



FCC SAR Test Report

APPLICANT : Motorola Mobility Inc.
EQUIPMENT : Quad-Band GSM/GPRS/EDGE (downlink only) and Dual-Band WCDMA Mobile Phone
BRAND NAME : Motorola
MODEL NAME : WX306
TYPE NAME : M0C42
FCC ID : IHDT56MZ3
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 Aug. 12, 2011 and completely tested on Aug. 12, 2011. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai / Manager



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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Motorola Mobility Inc. Quad-Band GSM/GPRS/EDGE (downlink only) and Dual-Band WCDMA Mobile Phone Motorola WX306 M0C42** are as follows (with expanded uncertainty 21.4 % for 300 MHz to 3 GHz).

Band	Position	SAR _{1g} (W/kg)
GSM850	Head	0.749
	Body (1.5 cm)	0.557
GSM1900	Head	0.416
	Body (1.5 cm)	0.259
WCDMA Band V	Head	1.25
	Body (1.5 cm)	0.563
WCDMA Band II	Head	1.35
	Body (1.5 cm)	0.644
Bluetooth	Head	N/A
	Body (1.5 cm)	N/A

Note: BT SAR not tested due to that average power is below the FCC procedure thresholds, per KDB 447498.

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 INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

2.2 Applicant

Company Name	Motorola Mobility Inc.
Address	No. 1 Wang Jing East Road, Chao Yang District, 100102 Beijing, P. R. China

2.3 Manufacturer

Company Name	Gongqingcheng Cellon Communication Technology Co., LTD.
Address	New industrial park, GongQingCheng, Jiujiang city · Jiangxi Province, China Postal code: 332020

2.4 Application Details

Date of Receipt of Application	Aug. 12, 2011
Date of Start during the Test	Aug. 12, 2011
Date of End during the Test	Aug. 12, 2011



3 General Information

3.1 Description of Device Under Test (DUT)

Product Feature & Specification	
DUT Type	Quad-Band GSM/GPRS/EDGE (downlink only) and Dual-Band WCDMA Mobile Phone
Brand Name	Motorola
Model Name	WX306
Marketing Name	M0C42
FCC ID	IHDT56MZ3
Tx Frequency	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~ 1910 MHz WCDMA Band V : 824 MHz ~ 849 MHz WCDMA Band II : 1850 MHz ~ 1910 MHz Bluetooth : 2400 MHz ~ 2483.5 MHz
Rx Frequency	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz WCDMA Band V : 869 MHz ~ 894 MHz WCDMA Band II : 1930 MHz ~ 1990 MHz Bluetooth : 2400 MHz ~ 2483.5 MHz
Maximum Output Power to Antenna	GSM850 : 32.99 dBm GSM1900 : 30.40 dBm WCDMA Band V : 23.67 dBm WCDMA Band II : 23.42 dBm Bluetooth: 6.73 dBm
Antenna Type	WWAN : Fixed Internal Antenna Bluetooth : PIFA Antenna
HW Version	P2b
SW Version	BUNTNG3_U_08.0E.2RDS
Type of Modulation	GSM/GPRS : GMSK EDGE : 8PSK (Downlink only) WCDMA : QPSK (Uplink) Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
DUT Stage	Production Unit

Remark:

The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



3.2 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 648474 D01 v01r05
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D03 v01

3.3 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.

3.4 Test Conditions

3.4.1 Ambient Condition

Ambient Temperature	20 to 24 °C
Humidity	< 60 %

3.4.2 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.

For WWAN SAR testing, the DUT is in GSM or GPRS or WCDMA link mode.

In general, the crest factor is 8.3 for GSM and GPRS multi-slot class 8, 4 for GPRS multi-slot class 10, 2 for GPRS multi-slot class 12, and 1 for WCDMA.

Bluetooth standalone SAR is not required because the Bluetooth power (6.73 dBm) is less than 60/f.

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:

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

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

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

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

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

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

Where: ζ 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

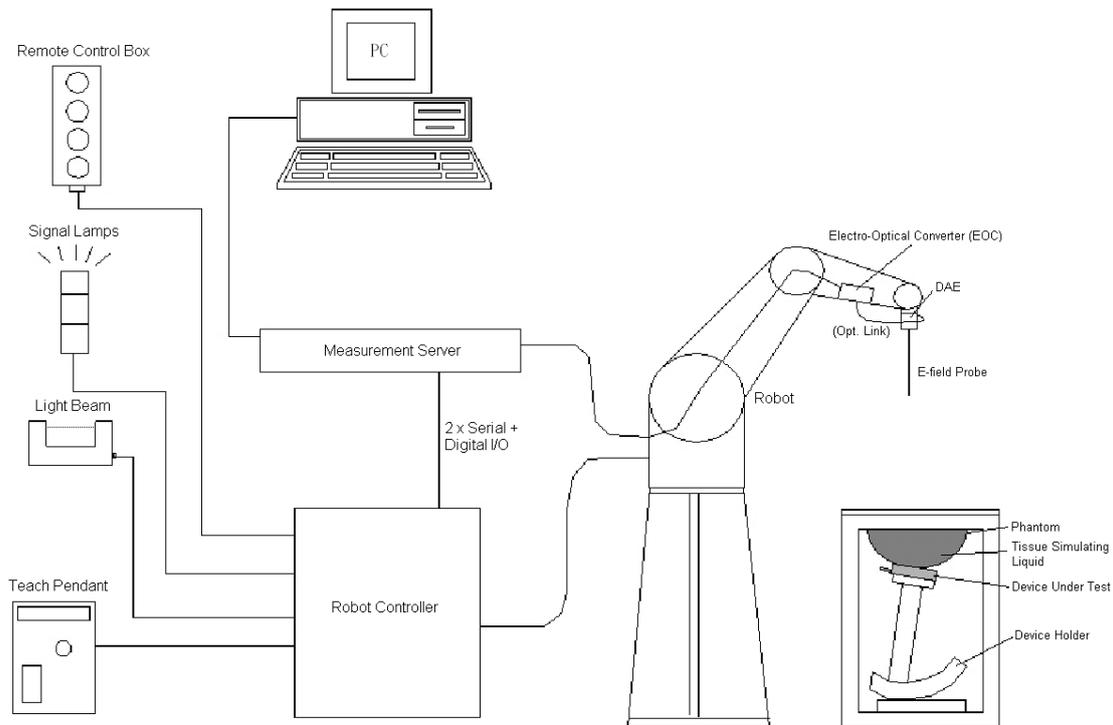


Fig 5.1 SPEAG DASY4 or DASY5 System Configurations

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

<ET3DV6 Probe >

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz to 3 GHz; Linearity: ± 0.2 dB
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 μ W/g to 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm



Fig 5.2 Photo of ET3DV6

<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 5.3 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 5.4 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; 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 5.5 Photo of DASY4



Fig 5.6 Photo of DASY5

5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, 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 5.7 Photo of Server for DASY4

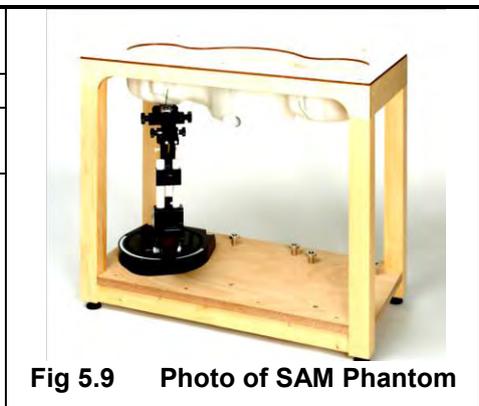


Fig 5.8 Photo of Server for DASY5

5.5 Phantom

<SAM Twin Phantom>

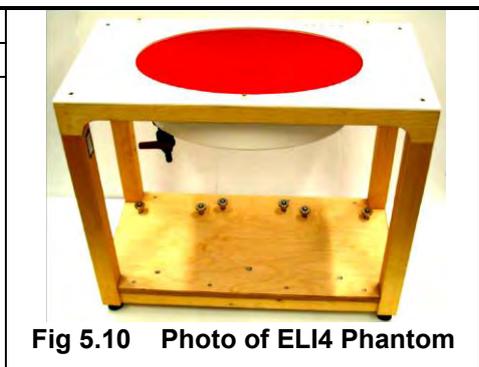
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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



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 5.11 Device Holder

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

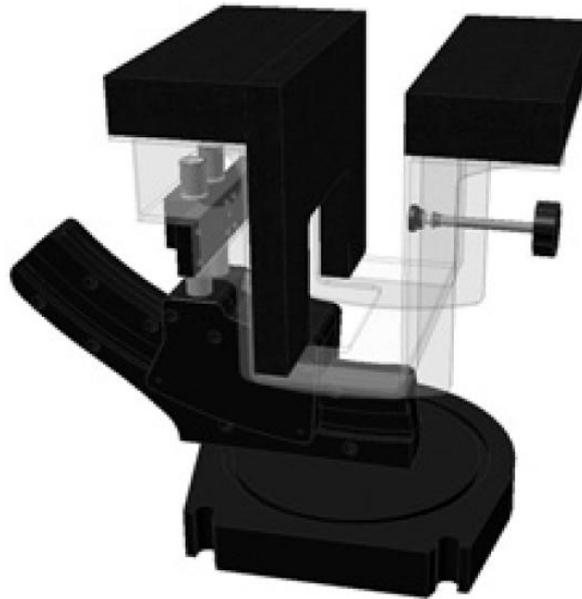


Fig 5.12 **Laptop Extension Kit**



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	Norm _i , a ₁₀ , a ₁₁ , a ₁₂
	- Conversion factor	ConvF _i
	- Diode compression point	dcp _i
Device parameters :	- Frequency	f
	- Crest factor	cf
Media parameters :	- Conductivity	ζ
	- 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
 ζ = conductivity in [mho/m] or [Siemens/m]
 ρ = equivalent tissue density in g/cm³

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	3578	Jun. 21, 2011	Jun. 20, 2012
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 22, 2010	Mar. 21, 2012
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 23, 2010	Mar. 22, 2012
SPEAG	Data Acquisition Electronics	DAE4	1279	Jun. 17, 2011	Jun. 16, 2012
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1383	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1477	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BB	1026	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46100746	Jun. 10, 2011	Jun. 09, 2012
Agilent	Wireless Communication Test Set	E5515C	MY48360820	Jan. 12, 2010	Jan. 11, 2012
Agilent	Wireless Communication Test Set	E5515C	GB46311322	Mar. 23, 2011	Mar. 22, 2013
Agilent	Wireless Communication Test Set	E5515C	MY50264370	Apr. 19, 2011	Apr. 18, 2013
Agilent	RF Vector Network Analyzer	E8358A	US40260131	May. 17, 2011	May. 16, 2012
R&S	Universal Radio Communication Tester	CMU200	114256	Feb. 08, 2010	Feb. 07, 2012
Agilent	Dielectric Probe Kit	85070D	US01440205	NCR	NCR
Agilent	Dual Directional Coupler	778D	50422	NCR	NCR
AR	Power Amplifier	5S1G4M2	0328767	NCR	NCR
R&S	Spectrum Analyzer	FSP7	101131	Jul. 29, 2011	Jul. 28, 2012
R&S	Spectrum Analyzer	FSP30	101329	May. 03, 2011	May. 02, 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.

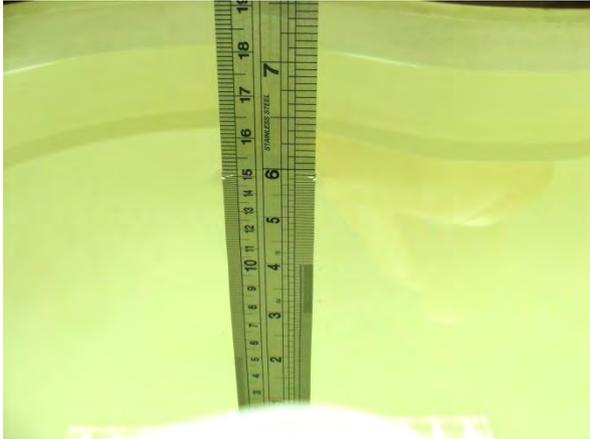


Fig 6.1 Photo of Liquid Height for Head SAR



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
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.7	0	0	0	0	45.3	1.96	39.0
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
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	67.6	0	0	0	0	32.4	2.16	52.5

Table 6.1 Recipes of Tissue Simulating Liquid

The following table gives the targets for tissue simulating liquid.

Frequency (MHz)	Liquid Type	Conductivity (σ)	$\pm 5\%$ Range	Permittivity (ϵ_r)	$\pm 5\%$ Range
835	Head	0.90	0.86 ~ 0.95	41.5	39.4 ~ 43.6
1800, 1900, 2000	Head	1.40	1.33 ~ 1.47	40.0	38.0 ~ 42.0
2450	Head	1.80	1.71 ~ 1.89	39.2	37.2 ~ 41.2
2496	Head	1.85	1.76 ~ 1.94	39.14	37.18 ~ 41.10
2593	Head	1.96	1.86 ~ 2.06	39.02	37.07 ~ 40.97
2600	Head	1.96	1.86 ~ 2.06	39.01	37.06 ~ 40.96
2690	Head	2.06	1.96 ~ 2.16	38.89	36.95 ~ 40.83
5200	Head	4.66	4.43 ~ 4.89	36.0	34.2 ~ 37.8
5500	Head	4.96	4.71 ~ 5.21	35.6	33.8 ~ 37.4
5800	Head	5.27	5.01 ~ 5.53	35.3	33.5 ~ 37.1
835	Body	0.97	0.92 ~ 1.02	55.2	52.4 ~ 58.0
1800, 1900, 2000	Body	1.52	1.44 ~ 1.60	53.3	50.6 ~ 56.0
2450	Body	1.95	1.85 ~ 2.05	52.7	50.1 ~ 55.3
2496	Body	2.02	1.92 ~ 2.12	52.64	50.01 ~ 55.27
2593	Body	2.15	2.04 ~ 2.26	52.52	49.89 ~ 55.15
2600	Body	2.16	2.05 ~ 2.27	52.51	49.88 ~ 55.14
2690	Body	2.29	2.18 ~ 2.40	52.39	49.77 ~ 55.01
5200	Body	5.30	5.04 ~ 5.57	49.0	46.6 ~ 51.5
5500	Body	5.65	5.37 ~ 5.93	48.6	46.2 ~ 51.0
5800	Body	6.00	5.70 ~ 6.30	48.2	45.8 ~ 50.6

Table 6.2 Targets 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.

Frequency (MHz)	Liquid Type	Temperature ($^{\circ}\text{C}$)	Conductivity (σ)	Permittivity (ϵ_r)	Measurement Date
835	Head	21.6	0.912	40.6	Aug. 12, 2011
835	Body	21.4	0.977	53.2	Aug. 12, 2011
1900	Head	21.2	1.43	39	Aug. 12, 2011
1900	Body	21.5	1.55	51.9	Aug. 12, 2011

Table 6.3 Measuring Results for Simulating Liquid

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/k ^(b)	1/√3	1/√6	1/√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	5.5	Normal	1	1	± 5.5 %
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					± 10.7 %
Coverage Factor for 95 %					K = 2
Expanded Uncertainty					± 21.4 %

Table 7.2 Uncertainty Budget of DASYS 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:

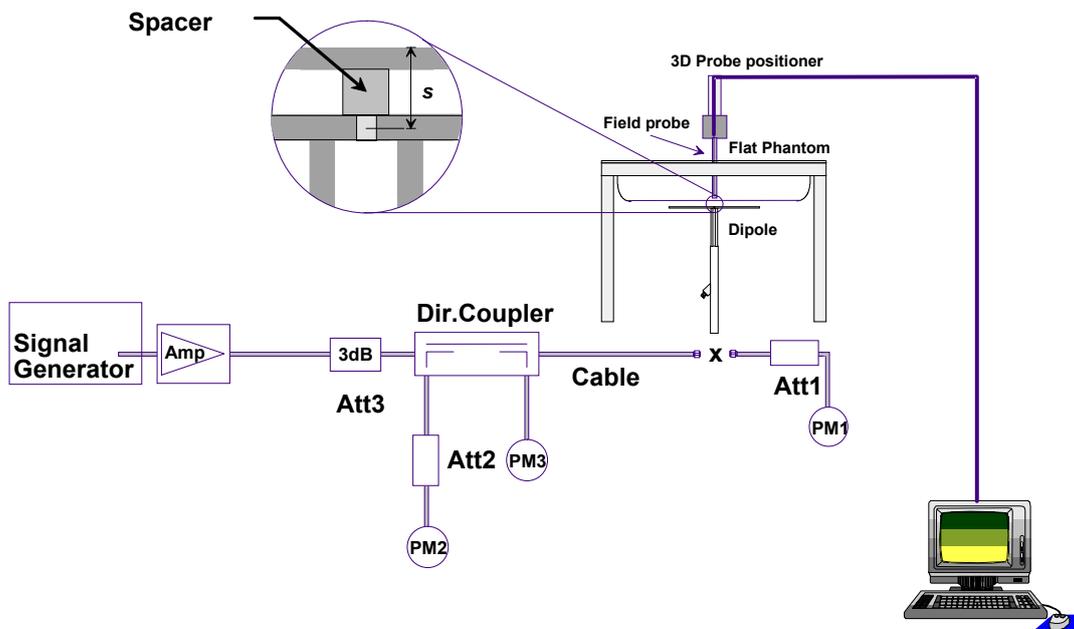


Fig 8.1 System Setup for System Evaluation

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)	Targeted SAR _{1g} (W/kg)	Measured SAR _{1g} (W/kg)	Normalized SAR _{1g} (W/kg)	Deviation (%)
Aug. 12, 2011	835	9.710	2.550	10.20	5.05
Aug. 12, 2011	835	9.820	2.390	9.56	-2.65
Aug. 12, 2011	1900	39.800	10.400	41.60	4.52
Aug. 12, 2011	1900	40.000	10.400	41.60	4.00

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, left cheek, left tilted, Front of the DUT with phantom 1.5 cm gap, Back 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.

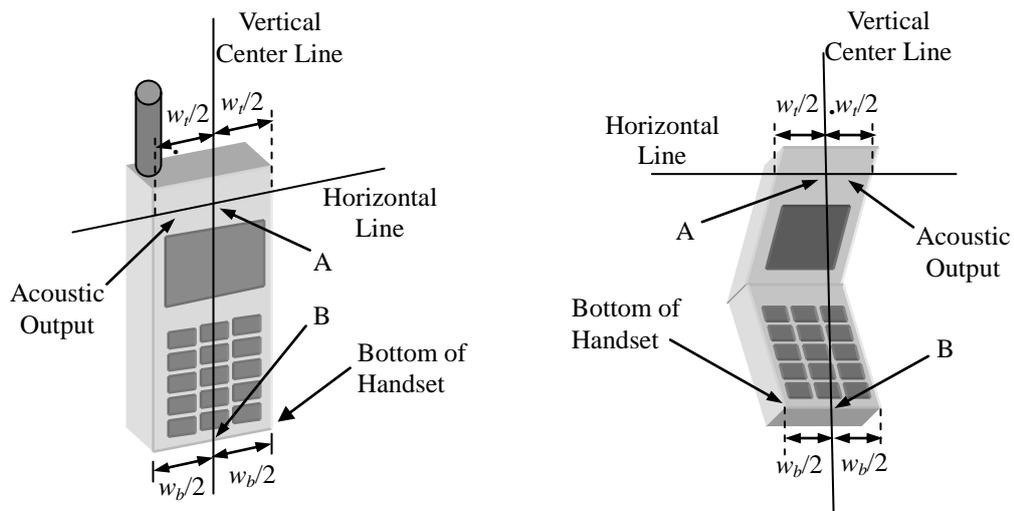


Fig 9.1 Illustration for Handset Vertical and Horizontal Reference Lines

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).

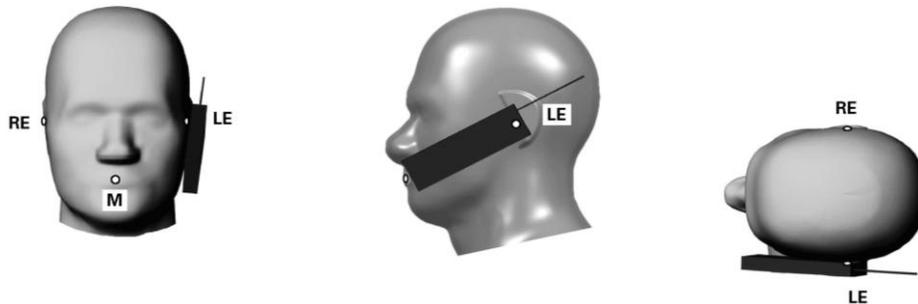


Fig 9.2 Illustration for Cheek Position

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).

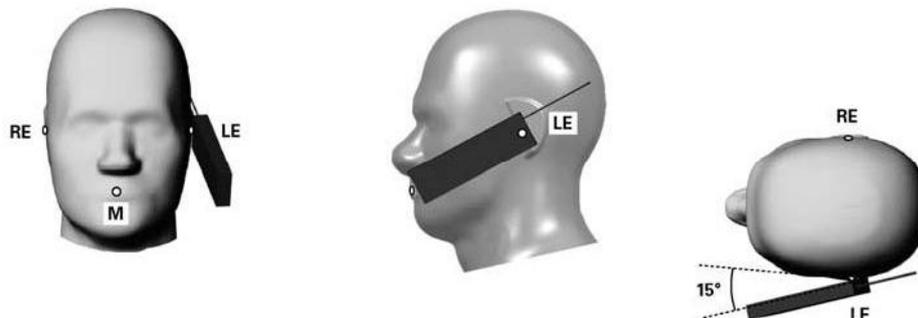


Fig 9.3 Illustration for Tilted Position

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.

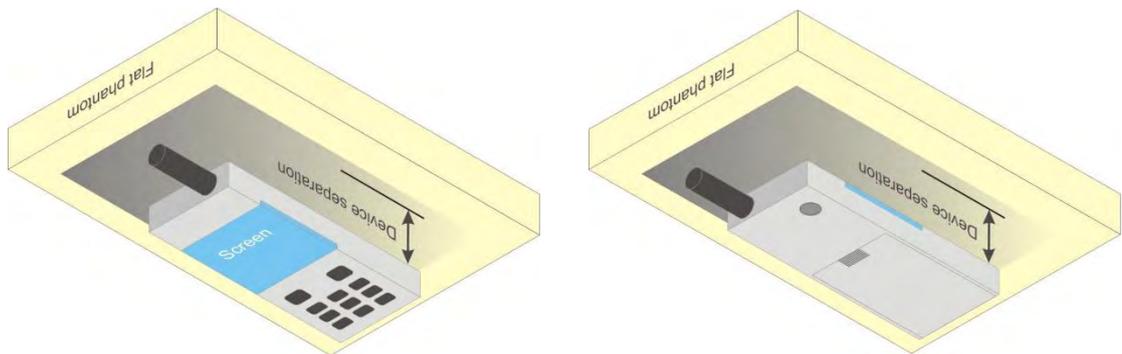


Fig 9.4 Illustration for Body Worn Position

<DUT Setup Photos>

Please refer to Appendix D for the test setup photos.

10 Measurement Procedures

The measurement procedures are as follows:

- (a) For WWAN function, link DUT with base station emulator in highest power channel
- (b) Set base station emulator to allow DUT to radiate maximum output power
- (c) Measure output power through RF cable and power meter
- (d) Place the DUT in the positions described in the last section
- (e) Set scan area, grid size and other setting on the DASY software
- (f) Taking data for the middle channel on each testing position
- (g) Find out the largest SAR result on these testing positions of each band
- (h) Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

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 Results

11.1 Conducted Power (Unit: dBm)

<GSM>

GSM/GPRS/EDGE 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)	32.94	32.88	32.87	30.38	30.40	30.32
GPRS 8 (1 Uplink) – CS1	32.99	32.93	32.92	30.36	30.39	30.34
GPRS 10 (2 Uplink) – CS1	32.12	32.06	32.04	28.87	28.92	28.91
GPRS 11 (3 Uplink) – CS1	29.37	29.23	29.40	26.44	26.45	26.58
GPRS 12 (4 Uplink) – CS1	28.40	28.36	28.39	25.29	25.42	25.20

Note: Maximum burst average power in the table above.

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
GPRS 8 (1 Uplink) – CS1	23.99	23.93	23.92	21.36	21.39	21.34
GPRS 10 (2 Uplink) – CS1	26.12	26.06	26.04	22.87	22.92	22.91
GPRS 11 (3 Uplink) – CS1	25.17	25.03	25.20	22.24	22.25	22.38
GPRS 12 (4 Uplink) – CS1	25.40	25.36	25.39	22.29	22.42	22.20

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 (4 Uplink) - 3 dB

Note:

- Following KDB 941225 D03, for Body-worn SAR testing, the DUT was set in GPRS10 for GSM850 and for GSM1900 due to its highest source-based time-average power.
- Per 2010/10 workshop, the maximum output power channel is used for SAR testing and for further SAR test reduction.

<WCDMA>

Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency (MHz)	826.4	836.4	846.6	1852.4	1880.0	1907.6
RMC 12.2K	23.67	23.30	23.33	23.34	23.42	23.37



Band	Bluetooth		
Data Rate	1Mbps		
Channel	0	39	78
Frequency	2402	2441	2480
Avg. Power	6.51	6.36	6.73

Note: Bluetooth standalone SAR is not required because the Bluetooth power (6.73dBm) is less than 60/f.



11.2 Test Records for Head SAR Test

<GSM>

Plot No.	Band	Mode	Test Position	Ch.	SAR _{1g} (W/kg)	SAR _{10g} (W/kg)
1	GSM850	GSM	Right Cheek	128	0.749	0.539
2	GSM850	GSM	Right Tilted	128	0.355	0.259
3	GSM850	GSM	Left Cheek	128	0.623	0.441
4	GSM850	GSM	Left Tilted	128	0.322	0.234
5	GSM1900	GSM	Right Cheek	661	0.368	0.227
6	GSM1900	GSM	Right Tilted	661	0.12	0.074
7	GSM1900	GSM	Left Cheek	661	0.416	0.246
8	GSM1900	GSM	Left Tilted	661	0.14	0.085

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.

<WCDMA>

Plot No.	Band	Mode	Test Position	Ch.	SAR _{1g} (W/kg)	SAR _{10g} (W/kg)
9	WCDMA Band V	RMC12.2K	Right Cheek	4132	1.13	0.809
10	WCDMA Band V	RMC12.2K	Right Tilted	4132	0.53	0.387
11	WCDMA Band V	RMC12.2K	Left Cheek	4132	0.839	0.597
12	WCDMA Band V	RMC12.2K	Left Tilted	4132	0.445	0.322
13	WCDMA Band V	RMC12.2K	Right Cheek	4182	1.11	0.796
14	WCDMA Band V	RMC12.2K	Right Cheek	4233	1.25	0.895
15	WCDMA Band V	RMC12.2K	Left Cheek	4182	0.981	0.695
16	WCDMA Band V	RMC12.2K	Left Cheek	4233	1.23	0.866
17	WCDMA Band II	RMC12.2K	Right Cheek	9400	1.18	0.723
18	WCDMA Band II	RMC12.2K	Right Tilted	9400	0.244	0.15
19	WCDMA Band II	RMC12.2K	Left Cheek	9400	1.35	0.802
20	WCDMA Band II	RMC12.2K	Left Tilted	9400	0.431	0.261
27	WCDMA Band II	RMC12.2K	Right Cheek	9262	0.547	0.339
28	WCDMA Band II	RMC12.2K	Right Cheek	9538	0.821	0.498
29	WCDMA Band II	RMC12.2K	Left Cheek	9262	0.685	0.397
30	WCDMA Band II	RMC12.2K	Left Cheek	9538	0.916	0.536



11.3 Test Records for Body SAR Test

<GSM>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Ear-phone	SAR _{1g} (W/kg)	SAR _{10g} (W/kg)
21	GSM850	GPRS10	Front	1.5	128	v	0.484	0.346
22	GSM850	GPRS10	Back	1.5	128	v	0.557	0.373
23	GSM1900	GPRS10	Front	1.5	661	v	0.184	1.11
24	GSM1900	GPRS10	Back	1.5	661	v	0.259	0.151

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.

