CERTIFICATE OF COMPLIANCE
SAR EVALUATION

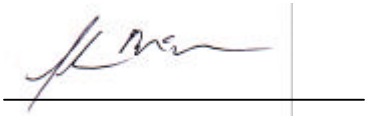
Test Lab:	**Applicant Information:**
CELLTECH RESEARCH INC. Testing and Engineering Lab 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250 - 860-3130 Fax: 250 - 860-3110 Toll Free: 1-877-545-6287 e-mail: info@celltechlabs.com web site: www.celtechlabs.com	**WITHUS IT CO., LTD.** 2F. DongNam Bldg. 448-16 Shingil-5Dong, YongDungPo-Ku, Seoul, Korea

FCC ID:	**POQWCE-220**
Model(s):	**WCE-220**
Equipment Type:	**Single-Mode Cellular CDMA Phone**
Classification:	**Licensed Non-Broadcast Transmitter Held to Ear (TNE)**
Tx Frequency Range:	**824.70 - 848.31 MHz**
Rx Frequency Range:	**869.70 - 893.31 MHz**
Max. RF Output Power:	**0.240 Watts (ERP)**
FCC Rule Part(s):	**2.1093; ET Docket 96.326**

Celltech Research Inc. declares under its sole responsibility that this device was found to be in compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in OET Bulletin 65, Supplement C, Edition 01-01 (General Population/Uncontrolled Exposure), and was tested in accordance with the appropriate measurement standards, guidelines, and recommended practices specified in American National Standards Institute C95.1-1992.

I attest to the accuracy of data. All measurements 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.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Research Inc. The results and statements contained in this report pertain only to the device(s) evaluated.



Shawn McMillen
General Manager
Celltech Research Inc.

TABLE OF CONTENTS

1.0 INTRODUCTION

This measurement report shows that the WITHUS IT CO., LTD. Model: WCE-220 Single-Mode Cellular CDMA Phone FCC ID: POQWCE-220 complies with FCC Part 2.1093, ET Docket 96-326 Rules for mobile and portable devices. The test procedures, as described in American National Standards Institute C95.1-1992 (see reference [1]), and FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [2]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of Equipment Under Test (EUT)

EUT Type	Single-Mode Cellular CDMA Phone	**FCC ID**	POQWCE-220
Equipment Class	Licensed Non-Broadcast Transmitter Held to Ear (TNE)	**Model No.(s)**	WCE-220
FCC Rule Part(s)	§ 2.1093, Docket 96-326	**Application Type**	FCC Part 22 Certification
Tx Frequency Range	824.70 - 848.31 MHz	**Serial No.**	Pre-production Unit
Rx Frequency Range	869.70 - 893.31 MHz	**Battery Type(s)**	3.6V 950mA/h Lithium-Ion Battery
Modulation	CDMA	**Antenna Type**	Retractable Whip (1/4λ)
Max. RF Output Power	0.240 Watts (ERP)	**Antenna Length**	113 mm

3.0 SAR MEASUREMENT SYSTEM

Celltech Research SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit 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. The DAE3 utilizes 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.

DASY3 SAR Measurement System with SAM phantom

4.0 MEASUREMENT SUMMARY

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.

HEAD SAR MEASUREMENT RESULTS - Left Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
824.70	1013	CDMA	24.00	24.00	Standard	Retracted	Left Ear	Cheek/Touch	0.994
824.70	1013	CDMA	24.00	24.00	Standard	Extended	Left Ear	Cheek/Touch	1.27
835.89	363	CDMA	24.03	23.97	Standard	Retracted	Left Ear	Cheek/Touch	0.640
835.89	363	CDMA	24.04	24.03	Standard	Extended	Left Ear	Cheek/Touch	1.30
848.31	777	CDMA	24.00	23.97	Standard	Retracted	Left Ear	Cheek/Touch	1.19
848.31	777	CDMA	24.00	24.00	Standard	Extended	Left Ear	Cheek/Touch	1.26
835.89	363	CDMA	24.07	24.06	Standard	Retracted	Left Ear	Ear/Tilt	0.229
835.89	363	CDMA	24.05	23.97	Standard	Extended	Left Ear	Ear/Tilt	0.361
Mixture Type: Brain (Measured) Dielectric Constant: 41.9 Conductivity: 0.97				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak: Uncontrolled Exposure/General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date: November 19, 2001.
2. The SAR values found were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest head SAR (left head section) value found was 1.30 w/kg (cheek/touch position).
4. The EUT was tested using the standard battery, which is the only battery option for this phone.
5. The EUT was tested with the clamshell open, which is the only ear-held operating configuration for this phone.
6. Ambient TEMPERATURE: 22.6 °C
   Relative HUMIDITY: 56.5 %
   Atmospheric PRESSURE: 95.2 kPa
7. Fluid Temperature ≈ 23.0 °C
8. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

MEASUREMENT SUMMARY (CONT.)

HEAD SAR MEASUREMENT RESULTS - Right Head Section

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Test Position	SAR 1g (w/kg)
824.70	1013	CDMA	24.08	24.06	Standard	Retracted	Right Ear	Cheek/Touch	1.12
824.70	1013	CDMA	24.00	24.08	Standard	Extended	Right Ear	Cheek/Touch	1.46
835.89	363	CDMA	24.07	24.23	Standard	Retracted	Right Ear	Cheek/Touch	0.834
835.89	363	CDMA	24.00	23.94	Standard	Extended	Right Ear	Cheek/Touch	1.36
848.31	777	CDMA	23.96	23.99	Standard	Retracted	Right Ear	Cheek/Touch	1.35
848.31	777	CDMA	23.96	23.85	Standard	Extended	Right Ear	Cheek/Touch	1.28
835.89	363	CDMA	24.04	24.06	Standard	Retracted	Right Ear	Ear/Tilt	0.195
835.89	363	CDMA	24.03	24.01	Standard	Extended	Right Ear	Ear/Tilt	0.407
Mixture Type: Brain (Measured) Dielectric Constant: 41.9 Conductivity: 0.97				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak: Uncontrolled Exposure/General Population BRAIN: 1.6 W/kg (averaged over 1 gram)**					

Notes:

1. Test Date: November 19, 2001.
2. The SAR values found were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The highest head SAR (right head section) value found was 1.46 w/kg (cheek/touch position).
4. The EUT was tested using the standard battery, which is the only battery option for this phone.
5. The EUT was tested with the clamshell open, which is the only ear-held operating configuration for this phone.
6. Ambient TEMPERATURE: 22.6 °C
   Relative HUMIDITY: 56.5 %
   Atmospheric PRESSURE: 95.2 kPa
7. Fluid Temperature ≈ 23.0 °C
8. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

MEASUREMENT SUMMARY (CONT.)

BODY SAR MEASUREMENT RESULTS

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Separation Distance (cm)	SAR 1g (w/kg)
824.70	1013	CDMA	24.03	24.15	Standard	Retracted	Planar	1.5	0.807
824.70	1013	CDMA	24.00	23.92	Standard	Extended	Planar	1.5	0.984
835.89	363	CDMA	24.03	23.92	Standard	Retracted	Planar	1.5	0.573
835.89	363	CDMA	24.01	24.06	Standard	Extended	Planar	1.5	1.34
848.31	777	CDMA	24.06	24.06	Standard	Retracted	Planar	1.5	0.878
848.31	777	CDMA	24.05	23.83	Standard	Extended	Planar	1.5	0.891
Mixture Type: Body (Measured) Dielectric Constant: 55.3 Conductivity: 1.05				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak: Uncontrolled Exposure/General Population BODY: 1.6 W/kg (averaged over 1 gram)**					

HAND SAR MEASUREMENTS RESULTS

Freq. (MHz)	Channel	Modulation	Cond. Power Before (dBm)	Cond. Power After (dBm)	Battery Type	Antenna Position	Phantom Section	Separation Distance (cm)	SAR 10g (w/kg)
835.89	363	CDMA	24.06	24.16	Standard	Retracted	Planar	0.0	1.82
835.89	363	CDMA	24.00	24.00	Standard	Extended	Planar	0.0	2.05
Mixture Type: Body (Measured) Dielectric Constant: 55.3 Conductivity: 1.05				**ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak: Uncontrolled Exposure/General Population HAND: 4.0 W/kg (averaged over 10 grams)**					

Notes:

1. Test Date(s): November 20, 2001.
2. The body SAR values found were below the maximum limit of 1.6 w/kg (averaged over 1 gram).
3. The hand SAR values found were below the maximum limit of 4.0 w/kg (averaged over 10 grams).
4. The highest body SAR value found was 1.34 w/kg, and the highest hand SAR value found was 2.05 w/kg.
5. The EUT was tested using the standard battery, which is the only battery option for this phone.
6. The EUT was tested for body SAR with the clamshell closed, which is the only intended body-worn operating configuration for this phone. A 1.5cm separation distance was maintained between the back of the phone and the outer surface of the SAM planar phantom.
7. The EUT was tested for hand SAR with the clamshell open, and the back of the phone touching the outer surface of the SAM planar phantom.
8. Ambient TEMPERATURE: 22.7 °C
   Relative HUMIDITY: 56.6 %
   Atmospheric PRESSURE: 95.4 kPa
9. Fluid Temperature ≈ 23.0 °C
10. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

5.0 DETAILS OF SAR EVALUATION

The WITHUS IT CO., LTD. Model: WCE-220 Single-Mode Cellular CDMA Phone FCC ID: POQWCE-220 was found to be compliant for localized Specific Absorption Rate (SAR) based on the following test provisions and conditions:

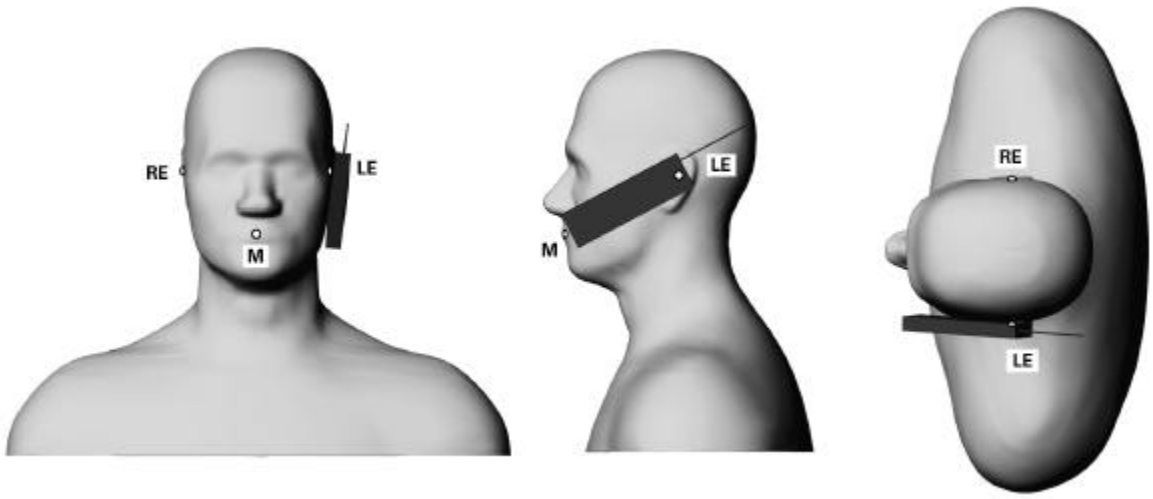
1) The EUT was tested in a ear-held configuration on both the left and right sections of the phantom with the device antenna in both the extended and retracted positions as follows:

   a) The handset was placed in the device holder in a normal operating position with the test device reference point located along the vertical centerline on the front of the device aligned to the ear reference point, with the center of the earpiece touching the center of the ear spacer of the SAM phantom.

   b) With the handset positioned parallel to the cheek, the test device reference point was aligned to the ear reference point on the head phantom, and the vertical centerline was aligned to the phantom reference plane (initial ear position).

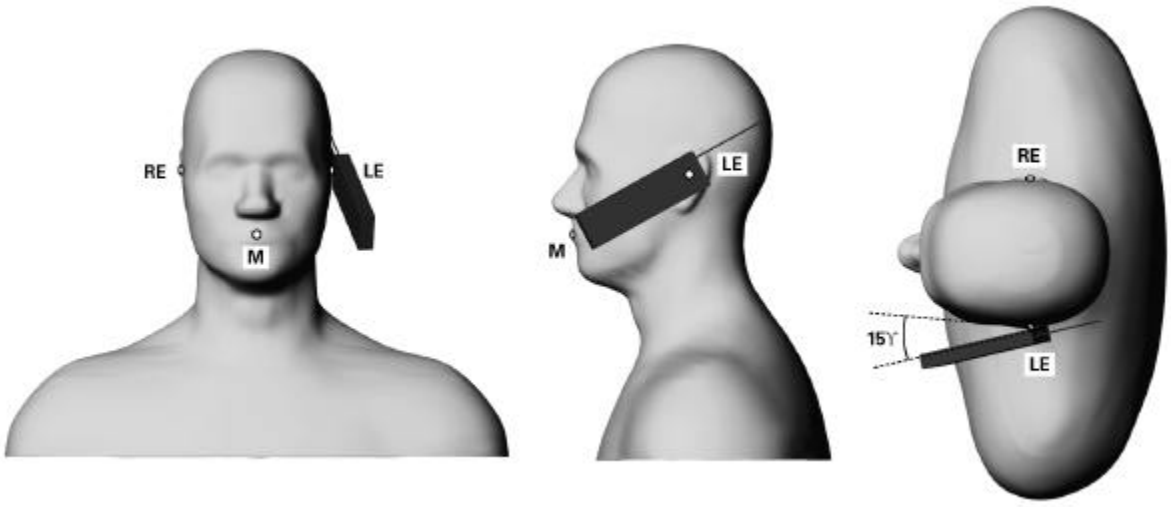
   c) While maintaining the three alignments, the body of the handset was gradually adjusted to each of the following test positions:

   • Cheek/Touch Position: The handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.



Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

- Ear/Tilt Position: With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.



Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

2) The EUT was tested in a body-worn configuration with the device in the clamshell-closed position and the back of the device placed parallel to the outer surface of the planar phantom at a separation distance of 1.5 cm. Both antenna extended and antenna retracted modes were tested. (Note: A body-holster or belt-clip were not available at the time of evaluation)
3) The EUT was tested in a hand-held configuration with the back of the device placed parallel to, and touching, the outer surface of the planar phantom. Both antenna extended and antenna retracted modes were tested.
4) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimize drift. The conducted power levels were checked before and after each test. If the conducted power level deviated more than 5% of the initial power level, then the EUT was retested. Any unusual anomalies over the course of the test also warranted a re-evaluation.
5) The conducted power was measured according to the procedures described in FCC Part 2.1046.
6) The EUT was placed into test mode via keypad access at a full data rate in the "always up" power control mode.
7) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.
8) The EUT was tested with a fully charged battery.

6.0 EVALUATION PROCEDURES

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation both the left and right ear positions were evaluated at the low, middle, and high frequencies of the band at maximum power, and with the device antenna in both the extended and extracted positions as applicable. The positioning of the ear-held device relative to the phantom was performed in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) using the SAM phantom.

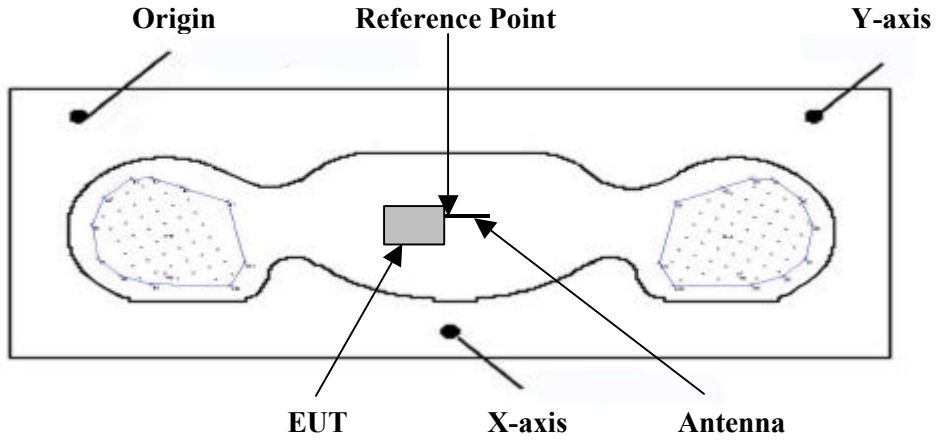
(ii) For face-held and body-worn devices a planar phantom was used.

b. The SAR was determined by a pre-defined procedure within the DASY3 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

c. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

d. The depth of the simulating tissue in the phantom used for the SAR evaluation was no less than 15cm.

e. The target tissue parameters for 900MHz were used in the SAR evaluation software. If there was any appreciable variation in the measured tissue parameters from the target values specified then the SAR was adjusted using the sensitivities to SAR (see “Appendix D-SAR Sensitivities”).



