



# TEST REPORT

Report Reference No. .... : TRE16060134 R/C.....: 93484

FCC ID..... : 2AAA6-S125

Applicant's name ..... : SENWA MEXICO,S.A.DE C.V

Address..... : Av. Javier Barros Sierra 540,Torre I, Piso 5; COL. LOMAS DE SANTA FE DELEGACION ALVARO OBREGON C.P. 01210 MEXICO,DISTRITO FEDERAL

Manufacturer..... : Senwa Mobile HK ltd

Address..... : Room 910, International Trade Centre 11-19 Sha Tsui Road, Tsuen Wan, NT, HK

Test item description ..... : Mobile Phone

Trade Mark ..... : SENWA

Model/Type reference..... : S125

Listed Model(s)..... : -

Standard ..... : FCC 47 CFR Part2.1093  
ANSI/IEEE C95.1: 1999  
IEEE 1528: 2013

Date of receipt of test sample..... : June 23, 2016

Date of testing..... : June 28, 2016 –June 29, 2016

Date of issue..... : July 06, 2016

Result..... : PASS

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Testing Laboratory Name ..... : Shenzhen Huatongwei International Inspection Co., Ltd

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*The test report merely corresponds to the test sample.*

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## 1 . Test Standards

The tests were performed according to following standards:

[FCC 47 Part 2.1093](#) Radiofrequency Radiation Exposure Evaluation:Portable Devices

[IEEE Std C95.1, 1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz.

[IEEE Std 1528™-2013](#): IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

[KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04](#): SAR Measurement Requirements for 100 MHz to 6 GHz

[KDB 865664 D02 RF Exposure Reporting v01r02](#): RF Exposure Compliance Reporting and Documentation Considerations

[KDB 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

[KDB 648474 D04 Handset SAR v01r03](#): SAR Evaluation Considerations for Wireless Handsets

## 2. Summary

### 2.1. Client Information

Applicant:	SENWA MEXICO,S.A.DE C.V
Address:	Av. Javier Barros Sierra 540,Torre I, Piso 5; COL. LOMAS DE SANTA FE DELEGACION ALVARO OBREGON C.P. 01210MEXICO,DISTRITO FEDERAL
Manufacturer:	Senwa Mobile HK Ltd
Address:	Room 910, International Trade Centre 11-19 Sha Tsui Road, Tsuen Wan, NT, HK

### 2.2. Product Description

Name of EUT	Mobile Phone		
Trade Mark:	SENWA		
Model No.:	S125		
Listed Model(s):	-		
Power supply:	DC 3.7V From internal battery		
Device Category:	Portable		
Product stage:	Production unit		
RF Exposure Environment:	General Population / Uncontrolled		
IMEI:	359430070000993		
Hardware version:	F61_MB_V1.0_20160422		
Software version:	SENWA_S125_Ver1.0		
Maximum SAR Value			
Separation Distance:	Head:	0mm	
	Body:	10mm	
Max Report SAR Value (1g):	Head:	0.562 W/Kg	
	Body:	0.296 W/Kg	
2G			
Support Network:	GSM, GPRS, EGPRS		
Support Band:	GSM850, PCS1900		
Modulation:	GSM/GPRS: GMSK EGPRS: GMSK		
Transmit Frequency:	GSM850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz		
Receive Frequency:	GSM850: 869.20MHz-893.80MHz PCS1900: 1930.20MHz-1989.80MHz		
GPRS Class:	12		
EGPRS Class:	12		
Antenna type:	Intergal Antenna		

Bluetooth	
Version:	Supported BT2.1+ Compatible EDR
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	Integral Antenna
<i>Remark:</i> <i>The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power</i>	

### **3. Test Environment**

#### **3.1. Address of the test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Phone: 86-755-26748019 Fax: 86-755-26748089

#### **3.2. Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

##### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

##### **A2LA-Lab Cert. No. 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.

##### **FCC-Registration No.: 317478**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

##### **IC-Registration No.: 5377A&5377B**

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec. 03, 2014, valid time is until Dec. 03, 2017.

##### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

##### **VCCI**

The 3m Semianechoic chamber (12.2m×7.95m×6.7m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 29, 2015.

Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.

Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

##### **DNV**

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

#### 4. Equipments Used during the Test

Test Equipment	Manufacturer	Type/Model	Serial Number	Calibration	
				Last Calibration	Calibration Interval
Data Acquisition Electronics DAEx	SPEAG	DAE4	1315	2015/07/22	1
E-field Probe	SPEAG	ES3DV3	3292	2015/08/15	1
System Validation Dipole 835V2	SPEAG	D835V2	4d134	2014/07/24	3
System Validation Dipole D1900V2	SPEAG	D1900V2	5d150	2015/12/12	1
Dielectric Probe Kit	Agilent	85070E	US44020288	/	/
Power meter	Agilent	E4417A	GB41292254	2015/10/26	1
Power sensor	Agilent	8481H	MY41095360	2015/10/26	1
Power sensor	Agilent	E9327A	US40441621	2015/10/26	1
Network analyzer	Agilent	8753E	US37390562	2015/10/25	1
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	112012	2015/10/23	1
Signal Generator	ROHDE & SCHWARZ	SMBV100A	258525	2015/10/23	1
Power Divider	ARRA	A3200-2	N/A	N/A	N/A
Dual Directional Coupler	Agilent	778D	50783	Note	
Attenuator 1	PE	PE7005-10	N/A	Note	
Attenuator 2	PE	PE7005-10	N/A	Note	
Attenuator 3	PE	PE7005-3	N/A	Note	
Power Amplifier	AR	5S1G4M2	0328798	Note	

Note:

1. The Probe, Dipole and DAE calibration reference to the Appendix A.
2. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
3. Referring to KDB865664 D01, the dipole calibration interval can be extended to 3 years with justification. The dipole are also not physically damaged or repaired during the interval.
4. The justification data of dipole D835V2, can be found in appendix A. the return loss is <-20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

## 5. Measurement Uncertainty

Measurement Uncertainty										
No.	Error Description	Type	Uncertainty Value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement System										
1	Probe calibration	B	6.0%	N	1	1	1	6.0%	6.0%	∞
2	Axial isotropy	B	4.70%	R	$\sqrt{3}$	0.7	0.7	1.90%	1.90%	∞
3	Hemispherical isotropy	B	9.60%	R	$\sqrt{3}$	0.7	0.7	3.90%	3.90%	∞
4	Boundary Effects	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
5	Probe Linearity	B	4.70%	R	$\sqrt{3}$	1	1	2.70%	2.70%	∞
6	Detection limit	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
7	RF ambient conditions-noise	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
8	RF ambient conditions-reflection	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
9	Response time	B	0.80%	R	$\sqrt{3}$	1	1	0.50%	0.50%	∞
10	Integration time	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
11	RF ambient	B	3.00%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
12	Probe positioned mech. restrictions	B	0.40%	R	$\sqrt{3}$	1	1	0.20%	0.20%	∞
13	Probe positioning with respect to phantom shell	B	2.90%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
14	Max.SAR evaluation	B	3.90%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
Test Sample Related										
15	Test sample positioning	A	1.86%	N	1	1	1	1.86%	1.86%	∞
16	Device holder uncertainty	A	1.70%	N	1	1	1	1.70%	1.70%	∞
17	Drift of output power	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
Phantom and Set-up										
18	Phantom uncertainty	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
19	Liquid conductivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
20	Liquid conductivity (meas.)	A	0.50%	N	1	0.64	0.43	0.32%	0.26%	∞
21	Liquid permittivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
22	Liquid permittivity (meas.)	A	0.16%	N	1	0.64	0.43	0.10%	0.07%	∞
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$		/	/	/	/	9.79%	9.67%	∞
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		R	K=2	/	/	19.57%	19.34%	∞