<WCDMA>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Ear-phone	SAR _{1g} (W/kg)	SAR _{10g} (W/kg)
25	WCDMA Band V	RMC12.2K	Front	1.5	4132	v	0.296	0.21
26	WCDMA Band V	RMC12.2K	Back	1.5	4132	v	0.563	0.392
31	WCDMA Band II	RMC12.2K	Front	1.5	9400	v	0.377	0.219
32	WCDMA Band II	RMC12.2K	Back	1.5	9400	v	0.644	0.374

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.

11.4 Simultaneous Multi-band Transmission

Bluetooth output power is < 60/f, per KDB 648474, the standalone SAR is not required, and simultaneous SAR is also not required due to the distance to other antennas > 5cm.

Test Engineer : San Lin and Vic



12 References

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- [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
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- [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_110812

DUT: Dipole 835 MHz

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

Medium: HSL_850_110812 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.912 \text{ mho/m}$; $\epsilon_r = 40.6$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.6 \text{ }^\circ\text{C}$; Liquid Temperature : $21.6 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 2.72 mW/g

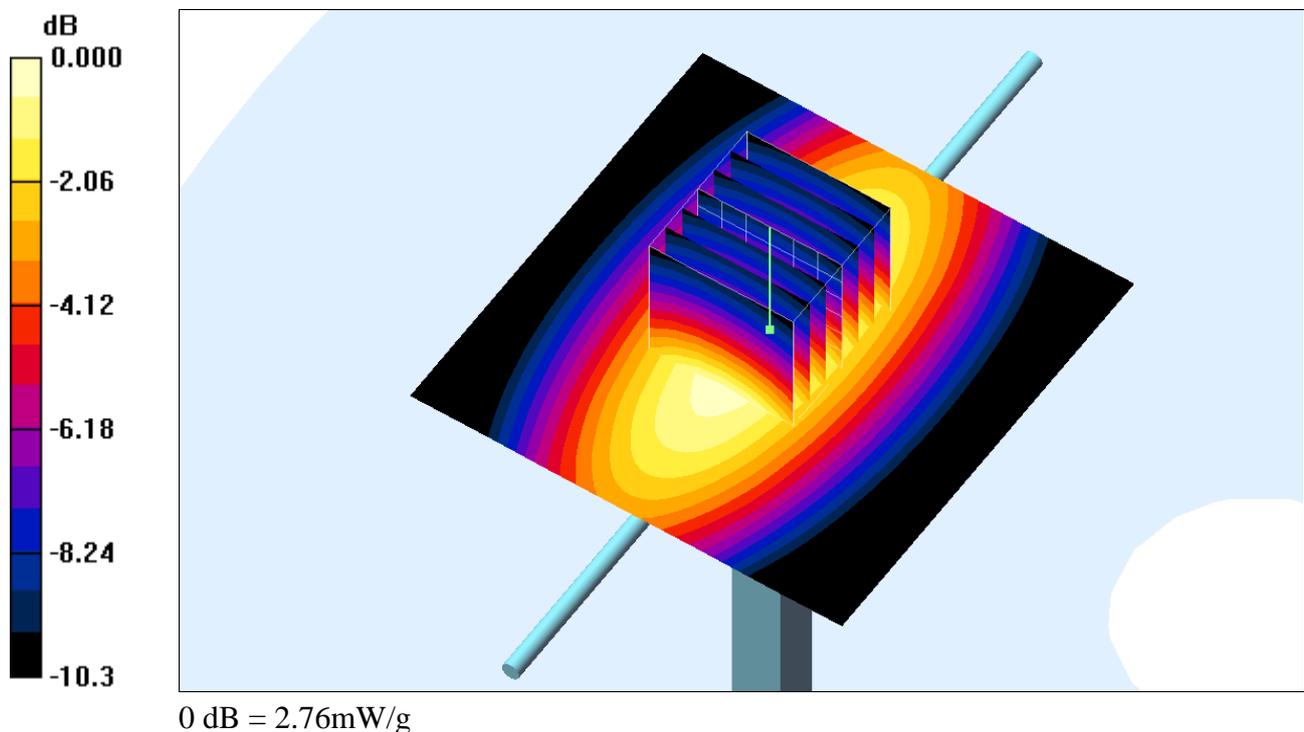
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.6 V/m ; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 3.85 W/kg

SAR(1 g) = 2.55 mW/g ; SAR(10 g) = 1.67 mW/g

Maximum value of SAR (measured) = 2.76 mW/g



System Check_Body_835MHz_110812

DUT: Dipole 835 MHz

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

Medium: MSL_850_110812 Medium parameters used: $f = 835$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.45, 8.45, 8.45); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

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

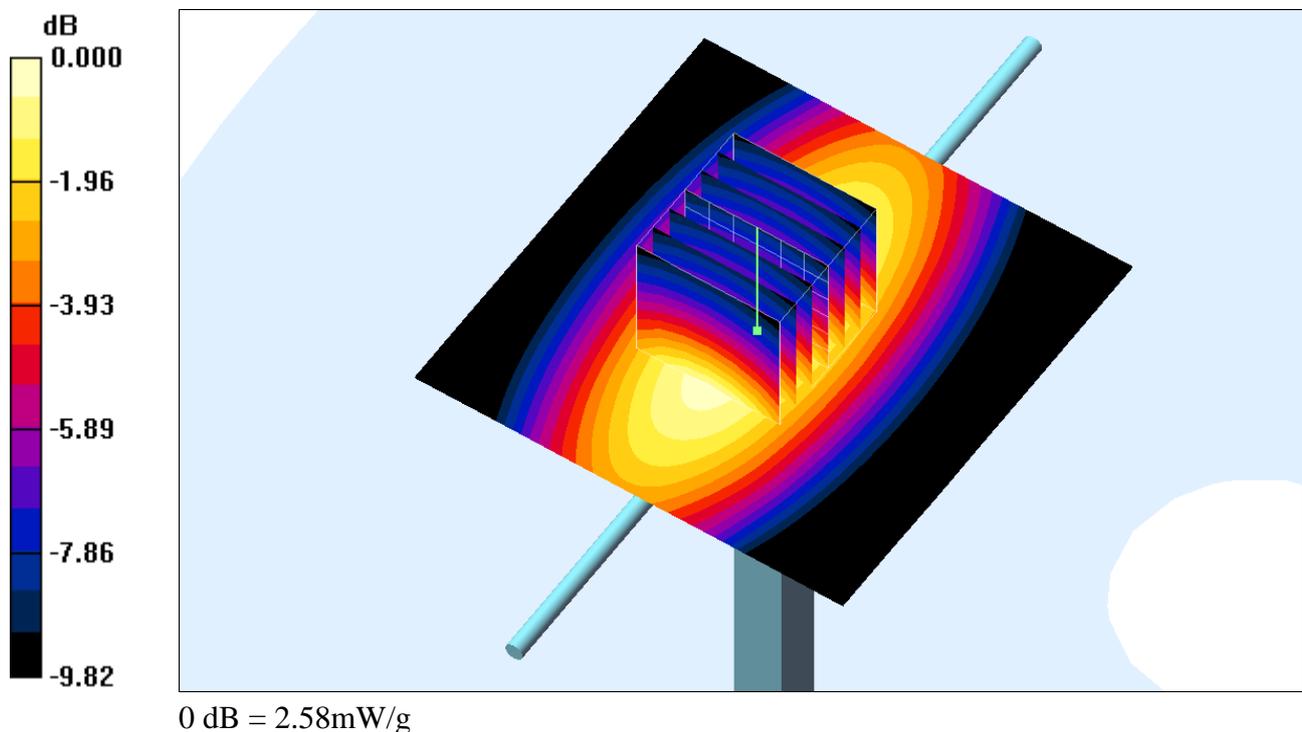
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.5 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 3.52 W/kg

SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.59 mW/g

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



System Check_Head_1900MHz_110812

DUT: Dipole 1900 MHz

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

Medium: HSL_1900_110812 Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.43 \text{ mho/m}$; $\epsilon_r = 39$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.2 \text{ }^\circ\text{C}$; Liquid Temperature : $21.2 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (91x91x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 11.5 mW/g

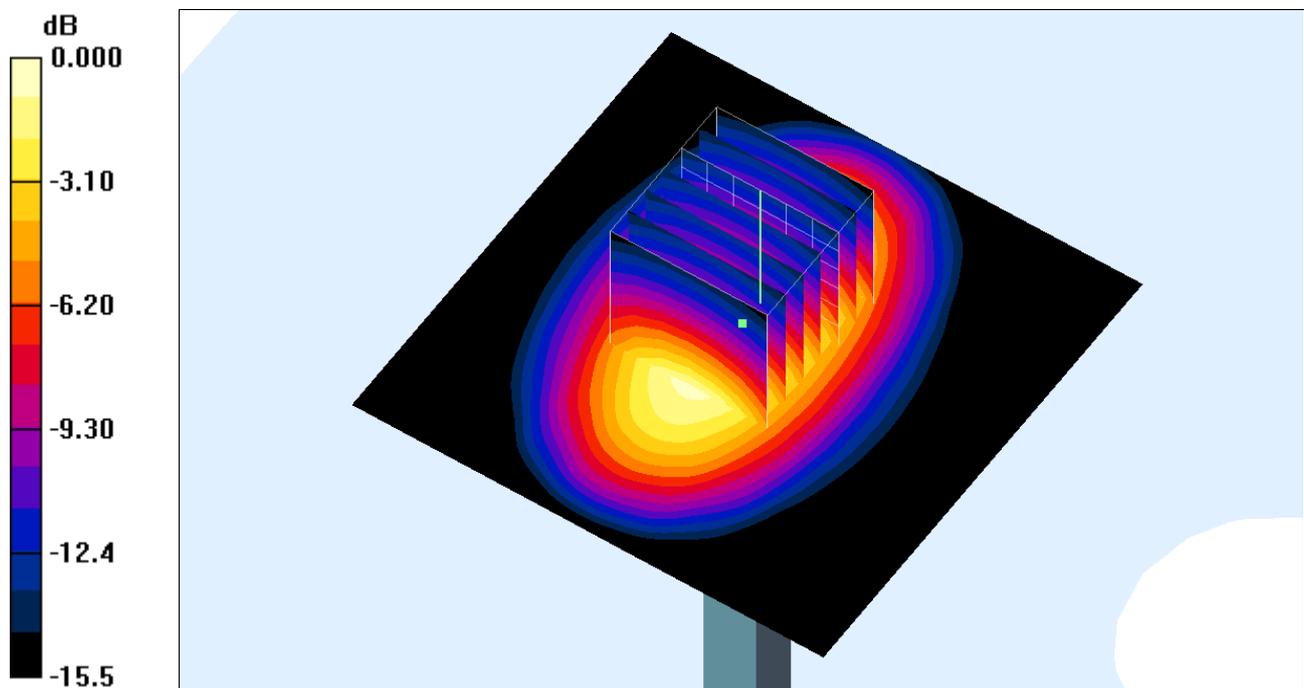
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 86.8 V/m ; Power Drift = 0.137 dB

Peak SAR (extrapolated) = 19.1 W/kg

SAR(1 g) = 10.4 mW/g ; SAR(10 g) = 5.75 mW/g

Maximum value of SAR (measured) = 11.5 mW/g



0 dB = 11.5 mW/g

System Check_Body_1900MHz_110812

DUT: Dipole 1900 MHz

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

Medium: MSL_1900_110812 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 51.9$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.68, 6.68, 6.68); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (interpolated) = 12.3 mW/g

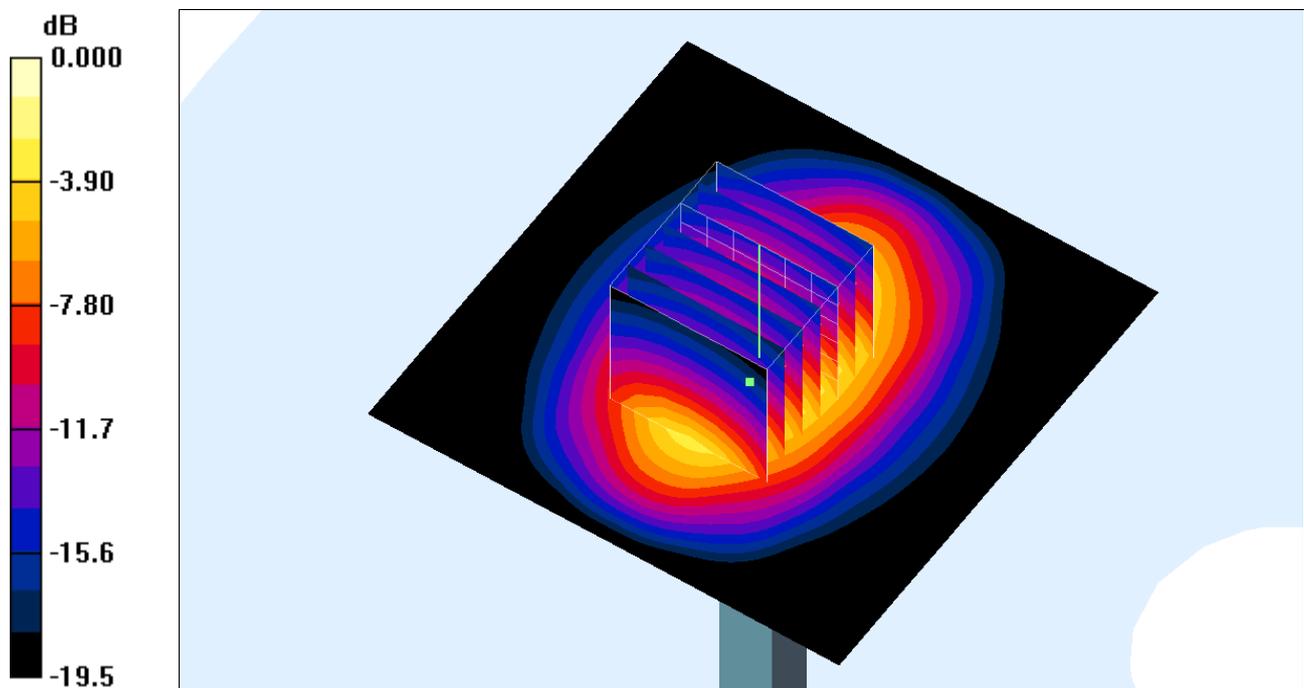
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.8 V/m; Power Drift = -0.050 dB

Peak SAR (extrapolated) = 20.1 W/kg

SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.25 mW/g

Maximum value of SAR (measured) = 11.8 mW/g



0 dB = 11.8mW/g



Appendix B. Plots of SAR Measurement

The plots are shown as follows.

#01 GSM850_Right Cheek_Ch128

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_850_110812 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.902$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.806 mW/g

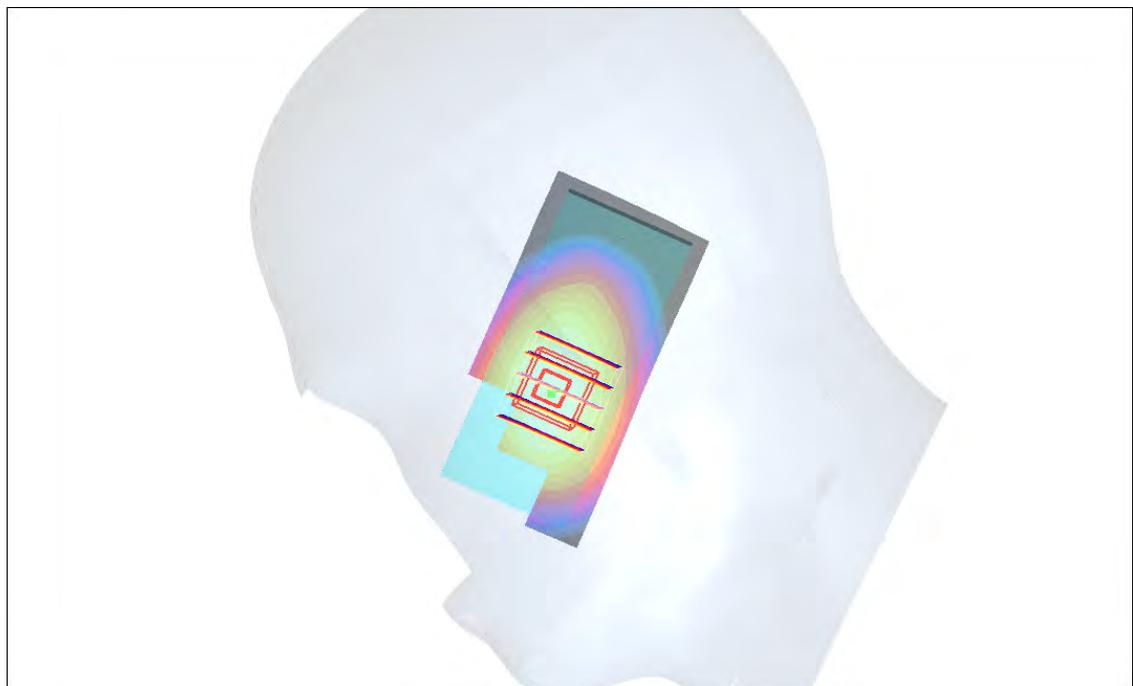
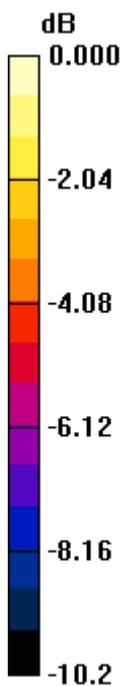
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.8 V/m; Power Drift = 0.099 dB

Peak SAR (extrapolated) = 0.969 W/kg

SAR(1 g) = 0.749 mW/g; SAR(10 g) = 0.539 mW/g

Maximum value of SAR (measured) = 0.796 mW/g



0 dB = 0.796mW/g

#01 GSM850_Right Cheek_Ch128_2D

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_850_110812 Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.902$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.806 mW/g

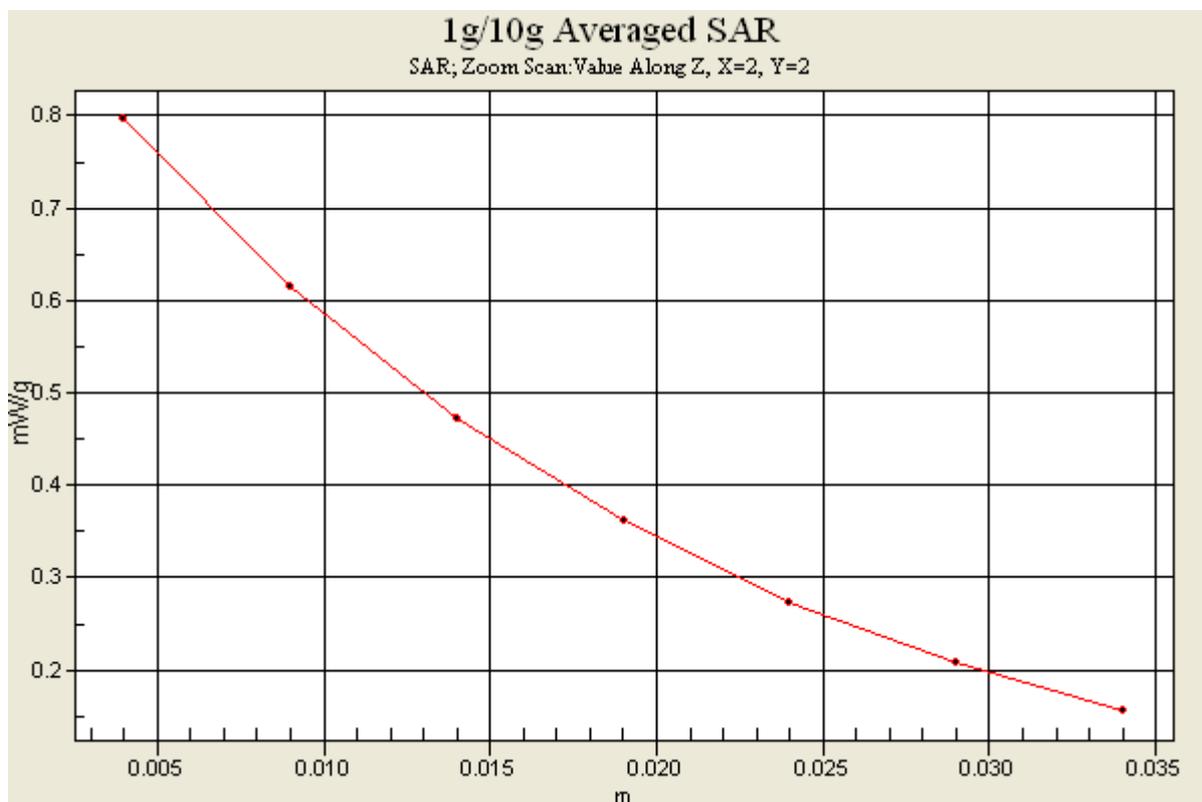
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.8 V/m; Power Drift = 0.099 dB

Peak SAR (extrapolated) = 0.969 W/kg

SAR(1 g) = 0.749 mW/g; SAR(10 g) = 0.539 mW/g

Maximum value of SAR (measured) = 0.796 mW/g



#02 GSM850_Right Tilted_Ch128

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_850_110812 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.902$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.366 mW/g

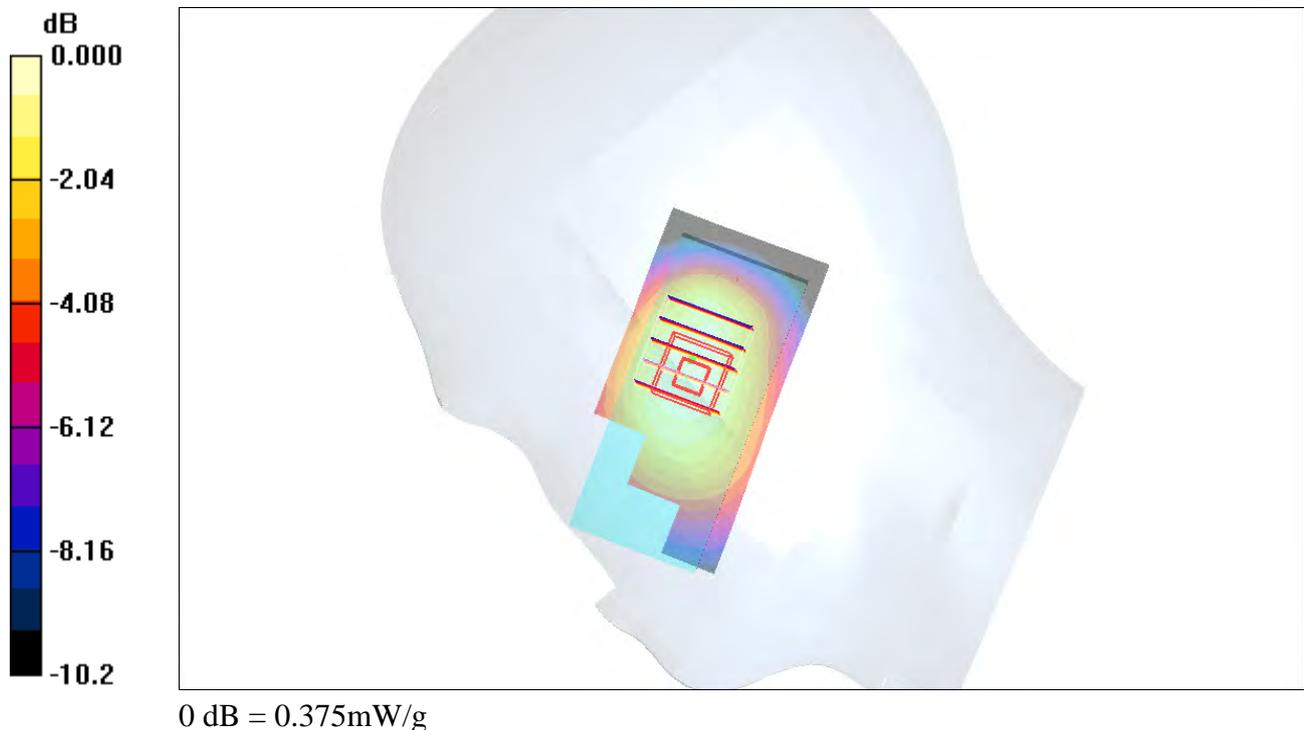
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.0 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 0.461 W/kg

SAR(1 g) = 0.355 mW/g; SAR(10 g) = 0.259 mW/g

Maximum value of SAR (measured) = 0.375 mW/g



#03 GSM850_Left Cheek_Ch128

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_850_110812 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.902$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.654 mW/g

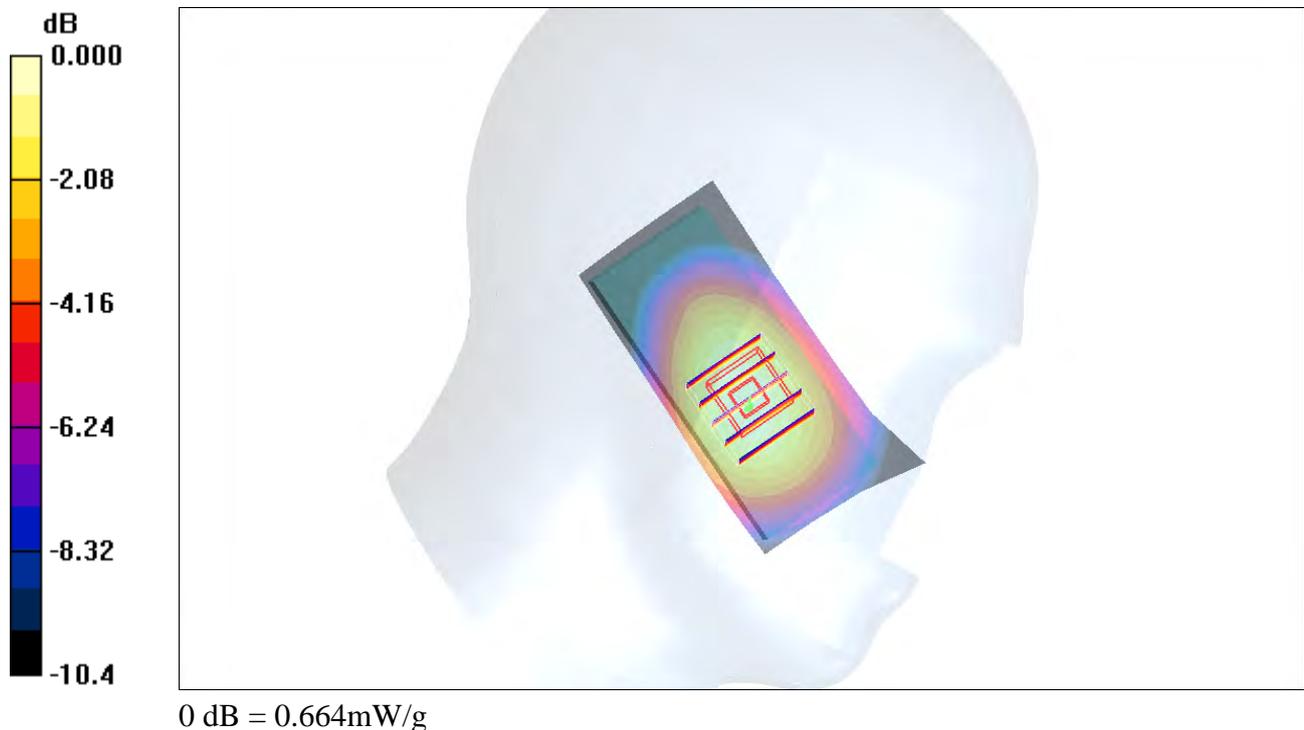
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.2 V/m; Power Drift = -0.146 dB

