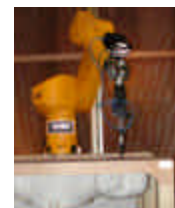


PCTEST ENGINEERING LABORATORY, INC.
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<http://www.pctestlab.com> (email: randy@pctestlab.com)
CERTIFICATE OF COMPLIANCE
(SAR EVALUATION)



APPLICANT NAME & ADDRESS:

Sony Corporation
6-7-35 Kitashinagawa
Shinagawa-ku, Tokyo
141-0001 JAPAN

DATE & LOCATION OF TESTING:

Dates of Tests: June 6-7, 2006
Test Report S/N: 0605310421
Test Site: PCTEST Lab, Columbia MD

FCC ID:

AK8WRT8P

APPLICANT:

Sony Corporation

EUT Type:

UHF Synthesized Transmitter – Wireless Microphone System

Tx/ Rx Frequency:

758.125 – 805.875 MHz

Max. RF Output Power:

250 mW ERP

0.152 mW Conducted

Max. SAR Measurement: 0.541 W/kg Model: U6264 Body SAR; 0.532 W/kg Model: U6264 Face SAR;
0.435 W/kg Model: U6668 Body SAR; 0.408 W/kg Model: U6668 Face SAR

Trade Name/Model(s):

Sony / WRT-8P

FCC Classification:

Licensed Broadcast Transmitter Held to Face

FCC Rule Part(s):

§2.1093; FCC/OET Bulletin 65 Supplement C [July 2001]

Application Type:

Certification

Test Device Serial No.:

pre-production [S/N: #8001 (U6264) & 8002 (U6668)]

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001) and IEEE Std. 1528 – 2003.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Grant Conditions: This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter. End-users must be provided with specific operating instructions for satisfying RF exposure compliance requirements.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.


Randy Ortman
President



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SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 1 of 24

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1. INTRODUCTION / SAR DEFINITION

The FCC has adopted the guidelines for evaluating the environmental effects of radiofrequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.[1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in *IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*. (c) 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.[2] The measurement procedure described in *IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave*[3] is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report No. 86 (c) NCRP, 1986, Bethesda, MD 20814.[6] SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (r). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 1.1).

$$SAR = \frac{d}{dt} \left(\frac{dU}{dm} \right) = \frac{d}{dt} \left(\frac{dU}{r dV} \right)$$

Figure 1.1
SAR Mathematical Equation

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

$$SAR = s E^2 / r$$

where:

$$\begin{aligned} s &= \text{conductivity of the tissue-simulant material (S/m)} \\ r &= \text{mass density of the tissue-simulant material (kg/m}^3\text{)} \\ E &= \text{Total RMS electric field strength (V/m)} \end{aligned}$$

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

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2. SAR MEASUREMENT SETUP

Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the Head equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Fig. 2.1).

System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the Gateway Pentium 4 2.53 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

System Electronics

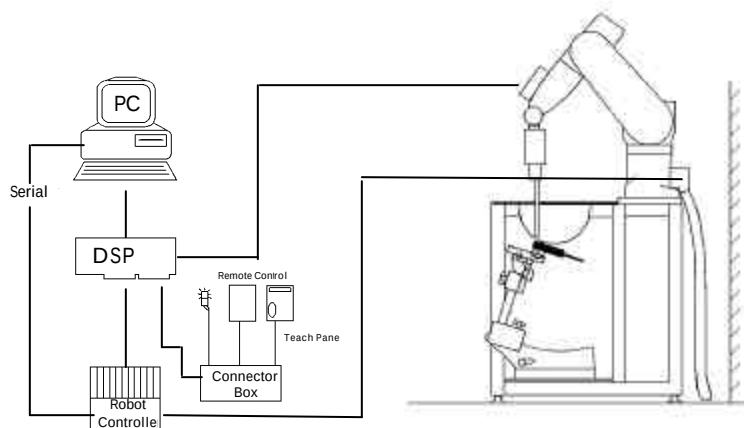


Figure 2.1 SAR Measurement System Setup

The DAE4 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 PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in [7].

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3. DASY4 E-FIELD PROBE SYSTEM

Probe Measurement System



Figure 3.1 DAE System

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration [7] (see Fig. 3.2) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip (see Fig. 3.3). It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting (see Fig.3.1). The approach is stopped at reaching the maximum.

Probe Specifications

Calibration:	In air from 10 MHz to 6 GHz In Head and Body simulating tissue at Frequencies of 150 MHz, 450 MHz, 835 MHz, 900 MHz, 1900MHz, 2450MHz, 5300MHz, & 5800MHz
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity:	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal probe axis)
Dynamic:	5 mW/g to > 100 mW/g;
Range:	Linearity: ± 0.2 dB
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 3 mm Distance from probe tip to dipole centers: 2 mm
Application:	General dosimetry up to 6 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

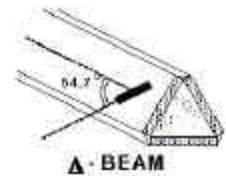


Figure 3.1 Triangular Probe Configuration



Figure 3.2 Probe Thick-Film Technique

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4. Probe Calibration Process

Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure described in [8] with accuracy better than +/- 10%. The spherical isotropy was evaluated with the procedure described in [9] 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 is tested.

Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz (see Fig. 4.1), and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity at the proper orientation with the field. The probe is then rotated 360 degrees.

Temperature Assessment *

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated Head 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 (see Fig. 4.2).

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

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (Head or Body),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E - field;

$$SAR = \frac{|E|^2 \cdot s}{r}$$

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm³ for Head tissue)

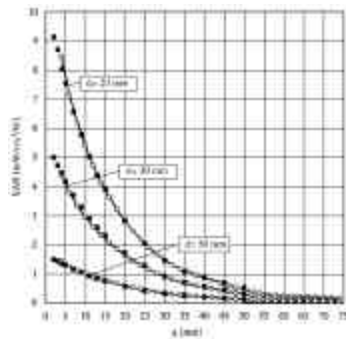


Figure 4.1 E-Field and Temperature measurements at 900MHz [7]

*NOTE: The temperature calibration was not performed by PCTEST. For information use only.

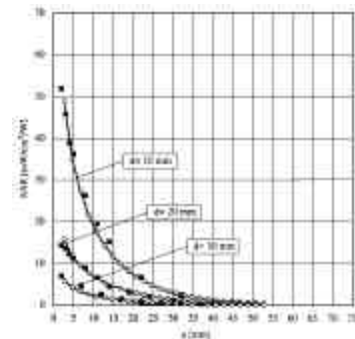


Figure 4.2 E-Field and temperature measurements at 1.9GHz [7]

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5. PHANTOM & EQUIVALENT TISSUES

SAM Phantom

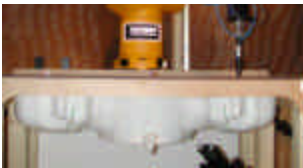


Figure 5.1 SAM Twin Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users [11][12]. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. (see Fig. 5.1)

Head & Body Simulating Mixture Characterization



Figure 5.2 Simulated Tissue

The Head and Body mixtures consist of a viscous gel using hydroxyethylcellulose (HEC) gelling agent and saline solution (see Table 6.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations. The mixture characterizations used for the Head and Body tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrrove [13].(see Fig. 5.2)

Table 5.1 Composition of the Head & Body Tissue Equivalent Matter

Ingredients (% by weight)	Frequency (MHz)									
	450		815		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.8	40.4	62.7	73.2
Salt (NaCl)	1.05	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.28	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.23	0.0	1.0	0.0	0.0
Bactericide	0.15	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGHE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7

Salt: 99% Pure Sodium Chloride Sugar: 98% Pure Sucrose
 Water: De-ionized, 16 MΩ resistivity HEC: Hydroxyethyl Cellulose
 DGHE: 99% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
 Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetrahydroxybutyl)phenyl] ether

Device Holder for Transmitters



Figure 5.2 Mounting Device

In combination with the SAM Twin Phantom V4.0, the Mounting Device (see Fig. 5.2) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening. The devices can be easily, accurately, and repeatably be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

* Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations [12]. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

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6. TEST SYSTEM SPECIFICATIONS

Automated Test System Specifications

Positioner

Robot: Stäubli Unimation Corp. Robot Model: RX60L
Repeatability: 0.02 mm
No. of axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Pentium 4
Clock Speed: 2.53 GHz
Operating System: Windows XP Professional

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, & control logic
Software: DASY4 software
Connecting Lines: Optical downlink for data and status info.
 Optical uplink for commands and clock



Figure 6.1 DASY4 Test System

PC Interface Card

Function: 24 bit (64 MHz) DSP for real time processing
 Link to DAE4
 16 bit A/D converter for surface detection system
 serial link to robot
 direct emergency stop output for robot

E-Field Probes

Model: ES3DV2 S/N: 3022
Construction: Triangular core
Frequency: 10 MHz to 6 GHz
Linearity: ± 0.2 dB (30 MHz to 6 GHz)

Phantom

Phantom: SAM Twin Phantom (V4.0)
Shell Material: VIVAC Composite
Thickness: 2.0 ± 0.2 mm

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7. DOSIMETRIC ASSESSMENT & PHANTOM SPECS

Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.
2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.
3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 34mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see Fig. 7.1):
 - a. The data at the surface was extrapolated, since the center of the dipoles is 2.7mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. The extrapolation was based on a least square algorithm [15]. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
 - b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions) [15][16]. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as procedure #1, was re-measured. If the value changed by more than 5%, the evaluation is repeated.



Figure 7.1 Sample SAR Area Scan

Deviation from measurement procedure - None

Specific Anthropomorphic Mannequin (SAM) Specifications

The phantom for handset SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Fig. 7.2). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimized reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15cm to minimize reflections from the upper surface.



Figure 7.2 SAM Twin Phantom shell

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8. TEST CONFIGURATION POSITIONS (Continued)

Body Holster / Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.5). A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are supplied with the device, the device is tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration where a separation distance between the back of the device and the flat phantom is used. All test position spacings are documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst-case positioning is then documented and used to perform Body SAR testing.

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements are included in the user's manual.



Figure 9.5 Typical Body Belt Clip & Holster Configurations
Example Photo Only
(Not Actual EUT)

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9. ANSI/IEEE C95.1 - 1992 RF EXPOSURE LIMITS

Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 10.1. Safety Limits for Partial Body Exposure [2]

	HUMAN EXPOSURE LIMITS	
	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR ¹ Head	1.60	8.00
SPATIAL AVERAGE SAR ² Whole Body	0.08	0.40
SPATIAL PEAK SAR ³ Hands, Feet, Ankles, Wrists	4.00	20.00

- 1 The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
 2 The Spatial Average value of the SAR averaged over the whole body.
 3 The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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10. MEASUREMENT UNCERTAINTIES

a	b	c	d	e= f(d,k)	f	g	h = cxf/e	i = cxg/e	k
Uncertainty Component	Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i (1 - g)	c_i (10 - g)	1 - g u_i (± %)	10 - g u_i (± %)	v_i
Measurement System									
Probe Calibration	E1.1	5.9	N	1	1	1	5.9	5.9	∞
Axial Isotropy	E1.2	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
Hemishperical Isotropy	E1.2	9.6	R	$\sqrt{3}$	0.7	0.7	3.9	3.9	∞
Boundary Effect	E1.3	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Linearity	E1.4	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
System Detection Limits	E1.5	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Readout Electronics	E1.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E1.7	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
Integration Time	E1.8	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
RF Ambient Conditions	E5.1	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E5.2	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E5.3	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Extrapolation, Interpolation & Integration Algorithms for Max. SAR Evaluation	E4.2	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E3.2.1	2.9	N	1	1	1	2.9	2.9	145
Device Holder Uncertainty	E3.1.1	3.6	N	1	1	1	3.6	3.6	5
Output Power Variation - SAR drift measurement	5.6.2	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E2.1	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E2.2	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E2.2	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity - deviation from target values	E2.2	5.0	R	$\sqrt{3}$	0.6	0.5	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E2.2	2.5	N	1	0.6	0.5	1.5	1.2	∞
Combined Standard Uncertainty (k=1)			RSS				10.8	10.6	
Expanded Uncertainty (k=2) (95% CONFIDENCE LEVEL)							21.7	21.2	

The above measurement uncertainties are according to IEEE Std. 1528-2003.

PCTEST SAR REPORT		FCC Measurement Report		Reviewed by: Quality Manager
SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 12 of 24

12. SAR TEST DATA SUMMARY

See Measurement Result Data Pages

Procedures Used To Establish Test Signal

The handset was placed into simulated call mode (FM modulation) using manufacturers test codes. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR [4]. See data pages for actual procedure used in measurement.

Device Test Conditions

The handset is battery operated. Each SAR measurement was taken with a fully charged battery. In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power. If a conducted power deviation of more than 5% occurred, the test was repeated.

PCTEST SAR REPORT		FCC Measurement Report		Reviewed by: Quality Manager
SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 14 of 24

SAR DATA SUMMARY (Continued)

Mixture Type: 835MHz Head

13.1 MEASUREMENT RESULTS (Model U6264, Face SAR)								
FREQUENCY		Modulation	Begin / End POWER [‡]		Device Test Position	Separation Distance (cm)	SAR W/kg	Remarks
MHz	Ch.		(dBm)					
770.125	6401	FM	21.69	21.61	Front Side	0.0 cm	0.541	Transmitter Part
770.125	6401	FM	21.69	21.69	Back Side	0.0 cm	0.474	Transmitter Part
770.125	6401	FM	21.69	21.71	Left Side	0.0 cm	0.341	Transmitter Part
770.125	6401	FM	21.69	21.73	Right Side	0.0 cm	0.539	Transmitter Part
770.125	6401	FM	21.69	21.73	Front Side	0.0 cm	0.461	Microphone Part
770.125	6401	FM	21.69	21.85	Microphone Top	0.0 cm	0.167	-
770.125	6401	FM	21.69	21.75	Microphone Bottom	0.0 cm	0.107	-
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Head 1.6 W/kg (mW/g) averaged over 1 gram			

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2003].
 - All modes of operation were investigated, and worst-case results are reported.
 - Battery is fully charged for all readings.
- [‡]Power Measured ☒ Conducted ☐ ERP ☐ EIRP
 4. SAR Measurement System ☒ DASY4 ☐ IDX
 Phantom Configuration ☐ Left Head ☒ Flat Phantom ☐ Right Head
 5. SAR Configuration ☐ Head ☐ Body ☒ Face
 6. Test Signal Call Mode ☒ Manu. Test Codes ☐ Base Station Simulator
- Tissue parameters and temperatures are listed on the SAR plots.
 - Liquid tissue depth is 15.1 cm. ± 0.1
 - Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July, 2003), if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).