System Check Uncertainty										
No.	Error Description	Type	Uncertainty Value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement System										
1	Probe calibration	B	6.0%	N	1	1	1	6.0%	6.0%	$\infty$
2	Axial isotropy	B	4.70%	R	$\sqrt{3}$	0.7	0.7	1.90%	1.90%	$\infty$
3	Hemispherical isotropy	B	9.60%	R	$\sqrt{3}$	0.7	0.7	3.90%	3.90%	$\infty$
4	Boundary Effects	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	$\infty$
5	Probe Linearity	B	4.70%	R	$\sqrt{3}$	1	1	2.70%	2.70%	$\infty$
6	Detection limit	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	$\infty$
7	RF ambient conditions-noise	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	$\infty$
8	RF ambient conditions-reflection	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	$\infty$
9	Response time	B	0.80%	R	$\sqrt{3}$	1	1	0.50%	0.50%	$\infty$
10	Integration time	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	$\infty$
11	RF ambient	B	3.00%	R	$\sqrt{3}$	1	1	1.70%	1.70%	$\infty$
12	Probe positioned mech. restrictions	B	0.40%	R	$\sqrt{3}$	1	1	0.20%	0.20%	$\infty$
13	Probe positioning with respect to phantom shell	B	2.90%	R	$\sqrt{3}$	1	1	1.70%	1.70%	$\infty$
14	Max.SAR evalation	B	3.90%	R	$\sqrt{3}$	1	1	2.30%	2.30%	$\infty$
System validation source-dipole										
15	Deviation of experimental dipole from numerical dipole	A	1.58%	N	1	1	1	1.58%	1.58%	$\infty$
16	Dipole axis to liquid distance	A	1.35%	N	1	1	1	1.35%	1.35%	$\infty$
17	Input power and SAR drift	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	$\infty$
Phantom and Set-up										
18	Phantom uncertainty	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	$\infty$
20	Liquid conductivity (meas.)	A	0.50%	N	1	0.64	0.43	0.32%	0.26%	$\infty$
22	Liquid cpermittivity (meas.)	A	0.16%	N	1	0.64	0.43	0.10%	0.07%	$\infty$
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$		/	/	/	/	8.80%	8.79%	$\infty$
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		R	K=2	/	/	17.59%	17.58%	$\infty$



## 6.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ES3DV3 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

### ● Probe Specification

Construction Symmetrical design with triangular core

Interleaved sensors

Built-in shielding against static charges

PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Calibration ISO/IEC 17025 calibration service available.

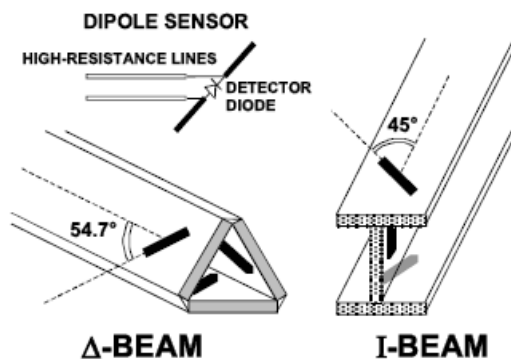
Frequency	10 MHz to 4 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 4 GHz)
Directivity	$\pm 0.2$ dB in HSL (rotation around probe axis) $\pm 0.3$ dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI



### ● Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

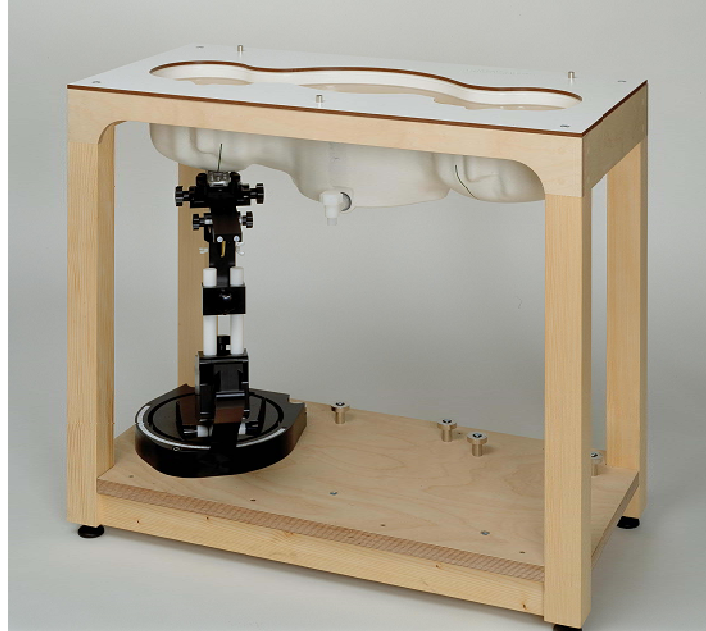
The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



### 6.3. Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.



SAM Twin Phantom

### 6.4. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



Device holder supplied by SPEAG

## 7. SAR Test Procedure

### 7.1. Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max.  $\pm 5\%$ .

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above  $\pm 0.1\text{mm}$ ). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe (It does not depend on the surface reflectivity or the probe angle to the surface within  $\pm 30^\circ$ .)

#### **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

#### **Zoom Scan**

Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x5 points within a cube whose base is centered around the maxima found in the preceding area scan.

#### **Spatial Peak Detection**

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as: • maximum search • extrapolation • boundary correction • peak search for averaged SAR. During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation. For a grid using 7x7x5 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x5 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

## 7.2. Data Storage and Evaluation

### Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors),s together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### Data Evaluation

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	Sensitivity:	Normi, ai0, ai1, ai2
	Conversion factor:	ConvFi
	Diode compression point:	Dcpi
Device parameters:	Frequency:	f
	Crest factor:	cf
Media parameters:	Conductivity:	σ
	Density:	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

Vi:	compensated signal of channel ( i = x, y, z )
Ui:	input signal of channel ( i = x, y, z )
cf:	crest factor of exciting field (DASY parameter)
dcp <sub>i</sub> :	diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

$$\mathbf{E} - \text{fieldprobes : } E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$\mathbf{H} - \text{fieldprobes : } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

Vi:	compensated signal of channel ( i = x, y, z )
Normi:	sensor sensitivity of channel ( i = x, y, z ), [mV/(V/m)²] for E-field Probes
ConvF:	sensitivity enhancement in solution
aij:	sensor sensitivity factors for H-field probes
f:	carrier frequency [GHz]
Ei:	electric field strength of channel i in V/m
Hi:	magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR: local specific absorption rate in mW/g  
Etot: total field strength in V/m  
 $\sigma$ : conductivity in [mho/m] or [Siemens/m]  
 $\rho$ : equivalent tissue density in g/cm<sup>3</sup>

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

## 8. Position of the wireless device in relation to the phantom

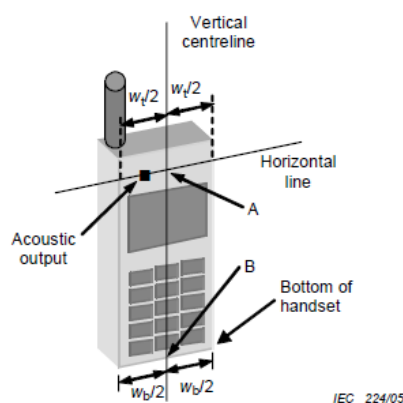
### 8.1. Head Position

The wireless device define two imaginary lines on the handset, the vertical centreline and the horizontal line, for the handset in vertical orientation as shown in Figures 5a and 5b.

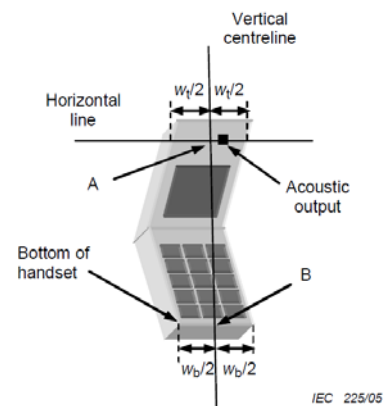
**The vertical centreline** passes through two points on the front side of the handset: the midpoint of the width  $W_t$  of the handset at the level of the acoustic output (point A in Figures 5a and 5b), and the midpoint of the width  $W_b$  of the bottom of the handset (point B).

**The horizontal line** is perpendicular to the vertical centreline and passes through the centre of the acoustic output (see Figures 5a and 5b). The two lines intersect at point A.

Note that for many handsets, point A coincides with the centre of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset (see Figure 5b), especially for clam-shell handsets, handsets with flip cover pieces, and other irregularly shaped handsets.



