

FCC SAR Test Report

APPLICANT : CT Asia
EQUIPMENT : GSM mobile
BRAND NAME : BLU
MODEL NAME : Neo
FCC ID : YHLBLUNEO
STANDARD : FCC 47 CFR Part 2 (2.1093)
IEEE C95.1-1991
IEEE 1528-2003
FCC OET Bulletin 65 Supplement C (Edition 01-01)

The product was received on Mar. 22, 2012 and completely tested on Mar. 30, 2012. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:



Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.

SPORTON INTERNATIONAL (KUNSHAN) INC.

TEL : 86-0512-5790-0158

FAX : 86-0512-5790-0958

FCC ID : YHLBLUNEO

Page Number : 1 of 32

Report Issued Date : Apr. 26, 2012

Report Version : Rev. 01



Table of Contents

1. Statement of Compliance	4
2. Administration Data	5
2.1 Testing Laboratory.....	5
2.2 Applicant	5
2.3 Manufacturer.....	5
2.4 Application Details.....	5
3. General Information	6
3.1 Description of Device Under Test (DUT)	6
3.2 Product Photos	7
3.3 Applied Standards.....	7
3.4 Device Category and SAR Limits	7
3.5 Test Conditions.....	7
4. Specific Absorption Rate (SAR).....	8
4.1 Introduction	8
4.2 SAR Definition.....	8
5. SAR Measurement System.....	9
5.1 E-Field Probe	10
5.2 Data Acquisition Electronics (DAE)	10
5.3 Robot	11
5.4 Measurement Server.....	11
5.5 Phantom.....	12
5.6 Device Holder	13
5.7 Data Storage and Evaluation	14
5.8 Test Equipment List.....	16
6. Tissue Simulating Liquids	17
7. Uncertainty Assessment	19
8. SAR Measurement Evaluation	21
8.1 Purpose of System Performance check	21
8.2 System Setup.....	21
8.3 Validation Results.....	22
9. DUT Testing Position	23
10. Measurement Procedures	26
10.1 Spatial Peak SAR Evaluation.....	26
10.2 Area & Zoom Scan Procedures.....	27
10.3 Volume Scan Procedures.....	27
10.4 SAR Averaged Methods	27
10.5 Power Drift Monitoring.....	27
11. SAR Test Configurations	28
12. SAR Test Results	30
12.1 Conducted Power (Unit: dBm)	30
12.2 Test Records for Head SAR Test.....	31
12.3 Test Records for Body-worn SAR Test	31
13. References	32

Appendix A. Plots of System Performance Check

Appendix B. Plots of SAR Measurement

Appendix C. DASY Calibration Certificate

Appendix D. Product Photos

Appendix E. Test Setup Photos



Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA232203	Rev. 01	Initial issue of report	Apr. 26, 2012

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **CT Asia, DUT : GSM mobile, Brand Name : BLU, Model Name : Neo** are as follows.

<Standalone SAR>

Band	Position	SAR _{1g} (W/kg)
GSM850	Head	1.13
	Body-worn (1.5 cm Gap)	0.785
GSM1900	Head	0.257
	Body-worn (1.5 cm Gap)	0.219

This 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 (2.1093) and ANSI/IEEE C95.1-1991, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003 and FCC OET Bulletin 65 Supplement C (Edition 01-01).

2. Administration Data

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

2.2 Applicant

Company Name	CT Asia
Address	RMA2011, 20/F, GOLDEN CENTRAL TOWER, NO.3037# JINTIAN ROAD, FUTIAN DISTRICT

2.3 Manufacturer

Company Name	zechin communication co., Ltd
Address	Unit804, 8th Floor Desay Tech Building Gaoxin Road South, Nanshan District Shenzhen, China

2.4 Application Details

Date of Receipt of Application	Mar. 22, 2012
Date of Start during the Test	Mar. 26, 2012
Date of End during the Test	Mar. 30, 2012

3. General Information

3.1 Description of Device Under Test (DUT)

Product Feature & Specification	
DUT Type	GSM mobile
Brand Name	BLU
Model Name	Neo
FCC ID	YHLBLUNEO
IMEI Code	355861041301884 (With TV) 351774050281679 (Without TV)
Tx Frequency	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Rx Frequency	GSM850: 869 MHz ~ 894 MHz GSM1900: 1930 MHz ~ 1990 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Maximum Output Power to Antenna	GSM850 : 32.72 dBm GSM1900 : 29.16 dBm Bluetooth: 6.54 dBm
Antenna Type	WWAN : Fixed Internal Antenna Bluetooth : Monopole Antenna
HW Version	E821-MB-V0.3
SW Version	E821_BLU_LEN_BT_FM_TV_SC_002_V027 (with TV) E821_BLU_LEN_BT_FM_TV_SC_004_V013(without TV)
Type of Modulation	GSM / GPRS : GMSK Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
Dual Transfer Mode (DTM) Category	Class B – DUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
DUT Stage	Production Unit
Remark: 1. The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. There are four different types of EUT. They are single SIM card without TV mobile, double SIM card without TV mobile, single SIM card with TV mobile, double SIM card with TV mobile. The others are the same including circuit design, PCB board, structure and all components. It is special to declare. After pre-scan four types of EUT, we found test result of the sample that double SIM card mobile was the worst, so we choose double SIM card to perform all test.	



3.2 Product Photos

Please refer to Appendix D.

3.3 Applied Standards

The Specific Absorption Rate (SAR) testing specification, method and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- IEEE C95.1-1991
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v04
- FCC KDB 648474 D01 v01r05
- FCC KDB 941225 D03 v01

3.4 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

3.5 Test Conditions

3.5.1 Ambient Condition

Ambient Temperature	20 to 24 °C
Humidity	< 60 %

3.5.2 Test Configuration

The device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of DUT. The DUT was set from the emulator to radiate maximum output power during all tests.

4. Specific Absorption Rate (SAR)

4.1 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 techniques 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.

4.2 SAR Definition

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

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

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

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

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

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

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

5. SAR Measurement System

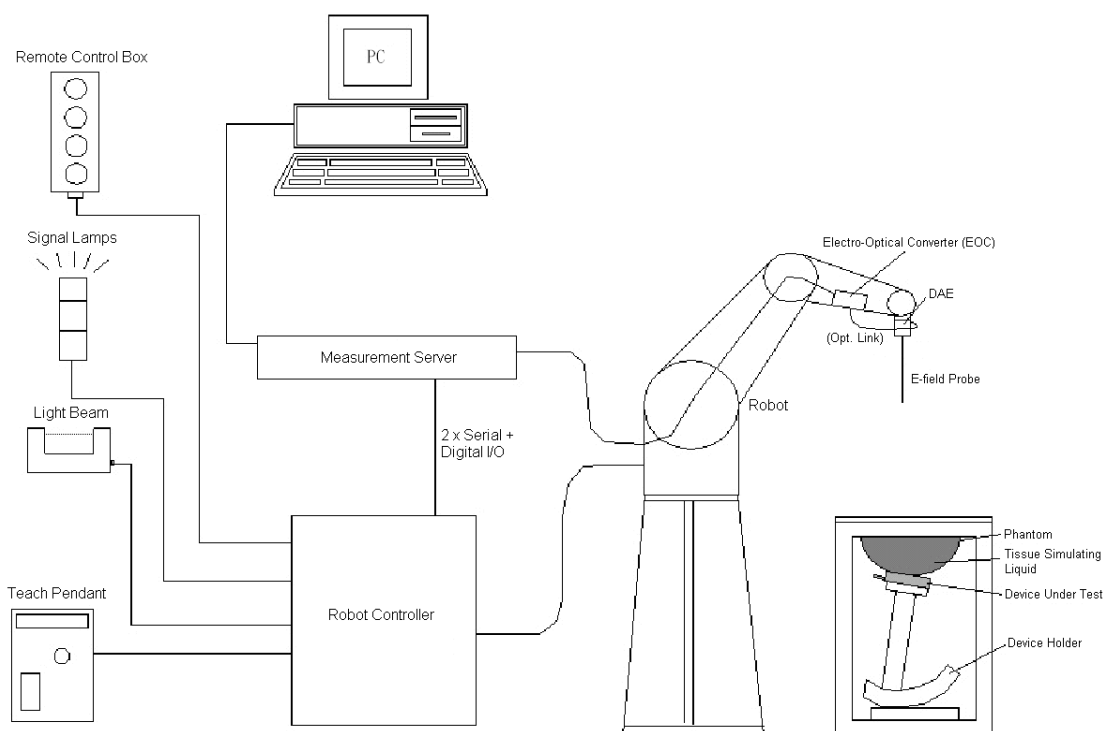


Fig 5.1 SPEAG DASY4 or DASY5 System Configurations

The DASY4 or DASY5 system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (ECO) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY4 or DASY5 software
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Some of the components are described in details in the following sub-sections.

5.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

5.1.1 E-Field Probe Specification

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 μ W/g to 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

Fig 5.2 Photo of EX3DV4

5.1.2 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

5.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



Fig 5.3 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ± 0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)



Fig 5.4 Photo of DASY5

5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.



Fig 5.5 Photo of Server for DASY5

5.5 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



Fig 5.6 Photo of SAM Phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI4 Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm

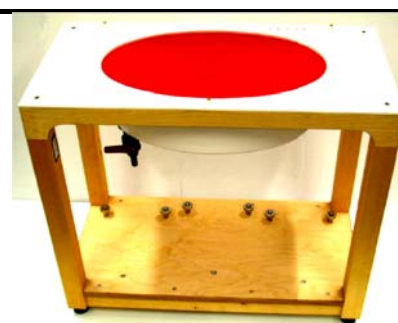


Fig 5.7 Photo of ELI4 Phantom

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

5.6 Device Holder

<Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

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

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



Fig 5.8 Device Holder

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing 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 erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

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

5.7.2 Data Evaluation

The DASY post-processing software (SEMCAD) 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	$\text{Norm}_i, a_{i0}, a_{i1}, a_{i2}$
	- Conversion factor	ConvF_i
	- Diode compression point	dcp_i
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 DASY components. In the direct measuring mode of the multi-meter 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 :

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

with V_i = compensated signal of channel i, (i = x, y, z)
 U_i = input signal of channel i, (i = x, y, z)
 cf = crest factor of exciting field (DASY parameter)
 dcp_i = diode compression point (DASY parameter)

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

$$\text{E-field Probes : } E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}}$$

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

with V_i = compensated signal of channel i, (i = x, y, z)
 Norm_i = sensor sensitivity of channel i, (i = x, y, z), $\mu\text{V}/(\text{V/m})^2$ for E-field Probes
 ConvF = sensitivity enhancement in solution
 a_{ij} = sensor sensitivity factors for H-field probes
 f = carrier frequency [GHz]
 E_i = electric field strength of channel i in V/m
 H_i = magnetic field strength of channel i in A/m

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

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

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

$$\text{SAR} = E_{\text{tot}}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in mW/g
 E_{tot} = total field strength in V/m
 σ = conductivity in [mho/m] or [Siemens/m]
 ρ = equivalent tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Field Probe	EX3DV4	3819	Nov. 16, 2011	Nov. 15, 2012
SPEAG	Data Acquisition Electronics	DAE4	1303	Nov. 10, 2011	Nov. 09, 2012
SPEAG	835MHz System Validation Kit	D835V2	4d091	Nov. 18, 2011	Nov. 17, 2012
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	Nov. 21, 2011	Nov. 20, 2012
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	Apr. 07, 2011	Apr. 06, 2012
Agilent	Wireless Communication Test Set	E5515C	MY50264165	Mar. 12, 2012	Mar. 11, 2013
Agilent	Base Station	E5515C	GB47050646	Aug. 18, 2011	Aug. 17, 2012
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1670	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1671	NCR	NCR
R&S	Spectrum Analyzer	FSP30	101400	Jun. 02, 2011	Jun. 01, 2012
R&S	Signal Generator	SMR40	100455	Dec. 30, 2011	Dec. 29, 2012

Table 5.1 Test Equipment List

Note: The calibration certificate of DASY can be referred to appendix C of this report.

6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, 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, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.2.



Fig 6.1 Photo of Liquid Height for Head SAR



Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
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

Table 6.1 Recipes of Tissue Simulating Liquid

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

The following table shows the measuring results for simulating liquid.

Freq.	Liquid Type	Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
835	Head	21.3	0.929	41.793	0.90	41.5	3.22	0.71	±5	Mar. 26, 2012
835	Body	21.4	0.971	56	0.97	55.2	0.10	1.45	±5	Mar. 30, 2012
1900	Head	21.7	1.427	41.191	1.40	40.0	1.93	2.98	±5	Mar. 29, 2012
1900	Body	21.5	1.535	54.565	1.52	53.3	0.99	2.37	±5	Mar. 29, 2012

Table 6.2 Measuring Results for Simulating Liquid

CH	Frequency (MHz)	Liquid Type	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Conductivity delta (%) (σ)	Permittivity delta (%) (ϵ_r)	Date
128	824.2	Head	0.919	41.913	0.90	41.6	2.11	0.75	Mar. 26, 2012
189	836.4	Head	0.93	41.777	0.90	41.5	3.33	0.67	Mar. 26, 2012
251	848.8	Head	0.941	41.625	0.91	41.5	3.41	0.30	Mar. 26, 2012
251	848.8	Body	0.983	55.871	0.99	55.2	-0.71	1.22	Mar. 30, 2012
810	1909.8	Head	1.436	41.187	1.39	40.0	3.31	2.97	Mar. 29, 2012
810	1909.8	Body	1.544	54.546	1.51	53.3	2.25	2.34	Mar. 29, 2012

Table 6.3 Low/mid/High channel for liquid validation

7. Uncertainty Assessment

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 7.1

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor ^(a)	1/ κ ^(b)	1/ $\sqrt{3}$	1/ $\sqrt{6}$	1/ $\sqrt{2}$

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Table 7.1 Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is showed in Table 7.2.

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (1g)
Measurement System					
Probe Calibration	6.0	Normal	1	1	± 6.0 %
Axial Isotropy	4.7	Rectangular	√3	0.7	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	± 0.6 %
Linearity	4.7	Rectangular	√3	1	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	± 0.6 %
Readout Electronics	0.3	Normal	1	1	± 0.3 %
Response Time	0.8	Rectangular	√3	1	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	± 0.6 %
Test Sample Related					
Device Positioning	2.9	Normal	1	1	± 2.9 %
Device Holder	3.6	Normal	1	1	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	± 2.9 %
Phantom and Setup					
Phantom Uncertainty	4.0	Rectangular	√3	1	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	± 1.8 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	± 1.6 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	± 1.5 %
Combined Standard Uncertainty					± 10.99 %
Coverage Factor for 95 %					K = 2
Expanded Uncertainty					± 21.97 %

Table 7.2 Uncertainty Budget of DASY for frequency range 300 MHz to 3 GHz

8. SAR Measurement Evaluation

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

8.1 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.

8.2 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. 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. The equipment setup is shown below:

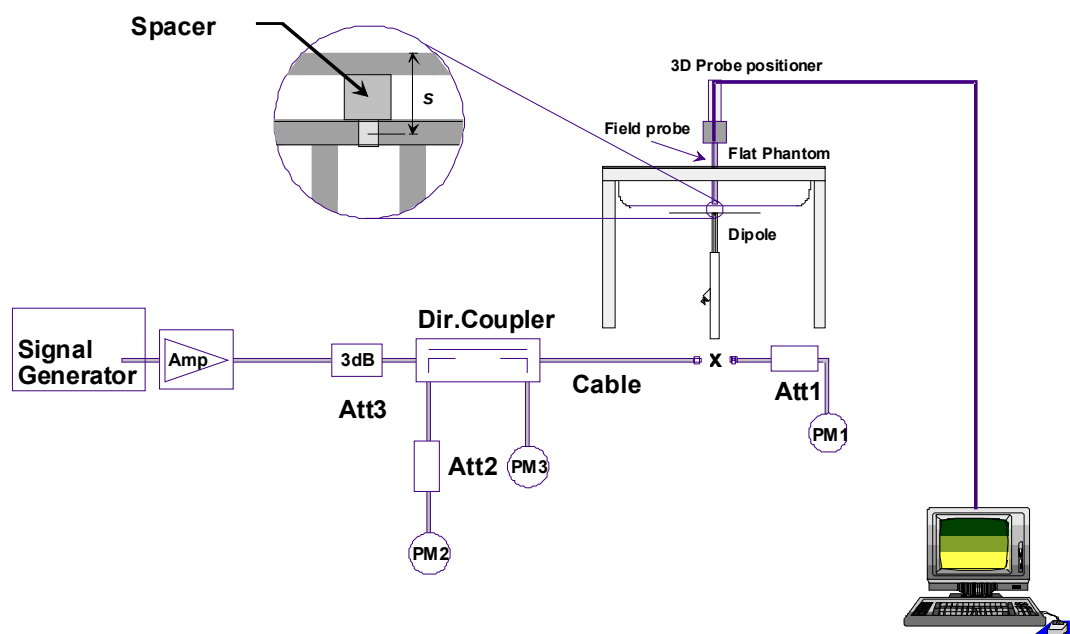


Fig 8.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

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



Fig 8.2 Photo of Dipole Setup

8.3 Validation Results

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 %. Table 8.1 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 and the plots can be referred to Appendix A of this report.

