DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

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Applicant Information

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Rule Part(s):	**FCC 47 CFR §2.1093; IC RSS-102 Issue 1 (Provisional)**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (01-01)**
Device Classification:	**Licensed Non-Broadcast Transmitter Held to Face (TNF)**
Device Type:	**Portable FM VHF PTT Radio Transceiver**
FCC ID:	**Q9FKY105**
Model(s):	**KY105**
Modulation:	**FM (VHF)**
Tx Frequency Range:	**148.050 - 173.950 MHz**
Max. RF Output Power Measured:	**5.40 W Conducted (148.050 MHz)** **5.56 W Conducted (163.050 MHz)** **4.92 W Conducted (173.950 MHz)**
Antenna Type(s):	**Whip**
Battery Type(s):	**NiMH (7.5V, 1300mAh)**
Body-Worn Accessories Tested:	**Belt-Clip, Speaker-Microphone**
Max. SAR Measured:	**1.67 W/kg - Face-Held (50% Duty Cycle)** **0.938 W/kg - Body-Worn (50% Duty Cycle)**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) and Industry Canada RSS-102 Issue 1 (Provisional) for the Occupational / Controlled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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.

Russell W. Pipe
Senior Compliance Technologist
Celltech Labs Inc.

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1.0 INTRODUCTION

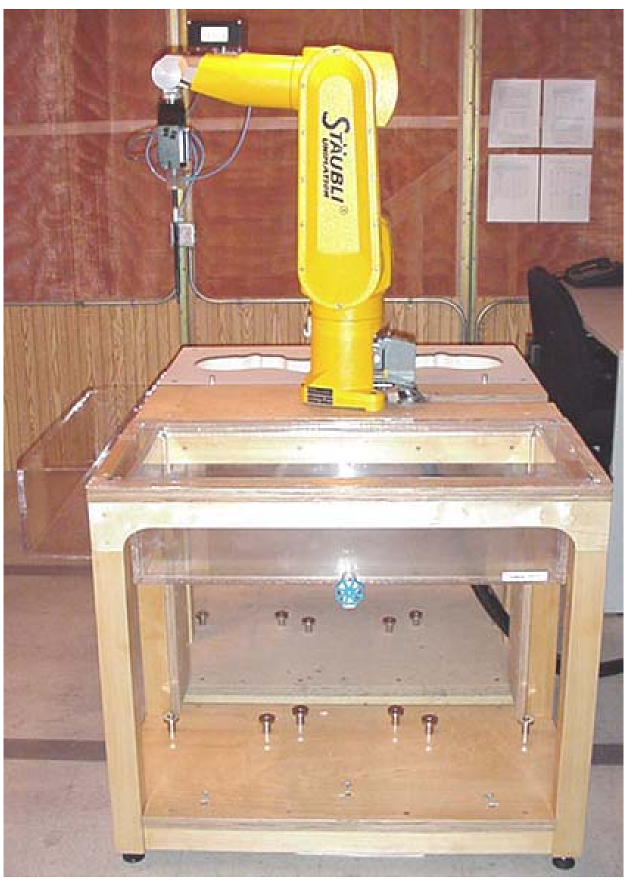
This measurement report demonstrates compliance of the Holzberg Communications, Inc. Model: KY105 Portable FM VHF PTT Radio Transceiver FCC ID: Q9FKY105 with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C (Edition 01-01) (see reference [3]) and IC RSS-102 Issue 1 (Provisional) (see reference [4]), 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 DEVICE UNDER TEST (DUT)

FCC Rule Part(s)	FCC 47 CFR §2.1093
IC Rule Part(s)	RSS-102 Issue 1 (Provisional)
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)
Device Classification	Licensed Non-Broadcast Transmitter Held to Face (TNF)
Device Type	Portable FM VHF PTT Radio Transceiver
FCC ID	Q9FKY105
Model No.(s)	KY105
Serial No.(s)	3 (Identical Prototype)
Modulation	FM (VHF)
Tx Frequency Range	148.050 - 173.950 MHz
Max. RF Output Power Measured	5.40 W Conducted (148.050 MHz) 5.56 W Conducted (163.050 MHz) 4.92 W Conducted (173.950 MHz)
Battery Type(s)	NiMH (7.5 V, 1300 mAh)
Antenna Type(s)	Whip (Length: 179 mm)
Body-worn Accessories Tested	Belt-Clip, Speaker-Microphone

3.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/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 DASY4 measurement server. The DAE4 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 DASY4 measurement server 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. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.



DASY4 SAR Measurement System with validation phantom

DASY4 SAR Measurement System with Plexiglas planar phantom

4.0 MEASUREMENT SUMMARY

SAR EVALUATION RESULTS

Test Type	Freq. (MHz)	Chan.	Test Mode	Measured Conducted RF Output Power			Battery Type	Accessory Type	Separation Distance to Planar Phantom (cm)	Measured SAR 1g (W/kg) Duty Cycle		Max. Cond. Power Drift (dB)	Scaled SAR 1g (W/kg) Duty Cycle	
				Before (W)	After (W)	Drift (dB)				100 %	50%		100%	50%
Face	163.050	Mid	CW	5.51	5.07	-0.36	NiMH	--	2.5	2.96	1.48	-0.53	3.34	1.67
Body	163.050	Mid	CW	5.56	4.92	-0.53	NiMH	Belt-clip Speaker-Mic	1.3	1.66	0.830	-0.53	1.88	0.938

ANSI / IEEE C95.1 1992 - SAFETY LIMIT
BRAIN / BODY: 8.0 W/kg (averaged over 1 gram)
Spatial Peak - Occupational / Controlled Exposure

Dielectric Constant ε_r	150 MHz Brain		150 MHz Body		Ambient Temperature	24.2 °C	
	IEEE Target	Measured	IEEE Target	Measured	Fluid Temperature	Brain: 20.2 °C	Body: 21.5 °C
	52.3 (± 5%)	54.2	**61.9 (± 5%)**	62.4	Fluid Depth	≥ 15 cm	
Conductivity σ (mho/m)	150 MHz Brain		150 MHz Body		ρ (Kg/m^3)	1000	
	IEEE Target	Measured	IEEE Target	Measured	Relative Humidity	67%	
	0.76 (± 5%)	0.73	**0.80 (± 5%)**	0.77	Atmospheric Pressure	102.5 KPa	

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]).
3. The conducted power levels measured after the SAR evaluations were > 5% from the measured start power. The maximum conducted power drift was added to the measured SAR levels to show scaled SAR results as listed in the above table.
4. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures reported were consistent for all measurement periods.
5. The dielectric parameters of the simulated tissues were measured prior to the evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters).

5.0 DETAILS OF SAR EVALUATION

The Holzberg Communications, Inc. Model: KY105 Portable FM VHF PTT Radio Transceiver FCC ID: Q9FKY105 was found to be compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix F.

1. The DUT was evaluated in a face-held configuration with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm separation distance was maintained between the front side of the DUT and the outer surface of the planar phantom for the duration of the test.
2. The DUT was evaluated in a body-worn configuration with the back of the radio placed parallel to the outer surface of the planar phantom. The attached belt-clip was touching the planar phantom and provided a 1.3 cm separation distance between the back of the DUT and the outer surface of the planar phantom. The DUT was tested for body-worn SAR with speaker-microphone accessory connected.
3. The conducted power levels were measured before and after each test using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046.
4. The conducted power levels measured after the SAR evaluations were > 5% from the measured start power. The maximum conducted power drift was added to the measured SAR levels to show scaled SAR results as shown in the test data table (page 5).
5. The DUT was tested in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.
6. The DUT was tested with a fully charged NiMH battery.
7. The SAR evaluations were performed using a Plexiglas planar phantom.
8. A stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.

6.0 EVALUATION PROCEDURES

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 using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.
b. The SAR was determined by a pre-defined procedure within the DASY4 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.

An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

1. Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away form the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix D). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
2. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed using a large Plexiglas planar phantom with a 300MHz dipole (see Appendix C for system validation procedure). The dielectric parameters of the simulated brain tissue were measured prior to the system performance check using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters). A forward power of 250mW was applied to the dipole and the system was verified to a tolerance of ±10% (see Appendix B for system performance check test plot).

SYSTEM PERFORMANCE CHECK

Test Date	300MHz Equiv. Tissue	SAR 1g (W/kg)		Dielectric Constant ε_r		Conductivity σ (mho/m)		ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		IEEE Target	Measured	IEEE Target	Measured	IEEE Target	Measured						
12/15/03	Brain	0.750 ±10%	0.770 +2.7%	45.3 ±5%	44.5	0.87 ±5%	0.84	1000	24.2	20.7	≥ 15	67	102.5

Note(s):
1. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.

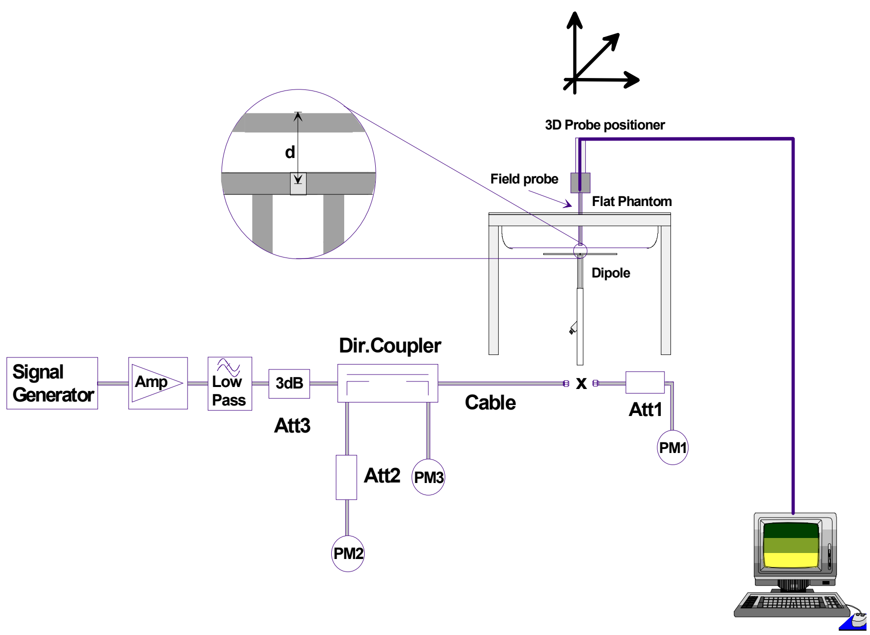


Figure 1. System Performance Check Setup Diagram

300 MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

The simulated tissue 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 (permittivity and conductivity).

SIMULATED TISSUE MIXTURES			
INGREDIENT	**300 MHz Brain (%) (System Check)**	**150 MHz Brain (%) (DUT Evaluation)**	**150 MHz Body (%) (DUT Evaluation)**
Water	37.56	38.35	46.6
Sugar	55.32	55.5	49.7
Salt	5.95	5.15	2.6
HEC	0.98	0.9	1.0
Bactericide	0.19	0.1	0.1

9.0 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 1g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10g)	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.

10.0 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:	AMD Athlon XP 2400+
Clock Speed:	2.0 GHz
Operating System:	Windows XP Professional

Data Converter

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

DASY4 Measurement Server

Function:	Real-time data evaluation for field measurements and surface detection
Hardware:	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections:	COM1, COM2, DAE, Robot, Ethernet, Service Interface

E-Field Probe

Model:	ET3DV6
Serial No.:	1387
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)

Evaluation Phantom

Type:	Planar Phantom
Shell Material:	Plexiglas
Bottom Thickness:	2.0 mm ± 0.1 mm
Outer Dimensions:	75.0 cm (L) x 22.5 cm (W) x 20.5 cm (H); Back Plane: 25.7 cm (H)

Validation Phantom (≤ 450MHz)

Type:	Planar Phantom
Shell Material:	Plexiglas
Bottom Thickness:	6.2 mm ± 0.1 mm
Outer Dimensions:	86.0 cm (L) x 39.5 cm (W) x 21.8 cm (H)

11.0 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)
Dynamic Range:	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Surface Detection:	± 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

12.0 PLANAR PHANTOM

The planar phantom is constructed of Plexiglas material with a 2.0 mm shell thickness for face-held and body-worn SAR evaluations of handheld radio transceivers. The planar phantom is mounted on the side of the DASY4 system


Plexiglas Planar Phantom

13.0 VALIDATION PLANAR PHANTOM

The validation planar phantom is constructed of Plexiglas material with a 6.0 mm shell thickness for SAR validations at 450MHz and below. The validation planar phantom is mounted in the DASY4 compact system.


Validation Planar Phantom

14.0 DEVICE HOLDER

The DASY4 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

15.0 TEST EQUIPMENT LIST

TEST EQUIPMENT	SERIAL NO.	CALIBRATION DATE
Schmid & Partner DASY4 System	-	-
DASY4 Measurement Server	1078	N/A
-Robot	599396-01	N/A
-ET3DV6 E-Field Probe	1387	Feb 2003
-300MHz Validation Dipole	135	Oct 2003
-450MHz Validation Dipole	136	Nov 2003
-900MHz Validation Dipole	054	June 2003
-1800MHz Validation Dipole	247	June 2003
-2450MHz Validation Dipole	150	Sept 2003
-Plexiglas Planar Phantom	161	N/A
-Validation Planar Phantom	137	N/A
HP 85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8651A Power Meter	8650137	April 2003
Gigatronics 8652A Power Meter	1835267	April 2003
Power Sensor 80701A	1833542	Feb 2003
Power Sensor 80701A	1833699	April 2003
HP E4408B Spectrum Analyzer	US39240170	Dec 2003
HP 8594E Spectrum Analyzer	3543A02721	April 2003
HP 8753E Network Analyzer	US38433013	May 2003
HP 8648D Signal Generator	3847A00611	May 2003
Amplifier Research 5S1G4 Power Amplifier	26235	N/A

16.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	√3	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	√3	1	± 5.9	8
Power drift	± 5.0	Rectangular	√3		± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 13.3**	
Expanded Uncertainty (k=2)					**± 26.6**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-200X (Draft - see reference [5])

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0	Rectangular	√3	1	± 1.2	∞
Input Power	± 4.7	Rectangular	√3	1	± 2.7	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 9.9**	
Expanded Uncertainty (k=2)					**± 19.8**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-200X (Draft - see reference [5])

17.0 REFERENCES

[1] Federal Communications Commission, “Radiofrequency radiation exposure evaluation: portable devices”, Rule Part 47 CFR §2.1093: 1999.

