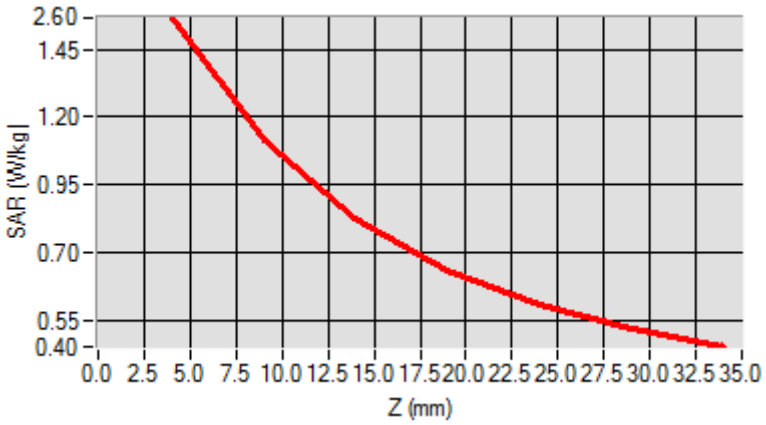
SURFACE SAR	VOLUME SAR
	

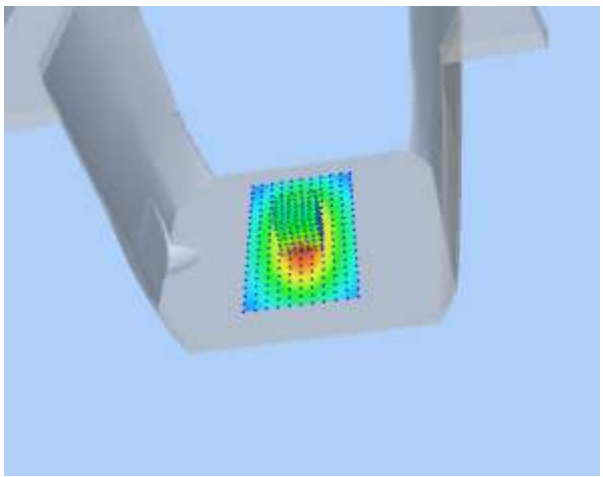
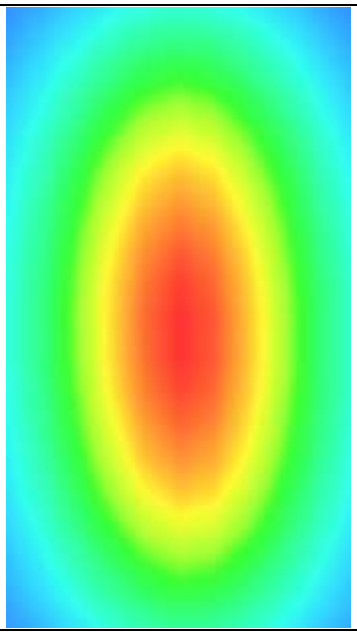
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.300865
SAR 1g (W/Kg)	2.124211

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.5132	1.1087	0.8214	0.5160	0.4875	0.4864



3D screen shot	Hot spot position
	

MEASUREMENT 7

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/08/2018

Measurement duration: 12 minutes 21 seconds

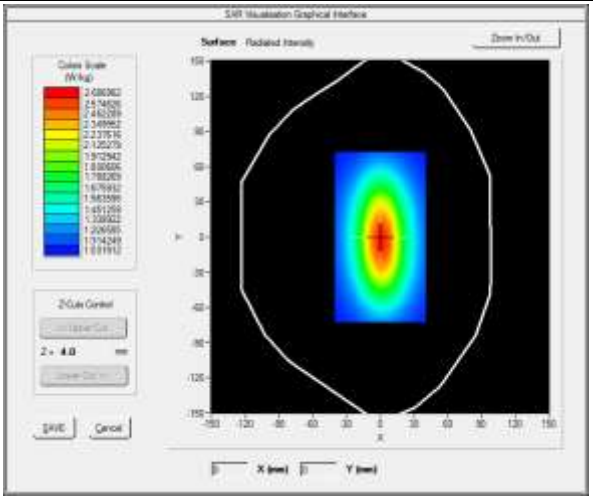
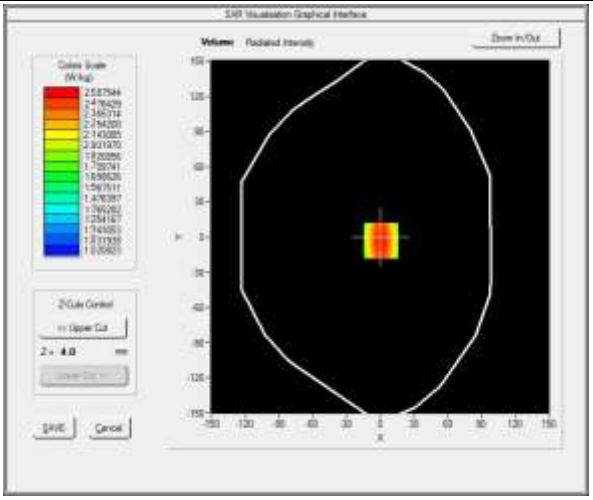
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

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

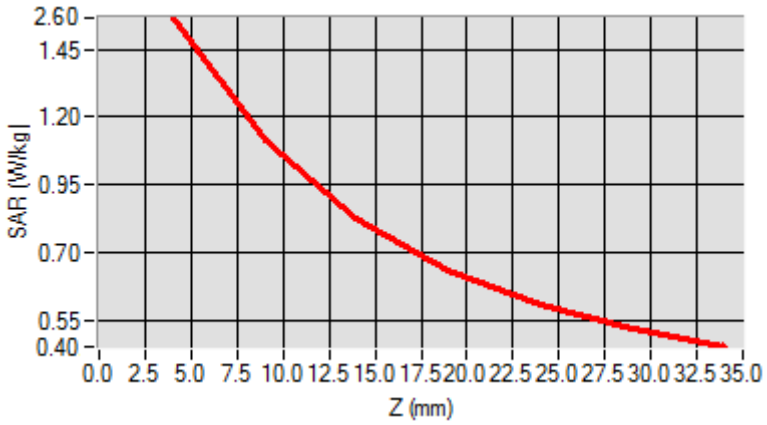
SURFACE SAR	VOLUME SAR
	

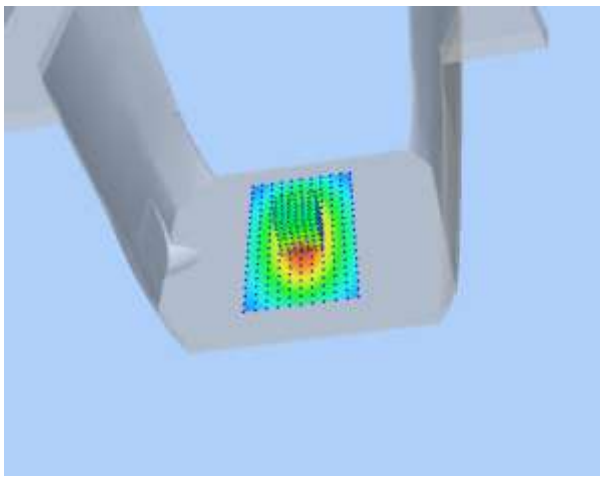
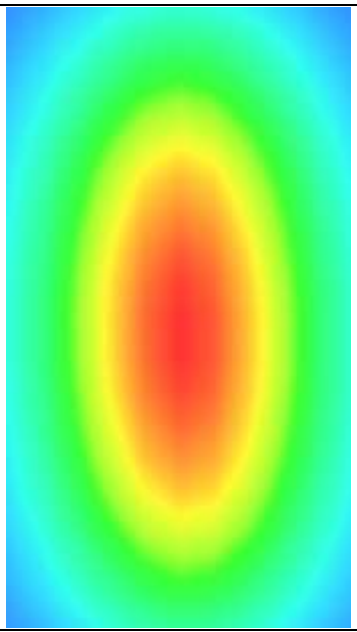
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.528956
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 8

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/09/2018

Measurement duration: 12 minutes 21 seconds

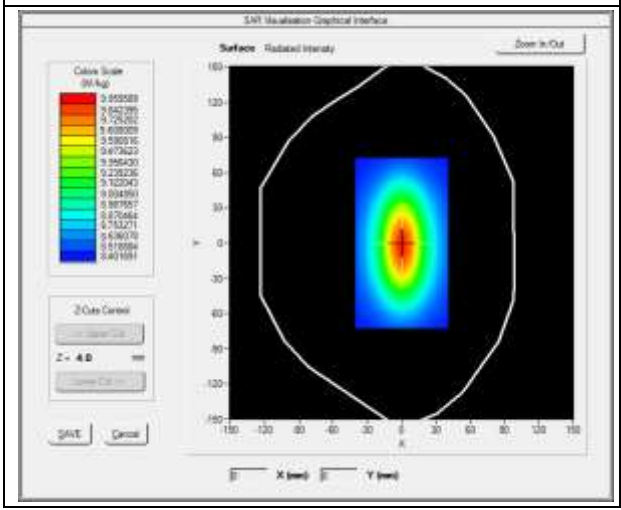
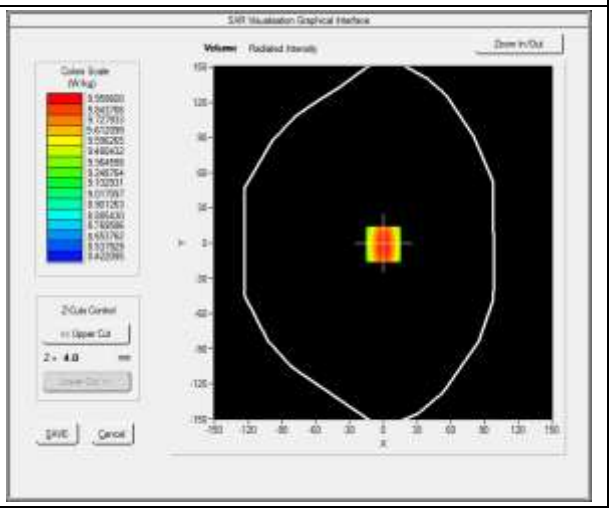
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.06; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative Permittivity (real part)	51.224510
Conductivity (S/m)	1.461261
Power Variation (%)	0.845690
Ambient Temperature	21.1
Liquid Temperature	21.2

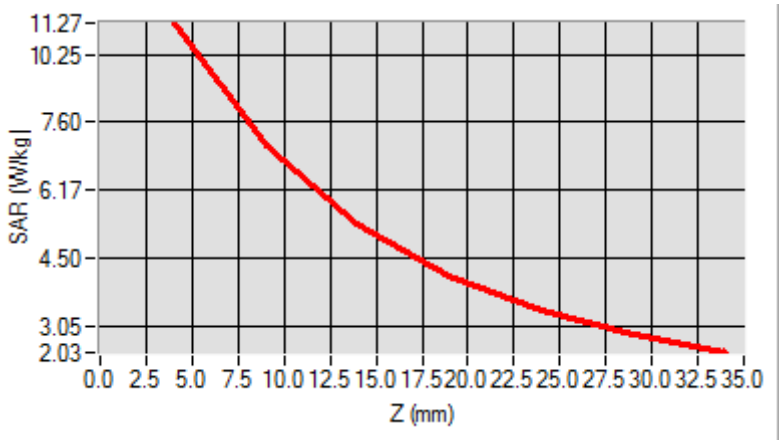
SURFACE SAR	VOLUME SAR
	

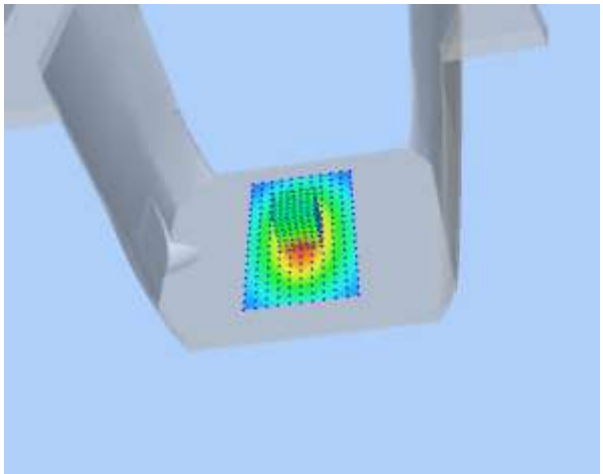
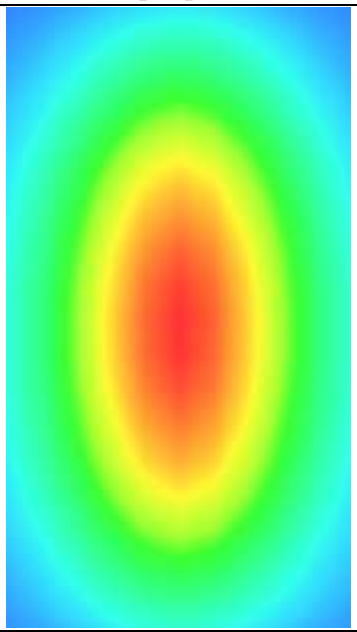
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	5.221202
SAR 1g (W/Kg)	9.582560

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	11.2425	9.4123	8.0345	6.9125	6.3092	3.9460