Peak SAR (extrapolated) = 0.828 W/kg

SAR(1 g) = 0.623 mW/g; SAR(10 g) = 0.441 mW/g

Maximum value of SAR (measured) = 0.664 mW/g



#04 GSM850_Left Tilted_Ch128

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL_850_110812 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.902$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.331 mW/g

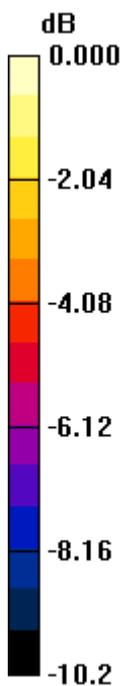
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.5 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 0.425 W/kg

SAR(1 g) = 0.322 mW/g; SAR(10 g) = 0.234 mW/g

Maximum value of SAR (measured) = 0.336 mW/g



0 dB = 0.336mW/g

#05 GSM1900_Right Cheek_Ch661

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_110812 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.41 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.2 \text{ }^\circ\text{C}$; Liquid Temperature : $21.2 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.429 mW/g

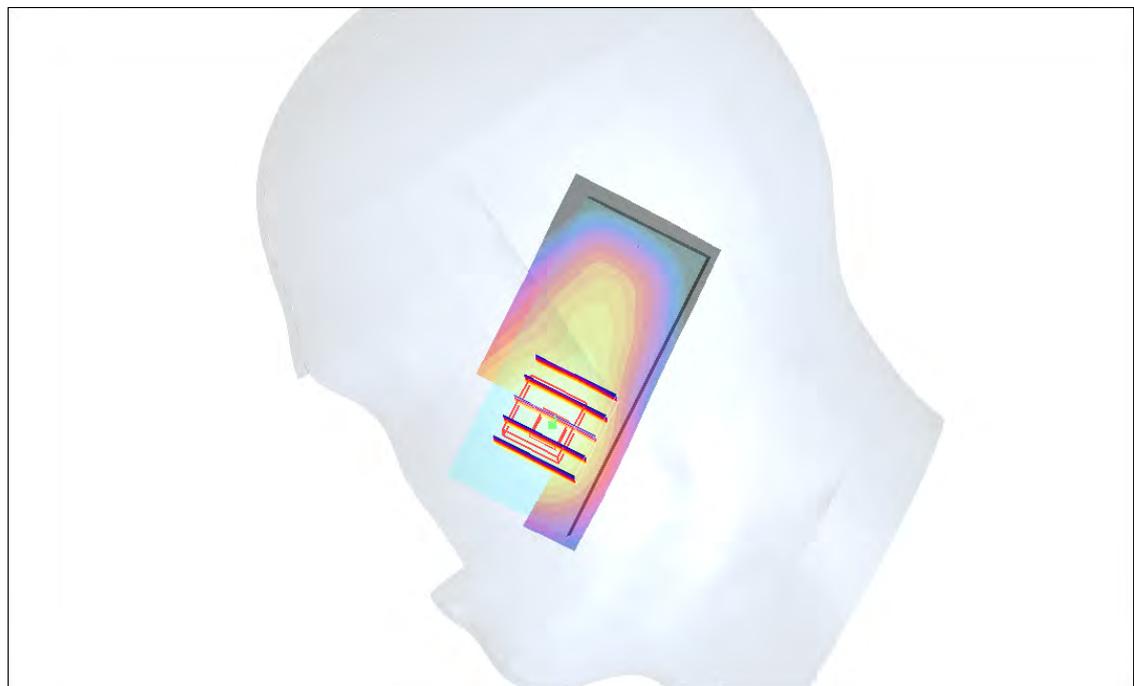
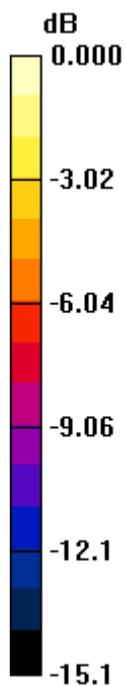
Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 5.93 V/m ; Power Drift = 0.108 dB

Peak SAR (extrapolated) = 0.565 W/kg

SAR(1 g) = 0.368 mW/g ; SAR(10 g) = 0.227 mW/g

Maximum value of SAR (measured) = 0.393 mW/g



0 dB = 0.393mW/g

#06 GSM1900_Right Tilted_Ch661

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_110812 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.41 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.2 \text{ }^\circ\text{C}$; Liquid Temperature : $21.2 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.150 mW/g

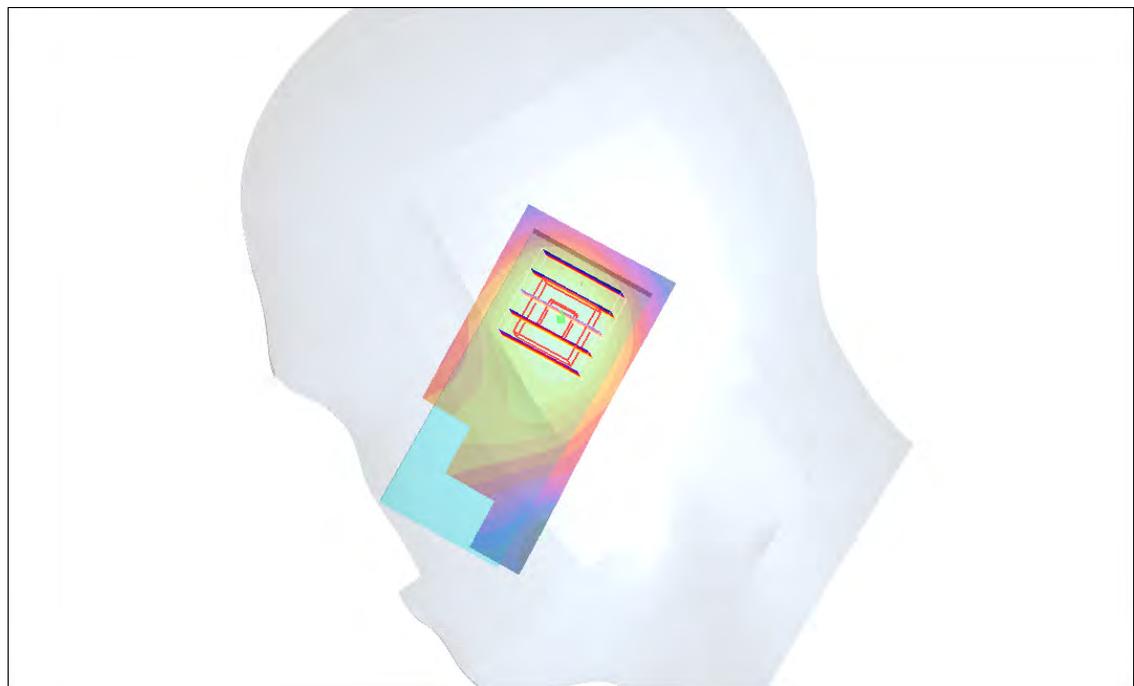
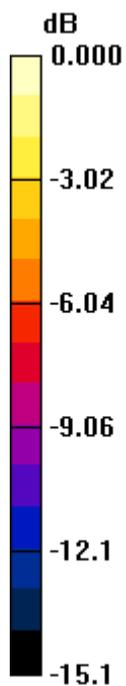
Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.59 V/m ; Power Drift = -0.031 dB

Peak SAR (extrapolated) = 0.179 W/kg

SAR(1 g) = 0.120 mW/g ; SAR(10 g) = 0.074 mW/g

Maximum value of SAR (measured) = 0.128 mW/g



0 dB = 0.128mW/g

#07 GSM1900_Left Cheek_Ch661

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.470 mW/g

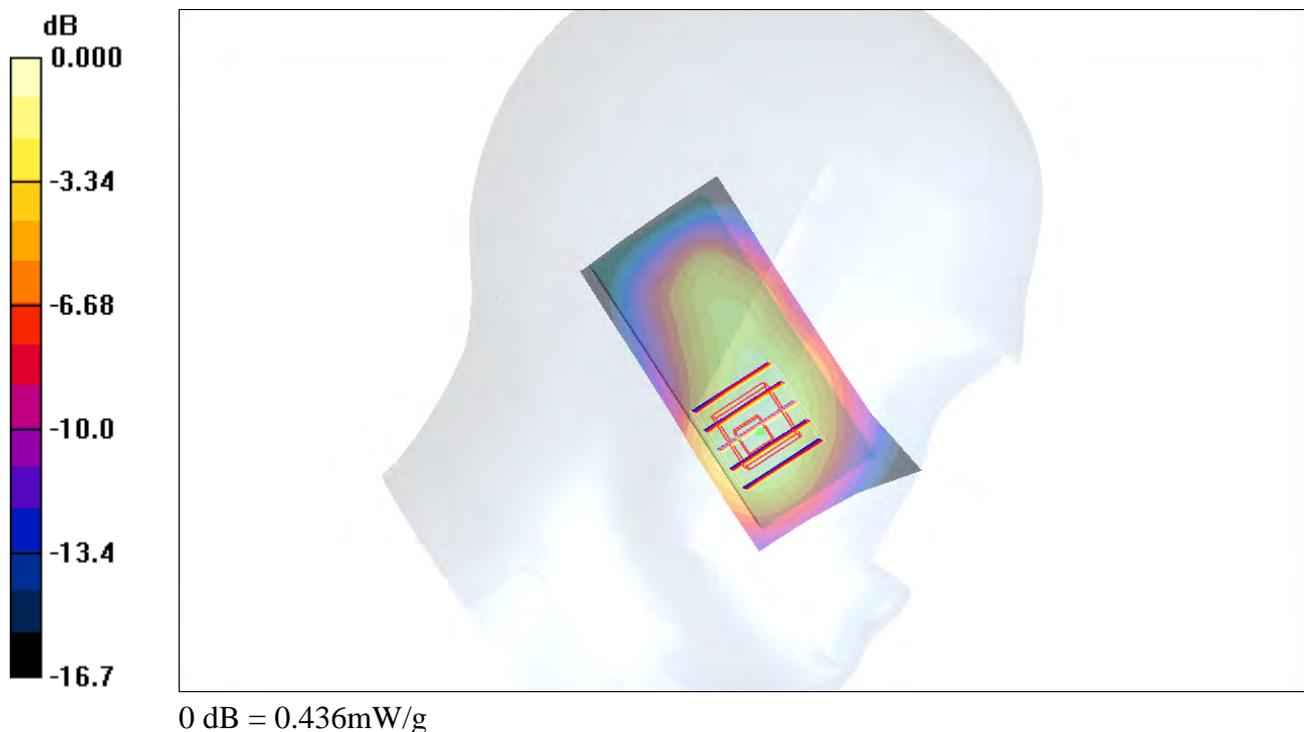
Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.51 V/m; Power Drift = -0.016 dB

Peak SAR (extrapolated) = 0.682 W/kg

SAR(1 g) = 0.416 mW/g; SAR(10 g) = 0.246 mW/g

Maximum value of SAR (measured) = 0.436 mW/g



#07 GSM1900_Left Cheek_Ch661_2D

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.470 mW/g

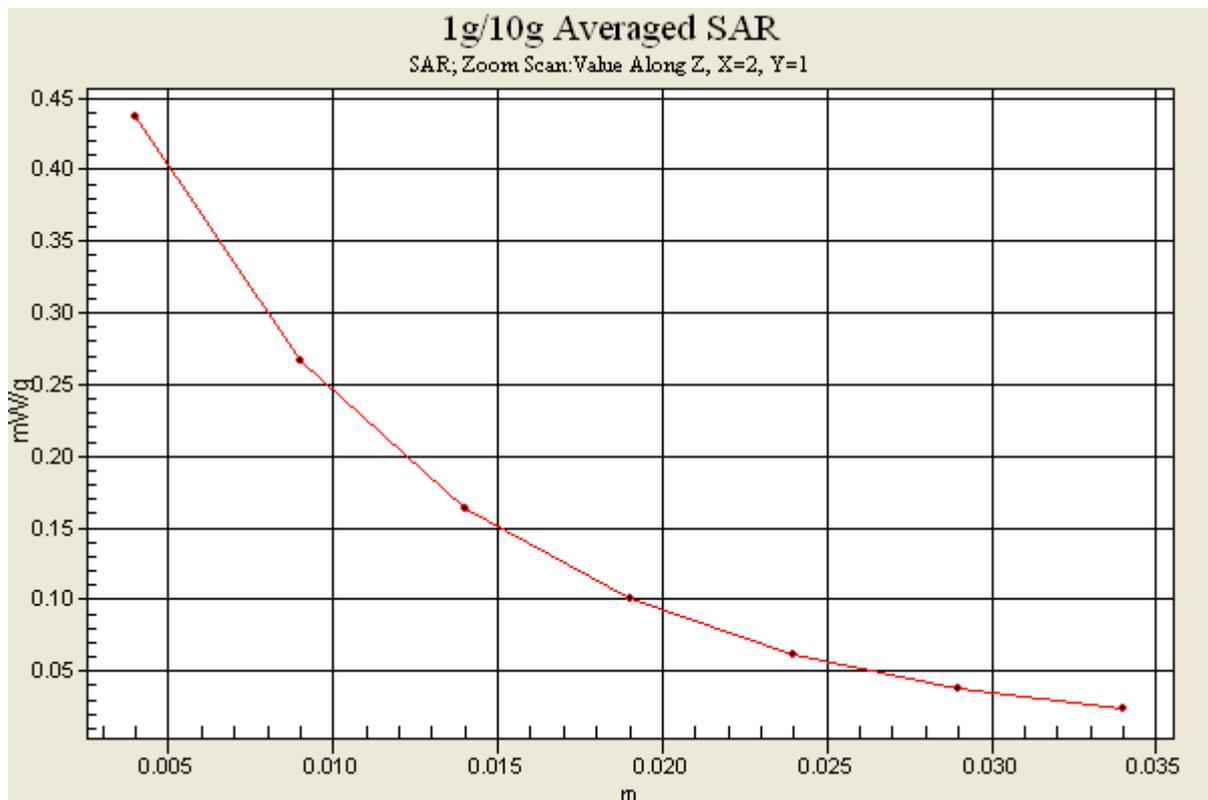
Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.51 V/m; Power Drift = -0.016 dB

Peak SAR (extrapolated) = 0.682 W/kg

SAR(1 g) = 0.416 mW/g; SAR(10 g) = 0.246 mW/g

Maximum value of SAR (measured) = 0.436 mW/g



#08 GSM1900_Left Tilted_Ch661

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.173 mW/g

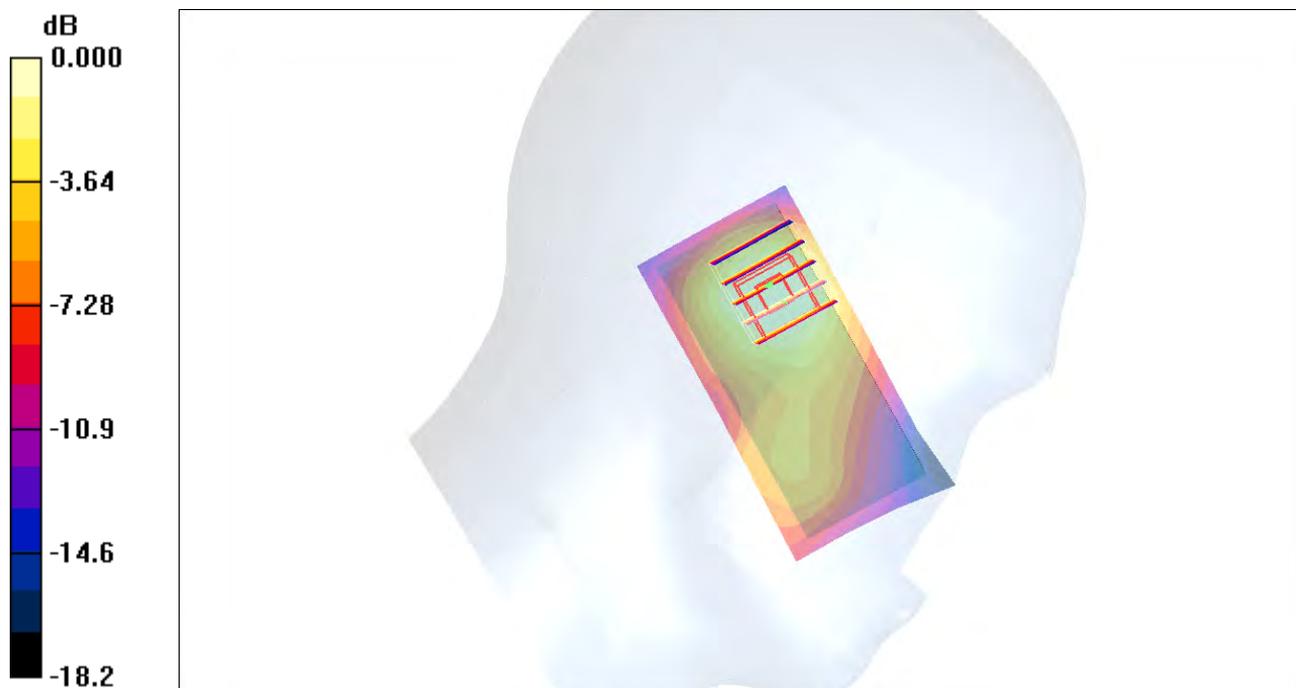
Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.70 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 0.218 W/kg

SAR(1 g) = 0.140 mW/g; SAR(10 g) = 0.085 mW/g

Maximum value of SAR (measured) = 0.149 mW/g



0 dB = 0.149mW/g

#09 WCDMA V_RMC12.2K_Right Cheek_Ch4132

DUT: 170737-01

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4132/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.22 mW/g

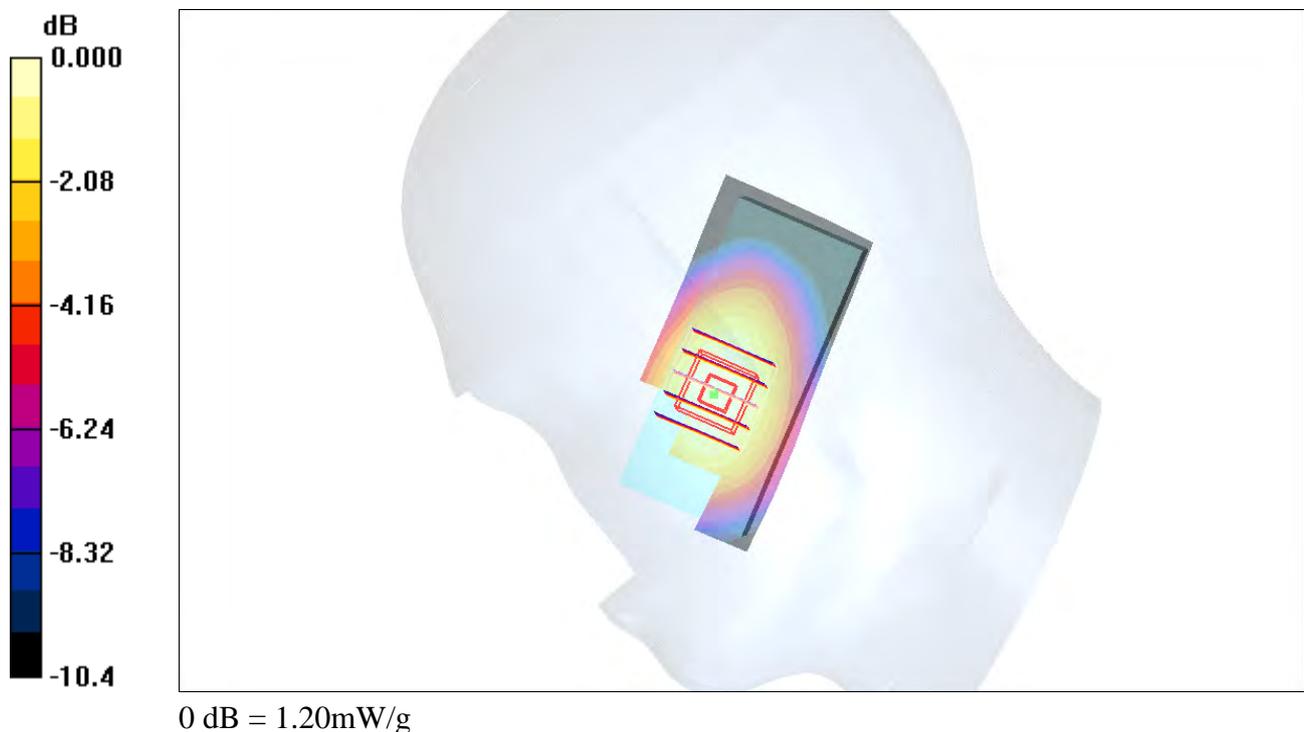
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.2 V/m; Power Drift = 0.145 dB

Peak SAR (extrapolated) = 1.46 W/kg

SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.809 mW/g

Maximum value of SAR (measured) = 1.20 mW/g



#10 WCDMA V_RMC12.2K_Right Tilted_Ch4132

DUT: 170737-01

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4132/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.547 mW/g

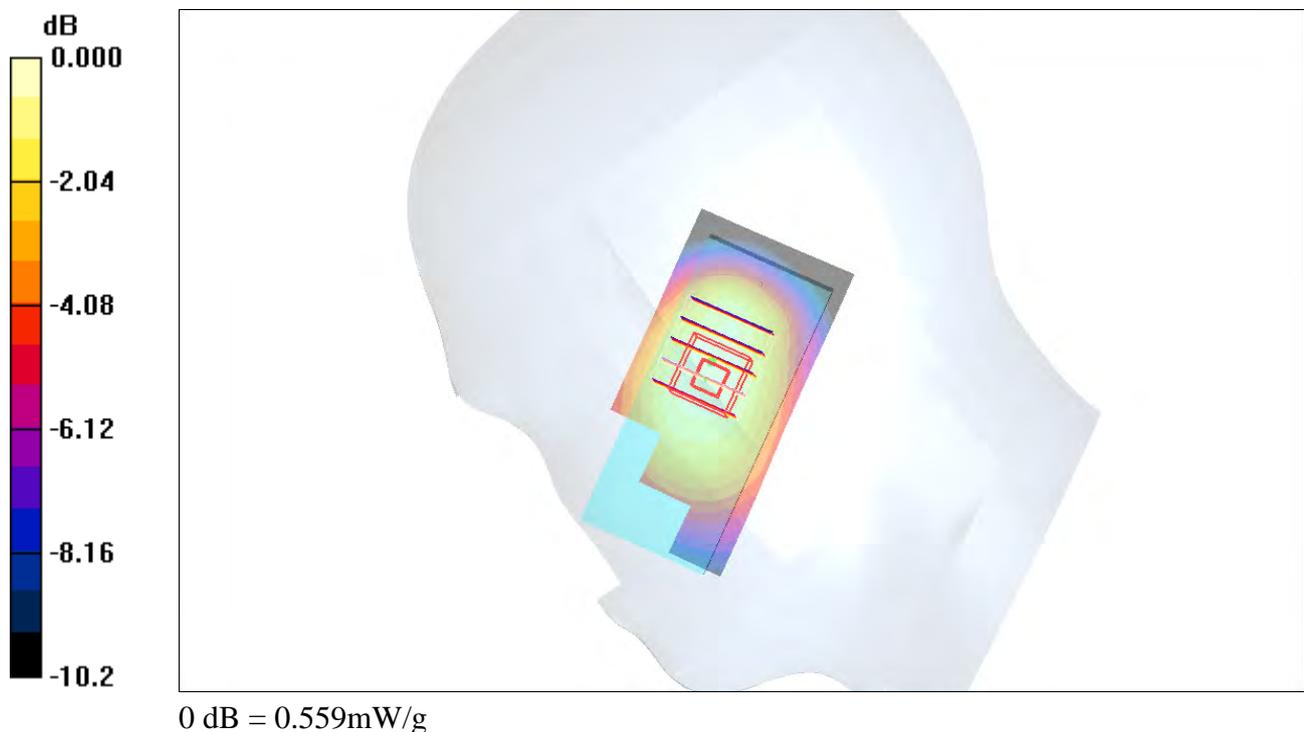
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.0 V/m; Power Drift = 0.042 dB

Peak SAR (extrapolated) = 0.694 W/kg

SAR(1 g) = 0.530 mW/g; SAR(10 g) = 0.387 mW/g

Maximum value of SAR (measured) = 0.559 mW/g



#11 WCDMA V_RMC12.2K_Left Cheek_Ch4132

DUT: 170737-01

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4132/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.884 mW/g

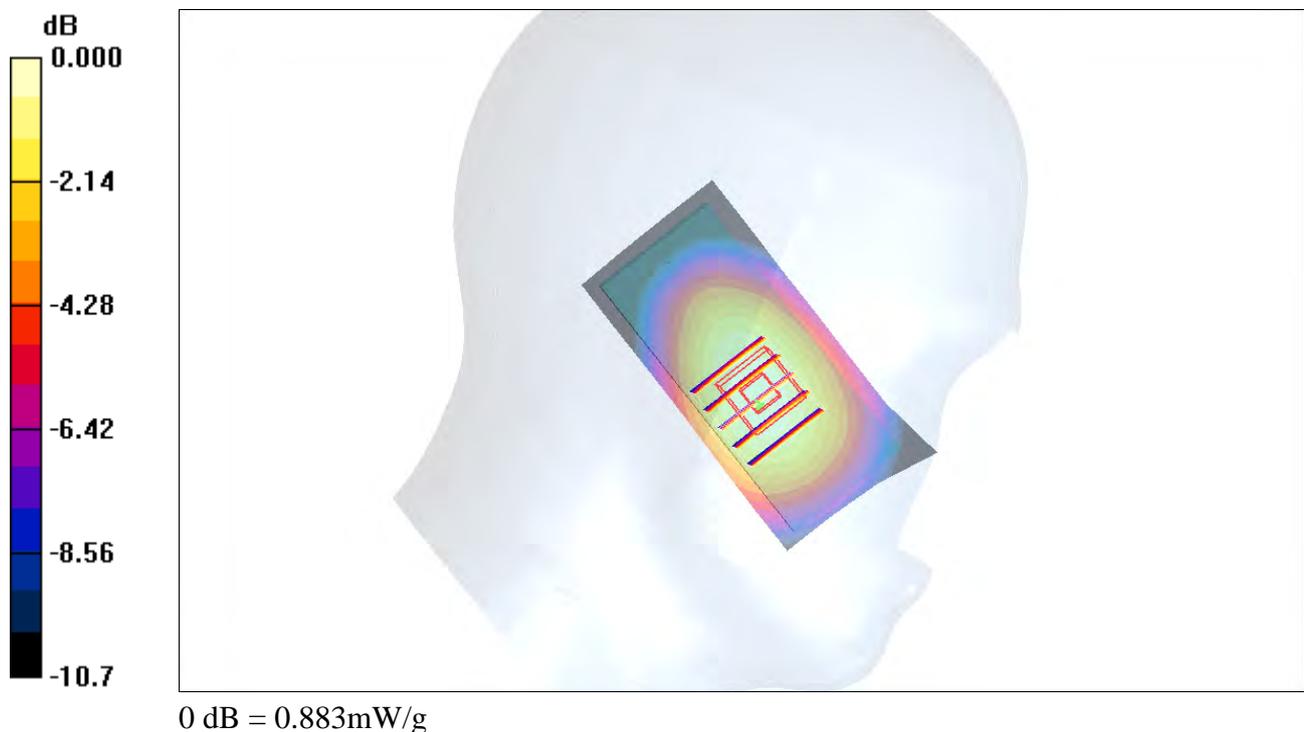
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.8 V/m; Power Drift = -0.048 dB