 Randy Ortanez
 President

PCTEST SAR REPORT	FCC Measurement Report		SONY	Reviewed by: Quality Manager
SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 15 of 24

SAR DATA SUMMARY (Continued)

Mixture Type: 835MHz Body

13.2 MEASUREMENT RESULTS (Model U6264, Body SAR)								
FREQUENCY		Modulation	Begin / End POWER [‡]		Device Test Position	Separation Distance (cm)	SAR W/kg	Remarks
MHz	Ch.		(dBm)					
770.125	6401	FM	21.69	21.56	Front Side	0.0 cm	0.532	Transmitter Part
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram			

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2003].
 - All modes of operation were investigated, and worst-case results are reported.
 - Battery is fully charged for all readings.
- *Power Measured ☒ Conducted ☐ ERP ☐ EIRP
4. SAR Measurement System ☒ DASY4 ☐ IDX
- Phantom Configuration ☐ Left Head ☒ Flat Phantom ☐ Right Head
5. SAR Configuration ☐ Head ☒ Body ☐ Face
6. Test Signal Call Mode ☒ Manu. Test ☐ Base Station Simulator
Codes
- Tissue parameters and temperatures are listed on the SAR plots.
 - Liquid tissue depth is 15.1 cm. ± 0.1
 - Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July, 2003), if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



Randy Orlanez
President

PCTEST SAR REPORT	FCC Measurement Report		SONY	Reviewed by: Quality Manager
SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 16 of 24

SAR DATA SUMMARY (Continued)

Mixture Type: 835MHz Head

13.3 MEASUREMENT RESULTS (Model U6668, Face SAR)								
FREQUENCY		Modulation	Begin / End POWER [‡]		Device Test Position	Separation Distance (cm)	SAR W/kg	Remarks
MHz	Ch.		(dBm)					
794.125	6801	FM	21.56	21.59	Front Side	0.0 cm	0.355	Transmitter Part
794.125	6801	FM	21.56	21.59	Back Side	0.0 cm	0.343	Transmitter Part
794.125	6801	FM	21.56	21.59	Left Side	0.0 cm	0.269	Transmitter Part
794.125	6801	FM	21.56	21.59	Right Side	0.0 cm	0.435	Transmitter Part
794.125	6801	FM	21.56	21.61	Front Side	0.0 cm	0.327	Microphone Part
794.125	6801	FM	21.56	21.60	Microphone Top	0.0 cm	0.117	-
794.125	6801	FM	21.56	21.56	Microphone Bottom	0.0 cm	0.072	-
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Head 1.6 W/kg (mW/g) averaged over 1 gram			

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2003].
 - All modes of operation were investigated, and worst-case results are reported.
 - Battery is fully charged for all readings.
- *Power Measured ☒ Conducted ☐ ERP ☐ EIRP
4. SAR Measurement System ☒ DASY4 ☐ IDX
- Phantom Configuration ☐ Left Head ☒ Flat Phantom ☐ Right Head
5. SAR Configuration ☐ Head ☐ Body ☒ Face
6. Test Signal Call Mode ☒ Manu. Test Codes ☐ Base Station Simulator
- Tissue parameters and temperatures are listed on the SAR plots.
 - Liquid tissue depth is 15.1 cm. ± 0.1
 - Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July, 2003), if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).


Randy Ortanez
President

PCTEST SAR REPORT	FCC Measurement Report		SONY	Reviewed by: Quality Manager
SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 17 of 24

SAR DATA SUMMARY (Continued)

Mixture Type: 835MHz Body

13.4 MEASUREMENT RESULTS (Model U6264, Body SAR)								
FREQUENCY		Modulation	Begin / End POWER [‡]		Device Test Position	Separation Distance (cm)	SAR W/kg	Remarks
MHz	Ch.		(dBm)					
794.125	6801	FM	21.56	21.56	Right Side	0.0 cm	0.408	Transmitter Part
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram			

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2003].
 - All modes of operation were investigated, and worst-case results are reported.
 - Battery is fully charged for all readings.
- *Power Measured ☒ Conducted ☐ ERP ☐ EIRP
4. SAR Measurement System ☒ DASY4 ☐ IDX
- Phantom Configuration ☐ Left Head ☒ Flat Phantom ☐ Right Head
5. SAR Configuration ☐ Head ☒ Body ☐ Face
6. Test Signal Call Mode ☒ Manu. Test ☐ Base Station Simulator Codes
- Tissue parameters and temperatures are listed on the SAR plots.
 - Liquid tissue depth is 15.1 cm. ± 0.1
 - Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July, 2003), if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



Randy Orlanez
President

PCTEST SAR REPORT	FCC Measurement Report		SONY	Reviewed by: Quality Manager
SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 18 of 24

14. SAR TEST EQUIPMENT

Equipment Calibration

Type	Calibration Due	Serial Number
Stäubli Robot RX60L	N/A	599131-01
Stäubli Robot Controller	N/A	PCT592
Stäubli Teach Pendant (Joystick)	N/A	3323-00161
Micron Computer, 450 MHz Pentium III, Windows NT	N/A	PCT577
SPEAG EDC3	N/A	321
SPEAG DAE4	Feb-07	900
SPEAG E-Field Probe ES3DV2	Jun-07	3022
SPEAG SAM Twin Phantom V4.0 (Main)	N/A	TP:1197
SPEAG SAM Twin Phantom V4.0 (Sub)	N/A	TP:1357
SPEAG Light Alignment Sensor	N/A	205
SPEAG Validation Dipole D835V2	Feb-07	4d026
SPEAG Validation Dipole D1900V2	Feb-07	502
SPEAG Validation Dipole D2450V2	Feb-07	719
Gigatronics 8651A Power Meter	Jan-07	1835299
HP-8648D (9kHz ~ 4GHz) Signal Generator	Jan-07	PCT530
Amplifier Research 5S1G4 Power Amp	N/A	PCT540
HP-8753E (30kHz ~ 6GHz) Network Analyzer	May-07	PCT552/ JP8020182
HP85070B Dielectric Probe Kit	N/A	PCT501
Ambient Noise/Reflection, etc. <12mW/kg/<3%of SAR	N/A	Anechoic Room PCT01

Table 15.1 Test Equipment Calibration

NOTE:

The E-field probe was calibrated by SPEAG, by waveguide technique procedure. Dipole Validation measurement is performed by PCTEST Lab. before each test. The Head simulating material is calibrated by PCTEST using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the Head-equivalent material.

PCTEST SAR REPORT	FCC Measurement Report			Reviewed by: Quality Manager
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15. CONCLUSION

Measurement Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.[3]

PCTEST SAR REPORT	 FCC Measurement Report 			Reviewed by: Quality Manager
SAR Filename: 0605310421	Test Dates: June 6-7, 2006	EUT Type: UHF Synthesizes Transmitter – Wireless Microphone System	FCC ID: AK8WRT8P	Page 20 of 24

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PCTEST SAR REPORT		FCC Measurement Report		Reviewed by: Quality Manager
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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Front side, Mid.ch

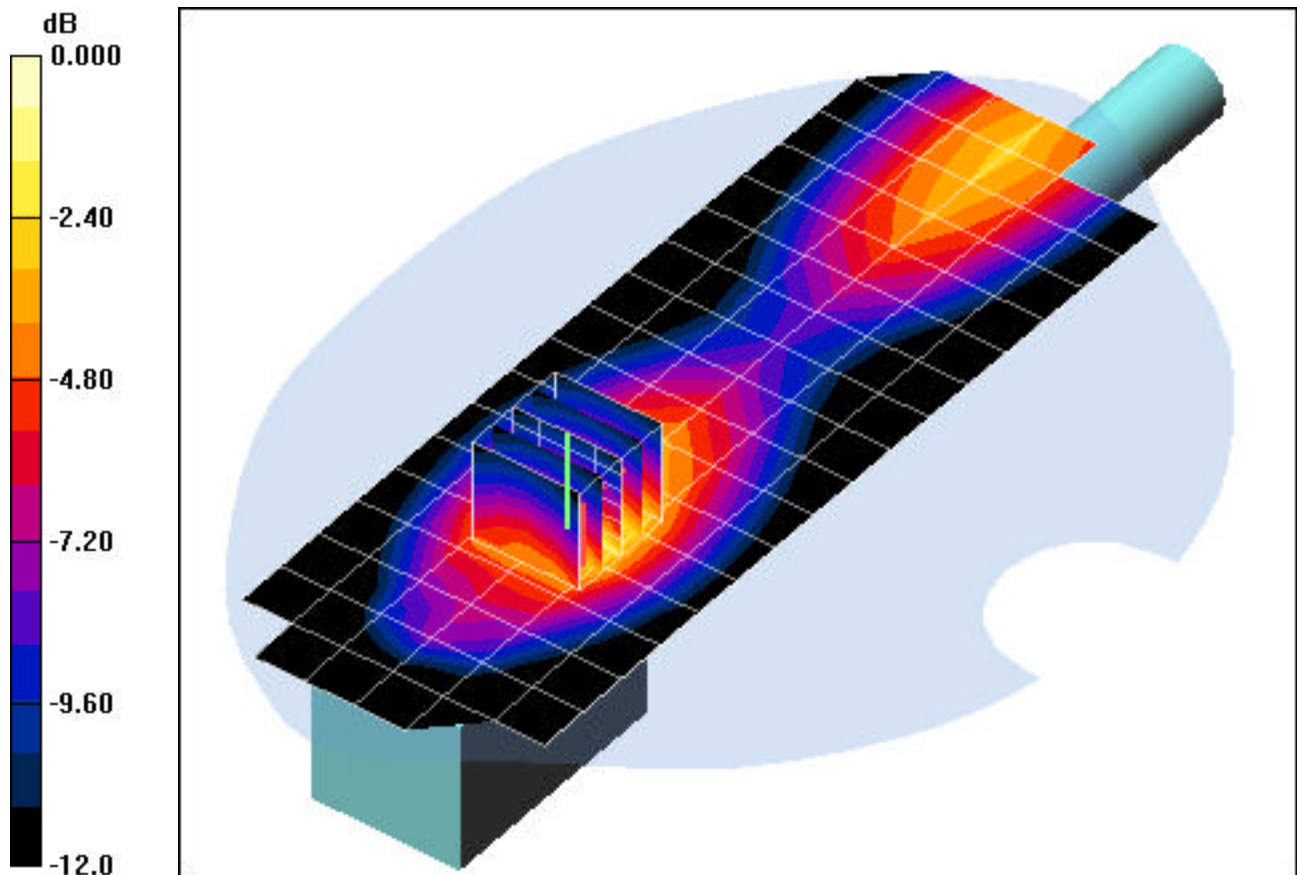
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 23.6 V/m

Peak SAR (extrapolated) = 0.942 W/kg

SAR(1 g) = 0.541 mW/g; SAR(10 g) = 0.322 mW/g



0 dB = 0.675mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C; Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Back side, Mid.ch

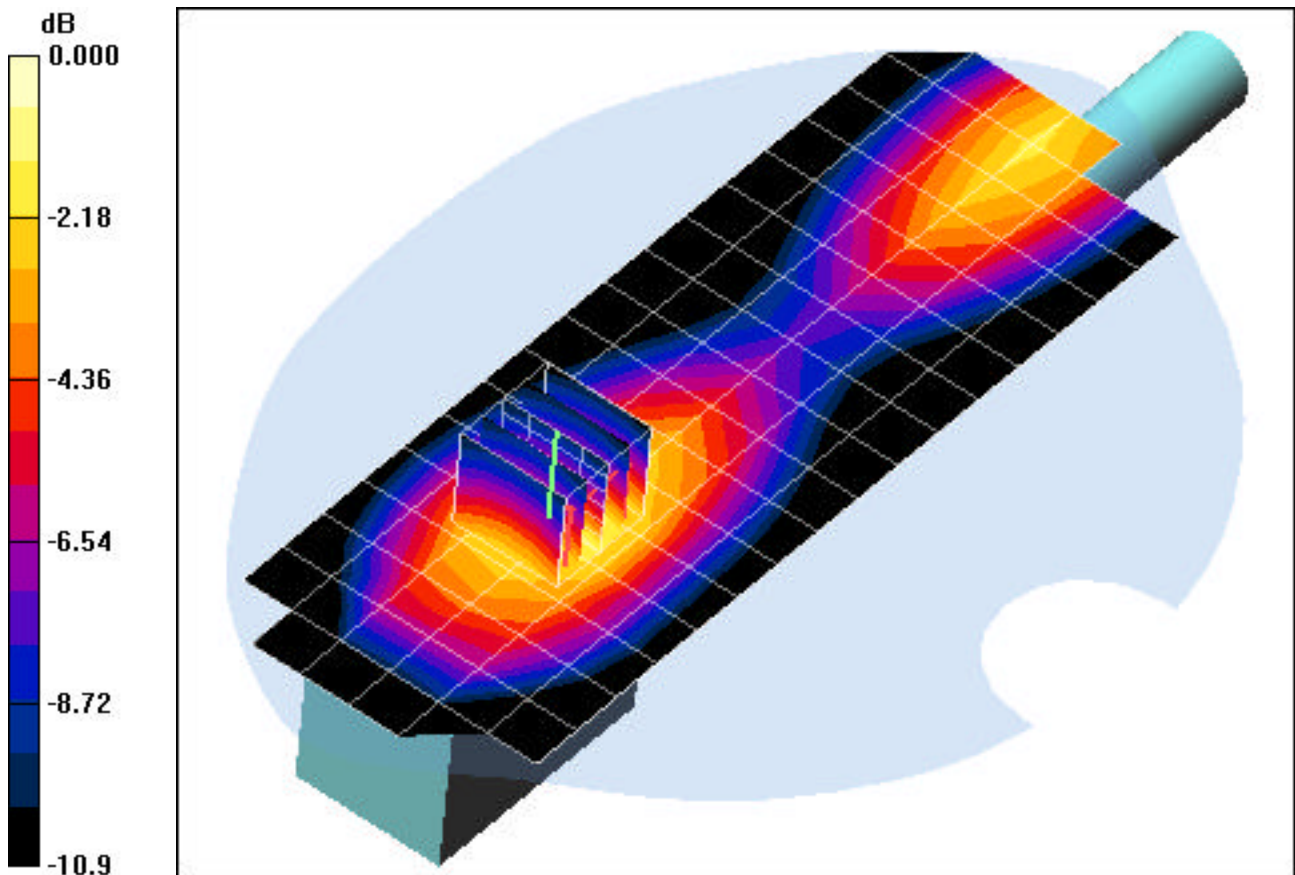
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 22.5 V/mB

Peak SAR (extrapolated) = 0.768 W/kg

SAR(1 g) = 0.474 mW/g; SAR(10 g) = 0.298 mW/g



0 dB = 0.574mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C; Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Left side, Mid.ch