3D screen shot	Hot spot position
	

MEASUREMENT 9

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/09/2018

Measurement duration: 12 minutes 21 seconds

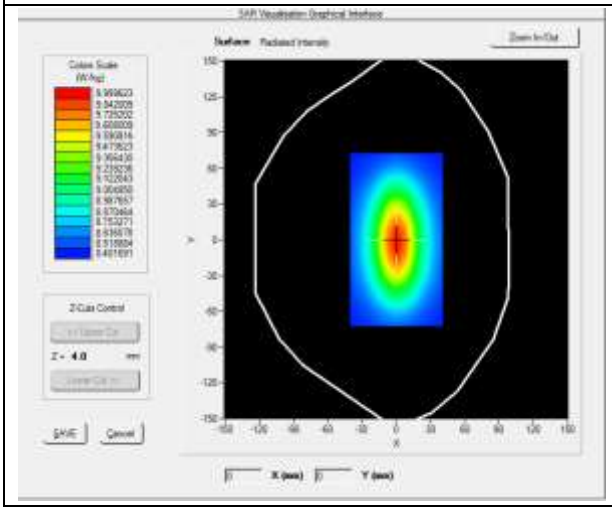
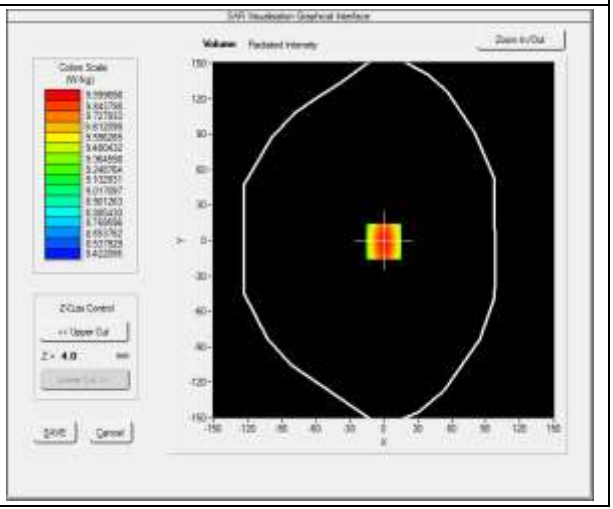
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

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

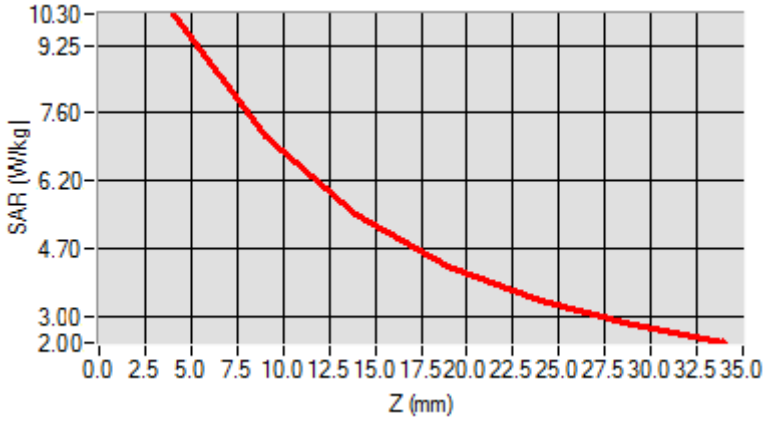
SURFACE SAR	VOLUME SAR
	

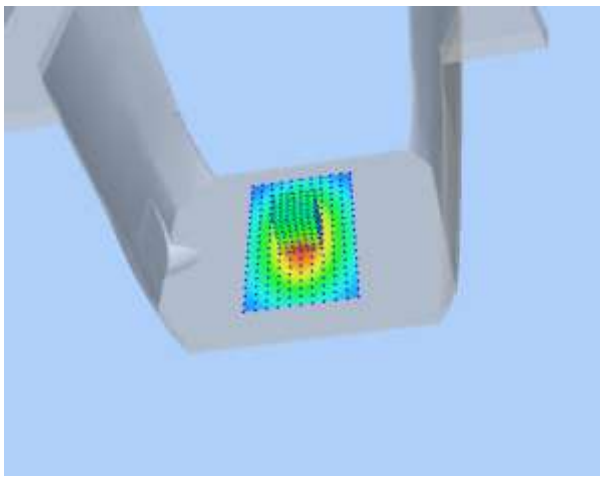
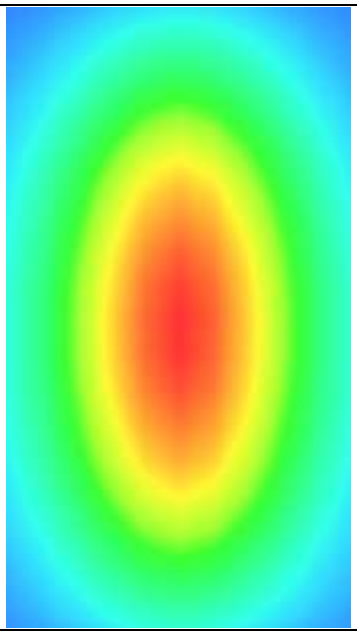
Maximum location: X=0.00, Y=0.00

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 10

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 10/10/2018

Measurement duration: 12 minutes 21 seconds

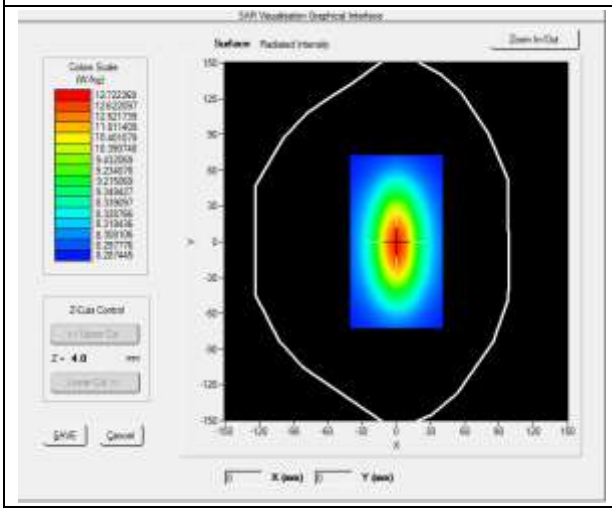
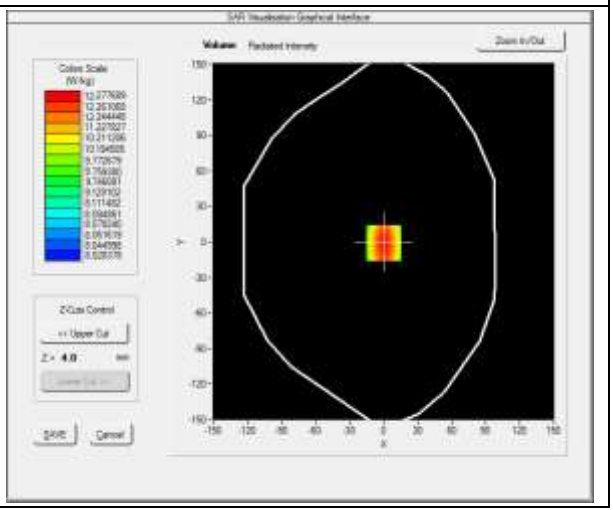
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.80; Calibrated: 06/01/2018

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

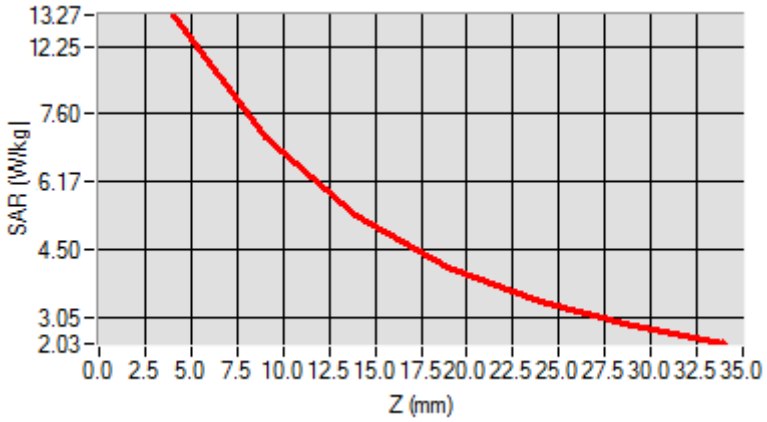
SURFACE SAR	VOLUME SAR
	

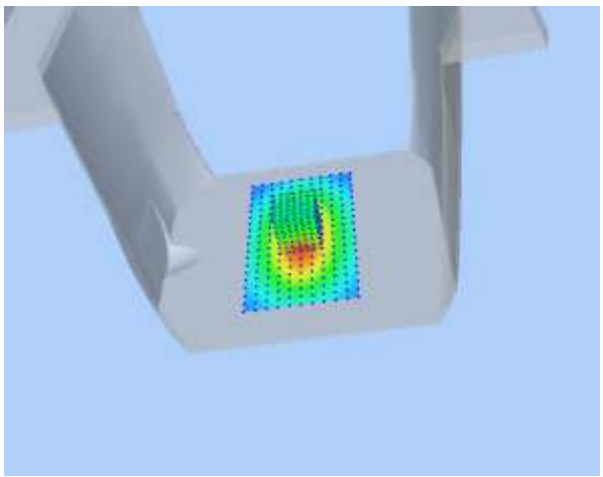
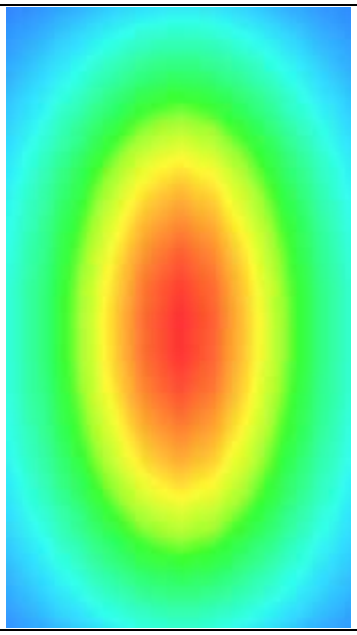
Maximum location: X=0.00, Y=0.00

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	13.1911	11.7951	9.2945	8.5400	6.3712	4.6225



3D screen shot	Hot spot position
	

Annex B. Plots of SAR Measurement

TYPE	BAND	PARAMETERS
Watch	**GSM850**	Measurement 1: Flat Plane with Front side(Near to Mouth) device position on Middle Channel in GSM mode
Watch	**GSM1900**	Measurement 2: Flat Plane with Front side(Near to Mouth) device position on Middle Channel in GSM mode
Watch	**WCDMA1900**	Measurement 3: Flat Plane with Front side(Near to Mouth) device position on Low Channel in WCDMA mode
Watch	**WCDMA850**	Measurement 6: Flat Plane with Front side(Near to Mouth) device position on Middle Channel in WCDMA mode
Watch	**LTE Band 2**	Measurement 7: Flat Plane with Front side(Near to Mouth) device position on Middle Channel in LTE mode
Watch	**LTE Band 4**	Measurement 13: Flat Plane with Front side(Near to Mouth) device position on Middle Channel in LTE mode
Watch	**LTE Band 12**	Measurement 17: Flat Plane with Front side(Near to Mouth) device position on Middle Channel in LTE mode
Watch	**WiFi_802.11b**	Measurement 19: Flat Plane with Front side(Near to Mouth) device position on Middle Channel in 802.11b mode
Watch	**GPRS850_4TX**	Measurement 20: Flat Plane with Back device position on Middle Channel in GPRS mode
Watch	**GPRS1900_4TX**	Measurement 21: Flat Plane with Back device position on Middle Channel in GPRS mode
Watch	**WCDMA1900**	Measurement 22: Flat Plane with Back side device position on Low Channel in WCDMA mode
Watch	**WCDMA850**	Measurement 23: Flat Plane with Back device position on Middle Channel in WCDMA mode
Watch	**LTE Band 2**	Measurement 24: Flat Plane with Back device position on Middle Channel in LTE mode
Watch	**LTE Band 4**	Measurement 26: Flat Plane with Back device position on Low Channel in LTE mode
Watch	**LTE Band 12**	Measurement 28: Flat Plane with Back device position on Middle Channel in LTE mode
Watch	**WiFi_802.11b**	Measurement 30: Flat Plane with Back side device position on Middle 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

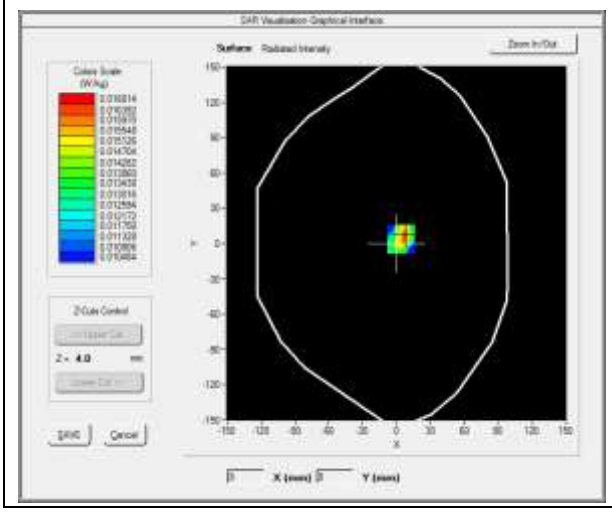
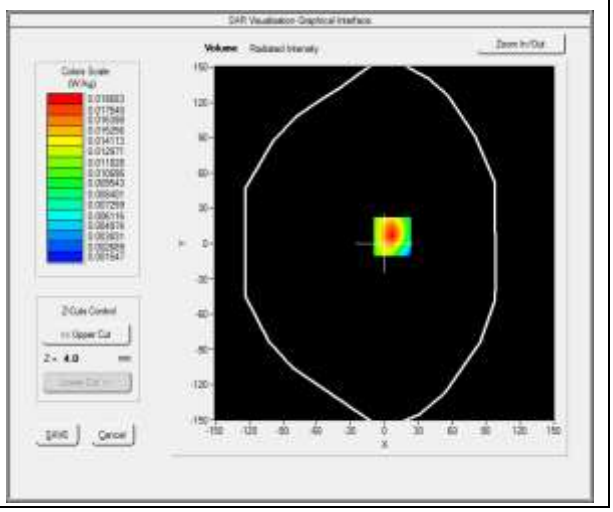
Type: Phone measurement (Complete)
Date of measurement: 10/08/2018
Measurement duration: 11 minutes 48 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.93; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)