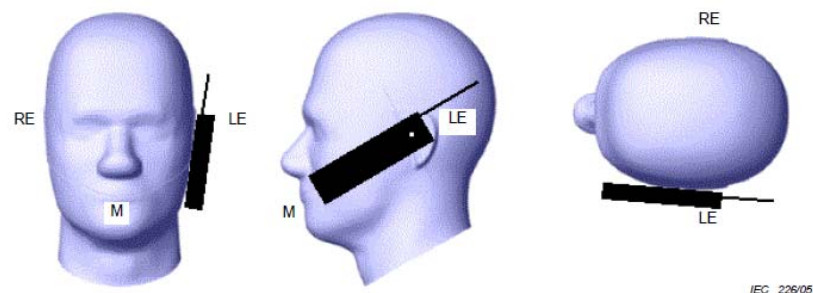
Figures 5a



Figures 5b

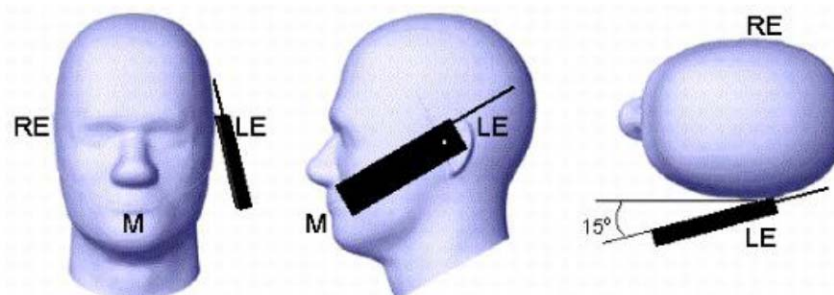
$W_t$	Width of the handset at the level of the acoustic
$W_b$	Width of the bottom of the handset
A	Midpoint of the width $w_t$ of the handset at the level of the acoustic output
B	Midpoint of the width $w_b$ of the bottom of the handset

### Cheek position



Picture 2 Cheek position of the wireless device on the left side of SAM

### Tilt position



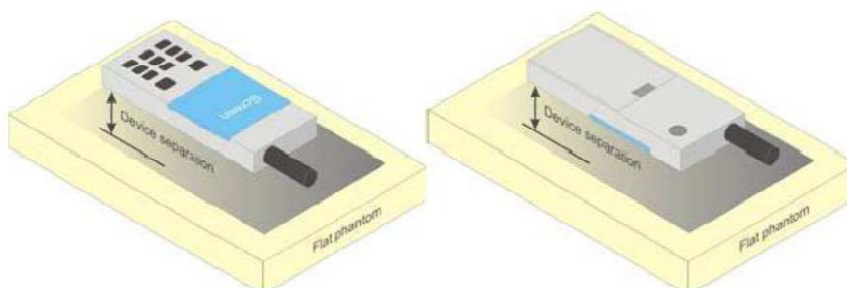
Picture 3 Tilt position of the wireless device on the left side of SAM



## 8.2. Body Position

Devices that support transmission while used with body-worn accessories must be tested for body-worn accessory SAR compliance, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.

Devices that are designed to operate on the body of users using lanyards and straps or without requiring additional body-worn accessories must be tested for SAR compliance using a conservative minimum test separation distance  $\leq 5 \text{ mm}$  to support compliance



Picture 4 Test positions for body-worn devices

## 9. System Check

### 9.1. Tissue Dielectric Parameters

The liquid is consisted of water,salt,Glycol,Sugar,Preventol and Cellulose.The liquid has previously been proven to be suited for worst-case.The table 3 and table 4 show the detail solition.It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB865664.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity ( $\sigma$ )	Permittivity ( $\epsilon_r$ )
For Head								
835	40.3	57.9	0.2	1.4	0.2	0	0.9	41.5
1800,1900,2000	55.2	0	0	0.3	0	44.5	1.4	40
2450	55	0	0	0	0	45	1.8	39.2
For Body								
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800.1900.2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

Tissue dielectric parameters for head and body phantoms				
Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (s/m)	$\epsilon_r$	$\sigma$ (s/m)
835	41.5	0.90	55.2	0.97
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95

**Check Result:**

Dielectric performance of Head tissue simulating liquid				
Frequency (MHz)	Description	DielectricParameters		Temp
		$\epsilon_r$	$\sigma$ (s/m)	°C
835	Recommended result ±5% window	41.50 39.43 to 43.58	0.90 0.86 to 0.95	/
	Measurement value 2016-06-28	41.48	0.91	21
1900	Recommended result ±5% window	40.0 38.00 to 42.00	1.40 1.33 to 1.47	/
	Measurement value 2016-06-29	40.01	1.41	21

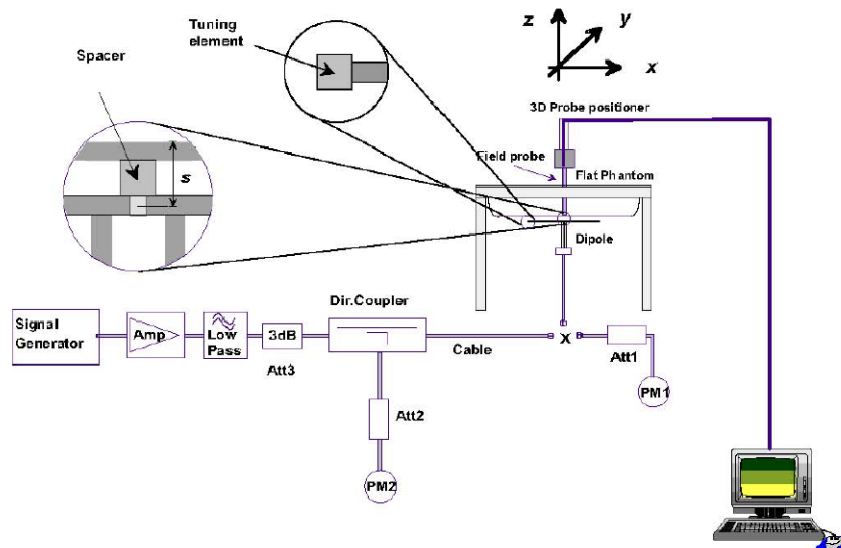
Dielectric performance of Body tissue simulating liquid				
Frequency (MHz)	Description	DielectricParameters		Temp
		$\epsilon_r$	$\sigma$ (s/m)	°C
835	Recommended result ±5% window	55.2 52.44 to 57.96	0.97 0.92 to 1.02	/
	Measurement value 2016-06-28	55.10	0.97	21
1900	Recommended result ±5% window	53.3 50.64 to 55.97	1.52 1.44 to 1.60	/
	Measurement value 2016-06-29	53.21	1.51	21

## 9.2. SAR System Check

The purpose of the system check is to verify that the system operates within its specifications at the device test frequency. The system check is a simple check of repeatability to make sure that the system works correctly at the time of the compliance test;

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system ( $\pm 10\%$ ).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.



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

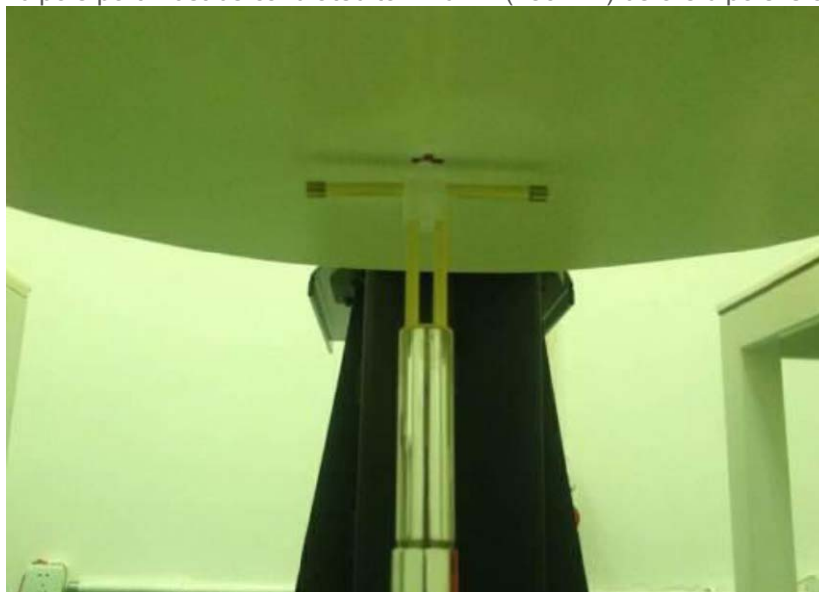


Photo of Dipole Setup

**Check Result:**

Head				
Frequency (MHz)	Description	SAR(W/kg)		Temp
		1g	10g	°C
835	Recommended result ±5% window	2.41 2.29 - 2.53	1.57 1.49 - 1.65	/
	Measurement value 2016-06-28	2.37	1.56	21
1900	Recommended result ±5% window	9.71 9.22 - 10.20	5.08 4.83 - 5.33	/
	Measurement value 2016-06-29	9.66	4.98	21

Body				
Frequency (MHz)	Description	SAR(W/kg)		Temp
		1g	10g	°C
835	Recommended result ±5% window	2.47 2.35 - 2.59	1.64 1.55 - 1.71	/
	Measurement value 2016-06-28	2.45	1.63	21
1900	Recommended result ±5% window	9.98 9.48 - 10.48	5.26 5.00 - 5.52	/
	Measurement value 2016-06-29	9.91	5.23	21

Note:

1. the graph results see follow.
2. Recommended Values used derive from the calibration certificate and 250 mW is used as feeding power to the calibrated dipole.