Device Positioning & Reference Point (Body & Hand SAR)

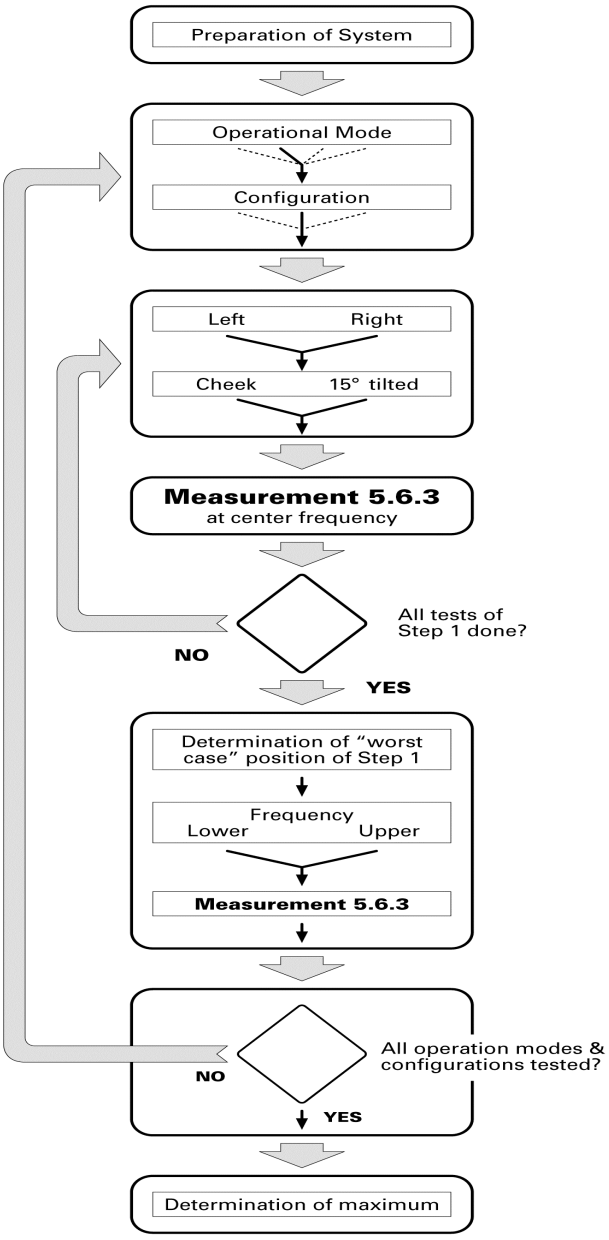
EVALUATION PROCEDURES (Cont.)

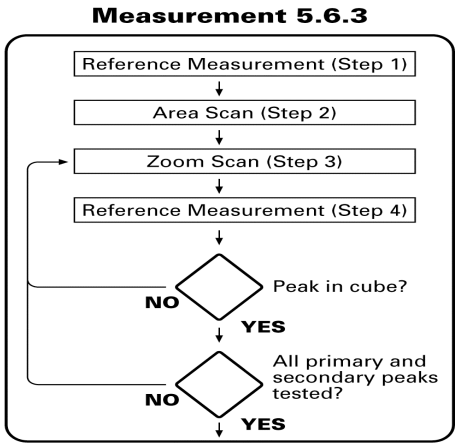
In order to ensure a conservative overestimation of SAR for the EUT, the following method was used. Firstly, the probe was calibrated by the system manufacturer at 900MHz and 1800MHz using simulated fluids with electrical parameters as set by OET 65 Supplement C. Prior to the SAR assessment of the EUT, the system was validated at 900MHz in the appropriate fluid to ensure system accuracy. Although the fundamental frequency of the mid channel of the EUT was approximately 835MHz, 900MHz E-field probe conversion numbers and fluid parameters were used since it provided the most accurate calibrated point within 100MHz of the EUT's mid channel. It must also be noted that the fluid used for both 835MHz and 900MHz have the same composition and therefore the probe has been calibrated in the appropriate fluid for the transmit band of the EUT. The following table shows a comparison of the measured results for the worst-case channel of the EUT using both 835MHz and 900MHz E-field probe conversion numbers with the appropriate fluid parameters.

EUT Channel	Conducted Power (dBm)	Conversion Number (CF)	Conductivity S/m	SAR Value (mW/g)	SAR Delta Ä
363	24.0	900MHz CF = 6.83	0.97	1.46	7.4%
363	24.0	835MHz CF = 6.91	0.90	1.36	1.5%
363	24.0	900MHz CF = 6.83	0.90	1.38	5%
363	24.0	835MHz CF = 6.91	0.97	1.45	

The measured results show that there is little change when 835MHz probe conversion numbers are used in place of 900MHz conversion numbers. The manufacturer specifies that between 750MHz and 1GHz, the conversion factors change by approximately 3% for every 100MHz. The table shows that for this particular device the change in conversion numbers yields only 1.5% change in SAR. By using 900MHz conversion numbers and a conductivity of 0.97 S/m, the actual SAR of the EUT is overestimated by at least 7%.

EVALUATION PROCEDURES (Cont.)





7.0 SYSTEM VALIDATION

Prior to the assessment, the system was verified in the planar section of the SAM phantom using a 900MHz dipole. A forward power of 250mW was applied to the dipole, and the system was verified to a tolerance of ±10%. The applicable verification is as follows (see Appendix B for validation test plot):

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Fluid Temperature	Validation Date
D900V2	2.78	2.75	≈23.0 °C	11/19/01
		2.76	≈23.0 °C	11/20/01

8.0 TISSUE PARAMETERS

The dielectric parameters of the fluids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer. The dielectric parameters of the fluid are as follows:

BRAIN TISSUE PARAMETERS - DIPOLE VALIDATION & EUT EVALUATION			
Equivalent Tissue	**Dielectric Constant e_r**	**Conductivity s (mho/m)**	**r (Kg/m^3)**
900MHz Brain (Target)	41.5 ±5%	0.97 ±5%	1000
900MHz Brain (Measured: 11/19/01)	41.4 ±5%	0.97 ±5%	1000
900MHz Brain (Measured: 11/20/01)	41.7 ±5%	0.97 ±5%	1000

BODY TISSUE PARAMETERS - EUT EVALUATION			
Equivalent Tissue	**Dielectric Constant e_r**	**Conductivity s (mho/m)**	**r (Kg/m^3)**
900MHz Body (Target)	55.0 ±5%	1.05 ±5%	1000
900MHz Body (Measured: 11/20/01)	55.2 ±5%	1.05 ±5%	1000

9.0 SIMULATED TISSUES

The brain and muscle mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide is added and visual inspection is made to ensure air bubbles are not trapped during the mixing process. The fluid was prepared according to standardized procedures, and measured for dielectric parameters (permitivity and conductivity).

TISSUE MIXTURE - DIPOLE VALIDATION & EUT EVALUATION		
INGREDIENT	**900MHz Brain Mixture (Validation & EUT Evaluation)**	**900MHz Body Mixture (EUT Evaluation)**
Water	40.71 %	53.70 %
Sugar	56.63 %	45.10 %
Salt	1.48 %	0.97 %
HEC	1.00 %	0.13%
Bactericide	0.18 %	0.10 %

10.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/Kg)	
	(General Population / Uncontrolled Exposure Environment)	**(Occupational / Controlled Exposure Environment)**
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Notes: 1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

11.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

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

Data Acquisition Electronic (DAE) System

Cell Controller

Processor:	Pentium III
Clock Speed:	450 MHz
Operating System:	Windows NT
Data Card:	DASY3 PC-Board

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	DASY3 software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16-bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

E-Field Probe

Model:	ET3DV6
Serial No.:	1590
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	± 0.2 dB (30 MHz to 3 GHz)

Phantom

Type:	SAM V4.0C
Configuration:	Left Head, Right Head, Planar Section
Shell Material:	Fiberglass
Thickness:	2.0 ±0.1 mm
Volume:	Approx. 20 liters

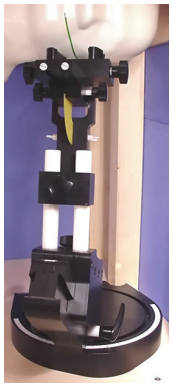
12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections.

SAM Phantom V4.0C

13.0 DEVICE HOLDER

The DASY3 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.



Device Holder

14.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal to probe axis)
Dynam. Rnge:	5 µW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. Detect.	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone

ET3DV6 E-Field Probe

15.0 TEST EQUIPMENT LIST

SAR MEASUREMENT SYSTEM		
EQUIPMENT	***SERIAL NO.***	***DATE CALIBRATED***
DASY3 System -Robot -ET3DV6 E-Field Probe -900MHz Validation Dipole -1800MHz Validation Dipole -SAM Phantom V4.0C	 599396-01 1590 054 247 N/A	 N/A Mar 2001 June 2001 June 2001 N/A
85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter -Power Sensor 80701A -Power Sensor 80701A	1835272 1833535 1833542	Oct 2001 Jan 2001 Feb 2001
E4408B Spectrum Analyzer	US39240170	Nov 2001
8594E Spectrum Analyzer	3543A02721	Mar 2001
8753E Network Analyzer	US38433013	Nov 2001
8648D Signal Generator	3847A00611	Aug 2001
5S1G4 Amplifier Research Power Amplifier	26235	N/A

16.0 MEASUREMENT UNCERTAINTIES

Uncertainty Description	Error	Distribution	Weight	Standard Deviation	Offset
Probe Uncertainty					
Axial isotropy	±0.2 dB	U-Shaped	0.5	±2.4 %	
Spherical isotropy	±0.4 dB	U-Shaped	0.5	±4.8 %	
Isotropy from gradient	±0.5 dB	U-Shaped	0	±	
Spatial resolution	±0.5 %	Normal	1	±0.5 %	
Linearity error	±0.2 dB	Rectangle	1	±2.7 %	
Calibration error	±3.3 %	Normal	1	±3.3 %	
SAR Evaluation Uncertainty					
Data acquisition error	±1 %	Rectangle	1	±0.6 %	
ELF and RF disturbances	±0.25 %	Normal	1	±0.25 %	
Conductivity assessment	±5 %	Rectangle	1	±5.8 %	
Spatial Peak SAR Evaluation Uncertainty					
Extrapolated boundary effect	±3 %	Normal	1	±3 %	±5 %
Probe positioning error	±0.1 mm	Normal	1	±1 %	
Integrated and cube orientation	±3 %	Normal	1	±3 %	
Cube Shape inaccuracies	±2 %	Rectangle	1	±1.2 %	
Device positioning	±6 %	Normal	1	±6 %	
Combined Uncertainties				±11.7 %	±5 %

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental.

According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of ± 1 to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ± 2dB can be expected.

According to CENELEC, typical worst-case uncertainty of field measurements is ± 5 dB.
For well-defined modulation characteristics the uncertainty can be reduced to ± 3 dB.

17.0 REFERENCES

[1] ANSI, *ANSI/IEEE C95.1: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 Ghz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY: 1992.*

[2] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[3] Thomas Schmid, Oliver Egger, and Neils Kuster, "Automated E-field scanning system for dosimetric assessments", IEEE *Transaction on Microwave Theory and Techniques,* Vol. 44, pp. 105 – 113: January 1996.

[4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetric evaluation of mobile communications equipment with know precision", IEICE Transactions of Communications, vol. E80-B, no. 5, pp. 645 – 652: May 1997.

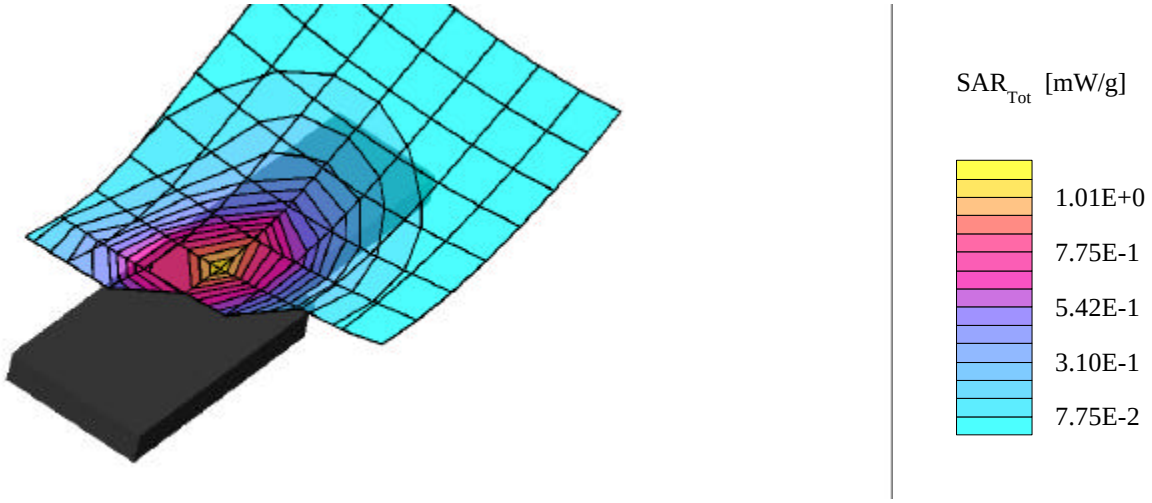
[5] IEEE Standards Coordinating Committee 34, DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques: Draft 6.1, November 2000.

APPENDIX A - SAR MEASUREMENT DATA

Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (70°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.12 dB
SAR (1g): 0.994 mW/g, SAR (10g): 0.668 mW/g

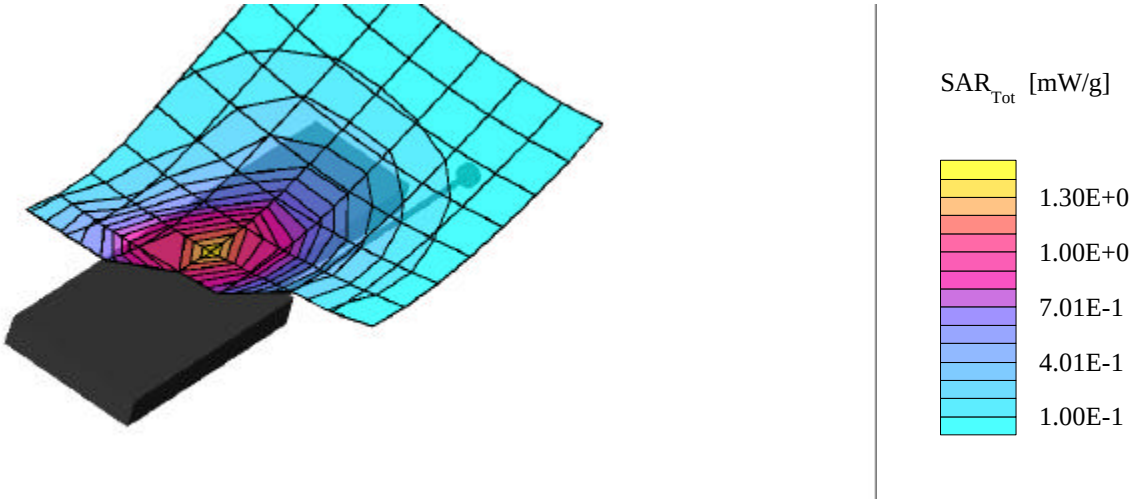
Left Cheek/Touch Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 1013 [824.70 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (70°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.01 dB
SAR (1g): 1.27 mW/g, SAR (10g): 0.852 mW/g

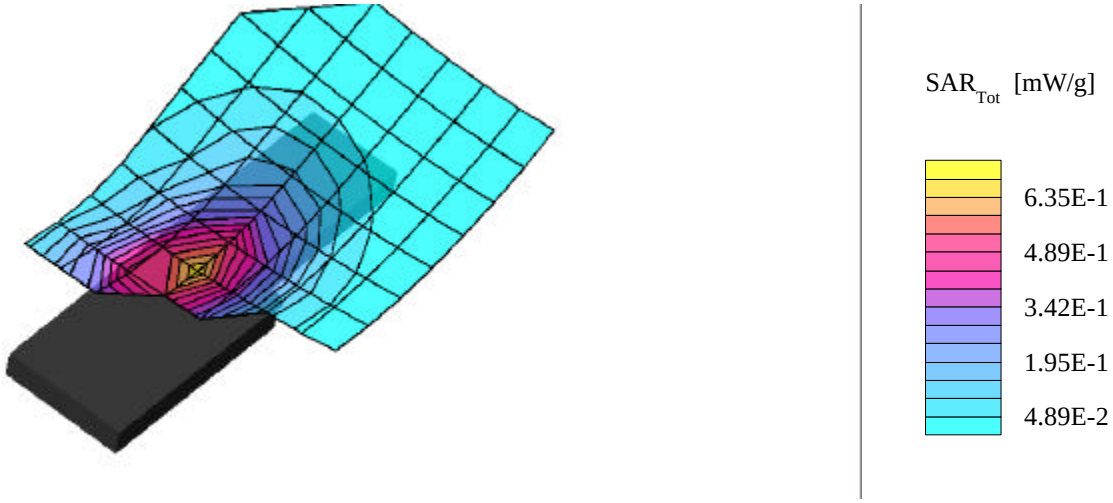
Left Cheek/Touch Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 1013 [824.70 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (70°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.05 dB
SAR (1g): 0.640 mW/g, SAR (10g): 0.428 mW/g

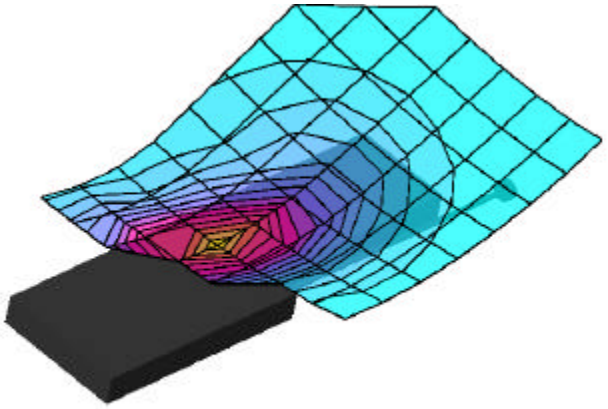
Left Cheek/Touch Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001

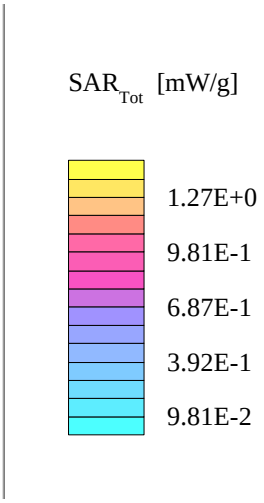


Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (70°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.01 dB
SAR (1g): 1.30 mW/g, SAR (10g): 0.858 mW/g