B. SAR Measurement Results

Frequency (MHz)	836.600000
Relative Permittivity (real part)	41.110245
Conductivity (S/m)	0.871245
Power Variation (%)	1.144536
Ambient Temperature	21.1
Liquid Temperature	21.3

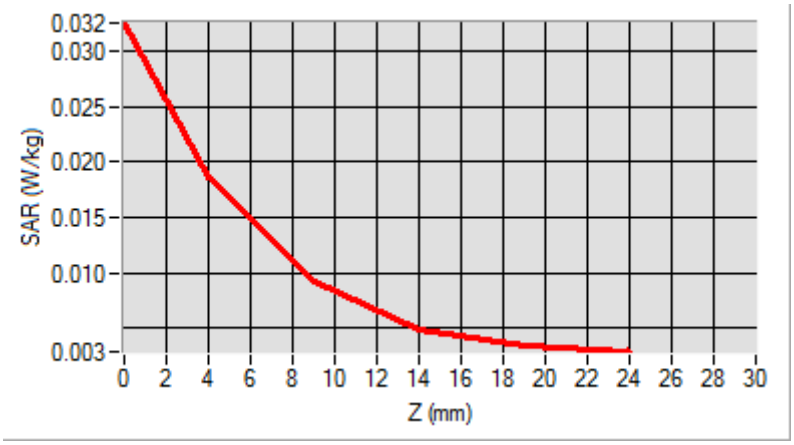
SURFACE SAR	VOLUME SAR
	

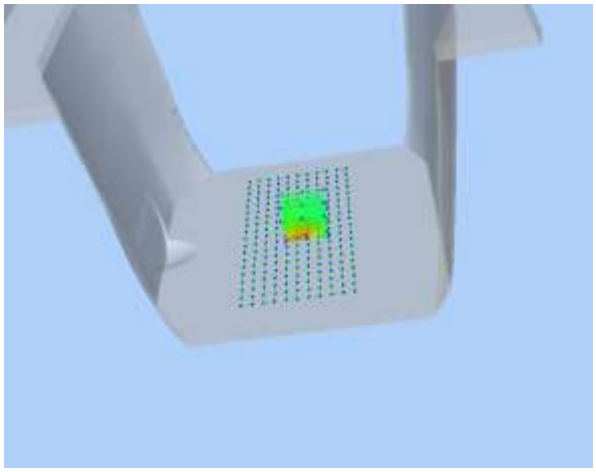
Maximum location: X=7.00, Y=6.00

SAR Peak: 0.03 W/kg

SAR 10g (W/Kg)	**0.009910**
SAR 1g (W/Kg)	**0.017829**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0325**	**0.0187**	**0.0092**	**0.0050**	**0.0035**



3D screen shot	**Hot spot position**
	

MEASUREMENT 2

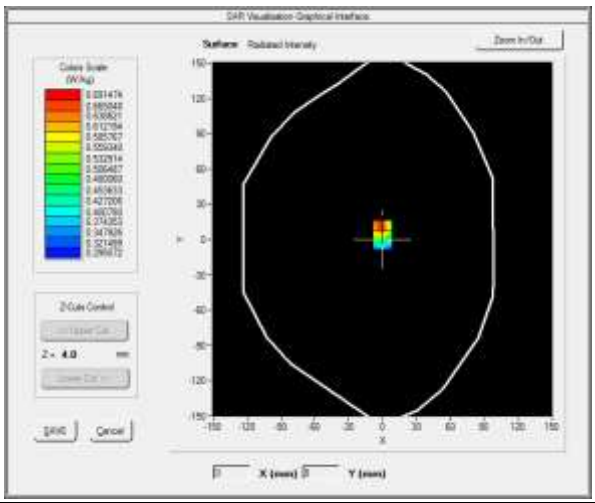
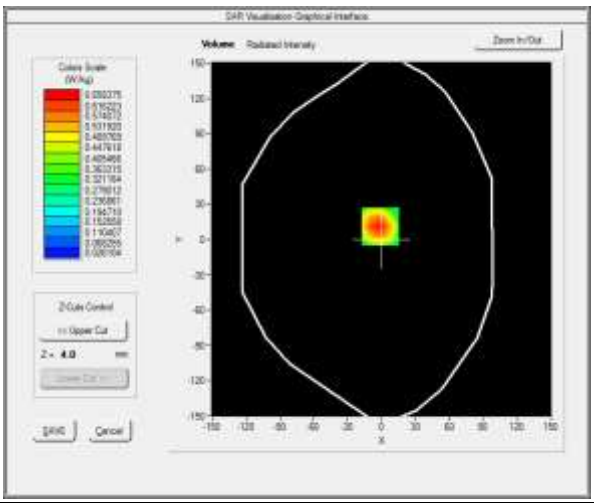
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 11 minutes 48 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.35; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative Permittivity (real part)	38.560124
Conductivity (S/m)	1.380369
Power Variation (%)	1.442440
Ambient Temperature	21.1
Liquid Temperature	21.3

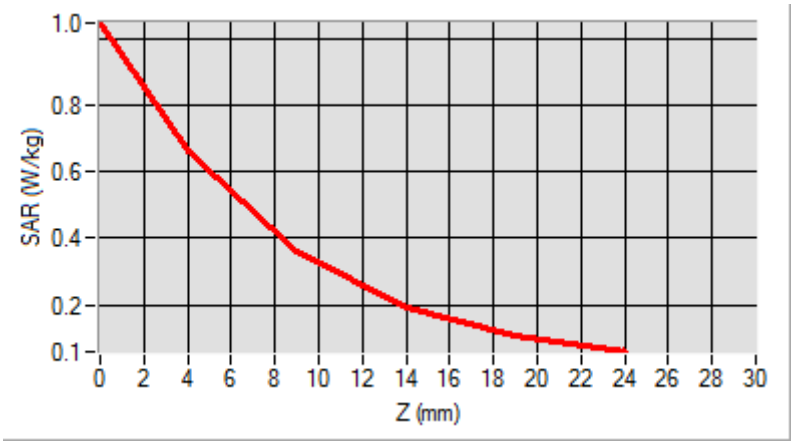
SURFACE SAR	VOLUME SAR
	

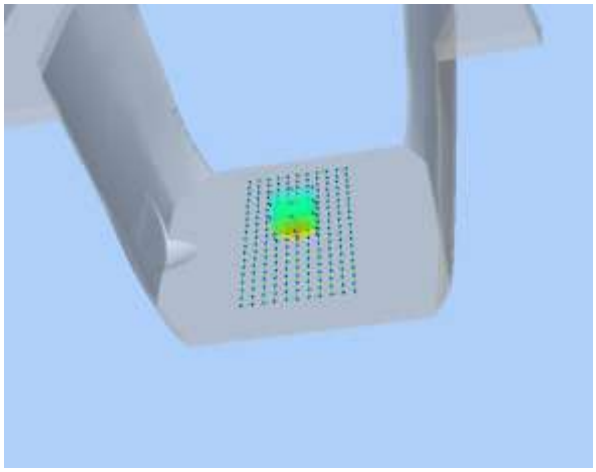
Maximum location: X=-1.00, Y=11.00

SAR Peak: 1.05 W/kg

SAR 10g (W/Kg)	**0.337352**
SAR 1g (W/Kg)	**0.621571**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**1.0456**	**0.6584**	**0.3577**	**0.1941**	**0.1094**



3D screen shot	**Hot spot position**
	

MEASUREMENT 3

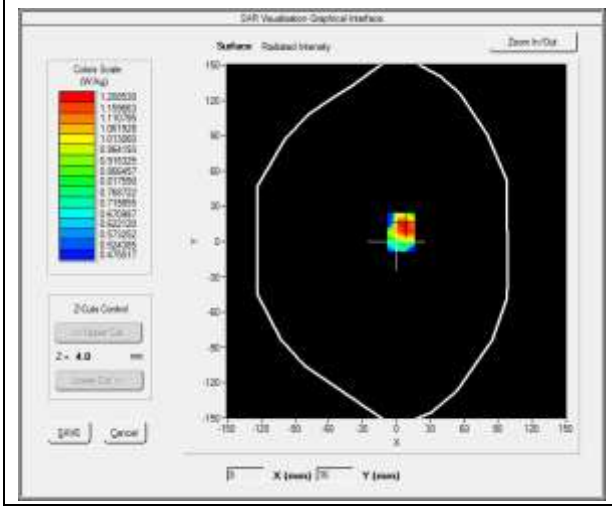
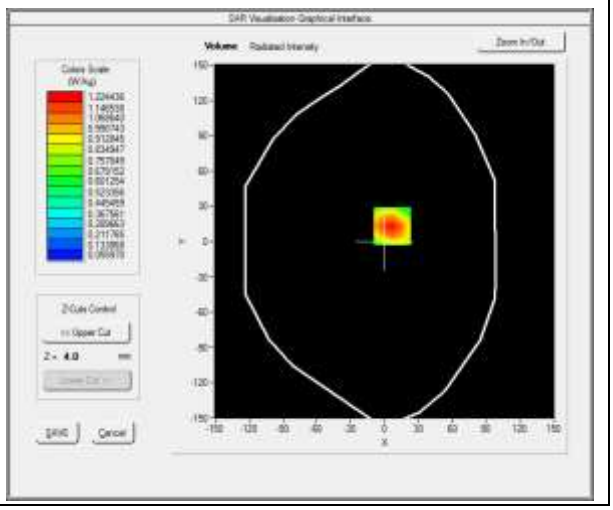
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.35; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	WCDMA1900_RMC
Channels	Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1852.400000
Relative Permittivity (real part)	38.560124
Conductivity (S/m)	1.380369
Power Variation (%)	1.524540
Ambient Temperature	21.1
Liquid Temperature	21.3

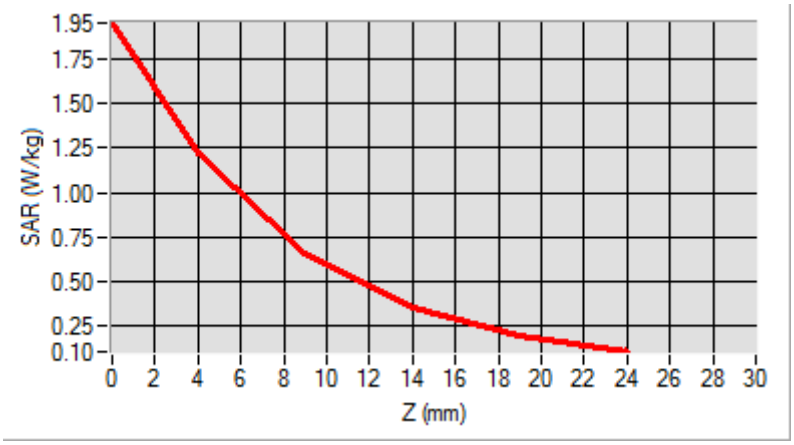
SURFACE SAR	VOLUME SAR
	

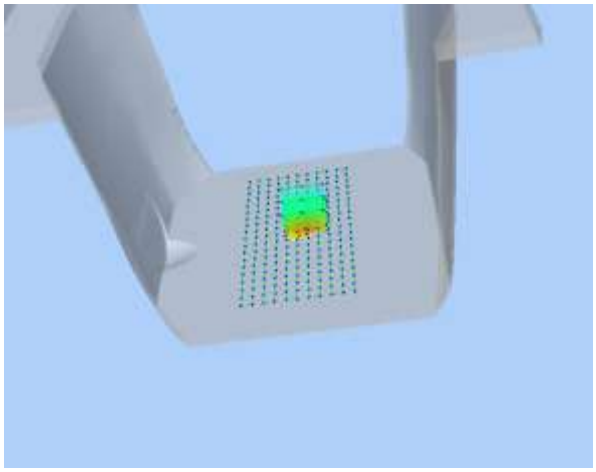
Maximum location: X=7.00, Y=13.00

SAR Peak: 1.96 W/kg

SAR 10g (W/Kg)	0.633676
SAR 1g (W/Kg)	1.159460

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.9541	1.2244	0.6596	0.3533	0.1956



