TESTING
No. L2264

OET 65

TEST REPORT

Product Name	Dual Band Two Way Radio
Model	AW-68/AW-69/AW-68V/LT-9800/LT-9808
FCC ID	RIQAW68XDB
Client	Access Device Integrated Communications Corp.

TA Technology (Shanghai) Co., Ltd.

GENERAL SUMMARY

Product Name	Dual Band Two Way Radio	**Model**	AW-68/AW-69/AW-68V/LT-9800/ LT-9808
FCC ID	RIQAW68XDB	**Report No.**	RXA1212-1196SAR01R2
Client	Access Device Integrated Communications Corp.		
Manufacturer	Access Device Integrated Communications Corp.		
Reference Standard(s)	**IEEE Std C95.1, 1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz. **SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001 including DA 02-1438 June 19, 2002:** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions. **KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01** SAR Measurement Requirements for 100 MHz to 6 GHz **KDB 643646 D01 SAR Test for PTT Radios v01r01:** SAR Test Reduction Considerations for Occupational PTT Radios **KDB 447498 D01 Mobile Portable RF Exposure v05:** Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies		
Conclusion	This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards. General Judgment: **Pass** (Stamp) 上海同耀通信技术有限公司 报告专用章 **Date of issue: May 13th, 2013**		
Comment	The test result only responds to the measured sample.		

Approved by________ 杨伟中
Director

Revised by________ 凌敏宝
SAR Manager

Performed by________ 孙易
SAR Engineer

TABLE OF CONTENT

1. General Information

1.1. Notes of the Test Report

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

TA Technology (Shanghai) Co., Ltd. is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. This report only refers to the item that has undergone the test.

This report standalone dose not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities. This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of **TA Technology (Shanghai) Co., Ltd.** and the Accreditation Bodies, if it applies.

If the electrical report is inconsistent with the printed one, it should be subject to the latter.

1.2. Testing Laboratory

Company:	TA Technology (Shanghai) Co., Ltd.
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1.3. Applicant Information

Company: Access Device Integrated Communications Corp.

Address: No.193,Sec.1,Chungching Road,Taya,Taichung City 42862,Taiwan(R.O.C.)

City: Taichung City

Postal Code: 428193

Country: /

1.4. Manufacturer Information

Company: Access Device Integrated Communications Corp.

Address: No.193,Sec.1,Chungching Road,Taya,Taichung City 42862,Taiwan(R.O.C.)

City: Taichung City

Postal Code: 428193

Country: /

1.5. Information of EUT

General Information

Device Type:	Portable Device
Exposure Category:	Controlled Environment /Occupational
State of Sample:	Prototype Unit
Product Name:	Dual Band Two Way Radio
S/N:	/
Hardware Version:	V 1.0
Software Version:	V 1.0
Antenna Type:	External Antenna
Device Operating Configurations:	
Test Modulation:	FM (Analog)
Operating Frequency Range(s):	136 MHz -174 MHz (VHF)

Auxiliary Equipment Details

Name	Model	Manufacturer	S/N	Note
Battery	BAT9800	QUANZHOU FEIJIE ELECTRONIC CO., LTD	/	/

Equipment Under Test (EUT) is a Dual Band Two Way Radio. SAR is tested for 136 MHz -174 MHz. The EUT has an external antennas that is used for Tx/Rx.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. The Maximum SAR_{1g} Values

Mode	Frequency (MHz)	Position	Reported SAR_{1g} (W/kg) 50% PTT duty cycle
VHF	145.5MHz	Face-held	**0.250**
	145.5MHz	Body-Worn	**0.648**

1.7. Test Date

The test performed from December 25, 2012 to December 26, 2012.

2. SAR Measurements System Configuration

2.1. SAR Measurement Set-up

The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

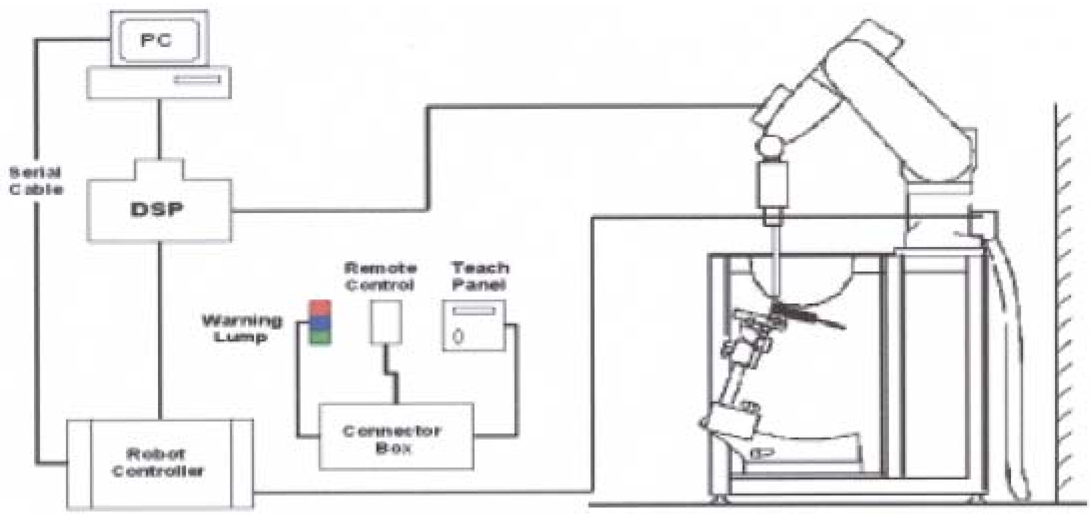


Figure 1. SAR Lab Test Measurement Set-up

2.2. DASY5 E-field Probe System

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

2.2.1. ES3DV3 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to 4 GHz Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 μW/g to > 100 mW/g Linearity: ± 0.2dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

Figure 2. ES3DV3 E-field Probe

Figure 3. ES3DV3 E-field probe

2.2.2. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.
Or

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

2.3. Other Test Equipment

2.3.1. Device Holder for Transmitters

The DASY device holder is designed to cope with the die rent positions given in the standard.
It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
The DASY device holder is constructed of low-loss POM material.The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the inference of the clamp on the test results could thus be lowered.

Figure 4.Device Holder

2.3.2. Phantom

Phantom for compliance testing of handheld andbody-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI isfully compatible with the IEC 62209-2 standard and all known tissuesimulating liquids. ELI has been optimized regarding its performance and can beintegrated into our standard phantom tables. A cover prevents evaporation ofthe liquid. Reference markings on the phantom allow installation of thecomplete setup, including all predefined phantom positions and measurementgrids, by teaching three points. The phantom is compatible with all SPEAGdosimetric probes and dipoles.

Shell Thickness	2±0.2 mm
Filling Volume	Approx. 30 liters
Dimensions	190×600×0 mm (H x L x W)

Figure 5.ELI4 Phantom

2.4. Scanning Procedure

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

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

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

- Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.

After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

- Zoom Scan

Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 5x5x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

- Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 5x5x7 measurement points with 8mm resolution amounting to 175 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 5x5x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

2.5. Data Storage and Evaluation

2.5.1. Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

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

2.5.2. Data Evaluation by SEMCAD

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

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

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

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot c\,f / d\,c\,p_i$$

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:

E-field probes: $$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes: $$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(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):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

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

$$SAR = (E_{tot})^2 \cdot \sigma / (\rho \cdot 1000)$$

with SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

σ = conductivity in [mho/m] or [Siemens/m]

ρ = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m

3. Laboratory Environment

Table 1: The Requirements of the Ambient Conditions

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

4. Tissue-equivalent Liquid

4.1. Tissue-equivalent Liquid Ingredients

The liquid is consisted of water, sugar, salt, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The table 2 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

The simulated tissue mixture was mixed based on the Simulated Tissue Composition indicated in table 2 below for 300 MHz. During the daily testing of this product, the applicable mixture was used to measure the Di-electric parameters at 300,150MHz frequencies to verify that the Di-electric parameters were within the tolerance of the tissue specifications.

Table 2: Composition of the Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Head) 300MHz
Water	37.56
Sugar	55.32
Salt	5.95
Preventol	0.19
Cellulose	0.98
Dielectric Parameters Target Value	f=300MHz ε=45.3 σ=0.87

MIXTURE%	FREQUENCY(Body) 300MHz
Water	49.48
Sugar	47.4
Salt	2.32
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=300MHz ε=58.2 σ=0.92

4.2. Tissue-equivalent Liquid Properties

Table 3: Dielectric Performance of Head Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ε_r	σ(s/m)	℃
150MHz (head)	Target value ±5% window	52.30 49.69 — 54.92	0.76 0.72 — 0.80	22.0
	Measurement value 2012-12-26	50.17	0.759	21.5
300MHz (head)	Target value ±5% window	45.30 43.04 — 47.57	0.87 0.83 — 0.91	22.0
	Measurement value 2012-12-26	45.12	0.883	21.5

Table 4: Dielectric Performance of Body Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ε_r	σ(s/m)	℃
150MHz (body)	Target value ±5% window	61.9 58.81 — 65.00	0.80 0.76 — 0.84	22.0
	Measurement value 2012-12-25	61.88	0.803	21.5
300MHz (body)	Target value ±5% window	58.20 55.3 — 61.1	0.92 0.87 — 0.97	22.0
	Measurement value 2012-12-25	57.34	0.912	21.5

5. System Check

5.1. Description of System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 398 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 5 and table 6.

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

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

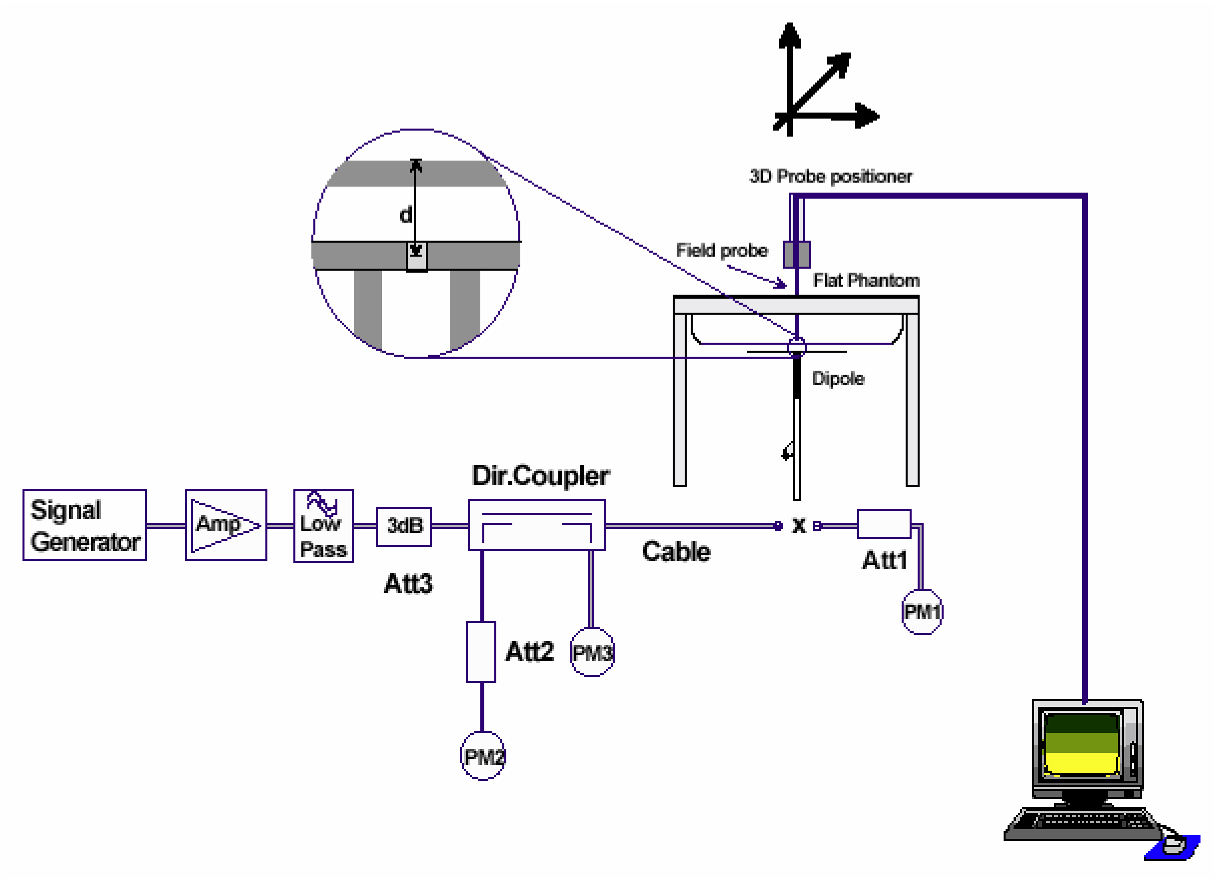


Figure 6. System Check Set-up

5.2. System Check Results

Table 5: System Check for Head Tissue Simulating Liquid

Frequency	Test Date	Dielectric Parameters		Temp	398mW Measure SAR_{1g}	1W Normalized SAR_{1g}	1W Target SAR_{1g} (±10% Deviation)
		ε_r	σ(s/m)	(℃)	(W/kg)		
300MHz (head)	2012-12-26	45.12	0.883	21.5	1.15	2.890	2.88 (2.592~3.168)

Note：1. The graph results see ANNEX B.
2. Target Value used derives from the calibration certificate.

Table 6: System Check for Body Tissue Simulating Liquid

Frequency	Test Date	Dielectric Parameters		Temp	398mW Measured SAR_{1g}	1W Normalized SAR_{1g}	1W Target SAR_{1g} (±10% Deviation)
		ε_r	σ(s/m)	(℃)	(W/kg)		
300MHz (body)	2012-12-25	57.34	0.912	21.5	1.12	2.814	2.84 (2.56~3.12)

Note：1. The graph results see ANNEX B.
2. Target Value used derives from the calibration certificate.