Peak SAR (extrapolated) = 1.12 W/kg

SAR(1 g) = 0.839 mW/g; SAR(10 g) = 0.597 mW/g

Maximum value of SAR (measured) = 0.883 mW/g



#12 WCDMA V_RMC12.2K_Left Tilted_Ch4132

DUT: 170737-01

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4132/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.458 mW/g

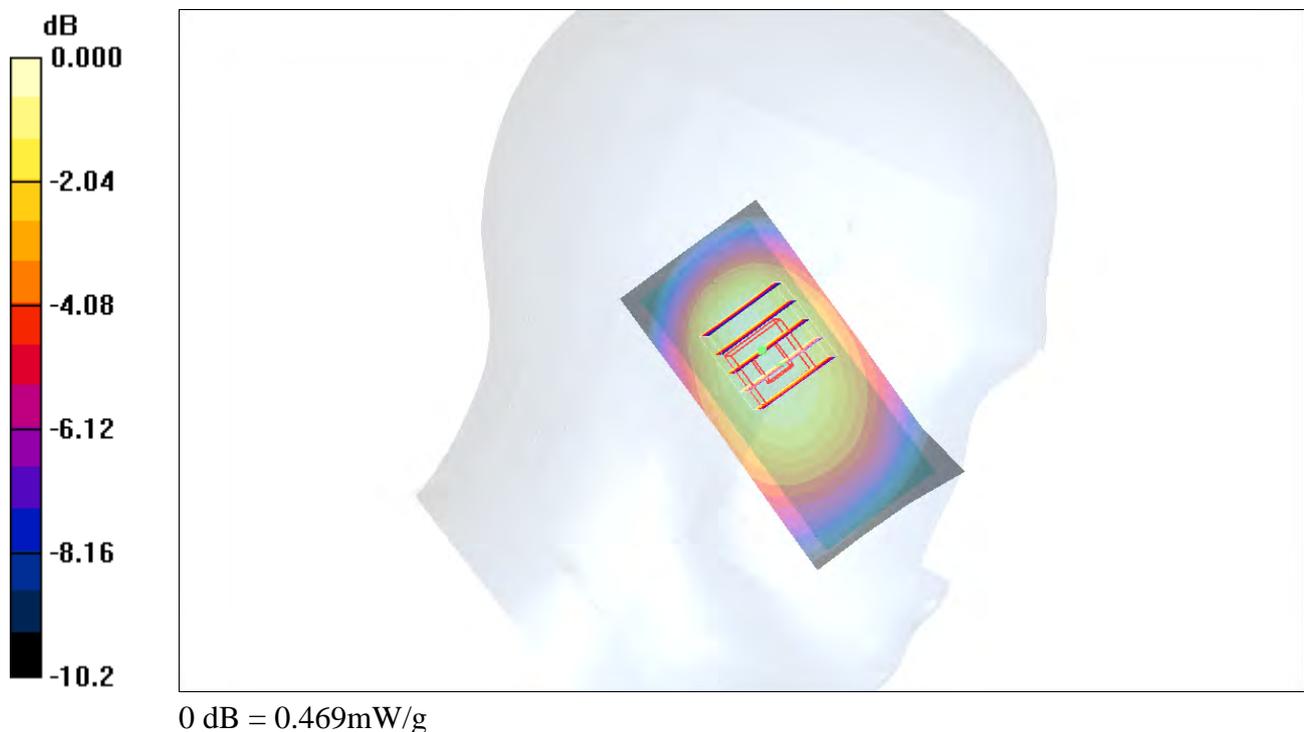
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.5 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 0.592 W/kg

SAR(1 g) = 0.445 mW/g; SAR(10 g) = 0.322 mW/g

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



#13 WCDMA V_RMC12.2K_Right Cheek_Ch4182

DUT: 170737-01

Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 836.4$ MHz; $\sigma = 0.914$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4182/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.20 mW/g

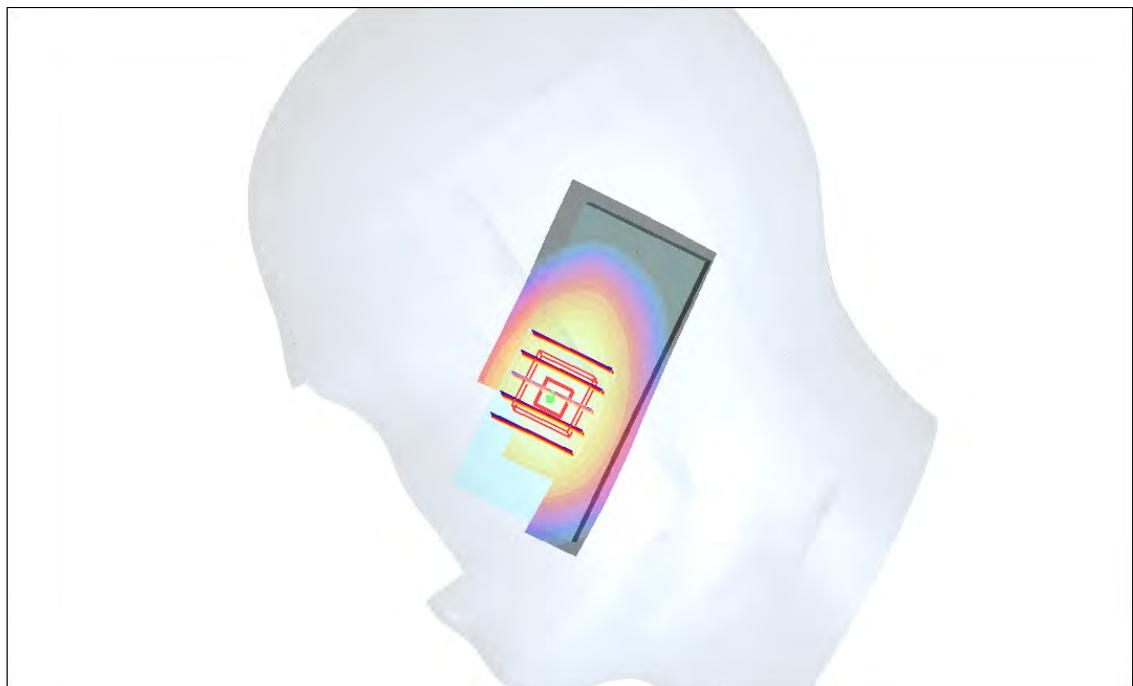
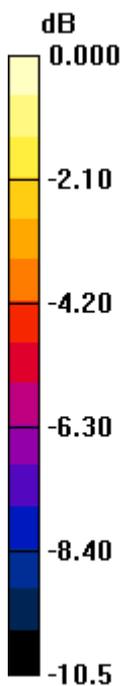
Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.5 V/m; Power Drift = 0.048 dB

Peak SAR (extrapolated) = 1.44 W/kg

SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.796 mW/g

Maximum value of SAR (measured) = 1.18 mW/g



0 dB = 1.18mW/g

#14 WCDMA V_RMC12.2K_Right Cheek_Ch4233

DUT: 170737-01

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 847 \text{ MHz}$; $\sigma = 0.924 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.6 \text{ }^\circ\text{C}$; Liquid Temperature : $21.6 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4233/Area Scan (31x61x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 1.35 mW/g

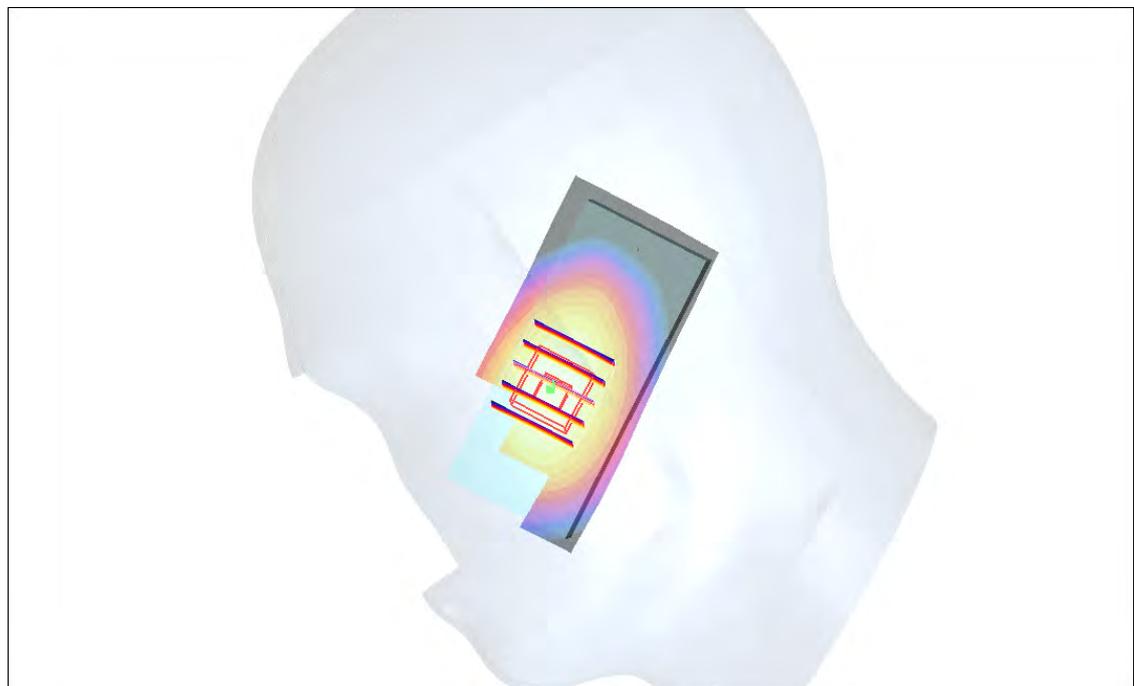
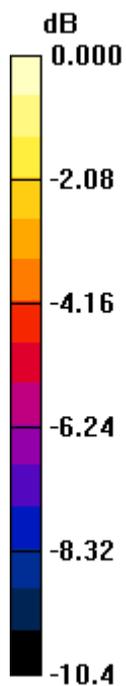
Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.2 V/m ; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 1.25 mW/g ; SAR(10 g) = 0.895 mW/g

Maximum value of SAR (measured) = 1.33 mW/g



0 dB = 1.33mW/g

#14 WCDMA V_RMC12.2K_Right Cheek_Ch4233_2D

DUT: 170737-01

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 847$ MHz; $\sigma = 0.924$ mho/m; $\epsilon_r = 40.5$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4233/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.35 mW/g

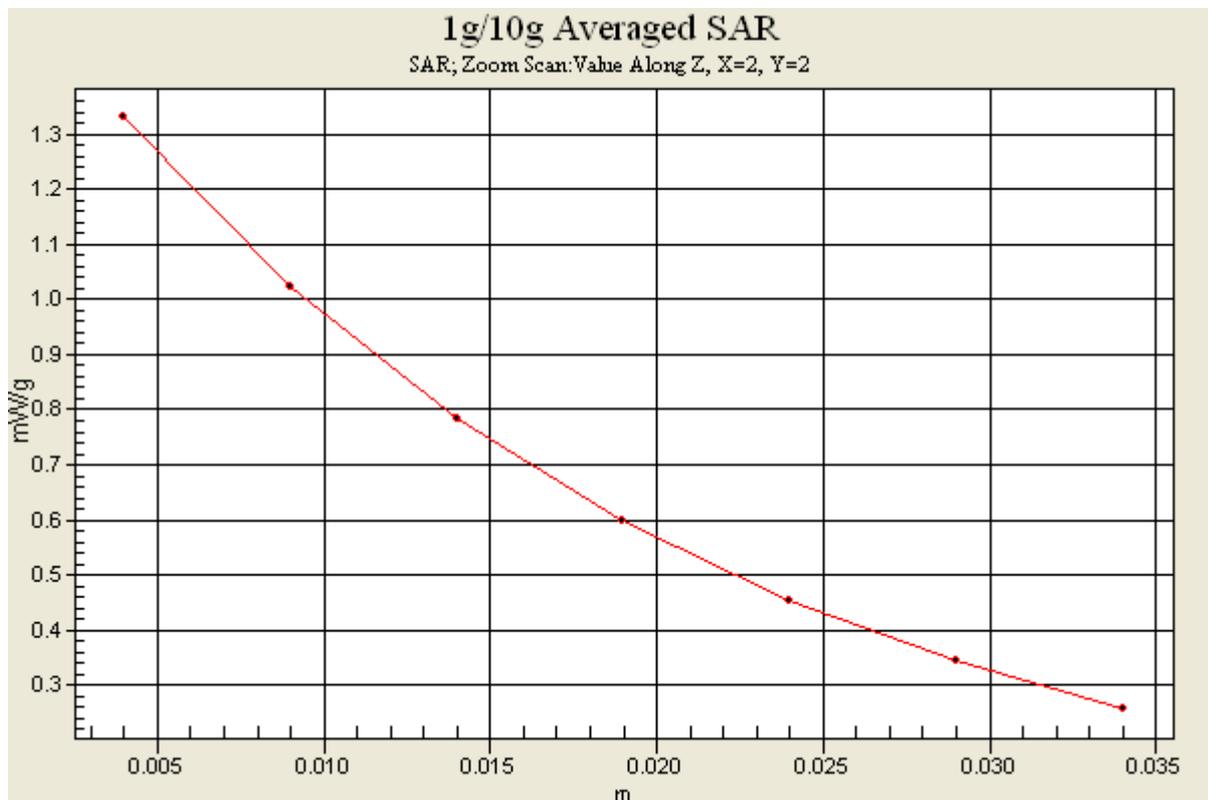
Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.2 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.895 mW/g

Maximum value of SAR (measured) = 1.33 mW/g



#15 WCDMA V_RMC12.2K_Left Cheek_Ch4182

DUT: 170737-01

Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 836.4$ MHz; $\sigma = 0.914$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4182/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.02 mW/g

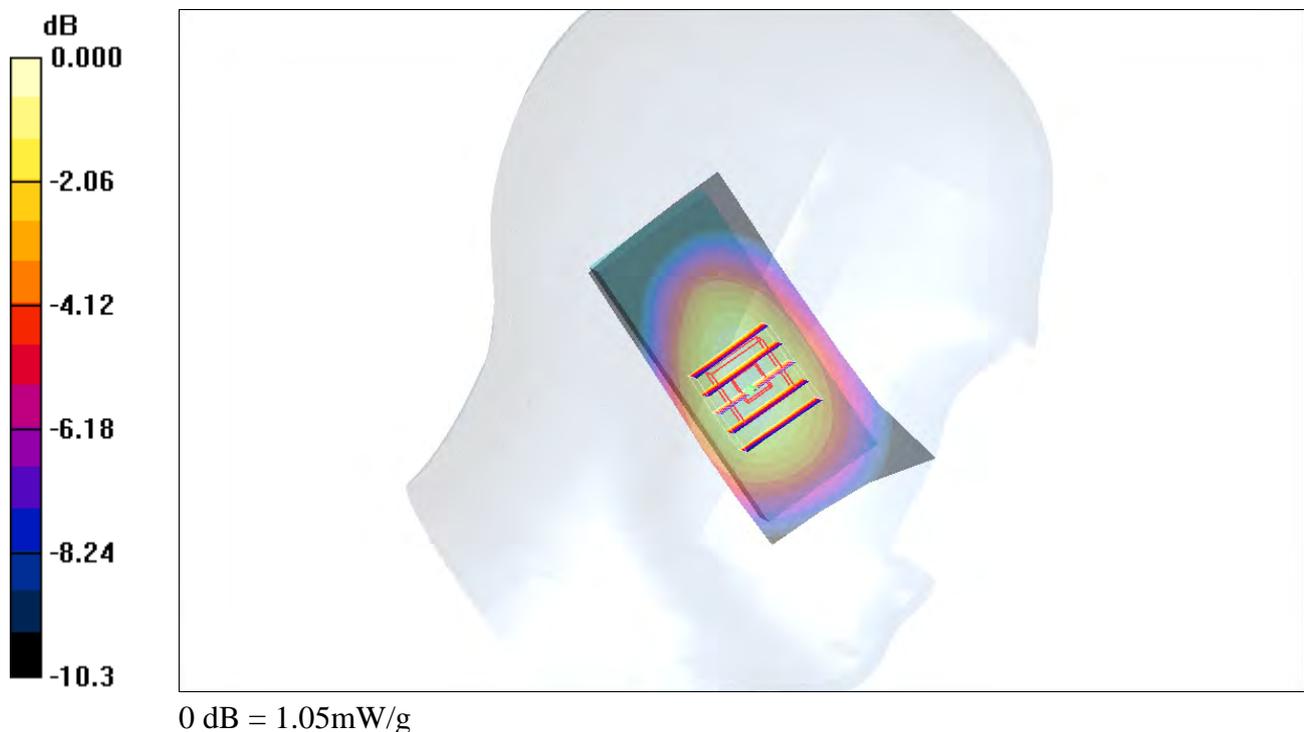
Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.5 V/m; Power Drift = -0.048 dB

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.981 mW/g; SAR(10 g) = 0.695 mW/g

Maximum value of SAR (measured) = 1.05 mW/g



#16 WCDMA V_RMC12.2K_Left Cheek_Ch4233

DUT: 170737-01

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: HSL_850_110812 Medium parameters used: $f = 847$ MHz; $\sigma = 0.924$ mho/m; $\epsilon_r = 40.5$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.6 °C ; Liquid Temperature : 21.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.33, 8.33, 8.33); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4233/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.30 mW/g

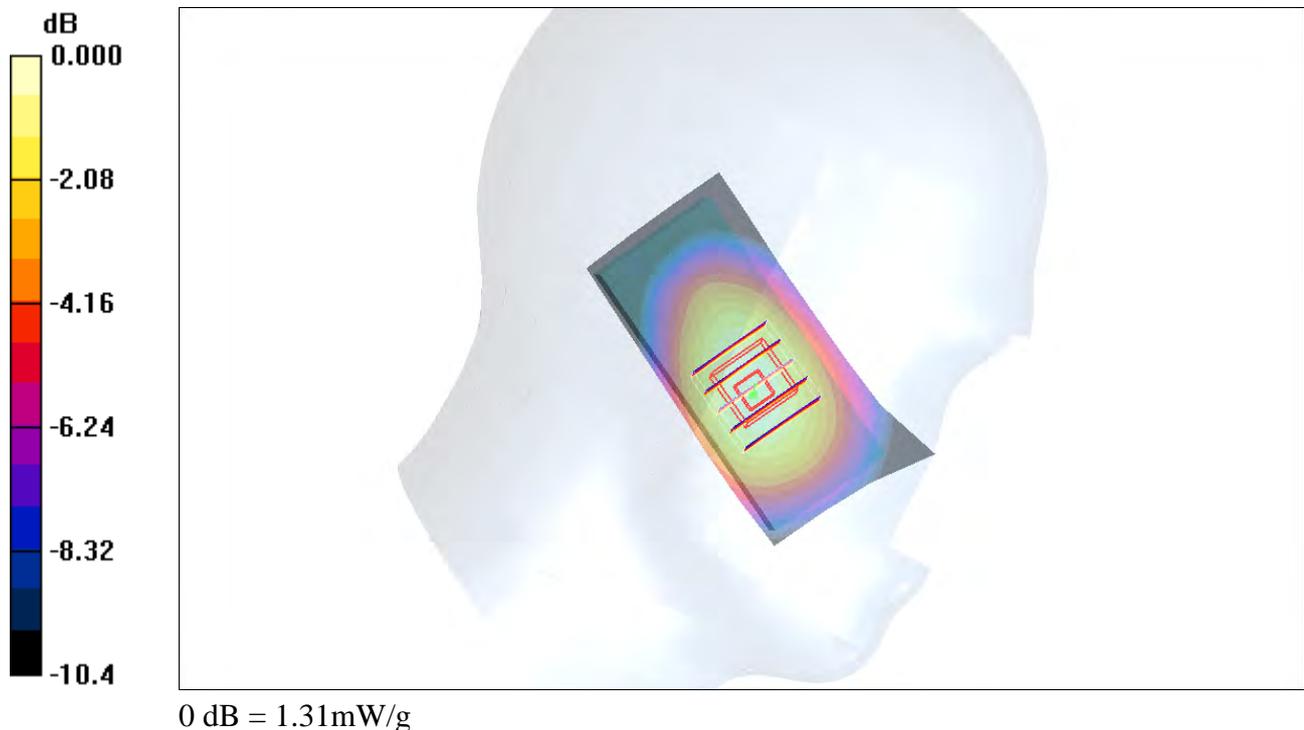
Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.9 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 1.64 W/kg

SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.866 mW/g

Maximum value of SAR (measured) = 1.31 mW/g



#17 WCDMA II_RMC12.2K_Right Cheek_Ch9400

DUT: 170737-01

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.47 mW/g

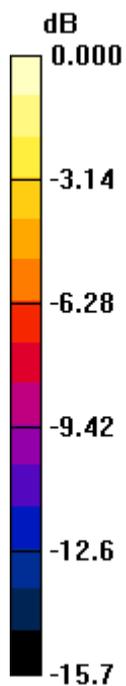
Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.3 V/m; Power Drift = -0.142 dB

Peak SAR (extrapolated) = 1.82 W/kg

SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.723 mW/g

Maximum value of SAR (measured) = 1.28 mW/g



0 dB = 1.28mW/g

#18 WCDMA II_RMC12.2K_Right Tilted_Ch9400

DUT: 170737-01

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.314 mW/g

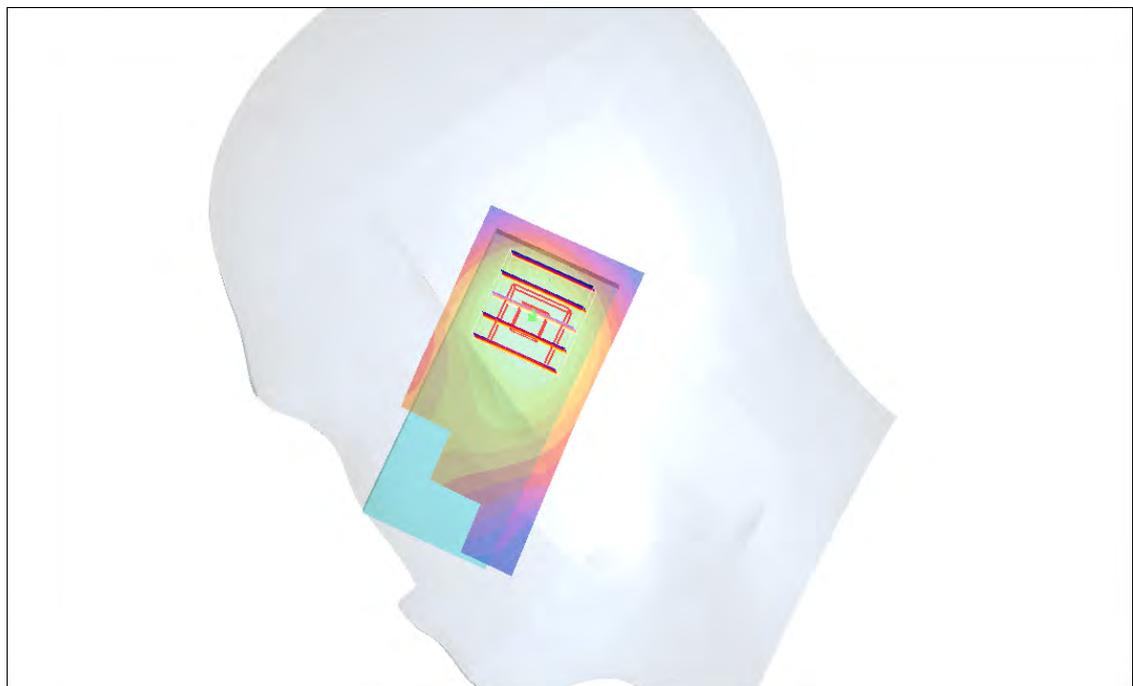
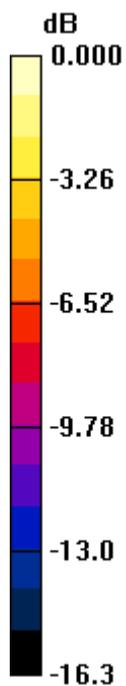
Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.3 V/m; Power Drift = 0.072 dB

Peak SAR (extrapolated) = 0.374 W/kg

SAR(1 g) = 0.244 mW/g; SAR(10 g) = 0.150 mW/g

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



0 dB = 0.260mW/g

#19 WCDMA II_RMC12.2K_Left Cheek_Ch9400

DUT: 170737-01

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.58 mW/g

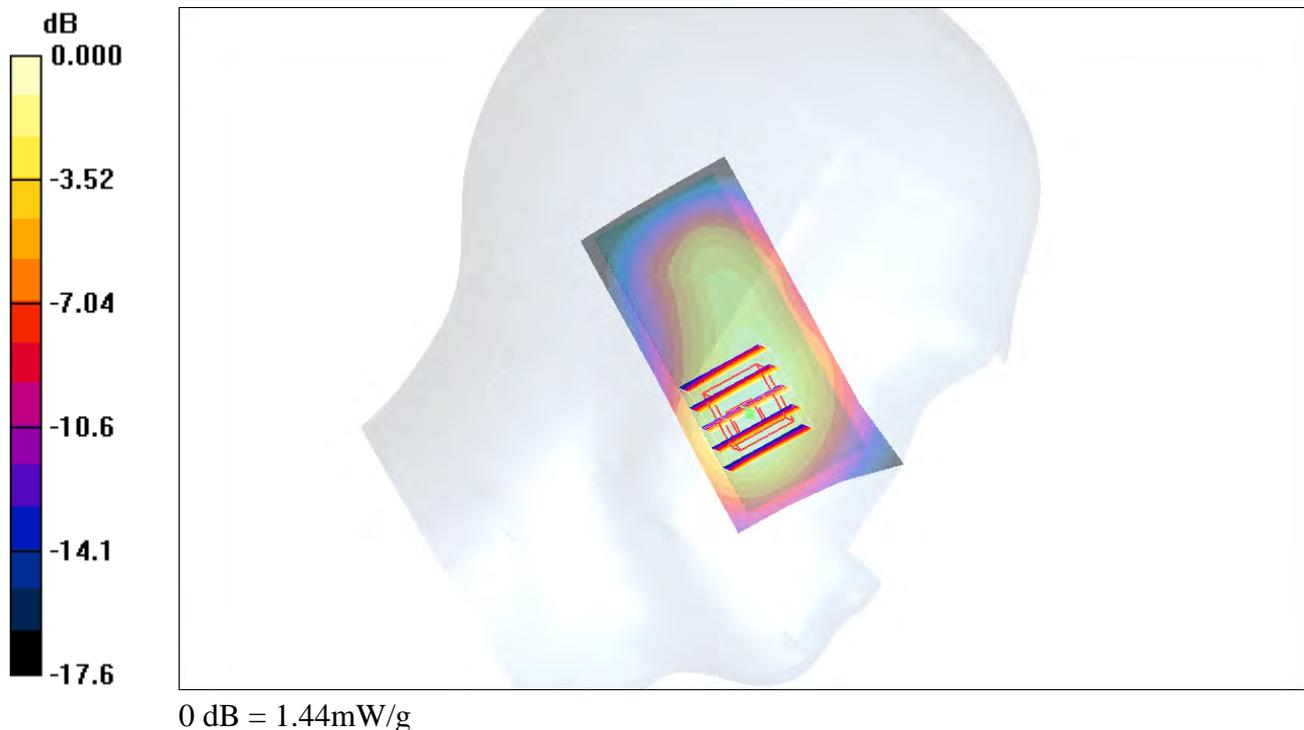
Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.3 V/m; Power Drift = -0.113 dB