Measurement Date	Frequency (MHz)	Liquid Type	Targeted SAR _{1g} (W/kg)	Measured SAR _{1g} (W/kg)	Normalized SAR _{1g} (W/kg)	Deviation (%)
Mar. 26, 2012	835	Head	9.40	2.41	9.64	2.55
Mar. 30, 2012	835	Body	9.42	2.29	9.16	-2.76
Mar. 29, 2012	1900	Head	40.3	10.4	41.60	3.23
Mar. 29, 2012	1900	Body	41.8	10.5	42.00	0.48

Table 8.1 Target and Measurement SAR after Normalized

9. DUT Testing Position

This DUT was tested in six different positions. They are right cheek, right tilted, and left cheek, left tilted, face of the DUT with phantom 1.5 cm gap, bottom of the DUT with phantom 1.5 cm gap, as illustrated below:

1. Define two imaginary lines on the handset

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

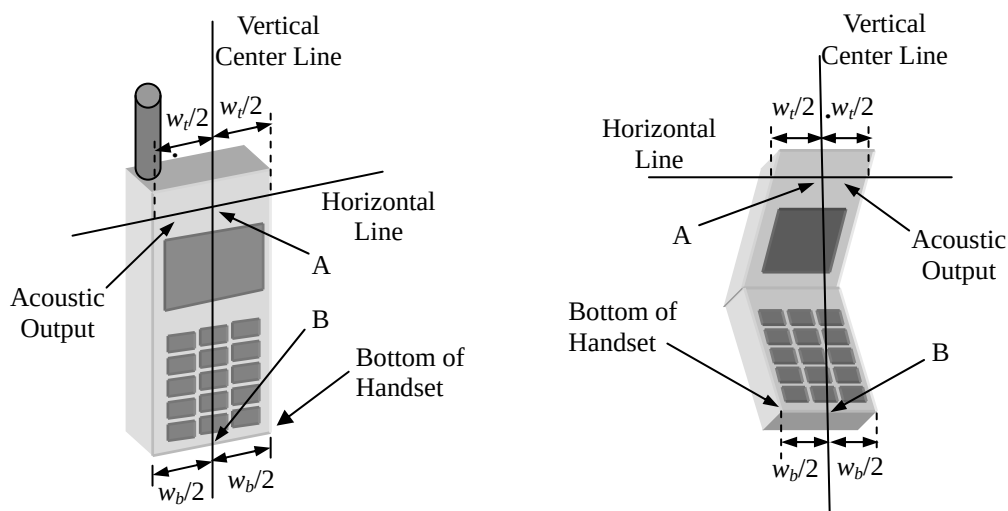


Fig 9.1 Illustration for Handset Vertical and Horizontal Reference Lines

2. Cheek Position

- (a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- (b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig. 9.2).

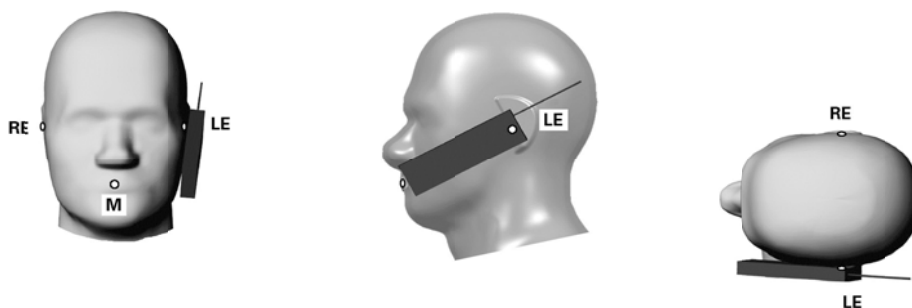


Fig 9.2 Illustration for Cheek Position

3. Tilted Position

- (a) To position the device in the “cheek” position described above.
- (b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig. 9.3).

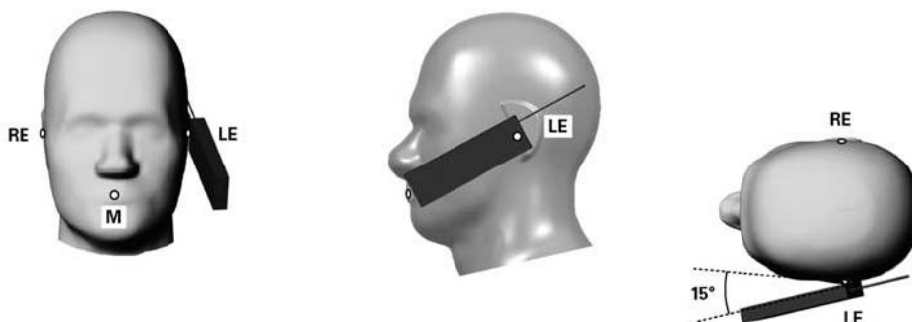


Fig 9.3 Illustration for Tilted Position

4. Body Worn Position

- (a) To position the device parallel to the phantom surface with either keypad up or down.
- (b) To adjust the device parallel to the flat phantom.
- (c) To adjust the distance between the device surface and the flat phantom to 1.5 cm.

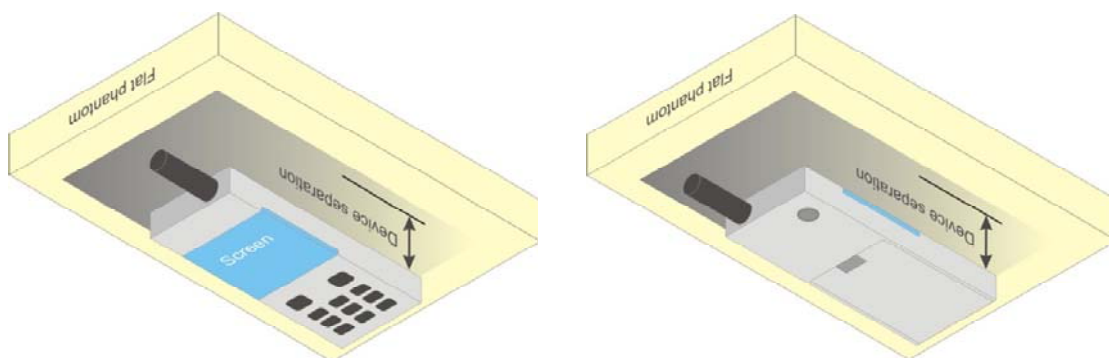


Fig 9.4 Illustration for Body Worn Position

<DUT Setup Photos>

Please refer to Appendix E for the test setup photos.

10. Measurement Procedures

The measurement procedures are as follows:

- (a) Use base station or engineering software (if applicable) to transmit RF power continuously (continuous Tx) in the highest power channel Set base station emulator to allow DUT to radiate maximum output power.
- (b) Measure output power through RF cable and power meter.
- (c) Place the DUT in the positions as Appendix E demonstrates.
- (d) Set scan area, grid size and other setting on the DASY software.
- (e) Measure SAR results for the highest power channel on each testing position.
- (f) Find out the largest SAR result on these testing positions of each band
- (g) 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

10.1 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 DASY 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 (SEMCAD). 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 (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D 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

10.2 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.

10.3 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 DUT 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, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

10.4 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

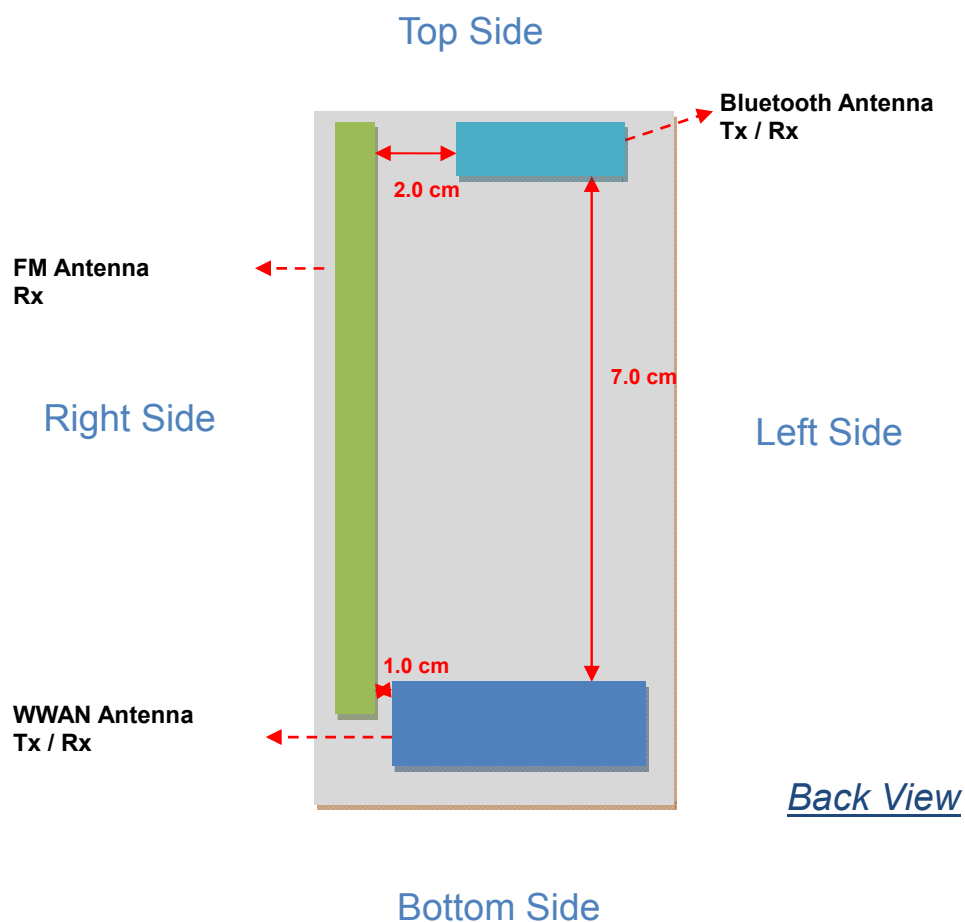
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

10.5 Power Drift Monitoring

All SAR testing is under the DUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of DUT 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.

11. SAR Test Configurations

11.1 Exposure Positions Consideration



Antenna	Length	Width
WWAN Antenna (Tx / Rx)	4.6cm	1.4 cm
Bluetooth Antenna (Tx / Rx)	2.0 cm	0.5 cm
FM Antenna (Rx only)	17.0 cm	0.1 cm

11.2 Simultaneous Transmitting Configurations

	Applicable Combination
Simultaneous Transmission	GSM/GPRS + Bluetooth

Note:

According to KDB 648474, Per KDB 648474 D01, Bluetooth (6.54 dBm) output power ≤ 60 dBm, and the distance to WWAN antenna is ≥ 5.0 cm, so the Bluetooth stand-alone SAR is not required; because the maximum WWAN SAR (1.13 W/kg) and Bluetooth stand-alone SAR is not required, so the sum SAR is < 1.6 W/kg, therefore, simultaneous transmission SAR for WWAN and Bluetooth were not required.

12. SAR Test Results

12.1 Conducted Power (Unit: dBm)

<GSM/GPRS>

Burst Average Power						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM (1 Uplink)	32.39	32.59	32.72	28.62	28.95	29.16
GPRS 8 (1 Uplink) – CS1	32.34	32.55	32.68	28.60	28.93	29.14
GPRS 10 (2 Uplink) – CS1	31.40	31.60	31.71	27.76	28.08	28.32
GPRS 11 (3 Uplink) – CS1	29.75	29.95	30.08	26.12	26.49	26.75
GPRS 12 (4 Uplink) – CS1	28.89	29.11	29.26	25.32	25.67	25.94

Source-Based Time-Averaged Power						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM (1 Uplink)	23.39	23.59	23.72	19.62	19.95	20.16
GPRS 8 (1 Uplink) – CS1	23.34	23.55	23.68	19.60	19.93	20.14
GPRS 10 (2 Uplink) – CS1	25.40	25.60	25.71	21.76	22.08	22.32
GPRS 11 (3 Uplink) – CS1	25.49	25.69	25.82	21.86	22.23	22.49
GPRS 12 (4 Uplink) – CS1	25.89	26.11	26.26	22.32	22.67	22.94

Remark: 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 averaged power = Maximum burst averaged power (1 Uplink) - 9 dB

Source based time averaged power = Maximum burst averaged power (2 Uplink) - 6 dB

Source based time averaged power = Maximum burst averaged power (3 Uplink) - 4.26 dB

Source based time averaged power = Maximum burst averaged power (4 Uplink) - 3 dB

Note:

1. For Head SAR testing, GSM should be evaluated, therefore the DUT was set in GSM for GSM850 and GSM1900 due to its highest source-based time-average power.
2. For Body-worn SAR testing, GPRS should be evaluated, therefore the DUT was set in GPRS 12 for GSM850 and GSM1900 due to its highest source-based time-average power.
3. Per 2010/10 workshop, the maximum output power channel is used for SAR testing and for further SAR test reduction.
4. The DUT do not support DTM function.

Band	Bluetooth		
Channel	0	39	78
Frequency	2402	2441	2480
Average Power	5.15	6.07	6.54
Peak Power	5.28	6.05	6.62

12.2 Test Records for Head SAR Test

<GSM>

Plot No.	Band	Mode	Test Position	Ch.	TV	SAR _{1g} (W/kg)
1	GSM850	GSM	Right Cheek	251	V	0.888
2	GSM850	GSM	Right Tilted	251	V	0.811
3	GSM850	GSM	Left Cheek	251	V	1.13
4	GSM850	GSM	Left Tilted	251	V	0.702
5	GSM850	GSM	Right Cheek	128	V	0.779
6	GSM850	GSM	Right Cheek	189	V	0.853
7	GSM850	GSM	Right Tilted	128	V	0.706
8	GSM850	GSM	Right Tilted	189	V	0.808
9	GSM850	GSM	Left Cheek	128	V	0.961
10	GSM850	GSM	Left Cheek	189	V	1.09
11	GSM850	GSM	Left Cheek	251	-	1.02
12	GSM850	GSM	Left Cheek	128	-	0.962
13	GSM850	GSM	Left Cheek	189	-	1.09
14	GSM1900	GSM	Right Cheek	810	V	0.241
15	GSM1900	GSM	Right Tilted	810	V	0.105
16	GSM1900	GSM	Left Cheek	810	V	0.165
17	GSM1900	GSM	Left Tilted	810	V	0.105
18	GSM1900	GSM	Right Cheek	810	-	0.257

Note: Per KDB 648474, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

12.3 Test Records for Body-worn SAR Test

<GSM>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	TV	SAR _{1g} (W/kg)
22	GSM850	GPRS12	Face	1.5	251	V	0.434
23	GSM850	GPRS12	Bottom	1.5	251	V	0.785
24	GSM850	GPRS12	Bottom	1.5	251	-	0.76
19	GSM1900	GPRS12	Face	1.5	810	V	0.071
20	GSM1900	GPRS12	Bottom	1.5	810	V	0.19
21	GSM1900	GPRS12	Bottom	1.5	810	-	0.219

Note:

Per KDB 648474, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

Test Engineer : Krin Wu



13. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] IEEE Std. C95.1-1991, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", 1991
- [3] IEEE Std. 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- [4] FCC OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", June 2001
- [5] SPEAG DASY System Handbook
- [6] FCC KDB 248227 D01 v01r02, "SAR Measurement Procedures for 802.11 a/b/g Transmitters", May 2007
- [7] FCC KDB 447498 D01 v04, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", November 2009
- [8] FCC KDB 447498 D02 v02, "SAR Measurement Procedures for USB Dongle Transmitters", November 2009
- [9] FCC KDB 616217 D01 v01r01, "SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens", November 2009
- [10] FCC KDB 616217 D03 v01, "SAR Evaluation Considerations for Laptop/Notebook/Netbook and Tablet Computers", November 2009
- [11] FCC KDB 648474 D01 v01r05, "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas", September 2008
- [12] FCC KDB 941225 D01 v02, "SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA", October 2007
- [13] FCC KDB 941225 D02 v02 "3GPP R6 HSPA and R7 HSPA+ SAR Guidance", December 2009.
- [14] FCC KDB 941225 D03 v01, "Recommended SAR Test Reduction Procedures for GSM / GPRS / EDGE", December 2008
- [15] FCC KDB 941225 D04 v01, "Evaluating SAR for GSM/(E)GPRS Dual Transfer Mode", January 27 2010



Appendix A. Plots of System Performance Check

The plots are shown as follows.