3D screen shot	Hot spot position
	

MEASUREMENT 6

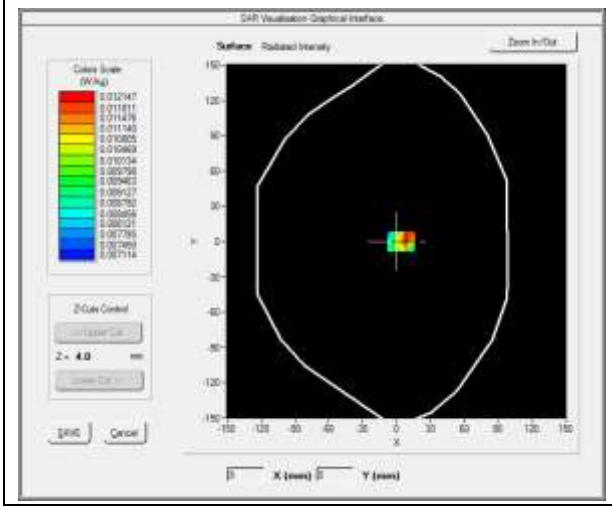
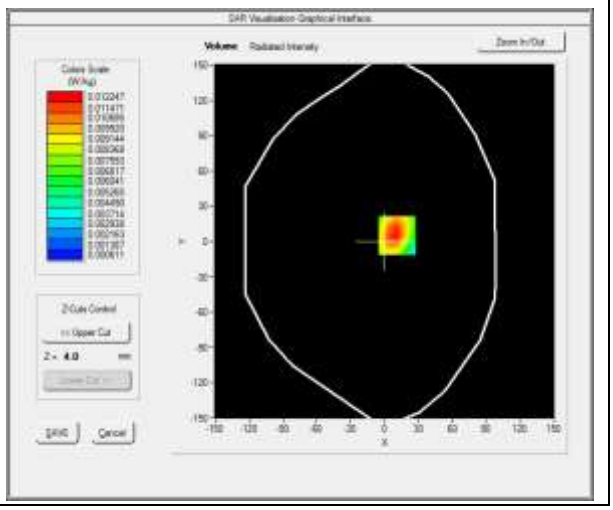
Type: Phone measurement (Complete)
Date of measurement: 10/08/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.93; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	WCDMA850_RMC
Channels	Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	836.600000
Relative Permittivity (real part)	41.110245
Conductivity (S/m)	0.871245
Power Variation (%)	1.342427
Ambient Temperature	21.1
Liquid Temperature	21.3

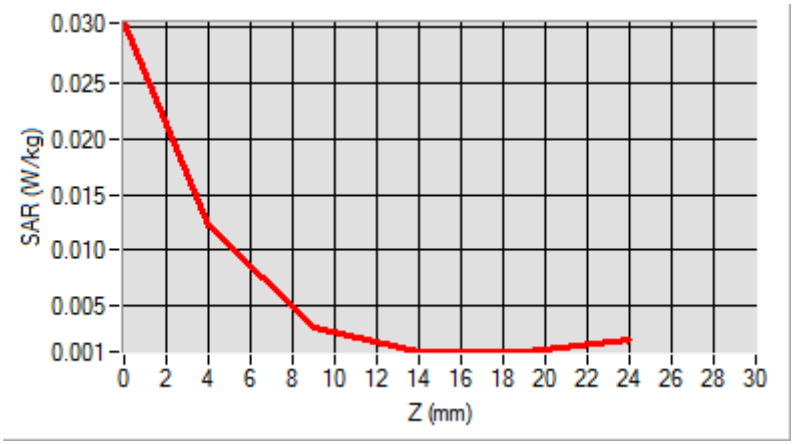
SURFACE SAR	VOLUME SAR
	

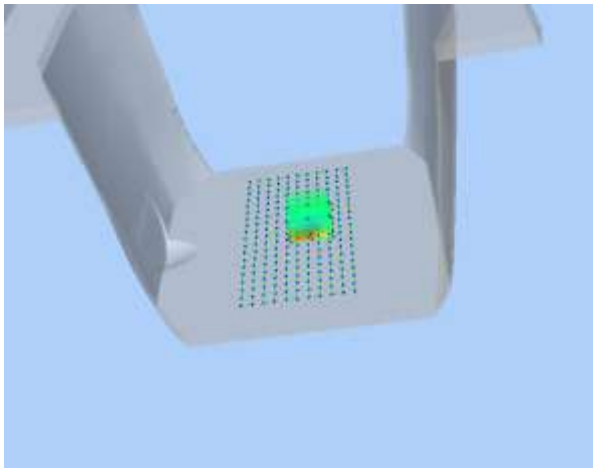
Maximum location: X=11.00, Y=5.00

SAR Peak: 0.03 W/kg

SAR 10g (W/Kg)	**0.006311**
SAR 1g (W/Kg)	**0.013233**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0304**	**0.0122**	**0.0030**	**0.0009**	**0.0009**



3D screen shot	**Hot spot position**
	

MEASUREMENT 7

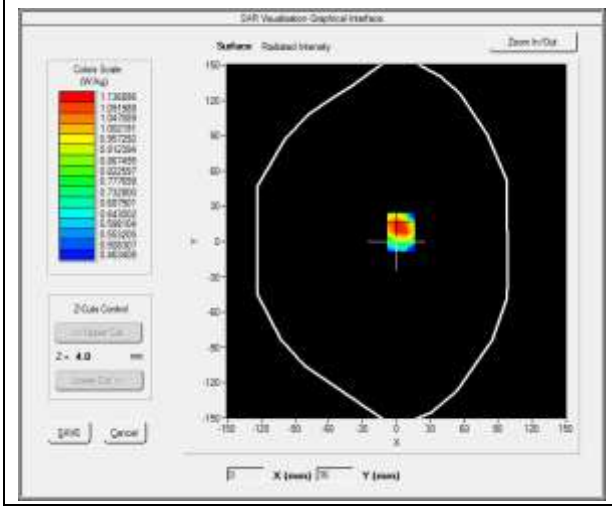
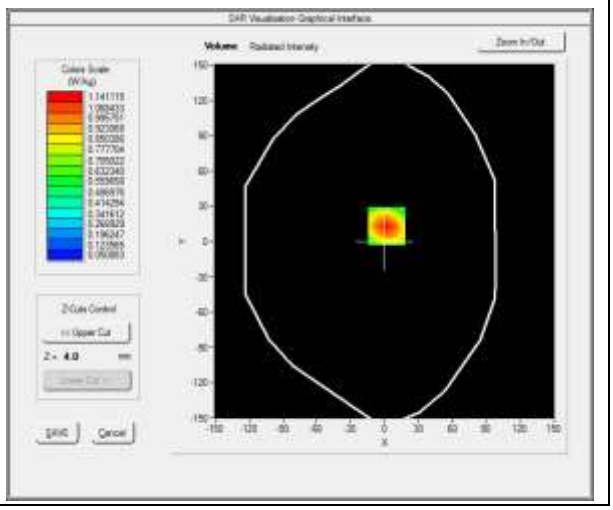
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.35; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	LTE Band 2
Channels	QPSK, 20MHz, 1RB, Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative Permittivity (real part)	38.560124
Conductivity (S/m)	1.380369
Power Variation (%)	1.743564
Ambient Temperature	21.1
Liquid Temperature	21.3

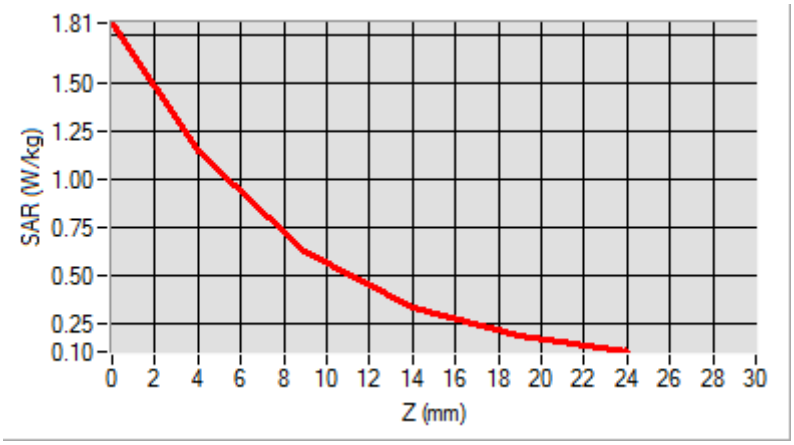
SURFACE SAR	VOLUME SAR
	

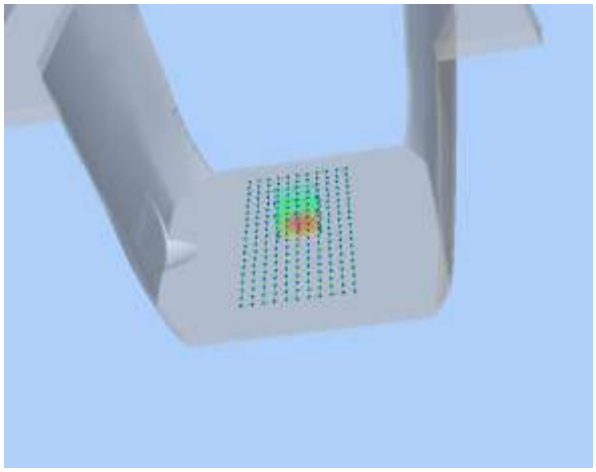
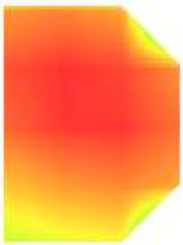
Maximum location: X=2.00, Y=13.00

SAR Peak: 1.81 W/kg

SAR 10g (W/Kg)	0.584860
SAR 1g (W/Kg)	1.074373

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.8112	1.1411	0.6197	0.3347	0.1866



3D screen shot	Hot spot position
	

MEASUREMENT 13

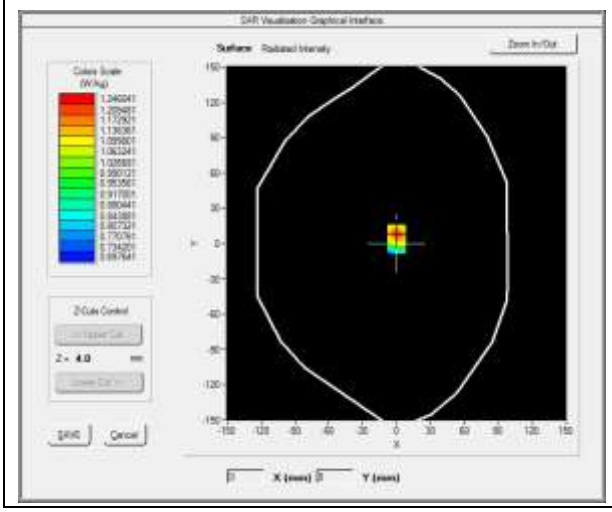
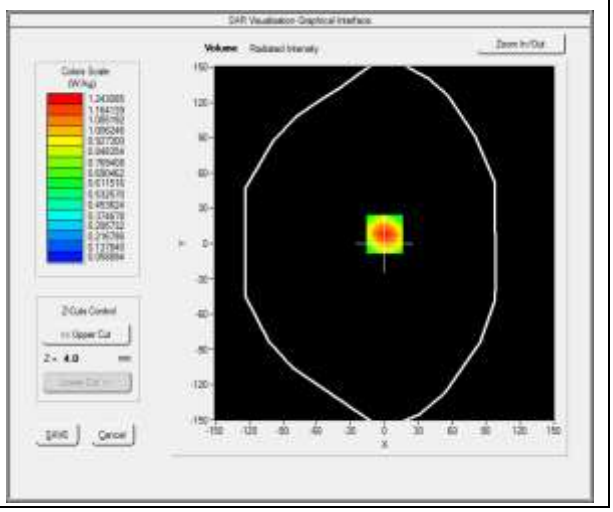
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.84; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	LTE Band 4
Channels	QPSK, 20MHz, 1RB, Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1732.500000
Relative Permittivity (real part)	39.025421
Conductivity (S/m)	1.370123
Power Variation (%)	1.374628
Ambient Temperature	21.1
Liquid Temperature	21.2

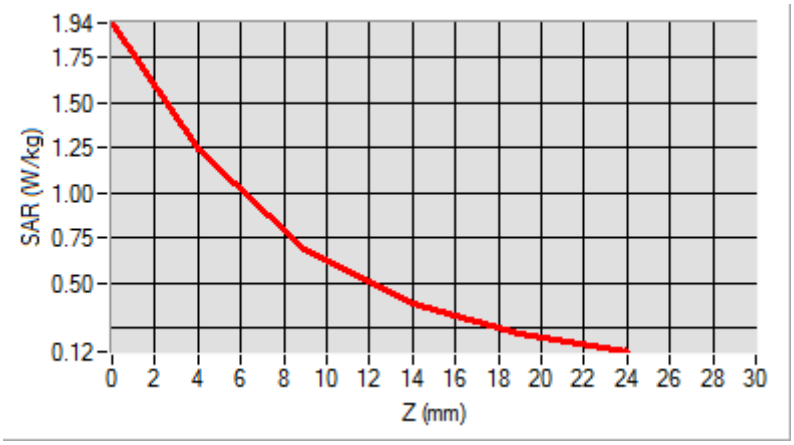
SURFACE SAR	VOLUME SAR
	

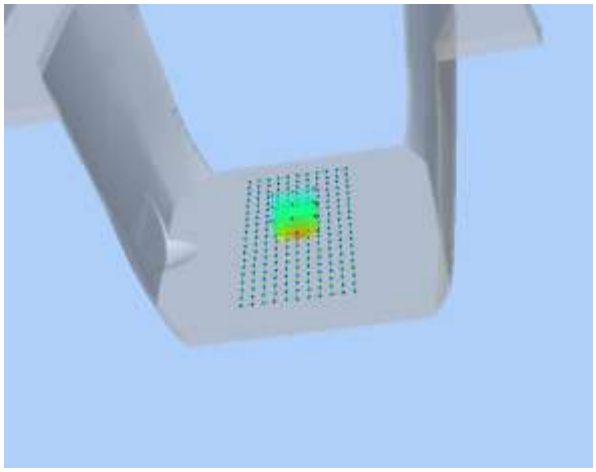
Maximum location: X=0.00, Y=8.00

SAR Peak: 1.95 W/kg

SAR 10g (W/Kg)	0.644540
SAR 1g (W/Kg)	1.169957

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.9445	1.2431	0.6897	0.3812	0.2166