[2] Health Canada, “Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz”, Safety Code 6.

[3] 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.

[4] Industry Canada, “Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada’s Safety Code 6 for Exposure of Humans to Radio Frequency Fields”, Radio Standards Specification RSS-102 Issue 1 (Provisional): September 1999.

[5] IEEE Standards Coordinating Committee 34, Std 1528-200X, “DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”.

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 12/15/03

DUT: Holzberg Communications Model: KY105; Type: VHF PTT Radio Transceiver; Serial: 3

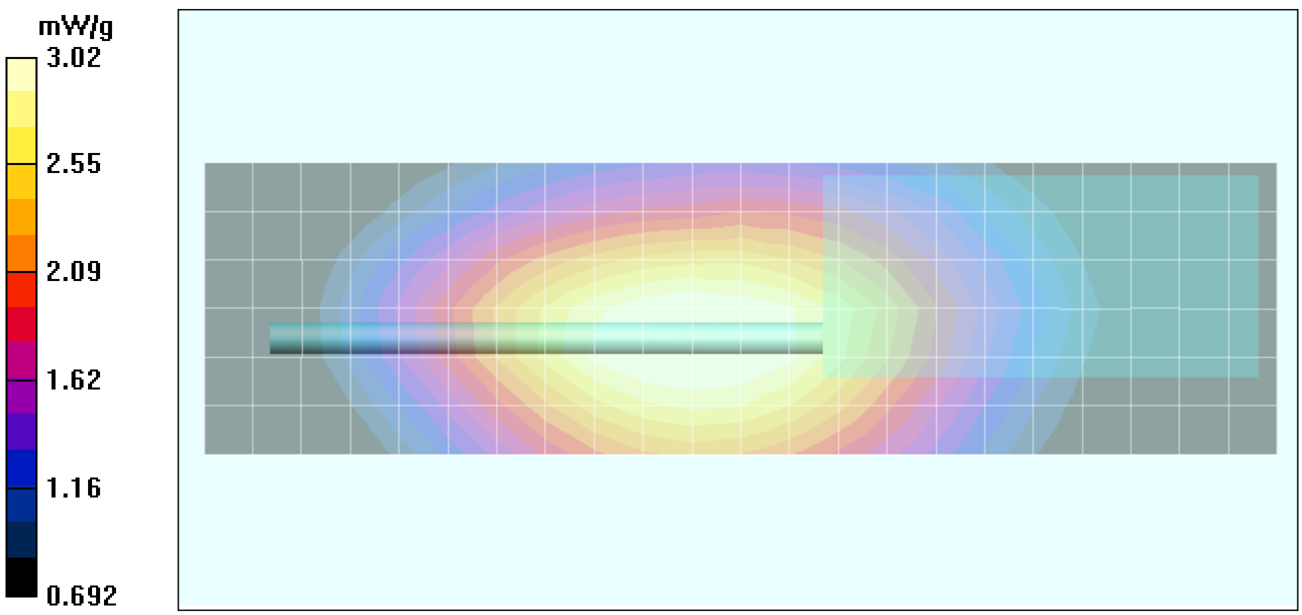
Ambient Temp: 24.2 °C; Fluid Temp: 20.2 °C; Barometric Pressure: 102.5 kPa; Humidity: 67%

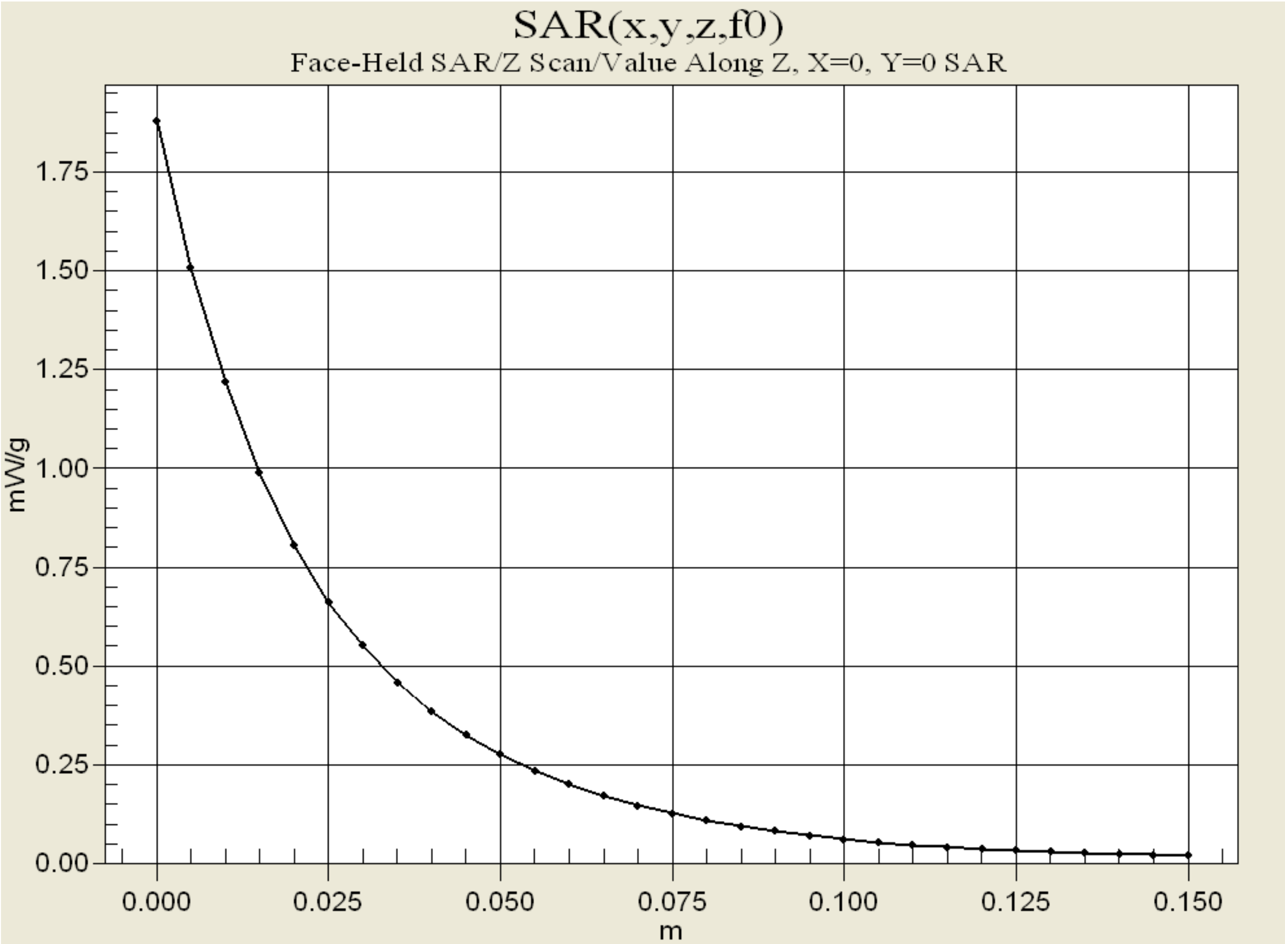
7.5V NiMH Battery Pack
Communication System: FM VHF
RF Output Power: 5.51 W (Conducted)
Frequency: 163.050 MHz; Duty Cycle: 1:1
Medium: HSL150 (σ = 0.73 mho/m, ε_r = 54.2, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(9.1, 9.1, 9.1); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Face-Held - 2.5 cm Separation Distance - Mid Channel/Area Scan (7x23x1): Measurement grid: dx=15mm, dy=15mm

Face-Held - 2.5 cm Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 4.64 W/kg
SAR(1 g) = 2.96 mW/g; SAR(10 g) = 2.18 mW/g
Reference Value = 61.8 V/m
Power Drift = -0.3 dB





SAR(x,y,z,f0)
Face-Held SAR/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0.000
0.025
0.050
0.075
0.100
0.125
0.150
m

Date Tested: 12/15/03

DUT: Holzberg Communications Model: KY105; Type: VHF PTT Radio Transceiver; Serial: 3

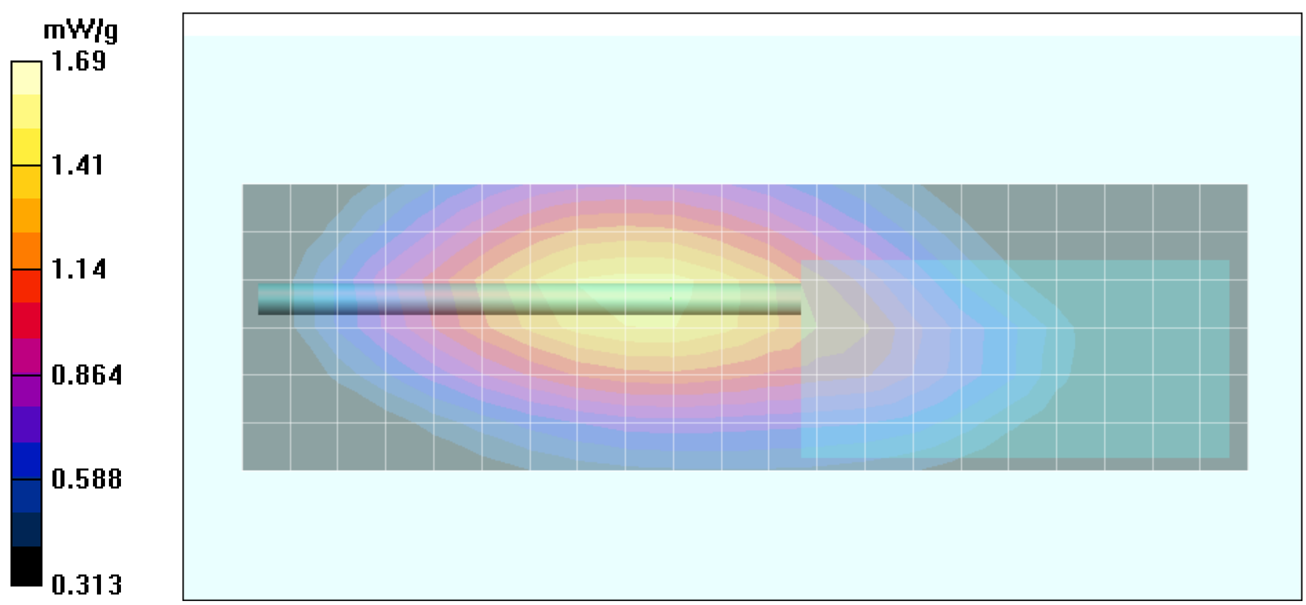
Ambient Temp: 24.2 °C; Fluid Temp: 21.5 °C; Barometric Pressure: 102.5 kPa; Humidity: 67%

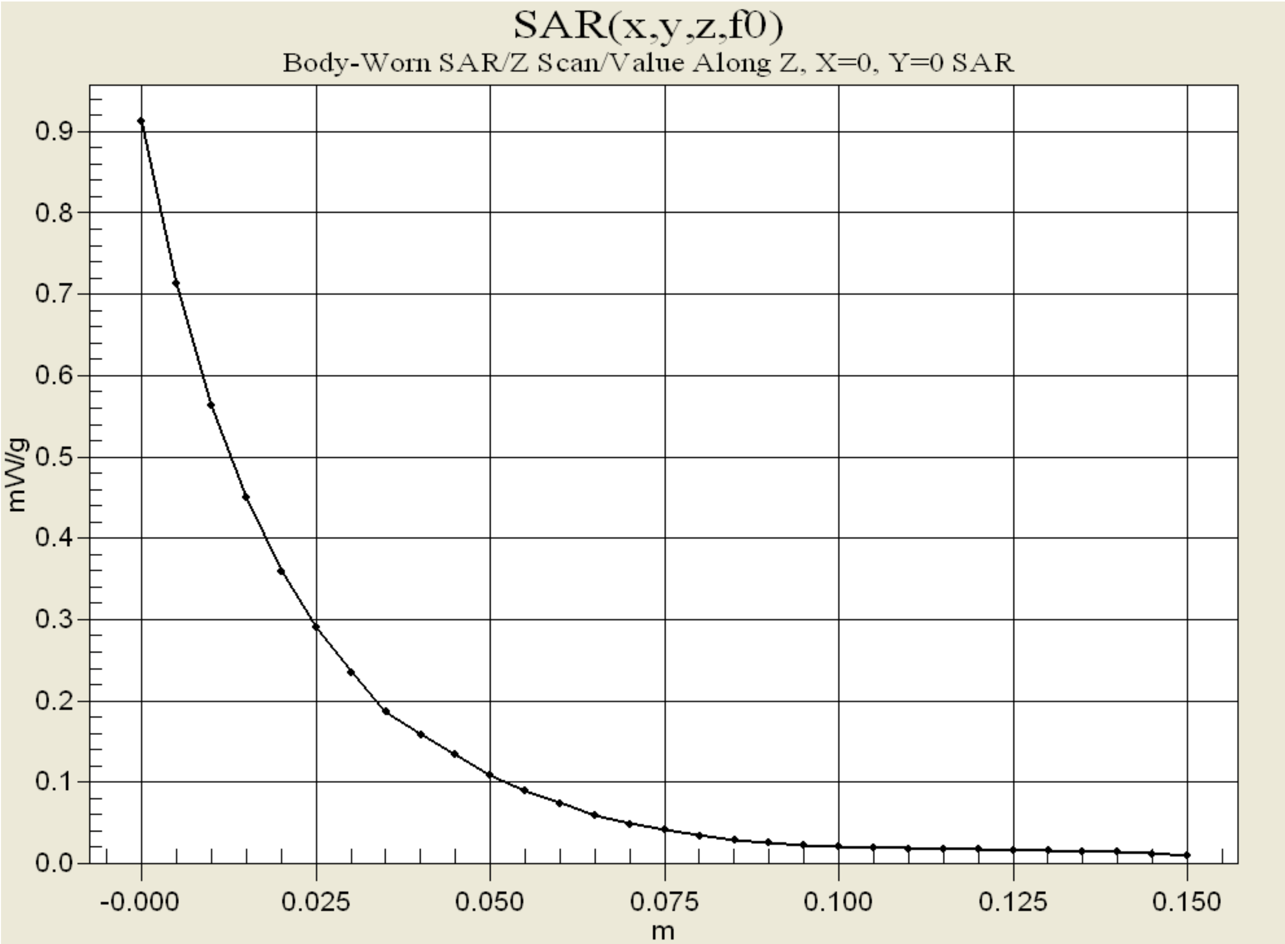
7.5V NiMH Battery Pack
Communication System: FM VHF
RF Output Power: 5.56 W (Conducted)
Frequency: 163.050 MHz; Duty Cycle: 1:1
Medium: M150 (σ = 0.77 mho/m, ε_r = 62.4, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(8.8, 8.8, 8.8); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