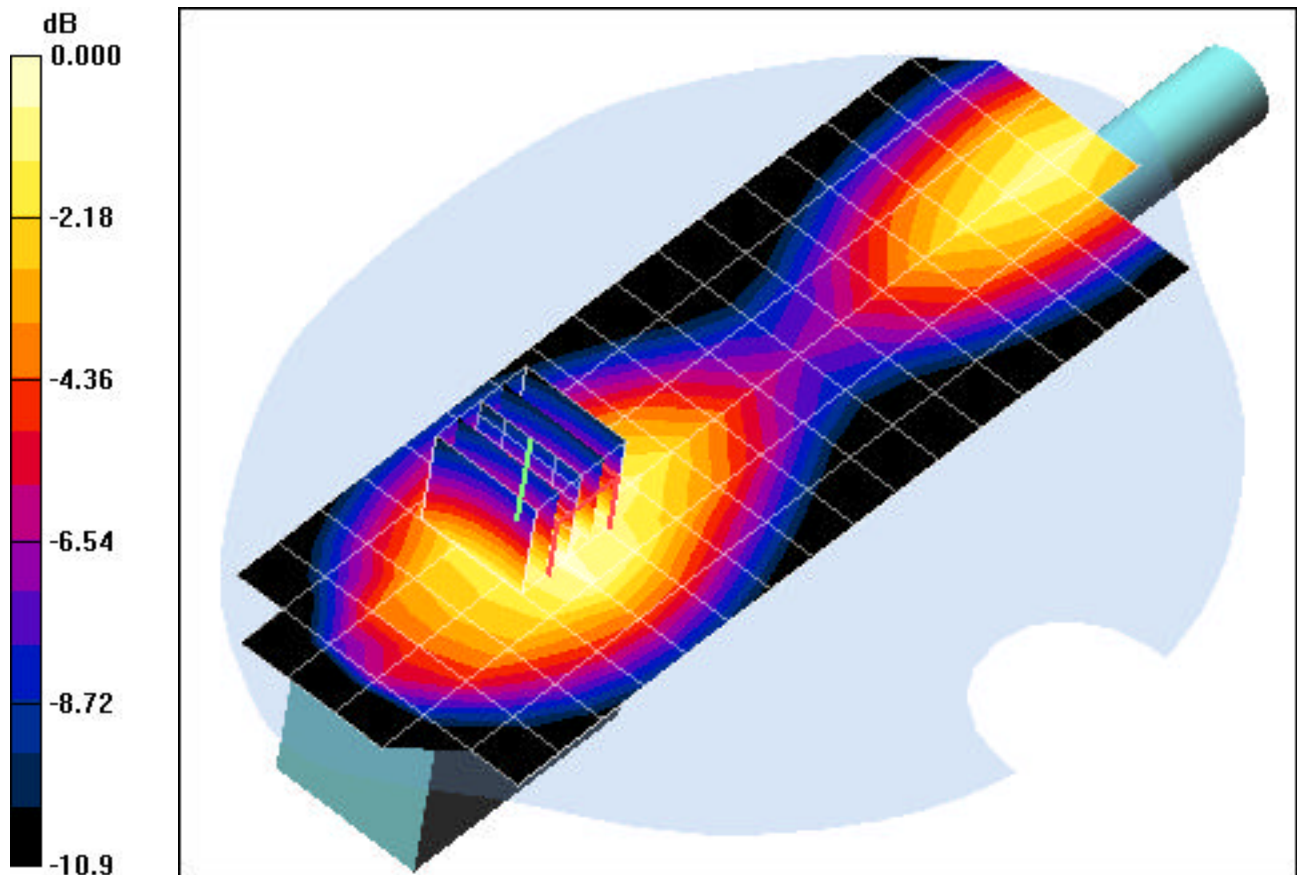
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 19.5 V/m

Peak SAR (extrapolated) = 0.567 W/kg

SAR(1 g) = 0.341 mW/g; SAR(10 g) = 0.224 mW/g



0 dB = 0.399mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C; Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Right side, Mid.ch

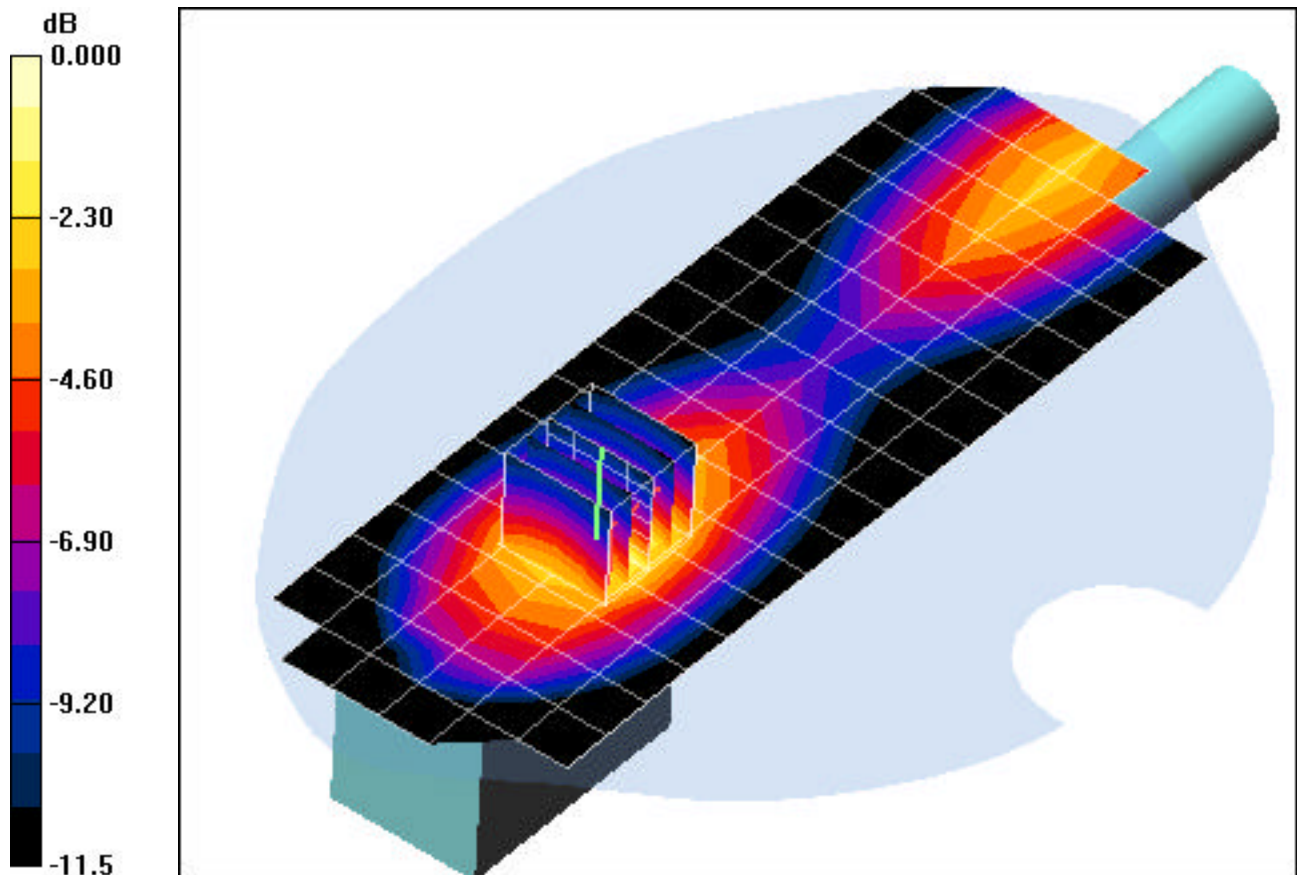
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 23.5 V/m

Peak SAR (extrapolated) = 0.915 W/kg

SAR(1 g) = 0.539 mW/g; SAR(10 g) = 0.330 mW/g



0 dB = 0.674mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Microphone part, Front side, Mid.ch

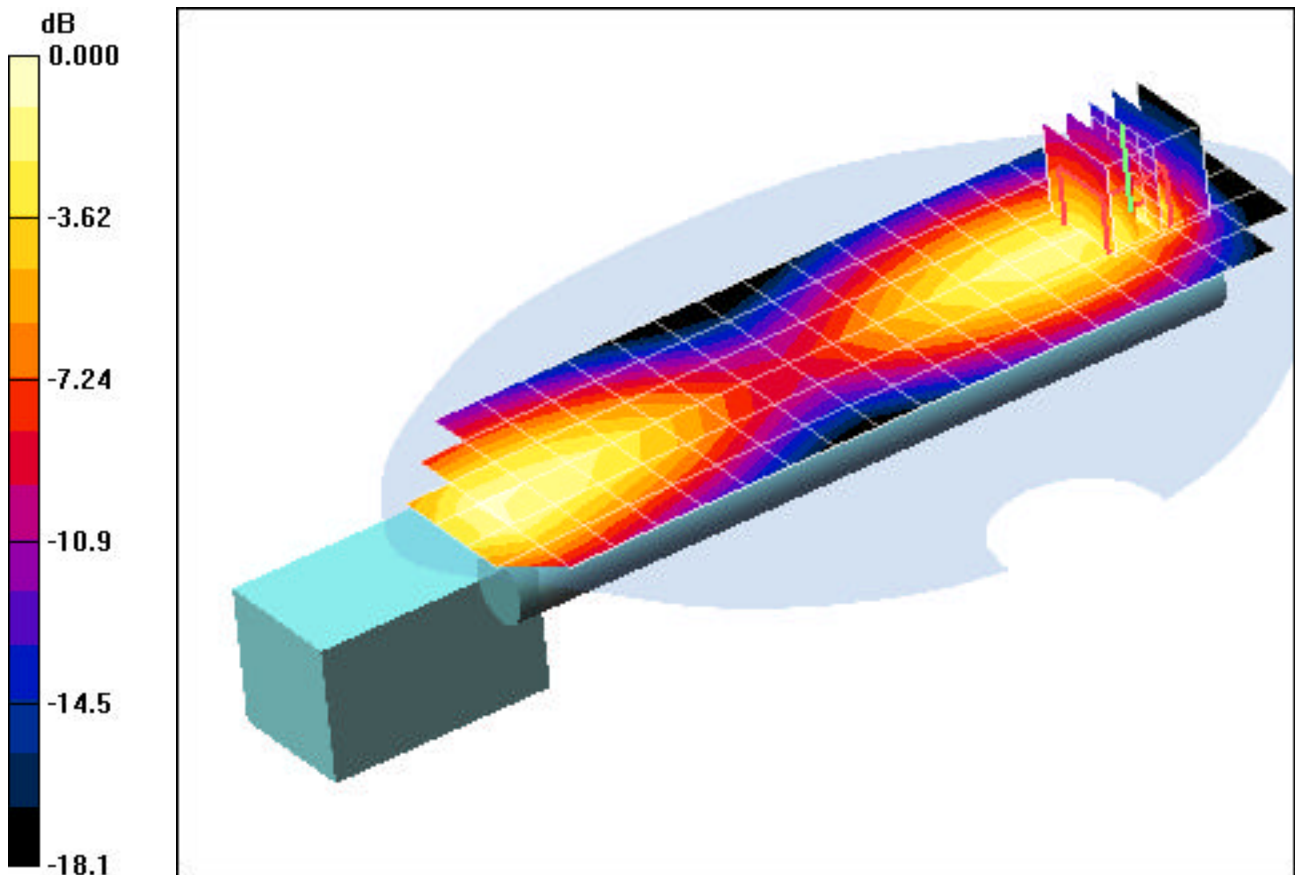
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 23.9 V/m

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.461 mW/g; SAR(10 g) = 0.249 mW/g



0 dB = 0.663mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Microphone top, Mid.ch

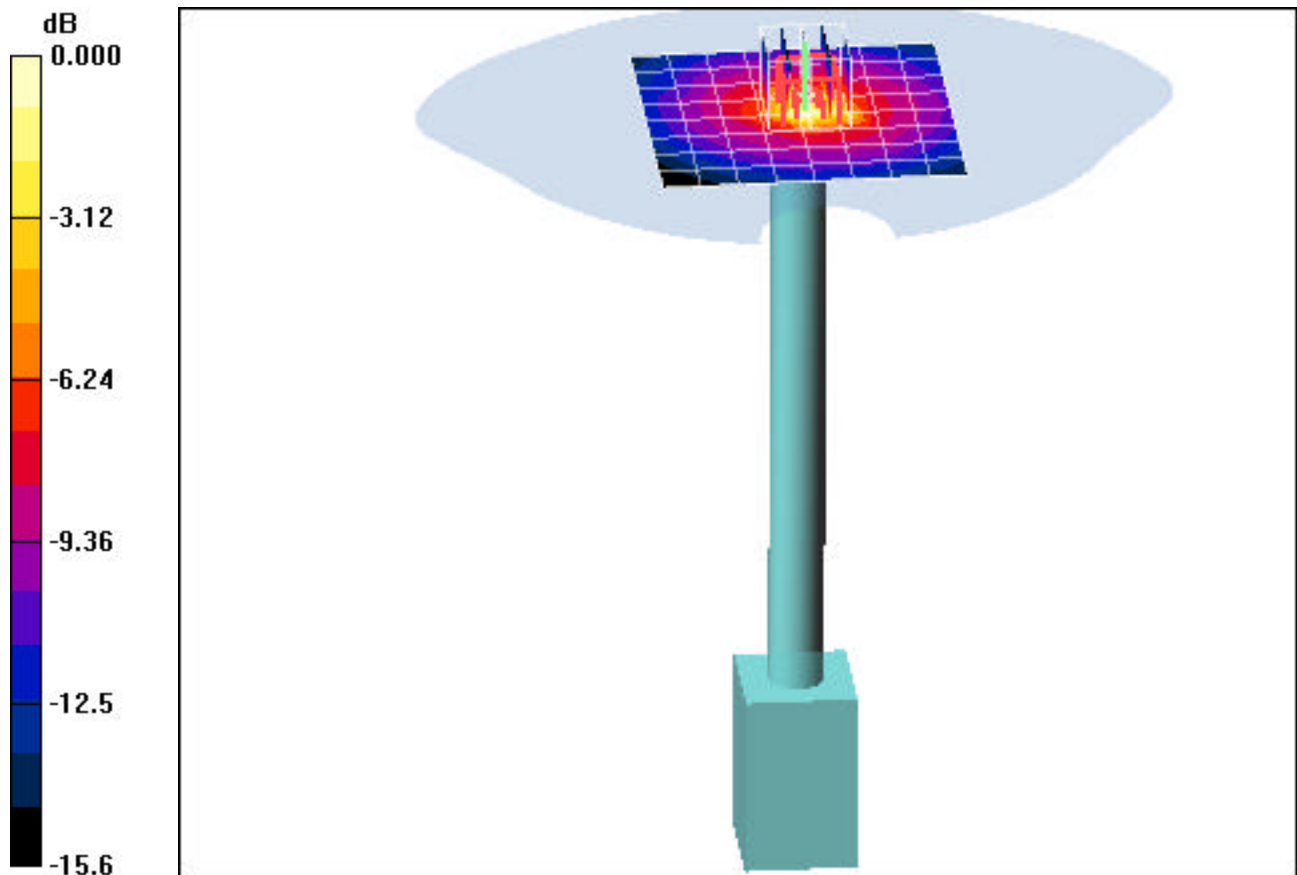
Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 13.6 V/m

Peak SAR (extrapolated) = 0.363 W/kg

SAR(1 g) = 0.167 mW/g; SAR(10 g) = 0.081 mW/g



0 dB = 0.211mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter bottom, Mid.ch