**System Performance Check at 835 MHz Head**

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d134

Date: 2016-06-28

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 835$  MHz;  $\sigma = 0.91$  S/m;  $\epsilon_r = 41.48$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

•Probe: ES3DV3 - SN3292; ConvF(6.23, 6.23, 6.23); Calibrated: 15/08/2015;

•Sensor-Surface: 4mm (Mechanical Surface Detection)

•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015

•Phantom: SAM 1; Type: SAM;

•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

**Area Scan (61x91x1):** Measurement grid:  $dx=15.00$  mm,  $dy=15.00$  mm

Maximum value of SAR (interpolated) = 2.58 mW/g

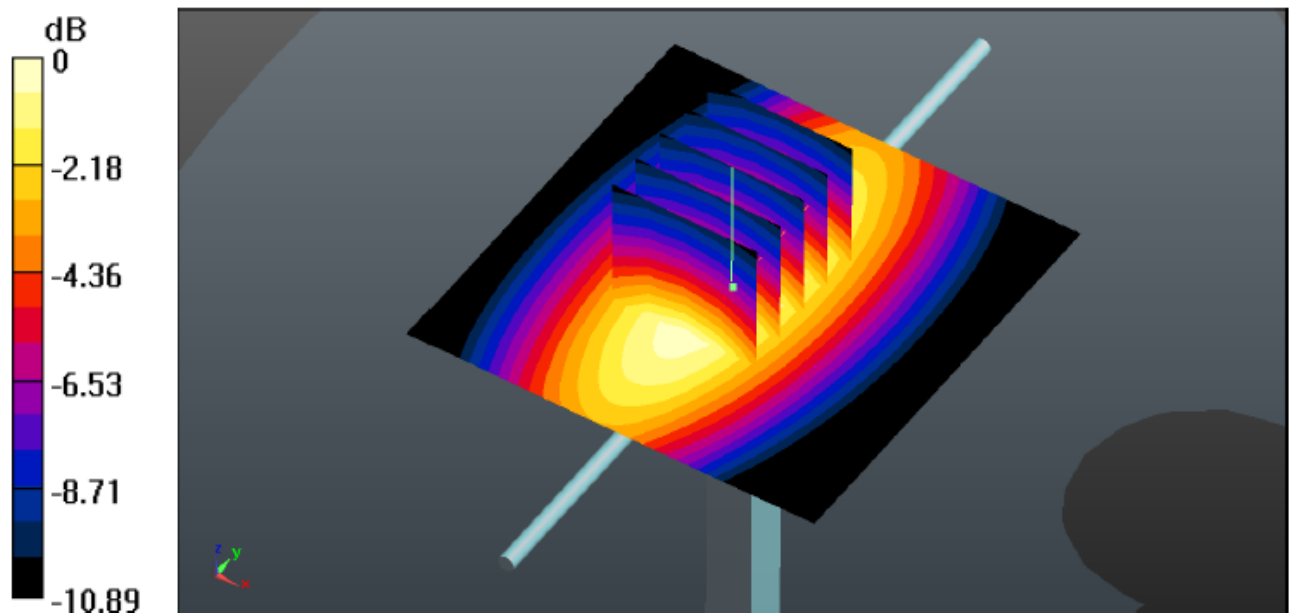
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7$  mm,  $dy=7$  mm,  $dz=5$  mm

Reference Value = 52.994 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 3.542 W/kg

**SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.56 mW/g**

Maximum value of SAR (measured) = 2.59 mW/g



System Performance Check 835MHz Head 250mW

**System Performance Check at 835 MHz Body**

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d134

Date: 2016-06-28

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 835$  MHz;  $\sigma = 0.97$  S/m;  $\epsilon_r = 55.10$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

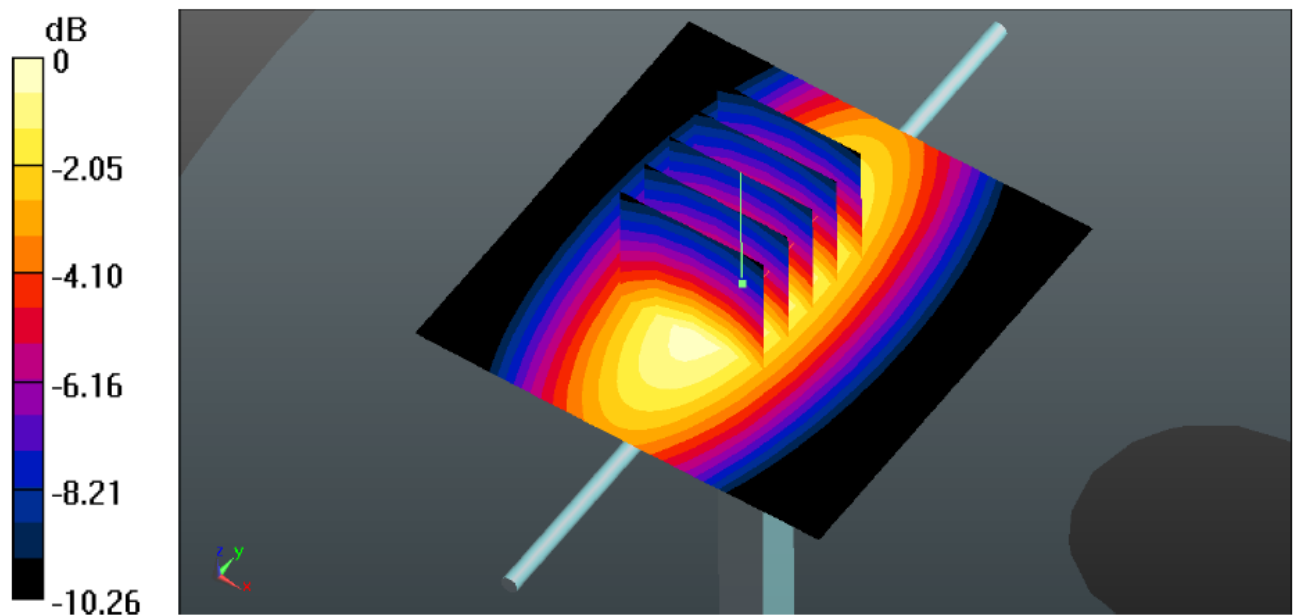
- Probe: ES3DV3 - SN3292; ConvF(6.11, 6.11, 6.11); Calibrated: 15/08/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

**Area Scan (61x91x1):** Measurement grid:  $dx=15.00$  mm,  $dy=15.00$  mm  
Maximum value of SAR (interpolated) = 2.45 mW/g

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7$  mm,  $dy=7$  mm,  $dz=5$  mm  
Reference Value = 46.528 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 2.562 W/kg

**SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.63 mW/g**

Maximum value of SAR (measured) = 2.46 mW/g



System Performance Check 835MHz Body 250mW

**System Performance Check at 1900 MHz Head**

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d150

Date: 2016-06-29

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1900$  MHz;  $\sigma = 1.41$  S/m;  $\epsilon_r = 40.01$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

Probe: ES3DV3 - SN3292; ConvF(5.03,5.03,5.03); Calibrated: 15/08/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1315; Calibrated: 22/07/2015

Phantom: SAM 1; Type: SAM;

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Area Scan (61x91x1):** Measurement grid:  $dx=15.00$  mm,  $dy=15.00$  mm