6. Operational Conditions during Test

6.1. General Description of Test Procedures

The spatial peak SAR values were assessed for VHF systems. Batterys and accessories shall be specified by the manufacturer. The EUT batterys must be fully charged and checked periodically during the test to ascertain uniform power output.

6.2. Test Configuration

6.2.1. Face-Held Configuration

The front of the EUT is towards the phantom.
The front surface of the EUT is positioned at 25mm parallel to the flat phantom.
The surface of the EUT antenna is positioned at 40mm to the flat phantom.

6.2.2. Body-Worn Configuration

The back of the EUT is towards the phantom.
The belt clip of the EUT directed tightly to touch the bottom of the flat phantom.
The surface of the EUT antenna is positioned at 26mm to the flat phantom.

7. Test Results

7.1. Conducted Power Results

Table 7: Conducted Power Measurement Results

Analog VHF (25KHz)	**Conducted Power**				
	136 MHz	145.5MHz	155 MHz	164.5MHz	173.4 MHz
Test Result (dBm)	37dBm	37.39 dBm	37.28 dBm	37.68 dBm	37.33 dBm

7.2. SAR Test Results

7.2.1. VHF

Table 8: SAR Values (VHF)

Test Position	Frequency (MHz)	Channel Spacing (KHz)	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit SAR$_{1g}$ 8.0 W/kg					
					Drift (dB)	Measured SAR$_{1g}$(W/kg)		Scaling Factor	Reported SAR$_{1g}$(W/kg)		Graph Results
						100%	50%		100%	50%	
The EUT display towards phantom for 25 KHz(Analog, Face Held)											
towards phantom	136	25	37.78	37.00	-0.086	0.083	0.042	1.20	0.099	0.050	Figure 9
	145.5	25	37.78	37.39	-0.053	0.452	0.226	1.09	0.494	0.247	Figure 10
	155	25	37.78	37.28	-0.054	0.101	0.051	1.12	0.113	0.057	Figure 11
	164.5	25	37.78	37.68	0.121	0.042	0.021	1.02	0.043	0.021	Figure 12
	173.4	25	37.78	37.33	-0.080	0.048	0.024	1.11	0.053	0.027	Figure 13
The EUT display towards ground for 25 KHz(Analog, Body-Worn)											
towards ground	136	25	37.78	37.00	-0.010	0.314	0.157	1.20	0.376	0.188	Figure 14
	145.5	25	37.78	37.39	-0.073	1.170	0.585	1.09	1.280	0.640	Figure 15
	155	25	37.78	37.28	-0.032	0.129	0.065	1.12	0.145	0.073	Figure 16
	164.5	25	37.78	37.68	-0.137	0.111	0.056	1.02	0.114	0.057	Figure 17
	173.4	25	37.78	37.33	-0.053	0.088	0.044	1.11	0.098	0.049	Figure 18

Note: 1. The EUT Radios with duty factors of 50% apply the maximum duty factor supported by the device to determine compliance.

2. According to KDB447498 $N_c = Round\left\{\left[100\left(f_{high} - f_{low}\right)/f_c\right]^{0.5} \times \left(f_c/100\right)^{0.2}\right\}$, We choose the channel with maximum conducted output power to test.

Table 9: SAR Values are scaled for the power drift

Limits	Reported 1 g Average (W/kg)		Power Drift (dB)	+ Power Drift 10^(|dB|/10)	Reported SAR 1g (W/kg) (include + power drift)	
	8.0		± 0.21			
Frequency	Duty Cycle		Power Drift(dB)		Duty Cycle	
	100%	50%			100%	50%
The EUT display towards phantom for 25 KHz(Analog,Face Held)						
136 MHz	0.099	0.050	-0.086	1.020	0.101	0.051
145.5 MHz	0.494	0.247	-0.053	1.012	0.500	0.250
155 MHz	0.113	0.057	-0.054	1.013	0.114	0.058
164.5 MHz	0.043	0.021	0.121	1.028	0.044	0.022
173.4 MHz	0.053	0.027	-0.080	1.019	0.054	0.028
The EUT display towards ground for 25 KHz(Analog,Body-Worn)						
136 MHz	0.376	0.188	-0.010	1.002	0.384	0.192
145.5 MHz	1.280	0.640	-0.073	1.017	1.295	0.648
155 MHz	0.145	0.073	-0.032	1.007	0.147	0.074
164.5 MHz	0.114	0.057	-0.137	1.032	0.117	0.059
173.4 MHz	0.098	0.049	-0.053	1.012	0.100	0.050

Note: 1.The value with blue color is the maximum SAR Value of each test band.
2. The SAR levels reported are based on 50% PTT duty factor including SAR droop.
3. The Exposure category about EUT: controlled environment/Occupational, so the SAR limit is 8.0 W/kg averaged over any 1 gram of tissue.
4. The (max.cube) labeling indicates that during the grid scanning an additional peak was found which was within 2.0dB of the highest peak. The value of the highest cube is given in the table above; the value from the second assessed cube is given in the SAR distribution plots (See ANNEX C).

8. 100MHz to 700MHz Measurement Uncertainty

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c_i	Standard ncertainty u_i' (%)	Degree of freedom V_{eff} or v_i
1	System repetivity	A	0.5	N	1	1	0.5	9
Measurement system								
2	-probe calibration	B	6.7	N	1	1	6.7	∞
3	-axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	1.9	∞
4	- Hemispherical isotropy of the probe	B	9.4	R	$\sqrt{3}$	$\sqrt{0.5}$	3.9	∞
6	-boundary effect	B	1.9	R	$\sqrt{3}$	1	1.1	∞
7	-probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
8	- System detection limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
9	-readout Electronics	B	1.0	N	1	1	1.0	∞
10	-response time	B	0	R	$\sqrt{3}$	1	0	∞
11	-integration time	B	4.32	R	$\sqrt{3}$	1	2.5	∞
12	-noise	B	0	R	$\sqrt{3}$	1	0	∞
13	-RF Ambient Conditions	B	3	R	$\sqrt{3}$	1	1.73	∞
14	-Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
15	-Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
16	-Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
Test sample Related								
17	-Test Sample Positioning	A	2.9	N	1	1	2.9	71
18	-Device Holder Uncertainty	A	4.1	N	1	1	4.1	5
19	-Output Power Variation - SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
Physical parameter								
20	-phantom	B	4.0	R	$\sqrt{3}$	1	2.3	∞

21	-liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.64	1.8	∞
22	-liquid conductivity (measurement uncertainty)	B	2.5	N	1	0.64	1.6	9
23	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
24	-liquid permittivity (measurement uncertainty)	B	2.5	N	1	0.6	1.5	9
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{24} c_i^2 u_i^2}$					11.88	
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		23.76	

9. Main Test Instruments

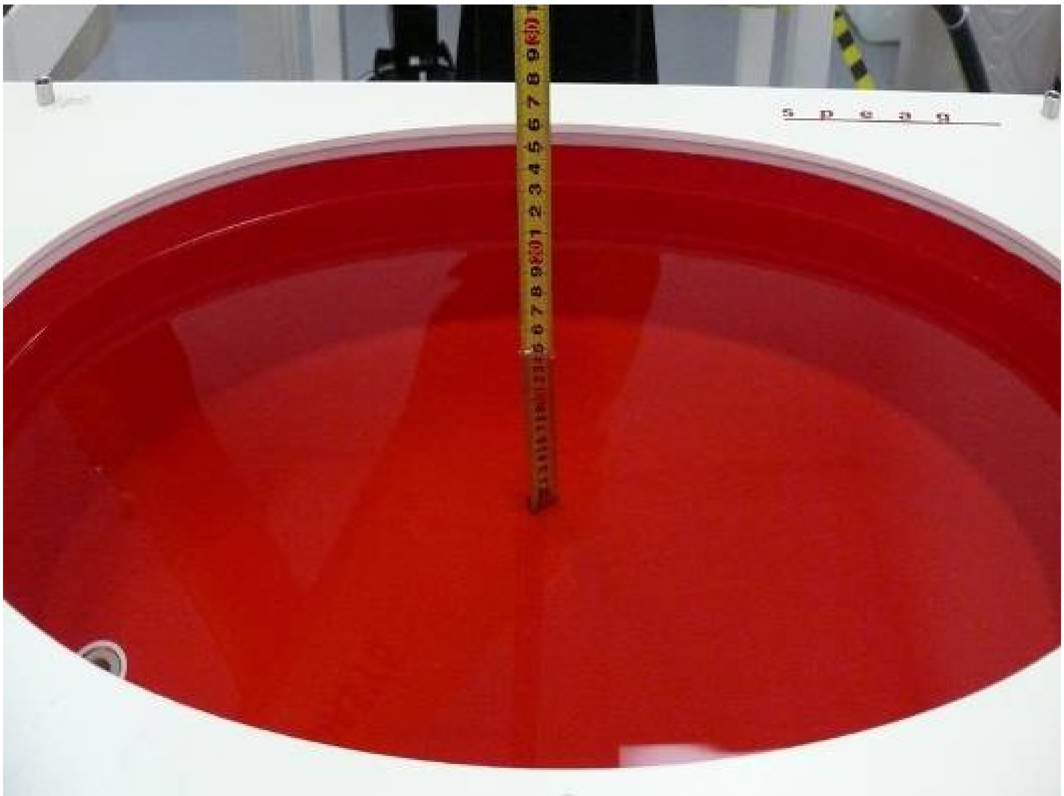
Table 10: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 11, 2012	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 11, 2012	One year
04	Power sensor	Agilent N8481H	MY50350004	September 24, 2012	One year
05	Power sensor	E9327A	US40441622	September 23, 2012	One year
06	Signal Generator	HP 8341B	2730A00804	September 11, 2012	One year
07	Amplifier	IXA-020	0401	No Calibration Requested	
08	E-field Probe	ES3DV3	3189	June 22, 2012	One year
09	DAE	DAE4	1317	January 23, 2012	One year
10	Validation Kit 300MHz	D300V3	1017	July 24, 2012	One year
11	Dual directional coupler	778D-012	50519	March 26, 2012	One year
12	Temperature Probe	JM222	AA1009129	March 15, 2012	One year
13	Hygrothermograph	WS-1	64591	September 27, 2012	One year

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

ANNEX A: Test Layout

Picture 1: Specific Absorption Rate Test Layout



Picture 2: Liquid depth in the Flat Phantom (150MHz, 15.1cm depth)

Picture 3: Liquid depth in the Flat Phantom (300MHz, 15.4cm depth)

ANNEX B: System Check Results

System Performance Check at 300 MHz Head TSL

DUT: Dipole300 MHz; Type: D300V3; Serial: 1017

Date/Time: 12/26/2012 11:18:50 AM

Communication System: CW; Frequency: 300 MHz;Duty Cycle: 1:1

Medium parameters used: f = 300 MHz; σ = 0.883 mho/m; ε_r = 45.12; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(6.83, 6.83, 6.83); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

d=15mm, Pin=398mW/Area Scan (61x301x1): Measurement grid: dx=15mm, dy=15mm

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

d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 37.3 V/m; Power Drift = -0.034 dB

Peak SAR (extrapolated) = 1.77 W/kg

SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.774 mW/g

Maximum value of SAR (measured) = 1.23 mW/g

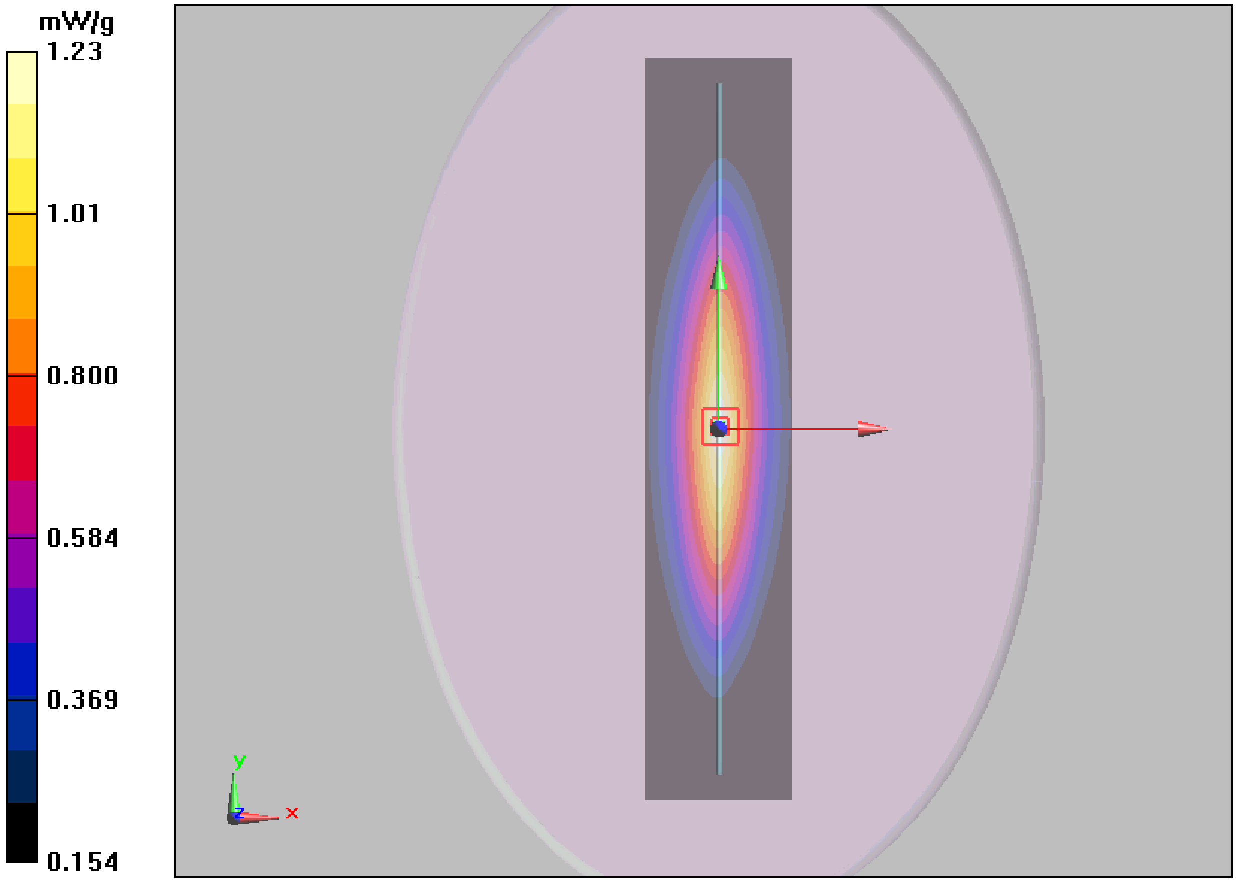


Figure 7 System Performance Check 300MHz 398mW

System Performance Check at 300 MHz Body TSL

DUT: Dipole300 MHz; Type: D300V3; Serial: 1017

Date/Time: 12/25/2012 7:05:18 PM

Communication System: CW; Frequency: 300 MHz;Duty Cycle: 1:1

Medium parameters used: f = 300 MHz; σ = 0.912 mho/m; ε_r = 57.34; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(6.53, 6.53, 6.53); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

d=15mm, Pin=398mW/Area Scan (61x301x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.2 mW/g