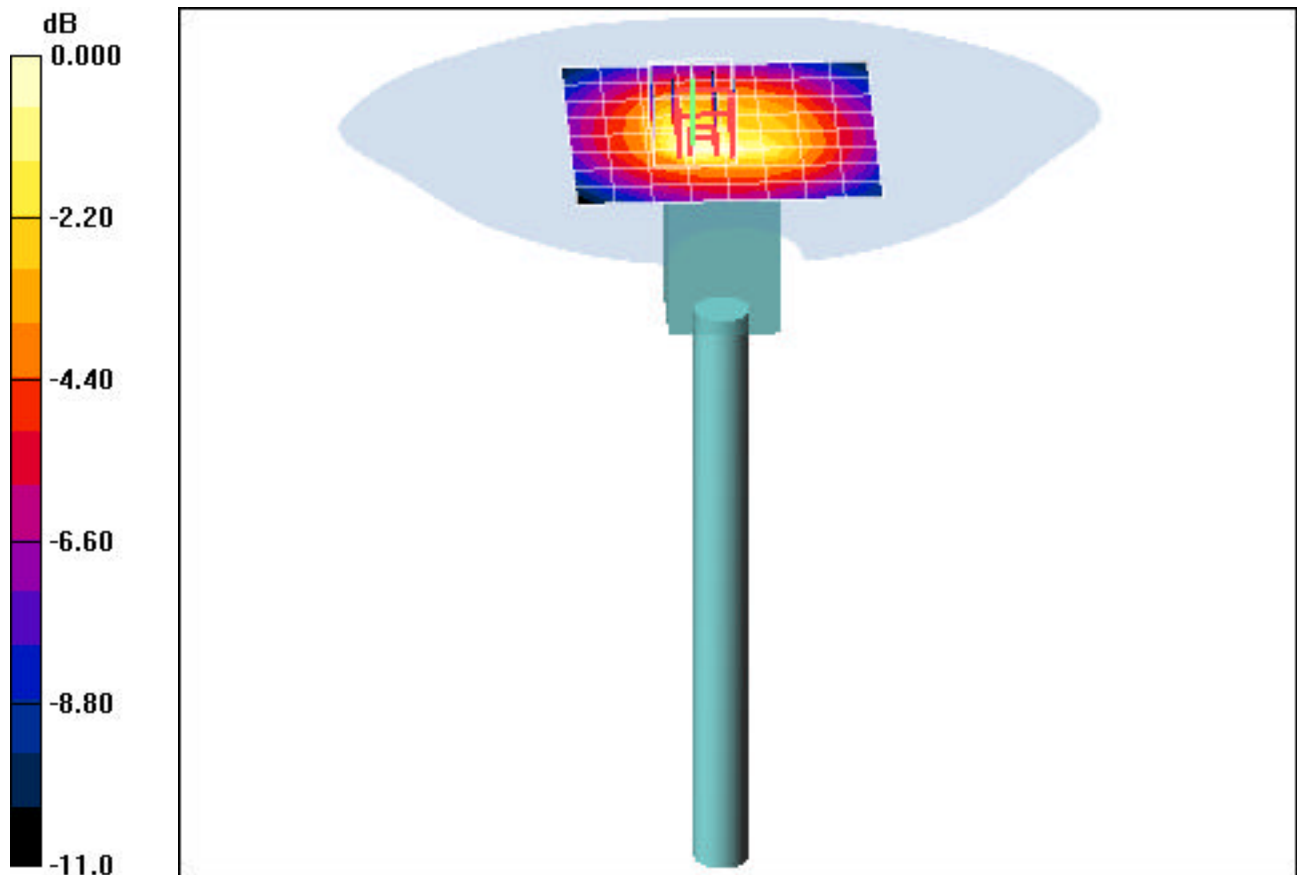
Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 9.49 V/m

Peak SAR (extrapolated) = 0.194 W/kg

SAR(1 g) = 0.107 mW/g; SAR(10 g) = 0.067 mW/g



0 dB = 0.124mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Muscle ($\sigma = 0.98$ mho/m, $\epsilon_r = 53.92$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-07-2006; Ambient Temp: 23.2°C Tissue Temp: 21.6 °C

Probe: ES3DV2 - SN3022; ConvF(5.98, 5.98, 5.98); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body SAR, Transmitter part, Front side, Mid.ch

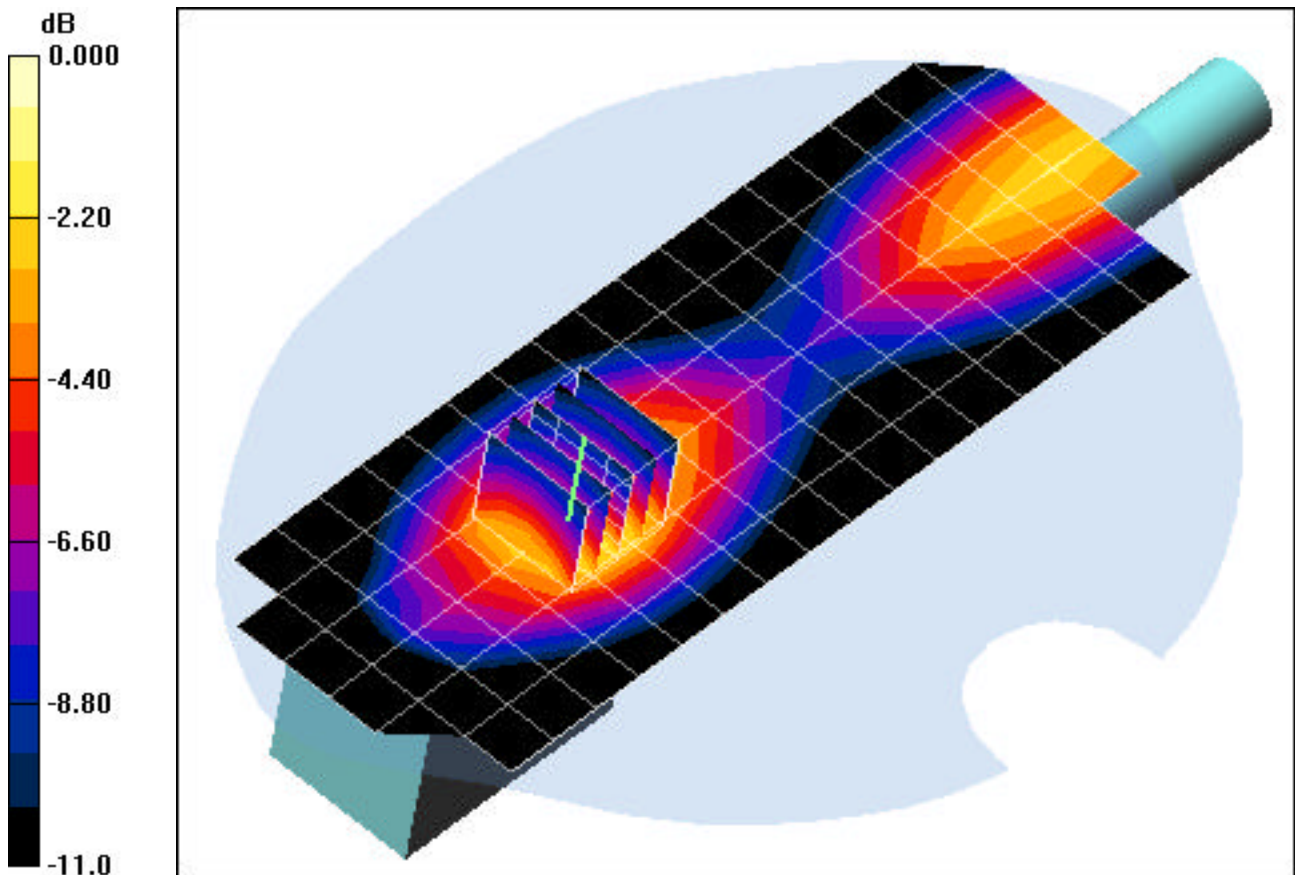
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 23.1 V/m

Peak SAR (extrapolated) = 0.844 W/kg

SAR(1 g) = 0.532 mW/g; SAR(10 g) = 0.335 mW/g



0 dB = 0.650mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Front side, Mid.ch

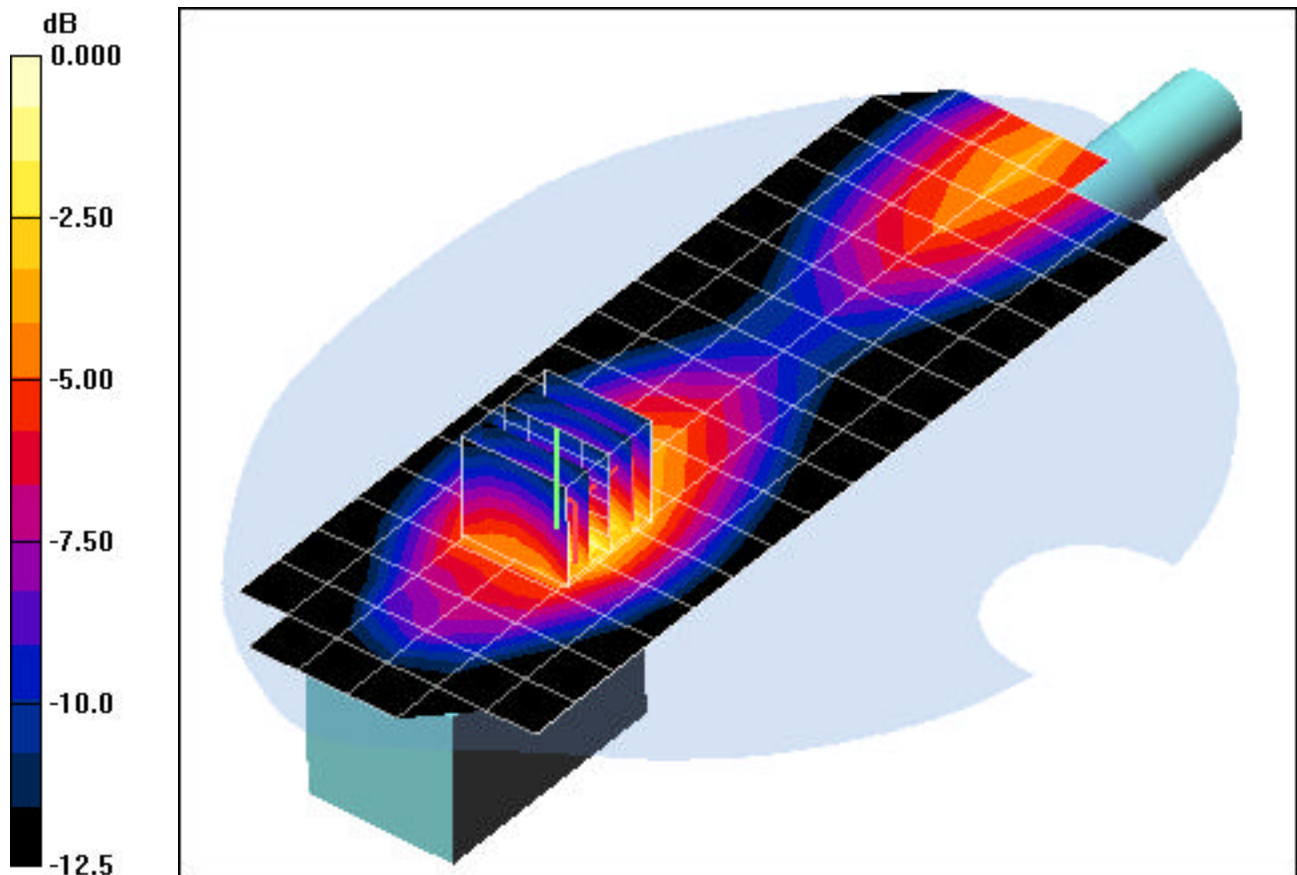
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 19.6 V/m

Peak SAR (extrapolated) = 0.623 W/kg

SAR(1 g) = 0.355 mW/g; SAR(10 g) = 0.210 mW/g



0 dB = 0.441mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C; Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Back side, Mid.ch

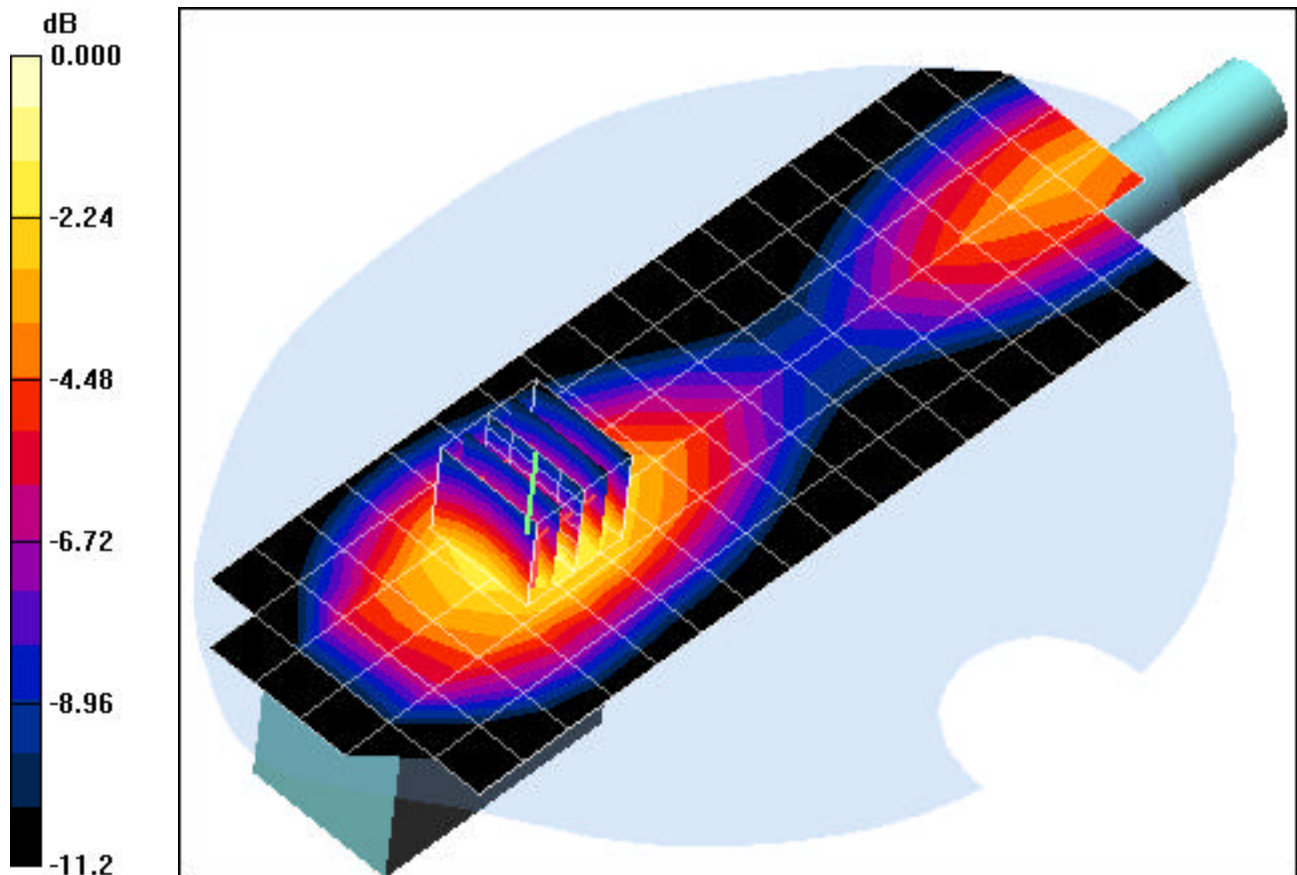
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 19.0 V/m

Peak SAR (extrapolated) = 0.542 W/kg

SAR(1 g) = 0.343 mW/g; SAR(10 g) = 0.218 mW/g



0 dB = 0.413mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Left side, Mid.ch