Left Cheek/Touch Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001

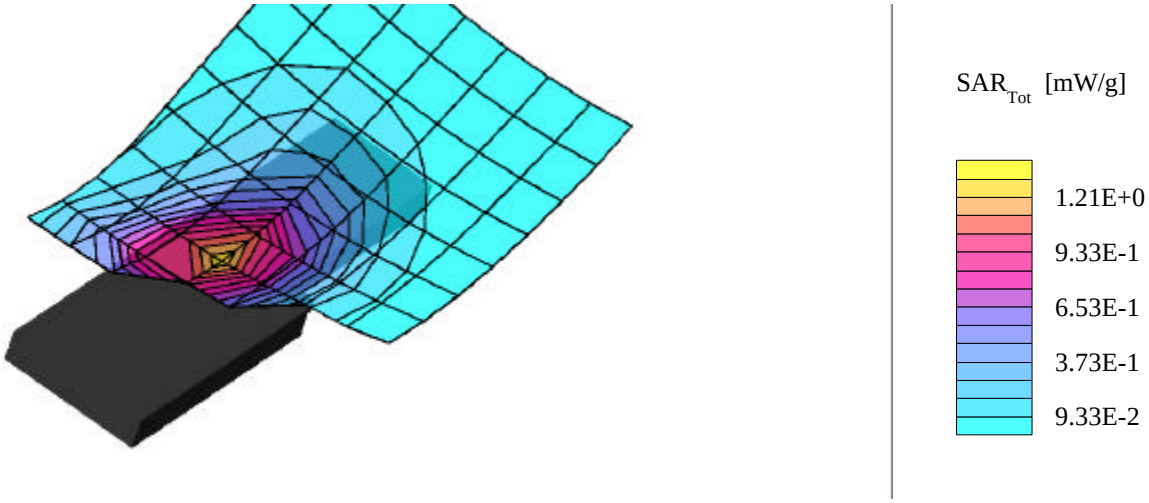




Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (70°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.06 dB
SAR (1g): 1.19 mW/g, SAR (10g): 0.797 mW/g

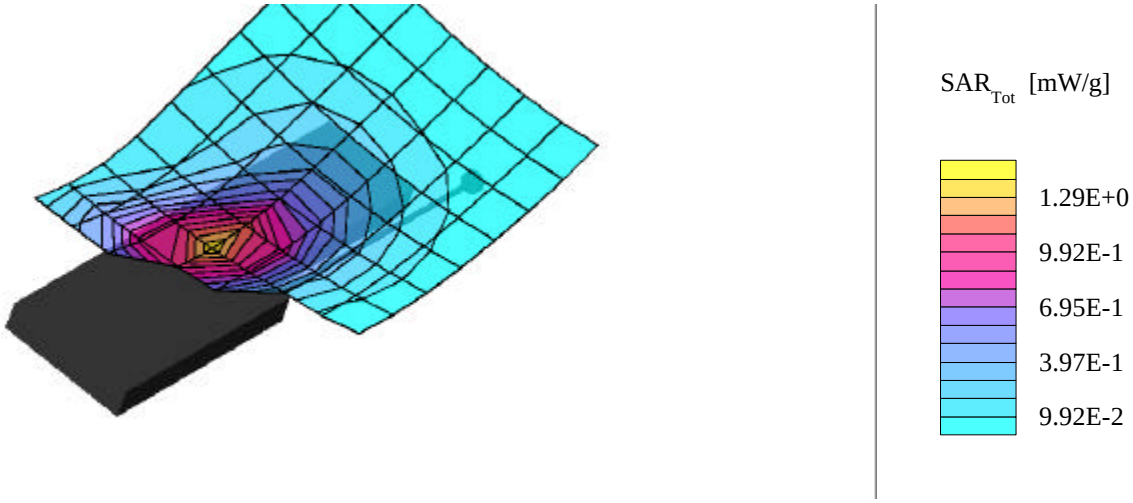
Left Cheek/Touch Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 777 [848.31 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (70°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.02 dB
SAR (1g): 1.26 mW/g, SAR (10g): 0.839 mW/g

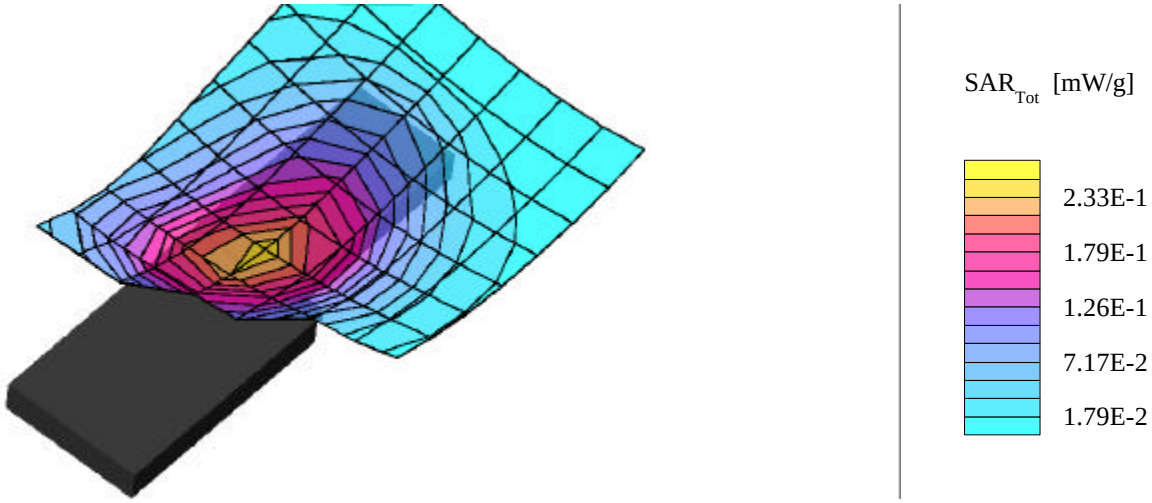
Left Cheek/Touch Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 777 [848.31 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (85°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.03 dB
SAR (1g): 0.229 mW/g, SAR (10g): 0.163 mW/g

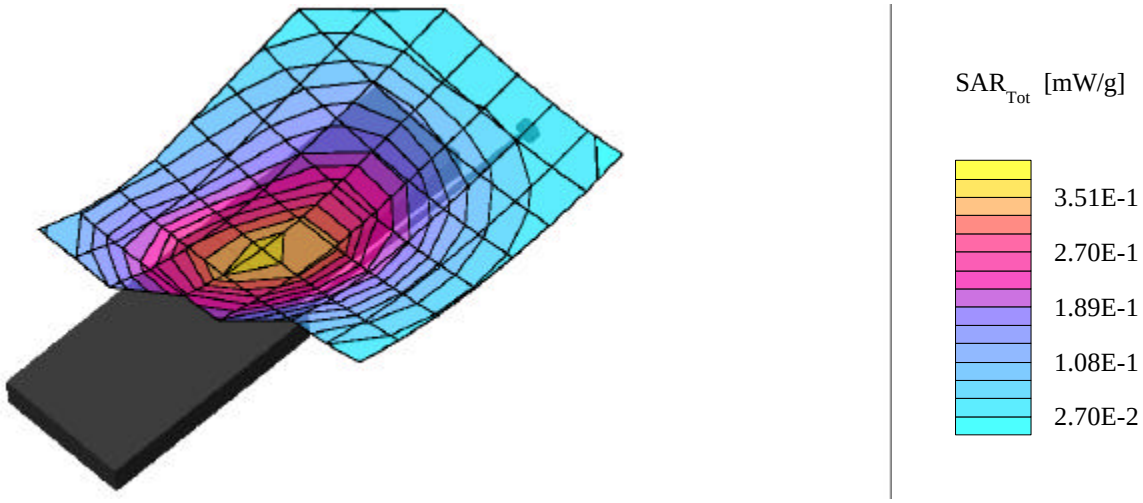
Left Ear/Tilt Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Left Hand Section; Position: (85°,65°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.00 dB
SAR (1g): 0.361 mW/g, SAR (10g): 0.260 mW/g

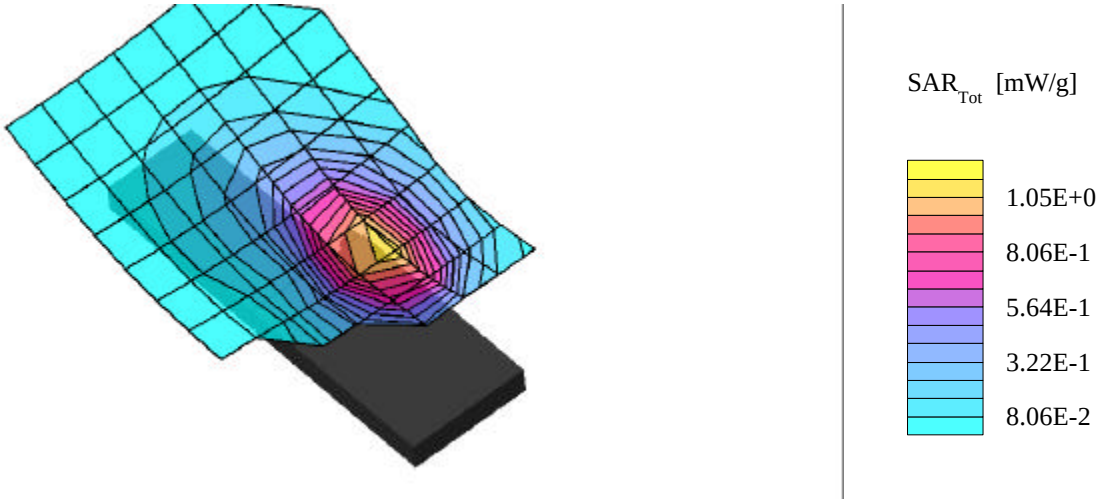
Left Ear/Tilt Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (70°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.04 dB
SAR (1g): 1.12 mW/g, SAR (10g): 0.731 mW/g

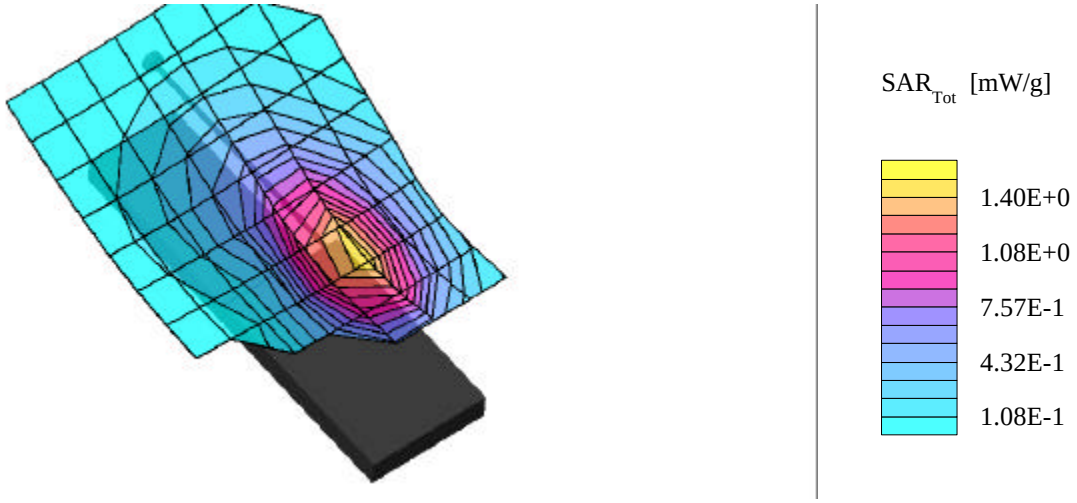
Right Cheek/Touch Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 1013 [824.70 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (70°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.06 dB
SAR (1g): 1.46 mW/g, SAR (10g): 0.962 mW/g

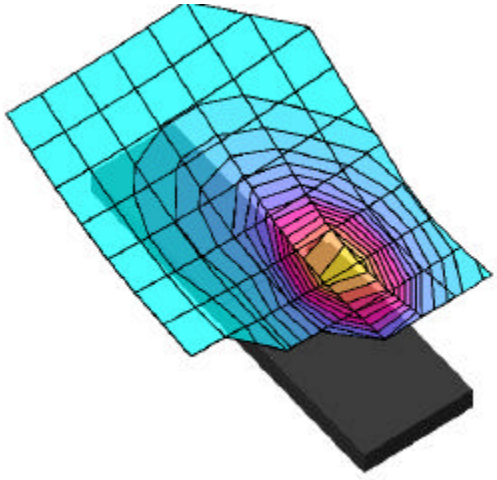
Right Cheek/Touch Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 1013 [824.70 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001

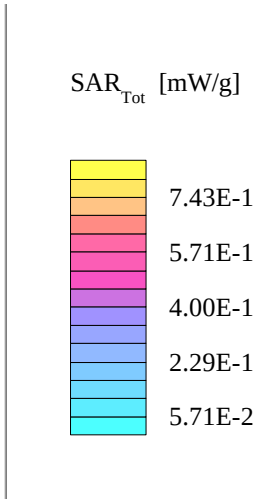


Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (70°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.12 dB
SAR (1g): 0.834 mW/g, SAR (10g): 0.542 mW/g

Right Cheek/Touch Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001

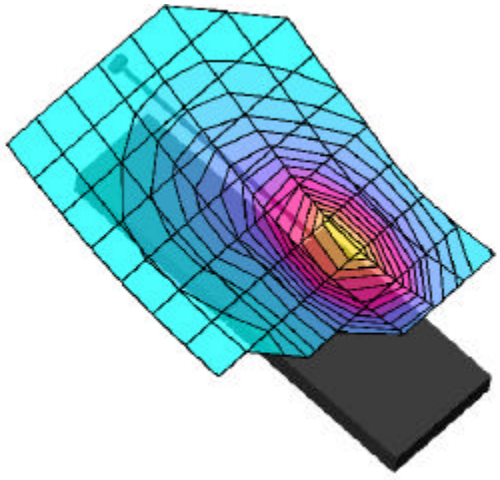


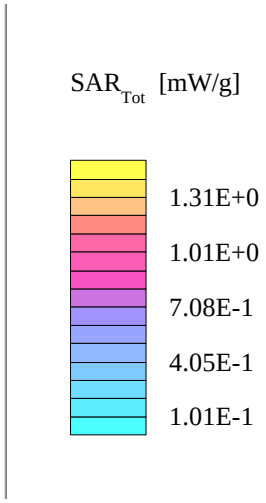


Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (70°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.00 dB
SAR (1g): 1.36 mW/g, SAR (10g): 0.902 mW/g

Right Cheek/Touch Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001

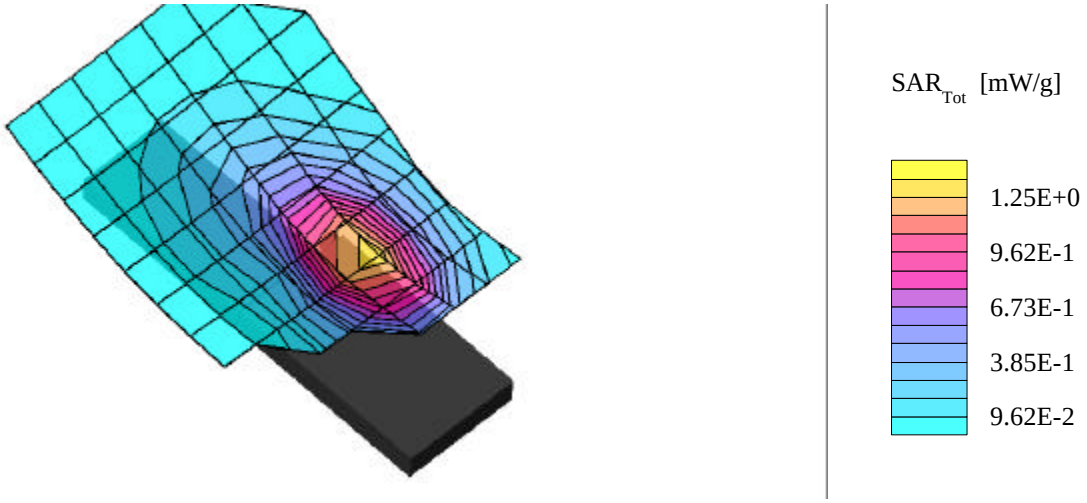




Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (70°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.05 dB
SAR (1g): 1.35 mW/g, SAR (10g): 0.873 mW/g

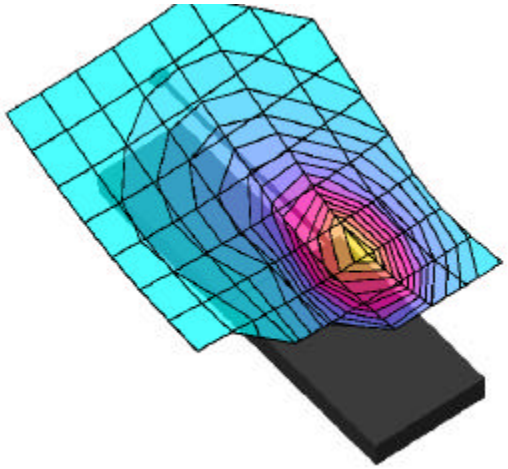
Right Cheek/Touch Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 777 [848.31 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001

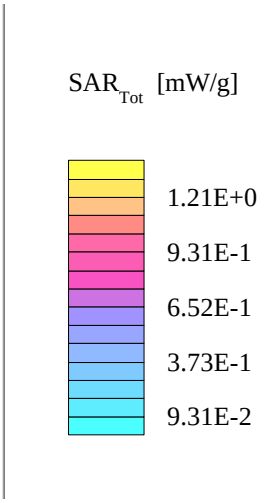


Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (70°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.08 dB
SAR (1g): 1.28 mW/g, SAR (10g): 0.836 mW/g

Right Cheek/Touch Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 777 [848.31 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001