Body-Worn - 1.3 cm Belt-Clip Separation Distance - Mid Channel/Area Scan (7x22x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 1.3 cm Belt-Clip Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 2.63 W/kg
SAR(1 g) = 1.66 mW/g; SAR(10 g) = 1.19 mW/g
Reference Value = 43.9 V/m
Power Drift = -0.50 dB




SAR(x,y,z,f0)
Body-Worn SAR/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.000
0.025
0.050
0.075
0.100
0.125
0.150
m

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 12/15/03

DUT: Dipole 300 MHz; Model: D300V2; Type: System Performance Check; Serial: 135

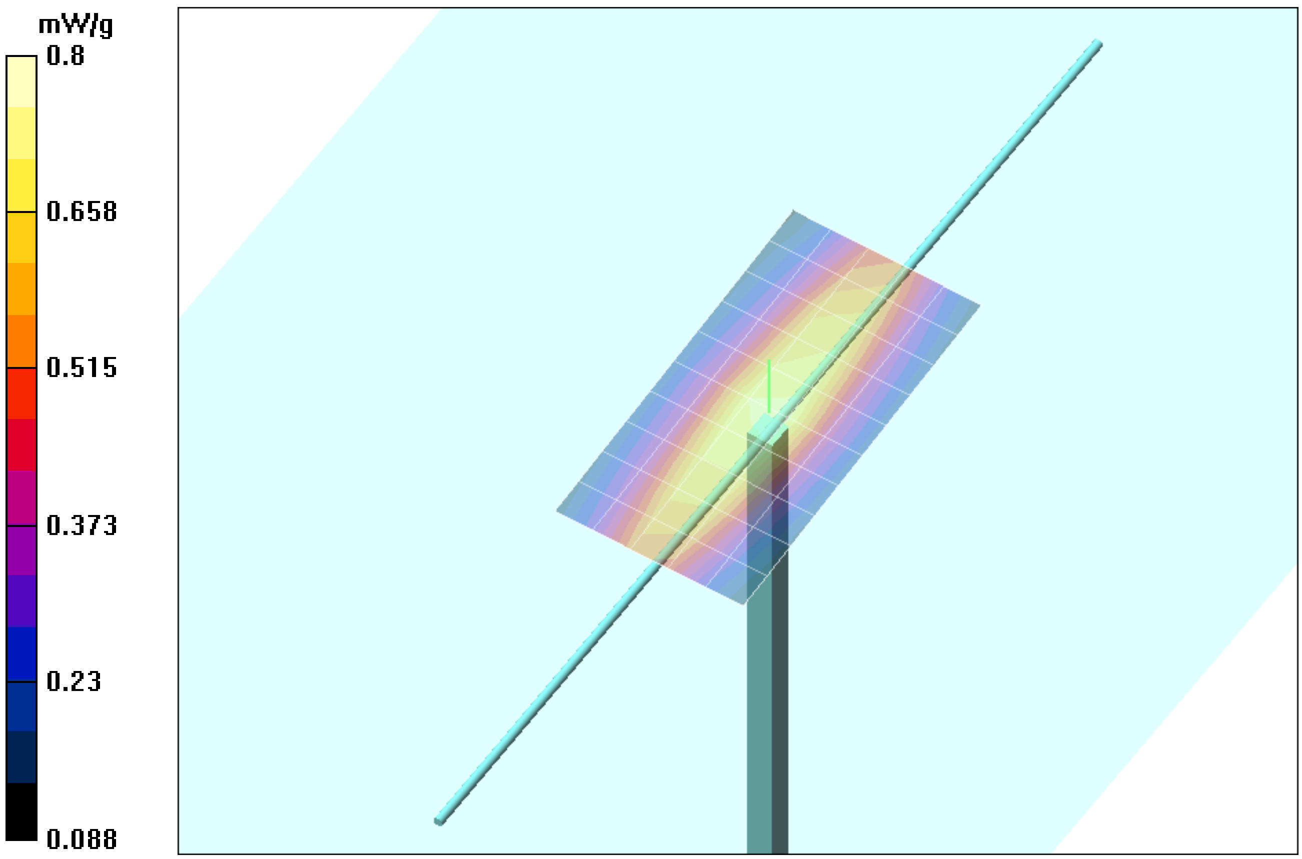
Ambient Temp: 24.2 °C; Fluid Temp: 20.7 °C; Barometric Pressure: 102.5 kPa; Humidity: 67%

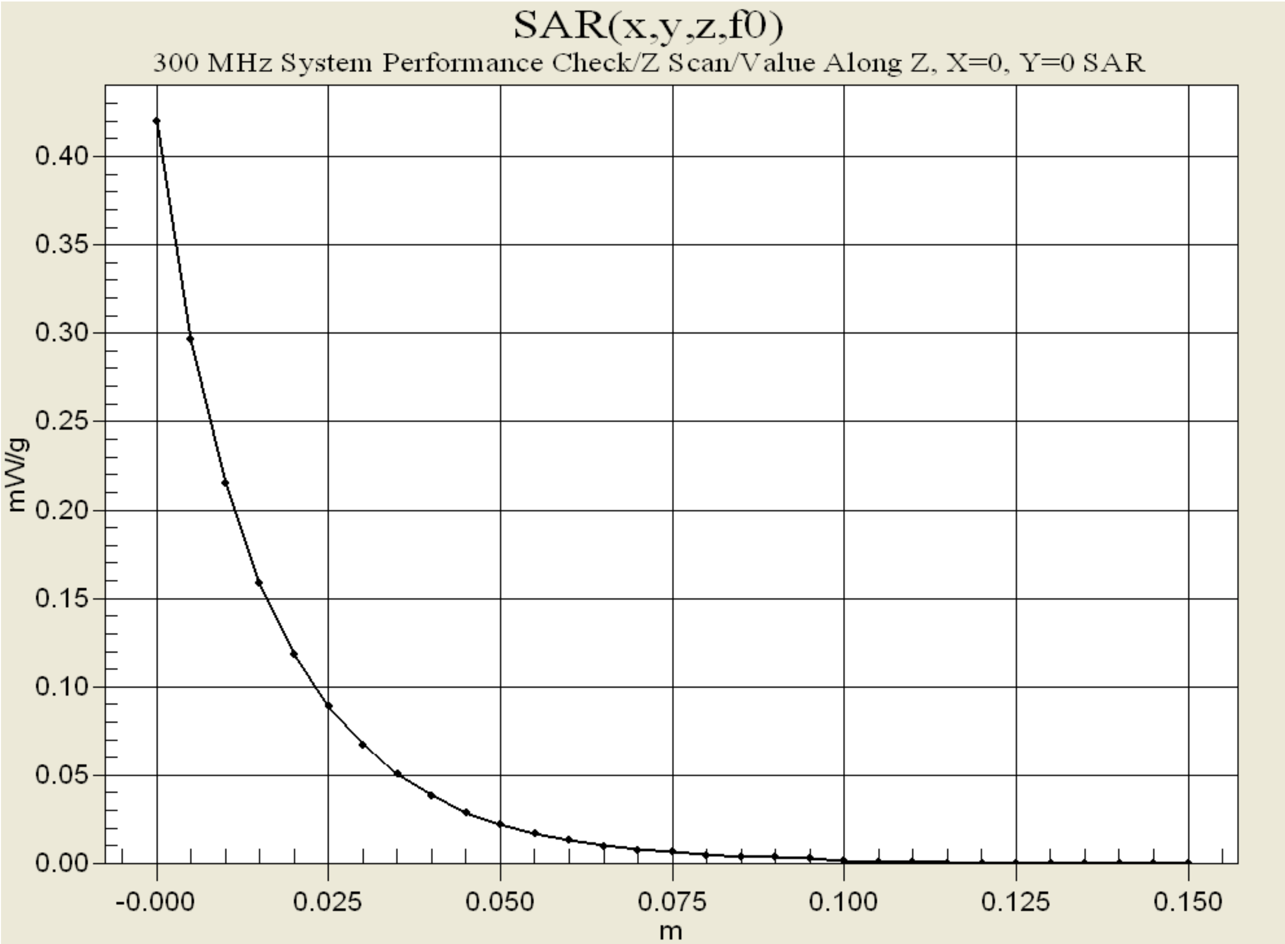
Communication System: CW
Forward Conducted Power: 250mW
Frequency: 300 MHz; Duty Cycle: 1:1
Medium: 300 HSL (σ = 0.84 mho/m, ε_r = 44.5, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(7.9, 7.9, 7.9); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: Validation Planar; Type: Plexiglas; Serial: 137
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

300 MHz System Performance Check/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

300 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.770 mW/g; SAR(10 g) = 0.492 mW/g
Reference Value = 30.9 V/m
Power Drift = -0.07 dB




SAR(x,y,z,f0)
300 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-0.000
0.025
0.050
0.075
0.100
0.125
0.150
m

APPENDIX C - SYSTEM VALIDATION

Celltech
Testing and Engineering Services Lab

300MHz SYSTEM VALIDATION DIPOLE

Type:	**300MHz Validation Dipole**
Serial Number:	**135**
Place of Calibration:	**Celltech Labs Inc.**
Date of Calibration:	**October 30, 2003**

Celltech Labs Inc. hereby certifies that this device has been calibrated on the date indicated above.

Calibrated by: Spencer Watson

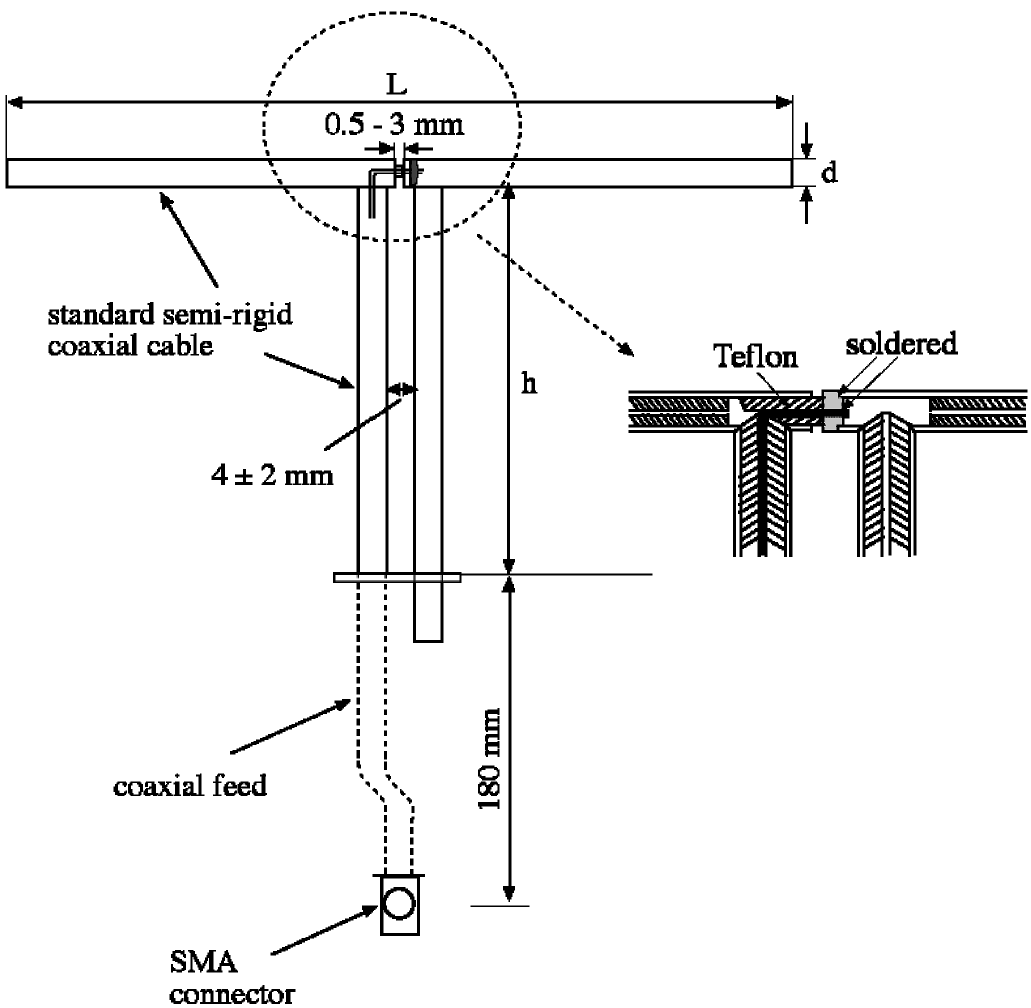
Approved by: Russell W. Pipe

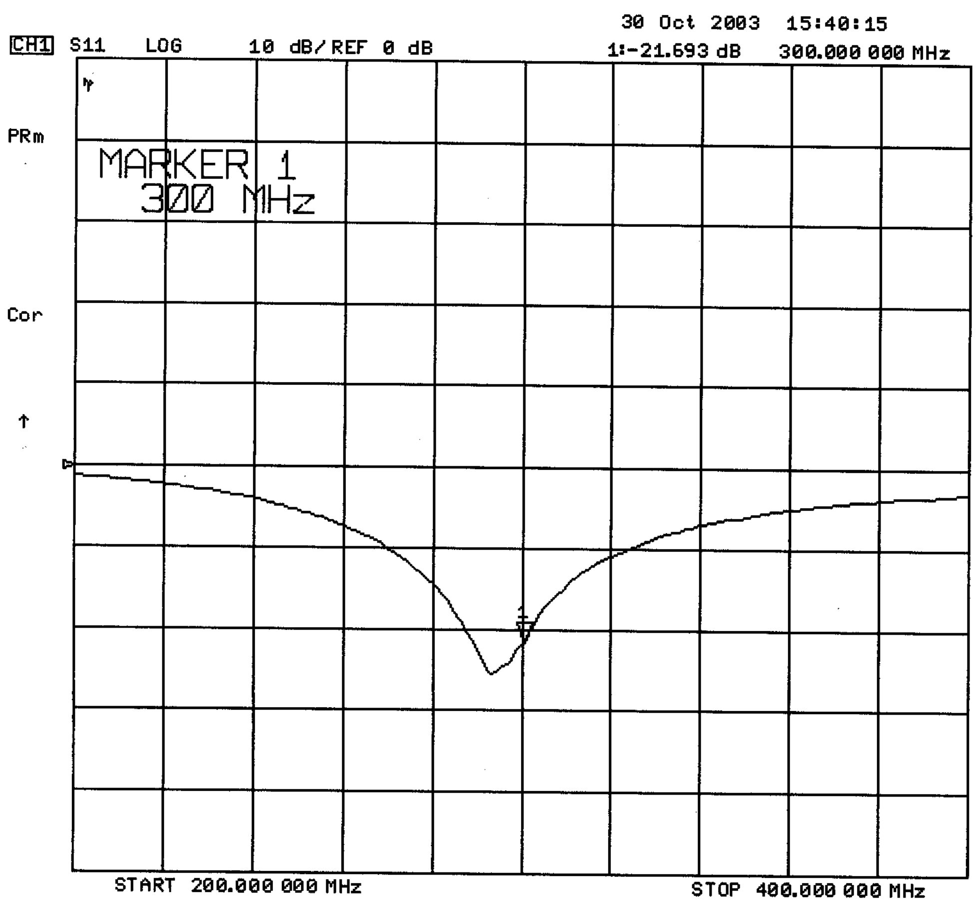
Celltech Labs Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-448-7047 • Fax. 250-448-7046 • e-mail: info@celltechlabs.com
www.celltechlabs.com