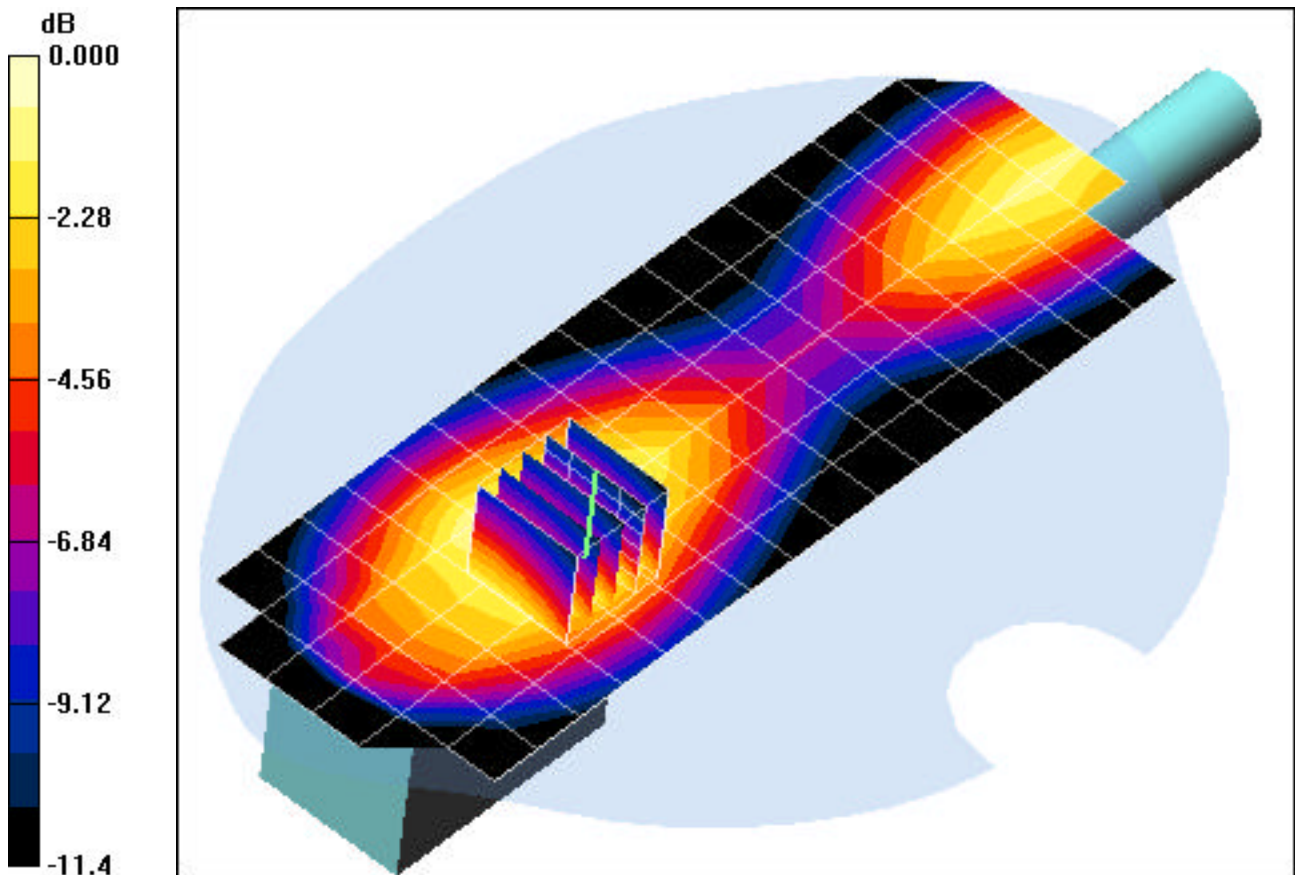
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 16.9 V/m

Peak SAR (extrapolated) = 0.452 W/kg

SAR(1 g) = 0.269 mW/g; SAR(10 g) = 0.175 mW/g



0 dB = 0.316mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C; Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Right side, Mid.ch

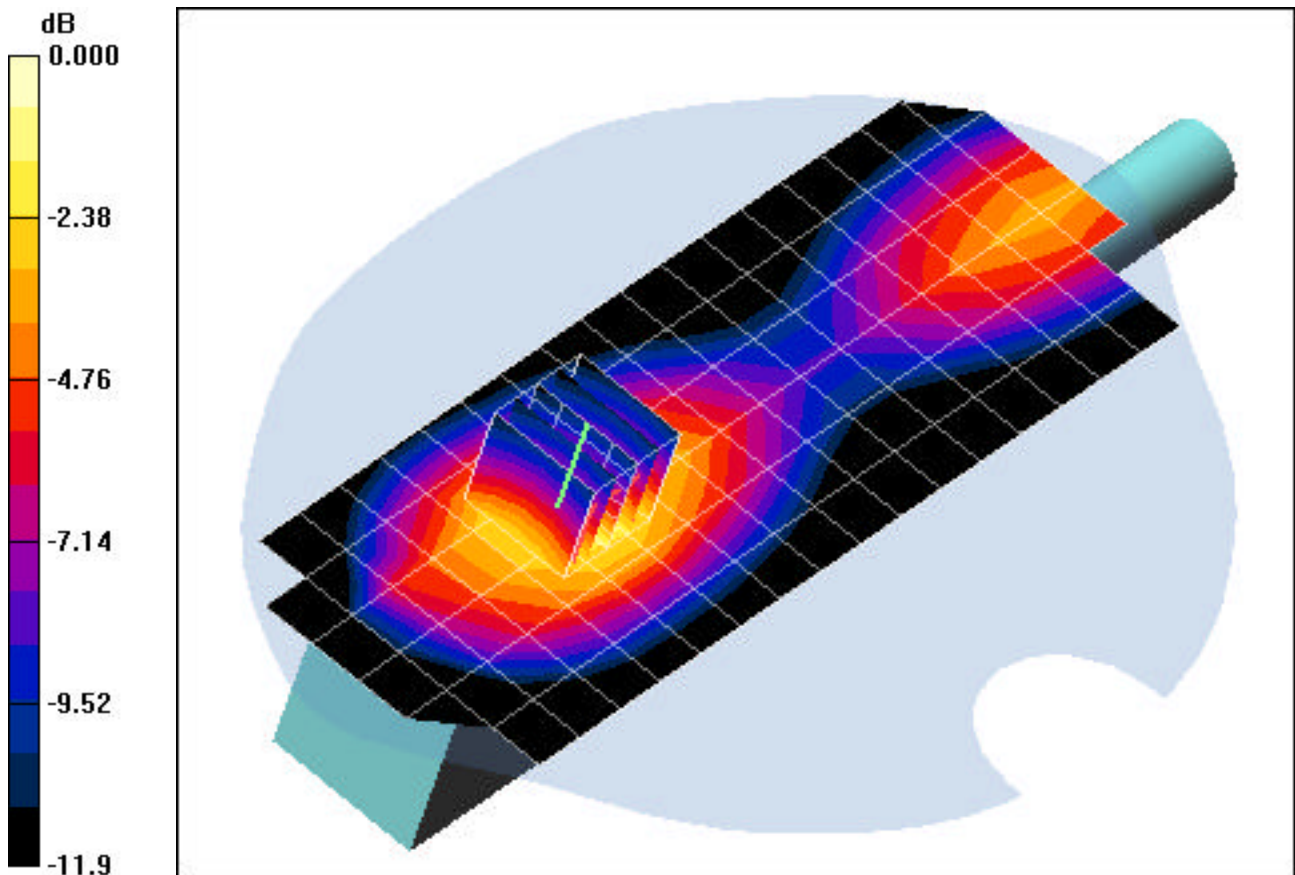
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 20.5 V/m

Peak SAR (extrapolated) = 0.748 W/kg

SAR(1 g) = 0.435 mW/g; SAR(10 g) = 0.267 mW/g



0 dB = 0.546mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Microphone part, Right side, Mid.ch

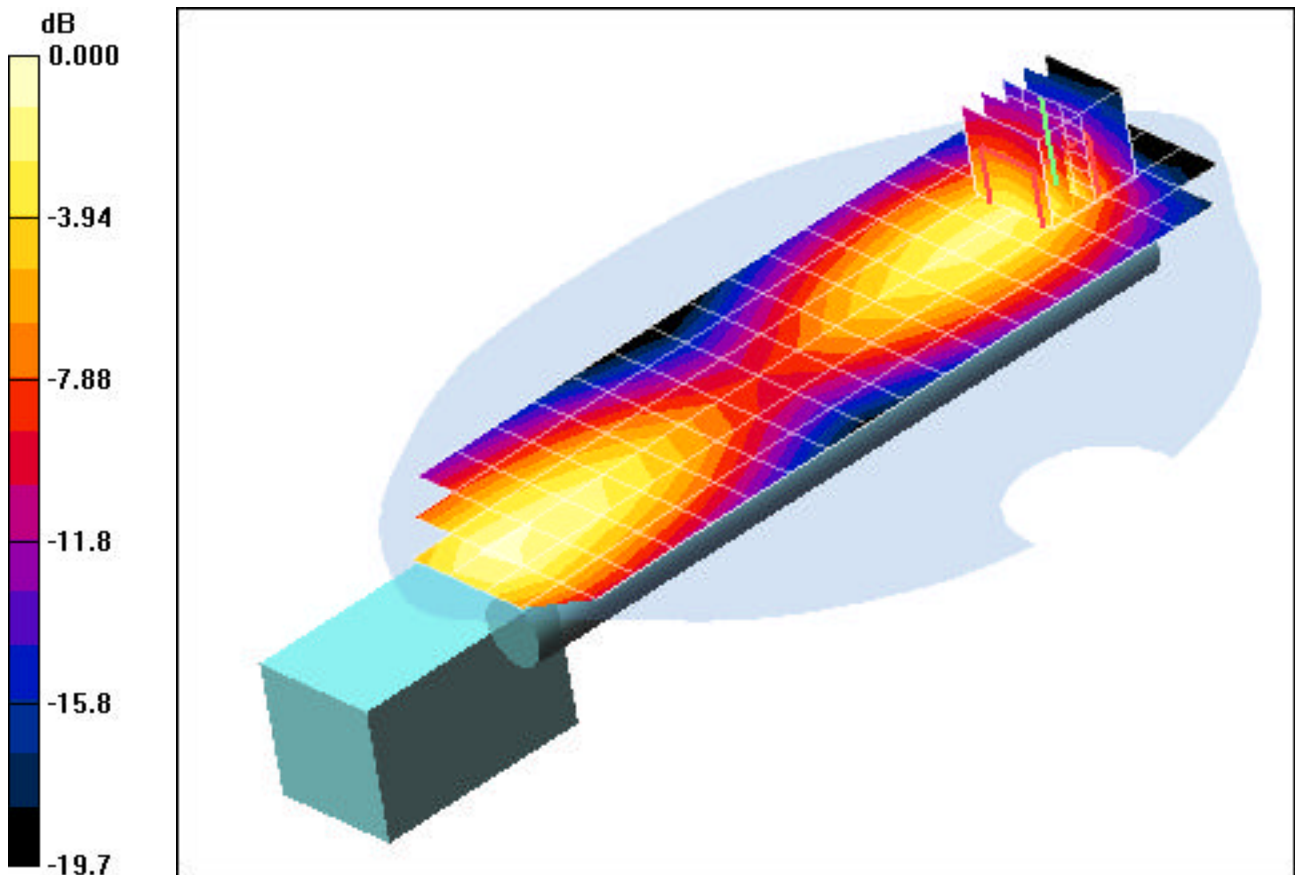
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 16.4 V/m

Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.327 mW/g; SAR(10 g) = 0.174 mW/g



0 dB = 0.508mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-07-2006; Ambient Temp: 23.5°C Tissue Temp: 21.4 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Microphone top, Mid.ch

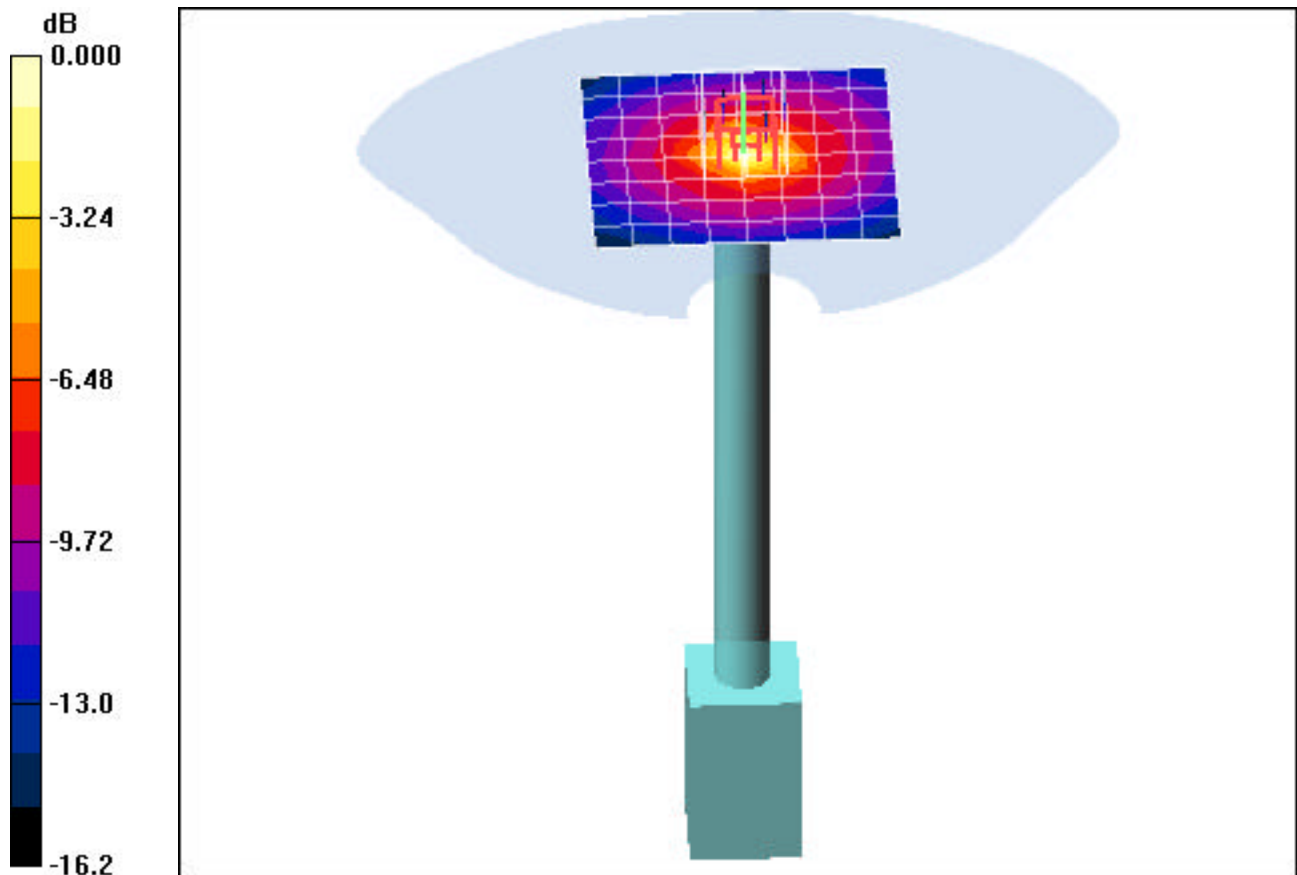
Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 11.9 V/m