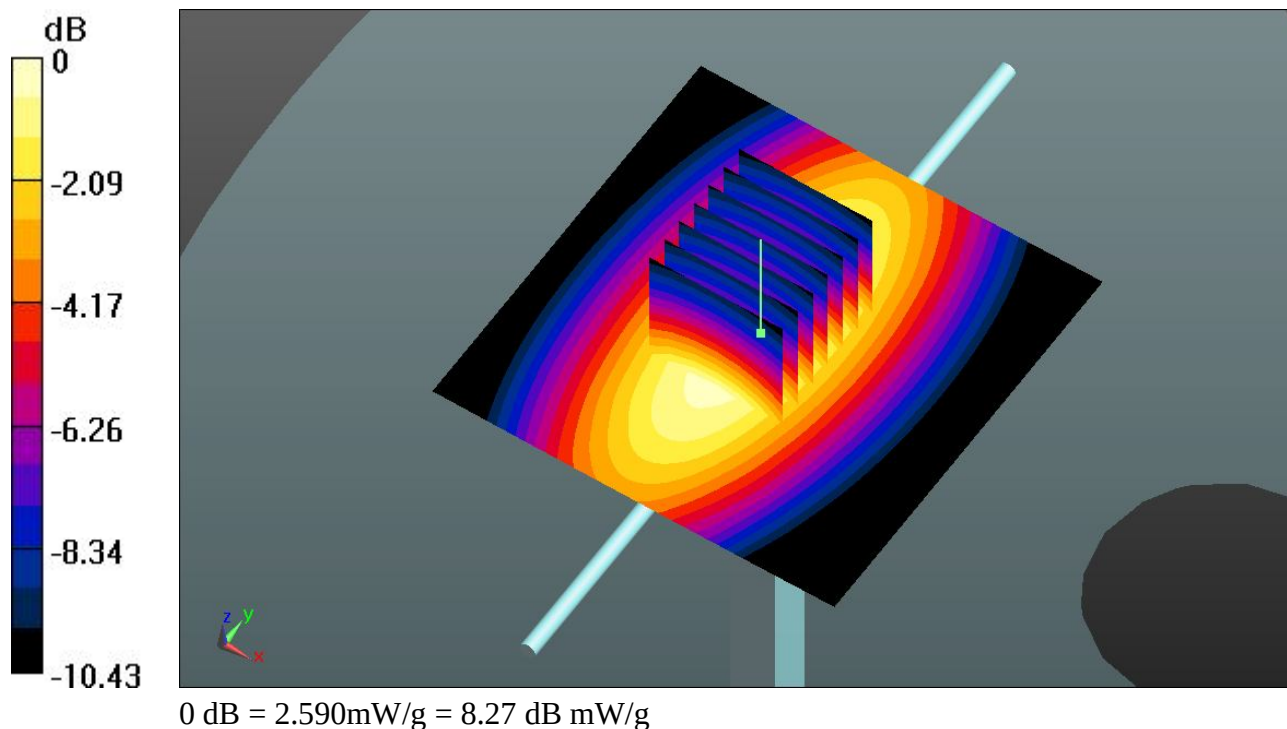
System Check_Head_835MHz_120326**DUT: D835V2 - SN: 4d091**

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

Medium: HSL_835_120326 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.929 \text{ mho/m}$; $\epsilon_r = 41.793$; $\rho = 1000 \text{ kg/m}^3$ Ambient Temperature : 23.5°C ; Liquid Temperature : 21.3°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Pin=250mW/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 2.590 mW/g **Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 52.711 V/m ; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.6310 **SAR(1 g) = 2.41 mW/g ; SAR(10 g) = 1.57 mW/g** Maximum value of SAR (measured) = 2.594 mW/g 

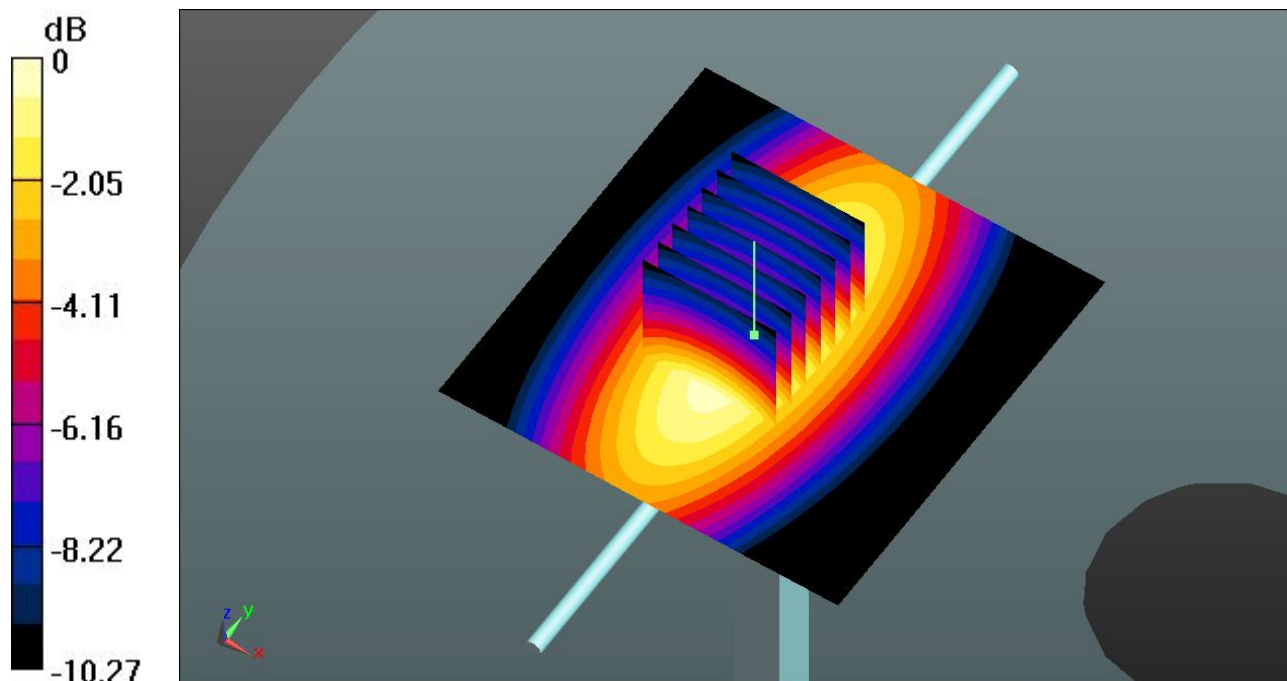
System Check_Body_835MHz_120330**DUT: D835V2 - SN: 4d091**

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

Medium: MSL_835_120330 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.971 \text{ mho/m}$; $\epsilon_r = 56$; $\rho = 1000 \text{ kg/m}^3$ Ambient Temperature : 23.5°C ; Liquid Temperature : 21.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Pin=250mW/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 2.468 mW/g **Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 50.106 V/m ; Power Drift = 0.0072 dB Peak SAR (extrapolated) = 3.4490 **SAR(1 g) = 2.29 mW/g ; SAR(10 g) = 1.5 mW/g** Maximum value of SAR (measured) = 2.476 mW/g  $0 \text{ dB} = 2.480 \text{ mW/g} = 7.89 \text{ dB mW/g}$

System Check_Head_1900MHz_120329**DUT: D1900V2 - SN: 5d118**

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

Medium: HSL_1900_120329 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.427$ mho/m; $\epsilon_r =$ 41.191; $\rho = 1000$ kg/m³

Ambient Temperature : 23.6 °C ; Liquid Temperature : 21.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(8.36, 8.36, 8.36); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.171 mW/g

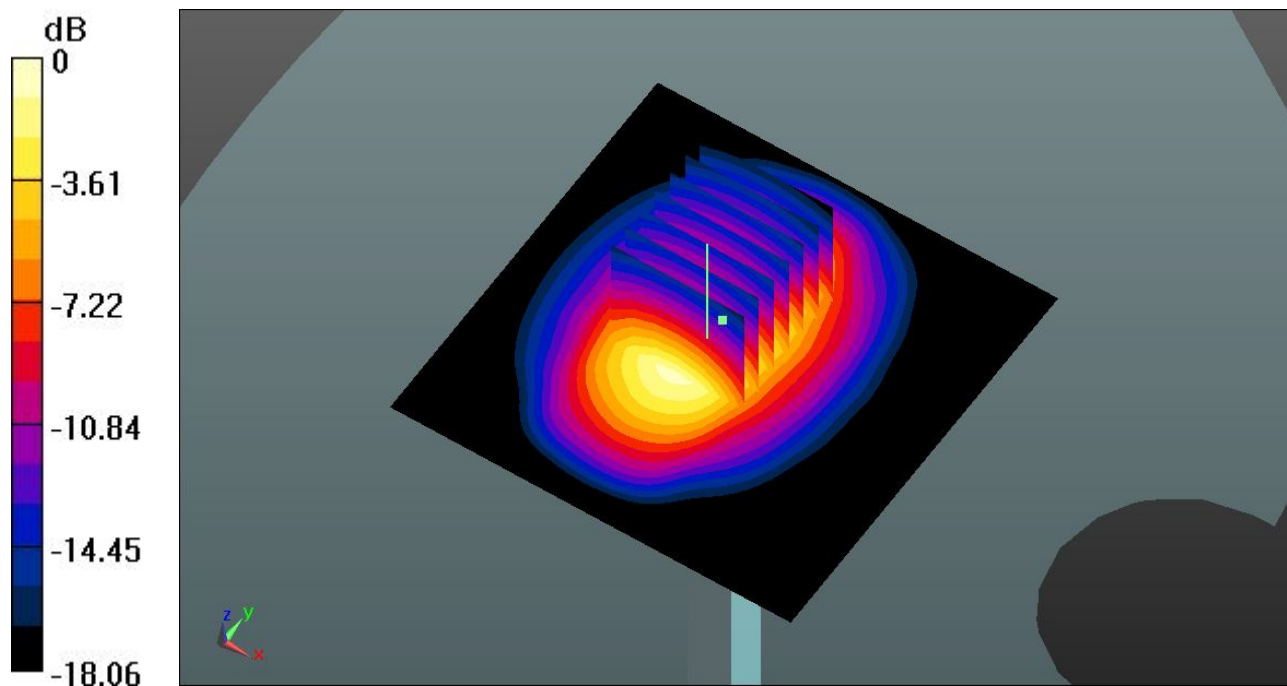
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 83.797 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 19.4830

SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.39 mW/g

Maximum value of SAR (measured) = 11.674 mW/g



0 dB = 11.670mW/g = 21.34 dB mW/g

System Check_Body_1900MHz_120329**DUT: D1900V2 - SN: 5d118**

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

Medium: MSL_1900_120329 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.535$ mho/m; $\epsilon_r =$

54.565; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(7.71, 7.71, 7.71); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.499 mW/g

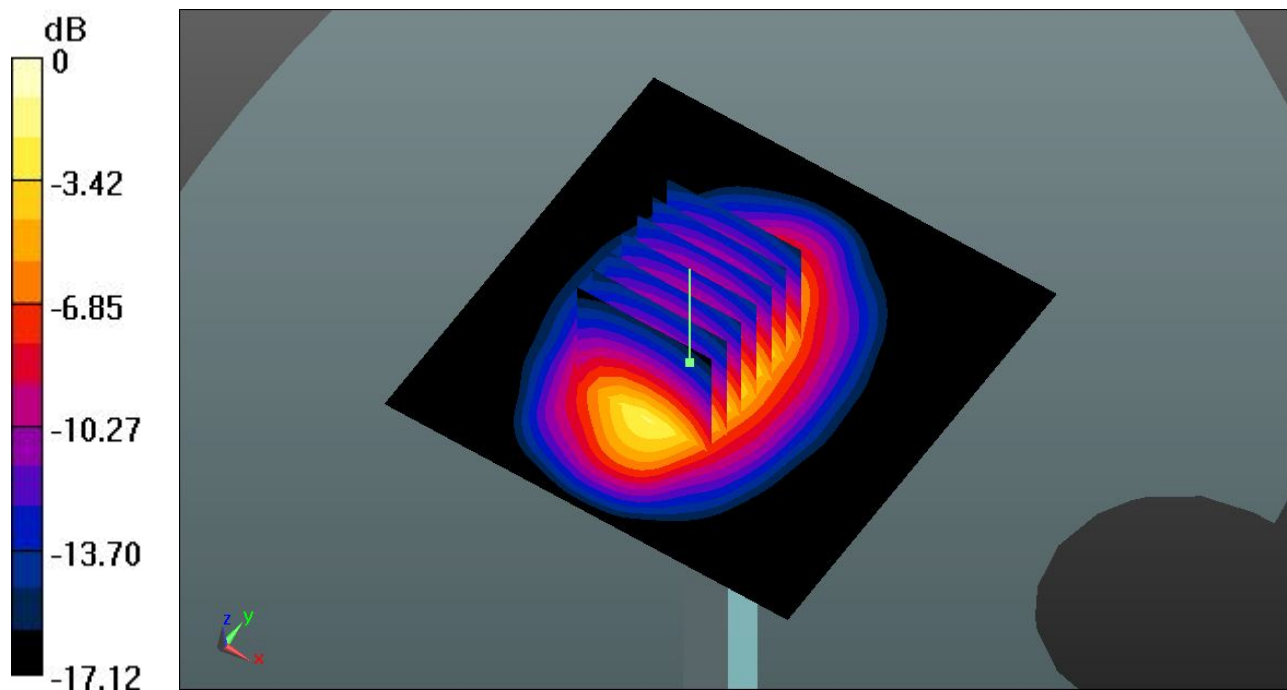
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 86.036 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 19.3600

SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.51 mW/g

Maximum value of SAR (measured) = 11.780 mW/g



0 dB = 11.780mW/g = 21.42 dB mW/g



Appendix B. Plots of SAR Measurement

The plots are shown as follows.

01 GSM850_Right Cheek_Ch251**DUT: 232203**

Communication System: Generic GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 849$ MHz; $\sigma = 0.941$ mho/m; $\epsilon_r = 41.625$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.960 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.047 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.0530

SAR(1 g) = 0.888 mW/g; SAR(10 g) = 0.664 mW/g

Maximum value of SAR (measured) = 0.935 mW/g

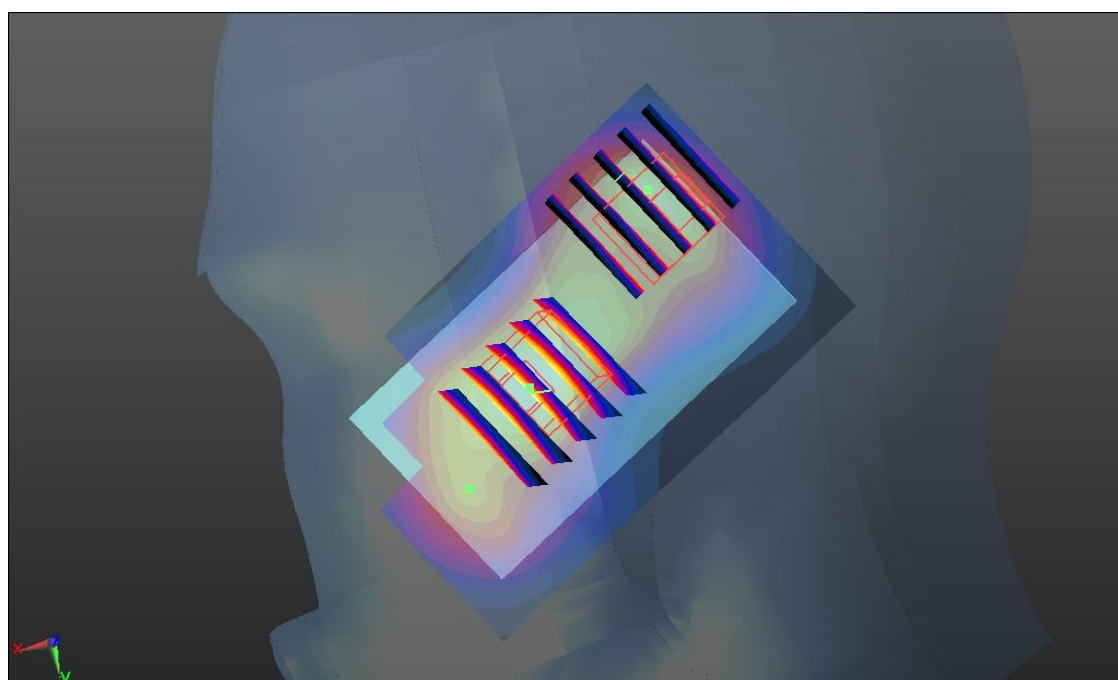
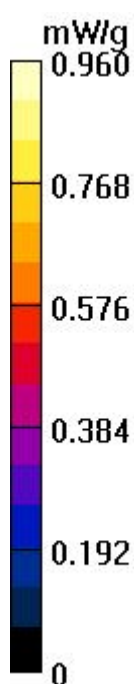
Ch251/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.047 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.6340