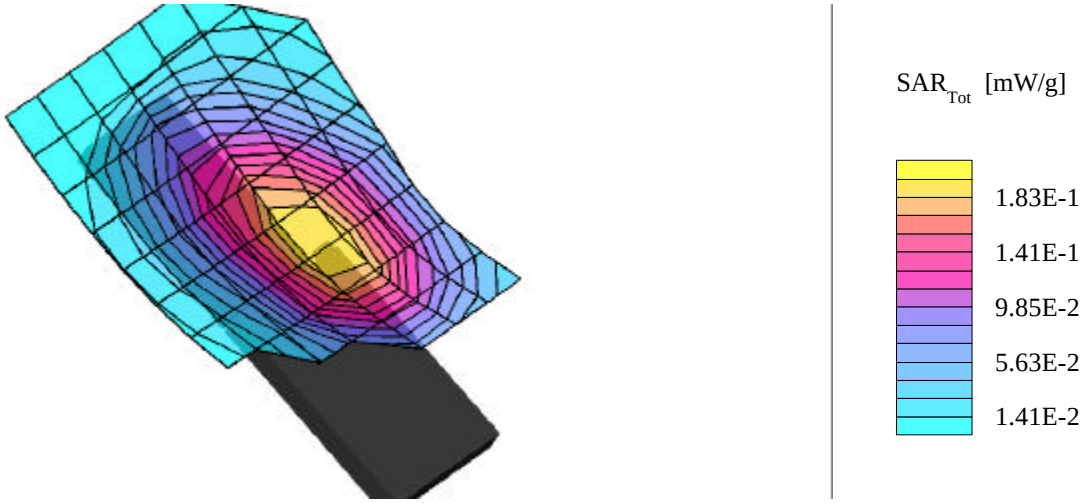




Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (85°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.00 dB
SAR (1g): 0.195 mW/g, SAR (10g): 0.140 mW/g

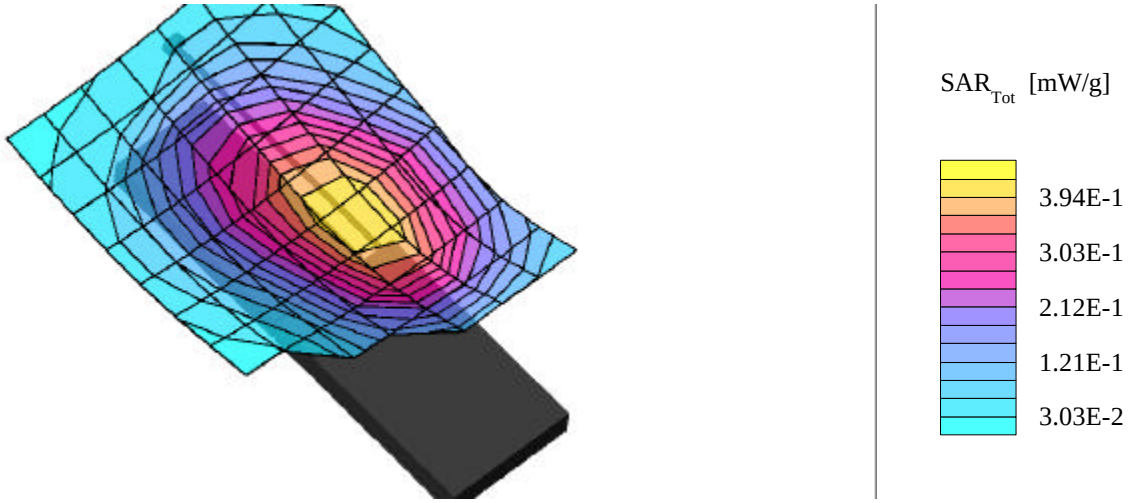
Right Ear/Tilt Position
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Right Hand Section; Position: (85°,295°)
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.04 dB
SAR (1g): 0.407 mW/g, SAR (10g): 0.297 mW/g

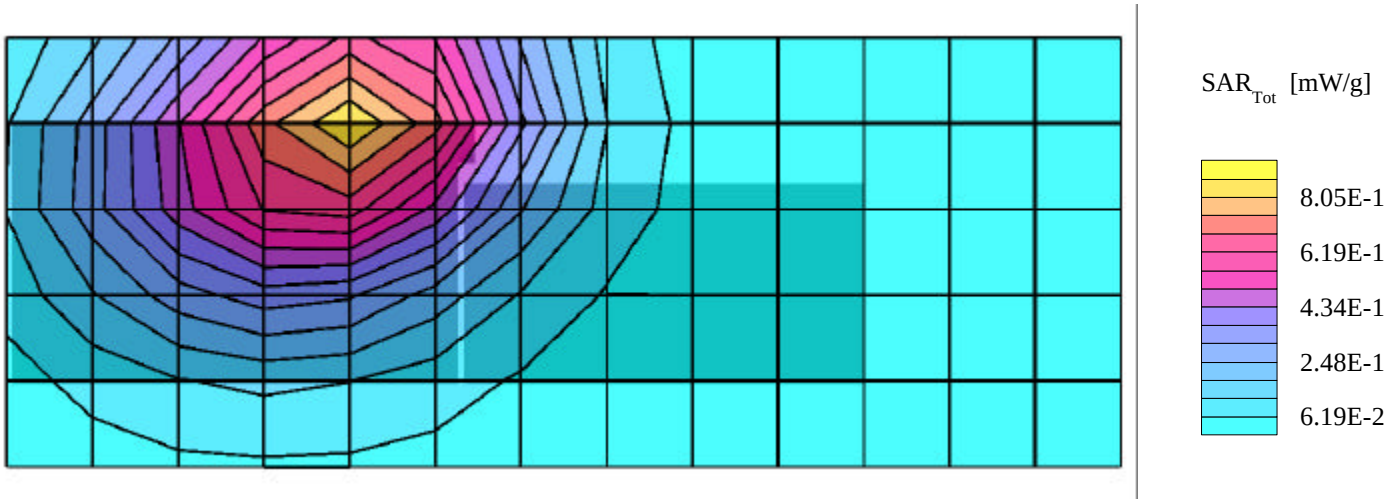
Right Ear/Tilt Position
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 19, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.09 dB
SAR (1g): 0.807 mW/g, SAR (10g): 0.549 mW/g

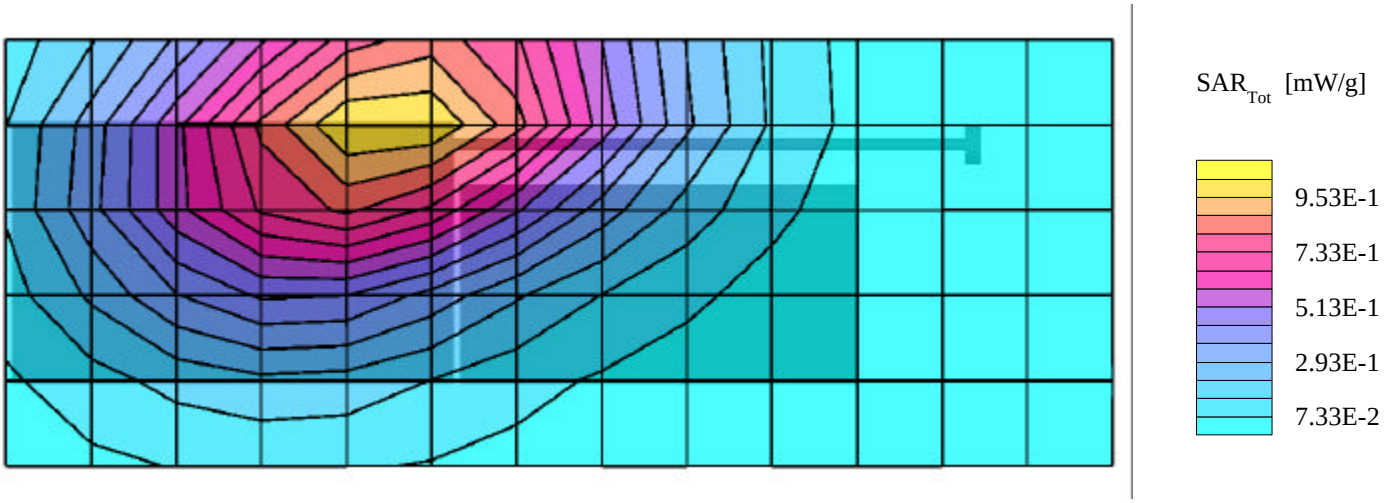
Body SAR at 1.5 cm Separation Distance
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 1013 [824.70 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.10 dB
SAR (1g): 0.984 mW/g, SAR (10g): 0.680 mW/g

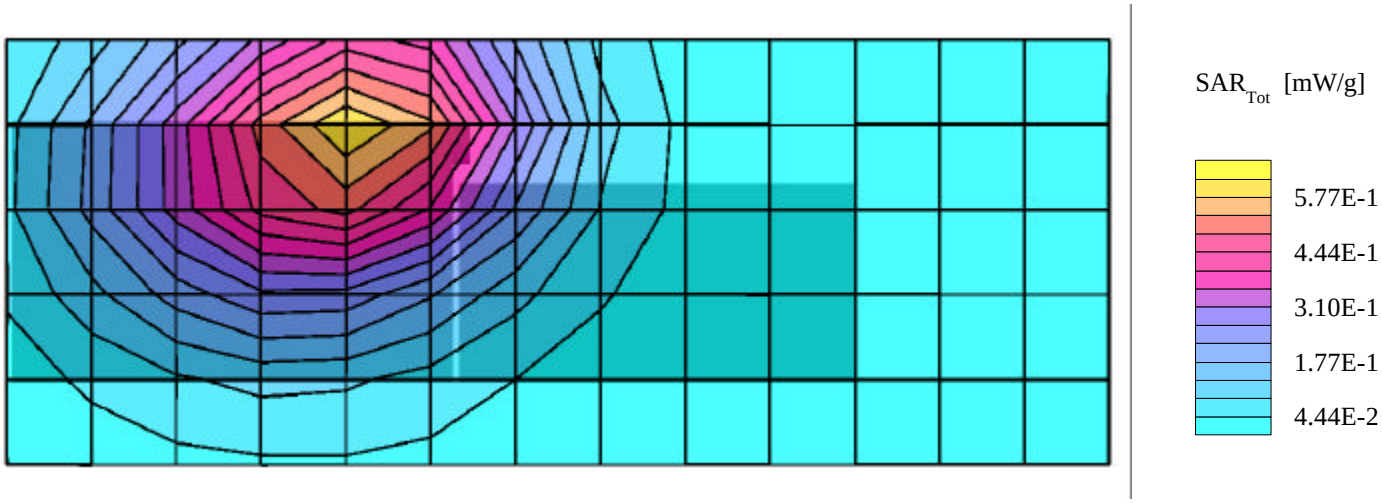
Body SAR at 1.5 cm Separation Distance
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 1013 [824.70 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.08 dB
SAR (1g): 0.573 mW/g, SAR (10g): 0.389 mW/g

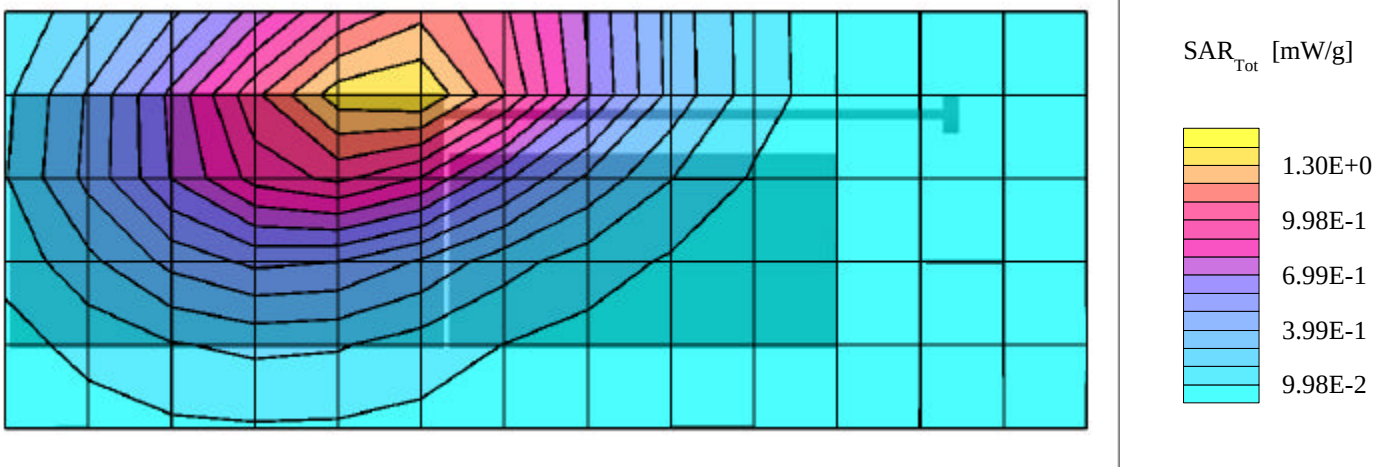
Body SAR at 1.5 cm Separation Distance
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.06 dB
SAR (1g): 1.34 mW/g, SAR (10g): 0.901 mW/g

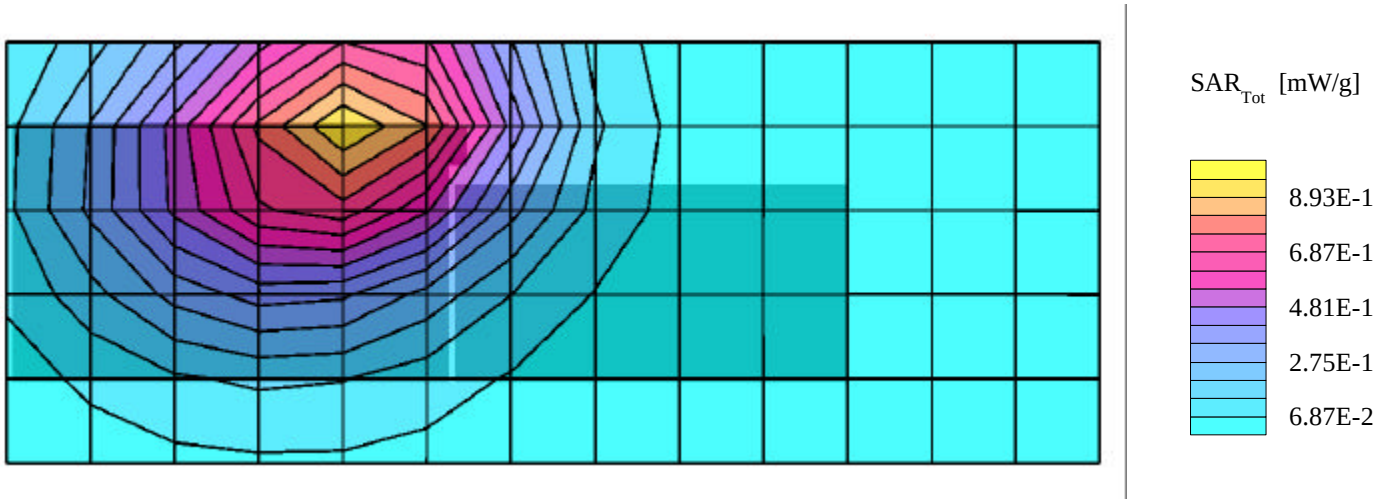
Body SAR at 1.5 cm Separation Distance
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.03 dB
SAR (1g): 0.878 mW/g, SAR (10g): 0.594 mW/g

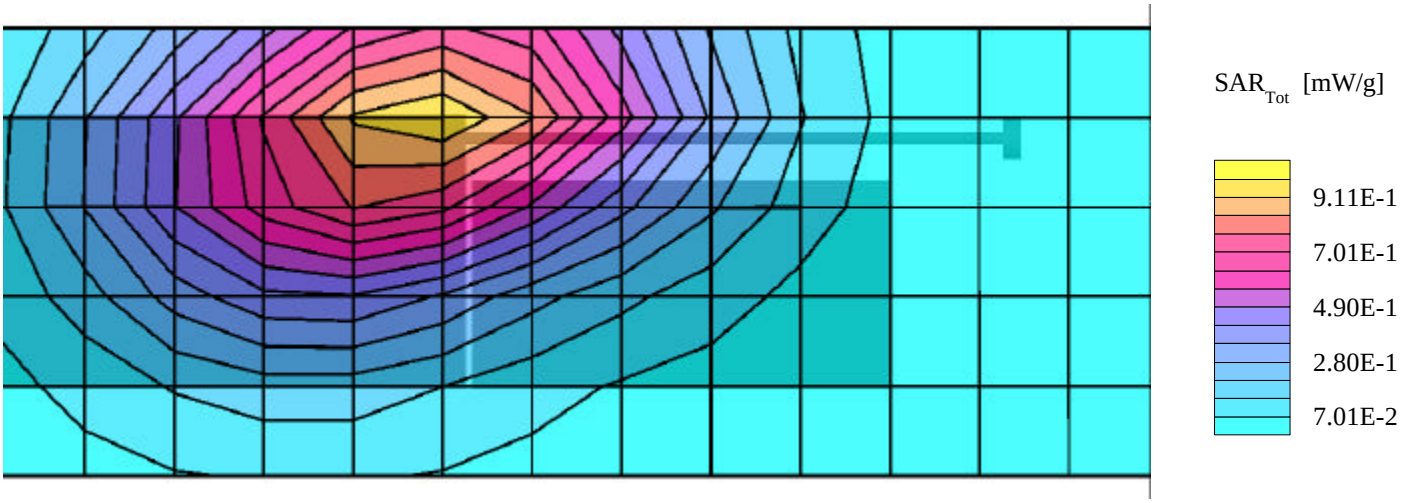
Body SAR at 1.5 cm Separation Distance
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 777 [848.31 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.19 dB
SAR (1g): 0.891 mW/g, SAR (10g): 0.607 mW/g