Peak SAR (extrapolated) = 0.251 W/kg

SAR(1 g) = 0.117 mW/g; SAR(10 g) = 0.057 mW/g



0 dB = 0.149mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-07-2006; Ambient Temp: 23.5°C Tissue Temp: 21.4 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter bottom, Mid.ch

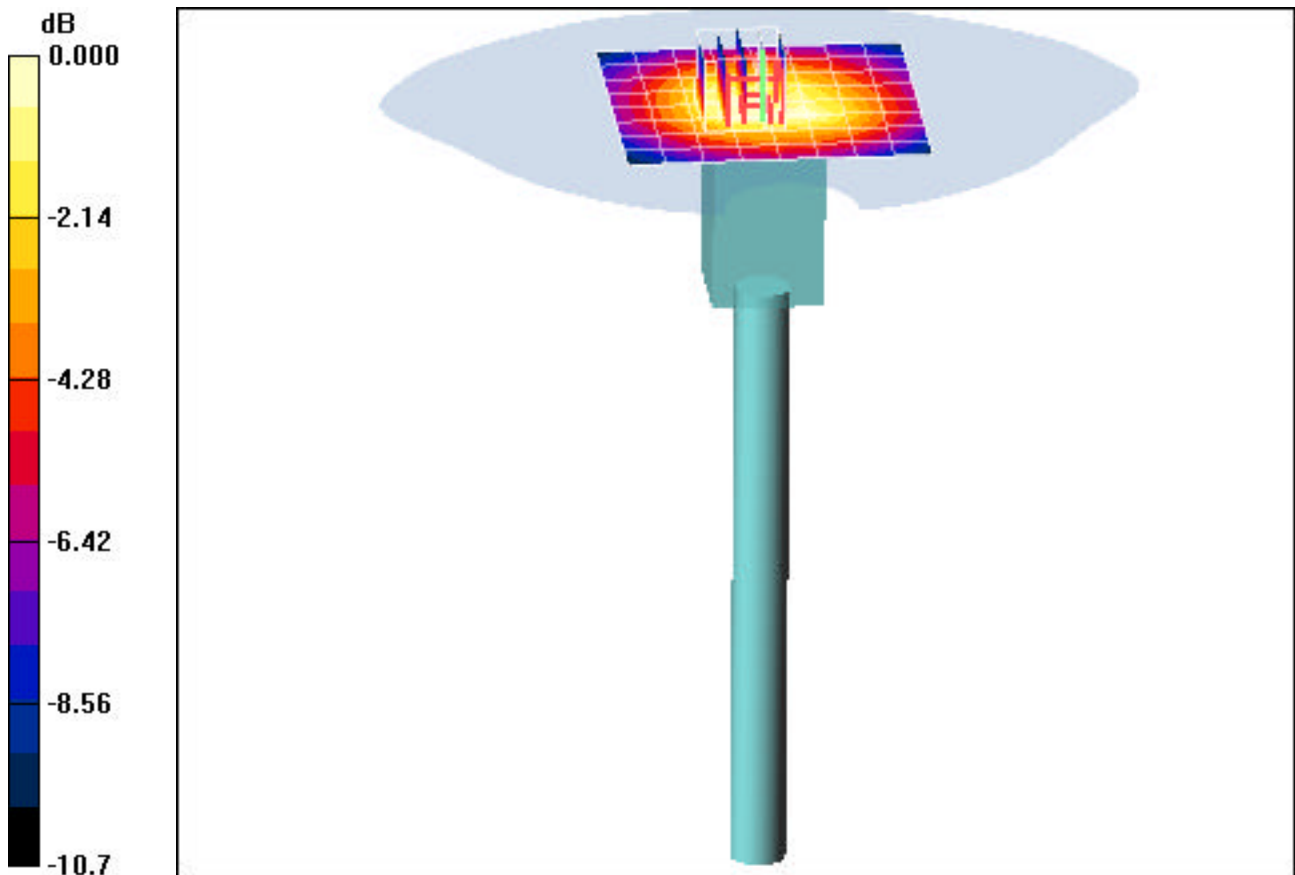
Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 8.26 V/m

Peak SAR (extrapolated) = 0.122 W/kg

SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.049 mW/g



0 dB = 0.084mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6668; Type: UHF Synthesized Transmitter; Serial: 8002

Communication System: UHF Wireless Microphone; Frequency: 794.125 MHz; Duty Cycle: 1:1

Medium: 835 Muscle ($\sigma = 0.98$ mho/m, $\epsilon_r = 53.92$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space: 0.0 cm

Test Date: 06-07-2006; Ambient Temp: 23.2°C Tissue Temp: 21.6 °C

Probe: ES3DV2 - SN3022; ConvF(5.98, 5.98, 5.98); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body SAR, Transmitter part, Right side, Mid.ch

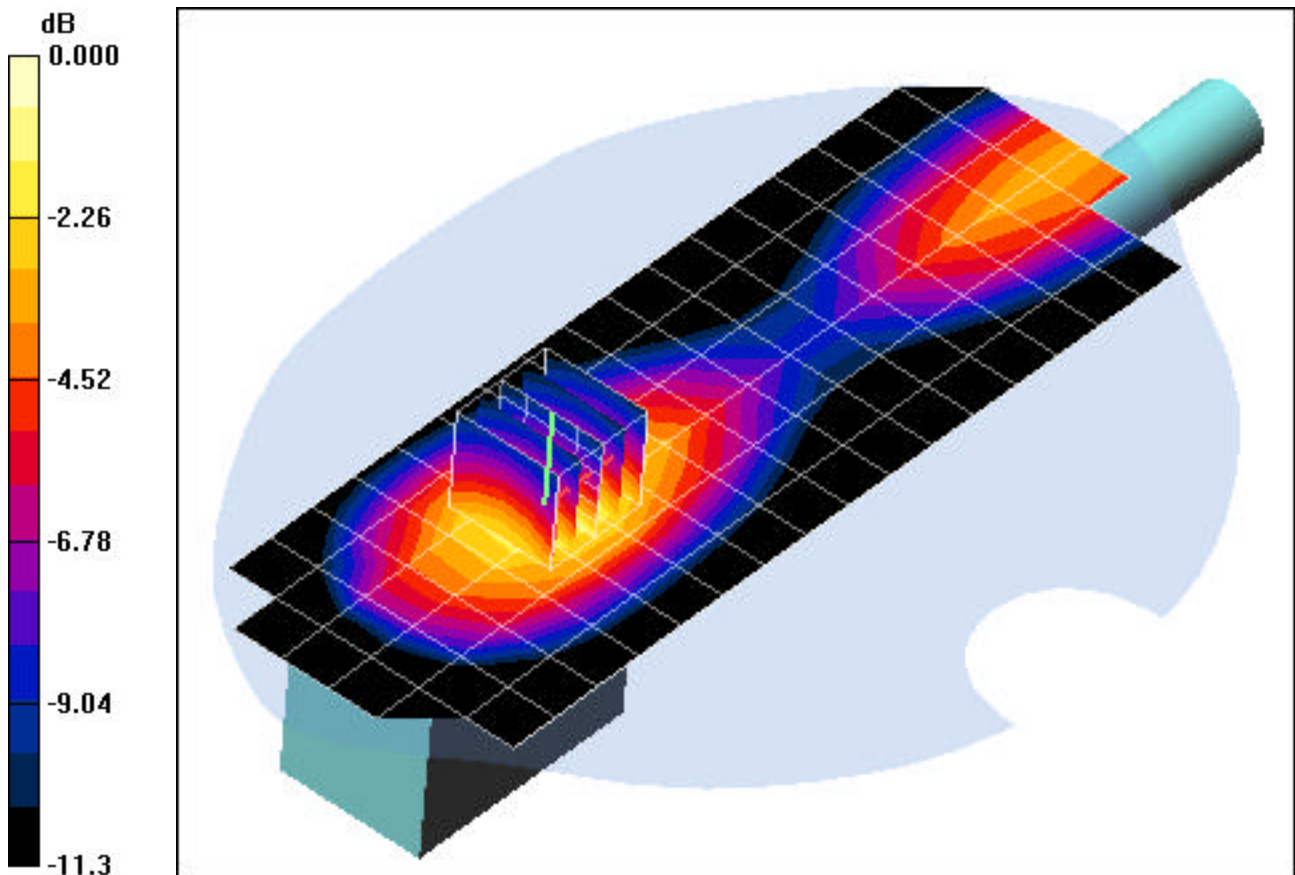
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 19.6 V/m

Peak SAR (extrapolated) = 0.653 W/kg

SAR(1 g) = 0.408 mW/g; SAR(10 g) = 0.259 mW/g



0 dB = 0.499mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C; Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(6.19, 6.19, 6.19); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Face SAR, Transmitter part, Front side, Mid.ch

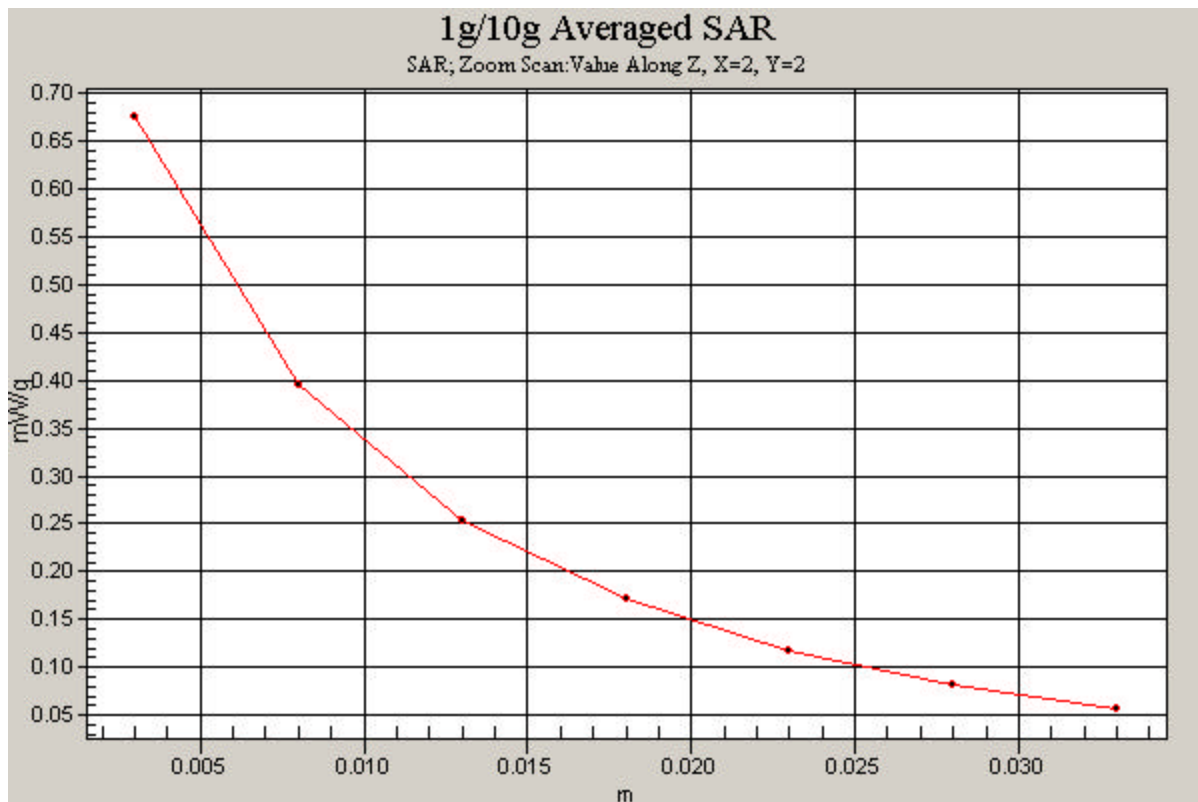
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 23.6 V/m

Peak SAR (extrapolated) = 0.942 W/kg

SAR(1 g) = 0.541 mW/g; SAR(10 g) = 0.322 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: WRT-8P, model U6264; Type: UHF Synthesized Transmitter; Serial: 8001

Communication System: UHF Wireless Microphone; Frequency: 770.125 MHz; Duty Cycle: 1:1

Medium: 835 Muscle ($\sigma = 0.98$ mho/m, $\epsilon_r = 53.92$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-07-2006; Ambient Temp: 23.2°C; Tissue Temp: 21.6 °C

Probe: ES3DV2 - SN3022; ConvF(5.98, 5.98, 5.98); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body SAR, Transmitter part, Front side, Mid.ch

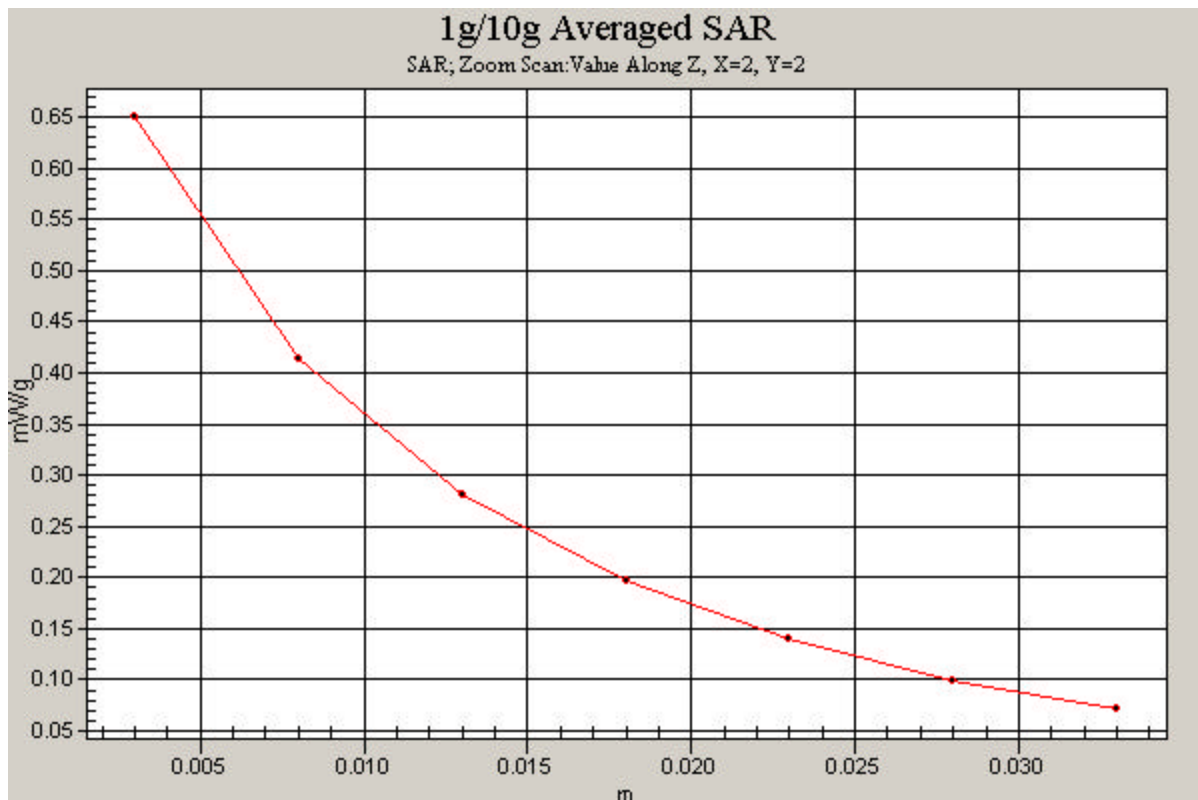
Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 23.1 V/m