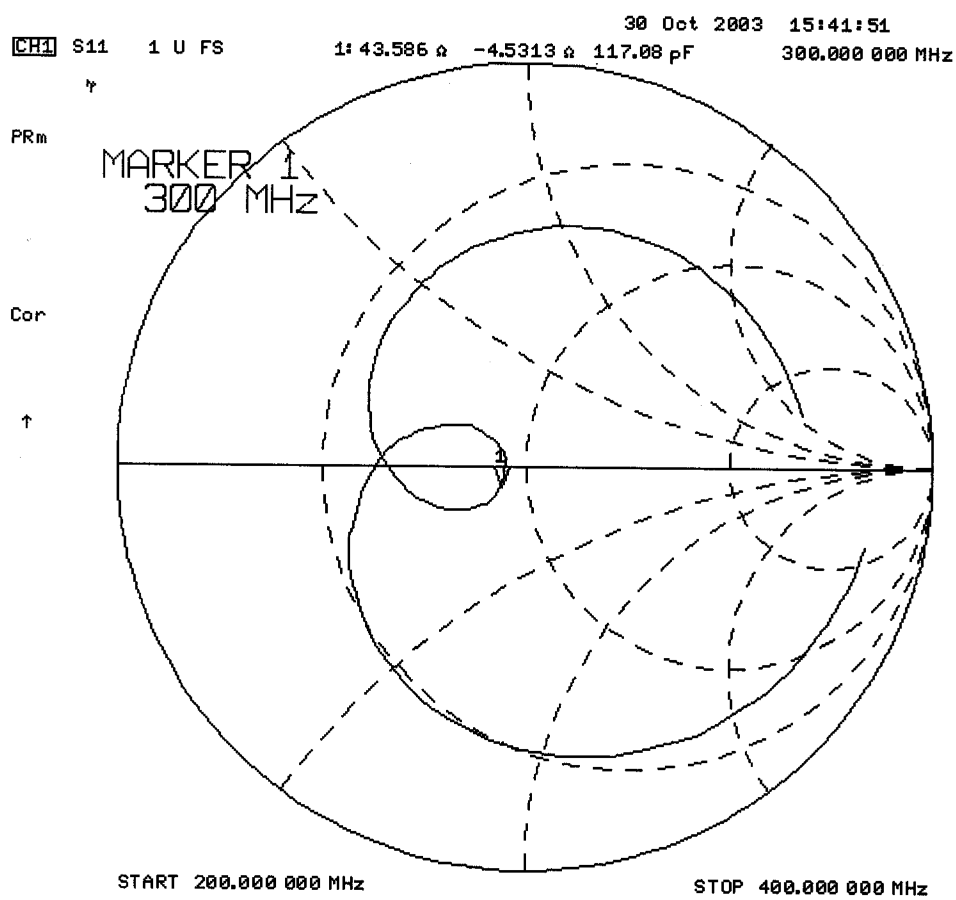
1. Validation Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Std. "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". The electrical properties were measured using an HP 8753E Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 15.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

Feed point impedance at 300MHz	Re{Z} = 43.586Ω
	Im{Z} = -4.5313Ω
Return Loss at 300MHz	-21.693dB




30 Oct 2003 15:40:15
CH1 S11 LOG 10 dB/ REF 0 dB
1:-21.693 dB 300.000 000 MHz
PRm
Cor
MARKER 1
300 MHz
START 200.000 000 MHz
STOP 400.000 000 MHz



30 Oct 2003 15:41:51
CH1 S11 1 U FS
1: 43.586 Ω -4.5313 Ω 117.08 pF
300.000 000 MHz
PRm
Cor
MARKER 1
300 MHz
START 200.000 000 MHz
STOP 400.000 000 MHz

2. Validation Dipole Dimensions

Frequency (MHz)	L (mm)	H (mm)	D (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

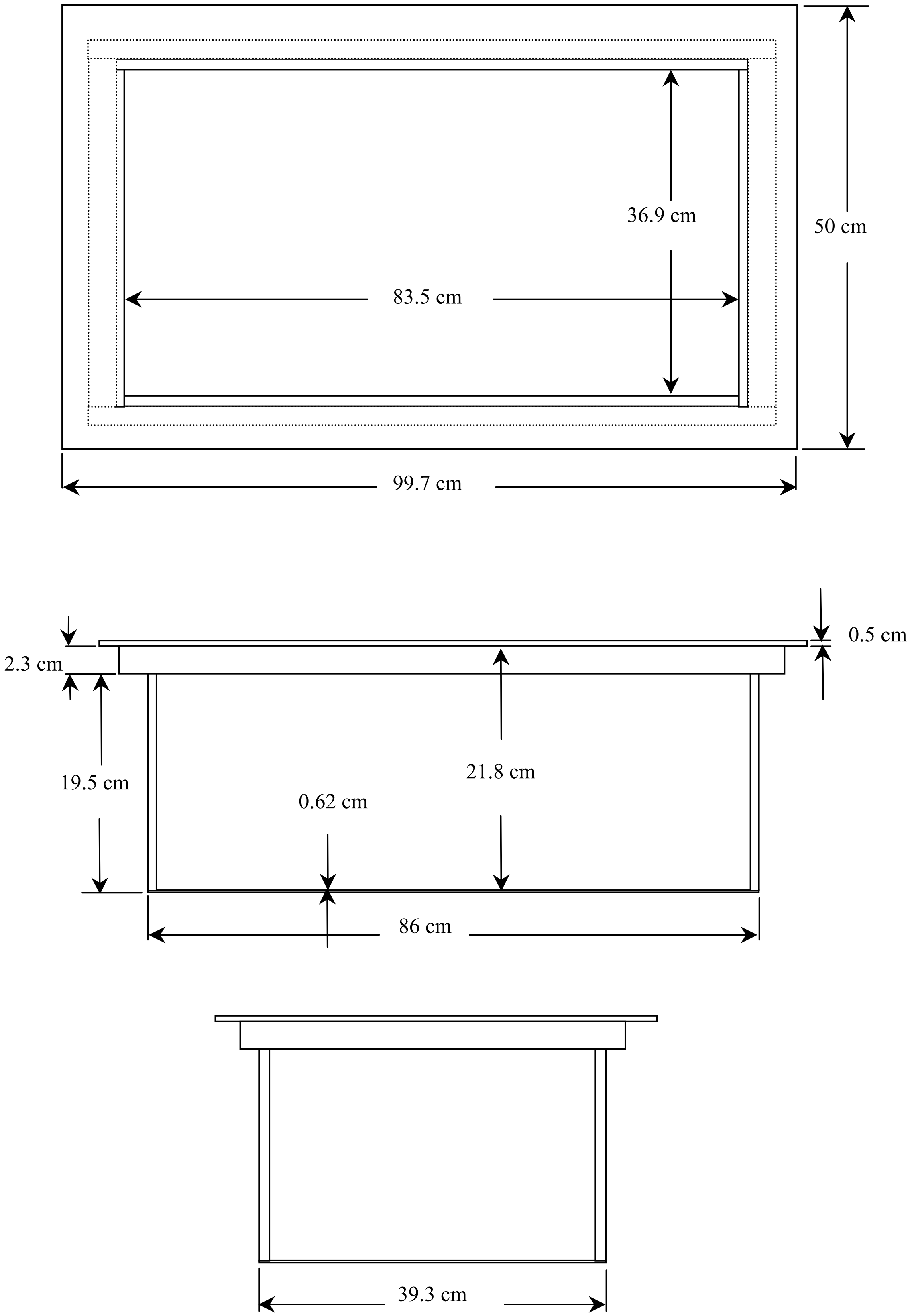
3. Validation Phantom

The validation phantom was constructed using relatively low-loss tangent Plexiglas material. The inner dimensions of the phantom are as follows:

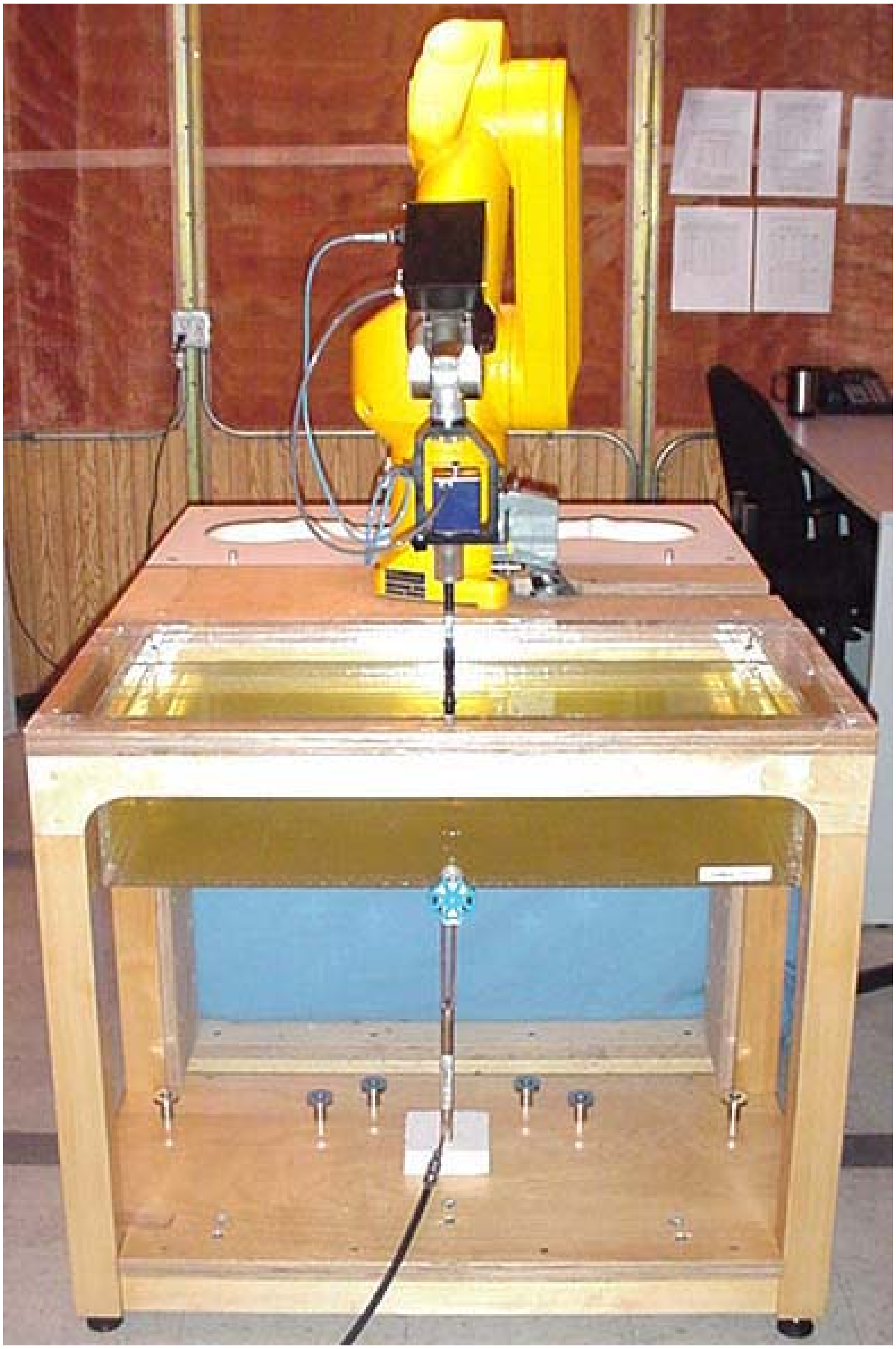
Length: 83.5 cm
Width: 36.9 cm
Height: 21.8 cm

The bottom section of the validation phantom is constructed of 6.2 ± 0.1mm Plexiglas.