Maximum value of SAR (interpolated) = 10.65 W/kg

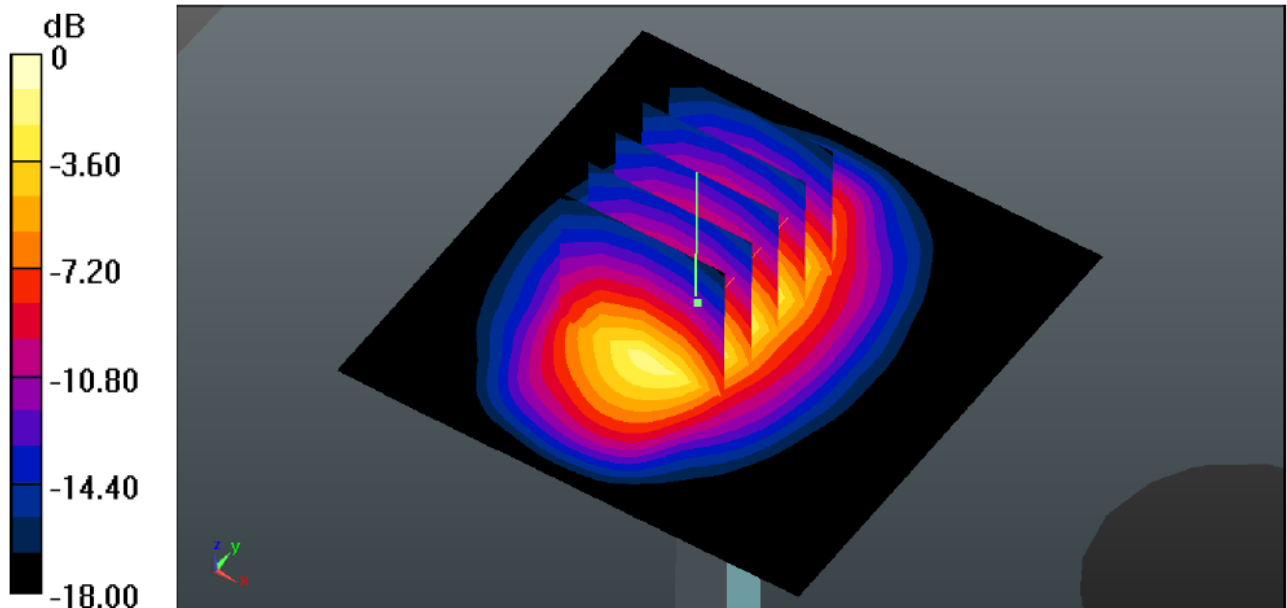
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7$  mm,  $dy=7$  mm,  $dz=5$  mm

Reference Value = 94.818 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 12.352 W/kg

**SAR(1 g) = 9.66 W/kg; SAR(10 g) = 4.98 W/kg**

Maximum value of SAR (measured) = 12.43 W/kg



System Performance Check 1900MHz Head 250mW



**System Performance Check at 1900 MHz Body**

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d150

Date: 2016-06-29

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1900$  MHz;  $\sigma = 1.51$  S/m;  $\epsilon_r = 53.21$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 15/08/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1315; Calibrated: 22/07/2015

Phantom: SAM 1; Type: SAM;

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

**Area Scan (61x91x1):** Measurement grid:  $dx=15.00$  mm,  $dy=15.00$  mm

Maximum value of SAR (interpolated) = 11.46 mW/g

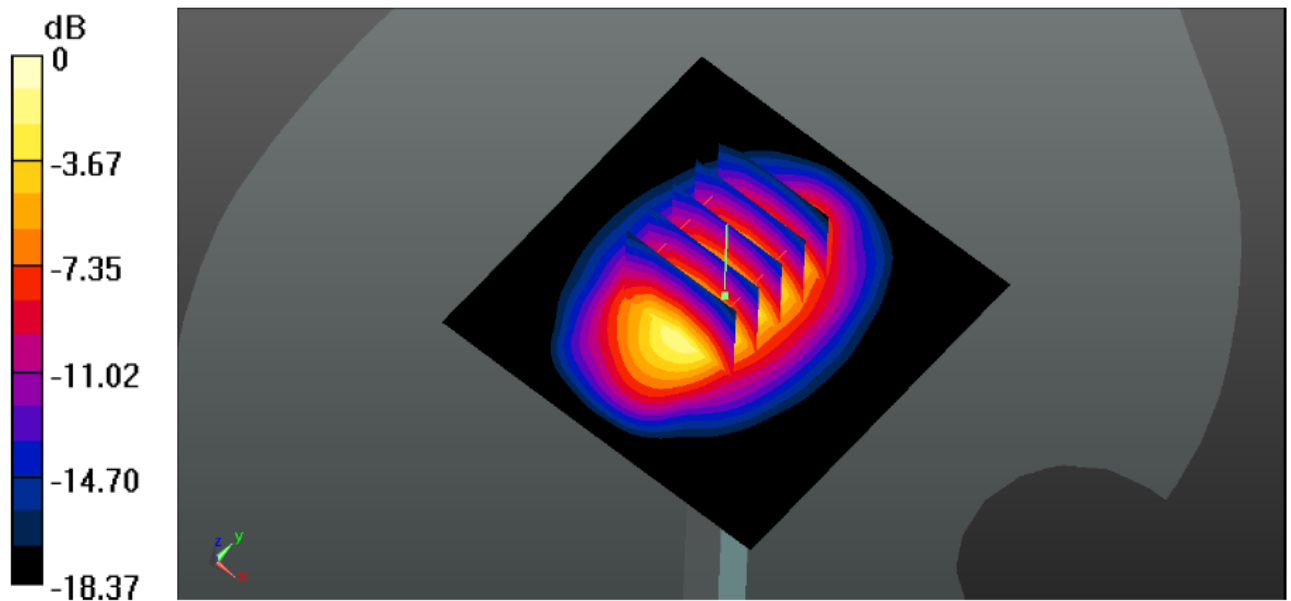
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7$  mm,  $dy=7$  mm,  $dz=5$  mm

Reference Value = 83.816 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 16.826 W/kg

**SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.23 mW/g**

Maximum value of SAR (measured) = 16.34 mW/g



System Performance Check 1900MHz Body250mW

## 10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of ANSI/IEEE C95.1-1992

Type Exposure	Limit (W/kg)	
	General Population / Uncontrolled Exposure Environment	Occupational / Controlled Exposure Environment
Spatial Average SAR (whole body)	0.08	0.4
Spatial Peak SAR (1g cube tissue for head and trunk)	1.60	8.0
Spatial Peak SAR (10g for limb)	4.0	20.0

Population/Uncontrolled Environments: are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled Environments: are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

## 11. Conducted Power Measurement Results

### GSM Conducted Power

1. Per KDB 447498 D01, the maximum output power channel is used for SAR testing and further SAR test reduction
2. Per KDB 941225 D01, considering the possibility of e.g. 3rd party VoIP operation for Head and Body-worn SAR test reduction for GSM and GPRS modes is determined by the source-base time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850 and GPRS (4Tx slots) for PCS1900.
3. Per KDB941225 D01, for hotspot SAR test reduction for GPRS modes is determined by the source-based time-averaged output power including tune-up tolerance, For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850 and GPRS (4Tx slots) for PCS1900.

Mode: GSM850		Conducted Power (dBm)			Division Factors	Averager Power (dBm)		
		CH128	CH190	CH251		CH128	CH190	CH251
		824.2MHz	836.6MHz	848.8MHz		824.2MHz	836.6MHz	848.8MHz
GSM		32.40	32.29	32.03	-9.03	23.37	23.26	23.00
GPRS (GMSK)	1TXslot	32.37	32.26	32.01	-9.03	23.34	23.23	22.98
	2TXslots	29.84	29.81	29.57	-6.02	23.82	23.79	23.55
	3TXslots	28.15	28.08	27.83	-4.26	23.89	23.82	23.57
	4TXslots	26.92	26.84	26.61	-3.01	23.91	23.83	23.60
EGPRS (GMSK)	1TXslot	32.37	32.26	32.01	-9.03	23.34	23.23	22.98
	2TXslots	29.84	29.81	29.57	-6.02	23.82	23.79	23.55
	3TXslots	28.15	28.08	27.83	-4.26	23.89	23.82	23.57
	4TXslots	26.92	26.84	26.61	-3.01	23.91	23.83	23.60
Mode: PCS1900		Conducted Power (dBm)			Division Factors	Averager Power (dBm)		
		CH512	CH661	CH810		CH512	CH661	CH810
		1850.2MHz	1880.0MHz	1909.8MHz		1850.2MHz	1880.0MHz	1909.8MHz
GSM		28.58	28.00	27.52	-9.03	19.55	18.97	18.49
GPRS (GMSK)	1TXslot	28.56	27.98	27.51	-9.03	19.53	18.95	18.48
	2TXslots	26.32	25.85	25.40	-6.02	20.30	19.83	19.38
	3TXslots	24.83	24.35	23.91	-4.26	20.57	20.09	19.65
	4TXslots	23.75	23.28	22.86	-3.01	20.74	20.27	19.85
EGPRS (GMSK)	1TXslot	28.56	27.98	27.51	-9.03	19.53	18.95	18.48
	2TXslots	26.32	25.85	25.40	-6.02	20.30	19.83	19.38
	3TXslots	24.83	24.35	23.91	-4.26	20.57	20.09	19.65
	4TXslots	23.75	23.28	22.86	-3.01	20.74	20.27	19.85