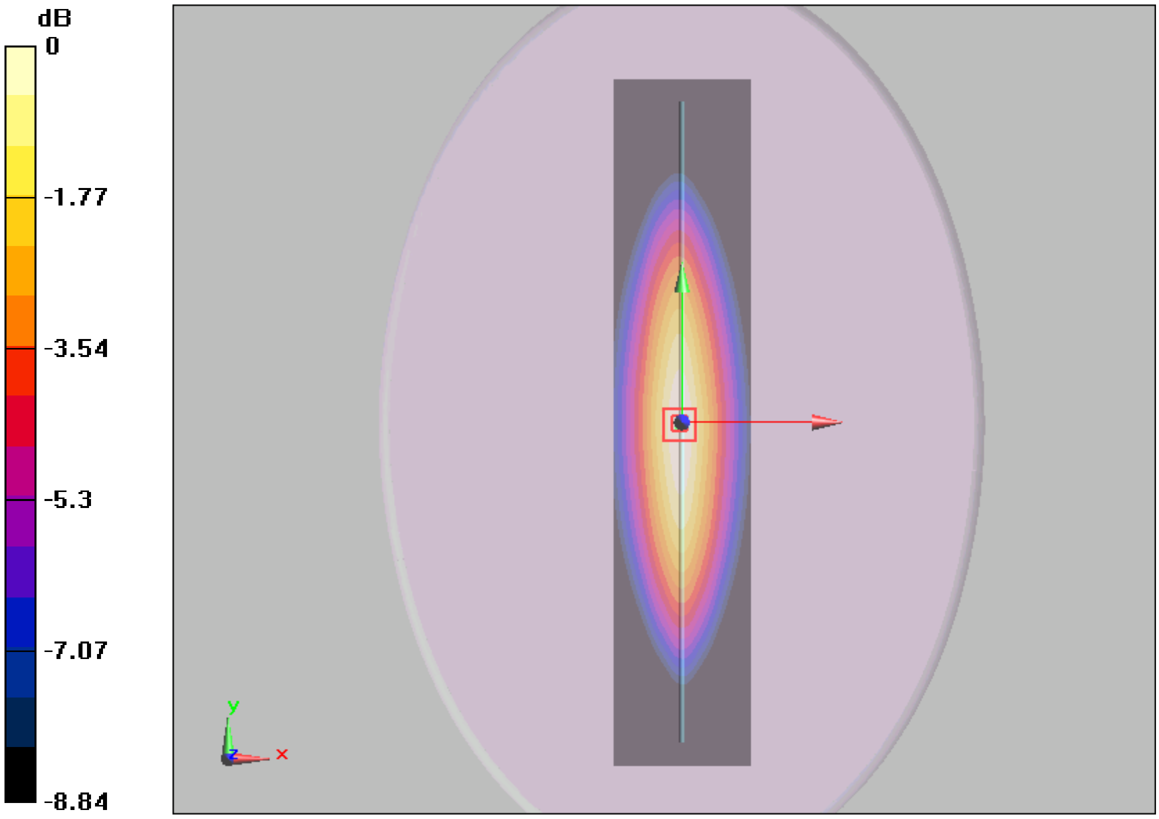
d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 36.8 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.769 mW/g

Maximum value of SAR (measured) = 1.2 mW/g



0 dB = 1.2mW/g

Figure 8 System Performance Check 300MHz 398mW

ANNEX C: Graph Results

Face Held for Analog, Front towards Phantom 136MHz (25 KHz Channel Spacing)

Date/Time: 12/26/2012 2:29:26 PM

Communication System: PTT 150; Frequency: 136 MHz;Duty Cycle: 1:1

Medium parameters used: f = 136 MHz; σ = 0.749 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.7, 7.7, 7.7); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 1/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.086 mW/g

Towards Ground Ch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.4 V/m; Power Drift = -0.086 dB

Peak SAR (extrapolated) = 0.113 W/kg

SAR(1 g) = 0.083 mW/g; SAR(10 g) = 0.065 mW/g

Maximum value of SAR (measured) = 0.087 mW/g

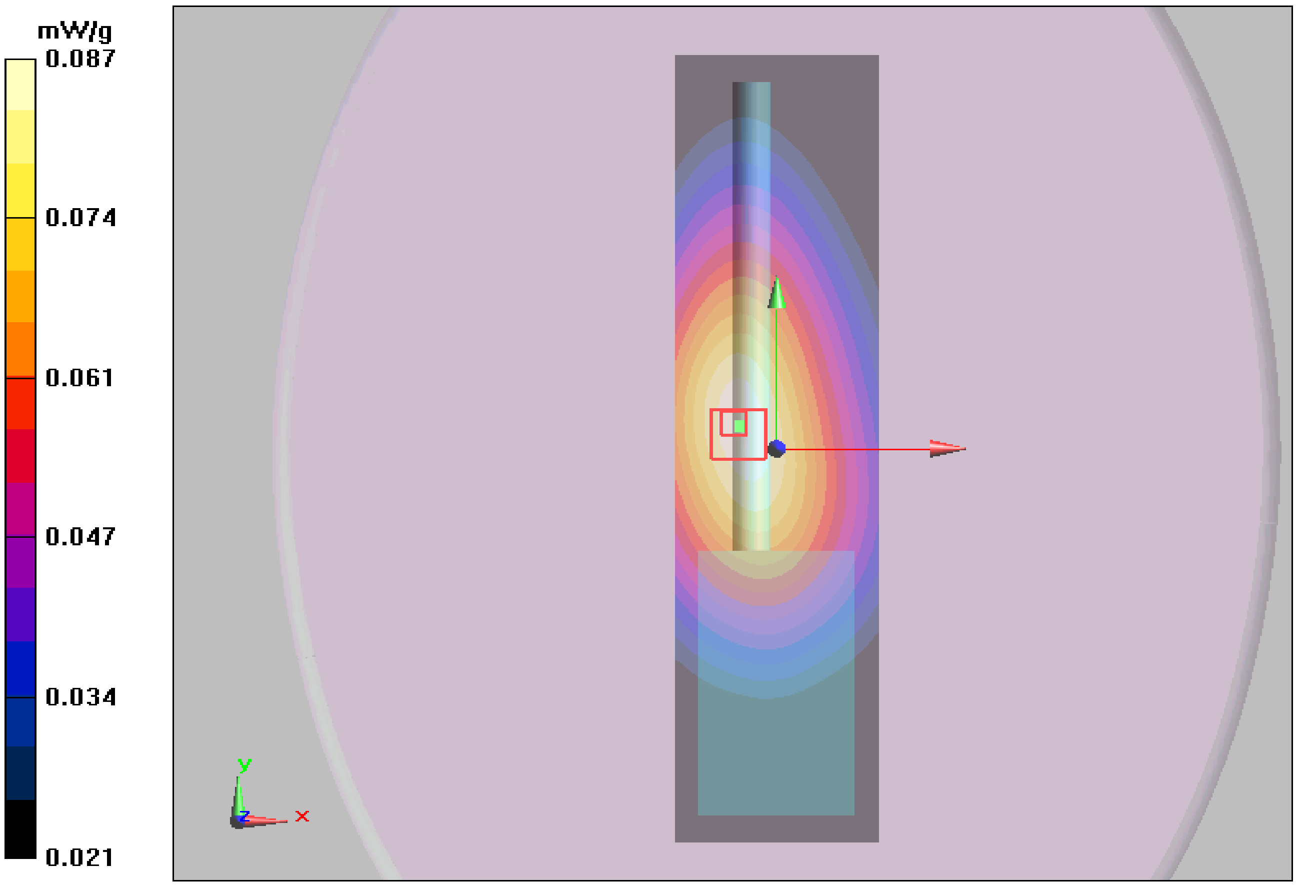


Figure 9 Face Held for Analog, Front towards Phantom 136MHz (25KHz Channel Spacing)

Face Held for Analog, Front towards Phantom 145.5MHz (25 KHz Channel Spacing)

Date/Time: 12/26/2012 2:07:31 PM

Communication System: PTT 150; Frequency: 145.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 145.5 MHz; σ = 0.757 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.7, 7.7, 7.7); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 2/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.473 mW/g

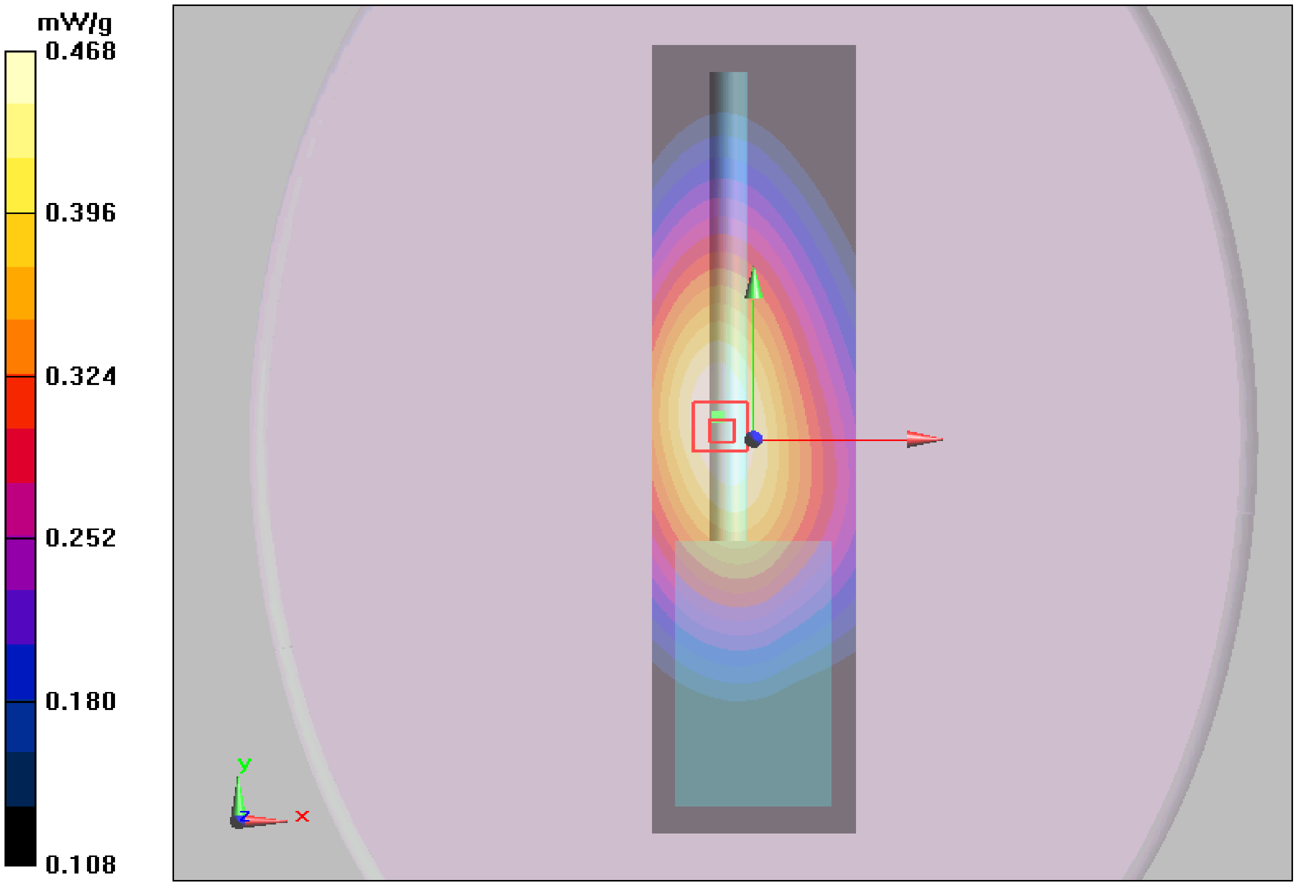
Towards Ground Ch 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 32.5 V/m; Power Drift = -0.053 dB