4. Dimensions of Plexiglas Planar Phantom



5. 300MHz System Validation Setup



300MHz System Validation Setup

6. Measurement Conditions

The planar phantom was filled with simulated brain tissue having the following parameters at 300MHz:

Relative Permittivity:	45.7
Conductivity:	0.88 mho/m
Fluid Temperature:	22.2°C
Fluid Depth:	≥ 15cm

Environmental Conditions:

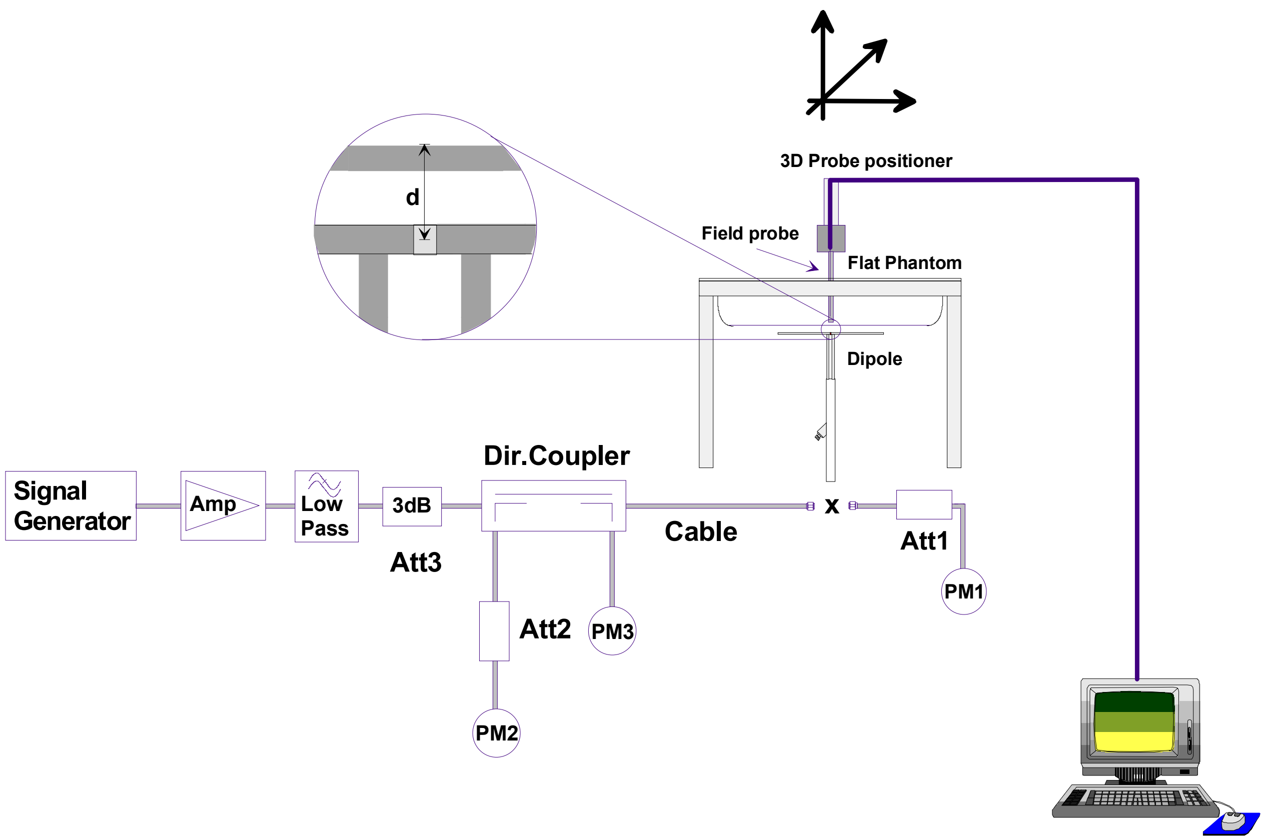
Ambient Temperature:	22.1°C
Humidity:	56%
Barometric Pressure:	103.4 kPa

The 300MHz simulated tissue mixture consists of the following ingredients:

Ingredient	Percentage by weight
Water	37.56%
Sugar	55.32%
Salt	5.95%
HEC	0.98%
Dowicil 75	0.19%
300MHz Target Dielectric Parameters at 22°C	ε_r = 45.3 σ = 0.87 S/m

7. SAR Measurement

The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the following procedures.



First the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 20dB below the forward power.

8. Validation Dipole SAR Test Results

Ten SAR measurements were performed in order to achieve repeatability and to establish an average target value.

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	0.781	3.12	0.497	1.99	1.39
Test 2	0.779	3.12	0.495	1.98	1.39
Test 3	0.780	3.12	0.496	1.98	1.38
Test 4	0.788	3.15	0.501	2.00	1.41
Test 5	0.787	3.15	0.498	1.99	1.39
Test 6	0.780	3.12	0.492	1.97	1.38
Test 7	0.776	3.10	0.494	1.98	1.37
Test 8	0.784	3.14	0.500	2.00	1.39
Test 9	0.785	3.14	0. 500	2.00	1.39
Test 10	0.784	3.14	0.496	1.98	1.40
Average Value	0.782	3.13	0.497	1.99	1.39

The results have been normalized to 1W (forward power) into the dipole.

IEEE Target over $1cm^3$ (1g) of tissue: 0.750 mW/g (+/- 10%)

Averaged over $1cm^3$ (1g) of tissue: 3.13 mW/g

Averaged over $10cm^3$ (10g) of tissue: 1.99 mW/g

Test Date: 10/30/03

DUT: Dipole 300 MHz; Model: D300V2; Type: System Validation; Serial: 135

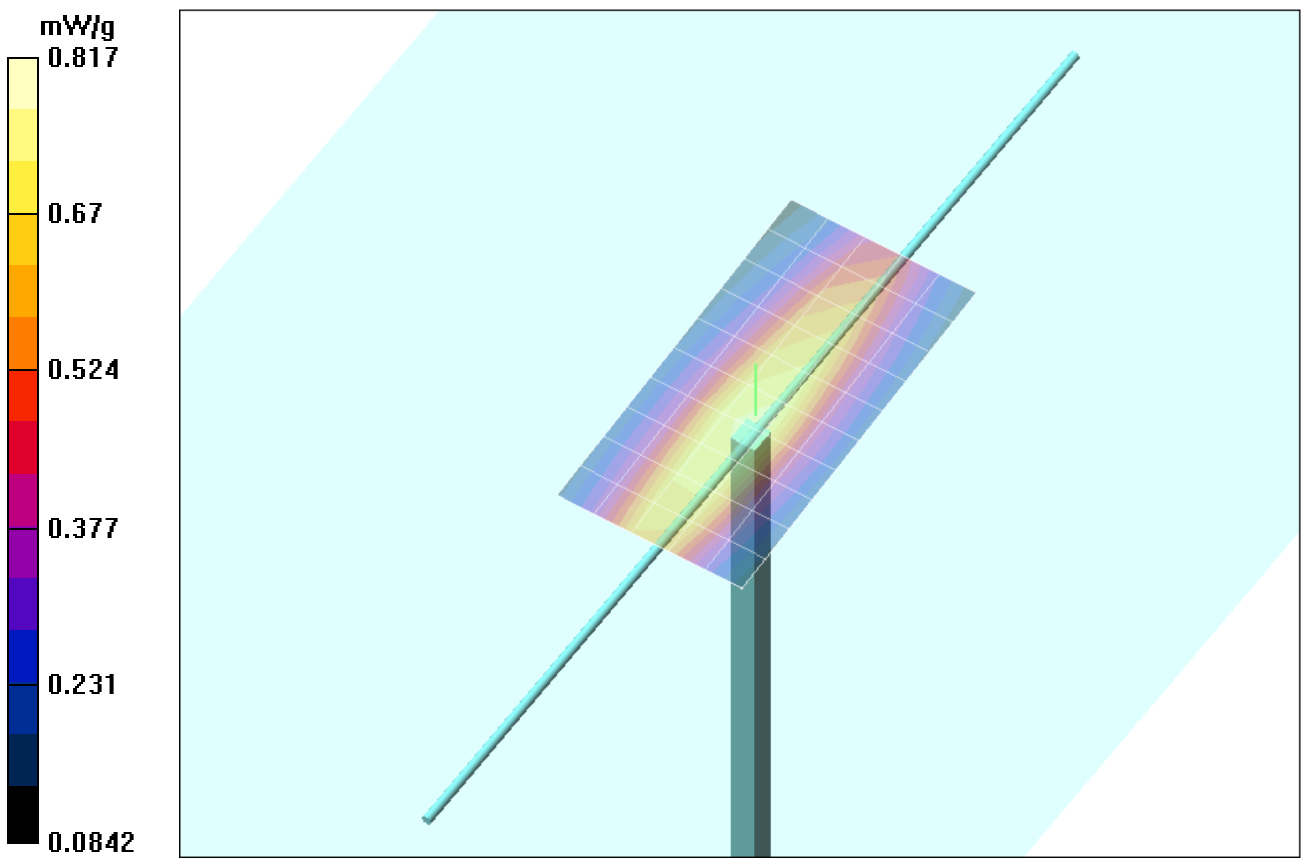
Ambient Temp: 22.1°C; Fluid Temp: 22.2°C; Barometric Pressure: 103.4 kPa; Humidity: 56%

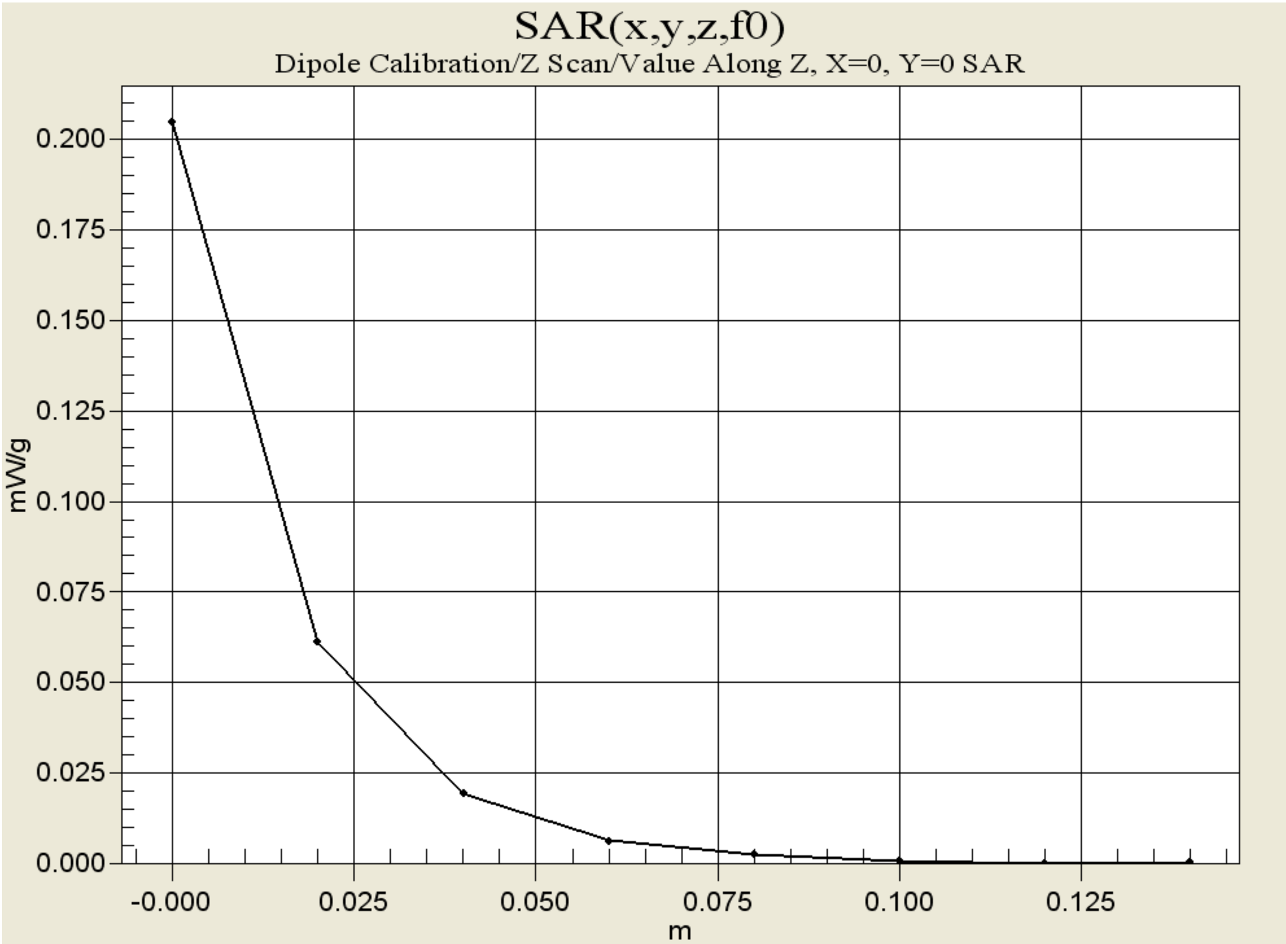
Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 300 MHz; Duty Cycle: 1:1
Medium: 300 HSL (σ = 0.88 mho/m, ε_r = 45.7, ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(7.9, 7.9, 7.9); Calibrated: 26/02/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 19/05/2003
- Phantom: Validation Planar; Type: Plexiglas; Serial: 137
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

300 MHz Validation/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 30.4 V/m
Power Drift = -0.1 dB

300 MHz Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.781 mW/g; SAR(10 g) = 0.497 mW/g
Reference Value = 30.4 V/m
Power Drift = -0.1 dB




SAR(x,y,z,f0)
Dipole Calibration/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
-0.000
0.025
0.050
0.075
0.100
0.125
m

300MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

October 30, 2003

Frequency	e'	e"
200.000000 MHz	49.8336	71.7361
210.000000 MHz	49.2398	69.1403
220.000000 MHz	48.9026	66.6656
230.000000 MHz	48.4363	64.3972
240.000000 MHz	47.9018	62.2373
250.000000 MHz	47.4646	60.4416
260.000000 MHz	47.0839	58.8112
270.000000 MHz	46.6772	57.3352
280.000000 MHz	46.4143	55.8759
290.000000 MHz	46.0204	54.5734
300.000000 MHz	45.6863	52.9882
310.000000 MHz	45.3261	51.7924
320.000000 MHz	44.9882	50.6430
330.000000 MHz	44.6549	49.5121
340.000000 MHz	44.3168	48.5356
350.000000 MHz	44.0824	47.5910
360.000000 MHz	43.7780	46.7661
370.000000 MHz	43.5461	45.8627
380.000000 MHz	43.3671	45.0444
390.000000 MHz	43.1052	44.2129
400.000000 MHz	42.8360	43.5735

APPENDIX D - PROBE CALIBRATION

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

Client Celltech Labs

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1387
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	February 26, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	8-Mar-02	Mar-03
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	N. Vetterli
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: February 26, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Probe ET3DV6

SN:1387

Manufactured:	September 21, 1999
Last calibration:	February 22, 2002
Recalibrated:	February 26, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1387

Sensitivity in Free Space

NormX	**1.55**	$\mu V/(V/m)^2$
NormY	**1.65**	$\mu V/(V/m)^2$
NormZ	**1.64**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**92**	mV
DCP Y	**92**	mV
DCP Z	**92**	mV

Sensitivity in Tissue Simulating Liquid

Head 900 MHz ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**
Head 835 MHz ε_r **= 41.5 ± 5%** σ **= 0.90 ± 5% mho/m**

ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.37**
ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.61**