Note:

#### 1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

**Bluetooth Conducted Power****General note:**

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances  $\leq 50\text{mm}$  are determined by:

$[(\text{max. Power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}]$   
 $\leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR

Bluetooth			
Mode	Channel	Frequency (MHz)	Conducted power (dBm)
GFSK	00	2402	3.63
	39	2441	3.35
	78	2480	3.25
$\pi/4$ QPSK	00	2402	2.78
	39	2441	2.91
	78	2480	2.96
8DPSK	00	2402	2.69
	39	2441	2.89
	78	2480	2.95

$(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) * [\sqrt{f(\text{GHz})}/x] \text{ W/kg}$  for test separation distances  $\leq 50 \text{ mm}$ ;

where  $x = 7.5$  for 1-g SAR.

Bluetooth Max power	Exposure position	Head	Hotspot	Body worn
	Test separation	0mm	10mm	5mm
4.00dBm	Estimated SAR (W/kg)	0.105 W/kg	0.052 W/kg	0.105 W/kg

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances  $\leq 50\text{mm}$  are determined by:

$[(\text{max. Power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR

Band/Mode	F(GHz)	Position	SAR test exclusion threshold (mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.45	Head	9.6	4	<b>2.51</b>	Yes
		Body	9.6	4	<b>2.51</b>	Yes

Per KDB 447498 D01, when the minimum test separation distance is  $< 5\text{mm}$ , a distance of 5mm is applied to determine SAR test exclusion.

**12. Maximum Tune-up Limit**

Mode	Burst Average Power (dBm)	
	GSM850	PCS1900
GSM (GMSK, 1Tx Slot)	33.00	29.00
GPRS (GMSK, 1Tx Slot)	33.00	29.00
GPRS (GMSK, 2Tx Slot)	30.00	27.00
GPRS (GMSK, 3Tx Slot)	29.00	25.00
GPRS (GMSK, 4Tx Slot)	27.00	24.00
EGPRS (GMSK, 1Tx Slot)	33.00	29.00
EGPRS (GMSK, 2Tx Slot)	30.00	27.00
EGPRS (GMSK, 3Tx Slot)	29.00	25.00
EGPRS (GMSK, 4Tx Slot)	27.00	24.00

Mode	Conducted Peak Power (dBm)
Bluetooth	4.00

### 13. SAR Measurement Results

#### Head SAR

GSM850										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Left-Cheek	128	824.2	26.92	27.00	1.02	-	-	-	-
		190	836.6	26.84	27.00	1.04	-0.09	0.441	0.457	H1
		251	848.8	26.61	27.00	1.09	-	-	-	-
	Left-Tilt	128	824.2	26.92	27.00	1.02	-	-	-	-
		190	836.6	26.84	27.00	1.04	0.10	0.337	0.350	-
		251	848.8	26.61	27.00	1.09	-	-	-	-
	Right-Cheek	128	824.2	26.92	27.00	1.02	-	-	-	-
		190	836.6	26.84	27.00	1.04	0.04	0.416	0.431	-
		251	848.8	26.61	27.00	1.09	-	-	-	-
	Right-Tilt	128	824.2	26.92	27.00	1.02	-	-	-	-
		190	836.6	26.84	27.00	1.04	-0.05	0.331	0.344	-
		251	848.8	26.61	27.00	1.09	-	-	-	-

PCS1900										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Left-Cheek	512	1850.2	23.75	24.00	1.06	-	-	-	-
		661	1880.0	23.28	24.00	1.18	-0.05	0.328	0.387	H2
		810	1909.8	22.86	24.00	1.30	-	-	-	-
	Left-Tilt	512	1850.2	23.75	24.00	1.06	-	-	-	-
		661	1880.0	23.28	24.00	1.18	-0.04	0.244	0.288	-
		810	1909.8	22.86	24.00	1.30	-	-	-	-
	Right-Cheek	512	1850.2	23.75	24.00	1.06	-	-	-	-
		661	1880.0	23.28	24.00	1.18	0.03	0.301	0.355	-
		810	1909.8	22.86	24.00	1.30	-	-	-	-
	Right-Tilt	512	1850.2	23.75	24.00	1.06	-	-	-	-
		661	1880.0	23.28	24.00	1.18	0.03	0.229	0.271	-
		810	1909.8	22.86	24.00	1.30	-	-	-	-

Note:

- Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg

**Body SAR**

GSM850										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Front	128	824.2	26.92	27.00	1.02	-	-	-	-
		190	836.6	26.84	27.00	1.04	0.02	0.164	0.170	-
		251	848.8	26.61	27.00	1.09	-	-	-	-
	Back	128	824.2	26.92	27.00	1.02	-	-	-	-
		190	836.6	26.84	27.00	1.04	0.04	0.235	0.244	B1
		251	848.8	26.61	27.00	1.09	-	-	-	-

PCS1900										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Front	512	1850.2	23.75	24.00	1.06	-	-	-	-
		661	1880.0	23.28	24.00	1.18	-0.08	0.122	0.144	-
		810	1909.8	22.86	24.00	1.30	-	-	-	-
	Back	512	1850.2	23.75	24.00	1.06	-	-	-	-
		661	1880.0	23.28	24.00	1.18	0.11	0.181	0.214	B2
		810	1909.8	22.86	24.00	1.30	-	-	-	-

Note:

1. Per KDB865664 D01, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg
2. The distance of the Body test is 10mm;

SAR Test Data Plots

Test mode:	GSM850-GPRS 4TS	Test Position:	Left Head Cheek	Test Plot:	H1
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Date: 2016-06-28

Communication System: Customer System; Frequency:836.6 MHz;Duty Cycle:1:2

Medium parameters used (interpolated):  $f=836.6$  MHz;  $\sigma=0.91$  S/m;  $\epsilon_r=41.48$ ;  $\rho=1000$  kg/m<sup>3</sup>

Phantom section: Left Head Section:

#### DASY 5 Configuration:

- Probe: ES3DV3 - SN3292; ConvF(6.23, 6.23, 6.23); Calibrated: 15/08/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

**Area Scan (51x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) =0.479 W/kg

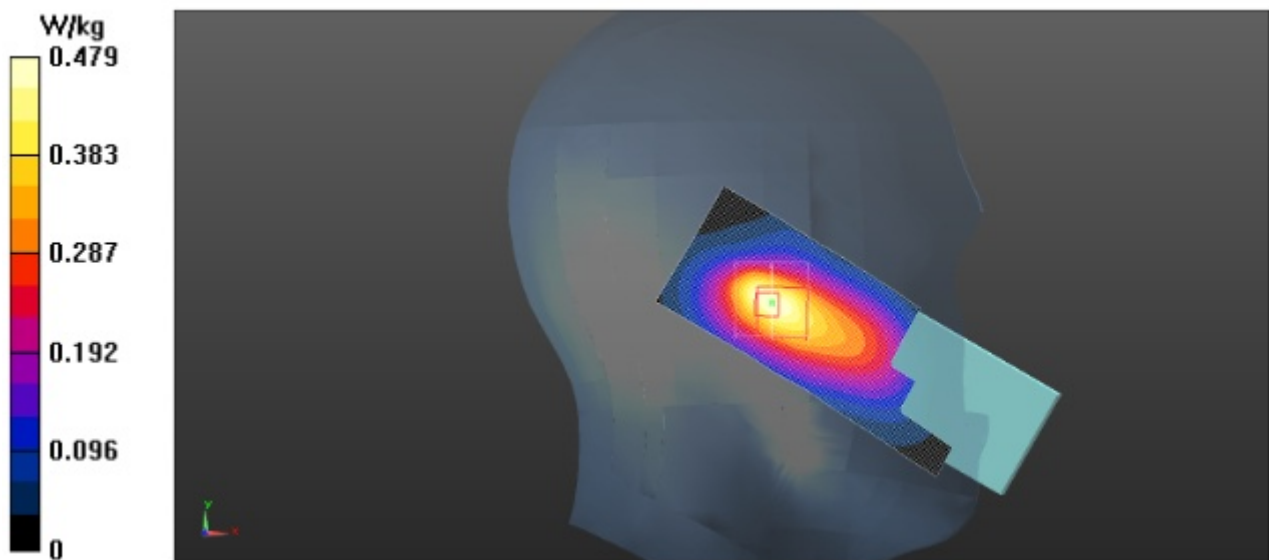
**Zoom Scan (5x5x6)/Cube 0:** Measurement grid:  $dx=7$ mm,  $dy=7$ mm,  $dz=5$ mm