3D screen shot	Hot spot position
	

MEASUREMENT 17

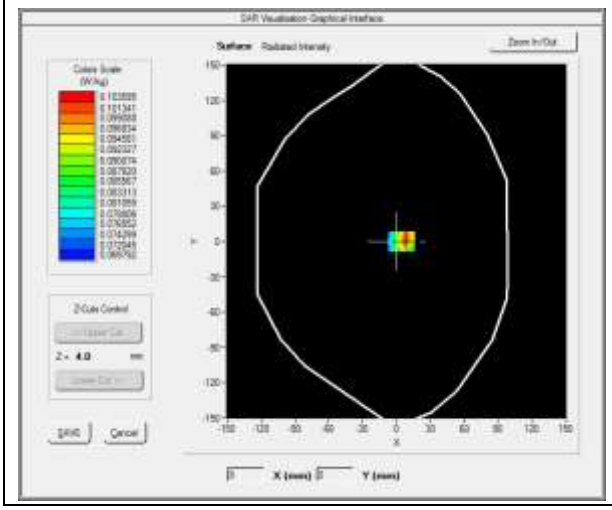
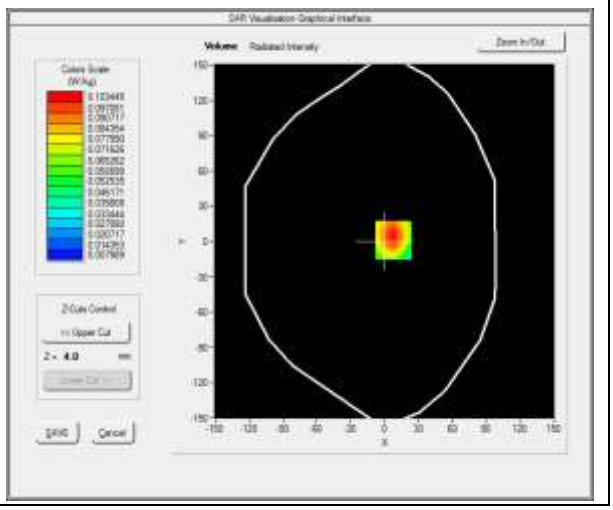
Type: Phone measurement (Complete)
Date of measurement: 10/08/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.99; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	LTE Band 12
Channels	QPSK, 10MHz, 1RB, Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	707.500000
Relative Permittivity (real part)	41.320574
Conductivity (S/m)	0.862373
Power Variation (%)	0.924535
Ambient Temperature	21.1
Liquid Temperature	21.2

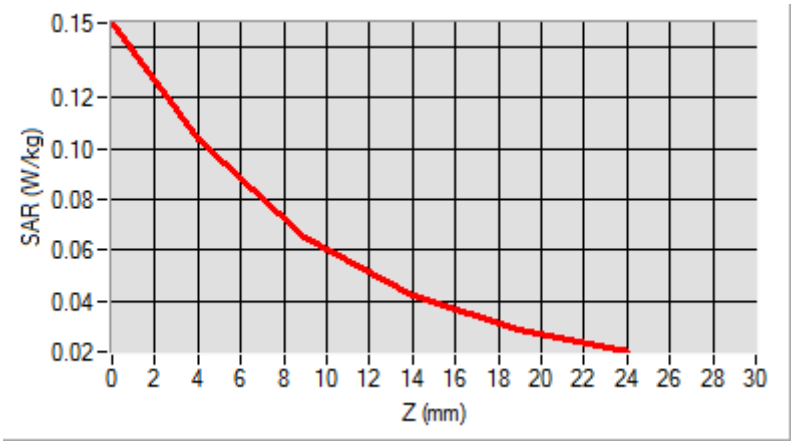
SURFACE SAR	VOLUME SAR
	

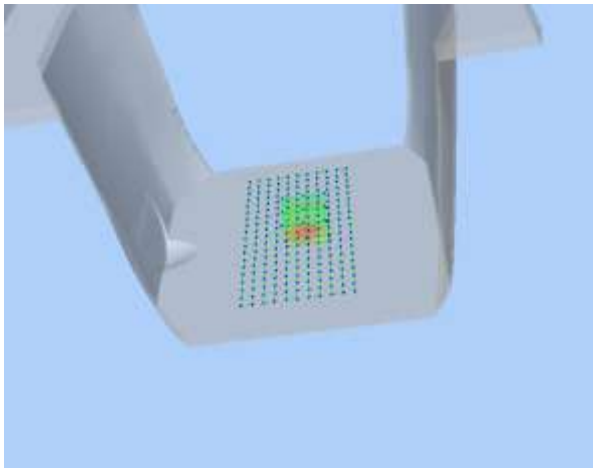
Maximum location: X=8.00, Y=1.00

SAR Peak: 0.15 W/kg

SAR 10g (W/Kg)	0.063589
SAR 1g (W/Kg)	0.101610

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1492	0.1034	0.0653	0.0423	0.0290



3D screen shot	Hot spot position
	

MEASUREMENT 19

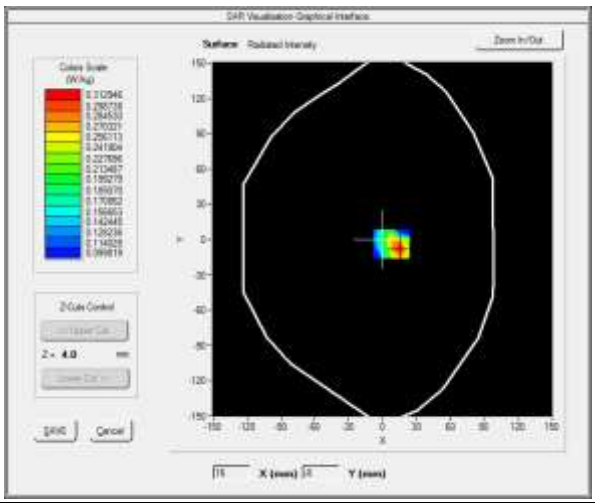
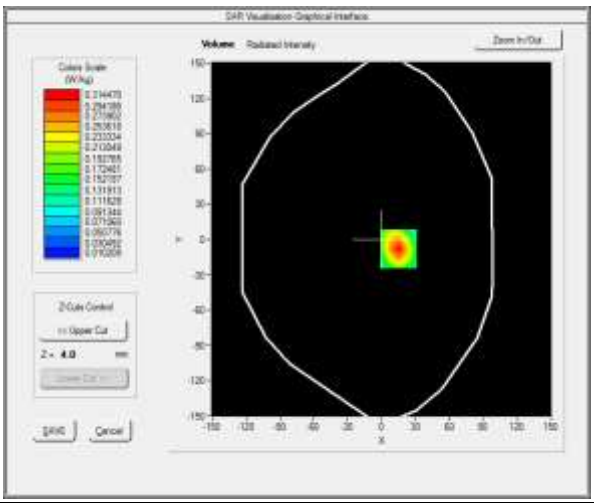
Type: Phone measurement (Complete)
Date of measurement: 10/10/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.64; Calibrated: 06/01/2018

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Front(Near to Mouth)
Band	WiFi_802.11b
Channels	Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative Permittivity (real part)	38.153660
Conductivity (S/m)	1.740236
Power Variation (%)	3.234772
Ambient Temperature	21.1
Liquid Temperature	21.2

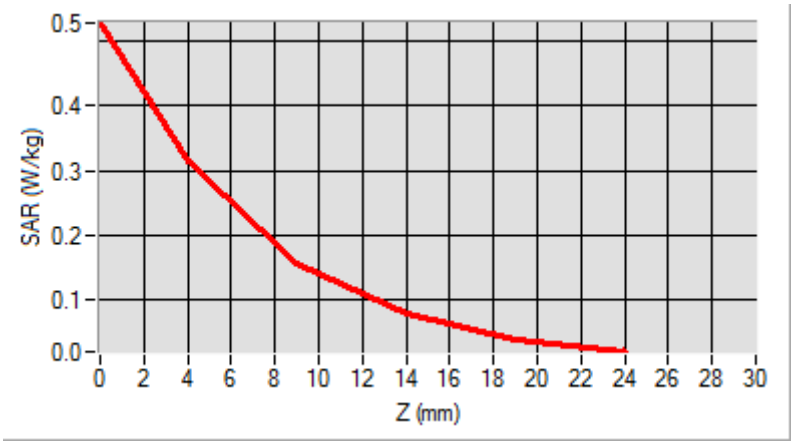
SURFACE SAR	VOLUME SAR
	

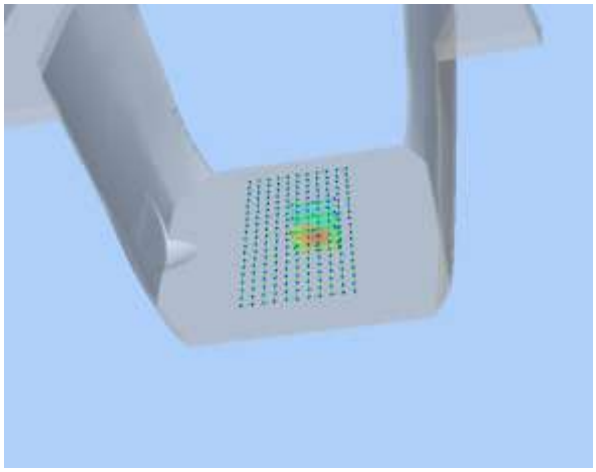
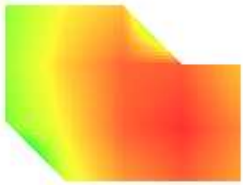
Maximum location: X=15.00, Y=-8.00

SAR Peak: 0.53 W/kg

SAR 10g (W/Kg)	**0.147879**
SAR 1g (W/Kg)	**0.193165**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.5270**	**0.3045**	**0.1573**	**0.0779**	**0.0406**



3D screen shot	**Hot spot position**
	

MEASUREMENT 20

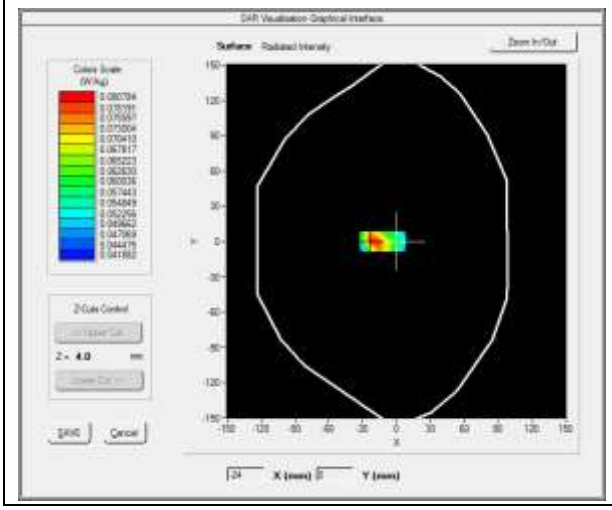
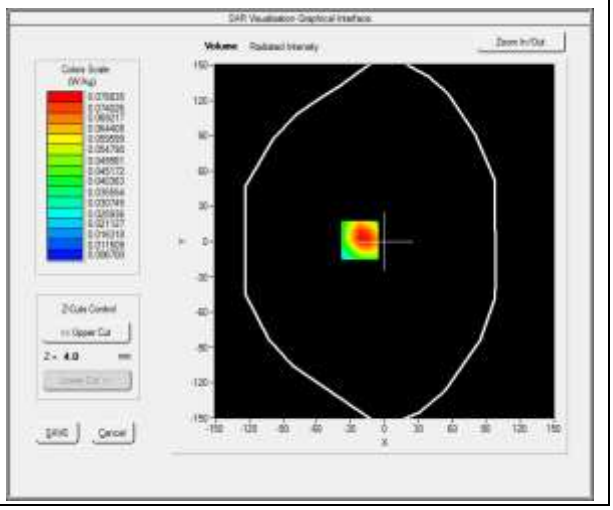
Type: Phone measurement (Complete)
Date of measurement: 10/08/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

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_4TX
Channels	Middle
Signal	Duty Cycle: 1:2

B. SAR Measurement Results

Frequency (MHz)	836.600000
Relative Permittivity (real part)	54.851214
Conductivity (S/m)	0.951454
Power Variation (%)	0.901472
Ambient Temperature	21.1
Liquid Temperature	21.3