Head 1800 MHz ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**
Head 1900 MHz ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

ConvF X	**5.2**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.2**	± 9.5% (k=2)	Alpha	**0.50**
ConvF Z	**5.2**	± 9.5% (k=2)	Depth	**2.73**

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	10.2	5.9
SAR_{be} [%]	With Correction Algorithm	0.4	0.6

Head 1800 MHz Typical SAR gradient: 10 % per mm

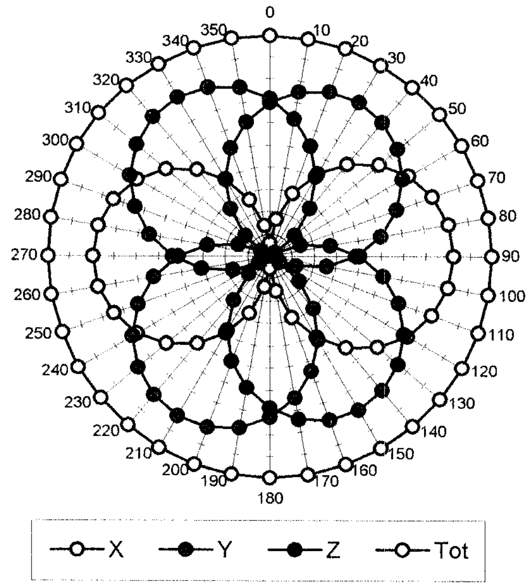
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.6	9.8
SAR_{be} [%]	With Correction Algorithm	0.2	0.0

Sensor Offset

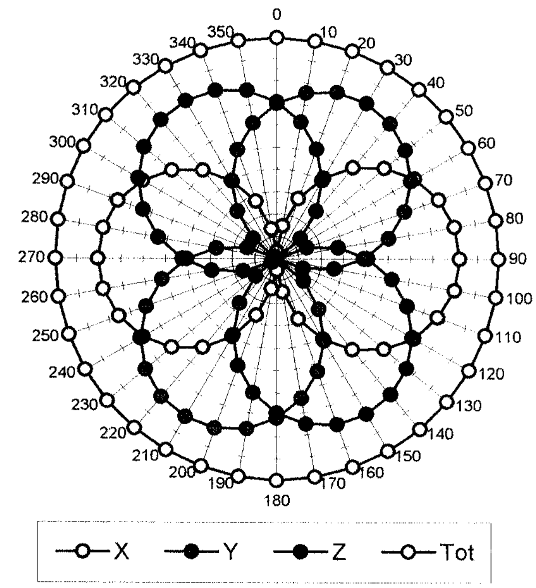
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