Peak SAR (extrapolated) = 2.24 W/kg

SAR(1 g) = 1.35 mW/g; SAR(10 g) = 0.802 mW/g

Maximum value of SAR (measured) = 1.44 mW/g



#19 WCDMA II_RMC12.2K_Left Cheek_Ch9400_2D

DUT: 170737-01

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 1.58 mW/g

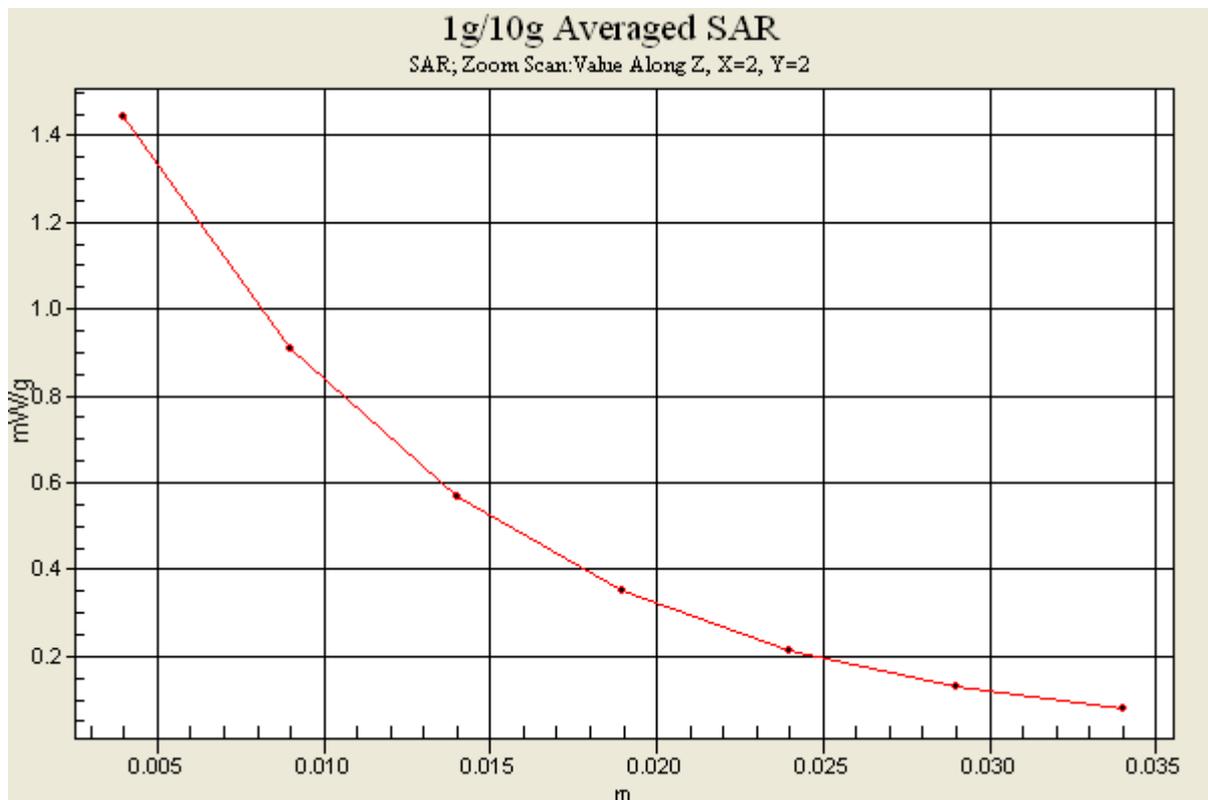
Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.3 V/m; Power Drift = -0.113 dB

Peak SAR (extrapolated) = 2.24 W/kg

SAR(1 g) = 1.35 mW/g; SAR(10 g) = 0.802 mW/g

Maximum value of SAR (measured) = 1.44 mW/g



#20 WCDMA II_RMC12.2K_Left Tilted_Ch9400

DUT: 170737-01

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.530 mW/g

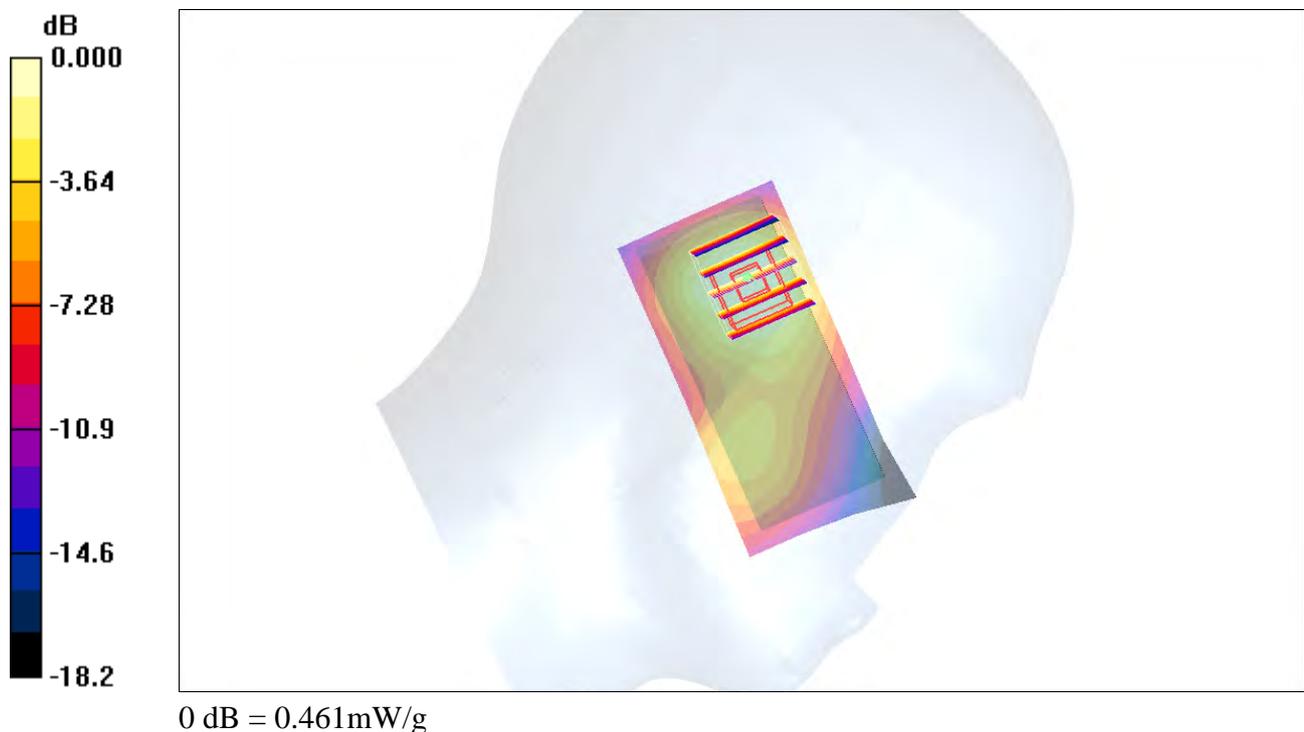
Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.4 V/m; Power Drift = 0.057 dB

Peak SAR (extrapolated) = 0.668 W/kg

SAR(1 g) = 0.431 mW/g; SAR(10 g) = 0.261 mW/g

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



#27 WCDMA II_RMC12.2K_Right Cheek_Ch9262

DUT: 170737-01

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1852.4$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9262/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.635 mW/g

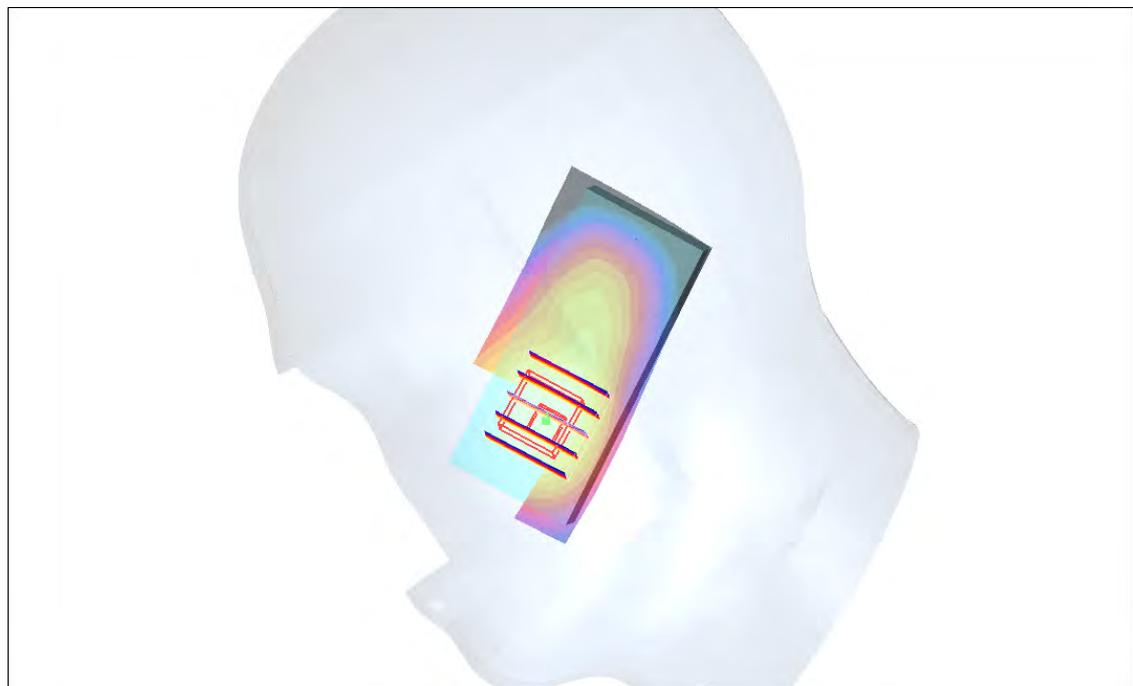
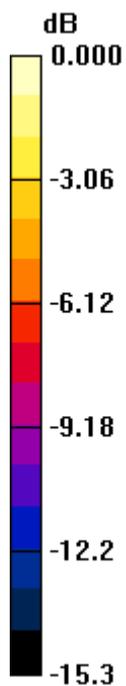
Ch9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.99 V/m; Power Drift = 0.152 dB

Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.547 mW/g; SAR(10 g) = 0.339 mW/g

Maximum value of SAR (measured) = 0.591 mW/g



0 dB = 0.591mW/g

#28 WCDMA II_RMC12.2K_Right Cheek_Ch9538

DUT: 170737-01

Communication System: WCDMA; Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1908 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 39$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.2 \text{ }^\circ\text{C}$; Liquid Temperature : $21.2 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9538/Area Scan (31x61x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.967 mW/g

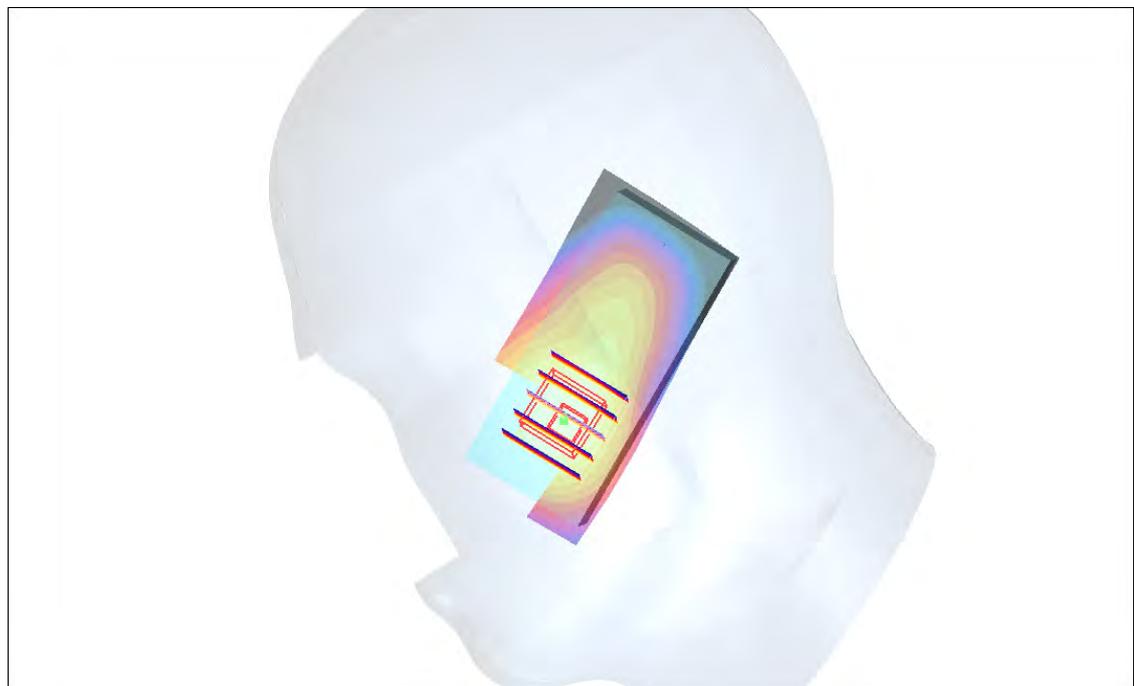
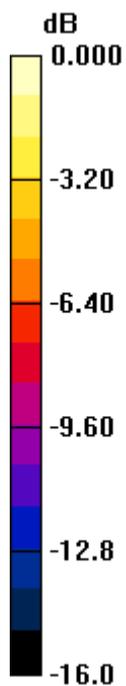
Ch9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.20 V/m ; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.821 mW/g ; SAR(10 g) = 0.498 mW/g

Maximum value of SAR (measured) = 0.888 mW/g



0 dB = 0.888mW/g

#29 WCDMA II_RMC12.2K_Left Cheek_Ch9262

DUT: 170737-01

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used : $f = 1852.4$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r =$

39.3 ; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.2 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21

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

- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17

- Phantom: SAM_Left; Type: SAM; Serial: TP-1150

- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9262/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.829 mW/g

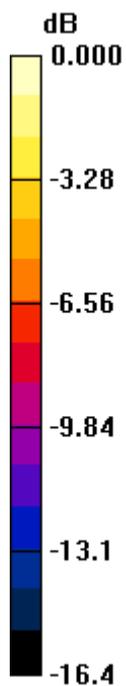
Ch9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.56 V/m; Power Drift = -0.167 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.685 mW/g; SAR(10 g) = 0.397 mW/g

Maximum value of SAR (measured) = 0.732 mW/g



0 dB = 0.732mW/g

#30 WCDMA II_RMC12.2K_Left Cheek_Ch9538

DUT: 170737-01

Communication System: WCDMA; Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium: HSL_1900_110812 Medium parameters used: $f = 1908 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 39$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.2 \text{ }^\circ\text{C}$; Liquid Temperature : $21.2 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Left; Type: SAM; Serial: TP-1150
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9538/Area Scan (31x61x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 1.05 mW/g

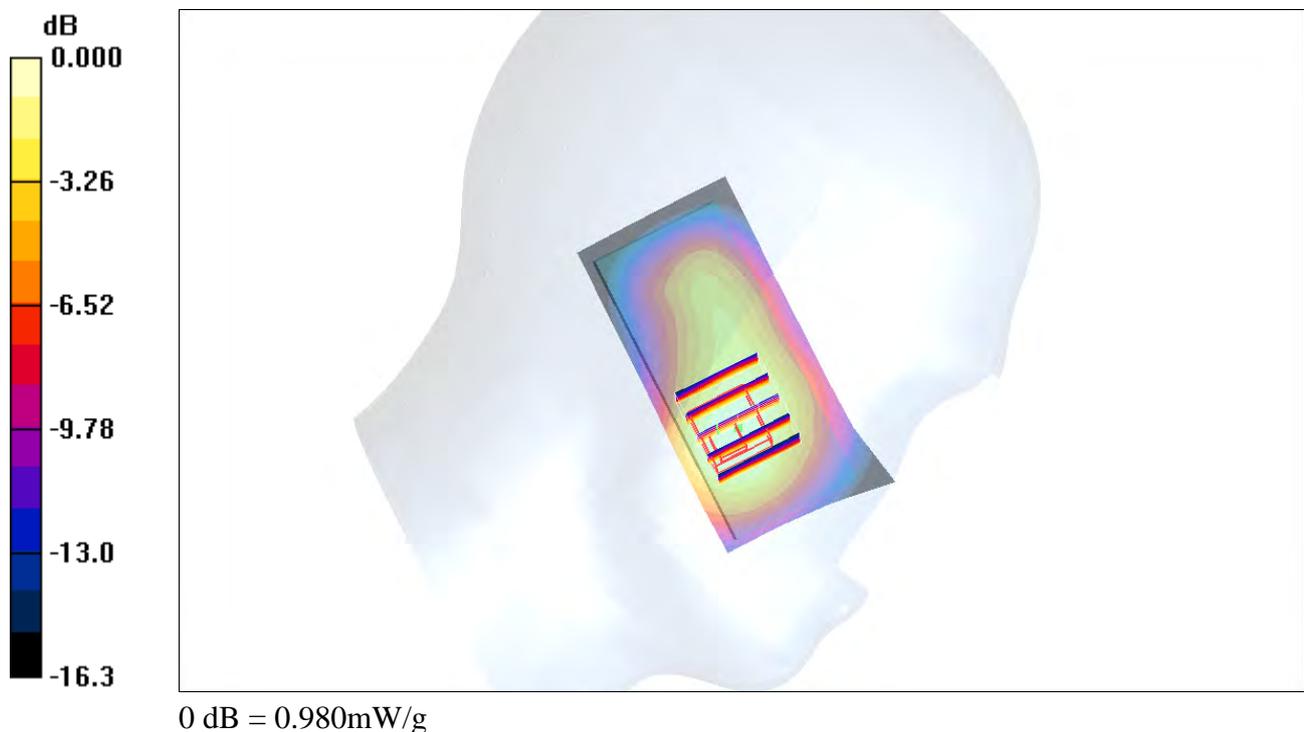
Ch9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.6 V/m ; Power Drift = -0.103 dB

Peak SAR (extrapolated) = 1.52 W/kg

SAR(1 g) = 0.916 mW/g ; SAR(10 g) = 0.536 mW/g

Maximum value of SAR (measured) = 0.980 mW/g



#21 GSM850_GPRS10_Front_1.5cm_Ch128aGctrj qpg

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:4

Medium: MSL_850_110812 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.965$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.45, 8.45, 8.45); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.513 mW/g

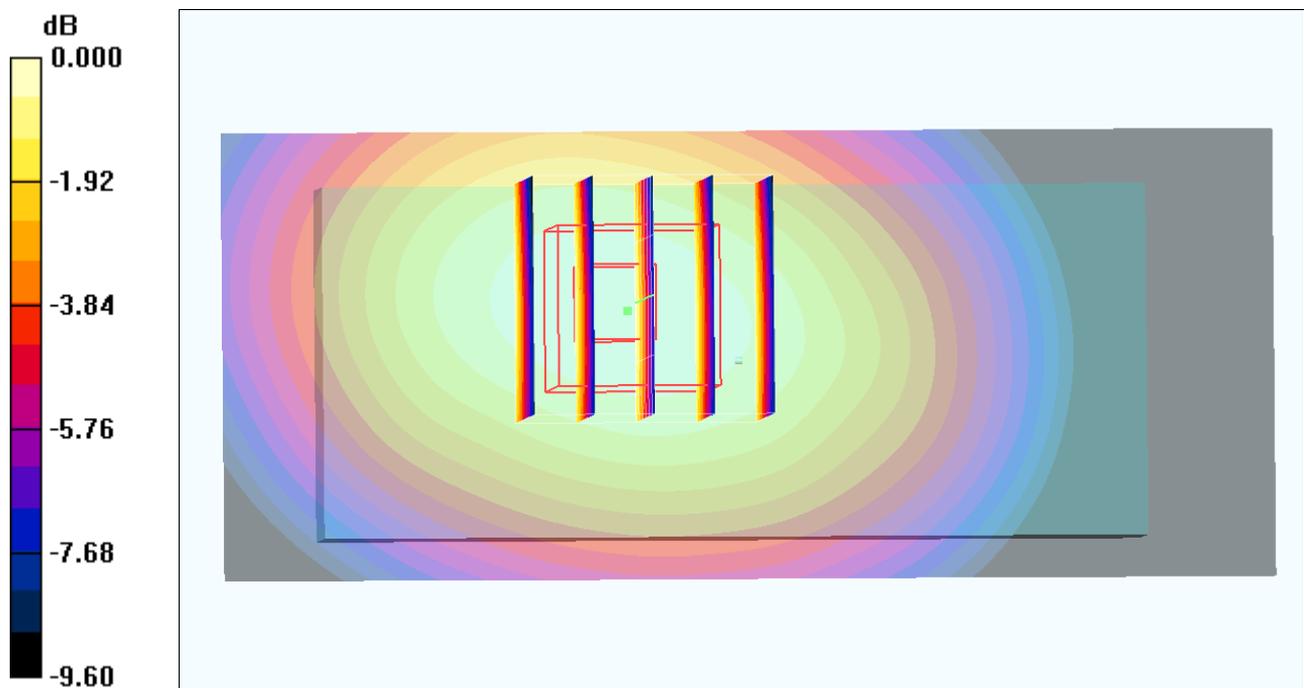
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.4 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 0.651 W/kg

SAR(1 g) = 0.484 mW/g; SAR(10 g) = 0.346 mW/g

Maximum value of SAR (measured) = 0.512 mW/g



0 dB = 0.512mW/g

#22 GSM850_GPRS10_Back_1.5cm_Ch128aGctrj qpg

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:4

Medium: MSL_850_110812 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.965$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.45, 8.45, 8.45); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.610 mW/g

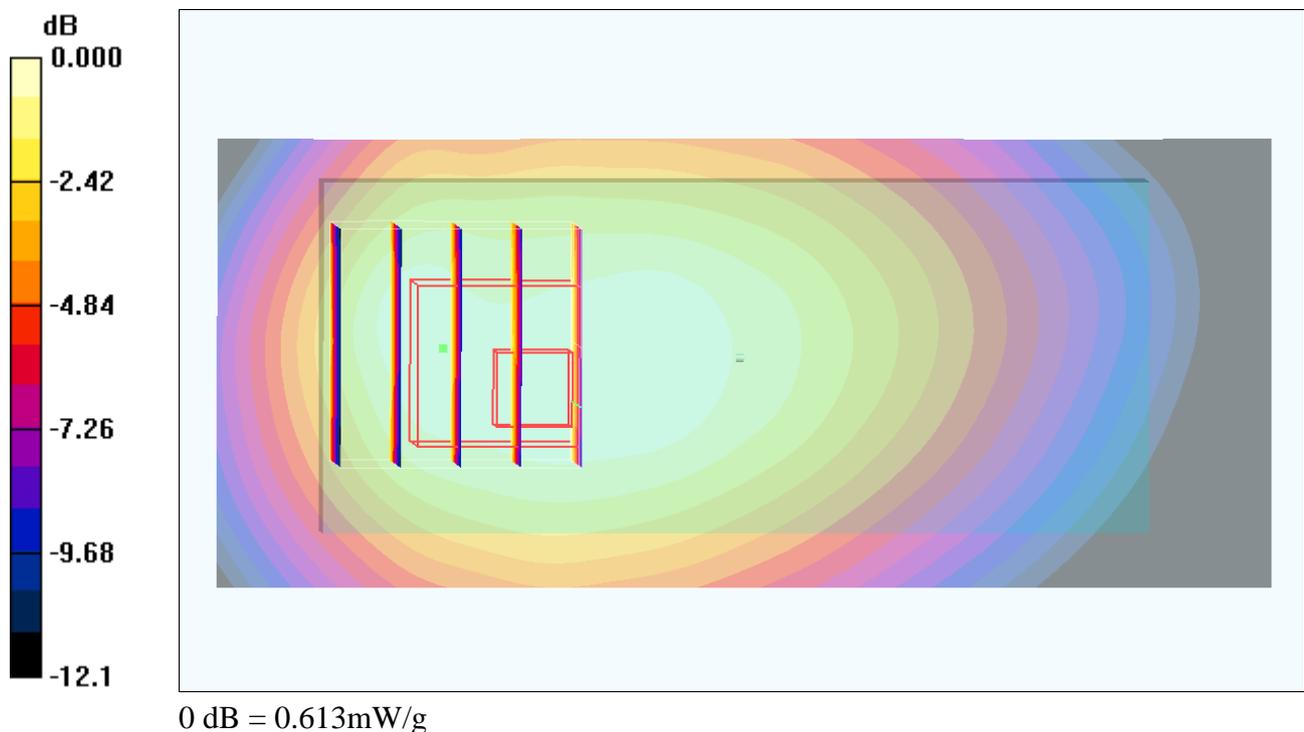
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.0 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 0.822 W/kg

SAR(1 g) = 0.557 mW/g; SAR(10 g) = 0.373 mW/g

Maximum value of SAR (measured) = 0.613 mW/g



#22 GSM850_GPRS10_Back_1.5cm_Ch128_Gctrj qpqa2D

DUT: 170737-01

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:4

Medium: MSL_850_110812 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.965$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.45, 8.45, 8.45); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch128/Area Scan (31x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.610 mW/g

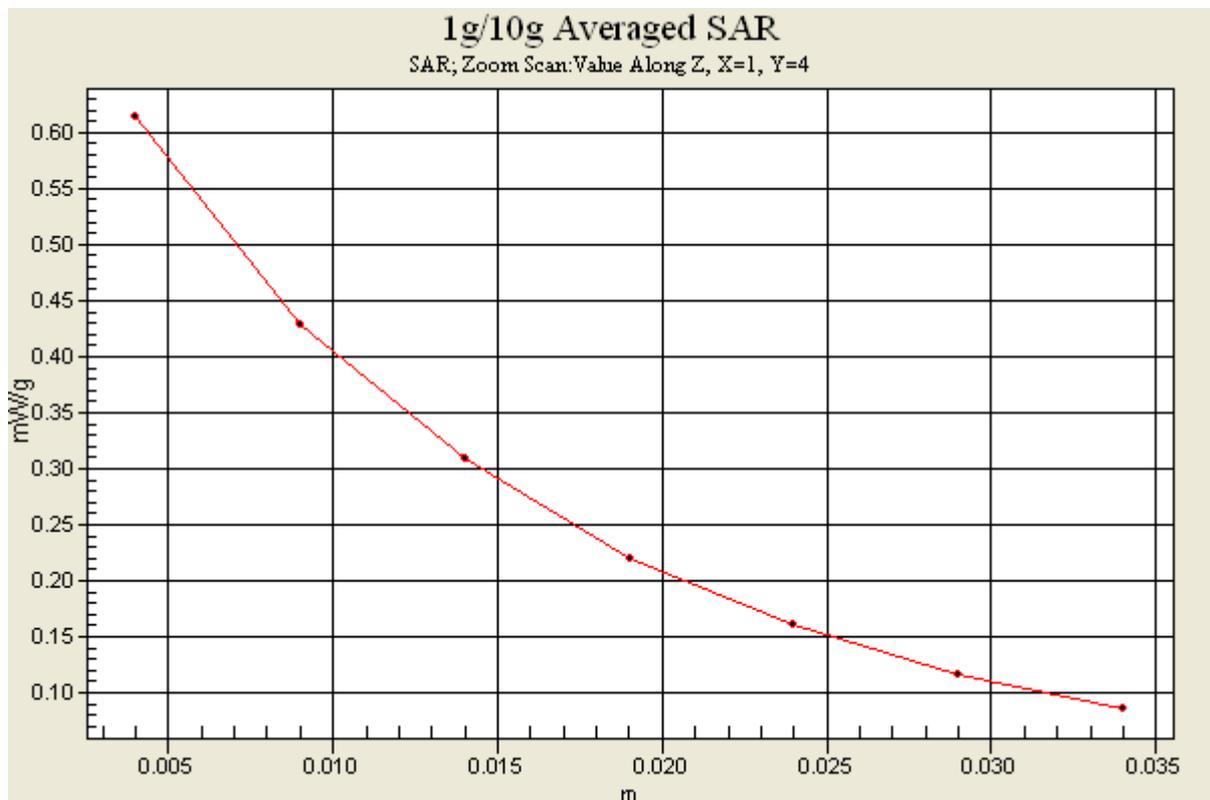
Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.0 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 0.822 W/kg