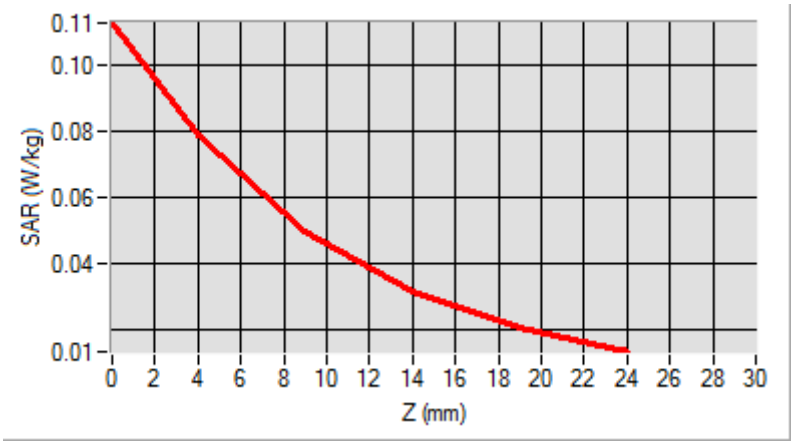
SURFACE SAR	VOLUME SAR
	

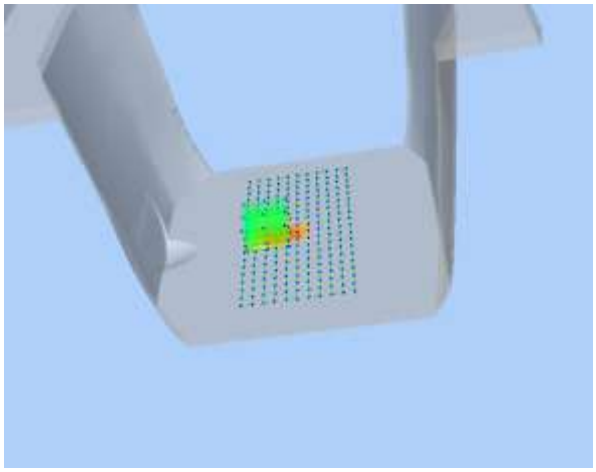
Maximum location: X=-22.00, Y=1.00

SAR Peak: 0.12 W/kg

SAR 10g (W/Kg)	**0.046091**
SAR 1g (W/Kg)	**0.076669**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.1129**	**0.0788**	**0.0498**	**0.0318**	**0.0208**



3D screen shot	**Hot spot position**
	

MEASUREMENT 21

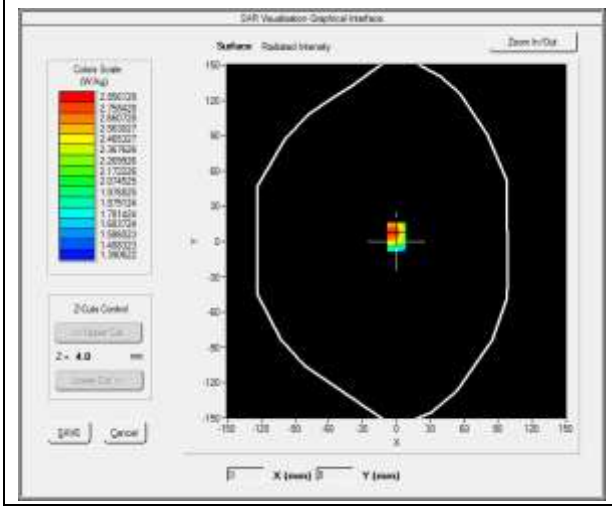
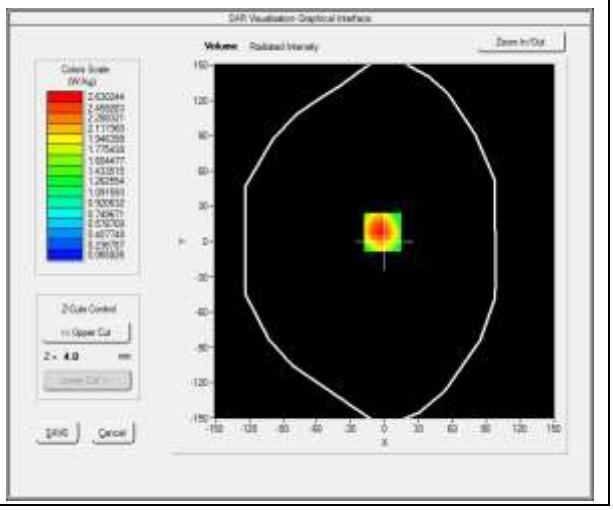
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

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_4TX
Channels	Middle
Signal	Duty Cycle: 1:2

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative Permittivity (real part)	52.420415
Conductivity (S/m)	1.501966
Power Variation (%)	1.474622
Ambient Temperature	21.1
Liquid Temperature	21.3

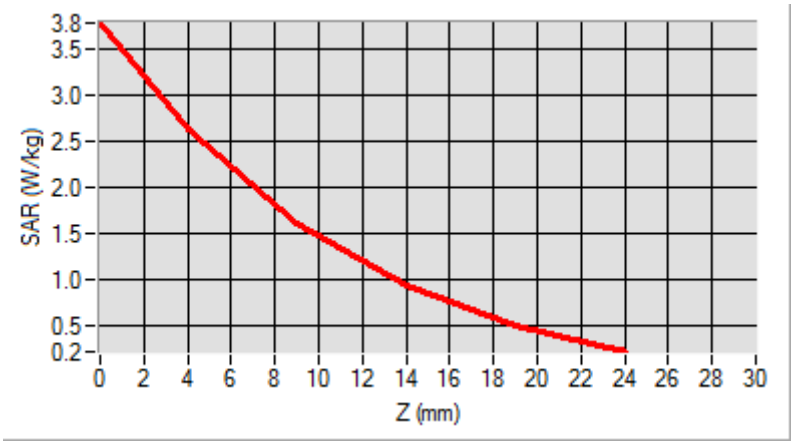
SURFACE SAR	VOLUME SAR
	

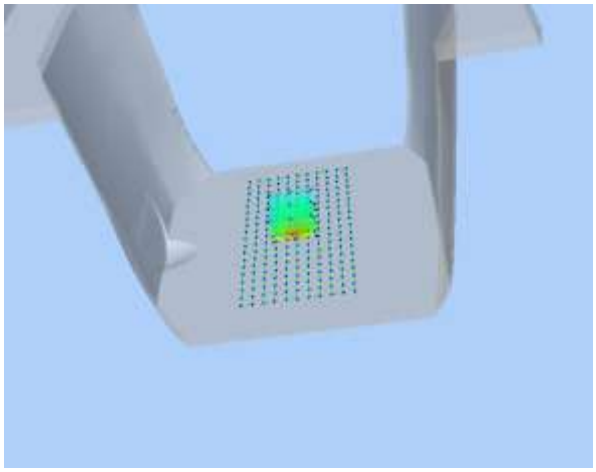
Maximum location: X=-2.00, Y=8.00

SAR Peak: 3.82 W/kg

SAR 10g (W/Kg)	1.391636
SAR 1g (W/Kg)	2.484201

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	3.7737	2.6302	1.6088	0.9327	0.4993



3D screen shot	Hot spot position
	

MEASUREMENT 22

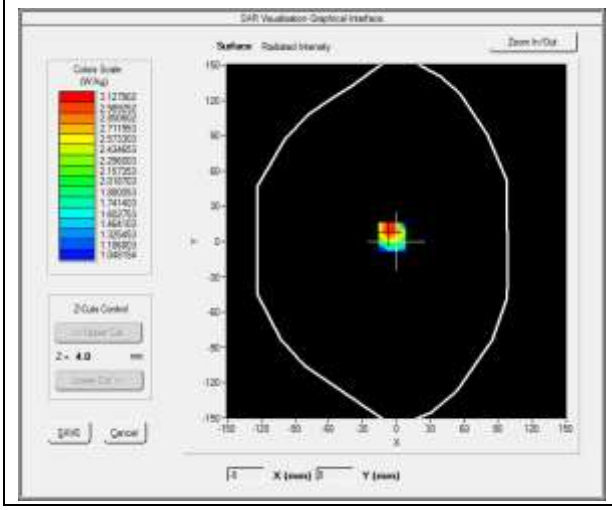
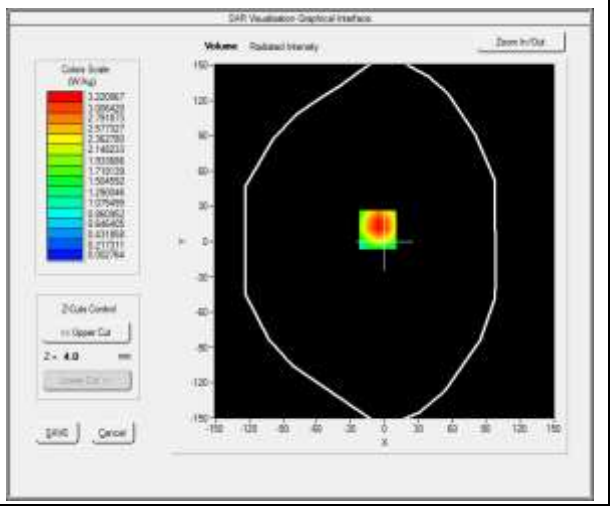
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

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	Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1852.400000
Relative Permittivity (real part)	52.420415
Conductivity (S/m)	1.501966
Power Variation (%)	1.789272
Ambient Temperature	21.1
Liquid Temperature	21.3

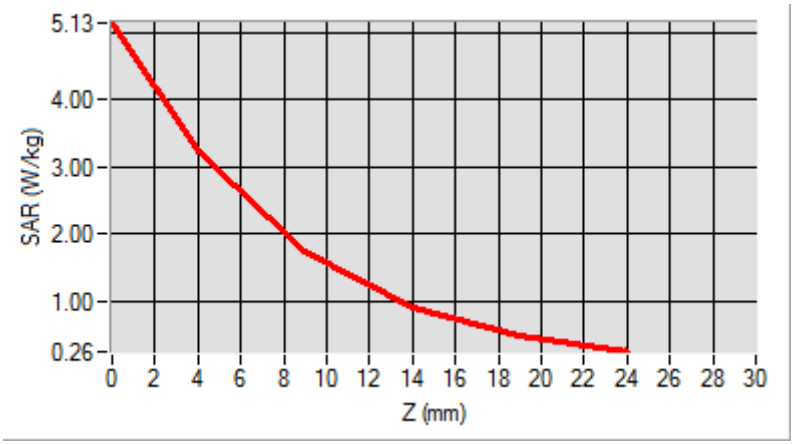
SURFACE SAR	VOLUME SAR
	

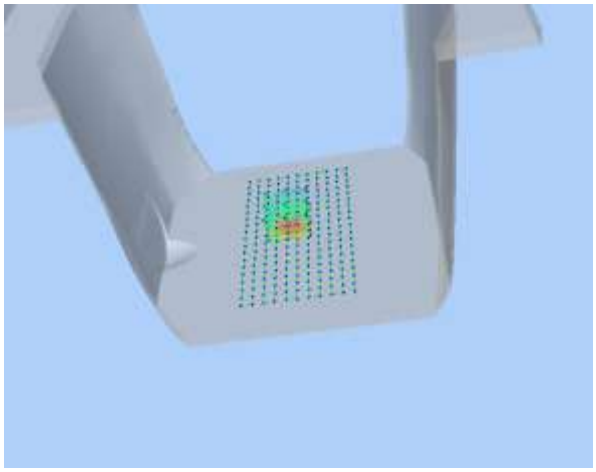
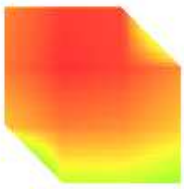
Maximum location: X=-6.00, Y=10.00

SAR Peak: 5.22 W/kg

SAR 10g (W/Kg)	1.653994
SAR 1g (W/Kg)	3.090821

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	5.1342	3.2210	1.7339	0.9224	0.5017



3D screen shot	Hot spot position
	

MEASUREMENT 23

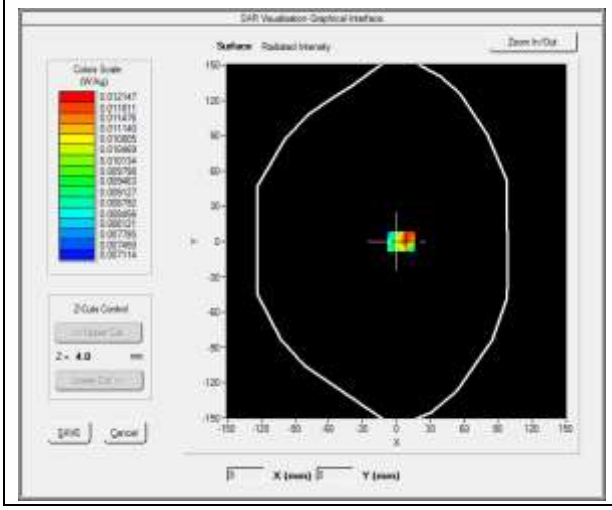
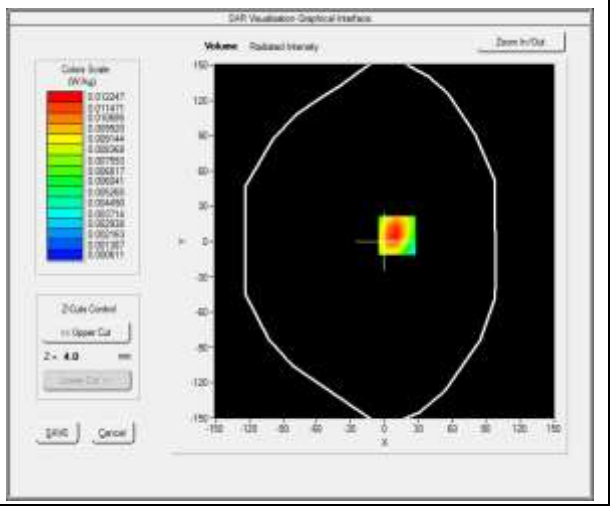
Type: Phone measurement (Complete)
Date of measurement: 10/08/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.13; Calibrated: 06/01/2018