SAR(1 g) = 0.690 mW/g; SAR(10 g) = 0.382 mW/g

Maximum value of SAR (measured) = 0.757 mW/g



02 GSM850_Right Tilted_Ch251

DUT: 232203

Communication System: Generic GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 849$ MHz; $\sigma = 0.941$ mho/m; $\epsilon_r = 41.625$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.981 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.083 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.6970

SAR(1 g) = 0.811 mW/g; SAR(10 g) = 0.468 mW/g

Maximum value of SAR (measured) = 0.873 mW/g

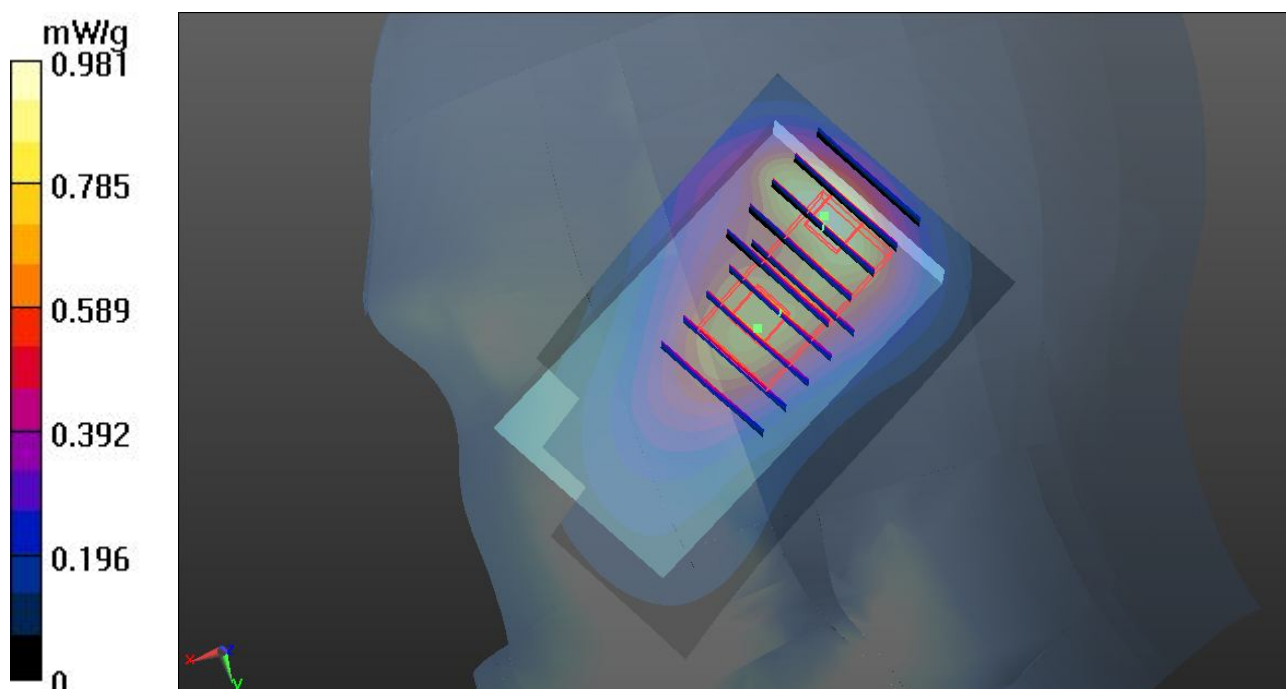
Ch251/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.083 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.9060

SAR(1 g) = 0.724 mW/g; SAR(10 g) = 0.511 mW/g

Maximum value of SAR (measured) = 0.762 mW/g



03 GSM850_Left Cheek_Ch251

DUT: 232203

Communication System: Generic GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 849$ MHz; $\sigma = 0.941$ mho/m; $\epsilon_r = 41.625$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.249 mW/g

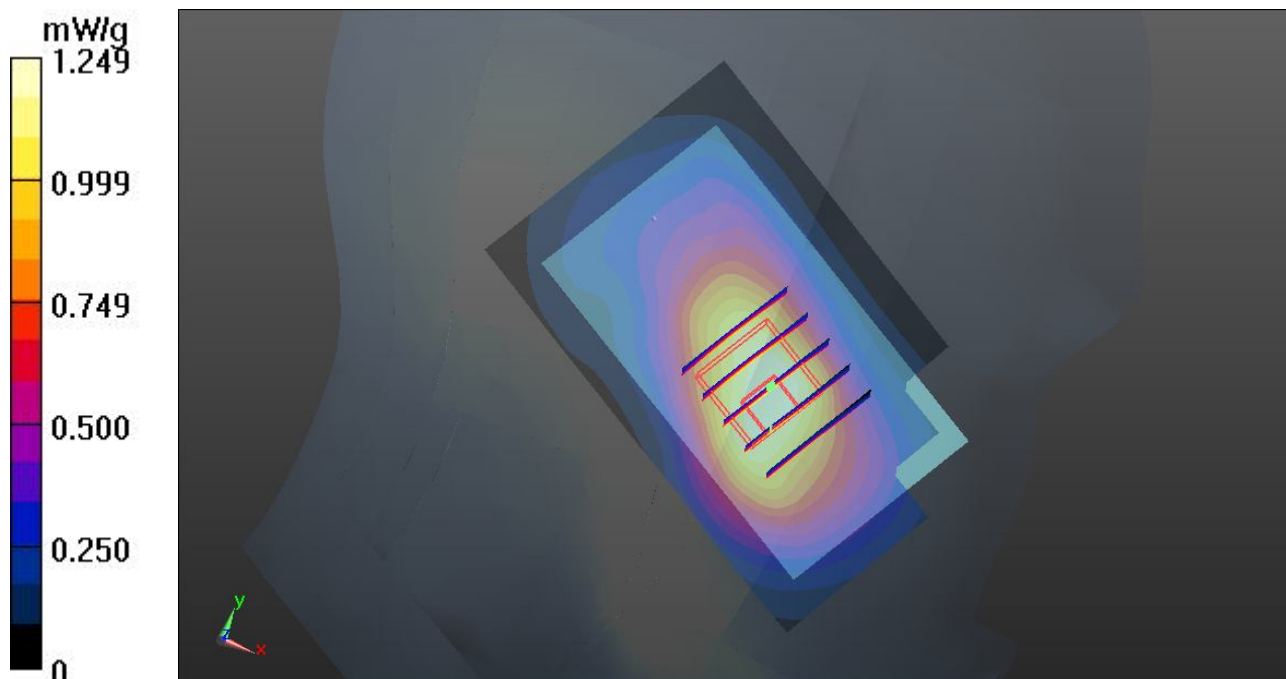
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.193 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.3930

SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.840 mW/g

Maximum value of SAR (measured) = 1.169 mW/g



03 GSM850_Left Cheek_Ch251_2D**DUT: 232203**

Communication System: Generic GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 849$ MHz; $\sigma = 0.941$ mho/m; $\epsilon_r = 41.625$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.249 mW/g

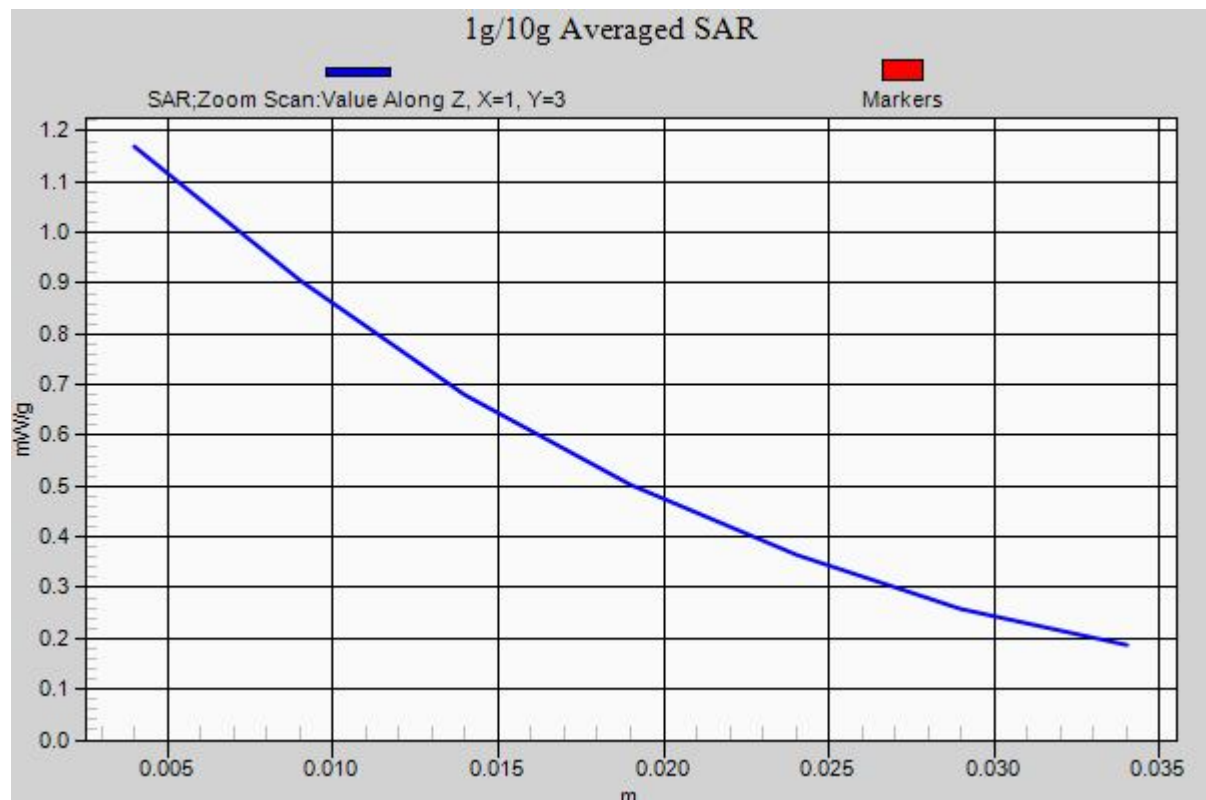
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.193 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.3930

SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.840 mW/g

Maximum value of SAR (measured) = 1.169 mW/g



04 GSM850_Left Tilted_Ch251**DUT: 232203**

Communication System: Generic GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 849$ MHz; $\sigma = 0.941$ mho/m; $\epsilon_r = 41.625$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.765 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.852 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.8470

SAR(1 g) = 0.702 mW/g; SAR(10 g) = 0.509 mW/g

Maximum value of SAR (measured) = 0.733 mW/g

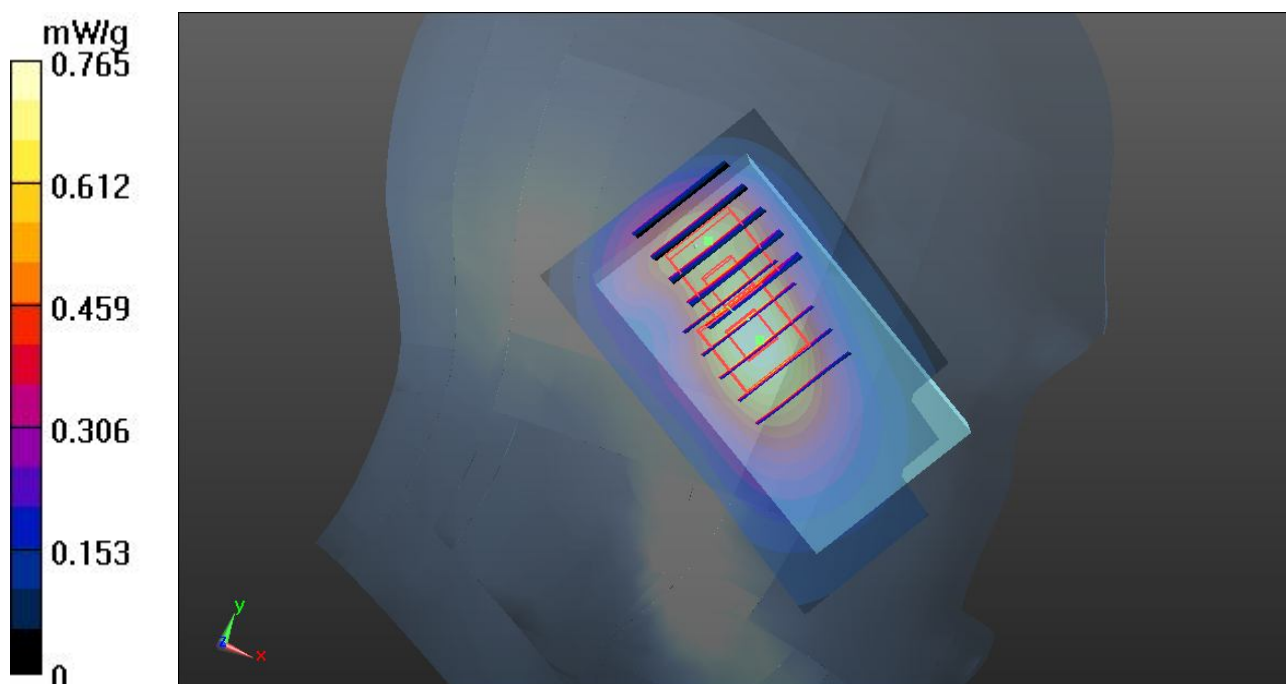
Ch251/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.852 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.9130

SAR(1 g) = 0.595 mW/g; SAR(10 g) = 0.393 mW/g

Maximum value of SAR (measured) = 0.674 mW/g



05 GSM850_Right Cheek_Ch128**DUT: 232203**

Communication System: Generic GSM; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 41.913$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch128/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.860 mW/g

Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.385 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.9620

SAR(1 g) = 0.779 mW/g; SAR(10 g) = 0.560 mW/g

Maximum value of SAR (measured) = 0.816 mW/g

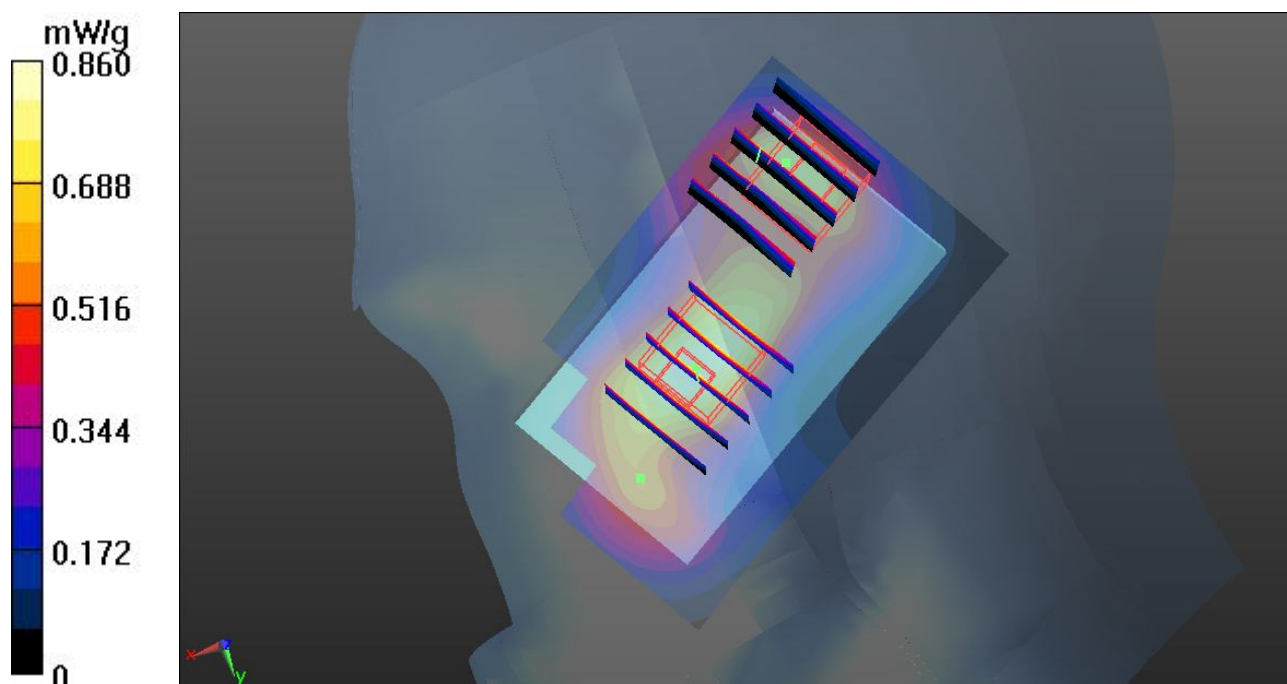
Ch128/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.385 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.4630