SAR(1 g) = 0.557 mW/g; SAR(10 g) = 0.373 mW/g

Maximum value of SAR (measured) = 0.613 mW/g



#23 GSM1900_GPRS10_Front_1.5cm_Ch661_Earphone

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:4

Medium: MSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.68, 6.68, 6.68); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.207 mW/g

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.54 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 0.301 W/kg

SAR(1 g) = 0.184 mW/g; SAR(10 g) = 0.110 mW/g

Maximum value of SAR (measured) = 0.197 mW/g

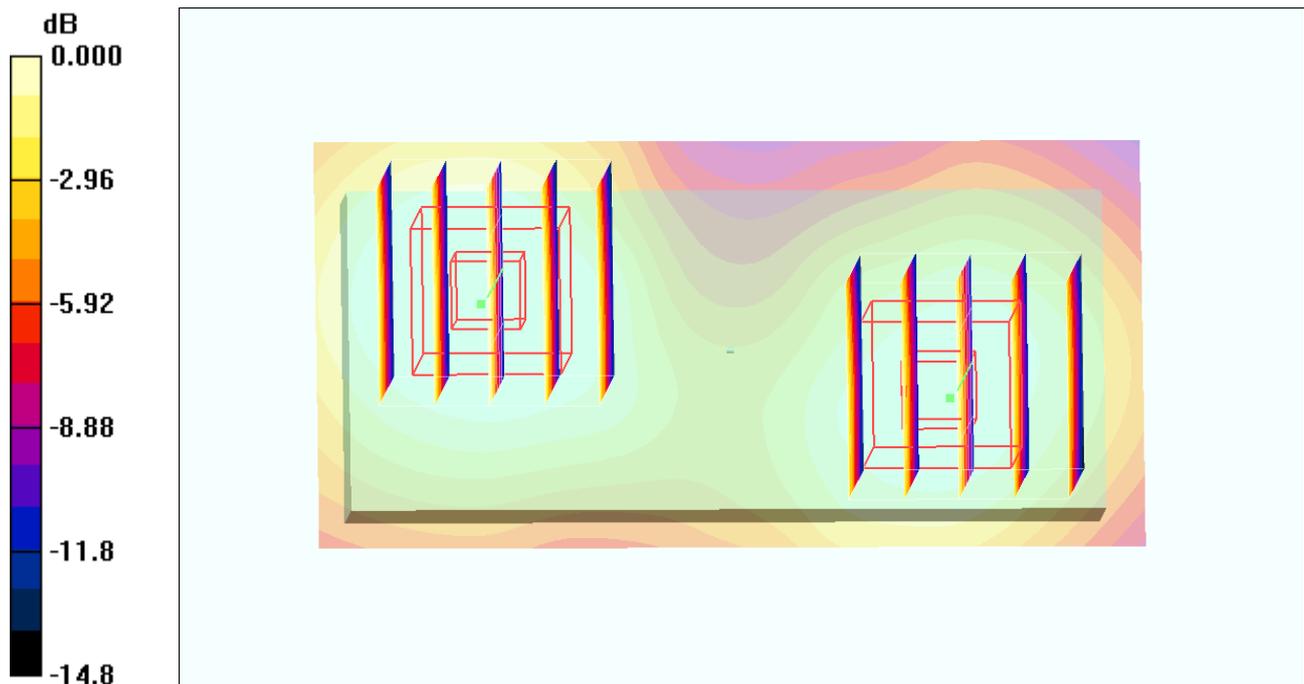
Ch661/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.54 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 0.225 W/kg

SAR(1 g) = 0.147 mW/g; SAR(10 g) = 0.092 mW/g

Maximum value of SAR (measured) = 0.158 mW/g



0 dB = 0.158mW/g

#24 GSM1900_GPRS10_Back_1.5cm_Ch661_Earphone

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:4

Medium: MSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.68, 6.68, 6.68); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.322 mW/g

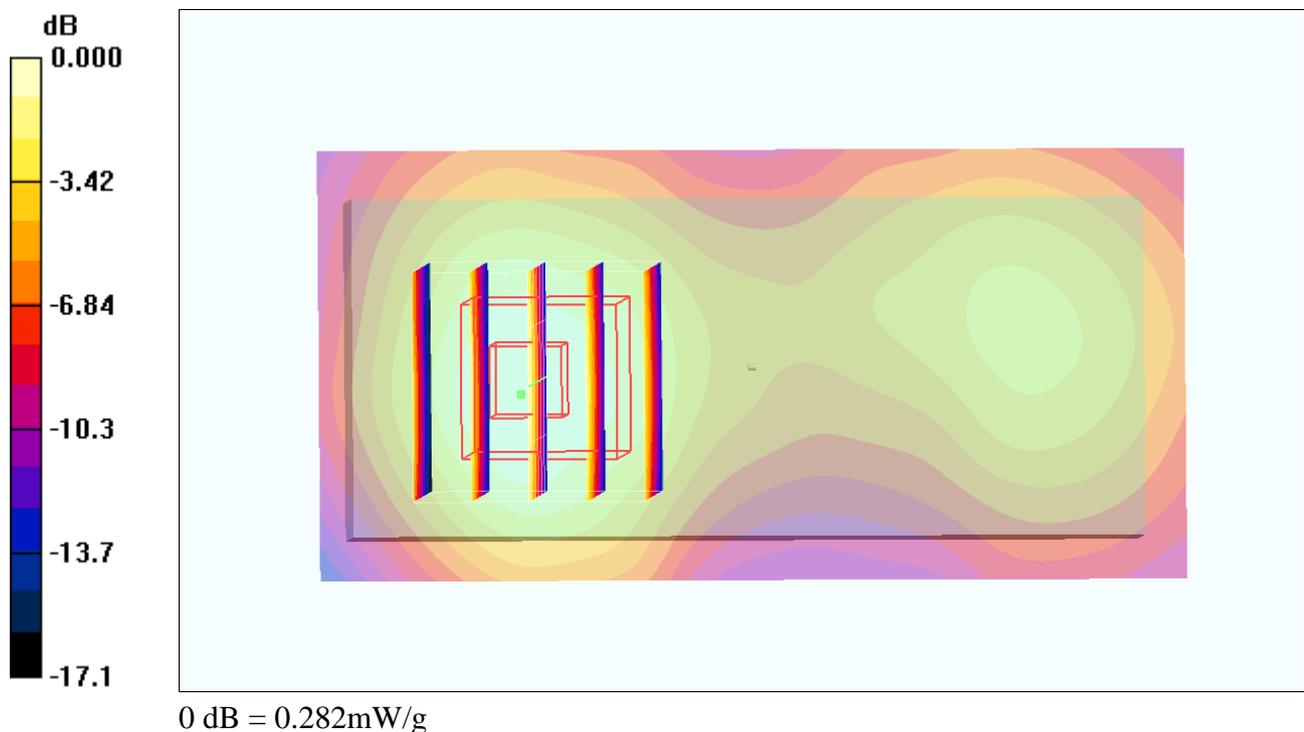
Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.35 V/m; Power Drift = 0.058 dB

Peak SAR (extrapolated) = 0.436 W/kg

SAR(1 g) = 0.259 mW/g; SAR(10 g) = 0.151 mW/g

Maximum value of SAR (measured) = 0.282 mW/g



#24 GSM1900_GPRS10_Back_1.5cm_Ch661_Earphone_2D

DUT: 170737-01

Communication System: PCS; Frequency: 1880 MHz; Duty Cycle: 1:4

Medium: MSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.68, 6.68, 6.68); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch661/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.322 mW/g

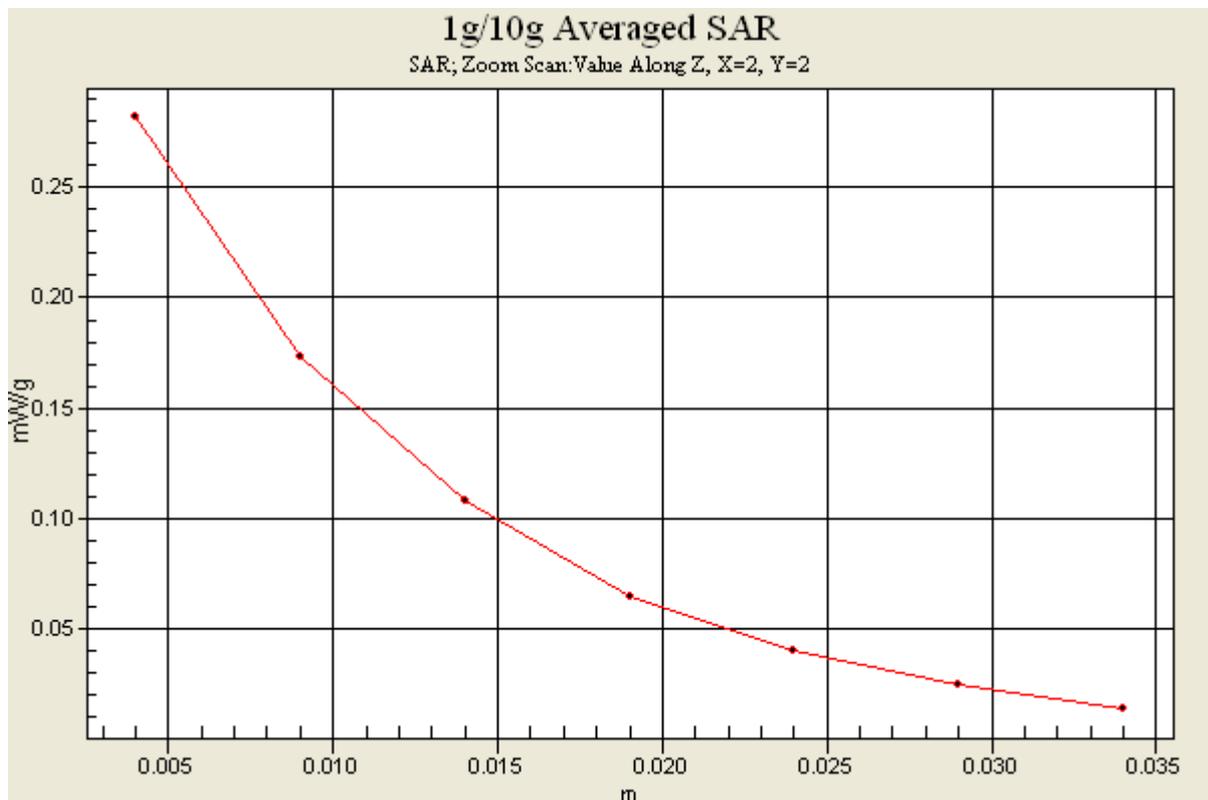
Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.35 V/m; Power Drift = 0.058 dB

Peak SAR (extrapolated) = 0.436 W/kg

SAR(1 g) = 0.259 mW/g; SAR(10 g) = 0.151 mW/g

Maximum value of SAR (measured) = 0.282 mW/g



#25 WCDMA V_RMC12.2K_Front_1.5cm_Ch4132aGctrj qpg

DUT: 170737-01

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: MSL_850_110812 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.968$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.45, 8.45, 8.45); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4132/Area Scan (31x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.306 mW/g

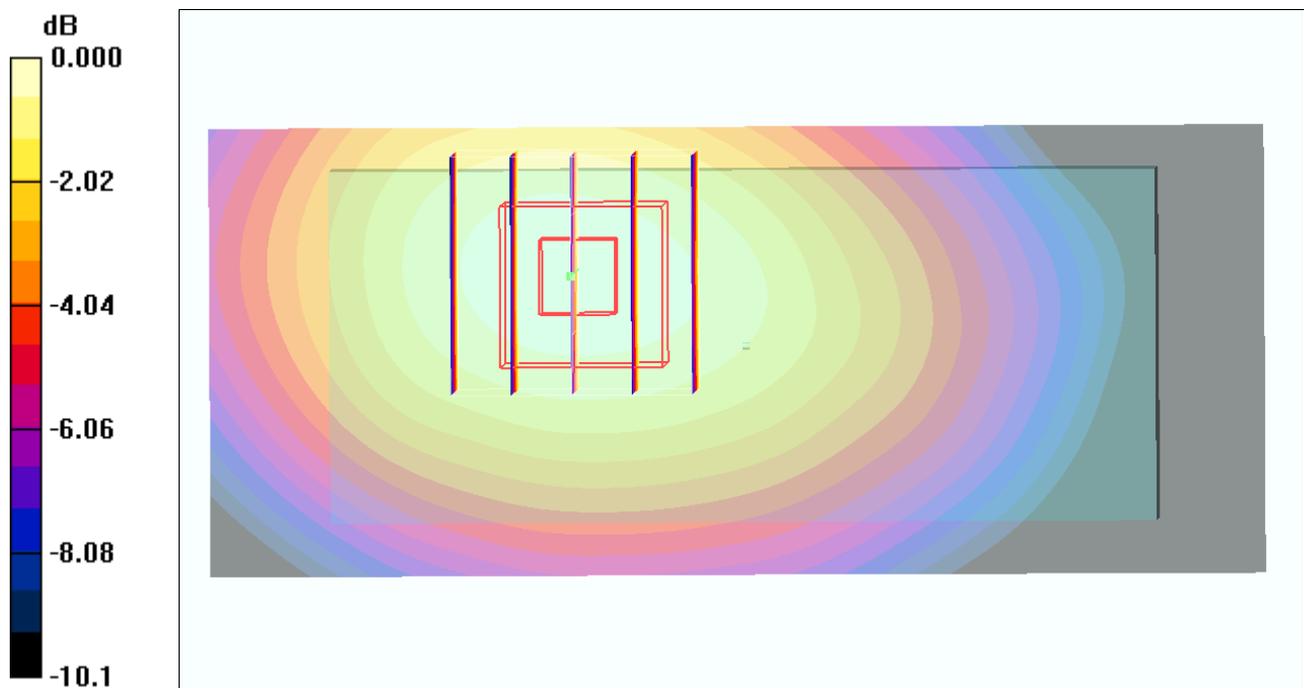
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.6 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 0.403 W/kg

SAR(1 g) = 0.296 mW/g; SAR(10 g) = 0.210 mW/g

Maximum value of SAR (measured) = 0.315 mW/g



0 dB = 0.315mW/g

#26 WCDMA V_RMC12.2K_Back_1.5cm_Ch4132aGctrj qpg

DUT: 170737-01

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: MSL_850_110812 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.968$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.4 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.45, 8.45, 8.45); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4132/Area Scan (31x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.582 mW/g

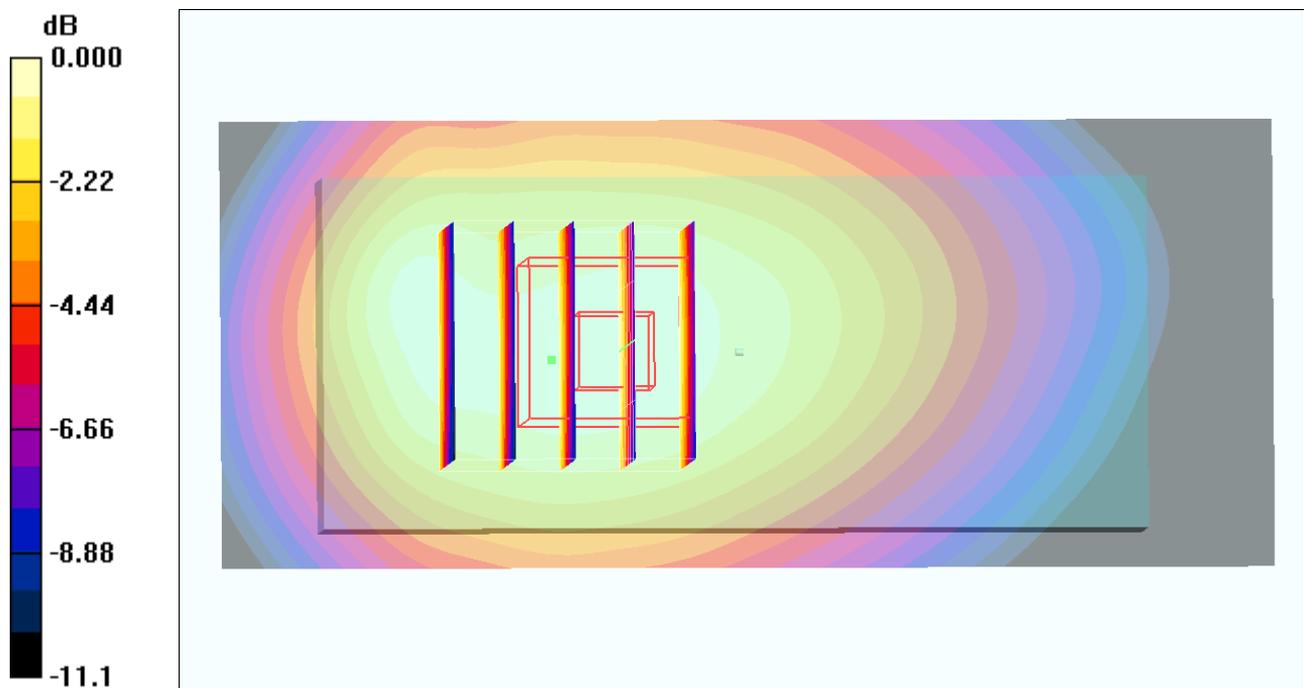
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.6 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 0.783 W/kg

SAR(1 g) = 0.563 mW/g; SAR(10 g) = 0.392 mW/g

Maximum value of SAR (measured) = 0.599 mW/g



0 dB = 0.599mW/g

#26 WCDMA V_RMC12.2K_Back_1.5cm_Ch4132aGctrj qpg_2D

DUT: 170737-01

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: MSL_850_110812 Medium parameters used: $f = 826.4 \text{ MHz}$; $\sigma = 0.968 \text{ mho/m}$; $\epsilon_r = 53.3$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $22.4 \text{ }^\circ\text{C}$; Liquid Temperature : $21.4 \text{ }^\circ\text{C}$

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.45, 8.45, 8.45); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch4132/Area Scan (31x71x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.582 mW/g

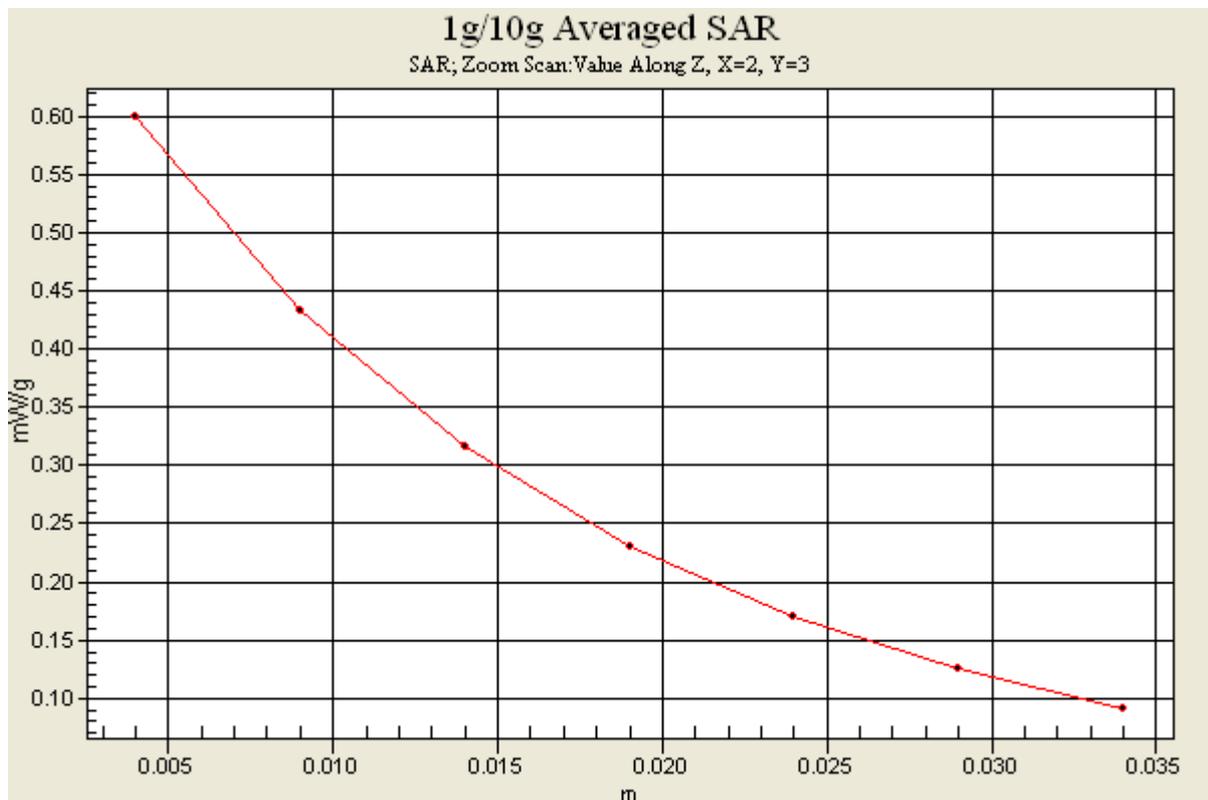
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 22.6 V/m ; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 0.783 W/kg

SAR(1 g) = 0.563 mW/g ; SAR(10 g) = 0.392 mW/g

Maximum value of SAR (measured) = 0.599 mW/g



#31 WCDMA II_RMC12.2K_Front_1.5cm_Ch9400_Earphone

DUT: 170737-01

Communication System: WCDMA Band 2; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: MSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.68, 6.68, 6.68); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.436 mW/g

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.6 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 0.630 W/kg

SAR(1 g) = 0.377 mW/g; SAR(10 g) = 0.219 mW/g

Maximum value of SAR (measured) = 0.408 mW/g

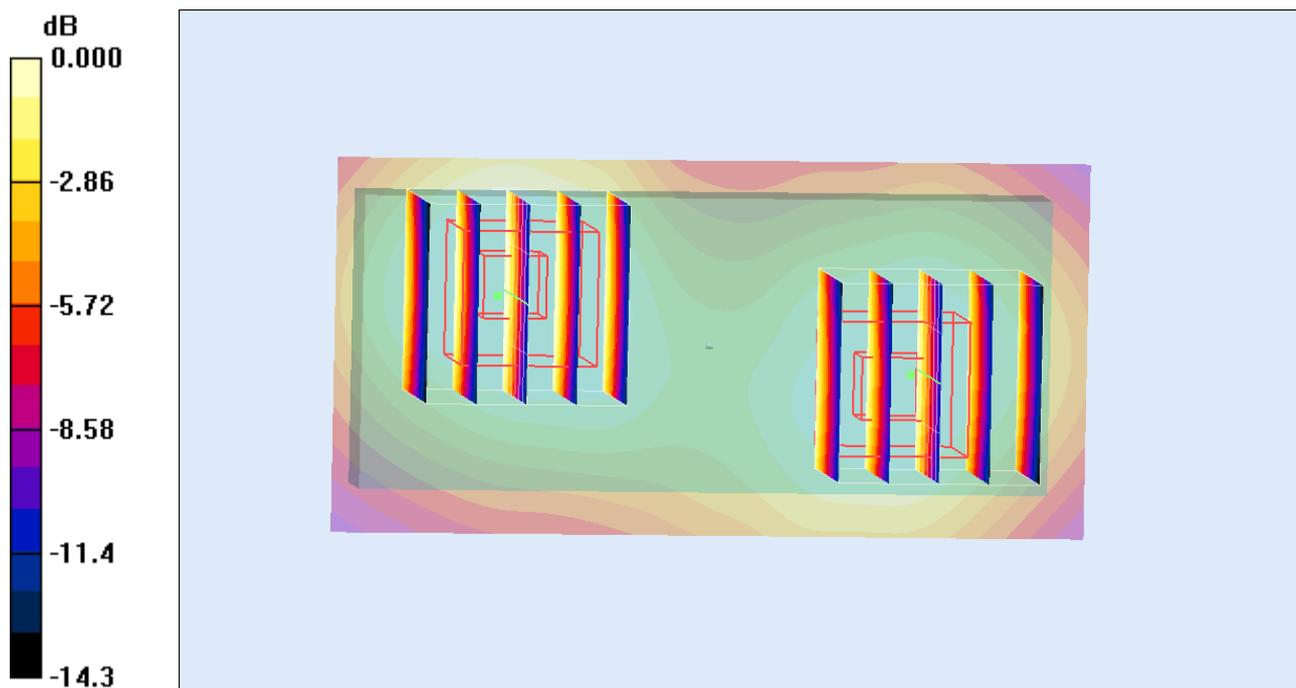
Ch9400/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.6 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 0.422 W/kg

SAR(1 g) = 0.278 mW/g; SAR(10 g) = 0.177 mW/g

Maximum value of SAR (measured) = 0.293 mW/g



0 dB = 0.293mW/g

#32 WCDMA II_RMC12.2K_Back_1.5cm_Ch9400_Earphone

DUT: 170737-01

Communication System: WCDMA Band 2; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: MSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.68, 6.68, 6.68); Calibrated: 2011-06-21
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17
- Phantom: SAM_Right; Type: SAM; Serial: TP-1303
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.777 mW/g

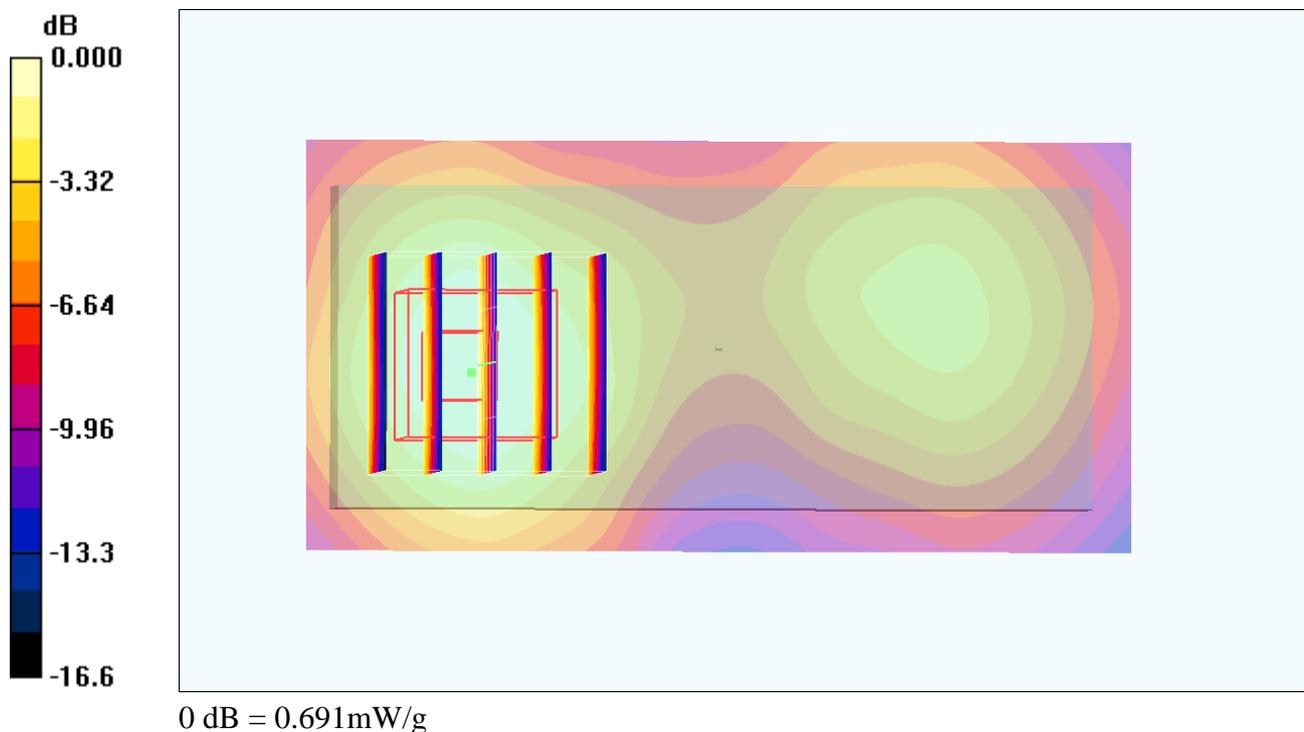
Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.5 V/m; Power Drift = 0.049 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.644 mW/g; SAR(10 g) = 0.374 mW/g