Peak SAR (extrapolated) = 0.603 W/kg

SAR(1 g) = 0.452 mW/g; SAR(10 g) = 0.352 mW/g

Maximum value of SAR (measured) = 0.468 mW/g



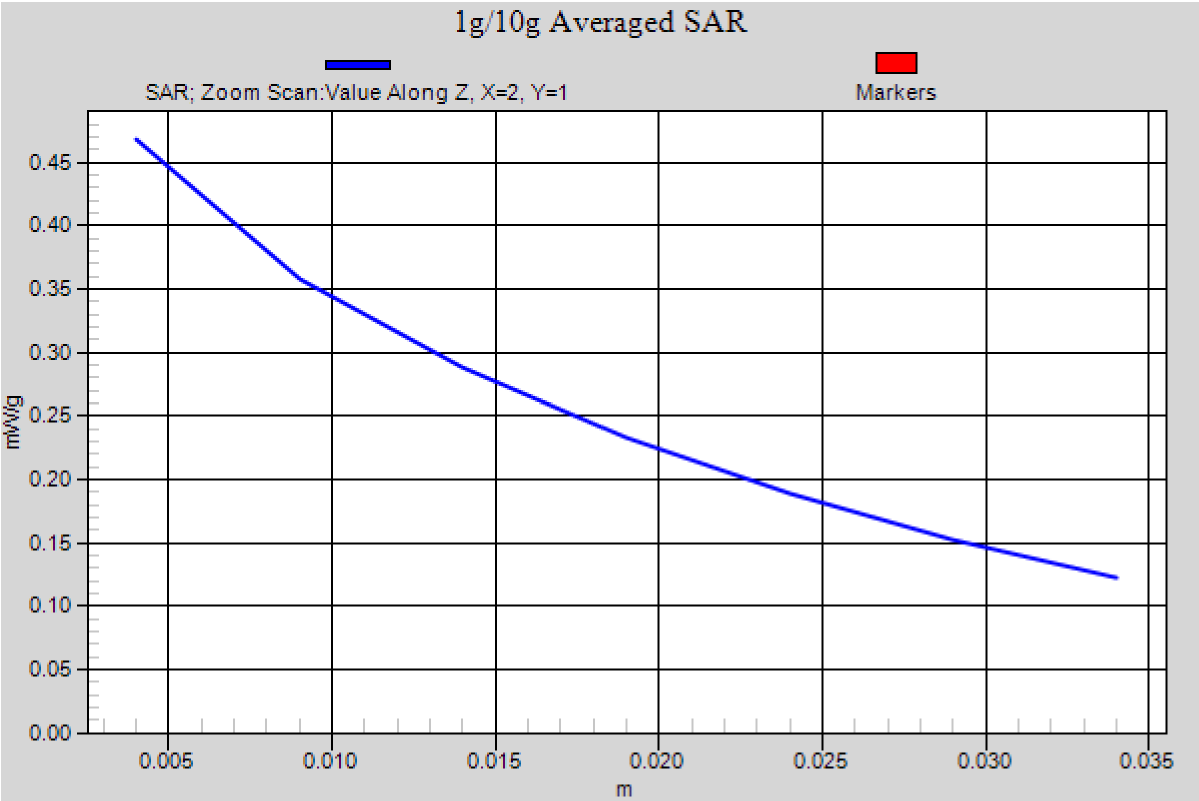


Figure 10 Face Held for Analog, Front towards Phantom 145.5MHz (25KHz Channel Spacing)

Face Held for Analog, Front towards Phantom 155MHz (25 KHz Channel Spacing)

Date/Time: 12/26/2012 1:17:59 PM

Communication System: PTT 150; Frequency: 155 MHz;Duty Cycle: 1:1

Medium parameters used: f = 155 MHz; σ = 0.762 mho/m; ε_r = 50; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.7, 7.7, 7.7); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 3/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.103 mW/g

Towards Ground Ch 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13 V/m; Power Drift = -0.054 dB

Peak SAR (extrapolated) = 0.136 W/kg

SAR(1 g) = 0.101 mW/g; SAR(10 g) = 0.079 mW/g

Maximum value of SAR (measured) = 0.105 mW/g

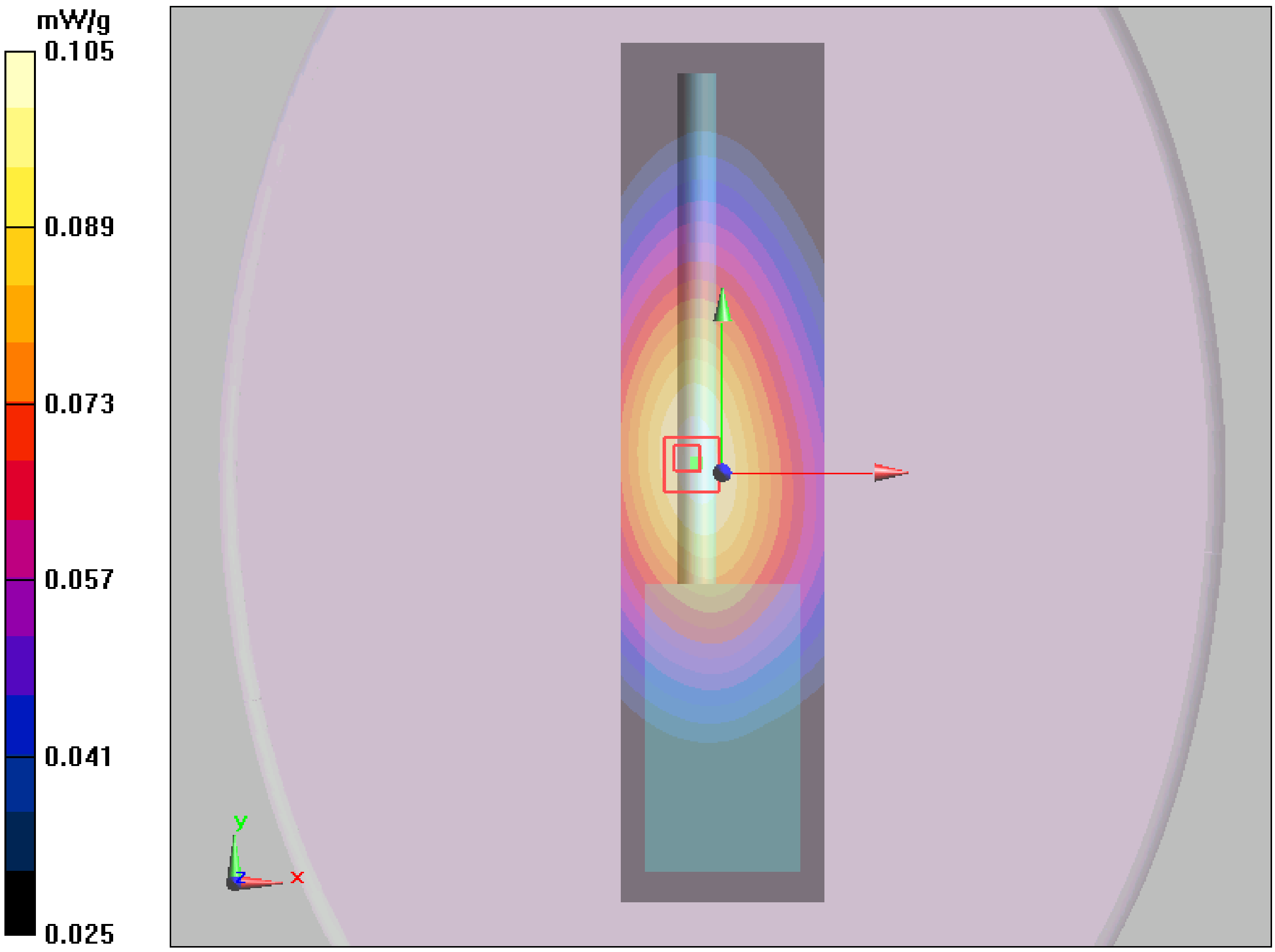


Figure 11 Face Held for Analog, Front towards Phantom 155MHz (25KHz Channel Spacing)

Face Held for Analog, Front towards Phantom 164.5MHz (25 KHz Channel Spacing)

Date/Time: 12/26/2012 12:54:07 PM

Communication System: PTT 150; Frequency: 164.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 164.5 MHz; σ = 0.768 mho/m; ε_r = 49.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.7, 7.7, 7.7); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 4/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.044 mW/g

Towards Ground Ch 4/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value =12 V/m; Power Drift = 0.121 dB

Peak SAR (extrapolated) = 0.055 W/kg

SAR(1 g) = 0.042 mW/g; SAR(10 g) = 0.033 mW/g

Maximum value of SAR (measured) = 0.044 mW/g

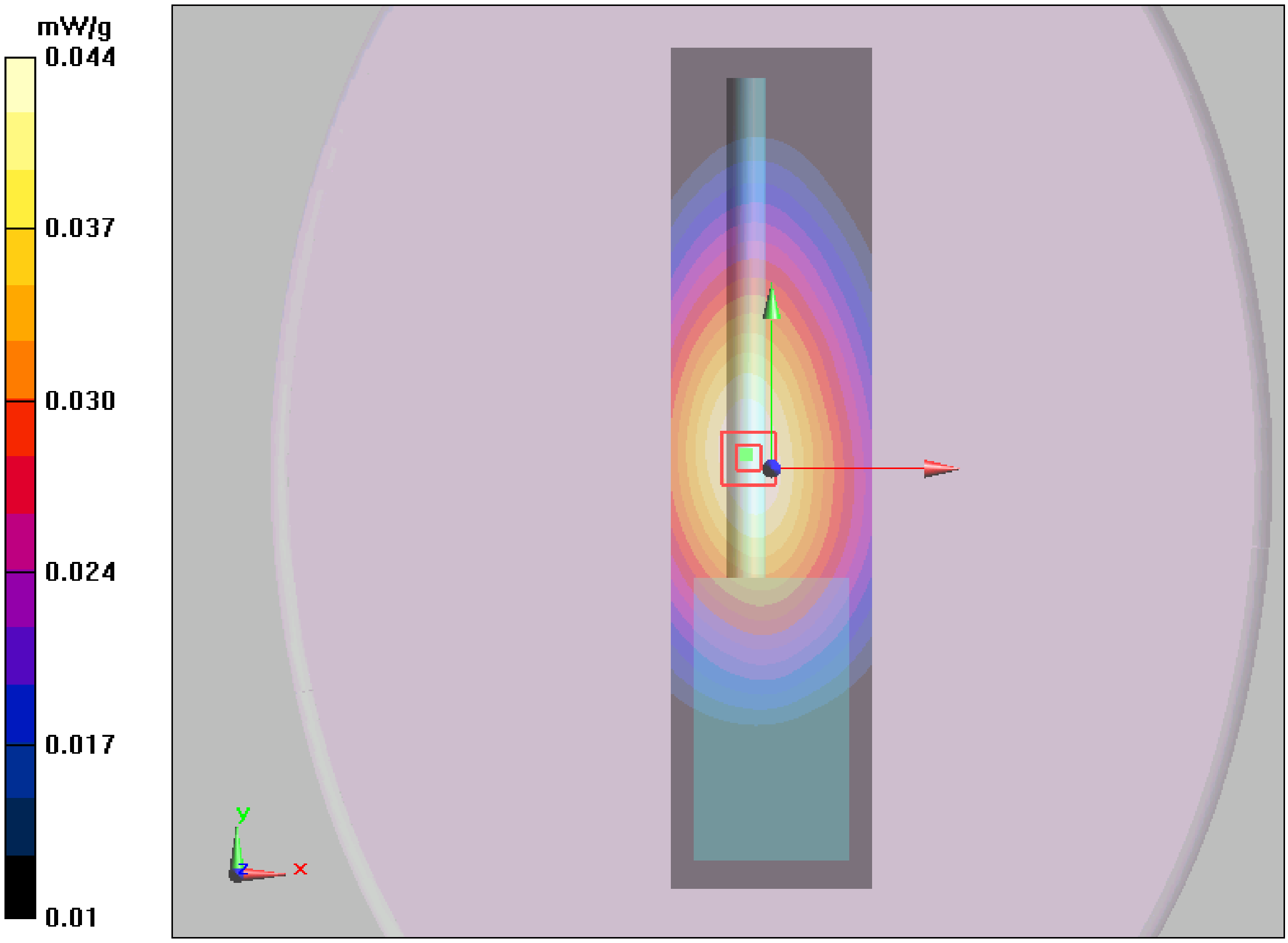


Figure 12 Face Held for Analog, Front towards Phantom 164.5MHz (25KHz Channel Spacing)

Face Held for Analog, Front towards Phantom 173.4MHz (25 KHz Channel Spacing)

Date/Time: 12/26/2012 12:20:08 PM

Communication System: PTT 150; Frequency: 173.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 173.4 MHz; σ = 0.773 mho/m; ε_r = 49.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.7, 7.7, 7.7); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 5/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.055 mW/g

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

Reference Value = 9.32 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.063 W/kg