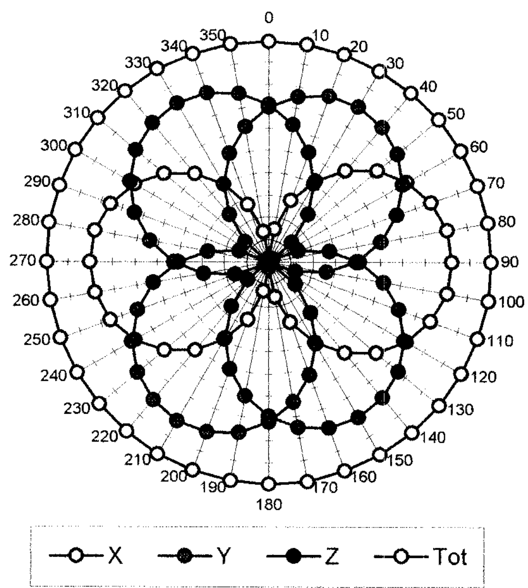
f = 30 MHz, TEM cell ifi110



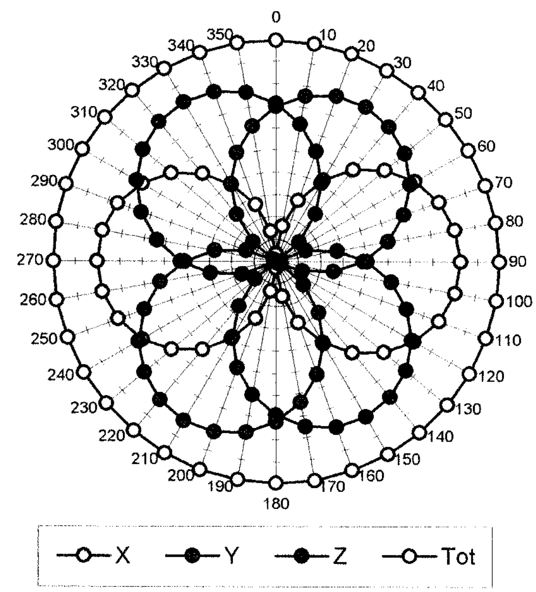
f = 100 MHz, TEM cell ifi110

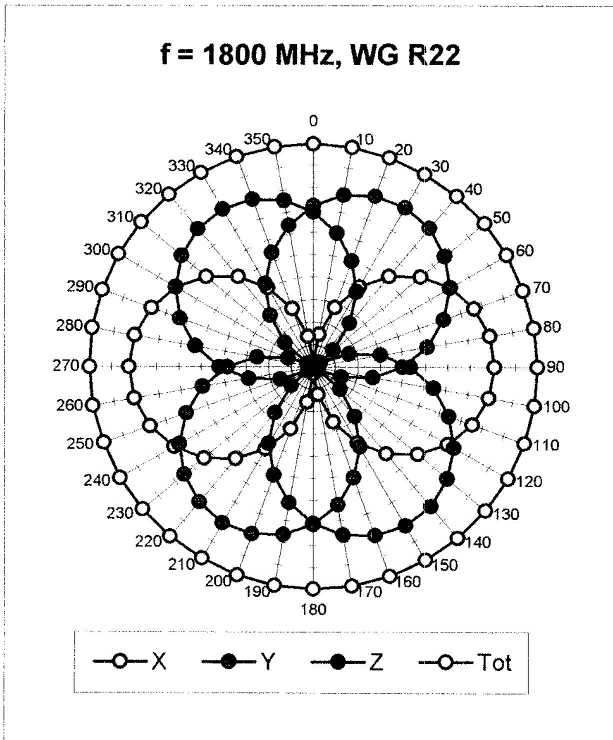


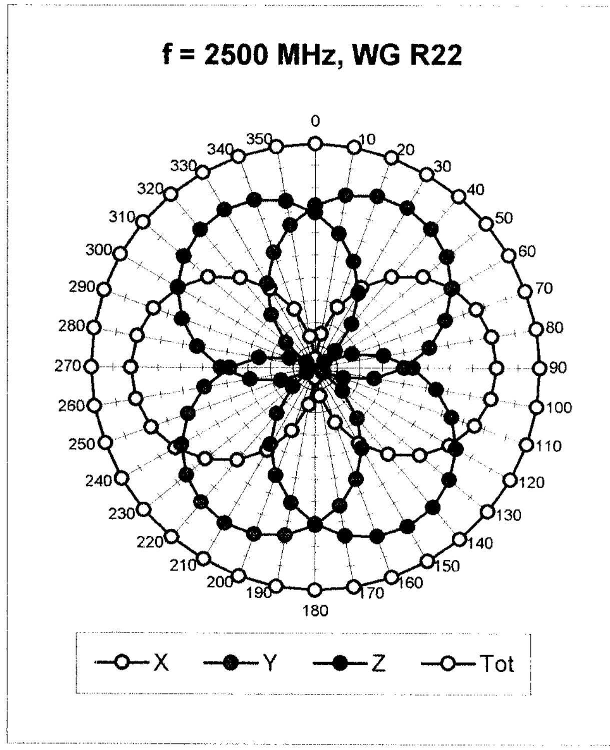
f = 300 MHz, TEM cell ifi110



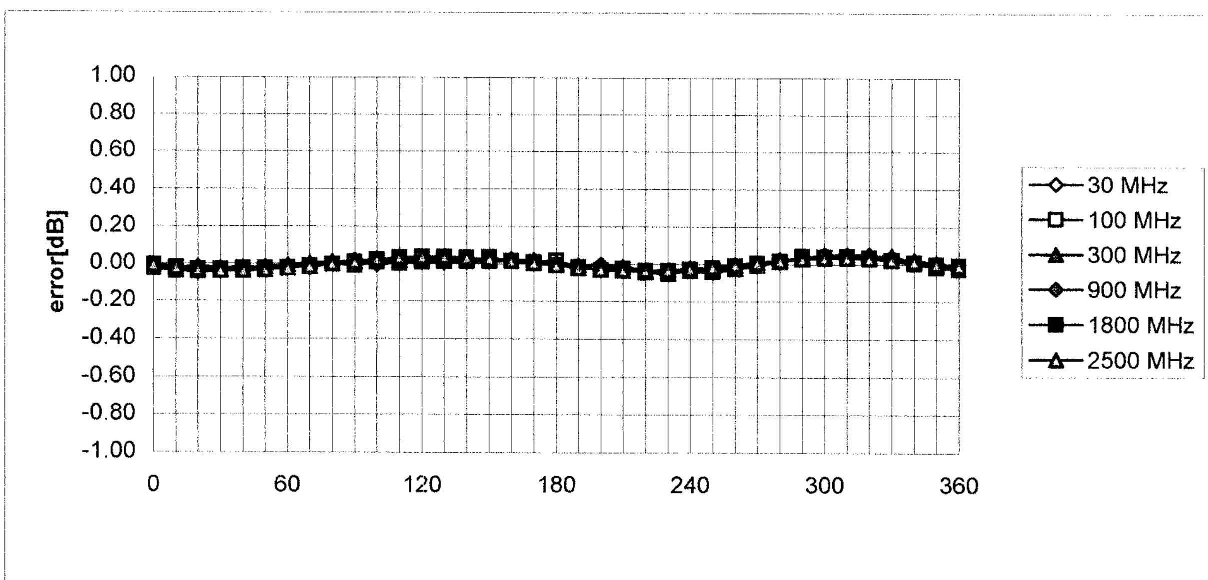
f = 900 MHz, TEM cell ifi110





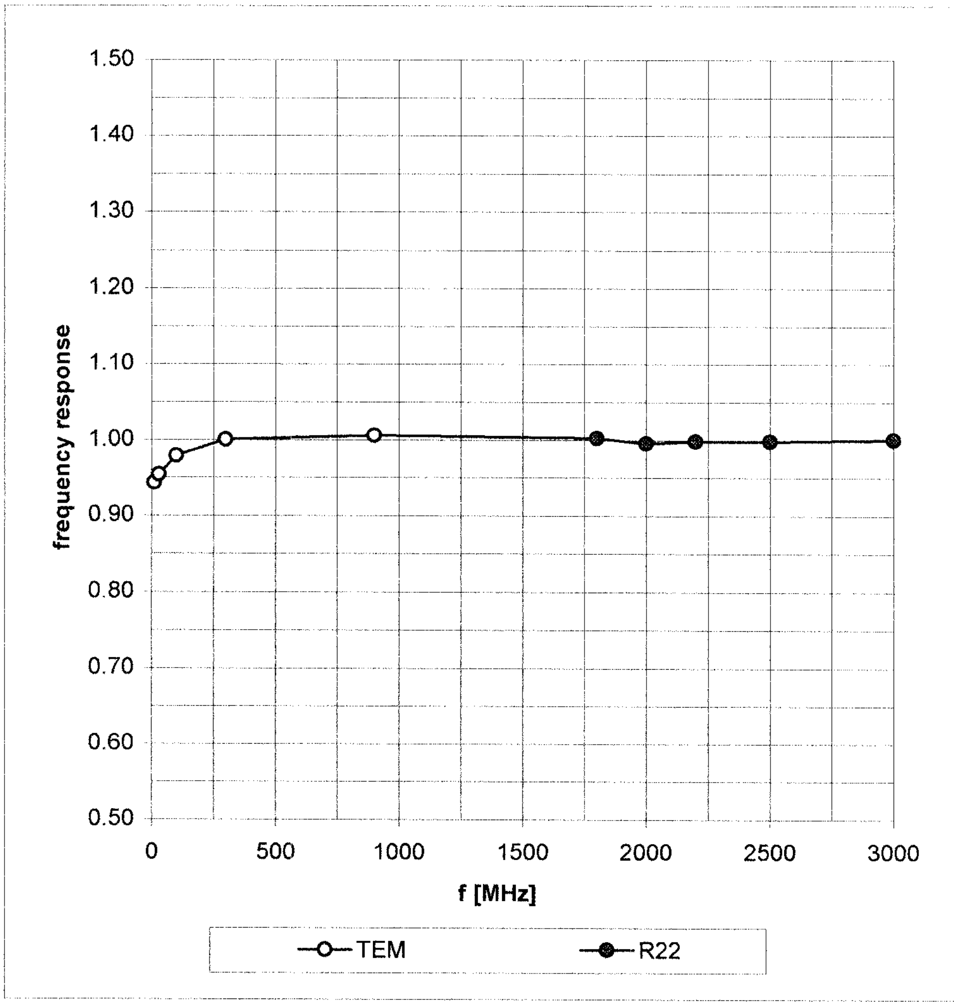


Isotropy Error (φ), θ = 0°



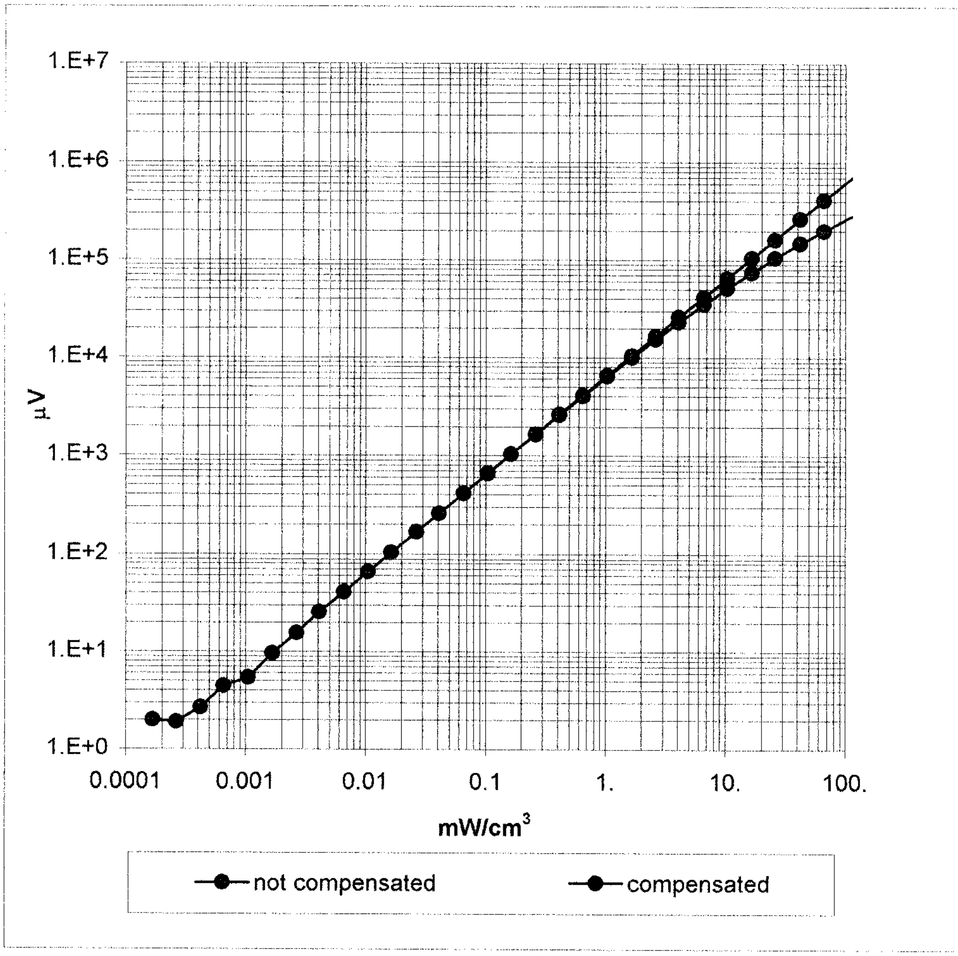
Frequency Response of E-Field

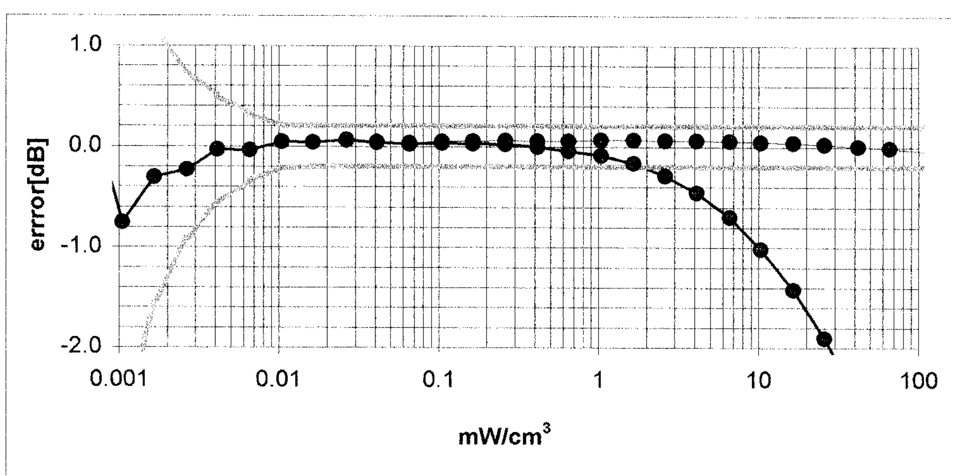
(TEM-Cell:ifi110, Waveguide R22)



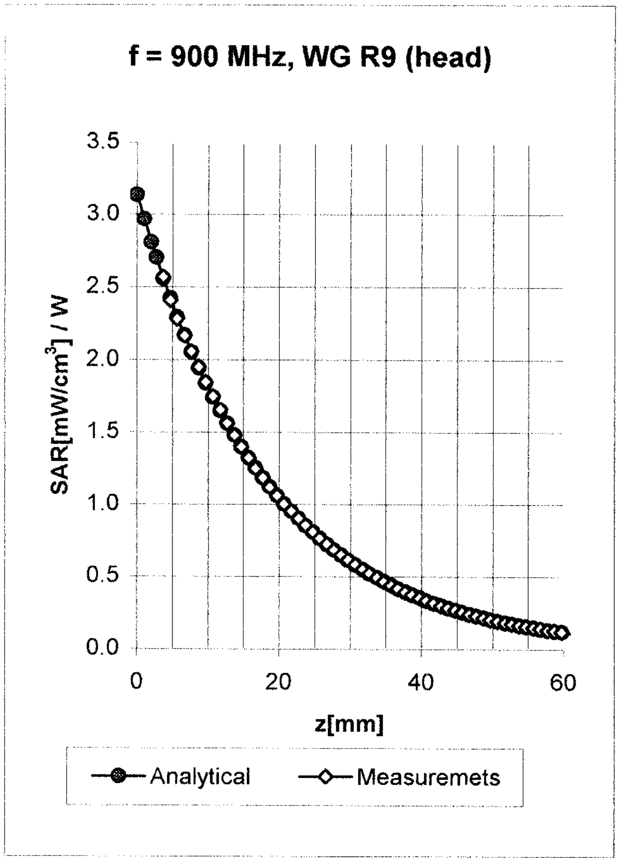
Dynamic Range f(SAR_{brain})

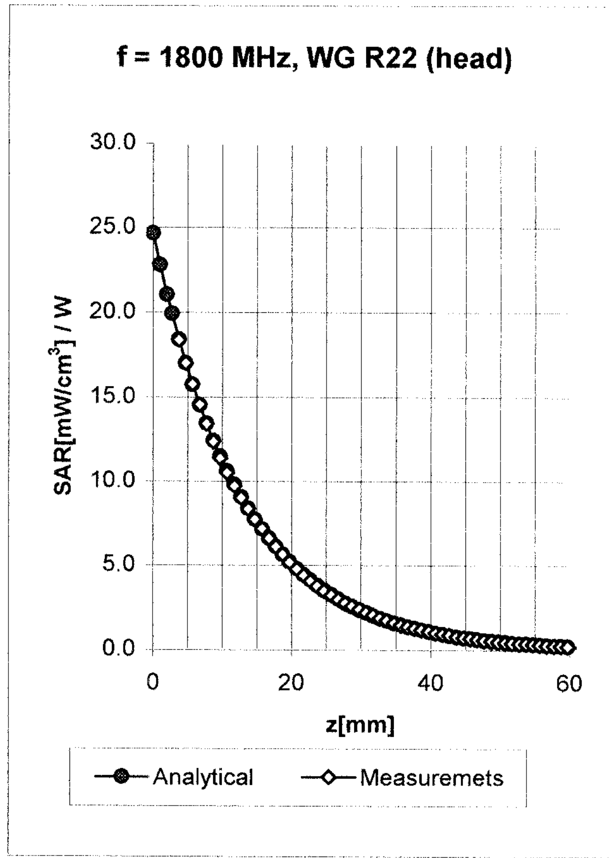
(Waveguide R22)





Conversion Factor Assessment

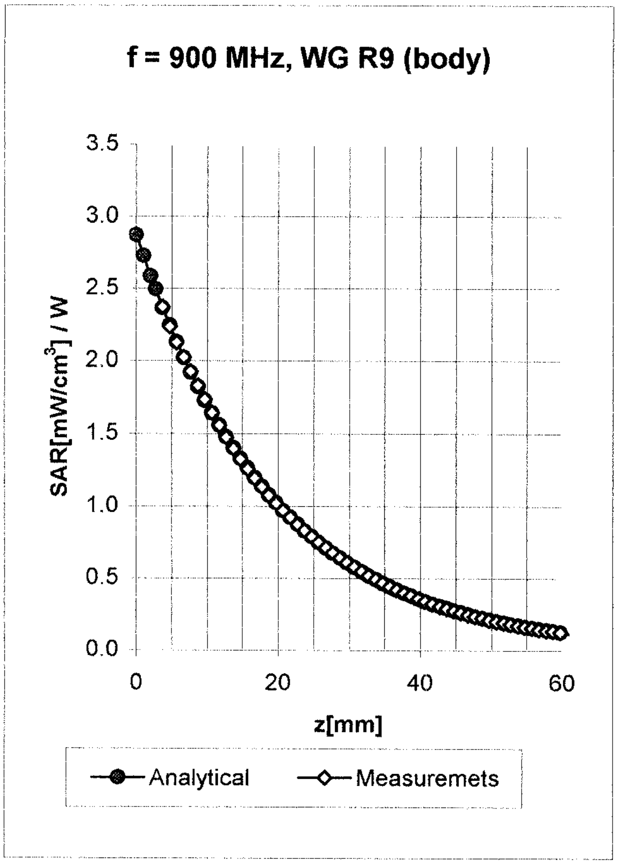


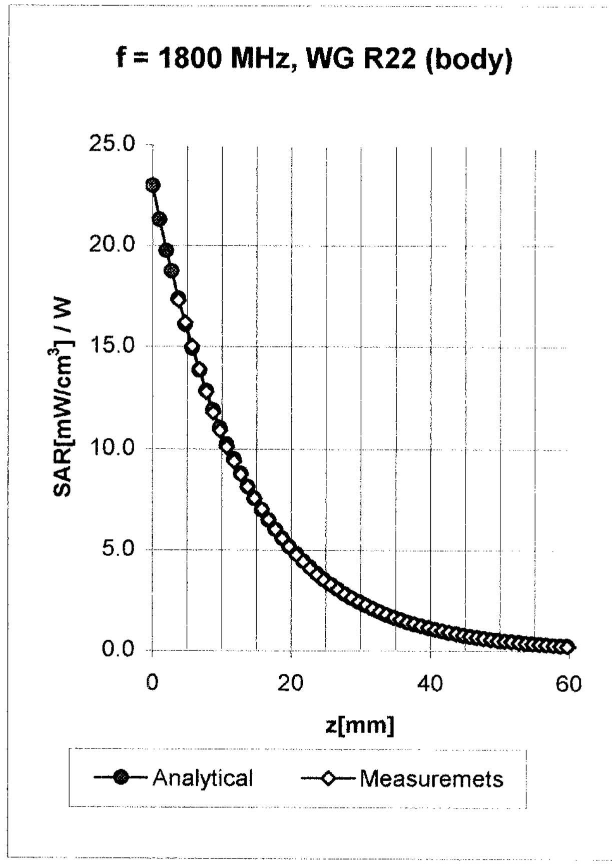


Head	**900 MHz**		ε_r **= 41.5 ± 5%**	σ **= 0.97 ± 5% mho/m**	
Head	**835 MHz**		ε_r **= 41.5 ± 5%**	σ **= 0.90 ± 5% mho/m**	
	ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.37**
	ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.61**

Head	**1800 MHz**		ε_r **= 40.0 ± 5%**	σ **= 1.40 ± 5% mho/m**	
Head	**1900 MHz**		ε_r **= 40.0 ± 5%**	σ **= 1.40 ± 5% mho/m**	
	ConvF X	**5.2**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.2**	± 9.5% (k=2)	Alpha	**0.50**
	ConvF Z	**5.2**	± 9.5% (k=2)	Depth	**2.73**

Conversion Factor Assessment

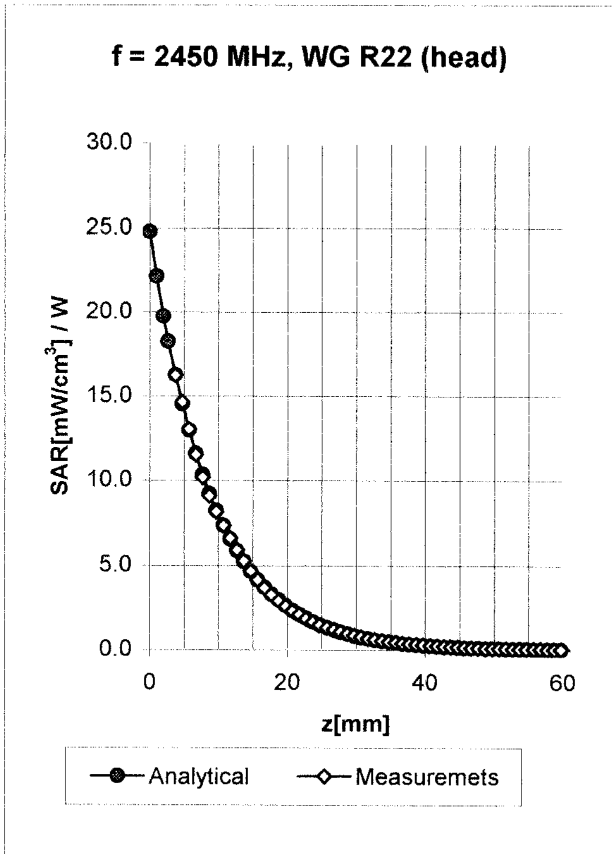


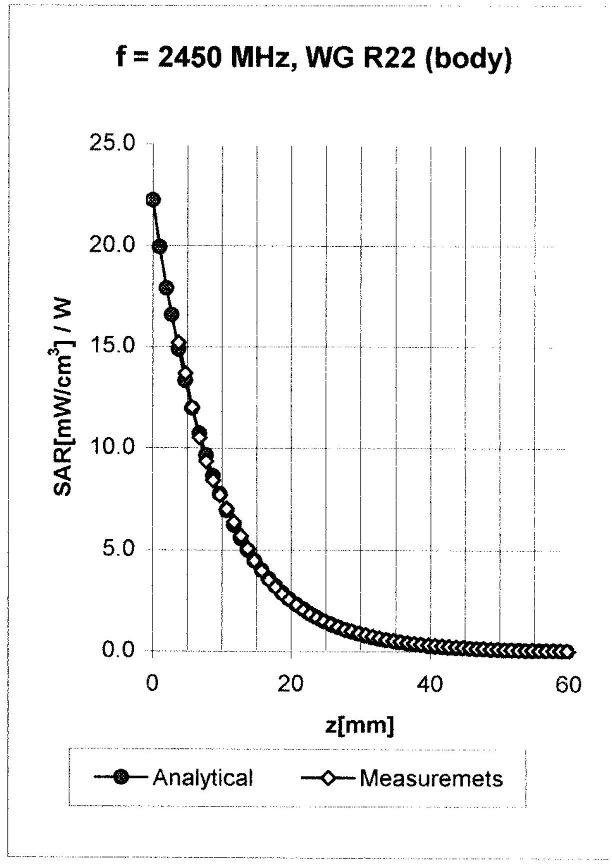


Body	**900 MHz**		ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**	
Body	**835 MHz**		ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**	
	ConvF X	**6.4**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.4**	± 9.5% (k=2)	Alpha	**0.45**
	ConvF Z	**6.4**	± 9.5% (k=2)	Depth	**2.35**