Reference Value = 14.577 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.675 mW/g

**SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.297 mW/g**

Maximum value of SAR (measured) = 0.473 W/kg



Left Head Cheek (GSM850 GPRS 4TS Middle Channel)



Test mode:	PCS1900 GPRS 4TS	Test Position:	Left Head Cheek	Test Plot:	H2
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Date: 2016-06-29

Communication System: Customer System; Frequency: 1880.0 MHz; Duty Cycle: 1:2

Medium parameters used (interpolated):  $f = 1880.0$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon = 40.01$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Head Section

#### DASY5 Configuration:

- Probe: ES3DV3 - SN3292; ConvF(5.03, 5.03, 5.03); Calibrated: 15/08/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

**Area Scan (51x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 0.355 W/kg

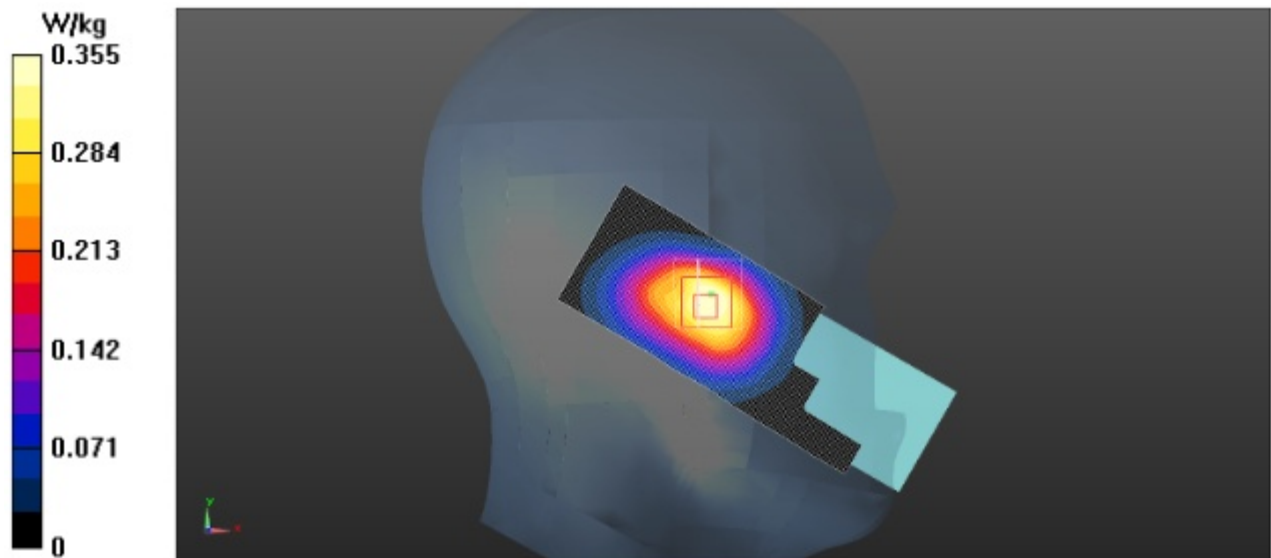
**Zoom Scan (5x5x6)/Cube 0:** Measurement grid:  $dx=7$ mm,  $dy=7$ mm,  $dz=5$ mm

Reference Value = 7.796 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.493 mW/g

**SAR(1 g) = 0.328 mW/g; SAR(10 g) = 0.204 mW/g**

Maximum value of SAR (measured) = 0.353 W/kg



Left Head Tilt (PCS1900 Middle Channel)

Test mode:	GSM850 GPRS 4TS	Test Position:	Body- worn Rear Side	Test Plot:	B1
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Date: 2016-06-28

Communication System: Customer System; Frequency:836.6 MHz;Duty Cycle:1:2

Medium parameters used (interpolated):  $f=836.6$  MHz;  $\sigma=0.97$  S/m;  $\epsilon_r=55.10$ ;  $\rho=1000$  kg/m<sup>3</sup>

Phantom section: Flat Section:

#### DASY 5 Configuration:

- Probe: ES3DV3 - SN3292; ConvF(6.11, 6.11, 6.11); Calibrated: 15/08/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

**Area Scan (51x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) =0.248 W/kg

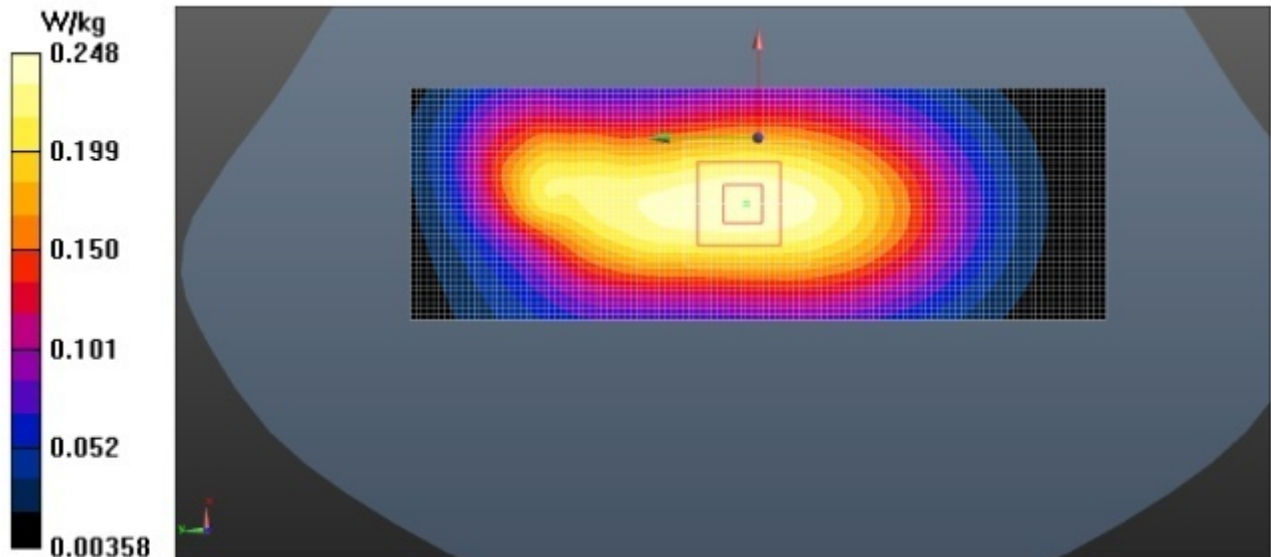
**Zoom Scan (5x5x6)/Cube 0:** Measurement grid:  $dx=7$ mm,  $dy=7$ mm,  $dz=5$ mm

Reference Value = 16.657 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.273 mW/g

**SAR(1 g) = 0.235 mW/g; SAR(10 g) = 0.188 mW/g**

Maximum value of SAR (measured) = 0.246 W/kg



Body- worn Rear Side (GSM850 GPRS 4TS Middle Channel)

Test mode:	PCS1900 GPRS 4TS	Test Position:	Body- worn Rear Side	Test Plot:	B2
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Date: 2016-06-29

Communication System: Customer System; Frequency: 1880.0 MHz; Duty Cycle: 1:2

Medium parameters used (interpolated):  $f = 1880.0$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon = 53.21$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### DASY5 Configuration:

- Probe: ES3DV3 - SN3292; ConvF(4.66, 4.66, 4.66); Calibrated: 15/08/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