SAR(1 g) = 0.048 mW/g; SAR(10 g) = 0.038 mW/g

Maximum value of SAR (measured) = 0.050 mW/g

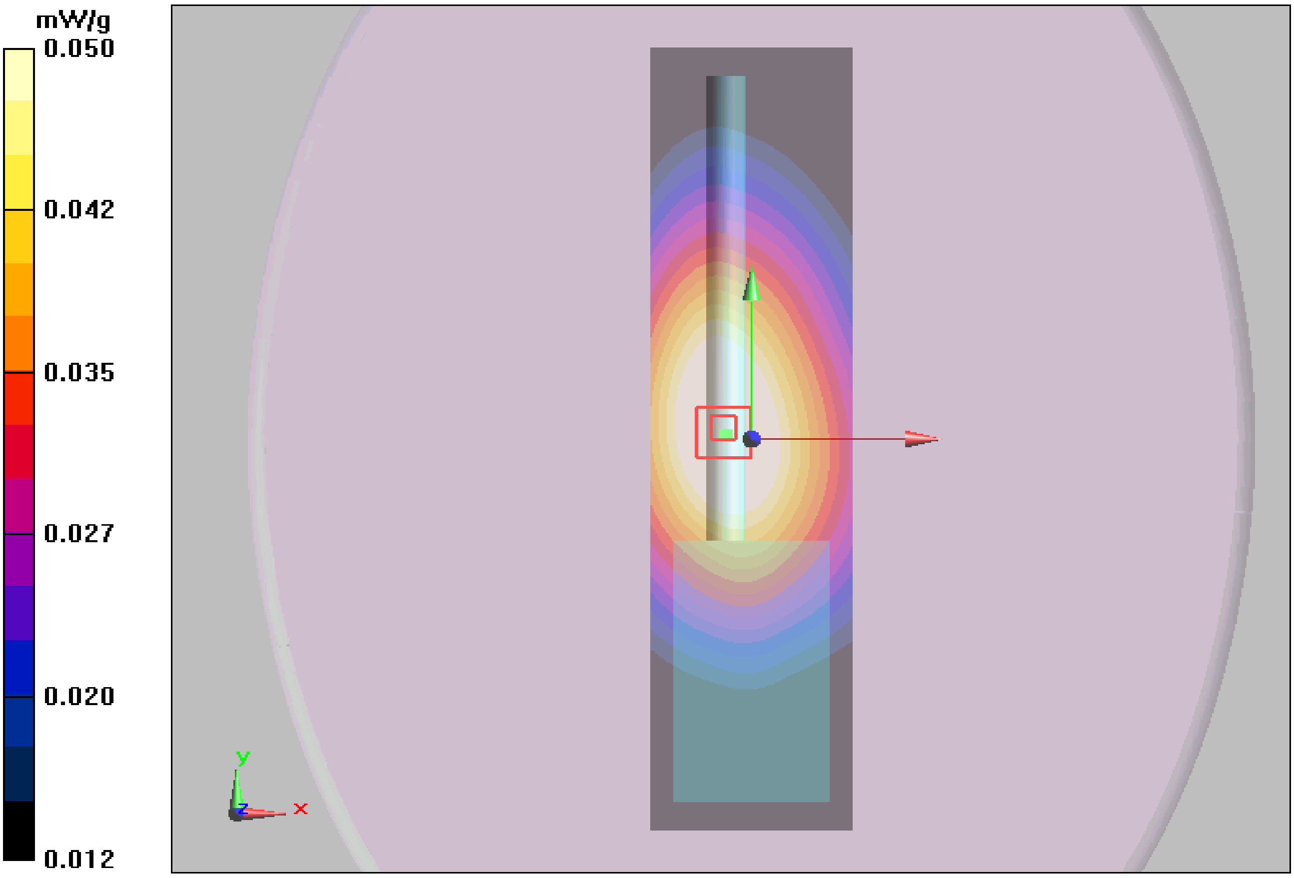


Figure 13 Face Held for Analog, Front towards Phantom 173.4MHz (25KHz Channel Spacing)

Body-Worn for Analog, Front towards Ground 136MHz (25 KHz Channel Spacing)

Date/Time: 12/25/2012 10:07:12 PM

Communication System: PTT 150; Frequency: 136 MHz;Duty Cycle: 1:1

Medium parameters used: f = 136 MHz; σ = 0.792 mho/m; ε_r = 62.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.3, 7.3, 7.3); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 1/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.329 mW/g

Towards Ground Ch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.8 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.606 W/kg

SAR(1 g) = 0.314 mW/g; SAR(10 g) = 0.197 mW/g

Maximum value of SAR (measured) = 0.340 mW/g

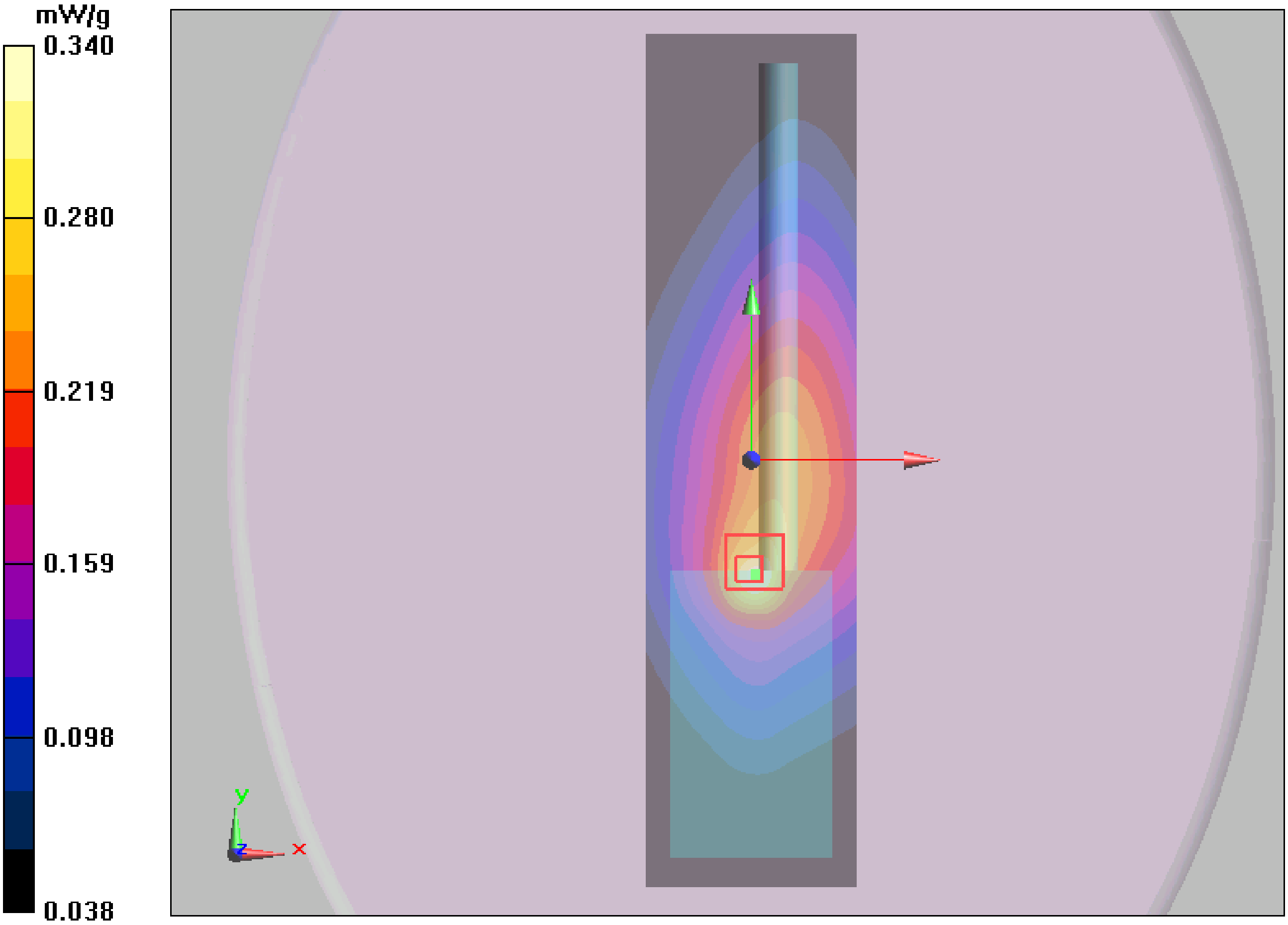


Figure 14 Body-Worn for Analog, Front towards Ground 136MHz (25KHz Channel Spacing)

Body-Worn for Analog, Front towards Ground 145.5MHz (25 KHz Channel Spacing)

Date/Time: 12/25/2012 9:31:44 PM

Communication System: PTT 150; Frequency: 145.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 145.5 MHz; σ = 0.8 mho/m; ε_r = 62; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.3, 7.3, 7.3); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 2/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.19 mW/g

Towards Ground Ch 2/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 45.3 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.873 mW/g; SAR(10 g) = 0.657 mW/g

Maximum value of SAR (measured) = 0.907 mW/g

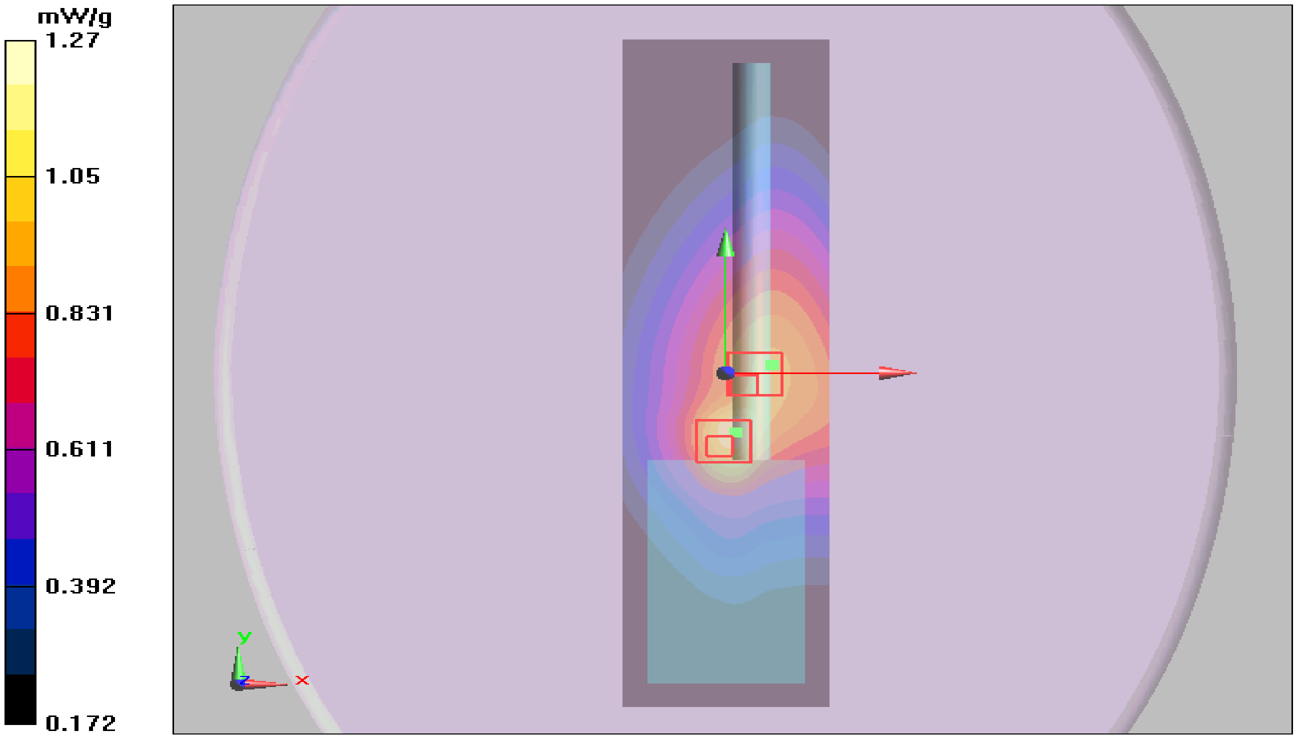
Towards Ground Ch 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

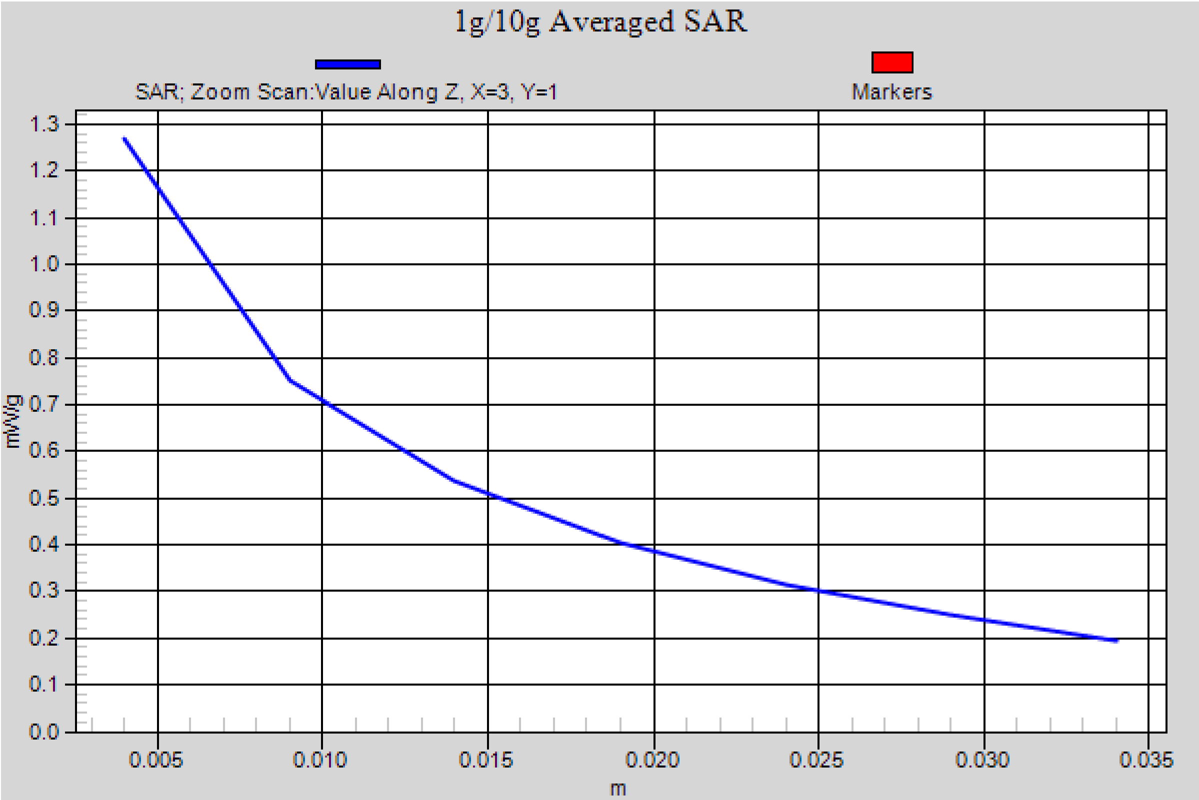
Reference Value = 45.3 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 2.25 W/kg

SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.737 mW/g

Maximum value of SAR (measured) = 1.27 mW/g





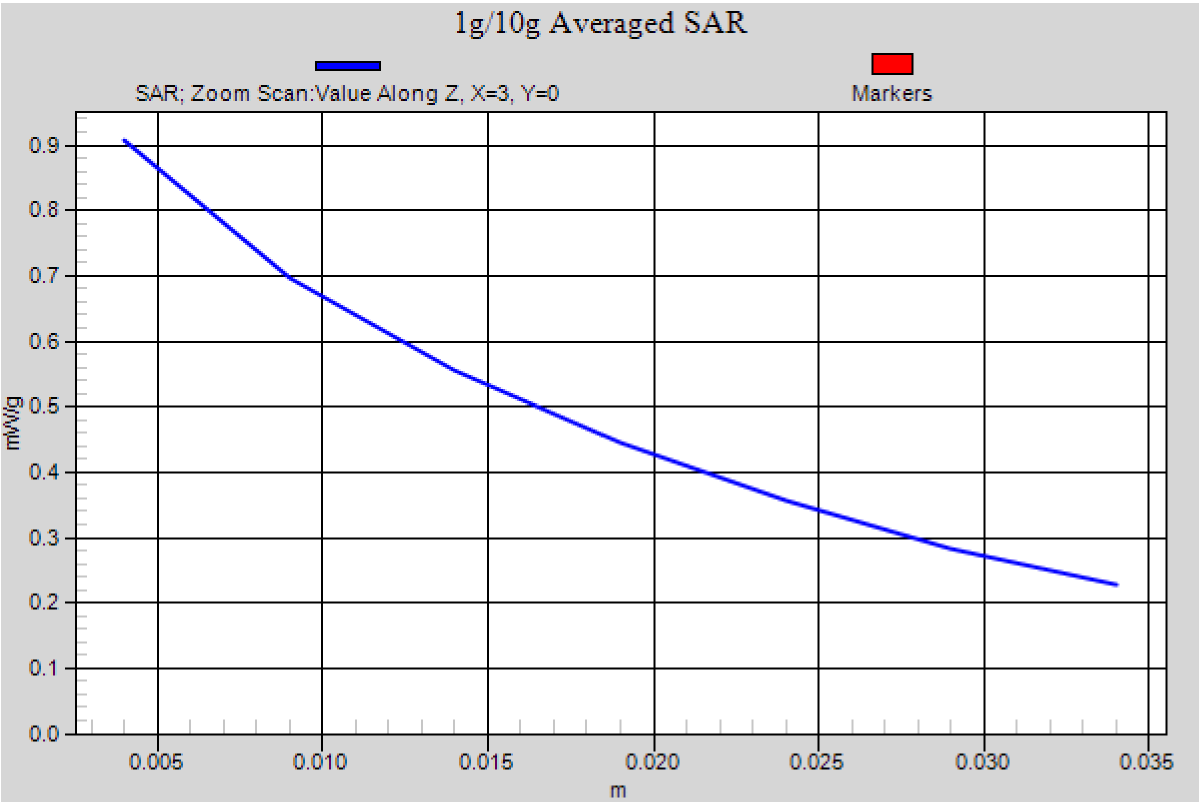


Figure 15 Body-Worn for Analog, Front towards Ground 145.5MHz (25KHz Channel Spacing)

Body-Worn for Analog, Front towards Ground 155MHz (25 KHz Channel Spacing)

Date/Time: 12/25/2012 10:36:04 PM

Communication System: PTT 150; Frequency: 155 MHz;Duty Cycle: 1:1

Medium parameters used: f = 155 MHz; σ = 0.806 mho/m; ε_r = 61.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.3, 7.3, 7.3); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 3/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.168 mW/g

Towards Ground Ch 3/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.1 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.135 W/kg

SAR(1 g) = 0.100 mW/g; SAR(10 g) = 0.076 mW/g

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

Towards Ground Ch 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.1 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.235 W/kg

SAR(1 g) = 0.129 mW/g; SAR(10 g) = 0.085 mW/g

Maximum value of SAR (measured) = 0.138 mW/g

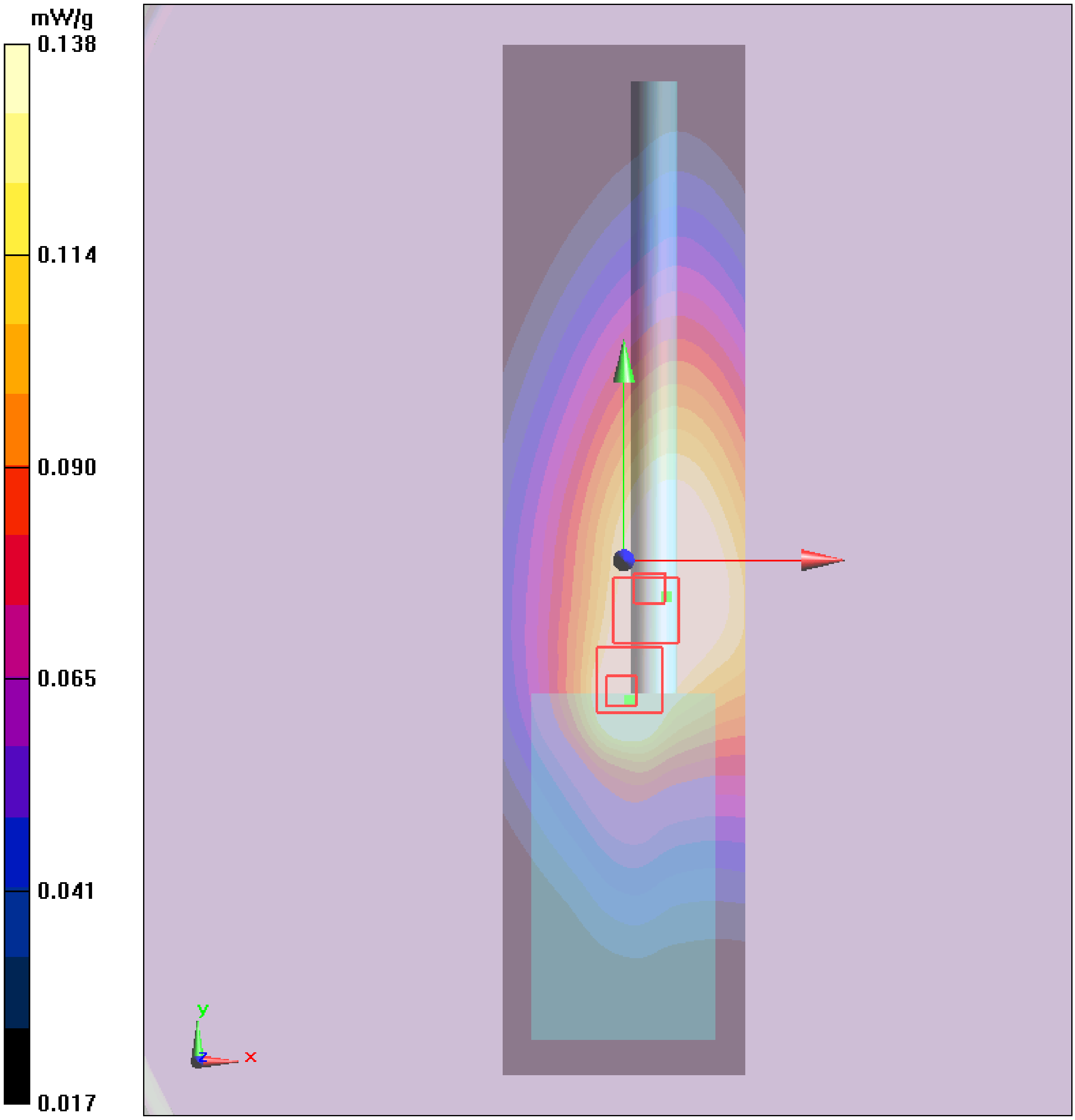


Figure 16 Body-Worn for Analog, Front towards Ground 155MHz (25KHz Channel Spacing)

Body-Worn for Analog, Front towards Ground 164.5MHz (25 KHz Channel Spacing)

Date/Time: 12/25/2012 11:05:46 PM

Communication System: PTT 150; Frequency: 164.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 164.5 MHz; σ = 0.812 mho/m; ε_r = 61.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.3, 7.3, 7.3); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 4/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.110 mW/g

Towards Ground Ch 4/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.7 V/m; Power Drift = -0.137 dB

Peak SAR (extrapolated) = 0.199 W/kg

SAR(1 g) = 0.111 mW/g; SAR(10 g) = 0.074 mW/g

Maximum value of SAR (measured) = 0.121 mW/g

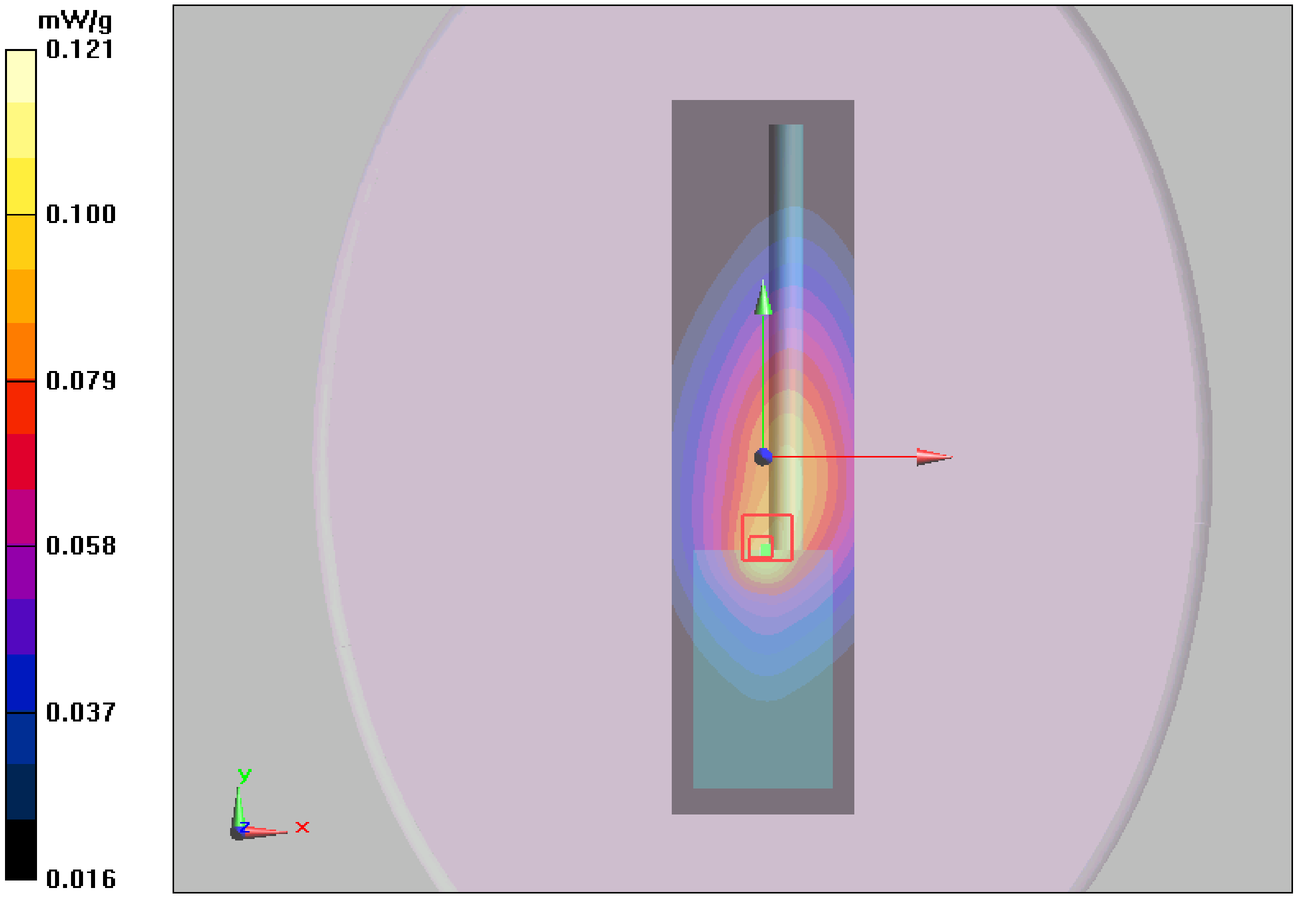


Figure 17 Body-Worn for Analog, Front towards Ground 164.5MHz (25KHz Channel Spacing)

Body-Worn for Analog, Front towards Ground 173.4MHz (25 KHz Channel Spacing)

Date/Time: 12/25/2012 11:39:17 PM

Communication System: PTT 150; Frequency: 173.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 173.4 MHz; σ = 0.818 mho/m; ε_r = 61.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(7.3, 7.3, 7.3); Calibrated: 6/22/2012

Electronics: DAE4 Sn871; Calibrated: 11/22/2011

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Towards Ground Ch 5/Area Scan (41x171x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.096 mW/g