Maximum value of SAR (measured) = 0.691 mW/g



#32 WCDMA II_RMC12.2K_Back_1.5cm_Ch9400_Earphone_2D**DUT: 170737-01**

Communication System: WCDMA Band 2; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: MSL_1900_110812 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52$; $\rho = 1000$ kg/m^3

Ambient Temperature : 22.5 °C ; Liquid Temperature : 21.5 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.68, 6.68, 6.68); Calibrated: 2011-06-21

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

- Electronics: DAE4 Sn1279; Calibrated: 2011-06-17

- Phantom: SAM_Right; Type: SAM; Serial: TP-1303

- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch9400/Area Scan (31x61x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.777 mW/g

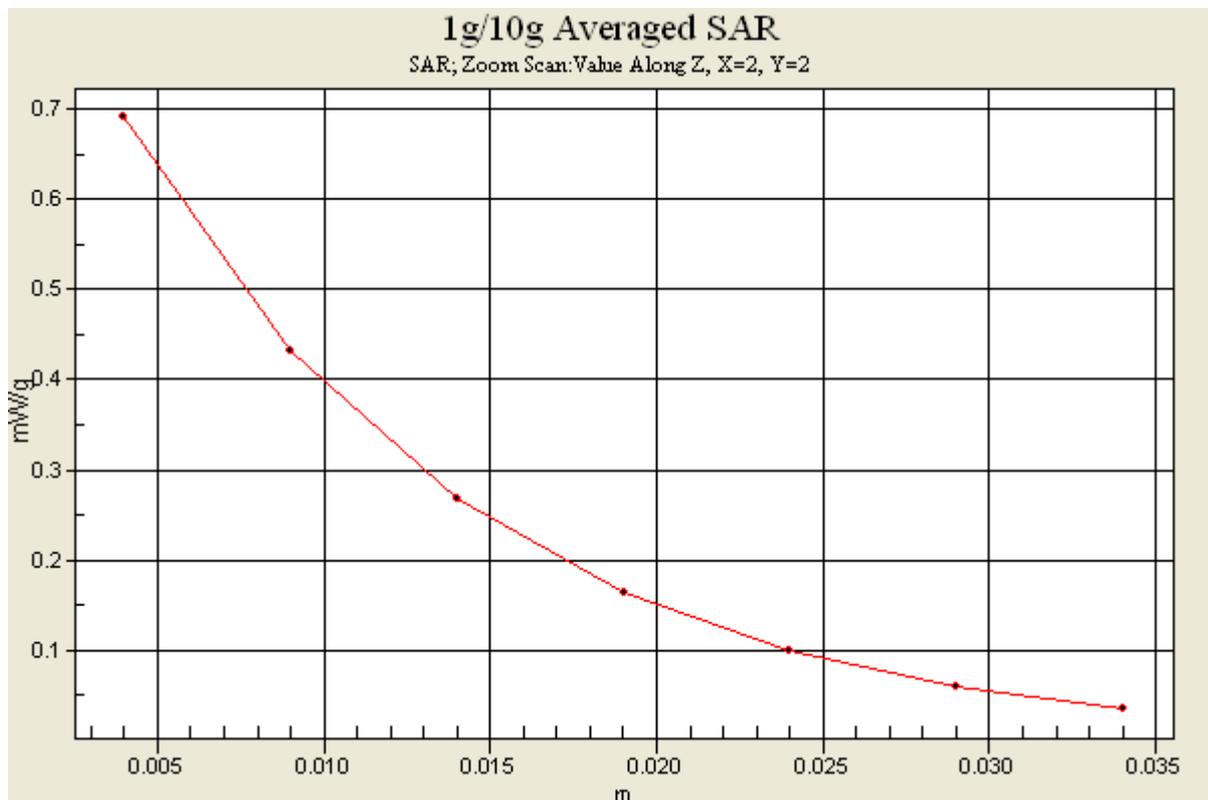
Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.5 V/m; Power Drift = 0.049 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.644 mW/g; SAR(10 g) = 0.374 mW/g

Maximum value of SAR (measured) = 0.691 mW/g





Appendix C. DASYS Calibration Certificate

The DASYS calibration certificates are shown as follows.



Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'etalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client Sporton (Auden)

Certificate No: D835V2-499_Mar10

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 499
Calibration procedure(s): QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date: March 22, 2010

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Table with 4 columns: Primary Standards, ID #, Cal Date (Certificate No.), Scheduled Calibration. Includes items like Power meter EPM-442A, Power sensor HP 8481A, Reference 20 dB Attenuator, etc.

Calibrated by: Dimce Iliev, Laboratory Technician
Approved by: Katja Pokovic, Technical Manager

Issued: March 22, 2010

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.



Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.9 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR normalized	normalized to 1W	9.72 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.71 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.31 mW / g ± 16.5 % (k=2)



Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.3 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.53 mW / g
SAR normalized	normalized to 1W	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.62 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.66 mW / g
SAR normalized	normalized to 1W	6.64 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.49 mW / g ± 16.5 % (k=2)



Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.2 Ω - 3.2 j Ω
Return Loss	- 28.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.1 Ω - 5.9 j Ω
Return Loss	- 24.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 10, 2003

DASY5 Validation Report for Head TSL

Date/Time: 22.03.2010 10:17:58

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

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

Medium: HSL900

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 42.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASYS, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

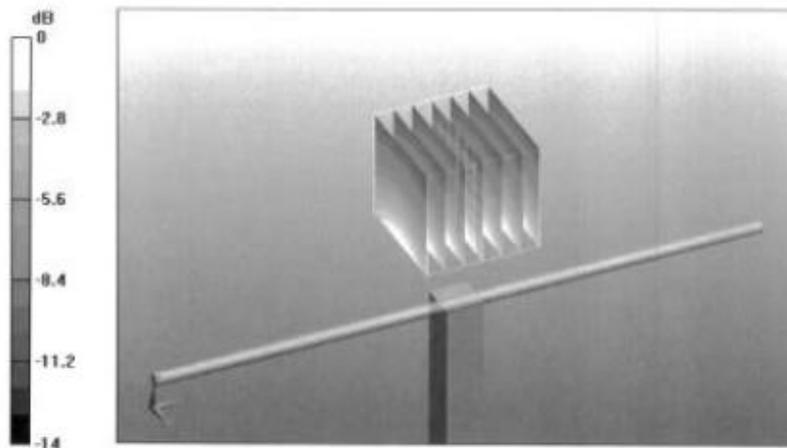
Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.5 V/m; Power Drift = 0.00691 dB

Peak SAR (extrapolated) = 3.63 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.58 mW/g

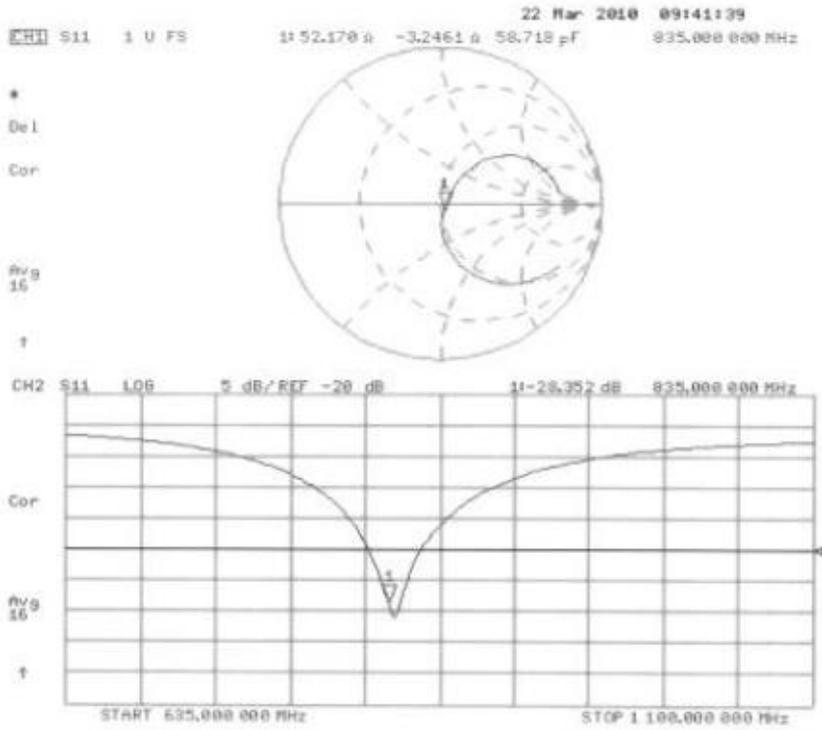
Maximum value of SAR (measured) = 2.84 mW/g



0 dB = 2.84mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 22.03.2010 14:07:53

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

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

Medium: MSL900

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 55.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

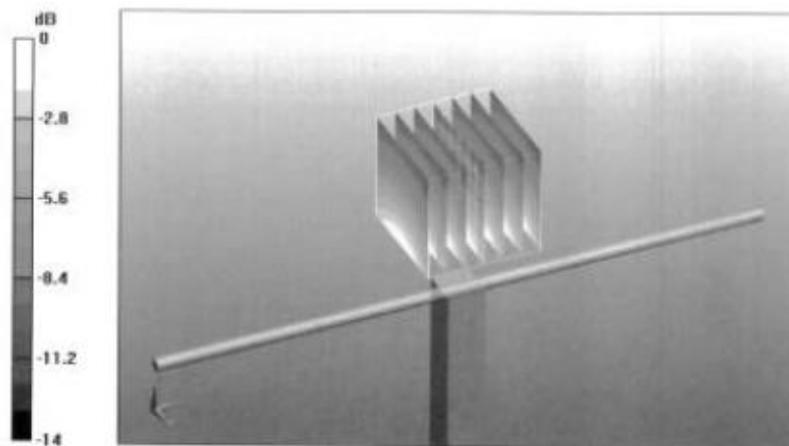
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.6 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 3.73 W/kg

SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.66 mW/g

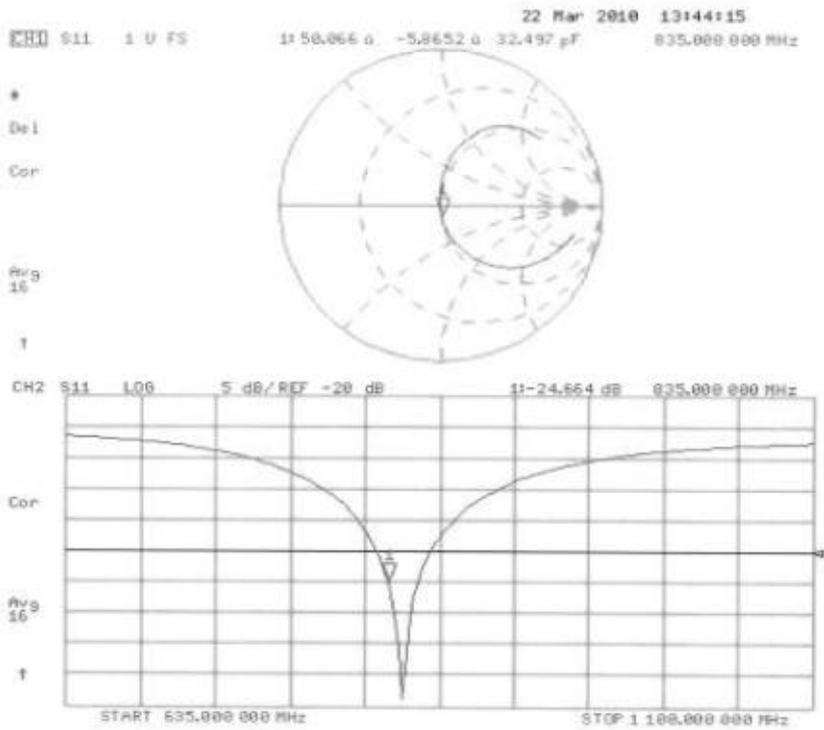
Maximum value of SAR (measured) = 2.94 mW/g



0 dB = 2.94mW/g



Impedance Measurement Plot for Body TSL



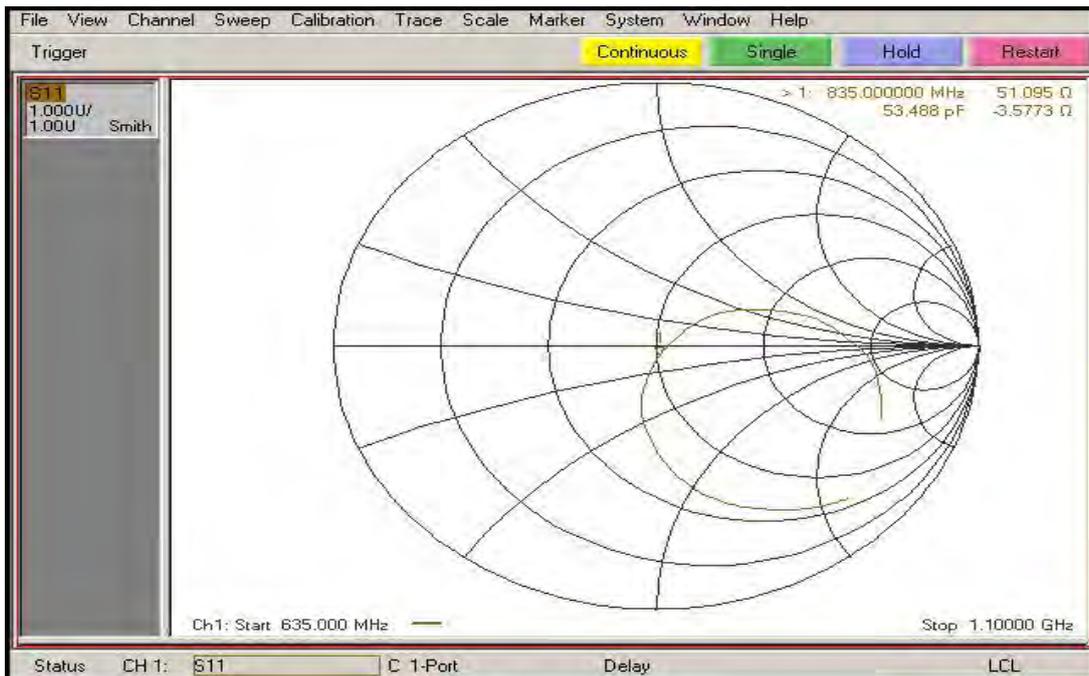


D835V2, serial no. 499 Extended Dipole Calibrations

Referring to KDB 450824, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

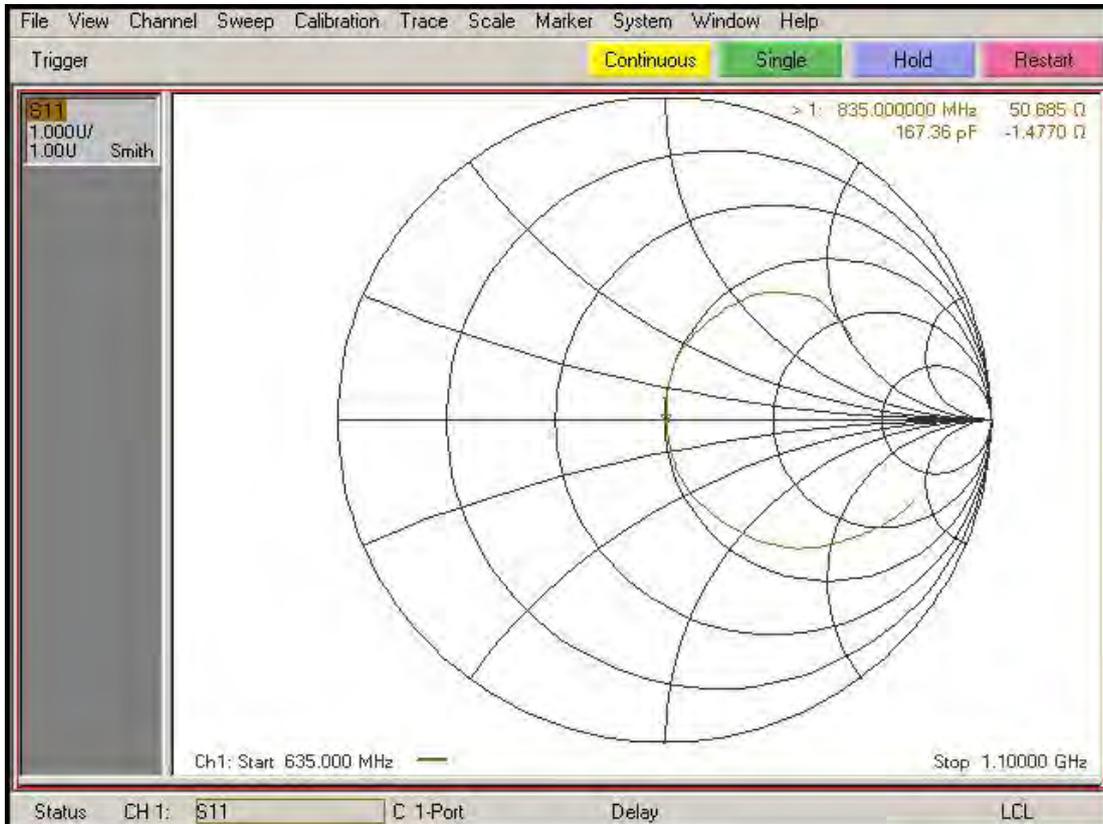
<Dipole Verification Data> - D835 V2, serial no. 499

835 MHz - Head





835 MHz – Body





<Justification of the extended calibration>

D835V2 – serial no. 499												
Date of Measurement	835 Head						835 Body					
	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
3.22.2010	-28.352		52.17		-3.2461		-24.664		50.066		-5.8652	
3.22.2011	-28.323	0.102	51.095	1.075	-3.5773	0.331	-24.665	-0.004	50.685	-0.619	-1.477	-4.388

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.



Calibration Laboratory of Schmid & Partner Engineering AG, Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst, C Service suisse d'étalonnage, S Servizio svizzero di taratura, S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client Sporton (Auden)

Certificate No: D1900V2-5d041_Mar10

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d041
Calibration procedure(s): QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date: March 23, 2010

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Table with 4 columns: Primary Standards, ID #, Cal Date (Certificate No.), Scheduled Calibration. Lists equipment like Power meter EPM-442A, Power sensor HP 8481A, etc.

Calibrated by: Name Dimce Iliev, Function Laboratory Technician, Signature [Handwritten]
Approved by: Name Katja Pokovic, Function Technical Manager, Signature [Handwritten]

Issued: March 23, 2010

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland



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S Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.



Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	1.45 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.8 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.25 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.9 mW /g ± 16.5 % (k=2)



Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9 ± 6 %	1.58 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.4 mW / g
SAR normalized	normalized to 1W	41.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.0 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.57 mW / g
SAR normalized	normalized to 1W	22.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	22.1 mW / g ± 16.5 % (k=2)



Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω + 5.9 j Ω
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω + 5.7 j Ω
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 04, 2003

DASY5 Validation Report for Head TSL

Date/Time: 23.03.2010 12:03:30

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d041

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

Medium: HSL U11 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

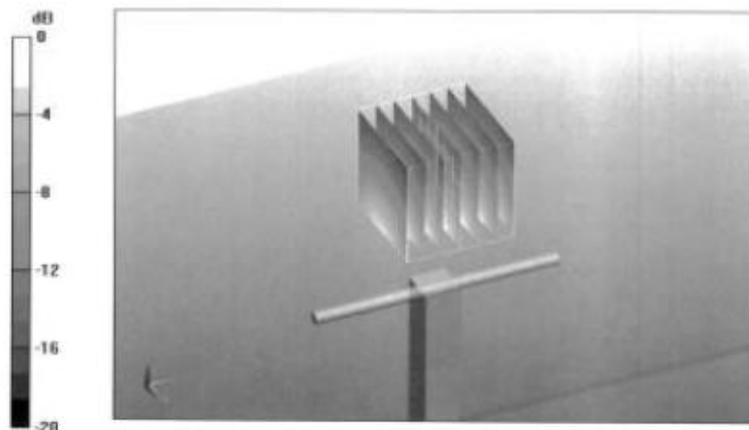
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.8 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 18.4 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.25 mW/g

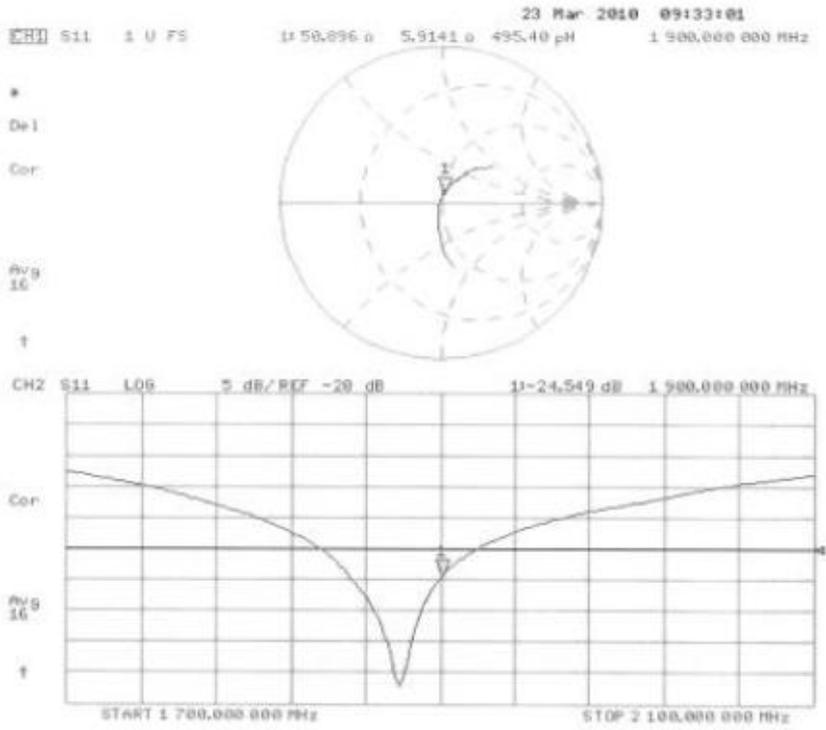
Maximum value of SAR (measured) = 12.7 mW/g



0 dB = 12.7mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 17.03.2010 12:43:32

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d041

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

Medium: MSL U11 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

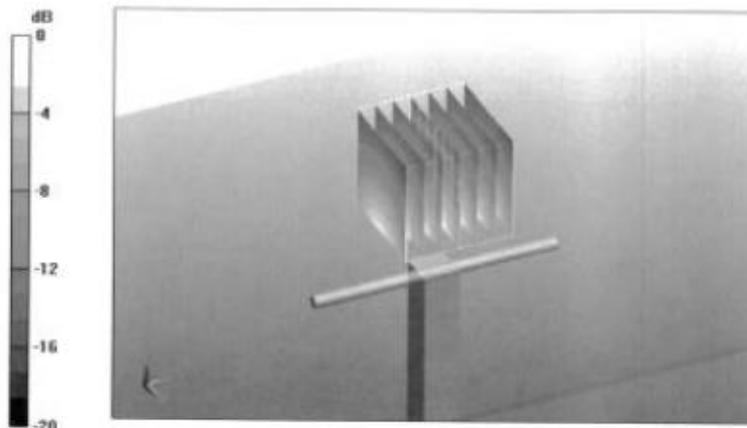
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.1 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.57 mW/g

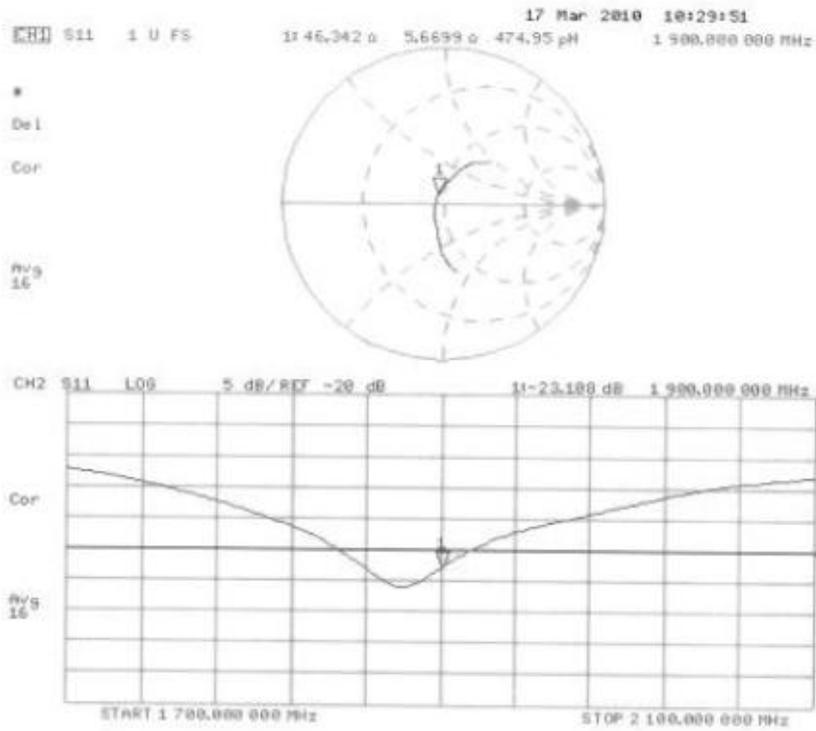
Maximum value of SAR (measured) = 13.1 mW/g