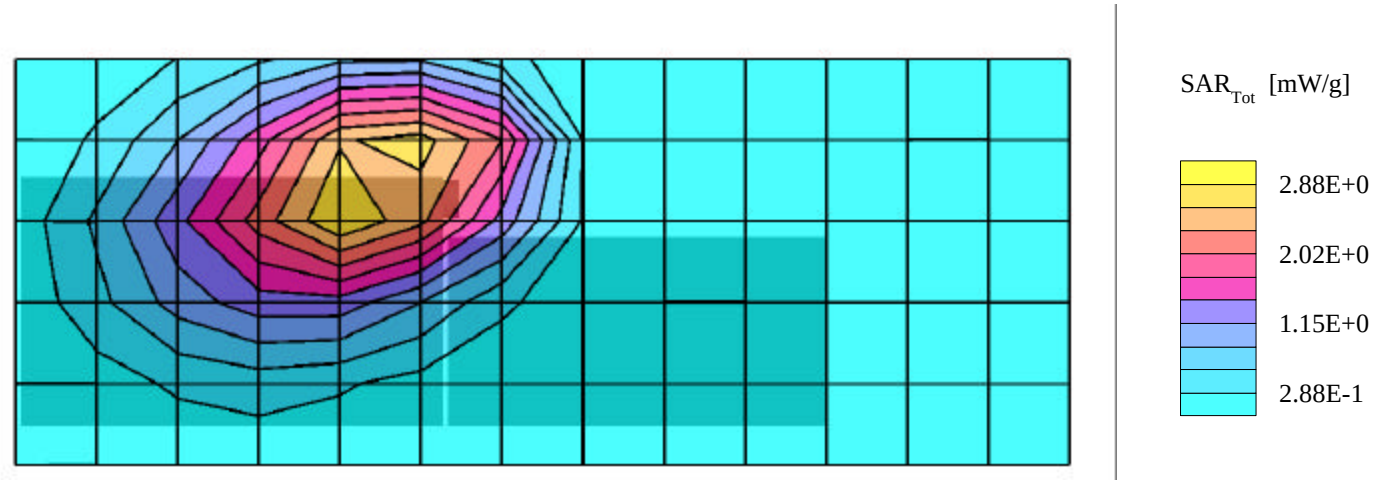
Body SAR at 1.5 cm Separation Distance
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 777 [848.31 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: -0.03 dB
SAR (10g): 1.82 mW/g

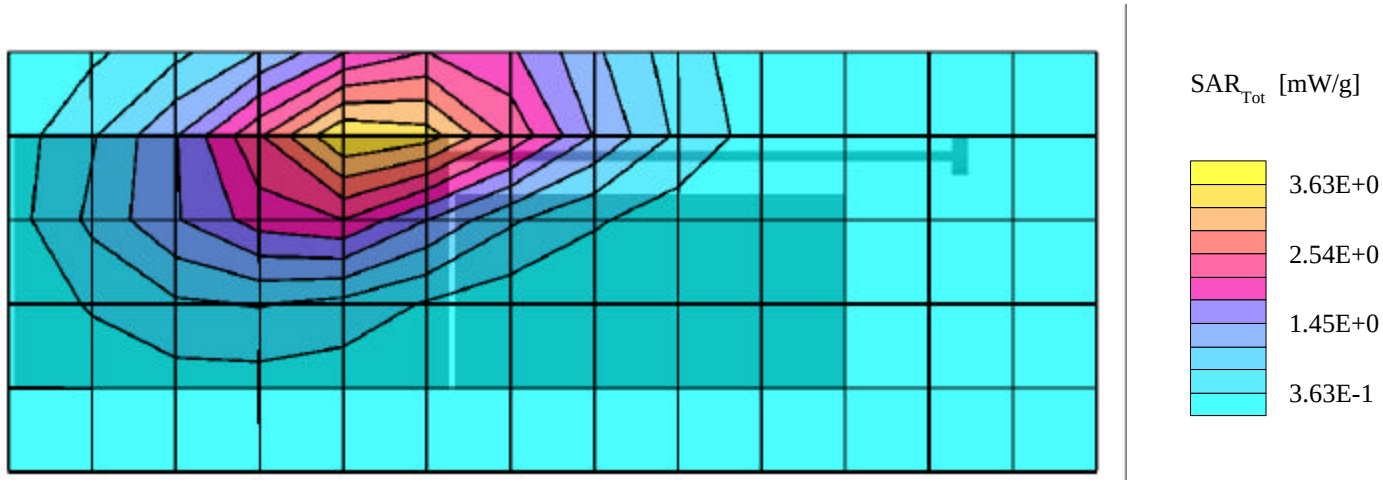
Hand SAR at 0.0 cm Separation Distance
Antenna In
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



Withus IT Co., Ltd. FCC ID: POQWCE-220

SAM Phantom; Flat Section; Position: (270°,270°)
Probe: ET3DV6 - SN1590; ConvF(6.61,6.61,6.61); Crest factor: 1.0
900 MHz Muscle: σ = 1.05 mho/m ε_r = 55.0 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7 Powerdrift: 0.13 dB
SAR (10g): 2.05 mW/g

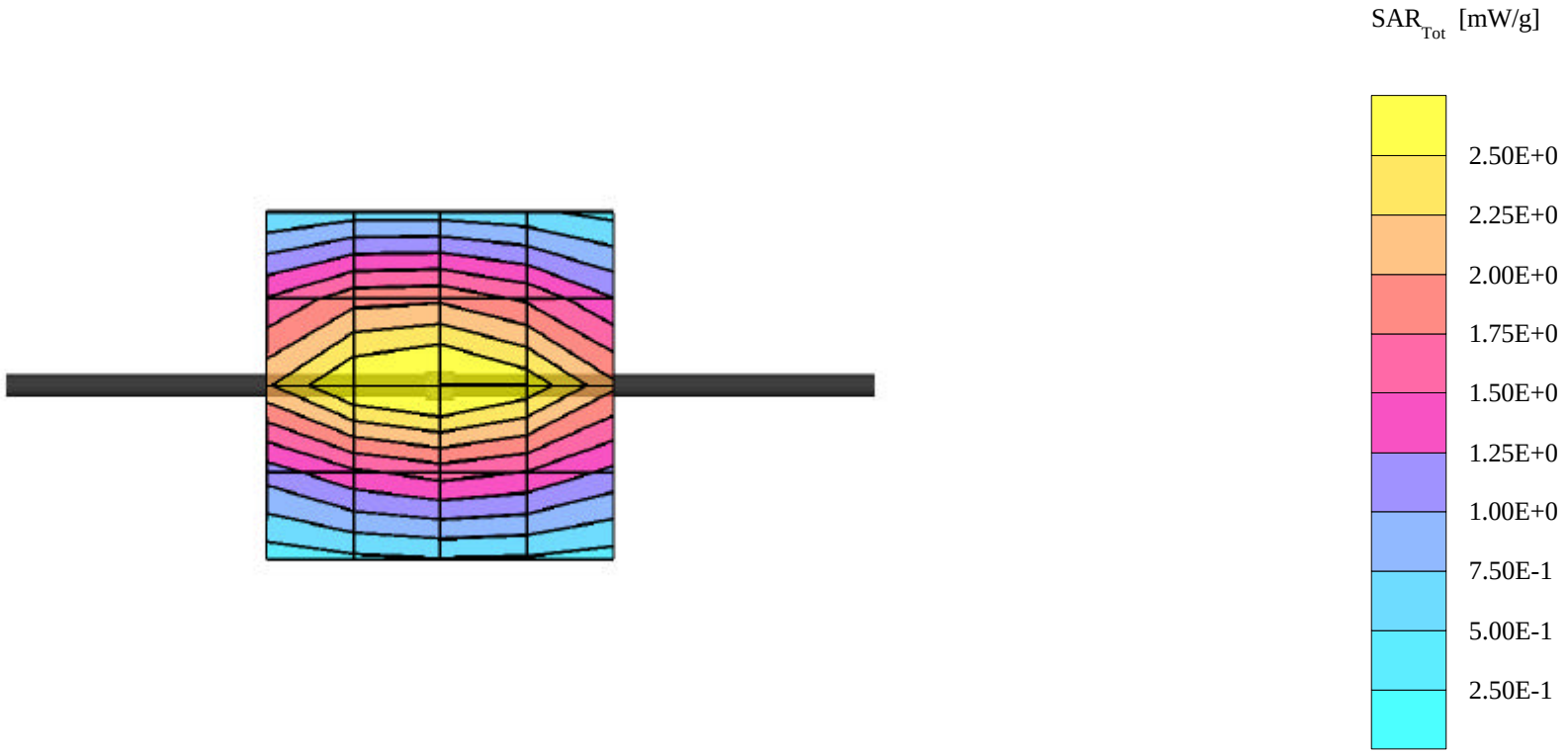
Hand SAR at 0.0 cm Separation Distance
Antenna Out
Withus Model: WCE-220
CDMA Mode
Channel 363 [835.89 MHz]
Conducted Power: 24.0 dBm
Date Tested: Nov. 20, 2001



APPENDIX B - DIPOLE VALIDATION

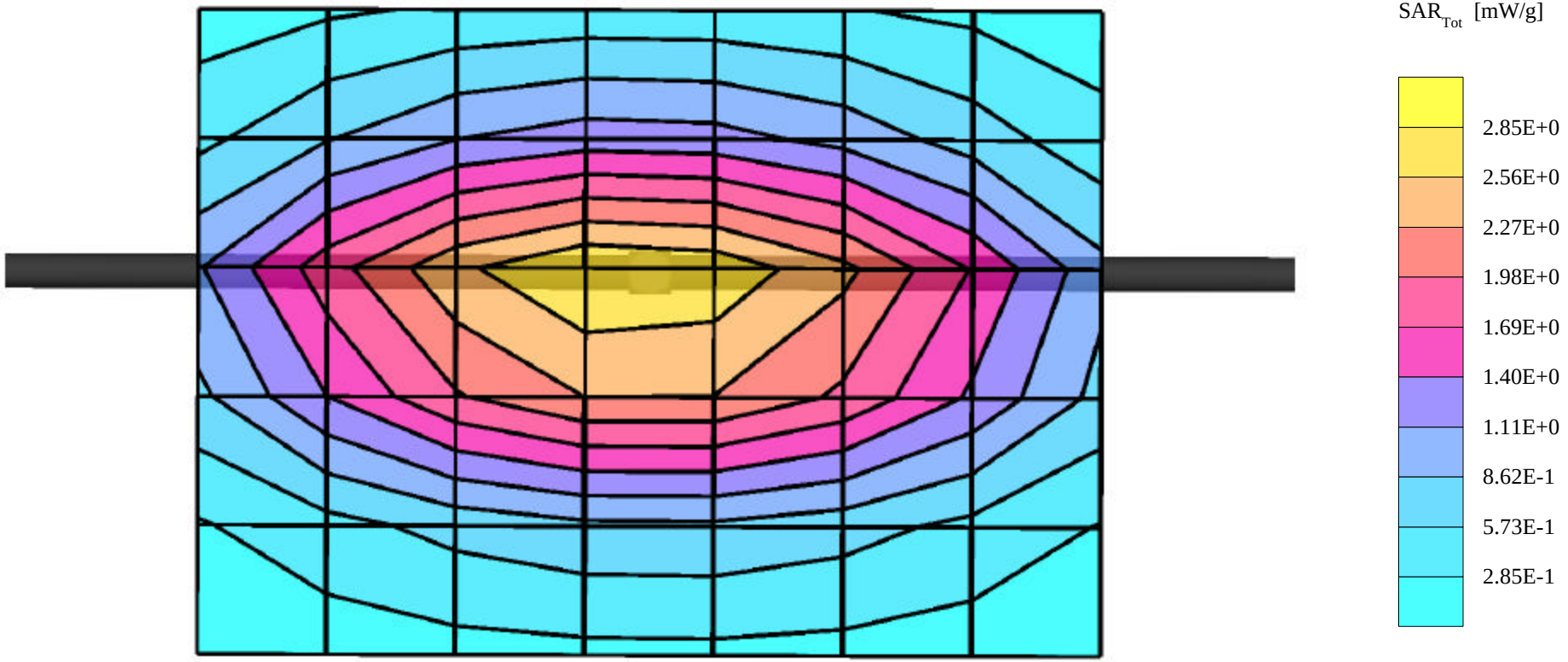
Validation Dipole D900V2 SN:054, d = 15 mm

Frequency: 900 MHz; Antenna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing:Dx = 15.0, Dy = 15.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(6.27,6.27,6.27); Crest factor: 1.0; IEEE1528 900 MHz: σ = 0.97 mho/m ε_r = 42.4 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.47 mW/g ± 0.05 dB, SAR (1g): 2.78 mW/g ± 0.04 dB, SAR (10g): 1.76 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 11.5 (10.3, 13.2) [mm]
Powerdrift: -0.00 dB



Dipole 900 MHz

Frequency: 900 MHz; Conducted Input Power: 250 [mW]
SAM Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0; 900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 4.51 mW/g, SAR (1g): 2.75 mW/g, SAR (10g): 1.74 mW/g, (Worst-case extrapolation)
Penetration depth: 11.4 (10.3, 12.8) [mm]
Powerdrift: -0.02 dB
Validation Date: Nov. 19, 2001

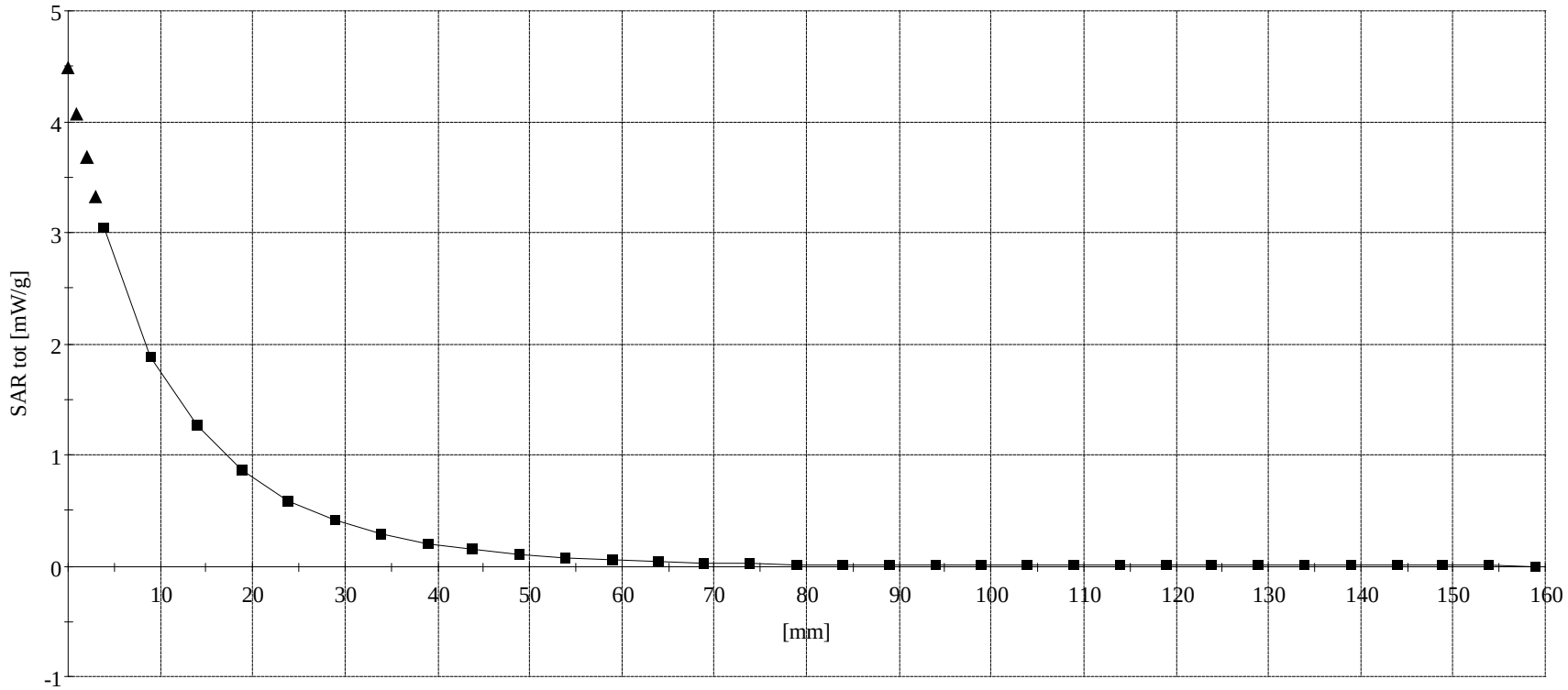


Dipole 900 MHz

SAM Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0

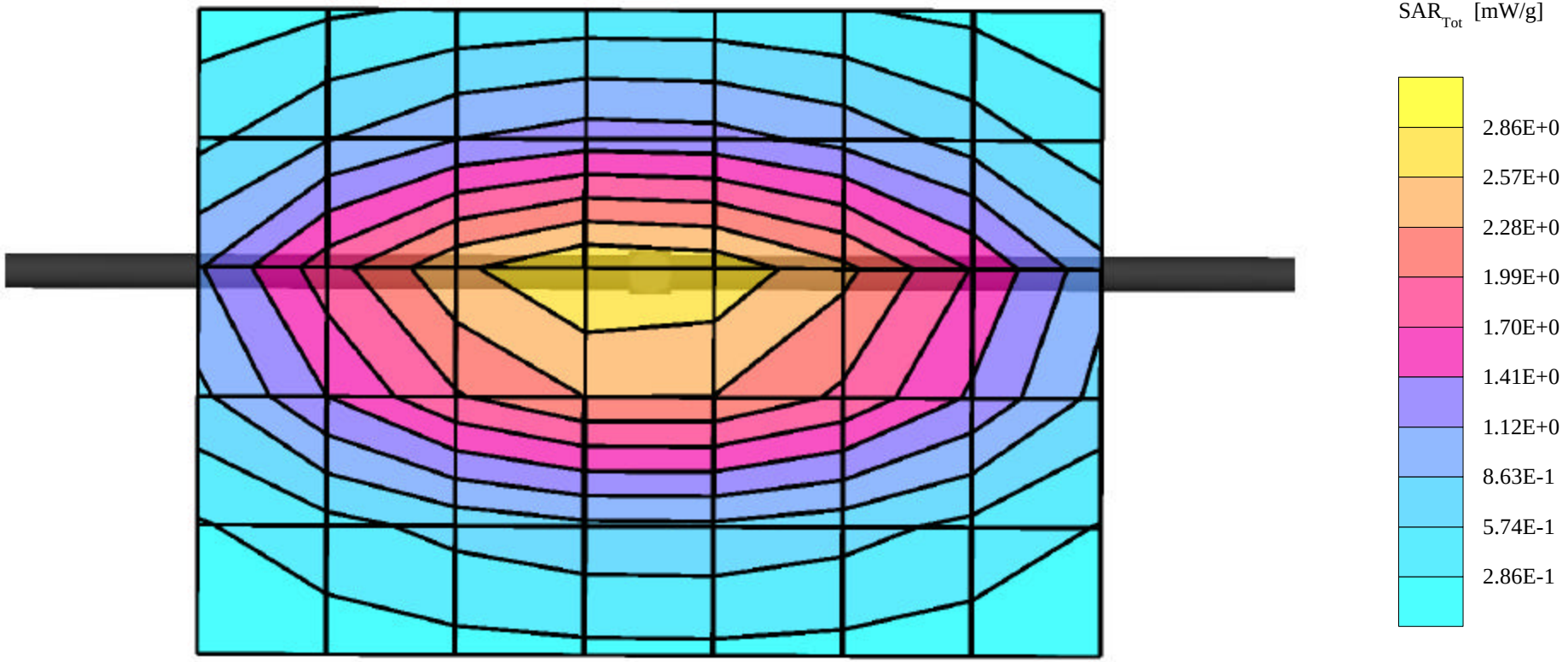
Z-Axis Scan to show minimum fluid depth of 15cm was maintained