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

Reference Value = 11.5 V/m; Power Drift = -0.053 dB

Peak SAR (extrapolated) = 0.149 W/kg

SAR(1 g) = 0.088 mW/g; SAR(10 g) = 0.061 mW/g

Maximum value of SAR (measured) = 0.095 mW/g

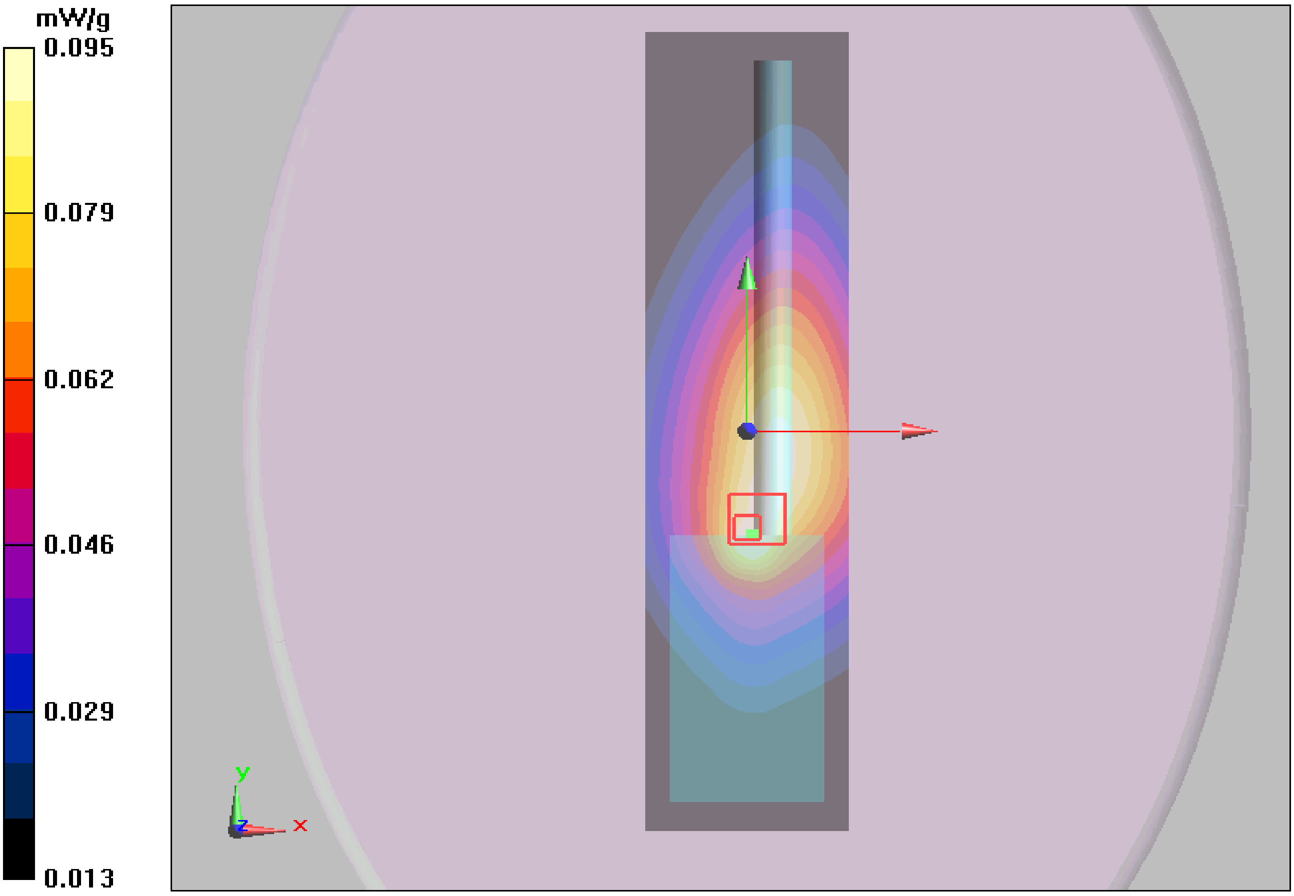


Figure 18 Body-Worn for Analog, Front towards Ground 173.4MHz (25KHz Channel Spacing)

ANNEX D: Probe Calibration Certificate

Schmid & Partner Engineering AG **s p e a g**

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3189**
Place of Assessment:	**Zurich**
Date of Assessment:	**June 22, 2012**
Probe Calibration Date:	**June 22, 2012**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 300, 450 and 835 MHz.

Assessed by:

Schmid & Partner Engineering AG
s p e a g
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ES3DV3 SN:3189

Conversion factor (± standard deviation)

150 ± 50 MHz	ConvF	**7.7 ± 10%**	ε_r = 52.3 ± 5% σ = 0.76 ± 5% mho/m (head tissue)
150 ± 50 MHz	ConvF	**7.3 ± 10%**	ε_r = 61.9 ± 5% σ = 0.80 ± 5% mho/m (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

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

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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 **TA-Shanghai (Auden)**

Certificate No: **ES3-3189_Jun12**

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3189

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: June 22, 2012

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 22, 2012

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

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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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., ϑ = 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,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
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,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 ≤ 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 *NORMx,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 ES3DV3

SN:3189

Manufactured: March 25, 2008
Calibrated: June 22, 2012

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3189

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.32	1.35	1.05	± 10.1 %
DCP (mV)[B]	99.5	100.6	100.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	160.3	±3.8 %
			Y	0.00	0.00	1.00	164.9	
			Z	0.00	0.00	1.00	182.0	

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: ES3DV3 - SN:3189

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)
300	45.3	0.87	6.83	6.83	6.83	0.25	1.06	± 13.4 %
450	43.5	0.87	6.37	6.37	6.37	0.14	1.67	± 13.4 %
835	41.5	0.90	5.81	5.81	5.81	0.63	1.24	± 12.0 %
1750	40.1	1.37	4.90	4.90	4.90	0.80	1.14	± 12.0 %
1900	40.0	1.40	4.69	4.69	4.69	0.62	1.31	± 12.0 %
2450	39.2	1.80	4.14	4.14	4.14	0.65	1.36	± 12.0 %

[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: ES3DV3 - SN:3189

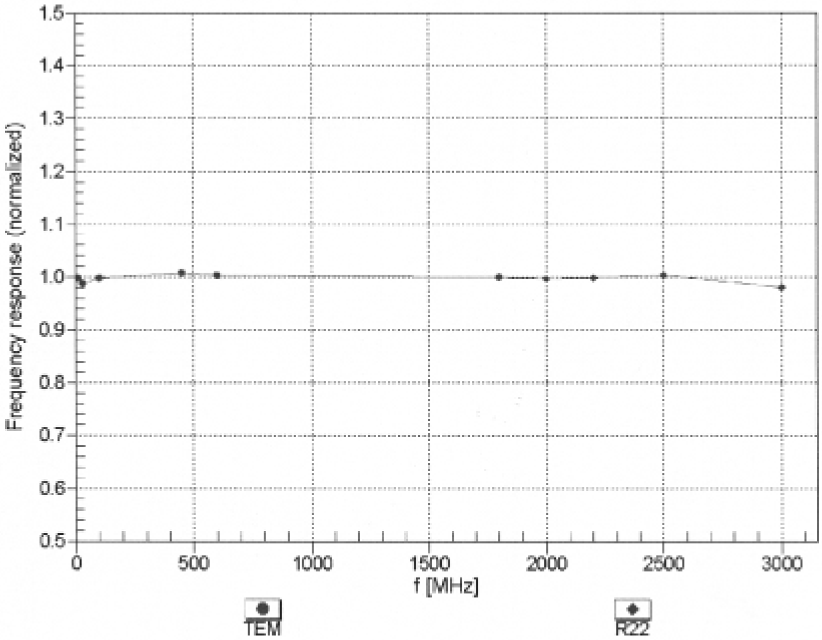
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
300	58.2	0.92	6.53	6.53	6.53	0.23	1.90	± 13.4 %
450	56.7	0.94	6.73	6.73	6.73	0.10	1.00	± 13.4 %
835	55.2	0.97	5.81	5.81	5.81	0.54	1.33	± 12.0 %
1750	53.4	1.49	4.65	4.65	4.65	0.67	1.38	± 12.0 %
1900	53.3	1.52	4.36	4.36	4.36	0.62	1.40	± 12.0 %
2450	52.7	1.95	3.96	3.96	3.96	0.64	0.99	± 12.0 %

[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.

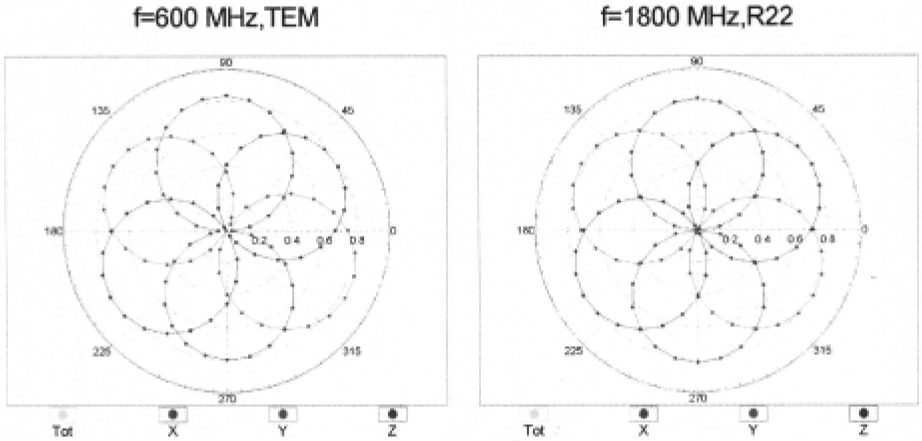
Frequency Response of E-Field

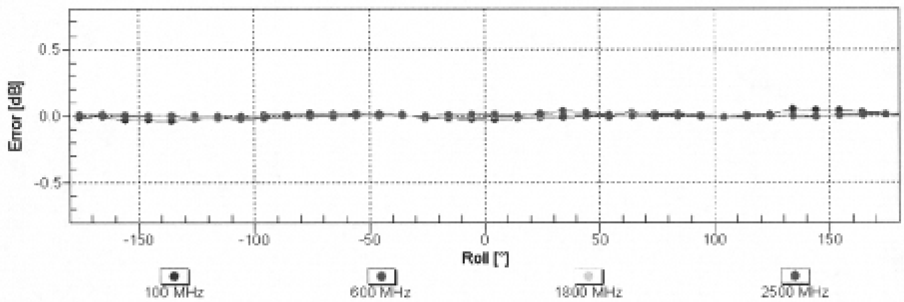
(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

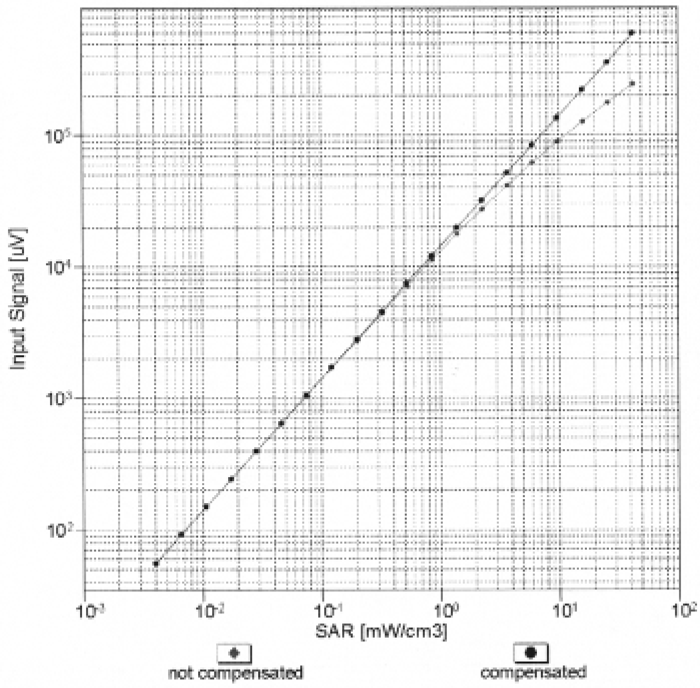


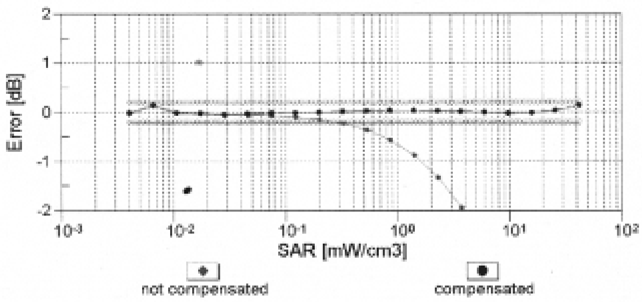


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

(TEM cell , f = 900 MHz)

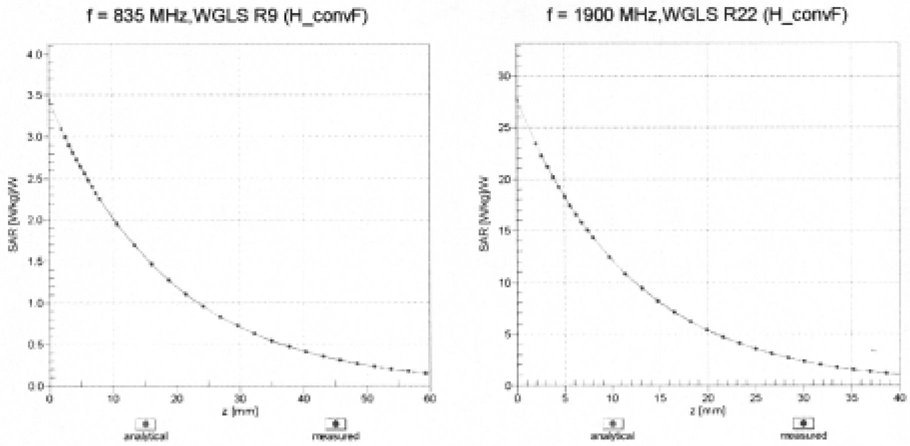




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

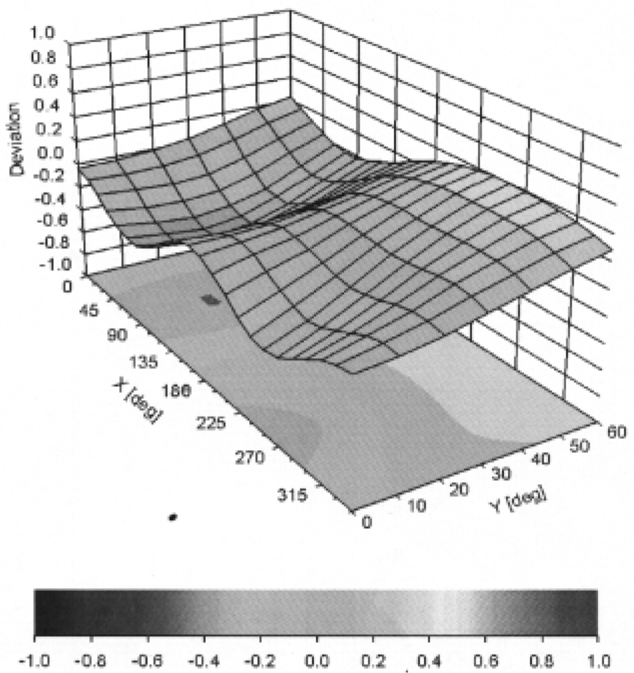
ES3DV3– SN:3189 June 22, 2012

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3189

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	54.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