0 dB = 13.1mW/g



Impedance Measurement Plot for Body TSL



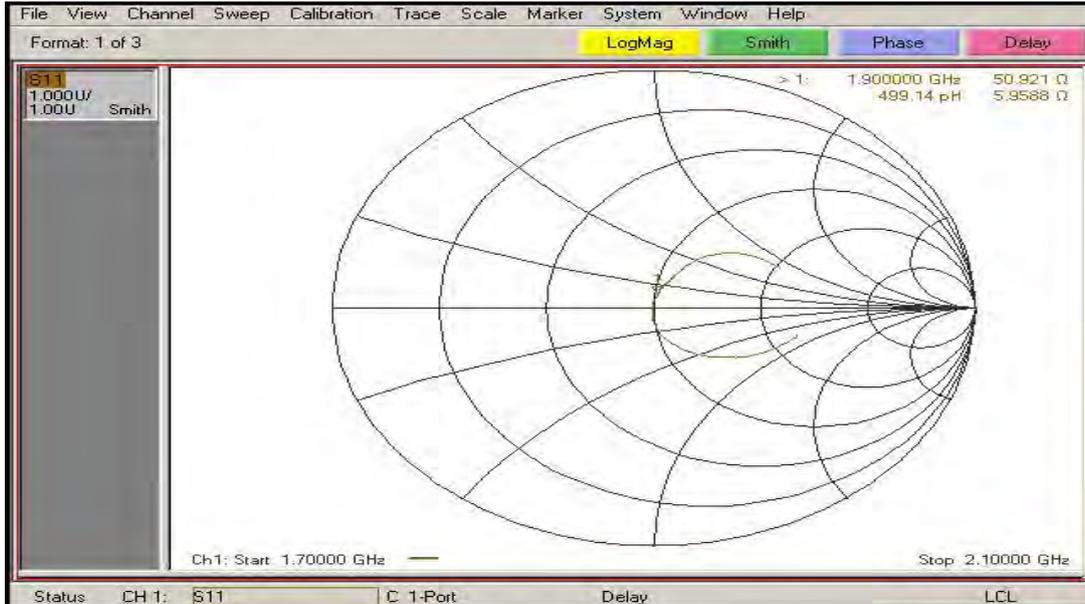


D1900V2, serial no. 5D041 Extended Dipole Calibrations

Referring to KDB 450824, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

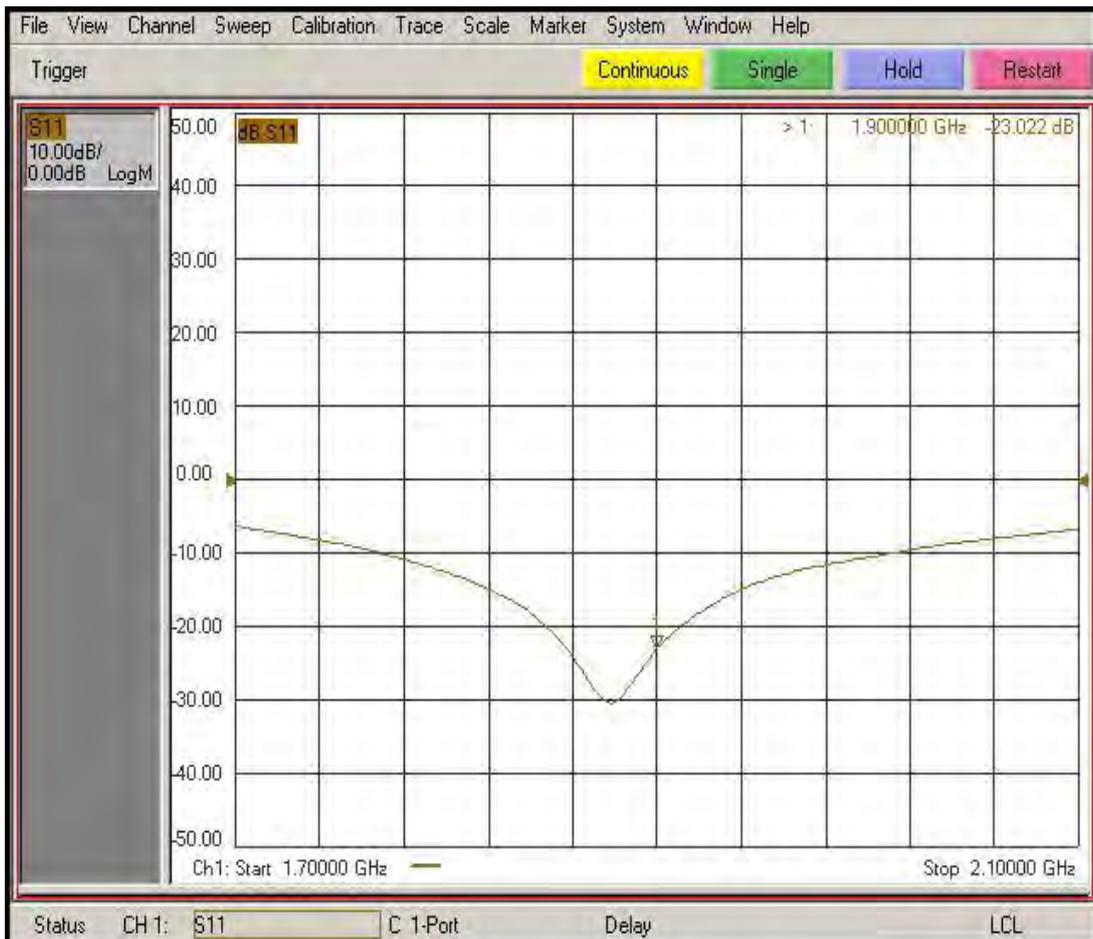
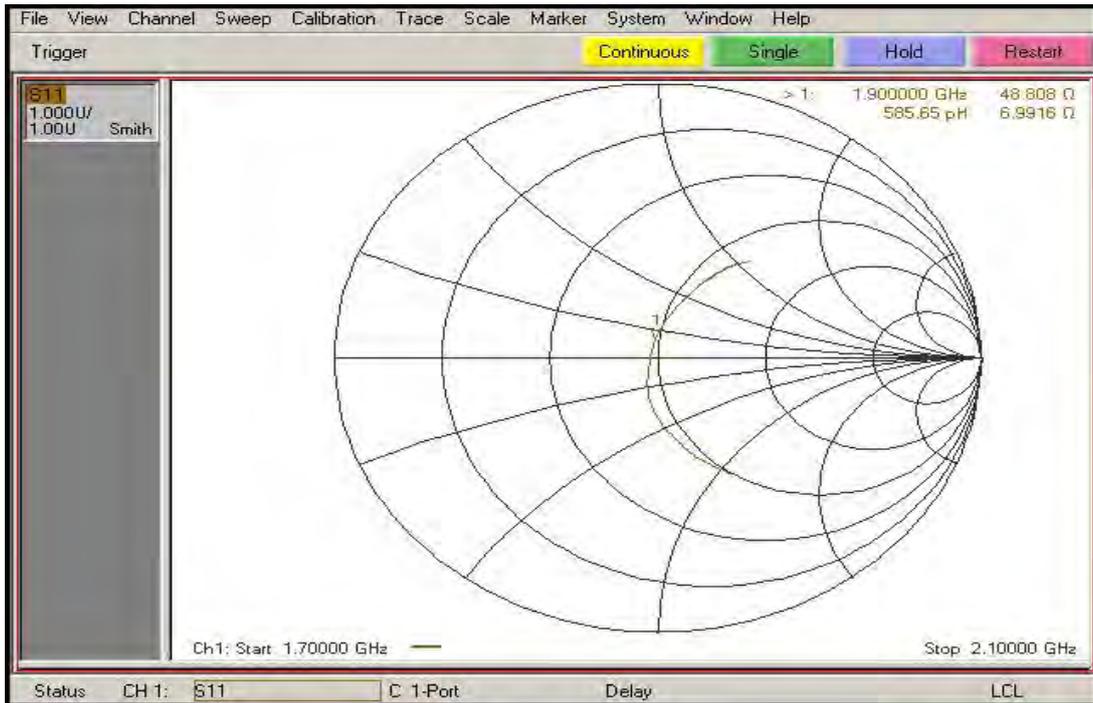
<Dipole Verification Data> - D1900 V2, serial no. 5D041

1900 MHz – Head





FCC Test Report



1900 MHz – Body

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978



<Justification of the extended calibration>

D1900V2 – serial no. 5D041												
	1900 Head						1900 Body					
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
3.23.2010	-24.549		50.896		5.9141		-23.108		46.342		5.669	
3.23.2011	-24.489	0.244	50.921	-0.025	5.9588	-0.045	-23.022	0.372	48.808	-2.466	6.991	-1.322

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:

Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:

Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:

To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Sporton (Auden)**

Certificate No: **DAE4-1279_Jun11**

CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BJ - SN: 1279**

Calibration procedure(s) **QA CAL-06.v23
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **June 17, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	08-Jun-11 (in house check)	In house check: Jun-12

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: June 17, 2011

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Glossary

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
 - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
 - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
 - *Input Offset Measurement:* Output voltage and statistical results over a large number of zero voltage measurements.
 - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - *Input resistance:* Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
 - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ V, full range = -100...+300 mV

Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.162 \pm 0.1% (k=2)	404.963 \pm 0.1% (k=2)	404.302 \pm 0.1% (k=2)
Low Range	3.98709 \pm 0.7% (k=2)	3.98815 \pm 0.7% (k=2)	3.99781 \pm 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	118.0 \pm 1 $^{\circ}$
---	--------------------------

Appendix

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	200002.8	-4.26	-0.00
Channel X + Input	20001.11	0.81	0.00
Channel X - Input	-19998.30	1.20	-0.01
Channel Y + Input	199995.9	-0.67	-0.00
Channel Y + Input	20000.72	0.62	0.00
Channel Y - Input	-19999.63	-0.23	0.00
Channel Z + Input	199995.6	0.15	0.00
Channel Z + Input	20000.35	0.35	0.00
Channel Z - Input	-20000.36	-0.96	0.00

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	1999.5	-0.70	-0.04
Channel X + Input	200.23	0.03	0.02
Channel X - Input	-198.52	1.58	-0.79
Channel Y + Input	1999.8	-0.15	-0.01
Channel Y + Input	198.26	-1.84	-0.92
Channel Y - Input	-200.72	-0.62	0.31
Channel Z + Input	1999.8	0.10	0.00
Channel Z + Input	199.24	-0.86	-0.43
Channel Z - Input	-200.82	-0.92	0.46

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	16.73	15.44
	- 200	-15.03	-16.55
Channel Y	200	7.99	7.96
	- 200	-9.76	-9.79
Channel Z	200	-0.47	-0.96
	- 200	-0.90	-0.88

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	2.87	-0.12
Channel Y	200	2.95	-	4.72
Channel Z	200	0.64	-1.17	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15670	15865
Channel Y	16434	16415
Channel Z	15919	15447

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	0.19	-0.98	1.40	0.51
Channel Y	-0.58	-2.05	0.62	0.61
Channel Z	-1.53	-3.41	0.30	0.56

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Auden**

Certificate No: **EX3-3578_Jun11**

CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3578**

Calibration procedure(s): **QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **June 21, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: June 21, 2011

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- **NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below *ConvF*).
- **NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- **DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- **PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- **A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A, B, C** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- **ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- **Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- **Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3578

Manufactured: November 4, 2005
Calibrated: June 21, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3578

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.53	0.50	0.56	$\pm 10.1 \%$
DCP (mV) ^B	101.0	99.8	100.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	117.4	$\pm 1.7 \%$
			Y	0.00	0.00	1.00	116.2	
			Z	0.00	0.00	1.00	123.2	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3578

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	8.66	8.66	8.66	0.80	0.71	± 12.0 %
835	41.5	0.90	8.33	8.33	8.33	0.80	0.69	± 12.0 %
900	41.5	0.97	8.21	8.21	8.21	0.80	0.69	± 12.0 %
1750	40.1	1.37	7.62	7.62	7.62	0.80	0.70	± 12.0 %
1900	40.0	1.40	7.26	7.26	7.26	0.80	0.69	± 12.0 %
2000	40.0	1.40	7.21	7.21	7.21	0.80	0.68	± 12.0 %
2450	39.2	1.80	6.42	6.42	6.42	0.80	0.68	± 12.0 %
5200	36.0	4.66	4.26	4.26	4.26	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.06	4.06	4.06	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.12	4.12	4.12	0.45	1.80	± 13.1 %
5600	35.5	5.07	3.94	3.94	3.94	0.40	1.80	± 13.1 %
5800	35.3	5.27	3.84	3.84	3.84	0.50	1.80	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4- SN:3578

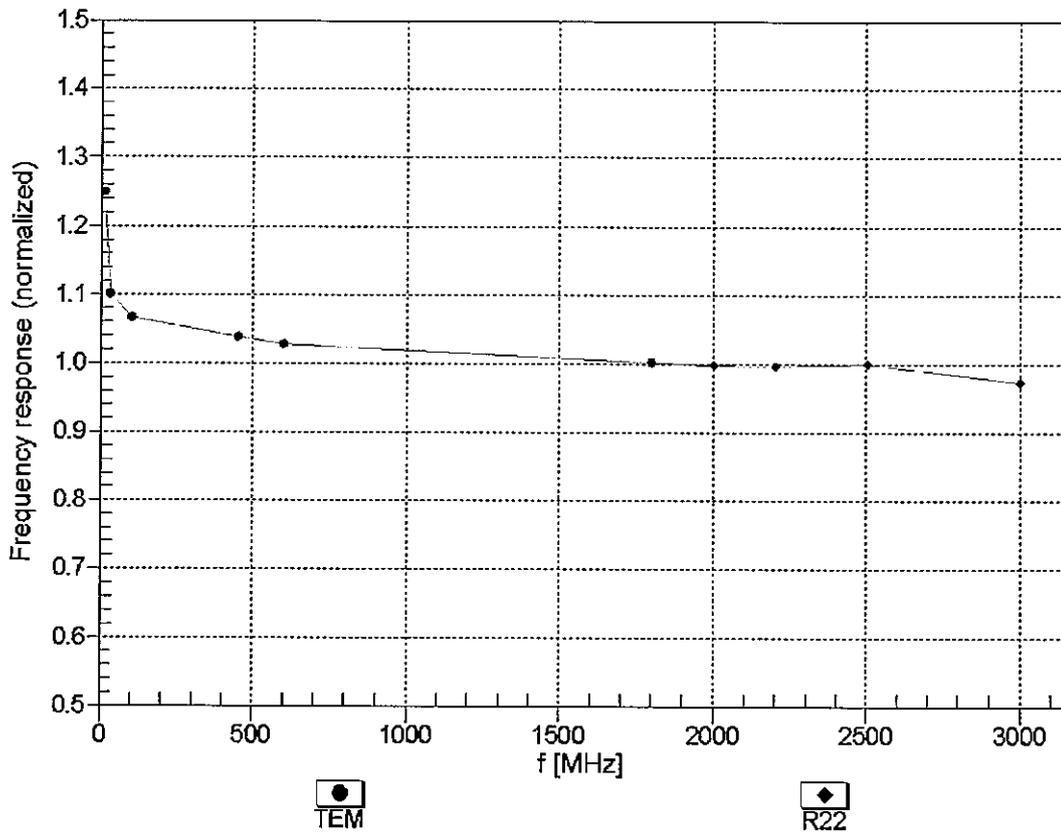
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	8.77	8.77	8.77	0.80	0.75	± 12.0 %
835	55.2	0.97	8.45	8.45	8.45	0.80	0.75	± 12.0 %
900	55.0	1.05	8.34	8.34	8.34	0.80	0.72	± 12.0 %
1750	53.4	1.49	7.19	7.19	7.19	0.80	0.75	± 12.0 %
1900	53.3	1.52	6.68	6.68	6.68	0.80	0.73	± 12.0 %
2000	53.3	1.52	6.68	6.68	6.68	0.80	0.73	± 12.0 %
2450	52.7	1.95	6.18	6.18	6.18	0.80	0.50	± 12.0 %
5200	49.0	5.30	3.74	3.74	3.74	0.55	1.90	± 13.1 %
5300	48.9	5.42	3.49	3.49	3.49	0.55	1.90	± 13.1 %
5500	48.6	5.65	3.40	3.40	3.40	0.60	1.90	± 13.1 %
5600	48.5	5.77	3.11	3.11	3.11	0.65	1.90	± 13.1 %
5800	48.2	6.00	3.23	3.23	3.23	0.65	1.90	± 13.1 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

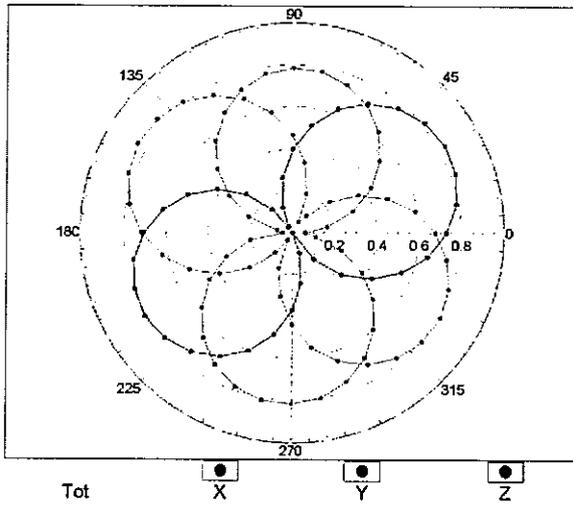
Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



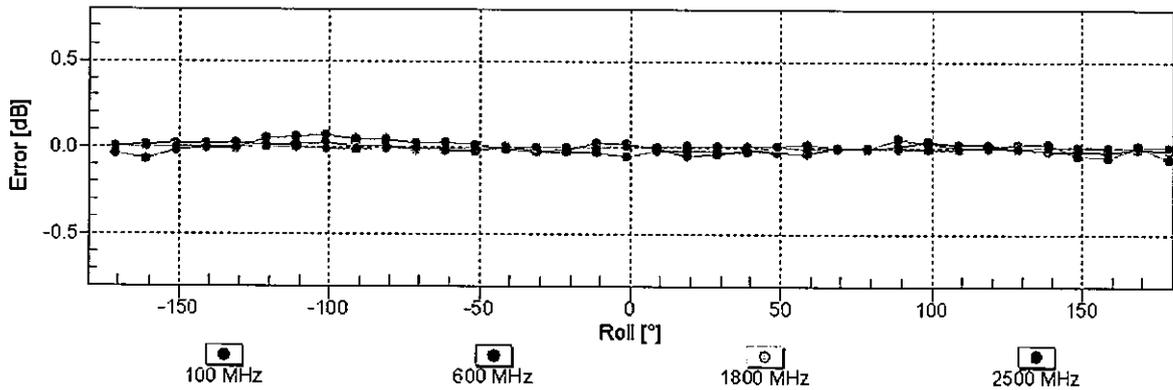
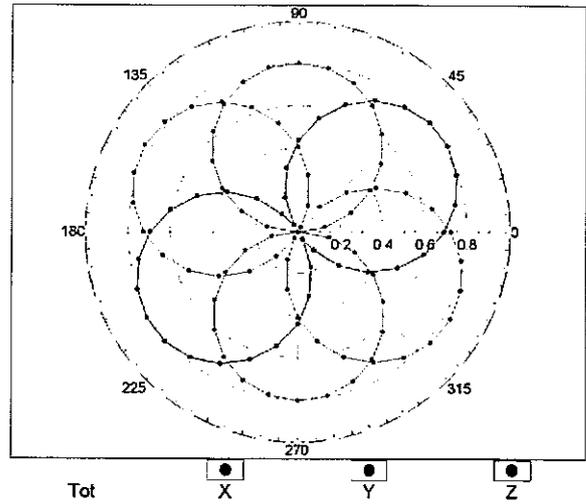
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz, TEM

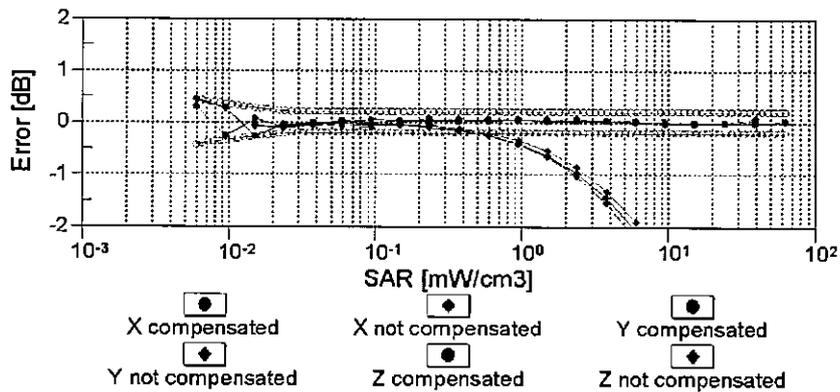
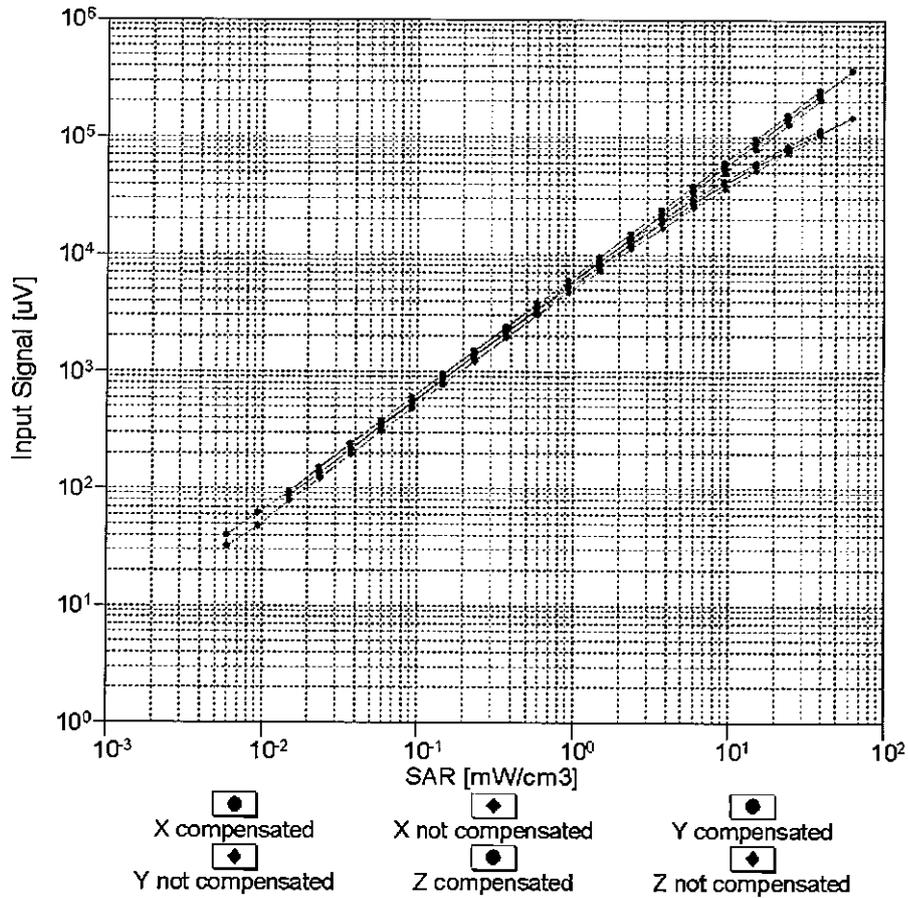


f=1800 MHz, R22



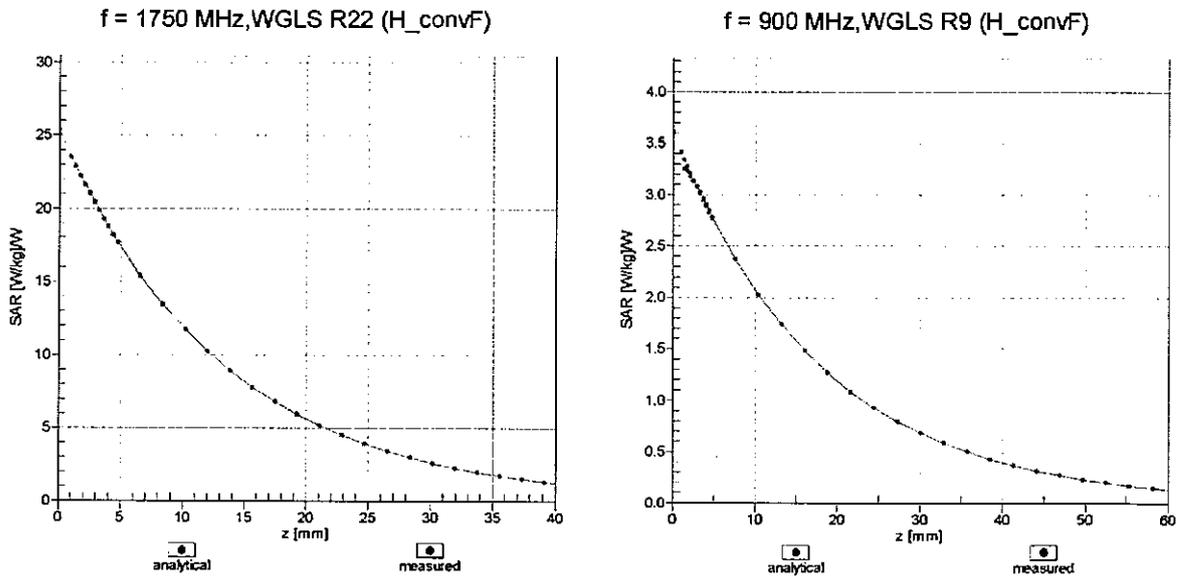
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range $f(SAR_{head})$ (TEM cell , $f = 900$ MHz)

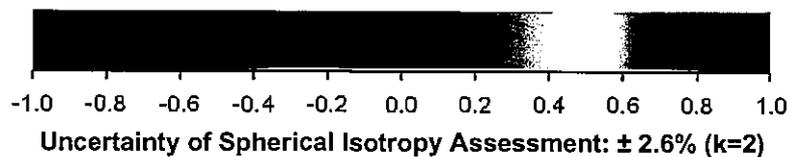
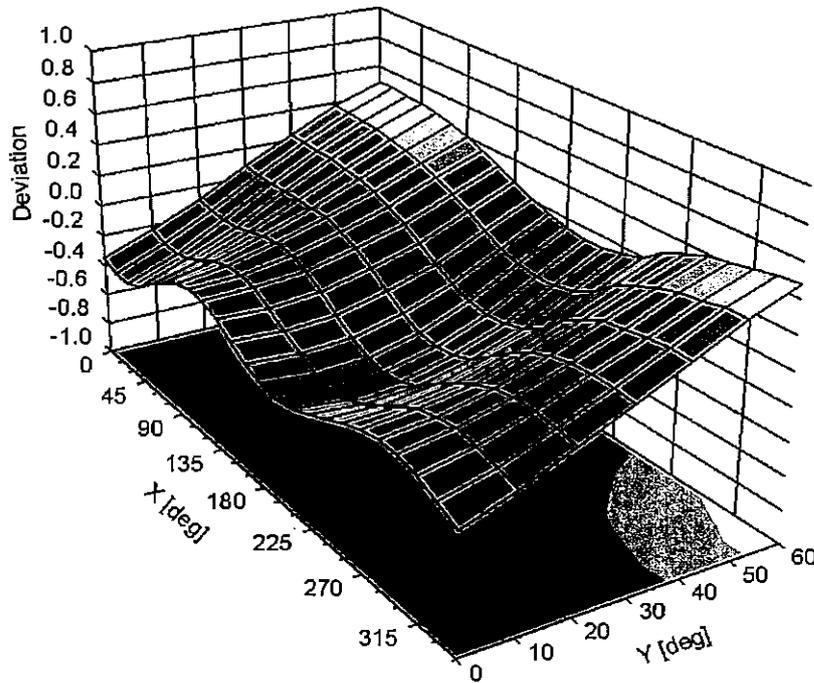


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3578**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

Appendix E. FCC 3G SAR Measurement Procedures

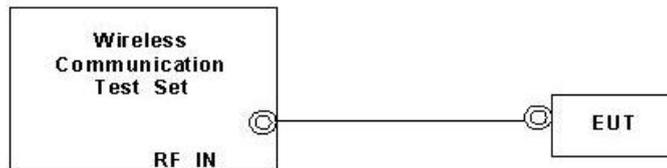
Conducted Output Power:

The EUT was tested according to the requirements of the FCC 3G procedures and the TS 34.121. A detailed analysis of the output power for all WCDMA modes is provided in the tables below. According to the FCC 3G procedures, handsets with WCDMA should be tested according to Release 99 WCDMA test procedures, and the function. Device was tested according to procedure KDB941225 - section Release 99 RMC12.2K Data Devices as documented/evaluated in the following table. Power values for RMC12.2K are configurations in WCDMA.

WCDMA SAR Test mode - Conducted Power							
Mode	Setup	Cell band (850)			PCS band (1900)		
		CH4132	CH4182	CH4233	CH9262	CH9400	CH9538
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)
WCDMA	RMC 12.2Kbps	23.67	23.30	23.33	23.34	23.42	23.37

WCDMA Setup Configuration:

- a. The EUT was connected to Base Station referred to the drawing of Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting
 - i. Data rates: Varied from RMC 12.2Kbps
 - ii. RMC Test Loop = Loop Mode 1
 - iii. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.



Setup Configuration



Reference:

- [1] 941225 D01 SAR test for 3G devices v02, SAR Measurement Procedures for 3G Devices CDMA 2000/Ev-Do/WCDMA/HSDPA/HSPA Oct. 2007 Laboratory Division Office of Engineering and Technology Federal Communications Commission
- [2.] TS 34.121 Universal Mobile Telecommunications System (UMTS); Terminal Conformance Specification, Radio Transmission and Reception (FDD)