**Area Scan (51x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 0.201 W/kg

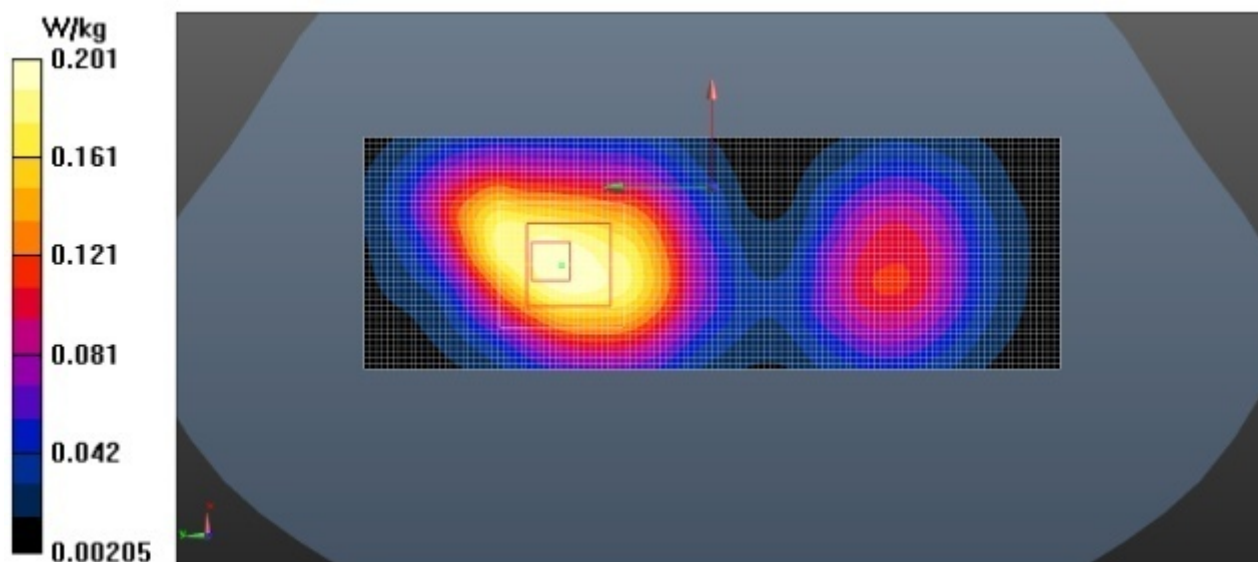
**Zoom Scan (5x5x6)/Cube 0:** Measurement grid:  $dx=7$ mm,  $dy=7$ mm,  $dz=5$ mm

Reference Value = 6.015 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.286 mW/g

**SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.114 mW/g**

Maximum value of SAR (measured) = 0.195 W/kg



Body- worn Rear Side (PCS1900 GPRS 4TS Middle Channel)

## 14. Simultaneous Transmission analysis

No.	Simultaneous Transmission Configurations	Head	Body-worn	Hotspot	Note
1	GSM(voice) + Bluetooth (data)	Yes	Yes		
2	GPRS (data) + Bluetooth (data)	Yes	Yes	Yes	

General note:

1. This device support VoIP in GPRS
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. EUT will choose either GSM according to the network signal condition; therefore, they will not operate simultaneously at any moment.
4. The reported SAR summation is calculated based on the same configuration and test position
5. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below
  - a)  $[(\text{max. Power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})/x}] \text{W/kg}$  for test separation distances  $\leq 50\text{mm}$ ; when  $x=7.5$  for 1-g SAR, and  $x=18.75$  for 10-g SAR.
  - b) When the minimum separation distance is  $<5\text{mm}$ , the distance is used 5mm to determine SAR test exclusion
  - c) 0.4 W/kg for 1-g SAR and 1.0W/kg for 10-g SAR, when the test separation distances is  $>50\text{mm}$ .

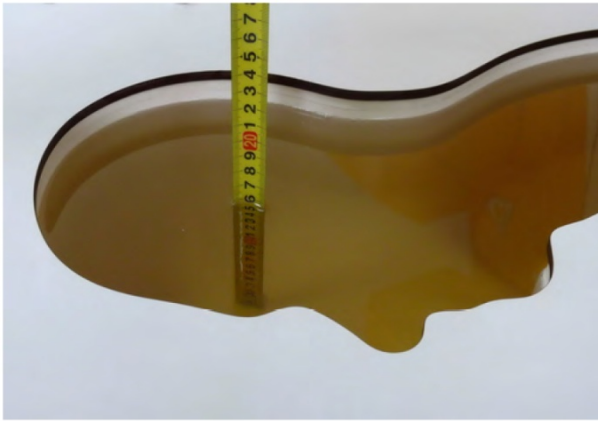
Bluetooth Max power	Exposure position	Head	Hotspot	Body worn
	Test separation	0mm	10mm	5mm
4.00dBm	Estimated SAR (W/kg)	0.105 W/kg	0.052 W/kg	0.105 W/kg

**Head Exposure condition**

WWAN PCE + Bluetooth DSS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR (W/kg)
			WWAN PCS	Bluetooth DSS	
GSM	GSM850	Left Cheek	0.457	0.105	<b>0.562</b>
		Left Tilted	0.350	0.105	0.455
		Right Cheek	0.431	0.105	0.536
		Right Tilted	0.344	0.105	0.448
	PCS1900	Left Cheek	0.387	0.105	0.492
		Left Tilted	0.288	0.105	0.393
		Right Cheek	0.355	0.105	0.460
		Right Tilted	0.271	0.105	0.376

**Body-Worn Accessory Exposure condition**

WWAN PCE + Bluetooth DSS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR (W/kg)
			WWAN PCS	Bluetooth DTS	
GSM	GSM850	Front	0.170	0.052	0.222
		Back	0.244	0.052	<b>0.296</b>
	PCS1900	Front	0.144	0.052	0.196
		Back	0.214	0.052	0.266

**15. TestSetup Photos**

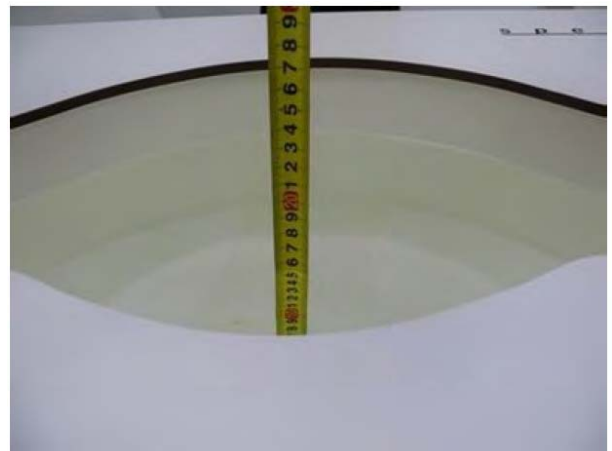
Liquid depth in the head phantom (835MHz)



Liquid depth in the body phantom (835MHz)

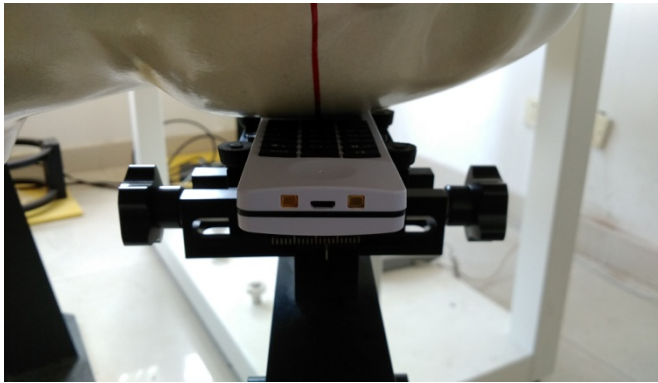


Liquid depth in the head phantom (1900MHz)

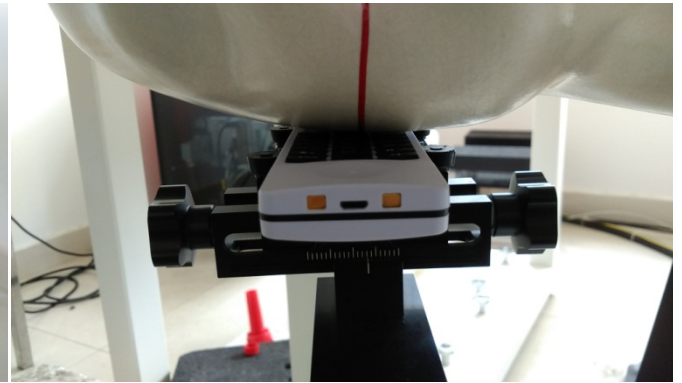


Liquid depth in the body phantom (1900MHz)





Left Head Touch



Right Head Touch



Left Head Tilt (15°)



Right Head Tilt (15°)



Body-worn Front Side (10mm)



Body-worn Rear Side (10mm)

## **16. External and Internal Photos of the EUT**

Please reference to the report No.: TRE1606013301

-----End of Report-----