ANNEX E: D300V3 Dipole Calibration Certificate

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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 **TMC (Auden)**

Certificate No: D300V3-1017_Jul12

CALIBRATION CERTIFICATE

Object	D300V3 - SN: 1017
Calibration procedure(s)	QA CAL-15.v6 Calibration procedure for dipole validation kits below 700 MHz
Calibration date:	July 24, 2012

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 654	18-Apr-12 (No. DAE4-654_Apr12)	Apr-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 25, 2012

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

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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:

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

c) 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:

d) 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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	300 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	45.3	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	44.2 ± 6 %	0.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	398 mW input power	1.13 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**2.88 mW /g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	398 mW input power	0.742 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**1.89 mW /g ± 17.6 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	58.2	0.92 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	58.3 ± 6 %	0.93 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	398 mW input power	1.14 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**2.84 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	398 mW input power	0.765 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**1.91 mW / g ± 17.6 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	58.9 Ω - 1.1 jΩ
Return Loss	- 21.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	56.8 Ω - 5.5 jΩ
Return Loss	- 21.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.746 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	November 30, 2010

DASY5 Validation Report for Head TSL

Date: 24.07.2012

Test Laboratory: SPEAG

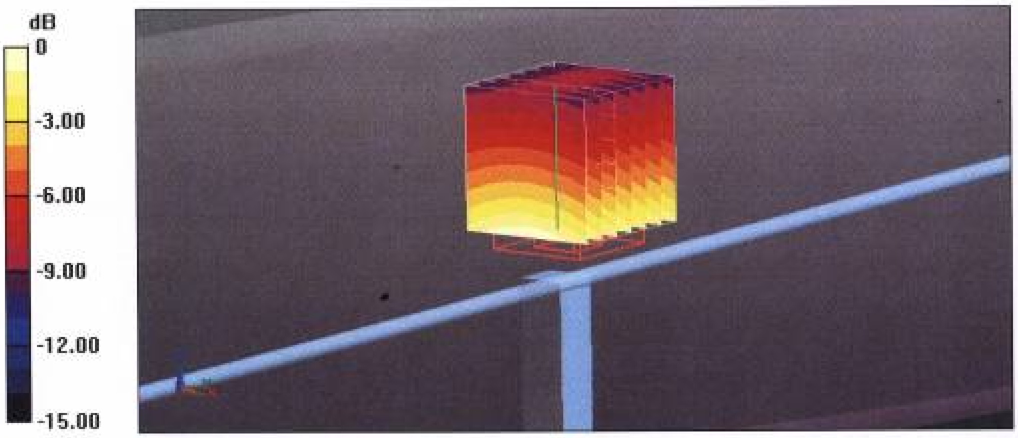
DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1017

Communication System: CW; Frequency: 300 MHz
Medium parameters used: f = 300 MHz; σ = 0.85 mho/m; ε_r = 44.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

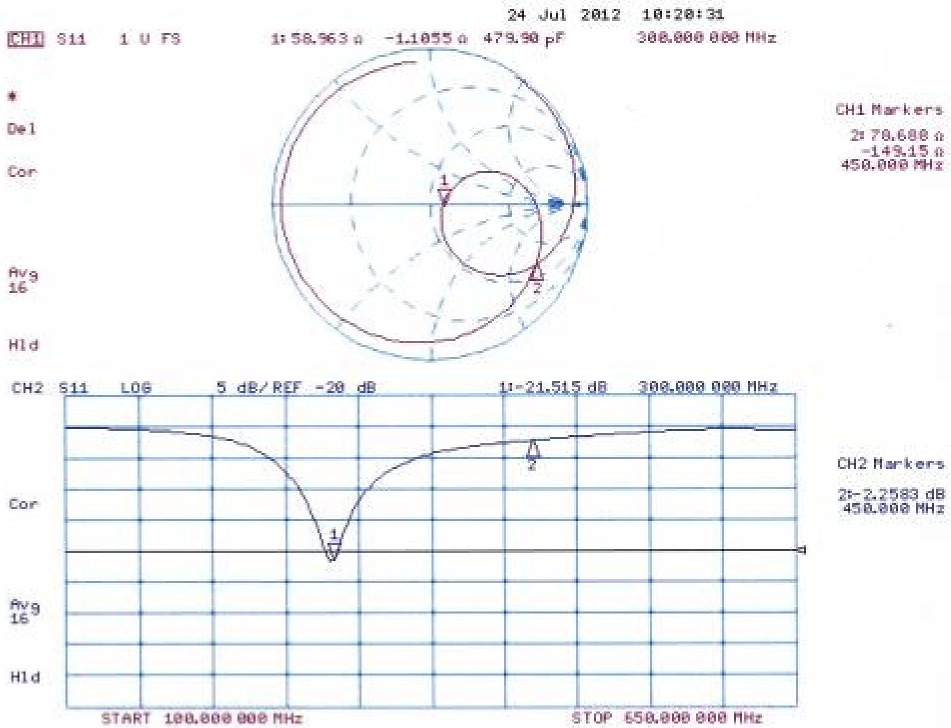
- Probe: ET3DV6 - SN1507; ConvF(7.3, 7.3, 7.3); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 37.841 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.881 mW/g
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.742 mW/g
Maximum value of SAR (measured) = 1.19 mW/g



0 dB = 1.19 mW/g = 1.51 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.07.2012

Test Laboratory: SPEAG

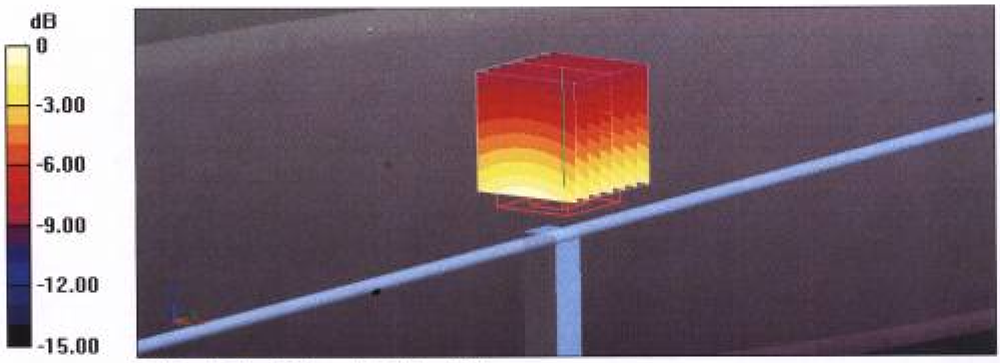
DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1017

Communication System: CW; Frequency: 300 MHz
Medium parameters used: f = 300 MHz; σ = 0.93 mho/m; ε_r = 58.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

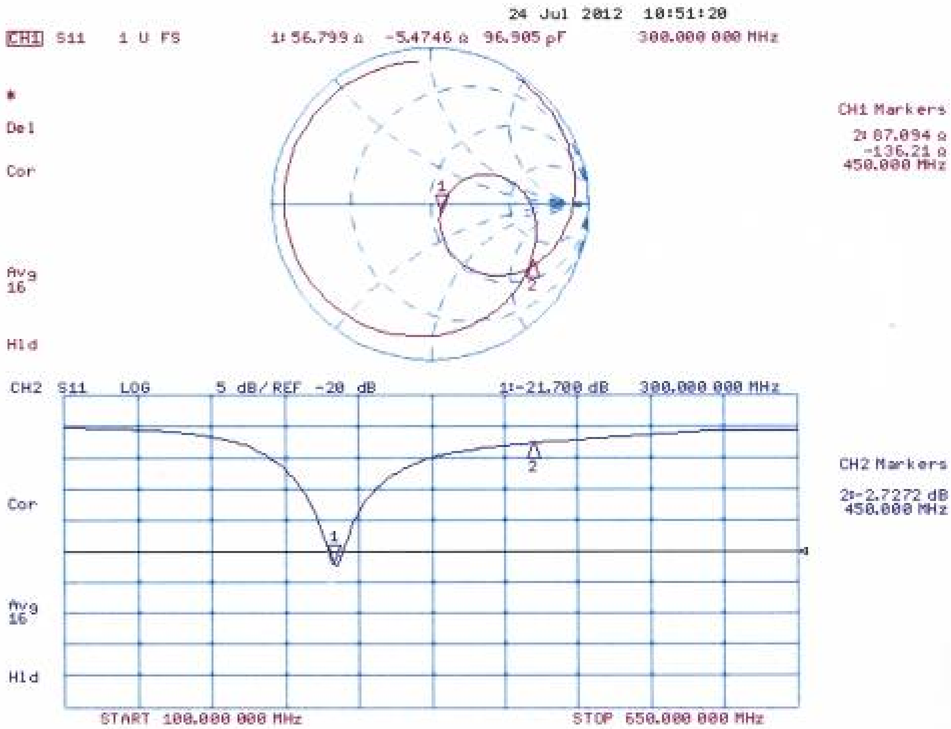
- Probe: ET3DV6 - SN1507; ConvF(7.15, 7.15, 7.15); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 37.172 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.778 mW/g
SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.765 mW/g
Maximum value of SAR (measured) = 1.21 mW/g



0 dB = 1.21 mW/g = 1.66 dB mW/g

Impedance Measurement Plot for Body TSL



ANNEX F: DAE4 Calibration Certificate

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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 **TA Shanghai (Auden)**

Certificate No: **DAE4-1317_Jan12**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 1317
Calibration procedure(s)	QA CAL-06.v24 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	January 23, 2012

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-11 (No:11450)	Sep-12
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V2.1	SE UWS 053 AA 1001	05-Jan-12 (in house check)	In house check: Jan-13

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

Issued: January 23, 2012

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
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

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 = 6.1μV , 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	404.064 ± 0.1% (k=2)	404.056 ± 0.1% (k=2)	403.955 ± 0.1% (k=2)
Low Range	3.98762 ± 0.7% (k=2)	3.98737 ± 0.7% (k=2)	3.98343 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	117.0 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199992.18	-1.75	-0.00
Channel X	+ Input	20001.35	0.46	0.00
Channel X	- Input	-19997.31	1.96	-0.01
Channel Y	+ Input	199993.18	-1.24	-0.00
Channel Y	+ Input	20001.40	0.60	0.00
Channel Y	- Input	-20000.04	-0.70	0.00
Channel Z	+ Input	199991.58	-2.43	-0.00
Channel Z	+ Input	19999.62	-1.14	-0.01
Channel Z	- Input	-20001.31	-1.83	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.74	-0.89	-0.04
Channel X	+ Input	202.18	-0.01	-0.01
Channel X	- Input	-197.58	0.36	-0.18
Channel Y	+ Input	2000.34	-1.20	-0.06
Channel Y	+ Input	199.67	-2.39	-1.18
Channel Y	- Input	-197.64	0.32	-0.16
Channel Z	+ Input	2000.69	-0.78	-0.04
Channel Z	+ Input	200.84	-1.16	-0.57
Channel Z	- Input	-198.45	-0.47	0.24

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	-23.40	-24.98
	- 200	28.01	26.12
Channel Y	200	-2.57	-2.75
	- 200	1.67	1.31
Channel Z	200	-11.92	-11.43
	- 200	9.80	9.45

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	-	-2.15	-4.41
Channel Y	200	7.18	-	-2.47
Channel Z	200	7.44	5.46	-

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	16081	17027
Channel Y	16103	16170
Channel Z	16221	16651

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.45	-1.32	0.40	0.32
Channel Y	-2.63	-3.99	-1.68	0.42
Channel Z	-0.67	-3.07	1.36	0.50

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

ANNEX G: The EUT Appearances and Test Configuration

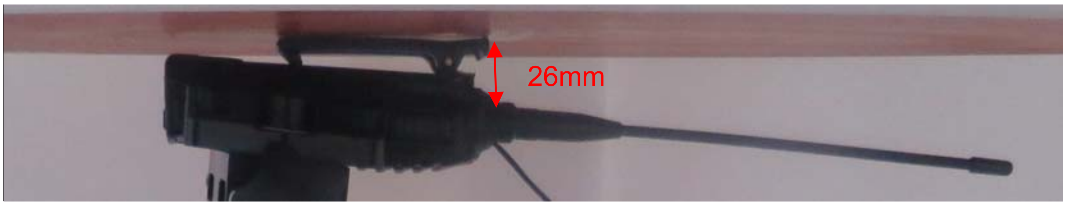
a: EUT

b: Belt clip

c: Antenna

Picture 4: Constituents of the sample

Picture 5: Face-held, the front of the EUT towards phantom, the distance from the EUT Antenna to the bottom of the Phantom is 40mm



Picture 6: Body-worn, the front of the EUT towards ground, Belt clip directed tightly to touch the bottom of the flat phantom, the distance from the EUT Antenna to the bottom of the Phantom is 26mm