Peak SAR (extrapolated) = 0.844 W/kg

SAR(1 g) = 0.532 mW/g; SAR(10 g) = 0.335 mW/g



APPENDIX B: DIPOLE VALIDATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

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

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space 1.5 cm

Test Date: 06-06-2006; Ambient Temp: 23.7°C Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(5.93, 5.93, 5.93); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

835MHz Dipole Validation

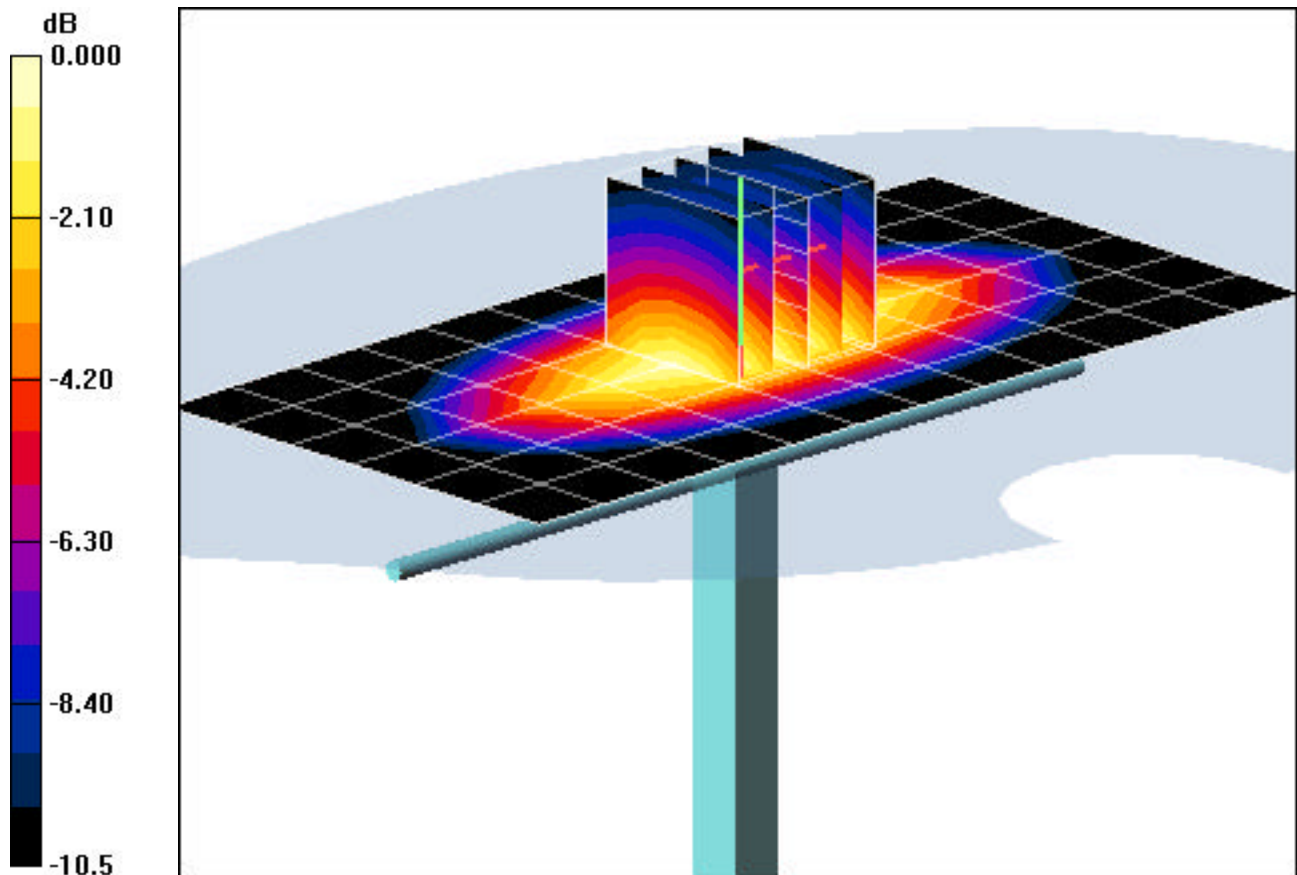
Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

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

Input Power 24.0 dBm (250 mW)

SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.49 mW/g

Target SAR(1g) 2.375 mW/g; Deviation = -4.42 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

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

Medium: 835 Brain ($\sigma = 0.88$ mho/m, $\epsilon_r = 41.23$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section Space 1.5 cm

Test Date: 06-07-2006; Ambient Temp: 23.5°C Tissue Temp: 21.4 °C

Probe: ES3DV2 - SN3022; ConvF(5.93, 5.93, 5.93); Calibrated: 7/21/2005

Sensor -Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn900; Calibrated: 2/28/2006

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

835MHz Dipole Validation

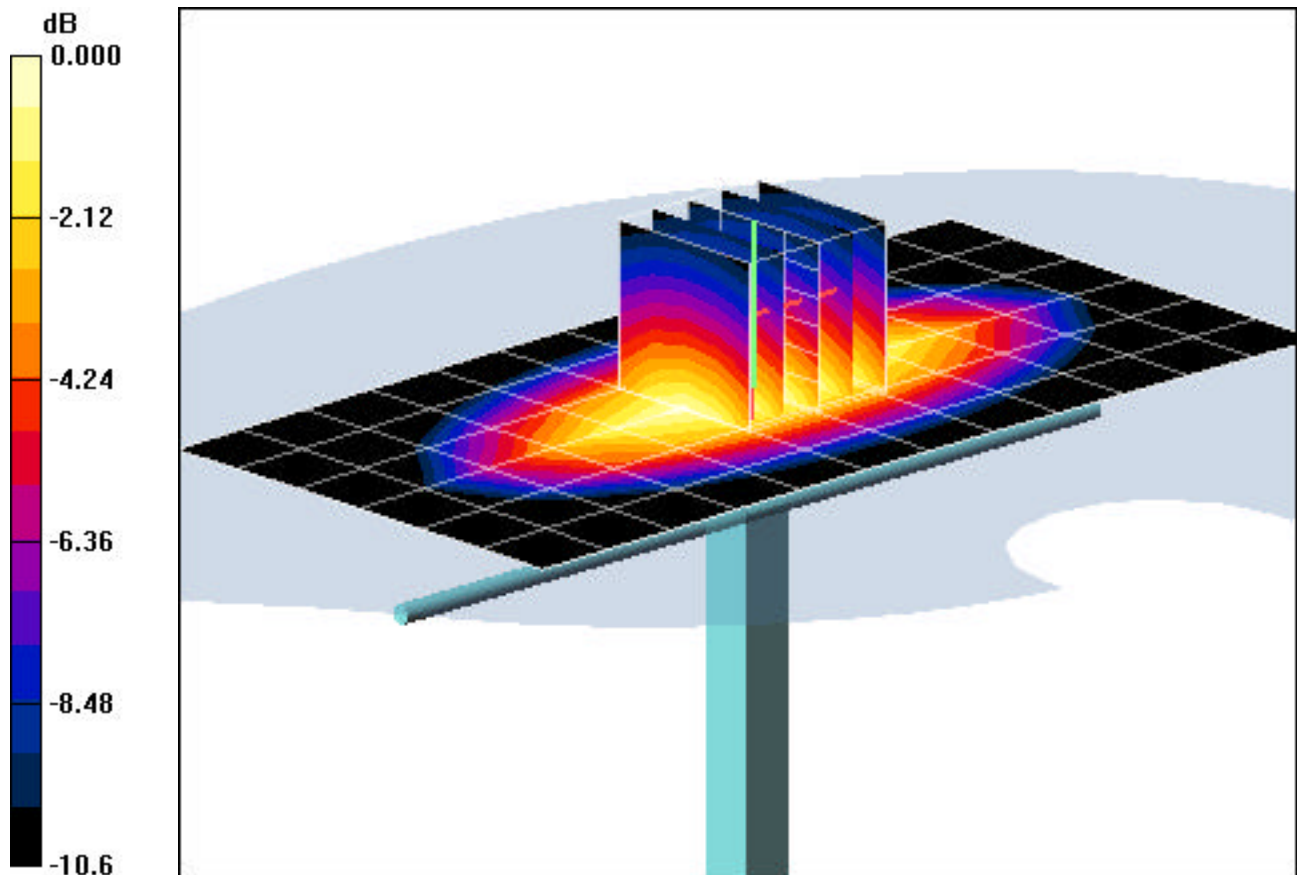
Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

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

Input Power 24.0 dBm (250 mW)

SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.53 mW/g

Target SAR(1g) 2.375 mW/g; Deviation = -1.47 %



APPENDIX C: PROBE CALIBRATION



Accredited by the Swiss Federal Office of Metrology and Accreditation
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 **PC Test**

Certificate No: **ES3-3022_Jul05**

CALIBRATION CERTIFICATE

Object **ES3DV2 - SN:3022**

Calibration procedure(s) **QA CAL-01.v5 and QA CAL-14.v2
Calibration procedure for dosimetric E-field probes**

Calibration date: **July 21, 2005**

Condition of the calibrated item **In Tolerance**

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%.

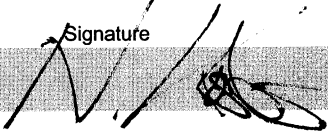
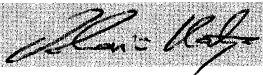
Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-04 (METAS, No. 251-00403)	Aug-05
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-04 (METAS, No. 251-00404)	Aug-05
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 907	21-Jun-05 (SPEAG, No. DAE4-907_Jun05)	Jun-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

Calibrated by: **Nico Vetterli** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature



Issued: July 21, 2005

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



Accredited by the Swiss Federal Office of Metrology and Accreditation
 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
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
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:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

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 effect the E^2 -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 (no uncertainty required). DCP does not depend on frequency nor media.
- 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 ES3DV2

SN:3022

Manufactured:	April 15, 2003
Last calibrated:	September 23, 2003
Recalibrated:	July 21, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV2 SN:3022

Sensitivity in Free Space^A

Diode Compression^B

NormX	1.00 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	93 mV
NormY	1.06 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	93 mV
NormZ	0.99 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	93 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	6.0	2.6
SAR _{be} [%]	With Correction Algorithm	0.1	0.1

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	8.3	5.1
SAR _{be} [%]	With Correction Algorithm	1.1	0.0

Sensor Offset

Probe Tip to Sensor Center **2 mm**

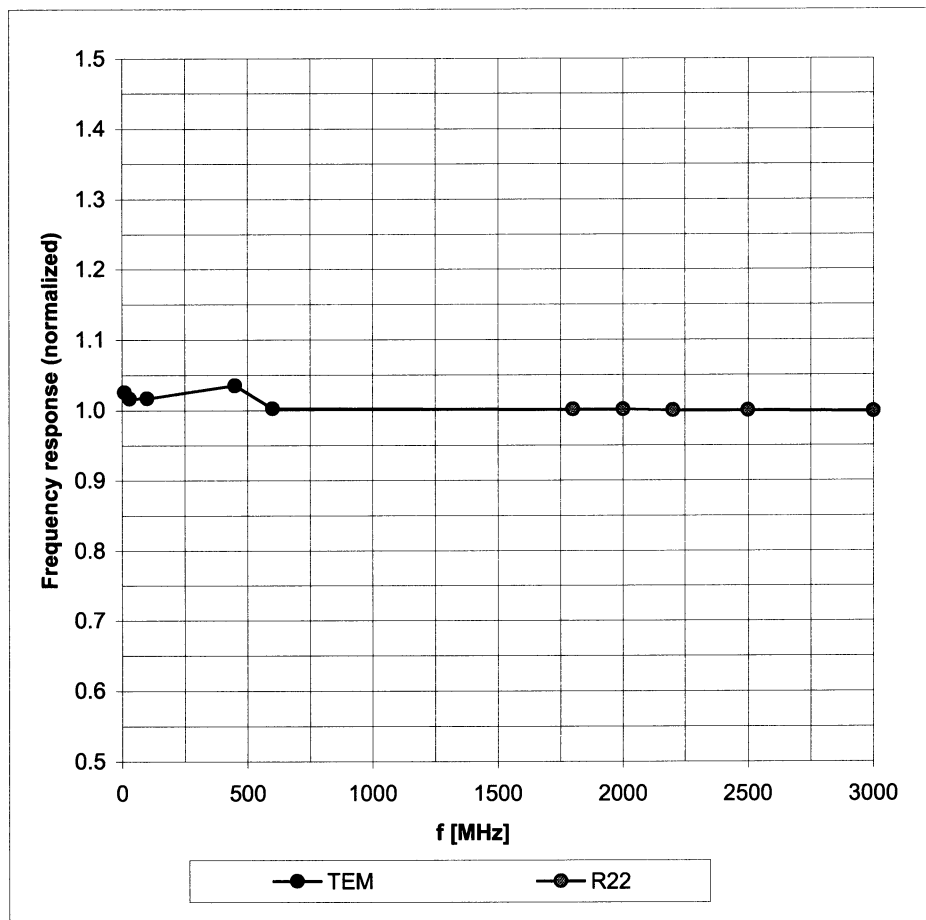
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