SAR(1 g) = 0.598 mW/g; SAR(10 g) = 0.322 mW/g

Maximum value of SAR (measured) = 0.673 mW/g



06 GSM850_Right Cheek_Ch189**DUT: 232203**

Communication System: Generic GSM; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 836.5$ MHz; $\sigma = 0.93$ mho/m; $\epsilon_r = 41.777$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch189/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.942 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.810 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.0320

SAR(1 g) = 0.853 mW/g; SAR(10 g) = 0.626 mW/g

Maximum value of SAR (measured) = 0.895 mW/g

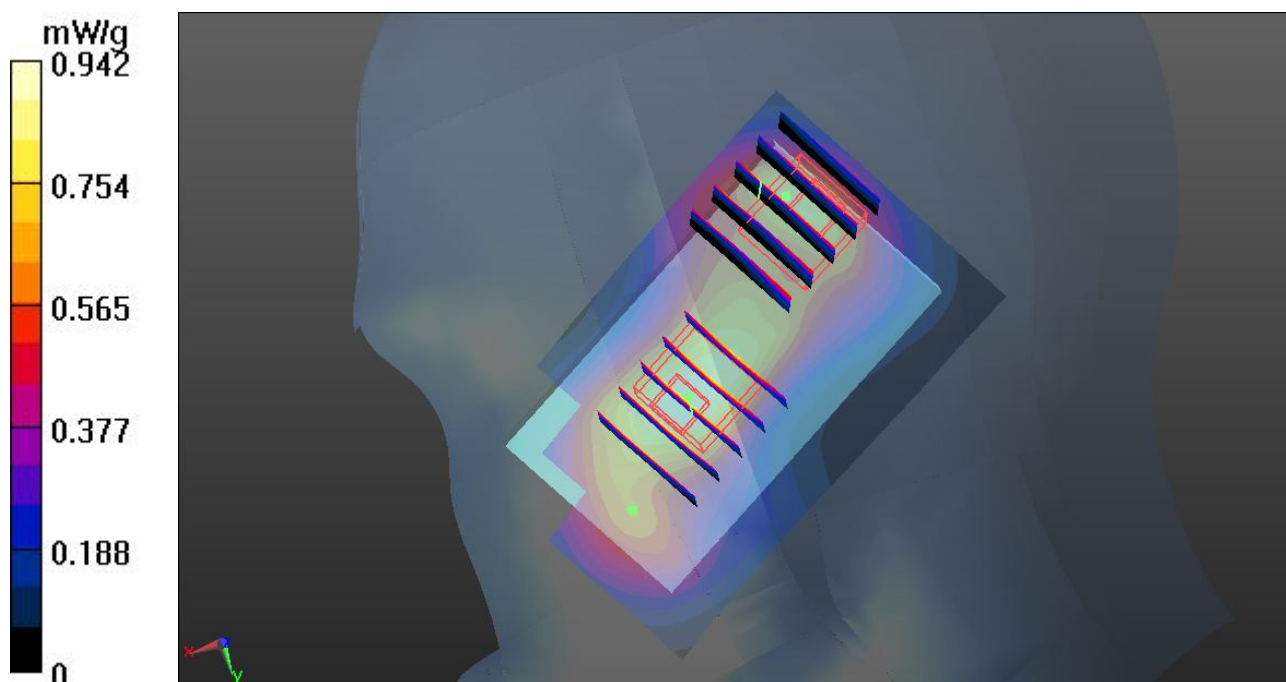
Ch189/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.810 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.5790

SAR(1 g) = 0.663 mW/g; SAR(10 g) = 0.361 mW/g

Maximum value of SAR (measured) = 0.737 mW/g



07 GSM850_Right Tilted_Ch128**DUT: 232203**

Communication System: Generic GSM; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 41.913$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch128/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.848 mW/g

Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.653 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.5640

SAR(1 g) = 0.706 mW/g; SAR(10 g) = 0.363 mW/g

Maximum value of SAR (measured) = 0.724 mW/g

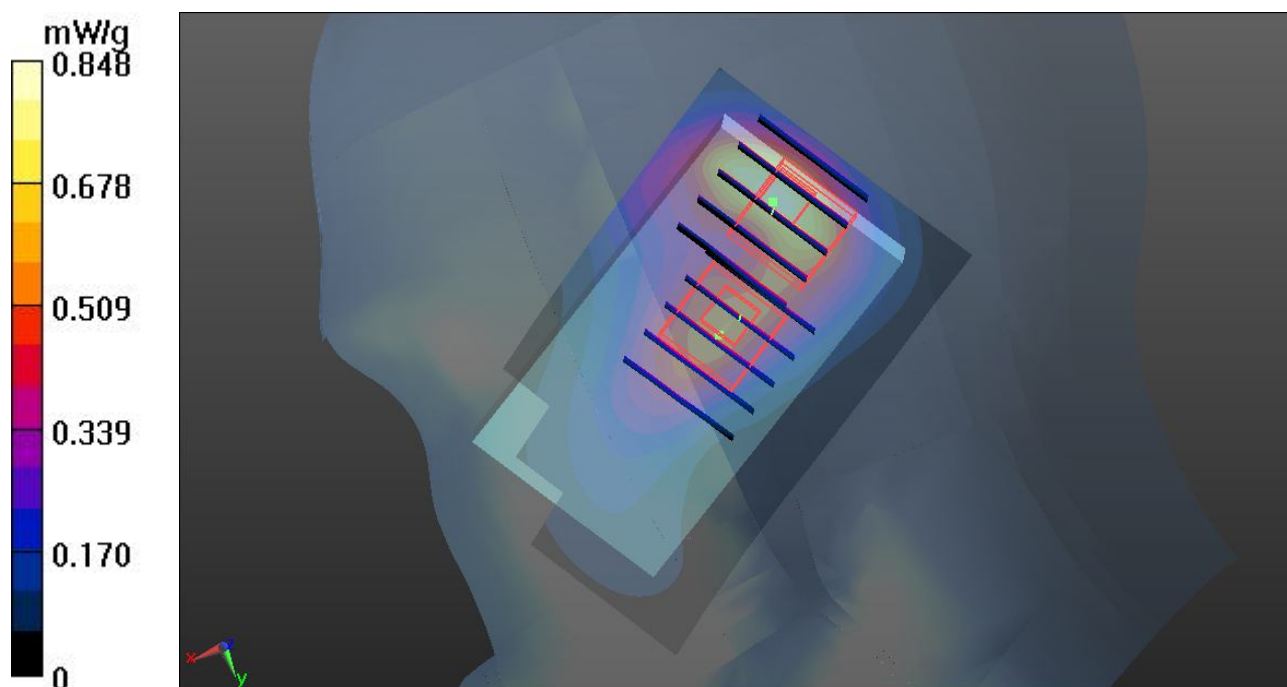
Ch128/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.653 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.6860

SAR(1 g) = 0.529 mW/g; SAR(10 g) = 0.359 mW/g

Maximum value of SAR (measured) = 0.561 mW/g



08 GSM850_Right Tilted_Ch189**DUT: 232203**

Communication System: Generic GSM; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 836.5$ MHz; $\sigma = 0.93$ mho/m; $\epsilon_r = 41.777$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch189/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.970 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.951 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.7460

SAR(1 g) = 0.808 mW/g; SAR(10 g) = 0.436 mW/g

Maximum value of SAR (measured) = 0.841 mW/g

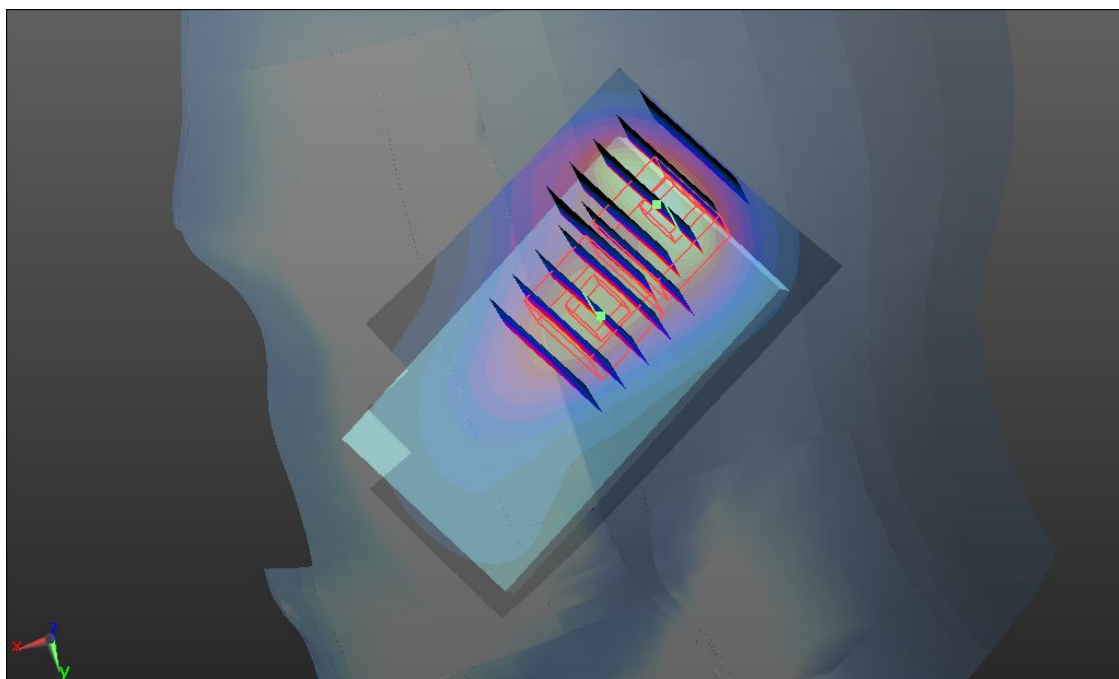
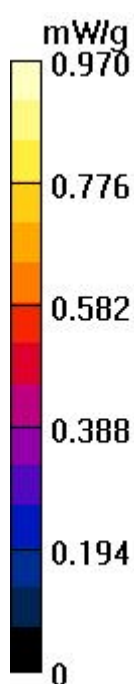
Ch189/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.951 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.8370

SAR(1 g) = 0.659 mW/g; SAR(10 g) = 0.458 mW/g

Maximum value of SAR (measured) = 0.686 mW/g



09 GSM850_Left Cheek_Ch128**DUT: 232203**

Communication System: Generic GSM; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 41.913$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch128/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.142 mW/g

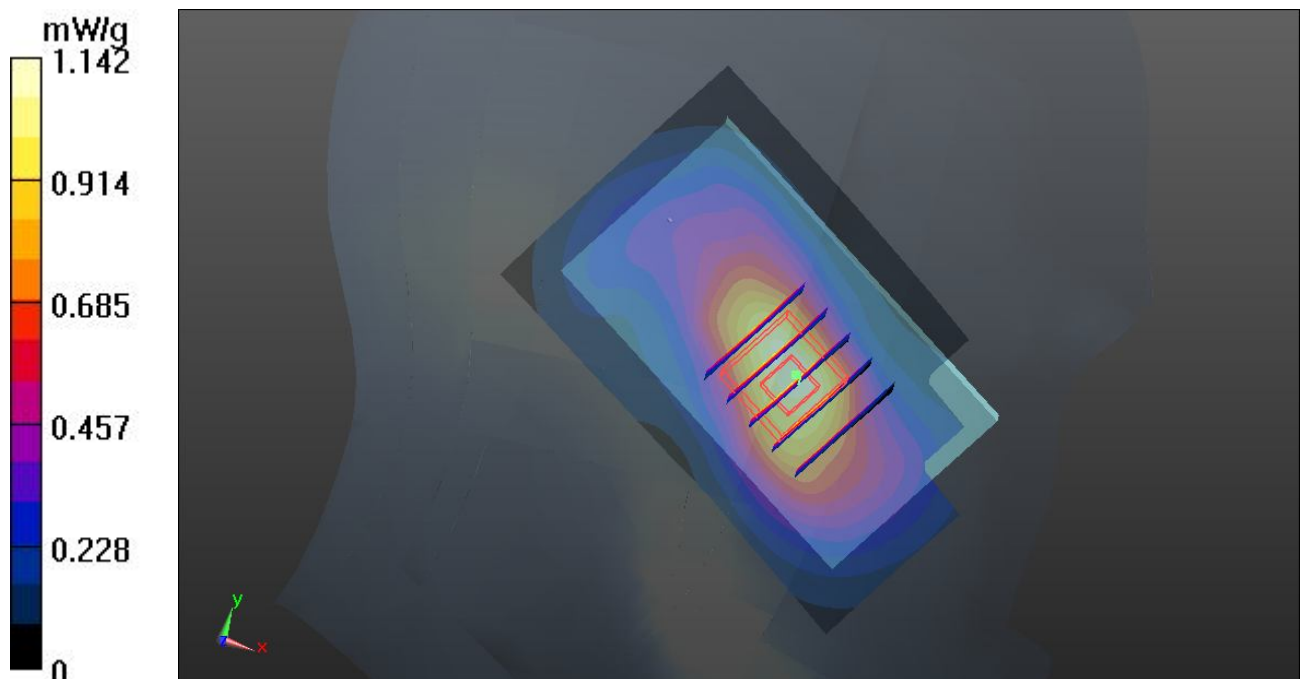
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.186 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.1380

SAR(1 g) = 0.961 mW/g; SAR(10 g) = 0.708 mW/g

Maximum value of SAR (measured) = 0.982 mW/g



10 GSM850_Left Cheek_Ch189**DUT: 232203**

Communication System: Generic GSM; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 836.5$ MHz; $\sigma = 0.93$ mho/m; $\epsilon_r = 41.777$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch189/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.249 mW/g

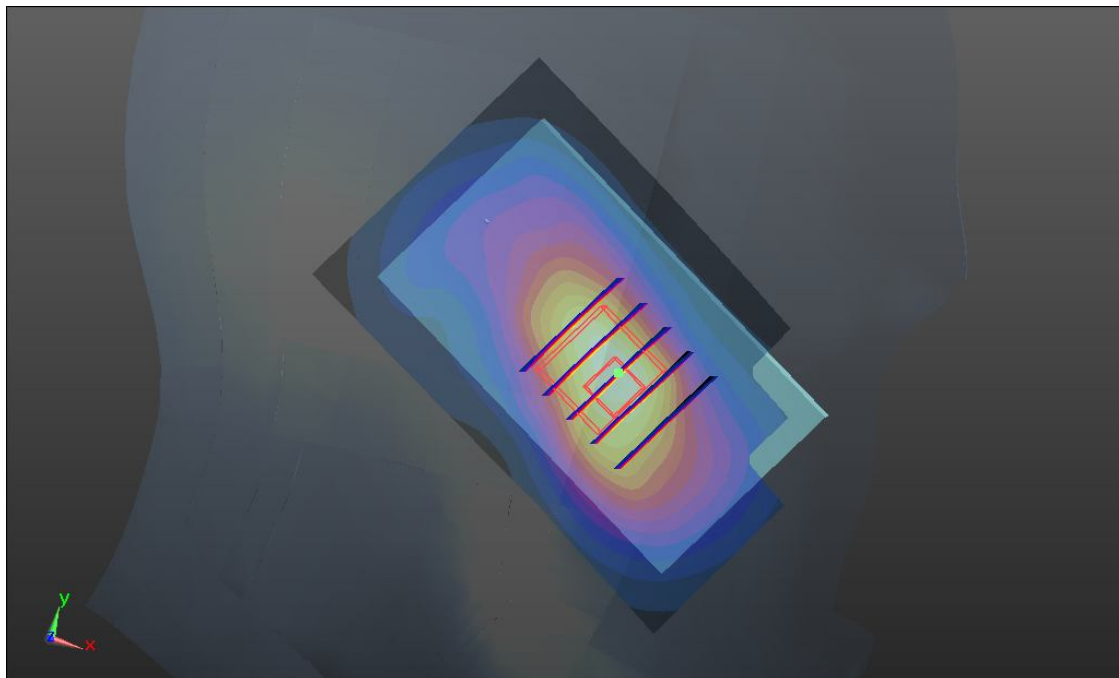
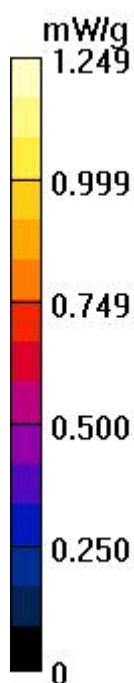
Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.855 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.2940

SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.814 mW/g

Maximum value of SAR (measured) = 1.118 mW/g



11 GSM850_Left Cheek_Ch251_without TV**DUT: 232203**

Communication System: Generic GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 849$ MHz; $\sigma = 0.941$ mho/m; $\epsilon_r = 41.625$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.129 mW/g

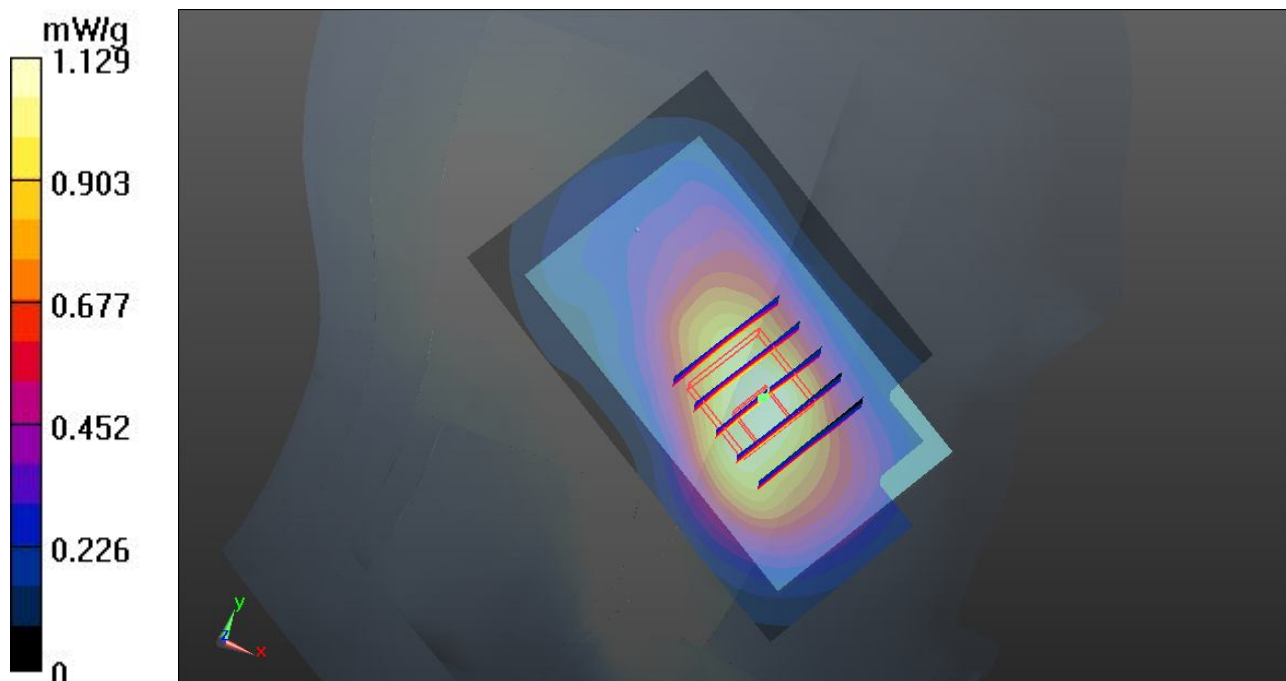
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.497 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.2620

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.757 mW/g

Maximum value of SAR (measured) = 1.050 mW/g



12 GSM850_Left Cheek_Ch128_without TV**DUT: 232203**

Communication System: Generic GSM; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 41.913$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch128/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.162 mW/g

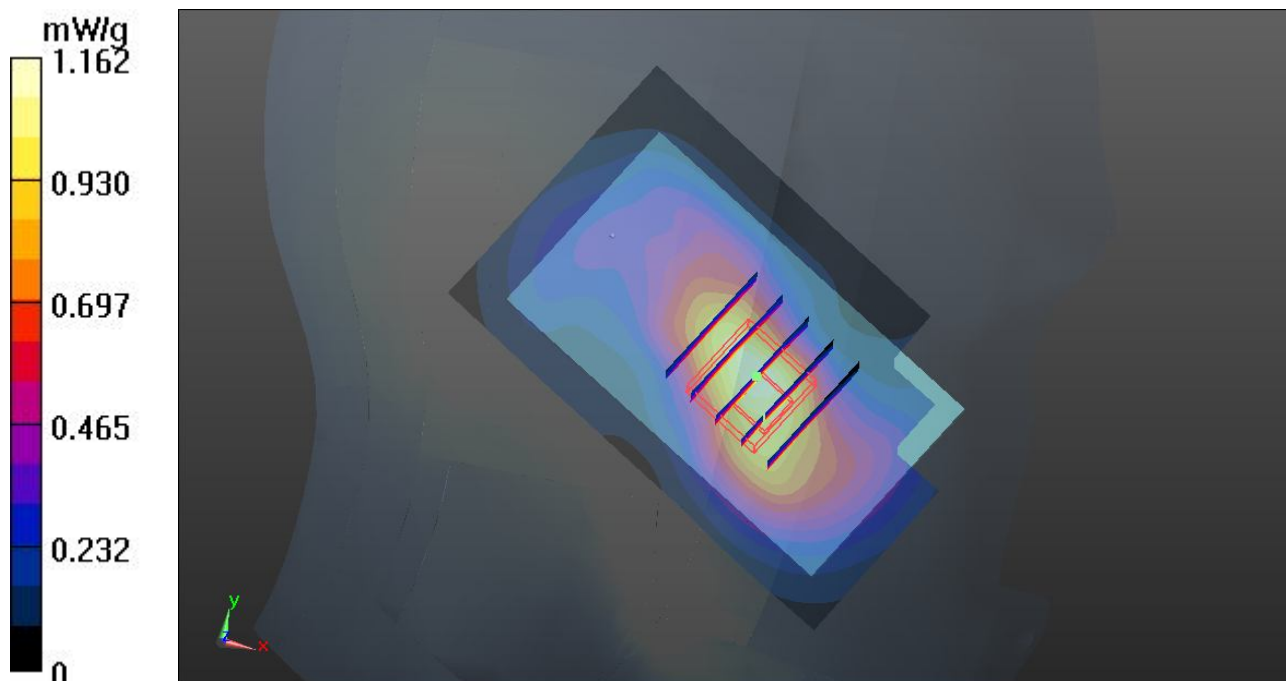
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.239 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 1.1810

SAR(1 g) = 0.962 mW/g; SAR(10 g) = 0.699 mW/g

Maximum value of SAR (measured) = 1.009 mW/g



13 GSM850_Left Cheek_Ch189_without TV**DUT: 232203**

Communication System: Generic GSM; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL_835_120326 Medium parameters used: $f = 836.5$ MHz; $\sigma = 0.93$ mho/m; $\epsilon_r = 41.777$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.4, 9.4, 9.4); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch189/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.211 mW/g

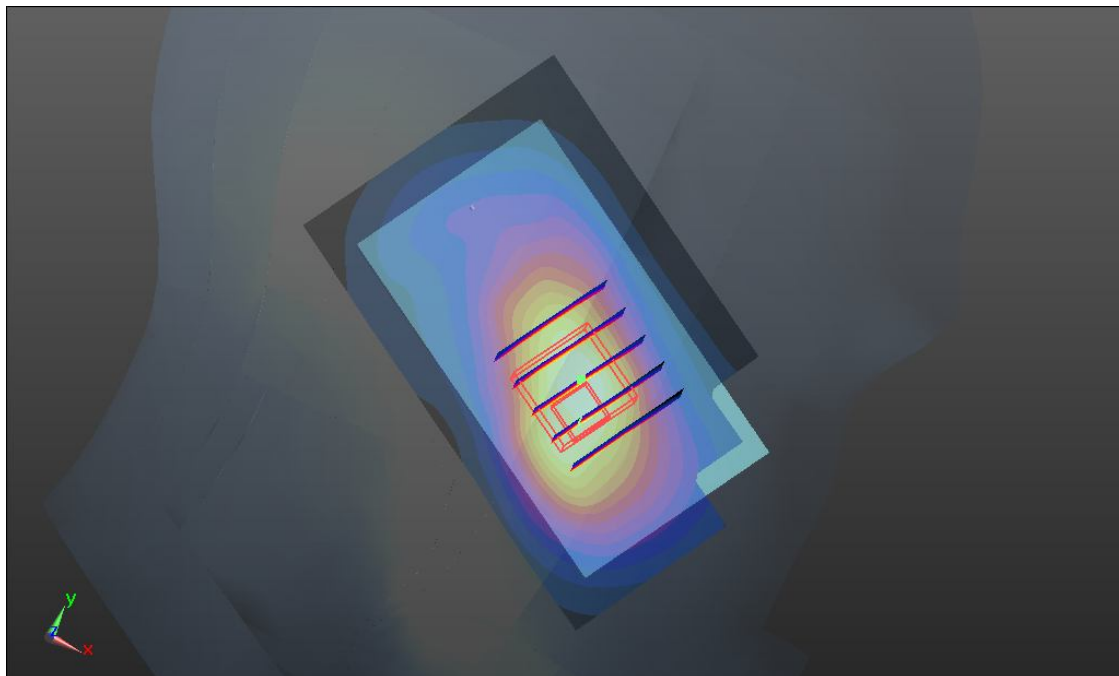
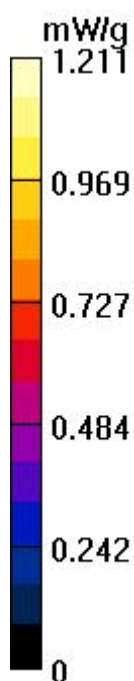
Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.004 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.3530

SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.811 mW/g

Maximum value of SAR (measured) = 1.151 mW/g



14 GSM1900_Right Cheek_Ch810**DUT: 232203**

Communication System: Generic GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.436$ mho/m; $\epsilon_r =$

41.187; $\rho = 1000$ kg/m³

Ambient Temperature : 23.6 °C ; Liquid Temperature : 21.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(8.36, 8.36, 8.36); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.260 mW/g

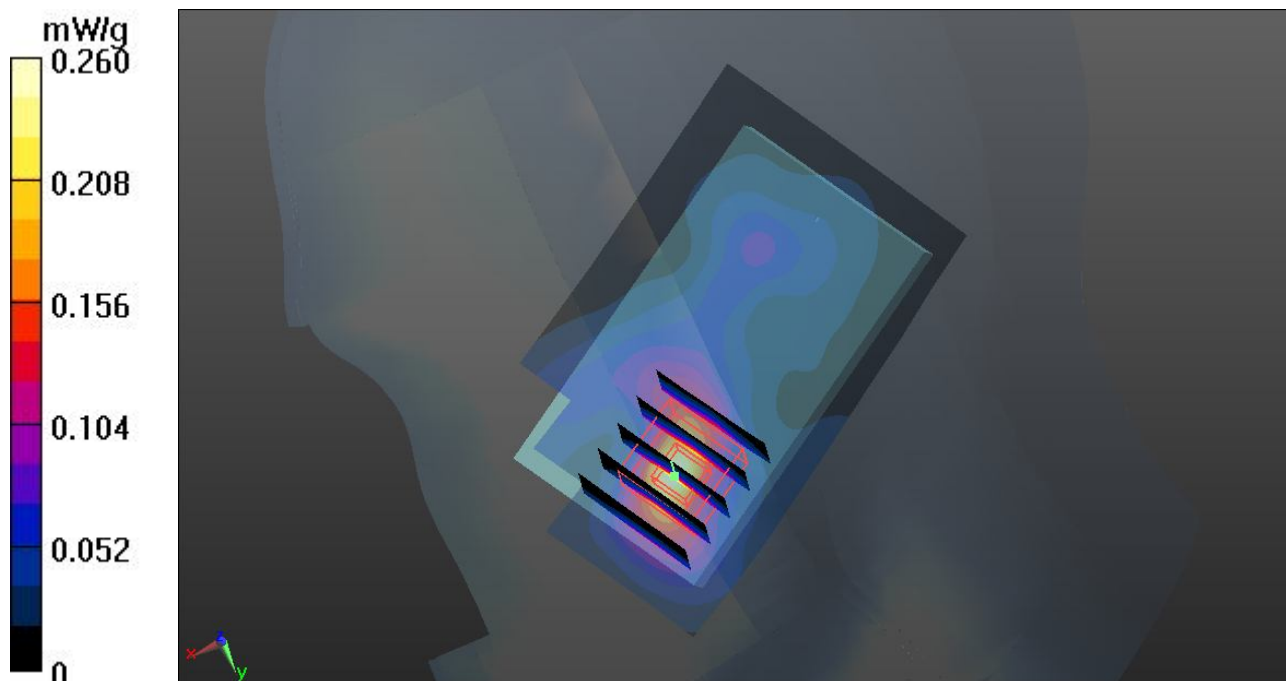
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.453 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.4700

SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.113 mW/g

Maximum value of SAR (measured) = 0.281 mW/g



15 GSM1900_Right Tilted_Ch810

DUT: 232203

Communication System: Generic GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.436$ mho/m; $\epsilon_r =$

41.187; $\rho = 1000$ kg/m³

Ambient Temperature : 23.6 °C; Liquid Temperature : 21.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(8.36, 8.36, 8.36); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.123 mW/g

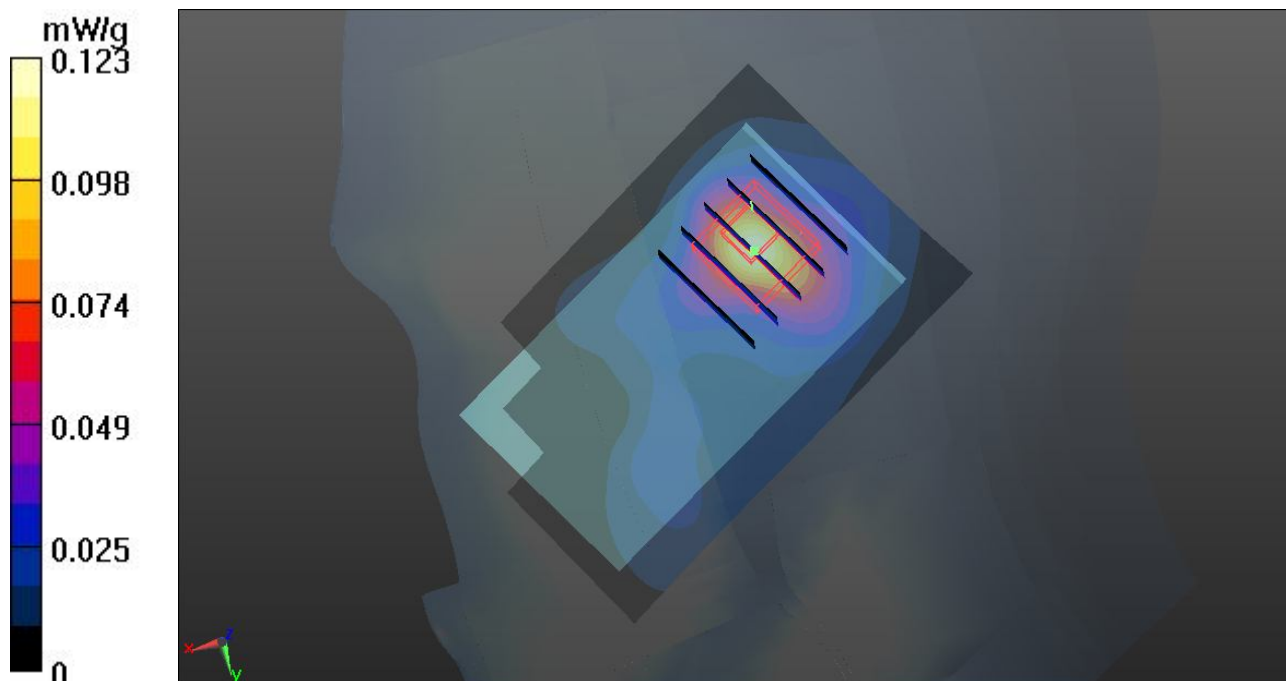
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.009 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.1750

SAR(1 g) = 0.105 mW/g; SAR(10 g) = 0.056 mW/g

Maximum value of SAR (measured) = 0.104 mW/g



16 GSM1900_Left Cheek_Ch810**DUT: 232203**

Communication System: Generic GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.436$ mho/m; $\epsilon_r =$

41.187; $\rho = 1000$ kg/m³

Ambient Temperature : 23.6 °C ; Liquid Temperature : 21.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(8.36, 8.36, 8.36); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.192 mW/g