Conducted Power: 250 mW
Date Tested: November 19, 2001



Dipole 900 MHz

Frequency: 900 MHz; Conducted Input Power: 250 [mW]
SAM Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0; 900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 4.51 mW/g, SAR (1g): 2.76 mW/g, SAR (10g): 1.75 mW/g, (Worst-case extrapolation)
Penetration depth: 11.4 (10.3, 12.8) [mm]
Powerdrift: -0.02 dB
Validation Date: Nov. 20, 2001

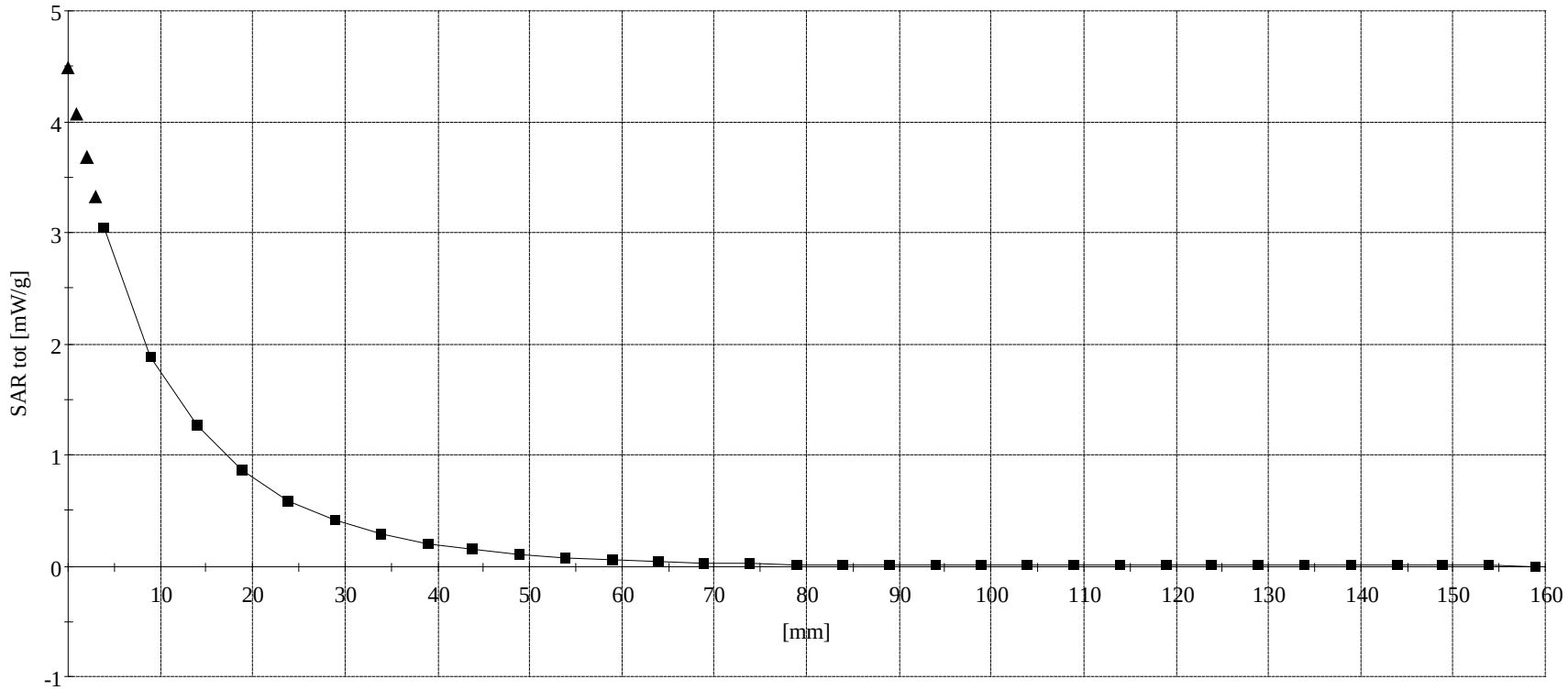


Dipole 900 MHz

SAM Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(6.83,6.83,6.83); Crest factor: 1.0
900 MHz Brain: σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0

Z-Axis Scan to show minimum fluid depth of 15cm was maintained

Conducted Power: 250 mW
Date Tested: November 20, 2001



APPENDIX C - PROBE CALIBRATION

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Calibrated:	March 26, 2001

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space

NormX	**1.77**	$\mu V/(V/m)^2$
NormY	**1.91**	$\mu V/(V/m)^2$
NormZ	**1.67**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**100**	mV
DCP Y	**100**	mV
DCP Z	**100**	mV

Sensitivity in Tissue Simulating Liquid

Head **450 MHz** e_r **= 43.5 ± 5%** s **= 0.87 ± 10% mho/m**

ConvF X	**7.36**	extrapolated	Boundary effect:	
ConvF Y	**7.36**	extrapolated	Alpha	**0.29**
ConvF Z	**7.36**	extrapolated	Depth	**2.72**

Head **900 MHz** e_r **= 42 ± 5%** s **= 0.97 ± 10% mho/m**

ConvF X	**6.83**	± 7% (k=2)	Boundary effect:	
ConvF Y	**6.83**	± 7% (k=2)	Alpha	**0.37**
ConvF Z	**6.83**	± 7% (k=2)	Depth	**2.48**

Head **1500 MHz** e_r **= 40.4 ± 5%** s **= 1.23 ± 10% mho/m**

ConvF X	**6.13**	interpolated	Boundary effect:	
ConvF Y	**6.13**	interpolated	Alpha	**0.47**
ConvF Z	**6.13**	interpolated	Depth	**2.17**

Head **1800 MHz** e_r **= 40 ± 5%** s **= 1.40 ± 10% mho/m**

ConvF X	**5.78**	± 7% (k=2)	Boundary effect:	
ConvF Y	**5.78**	± 7% (k=2)	Alpha	**0.53**
ConvF Z	**5.78**	± 7% (k=2)	Depth	**2.01**

Sensor Offset

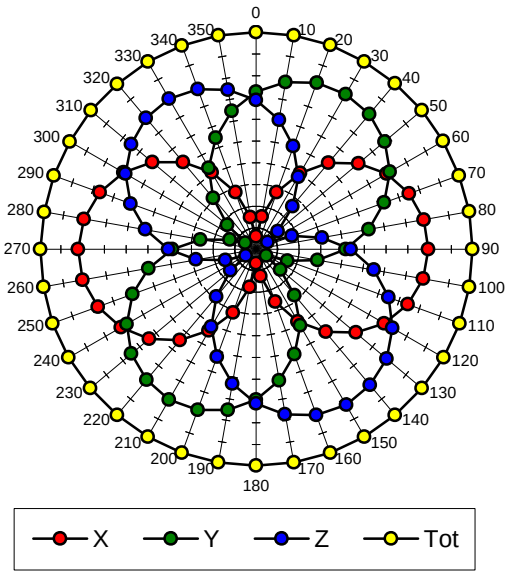
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.2 ± 0.2**	mm

DASY3 - Parameters of Probe: ET3DV6 SN: 1590

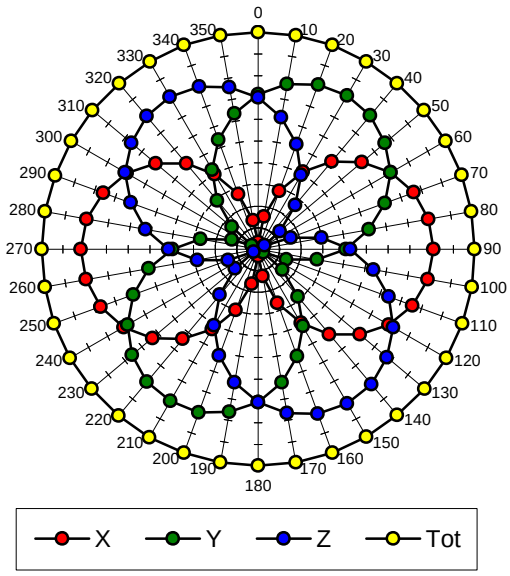
Body	**450 MHz**		**ε_r = 56.7 ± 5%**	**σ = 0.94 ± 10% mho/m**	
	ConvF X	**7.23** extrapolated		Boundary effect:	
	ConvF Y	**7.23** extrapolated		Alpha	**0.29**
	ConvF Z	**7.23** extrapolated		Depth	**2.72**
Body	**900 MHz**		**ε_r = 55.0 ± 5%**	**σ = 1.05 ± 10% mho/m**	
	ConvF X	**6.61**	± 7% (k=2)	Boundary effect:	
	ConvF Y	**6.61**	± 7% (k=2)	Alpha	**0.37**
	ConvF Z	**6.61**	± 7% (k=2)	Depth	**2.48**
Body	**1500 MHz**		**ε_r = 54.0 ± 5%**	**σ = 1.30 ± 10% mho/m**	
	ConvF X	**5.78** interpolated		Boundary effect:	
	ConvF Y	**5.78** interpolated		Alpha	**0.47**
	ConvF Z	**5.78** interpolated		Depth	**2.17**
Body	**1800 MHz**		**ε_r = 53.3 ± 5%**	**σ = 1.52 ± 10% mho/m**	
	ConvF X	**5.36**	± 7% (k=2)	Boundary effect:	
	ConvF Y	**5.36**	± 7% (k=2)	Alpha	**0.53**
	ConvF Z	**5.36**	± 7% (k=2)	Depth	**2.01**