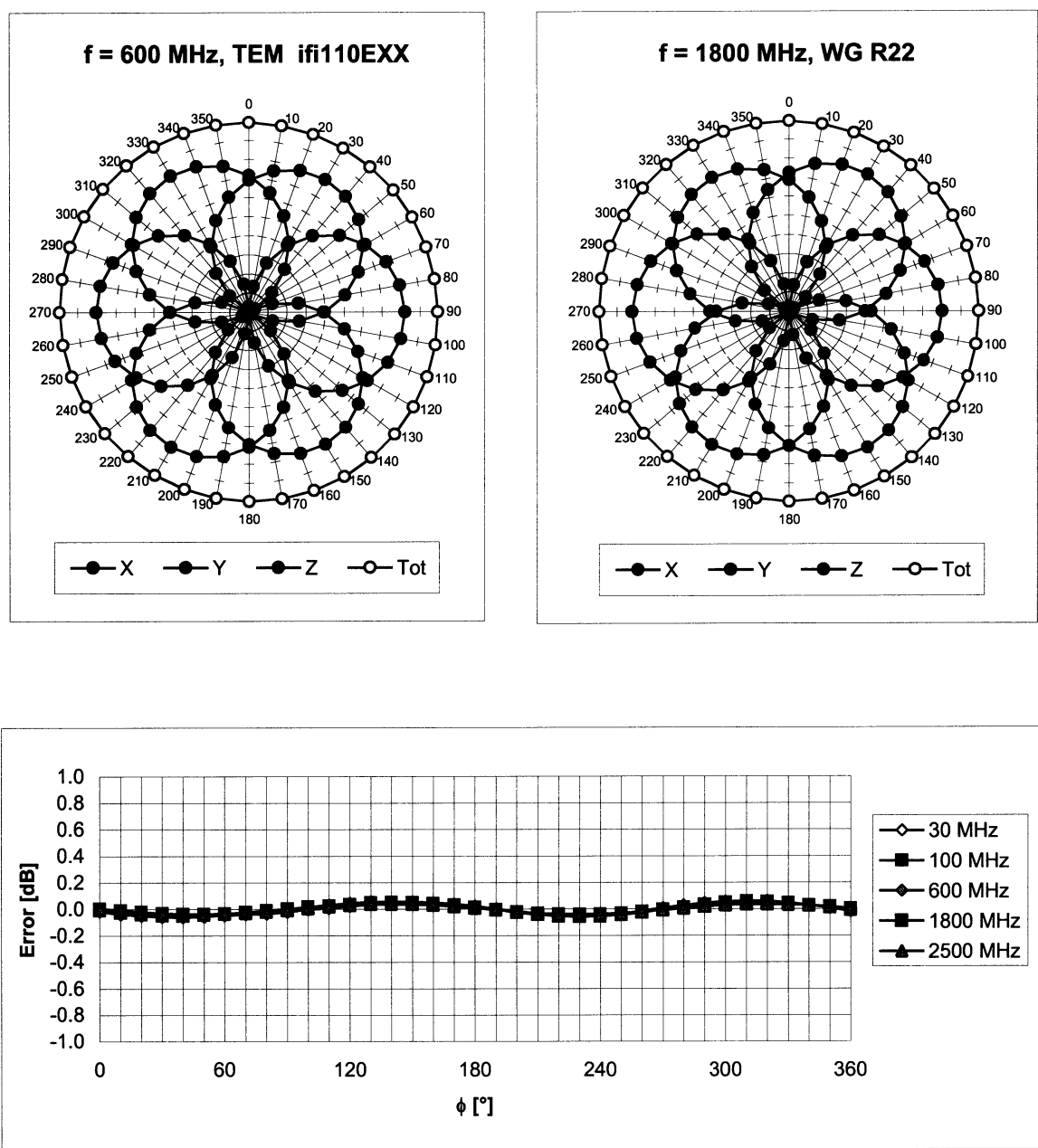
Frequency Response of E-Field

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



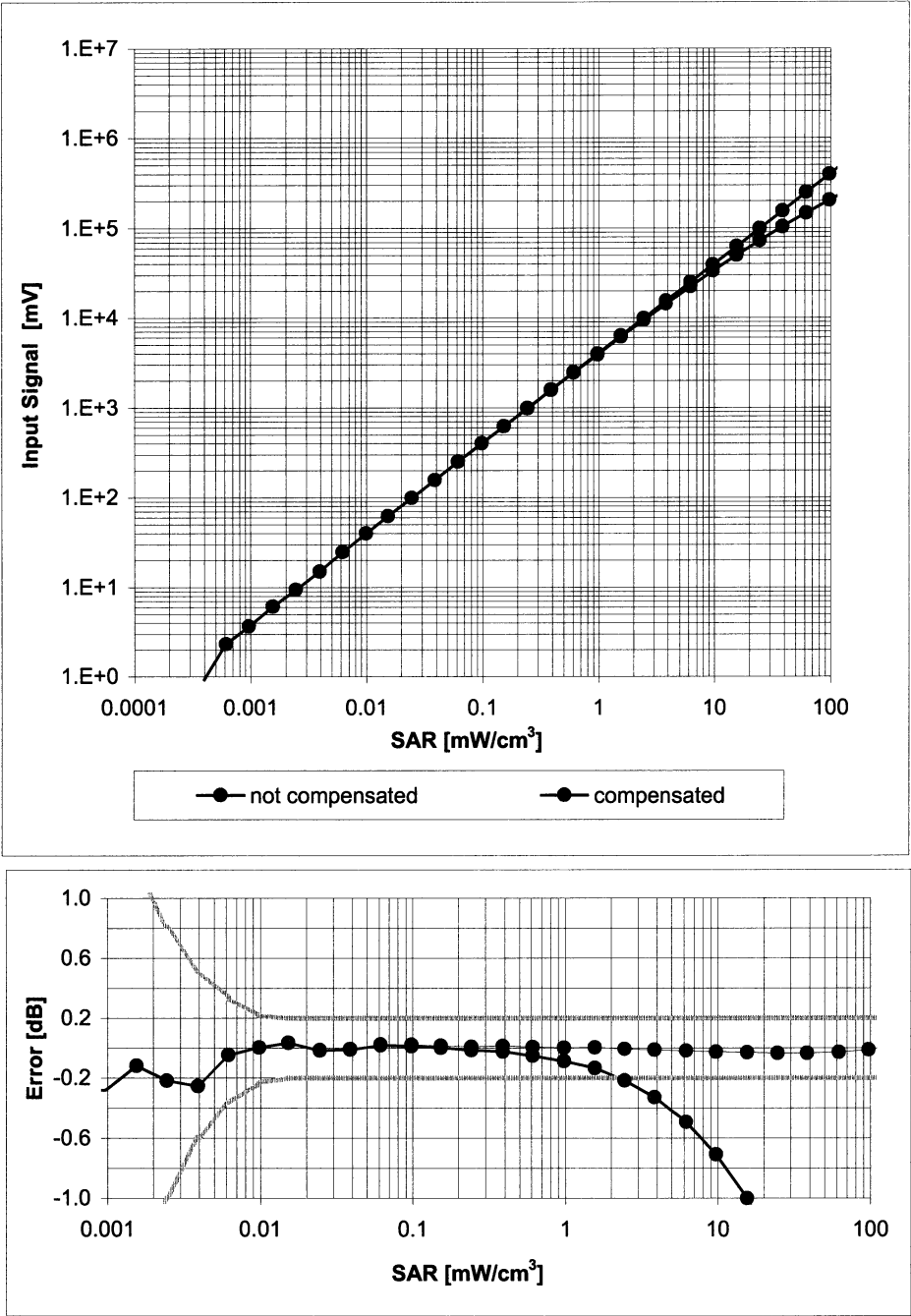
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



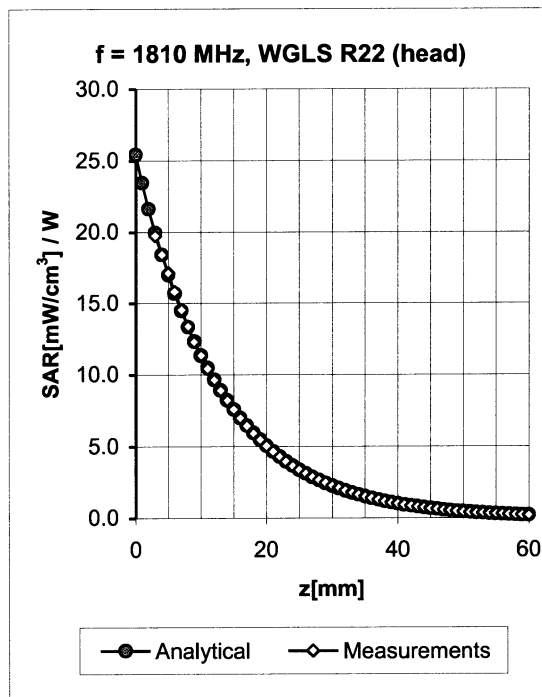
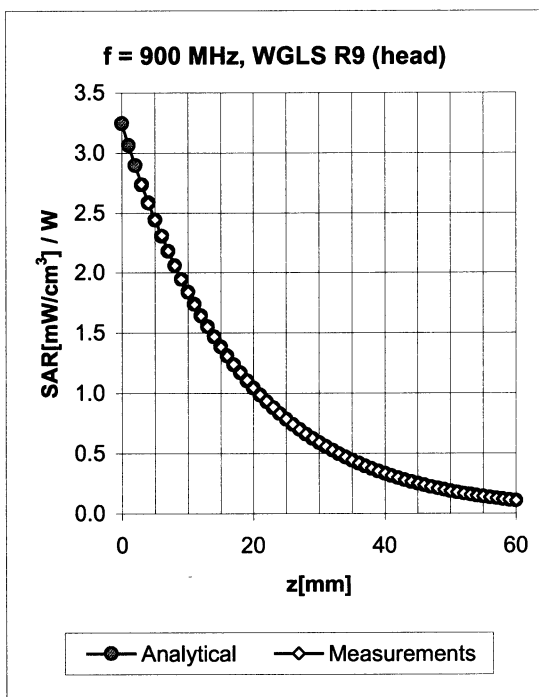
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range f(SAR_{head})
(Waveguide R22, f = 1800 MHz)



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

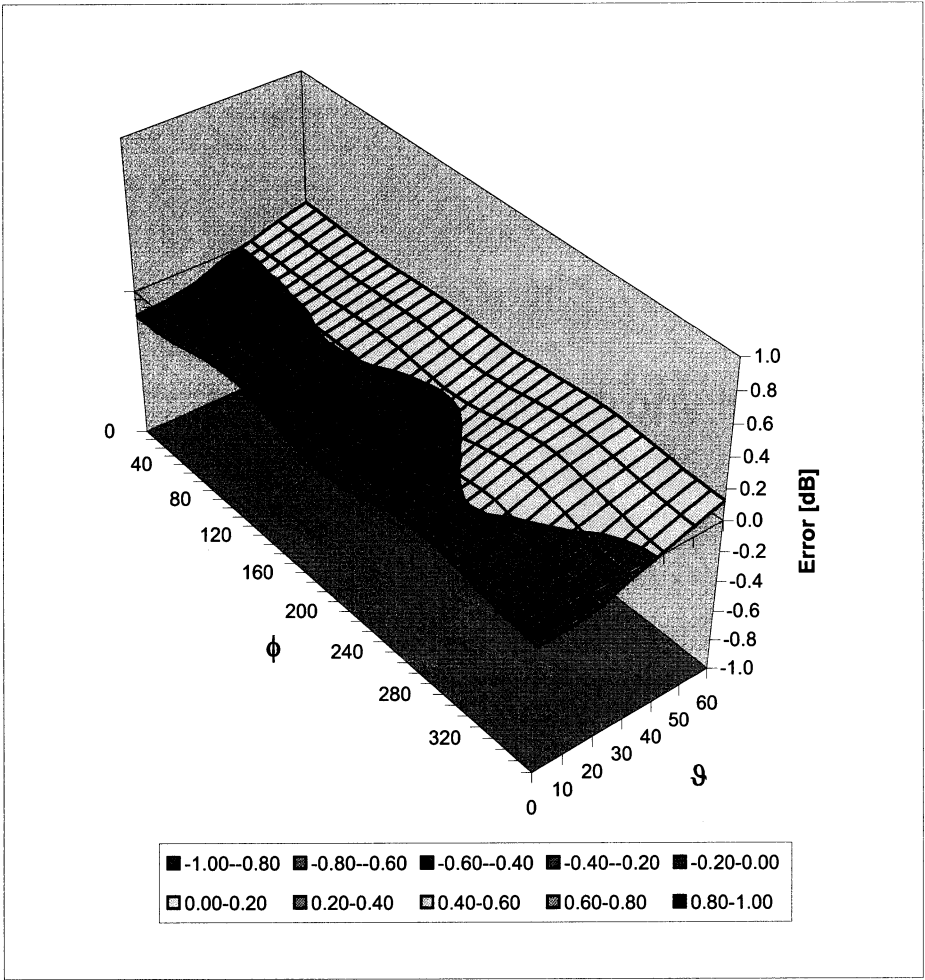
Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.51	1.35	5.93 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.48	1.75	5.03 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.48	1.61	4.37 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.53	1.33	5.78 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.44	2.04	4.54 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.49	1.52	4.12 ± 11.8% (k=2)

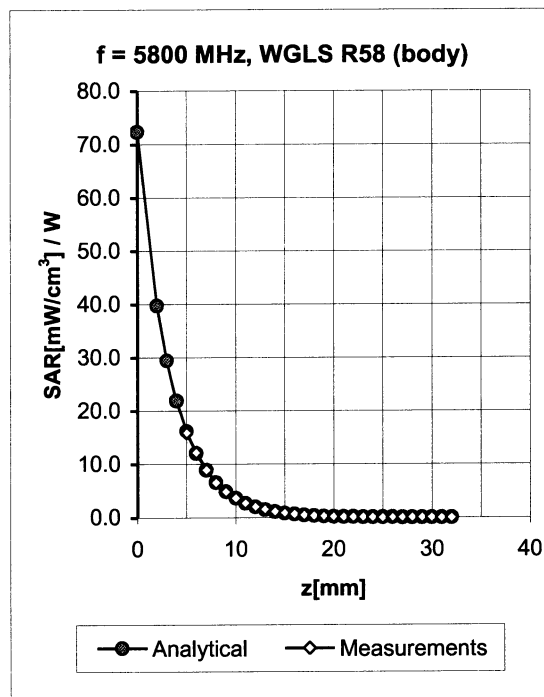
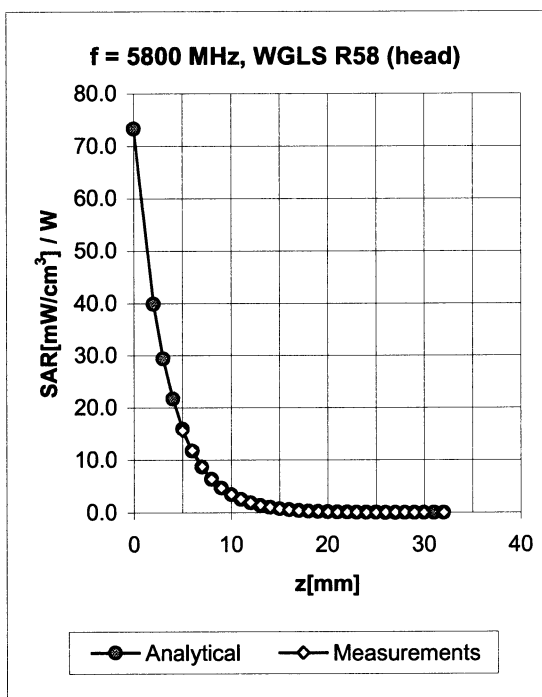
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

Appendix^D



f [MHz] ^D	Validity [MHz]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
5800	± 50	Head	35.3 ± 5%	5.27 ± 5%	0.70	2.40	2.02	± 16.6% (k=2)
5800	± 50	Body	48.2 ± 5%	6.00 ± 5%	0.80	2.50	1.68	± 16.6% (k=2)

^D Accreditation for ConvF assessment above 3000 MHz is currently applied for.

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ES3DV2

Serial Number:

3022

Place of Assessment:

Zurich

Date of Assessment:

June 6, 2006

Probe Calibration Date:

July 21, 2005

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. The evaluation is coupled with measured conversion factors (probe calibration date indicated above). The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Dosimetric E-Field Probe ES3DV2 SN:3022

Conversion factor ($\pm$ standard deviation)

750 $\pm$ 50 MHz *ConvF* **6.19 $\pm$ 7%**

$\epsilon_r = 41.9 \pm 5\%$
 $\sigma = 0.89 \pm 5\%$ mho/m
(head tissue)

750 $\pm$ 50 MHz *ConvF* **5.98 $\pm$ 7%**

$\epsilon_r = 55.5 \pm 5\%$
 $\sigma = 0.96 \pm 5\%$ 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 Section 4.7 of the DASY4 Manual.