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)	836.600000
Relative Permittivity (real part)	54.851214
Conductivity (S/m)	0.951454
Power Variation (%)	2.341234
Ambient Temperature	21.1
Liquid Temperature	21.3

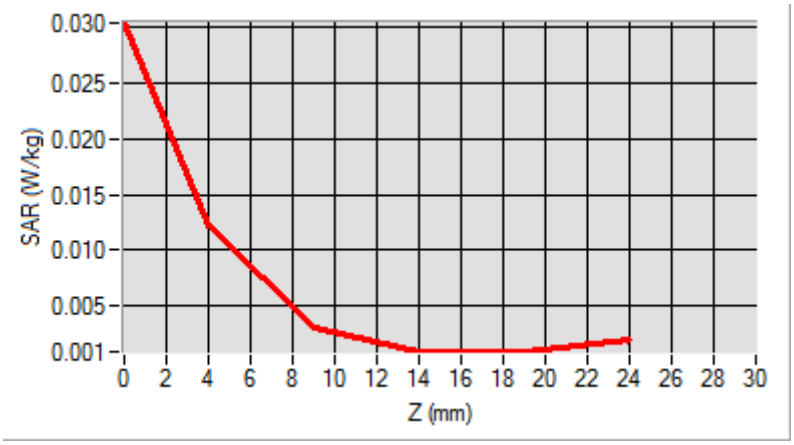
SURFACE SAR	VOLUME SAR
	

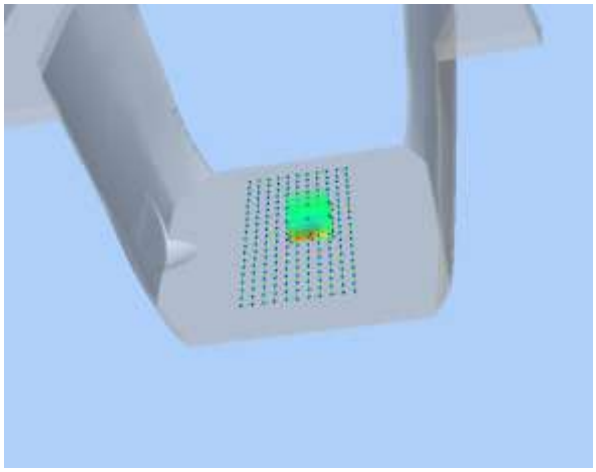
Maximum location: X=11.00, Y=5.00

SAR Peak: 0.03 W/kg

SAR 10g (W/Kg)	0.006311
SAR 1g (W/Kg)	0.013233

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0304	0.0122	0.0030	0.0009	0.0009



3D screen shot	Hot spot position
	

MEASUREMENT 24

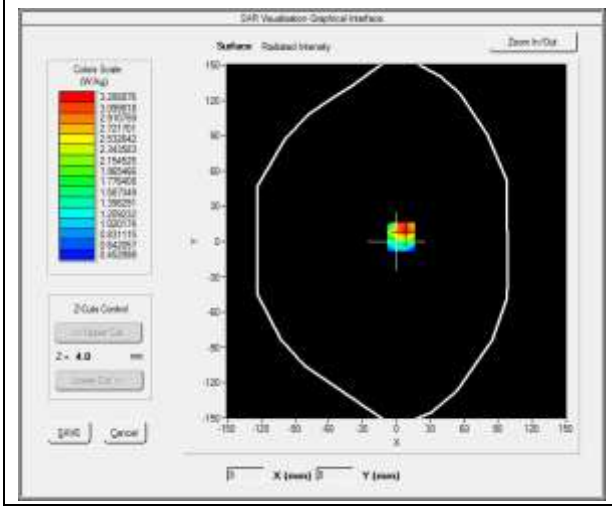
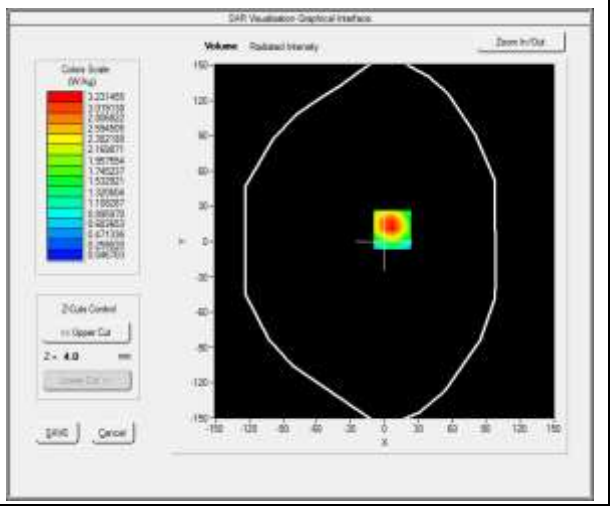
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.55; Calibrated: 06/01/2018

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,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 (%)	1.523573
Ambient Temperature	21.1
Liquid Temperature	21.3

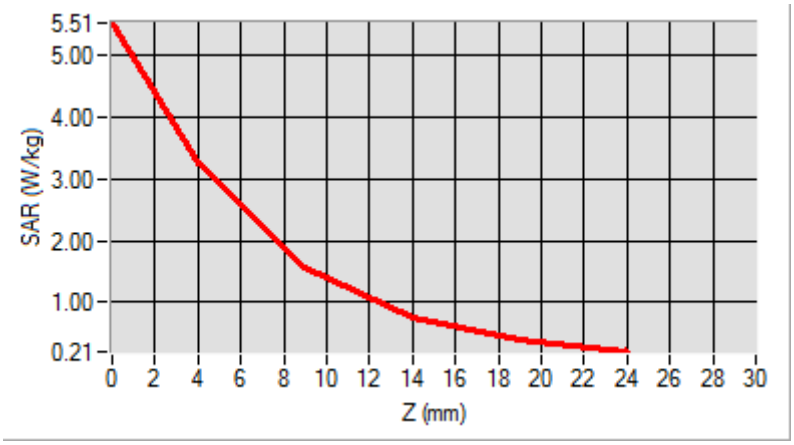
SURFACE SAR	VOLUME SAR
	

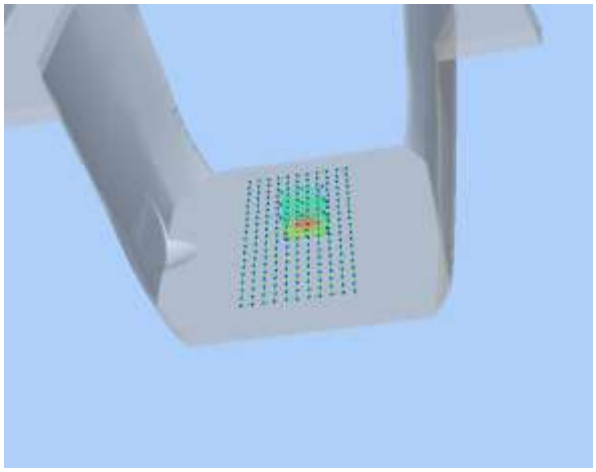
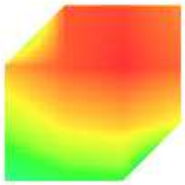
Maximum location: X=7.00, Y=10.00

SAR Peak: 5.65 W/kg

SAR 10g (W/Kg)	**1.585603**
SAR 1g (W/Kg)	**3.116122**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**5.5070**	**3.2315**	**1.5782**	**0.7658**	**0.3985**



3D screen shot	**Hot spot position**
	

MEASUREMENT 26

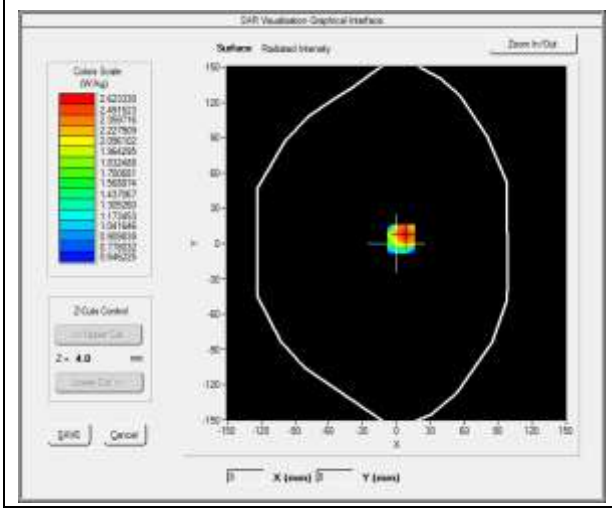
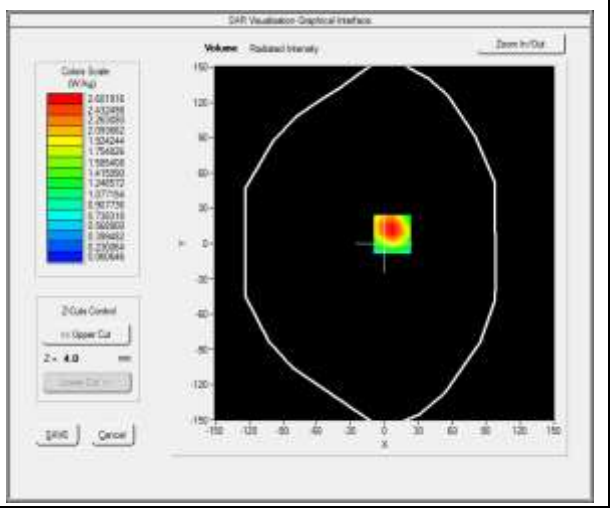
Type: Phone measurement (Complete)
Date of measurement: 10/09/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.06; Calibrated: 06/01/2018

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 4
Channels	QPSK, 20MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1720.000000
Relative Permittivity (real part)	51.220432
Conductivity (S/m)	1.460124
Power Variation (%)	0.858383
Ambient Temperature	21.1
Liquid Temperature	21.2

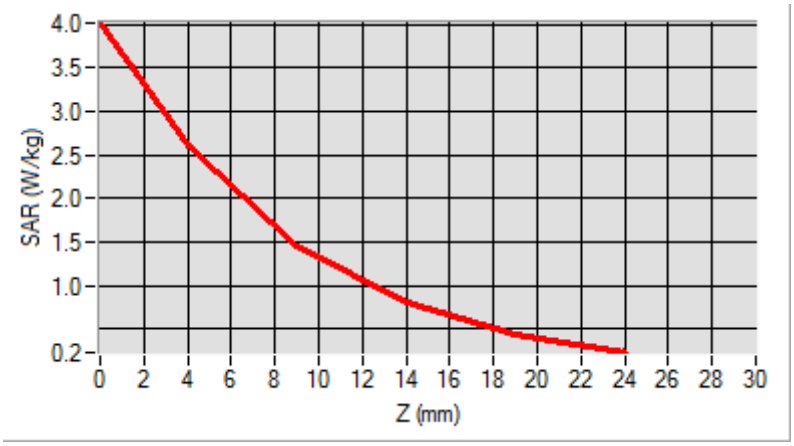
SURFACE SAR	VOLUME SAR
	

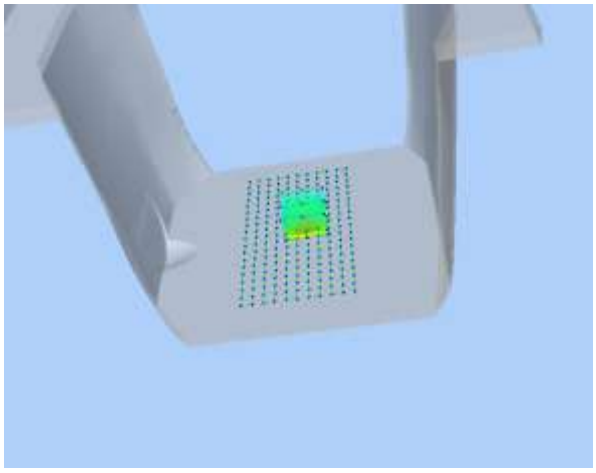
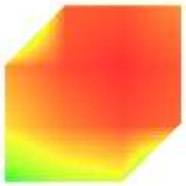
Maximum location: X=7.00, Y=8.00

SAR Peak: 4.16 W/kg

SAR 10g (W/Kg)	1.376451
SAR 1g (W/Kg)	2.518273

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	4.0172	2.6019	1.4642	0.8117	0.4521