Receiving Pattern (ϕ , θ = 0°

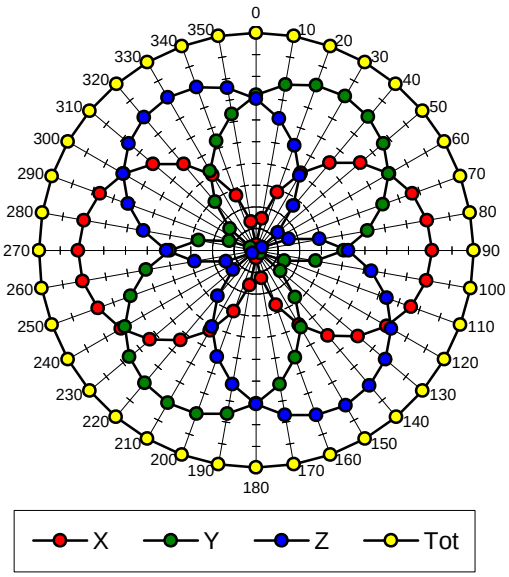
f = 30 MHz, TEM cell ifi110



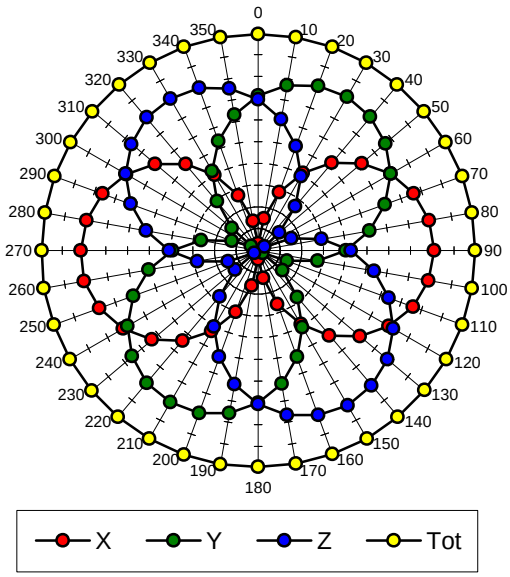
f = 100 MHz, TEM cell ifi110



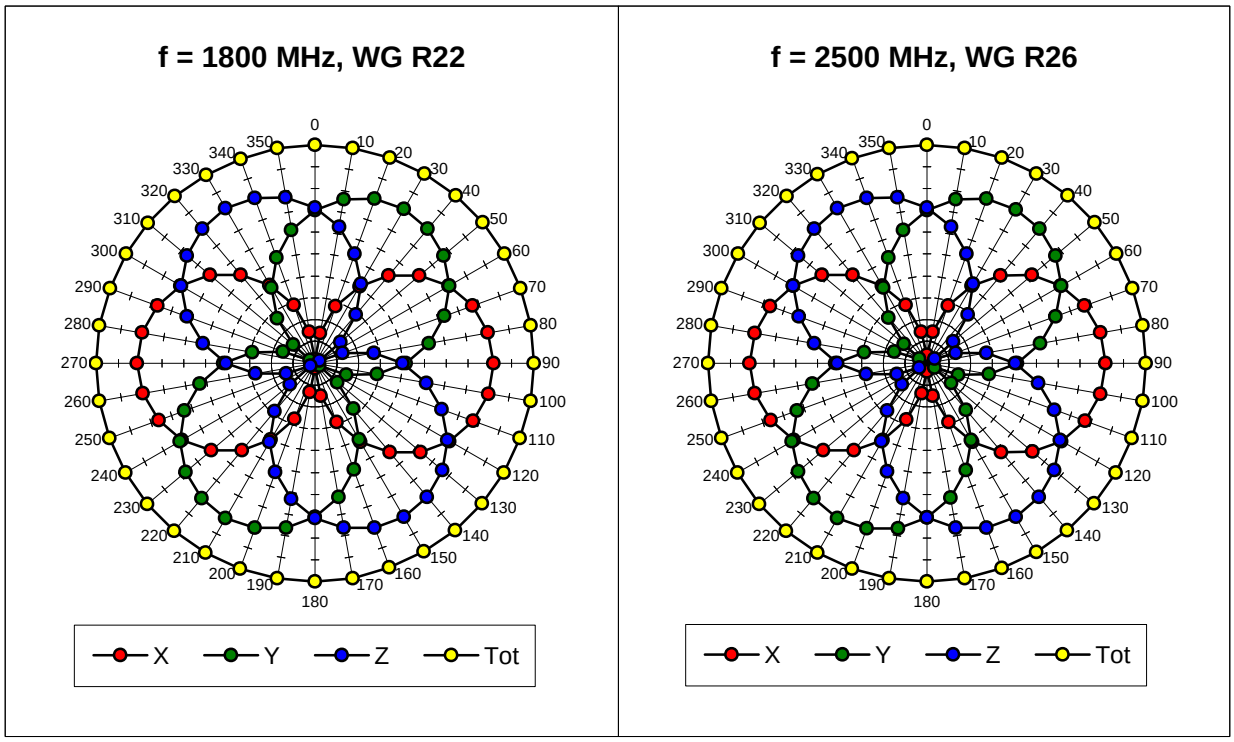
f = 300 MHz, TEM cell ifi110



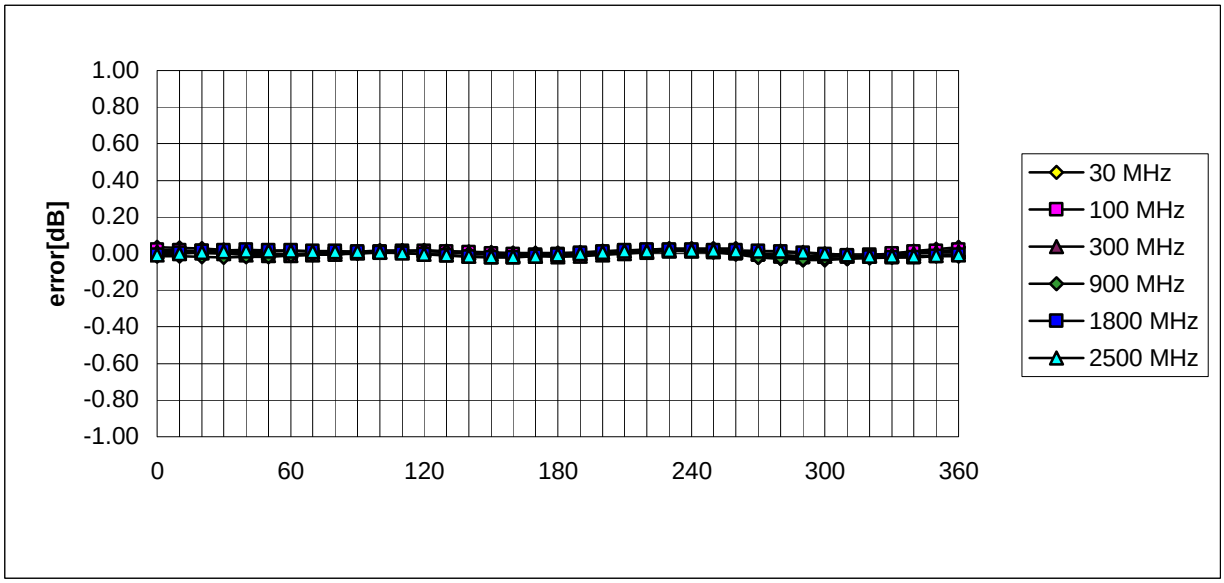
f = 900 MHz, TEM cell ifi110



ET3DV6 SN:1590

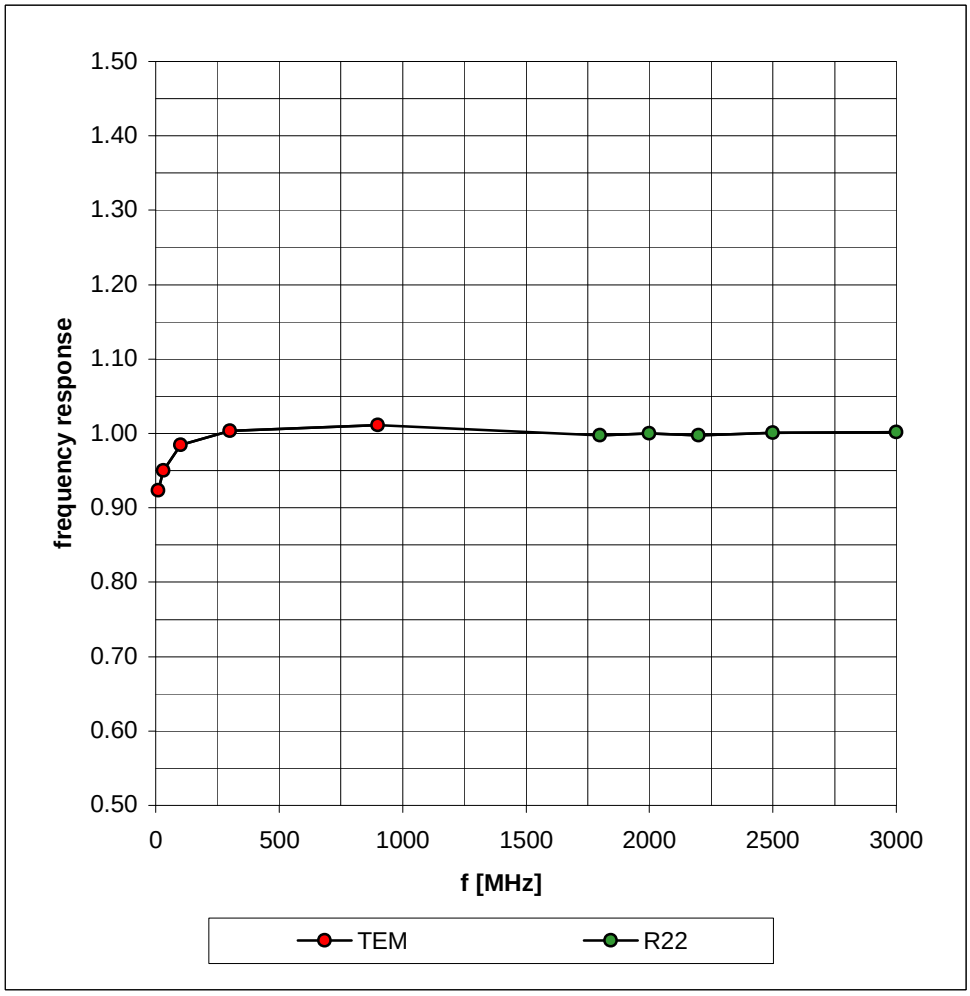


Isotropy Error (f), q = 0°



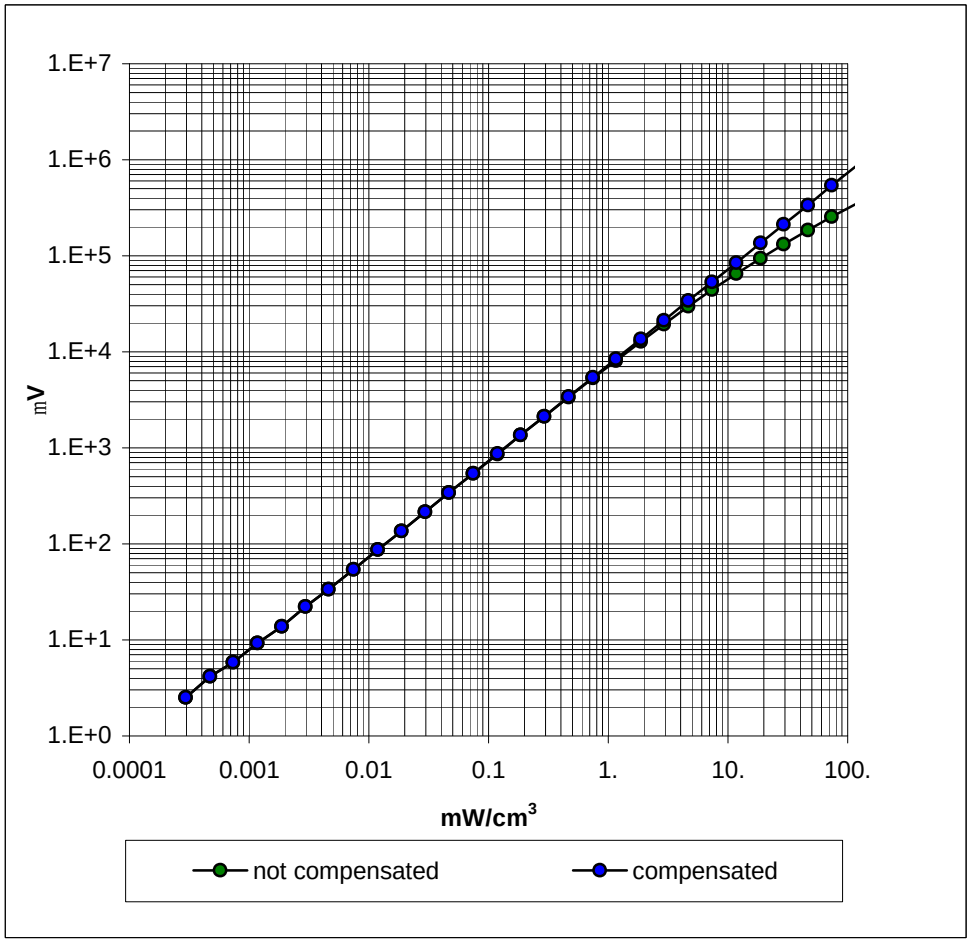
Frequency Response of E-Field

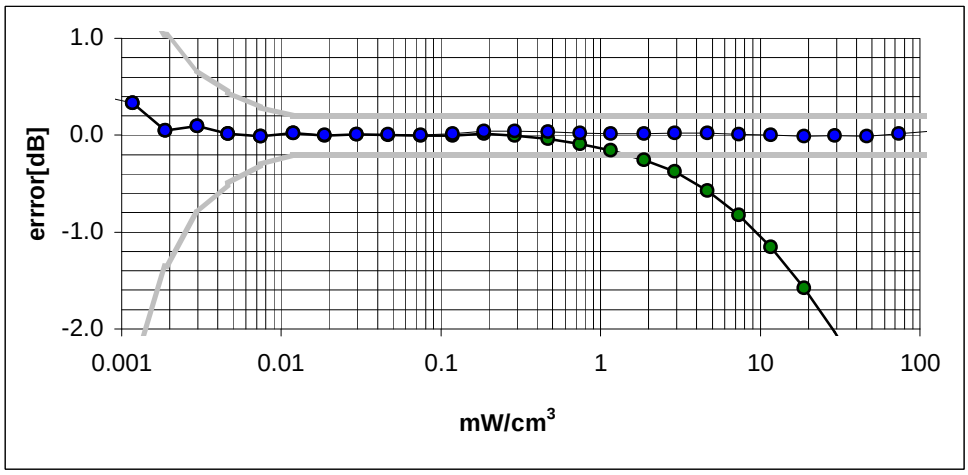
(TEM-Cell:ifi110, Waveguide R22)



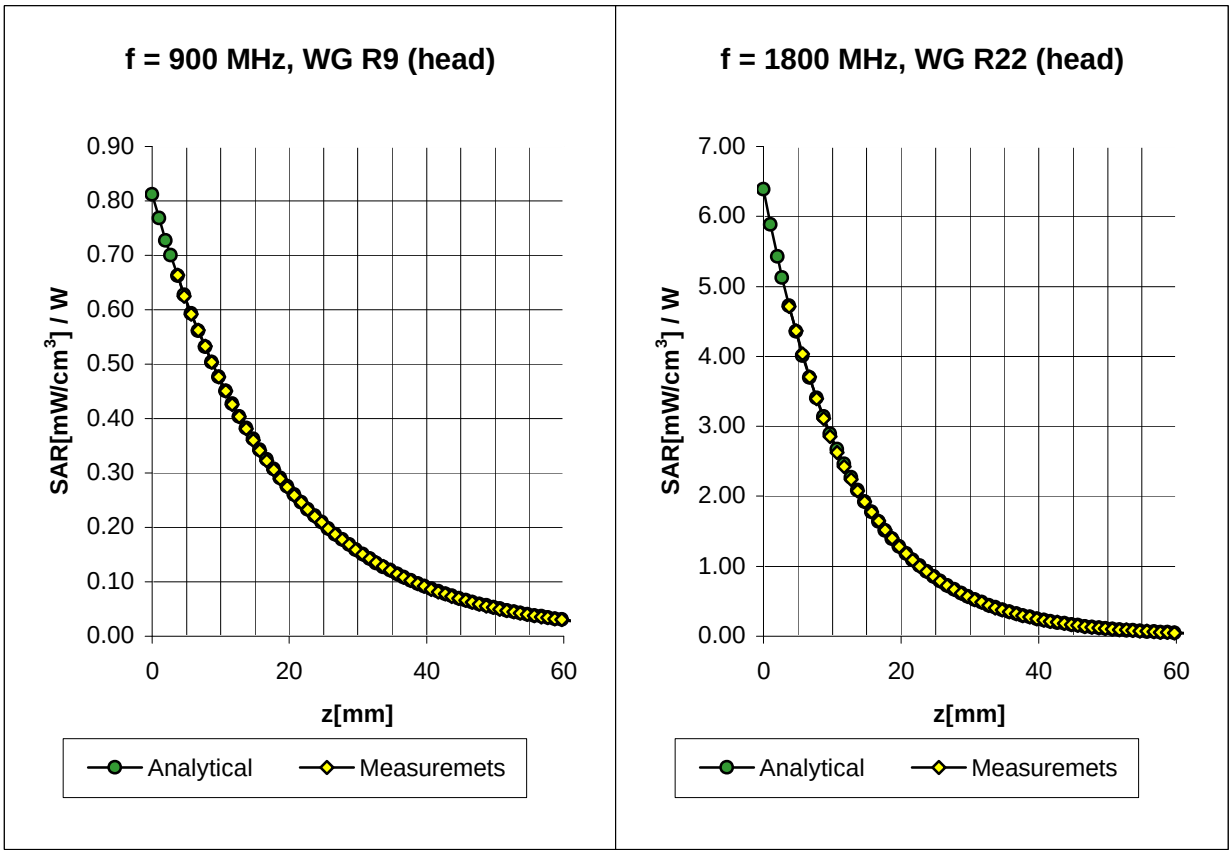
Dynamic Range f(SAR_{brain})

(TEM-Cell:ifi110)





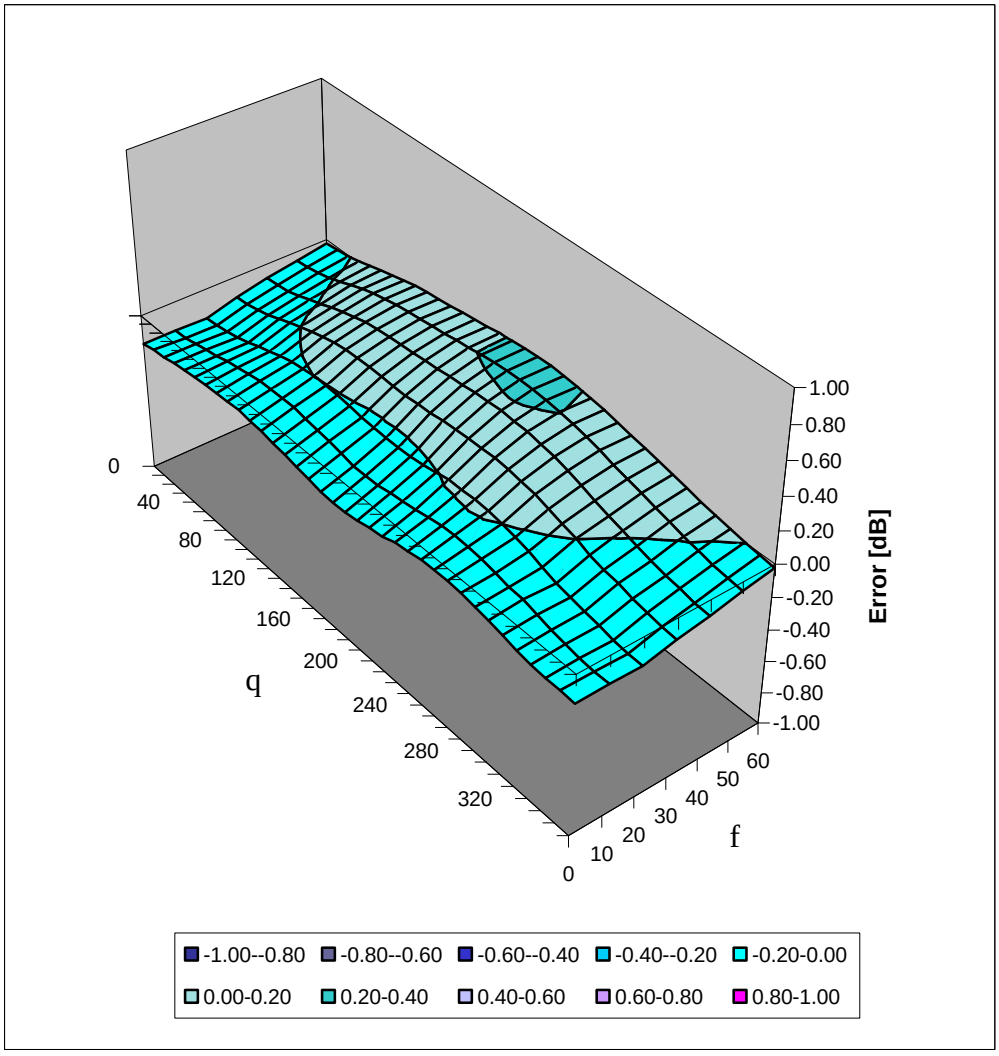
Conversion Factor Assessment



ET3DV6 SN:1590

Deviation from Isotropy in HSL

Error (q,f), f = 900 MHz



APPENDIX D – SAR SENSITIVITIES

Application Note: SAR Sensitivities

Introduction

The measured SAR-values in homogeneous phantoms depend strongly on the electrical parameters of the liquid. Liquids with exactly matching parameters are difficult to produce; there is always a small error involved in the production or measurement of the liquid parameters. The following sensitivities allow the estimation of the influence of small parameter errors on the measured SAR values. The calculations are based on an approximation formula [1] for the SAR of an electrical dipole near the phantom surface and a adapted plane wave approximation for the penetration depth. The sensitivities are given in percent SAR change per percent change in the controlling parameter:

$$S(x) = \frac{d\,SAR / SAR}{d\,x / x}$$

The controlling parameters x are:

- ε : permitivity
- σ : conductivity
- ρ : brain density (= one over integration volume)

For example: If The liquid permitivity increases by 2 percent and the sensitivity of the SAR to permitivity is -0.6 then the SAR will decrease by 1.2 percent.

The sensitivities are given for surface SAR values and averaged SAR values for 1 g and 10 g cubes and for dipole distances d of 10mm (for frequencies below 1000 MHz) and 15mm (for frequencies above 1000 MHz) from the liquid surface.

Liquid parameters are as proposed in the new standards (e.g., IEEE 1528).

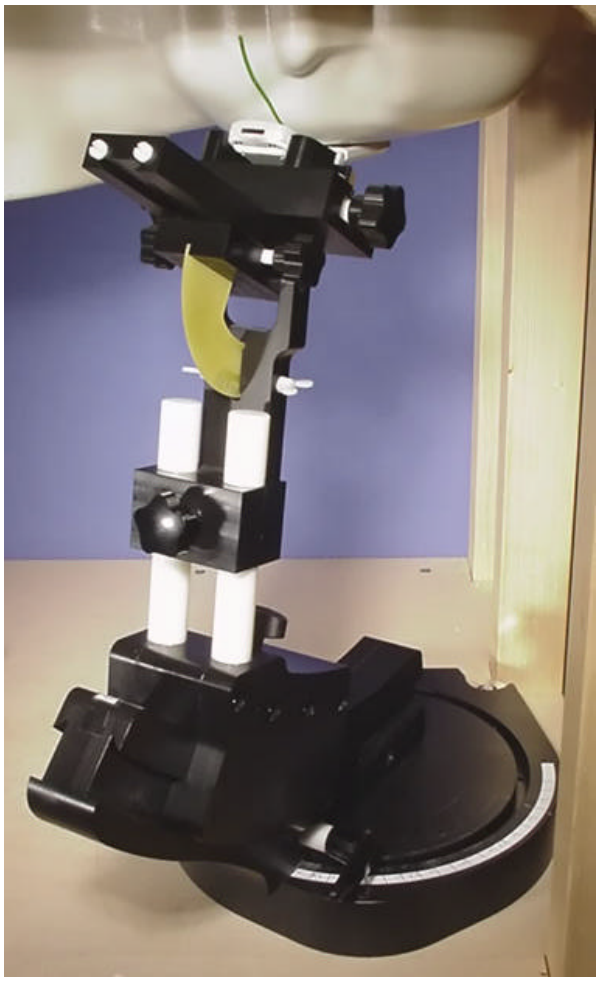
References

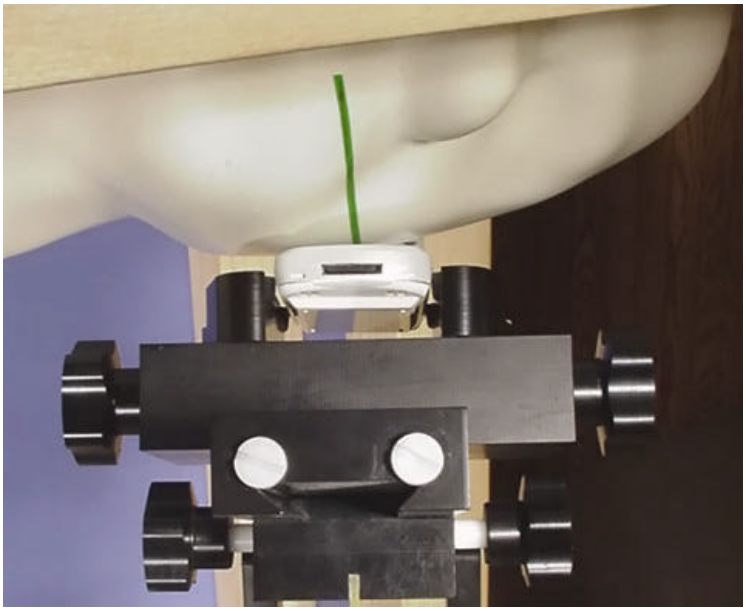
[1] N. Kuster and Q. Balzano, “Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300 MHz”, *IEEE Transacions on Vehicular Technology*, vol. 41(1), pp. 17-23, 1992.