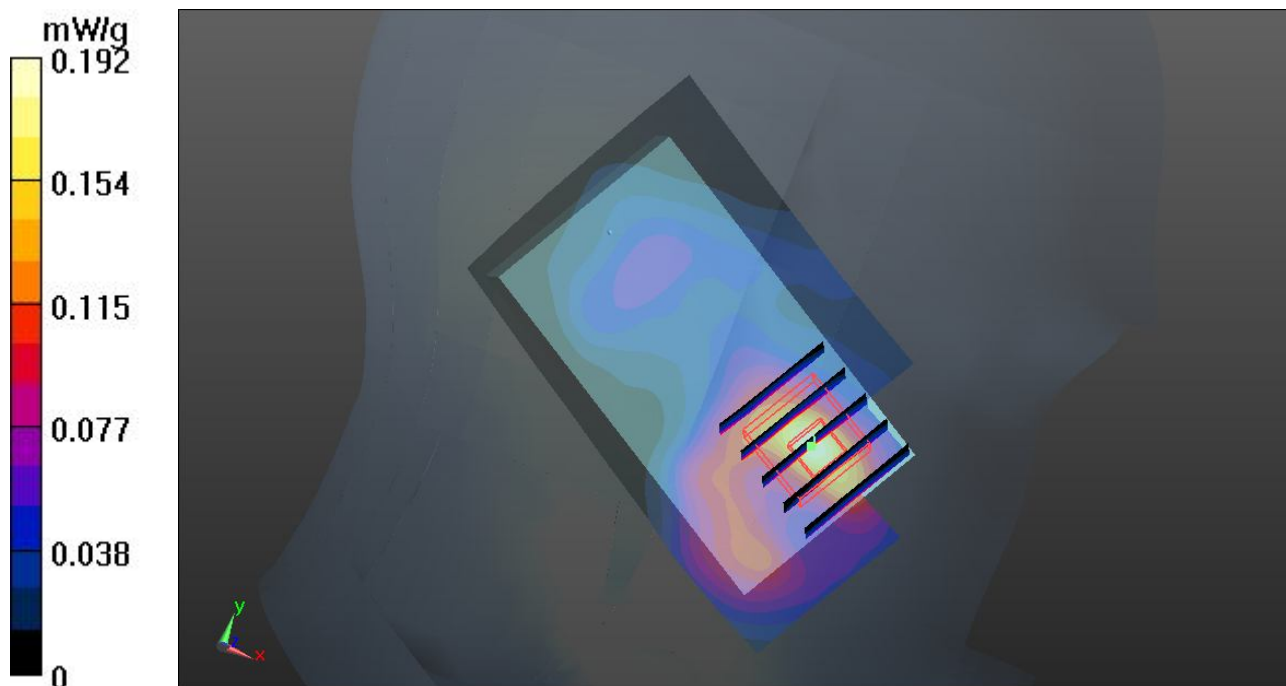
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.793 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.3140

SAR(1 g) = 0.165 mW/g; SAR(10 g) = 0.084 mW/g

Maximum value of SAR (measured) = 0.193 mW/g



17 GSM1900_Left Tilted_Ch810**DUT: 232203**

Communication System: Generic GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.436$ mho/m; $\epsilon_r =$

41.187; $\rho = 1000$ kg/m³

Ambient Temperature : 23.6 °C ; Liquid Temperature : 21.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(8.36, 8.36, 8.36); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.122 mW/g

Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.333 V/m; Power Drift = -0.0081 dB

Peak SAR (extrapolated) = 0.1560

SAR(1 g) = 0.105 mW/g; SAR(10 g) = 0.057 mW/g

Maximum value of SAR (measured) = 0.114 mW/g



18 GSM1900_Right Cheek_Ch810_without TV**DUT: 232203**

Communication System: Generic GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.436$ mho/m; $\epsilon_r =$

41.187; $\rho = 1000$ kg/m³

Ambient Temperature : 23.6 °C; Liquid Temperature : 21.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(8.36, 8.36, 8.36); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.285 mW/g

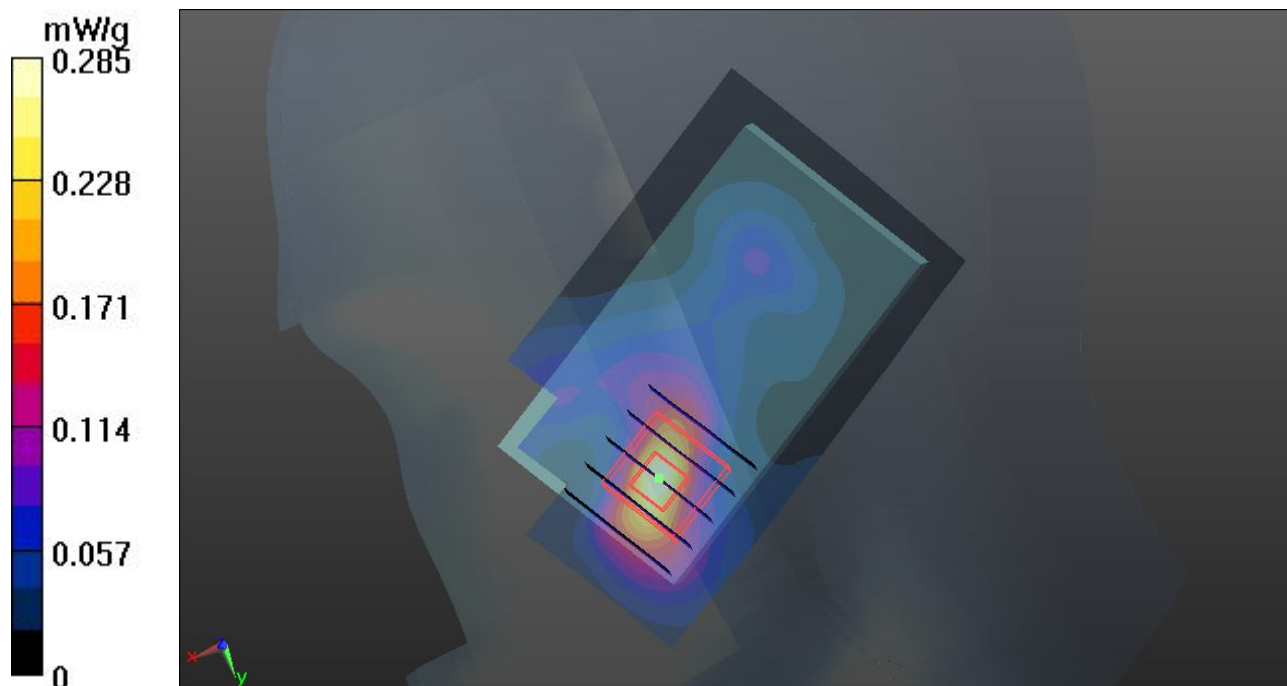
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.583 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.4930

SAR(1 g) = 0.257 mW/g; SAR(10 g) = 0.126 mW/g

Maximum value of SAR (measured) = 0.298 mW/g



18 GSM1900_Right Cheek_Ch810_without TV_2D**DUT: 232203**

Communication System: Generic GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.436$ mho/m; $\epsilon_r =$ 41.187; $\rho = 1000$ kg/m³

Ambient Temperature : 23.6 °C ; Liquid Temperature : 21.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(8.36, 8.36, 8.36); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.285 mW/g

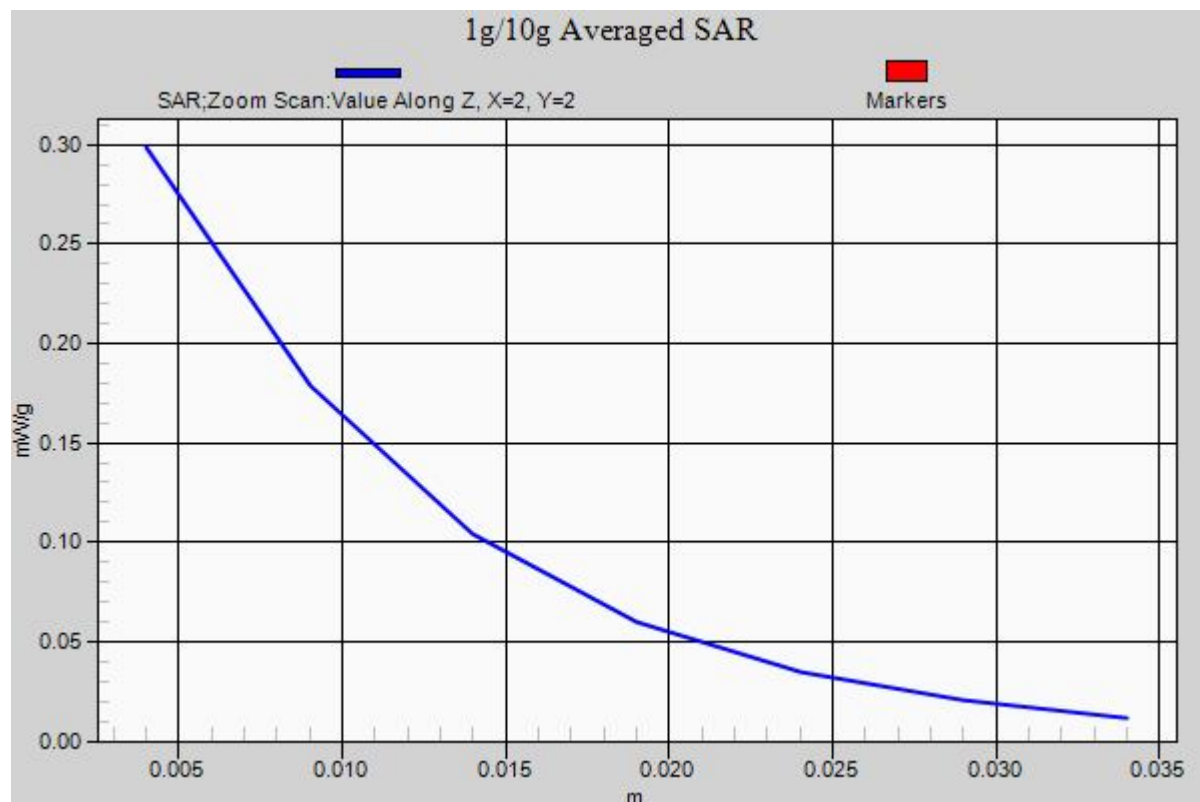
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.583 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.4930

SAR(1 g) = 0.257 mW/g; SAR(10 g) = 0.126 mW/g

Maximum value of SAR (measured) = 0.298 mW/g



22 GSM850_GPRS12_Face_1.5cm_Ch251**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: MSL_835_120330 Medium parameters used: $f = 849$ MHz; $\sigma = 0.983$ mho/m; $\epsilon_r = 55.871$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.469 mW/g

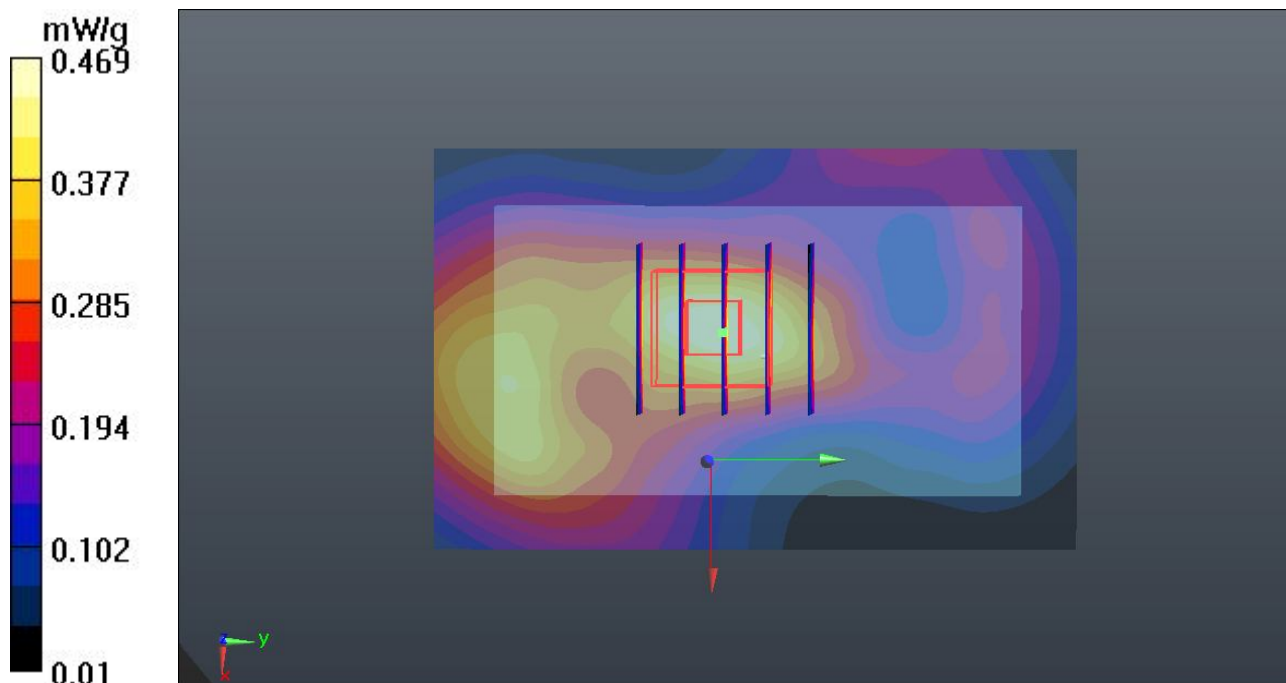
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.625 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.5340

SAR(1 g) = 0.434 mW/g; SAR(10 g) = 0.310 mW/g

Maximum value of SAR (measured) = 0.461 mW/g



23 GSM850_GPRS12_Bottom_1.5cm_Ch251**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: MSL_835_120330 Medium parameters used: $f = 849$ MHz; $\sigma = 0.983$ mho/m; $\epsilon_r = 55.871$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.840 mW/g

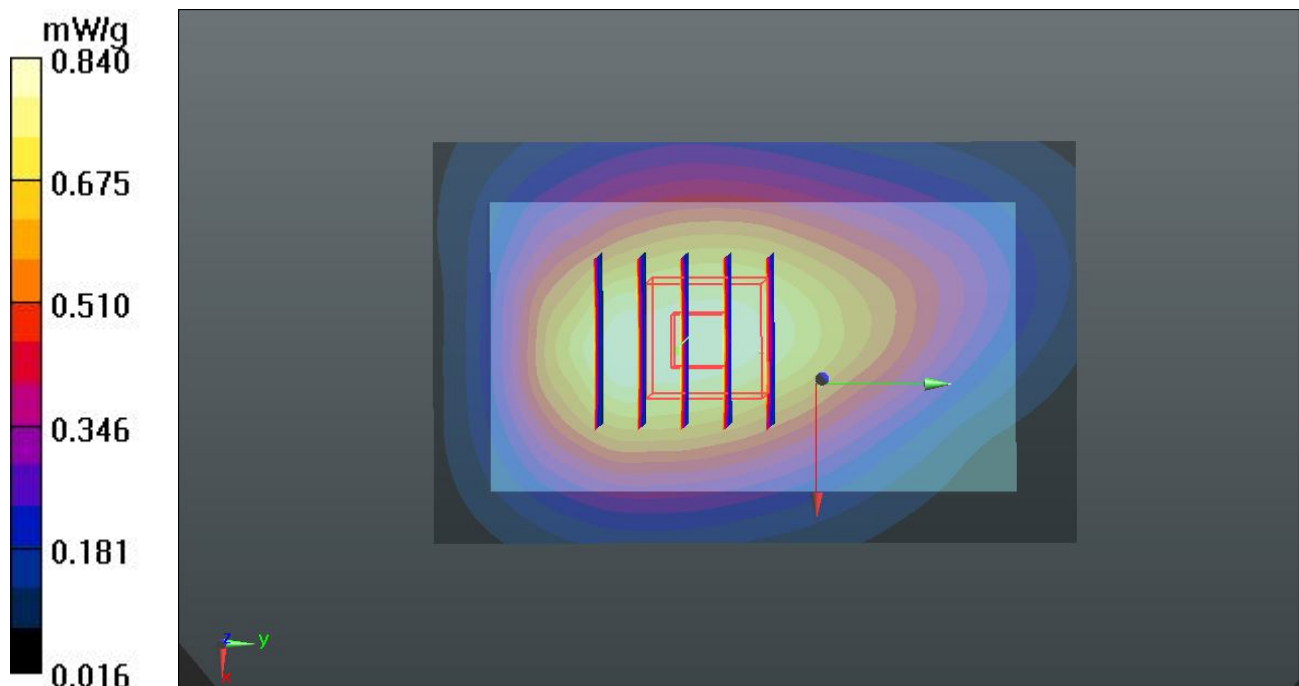
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.572 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.0130