3D screen shot	Hot spot position
	

MEASUREMENT 28

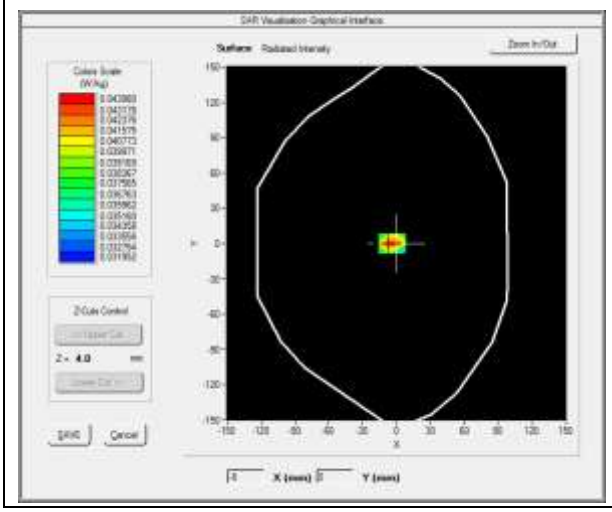
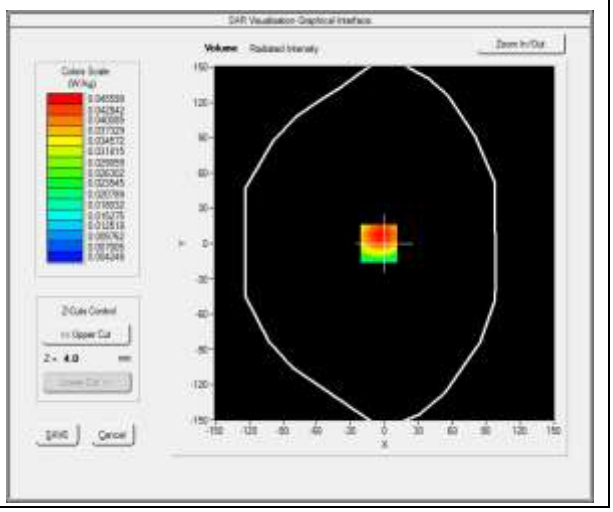
Type: Phone measurement (Complete)
Date of measurement: 10/08/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.28; Calibrated: 06/01/2018

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 12
Channels	QPSK, 10MHz, 1RB, Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	707.500000
Relative Permittivity (real part)	54.964739
Conductivity (S/m)	0.931048
Power Variation (%)	3.672346
Ambient Temperature	21.1
Liquid Temperature	21.2

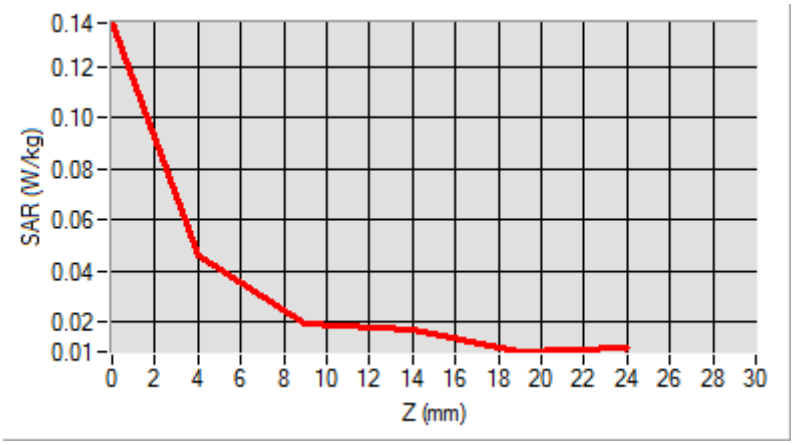
SURFACE SAR	VOLUME SAR
	

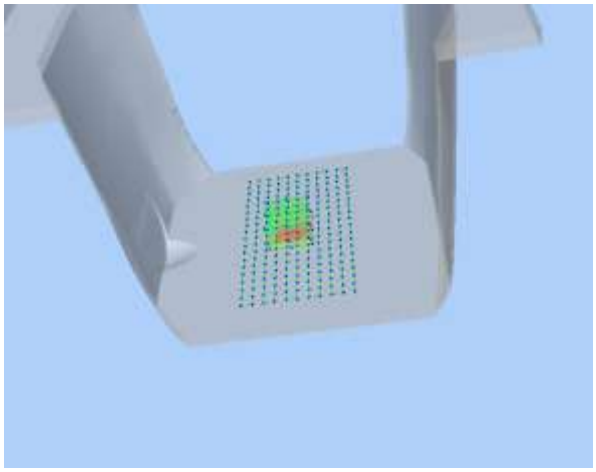
Maximum location: X=-5.00, Y=0.00

SAR Peak: 0.07 W/kg

SAR 10g (W/Kg)	0.027628
SAR 1g (W/Kg)	0.045085

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.1370	0.0456	0.0191	0.0172	0.0083



3D screen shot	Hot spot position
	

MEASUREMENT 30

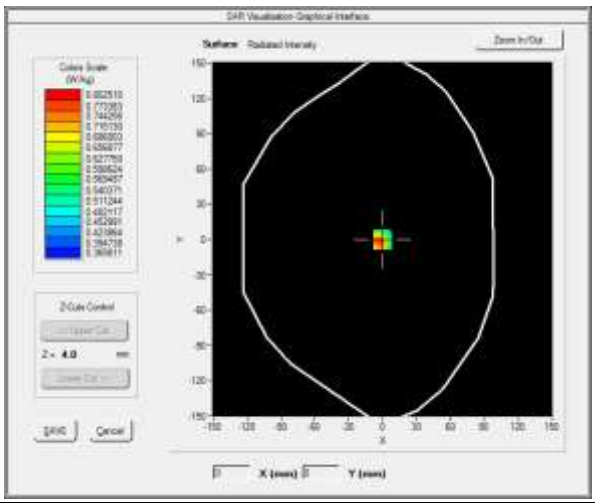
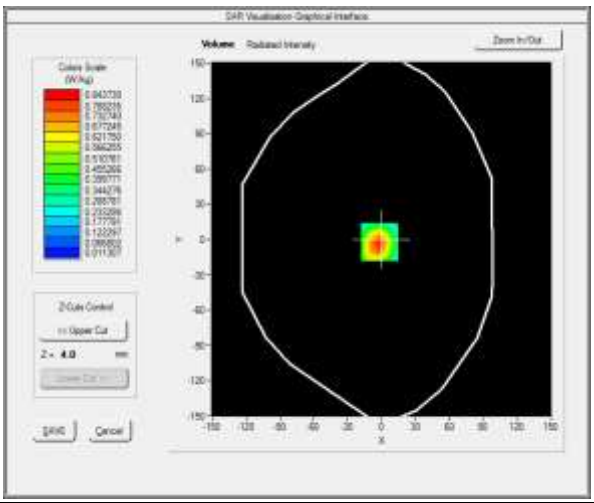
Type: Phone measurement (Complete)
Date of measurement: 10/10/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 5.80; Calibrated: 06/01/2018

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	Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative Permittivity (real part)	52.010212
Conductivity (S/m)	1.910255
Power Variation (%)	2.492743
Ambient Temperature	21.1
Liquid Temperature	21.2

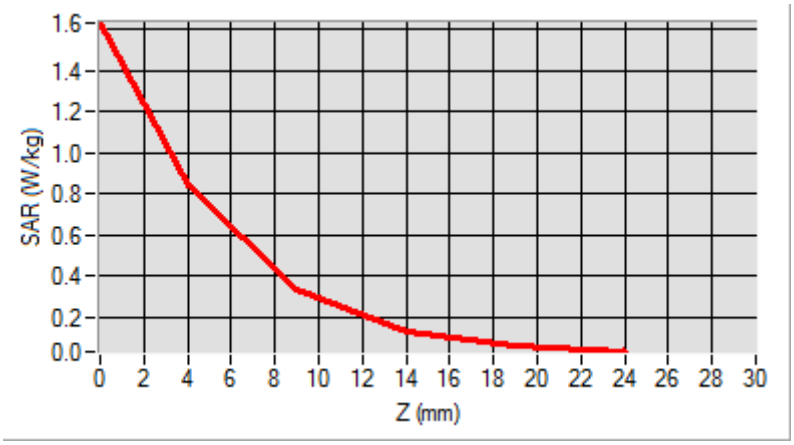
SURFACE SAR	VOLUME SAR
	

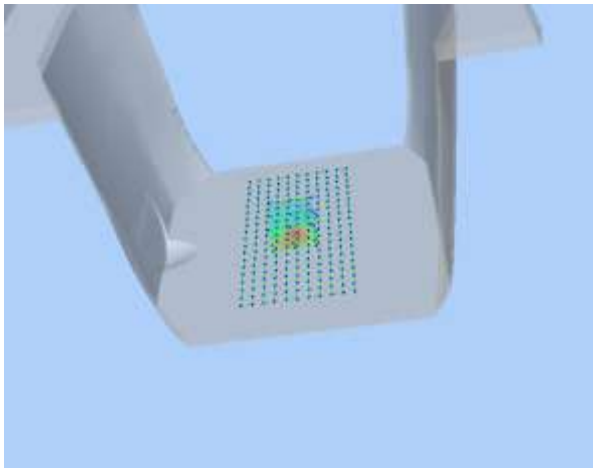
Maximum location: X=-2.00, Y=-2.00

SAR Peak: 1.65 W/kg

SAR 10g (W/Kg)	**0.368563**
SAR 1g (W/Kg)	**0.801834**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**1.6310**	**0.8437**	**0.3334**	**0.1270**	**0.0567**



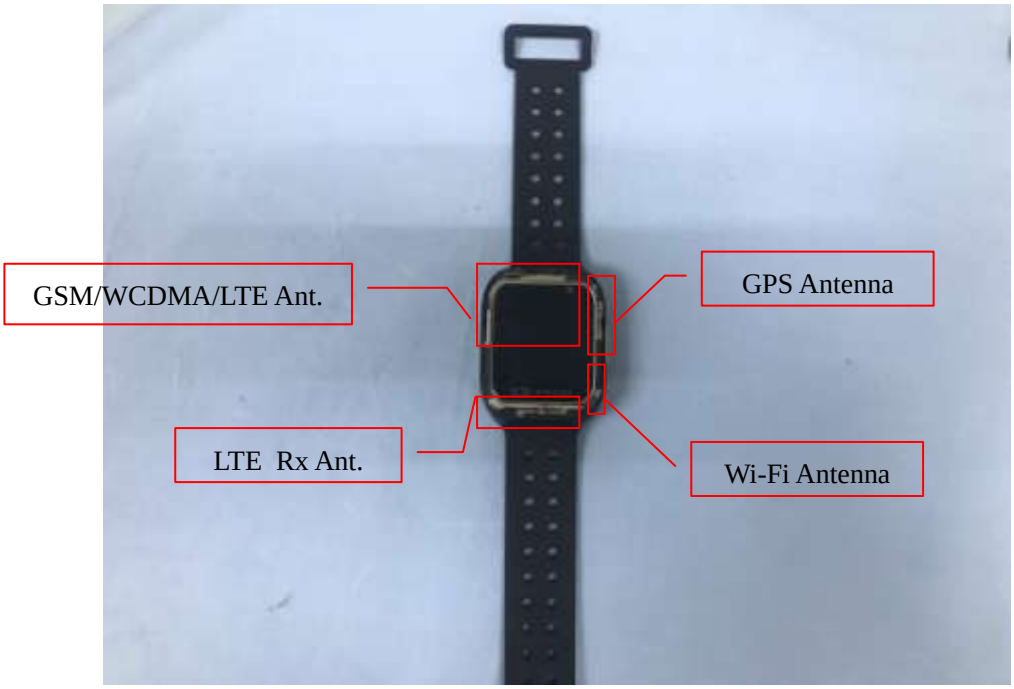
3D screen shot	**Hot spot position**
	

Annex C. EUT Photos

EUT View Front

EUT View Back

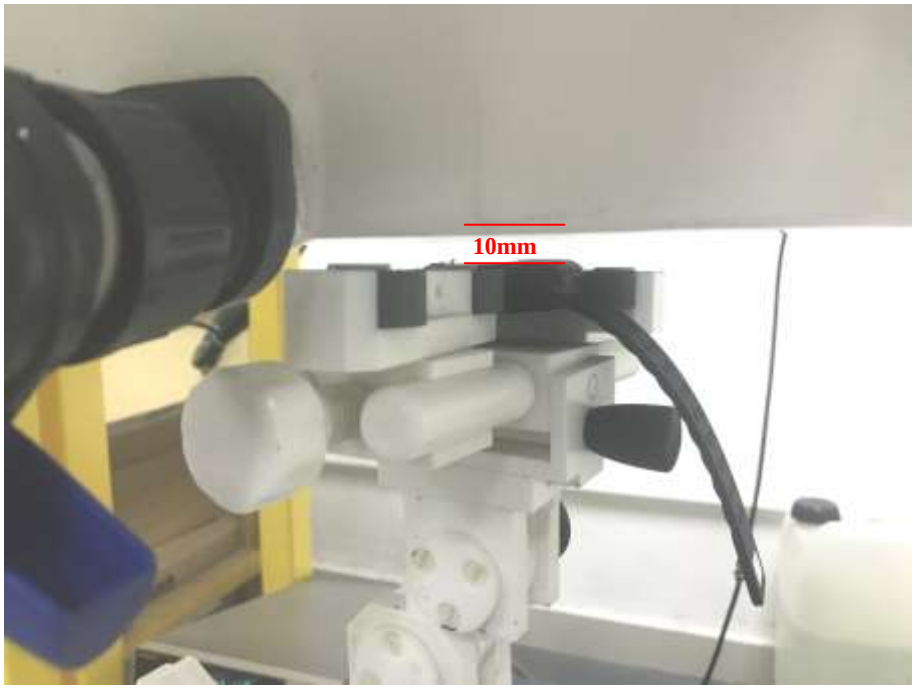
Antenna View



Annex D. Test Setup Photos

Near to Mouth Exposure Conditions

Body Front



Wrist-worn mode Exposure Conditions

Body Back

Annex E. Calibration Certificate

Please refer to the exhibit for the calibration certificate

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