Parameter	ε	σ	ρ
f=300 MHz (εr=45.3, σ=0.87S/m, ρ=1g/cm³)			
d=15mm: Surface	- 0.41	+ 0.48	—
1 g	- 0.33	+ 0.28	0.08
10 g	- 0.26	+ 0.09	0.16
f=450 MHz (εr=43.5, σ=0.87S/m, ρ=1g/cm³)			
d=15mm: Surface	- 0.56	+ 0.67	—
1 g	- 0.46	+ 0.43	0.09
10 g	- 0.37	+ 0.22	0.17
f=835 MHz (εr=41.5, σ=0.90S/m, ρ=1g/cm³)			
d=15mm: Surface	- 0.70	+ 0.86	—
1 g	- 0.57	+ 0.59	0.10
10 g	- 0.45	+ 0.35	0.18
f=900 MHz (εr=41.5, σ=0.97S/m, ρ=1g/cm³)			
d=15mm: Surface	- 0.69	+ 0.86	—
1 g	- 0.55	+ 0.57	0.10
10 g	- 0.44	+ 0.32	0.19
f=1450 MHz (εr=40.5, σ=1.20/m, ρ=1g/cm³)			
d=10mm: Surface	- 0.73	+ 0.91	—
1 g	- 0.55	+ 0.55	0.12
10 g	- 0.42	+ 0.27	0.22
f=1800 MHz (εr=40.0, σ=1.40S/m, ρ=1g/cm³)			
d=10mm: Surface	- 0.73	+ 0.92	—
1 g	- 0.52	+ 0.51	0.14
10 g	- 0.38	+ 0.21	0.24
f=1900 MHz (εr=40.0, σ=1.40S/m, ρ=1g/cm³)			
d=10mm: Surface	- 0.73	+ 0.93	—
1 g	- 0.53	+ 0.51	0.14
10 g	- 0.39	+ 0.22	0.24
f=2000 MHz (εr=40.0, σ=1.40S/m, ρ=1g/cm³)			
d=10mm: Surface	- 0.74	+ 0.94	—
1 g	- 0.53	+ 0.52	0.14
10 g	- 0.39	+ 0.22	0.24
f=2450 MHz (εr=39.2, σ=1.80S/m, ρ=1g/cm³)			
d=10mm: Surface	- 0.74	+ 0.93	—
1 g	- 0.49	+ 0.41	0.17
10 g	- 0.34	+ 0.12	0.28
f=3000 MHz (εr=38.5, σ=2.40S/m, ρ=1g/cm³)			
d=10mm: Surface	- 0.75	+ 0.90	—
1 g	- 0.45	+ 0.28	0.21
10 g	- 0.32	+ 0.02	0.31

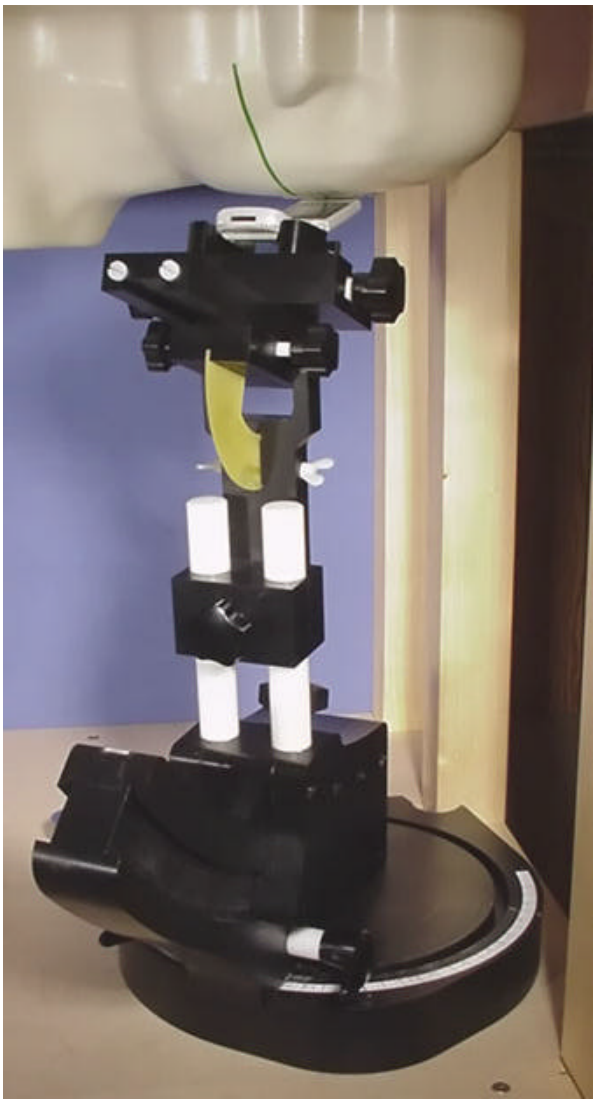
APPENDIX E - SAR TEST SETUP PHOTOGRAPHS

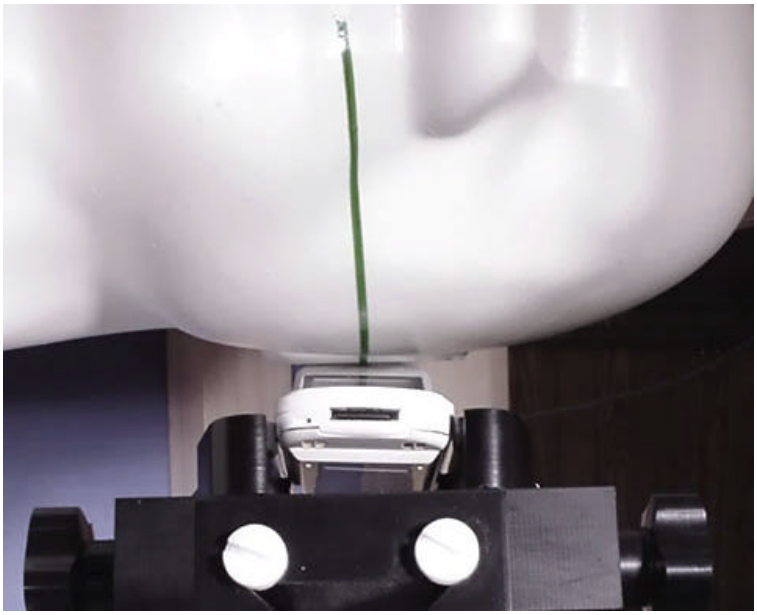
SAR TEST SETUP PHOTOGRAPHS
Left Head Section – Cheek/Touch Position



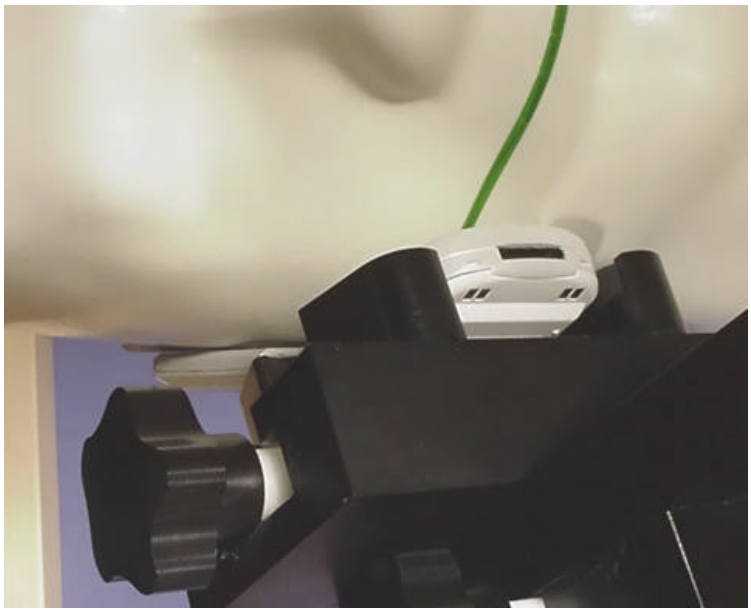


SAR TEST SETUP PHOTOGRAPHS
Left Head Section – Ear/Tilt Position

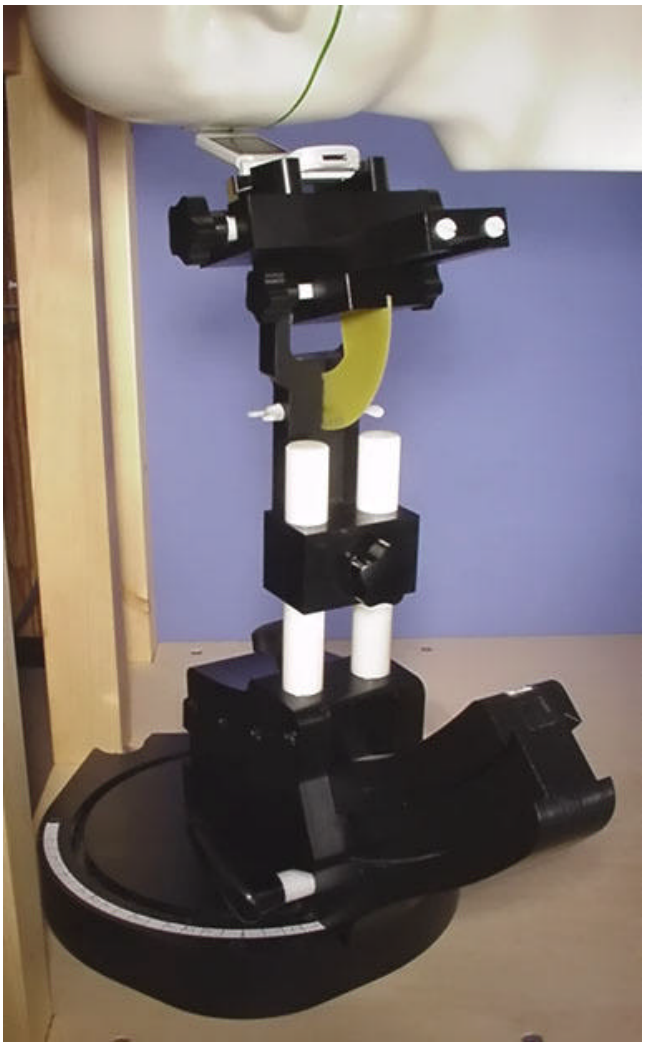


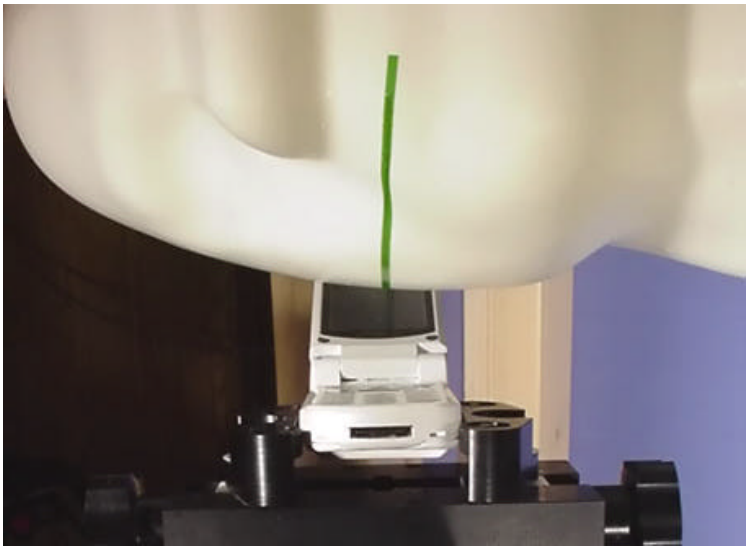


SAR TEST SETUP PHOTOGRAPHS
Right Head Section – Cheek/Touch Position

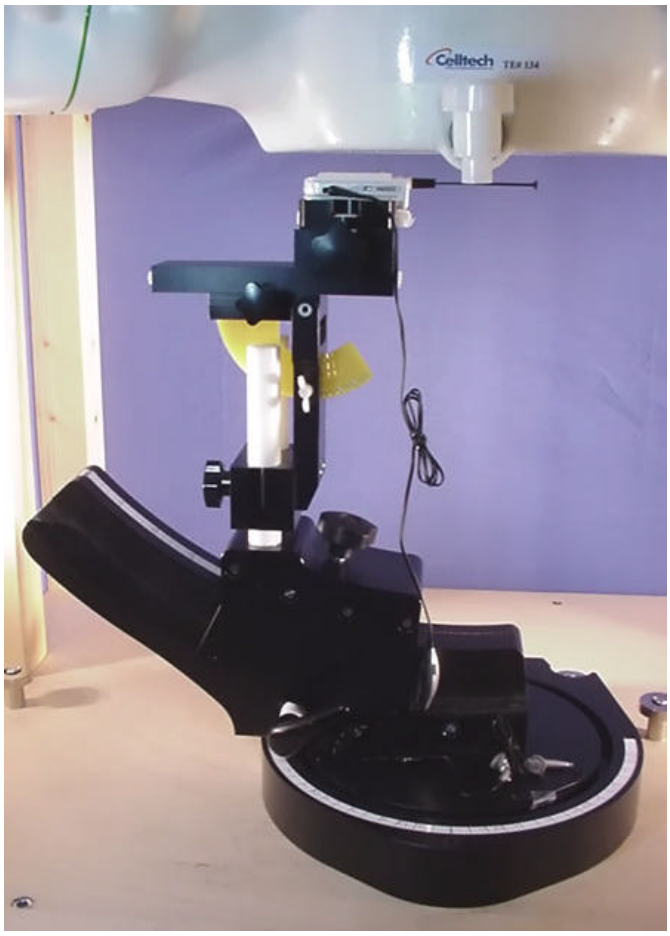


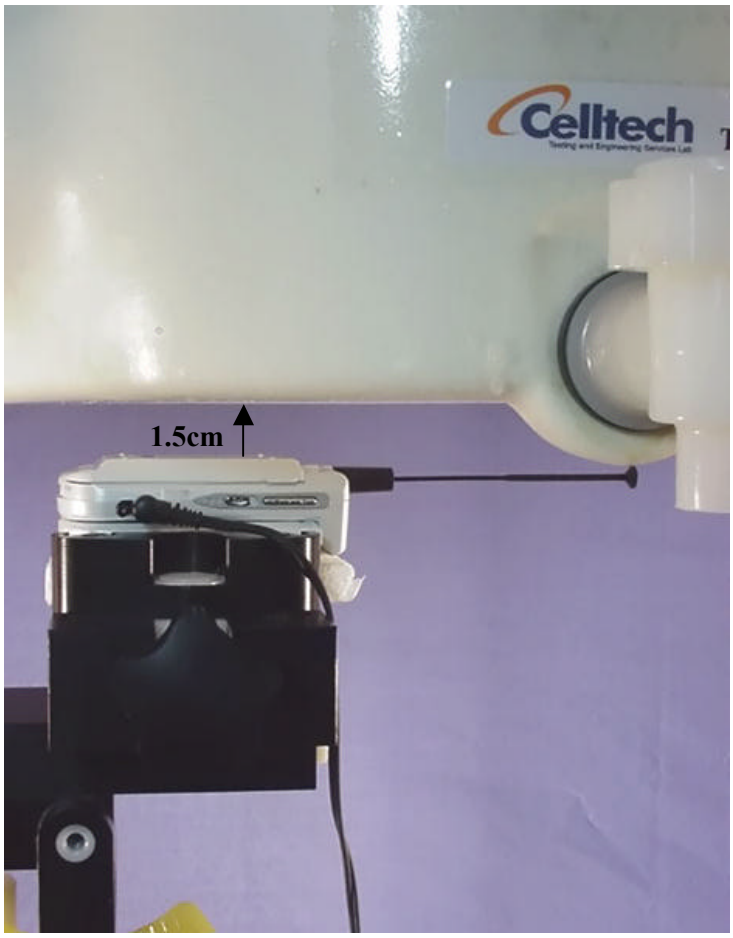
SAR TEST SETUP PHOTOGRAPHS
Right Head Section – Ear/Tilt Position





SAR TEST SETUP PHOTOGRAPHS
Planar Section – Body-Worn Configuration
(1.5 cm Separation Distance)





SAR TEST SETUP PHOTOGRAPHS
Planar Section – Hand-Held Configuration
(0.0 cm Separation Distance)