SAR(1 g) = 0.785 mW/g; SAR(10 g) = 0.575 mW/g

Maximum value of SAR (measured) = 0.826 mW/g



23 GSM850_GPRS12_Bottom_1.5cm_Ch251_2D**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: MSL_835_120330 Medium parameters used: $f = 849$ MHz; $\sigma = 0.983$ mho/m; $\epsilon_r = 55.871$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.840 mW/g

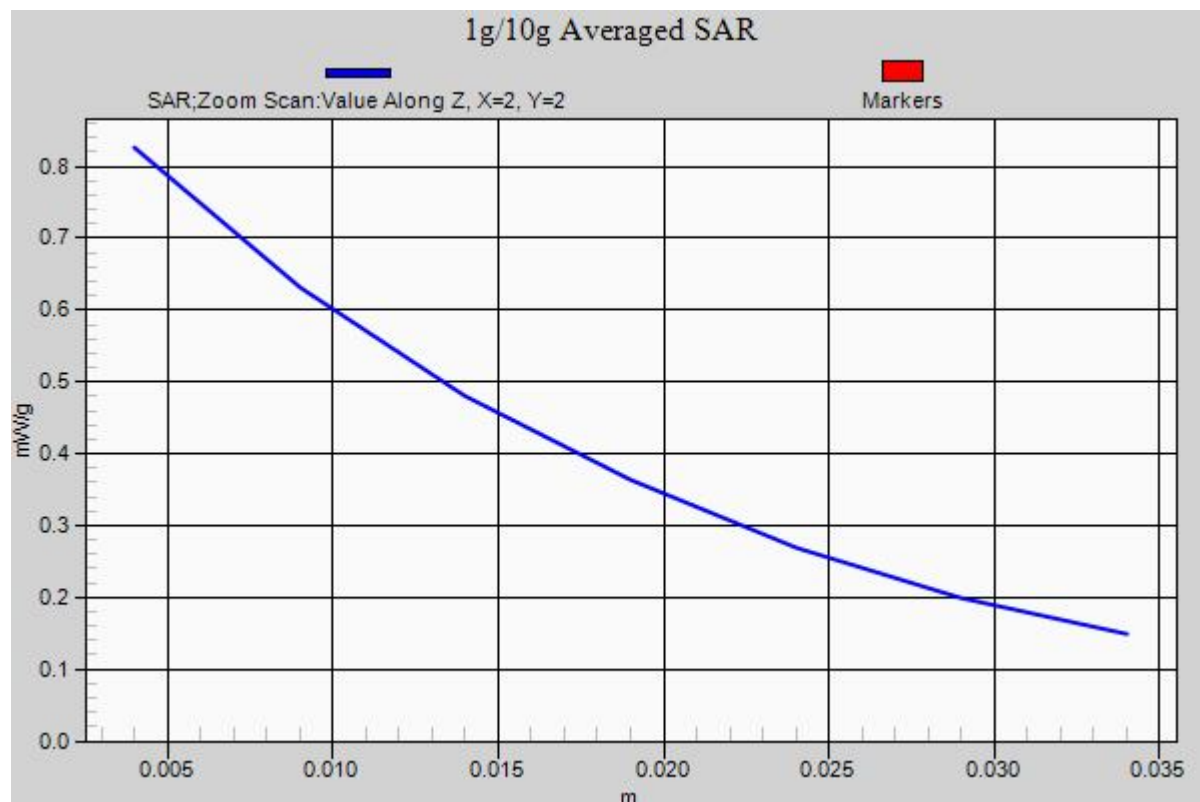
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.572 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.0130

SAR(1 g) = 0.785 mW/g; SAR(10 g) = 0.575 mW/g

Maximum value of SAR (measured) = 0.826 mW/g



24 GSM850_GPRS12_Bottom_1.5cm_Ch251 _without TV**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: MSL_835_120330 Medium parameters used: $f = 849$ MHz; $\sigma = 0.983$ mho/m; $\epsilon_r = 55.871$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(9.72, 9.72, 9.72); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch251/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.816 mW/g

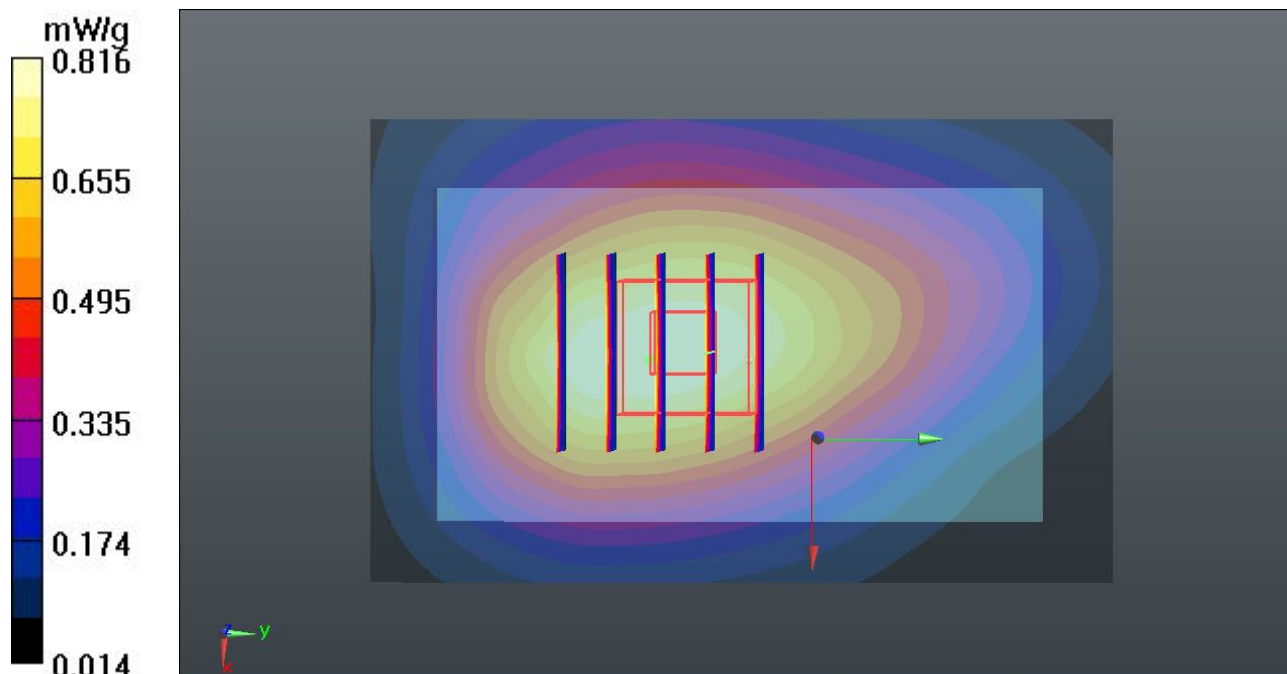
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.102 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.9760

SAR(1 g) = 0.760 mW/g; SAR(10 g) = 0.558 mW/g

Maximum value of SAR (measured) = 0.794 mW/g



19 GSM1900_GPRS12_Face_1.5cm_Ch810**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: MSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.544$ mho/m; $\epsilon_r =$

54.546; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(7.71, 7.71, 7.71); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.073 mW/g

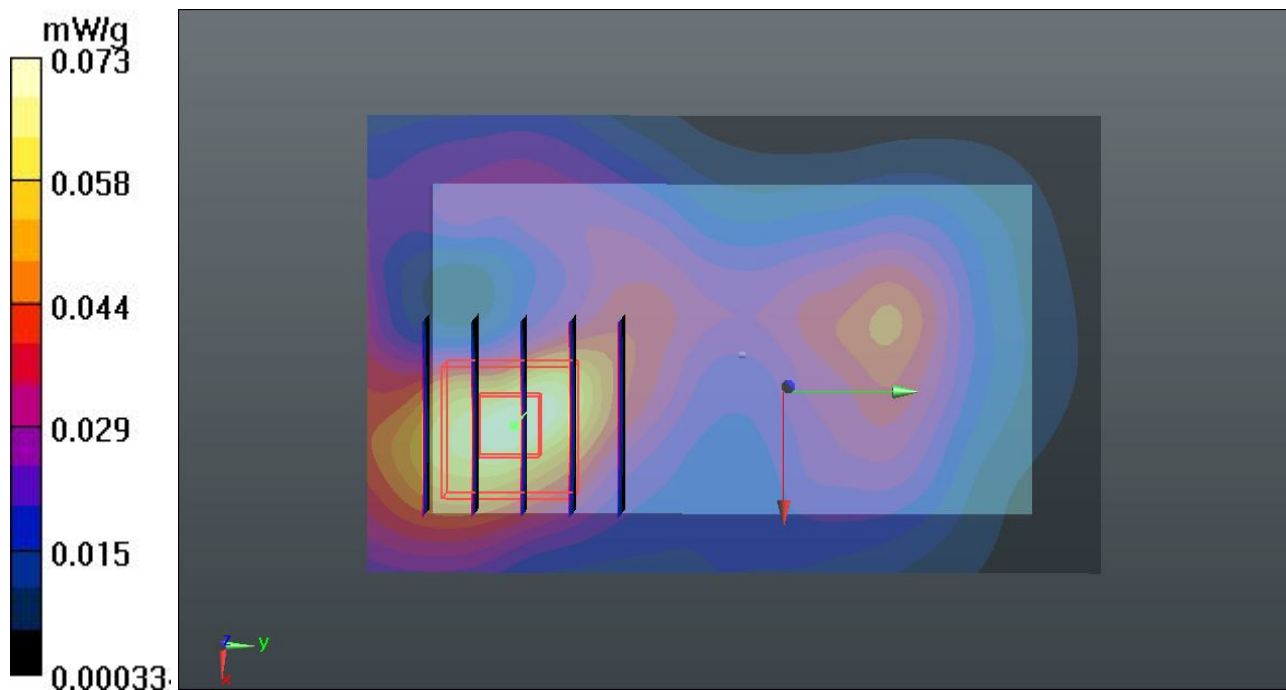
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.938 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.1260

SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.038 mW/g

Maximum value of SAR (measured) = 0.079 mW/g



20 GSM1900_GPRS12_Bottom_1.5cm_Ch810**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: MSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.544$ mho/m; $\epsilon_r =$

54.546; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 21.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(7.71, 7.71, 7.71); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.196 mW/g

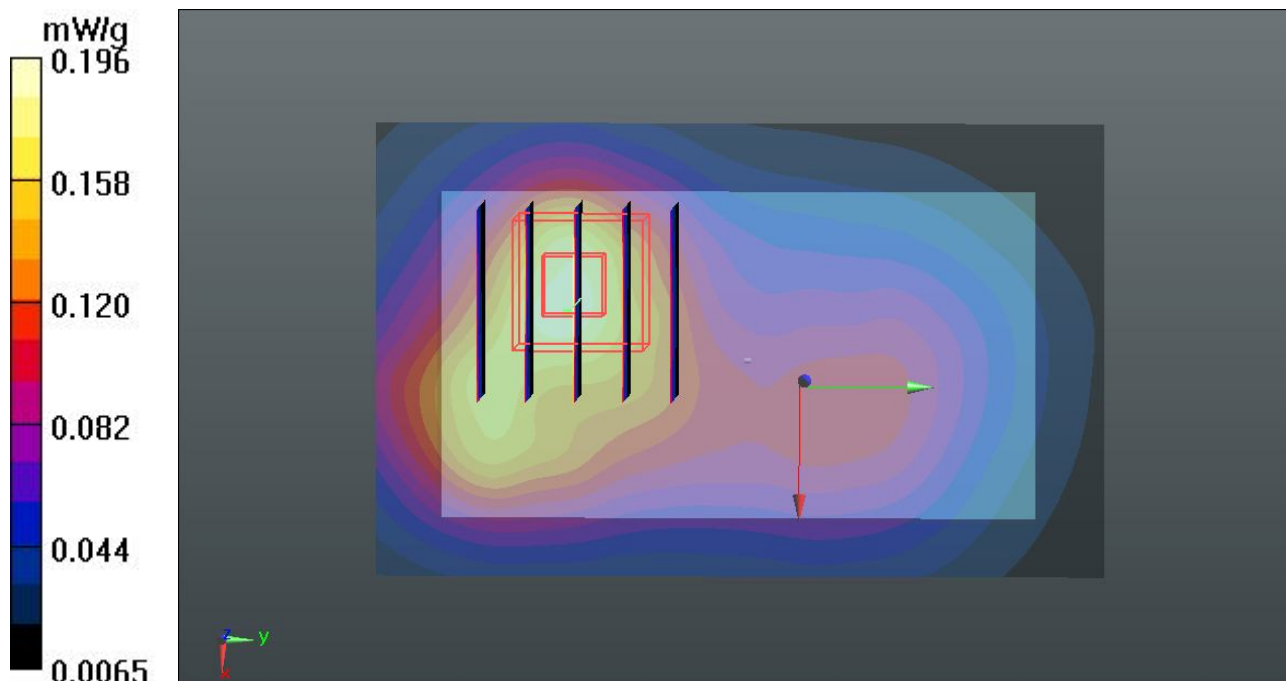
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.536 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.3350

SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.104 mW/g

Maximum value of SAR (measured) = 0.205 mW/g



21 GSM1900_GPRS12_Bottom_1.5cm_Ch810 _without TV**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: MSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.544$ mho/m; $\epsilon_r =$

54.546; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(7.71, 7.71, 7.71); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.218 mW/g

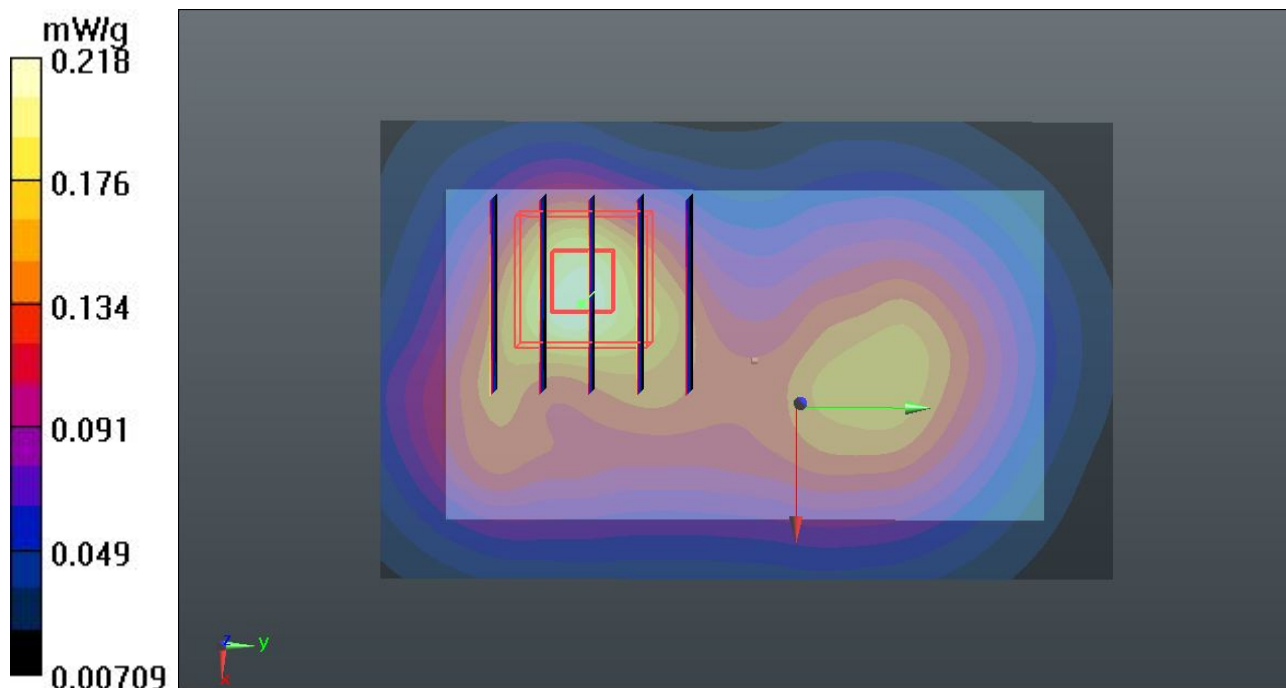
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.643 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.3800

SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.124 mW/g

Maximum value of SAR (measured) = 0.239 mW/g



21 GSM1900_GPRS12_Bottom_1.5cm_Ch810 _without TV_2D**DUT: 232203**

Communication System: GPRS/EDGE12; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: MSL_1900_120329 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.544$ mho/m; $\epsilon_r =$

54.546; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 21.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3819; ConvF(7.71, 7.71, 7.71); Calibrated: 16.11.2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 10.11.2011
- Phantom: SAM2; Type: QD000P40CD; Serial: TP:1671
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Ch810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.218 mW/g

Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.643 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.3800

SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.124 mW/g

Maximum value of SAR (measured) = 0.239 mW/g