Body	**1800 MHz**		ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**	
Body	**1900 MHz**		ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**	
	ConvF X	**4.9**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**4.9**	± 9.5% (k=2)	Alpha	**0.60**
	ConvF Z	**4.9**	± 9.5% (k=2)	Depth	**2.59**

Conversion Factor Assessment





Head	**2450**	**MHz**	ε_r **= 39.2 ± 5%**	σ **= 1.80 ± 5% mho/m**

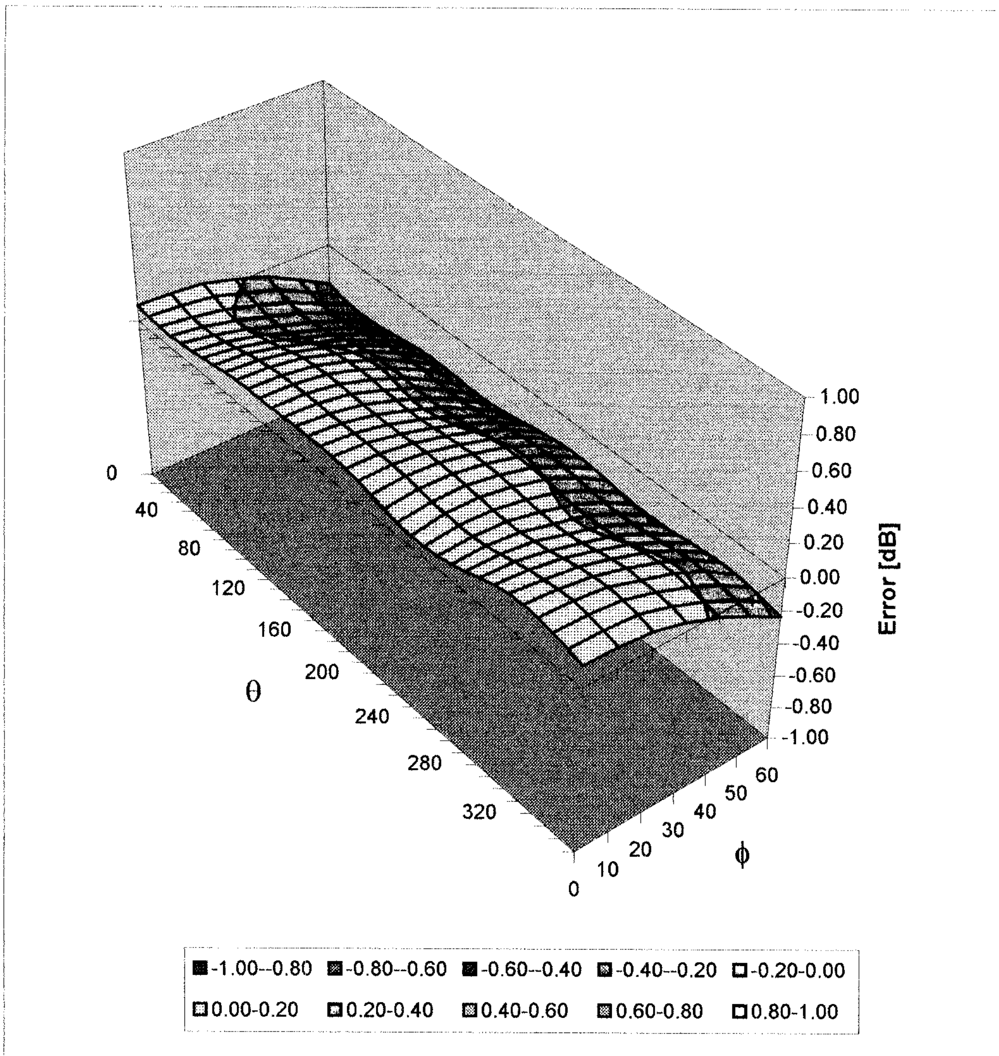
ConvF X	**5.0** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**5.0** ± 8.9% (k=2)	Alpha	**1.04**
ConvF Z	**5.0** ± 8.9% (k=2)	Depth	**1.85**

Body	**2450**	**MHz**	ε_r **= 52.7 ± 5%**	σ **= 1.95 ± 5% mho/m**

ConvF X	**4.6** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.6** ± 8.9% (k=2)	Alpha	**1.20**
ConvF Z	**4.6** ± 8.9% (k=2)	Depth	**1.60**

Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



Schmid & Partner
Engineering AG

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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Assessment:	**Zurich**
Date of Assessment:	**February 28, 2003**
Probe Calibration Date:	**February 26, 2003**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Dosimetric E-Field Probe ET3DV6 SN:1387

Conversion factor (± standard deviation)

150 MHz	ConvF	**9.1 ± 8%**	ε_r = **52.3** **σ = 0.76 mho/m** (head tissue)
300 MHz	ConvF	**7.9 ± 8%**	ε_r = **45.3** **σ = 0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.5 ± 8%**	ε_r = **43.5** **σ = 0.87 mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	ε_r = **61.9** **σ = 0.80 mho/m** (body tissue)
300 MHz	ConvF	**8.0 ± 8%**	ε_r = **58.2** **σ = 0.92 mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	ε_r = **56.7** **σ = 0.94 mho/m** (body tissue)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

300 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

December 15, 2003

Frequency	e'	e''
200.000000 MHz	48.7939	67.6593
210.000000 MHz	48.2337	65.2160
220.000000 MHz	47.8623	63.0172
230.000000 MHz	47.4057	60.8365
240.000000 MHz	46.8088	58.9185
250.000000 MHz	46.3837	57.2063
260.000000 MHz	45.8918	55.7120
270.000000 MHz	45.4627	54.4009
280.000000 MHz	45.1917	53.0798
290.000000 MHz	44.7912	51.9057
300.000000 MHz	44.5017	50.5211
310.000000 MHz	44.2251	49.3988
320.000000 MHz	43.8481	48.3184
330.000000 MHz	43.4544	47.2682
340.000000 MHz	43.1331	46.2602
350.000000 MHz	42.9040	45.4074
360.000000 MHz	42.6462	44.4299
370.000000 MHz	42.4121	43.6615
380.000000 MHz	42.2432	42.8919
390.000000 MHz	41.9850	42.1402
400.000000 MHz	41.7914	41.4814

150 MHz DUT Evaluation (Face)

Measured Fluid Dielectric Parameters (Brain)

December 15, 2003

Frequency	e'	e"
50.000000 MHz	69.4880	229.1266
60.000000 MHz	65.5590	193.3289
70.000000 MHz	63.5113	167.5938
80.000000 MHz	61.7031	148.6834
90.000000 MHz	59.8432	133.5274
100.000000 MHz	58.3634	122.2381
110.000000 MHz	57.3853	112.9420
120.000000 MHz	56.1787	104.5951
130.000000 MHz	55.4062	97.9151
140.000000 MHz	54.9496	92.0507
150.000000 MHz	54.2475	87.1407
160.000000 MHz	53.6952	82.5005
170.000000 MHz	53.2530	78.6112
180.000000 MHz	52.9506	75.0485
190.000000 MHz	52.3020	71.6449
200.000000 MHz	51.7945	68.9602
210.000000 MHz	51.1654	66.3054
220.000000 MHz	50.7846	64.0957
230.000000 MHz	50.1373	61.8854
240.000000 MHz	49.6408	59.9330
250.000000 MHz	49.1449	58.2035

150 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

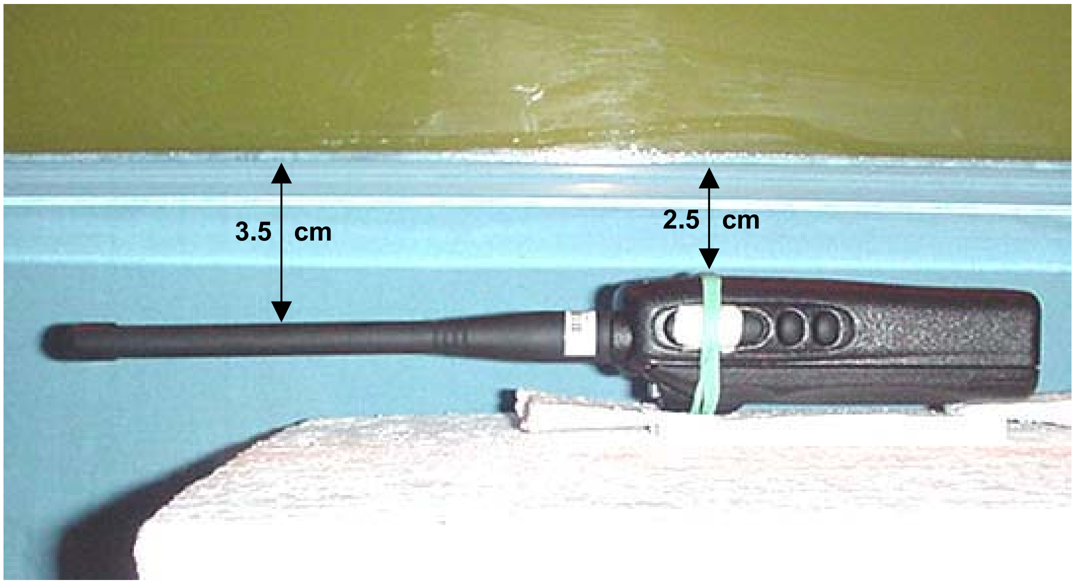
December 15, 2003

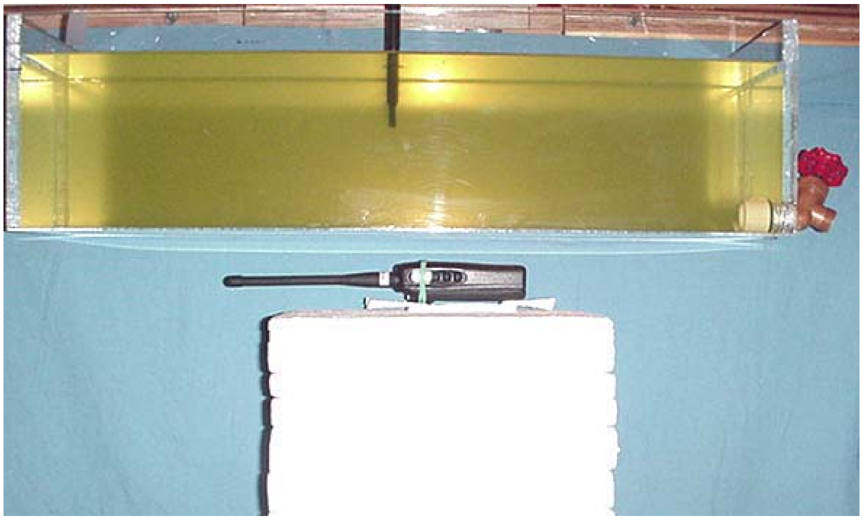
Frequency	e'	e''
50.000000 MHz	73.1891	251.3218
60.000000 MHz	69.9525	210.3738
70.000000 MHz	69.5155	181.3662
80.000000 MHz	67.3137	160.6659
90.000000 MHz	66.2183	143.8822
100.000000 MHz	64.9050	131.2687
110.000000 MHz	64.2497	120.8708
120.000000 MHz	63.3564	111.8666
130.000000 MHz	63.0358	104.4873
140.000000 MHz	62.7436	97.7353
150.000000 MHz	62.3960	91.9829
160.000000 MHz	61.8470	87.0051
170.000000 MHz	61.7143	82.6687
180.000000 MHz	61.3480	78.5008
190.000000 MHz	61.0912	75.0140
200.000000 MHz	60.8228	71.8475
210.000000 MHz	60.3155	69.0381
220.000000 MHz	59.9593	66.7108
230.000000 MHz	59.6135	64.3272
240.000000 MHz	59.1831	62.3209
250.000000 MHz	58.8467	60.3618

APPENDIX F - SAR TEST SETUP & DUT PHOTOGRAPHS

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

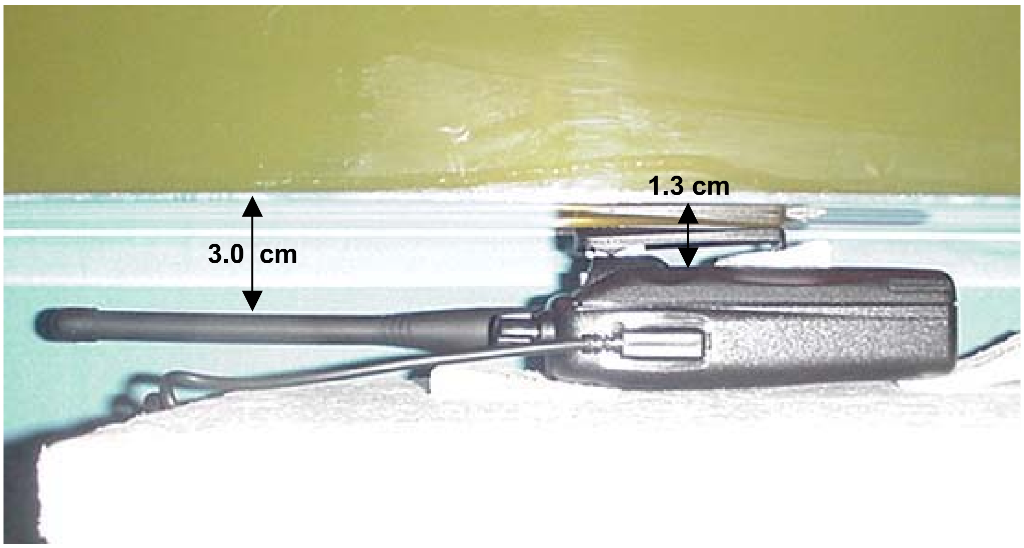
2.5 cm Separation Distance from Front of Radio to Planar Phantom





BODY-WORN SAR TEST SETUP PHOTOGRAPHS

1.3 cm Belt-Clip Separation Distance to Planar Phantom
(with Speaker-Microphone Accessory)



DUT PHOTOGRAPHS

DUT PHOTOGRAPHS

DUT PHOTOGRAPHS

Radio without Battery Pack

NiMH Battery Pack

NiMH Battery Pack

DUT PHOTOGRAPHS

with Speaker-Microphone Accessory